



# TEST REPORT

No. B20N00042-BLE

**i.safe MOBILE GmbH**

**LTE SMARTPHONE**

**Model Name: M33A01**

**with**

**Hardware Version: V1.00**

**Software Version:**

**LA6925(IS330)\_IS330\_EEA\_1.0.0.0.0\_1\_20200103\_MultiDownload\_2**

**02001101536\_user**

**FCC ID: 2AACZ-M33A01**

**IC: 11122A-M33A01**

**Issued Date: 2020-03-11**

**Note:**

The test results in this test report relate only to the devices specified in this report. This report shall not be reproduced except in full without the written approval of SAICT.

**Test Laboratory:**

**Shenzhen Academy of Information and Communications Technology**

Building G, Shenzhen International Innovation Center, No.1006 Shennan Road, Futian District, Shenzhen, Guangdong, P. R. China 518026.

Tel: +86(0)755-33322000, Fax: +86(0)755-33322001

Email: yewu@caict.ac.cn, website: [www.cszit.com](http://www.cszit.com)

## **CONTENTS**

<b>1. SUMMARY OF TEST REPORT.....</b>	<b>3</b>
1.1. TEST ITEMS.....	3
1.2. TEST STANDARDS .....	3
1.3. TEST RESULT .....	3
1.4. TESTING LOCATION .....	3
1.5. PROJECT DATA .....	3
1.6. SIGNATURE .....	3
<b>2. CLIENT INFORMATION.....</b>	<b>4</b>
2.1. APPLICANT INFORMATION .....	4
2.2. MANUFACTURER INFORMATION .....	4
<b>3. EQUIPMENT UNDER TEST (EUT) AND ANCILLARY EQUIPMENT (AE) .....</b>	<b>5</b>
3.1. ABOUT EUT .....	5
3.2. INTERNAL IDENTIFICATION OF EUT USED DURING THE TEST .....	5
3.3. INTERNAL IDENTIFICATION OF AE USED DURING THE TEST .....	5
3.4. GENERAL DESCRIPTION.....	6
<b>4. REFERENCE DOCUMENTS .....</b>	<b>7</b>
4.1. DOCUMENTS SUPPLIED BY APPLICANT .....	7
4.2. REFERENCE DOCUMENTS FOR TESTING.....	7
<b>5. TEST RESULTS .....</b>	<b>8</b>
5.1. TESTING ENVIRONMENT.....	8
5.2. TEST RESULTS .....	8
5.3. STATEMENTS.....	8
<b>6. TEST EQUIPMENTS UTILIZED .....</b>	<b>9</b>
<b>7. LABORATORY ENVIRONMENT .....</b>	<b>10</b>
<b>8. MEASUREMENT UNCERTAINTY .....</b>	<b>11</b>
<b>ANNEX A: DETAILED TEST RESULTS.....</b>	<b>12</b>
A.0 ANTENNA REQUIREMENT .....	12
A.1 MAXIMUM PEAK OUTPUT POWER .....	13
A.2 PEAK POWER SPECTRAL DENSITY .....	14
A.3 6dB BANDWIDTH.....	18
A.4 BAND EDGES COMPLIANCE .....	22
A.5 TRANSMITTER SPURIOUS EMISSION - CONDUCTED .....	25
A.6 TRANSMITTER SPURIOUS EMISSION - RADIATED .....	37
A.7 AC POWER LINE CONDUCTED EMISSION .....	53
A.8 OCCUPIED BANDWIDTH.....	59

## 1. Summary of Test Report

### 1.1. Test Items

Description	LTE SMARTPHONE
Model Name	M33A01
Applicant's name	i.safe MOBILE GmbH
Manufacturer's Name	i.safe MOBILE GmbH

### 1.2. Test Standards

FCC Part15-2018; ANSI C63.10-2013; RSS-247 Issue 2; RSS-Gen Issue 5

### 1.3. Test Result

**Pass**

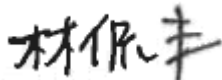
### 1.4. Testing Location

Address: Building G, Shenzhen International Innovation Center, No.1006 Shennan Road, Futian District, Shenzhen, Guangdong, P. R. China

### 1.5. Project data

Testing Start Date:	2020-01-15
Testing End Date:	2020-02-03

### 1.6. Signature



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Lin Kanfeng  
(Prepared this test report)



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Tang Weisheng  
(Reviewed this test report)



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Zhang Bojun  
(Approved this test report)



## **2. Client Information**

### **2.1. Applicant Information**

Company Name: i.safe MOBILE GmbH  
Address: i\_Park Tauberfranken 10 97922 Lauda-Koenigshofen Germany  
Contact Person Dirk Amann  
E-Mail dirk.amann@isafe-mobile.com  
Telephone: +491703719004  
Fax: /

### **2.2. Manufacturer Information**

Company Name: i.safe MOBILE GmbH  
Address: i\_Park Tauberfranken 10 97922 Lauda-Koenigshofen Germany  
Contact Person Dirk Amann  
E-Mail dirk.amann@isafe-mobile.com  
Telephone: +491703719004  
Fax: /



### 3. Equipment Under Test (EUT) and Ancillary Equipment (AE)

#### 3.1. About EUT

Description	LTE SMARTPHONE
Model Name	M33A01
Brand Name	i.safe MOBILE
Frequency Range	2400MHz~2483.5MHz
Type of Modulation	GFSK
Number of Channels	40
Antenna Type	Integrated
Antenna Gain	1.8dBi
Power Supply	3.8V DC by Battery
FCC ID	2AACZ-M33A01
IC	11122A-M33A01
Condition of EUT as received	No abnormality in appearance

Note: Components list, please refer to documents of the manufacturer; it is also included in the original test record of Shenzhen Academy of Information and Communications Technology.

#### 3.2. Internal Identification of EUT used during the test

EUT ID*	IMEI	HW Version	SW Version	Receive Date
EUT1	359052100502739	V1.0.0	LA6925(IS330)_IS330_EEA_1 .0.0.0.0_1_20200103_MultiDo wnload_202001101536_user	2020-01-03

\*EUT ID: is used to identify the test sample in the lab internally.

#### 3.3. Internal Identification of AE used during the test

AE ID*	Description	SN
AE1	Charger	/
AE2	Battery	/

AE1

Model	ICP12-050-2000B
Manufacturer	SHENZHEN SHI YINGYUAN POWER SUPPLY TECHNOLOGY CO., LTD.

AE2

Model	MBP33A01
Manufacturer	Shenzhen 3Sun Electronics Co.,Ltd.
Capacitance	4050mAh
Nominal Voltage	3.7V

\*AE ID: is used to identify the test sample in the lab internally.



### **3.4. General Description**

The Equipment under Test (EUT) is a model of LTE SMARTPHONE with integrated antenna and battery.

It consists of normal options: Lithium Battery, Charger and Headset.

Manual and specifications of the EUT were provided to fulfil the test.

Samples undergoing test were selected by the client.



## 4. Reference Documents

### 4.1. Documents supplied by applicant

EUT feature information is supplied by the applicant or manufacturer, which is the basis of testing.

### 4.2. Reference Documents for testing

The following documents listed in this section are referred for testing.

<b>Reference</b>	<b>Title</b>	<b>Version</b>
FCC Part15	FCC CFR 47, Part 15, Subpart C: 15.205 Restricted bands of operation; 15.209 Radiated emission limits, general requirements; 15.247 Operation within the bands 902–928MHz, 2400–2483.5 MHz, and 5725–5850 MHz	2018
ANSI C63.10	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices	2013
RSS-247	Spectrum Management and Telecommunications Radio Standards Specification Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and License-Exempt Local Area Network (LE-LAN) Devices	Issue 2 February, 2017
RSS-Gen	Spectrum Management and Telecommunications Radio Standards Specification General Requirements for Compliance of Radio Apparatus	Issue 5 April, 2018

## 5. Test Results

### 5.1. Testing Environment

Normal Temperature: 15~35°C

Relative Humidity: 20~75%

### 5.2. Test Results

No	Test cases	Sub-clause of Part 15C	Sub-clause of IC	Verdict
0	Antenna Requirement	15.203	/	<b>P</b>
1	Maximum Peak Output Power	15.247 (b)	RSS-247 section 5.4	<b>P</b>
2	Peak Power Spectral Density	15.247 (e)	RSS-247 section 5.2	<b>P</b>
3	6dB Bandwidth	15.247 (a)	RSS-247 section 5.2	<b>P</b>
4	Band Edges Compliance	15.247 (d)	RSS-247 section 5.5	<b>P</b>
5	Transmitter Spurious Emission - Conducted	15.247 (d)	RSS-247 section 5.5/ RSS-Gen section 6.13	<b>P</b>
6	Transmitter Spurious Emission - Radiated	15.247, 15.205, 15.209	RSS-247 section 5.5/ RSS-Gen section 6.13	<b>P</b>
7	AC Power line Conducted Emission	15.107, 15.207	RSS-Gen section 8.8	<b>P</b>
8	Occupied Bandwidth	/	RSS-Gen section 6.7	<b>P</b>

See **ANNEX A** for details.

### 5.3. Statements

SAICT has evaluated the test cases requested by the applicant/manufacture as listed in section 5.2 of this report, for the EUT specified in section 3, according to the standards or reference documents listed in section 4.2.



## 6. Test Equipments Utilized

### Conducted test system

No.	Equipment	Model	Serial Number	Manufacturer	Calibration Date	Calibration Period
1	Vector Signal Analyzer	FSV40	100903	Rohde & Schwarz	2021-01-15	1 year
2	Power Sensor	U2021XA	MY55430013	Agilent	2021-01-15	1 year
3	Data Acquisition	U2531A	TW55443507	Agilent	/	/

### Radiated emission test system

No.	Equipment	Model	Serial Number	Manufacturer	Calibration Date	Calibration Period
1	LISN	ESH2-Z5	100196	R&S	2021-01-02	1 year
2	Test Receiver	ESCI	100701	R&S	2020-08-06	1 year
3	Loop Antenna	HLA6120	35779	TESEQ	2022-05-01	3 year
4	BiLog Antenna	VULB9163	9163 329	Schwarzbeck	2021-02-16	3 year
5	Horn Antenna	3117	00066585	ETS-Lindgren	2022-03-04	3 year
6	Test Receiver	ESR7	101675	R&S	2020-07-18	1 year
7	Spectrum Analyzer	FSP 40	100378	R&S	2020-12-12	1 year
8	Chamber	FACT5-2.0	4166	ETS-Lindgren	2021-05-12	3 year
9	Antenna	QSH-SL-1 8-26-S-20	17013	Q-par	2021-01-14	3 year
10	Antenna	QSH-SL-2 6-40-K-20	17014	Q-par	2021-01-10	3 year

### Test software

No.	Equipment	Manufacturer	Version
1	TechMgr Software	CAICT	2.1.1
2	EMC32	Rohde & Schwarz	8.53.0
3	EMC32	Rohde & Schwarz	10.01.00

EUT is engineering software provided by the customer to control the transmitting signal.

The EUT was programmed to be in continuously transmitting mode.

### Anechoic chamber

Fully anechoic chamber by ETS-Lindgren

## 7. Laboratory Environment

### Semi-anechoic chambe

Temperature	Min. = 15 °C, Max. = 35 °C
Relative humidity	Min. = 15 %, Max. = 75 %
Shielding effectiveness	0.014MHz-1MHz> 60 dB; 1MHz-18000MHz>90 dB
Electrical insulation	> 2MΩ
Ground system resistance	< 4 Ω
Normalised site attenuation (NSA)	< ±4 dB, 3 m distance, from 30 to 1000 MHz

### Shielded room

Temperature	Min. = 15 °C, Max. = 35 °C
Relative humidity	Min. =20 %, Max. = 75 %
Shielding effectiveness	0.014MHz-1MHz> 60 dB; 1MHz-1000MHz>90 dB
Electrical insulation	> 2MΩ
Ground system resistance	< 4 Ω

### Fully-anechoic chamber

Temperature	Min. = 15 °C, Max. = 35 °C
Relative humidity	Min. = 15 %, Max. = 75 %
Shielding effectiveness	0.014MHz-1MHz> 60 dB; 1MHz-18000MHz>90 dB
Electrical insulation	> 2MΩ
Ground system resistance	< 4 Ω
Voltage Standing Wave Ratio (VSWR)	≤ 6 dB, from 1 to 18 GHz, 3 m distance
Uniformity of field strength	Between 0 and 6 dB, from 80 to 6000 MHz

## 8. Measurement Uncertainty

Test Name	Uncertainty ( $k=2$ )	
1. RF Output Power - Conducted	1.32dB	
2. Power Spectral Density - Conducted	2.32dB	
3. Occupied channel bandwidth - Conducted	66Hz	
4. Transmitter Spurious Emission - Conducted	$30\text{MHz} \leq f \leq 1\text{GHz}$	1.41dB
	$1\text{GHz} \leq f \leq 7\text{GHz}$	1.92dB
	$7\text{GHz} \leq f \leq 13\text{GHz}$	2.31dB
	$13\text{GHz} \leq f \leq 26\text{GHz}$	2.61dB
5. Transmitter Spurious Emission - Radiated	$9\text{kHz} \leq f \leq 30\text{MHz}$	1.70dB
	$30\text{MHz} \leq f \leq 1\text{GHz}$	4.90dB
	$1\text{GHz} \leq f \leq 18\text{GHz}$	4.60dB
	$18\text{GHz} \leq f \leq 40\text{GHz}$	4.10dB
6. AC Power line Conducted Emission	$150\text{kHz} \leq f \leq 30\text{MHz}$	3.00dB

## **ANNEX A: Detailed Test Results**

### **A.0 Antenna requirement**

#### **Measurement Limit:**

<b>Standard</b>	<b>Requirement</b>
FCC CRF Part 15.203	<p>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. This requirement does not apply to carrier current devices or to devices operated under the provisions of §15.211, §15.213, §15.217, §15.219, or §15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with §15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.</p>

Conclusion: The Directional gains of antenna used for transmitting is 1.8 dBi. The RF transmitter uses an integrate antenna without connector.

**A.1 Maximum Peak Output Power****Method of Measurement: See ANSI C63.10-clause 11.9.1.3**

The maximum peak conducted output power may be measured using a broadband peak RF power meter.

