



RFID 13.56 MHz Radio Test Report

FCC ID: HLEMT65MF1

This report concerns (check one) : Original Grant Class II Change

Issued Date : Aug. 26, 2011
Project No. : R1106003
Equipment : Video T&A Terminal
Model Name : MT650-AQUEAG; MT650;
MT650-XXXXXG (Where X is 0-9, A-Z, -
or blank for marketing purpose)

Applicant : unitech electronics co., ltd.
5F, No. 136, Lane 235, Pao-Chiao Rd.,
Hsin-Tien Dist., New Taipei City Taiwan.

Tested by: Neutron Engineering Inc. EMC Laboratory

Date of Receipt: Jul. 13, 2011

Date of Test: Jul. 13, 2011 ~ Aug. 03, 2011

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Lab Code: 200145-0





Declaration

Neutron represents to the client that testing is done in accordance with standard procedures as applicable and that test instruments used has been calibrated with the standards traceable to National Measurement Laboratory (**NML**) of **R.O.C.**, or National Institute of Standards and Technology (**NIST**) of **U.S.A.**

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1. CERTIFICATION

Equipment: Video T&A Terminal

Brand Name: unitech

Model Name: MT650-AQUEAG; MT650; MT650-XXXXXG (Where X is 0-9, A-Z, - or blank for marketing purpose)

Applicant: unitech electronics co., ltd.

Data of Test: Jul. 13, 2011 ~ Aug. 03, 2011

Standards: FCC Part15, Subpart C / ANCI C63.4 : 2003

The above equipment has been tested and found compliance with the requirement of the relative standards by Neutron Engineering Inc. EMC Laboratory.

The test data, data evaluation, and equipment configuration contained in our test report (Ref No. NEI-FCCP-5-R1106003) were obtained utilizing the test procedures, test instruments, test sites that has been accredited by the Authority of NVLAP and TAF according to the ISO-17025 quality assessment standard and technical standard(s).



2. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

| FCC Part15, Subpart C | | | |
|-------------------------------------|---------------------|----------|--------|
| Standard Section | Test Item | Judgment | Remark |
| 15.207 | Conducted Emission | PASS | |
| 15.35 / 15.205 / 15.209 / 15.225 | Radiated Emission | PASS | |
| 15.225(e) | Frequency Stability | PASS | |
| 15.203 | Antenna Requirement | PASS | |

NOTE:

- (1) "N/A" denotes test is not applicable in this Test Report
- (2) Portable device; SAR report is required.
- (3) **The EUT include WiFi function and RFID function, this report covers EUT RFID function only. Its WiFi function testing is covered in another test report: NEI-FCCP-2-R1106003**



2.1 TEST FACILITY

The test facilities used to collect the test data in this report:

C01: (VCCI RN: C-2918; T-1666; FCC RN: 95335; FCC DN: TW1010)

No.132-1, Lane 329, Sec. 2, Palian Road, Shijr City, Taipei, Taiwan.

CB08: (VCCI RN: G-91; FCC RN: 614388; FCC DN: TW1054;

IC Assigned Code: 4428C-1)

1F., No. 61, Ln. 77, Sing-ai Rd., Neihu Dist., Taipei City 114, Taiwan (R.O.C.)

2.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement $y \pm U$, where expended uncertainty **U** is based on a standard uncertainty multiplied by a coverage factor of **k=2**, providing a level of confidence of approximately **95%**.

The measurement instrumentation uncertainty considerations contained in CISPR 16-4-2.

A. Conducted Measurement :

| Test Site | Method | Measurement Frequency Range | U, (dB) | NOTE |
|-----------|--------|-----------------------------|---------|------|
| C01 | ANSI | 150 kHz ~ 30 MHz | 1.94 | |

B. Radiated Measurement :

| Test Site | Item | Measurement Frequency Range | Uncertainty | NOTE |
|-----------|---------------------------|-----------------------------|-------------|------|
| CB08 | Radiated mission at 3m | 30 - 00MHz | 3.35 dB | |
| | | 200 - 1000MHz | 3.11 dB | |
| | | 1 - 18GHz | 3.97 dB | |
| | | 18 - 40GHz | 4.01 dB | |
| | Vertical Polarization | 30 - 200MHz | 3.22 dB | |
| | | 200 - 1000MHz | 3.24 dB | |
| | | 1 - 18GHz | 4.05 dB | |
| | | 18 - 40GHz | 4.04 dB | |

Our calculated Measurement Instrumentation Uncertainty is shown in the tables above. These are our U_{lab} values in CISPR 16-4-2 terminology.

Since Table 1 of CISPR 16-4-2 has values of measurement instrumentation uncertainty, called U_{CISPR} , as follows:

Conducted Disturbance (mains port) – 150 kHz – 30 MHz : 3.6 dB

Radiated Disturbance (electric field strength on an open area test site or alternative test site) – 30 MHz – 1000 MHz : 5.2 dB

It can be seen that our U_{lab} values are smaller than U_{CISPR} .



3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

| | |
|------------------------|---|
| Equipment | Video T&A Terminal |
| Brand Name | unitech |
| Model Name | MT650-AQUEAG; MT650; MT650-XXXXXG (Where X is 0-9, A-Z, - or blank for marketing purpose) |
| OEM Brand Name | TASHI |
| Model Difference | Please refer to Note 2. |
| Product Description | <p>The EUT is a Video T&A Terminal.</p> <p>Operation Frequency: 13.56 MHz</p> <p>Antenna Designation: LOOP Antenna</p> <p>Based on the application, features, or specification exhibited in User's Manual, the EUT is considered as an ITE/Computing Device. More details of EUT technical specification, please refer to the User's Manual.</p> |
| Power Source | DC Voltage supplied from External Power Supply or PoE. |
| Power Rating | SWITCHING ADAPTER: I/P: AC 100-240V 1.0A MAX 50-60Hz / O/P: DC +12V 2.0A PoE: I/P: DC +48V |
| Products Covered | Please refer to the User's Manual |
| Connecting I/O Port(s) | <ul style="list-style-type: none">1 * CPU: Samsung 6410 667MHz1 * 5.7" LCD Panel: DATA IMAGE FX050720DWSWDGT51 * Battery: Lithium-Ion @ 7.4V 1400mAh1 * WiFi 802.11b/g Module: USI WM-G-MR-9-REF-21 * RFID Module (13.56MHz): Mifare MP-702MF1 * Fingerprint Reader (optional): (1) TCEBB1CE010 (2) SFM30201 * SWITCHING ADAPTER: Sunny SYS1319-2412-T3 |
| EUT Modification(s) | N/A |



Note:

1. For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.
2. The EUT has two brand names (unitech, TASHI) and three types and all models are based on these three types:

| Type | WiFi 802.11b/g | RFID Module | Fingerprint Reader | Bar Code Reader | Power Source |
|------|----------------|-------------|--------------------|-----------------|----------------|
| A | YES | 13.56MHz | SFM3020 | None | Adapter or PoE |
| B | YES | 13.56MHz | TCEBB1CE010 | None | Adapter or PoE |
| C | YES | 13.56MHz | None | None | Adapter or PoE |

All the above types were tested, and the type: A was found to be the worst cases during the pre-scanning test. This type of the worst case was used for final testing and collecting test data included in this report.



