

FCC Radio Test Report

FCC ID: YWTWF7681KMX

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

Project No. : 1407C118
Equipment : UART WiFi Module
Model Name : GWF-KM22
Applicant : Shenzhen Ogemray Technology Co.,Ltd.
Address : 3/F~4/F,NO.5 Bldg, Dongwu Industrial Park,
Donghuan 1st Road, Longhua Town, Shenzhen, China

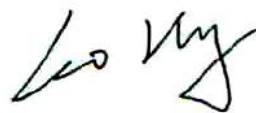
Date of Receipt : Jul. 16, 2014
Date of Test : Jul. 16, 2014~ Sep. 04, 2014
Issued Date : Sep. 09, 2014
Tested by : BTL Inc.

Testing Engineer :



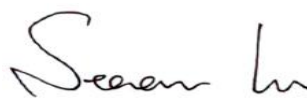
(David Mao)

Technical Manager :



(Leo Hung)

Authorized Signatory :



(Steven Lu)

B T L I N C .

No.3, Jinshagang 1st Road, Shixia, Dalang Town, Dongguan,
Guangdong, China.

TEL: +86-769-8318-3000 FAX: +86-769-8319-6000

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**.

BTL's reports apply only to the specific samples tested under conditions. It is manufacture's responsibility to ensure that additional production units of this model are manufactured with the identical electrical and mechanical components. **BTL** shall have no liability for any declarations, inferences or generalizations drawn by the client or others from **BTL** issued reports.

BTL's reports must not be used by the client to claim product endorsement by the authorities or any agency of the Government.

This report is the confidential property of the client. As a mutual protection to the clients, the public and **BTL-self**, extracts from the test report shall not be reproduced except in full with **BTL's** authorized written approval.

BTL's laboratory quality assurance procedures are in compliance with the **ISO Guide 17025** requirements, and accredited by the conformity assessment authorities listed in this test report.

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.

Table of Contents	Page
1 . CERTIFICATION	6
2 . SUMMARY OF TEST RESULTS	7
2.1 TEST FACILITY	8
2.2 MEASUREMENT UNCERTAINTY	8
3 . GENERAL INFORMATION	9
3.1 GENERAL DESCRIPTION OF EUT	9
3.2 DESCRIPTION OF TEST MODES	11
3.3 TABLE OF PARAMETERS OF TEXT SOFTWARE SETTING	12
3.4 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED	13
3.5 DESCRIPTION OF SUPPORT UNITS	14
4 . EMC EMISSION TEST	15
4.1 CONDUCTED EMISSION MEASUREMENT	15
4.1.1 POWER LINE CONDUCTED EMISSION LIMITS	15
4.1.2 TEST PROCEDURE	15
4.1.3 DEVIATION FROM TEST STANDARD	15
4.1.4 TEST SETUP	16
4.1.5 EUT OPERATING CONDITIONS	16
4.1.6 EUT TEST CONDITIONS	16
4.1.7 TEST RESULTS	16
4.2 RADIATED EMISSION MEASUREMENT	17
4.2.1 RADIATED EMISSION LIMITS	17
4.2.2 TEST PROCEDURE	18
4.2.3 DEVIATION FROM TEST STANDARD	18
4.2.4 TEST SETUP	18
4.2.5 EUT OPERATING CONDITIONS	19
4.2.6 EUT TEST CONDITIONS	19
4.2.7 TEST RESULTS (9KHZ TO 30MHZ)	20
4.2.8 TEST RESULTS (BETWEEN 30MHZ TO 1000 MHZ)	20
4.2.9 TEST RESULTS (ABOVE 1000 MHZ)	20
5 . BANDWIDTH TEST	21
5.1 APPLIED PROCEDURES	21
5.1.1 TEST PROCEDURE	21
5.1.2 DEVIATION FROM STANDARD	21
5.1.3 TEST SETUP	21
5.1.4 EUT OPERATION CONDITIONS	21
5.1.5 EUT TEST CONDITIONS	21
5.1.6 TEST RESULTS	21

Table of Contents	Page
6 . MAXIMUM PEAK CONDUCTED OUTPUT POWER TEST	22
6.1 APPLIED PROCEDURES / LIMIT	22
6.1.1 TEST PROCEDURE	22
6.1.2 DEVIATION FROM STANDARD	22
6.1.3 TEST SETUP	22
6.1.4 EUT OPERATION CONDITIONS	22
6.1.5 EUT TEST CONDITIONS	22
6.1.6 TEST RESULTS	22
7 . ANTENNA CONDUCTED SPURIOUS EMISSION	23
7.1 APPLIED PROCEDURES / LIMIT	23
7.1.1 TEST PROCEDURE	23
7.1.2 DEVIATION FROM STANDARD	23
7.1.3 TEST SETUP	23
7.1.4 EUT OPERATION CONDITIONS	23
7.1.5 EUT TEST CONDITIONS	23
7.1.6 TEST RESULTS	23
8 . POWER SPECTRAL DENSITY TEST	24
8.1 APPLIED PROCEDURES / LIMIT	24
8.1.1 TEST PROCEDURE	24
8.1.2 DEVIATION FROM STANDARD	24
8.1.3 TEST SETUP	24
8.1.4 EUT OPERATION CONDITIONS	24
8.1.5 EUT TEST CONDITIONS	24
8.1.6 TEST RESULTS	24
9 . MEASUREMENT INSTRUMENTS LIST	25
10 . EUT TEST PHOTO	27
ATTACHMENT A - CONDUCTED EMISSION	31
ATTACHMENT B - RADIATED EMISSION (9KHZ TO 30MHZ)	34
ATTACHMENT C - RADIATED EMISSION (30MHZ TO 1000MHZ)	36
ATTACHMENT D - RADIATED EMISSION (ABOVE 1000MHZ)	43
ATTACHMENT E - BANDWIDTH	80
ATTACHMENT F - MAXIMUM PEAK CONDUCTED OUTPUT POWER	87
ATTACHMENT G - ANTENNA CONDUCTED SPURIOUS EMISSION	89
ATTACHMENT H - POWER SPECTRAL DENSITY	102

REPORT ISSUED HISTORY

Issued No.	Description	Issued Date
BTL-FCCP-1-1407C118	Original Issue.	Sep. 09, 2014

1. CERTIFICATION

Equipment : UART WiFi Module
Brand Name : N/A
Model Name : GWF-KM22
Applicant : Shenzhen Ogemray Technology Co.,Ltd.
Manufacturer: Shenzhen Ogemray Technology Co.,Ltd.
Address : 3/F~4/F,NO.5 Bldg, Dongwu Industrial Park, Donghuan 1st Road, Longhua Town, Shenzhen, China
Factory : Shenzhen Ogemray Technology Co.,Ltd.
Address : 3/F~4/F,NO.5 Bldg, Dongwu Industrial Park, Donghuan 1st Road, Longhua Town, Shenzhen, China
Date of Test : Jul. 16, 2014~ Sep. 04, 2014
Test Sample : ENGINEERING SAMPLE
Standard(s) : FCC Part15, Subpart C: 2013 (15.247) / ANSI C63.4-2009

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-FCCP-1-1407C118) 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): 47 CFR Part 15, Subpart C: 2013			
Standard(s) Section	Test Item	Judgment	Remark
FCC			
15.207	Conducted Emission	PASS	
15.247(d)	Antenna conducted Spurious Emission	PASS	
15.247(a)(1)	Hopping Channel Separation	PASS	
15.247(b)(1)	Peak Output Power	PASS	
15.247(d)15.209	Radiated Spurious Emission	PASS	
15.247(a)(1)(iii)	Number of Hopping Frequency	PASS	
15.247(a)(1)(iii)	Dwell Time	PASS	
15.205	Restricted Bands	PASS	
15.203	Antenna Requirement	PASS	

NOTE:

(1) "N/A" denotes test is not applicable in this test report.

(2) The test follows FCC KDB Publication No. 558074 D01 DTS Meas Guidance v03r02 (Measurement Guidelines of DTS)

2.1 TEST FACILITY

The test facilities used to collect the test data in this report is **DG-C02/DG-CB03** at the location of No.3,Jinshagang 1st Road, Shixia, Dalang Town, Dongguan, Guangdong, China.523792
BTL's test firm number for FCC: 319330

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 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	3.4	

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	

3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

Equipment	UART WiFi Module	
Brand Name	N/A	
Model Name	GWF-KM22	
Model Difference	N/A	
Product Description	Operation Frequency	2412~2462 MHz
	Modulation Technology	802.11b:DSSS 802.11g:OFDM 802.11n:OFDM
	Bit Rate of Transmitter	802.11b: 11/5.5/2/1 Mbps 802.11g: 54/48/36/24/18/12/9/6 Mbps 802.11n up to 115200bps
	Output Power (Max.)	802.11b: 20.03dBm 802.11g: 22.02dBm 802.11n(20MHz): 20.87dBm
Power Source	Supplied from system	
Power Rating	DC 3.3V	

Note:

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

2. Channel List:

CH01 – CH11 for 802.11b, 802.11g, 802.11n(20MHz)							
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
01	2412	04	2427	07	2442	10	2457
02	2417	05	2432	08	2447	11	2462
03	2422	06	2437	09	2452		

3. Table for Filed Antenna

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)
1	N/A	N/A	Printed	N/A	2

3.2 DESCRIPTION OF TEST MODES

To investigate the maximum EMI emission characteristics generated from EUT, the test system was pre-scanning tested based on the consideration of following EUT operation mode or test configuration mode which possibly 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 B MODE CHANNEL 01/06/11
Mode 2	TX G MODE CHANNEL 01/06/11
Mode 3	TX N-20MHZ MODE CHANNEL 01/06/11
Mode 4	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 5	TX MODE

For Radiated Test	
Final Test Mode	Description
Mode 1	TX B MODE CHANNEL 01/06/11
Mode 2	TX G MODE CHANNEL 01/06/11
Mode 3	TX N-20MHZ MODE CHANNEL 01/06/11

Note:

- (1) The measurements are performed at the high, middle, low available channels.
- (2) 802.11b mode: DBPSK (1Mbps)
 802.11g mode: OFDM (6Mbps)
 802.11n HT20 mode : BPSK (6.5Mbps)
 For radiated emission tests, the highest output powers were set for final test.
- (3) For radiated below 1G test, the 802.11b is found to be the worst case and recorded.

