Radio Test Report

FCC ID: HLEMT880BTNF

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

Issued Date	:	Oct. 31, 2013
Project No.	:	1309202
Equipment	:	Multi-functional Master Controller
Model Name	:	MT880
Applicant	:	unitech electronics co., ltd.
Address	:	5F, No. 136, Lane 235, Pao-Chiao Rd., Hsin-Tien Dist., New Taipei City, Taiwan

Tested by: Neutron Engineering Inc. EMC Laboratory
Date of Receipt: Sep. 24, 2013
Date of Test: Sep. 24, 2013 ~ Oct. 25, 2013

Testing Engineer : (Josh Lin)

Technical Manager : (Jeff Yang)

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Testing Laboratory
0659

Declaration

Neutron represents to the client that testing is done in accordance with standard procedures as applicable and that test instruments used has been calibrated with the standards traceable to National Measurement Laboratory (**NML**) of **R.O.C**., or National Institute of Standards and Technology (**NIST**) of **U.S.A.**

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Limitation

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

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REPORT ISSUED HISTORY

Revised Version No.	Description	Issued Date
-	Initial Issue.	Oct. 31, 2013

1 CERTIFICATION

Equipment	:	Multi-functional Master Controller
Brand Name	:	unitech; TASHI
Model Name	:	MT880
Applicant	:	unitech electronics co., ltd.
Date of Test	:	Sep. 24, 2013 ~ Oct. 25, 2013
Standards	:	FCC Part 15, Subpart C: 2012 ANSI C63.4: 2009

The above equipment has been tested and found compliance with the requirement of the relative standards by Neutron Engineering Inc. EMC Laboratory.
The test data, data evaluation, and equipment configuration contained in our test report (Ref No. NEI-FCCP-2-1309202) 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

Standard Clause	Test Item	Result
15.207	Conducted Emission	**PASS**
15.247 (c)	Antenna conducted Spurious Emission	**PASS**
15.247 (a)(1)	Hopping Channel Separation	**PASS**
15.247 (b)	Maximum Peak Conducted Output Power	**PASS**
15.247 (c)	Radiated Spurious Emission	**PASS**
15.247 (b)(1)	Number of Hopping Frequency	**PASS**
15.247 (a)(1)	Average time of occupancy	**PASS**
15.205	Restricted Bands	**PASS**
15.203	Antenna Requirement	**PASS**
1.1307 1.1310 2.1091 2.1093	RF Exposure Compliance	**PASS**

NOTE:

1. **N/A**: denotes test is not applicable in this Test Report
2. Portable device; SAR report is required.
3. The EUT include WiFi & Bluetooth function and RFID function, this report covers EUT Bluetooth function only. It's WiFi & RFID function testing is covered in another test report: NEI-FCCP-1-1309202(WLAN), NEI-FCCP-3-1309202(RFID).

2.1 TEST FACILITY

The test facilities used to collect the test data in this report:

Conducted emission Test:

C02: (VCCI RN: C-3477; FCC RN: 614388; FCC DN: TW1054)
1F., No. 61, Ln. 77, Sing-ai Rd., Neihu Dist., Taipei City 114, Taiwan (R.O.C.)

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/Industry Canada rules and for reference only.

The reported uncertainty of measurement **y** ± **U**，where expended 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.

A. Conducted emission test:

Test Site	Measurement Frequency Range	U，(dB)	NOTE
C02	150 kHz ~ 30 MHz	2.59	

B. Radiated emission test:

Test Site	Item	Measurement Frequency Range		Uncertainty	NOTE
CB08	Radiated emission at 3m	Horizontal Polarization	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	

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

<table>
<tr><td>Equipment</td><td>Multi-functional Master Controller</td></tr>
<tr><td>Brand Name</td><td>unitech; TASHI</td></tr>
<tr><td>Model Name</td><td>MT880</td></tr>
<tr><td>OEM Brand/Model Name</td><td>N/A</td></tr>
<tr><td>Model Difference</td><td>N/A</td></tr>
<tr><td>Product Description</td><td>The EUT is a Multi-functional Master Controller.
<table>
<tr><td>Operation Frequency</td><td>2402 MHz ~ 2480 MHz</td></tr>
<tr><td>Modulation Type</td><td>FHSS(GFSK, pi/4 DQPSK, 8DPSK)</td></tr>
<tr><td>Bit Rate of Transmitter</td><td>1/3 Mbps</td></tr>
<tr><td>Number Of Channel</td><td>Please refer to the Note 2.</td></tr>
<tr><td>Antenna Designation</td><td>Please refer to the Note 3.</td></tr>
<tr><td>Antenna Gain(Peak)</td><td>Please refer to the Note 3.</td></tr>
<tr><td>Maximum Conducted Output Power</td><td>Peak Output Power:
1 Mbps: 2.35dBm
3 Mbps: 5.39dBm
Avg Output Power:
1 Mbps: dBm
3 Mbps: dBm</td></tr>
</table>
More details of EUT technical specification, please refer to the User's Manual.</td></tr>
<tr><td>Power Source</td><td>DC Voltage supplied from External Power Supply.</td></tr>
<tr><td>Power Rating</td><td>1. EUT: I/P: DC 12V 2A
2. SWITCHING ADAPTER:
I/P: AC 100-240V 1.0A MAX 50-60Hz / O/P: DC +12V 2.0A 24W MAX.</td></tr>
<tr><td>Connecting I/O Port(s)</td><td>Please refer to the User's Manual</td></tr>
<tr><td>Products Covered</td><td>1 * SWITCHING ADAPTER: Sunny / SYS1319-2412-T3
1 * 10.1” LCD Panel: AU / B101EW05
1 * Wi-Fi & Bluetooth Module: SDC-SSD40NBT
1 * RFID Module</td></tr>
<tr><td>EUT Modification(s)</td><td>N/A</td></tr>
</table>

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)	Channel	Frequency (MHz)
00	2402	27	2429	54	2456
01	2403	28	2430	55	2457
02	2404	29	2431	56	2458
03	2405	30	2432	57	2459
04	2406	31	2433	58	2460
05	2407	32	2434	59	2461
06	2408	33	2435	60	2462
07	2409	34	2436	61	2463
08	2410	35	2437	62	2464
09	2411	36	2438	63	2465
10	2412	37	2439	64	2466
11	2413	38	2440	65	2467
12	2414	39	2441	66	2468
13	2415	40	2442	67	2469
14	2416	41	2443	68	2470
15	2417	42	2444	69	2471
16	2418	43	2445	70	2472
17	2419	44	2446	71	2473
18	2420	45	2447	72	2474
19	2421	46	2448	73	2475
20	2422	47	2449	74	2476
21	2423	48	2450	75	2477
22	2424	49	2451	76	2478
23	2425	50	2452	77	2479
24	2426	51	2453	78	2480
25	2427	52	2454		
26	2428	53	2455		

3. Table for Filed Antenna

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)
1	Ethertronics Inc.	5000987	PIFA	I-PEX	2.50

3.2 DESCRIPTION OF TEST MODES

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Test Items	Mode	Data Rate	Tested Channel/Mode
Conducted Emission	GFSK	1 Mbps	2441 MHz
Antenna conducted Spurious Emission	GFSK	1 Mbps	2402 MHz, 2441 MHz, 2480 MHz
	8DPSK	3 Mbps	
Hopping Channel Separation	GFSK	1 Mbps	2402 MHz, 2441 MHz, 2480 MHz
	8DPSK	3 Mbps	
Maximum Peak Conducted Output Power	GFSK	1 Mbps	2402 MHz, 2441 MHz, 2480 MHz
	8DPSK	3 Mbps	
Radiated Spurious Emission (30 MHz to 1 GHz)	GFSK	1 Mbps	2441 MHz
Radiated Spurious Emission (above 1 GHz)	GFSK	1 Mbps	2402 MHz, 2441 MHz, 2480 MHz
	8DPSK	3 Mbps	
Number of Hopping Frequency	GFSK	1 Mbps	2402 MHz, 2441 MHz, 2480 MHz
	8DPSK	3 Mbps	
Average time of occupancy	GFSK	1 Mbps	2402 MHz, 2441 MHz, 2480 MHz
	8DPSK	3 Mbps	
Restricted Bands	GFSK	1 Mbps	2402 MHz, 2441 MHz, 2480 MHz
	8DPSK	3 Mbps	
Antenna Requirement	GFSK	---	---
RF Exposure Compliance	GFSK	---	---

NOTE: The measurements are performed at the highest, middle, lowest available channels.

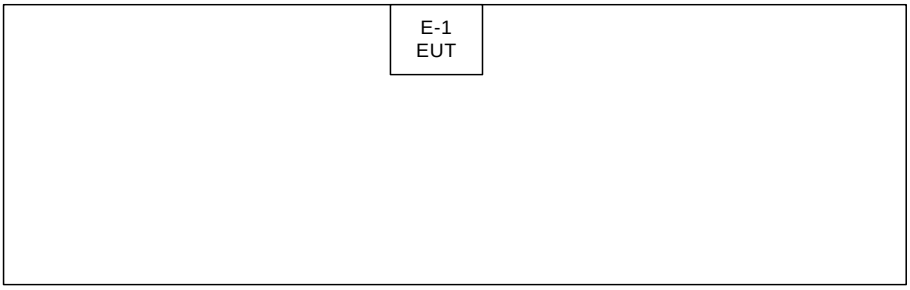
3.3 TABLE OF PARAMETERS OF TEXT SOFTWARE SETTING

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.

Data Rate	1 Mbps		
Test software Version	Bluetooth test		
Frequency	2402 MHz	2441 MHz	2480 MHz
Parameter	def.	def.	def.

Data Rate	3 Mbps		
Test software Version	Bluetooth test		
Frequency	2402 MHz	2441 MHz	2480 MHz
Parameter	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	Series No.	Note
E-1	Multi-functional Master Controller	unitech	MT880	HLEMT880BTNF	N/A	EUT

Item	Shielded Type	Ferrite Core	Length	Note
N/A	-	-	-	-

NOTE: The support equipment was authorized by Declaration of Conformity (DOC).

4 CONDUCTED EMISSION

4.1 LIMIT

FREQUENCY (MHz)	Class A (dBuV)		Class B (dBuV)	
	Quasi-peak	Average	Quasi-peak	Average
0.15 - 0.5	79.00	66.00	66 - 56 *	56 - 46 *
0.50 - 5.0	73.00	60.00	56.00	46.00
5.0 - 30.0	73.00	60.00	60.00	50.00

NOTE:

1. The tighter limit applies at the band edges.
2. The limit of " * " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.
3. 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

4.2 MEASUREMENT INSTRUMENTS LIST

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	LISN	Schwarzbeck	NSLK 8127	8127685	Feb. 24, 2014
2	Test Cable	TIMES	CFD300-NL	C01	Jun. 16, 2014
3	EMI Test Receiver	Agilent	N9038A	MY51210215	Mar. 21, 2014
4	Measurement Software	EZ	EZ_EMC (Version NB-02A)	N/A	N/A

NOTE: **N/A**: denotes No Model Name, No Serial No. or No Calibration specified.

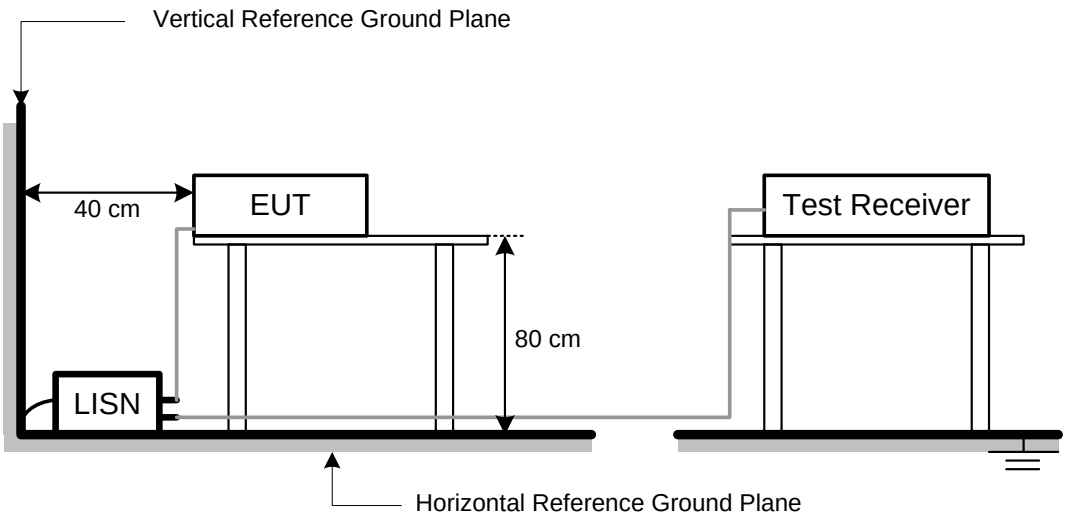
4.3 TEST PROCEDURES

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.

NOTE:

a. Reading in which marked as Peak, QP or AVG means measurements by using are Quasi-Peak or Average Mode with Detector BW=9 kHz (6 dB Bandwidth).
b. All readings are Peak Mode value unless otherwise stated QP or AVG in column of Note. If the Peak or 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 Peak or QP Mode was measured, but AVG Mode didn‘t perform.

4.4 TEST SETUP LAYOUT



4.5 DEVIATION FROM TEST STANDARD

No deviation

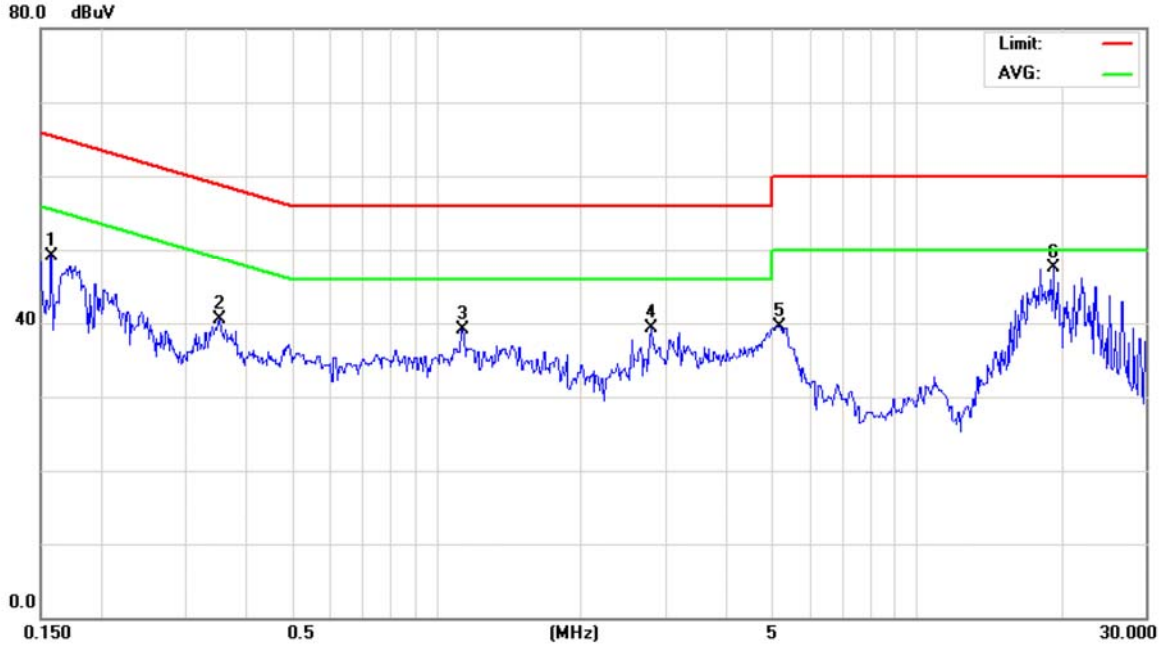
4.6 EUT OPERATING CONDITIONS

The EUT used during radiated and/or conducted emission measurement was designed to exercise in a manner similar to a typical use.

4.7 TEST RESULTS

E.U.T	Multi-functional Master Controller	Model Name	MT880
Temperature	24°C	Relative Humidity	48%
Test Voltage	AC 120V/60Hz		
Test Mode	Bluetooth/1 Mbps/2441 MHz		

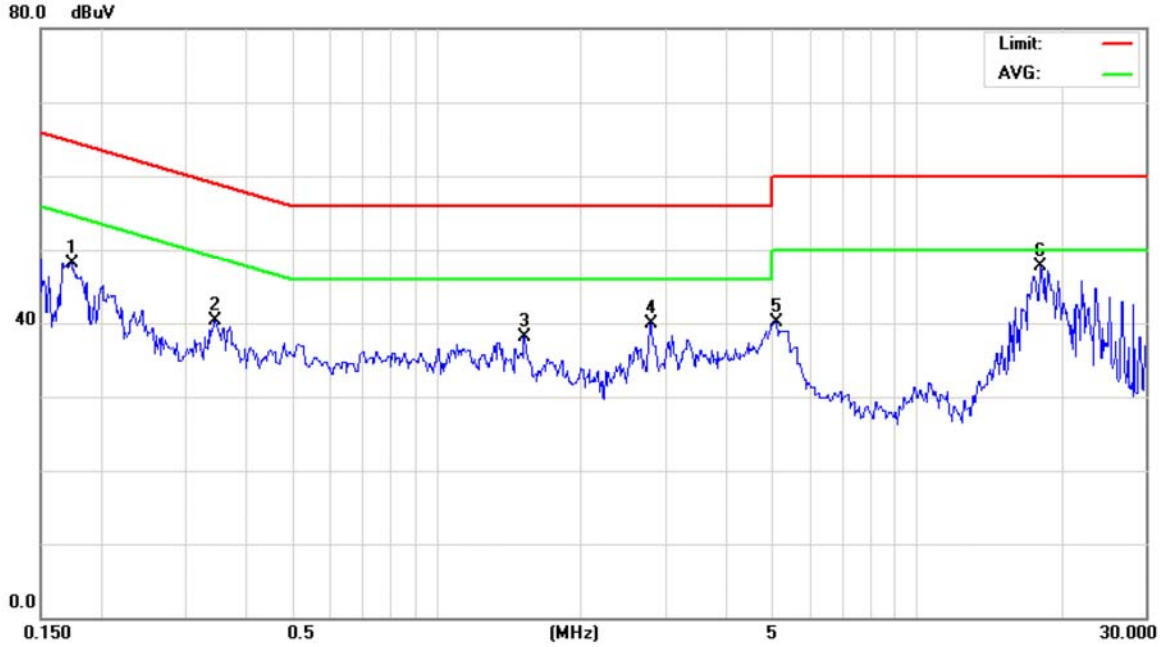
Phase: Line



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1577	40.10	8.96	49.06	65.58	-16.52	peak	
2		0.3530	32.78	7.80	40.58	58.89	-18.31	peak	
3		1.1300	29.44	9.64	39.08	56.00	-16.92	peak	
4		2.7950	29.97	9.38	39.35	56.00	-16.65	peak	
5		5.1500	30.04	9.51	39.55	60.00	-20.45	peak	
6	*	19.2000	37.90	9.55	47.45	60.00	-12.55	peak	

E.U.T	Multi-functional Master Controller	Model Name	MT880
Temperature	24°C	Relative Humidity	48%
Test Voltage	AC 120V/60Hz		
Test Mode	Bluetooth/1 Mbps/2441 MHz		

Phase: Neutral



NTo.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1737	38.64	9.54	48.18	64.78	-16.60	peak	
2		0.3453	32.45	7.80	40.25	59.07	-18.82	peak	
3		1.5260	28.51	9.50	38.01	56.00	-17.99	peak	
4		2.7860	30.45	9.38	39.83	56.00	-16.17	peak	
5		5.1000	30.54	9.51	40.05	60.00	-19.95	peak	
6	*	18.0500	38.07	9.55	47.62	60.00	-12.38	peak	

5 ANTENNA CONDUCTED SPURIOUS EMISSION

5.1 LIMIT

Test Item	Frequency Range (MHz)	Limit
Antenna conducted Spurious Emission	30-25000	20 dB less than the peak value of fundamental frequency

5.2 MEASUREMENT INSTRUMENTS LIST

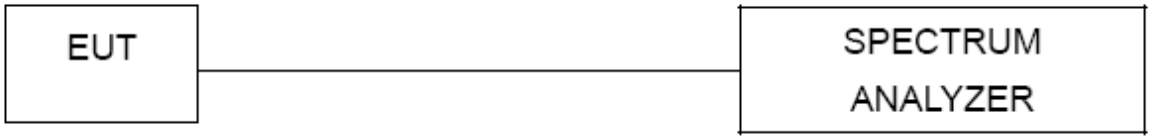
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP-30	100854	Sep. 08, 2014

NOTE: **N/A**: denotes No Model Name, No Serial No. or No Calibration specified.

5.3 TEST PROCEDURES

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=100KHz, Sweep time = Auto.

5.4 TEST SETUP LAYOUT



5.5 DEVIATION FROM TEST STANDARD

No deviation

5.6 EUT OPERATING CONDITIONS

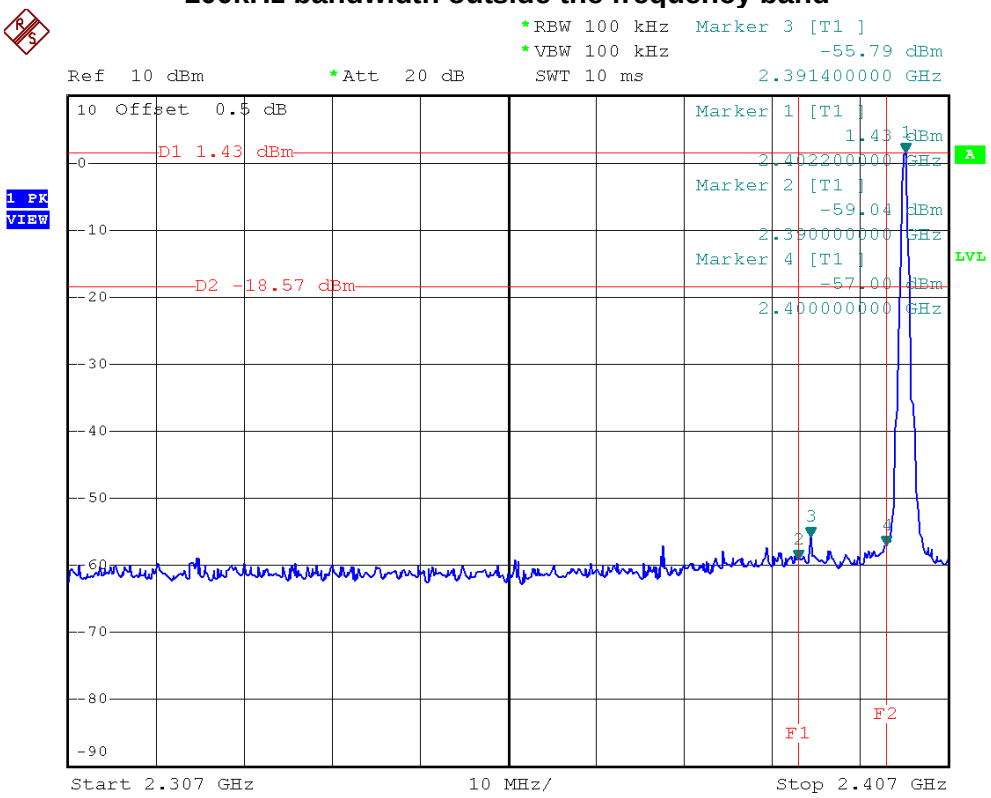
The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.

5.7 TEST RESULTS

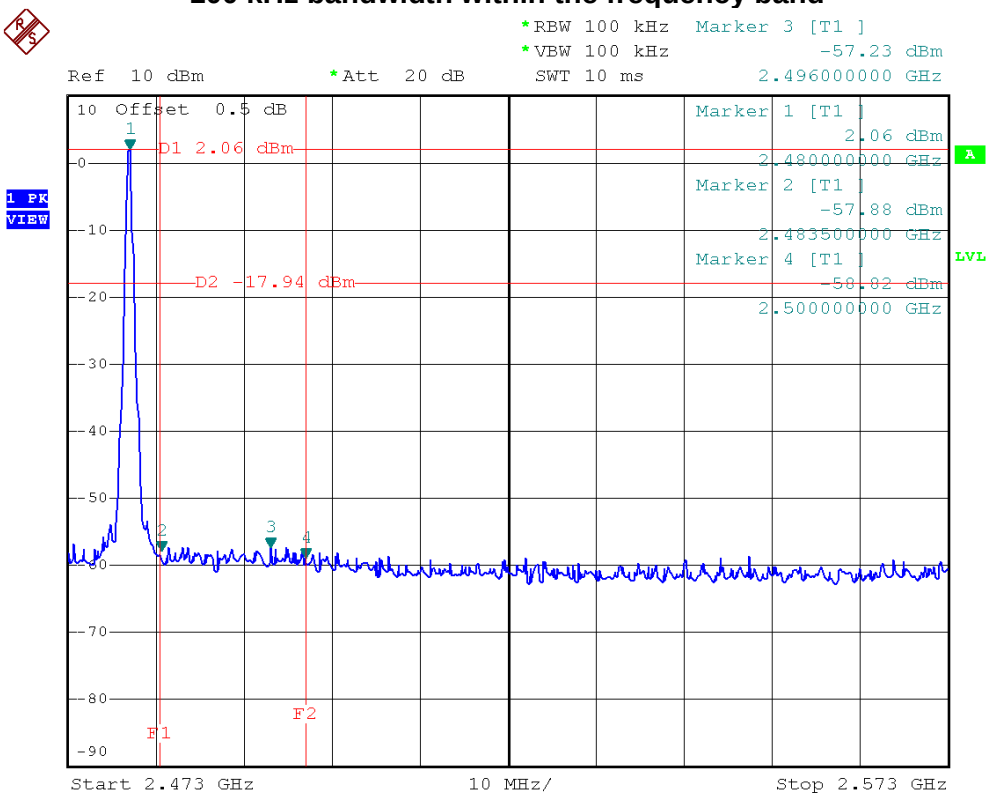
E.U.T	Multi-functional Master Controller	Model Name	MT880
Temperature	26°C	Relative Humidity	46%
Test Voltage	AC 120V/60Hz		
Test Mode	Bluetooth/1 Mbps		

Channel of Worst Data			
The max. radio frequency power in any 100kHz bandwidth outside the frequency band		The max. radio frequency power in any 100 kHz bandwidth within the frequency band.	
FREQUENCY(MHz)	POWER(dBm)	FREQUENCY(MHz)	POWER(dBm)
2391.4	-55.79	2496.0	-57.23
Result			
In any 100kHz bandwidth outside the frequency band, the radio frequency power is at least 20dB below that in the 100kHz bandwidth within the band that contains the highest lever of the desired power.			

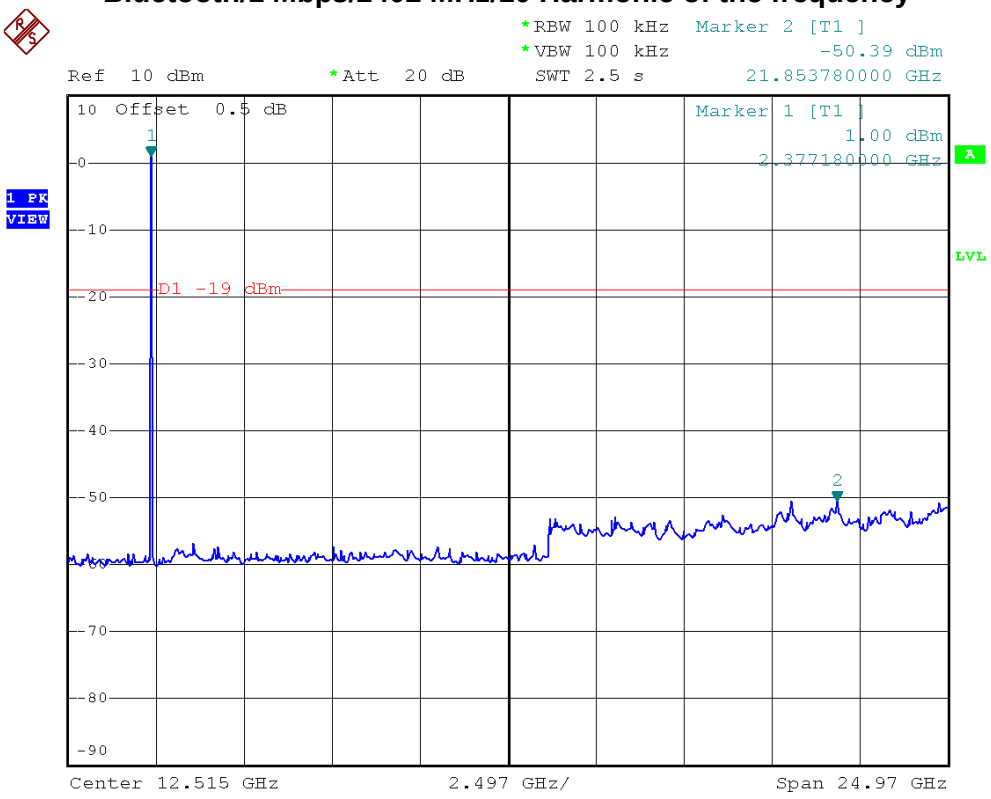
Bluetooth/1 Mbps/The max. radio frequency power in any 100kHz bandwidth outside the frequency band



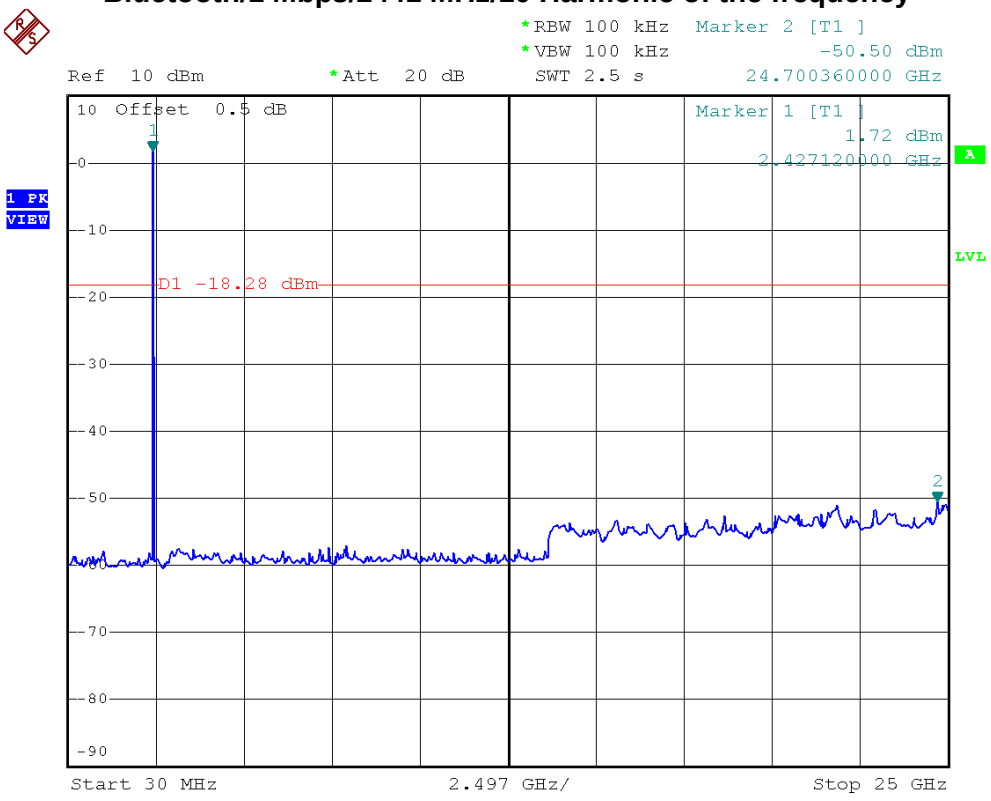
Bluetooth/1 Mbps/The max. radio frequency power in any 100 kHz bandwidth within the frequency band



