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# FCC TEST REPORT (RFID/NFC)

**REPORT NO.:** RF120823C14-9

**MODEL NO.:** F-03E

**FCC ID:** VQK-F03E

**RECEIVED:** Aug. 23, 2012

**TESTED:** Oct. 04 ~ Oct. 05, 2012

**ISSUED:** Oct. 09, 2012

**APPLICANT:** FUJITSU LIMITED

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**ISSUED BY:** Bureau Veritas Consumer Products Services (H.K.)  
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## RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF120823C14-9	Original release	Oct. 09, 2012



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## 1. CERTIFICATION

**PRODUCT:** Mobile Phone

**MODEL NO.:** F-03E

**BRAND:** NTT DOCOMO

**APPLICANT:** FUJITSU LIMITED

**TEST SAMPLE:** ENGINEERING SAMPLE

**TESTED:** Oct. 04 ~ Oct. 05, 2012

**STANDARDS:** FCC Part 15, Subpart C (Section 15.225)

FCC Part 15, Subpart C (Section 15.215)

ANSI C63.10-2009

The above equipment (model: F-03E) has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

**PREPARED BY** :  , DATE: Oct. 09, 2012  
Pettie Chen / Senior Specialist

**APPROVED BY** :  , DATE: Oct. 09, 2012  
Ken Liu / Manager



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## 2. SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC PART 15, SUBPART C (SECTION 15.225, 15.215)			
STANDARD SECTION	TEST TYPE AND LIMIT	RESULT	REMARK
15.207	Conducted emission test	NA	Power supply is 3.8Vdc from battery
15.225 (a)	The field strength of any emissions within the band 13.553-13.567 MHz	PASS	Meet the requirement of limit. Minimum passing margin is -74.7dB at 13.56MHz.
15.225 (d)	The field strength of any emissions appearing outside of the 13.110-14.010 MHz band	PASS	Meet the requirement of limit. Minimum passing margin is -3.00dB at 66.84MHz.
15.225 (e)	The frequency tolerance	PASS	Meet the requirement of limit.
15.215 (c)	20dB Bandwidth	PASS	Meet the requirement of limit.

### 2.1 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

MEASUREMENT	FREQUENCY	UNCERTAINTY
Radiated emissions	30MHz ~ 200MHz	3.34 dB
	200MHz ~1000MHz	3.35 dB

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.



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### 3. GENERAL INFORMATION

#### 3.1 GENERAL DESCRIPTION OF EUT

<b>EUT</b>	Mobile Phone
<b>MODEL NO.</b>	F-03E
<b>POWER SUPPLY</b>	5.1Vdc (adapter or host equipment) 3.8Vdc (battery)
<b>MODULATION TYPE</b>	ASK
<b>OPERATING FREQUENCY</b>	13.56MHz
<b>ANTENNA TYPE</b>	Loop antenna
<b>DATA CABLE</b>	Refer to Note as below
<b>I/O PORTS</b>	Refer to user's manual
<b>ACCESSORY DEVICES</b>	Refer to Note as below

**NOTE:**

1. The EUT contains following accessory and components.

ITEM	BRAND	MODEL	SPECIFICATION
Battery	FUJITSU	F29	Rating: 3.8Vdc, 1810mAh Type: Li-ion
LCD Panel	JDI	GCX162BLP-7	--
Photo Camera	ALTEK	AOA0803	--
Video Camera	ALTEK	ASF0104	--

2. The following accessories are for support units only.

ITEM	BRAND	MODEL	SPECIFICATION
Adapter	Motorola	DC4050US0301	Input: 100-240Vac, 50/60Hz, 0.2A Output: 5.1Vdc, 850mA
USB cable	Motorola	NA	1.0m

3. SW version is LYDV01R13Ge
4. HW version is DVT2.
5. IMEI code: 353737050011550
6. The above EUT information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or User's Manual.



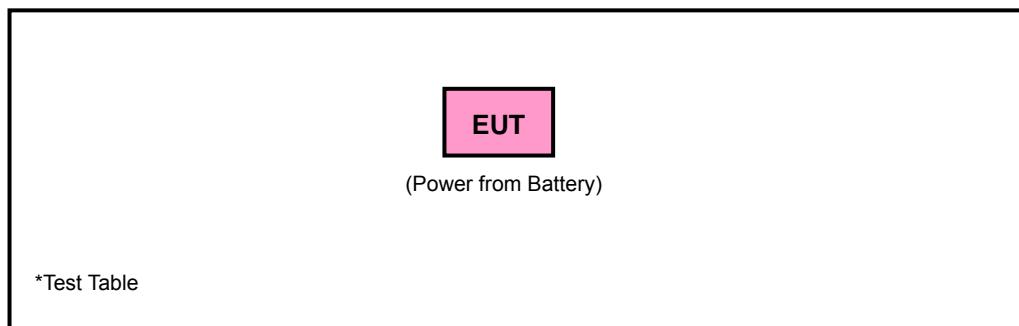
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### 3.2 DESCRIPTION OF TEST MODES

The EUT only have one channel.

CHANNEL	FREQUENCY (MHz)
1	13.56

#### 3.2.1 CONFIGURATION OF SYSTEM UNDER TEST





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### 3.2.2 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

EUT CONFIGURE MODE	APPLICABLE TO				DESCRIPTION
	RE	PLC	FS	BW	
A	✓	-	✓	✓	RFID function
B	✓	-	✓	✓	NFC function

Where RE: Radiated Emission

PLC: Power Line Conducted Emission

FS: Frequency Stability

BW: 20dB Bandwidth

**NOTE 1:**

The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on Y-plane.

