

FCC Radio Test Report

FCC ID: Q3N-8231

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

Project No. : 1411165A
Equipment : Terminal
Model Name : 8231
Applicant : CIPHERLAB CO., LTD.
Address : 12F, 333, Dunhua S. Rd., Sec. 2, Taipei, Taiwan

Date of Receipt : May 26, 2015
Date of Test : May 26, 2015 ~ Jun. 10, 2015
Issued Date : Jun. 15, 2015
Tested by : BTL Inc.

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Declaration

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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-FCCP-2-1411165A	Original Issue.	Jun. 15, 2015

1. CERTIFICATION

Equipment : Terminal
Brand Name : CIPHERLAB
Model Name : 8231
Applicant : CIPHERLAB CO., LTD.
Manufacturer : CIPHERLAB CO., LTD.
Address : 12F, 333, Dunhua S. Rd., Sec. 2, Taipei, Taiwan
Factory : CIPHERLAB CO., LTD. 2nd
Address : 12F, 333, Dunhua S. Rd., Sec. 2, Taipei, Taiwan
Date of Test : May 26, 2015 ~ Jun. 10, 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 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-2-1411165A) 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):

Standard(s)	Section	Test Item	Judgment	Remark
15.207		Conducted Emission	PASS	
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 to this device.

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

2.1 TEST FACILITY

Conducted emission Test:

C05: (FCC RN:965108; FCC DN:TW1082)

No. 68-1, Ln. 169, Sec.2, Datong Rd., Xizhi Dist., New Taipei City 221, Taiwan

Radiated emission Test (Below 1 GHz):

CB08: (FCC RN: 614388; FCC DN: TW1054; IC Assigned Code: 4428C-1)

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

Radiated emission Test (Above 1 GHz):

CB08: (VCCI RN: G-91; FCC RN: 614388; FCC DN: TW1054; IC Assigned Code: 4428C-1)

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

2.2 MEASUREMENT UNCERTAINTY

The measurement uncertainty is not specified by FCC rules and Canada Industry for reference only.

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%**.

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

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

A. Conducted Measurement :

Test Site	Measurement Frequency Range	U , (dB)	NOTE
C05	150 kHz ~ 30 MHz	1.94	

B. Radiated Measurement :

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

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

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

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

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

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

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

3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

Equipment	Terminal	
Brand Name	CIPHERLAB	
Model Name	8231	
Model Difference	The EUT includes three optional readers: 2D, CCD and Laser.	
Product Description	Operation Frequency	2402~2480 MHz
	Modulation Technology	GFSK(1Mbps)
	Bit Rate of Transmitter	
	Output Power (Max.)	4.98 dBm(0.0031W) (1Mbps)
Power Source	#1 DC Voltage supplied from AC adapter. Brand/Model: ADAPTER TECH./STD-05030V #2 DC Voltage supplied from USB host. #3 Supplied from Li-ion Battery. Model:BA-80S1A2	
Power Rating	#1 I/P:AC 100-240V~47-63Hz 0.48A MAX O/P:5V/3A 15W MAX #2 I/P: DC 5V 500mA #3 DC 3.7V 1200mAh,4.44Wh	

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	CIPHERLAB	8231 BT Antenna	PIFA	N/A	1.71

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 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:

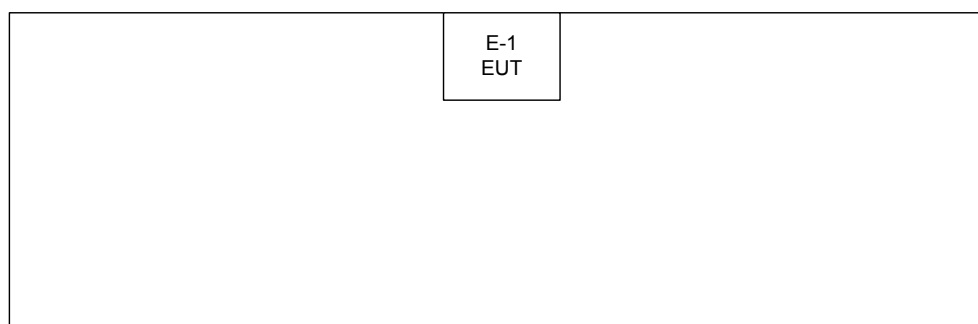
(1) The measurements are performed at the high, middle, low available channels.

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	0		
Frequency (MHz)	2402	2440	2480
BT LE	DEF	DEF	DEF

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 (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

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

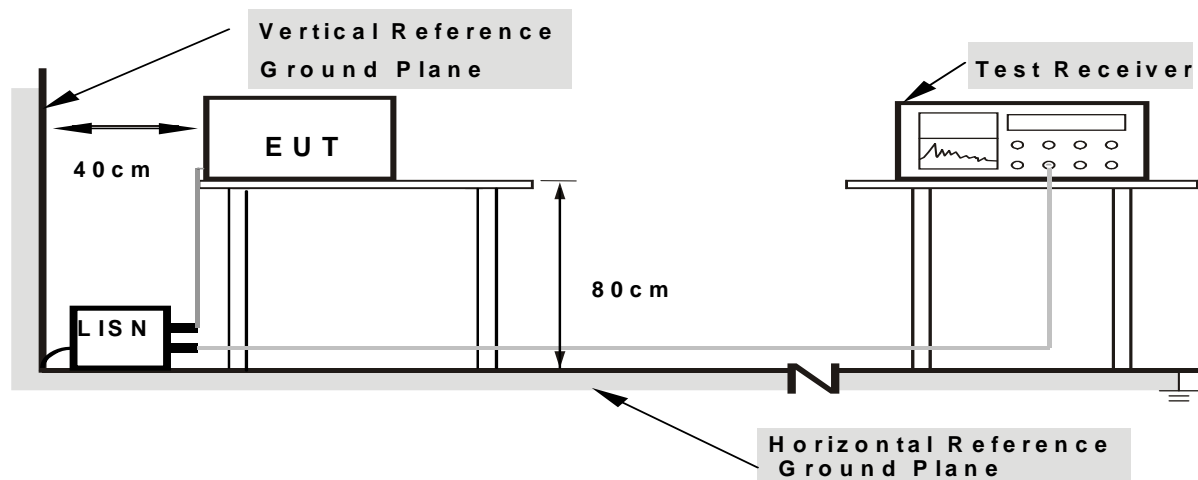
4.1.2 TEST PROCEDURE

- 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
 from other units and other metal planes

4.1.5 EUT OPERATING CONDITIONS

The EUT was configured for testing in a typical function (as a customer would normally use it), EUT was programmed to be in continuously transmitting/receiving data or hopping on mode.

4.1.6 EUT TEST CONDITIONS

Temperature: 26°C
 Relative Humidity: 59%
 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), 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 or PK detector

4.2.2 TEST PROCEDURE

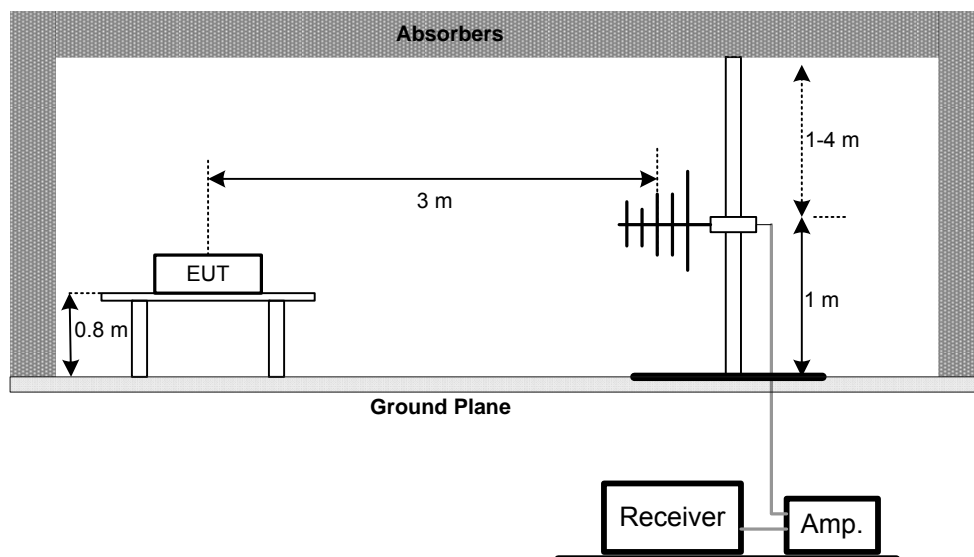
- The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(below 1GHz)
- The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3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

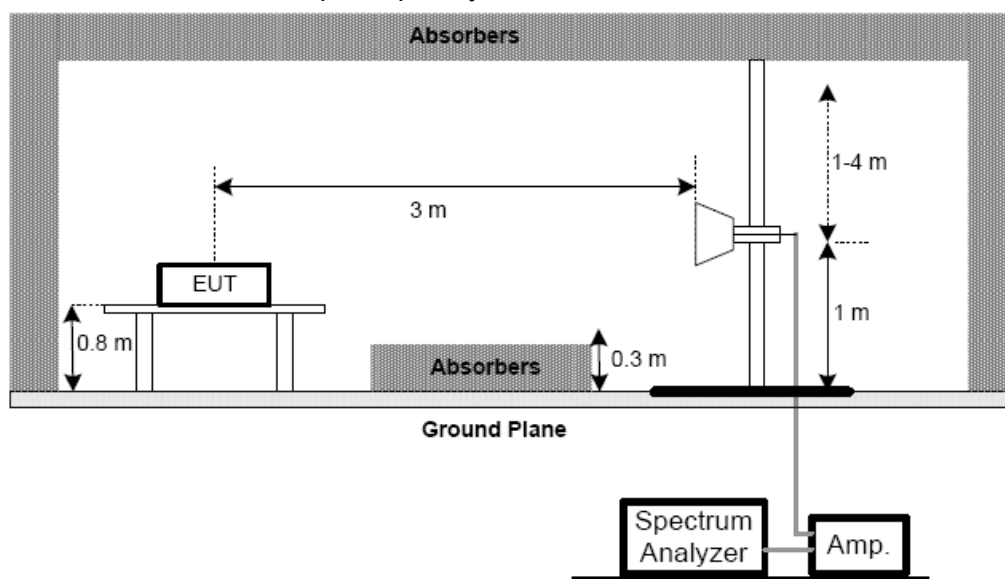
No deviation

4.2.4 TEST SETUP

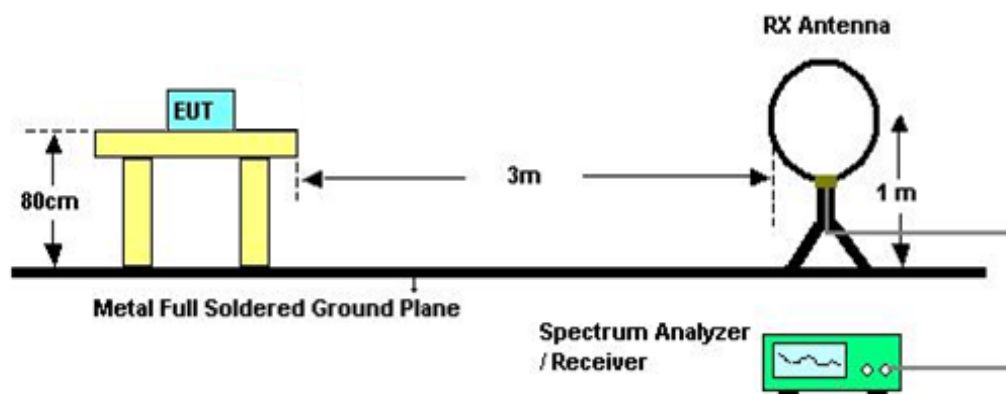
(A) Radiated Emission Test Set-Up Frequency Below 1 GHz



