

FCC&IC Radio Test Report

FCC ID: SEP-CORE

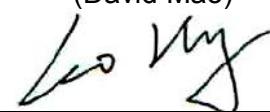
IC: 20477-CORE

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

Project No. : 1503C019
Equipment : Wireless Speaker System
Model Name : Core
Applicant for FCC : MASS FIDELITY
Address for FCC : 326 Adeliade Street West suite 400 Toronto ON M5V 1R3 Canada
Applicant for IC : Mass Fidelity Inc.
Address for IC : 326 Adeliade Street West Toronto ON M5V 1R3 Canada

Date of Receipt : Mar. 05, 2015
Date of Test : Mar. 05, 2015 ~ Jun. 25, 2015
Issued Date : Jun. 26, 2015
Tested by : BTL Inc.

Testing Engineer : 
(David Mao)

Technical Manager : 
(Leo Hung)

Authorized Signatory : 
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Declaration

BTL 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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Limitation

For the use of the authority's logo is limited unless the Test Standard(s)/Scope(s)/Item(s) mentioned in this test report is (are) included in the conformity assessment authorities acceptance respective.

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REPORT ISSUED HISTORY

Issued No.	Description	Issued Date
BTL-FICP-2-1503C019	Original Issue.	Jun. 26, 2015

1. CERTIFICATION

Equipment : Wireless Speaker System
Brand Name : massFIDELITY
Model Name : Core
Applicant for : MASS FIDELITY
FCC
Applicant for : Mass Fidelity Inc.
IC
Manufacturer : MASS FIDELITY
for FCC
Address for : 326 Adelaide Street West suite 400 Toronto ON M5V 1R3 Canada
FCC
Manufacturer : Mass Fidelity Inc.
for IC
Address for : 326 Adelaide Street West Toronto ON M5V 1R3 Canada
IC
Factory : ZHONG SHAN CITY LI TAI ELECTRONIC INSTUDRIAL CO.,LTD
Address : No.3 Industrial Park, Wuguishan Town, Zhongshan, Guangdong, China
Date of Test : Mar. 05, 2015 ~ Jun. 25, 2015
Test Sample : Engineering Sample
Standard(s) : FCC Part15, Subpart C:2014 (15.247) / ANSI C63.10-2013
Canada RSS-247 Issue 1, May 2015
RSS-GEN Issue 4, Nov 2014

The above equipment has been tested and found compliance with the requirement of the relative standards by BTL Inc.

The test data, data evaluation, and equipment configuration contained in our test report (Ref No. BTL-FICP-2-1503C019) were obtained utilizing the test procedures, test instruments, test sites that has been accredited by the Authority of TAF according to the ISO-17025 quality assessment standard and technical standard(s).

2. SUMMARY OF TEST RESULTS

Test procedures according to the technical standard(s):

Applied Standard(s): FCC Part15 (15.247) , Subpart C Canada RSS-247 Issue 1, May 2015; RSS-GEN Issue 4, Nov 2014				
Standard(s)	Section	Test Item	Judgment	Remark
15.207	RSS-GEN 8.8	Conducted Emission	PASS	
15.247(d)	RSS-247 5.5	Antenna conducted Spurious Emission	PASS	
15.247(a)(2)	RSS-247 5.2 (1)	6dB Bandwidth	PASS	
15.247(b)(3)	RSS-247 5.4 (4)	Peak Output Power	PASS	
15.247(e)	RSS-247 5.2 (2)	Power Spectral Density	PASS	
15.203	-	Antenna Requirement	PASS	
15.209/15.205	RSS-247 5.5	Transmitter Radiated Emissions	PASS	

NOTE:

- (1)" N/A" denotes test is not applicable to this device.
- (2) The test follows FCC KDB Publication No. 558074 D01 DTS Meas Guidance v03r03 (Measurement Guidelines of DTS)

2.1 TEST FACILITY

The test facilities used to collect the test data in this report is at the location of No.3, Jinshagang 1st Road, Shixia, Dalang Town, Dongguan, Guangdong, China.

BTL's test firm number for FCC: 319330

BTL's test firm number for IC: 4428B-1

2.2 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.

The BTL measurement uncertainty is less than the CISPR 16-4-2 U_{cisp} requirement.

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

A. Conducted Measurement :

Test Site	Method	Measurement Frequency Range	U, (dB)	Note
DG-C02	CISPR	150 KHz ~ 30MHz	1.94	

B. Radiated Measurement :

Test Site	Method	Measurement Frequency Range	Ant. H / V	U, (dB)	Note
DG-CB03	CISPR	9KHz~30MHz	V	3.79	
		9KHz~30MHz	H	3.57	
		30MHz ~ 200MHz	V	3.82	
		30MHz ~ 200MHz	H	3.60	
		200MHz ~ 1,000MHz	V	3.86	
		200MHz ~ 1,000MHz	H	3.94	
		1GHz~18GHz	V	3.12	
		1GHz~18GHz	H	3.68	
		18GHz~40GHz	V	4.15	
		18GHz~40GHz	H	4.14	

Note: Unless specifically mentioned, the uncertainty of measurement has not been taken into account to declare the compliance or non-compliance to the specification.

3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

Equipment	Wireless Speaker System	
Brand Name	massFIDELITY	
Model Name	Core	
Model Difference	N/A	
Product Description	Operation Frequency	2402~2480 MHz
	Modulation Technology	GFSK(1Mbps)
	Bit Rate of Transmitter	
	Output Power (Max.)	3.76 dBm (1Mbps)
Power Source	DC Voltage supplied from AC/DC adapter. Brand/ Model: massFIDELITY/ ADS-65SI-19-2 18045G	
Power Rating	I/P: 100-240V~ 50/60Hz 1.5A max O/P: 18VDC 2.5A	

Note:

1. For a more detailed features description, please refer to the manufacturer's specifications or the user's manual.

2.

Channel List			
Channel	Frequency (MHz)	Channel	Frequency (MHz)
00	2402	20	2442
01	2404	21	2444
02	2406	22	2446
03	2408	23	2448
04	2410	24	2450
05	2412	25	2452
06	2414	26	2454
07	2416	27	2456
08	2418	28	2458
09	2420	29	2460
10	2422	30	2462
11	2424	31	2464
12	2426	32	2466
13	2428	33	2468
14	2430	34	2470
15	2432	35	2472
16	2434	36	2474
17	2436	37	2476
18	2438	38	2478
19	2440	39	2480

3. Table for Filed Antenna

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)
1	N/A	N/A	Printed	N/A	2.12

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 Mode	Description
Mode 1	TX Mode NOTE (1)
Mode 2	TX Mode

The EUT system operated these modes were found to be the worst case during the pre-scanning test as following:

For Conducted Test	
Final Test Mode	Description
Mode 2	TX Mode

For Radiated Test	
Final Test Mode	Description
Mode 1	TX Mode NOTE (1)

Note:

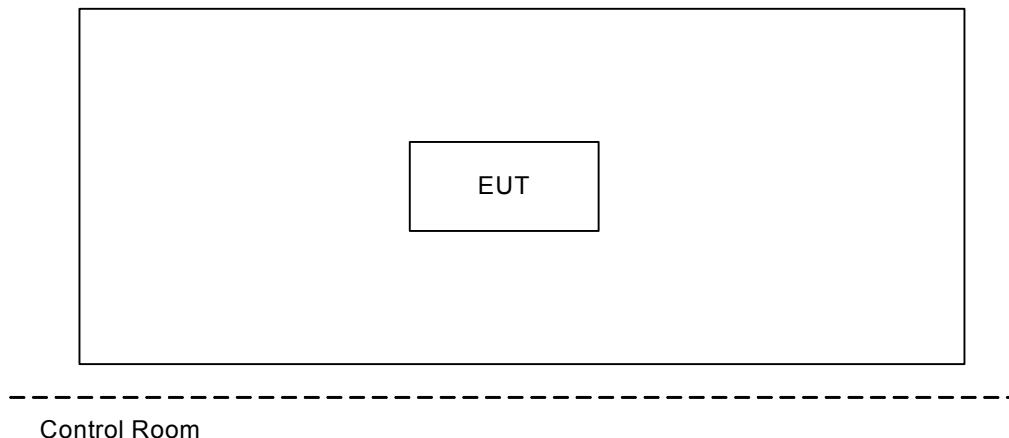
- (1) The measurements are performed at the high, middle, low available channels.
- (2) The EUT is considered a general unit, it was pre-tested on the positioned of each 3 axis. The worst case was found positioned on X-plane. Therefore only the test data of this X-plane was used for radiated emission measurement test

3.3 TABLE OF PARAMETERS OF TEXT SOFTWARE SETTING

During testing channel & power controlling software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product power parameters of WLAN

Test Software Version	CSR		
	2402	2440	2480
BT LE	50	50	50

3.4 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED



3.5 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/IC	Series No.	Note
-	-	-	-	-	-	-

Item	Shielded Type	Ferrite Core	Length	Note
-	-	-	-	-

Note:

- (1) For detachable type I/O cable should be specified the length in m in 『Length』 column.

4. EMC EMISSION TEST

4.1 CONDUCTED EMISSION MEASUREMENT

4.1.1 POWER LINE CONDUCTED EMISSION Limits (Frequency Range 150KHz-30MHz)

Frequency of Emission (MHz)	Conducted Limit (dB μ V)	
	Quasi-peak	Average
0.15 -0.5	66 to 56*	56 to 46*
0.50 -5.0	56	46
5.0 -30.0	60	50

Note:

(1) The limit of " * " decreases with the logarithm of the frequency

The following table is the setting of the receiver

Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 kHz

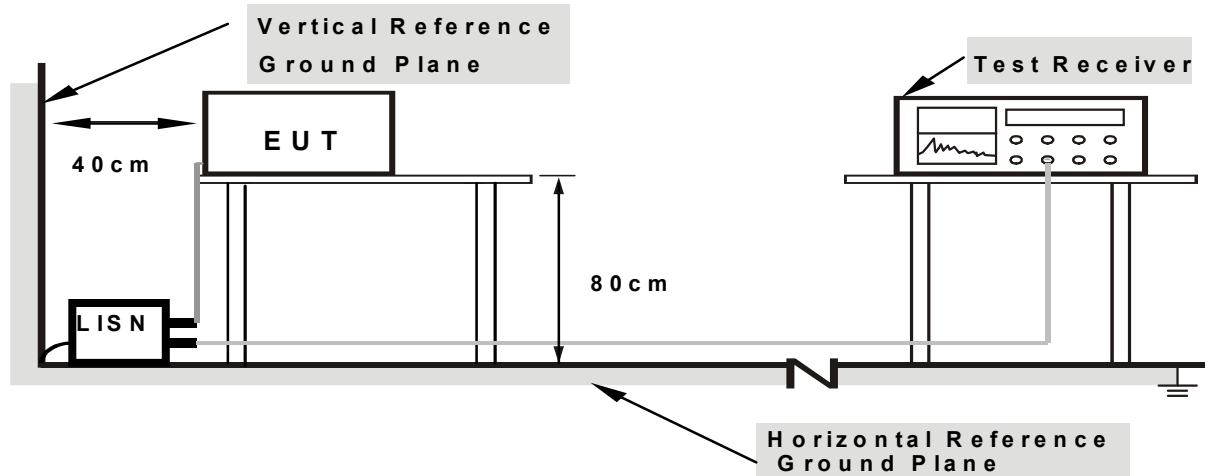
4.1.2 TEST PROCEDURE

- 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.
- 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.
- 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.
- LISN at least 80 cm from nearest part of EUT chassis.
- For the actual test configuration, please refer to the related Item –EUT Test Photos.

4.1.3 DEVIATION FROM TEST STANDARD

No deviation

4.1.4 TEST SETUP



Note:

1. Support units were connected to second LISN.
2. Both of LISNs (AMN) are 80 cm from EUT and at least 80 cm from other units and other metal planes

4.1.5 EUT OPERATING CONDITIONS

The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.

4.1.6 EUT TEST CONDITIONS

Temperature: 25°C

Relative Humidity: 55%

Test Voltage: AC 120V/60Hz

4.1.7 TEST RESULTS

Please refer to the Attachment A.

Remark:

- (1) 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.
- (2) Measuring frequency range from 150KHz to 30MHz.
- (3) “N/A” denotes test is not applicable to this device.

4.2 RADIATED EMISSION MEASUREMENT

4.2.1 RADIATED EMISSION LIMITS

20dB in any 100 KHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 15.205(a) & RSS-247 5.5, then the 15.209(a)& RSS-Gen limit in the table below has to be followed.

