

FCC Radio Test Report

FCC ID: XMF-MID8001

FCC Class II Permissive Change

Report No. : TB-FCC145092
Applicant : Lightcomm Technology Co., Ltd.
Equipment Under Test (EUT)
EUT Name : MID
Model No. : MID8001-IB
Series Model No. : DL801W, DL808W
Brand Name : N/A
Receipt Date : 2015-08-12
Test Date : 2015-08-12 to 2015-08-17
Issue Date : 2015-08-18
Standards : FCC Part 15: 2014, Subpart C(15.247)
Test Method : ANSI C63.10:2013
Conclusions : **PASS**

In the configuration tested, the EUT complied with the standards specified above,
The EUT technically complies with the FCC requirements

Test/Witness Engineer :

WANG SU

Approved& Authorized :

Longhai



This report details the results of the testing carried out on one sample. The results contained in this test report do not relate to other samples of the same product. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in the report.

Contents

CONTENTS.....	2
1. GENERAL INFORMATION ABOUT EUT	3
1.1 Client Information.....	3
1.2 General Description of EUT (Equipment Under Test)	3
1.3 Block Diagram Showing the Configuration of System Tested.....	5
1.4 Description of Support Units	5
1.5 Description of Test Mode.....	5
1.6 Description of Test Software Setting	6
1.7 Measurement Uncertainty	7
1.8 Test Facility.....	7
2. TEST SUMMARY	8
3. TEST EQUIPMENT	9
4. CONDUCTED EMISSION TEST	10
4.1 Test Standard and Limit.....	10
4.2 Test Setup.....	10
4.3 Test Procedure.....	10
4.4 EUT Operating Mode	11
4.5 Test Data.....	11
5. RADIATED EMISSION TEST	16
5.1 Test Standard and Limit.....	16
5.2 Test Setup.....	17
5.3 Test Procedure.....	18
5.4 EUT Operating Condition	18
6. RESTRICTED BANDS REQUIREMENT	38
6.1 Test Standard and Limit.....	38
6.2 Test Setup.....	38
6.3 Test Procedure.....	38
6.4 EUT Operating Condition	39
6.4 Test Data.....	39
7. ANTENNA REQUIREMENT.....	48
7.1 Standard Requirement.....	48
7.2 Antenna Connected Construction	48

1. General Information about EUT

1.1 Client Information

Applicant : Lightcomm Technology Co., Ltd.
Address : RM 1708-10, 17/F, PROSPERITY CENTRE, 25 CHONG YIP STREET, KWUN TONG, KOWLOON, HONG KONG
Manufacturer : Huizhou Hengdu Electronics Co.,Ltd.
Address : DIP South Area, Huiao Highway, Huizhou, Guangdong, China

1.2 General Description of EUT (Equipment Under Test)

EUT Name	:	MID
Models No.	:	MID8001-IB, DL801W, DL808W
Model Difference	:	All models are identical in the same PCB layout, interior structure and electrical circuit, The only difference is model name for commercial purpose.
Product Description	:	Operation Frequency: Bluetooth:2402~2480MHz
		Number of Channel: Bluetooth:79 Channels see note (2)
		Max Peak Output Power: GFSK:4.204dBm (Conducted Power)
		Antenna Gain: 0 dBi FPC Antenna
		Modulation Type: GFSK 1Mbps(1 Mbps) π /4-DQPSK(2 Mbps) 8-DPSK(3 Mbps)
Power Supply	:	DC power supplied by AC/DC Adapter. DC Voltage supplied from Li-ion battery.
Power Rating	:	Input: AC 100~240V 50/60Hz 0.35A Max. Output: 5V 2A. DC 3.7V from 4500mA Li-ion battery.
Connecting I/O Port(S)	:	Please refer to the User's Manual

Note:

- (1) For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.
- (2) This Test Report is FCC Part 15.247 for Bluetooth, and test procedure in accordance with Public Notice: DA 00-705.
- (3) Channel List:

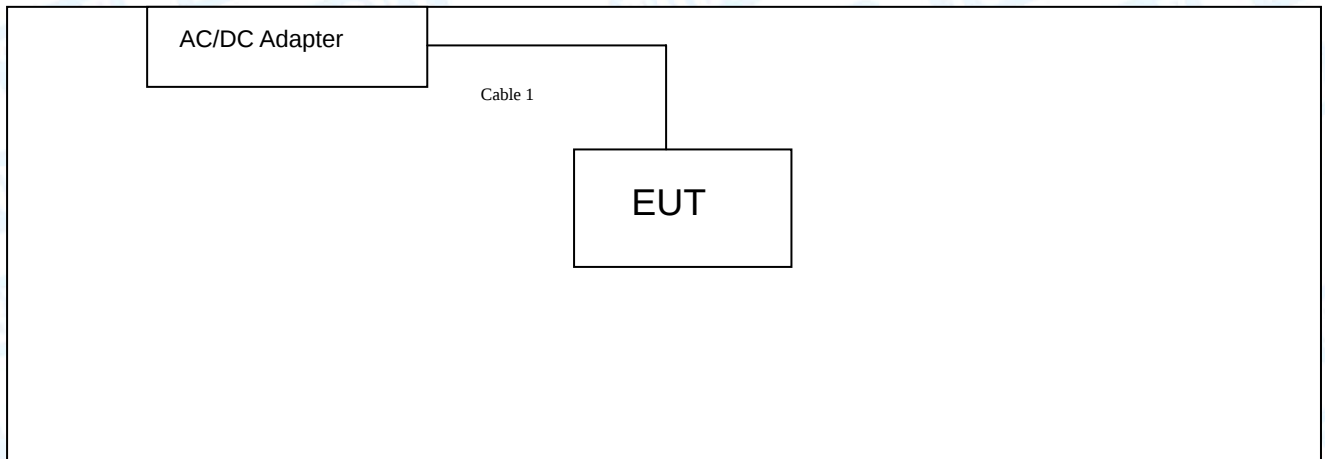
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
00	2402	27	2429	54	2456

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		

(4) The Antenna information about the equipment is provided by the applicant.

1.3 Block Diagram Showing the Configuration of System Tested

TX Mode



1.4 Description of Support Units

Equipment Information				
Name	Model	FCC ID/DOC	Manufacturer	Used “√”
√	√	√	√	√
Cable Information				
Number	Shielded Type	Ferrite Core	Length	Note
Cable 1	YES	NO	1.1M	Accessories

1.5 Description of Test Mode

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 follow was evaluated respectively.

For Conducted Test	
Final Test Mode	Description
Mode 1	AC Charging with TX GFSK Mode

For Radiated Test	
Final Test Mode	Description
Mode 1	AC Charging with TX GFSK Mode
Mode 2	TX Mode(GFSK) Channel 00/39/78
Mode 3	TX Mode($\pi/4$ -DQPSK) Channel 00/39/78
Mode 4	TX Mode(8-DPSK) Channel 00/39/78
Mode 5	Hopping Mode(GFSK)
Mode 6	Hopping Mode($\pi/4$ -DQPSK)
Mode 7	Hopping Mode(8-DPSK)

Note:

- (1) For all test, we have verified the construction and function in typical operation. And all the test modes were carried out with the EUT in transmitting operation in maximum power with all kinds of data rate. We have pretested all the test mode above.
According to ANSI C63.10 standards, the measurements are performed at the highest, middle, lowest available channels, and the worst case data rate as follows:
TX Mode: GFSK (1 Mbps)
TX Mode: 8-DPSK (3 Mbps)
- (2) The EUT is considered a portable unit; it was pre-tested on the positioned of each 3 axis, X-plane, Y-plane and Z-plane. The worst case was found positioned on X-plane as the normal use. Therefore only the test data of this X-plane was used for radiated emission measurement test.

1.6 Description of Test Software Setting

During testing channel& Power controlling software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product power parameters of Bluetooth mode.

Test Software Version	Realtek Bluetooth MP--RTK_BT_CHIP_ID_RTL8723B		
Frequency	2402 MHz	2441MHz	2480 MHz
GFSK	DEF	DEF	DEF
$\pi/4$ -DQPSK	DEF	DEF	DEF
8-DPSK	DEF	DEF	DEF

1.7 Measurement Uncertainty

The reported uncertainty of measurement $y \pm U$, where expanded uncertainty U is based on a standard uncertainty multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately 95 %.

Test Item	Parameters	Expanded Uncertainty (U_{Lab})
Conducted Emission	Level Accuracy: 9kHz~150kHz 150kHz to 30MHz	± 3.42 dB ± 3.42 dB
Radiated Emission	Level Accuracy: 9kHz to 30 MHz	± 4.60 dB
Radiated Emission	Level Accuracy: 30MHz to 1000 MHz	± 4.40 dB
Radiated Emission	Level Accuracy: Above 1000MHz	± 4.20 dB

1.8 Test Facility

The testing report were performed by the Shenzhen Toby Technology Co., Ltd., in their facilities located at 1A/F., Bldg.6, Yusheng Industrial Zone, The National Road No.107 Xixiang Section 467, Xixiang, Bao'an, Shenzhen, Guangdong, China. At the time of testing, the following bodies accredited the Laboratory:

CNAS (L5813)

The Laboratory has been accredited by CNAS to ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories for the competence in the field of testing. And the Registration No.: CNAS L5813.

FCC List No.: (811562)

The Laboratory is listed in the United States of American Federal Communications Commission (FCC), and the registration number is 811562.

IC Registration No.: (11950A-1)

The Laboratory has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing. The site registration: Site# 11950A-1.

May 22, 2014 certificated by TUV Rheinland(China) Co., Ltd. with TUV certificate No.: UA 50282953 0001 and report No.: 17026822 002. The certificate is valid until the next scheduled audit or up to 18 months, at the discretion of TUV Rhineland.

2. Test Summary

FCC Part 15 Subpart C(15.247)/ RSS 247 Issue 1				
Standard Section		Test Item	Judgment	Remark
FCC	IC			
15.203		Antenna Requirement	PASS	N/A
15.207	RSS-GEN 7.2.2	Conducted Emission	PASS	N/A
15.205	RSS-Gen 7.2.3	Restricted Bands	PASS	N/A
15.247(a)(1)	RSS 247 5.1 (2)	Hopping Channel Separation	PASS	N/A Note(3)
15.247(a)(1)	RSS 247 5.1 (4)	Dwell Time	PASS	N/A Note(3)
15.247(b)(1)	RSS 247 5.4 (2)	Peak Output Power	PASS	N/A Note(3)
15.247(b)(1)	RSS 247 5.1 (4)	Number of Hopping Frequency	PASS	N/A Note(3)
15.247(c)	RSS 247 5.5	Radiated Spurious Emission	PASS	N/A
15.247(a)	RSS 247 5.1 (1)	99% Occupied Bandwidth & 20dB Bandwidth	PASS	99%OBW GFSK:917.1511kHz 8-DPSK: 1185.80kHz Note(3)
Note (1): “/” for no requirement for this test item. (2): N/A is an abbreviation for Not Applicable. (3): This report is Class II change report for the original equipment have changed, the transmitter module itself has not changed. More information about the test data please refer to the original test report.				

3. Test Equipment

Conducted Emission Test					
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Due Date
EMI Test Receiver	Rohde & Schwarz	ESCI	100321	Aug. 07, 2015	Aug. 06, 2016
RF Switching Unit	Compliance Direction Systems Inc	RSU-A4	34403	Aug. 07, 2015	Aug. 06, 2016
AMN	SCHWARZBECK	NNBL 8226-2	8226-2/164	Aug. 07, 2015	Aug. 06, 2016
LISN	Rohde & Schwarz	ENV216	101131	Aug. 07, 2015	Aug. 06, 2016
Radiation Emission Test					
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Due Date
Spectrum Analyzer	Agilent	E4407B	MY45106456	Sep. 01, 2014	Aug. 31, 2015
EMI Test Receiver	Rohde & Schwarz	ESCI	100010/007	Aug. 07, 2015	Aug. 06, 2016
Bilog Antenna	ETS-LINDGREN	3142E	00117537	Mar. 28, 2015	Mar. 27, 2016
Bilog Antenna	ETS-LINDGREN	3142E	00117542	Mar. 28, 2015	Mar. 27, 2016
Horn Antenna	ETS-LINDGREN	3117	00143207	Mar. 28, 2015	Mar. 27, 2016
Horn Antenna	ETS-LINDGREN	3117	00143209	Mar. 28, 2015	Mar. 27, 2016
Pre-amplifier	Sonoma	310N	185903	Mar. 28, 2015	Mar. 27, 2016
Pre-amplifier	HP	8447B	3008A00849	Mar. 28, 2015	Mar. 27, 2016
Cable	HUBER+SUHNER	100	SUCOFLEX	Mar. 28, 2015	Mar. 27, 2016
Positioning Controller	ETS-LINDGREN	2090	N/A	N/A	N/A

4. Conducted Emission Test

4.1 Test Standard and Limit

4.1.1 Test Standard
FCC Part 15.207

4.1.2 Test Limit

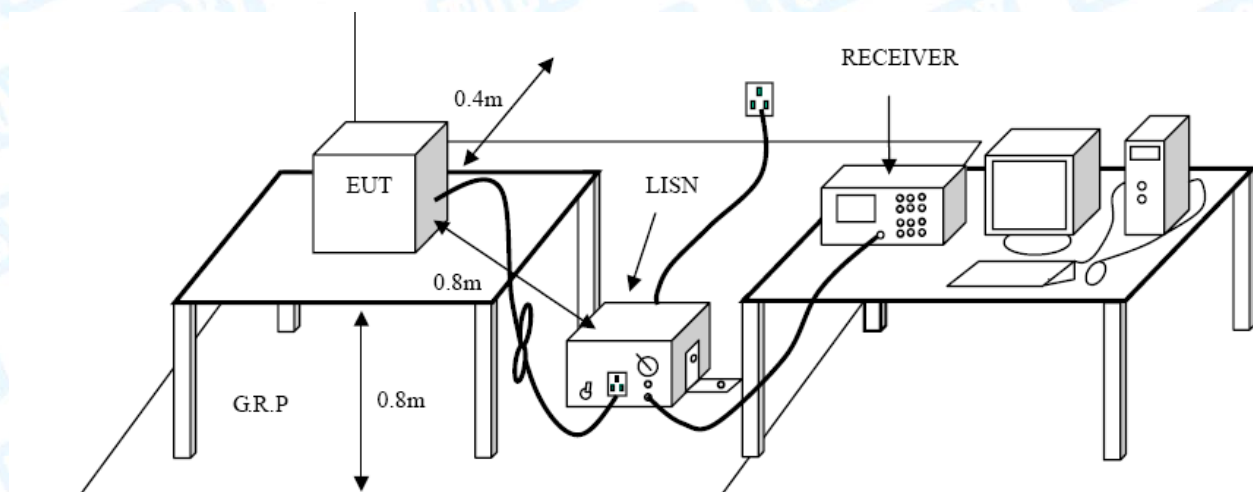
Conducted Emission Test Limit

Frequency	Maximum RF Line Voltage (dB μ V)	
	Quasi-peak Level	Average Level
150kHz~500kHz	66 ~ 56 *	56 ~ 46 *
500kHz~5MHz	56	46
5MHz~30MHz	60	50

Notes:

- (1) *Decreasing linearly with logarithm of the frequency.
- (2) The lower limit shall apply at the transition frequencies.
- (3) The limit decrease in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

4.2 Test Setup



4.3 Test Procedure

The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.

Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.

I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.

LISN at least 80 cm from nearest part of EUT chassis

The bandwidth of EMI test receiver is set at 9kHz, and the test frequency band is from 0.15MHz to 30MHz.

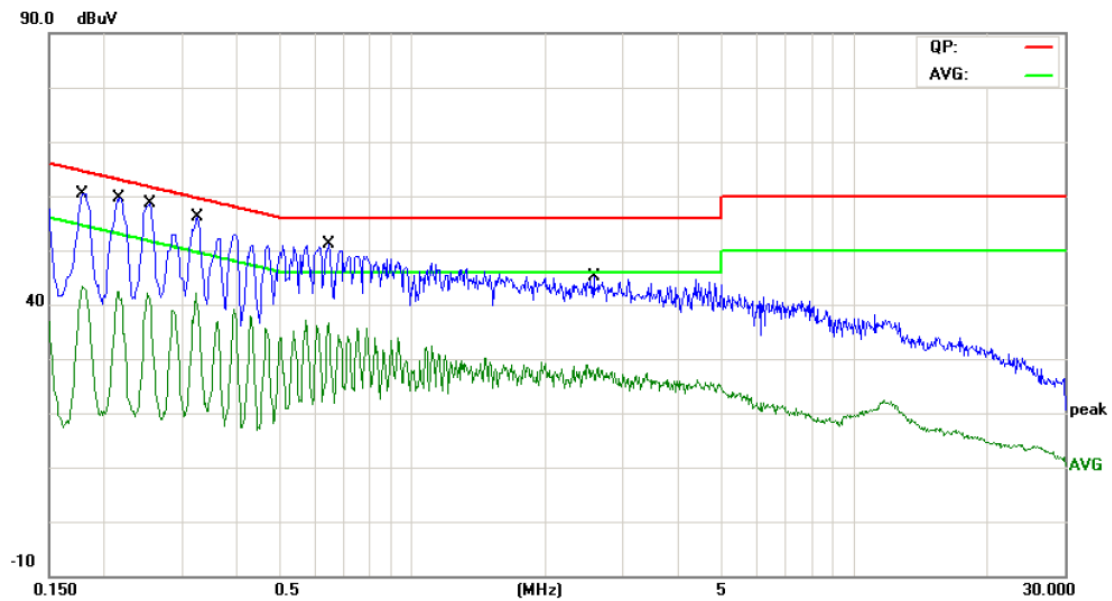
4.4 EUT Operating Mode

Please refer to the description of test mode.

4.5 Test Data

Please see the next page.

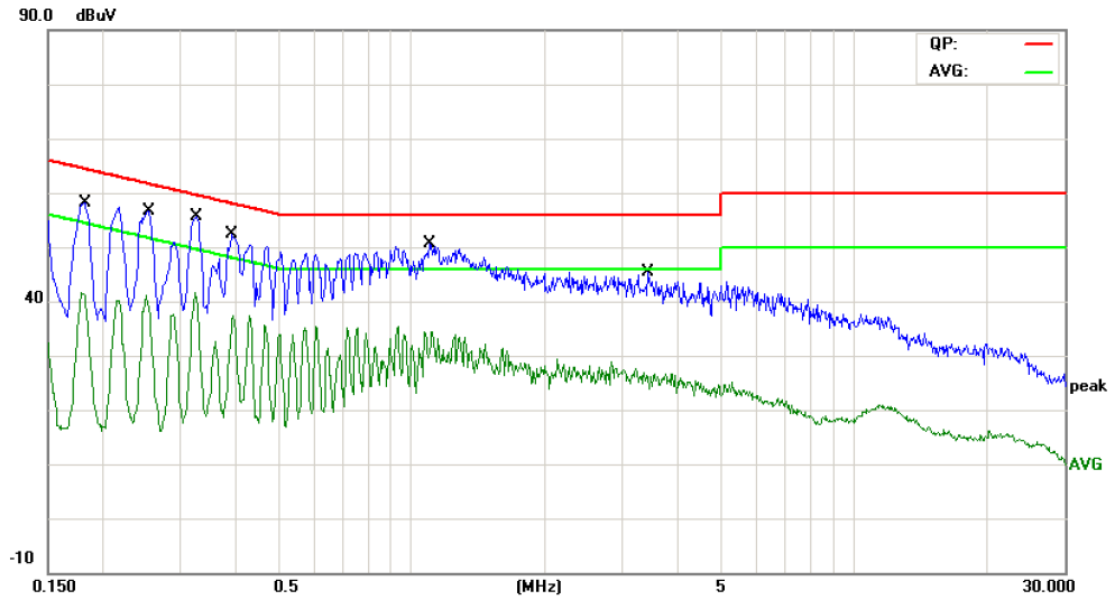
EUT:	MID	Model Name :	MID8001-IB
Temperature:	25 °C	Relative Humidity:	55%
Test Voltage:	AC 120V/60 Hz		
Terminal:	Line		
Test Mode:	AC Charging with TX GFSK Mode 2402 MHz		
Remark:	Only worse case is reported		



No. Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
	MHz	dBuV	dB	dBuV	dBuV	dB	Detector
1	0.1779	50.47	9.98	60.45	64.58	-4.13	QP
2	0.1779	33.35	9.98	43.33	54.58	-11.25	AVG
3	0.2149	49.62	10.02	59.64	63.01	-3.37	QP
4	0.2149	31.18	10.02	41.20	53.01	-11.81	AVG
5 *	0.2540	48.53	10.02	58.55	61.62	-3.07	QP
6	0.2540	30.90	10.02	40.92	51.62	-10.70	AVG
7	0.3260	46.14	10.02	56.16	59.55	-3.39	QP
8	0.3260	29.58	10.02	39.60	49.55	-9.95	AVG
9	0.6460	41.12	10.09	51.21	56.00	-4.79	QP
10	0.6460	26.61	10.09	36.70	46.00	-9.30	AVG
11	2.5698	35.00	10.04	45.04	56.00	-10.96	QP
12	2.5698	16.02	10.04	26.06	46.00	-19.94	AVG

Emission Level= Read Level+ Correct Factor

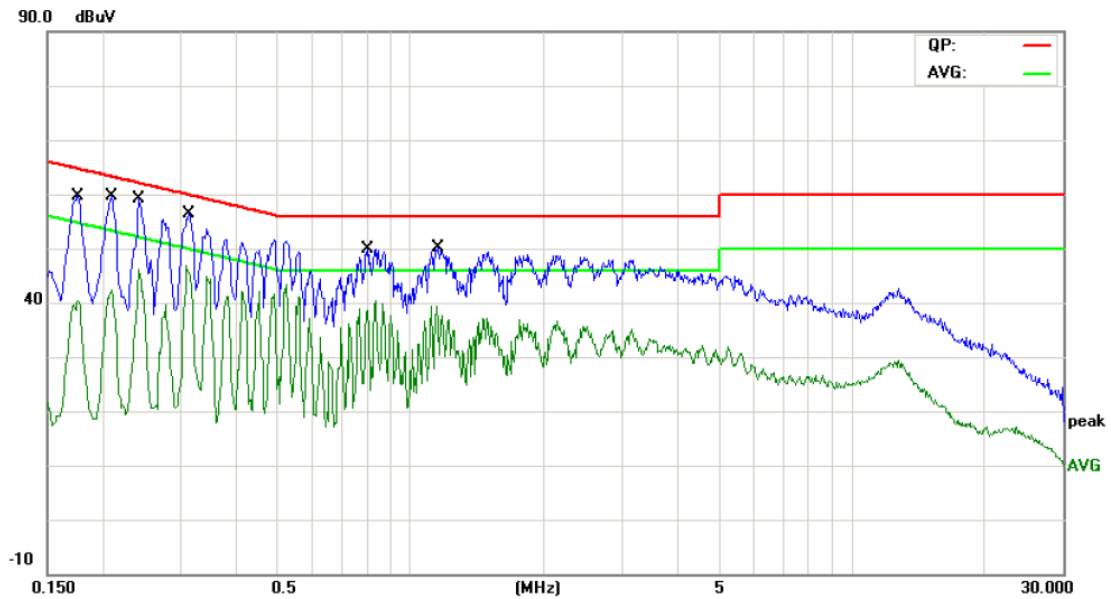
EUT:	MID	Model Name :	MID8001-IB
Temperature:	25 °C	Relative Humidity:	55%
Test Voltage:	AC 120V/60 Hz		
Terminal:	Neutral		
Test Mode:	AC Charging with TX GFSK Mode 2402 MHz		
Remark:	Only worse case is reported		



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector
1		0.1819	48.15	9.98	58.13	64.39	-6.26	QP
2		0.1819	30.02	9.98	40.00	54.39	-14.39	AVG
3		0.2540	46.66	10.02	56.68	61.62	-4.94	QP
4		0.2540	28.98	10.02	39.00	51.62	-12.62	AVG
5	*	0.3260	45.60	10.02	55.62	59.55	-3.93	QP
6		0.3260	30.71	10.02	40.73	49.55	-8.82	AVG
7		0.3912	42.24	10.02	52.26	58.04	-5.78	QP
8		0.3912	26.68	10.02	36.70	48.04	-11.34	AVG
9		1.0980	40.63	10.06	50.69	56.00	-5.31	QP
10		1.0980	20.61	10.06	30.67	46.00	-15.33	AVG
11		3.4220	35.39	10.01	45.40	56.00	-10.60	QP
12		3.4220	16.10	10.01	26.11	46.00	-19.89	AVG

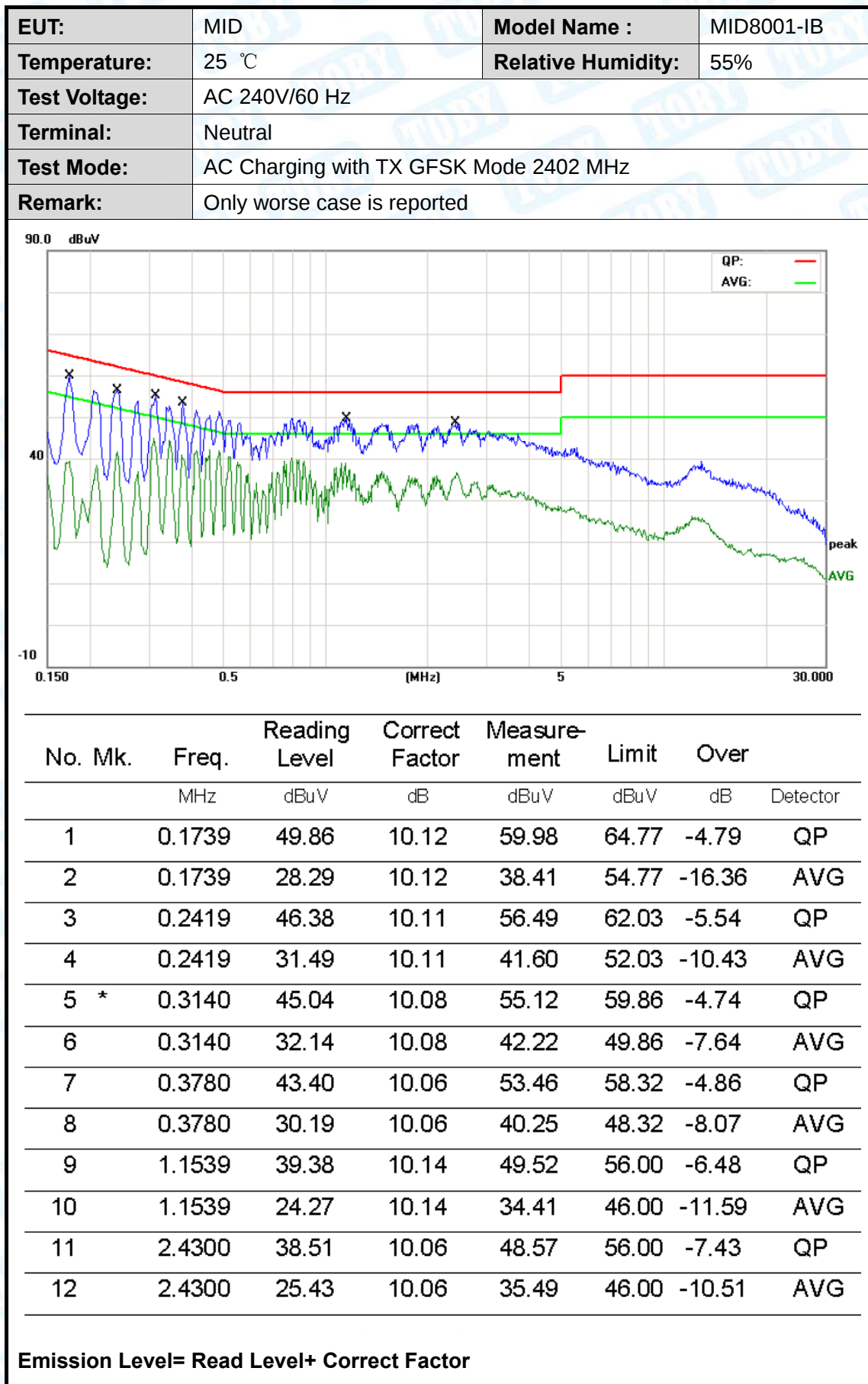
Emission Level= Read Level+ Correct Factor

EUT:	MID	Model Name :	MID8001-IB
Temperature:	25 °C	Relative Humidity:	55%
Test Voltage:	AC 240V/60 Hz		
Terminal:	Line		
Test Mode:	AC Charging with TX GFSK Mode 2402 MHz		
Remark:	Only worse case is reported		



No. Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
	MHz	dBuV	dB	dBuV	dBuV	dB	Detector
1	0.1758	49.71	9.97	59.68	64.68	-5.00	QP
2	0.1758	30.46	9.97	40.43	54.68	-14.25	AVG
3	0.2099	49.61	10.02	59.63	63.21	-3.58	QP
4	0.2099	32.24	10.02	42.26	53.21	-10.95	AVG
5 *	0.2419	49.17	10.02	59.19	62.03	-2.84	QP
6	0.2419	36.02	10.02	46.04	52.03	-5.99	AVG
7	0.3140	46.30	10.02	56.32	59.86	-3.54	QP
8	0.3140	35.65	10.02	45.67	49.86	-4.19	AVG
9	0.7980	39.68	10.10	49.78	56.00	-6.22	QP
10	0.7980	28.49	10.10	38.59	46.00	-7.41	AVG
11	1.1539	39.98	10.06	50.04	56.00	-5.96	QP
12	1.1539	25.36	10.06	35.42	46.00	-10.58	AVG