3.2 DESCRIPTION OF TEST MODES

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

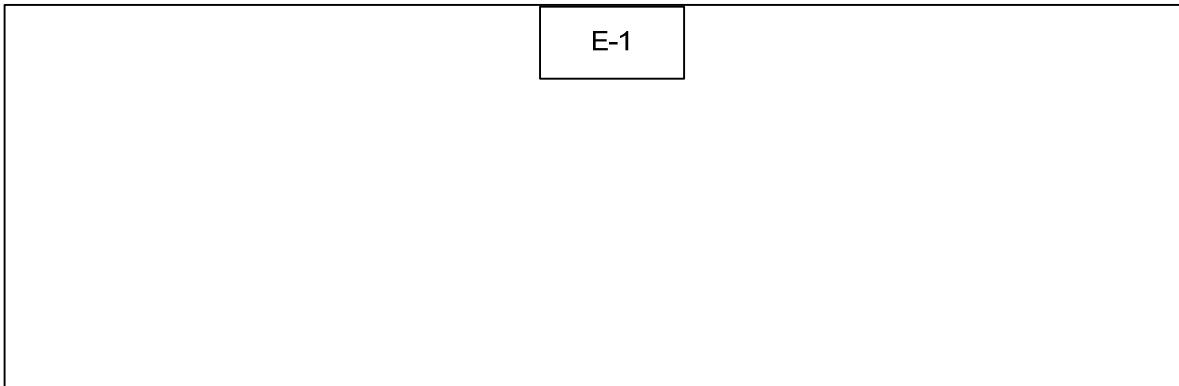
| Pretest Test Mode | Description |
|-------------------|-------------|
| Mode 1 | TX |

| For Conducted Test | |
|--------------------|-------------|
| Final Test Mode | Description |
| Mode 1 | TX |

| For Radiated Test | |
|-------------------|-------------|
| Final Test Mode | Description |
| Mode 1 | TX |



3.3 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED





3.4 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

| Item | Equipment | Mfr/Brand | Model/Type No. | FCC ID | Series No. | Note |
|------|--------------------|-----------|----------------|------------|------------|------|
| E-1 | Video T&A Terminal | unitech | MT650-AQUEAG | HLEMT65MF1 | N/A | EUT |

| Item | Shielded Type | Ferrite Core | Length | Note |
|------|---------------|--------------|--------|------|
| N/A | - | - | - | |

Note:

- (1) The support equipment was authorized by Declaration of Conformity.
- (2) For detachable type I/O cable should be specified the length in cm in 『Length』 column.



4. EMC EMISSION TEST

4.1 CONDUCTED EMISSION MEASUREMENT

4.1.1 POWER LINE CONDUCTED EMISSION (FREQUENCY RANGE 150 KHZ-30MHZ)

| FREQUENCY (MHz) | Class A (dBuV) | | Class B (dBuV) | |
|------------------|----------------|---------|----------------|-----------|
| | Quasi-peak | Average | Quasi-peak | Average |
| 0.15 -0.5 | 79.00 | 66.00 | 66 - 56 * | 56 - 46 * |
| 0.50 -5.0 | 73.00 | 60.00 | 56.00 | 46.00 |
| 5.0 -30.0 | 73.00 | 60.00 | 60.00 | 50.00 |

Note:

- (1) The tighter limit applies at the band edges.
- (2) The limit of " * " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.
- (3) The test result calculated as following:
Measurement Value = Reading Level + Correct Factor
Correct Factor = Insertion Loss + Cable Loss + Attenuator Factor(if use)
Margin Level = Measurement Value – Limit Value

4.1.2 MEASUREMENT INSTRUMENTS LIST

| Item | Kind of Equipment | Manufacturer | Type No. | Serial No. | Calibrated until |
|------|-------------------------|-----------------|----------|--------------|------------------|
| 1 | LISN | EMCO | 3816/2 | 00042991 | Feb. 16, 2012 |
| 2 | Test Cable | TIMES | LMR-400 | SR03_C_01&02 | Aug. 20, 2011 |
| 3 | Pulse Limiter | Electro-Metrics | EM-7600 | 112647 | Dec. 13, 2011 |
| 4 | EMI Test Receiver | R&S | ESCI | 100082 | Mar. 15, 2012 |
| 5 | 50Ω BNC TYPE Terminator | N/A | N/A | 01 | Jun. 02, 2013 |
| 6 | 50Ω BNC TYPE Terminator | N/A | N/A | 03 | Jun. 02, 2013 |
| 7 | LISN | EMCO | 4825/2 | 00028234 | Jul. 21, 2012 |

Remark: " N/A" denotes No Model Name , Serial No. or No Calibration specified.



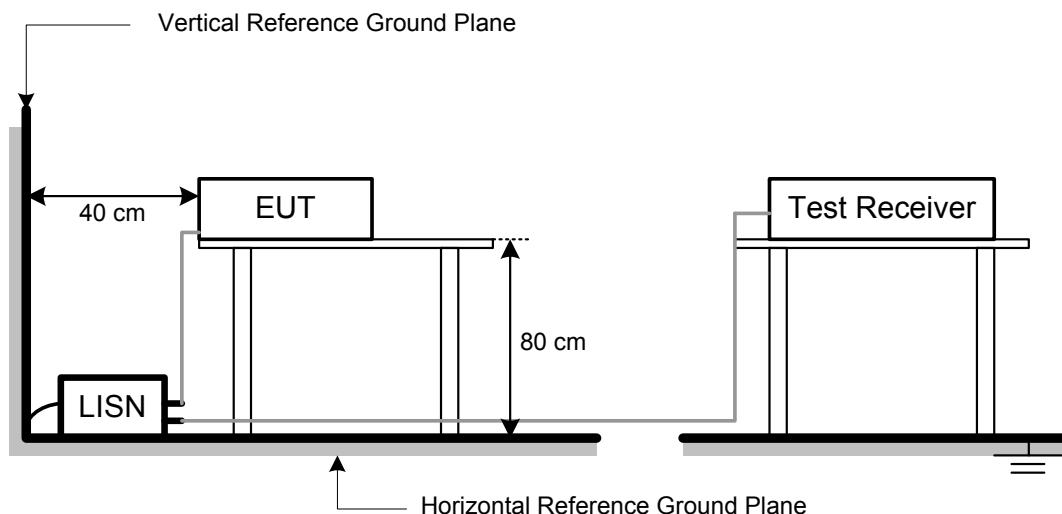
4.1.3 TEST PROCEDURE

- a. The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
- b. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
- c. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
- d. LISN at least 80 cm from nearest part of EUT chassis.
- e. For the actual test configuration, please refer to the related Item –EUT Test Photos.