(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: 24°C

Relative Humidity: 60%

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				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(a)(2)	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				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(b)(3)	Maximum Output Power	1 watt or 30dBm	2400-2483.5	PASS

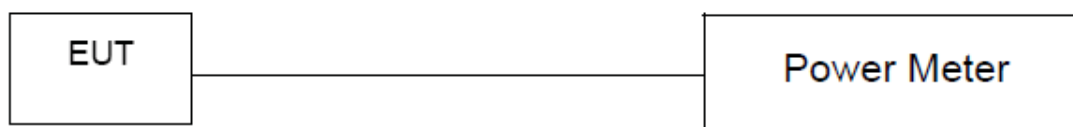
6.1.1 TEST PROCEDURE

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

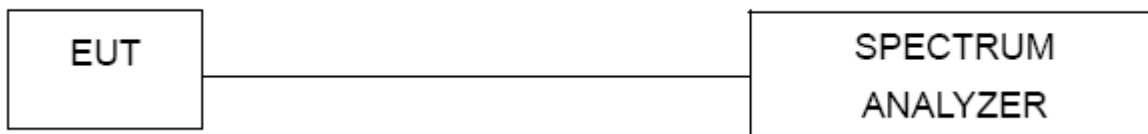
8.1.1 TEST PROCEDURE

- 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=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	TWO-LINE V-NETWORK	R&S	ENV216	101050	Feb. 01, 2016
2	Test Cable	TIMES	CFD300-NL	C05	Jun. 10, 2016
3	EMI Test Receiver	R&S	ESR3	101854	Dec. 09, 2015

Radiated Emission Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP-40	100129	Jan.07, 2016
2	Horn Antenna	Schwarzbeck	BBHA 9120	D-325	Jun. 15, 2016
3	Microwave Pre_amplifier	Agilent	8449B	3008A01714	Apr. 16, 2016
4	Microflex Cable	Harbour industries	27478LL142	1m	May. 13, 2016
5	Microflex Cable	EMC	S104-SMA	8m	May. 15, 2016
6	Microflex Cable	Harbour industries	27478LL142	3m	May. 13, 2016
7	Test Cable	LMR	LMR-400	12m	May. 14, 2016
8	Test Cable	LMR	LMR-400	3m	May. 14, 2016
9	Pre-Amplifier	Anritsu	MH648A	M92649	Jun. 20, 2015
10	Log-Bicon Antenna	Schwarzbeck	VULB9168-35 2	9168-352	Jun. 20, 2015
11	Loop Antenna	EMCO	6502	00042960	Nov. 08, 2015

6dB Bandwidth Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP-40	100129	Jan. 07, 2016

Peak Output Power Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Power Meter	Anritsu	ML2495A	1128008	Aug. 08, 2015
2	Power Meter Sensor	Anritsu	MA2411B	1126001	Aug. 08, 2015

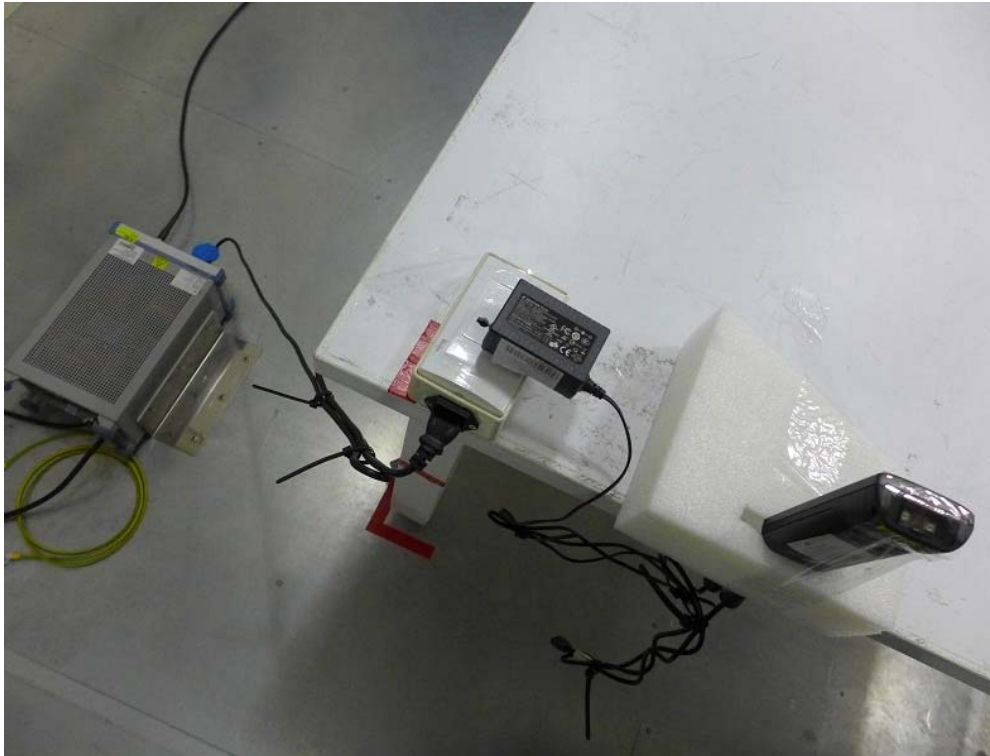
Antenna Conducted Spurious Emission Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP-40	100129	Jan. 07, 2016

Power Spectral Density Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP-40	100129	Jan. 07, 2016

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

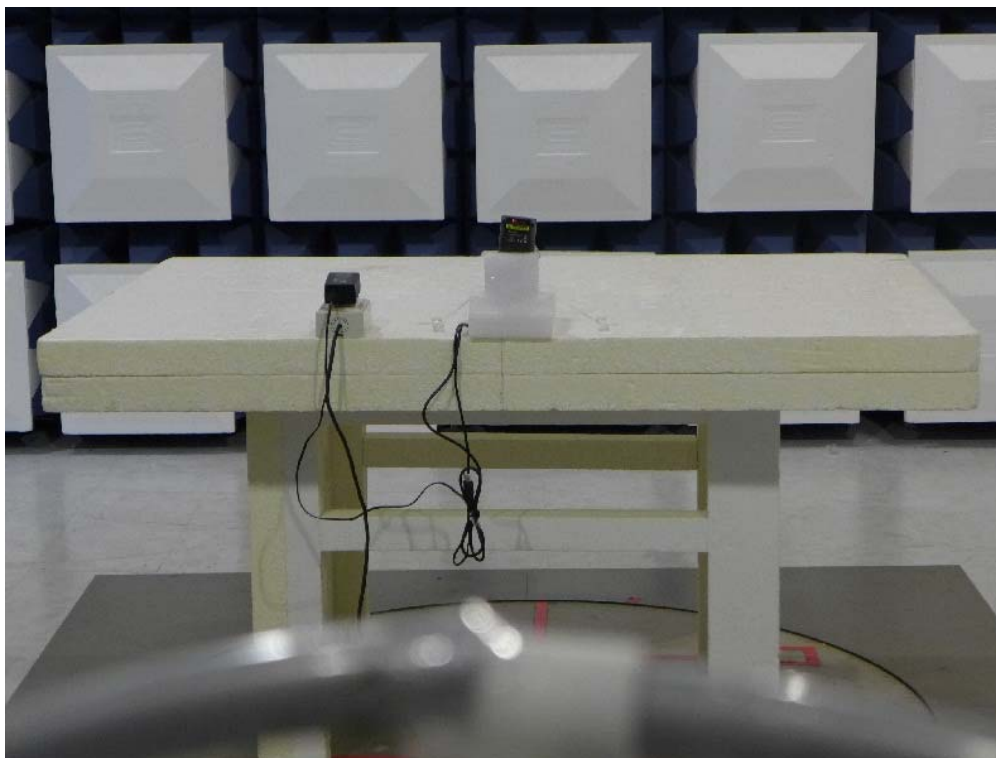
10. EUT TEST PHOTO

Conducted Measurement Photos



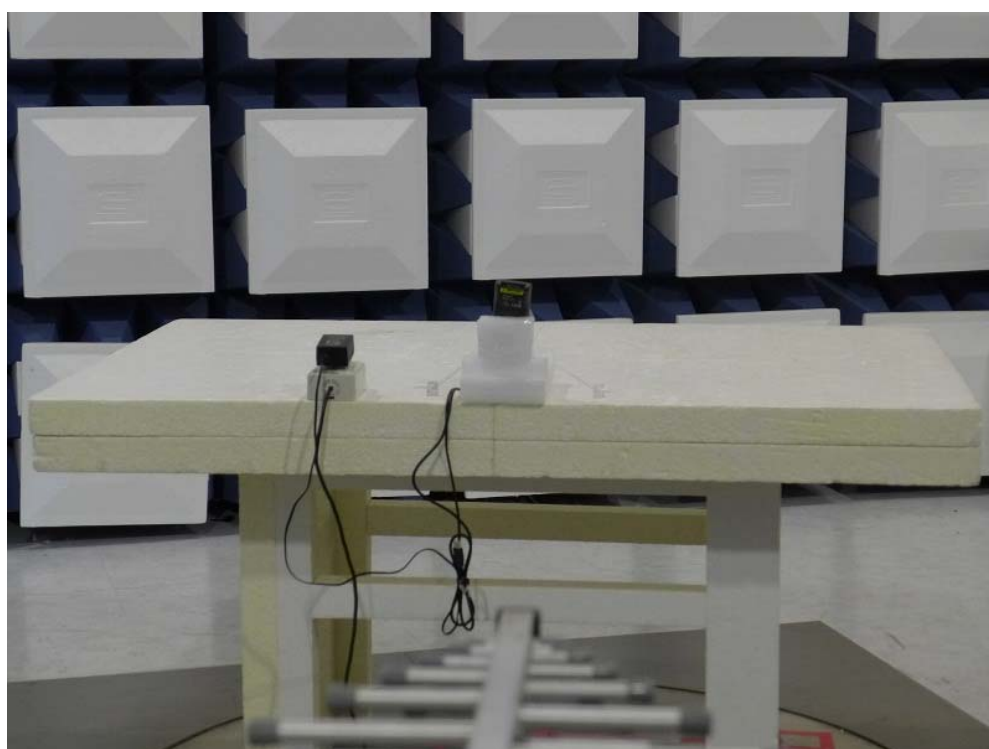
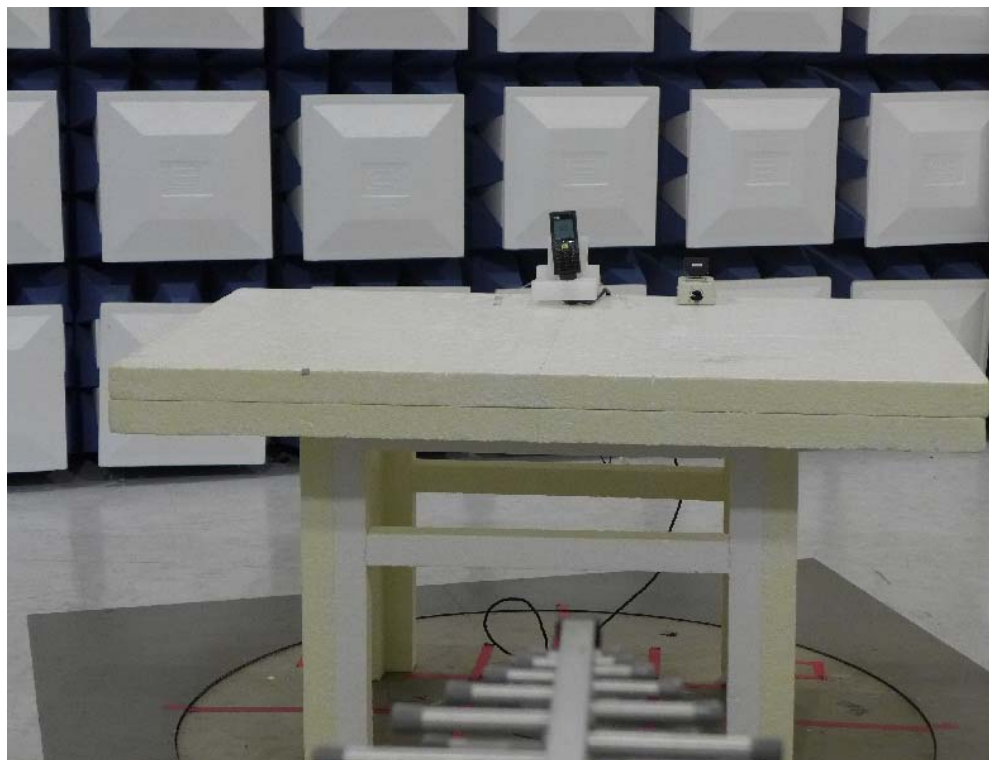
Radiated Measurement Photos