**NOTE 2:** No need to concern of Conducted Emission due to the EUT is powered by battery.

**RADIATED EMISSION TEST:**

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE
A	1	1	ASK
B	1	1	ASK

**POWER LINE CONDUCTED EMISSION TEST:**

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE
A	1	1	ASK
B	1	1	ASK

**FREQUENCY STABILITY:**

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE
A	1	1	ASK
B	1	1	ASK



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#### 20dB BANDWIDTH:

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE
A	1	1	ASK
B	1	1	ASK

#### TEST CONDITION:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE	25deg. C, 65%RH	3.8Vdc	Chris Lin
FT	25deg. C, 65%RH	3.8Vdc	Mark Liao
BW	20deg. C, 45%RH	3.8Vdc	Chris Lin

### 3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is a RFID Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

**FCC Part 15, Subpart C (15.225)**

**FCC Part 15, Subpart C (15.215)**

ANSI C63.10-2009

All test items have been performed and recorded as per the above standards.

**NOTE:** The EUT is also considered as a kind of computer peripheral, because the connection to computer is necessary for typical use. It has been verified to comply with the requirements of FCC Part 15, Subpart B, Class B. The test report has been issued separately.

### 3.4 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit.



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## 4. TEST TYPES AND RESULTS

### 4.1 RADIATED EMISSION MEASUREMENT

#### 4.1.1 LIMITS OF RADIATED EMISSION MEASUREMENT

The field strength of any emissions within the band 13.553-13.567 MHz shall not exceed 15,848 microvolts/meter at 30 meters.

The field strength of any emissions appearing outside of the 13.110-14.010 MHz band shall not exceed the general radiated emission limits in § 15.209.

FREQUENCIES (MHz)	FIELD STRENGTH (microvolts/meter)	MEASUREMENT DISTANCE (meters)
0.009 ~ 0.490	2400/F(kHz)	300
0.490 ~ 1.705	24000/F(kHz)	30
1.705 ~ 30.0	30	30
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

**NOTE:**

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dB<sub>u</sub>V/m) = 20 log Emission level (uV/m).
3. As shown in 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.



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#### 4.1.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Test Receiver ROHDE & SCHWARZ	ESIB7	100212	Aug. 06, 2012	Aug. 05, 2013
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100039	Feb. 03, 2012	Feb. 02, 2013
BILOG Antenna SCHWARZBECK	VULB9168	9168-160	Apr. 06, 2012	Apr. 05, 2013
HORN Antenna SCHWARZBECK	9120D	209	Sep. 03, 2012	Sep. 02, 2013
HORN Antenna SCHWARZBECK	BBHA 9170	148	Jul. 11, 2012	Jul. 10, 2013
Loop Antenna	HFH2-Z2	100070	Jan. 31, 2012	Jan. 30, 2014
Preamplifier Agilent	8447D	2944A10633	Oct. 29, 2011	Oct. 28, 2012
Preamplifier Agilent	8449B	3008A01964	Oct. 29, 2011	Oct. 28, 2012
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	250723/4	Aug. 28, 2012	Aug. 27, 2013
RF signal cable HUBER+SUHNNER	SUCOFLEX 106	12738/6+309224/4	Aug. 28, 2012	Aug. 27, 2013
Software ADT.	ADT_Radiated_V7.6.15.9.2	NA	NA	NA
Antenna Tower inn-co GmbH	MA 4000	013303	NA	NA
Antenna Tower Controller inn-co GmbH	CO2000	017303	NA	NA
Turn Table ADT.	TT100	TT93021703	NA	NA
Turn Table Controller ADT.	SC100	SC93021703	NA	NA

**NOTE:**

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The calibration interval of the loop antenna is 24 months and the calibrations are traceable to NML/ROC and NIST/USA.
3. The test was performed in HwaYa Chamber 3.
4. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
5. The FCC Site Registration No. is 988962.
6. The IC Site Registration No. is IC 7450F-3.



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#### 4.1.3 TEST PROCEDURES

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. If the emission level of the EUT in peak mode was lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