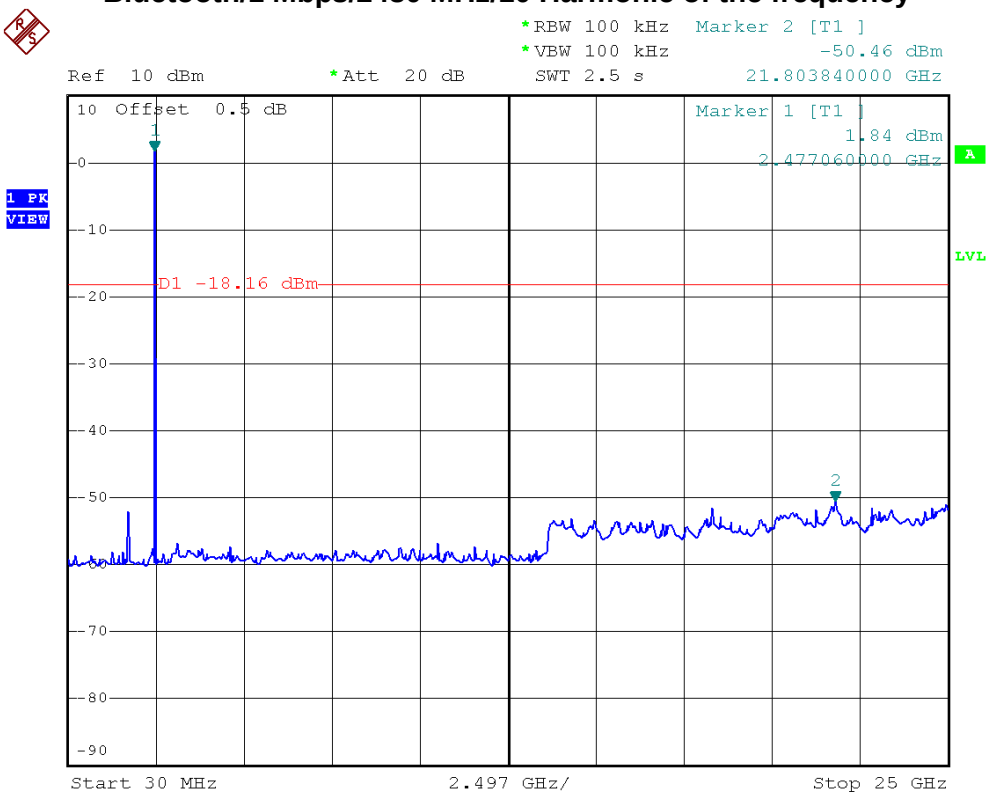
Bluetooth/1 Mbps/2402 MHz/10 Harmonic of the frequency



Bluetooth/1 Mbps/2441 MHz/10 Harmonic of the frequency



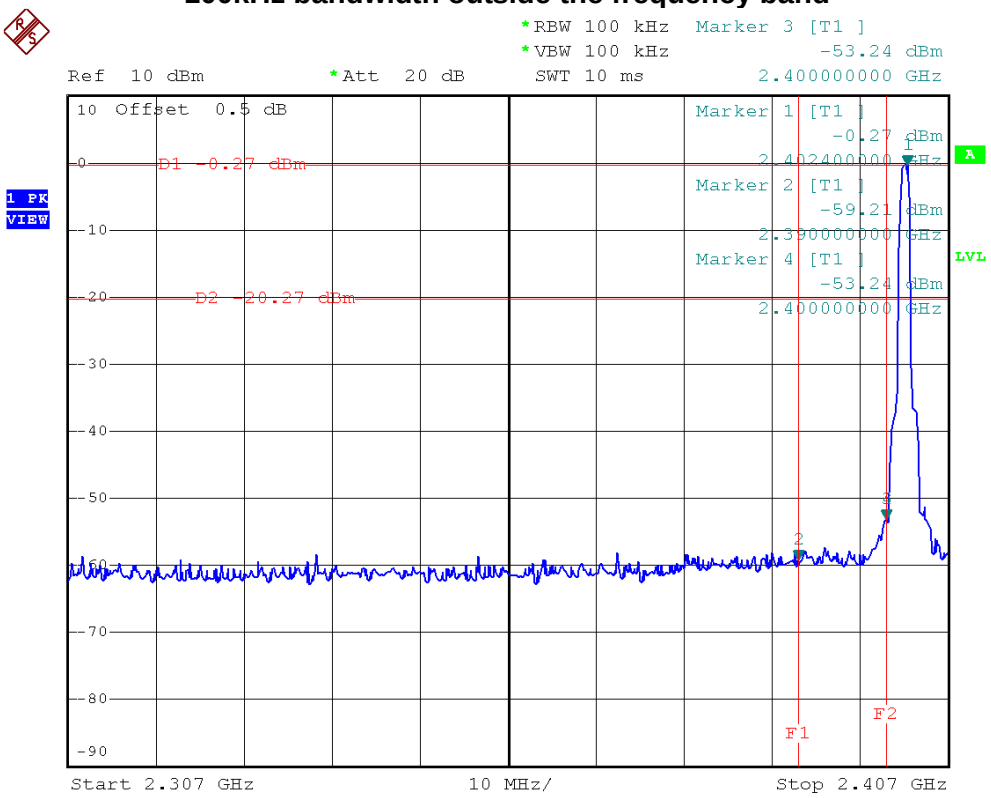
Bluetooth/1 Mbps/2480 MHz/10 Harmonic of the frequency



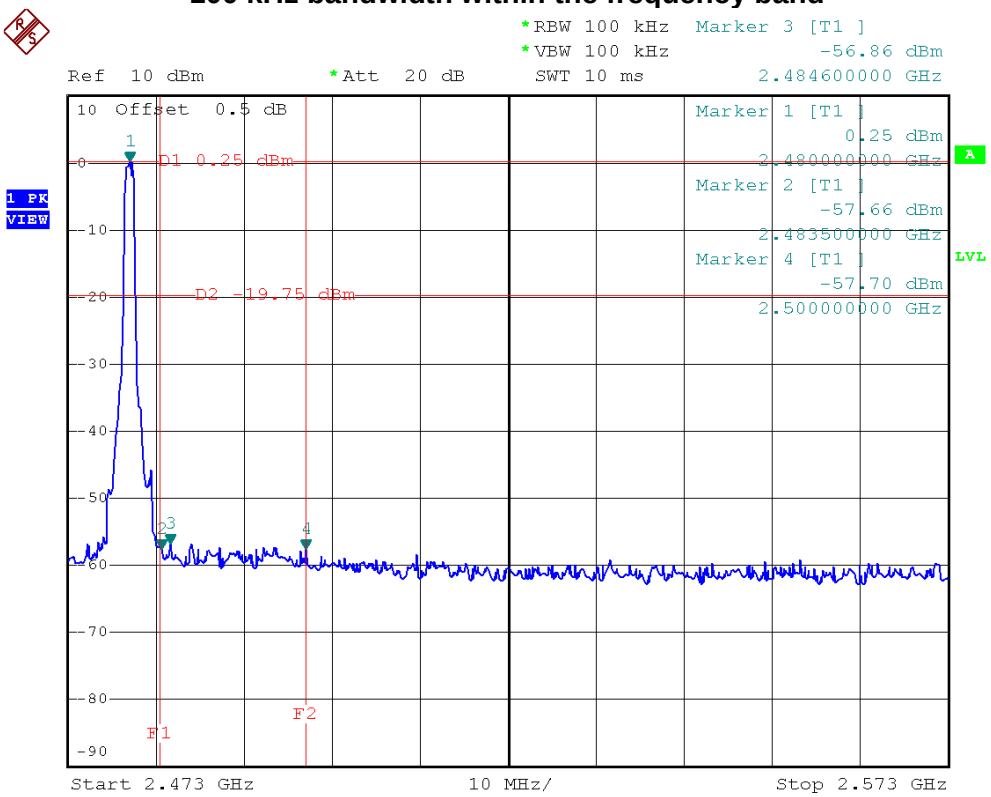
E.U.T	Multi-functional Master Controller	Model Name	MT880
Temperature	26°C	Relative Humidity	46%
Test Voltage	AC 120V/60Hz		
Test Mode	Bluetooth/3 Mbps		

Channel of Worst Data			
The max. radio frequency power in any 100kHz bandwidth outside the frequency band		The max. radio frequency power in any 100 kHz bandwidth within the frequency band.	
FREQUENCY(MHz)	POWER(dBm)	FREQUENCY(MHz)	POWER(dBm)
2400.0	-53.24	2484.6	-56.86
Result			
In any 100kHz bandwidth outside the frequency band, the radio frequency power is at least 20dB below that in the 100kHz bandwidth within the band that contains the highest lever of the desired power.			

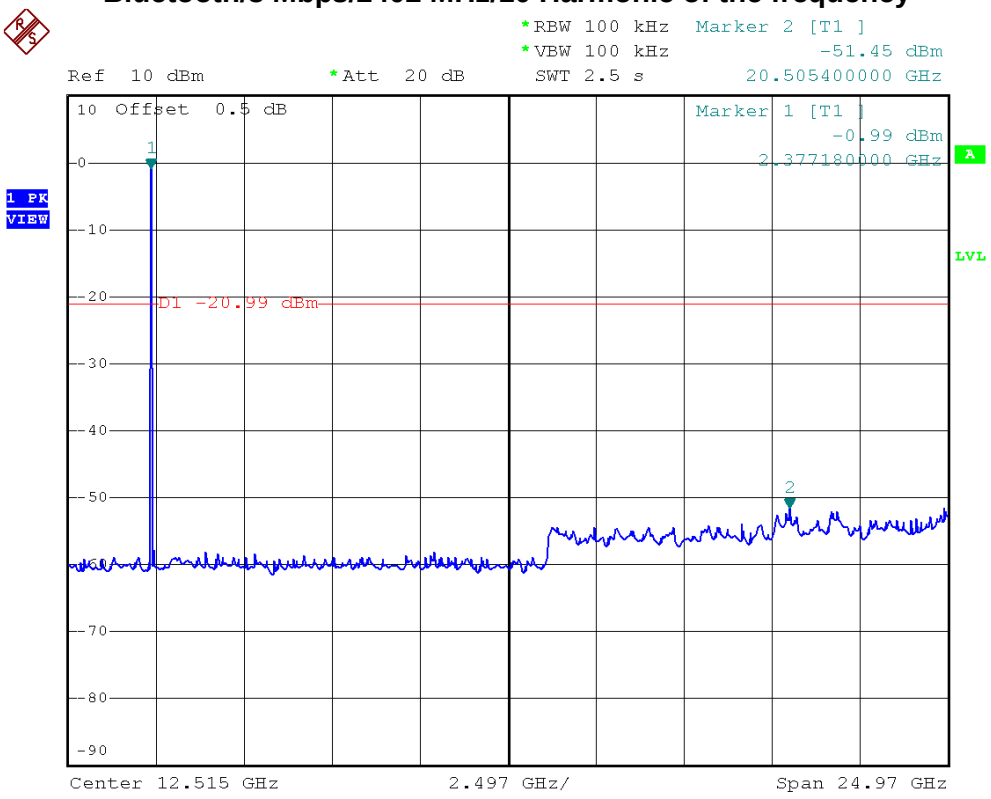
Bluetooth/3 Mbps/The max. radio frequency power in any 100kHz bandwidth outside the frequency band



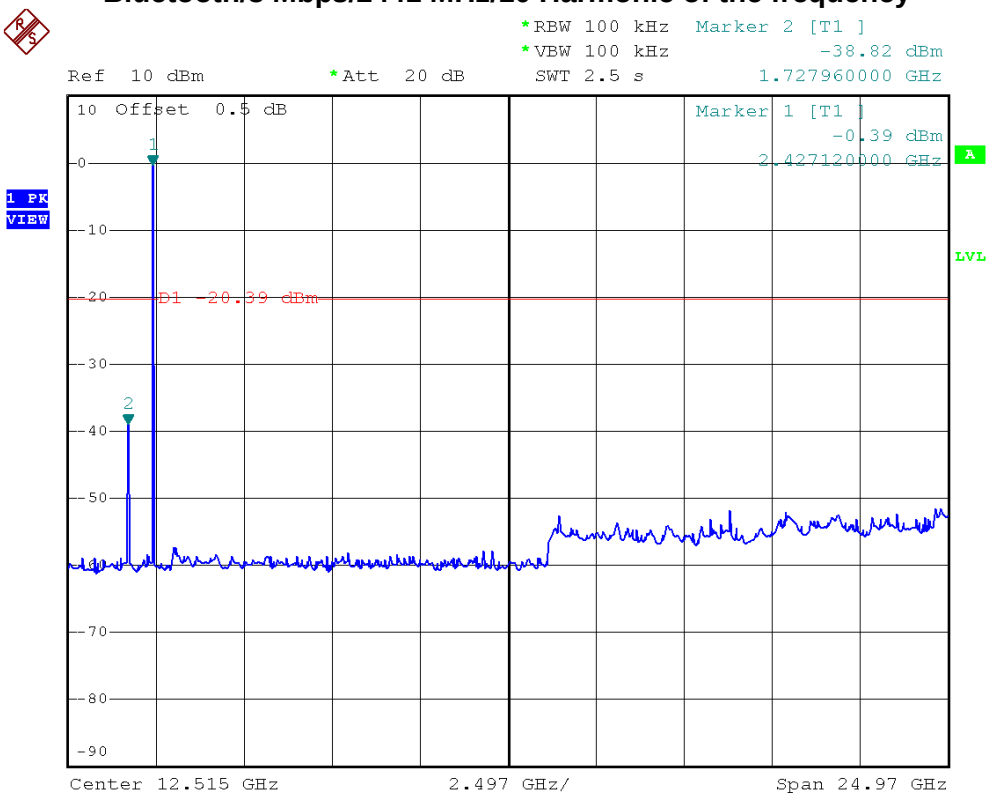
Bluetooth/3 Mbps/The max. radio frequency power in any 100 kHz bandwidth within the frequency band



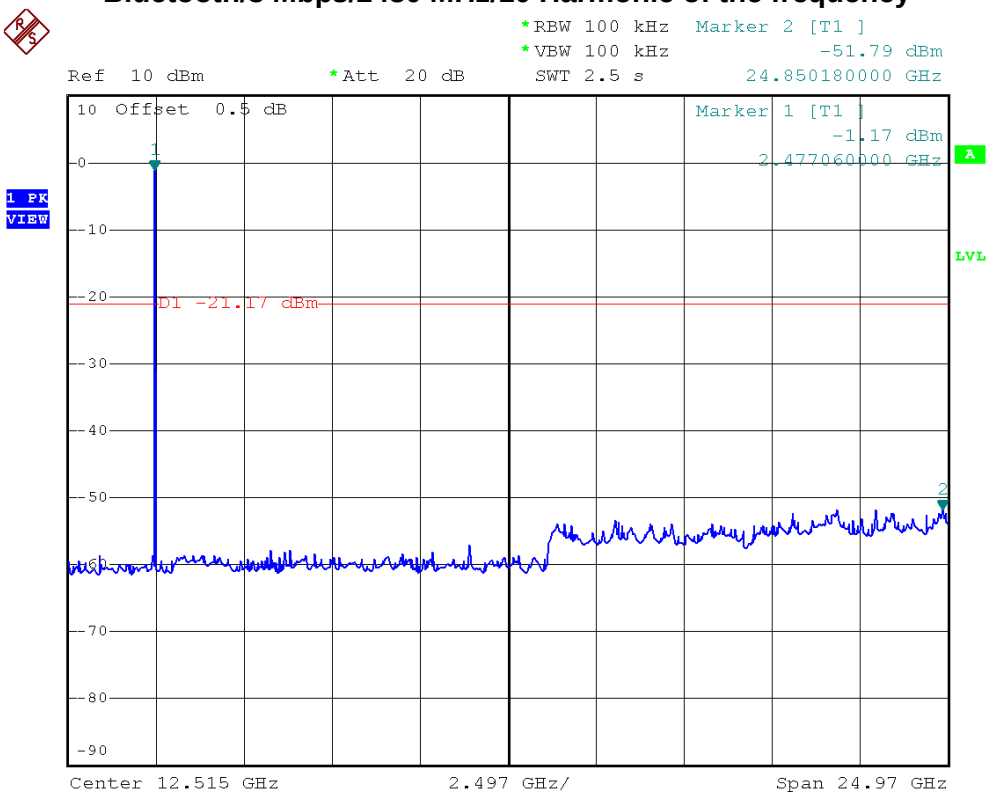
Bluetooth/3 Mbps/2402 MHz/10 Harmonic of the frequency



Bluetooth/3 Mbps/2441 MHz/10 Harmonic of the frequency



Bluetooth/3 Mbps/2480 MHz/10 Harmonic of the frequency



6 HOPPING CHANNEL SEPARATION

6.1 LIMIT

Frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater.

6.2 MEASUREMENT INSTRUMENTS LIST

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP-30	100854	Sep. 08, 2014

NOTE: **N/A**: denotes No Model Name, No Serial No. or No Calibration specified.

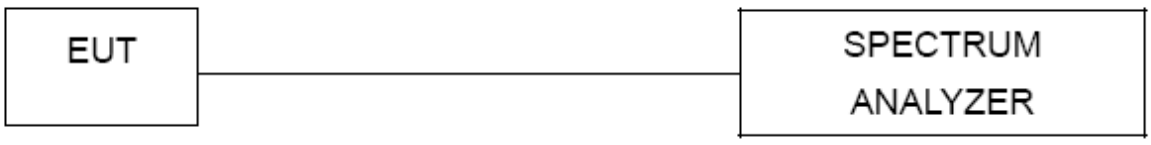
6.3 MEASURING INSTRUMENTS SETTING

EMI Test Receiver	Parameter Setting
Attenuation	Auto
Span Frequency	> Measurement Bandwidth or Channel Separation
RB	30 kHz (20dB Bandwidth) / 100 kHz (Channel Separation)
VB	100 kHz (20dB Bandwidth) / 300 kHz (Channel Separation)
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

6.4 TEST PROCEDURES

a. The transmitter output (antenna port) was connected to the spectrum analyser in peak hold mode.
b. The resolution bandwidth of 30 kHz and the video bandwidth of 100 kHz were utilised for 20 dB bandwidth measurement.
c. The resolution bandwidth of 100 kHz and the video bandwidth of 300 kHz were utilised for channel separation measurement.

6.5 TEST SETUP LAYOUT



6.6 DEVIATION FROM TEST STANDARD

No deviation

6.7 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 5.6 Unless otherwise a special operating condition is specified in the follows during the testing.

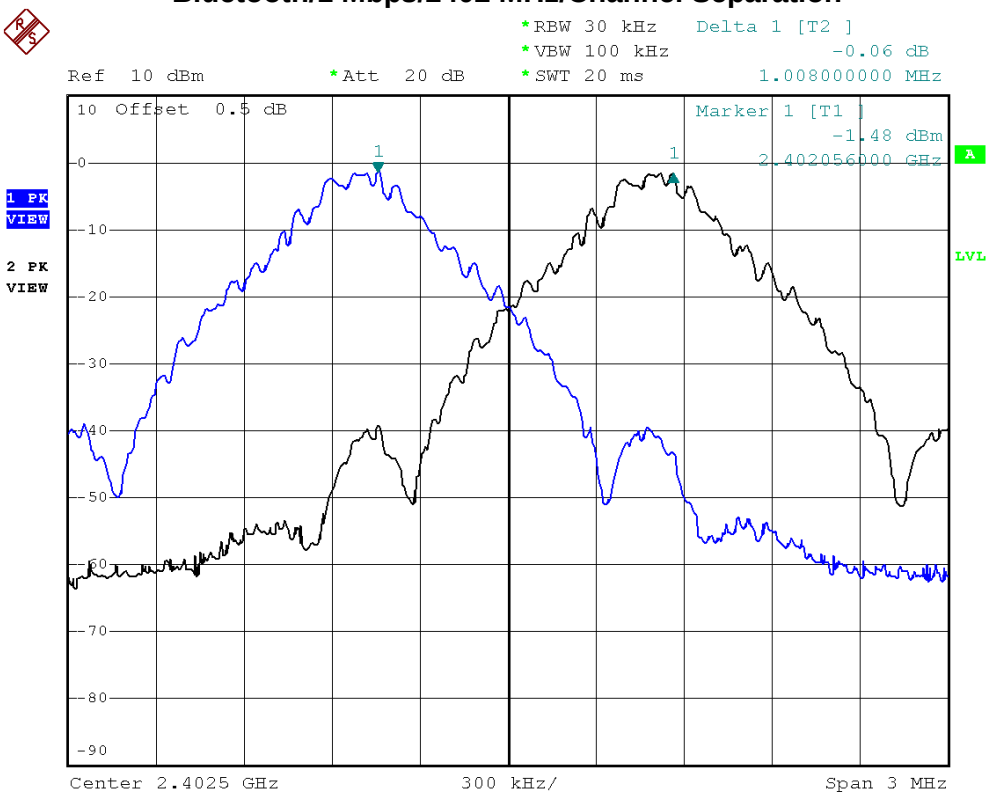
6.8 TEST RESULTS

E.U.T	Multi-functional Master Controller	Model Name	MT880
Temperature	26°C	Relative Humidity	46%
Test Voltage	AC 120V/60Hz		
Test Mode	Bluetooth/1 Mbps/2402 MHz, 2441 MHz, 2480 MHz		

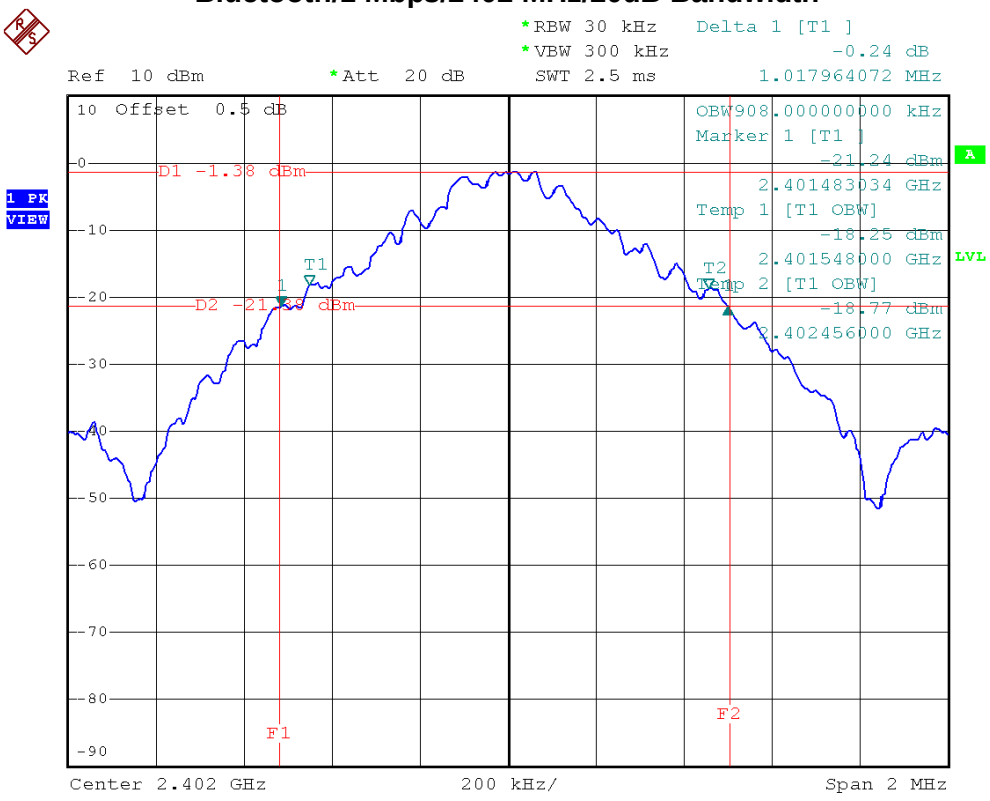
Frequency	Channel Separation (MHz)	20 dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Two-thirds of the 20 dB Bandwidth	Result
2402 MHz	1.01	1.018	0.908	0.68	PASS
2441 MHz	1.00	0.996	0.908	0.66	PASS
2480 MHz	1.00	0.974	0.908	0.65	PASS

NOTE: Ch. Separation Limits: >25 KHz or >2/3 of 20dB bandwidth

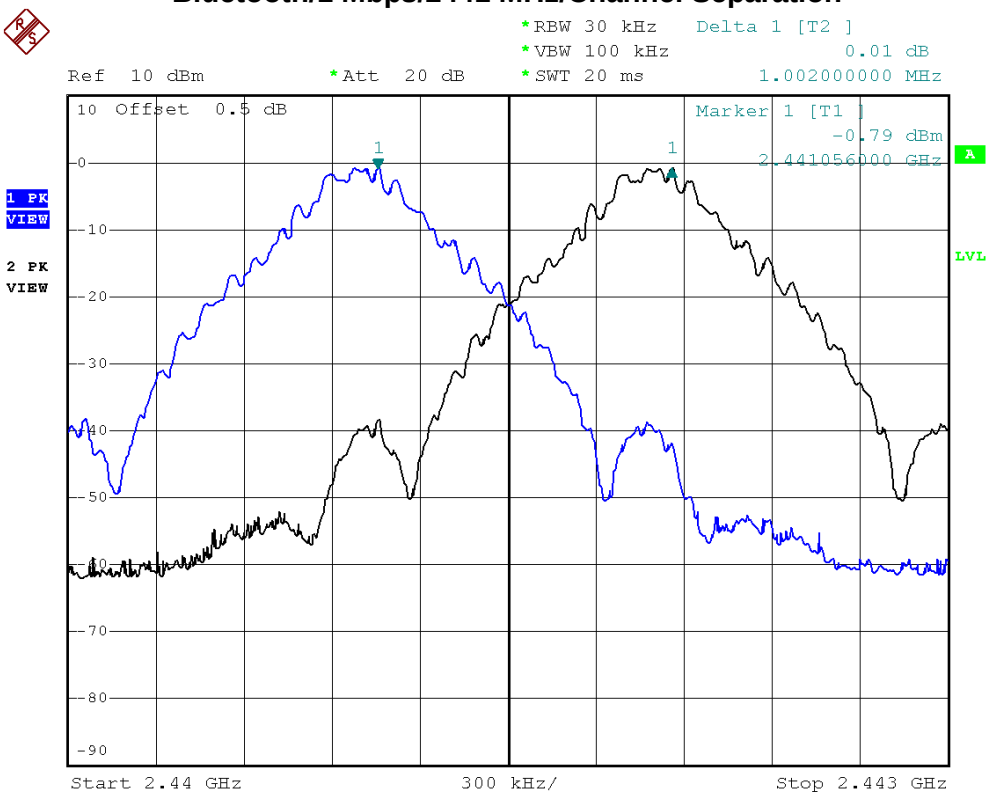
Bluetooth/1 Mbps/2402 MHz/Channel Separation



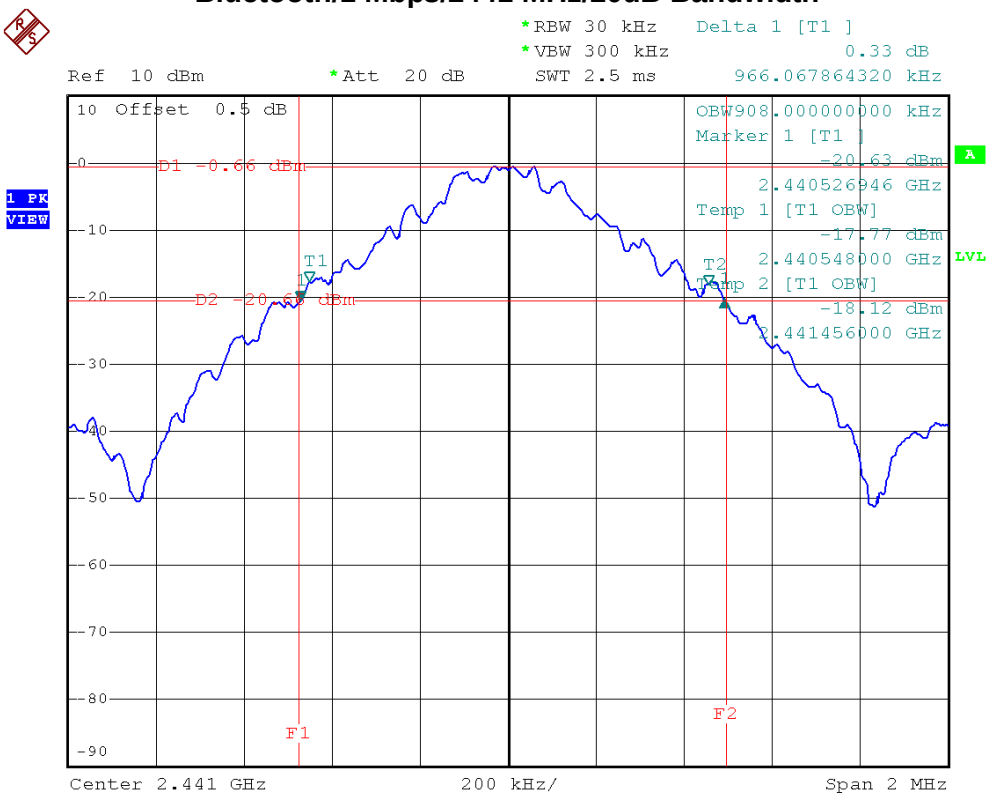
Bluetooth/1 Mbps/2402 MHz/20dB Bandwidth



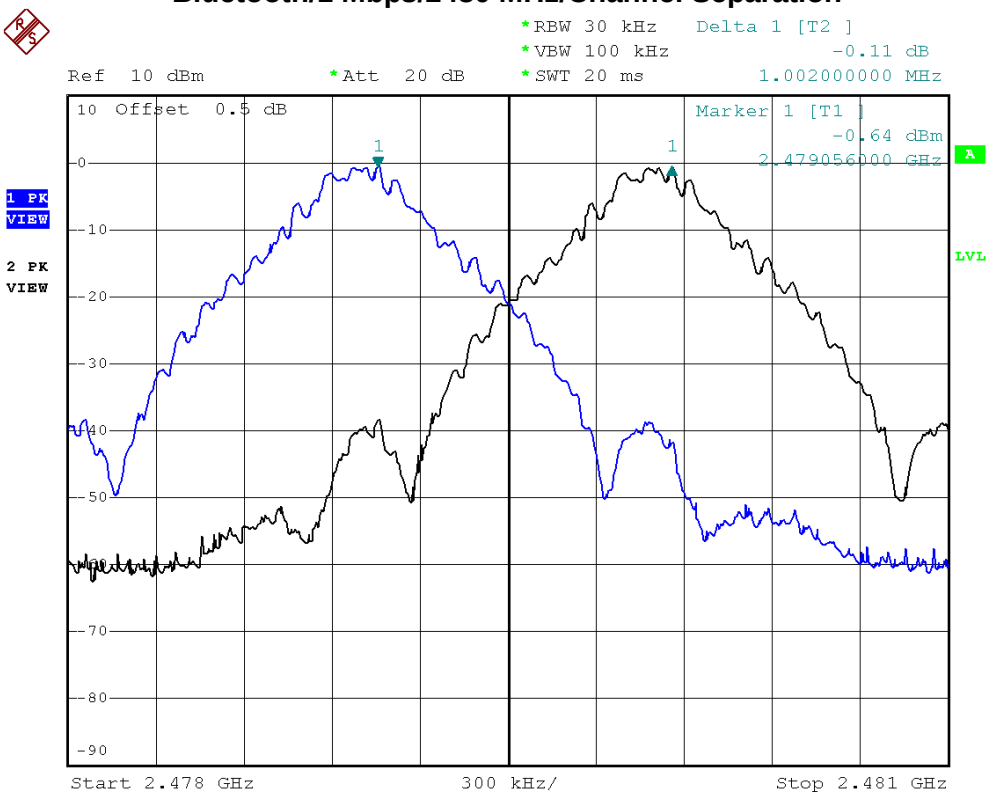
Bluetooth/1 Mbps/2441 MHz/Channel Separation



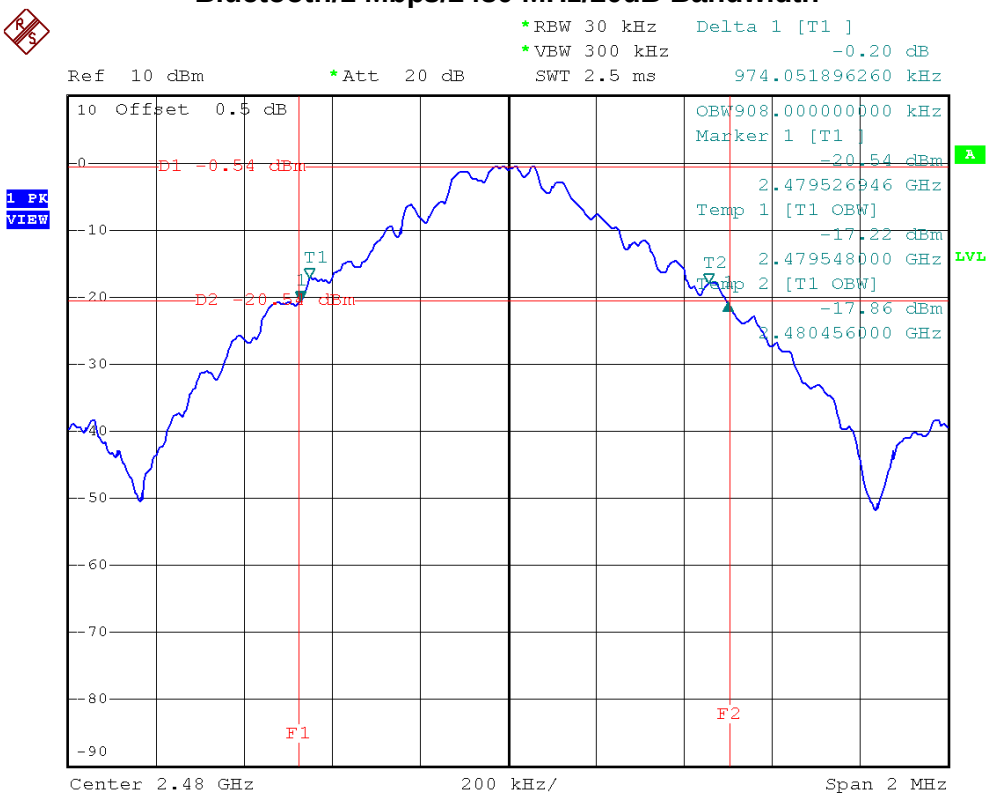
Bluetooth/1 Mbps/2441 MHz/20dB Bandwidth