LIMITS OF RADIATED EMISSION MEASUREMENT (9KHz-1000MHz)

Frequency (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
960~1000	500	3

LIMITS OF RADIATED EMISSION MEASUREMENT (Above 1000MHz)

Frequency (MHz)	(dBuV/m) (at 3 meters)	
	PEAK	AVERAGE
Above 1000	74	54

Notes:

- (1) The limit for radiated test was performed according to FCC PART 15C.
- (2) The tighter limit applies at the band edges.
- (3) Emission level (dBuV/m)=20log Emission level (uV/m).
- (4) The test result calculated as following:

$$\text{Measurement Value} = \text{Reading Level} + \text{Correct Factor}$$

$$\text{Correct Factor} = \text{Antenna Factor} + \text{Cable Loss} - \text{Amplifier Gain(if use)}$$

$$\text{Margin Level} = \text{Measurement Value} - \text{Limit Value}$$

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RBW / VBW (Emission in restricted band)	RBW 1MHz VBW 3MHz peak detector for Pk value RMS detector for AV value

Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9KHz~90KHz for PK/AVG detector
Start ~ Stop Frequency	90KHz~110KHz for QP detector
Start ~ Stop Frequency	110KHz~490KHz for PK/AVG detector
Start ~ Stop Frequency	490KHz~30MHz for QP detector
Start ~ Stop Frequency	30MHz~1000MHz for QP detector

4.2.2 TEST PROCEDURE

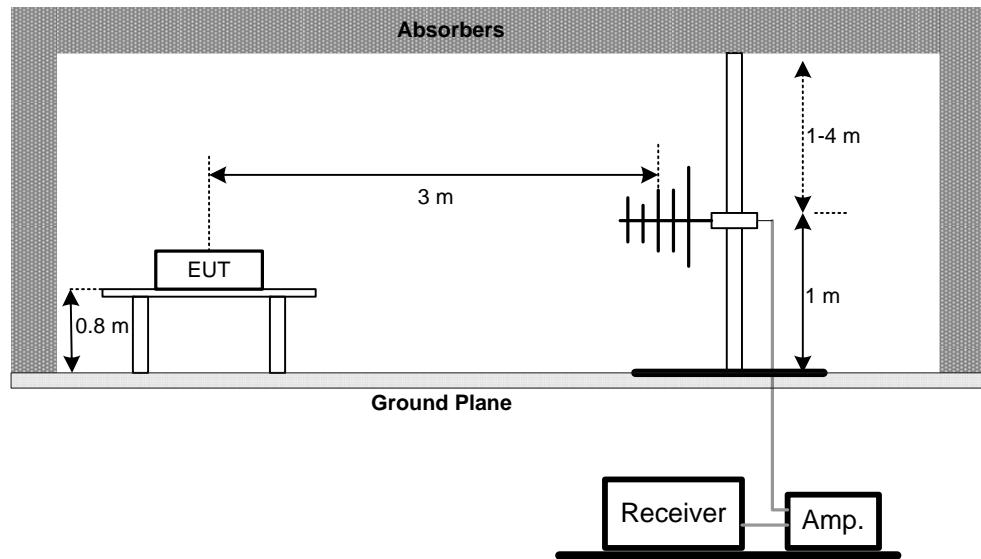
- The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(below 1GHz)
- The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(above 1GHz)
- The height of the equipment or of the substitution antenna shall be 1.5m; 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.
- The initial step in collecting conducted 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.
- 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.
- For the actual test configuration, please refer to the related Item –EUT Test Photos.

4.2.3 DEVIATION FROM TEST STANDARD

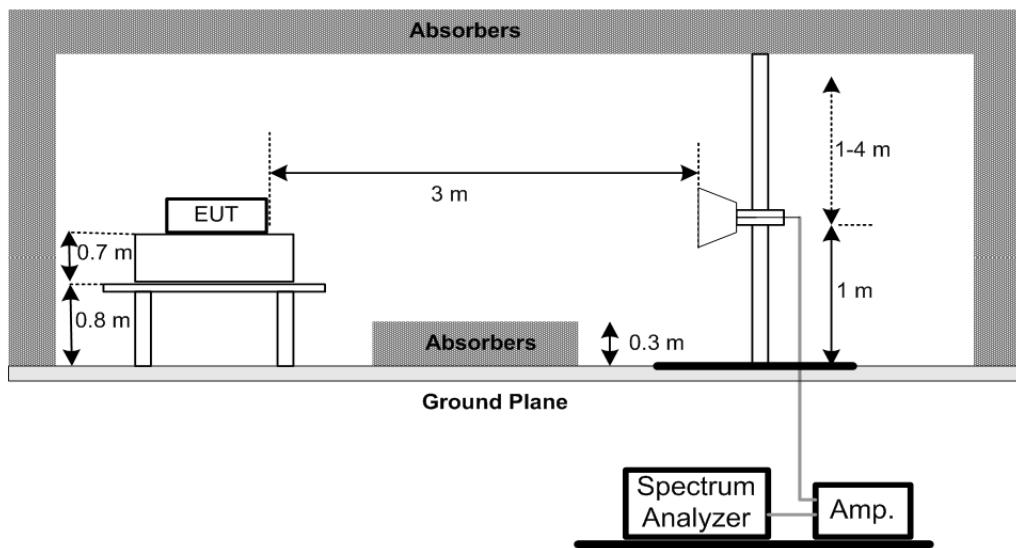
No deviation

4.2.4 TEST SETUP

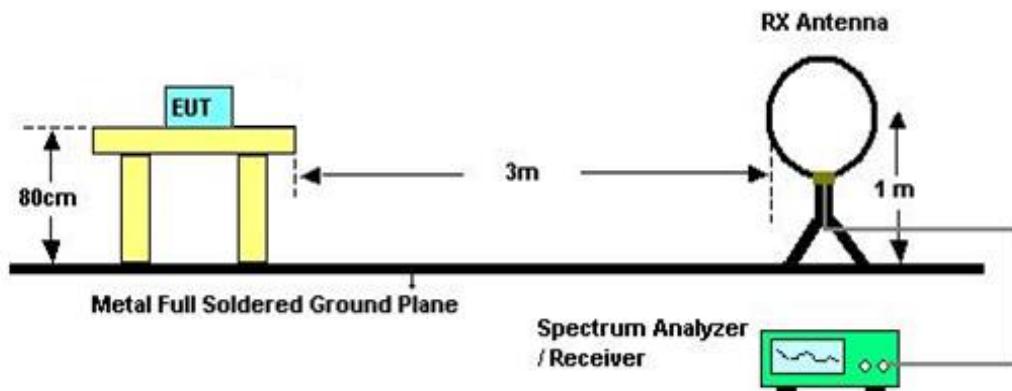
(A) Radiated Emission Test Set-Up Frequency Below 1 GHz



(B) Radiated Emission Test Set-Up Frequency Above 1 GHz



(C) For radiated emissions below 30MHz



4.2.5 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of **4.1.5 Unless** otherwise a special operating condition is specified in the follows during the testing.

4.2.6 EUT TEST CONDITIONS

Temperature: 25°C

Relative Humidity: 55%

Test Voltage: AC 120V/60Hz

4.2.7 TEST RESULTS (9KHZ TO 30MHZ)

Please refer to the Attachment B

Remark:

- (1) The amplitude of spurious emissions which are attenuated by more than 20 dB below the permissible value has no need to be reported.
- (2) Distance extrapolation factor = $40 \log (\text{specific distance} / \text{test distance})$ (dB).
- (3) Limit line = specific limits (dBuV) + distance extrapolation factor.

4.2.8 TEST RESULTS (BETWEEN 30MHZ TO 1000 MHZ)

Please refer to the Attachment C.

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 show in table.

4.2.9 TEST RESULTS (ABOVE 1000 MHZ)

Please refer to the Attachment D.

Remark:

- (1) 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.
- (2) Radiated emissions measured in frequency range above 1000MHz were made with an instrument using Peak detector mode and AV detector mode of the emission
- (3) A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.
- (4) EUT Orthogonal Axis:
"X" - denotes Laid on Table; "Y" - denotes Vertical Stand; "Z" - denotes Side Stand
- (5) During the measurements above 1 GHz it is taken care of that the EUT is always within the 3 dB cone of radiation BW of the used antenna
- (6) No limit: This is fundamental signal, the judgment is not applicable.
For fundamental signal judgment was referred to Peak output test.

5. BANDWIDTH TEST

5.1 Applied procedures / limit

FCC Part15 (15.247) , Subpart C/ RSS-GEN and RSS-247				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(a)(2) RSS-GEN section 6.6 RSS-247 5.2 (1)	Bandwidth	$\geq 500\text{KHz}$ (6dB bandwidth)	2400-2483.5	PASS

5.1.1 TEST PROCEDURE

- The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
- Spectrum Setting : RBW= 100KHz, VBW=300KHz, Sweep time = 2.5 ms.

5.1.2 DEVIATION FROM STANDARD

No deviation.

5.1.3 TEST SETUP



5.1.4 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 4.1.5 Unless otherwise a special operating condition is specified in the follows during the testing.

5.1.5 EUT TEST CONDITIONS

Temperature: 25°C
 Relative Humidity: 55%
 Test Voltage: AC 120V/60Hz

5.1.6 TEST RESULTS

Please refer to the Attachment E.

6. MAXIMUM OUTPUT POWER TEST

6.1 Applied procedures / limit

FCC Part15 (15.247) , Subpart C/ RSS-247				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(b)(3) RSS-247 5.4 (4)	Maximum Output Power	1 watt or 30dBm	2400-2483.5	PASS

6.1.1 TEST PROCEDURE

- a. The EUT was directly connected to the power meter and antenna output port as show in the block diagram below,
- b. The maximum peak conducted output power was performed in accordance with method 9.1.2 of FCC KDB 558074 D01 DTS Meas Guidance v03r03.

6.1.2 DEVIATION FROM STANDARD

No deviation.

6.1.3 TEST SETUP



6.1.4 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 4.1.5 Unless otherwise a special operating condition is specified in the follows during the testing.

6.1.5 EUT TEST CONDITIONS

Temperature: 25°C
 Relative Humidity: 55%
 Test Voltage: AC 120V/60Hz

6.1.6 TEST RESULTS

Please refer to the Attachment F.

7. ANTENNA CONDUCTED SPURIOUS EMISSION

7.1 Applied procedures / limit

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided that the transmitter demonstrates compliance with the peak conducted power limits.

7.1.1 TEST PROCEDURE

- a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
- b. Spectrum Setting : RBW= 100KHz, VBW=300KHz, Sweep time = 10 ms.

7.1.2 DEVIATION FROM STANDARD

No deviation.

7.1.3 TEST SETUP



7.1.4 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 4.1.5 Unless otherwise a special operating condition is specified in the follows during the testing.

7.1.5 EUT OPERATION CONDITIONS

Temperature: 25°C
Relative Humidity: 55%
Test Voltage: AC 120V/60Hz

7.1.6 TEST RESULTS

Please refer to the Attachment G.

8. POWER SPECTRAL DENSITY TEST

8.1 Applied procedures / limit

FCC Part15 (15.247) , Subpart C / RSS-247				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(e) RSS-247 5.2 (2)	Power Spectral Density	8 dBm (in any 3KHz)	2400-2483.5	PASS

8.1.1 TEST PROCEDURE

- a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
- b. Spectrum Setting: RBW=3KHz, VBW=10 KHz, Sweep time = auto.

8.1.2 DEVIATION FROM STANDARD

No deviation.

8.1.3 TEST SETUP



8.1.4 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 4.1.5 Unless otherwise a special operating condition is specified in the follows during the testing.

8.1.5 EUT TEST CONDITIONS

Temperature: 25°C

Relative Humidity: 55%

Test Voltage: AC 120V/60Hz

8.1.6 TEST RESULTS

Please refer to the Attachment H.

9. MEASUREMENT INSTRUMENTS LIST

Conducted Emission Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	LISN	EMCO	3816/2	00052765	Mar. 28, 2016
2	LISN	R&S	ENV216	101447	Mar. 28, 2016
3	Test Cable	emci	RG223(9KHz-30MHz)	C_17	Mar. 13, 2016
4	EMI TEST RECEIVER	R&S	ESCS30	833364/017	Mar. 28, 2016
5	50Ω Terminator	SHX	TF2-3G-A	08122902	Mar. 28, 2016
6	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A

Radiated Emission Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Antenna	Schwarbeck	VULB9160	9160-3232	Mar. 28, 2016
2	Amplifier	HP	8447D	2944A09673	Nov. 17, 2015
3	Receiver	AGILENT	N9038A	MY52130039	Sep. 30, 2015
4	Test Cable	emci	LMR-400(30MHz-1GHz)	C-01	Jul. 01, 2015
5	Controller	CT	SC100	N/A	N/A
6	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A
7	Antenna	ETS	3115	00075789	Mar. 28, 2016
8	Amplifier	Agilent	8449B	3008A02274	Nov. 02, 2015
9	Receiver	AGILENT	N9038A	MY52130039	Sep. 30, 2015
10	Test Cable	emci	EMC104-SM-S M-10000(1GHz-26.5GHz)	C-68	Jul. 01, 2015
11	Controller	CT	SC100	N/A	N/A
12	Broad-Band Horn Antenna	Schwarzbeck	BBHA 9170	9170319	Mar. 28, 2016
13	Microwave Preamplifier With Adaptor	EMC INSTRUMENT	EMC2654045	980039 & HA01	Mar. 28, 2016
14	Active Loop Antenna	R&S	HFH2-Z2	830749/020	Aug. 16, 2015

6dB Bandwidth Measurement

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP 40	100185	Nov. 02, 2015

Peak Output Power Measurement

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	power Meter	ANRITSU	ML2495A	1128009	Mar. 28, 2016
2	Pulse Power Sensor	ANRITSU	MA 2411B	1027500	Mar. 28, 2016

Antenna Conducted Spurious Emission Measurement

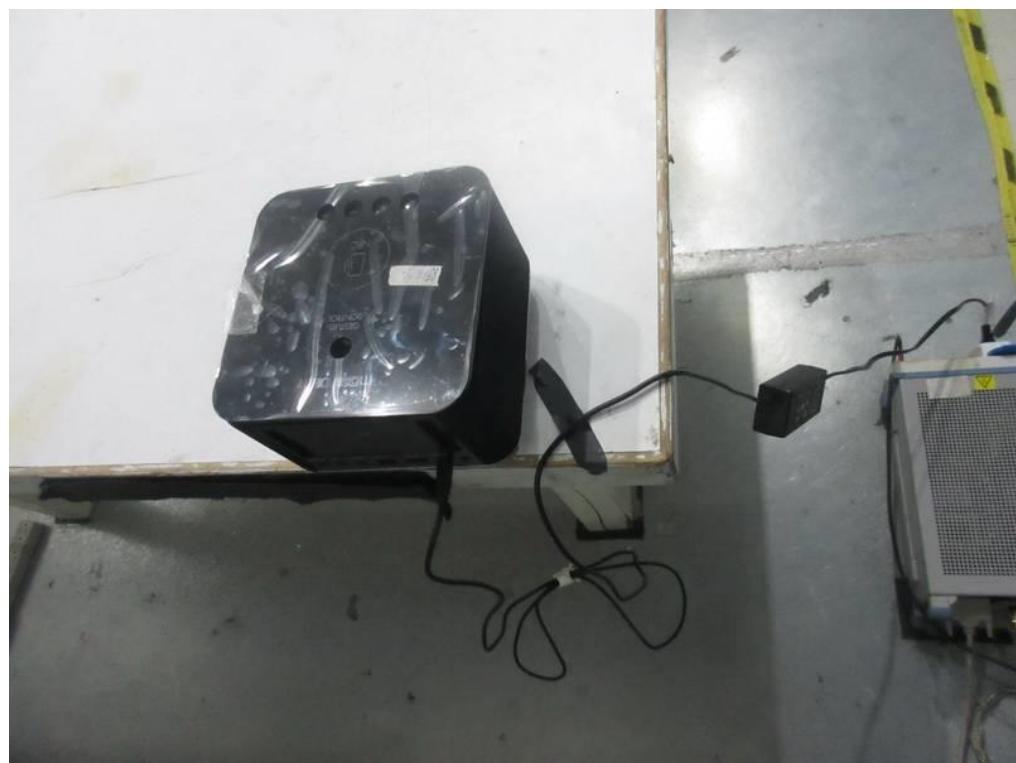
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP 40	100185	Nov. 02, 2015

Power Spectral Density Measurement

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP 40	100185	Nov. 02, 2015

Remark: "N/A" denotes no model name, serial no. or calibration specified.

