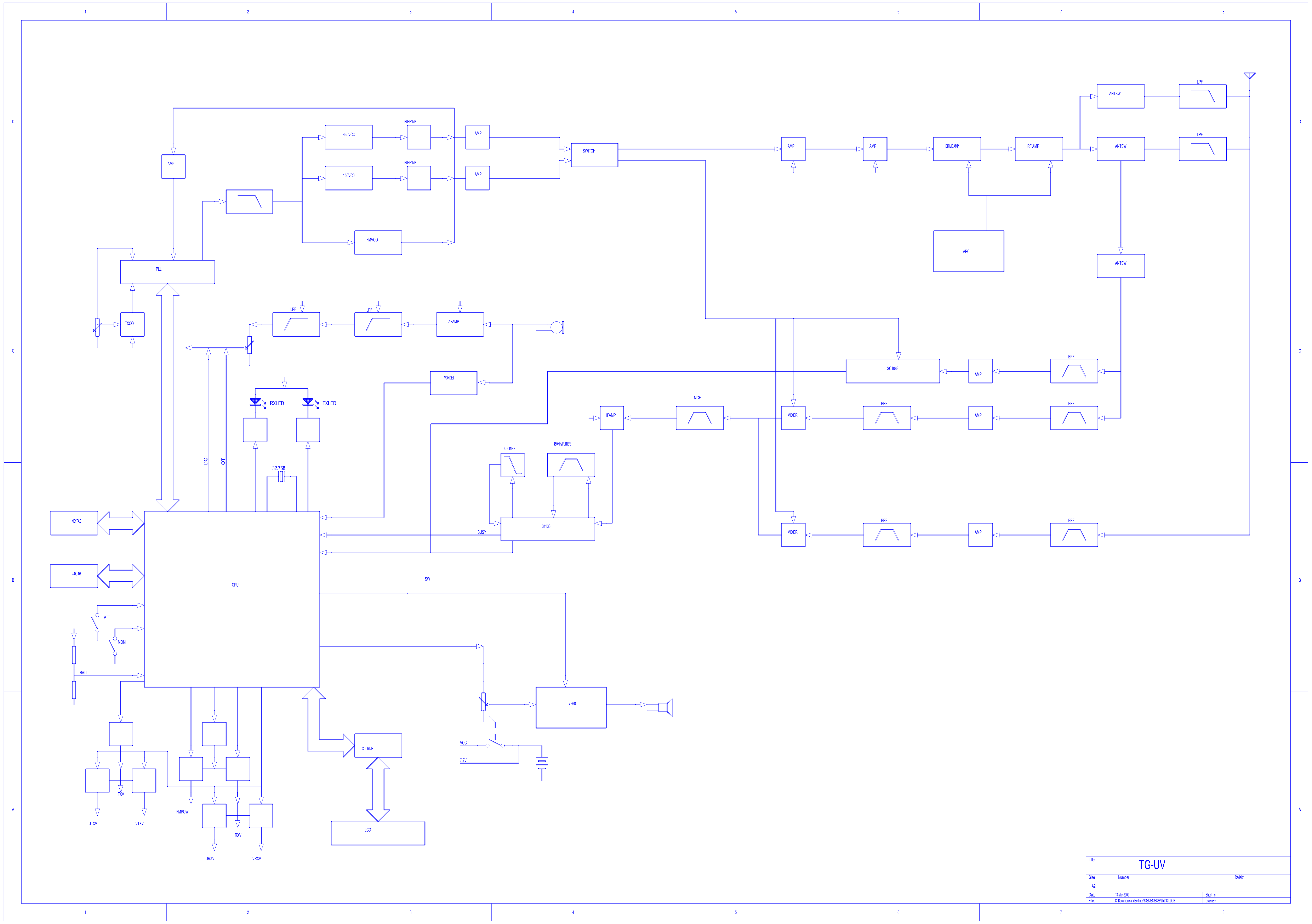
# PCB BLOCK DIAGRAM



# ANNEX D: PROBE CALIBRATION CERTIFICATE


**Calibration Laboratory of**
Schmid & Partner
Engineering AG
**Zeughausstrasse 43, 8004 Zurich, Switzerland**


**S** Schweizerischer Kalibrierdienst
**C** Service suisse d'étalonnage
Servizio svizzero di taratura
**S** Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)
**The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates**

**Accreditation No.: SCS 108**

Client **TA Shanghai (Auden)**

Certificate No: **ET3-1737_Nov08**

## CALIBRATION CERTIFICATE

| | |
|---|---|
| Object | ET3DV6 - SN:1737 |
| Calibration procedure(s) | QA CAL-01.v6, QA CAL-12.v5 and QA CAL-23.v3<br>Calibration procedure for dosimetric E-field probes |
| Calibration date: | November 25, 2008 |
| Condition of the calibrated item | In Tolerance |

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

| Primary Standards | ID # | Cal Date (Certificate No.) | Scheduled Calibration |
|---|---|---|---|
| Power meter E4419B | GB41293874 | 1-Apr-08 (No. 217-00788) | Apr-09 |
| Power sensor E4412A | MY41495277 | 1-Apr-08 (No. 217-00788) | Apr-09 |
| Power sensor E4412A | MY41498087 | 1-Apr-08 (No. 217-00788) | Apr-09 |
| Reference 3 dB Attenuator | SN: S5054 (3c) | 1-Jul-08 (No. 217-00865) | Jul-09 |
| Reference 20 dB Attenuator | SN: S5086 (20b) | 31-Mar-08 (No. 217-00787) | Apr-09 |
| Reference 30 dB Attenuator | SN: S5129 (30b) | 1-Jul-08 (No. 217-00866) | Jul-09 |
| Reference Probe ES3DV2 | SN: 3013 | 2-Jan-08 (No. ES3-3013_Jan08) | Jan-09 |
| DAE4 | SN: 660 | 9-Sep-08 (No. DAE4-660_Sep08) | Sep-09 |

| Secondary Standards | ID # | Check Date (in house) | Scheduled Check |
|---|---|---|---|
| RF generator HP 8648C | US3642U01700 | 4-Aug-99 (in house check Oct-07) | In house check: Oct-09 |
| Network Analyzer HP 8753E | US37390585 | 18-Oct-01 (in house check Oct-08) | In house check: Oct-09 |

| | Name | Function | Signature |
|---|---|---|---|
| Calibrated by: | Katja Pokovic | Technical Manager | |
| Approved by: | Niels Kuster | Quality Manager | |

Issued: November 25, 2008

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.

**Calibration Laboratory of**
Schmid & Partner
Engineering AG
**Zeughausstrasse 43, 8004 Zurich, Switzerland**

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**C** Service suisse d'étalonnage
**S** Servizio svizzero di taratura
**S** Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)
**The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates**

Accreditation No.: **SCS 108**

**Glossary:**

| | |
|---|---|
| TSL | tissue simulating liquid |
| NORMx,y,z | sensitivity in free space |
| ConvF | sensitivity in TSL / NORMx,y,z |
| DCP | diode compression point |
| Polarization φ | φ rotation around probe axis |
| Polarization ϑ | ϑ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., ϑ = 0 is normal to probe axis |

**Calibration is Performed According to the Following Standards:**

a) IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003

b) [illegible]

# Probe ET3DV6

## SN:1737

| | |
|---|---|
| Manufactured: | September 27, 2002 |
| Last calibrated: | February 19, 2007 |
| Repaired: | November 18, 2008 |
| Recalibrated: | November 25, 2008 |

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

ET3DV6 SN:1737 November 25, 2008

# DASY - Parameters of Probe: ET3DV6 SN:1737

## Sensitivity in Free Space[A]

| | | | | | |
|---|---|---|---|---|---|
| NormX | **1.42** ± 10.1% | $\mu V/(V/m)^2$ | DCP X | **93** mV |
| NormY | **1.68** ± 10.1% | $\mu V/(V/m)^2$ | DCP Y | **94** mV |
| NormZ | **1.63** ± 10.1% | $\mu V/(V/m)^2$ | DCP Z | **85** mV |

Diode Compression[B]

## Sensitivity in Tissue Simulating Liquid (Conversion Factors)

**Please see Page 8.**

## Boundary Effect

**TSL 900 MHz Typical SAR gradient: 5 % per mm**

| Sensor Center to Phantom Surface Distance | | **3.7 mm** | **4.7 mm** |
|---|---|---|---|
| $SAR_{be}$ [%] | Without Correction Algorithm | 10.7 | 6.9 |
| $SAR_{be}$ [%] | With Correction Algorithm | 0.3 | 0.4 |

**TSL 1750 MHz Typical SAR gradient: 10 % per mm**

| Sensor Center to Phantom Surface Distance | | **3.7 mm** | **4.7 mm** |
|---|---|---|---|
| $SAR_{be}$ [%] | Without Correction Algorithm | 12.5 | 8.4 |
| $SAR_{be}$ [%] | With Correction Algorithm | 0.8 | 0.5 |

## Sensor Offset

Probe Tip to Sensor Center **2.7** mm

**The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.**

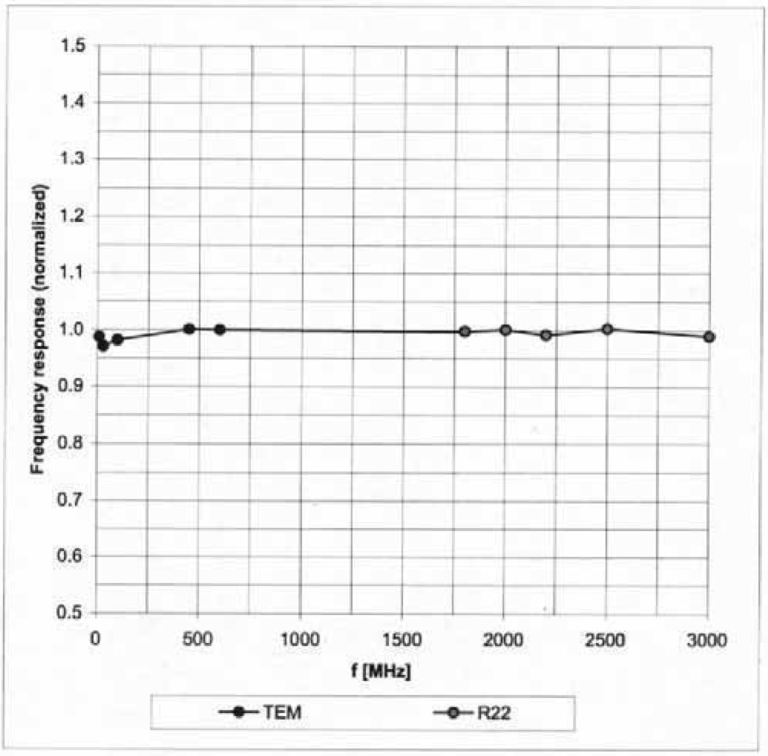
[A] The uncertainties of NormX,Y,Z do not affect the $E^2$-field uncertainty inside TSL (see Page 8).

[B] Numerical linearization parameter: uncertainty not required.

ET3DV6 SN:1737 November 25, 2008

## Frequency Response of E-Field

**(TEM-Cell:ifi110 EXX, Waveguide: R22)**

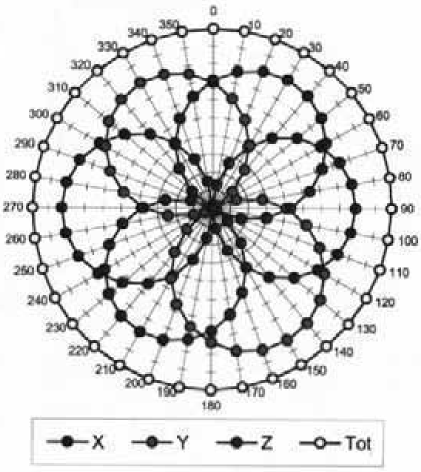



**Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)**

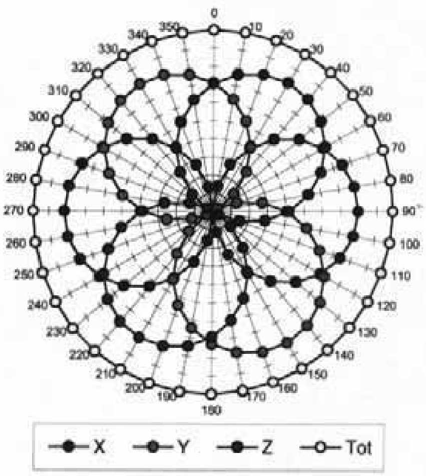
ET3DV6 SN:1737 November 25, 2008

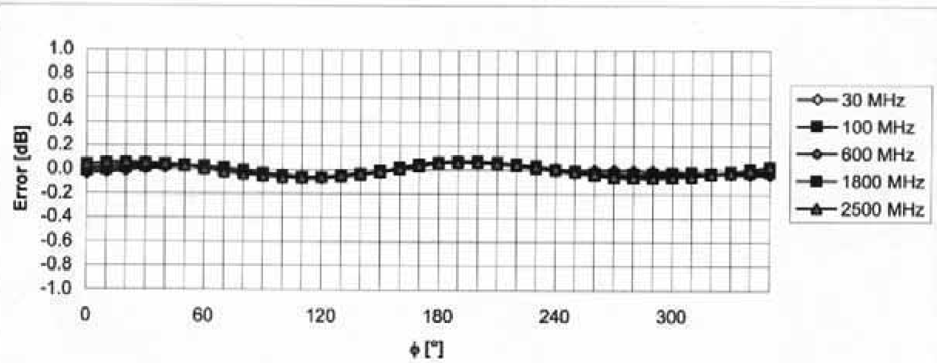
## Receiving Pattern (ϕ), ϑ = 0°

f = 600 MHz, TEM ifi110EXX




f = 1800 MHz, WG R22



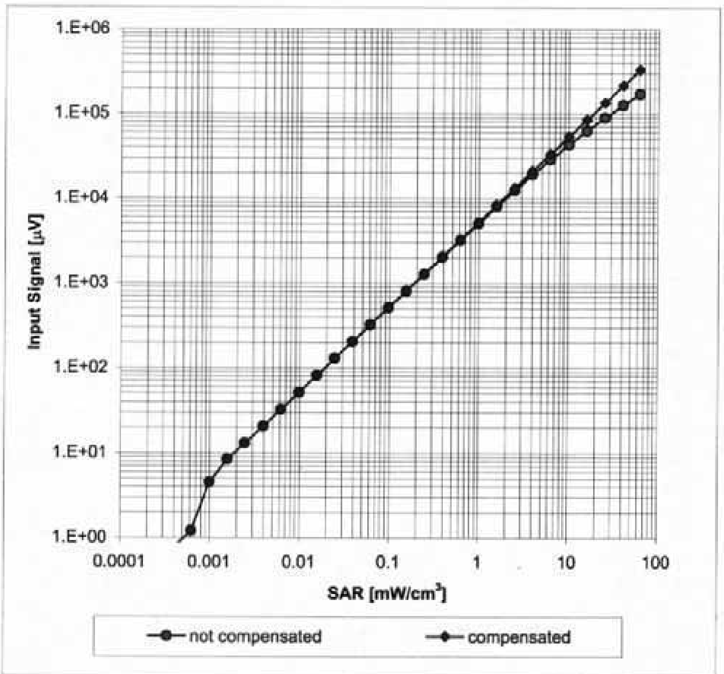



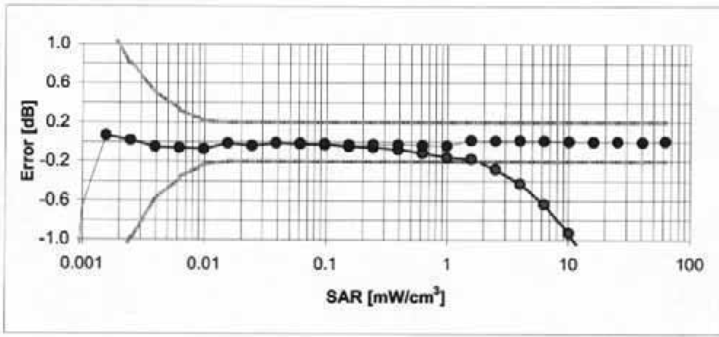

Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

ET3DV6 SN:1737 November 25, 2008

# Dynamic Range f($SAR_{head}$)

**(Waveguide R22, f = 1800 MHz)**

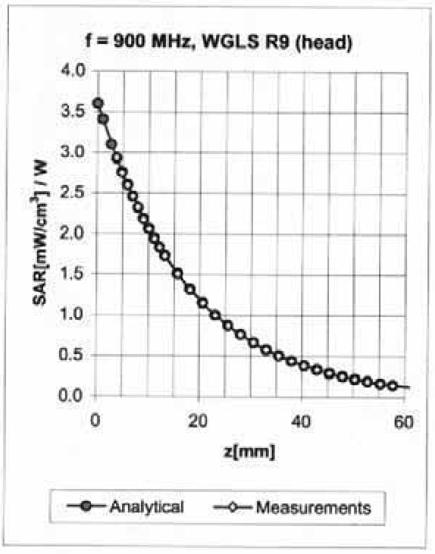


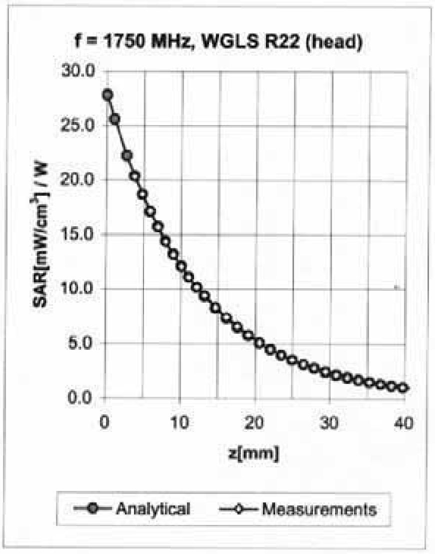




**Uncertainty of Linearity Assessment: ± 0.6% (k=2)**

ET3DV6 SN:1737 November 25, 2008

# Conversion Factor Assessment



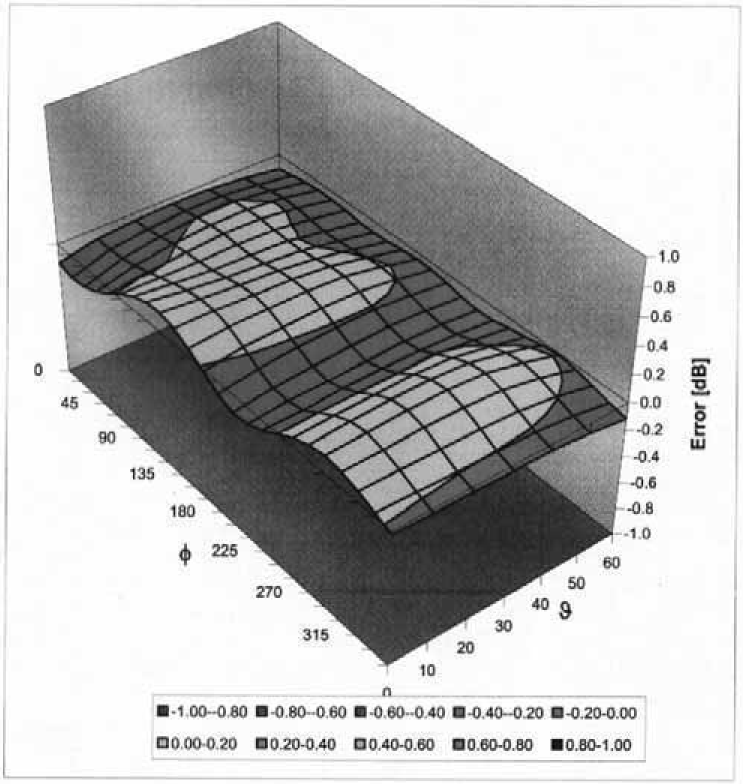

| f [MHz] | Validity [MHz][c] | TSL | Permittivity | Conductivity | Alpha | Depth | ConvF | Uncertainty |
|---|---|---|---|---|---|---|---|---|
| 450 | ± 50 / ± 100 | Head | 43.5 ± 5% | 0.87 ± 5% | 0.36 | 1.84 | 7.20 | ± 13.3% (k=2) |
| 835 | ± 50 / ± 100 | Head | 41.5 ± 5% | 0.90 ± 5% | 0.25 | 3.53 | 6.33 | ± 11.0% (k=2) |
| 900 | ± 50 / ± 100 | Head | 41.5 ± 5% | 0.97 ± 5% | 0.27 | 3.53 | 6.14 | ± 11.0% (k=2) |
| 1750 | ± 50 / ± 100 | Head | 40.1 ± 5% | 1.37 ± 5% | 0.56 | 2.77 | 5.35 | ± 11.0% (k=2) |
| 1950 | ± 50 / ± 100 | Head | 40.0 ± 5% | 1.40 ± 5% | 0.57 | 2.72 | 4.89 | ± 11.0% (k=2) |
| 2450 | ± 50 / ± 100 | Head | 39.2 ± 5% | 1.80 ± 5% | 0.51 | 1.60 | 4.39 | ± 11.0% (k=2) |
| 450 | ± 50 / ± 100 | Body | 56.7 ± 5% | 0.94 ± 5% | 0.27 | 1.80 | 7.52 | ± 13.3% (k=2) |
| 835 | ± 50 / ± 100 | Body | 55.2 ± 5% | 0.97 ± 5% | 0.36 | 2.75 | 6.14 | ± 11.0% (k=2) |
| 900 | ± 50 / ± 100 | Body | 55.0 ± 5% | 1.05 ± 5% | 0.43 | 2.51 | 5.98 | ± 11.0% (k=2) |
| 1750 | ± 50 / ± 100 | Body | 53.4 ± 5% | 1.49 ± 5% | 0.99 | 1.74 | 4.84 | ± 11.0% (k=2) |
| 1950 | ± 50 / ± 100 | Body | 53.3 ± 5% | 1.52 ± 5% | 0.99 | 1.50 | 4.60 | ± 11.0% (k=2) |
| 2450 | ± 50 / ± 100 | Body | 52.7 ± 5% | 1.95 ± 5% | 0.98 | 1.42 | 3.91 | ± 11.0% (k=2) |

[c] The validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2). The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

ET3DV6 SN:1737 November 25, 2008

## Deviation from Isotropy in HSL

**Error (ϕ, ϑ), f = 900 MHz**




**Uncertainty of Spherical Isotropy Assessment: ± 2.6% (k=2)**

# ANNEX E: D450V2 DIPOLE CALIBRATION CERTIFICATE

**Calibration Laboratory of**
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Engineering AG
Zeughausstrasse 43, 8004 Zurich, Switzerland

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Accreditation No.: **SCS 108**

Client **ATL (Auden)**

Certificate No: **D450V2-1021_Feb09**

## CALIBRATION CERTIFICATE

| | |
|---|---|
| Object | D450V2 - SN: 1021 |
| Calibration procedure(s) | QA CAL-15.v5<br>Calibration Procedure for dipole validation kits below 800 MHz |
| Calibration date: | February 02, 2009 |
| Condition of the calibrated item | In Tolerance |

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

| Primary Standards | ID # | Cal Date (Calibrated by, Certificate No.) | Scheduled Calibration |
|---|---|---|---|
| Power meter E4419B | GB41293874 | 01-Apr-08 (No. 217-00788) | Apr-09 |
| Power sensor E4412A | MY41495277 | 01-Apr-08 (No. 217-00788) | Apr-09 |
| Power sensor E4412A | MY41498087 | 01-Apr-08 (No. 217-00788) | Apr-09 |
| Reference 3 dB Attenuator | SN: S5054 (3c) | 01-Jul-08 (No. 217-00865) | Jul-09 |
| Reference 20 dB Attenuator | SN: S5086 (20b) | 31-Mar-08 (No. 217-00787) | Mar-09 |
| Type-N mismatch combination | SN: 5047.2 / 06327 | 01-Jul-08 (No. 217-00867) | Jul-09 |
| Reference Probe ET3DV6 (LF) | SN: 1507 | 27-Jun-08 (No. ET3-1507_Jun08) | Jun-09 |
| DAE4 | SN: 601 | 14-Mar-08 (No. DAE4-601_Mar08) | Mar-09 |

| Secondary Standards | ID # | Check Date (in house) | Scheduled Check |
|---|---|---|---|
| RF generator HP 8648C | US3642U01700 | 04-Aug-99 (in house check Oct-07) | In house check: Oct-09 |
| Network Analyzer HP 8753E | US37390585 S4206 | 18-Oct-01 (in house check Oct-08) | In house check: Oct-09 |

| | Name | Function | Signature |
|---|---|---|---|
| Calibrated by: | Jeton Kastrati | Laboratory Technician | |
| Approved by: | Katja Pokovic | Technical Manager | |

Issued: February 4, 2009

**Calibration Laboratory of**
Schmid & Partner
Engineering AG
Zeughausstrasse 43, 8004 Zurich, Switzerland

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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

**Glossary:**

| | |
|---|---|
| TSL | tissue simulating liquid |
| ConF | sensitivity in TSL / NORM x,y,z |
| N/A | not applicable or not measured |

**Calibration is Performed According to the Following Standards:**

a) IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
c) Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

**Additional Documentation:**

d) DASY4 System Handbook

**Methods Applied and Interpretation of Parameters:**

- *Measurement Conditions:* Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- *Antenna Parameters with TSL:* The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- *Feed Point Impedance and Return Loss:* These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- *Electrical Delay:* One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- *SAR measured:* SAR measured at the stated antenna input power.
- *SAR normalized:* SAR as measured, normalized to an input power of 1 W at the antenna connector.
- *SAR for nominal TSL parameters:* The measured TSL parameters are used to calculate the nominal SAR result.

## Measurement Conditions

DASY system configuration, as far as not given on page 1.

| | | |
|---|---|---|
| **DASY Version** | DASY5 | V5.0 |
| **Extrapolation** | Advanced Extrapolation | |
| **Phantom** | Flat Phantom V4.4 | Shell thickness: 6 ± 0.2 mm |
| **Distance Dipole Center - TSL** | 15 mm | with Spacer |
| **Area Scan Resolution** | dx, dy = 15 mm | |
| **Zoom Scan Resolution** | dx, dy, dz = 5 mm | |
| **Frequency** | 450 MHz ± 1 MHz | |

## Head TSL parameters

The following parameters and calculations were applied.

| | **Temperature** | **Permittivity** | **Conductivity** |
|---|---|---|---|
| **Nominal Head TSL parameters** | 22.0 °C | 43.5 | 0.87 mho/m |
| **Measured Head TSL parameters** | (22.0 ± 0.2) °C | 43.3 ± 6 % | 0.83 mho/m ± 6 % |
| **Head TSL temperature during test** | (21.5 ± 0.2) °C | ---- | ---- |

## SAR result with Head TSL

| **SAR averaged over 1 $cm^3$ (1 g) of Head TSL** | condition | |
|---|---|---|
| SAR measured | 398 mW input power | 1.90 mW / g |
| SAR normalized | normalized to 1W | 4.77 mW / g |
| SAR for nominal Head TSL parameters [1] | normalized to 1W | **4.96 mW / g ± 18.1 % (k=2)** |

| **SAR averaged over 10 $cm^3$ (10 g) of Head TSL** | condition | |
|---|---|---|
| SAR measured | 398 mW input power | 1.27 mW / g |
| SAR normalized | normalized to 1W | 3.19 mW / g |
| SAR for nominal Head TSL parameters [1] | normalized to 1W | **3.30 mW / g ± 17.6 % (k=2)** |

[1] Correction to nominal TSL parameters according to d), chapter "SAR Sensitivities"

## Body TSL parameters

The following parameters and calculations were applied.

| | Temperature | Permittivity | Conductivity |
|---|---|---|---|
| **Nominal Body TSL parameters** | 22.0 °C | 56.7 | 0.94 mho/m |
| **Measured Body TSL parameters** | (22.0 ± 0.2) °C | 54.0 ± 6 % | 0.89 mho/m ± 6 % |
| **Body TSL temperature during test** | (22.0 ± 0.2) °C | ---- | ---- |

## SAR result with Body TSL

| **SAR averaged over 1 $cm^3$ (1 g) of Body TSL** | condition | |
|---|---|---|
| SAR measured | 398 mW input power | 1.81 mW / g |
| SAR normalized | normalized to 1W | 4.55 mW / g |
| SAR for nominal Body TSL parameters [2] | normalized to 1W | **4.69 mW / g ± 18.1 % (k=2)** |

| **SAR averaged over 10 $cm^3$ (10 g) of Body TSL** | condition | |
|---|---|---|
| SAR measured | 398 mW input power | 1.22 mW / g |
| SAR normalized | normalized to 1W | 3.07 mW / g |
| SAR for nominal Body TSL parameters [2] | normalized to 1W | **3.16 mW / g ± 17.6 % (k=2)** |

[2] Correction to nominal TSL parameters according to d), chapter "SAR Sensitivities"

## Appendix

### Antenna Parameters with Head TSL

| | |
|---|---|
| Impedance, transformed to feed point | 57.2 Ω - 2.7 jΩ |
| Return Loss | - 22.9 dB |

### Antenna Parameters with Body TSL

| | |
|---|---|
| Impedance, transformed to feed point | 54.1 Ω - 8.1 jΩ |
| Return Loss | - 21.2 dB |

### General Antenna Parameters and Design

| | |
|---|---|
| Electrical Delay (one direction) | 1.352 ns |

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

### Additional EUT Data

| | |
|---|---|
| Manufactured by | SPEAG |
| Manufactured on | February 04, 2004 |

## DASY5 Validation Report for Head TSL

Date/Time: 02.02.2009 11:59:48

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 450 MHz; Type: D450V2; Serial: D450V2 - SN:1021**

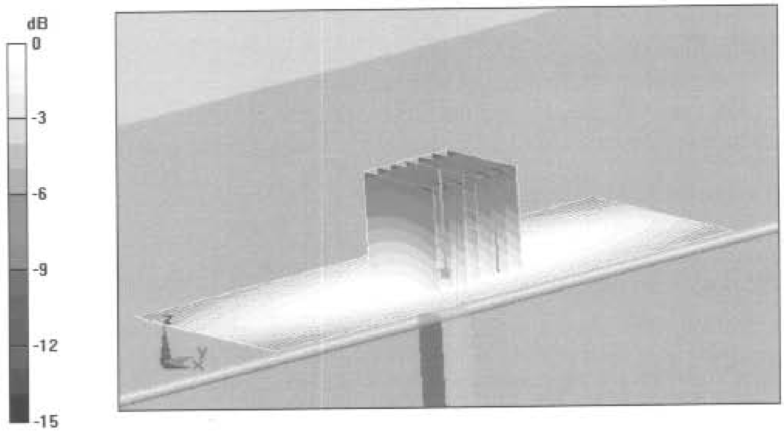
Communication System: CW; Frequency: 450 MHz; Duty Cycle: 1:1
Medium: HSL450
Medium parameters used: f = 450 MHz; $\sigma$ = 0.83 mho/m; $\varepsilon_r$ = 43.3; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC)

DASY5 Configuration:

- Probe: ET3DV6 - SN1507 (LF); ConvF(6.66, 6.66, 6.66); Calibrated: 27.06.2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 14.03.2008
- Phantom: Flat Phantom 4.4; Type: Flat Phantom 4.4; Serial: 1002
- Measurement SW: DASY5, V5.0 Build 120; SEMCAD X Version 13.4 Build 45

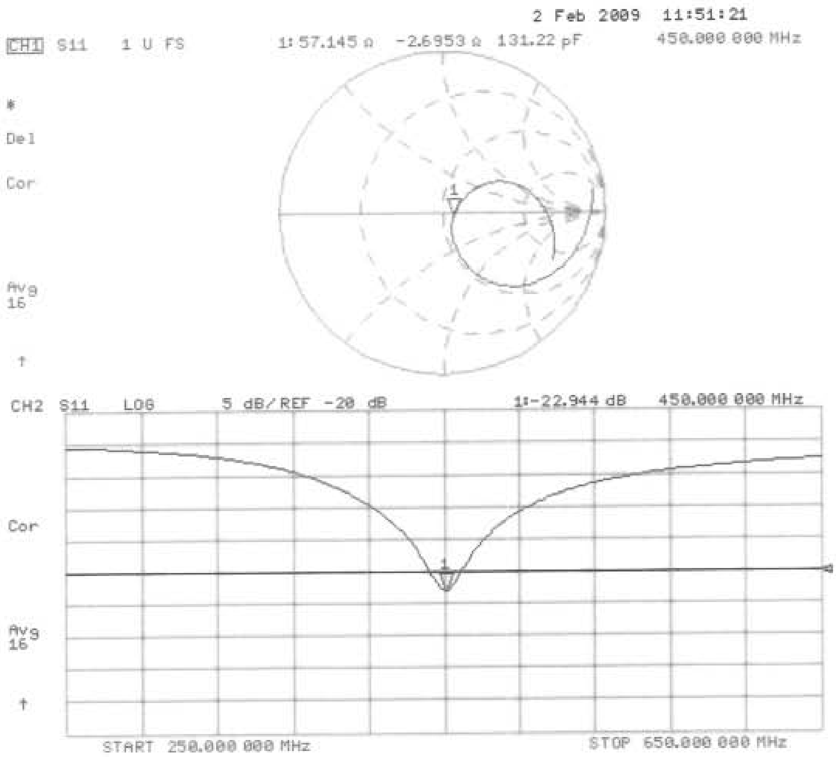
**d=15mm, Pin=398mW/Area Scan (41x111x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 2.02 mW/g

**d=15mm, Pin=398mW/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 51.8 V/m; Power Drift = -0.033 dB
Peak SAR (extrapolated) = 2.83 W/kg
**SAR(1 g) = 1.9 mW/g; SAR(10 g) = 1.27 mW/g**
Maximum value of SAR (measured) = 2.04 mW/g




0 dB = 2.04mW/g

Impedance Measurement Plot for Head TSL



**DASY5 Validation Report for Body TSL**

Date/Time: 02.02.2009 13:32:58

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 450 MHz; Type: D450V2; Serial: D450V2 - SN:1021**

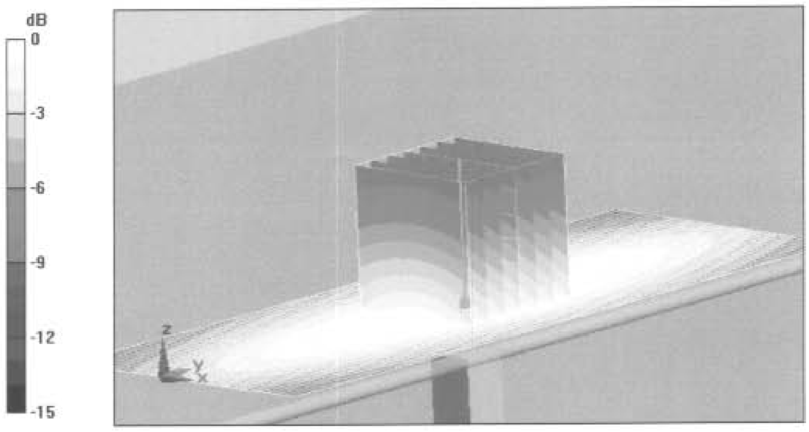
Communication System: CW; Frequency: 450 MHz; Duty Cycle: 1:1
Medium: MSL450
Medium parameters used: f = 450 MHz; $\sigma$ = 0.89 mho/m; $\varepsilon_r$ = 54; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC)

DASY5 Configuration:

- Probe: ET3DV6 - SN1507 (LF); ConvF(7.22, 7.22, 7.22); Calibrated: 27.06.2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 14.03.2008
- Phantom: Flat Phantom 4.4; Type: Flat Phantom 4.4; Serial: 1002
- Measurement SW: DASY5, V5.0 Build 120; SEMCAD X Version 13.4 Build 45

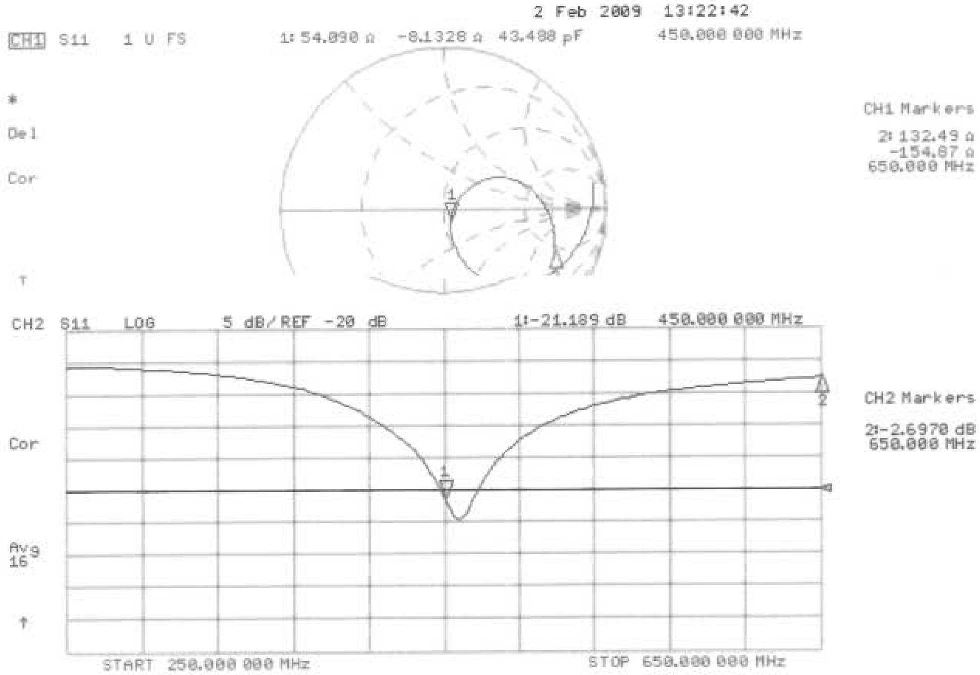
**d=15mm, Pin=398mW/Area Scan (41x111x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.92 mW/g

**d=15mm, Pin=398mW/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 48.4 V/m; Power Drift = -0.013 dB
Peak SAR (extrapolated) = 2.71 W/kg
**SAR(1 g) = 1.81 mW/g; SAR(10 g) = 1.22 mW/g**
Maximum value of SAR (measured) = 1.94 mW/g




0 dB = 1.94mW/g

Impedance Measurement Plot for Body TSL



# ANNEX F: DAE4 CALIBRATION CERTIFICATE

**Calibration Laboratory of**
Schmid & Partner
Engineering AG
**Zeughausstrasse 43, 8004 Zurich, Switzerland**

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**S** Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)
**The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates**

**Accreditation No.: SCS 108**

Client **Auden**

**Certificate No: DAE4-452_Nov08**

## CALIBRATION CERTIFICATE

| | |
|---|---|
| Object | DAE4 - SD 000 D04 BJ - SN: 452 |
| Calibration procedure(s) | QA CAL-06.v12<br>Calibration procedure for the data acquisition electronics (DAE) |
| Calibration date: | November 18, 2008 |
| Condition of the calibrated item | In Tolerance |

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI). The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

| Primary Standards | ID # | Cal Date (Certificate No.) | Scheduled Calibration |
|---|---|---|---|
| Fluke Process Calibrator Type 702 | SN: 6295803 | 30-Sep-08 (No: 7673) | Sep-09 |
| Keithley Multimeter Type 2001 | SN: 0810278 | 30-Sep-08 (No: 7670) | Sep-09 |

| Secondary Standards | ID # | Check Date (in house) | Scheduled Check |
|---|---|---|---|
| Calibrator Box V1.1 | SE UMS 006 AB 1004 | 06-Jun-08 (in house check) | In house check: Jun-09 |

| | Name | Function | Signature |
|---|---|---|---|
| Calibrated by: | Dominique Steffen | Technician | |
| Approved by: | Fin Bomholt | R&D Director | |

**Calibration Laboratory of**
Schmid & Partner
Engineering AG
**Zeughausstrasse 43, 8004 Zurich, Switzerland**

**S** Schweizerischer Kalibrierdienst
**C** Service suisse d'étalonnage
Servizio svizzero di taratura
**S** Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)
**The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates**

Accreditation No.: **SCS 108**

## Glossary

| | |
|---|---|
| DAE | data acquisition electronics |
| Connector angle | information used in DASY system to align probe sensor X to the robot coordinate system. |

## Methods Applied and Interpretation of Parameters

- *DC Voltage Measurement:* Calibration Factor assessed for use in DASY system by comparison with a calibrated instrument traceable to national standards. The figure given corresponds to the full scale range of the voltmeter in the respective range.
- *Connector angle*: The angle of the connector is assessed measuring the angle mechanically by a tool inserted. Uncertainty is not required.
- The following parameters as documented in the Appendix contain technical information as a result from the performance test and require no uncertainty.
  - *DC Voltage Measurement Linearity:* Verification of the Linearity at +10% and -10% of the nominal calibration voltage. Influence of offset voltage is included in this measurement.
  - *Common mode sensitivity:* Influence of a positive or negative common mode voltage on the differential measurement.
  - *Channel separation:* Influence of a voltage on the neighbor channels not subject to an input voltage.
  - *AD Converter Values with inputs shorted:* Values on the internal AD converter corresponding to zero input voltage
  - *Input Offset Measurement*: Output voltage and statistical results over a large number of zero voltage measurements.
  - *Input Offset Current:* Typical value for information; Maximum channel input offset current, not considering the input resistance.
  - *Input resistance:* DAE input resistance at the connector, during internal auto-zeroing and during measurement.
  - *Low Battery Alarm Voltage:* Typical value for information. Below this voltage, a battery alarm signal is generated.
  - *Power consumption:* Typical value for information. Supply currents in various operating modes.

## DC Voltage Measurement

A/D - Converter Resolution nominal

High Range: 1LSB = 6.1μV , full range = -100...+300 mV

Low Range: 1LSB = 61nV , full range = -1.......+3mV

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

| Calibration Factors | X | Y | Z |
|---|---|---|---|
| **High Range** | 404.585 ± 0.1% (k=2) | 404.416 ± 0.1% (k=2) | 404.565 ± 0.1% (k=2) |
| **Low Range** | 3.97854 ± 0.7% (k=2) | 3.95135 ± 0.7% (k=2) | 3.98063 ± 0.7% (k=2) |

## Connector Angle

| | |
|---|---|
| **Connector Angle** to be used in DASY system | 148 ° ± 1 ° |

## Appendix

### 1. DC Voltage Linearity

| High Range | | Input (μV) | Reading (μV) | Error (%) |
|---|---|---|---|---|
| Channel X | + Input | 200000 | 200000 | 0.00 |
| Channel X | + Input | 20000 | 20006.89 | 0.03 |
| Channel X | - Input | 20000 | -20003.71 | 0.02 |
| Channel Y | + Input | 200000 | 200000.5 | 0.00 |
| Channel Y | + Input | 20000 | 20008.05 | 0.04 |
| Channel Y | - Input | 20000 | -20006.61 | 0.03 |
| Channel Z | + Input | 200000 | 199999.6 | 0.00 |
| Channel Z | + Input | 20000 | 20006.84 | 0.03 |
| Channel Z | - Input | 20000 | -20004.66 | 0.02 |

| Low Range | | Input (μV) | Reading (μV) | Error (%) |
|---|---|---|---|---|
| Channel X | + Input | 2000 | 2000 | 0.00 |
| Channel X | + Input | 200 | 200.19 | 0.09 |
| Channel X | - Input | 200 | -199.99 | 0.00 |
| Channel Y | + Input | 2000 | 2000 | 0.00 |
| Channel Y | + Input | 200 | 199.38 | -0.31 |
| Channel Y | - Input | 200 | -200.73 | 0.36 |
| Channel Z | + Input | 2000 | 2000.1 | 0.00 |
| Channel Z | + Input | 200 | 199.25 | -0.38 |
| Channel Z | - Input | 200 | -201.52 | 0.76 |

### 2. Common mode sensitivity

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

| | Common mode Input Voltage (mV) | High Range Average Reading (μV) | Low Range Average Reading (μV) |
|---|---|---|---|
| Channel X | 200 | 2.99 | 1.90 |
| | - 200 | -1.54 | -1.85 |
| Channel Y | 200 | -8.82 | -8.73 |
| | - 200 | 6.90 | 6.96 |
| Channel Z | 200 | 9.94 | 10.21 |

## 4. AD-Converter Values with inputs shorted

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

| | High Range (LSB) | Low Range (LSB) |
|---|---|---|
| Channel X | 16123 | 16646 |
| Channel Y | 15886 | 16452 |
| Channel Z | 16175 | 16346 |

## 5. Input Offset Measurement

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec
Input 10MΩ

| | Average (μV) | min. Offset (μV) | max. Offset (μV) | Std. Deviation (μV) |
|---|---|---|---|---|
| Channel X | 0.53 | -0.80 | 1.64 | 0.33 |
| Channel Y | -1.51 | -2.67 | -0.89 | 0.35 |
| Channel Z | -1.99 | -3.07 | -1.43 | 0.29 |

## 6. Input Offset Current

Nominal Input circuitry offset current on all channels: <25fA

## 7. Input Resistance

| | Zeroing (MOhm) | Measuring (MOhm) |
|---|---|---|
| Channel X | 0.1999 | 198.3 |
| Channel Y | 0.1999 | 200.1 |
| Channel Z | 0.1999 | 199.3 |

## 8. Low Battery Alarm Voltage (verified during pre test)

| Typical values | Alarm Level (VDC) |
|---|---|
| Supply (+ Vcc) | +7.9 |
| Supply (- Vcc) | -7.6 |

## 9. Power Consumption (verified during pre test)

| Typical values | Switched off (mA) | Stand by (mA) | Transmitting (mA) |
|---|---|---|---|
| Supply (+ Vcc) | +0.0 | +6 | +14 |
| Supply (- Vcc) | –0.01 | -8 | -9 |

TOP VIEW OF EUT


BOTTOM VIEW OF EUT

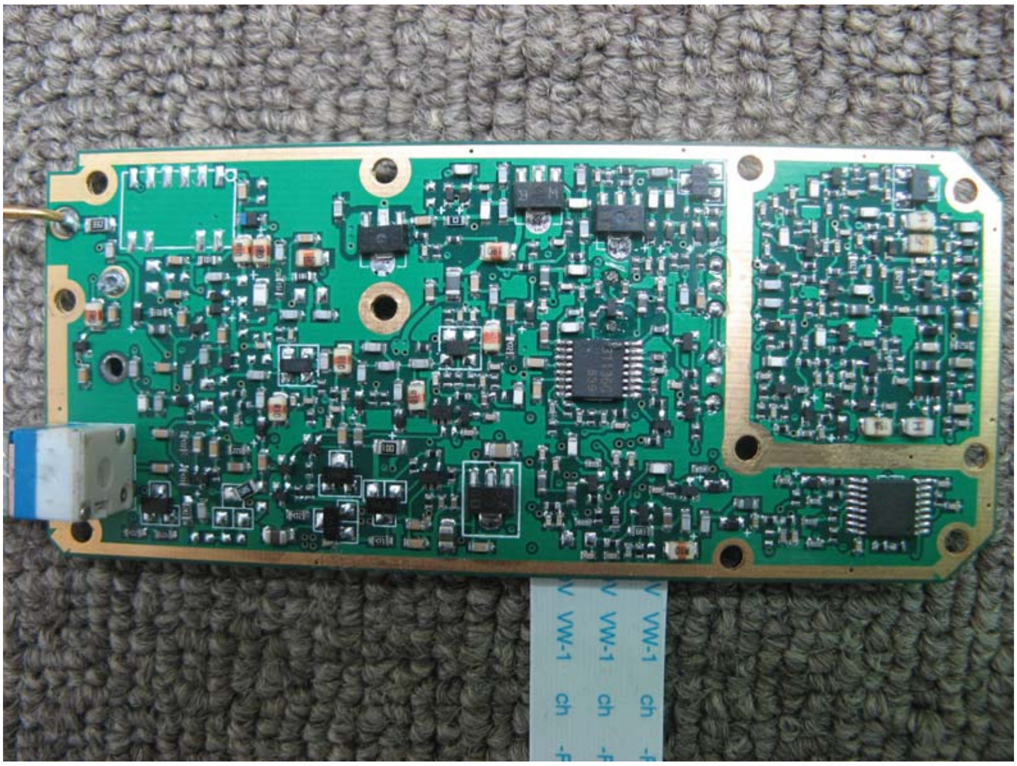
LEFT VIEW OF EUT

RIGHT VIEW OF EUT

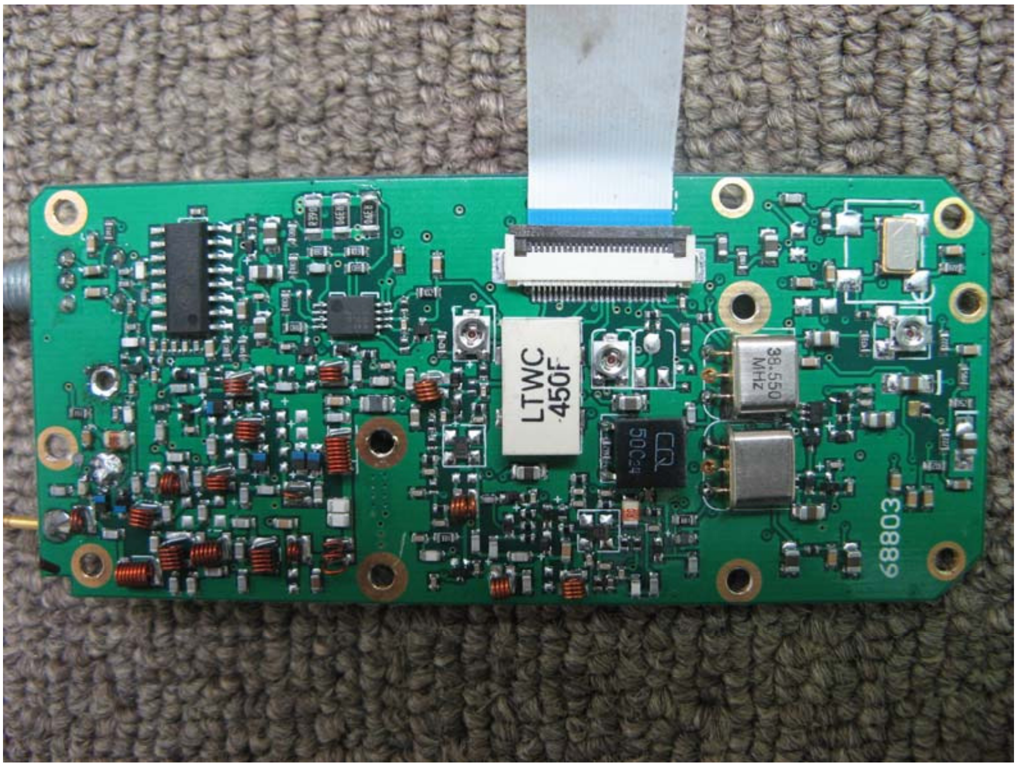
FRONT VIEW OF EUT


BACK VIEW OF EUT

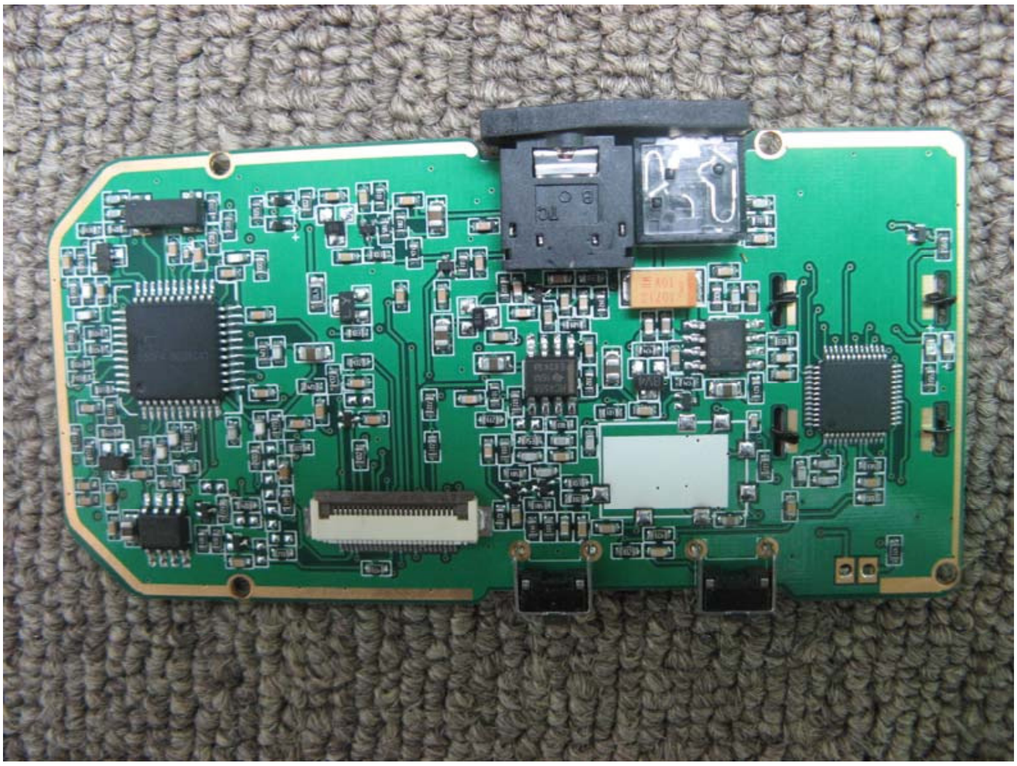
INTERNAL VIEW OF EUT – 1



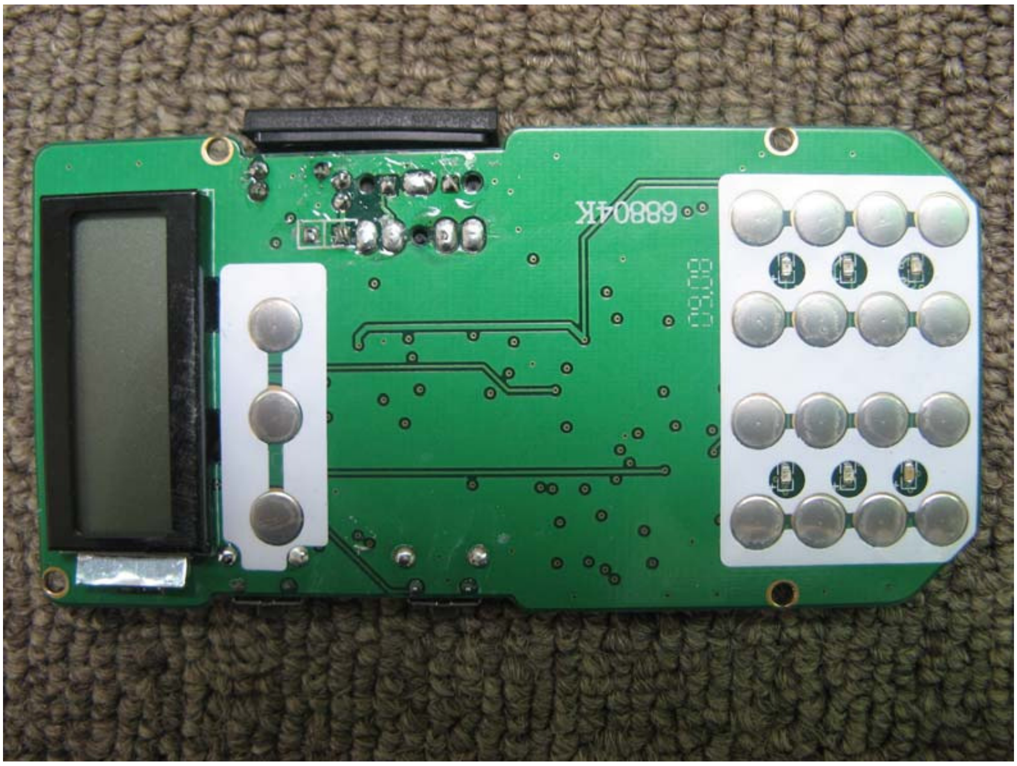

INTERNAL VIEW OF EUT – 2



INTERNAL VIEWOF EUT-3



INTERNAL VIEW OF EUT-4



----END OF REPORT----

May 14, 2009

Federal Communications Commission
Authorization & Evaluation Division
7435 Oakland Mills Road
Colombia, Maryland 21046

**Subject: FCC ID: XBPTG-UV Justification Letter for Expanded Frequency Range 400-470 MHz**

Gentlemen;

You have asked **Fujian Nanan Quansheng Electronics Co., Ltd.** for justification to have the freq range **400-470 MHz** appears on the face of the FCC Grant of Certification for a Part 90 Certification. This frequency range is regarded as usual & customary by United States Federal Government and its various departments, user organizations and the military to appear on the face of the equipment Grant of Certification.