9K-30MHz



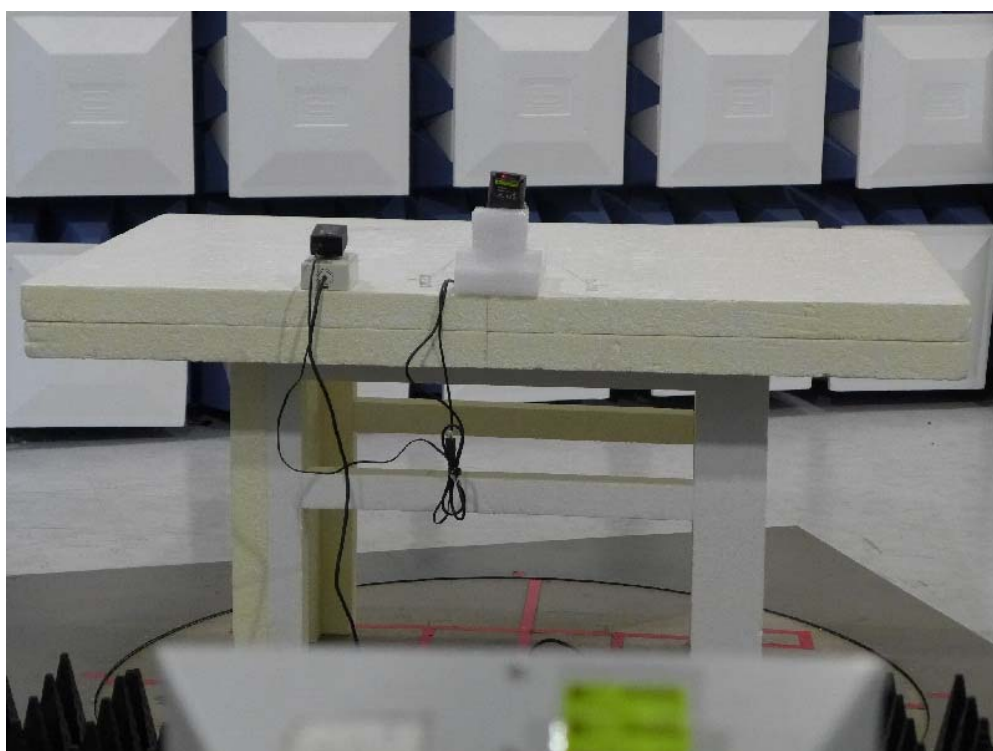
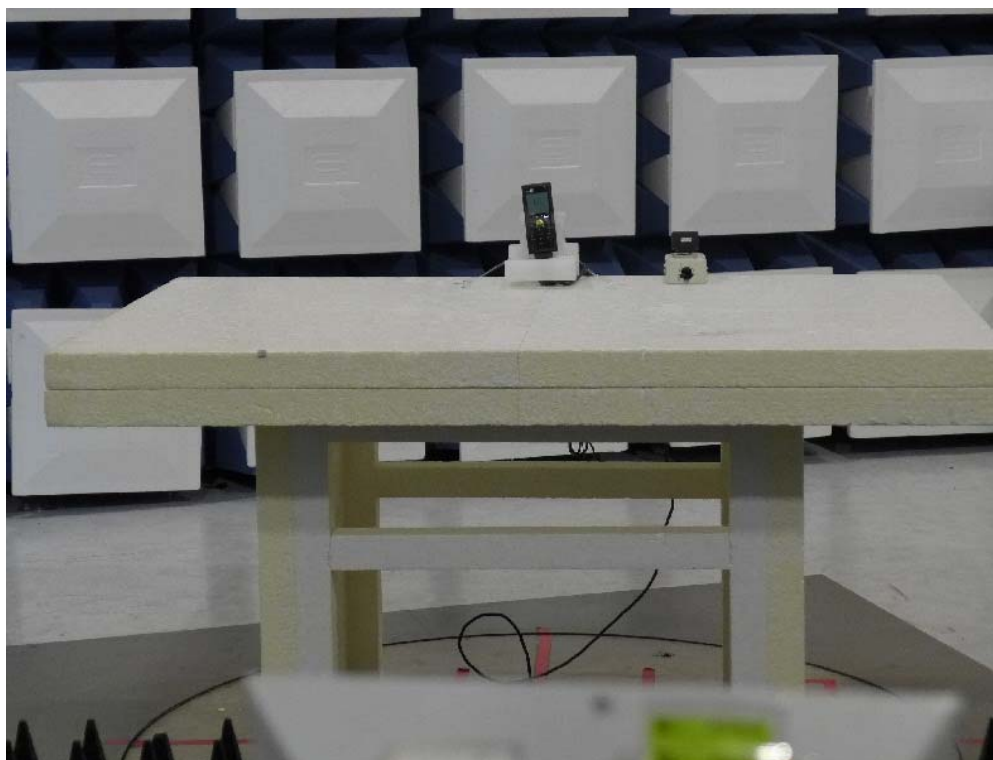
Radiated Measurement Photos

30MHz-1G



Radiated Measurement Photos

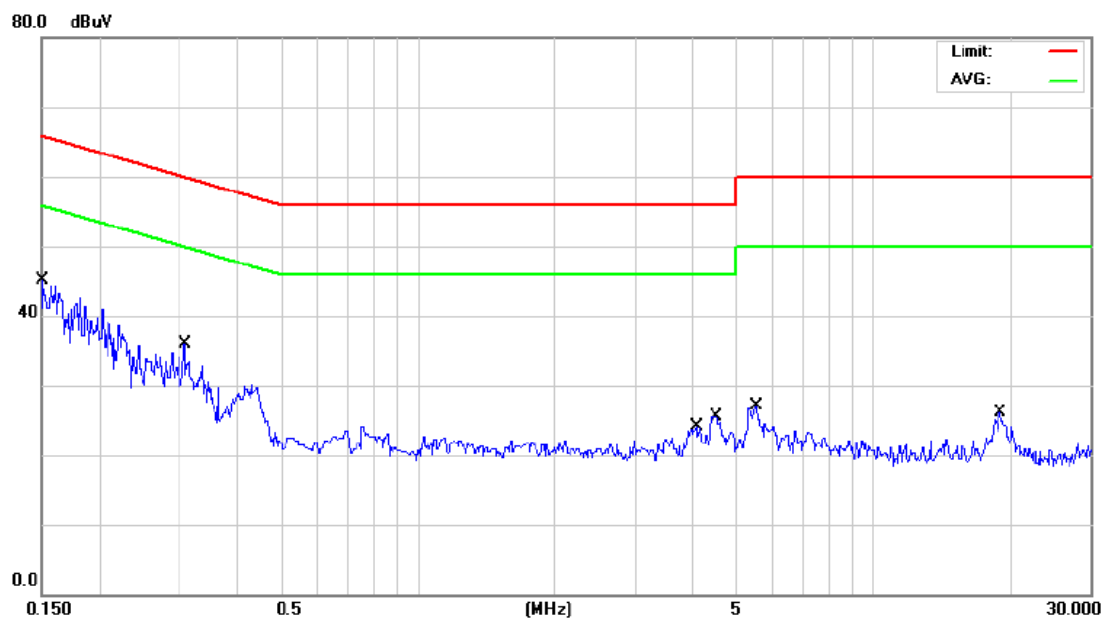
Above 1G



ATTACHMENT A - CONDUCTED EMISSION

Test Mode: TX Mode

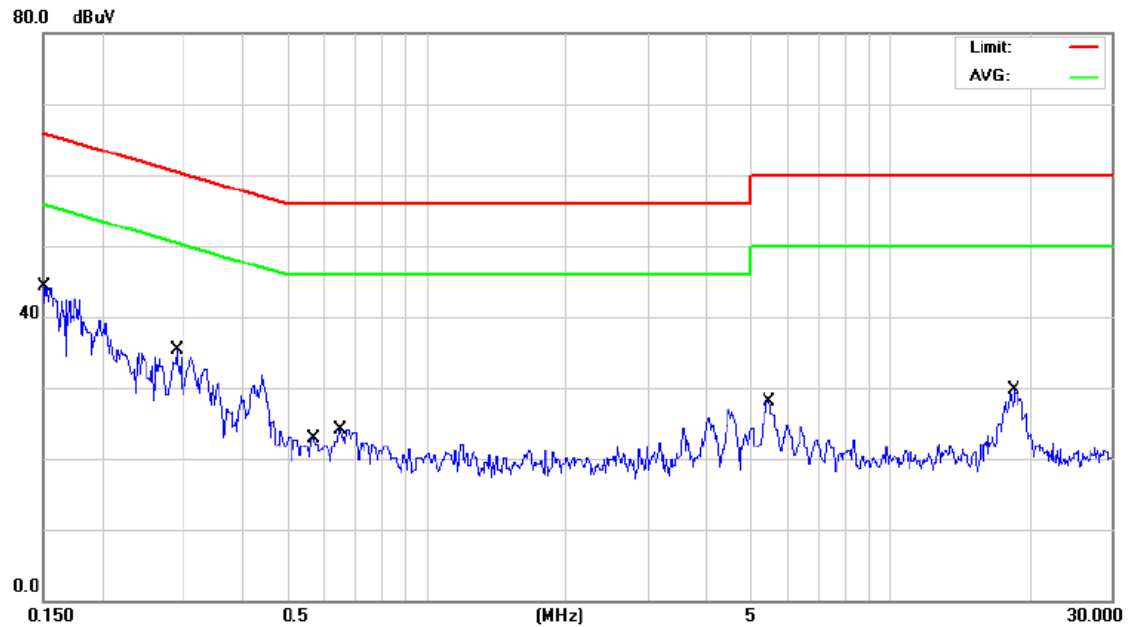
Line



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1	*	0.1507	25.70	9.64	35.34	65.96	-30.62	QP	
2		0.1507	12.60	9.64	22.24	55.96	-33.72	AVG	
3		0.3068	13.60	9.63	23.23	60.05	-36.82	QP	
4		0.3068	6.90	9.63	16.53	50.05	-33.52	AVG	
5		4.0820	5.00	9.82	14.82	56.00	-41.18	QP	
6		4.0820	1.00	9.82	10.82	46.00	-35.18	AVG	
7		4.5050	6.60	9.83	16.43	56.00	-39.57	QP	
8		4.5050	1.10	9.83	10.93	46.00	-35.07	AVG	
9		5.5500	11.30	9.86	21.16	60.00	-38.84	QP	
10		5.5500	7.40	9.86	17.26	50.00	-32.74	AVG	
11		18.9500	8.50	9.84	18.34	60.00	-41.66	QP	
12		18.9500	4.40	9.84	14.24	50.00	-35.76	AVG	