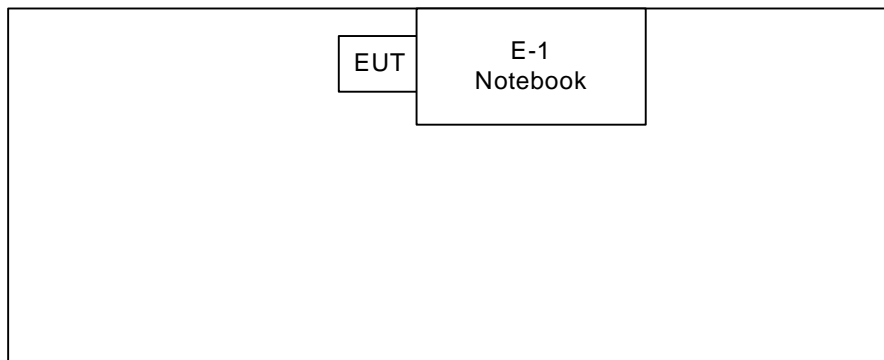
3.3 TABLE OF PARAMETERS OF TEXT SOFTWARE SETTING

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

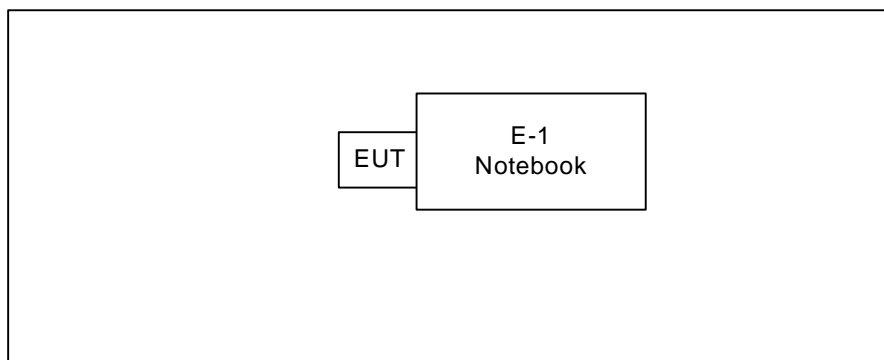
Test software version	GUI_Demo_01.05.29_8192		
Frequency	2412 MHz	2437 MHz	2462 MHz
IEEE 802.11b	6	6	6
IEEE 802.11G	0	0	0
IEEE 802.11N20	0	0	0

3.4 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

Conducted TX Mode:



Radiated TX Mode:



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	Series No.	Note
E-1	Notebook	DELL	INSPIRON 1420	DOC	N/A	

Item	Shielded Type	Ferrite Core	Length	Note
-	-	-	-	

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

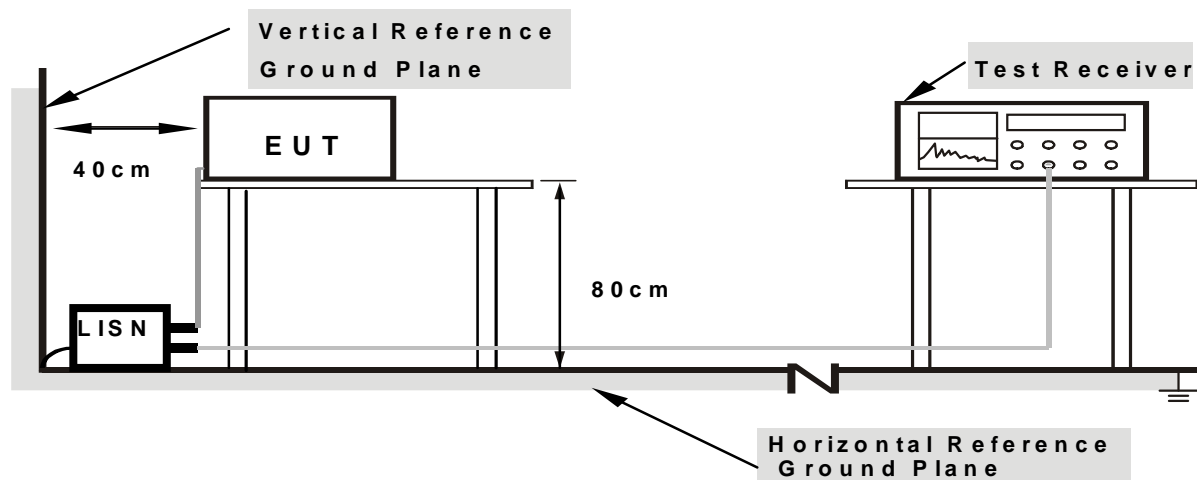
4.1.2 TEST PROCEDURE

- 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.

4.1.3 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 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.

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) & Annex 8 (A8.5), then the 15.209(a) 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).

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

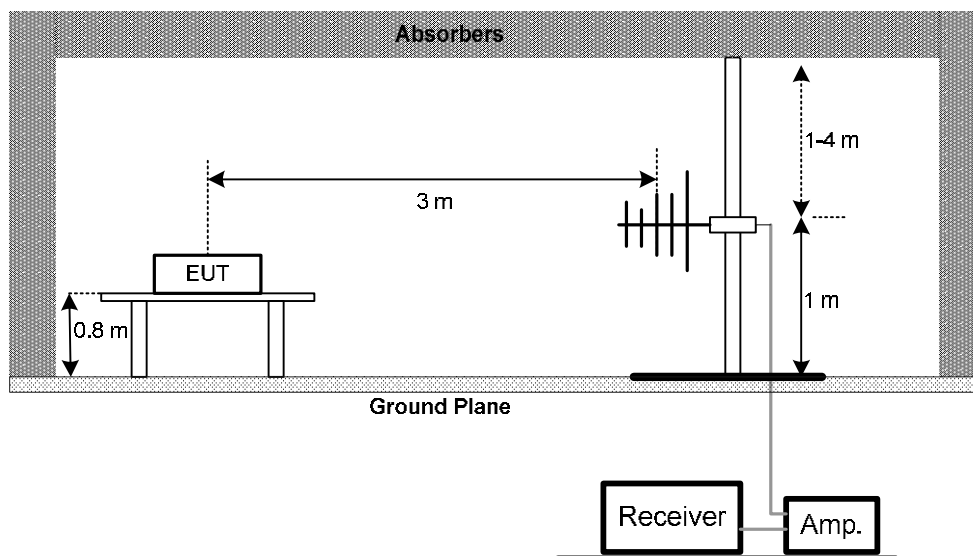
- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(below 1GHz)
- b. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(above 1GHz)
- 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 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.
- 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.

4.2.3 DEVIATION FROM TEST STANDARD

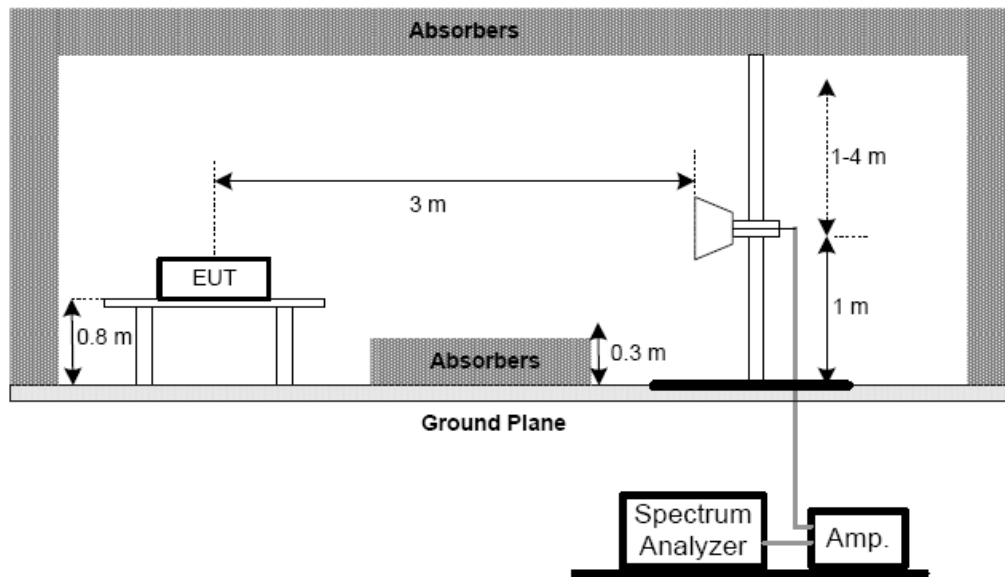
No deviation

4.2.4 TEST SETUP

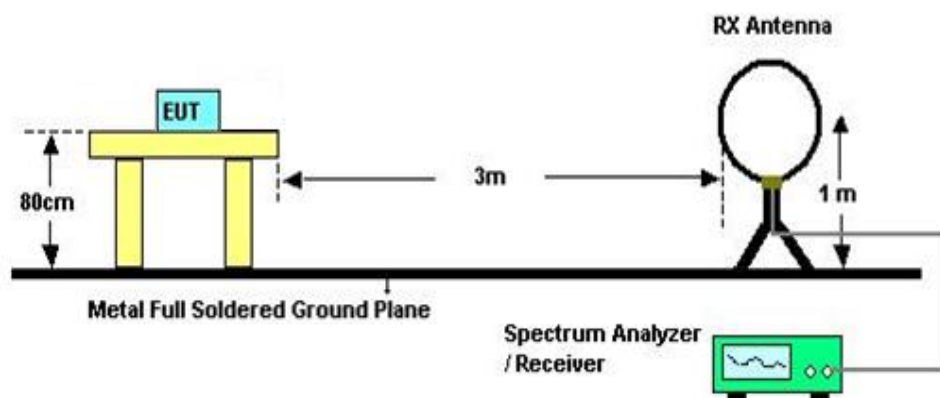
(A) Radiated Emission Test Set-Up Frequency Below 1 GHz



(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: DC 3.3V

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.

4.2.9 TEST RESULTS (ABOVE 1000 MHZ)

Please refer to the Attachment D.

5. BANDWIDTH TEST

5.1 Applied procedures

FCC Part15 (15.247) , Subpart C			
Section	Test Item	Frequency Range (MHz)	Result
15.247(a)(2)	Bandwidth	2400-2483.5	PASS

5.1.1 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 = 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: DC 3.3V

5.1.6 TEST RESULTS

Please refer to the Attachment E.

6. MAXIMUM PEAK CONDUCTED OUTPUT POWER TEST

6.1 Applied procedures / limit

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

6.1.1 TEST PROCEDURE

- The EUT was directly connected to the power meter and antenna output port as show in the block diagram below,
- The maximum peak conducted output power was performed in accordance with method 9.1.3 of FCC KDB 558074 D01 DTS Meas Guidance v03r02.

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. Transmit output power was measured while the host equipment supply voltage was varied from 85 % to 115 % of the nominal rated supply voltage. No change in transmit output power was observed.

6.1.5 EUT TEST CONDITIONS

Temperature: 25°C Relative Humidity: 55% Test Voltage: DC 3.3V

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 intentional radiator is operating, the radio frequency power that is produced by the intentional radiator 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 measurement, provided the transmitter demonstrates compliance with the peak conducted power limits.

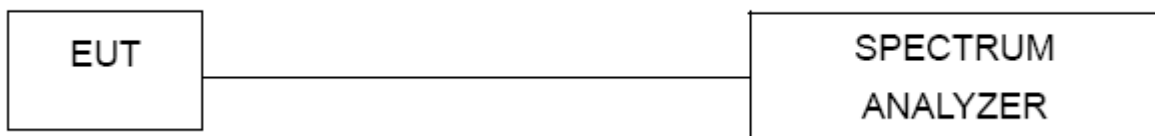
7.1.1 TEST PROCEDURE

- 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 = Auto.