4.1.4 DEVIATION FROM TEST STANDARD

No deviation

4.1.5 TEST SETUP





4.1.6 EUT OPERATING CONDITIONS

The EUT exercise program used during radiated and/or conducted emission measurement was designed to exercise the various system components in a manner similar to a typical use.

The EUT has been programmed to continuously transmit during test.



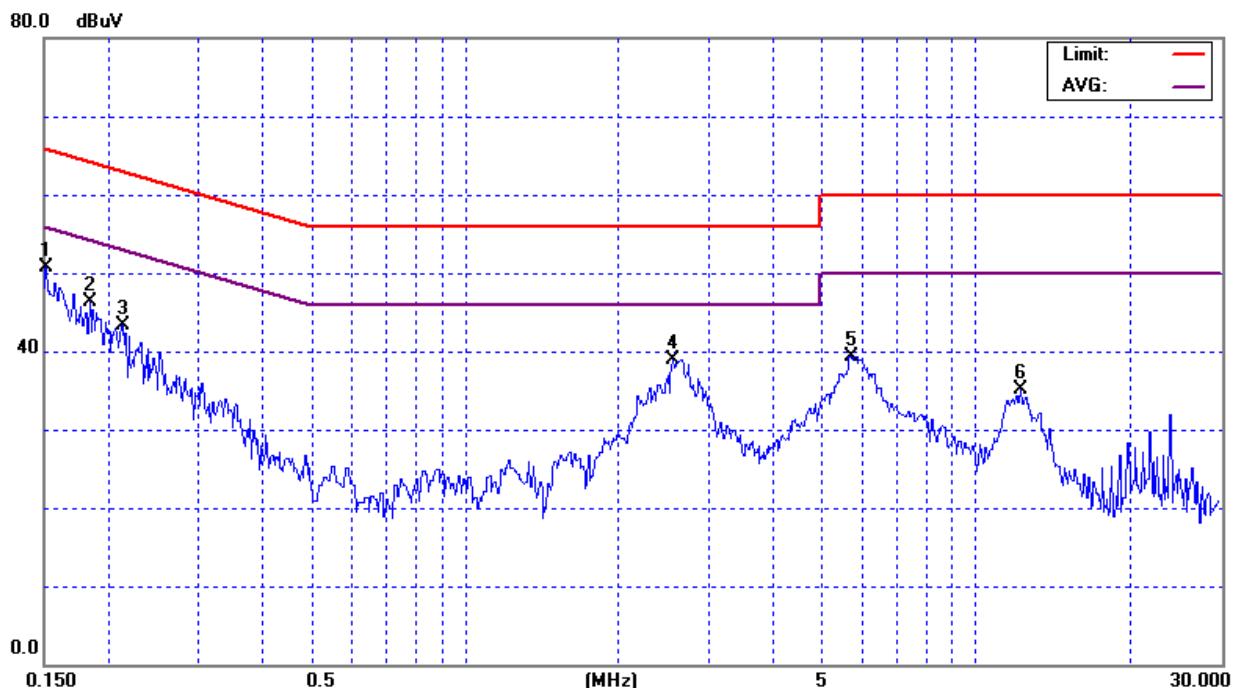
4.1.7 TEST RESULTS

| | | | |
|----------------|--------------------|---------------------|--------------|
| E.U.T : | Video T&A Terminal | Model Name : | MT650-AQUEAG |
| Temperature : | 24 °C | Relative Humidity : | 48% |
| Test Voltage : | AC 120V/60Hz | | |
| Test Mode : | 802.11b/CH06 | | |

| Freq. (MHz) | Terminal L/N | Reading Level(dBuV) | | Correct Factor(dB) | Measurement(dBuV) | | Limit(dBuV) | | Margin (dB) | Note |
|----------------|-----------------|---------------------|---------|-----------------------|-------------------|---------|-------------|---------|----------------|------|
| | | QP-Mode | AV-Mode | | QP-Mode | AV-Mode | QP-Mode | AV-Mode | | |
| 0.1514 | Line | 40.49 | * | 10.14 | 50.63 | * | 65.92 | 55.92 | -15.29 | (QP) |
| 0.1843 | Line | 36.16 | * | 10.08 | 46.24 | * | 64.29 | 54.29 | -18.05 | (QP) |
| 0.2130 | Line | 33.33 | * | 10.04 | 43.37 | * | 63.09 | 53.09 | -19.72 | (QP) |
| 2.5520 | Line | 30.13 | * | 8.86 | 38.99 | * | 56.00 | 46.00 | -17.01 | (QP) |
| 5.7000 | Line | 30.26 | * | 8.97 | 39.23 | * | 60.00 | 50.00 | -20.77 | (QP) |
| 12.2500 | Line | 26.03 | * | 9.16 | 35.19 | * | 60.00 | 50.00 | -24.81 | (QP) |

Remark:

- (1) Reading in which marked as QP means measurements by using are Quasi-Peak Mode with Detector BW=9 kHz; SPA setting in RBW=10 kHz, VBW =10 kHz, Swp. Time = 0.2 sec./ MHz. Reading in which marked as AV means measurements by using are Average Mode with instrument setting in RBW=10 kHz, VBW=10 kHz, Swp. Time =0.2 sec./ MHz.
- (2) All readings are QP Mode value unless otherwise stated AVG in column of Note. If the QP Mode Measured value compliance with the QP Limits and lower than AVG Limits, the EUT shall be deemed to meet both QP & AVG Limits and then only QP Mode was measured, but AVG Mode didn't perform. In this case, a “*” marked in AVG Mode column of Interference Voltage Measured.
- (3) In the “Note” column, QP means the margin value of QP is higher than Average and the “Margin” column shows the margin value of QP; AV means the margin value of Average is higher than QP and the “Margin” column shows the margin value of Average.



