



International Certification Corp.

No. 3-1, Lane 6, Wen San 3rd St., Kwei Shan Hsiang, Tao Yuan Hsien 333, Taiwan, R.O.C.

Tel: 886-3-271-8666

Fax: 886-3-318-0155

FCC Test Report

FCC ID : SQGBT800
Equipment : BTv4.0 Dual Mode USB HCI Module
refer to item 1.1.1 for more details
Model No. : BT800 refer to item 1.1.1 for more details
Brand Name : Laird Technologies
Applicant : Laird Technologies
Address : 11160 Thompson Ave. / Lenexa, Kansas /
66219 / USA
Standard : 47 CFR FCC Part 15.247
Received Date : Jun. 25, 2013
Tested Date : Jun. 25 ~ Jul. 08, 2013

We, International Certification Corp., would like to declare that the tested sample has been evaluated and in compliance with the requirement of the above standards. The test results contained in this report refer exclusively to the product. It may be duplicated completely for legal use with the approval of the applicant. It shall not be reproduced except in full without the written approval of our laboratory.

Approved & Reviewed by:


Gary Chang / Manager





Table of Contents

1	GENERAL DESCRIPTION	5
1.1	Information.....	5
1.2	Test Setup Chart	7
1.3	Local Support Equipment List	7
1.4	Test Equipment List and Calibration Data.....	8
1.5	Test Standards	10
1.6	Measurement Uncertainty	11
2	TEST CONFIGURATION	12
2.1	Testing Condition	12
2.2	The Worst Test Modes and Channel Details	12
3	TRANSMITTER TEST RESULTS.....	13
3.1	AC Power Line Conducted Emissions	13
3.2	6dB Bandwidth	18
3.3	RF Output Power.....	21
3.4	Power Spectral Density	23
3.5	Emissions in Restricted Frequency Bands.....	25
3.6	Emissions in non-restricted Frequency Bands.....	43



International Certification Corp.

No. 3-1, Lane 6, Wen San 3rd St., Kwei Shan Hsiang, Tao Yuan Hsien 333, Taiwan, R.O.C.

Tel: 886-3-271-8666

Fax: 886-3-318-0155

Release Record

Report No.	Version	Description	Issued Date
FR362601AE	Rev. 01	Initial issue	Aug. 09, 2013



Summary of Test Results

FCC Rules	Test Items	Measured	Result
15.207	AC Power Line Conducted Emissions	[dBuV]: 0.166MHz 53.11 (Margin -12.05dB) - QP	Pass
15.247(d) 15.209	Radiated Emissions	[dBuV/m at 3m]: 48.43MHz 38.84 (Margin -1.16dB) - QP	Pass
15.247(b)(3)	Fundamental Emission Output Power	Power [dBm]: 7.90	Pass
15.247(a)(2)	6dB Bandwidth	Meet the requirement of limit	Pass
15.247(e)	Power Spectral Density	Meet the requirement of limit	Pass
15.203	Antenna Requirement	Meet the requirement of limit	Pass



1 General Description

1.1 Information

1.1.1 Product Details

The following models are provided to this EUT.

Model Name	Description	Difference
BT800	BTv4.0 Dual Mode USB HCI Module	---
BT810	BTv4.0 Dual Mode USB HCI Module (BG carrier board)	BT800 module mounted onto a PCB carrier board to change footprint – no other differences.
BT820	BTv4.0 Dual Mode USB Dongle	BT800 module mounted onto a carrier board with USB connector.

✦ The above models, model BT810 and BT820 were selected as representative ones for the radiated final test and only its data was recorded in this report.

1.1.2 Specification of the Equipment under Test (EUT)

RF General Information				
Frequency Range (MHz)	Bluetooth Mode	Ch. Freq. (MHz)	Channel Number	Data Rate / MCS
2400-2483.5	BR	2402-2480	0-39 [40]	1 Mbps

Note 1: Bluetooth BR uses a GFSK (1Mbps).
 Note 2: Bluetooth BR uses as a system using FHSS modulation.

1.1.3 Antenna Details

Ant. No.	Brand	Type	Gain (dBi)	Connector	Model
1	ACX	Chip	0.5	N/A	AT3216-B2R7HAA_3216

1.1.4 EUT Operational Condition

Supply Voltage	<input type="checkbox"/> AC mains	<input checked="" type="checkbox"/> DC (5Vdc)	
Type of DC Source	<input type="checkbox"/> Internal DC supply	<input type="checkbox"/> External DC adapter	<input checked="" type="checkbox"/> From Host

1.1.5 Accessories

N/A



1.1.6 Channel List

Frequency band (MHz)				2400~2483.5			
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
37	2402	9	2422	18	2442	28	2462
0	2404	10	2424	19	2444	29	2464
1	2406	38	2426	20	2446	30	2466
2	2408	11	2428	21	2448	31	2468
3	2410	12	2430	22	2450	32	2470
4	2412	13	2432	23	2452	33	2472
5	2414	14	2434	24	2454	34	2474
6	2416	15	2436	25	2456	35	2476
7	2418	16	2438	26	2458	36	2478
8	2420	17	2440	27	2460	39	2480

1.1.7 Test Tool and Duty Cycle

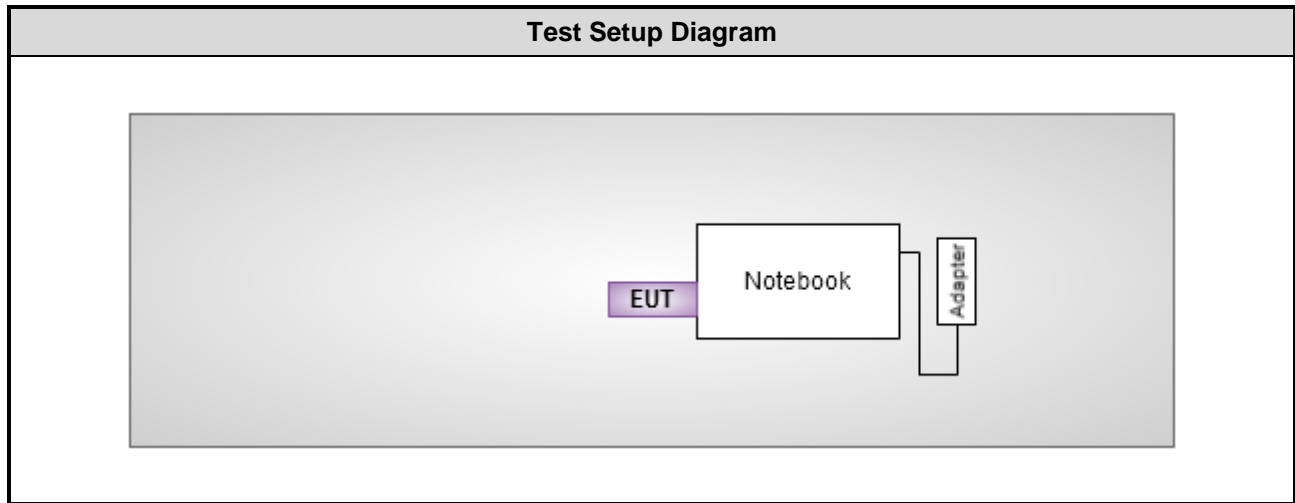
Test tool	Blue Tool, ver. 2.5
Duty cycle of test signal (%)	66.37%
Duty Factor (dB)	1.78

1.1.8 Power Setting

Modulation Mode	Test Frequency (MHz)		
	2402	2440	2480
GFSK/1Mbps	Default	Default	Default



1.2 Test Setup Chart



1.3 Local Support Equipment List

Support Equipment List						
No.	Equipment	Brand	Model	S/N	FCC ID	Length (m)
1	Notebook	DELL	E6430	---	---	---



1.4 Test Equipment List and Calibration Data

Test Item	Conducted Emission				
Test Site	Conduction room 1 / (CO01-WS)				
Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Until
EMC Receiver	R&S	ESCS 30	100169	Dec. 12, 2012	Dec. 11, 2013
LISN	SCHWARZBECK MESS-ELEKTRONIK	Schwarzbeck 8127	8127-667	Dec. 04, 2012	Dec. 03, 2013
LISN (Support Unit)	SCHWARZBECK MESS-ELEKTRONIK	Schwarzbeck 8127	8127-666	Dec. 04, 2012	Dec. 03, 2013
ISN	TESEQ	ISN T800	34406	Apr. 08, 2013	Apr. 07, 2014
ISN	TESEQ	ISN T200A	30494	Apr. 09, 2013	Apr. 08, 2014
ISN	TESEQ	ISN T8-Cat6	27262	Sep. 17, 2012	Sep. 16, 2013
ISN	TESEQ	ISN ST08	22589	Jan. 24, 2013	Jan. 23, 2014
RF Current Probe	FCC	F-33-4	121630	Dec. 04, 2012	Dec. 03, 2013
RF Cable-CON	Woken	CFD200-NL	CFD200-NL-001	Dec. 25, 2012	Dec. 24, 2013
ESH3-Z6 V-Network(+)	R&S	ESH3-Z6	100920	Nov. 21, 2012	Nov. 20, 2013
ESH3-Z6 V-Network(-)	R&S	ESH3-Z6	100951	Jan. 03, 2013	Jan. 02, 2014
Two-Line V-Network	R&S	ENV216	101579	Jan. 07, 2013	Jan. 06, 2014
50 ohm terminal	NA	50	01	Apr. 22, 2013	Apr. 21, 2014
50 ohm terminal	NA	50	02	Apr. 22, 2013	Apr. 21, 2014
50 ohm terminal	NA	50	03	Apr. 22, 2013	Apr. 21, 2014
50 ohm terminal (Support Unit)	NA	50	04	Apr. 22, 2013	Apr. 21, 2014
Note: Calibration Interval of instruments listed above is one year.					



Test Item	Radiated Emission above 1GHz				
Test Site	966 chamber1 / (03CH01-WS)				
Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Until
3m semi-anechoic chamber	CHAMPRO	SAC-03	03CH01-WS	Jan. 04, 2013	Jan. 03, 2014
Spectrum Analyzer	R&S	FSV40	101498	Jan. 24, 2013	Jan. 23, 2014
Receiver	ROHDE&SCHWARZ	ESR3	101658	Jan. 28, 2013	Jan. 27, 2014
Bilog Antenna	SCHWARZBECK	VULB9168	VULB9168-522	Jan. 11, 2013	Jan. 10, 2014
Horn Antenna 1G-18G	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D 1096	Feb. 18, 2013	Feb. 17, 2014
Horn Antenna 18G-40G	SCHWARZBECK	BBHA 9170	BBHA 9170517	Jan. 14, 2013	Jan. 13, 2014
Amplifier	Burgeon	BPA-530	100219	Nov. 28, 2012	Nov. 27, 2013
Amplifier	Agilent	83017A	MY39501308	Dec. 18, 2012	Dec. 17, 2013
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16014/4	Dec. 25, 2012	Dec. 24, 2013
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16019/4	Dec. 25, 2012	Dec. 24, 2013
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16139/4	Dec. 25, 2012	Dec. 24, 2013
RF Cable-R03m	Woken	CFD400NL-LW	CFD400NL-001	Dec. 25, 2012	Dec. 24, 2013
RF Cable-R10m	Woken	CFD400NL-LW	CFD400NL-002	Dec. 25, 2012	Dec. 24, 2013
control	EM Electronics	EM1000	60612	N/A	N/A
Note: Calibration Interval of instruments listed above is one year.					

Loop Antenna	R&S	HFH2-Z2	100330	Nov. 15, 2012	Nov. 14, 2014
Amplifier	MITEQ	AMF-6F-260400	9121372	Apr. 19, 2013	Apr. 18, 2015
Note: Calibration Interval of instruments listed above is two year.					