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		0.1500	27.90	9.63	37.53	65.99	-28.46	QP	
2		0.1500	16.20	9.63	25.83	55.99	-30.16	AVG	
3		0.2884	20.90	9.64	30.54	60.57	-30.03	QP	
4	*	0.2884	17.60	9.64	27.24	50.57	-23.33	AVG	
5		0.5720	5.70	9.65	15.35	56.00	-40.65	QP	
6		0.5720	4.80	9.65	14.45	46.00	-31.55	AVG	
7		0.6530	8.90	9.66	18.56	56.00	-37.44	QP	
8		0.6530	7.50	9.66	17.16	46.00	-28.84	AVG	
9		5.4499	11.60	9.85	21.45	60.00	-38.55	QP	
10		5.4499	7.90	9.85	17.75	50.00	-32.25	AVG	
11		18.5000	15.20	9.85	25.05	60.00	-34.95	QP	
12		18.5000	10.40	9.85	20.25	50.00	-29.75	AVG	

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

Test Mode:	TX Mode
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Frequency (MHz)	Ant 0°/90°	Read level dBuV/m	Factor (dB)	Measured(FS) (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Note
0.0150	0°	33.36	22.28	55.64	104.08	-48.45	AVG
0.0150	0°	44.32	22.28	66.60	124.08	-57.49	PK
0.0255	0°	28.52	22.01	50.53	99.47	-48.94	AVG
0.0255	0°	33.63	22.01	55.64	119.47	-63.83	PK
0.0366	0°	24.92	21.74	46.66	96.33	-49.68	AVG
0.0366	0°	32.63	21.74	54.37	116.33	-61.97	PK
0.0600	0°	24.78	21.24	46.02	92.04	-46.02	AVG
0.0600	0°	34.69	21.24	55.93	112.04	-56.11	PK
1.2650	0°	34.87	20.34	55.21	65.56	-10.36	QP
1.1353	0°	37.65	20.46	58.11	66.50	-8.39	QP

Frequency (MHz)	Ant 0°/90°	Read level dBuV/m	Factor (dB)	Measured(FS) (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Note
0.0132	90°	34.11	22.32	56.43	105.19	-48.76	AVG
0.0132	90°	48.32	22.32	70.64	125.19	-54.55	PK
0.0257	90°	27.33	22.01	49.34	99.41	-50.07	AVG
0.0257	90°	42.82	22.01	64.83	119.41	-54.58	PK
0.0345	90°	26.39	21.79	48.18	96.85	-48.67	AVG
0.0345	90°	35.41	21.79	57.20	116.85	-59.65	PK
0.0632	90°	22.36	21.19	43.55	91.59	-48.04	AVG
0.0632	90°	38.62	21.19	59.81	111.59	-51.78	PK
1.2510	90°	34.33	20.35	54.68	65.66	-10.98	QP
1.6500	90°	36.31	19.95	56.26	63.25	-6.99	QP

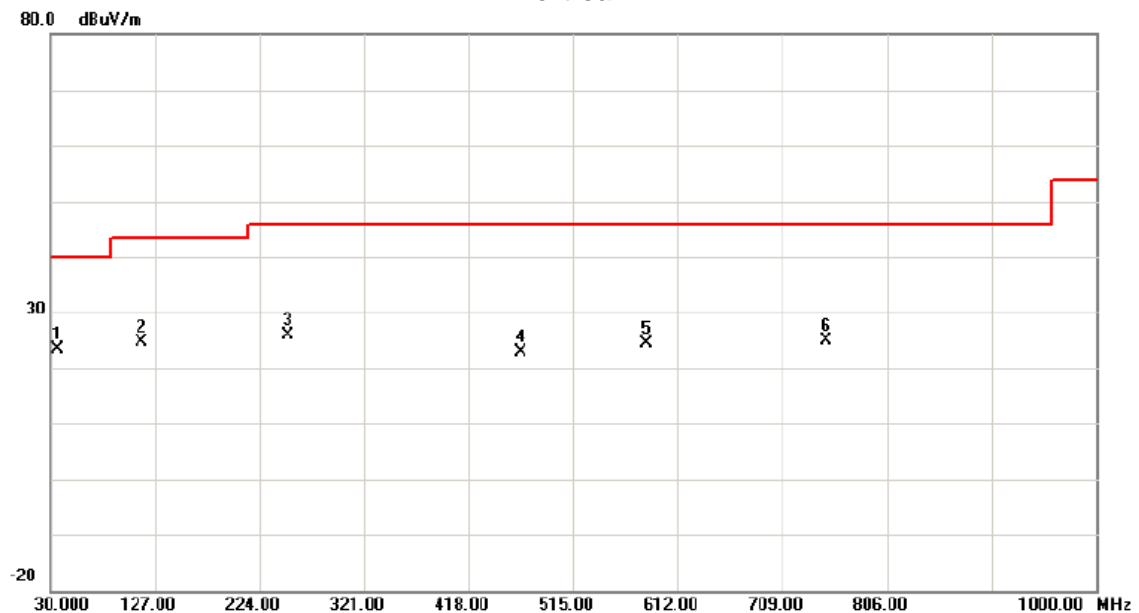
Remark:

- (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 2440MHz -CH19 -1Mbps
------------	-------------------------

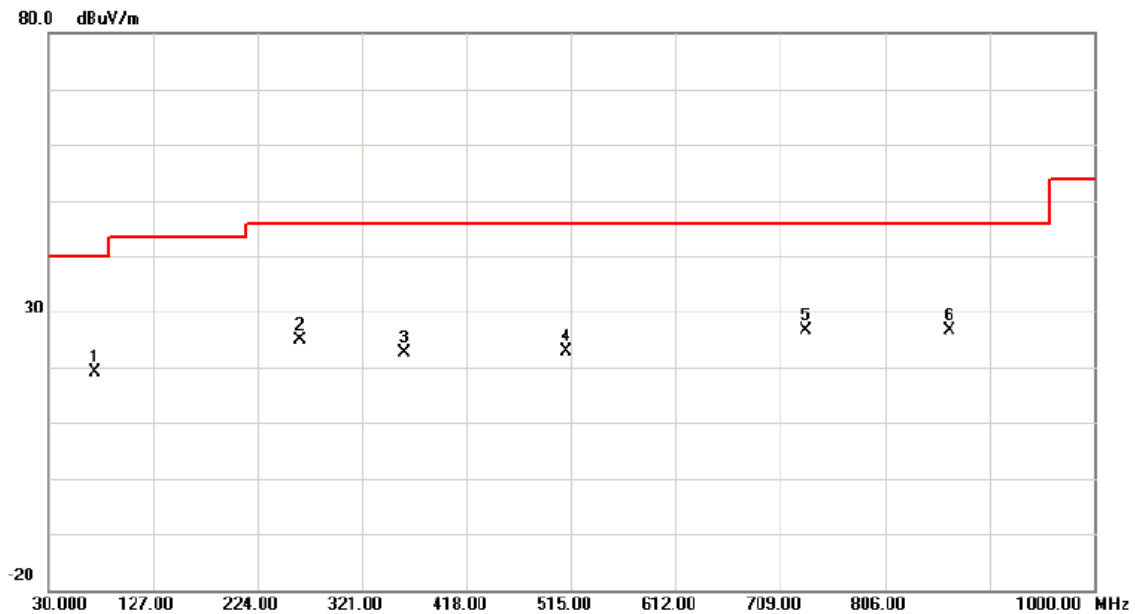
Vertical



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Antenna Height cm	Table Degree degree	Comment
1	*	37.2750	38.27	-14.78	23.49	40.00	-16.51	peak		
2		114.8750	41.55	-16.98	24.57	43.50	-18.93	peak		
3		250.6750	40.76	-14.98	25.78	46.00	-20.22	peak		
4		466.5000	32.59	-9.77	22.82	46.00	-23.18	peak		
5		582.9000	32.28	-7.78	24.50	46.00	-21.50	peak		
6		750.2250	30.21	-5.23	24.98	46.00	-21.02	peak		

Test Mode: TX 2440MHz -CH19 -1Mbps

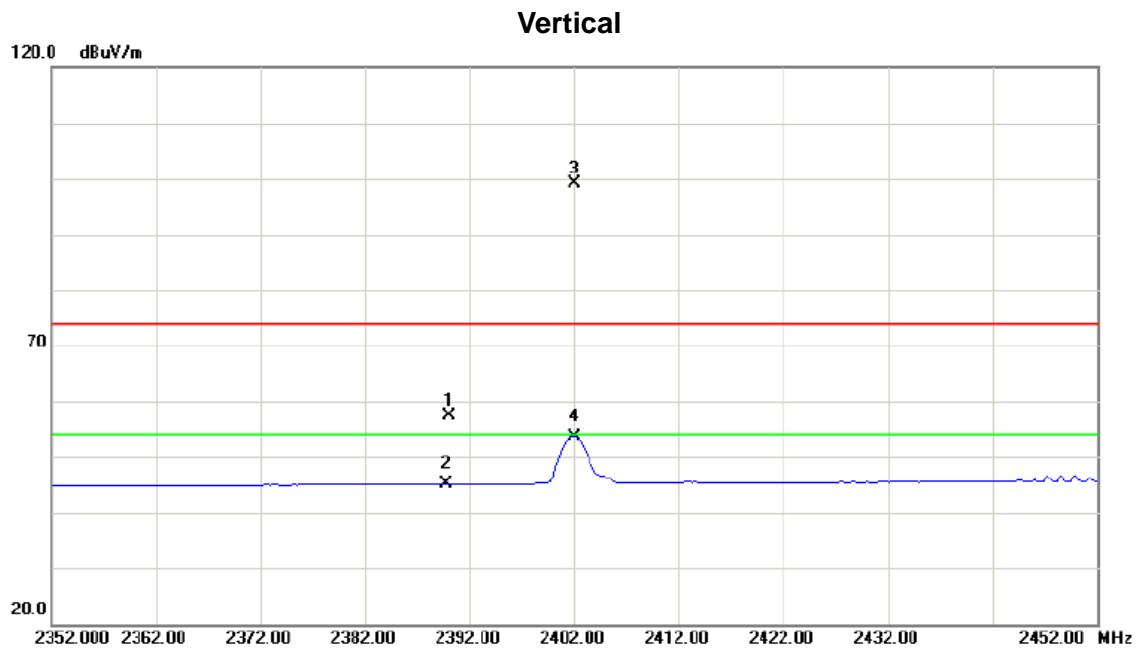
Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree	Comment
1		73.6500	36.31	-17.14	19.17	40.00	-20.83	peak		
2		262.8000	39.49	-14.60	24.89	46.00	-21.11	peak		
3		359.8000	35.09	-12.35	22.74	46.00	-23.26	peak		
4		510.1500	32.03	-9.25	22.78	46.00	-23.22	peak		
5		733.2500	31.95	-5.43	26.52	46.00	-19.48	peak		
6	*	866.6250	30.53	-3.86	26.67	46.00	-19.33	peak		

ATTACHMENT D - RADIATED EMISSION (ABOVE 1000MHZ)

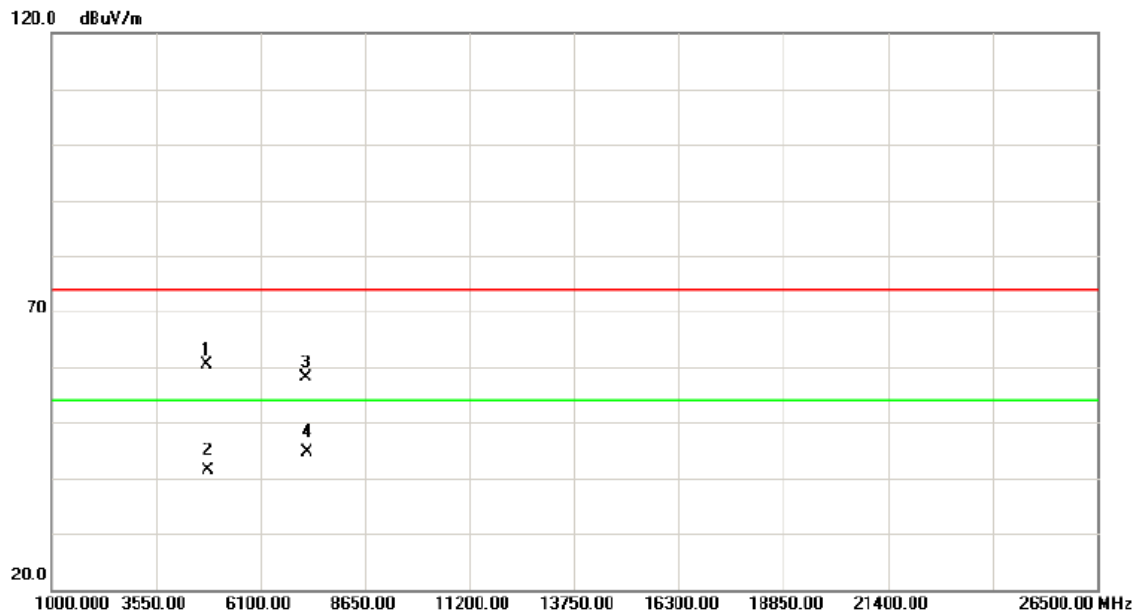
Orthogonal Axis :	X
Test Mode :	TX 2402MHz _CH00_1Mbps