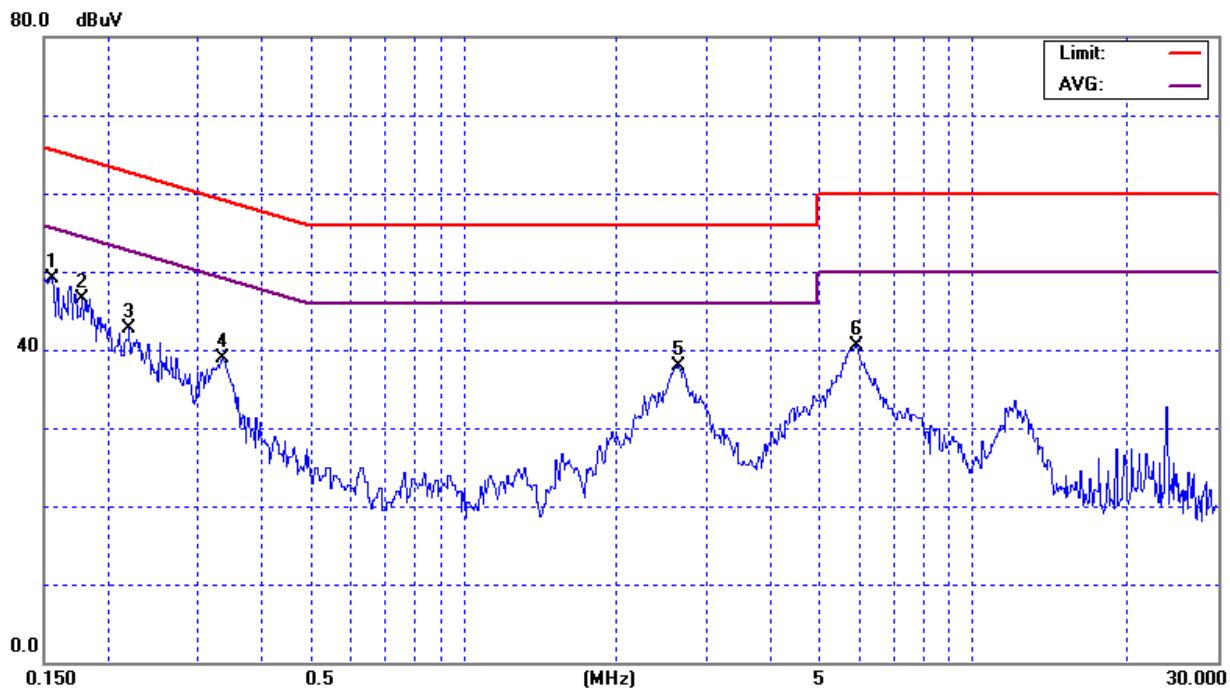


| | | | |
|----------------|--------------------|---------------------|--------------|
| E.U.T : | Video T&A Terminal | Model Name : | MT650-AQUEAG |
| Temperature : | 24 °C | Relative Humidity : | 48% |
| Test Voltage : | AC 120V/60Hz | | |
| Test Mode : | 802.11b/CH06 | | |

| Freq. (MHz) | Terminal L/N | Reading Level(dBuV) | | Correct Factor(dB) | Measurement(dBuV) | | Limit(dBuV) | | Margin (dB) | Note |
|----------------|-----------------|---------------------|---------|-----------------------|-------------------|---------|-------------|---------|----------------|------|
| | | QP-Mode | AV-Mode | | QP-Mode | AV-Mode | QP-Mode | AV-Mode | | |
| 0.1549 | Neutral | 39.22 | * | 9.93 | 49.15 | * | 65.73 | 55.73 | -16.58 | (QP) |
| 0.1780 | Neutral | 36.61 | * | 9.91 | 46.52 | * | 64.58 | 54.58 | -18.06 | (QP) |
| 0.2207 | Neutral | 32.79 | * | 9.87 | 42.66 | * | 62.79 | 52.79 | -20.13 | (QP) |
| 0.3362 | Neutral | 29.11 | * | 9.70 | 38.81 | * | 59.30 | 49.30 | -20.49 | (QP) |
| 2.6420 | Neutral | 29.19 | * | 8.68 | 37.87 | * | 56.00 | 46.00 | -18.13 | (QP) |
| 5.9000 | Neutral | 31.68 | * | 8.74 | 40.42 | * | 60.00 | 50.00 | -19.58 | (QP) |

Remark:

- (1) Reading in which marked as QP means measurements by using are Quasi-Peak Mode with Detector BW=9 kHz; SPA setting in RBW=10 kHz, VBW =10 kHz, Swp. Time = 0.2 sec./ MHz. Reading in which marked as AV means measurements by using are Average Mode with instrument setting in RBW=10 kHz, VBW=10 kHz, Swp. Time =0.2 sec./ MHz.
- (2) All readings are QP Mode value unless otherwise stated AVG in column of Note. If the QP Mode Measured value compliance with the QP Limits and lower than AVG Limits, the EUT shall be deemed to meet both QP & AVG Limits and then only QP Mode was measured, but AVG Mode didn't perform. In this case, a “*” marked in AVG Mode column of Interference Voltage Measured.
- (3) In the “Note” column, QP means the margin value of QP is higher than Average and the “Margin” column shows the margin value of QP; AV means the margin value of Average is higher than QP and the “Margin” column shows the margin value of Average.



**4.2 RADIATED EMISSION MEASUREMENT****4.2.1 RADIATED EMISSION LIMITS (Frequency Range 30MHz-1000MHz)**

| FCC Part 15.209 | | | | |
|------------------------|---------------------------|------|--|-------------------------|
| Frequency (MHz) | Field Strength Limitation | | Field Strength Limitation at 3m Measurement Dist | |
| | (uV/m) | Dist | (uV/m) | (dBuV/m) |
| 0.009 – 0.490 | 2400 / F(KHz) | 300m | 10000 * 2400/F(KHz) | 20log 2400/F(KHz) + 80 |
| 0.490 – 1.705 | 24000 / F(KHz) | 30m | 100 * 24000/F(KHz) | 20log 24000/F(KHz) + 40 |
| 1.705 – 30.00 | 30 | 30m | 100* 30 | 20log 30 + 40 |
| 30.0 – 88.0 | 100 | 3m | 100 | 20log 100 |
| 88.0 – 216.0 | 150 | 3m | 150 | 20log 150 |
| 216.0 – 960.0 | 200 | 3m | 200 | 20log 200 |
| Above 960.0 | 500 | 3m | 500 | 20log 500 |

| FCC Part 15.225(a)/(b)/(c) | | | | |
|-----------------------------------|---------------------------|------|--|----------|
| Frequency (MHz) | Field Strength Limitation | | Field Strength Limitation at 3m Measurement Dist | |
| | (uV/m) | Dist | (uV/m) | (dBuV/m) |
| 13.553 – 13.567 | 15,848 | 30 m | 15,848*100 | 124 |
| 13.567 – 13.710 | 334 | 30 m | 334*100 | 90.5 |
| 13.110 – 13.410 | 106 | 30 m | 106*100 | 80.5 |
| 13.710 – 14.010 | | | | |

Notes:

- (1) The tighter limit shall apply at the boundary between two frequency range.
- (2) Limitation expressed in dBuV/m is calculated by 20log Emission Level (uV/m).
- (3) If measurement is made at 3m distance, then F.S Limitation at 3m distance is adjusted by using the formula of $L_{d1} = L_{d2} * (d_2/d_1)^2$.