**Measurement Limit:**

Standard	Limit (dBm)	E.I.R.P Limit (dBm)
FCC CRF Part 15.247(b) & RSS-247 section 5.4	< 30	< 36

**Measurement Results:****LE-1M**

Mode	Frequency (MHz)	Peak Conducted Output Power (dBm)	E.I.R.P (dBm)	Conclusion
GFSK	2402 (CH0)	-4.84	-3.04	<b>P</b>
	2440 (CH19)	-4.97	-3.17	<b>P</b>
	2480 (CH39)	-3.06	-1.26	<b>P</b>

**LE-2M**

Mode	Frequency (MHz)	Peak Conducted Output Power (dBm)	E.I.R.P (dBm)	Conclusion
GFSK	2402 (CH0)	-4.86	-3.06	<b>P</b>
	2440 (CH19)	-4.92	-3.12	<b>P</b>
	2480 (CH39)	-3.00	-1.20	<b>P</b>

**Conclusion: Pass**

## A.2 Peak Power Spectral Density

Method of Measurement: See ANSI C63.10-clause 11.10.2

Measurement Limit:

Standard	Limit
FCC CRF Part 15.247(e) & RSS-247 section 5.2	< 8 dBm/3 kHz

### Measurement Results:

Mode	Frequency (MHz)	Peak Power Spectral Density (dBm)	Conclusion
LE-1M	2402 (CH0)	Fig.1	P
	2440 (CH19)	Fig.2	P
	2480 (CH39)	Fig.3	P
LE-2M	2402 (CH0)	Fig.4	P
	2440 (CH19)	Fig.5	P
	2480 (CH39)	Fig.6	P

See below for test graphs.

Conclusion: PASS

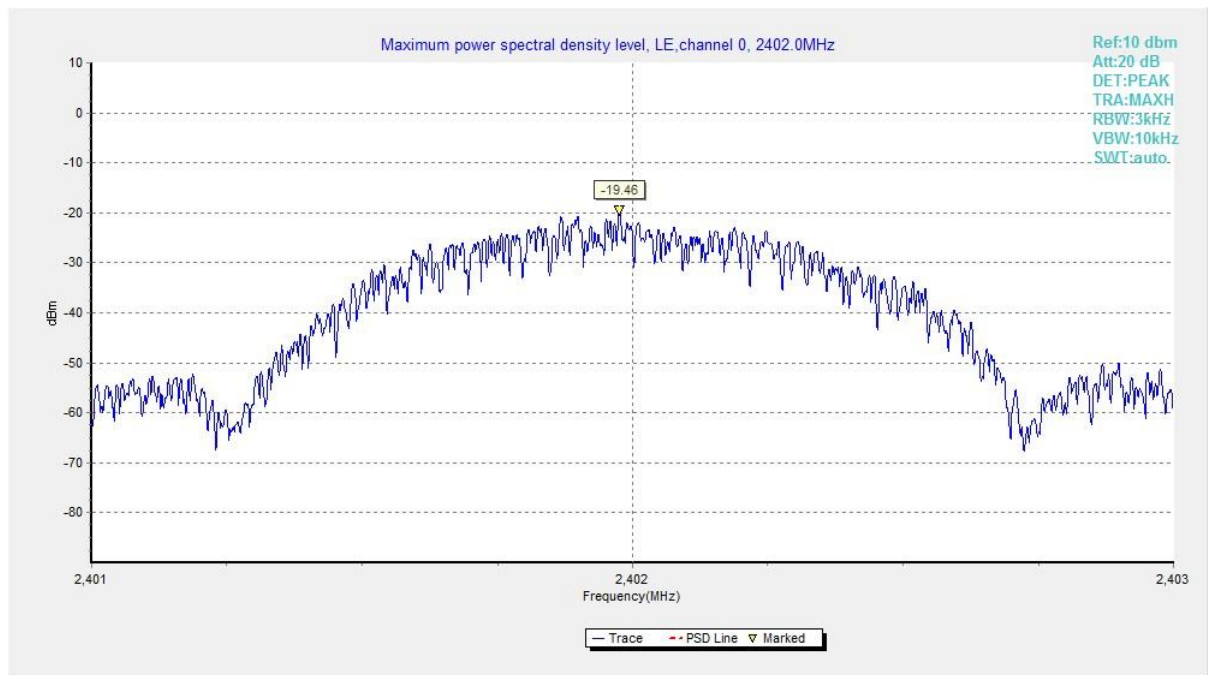


Fig.1 Power Spectral Density (Ch 0), LE 1M

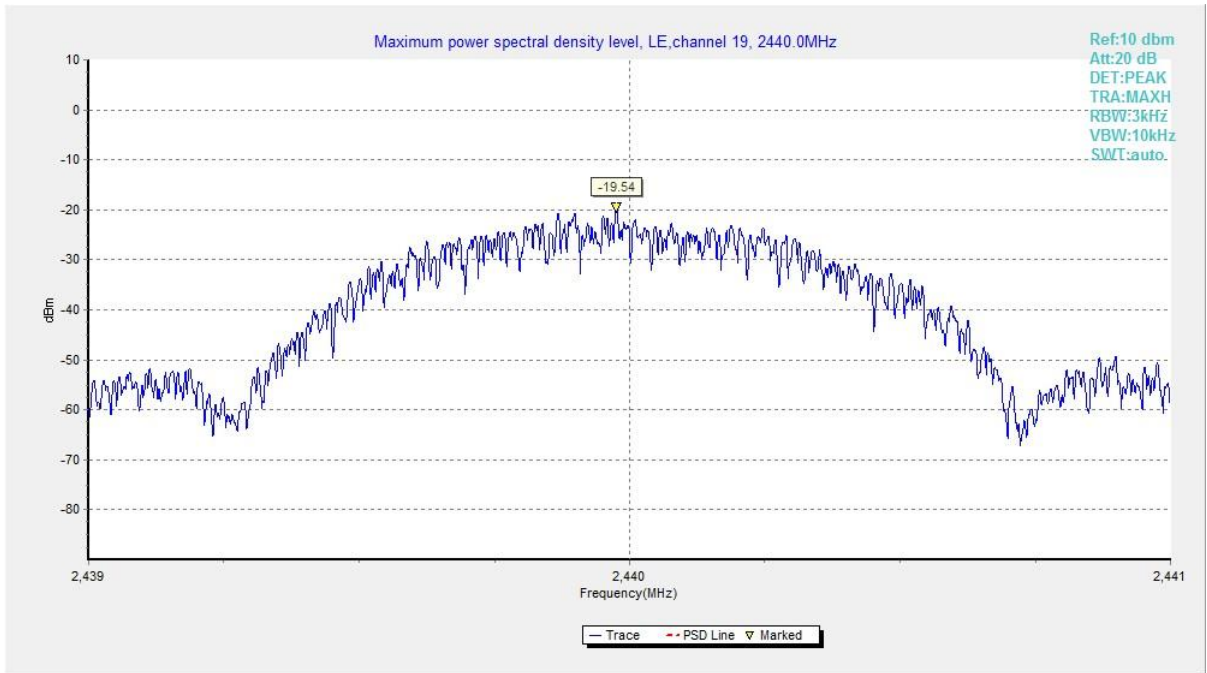


Fig.2 Power Spectral Density (Ch 19), LE 1M

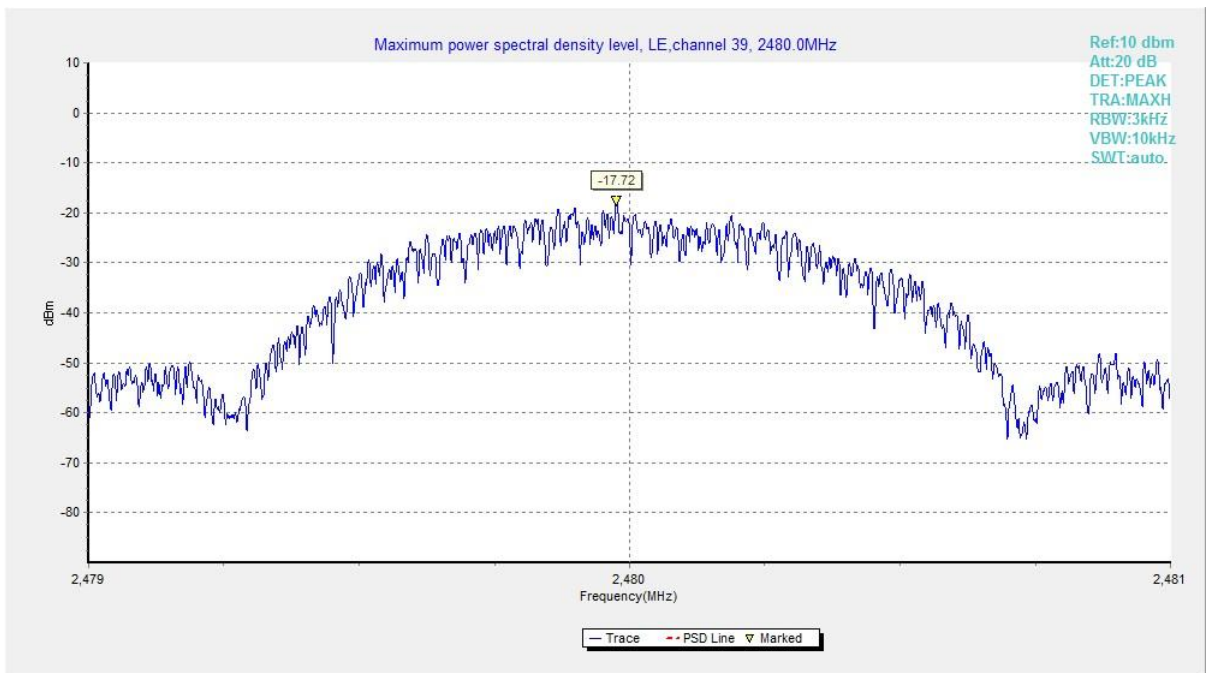
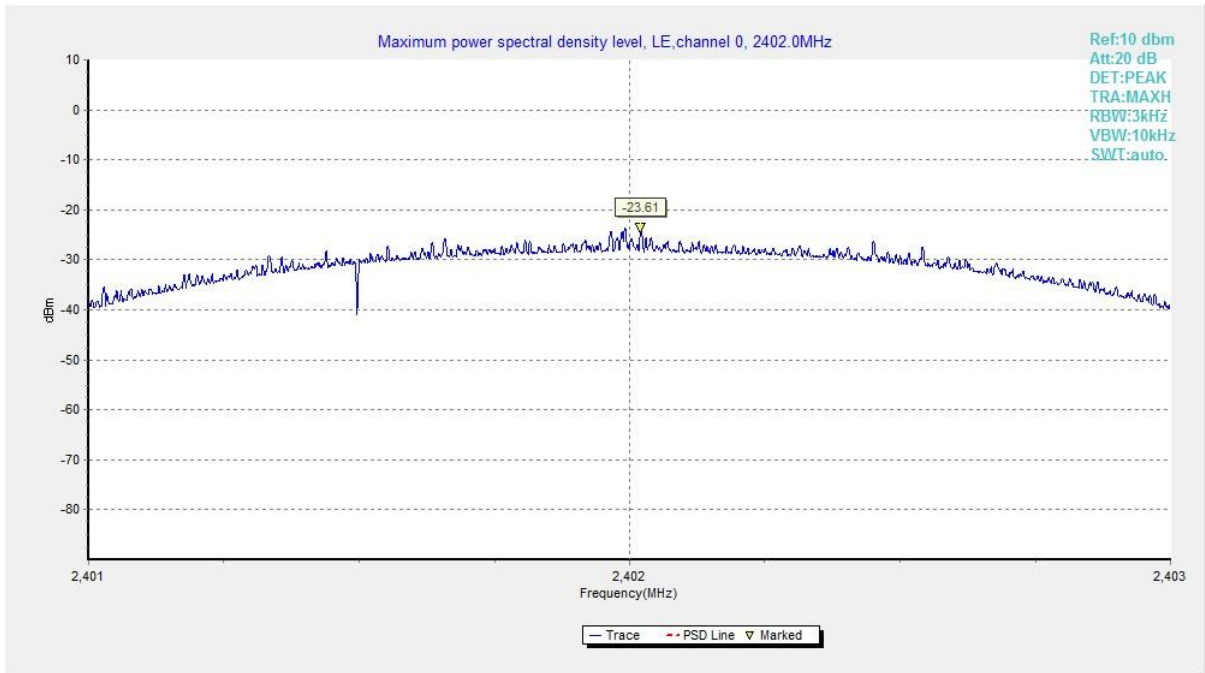
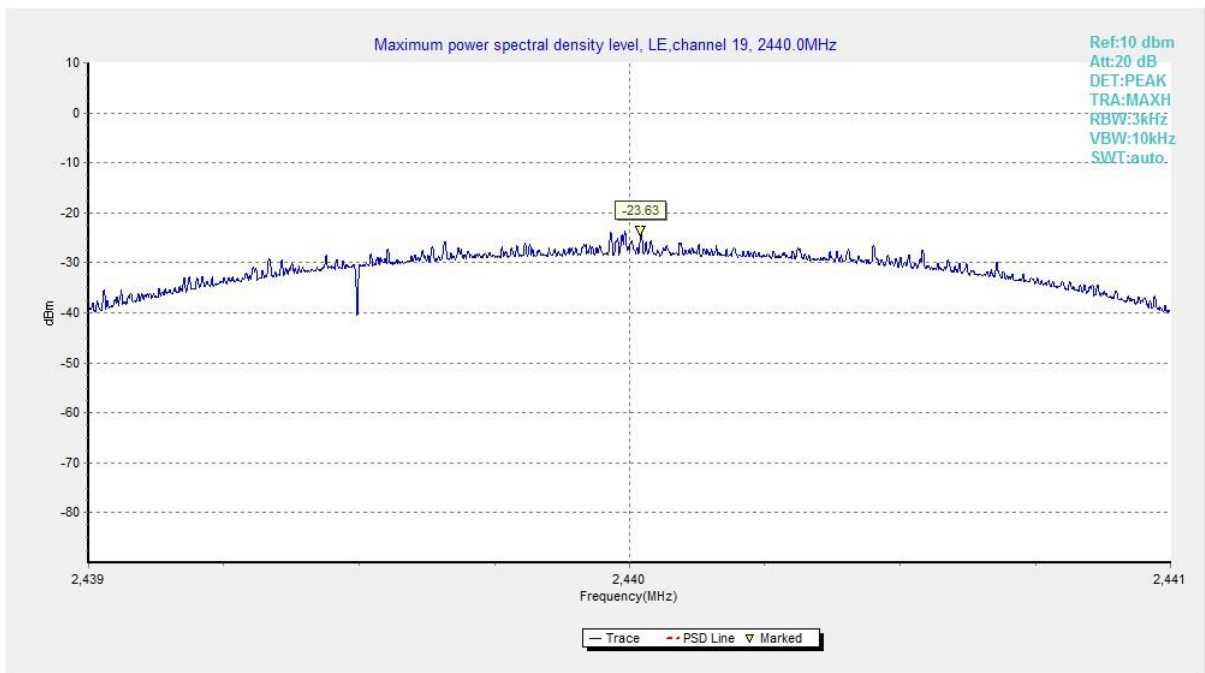