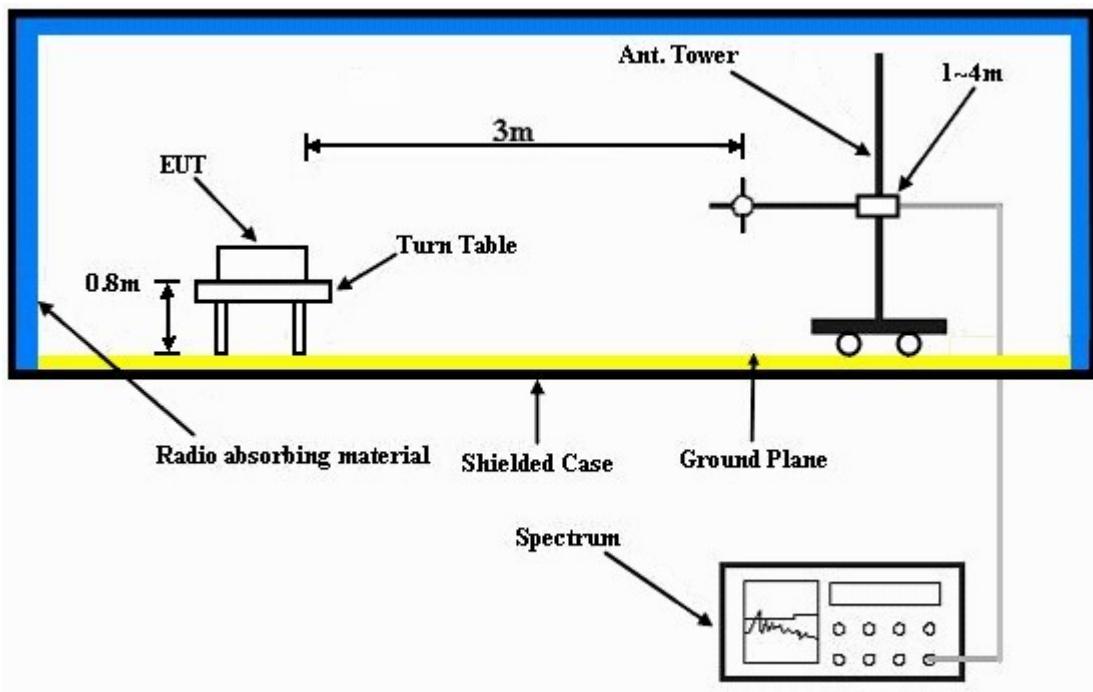
**NOTE:**

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz.
3. All modes of operation were investigated and the worst-case emissions are reported.

#### 4.1.4 DEVIATION FROM TEST STANDARD

No deviation.

#### 4.1.5 TEST SETUP



For the actual test configuration, please refer to the attached file (Test Setup Photo).

#### 4.1.6 EUT OPERATING CONDITIONS

Set the EUT under transmission condition continuously at specific channel frequency.



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#### 4.1.7 TEST RESULTS

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 1	FREQUENCY RANGE	13.553 ~ 13.567MHz
INPUT POWER	3.8Vdc	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Chris Lin
TEST MODE	A		

ANTENNA POLARITY & TEST DISTANCE: LOOP ANTENNA OPEN AT 3m								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	13.56	49.3	124.0	-74.7	1.00	63	29.5	19.8

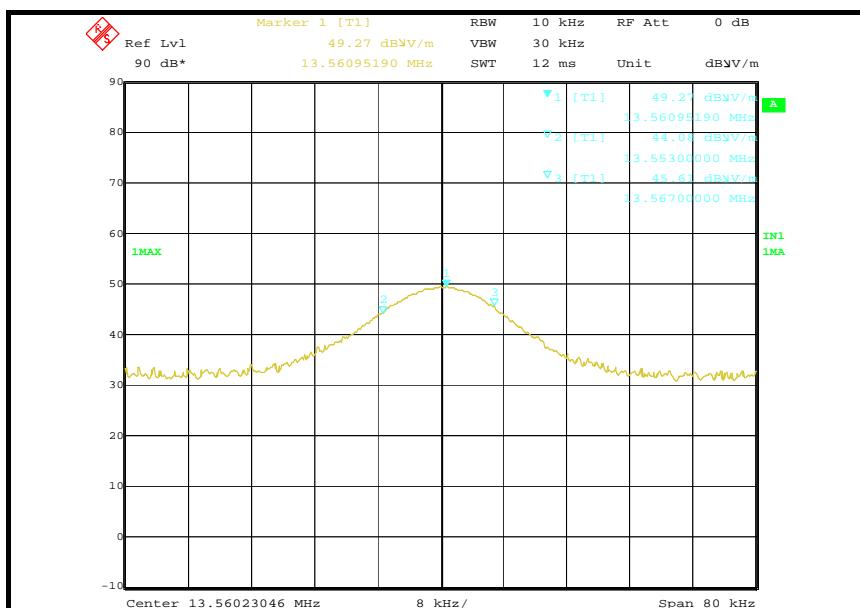
**REMARKS:**

1. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. Above limits have been translated by the formula

The measured field strength was extrapolated to distance 30 meters, using the formula that the limit of field strength varies as the inverse distance square (40dB per decade of distance)

Example:

$$\begin{aligned}13.56\text{MHz} &= 15848\text{uV/m} & 30\text{m} \\ &= 84\text{dBuV/m} & 30\text{m} \\ &= 84+20\log(30/3)^2 & 3\text{m} \\ &= 124\text{dBuV/m}\end{aligned}$$





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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 1	FREQUENCY RANGE	13.553 ~ 13.567MHz
INPUT POWER	3.8Vdc	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Chris Lin
TEST MODE	A		

ANTENNA POLARITY & TEST DISTANCE: LOOP ANTENNA CLOSE AT 3m								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	13.56	47.0	124.0	-77.0	1.00	169	27.2	19.8

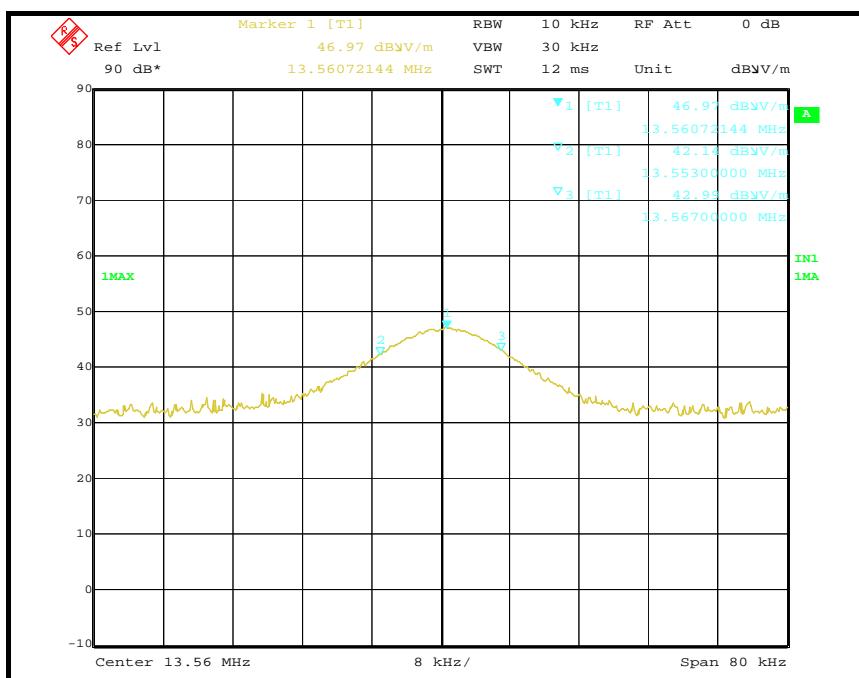
**REMARKS:**

1. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. Above limits have been translated by the formula