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 TEST CONDITIONS

Temperature: 25°C Relative Humidity: 55% Test Voltage: DC 3.3V

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				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(e)	Power Spectral Density	8 dBm (in any 3KHz)	2400-2483.5	PASS

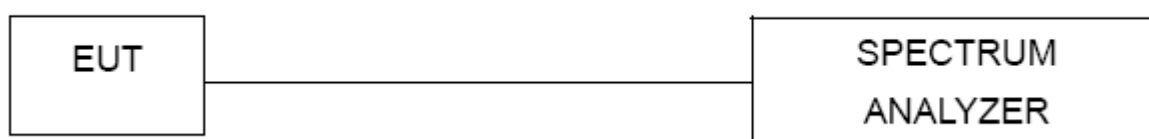
8.1.1 TEST PROCEDURE

- 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=10KHz, 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: DC 3.3V

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. 29, 2015
2	LISN	R&S	ENV216	101447	Mar. 29, 2015
3	Test Cable	N/A	C_17	N/A	Mar. 14, 2015
4	EMI TEST RECEIVER	R&S	ESCS30	833364/017	Mar. 29, 2015
5	50Ω Terminator	SHX	TF2-3G-A	08122902	Mar. 29, 2015

Radiated Emission Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Antenna	EMCO	3142C	00066462	Mar. 29, 2015
2	Antenna	EMCO	3142C	00066464	Mar. 29, 2015
3	Amplifier	Agilent	8447D	2944A11203	Nov. 11, 2014
4	Amplifier	Agilent	8447D	2944A11204	Nov. 11, 2014
5	Spectrum Analyzer	Agilent	E4443A	MY48250370	Nov. 11, 2014
6	RF Pre-selector	Agilent	N9039A	MY46520201	Nov. 11, 2014
7	Test Cable	N/A	Cable_5m_8m_15m	N/A	Jan. 14, 2015
8	Test Cable	N/A	Cable_5m_11m_15m	N/A	Jan. 14, 2015
9	Spectrum Analyzer	Agilent	E4447A	MY48250208	Nov. 11, 2014
10	RF Pre-selector	Agilent	N9039A	MY46520214	Nov. 11, 2014
11	Multi-Device Controller	ETS-Lindgren	2090	N/A	N/A
12	Horn Antenna	EMCO	3115	9605-4803	Mar. 29, 2015
13	Amplifier	Agilent	8449B	3008A02584	Nov. 11, 2014
14	Spectrum Analyzer	Agilent	E4447A	MY48250208	Nov. 11, 2014
15	Test Cable	Huber+Suhner	SUCOFLEX_1 5m_4m	N/A	Jan. 14, 2015

6dB Bandwidth Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP 40	100185	Nov. 11, 2014

Peak Output Power Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	P-series Power meter	Agilent	N1911A	MY45100473	Mar. 29, 2015
2	Wireband Power sensor	Agilent	N1921A	MY51100041	Mar. 29, 2015

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. 11, 2014

Power Spectral Density Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP 40	100185	Nov. 11, 2014

Remark: "N/A" denotes no model name, serial no. or calibration specified.
 All calibration period of equipment list is one year.

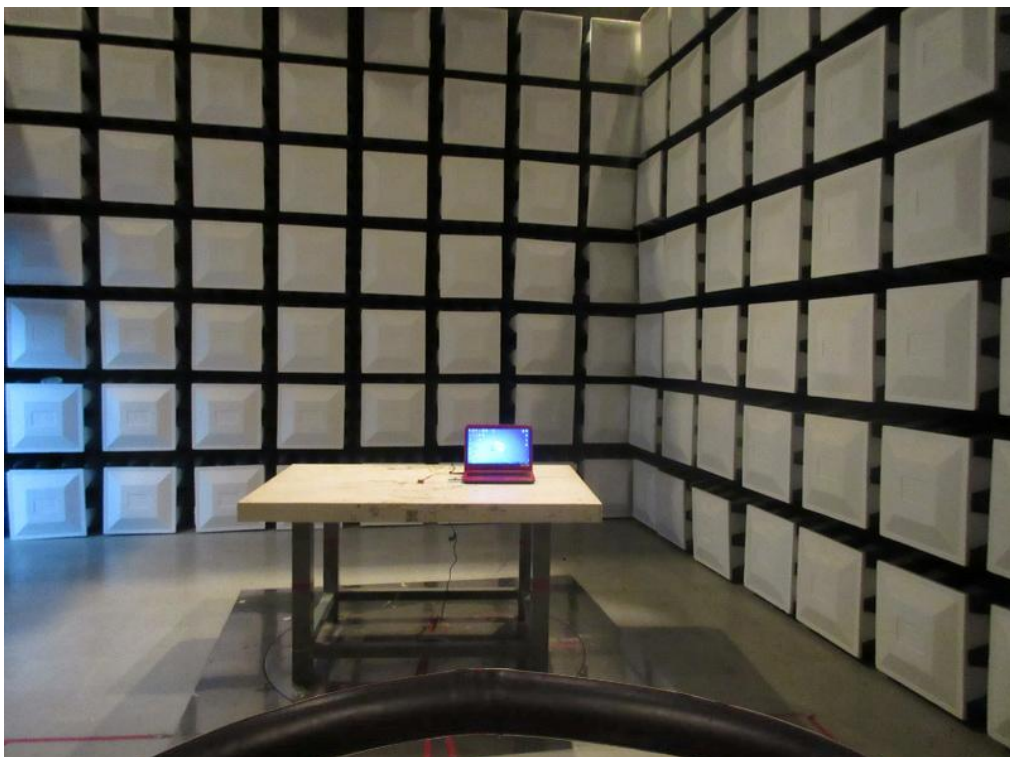
10. EUT TEST PHOTO

Conducted Measurement Photos



Radiated Measurement Photos

9KHz to 30MHz



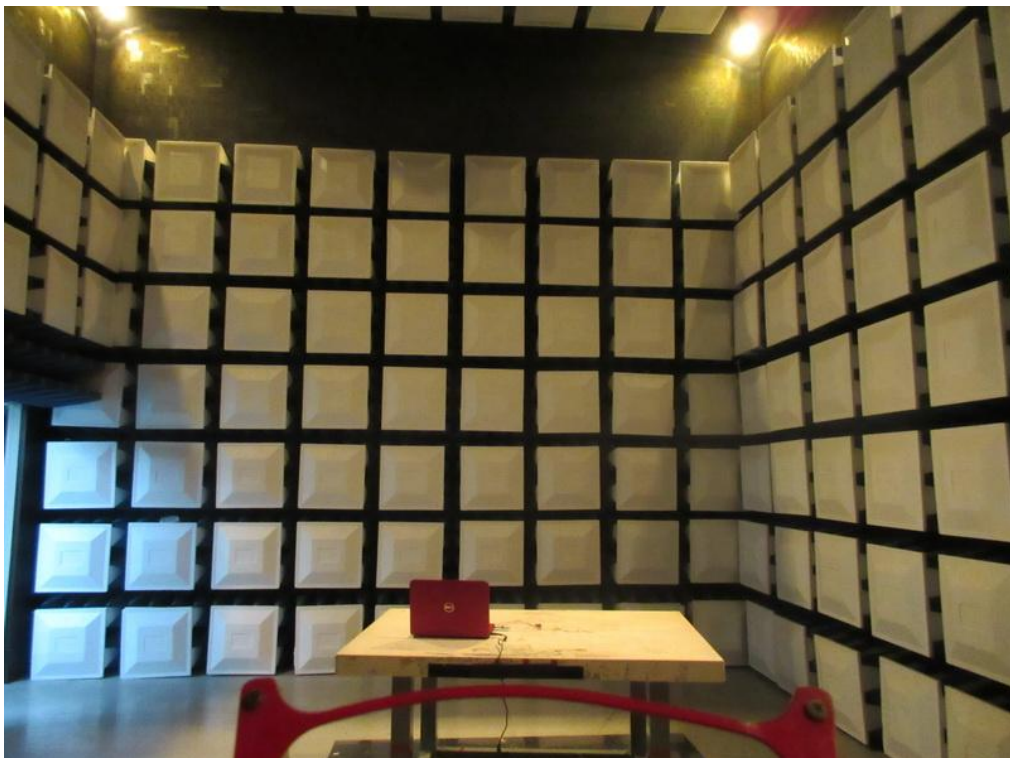
Radiated Measurement Photos

30MHz to 1000MHz



Radiated Measurement Photos

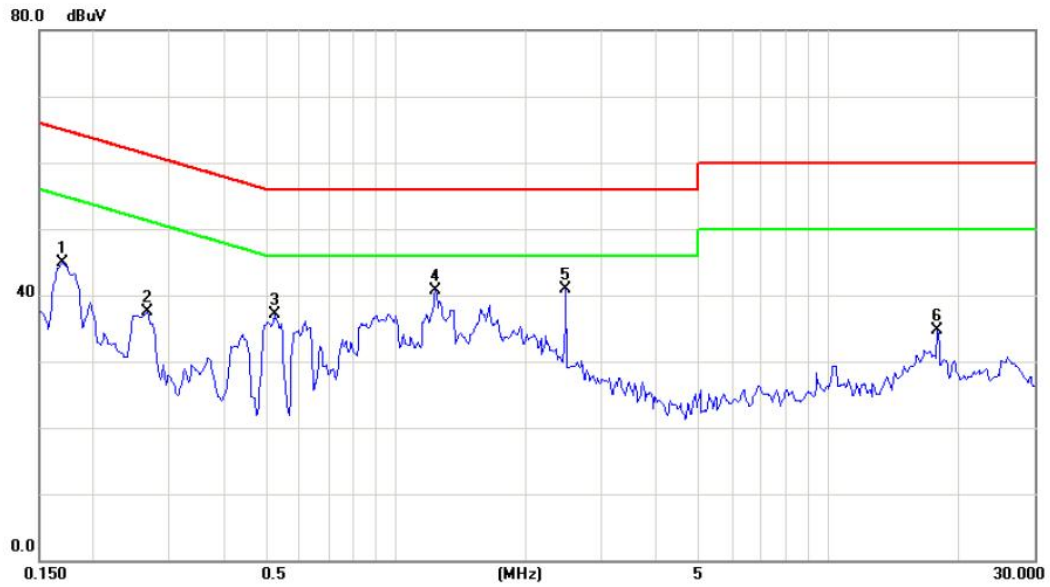
Above 1000MHz



ATTACHMENT A - CONDUCTED EMISSION

Test Mode : TX MODE

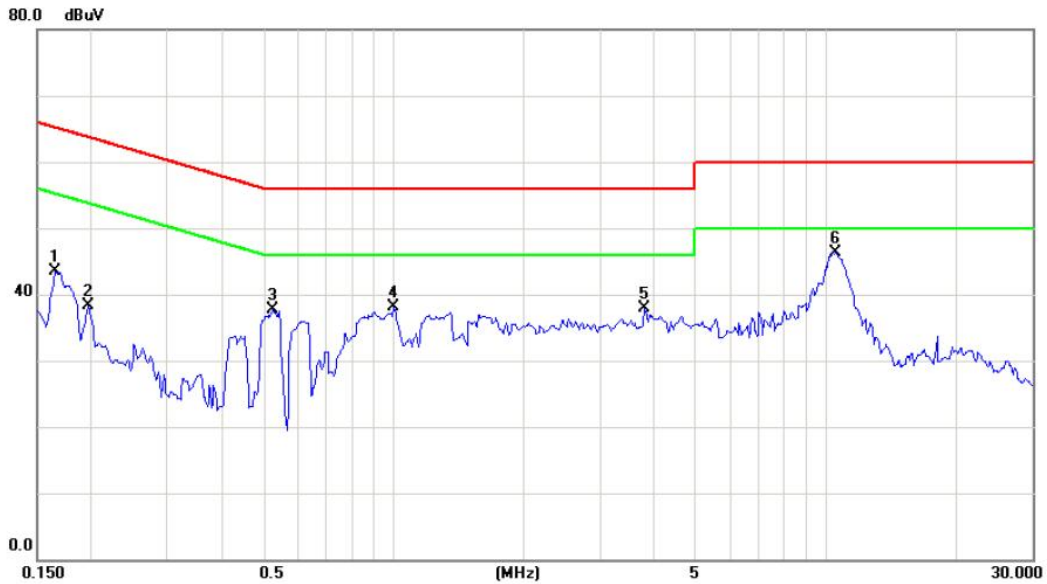
Line



No. Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1	0.1695	35.43	9.53	44.96	64.98	-20.02	peak	
2	0.2672	27.92	9.58	37.50	61.20	-23.70	peak	
3	0.5250	27.47	9.69	37.16	56.00	-18.84	peak	
4	1.2398	31.06	9.71	40.77	56.00	-15.23	peak	
5 *	2.4781	31.26	9.73	40.99	56.00	-15.01	peak	
6	17.9220	24.40	10.37	34.77	60.00	-25.23	peak	

Test Mode : TX MODE

Neutral



No. Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1	0.1655	33.79	9.62	43.41	65.18	-21.77	peak	
2	0.1970	28.65	9.61	38.26	63.74	-25.48	peak	
3	0.5250	28.11	9.64	37.75	56.00	-18.25	peak	
4	1.0016	28.42	9.67	38.09	56.00	-17.91	peak	
5	3.8047	28.08	9.82	37.90	56.00	-18.10	peak	
6 *	10.5586	36.17	10.11	46.28	60.00	-13.72	peak	