All calibration period of equipment list is one year.

10. EUT TEST PHOTO**Conducted Measurement Photos**

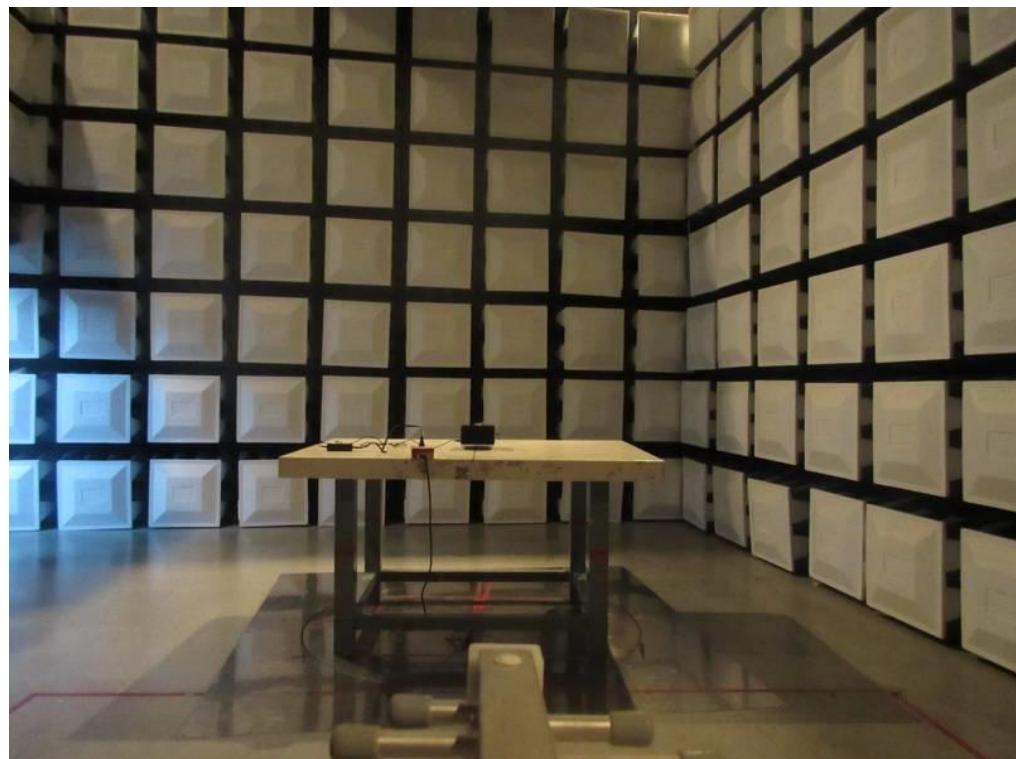
Radiated Measurement Photos

9KHz to 30MHz



Radiated Measurement Photos

30M to 1000MHz



Radiated Measurement Photos

Above 1000MHz



ATTACHMENT A - CONDUCTED EMISSION

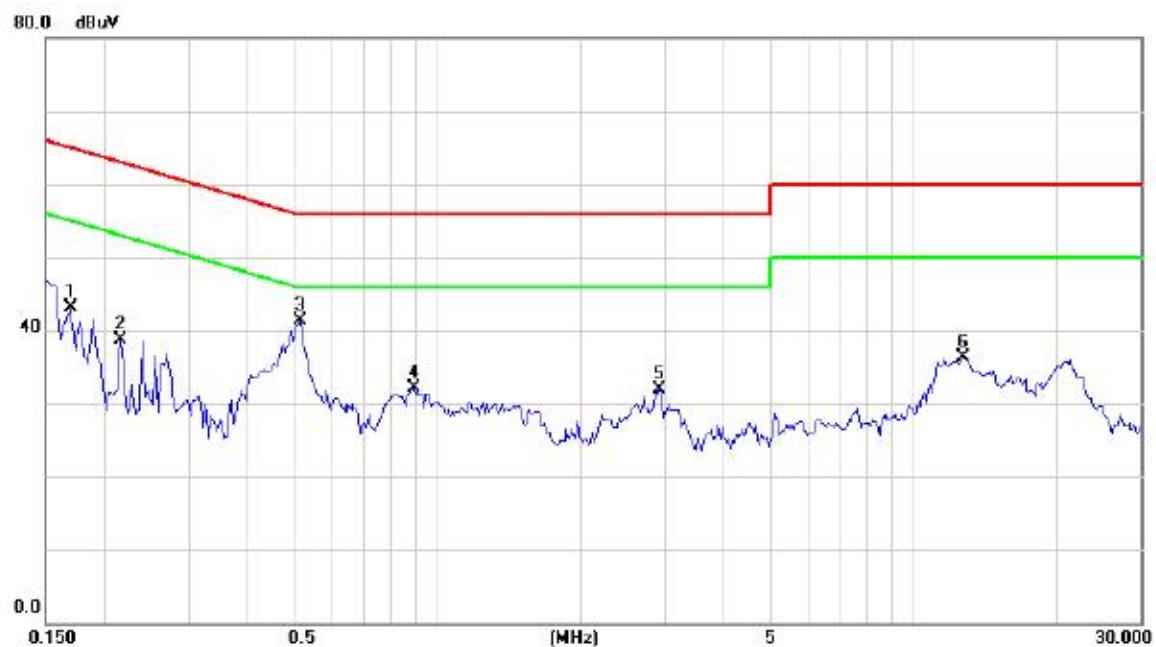
Test Mode: TX Mode

Line



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Margin		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1811	29.04	9.53	38.57	64.44	-25.87	peak	
2		0.2553	24.31	9.57	33.88	61.58	-27.70	peak	
3	*	0.5092	31.27	9.70	40.97	56.00	-15.03	peak	
4		0.8842	23.72	9.67	33.39	56.00	-22.61	peak	
5		1.7360	26.50	9.71	36.21	56.00	-19.79	peak	
6		2.8256	23.90	9.76	33.66	56.00	-22.34	peak	

Test Mode: TX Mode

Neutral

No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Margin	Detector	Comment
			Level	Factor	ment				
		MHz	dBuV	dB	dBuV	dBuV	dB		
1		0.1695	33.41	9.62	43.03	64.98	-21.95		peak
2		0.2164	29.09	9.61	38.70	62.96	-24.26		peak
3	*	0.5131	31.66	9.64	41.30	56.00	-14.70		peak
4		0.8921	22.39	9.67	32.06	56.00	-23.94		peak
5		2.9350	22.19	9.78	31.97	56.00	-24.03		peak
6		12.7030	26.06	10.20	36.26	60.00	-23.74		peak

ATTACHMENT B - RADIATED EMISSION (9KHZ TO 30MHZ)

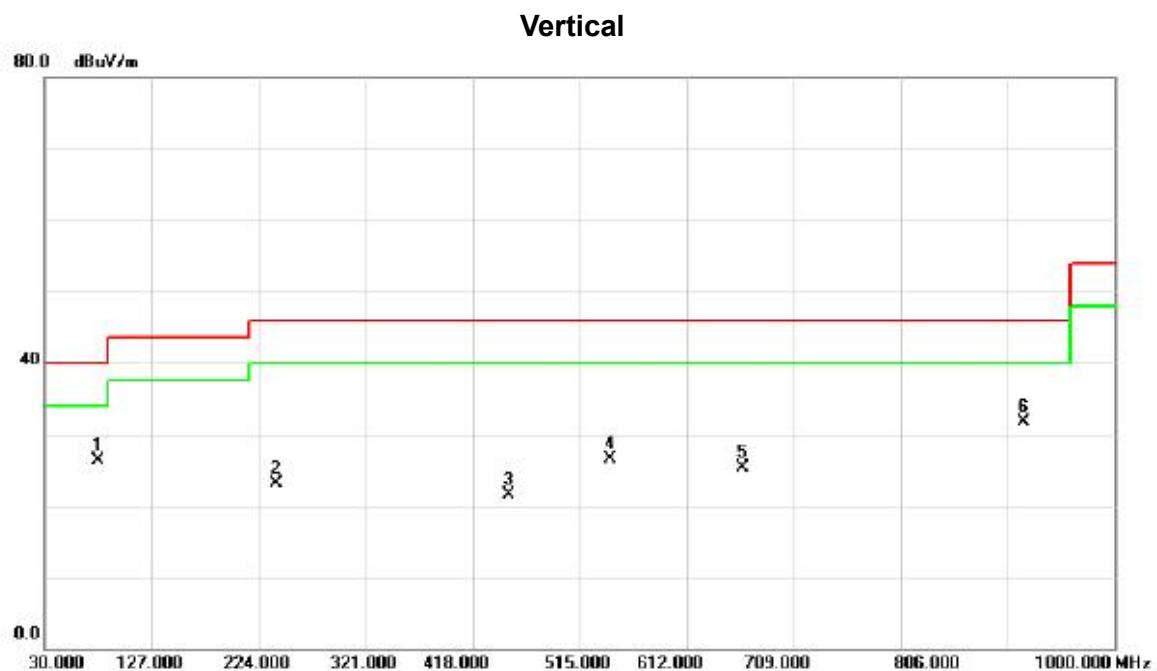
Test Mode: TX Mode

Frequency (MHz)	Ant 0°/90°	Read level dBuV/m	Factor (dB)	Measured(FS) dBuV/m	Limit dBuV/m	Margin (dB)	Note
0.0082	0°	10.11	25.05	35.16	129.33	-94.17	AVG
0.0082	0°	15.20	25.05	40.25	149.33	-109.08	PEAK
0.0206	0°	7.31	24.26	31.57	121.33	-89.75	AVG
0.0206	0°	9.21	24.26	33.47	141.33	-107.85	PEAK
0.0350	0°	4.62	23.35	27.97	116.72	-88.75	AVG
0.0350	0°	5.22	23.35	28.57	136.72	-108.15	PEAK
0.0414	0°	0.18	22.94	23.12	115.26	-92.14	AVG
0.0414	0°	1.46	22.94	24.40	135.26	-110.86	PEAK
0.5238	0°	18.05	19.88	37.93	73.22	-35.29	QP
1.9257	0°	22.18	19.51	41.69	69.54	-27.85	QP

Frequency (MHz)	Ant 0°/90°	Read level dBuV/m	Factor (dB)	Measured(FS) dBuV/m	Limit dBuV/m	Margin (dB)	Note
0.0162	90°	10.36	24.30	34.66	123.41	-88.75	AVG
0.0162	90°	13.14	24.30	37.44	143.41	-105.97	PEAK
0.0301	90°	6.01	23.66	29.67	118.03	-88.36	AVG
0.0301	90°	8.34	23.66	32.00	138.03	-106.03	PEAK
0.0352	90°	3.74	23.34	27.08	116.67	-89.60	AVG
0.0352	90°	4.59	23.34	27.93	136.67	-108.75	PEAK
0.0417	90°	1.36	22.93	24.29	115.20	-90.92	AVG
0.0417	90°	1.31	22.93	24.24	135.20	-110.97	PEAK
0.6174	90°	20.24	20.18	40.42	71.79	-31.38	QP
2.3610	90°	24.67	19.28	43.95	69.54	-25.59	QP

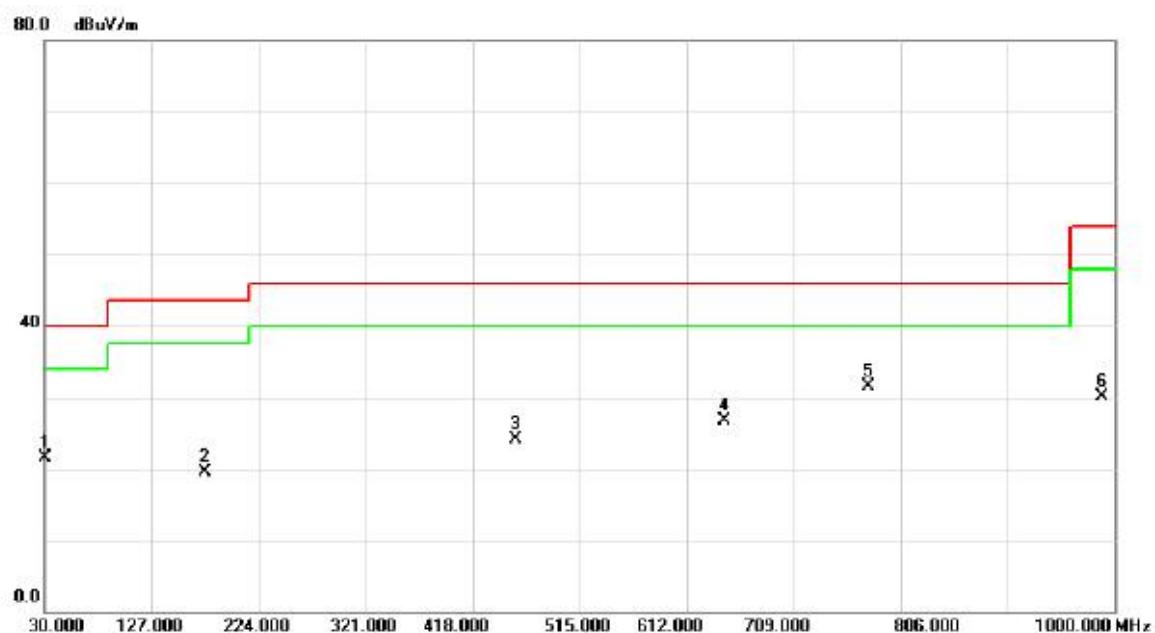
ATTACHMENT C - RADIATED EMISSION (30MHZ TO 1000MHZ)

