

FCC Radio Test Report

FCC ID: N73-ET33

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

Project No. : 1501C132
Equipment : ET33 Tag
Model Name : ET33
Applicant : Mine Site Technologies Pty Ltd.
Address : 113 Wicks Road, North Ryde, New South Wales 2113, Australia

Date of Receipt : Jan. 19, 2015
Date of Test : Jan. 19, 2015 ~ Apr. 22, 2015
Issued Date : Apr. 23, 2015
Tested by : BTL Inc.

Testing Engineer : David Mao
(David Mao)

Technical Manager : Leo Hung
(Leo Hung)

Authorized Signatory : Steven Lu
(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 report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal 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	13
4 . EMC EMISSION TEST	14
4.1 CONDUCTED EMISSION MEASUREMENT	14
4.1.1 POWER LINE CONDUCTED EMISSION LIMITS	14
4.1.2 TEST PROCEDURE	14
4.1.3 DEVIATION FROM TEST STANDARD	14
4.1.4 TEST SETUP	15
4.1.5 EUT OPERATING CONDITIONS	15
4.1.6 EUT TEST CONDITIONS	15
4.1.7 TEST RESULTS	15
4.2 RADIATED EMISSION MEASUREMENT	16
4.2.1 RADIATED EMISSION LIMITS	16
4.2.2 TEST PROCEDURE	17
4.2.3 DEVIATION FROM TEST STANDARD	17
4.2.4 TEST SETUP	17
4.2.5 EUT OPERATING CONDITIONS	18
4.2.6 EUT TEST CONDITIONS	18
4.2.7 TEST RESULTS (9KHZ TO 30MHZ)	19
4.2.8 TEST RESULTS (BETWEEN 30MHZ TO 1000 MHZ)	19
4.2.9 TEST RESULTS (ABOVE 1000 MHZ)	19
5 . BANDWIDTH TEST	20
5.1 APPLIED PROCEDURES	20
5.1.1 TEST PROCEDURE	20
5.1.2 DEVIATION FROM STANDARD	20
5.1.3 TEST SETUP	20
5.1.4 EUT OPERATION CONDITIONS	20
5.1.5 EUT TEST CONDITIONS	20
5.1.6 TEST RESULTS	20

Table of Contents	Page
6 . MAXIMUM PEAK CONDUCTED OUTPUT POWER TEST	21
6.1 APPLIED PROCEDURES / LIMIT	21
6.1.1 TEST PROCEDURE	21
6.1.2 DEVIATION FROM STANDARD	21
6.1.3 TEST SETUP	21
6.1.4 EUT OPERATION CONDITIONS	21
6.1.5 EUT TEST CONDITIONS	21
6.1.6 TEST RESULTS	21
7 . ANTENNA CONDUCTED SPURIOUS EMISSION	22
7.1 APPLIED PROCEDURES / LIMIT	22
7.1.1 TEST PROCEDURE	22
7.1.2 DEVIATION FROM STANDARD	22
7.1.3 TEST SETUP	22
7.1.4 EUT OPERATION CONDITIONS	22
7.1.5 EUT TEST CONDITIONS	22
7.1.6 TEST RESULTS	22
8 . POWER SPECTRAL DENSITY TEST	23
8.1 APPLIED PROCEDURES / LIMIT	23
8.1.1 TEST PROCEDURE	23
8.1.2 DEVIATION FROM STANDARD	23
8.1.3 TEST SETUP	23
8.1.4 EUT OPERATION CONDITIONS	23
8.1.5 EUT TEST CONDITIONS	23
8.1.6 TEST RESULTS	23
9 . MEASUREMENT INSTRUMENTS LIST	24
10 . EUT TEST PHOTO	26
ATTACHMENT A - CONDUCTED EMISSION	29
ATTACHMENT B - RADIATED EMISSION (9KHZ TO 30MHZ)	30
ATTACHMENT C - RADIATED EMISSION (30MHZ TO 1000MHZ)	32
ATTACHMENT D - RADIATED EMISSION (ABOVE 1000MHZ)	39
ATTACHMENT E - BANDWIDTH	52
ATTACHMENT F – MAXIMUM PEAK CONDUCTED OUTPUT POWER	55
ATTACHMENT G - ANTENNA CONDUCTED SPURIOUS EMISSION	57
ATTACHMENT H - POWER SPECTRAL DENSITY	61

REPORT ISSUED HISTORY

Issued No.	Description	Issued Date
BTL-FCCP-1-1501C132	Original Issue.	Apr. 23, 2015

1. CERTIFICATION

Equipment : ET33 Tag
Brand Name : MST
Model Name : ET33
Applicant : Mine Site Technologies Pty Ltd.
Manufacturer: Mine Site Technologies China Co., Ltd.
Address : 4F Building-1 1413 Moganshan Road, Hangzhou, CHINA
Factory : Mine Site Technologies China Co., Ltd.
Address : 4F Building-1 1413 Moganshan Road, Hangzhou, CHINA
Date of Test : Jan. 19, 2015 ~ Apr. 22, 2015
Test Sample : ENGINEERING SAMPLE
Standard(s) : FCC Part15, Subpart C: 2014 (15.247) / ANSI C63.4-2009

The above equipment has been tested and found is compliant 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-1-1501C132) 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: 2014			
Standard(s) Section	Test Item	Judgment	Remark
15.207	Conducted Emission	N/A	
15.247(d)	Antenna conducted Spurious Emission	PASS	
15.247(a)(2)	6dB Bandwidth	PASS	
15.247(b)(3)	Peak Output Power	PASS	
15.247(e)	Power Spectral Density	PASS	
15.203	Antenna Requirement	PASS	
15.209/15.205	Transmitter Radiated Emissions	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 at the location of No.3, Jinshagang 1st Road, Shixia, Dalang Town, Dongguan, Guangdong, China.

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 BTL measurement uncertainty is less than the CISPR 16-4-2 U_{CISPR} 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. 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	ET33 Tag	
Brand Name	MST	
Model Name	ET33	
Model Difference	N/A	
Product Description	Operation Frequency	2412~2462 MHz
	Modulation Technology	802.11b:DSSS
	Bit Rate of Transmitter	802.11b: 11/5.5/2/1 Mbps
	Output Power (Max.)	802.11b: 21.39dBm
Power Source	Battery supplied.	
Power Rating	DC 3.6V	

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							
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)	Note
1	RainSun	AN9520-245	Chip	N/A	1.30	TX/RX

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

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
N/A	"N/A" denotes test is not applicable to this device.

For Radiated Test	
Final Test Mode	Description
Mode 1	TX B MODE CHANNEL 01/06/11

Note:

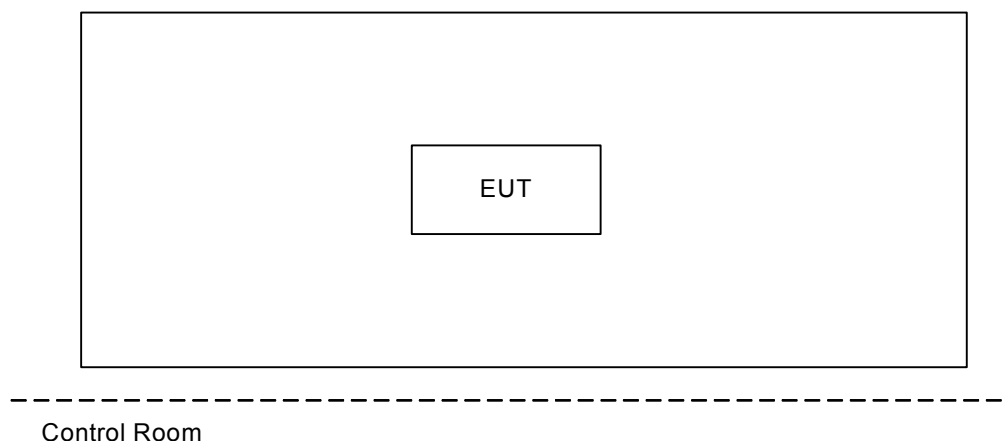
- (1) The measurements are performed at the high, middle, low available channels.
- (2) 802.11b mode: DBPSK (1Mbps)
For radiated emission tests, the highest output powers were set for final test.
- (3) The EUT was programmed to be in continuously transmitting mode and the transmit duty cycle is not less than 98%.

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	LSD-PRGS430USW_V2.15		
Frequency (MHz)	2412	2437	2462
802.11b	N/A	N/A	N/A

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
-	-	-	-	

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 (dBμV)	
	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
- (2) The test result calculated as following:
 Measurement Value = Reading Level + Correct Factor
 Correct Factor = Insertion Loss + Cable Loss + Attenuator Factor(if use)
 Margin Level = Measurement Value - Limit Value

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

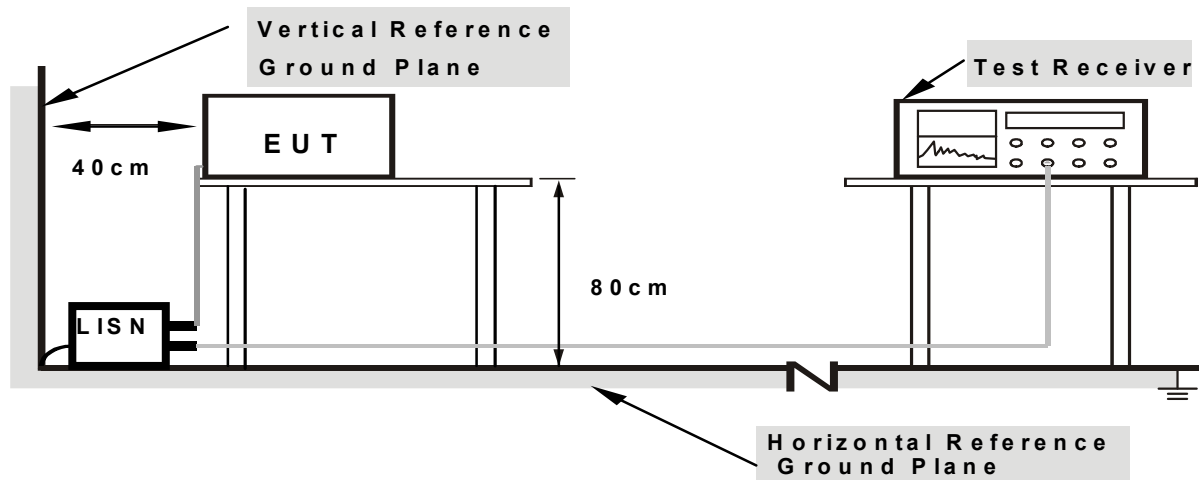
4.1.2 TEST PROCEDURE

- 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: N/A Relative Humidity: N/A Test Voltage: N/A

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), 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).
- (4) The test result calculated as following:
 Measurement Value = Reading Level + Correct Factor
 Correct Factor = Antenna Factor + Cable Loss - Amplifier Gain(if use)
 Margin Level = Measurement Value - 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