(1) **Fujian Nanan Quansheng Electronics Co., Ltd.**'s Marketing Department plans to ensure that USA users, other than those specifically identified in this letter, not operate within bands **400 -406 MHz**, as controlled by the users' FCC station license.
(2) This device will not be marketed to USA users, other than those identified in the letter, namely the US Government and its various departments & military, for operation in **400-406 MHz** frequency range.

Sincerely,

**Fujian Nanan Quansheng Electronics Co.. Ltd.**

**Chenfeili / Manager**

This device complies with Part 90 of the FCC rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) This device must accept any interference received, including interference that may cause undesired operation.

FCC ID: XBPTG-UV

CAUTION

**Device must be restricted to occupational use to satisfy FCC RF exposure compliance. See owner's manual for specific operating requirements**

## FCC RF Warning Label

## Receiver System

### ■1-1 VHF Front End

The received signal from the antenna passes through a lowpass filter and then through a transmission/reception switching circuit (antenna switch) and enters the band-pass filter (L22,L23).
The signal passing through the band-pass filter (L22, L23) is amplified by with an RF amplifier (Q22), passes through a band-pass filter (L19, L21) and enters the first mixer (Q21).
These band-pass filters are tuned to a desired frequency by varicaps (D36, D39, D40, D41).

### ■1-2 UHF Front End

The received signal from the antenna passes through a lowpass filter and then through a transmission/reception switching circuit (antenna switch) and enters the band-pass filter (L10,L20,L27).
The signal passing through the band-pass filter (L10,L20,L27) is amplified by with an RF amplifier (Q9), passes through a band-pass filter (L7,L8,L9) and enters the first mixer (Q8).
These band-pass filters are tuned to a desired frequency by varicaps (D10,D16,D34,D35,D3,D6,D28,D38).

A tuning voltage corresponding to the desired signal is applied to each varicap through the DA terminal (pin 23) of the MPU (IC1) to tune to the receive frequency.
Double super heterodyne
Reception method 1st IF Frequency 38.85MHz (Lower)
2nd IF Frequency 450kHz (Lower)

### ■ IF Circuit

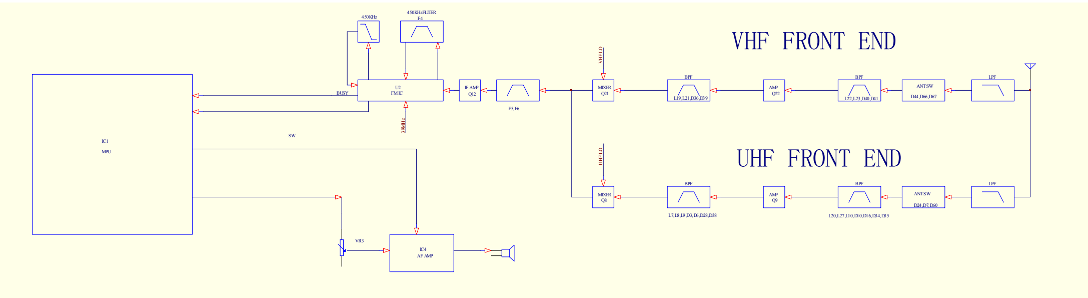
The first IF signal passes through crystal filter: F5,F6 to remove unwanted components.
The first IF signal passing through the F5,F6 is amplified by an IF amplifier (Q12) and the resulting signal enters the FM IC (U2).
The first IF signal (38.85 MHz) amplified by the IF amplifier (Q12) and the second IF signal (39 MHz) generated by tripling the 13MHz reference oscillator frequency of the TCXO (X1) by Q19, are mixed in the FM IC to produce a second IF signal (450 kHz) (Lower heterodyne).
The second IF signal passes through a ceramic filter (F4) to remove unwanted components and passes through the IF amplifier in the FM IC again and is detected to produced an audio signal.

### ■ Squelch

A noise component is obtained by passing FM detection output (FM IC pin 14) .

### ■ AF Amplifier

The detected audio signal is amplified by IC1(pin 16,17 ), the signal output of IC1 pin 25 passes through an AF volume (VR3) and is amplified to a specified output level with an AF amplifier (IC4).
The audio signal amplified with the AF amplifier (IC4) is output through an internal speaker or an external speaker jack (J4).
The beep tone are output from the (pin 20) of the MPU (IC1), enters the AF amplifier (IC4) and is output as a monitor tone.




## Transmitter System

### ■ Microphone Amplifier Circuit

The audio signal from the microphone enters a microphone amplifier (IC6).
The signal passes through a pre-emphasis circuit, limiter amplifier and splatter filter inside the microphone amplifier.
The splatter filter will remove distortion outside the audio band.

### ■ Modulation Circuit

The audio signal amplified by the microphone amplifier (IC6) passes through a semi-fixed volume (VR4) for modulation adjustment, and goes to the VCO modulation varicap (D46) for variable reactance phase modulation.

### ■ Drive and Final Circuit

For the VHF VCO(Q17) output signal passes through an RF amplifier (Q13, Q15) and drive amplifier (Q23, Q24,Q25), and is amplified by a power amplifier (Q26).
For the UHF VCO(Q31) output signal passes through an RF amplifier (Q14, Q16) and drive amplifier (Q23, Q24,Q25), and is amplified by a power amplifier (Q26).

### ■ APC Circuit

The APC (Automatic Power Control) circuit is used to obtain a stable transmission power and controls transmission output by detecting the drain current of Q25 and Q26.
The transmission output can be changed in three levels: High, Mid, and Low.
The reference voltage is output from the DA terminal (pin 23) of the MPU (IC1) and the detection voltage generated by R154, R155 and R156 are fed to the APC differential amplifier (U4).
The voltage in proportion to the difference between reference voltage and detection voltage is output from the BOUT terminal (pin 7) of U4 as an APC voltage.

The APC voltage controls the gate voltage of Q25 and Q26, and keeps transmission output stable.

## PLL System

### ■ PLL Circuit

A reference frequency of 5 kHz or 6.25 kHz is produced by dividing the 13 MHz reference frequency of the TCXO (X1) with PLL IC (IC5). Comparison frequency is produced by amplifying VCO and dividing it with the PLL IC.
The PLL synthesizer with 5 kHz and 6.25 kHz step is configured by comparing phases of the reference frequency and comparison frequency.
The phase difference between reference frequency and comparison frequency passes through a charge pump in the PLL IC, then ripples are removed with a loop filter with lowrange passing characteristics to produce VCO control voltage (lock voltage).

### ■ VCO Circuit

The VHF VCO produces a desired frequency directly with a Colpits oscillation circuit containing an oscillation transistor (Q17) used for both transmission and reception. The VCO control voltage is applied to varicap (D48,50) to produce a desired frequency.
The UHF VCO produces a desired frequency directly with a Colpits oscillation circuit containing an oscillation transistor (Q17) used for both transmission and reception. The VCO control voltage is applied to varicap (D22,D33,D47,D54) to produce a desired frequency

### ■ Unlock Detection Circuit

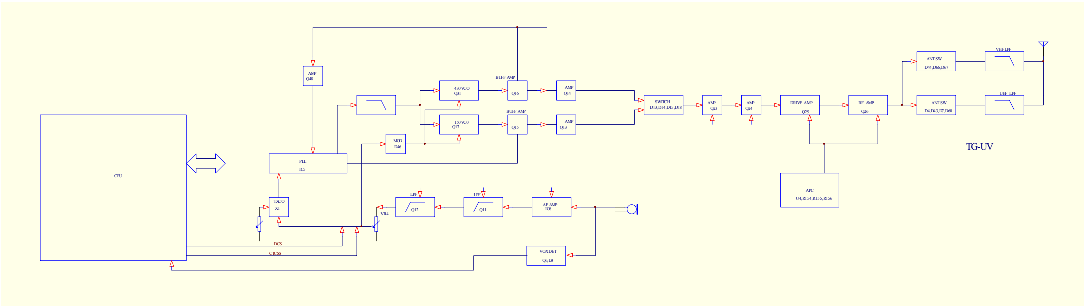
When the PLL is unlocked, the waveform of the pulse output from the Fo/LD terminal (pin 10) of the PLL IC (IC5), and the Fo/LD terminal is made "L" level. The voltage at the Fo/LD terminal is detected by the MPU to control transmission/reception switching timing.

### ■ CTCSS/DCS

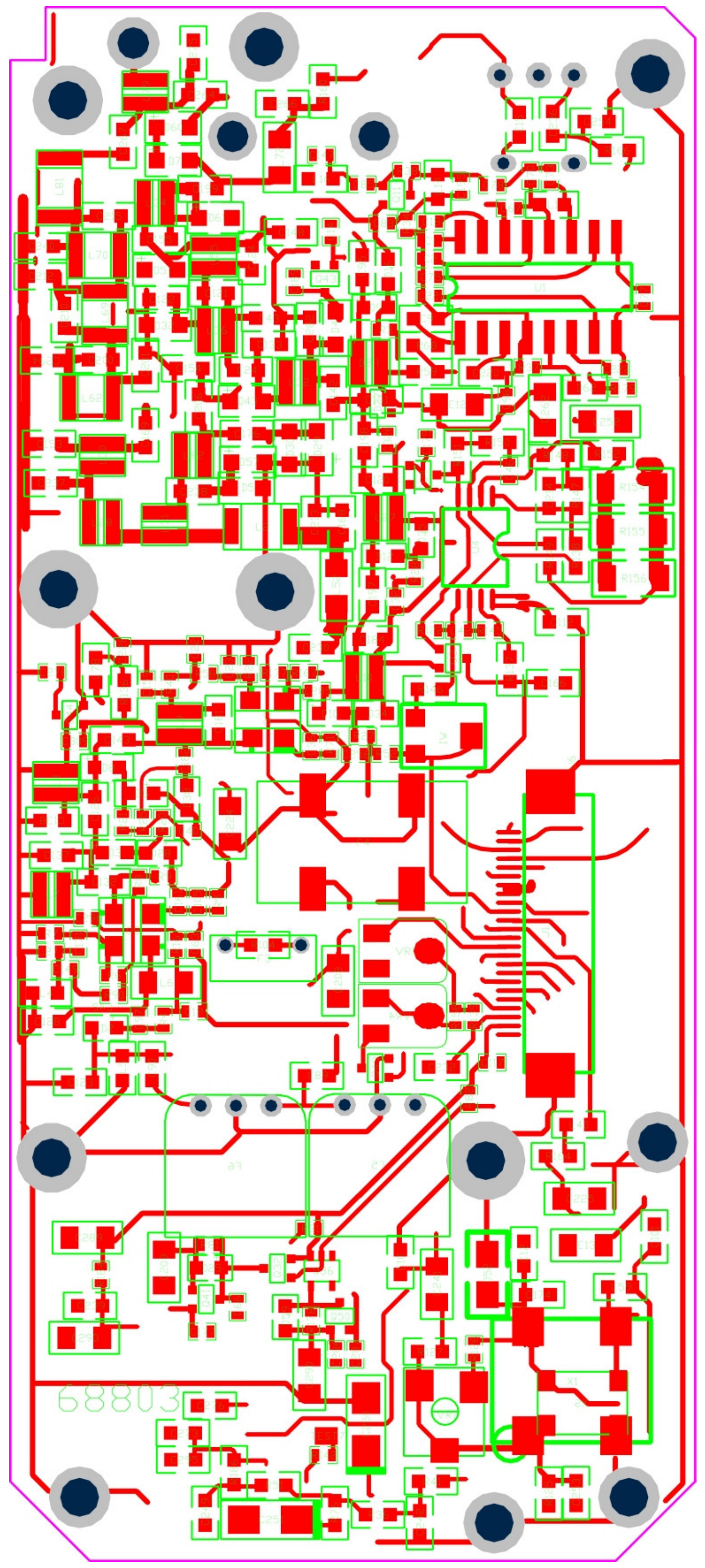
The encode signal is generated by the MPU (IC1) and output from the TONE terminal (pin 20) of the MPU. The unwanted high-frequency components of the encode signal output from the MPU are removed with a low-pass filter, and applied to VCO modulation input (MOD) and TCXO VC terminal for modulation.
The decode signal is input to the SIGIN pin (pin 17) of the MPU after the waveform of the audio signal from the FM IC .Then the set CTCSS tone frequency and DCS code are detected by digital signal processing in the MPU to control muting.

### ■ VOX

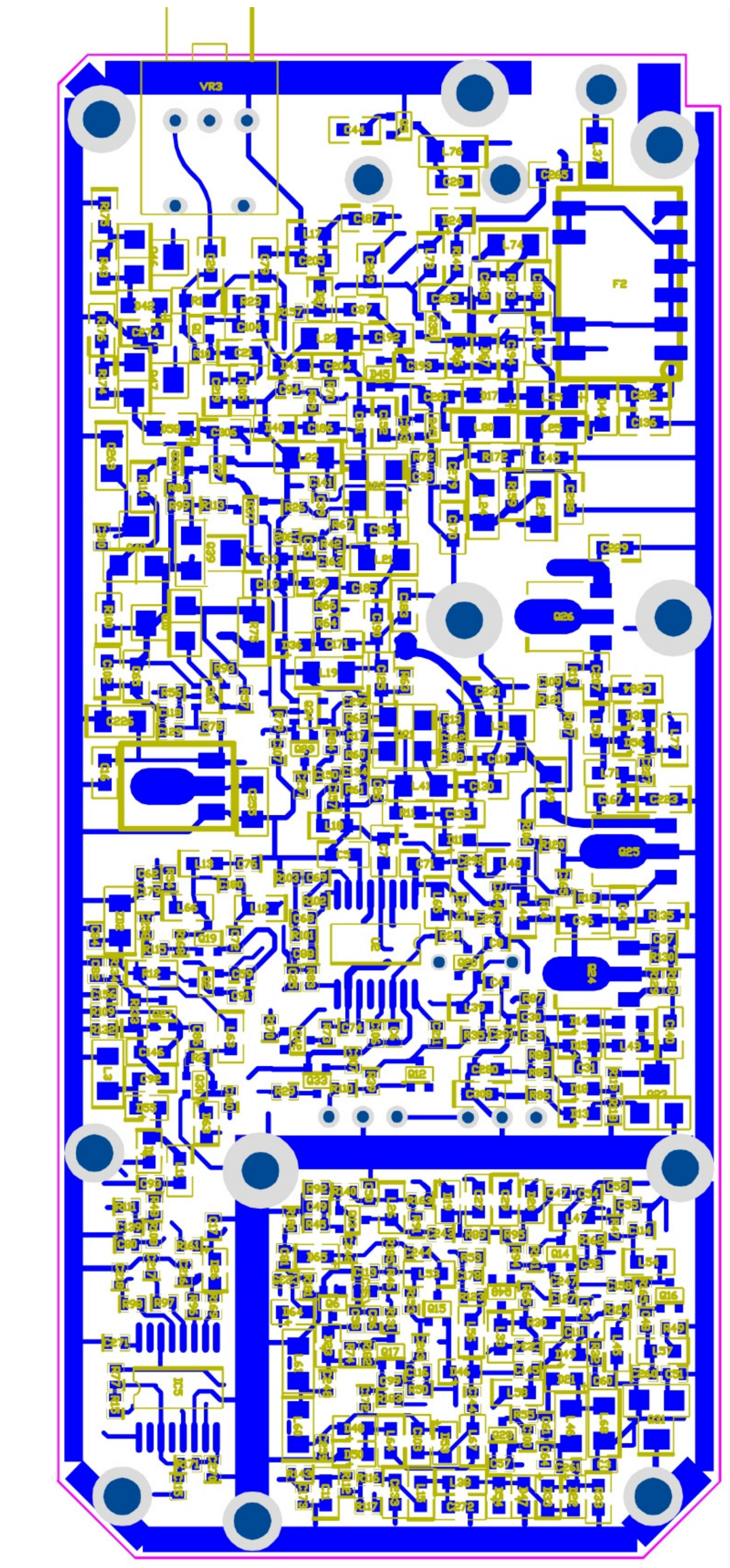
The Q6 amplify the audio signal captured in the microphone, and then the signal is converted into the DC Voltage by D3. The DC voltage activates the MPU (IC1), and the VOX starts.


CPU
AMP
Q48
PLL
IC5
TXCO
X1
MOD
D46
430 VCO
Q31
150 VC0
Q17
BUFF AMP
Q16
BUFF AMP
Q15
AMP
Q14
AMP
Q13
LPF
Q12
LPF
Q11
VR4
AF AMP
IC6
DCS
CTCSS
VOXDET
Q6,D8
SWITCH
D13,D14,D15,D18
AMP
Q23
AMP
Q24
DRIVE AMP
Q25
RF AMP
Q26
APC
U4,R154,R155,R156
ANT SW
D44,D66,D67
ANT SW
D4,D43,D7,D60
VHF LPF
UHF LPF
TG-UV

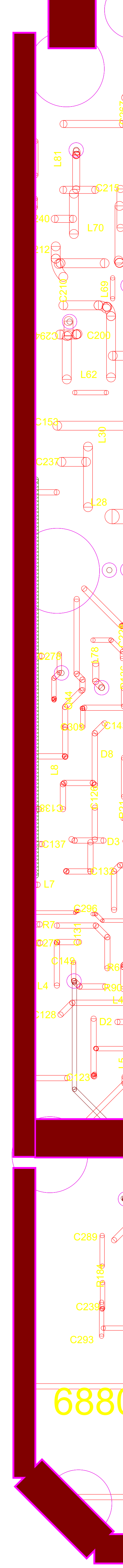
## TOP DIAGRAM



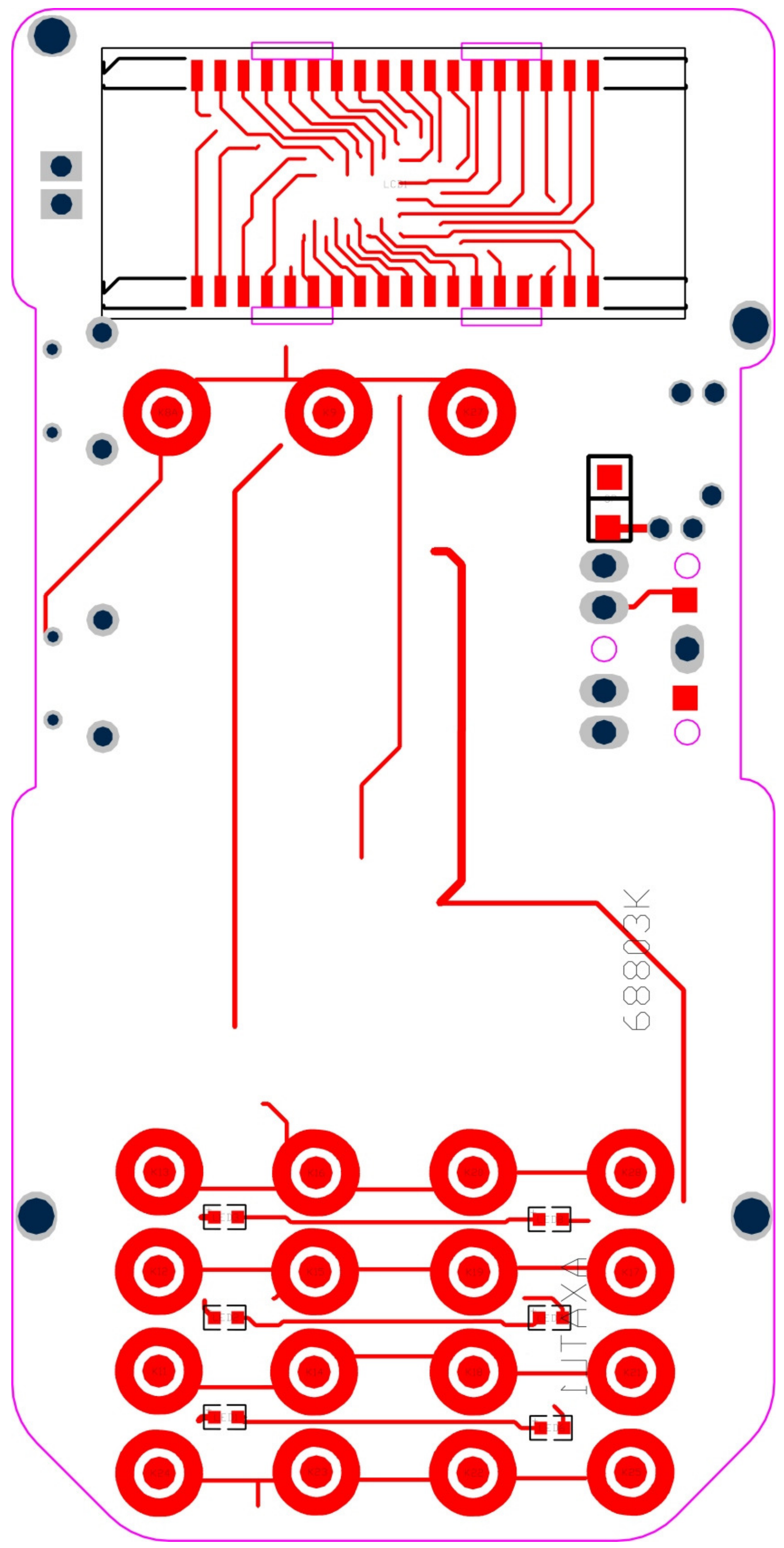
## BOTTOM DIAGRAM



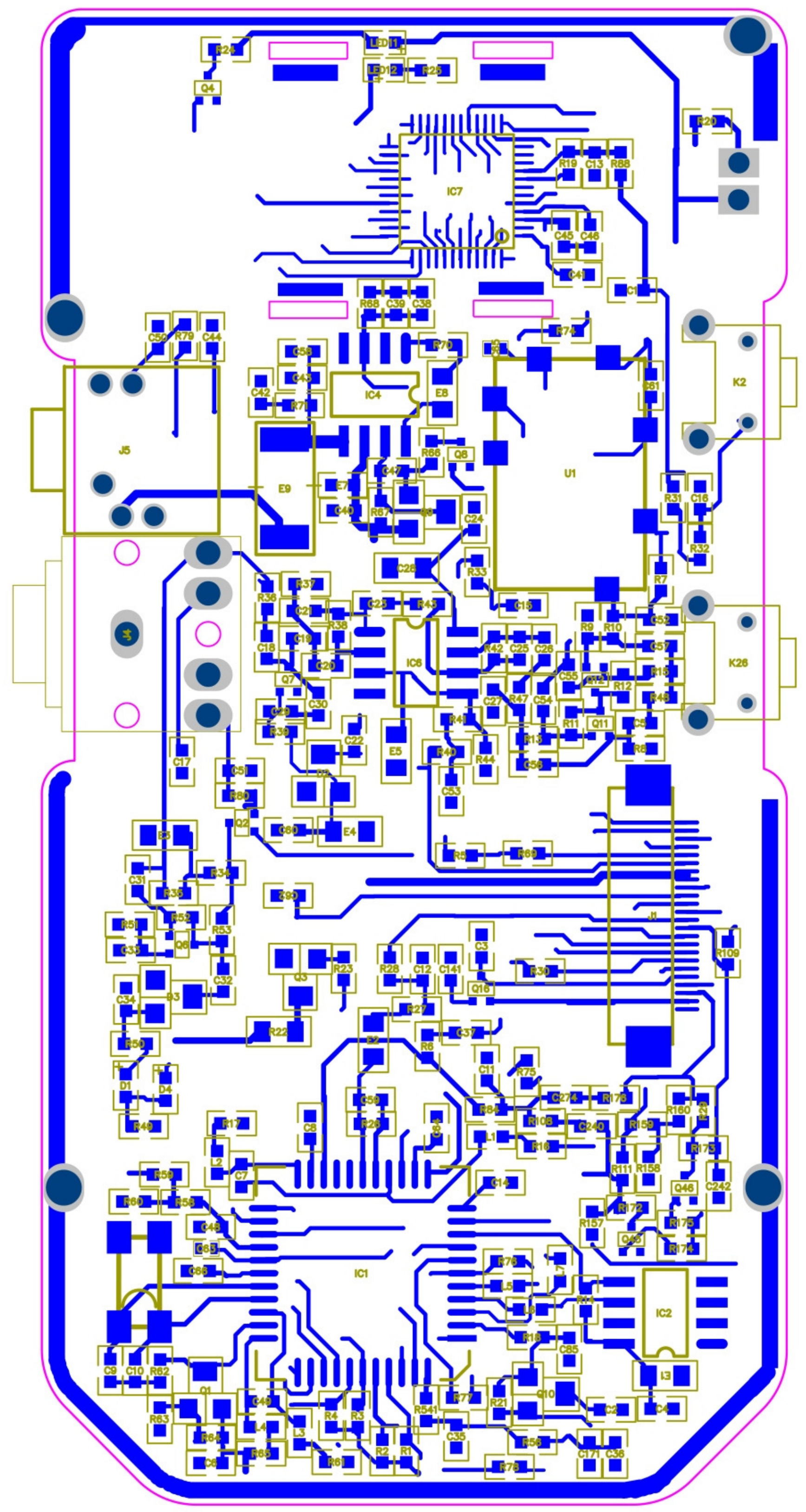




# TOP CONTROL BOARD DIAGRAM



# BOTTOM CONTROL BOARD DIAGRAM



# PARTS LIST

| Ref NO. | Specification | Tilte | Manufacturer |
|---|---|---|---|
| C1 | 104P | CM05X7R104K16AT | KYOCERA |
| C10 | 102P | CM05X7R102K50AH | KYOCERA |
| C100 | 102P | CM05X7R102K50AH | KYOCERA |
| C101 | 10P | CM05CG100C50AH | KYOCERA |
| C102 | 104P | CM05X7R104K16AT | KYOCERA |
| C104 | 224P | CM05X7R224K10AT | KYOCERA |
| C105 | 103P | CM05X7R103K16AH | KYOCERA |
| C106 | 103P | CM05X7R103K16AH | KYOCERA |
| C107 | 103P | CM05X7R103K16AH | KYOCERA |
| C108 | 103P | CM05X7R103K16AH | KYOCERA |
| C109 | 103P | CM05X7R103K16AH | KYOCERA |
| C11 | 104P | CM05X7R104K16AT | KYOCERA |
| C110 | 103P | CM05X7R103K16AH | KYOCERA |
| C111 | 1P | CM05CG1R0B50AH | KYOCERA |
| C112 | 103P | CM05X7R103K16AH | KYOCERA |
| C113 | 103P | CM05X7R103K16AH | KYOCERA |
| C114 | 103P | CM05X7R103K16AH | KYOCERA |
| C115 | 103P | CM05X7R103K16AH | KYOCERA |
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| C117 | 103P | CM05X7R103K16AH | KYOCERA |
| C118 | 104P | CM05X7R104K16AT | KYOCERA |
| C119 | 105P | CM05X7R105K16AH | KYOCERA |
| C12 | 104P | CM05X7R104K16AT | KYOCERA |
| C121 | 1P | CM05CG1R0B50AH | KYOCERA |
| C122 | 4P | CM05CG4R0B50AH | KYOCERA |
| C123 | 15P | CM05CG150J50AT | KYOCERA |
| C124 | 1P | CM05CG1R0B50AH | KYOCERA |
| C125 | 5P | CM05CG5R0B50AH | KYOCERA |
| C126 | 1P | CM05CG1R0B50AH | KYOCERA |
| C127 | 1P | CM05CG1R0B50AH | KYOCERA |
| C128 | 18P | CM05CG180J50AT | KYOCERA |
| C129 | 105P | CM05X7R105K16AH | KYOCERA |
| C13 | 104P | CM05X7R104K16AT | KYOCERA |
| C130 | 18P | CM05CG180J50AT | KYOCERA |
| C131 | 102P | CM05X7R102K50AH | KYOCERA |
| C132 | 102P | CM05X7R102K50AH | KYOCERA |
| C134 | 102P | CM05X7R102K50AH | KYOCERA |
| C135 | 102P | CM05X7R102K50AH | KYOCERA |
| C138 | 2P | CM05CG2R0B50AH | KYOCERA |
| C139 | 224P | CM05X7R224K10AT | KYOCERA |
| C14 | 104P | CM05X7R104K16AT | KYOCERA |
| C140 | 12P | CM05CG120J50AT | KYOCERA |
| C141 | 2P | CM05CG2R0B50AH | KYOCERA |
| C143 | 470P | CM05X7R470K50AH | KYOCERA |

| Ref NO. | Specification | Tilte | Manufacturer |
|---|---|---|---|
| C144 | 1P5 | CM05CG1R5B50AH | KYOCERA |
| C145 | 1P5 | CM05CG1R5B50AH | KYOCERA |
| C146 | 39P | CM05CG390J50AH | KYOCERA |
| C147 | 18P | CM05CG180J50AT | KYOCERA |
| C148 | 3P | CM05CG3R0B50AH | KYOCERA |
| C149 | 5P | CM05CG5R0B50AH | KYOCERA |
| C15 | 104P | CM05X7R104K16AT | KYOCERA |
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| C154 | 15P | CM05CG150J50AT | KYOCERA |
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| C156 | 15P | CM05CG150J50AT | KYOCERA |
| C158 | 12P | CM05CG120J50AT | KYOCERA |
| C159 | 102P | CM05X7R102K50AH | KYOCERA |
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| C162 | 102P | CM05X7R102K50AH | KYOCERA |
| C163 | 102P | CM05X7R102K50AH | KYOCERA |
| C164 | 102P | CM05X7R102K50AH | KYOCERA |
| C165 | 102P | CM05X7R102K50AH | KYOCERA |
| C166 | 102P | CM05X7R102K50AH | KYOCERA |
| C167 | 22P | CM05C220J50AH | KYOCERA |
| C168 | 102P | CM05X7R102K50AH | KYOCERA |
| C169 | 102P | CM05X7R102K50AH | KYOCERA |
| C17 | 104P | CM05X7R104K16AT | KYOCERA |
| C170 | 470P | CM05X7R470K50AH | KYOCERA |
| C171 | 200P | CM05CG201J50AH | KYOCERA |
| C172 | 102P | CM05X7R102K50AH | KYOCERA |
| C173 | 102P | CM05X7R102K50AH | KYOCERA |
| C174 | 102P | CM05X7R102K50AH | KYOCERA |
| C175 | 102P | CM05X7R102K50AH | KYOCERA |
| C177 | 102P | CM05X7R102K50AH | KYOCERA |
| C178 | 102P | CM05X7R102K50AH | KYOCERA |
| C179 | 102P | CM05X7R102K50AH | KYOCERA |
| C18 | 470P | CM05X7R470K50AH | KYOCERA |
| C180 | 102P | CM05X7R102K50AH | KYOCERA |
| C182 | 200P | CM05CG201J50AH | KYOCERA |
| C183 | 2P | CM05CG2R0B50AH | KYOCERA |
| C185 | 200P | CM05CG201J50AH | KYOCERA |
| C186 | 200P | CM05CG201J50AH | KYOCERA |
| C187 | 10P | CM05CG100C50AH | KYOCERA |
| C188 | 102P | CM05X7R102K50AH | KYOCERA |
| C189 | 470P | CM05X7R470K50AH | KYOCERA |
| C19 | 102P | CM05X7R102K50AH | KYOCERA |

| Ref NO. | Specification | Tilte | Manufacturer |
|---|---|---|---|
| C190 | 2P | CM05CG2R0B50AH | KYOCERA |
| C191 | 5P | CM05CG5R0B50AH | KYOCERA |
| C192 | 15P | CM05CG150J50AT | KYOCERA |
| C193 | 102P | CM05X7R102K50AH | KYOCERA |
| C194 | 2P | CM05CG2R0B50AH | KYOCERA |
| C195 | 15P | CM05CG150J50AT | KYOCERA |
| C196 | 3P | CM05CG3R0B50AH | KYOCERA |
| C197 | 1P5 | CM05CG1R5B50AH | KYOCERA |
| C198 | 470P | CM05X7R470K50AH | KYOCERA |
| C199 | 470P | CM05X7R470K50AH | KYOCERA |
| C2 | 104P | CM05X7R104K16AT | KYOCERA |
| C20 | 103P | CM05X7R103K16AH | KYOCERA |
| C200 | 10P | CM05CG100C50AH | KYOCERA |
| C201 | 30P | CM05CG300C50AH | KYOCERA |
| C202 | 102P | CM05X7R102K50AH | KYOCERA |
| C203 | 1P | CM05CG1R0B50AH | KYOCERA |
| C205 | 12P | CMO5CG120J50AT | KYOCERA |
| C206 | 470P | CM05X7R470K50AH | KYOCERA |
| C207 | 470P | CM05X7R470K50AH | KYOCERA |
| C208 | 10uF | T491A106K10AT | KMET |
| C209 | 4uF7 | T491A75K016AS | KMET |
| C21 | 103P | CM05X7R103K16AH | KYOCERA |
| C210 | 10P | CM05CG100C50AH | KYOCERA |
| C211 | 100P | PARTYCL-RC02-104J-LF | YAGEO |
| C212 | 20P | CM05CG200C50AH | KYOCERA |
| C213 | 100P | PARTYCL-RC02-104J-LF | YAGEO |
| C214 | 100P | PARTYCL-RC02-104J-LF | YAGEO |
| C215 | 10P | CM05CG100C50AH | KYOCERA |
| C216 | 100P | PARTYCL-RC02-104J-LF | YAGEO |
| C217 | 100P | PARTYCL-RC02-104J-LF | YAGEO |
| C218 | 100P | PARTYCL-RC02-104J-LF | YAGEO |
| C219 | 152P | CM05X5R152K06AH | KYOCERA |
| C22 | 470P | CM05X7R470K50AH | KYOCERA |
| C220 | 105P | CM05X7R105K16AH | KYOCERA |
| C221 | 180P | CM05X5R180K06AH | KYOCERA |
| C222 | 332P | CM05X5R332K25AH | KYOCERA |
| C223 | 20P | CM05CG200C50AH | KYOCERA |
| C224 | 10uF | T491A106K010AT | KEMET |
| C225 | 10uF | T491A106K010AT | KEMET |
| C226 | 10uF | T491A106K010AT | KEMET |
| C227 | 102P | CM05X7R102K50AH | KYOCERA |
| C228 | 102P | CM05X7R102K50AH | KYOCERA |
| C229 | 4P | CM05CG4R0B50AH | KYOCERA |
| C23 | 470P | CM05X7R470K50AH | KYOCERA |

| Ref NO. | Specification | Tilte | Manufacturer |
|---|---|---|---|
| C230 | 105P | CM05X7R105K16AH | KYOCERA |
| C231 | 105P | CM05X7R105K16AH | KYOCERA |
| C232 | 105P | CM05X7R105K16AH | KYOCERA |
| C233 | 104P | CM05X7R104K16AT | KYOCERA |
| C234 | 2P | CM05CG2R0B50AH | KYOCERA |
| C235 | 470P | CM05X7R470K50AH | KYOCERA |
| C236 | 105P | CM05X7R105K16AH | KYOCERA |
| C237 | 56P | CM05CG560J50AH | KYOCERA |
| C238 | 20P | CM05CG200C50AH | KYOCERA |
| C239 | 102P | CM05X7R102K50AH | KYOCERA |
| C24 | 470P | CM05X7R470K50AH | KYOCERA |
| C240 | 15P | CM05CG150J50AT | KYOCERA |
| C241 | 4.7uF | T149A75K016AS | KEMET |
| C242 | 104P | CM05X7R104K16AT | KYOCERA |
| C243 | 22P | CM05C220J50AH | KYOCERA |
| C244 | 33P | CM05CG330J50AH | KYOCERA |
| C245 | 33P | CM05CG330J50AH | KYOCERA |
| C246 | 22P | CM05C220J50AH | KYOCERA |
| C247 | 22P | CM05C220J50AH | KYOCERA |
| C248 | 103P | CM05X7R103K16AH | KYOCERA |
| C249 | 224P | CM05X7R224K10T | KYOCERA |
| C25 | 470P | CM05X7R470K50AH | KEMET |
| C250 | 2UF2 | T491A225K016AS | KEMET |
| C251 | 4UF7 | T491A75K016AS | KEMET |
| C252 | 10uF | T491106K010AT | KYOCERA |
| C253 | 103P | CM05X7R103K16AH | KYOCERA |
| C254 | 223P | CM05X7R223K16AT | KYOCERA |
| C255 | 105P | CM05X7R105K16AH | KYOCERA |
| C256 | 471P | CM05X7R471K50AH | KYOCERA |
| C257 | 120P | CM05X7R120K16AH | KYOCERA |
| C258 | 47P | CM05CG470J50AH | KYOCERA |
| C26 | 102P | CM05X7R102K50AH | KYOCERA |
| C260 | 5P | CM05CG5R0B50AH | KYOCERA |
| C261 | 470P | CM05X7R470K50AH | KYOCERA |
| C262 | 10uF | T491A106K010AT | KEMET |
| C263 | 10uF | T491A106K010AT | KEMET |
| C264 | 470P | CM05X7R470K50AH | KYOCERA |
| C265 | 4P | CM05CG4R0B50AH | KYOCERA |
| C266 | 102P | CM05X7R102K50AH | KYOCERA |
| C267 | 47P | CM05CG470J50AH | KYOCERA |
| C268 | 102P | CM05X7R102K50AH | KYOCERA |
| C269 | 102P | CM05X7R102K50AH | KYOCERA |
| C27 | 470P | CM05X7R470K50AH | KYOCERA |
| C270 | 103P | CM05X7R103K16AH | KYOCERA |

| Ref NO. | Specification | Tilte | Manufacturer |
|---|---|---|---|
| C271 | 103P | CM05X7R103K16AH | KYOCERA |
| C272 | 102P | CM05X7R102K50AH | KYOCERA |
| C273 | 102P | CM05X7R102K50AH | KYOCERA |
| C274 | 470P | CM05X7R470K50AH | KYOCERA |
| C275 | 1P | CM05CG1R0B50AH | KYOCERA |
| C276 | 473P | CM05X5R473KC10AH | KYOCERA |
| C277 | 5P | CM05CG5R0B50AH | KYOCERA |
| C278 | 102P | CM05X7102K50AH | KYOCERA |
| C279 | 470P | CM05X7R470K50AH | KYOCERA |
| C28 | 102P | CM05X7R102K50AH | KYOCERA |
| C280 | 470P | CM05X7R470K50AH | KYOCERA |
| C283 | 102P | CM05X7R102K50AH | KYOCERA |
| C285 | 102P | CM05X7R102K50AH | KYOCERA |
| C286 | 102P | CM05X7R102K50AH | KYOCERA |
| C287 | 102P | CM05X7R102K50AH | KYOCERA |
| C288 | 102P | CM05X7R102K50AH | KYOCERA |
| C289 | 4uF7 | T491A75K016AS | KEMET |
| C29 | 470P | CM05X7R470K50AH | KYOCERA |
| C290 | 4uF7 | T491A75K016AS | KEMET |
| C291 | 102P | CM05X7R102K50AH | KYOCERA |
| C292 | 102P | CM05X7R102K50AH | KYOCERA |
| C293 | 10uF | T491A106K010AT | KEMET |
| C294 | 27P | CM05CG270J50AH | KYOCERA |
| C295 | 104P | CM05X7R104K16AT | YAGEO |
| C296 | 102P | CM05X7R102K50AH | KYOCERA |
| C297 | 102P | CM05X7R102K50AH | YAGEO |
| C299 | 102P | CM05X7R102K50AH | YAGEO |
| C30 | 470P | CM05X7R470K50AH | KYOCERA |
| C302 | 102P | CM05X7R102K50AH | YAGEO |
| C303 | 102P | CM05X7R102K50AH | YAGEO |
| C306 | 102P | CM05X7R102K50AH | YAGEO |
| C307 | 102P | CM05X7R102K50AH | KYOCERA |
| C308 | 102P | CM05X7R102K50AH | KYOCERA |
| C309 | 102P | CM05X7R102K50AH | KYOCERA |
| C31 | 470P | CM05X7R470K50AH | KYOCERA |
| C310 | 102P | CM05X7R102K50AH | KYOCERA |
| C32 | 470P | CM05X7R470K50AH | KYOCERA |
| C327 | 103P | CM05X7R103K16AH | KEMET |
| C33 | 470P | CM05X7R470K50AH | KEMET |
| C34 | 470P | CM05X7R470K50AH | KEMET |
| C35 | 470P | CM05X7R470K50AH | KYOCERA |
| C36 | 470P | CM05X7R470K50AH | KYOCERA |
| C37 | 470P | CM05X7R470K50AH | KYOCERA |
| C38 | 470P | CM05X7R470K50AH | KYOCERA |

| Ref NO. | Specification | Tilte | Manufacturer |
|---|---|---|---|
| C39 | 470P | CM05X7R470K50AH | KYOCERA |
| C4 | 104P | CM05X7R104K16AT | KYOCERA |
| C40 | 470P | CM05X7R470K50AH | KYOCERA |
| C41 | 10 | CM05CG100C50AH | KYOCERA |
| C42 | 470P | CM05X7R470K50AH | KYOCERA |
| C43 | 6P | CM05CG6R0C50AH | KYOCERA |
| C44 | 102P | CM05X7R102K50AH | KYOCERA |
| C45 | 470P | CM05X7R470K50AH | KYOCERA |
| C47 | 12P | CM05CG120J50AT | KYOCERA |
| C48 | 0.5P | CM05CGR50B50AH | KYOCERA |
| C49 | 470P | CM05X7R470K50AH | KYOCERA |
| C5 | 104P | CM05X7R104K16AT | KYOCERA |
| C50 | 470P | CM05X7R470K50AH | KYOCERA |
| C51 | 6P | CM05CG6R0C50AH | KYOCERA |
| C52 | 470P | CM05X7R470K50AH | KYOCERA |
| C53 | 470P | CM05X7R470K50AH | KYOCERA |
| C55 | 102P | CM05X7R102K50AH | KYOCERA |
| C56 | 103P | CM05X7R103K16AH | KYOCERA |
| C57 | 470P | CM05X7R470K50AH | KYOCERA |
| C58 | 103P | CM05X7R103K16AH | KYOCERA |
| C59 | 103P | CM05X7R103K16AH | KYOCERA |
| C6 | 104P | CM05X7R104K16AT | KYOCERA |
| C60 | 1P | CM05CG1R0B50AH | KYOCERA |
| C61 | 102P | CM05X7R102K50AH | KYOCERA |
| C62 | 470P | CM05X7R470K50AH | KYOCERA |
| C63 | 470P | CM05X7R470K50AH | KYOCERA |
| C65 | 103P | CM05X7R103K16AH | KYOCERA |
| C66 | 470P | CM05X7R470K50AH | KYOCERA |
| C67 | 220P | CM05CG221J50AH | KYOCERA |
| C68 | 220P | CM05CG221J50AH | KYOCERA |
| C69 | 220P | CM05CG221J50AH | KYOCERA |
| C7 | 104P | CM05X7R104K16AT | KYOCERA |
| C70 | 47P | CM05CG470J50AH | KYOCERA |
| C71 | 68P | CM05CG680J50AH | KYOCERA |
| C72 | 68P | CM05CG680J50AH | KYOCERA |
| C73 | 68P | CM05CG680J50AH | KYOCERA |
| C74 | 82P | CM05CG820J50AH | KYOCERA |
| C75 | 330P | CM05CG331J50AH | KYOCERA |
| C76 | 330P | CM05CG331J50AH | KYOCERA |
| C77 | 392P | CM05X7R392K25AH | KYOCERA |
| C78 | 100P | PARTYCL-RC02-104J-LF | YAGEO |
| C79 | 104P | CM05X7R104K16AT | KYOCERA |
| C8 | 104P | CM05X7R104K16AT | KYOCERA |
| C80 | 102P | CM05X7R102K50AH | KYOCERA |

| Ref NO. | Specification | Tilte | Manufacturer |
|---|---|---|---|
| C81 | 5P | CM05CG5R0B50AH | KYOCERA |
| C82 | 102P | CM05X7R102K50AH | KYOCERA |
| C83 | 102P | CM05X7R102K50AH | KYOCERA |
| C84 | 102P | CM05X7R102K50AH | KYOCERA |
| C85 | 102P | CM05X7R102K50AH | KYOCERA |
| C86 | 1P | CM05CG1R0B50AH | KYOCERA |
| C87 | 470P | CM05X7R470K50AH | KYOCERA |
| C88 | 100P | PARTYCL-RC02-104J-LF | YAGEO |
| C89 | 15P | CM05CG150J50AT | KYOCERA |
| C9 | 104P | CM05X7R104K16AT | KYOCERA |
| C90 | 680R | PARTYCL-RC02-681J-LF | KYOCERA |
| C91 | 102P | CM05X7R102K50AH | KYOCERA |
| C92 | 220P | CM05CG221J50AH | KYOCERA |
| C93 | 224P | CM05X7R224K10AT | KYOCERA |
| C94 | 102P | CM05X7R102K50AH | KYOCERA |
| C95 | 15P | CM05CG150J50AT | KYOCERA |
| C96 | 10P | CM05CG100C50AH | KYOCERA |
| C97 | 102P | CM05X7R102K50AH | KYOCERA |
| C98 | 102P | CM05X7R102K50AH | KYOCERA |
| C99 | 22P | CM05C220J50AH | KYOCERA |
| D1 | HVC350 | HVC350BTRF-E | RENESAS |
| D10 | HVC376B | HVC376BTRF-E | RENESAS |
| D11 | HSC277 | HSC277TRF-EQ | RENESAS |
| D12 | 200P | CM05CG201J50AH | KYOCERA |
| D13 | HSC277 | HSC277TRF-EQ | RENESAS |
| D14 | HSC277 | HSC277TRF-EQ | RENESAS |
| D15 | HSC277 | HSC277TRF-EQ | RENESAS |
| D16 | HVC369 | HVC369BTRF | HITACHI |
| D18 | HSC277 | HSC277TRF-EQ | RENESAS |
| D19 | HSC277 | HSC277TRF-EQ | RENESAS |
| D2 | HSC277 | HSC277TRF-EQ | RENESAS |
| D20 | HSC277 | HSC277TRF-EQ | RENESAS |
| D21 | HSC277 | HSC277TRF-EQ | RENESAS |
| D22 | HVC376B | HVC376BTRF-E | RENESAS |
| D23 | HSC277 | HSC277TRF-EQ | RENESAS |
| D24 | HSC277 | HSC277TRF-EQ | RENESAS |
| D25 | HSC277 | HSC277TRF-EQ | RENESAS |
| D26 | HSC277 | HSC277TRF-EQ | RENESAS |
| D27 | HSC277 | HSC277TRF-EQ | RENESAS |
| D28 | HVC369 | HVC369BTRF | HITACHI |
| D3 | HVC376B | HVC376BTRF-E | RENESAS |
| D31 | HSC277 | HSC277TRF-EQ | RENESAS |
| D33 | HVC376B | HVC376BTRF-E | RENESAS |
| D34 | HVC369 | HVC369BTRF | HITACHI |