The measured field strength was extrapolated to distance 30 meters, using the formula that the limit of field strength varies as the inverse distance square (40dB per decade of distance)

Example:

$$\begin{aligned}
 13.56\text{MHz} &= 15848\text{uV/m} & 30\text{m} \\
 &= 84\text{dBuV/m} & 30\text{m} \\
 &= 84+20\log(30/3)^2 & 3\text{m} \\
 &= 124\text{dBuV/m}
 \end{aligned}$$





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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 1	FREQUENCY RANGE	
INPUT POWER	3.8Vdc	DETECTOR FUNCTION	
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	
TEST MODE	B		

ANTENNA POLARITY & TEST DISTANCE: LOOP ANTENNA OPEN AT 3m								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	13.56	49.2	124.0	-74.8	1.00	79	29.4	19.8

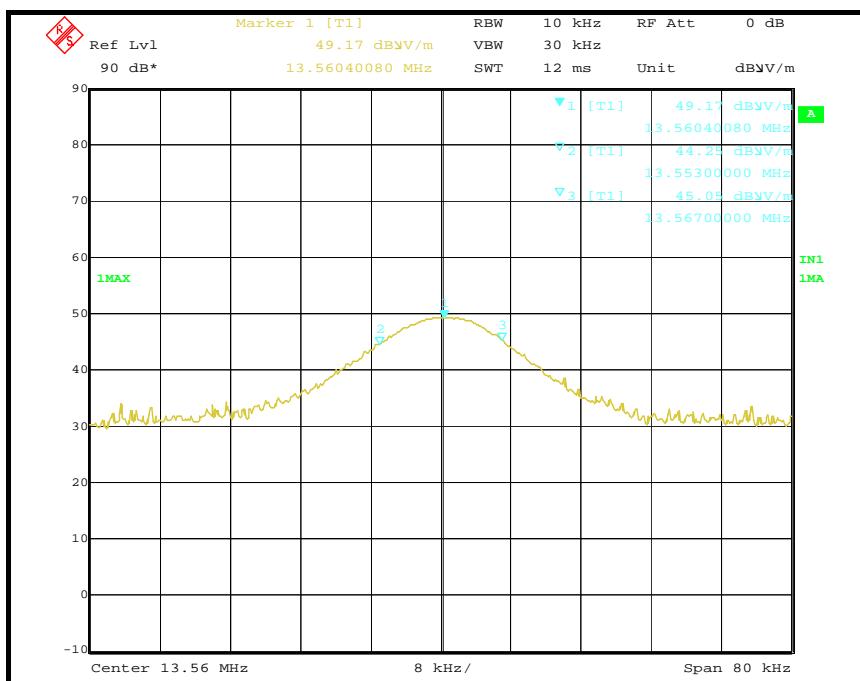
**REMARKS:**

1. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. Above limits have been translated by the formula

The measured field strength was extrapolated to distance 30 meters, using the formula that the limit of field strength varies as the inverse distance square (40dB per decade of distance)

Example:

$$\begin{aligned}
 13.56\text{MHz} &= 15848\text{uV/m} & 30\text{m} \\
 &= 84\text{dBuV/m} & 30\text{m} \\
 &= 84+20\log(30/3)^2 & 3\text{m} \\
 &= 124\text{dBuV/m}
 \end{aligned}$$





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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 1	FREQUENCY RANGE	13.553 ~ 13.567MHz
INPUT POWER	3.8Vdc	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Chris Lin
TEST MODE	B		

ANTENNA POLARITY & TEST DISTANCE: LOOP ANTENNA CLOSE AT 3m								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	13.56	46.7	124.0	-77.3	1.00	180	26.9	19.8