Test Mode: TX 2402MHz -CH00 -1Mbps



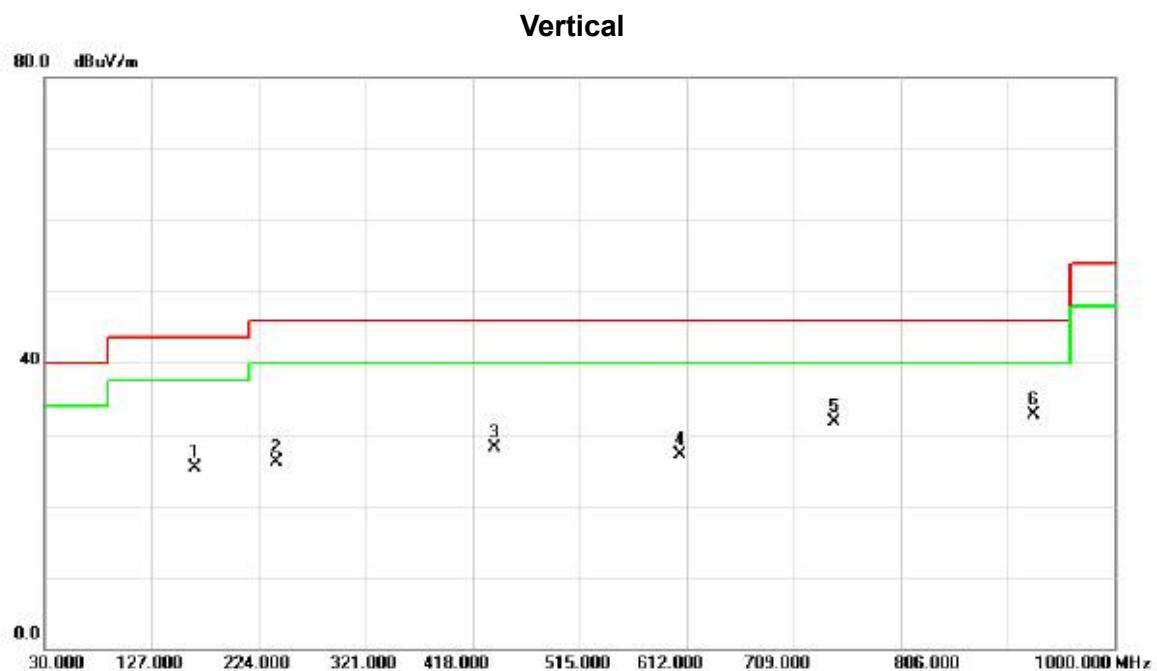
No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Margin	Detector	Comment
			Level	Factor	ment				
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB		
1	*	78.5000	43.45	-17.17	26.28	40.00	-13.72	peak	
2		240.4900	37.16	-14.06	23.10	46.00	-22.90	peak	
3		450.9800	30.25	-8.70	21.55	46.00	-24.45	peak	
4		542.1600	34.89	-8.48	26.41	46.00	-19.59	peak	
5		663.4100	30.35	-5.13	25.22	46.00	-20.78	peak	
6		917.5500	32.95	-1.16	31.79	46.00	-14.21	peak	

Test Mode: TX 2402MHz -CH00 -1Mbps

Horizontal

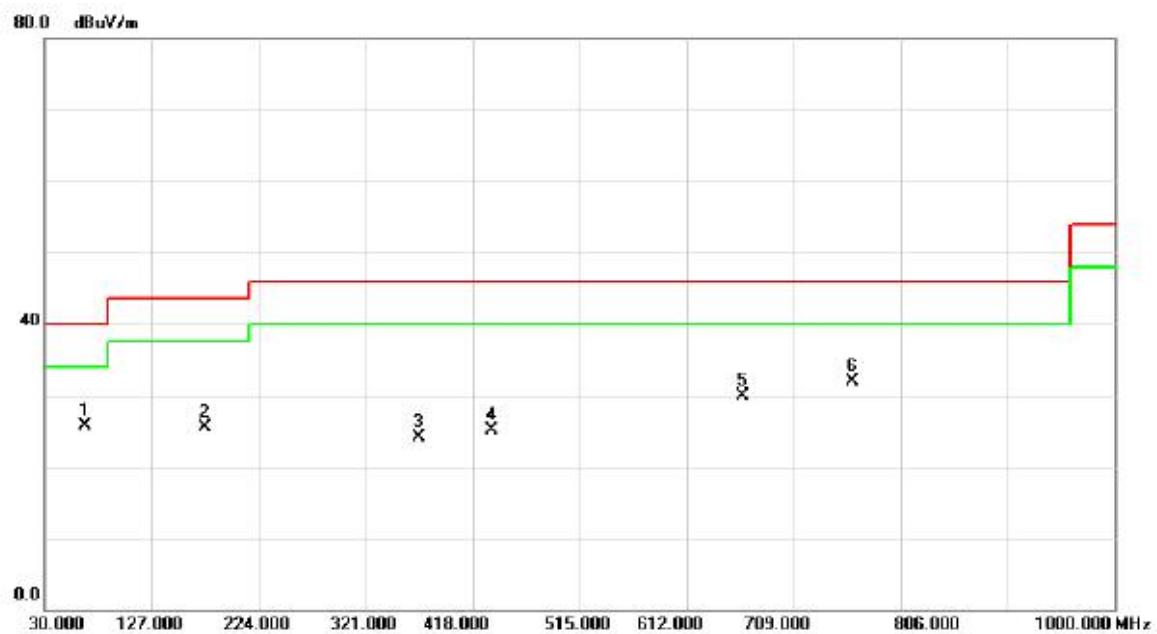
No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Margin	Detector	Comment
			Level	Factor	ment				
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB		
1		30.0000	37.27	-15.79	21.48	40.00	-18.52	peak	
2		175.5000	32.42	-12.96	19.46	43.50	-24.04	peak	
3		457.7700	33.13	-8.95	24.18	46.00	-21.82	peak	
4		646.9200	31.98	-5.37	26.61	46.00	-19.39	peak	
5	*	776.9000	35.17	-3.73	31.44	46.00	-14.56	peak	
6		988.3600	30.53	-0.41	30.12	54.00	-23.88	peak	

Test Mode: TX 2440MHz -CH19 -1Mbps



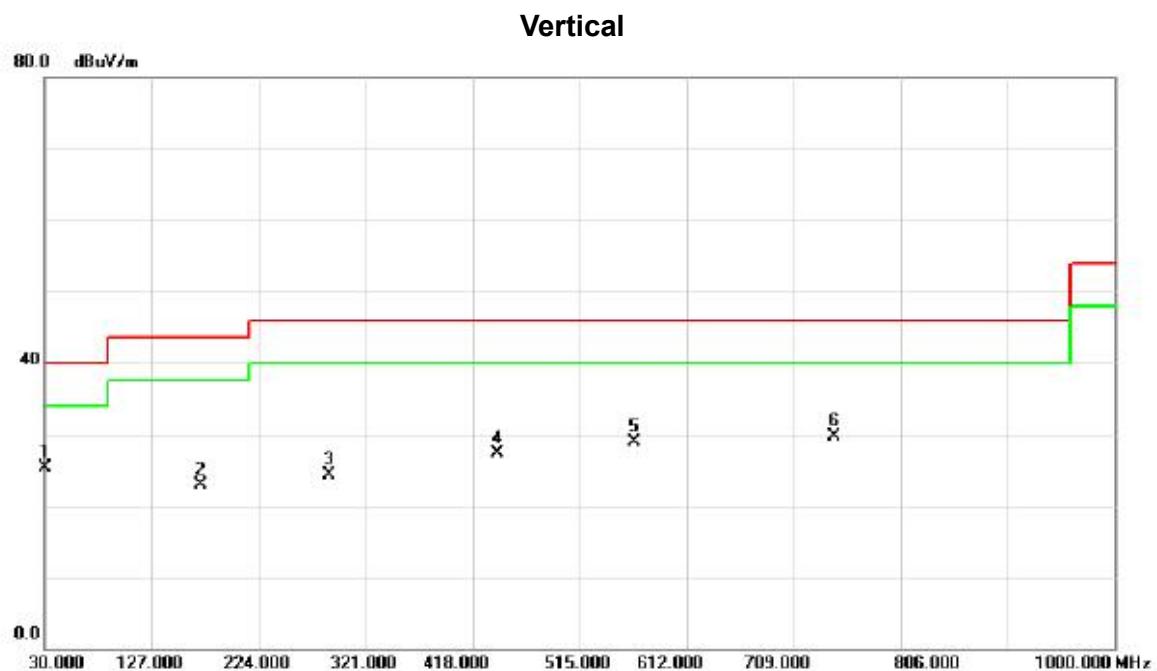
No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Margin	
			Level	Factor	ment			
		MHz	dBuV	dB	dBuV/m	dB	Detector	Comment
1		166.7700	38.38	-13.12	25.26	43.50	-18.24	peak
2		240.4900	40.16	-14.06	26.10	46.00	-19.90	peak
3		437.4000	36.98	-8.91	28.07	46.00	-17.93	peak
4		606.1800	34.75	-7.74	27.01	46.00	-18.99	peak
5		745.8600	36.49	-4.71	31.78	46.00	-14.22	peak
6	*	927.2500	33.67	-0.89	32.78	46.00	-13.22	peak

Test Mode: TX 2440MHz -CH19 -1Mbps

Horizontal

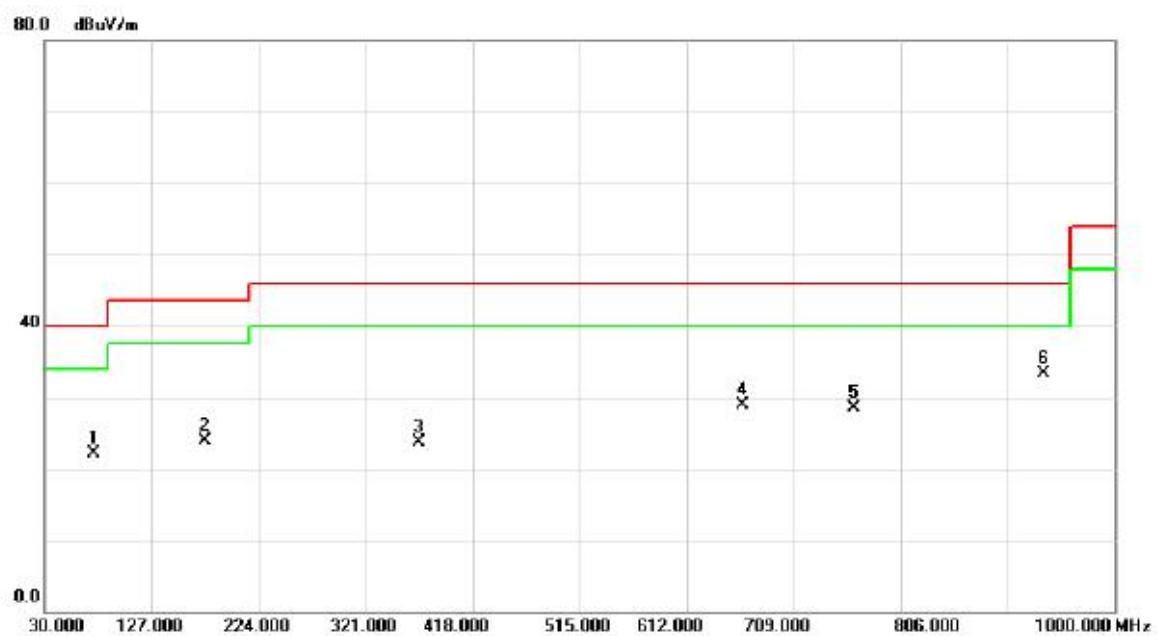
No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Margin		
			Level	Factor	ment				
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		66.8600	41.63	-15.98	25.65	40.00	-14.35	peak	
2		175.5000	38.42	-12.96	25.46	43.50	-18.04	peak	
3		369.5000	35.10	-10.98	24.12	46.00	-21.88	peak	
4		435.4600	33.97	-8.95	25.02	46.00	-20.98	peak	
5		663.4100	35.13	-5.13	30.00	46.00	-16.00	peak	
6	*	762.3500	36.19	-4.24	31.95	46.00	-14.05	peak	

Test Mode: TX 2480MHz -CH39 -1Mbps



No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Margin	
			Level	Factor	ment			
		MHz	dBuV	dB	dBuV/m	dB	Detector	Comment
1	*	30.0000	41.16	-15.79	25.37	40.00	-14.63	peak
2		171.6200	35.66	-12.81	22.85	43.50	-20.65	peak
3		288.0200	35.85	-11.46	24.39	46.00	-21.61	peak
4		440.3100	36.10	-8.85	27.25	46.00	-18.75	peak
5		564.4700	37.09	-8.10	28.99	46.00	-17.01	peak
6		745.8600	34.49	-4.71	29.78	46.00	-16.22	peak