Fig.3 Power Spectral Density (Ch 39), LE 1M

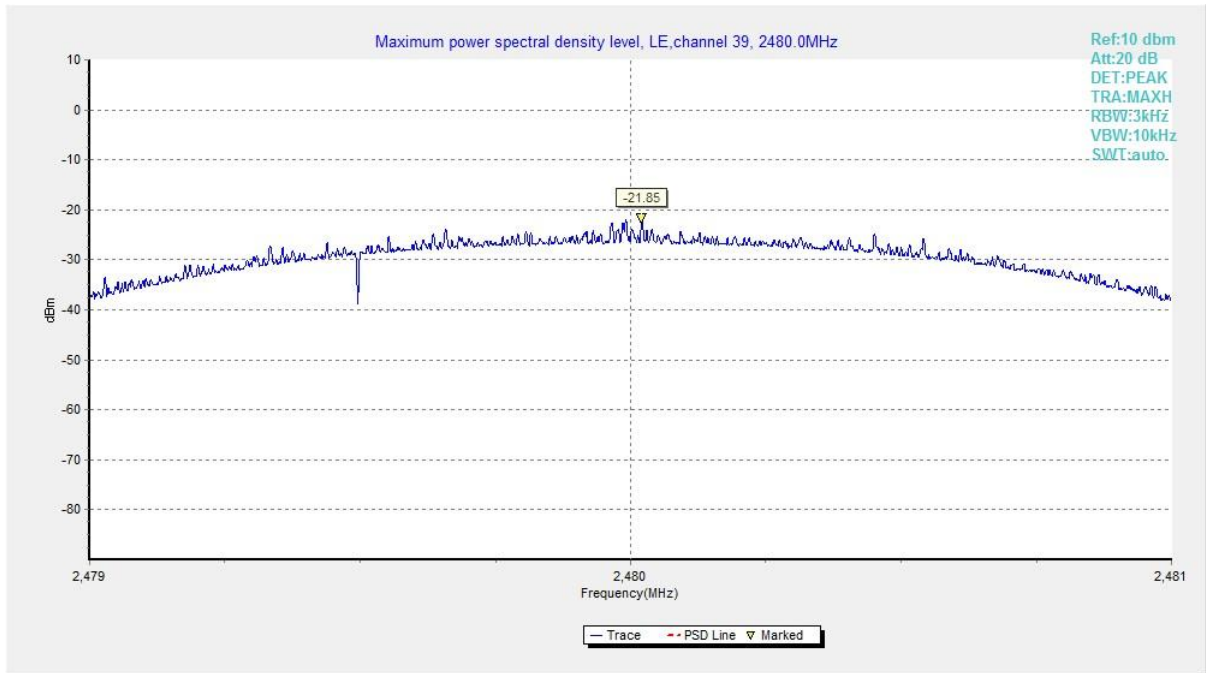


**Fig.4 Power Spectral Density (Ch 0), LE 2M**



**Fig.5 Power Spectral Density (Ch 19), LE 2M**





**Fig.6 Power Spectral Density (Ch 39), LE 2M**

### A.3 6dB Bandwidth

Measurement Limit:

Standard	Limit (kHz)
FCC 47 CFR Part 15.247 (a) & RSS-247 section 5.2	≥ 500

Measurement Result:

Mode	Frequency (MHz)	Test Results (kHz)		Conclusion
LE-1M	2402 (CH0)	Fig.7	663.00	P
	2440 (CH19)	Fig.8	661.50	P
	2480 (CH39)	Fig.9	662.00	P
LE-2M	2402 (CH0)	Fig.10	1148.00	P
	2440 (CH19)	Fig.11	1147.50	P
	2480 (CH39)	Fig.12	1150.50	P

See below for test graphs.

Conclusion: PASS



Fig.7 6dB Bandwidth (Ch 0), LE 1M



Fig.8 6dB Bandwidth (Ch 19), LE 1M

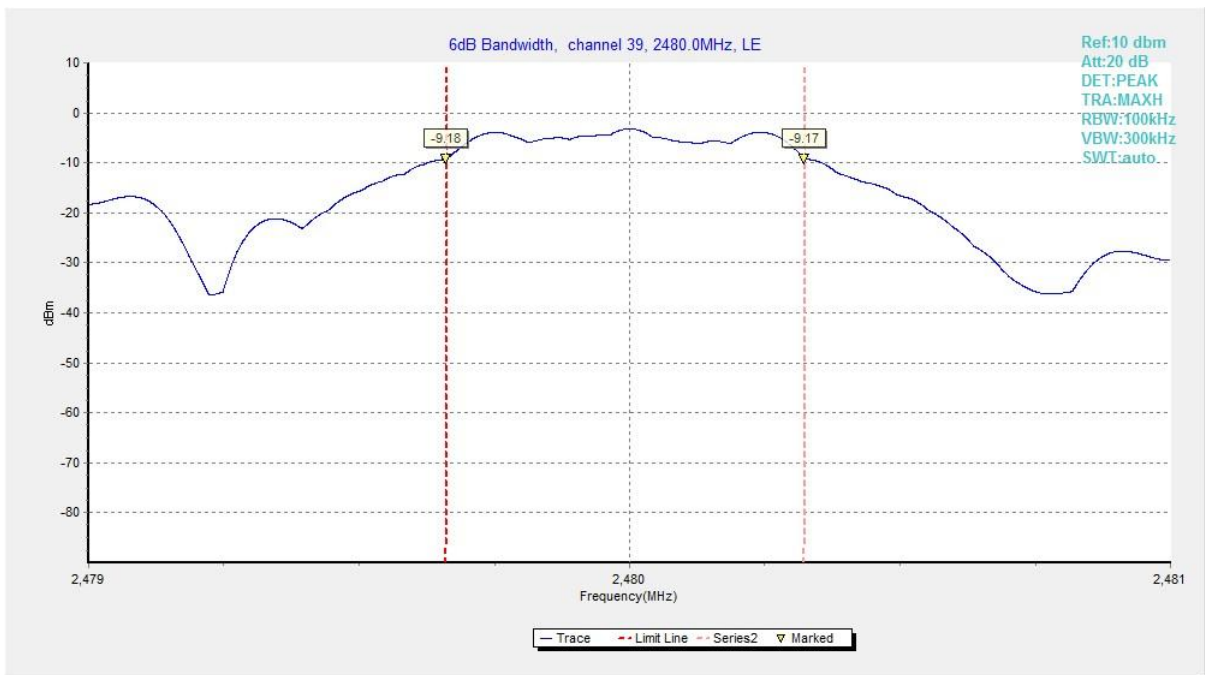


Fig.9 6dB Bandwidth (Ch 39), LE 1M

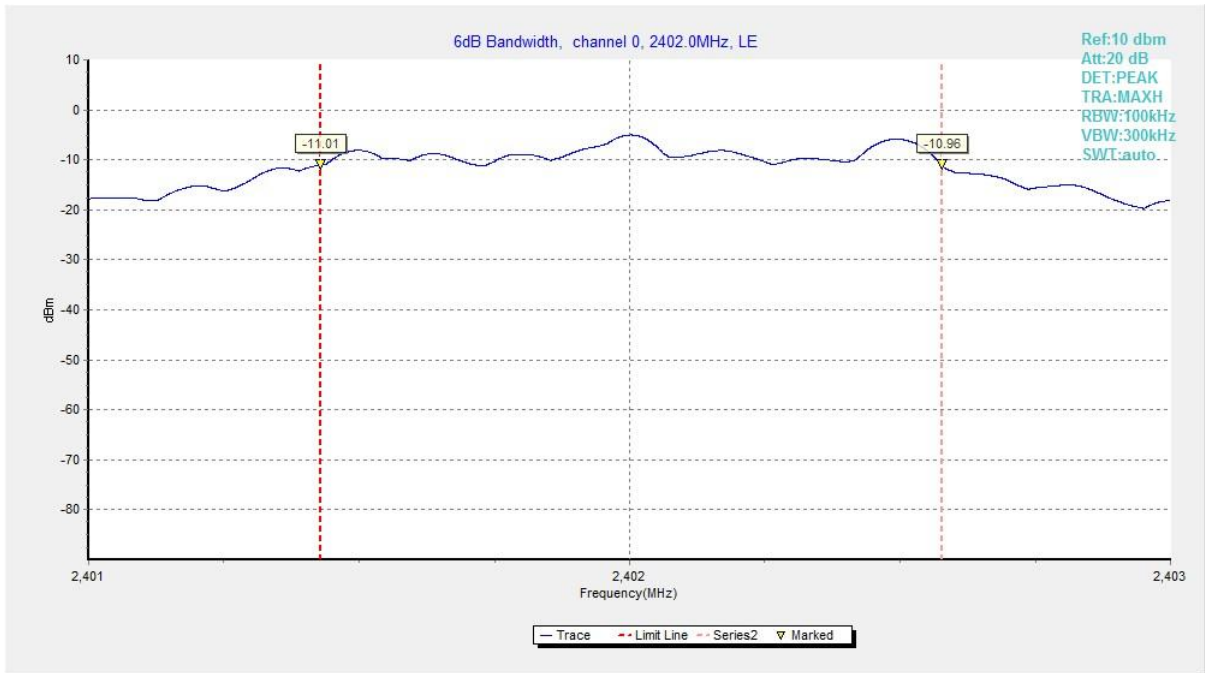


Fig.10 6dB Bandwidth (Ch 0), LE 2M

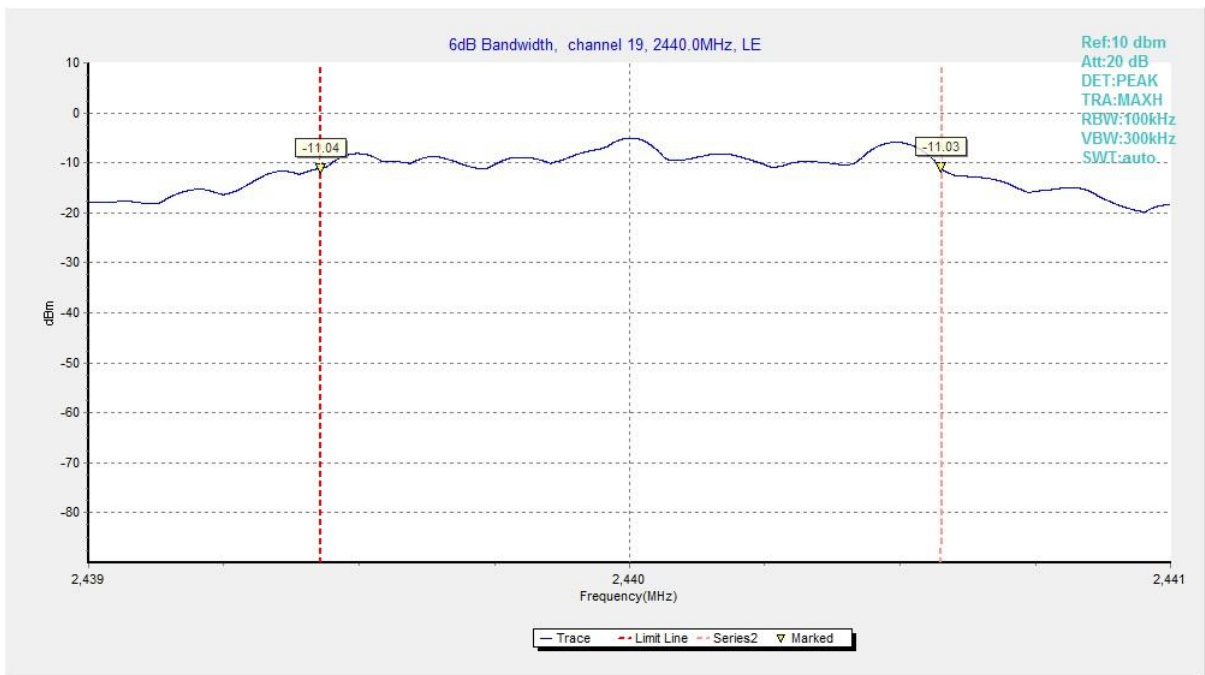


Fig.11 6dB Bandwidth (Ch 19), LE 2M

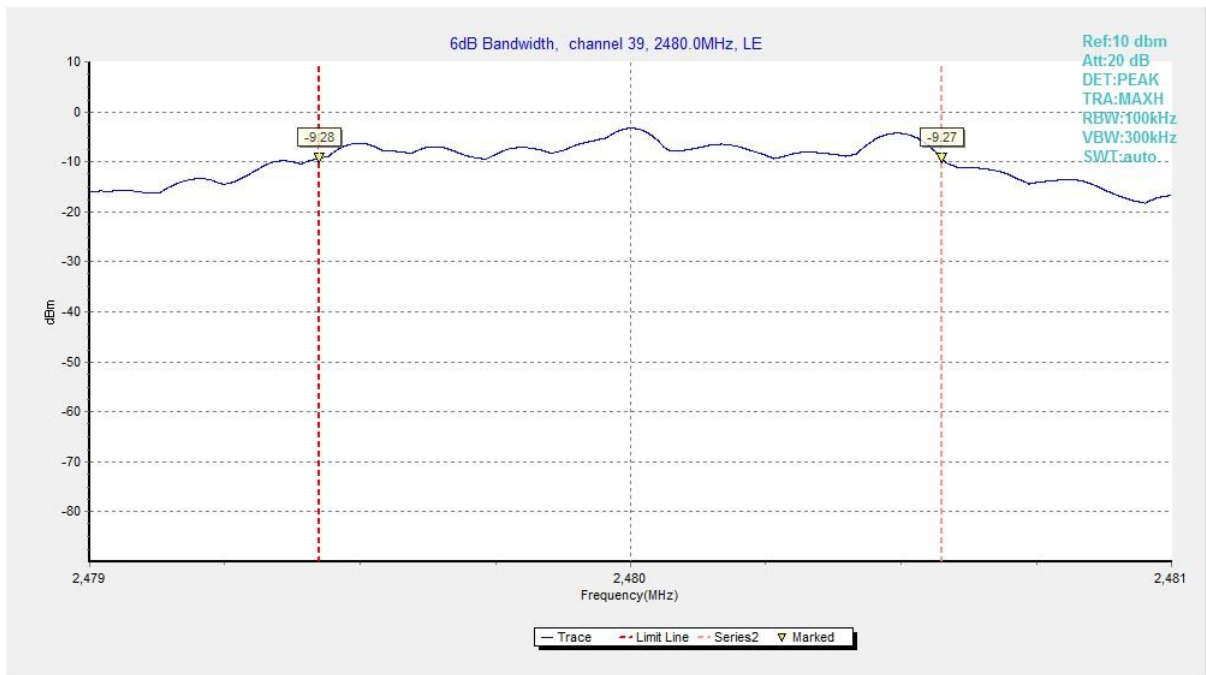


Fig.12 6dB Bandwidth (Ch 39), LE 2M

### A.4 Band Edges Compliance

Measurement Limit:

Standard	Limit (dB)
FCC 47 CFR Part 15.247 (d) & RSS-247 section 5.5	> 20

Measurement Result:

Mode	Frequency (MHz)	Test Results (dB)		Conclusion
LE-1M	2402 (CH0)	Fig.13	55.35	P
	2480 (CH39)	Fig.14	61.94	P
LE-2M	2402 (CH0)	Fig.15	50.12	P
	2480 (CH39)	Fig.16	45.93	P

See below for test graphs.