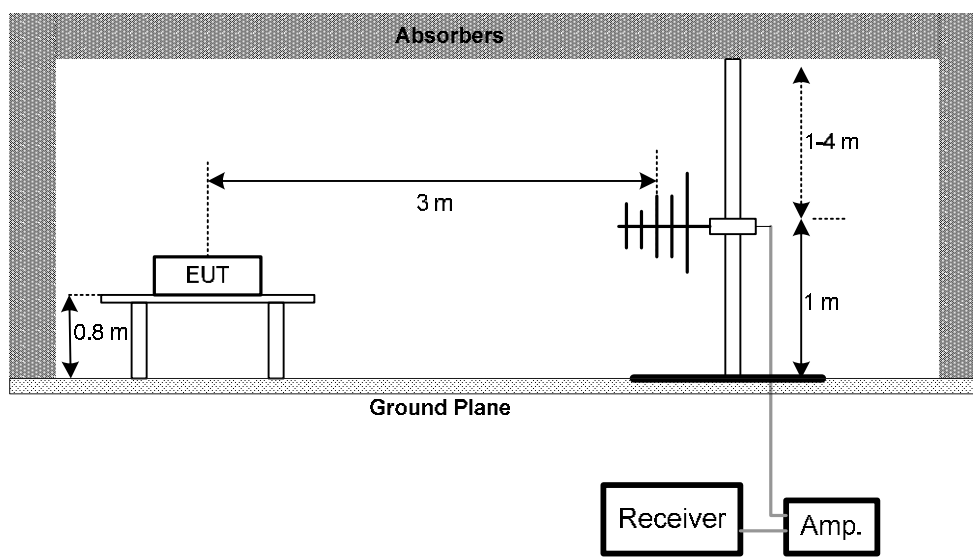
- The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(below 1GHz)
- The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3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

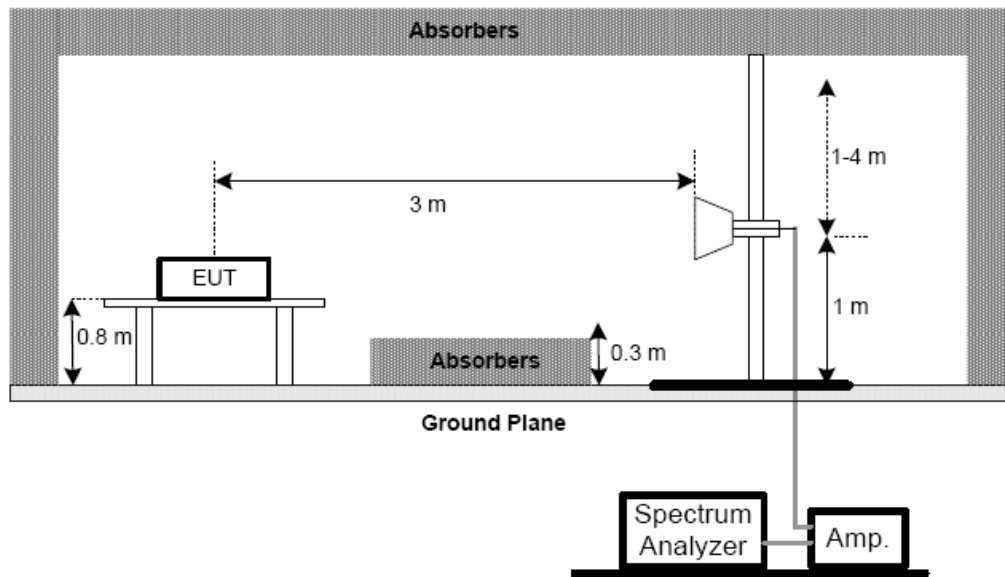
No deviation

4.2.4 TEST SETUP

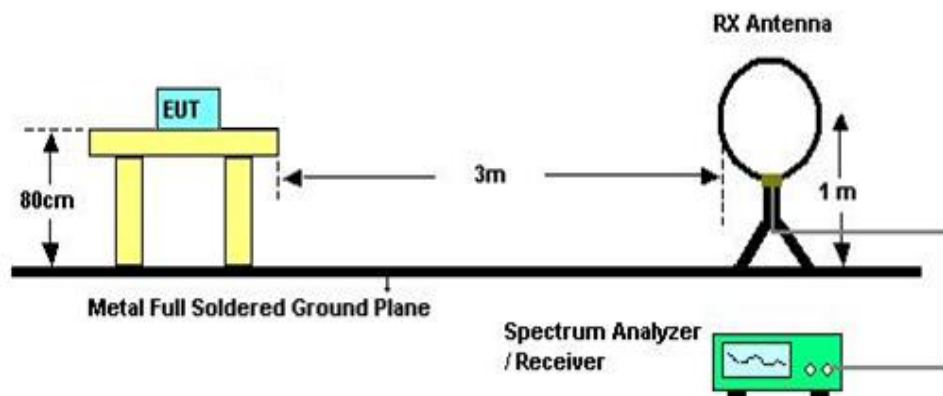
(A) Radiated Emission Test Set-Up Frequency Below 1 GHz



(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: 28°C Relative Humidity: 60% Test Voltage: DC 3.6V

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.

Remark:

- (1) 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

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

- 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: 28°C Relative Humidity: 60% Test Voltage: DC 3.6V

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 9.1.2 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: 28°C Relative Humidity: 60% Test Voltage: DC 3.6V

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.

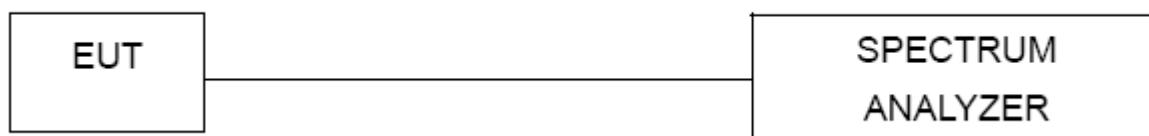
7.1.1 TEST PROCEDURE

- 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: 28°C Relative Humidity: 60% Test Voltage: DC 3.6V

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

- The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
- 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: 28°C Relative Humidity: 60% Test Voltage: DC 3.6V

8.1.6 TEST RESULTS

Please refer to the Attachment H.

9. MEASUREMENT INSTRUMENTS LIST

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	MY5213003 9	Sep. 30, 2015
4	Test Cable	N/A	C-01_CB03	N/A	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	MY5213003 9	Sep. 30, 2015
10	Test Cable	HUBER+SUHNER	C-48	N/A	Apr. 30, 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	P-series Power meter	Agilent	N1911A	MY45100473	Mar. 28, 2016
2	Wireband Power sensor	Agilent	N1921A	MY51100041	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

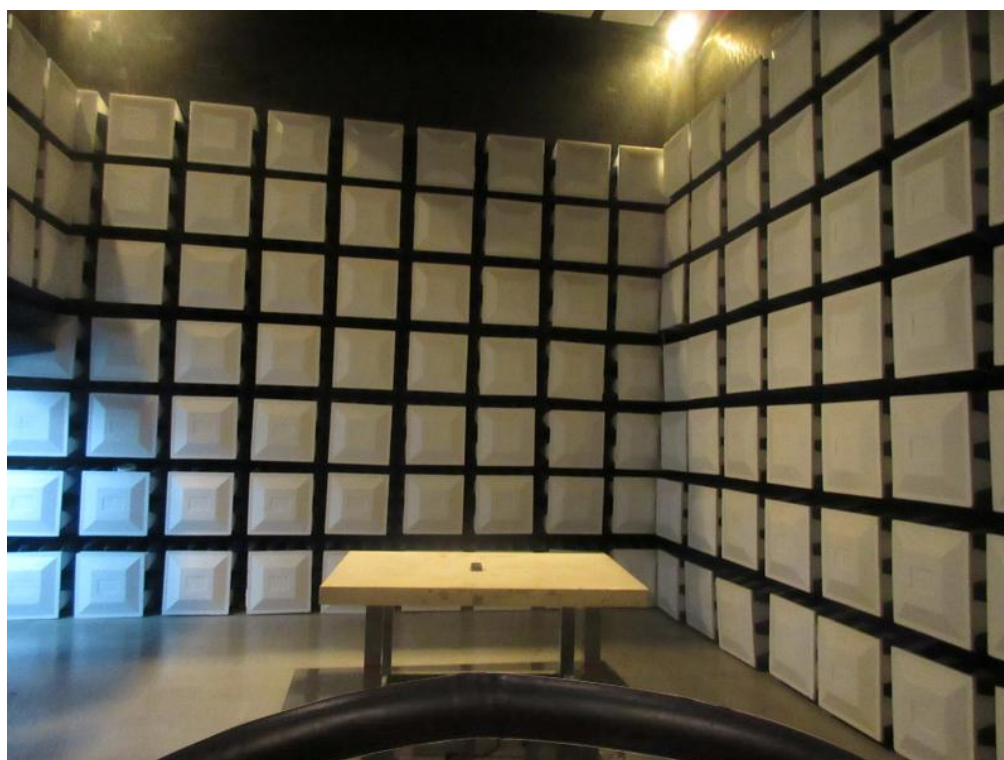
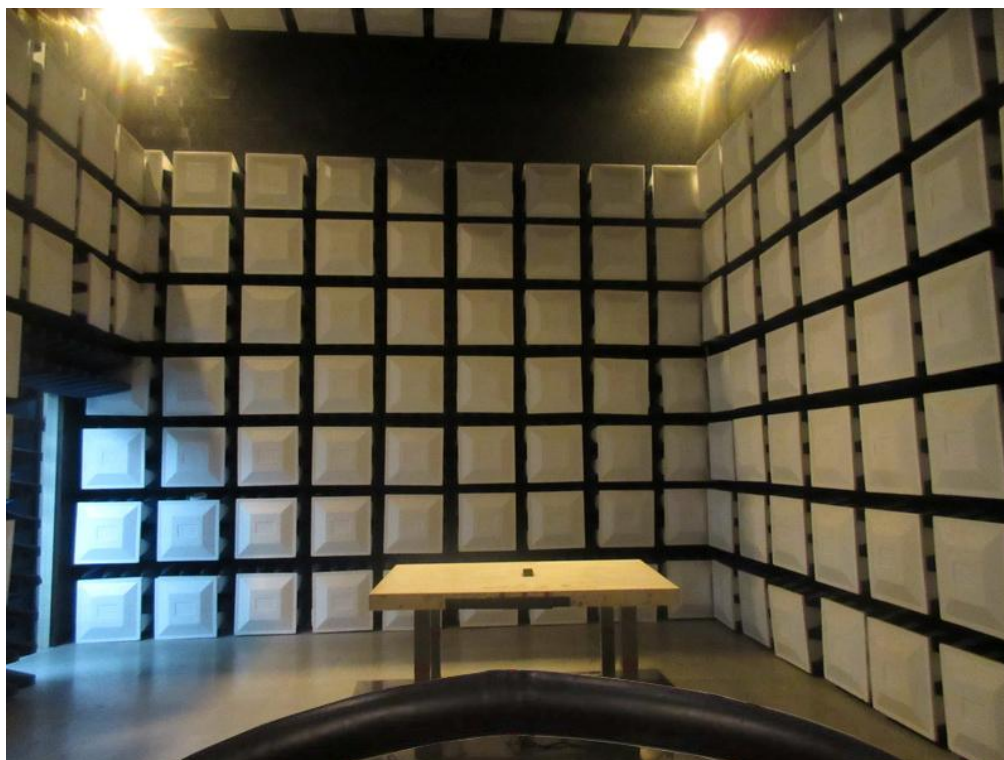
Power Spectral Density Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP 40	100185	Nov. 02, 2015