Emission Level= Read Level+ Correct Factor



5. Radiated Emission Test

5.1 Test Standard and Limit

5.1.1 Test Standard
FCC Part 15.209

5.1.2 Test Limit

Radiated Emission Limit (9 kHz~1000MHz)

Frequency (MHz)	Field Strength (microvolt/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

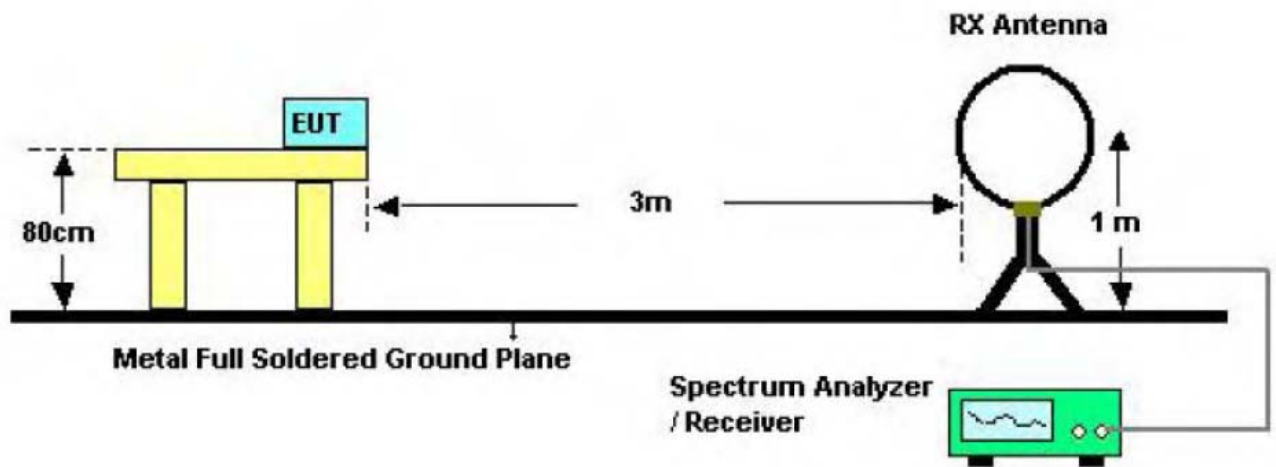
Radiated Emission Limit (Above 1000MHz)

Frequency (MHz)	Class B (dBuV/m)(at 3m)	
	Peak	Average
Above 1000	74	54

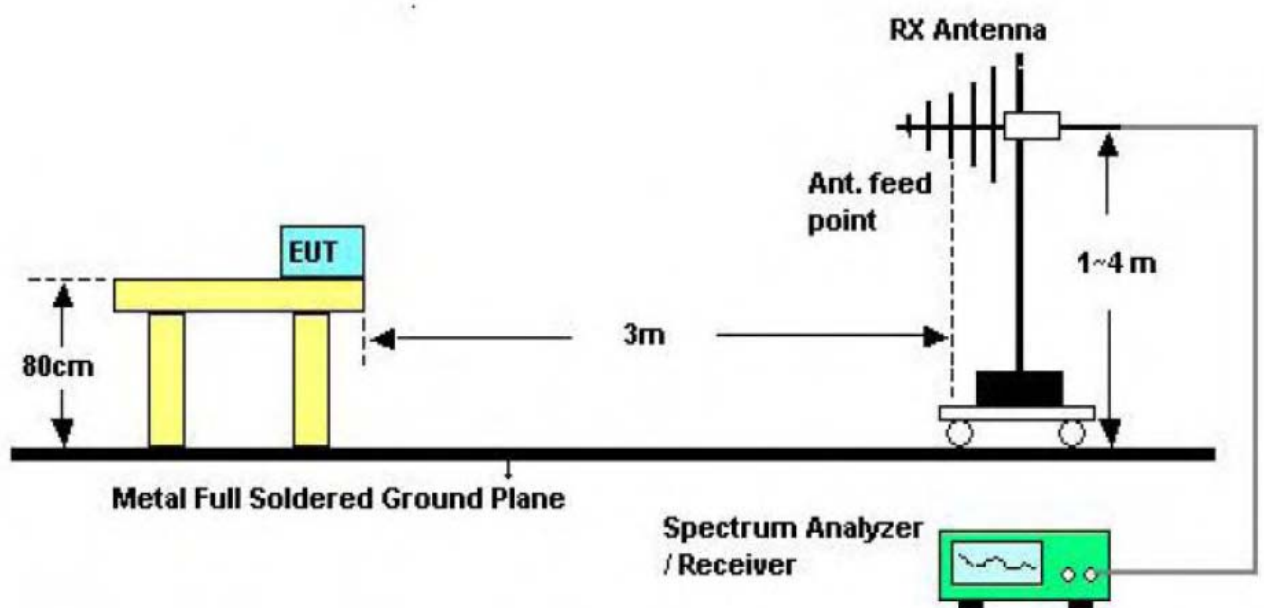
Note:

- (1) The tighter limit applies at the band edges.
- (2) Emission Level (dBuV/m)=20log Emission Level (uV/m)

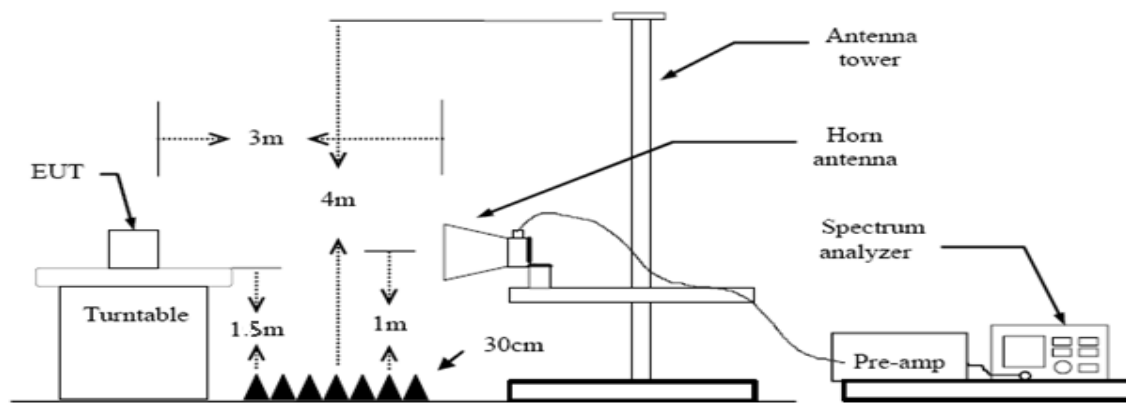
5.2 Test Setup



Bellow 30MHz Test Setup



Bellow 1000MHz Test Setup



Above 1GHz Test Setup

5.3 Test Procedure

- (1) The measuring distance of 3m shall be used for measurements at frequency up to 1GHz. The EUT was placed on a rotating 0.8m high above the ground, the table was rotated 360 degrees to determine the position of the highest radiation.
- (2) Measurements at frequency above 1GHz. The EUT was placed on a rotating 1.5m high above the ground. RF absorbers covered the ground plane with a minimum area of 3.0m by 3.0m between the EUT and measurement receiver antenna. The RF absorber shall not exceed 30cm in high above the conducting floor. The table was rotated 360 degrees to determine the position of the highest radiation.
- (3) The Test antenna shall vary between 1m and 4m, Both Horizontal and Vertical antenna are set to make measurement.
- (4) 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.
- (5) If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit Bellow 1 GHz, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed. But the Peak Value and average value both need to comply with applicable limit above 1 GHz.
- (6) Testing frequency range below 1GHz the measuring instrument use VBW=120 kHz with Quasi-peak detection.
- (7) Testing frequency range above 1GHz the measuring instrument use RBW=1 MHz and VBW=3 MHz with Peak Detector for Peak Values, and use RBW=1 MHz and VBW=10 Hz with Peak Detector for Average Values.
- (8) For the actual test configuration, please see the test setup photo.

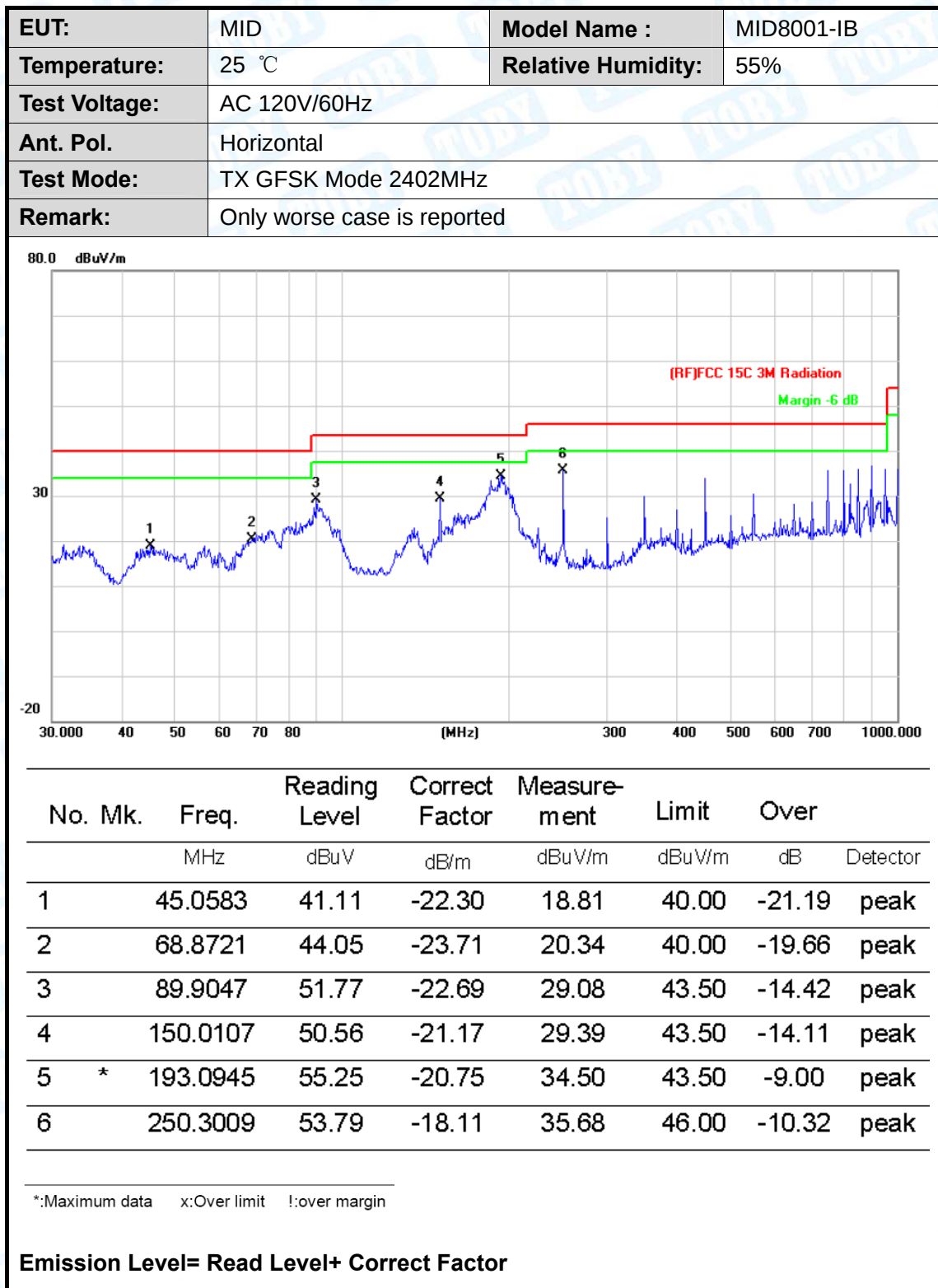
5.4 EUT Operating Condition

The Equipment Under Test was set to Continual Transmitting in maximum power in TX mode.

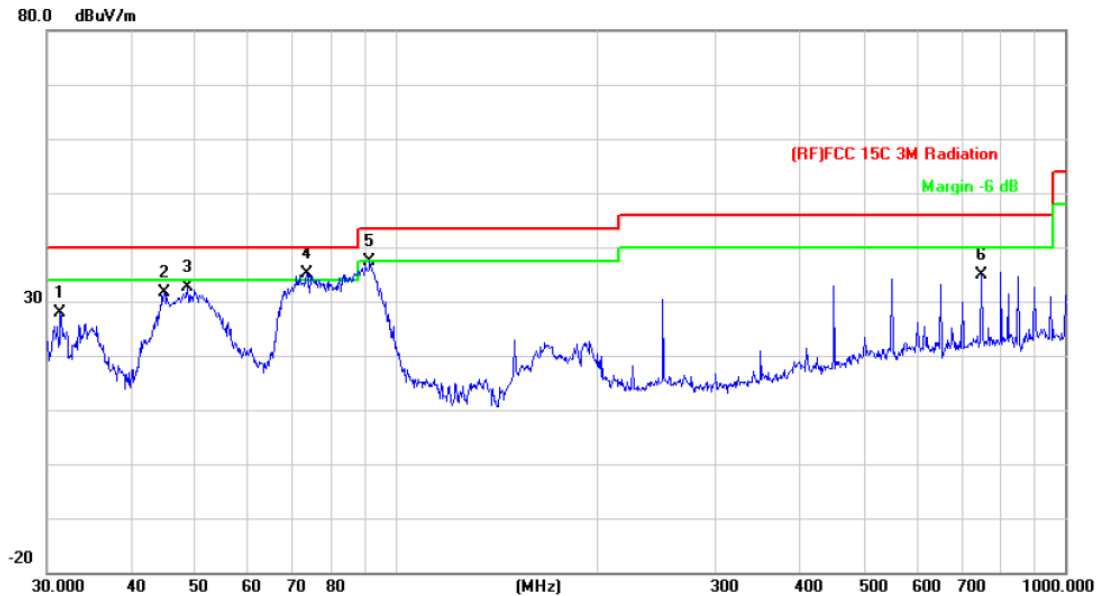
5.5 Test Data

Remark: During testing above 1GHz the measuring instrument use RBW=1 MHz and VBW=3

MHz with Peak Detector for Peak Values, and use RBW=1 MHz and VBW=10 Hz with Peak Detector for Average Values.
Test data please refer the following pages.