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree	Comment
1		2390.000	26.05	31.29	57.34	74.00	-16.66	peak		
2		2390.000	13.83	31.29	45.12	54.00	-8.88	AVG		
3	*	2402.000	67.83	31.34	99.17	74.00	25.17	peak		NO LIMIT
4		2402.000	22.31	31.34	53.65	54.00	-0.35	AVG		NO LIMIT

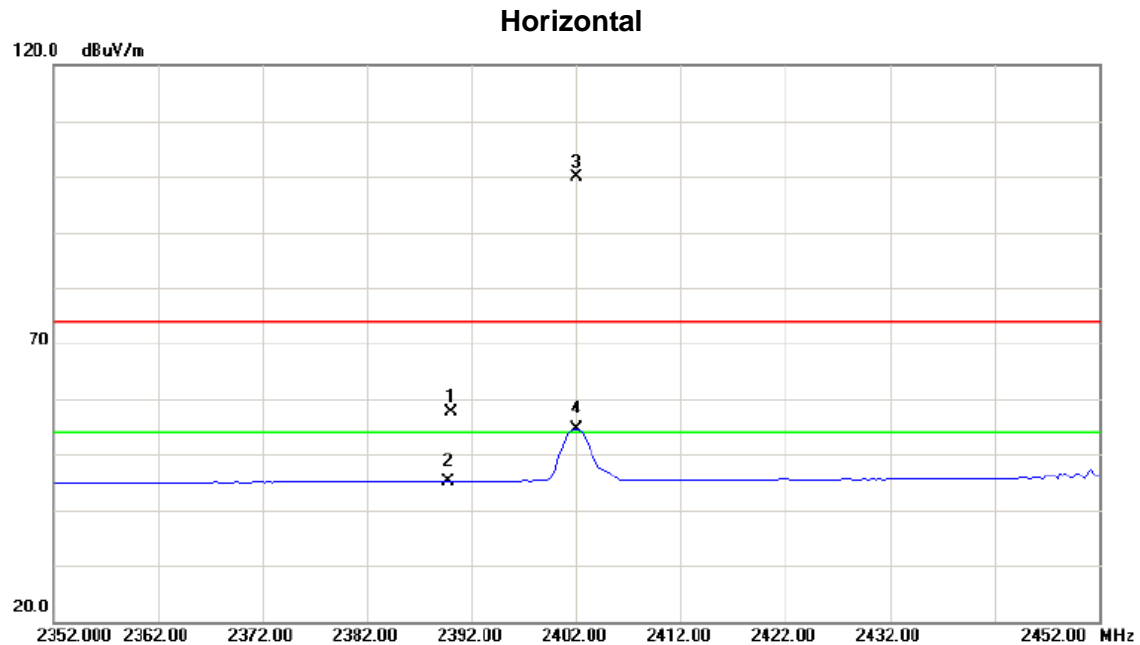
Orthogonal Axis :	X
Test Mode :	TX 2402MHz _CH00_1Mbps

Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree	Comment
1		4804.025	52.93	7.57	60.50	74.00	-13.50	peak		
2		4804.025	33.78	7.57	41.35	54.00	-12.65	AVG		
3		7208.675	44.16	13.86	58.02	74.00	-15.98	peak		
4	*	7208.675	30.66	13.86	44.52	54.00	-9.48	AVG		

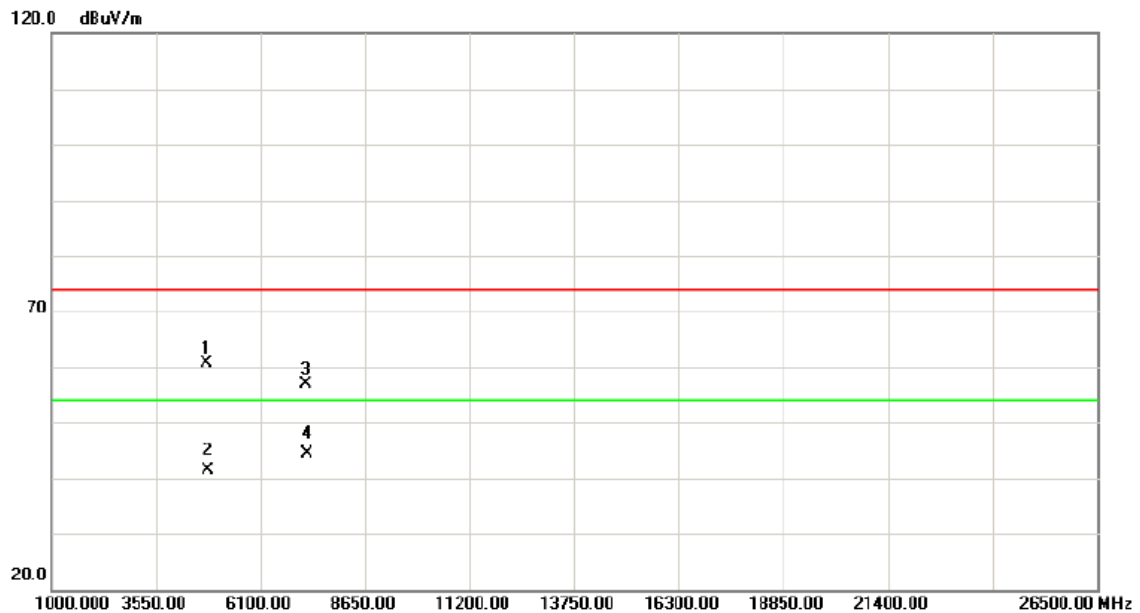
Orthogonal Axis :	X
Test Mode :	TX 2402MHz _CH00_1Mbps



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Antenna Height cm	Table Degree	Comment
1		2390.000	26.35	31.29	57.64	74.00	-16.36	peak		
2		2390.000	13.85	31.29	45.14	54.00	-8.86	AVG		
3	*	2402.000	68.66	31.34	100.00	74.00	26.00	peak		NO LIMIT
4	X	2402.000	23.33	31.34	54.67	54.00	0.67	AVG		NO LIMIT

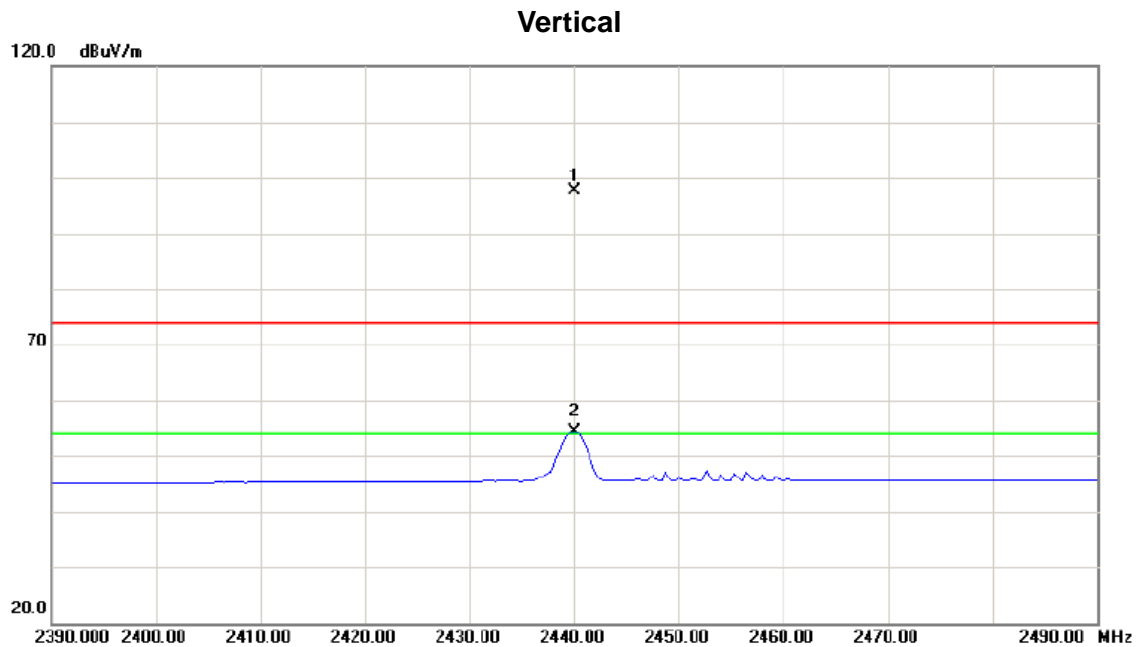
Orthogonal Axis :	X
Test Mode :	TX 2402MHz _CH00_1Mbps

Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree	Comment
1		4803.800	52.96	7.57	60.53	74.00	-13.47	peak		
2		4803.800	33.69	7.57	41.26	54.00	-12.74	AVG		
3		7205.400	42.90	13.86	56.76	74.00	-17.24	peak		
4	*	7205.400	30.63	13.86	44.49	54.00	-9.51	AVG		

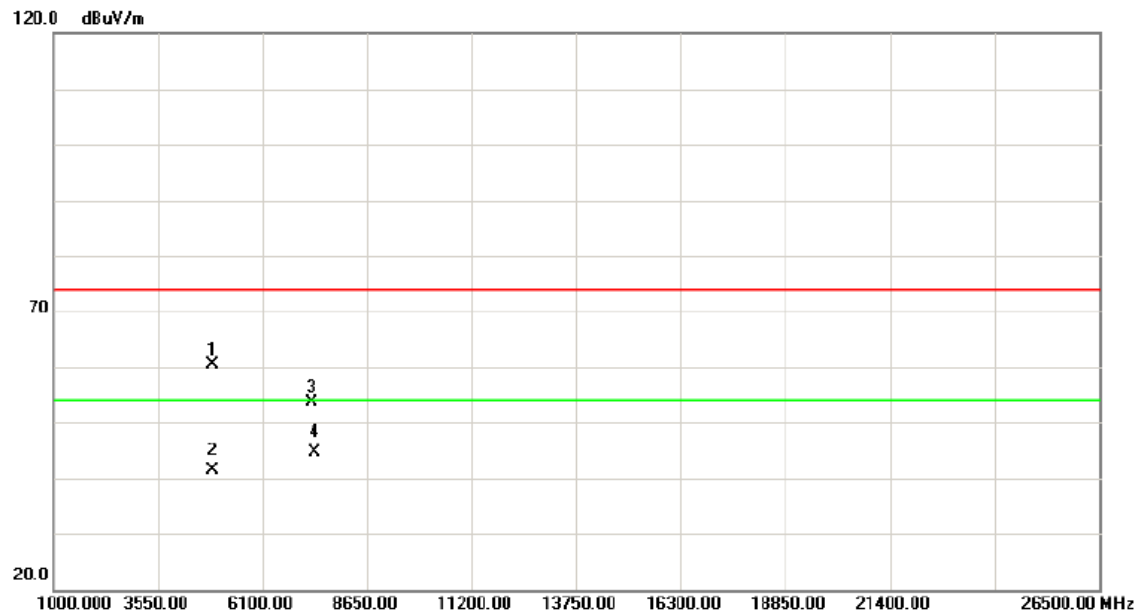
Orthogonal Axis :	X
Test Mode :	TX 2440MHz _CH19_1Mbps