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

Radiated Measurement Photos

9KHz to 30MHz



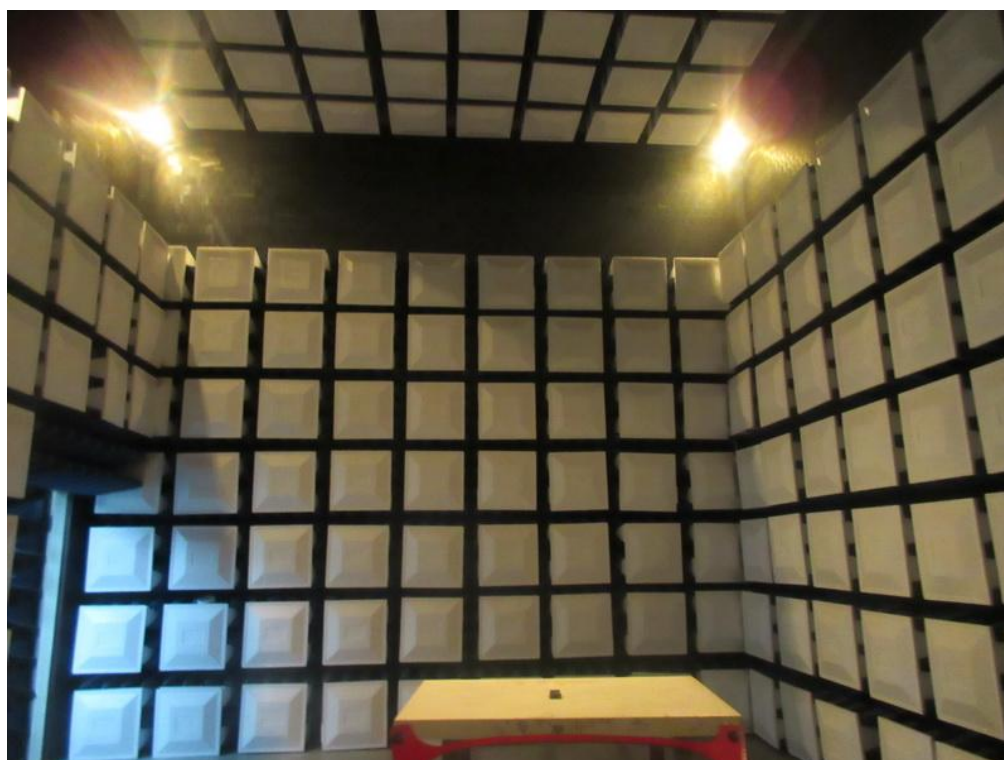
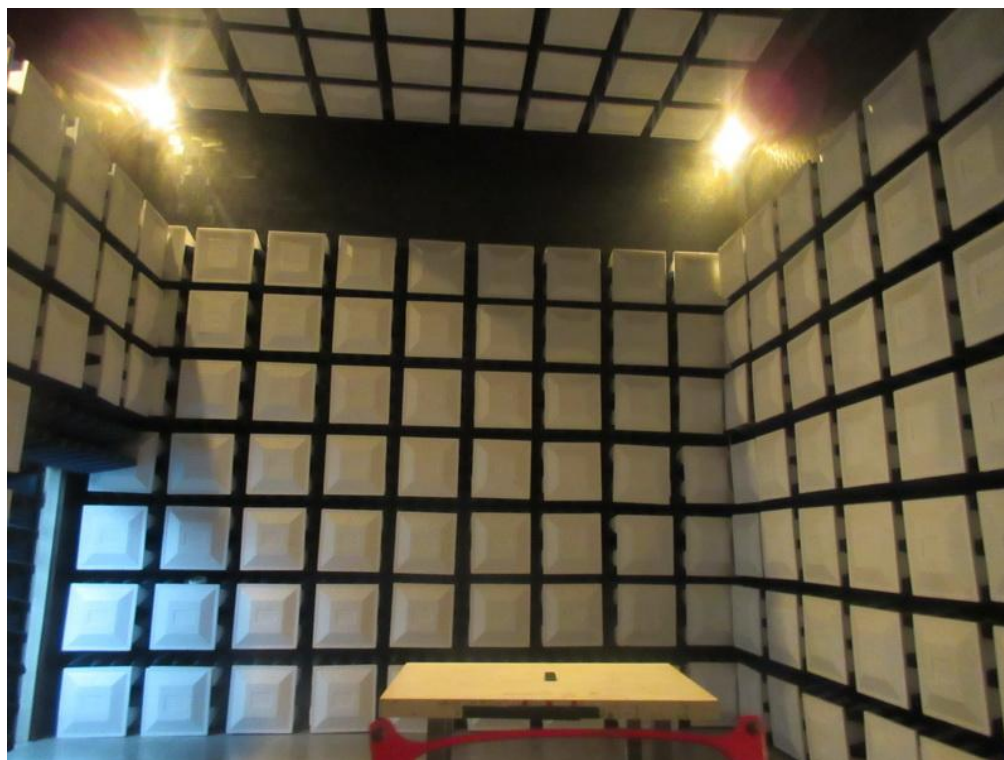
Radiated Measurement Photos

30MHz to 1000MHz



Radiated Measurement Photos

Above 1000MHz



ATTACHMENT A - CONDUCTED EMISSION

Test Mode: N/A

Note: "N/A" denotes test is not applicable to this device.

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

Test Mode: TX Mode 2412MHz

Frequency (MHz)	Ant 0°/90°	Read level dBuV/m	Factor (dB)	Measured(FS) (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Note
0.0090	0°	12.14	25.00	37.14	128.53	-91.39	AVG
0.0090	0°	14.39	25.00	39.39	148.53	-109.14	PEAK
0.0265	0°	5.26	23.89	29.15	119.14	-89.99	AVG
0.0265	0°	9.42	23.89	33.31	139.14	-105.83	PEAK
0.0328	0°	2.36	23.49	25.85	117.29	-91.44	AVG
0.0328	0°	6.32	23.49	29.81	137.29	-107.48	PEAK
0.0419	0°	2.03	22.91	24.94	115.16	-90.22	AVG
0.0419	0°	3.28	22.91	26.19	135.16	-108.97	PEAK
0.5132	0°	20.03	19.84	39.87	73.40	-33.53	QP
1.8325	0°	22.49	19.52	42.01	69.54	-27.53	QP

Frequency (MHz)	Ant 0°/90°	Read level dBuV/m	Factor (dB)	Measured(FS) (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Note
0.0093	90°	12.36	24.30	36.66	128.22	-91.56	AVG
0.0093	90°	15.31	24.30	39.61	148.22	-108.61	PEAK
0.0315	90°	6.34	23.57	29.91	117.64	-87.73	AVG
0.0315	90°	9.41	23.57	32.98	137.64	-104.66	PEAK
0.0361	90°	4.02	23.28	27.30	116.45	-89.15	AVG
0.0361	90°	8.06	23.28	31.34	136.45	-105.11	PEAK
0.0427	90°	2.31	22.86	25.17	115.00	-89.82	AVG
0.0427	90°	4.36	22.86	27.22	135.00	-107.77	PEAK
0.5213	90°	20.49	19.87	40.36	73.26	-32.90	QP
1.8325	90°	23.44	19.52	42.96	69.54	-26.58	QP

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	Margin dB	Detector	Comment
1		75.5900	40.69	-16.67	24.02	40.00	-15.98	peak	
2		220.1200	33.50	-14.87	18.63	46.00	-27.37	peak	
3		434.4900	30.74	-8.90	21.84	46.00	-24.16	peak	
4		560.5900	30.40	-7.92	22.48	46.00	-23.52	peak	
5		651.7700	29.76	-5.15	24.61	46.00	-21.39	peak	
6	*	833.1600	41.43	-3.06	38.37	46.00	-7.63	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	Margin dB	Detector	Comment
1		176.4700	36.40	-12.90	23.50	43.50	-20.00	peak	
2		253.1000	36.44	-13.95	22.49	46.00	-23.51	peak	
3		329.7300	39.50	-11.47	28.03	46.00	-17.97	peak	
4		374.3500	44.86	-10.68	34.18	46.00	-11.82	peak	
5		428.6700	33.58	-9.00	24.58	46.00	-21.42	peak	
6	*	833.1600	39.72	-3.06	36.66	46.00	-9.34	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	Margin dB	Detector	Comment
1		76.5600	41.63	-16.78	24.85	40.00	-15.15	peak	
2		176.4700	34.36	-12.90	21.46	43.50	-22.04	peak	
3		220.1200	36.00	-14.87	21.13	46.00	-24.87	peak	
4		434.4900	34.74	-8.90	25.84	46.00	-20.16	peak	
5		651.7700	31.76	-5.15	26.61	46.00	-19.39	peak	
6	*	833.1600	40.93	-3.06	37.87	46.00	-8.13	peak	

