

FCC RADIO TEST REPORT

For

FCC ID: X5B-090079

IC: 8814A-090079

Report Reference No..... : 19EFAB05008 61

Date of issue..... : 2019-08-19

Testing Laboratory..... : DongGuan ShuoXin Electronic Technology Co., Ltd.

Address..... : Zone A, 1F, No. 6, XinGang Road YuanGang Street, XinAn
District, ChangAn Town, DongGuan City, GuangDong, China

Applicant's name.....: Performance Designed Products, LLC

Address.....: 14144 Ventura Blvd, Suite 200 Sherman Oaks, CA 91423 U.S.A

Manufacturer.....: Performance Designed Products, LLC

Test specification:

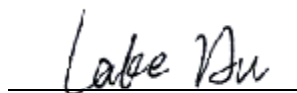
Test item description..... : MARS LIGHTCON

Trade Mark : N/A

Model/Type reference..... : 090-079

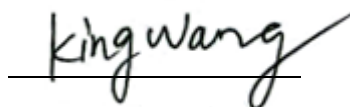
Ratings..... : I/P: 3Vdc

Responsible Engineer :



Lake Hu

Authorized Signatory:



King Wang

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TEST REPORT DECLARE

Applicant	:	Performance Designed Products, LLC
Address	:	14144 Ventura Blvd, Suite 200 Sherman Oaks, CA 91423 U.S.A
Equipment under Test	:	MARS LIGHTCON
Test Model No	:	090-079
Manufacturer	:	Performance Designed Products, LLC
Address	:	14144 Ventura Blvd, Suite 200 Sherman Oaks, CA 91423 U.S.A

Test Standard Used: FCC Rules and Regulations Part 15 Subpart C (15.249)

RSS-210 Issue 9 August 2016, RSS-Gen Issue 5 March 2019

Test procedure used: ANSI C63.10:2013, ANSI C63.4:2014

We Declare:

The equipment described above is tested by DongGuan ShuoXin Electronic Technology Co., Ltd. and in the configuration tested the equipment complied with the standards specified above. The test results are contained in this test report and DongGuan ShuoXin Electronic Technology Co., Ltd. is assumed of full responsibility for the accuracy and completeness of these tests.

After test and evaluation, our opinion is that the equipment provided for test compliance with the requirement of the above FCC standards.

Report No:	19EFAB05008 61		
Date of Test:	2019-04-30 To 2019-08-19	Date of Report:	2019-08-19

Note: This report applies to above tested sample only. This report shall not be reproduced in parts without written approval of DongGuan ShuoXin Electronic Technology Co., Ltd.

1. Summary of test Standards and results

The EUT have been tested according to the applicable standards as referenced below.

Description of Test Item	Standard	Results
Restricted bands of operation	FCC Part 15.205, RSS-GEN 8.10	PASS
AC Line Conducted Emissions	FCC Part 15.207 (a), RSS-GEN 8.8	N/A
20dB 99% Bandwidth	15.215(c), RSS-GEN 6.7	PASS
Radiated emission	FCC Part 15.209, 15.249 (a), RSS-210 B.10 (a) RSS-GEN 8.9	PASS
Bandedge	15.249(d), RSS-210 B.10 (b)	PASS
Frequency Stability	RSS-GEN section 6.11	PASS

NOTE: "N/A" denotes test is not applicable in this Test Report

2. General test information

2.1. Description of EUT

EUT* Name	:	MARS LIGHTCON
Model Number	:	090-079
EUT function description	:	Please reference user manual of this device
Power supply	:	3Vdc
Adaptor	:	N/A
Radio Technology	:	BLE
Operation frequency	:	2402-2480MHz
Modulation	:	GFSK
Antenna Type	:	Internal Antenna, maximum PK gain: -2.6dBi
Date of Receipt	:	2019/04/29
Sample Type	:	Single production
Hardware Version	:	Rev. C
Software Version	:	V2.14

Note: EUT is the ab. of equipment under test.

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

2.2. Accessories of EUT

Description of Accessories	Manufacturer	Model number or Type	Other

2.3. Assistant equipment used for test

Description of Assistant equipment	Manufacturer	Model number or Type	Other

2.4. Block diagram of EUT configuration for test



Note: New battery is used during all test

EUT enters the engineering interface by clicking the system version to control EUT work in test mode as blow table.

Tested mode, channel, and data rate information			
Mode	data rate (Mbps) (see Note)	Channel	Frequency (MHz)
DTS	1	Low: CH 0	2402
DTS	1	Medium: CH 20	2442
DTS	1	High: CH 39	2480
Note: According exploratory test, EUT will have maximum output power in those data rate, so those data rate were used for all test.			

2.5. Test environment conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature range:	21-25℃
Humidity range:	40-75%
Pressure range:	86-106kPa

2.6. Measurement uncertainty

Test Item	Uncertainty
Uncertainty for Conduction emission test (9kHz-150kHz)	3.7 dB
Uncertainty for Conduction emission test (150kHz-30MHz)	3.3 dB
Uncertainty for Radiation Emission test (30MHz-200MHz)	4.60 dB (Polarize: V)
	4.60 dB (Polarize: H)
Uncertainty for Radiation Emission test (200MHz-1GHz)	6.10 dB (Polarize: V)
	5.08 dB (Polarize: H)
Uncertainty for Radiation Emission test (1GHz-6GHz)	5.01 dB (Polarize: V)
	5.01 dB (Polarize: H)
Uncertainty for Radiation Emission test (6GHz-18GHz)	5.26 dB (Polarize: V)
	5.26 dB (Polarize: H)
Uncertainty for Radiation Emission test (18GHz-40GHz)	5.06 dB (Polarize: V)
	5.06 dB (Polarize: H)
Uncertainty for radio frequency	$\pm 0.048\text{kHz}$
Uncertainty for conducted RF Power	$\pm 0.32\text{dB}$

Note: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

2.7. Table Of Parameters Of Test Software Setting

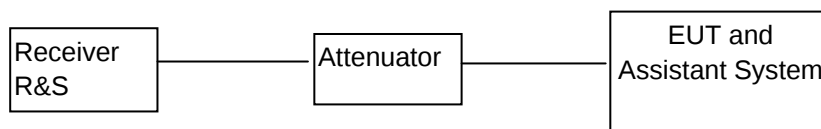
N/A.(During testing channel & power ammonium bond on product was used to control the operating channel as well as the output power level, No test software)

3. 99% Occupied Bandwidth

3.1. Test equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Calibrated until	Calibrated Date
1	Spectrum analyzer	KEYSIGHT	N9010A	MY55150427	05/27/2020	05/28/2019
2	Attenuator	Mini-Circuits	BW-S10W2	101109	12/16/2019	12/17/2018
3	RF Cable	Micable	C10-01-01-1	100309	12/16/2019	12/17/2018

3.2. Block diagram of test setup



3.3. Limits

N/A

3.4. Test Procedure

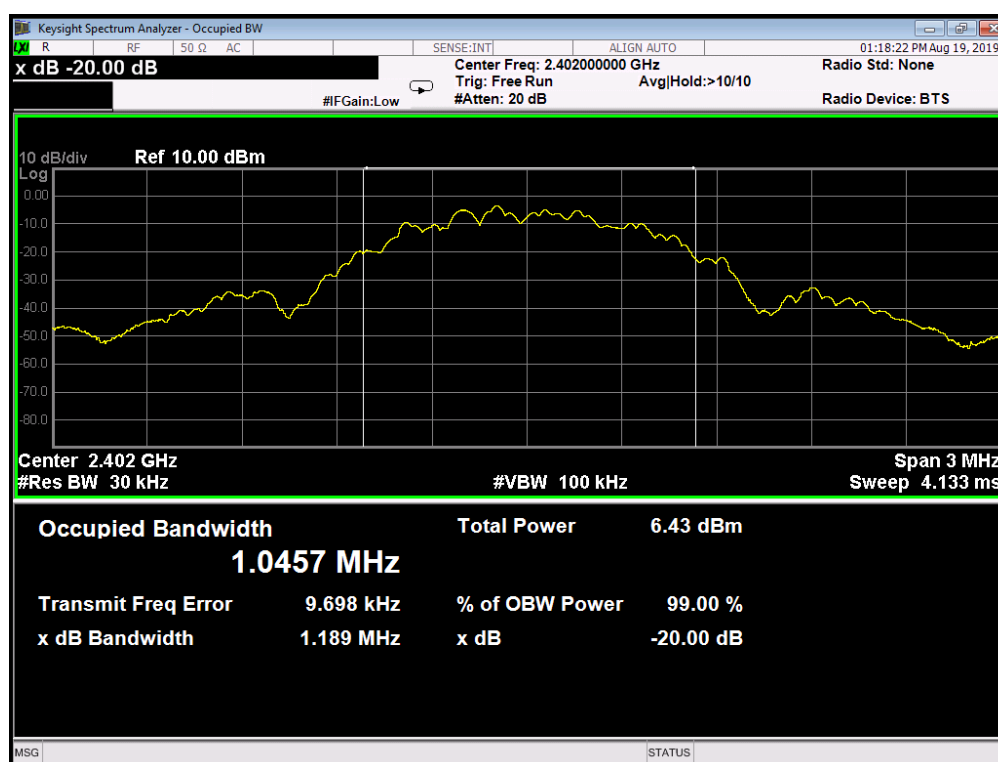
- (1) Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- (2) Position the EUT without connection to measurement instrument. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
- (3) Measure the frequency difference of two frequencies that were attenuated 6 dB from the reference level. Record the frequency difference as the emission bandwidth.
- (4) Repeat above procedures until all frequencies measured were complete.