Conclusion: Pass

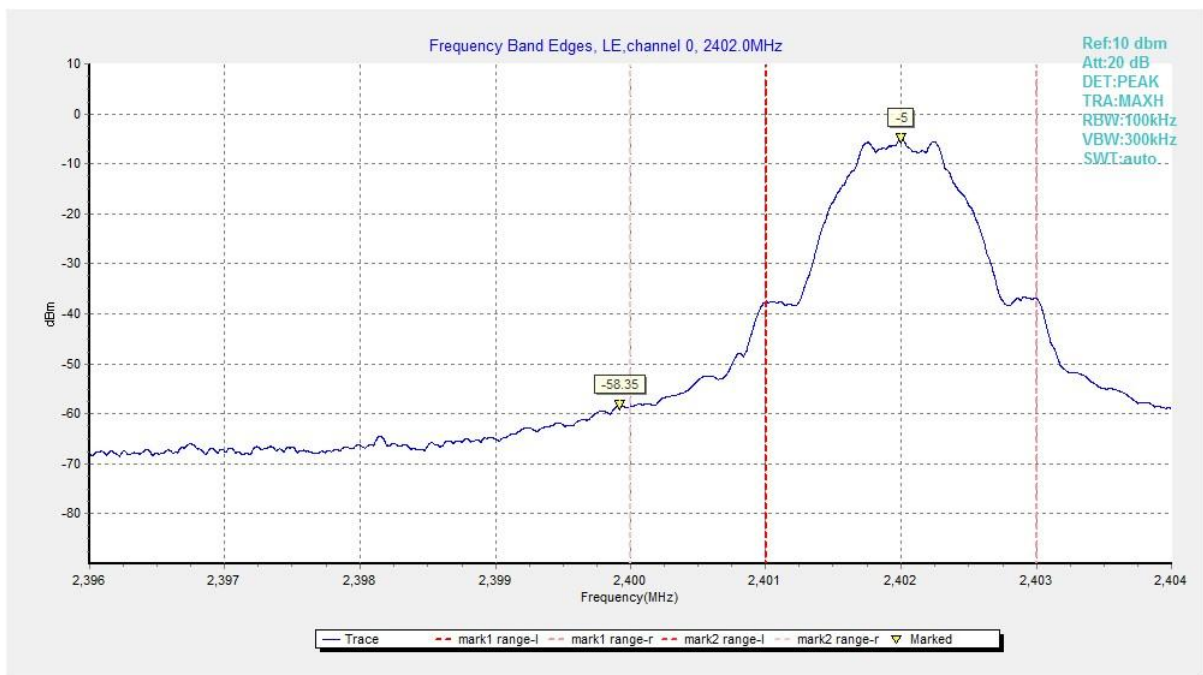


Fig.13 Band Edges (Ch 0), LE 1M

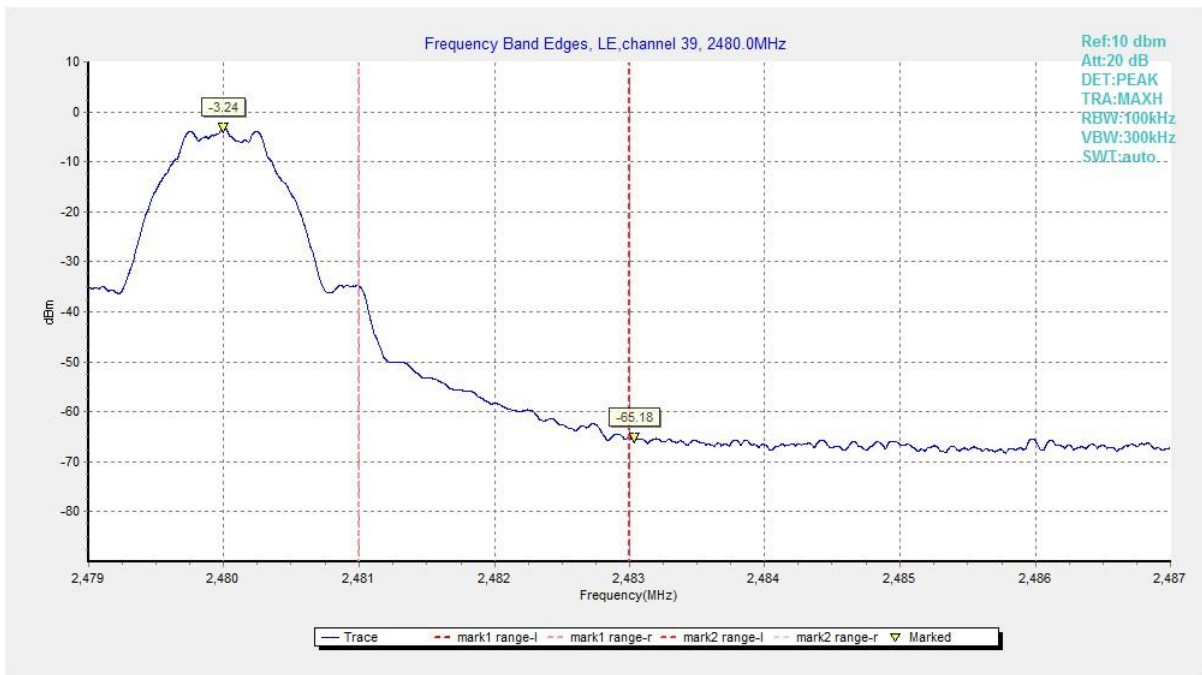


Fig.14 Band Edges (Ch 39), LE 1M

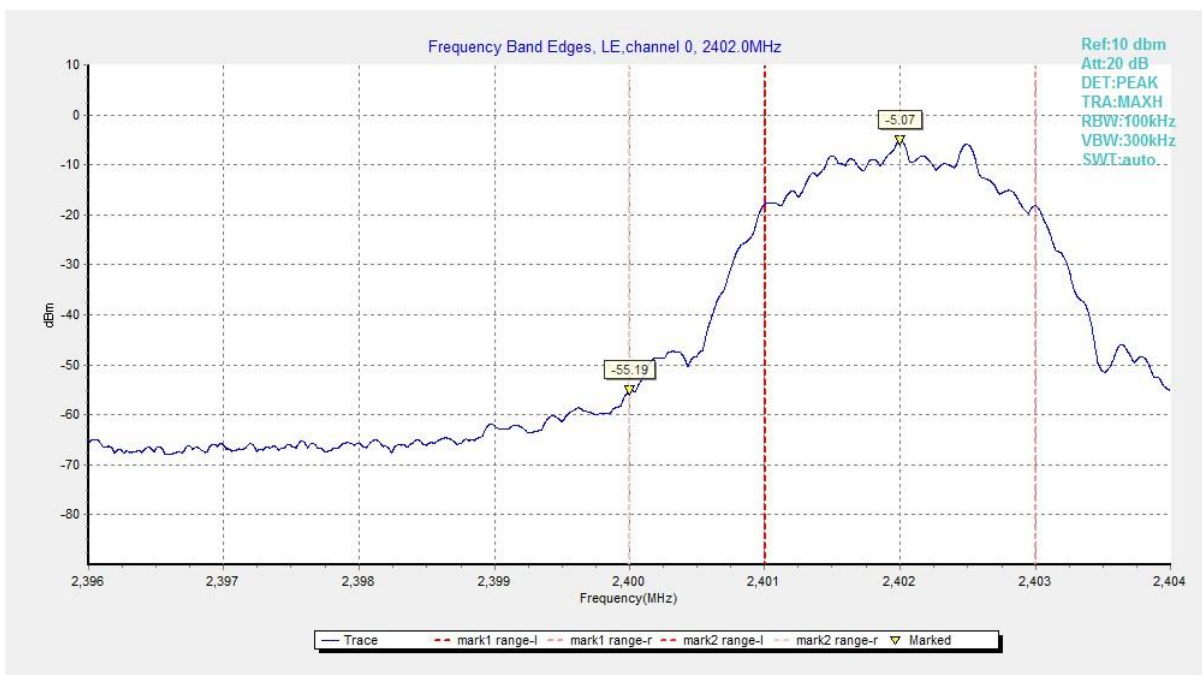


Fig.15 Band Edges (Ch 0), LE 2M



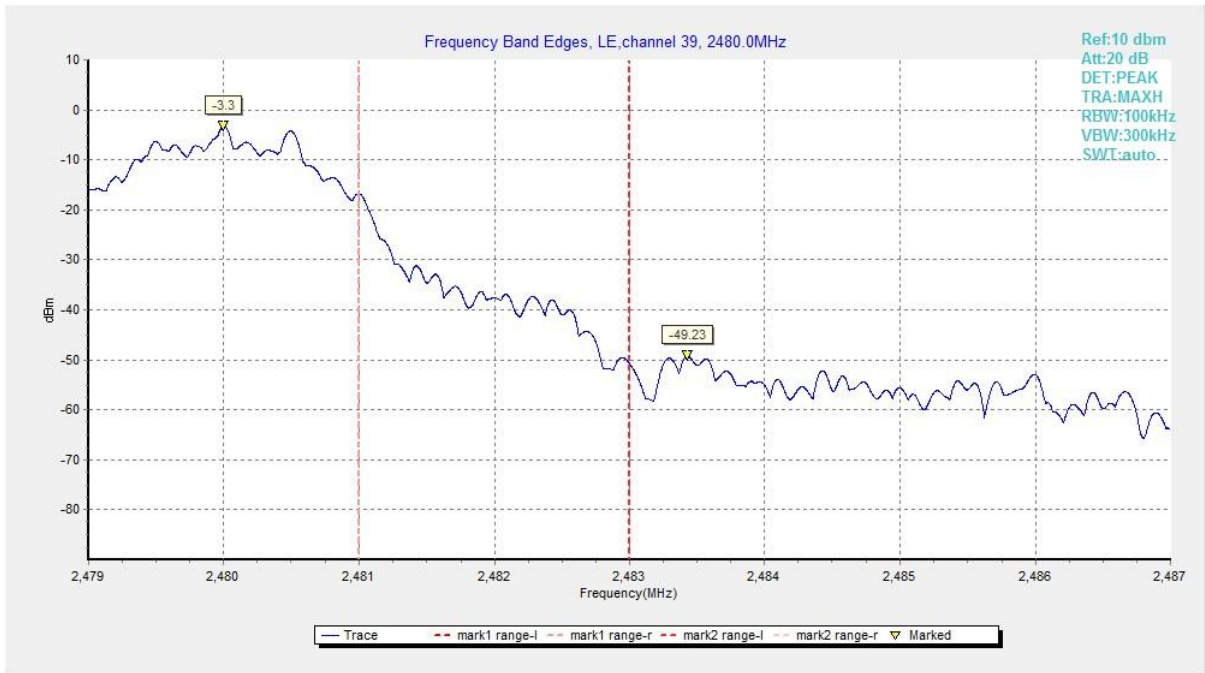


Fig.16 Band Edges (Ch 39), LE 2M



## A.5 Transmitter Spurious Emission - Conducted

### Measurement Limit:

Standard	Limit
FCC 47 CFR Part 15.247 (d) & RSS-247 section 5.5/ RSS-Gen section 6.13	20dB below peak output power in 100kHz bandwidth

### Measurement Results:

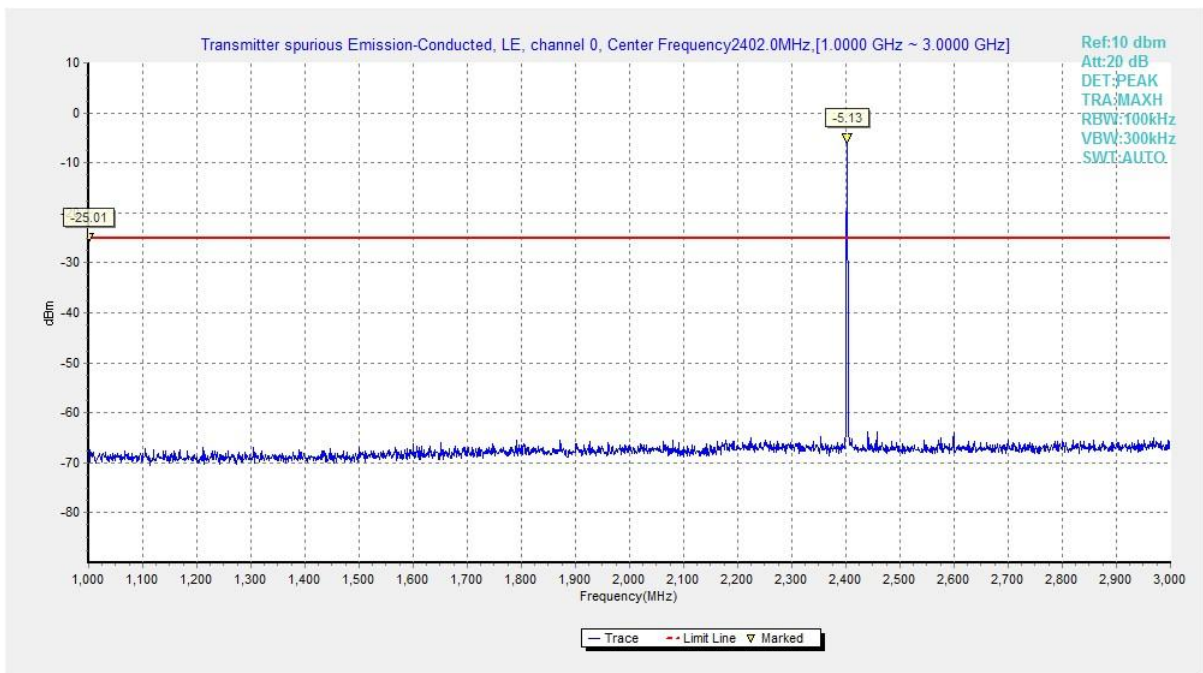
MODE	Channel	Frequency Range	Test Results	Conclusion
LE-1M	0	2.402 GHz	Fig.17	P
		1 GHz ~ 3 GHz	Fig.18	P
		3 GHz ~ 10 GHz	Fig.19	P
	19	2.440 GHz	Fig.20	P
		1 GHz ~ 3 GHz	Fig.21	P
		3 GHz ~ 10 GHz	Fig.22	P
	39	2.480 GHz	Fig.23	P
		1 GHz ~ 3 GHz	Fig.24	P
		3 GHz ~ 10 GHz	Fig.25	P
	All channels	30 MHz ~ 1 GHz	Fig.26	P
		10 GHz ~ 26 GHz	Fig.27	P
	LE-2M	0	2.402 GHz	Fig.28
1 GHz ~ 3 GHz			Fig.29	P
3 GHz ~ 10 GHz			Fig.30	P
19		2.440 GHz	Fig.31	P
		1 GHz ~ 3 GHz	Fig.32	P
		3 GHz ~ 10 GHz	Fig.33	P
39		2.480 GHz	Fig.34	P
		1 GHz ~ 3 GHz	Fig.35	P
		3 GHz ~ 10 GHz	Fig.36	P
All channels		30 MHz ~ 1 GHz	Fig.37	P
		10 GHz ~ 26 GHz	Fig.38	P

See below for test graphs.