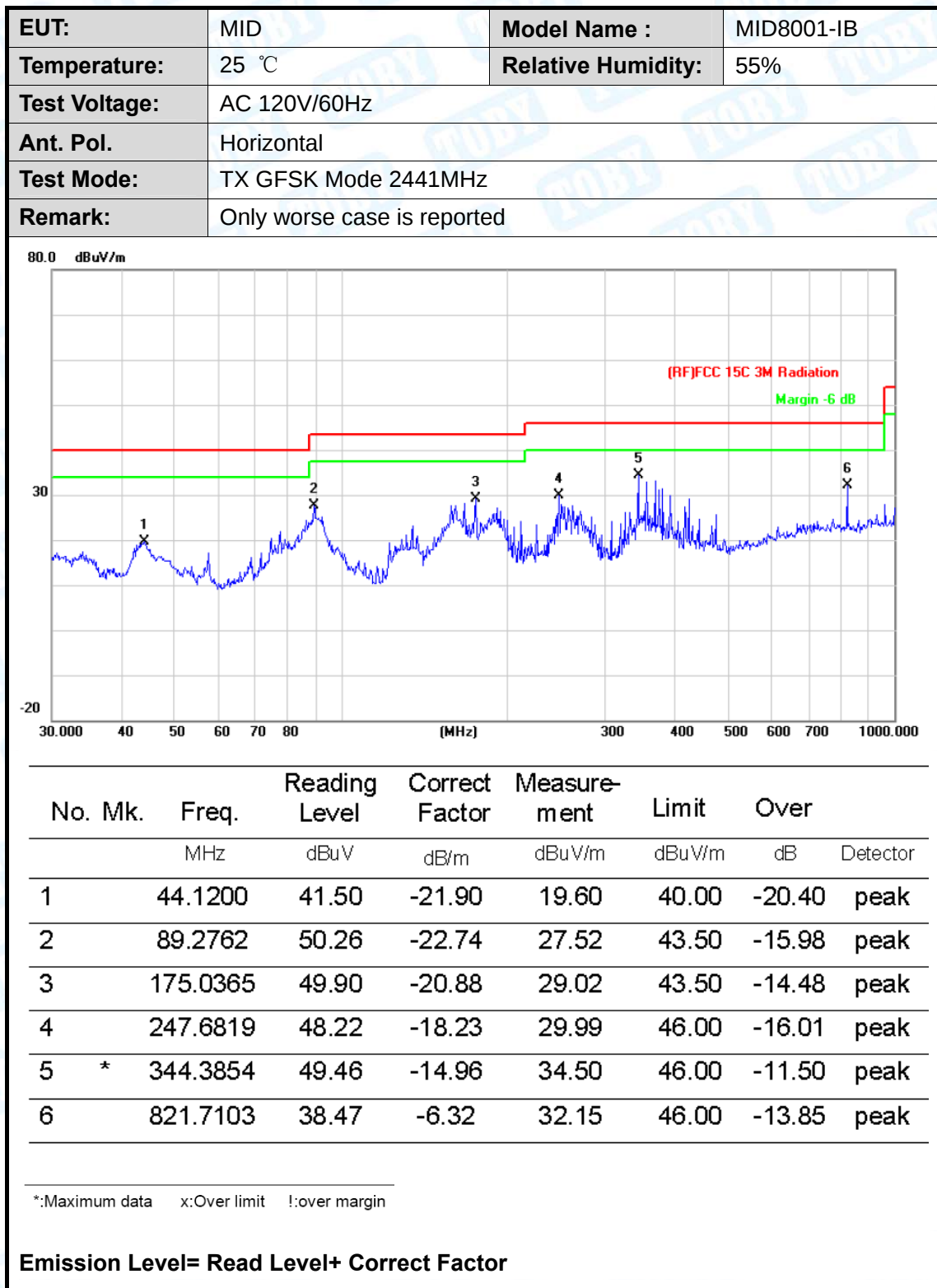
EUT:	MID	Model Name :	MID8001-IB
Temperature:	25 °C	Relative Humidity:	55%
Test Voltage:	AC 120V/60Hz		
Ant. Pol.	Vertical		
Test Mode:	TX GFSK Mode 2402MHz		
Remark:	Only worse case is reported		

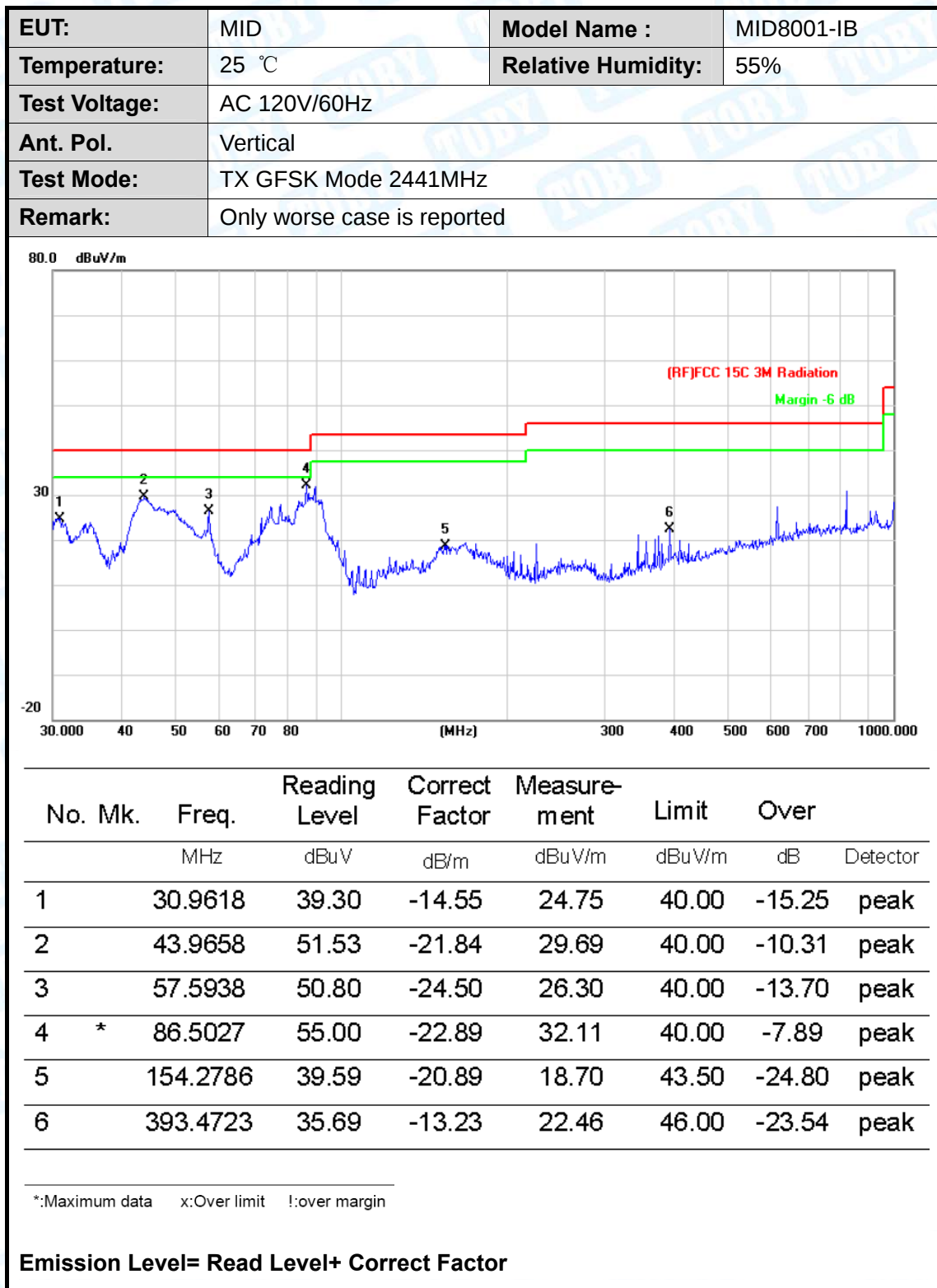


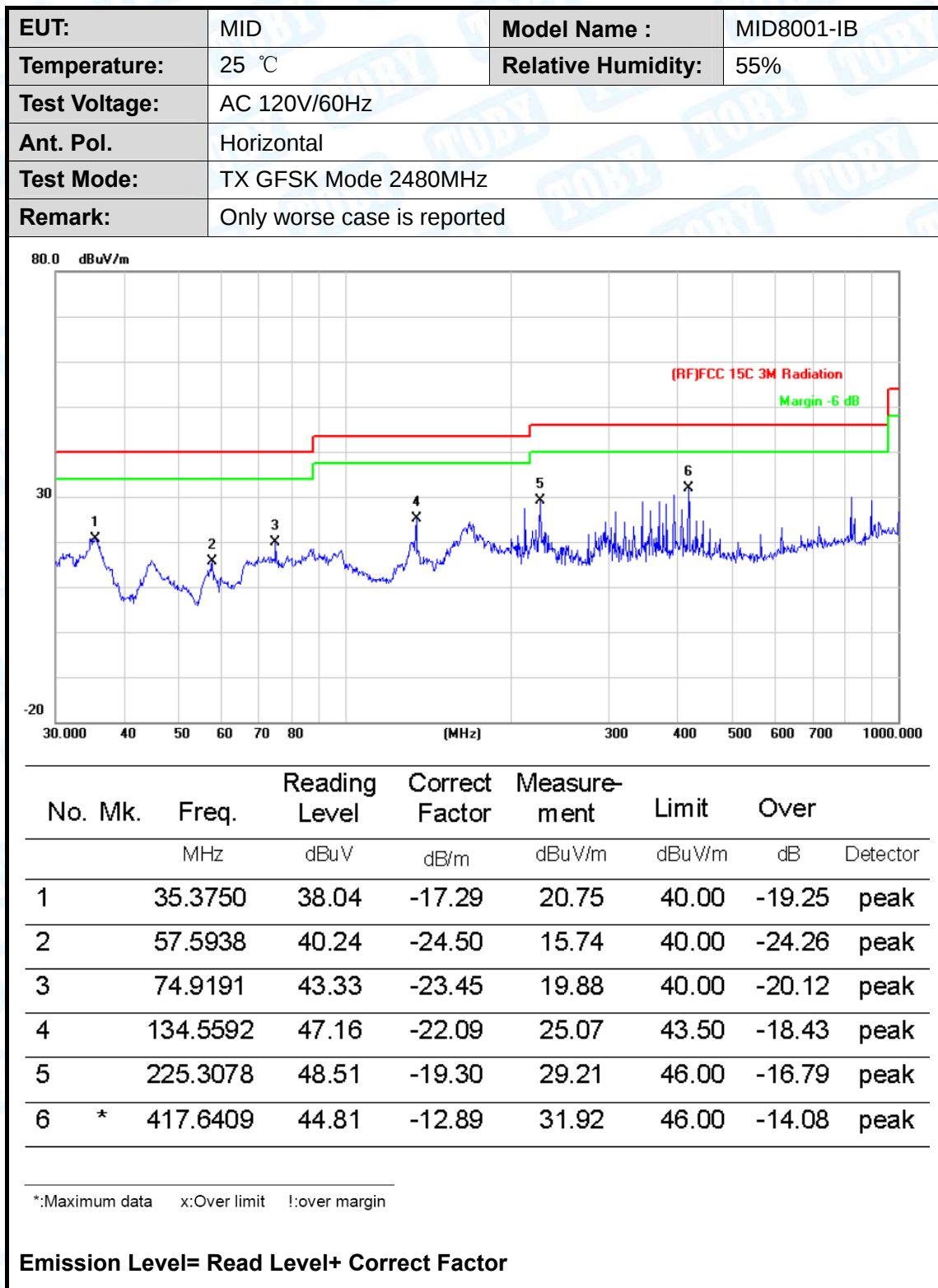
No. Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1	31.3992	42.70	-14.83	27.87	40.00	-12.13	peak
2	44.9004	53.81	-22.23	31.58	40.00	-8.42	peak
3	48.6719	56.37	-23.84	32.53	40.00	-7.47	peak
4 *	73.3593	58.55	-23.50	35.05	40.00	-4.95	peak
5	91.1744	59.86	-22.59	37.27	43.50	-6.23	peak
6	750.1082	42.04	-7.08	34.96	46.00	-11.04	peak

*:Maximum data x:Over limit !:over margin

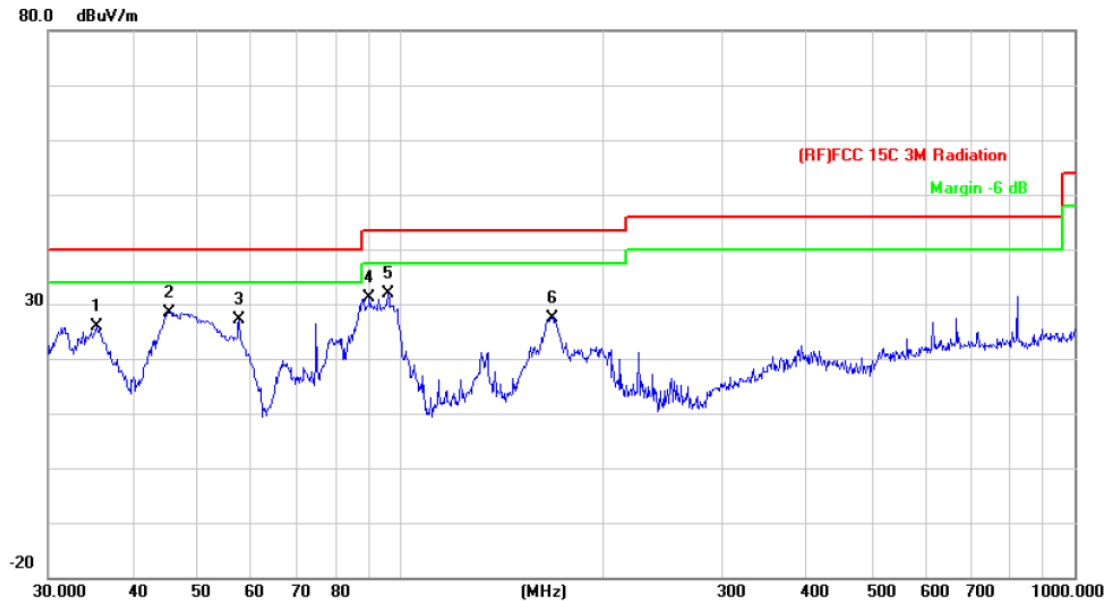
Emission Level= Read Level+ Correct Factor







EUT:	MID	Model Name :	MID8001-IB
Temperature:	25 °C	Relative Humidity:	55%
Test Voltage:	AC 120V/60Hz		
Ant. Pol.	Vertical		
Test Mode:	TX GFSK Mode 2480MHz		
Remark:	Only worse case is reported		