Test Mode: TX B MODE CHANNEL 06

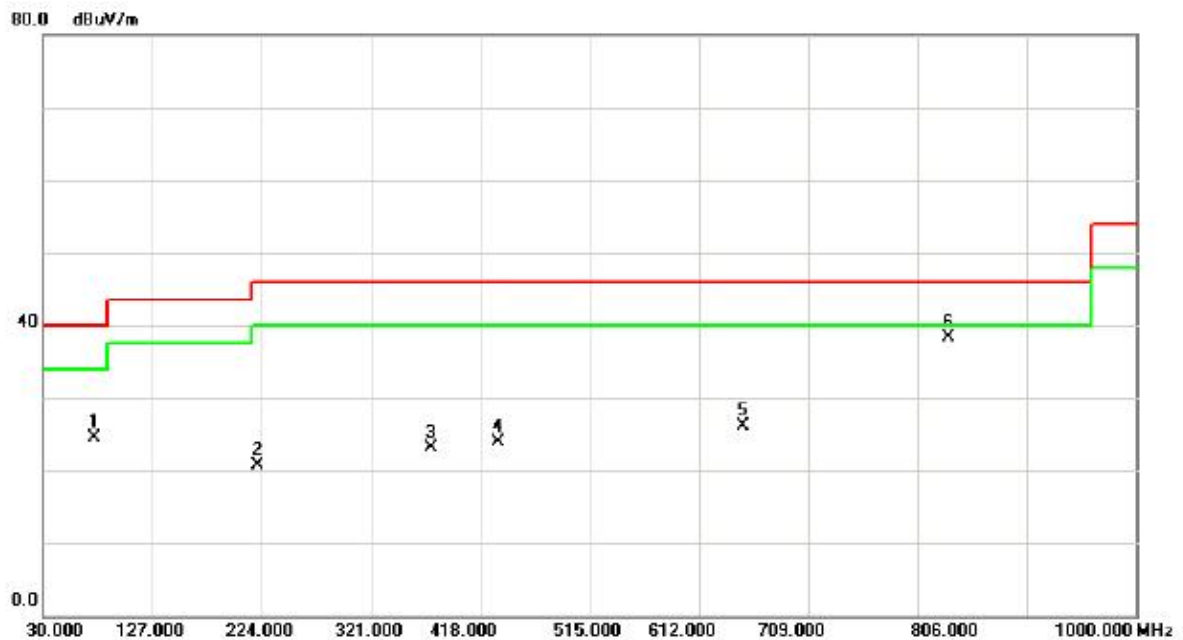
Horizontal



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		69.7700	39.96	-16.22	23.74	40.00	-16.26	peak	
2		176.4700	38.40	-12.90	25.50	43.50	-18.00	peak	
3		329.7300	41.00	-11.47	29.53	46.00	-16.47	peak	
4		374.3500	44.36	-10.68	33.68	46.00	-12.32	peak	
5		560.5900	32.51	-7.92	24.59	46.00	-21.41	peak	
6	*	833.1600	38.72	-3.06	35.66	46.00	-10.34	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	Margin dB	Detector	Comment
1		75.5900	41.19	-16.67	24.52	40.00	-15.48	peak	
2		220.1200	35.50	-14.87	20.63	46.00	-25.37	peak	
3		374.3500	33.78	-10.68	23.10	46.00	-22.90	peak	
4		434.4900	32.74	-8.90	23.84	46.00	-22.16	peak	
5		651.7700	31.26	-5.15	26.11	46.00	-19.89	peak	
6	*	833.1600	41.43	-3.06	38.37	46.00	-7.63	peak	

Test Mode: TX B MODE CHANNEL 11

Horizontal

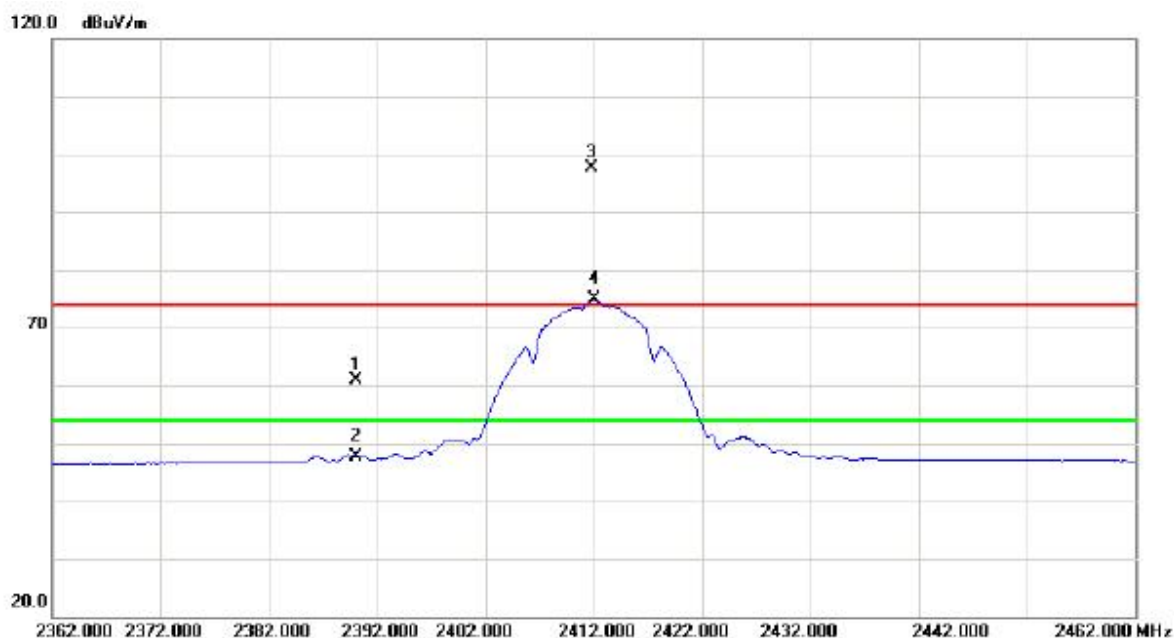


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		176.4700	36.90	-12.90	24.00	43.50	-19.50	peak	
2		329.7300	37.50	-11.47	26.03	46.00	-19.97	peak	
3		374.3500	42.36	-10.68	31.68	46.00	-14.32	peak	
4		560.5900	33.01	-7.92	25.09	46.00	-20.91	peak	
5		668.2600	30.33	-5.07	25.26	46.00	-20.74	peak	
6	*	833.1600	37.72	-3.06	34.66	46.00	-11.34	peak	

ATTACHMENT D - RADIATED EMISSION (ABOVE 1000MHZ)

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

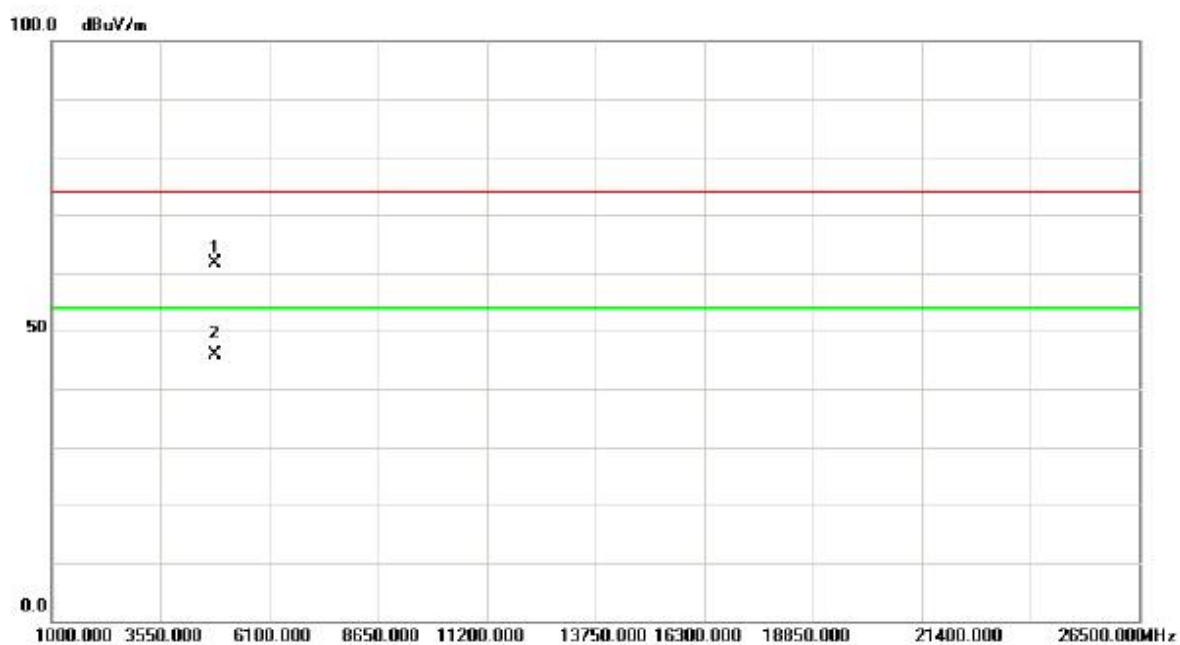
Vertical



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		2390.000	28.17	32.68	60.85	74.00	-13.15	peak	
2		2390.000	15.00	32.68	47.68	54.00	-6.32	AVG	
3	*	2411.800	64.81	32.71	97.52	74.00	23.52	peak	No Limit
4	X	2412.000	42.07	32.71	74.78	54.00	20.78	AVG	No Limit

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

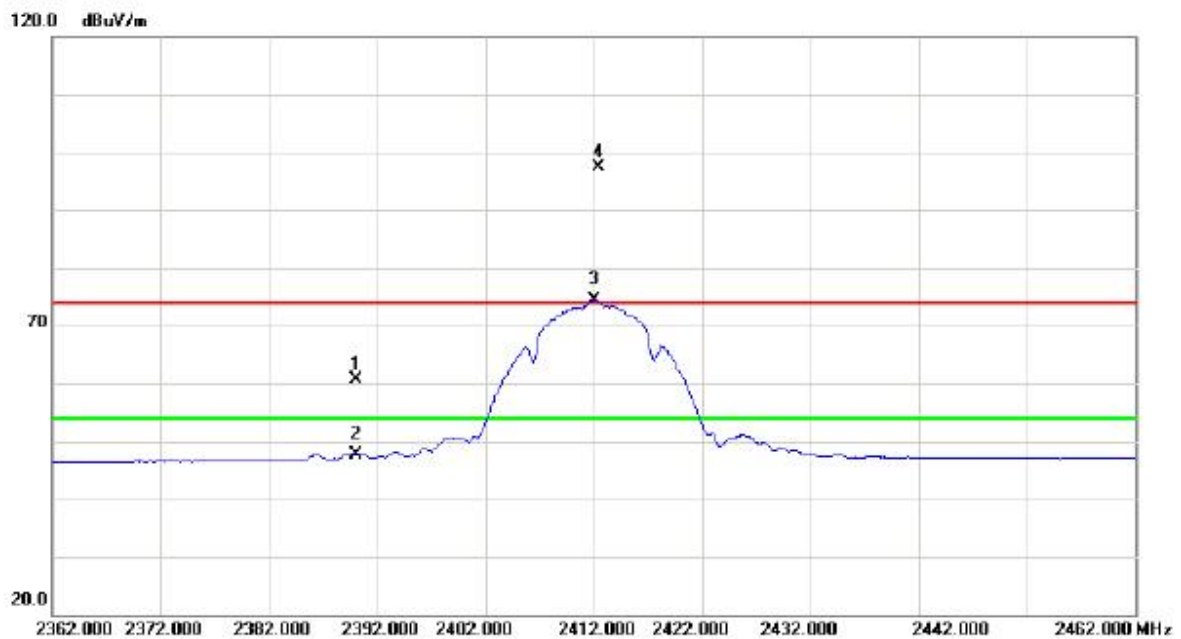
Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4823.920	55.81	5.87	61.68	74.00	-12.32	peak	
2	*	4823.960	40.12	5.87	45.99	54.00	-8.01	AVG	