Conclusion: Pass



**Fig.17 Conducted Spurious Emission (Ch0, Center Frequency), LE 1M**



**Fig.18 Conducted Spurious Emission (Ch0, 1 GHz-3 GHz), LE 1M**

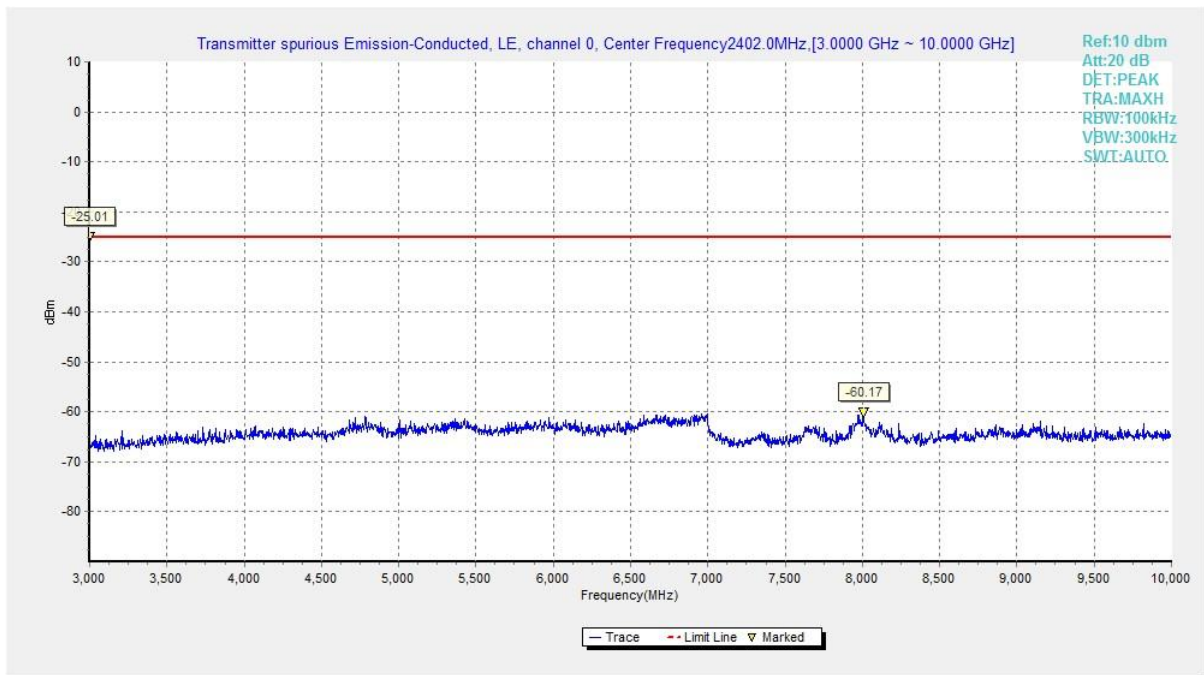


Fig.19 Conducted Spurious Emission (Ch0, 3 GHz-10 GHz), LE 1M

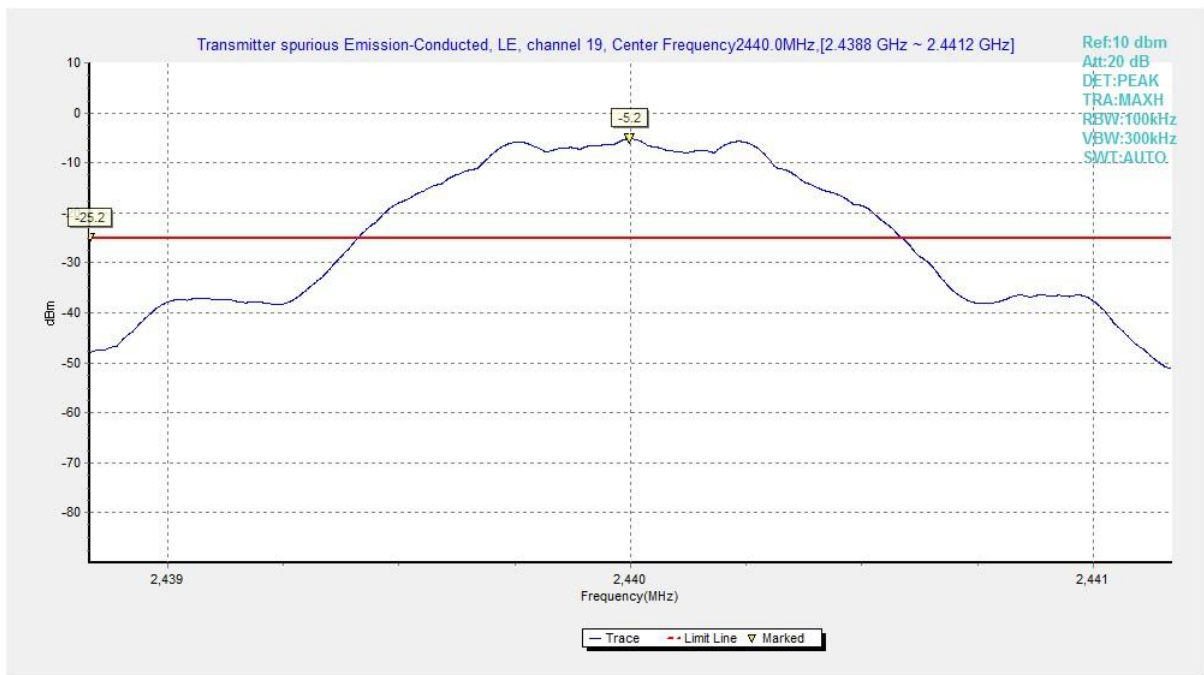


Fig.20 Conducted Spurious Emission (Ch19, Center Frequency), LE 1M

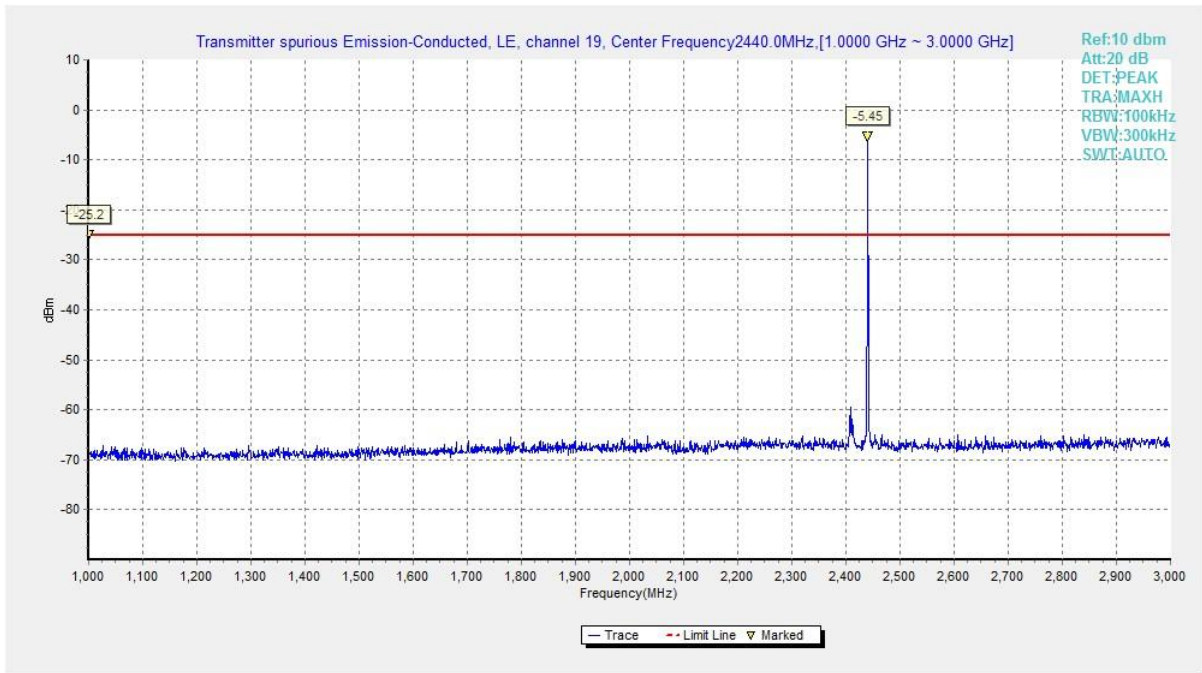


Fig.21 Conducted Spurious Emission (Ch19, 1 GHz-3 GHz), LE 1M

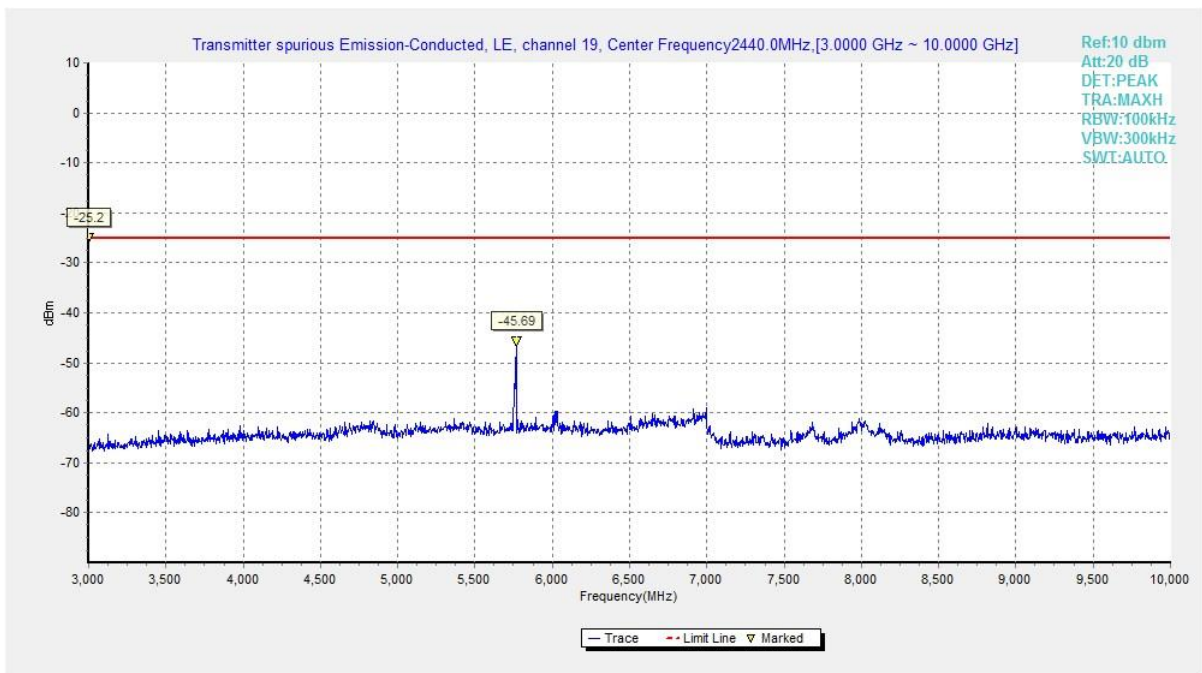


Fig.22 Conducted Spurious Emission (Ch19, 3 GHz-10 GHz), LE 1M