Test Item	RF Conducted				
Test Site	(TH01-WS)				
Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Until
Spectrum Analyzer	R&S	FSV 40	101063	Feb. 18, 2013	Feb. 17, 2014
TEMP&HUMIDITY CHAMBER	GIANT FORCE	GCT-225-40-SP-SD	MAF1212-002	Nov. 29, 2012	Nov. 28, 2013
Power Meter	Anritsu	ML2495A	1241002	Oct. 15, 2012	Oct. 14, 2013
Power Sensor	Anritsu	MA2411B	1027366	Oct. 24, 2012	Oct. 23, 2013
Signal Generator	R&S	SMB100A	175727	Jan. 14, 2013	Jan. 13, 2014
Radio Communication Analyzer	Anritsu	MT8820C	6201240341	Mar. 13, 2013	Mar. 12, 2014
Wideband Radio Communication Tester	R&S	CMW500	106070	Jan. 29, 2013	Jan. 28, 2014
Bluetooth Tester	R&S	CBT	100959	Jan. 09, 2013	Jan. 08, 2014
MXG-B RF Vector Signal Generator	Agilent	N5182B	MY53050081	Apr. 19, 2013	Apr. 18, 2014

Note: Calibration Interval of instruments listed above is one year.

1.5 Test Standards

According to the specification of EUT, the EUT must comply with following standards and KDB documents.

47 CFR FCC Part 15.247

ANSI C63.10-2009

FCC KDB 558074 D01 DTS Meas Guidance v03

Note: The EUT has been tested and complied with FCC part 15B requirement. FCC Part 15B test results are issued to another report.



1.6 Measurement Uncertainty

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor (k=2))

Measurement Uncertainty	
Parameters	Uncertainty
Bandwidth	±35.286 Hz
Conducted power	±0.536 dB
Frequency error	±35.286 Hz
Temperature	±0.3 °C
Conducted emission	±2.946 dB
AC conducted emission	±2.43 dB
Radiated emission	±2.49 dB



2 Test Configuration

2.1 Testing Condition

Test Item	Test Site	Ambient Condition	Tested By
AC Conduction	CO01-WS	22°C / 52%	Skys Huang
Radiated Emissions	03CH01-WS	25°C / 65%	Haru Yang
RF Conducted	TH01-WS	24°C / 61%	Brad Wu

➤ FCC site registration No.: 657002

➤ IC site registration No.: 10807A-1

2.2 The Worst Test Modes and Channel Details

Test item	Mode	Test Frequency (MHz)	Data rate (Mbps)	Test Configuration
AC Power Line Conducted Emissions	GFSK	2402	1Mbps	1, 2
Radiated Emissions (below 1GHz)	GFSK	2402	1Mbps	1, 2
Radiated Emissions (above 1GHz)	GFSK	2402, 2440, 2480	1Mbps	1, 2
Fundamental Emission Output Power	GFSK	2402, 2440, 2480	1Mbps	1
6dB bandwidth				
Power spectral density				

NOTE:

1. 2 types EUT were selected to perform radiated emission test as below test configuration

1) Configuration 1 : BT810

2) Configuration 2 : BT820



3 Transmitter Test Results

3.1 AC Power Line Conducted Emissions

3.1.1 Limit of AC Power Line Conducted Emissions

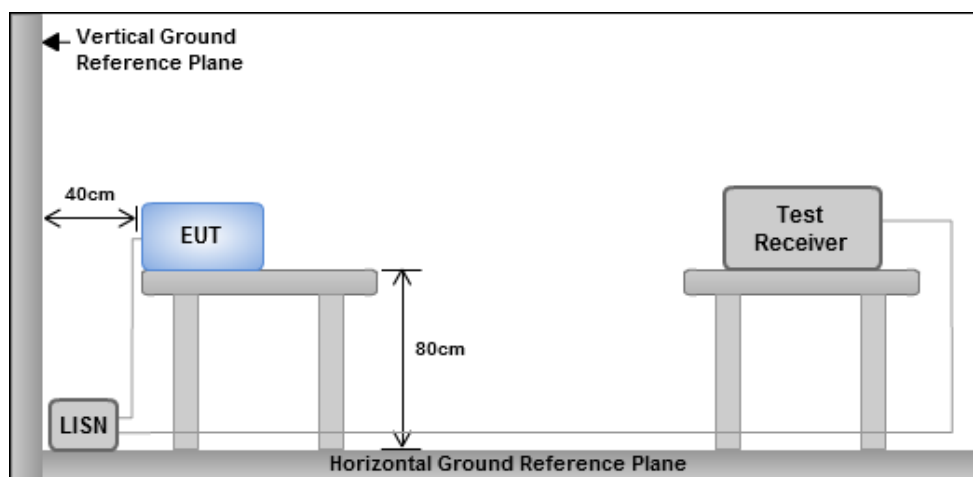
Conducted Emissions Limit		
Frequency Emission (MHz)	Quasi-Peak	Average
0.15-0.5	66 - 56 *	56 - 46 *
0.5-5	56	46
5-30	60	50

Note 1: * Decreases with the logarithm of the frequency.

3.1.2 Test Procedures

1. The device is placed on a test table, raised 80 cm above the reference ground plane. The vertical conducting plane is located 40 cm to the rear of the device.
2. The device is connected to line impedance stabilization network (LISN) and other accessories are connected to other LISN. Measured levels of AC power line conducted emission are across the 50 Ω LISN port.
3. AC conducted emission measurements is made over frequency range from 150 kHz to 30 MHz.
4. This measurement was performed with AC 120V/60Hz

3.1.3 Test Setup



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



3.1.4 Test Result of Conducted Emissions

Modulation Mode	GFSK	Test Freq. (MHz)	2402
Power Phase	Line	Test Configuration	1

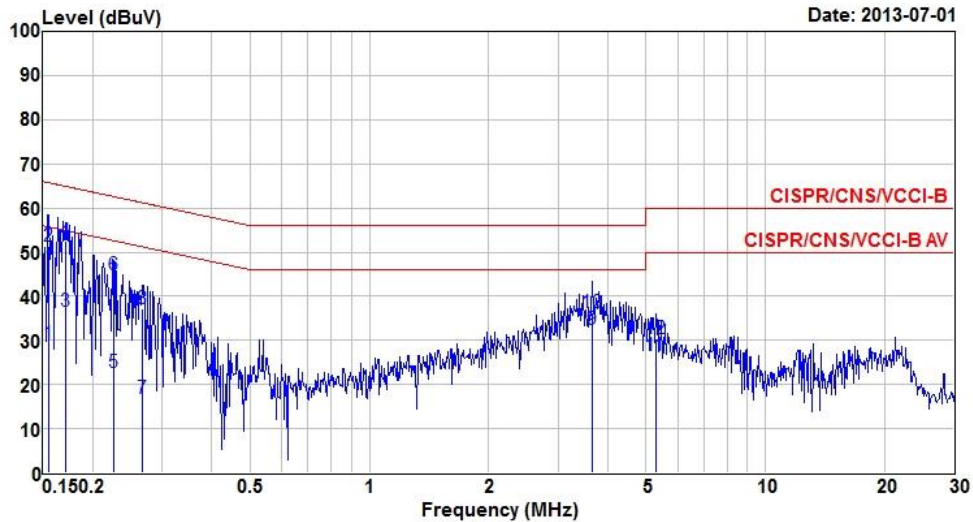
Date: 2013-07-01

	Freq	Level	Limit	Over	Read	LISN	cable	Remark
	MHz	dBuV	Line	Limit	Level	factor	loss	
			dBuV	dB	dBuV	dB	dB	-----
1	0.162	37.53	55.38	-17.85	37.41	0.03	0.09	Average
2	0.162	50.73	65.38	-14.65	50.61	0.03	0.09	QP
3	0.181	28.15	54.46	-26.31	27.98	0.03	0.14	Average
4	0.181	51.21	64.46	-13.25	51.04	0.03	0.14	QP
5	0.219	23.02	52.88	-29.86	22.83	0.03	0.16	Average
6	0.219	43.14	62.88	-19.74	42.95	0.03	0.16	QP
7	3.436	26.27	46.00	-19.73	25.99	0.06	0.22	Average
8	3.436	36.55	56.00	-19.45	36.27	0.06	0.22	QP
9	4.092	26.16	46.00	-19.84	25.86	0.06	0.24	Average
10	4.092	33.80	56.00	-22.20	33.50	0.06	0.24	QP
11	9.107	11.92	50.00	-38.08	11.70	0.10	0.12	Average
12	9.107	24.40	60.00	-35.60	24.18	0.10	0.12	QP

Note 1: Level (dBuV) = Read Level (dBuV) + LISN Factor (dB) + Cable Loss (dB).
 Note 2: Over Limit (dBuV) = Limit Line (dBuV) – Level (dBuV).



Modulation Mode	GFSK	Test Freq. (MHz)	2402
Power Phase	Neutral	Test Configuration	1

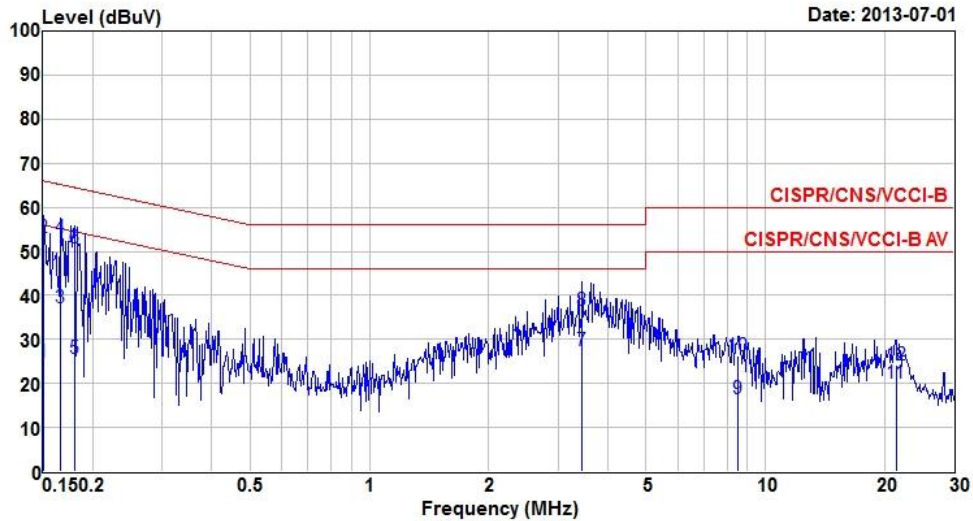


	Freq MHz	Level dBuV	Limit Line dBuV	Over Limit dB	Read Level dBuV	LISN factor dB	cable loss dB	Remark
1	0.155	29.13	55.74	-26.61	29.04	0.02	0.07	Average
2	0.155	51.29	65.74	-14.45	51.20	0.02	0.07	QP
3	0.171	36.56	54.90	-18.34	36.42	0.02	0.12	Average
4	0.171	52.61	64.90	-12.29	52.47	0.02	0.12	QP
5	0.226	22.71	52.61	-29.90	22.53	0.02	0.16	Average
6	0.226	44.74	62.61	-17.87	44.56	0.02	0.16	QP
7	0.267	16.88	51.20	-34.32	16.73	0.02	0.13	Average
8	0.267	37.21	61.20	-23.99	37.06	0.02	0.13	QP
9	3.661	32.46	46.00	-13.54	32.18	0.05	0.23	Average
10	3.661	36.29	56.00	-19.71	36.01	0.05	0.23	QP
11	5.277	26.48	50.00	-23.52	26.22	0.06	0.20	Average
12	5.277	30.37	60.00	-29.63	30.11	0.06	0.20	QP

Note 1: Level (dBUV) = Read Level (dBUV) + LISN Factor (dB) + Cable Loss (dB).
 2: Over Limit (dBUV) = Limit Line (dBUV) – Level (dBUV).