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

Test Mode:	TX Mode 2412MHz
------------	-----------------

Freq. (MHz)	Ant. 0°/90°	Reading(RA) (dBuV)	Corr.Factor(CF) (dB)	Measured(FS) (dBuV/m)	Limits(QP) (dBuV/m)	Margin (dB)	Note
0.0094	0°	10.20	24.97	35.17	108.14	-72.97	AVG
0.0094	0°	12.72	24.97	37.69	128.14	-90.45	PEAK
0.0238	0°	14.61	24.06	38.67	100.07	-61.40	AVG
0.0238	0°	18.05	24.06	42.11	120.07	-77.96	PEAK
0.0315	0°	18.69	23.57	42.26	97.64	-55.38	AVG
0.0315	0°	22.32	23.57	45.89	117.64	-71.75	PEAK
0.0426	0°	21.35	22.87	44.22	95.02	-50.80	AVG
0.0426	0°	23.60	22.87	46.47	115.02	-68.55	PEAK
0.4919	0°	18.29	19.82	38.11	73.77	-35.66	QP
1.7155	0°	20.53	19.53	40.06	69.54	-29.48	QP

Freq. (MHz)	Ant. 0°/90°	Reading(RA) (dBuV)	Corr.Factor(CF) (dB)	Measured(FS) (dBuV/m)	Limits(QP) (dBuV/m)	Margin (dB)	Note
0.0092	90°	12.64	24.30	36.94	128.33	-91.39	AVG
0.0092	90°	13.42	24.30	37.72	148.33	-110.61	PEAK
0.0223	90°	10.18	24.15	34.33	120.64	-86.30	AVG
0.0223	90°	23.98	24.15	48.13	140.64	-92.50	PEAK
0.0346	90°	17.30	23.38	40.68	116.82	-76.15	AVG
0.0346	90°	20.27	23.38	43.65	136.82	-93.18	PEAK
0.0421	90°	19.56	22.90	42.46	115.12	-72.66	AVG
0.0421	90°	23.31	22.90	46.21	135.12	-88.91	PEAK
0.4912	90°	24.38	19.82	44.20	73.78	-29.58	QP
1.7123	90°	18.90	19.53	38.43	69.54	-31.11	QP

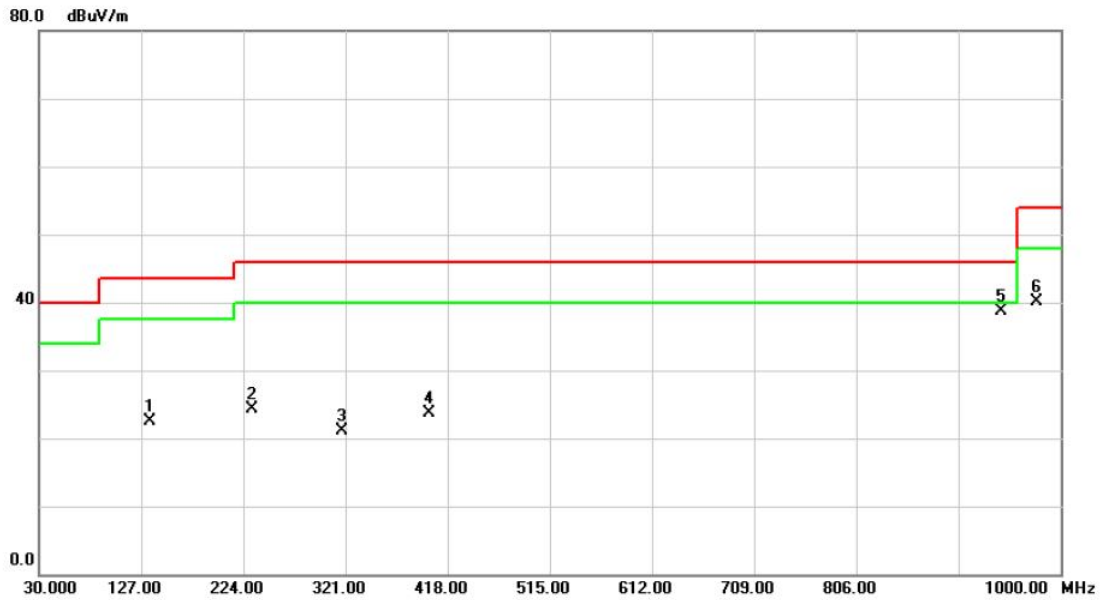
Remark:

- (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 (specific distance / test distance) (dB);
- (3) Limit line = specific limits (dBuV) + distance extrapolation factor.

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

Test Mode: TX B MODE CHANNEL 01

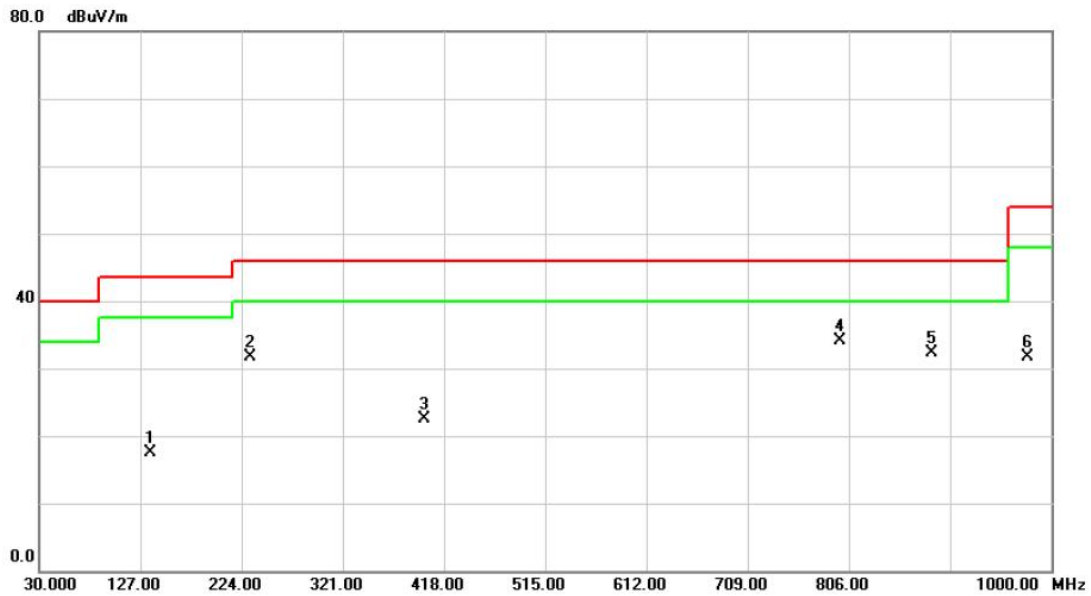
Vertical



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1		135.7300	45.01	-22.55	22.46	43.50	-21.04	peak	
2		231.7600	42.53	-18.27	24.26	46.00	-21.74	peak	
3		317.1200	36.63	-15.58	21.05	46.00	-24.95	peak	
4		400.5400	37.29	-13.52	23.77	46.00	-22.23	peak	
5	*	943.7400	42.33	-3.67	38.66	46.00	-7.34	peak	
6		976.7200	43.44	-3.26	40.18	54.00	-13.82	peak	

Test Mode: TX B MODE CHANNEL 01

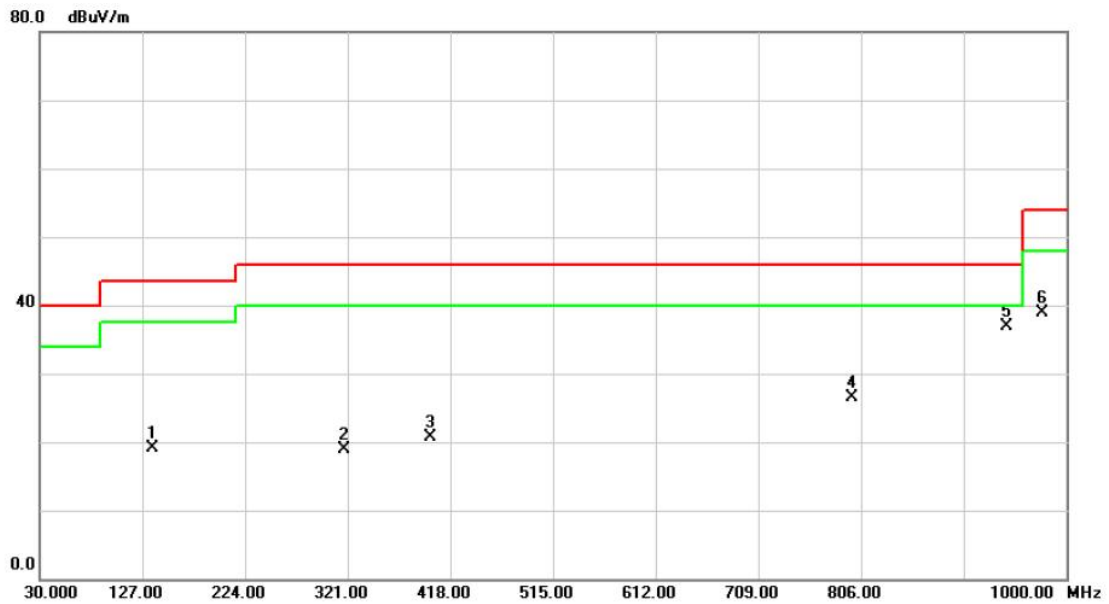
Horizontal



No. Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1	136.7000	40.06	-22.53	17.53	43.50	-25.97	peak	
2	232.7300	49.83	-18.21	31.62	46.00	-14.38	peak	
3	399.5700	36.13	-13.53	22.60	46.00	-23.40	peak	
4 *	797.2700	40.51	-6.35	34.16	46.00	-11.84	peak	
5	885.5400	37.29	-4.89	32.40	46.00	-13.60	peak	
6	976.7200	35.01	-3.26	31.75	54.00	-22.25	peak	

Test Mode: TX B MODE CHANNEL 06

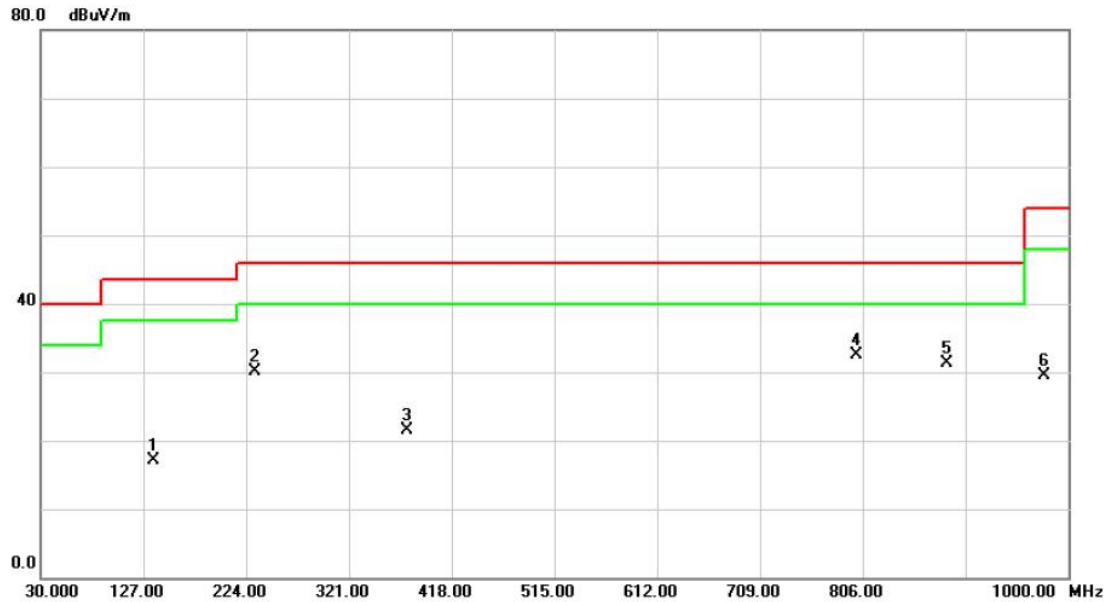
Vertical



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1		136.7000	41.58	-22.53	19.05	43.50	-24.45	peak	
2		318.0900	34.48	-15.54	18.94	46.00	-27.06	peak	
3		399.5700	34.24	-13.53	20.71	46.00	-25.29	peak	
4		797.2700	32.84	-6.35	26.49	46.00	-19.51	peak	
5	*	943.7400	40.50	-3.67	36.83	46.00	-9.17	peak	
6		976.7200	42.14	-3.26	38.88	54.00	-15.12	peak	