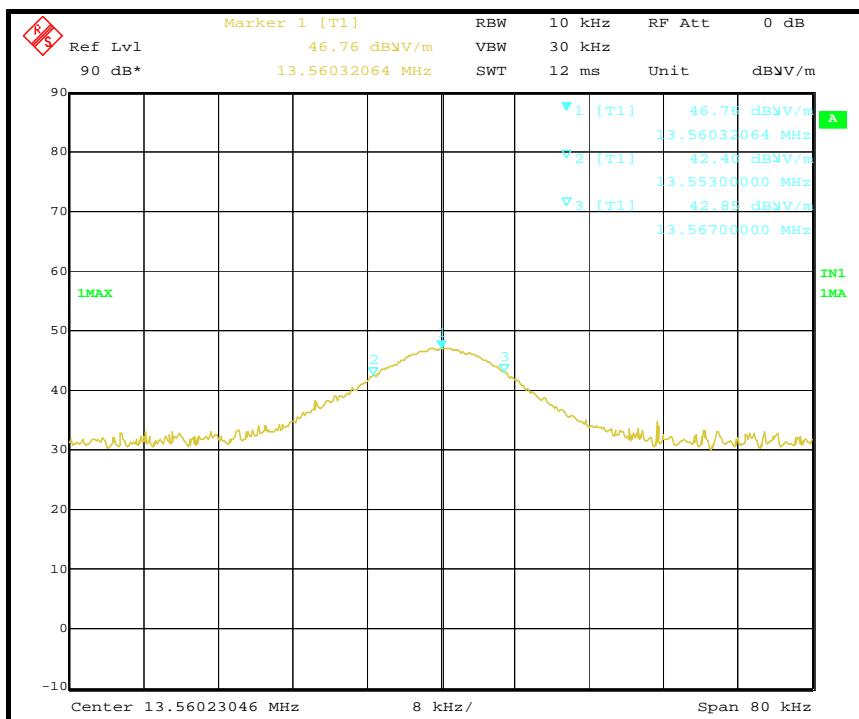
**REMARKS:**

1. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. Above limits have been translated by the formula

The measured field strength was extrapolated to distance 30 meters, using the formula that the limit of field strength varies as the inverse distance square (40dB per decade of distance)

Example:

$$\begin{aligned}
 13.56\text{MHz} &= 15848\text{uV/m} & 30\text{m} \\
 &= 84\text{dBuV/m} & 30\text{m} \\
 &= 84+20\log(30/3)^2 & 3\text{m} \\
 &= 124\text{dBuV/m}
 \end{aligned}$$





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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 1	FREQUENCY RANGE	Below 30MHz
INPUT POWER	3.8Vdc	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Chris Lin
TEST MODE	A		

ANTENNA POLARITY & TEST DISTANCE: LOOP ANTENNA OPEN AT 3m								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	27.120	32.5	69.5	-37.0	1.00	108	12.2	20.3
ANTENNA POLARITY & TEST DISTANCE: LOOP ANTENNA CLOSE AT 3m								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	27.120	32.5	69.5	-37.0	1.00	115	12.2	20.3

**REMARKS:**

1. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.



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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 1	FREQUENCY RANGE	Below 30MHz
INPUT POWER	3.8Vdc	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Chris Lin
TEST MODE	B		

ANTENNA POLARITY & TEST DISTANCE: LOOP ANTENNA OPEN AT 3m								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	27.120	32.5	69.5	-37.0	1.00	152	12.2	20.3
ANTENNA POLARITY & TEST DISTANCE: LOOP ANTENNA CLOSE AT 3m								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	27.120	32.4	69.5	-37.1	1.00	108	12.1	20.3

**REMARKS:**

1. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.



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EUT TEST CONDITION		MEASUREMENT DETAIL		
CHANNEL		Channel 1		FREQUENCY RANGE
INPUT POWER		3.8Vdc		DETECTOR FUNCTION
ENVIRONMENTAL CONDITIONS		25deg. C, 65%RH		TESTED BY
TEST MODE		A		Chris Lin

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	121.28	23.00 QP	43.50	-20.50	1.50 H	218	11.10	11.90
2	407.09	21.30 QP	46.00	-24.70	1.50 H	7	3.60	17.70
3	517.92	20.40 QP	46.00	-25.60	2.00 H	213	0.10	20.30
4	603.47	20.80 QP	46.00	-25.20	1.24 H	6	-1.40	22.20
5	735.68	22.90 QP	46.00	-23.10	2.00 H	13	-1.00	23.90
6	865.94	25.70 QP	46.00	-20.30	1.24 H	324	-0.70	26.40
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	39.62	28.90 QP	40.00	-11.10	1.00 V	358	15.30	13.60
2	121.28	28.70 QP	43.50	-14.80	1.99 V	99	16.80	11.90
3	166.00	24.40 QP	43.50	-19.10	1.00 V	60	10.60	13.80
4	232.11	26.60 QP	46.00	-19.40	1.00 V	73	14.30	12.30
5	335.15	28.80 QP	46.00	-17.20	1.50 V	45	12.90	15.90
6	432.37	28.50 QP	46.00	-17.50	1.50 V	138	10.20	18.30

**REMARKS:**

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.



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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 1	FREQUENCY RANGE	Below 1000MHz
INPUT POWER	3.8Vdc	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Chris Lin
TEST MODE	B		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	121.28	23.00 QP	43.50	-20.50	1.50 H	218	11.10	11.90
2	329.32	17.00 QP	46.00	-29.00	2.00 H	349	1.30	15.70
3	517.92	20.40 QP	46.00	-25.60	2.00 H	213	0.10	20.30
4	655.96	22.50 QP	46.00	-23.50	1.24 H	6	-0.10	22.60
5	786.23	24.00 QP	46.00	-22.00	1.24 H	6	-1.30	25.30
6	897.05	26.80 QP	46.00	-19.20	2.00 H	13	0.00	26.80
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	66.84	37.00 QP	40.00	-3.00	1.00 V	215	24.30	12.70
2	232.11	26.60 QP	46.00	-19.40	1.00 V	73	14.30	12.30
3	335.15	28.80 QP	46.00	-17.20	1.50 V	45	12.90	15.90
4	432.37	28.50 QP	46.00	-17.50	1.50 V	138	10.20	18.30
5	624.85	27.30 QP	46.00	-18.70	1.00 V	153	5.00	22.30
6	916.50	27.00 QP	46.00	-19.00	1.50 V	67	0.00	27.00

**REMARKS:**

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.



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## 4.2 FREQUENCY STABILITY

### 4.2.1 LIMITS OF FREQUENCY STABILITY MEASUREMENT

The frequency tolerance of the carrier signal shall be maintained within +/- 0.01% of the operating frequency over a temperature variation of -10 degrees to 55 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 90% to 110% of the rated supply voltage at a temperature of 20 degrees C.