Modulation Mode	GFSK	Test Freq. (MHz)	2402
Power Phase	Line	Test Configuration	2

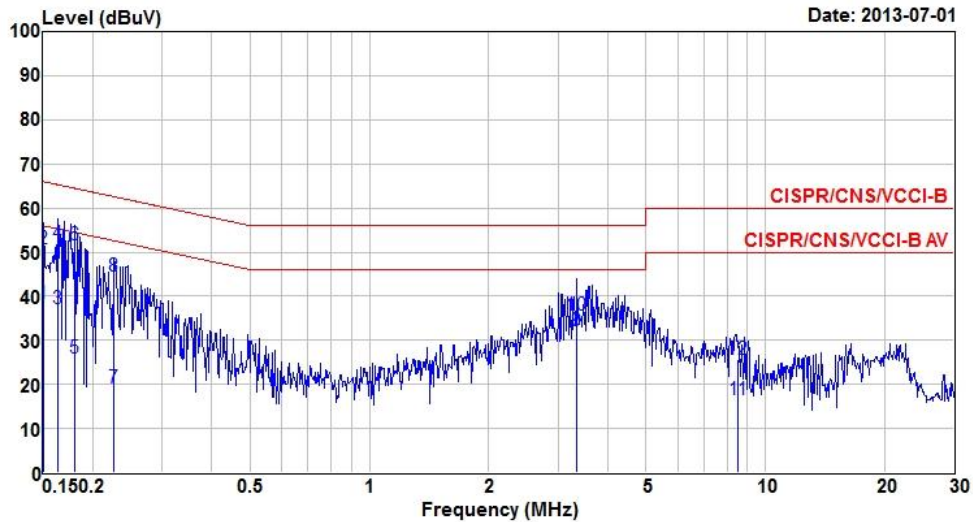


	Freq MHz	Level dBuV	Limit Line dBuV	Over Limit dB	Read Level dBuV	LISN factor dB	cable loss dB	Remark
1	0.150	24.89	56.00	-31.11	24.80	0.03	0.06	Average
2	0.150	53.15	66.00	-12.85	53.06	0.03	0.06	QP
3	0.166	37.18	55.16	-17.98	37.05	0.03	0.10	Average
4	0.166	53.11	65.16	-12.05	52.98	0.03	0.10	QP
5	0.180	25.76	54.50	-28.74	25.59	0.03	0.14	Average
6	0.180	50.65	64.50	-13.85	50.48	0.03	0.14	QP
7	3.454	27.54	46.00	-18.46	27.26	0.06	0.22	Average
8	3.454	36.68	56.00	-19.32	36.40	0.06	0.22	QP
9	8.546	16.67	50.00	-33.33	16.45	0.09	0.13	Average
10	8.546	26.14	60.00	-33.86	25.92	0.09	0.13	QP
11	21.373	20.00	50.00	-30.00	19.58	0.14	0.28	Average
12	21.373	24.33	60.00	-35.67	23.91	0.14	0.28	QP

Note 1: Level (dBuV) = Read Level (dBuV) + LISN Factor (dB) + Cable Loss (dB).
 2: Over Limit (dBuV) = Limit Line (dBuV) – Level (dBuV).



Modulation Mode	GFSK	Test Freq. (MHz)	2402
Power Phase	Neutral	Test Configuration	2



	Freq	Level	Limit	Over	Read	LISN	cable	Remark
	MHz	dBuV	Line	Limit	Level	factor	loss	
			dBuV	dB	dBuV	dB	dB	
1	0.151	38.30	55.96	-17.66	38.22	0.02	0.06	Average
2	0.151	50.64	65.96	-15.32	50.56	0.02	0.06	QP
3	0.163	37.25	55.30	-18.05	37.13	0.02	0.10	Average
4	0.163	51.92	65.30	-13.38	51.80	0.02	0.10	QP
5	0.180	26.03	54.50	-28.47	25.87	0.02	0.14	Average
6	0.180	51.60	64.50	-12.90	51.44	0.02	0.14	QP
7	0.227	19.31	52.57	-33.26	19.13	0.02	0.16	Average
8	0.227	44.45	62.57	-18.12	44.27	0.02	0.16	QP
9	3.346	32.08	46.00	-13.92	31.81	0.05	0.22	Average
10	3.346	35.80	56.00	-20.20	35.53	0.05	0.22	QP
11	8.546	16.67	50.00	-33.33	16.46	0.08	0.13	Average
12	8.546	25.82	60.00	-34.18	25.61	0.08	0.13	QP

Note 1: Level (dBuV) = Read Level (dBuV) + LISN Factor (dB) + Cable Loss (dB).
 2: Over Limit (dBuV) = Limit Line (dBuV) – Level (dBuV).



3.2 6dB Bandwidth

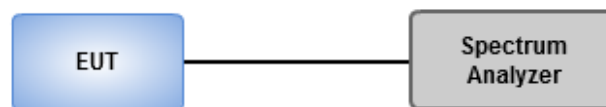
3.2.1 Limit of 6dB Bandwidth

The minimum 6dB bandwidth shall be at least 500 kHz.

3.2.2 Test Procedures

1. Set resolution bandwidth (RBW) = 100 kHz, Video bandwidth = 300 kHz.
2. Detector = Peak, Trace mode = max hold.
3. Sweep = auto couple, Allow the trace to stabilize.
4. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower) that are attenuated by 6dB relative to the maximum level measured in the fundamental emission.