3.5. Test Result

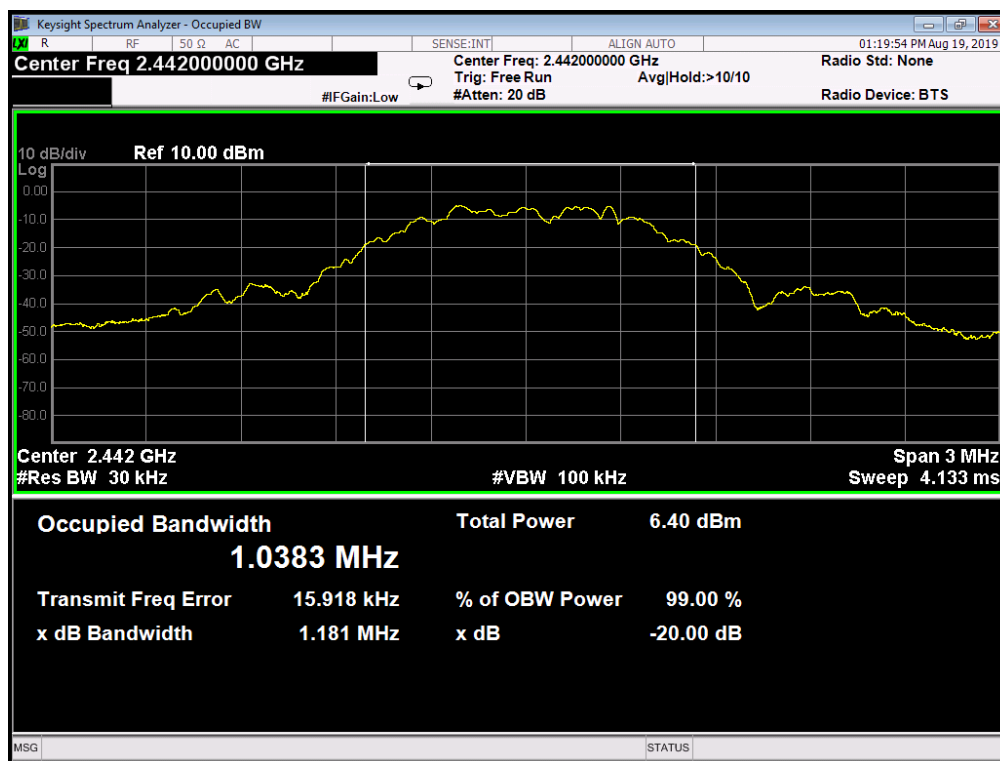
Frequency (MHz)	20dB Bandwidth (MHz)	99% dB bandwidth (MHz)
2402	1.189	1.0457
2442	1.181	1.0383
2480	1.125	1.0564

3.6. Original test data

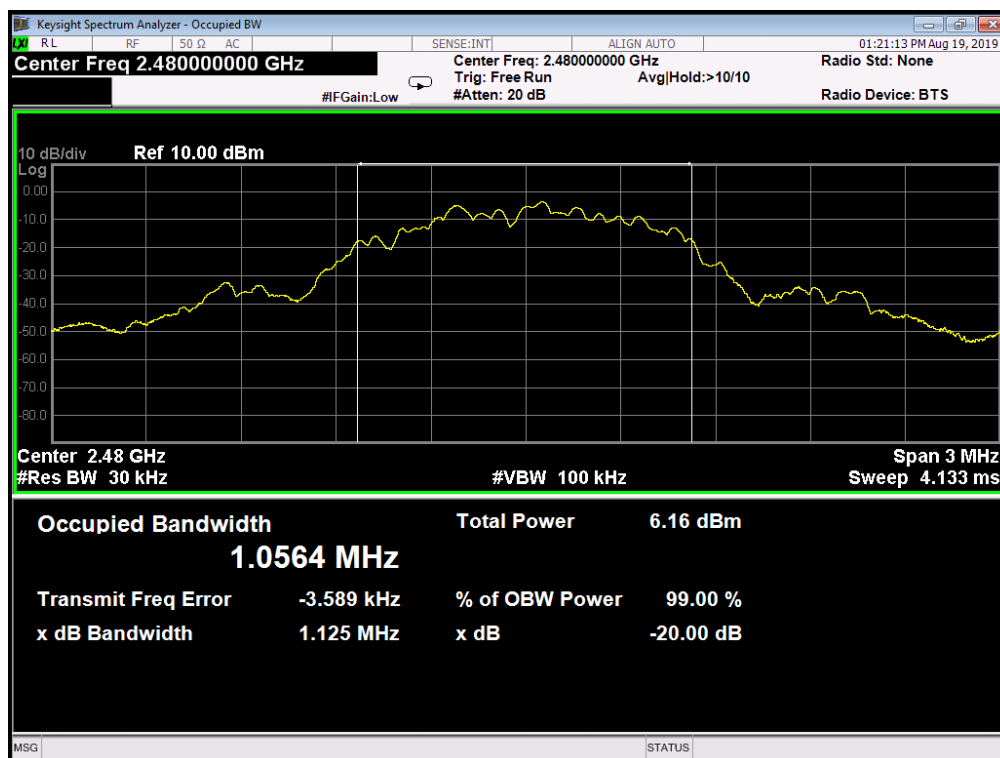
CH 0



CH 20



CH 39



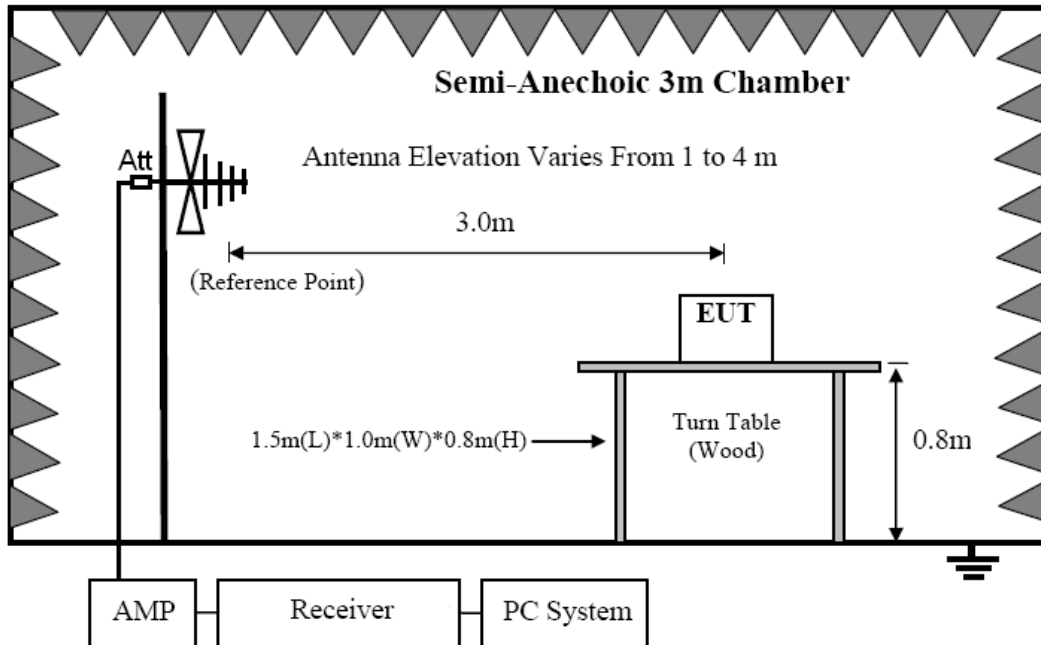
4. Field Strength of Spurious Emissions And Field Strength of Fundamental

4.1. Test equipment

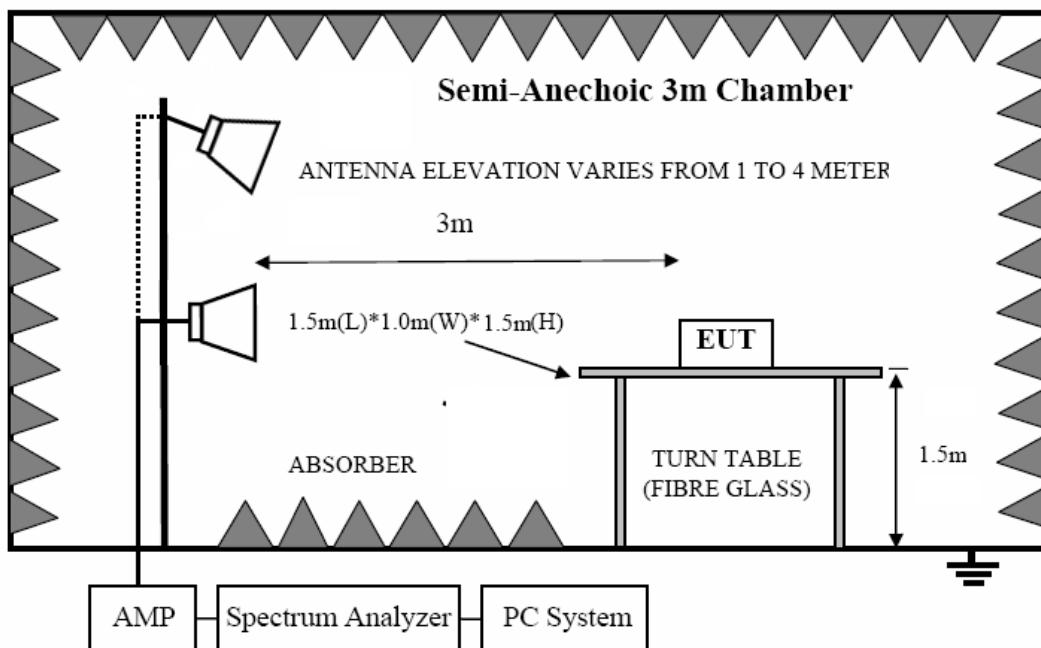
Item	Equipment	Manufacturer	Model No.	Serial No.	Calibrated until	Calibrated Date
1	EMI Test Receiver	R&S	ESCI	101307	12/16/2019	12/17/2018
2	Spectrum analyzer	Agilent	E4407B	US40240708	11/20/2019	11/21/2018
3	Trilog Broadband Antenna	Schwarzbeck	VULB9168	VULB9168-192	03/22/2020	03/23/2019
4	Double Ridged Horn Antenna	SCHWARZBECK	BBHA 9120D1065	100276	12/16/2019	12/17/2018
5	Double Ridged Horn Antenna	SCHWARZBECK	BBHA 9120D1065	100546	12/16/2019	12/17/2018
6	Dipole antenna	Schwarzbeck	UHAP	1101	12/16/2019	12/17/2018
7	Dipole antenna	Schwarzbeck	VHAP	1118	12/16/2019	12/17/2018
8	Pre-Amplifier	CY	EMC011830	980136	12/19/2019	12/20/2018
9	Pre-amplifier	HP	8447F	3113A05680	12/16/2019	12/17/2018
10	RF Cable	R&S	R01	10403	12/16/2019	12/17/2018
11	RF Cable	R&S	R02	10512	12/16/2019	12/17/2018
12	RF Cable	R&S	R01	10454	12/16/2019	12/17/2018
13	RF Cable	R&S	R02	10343	12/16/2019	12/17/2018
14	6 dB Attenuator	EMEC	ATT6000-6-N	N/A	12/16/2019	12/17/2018
15	Turn Table	UC	UC3000	N/A	N/A	N/A
16	Antenna Mast	UC	UC3000	N/A	N/A	N/A
17	Measurement Software	Farad	EZ-EMC (Ver.ATT-03A)	N/A	N/A	N/A