Fig.23 Conducted Spurious Emission (Ch39, Center Frequency), LE 1M

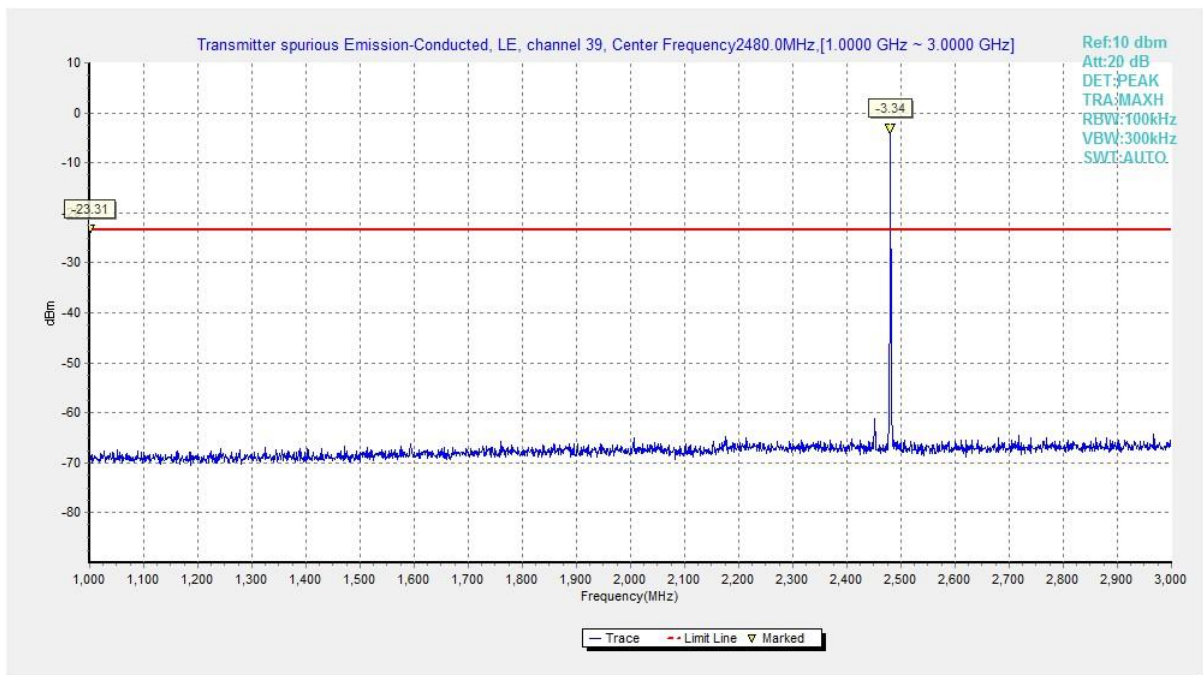


Fig.24 Conducted Spurious Emission (Ch39, 1 GHz-3 GHz), LE 1M



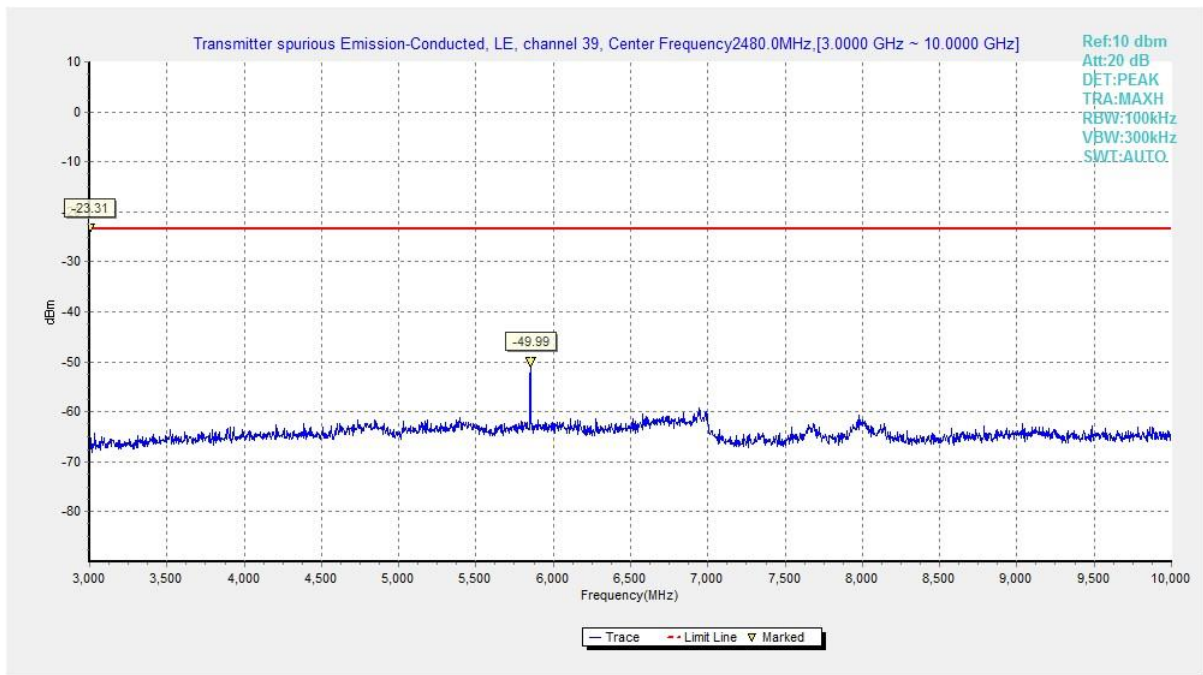


Fig.25 Conducted Spurious Emission (Ch39, 3 GHz-10 GHz), LE 1M

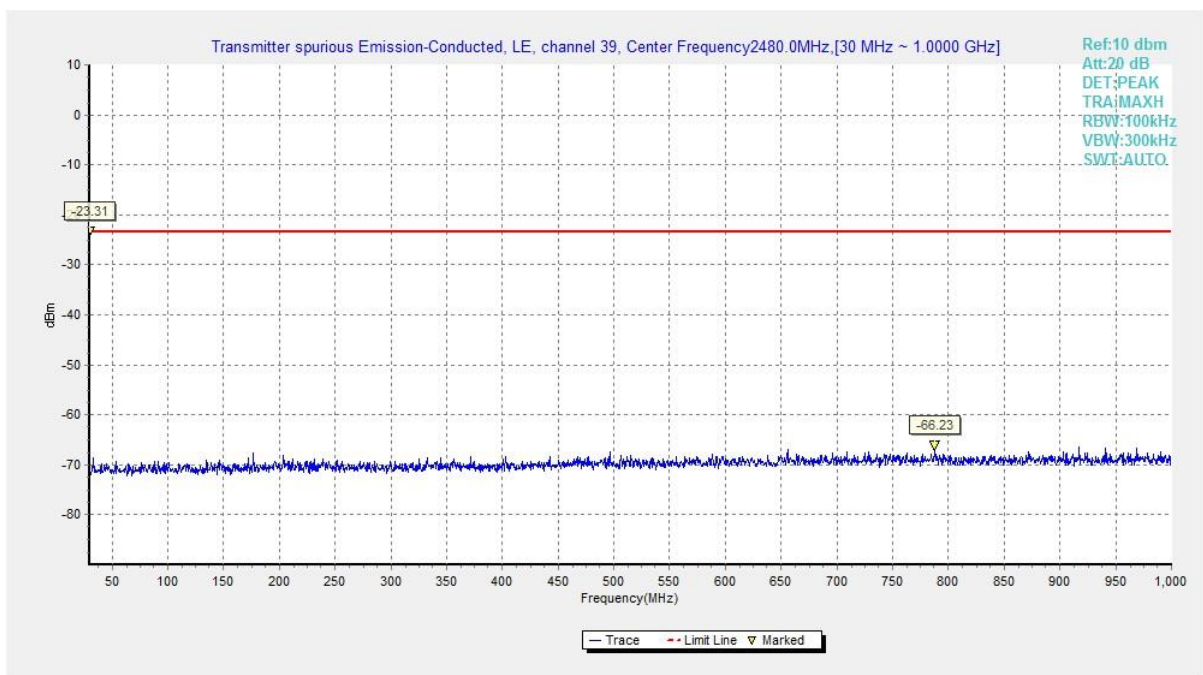
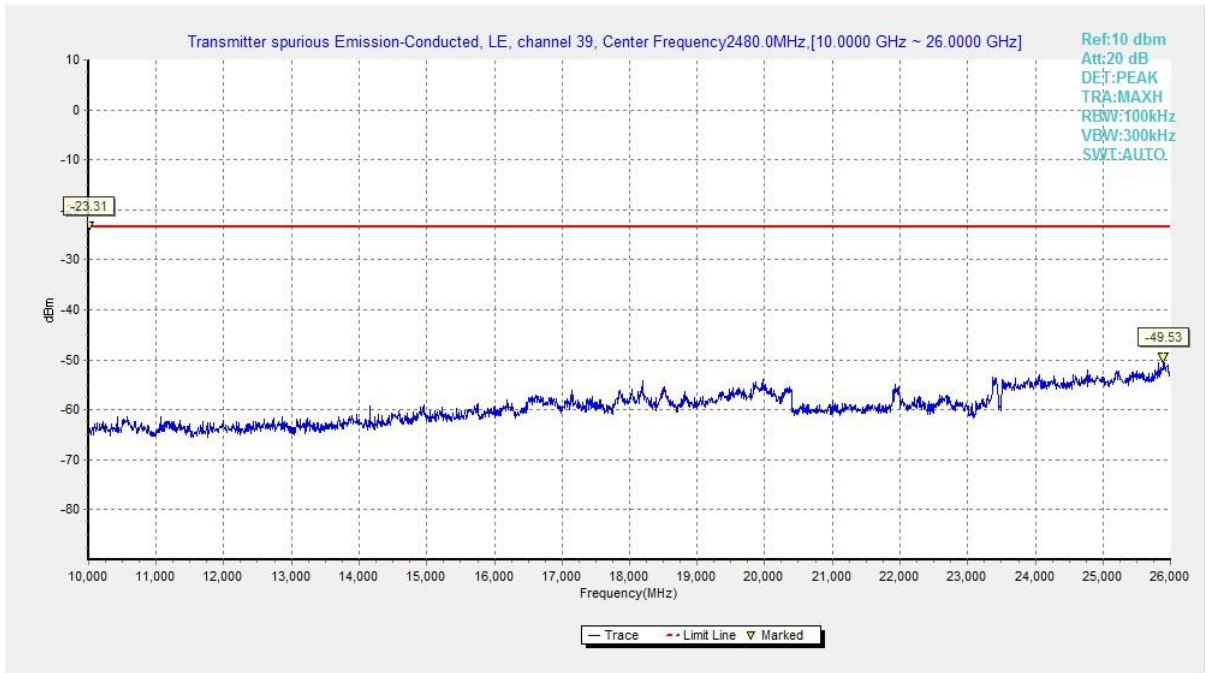
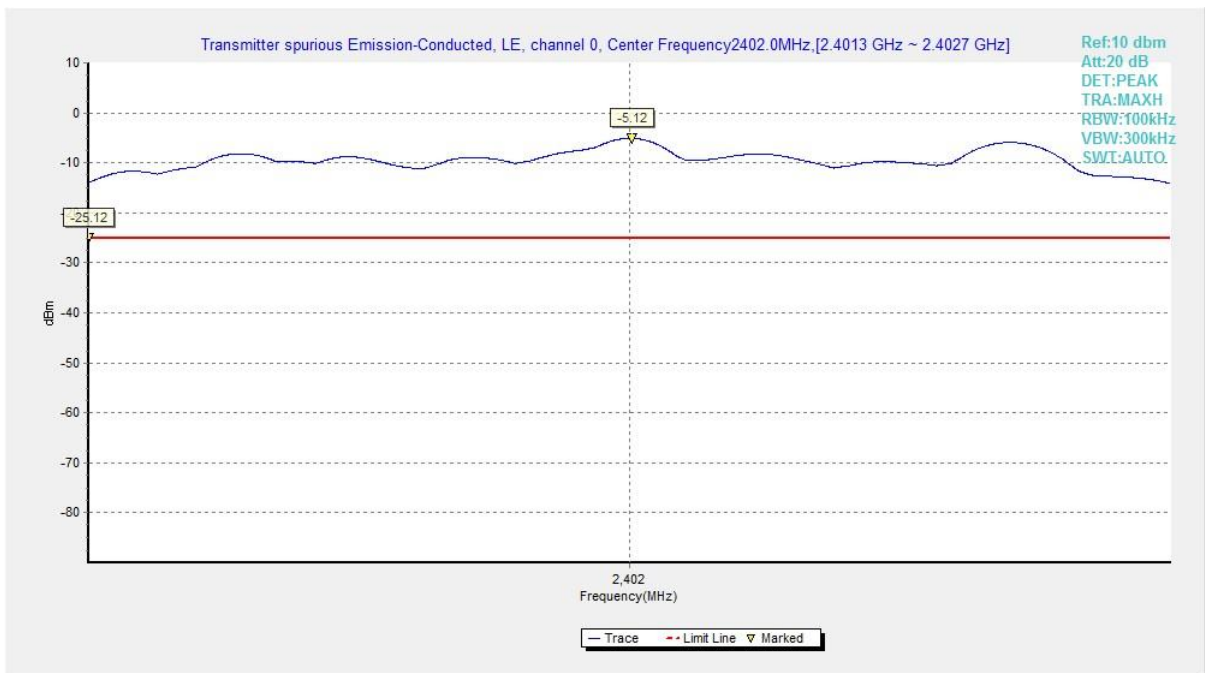


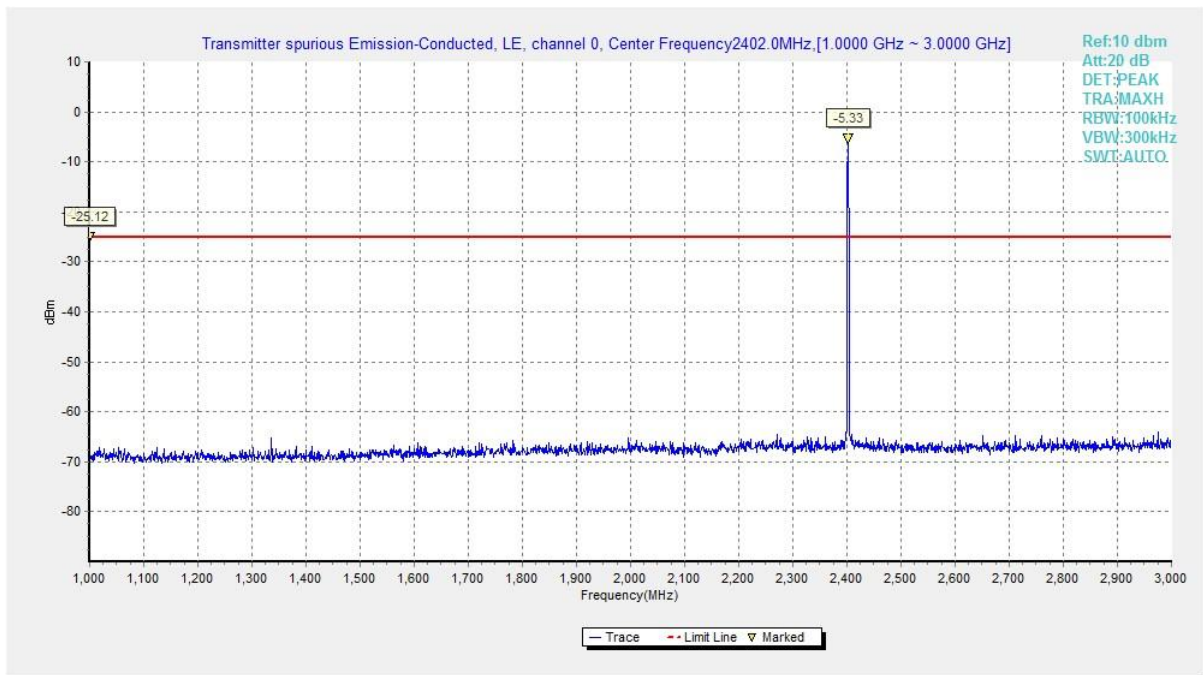
Fig.26 Conducted Spurious Emission (All channels, 30 MHz-1 GHz), LE 1M



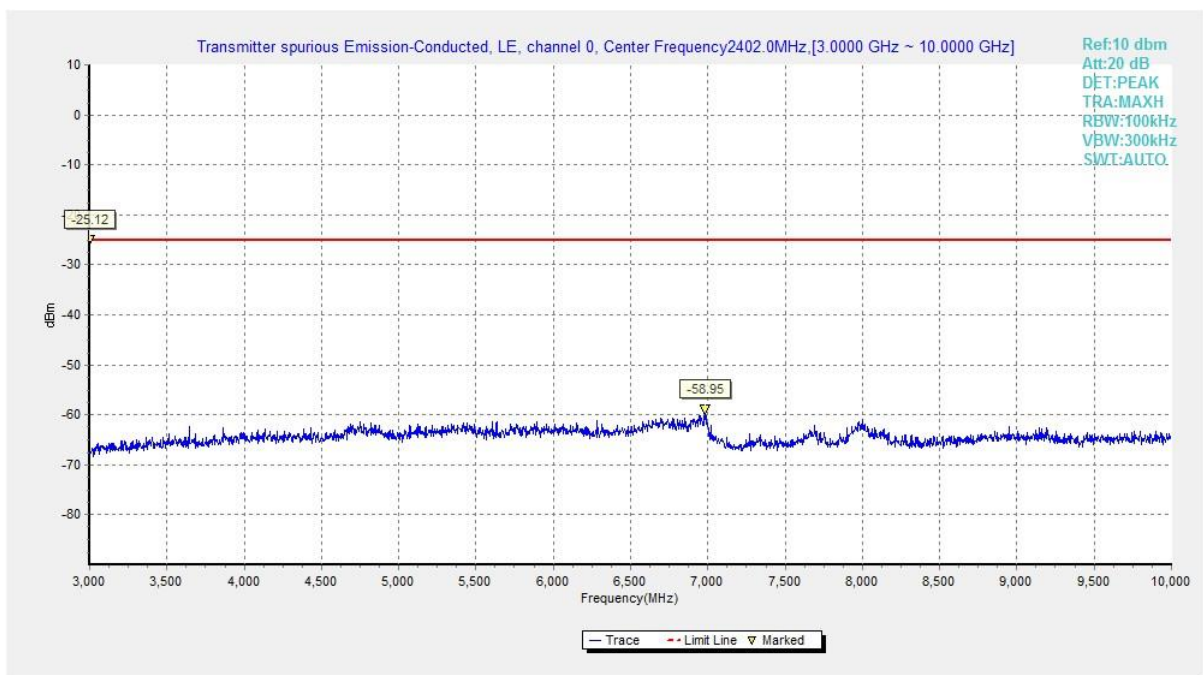
**Fig.27 Conducted Spurious Emission (All channels, 10 GHz-26 GHz), LE 1M**