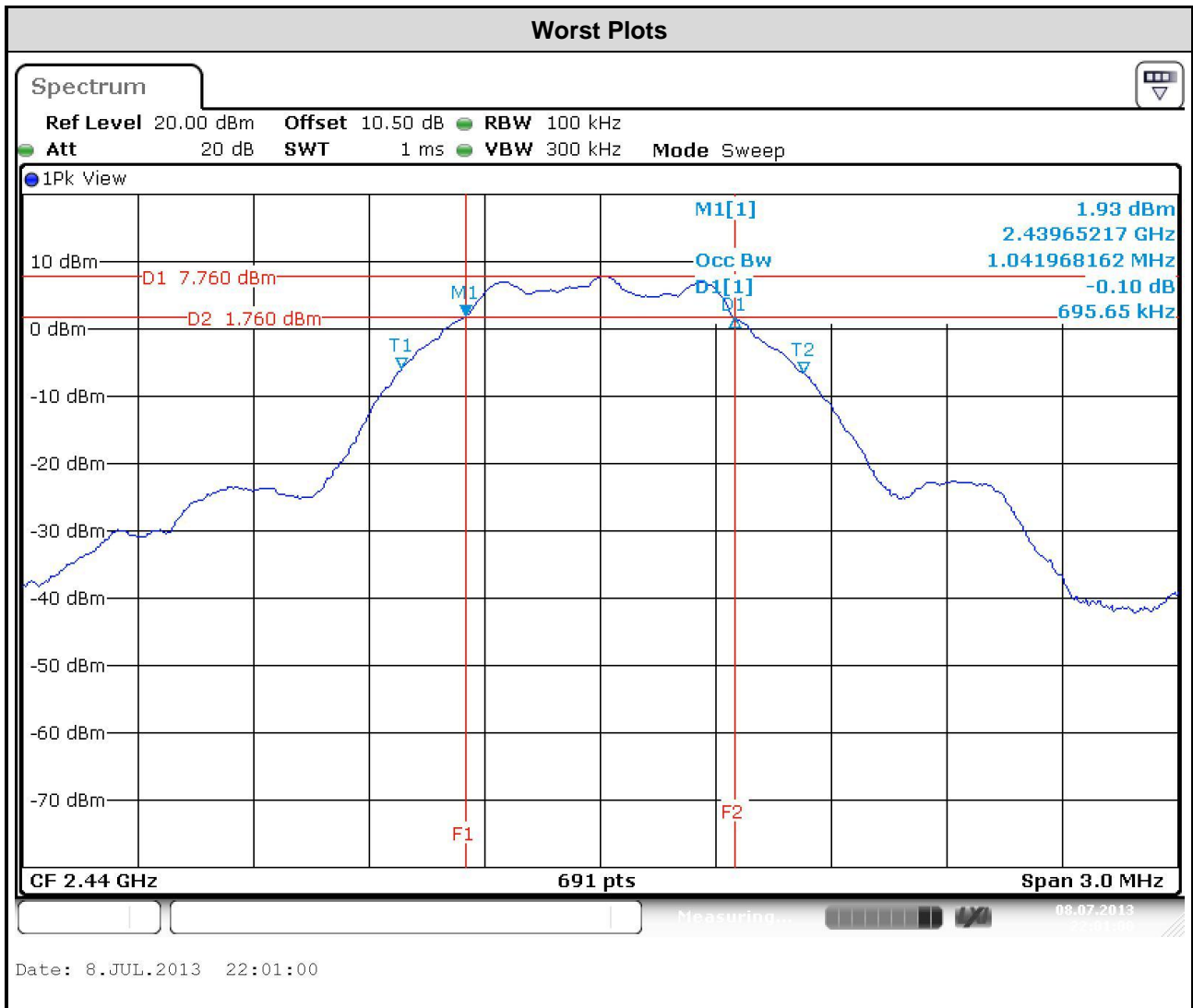
3.2.3 Test Setup





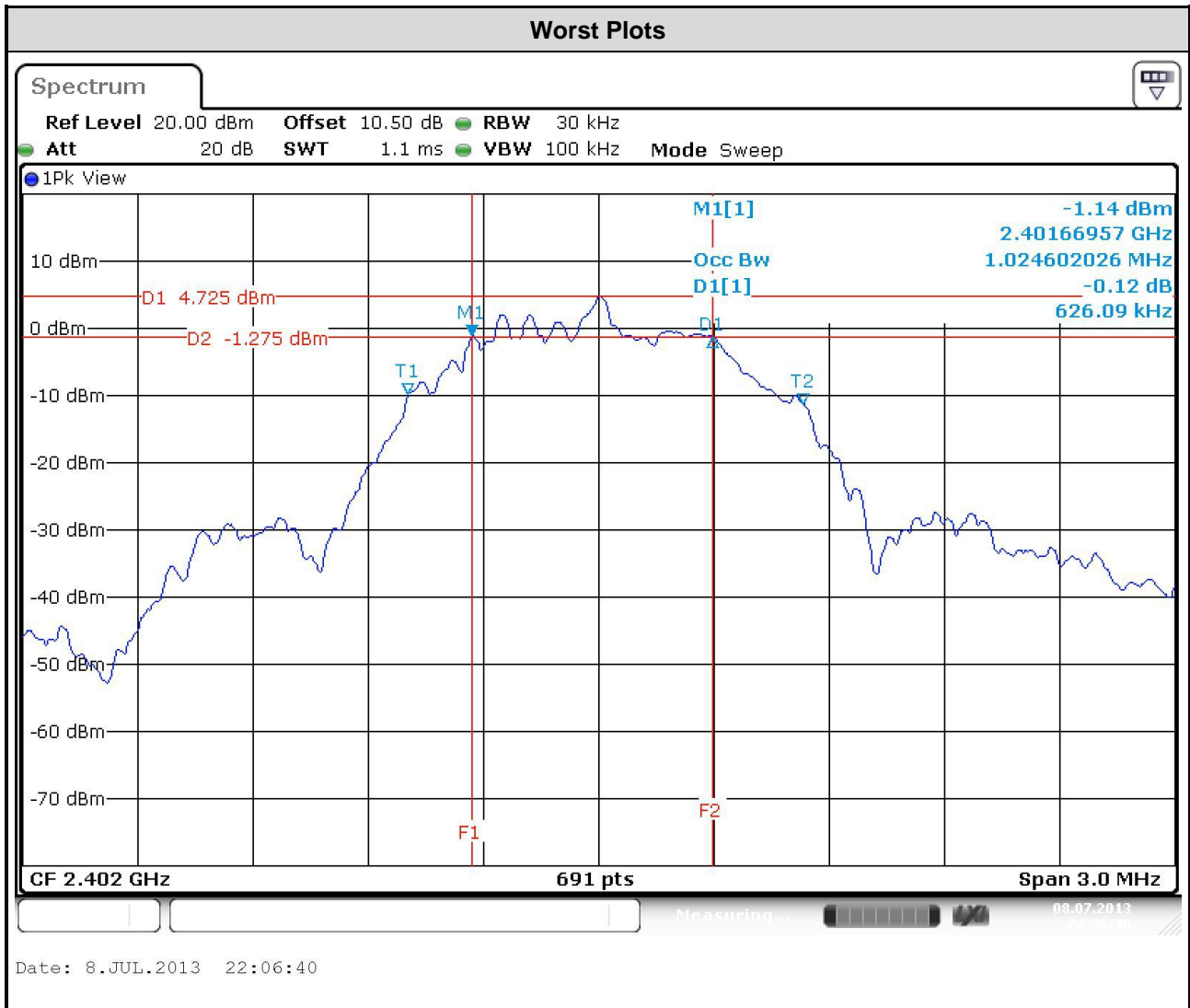
3.2.4 Test Result of Emission Bandwidth

Freq. (MHz)	6dB Bandwidth (kHz)	Limit (kHz)
2402	691.30	500
2440	695.65	500
2480	691.30	500





Freq. (MHz)	99% Occupied Bandwidth (MHz)
2402	1.0246
2440	1.0203
2480	1.0203





3.3 RF Output Power

3.3.1 Limit of RF Output Power

Conducted power shall not exceed 1Watt.

- Antenna gain \leq 6dBi, no any corresponding reduction is in output power limit.
- Antenna gain $>$ 6dBi
 - Non Fixed, point to point operations.
The conducted output power from the intentional radiator shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dB
 - Fixed, point to point operations
Systems operating in the 2400–2483.5 MHz band that are used exclusively for fixed, point-to-point Operations, maximum peak output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi.

Systems operating in the 5725–5850 MHz band that are used exclusively for fixed, point-to-point operations ,no any corresponding reduction is in transmitter peak output power

3.3.2 Test Procedures

- Maximum Peak Conducted Output Power
 - Spectrum analyzer**
 1. Set RBW = 1MHz, VBW = 3MHz, Detector = Peak.
 2. Sweep time = auto, Trace mode = max hold, Allow trace to fully stabilize.
 3. Use the spectrum analyzer channel power measurement function with the band limits set equal to the DTS bandwidth edges.
 - Power meter**
 1. A broadband Peak RF power meter is used for output power measurement. The video bandwidth of power meter is greater than DTS bandwidth of EUT. If duty cycle of test signal is not 100 %, trigger and gating function of power meter will be enabled to capture transmission burst for measuring output power.
- Maximum Conducted Average Output Power (For reference only)
 - Spectrum analyzer**
 1. Set RBW = 1MHz, VBW = 3MHz, Detector = RMS.
 2. Set the sweep time to: $\geq 10 \times$ (number of measurement points in sweep) \times (maximum data rate per stream).
 3. Perform the measurement over a single sweep.
 4. Use the spectrum analyzer's band power measurement function with band limits set equal to the EBW(26dBc) band edges.
 - Power meter**
 1. A broadband Average RF power meter is used for output power measurement. The video bandwidth of power meter is greater than DTS bandwidth of EUT. If duty cycle of test signal is not 100 %, trigger and gating function of power meter will be enabled to capture transmission burst for measuring output power.



3.3.3 Test Setup



3.3.4 Test Result of Maximum Output Power

Freq. (MHz)	Peak Conducted Power (dBm)	Limit (dBm)
2402	6.80	30
2440	7.59	30
2480	7.90	30

Freq. (MHz)	Average Conducted Power (dBm)	Limit (dBm)
2402	6.44	30
2440	7.28	30
2480	7.61	30

Note: Average power is for reference only.



3.4 Power Spectral Density

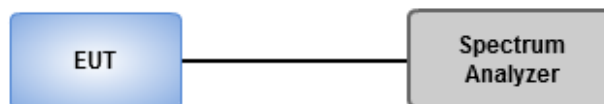
3.4.1 Limit of Power Spectral Density

Power spectral density shall not be greater than 8 dBm in any 3 kHz band.

3.4.2 Test Procedures

- Maximum peak conducted output power was used to demonstrate compliance to the fundamental output power limit.
 1. Set the RBW = 10kHz, VBW = 30kHz.
 2. Detector = Peak, Sweep time = auto couple.
 3. Trace mode = max hold, allow trace to fully stabilize.
 4. Use the peak marker function to determine the maximum amplitude level.
- Maximum (average) conducted output power was used to demonstrate compliance to the fundamental output power limit.
 1. Set the RBW = 100kHz, VBW = 300 kHz.
 2. Detector = RMS, Sweep time = auto couple.
 3. Set the sweep time to: $\geq 10 \times (\text{number of measurement points in sweep}) \times (\text{maximum data rate per stream})$.
 4. Perform the measurement over a single sweep.
 5. Use the peak marker function to determine the maximum amplitude level.\

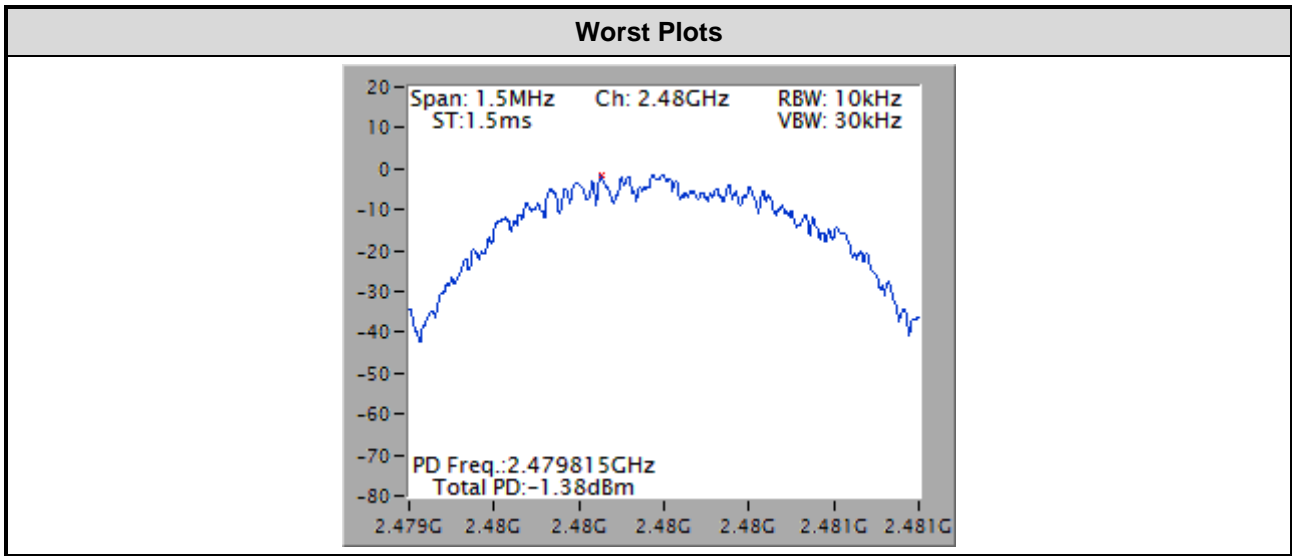
3.4.3 Test Setup





3.4.4 Test Result of Power Spectral Density

Freq. (MHz)	Power Spectral Density (dBm / 10kHz)	Limit (dBm)
2402	-2.57	8
2440	-1.66	8
2480	-1.38	8





3.5 Emissions in Restricted Frequency Bands

3.5.1 Limit of Emissions in Restricted Frequency Bands

Restricted Band Emissions Limit			
Frequency Range (MHz)	Field Strength (uV/m)	Field Strength (dBuV/m)	Measure Distance (m)
0.009~0.490	2400/F(kHz)	48.5 - 13.8	300
0.490~1.705	24000/F(kHz)	33.8 - 23	30
1.705~30.0	30	29	30
30~88	100	40	3
88~216	150	43.5	3
216~960	200	46	3
Above 960	500	54	3

Note 1:
Qusai-Peak value is measured for frequency below 1GHz except for 9–90 kHz, 110–490 kHz frequency band. Peak and average value are measured for frequency above 1GHz. The limit on average radio frequency emission is as above table. The limit on peak radio frequency emissions is 20 dB above the maximum permitted average emission limit

Note 2:
Measurements may be performed at a distance other than what is specified provided. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor as below, Frequency at or above 30 MHz: 20 dB/decade Frequency below 30 MHz: 40 dB/decade.

3.5.2 Test Procedures

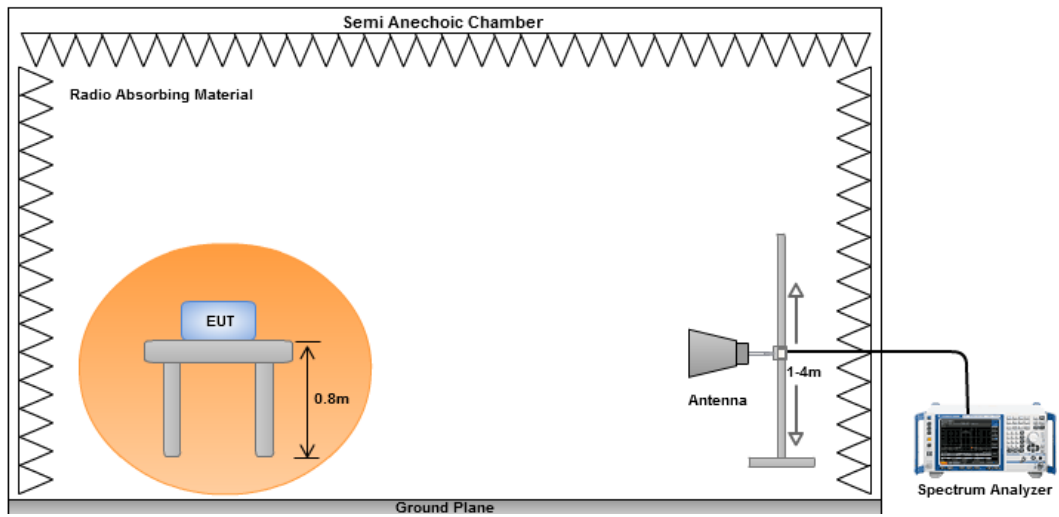
1. Measurement is made at a semi-anechoic chamber that incorporates a turntable allowing a EUT rotation of 360°. A continuously-rotating, remotely-controlled turntable is installed at the test site to support the EUT and facilitate determination of the direction of maximum radiation for each EUT emission frequency. The EUT is placed at a height of 0.8 m test table above the ground plane.
2. Measurement is made with the antenna positioned in both the horizontal and vertical planes of polarization. The measurement antenna is varied in height (1m ~ 4m) above the reference ground plane to obtain the maximum signal strength. Distance between EUT and antenna is 3 m.
3. This investigation is performed with the EUT rotated 360°, the antenna height scanned between 1 m and 4 m, and the antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations.