4.2. Block diagram of test setup

In 3m Anechoic Chamber Test Setup Diagram for below 1GHz



In 3m Anechoic Chamber Test Setup Diagram for frequency above 1GHz



Note: For harmonic emissions test a appropriate high pass filter was inserted in the input port of AMP.

4.3. Limit

6.3.1 FCC 15.205 Restricted frequency band

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
¹ 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2690 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	(²)

6.3.2 FCC 15.209 Limit

FREQUENCY MHz	DISTANCE Meters	FIELD STRENGTHS LIMIT	
		μV/m	dB(μV)/m
30 ~ 88	3	100	40.0
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46.0
960 ~ 1000	3	500	54.0
Above 1000	3	74.0 dB(μV)/m (Peak) 54.0 dB(μV)/m (Average)	

6.3.3 FCC 15.249(a) limit

Fundamental Frequency (MHz)	Field strength of fundamental (millivolts/meter)	Field strength of harmonics (millivolts/meter)
902-928	50	500
2400-2483.5	50	500
5725-5875	50	500
24.0-24.25	250	2500

4.4. Test Procedure

- (1) EUT was placed on a non-metallic table, 80 cm above the ground plane inside a semi-anechoic chamber.
- (2) Setup EUT and assistant system according clause 2.4 and 8.2
- (3) Test antenna was located 3m from the EUT on an adjustable mast. Below pre-scan procedure was first performed in order to find prominent radiated emissions.
 - (a) Change work frequency or channel of device if practicable.
 - (b) Change modulation type of device if practicable.
 - (c) Change power supply range from 85% to 115% of the rated supply voltage
 - (d) Rotated EUT though three orthogonal axes to determine the attitude of EUT arrangement produces highest emissions
- (4) Spectrum frequency from 9MHz to 25GHz (tenth harmonic of fundamental frequency) was investigated, and no any obvious emission were detected from 9KHz to 30MHz and 18GHz to 25GHz, so below final test was performed with frequency range from 30MHz to 18GHz.
- (5) For final emissions measurements at each frequency of interest, the EUT were rotated and the antenna height was varied between 1m and 4m in order to maximize the emission. Measurements in both horizontal and vertical polarities were made and the data was recorded. In order to find the maximum emission, the relative positions of equipments and all of the interface cables were changed according to ANSI C63.10 2013 on Radiated Emission test.
- (6) For emissions from 30MHz to 1GHz, Quasi-Peak values were measured with EMI Receiver and the bandwidth of Receiver is 120 KHz.
- (7) For emissions above 1GHz, both Peak and Average level were measured with Spectrum Analyzer, and the RBW is set at 1MHz, VBW is set at 3MHz for Peak measure, Detector is at PK; RBW is set at 1MHz, VBW is set at 3MHz for Average measure, Detector is at RMS.
- (8) For Field Strength of Fundamental were measured with Spectrum Analyzer, and the RBW is set at above 99% Occupied Bandwidth , VBW is set at equal to RBW for Peak measure, Detector is at PK,for Average measure, Detector is at RMS.

4.5. Test result

Below 30M

EUT:	MARS LIGHTCON	Model No.:	090-079
Temperature:	24℃	Relative Humidity:	55%
Distance:	3m	Test Power:	DC 3V
Polarization:	--	Test Result:	Pass
Test Mode:	Keeping TX mode	Test By:	Lake

Freq.	Reading	Limit	Margin	State
(MHz)	(dBuV/m)	(dBuV/m)	(dB)	P/F
--	--	--	--	P
--	--	--	--	P

Note:

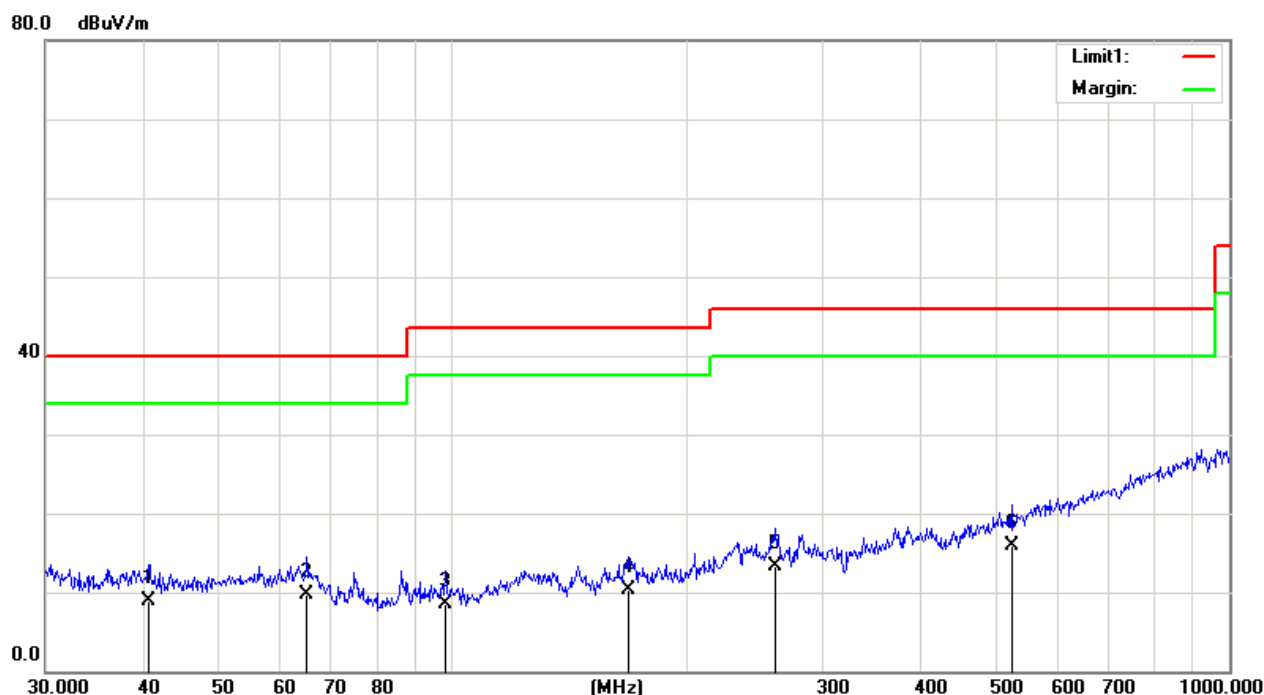
The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

Distance extrapolation factor = $20 \log (\text{specific distance}/\text{test distance})(\text{dB})$;

Limit line = specific limits(dBuv) + distance extrapolation factor

Between 30M – 1000 MHz

EUT:	MARS LIGHTCON	Model No.:	090-079
Temperature:	24°C	Relative Humidity:	55%
Distance:	3m	Test Power:	DC 3V
Polarization:	Vertical	Test Result:	Pass
Test Time:	2019-05-03	Test By:	Lake
Standard:	(RE)FCC PART 15		
Test Mode:	TX		
Note:	2402MHz		