### 4.2.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
SPECTRUM ANALYZER R&S	FSP40	100040	Jul. 16, 2012	Jul. 15, 2013
WIT STANDARD TEMPERATURE AND HUMIDITY CHAMBER	TH-4S-C	W981030	Jun. 13, 2012	Jun. 12, 2013

**NOTE:** The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

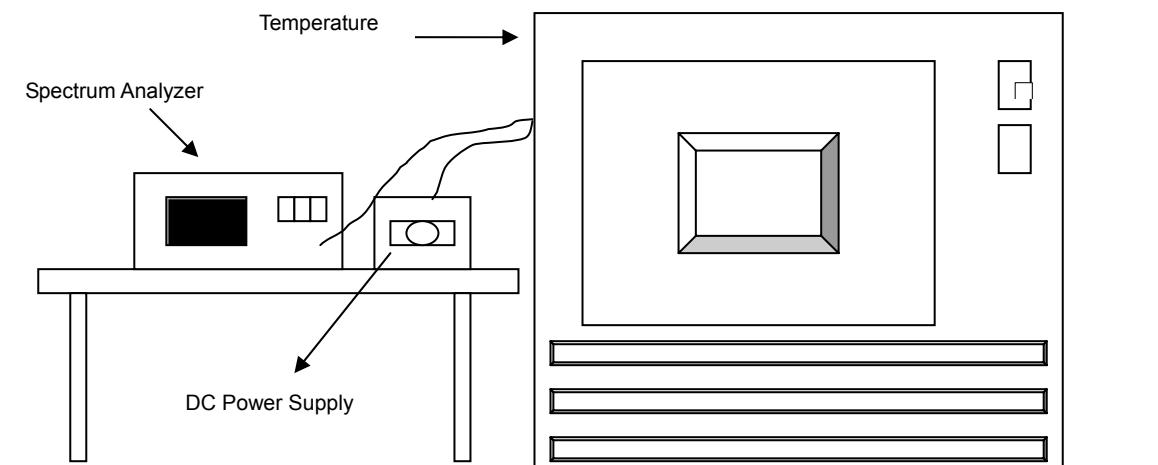
### 4.2.3 TEST PROCEDURE

- a. The EUT was placed inside the environmental test chamber and powered by nominal DC voltage.
- b. Turn the EUT on and couple its output to a spectrum analyzer.
- c. Turn the EUT off and set the chamber to the highest temperature specified.
- d. Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize, turn the EUT on and measure the operating frequency after 2, 5, and 10 minutes.
- e. Repeat step 2 and 3 with the temperature chamber set to the lowest temperature.
- f. The test chamber was allowed to stabilize at +20 degree C for a minimum of 30 minutes. The supply voltage was then adjusted on the EUT from 85% to 115% and the frequency record.

#### 4.2.4 DEVIATION FROM TEST STANDARD

No deviation.

#### 4.2.5 TEST SETUP



#### 4.2.6 EUT OPERATING CONDITION

Same as Item 4.1.6.



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#### 4.2.7 TEST RESULTS

TEST MODE	A
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FREQUEMCY STABILITY VERSUS TEMP.									
TEMP. (°C)	POWER SUPPLY (Vdc)	0 MINUTE		2 MINUTE		5 MINUTE		10 MINUTE	
		Measured Frequency	Frequency Drift	Measured Frequency	Frequency Drift	Measured Frequency	Frequency Drift	Measured Frequency	Frequency Drift
		(MHz)	%	(MHz)	%	(MHz)	%	(MHz)	%
55	3.8	13.559715	-0.0020997	13.559725	-0.0020280	13.559749	-0.0018520	13.559721	-0.0020575
50	3.8	13.559706	-0.0021677	13.559704	-0.0021829	13.559713	-0.0021178	13.559745	-0.0018805
40	3.8	13.559783	-0.0015990	13.559787	-0.0015708	13.559797	-0.0014980	13.559816	-0.0013569
30	3.8	13.559794	-0.0015185	13.559791	-0.0015413	13.559772	-0.0016781	13.559795	-0.0015118
20	3.8	13.559766	-0.0017226	13.559779	-0.0016298	13.559785	-0.0015826	13.559768	-0.0017109
10	3.8	13.559798	-0.0014873	13.559825	-0.0012906	13.559811	-0.0013925	13.559828	-0.0012684
0	3.8	13.559780	-0.0016210	13.559821	-0.0013201	13.559799	-0.0014844	13.559772	-0.0016814
-10	3.8	13.559839	-0.0011896	13.559854	-0.0010767	13.559875	-0.0009233	13.559884	-0.0008555

FREQUEMCY STABILITY VERSUS VOLTAGE									
TEMP. (°C)	POWER SUPPLY (Vac)	0 MINUTE		2 MINUTE		5 MINUTE		10 MINUTE	
		Measured Frequency	Frequency Drift	Measured Frequency	Frequency Drift	Measured Frequency	Frequency Drift	Measured Frequency	Frequency Drift
		(MHz)	%	(MHz)	%	(MHz)	%	(MHz)	%
20	3.8	13.559766	-0.0017226	13.559779	-0.0016298	13.559785	-0.0015826	13.559768	-0.0017109
	4.18	13.559764	-0.0017405	13.559784	-0.0015929	13.559779	-0.0016315	13.559781	-0.0016150
	3.42	13.559724	-0.0020324	13.559734	-0.0019617	13.559751	-0.0018374	13.559729	-0.0019985