Note:

1. 120kHz measurement bandwidth of test receiver and Quasi-peak detector is for radiated emission below 1GHz.
2. RBW=1MHz, VBW=3MHz and Peak detector is for peak measured value of radiated emission above 1GHz.
3. RBW=1MHz, VBW=1/T and Peak detector is for average measured value of radiated emission above 1GHz.



3.5.3 Test Setup





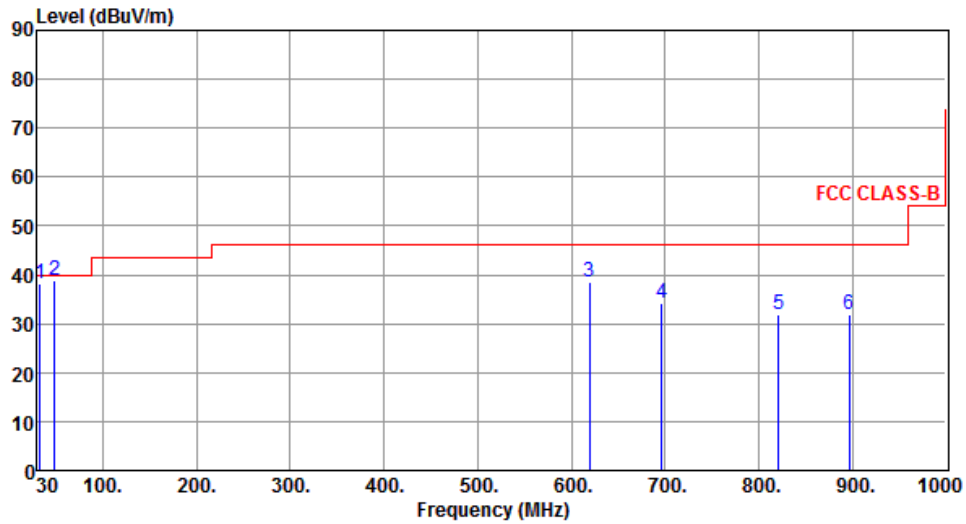
3.5.4 Transmitter Radiated Unwanted Emissions (Below 1GHz)

Polarization	Horizontal		Test Freq. (MHz)	2402					
Test Configuration	1								
<p>The graph plots Level (dBuV/m) on the y-axis (0 to 90) against Frequency (MHz) on the x-axis (30 to 1000). A red step-like line represents the FCC CLASS-B limit. Six blue vertical lines indicate emission peaks at various frequencies: 1 (98.87 MHz), 2 (232.73 MHz), 3 (298.69 MHz), 4 (527.61 MHz), 5 (798.24 MHz), and 6 (912.70 MHz). The emission levels are generally below the limit, with peak 6 being the highest at approximately 33 dBuV/m.</p>									
	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	98.87	35.12	43.50	-8.38	56.89	-21.77	Peak	---	---
2	232.73	36.77	46.00	-9.23	55.42	-18.65	Peak	---	---
3	298.69	35.42	46.00	-10.58	51.68	-16.26	Peak	---	---
4	527.61	30.83	46.00	-15.17	41.92	-11.09	Peak	---	---
5	798.24	36.55	46.00	-9.45	43.32	-6.77	Peak	---	---
6	912.70	33.13	46.00	-12.87	38.47	-5.34	Peak	---	---

Note 1: Level (dBuV/m) = Read Level (dBuV/m) + Antenna Factor (dB) + Cable Loss (dB) - Preamp Factor (dB).
 2: Over Limit (dBuV/m) = Limit Line (dBuV/m) – Level (dBuV/m).



Polarization	Vertical	Test Freq. (MHz)	2402
Test Configuration	1		

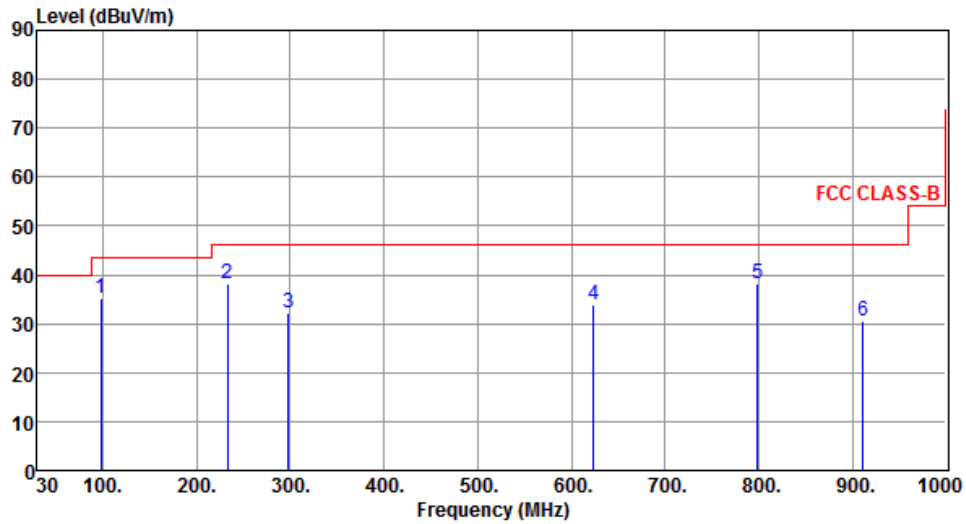


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	32.68	38.36	40.00	-1.64	55.92	-17.56	QP	---	---
2	48.43	38.84	40.00	-1.16	55.44	-16.60	QP	---	---
3	619.76	38.45	46.00	-7.55	47.91	-9.46	Peak	---	---
4	696.39	34.04	46.00	-11.96	42.34	-8.30	Peak	---	---
5	821.52	31.98	46.00	-14.02	38.46	-6.48	Peak	---	---
6	896.21	32.02	46.00	-13.98	37.58	-5.56	Peak	---	---

Note 1: Level (dBuV/m) = Read Level (dBuV/m) + Antenna Factor (dB) + Cable Loss (dB) - Preamp Factor (dB).
 2: Over Limit (dBuV/m) = Limit Line (dBuV/m) – Level (dBuV/m).



Polarization	Horizontal	Test Freq. (MHz)	2402
Test Configuration	2		

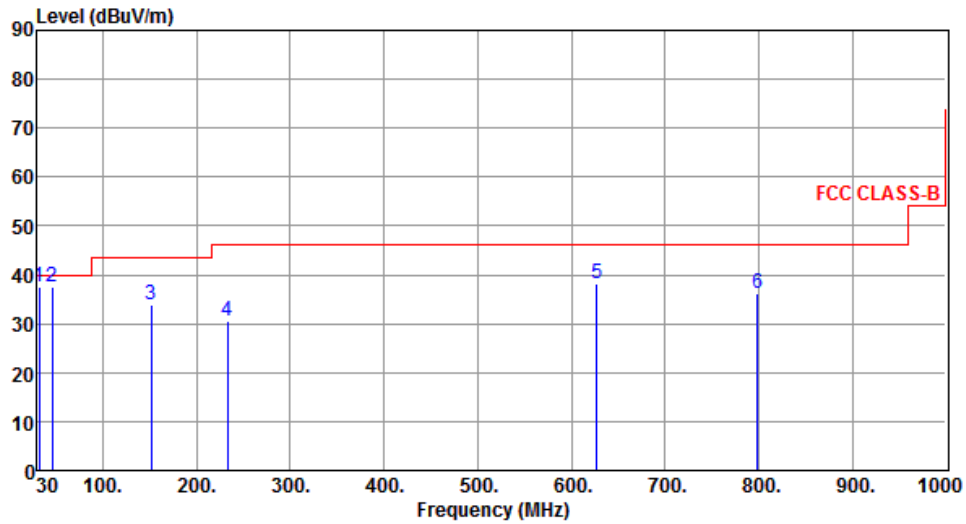


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	97.52	35.13	43.50	-8.37	57.09	-21.96	Peak	---	---
2	233.04	38.25	46.00	-7.75	56.87	-18.62	Peak	---	---
3	298.41	32.36	46.00	-13.64	48.63	-16.27	Peak	---	---
4	623.47	33.94	46.00	-12.06	43.35	-9.41	Peak	---	---
5	798.83	38.12	46.00	-7.88	44.89	-6.77	Peak	---	---
6	911.68	30.57	46.00	-15.43	35.92	-5.35	Peak	---	---

Note 1: Level (dBuV/m) = Read Level (dBuV/m) + Antenna Factor (dB) + Cable Loss (dB) - Preamp Factor (dB).
 2: Over Limit (dBuV/m) = Limit Line (dBuV/m) – Level (dBuV/m).



Polarization	Vertical	Test Freq. (MHz)	2402
Test Configuration	2		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	32.47	37.67	40.00	-2.33	55.25	-17.58	QP	---	---
2	46.24	37.53	40.00	-2.47	54.20	-16.67	QP	---	---
3	151.68	33.72	43.50	-9.78	50.64	-16.92	Peak	---	---
4	232.93	30.51	46.00	-15.49	49.13	-18.62	Peak	---	---
5	626.82	38.11	46.00	-7.89	47.47	-9.36	Peak	---	---
6	798.76	36.04	46.00	-9.96	42.81	-6.77	Peak	---	---

Note 1: Level (dBuV/m) = Read Level (dBuV/m) + Antenna Factor (dB) + Cable Loss (dB) - Preamp Factor (dB).
 2: Over Limit (dBuV/m) = Limit Line (dBuV/m) – Level (dBuV/m).



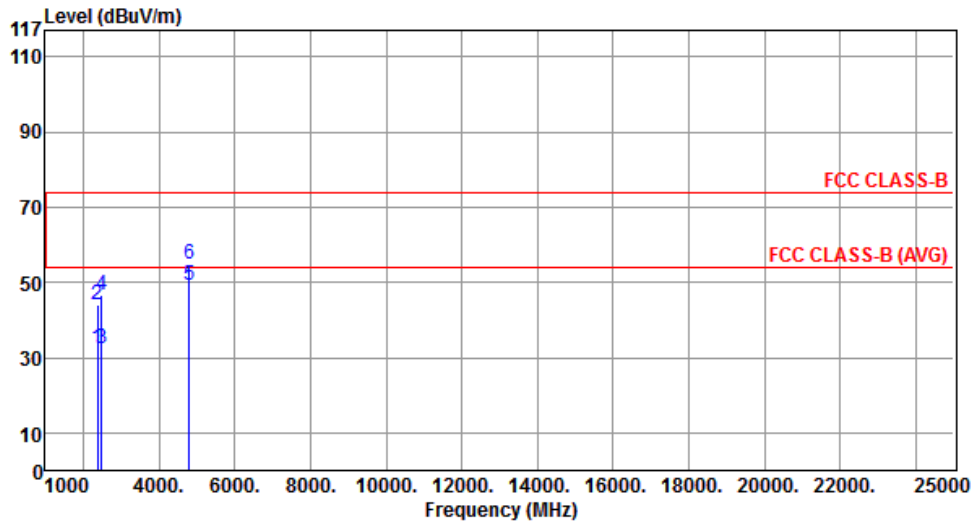
3.5.5 Transmitter Radiated Unwanted Emissions (Above 1GHz)

Polarization	Horizontal	Test Freq. (MHz)	2402						
Test Configuration	1								
	Freq.	Emission level	Limit	Margin	SA reading	Factor	Remark	ANT High cm	Turn Table deg
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB			
1	2390.00	31.44	54.00	-22.56	34.66	-3.22	Average	---	---
2	2390.00	43.52	74.00	-30.48	46.74	-3.22	Peak	---	---
3	2497.00	33.86	54.00	-20.14	36.63	-2.77	Average	---	---
4	2497.00	44.24	74.00	-29.76	47.01	-2.77	Peak	---	---
5	4804.00	43.54	54.00	-10.46	39.26	4.28	Average	---	---
6	4804.00	50.48	74.00	-23.52	46.20	4.28	Peak	---	---

Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.
 Note 2: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.
 Note 3: For un-restricted bands, unwanted emissions shall be attenuated by at least 20 dB relative to the maximum measured in-band level.