| Ref NO. | Specification | Tilte | Manufacturer |
|---|---|---|---|
| D35 | HVC369 | HVC369BTRF | HITACHI |
| D36 | HVC369 | HVC369BTRF | HITACHI |
| D38 | HVC369 | HVC369BTRF | HITACHI |
| D39 | HVC369 | HVC369BTRF | HITACHI |
| D4 | HVU131 | HVU131TRF/BA592 E6327 | INFINEON |
| D40 | HVC369 | HVC369BTRF | HITACHI |
| D42 | 2R2 | PARTYCL-RC02-2R2J-LF | YAGEO |
| D43 | HVU131 | HVU131TRF/BA592 E6327 | INFINEON |
| D44 | HVU131 | HVU131TRF/BA592 E6327 | INFINEON |
| D46 | HVC369 | HVC369BTRF | HITACHI |
| D47 | HVC376B | HVC376BTRF-E | RENESAS |
| D48 | HVC376 | HVC376BTRF-E | RENESAS |
| D49 | HVC369 | HVC369BTRF | HITACHI |
| D5 | HVU131 | HVU131TRF/BA592 E6327 | INFINECON |
| D50 | HVC376 | HVC376BTRF-E | RENESAS |
| D52 | 3.1V | RD3.0UH-TI | TOSHIBA |
| D53 | HVC369 | HVC369BTRF | HITACHI |
| D54 | HVC376B | HVC376BTRF-E | RENESAS |
| D55 | 220P | CM05CG221J50AH | KYOCERA |
| D56 | HSC277 | HSC277TRF-EQ | RENESAS |
| D57 | HVU131 | HVU131TRF/BA592 E6327 | INFINECON |
| D59 | HSC277 | HSC277TRF-EQ | RENESAS |
| D6 | HVC369 | HVC369BTRF | HITACHI |
| D60 | HVU131 | HVU131TRF/BA592 E6327 | INFINECON |
| D61 | 1P | CM05CG1R0B50AH | KYOCERA |
| D62 | HSC277 | HSC277TRF-EQ | RENESAS |
| D63 | HSC277 | HSC277TRF-EQ | RENESAS |
| D64 | HSC277 | HSC277TRF-EQ | RENESAS |
| D65 | HSC277 | HSC277TRF-EQ | RENESAS |
| D66 | HSC277 | HSC277TRF-EQ | RENESAS |
| D67 | HSC277 | HSC277TRF-EQ | RENESAS |
| D7 | HVU131 | HVU131TRF/BA592 E6327 | INFINECON |
| D8 | 200P | CM05CG201J50AH | KYOCERA |
| D9 | 200P | CM05CG201J50AH | KYOCERA |
| E12 | 10UF | T491A106K010AT | KEMET |
| F3 | 50C24 | CQ 50C24 | CQ |
| F4 | 450F | LTM450FW | CD |
| F5 | 38.550M | | |
| F6 | 38.550M | | |
| Ic5 | 8308 | Fs8308 | 普诚 |
| J1 | CON24 | | |
| L1 | 100nH | CH160808-R10J | Sunlord |
| L10 | 4T(1.4) | 0.35*1.5*4T | |
| L11 | 22uH | CI160808-180K | Sunlord |

| Ref NO. | Specification | Tilte | Manufacturer |
|---|---|---|---|
| L12 | 220nH | CH160808-R22J | Sunlord |
| L13 | 470nH | CH160808-R47J | Sunlord |
| L14 | 100nH | CH160808-R10J | Sunlord |
| L15 | 1K5 | PARTYCL-RC02-152J-LF | YAGEO |
| L16 | 100nH | CH160808-R10J | Sunlord |
| L17 | 100nH | CH160808-R10J | Sunlord |
| L18 | 220nH | CH160808-R22J | Sunlord |
| L19 | 100nH | CH160808-R10J | Sunlord |
| L2 | 8T | 0.35*1.5*8T | |
| L20 | 3T | 0.35*1.5*3T | |
| L21 | 100nH | CH160808-R10J | Sunlord |
| L22 | 100nH | CH160808-R10J | Sunlord |
| L25 | 1UH | CH160808-IR0K | Sunlord |
| L26 | 100nH | CH160808-R10J | Sunlord |
| L27 | 3T | 0.35*1.5*3T | |
| L28 | 3T | 0.35*1.5*3T | |
| L29 | 1uH | CI160808-IR0K | Sunlord |
| L3 | 100nH | CH160808-R10J | Sunlord |
| L30 | 2(1.0)T | 0.35*1.0*2T | |
| L32 | 4T | 0.35*1.5*4T | |
| L33 | 18nH | CI160808-18NJ | Sunlord |
| L34 | 4T | 0.35*1.5*4T | |
| L35 | 100nH | CH160808-R10J | Sunlord |
| L36 | 3T | 0.35*1.5*4T | |
| L37 | 3K3 | PARTYCL-RC02-332J-LF | YAGEO |
| L38 | 1uH | CI160808-IR0K | Sunlord |
| L39 | 33uH | CI160808-270K | Sunlord |
| L4 | 22nH | CH160808-22NJ | Sunlord |
| L40 | 33uH | CI160808-270K | Sunlord |
| L41 | 1uH | CI160808-1R0K | Sunlord |
| L42 | 15nH | CH160808-15NJ | Sunlord |
| L43 | 100nH | CH160808-R10J | Sunlord |
| L44 | 100nH | CH160808-R10J | Sunlord |
| L45 | 100nH | CH160808-R10J | Sunlord |
| L46 | 10nH | CH160808-R10J | Sunlord |
| L47 | 18nH | CH160808-R18NJ | Sunlord |
| L48 | 0.1uH | CI160808-R10K | Sunlord |
| L49 | 1uH | CI160808-IR0K | Sunlord |
| L5 | 0.56uH | CI160808-R56K | Sunlord |
| L50 | 0R | PARTYCL-RC02-0RJ-LF | YAGEO |
| L51 | CNB2010 | PB201209-101 | Sunlord |
| L52 | CB2012-100 | PB201209-101 | Sunlord |
| L53 | 100nH | CH160808-R10J | Sunlord |
| L54 | 22nH | CH160808-22NJ | |

| Ref NO. | Specification | Tilte | Manufacturer |
|---|---|---|---|
| L55 | 3T | 0.35*1.5*3t | Sunlord |
| L56 | 0.1uH | CI160808-R10K | Sunlord |
| L57 | 1uH | CI160808-IR10K | Sunlord |
| L58 | 100K | PARTYCL-RC02-100K-J-LF | YAGEO |
| L59 | 1uH | CI160808-IR0K | Sunlord |
| L6 | 1uH | CI160808-IR0K | Sunlord |
| L60 | 27nH | HW10805UC27NG-BM | Sunlord |
| L61 | 15nH | CH160808-15NJ | Sunlord |
| L62 | 5T | 0.5*1.5*5T | |
| L63 | 220nH | CH160808-R22J | Sunlord |
| L64 | 22uH | CI160808-180K | Sunlord |
| L65 | 220nH | CH160808-R22J | Sunlord |
| L66 | 560nH | CI160808-R56K | Sunlord |
| L67 | 22uH | CI160808-180K | Sunlord |
| L68 | 27nH | HW10805UC27NG-BM | Sunlord |
| L69 | 6T | 0.35*1.5*6T | |
| L7 | 4T(1.4) | 0.35*1.5*4T | |
| L70 | 5T | 0.5*1.5*5T | |
| L71 | 22nH | CH160808-22NJ | Sunlord |
| L72 | 1uH | CI160808-IR0K | Sunlord |
| L73 | 1uH | CI160808-IR0K | Sunlord |
| L76 | 1uH | CI160808-IR0K | Sunlord |
| L77 | 220nH | CH160808-R22J | Sunlord |
| L78 | 220nH | CH160808-R22J | Sunlord |
| L79 | 2T | 0.35*1.0*2T | |
| L8 | 4T(1.4) | 0.35*1.5*4T | |
| L80 | 100nH | CH160808-R10J | Sunlord |
| L81 | 8T | 0.35*1.5*8T | |
| L82 | 1T(1.0) | 0.35*1.0*1T | |
| L9 | 4T(1.4) | 0.35*1.5*4T | |
| Q1 | 2SC4617 | ZPC4617R | PHILIPS |
| Q10 | BV4 | 2SB624-TB | NEC |
| Q11 | 2SC5066 | 2SC5066-Y | TOSHIBA |
| Q12 | 2SC5066 | 2SC5066-Y | TOSHIBA |
| Q13 | 2SC5066 | 2SC5066-Y | TOSHIBA |
| Q14 | 2SC5066 | 2SC5066-Y | TOSHIBA |
| Q15 | 2SC5066 | 2SC5066-Y | TOSHIBA |
| Q16 | 2SC5066 | 2SC5066-Y | TOSHIBA |
| Q17 | 2SC5066 | 2SC5066-Y | TOSHIBA |
| Q18 | UMG3N | UMG3N NTR | ROHM |
| Q19 | 2SC5066 | 2SC5066-Y | TOSHIBA |
| Q2 | DTA114EE | DTA114EE-TL | ROHM |
| Q20 | DTA114EE | DTA114EE-TL | ROHM |
| Q21 | 3SK318 | 3SK318YB-TL-EQ | RENESAS |

| Ref NO. | Specification | Tilte | Manufacturer |
|---|---|---|---|
| Q22 | 998R | BF998R | PHILIPS |
| Q23 | R24 | 2SC3356-T113 | NEC |
| Q24 | 2SC3357 | 2SC3357-T1 | NEC |
| Q25 | 234 | NESG260234 | NEC |
| Q26 | RAQ0009 | RQA0009SXTL-E | RENESAS |
| Q27 | 2SC5066 | 2SC5066SXTL-E | TOSHIBA |
| Q28 | DTC114EE | DTA114EE-TL | ROHM |
| Q29 | DTA114EE | DTA114EE-TL | ROHM |
| Q3 | DTC114EE | DTA114EE-TL | ROHM |
| Q30 | 2SC5066 | 2SC5066-Y | TOSHIBA |
| Q31 | K52 | 2SK508-T1B | NEC |
| Q32 | DTA114EE | DTA114EE-TL | ROHM |
| Q33 | DTC114EE | DTA114EE-TL | ROHM |
| Q34 | UMC4 | UMC4 NTR | ROHM |
| Q35 | DTC114EE | DTA114EE-TL | ROHM |
| Q36 | UMC4 | UMC4 NTR | ROHM |
| Q37 | DTC114EE | DTA114EE-TL | ROHM |
| Q38 | DTC114EE | DTA114EE-TL | ROHM |
| Q39 | Bv4 | 2SB624-TB | NEC |
| Q4 | DTC114EE | DTA114EE-TL | ROHM |
| 40 | Bv4 | 2SB624-TB | NEC |
| Q41 | 2SC4617 | ZPC4617R | PHILIPS |
| Q42 | DTA114EE | DTA114EE-TL | ROHM |
| Q43 | DTC114EE | DTA114EE-TL | ROHM |
| Q44 | DTC114EE | DTA114EE-T | ROHM |
| Q46 | Bv4 | 2SB624-TB | NEC |
| Q48 | 2SC4617 | 2SC5066-Y | TOSHIBA |
| Q5 | DTC114EE | DTA114EE-TL | ROHM |
| Q50 | 2SC4617 | ZPC4617R | PHILIPS |
| Q6 | DTC114EE | DTA114EE-TL | ROHM |
| Q7 | DTC114EE | DTA114EE-TL | ROHM |
| Q8 | 3SK318 | 3SK318YB-TL-EQ | RENESAS |
| Q9 | 3SK318 | 3SK318YB-TL-EQ | RENESAS |
| R1 | 47K | PARTYC0402-07 47KL | YAGEO |
| R10 | 1M8 | PARTYCL-RC02-07 1855J-LF | YAGEO |
| R100 | 47K | PARTYC0402-07 47KL | YAGEO |
| R101 | 180K | PARTYCL-RC02-184J-LF | YAGEO |
| R102 | 180K | PARTYCL-RC02-184J-LF | YAGEO |
| R103 | 18K | PARTYCL-RC02-183J-LF | YAGEO |
| R104 | 1K8 | PARTYCL-RC02-182J-LF | YAGEO |
| R105 | 22K | PARTYCL-RC02-223J-LF | YAGEO |
| R106 | 1K | PARTYCL-RC02-102J-LF | YAGEO |
| R107 | 10K | PARTYCL-RC02-103J-LF | YAGEO |
| R108 | 3K3 | PARTYCL-RC02-332J-LF | YAGEO |

| Ref NO. | Specification | Tilte | Manufacturer |
|---|---|---|---|
| R109 | 220R | PARTYCL-RC02-221J-LF | YAGEO |
| R11 | 4K7 | PARTYCL-RC02-472J-LF | YAGEO |
| R110 | 560R | CM05X7R561K50AH | KYOCERA |
| R112 | 560R | CM05X7R561K50AH | KYOCERA |
| R113 | 4K7 | PARTYCL-RC02-472J-LF | YAGEO |
| R114 | 4K7 | PARTYCL-RC02-472J-LF | YAGEO |
| R115 | 1K | PARTYCL-RC02-102J-LF | YAGEO |
| R116 | 2K2 | PARTYCL-RC02-222J-LF | YAGEO |
| R117 | 1K5 | PARTYCL-RC02-152J-LF | YAGEO |
| R118 | 470R | PARTYCL-RC02-471J-LF | YAGEO |
| R12 | 100R | PARTYC0402-07 100RL | YAGEO |
| R120 | 47K | PARTYC0402-07 47KL | YAGEO |
| R121 | 33K | PARTYCL-RC02-333J-LF | YAGEO |
| R122 | 8K2 | PARTYCL-RC02-822J-LF | YAGEO |
| R123 | 47K | PARTYC0402-07 47KL | YAGEO |
| R124 | 22R | PARTYCL-RC02-220J-LF | YAGEO |
| R125 | 22K | PARTYCL-RC02-223J-LF | YAGEO |
| R126 | 15K | PARTYCL-RC02-153J-LF | YAGEO |
| R127 | 47K | PARTYC0402-07 47KL | YAGEO |
| R128 | 680R | PARTYCL-RC02-681J-LF | YAGEO |
| R129 | 1K5 | PARTYCL-RC02-152J-LF | YAGEO |
| R13 | 150R | PARTYCL-RC02-151J-LF | YAGEO |
| R130 | 22R | PARTYCL-RC02-220J-LF | YAGEO |
| R131 | 22R | PARTYCL-RC02-220J-LF | YAGEO |
| R133 | 68K | PARTYCL-RC02-683J-LF | YAGEO |
| R134 | 22R | PARTYCL-RC02-220J-LF | YAGEO |
| R136 | 330R | PARTYCL-RC02-331J-LF | YAGEO |
| R137 | 1K5 | PARTYCL-RC02-152J-LF | YAGEO |
| R138 | 10K | PARTYCL-RC02-103J-LF | YAGEO |
| R139 | 30K | PARTYC0402-07 30KL | YAGEO |
| R14 | 330R | PARTYCL-RC02-331J-LF | YAGEO |
| R140 | 10K | PARTYCL-RC02-103J-LF | YAGEO |
| R141 | 10K | PARTYCL-RC02-103J-LF | YAGEO |
| R142 | 10K | PARTYCL-RC02-103J-LF | YAGEO |
| R143 | 560R | CM05X7R561K50AH | KYOCERA |
| R144 | 10K | PARTYCL-RC02-103J-LF | YAGEO |
| R145 | 1M | PARTYCL-RC02-07 105J-LF | YAGEO |
| R146 | 100K | PARTYCL-RC02-104J-LF | YAGEO |
| R147 | 150K | PARTYCL-RC02-1503F-LF | YAGEO |
| R148 | 150K | PARTYCL-RC02-1503F-LF | YAGEO |
| R149 | 150K | PARTYCL-RC02-1503F-LF | YAGEO |
| R15 | 1K5 | PARTYCL-RC02-152J-LF | YAGEO |
| R150 | 150K | PARTYCL-RC02-1503F-LF | YAGEO |
| R151 | 150K | PARTYCL-RC02-1503F-LF | YAGEO |

# PARTS LIST

| Ref NO. | Specification | Tilte | Manufacturer |
|---|---|---|---|
| R152 | 150K | PARTYCL-RC02-1503F-LF | YAGEO |
| R153 | 100K | PARTYCL-RC02-104J-LF | YAGEO |
| R154 | 0.39R | RC1206JR-07R 39L | PHYCOMP |
| R155 | 0.39R | RC1206JR-07R 39L | PHYCOMP |
| R156 | 0.39R | RC1206JR-07R 39L | PHYCOMP |
| R157 | 4K7 | PARTYCL-RC02-472J-LF | YAGEO |
| R159 | 180R | PART232270570 | PHYCOMP |
| R16 | 47R | YCL-RC02-470J-LF | YAGEO |
| R160 | 150R | PARTYCL-RC02-151J-LF | YAGEO |
| R161 | 82K | PARTYCL-RC02-823J-LF | YAGEO |
| R162 | 56R | YCL-RC02-560J-LF | YAGEO |
| R163 | 10R | PARTYCL-RC02-100J-LF | YAGEO |
| R164 | 10R | PARTYCL-RC02-100J-LF | YAGEO |
| R165 | 100K | PARTYCL-RC02-104J-LF | YAGEO |
| R166 | 39K | PARTYCL-RC02-393J-LF | YAGEO |
| R167 | 100K | PARTYCL-RC02-104J-LF | YAGEO |
| R168 | 470K | RC0402JR-07 390R | YAGEO |
| R169 | 1K | PARTYCL-RC02-102-LF | YAGEO |
| R17 | 47R | YCL-RC02-470J-LF | YAGEO |
| R170 | 30K | PARTYCL0402-07 30KL | YAGEO |
| R171 | 2K2 | PARTYCL-RC02-222J-LF | YAGEO |
| R172 | 150R | PARTYCL-RC02-151J-LF | YAGEO |
| R175 | 4K7 | PARTYCL-RC02-472J-LF | YAGEO |
| R177 | 68K | PARTYCL-RC02-683J-LF | YAGEO |
| R178 | 4K7 | PARTYCL-RC02-472J-LF | YAGEO |
| R179 | 10K | PARTYCL-RC02-103J-LF | YAGEO |
| R18 | 47R | YCL-RC02-470J-LF | YAGEO |
| R180 | 10K | PARTYCL-RC02-103J-LF | YAGEO |
| R171 | 10K | PARTYCL-RC02-103J-LF | YAGEO |
| R182 | 150K | PARTYCL-RC02-1503F-LF | YAGEO |
| R184 | 100K | PARTYCL-RC02-104J-LF | YAGEO |
| R185 | 3K3 | PARTYCL-RC02-332J-LF | YAGEO |
| R186 | 1K | PARTYCL-RC02-102J-LF | YAGEO |
| R19 | 47R | YCL-RC02-470J-LF | YAGEO |
| R2 | 47K | PARTYCL0402-07 47KL | YAGEO |
| R20 | 220K | PARTYCL-RC02-07 224J-LF | YAGEO |
| R21 | 220K | PARTYCL-RC02-07 224J-LF | YAGEO |
| R23 | 4K7 | PARTYCL-RC02-472J-LF | YAGEO |
| R24 | 100K | PARTYCL-RC02-104J-LF | YAGEO |
| R25 | 220K | PARTYCL-RC02-07 224J-LF | YAGEO |
| R26 | 220K | PARTYCL-RC02-07 224J-LF | YAGEO |
| R27 | 220K | PARTYCL-RC02-07 224J-LF | YAGEO |
| R28 | 220K | PARTYCL-RC02-07 224J-LF | YAGEO |
| R29 | 220K | PARTYCL-RC02-223J-LF | YAGEO |

| Ref NO. | Specification | Tilte | Manufacturer |
|---|---|---|---|
| R3 | 220K | PARTYCL-RC02-07 224J-LF | YAGEO |
| R30 | 1K | PARTYCL-RC02-102J-LF | YAGEO |
| R31 | 100K | PARTYCL-RC02-104J-LF | YAGEO |
| R32 | 100K | PARTYCL-RC02-104J-LF | YAGEO |
| R33 | 100nH | CH160808-R10J | Sunlord |
| R34 | 10R | PARTYCL-RC02-100J-LF | YAGEO |
| R35 | 2K7 | PARTYCL-RC02-272J-LF | YAGEO |
| R36 | 560R | CM05X7R561K50AH | KYOCERA |
| R37 | 330R | PARTYCL-RC02-331J-LF | YAGEO |
| R38 | 56K | PARTYCL0402-07 56KL | YAGEO |
| R39 | 680K | PARTYCL-RC02-684J-LF | YAGEO |
| R4 | 4K7 | PARTYCL-RC02-472J-LF | YAGEO |
| R40 | 100R | PARTYC0402-07 100RL | YAGEO |
| R41 | 2K2 | PARTYCL-RC02-222J-LF | YAGEO |
| R42 | 100R | PARTYC0402-07 100RL | YAGEO |
| R43 | 47K | PARTYC0402-07 47KL | YAGEO |
| R44 | 100R | PARTYC0402-07 100RL | YAGEO |
| R45 | 100R | PARTYC0402-07 100RL | YAGEO |
| R46 | 10R | PARTYCL-RC02-100J-LF | YAGEO |
| R47 | 100R | PARTYC0402-07 100RL | YAGEO |
| R48 | 4K7 | PARTYCL-RC02-472J-LF | YAGEO |
| R49 | 100R | PARTYC0402-07 100RL | YAGEO |
| R5 | 150R | PARTYCL-RC02-151J-LF | YAGEO |
| R50 | 330R | PARTYCL-RC02-331J-LF | YAGEO |
| R51 | 2K2 | PARTYCL-RC02-222J-LF | YAGEO |
| R52 | 100R | PARTYC0402-07 100RL | YAGEO |
| R53 | 100K | PARTYCL-RC02-104J-LF | YAGEO |
| R54 | 100R | PARTYC0402-07 100RL | YAGEO |
| R55 | 4K7 | PARTYCL-RC02-472J-LF | YAGEO |
| R56 | 2K7 | PARTYCL-RC02-272J-LF | YAGEO |
| R57 | 3K3 | PARTYCL-RC02-332J-LF | YAGEO |
| R58 | 100K | PARTYCL-RC02-104J-LF | YAGEO |
| R59 | 1M8 | PARTYCL-RC02-07 1855J-LF | YAGEO |
| R6 | 220K | PARTYCL-RC02-07 224J-LF | YAGEO |
| R60 | 220K | PARTYCL-RC02-07 224J-LF | KYOCERA |
| R61 | 100K | PARTYCL-RC02-104J-LF | YAGEO |
| R62 | 220K | PARTYCL-RC02-07 224J-LF | YAGEO |
| R63 | 100K | PARTYCL-RC02-104J-LF | YAGEO |
| R64 | 220K | PARTYCL-RC02-07 224J-LF | YAGEO |
| R65 | 100K | PARTYCL-RC02-104J-LF | YAGEO |
| R66 | 220K | PARTYCL-RC02-07 224J-LF | YAGEO |
| R67 | 100K | PARTYCL-RC02-104J-LF | YAGEO |
| R68 | 150K | PARTYCL-RC02-1503F-LF | YAGEO |
| R69 | 220K | PARTYCL-RC02-07 224J-LF | YAGEO |

| Ref NO. | Specification | Tilte | Manufacturer |
|---|---|---|---|
| R7 | 100K | PARTYCL-RC02-104J-LF | YAGEO |
| R70 | 220K | PARTYCL-RC02-07 224J-LF | YAGEO |
| R71 | 220R | PARTYCL-RC02-221J-LF | YAGEO |
| R72 | 47R | YCL-RC02-470J-LF | YAGEO |
| R73 | 1K8 | PARTYCL-RC02-182J-LF | YAGEO |
| R74 | 4K7 | PARTYCL-RC02-472J-LF | YAGEO |
| R75 | 10R | PARTYCL-RC02-100J-LF | YAGEO |
| R76 | 1K5 | PARTYCL-RC02-152J-LF | YAGEO |
| R77 | 22K | PARTYCL-RC02-223J-LF | YAGEO |
| R78 | 1K | PARTYCL-RC02-102J-LF | YAGEO |
| R8 | 220K | PARTYCL-RC02-07 224J-LF | YAGEO |
| R80 | 4K7 | PARTYCL-RC02-472J-LF | YAGEO |
| R81 | 4K7 | PARTYCL-RC02-472J-LF | YAGEO |
| R82 | 4K7 | PARTYCL-RC02-472J-LF | YAGEO |
| R83 | 3K3 | PARTYCL-RC02-332J-LF | YAGEO |
| R84 | 3K3 | PARTYCL-RC02-332J-LF | YAGEO |
| R85 | 10K | PARTYCL-RC02-103J-LF | YAGEO |
| R86 | 6K8 | PARTYCL-RC02-682J-LF | YAGEO |
| R87 | 10R | PARTYCL-RC02-100J-LF | YAGEO |
| R88 | 10R | PARTYCL-RC02-100J-LF | YAGEO |
| R89 | 3K3 | PARTYCL-RC02-332J-LF | YAGEO |
| R9 | 100K | PARTYCL-RC02-104J-LF | YAGEO |
| R90 | 10K | PARTYCL-RC02-103J-LF | YAGEO |
| R91 | 3K3 | PARTYCL-RC02-332J-LF | YAGEO |
| R92 | 3K3 | PARTYCL-RC02-332J-LF | YAGEO |
| R93 | 1K | PARTYCL-RC02-102J-LF | YAGEO |
| R94 | 5K6 | PARTYCL-RC02-562J-LF | YAGEO |
| R95 | 3K3 | PARTYCL-RC02-332J-LF | YAGEO |
| R96 | 3K3 | PARTYCL-RC02-332J-LF | YAGEO |
| R97 | 3K3 | PARTYCL-RC02-332J-LF | YAGEO |
| R98 | 3K3 | PARTYCL-RC02-332J-LF | YAGEO |
| R99 | 47K | PARTYC0402-07 47KL | YAGEO |
| U1 | Sc1088 | SC7088 YW7GL9M | |
| U2 | TA31136F | TA31136FG | TOSHIBA |
| U4 | LM2904V | NJM2904V(TE1) | JRC |
| U6 | 2931 | 2950 | UTC |
| VR1 | 50K | EVM3E3SX50B54 | PANASONIC |
| VR2 | 10K | EVM3E3SX50B14 | PANASONIC |
| VR3 | 10K | EVM3E3SX50B14 | PANASONIC |
| W1 | 50K | EVM3E3SX50B54 | PANASONIC |
| X1 | 13MHz | | KYOCERA |
| ZD2 | 3.1V | RD3.0UH-TI | TOSHIBA |
| | | | |
| | | | |

| Ref NO. | Specification | Tilte | Manufacturer |
|---|---|---|---|
| AXATL1 | 32.768K | | |
| C1 | 103P | CM05X7R103K16AH | KYOCERA |
| C10 | 27P | CM05CG270J50AH | KYOCERA |
| C11 | 102P | CM05X7R102K50AH | KYOCERA |
| C12 | 103P | CM05X7R103K16AH | KYOCERA |
| C13 | 104P | CM05X7R104K16AT | KYOCERA |
| C14 | 220P | CM05X7R220J50AT | KYOCERA |
| C15 | 471P | CM05X7R471K50AH | KYOCERA |
| C16 | 102P | CM05X7R102K50AH | KYOCERA |
| C17 | 102P | CM05X7R102K50AH | KYOCERA |
| C171 | 102P | CM05X7R102K50AH | KYOCERA |
| C18 | 104P | CM05X7R104K16AT | KYOCERA |
| C19 | 473P | CM05X5R473KC10AH | KYOCERA |
| C2 | 103P | CM05X7R103K16AT | KYOCERA |
| C20 | 223P | CM05X7R223KC16AH | KYOCERA |
| C21 | 102P | CM05X7R102K50AH | KYOCERA |
| C22 | 104P | CM05X7R104K16AT | KYOCERA |
| C23 | 103P | CM05X7R103K16AH | KYOCERA |
| C24 | 104P | CM05X7R104K16AT | KYOCERA |
| C242 | 102P | CM05X7R102K50AH | KYOCERA |
| C25 | 47P | CM05CG470J50AH | KYOCERA |
| C26 | 473P | CM05X5R473KC10AH | KYOCERA |
| C274 | 472P | CM05X7R472K25AH | KYOCERA |
| C28 | 10uF | T491A106K010AT | KEMET |
| C29 | 102P | CM05X7R102K50AH | KYOCERA |
| C3 | 103P | CM05X7R103K16AH | KYOCERA |
| C30 | 102P | CM05X7R102K50AH | KYOCERA |
| C31 | 103P | CM05X7R103K16AH | KYOCERA |
| C32 | 104P | CM05X7R104K16AT | KYOCERA |
| C33 | 104P | CM05X7R104K16AT | KYOCERA |
| C34 | 102P | CM05X7R102K50AH | KYOCERA |
| C35 | 473P | CM05X5R473KC10AH | KYOCERA |
| C36 | 473P | CM05X5R473KC10AH | KYOCERA |
| C37 | 104P | CM05X7R104K16AT | KYOCERA |
| C38 | 104P | CM05X7R103K16AT | KYOCERA |
| C39 | 102P | CM05X7R102K50AH | KYOCERA |
| C4 | 104P | CM05X7R104K16AT | KYOCERA |
| C40 | 102P | CM05X7R102K50AH | KYOCERA |
| C41 | 470P | CM05X7R470K50AH | KYOCERA |
| C42 | 473P | CM05X5R473KC10AH | KYOCERA |
| C43 | 470P | CM05X7R470K50AH | KYOCERA |
| C44 | 102P | CM05X7R102K50AH | KYOCERA |
| C45 | 470P | CM05X7R470K50AH | KYOCERA |
| C46 | 470P | CM05X7R470K50AH | KYOCERA |

| Ref NO. | Specification | Tilte | Manufacturer |
|---|---|---|---|
| C47 | 473P | CM05X5R473KC10AH | KYOCERA |
| C48 | 103P | CM05X7R103K16AH | KYOCERA |
| C49 | 104P | CM05X7R104K16AT | KYOCERA |
| C5 | 473P | CM05X5R473KC10AH | KYOCERA |
| C50 | 221P | CM05X7R221J50AH | KYOCERA |
| C51 | 104P | CM05X7R104K16AT | KYOCERA |
| C52 | 103P | CM05X7R103K16AH | KYOCERA |
| C53 | 102P | CM05X7R102K50AH | KYOCERA |
| C54 | 470P | CM05X7R470K50AH | KYOCERA |
| C55 | 470P | CM05X7R470K50AH | KYOCERA |
| C56 | 332P | CM05X7R332K25AH | KYOCERA |
| C57 | 332P | CM05X7R332K25AH | KYOCERA |
| C58 | 104P | CM05X7R104K16AT | KYOCERA |
| C59 | 100P | PARTYCL-RC02-104J-LF | YAGEO |
| C6 | 104P | CM05X7R104K16AT | KYOCERA |
| C60 | 102P | CMO5X7R102K50AH | KYOCERA |
| C61 | 105P | CM05X7R105K16AT | KYOCERA |
| C62 | 102P | CM05X7R102K50AH | KYOCERA |
| C63 | 102P | CM05X7R102K50AH | KYOCERA |
| C64 | 102P | CM05X7R102K50AH | KYOCERA |
| C65 | 102P | CM05X7R102K50AH | KYOCERA |
| C66 | 102P | CM05X7R102K50AH | KYOCERA |
| C7 | 104P | CM05X7R104K16AT | KYOCERA |
| C8 | 473P | CM05X5R473KC10AH | KYOCERA |
| C85 | 102P | CM05X7R102K50AH | KYOCERA |
| C9 | 27P | CM05CG270J50AH | KYOCERA |
| D1 | HSC277 | HSC277TRF-EQ | RENESAS |
| D2 | 1SS372 | 1SS372 | ICESENES |
| D3 | 1SS327 | BAV99 | Sunlord |
| D4 | HSC277 | HSC277TRF-EQ | RENENSAS |
| E1 | 10uF | T491A106K010AT | KEMET |
| E2 | 4.7uF | T491A75K016AS | KEMET |
| E3 | 4uF7 | T491A75K016AS | KEMET |
| E4 | 10uF | T491A106K010AT | KEMET |
| E5 | 10uF | T491A106K010AT | KEMET |
| E7 | 105P | CM05X7R105K16AT | KYOCERA |
| E8 | 10uF | T491A106K010AT | KEMET |
| E9 | 100uF | T491C107K010AT | KEMET |
| IC1 | 78P561 | A-1 | |
| IC2 | 24C16 | AT24C16AT | AT |
| IC4 | Lm386 | LM386-1 | LM |
| IC6 | Mc4558 | RC4558DR | TI |
| IC7 | HT1621BD | HT1621BD | HOLTEK |
| J1 | CON10 | | |

| Ref NO. | Specification | Tilte | Manufacturer |
|---|---|---|---|
| J4 | PHONEMIC | | |
| J5 | PHONESP | | |
| K11 | 7 | | |
| K12 | 4 | | |
| K13 | 1 | | |
| K14 | 8 | | |
| K15 | 5 | | |
| K16 | 2 | | |
| K17 | B | | |
| K18 | 9 | | |
| K19 | 6 | | |
| K2 | PTT | | |
| K20 | 3 | | |
| K21 | C | | |
| K22 | # | | |
| K23 | 0 | | |
| K24 | * | | |
| K25 | D | | |
| K26 | MONI | | |
| K27 | FM | | |
| K28 | A | | |
| K8A | SET | | |
| K9 | EXIT | | |
| L1 | 220nH | CH160808-R22J | Sunlord |
| L2 | 220nH | CH160808-R22J | Sunlord |
| L3 | 220nH | CH160808-R22J | Sunlord |
| L4 | 220nH | CH160808-R22J | Sunlord |
| L5 | 220nH | CH160808-R22J | Sunlord |
| L6 | 220nH | CH160808-R22J | Sunlord |
| L7 | 220nH | CH160808-R22J | Sunlord |
| LCD1 | COM36 | | |
| LED1 | LED | EVER BRIGHT ECO2-0603QRC/E | |
| LED11 | LED BUSY 绿灯 | EC02-0603GC1E-AV | EVERBRIGHF |
| LED12 | LED TX红灯 | EC02-0603 QRC 1E | EVERBRIGHF |
| LED2 | LED | EVER BRIGHT ECO2-0603QRC/E | |
| LED3 | LED | EVER BRIGHT ECO2-0603QRC/E | |
| LED4 | LED | EVER BRIGHT ECO2-0603QRC/E | |
| LED6 | LED | EVER BRIGHT ECO2-0603QRC/E | |
| LED7 | LED | EVER BRIGHT ECO2-0603QRC/E | |
| LED8 | LED | EVER BRIGHT ECO2-0603QRC/E | |
| MIC | MIC | | |
| Q1 | BV4 | 2SB624-TB | |
| Q10 | BV4 | 2SB624-TB | |
| Q11 | 2SC4617 | ZPC4617R | |

| Ref NO. | Specification | Tilte | Manufacturer |
|---|---|---|---|
| Q12 | 2SC4617 | ZPC4617R | PHILIPS |
| Q16 | DTA114EE | DTA114EE-TL | ROHM |
| Q2 | DTA114EE | DTA114EE-TL | ROHM |
| Q3 | LY | 2SC2712-Y | TOSHIBA |
| Q4 | DTC114EE | DTA114EE-TL | ROHM |
| Q45 | DTC114EE | DTA114EE-TL | ROHM |
| Q46 | DTC114EE | DTA114EE-TL | ROHM |
| Q6 | 2SC4617 | ZPC4617R | PHILIPS |
| Q7 | 2SC4617 | ZPC4617R | PHILIPS |
| Q8 | DTC114EE | DTA114EE-TL | ROHM |
| Q9 | BV4 | 2SB624-TB | NEC |
| R1 | 47K | PARTYC0402-07 47KL | YAGEO |
| R10 | 3K3 | PARTYCL-RC02-332J-LF | YAGEO |
| R109 | 47K | PARTYC0402-07 47KL | YAGEO |
| R11 | 1M8 | PARTYCL-RC02-07 1855J-LF | YAGEO |
| R111 | 100K | PARTYCL-RC02-104J-LF | YAGEO |
| R12 | 1M8 | PARTYCL-RC02-07 1855J-LF | YAGEO |
| R13 | 33K | PARTYCL-RC02-333J-LF | YAGEO |
| R14 | 10K | PARTYCL-RC02-103J-LF | YAGEO |
| R15 | 33K | PARTYCL-RC02-333J-LF | YAGEO |
| R16 | 10R | PARTYCL-RC02-100J-LF | YAGEO |
| R17 | 10R | PARTYCL-RC02-100J-LF | YAGEO |
| R172 | 22K | PARTYCL-RC02-223J-LF | YAGEO |
| R174 | 30K | PARTYC0402-07 30KL | YAGEO |
| R175 | 30K | PARTYC0402-07 30KL | YAGEO |
| R176 | 330K | PARTYCL-RC02-07 334J-LF | YAGEO |
| R18 | 4K7 | PARTYCL-RC02-472J-LF | YAGEO |
| R19 | 56K | PARTYC0402-07 56KL | YAGEO |
| R2 | 47K | PARTYC0402-07 47KL | YAGEO |
| R20 | 470R | PARTYCL-RC02-471J-LF | YAGEO |
| R21 | 47K | PARTYC0402-07 47KL | YAGEO |
| R22 | 47R | YCL-RC02-470J-LF | YAGEO |
| R23 | 10K | PARTYCL-RC02-103J-LF | YAGEO |
| R24 | 560R | CM05X7R561K50AH | KYOCERA |
| R25 | 560R | CM05X7R561K50AH | KYOCERA |
| R26 | 120K | PARTYCL-RC02-1203F-LF | YAGEO |
| R27 | 4K7 | PARTYCL-RC02-472J-LF | YAGEO |
| R28 | 4K7 | PARTYCL-RC02-472J-LF | YAGEO |
| R29 | 27K | PARTYC0402-07 27KL | YAGEO |
| R3 | 47K | PARTYC0402-07 47KL | YAGEO |
| R30 | 1K | PARTYCL-RC02-102J-LF | YAGEO |
| R31 | 47K | PARTYC0402-07 47KL | YAGEO |
| R32 | 1K | PARTYCL-RC02-102J-LF | YAGEO |
| R33 | 100R | PARTYC0402-07 100RL | YAGEO |

| Ref NO. | Specification | Tilte | Manufacturer |
|---|---|---|---|
| R34 | 470R | PARTYCL-RC02-471J-LF | YAGEO |
| R35 | 1K8 | PARTYCL-RC02-182J-LF | YAGEO |
| R36 | 330R | PARTYCL-RC02-331J-LF | YAGEO |
| R37 | 10K | PARTYCL-RC02-103J-LF | Sunlord |
| R38 | 680K | PARTYCL-RC02-684J-LF | YAGEO |
| R39 | 3K3 | PARTYCL-RC02-332J-LF | YAGEO |
| R4 | 47K | PARTYCL0402-07 47KL | YAGEO |
| R40 | 100R | PARTYCL0402-07 100RL | YAGEO |
| R41 | 22K | PARTYCL-RC02-223J-LF | YAGEO |
| R42 | 30K | PARTYCL0402-07 30KL | YAGEO |
| R43 | 3K3 | PARTYCL-RC02-332J-LF | YAGEO |
| R44 | 27K | PARTYC0402-07 27KL | YAGEO |
| R47 | 15K | PARTYCL-RC02-153J-LF | YAGEO |
| R48 | 39K | PARTYCL-RC02-393J-LF | YAGEO |
| R49 | 1M | PARTYC0402-07 105J-LF | YAGEO |
| R5 | 2K2 | PARTYCL-RC02-222J-LF | YAGEO |
| R50 | 1K | PARTYCL-RC02-102J-LF | YAGEO |
| R51 | 100R | PARTYCL0402-07100RL | YAGEO |
| R52 | 1M8 | PARTYC0402-07 1855J-LF | YAGEO |
| R53 | 10K | PARTYCL-RC02-103J-LF | YAGEO |
| R541 | 10K | PARTYCL-RC02-103J-LF | YAGEO |
| R56 | 4K7 | PARTYCL-RC02-472J-LF | YAGEO |
| R58 | 1K | PARTYCL-RC02-102J-LF | YAGEO |
| R59 | 150K-1% | PARTYCL-RC02-1503F-LF | YAGEO |
| R6 | 120K | PARTYCL-RC02-1203F-LF | YAGEO |
| R60 | 150K-1% | PARTYCL-RC02-1503F-LF | YAGEO |
| R61 | 10R | PARTYCL-RC02-100J-LF | YAGEO |
| R62 | 100K | PARTYCL-RC02-104J-LF | YAGEO |
| R63 | 82K | PARTYCL-RC02-823J-LF | YAGEO |
| R64 | 15K | PARTYCL-RC02-153J-LF | YAGEO |
| R65 | 10R | PARTYCL-RC02-100J-LF | YAGEO |
| R66 | 470K | RC0402JR-07 390R | YAGEO |
| R67 | 470K | RC0402JR-07 390R | YAGEO |
| R68 | 10K | PARTYCL-RC02-103J-LF | YAGEO |
| R69 | 2K2 | PARTYCL-RC02-222J-LF | YAGEO |
| R7 | 104P | CM05X7R104K16AT | KYOCERA |
| R70 | 1K | PARTYCL-RC02-102J-LF | YAGEO |
| R71 | 10R | PARTYCL-RC02-100J-LF | YAGEO |
| R74 | 2K2 | PARTYCL-RC02-222J-LF | YAGEO |
| R75 | 2K2 | PARTYCL-RC02-222J-LF | YAGEO |
| R76 | 2K2 | PARTYCL-RC02-222J-LF | YAGEO |
| R77 | 2K2 | PARTYCL-RC02-222J-LF | YAGEO |
| R78 | 2K2 | PARTYCL-RC02-222J-LF | YAGEO |
| R79 | 100R | PARTYC0402-07 100RL | YAGEO |

| Ref NO. | Specification | Tilte | Manufacturer |
|---|---|---|---|
| R8 | 10K | PARTYCL-RC02-103J-LF | YAGEO |
| R80 | 100R | PARTYC0402-07 100RL | YAGEO |
| R84 | 47K | PARTYC0402-07 47KL | YAGEO |
| R88 | 10R | PARTYCL-RC02-100J-LF | YAGEO |
| R9 | 10K | PARTYCL-RC02-103J-LF | YAGEO |
| U1 | VOICE | | |

NO.: WTA2009-0519

(No. CNAS L2264)

# TEST REPORT

| | |
|---|---|
| **Test name** | Electromagnetic Field (Specific Absorption Rate) |
| **Product** | TRANSCEIVER |
| **Model** | TG-UV |
| **FCC ID** | XBPTG-UV |
| **Client** | Fujian Nanan Quansheng Electronics Co.,Ltd |

**TA Technology (Shanghai) Co., Ltd.**

报告专用章

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# GENERAL SUMMARY

| | | | |
|---|---|---|---|
| **Product** | TRANSCEIVER | **Model** | TG-UV |
| **Client** | Fujian Nanan Quansheng Electronics Co.,Ltd | **Type of test** | Entrusted |
| **Manufacturer** | Fujian Nanan Quansheng Electronics Co.,Ltd | **Arrival Date of sample** | Apri 30th, 2009 |
| **Place of sampling** | (Blank) | **Carrier of the samples** | Eason Zhao |
| **Quantity of the samples** | One | **Date of product** | (Blank) |
| **Base of the samples** | (Blank) | **Items of test** | SAR |
| **Series number** | / | | |
| **Standard(s)** | **ANSI/IEEE C95.1-1999:** IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz.<br>**IEEE 1528–2003:** Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head Due to Wireless Communications Devices: Experimental Techniques.<br>**OET Bulletin 65 supplement C, published June 2001 including DA 02-1438, published June 2002:** Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits. Transition Period for the Phantom Requirements of Supplement C to OET Bulletin 65.<br>**IEC 62209-1:** Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices – Human models, instrumentation, and procedures –Part 1: Procedure to determine the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz).<br>**IEC 62209-2:2008(106/162/CDV):** Human exposure to radio frequency fields from handheld and body-mounted wireless communication devices – Human models, instrumentation, and procedures –Part 2: Procedure to determine the Specific Absorption Rate (SAR)for wireless communication devices used in close proximity to the human body .( frequency rang of 30MHz to 6GHz ) | | |
| **Conclusion** | Localized Specific Absorption Rate (SAR) of this portable wireless equipment has been measured in all cases requested by the relevant standards cited in Clause 7.2 of this test report. Maximum localized SAR is below exposure limits specified in the relevant standards cited in Clause 7.1 of this test report.<br>General Judgment: **Pass**<br>(Stamp)<br>**Date of issue: May 18th, 2009**<br>上海同耀通信技术有限公司 报告专用章 | | |
| **Comment** | The test result only responds to the measured sample. | | |

**Approved by** 杨伟中
Weizhong Yang

**Revised by** 凌敏宝
Minbao Ling

**Performed by** 王 路
Lu Wang

# TABLE OF CONTENT

# 1. COMPETENCE AND WARRANTIES

**TA Technology (Shanghai) Co., Ltd.** is a test laboratory competent to carry out the tests described in this test report.

**TA Technology (Shanghai) Co., Ltd.** guarantees the reliability of the data presented in this test report, which is the results of measurements and tests performed for the items under test on the date and under the conditions stated in this test report and is based on the knowledge and teCHnical facilities available at TA Technology (Shanghai) Co., Ltd. at the time of execution of the test.

**TA Technology (Shanghai) Co., Ltd.** is liable to the client for the maintenance by its personnel of the confidentiality of all information related to the items under test and the results of the test.

# 2. GENERAL CONDITIONS

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# 3. DESCRIPTION OF EUT

## 3.1. Addressing Information Related to EUT

**Table 1: Applicant (The Client)**

| | |
|---|---|
| Name or Company | Fujian Nanan Quansheng Electronics Co.,Ltd |
| Address/Post | No 82,Qiuzhong Industry Area,Xiamei Town,Nanan City, |
| City | Fujian Province |
| Postal Code | 362301 |
| Country | China |
| Telephone | 0595-86769269 |
| Fax | 0595-86762335 |

**Table 2: Manufacturer**

| | |
|---|---|
| Name or Company | Fujian Nanan Quansheng Electronics Co.,Ltd |
| Address/Post | No 82,Qiuzhong Industry Area,Xiamei Town,Nanan City, |
| City | Fujian Province |
| Postal Code | 362301 |
| Country | China |
| Telephone | 0595-86769269 |
| Fax | 0595-86762335 |

## 3.2. Constituents of EUT

**Table 3: Constituents of Samples**

| Description | Model | Serial Number | Manufacturer |
|---|---|---|---|
| The EUT | TG-UV | / | Fujian Nanan Quansheng Electronics Co.,Ltd |
| Lithium Battery | BAT0110 | / | Fujian Nanan Quansheng Electronics Co.,Ltd |
| AC/DC Adapter | QS-0616 | / | Fujian Nanan Quansheng Electronics Co.,Ltd |

Note:
The EUT appearances see ANNEX G.

## 3.3. General Description

Equipment Under Test (EUT) is a model of transceiver with external antenna. The detail about Mobile phone, Lithium Battery and AC/DC Adapter is in Table 3. SAR is tested for 400.0 - 470.0 MHz UHF only.

The sample under test was selected by the Client.

Components list please refer to documents of the manufacturer.

## 3.4. Test item

**Table 4: Test item of EUT**

| | |
|---|---|
| Device type : | portable device |
| Exposure category: | controlled environment / general Occupational |
| Device operating configurations : | |
| Operating mode(s): | 400.0 - 470.0 MHz UHF |
| Modulation: | FM |
| Operating frequency range(s) | transmitter frequency range |
| UHF | 400MHz ~ 470 MHz |
| Test channel<br>(Low –Middle –High) | 9 -10 – 11 |
| Hardware version: | / |
| Software version: | / |
| Antenna type: | External antenna |

# 4. OPERATIONAL CONDITIONS DURING TEST

The spatial peak SAR values were assessed for the lowest, middle and highest channels defined by UHF (Ch9 = 400.125MHz, Ch10 =435MHz, Ch11 = 469.225MHz) systems UHF, Battery and accessories shall be those specified by the manufacturer. The battery shall be fully charged before each measurement and there shall be no external connections.

# 5. SAR MEASUREMENTS SYSTEM CONFIGURATION

## 5.1. SAR Measurement Set-up

The DASY4 system for performing compliance tests consists of the following items:

- A standard high precision 6-axis robot (Stäubli RX family) with controller and software. An arm extension for accommodating the data acquisition electronics (DAE).
- A dosimetric probe, i.e. an isotropic E-field probe optimized and calibrated for usage in tissue simulating liquid. The probe is equipped with an optical surface detector system.
- A data acquisition electronic (DAE) which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.
- A unit to operate the optical surface detector which is connected to the EOC.
- The Electro-Optical Coupler (EOC) performs the conversion from the optical into a digital electric signal of the DAE. The EOC is connected to the DASY4 measurement server.
- The DASY4 measurement server, which performs all real-time data evaluation for field measurements and surface detection, controls robot movements and handles safety operation. A computer operating Windows 2003
- DASY4 software and SEMCAD data evaluation software.
- Remote control with teach panel and additional circuitry for robot safety such as warning lamps, etc.
- The generic twin phantom enabling the testing of left-hand and right-hand usage.
- The device holder for handheld mobile phones.
- Tissue simulating liquid mixed according to the given recipes.
- System validation dipoles allowing to validate the proper functioning of the system.

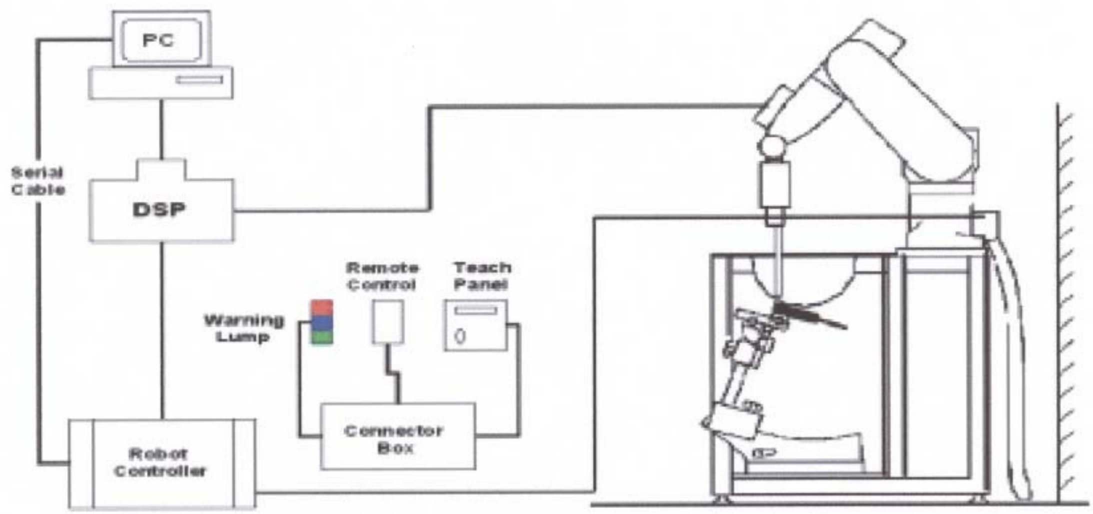



**Figure 1. SAR Lab Test Measurement Set-up**

## 5.2. Dasy4 E-field Probe System

The SAR measurements were conducted with the dosimetric probe ET3DV6 (manufactured by SPEAG), designed in the classical triangular configuration and optimized for dosimetric evaluation.