Example:

F.S Limit at 30m distance is 30uV/m , then F.S Limitation at 3m distance is adjusted as $L_{d1} = L_1 = 30uV/m * (10)^2 = 100 * 30 uV/m$

**4.2.2 MEASUREMENT INSTRUMENTS LIST**

| Item | Kind of Equipment | Manufacturer | Type No. | Serial No. | Calibrated until |
|------|-------------------|--------------|--------------|------------|------------------|
| 1 | Spectrum Analyzer | R&S | FSP-40 | 100129 | Aug. 31, 2011 |
| 2 | Microflex Cable | N/A | N/A | 1m | May. 18, 2012 |
| 3 | Test Cable | N/A | LMR-400 | 966_12m | Jun. 16, 2012 |
| 4 | Test Cable | N/A | LMR-400 | 966_3m | Jun. 16, 2012 |
| 5 | Pre-Amplifier | EMC | EMC-330 | 980001 | Jun. 02, 2012 |
| 6 | Log-Bicon Antenna | Schwarzbeck | VULB9168-352 | 9168-352 | Jun. 20, 2012 |
| 7 | Loop Ant. | EMCO | 6502 | 00042960 | Jan. 12,2012 |

Remark: " N/A" denotes No Model Name / Serial No. and No Calibration specified.

4.2.3 TEST PROCEDURE

- a. The measuring distance of at 10 m shall be used for measurements at frequency up to 1GHz. For frequencies above 1GHz, any suitable measuring distance may be used.
- b. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3m or 10 meter open area test site. The table was rotated 360 degrees to determine the position of the highest radiation.
- c. The height of the equipment or of the substitution antenna shall be 0.8 m; the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. The initial step in collecting radiated emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
- e. If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed.
- f. For the actual test configuration, please refer to the related Item –EUT Test Photos.

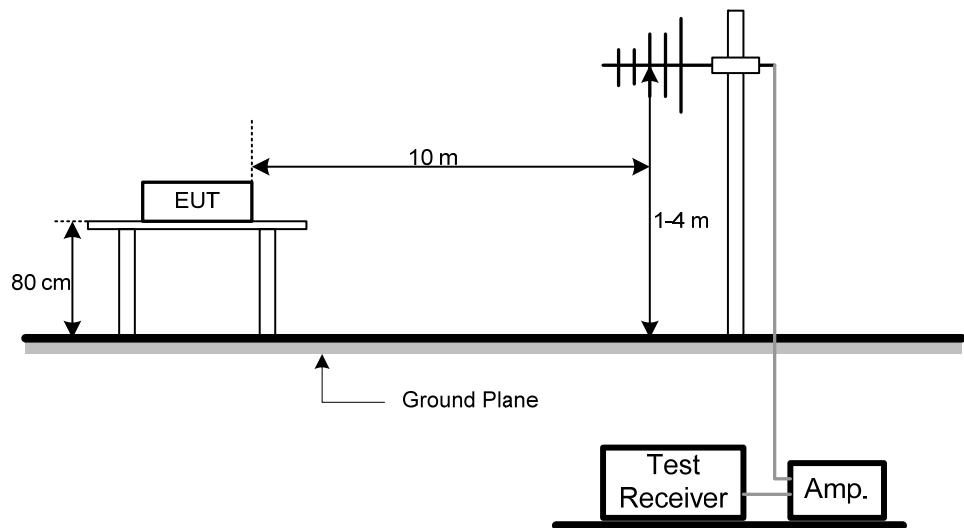
4.2.4 DEVIATION FROM TEST STANDARD

No deviation

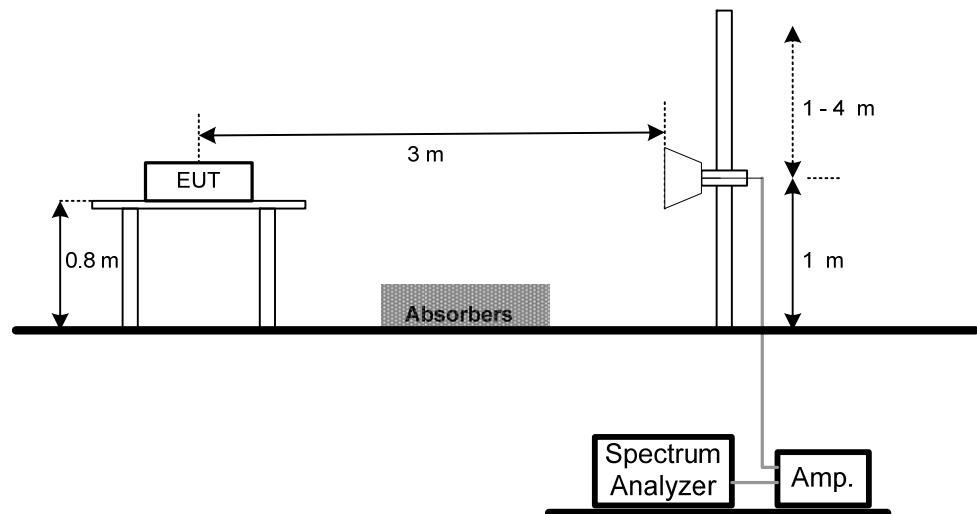


4.2.5 TEST SETUP

Radiated Emission Test Set-Up Frequency 30 - 1000MHz



Radiated Emission Test Set-Up Frequency Above 1 GHz



4.2.6 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 4.1.6 Unless otherwise a special operating condition is specified in the follows during the testing.