Polarization	Vertical	Test Freq. (MHz)	2402
Test Configuration	1		

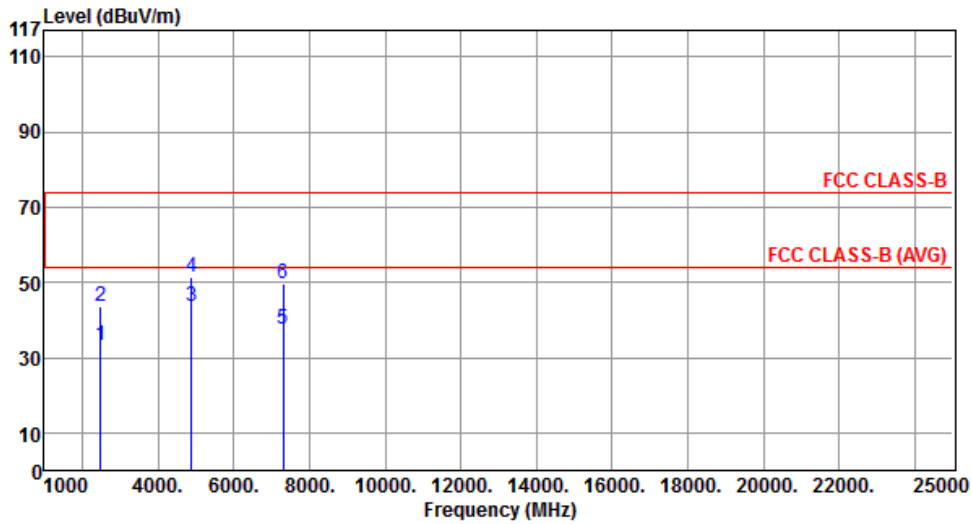


	Freq. MHz	Emission level dBUV/m	Limit dBUV/m	Margin dB	SA reading dBUV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2390.00	32.59	54.00	-21.41	35.81	-3.22	Average	---	---
2	2390.00	44.03	74.00	-29.97	47.25	-3.22	Peak	---	---
3	2497.00	32.47	54.00	-21.53	35.24	-2.77	Average	---	---
4	2497.00	46.81	74.00	-27.19	49.58	-2.77	Peak	---	---
5	4804.00	49.40	54.00	-4.60	45.12	4.28	Average	---	---
6	4804.00	54.95	74.00	-19.05	50.67	4.28	Peak	---	---

Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.
 Note 2: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.
 Note 3: For un-restricted bands, unwanted emissions shall be attenuated by at least 20 dB relative to the maximum measured in-band level.



Polarization	Horizontal	Test Freq. (MHz)	2440
Test Configuration	1		

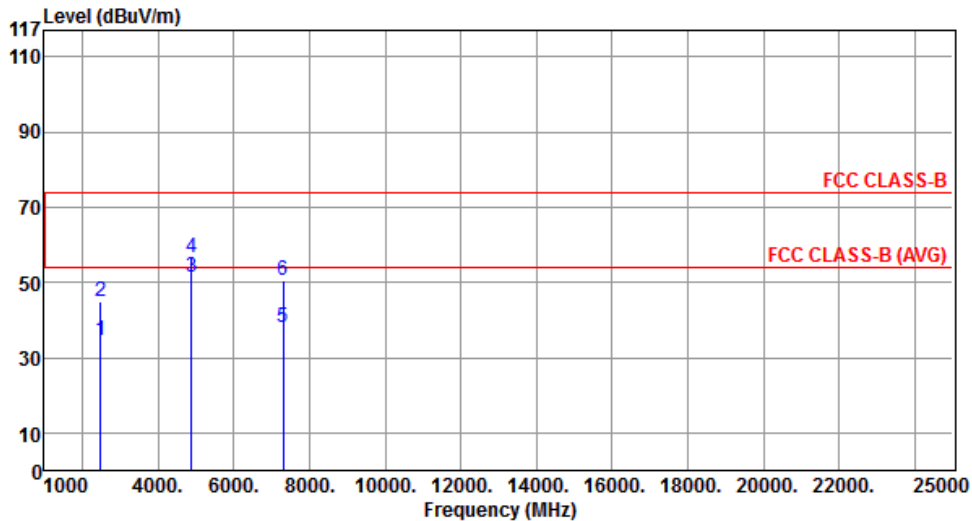


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2491.00	33.03	54.00	-20.97	35.83	-2.80	Average	---	---
2	2491.00	43.44	74.00	-30.56	46.24	-2.80	Peak	---	---
3	4880.00	43.39	54.00	-10.61	38.99	4.40	Average	---	---
4	4880.00	51.36	74.00	-22.64	46.96	4.40	Peak	---	---
5	7320.00	37.73	54.00	-16.27	28.80	8.93	Average	---	---
6	7320.00	49.85	74.00	-24.15	40.92	8.93	Peak	---	---

Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.
 Note 2: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.
 Note 3: For un-restricted bands, unwanted emissions shall be attenuated by at least 20 dB relative to the maximum measured in-band level.



Polarization	Vertical	Test Freq. (MHz)	2440
Test Configuration	1		

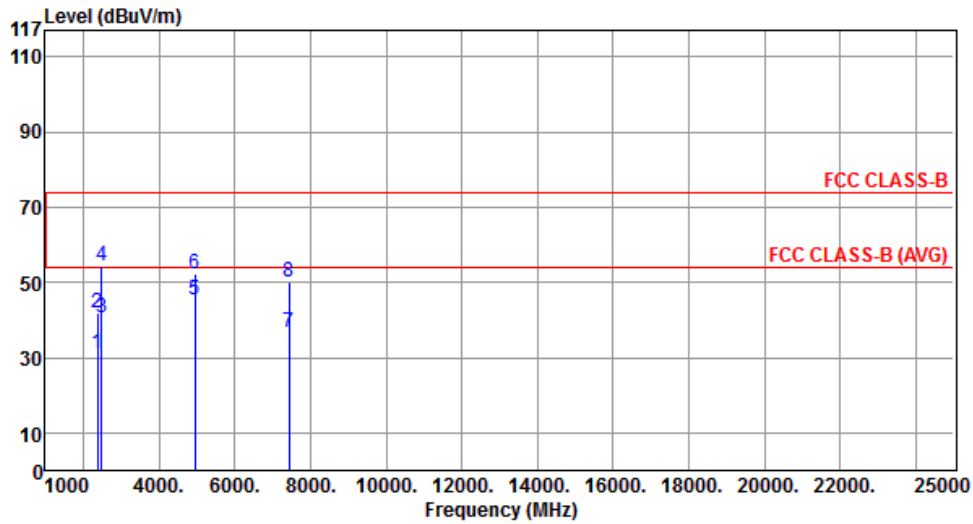


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2491.00	34.33	54.00	-19.67	37.13	-2.80	Average	---	---
2	2491.00	45.04	74.00	-28.96	47.84	-2.80	Peak	---	---
3	4880.00	51.27	54.00	-2.73	46.87	4.40	Average	---	---
4	4880.00	56.57	74.00	-17.43	52.17	4.40	Peak	---	---
5	7320.00	38.13	54.00	-15.87	29.20	8.93	Average	---	---
6	7320.00	50.57	74.00	-23.43	41.64	8.93	Peak	---	---

Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.
 Note 2: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.
 Note 3: For un-restricted bands, unwanted emissions shall be attenuated by at least 20 dB relative to the maximum measured in-band level.



Polarization	Horizontal	Test Freq. (MHz)	2480
Test Configuration	1		

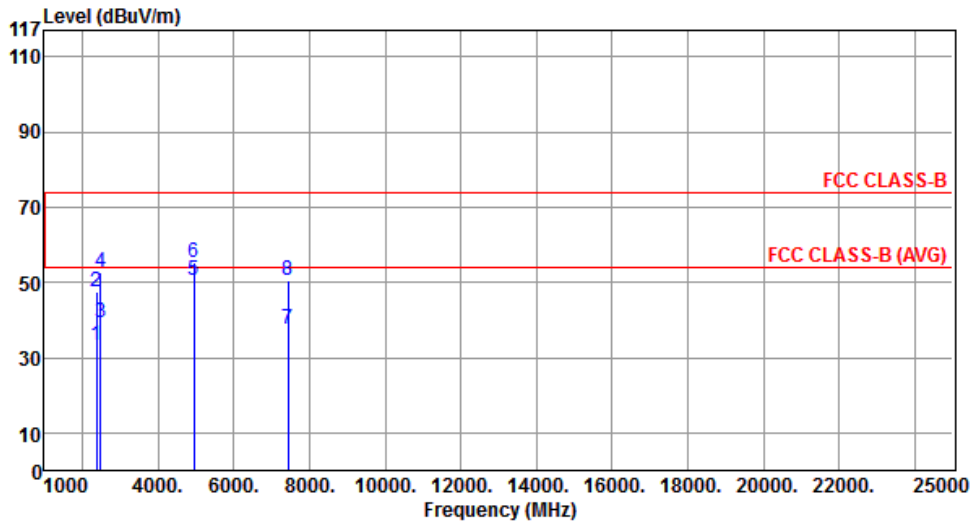


	Freq. MHz	Emission level dBUV/m	Limit dBUV/m	Margin dB	SA reading dBUV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2375.00	30.97	54.00	-23.03	34.25	-3.28	Average	---	---
2	2375.00	41.90	74.00	-32.10	45.18	-3.28	Peak	---	---
3	2483.50	40.64	54.00	-13.36	43.47	-2.83	Average	---	---
4	2483.50	54.46	74.00	-19.54	57.29	-2.83	Peak	---	---
5	4960.00	45.35	54.00	-8.65	40.81	4.54	Average	---	---
6	4960.00	52.05	74.00	-21.95	47.51	4.54	Peak	---	---
7	7440.00	36.87	54.00	-17.13	27.75	9.12	Average	---	---
8	7440.00	49.98	74.00	-24.02	40.86	9.12	Peak	---	---

Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.
 Note 2: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.
 Note 3: For un-restricted bands, unwanted emissions shall be attenuated by at least 20 dB relative to the maximum measured in-band level.