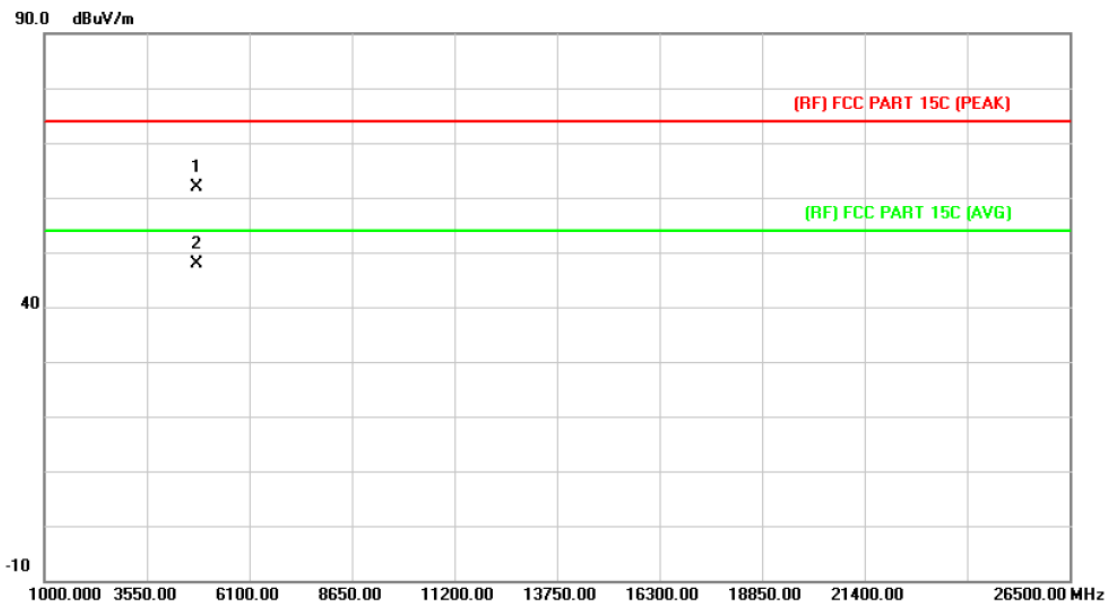


No. Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1	35.3750	43.05	-17.29	25.76	40.00	-14.24	peak
2	45.3755	50.88	-22.44	28.44	40.00	-11.56	peak
3	57.5938	51.71	-24.50	27.21	40.00	-12.79	peak
4	89.9047	53.75	-22.69	31.06	43.50	-12.44	peak
5 *	95.7622	54.17	-22.19	31.98	43.50	-11.52	peak
6	167.8241	48.53	-21.04	27.49	43.50	-16.01	peak

*:Maximum data x:Over limit !:over margin

Emission Level= Read Level+ Correct Factor

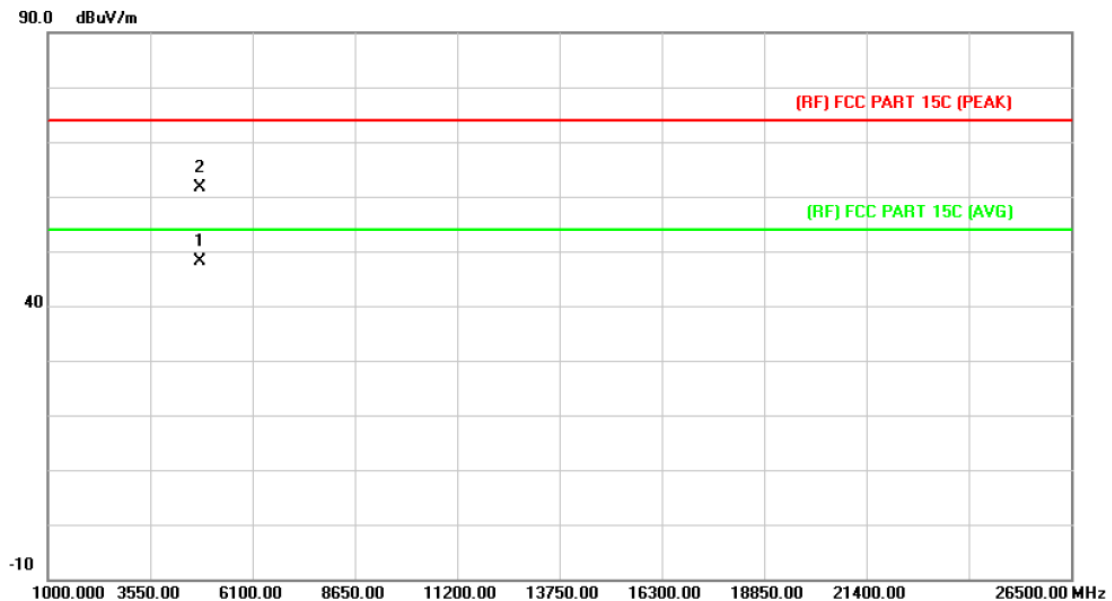
EUT:	MID	Model Name :	MID8001-IB
Temperature:	25 °C	Relative Humidity:	55%
Test Voltage:	AC 120V/60Hz		
Ant. Pol.	Horizontal		
Test Mode:	TX GFSK Mode 2402MHz		
Remark:	No report for the emission which more than 10 dB below the prescribed limit.		



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1		4803.984	48.43	13.44	61.87	74.00	-12.13	peak
2	*	4804.017	34.45	13.44	47.89	54.00	-6.11	AVG

Emission Level= Read Level+ Correct Factor

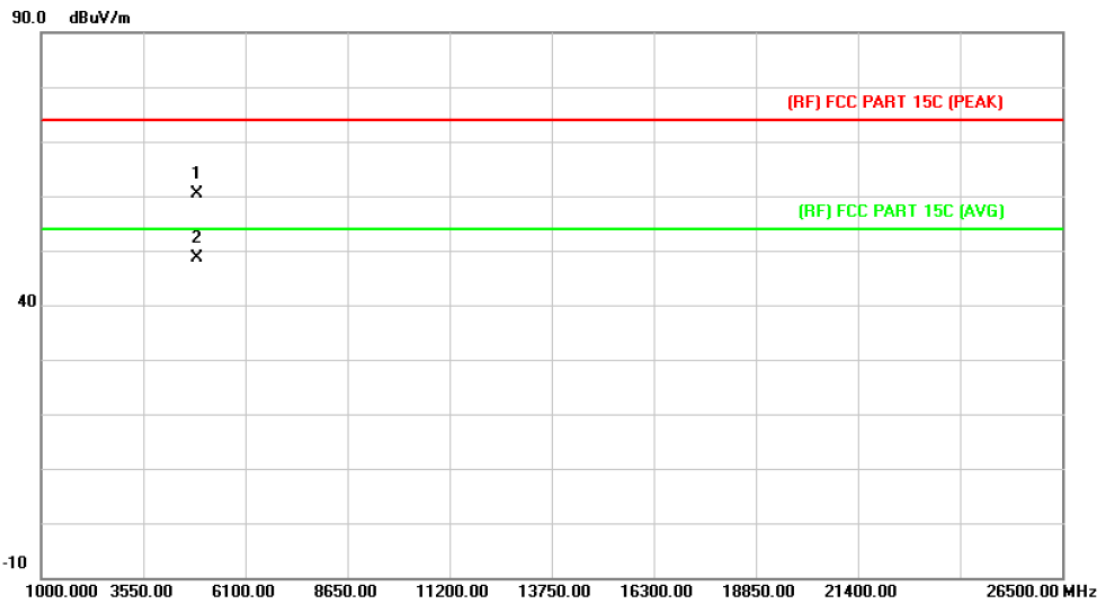
EUT:	MID	Model Name :	MID8001-IB
Temperature:	25 °C	Relative Humidity:	55%
Test Voltage:	AC 120V/60Hz		
Ant. Pol.	Vertical		
Test Mode:	TX GFSK Mode 2402MHz		
Remark:	No report for the emission which more than 10 dB below the prescribed limit.		



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1	*	4803.937	34.57	13.44	48.01	54.00	-5.99	AVG
2		4804.084	48.10	13.44	61.54	74.00	-12.46	peak

Emission Level= Read Level+ Correct Factor

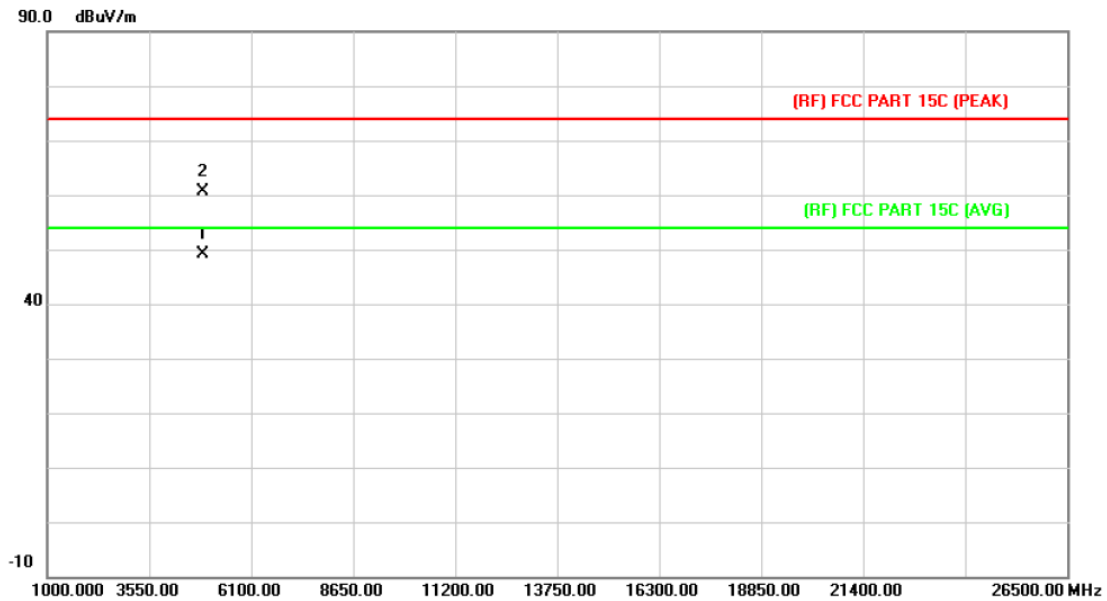
EUT:	MID	Model Name :	MID8001-IB
Temperature:	25 °C	Relative Humidity:	55%
Test Voltage:	AC 120V/60Hz		
Ant. Pol.	Horizontal		
Test Mode:	TX GFSK Mode 2441MHz		
Remark:	No report for the emission which more than 10 dB below the prescribed limit.		



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1		4882.054	46.52	13.90	60.42	74.00	-13.58	peak
2	*	4882.067	34.67	13.90	48.57	54.00	-5.43	AVG

Emission Level= Read Level+ Correct Factor

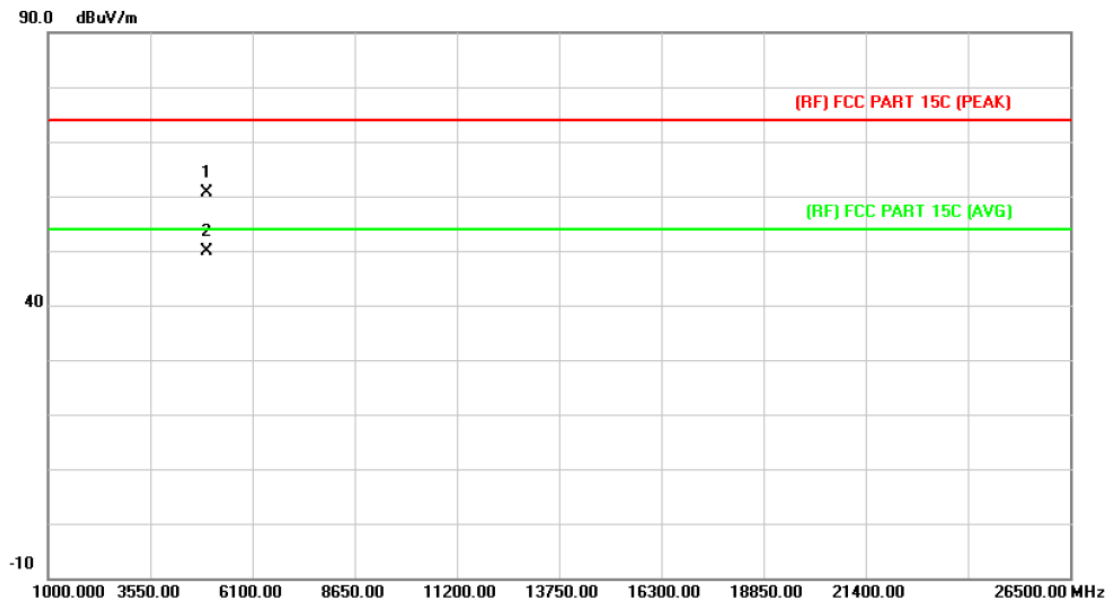
EUT:	MID	Model Name :	MID8001-IB
Temperature:	25 °C	Relative Humidity:	55%
Test Voltage:	AC 120V/60Hz		
Ant. Pol.	Vertical		
Test Mode:	TX GFSK Mode 2441MHz		
Remark:	No report for the emission which more than 10 dB below the prescribed limit.		



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1	*	4881.947	35.24	13.90	49.14	54.00	-4.86	AVG
2		4881.957	46.84	13.90	60.74	74.00	-13.26	peak

Emission Level= Read Level+ Correct Factor

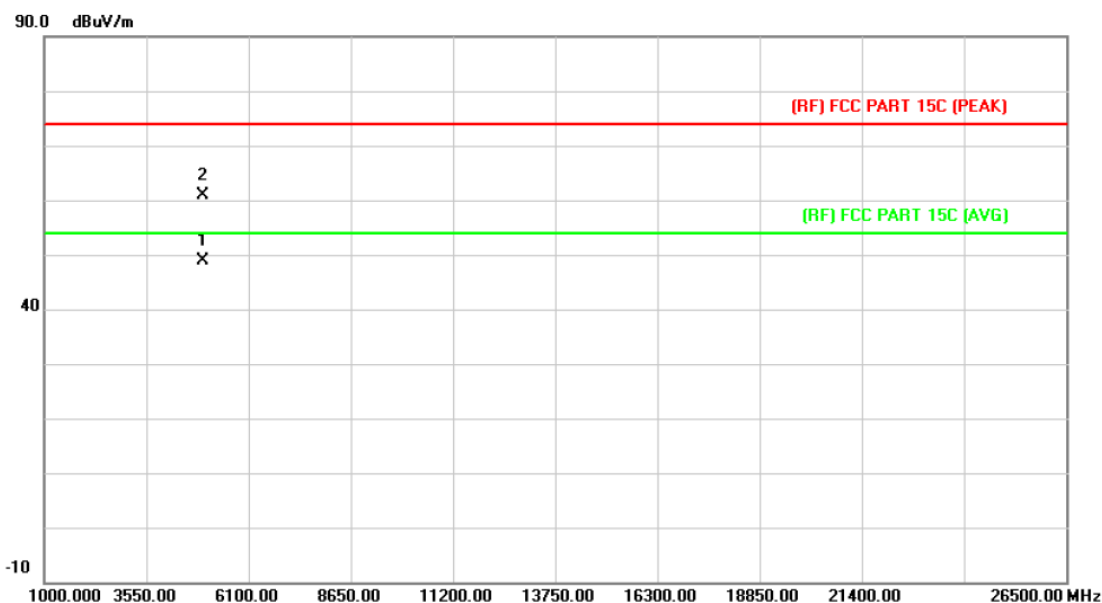
EUT:	MID	Model Name :	MID8001-IB
Temperature:	25 °C	Relative Humidity:	55%
Test Voltage:	AC 120V/60Hz		
Ant. Pol.	Horizontal		
Test Mode:	TX GFSK Mode 2480MHz		
Remark:	No report for the emission which more than 10 dB below the prescribed limit.		