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

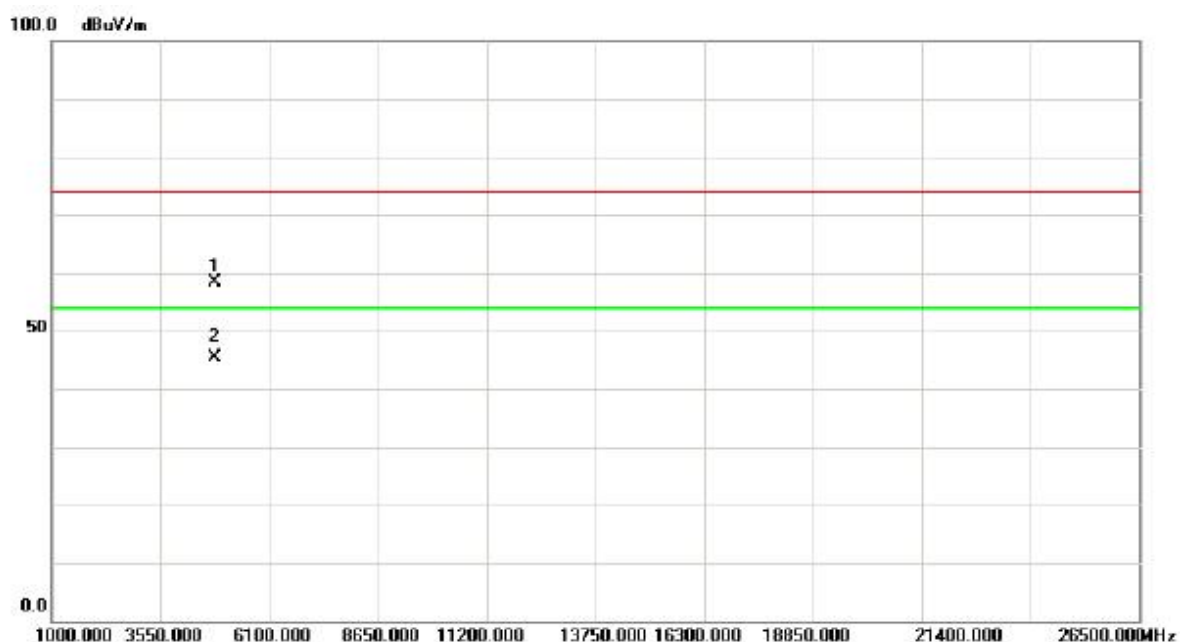
Horizontal



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		2390.000	28.00	32.68	60.68	74.00	-13.32	peak	
2		2390.000	14.97	32.68	47.65	54.00	-6.35	AVG	
3	X	2412.000	41.72	32.71	74.43	54.00	20.43	AVG	No Limit
4	*	2412.520	64.63	32.71	97.34	74.00	23.34	peak	No Limit

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

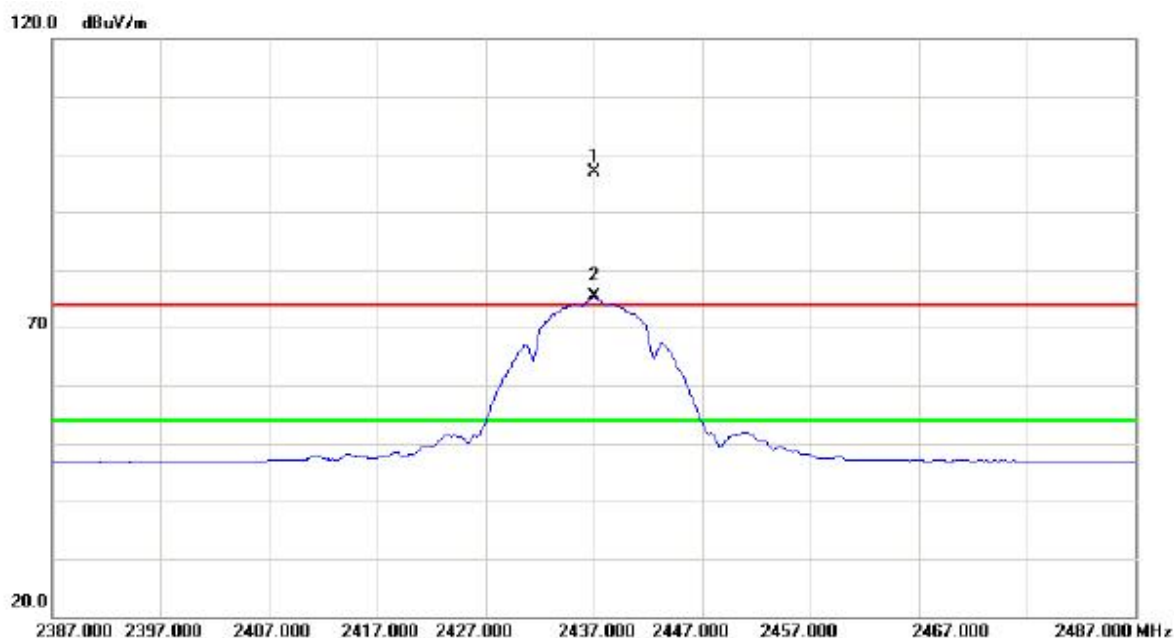
Horizontal



No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Margin		
		MHz	Level	Factor	ment			Detector	Comment
			dBuV	dB	dBuV/m	dBuV/m	dB		
1		4823.980	52.62	5.87	58.49	74.00	-15.51	peak	
2	*	4823.980	39.61	5.87	45.48	54.00	-8.52	AVG	

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

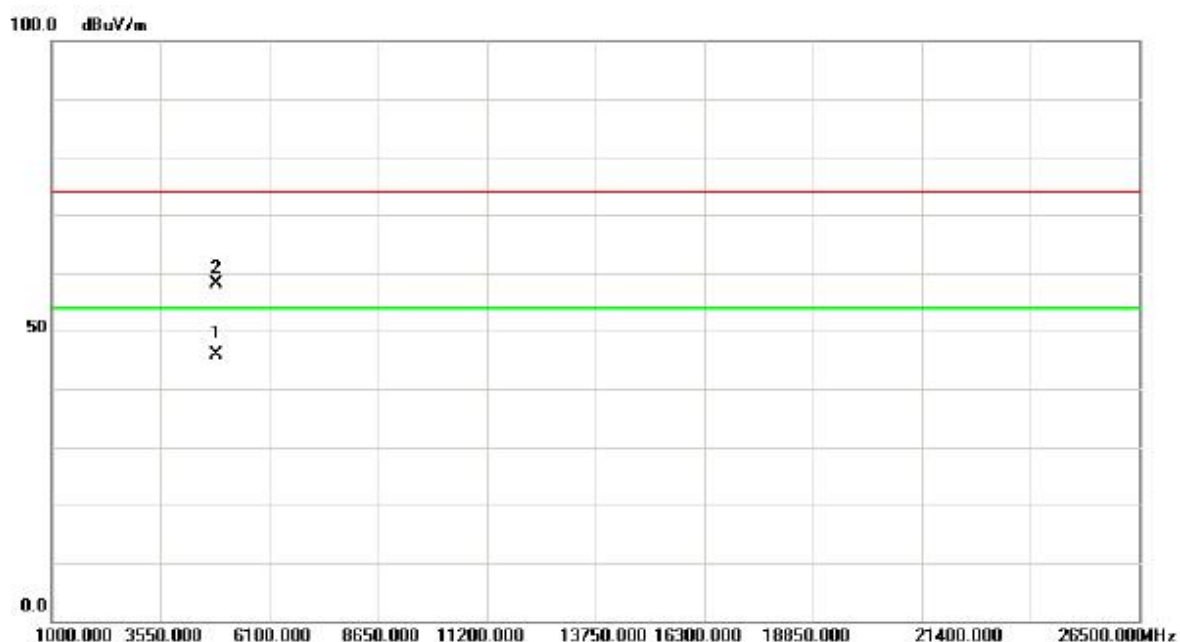
Vertical



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	*	2437.000	64.23	32.74	96.97	74.00	22.97	peak	No Limit
2	X	2437.000	42.60	32.74	75.34	54.00	21.34	AVG	No Limit

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

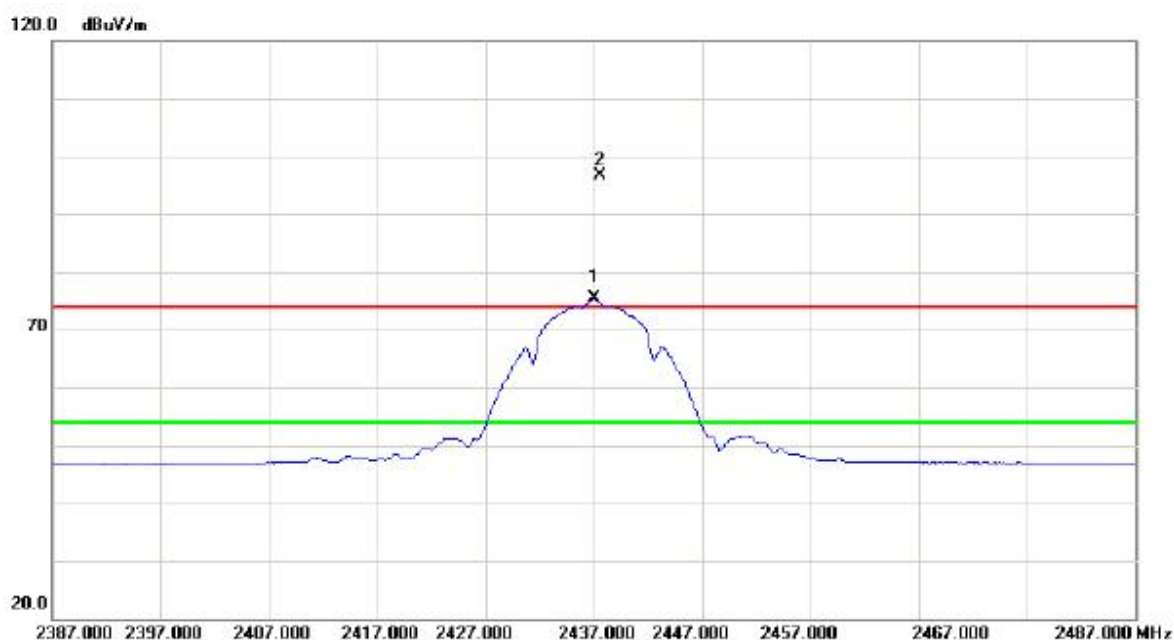
Vertical



No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Margin		
		MHz	Level	Factor	ment			Detector	Comment
			dBuV	dB	dBuV/m	dBuV/m	dB		
1	*	4873.980	39.83	6.01	45.84	54.00	-8.16	AVG	
2		4874.010	52.03	6.01	58.04	74.00	-15.96	peak	