Test Mode: TX B MODE CHANNEL 06

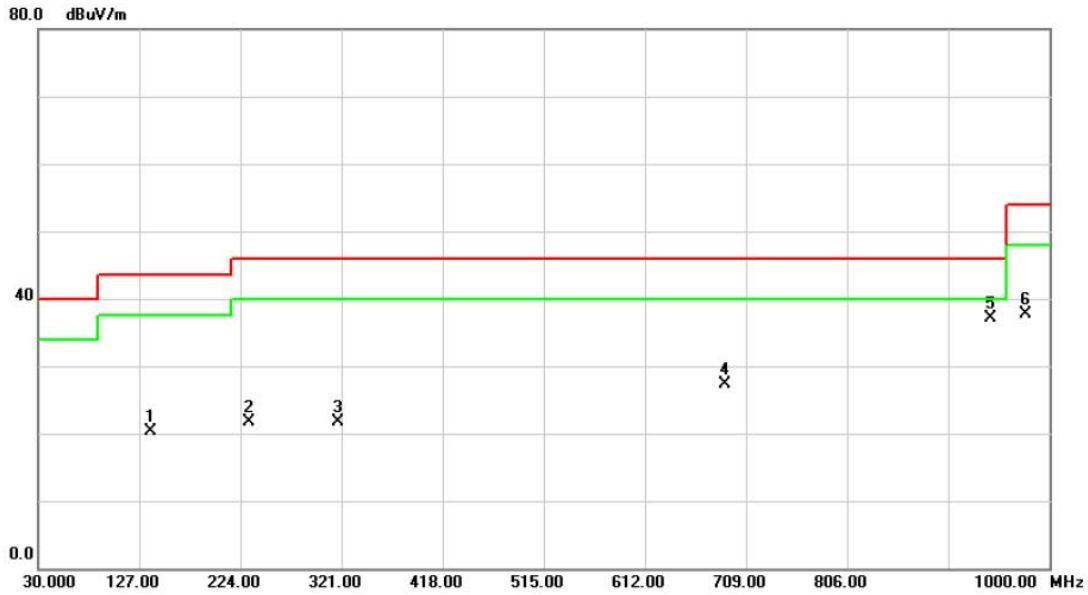
Horizontal



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1		136.7000	39.58	-22.53	17.05	43.50	-26.45	peak	
2		232.7300	48.26	-18.21	30.05	46.00	-15.95	peak	
3		375.3200	34.95	-13.47	21.48	46.00	-24.52	peak	
4	*	800.1800	38.81	-6.34	32.47	46.00	-13.53	peak	
5		885.5400	36.16	-4.89	31.27	46.00	-14.73	peak	
6		976.7200	32.70	-3.26	29.44	54.00	-24.56	peak	

Test Mode: TX B MODE CHANNEL 11

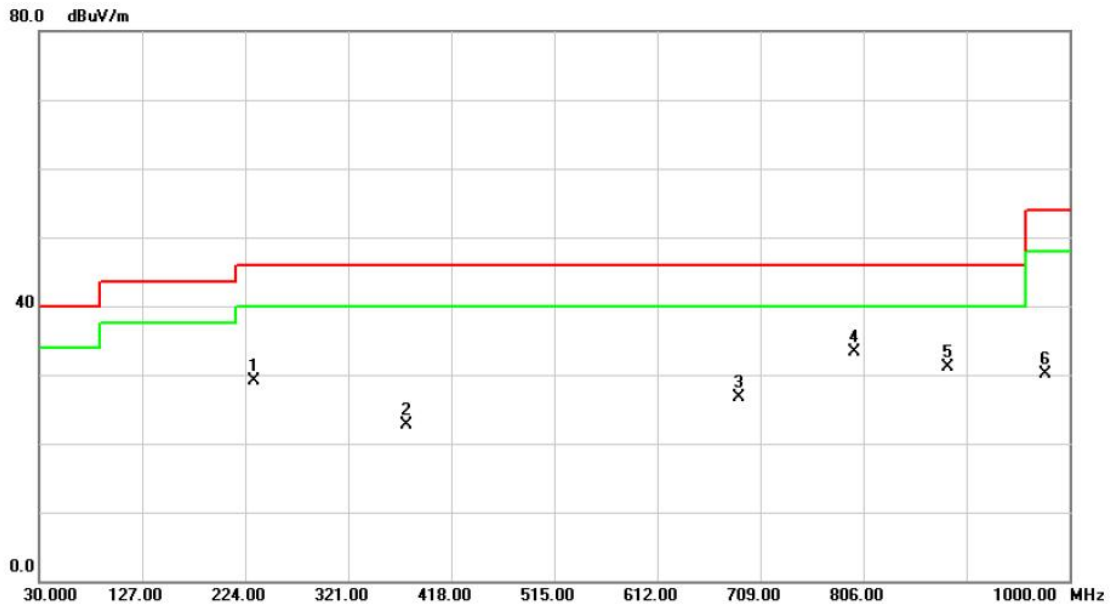
Vertical



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1		137.6700	42.86	-22.51	20.35	43.50	-23.15	peak	
2		231.7600	39.88	-18.27	21.61	46.00	-24.39	peak	
3		318.0900	37.16	-15.54	21.62	46.00	-24.38	peak	
4		688.6300	34.12	-6.77	27.35	46.00	-18.65	peak	
5	*	943.7400	40.83	-3.67	37.16	46.00	-8.84	peak	
6		976.7200	40.97	-3.26	37.71	54.00	-16.29	peak	

Test Mode: TX B MODE CHANNEL 11

Horizontal

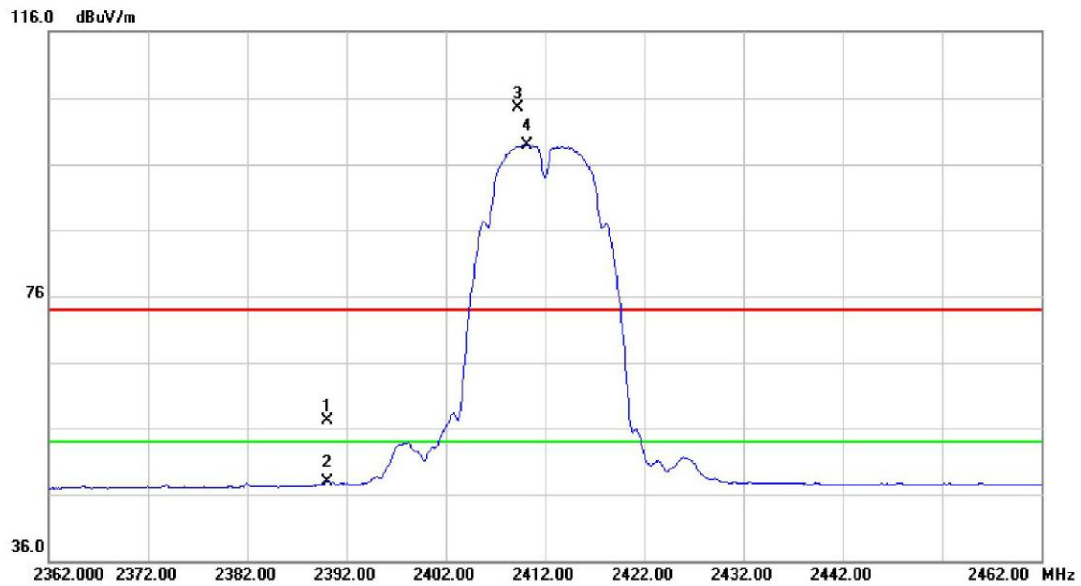


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1		232.7300	47.27	-18.21	29.06	46.00	-16.94	peak	
2		375.3200	36.24	-13.47	22.77	46.00	-23.23	peak	
3		688.6300	33.57	-6.77	26.80	46.00	-19.20	peak	
4	*	797.2700	39.61	-6.35	33.26	46.00	-12.74	peak	
5		885.5400	35.93	-4.89	31.04	46.00	-14.96	peak	
6		976.7200	33.41	-3.26	30.15	54.00	-23.85	peak	

ATTACHMENT D - RADIATED EMISSION (ABOVE 1000MHZ)

Orthogonal Axis :	X
Test Mode :	TX B MODE 2412MHz

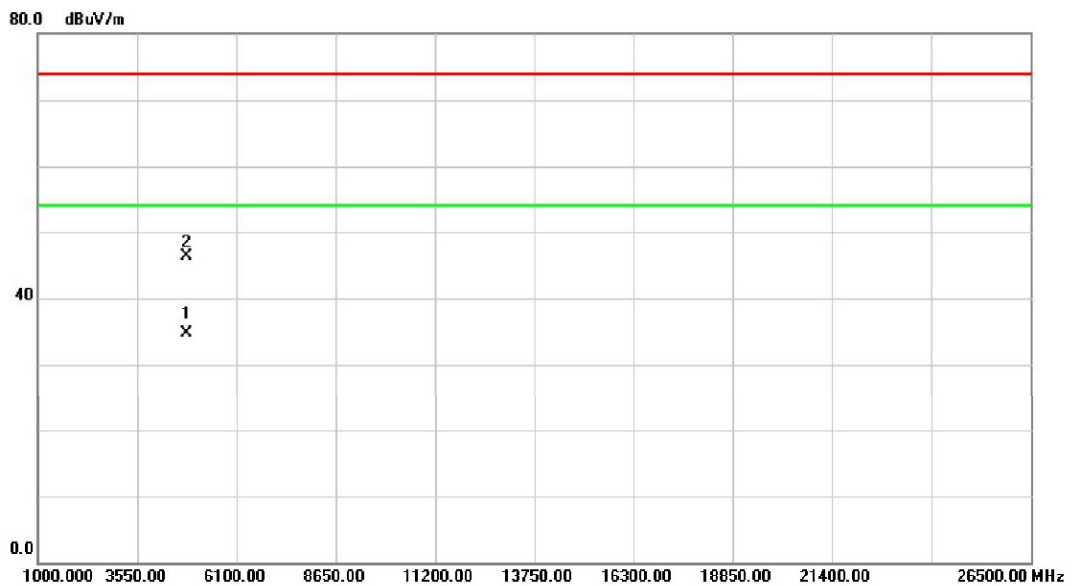
Vertical



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1		2390.000	23.78	33.38	57.16	74.00	-16.84	peak	
2		2390.000	14.56	33.38	47.94	54.00	-6.06	AVG	
3	X	2409.300	71.08	33.43	104.51	74.00	30.51	peak	no limit
4	*	2410.200	65.56	33.44	99.00	54.00	45.00	AVG	no limit