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1		4961.954	46.36	14.38	60.74	74.00	-13.26	peak
2	*	4961.987	35.49	14.38	49.87	54.00	-4.13	AVG

Emission Level= Read Level+ Correct Factor

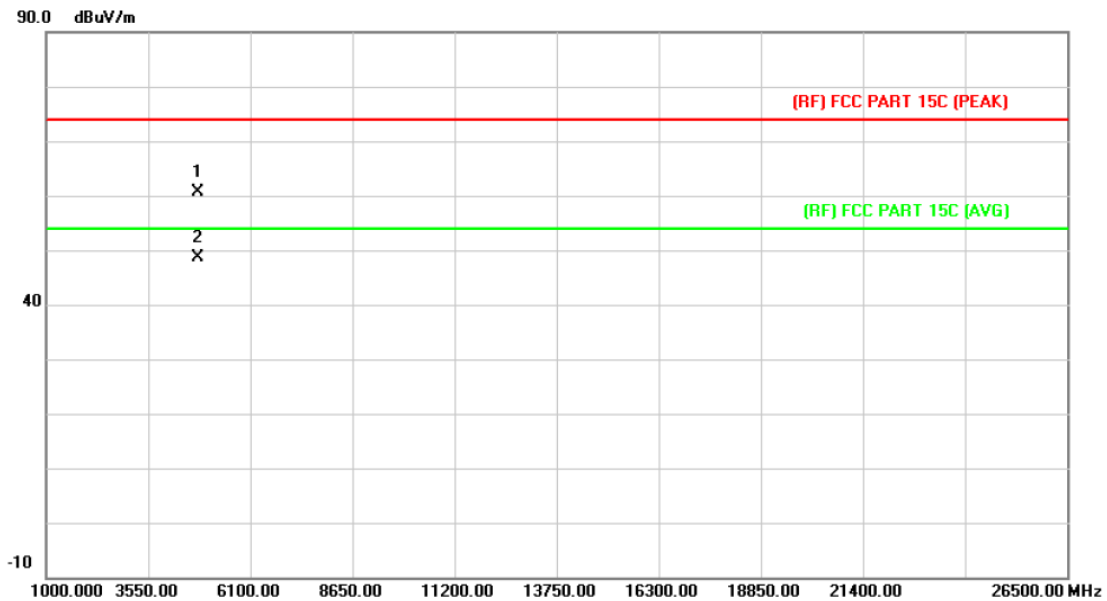
EUT:	MID	Model Name :	MID8001-IB
Temperature:	25 °C	Relative Humidity:	55%
Test Voltage:	AC 120V/60Hz		
Ant. Pol.	Vertical		
Test Mode:	TX GFSK Mode 2480MHz		
Remark:	No report for the emission which more than 10 dB below the prescribed limit.		



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1	*	4960.053	34.41	14.36	48.77	54.00	-5.23	AVG
2		4960.847	46.62	14.36	60.98	74.00	-13.02	peak

Emission Level= Read Level+ Correct Factor

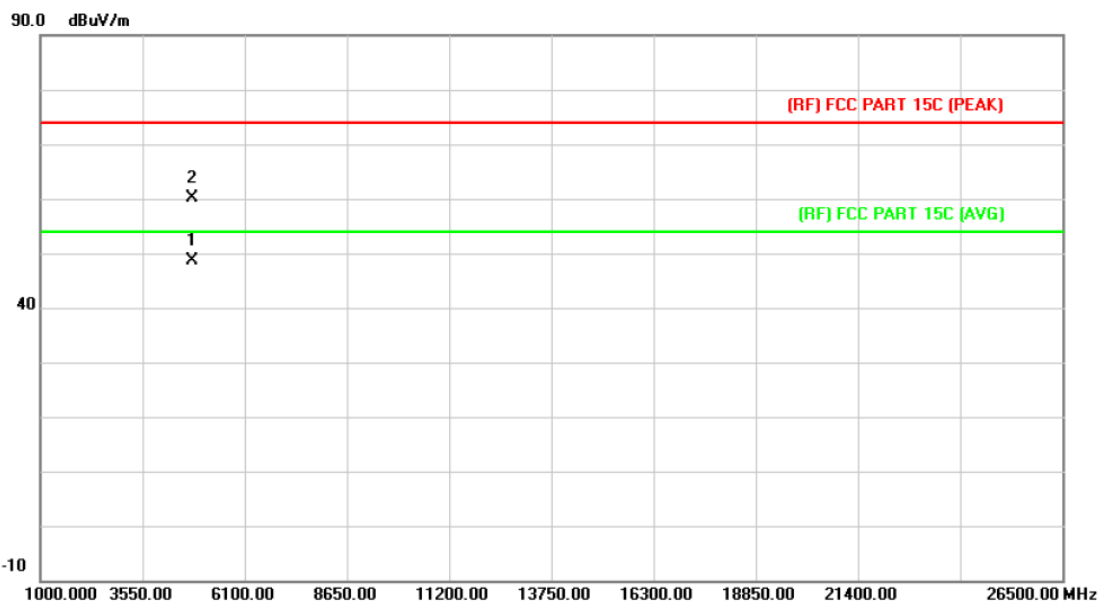
EUT:	MID	Model Name :	MID8001-IB
Temperature:	25 °C	Relative Humidity:	55%
Test Voltage:	AC 120V/60Hz		
Ant. Pol.	Horizontal		
Test Mode:	TX 8-DPSK Mode 2402MHz		
Remark:	No report for the emission which more than 10 dB below the prescribed limit.		



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1		4803.947	47.07	13.44	60.51	74.00	-13.49	peak
2	*	4803.987	35.30	13.44	48.74	54.00	-5.26	AVG

Emission Level= Read Level+ Correct Factor

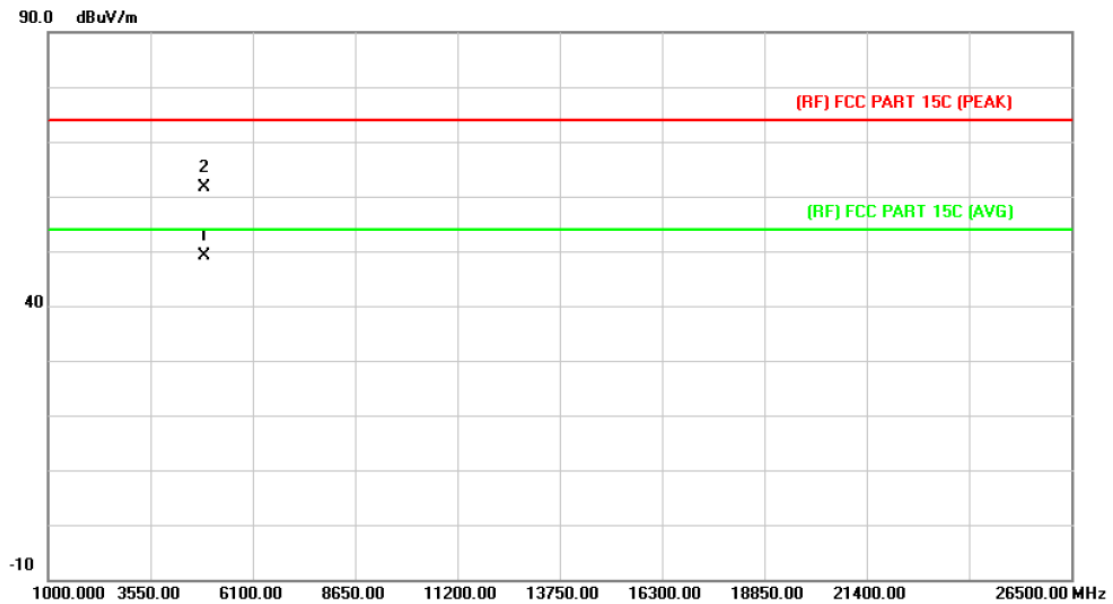
EUT:	MID	Model Name :	MID8001-IB
Temperature:	25 °C	Relative Humidity:	55%
Test Voltage:	AC 120V/60Hz		
Ant. Pol.	Vertical		
Test Mode:	TX 8-DPSK Mode 2402MHz		
Remark:	No report for the emission which more than 10 dB below the prescribed limit.		



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1	*	4804.038	35.20	13.44	48.64	54.00	-5.36	AVG
2		4804.047	46.70	13.44	60.14	74.00	-13.86	peak

Emission Level= Read Level+ Correct Factor

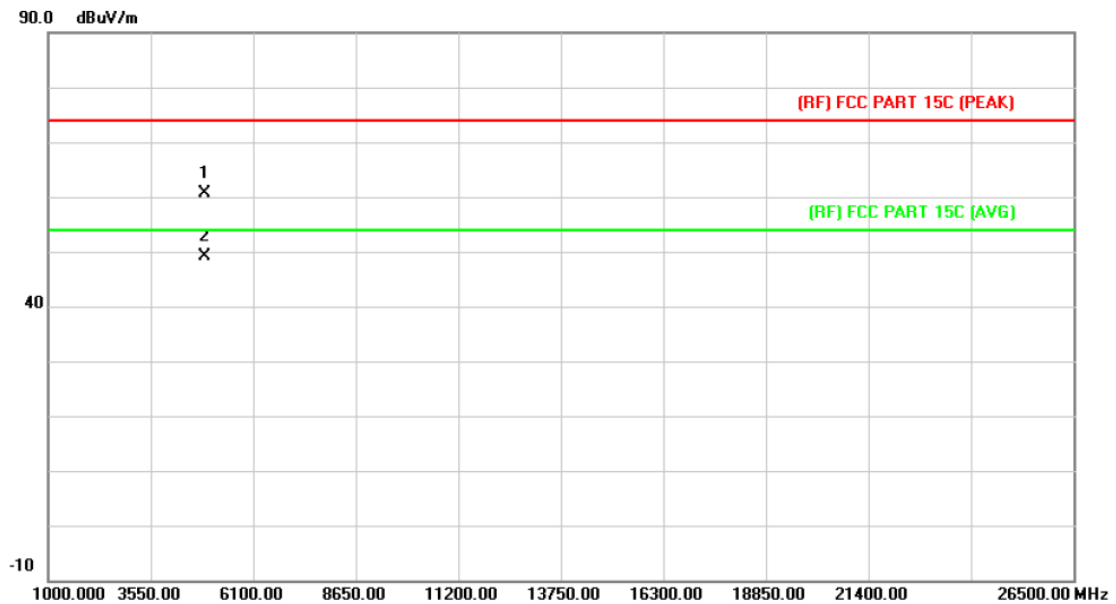
EUT:	MID	Model Name :	MID8001-IB
Temperature:	25 °C	Relative Humidity:	55%
Test Voltage:	AC 120V/60Hz		
Ant. Pol.	Horizontal		
Test Mode:	TX 8-DPSK Mode 2441MHz		
Remark:	No report for the emission which more than 10 dB below the prescribed limit.		



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1	*	4882.024	35.14	13.90	49.04	54.00	-4.96	AVG
2		4882.029	47.64	13.90	61.54	74.00	-12.46	peak

Emission Level= Read Level+ Correct Factor

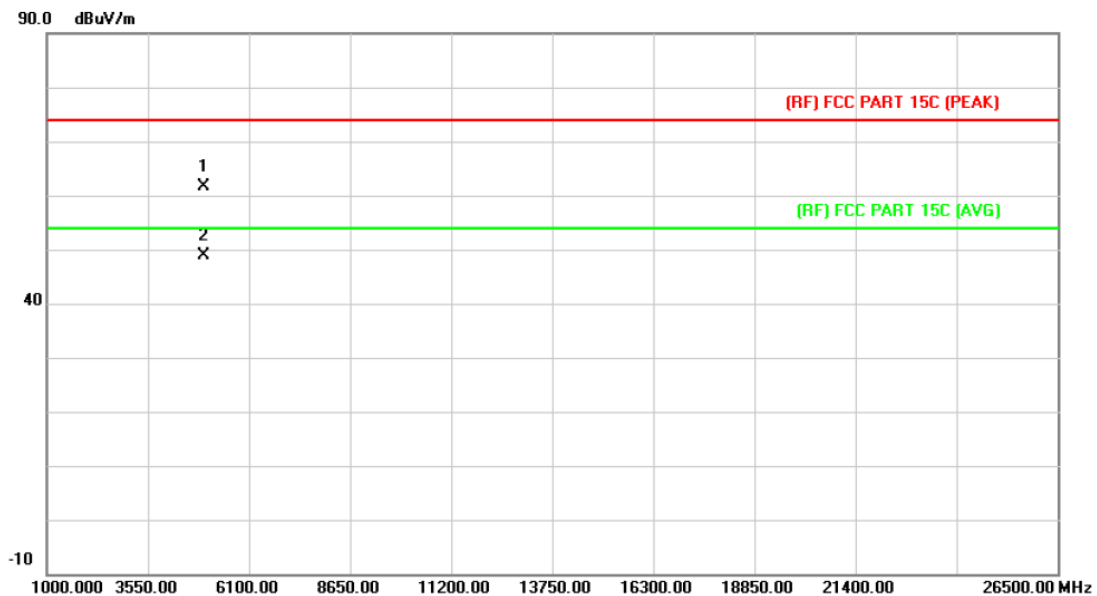
EUT:	MID	Model Name :	MID8001-IB
Temperature:	25 °C	Relative Humidity:	55%
Test Voltage:	AC 120V/60Hz		
Ant. Pol.	Vertical		
Test Mode:	TX 8-DPSK Mode 2441MHz		
Remark:	No report for the emission which more than 10 dB below the prescribed limit.		



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1		4881.984	46.84	13.90	60.74	74.00	-13.26	peak
2	*	4882.847	35.17	13.90	49.07	54.00	-4.93	AVG

Emission Level= Read Level+ Correct Factor

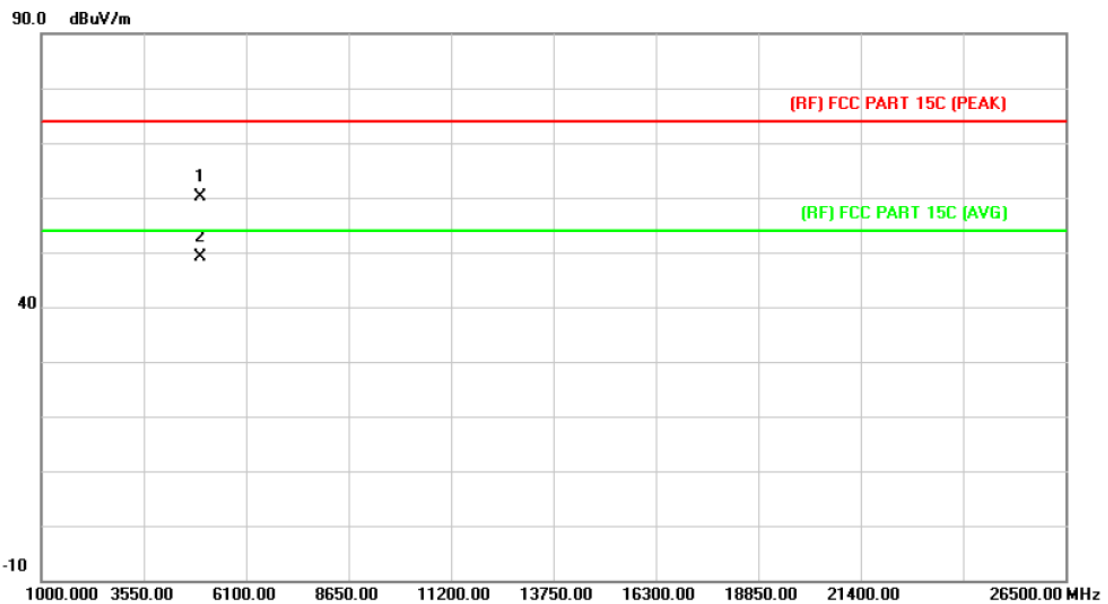
EUT:	MID	Model Name :	MID8001-IB
Temperature:	25 °C	Relative Humidity:	55%
Test Voltage:	AC 120V/60Hz		
Ant. Pol.	Horizontal		
Test Mode:	TX 8-DPSK Mode 2480MHz		
Remark:	No report for the emission which more than 10 dB below the prescribed limit.		



No. Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1	4959.785	47.21	14.36	61.57	74.00	-12.43	peak
2 *	4959.874	34.50	14.36	48.86	54.00	-5.14	AVG

Emission Level= Read Level+ Correct Factor

EUT:	MID	Model Name :	MID8001-IB
Temperature:	25 °C	Relative Humidity:	55%
Test Voltage:	AC 120V/60Hz		
Ant. Pol.	Vertical		
Test Mode:	TX 8-DPSK Mode 2480MHz		
Remark:	No report for the emission which more than 10 dB below the prescribed limit.		



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1		4960.457	45.82	14.36	60.18	74.00	-13.82	peak
2	*	4960.578	34.87	14.36	49.23	54.00	-4.77	AVG

Emission Level= Read Level+ Correct Factor

6. Restricted Bands Requirement

6.1 Test Standard and Limit

6.1.1 Test Standard

FCC Part 15.209

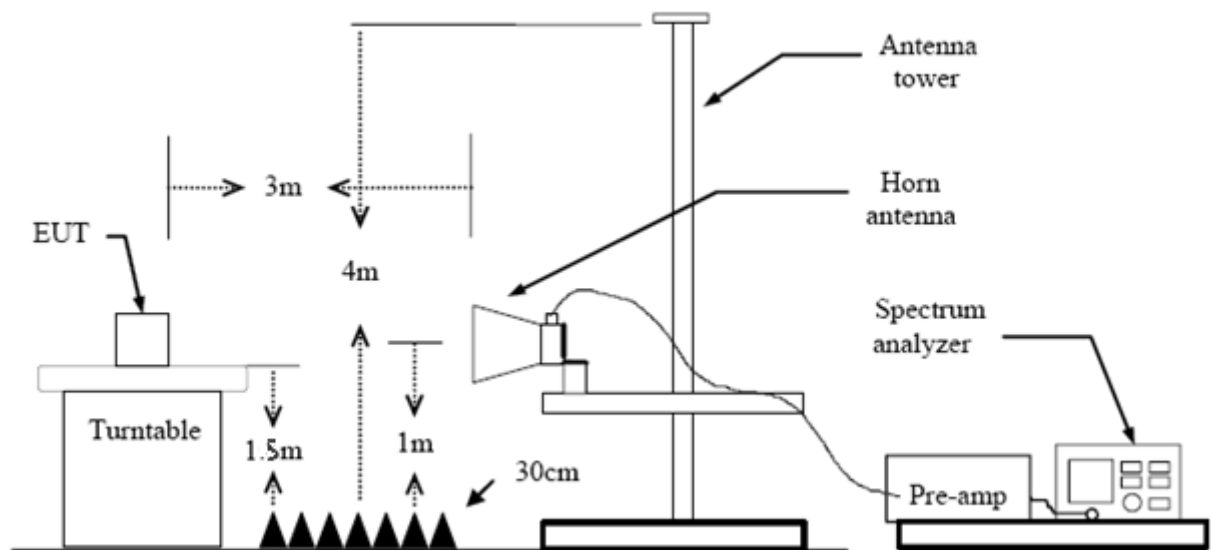
FCC Part 15.205

6.1.2 Test Limit

Restricted Frequency Band (MHz)	Class B (dBUV/m)(at 3m)	
	Peak	Average
2310 ~2390	74	54
2483.5 ~2500	74	54

Note: All restriction bands have been tested, only the worst case is reported.

6.2 Test Setup



6.3 Test Procedure

- (1) The measuring distance of 3m shall be used for measurements at frequency up to 1GHz. The EUT was placed on a rotating 0.8m high above the ground, the table was rotated 360 degrees to determine the position of the highest radiation.
- (2) Measurements at frequency above 1GHz. The EUT was placed on a rotating 1.5m high above the ground. RF absorbers covered the ground plane with a minimum area of 3.0m by 3.0m between the EUT and measurement receiver antenna. The RF absorber shall not exceed 30cm in high above the conducting floor. The table was rotated 360 degrees to determine the position of the highest radiation.

-
- (3) The Test antenna shall vary between 1m and 4m, Both Horizontal and Vertical antenna are set to make measurement.
 - (4) 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.
 - (5) If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit Bellow 1 GHz, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed. But the Peak Value and average value both need to comply with applicable limit above 1 GHz.
 - (6) Testing frequency range below 1GHz the measuring instrument use VBW=120 kHz with Quasi-peak detection.
 - (7) Testing frequency range above 1GHz the measuring instrument use RBW=1 MHz and VBW=3 MHz with Peak Detector for Peak Values, and use RBW=1 MHz and VBW=10 Hz with Peak Detector for Average Values.
 - (8) For the actual test configuration, please see the test setup photo.

6.4 EUT Operating Condition

The Equipment Under Test was set to Continual Transmitting in maximum power.

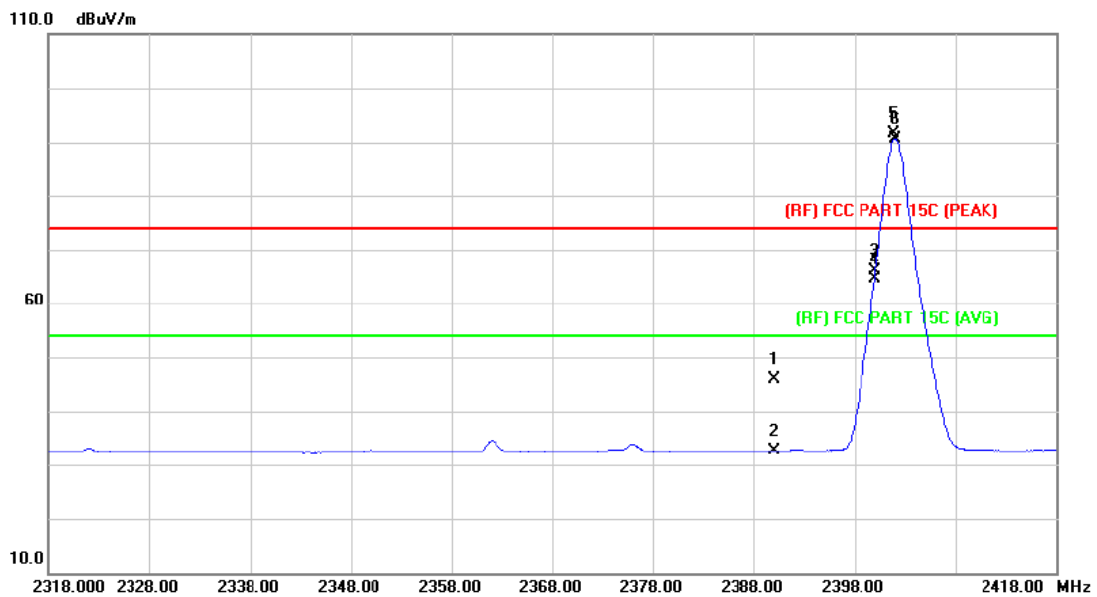
6.4 Test Data

Remark: During testing above 1GHz the measuring instrument use RBW=1 MHz and VBW=3 MHz with Peak Detector for Peak Values, and use RBW=1 MHz and VBW=1 KHz with Peak Detector for Average Values.

All restriction bands have been tested, only the worst case is reported.

(1) Radiation Test

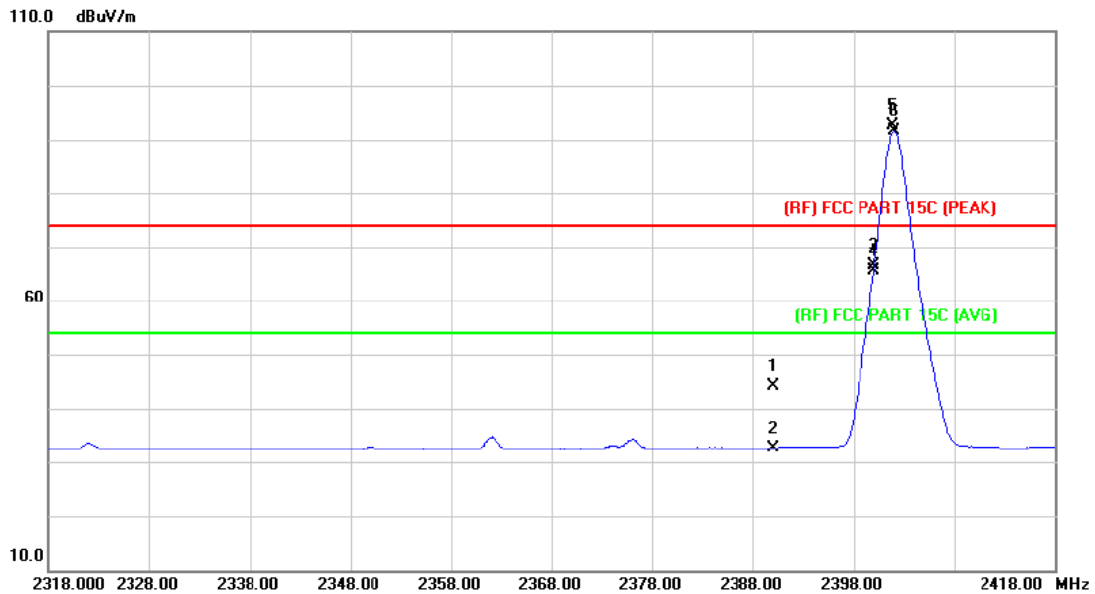
EUT:	MID	Model Name :	MID8001-IB
Temperature:	25 °C	Relative Humidity:	55%
Test Voltage:	AC 120V/60Hz		
Ant. Pol.	Horizontal		
Test Mode:	TX GFSK Mode 2402MHz		
Remark:	N/A		



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB/m	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector
1		2390.000	45.11	0.77	45.88	74.00	-28.12	peak
2		2390.000	31.85	0.77	32.62	54.00	-21.38	AVG
3		2400.000	65.23	0.81	66.04	Fundamental Frequency		peak
4	X	2400.000	63.88	0.81	64.69	Fundamental Frequency		AVG
5	X	2401.900	90.91	0.82	91.73	74.00	17.73	peak
6	*	2402.100	89.86	0.82	90.68	54.00	36.68	AVG

Emission Level= Read Level+ Correct Factor

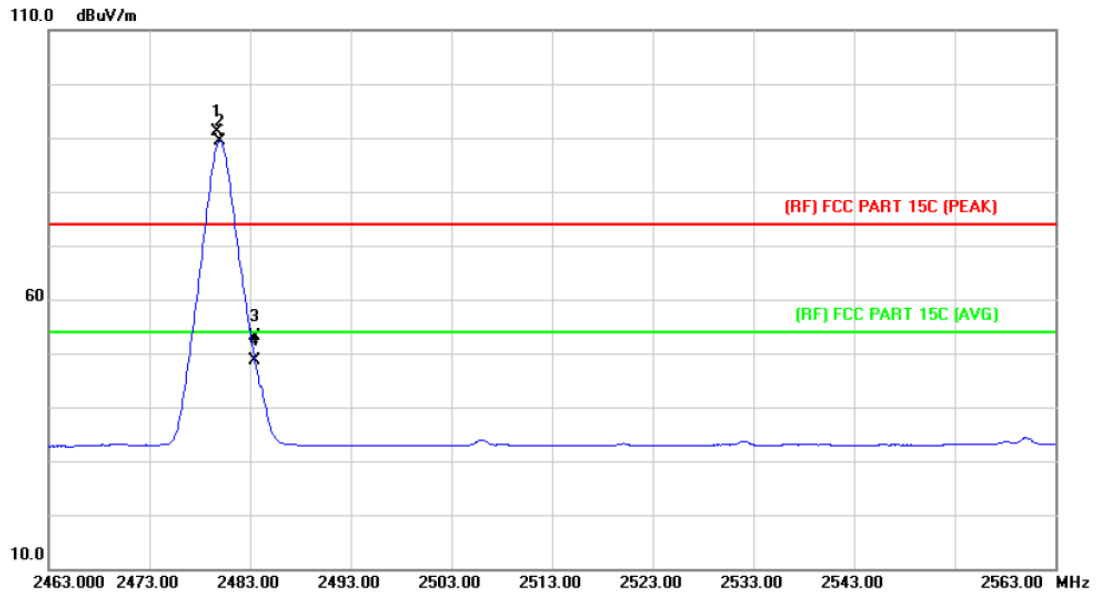
EUT:	MID	Model Name :	MID8001-IB
Temperature:	25 °C	Relative Humidity:	55%
Test Voltage:	AC 120V/60Hz		
Ant. Pol.	Vertical		
Test Mode:	TX GFSK Mode 2402MHz		
Remark:	N/A		



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1		2390.000	43.41	0.77	44.18	74.00	-29.82	peak
2		2390.000	31.95	0.77	32.72	54.00	-21.28	AVG
3		2400.000	65.73	0.81	66.54	Fundamental Frequency		peak
4	X	2400.000	64.70	0.81	65.51	Fundamental Frequency		AVG
5	X	2401.900	91.75	0.82	92.57	74.00	18.57	peak
6	*	2402.000	90.69	0.82	91.51	54.00	37.51	AVG