### 5.2.1. ET3DV6 Probe Specification

| | |
|---|---|
| Construction | Symmetrical design with triangular core Built-in optical fiber for surface detection System (ET3DV6 only) Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.q., glycol) |
| Calibration | In air from 10 MHz to 3 GHz<br>In brain and muscle simulating tissue at frequencies of 450MHz, 900MHz, 1750 MHz, 1950MHz and 2450 MHz. (accuracy±8%)<br>Calibration for other liquids and frequencies upon request |
| Frequency | 10 MHz to 2.5 GHz; Linearity: ±0.2 dB (30 MHz to 2.5 GHz) |
| Directivity | ±0.2 dB in brain tissue (rotation around probe axis)<br>±0.4 dB in brain tissue (rotation around probe axis) |
| Dynamic Range | 5u W/g to > 100mW/g; Linearity: ±0.2dB |
| Surface Detection | ±0.2 mm repeatability in air and clear liquids over diffuse reflecting surface (ET3DV6 only) |
| Dimensions | Overall length: 330mm<br>Tip length: 16mm<br>Body diameter: 12mm<br>Tip diarneter: 6.8mm<br>Distance from probe tip to dipole centers: 2.7mm |
| Application | General dosimetry up to 2.5GHz<br>Compliance tests of mobile phones<br>Fast automatic scanning in arbitrary phantoms |

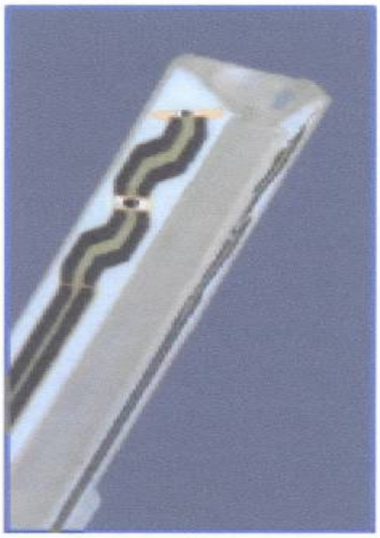


**Figure 2 ET3DV6 E-field Probe**

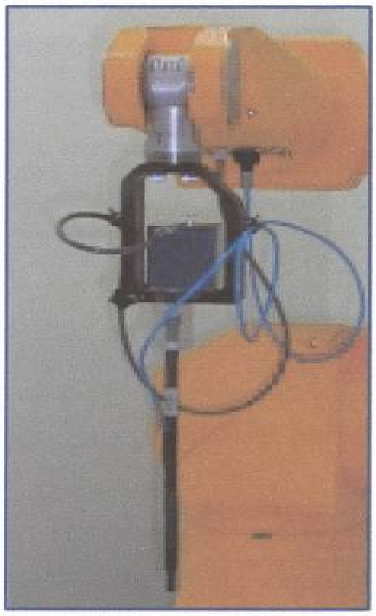


**Figure 3 ET3DV6 E-field probe**

#### 5.2.2. E-field Probe Calibration

Each probe is calibrated according to a dosimetric assessment procedure with accuracy better than ± 10%. The spherical isotropy was evaluated and found to be better than ± 0.25dB. The sensitivity parameters (NormX, NormY, NormZ), the diode compression parameter (DCP) and the conversion factor (ConvF) of the probe are tested.

The free space E-field from amplified probe outputs is determined in a test chamber. This is performed in a TEM cell for frequencies bellow 1 GHz, and in a wave guide above 1 GHz for free space. For the free space calibration, the probe is placed in the volumetric center of the cavity and at the proper orientation with the field. The probe is then rotated 360 degrees.
E-field temperature correlation calibration is performed in a flat phantom filled with the appropriate simulated brain tissue. The measured free space E-field in the medium correlates to temperature rise in a dielectric medium. For temperature correlation calibration a RF transparent thermistor-based temperature probe is used in conjunction with the E-field probe.

$$\mathbf{SAR} = \mathbf{C}\frac{\Delta T}{\Delta t}$$

Where: $\Delta t$ = Exposure time (30 seconds),
C = Heat capacity of tissue (brain or muscle),
$\Delta T$ = Temperature increase due to RF exposure.
Or

$$\mathbf{SAR} = \frac{|E|^2 \sigma}{\rho}$$

Where:
σ = Simulated tissue conductivity,
ρ = Tissue density (kg/m3).

### 5.3. Other Test Equipment

#### 5.3.1. Device Holder for Transmitters

**Figure 4.Device Holder**

The DASY device holder is designed to cope with the die rent positions given in the standard.
It has two scales for device rotation (with respect to the body axis) and device inclination (with respect to the line between the ear reference points). The rotation centers for both scales is the ear reference point (ERP). Thus the device needs no repositioning when changing the angles.
The DASY device holder is constructed of low-loss POM material.The amount of dielectric material has been reduced in the closest vicinity of the device, since measurements have suggested that the inference of the clamp on the test results could thus be lowered.

### 5.3.2. Phantom

The shell corresponds to the specifications of the Specific Anthropomorphic Mannequin (Oval Flat) phantom defined in IEEE 1528-2003, CENELEC 50361 and IEC 62209. It enables the dosimetric evaluation of wireless portable device usage as well as body mounted usage at the flat phantom region. A cover prevents evaporation of the liquid. Reference markings on the phantom allow the complete setup of all predefined phantom positions and measurement grids by manually teaching three points with the robot.

Shell Thickness 2 ±0.2 mm
Filling Volume Approx. 30 liters
Dimensions 190×600×400 mm (H×L×W)

**Figure 5.Generic Twin Phantom**

## 5.4. Scanning procedure

The DASY4 installation includes predefined files with recommended procedures for measurements and validation. They are read-only document files and destined as fully defined but unmeasured masks. All test positions (head or body-worn) are tested with the same configuration of test steps differing only in the grid definition for the different test positions.

- The ”reference“ and ”drift“ measurements are located at the beginning and end of the batch process. They measure the field drift at one single point in the liquid over the complete procedure. The indicated drift is mainly the variation of the DUT's output power and should vary max. ± 5 %.

- The ”surface check“ measurement tests the optical surface detection system of the DASY4 system by repeatedly detecting the surface with the optical and mechanical surface detector and comparing the results. The output gives the detecting heights of both systems, the difference between the two systems and the standard deviation of the detection repeatability. Air bubbles or refraction in the liquid due to separation of the sugar-water mixture gives poor repeatability (above ± 0.1mm). To prevent wrong results tests are only executed when the liquid is free of air bubbles. The difference between the optical surface detection and the actual surface depends on the probe and is specified with each probe. (It does not depend on the surface reflectivity or the probe angle to the surface within ± 30°.)

- Area Scan

The Area Scan is used as a fast scan in two dimensions to find the area of high field values before running a detailed measurement around the hot spot.Before starting the area scan a grid spacing of 15 mm x 15 mm is set. During the scan the distance of the probe to the phantom remains unchanged.
After finishing area scan, the field maxima within a range of 2 dB will be ascertained.

- Zoom Scan
  Zoom Scans are used to estimate the peak spatial SAR values within a cubic averaging volume containing 1 g and 10 g of simulated tissue. The default Zoom Scan is done by 7x7x7 points within a cube whose base is centered around the maxima found in the preceding area scan.

- Spatial Peak Detection

The procedure for spatial peak SAR evaluation has been implemented and can determine values of masses of 1g and 10g, as well as for user-specific masses.The DASY4 system allows evaluations that combine measured data and robot positions, such as:

- maximum search
- extrapolation
- boundary correction
- peak search for averaged SAR

During a maximum search, global and local maxima searches are automatically performed in 2-D after each Area Scan measurement with at least 6 measurement points. It is based on the evaluation of the local SAR gradient calculated by the Quadratic Shepard' s method. The algorithm will find the global maximum and all local maxima within -2 dB of the global maxima for all SAR distributions.
Extrapolation routines are used to obtain SAR values between the lowest measurement points and the inner phantom surface. The extrapolation distance is determined by the surface detection distance and the probe sensor offset. Several measurements at different distances are necessary for the extrapolation. Extrapolation routines require at least 10 measurement points in 3-D space. They are used in the Zoom Scan to obtain SAR values between the lowest measurement points and the inner phantom surface. The routine uses the modified Quadratic Shepard' s method for extrapolation. For a grid using 7x7x7 measurement points with 5mm resolution amounting to 343 measurement points, the uncertainty of the extrapolation routines is less than 1% for 1g and 10g cubes.

- A Z-axis scan measures the total SAR value at the x-and y-position of the maximum SAR value found during the cube 7x7x7 scan. The probe is moved away in z-direction from the bottom of the SAM phantom in 5mm steps.

## 5.5. Data Storage and Evaluation

### 5.5.1. Data Storage

The DASY4 software stores the acquired data from the data acquisition electronics as raw data (in microvolt readings from the probe sensors), together with all necessary software parameters for the data evaluation (probe calibration data, liquid parameters and device frequency and modulation data) in measurement files with the extension ".DA4". The software evaluates the desired unit and format for output each time the data is visualized or exported. This allows verification of the complete software setup even after the measurement and allows correction of incorrect parameter settings. For example, if a measurement has been performed with a wrong crest factor parameter in the device setup, the parameter can be corrected afterwards and the data can be re-evaluated.

The measured data can be visualized or exported in different units or formats, depending on the selected probe type ([V/m], [A/m], [°C], [mW/g], [mW/cm²], [dBrel], etc.). Some of these units are not available in certain situations or show meaningless results, e.g., a SAR output in a lossless media will always be zero. Raw data can also be exported to perform the evaluation with other software packages.

### 5.5.2. Data Evaluation by SEMCAD

The SEMCAD software automatically executes the following procedures to calculate the field units from the microvolt readings at the probe connector. The parameters used in the evaluation are stored in the configuration modules of the software:

| | | |
|---|---|---|
| Probe parameters: | - Sensitivity | Normi, $ai_0$, $a_{i1}$, $a_{i2}$ |
| | - Conversion factor | $ConvF_i$ |
| | - Diode compression point | $Dcp_i$ |
| Device parameters: | - Frequency | f |
| | - Crest factor | cf |
| Media parameters: | - Conductivity | $\sigma$ |
| | - Density | $\rho$ |

These parameters must be set correctly in the software. They can be found in the component documents or they can be imported into the software from the configuration files issued for the DASY4 components. In the direct measuring mode of the multimeter option, the parameters of the actual system setup are used. In the scan visualization and export modes, the parameters stored in the corresponding document files are used.

The first step of the evaluation is a linearization of the filtered input signal to account for the compression characteristics of the detector diode. The compensation depends on the input signal, the diode type and the DC-transmission factor from the diode to the evaluation electronics.

If the exciting field is pulsed, the crest factor of the signal must be known to correctly compensate for peak power. The formula for each channel can be given as:

$$V_i = U_i + U_i^2 \cdot c\,f / d\,c\,p_i$$

With $V_i$ = compensated signal of channel i ( i = x, y, z )

$U_i$ = input signal of channel i ( i = x, y, z )

$cf$ = crest factor of exciting field (DASY parameter)

$dcp_i$ = diode compression point (DASY parameter)

From the compensated input signals the primary field data for each channel can be evaluated:

E-field probes: $$E_i = ( V_i / Norm_i \cdot ConvF )^{1/2}$$

H-field probes: $$H_i = ( V_i )^{1/2} \cdot ( a_{i0} + a_{i1} f + a_{i2} f^2 ) / f$$

With $V_i$ = compensated signal of channel i (i = x, y, z)

$Norm_i$ = sensor sensitivity of channel i (i = x, y, z)

[mV/(V/m)$^2$] for E-field Probes

$ConvF$ = sensitivity enhancement in solution

$a_{ij}$ = sensor sensitivity factors for H-field probes

$f$ = carrier frequency [GHz]

$E_i$ = electric field strength of channel i in V/m

$H_i$ = magnetic field strength of channel i in A/m

The RSS value of the field components gives the total field strength (Hermitian magnitude):

$$E_{tot} = (E_x^2 + E_Y^2 + E_z^2)^{1/2}$$

The primary field data are used to calculate the derived field units.

$$SAR = ( E_{tot}^2 \cdot \sigma ) / ( \rho \cdot 1000)$$

with ***SAR*** = local specific absorption rate in mW/g

$\boldsymbol{E_{tot}}$ = total field strength in V/m

$\sigma$ = conductivity in [mho/m] or [Siemens/m]

$\rho$ = equivalent tissue density in g/cm$^3$

Note that the density is normally set to 1 (or 1.06), to account for actual brain density rather than the density of the simulation liquid. The power flow density is calculated assuming the excitation field to be a free space field.

$$P_{pwe} = E_{tot}^2 / 3770 \quad \text{or} \quad \boldsymbol{P_{pwe} = H_{tot}^2 \cdot 37.7}$$

with $P_{pwe}$ = equivalent power density of a plane wave in mW/cm$^2$

$\boldsymbol{E_{tot}}$ = total electric field strength in V/m

$\boldsymbol{H_{tot}}$ = total magnetic field strength in A/m

## 5.6. System check

The manufacturer calibrates the probes annually. Dielectric parameters of the tissue simulants were measured every day using the dielectric probe kit and the network analyser. A system check measurement was made following the determination of the dielectric parameters of the simulant, using the dipole validation kit. A power level of 398 mW was supplied to the dipole antenna, which was placed under the flat section of the twin SAM phantom. The system check results (dielectric parameters and SAR values) are given in the table 11.

System check results have to be equal or near the values determined during dipole calibration with the relevant liquids and test system (±10 %).

System check is performed regularly on all frequency bands where tests are performed with the DASY 4 system.

.

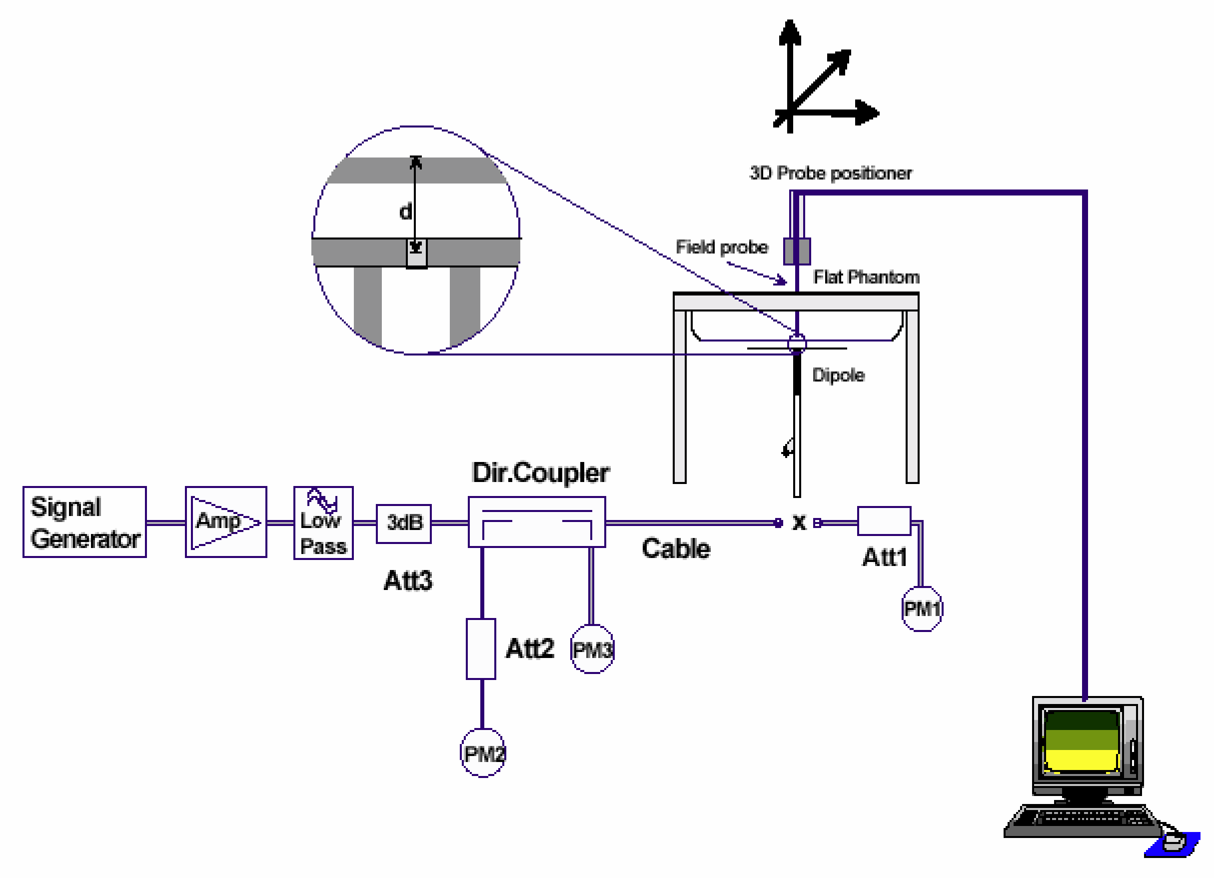



**Figure 6. System Check Set-up**

## 5.7. Equivalent Tissues

The liquid is consisted of water, sugar, salt, Preventol and Cellulose. The liquid has previously been proven to be suited for worst-case. The Table 5 and Table 6 show the detail solution. It's satisfying the latest tissue dielectric parameters requirements proposed by the OET 65.

**Table 5: Composition of the Head Tissue Equivalent Matter**

| MIXTURE% | FREQUENCY(Brain) 450MHz |
|---|---|
| Water | 38.56 |
| Sugar | 56.32 |
| Salt | 3.95 |
| Preventol | 0.10 |
| Cellulose | 1.07 |
| Dielectric Parameters Target Value | f=450MHz ε=43.5 σ=0.87 |

**Table 6: Composition of the Body Tissue Equivalent Matter**

| MIXTURE% | FREQUENCY(Body)450MHz |
|---|---|
| Water | 51.16 |
| Sugar | 46.78 |
| Salt | 1.49 |
| Preventol | 0.10 |
| Cellulose | 0.47 |
| Dielectric Parameters Target Value | f=450MHz ε=56.7 σ=0.94 |

# 6. LABORATORY ENVIRONMENT

**Table 7: The Ambient Conditions during Test**

| | |
|---|---|
| Temperature | Min. = 20°C, Max. = 25 °C |
| Relative humidity | Min. = 30%, Max. = 70% |
| Ground system resistance | < 0.5 Ω |
| Ambient noise is checked and found very low and in compliance with requirement of standards. Reflection of surrounding objects is minimized and in compliance with requirement of standards. | |

# 7. CHARACTERISTICS OF THE TEST

## 7.1. Applicable Limit Regulations

**ANSI/IEEE C95.1-1999:** IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz.

## 7.2. Applicable Measurement Standards

**IEEE 1528–2003:** Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head Due to Wireless Communications Devices: Experimental Techniques.

**OET Bulletin 65 supplement C, published June 2001 including DA 02-1438, published June 2002:** Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits. Transition Period for the Phantom Requirements of Supplement C to OET Bulletin 65.

**IEC 62209-1:** Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices – Human models, instrumentation, and procedures –Part 1: Procedure to determine the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz).

**IEC 62209-2:2008(106/162/CDV):** Human exposure to radio frequency fields from handheld and body-mounted wireless communication devices – Human models, instrumentation, and procedures –Part 2: Procedure to determine the Specific Absorption Rate (SAR)for wireless communication devices used in close proximity to the human body .( frequency rang of 30MHz to 6GHz )

# 8. CONDUCTED OUTPUT POWER MEASUREMENT

## 8.1. Conducted Power Results

**Table 8: Conducted Power Measurement Results**

| UHF | Conducted Power | | |
|---|---|---|---|
| | **Channel 9 (400.125MHz)** | **Channel 10 (435MHz)** | **Channel 11 (469.225MHz)** |
| Before test (dBm) | 35.55 | 35.63 | 35.50 |
| After test (dBm) | 35.54 | 35.62 | 35.51 |

# 9. TEST RESULTS

## 9.1. Dielectric Performance

**Table 9: Dielectric Performance of Head Tissue Simulating Liquid**

| Frequency | Description | Dielectric Parameters | | Temp |
|---|---|---|---|---|
| | | $\varepsilon_r$ | σ(s/m) | ℃ |
| 450MHz (head) | Target value<br>±5% window | 43.50<br>41.33 — 45.68 | 0.87<br>0.83 — 0.91 | / |
| | Measurement value<br>2009-5-17 | 44.93 | 0.85 | 21.8 |

**Table 10: Dielectric Performance of Body Tissue Simulating Liquid**

| Frequency | Description | Dielectric Parameters | | Temp |
|---|---|---|---|---|
| | | $\varepsilon_r$ | σ(s/m) | ℃ |
| 450MHz (body) | Target value<br>±5% window | 56.70<br>53.87 — 59.54 | 0.94<br>0.89— 0.99 | / |
| | Measurement value<br>2009-5-17 | 56.30 | 0.97 | 21.9 |

## 9.2. System Check Results

**Table 11: System Check**

| Frequency | Description | SAR(W/kg) | | Dielectric Parameters | | Temp |
|---|---|---|---|---|---|---|
| | | 10g | 1g | $\varepsilon_r$ | σ(s/m) | ℃ |
| 450MHz | Recommended result<br>±10% window | 1.27<br>1.143—1.397 | 1.9<br>1.71 — 2.09 | 43.3 | 0.83 | / |
| | Measurement value<br>2009-5-17 | 1.31 | 2.02 | 44.93 | 0.85 | 21.9 |

Note：1. The graph results see ANNEX B.

1. 2. Target Values used derive from the calibration certificate and 398 mW is used as feeding power to the calibrated dipole.

## 9.3. Summary of Measurement Results

**Table 12: SAR Values (UHF)**

| Frequency | Channel | 1 g Average | | Power Drift (dB) | Graph Results |
|---|---|---|---|---|---|
| | | Limits 8.0 W/kg | | ± 0.21 | |
| | | Duty cycle | | Power | |
| | | 100% | 50% | Drift(dB) | |
| The EUT display towards phantom, Distance 15mm (Face Held) | | | | | |
| 400.125MHz | 9 | 2.280 | 1.140 | 0.014 | Figure 8 |
| 435 MHz | 10 | 7.390 | 3.695 | 0.001 | Figure 10 |
| 469.225 MHz | 11 | 4.380 | 2.190 | -0.039 | Figure 12 |
| The EUT display towards phantom with belt clip, Distance 0mm (Body-Worn) | | | | | |
| 400.125MHz | 9 | 2.210 | 1.105 | -0.019 | Figure 14 |
| 435 MHz | 10 | 8.340 | 4.170 | -0.058 | Figure 16 |
| 469.225 MHz | 11 | 4.630 | 2.315 | -0.042 | Figure 18 |

**Table 13:SAR Values are scaled for the power drift**

| Frequency | Channel | 1 g Average | | Power Drift (dB) | + Power Drift 10^(dB/10) | SAR 1g(W/kg) (include +power drift) | |
|---|---|---|---|---|---|---|---|
| | | Limits 8.0 W/kg | | ± 0.21 | | | |
| | | Duty cycle | | Power Drift(dB) | | Duty cycle | |
| | | 100% | 50% | | | 100% | 50% |
| The EUT display towards phantom, Distance 15mm (Face Held) | | | | | | | |
| 400.125MHz | 9 | 2.280 | 1.140 | 0.014 | 1.003 | 2.287 | 1.143 |
| 435 MHz | 10 | 7.390 | 3.695 | 0.001 | 1.000 | 7.390 | 3.695 |
| 469.225 MHz | 11 | 4.380 | 2.190 | -0.039 | 1.009 | 4.419 | 2.210 |
| The EUT display towards phantom with belt clip, Distance 0mm (Body-Worn) | | | | | | | |
| 400.125MHz | 9 | 2.210 | 1.105 | -0.019 | 1.004 | 2.219 | 1.110 |
| 435 MHz | 10 | 8.340 | 4.170 | -0.058 | 1.013 | 8.448 | 4.224 |
| 469.225 MHz | 11 | 4.630 | 2.315 | -0.042 | 1.010 | 4.676 | 2.338 |

Note: 1.The value with blue color is the maximum SAR Value of each test band.

2. The Exposure category about EUT: controlled environment / general Occupational, so the SAR limit is 8.0 W/kg averaged over any 1 gram of tissue.

## 9.4. Conclusion

Localized Specific Absorption Rate (SAR) of this portable wireless device has been measured in all cases requested by the relevant standards cited in Clause 7.2 of this report. Maximum localized SAR is 4.224W/kg that are below exposure limits specified in the relevant standards cited in Clause 7.1 of this test report.

# 10. MEASUREMENT UNCERTAINTY

| No. | source | Type | Uncertainty Value (%) | Probability Distribution | k | $c_i$ | Standard ncertainty $u_i^{'}$ (%) | Degree of freedom $V_{eff}$ or $v_i$ |
|---|---|---|---|---|---|---|---|---|
| 1 | System repetivity | A | 0.5 | N | 1 | 1 | 0.5 | 9 |
| Measurement system | | | | | | | | |
| 2 | probe calibration | B | 5.9 | N | 1 | 1 | 5.9 | ∞ |
| 3 | axial isotropy of the probe | B | 4.7 | R | $\sqrt{3}$ | $\sqrt{0.5}$ | 1.9 | ∞ |
| 4 | Hemispherical isotropy of the probe | B | 9.4 | R | $\sqrt{3}$ | $\sqrt{0.5}$ | 3.9 | ∞ |
| 6 | boundary effect | B | 1.9 | R | $\sqrt{3}$ | 1 | 1.1 | ∞ |
| 7 | probe linearity | B | 4.7 | R | $\sqrt{3}$ | 1 | 2.7 | ∞ |
| 8 | System detection limits | B | 1.0 | R | $\sqrt{3}$ | 1 | 0.6 | ∞ |
| 9 | readout Electronics | B | 1.0 | N | 1 | 1 | 1.0 | ∞ |
| 10 | response time | B | 0 | R | $\sqrt{3}$ | 1 | 0 | ∞ |
| 11 | integration time | B | 4.32 | R | $\sqrt{3}$ | 1 | 2.5 | ∞ |
| 12 | noise | B | 0 | R | $\sqrt{3}$ | 1 | 0 | ∞ |
| 13 | RF Ambient Conditions | B | 3 | R | $\sqrt{3}$ | 1 | 1.73 | ∞ |
| 14 | Probe Positioner Mechanical Tolerance | B | 0.4 | R | $\sqrt{3}$ | 1 | 0.2 | ∞ |
| 15 | Probe Positioning with respect to Phantom Shell | B | 2.9 | R | $\sqrt{3}$ | 1 | 1.7 | ∞ |
| 16 | Extrapolation, interpolation and Integration Algorithms for Max. SAR Evaluation | B | 3.9 | R | $\sqrt{3}$ | 1 | 2.3 | ∞ |
| Test sample Related | | | | | | | | |
| 17 | -Test Sample Positioning | A | 2.9 | N | 1 | 1 | 2.9 | 5 |
| 18 | -Device Holder Uncertainty | A | 4.1 | N | 1 | 1 | 4.1 | 5 |
| 19 | -Output Power Variation - SAR drift measurement | B | 5.0 | R | $\sqrt{3}$ | 1 | 2.9 | ∞ |
| Physical parameter | | | | | | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 20 | -phantom | B | 4.0 | R | $\sqrt{3}$ | 1 | 2.3 | ∞ |
| 21 | -liquid conductivity (deviation from target) | B | 5.0 | R | $\sqrt{3}$ | 0.64 | 1.8 | ∞ |
| 22 | -liquid conductivity (measurement uncertainty) | B | 5.0 | N | 1 | 0.64 | 3.2 | ∞ |
| 23 | -liquid permittivity (deviation from target) | B | 5.0 | R | $\sqrt{3}$ | 0.6 | 1.7 | ∞ |
| 24 | -liquid permittivity (measurement uncertainty ) | B | 5.0 | N | 1 | 0.6 | 3.0 | ∞ |
| Combined standard uncertainty | | $u_c^{'} = \sqrt{\sum_{i=1}^{21} c_i^2 u_i^2}$ | | | | | 12.0 | |
| Expanded uncertainty (confidence interval of 95 %) | | $u_e = 2u_c$ | | N | k=2 | | 24.0 | |

# 11. MAIN TEST INSTRUMENTS

**Table 14: List of Main Instruments**

| No. | Name | Type | Serial Number | Calibration Date | Valid Period |
|---|---|---|---|---|---|
| 01 | Network analyzer | Agilent 8753E | US37390326 | September 14, 2008 | One year |
| 02 | Dielectric Probe Kit | Agilent 85070E | US44020115 | No Calibration Requested | |
| 03 | Power meter | Agilent E4417A | GB41291714 | March 14, 2009 | One year |
| 04 | Power sensor | Agilent 8481H | MY41091316 | March 14, 2009 | One year |
| 05 | Signal Generator | HP 8341B | 2730A00804 | September 14, 2008 | One year |
| 06 | Amplifier | IXA-020 | 0401 | No Calibration Requested | |
| 07 | BTS | E5515C | GB46490218 | September 14, 2008 | One year |
| 08 | E-field Probe | ET3DV6 | 1737 | November 25, 2008 | One year |
| 09 | DAE | DAE4 | 452 | November 18, 2008 | One year |
| 10 | Validation Kit 450MHz | D450V2 | 1021 | February 2, 2009 | One year |

# 12. TEST PERIOD

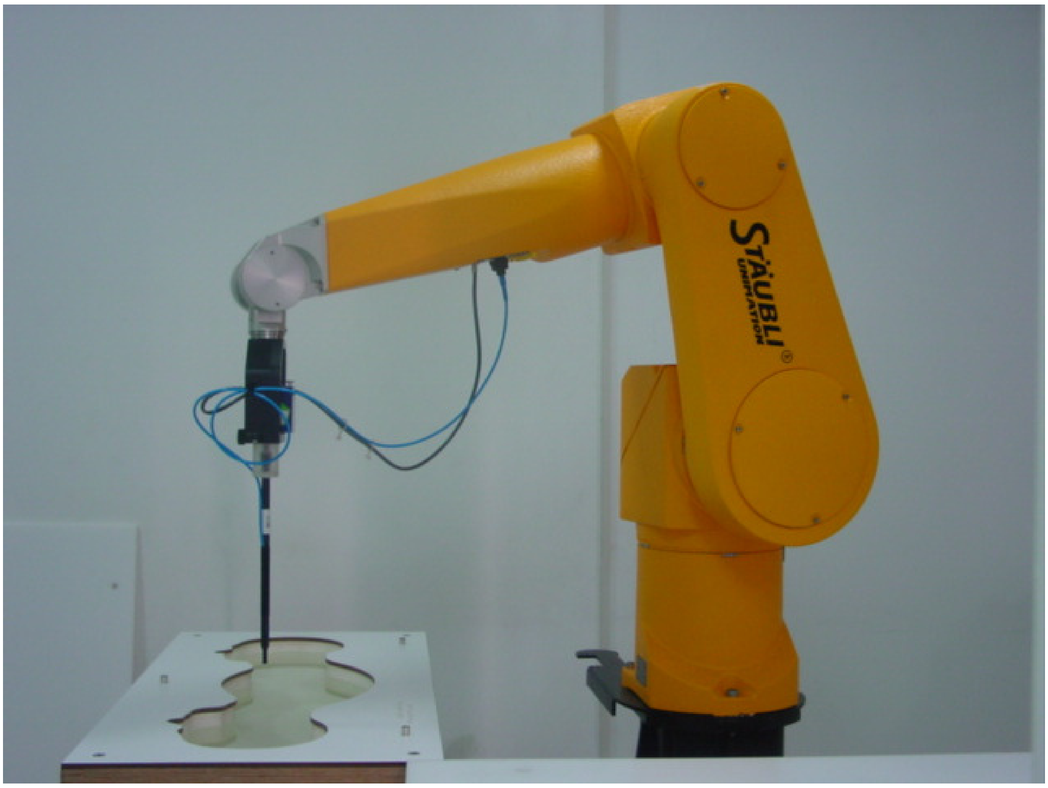
The test is performed in May 17, 2009.

# 13. TEST LOCATION

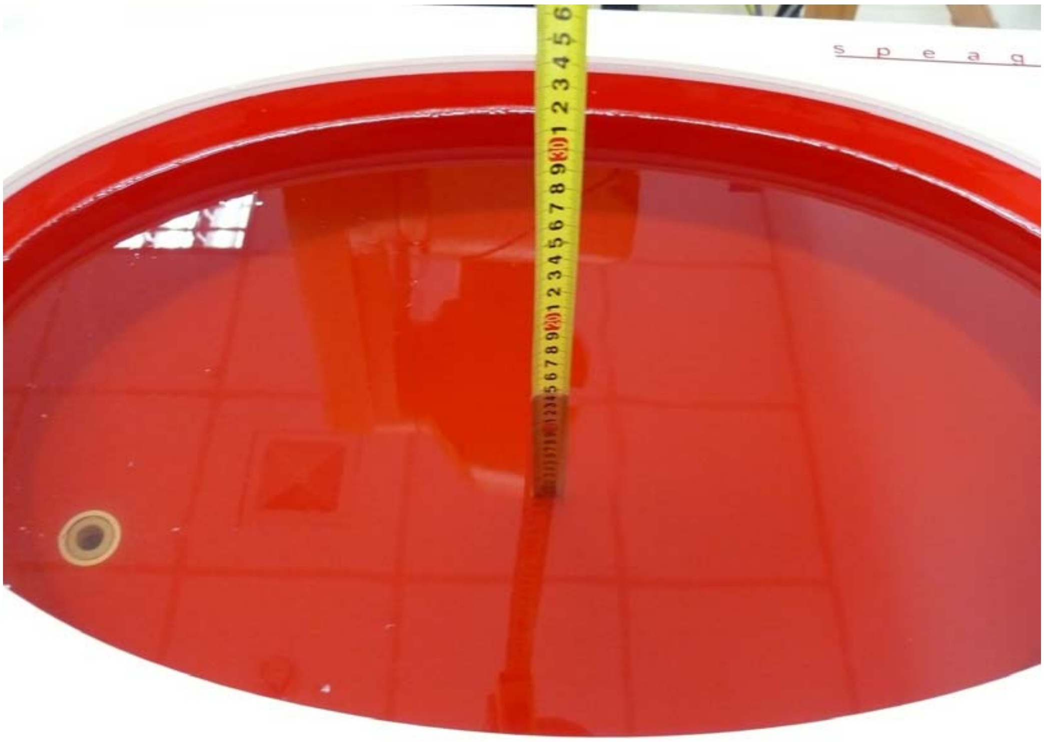
The test is performed at TA Technology (Shanghai) Co., Ltd.

*****END OF REPORT BODY*****

## ANNEX A: TEST LAYOUT




Picture 1: Specific Absorption Rate Test Layout




Picture 2: Liquid depth in the Flat Phantom (450 MHz)

# ANNEX B: SYSTEM VALIDATION RESULTS

## System Performance Check at 450 MHz

**DUT: Dipole450 MHz; Type: D450V2; Serial: 1021**

Date/Time: 5/17/2009 0:14:33 AM

Communication System: CW; Frequency: 450 MHz;Duty Cycle: 1:1

Medium parameters used: f = 450 MHz; $\sigma$ = 0.85 mho/m; $\varepsilon_r$ = 44.93; $\rho$ = 1000 kg/$m^3$

- Probe: ET3DV6 - SN1737; ConvF(7.2, 7.2, 7.2);
- Electronics: DAE4 Sn452;

**d=15mm, Pin=398mW/Area Scan (41x131x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 2.15 mW/g

**d=15mm, Pin=398mW/Zoom Scan (7x7x7) (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 52.1 V/m; Power Drift = -0.022 dB
Peak SAR (extrapolated) = 3.29 W/kg
**SAR(1 g) = 2.02 mW/g; SAR(10 g) = 1.31 mW/g**
Maximum value of SAR (measured) = 2.15 mW/g

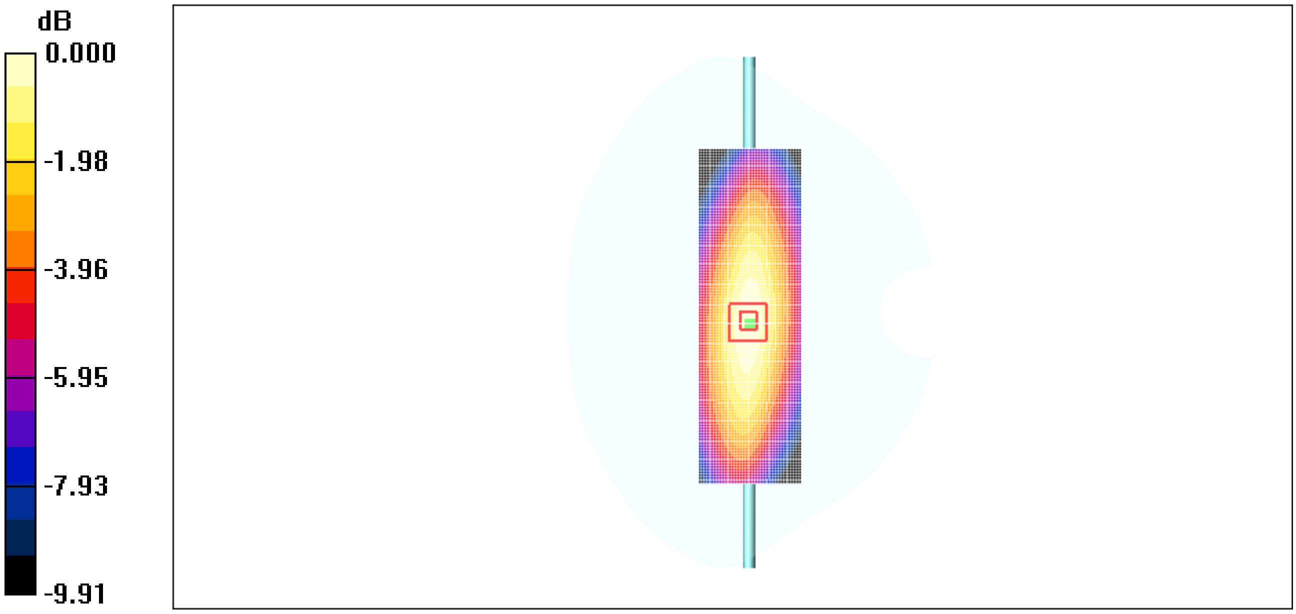



**Figure 7 System Performance Check 450MHz 398mW**

# ANNEX C: GRAPH RESULTS

## TG-UV Front towards Phantom, distance 15 mm, High

Date/Time: 5/17/2009 0:48:58 AM

Communication System: PTT 450; Frequency: 469.225 MHz;Duty Cycle: 1:1

Medium parameters used (interpolated): f = 469.225 MHz; σ = 0.865 mho/m; $\varepsilon_r$ = 44.5; ρ = 1000 kg/m$^3$

Ambient Temperature:22.3 ℃ Liqiud Temperature: 21.5℃

Phantom section: Flat Section

DASY4 Configuration:

Probe: ET3DV6 - SN1737; ConvF(7.2, 7.2, 7.2); Calibrated: 11/25/2008

Electronics: DAE4 Sn452; Calibrated: 11/18/2008

Phantom: Flat Phantom ELI4.0; Type: QDOVA001BB; Serial: SN1058

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Towards Phantom High/Area Scan (51x181x1):** Measurement grid: dx=20mm, dy=20mm

Maximum value of SAR (interpolated) = 2.77 mW/g

**Towards Phantom High/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 55.9 V/m; Power Drift = 0.014dB

Peak SAR (extrapolated) = 3.29 W/kg

**SAR(1 g) = 2.28 mW/g; SAR(10 g) = 1.62 mW/g**

Maximum value of SAR (measured) = 2.45 mW/g

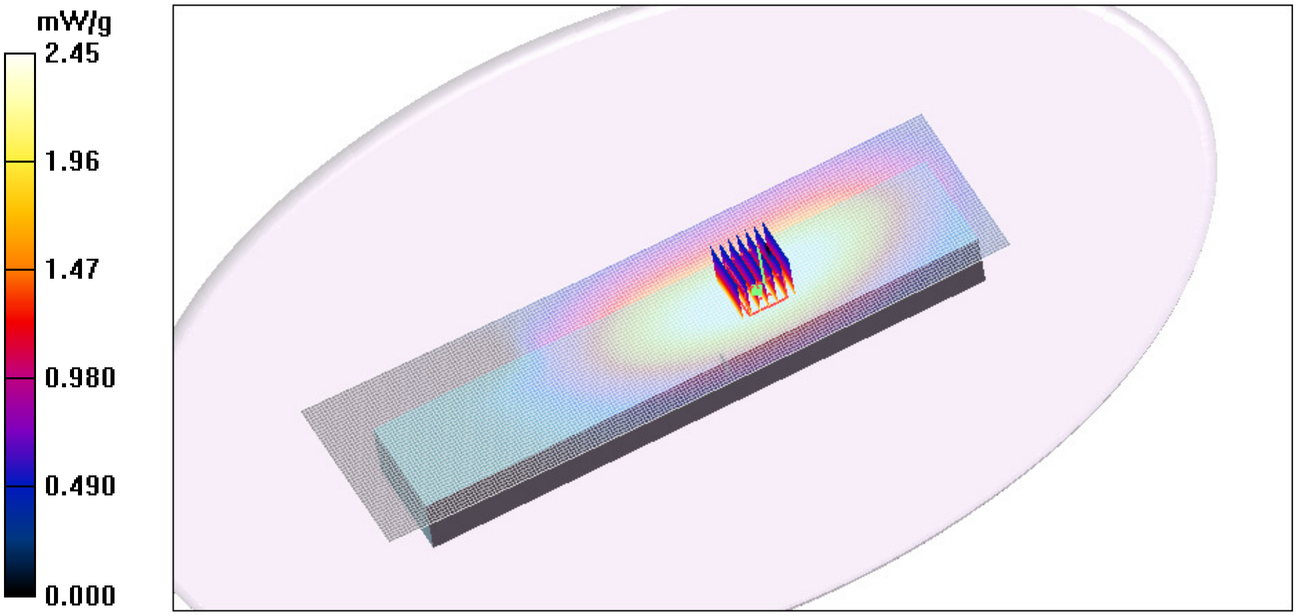



**Figure 8 Face Held, Towards Phantom, distance 15mm Channel 11**

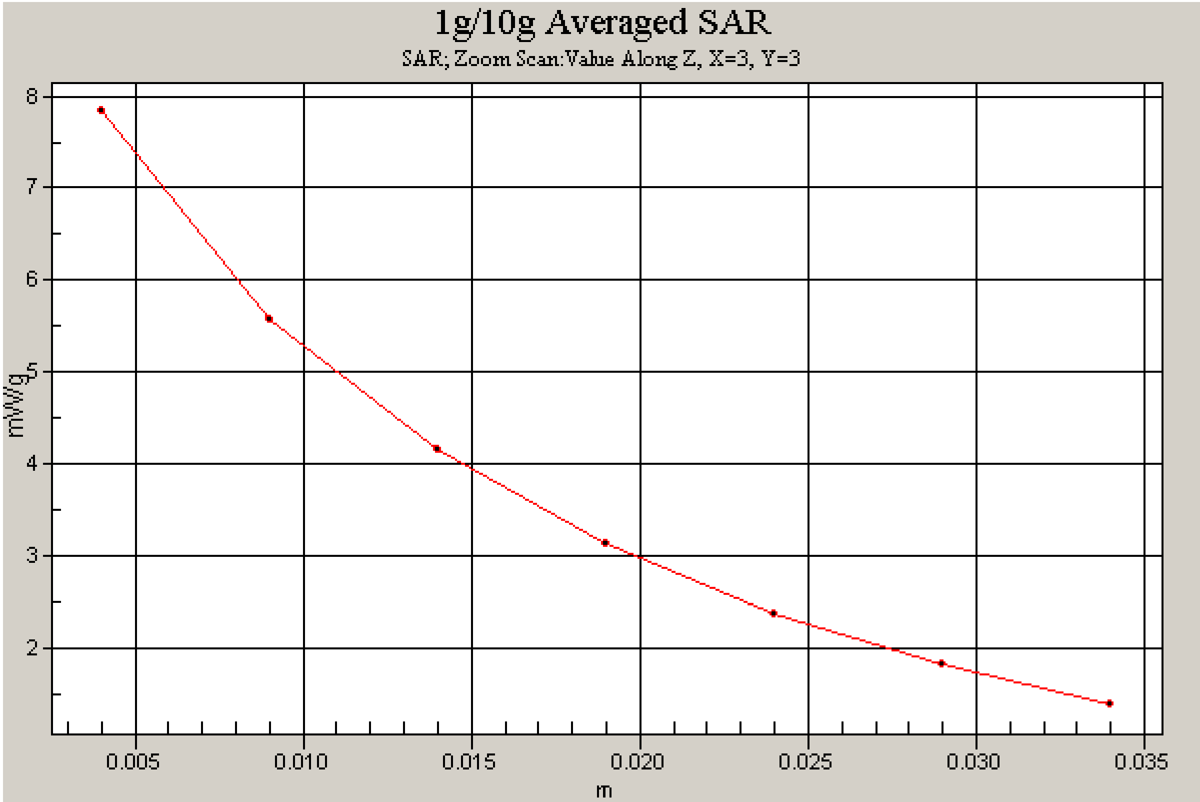



**Figure 9 Z-Scan at power reference point (Face Held, Towards Phantom, distance 15mm Channel 11)**

**TG-UV Front Towards Phantom, distance 15 mm, Middle**

Date/Time: 5/17/2009 1:10:07 AM

Communication System: PTT 450; Frequency: 435 MHz;Duty Cycle: 1:1

Medium parameters used: f = 435 MHz; σ = 0.838 mho/m; $\varepsilon_r$ = 45.3; ρ = 1000 kg/m$^3$

Ambient Temperature:22.3 ℃ Liqiud Temperature: 21.5℃

Phantom section: Flat Section

DASY4 Configuration:

Probe: ET3DV6 - SN1737; ConvF(7.2, 7.2, 7.2); Calibrated: 11/25/2008

Electronics: DAE4 Sn452; Calibrated: 11/18/2008

Phantom: Flat Phantom ELI4.0; Type: QDOVA001BB; Serial: SN1058

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Towards Phantom Middle/Area Scan (51x181x1):** Measurement grid: dx=20mm, dy=20mm

Maximum value of SAR (interpolated) = 8.28 mW/g

**Towards Phantom Middle/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 93.5 V/m; Power Drift = 0.001 dB

Peak SAR (extrapolated) = 10.6 W/kg

**SAR(1 g) = 7.39 mW/g; SAR(10 g) = 5.32 mW/g**

Maximum value of SAR (measured) = 7.83 mW/g

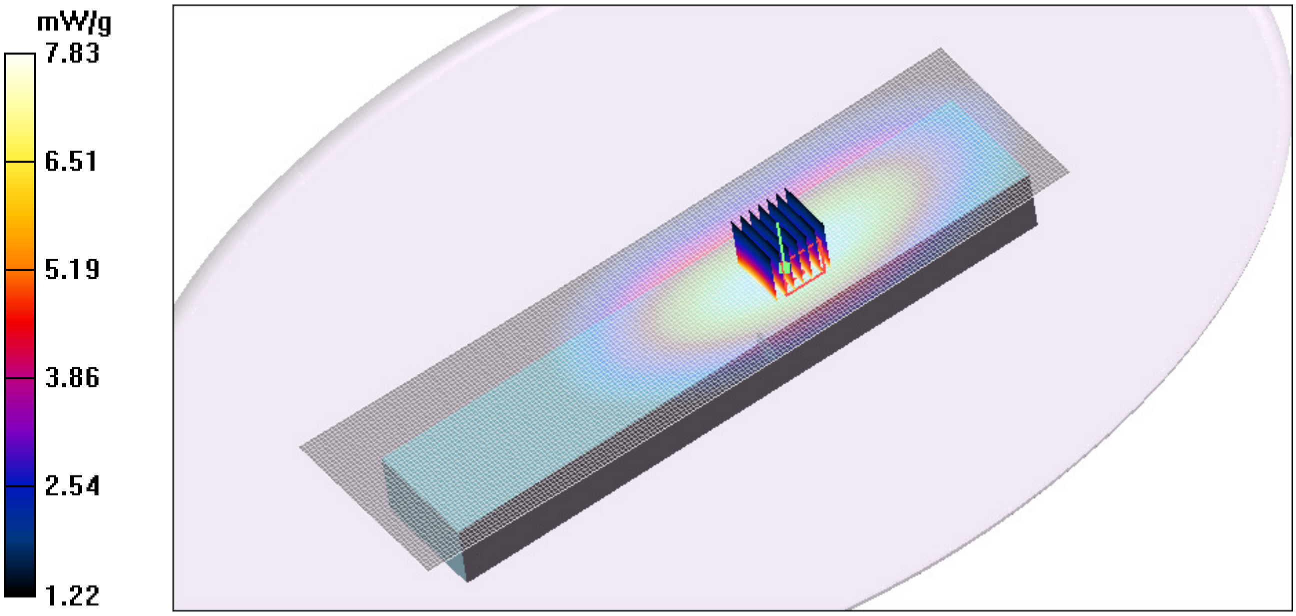



**Figure 10 Face Held, Front Towards Phantom, distance 15 mm, Channel 10**

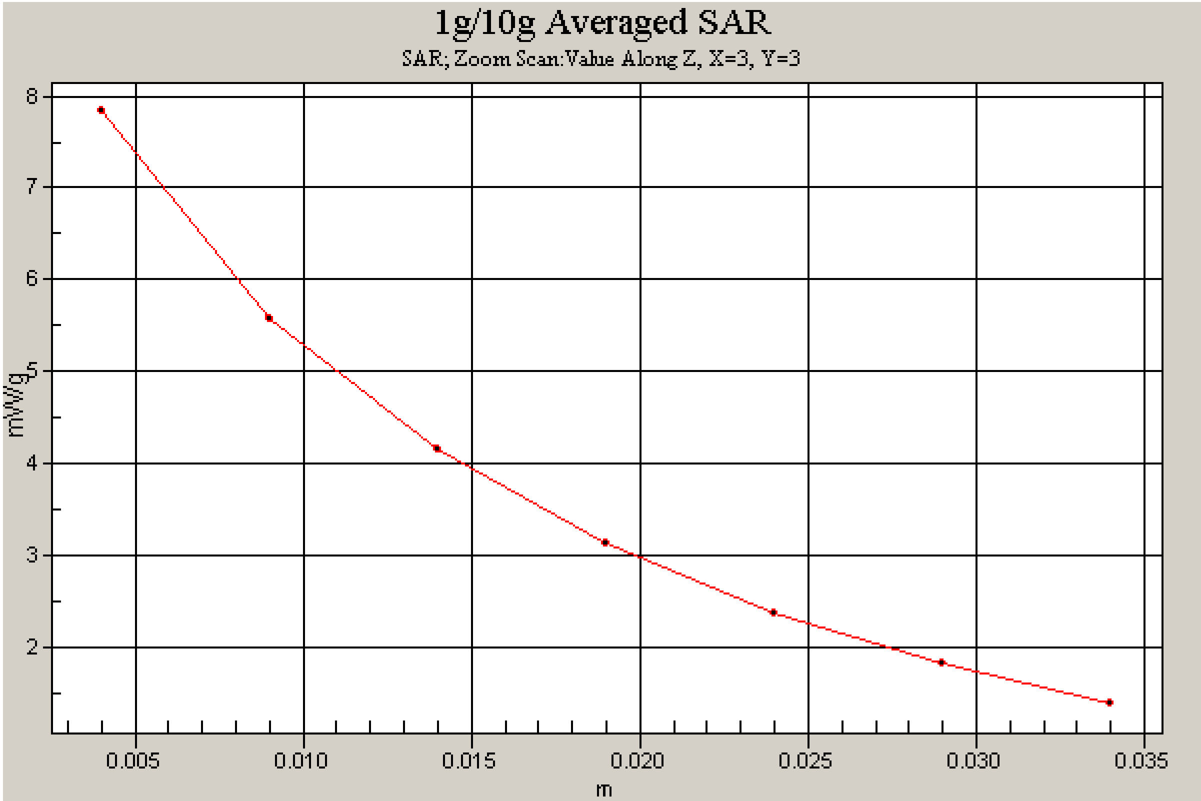



**Figure 11 Z-Scan at power reference point (Face Held, Front towards Phantom, distance 15 mm, Channel 10)**

**TG-UV Front Towards Phantom, distance 15 mm, Low**

Date/Time: 5/17/2009 1:35:28 AM

Communication System: PTT 450; Frequency: 400.125 MHz;Duty Cycle: 1:1

Medium parameters used (interpolated): f = 400.125 MHz; σ = 0.831 mho/m; $\varepsilon_r$ = 45.7; ρ = 1000 kg/$m^3$

Ambient Temperature:22.3 ℃ Liqiud Temperature: 21.5℃

Phantom section: Flat Section

DASY4 Configuration:

Probe: ET3DV6 - SN1737; ConvF(7.2, 7.2, 7.2); Calibrated: 11/25/2008

Electronics: DAE4 Sn452; Calibrated: 11/18/2008

Phantom: Flat Phantom ELI4.0; Type: QDOVA001BB; Serial: SN1058

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Towards Phantom Low/Area Scan (51x181x1):** Measurement grid: dx=20mm, dy=20mm