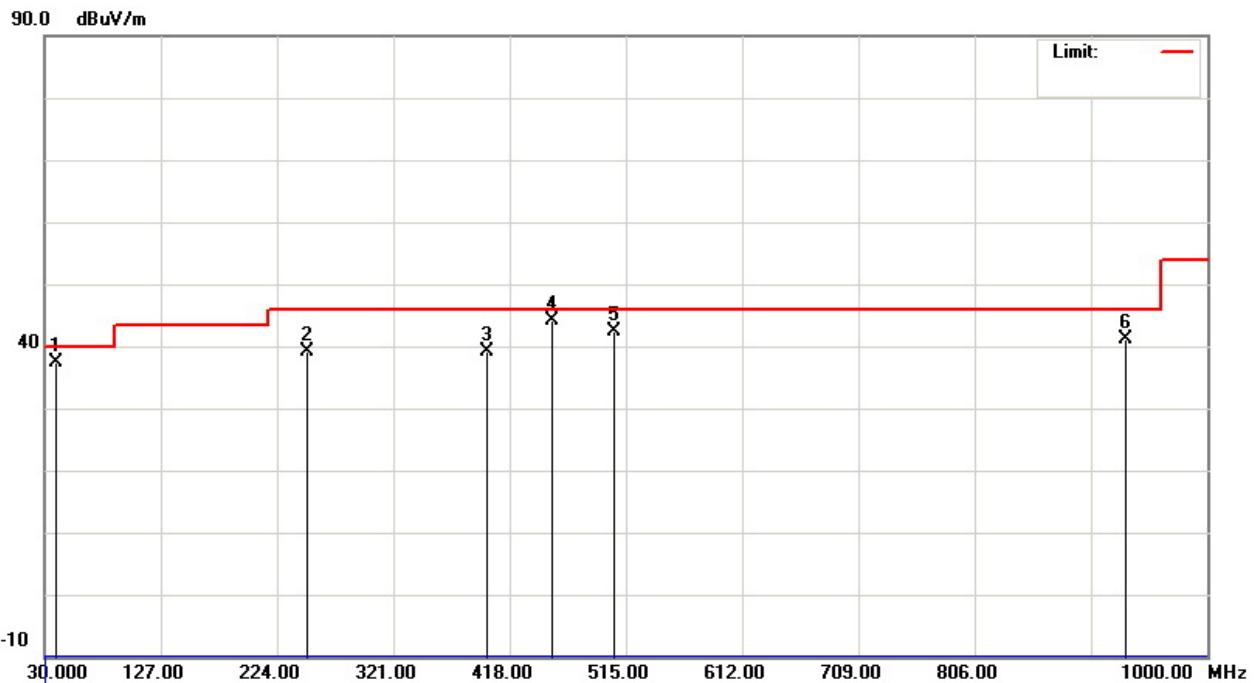
**4.2.7 TEST RESULTS- FCC PART 15.209**

| | | | |
|----------------|--------------------|---------------------|--------------|
| E.U.T : | Video T&A Terminal | Model Name : | MT650-AQUEAG |
| Temperature : | 25 °C | Relative Humidity : | 42% |
| Test Voltage : | AC 120V/60Hz | | |
| Test Mode : | TX | | |

| Freq. (MHz) | Ant.Pol. H/V | DetectorMode (PK/AV) | Reading (dBuV) | Ant./CL/ Amp. CF(dB) | Actual FS (dBuV/m) | Limit-3m (dBuV/m) | Safe Margins (dBuV/m) | Note |
|-------------|--------------|----------------------|----------------|----------------------|--------------------|-------------------|-----------------------|------|
| 39.7000 | V | Peak | 49.94 | - 12.45 | 37.49 | 40.00 | - 2.51 | (QP) |
| 249.2200 | V | Peak | 53.23 | - 14.14 | 39.09 | 46.00 | - 6.91 | |
| 398.6000 | V | Peak | 49.14 | - 10.09 | 39.05 | 46.00 | - 6.95 | |
| 452.9200 | V | Peak | 52.76 | - 8.71 | 44.05 | 46.00 | - 1.95 | (QP) |
| 505.3000 | V | Peak | 50.31 | - 7.90 | 42.41 | 46.00 | - 3.59 | |
| 932.1000 | V | Peak | 43.24 | - 2.17 | 41.07 | 46.00 | - 4.93 | |

Remark :

- (1) Reading in which marked as QP or Peak means measurements by using are Quasi-Peak Mode or Peak Mode with Detector BW=120KHz ; SPA setting in RBW=120KHz, VBW =120KHz, Swp. Time = 0.3 sec./MHz .
- (2) All readings are Peak unless otherwise stated QP in column of 『Note』 . Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn't perform .
- (3) Measuring frequency range from 30MHz to 1000MHz .
- (4) If the peak scan value lower limit more than 20dB, then this signal data does not how in table .



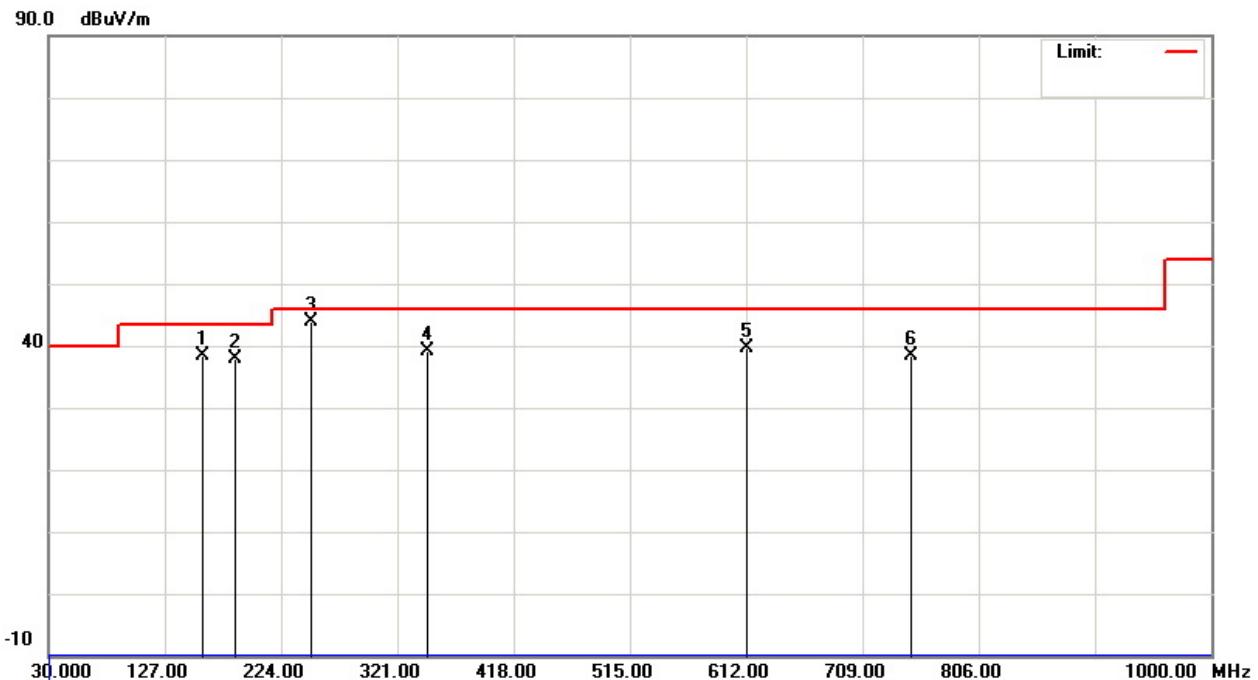


| | | | |
|----------------|--------------------|---------------------|--------------|
| E.U.T : | Video T&A Terminal | Model Name : | MT650-AQUEAG |
| Temperature : | 25 °C | Relative Humidity : | 42% |
| Test Voltage : | AC 120V/60Hz | | |
| Test Mode : | TX | | |