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree
1	*	2440.000	66.29	31.44	97.73	74.00	23.73	peak		NO LIMIT
2	X	2440.000	22.97	31.44	54.41	54.00	0.41	AVG		NO LIMIT

Orthogonal Axis :	X
Test Mode :	TX 2440MHz _CH19_1Mbps

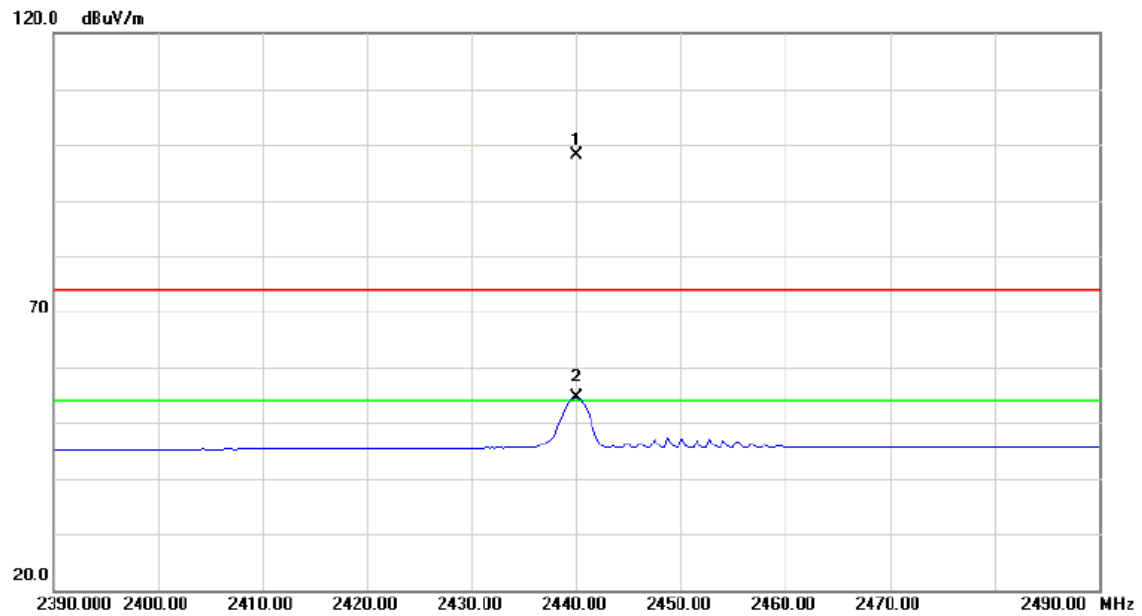
Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree	Comment
1		4879.275	52.60	7.87	60.47	74.00	-13.53	peak		
2		4879.275	33.40	7.87	41.27	54.00	-12.73	AVG		
3		7315.025	39.53	14.18	53.71	74.00	-20.29	peak		
4	*	7315.025	30.48	14.18	44.66	54.00	-9.34	AVG		

Orthogonal Axis :	X
Test Mode :	TX 2440MHz _CH19_1Mbps

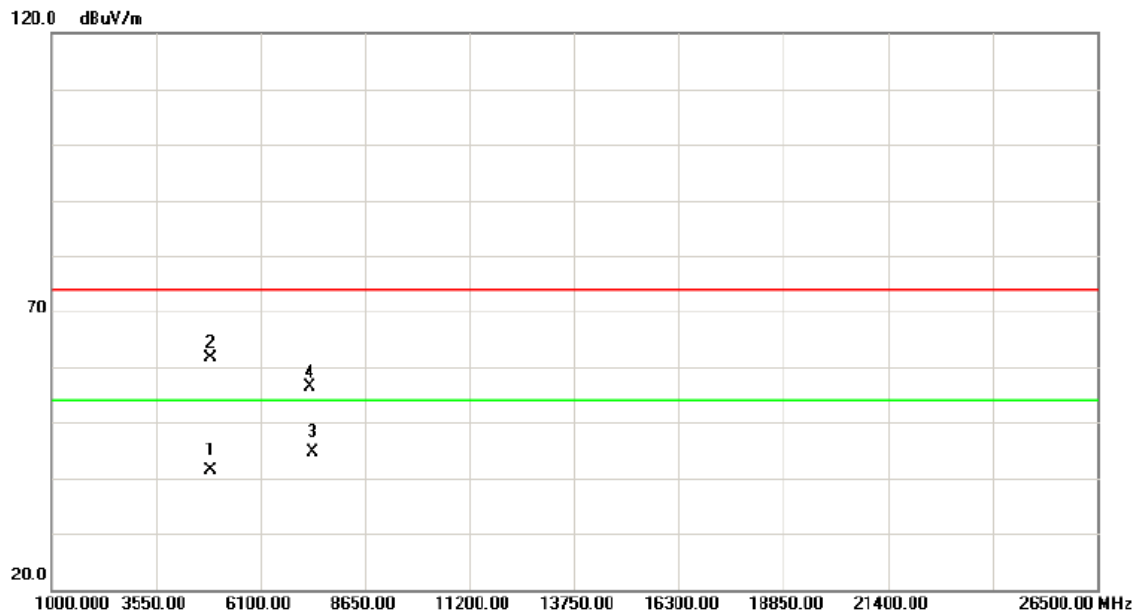
Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree
1	*	2440.000	66.67	31.44	98.11	74.00	24.11	peak		NO LIMIT
2	X	2440.000	23.10	31.44	54.54	54.00	0.54	AVG		NO LIMIT

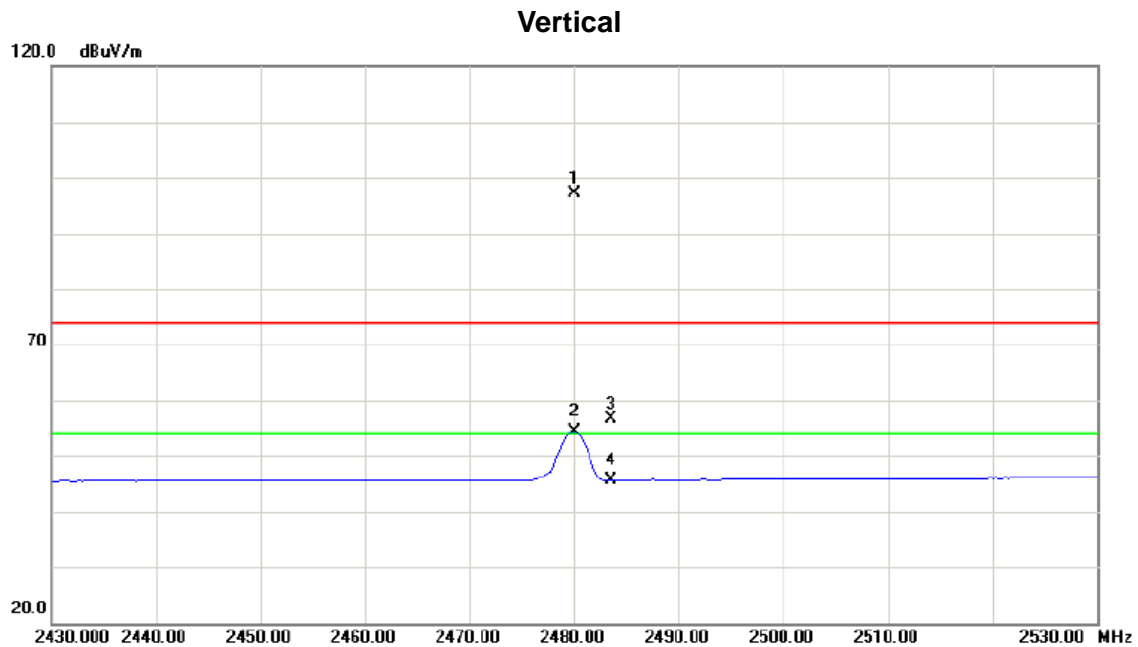
Orthogonal Axis :	X
Test Mode :	TX 2440MHz _CH19_1Mbps

Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree	Comment
1		4879.325	33.47	7.87	41.34	54.00	-12.66	AVG		
2		4879.325	53.71	7.87	61.58	74.00	-12.42	peak		
3	*	7317.000	30.52	14.19	44.71	54.00	-9.29	AVG		
4		7317.000	42.25	14.19	56.44	74.00	-17.56	peak		

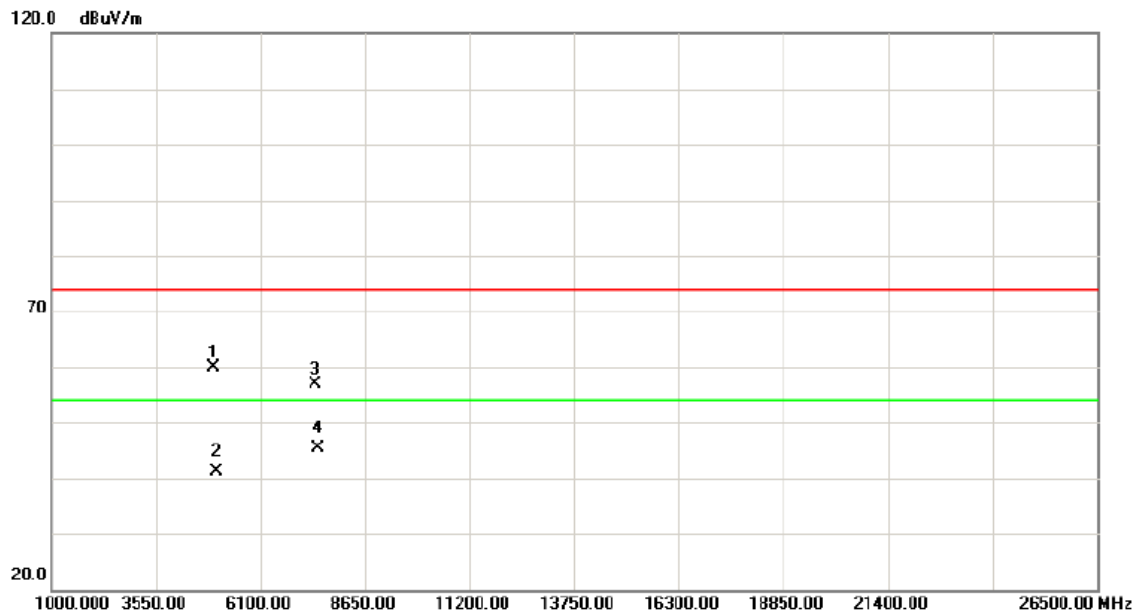
Orthogonal Axis :	X
Test Mode :	TX 2480MHz _CH39_1Mbps



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Antenna Height cm	Table Degree	Comment
1	*	2480.000	65.52	31.56	97.08	74.00	23.08	peak		NO LIMIT
2	X	2480.000	22.85	31.56	54.41	54.00	0.41	AVG		NO LIMIT
3		2483.500	25.11	31.57	56.68	74.00	-17.32	peak		
4		2483.500	14.17	31.57	45.74	54.00	-8.26	AVG		