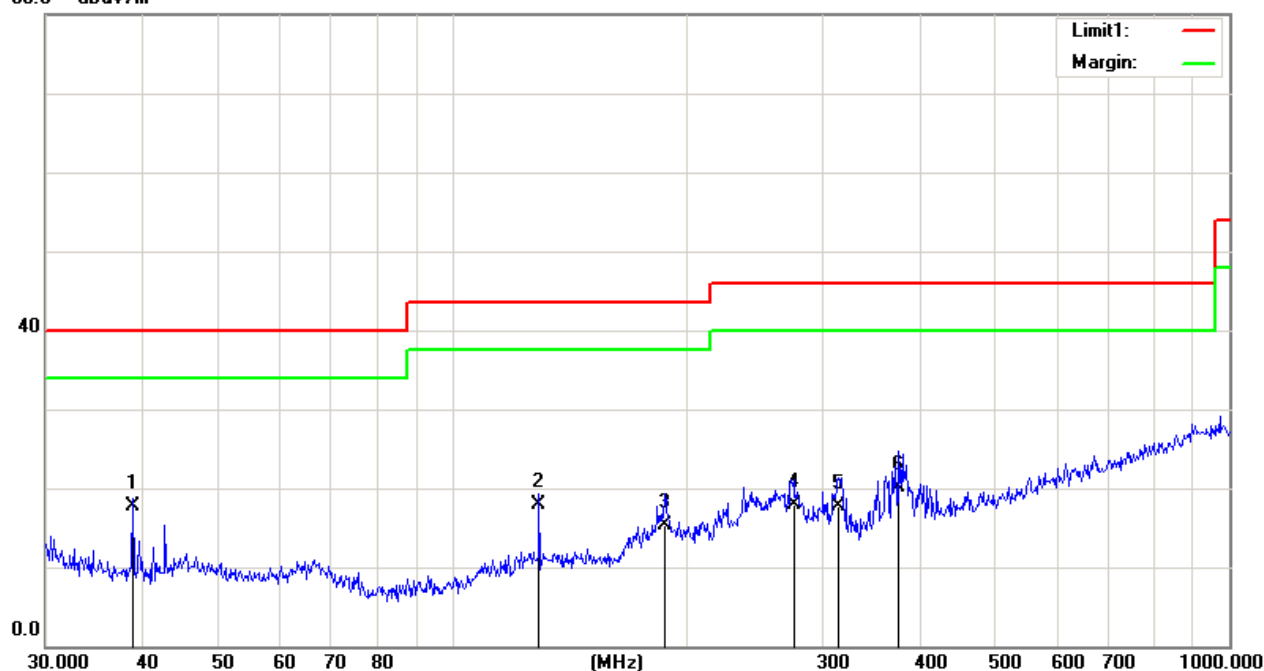
No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	40.7016	22.32	-13.43	8.89	40.00	-31.11	QP
2	65.1145	22.75	-12.99	9.76	40.00	-30.24	QP
3	98.1419	23.86	-15.30	8.56	43.50	-34.94	QP
4	168.4138	21.56	-11.17	10.39	43.50	-33.11	QP
5	260.1444	19.86	-6.64	13.22	46.00	-32.78	QP
6	524.5541	21.88	-6.05	15.83	46.00	-30.17	QP

The test result is calculated as the following:

- (1) Result = Reading + Correct Factor
- (2) Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain + Attenuator
- (3) Margin = Result - Limit

EUT:	MARS LIGHTCON	Model No.:	090-079
Temperature:	24℃	Relative Humidity:	55%
Distance:	3m	Test Power:	DC 3V
Polarization:	Horizontal	Test Result:	Pass
Test Time:	2019-05-03	Test By:	Lake
Standard:	(RE)FCC PART 15		
Test Mode:	TX		
Note:	2402MHz		

80.0 dBuV/m



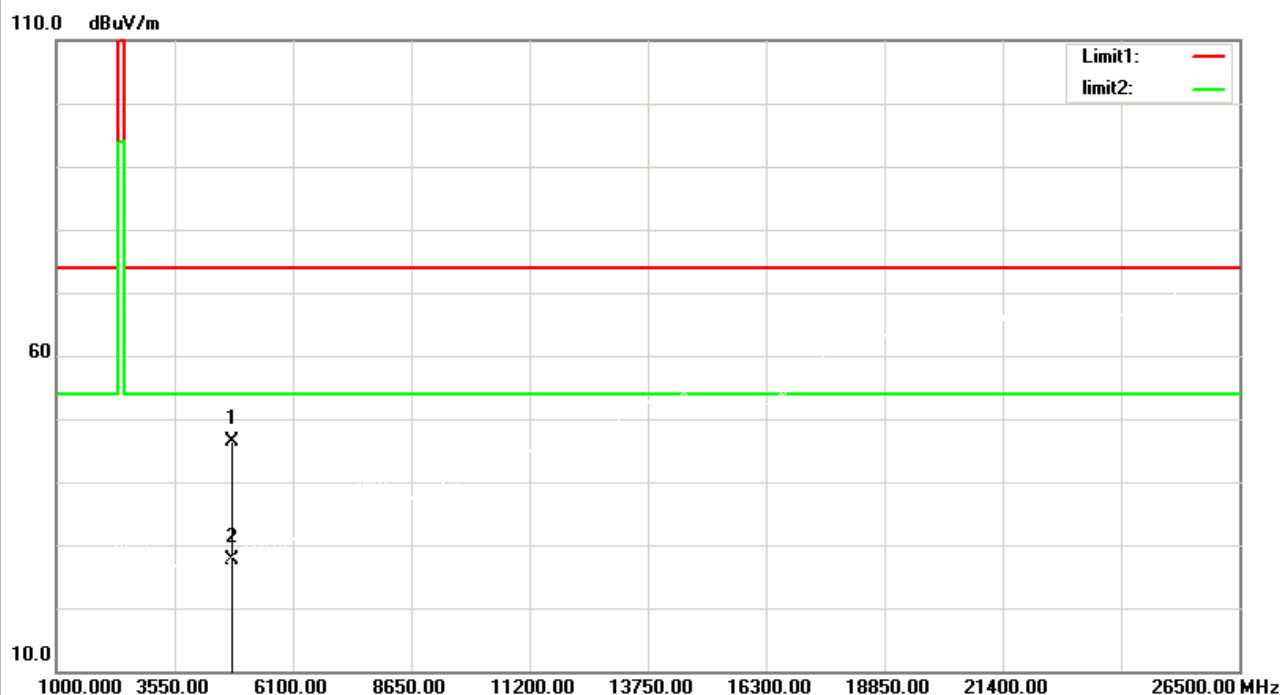
No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	38.8878	33.69	-15.97	17.72	40.00	-22.28	QP
2	129.4677	31.79	-13.90	17.89	43.50	-25.61	QP
3	187.7530	25.61	-10.39	15.22	43.50	-28.28	QP
4	275.1570	23.85	-6.01	17.84	46.00	-28.16	QP
5	314.3765	27.04	-9.41	17.63	46.00	-28.37	QP
6	375.9385	29.11	-8.93	20.18	46.00	-25.82	QP

The test result is calculated as the following:

- (1) Result = Reading + Correct Factor
- (2) Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain + Attenuator
- (3) Margin = Result - Limit

Between 1000M – 25000 MHz

EUT:	MARS LIGHTCON	Model No.:	090-079
Temperature:	24℃	Relative Humidity:	55%
Distance:	3m	Test Power:	DC 3V
Polarization:	Vertical	Test Result:	Pass
Test Time:	2019-05-03	Test By:	Lake
Standard:	FCC PART 15 C 1-26.5G PEAK		
Test Mode:	TX		
Note:	2402MHz		

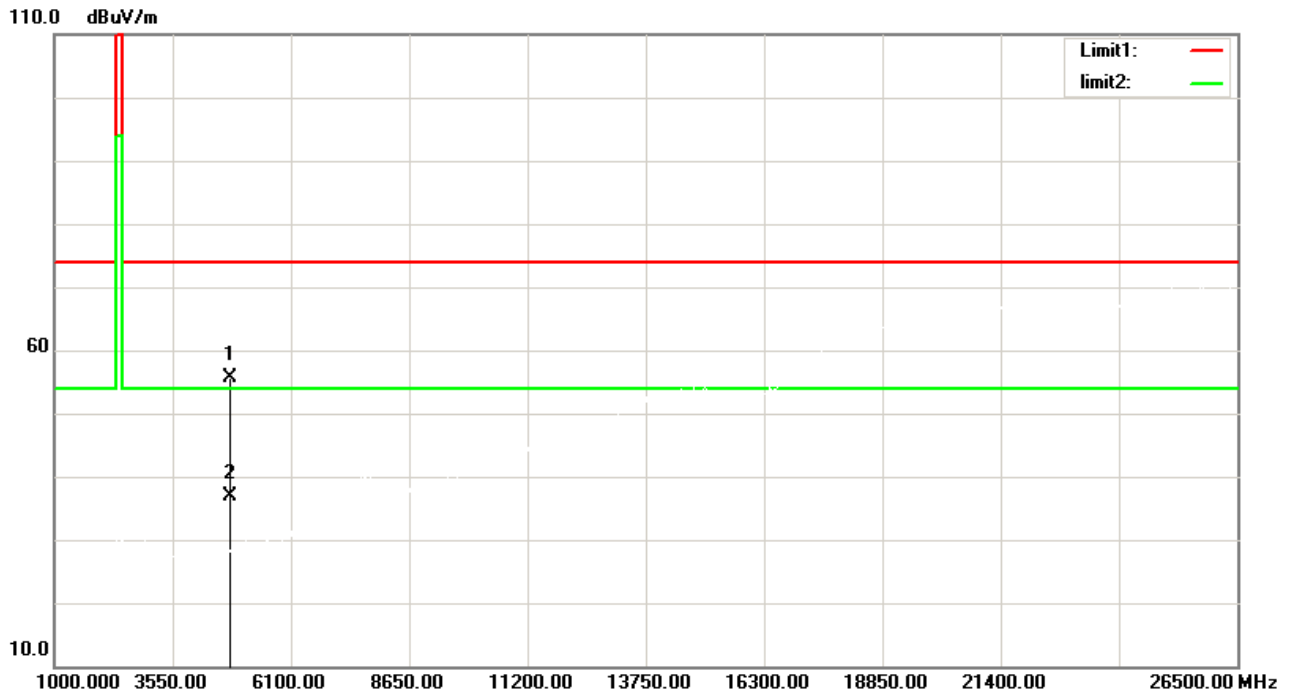


No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4804.169	57.19	-10.79	46.40	74.00	-27.60	peak
2	4804.169	38.48	-10.79	27.69	54.00	-26.31	AVG

The test result is calculated as the following:

- (1) Result = Reading + Correct Factor
- (2) Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain + Attenuator
- (3) Margin = Result - Limit