Bluetooth/1 Mbps/2480 MHz/Channel Separation



Bluetooth/1 Mbps/2480 MHz/20dB Bandwidth

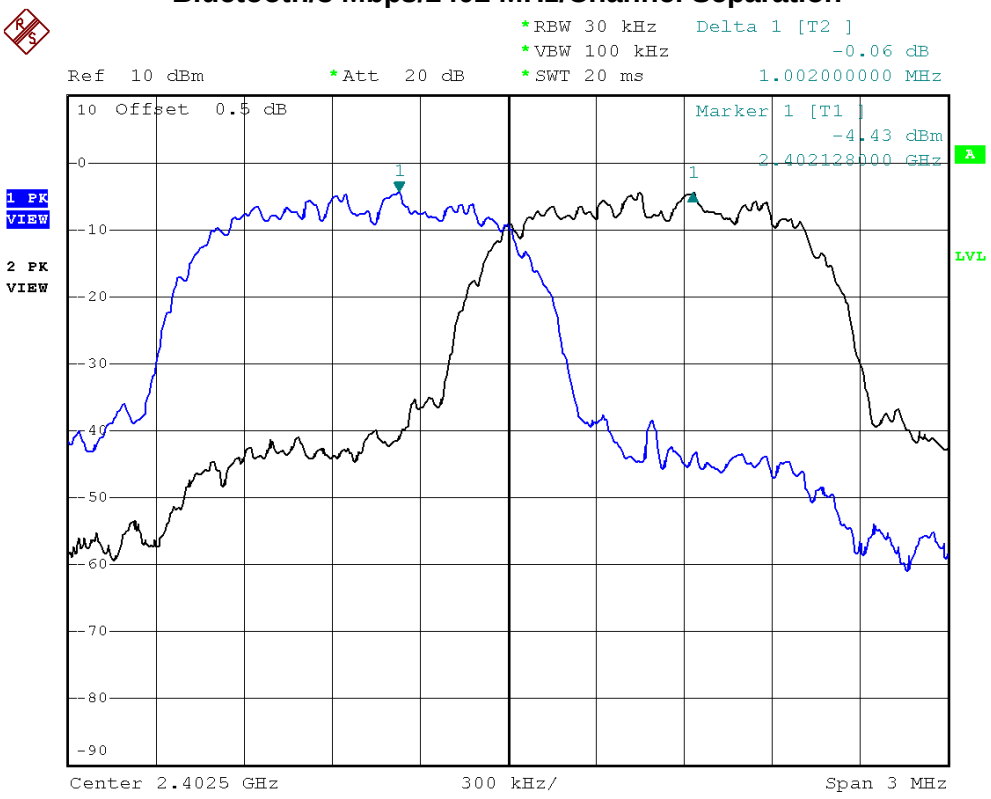


E.U.T	Multi-functional Master Controller	Model Name	MT880
Temperature	26°C	Relative Humidity	46%
Test Voltage	AC 120V/60Hz		
Test Mode	Bluetooth/3 Mbps/2402 MHz, 2441 MHz, 2480 MHz		

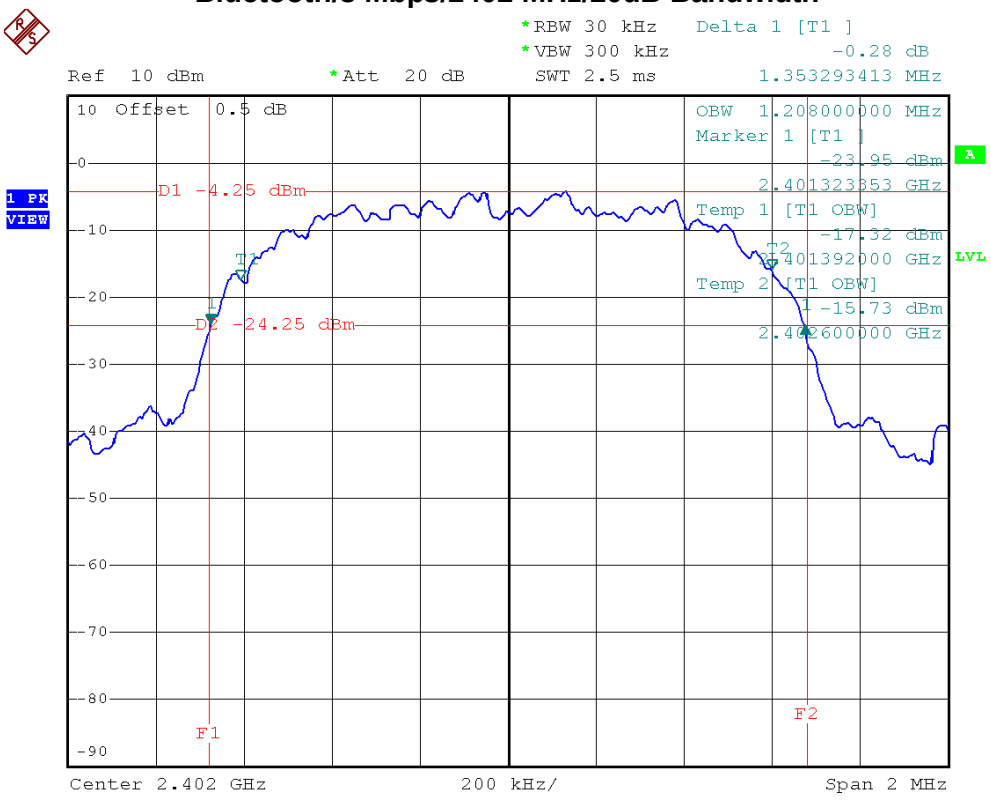
Frequency	Channel Separation (MHz)	20 dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Two-thirds of the 20 dB Bandwidth	Result
2402 MHz	1.00	1.353	1.208	0.90	PASS
2441 MHz	1.00	1.353	1.204	0.90	PASS
2480 MHz	1.00	1.344	1.204	0.90	PASS

NOTE: Ch. Separation Limits: >25 KHz or >2/3 of 20dB bandwidth

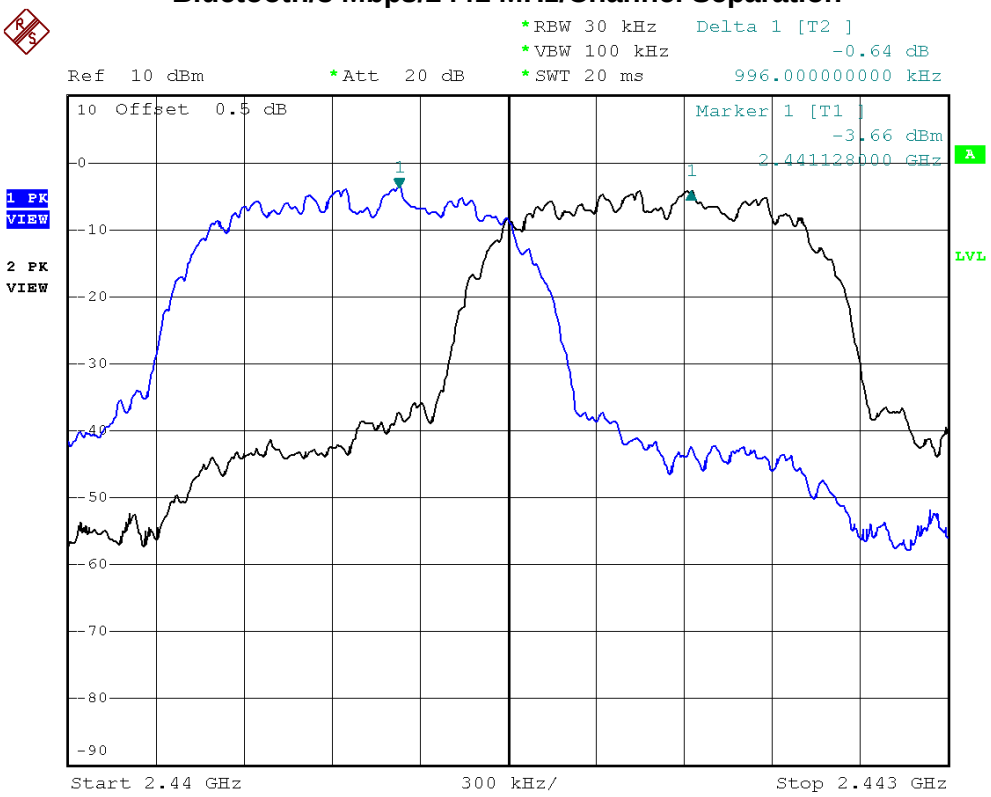
Bluetooth/3 Mbps/2402 MHz/Channel Separation



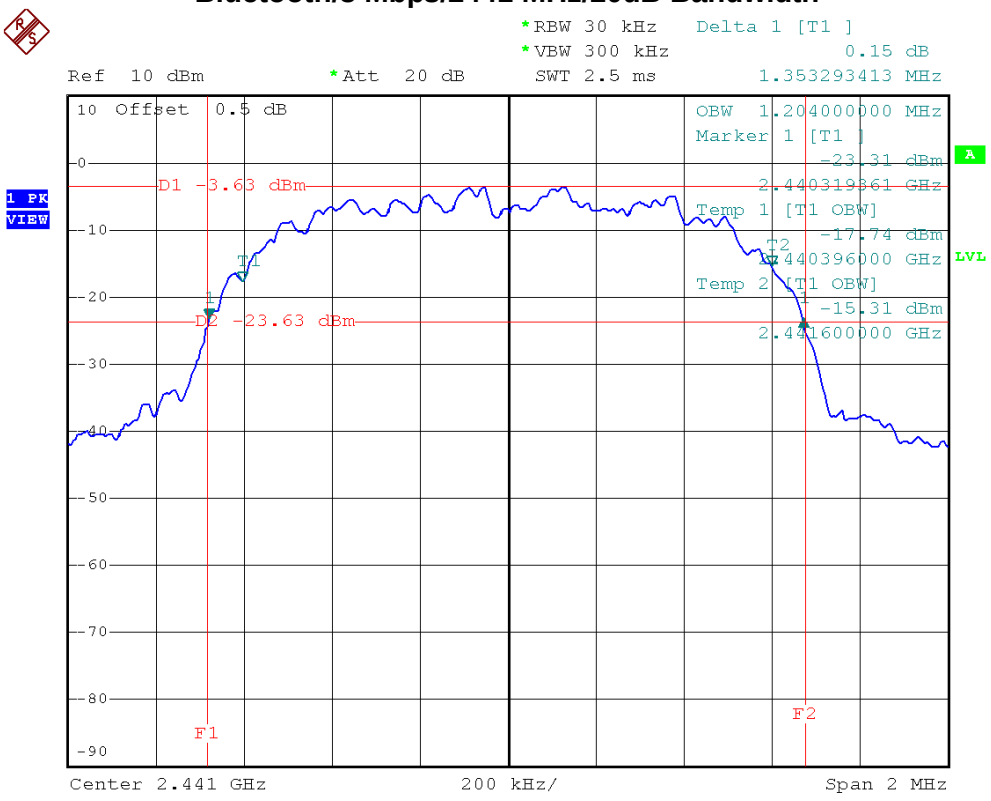
Bluetooth/3 Mbps/2402 MHz/20dB Bandwidth



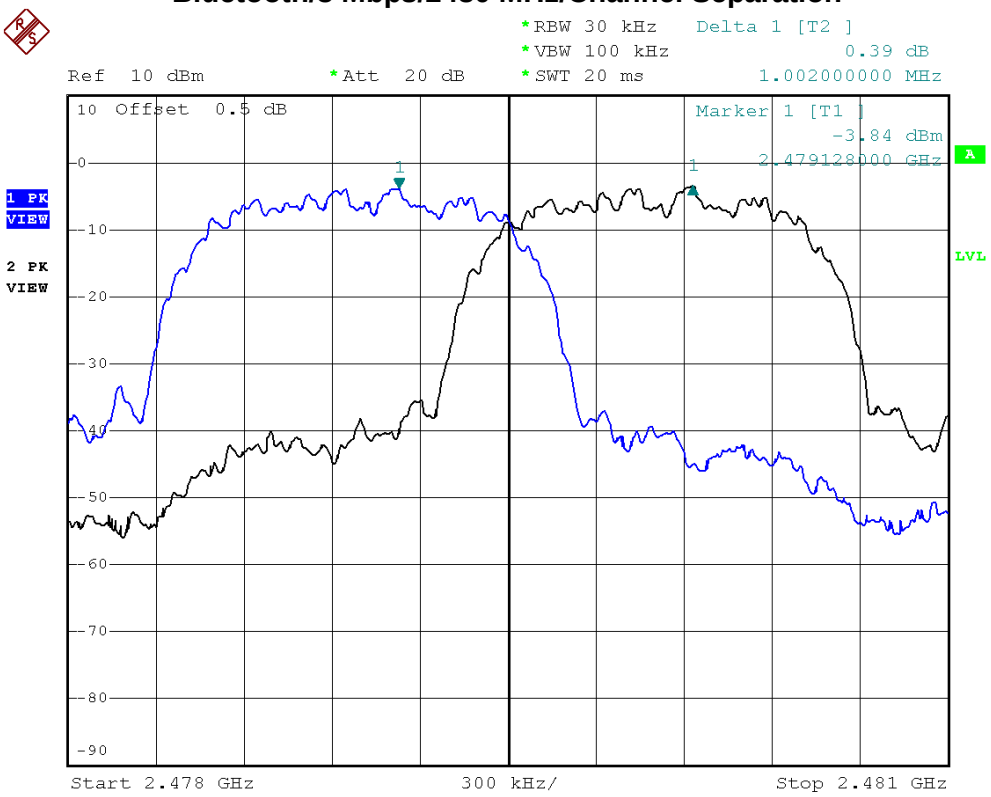
Bluetooth/3 Mbps/2441 MHz/Channel Separation



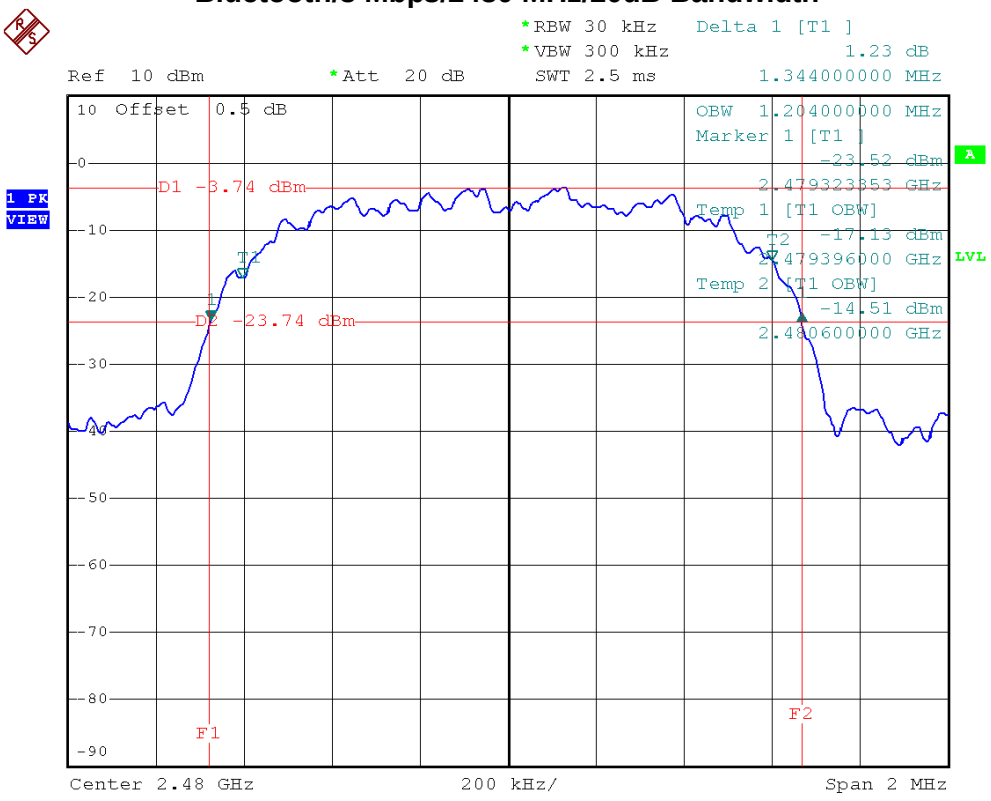
Bluetooth/3 Mbps/2441 MHz/20dB Bandwidth



Bluetooth/3 Mbps/2480 MHz/Channel Separation



Bluetooth/3 Mbps/2480 MHz/20dB Bandwidth



7 MAXIMUM PEAK CONDUCTED OUTPUT POWER

7.1 LIMIT

Test Item	Frequency Range (MHz)	Limit
Maximum Peak Conducted Output Power	2400-2483.5	1 watt or 30 dBm

7.2 MEASUREMENT INSTRUMENTS LIST

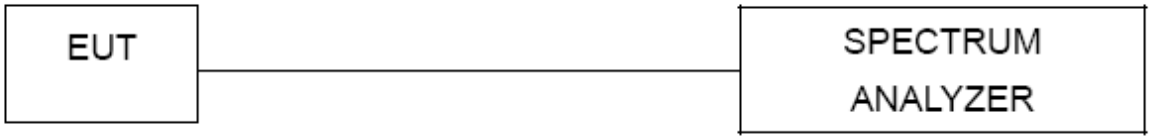
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP-30	100854	Sep. 08, 2014

NOTE: **N/A**: denotes No Model Name, No Serial No. or No Calibration specified.

7.3 TEST PROCEDURES

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= 3 MHz, VBW= 3 MHz, Sweep time = Auto.

7.4 TEST SETUP LAYOUT



7.5 DEVIATION FROM TEST STANDARD

No deviation

7.6 EUT OPERATING CONDITIONS

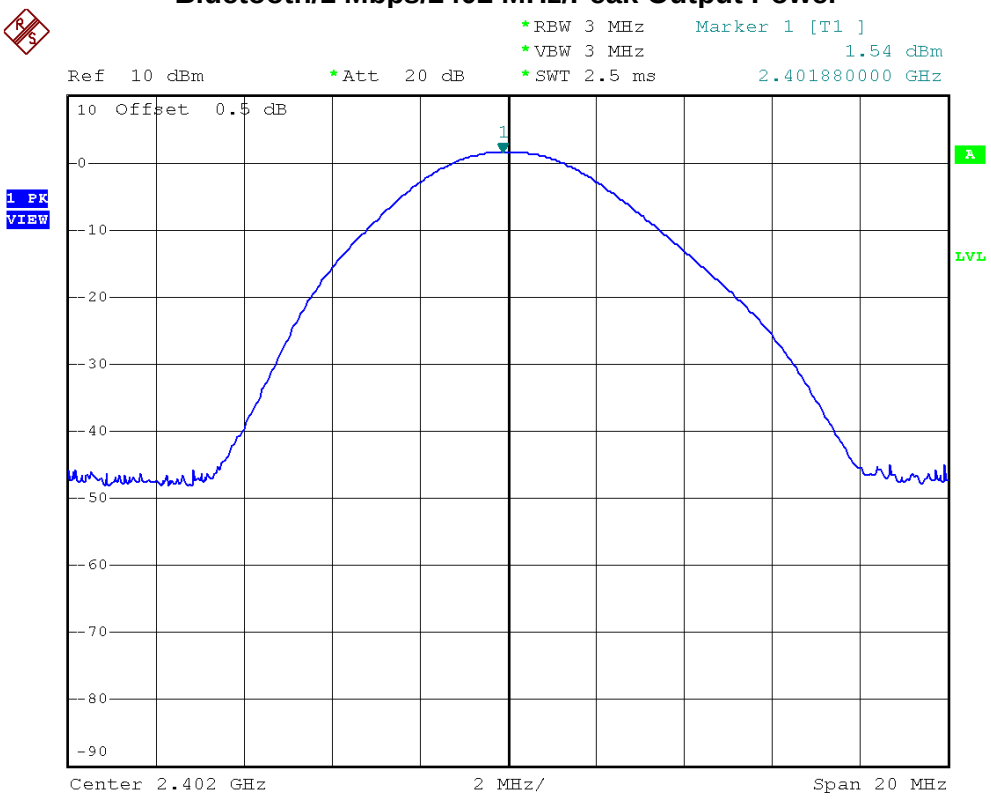
The EUT tested system was configured as the statements of 5.6 Unless otherwise a special operating condition is specified in the follows during the testing.

7.7 TEST RESULTS

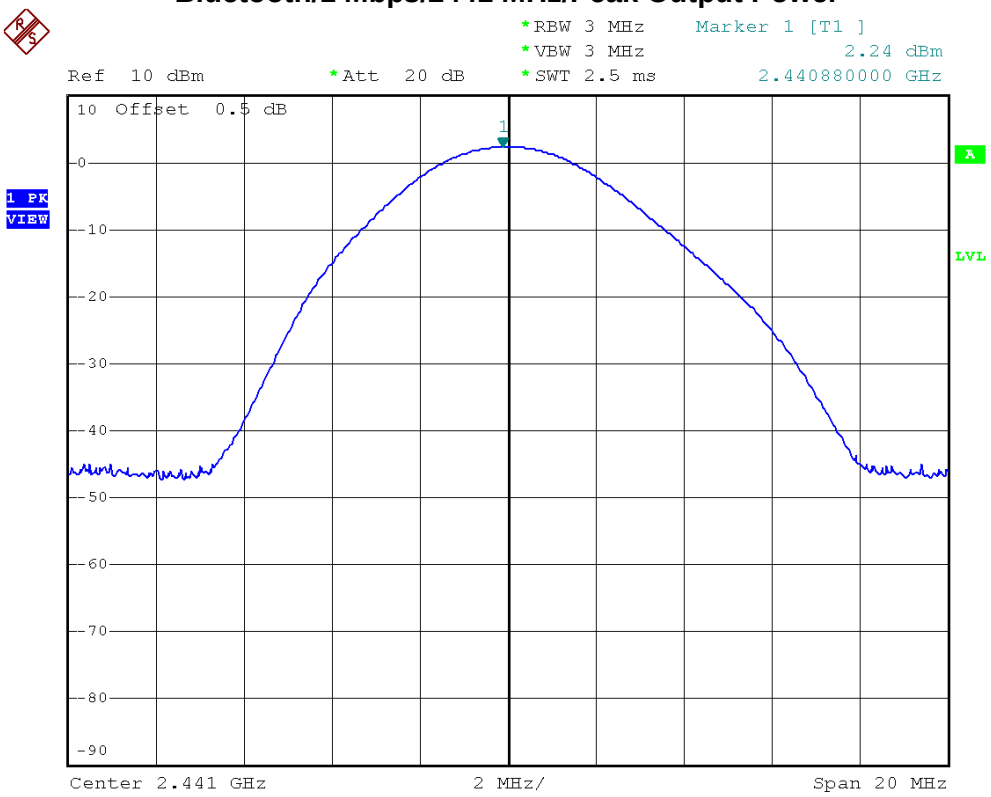
E.U.T	Multi-functional Master Controller	Model Name	MT880
Temperature	26°C	Relative Humidity	46%
Test Voltage	AC 120V/60Hz		
Test Mode	Bluetooth/1 Mbps/2402 MHz, 2441 MHz, 2480 MHz		

Frequency	Peak Output Power (dBm)	LIMIT (dBm)	Result
2402 MHz	1.54	30	PASS
2441 MHz	2.24	30	PASS
2480 MHz	2.35	30	PASS

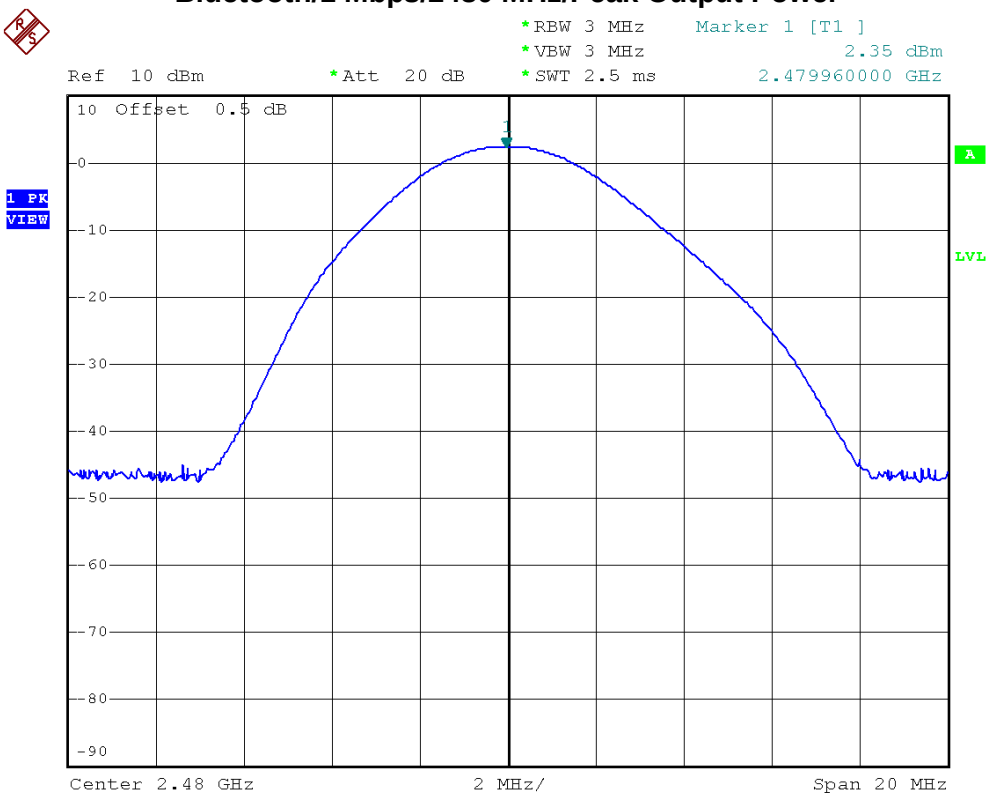
Bluetooth/1 Mbps/2402 MHz/Peak Output Power



Bluetooth/1 Mbps/2441 MHz/Peak Output Power



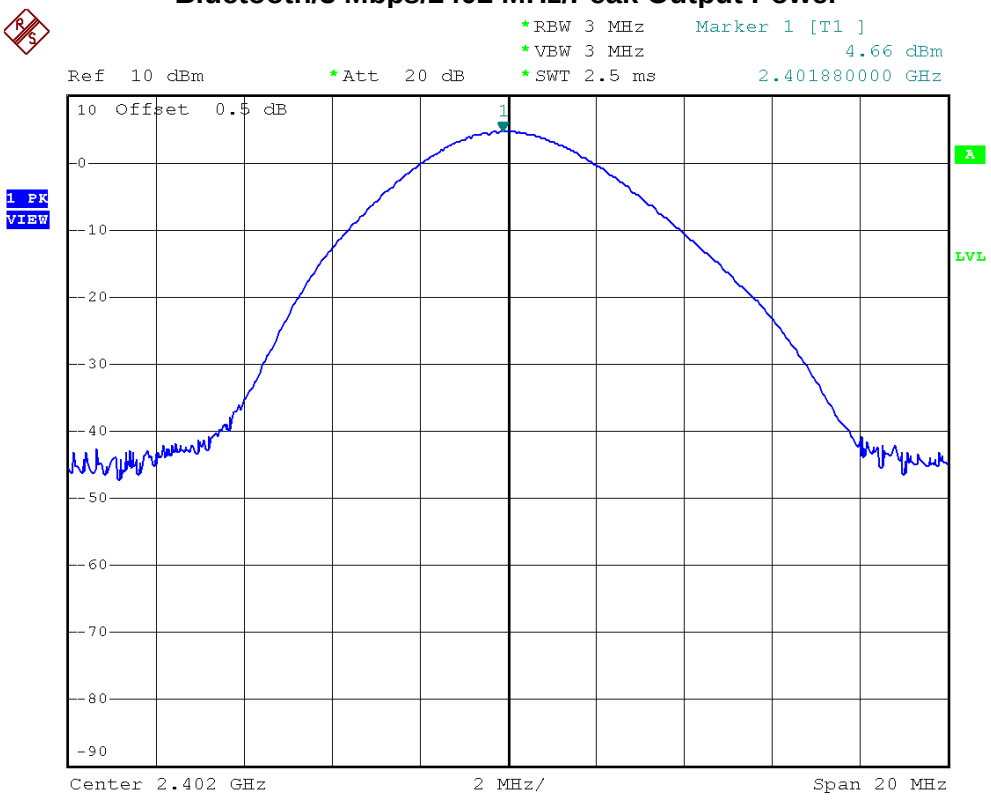
Bluetooth/1 Mbps/2480 MHz/Peak Output Power



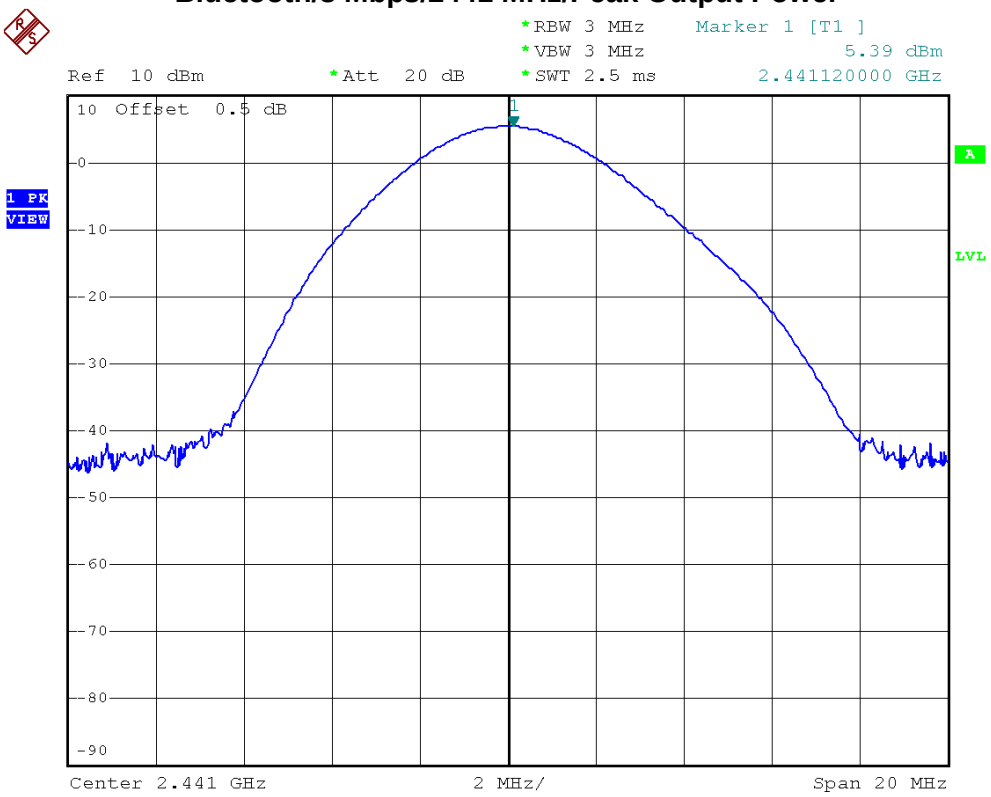
E.U.T	Multi-functional Master Controller	Model Name	MT880
Temperature	26°C	Relative Humidity	46%
Test Voltage	AC 120V/60Hz		
Test Mode	Bluetooth/3 Mbps/2402 MHz, 2441 MHz, 2480 MHz		

Frequency	Peak Output Power (dBm)	LIMIT (dBm)	Result
2402 MHz	4.66	30	PASS
2441 MHz	5.39	30	PASS
2480 MHz	5.23	30	PASS

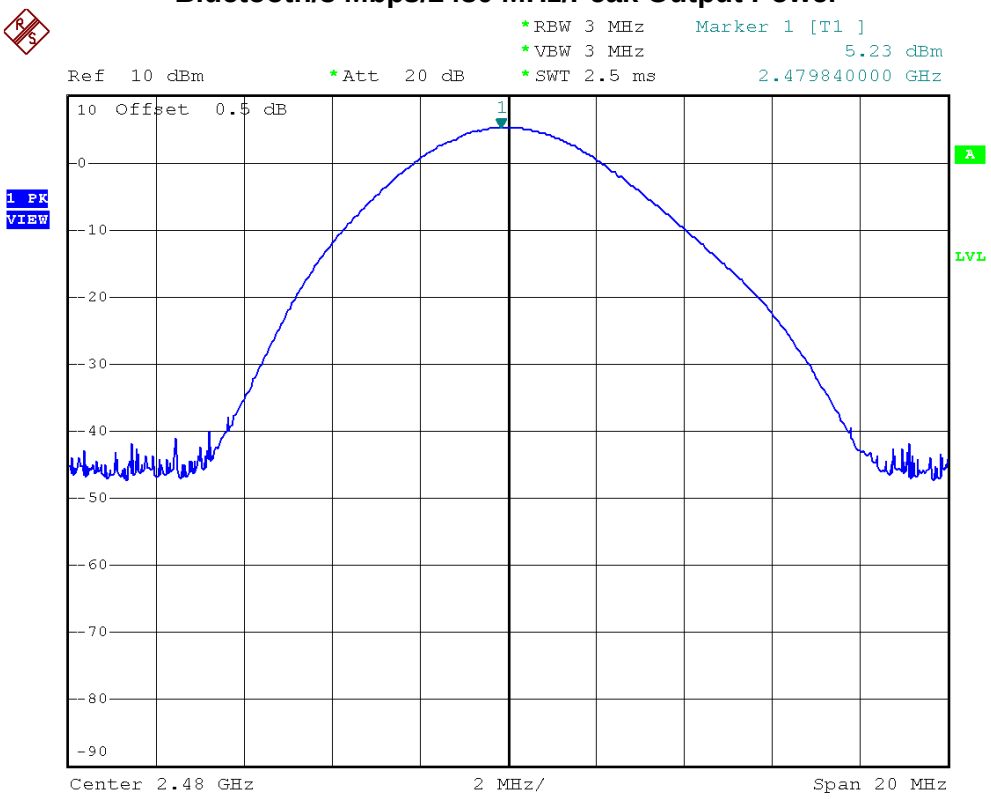
Bluetooth/3 Mbps/2402 MHz/Peak Output Power



Bluetooth/3 Mbps/2441 MHz/Peak Output Power



Bluetooth/3 Mbps/2480 MHz/Peak Output Power



8 RADIATED SPURIOUS EMISSION (9 KHZ TO 1 GHZ)

8.1 LIMIT

20 dB 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.