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

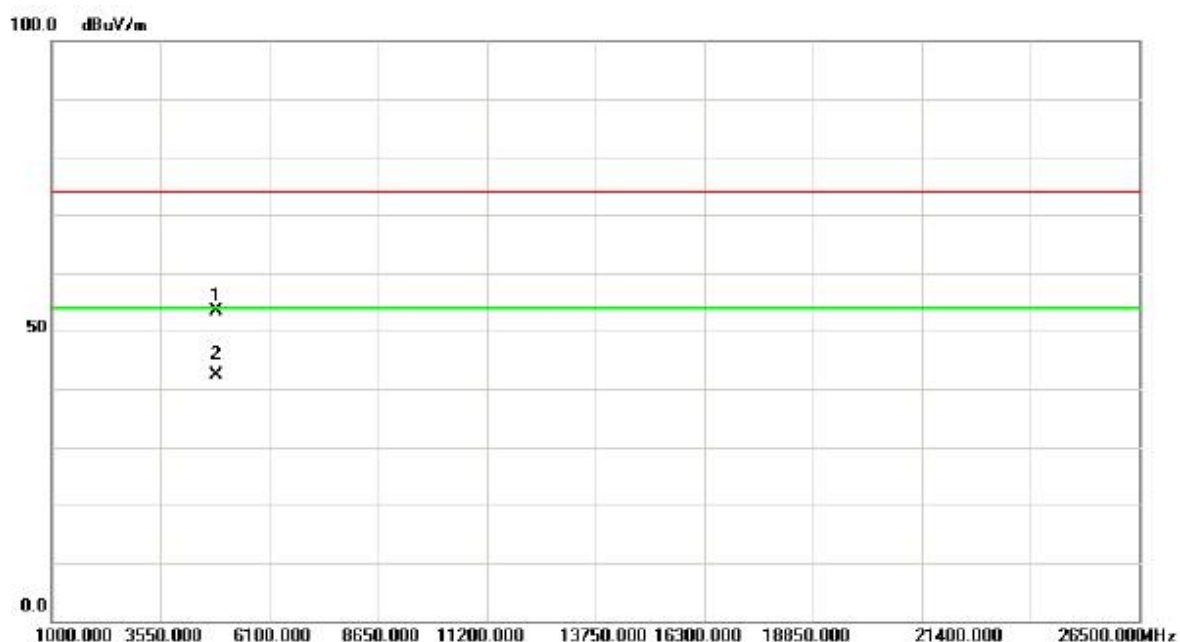
Horizontal



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	X	2437.000	42.57	32.74	75.31	54.00	21.31	AVG	No Limit
2	*	2437.600	64.00	32.74	96.74	74.00	22.74	peak	No Limit

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

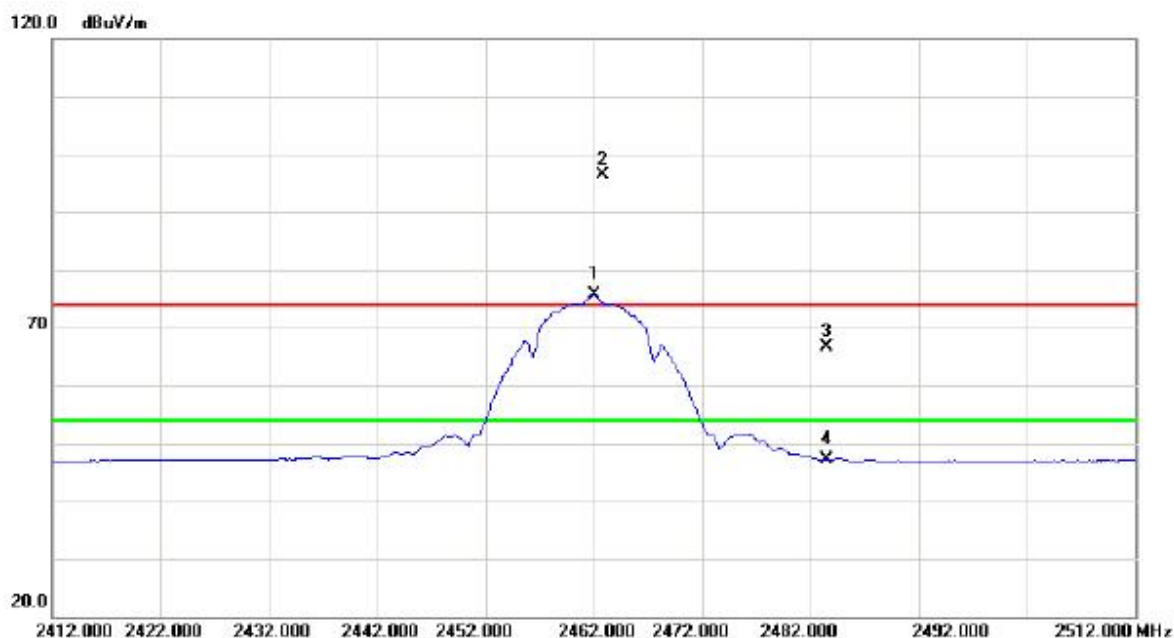
Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4874.010	47.35	6.01	53.36	74.00	-20.64	peak	
2	*	4874.020	36.25	6.01	42.26	54.00	-11.74	AVG	

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

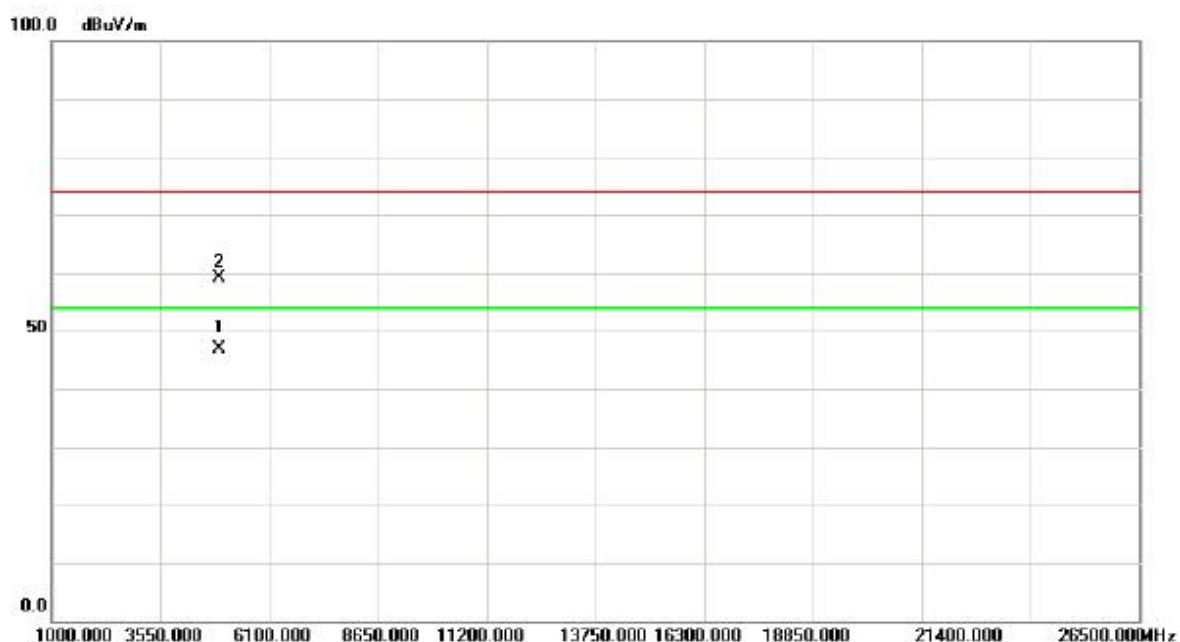
Vertical



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	X	2462.000	42.81	32.78	75.59	54.00	21.59	AVG	No Limit
2	*	2462.900	63.54	32.78	96.32	74.00	22.32	peak	No Limit
3		2483.500	33.73	32.81	66.54	74.00	-7.46	peak	
4		2483.500	14.42	32.81	47.23	54.00	-6.77	AVG	

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

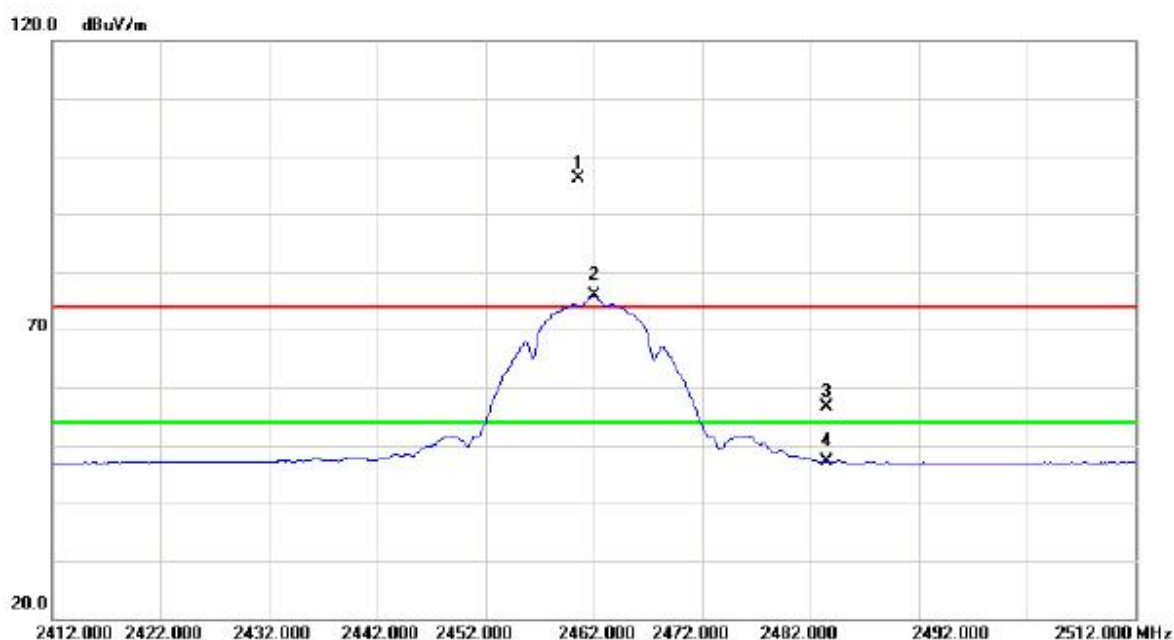
Vertical



No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Margin		
		MHz	Level	Factor	ment			Detector	Comment
			dBuV	dB	dBuV/m	dBuV/m	dB		
1	*	4923.960	40.70	6.14	46.84	54.00	-7.16	AVG	
2		4924.020	52.90	6.14	59.04	74.00	-14.96	peak	

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

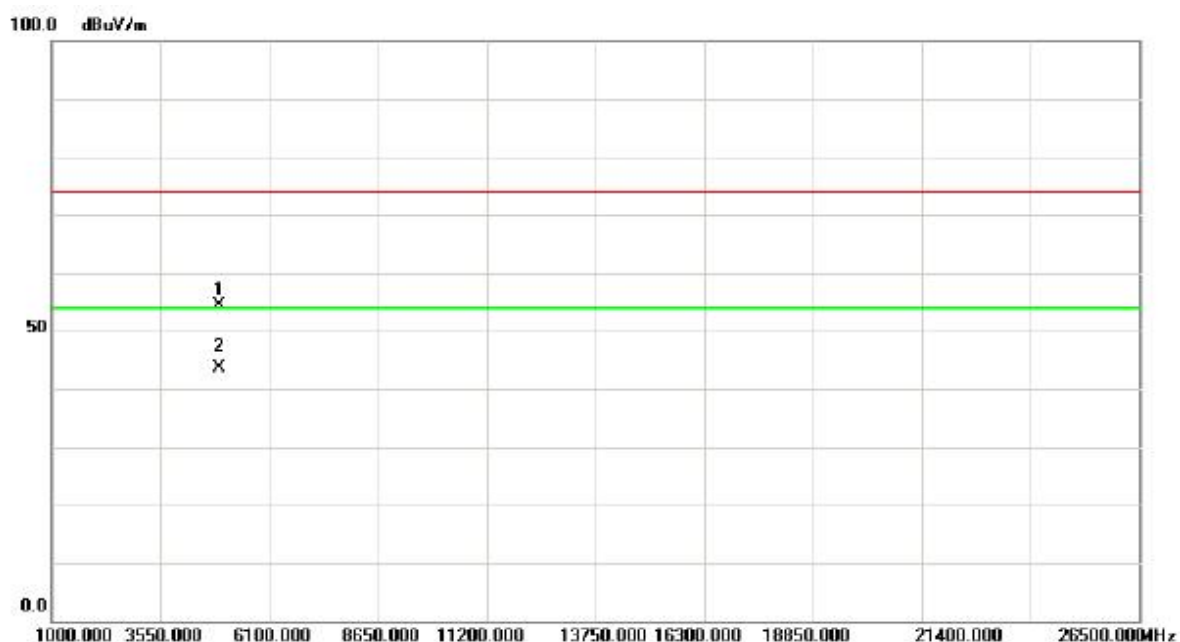
Horizontal



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	*	2460.600	63.24	32.78	96.02	74.00	22.02	peak	No Limit
2	X	2462.000	42.98	32.78	75.76	54.00	21.76	AVG	No Limit
3		2483.500	23.86	32.81	56.67	74.00	-17.33	peak	
4		2483.500	14.37	32.81	47.18	54.00	-6.82	AVG	