EUT:	MARS LIGHTCON	Model No.:	090-079
Temperature:	24℃	Relative Humidity:	55%
Distance:	3m	Test Power:	DC 3V
Polarization:	Horizontal	Test Result:	Pass
Test Time:	2019-05-03	Test By:	Lake
Standard:	FCC PART 15 C 1-26.5G PEAK		
Test Mode:	TX		
Note:	2402MHz		

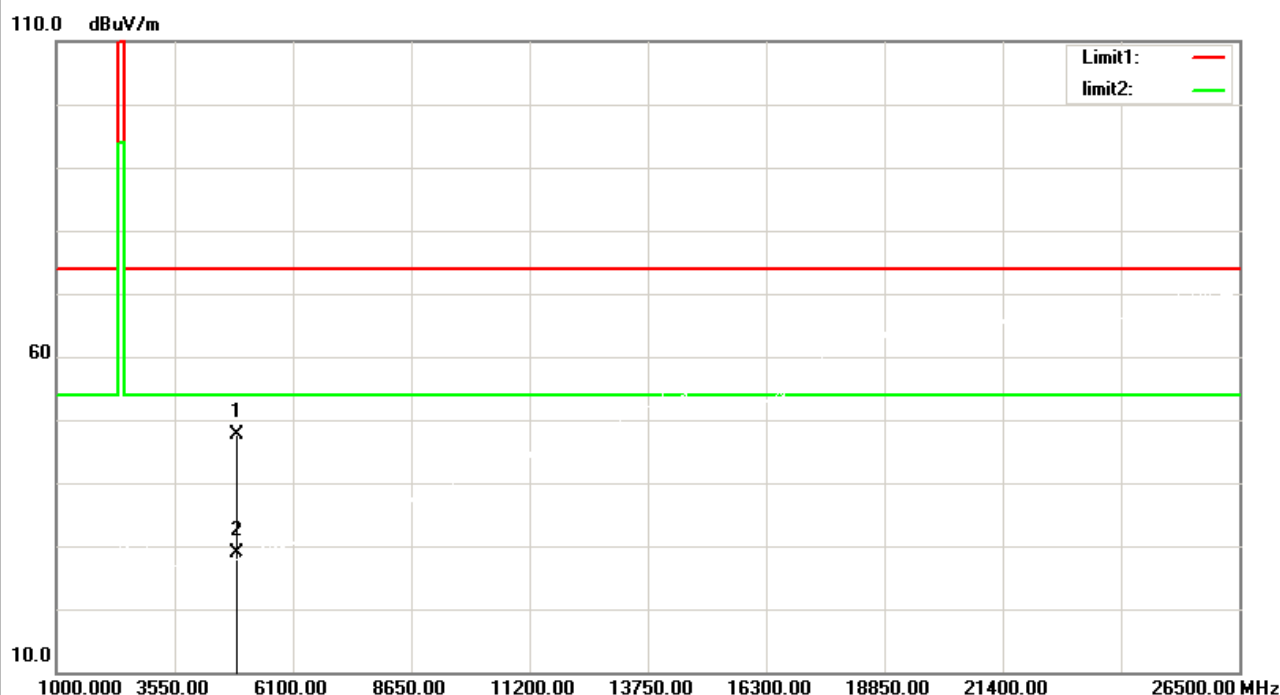


No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4804.029	66.32	-10.79	55.53	74.00	-18.47	peak
2	4804.029	47.61	-10.79	36.82	54.00	-17.18	AVG

The test result is calculated as the following:

- (1) Result = Reading + Correct Factor
- (2) Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain + Attenuator
- (3) Margin = Result - Limit

EUT:	MARS LIGHTCON	Model No.:	090-079
Temperature:	24℃	Relative Humidity:	55%
Distance:	3m	Test Power:	DC 3V
Polarization:	Vertical	Test Result:	Pass
Test Time:	2019-05-03	Test By:	Lake
Standard:	FCC PART 15 C 1-26.5G PEAK		
Test Mode:	TX		
Note:	2442MHz		

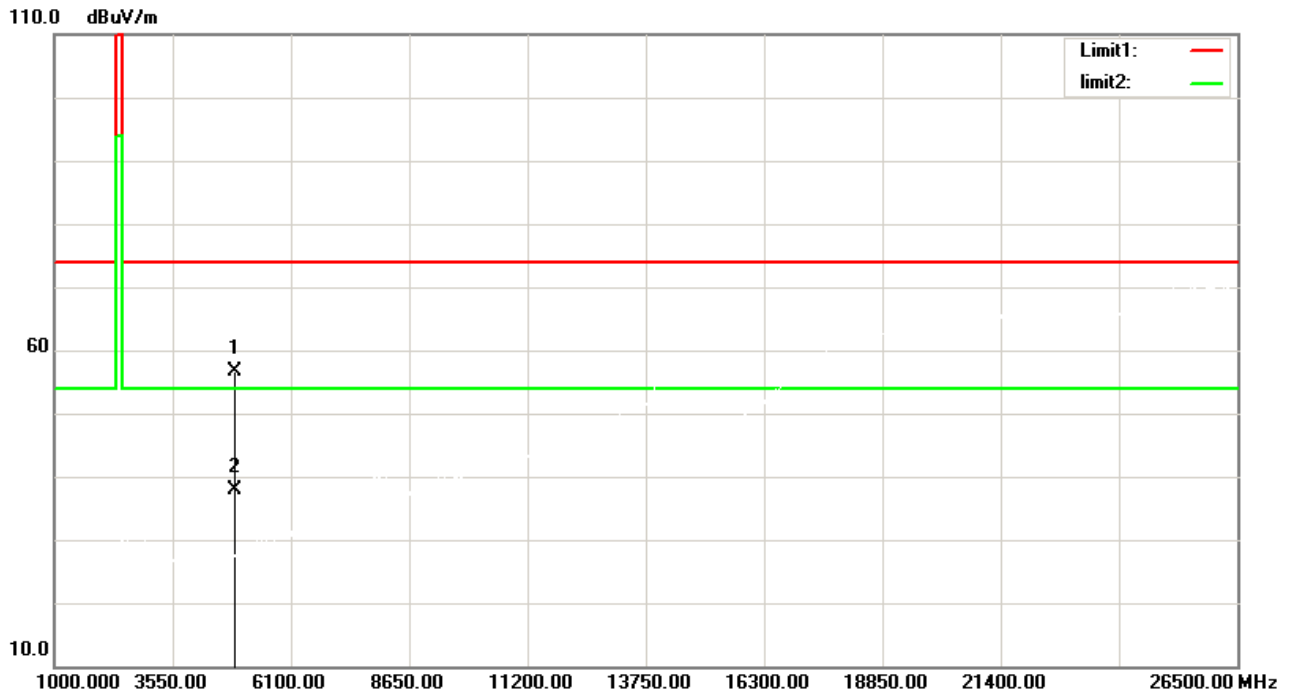


No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4884.149	57.94	-10.41	47.53	74.00	-26.47	peak
2	4884.149	39.23	-10.41	28.82	54.00	-25.18	AVG

The test result is calculated as the following:

- (1) Result = Reading + Correct Factor
- (2) Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain + Attenuator
- (3) Margin = Result - Limit

EUT:	MARS LIGHTCON	Model No.:	090-079
Temperature:	24℃	Relative Humidity:	55%
Distance:	3m	Test Power:	DC 3V
Polarization:	Horizontal	Test Result:	Pass
Test Time:	2019-05-03	Test By:	Lake
Standard:	FCC PART 15 C 1-26.5G PEAK		
Test Mode:	TX		
Note:	2442MHz		

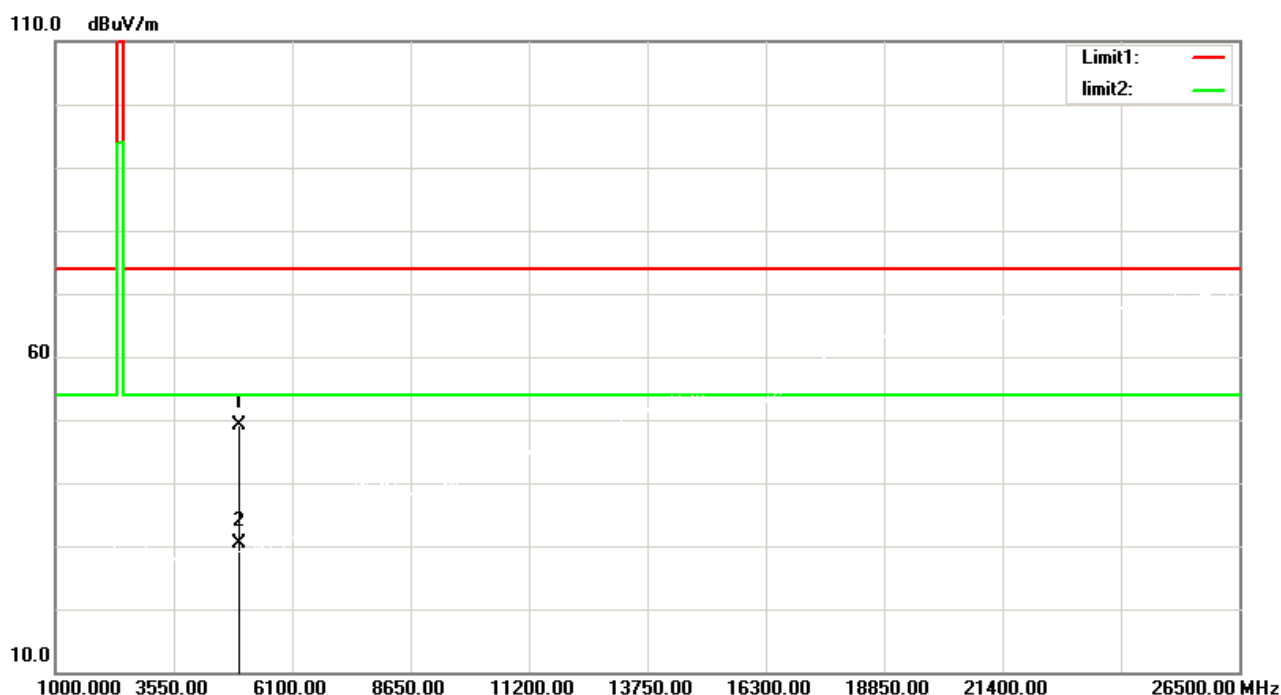


No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4883.907	66.96	-10.41	56.55	74.00	-17.45	peak
2	4883.907	48.25	-10.41	37.84	54.00	-16.16	AVG