Test Mode: TX 2480MHz -CH39 -1Mbps

Horizontal

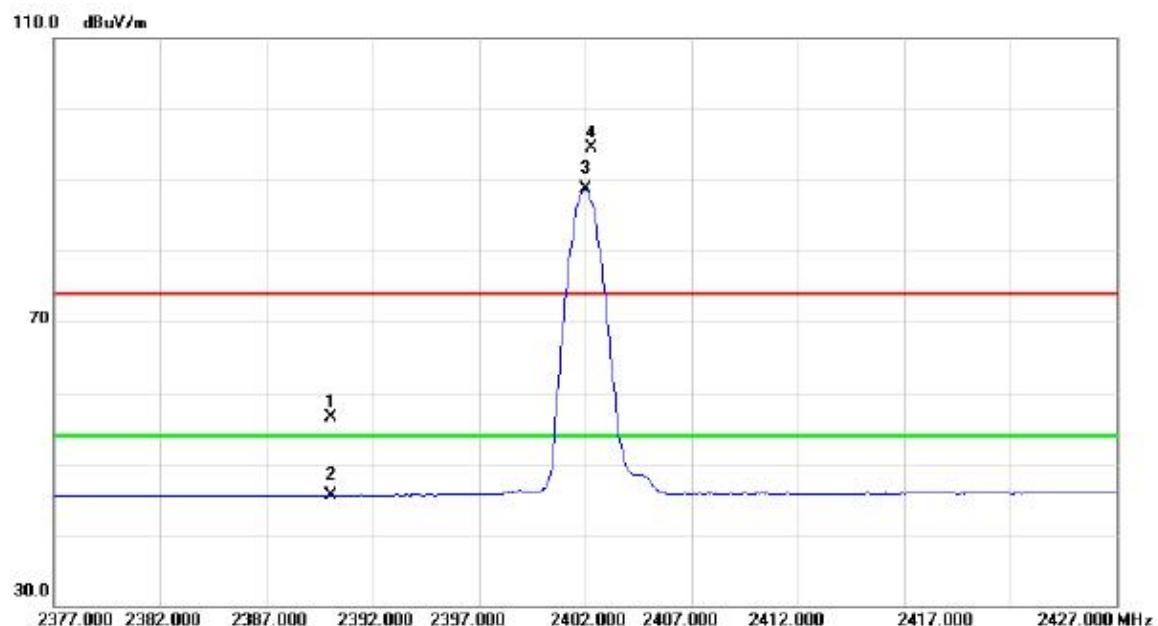
No.	Mk.	Freq. MHz	Reading dBuV	Correct Factor	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		74.6200	38.90	-16.74	22.16	40.00	-17.84	peak	
2		175.5000	36.92	-12.96	23.96	43.50	-19.54	peak	
3		369.5000	34.60	-10.98	23.62	46.00	-22.38	peak	
4		663.4100	34.13	-5.13	29.00	46.00	-17.00	peak	
5		763.3200	32.78	-4.20	28.58	46.00	-17.42	peak	
6	*	935.9800	33.93	-0.67	33.26	46.00	-12.74	peak	

ATTACHMENT D - RADIATED EMISSION (ABOVE 1000MHZ)

Orthogonal Axis : X

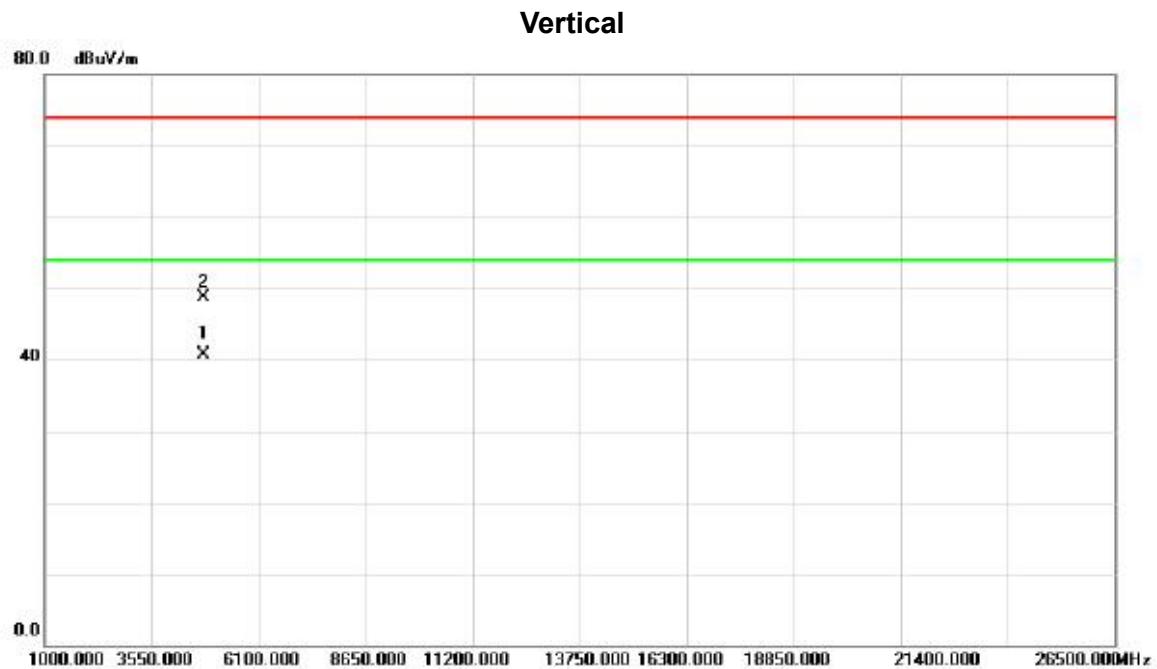
Test Mode : TX 2402MHz _ CH00 _ 1Mbps

Vertical



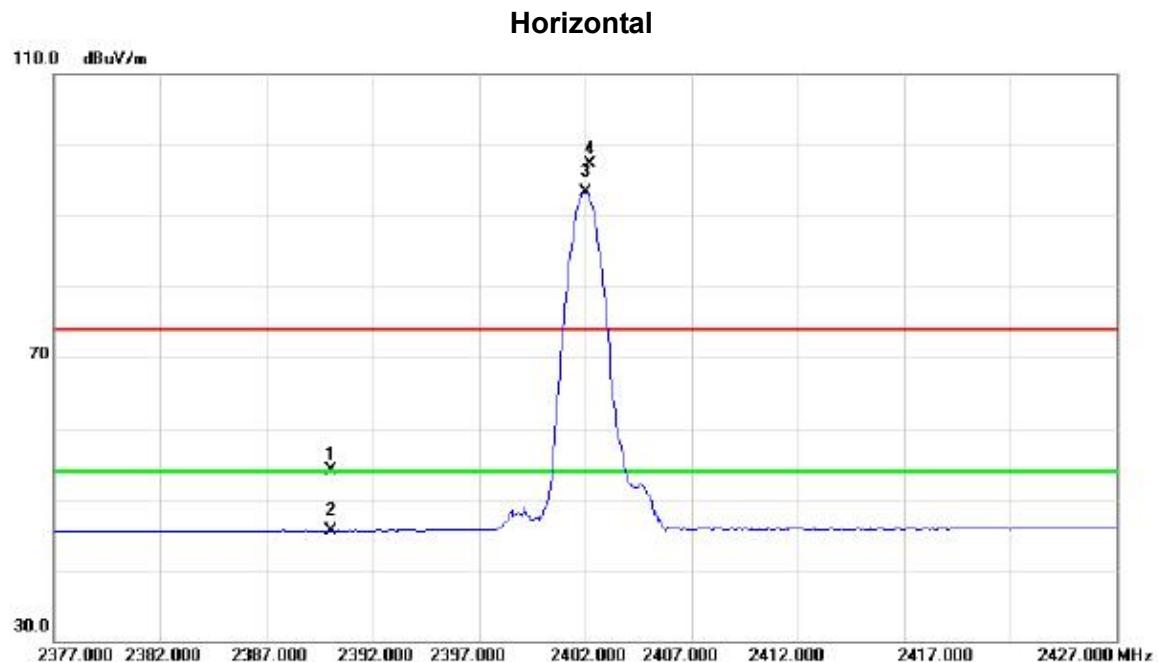
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		2390.000	24.67	31.88	56.55	74.00	-17.45	peak	
2		2390.000	13.64	31.88	45.52	54.00	-8.48	AVG	
3	*	2402.000	56.76	31.89	88.65	54.00	34.65	AVG	NO LIMIT
4	X	2402.300	62.71	31.89	94.60	74.00	20.60	peak	NO LIMIT

Orthogonal Axis :	X
Test Mode :	TX 2402MHz _CH00_1Mbps



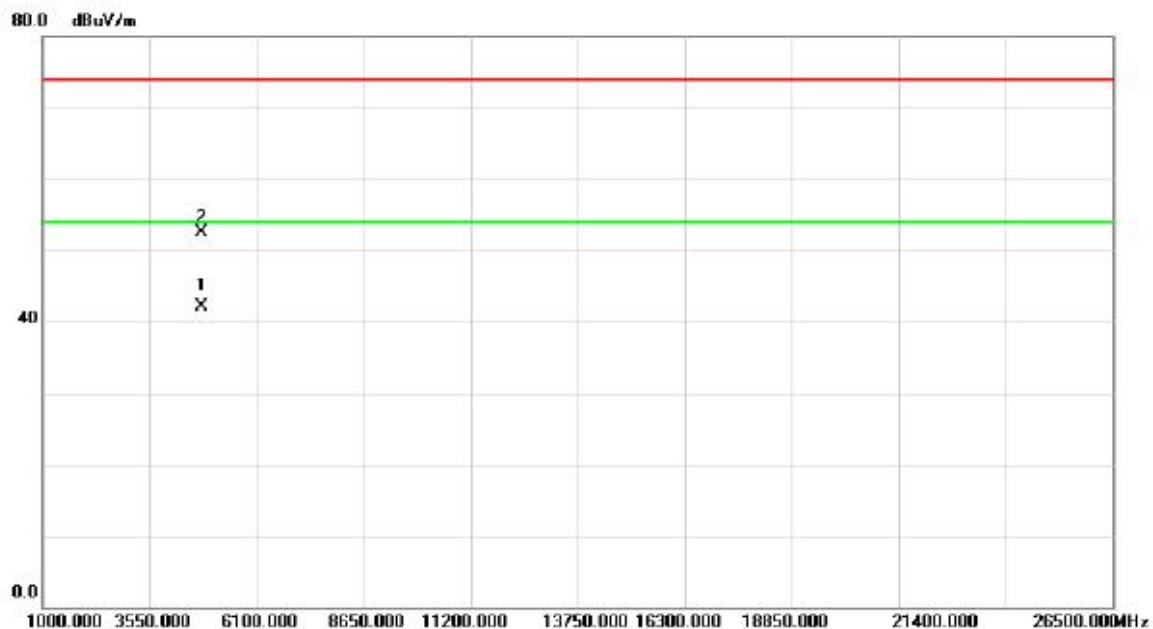
No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Margin	Detector	Comment
			Level	Factor	ment				
1	*	4803.650	34.36	6.39	40.75	54.00	-13.25	AVG	
2		4804.380	42.28	6.39	48.67	74.00	-25.33	peak	

Orthogonal Axis :	X
Test Mode :	TX 2402MHz _CH00_1Mbps



No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Margin	Detector	Comment
			Level	Factor	ment				
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB		
1		2390.000	22.29	31.88	54.17	74.00	-19.83	peak	
2		2390.000	13.66	31.88	45.54	54.00	-8.46	AVG	
3	*	2402.000	61.48	31.89	93.37	54.00	39.37	AVG	NO LIMIT
4	X	2402.250	65.37	31.89	97.26	74.00	23.26	peak	NO LIMIT

Orthogonal Axis :	X
Test Mode :	TX 2402MHz _CH00_1Mbps

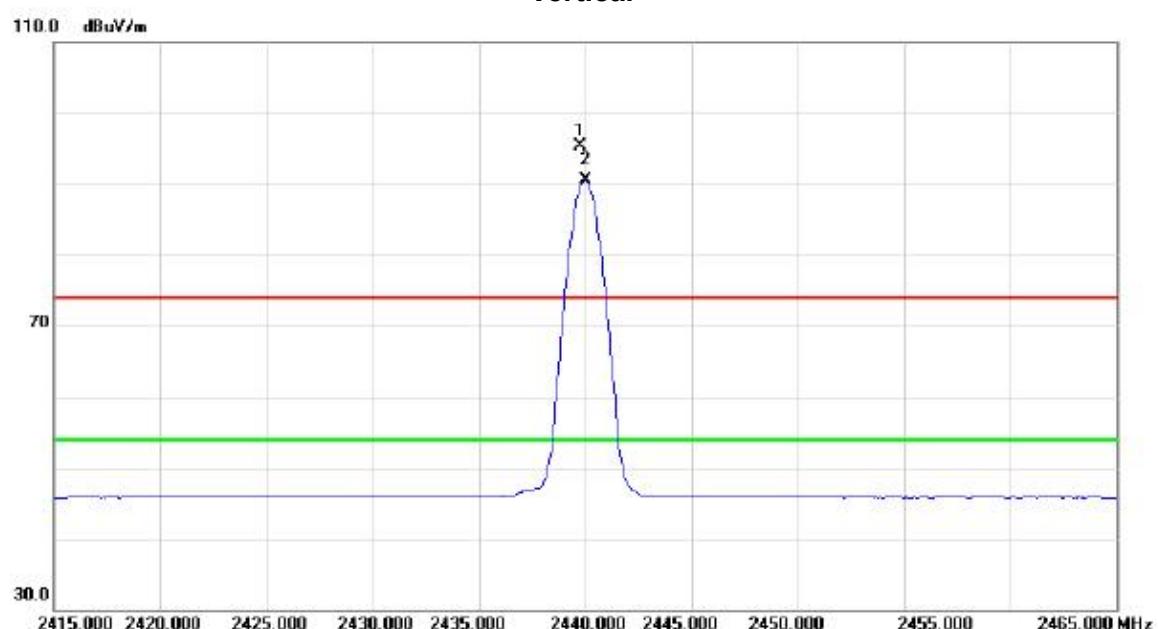
Horizontal

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector Comment
1	*	4803.290	35.78	6.39	42.17	54.00	-11.83	AVG
2		4803.976	46.16	6.39	52.55	74.00	-21.45	peak