| Freq. (MHz) | Ant.Pol. H/V | DetectorMode (PK/AV) | Reading (dBuV) | Ant./CL/ Amp. CF(dB) | Actual FS (dBuV/m) | Limit-3m (dBuV/m) | Safe Margins (dBuV/m) | Note |
|-------------|--------------|----------------------|----------------|----------------------|--------------------|-------------------|-----------------------|------|
| 158.0400 | H | Peak | 51.58 | - 13.15 | 38.43 | 43.50 | - 5.07 | |
| 185.2000 | H | Peak | 53.31 | - 15.49 | 37.82 | 43.50 | - 5.68 | |
| 249.2200 | H | Peak | 58.12 | - 14.14 | 43.98 | 46.00 | - 2.02 | (QP) |
| 346.2200 | H | Peak | 50.64 | - 11.45 | 39.19 | 46.00 | - 6.81 | |
| 612.0000 | H | Peak | 45.36 | - 5.81 | 39.55 | 46.00 | - 6.45 | |
| 749.7400 | H | Peak | 41.87 | - 3.46 | 38.41 | 46.00 | - 7.59 | |

Remark :

- (1) Reading in which marked as QP or Peak means measurements by using are Quasi-Peak Mode or Peak Mode with Detector BW=120KHz ; SPA setting in RBW=120KHz, VBW =120KHz, Swp. Time = 0.3 sec./MHz .
- (2) All readings are Peak unless otherwise stated QP in column of 『Note』 . Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn't perform .
- (3) Measuring frequency range from 30MHz to 1000MHz .
- (4) If the peak scan value lower limit more than 20dB, then this signal data does not how in table .



**4.2.8 TEST RESULTS- FCC PART 15.225**

| | | | |
|----------------|--------------------|---------------------|--------------|
| E.U.T : | Video T&A Terminal | Model Name : | MT650-AQUEAG |
| Temperature : | 25 °C | Relative Humidity : | 36% |
| Test Voltage : | AC 120V/60Hz | | |
| Test Mode : | TX | | |

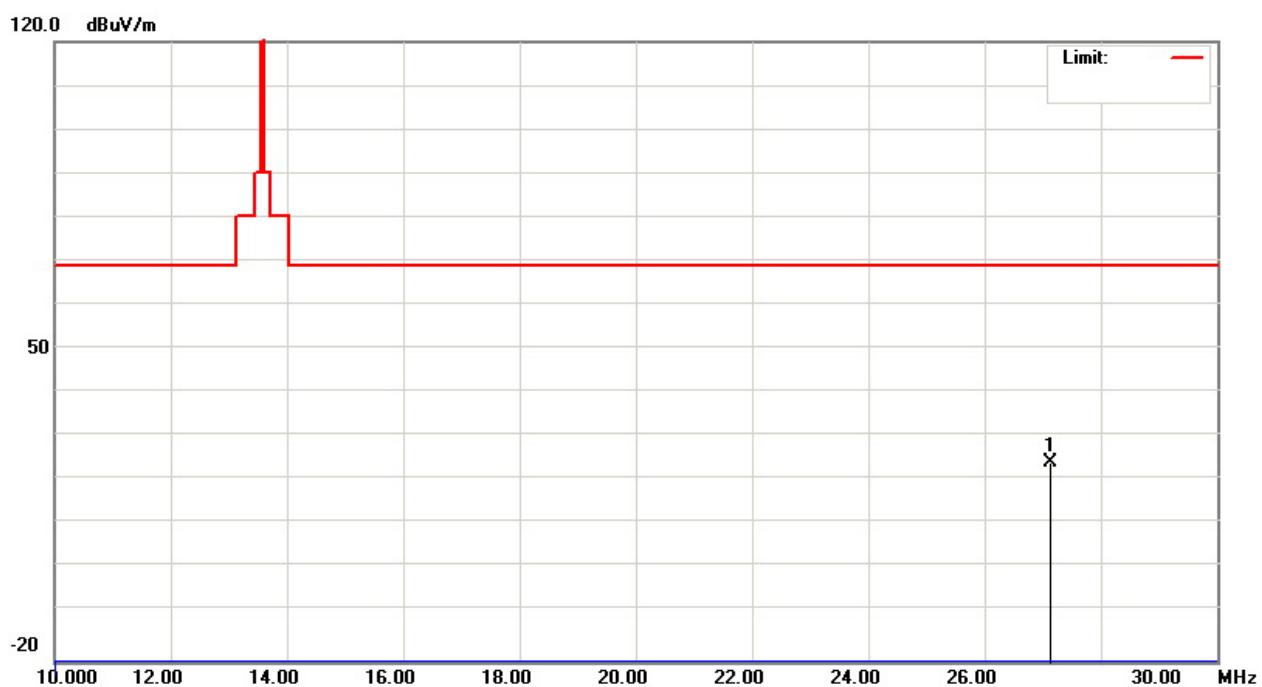
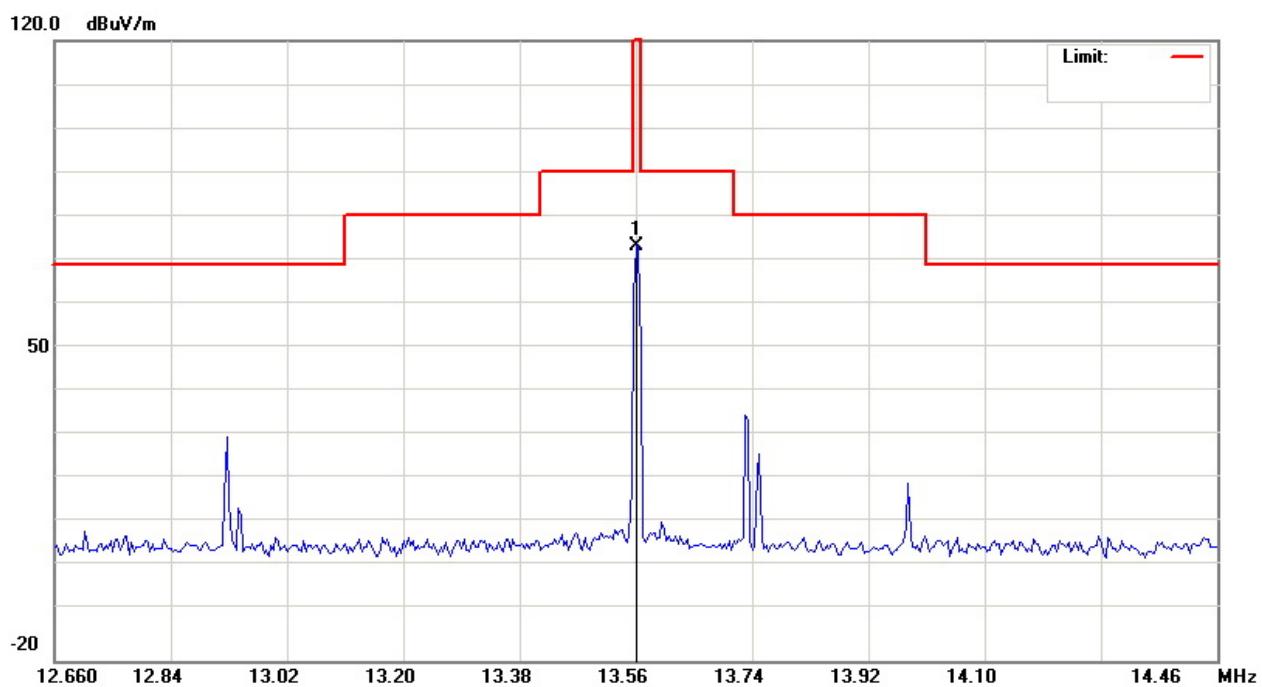
| Freq. (MHz) | DetectorMode (PK/AV) | Reading (dBuV) | Ant./CL/ Amp. CF(dB) | Actual FS (dBuV/m) | Limit-3m (dBuV/m) | Safe Margins (dBuV/m) | Note |
|----------------|-------------------------|-------------------|-------------------------|-----------------------|----------------------|--------------------------|------|
| 13.5600 | Peak | 63.06 | 10.62 | 73.68 | 124.00 | - 50.32 | |
| 27.1172 | Peak | 15.47 | 9.37 | 24.84 | 69.54 | - 44.70 | |