The test result is calculated as the following:

- (1) Result = Reading + Correct Factor
- (2) Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain + Attenuator
- (3) Margin = Result - Limit

EUT:	MARS LIGHTCON	Model No.:	090-079
Temperature:	24℃	Relative Humidity:	55%
Distance:	3m	Test Power:	DC 3V
Polarization:	Vertical	Test Result:	Pass
Test Time:	2019-05-03	Test By:	Lake
Standard:	FCC PART 15 C 1-26.5G PEAK		
Test Mode:	TX		
Note:	2480MHz		

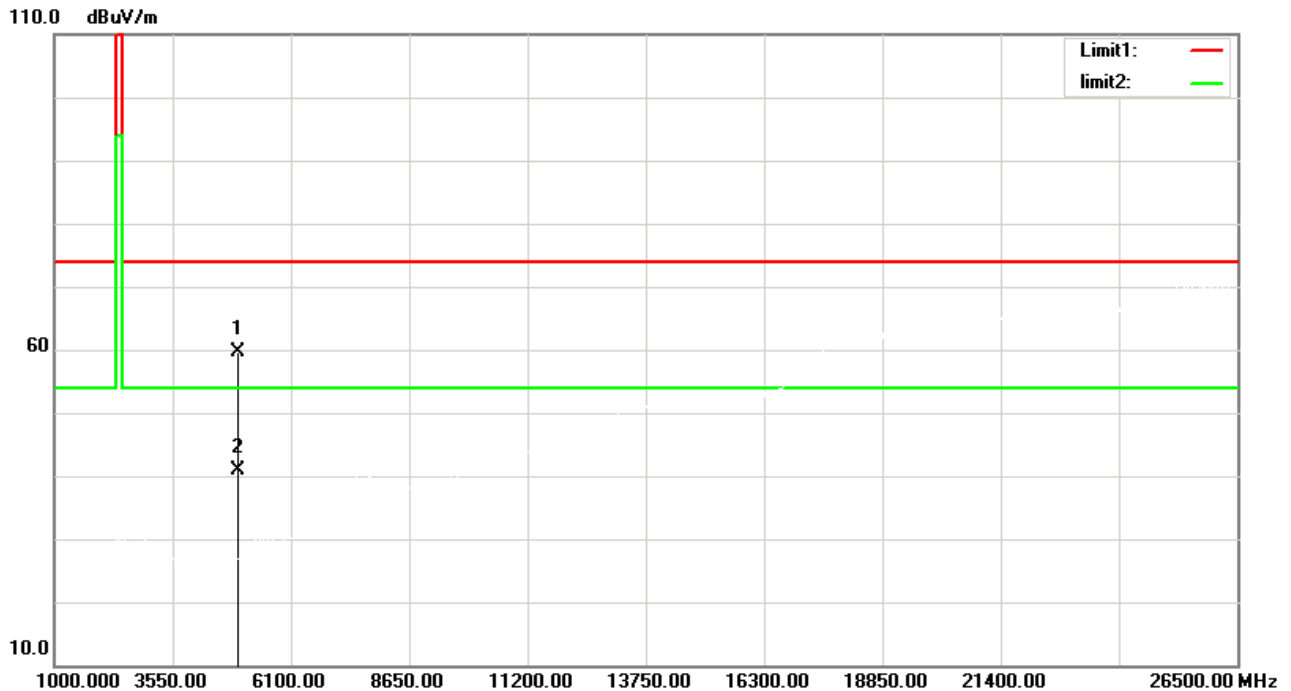


No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4959.938	59.16	-10.08	49.08	74.00	-24.92	peak
2	4959.938	40.45	-10.08	30.37	54.00	-23.63	AVG

The test result is calculated as the following:

- (1) Result = Reading + Correct Factor
- (2) Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain + Attenuator
- (3) Margin = Result - Limit

EUT:	MARS LIGHTCON	Model No.:	090-079
Temperature:	24℃	Relative Humidity:	55%
Distance:	3m	Test Power:	DC 3V
Polarization:	Horizontal	Test Result:	Pass
Test Time:	2019-05-03	Test By:	Lake
Standard:	FCC PART 15 C 1-26.5G PEAK		
Test Mode:	TX		
Note:	2480MHz		



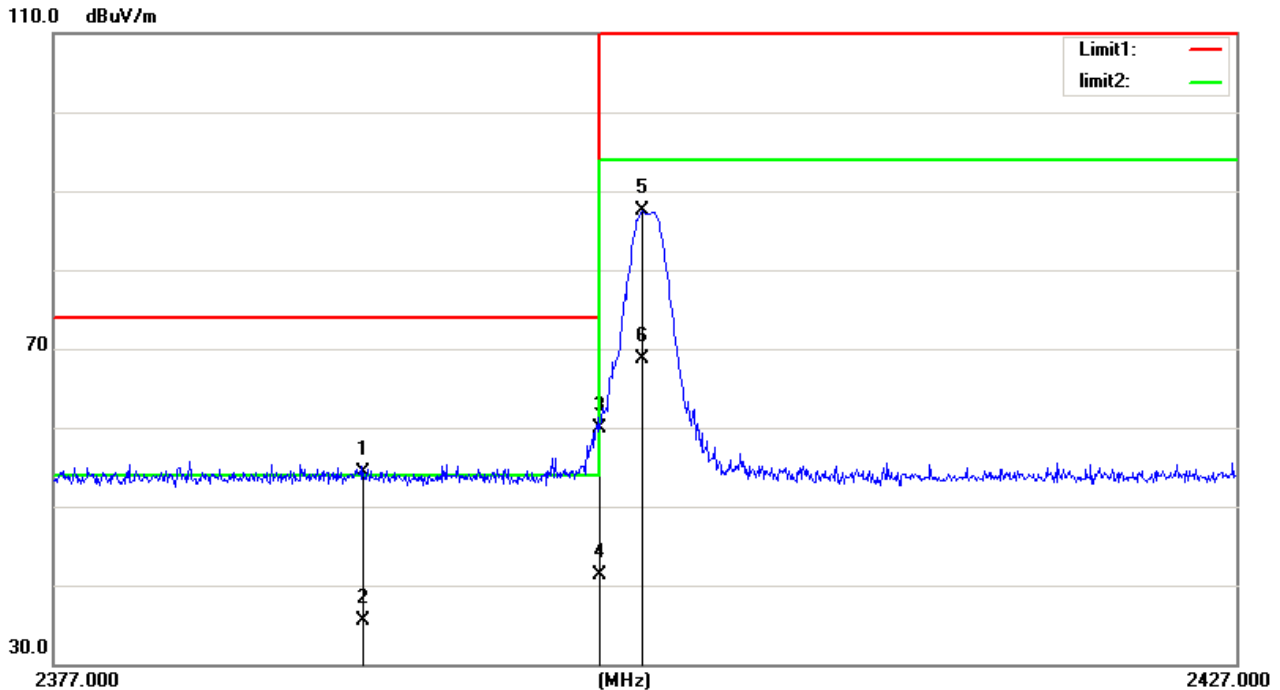
No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4959.904	69.78	-10.08	59.70	74.00	-14.30	peak
2	4959.904	51.07	-10.08	40.99	54.00	-13.01	AVG

The test result is calculated as the following:

- (1) Result = Reading + Correct Factor
- (2) Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain + Attenuator
- (3) Margin = Result - Limit

Radiated band edge and Field Strength of Fundamental

EUT:	MARS LIGHTCON	Model No.:	090-079
Temperature:	24℃	Relative Humidity:	55%
Distance:	3m	Test Power:	DC 3V
Polarization:	Vertical	Test Result:	Pass
Test Time:	2019-05-03	Test By:	Lake
Standard:	FCC PART 15 C 1-26.5G PEAK		
Test Mode:	TX		
Note:	2402MHz		