Orthogonal Axis : X

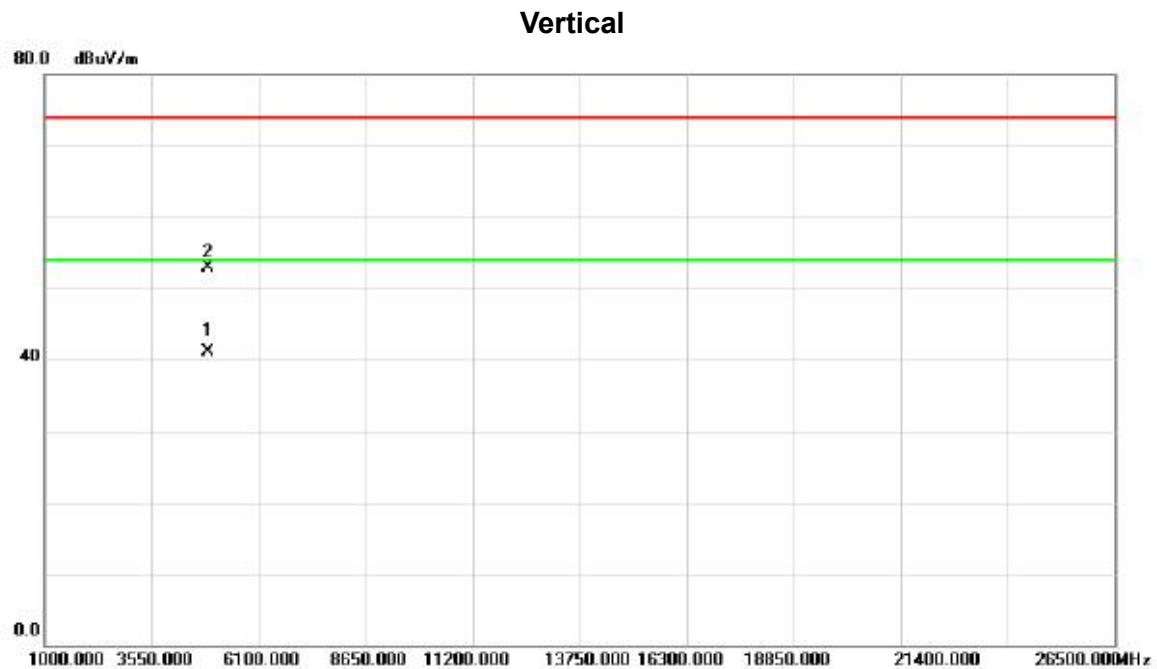
Test Mode : TX 2440MHz _CH19_1Mbps

Vertical



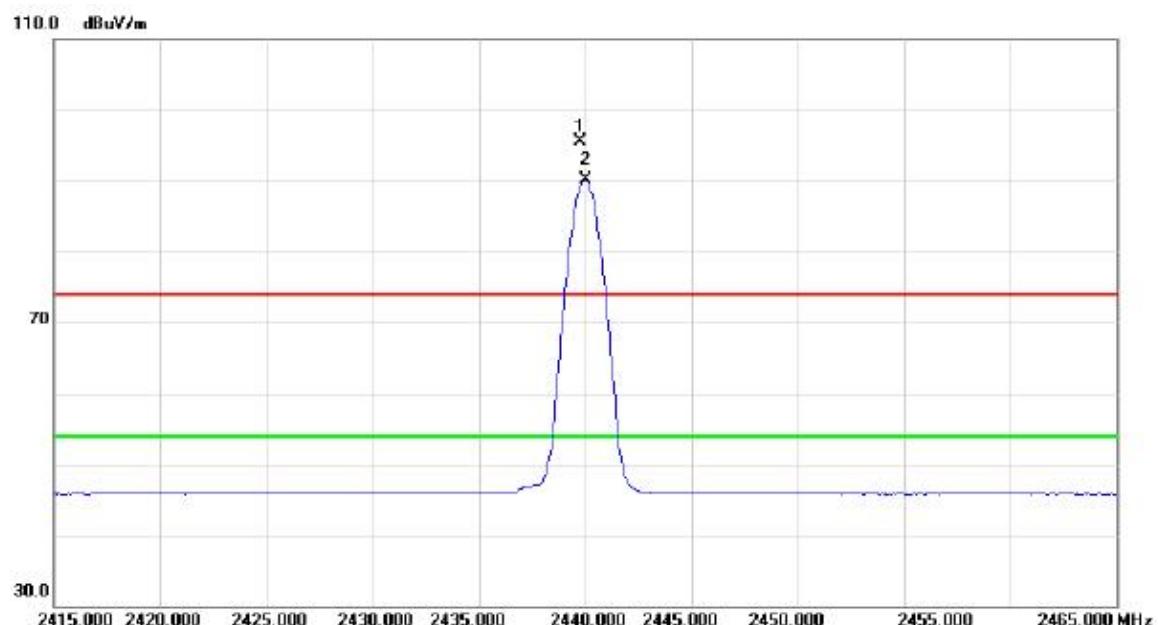
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Margin	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector Comment
1	X	2439.750	63.35	31.95	95.30	74.00	21.30	peak NO LIMIT
2	*	2440.000	58.51	31.95	90.46	54.00	36.46	AVG NO LIMIT

Orthogonal Axis :	X
Test Mode :	TX 2440MHz _CH19_1Mbps



No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Margin	Detector	Comment
			Level	Factor	ment				
1	*	4879.960	34.56	6.57	41.13	54.00	-12.87	AVG	
2		4880.256	46.30	6.57	52.87	74.00	-21.13	peak	

Orthogonal Axis :	X
Test Mode :	TX 2440MHz _CH19_1Mbps

Horizontal

No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Margin	Detector	Comment
			Level	Factor	ment				
1	X	2439.750	63.46	31.95	95.41	74.00	21.41	peak	NO LIMIT
2	*	2440.000	58.12	31.95	90.07	54.00	36.07	AVG	NO LIMIT

Orthogonal Axis :	X
Test Mode :	TX 2440MHz _CH19_1Mbps

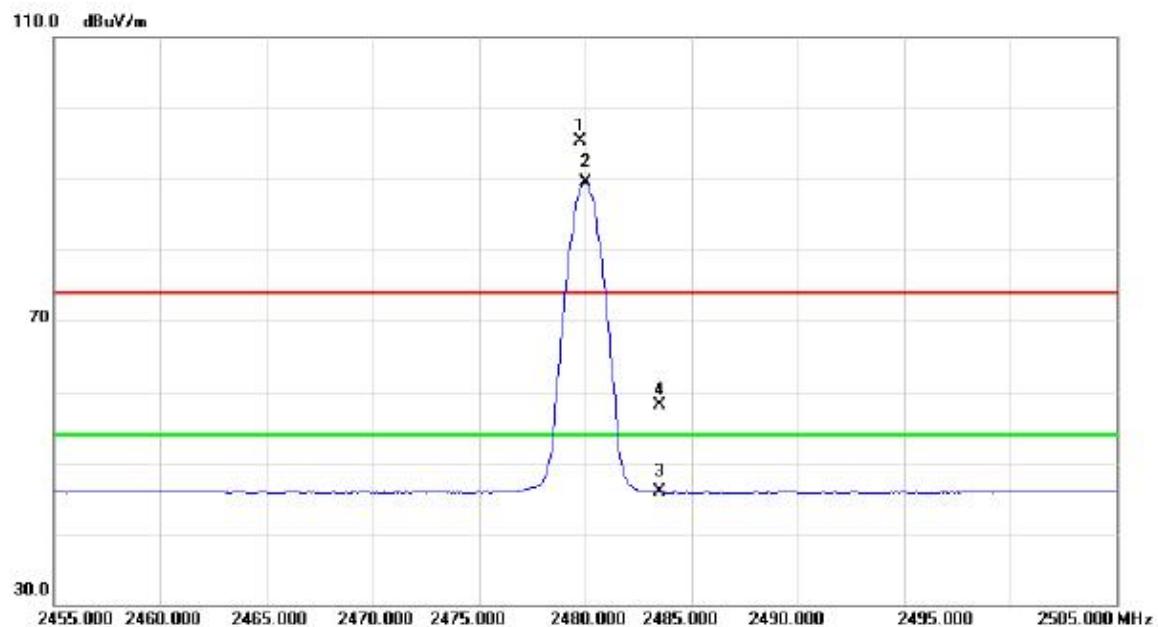
Horizontal

No.	Mk.	Reading Level	Correct Factor	Measure-ment	Limit	Margin	
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector Comment
1	*	4879.672	36.25	6.57	42.82	54.00	-11.18 AVG
2		4880.220	45.21	6.57	51.78	74.00	-22.22 peak

Orthogonal Axis : X

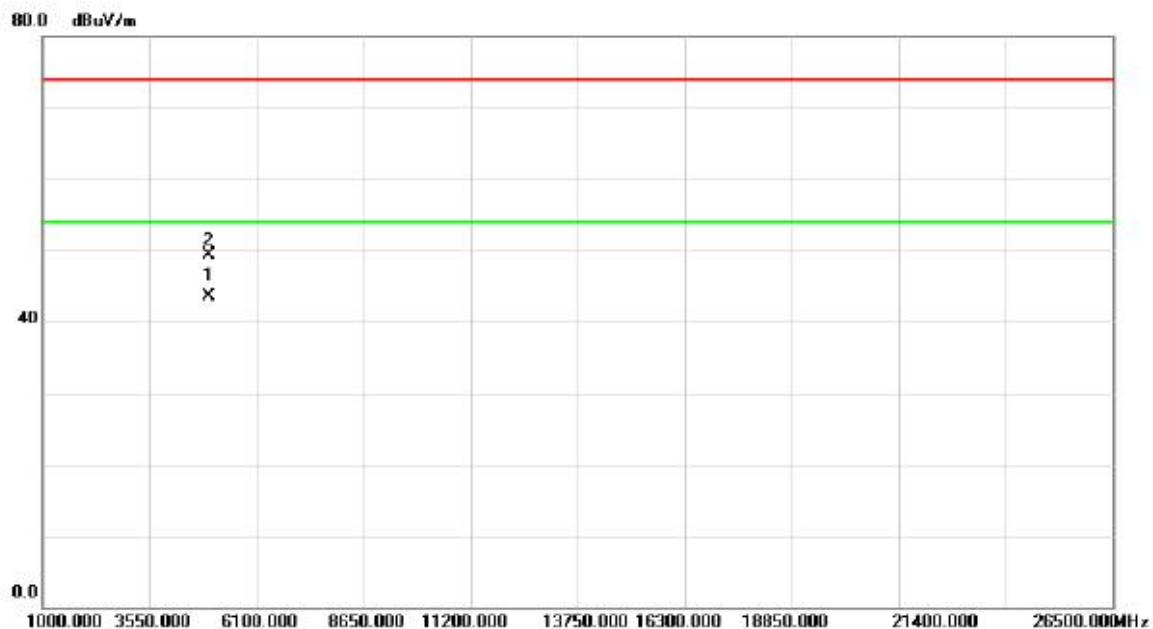
Test Mode : TX 2480MHz _CH39_1Mbps

Vertical



No.	Mk.	Reading Level	Correct Factor	Measure-ment	Limit	Margin	
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector Comment
1	X 2479.750	63.21	32.00	95.21	74.00	21.21	peak NO LIMIT
2	* 2480.000	57.46	32.00	89.46	54.00	35.46	AVG NO LIMIT
3	2483.500	13.85	32.01	45.86	54.00	-8.14	AVG
4	2483.500	26.16	32.01	58.17	74.00	-15.83	peak

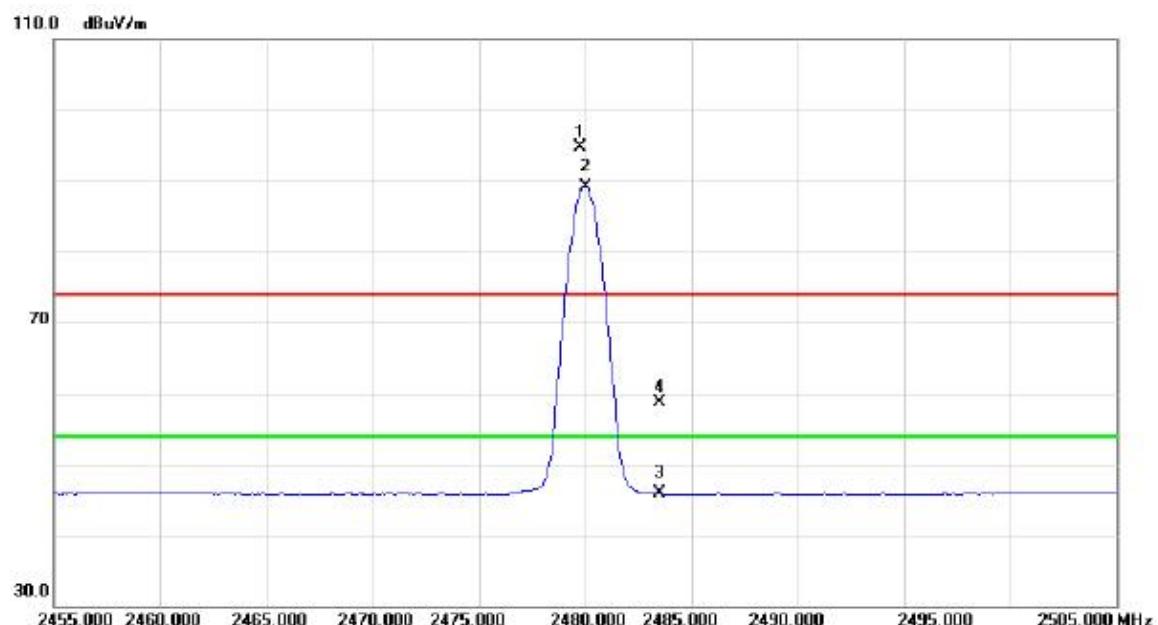
Orthogonal Axis :	X
Test Mode :	TX 2480MHz _CH39_1Mbps