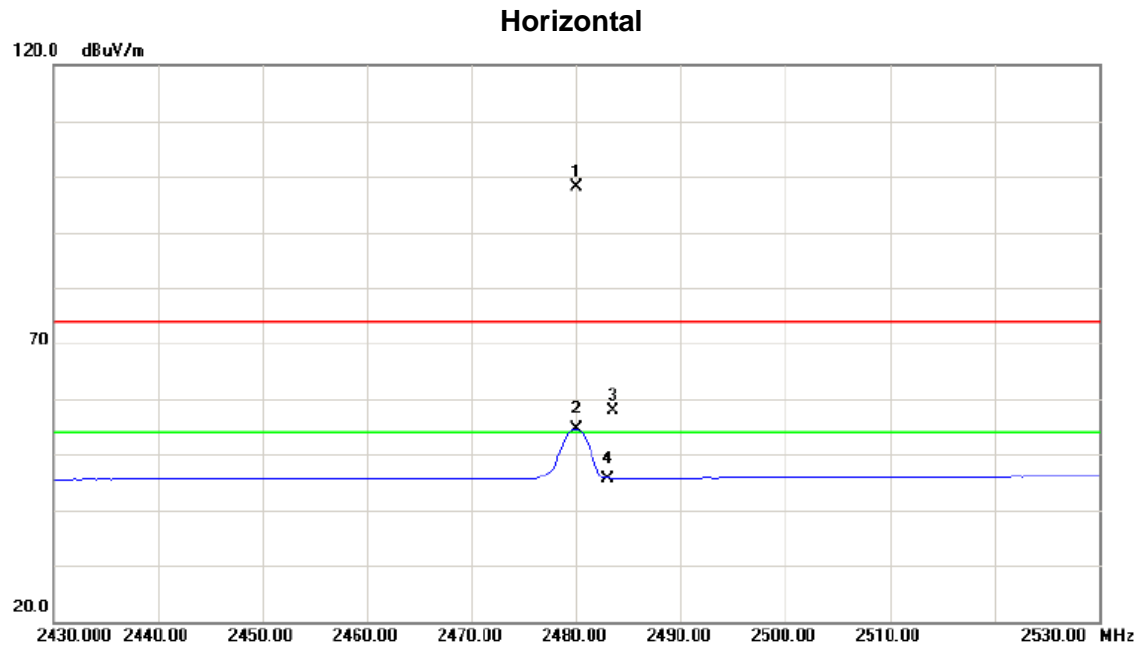
Orthogonal Axis :	X
Test Mode :	TX 2480MHz _CH39_1Mbps

Vertical



No. Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree	Comment
1	4959.413	51.62	8.17	59.79	74.00	-14.21	peak		
2	4959.413	32.99	8.17	41.16	54.00	-12.84	AVG		
3	7442.450	42.42	14.57	56.99	74.00	-17.01	peak		
4 *	7442.450	30.93	14.57	45.50	54.00	-8.50	AVG		

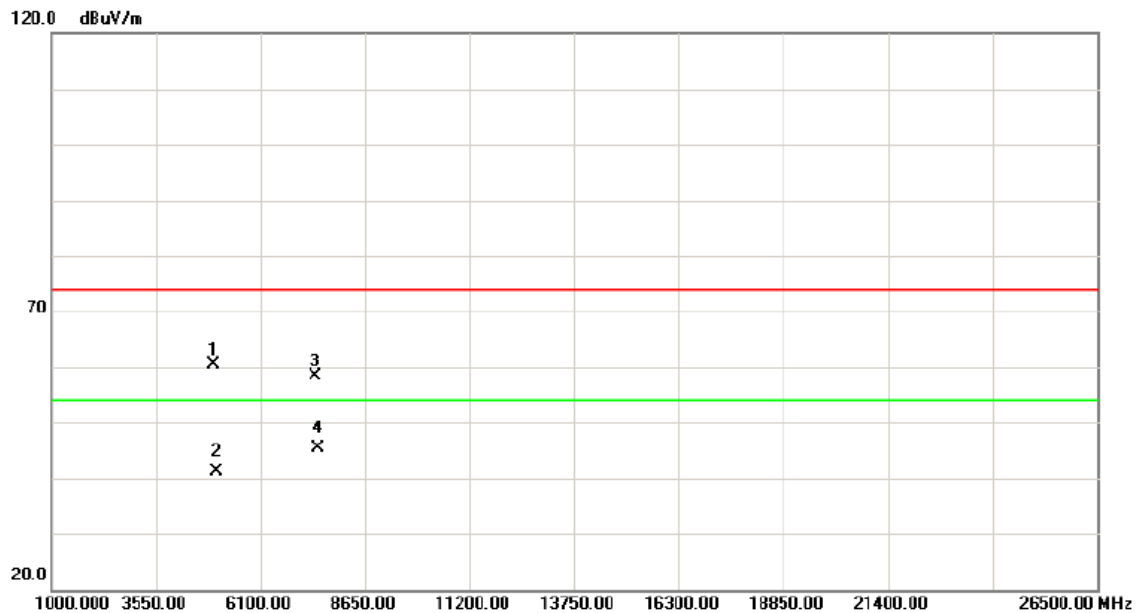
Orthogonal Axis :	X
Test Mode :	TX 2480MHz _CH39_1Mbps



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree	Comment
1	*	2480.000	66.47	31.56	98.03	74.00	24.03	peak		NO LIMIT
2	X	2480.000	23.03	31.56	54.59	54.00	0.59	AVG		NO LIMIT
3		2483.500	26.33	31.57	57.90	74.00	-16.10	peak		
4		2483.500	14.12	31.57	45.69	54.00	-8.31	AVG		

Orthogonal Axis :	X
Test Mode :	TX 2480MHz _CH39_1Mbps

Horizontal

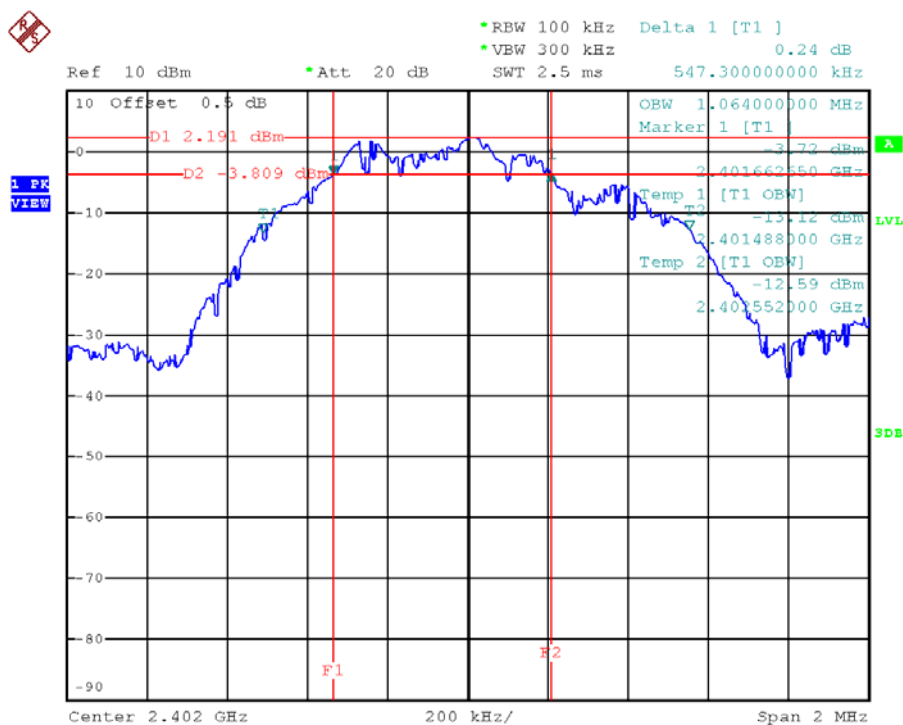


No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree	Comment
1		4959.688	52.31	8.18	60.49	74.00	-13.51	peak		
2		4959.688	33.00	8.18	41.18	54.00	-12.82	AVG		
3		7441.225	43.85	14.57	58.42	74.00	-15.58	peak		
4	*	7441.225	30.93	14.57	45.50	54.00	-8.50	AVG		

ATTACHMENT E - BANDWIDTH

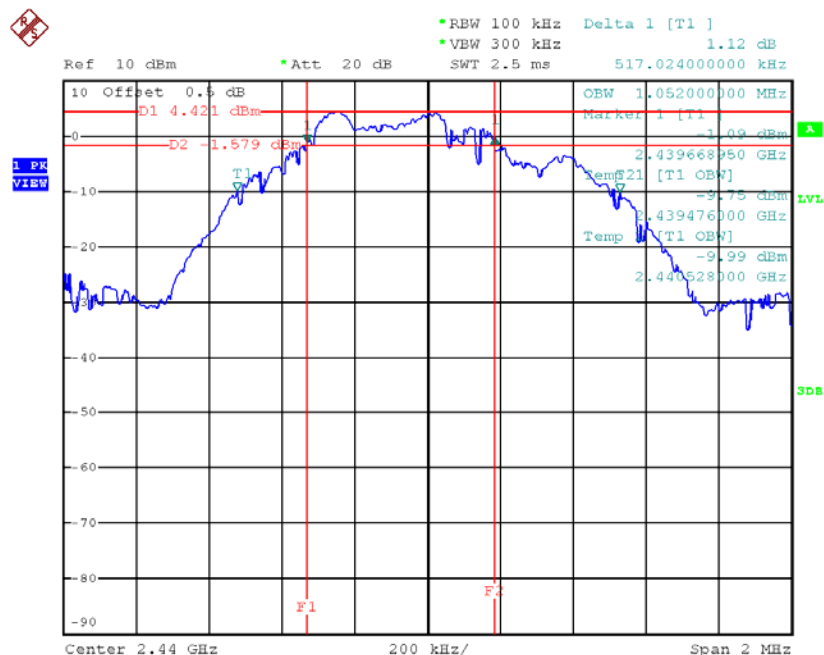
Frequency (MHz)	6dB Bandwidth (MHz)	99% Occupied BW (MHz)	Min. Limit (kHz)	Test Result
2402	0.547	1.064	500	Complies
2440	0.517	1.052	500	Complies
2480	0.537	1.056	500	Complies