Frequency Range: 9 kHz to 1 GHz		
FREQUENCY (MHz)	Field Strength (micorvolts/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
Above 960	500	3

Frequency Range: above 1 GHz				
FREQUENCY (MHz)	Class A (dBuV/m) (at 3m)		Class B (dBuV/m) (at 3m)	
	PEAK	AVERAGE	PEAK	AVERAGE
above 1 GHz	80	60	74	54

NOTE:

(1) The limit for radiated test was performed according to FCC PART 15B.
(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

8.2 MEASUREMENT INSTRUMENTS LIST

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP-30	100854	Sep. 08, 2014
2	Horn Antenna	Schwarzbeck	BBHA 9120	D-325	Apr. 15, 2014
3	Microwave Pre_amplifier	Agilent	8449B	3008A01714	Apr. 16, 2014
4	Microflex Cable	Harbour industries	27478LL142	1m	May. 13, 2014
5	Microflex Cable	EMC	S104-SMA	8m	May. 13, 2014
6	Microflex Cable	Harbour industries	27478LL142	3m	May. 13, 2014
7	Test Cable	LMR	LMR-400	12m	May. 14, 2014
8	Test Cable	LMR	LMR-400	3m	May. 14, 2014
9	Pre-Amplifier	Anritsu	MH648A	M92649	Jun. 18, 2014
10	Log-Bicon Antenna	Schwarzbeck	VULB9168-352	9168-352	Jun. 11, 2014
11	Preamplifier With Adaptor	EMC	EMC2654045	980030	Feb. 18, 2014
12	Horn Antenna	Schwarzbeck	BBHA 9170	187	Dec. 24, 2013

Remark: “N/A” denotes No Model Name, No Serial No. or No Calibration specified.

8.3 MEASURING INSTRUMENTS SETTING

EMI Test Receiver	Parameter Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

8.4 TEST PROCEDURES

a. The measuring distance of at 3 m shall be used for measurements at frequency up to 1 GHz. For frequencies above 1 GHz, any suitable measuring distance may be used.
b. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3m Semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
c. The height of the equipment or of the substitution antenna shall be 0.8 m; the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
d. The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
e. If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed.
f. For the actual test configuration, please refer to the related Item –EUT Test Photos.
g. The testing follows the guidelines in ANSI C63.4 and FCC Public Notice DA 00-705 Measurement Guidelines. In case the emission is fail due to the used RBW/VBW is too wide, marker-delta method of FCC Public Notice DA 00-705 will be followed.

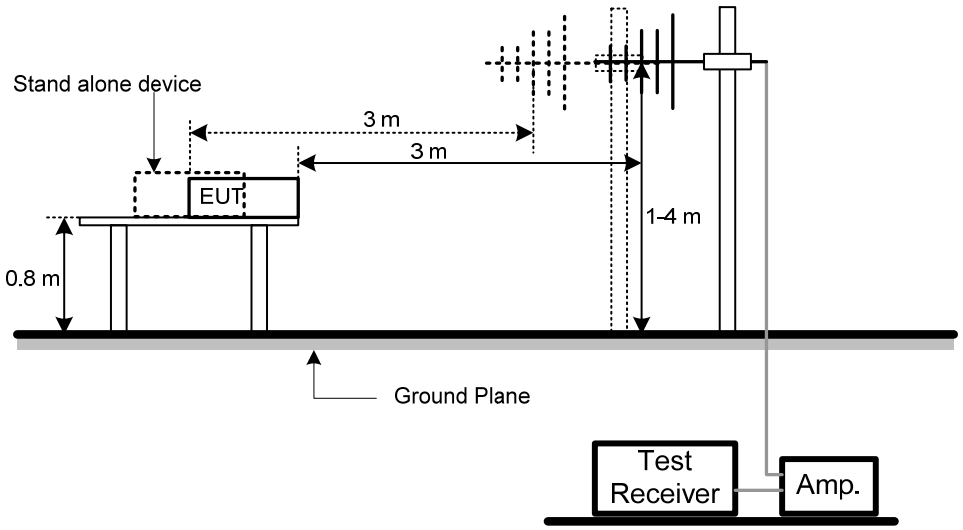
NOTE:

a. Reading in which marked as QP or Peak means measurements by using are Quasi-Peak Mode with Detector BW=120 kHz; SPA setting in RBW=100 kHz, VBW =100 kHz, Swp. Time = 0.3 sec./ MHz.
b. 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.

8.5 DEVIATION FROM TEST STANDARD

No deviation

8.6 TEST SETUP LAYOUT



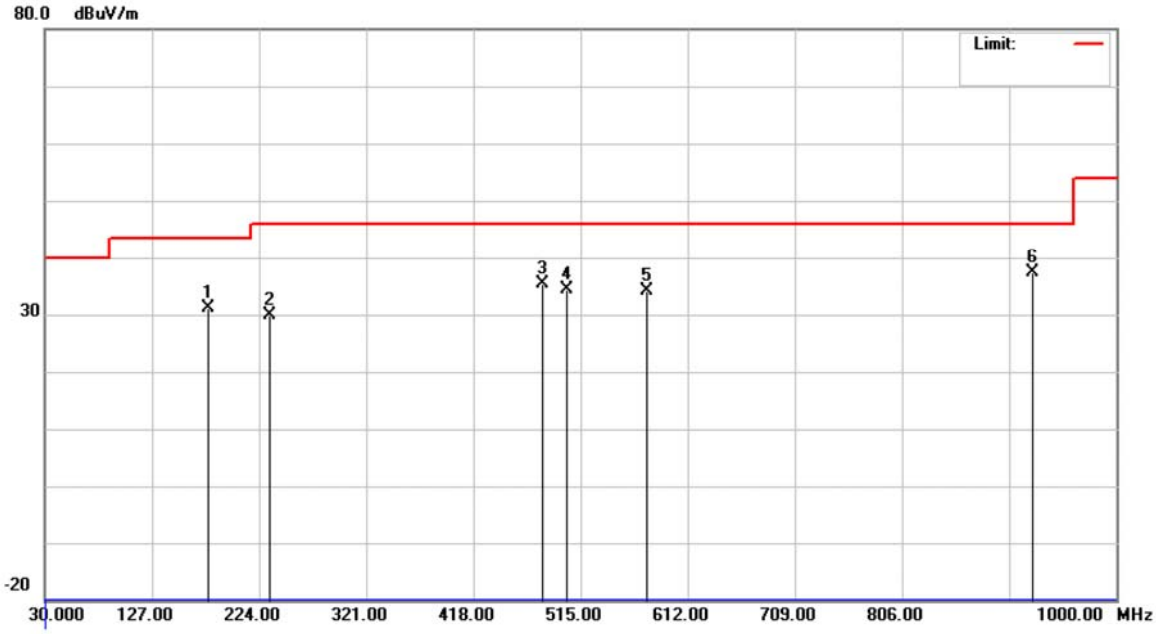
8.7 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 5.6 Unless otherwise a special operating condition is specified in the follows during the testing.

8.8 TEST RESULTS

E.U.T	Multi-functional Master Controller	Model Name	MT880
Temperature	26°C	Relative Humidity	60%
Test Voltage	AC 120V/60Hz		
Test Mode	Bluetooth/1 Mbps/2441 MHz		

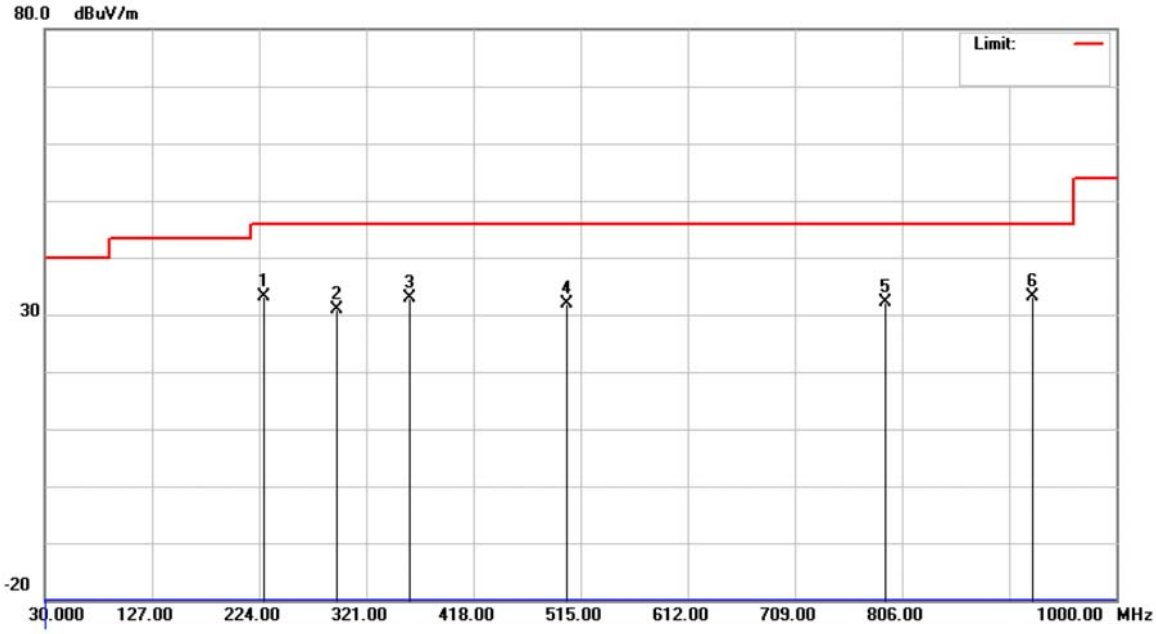
Polarization: Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		177.9250	46.86	-15.62	31.24	43.50	-12.26	peak	
2		233.6999	45.91	-15.99	29.92	46.00	-16.08	peak	
3		481.0499	44.86	-9.59	35.27	46.00	-10.73	peak	
4		502.8750	43.91	-9.42	34.49	46.00	-11.51	peak	
5		575.6250	41.67	-7.47	34.20	46.00	-11.80	peak	
6	*	924.8250	40.39	-3.04	37.35	46.00	-8.65	peak	

E.U.T	Multi-functional Master Controller	Model Name	MT880
Temperature	26°C	Relative Humidity	60%
Test Voltage	AC 120V/60Hz		
Test Mode	Bluetooth/1 Mbps/2441 MHz		

Polarization: Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		228.8500	49.51	-16.36	33.15	46.00	-12.85	peak	
2		294.3250	44.97	-14.09	30.88	46.00	-15.12	peak	
3		359.7999	45.36	-12.37	32.99	46.00	-13.01	peak	
4		502.8750	41.37	-9.42	31.95	46.00	-14.05	peak	
5		791.4500	37.11	-4.93	32.18	46.00	-13.82	peak	
6	*	924.8250	36.23	-3.04	33.19	46.00	-12.81	peak	

9 RADIATED SPURIOUS EMISSION (ABOVE 1 GHZ)

9.1 LIMIT

20dBc 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.

Frequency Range: 9 kHz to 1 GHz		
FREQUENCY (MHz)	Field Strength (micorvolts/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
Above 960	500	3

Frequency Range: above 1 GHz				
FREQUENCY (MHz)	Class A (dBuV/m) (at 3m)		Class B (dBuV/m) (at 3m)	
	PEAK	AVERAGE	PEAK	AVERAGE
above 1 GHz	80	60	74	54

NOTE:

(1) The limit for radiated test was performed according to FCC PART 15B.
(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

9.2 MEASUREMENT INSTRUMENTS LIST

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP-30	100854	Sep. 08, 2014
2	Horn Antenna	Schwarzbeck	BBHA 9120	D-325	Apr. 15, 2014
3	Microwave Pre_amplifier	Agilent	8449B	3008A01714	Apr. 16, 2014
4	Microflex Cable	Harbour industries	27478LL142	1m	May. 13, 2014
5	Microflex Cable	EMC	S104-SMA	8m	May. 13, 2014
6	Microflex Cable	Harbour industries	27478LL142	3m	May. 13, 2014
7	Test Cable	LMR	LMR-400	12m	May. 14, 2014
8	Test Cable	LMR	LMR-400	3m	May. 14, 2014
9	Pre-Amplifier	Anritsu	MH648A	M92649	Jun. 18, 2014
10	Log-Bicon Antenna	Schwarzbeck	VULB9168-352	9168-352	Jun. 11, 2014
11	Preamplifier With Adaptor	EMC	EMC2654045	980030	Feb. 18, 2014
12	Horn Antenna	Schwarzbeck	BBHA 9170	187	Dec. 24, 2013

Remark: “N/A” denotes No Model Name, No Serial No. or No Calibration specified.

9.3 MEASURING INSTRUMENTS SETTING

Spectrum Analyzer	Parameter Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RB / VB (emission in restricted band)	1MHz / 1MHz for Peak, 1 MHz / 10Hz for Average
RB / VB (other emission)	1MHz / 1MHz for Peak, 1 MHz / 10Hz for Average

9.4 TEST PROCEDURES

a. The measuring distance of at 3 m shall be used for measurements at frequency up to 1 GHz. For frequencies above 1 GHz, any suitable measuring distance may be used.
b. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3m Semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
c. The height of the equipment or of the substitution antenna shall be 0.8 m; the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
d. The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
e. If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed.
f. For the actual test configuration, please refer to the related Item –EUT Test Photos.
g. The testing follows the guidelines in ANSI C63.4 and FCC Public Notice DA 00-705 Measurement Guidelines. In case the emission is fail due to the used RBW/VBW is too wide, marker-delta method of FCC Public Notice DA 00-705 will be followed.

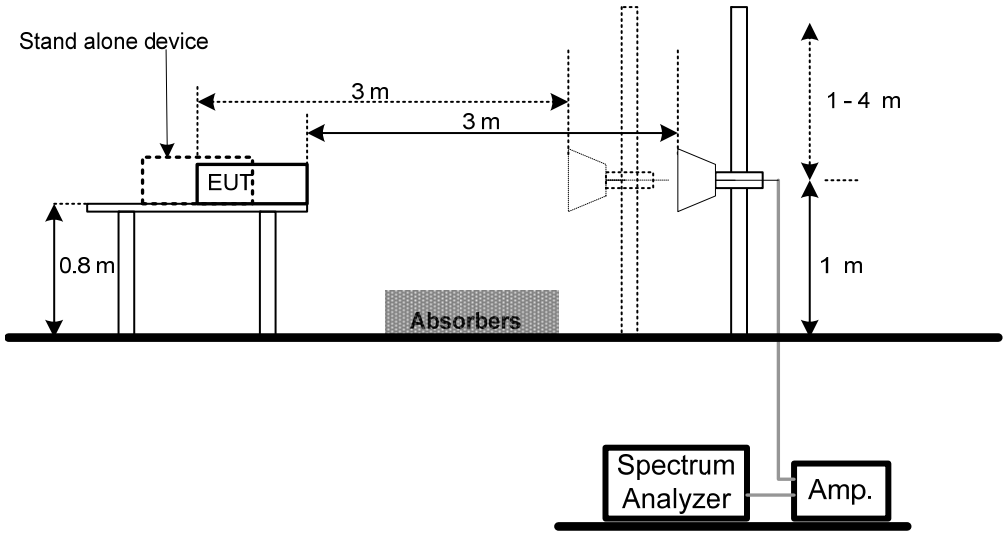
NOTE:

a. Reading in which marked as Peak means measurements by using are Peak Mode with instrument setting in RBW= 1 MHz, VBW= 1 MHz, Swp. Time = Auto.
Reading in which marked as AV means measurements by using are Average Mode with instrument setting in RBW= 1 MHz, VBW= 10 Hz, Swp. Time = Auto.
b. All readings are Peak Mode value unless otherwise stated AVG in column of Note. If the Peak Mode Measured value compliance with the Peak Limits and lower than AVG Limits, the EUT shall be deemed to meet both Peak & AVG Limits and then only Peak Mode was measured, but AVG Mode didn't perform.

9.5 DEVIATION FROM TEST STANDARD

No deviation

9.6 TEST SETUP LAYOUT



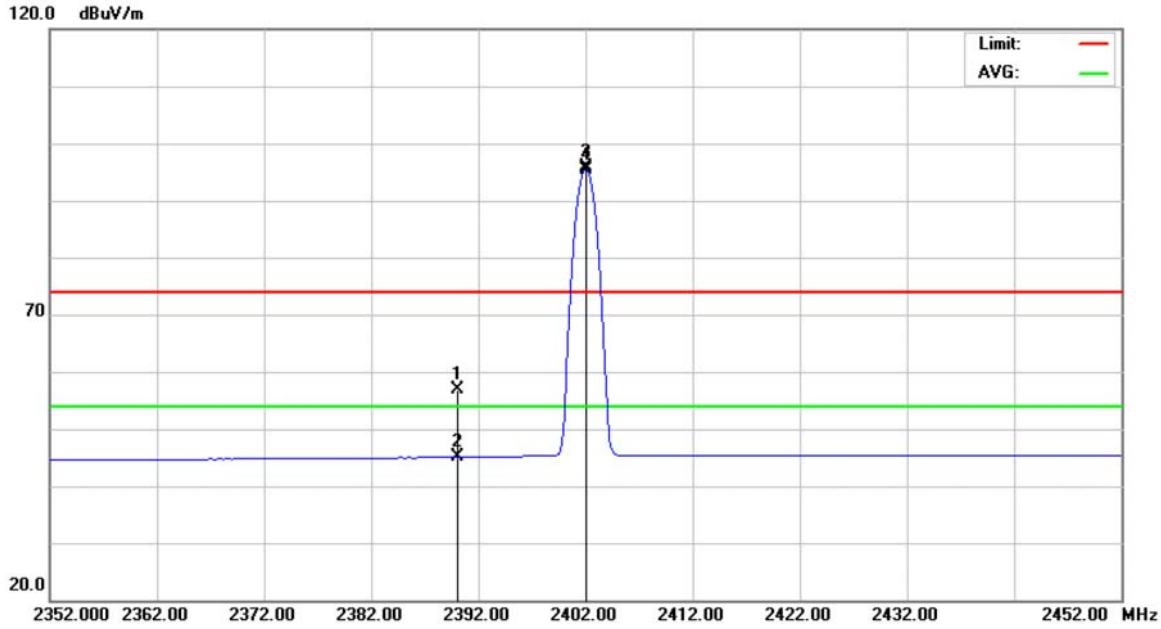
9.7 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 5.6 Unless otherwise a special operating condition is specified in the follows during the testing.

9.8 TEST RESULTS

E.U.T	Multi-functional Master Controller	Model Name	MT880
Temperature	26°C	Relative Humidity	60%
Test Voltage	AC 120V/60Hz		
Test Mode	Bluetooth/1 Mbps/2402 MHz		

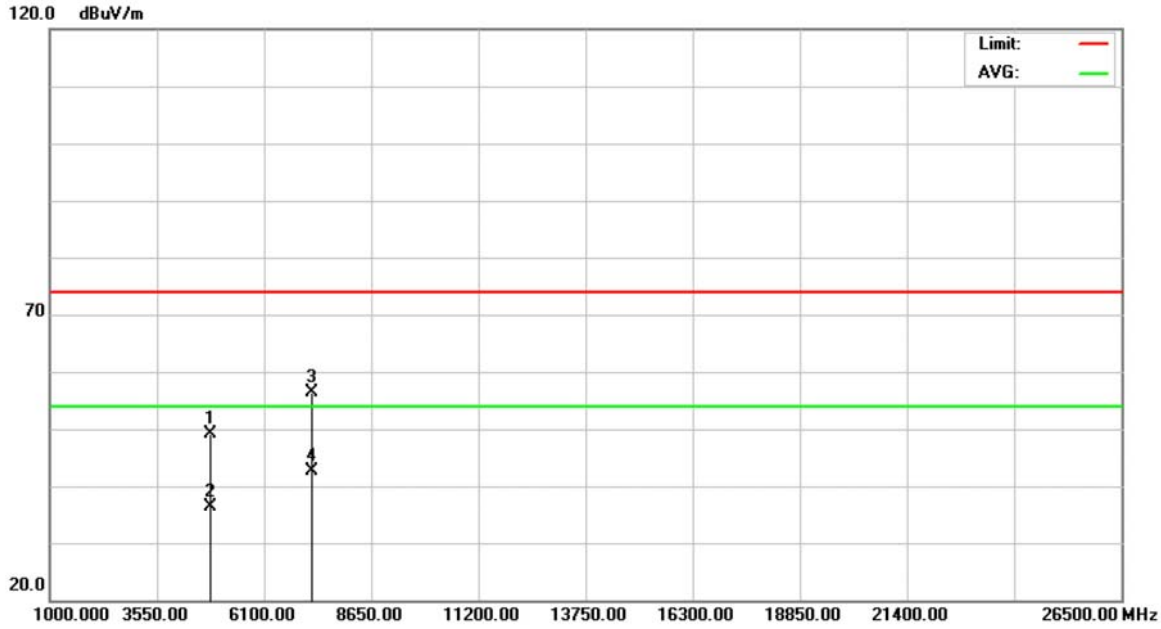
Polarization: Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		2390.000	25.11	31.67	56.78	74.00	-17.22	peak	
2		2390.000	13.39	31.67	45.06	54.00	-8.94	AVG	
3	X	2402.000	64.09	31.72	95.81	74.00	21.81	peak	
4	*	2402.000	63.67	31.72	95.39	54.00	41.39	AVG	

E.U.T	Multi-functional Master Controller	Model Name	MT880
Temperature	26°C	Relative Humidity	60%
Test Voltage	AC 120V/60Hz		
Test Mode	Bluetooth/1 Mbps/2402 MHz		

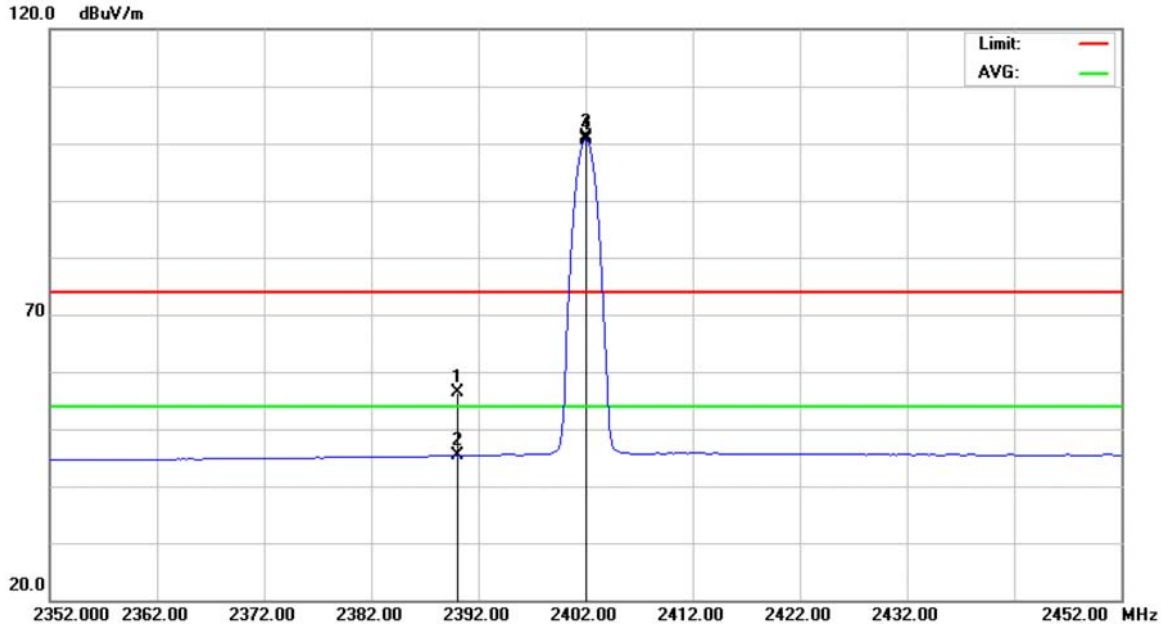
Polarization: Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4803.805	43.47	5.69	49.16	74.00	-24.84	peak	
2		4803.805	30.71	5.69	36.40	54.00	-17.60	AVG	
3		7205.980	44.19	12.18	56.37	74.00	-17.63	peak	
4	*	7205.980	30.57	12.18	42.75	54.00	-11.25	AVG	

E.U.T	Multi-functional Master Controller	Model Name	MT880
Temperature	26°C	Relative Humidity	60%
Test Voltage	AC 120V/60Hz		
Test Mode	Bluetooth/1 Mbps/2402 MHz		

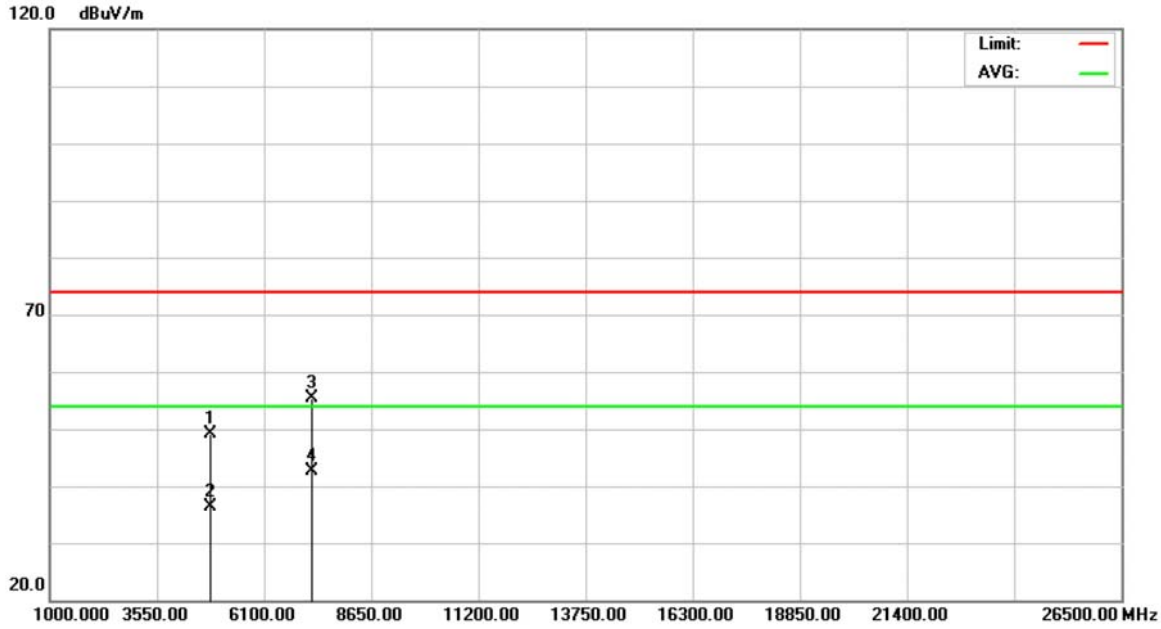
Polarization: Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		2390.000	24.64	31.67	56.31	74.00	-17.69	peak	
2		2390.000	13.72	31.67	45.39	54.00	-8.61	AVG	
3	X	2402.000	69.31	31.72	101.03	74.00	27.03	peak	
4	*	2402.000	68.91	31.72	100.63	54.00	46.63	AVG	

E.U.T	Multi-functional Master Controller	Model Name	MT880
Temperature	26°C	Relative Humidity	60%
Test Voltage	AC 120V/60Hz		
Test Mode	Bluetooth/1 Mbps/2402 MHz		

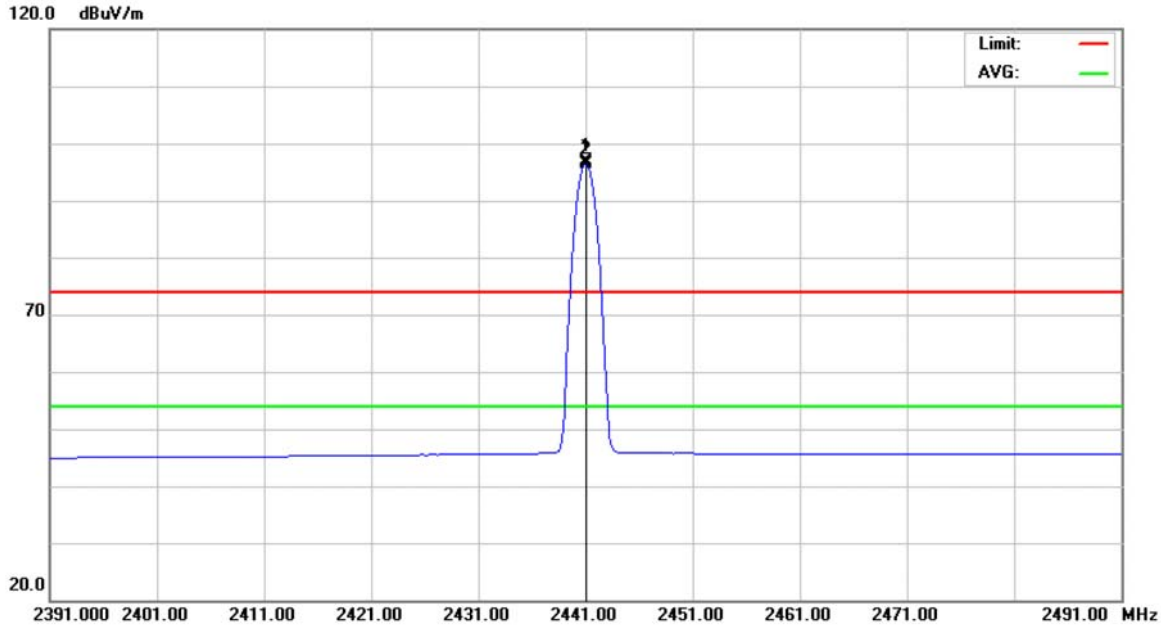
Polarization: Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4804.145	43.39	5.69	49.08	74.00	-24.92	peak	
2		4804.145	30.60	5.69	36.29	54.00	-17.71	AVG	
3		7206.045	43.18	12.18	55.36	74.00	-18.64	peak	
4	*	7206.045	30.57	12.18	42.75	54.00	-11.25	AVG	

E.U.T	Multi-functional Master Controller	Model Name	MT880
Temperature	26°C	Relative Humidity	60%
Test Voltage	AC 120V/60Hz		
Test Mode	Bluetooth/1 Mbps/2441 MHz		

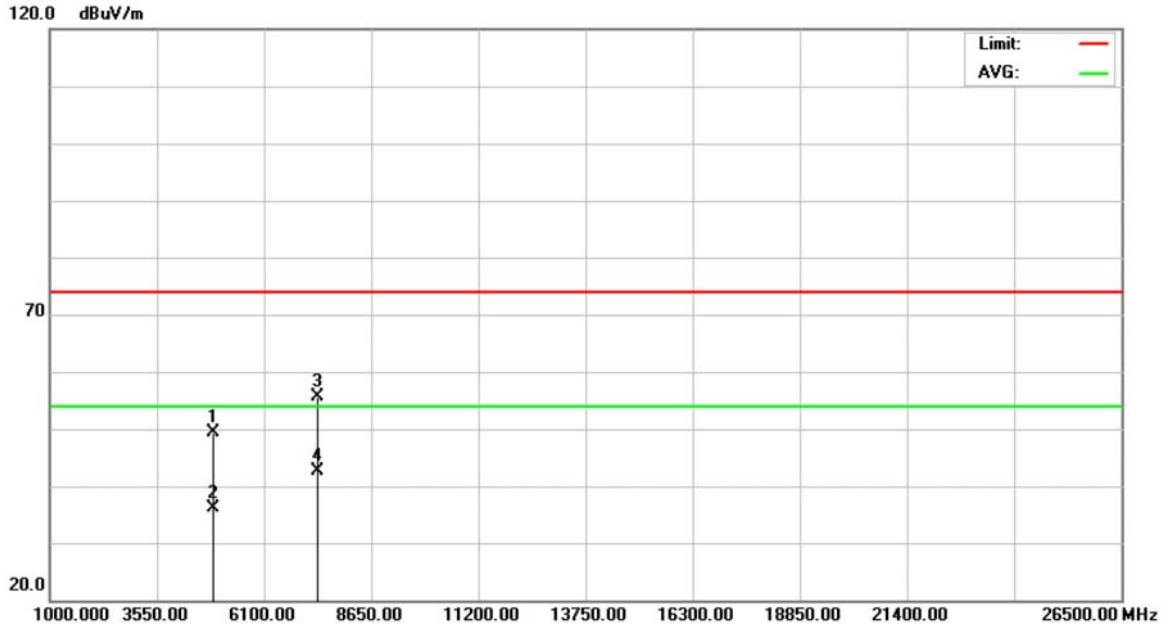
Polarization: Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	X	2441.000	64.89	31.90	96.79	74.00	22.79	peak	
2	*	2441.000	64.47	31.90	96.37	54.00	42.37	AVG	