**Fig.28 Conducted Spurious Emission (Ch0, Center Frequency), LE 2M**

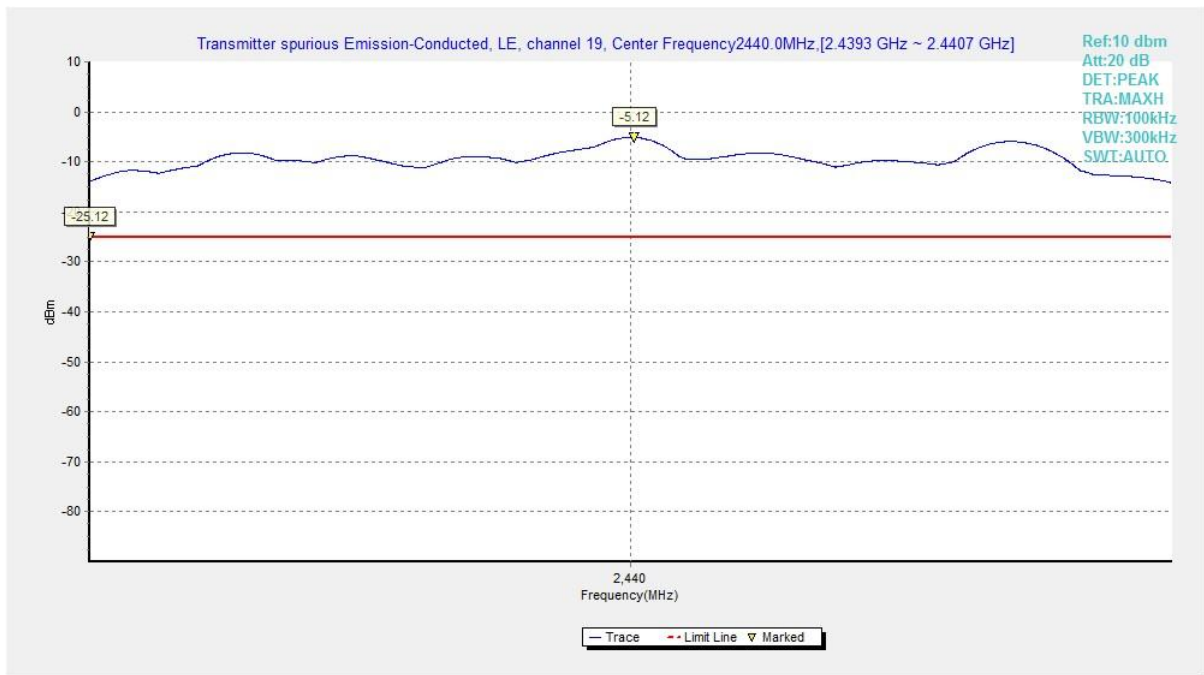


**Fig.29 Conducted Spurious Emission (Ch0, 1 GHz-3 GHz), LE 2M**

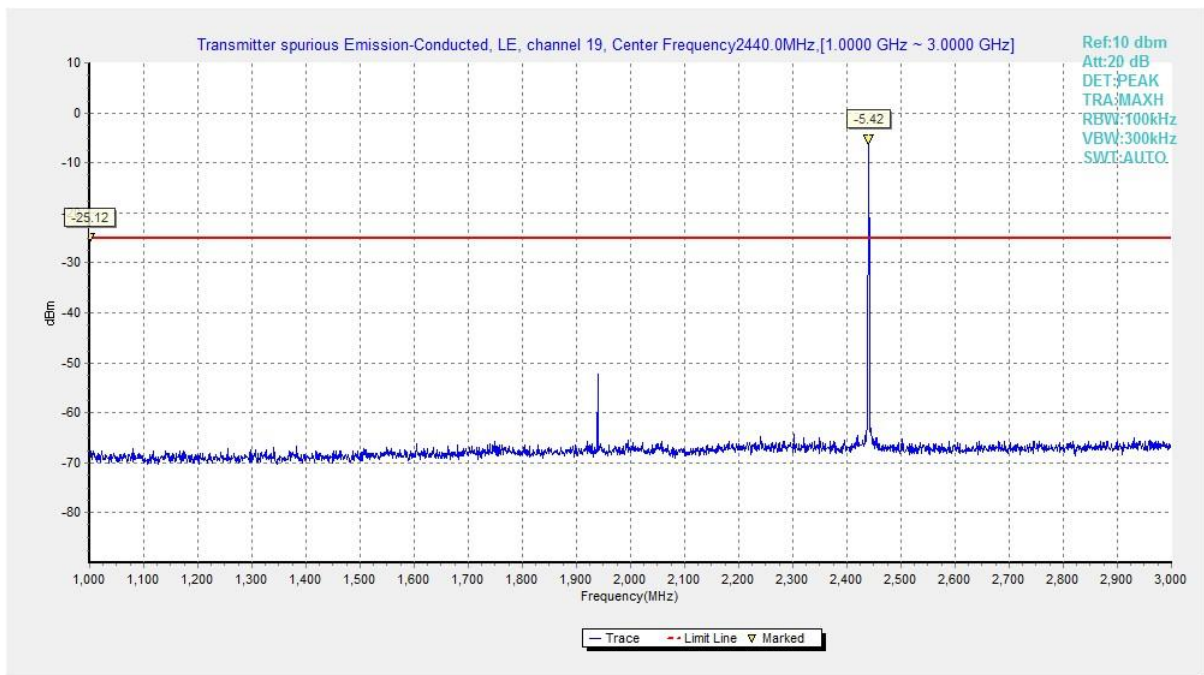


**Fig.30 Conducted Spurious Emission (Ch0, 3 GHz-10 GHz), LE 2M**

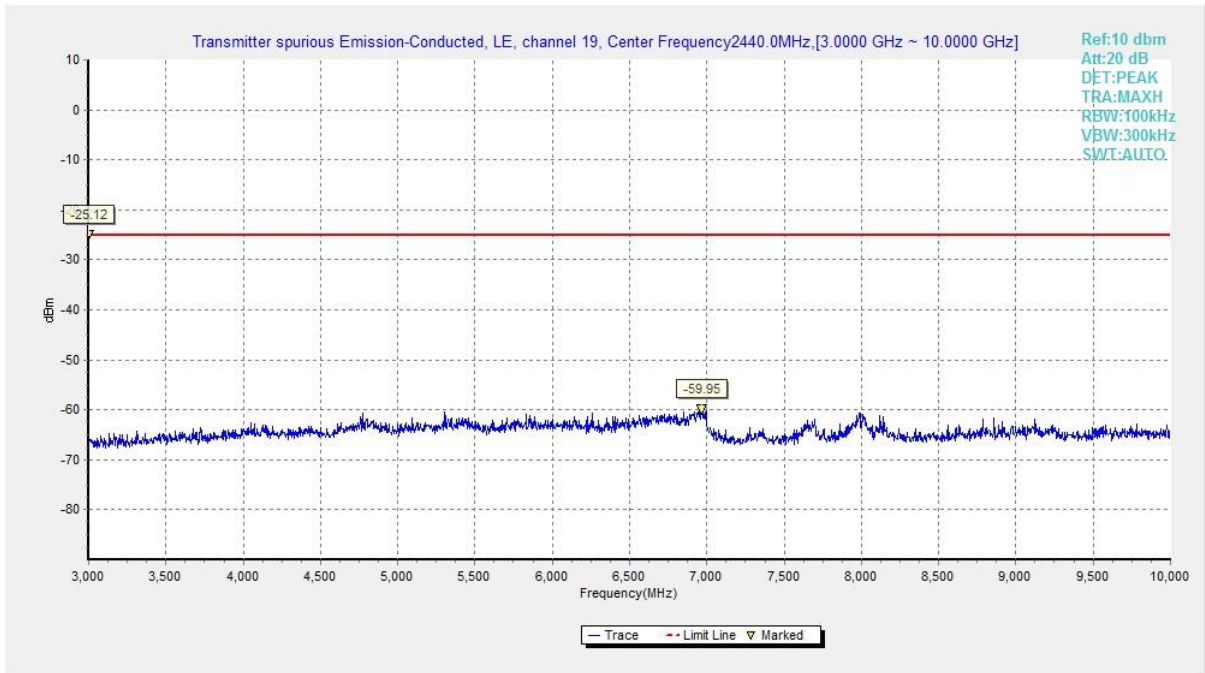




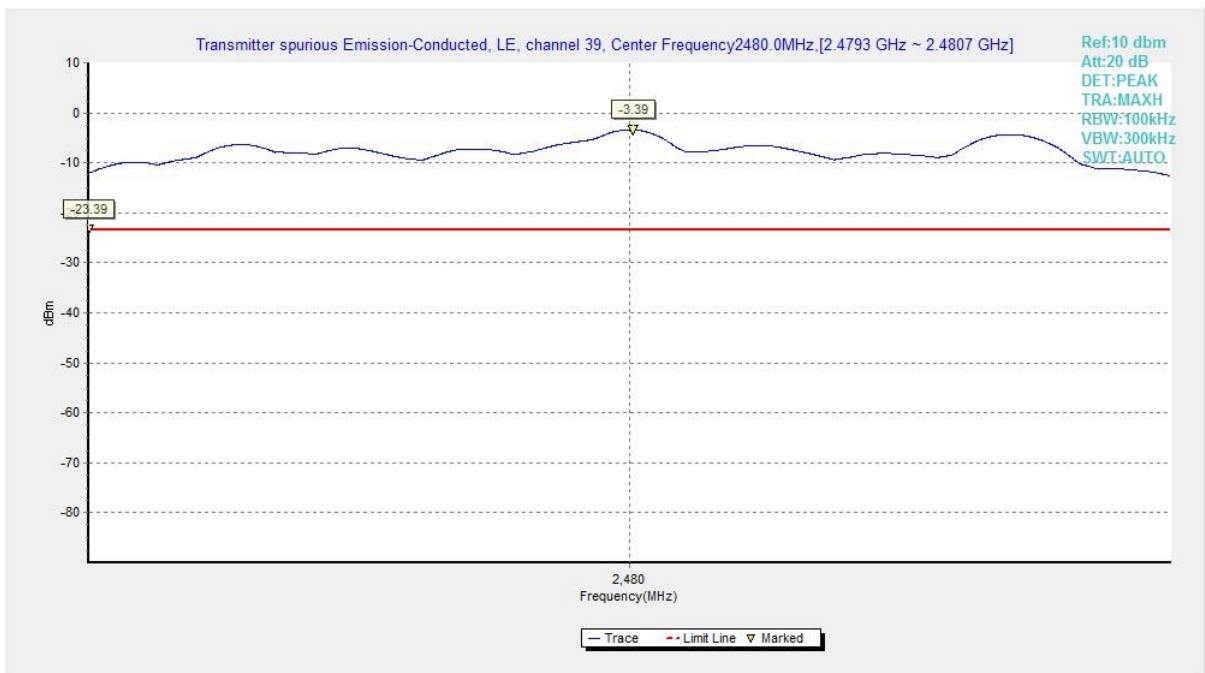
**Fig.31 Conducted Spurious Emission (Ch19, Center Frequency), LE 2M**