Vertical

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector Comment
1	*	4960.684	36.78	6.74	43.52	54.00	-10.48	AVG
2		4960.379	42.63	6.74	49.37	74.00	-24.63	peak

Orthogonal Axis :	X
Test Mode :	TX 2480MHz _CH39_1Mbps

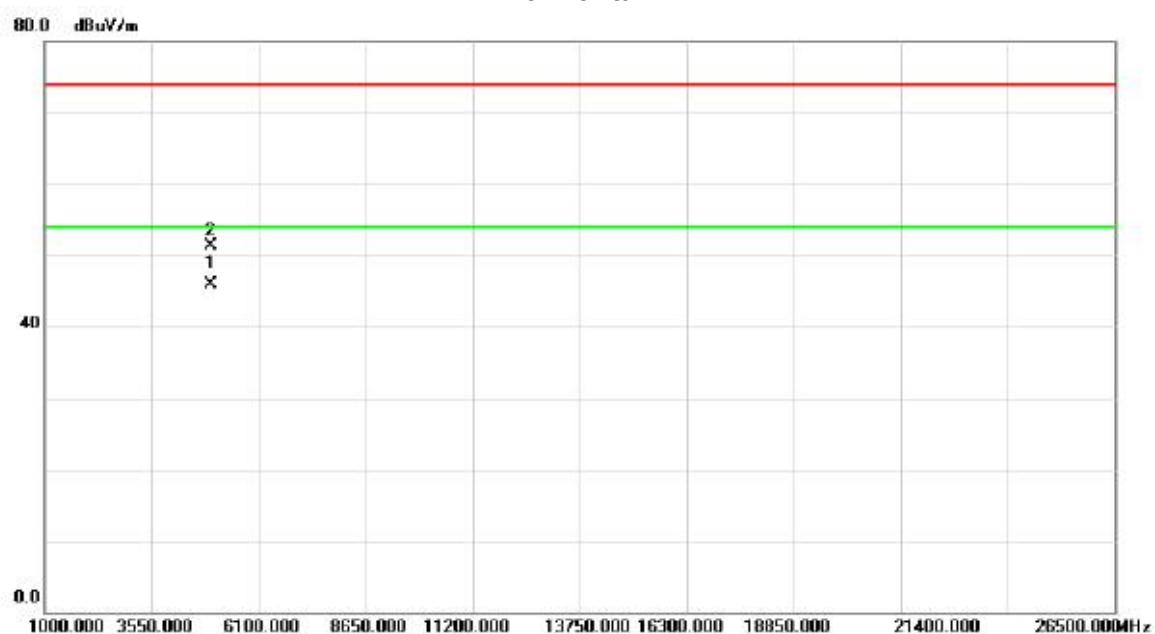
Horizontal



No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Margin	Detector	Comment
			Level	Factor	ment				
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB		
1	X	2479.750	62.64	32.00	94.64	74.00	20.64	peak	NO LIMIT
2	*	2480.000	57.20	32.00	89.20	54.00	35.20	AVG	NO LIMIT
3		2483.500	13.81	32.01	45.82	54.00	-8.18	AVG	
4		2483.500	26.64	32.01	58.65	74.00	-15.35	peak	

Orthogonal Axis : X

Test Mode : TX 2480MHz _CH39_1Mbps

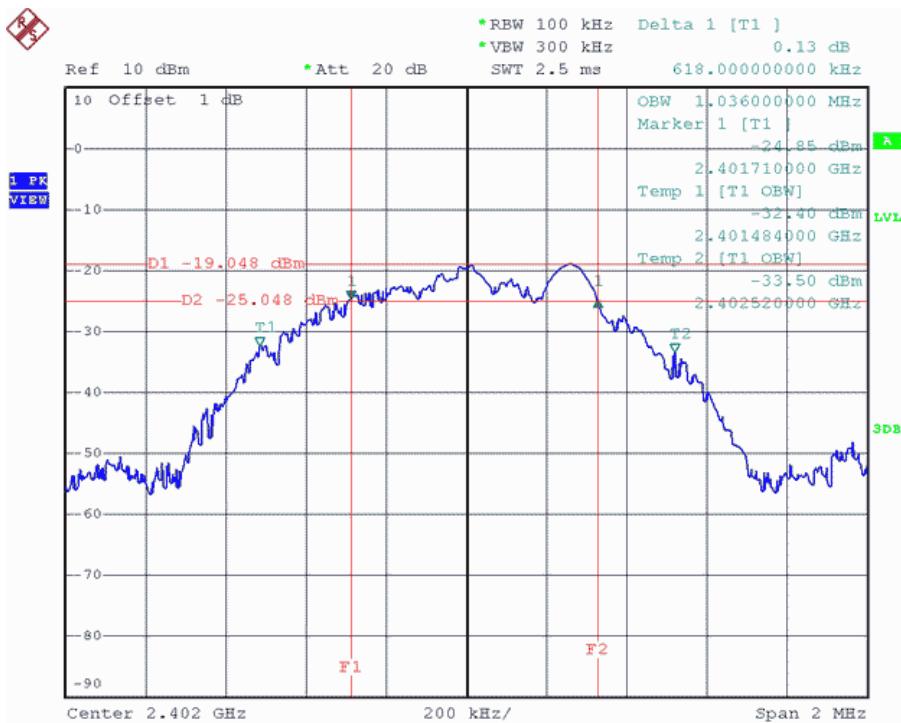
Horizontal

No.	Mk.	Reading Level	Correct Factor	Measure-ment	Limit	Margin	
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector Comment
1	*	4960.357	39.16	6.74	45.90	54.00	-8.10 AVG
2		4959.438	44.57	6.74	51.31	74.00	-22.69 peak

ATTACHMENT E - BANDWIDTH

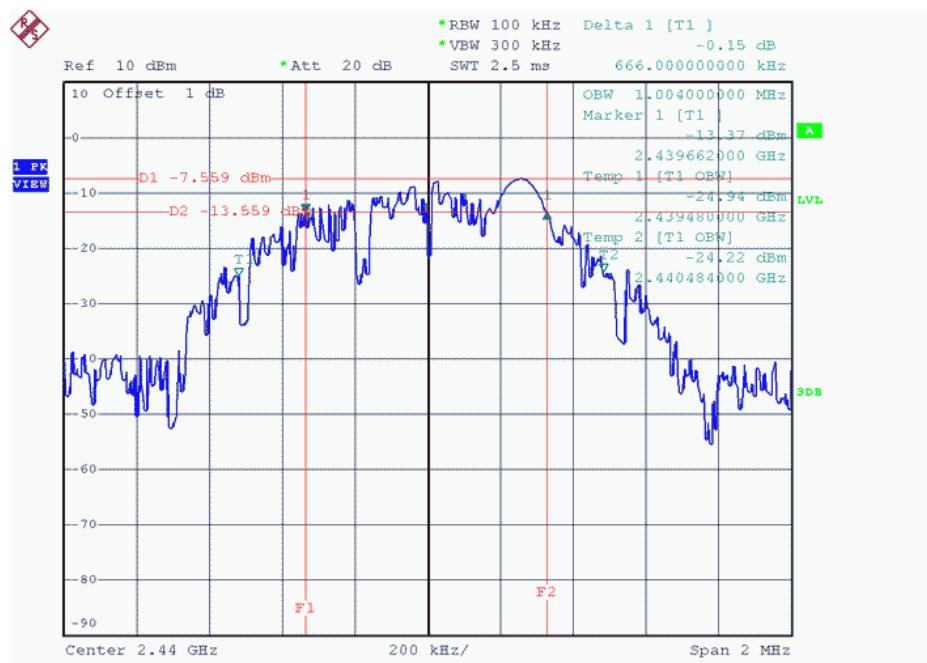
Frequency (MHz)	6dB Bandwidth (MHz)	99% Occupied BW (MHz)	Min. Limit (kHz)	Test Result
2402	0.618	1.036	500	Complies
2440	0.666	1.004	500	Complies
2480	0.682	1.044	500	Complies

TX CH00



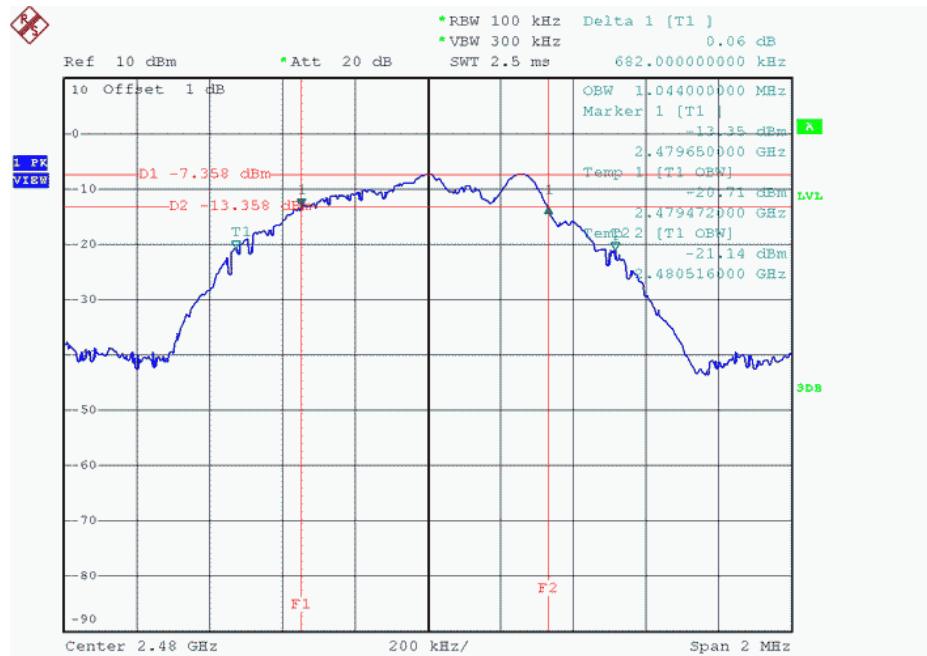
Date: 18.JUN.2015 15:42:03

TX CH19



Date: 18.JUN.2015 15:44:57

TX CH39



Date: 18.JUN.2015 15:46:30

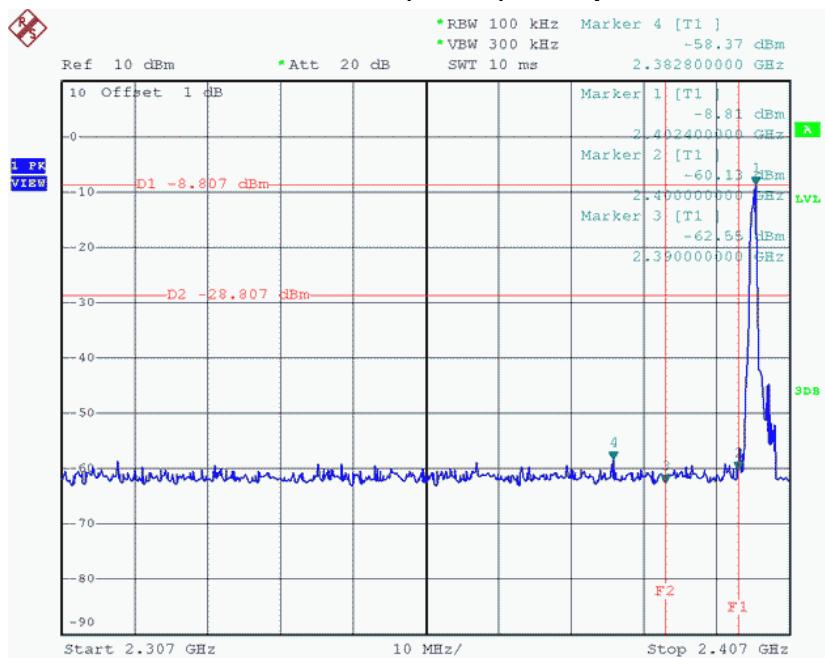
ATTACHMENT F - MAXIMUM OUTPUT POWER TEST

Frequency (MHz)	Conducted Power (dBm)	Conducted Power (Watt)	Max. Limit (dBm)	Max. Limit (Watt)	Test Result
2402	3.13	0.0021	30.00	1.00	Complies
2440	3.76	0.0024	30.00	1.00	Complies
2480	3.24	0.0021	30.00	1.00	Complies