Maximum value of SAR (interpolated) = 9.06 mW/g

**Towards Phantom Low/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 74.6 V/m; Power Drift = -0.039 dB

Peak SAR (extrapolated) = 10.9 W/kg

**SAR(1 g) = 4.38 mW/g; SAR(10 g) = 2.93 mW/g**

Maximum value of SAR (measured) = 4.38 mW/g

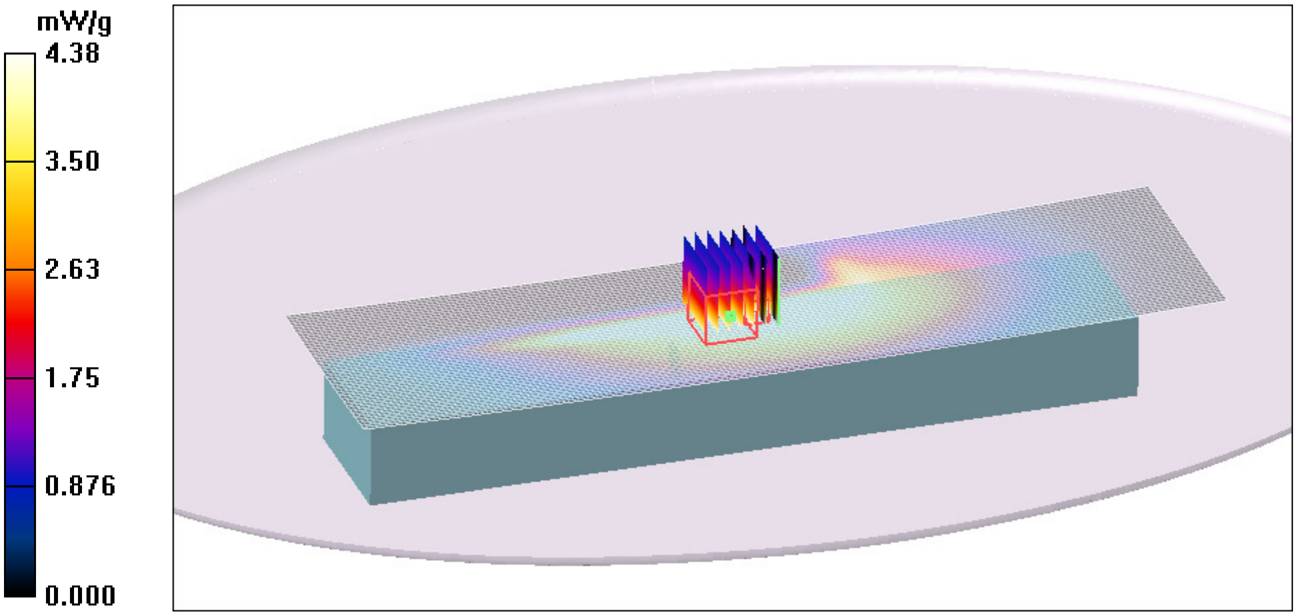



**Figure 12 Face Held, Front Towards Phantom, distance 15 mm, Channel 9**

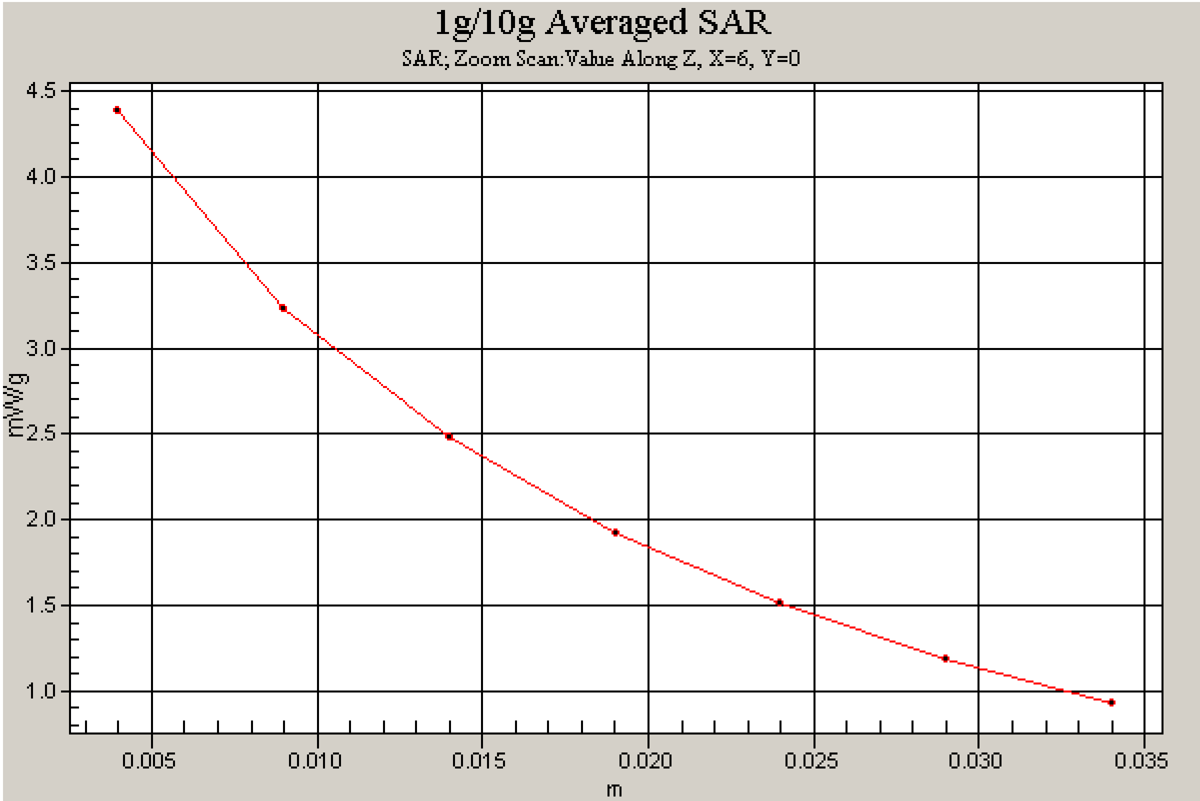



**Figure 13 Z-Scan at power reference point (Face Held, Front Towards Phantom, distance 15 mm, Channel 9)**

**TG-UV Back to Phanntom, Belt clip attach Phanntom High**

Date/Time: 5/17/2009 2:05:56 AM

Communication System: PTT 450; Frequency: 469.225 MHz;Duty Cycle: 1:1

Medium parameters used (interpolated): f = 469.225 MHz; σ = 0.982 mho/m; $\varepsilon_r$ = 55.8; ρ = 1000 kg/$m^3$

Ambient Temperature:22.3 ℃ Liqiud Temperature: 21.5℃

Phantom section: Flat Section

DASY4 Configuration:

Probe: ET3DV6 - SN1737; ConvF(7.52, 7.52, 7.52); Calibrated: 11/25/2008

Electronics: DAE4 Sn452; Calibrated: 11/18/2008

Phantom: Flat Phantom ELI4.0; Type: QDOVA001BB; Serial: SN1058

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Towards Ground High/Area Scan (51x181x1):** Measurement grid: dx=20mm, dy=20mm
Maximum value of SAR (interpolated) = 4.89 mW/g

**Towards Ground High/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 53.1 V/m; Power Drift = -0.019 dB

Peak SAR (extrapolated) = 3.24 W/kg

**SAR(1 g) = 2.21 mW/g; SAR(10 g) = 1.46 mW/g**

Maximum value of SAR (measured) = 2.36 mW/g

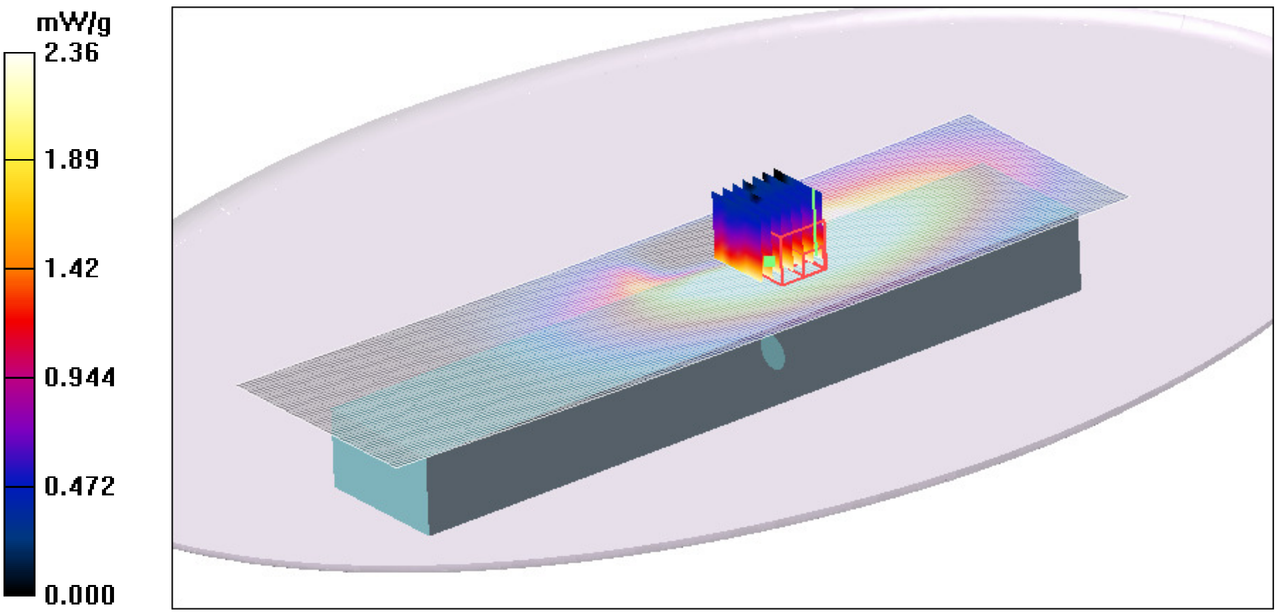



**Figure 14 Body-Worn, Back to Phanntom, Belt clip attach Phanntom Channel 11**

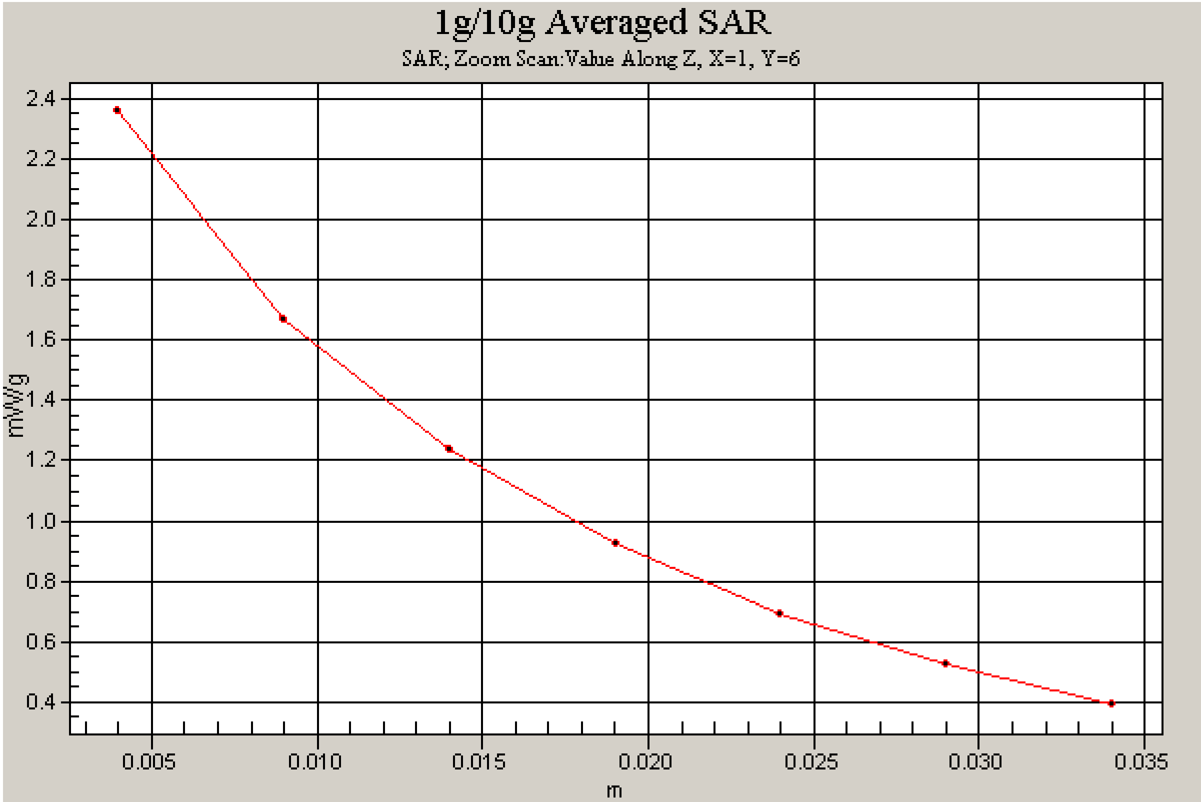



**Figure 15 Z-Scan at power reference point (Body-Worn, Back to Phanntom, Belt clip attach Phanntom Channel 11 )**

**TG-UV Back to Phanntom, Belt clip attach Phanntom Middle**

Date/Time: 5/17/2009 2:40:58 AM

Communication System: PTT 450; Frequency: 435 MHz;Duty Cycle: 1:1

Medium parameters used: f = 435 MHz; σ = 0.961 mho/m; $\varepsilon_r$ = 56.5; ρ = 1000 kg/m$^3$

Ambient Temperature:22.3 ℃ Liqiud Temperature: 21.5℃

Phantom section: Flat Section

DASY4 Configuration:

Probe: ET3DV6 - SN1737; ConvF(7.52, 7.52, 7.52); Calibrated: 11/25/2008

Electronics: DAE4 Sn452; Calibrated: 11/18/2008

Phantom: Flat Phantom ELI4.0; Type: QDOVA001BB; Serial: SN1058

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Towards Ground Middle/Area Scan (51x181x1):** Measurement grid: dx=20mm, dy=20mm

Maximum value of SAR (interpolated) = 18.1 mW/g

**Towards Ground Middle/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 100.9 V/m; Power Drift = -0.058 dB

Peak SAR (extrapolated) = 18.2 W/kg

**SAR(1 g) = 8.34 mW/g; SAR(10 g) = 5.34 mW/g**

Maximum value of SAR (measured) = 8.37 mW/g

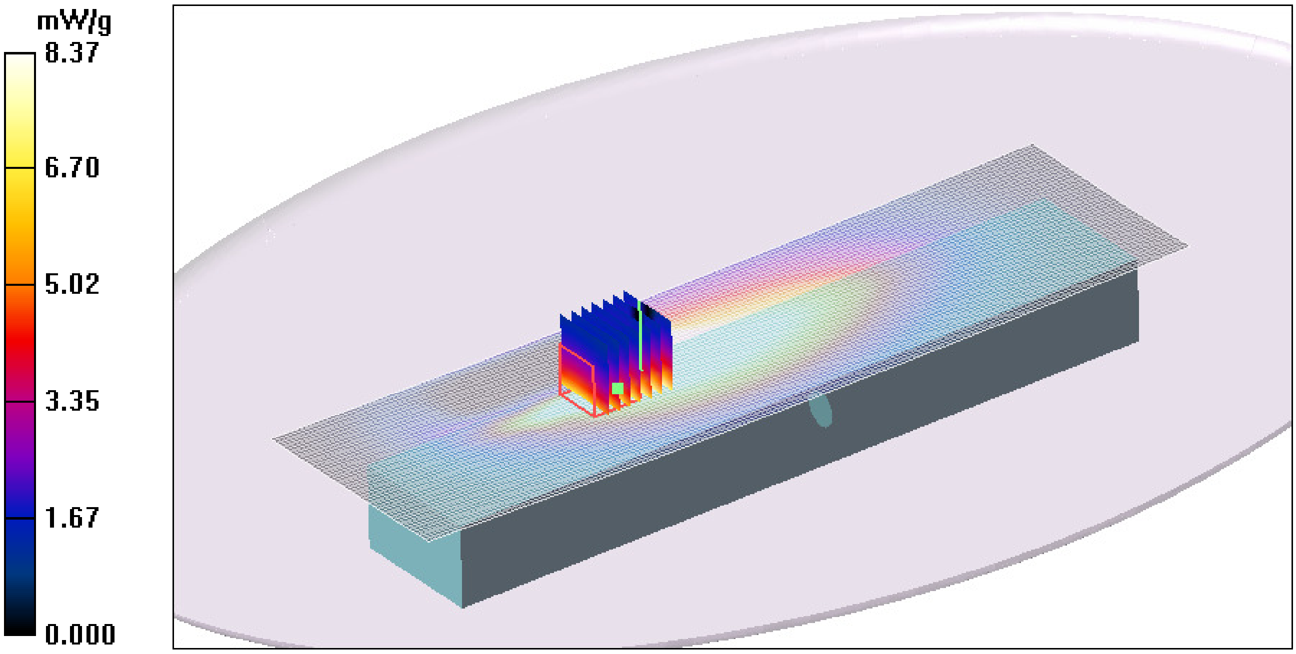



**Figure 16 Body-Worn, Back to Phanntom, Belt clip attach Phanntom Channel 10**

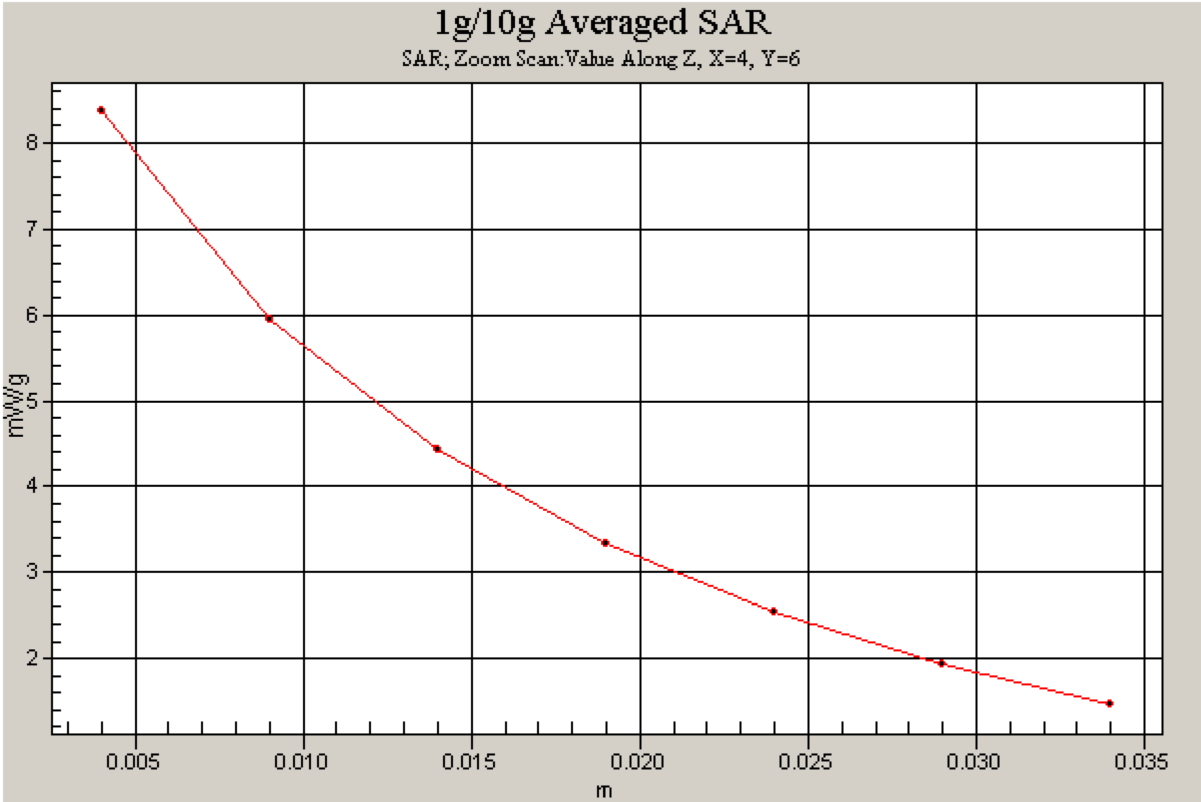



**Figure 17 Z-Scan at power reference point (Body-Worn, Back to Phanntom, Belt clip attach Phanntom, Channel 10)**

**TG-UV Back to Phanntom, Belt clip attach Phanntom Low**

Date/Time: 5/17/2009 3:26:08 AM

Communication System: PTT 450; Frequency: 400.125 MHz;Duty Cycle: 1:1

Medium parameters used (interpolated): f = 400.125 MHz; σ = 0.92 mho/m; $\varepsilon_r$ = 56.7; ρ = 1000 kg/$m^3$

Ambient Temperature:22.3 ℃ Liqiud Temperature: 21.5℃

Phantom section: Flat Section

DASY4 Configuration:

Probe: ET3DV6 - SN1737; ConvF(7.52, 7.52, 7.52); Calibrated: 11/25/2008

Electronics: DAE4 Sn452; Calibrated: 11/18/2008

Phantom: Flat Phantom ELI4.0; Type: QDOVA001BB; Serial: SN1058

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Towards Ground Low/Area Scan (51x181x1):** Measurement grid: dx=20mm, dy=20mm

Maximum value of SAR (interpolated) = 10.4 mW/g

**Towards Ground Low/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 71.9 V/m; Power Drift = -0.042 dB

Peak SAR (extrapolated) = 6.79 W/kg

**SAR(1 g) = 4.63 mW/g; SAR(10 g) = 3.3 mW/g**

Maximum value of SAR (measured) = 4.93 mW/g

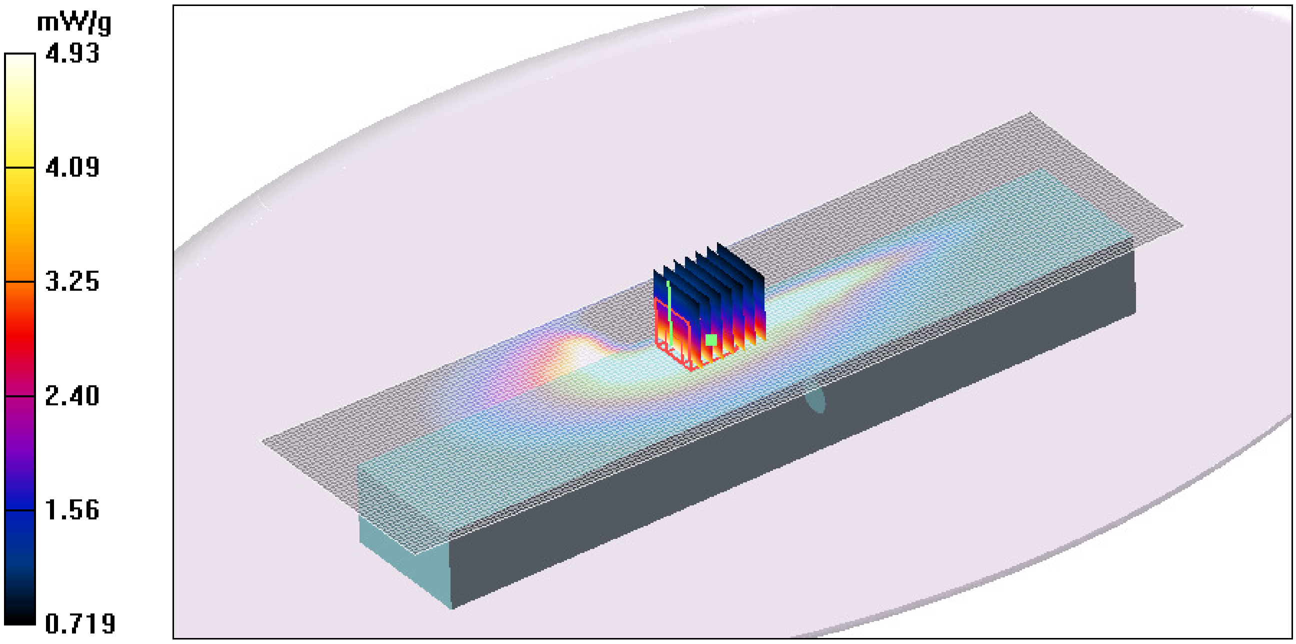



**Figure 18 Body-Worn, Back to Phanntom, Belt clip attach Phanntom Channel 9**

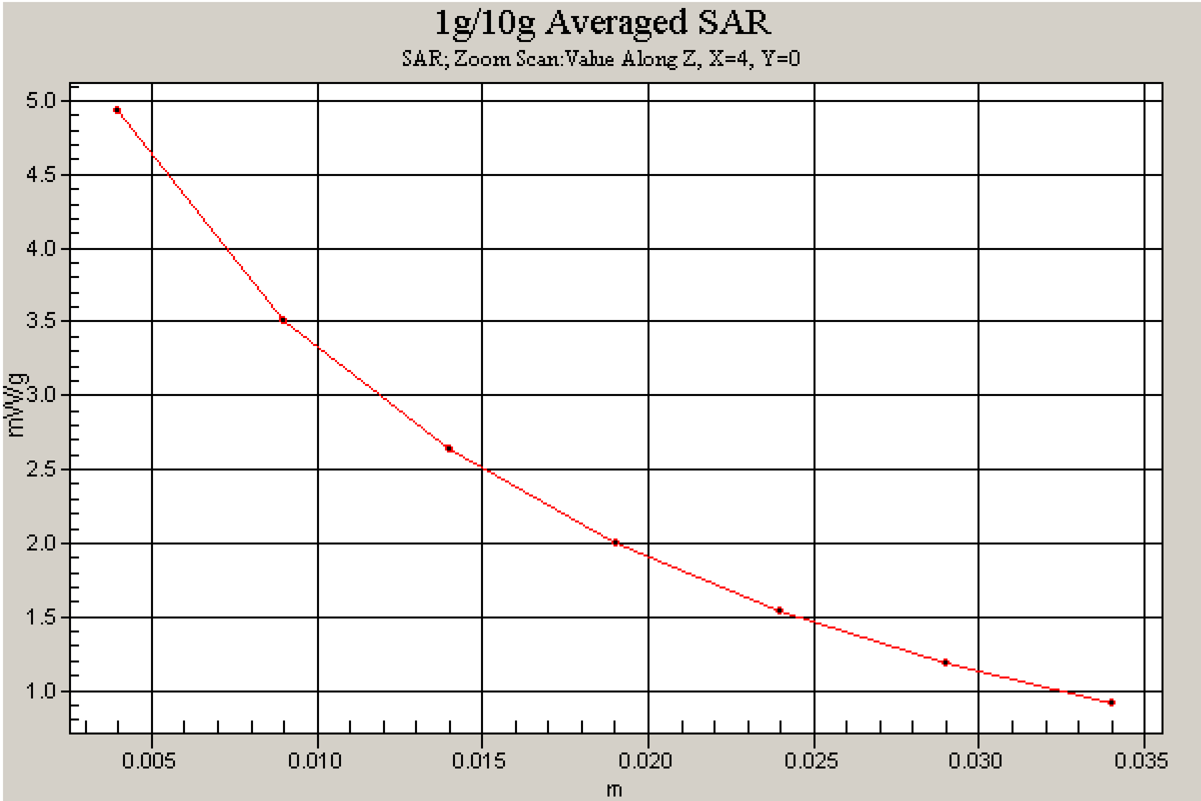
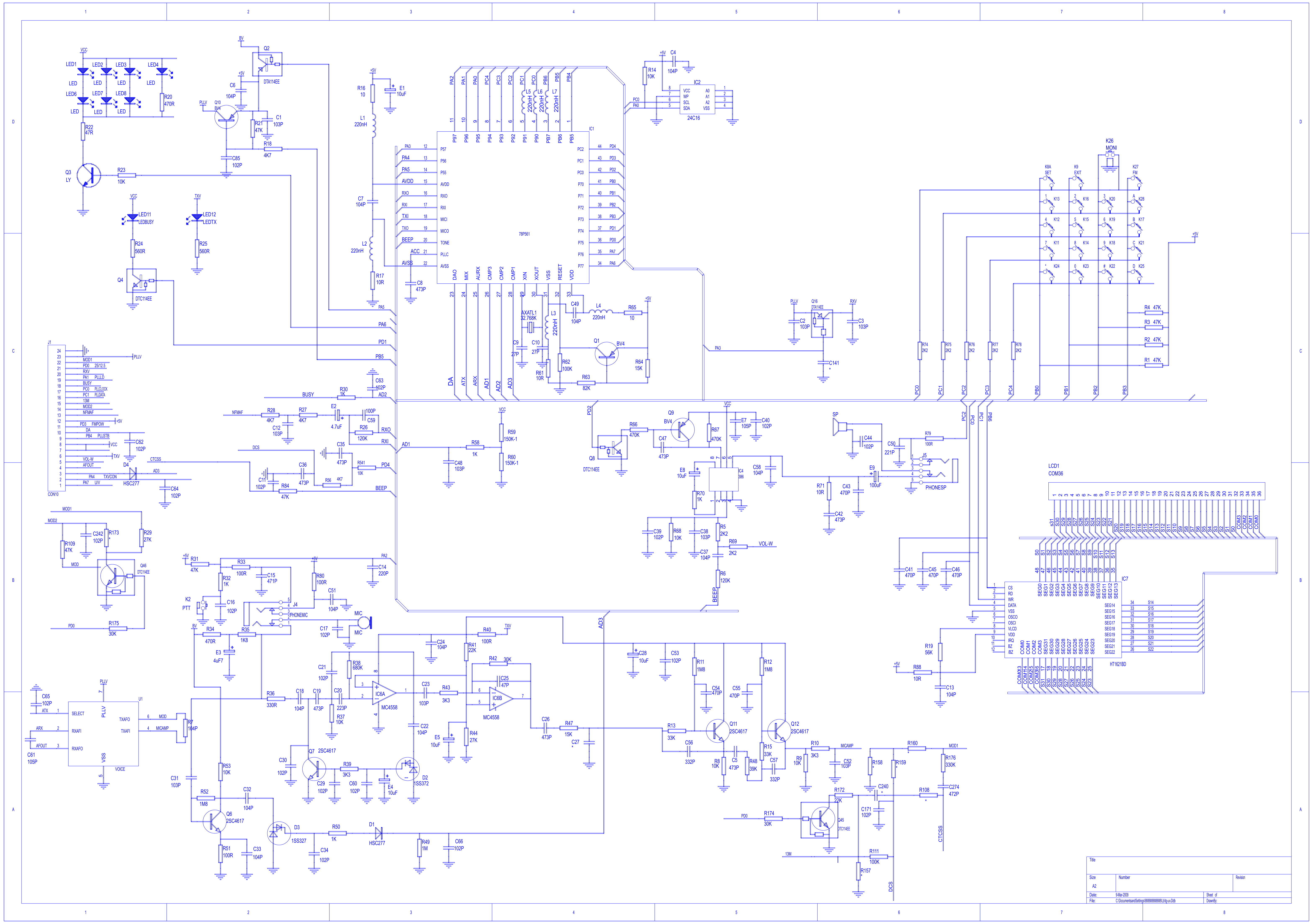



**Figure 19 Z-Scan at power reference point (Body-Worn, Back to Phanntom, Belt clip attach Phanntom, Channel 9)**

# CONTROL BOARD SCHEMATIC DIAGRAM



# PCB SCHEMATIO DIAGRAM

# FCC Part 90
# Test Report

*For*

**Transceiver**

**Model Name: TG-UV**

**Brand Name: Quansheng**

**FCC ID: XBPTG-UV**

**Report No.: AGC10080904QZ03E6**

**Date of Issue: Apr.22, 2009**

*Prepared For*


**Fujian Nanan Quansheng Electronics Co., Ltd.**

**No 82,Qiuzhong Industry Area, Xiamei Town, Nanan City,**

**Fujian Province, China**

TEL: 86-595-8676 9296

FAX: 86-595-8676 2335


*Prepared By*


**Shenzhen Attestation of Global Compliance Science & Technology Co., Ltd.**

**2F, No.2 Building, ChaXi SanWei Industrial Zone, GuShu Community,**

**XiXiang Street, Bao'An, ShenZhen, China**

Tel: 86-755-2974 2358

Fax: 86-755-2600 8484

## VERIFICATION OF COMPLIANCE

| | |
|---|---|
| Applicant: | Fujian Nanan Quansheng Electronics Co., Ltd.<br>No 82,Qiuzhong Industry Area, Xiamei Town, Nanan City, Fujian Province, China |
| Manufacturer: | Fujian Nanan Quansheng Electronics Co., Ltd.<br>No 82,Qiuzhong Industry Area, Xiamei Town, Nanan City, Fujian Province, China |
| Product Description: | Transceiver |
| Brand Name: | Quansheng |
| Model Number: | TG-UV |
| Model Difference: | N/A |
| File Number: | AGC10080904QZ03E6 |
| Date of Test: | Apr.18 to Apr.22, 2009 |

## We hereby certify that:

The above equipment was tested by Shenzhen Attestation of Global Compliance Science & Technology Co., Ltd. The data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C 63.4:2003 and TIA/EIA 603. The sample tested as described in this report is in compliance with the FCC Rules Part 90.

The test results of this report relate only to the tested sample identified in this report.

Checked By: Tony Tian

Tony Tian Apr.22, 2009

Authorized By: King Zhang

King Zhang Apr.22, 2009

# TABLE OF CONTENTS

# 1. GENERAL INFORMATION

## 1.1 PRODUCT DESCRIPTION

The EUT is a single channel Two-way Radio designed for voice communication. It is designed by way of utilizing the FM modulation achieves the system operating.

A major technical description of EUT is described as following:

| | |
|---|---|
| Communication Type | Voice / Tone only |
| Modulation | FM |
| Emission Type | 16K0F3E/11K0F3E |
| Emission Bandwidth | 10.34 KHz (Limit:11.25 KHz for 12.5 KHz channel separation) at 136-174MHz<br>10.50 KHz (Limit:11.25 KHz for 12.5 KHz channel separation) at 400-470MHz |
| | 15.33 KHz (Limit: 20 KHz for 25 KHz channel Separation) at 136-174MHz<br>15.34 KHz (Limit: 20 KHz for 25 KHz channel Separation) at 400-470MHz |
| Peak Frequency Deviation | 1.89 KHz for 12.5 KHz Channel Separation (Limit<±2.5 KHz) |
| | 3.72 KHz for 25 KHz Channel Separation (Limit<±5 KHz) |
| Audio Frequency Response | 2.17 KHz (Limit<3.125 KHz) |
| Maximum Transmitter Power | 35.47 dBm/35.52 dBm for 12.5 KHz/25.0KHz Channel Separation at 136MHz-174MHz<br>35.45 dBm/35.49 dBm for 12.5 KHz/25.0KHz Channel Separation at 400MHz-470MHz |
| Output power Modification | 4W |
| Antenna Designation | Detachable |
| Power Supply | DC 7.4V by battery |
| Battery Endpoint | DC 6.4V |
| Operation Frequency Range and Channel | Frequency Range: 136 MHz to 173.995MHz, 400 MHz to 469.995 MHz<br>Channel Separation: 12.5KHz and 25KHz |
| | Top Channel: 173.995 MHz, 469.995 MHz, |
| | Centre Channel: 150.000 MHz,435.000 MHz, |
| | Bottom Channel: 136.000 MHz,400.000MHz |
| Frequency Tolerance | 1.794ppm/1.868ppm for 12.5 KHz/25.0 KHz Channel Separation at 136-174MHz<br>1.581ppm/1.615ppm for 12.5KHz/25.0 KHz Channel Separation at 400-470MHz |

## 1.2 RELATED SUBMITTAL(S) / GRANT (S)

This submittal(s) (test report) is intended for FCC ID: XBPTG-UV, filing to comply with the FCC Part 90 requirements.

## 1.3 TEST METHODOLOGY

The radiated emission testing was performed according to the procedures of ANSI C 63.4: 2003; TIA/EIA 603 and FCC CFR 47 Rules of 2.1046, 2.1047, 2.1049, 2.1051, 2.1053, 2.1055, 2.1057.

## 1.4 TEST FACILITY

The test site used to collect the radiated data is located on the address of World Standardization Certification & Testing Co., Ltd. 1-2/F, Dachong Keji Building, No.28 of Tonggu Road, Nanshan District, Shenzhen, China. The test site is constructed and calibrated to meet the FCC requirements in documents ANSI C63.4: 2003.

FCC register No.: 276008 and IC register No.: 7700A-1.

## 1.5 SPECIAL ACCESSORIES

Not available for this EUT intended for grant.

## 1.6 EQUIPMENT MODIFICATIONS

Not available for this EUT intended for grant.

# 2. SYSTEM TEST CONFIGURATION

## 2.1 EUT CONFIGURATION

The EUT configuration for testing is installed on RF field strength measurement to meet the Commission's requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

## 2.2 EUT EXERCISE

The Transmitter was operated in the normal operating mode. The TX frequency was fixed which was for the purpose of the measurements.

## 2.3 GENERAL TECHNICAL REQUIREMENTS

(1). Section 15.207: Conducted Limits (Not applicable)
(2). Section 90.205: Maximum ERP is dependent upon the station's antenna HAAT and required service area
(3). Section 90.207: Modulation Characteristic
(4). Section 90.209: Occupied Bandwidth
(5). Section 90.210: Emission Mask
(6). Section 90.213: Frequency Tolerance
(7). Section 90.214: Transient Frequency Behavior

## 2.4 CONFIGURATION OF TESTED SYSTEM

Fig. 2-1 Configuration of Tested System

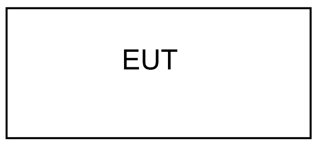



Table 2-1 Equipment Used in Tested System

| Item | Equipment | Model No. | Identifier | Note |
|---|---|---|---|---|
| 1 | Two-way Radio | TG-UV | FCC ID: XBPTG-UV | EUT |
| -- | -- | -- | -- | -- |
| -- | -- | -- | -- | -- |

# 3. SUMMARY OF TEST RESULTS

| FCC Rules | Description Of Test | Result |
|---|---|---|
| §15.207 | Conducted Emission | N/A |
| §90.205 | Maximum Transmitter Power | Compliant |
| §90.207 | Modulation Characteristic | Compliant |
| §90.209 | Occupied Bandwidth | Compliant |
| §90.210 | Emission Mask | Compliant |
| §90.213 | Frequency Tolerance | Compliant |
| §90.214 | Transient Frequency Behavior | Compliant |

# 4. DESCRIPTION OF TEST MODES

The EUT (Two-way Radio) has been tested under normal operating condition. Three channels (The top channel, the middle channel and the bottom channel) are chosen for testing at each channel separation (12.5 KHz/ 25 KHz).

# 5. CONDUCTED LIMITS (NOT APPLICABLE)

## 5.1 PROVISIONS APPLICABLE

For an intentional radiator that is designed to be connected to the public utility (AC) power line, the, the radio frequency voltage that is conducted back onto the AC power line on any frequencies within the band 150 KHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50uH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequencies ranges.

| Frequency of Emission (MHz) | Conducted Limit(dBuV) | |
|---|---|---|
| | Quasi-Peak | Average |
| 0.15 – 0.5 | 66 to 56 * | 56 to 46 * |
| 0.5 – 5 | 56 | 46 |
| 5 – 30 | 60 | 50 |

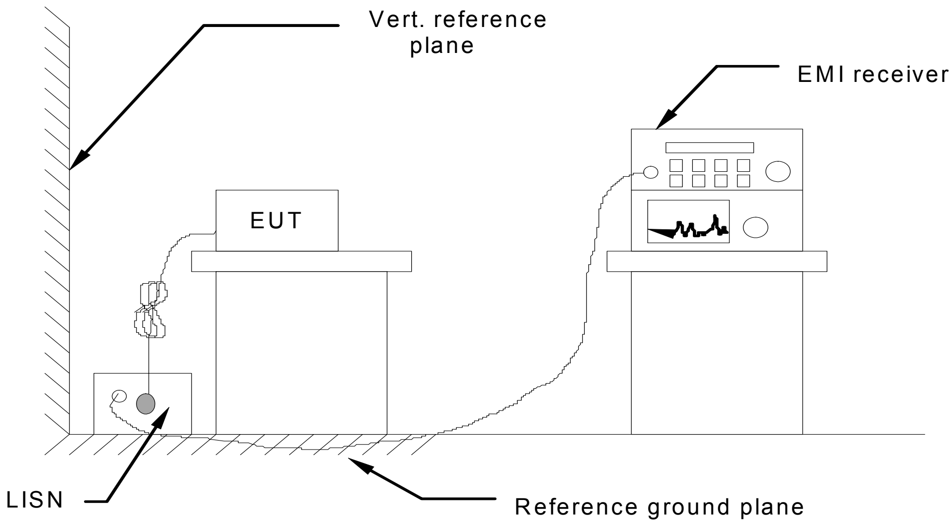
* Decreases with the logarithm of the frequency.

## 5.2 MEASUREMENT PROCEDURE

(1) The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. When the EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.4 (see Test Facility for the dimensions of the ground plane used). When the EUT is a floor-standing equipment, it is placed on the ground plane which has a 3-12 mm non-conductive covering to insulate the EUT from the ground plane.
(2) Support equipment, if needed, was placed as per ANSI C63.4.
(3) All I/O cables were positioned to simulate typical actual usage as per ANSI C63.4.
(4) The EUT received AC120V/60Hz power through a Line Impedance Stabilization Network (LISN) which supplied power source and was grounded to the ground plane.
(5) All support equipments received AC power from a second LISN, if any.
(6) The EUT test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
(7) Analyzer / Receiver scanned from 150kHz to 30MHz for emissions in each of the test modes.

During the above scans, the emissions were maximized by cable manipulation.

## 5.3 TEST SETUP BLOCK DIAGRAM




## 5.4 TEST EQUIPMENT USED

| Conducted Emission Test Site | | | | |
|---|---|---|---|---|
| **Name of Equipment** | **Manufacturer** | **Model** | **Serial Number** | **Cal. Date** |
| TEST RECEIVER | R&S | FCKL1528 | A0304230 | 2008.06 |
| LISN | SCHWARZBECK | NSLK8127 | A0304233 | 2008.06 |

## 5.5 TEST RESULT

LINE CONDUCTED EMISSION TEST

| FREQ MHz | PEAK RAW dBuV | Q.P. RAW dBuV | AVG RAW dBuV | Q.P. Limit dBuV | AVG Limit dBuV | Q.P. Margin dB | AVG Margin dB | NOTE |
|---|---|---|---|---|---|---|---|---|
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |

**NOTE:

"---" denotes the peak emission level was or more than 2dB below the Average limit, so no re-check anymore.

L1 = Line One (Hot side) / L2 = Line Two (Neutral side)

# 6. FREQUENCY TOLERANCE

## 6.1 PROVISIONS APPLICABLE

a). According to FCC Part 2 Section 2.1055(a)(1), the frequency stability shall be measured with variation of ambient temperature from –30℃ to +60℃ centigrade.

b). According to FCC Part 2 Section 2.1055(d)(2), for battery powered equipment, the frequency stability shall be measured with reducing primary supply voltage to the battery operating end point, which is specified by the manufacturer.

c). According to FCC Part 90 Section 90.213, the frequency tolerance must be maintained within 0.00025% for 12.5KHz channel separation and 0.0005% for 25KHz channel separation.

## 6.2 MEASUREMENT PROCEDURE

### 6.2.1 Frequency stability versus environmental temperature

1. Setup the configuration per figure 1 for frequencies measurement inside an environment chamber, Install new battery in the EUT.
2. Turn on EUT and set SA center frequency to the EUT radiated frequency. Set SA Resolution Bandwidth to 1KHz and Video Resolution Bandwidth to 1KHz and Frequency Span to 50KHz.Record this frequency as reference frequency.
3. Set the temperature of chamber to 60℃. Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize. While maintaining a constant temperature inside the chamber, turn the EUT on and measure the EUT operating frequency.
4. Repeat step 2 with a 10℃ decreased per stage until the lowest temperature -30℃ is measured, record all measured frequencies on each temperature step.

### 6.2.2 Frequency stability versus input voltage

1. Setup the configuration per figure 1 for frequencies measured at temperature if it is within 15℃ to 25℃. Otherwise, an environment chamber set for a temperature of 20℃ shall be used. The EUT shall be powered by DC 7.4 V
2. Set SA center frequency to the EUT radiated frequency. Set SA Resolution Bandwidth to 1 KHz and Video Resolution Bandwidth to 1KHz. Record this frequency as reference frequency.
3. Supply the EUT primary voltage at the operating end point which is specified by manufacturer and record the frequency.

## 6.3 TEST SETUP BLOCK DIAGRAM

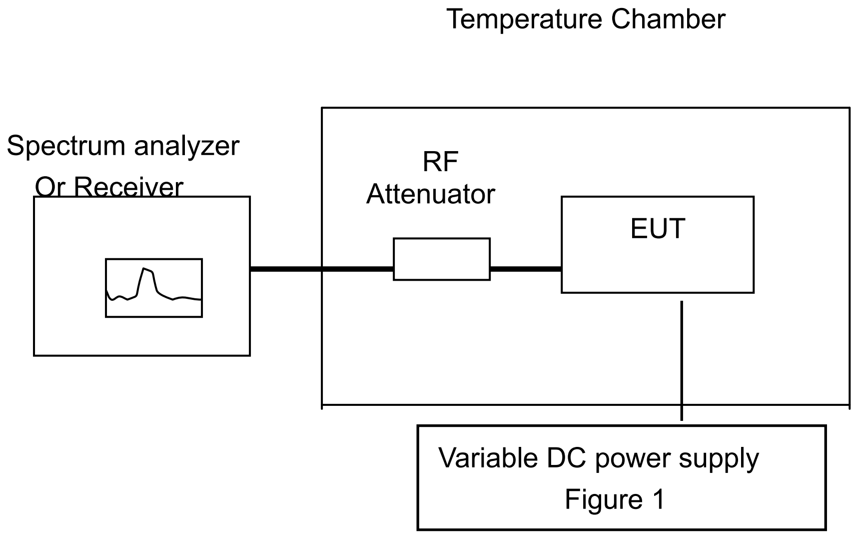


Figure 1

## 6.4 TEST EQUIPMENT USED:

| NAME OF EQUIPMENT | MANUFACTURER | MODEL | SERIAL NUMBER | CAL. DATE |
|---|---|---|---|---|
| Receiver | R&S | ESIB26 | A0304218 | 2008.06 |
| Climate Chamber | Albatross | -- | -- | 2008.12 |

## 6.5 TEST RESULT

(1) Frequency stability versus input voltage (battery operation end point voltage is 6.4V)

**Measurement Result for Channel Separation of 12.5 KHz**

| Channel | Reference Frequency (MHz) | Frequency Measured at end point voltage | Frequency Deviation ppm | Limit ppm |
|---|---|---|---|---|
| Top | 173.995 | 173.994726 | 1.575 | 2.5 |
| Middle | 150.000 | 149.999823 | 1.180 | 2.5 |
| Bottom | 136.000 | 135.999756 | 1.794 | 2.5 |

**Measurement Result for Channel Separation of 25KHz**

| Channel | Reference Frequency (MHz) | Frequency Measured at end point voltage | Frequency Deviation ppm | Limit ppm |
|---|---|---|---|---|
| Top | 173.995 | 173.994776 | 1.287 | 5.0 |
| Middle | 150.000 | 149.999810 | 1.267 | 5.0 |
| Bottom | 136.000 | 135.999746 | 1.868 | 5.0 |

**Measurement Result for Channel Separation of 12.5 KHz**

| Channel | Reference Frequency (MHz) | Frequency Measured at end point voltage | Frequency Deviation ppm | Limit ppm |
|---|---|---|---|---|
| Top | 469.995 | 469.994257 | 1.581 | 2.5 |
| Middle | 435.000 | 434.999678 | 0.740 | 2.5 |
| Bottom | 400.000 | 399.999851 | 0.373 | 2.5 |

**Measurement Result for Channel Separation of 25KHz**

| Channel | Reference Frequency (MHz) | Frequency Measured at end point voltage | Frequency Deviation ppm | Limit ppm |
|---|---|---|---|---|
| Top | 469.995 | 469.994241 | 1.615 | 5.0 |
| Middle | 435.000 | 434.999670 | 0.759 | 5.0 |
| Bottom | 400.000 | 399.999863 | 0.342 | 5.0 |

(2)Frequency stability versus ambient temperature

**Bottom Channel @ 12.5 KHz Channel Separation**

| Reference Frequency: 136.000 MHz | | Limit: 2.5 ppm | |
|---|---|---|---|
| Environment Temperature (℃) | Power Supply (V) | Frequency deviation | |
| | | (MHz) | ppm |
| 50 | 7.4 | 135.999982 | 0.132 |
| 40 | 7.4 | 135.999956 | 0.324 |
| 30 | 7.4 | 135.999949 | 0.375 |
| 20 | 7.4 | 135.999906 | 0.691 |
| 10 | 7.4 | 135.999894 | 0.779 |
| 0 | 7.4 | 135.999880 | 0.882 |
| -10 | 7.4 | 135.999860 | 1.029 |
| -20 | 7.4 | 135.999832 | 1.230 |
| -30 | 7.4 | 135.999802 | 1.455 |

**Middle Channel @ 12.5 KHz Channel Separation**

| Reference Frequency: 150.000MHz | | Limit: 2.5 ppm | |
|---|---|---|---|
| Environment Temperature (℃) | Power Supply (V) | Frequency deviation | |
| | | (MHz) | ppm |
| 50 | 7.4 | 149.999979 | 0.140 |
| 40 | 7.4 | 149.999970 | 0.200 |
| 30 | 7.4 | 149.999959 | 0.273 |
| 20 | 7.4 | 149.999946 | 0.360 |
| 10 | 7.4 | 149.999919 | 0.540 |
| 0 | 7.4 | 149.999890 | 0.733 |
| -10 | 7.4 | 149.999880 | 0.8 |
| -20 | 7.4 | 149.999872 | 0.853 |
| -30 | 7.4 | 149.999823 | 1.18 |

**Top Channel @ 12.5KHz Channel Separation**

| Reference Frequency: 173.995 MHz | | Limit: 2.5 ppm | |
|---|---|---|---|
| Environment Temperature(℃) | Power Supply (V) | Frequency deviation | |
| | | (MHz) | ppm |
| 50 | 7.4 | 173.994949 | 0.293 |
| 40 | 7.4 | 173.994936 | 0.368 |
| 30 | 7.4 | 173.994925 | 0.431 |
| 20 | 7.4 | 173.994913 | 0.500 |
| 10 | 7.4 | 173.994898 | 0.586 |
| 0 | 7.4 | 173.994882 | 0.678 |
| -10 | 7.4 | 173.994875 | 0.718 |
| -20 | 7.4 | 173.994865 | 0.775 |
| -30 | 7.4 | 173.994852 | 0.850 |

**Bottom Channel @ 25.0 KHz Channel Separation**

| Reference Frequency: 136.000MHz | | Limit: 5.0 ppm | |
|---|---|---|---|
| Environment Temperature (℃) | Power Supply (V) | Frequency deviation | |
| | | (MHz) | ppm |
| 50 | 7.4 | 135.999970 | 0.221 |
| 40 | 7.4 | 135.999960 | 0.294 |
| 30 | 7.4 | 135.999897 | 0.757 |
| 20 | 7.4 | 135.999861 | 1.022 |
| 10 | 7.4 | 135.999840 | 1.176 |
| 0 | 7.4 | 135.999826 | 1.270 |
| -10 | 7.4 | 135.999811 | 1.389 |
| -20 | 7.4 | 135.999801 | 1.463 |
| -30 | 7.4 | 135.999791 | 1.536 |

**Middle Channel @ 25.0 KHz Channel Separation**

| Reference Frequency: 150.000 MHz | | Limit: 5.0 ppm | |
|---|---|---|---|
| Environment Temperature (℃) | Power Supply (V) | Frequency deviation | |
| | | (MHz) | ppm |
| 50 | 7.4 | 149.999981 | 0.127 |
| 40 | 7.4 | 149.999972 | 0.187 |
| 30 | 7.4 | 149.999981 | 0.127 |
| 20 | 7.4 | 149.999965 | 0.233 |
| 10 | 7.4 | 149.999961 | 0.260 |
| 0 | 7.4 | 149.999912 | 0.586 |
| -10 | 7.4 | 149.999812 | 1.253 |
| -20 | 7.4 | 149.999814 | 1.240 |
| -30 | 7.4 | 149.999832 | 1.120 |

**Top Channel @ 25.0 KHz Channel Separation**

| Reference Frequency: 173.995 MHz | | Limit: 5.0 ppm | |
|---|---|---|---|
| Environment Temperature(℃) | Power Supply (V) | Frequency deviation | |
| | | (MHz) | ppm |
| 50 | 7.4 | 173.994951 | 0.282 |
| 40 | 7.4 | 173.994938 | 0.356 |
| 30 | 7.4 | 173.994927 | 0.420 |
| 20 | 7.4 | 173.994915 | 0.489 |
| 10 | 7.4 | 173.994891 | 0.626 |
| 0 | 7.4 | 173.994861 | 0.798 |
| -10 | 7.4 | 173.994873 | 0.729 |
| -20 | 7.4 | 173.994856 | 0.827 |
| -30 | 7.4 | 173.994854 | 0.839 |

**Bottom Channel @ 12.5 KHz Channel Separation**

| Reference Frequency: 400.000 MHz | | Limit: 2.5 ppm | |
|---|---|---|---|
| Environment Temperature (℃) | Power Supply (V) | Frequency deviation | |
| | | (MHz) | ppm |
| 50 | 7.4 | 399.999872 | 0.320 |
| 40 | 7.4 | 399.999856 | 0.360 |
| 30 | 7.4 | 399.999879 | 0.302 |
| 20 | 7.4 | 399.999856 | 0.360 |
| 10 | 7.4 | 399.999834 | 0.415 |
| 0 | 7.4 | 399.999820 | 0.45 |
| -10 | 7.4 | 399.999720 | 0.7 |
| -20 | 7.4 | 399.999772 | 0.57 |
| -30 | 7.4 | 399.999702 | 0.745 |

**Middle Channel @ 12.5 KHz Channel Separation**

| Reference Frequency: 435.000 MHz | | Limit: 2.5 ppm | |
|---|---|---|---|
| Environment Temperature (℃) | Power Supply (V) | Frequency deviation | |
| | | (MHz) | ppm |
| 50 | 7.4 | 434.999923 | 0.177 |
| 40 | 7.4 | 434.999870 | 0.299 |
| 30 | 7.4 | 434.999869 | 0.301 |
| 20 | 7.4 | 434.999806 | 0.446 |
| 10 | 7.4 | 434.999799 | 0.462 |
| 0 | 7.4 | 434.999790 | 0.482 |
| -10 | 7.4 | 434.999780 | 0.505 |
| -20 | 7.4 | 434.999772 | 0.524 |
| -30 | 7.4 | 434.999723 | 0.636 |

**Top Channel @ 12.5KHz Channel Separation**

| Reference Frequency: 469.995 MHz | | Limit: 2.5 ppm | |
|---|---|---|---|
| Environment Temperature(℃) | Power Supply (V) | Frequency deviation | |
| | | (MHz) | ppm |
| 50 | 7.4 | 469.994949 | 0.109 |
| 40 | 7.4 | 469.994936 | 0.136 |
| 30 | 7.4 | 469.994925 | 0.160 |
| 20 | 7.4 | 469.994913 | 0.185 |
| 10 | 7.4 | 469.994898 | 0.217 |
| 0 | 7.4 | 469.994882 | 0.251 |
| -10 | 7.4 | 469.994875 | 0.265 |
| -20 | 7.4 | 469.994865 | 0.287 |
| -30 | 7.4 | 469.994852 | 0.317 |

**Bottom Channel @ 25.0 KHz Channel Separation**

| Reference Frequency: 400.000MHz | | Limit: 5.0 ppm | |
|---|---|---|---|
| Environment Temperature (℃) | Power Supply (V) | Frequency deviation | |
| | | (MHz) | ppm |
| 50 | 7.4 | 399.999972 | 0.070 |
| 40 | 7.4 | 399.999956 | 0.110 |
| 30 | 7.4 | 399.999899 | 0.252 |
| 20 | 7.4 | 399.999886 | 0.285 |
| 10 | 7.4 | 399.999884 | 0.290 |
| 0 | 7.4 | 399.999870 | 0.325 |
| -10 | 7.4 | 399.999790 | 0.525 |
| -20 | 7.4 | 399.999767 | 0.582 |
| -30 | 7.4 | 399.999702 | 0.745 |

**Middle Channel @ 25.0 KHz Channel Separation**

| Reference Frequency: 435.000 MHz | | Limit: 5.0 ppm | |
|---|---|---|---|
| Environment Temperature (℃) | Power Supply (V) | Frequency deviation | |
| | | (MHz) | ppm |
| 50 | 7.4 | 434.999923 | 0.177 |
| 40 | 7.4 | 434.999870 | 0.299 |
| 30 | 7.4 | 434.999869 | 0.301 |
| 20 | 7.4 | 434.999856 | 0.331 |
| 10 | 7.4 | 434.999849 | 0.347 |
| 0 | 7.4 | 434.999790 | 0.482 |
| -10 | 7.4 | 434.999710 | 0.666 |
| -20 | 7.4 | 434.999702 | 0.685 |
| -30 | 7.4 | 434.999700 | 0.689 |

**Top Channel @ 25.0 KHz Channel Separation**

| Reference Frequency: 469.995MHz | | Limit: 5.0 ppm | |
|---|---|---|---|
| Environment Temperature(℃) | Power Supply (V) | Frequency deviation | |
| | | (MHz) | ppm |
| 50 | 7.4 | 469.994949 | 0.109 |
| 40 | 7.4 | 469.994936 | 0.136 |
| 30 | 7.4 | 469.994925 | 0.160 |
| 20 | 7.4 | 469.994913 | 0.185 |
| 10 | 7.4 | 469.994898 | 0.217 |
| 0 | 7.4 | 469.994882 | 0.251 |
| -10 | 7.4 | 469.994875 | 0.265 |
| -20 | 7.4 | 469.994865 | 0.287 |
| -30 | 7.4 | 469.994852 | 0.317 |

# 7. EMISSION BANDWIDTH

## 7.1 PROVISIONS APPLICABLE

According to FCC Part 90 Section 90.209: The authorized bandwidth shall be 11.25 KHz for 12.5 KHz and 20 KHz for 25 KHz

## 7.2 MEASUREMENT PROCEDURE

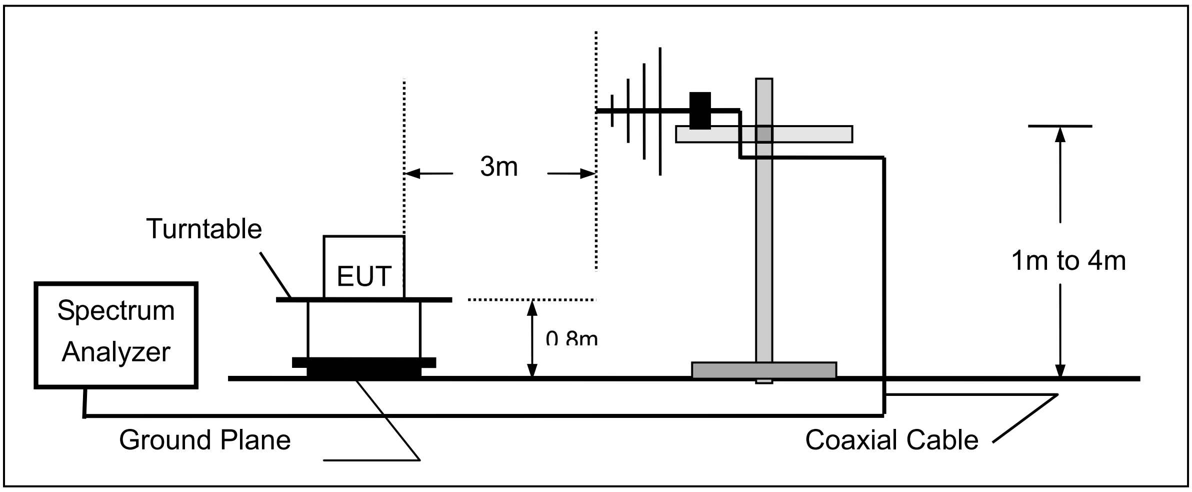
1). The EUT was placed on a turn table which is 0.8m above ground plane.