TX CH00



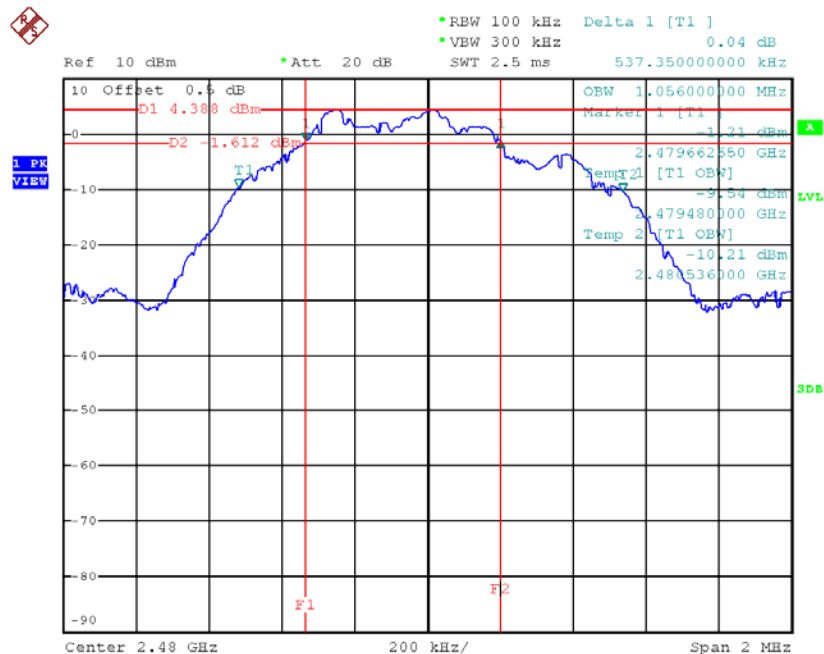
Date: 11.JUN.2015 12:49:20

TX CH19



Date: 8.JUN.2015 15:44:58

TX CH39



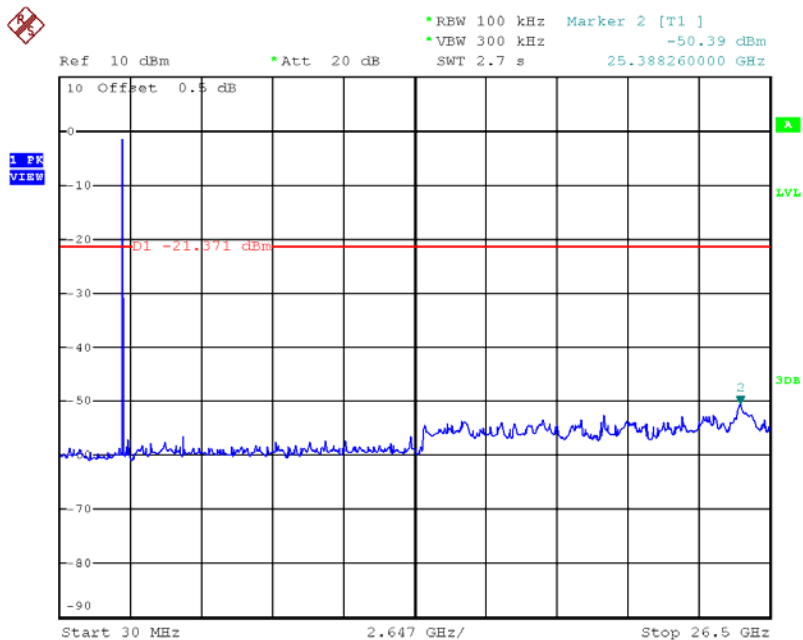
Date: 8.JUN.2015 15:45:54

ATTACHMENT F - MAXIMUM OUTPUT POWER TEST

Frequency (MHz)	Conducted Power (dBm)	Conducted Power (Watt)	Max. Limit (dBm)	Max. Limit (Watt)	Test Result	Point to Point Max. Limit(dBm)	Max. Limit(W)
2402	3.87	0.0024	30.00	1.00	Complies	30.00	1.0000
2440	4.98	0.0031	30.00	1.00	Complies	30.00	1.0000
2480	4.92	0.0031	30.00	1.00	Complies	30.00	1.0000

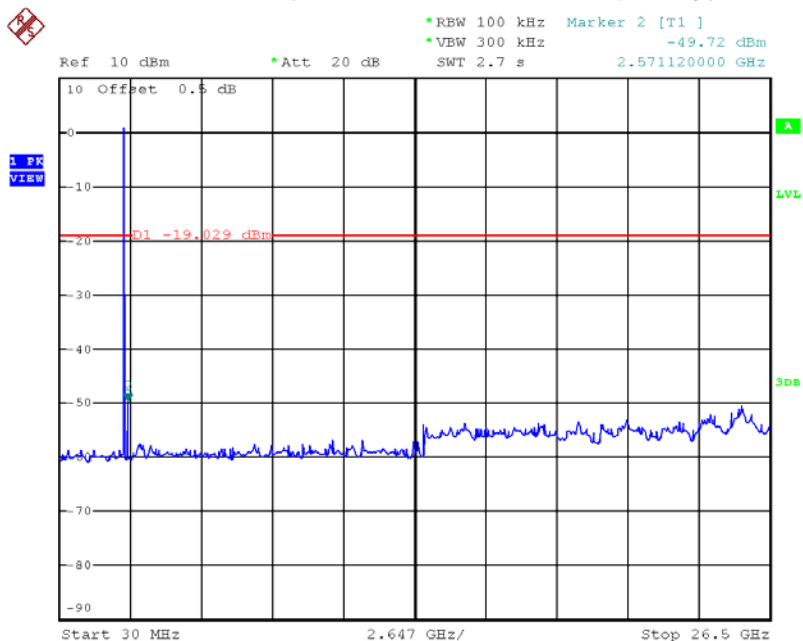
ATTACHMENT G - ANTENNA CONDUCTED SPURIOUS EMISSION

CH00 (10 Harmonic of the frequency)



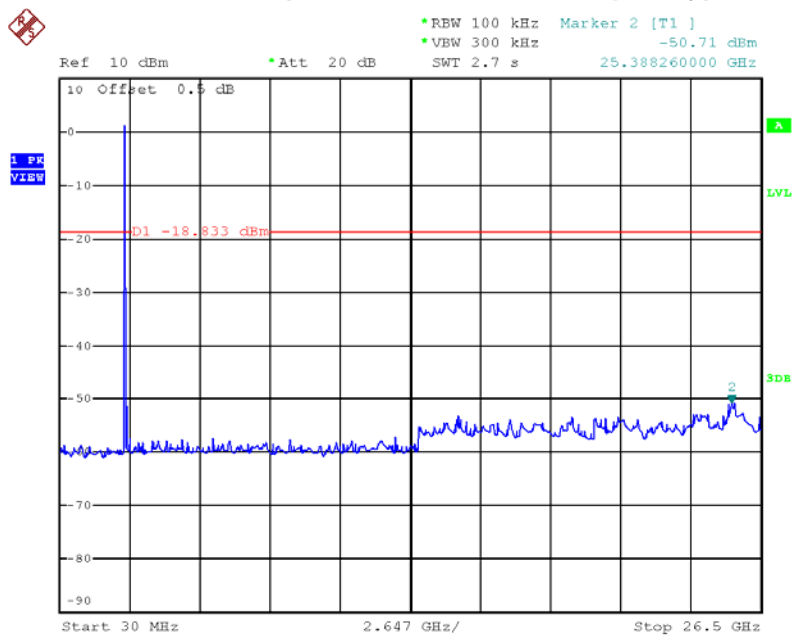
Date: 8.JUN.2015 15:54:15

CH19 (10 Harmonic of the frequency)



Date: 8.JUN.2015 16:01:32

CH39 (10 Harmonic of the frequency)

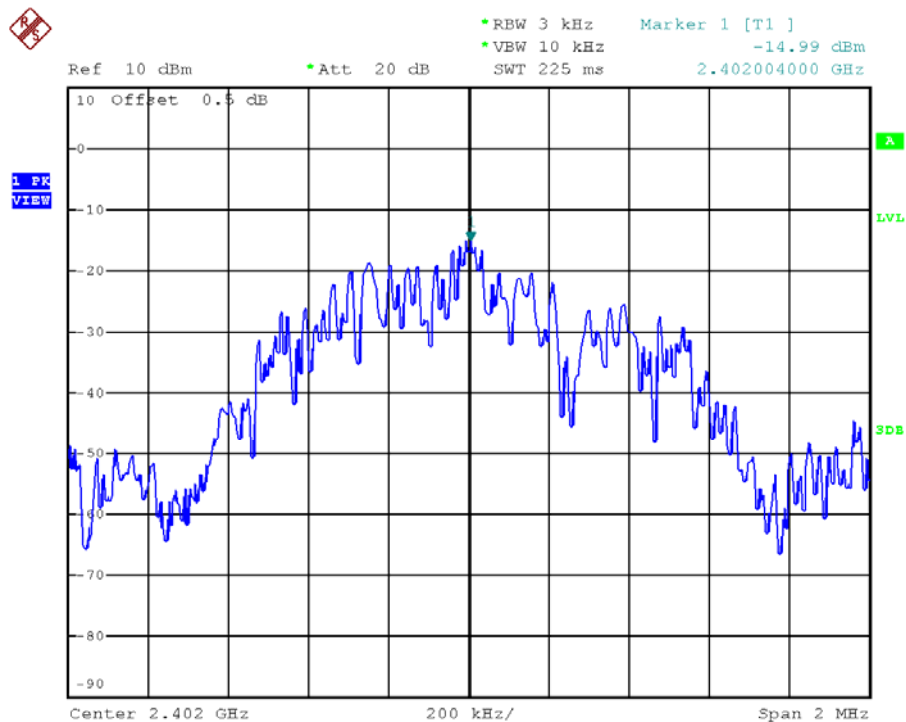


Date: 8.JUN.2015 15:57:49

ATTACHMENT H - POWER SPECTRAL DENSITY TEST

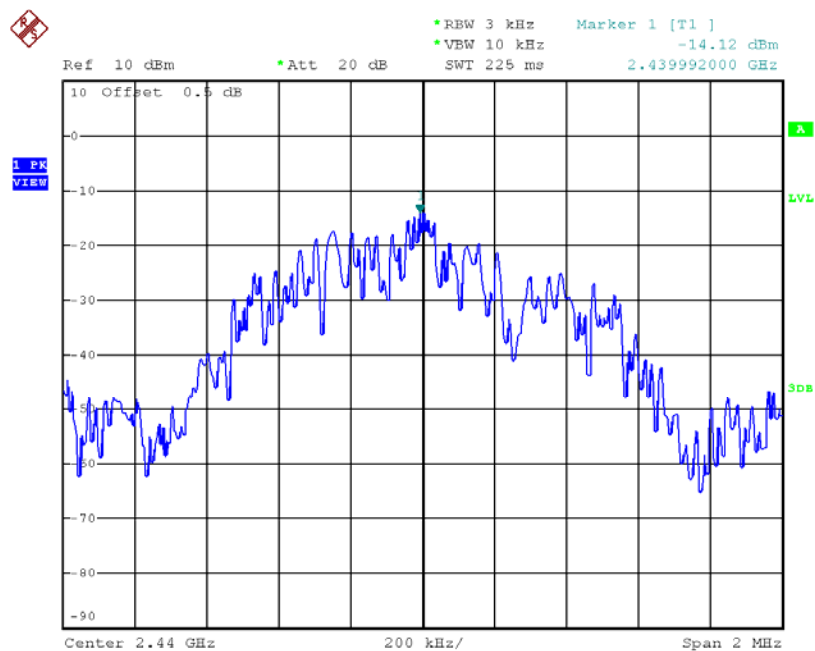
Frequency (MHz)	Power Density (dBm)	Max. Limit (dBm)	Result
2402	-14.99	8	Complies
2440	-14.12	8	Complies
2480	-14.12	8	Complies

TX CH00



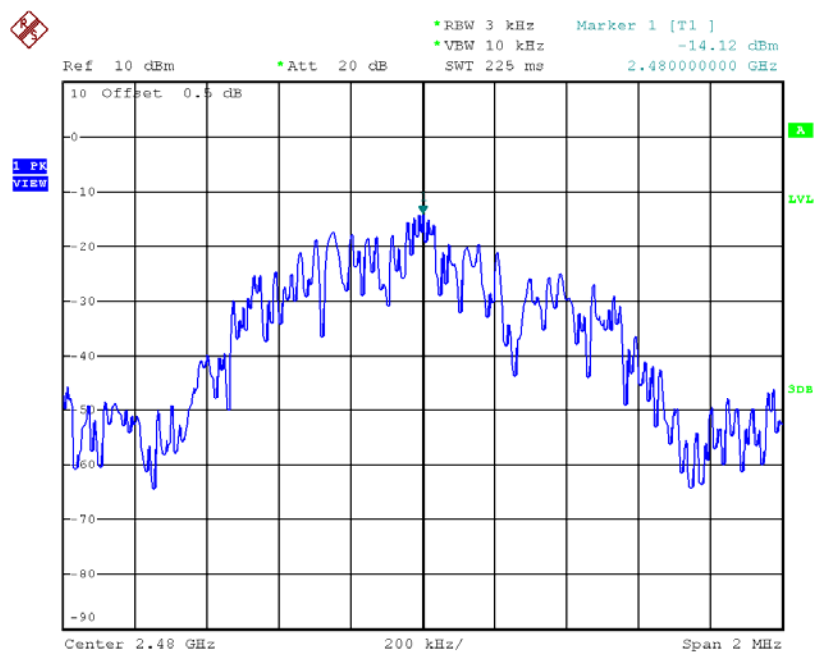
Date: 8.JUN.2015 15:44:18

TX CH19



Date: 8.JUN.2015 15:45:19

TX CH39



Date: 8.JUN.2015 15:47:05