**ATTACHMENT G - ANTENNA CONDUCTED SPURIOUS
EMISSION**

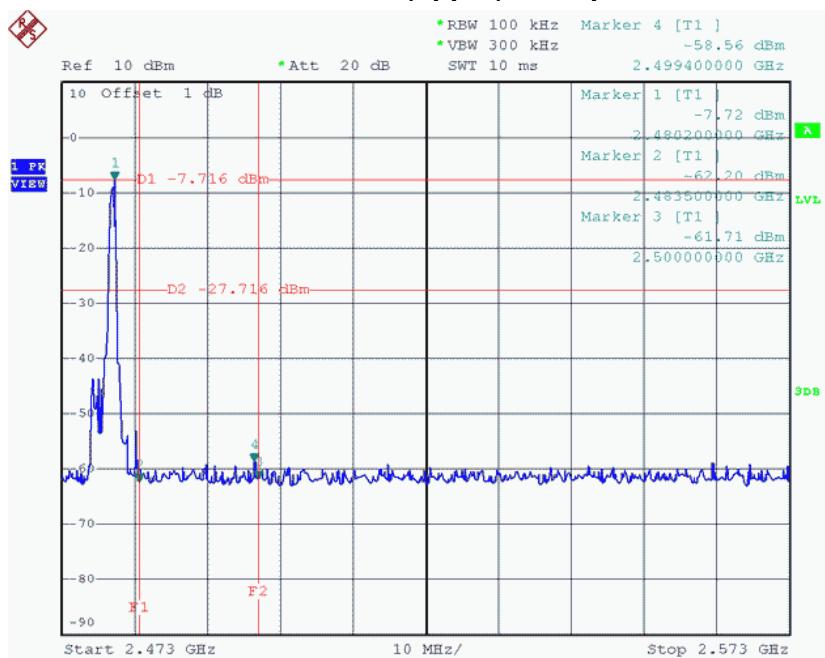
Test Mode : CH00, CH19 , CH39 - 1Mbps

CH00 (Lower) - 1Mbps

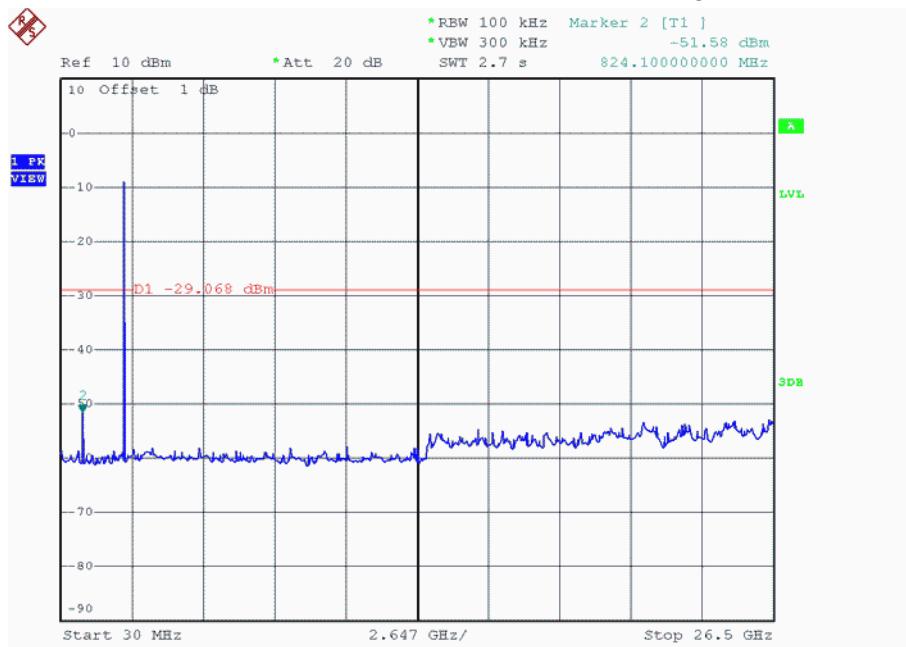


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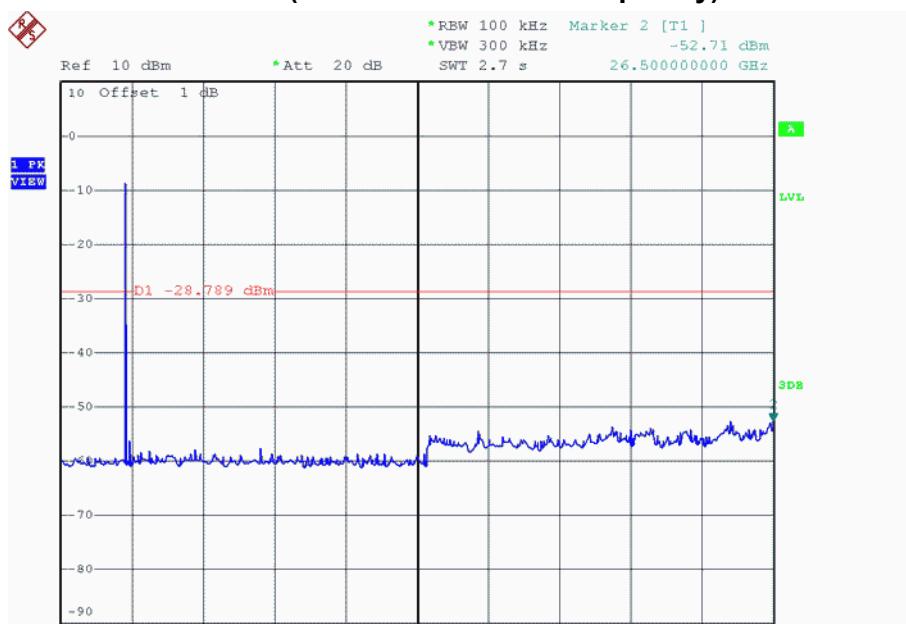
CH39 (upper) - 1Mbps



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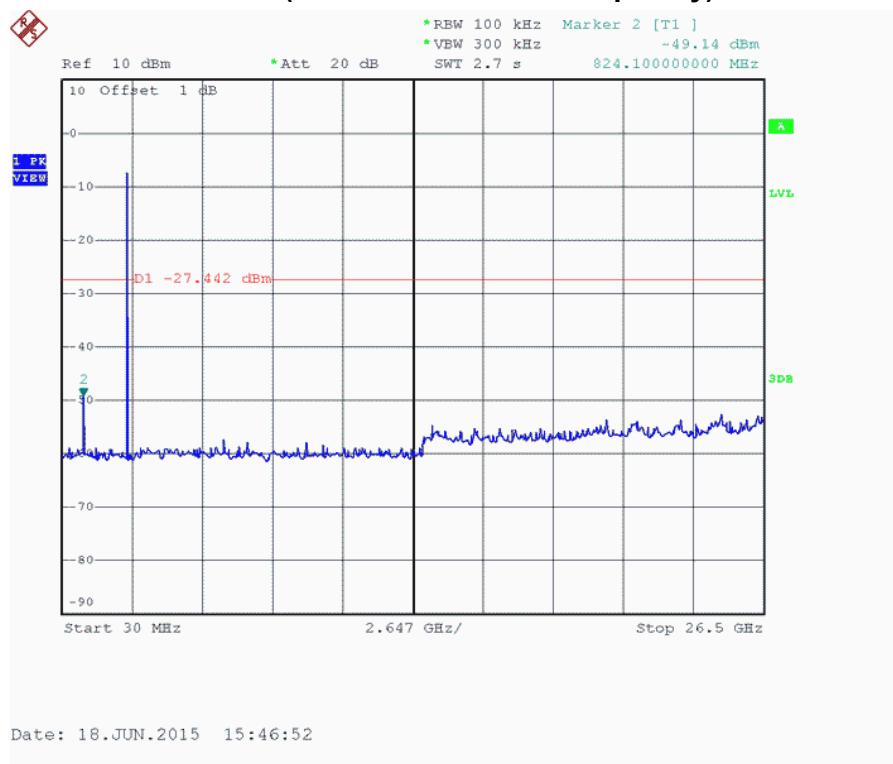
CH00 (10 Harmonic of the frequency)

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CH19 (10 Harmonic of the frequency)

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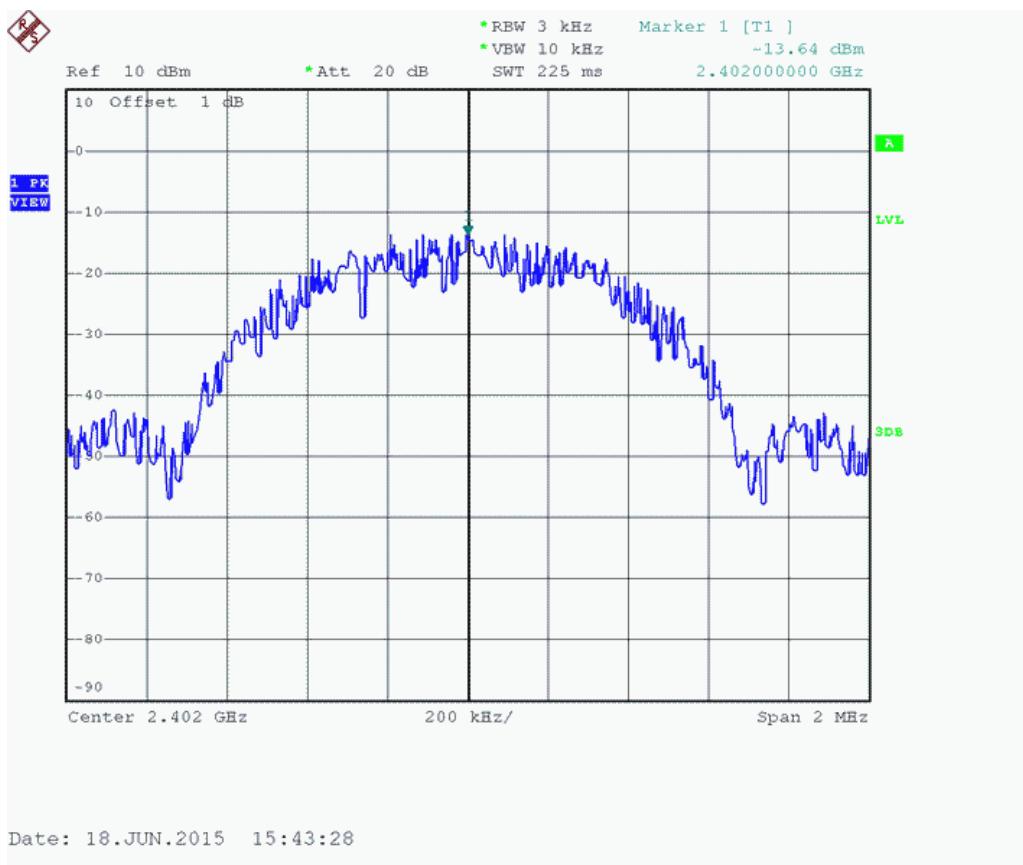
CH39 (10 Harmonic of the frequency)



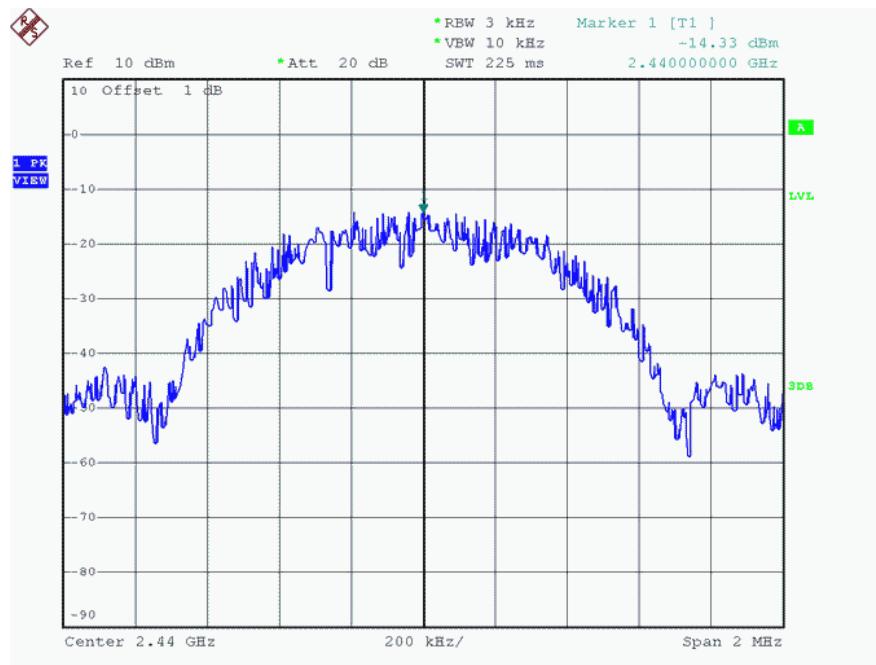
ATTACHMENT H - POWER SPECTRAL DENSITY TEST

Frequency (MHz)	Power Density (dBm)	Max. Limit (dBm)	Result
2402	-13.64	8	Complies
2440	-14.33	8	Complies
2480	-15.24	8	Complies

TX CH00

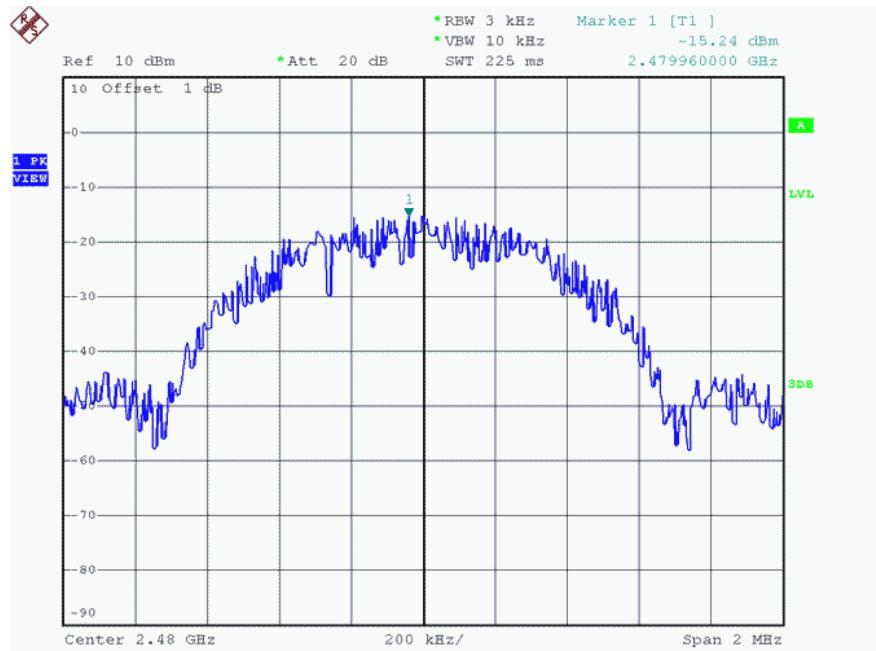


TX CH19



Date: 18.JUN.2015 15:45:17

TX CH39



Date: 18.JUN.2015 15:46:58