2). The EUT was modulated by 2.5 KHz Sine wave audio signal, The level of the audio signal employed is 16 dB greater than that necessary to produce 50% of rated system deviation. Rated system deviation is 2.5 kHz (12.5 kHz channel spacing) and 5 kHz (25 kHz channel spacing).

3). Set SPA Center Frequency = fundamental frequency, RBW=VBW= 300 Hz, Span =50 KHz.

4). Set SPA Max hold. Mark peak, -26 dB.

## 7.3 TEST SETUP BLOCK DIAGRAM




## 7.4 MEASUREMENT EQUIPMENT USED:

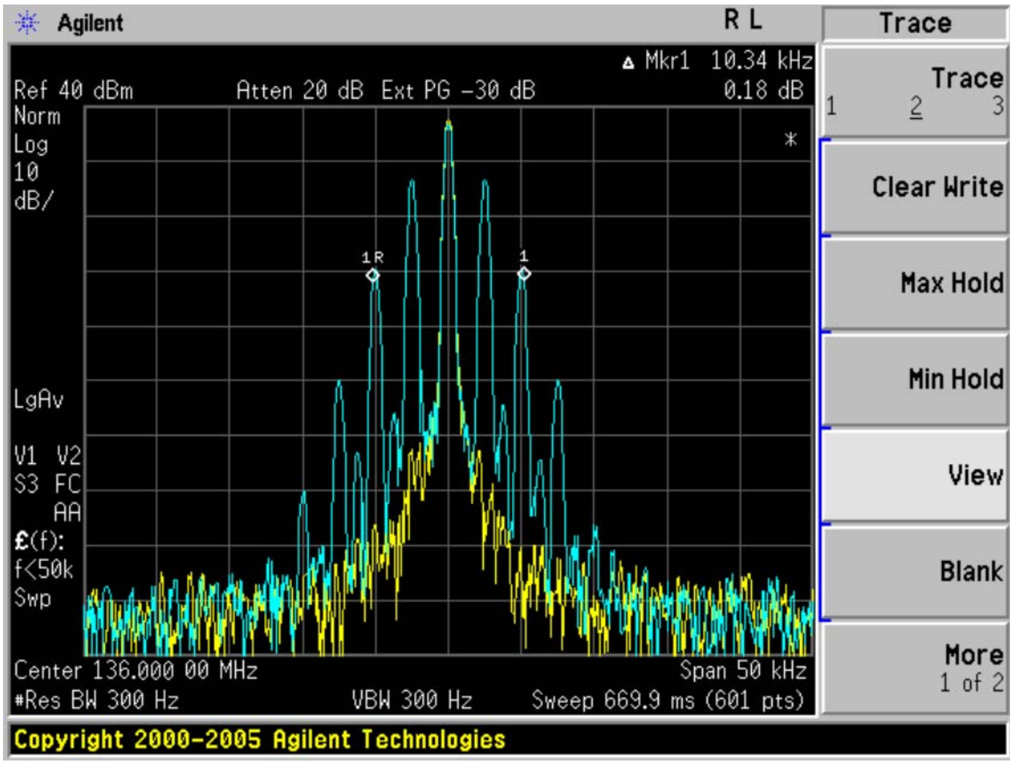
| NAME OF EQUIPMENT | MANUFACTURER | MODEL | SERIAL NUMBER | CAL. DATE |
|---|---|---|---|---|
| SPECTRUM ANALYZER | AGILENT | E4440A | US44300399 | 2008.06 |
| MODULATION ANALYZER | HP | 8901B | 3104A03367 | 2008.06 |
| BROADBAND ANT. | R&S | HL562 | A0304224 | 2008.06 |

## 7.5 MEASUREMENT RESULT:

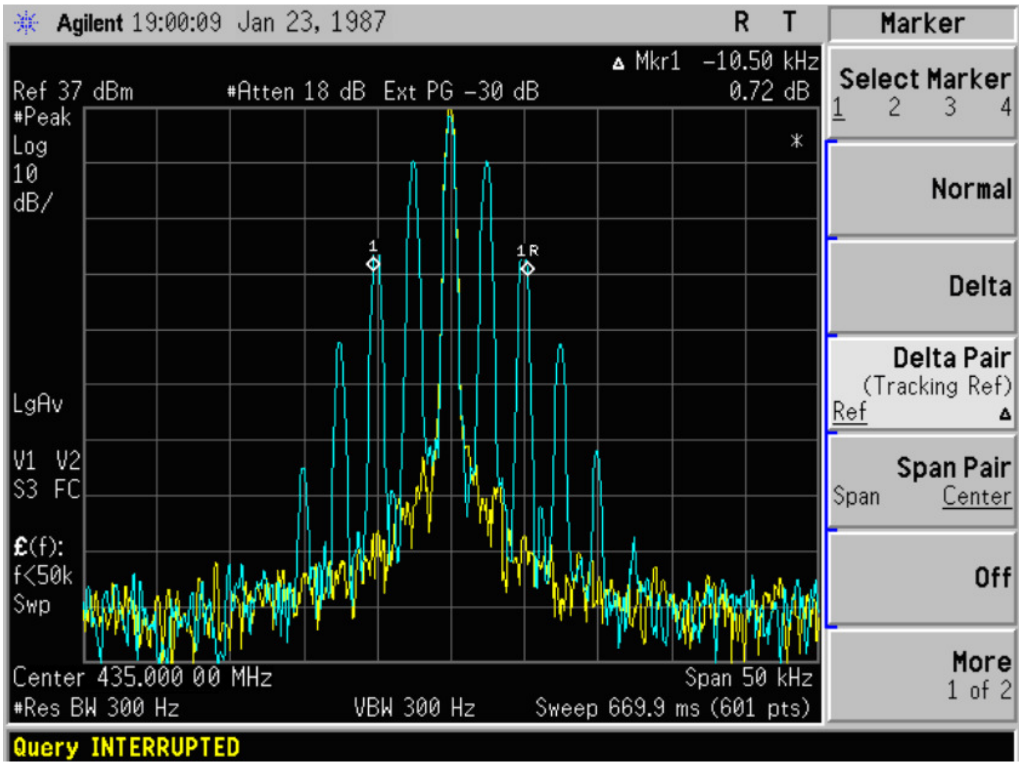
| 26 dB Bandwidth Measurement Result at 136MHz-174MHz | | | | | | |
|---|---|---|---|---|---|---|
| Operating Frequency | 12.5 KHz Channel Separation | | | 25 KHz Channel Separation | | |
| | Test Data | Limits | Result | Test Data | Limits | Result |
| Bottom Channel | 10.34 KHz | 11.25 KHz | Pass | 15.33 KHz | 20.00 KHz | Pass |
| Middle Channel | 10.29 KHz | 11.25 KHz | Pass | 15.29 KHz | 20.00 KHz | Pass |
| Top Channel | 10.31 KHz | 11.25 KHz | Pass | 15.31 KHz | 20.00 KHz | Pass |

| 26 dB Bandwidth Measurement Result at 400MHz-470MHz | | | | | | |
|---|---|---|---|---|---|---|
| Operating Frequency | 12.5 KHz Channel Separation | | | 25 KHz Channel Separation | | |
| | Test Data | Limits | Result | Test Data | Limits | Result |
| Bottom Channel | 10.50 KHz | 11.25 KHz | Pass | 15.34 KHz | 20.00 KHz | Pass |
| Middle Channel | 10.42 KHz | 11.25 KHz | Pass | 15.30 KHz | 20.00 KHz | Pass |
| Top Channel | 10.44 KHz | 11.25 KHz | Pass | 15.31 KHz | 20.00 KHz | Pass |

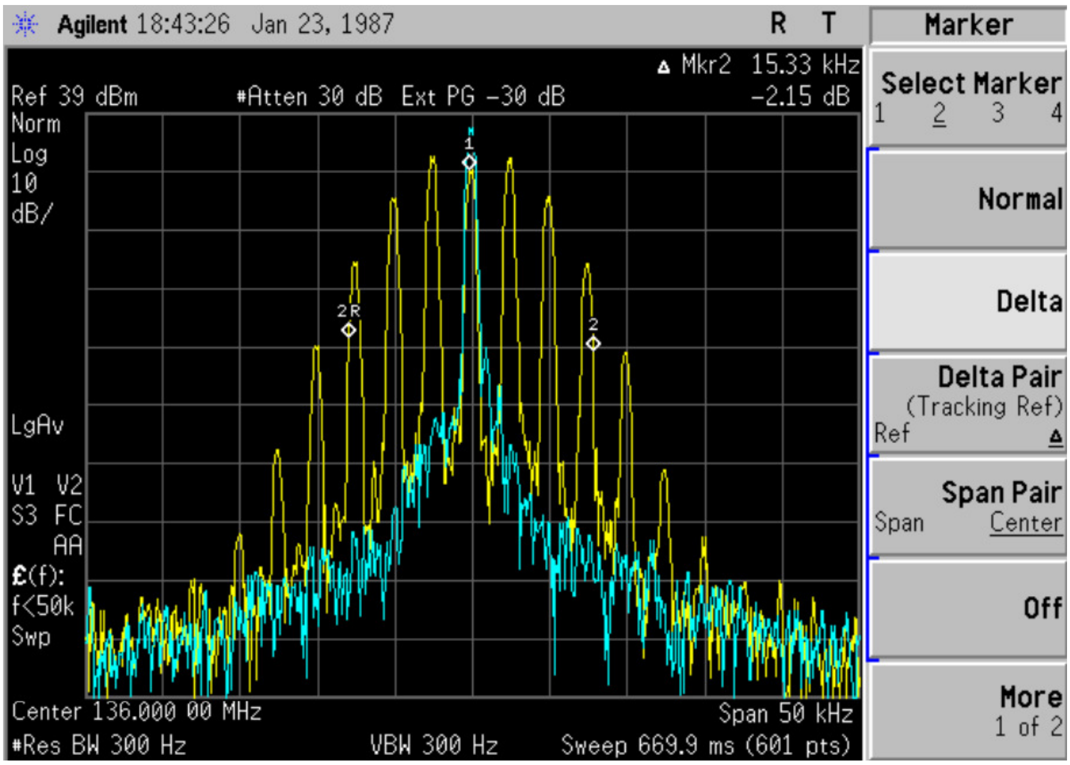
**Occupied bandwidth of Bottom Channel (Maximum) @12.5KHz Channel Separation**



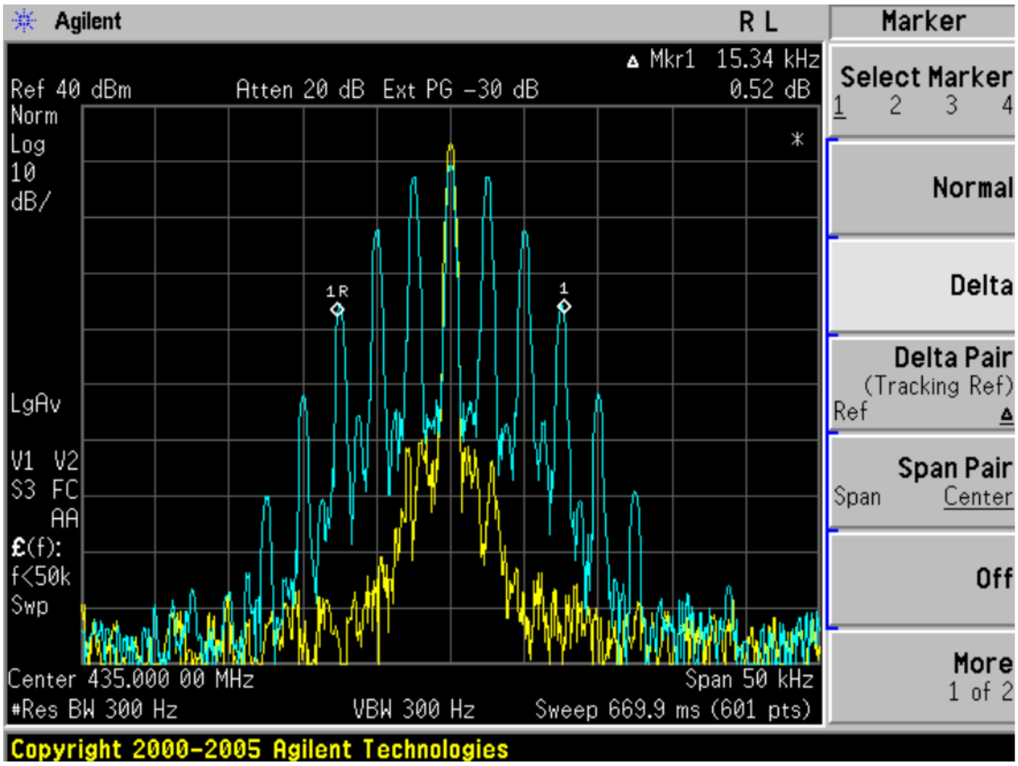
**Occupied bandwidth of Middle Channel (Maximum) @12.5KHz Channel Separation**




**Occupied bandwidth of Bottom Channel (Maximum) @ 25 KHz Channel Separation**



**Occupied bandwidth of Middle Channel (Maximum) @ 25 KHz Channel Separation**



# 8. UNWANTED RADIATION

## 8.1 PROVISIONS APPLICABLE

8.1.1 According to Section 90.210, the power of each unwanted emission shall be less than Transmitted Power as specified below for transmitters designed to operate with 12.5 KHz channel bandwidth:

(1).On any frequency removed from the center of the authorized bandwidth fo to 5.625 KHz removed from fo: Zero dB

(2). On any frequency removed from the center of the authorized bandwidth by a displacement frequency (fd in KHz)fo of more than 5.625 KHz but no more than 12.5 KHz: At least 7.27(fd-2.88 KHz) dB

(3). On any frequency removed from the center of the authorized bandwidth by a displacement Frequency (fd in KHz)fo of more than 12.5 KHz: At least 50+10 log(P) dB or 70 dB, which ever is lesser attenuation.

8.1.2 According to Section 90.210, Emission mask B. For transmitters designed to transmit with 25 KHz channel separation and equipped with an audio low-pass filter, the power of any emission must be attenuated below the unmodulated carrier power (P) as following:

(1), On any frequency removed from the assigned frequency by more than 50 percent, but no more than 100 percent of the authorized bandwidth: At least 25 dB.

(2), On any frequency removed from the assigned frequency by more than 100 percent, but no more than 250 percent of the authorized bandwidth: At least 35 dB.

(3), On any frequency removed from the assigned frequency by more than 250 percent of the authorized bandwidth: At least 43+10Log(P) dB.

## 8.2 MEASUREMENT PROCEDURE

(1). On a test site, the EUT shall be placed on a turntable, and in the position closest to the normal use as declared by the user.

(2). The test antenna shall be oriented initially for vertical polarization located 3m from the EUT to correspond to the transmitter.

(3). The output of the antenna shall be connected to the measuring receiver and either a peak or quasi-peak detector was used for the measurement as indicated on the report. The detector selection is based on how close the emission level was approaching the limit.

(4). The transmitter shall be switched on; if possible, without the modulation and the measurement receiver shall be tuned to the frequency of the transmitter under test.

(5). The test antenna shall be raised and lowered through the specified range of height until the measuring receiver detects a maximum signal level.

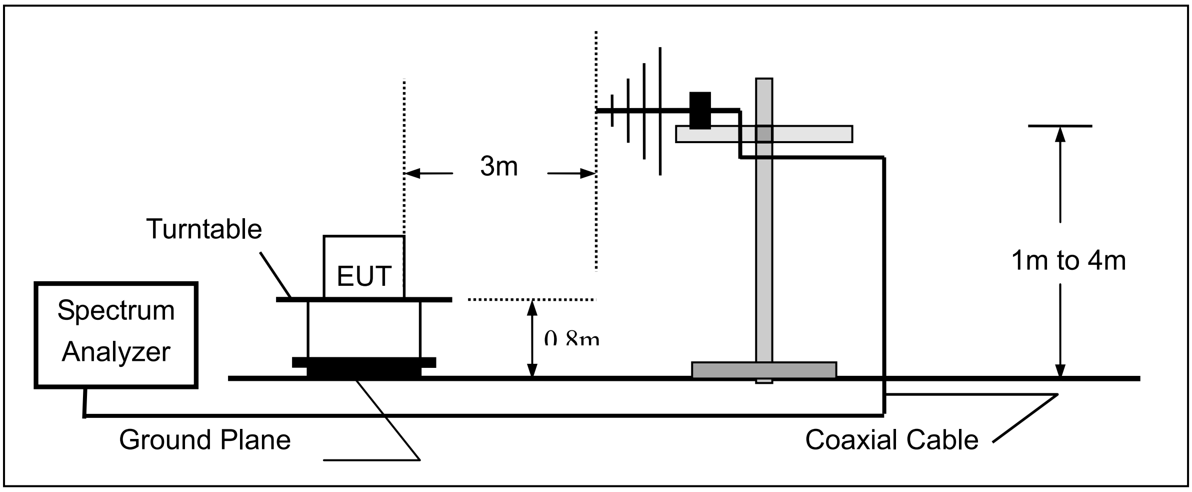
(6). The transmitter shall than be rotated through 360°in the horizontal plane, until the maximum signal level is detected by the measuring receiver.

(7). The test antenna shall be raised and lowered again through the specified range of height until the measuring receiver detects a maximum signal level.

(8). The maximum signal level detected by the measuring receiver shall be noted.

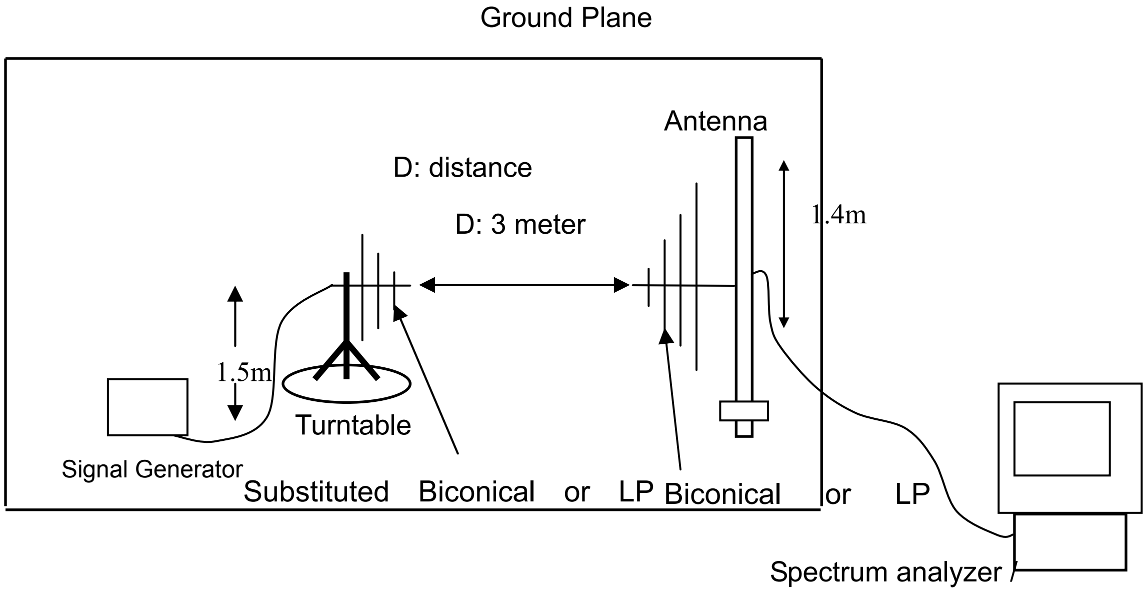
(9). The measurement shall be repeated with the test antenna set to horizontal polarization.
(10). Replace the antenna with a proper Antenna (substitution antenna).
(11). The substitution antenna shall be oriented for vertical polarization and, if necessary, the length of the substitution antenna shall be adjusted to correspond to the frequency of transmitting.
(12). The substitution antenna shall be connected to a calibrated signal generator.
(13). If necessary, the input attenuator setting of the measuring receiver shall be adjusted in order to increase the sensitivity of the measuring receiver.
(14). The test antenna shall be raised and lowered through the specified range of the height to ensure that the maximum signal is received.
(15). The input signal to substitution antenna shall be adjusted to the level that produces a level detected by the measuring receiver, that is equal to the level noted while the transmitter radiated power was measured, corrected for the change of input attenuation setting of the measuring receiver.
(16). The input level to the substitution antenna shall be recorded as power level in dBm, corrected for any change of input attenuator setting of the measuring receiver.
(17). The measurement shall be repeated with the test antenna and the substitution antenna oriented for horizontal polarization.

**8.3 TEST SETUP BLOCK DIAGRAM**

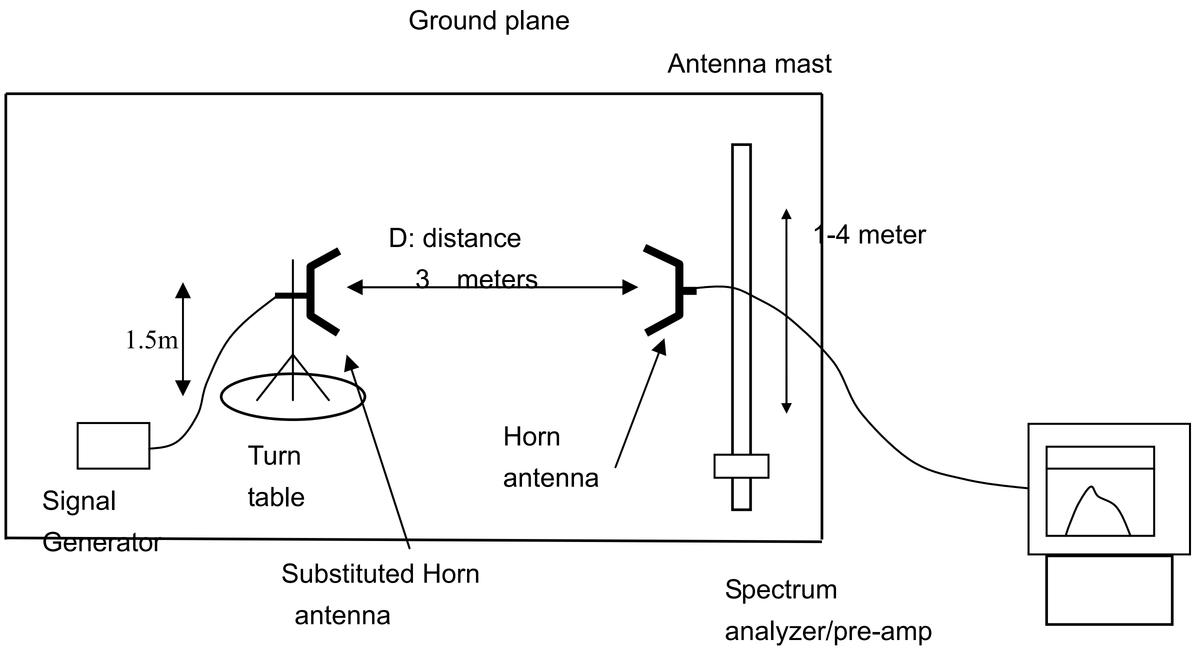


**SUBSTITUTION METHOD: (Radiated Emissions)**

**Radiated Below 1GHz**




**Radiated Above 1 GHz**



### 8.4 MEASUREMENT EQUIPMENT USED:

| NAME OF EQUIPMENT | MANUFACTURER | MODEL | SERIAL NUMBER | CAL. DATE |
|---|---|---|---|---|
| SPECTRUM ANALYZER | AGILENT | E4440A | US44300399 | 2008.06 |
| TEST RECEIVER | R&S | ESIB26 | A0304218 | 2008.06 |
| LOOP ANTENNA | R&S | HFH2-Z2 | A0304220 | 2008.06 |
| HORN ANT. | R&S | HF906 | 100150 | 2008.06 |
| BROADBAND ANT. | R&S | HL562 | A0304224 | 2008.06 |

### 8.5 MEASUREMENT RESULTS:

**Measurement Result for 12.5 KHz Channel Separation**

Calculation: Limit (dBm)= EL-50-10log10 (TP)

Notes:

EL is the emission level of the Output Power expressed in dBm,, in this application, the EL is 36.02 dBm.

Limit (dBm)=36.02-50-10log 10 (4) = -20

**Bottom Channel**

| Frequency (MHz) | Reading level (dBuV) | Antenna Polarization | S.G. (dBm) | Cable loss (dB) | Correction (dB) | Emission level (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|
| -- | -- | -- | -- | -- | -- | -- | -20 | -- |

**Middle Channel**

| Frequency (MHz) | Reading level (dBuV) | Antenna Polarization | S.G. (dBm) | Cable loss (dB) | Correction (dB) | Emission level (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|
| -- | -- | -- | -- | -- | -- | -- | -20 | -- |

**Top Channel**

| Frequency (MHz) | Reading level (dBuV) | Antenna Polarization | S.G. (dBm) | Cable loss (dB) | Correction (dB) | Emission level (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|
| -- | -- | -- | -- | -- | -- | -- | -20 | -- |

## Notes:

"--" means that the emission level is too low to be measured or at least 20 dB down than the limit.

**Measurement Result For 25 KHz Channel Separation**

Calculation: Limit (dBm)= EL-43-10log10 (TP)

Notes: EL is the emission level of the Output Power expressed in dBm,, in this application, the EL is 10log10(P) dBm.

Limit (dBm)=10log10(P) - 43-10log 10 (P) = -13 dBm

**Bottom Channel**

| Frequency (MHz) | Reading level (dBuV) | Antenna Polarization | S.G. (dBm) | Cable loss (dB) | Correction (dB) | Emission level (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|
| -- | -- | -- | -- | -- | -- | -- | -13 | -- |

**Middle Channel**

| Frequency (MHz) | Reading level (dBuV) | Antenna Polarization | S.G. (dBm) | Cable loss (dB) | Correction (dB) | Emission level (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|
| -- | -- | -- | -- | -- | -- | -- | -13 | -- |

**Top Channel**

| Frequency (MHz) | Reading level (dBuV) | Antenna Polarization | S.G. (dBm) | Cable loss (dB) | Correction (dB) | Emission level (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|
| -- | -- | -- | -- | -- | -- | -- | -13 | -- |

**Notes:**

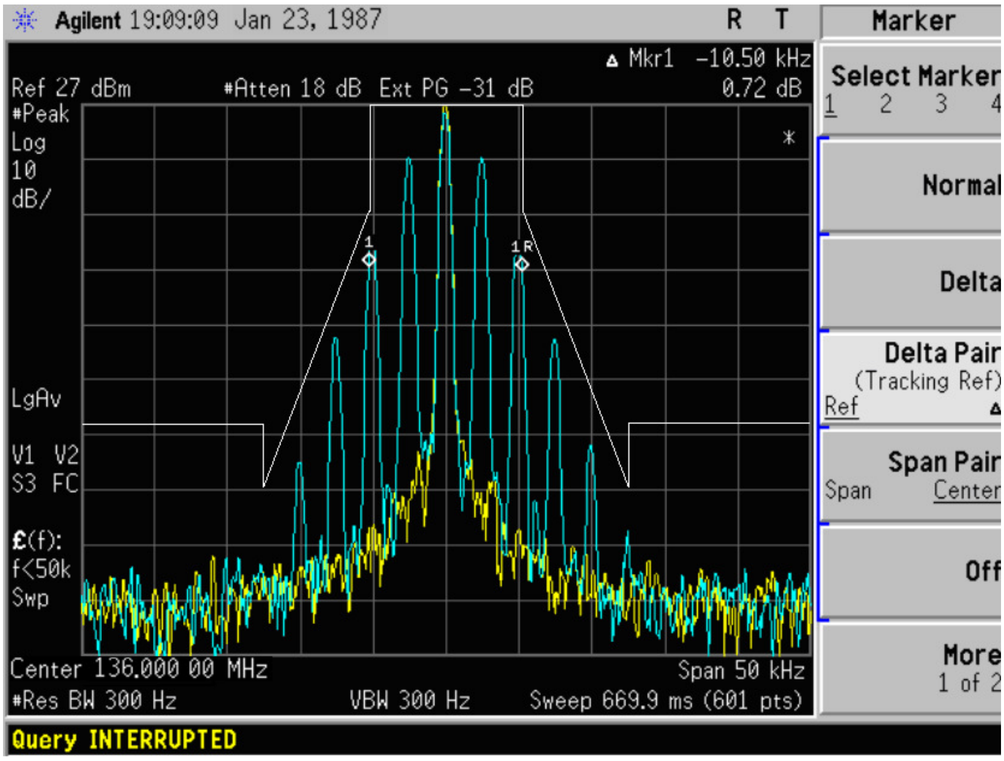
"--" means that the emission level is too low to be measured or at least 20 dB down than the limit.

### 8.6 EMISSION MASK PLOT

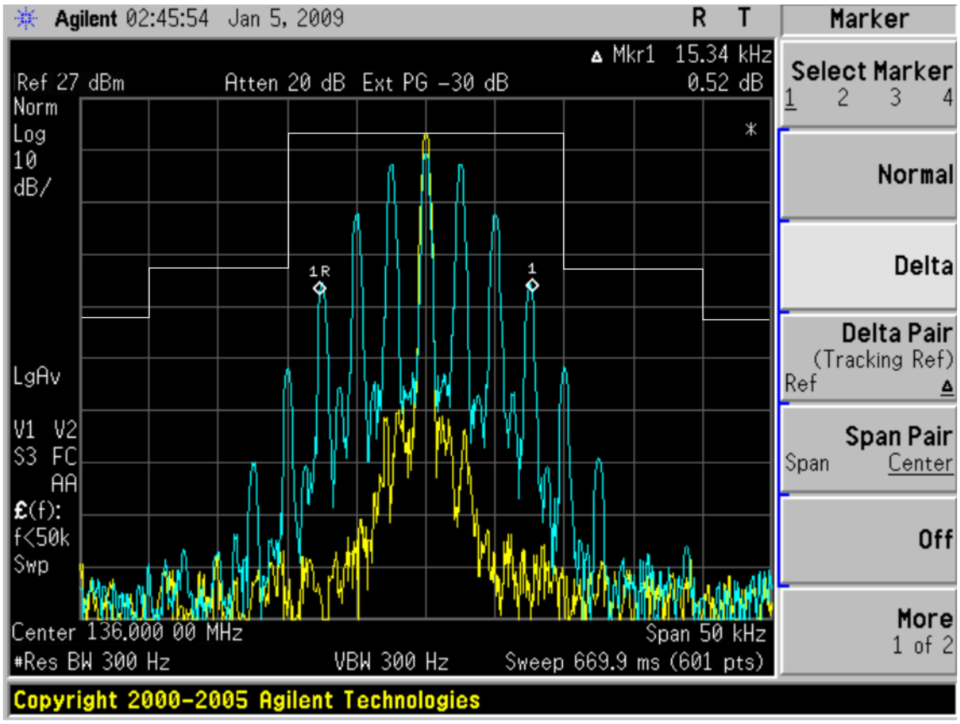
The detailed procedure employed for Emission Mask measurements are specified as following:

- The transmitter shall be modulated by a 2.5 kHz audio signal,
- The level of the audio signal employed is 16 dB greater than that necessary to produce 50% of rated system deviation. Rated system deviation is 2.5 kHz (12.5 kHz channel spacing) and 5 kHz (25 kHz channel spacing)

**The Worst Emission Mask for 12.5 KHz channel Separation**



__The Worst Emission Mask for 25 KHz channel Separation__



# 9. MODULATION CHARACTERISTICS

## 9.1 PROVISIONS APPLICABLE

According to CFR 47 section 2.1047(a), for Voice Modulation Communication Equipment, the frequency response of the audio modulation circuit over a range of 100 to 5000Hz shall be measured.

## 9.2 MEASUREMENT METHOD

### 9.2.1 Modulation Limit

(1). Configure the EUT as shown in figure 1, adjust the audio input for 60% of rated system deviation at 1KHz using this level as a reference (0dB) and vary the input level from –20 to +20dB. Record the frequency deviation obtained as a function of the input level.

(2). Repeat step 1 with input frequency changing to 300, 1000, 1500 and 3000Hz in sequence.

### 9.2.2 Audio Frequency Response

(1). Configure the EUT as shown in figure 1.

(2). Adjust the audio input for 20% of rated system deviation at 1 KHz using this level as a reference (0 dB).

(3). Vary the Audio frequency from 100 Hz to 10 KHz and record the frequency deviation.

(4). Audio Frequency Response = 20log10 (Deviation of test frequency/Deviation of 1 KHz reference).

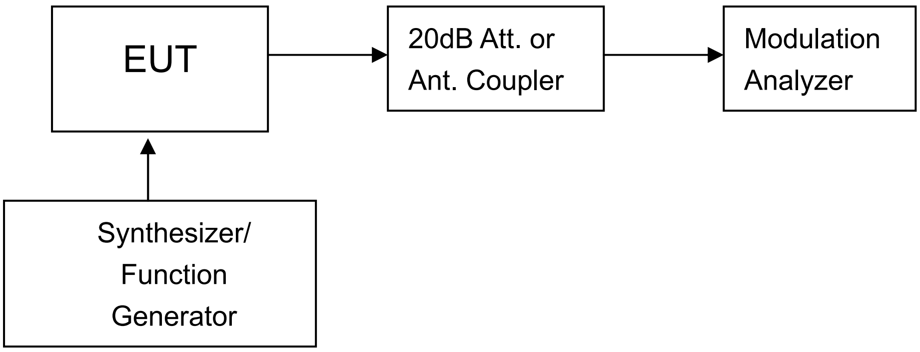



**Figure 1: Modulation characteristic measurement configuration**

## 9.3 MEASUREMENT INSTRUMENTS

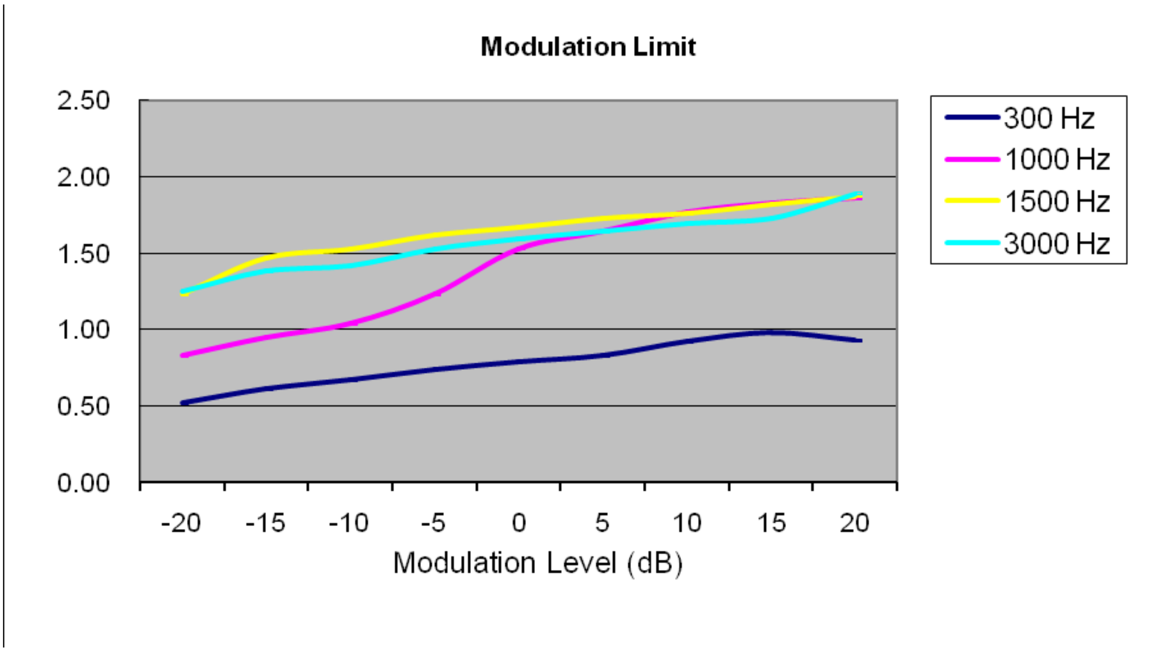
| NAME OF EQUIPMENT | MANUFACTURER | MODEL | SERIAL NUMBER | CAL. DATE |
|---|---|---|---|---|
| Modulation Analyzer | HP | 8901B | 3104A03367 | 2008.06 |

## 9.4 MEASUREMENT RESULT

### (a). Modulation Limit:

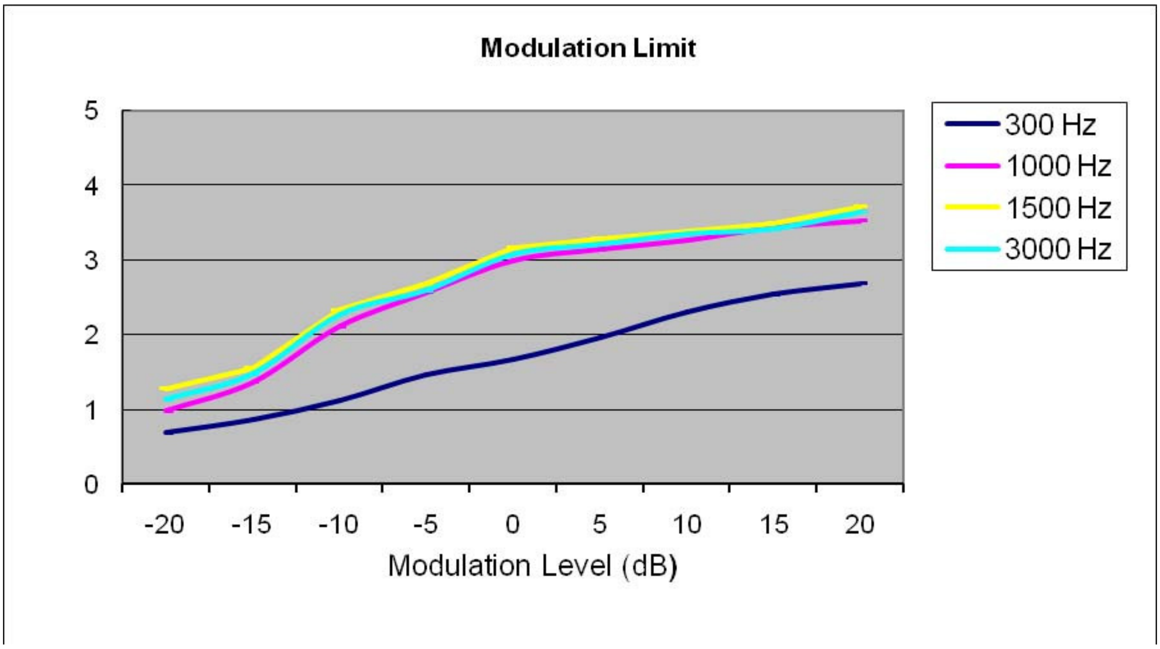
**Middle Channel @ 12.5 KHz Channel Separations**

| Modulation Level (dB) | Peak Freq. Deviation At 300 Hz | Peak Freq. Deviation At 1000 Hz | Peak Freq. Deviation At 1500 Hz | Peak Freq. Deviation At 3000 Hz |
|---|---|---|---|---|
| -20 | 0.52 | 0.83 | 1.23 | 1.25 |
| -15 | 0.61 | 0.95 | 1.47 | 1.38 |
| -10 | 0.67 | 1.04 | 1.53 | 1.42 |
| -5 | 0.74 | 1.23 | 1.62 | 1.53 |
| 0 | 0.79 | 1.53 | 1.67 | 1.59 |
| +5 | 0.83 | 1.64 | 1.73 | 1.64 |
| +10 | 0.92 | 1.77 | 1.76 | 1.69 |
| +15 | 0.98 | 1.83 | 1.82 | 1.73 |
| +20 | 0.93 | 1.86 | 1.87 | 1.89 |



**Middle Channel @ 25KHz Channel Separation**

| Modulation Level (dB) | Peak Freq. Deviation At 300 Hz | Peak Freq. Deviation At 1000 Hz | Peak Freq. Deviation At 1500 Hz | Peak Freq. Deviation At 3000 Hz |
|---|---|---|---|---|
| -20 | 0.69 | 0.98 | 1.28 | 1.14 |
| -15 | 0.87 | 1.37 | 1.56 | 1.48 |
| -10 | 1.13 | 2.11 | 2.34 | 2.28 |
| -5 | 1.47 | 2.57 | 2.68 | 2.59 |
| 0 | 1.68 | 3 | 3.17 | 3.08 |
| +5 | 1.97 | 3.14 | 3.29 | 3.21 |
| +10 | 2.31 | 3.27 | 3.38 | 3.35 |
| +15 | 2.54 | 3.44 | 3.49 | 3.42 |
| +20 | 2.69 | 3.53 | 3.72 | 3.65 |

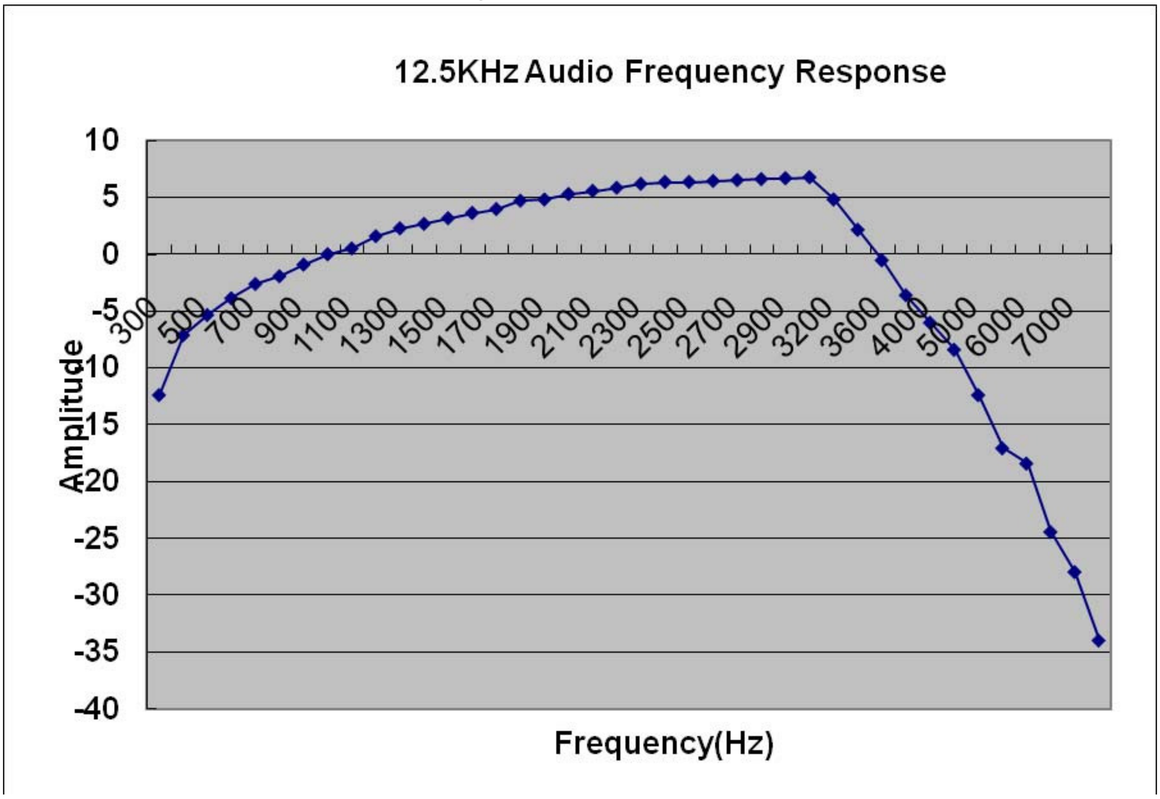


## (b). Audio Frequency Response:

**12.5 KHz Channel Separation**

| Frequency (Hz) | Deviation (KHz) |
|---|---|
| 100 | -- |
| 200 | -- |
| 300 | 0.12 |
| 400 | 0.22 |
| 500 | 0.27 |
| 600 | 0.32 |
| 700 | 0.37 |
| 800 | 0.40 |
| 900 | 0.45 |
| 1000 | 0.50 |
| 1100 | 0.53 |
| 1200 | 0.60 |
| 1300 | 0.65 |
| 1400 | 0.68 |
| 1500 | 0.72 |
| 1600 | 0.76 |
| 1700 | 0.79 |
| 1800 | 0.86 |
| 1900 | 0.87 |
| 2000 | 0.92 |
| 2100 | 0.95 |
| 2200 | 0.98 |
| 2300 | 1.02 |
| 2400 | 1.04 |
| 2500 | 1.04 |
| 2600 | 1.05 |
| 2700 | 1.06 |
| 2800 | 1.07 |
| 2900 | 1.08 |
| 3000 | 1.09 |
| 3200 | 0.87 |
| 3400 | 0.64 |
| 3600 | 0.47 |
| 3800 | 0.33 |
| 4000 | 0.25 |
| 4500 | 0.19 |
| 5000 | 0.12 |
| 5500 | 0.07 |
| 6000 | 0.06 |
| 6500 | 0.03 |
| 7000 | 0.02 |
| 7500 | 0.01 |
| 8000 | -- |
| 8500 | -- |
| 9000 | -- |
| 9500 | -- |
| 10000 | -- |
| 11000 | -- |

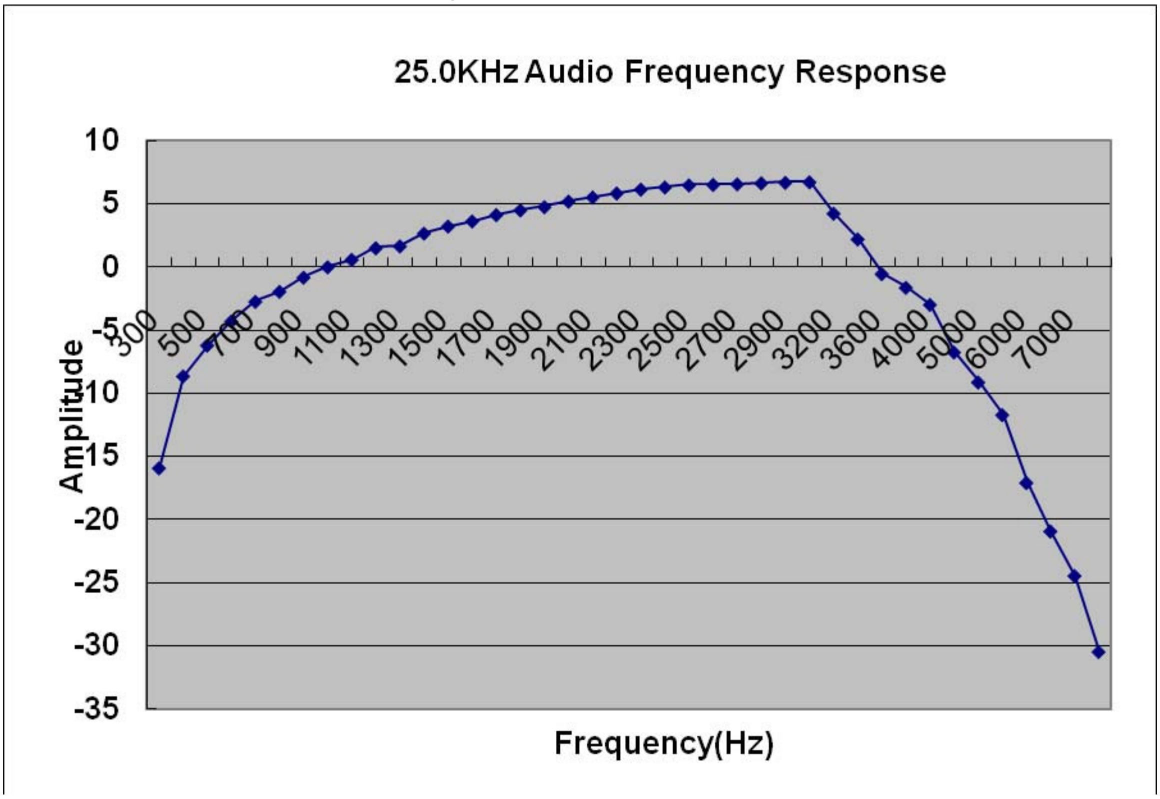
**Frequency Response of Middle Channel**



## 25 KHz Channel Separation

| Frequency (Hz) | Deviation (KHz) |
|---|---|
| 100 | -- |
| 200 | -- |
| 300 | 0.13 |
| 400 | 0.36 |
| 500 | 0.50 |
| 600 | 0.67 |
| 700 | 0.76 |
| 800 | 0.80 |
| 900 | 0.91 |
| 1000 | 1.00 |
| 1100 | 1.08 |
| 1200 | 1.19 |
| 1300 | 1.21 |
| 1400 | 1.36 |
| 1500 | 1.45 |
| 1600 | 1.52 |
| 1700 | 1.61 |
| 1800 | 1.68 |
| 1900 | 1.73 |
| 2000 | 1.88 |
| 2100 | 1.89 |
| 2200 | 1.96 |
| 2300 | 2.00 |
| 2400 | 2.07 |
| 2500 | 2.11 |
| 2600 | 2.12 |
| 2700 | 2.13 |
| 2800 | 2.15 |
| 2900 | 2.16 |
| 3000 | 2.17 |
| 3200 | 1.63 |
| 3400 | 1.29 |
| 3600 | 0.94 |
| 3800 | 0.83 |
| 4000 | 0.72 |
| 4500 | 0.46 |
| 5000 | 0.37 |
| 5500 | 0.26 |
| 6000 | 0.14 |
| 6500 | 0.09 |
| 7000 | 0.06 |
| 7500 | 0.03 |
| 8000 | -- |
| 8500 | -- |
| 9000 | -- |
| 9500 | -- |
| 10000 | -- |

**Frequency Response of Middle Channel**



## 10. MAXIMUMN TRANSMITTER POWER (CONDUCTED OUTPUT POWER)

### 10.1 PROVISIONS APPLICABLE

Per FCC §2.1046 and §90.205: Maximum ERP is dependent upon the station's antenna HAAT and required service area.