E.U.T	Multi-functional Master Controller	Model Name	MT880
Temperature	26°C	Relative Humidity	60%
Test Voltage	AC 120V/60Hz		
Test Mode	Bluetooth/1 Mbps/2441 MHz		

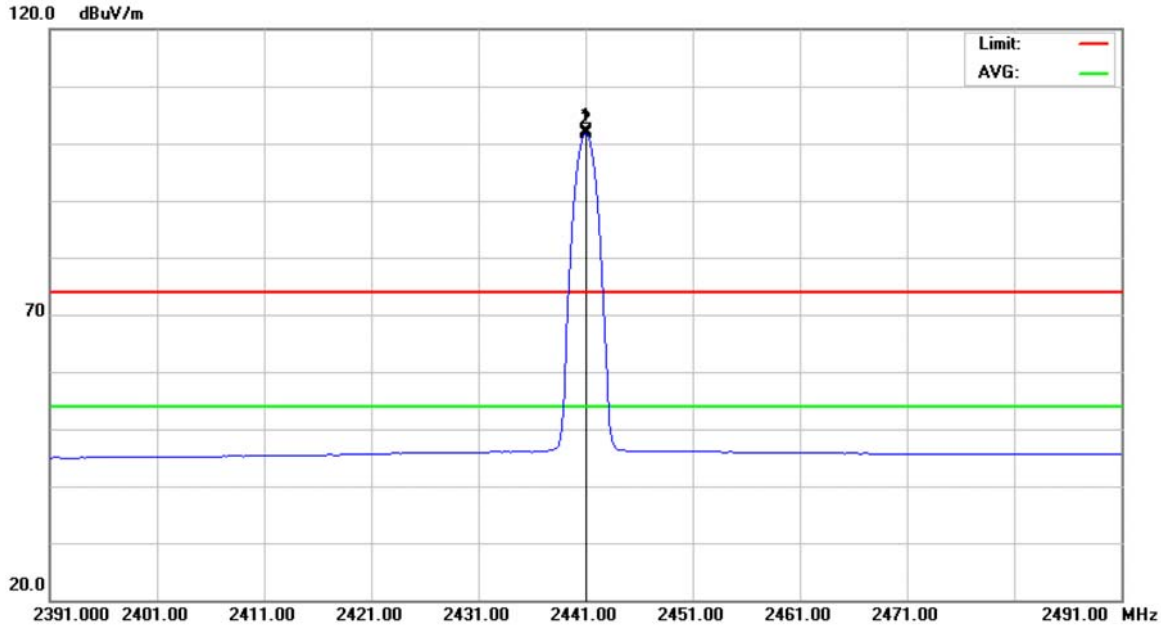
Polarization: Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4881.925	43.55	5.79	49.34	74.00	-24.66	peak	
2		4881.925	30.34	5.79	36.13	54.00	-17.87	AVG	
3		7322.775	43.13	12.61	55.74	74.00	-18.26	peak	
4	*	7322.775	30.11	12.61	42.72	54.00	-11.28	AVG	

E.U.T	Multi-functional Master Controller	Model Name	MT880
Temperature	26°C	Relative Humidity	60%
Test Voltage	AC 120V/60Hz		
Test Mode	Bluetooth/1 Mbps/2441 MHz		

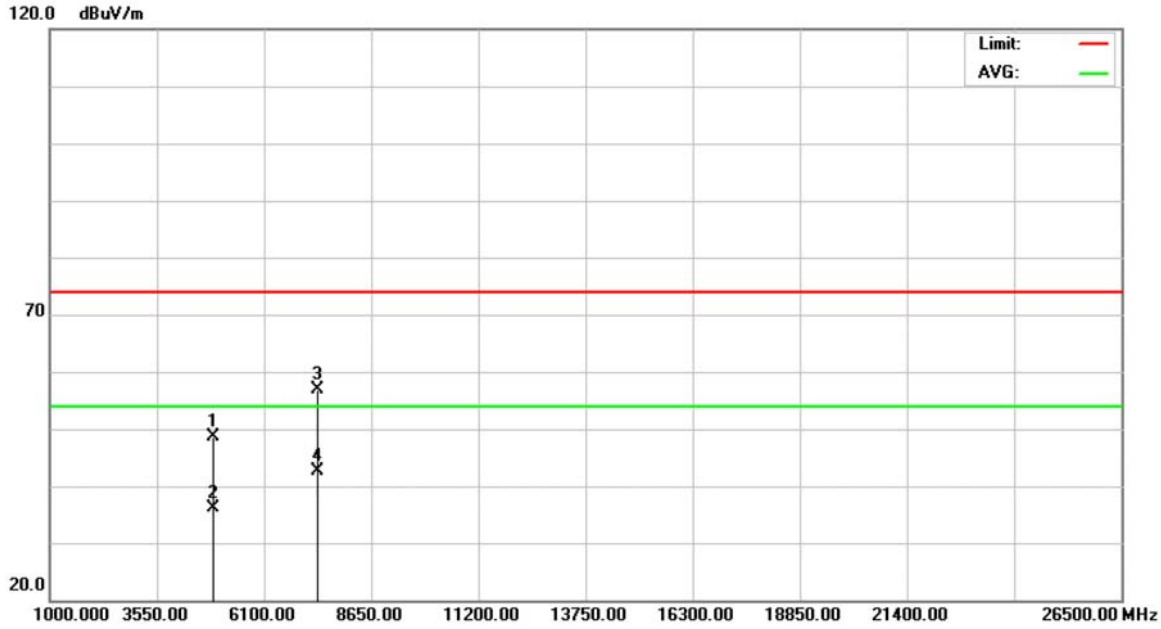
Polarization: Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	X	2441.000	70.19	31.90	102.09	74.00	28.09	peak	
2	*	2441.000	69.75	31.90	101.65	54.00	47.65	AVG	

E.U.T	Multi-functional Master Controller	Model Name	MT880
Temperature	26°C	Relative Humidity	60%
Test Voltage	AC 120V/60Hz		
Test Mode	Bluetooth/1 Mbps/2441 MHz		

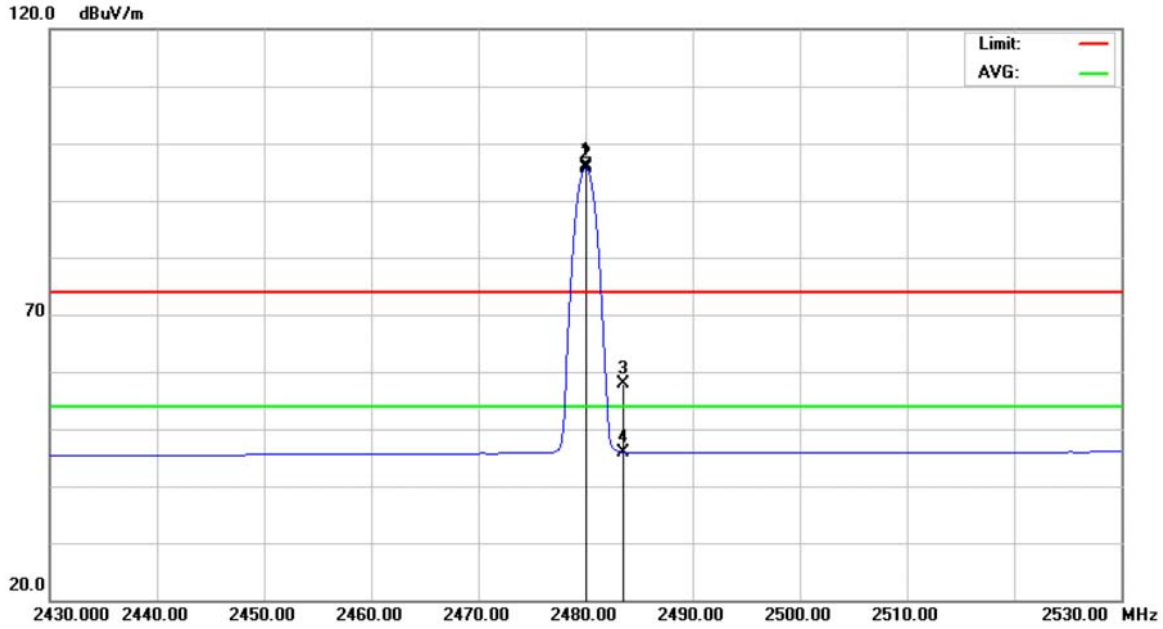
Polarization: Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4882.080	42.81	5.79	48.60	74.00	-25.40	peak	
2		4882.080	30.38	5.79	36.17	54.00	-17.83	AVG	
3		7323.190	44.24	12.61	56.85	74.00	-17.15	peak	
4	*	7323.190	30.03	12.61	42.64	54.00	-11.36	AVG	

E.U.T	Multi-functional Master Controller	Model Name	MT880
Temperature	26°C	Relative Humidity	60%
Test Voltage	AC 120V/60Hz		
Test Mode	Bluetooth/1 Mbps/2480 MHz		

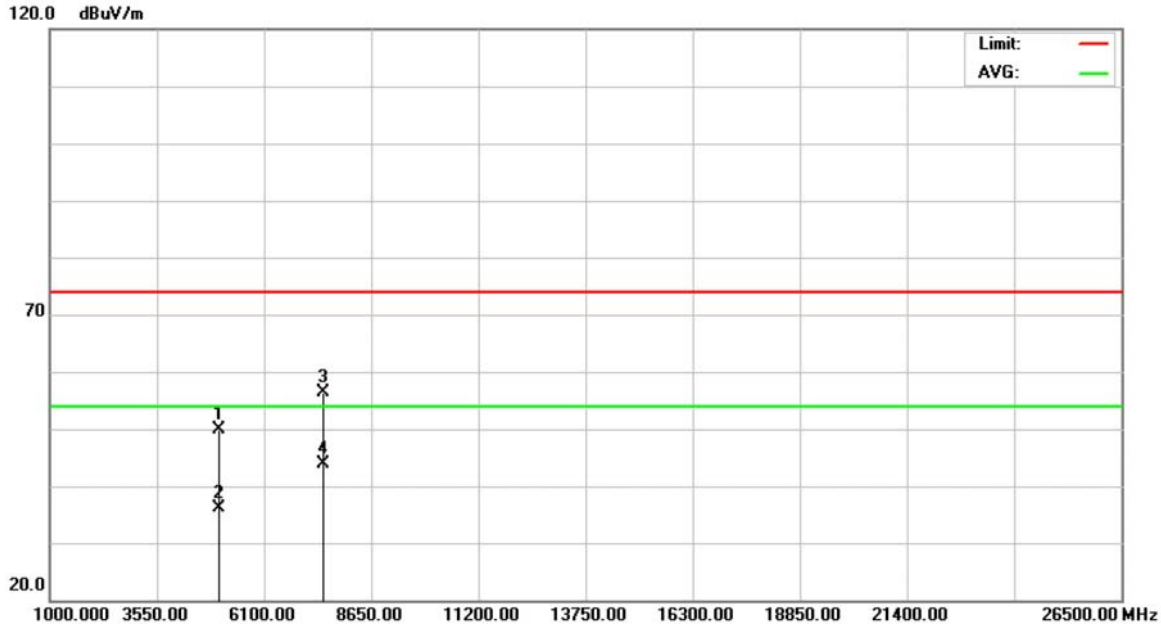
Polarization: Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	X	2480.000	64.05	32.07	96.12	74.00	22.12	peak	
2	*	2480.000	63.58	32.07	95.65	54.00	41.65	AVG	
3		2483.500	25.80	32.09	57.89	74.00	-16.11	peak	
4		2483.500	13.78	32.09	45.87	54.00	-8.13	AVG	

E.U.T	Multi-functional Master Controller	Model Name	MT880
Temperature	26°C	Relative Humidity	60%
Test Voltage	AC 120V/60Hz		
Test Mode	Bluetooth/1 Mbps/2480 MHz		

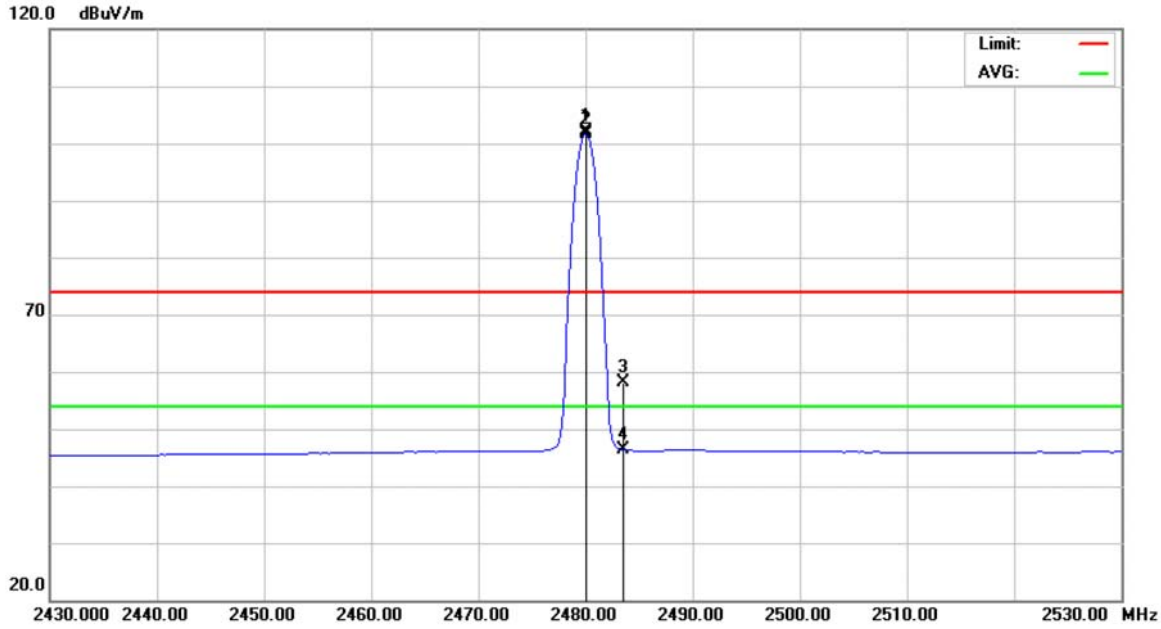
Polarization: Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4960.240	44.03	5.89	49.92	74.00	-24.08	peak	
2		4960.240	30.22	5.89	36.11	54.00	-17.89	AVG	
3		7440.075	43.33	13.05	56.38	74.00	-17.62	peak	
4	*	7440.075	30.75	13.05	43.80	54.00	-10.20	AVG	

E.U.T	Multi-functional Master Controller	Model Name	MT880
Temperature	26°C	Relative Humidity	60%
Test Voltage	AC 120V/60Hz		
Test Mode	Bluetooth/1 Mbps/2480 MHz		

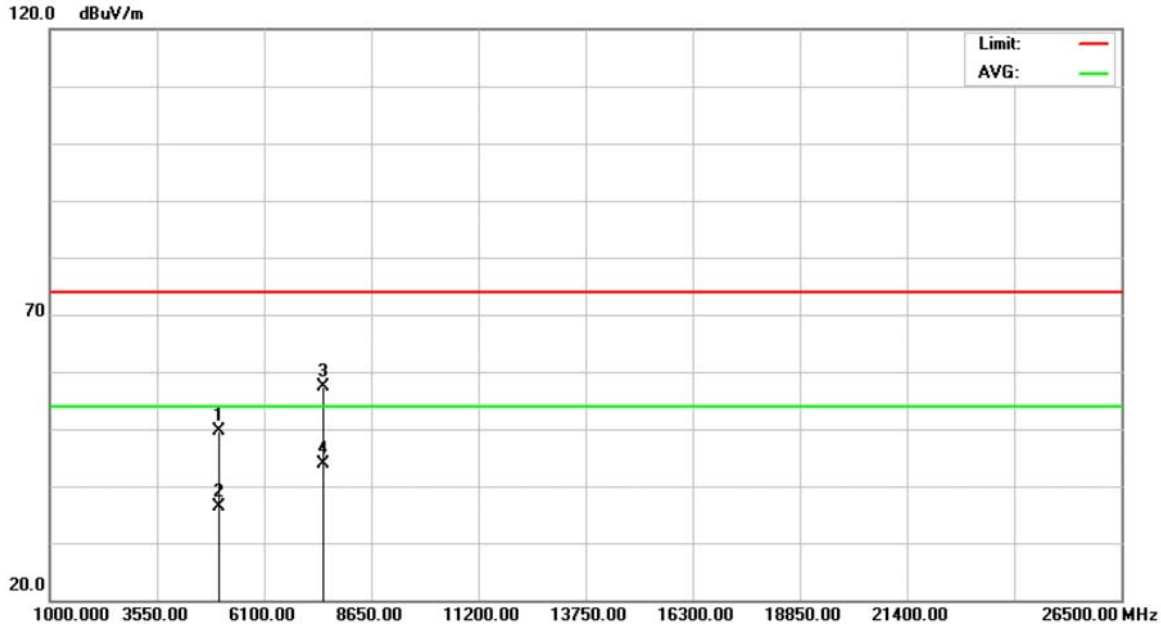
Polarization: Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	X	2480.000	69.98	32.07	102.05	74.00	28.05	peak	
2	*	2480.000	69.52	32.07	101.59	54.00	47.59	AVG	
3		2483.500	26.11	32.09	58.20	74.00	-15.80	peak	
4		2483.500	14.32	32.09	46.41	54.00	-7.59	AVG	

E.U.T	Multi-functional Master Controller	Model Name	MT880
Temperature	26°C	Relative Humidity	60%
Test Voltage	AC 120V/60Hz		
Test Mode	Bluetooth/1 Mbps/2480 MHz		

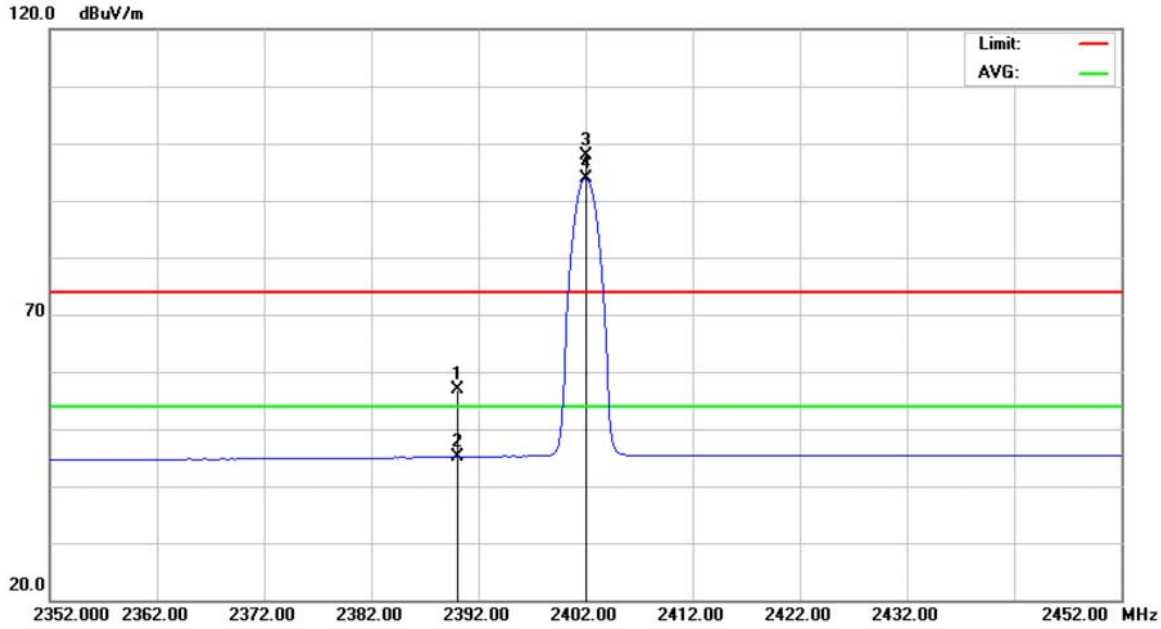
Polarization: Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4959.835	43.85	5.89	49.74	74.00	-24.26	peak	
2		4959.835	30.43	5.89	36.32	54.00	-17.68	AVG	
3		7439.920	44.23	13.05	57.28	74.00	-16.72	peak	
4	*	7439.920	30.75	13.05	43.80	54.00	-10.20	AVG	

E.U.T	Multi-functional Master Controller	Model Name	MT880
Temperature	26°C	Relative Humidity	60%
Test Voltage	AC 120V/60Hz		
Test Mode	Bluetooth/3 Mbps/2402 MHz		

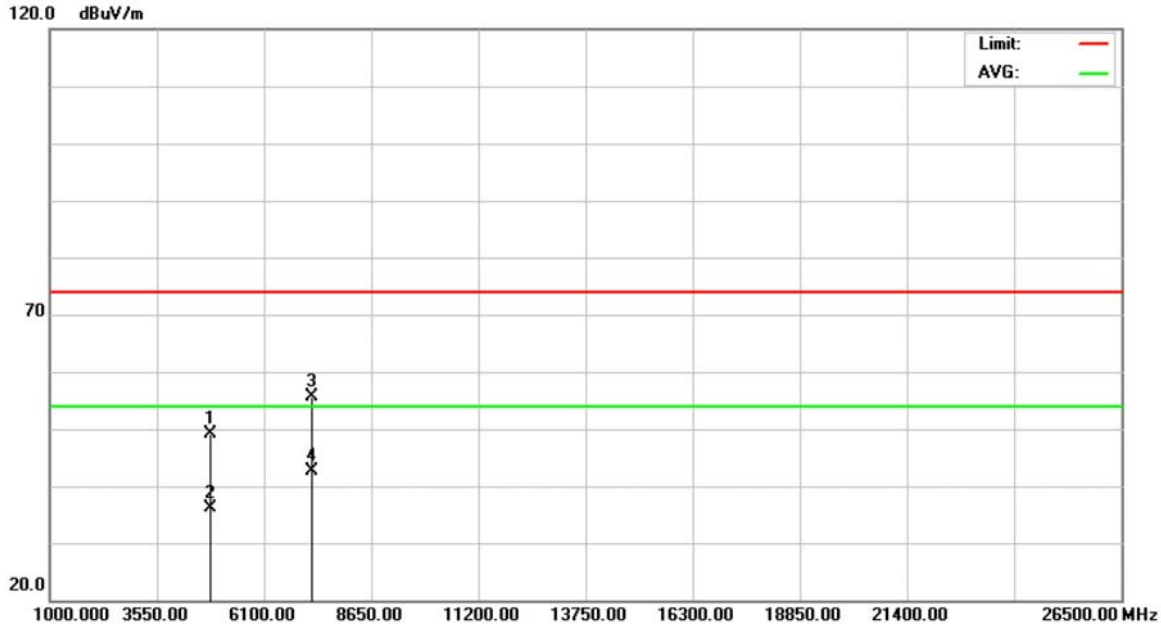
Polarization: Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		2390.000	25.30	31.67	56.97	74.00	-17.03	peak	
2		2390.000	13.42	31.67	45.09	54.00	-8.91	AVG	
3	X	2402.000	66.18	31.72	97.90	74.00	23.90	peak	
4	*	2402.000	62.16	31.72	93.88	54.00	39.88	AVG	

E.U.T	Multi-functional Master Controller	Model Name	MT880
Temperature	26°C	Relative Humidity	60%
Test Voltage	AC 120V/60Hz		
Test Mode	Bluetooth/3 Mbps/2402 MHz		

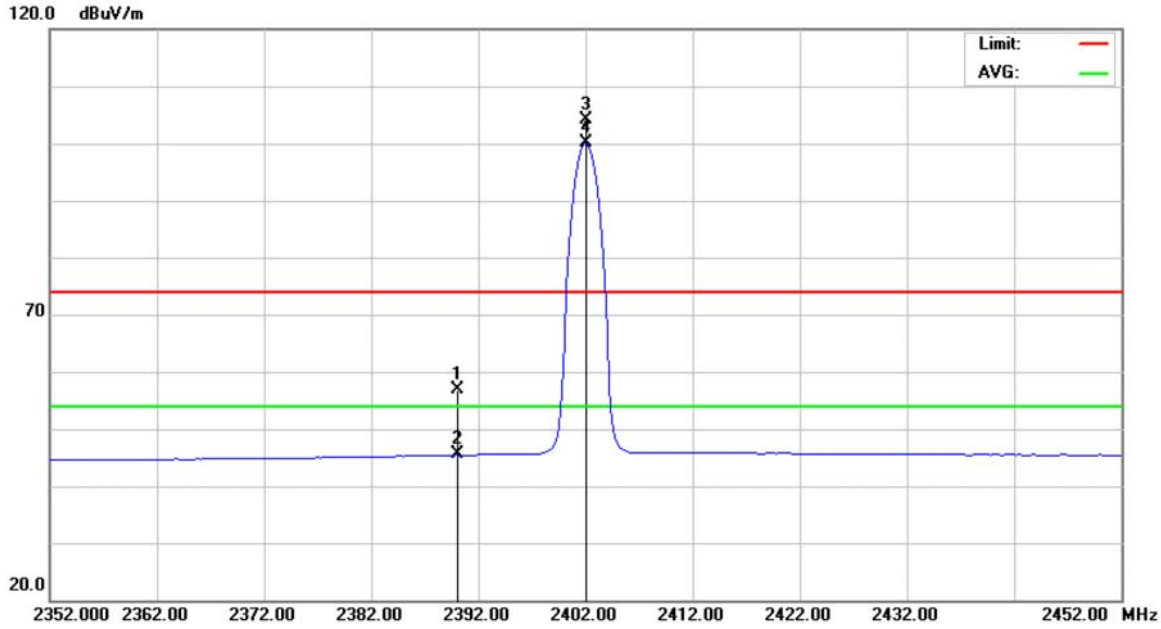
Polarization: Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4804.390	43.38	5.69	49.07	74.00	-24.93	peak	
2		4804.390	30.46	5.69	36.15	54.00	-17.85	AVG	
3		7206.065	43.33	12.18	55.51	74.00	-18.49	peak	
4	*	7206.065	30.49	12.18	42.67	54.00	-11.33	AVG	

E.U.T	Multi-functional Master Controller	Model Name	MT880
Temperature	26°C	Relative Humidity	60%
Test Voltage	AC 120V/60Hz		
Test Mode	Bluetooth/3 Mbps/2402 MHz		

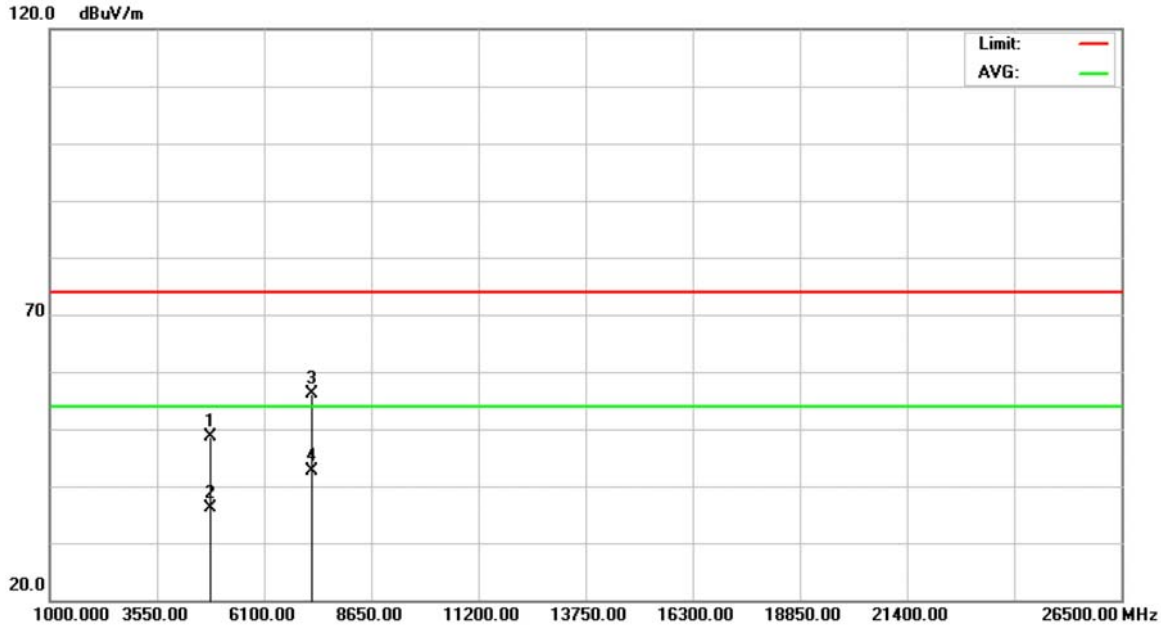
Polarization: Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		2390.000	25.27	31.67	56.94	74.00	-17.06	peak	
2		2390.000	13.84	31.67	45.51	54.00	-8.49	AVG	
3	X	2402.000	72.34	31.72	104.06	74.00	30.06	peak	
4	*	2402.000	68.33	31.72	100.05	54.00	46.05	AVG	

E.U.T	Multi-functional Master Controller	Model Name	MT880
Temperature	26°C	Relative Humidity	60%
Test Voltage	AC 120V/60Hz		
Test Mode	Bluetooth/3 Mbps/2402 MHz		

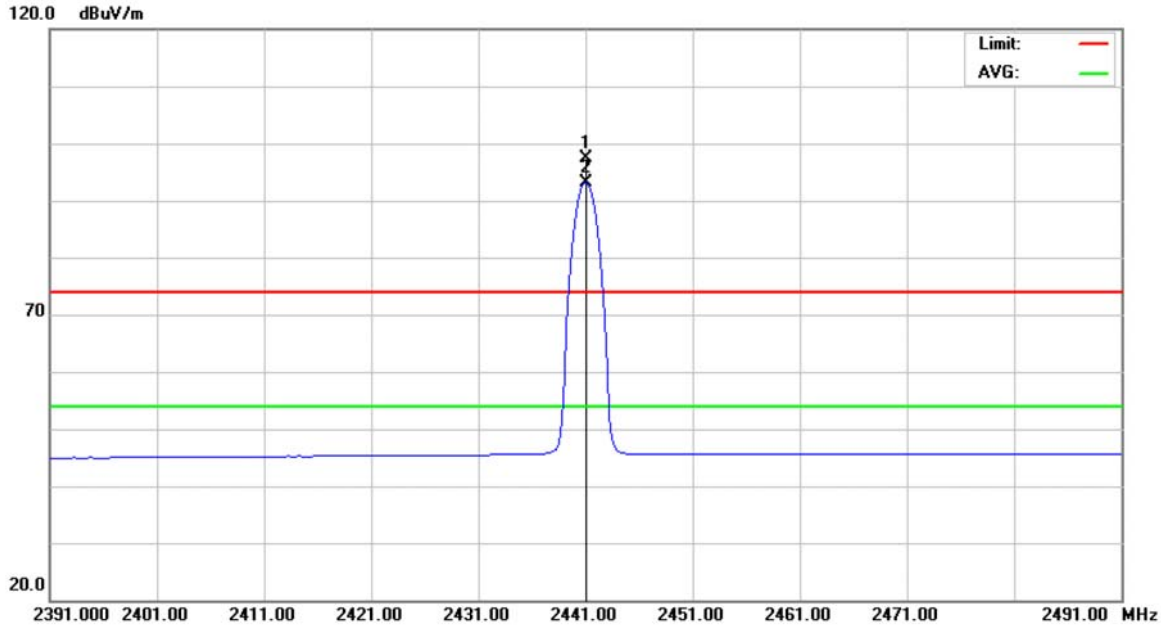
Polarization: Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4803.685	43.00	5.69	48.69	74.00	-25.31	peak	
2		4803.685	30.38	5.69	36.07	54.00	-17.93	AVG	
3		7206.180	44.06	12.18	56.24	74.00	-17.76	peak	
4	*	7206.180	30.45	12.18	42.63	54.00	-11.37	AVG	

E.U.T	Multi-functional Master Controller	Model Name	MT880
Temperature	26°C	Relative Humidity	60%
Test Voltage	AC 120V/60Hz		
Test Mode	Bluetooth/3 Mbps/2441 MHz		