**TEST MODE****B****FREQUEMCY STABILITY VERSUS TEMP.**

TEMP. (°C)	POWER SUPPLY (Vdc)	0 MINUTE		2 MINUTE		5 MINUTE		10 MINUTE	
		Measured Frequency	Frequency Drift	Measured Frequency	Frequency Drift	Measured Frequency	Frequency Drift	Measured Frequency	Frequency Drift
		(MHz)	%	(MHz)	%	(MHz)	%	(MHz)	%
55	3.8	13.559705	-0.0021720	13.559729	-0.0019979	13.559711	-0.0021297	13.559720	-0.0020648
50	3.8	13.559716	-0.0020958	13.559703	-0.0021880	13.559745	-0.0018788	13.559712	-0.0021274
40	3.8	13.559757	-0.0017948	13.559756	-0.0018012	13.559746	-0.0018713	13.559800	-0.0014744
30	3.8	13.559753	-0.0018192	13.559758	-0.0017825	13.559767	-0.0017204	13.559750	-0.0018462
20	3.8	13.559746	-0.0018716	13.559738	-0.0019331	13.559756	-0.0018029	13.559744	-0.0018849
10	3.8	13.559782	-0.0016087	13.559801	-0.0014672	13.559757	-0.0017930	13.559780	-0.0016257
0	3.8	13.559761	-0.0017608	13.559759	-0.0017736	13.559758	-0.0017880	13.559745	-0.0018771
-10	3.8	13.559801	-0.0014655	13.559835	-0.0012197	13.559826	-0.0012837	13.559816	-0.0013583

**FREQUEMCY STABILITY VERSUS VOLTAGE**

TEMP. (°C)	POWER SUPPLY (Vac)	0 MINUTE		2 MINUTE		5 MINUTE		10 MINUTE	
		Measured Frequency	Frequency Drift	Measured Frequency	Frequency Drift	Measured Frequency	Frequency Drift	Measured Frequency	Frequency Drift
		(MHz)	%	(MHz)	%	(MHz)	%	(MHz)	%
20	3.8	13.559746	-0.0018716	13.559738	-0.0019331	13.559756	-0.0018029	13.559744	-0.0018849
	4.18	13.559759	-0.0017754	13.559737	-0.0019400	13.559763	-0.0017501	13.559796	-0.0015025
	3.42	13.559722	-0.0020527	13.559757	-0.0017928	13.559735	-0.0019563	13.559750	-0.0018412



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## 4.3 20dB BANDWIDTH

### 4.3.1 LIMITS OF 20dB BANDWIDTH MEASUREMENT

The 20dB bandwidth shall be specified in operating frequency band.

### 4.3.2 TEST INSTRUMENTS

Same as Item 4.1.2.

### 4.3.3 TEST PROCEDURE

The bandwidth of the fundamental frequency was measured by spectrum analyzer with 1kHz RBW and 1kHz VBW. The 20dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 20dB.

### 4.3.4 DEVIATION FROM TEST STANDARD

No deviation.

### 4.3.5 TEST SETUP

Same as Item 4.1.5.