Remark :

- (1) Spectrum Setting:
9 KHz – 150 KHz, RBW= 1 KHz, VBW=1 KHz, Sweep time = 200 ms.
150 K Hz – 30 MHz, RBW= 9 KHz, VBW=9 KHz, Sweep time = 200 ms.
30 MHz – 1000 MHz, RBW= 100KHz, VBW=100KHz, Sweep time = 200 ms.
- (2) All readings are Peak unless otherwise stated QP in column of 『Note』 . Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn't perform .
- (3) The Log-Bicon Antenna will use to test frequency range from 30MHz to 1000MHz and the Loop Antenna will use to test frequency below 30MHz.
- (4) If the peak scan value lower limit more than 20dB, then this signal data does not how in table .



Neutron Engineering Inc.





4.3 FREQUENCY STABILITY MEASUREMENT

4.3.1 FREQUENCY STABILITY LIMITS

FCC Part 15.225(e)

the frequency tolerance of the carrier signal shall be maintained within +/-0.01% of the operating frequency over a temperature variation of -20 degrees to + 50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

4.3.2 MEASUREMENT INSTRUMENTS LIST

| Item | Kind of Equipment | Manufacturer | Type No. | Serial No. | Calibrated until |
|------|-------------------|--------------|----------|------------|------------------|
| 1 | Spectrum Analyzer | R&S | FSP-40 | 100129 | Aug. 31, 2011 |

Remark: " N/A" denotes No Model No. / Serial No. and No Calibration specified.

4.3.3 TEST PROCEDURE

- a. The equipment under test was connected to an external AC power supply and the RF output was connected to a frequency counter via feed through attenuators. The EUT was placed inside the temperature chamber.
After the temperature stabilized for approximately 20 minutes, the frequency of the output signal was recorded from the counter.
- b. At room temperature ($25\pm 5^{\circ}\text{C}$), an external variable AC power supply was connected to the EUT. The frequency of the transmitter was measured for 115%, 100% and 85% of the nominal operating input voltage.
- c. For the actual test configuration, please refer to the related Item –EUT Test Photos.

4.3.4 DEVIATION FROM TEST STANDARD

No deviation

4.3.5 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 4.1.6 Unless otherwise a special operating condition is specified in the follows during the testing.

**4.3.6 TEST RESULTS**

| | | | |
|----------------|--------------------|---------------------|--------------|
| E.U.T : | Video T&A Terminal | Model Name : | MT650-AQUEAG |
| Temperature : | 23 °C | Relative Humidity : | 50% |
| Test Voltage : | AC 120V/60Hz | | |
| Test Mode : | TX | | |

Frequency Stability Versus Environmental Temperature

| | Temperature (°C) | Voltage (Vac) | Frequency (MHz) | Freq Error (KHz) | Limit (KHz) | Results |
|--------|------------------|---------------|-----------------|------------------|-------------|---------|
| | 20 | 120V | 13.56060 | | | |
| 0 min | 50 | 120V | 13.56062 | 0.020 | +/- 1.356 | PASS |
| | -20 | 120V | 13.56034 | -0.260 | +/- 1.356 | PASS |
| 2 min | 50 | 120V | 13.56062 | 0.020 | +/- 1.356 | PASS |
| | -20 | 120V | 13.56034 | -0.260 | +/- 1.356 | PASS |
| 5 min | 50 | 120V | 13.56064 | 0.040 | +/- 1.356 | PASS |
| | -20 | 120V | 13.56030 | -0.300 | +/- 1.356 | PASS |
| 10 min | 50 | 120V | 13.56064 | 0.040 | +/- 1.356 | PASS |
| | -20 | 120V | 13.56030 | -0.300 | +/- 1.356 | PASS |

Frequency Stability Versus Input Voltage

| Temperature (°C) | Voltage (Vac) | | Frequency (MHz) | Freq Error (KHz) | Limit (KHz) | Results |
|------------------|---------------|--|-----------------|------------------|-------------|-----------|
| 20 | V-nom | | 120 | 13.56060 | | |
| 20 | V-min | | 102 | 13.56060 | 0 | +/- 1.356 |
| 20 | V-max | | 138 | 13.56060 | 0 | +/- 1.356 |