Polarization	Vertical	Test Freq. (MHz)	2480
Test Configuration	1		

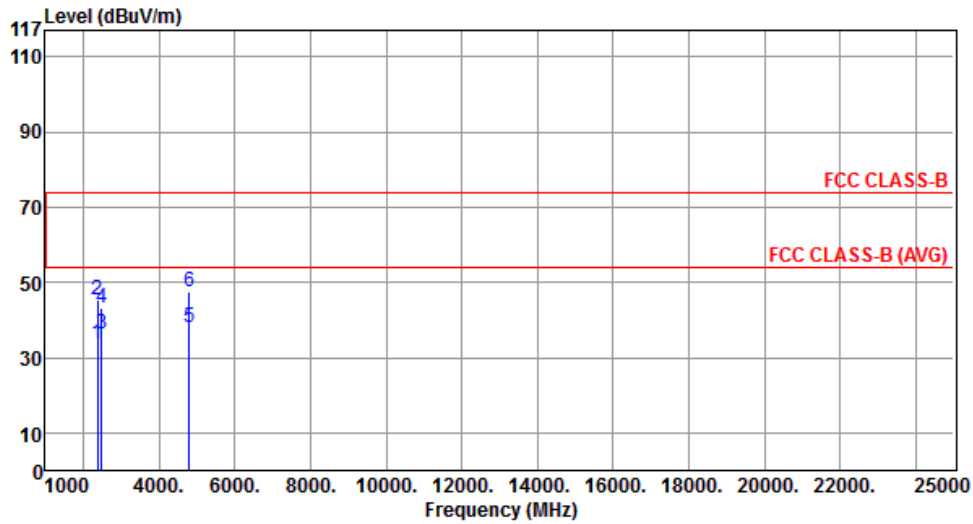


	Freq. MHz	Emission level dBUV/m	Limit dBUV/m	Margin dB	SA reading dBUV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2375.00	33.36	54.00	-20.64	36.64	-3.28	Average	---	---
2	2375.00	47.59	74.00	-26.41	50.87	-3.28	Peak	---	---
3	2483.50	39.15	54.00	-14.85	41.98	-2.83	Average	---	---
4	2483.50	52.58	74.00	-21.42	55.41	-2.83	Peak	---	---
5	4960.00	50.51	54.00	-3.49	45.97	4.54	Average	---	---
6	4960.00	55.33	74.00	-18.67	50.79	4.54	Peak	---	---
7	7440.00	37.40	54.00	-16.60	28.28	9.12	Average	---	---
8	7440.00	50.47	74.00	-23.53	41.35	9.12	Peak	---	---

Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.
 Note 2: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.
 Note 3: For un-restricted bands, unwanted emissions shall be attenuated by at least 20 dB relative to the maximum measured in-band level.



Polarization	Horizontal	Test Freq. (MHz)	2402
Test Configuration	2		

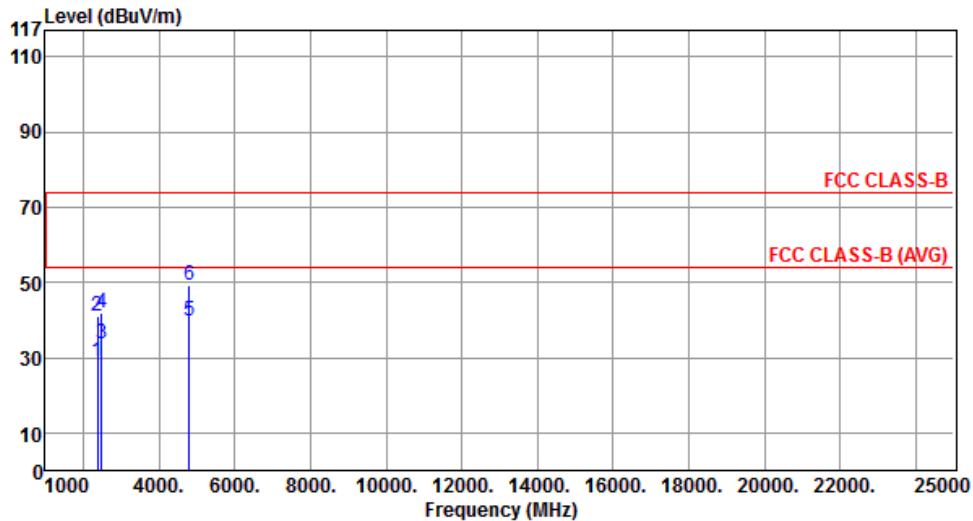


	Freq. MHz	Emission level dBUV/m	Limit dBUV/m	Margin dB	SA reading dBUV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2390.00	33.57	54.00	-20.43	36.79	-3.22	Average	---	---
2	2390.00	45.31	74.00	-28.69	48.53	-3.22	Peak	---	---
3	2497.00	36.37	54.00	-17.63	39.14	-2.77	Average	---	---
4	2497.00	43.24	74.00	-30.76	46.01	-2.77	Peak	---	---
5	4804.00	37.84	54.00	-16.16	33.56	4.28	Average	---	---
6	4804.00	47.31	74.00	-26.69	43.03	4.28	Peak	---	---

Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.
 Note 2: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.
 Note 3: For un-restricted bands, unwanted emissions shall be attenuated by at least 20 dB relative to the maximum measured in-band level.



Polarization	Vertical	Test Freq. (MHz)	2402
Test Configuration	2		

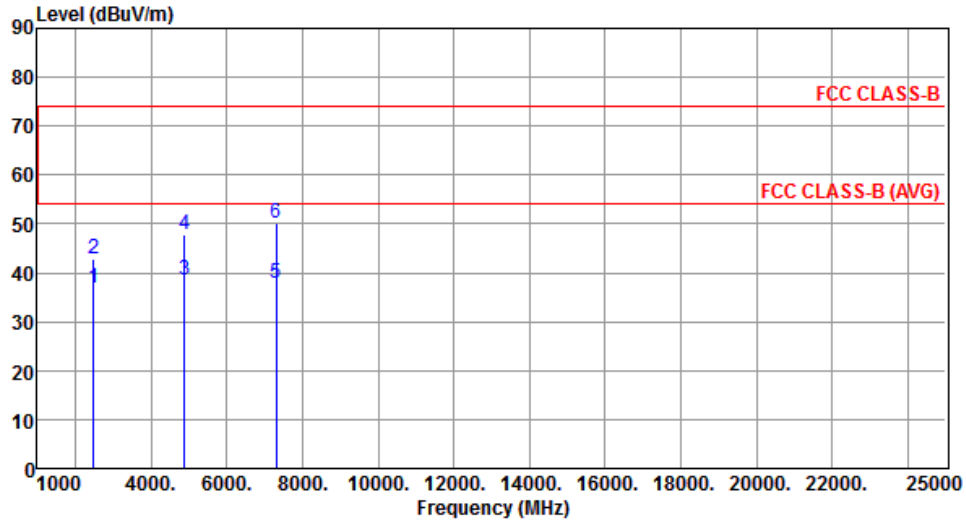


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2390.00	28.98	54.00	-25.02	32.20	-3.22	Average	---	---
2	2390.00	41.08	74.00	-32.92	44.30	-3.22	Peak	---	---
3	2497.00	33.86	54.00	-20.14	36.63	-2.77	Average	---	---
4	2497.00	41.99	74.00	-32.01	44.76	-2.77	Peak	---	---
5	4804.00	39.53	54.00	-14.47	35.25	4.28	Average	---	---
6	4804.00	49.14	74.00	-24.86	44.86	4.28	Peak	---	---

Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.
 Note 2: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.
 Note 3: For un-restricted bands, unwanted emissions shall be attenuated by at least 20 dB relative to the maximum measured in-band level.



Polarization	Horizontal	Test Freq. (MHz)	2440
Test Configuration	2		

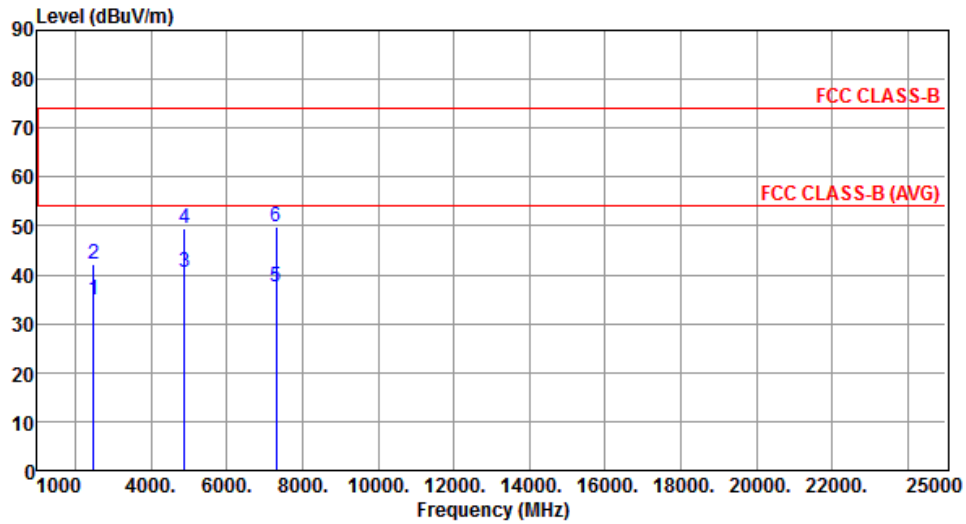


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2491.00	36.76	54.00	-17.24	39.56	-2.80	Average	---	---
2	2491.00	42.91	74.00	-31.09	45.71	-2.80	Peak	---	---
3	4880.00	38.36	54.00	-15.64	33.96	4.40	Average	---	---
4	4880.00	47.73	74.00	-26.27	43.33	4.40	Peak	---	---
5	7320.00	37.90	54.00	-16.10	28.97	8.93	Average	---	---
6	7320.00	50.07	74.00	-23.93	41.14	8.93	Peak	---	---

Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.
 Note 2: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.
 Note 3: For un-restricted bands, unwanted emissions shall be attenuated by at least 20 dB relative to the maximum measured in-band level.



Polarization	Vertical	Test Freq. (MHz)	2440
Test Configuration	2		

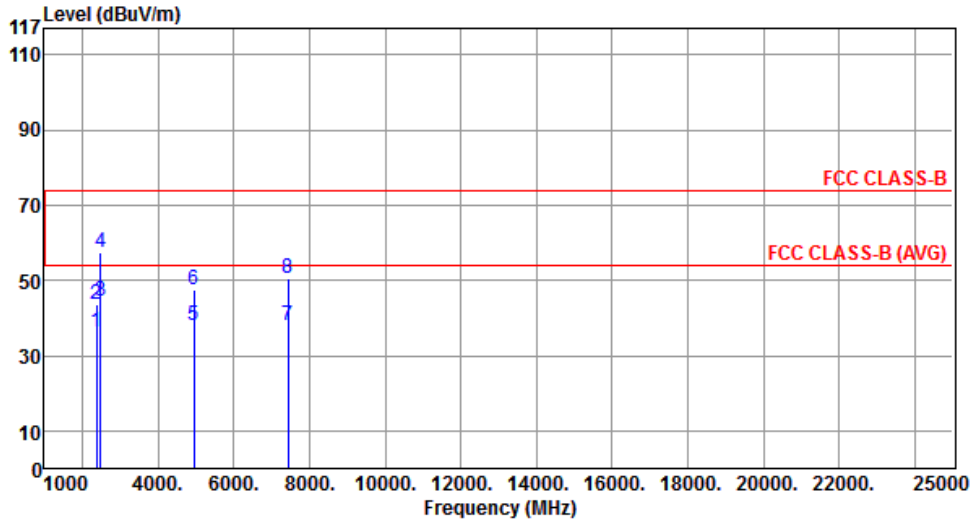


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2491.00	34.93	54.00	-19.07	37.73	-2.80	Average	---	---
2	2491.00	42.02	74.00	-31.98	44.82	-2.80	Peak	---	---
3	4880.00	40.35	54.00	-13.65	35.95	4.40	Average	---	---
4	4880.00	49.43	74.00	-24.57	45.03	4.40	Peak	---	---
5	7320.00	37.63	54.00	-16.37	28.70	8.93	Average	---	---
6	7320.00	49.84	74.00	-24.16	40.91	8.93	Peak	---	---

Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.
 Note 2: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.
 Note 3: For un-restricted bands, unwanted emissions shall be attenuated by at least 20 dB relative to the maximum measured in-band level.