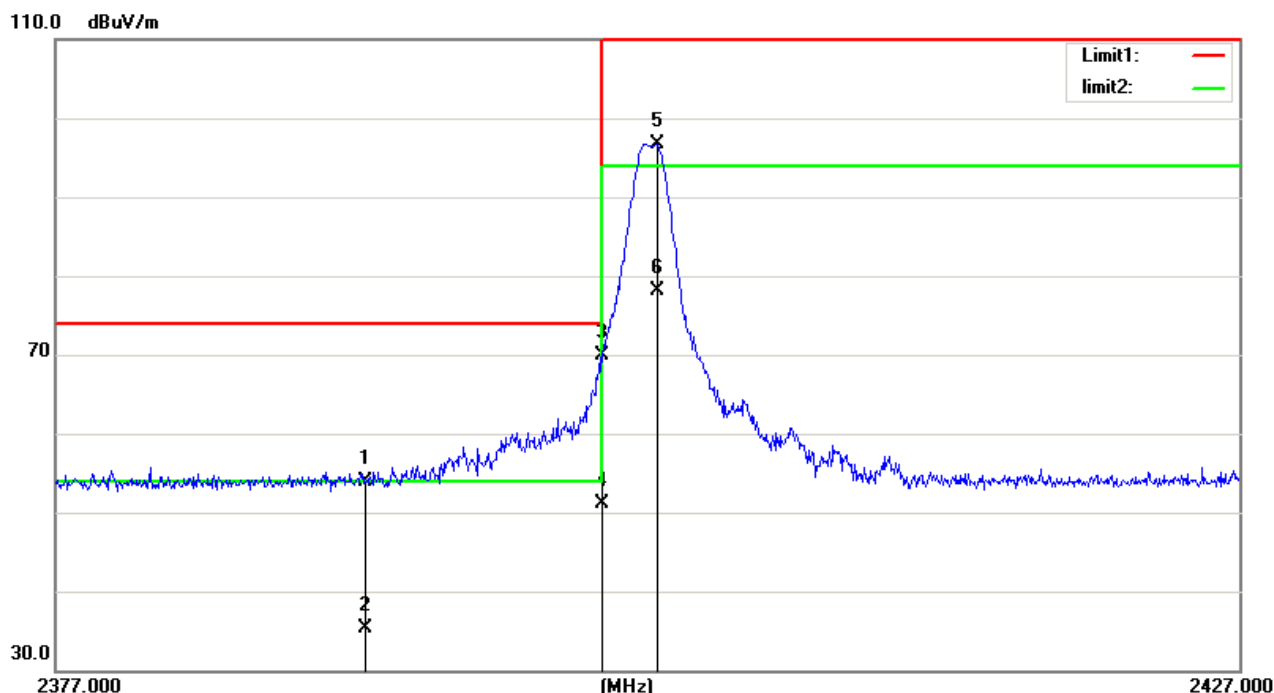


No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2390.000	23.49	30.74	54.23	74.00	-19.77	peak
2	2390.000	4.78	30.74	35.52	54.00	-18.48	AVG
3	2400.000	29.18	30.77	59.95	74.00	-14.05	peak
4	2400.000	10.47	30.77	41.24	54.00	-12.76	AVG
5	2401.800	56.65	30.77	87.42	114.00	-26.58	peak
6	2401.800	37.94	30.77	68.71	94.00	-25.29	AVG

The test result is calculated as the following:

- (1) Result = Reading + Correct Factor
- (2) Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain + Attenuator
- (3) Margin = Result - Limit

EUT:	MARS LIGHTCON	Model No.:	090-079
Temperature:	24℃	Relative Humidity:	55%
Distance:	3m	Test Power:	DC 3V
Polarization:	Horizontal	Test Result:	Pass
Test Time:	2019-05-03	Test By:	Lake
Standard:	FCC PART 15 C 1-26.5G PEAK		
Test Mode:	TX		
Note:	2402MHz		

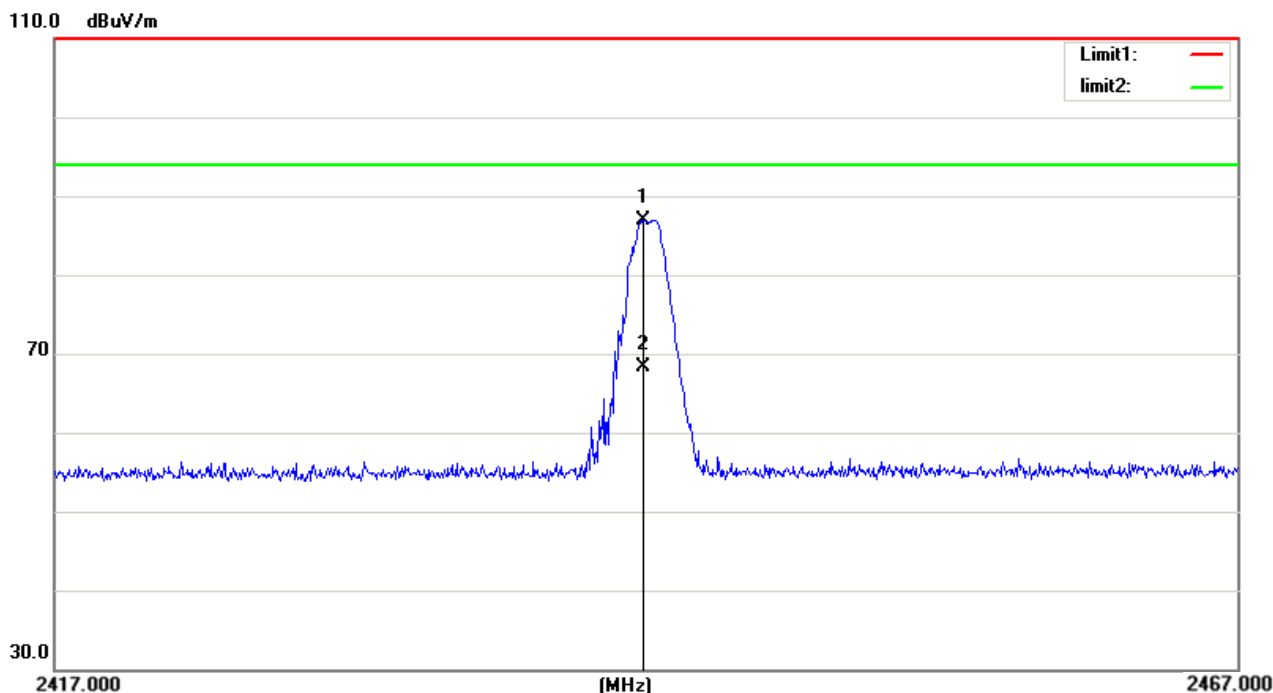


No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2390.000	23.17	30.74	53.91	74.00	-20.09	peak
2	2390.000	4.46	30.74	35.20	54.00	-18.80	AVG
3	2400.000	39.04	30.77	69.81	74.00	-4.19	peak
4	2400.000	20.33	30.77	51.10	54.00	-2.90	AVG
5	2402.300	65.96	30.77	96.73	114.00	-17.27	peak
6	2402.300	47.25	30.77	78.02	94.00	-15.98	AVG

The test result is calculated as the following:

- (1) Result = Reading + Correct Factor
- (2) Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain + Attenuator
- (3) Margin = Result - Limit

EUT:	MARS LIGHTCON	Model No.:	090-079
Temperature:	24°C	Relative Humidity:	55%
Distance:	3m	Test Power:	DC 3V
Polarization:	Vertical	Test Result:	Pass
Test Time:	2019-05-03	Test By:	Lake
Standard:	FCC PART 15 C 1-26.5G PEAK		
Test Mode:	TX		
Note:	2442MHz		

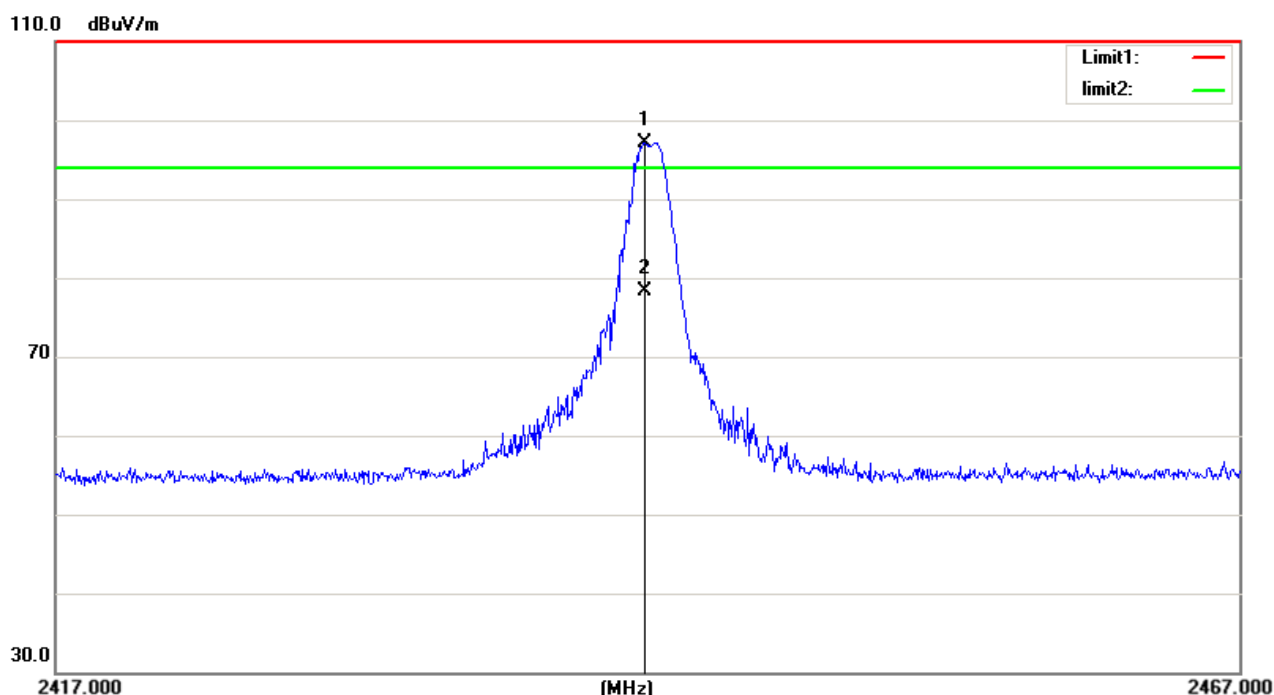


No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2441.800	56.10	30.89	86.99	114.00	-27.01	peak
2	2441.800	37.39	30.89	68.28	94.00	-25.72	AVG

The test result is calculated as the following:

- (1) Result = Reading + Correct Factor
- (2) Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain + Attenuator
- (3) Margin = Result - Limit

EUT:	MARS LIGHTCON	Model No.:	090-079
Temperature:	24℃	Relative Humidity:	55%
Distance:	3m	Test Power:	DC 3V
Polarization:	Horizontal	Test Result:	Pass
Test Time:	2019-05-03	Test By:	Lake
Standard:	FCC PART 15 C 1-26.5G PEAK		
Test Mode:	TX		
Note:	2442MHz		