Emission Level= Read Level+ Correct Factor

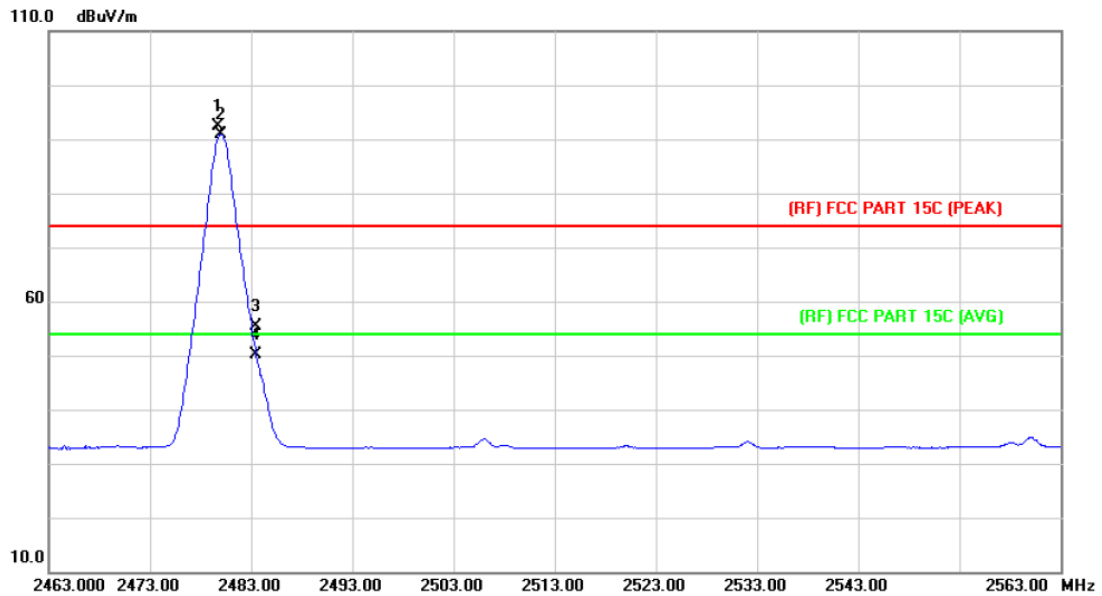
EUT:	MID	Model Name :	MID8001-IB
Temperature:	25 °C	Relative Humidity:	55%
Test Voltage:	AC 120V/60Hz		
Ant. Pol.	Horizontal		
Test Mode:	TX GFSK Mode 2480 MHz		
Remark:	N/A		



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB Detector
1	X	2479.700	89.89	1.15	91.04	Fundamental Frequency	peak
2	*	2480.000	88.24	1.15	89.39	Fundamental Frequency	AVG
3		2483.500	51.97	1.17	53.14	74.00	-20.86 peak
4		2483.500	47.50	1.17	48.67	54.00	-5.33 AVG

Emission Level= Read Level+ Correct Factor

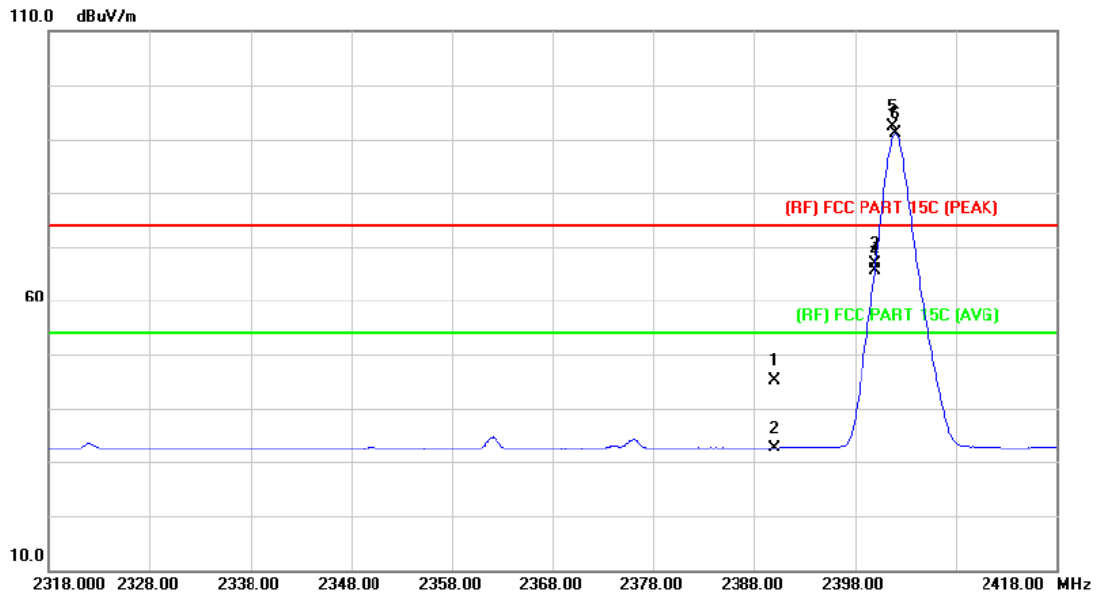
EUT:	MID	Model Name :	MID8001-IB
Temperature:	25 °C	Relative Humidity:	55%
Test Voltage:	AC 120V/60Hz		
Ant. Pol.	Vertical		
Test Mode:	TX GFSK Mode 2480 MHz		
Remark:	N/A		



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB Detector
1	X	2479.700	91.32	1.15	92.47	Fundamental Frequency	peak
2	*	2480.000	89.83	1.15	90.98	Fundamental Frequency	AVG
3		2483.500	54.32	1.17	55.49	74.00	-18.51 peak
4		2483.500	49.05	1.17	50.22	54.00	-3.78 AVG

Emission Level= Read Level+ Correct Factor

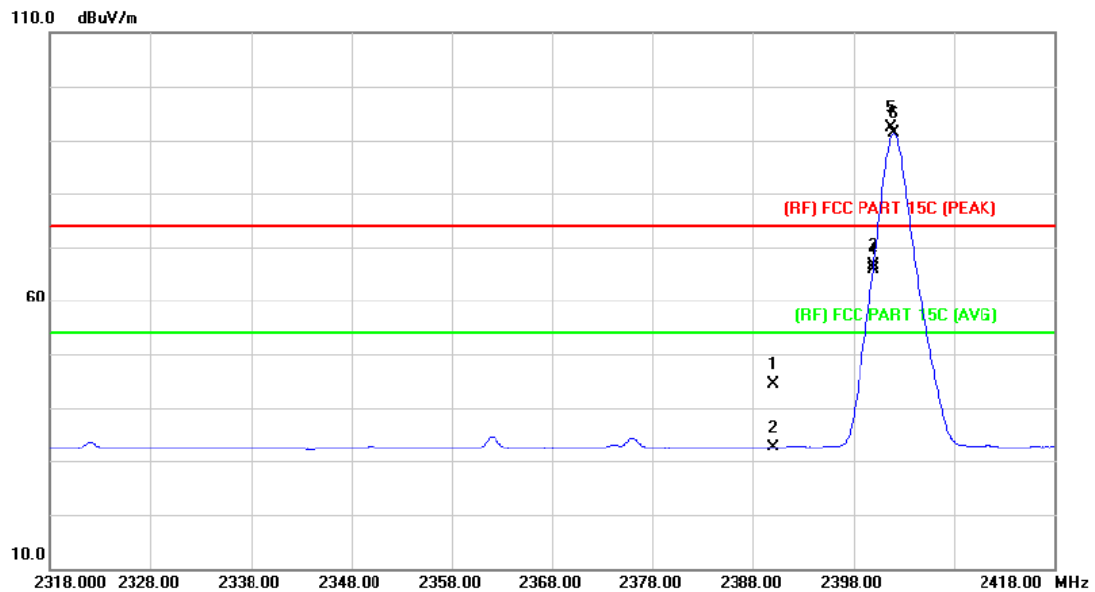
EUT:	MID	Model Name :	MID8001-IB
Temperature:	25 °C	Relative Humidity:	55%
Test Voltage:	AC 120V/60Hz		
Ant. Pol.	Horizontal		
Test Mode:	TX 8-DPSK Mode 2402MHz		
Remark:	N/A		



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB/m	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector
1		2390.000	44.40	0.77	45.17	74.00	-28.83	peak
2		2390.000	31.95	0.77	32.72	54.00	-21.28	AVG
3		2400.000	65.97	0.81	66.78	Fundamental Frequency		peak
4	X	2400.000	64.70	0.81	65.51	Fundamental Frequency		AVG
5	X	2401.800	91.52	0.82	92.34	74.00	18.34	peak
6	*	2402.000	90.19	0.82	91.01	54.00	37.01	AVG

Emission Level= Read Level+ Correct Factor

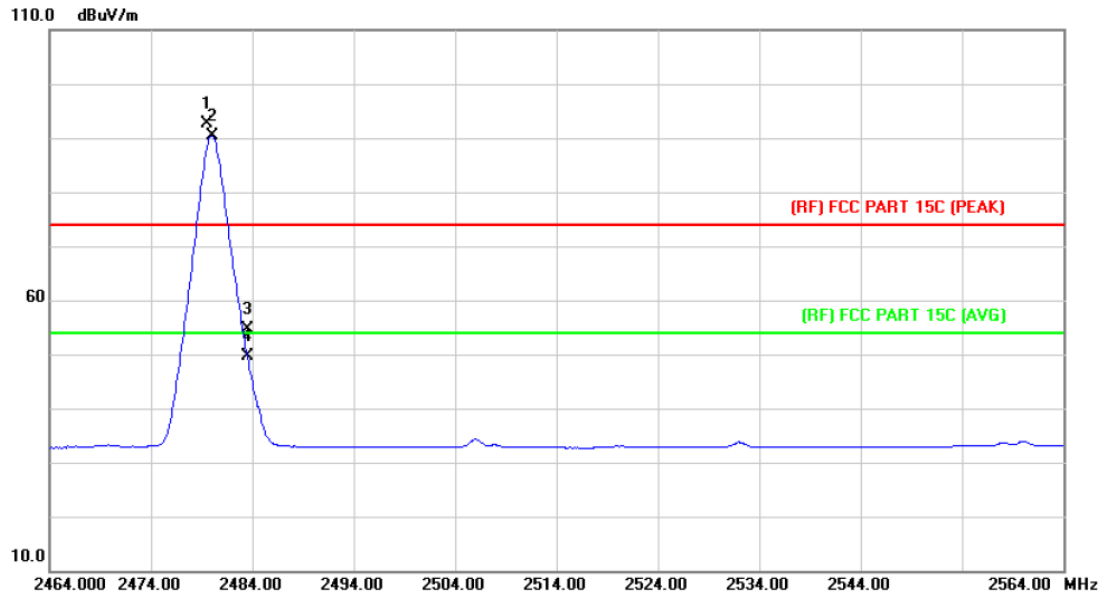
EUT:	MID	Model Name :	MID8001-IB
Temperature:	25 °C	Relative Humidity:	55%
Test Voltage:	AC 120V/60Hz		
Ant. Pol.	Vertical		
Test Mode:	TX 8-DPSK Mode 2402MHz		
Remark:	N/A		



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB/m	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector
1		2390.000	43.73	0.77	44.50	74.00	-29.50	peak
2		2390.000	31.84	0.77	32.61	54.00	-21.39	AVG
3		2400.000	65.78	0.81	66.59	Fundamental Frequency		peak
4	X	2400.000	65.03	0.81	65.84	Fundamental Frequency		AVG
5	X	2401.800	91.66	0.82	92.48	74.00	18.48	peak
6	*	2402.100	90.52	0.82	91.34	54.00	37.34	AVG

Emission Level= Read Level+ Correct Factor

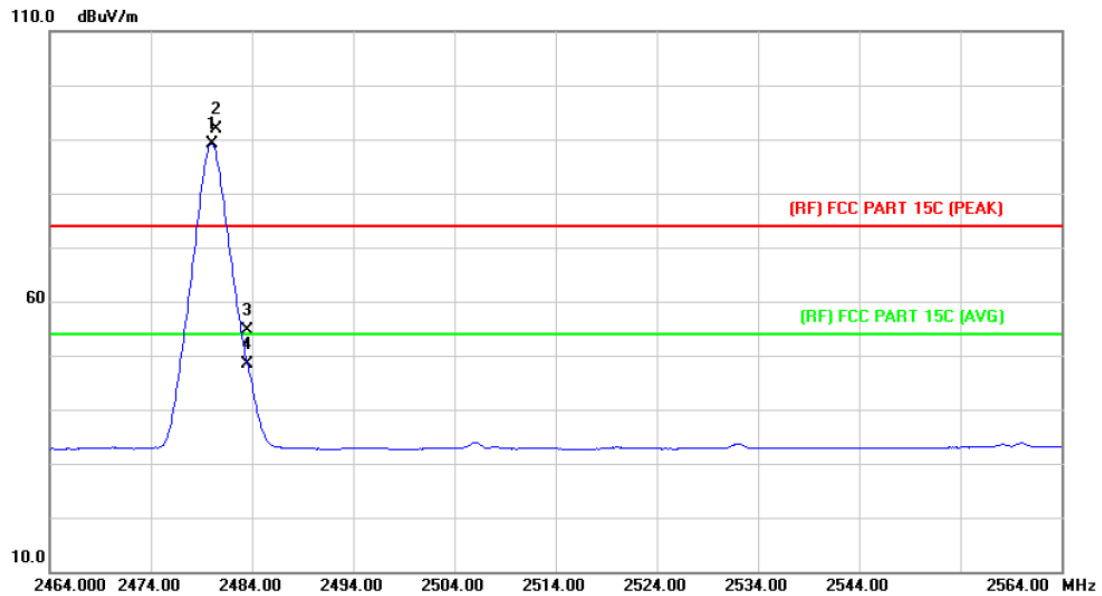
EUT:	MID	Model Name :	MID8001-IB
Temperature:	25 °C	Relative Humidity:	55%
Test Voltage:	AC 120V/60Hz		
Ant. Pol.	Horizontal		
Test Mode:	TX 8-DPSK Mode 2480MHz		
Remark:	N/A		



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB/m	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector
1	X	2479.500	91.42	1.15	92.57	Fundamental Frequency		peak
2	*	2480.000	89.23	1.15	90.38	Fundamental Frequency		AVG
3		2483.500	53.57	1.17	54.74	74.00	-19.26	peak
4		2483.500	48.49	1.17	49.66	54.00	-4.34	AVG

Emission Level= Read Level+ Correct Factor

EUT:	MID	Model Name :	MID8001-IB
Temperature:	25 °C	Relative Humidity:	55%
Test Voltage:	AC 120V/60Hz		
Ant. Pol.	Vertical		
Test Mode:	TX 8-DPSK Mode 2480MHz		
Remark:	N/A		



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB/m	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector
1	*	2480.000	88.08	1.15	89.23	Fundamental Frequency		AVG
2	X	2480.400	90.63	1.15	91.78	Fundamental Frequency		peak
3		2483.500	53.52	1.17	54.69	74.00	-19.31	peak
4		2483.500	47.25	1.17	48.42	54.00	-5.58	AVG

Emission Level= Read Level+ Correct Factor

7. Antenna Requirement

7.1 Standard Requirement

7.1.1 Standard

FCC Part 15.203

7.1.2 Requirement

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

7.2 Antenna Connected Construction

The directional gains of the antenna used for transmitting is 0 dBi, and the antenna connector is de-signed with permanent attachment and no consideration of replacement. Please see the EUT photo for details.

The EUT antenna is a FPC Antenna. It complies with the standard requirement.

Antenna Type
☒ Permanent attached antenna
☐ Unique connector antenna
☐ Professional installation antenna