Orthogonal Axis :	X
Test Mode :	TX B MODE 2412MHz

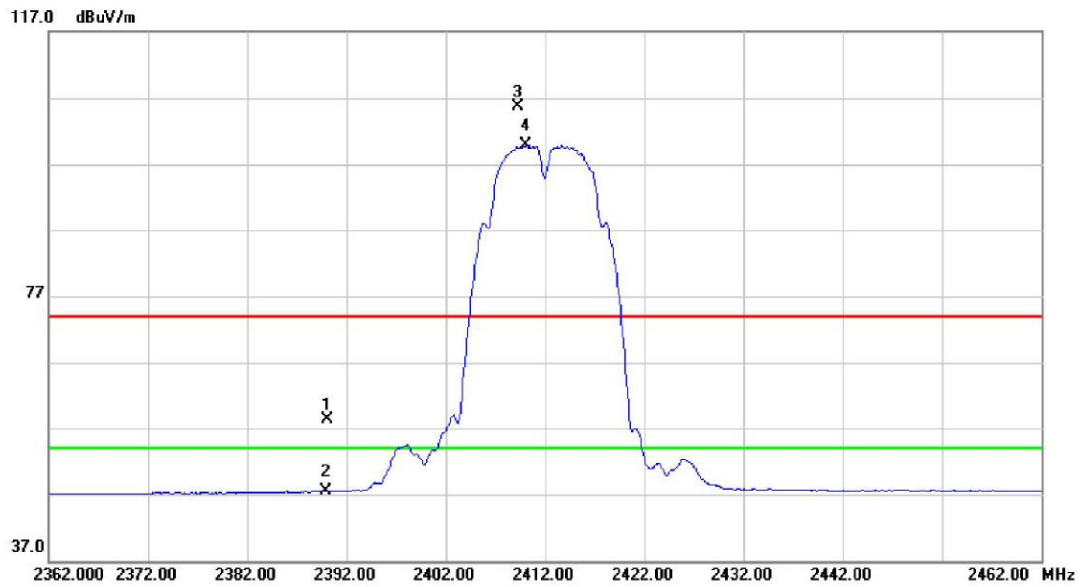
Vertical



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1	*	4824.000	28.25	6.44	34.69	54.00	-19.31	AVG	
2		4824.490	39.89	6.44	46.33	74.00	-27.67	peak	

Orthogonal Axis :	X
Test Mode :	TX B MODE 2412MHz

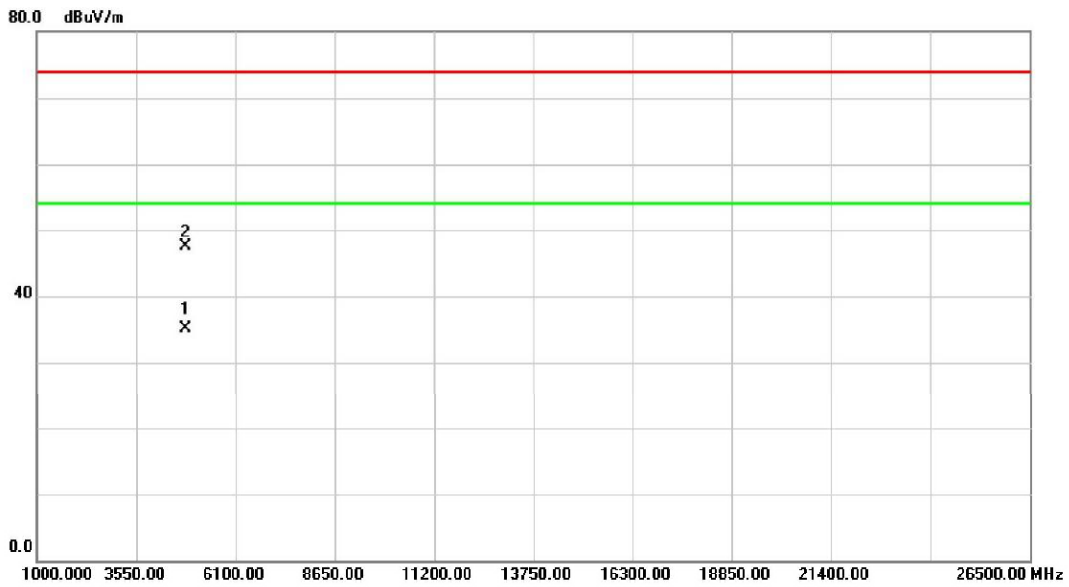
Horizontal



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1		2390.000	24.88	33.38	58.26	74.00	-15.74	peak	
2		2390.000	14.07	33.38	47.45	54.00	-6.55	AVG	
3	X	2409.300	72.22	33.43	105.65	74.00	31.65	peak	no limit
4	*	2410.100	66.47	33.44	99.91	54.00	45.91	AVG	no limit

Orthogonal Axis :	X
Test Mode :	TX B MODE 2412MHz

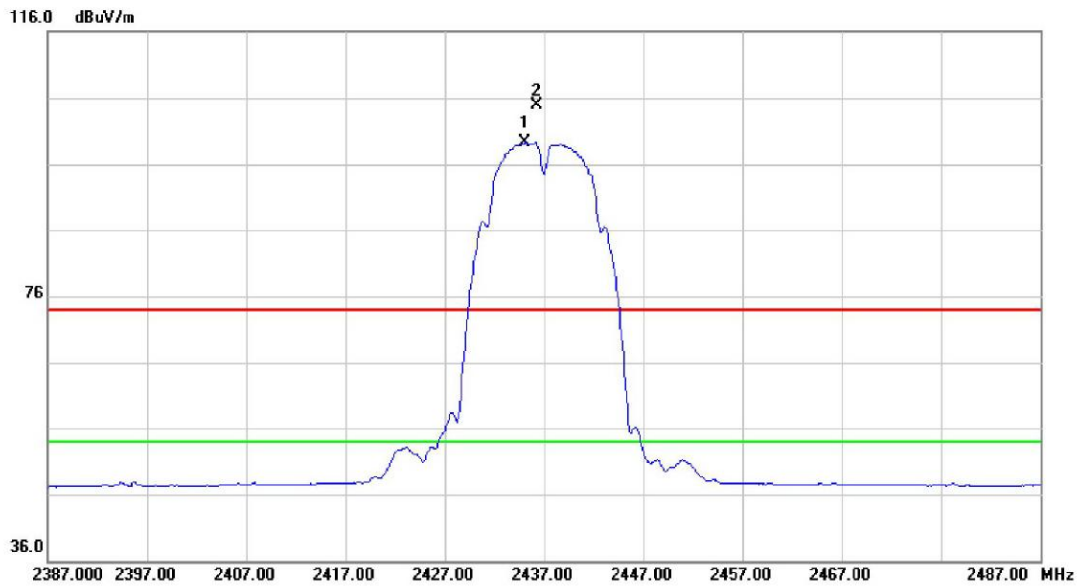
Horizontal



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1	*	4823.990	28.74	6.44	35.18	54.00	-18.82	AVG	
2		4824.010	40.97	6.44	47.41	74.00	-26.59	peak	

Orthogonal Axis :	X
Test Mode :	TX B MODE 2437MHz

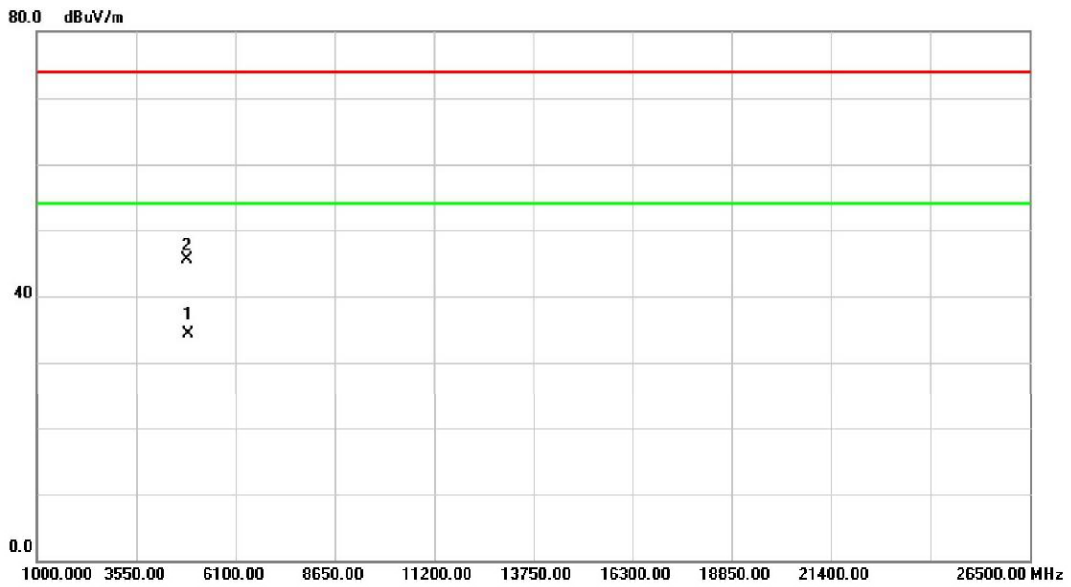
Vertical



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1	*	2435.100	65.90	33.50	99.40	54.00	45.40	AVG	no limit
2	X	2436.200	71.40	33.50	104.90	74.00	30.90	peak	no limit

Orthogonal Axis :	X
Test Mode :	TX B MODE 2437MHz

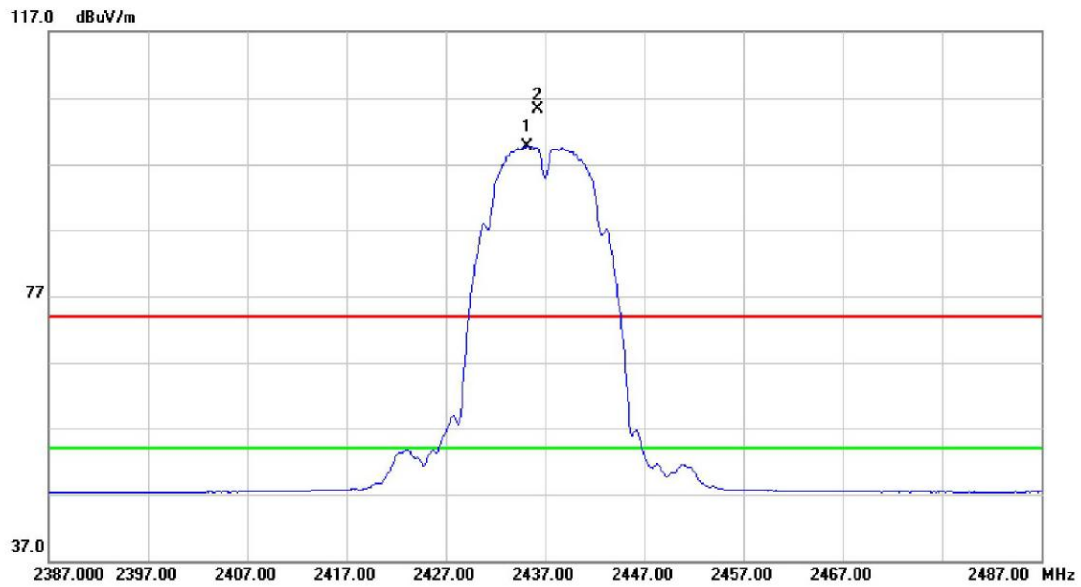
Vertical



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1	*	4873.620	27.69	6.55	34.24	54.00	-19.76	AVG	
2		4873.800	38.87	6.55	45.42	74.00	-28.58	peak	