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

Horizontal



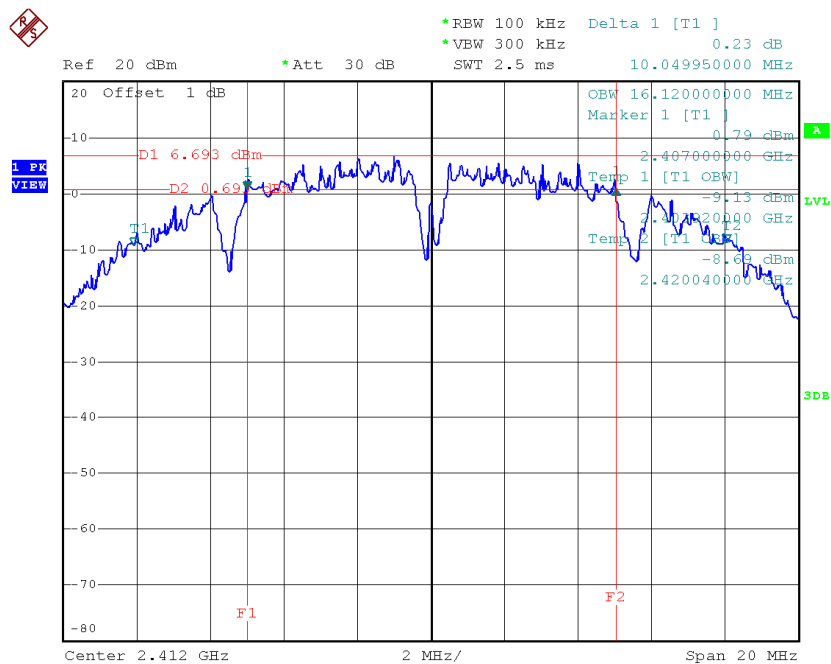
No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		4923.960	48.28	6.14	54.42	74.00	-19.58	peak	
2	*	4923.980	37.40	6.14	43.54	54.00	-10.46	AVG	

ATTACHMENT E - BANDWIDTH

Test Mode : TX B Mode_CH01/06/11

Frequency (MHz)	6dB Bandwidth (MHz)	99% Occupied BW (MHz)	Min. Limit (kHz)	Test Result
2412	10.05	16.12	500	Complies
2437	10.03	16.00	500	Complies
2462	9.76	16.00	500	Complies

TX CH01



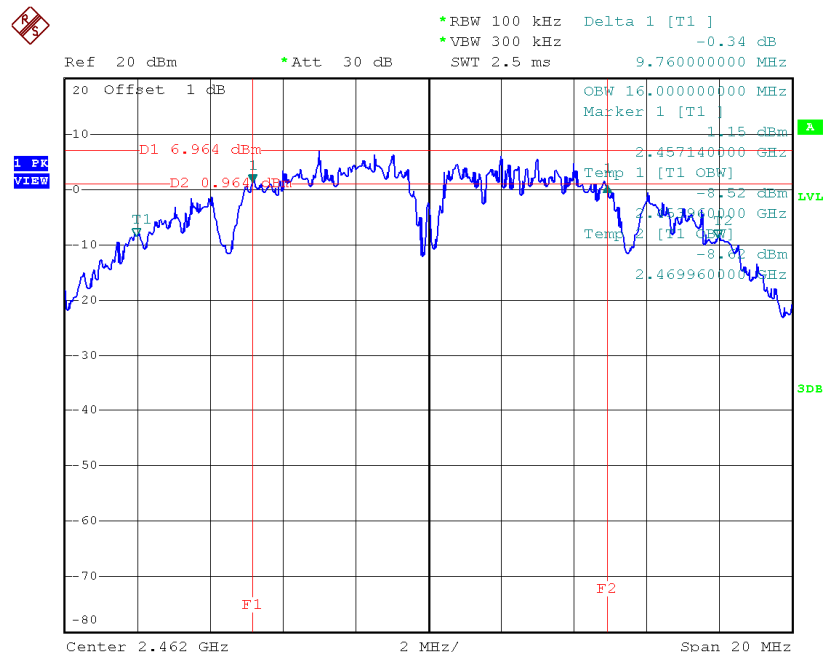
Date: 21.APR.2015 14:31:52

TX CH06



Date: 21.APR.2015 14:35:35

TX CH11



Date: 21.APR.2015 14:38:31

ATTACHMENT F – MAXIMUM PEAK CONDUCTED OUTPUT POWER

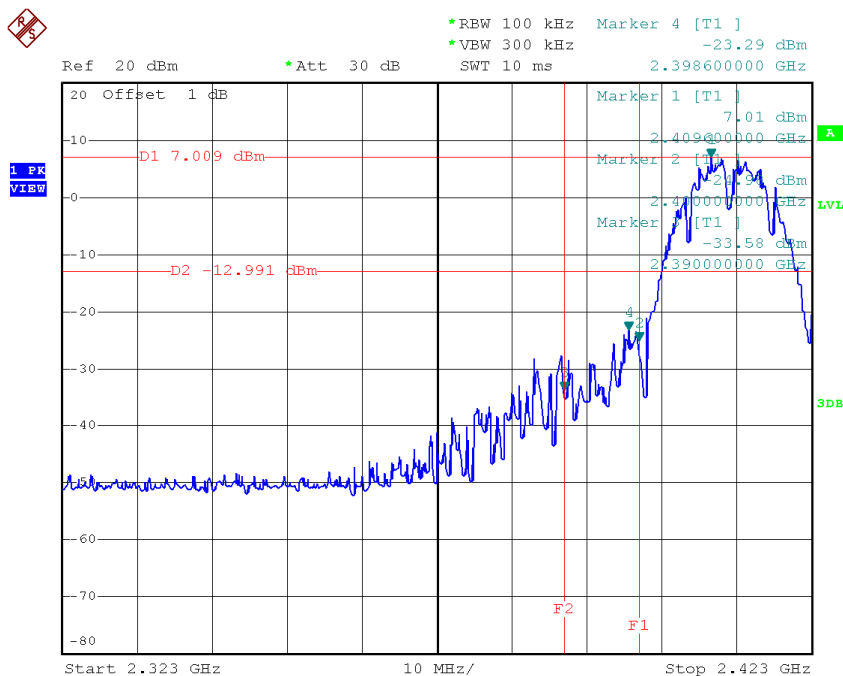
Test Mode :TX B Mode_CH01/06/11

Frequency (MHz)	Conducted Power (dBm)	Conducted Power (W)	Max. Limit (dBm)	Max. Limit (W)	Result
2412	21.39	0.14	30.00	1.00	Complies
2437	21.27	0.13	30.00	1.00	Complies
2462	20.87	0.12	30.00	1.00	Complies