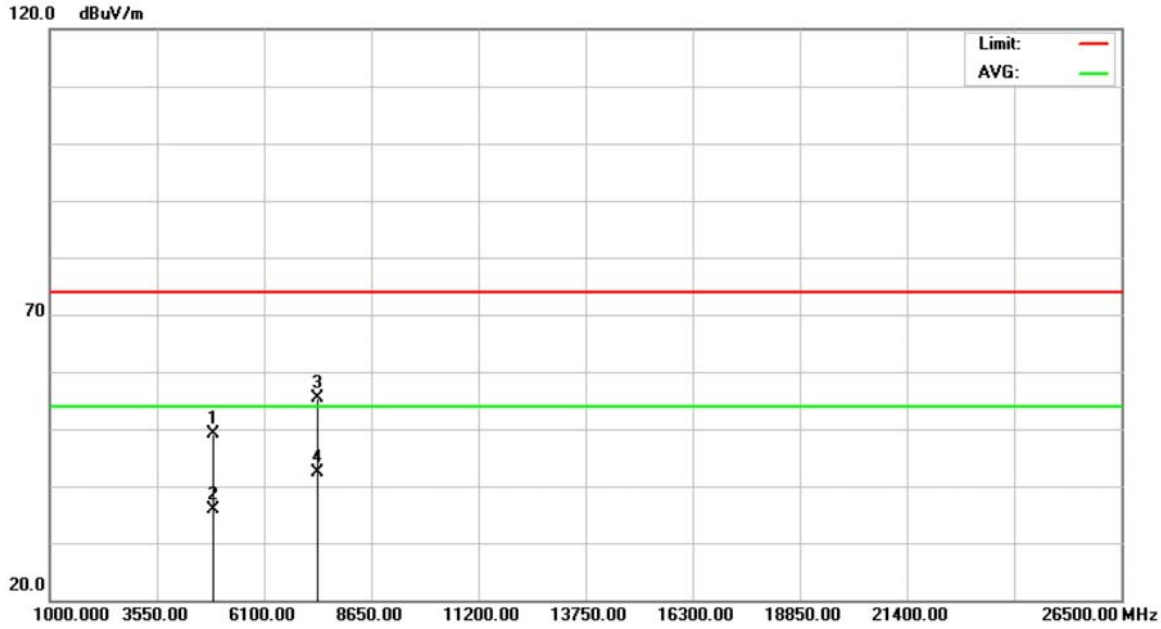
Polarization: Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	X	2441.000	65.47	31.90	97.37	74.00	23.37	peak	
2	*	2441.000	61.32	31.90	93.22	54.00	39.22	AVG	

E.U.T	Multi-functional Master Controller	Model Name	MT880
Temperature	26°C	Relative Humidity	60%
Test Voltage	AC 120V/60Hz		
Test Mode	Bluetooth/3 Mbps/2441 MHz		

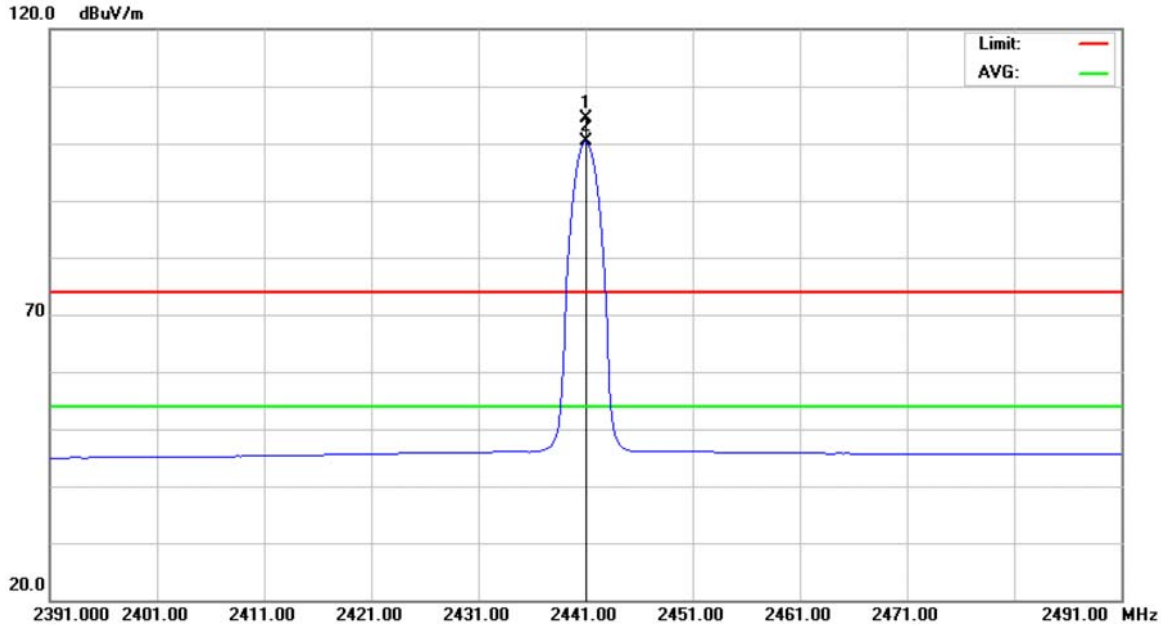
Polarization: Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4881.620	43.41	5.79	49.20	74.00	-24.80	peak	
2		4881.620	30.18	5.79	35.97	54.00	-18.03	AVG	
3		7322.730	42.82	12.61	55.43	74.00	-18.57	peak	
4	*	7322.730	29.83	12.61	42.44	54.00	-11.56	AVG	

E.U.T	Multi-functional Master Controller	Model Name	MT880
Temperature	26°C	Relative Humidity	60%
Test Voltage	AC 120V/60Hz		
Test Mode	Bluetooth/3 Mbps/2441 MHz		

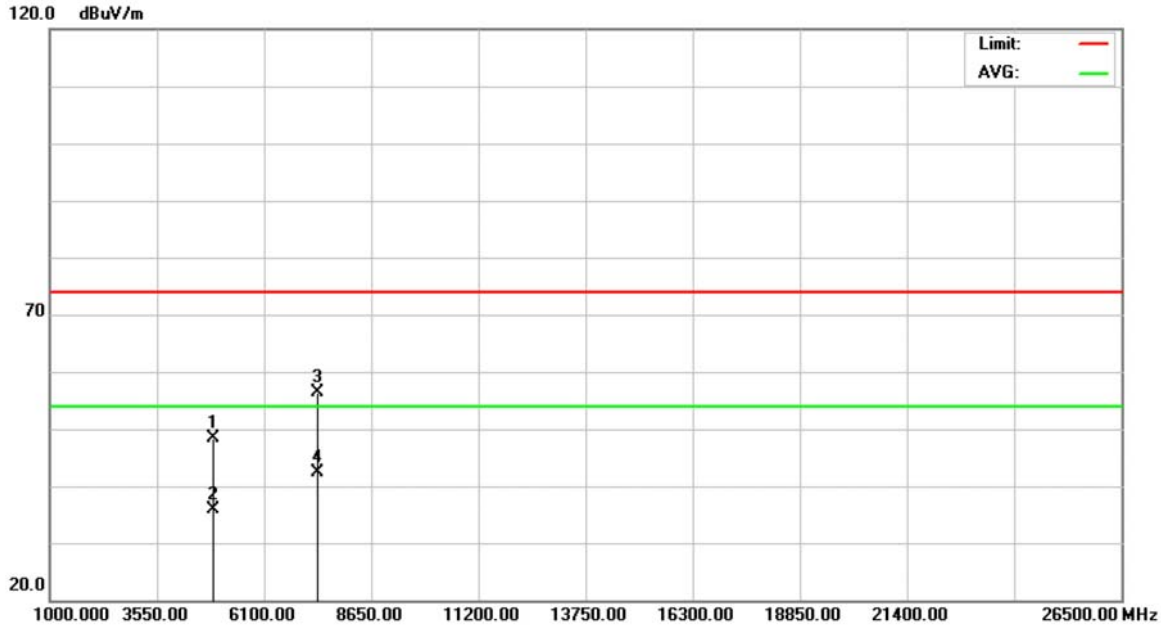
Polarization: Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	X	2441.000	72.52	31.90	104.42	74.00	30.42	peak	
2	*	2441.000	68.38	31.90	100.28	54.00	46.28	AVG	

E.U.T	Multi-functional Master Controller	Model Name	MT880
Temperature	26°C	Relative Humidity	60%
Test Voltage	AC 120V/60Hz		
Test Mode	Bluetooth/3 Mbps/2441 MHz		

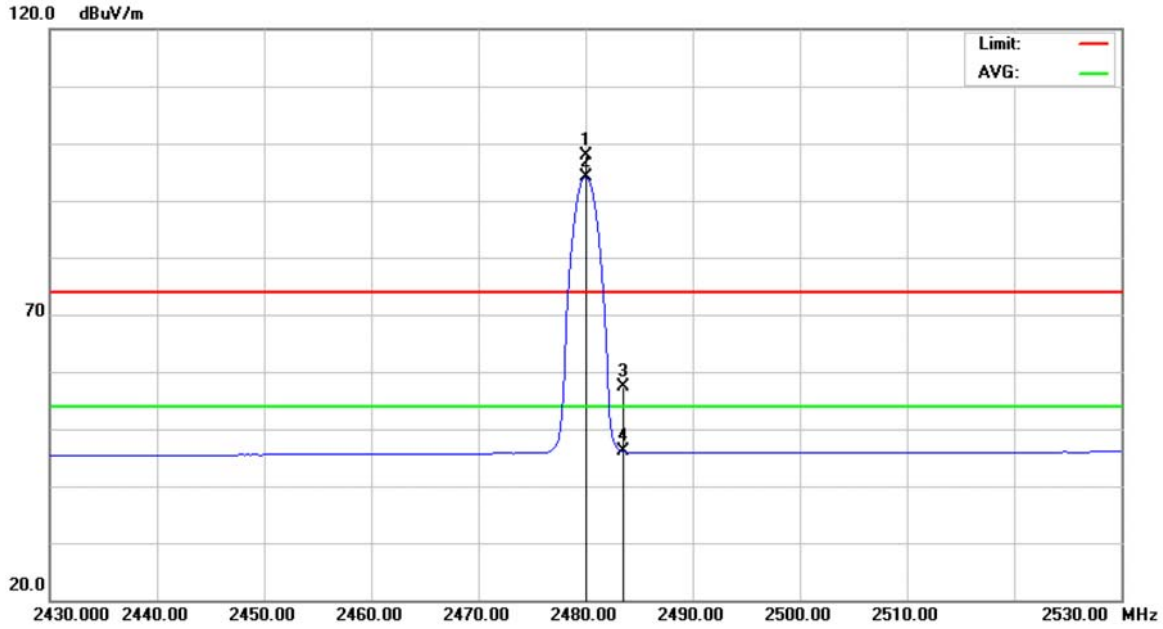
Polarization: Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4881.640	42.69	5.79	48.48	74.00	-25.52	peak	
2		4881.640	30.19	5.79	35.98	54.00	-18.02	AVG	
3		7322.740	43.74	12.61	56.35	74.00	-17.65	peak	
4	*	7322.740	29.78	12.61	42.39	54.00	-11.61	AVG	

E.U.T	Multi-functional Master Controller	Model Name	MT880
Temperature	26°C	Relative Humidity	60%
Test Voltage	AC 120V/60Hz		
Test Mode	Bluetooth/3 Mbps/2480 MHz		

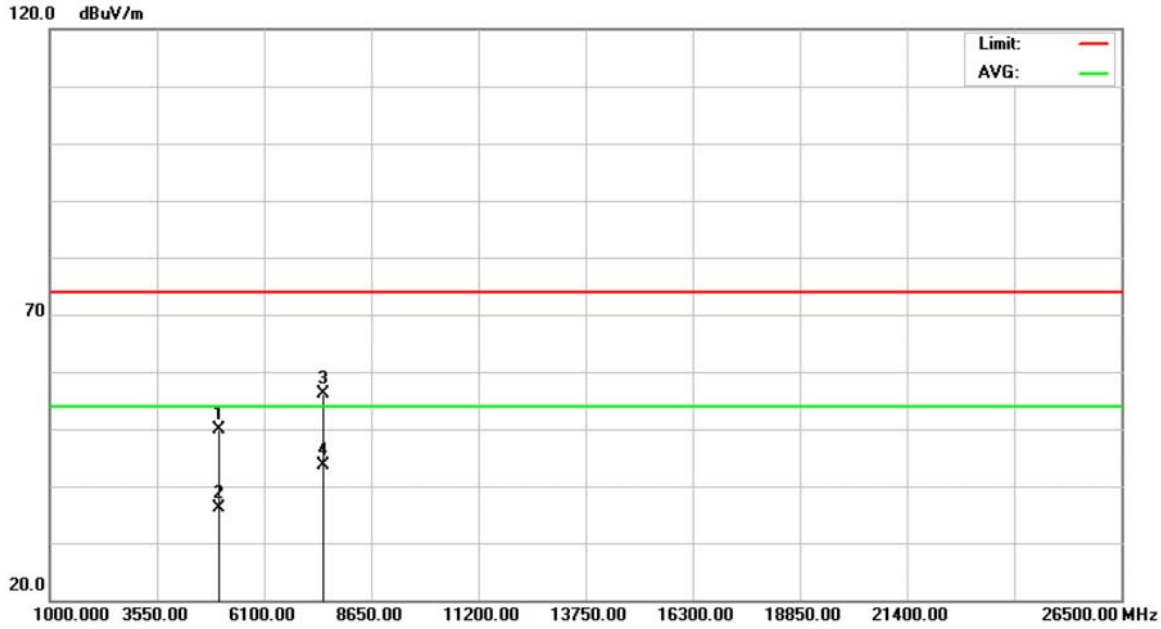
Polarization: Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	X	2480.000	65.93	32.07	98.00	74.00	24.00	peak	
2	*	2480.000	62.01	32.07	94.08	54.00	40.08	AVG	
3		2483.500	25.18	32.09	57.27	74.00	-16.73	peak	
4		2483.500	13.95	32.09	46.04	54.00	-7.96	AVG	

E.U.T	Multi-functional Master Controller	Model Name	MT880
Temperature	26°C	Relative Humidity	60%
Test Voltage	AC 120V/60Hz		
Test Mode	Bluetooth/3 Mbps/2480 MHz		

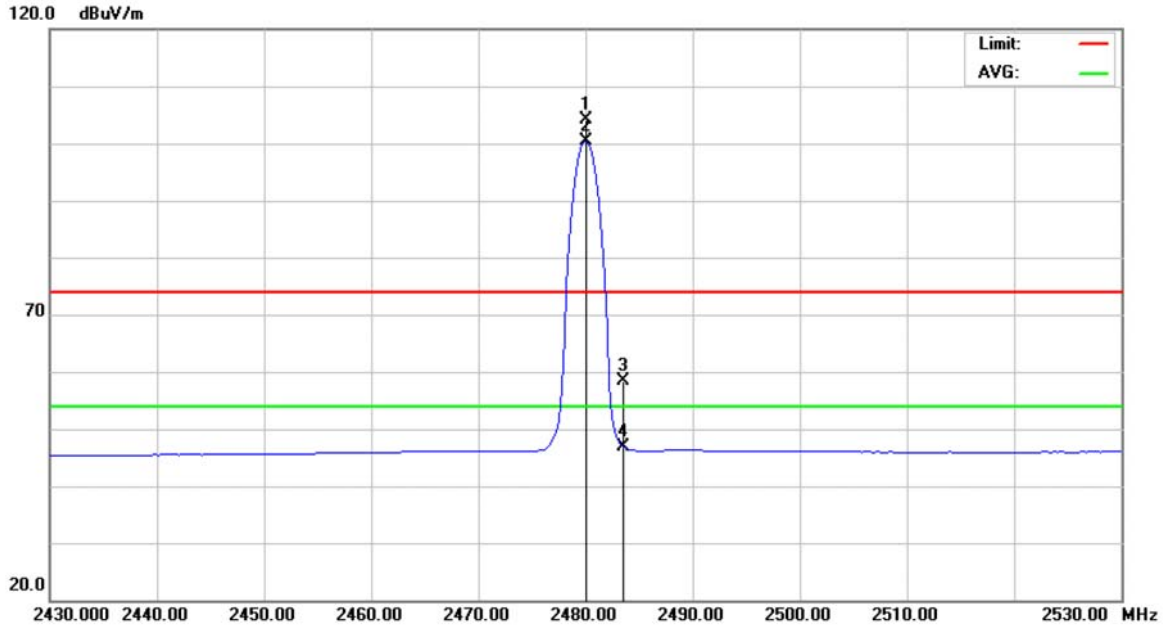
Polarization: Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4959.990	43.98	5.89	49.87	74.00	-24.13	peak	
2		4959.990	30.17	5.89	36.06	54.00	-17.94	AVG	
3		7440.370	43.12	13.05	56.17	74.00	-17.83	peak	
4	*	7440.370	30.61	13.05	43.66	54.00	-10.34	AVG	

E.U.T	Multi-functional Master Controller	Model Name	MT880
Temperature	26°C	Relative Humidity	60%
Test Voltage	AC 120V/60Hz		
Test Mode	Bluetooth/3 Mbps/2480 MHz		

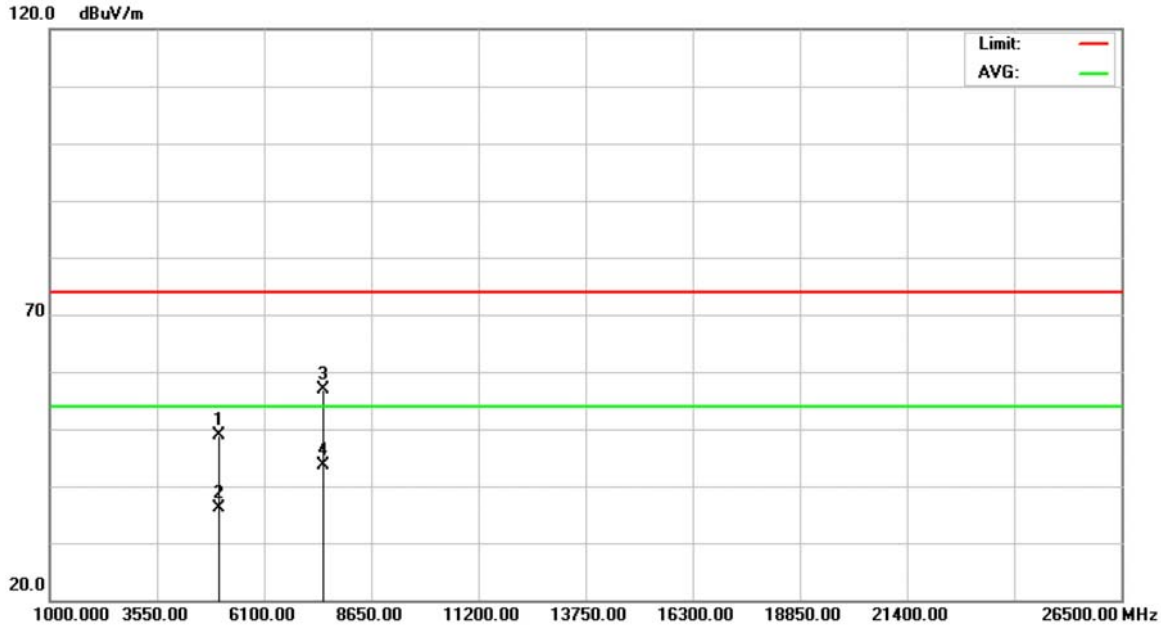
Polarization: Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	X	2480.000	72.17	32.07	104.24	74.00	30.24	peak	
2	*	2480.000	68.27	32.07	100.34	54.00	46.34	AVG	
3		2483.500	26.41	32.09	58.50	74.00	-15.50	peak	
4		2483.500	14.74	32.09	46.83	54.00	-7.17	AVG	

E.U.T	Multi-functional Master Controller	Model Name	MT880
Temperature	26°C	Relative Humidity	60%
Test Voltage	AC 120V/60Hz		
Test Mode	Bluetooth/3 Mbps/2480 MHz		

Polarization: Horizontal

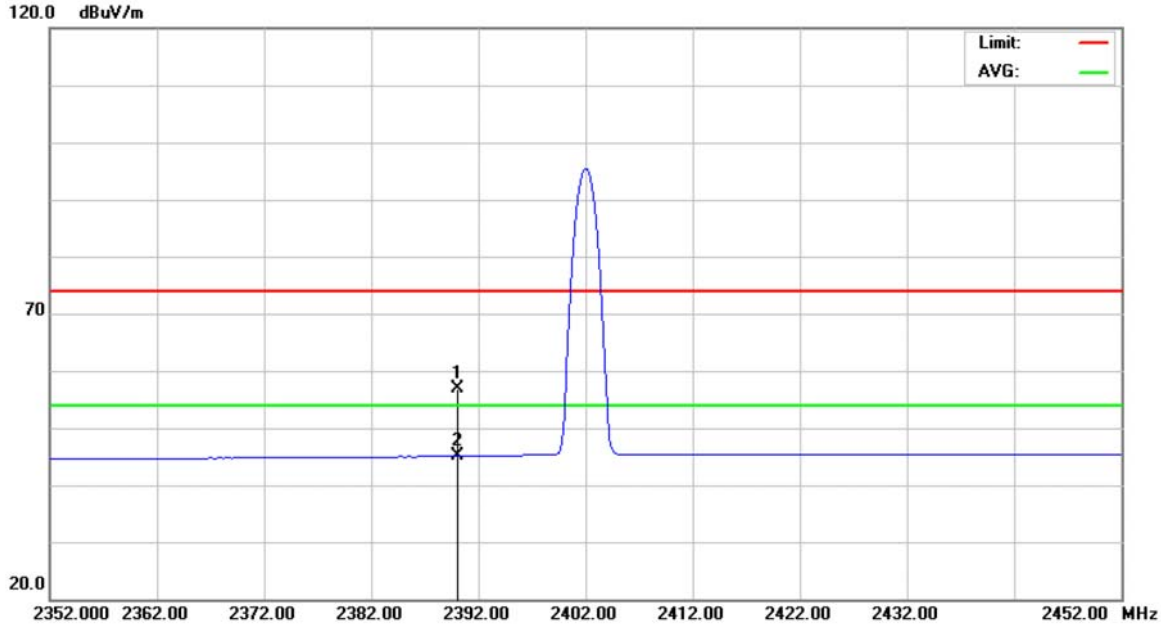


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4959.635	43.06	5.89	48.95	74.00	-25.05	peak	
2		4959.635	30.17	5.89	36.06	54.00	-17.94	AVG	
3		7440.090	43.93	13.05	56.98	74.00	-17.02	peak	
4	*	7440.090	30.58	13.05	43.63	54.00	-10.37	AVG	

9.9 TEST RESULTS (RESTRICTED BANDS)

E.U.T	Multi-functional Master Controller	Model Name	MT880
Temperature	24°C	Relative Humidity	46%
Test Voltage	AC 120V/60Hz		
Test Mode	Bluetooth/1 Mbps/2402 MHz		
NOTE	The transmitter was setup to transmit at the lowest channel and the field strength was measured at 2310-2390 MHz.		

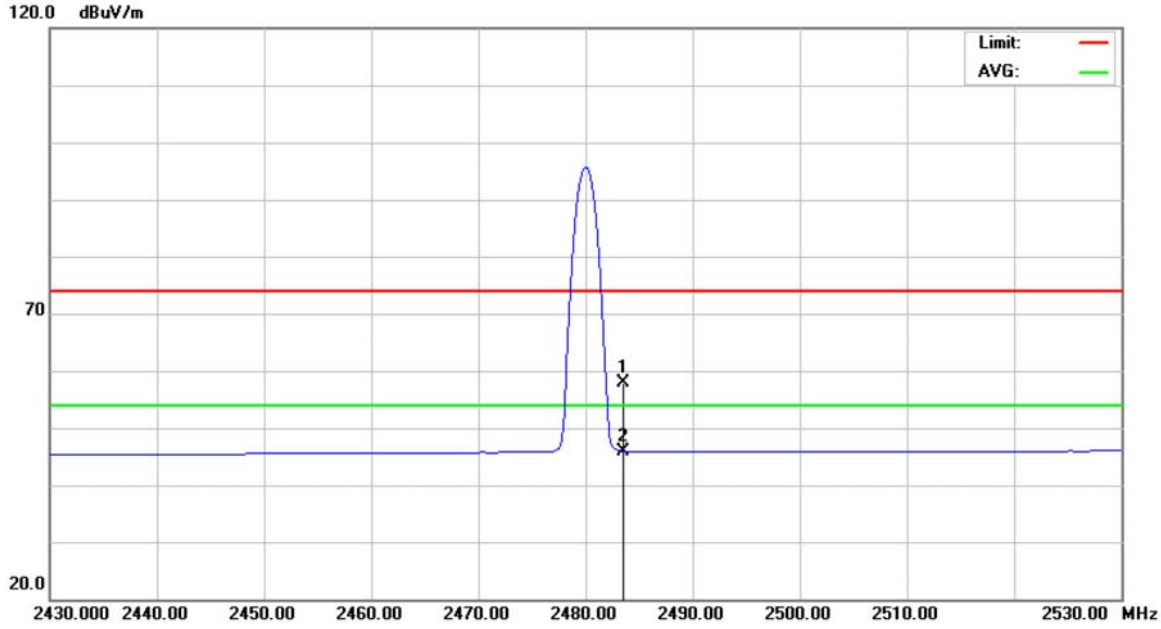
Polarization: Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		2390.000	25.11	31.67	56.78	74.00	-17.22	peak	
2	*	2390.000	13.39	31.67	45.06	54.00	-8.94	AVG	

E.U.T	Multi-functional Master Controller	Model Name	MT880
Temperature	24°C	Relative Humidity	46%
Test Voltage	AC 120V/60Hz		
Test Mode	Bluetooth/1 Mbps/2480 MHz		
NOTE	The transmitter was setup to transmit at the highest channel and the field strength was measured at 2483.5-2500 MHz.		

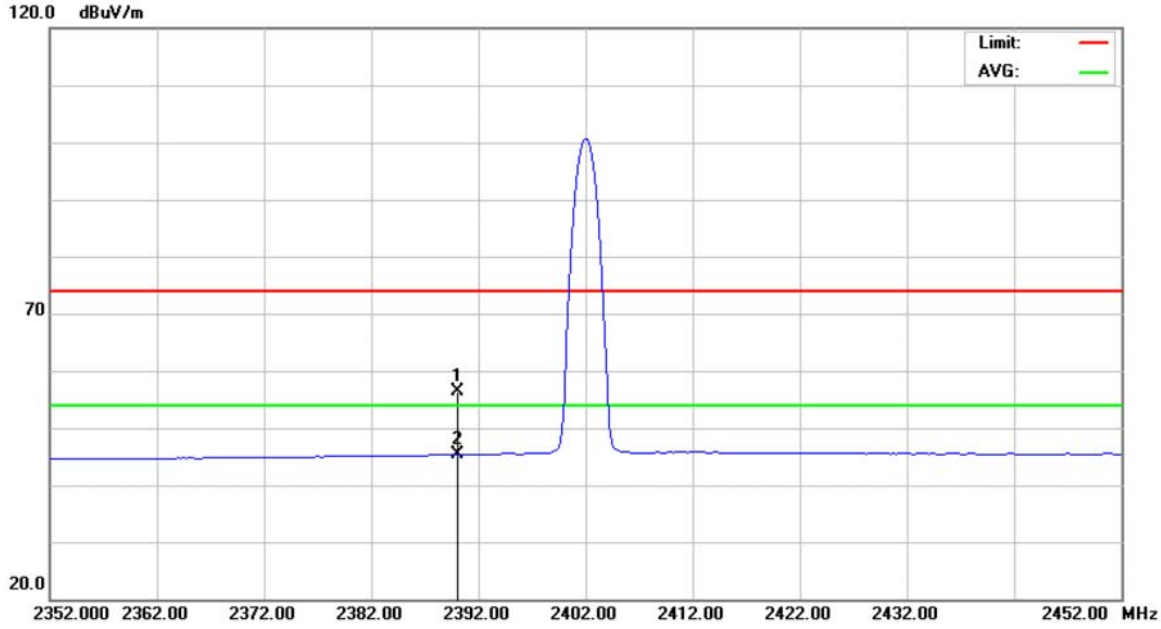
Polarization: Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		2483.500	25.80	32.09	57.89	74.00	-16.11	peak	
2	*	2483.500	13.78	32.09	45.87	54.00	-8.13	AVG	

E.U.T	Multi-functional Master Controller	Model Name	MT880
Temperature	24°C	Relative Humidity	46%
Test Voltage	AC 120V/60Hz		
Test Mode	Bluetooth/1 Mbps/2402 MHz		
NOTE	The transmitter was setup to transmit at the lowest channel and the field strength was measured at 2310-2390 MHz.		

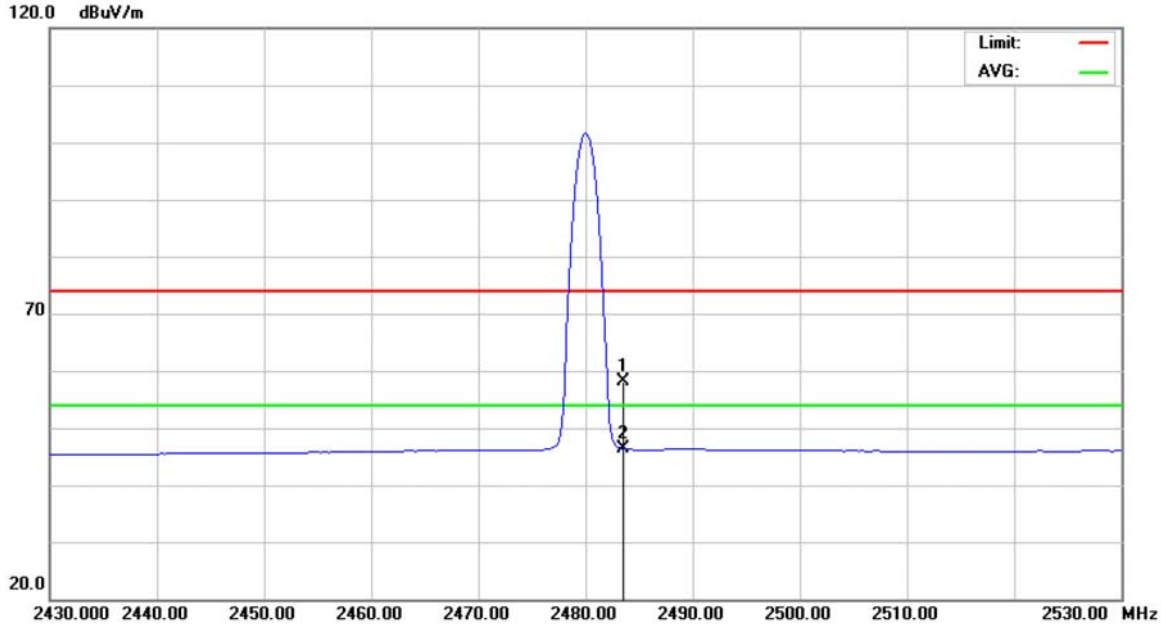
Polarization: Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		2390.000	24.64	31.67	56.31	74.00	-17.69	peak	
2	*	2390.000	13.72	31.67	45.39	54.00	-8.61	AVG	

E.U.T	Multi-functional Master Controller	Model Name	MT880
Temperature	24°C	Relative Humidity	46%
Test Voltage	AC 120V/60Hz		
Test Mode	Bluetooth/1 Mbps/2480 MHz		
NOTE	The transmitter was setup to transmit at the highest channel and the field strength was measured at 2483.5-2500 MHz.		

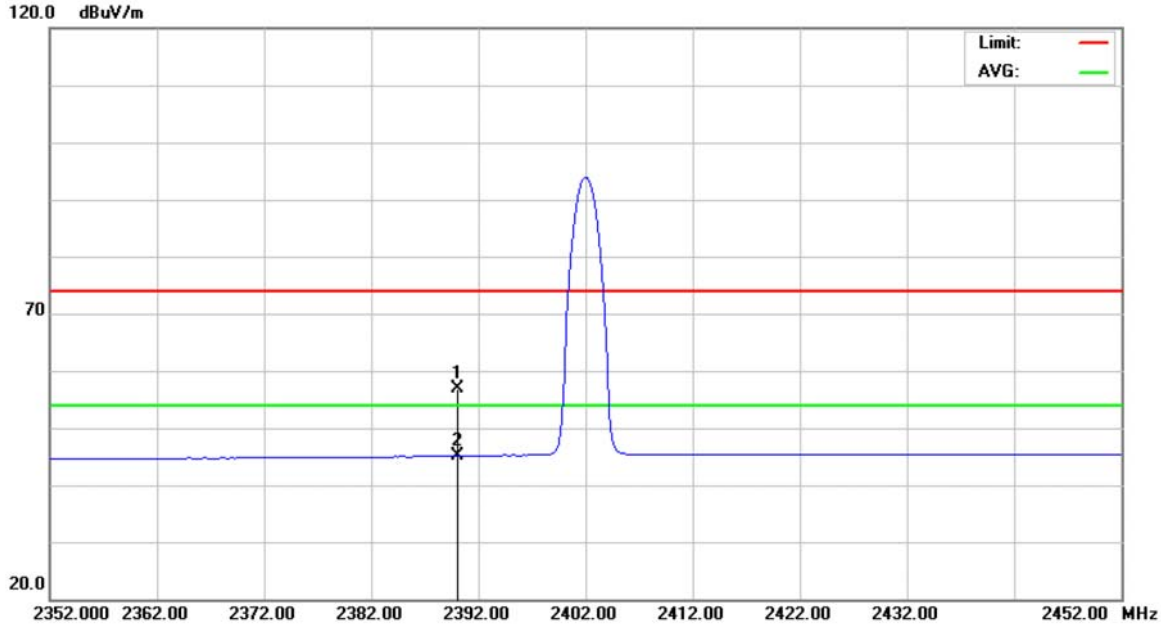
Polarization: Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		2483.500	26.11	32.09	58.20	74.00	-15.80	peak	
2	*	2483.500	14.32	32.09	46.41	54.00	-7.59	AVG	

E.U.T	Multi-functional Master Controller	Model Name	MT880
Temperature	24°C	Relative Humidity	46%
Test Voltage	AC 120V/60Hz		
Test Mode	Bluetooth/3 Mbps/2402 MHz		
NOTE	The transmitter was setup to transmit at the lowest channel and the field strength was measured at 2310-2390 MHz.		