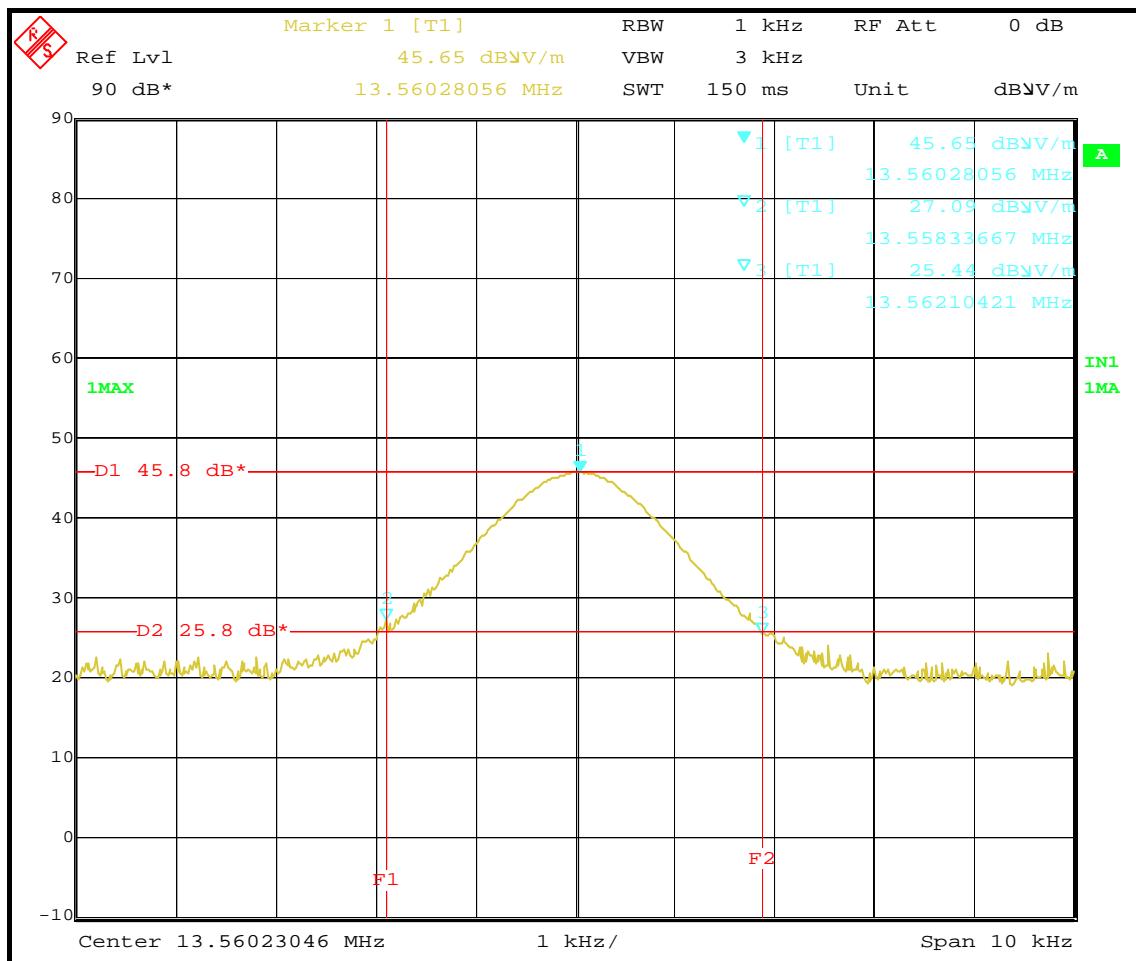
### 4.3.6 EUT OPERATING CONDITION

Same as Item 4.1.6.

#### 4.3.7 TEST RESULTS

TEST MODE	A
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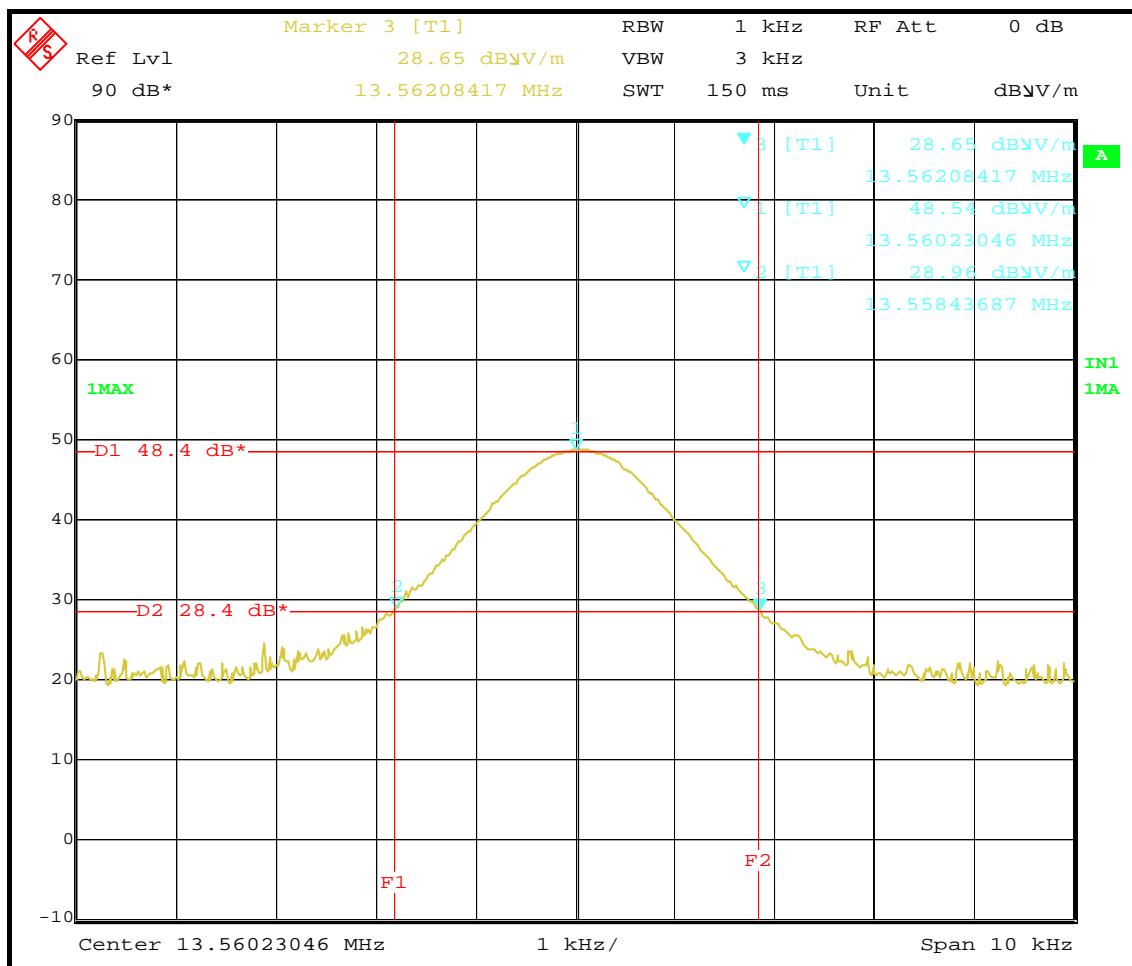
20dBc point (Low)	20dBc point (HIGH)	Operating frequency band (MHz)	PASS/FAIL
13.558 MHz	13.562 MHz	13.553~13.567	PASS



## TEST MODE

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20dBc point (Low)	20dBc point (HIGH)	Operating frequency band (MHz)	PASS/FAIL
13.558 MHz	13.562 MHz	13.553~13.567	PASS





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## 5. PHOTOGRAPHS OF THE TEST CONFIGURATION

Please refer to the attached file (Test Setup Photo).



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## 6. INFORMATION ON THE TESTING LABORATORIES

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following:

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**Web Site:** [www.bureauveritas-adt.com](http://www.bureauveritas-adt.com)

The address and road map of all our labs can be found in our web site also.



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## **7. APPENDIX A - MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB**

No any modifications are made to the EUT by the lab during the test.

**--- END ---**