ATTACHMENT G - ANTENNA CONDUCTED SPURIOUS EMISSION

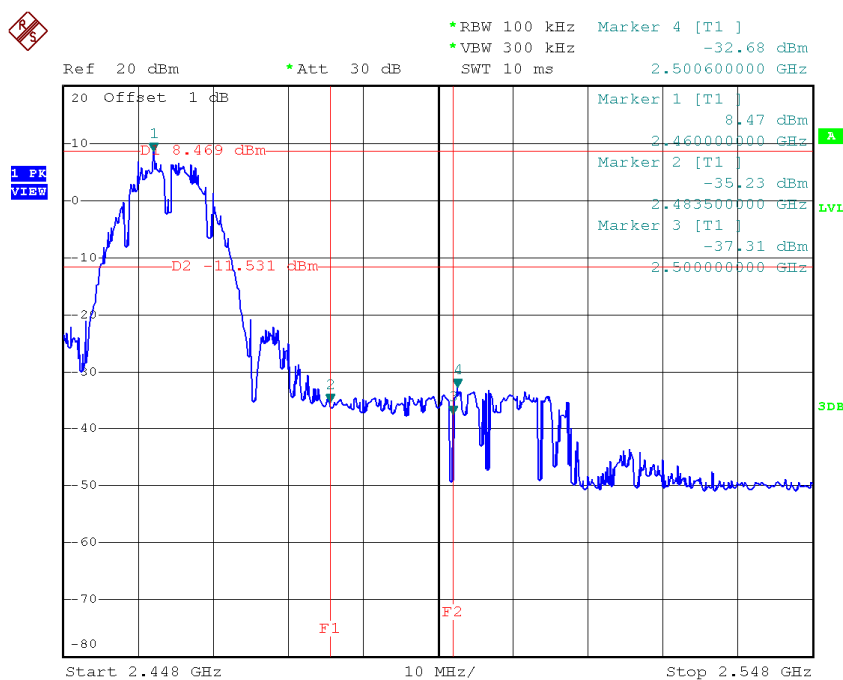
Test Mode : TX B Mode

TX B mode CH01



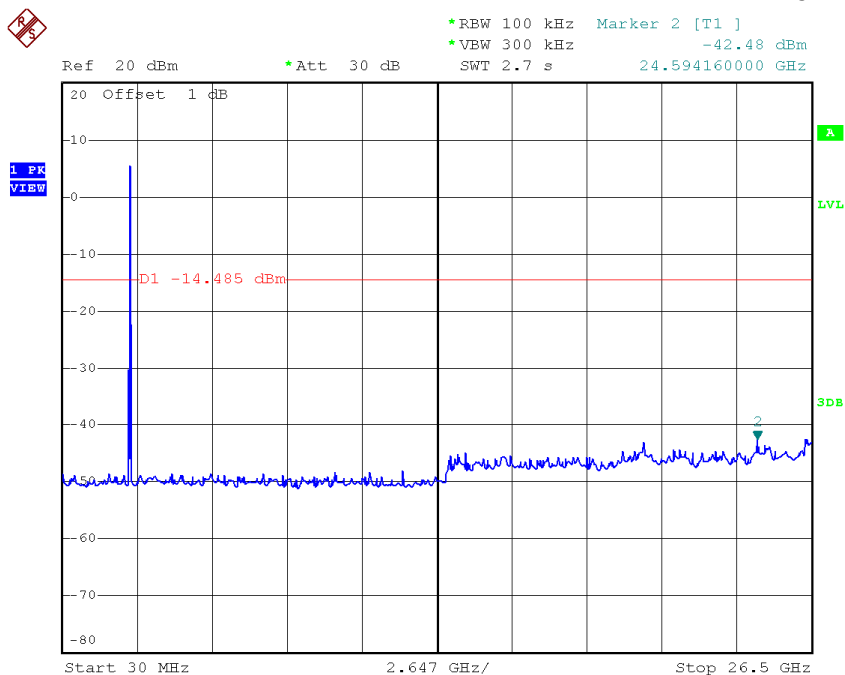
Date: 21.APR.2015 14:33:18

TX B mode CH11



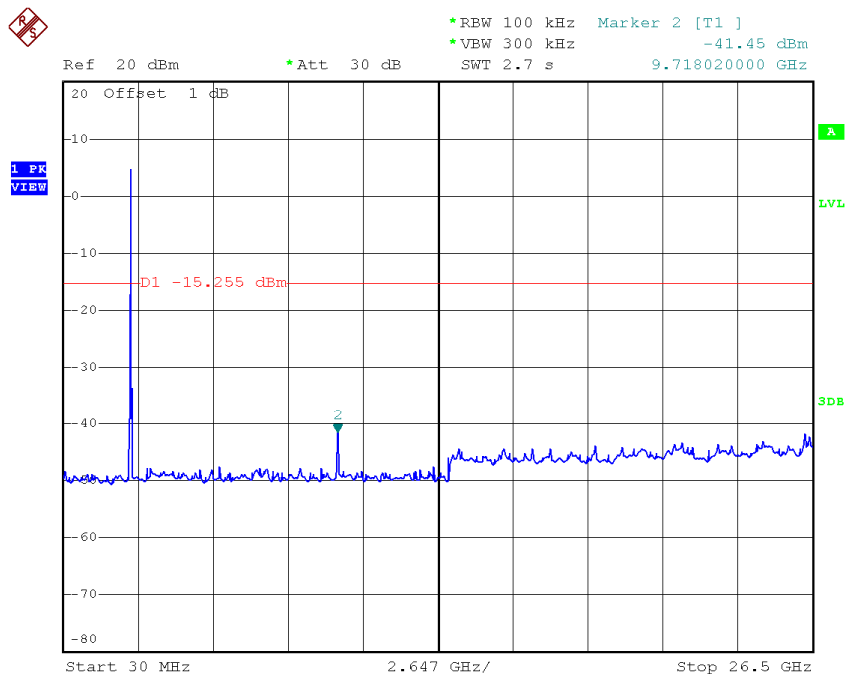
Date: 21.APR.2015 14:45:05

TX B mode CH01 (10 Harmonic of the frequency)



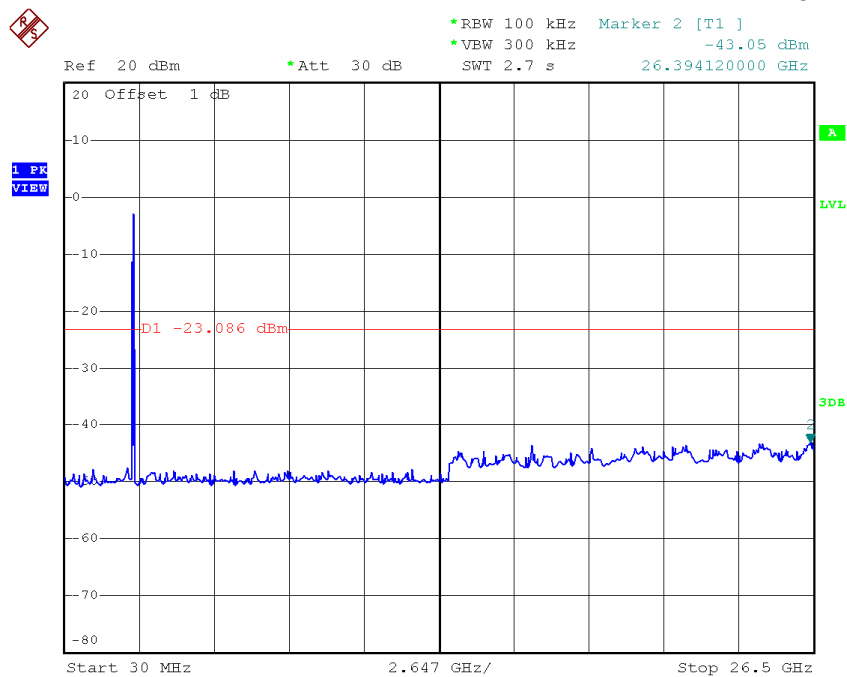
Date: 21.APR.2015 14:32:07

TX B mode CH06 (10 Harmonic of the frequency)



Date: 21.APR.2015 14:37:23

TX B mode CH11 (10 Harmonic of the frequency)



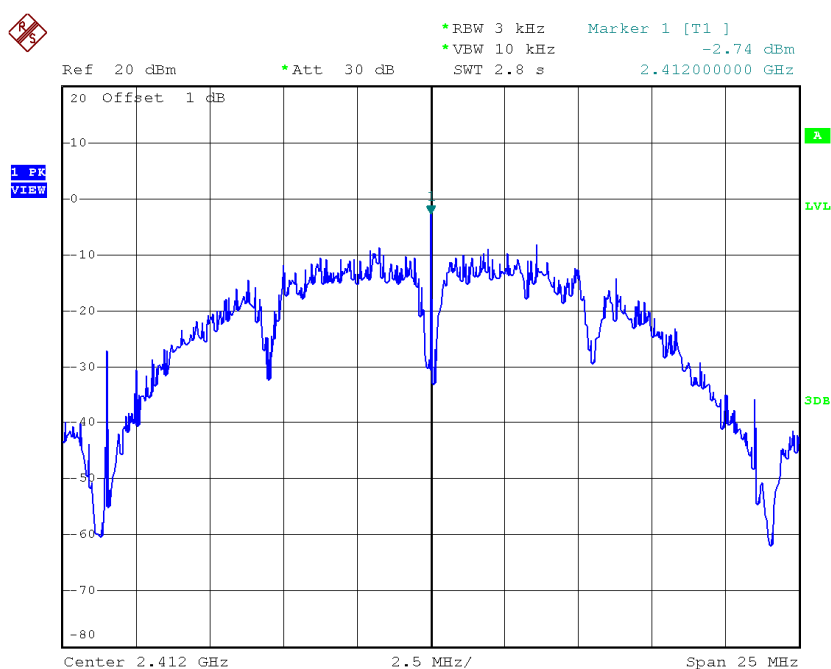
Date: 21.APR.2015 14:38:56

ATTACHMENT H - POWER SPECTRAL DENSITY

Test Mode :TX B Mode_CH01/06/11

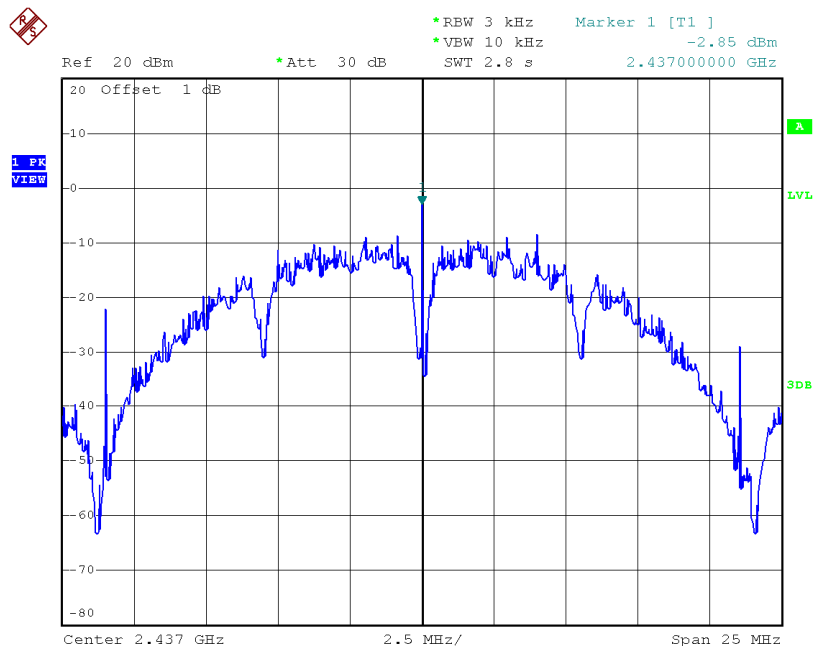
Frequency (MHz)	Power Density (dBm/3kHz)	Power Density (mW/3kHz)	Max. Limit (dBm/3kHz)	Result
2412	-2.74	0.53	8.00	Complies
2437	-2.85	0.52	8.00	Complies
2462	-2.81	0.52	8.00	Complies

TX CH01



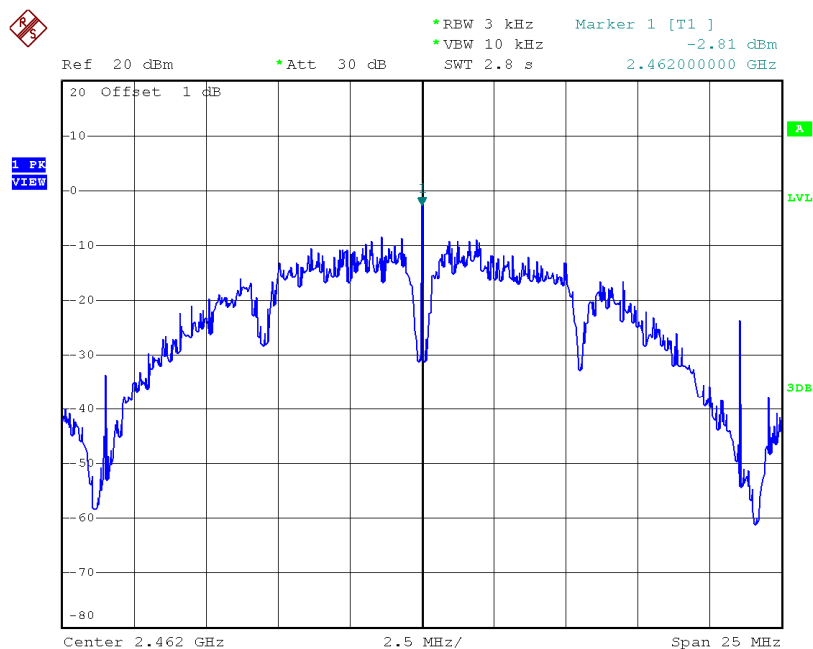
Date: 21.APR.2015 14:34:52

TX CH06



Date: 21.APR.2015 14:37:43

TX CH11



Date: 21.APR.2015 14:40:48