### 10.2 TEST PROCEDURE

The RF output of Two-way Radio was conducted to a spectrum analyzer through an appropriate attenuator.

### 10.3 TEST INSTRUMENTS

| NAME OF EQUIPMENT | MANUFACTURER | MODEL | SERIAL NUMBER | CAL. DATE |
|---|---|---|---|---|
| SPECTRUM ANALYZER | AGILENT | E4440A | US44300399 | 2008.06 |

### 10.4 TEST RESULT

The maximum Conducted Power (CP) is

4 W for 12.5 KHz Channel Separation

4 W for 25.0 KHz Channel Separation

Calculation Formula: CP = R + A + L

* Note:

CP: The final Conducted Power

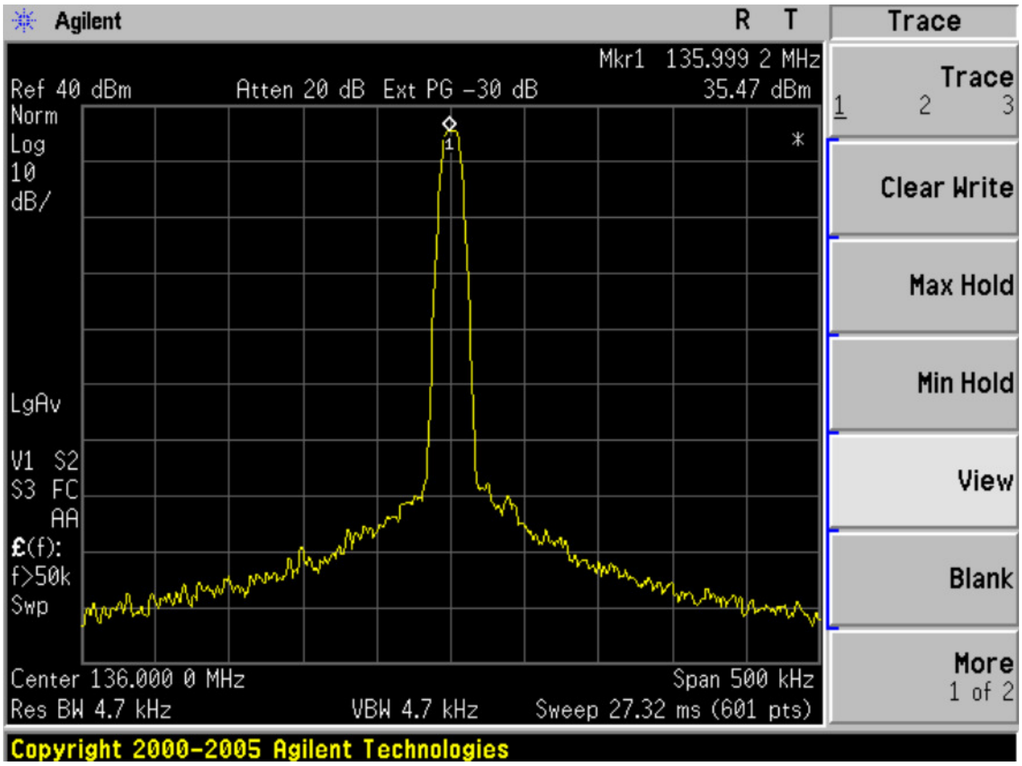
R : The reading value from spectrum analyzer

A : The attenuation value of the used attenuator

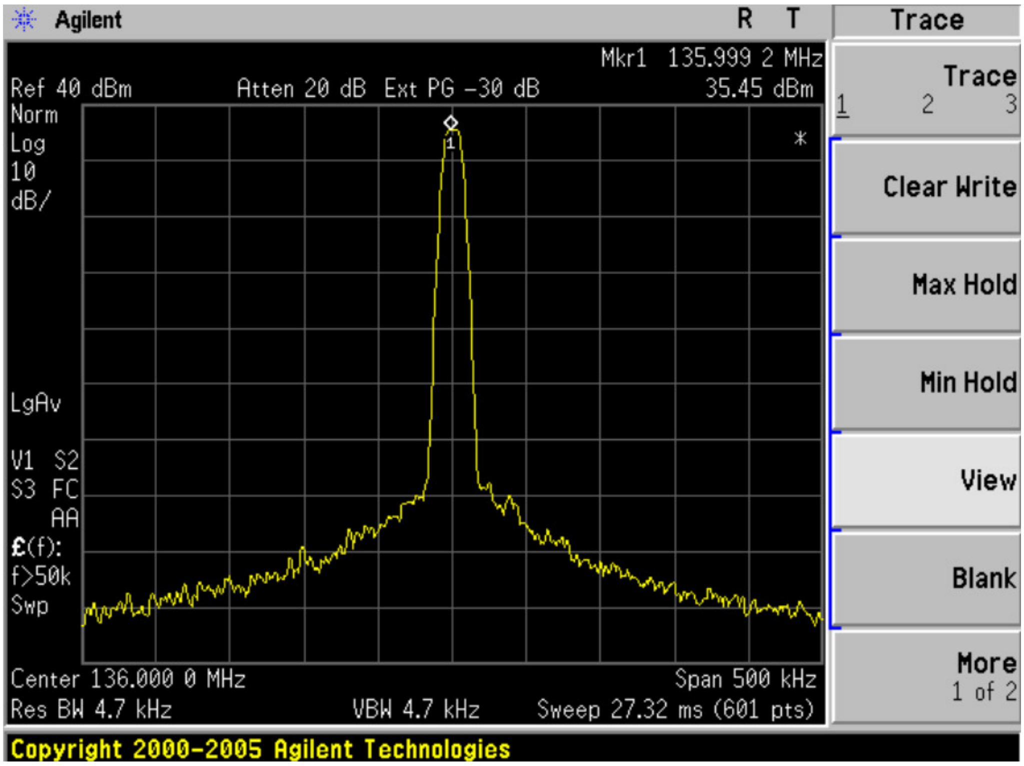
L : The loss of all connection cables

| Conducted Power Measurement Results | | | |
|---|---|---|---|
| **Channel Separation** | **Channel** | **Measurement Result (dBm)** | **Measurement Result (dBm)** |
| | | **For 4W at 136-174MHz** | **For 4W at 400-470MHz** |
| 12.5 KHz | Bottom | 35.47 | 35.52 |
| | Middle | 35.42 | 35.50 |
| | Top | 35.44 | 35.48 |
| 25 KHz | Bottom | 35.45 | 35.49 |
| | Middle | 35.43 | 35.45 |
| | Top | 35.42 | 35.47 |

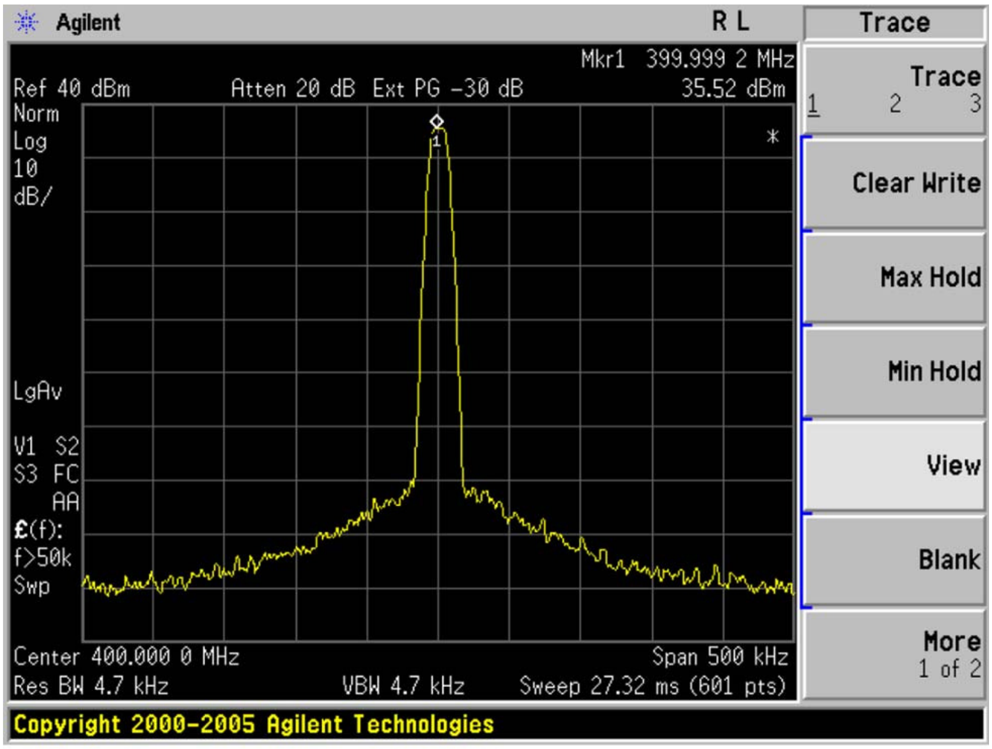
**OUTPUT POWER (MAXIMUM) FOR 4W (136.000M) at 12.5 KHz**



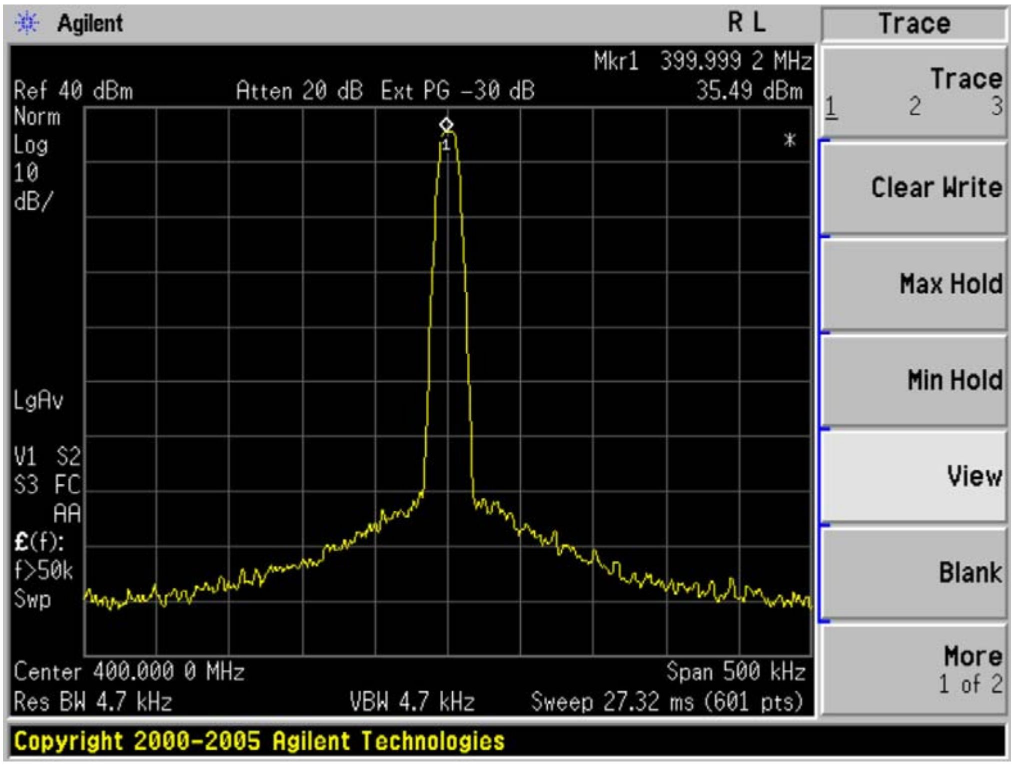

**OUTPUT POWER (MAXIMUM) FOR 4W (136.000M) at 25 KHz**



**OUTPUT POWER (MAXIMUM) FOR 4W (400.00M) at 12.5 KHz**

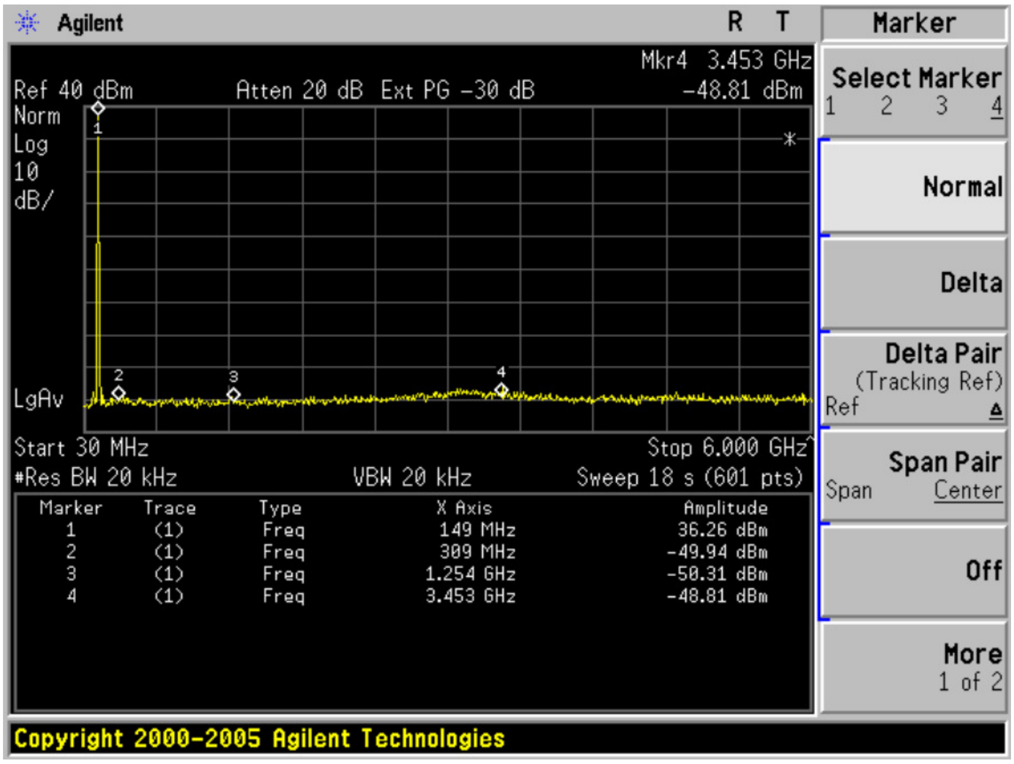



**OUTPUT POWER (MAXIMUM) FOR 4W (400.000M) at 25 KHz**

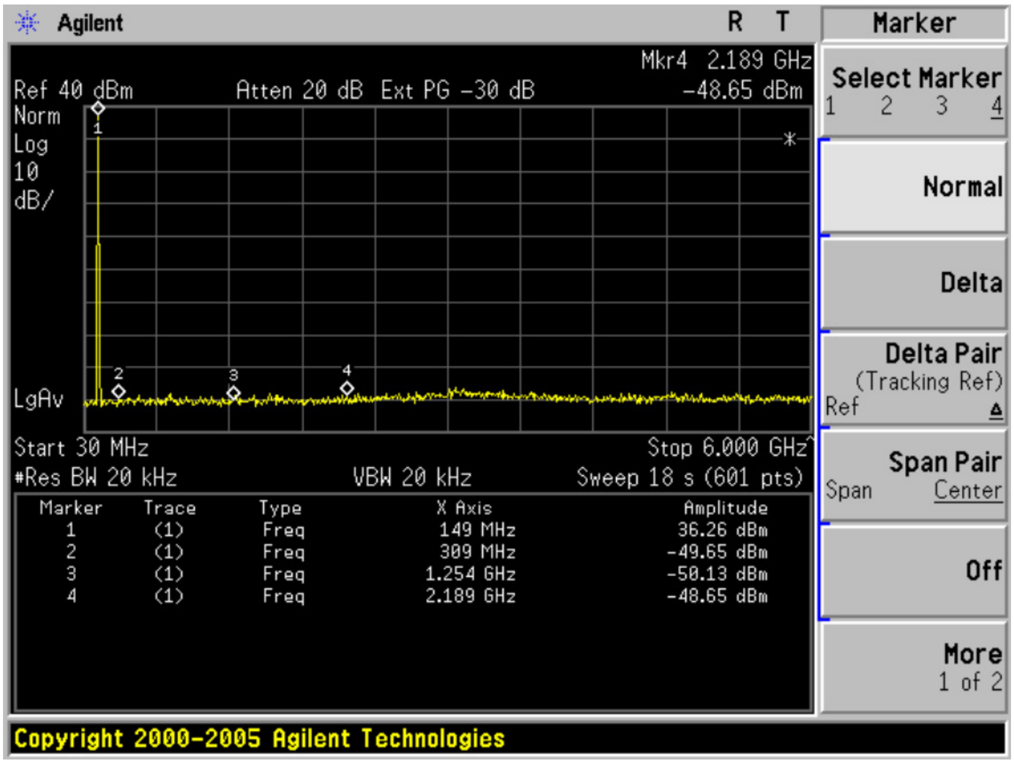


## 10.4 CONDUCT SPURIOUS PLOT

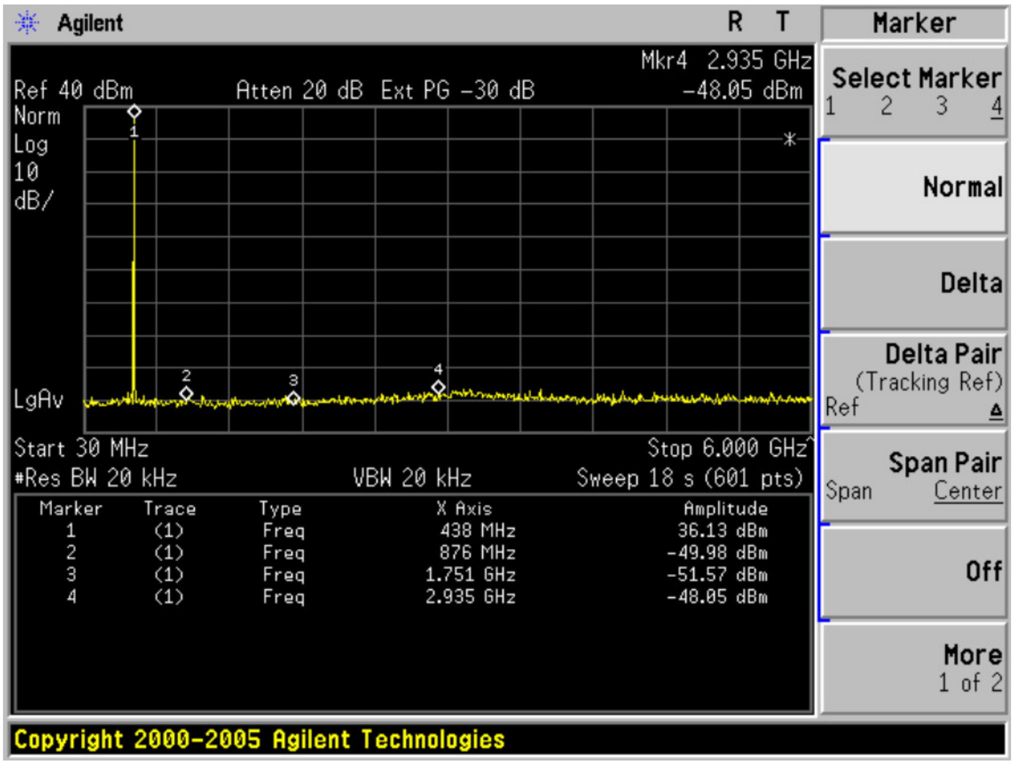
***The Worst Case (4 W)of The Three Channels for Conduct Spurious Emission @ 12.5KHz***



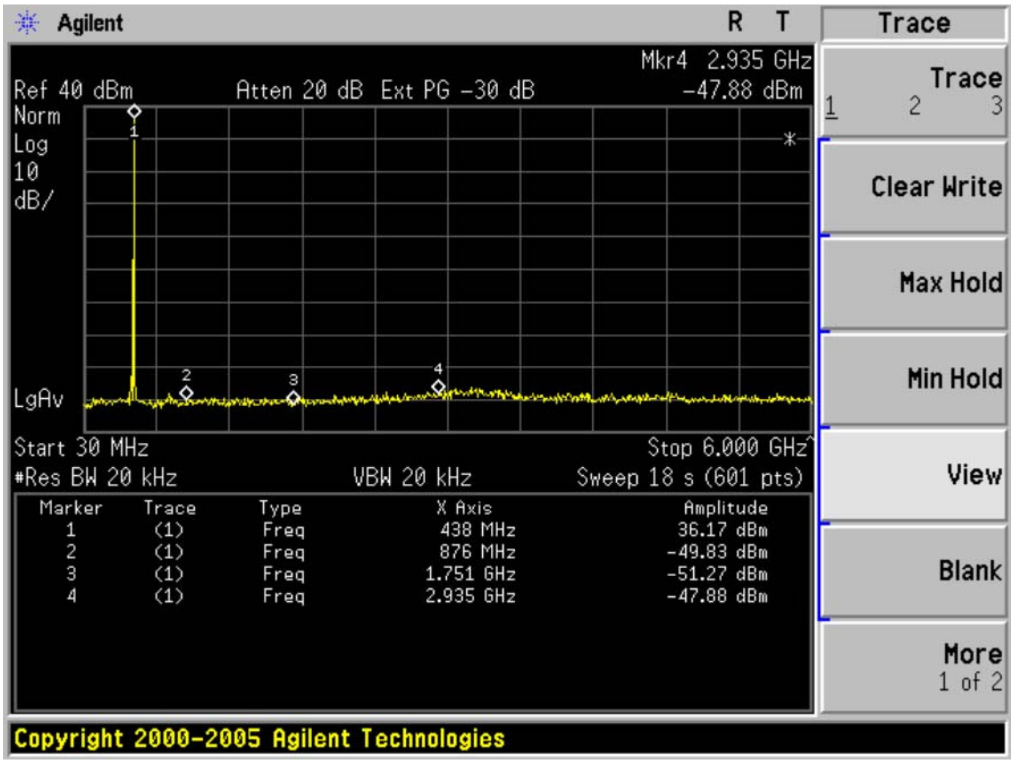

**The Worst Case (4w) of The Three Channels for Conduct Spurious Emission @ 25KHz**



**The Worst Case (4W)of The Three Channels for Conduct Spurious Emission @ 12.5KHz**




**The Worst Case (4W)of The Three Channels for Conduct Spurious Emission @ 25.0 KHz**



## 11. RANSMITTER FREQUENCY BEHAVIOR

### 11.1 PROVISIONS APPLICABLE

Section 90.214

### 11.2 TEST METHOD

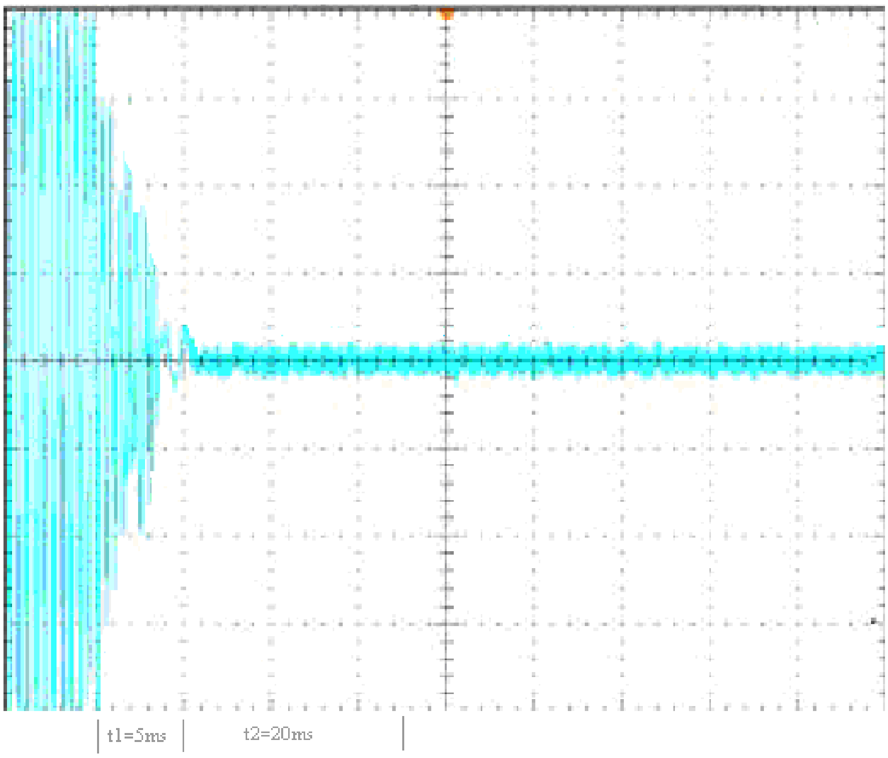
TIA/EIA-603 2.2.19

### 11.3 TEST INSTRUMENTS

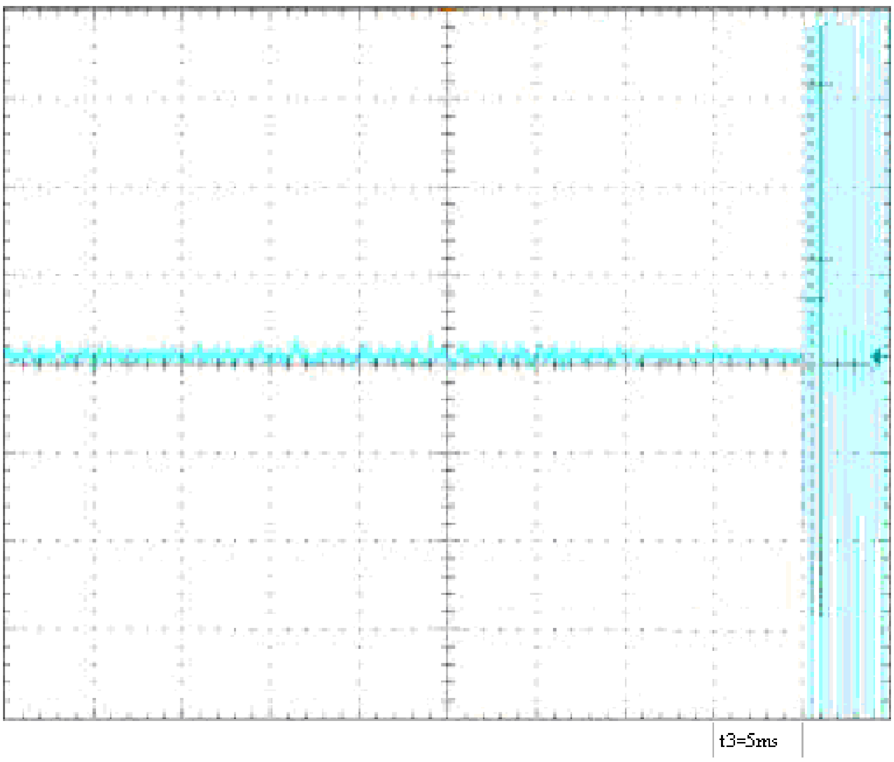
| NAME OF EQUIPMENT | MANUFACTURER | MODEL | SERIAL NUMBER | CAL. DATE |
|---|---|---|---|---|
| Signal Generator | R&S | SMT02 | A0304261 | 2008.06 |
| Storage Oscilloscope | Tektronix | TDS3052 | B017447 | 2007.12 |

### 11.4 MEASURE RESULT

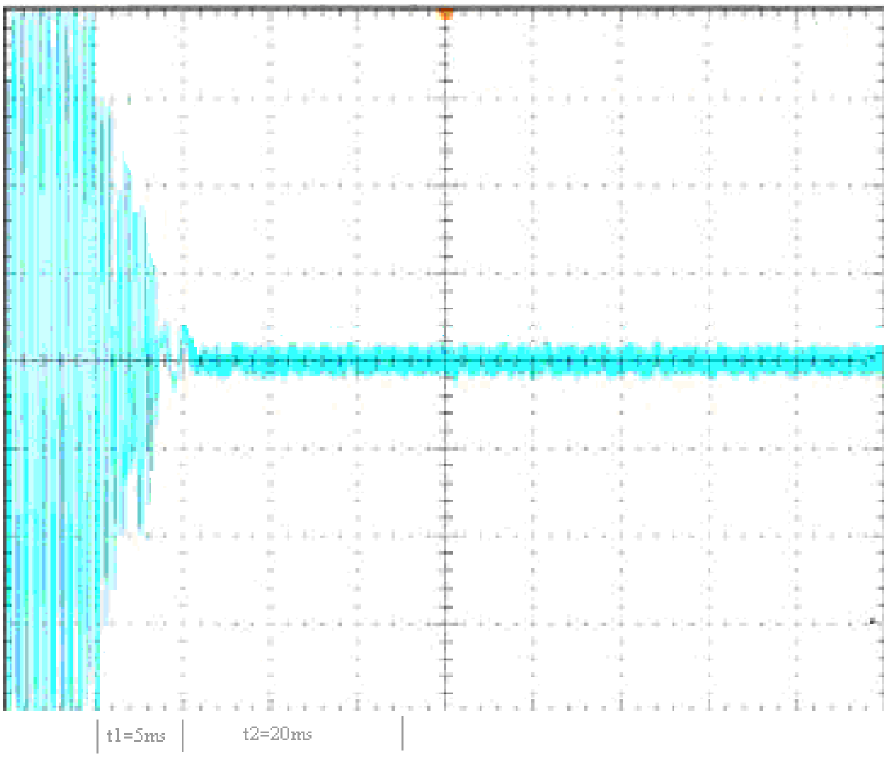
Transmitter Frequency Behavior @ 25 KHz Channel Separation--Off to On at 136-174MHz



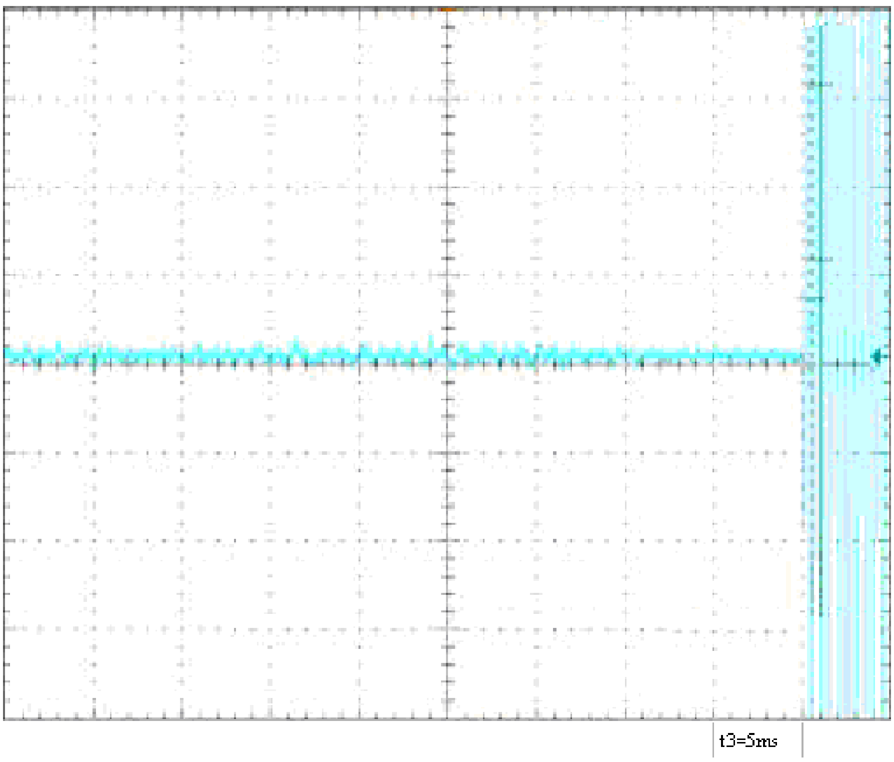

Transmitter Frequency Behaviour @ 25 KHz Channel Separation--On to Off at 136-174MHz



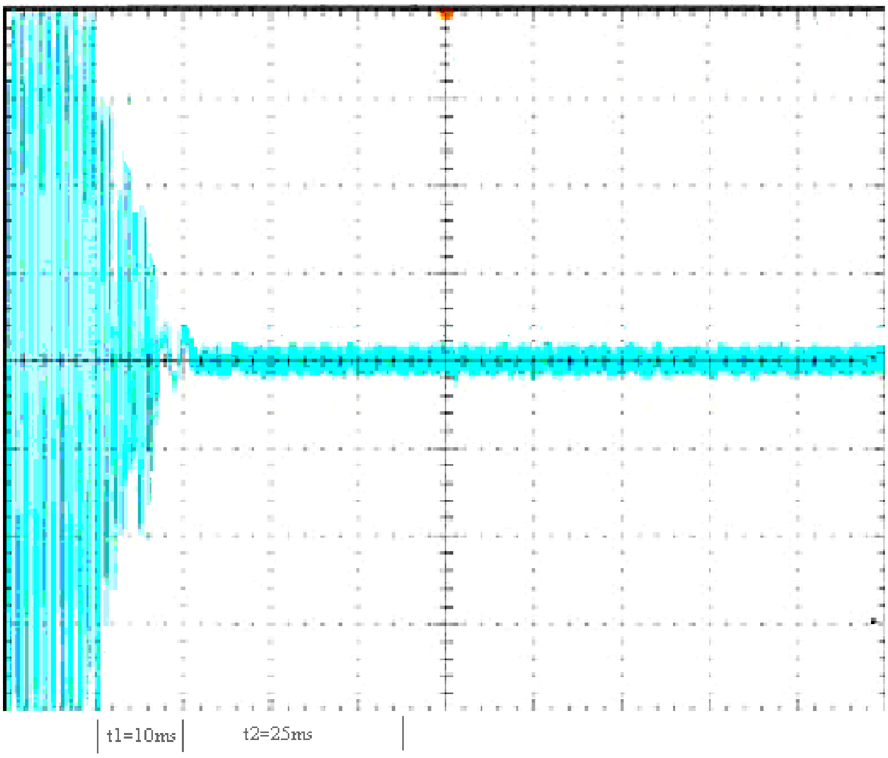
Transmitter Frequency Behaviour @ 12.5 KHz Channel Separation--Off to On at 136-174MHz



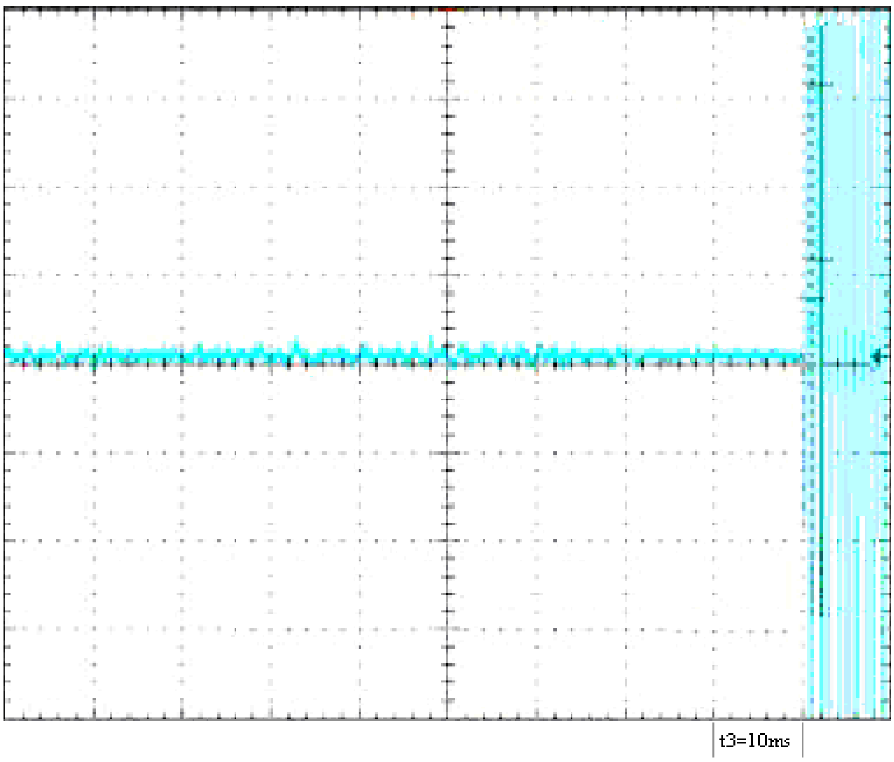

Transmitter Frequency Behaviour @ 12.5 KHz Channel Separation--On to Off at 136-174MHz



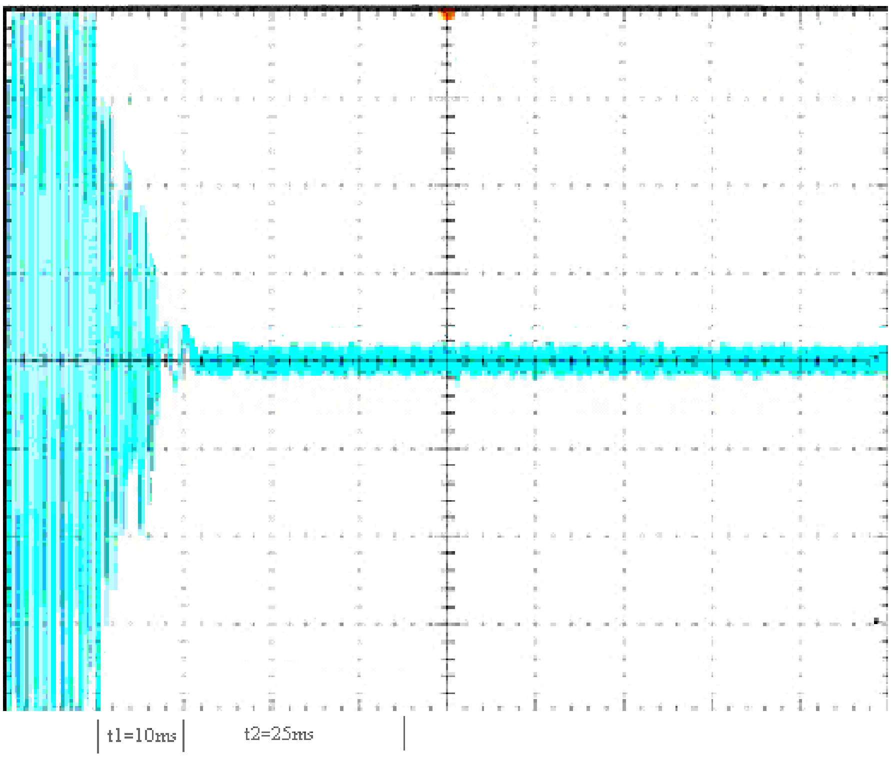
Transmitter Frequency Behavior @ 25 KHz Channel Separation--Off to On at 400-470MHz



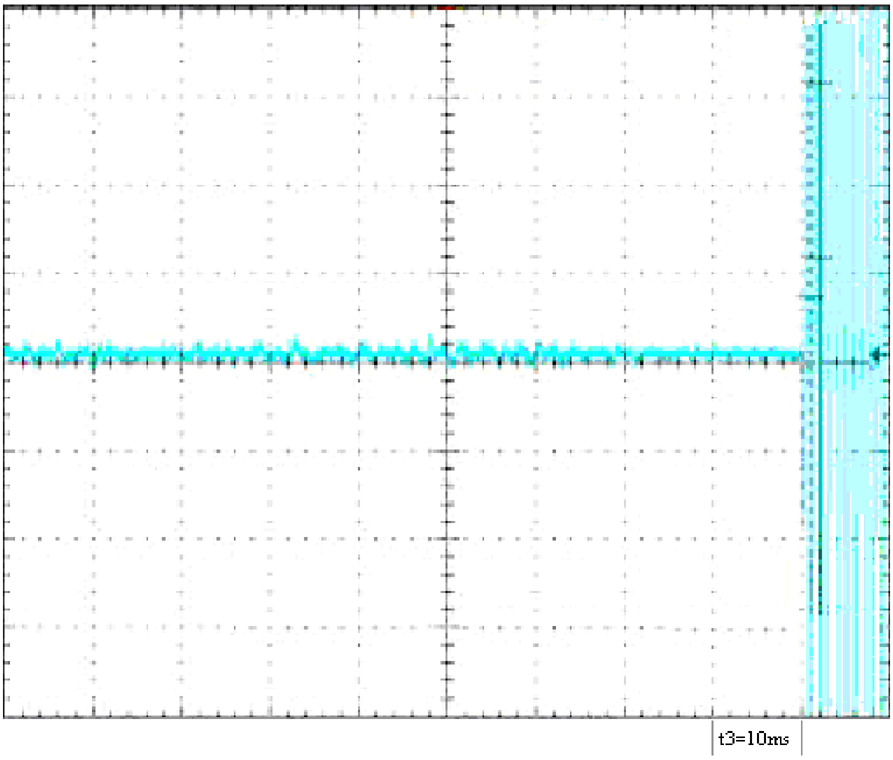

Transmitter Frequency Behaviour @ 25 KHz Channel Separation--On to Off at 400-470MHz



Transmitter Frequency Behaviour @ 12.5 KHz Channel Separation--Off to On at 400-470MHz




Transmitter Frequency Behaviour @ 12.5 KHz Channel Separation--On to Off at 400-470MHz



# 12. RADIATED EMISSION ON RECEIVING MODE

## 12.1 PROVISIONS APPLICABLE

FCC Part 15 Subpart B Section 15.109

## 12.2 TEST METHOD

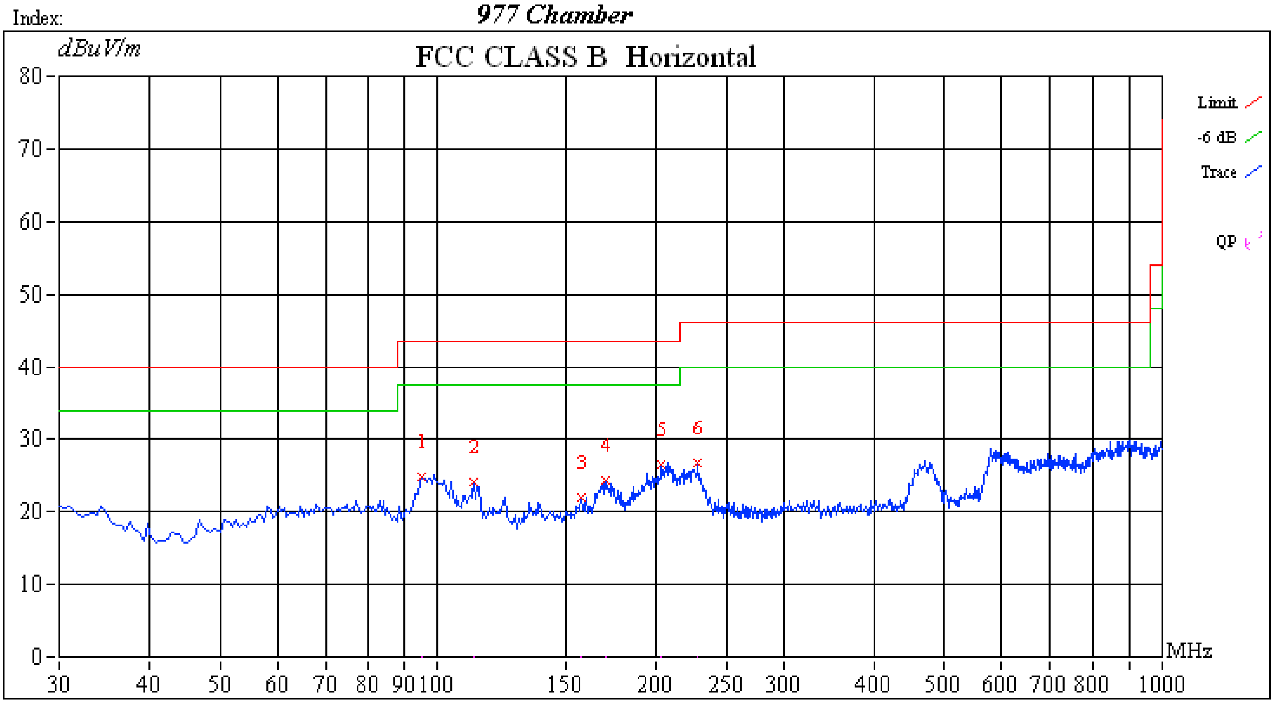
ANSI C 63.4: 2003

## 12.3 TEST INSTRUMENTS

| NAME OF EQUIPMENT | MANUFACTURER | MODEL | SERIAL NUMBER | CAL. DATE |
|---|---|---|---|---|
| SPECTRUM ANALYZER | AGILENT | E4440A | US44300399 | 2008.06 |
| TEST RECEIVER | R&S | ESIB26 | A0304218 | 2008.06 |
| LOOP ANTENNA | R&S | HFH2-Z2 | A0304220 | 2008.06 |
| HORN ANT. | R&S | HF906 | 100150 | 2008.06 |
| BROADBAND ANT. | R&S | HL562 | A0304224 | 2008.06 |

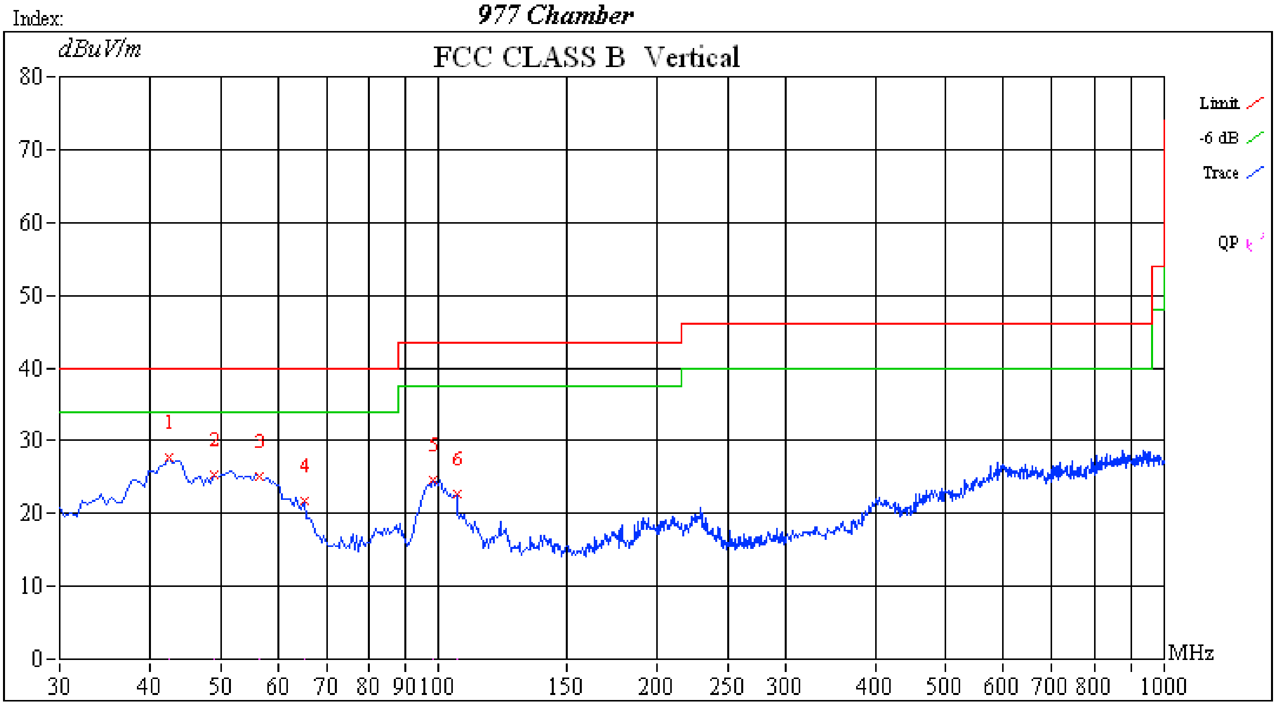
## 12.4 MEASURE RESULT (MEASURED AT 3M USING FCC PART15 B LIMITS)