Orthogonal Axis :	X
Test Mode :	TX B MODE 2437MHz

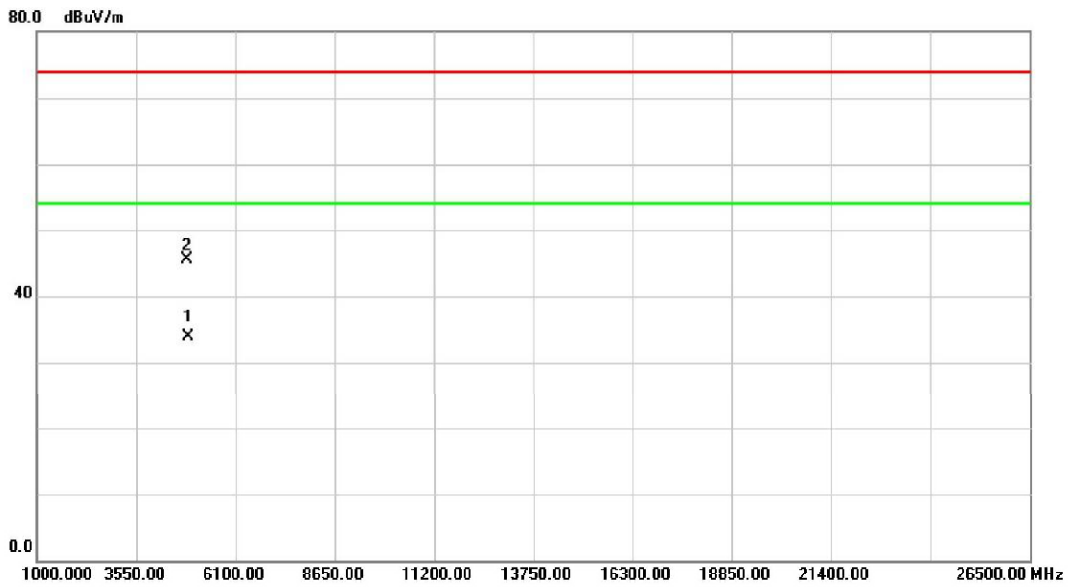
Horizontal



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1	*	2435.200	66.24	33.50	99.74	54.00	45.74	AVG	no limit
2	X	2436.200	71.84	33.50	105.34	74.00	31.34	peak	no limit

Orthogonal Axis :	X
Test Mode :	TX B MODE 2437MHz

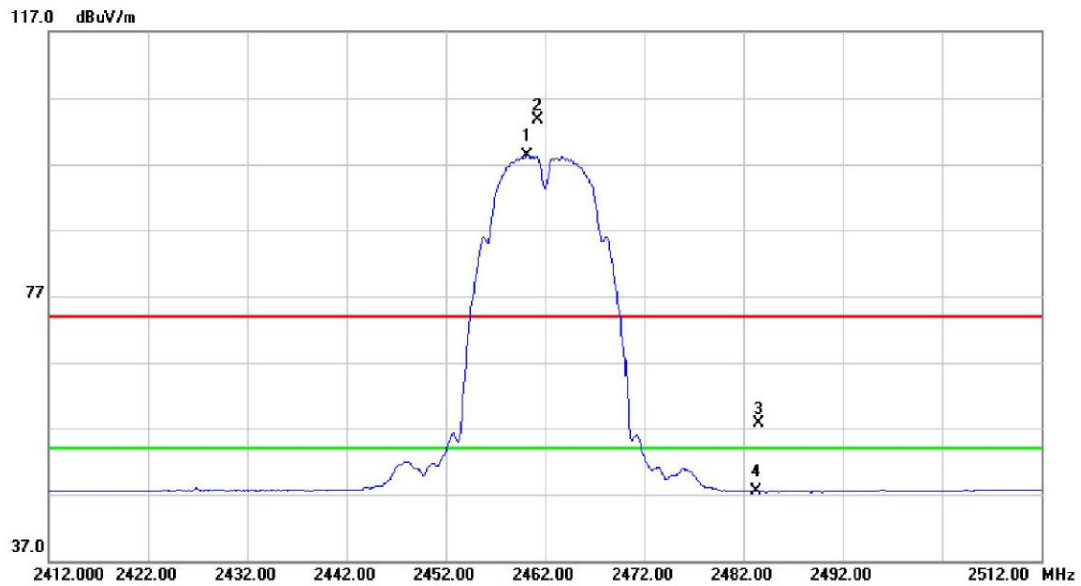
Horizontal



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1	*	4873.900	27.41	6.55	33.96	54.00	-20.04	AVG	
2		4874.000	38.90	6.55	45.45	74.00	-28.55	peak	

Orthogonal Axis :	X
Test Mode :	TX B MODE 2462MHz

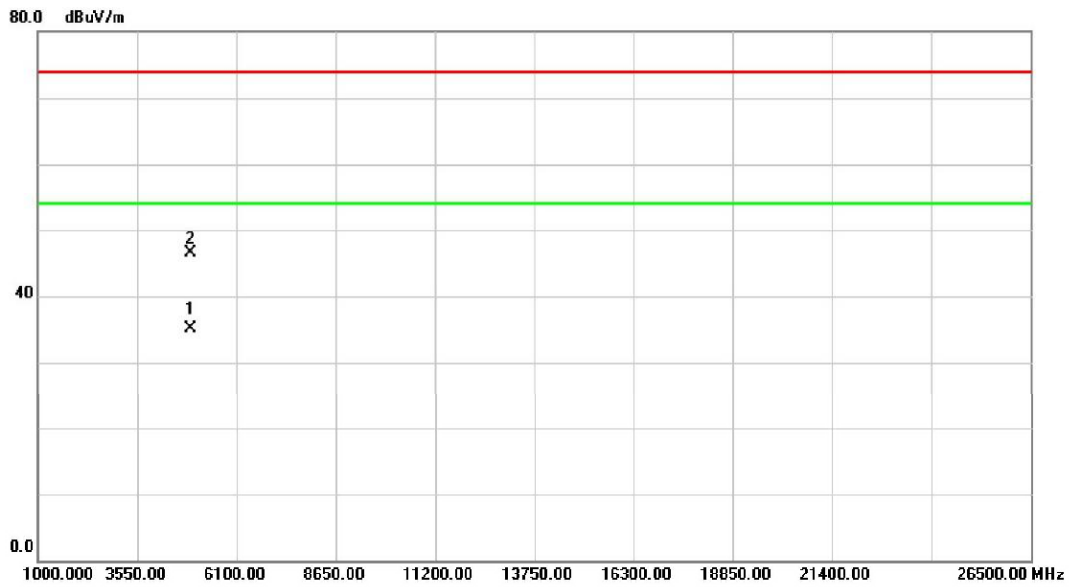
Vertical



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1	*	2460.200	64.80	33.56	98.36	54.00	44.36	AVG	no limit
2	X	2461.200	70.23	33.56	103.79	74.00	29.79	peak	no limit
3		2483.500	24.17	33.62	57.79	74.00	-16.21	peak	
4		2483.500	13.83	33.62	47.45	54.00	-6.55	AVG	

Orthogonal Axis :	X
Test Mode :	TX B MODE 2462MHz

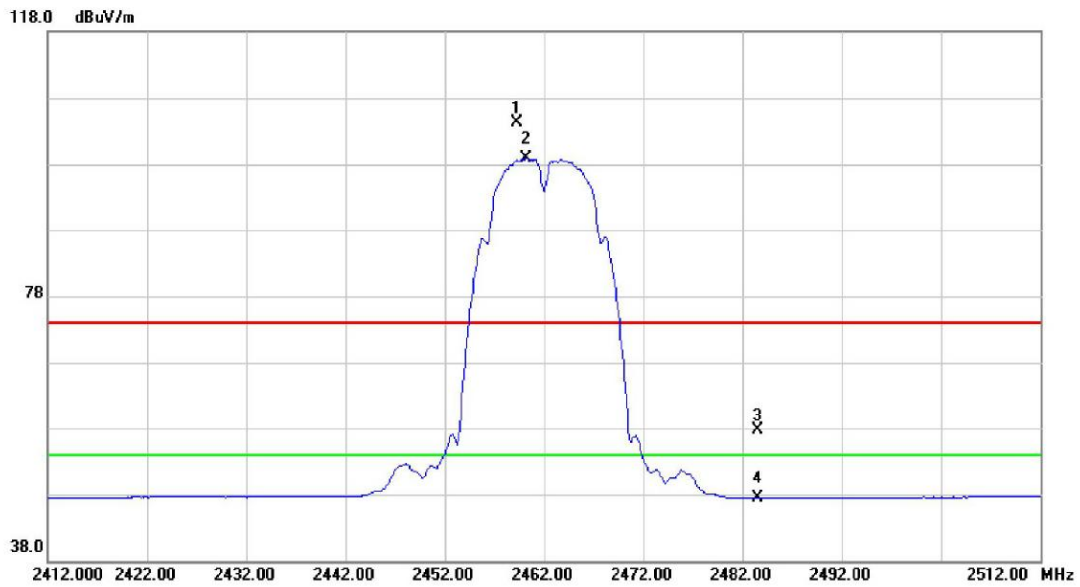
Vertical



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1	*	4924.330	28.37	6.66	35.03	54.00	-18.97	AVG	
2		4924.500	39.78	6.66	46.44	74.00	-27.56	peak	

Orthogonal Axis :	X
Test Mode :	TX B MODE 2462MHz

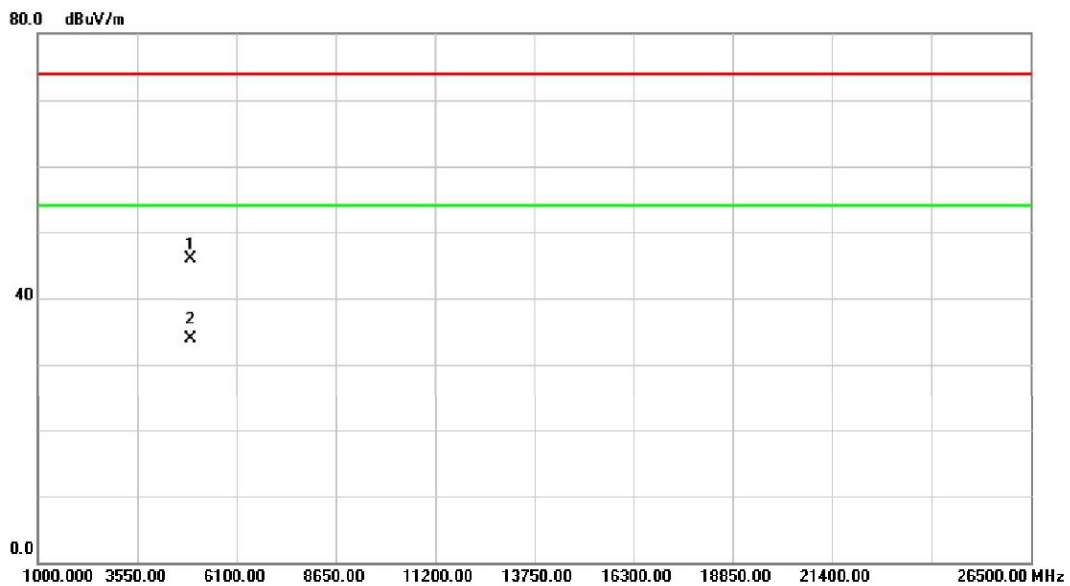
Horizontal



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1	X	2459.300	70.79	33.56	104.35	74.00	30.35	peak	no limit
2	*	2460.200	65.41	33.56	98.97	54.00	44.97	AVG	no limit
3		2483.500	24.13	33.62	57.75	74.00	-16.25	peak	
4		2483.500	13.91	33.62	47.53	54.00	-6.47	AVG	