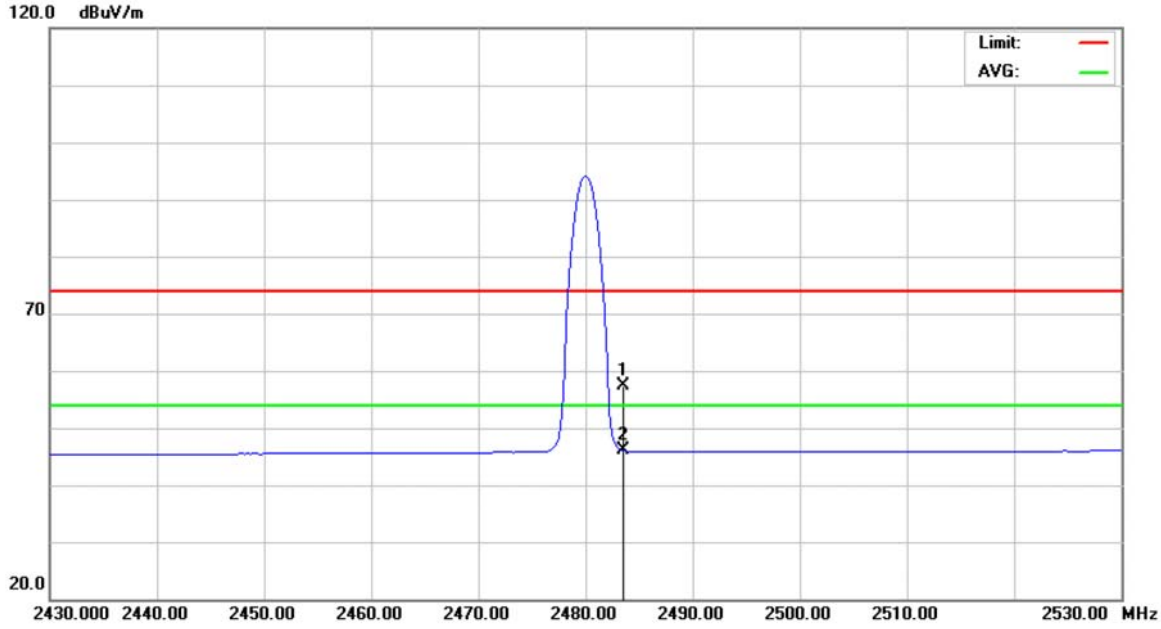
Polarization: Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		2390.000	25.30	31.67	56.97	74.00	-17.03	peak	
2	*	2390.000	13.42	31.67	45.09	54.00	-8.91	AVG	

E.U.T	Multi-functional Master Controller	Model Name	MT880
Temperature	24°C	Relative Humidity	46%
Test Voltage	AC 120V/60Hz		
Test Mode	Bluetooth/3 Mbps/2480 MHz		
NOTE	The transmitter was setup to transmit at the highest channel and the field strength was measured at 2483.5-2500 MHz.		

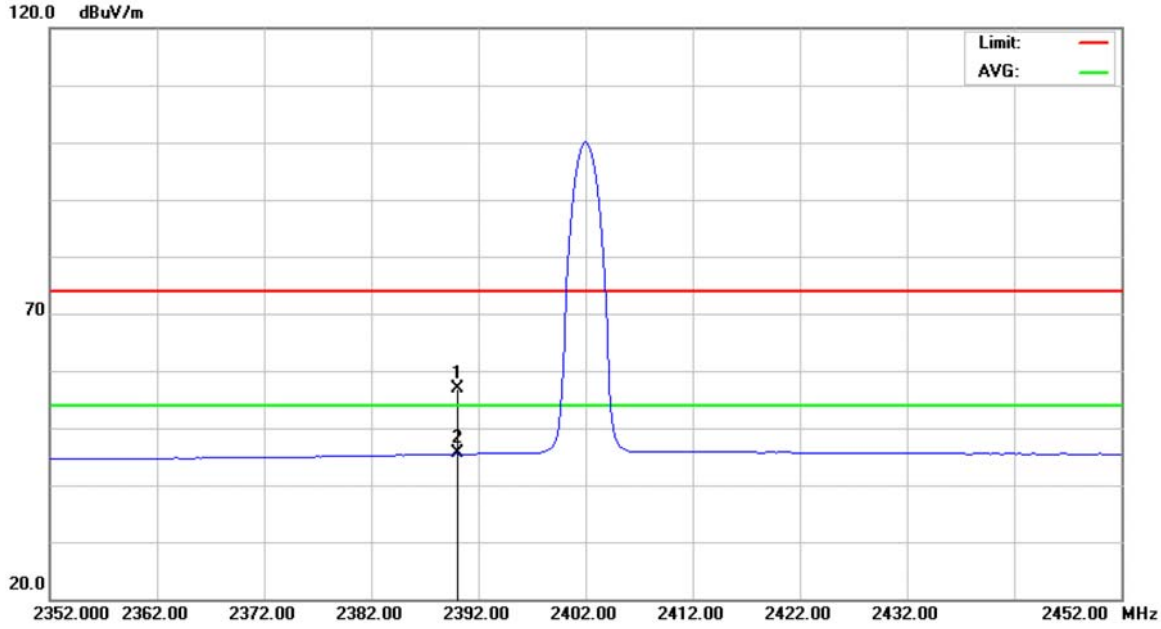
Polarization: Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		2483.500	25.18	32.09	57.27	74.00	-16.73	peak	
2	*	2483.500	13.95	32.09	46.04	54.00	-7.96	AVG	

E.U.T	Multi-functional Master Controller	Model Name	MT880
Temperature	24°C	Relative Humidity	46%
Test Voltage	AC 120V/60Hz		
Test Mode	Bluetooth/3 Mbps/2402 MHz		
NOTE	The transmitter was setup to transmit at the lowest channel and the field strength was measured at 2310-2390 MHz.		

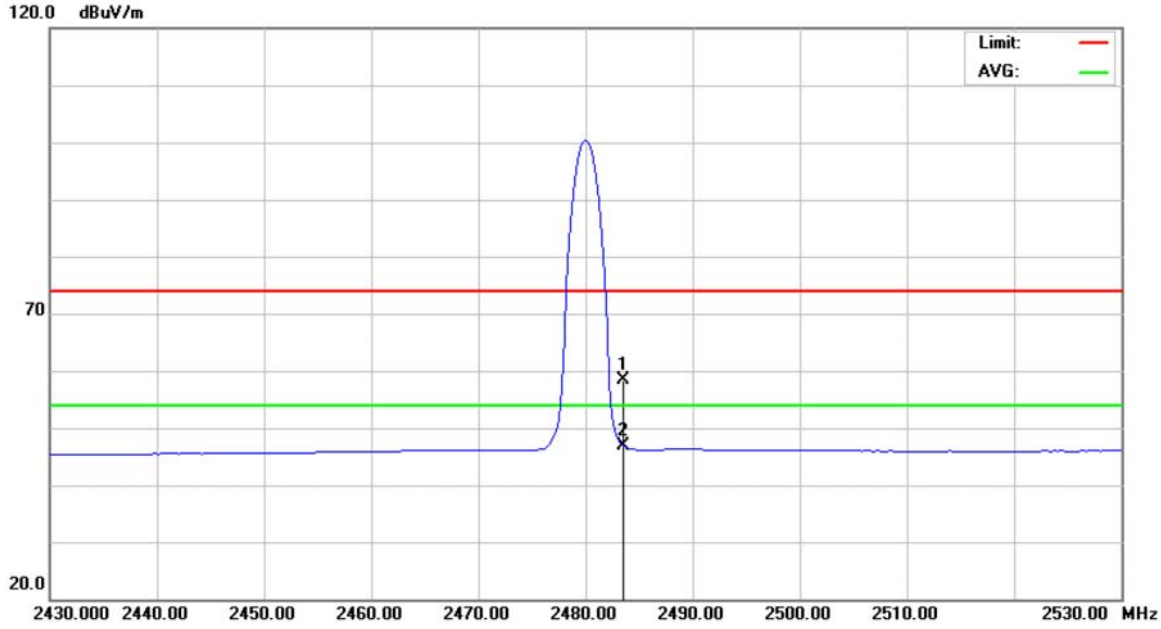
Polarization: Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		2390.000	25.27	31.67	56.94	74.00	-17.06	peak	
2	*	2390.000	13.84	31.67	45.51	54.00	-8.49	AVG	

E.U.T	Multi-functional Master Controller	Model Name	MT880
Temperature	24°C	Relative Humidity	46%
Test Voltage	AC 120V/60Hz		
Test Mode	Bluetooth/3 Mbps/2480 MHz		
NOTE	The transmitter was setup to transmit at the highest channel and the field strength was measured at 2483.5-2500 MHz.		

Polarization: Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		2483.500	26.41	32.09	58.50	74.00	-15.50	peak	
2	*	2483.500	14.74	32.09	46.83	54.00	-7.17	AVG	

10 NUMBER OF HOPPING FREQUENCY

10.1 LIMIT

Test Item	Frequency Range (MHz)	Limit
Number of Hopping Channel	2400-2483.5	shall use at least 15 channels

10.2 MEASUREMENT INSTRUMENTS LIST

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP-30	100854	Sep. 08, 2014

NOTE: **N/A**: denotes No Model Name, No Serial No. or No Calibration specified.

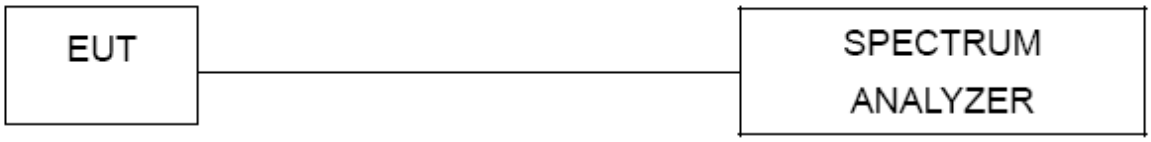
10.3 MEASURING INSTRUMENTS SETTING

Spectrum Analyzer	Parameter Setting
Attenuation	Auto
Span Frequency	> Operating Frequency Range
RB	100 kHz
VB	100 kHz
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

10.4 TEST PROCEDURES

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= 100 kHz, VBW=100 kHz, Sweep time = Auto.

10.5 TEST SETUP LAYOUT



10.6 DEVIATION FROM TEST STANDARD

No deviation

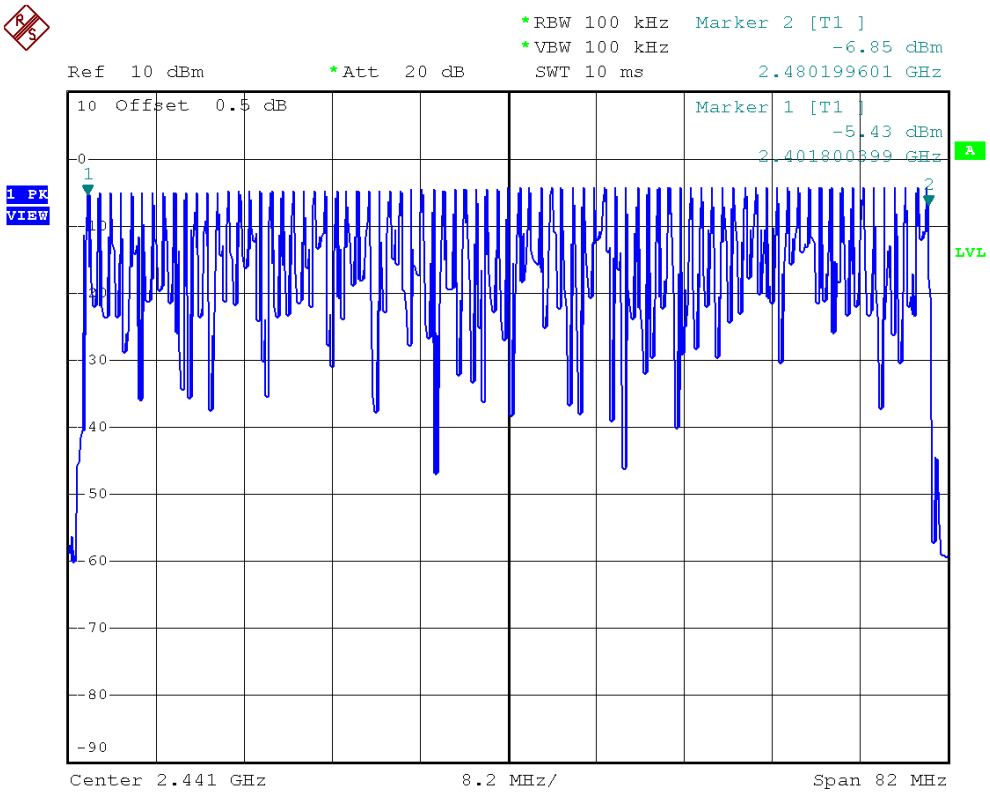
10.7 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 5.6 Unless otherwise a special operating condition is specified in the follows during the testing.

10.8TEST RESULTS

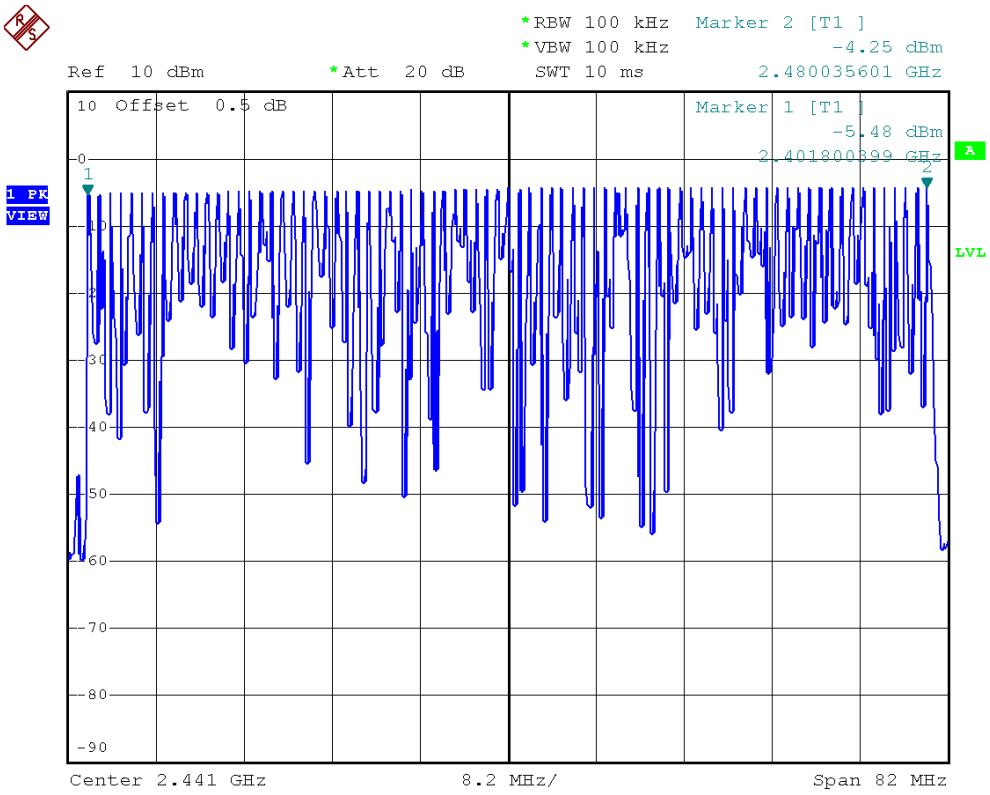
E.U.T	Multi-functional Master Controller	Model Name	MT880
Temperature	26°C	Relative Humidity	60%
Test Voltage	AC 120V/60Hz		
Test Mode	Bluetooth/1 Mbps		

Number of Hopping Channel	Limit	Result
79	15	Pass



E.U.T	Multi-functional Master Controller	Model Name	MT880
Temperature	26°C	Relative Humidity	60%
Test Voltage	AC 120V/60Hz		
Test Mode	Bluetooth/3 Mbps		

Number of Hopping Channel	Limit	Result
79	15	Pass



11 AVERAGE TIME OF OCCUPANCY

11.1LIMIT

Test Item	Frequency Range (MHz)	Limit
Average time of occupancy	2400-2483.5	shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

11.2MEASUREMENT INSTRUMENTS LIST

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP-30	100854	Sep. 08, 2014

NOTE: **N/A**: denotes No Model Name, No Serial No. or No Calibration specified.

11.3TEST PROCEDURES

a. The transmitter output (antenna port) was connected to the spectrum analyzer
b. Set RBW of spectrum analyzer to 100 kHz and VBW to 100 kHz.
c. Use a video trigger with the trigger level set to enable triggering only on full pulses.
d. Sweep Time is more than once pulse time.
e. Set the center frequency on any frequency would be measure and set the frequency span to zero span.
f. Measure the maximum time duration of one single pulse.
g. Set the EUT for DH5, DH3 and DH1 packet transmitting.
h. Measure the maximum time duration of one single pulse.
i. DH5 Packet permit maximum 1600/ 79 / 6 = 3.37 hops per second in each channel (5 time slots RX, 1 time slot TX). So, the dwell time is the time duration of the pulse times 3.37 x 31.6 = 106.6 within 31.6 seconds.
j. DH3 Packet permit maximum 1600 / 79 / 4 = 5.06 hops per second in each channel (3 time slots RX, 1 time slot TX). So, the dwell time is the time duration of the pulse times 5.06 x 31.6 = 160 within 31.6 seconds.
k. DH1 Packet permit maximum 1600 / 79 /2 = 10.12 hops per second in each channel (1 time slot RX, 1 time slot TX). So, the dwell time is the time duration of the pulse times 10.12 x 31.6 = 320 within 31.6 seconds.

11.4TEST SETUP LAYOUT

11.5DEVIATION FROM TEST STANDARD

No deviation

11.6 EUT OPERATING CONDITIONS

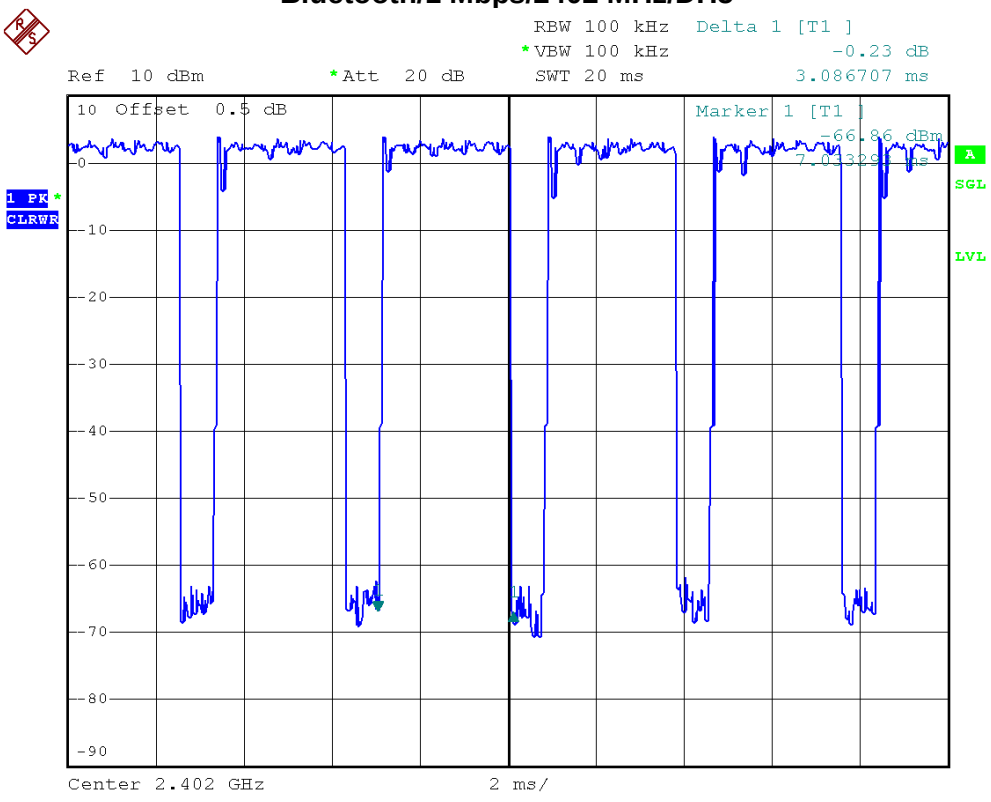
The EUT tested system was configured as the statements of 5.6 Unless otherwise a special operating condition is specified in the follows during the testing.

11.7TEST RESULTS

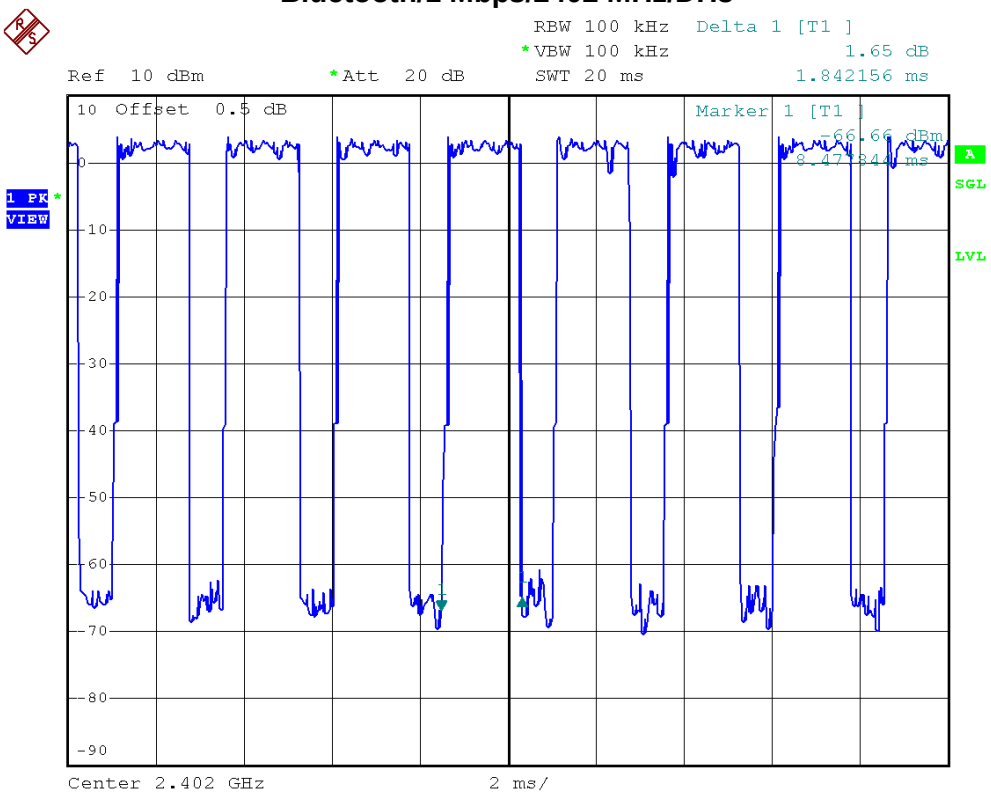
E.U.T	Multi-functional Master Controller	Model Name	MT880
Temperature	26°C	Relative Humidity	46%
Test Voltage	AC 120V/60Hz		
Test Mode	Bluetooth/1 Mbps/2402 MHz		

Data Packet	Frequency	Pulse Duration (ms)	Dwell Time (s)	Limit (s)	Result
DH5	2402 MHz	3.0867	0.3292	0.4	PASS
DH3	2402 MHz	1.8422	0.2947	0.4	PASS
DH1	2402 MHz	0.5622	0.1799	0.4	PASS

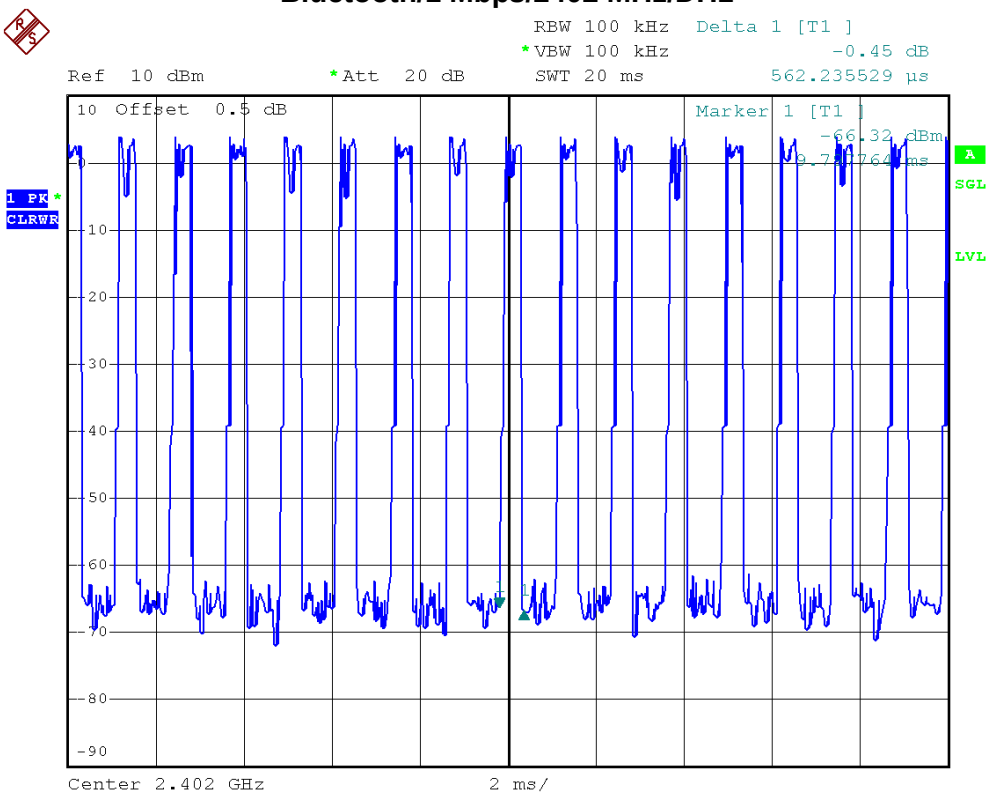
Bluetooth/1 Mbps/2402 MHz/DH5



Bluetooth/1 Mbps/2402 MHz/DH3



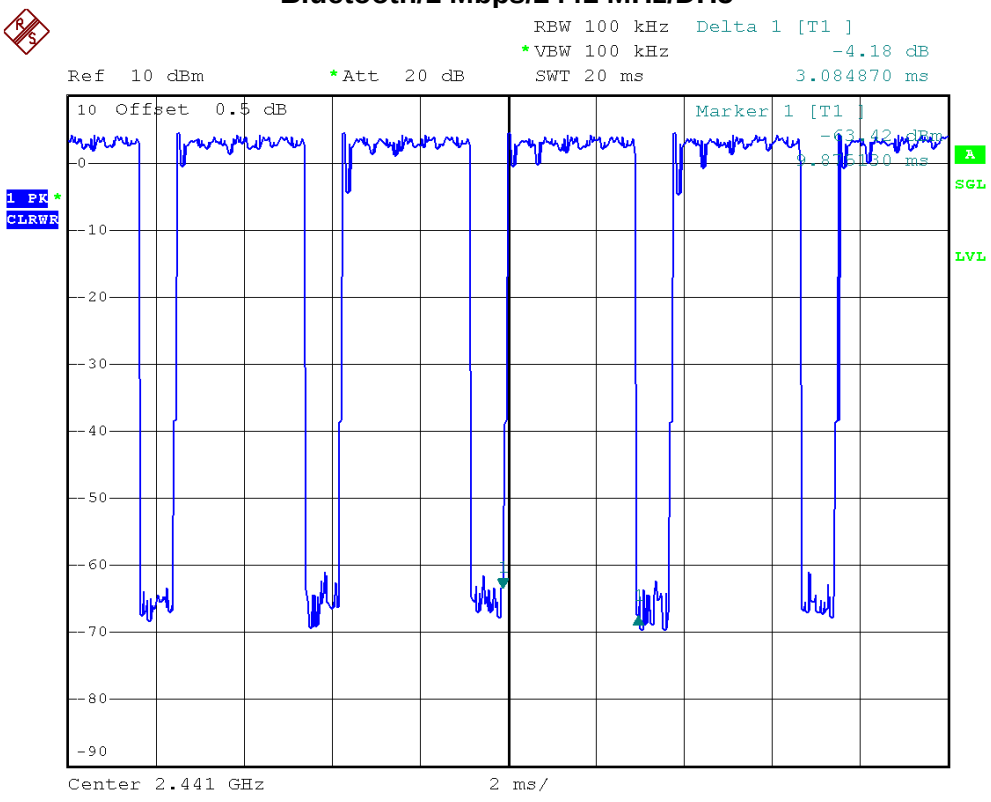
Bluetooth/1 Mbps/2402 MHz/DH1



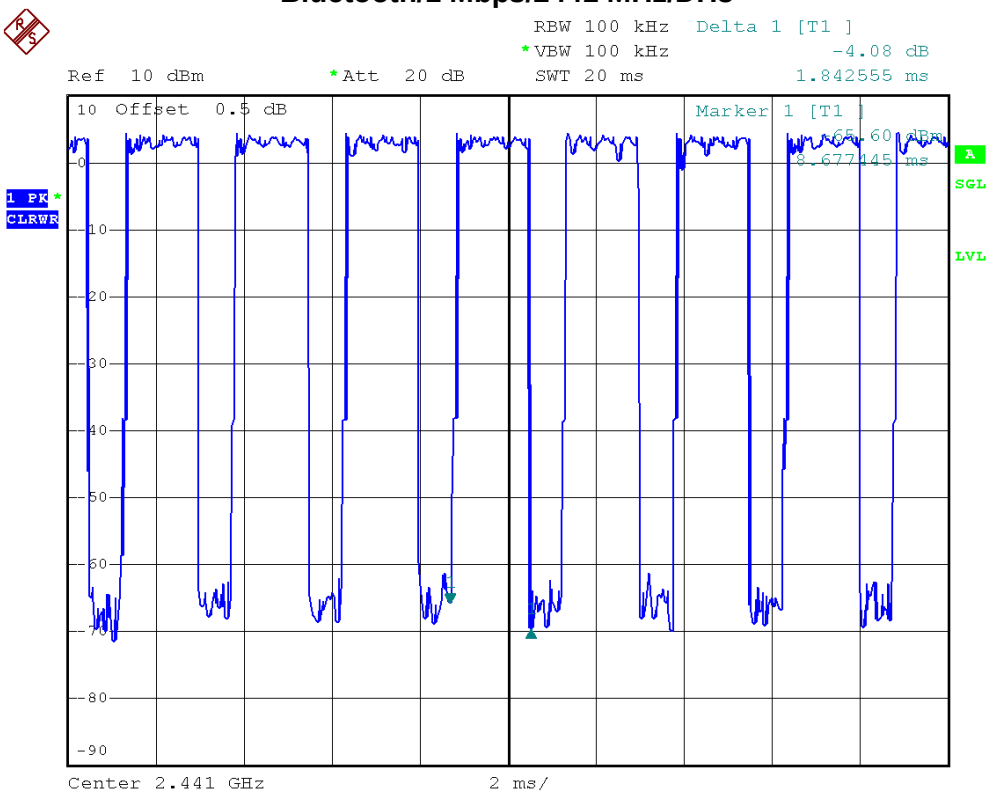
E.U.T	Multi-functional Master Controller	Model Name	MT880
Temperature	26°C	Relative Humidity	46%
Test Voltage	AC 120V/60Hz		
Test Mode	Bluetooth/1 Mbps/2441 MHz		

Data Packet	Frequency	Pulse Duration (ms)	Dwell Time (s)	Limit (s)	Result
DH5	2441 MHz	3.0849	0.3291	0.4	PASS
DH3	2441 MHz	1.8426	0.2948	0.4	PASS
DH1	2441 MHz	0.5618	0.1798	0.4	PASS