RADIATED EMISSION TEST RESULTS – HORIZONTAL




| | Freq(MHz) | Pk(dBuV/m) | QP(dBuV/m) | Pk Margin(dB) | QP Margin(dB) | Limit(dBuV/m) | Read(dBuV) | C.F(dB) | Height | Deg | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 94.9299 | 24.87 | | -18.63 | | 43.50 | 28.29 | -3.42 | 100 | 0 | |
| 2 | 112.2445 | 24.18 | | -19.32 | | 43.50 | 27.72 | -3.54 | 100 | 0 | |
| 3 | 157.6954 | 22.09 | | -21.41 | | 43.50 | 25.58 | -3.49 | 100 | 0 | |
| 4 | 170.1403 | 24.48 | | -19.02 | | 43.50 | 29.01 | -4.53 | 100 | 0 | |
| 5 | 203.6874 | 26.47 | | -17.03 | | 43.50 | 26.69 | -0.22 | 100 | 0 | |
| 6 | 228.5772 | 26.70 | | -19.30 | | 46.00 | 26.79 | -0.09 | 100 | 0 | |

RADIATED EMISSION TEST RESULTS – VERTICAL




| | Freq(MHz) | Pk(dBuV/m) | QP(dBuV/m) | Pk Margin(dB) | QP Margin(dB) | Limit(dBuV/m) | Read(dBuV) | C.F(dB) | Height | Deg | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 42.4449 | 27.65 | | -12.35 | | 40.00 | 30.88 | -3.23 | 100 | 0 | |
| 2 | 48.9379 | 25.43 | | -14.57 | | 40.00 | 29.96 | -4.53 | 100 | 0 | |
| 3 | 56.5130 | 25.14 | | -14.86 | | 40.00 | 30.31 | -5.17 | 100 | 0 | |
| 4 | 65.1703 | 21.78 | | -18.22 | | 40.00 | 27.47 | -5.69 | 100 | 0 | |
| 5 | 98.1764 | 24.51 | | -18.99 | | 43.50 | 31.22 | -6.71 | 100 | 0 | |
| 6 | 105.7515 | 22.74 | | -20.76 | | 43.50 | 29.16 | -6.42 | 100 | 0 | |

# APPENDIX I

# PHOTOGRAPHS OF SETUP

RADIATED TEST SETUP

# APPENDIX II
# EXTERNAL VIEW OF EUT

TOP VIEW OF EUT


BOTTOM VIEW OF EUT

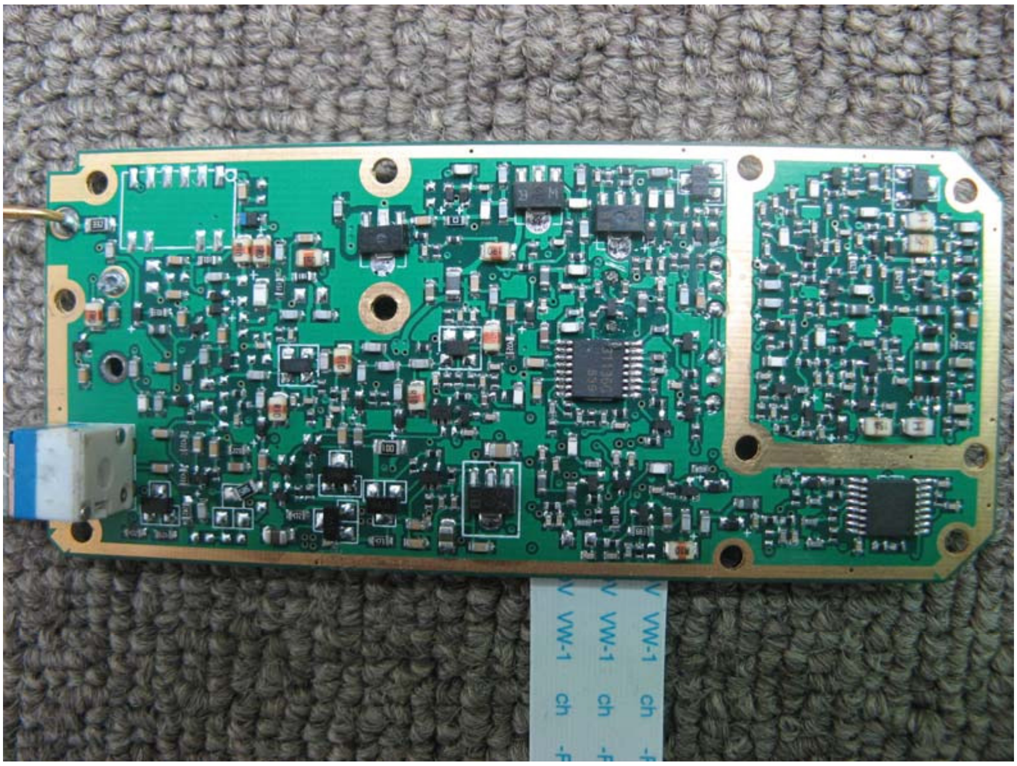
LEFT VIEW OF EUT

RIGHT VIEW OF EUT

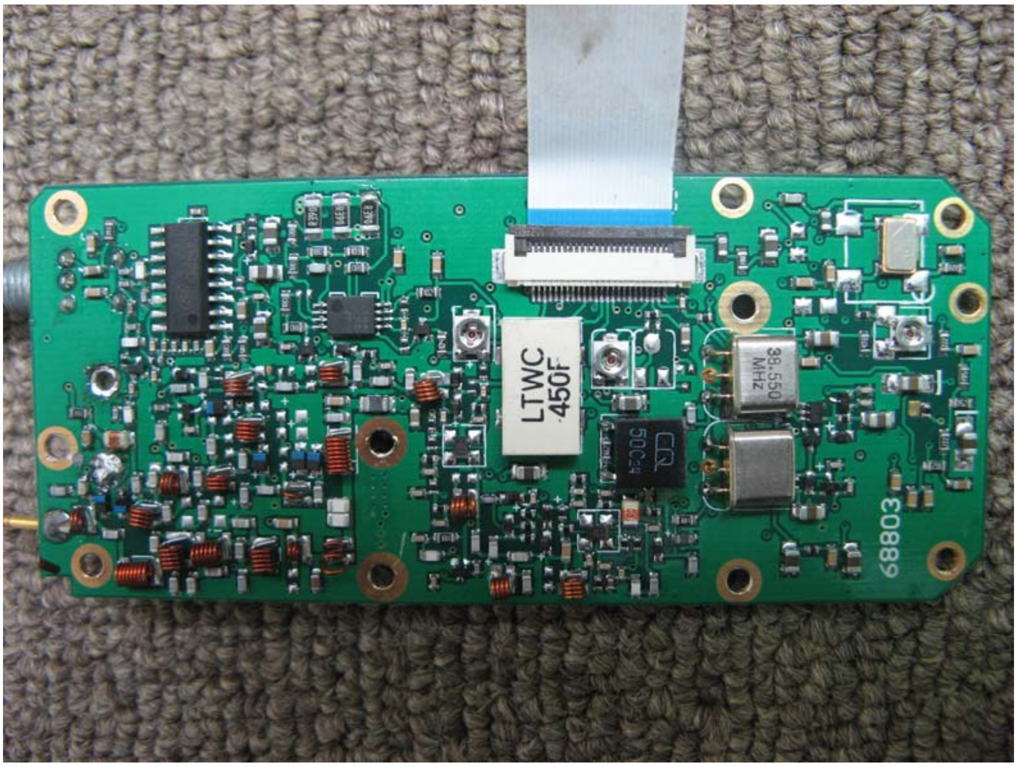
FRONT VIEW OF EUT


BACK VIEW OF EUT

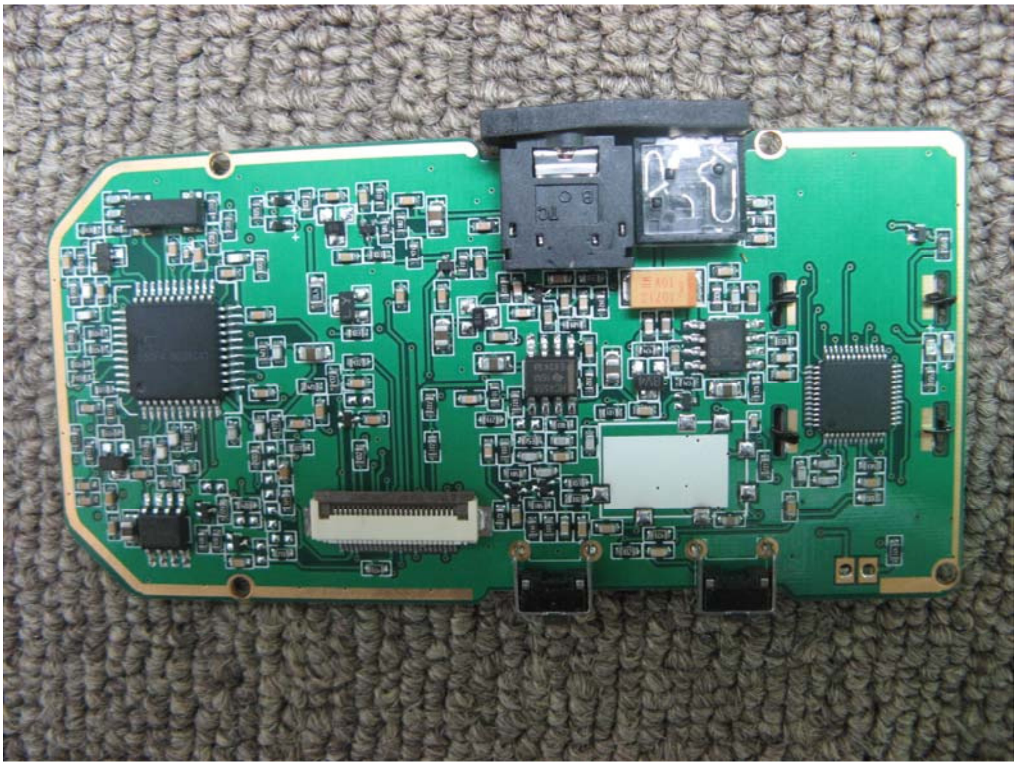
INTERNAL VIEW OF EUT – 1



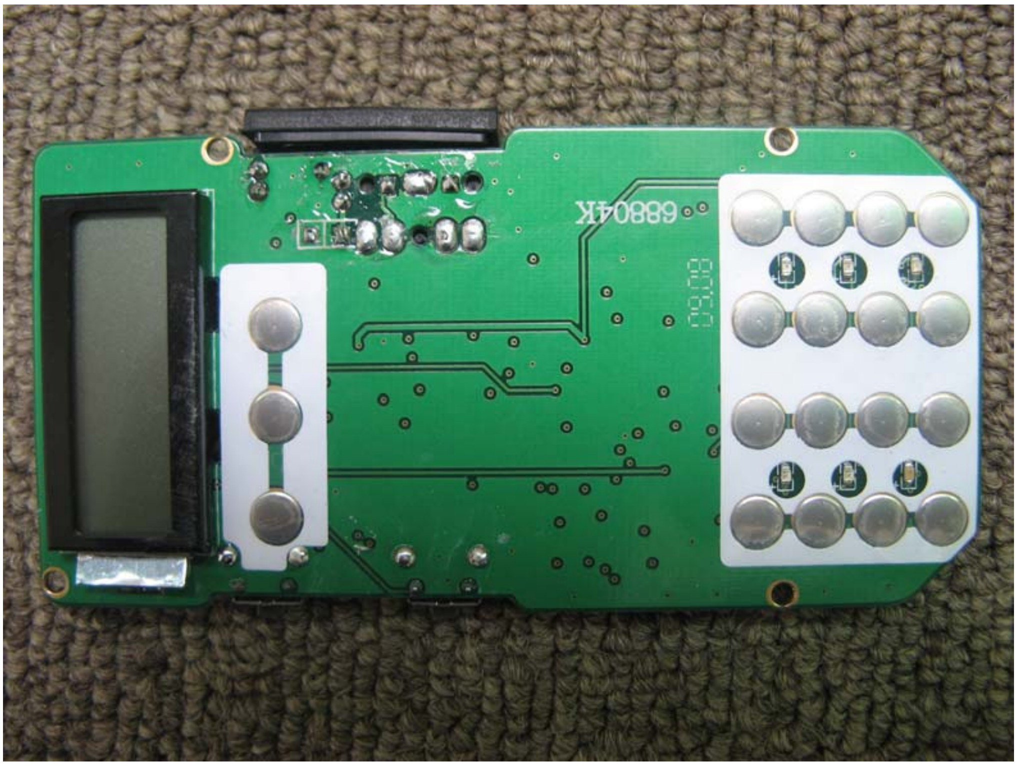

INTERNAL VIEW OF EUT – 2



INTERNAL VIEWOF EUT-3



INTERNAL VIEW OF EUT-4



----END OF REPORT----

RADIATED TEST SETUP

## ANNEX G: THE EUT APPEARANCES AND TEST CONFIGURATION


Picture 3: Constituents of the sample

Picture 4: Face-held, The EUT display towards phantom, the distance from EUT to the bottom of the Phantom is 15mm

Picture 5: Body-worn, The EUT display towards ground, Belt clip attach the Panntom

# ADJUSTMENT

## Required Test Equipment

### 1. Stabilized Power supply

1. The supply voltage can be changed between 5V and 18V, and the current is 3A or more.
2. The standard voltage is 7.5V.

### 2. DC Ammeter

1. Class 1 ammeter (17 ranges and other features).
2. The full scale can be set to either 300mA or 3A.
3. A cable of less internal loss must be used.

### 3. Frequency Counter (f. counter)

1. Frequencies of up to 1GHz or so can be measured.
2. The sensitivity can be changed to 500MHz or below, and measurements are highly stable and accurate (0.2ppm or so).

### 4. Power Meter

1. Measurable frequency : Up to 500MHz
2. Impedance : 50 , unbalanced
3. Measuring range : Full scale of 10W or so
4. A standard cable (5D2W 1m) must be used.

### 5. RF Voltmeter(RF V.M)

1. Measurable frequency : Up to 500MHz or so.

### 6. Linear Detector

1. Measurable frequency : Up to 500MHz or so
2. Characteristics are flat, and CN is 60dB or more.

### 7. Digital Voltmeter

1. Voltage range : FS=18V or so
2. Input resistance : 1M or more

### 8. Oscilloscope

1. Measuring range : DC to 30MHz
2. Provides highly accurate measurements for 5 to 25MHz.

### 9. AF Voltmeter (AF V.M)

1. Measurable frequency : 50Hz to 1MHz
2. Maximum sensitivity : 1mV or more

### 10. Spectrum Analyzer

1. Measuring range : DC to 1GHz or more

### 11. Standard Signal Generator (SSG)

1. Maximum frequency : 500MHz or more
2. Output : -133dBm/0.05µV to 7dBm/501mV
3. Output impedance : 50

### 12. Tracking Generator

1. Center frequency : 50kHz to 500MHz
2. Frequency deviation : ±35MHz
3. Output voltage : 100mV or more

### 13. Dummy Load

1. 8 , 3W or more

### 14. AF Generator(AG)

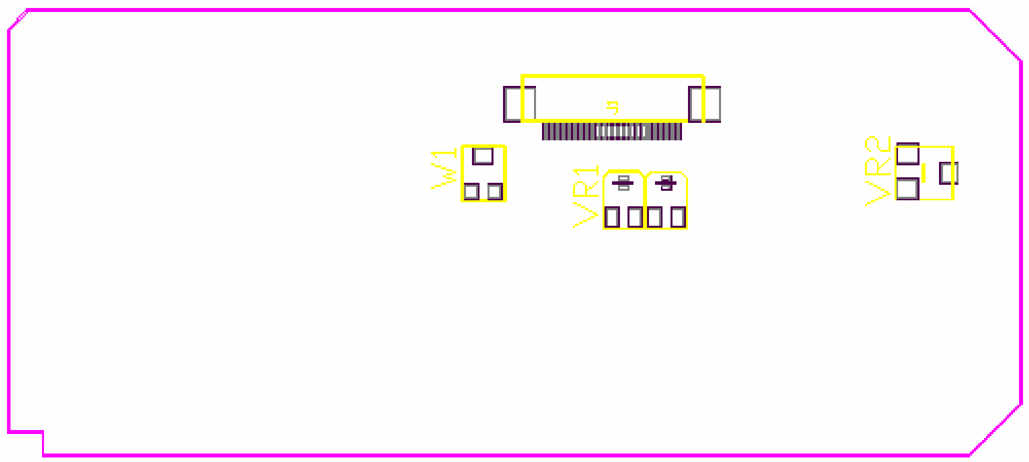
1. Frequency range : 100Hz to 100kHz
2. Output : 0.5mV to 1V

### 15. Distortion Meter

1. Measurable frequency : 30Hz to 100kHz
2. Input level : 50mV to 10Vrms

While holding MENU and EXIT key,turn power switch ON to enter Adjustment Mode

| 信道频率 | 压控电压 | 信噪比 | 功率 | 调制失真度 | 调制频偏 | DCS,ctcss | 频率误差 |
|---|---|---|---|---|---|---|---|
| 0-136.100 | RX≥0.5V,TX≥0.5V | ≥12dB（-122dBm） | ≥3.5W | ≤5% | **4.0~4.3KHz** | | ≤200Hz |
| 1-151.250 | | ≥12dB（-122dBm） | ≥4W | ≤5% | **4.0~4.3KHz** | | ≤200Hz |
| 2-173.125 | RX≤3.8VTX≤2.5V | ≥12dB（-122dBm） | ≥3W | ≤5% | **4.0~4.3KHz** | | ≤200Hz |
| 3-136.125 | | | | | | 0.5~0.9KHz | |
| 4-151.750 | | | | | | 0.5~0.9KHz | |
| 5-173.175 | | | | | | 0.5~0.9KHz | |
| 6-136.150 | | | | | | 0.5~0.9KHz | |
| 7-151.150 | | | | | | 0.5~0.9KHz | |
| 8-173.225 | | | | | | 0.5~0.9KHz | |
| 9-400.125 | RX≥0.4V,TX≥0.5V | ≥12dB（-121dBm） | ≥3.5W | ≤5% | **4.0~4.3KHz** | | ≤200Hz |
| 10-440.325 | | ≥12dB（-121dBm） | ≥4W | ≤5% | **4.0~4.3KHz** | | ≤200Hz |
| 11-469.225 | RX≤4.2V,TX≤3.8V | ≥12dB（-121dBm） | ≥3W | ≤5% | **4.0~4.3KHz** | | ≤200Hz |
| 12-400.150 | | | | | | 0.5~0.9KHz | |
| 13-440.350 | | | | | | 0.5~0.9KHz | |
| 14-469.250 | | | | | | 0.5~0.9KHz | |
| 15-400.175 | | | | | | 0.5~0.9KHz | |
| 16-440.375 | | | | | | 0.5~0.9KHz | |
| 17-469.275 | | | | | | 0.5~0.9KHz | |
| 18-150.125 | | | | | **2.0~2.5KHz** | | |
| 19-440.425 | | | | | **2.0~2.5KHz** | | |




W1:HI POWER ADJUST

VR1:MAX DEVIATION ADJUSTMENT
VR3:FREQUENCY ADJUSTMENT

This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must except any interference received, including interference that may cause undesired operation.

# SAFETY TRAINING INFORMATION

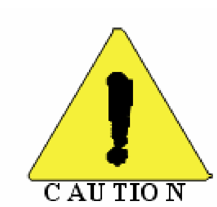

**Your Quansheng radio generates RF electromagnetic en-ergy during transmit mode. This radio is designed for and classified as "Occupational Use Only", meaning it must be used only during the course of employment by individuals aware of the hazards, Warning and the ways to minimize such hazards. This radio is not intended for use by the "General Population" in an uncontrolled environment.**

This radio has been tested and complies with the FCC RF exposure limits for "Occupational Use Only." In addition, your Quansheng radio complies with the following Standards and Guidelines with regard to RF energy and electromagnetic energy levels and evaluation of such levels for exposure to humans:

• FCC OET Bulletin 65 Edition 97-01 Supplement C, Evaluating Compliance with FCC Guidelines for Human Exposure to Radio Frequency Electromagnetic Fields.

• American National Standards Institute (C95.1–1992), IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz.

• American National Standards Institute (C95.3–1992), IEEE Recommended Practice for the Measurement of Potential y Hazardous Electromagnetic Fields— RF and Microwave.




**To ensure that your exposure to RF electromagnetic energy is within the FCC allowable limits for occupational use, always adhere to the following**

**CAUTION guidelines:**

• **DO NOT** operate the radio without a proper antenna attached, as this may damage the radio and may also cause you to exceed FCC RF exposure limits. A proper antenna is the antenna supplied with this radio by the manufacturer or an antenna specifically authorized by the manufacturer for use with this radio.

• **DO NOT** transmit for more than 50% of total radio use time (“50% duty cycle”). Transmitting more than 50% of the time can cause FCC RF exposure compliance requirements to be exceeded. The radio is transmitting when the “TX indicator” lights red. You can cause the radio to transmit by pressing the “PTT” switch.

• **ALWAYS** use Quansheng authorized accessories (antennas, batteries, belt clips, speaker/mics, etc). Use of unauthorized accessories can cause the FCC RF exposure compliance requirements to be exceeded. Body-worn operations are restricted to belt-clips, holsters or similar accessories that have no metallic component in the assembly and that provide at least 1.5 cm separation between the device, including its antenna, and the user's body. To provide the recipients of your transmission the best sound quality, hold the antenna at least 5 cm (2 inches) from mouth, and slightly off to one side. The information listed above provides the user with the information needed to make him or her aware of RF exposure, and what to do to assure that this radio operates within the FCC RF exposure limits of this radio.

**Electromagnetic Interference/Compatibility**

During transmissions, your Quansheng radio generates RF energy that can possibly cause interference with other devices or systems. To avoid such interference, turn off the radio in areas where signs are posted to do so. **DO NOT** operate the transmitter in areas that are sensitive to electromagnetic radiation such as hospitals, aircraft, and blasting sites.

# FOREWORD

Thank you for purchasing the TG-UV transceiver.

**READ ALL INSTRUCTIONS** carefully and completely before using the transceiver.

**SAVE THIS INSTRUCTION MANUAL–**This instruction manual contains important operating instructions for the transceiver.

# INSTALLATION NOTES

• Body-worn operations are restricted to belt-clips, holsters or similar accessories that have no metallic component in the assembly and that provide at least 1.5 cm separation between the device, including its antenna, and the user's body

• If you wear a portable two-way radio on your body, ensure that the antenna is at least 2.5 centimeters (1 in.) from your body when transmitting.

# IMPORTANT

RF CAUTION! NEVER hold the transceiver so that the antenna is very close to, or touching exposed parts of the body, especially the face or eyes, while transmitting. The transceiver will perform best if the microphone is 2 to 4 in. (5 to 10 cm) away from the lips and the transceiver is vertical.

RF **CAUTION! NEVER** operate the transceiver with a headset or other audio accessories at high volume levels.

RF **CAUTION! NEVER** short the terminals of the battery pack.

**DO NOT** push the PTT when not actually desiring to transmit.

**AVOID** using or placing the transceiver in direct sunlight or in areas with temperatures below +14°F (–10°C) or above +122°F (+50°C). The basic operations, transmission and reception of the transceiver, are guaranteed within the specified operating temperature range (depending on version). However, the LCD display may not be operate correctly, or show an indication in the case of long hours of operation, or after being placed in extremely cold areas.

**DO NOT** modify the transceiver for any reason.

KEEP the transceiver from the heavy rain, and **never** immerse it in the water. The transceiver construction is **water resistant**, not waterproof.

The use of non Quansheng battery packs/chargers may impair transceiver performance and invalidate the warranty.

# CONTENTS

# FCC INFORMATION

This device complies with Part 15 and Part 90 of the FCC rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) This device must accept any interference received, including interference that may cause undesired operation.

## FCC ID: XBPTG-UV

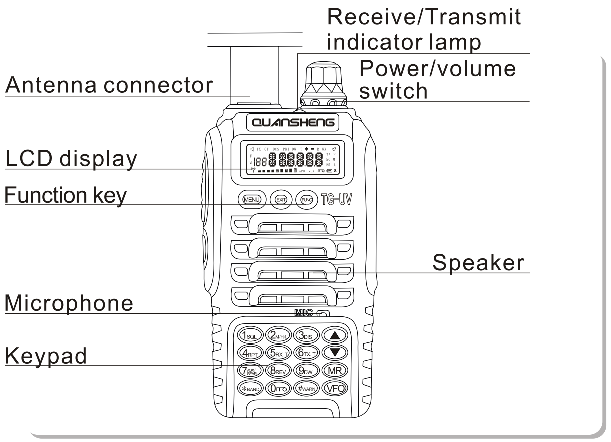
## SCOPE OF THIS MANUAL

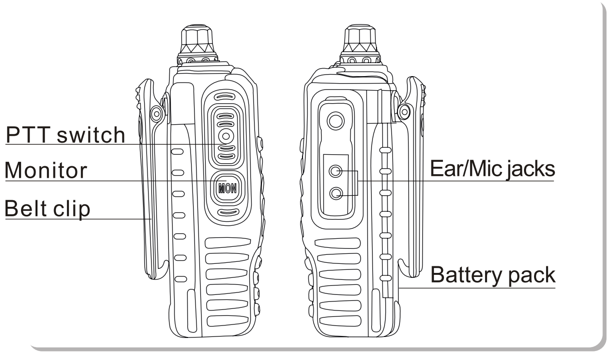
This manual is intended for use by experienced technicians familiar with similar types of commercial grade communications equipment.It contains all required service information for the equipment and is current as of publication data.

## NOTE BEFORE USING

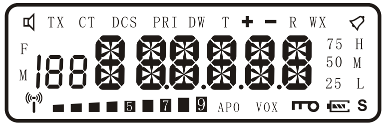
- Do NOT transmit until all RF connectors are verified secure and any open connectors are properly terminated.
- SHUT OFF and DO NOT operate this equipment near electrical blasting caps or in an explosive atmosphere.
- This equipment should be serviced by a qualified technician only.

# FUNCTION DESCRIBTION



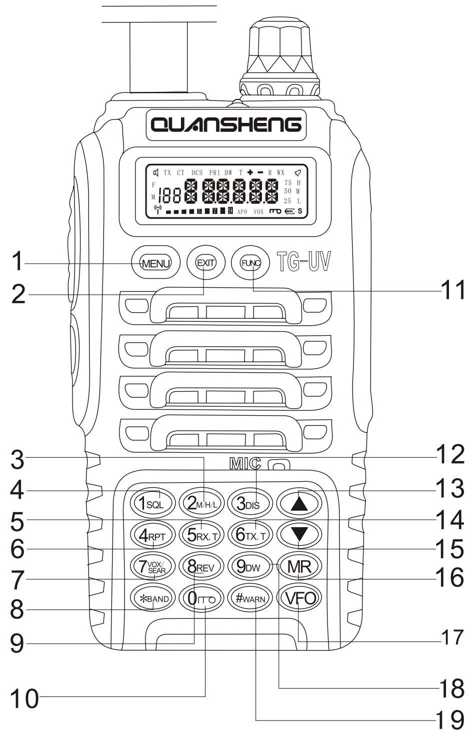



On the LCD display,you can see various indicative symbol. The following is the signification of the symbols.




| | |
|---|---|
| F | Function key |
| | Signal indicator |
| | Keypad beep |
| | Battery capacity indicator |
| | Keypad lock |
| | Frequency display |
| H/M/L | Output power indicator |
| VOX | Vox |
| S | Scan |
| PRI | Priority scan |
| M 188 | Memory channel indicator |
| TX | Transmitting indication |
| CT | CTCSS |
| DCS | DCS |
| DW | Dual-watch operation |
| + − | Repeater shift direction |
| R | Reverse frequency function |
| WX | Dual-watch channel operation |
| T | Priority scan channel |

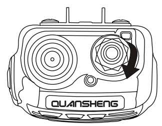
# FUNCTION DESCRIBTION



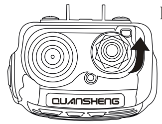
1. Menu/confirm
2. Exit
3. High/medium/low power adjust
4. Squelch adjust
5. CTCSS/DCS receive
6. Repeater shift direction
7. VOX search
8. Frequency band switch
9. Reverse frequency function
10. Keypad lock
11. Function key
12. Channel/frequency display
13. Up key
14. CTCSS/DCS transmit
15. Down key
16. Channel mode / Channel scan
17. Frequency mode / Frequency scan
18. Dual-watch operation
19. Emergency alarm

## BASIC OPERATIONS

- Switch the Power/Volume clockwise to turn the power on.
  When you turn it on, it will beep and the channel will diaplay on the LCD, the LCD backlight shows.
- Switch power volume controller counter-clockwise to turn off the radio's power supply.



P-1

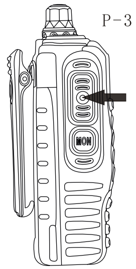


P-2

PS: Pressing and hold the Monitor,then rotating the power/volume switch to turn up or down the radio.

- To make a call, press and hold the "PTT switch", then speak into the microphone in normal speaking voices.

  PS: Hold the microphone approximately 1.5 inches (3-4cm) from your lips.
- Release "PTT" to receive signals.



P-3

- Press key"FUNC"+"1 SQL", set the squelch level, press key"▲" or"▼" to choose it from 0～9, press"MENU" to confirm and save.
  LCD display as picture: 5 SQL. 0

- Press key"FUNC"+"2 H/M/L", set the High/Medium/Low power, operation repeat, choose it from H/M/L (LCD display)
  LCD display as picture: 400.770

- Press key"MR" into channel mode, then press key "FUNC"+"3 DIS" to switch the channel mode and cha-nnel+frequency mode.  .
  LCD display as picture: 01 U2-00 | 01 400.750
  01: channel number
  U2: frequency band
  00: memory channels

- Press key"FUNC"+"4 RPT", set repeater shift direction , operation repeat,choose it from OFF/+/−,press"MENU" to confirm and save.

- Press key"FUNC"+"5 RXT", set CTCSS/DCS receive, show "rc OFF", press"✻BAND" change the CTCSS/DCS mode:
  rc OFF: no CTCSS/DCS
  rc CT: CTCSS
  rc N(I) : DCS
  press key"▲" or"▼" to choose CTCSS code or DCS code, and then press"MENU" to save.

- Press key"FUNC"+"6 TXT", Set CTCSS/DCS Transmit,show "tc OFF".
  Press key"✱BAND"to choose the CTCSS/DCS Trasmit mode:
  tc OFF:NO CTCSS/DCS
  tc CT:CTCSS
  tc N(I):DCS
  (Press key"▲"or"▼",choose CTCSS code or DCS code and then press"MENU"to save.)

- Press key"FUNC"+"7 VOX SEAR", Set the VOX grade, press key"▲"or"▼"to choose the grade from 1～9. Press"MENU"confirm and save.
  LCD display as picture:

- Press key"FUNC"+"8 REV", use the reverse frequency function, LCD show"R", operation again to exit.
  LCD display as picture:


- Press key"FUNC"+"9 DW", use the dual-watch operation, LCD show"DW", the radio awaits the using channel and dual-watch channel at the same time, Press"EXIT"to exit.

LCD display as picture:


**Note**:It needs to set the dual-watch channel first. Choose Menu 4 "DCH" as"ON",LCD shows"WX",then the dual-watch channel is set.

- Press key″FUNC″+″#WARN″, use the alarm function, LCD show″WARN″, press″PTT″to exit.

  LCD display as picture:


- Press key″FUNC″+″*BAND″, frequency band switch. On the mode of frequency, switch among F0、F1、F2、F3、F4.

- Press key″0″more than 2 seconds, keypad lock, LCD show″ ″, operation again, keypad unlock.

- Press key″7VOX SEAR″more than 2 seconds, LCD show ″SEARCH″, search CTCSS or DCS, LCD show the CTCSS/DCS when searched, on the mode of frequency,press key″MENU″ to save, press key ″EXIT″to end the search.

  LCD display as picture:

## The using method of menu

1.Press key"MENU" into the menu mode.
2.Press key"▲" or"▼" to choose your desired menu option.
3.Then press key"MENU" again into menu content.
4.Press"▲" or"▼" to choose the parameter of menu option.
5.After choosing the desired parameter, Press key"MENU" to save and exit, Press key"EXIT" to exit

| NO. | Feature | LCD display | Choice content |
|---|---|---|---|
| 1 | Channel step | STP. | 5/6. 25/10/12. 5/15/20/25/30/50/100KHz |
| 2 | RX CTCSS/DCS | RX .CODE | OFF/CTCSS/DCS |
| 3 | TX CTCSS/DCS | TX. CODE | OFF/CTCSS/DCS |
| 4 | Dual-watch channel | DCH | ON/OFF |
| 5 | Squelch level shift direction | SQL. | 0～9 |
| 6 | Repeater shift direction | RPT. | OFF/-/+ |
| 7 | Off set | OFFSET | Press key"#"then input0～70.000MHz |
| 8 | Power choosing | POW. | HI/MI/LO |
| 9 | Time-out-Timer | TOT. | 0～9 |
| 10 | Channel spacing | W/N. | W(25KHz)/N(12. 5KHz) |
| 11 | Keypad beep switch | BEEP | ON/OFF |
| 12 | Voice scrambler | SCR. | ON/OFF |
| 13 | Priority scan | PCH | ON/OFF |
| 14 | Busy channel lock | BCL. | ON/OFF |
| 15 | VOX | VOX . | OFF/1～9 |
| 16 | Channel display switch | CH. PLAY | ON/OFF |
| 17 | Delete | BEL. | YES/NO |
| 18 | Reset | RESET | VFO/FULL |

## PC Programmable Function

This radio can be programmed by computer, the operation details see **QS** PC software.

## Frequency Mode

Press key"VFO" into frequency mode, change the frequency according channel step by pressing key "▲" or "▼", or input the frequency directly by press key"#WARN".

Example: #+095500 ⟶ F0 95. 5MHz

#+150000 ⟶ F1 150. 000MHz

If you want to set different frequency, it needs to set the RPT, then set the CTCSS/DCS (if necessary) and then to talk.

## Memory Channel Store

On the frequency mode, set the receiving frequency first, if you want to set different frequency, it needs to set the RPT, then set the CTCSS/DCS (if necessary), press key"FUNC"+"MR", choose the storing channel by pressing key"▲" or"▼", or input the channel number directly by press key"#WARN", then press key"MR" to save.

This radio can total"0～99"total 100 channels.

## Choose Memory Channel

Press key"MR" into channel mode, then press key"▲" or"▼" to choose the channel you need, or press key"#WARN" to input the channel you need directly, then you can talk.

## Delete The Memory Channel

Press key"MR"into channel mode, choose the channel need to delete. Press key"MENU"then press "▲"or"▼"to choose menu"17", and then press "MENU"to choose"YES"(delete) or"NO"(undelete) then press key"MENU"to confirm and exit.

## Busy Channel Lock

The busy lock feature disables the transmitter if another signal is present, if the function open, the radio alarm by pressing PTT,shows"Busy"on the display and stop transmitting.

## VOX

VOX function can't switch to transmit mode manually each time. Once the vox circuit check you speak to microphone, the radio switch to transmit mode automatically.

## VOX PLUS

You must adjust the VOX PLUS level correctly and then can use VOX function effectly.
"OFF/1～9", "1"denote the VOX PLUS lowest, "9" denote the VOX PLUS highest.
The user needs to choose the proper level according to the environment.

## Reset

The radio has two kinds reset function, ″VFO″shows frequency mode reset, press″MENU″and then press ″▲″or″▼″switch to No.18 menu, then press ″MENU″to choose″VFO″, press key″MENU″to choose ″YES″, ″FULL″means reset completely.

## Time-Out-Timer

To avoid someone transmit without permission or transmit careless, it can be set to forbid transmitting choose from″0～9″, ″0″means that it can't be open this function, ″1～9″means transmit 1～9 minutes.

## Voice Scrambler（Optional）

When scrambler, other radio without voice scra- mbler can receive the signal but can't hear the content of other two radios communication. Only communication when two radios both have chosen voice scrambler.

## Cable Cloning Function

Press the key″monitor″of master radio, turn the power on, LCD show″COPY″into cable clone, turn the power on of sub-master, connect the cloning cable, Press key ″Monitor″of master radio to copy, LCD show″WAIT″. The receiving indicator glitter of sub-master radio.After copying turn the power off.

## Scan Function

Press key"VFO" into the frequency mode, press key "VFO" more than 2 seconds , then it can scan frequency according the channel step.
It can change the scan direction by pressing"▲" or"▼", press key"EXIT" to exit, press key"MR" into channel mode, press key"MR" more than 2 seconds then it can scan channel, press key"▲" or"▼" to change the scan direction, press"EXIT" to exit.

## Priority Scan

When monitor other frequency need to check the priority frequency at the same time, you can use"Priority Scan" Function. Setting a priority scan channel before use this function.
Priority scan channel:
Choose Menu NO. 13 PCH as"ON", LCD show"T"when set.
Press key"FUNC"into priority scan when channel scan, LCD shows"PRI", press key"FUNC"again to exit.

## The annunciation of no transmitting

1. If busy channel lock, LCD show"BUSY".
2. If PLL unlock, LCD show"LOST".
3. If the battery voltage higher than normal, LCD show "HIGH".
4. If the battery voltage lower than normal, LCD show "LOW".
5. If time out timer, LCD show"OVER".

## CTCSS

| | | | | | |
|---|---|---|---|---|---|
| 1 | 67.0 | 18 | 118.8 | 35 | 183.5 |
| 2 | 69.3 | 19 | 123.0 | 36 | 186.2 |
| 3 | 71.9 | 20 | 127.3 | 37 | 189.9 |
| 4 | 74.4 | 21 | 131.8 | 38 | 192.8 |
| 5 | 77.0 | 22 | 136.5 | 39 | 196.6 |
| 6 | 79.7 | 23 | 141.3 | 40 | 199.5 |
| 7 | 82.5 | 24 | 146.2 | 41 | 203.5 |
| 8 | 85.4 | 25 | 151.4 | 42 | 206.5 |
| 9 | 88.5 | 26 | 156.7 | 43 | 210.7 |
| 10 | 91.5 | 27 | 159.8 | 44 | 218.1 |
| 11 | 94.8 | 28 | 162.2 | 45 | 225.7 |
| 12 | 97.4 | 29 | 165.5 | 46 | 229.1 |
| 13 | 100.0 | 30 | 167.9 | 47 | 233.6 |
| 14 | 103.5 | 31 | 171.3 | 48 | 241.8 |
| 15 | 107.2 | 32 | 173.8 | 49 | 250.3 |
| 16 | 110.9 | 33 | 177.3 | 50 | 254.1 |
| 17 | 114.8 | 34 | 179.9 | | |

# DCS

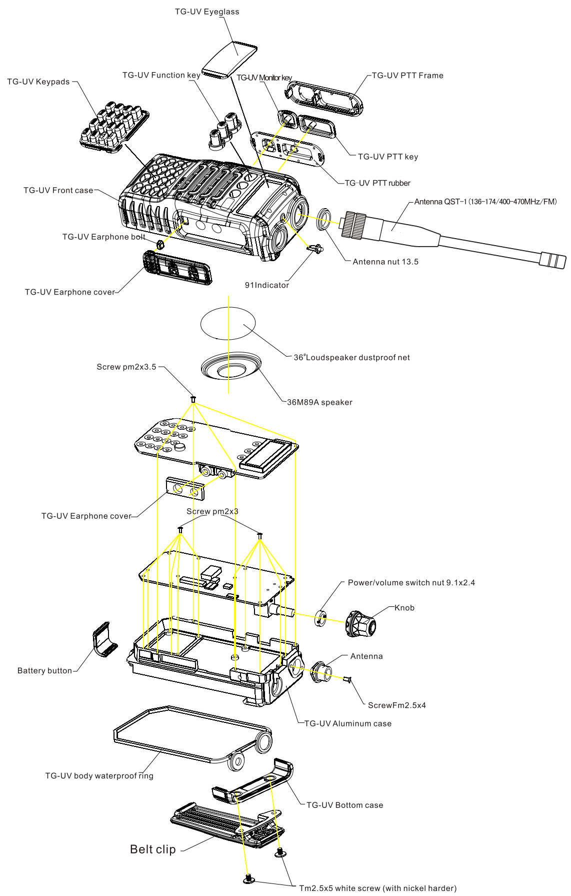
| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | D023N | 43 | D251N | 85 | D532N | 127 | D132I | 169 | D411I |
| 2 | D025N | 44 | D252N | 86 | D546N | 128 | D134I | 170 | D412I |
| 3 | D026N | 45 | D255N | 87 | D565N | 129 | D143I | 171 | D413I |
| 4 | D031N | 46 | D261N | 88 | D606N | 130 | D145I | 172 | D423I |
| 5 | D032N | 47 | D263N | 89 | D612N | 131 | D152I | 173 | D431I |
| 6 | D036N | 48 | D265N | 90 | D624N | 132 | D155I | 174 | D432I |
| 7 | D043N | 49 | D266N | 91 | D627N | 133 | D156I | 175 | D445I |
| 8 | D047N | 50 | D271N | 92 | D631N | 134 | D162I | 176 | D446I |
| 9 | D051N | 51 | D274N | 93 | D632N | 135 | D165I | 177 | D452I |
| 10 | D053N | 52 | D306N | 94 | D654N | 136 | D172I | 178 | D454I |
| 11 | D054N | 53 | D311N | 95 | D662N | 137 | D174I | 179 | D455I |
| 12 | D065N | 54 | D315N | 96 | D664N | 138 | D205I | 180 | D462I |
| 13 | D071N | 55 | D325N | 97 | D703N | 139 | D212I | 181 | D464I |
| 14 | D072N | 56 | D331N | 98 | D712N | 140 | D223I | 182 | D465I |
| 15 | D073N | 57 | D332N | 99 | D723N | 141 | D225I | 183 | D466I |
| 16 | D074N | 58 | D343N | 100 | D731N | 142 | D226I | 184 | D503I |
| 17 | D114N | 59 | D346N | 101 | D732N | 143 | D243I | 185 | D506I |
| 18 | D115N | 60 | D351N | 102 | D734N | 144 | D144I | 186 | D516I |
| 19 | D116N | 61 | D356N | 103 | D743N | 145 | D245I | 187 | D523I |
| 20 | D122N | 62 | D364N | 104 | D754N | 146 | D246I | 188 | D526I |
| 21 | D125N | 63 | D365N | 105 | D023I | 147 | D251I | 189 | D532I |
| 22 | D131N | 64 | D371N | 106 | D025I | 148 | D252I | 190 | D546I |
| 23 | D132N | 65 | D411N | 107 | D026I | 149 | D255I | 191 | D565I |
| 24 | D134N | 66 | D412N | 108 | D031I | 150 | D261I | 192 | D606I |
| 25 | D143N | 67 | D413N | 109 | D032I | 151 | D263I | 193 | D612I |
| 26 | D145N | 68 | D423N | 110 | D036I | 152 | D265I | 194 | D624I |
| 27 | D152N | 69 | D431N | 111 | D043I | 153 | D266I | 195 | D627I |
| 28 | D155N | 70 | D432N | 112 | D047I | 154 | D271I | 196 | D631I |
| 29 | D156N | 71 | D445N | 113 | D051I | 155 | D274I | 197 | D632I |
| 30 | D162N | 72 | D446N | 114 | D053I | 156 | D306I | 198 | D654I |
| 31 | D165N | 73 | D452N | 115 | D054I | 157 | D311I | 199 | D662I |
| 32 | D172N | 74 | D454N | 116 | D065I | 158 | D315I | 200 | D664I |
| 33 | D174N | 75 | D455N | 117 | D071I | 159 | D325I | 201 | D703I |
| 34 | D205N | 76 | D462N | 118 | D072I | 160 | D331I | 202 | D712I |
| 35 | D212N | 77 | D464N | 119 | D073I | 161 | D332I | 203 | D723I |
| 36 | D223N | 78 | D465N | 120 | D074I | 162 | D343I | 204 | D731I |
| 37 | D225N | 79 | D466N | 121 | D114I | 163 | D346I | 205 | D732I |
| 38 | D226N | 80 | D503N | 122 | D115I | 164 | D351I | 206 | D734I |
| 39 | D243N | 81 | D506N | 123 | D116I | 165 | D356I | 207 | D743I |
| 40 | D244N | 82 | D516N | 124 | D122I | 166 | D364I | 208 | D754I |
| 41 | D245N | 83 | D523N | 125 | D125I | 167 | D365I | | |
| 42 | D246N | 84 | D526N | 126 | D131I | 168 | D371I | | |

(The following elimination flow just for your reference)

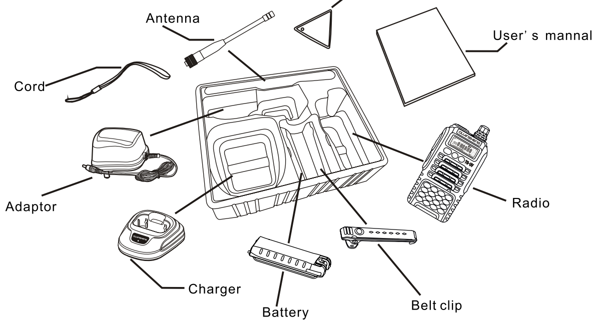
## Easy Malfunction Elimination

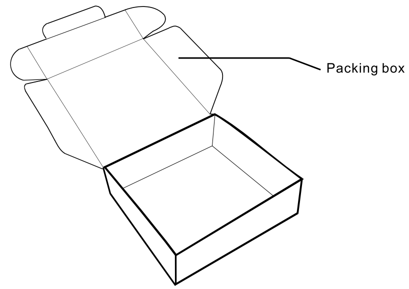
| Description | Solution |
|---|---|
| No Power On | 1.The battery is exhausted,pls change a new battery or charge the battery |
| | 2.Check if power switch(VR3) is put through |
| | 3.Check if CPU(LCI1)32.768MHz crystall oscillate. |
| No Transmmitter | 1.Check if the switch tube of the H/L frequency voltage BV3(Q39、Q40、Q46) change |
| | 2.Check if the RQA009(Q26), it work |
| No Noise | 1.Check if the cable of the speaker(SP) connect well |
| | 2.Check if the speaker put through |
| | 3.Check if the earphone base(J5) put through |
| | 4.Press the key Monitor(MON),check if BV3(Q9)transmitter grade have the turn vlotage around7.5 |
| | 5.Use oscillograph to check if audio power LM386(LC4)pin(5) magnify output |
| No Microphone | 1.Check microphone(Mic) |
| | 2.Check if earphone base(J4) put through |
| | 3.Check if MC4558(I C6) output |
| No Receiption | 1.Check frequency and CTCSS set |
| | 2.Check the intermediate frequency integrat circuit TA31136F(U2) |
| | 3.Check 450F(F4) |
| Monitor lose control | 1.Check the squech |
| | 2.Check if the key monitor(Mic) is locked |
| | 3.Check if the kyepad of the monitor destroy |
| | 4.Check intermediate frequency integrate circuit TA31136F(U2) |
| LOST | 1.Check (PLL) circuit |
| | 2.Check 24 pin ( J1 ) and the connect line |
| | 3.Check and test capacitance2UF2(C290)、4UF7(C251) |
| No sound | 1.Check it all of the frequency you set whether is the same with the other radios |
| | 2.Check magnify 2SC5066(Q11) |
| | 3.Check FM radio integrate circuit SC1088(U1) |
| No display | 1.Take out of the LCD frame , clean the dirty on the zebraic strip and restall it |
| | 2.Check if LCD unit have broken,or change the LCD unit |
| | 3.Check the LCD drive HT1621(I C7) |
| | 4.Check the data connect of the CPU(I C I) 3(PB6)、4(PCO)、5(PCI) |
| Can't read or write frequency | 1.Check if install software way right |
| | 2.Check if use the software of TG-UV |
| | 3.Radio is connect well with the data cable |
| | 4.Check the earphone base (J4)、(J5) |
| | 5.Check CPU(I C I) |

# EXPLODED VIEW



# PACKING


Eligible card
Antenna
User’ s mannal
Cord
Adaptor
Radio
Charger
Battery
Belt clip


Packing box

# TG-UV TESING INDICES

Test Voltage: 7. 5V

| Channel frequency | Control Voltage | SNR | Power | Emission Current | Modulation Distortion | Modulation Deviation | DCS | CTCSS | Frequency error | Tramsmitter | Max volume |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0-136.100 | RX≥0.5V, TX≥0.5V | ≥12dB(-122d BM) | ≥3.5W | ≤1.35A | ≤5% | 4.0~4.3KHz | | | ≤200Hz | ≤0.1KHz | ≥1.7V |
| 1-151.250 | | ≥12dB(-122d BM) | ≥4W | ≤1.35A | ≤5% | 4.0~4.3KHz | | | ≤200Hz | ≤0.1KHz | |
| 2-173.125 | RX≤3.8V, TX≤2.5V | ≥12dB(-122d BM) | ≥3W | ≤1.35A | ≤5% | 4.0~4.3KHz | | | ≤200Hz | ≤0.1KHz | |
| 3-136.125 | | | | | | | | 0.5~0.9KHz | | | |
| 4-151.750 | | | | | | | | 0.5~0.9KHz | | | |
| 5-173.175 | | | | | | | | 0.5~0.9KHz | | | |
| 6-136.150 | | | | | | | 0.5~0.9KHz | | | | |
| 7-151.150 | | | | | | | 0.5~0.9KHz | | | | |
| 8-173.225 | | | | | | | 0.5~0.9KHz | | | | |
| 9-400.125 | RX≥0.4V, TX≥0.5V | ≥12dB(-121d BM) | ≥3.5W | ≤1.4A | ≤5% | 4.0~4.3KHz | | | ≤200Hz | ≤0.1KHz | |
| 10-440.325 | | ≥12dB(-121d BM) | ≥4W | ≤1.4A | ≤5% | 4.0~4.3KHz | | | ≤200Hz | ≤0.1KHz | |
| 11-469.225 | RX≤4.2V, TX≤3.8V | ≥12dB(-121d BM) | ≥3W | ≤1.4A | ≤5% | 4.0~4.3KHz | | | ≤200Hz | ≤0.1KHz | |
| 12-400.150 | | | | | | | | 0.5~0.9KHz | | | |
| 13-440.350 | | | | | | | | 0.5~0.9KHz | | | |
| 14-469.250 | | | | | | | | 0.5~0.9KHz | | | |
| 15-400.175 | | | | | | | 0.5~0.9KHz | | | | |
| 16-440.375 | | | | | | | 0.5~0.9KHz | | | | |
| 17-469.275 | | | | | | | 0.5~0.9KHz | | | | |
| 18-150.125 | | | | | | 4.0~4.3KHz | | | | | |
| 19-440.12 | | | | | | 4.0~4.3KHz | | | | | |
| 20-350.100 | | ≥12dB(-118d BM) | | | | | | | | | |
| 21-519.975 | | ≥12dB(-120d BM) | | | | | | | | | |

Modulation Description:
1.Choose the channel to10, Modulatie frequency error,Eimisson Current.Eimission frequency deviation input,Audio frequency 1KHz,50mV,filter 50Hz~15KHz.
2.Channel 3, 4, 5, 6, 7. 8, 12, 13, 14, filter≥300Hz.