Orthogonal Axis :	X
Test Mode :	TX B MODE 2462MHz

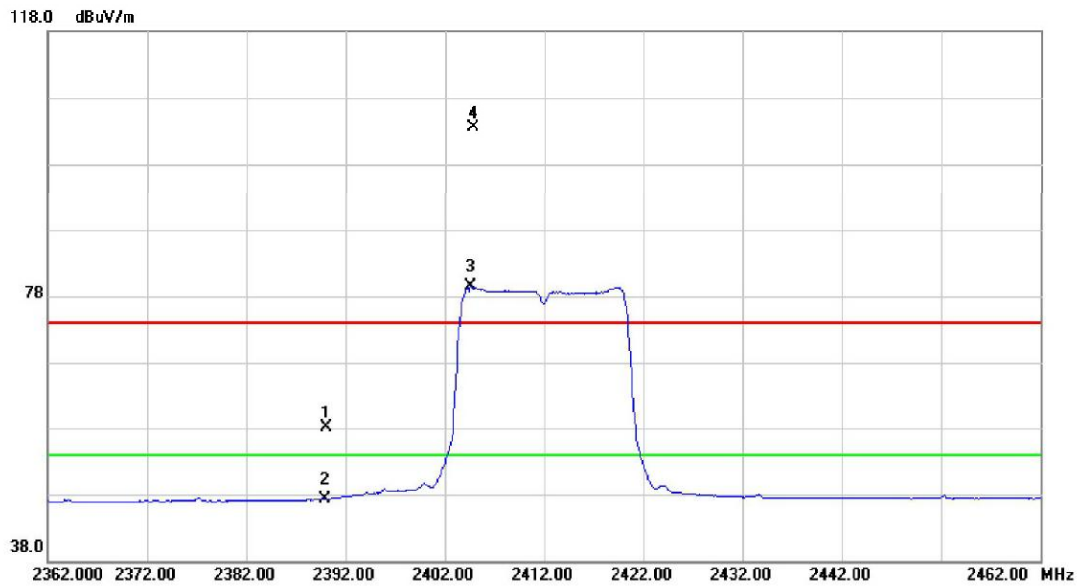
Horizontal



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1		4924.200	39.15	6.66	45.81	74.00	-28.19	peak	
2	*	4924.590	27.23	6.66	33.89	54.00	-20.11	AVG	

Orthogonal Axis :	X
Test Mode :	TX G MODE 2412MHz

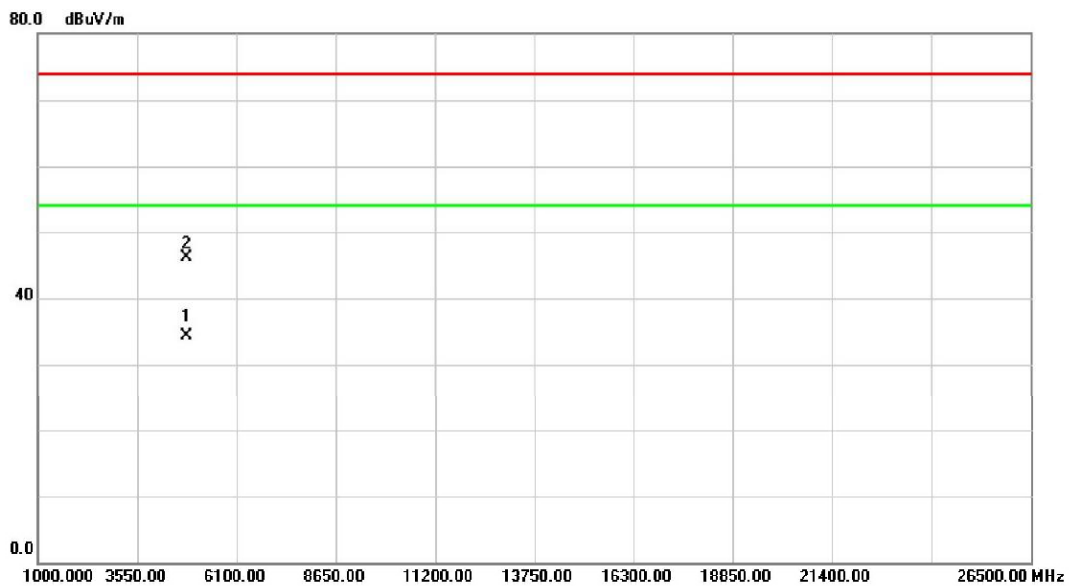
Vertical



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1		2390.000	24.79	33.38	58.17	74.00	-15.83	peak	
2		2390.000	13.97	33.38	47.35	54.00	-6.65	AVG	
3	X	2404.600	46.00	33.42	79.42	54.00	25.42	AVG	no limit
4	*	2404.800	70.16	33.42	103.58	74.00	29.58	peak	no limit

Orthogonal Axis :	X
Test Mode :	TX G MODE 2412MHz

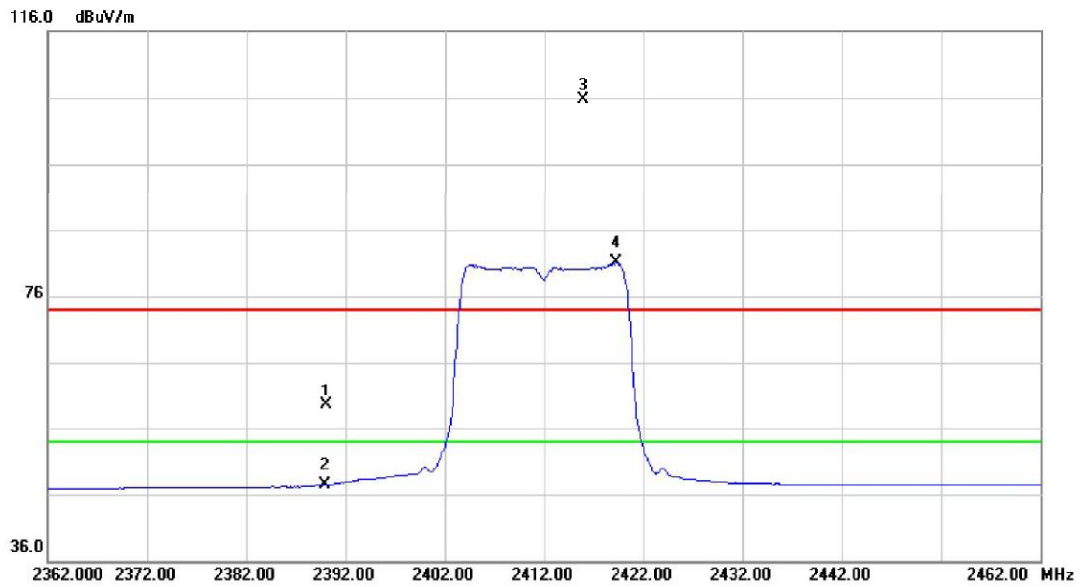
Vertical



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1	*	4824.690	27.84	6.44	34.28	54.00	-19.72	AVG	
2		4825.010	39.65	6.44	46.09	74.00	-27.91	peak	

Orthogonal Axis :	X
Test Mode :	TX G MODE 2412MHz

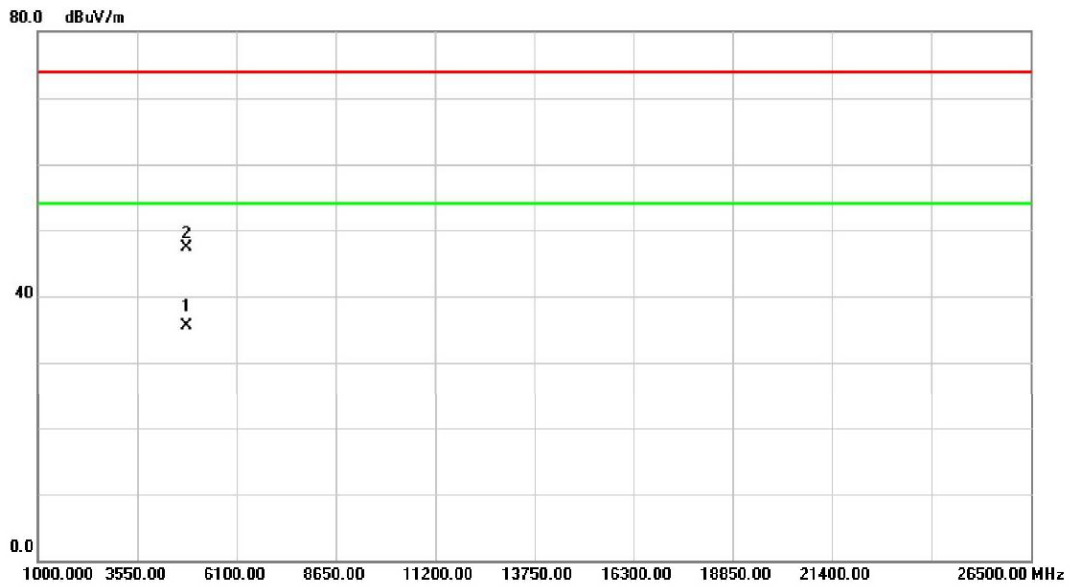
Horizontal



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1		2390.000	26.11	33.38	59.49	74.00	-14.51	peak	
2		2390.000	14.09	33.38	47.47	54.00	-6.53	AVG	
3	*	2415.900	72.17	33.45	105.62	74.00	31.62	peak	no limit
4	X	2419.200	47.63	33.46	81.09	54.00	27.09	AVG	no limit

Orthogonal Axis :	X
Test Mode :	TX G MODE 2412MHz

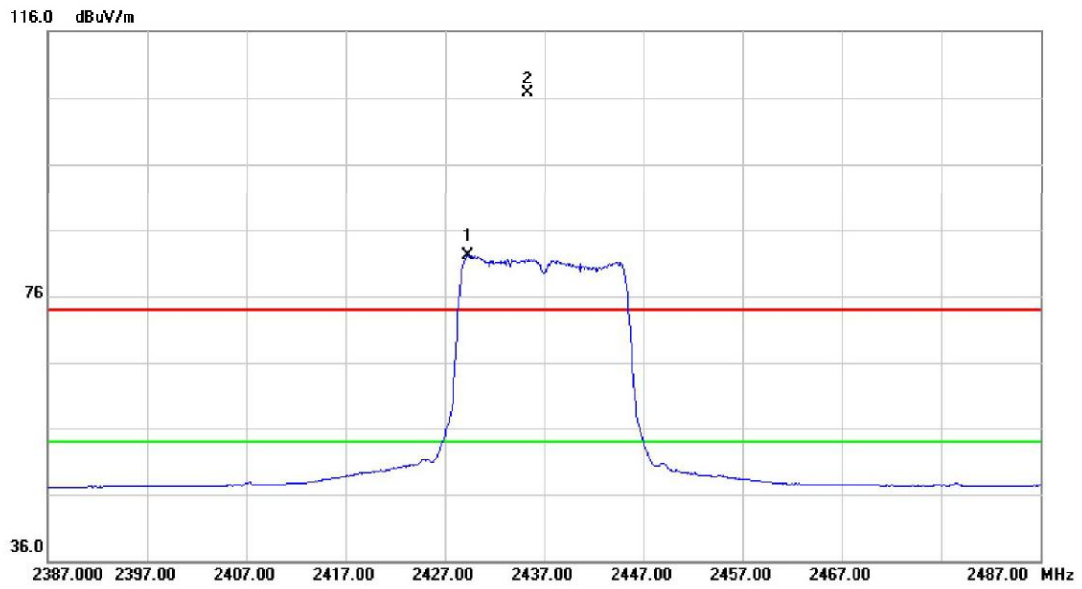
Horizontal



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1	*	4823.540	28.97	6.44	35.41	54.00	-18.59	AVG	
2		4823.740	40.86	6.44	47.30	74.00	-26.70	peak	

Orthogonal Axis :	X
Test Mode :	TX G MODE 2437MHz

Vertical



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1	X	2429.300	48.71	33.48	82.19	54.00	28.19	AVG	no limit
2	*	2435.300	73.13	33.50	106.63	74.00	32.63	peak	no limit