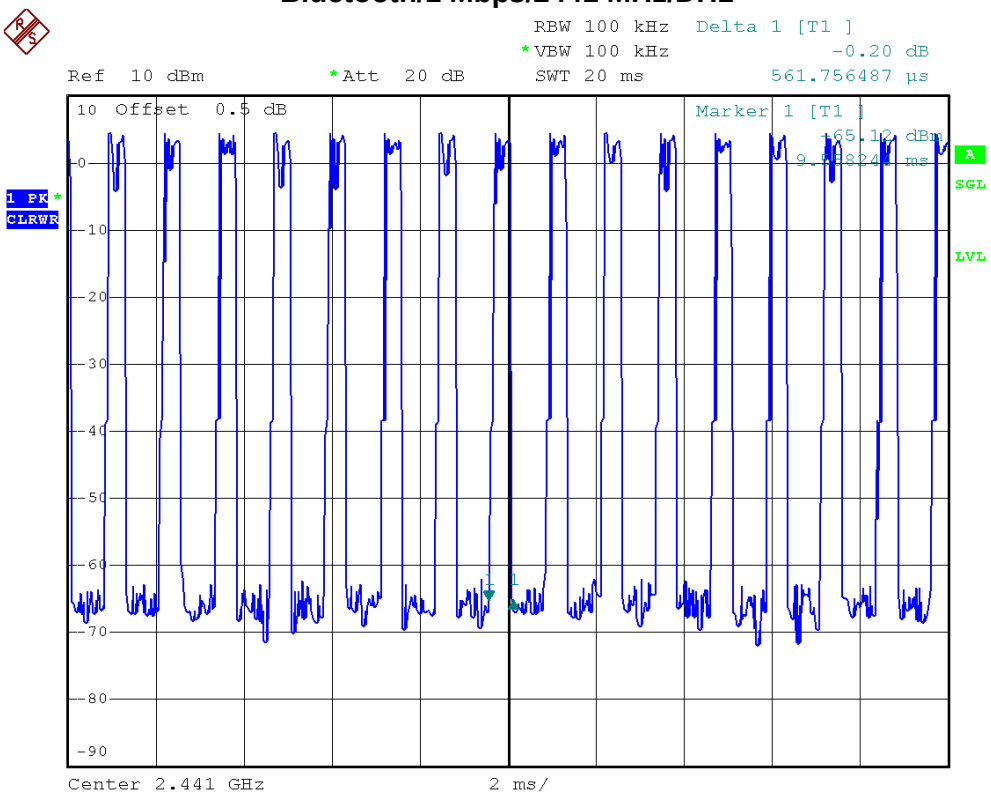
Bluetooth/1 Mbps/2441 MHz/DH5



Bluetooth/1 Mbps/2441 MHz/DH3



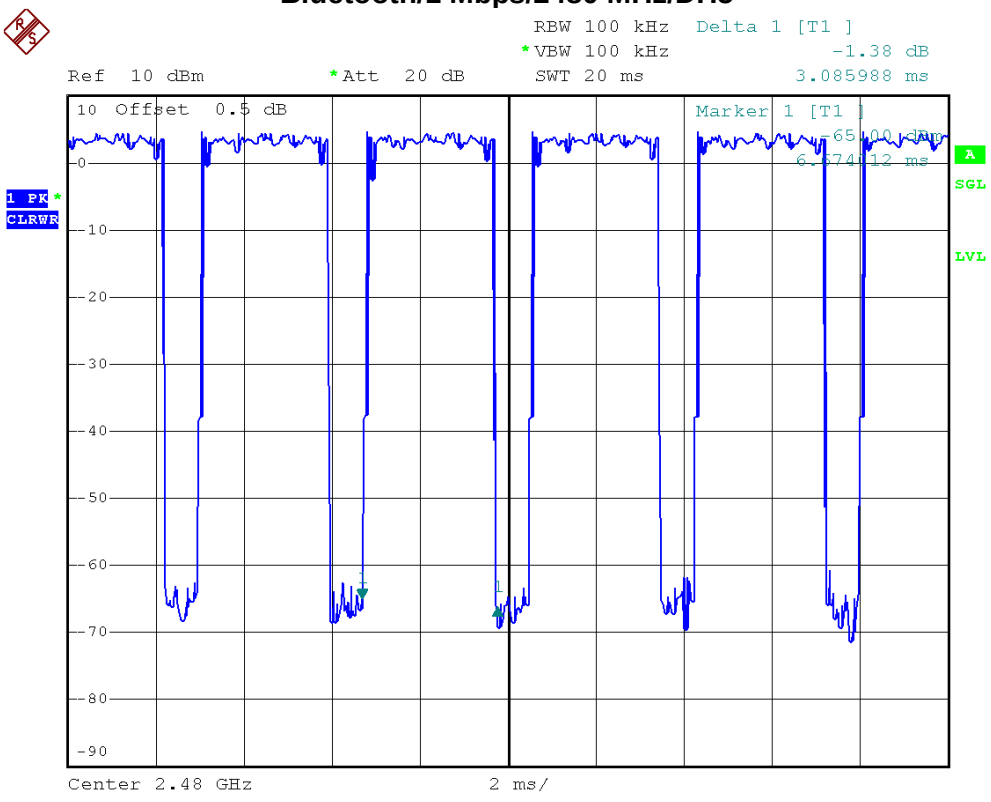
Bluetooth/1 Mbps/2441 MHz/DH1



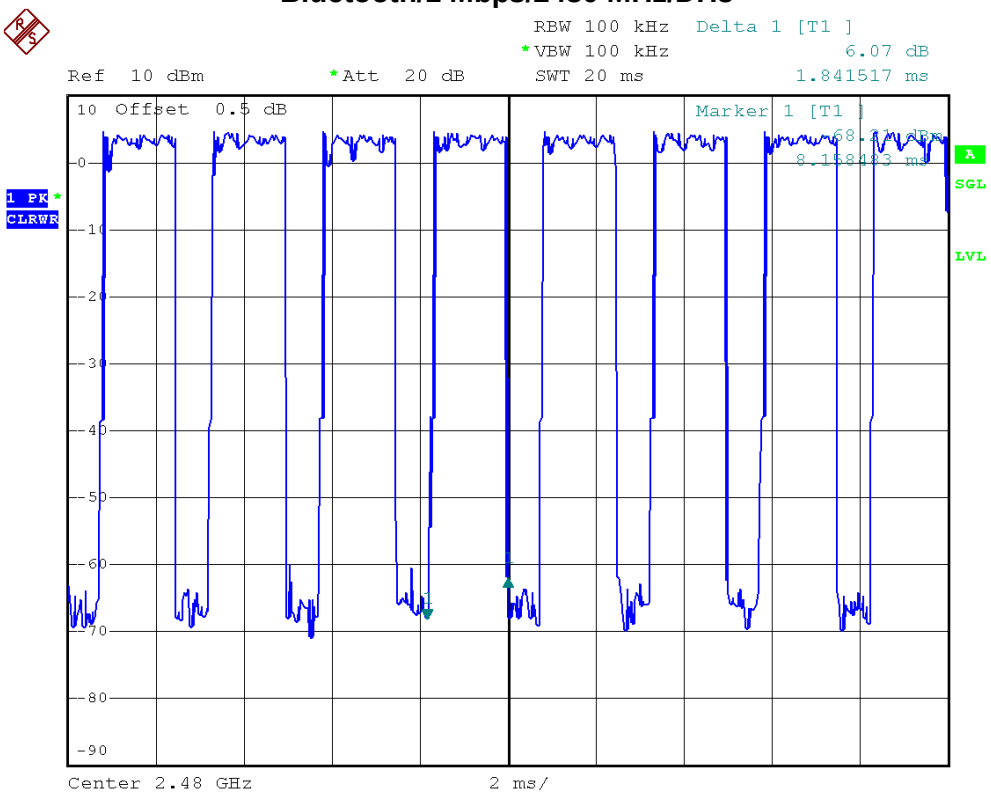
E.U.T	Multi-functional Master Controller	Model Name	MT880
Temperature	26°C	Relative Humidity	46%
Test Voltage	AC 120V/60Hz		
Test Mode	Bluetooth/1 Mbps/2480 MHz		

Data Packet	Frequency	Pulse Duration (ms)	Dwell Time (s)	Limit (s)	Result
DH5	2480 MHz	3.0860	0.3292	0.4	PASS
DH3	2480 MHz	1.8415	0.2946	0.4	PASS
DH1	2480 MHz	0.6004	0.1921	0.4	PASS

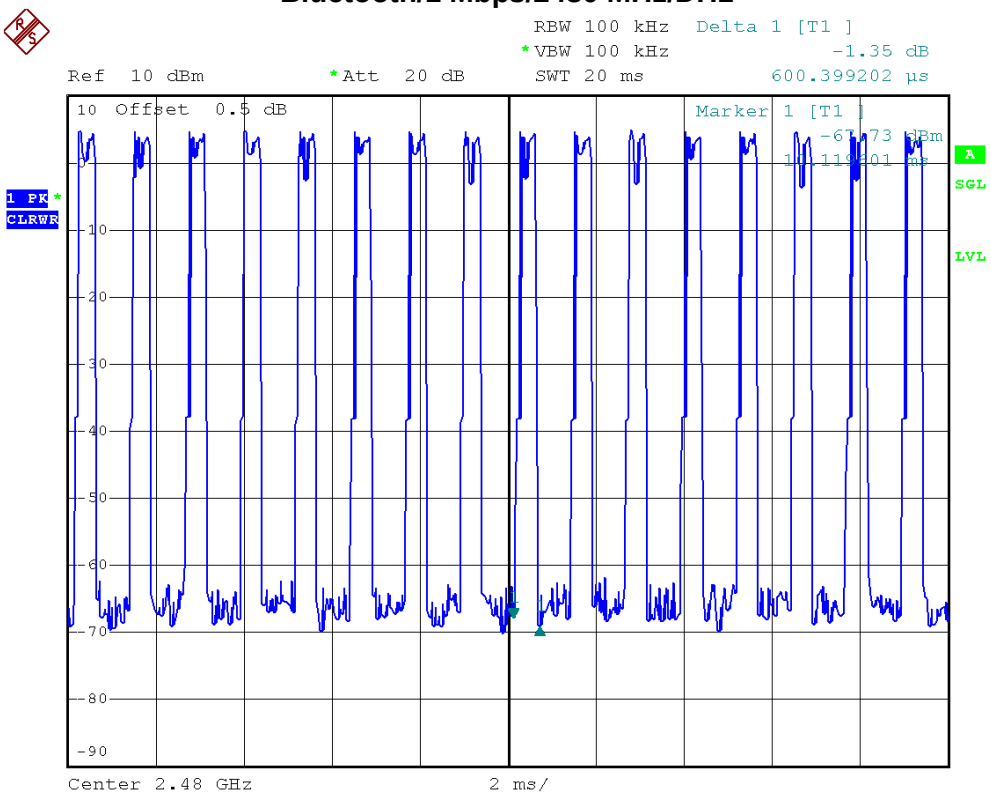
Bluetooth/1 Mbps/2480 MHz/DH5



Bluetooth/1 Mbps/2480 MHz/DH3



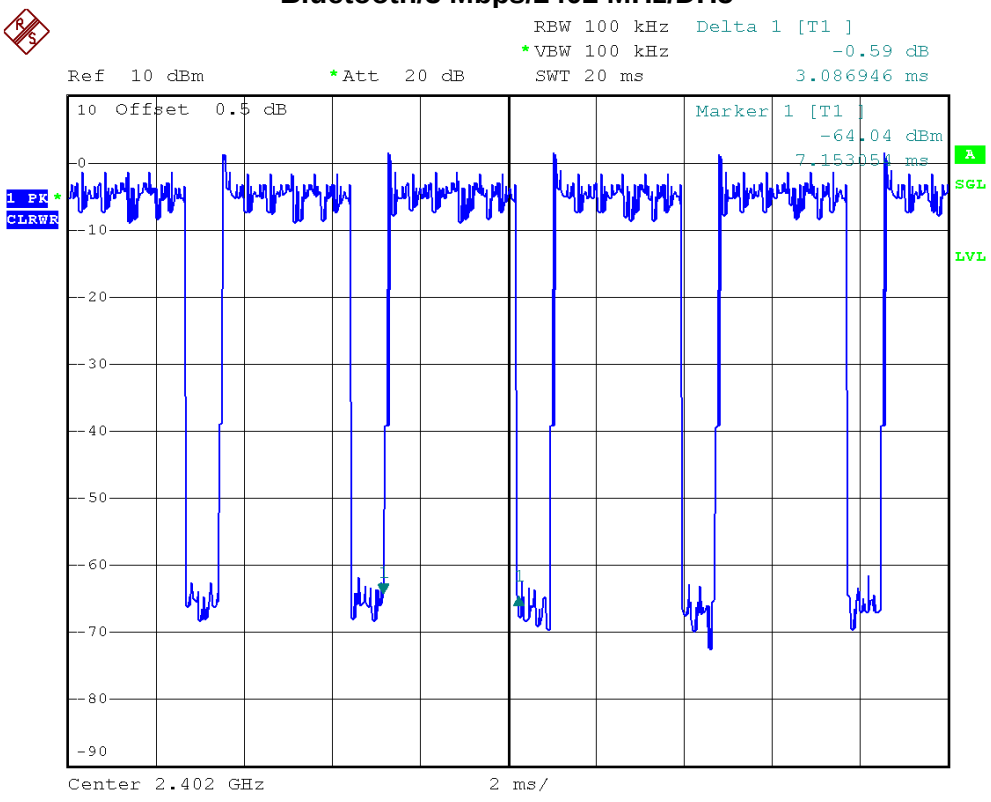
Bluetooth/1 Mbps/2480 MHz/DH1



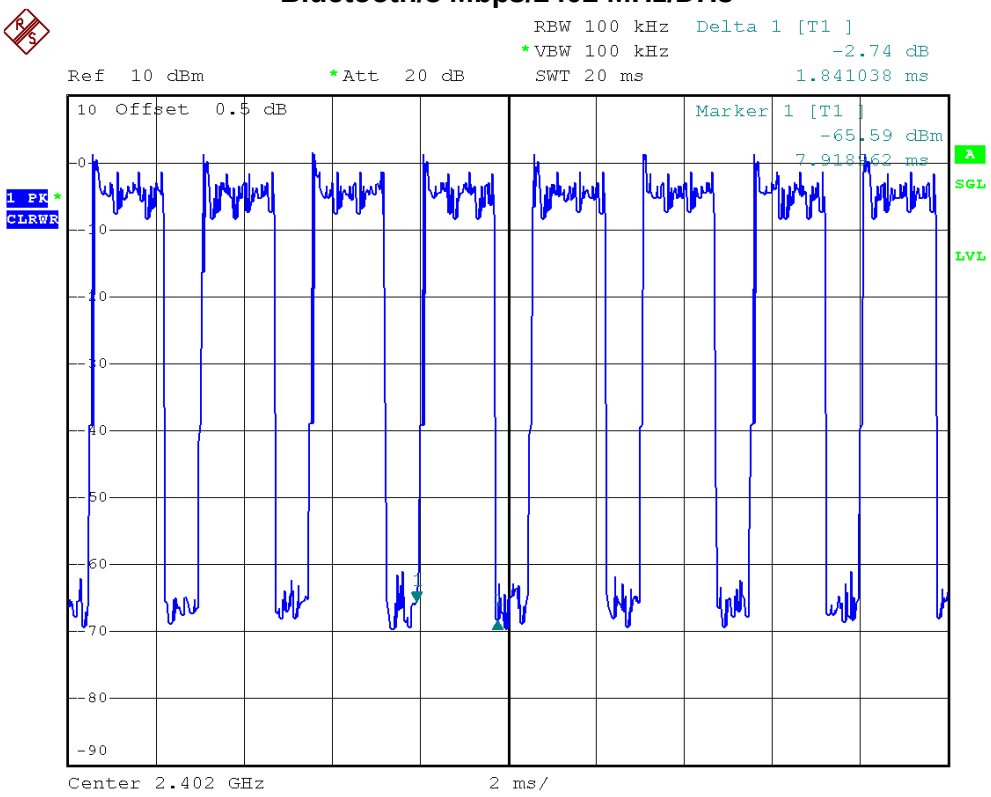
E.U.T	Multi-functional Master Controller	Model Name	MT880
Temperature	26°C	Relative Humidity	46%
Test Voltage	AC 120V/60Hz		
Test Mode	Bluetooth/3 Mbps/2402 MHz		

Data Packet	Frequency	Pulse Duration (ms)	Dwell Time (s)	Limit (s)	Result
DH5	2402 MHz	3.0869	0.3293	0.4	PASS
DH3	2402 MHz	1.8410	0.2946	0.4	PASS
DH1	2402 MHz	0.5602	0.1793	0.4	PASS

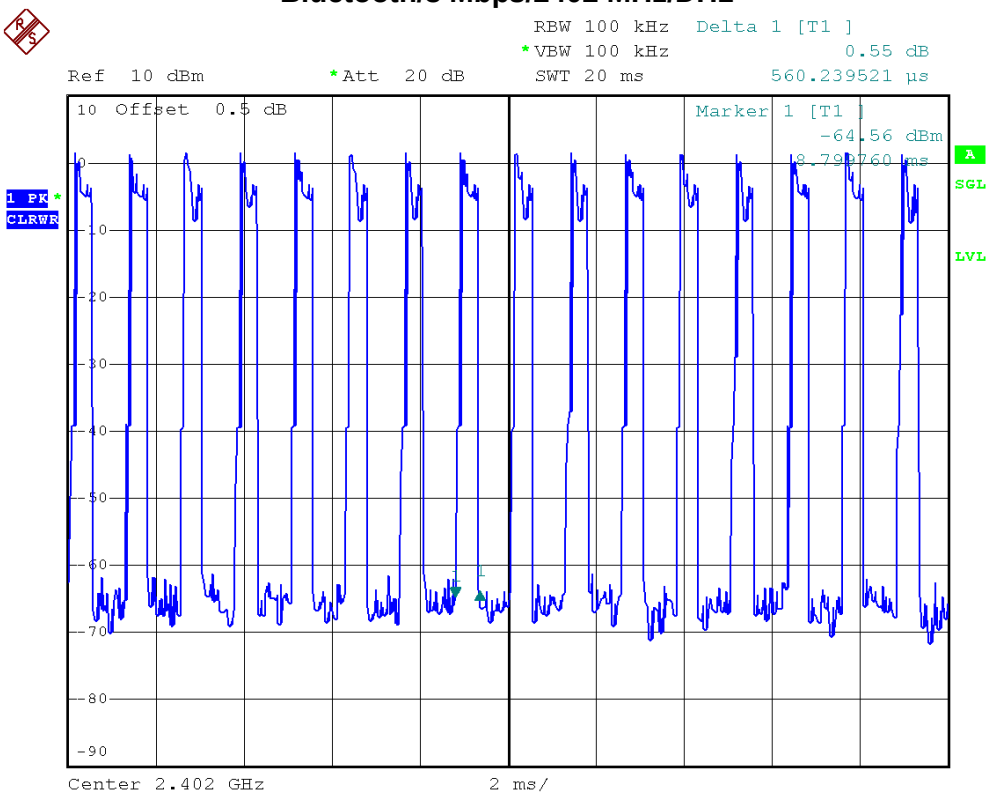
Bluetooth/3 Mbps/2402 MHz/DH5



Bluetooth/3 Mbps/2402 MHz/DH3



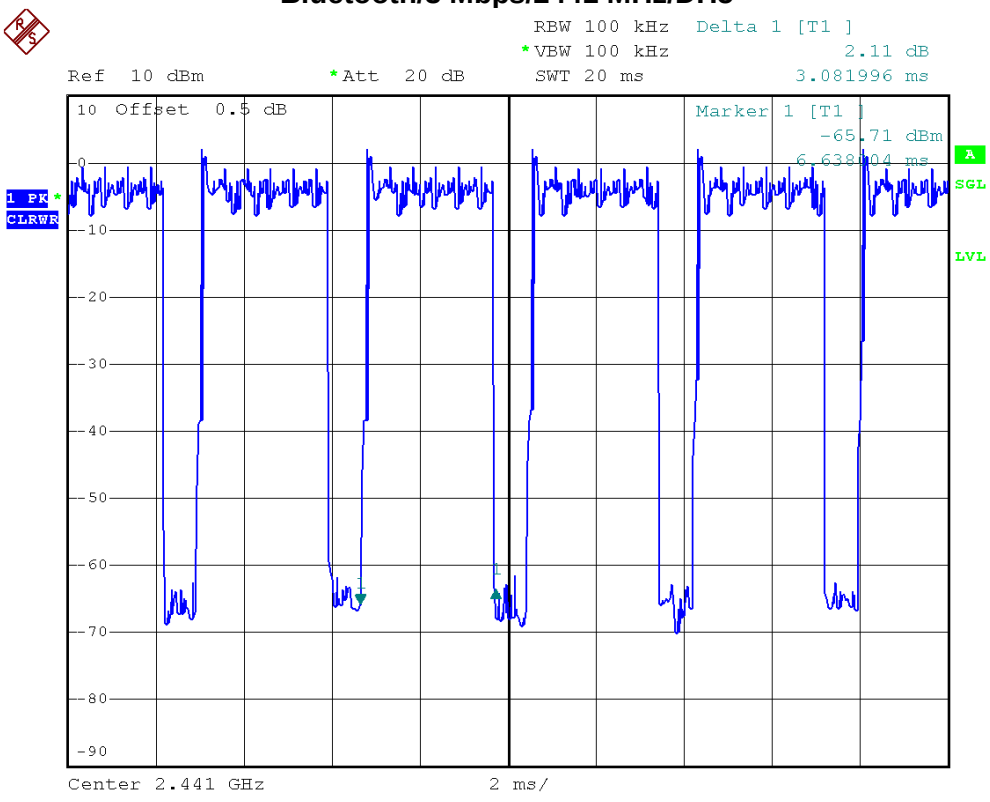
Bluetooth/3 Mbps/2402 MHz/DH1



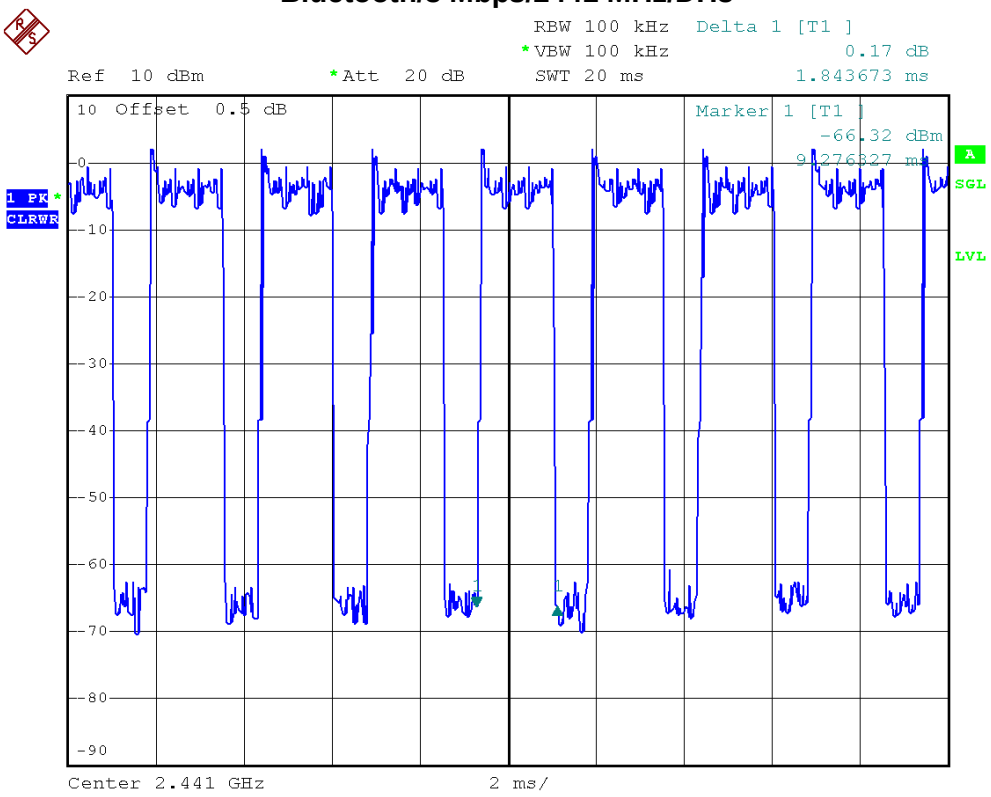
E.U.T	Multi-functional Master Controller	Model Name	MT880
Temperature	26°C	Relative Humidity	46%
Test Voltage	AC 120V/60Hz		
Test Mode	Bluetooth/3 Mbps/2441 MHz		

Data Packet	Frequency	Pulse Duration (ms)	Dwell Time (s)	Limit (s)	Result
DH5	2441 MHz	3.0820	0.3287	0.4	PASS
DH3	2441 MHz	1.8437	0.2950	0.4	PASS
DH1	2441 MHz	0.5616	0.1797	0.4	PASS

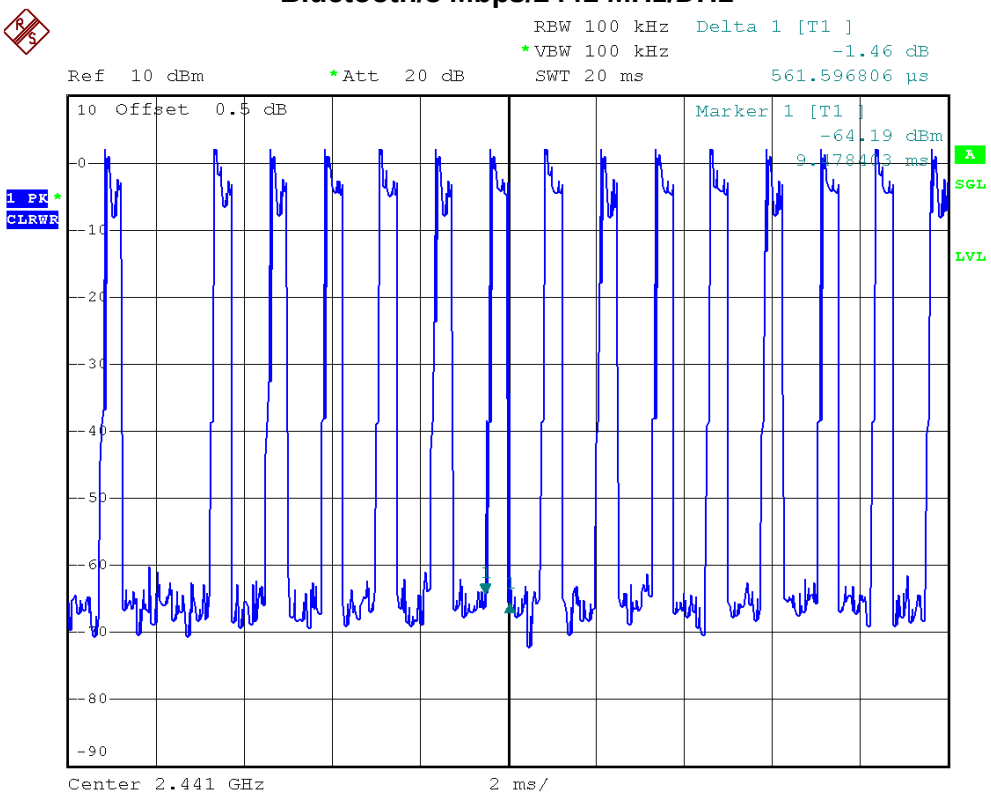
Bluetooth/3 Mbps/2441 MHz/DH5



Bluetooth/3 Mbps/2441 MHz/DH3



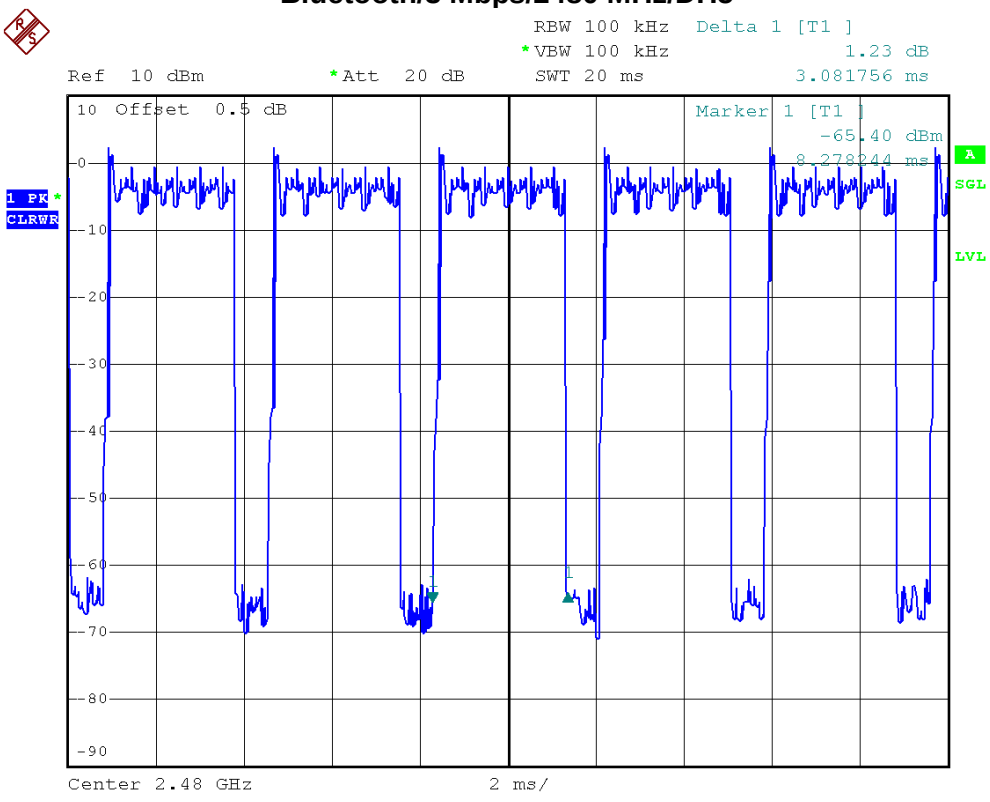
Bluetooth/3 Mbps/2441 MHz/DH1



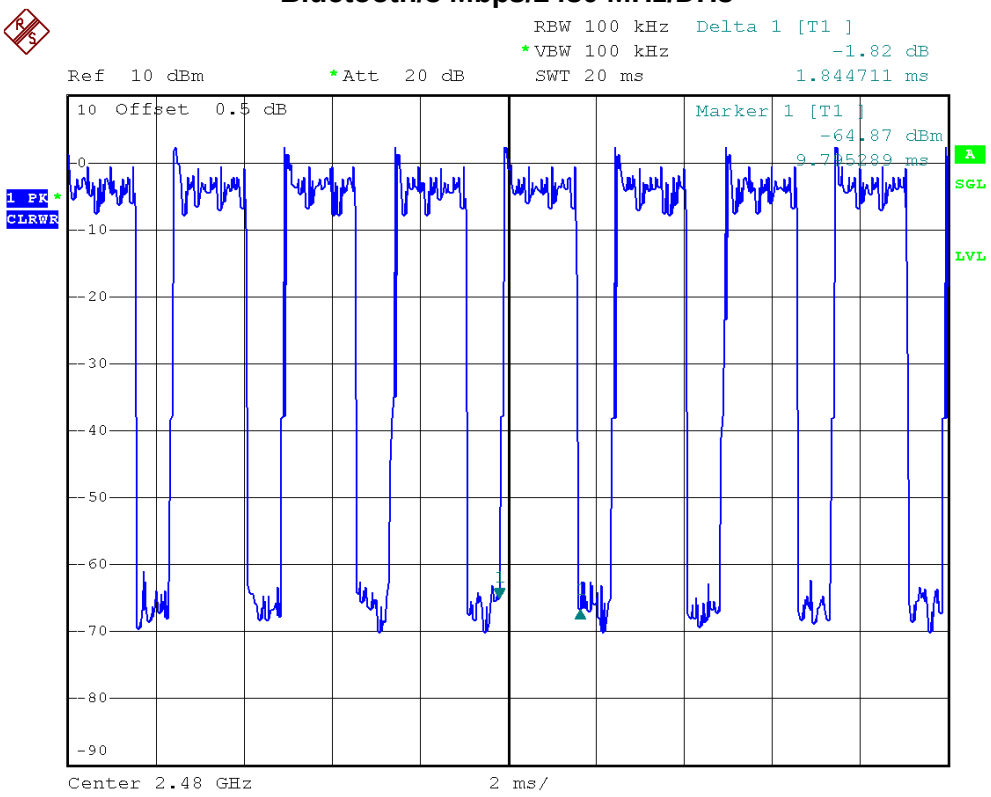
E.U.T	Multi-functional Master Controller	Model Name	MT880
Temperature	26°C	Relative Humidity	46%
Test Voltage	AC 120V/60Hz		
Test Mode	Bluetooth/3 Mbps/2480 MHz		

Data Packet	Frequency	Pulse Duration (ms)	Dwell Time (s)	Limit (s)	Result
DH5	2480 MHz	3.0818	0.3287	0.4	PASS
DH3	2480 MHz	1.8447	0.2952	0.4	PASS
DH1	2480 MHz	0.5600	0.1792	0.4	PASS

Bluetooth/3 Mbps/2480 MHz/DH5



Bluetooth/3 Mbps/2480 MHz/DH3



Bluetooth/3 Mbps/2480 MHz/DH1