Polarization	Horizontal	Test Freq. (MHz)	2480
Test Configuration	2		

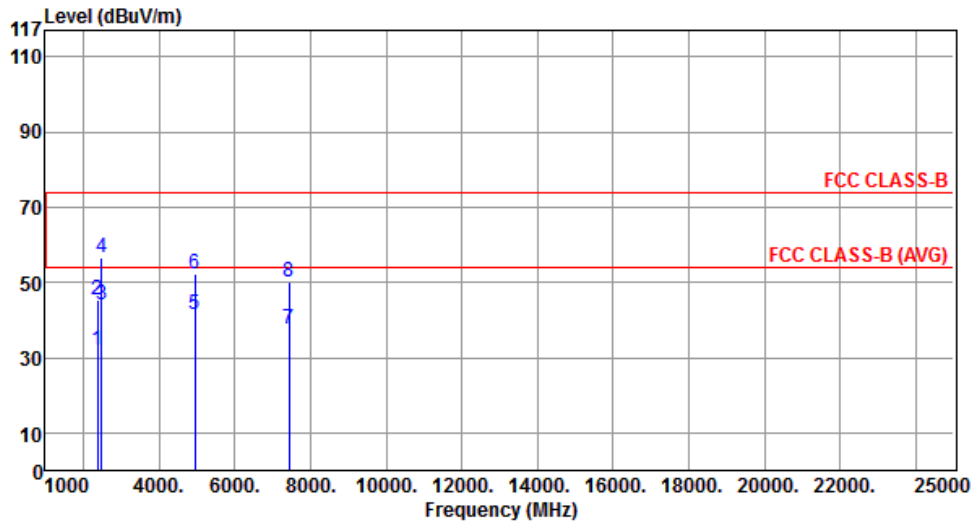


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2375.00	36.30	54.00	-17.70	39.58	-3.28	Average	---	---
2	2375.00	43.74	74.00	-30.26	47.02	-3.28	Peak	---	---
3	2483.50	44.66	54.00	-9.34	47.49	-2.83	Average	---	---
4	2483.50	57.57	74.00	-16.43	60.40	-2.83	Peak	---	---
5	4960.00	37.92	54.00	-16.08	33.38	4.54	Average	---	---
6	4960.00	47.68	74.00	-26.32	43.14	4.54	Peak	---	---
7	7440.00	37.88	54.00	-16.12	28.76	9.12	Average	---	---
8	7440.00	50.64	74.00	-23.36	41.52	9.12	Peak	---	---

Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.
 Note 2: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.
 Note 3: For un-restricted bands, unwanted emissions shall be attenuated by at least 20 dB relative to the maximum measured in-band level.



Polarization	Vertical	Test Freq. (MHz)	2480
Test Configuration	2		



	Freq. MHz	Emission level dBUV/m	Limit dBUV/m	Margin dB	SA reading dBUV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2375.00	32.15	54.00	-21.85	35.43	-3.28	Average	---	---
2	2375.00	45.16	74.00	-28.84	48.44	-3.28	Peak	---	---
3	2483.50	43.83	54.00	-10.17	46.66	-2.83	Average	---	---
4	2483.50	56.39	74.00	-17.61	59.22	-2.83	Peak	---	---
5	4960.00	41.25	54.00	-12.75	36.71	4.54	Average	---	---
6	4960.00	52.36	74.00	-21.64	47.82	4.54	Peak	---	---
7	7440.00	37.63	54.00	-16.37	28.51	9.12	Average	---	---
8	7440.00	49.99	74.00	-24.01	40.87	9.12	Peak	---	---

Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.
 Note 2: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.
 Note 3: For un-restricted bands, unwanted emissions shall be attenuated by at least 20 dB relative to the maximum measured in-band level.



3.6 Emissions in non-restricted Frequency Bands

3.6.1 Emissions in non-restricted frequency bands limit

Peak power in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz

3.6.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

3.6.3 Test Procedures

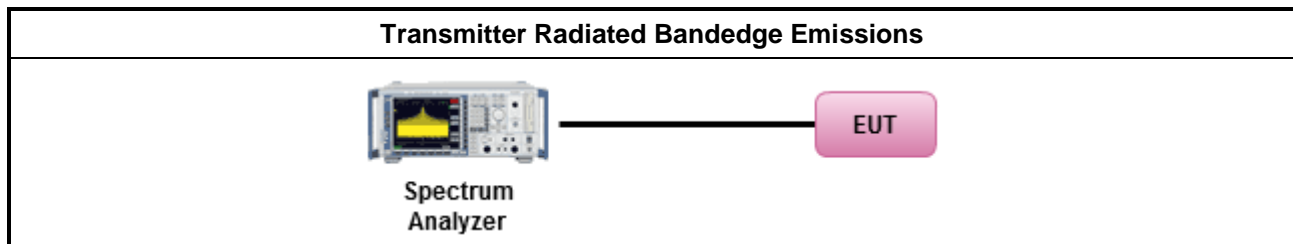
Reference level measurement

1. Set RBW=100kHz, VBW = 300kHz , Detector = Peak, Sweep time = Auto
2. Trace = max hold , Allow Trace to fully stabilize
3. Use the peak marker function to determine the maximum PSD level

Emission level measurement

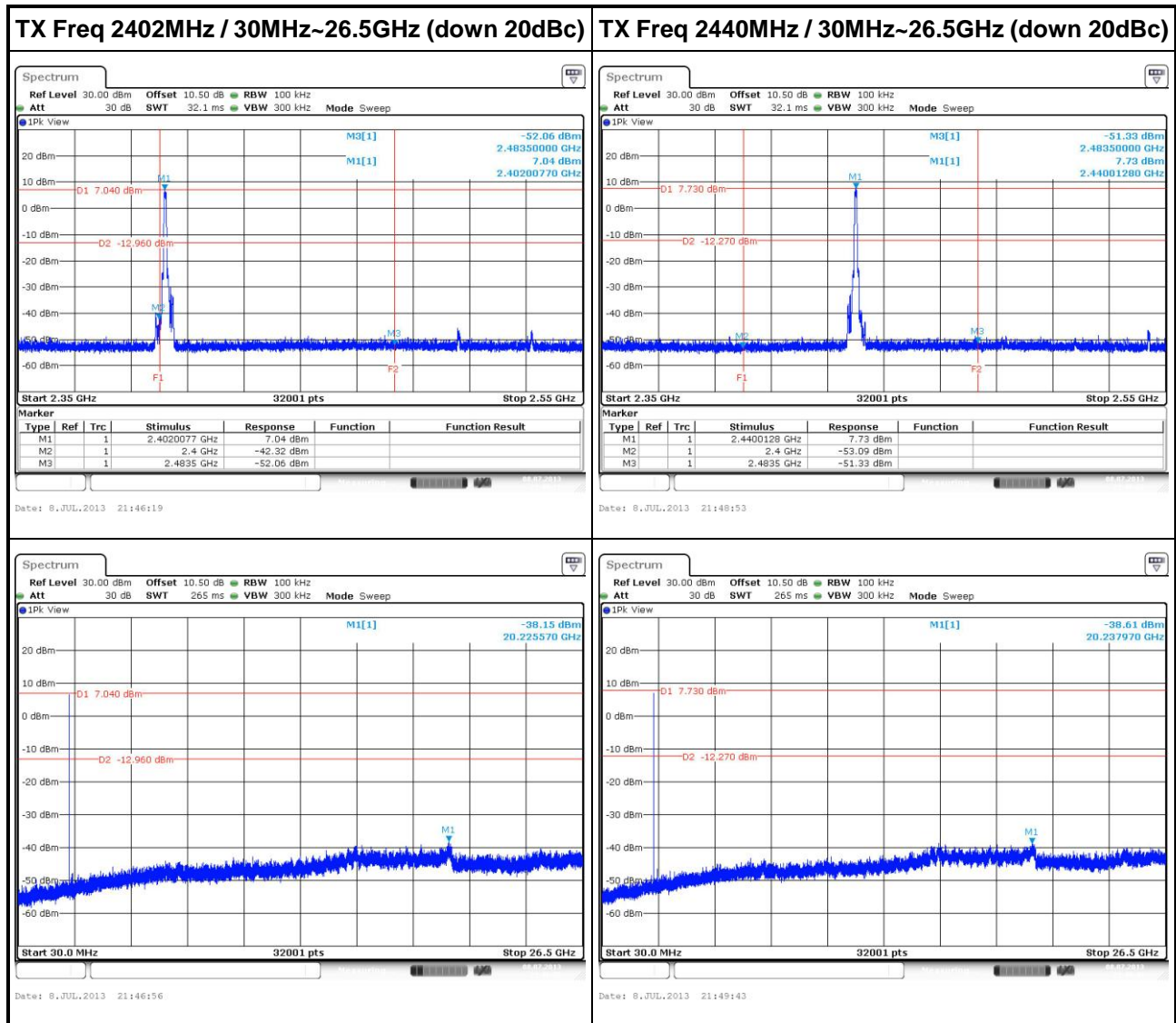
1. Set RBW=100kHz, VBW = 300kHz , Detector = Peak, Sweep time = Auto
2. Trace = max hold , Allow Trace to fully stabilize
3. Scan Frequency range is up to 26.5GHz
4. Use the peak marker function to determine the maximum amplitude level

3.6.4 Test Setup



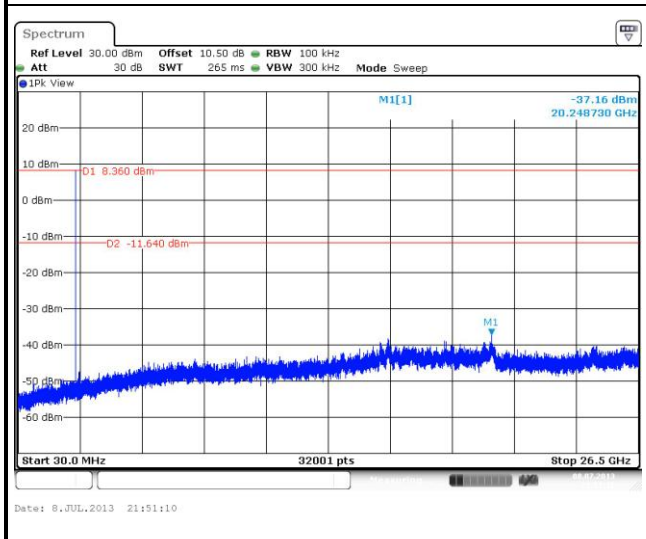
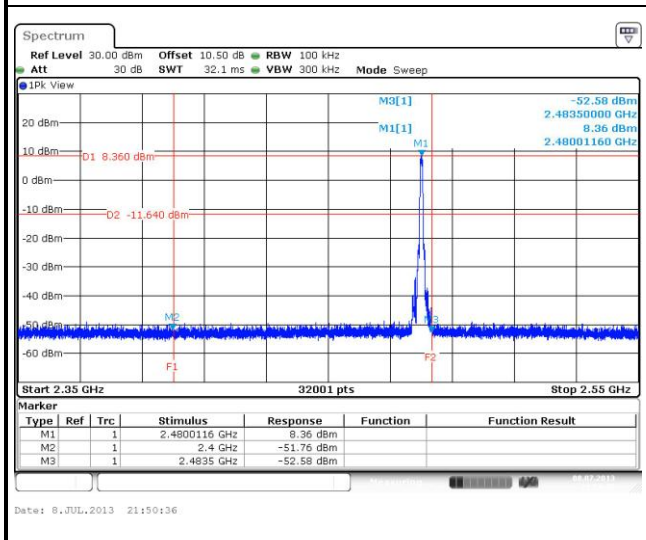


3.6.5 Test Result of Emissions in non-restricted Frequency Bands





TX Freq 2480MHz / 30MHz~26.5GHz (down 20dBc)



==END==