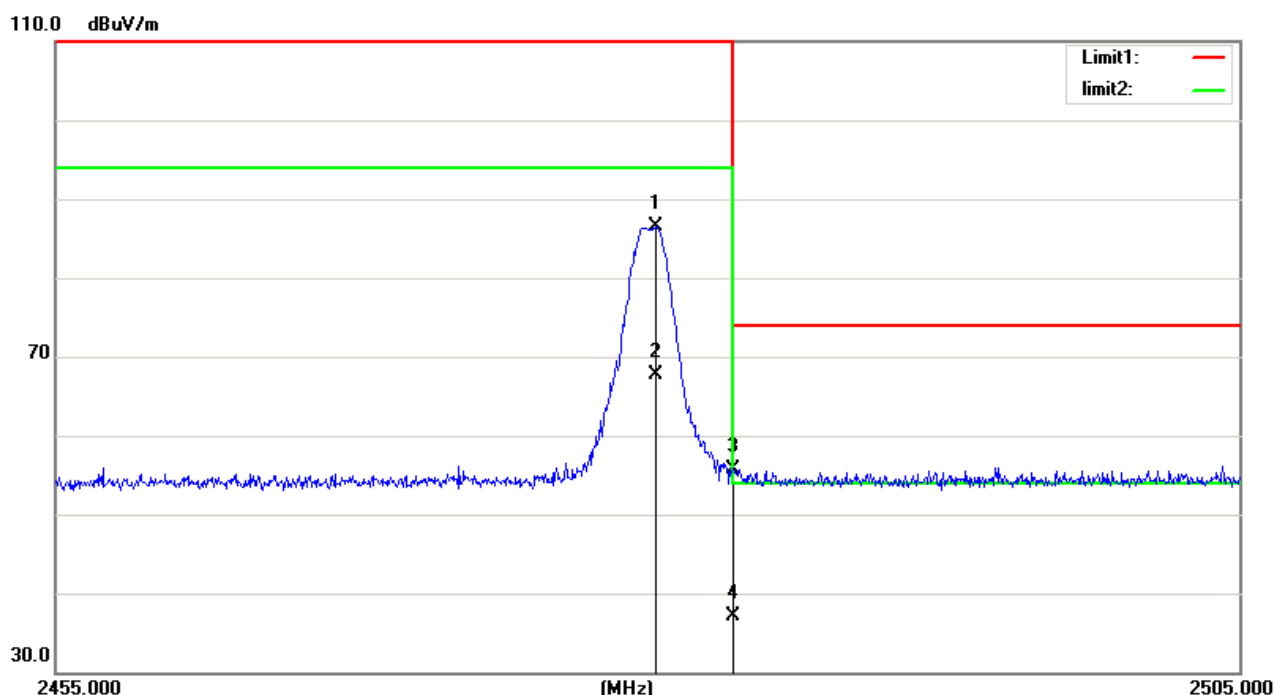


No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2441.800	66.13	30.89	97.02	114.00	-16.98	peak
2	2441.800	47.46	30.89	78.35	94.00	-15.65	AVG

The test result is calculated as the following:

- (1) Result = Reading + Correct Factor
- (2) Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain + Attenuator
- (3) Margin = Result - Limit

EUT:	MARS LIGHTCON	Model No.:	090-079
Temperature:	24℃	Relative Humidity:	55%
Distance:	3m	Test Power:	DC 3V
Polarization:	Vertical	Test Result:	Pass
Test Time:	2019-05-03	Test By:	Lake
Standard:	FCC PART 15 C 1-26.5G PEAK		
Test Mode:	TX		
Note:	2480MHz		

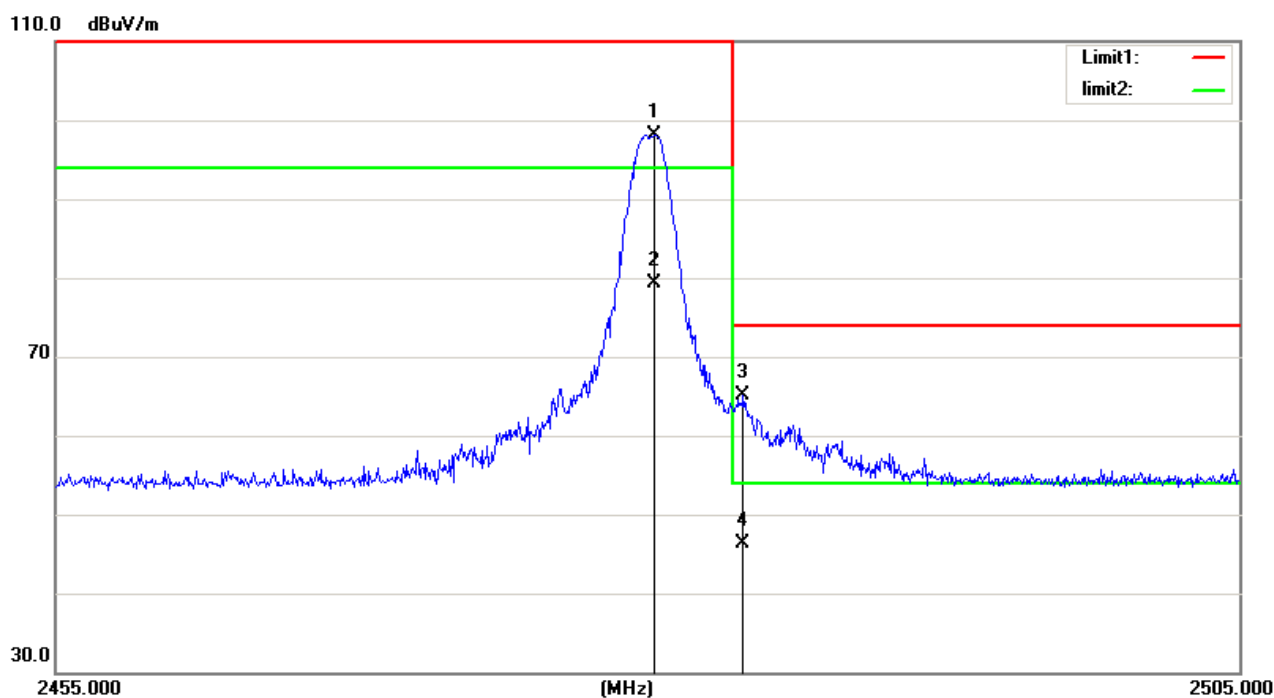


No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2480.250	55.42	31.04	86.46	114.00	-27.54	peak
2	2480.250	36.71	31.04	67.75	94.00	-26.25	AVG
3	2483.500	24.70	31.05	55.75	74.00	-18.25	peak
4	2483.500	5.99	31.05	37.04	54.00	-16.96	AVG

The test result is calculated as the following:

- (1) Result = Reading + Correct Factor
- (2) Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain + Attenuator
- (3) Margin = Result - Limit

EUT:	MARS LIGHTCON	Model No.:	090-079
Temperature:	24℃	Relative Humidity:	55%
Distance:	3m	Test Power:	DC 3V
Polarization:	Horizontal	Test Result:	Pass
Test Time:	2019-05-03	Test By:	Lake
Standard:	FCC PART 15 C 1-26.5G PEAK		
Test Mode:	TX		
Note:	2480MHz		



No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2480.200	67.04	31.04	98.08	114.00	-15.92	peak
2	2480.200	48.33	31.04	79.37	94.00	-14.63	AVG
3	2483.950	33.96	31.05	65.01	74.00	-8.99	peak
4	2483.950	15.25	31.05	46.30	54.00	-7.70	AVG

The test result is calculated as the following:

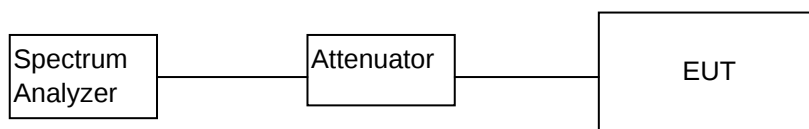
- (1) Result = Reading + Correct Factor
- (2) Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain + Attenuator
- (3) Margin = Result - Limit

5 Frequency Stability

5.1. Test equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Calibrated until	Calibrated Date
1	Spectrum analyzer	KEYSIGHT	N9010A	MY55150427	05/27/2020	05/28/2019
2	Attenuator	Mini-Circuits	BW-S10W2	101109	12/16/2019	12/17/2018
3	RF Cable	Micable	C10-01-01-1	100309	12/16/2019	12/17/2018
4	Temperature conditioning	Guan Jian.HTH1000	-20-130℃	GJ1000-10D001	12/16/2019	12/17/2018
5	DC Power Supply	G.KE	IPR-10010D	010931954	12/16/2019	12/17/2018

5.2. Block diagram of test setup



5.3 Test Result

GFSK

Temperature vs. Frequency Stability		
Voltage	Temperature	Measurement Frequency (MHz)
3.0V	(°C)	2402
	-20	2401.982
	20	2401.965
	50	2402.024
2.5V	20	2402.031
	Max. Deviation (MHz)	2401.965
	Max. Deviation (ppm)	-14.57

Voltage	Temperature	Measurement Frequency (MHz)
3.0V	(°C)	2442
	-20	2441.979
	20	2441.952
	50	2442.023
2.5V	20	2441.976
	Max. Deviation (MHz)	2441.952
	Max. Deviation (ppm)	-19.66

Voltage	Temperature	Measurement Frequency (MHz)
3.0V	(°C)	2480
	-20	2480.021
	20	2479.968
	50	2479.982
2.5V	20	2479.974
	Max. Deviation (MHz)	2489.968
	Max. Deviation (ppm)	-12.90

Note: 2.5V is the end point voltage, and products below 2.5V will cease working

END OF REPORT