**Fig.32 Conducted Spurious Emission (Ch19, 1 GHz-3 GHz), LE 2M**



**Fig.33 Conducted Spurious Emission (Ch19, 3 GHz-10 GHz), LE 2M**



**Fig.34 Conducted Spurious Emission (Ch39, Center Frequency), LE 2M**

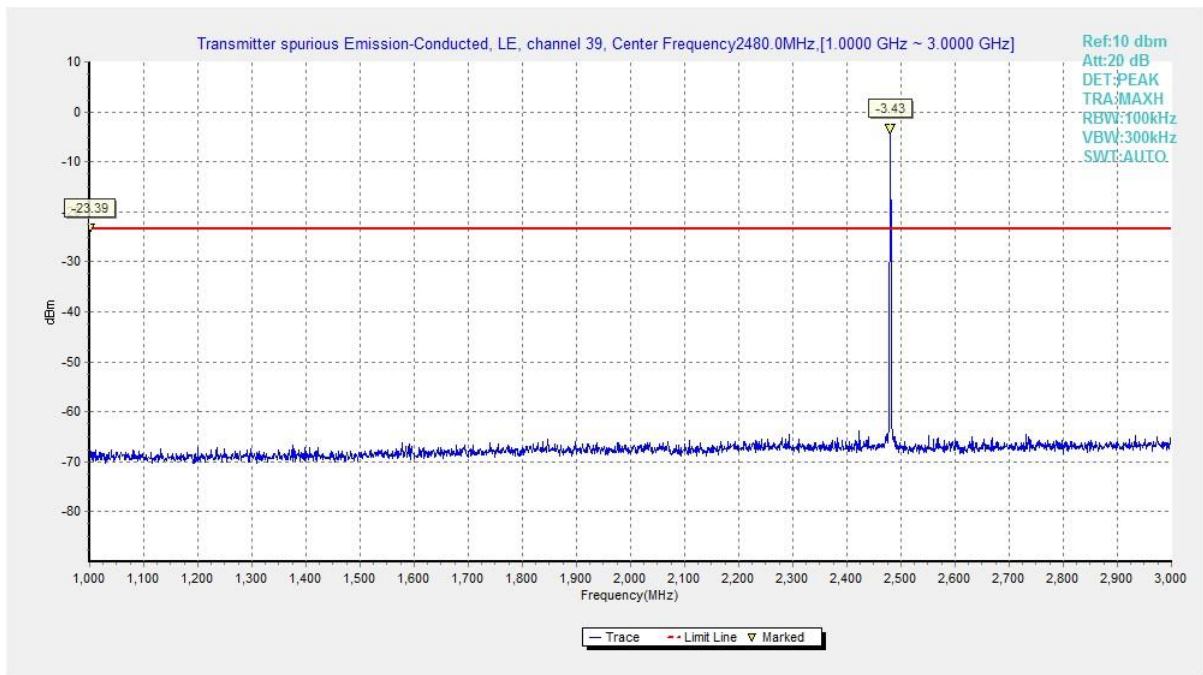


Fig.35 Conducted Spurious Emission (Ch39, 1 GHz-3 GHz), LE 2M

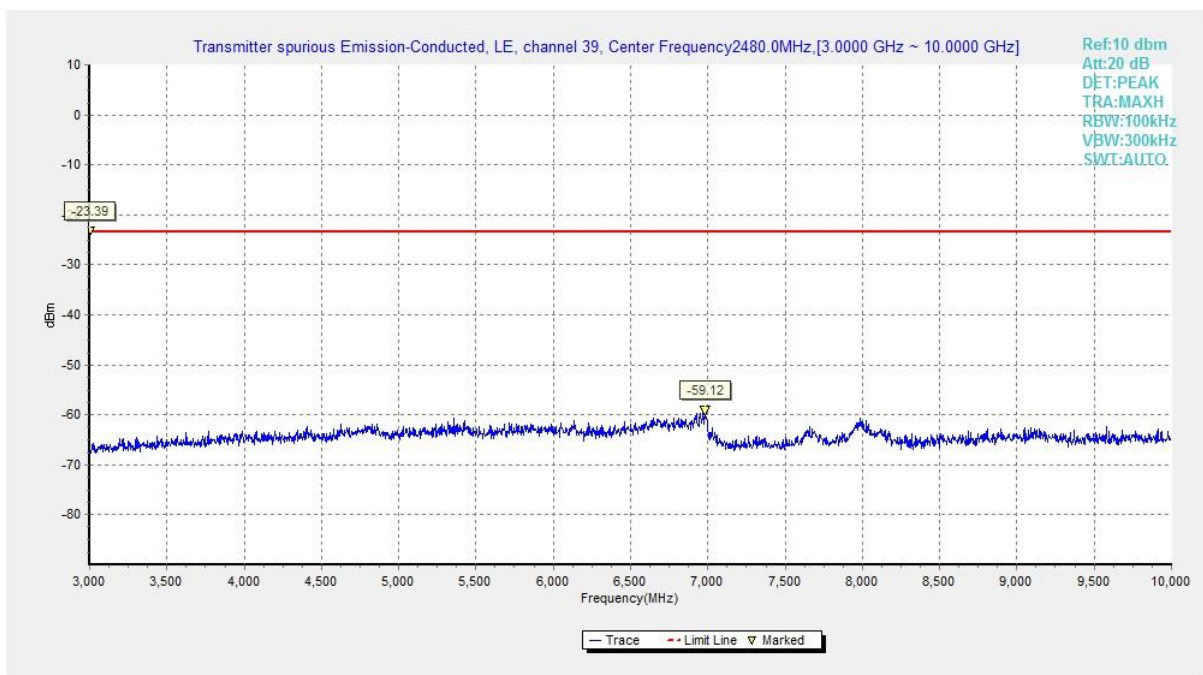
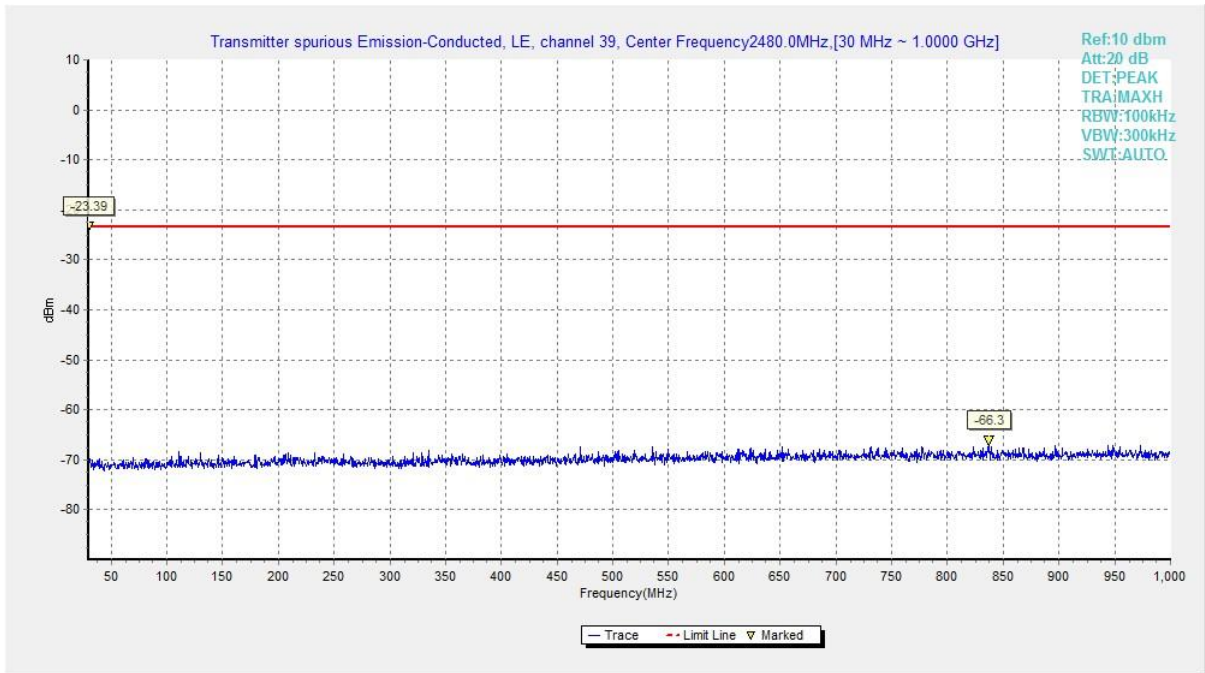
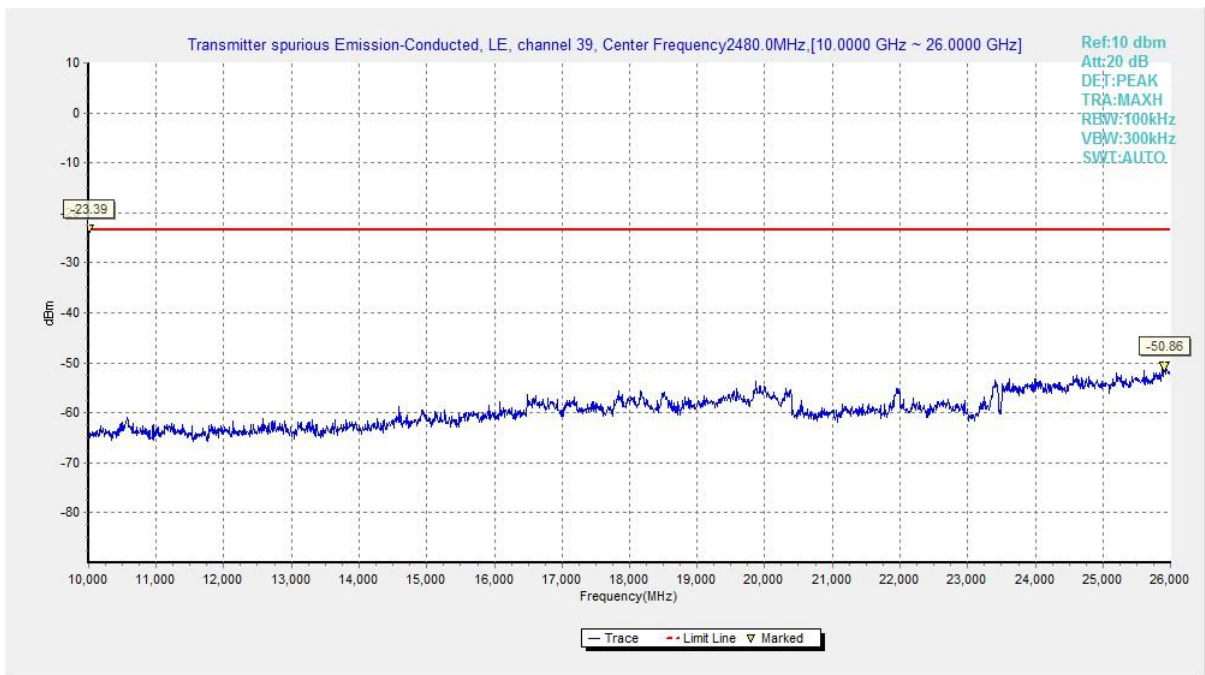


Fig.36 Conducted Spurious Emission (Ch39, 3 GHz-10 GHz), LE 2M



**Fig.37 Conducted Spurious Emission (All channels, 30 MHz-1 GHz), LE 2M**



**Fig.38 Conducted Spurious Emission (All channels, 10 GHz-26 GHz), LE 2M**

## A.6 Transmitter Spurious Emission - Radiated

### Measurement Limit:

Standard	Limit
FCC 47 CFR Part 15.247, 15.205, 15.209 & RSS-247 section 5.5/RSS-Gen section 6.13	20dB below peak output power

In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a) (see § 15.205(c)).

### Limit in restricted band:

Frequency of emission (MHz)	Field strength ( $\mu\text{V}/\text{m}$ )	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

### Test Condition:

The EUT was placed on a non-conductive table. The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and the EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. This maximization process was repeated with the EUT positioned in each of its three orthogonal orientations.

Frequency of emission (MHz)	RBW/VBW	Sweep Time (s)
30-1000	120kHz/300kHz	5
1000-4000	1MHz/3MHz	15
4000-18000	1MHz/3MHz	40
18000-26500	1MHz/3MHz	20

Note: According to the performance evaluation, the radiated emission margin of EUT is over 20dB in the band from 9kHz to 30MHz. Therefore, the measurement starts from 30MHz to tenth harmonic. The measurement results include the horizontal polarization and vertical polarization measurements.



**Measurement Results:**

Mode	Channel	Frequency Range	Test Results	Conclusion
LE-1M	0	1 GHz ~ 3 GHz	Fig.39	P
		3 GHz ~ 18 GHz	Fig.40	P
	19	9 kHz ~ 30 MHz	Fig.41	P
		30 MHz ~ 1 GHz	Fig.42	P
		1 GHz ~ 3 GHz	Fig.43	P
		3 GHz ~ 18 GHz	Fig.44	P
	39	18 GHz ~ 26.5 GHz	Fig.45	P
		1 GHz ~ 3 GHz	Fig.46	P
		3 GHz ~ 18 GHz	Fig.47	P
	Restricted Band(CH0)	2.38 GHz ~ 2.45 GHz	Fig.48	P
Restricted Band(CH39)	2.45 GHz ~ 2.5 GHz	Fig.49	P	
LE-2M	0	1 GHz ~ 3 GHz	Fig.50	P
		3 GHz ~ 18 GHz	Fig.51	P
	19	9 kHz ~ 30 MHz	Fig.52	P
		30 MHz ~ 1 GHz	Fig.53	P
		1 GHz ~ 3 GHz	Fig.54	P
		3 GHz ~ 18 GHz	Fig.55	P
	39	18 GHz ~ 26.5 GHz	Fig.56	P
		1 GHz ~ 3 GHz	Fig.57	P
		3 GHz ~ 18 GHz	Fig.58	P
	Restricted Band(CH0)	2.38 GHz ~ 2.45 GHz	Fig.59	P
Restricted Band(CH39)	2.45 GHz ~ 2.5 GHz	Fig.60	P	

See below for test graphs.

Conclusion: Pass

**LE-1M**
**GFSK CH0 (3-18GHz)**

Frequency (MHz)	MaxPeak (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Pol	Corr. (dB)
10896.00	45.79	74.00	28.21	V	5.2
11877.00	46.25	74.00	27.75	H	6.7
13563.50	46.97	74.00	27.03	H	8.6
14403.00	49.05	74.00	24.95	V	10.9
16611.00	50.53	74.00	23.47	V	14.8
17933.50	50.78	74.00	23.22	H	16.1

Frequency (MHz)	Average (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Pol	Corr. (dB)
10605.00	36.20	54.00	17.80	H	4.9
11705.00	36.76	54.00	17.24	H	6.9
12487.50	37.17	54.00	16.83	V	8.0
14527.00	38.41	54.00	15.59	H	11.5
16975.50	40.99	54.00	13.01	H	14.8
17909.50	41.55	54.00	12.45	H	16.3

**GFSK CH19 (3-18GHz)**

Frequency (MHz)	MaxPeak (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Pol	Corr. (dB)
10406.00	44.75	74.00	29.25	H	5.0
11909.50	46.73	74.00	27.27	V	7.0
13105.00	46.88	74.00	27.12	H	8.5
14879.50	48.72	74.00	25.28	H	11.0
16712.00	50.39	74.00	23.61	H	14.9
17916.50	50.79	74.00	23.21	H	16.2

Frequency (MHz)	Average (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Pol	Corr. (dB)
10404.50	35.49	54.00	18.51	H	5.0
12098.00	36.72	54.00	17.28	V	7.4
13235.00	37.08	54.00	16.92	V	8.7
14507.00	39.36	54.00	14.64	V	11.5
16774.50	41.04	54.00	12.96	H	14.8
17921.50	41.39	54.00	12.61	H	16.2

**GFSK CH39 (3-18GHz)**

Frequency (MHz)	MaxPeak (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Pol	Corr. (dB)
10270.00	45.54	74.00	28.46	V	5.1
12503.50	46.93	74.00	27.07	H	8.0
13204.00	47.69	74.00	26.31	V	8.6
14854.00	48.11	74.00	25.89	V	10.8
16764.00	50.74	74.00	23.26	H	14.8
17927.50	50.88	74.00	23.12	V	16.1

Frequency (MHz)	Average (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Pol	Corr. (dB)
10197.00	35.90	54.00	18.10	V	5.1
11906.00	37.19	54.00	16.81	V	7.0
12711.00	37.36	54.00	16.64	H	7.8
14496.50	38.80	54.00	15.20	V	11.4
16694.50	41.07	54.00	12.93	H	14.9
17764.00	41.28	54.00	12.72	V	16.2

**LE-2M**
**GFSK CH0 (3-18GHz)**

Frequency (MHz)	MaxPeak (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Pol	Corr. (dB)
10682.50	45.28	74.00	28.72	V	4.9
12093.50	45.76	74.00	28.24	V	7.4
13300.00	46.06	74.00	27.94	V	9.0
14468.00	47.48	74.00	26.52	V	11.2
16643.50	50.44	74.00	23.56	V	14.9
17914.00	50.76	74.00	23.24	V	16.3

Frequency (MHz)	Average (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Pol	Corr. (dB)
10811.50	35.10	54.00	18.90	H	5.2
11835.50	36.19	54.00	17.81	V	6.6
13214.00	36.99	54.00	17.01	V	8.6
14505.50	38.49	54.00	15.51	H	11.5
16721.00	41.22	54.00	12.78	V	14.9
17896.50	41.38	54.00	12.62	V	16.3



**GFSK CH19 (3-18GHz)**

Frequency (MHz)	MaxPeak (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Pol	Corr. (dB)
10407.00	44.64	74.00	29.36	H	5.0
11567.50	45.52	74.00	28.48	H	6.5
13346.50	46.98	74.00	27.02	H	8.7
14520.00	48.86	74.00	25.14	V	11.5
16639.00	50.55	74.00	23.45	V	14.9
17942.00	50.63	74.00	23.37	V	16.0

Frequency (MHz)	Average (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Pol	Corr. (dB)
10476.50	35.98	54.00	18.02	V	5.0
11717.00	36.43	54.00	17.57	H	6.9
12520.00	37.10	54.00	16.90	H	8.0
14470.50	38.64	54.00	15.36	H	11.3
16589.50	40.69	54.00	13.31	V	14.8
17912.00	41.43	54.00	12.57	V	16.3

**GFSK CH39 (3-18GHz)**

Frequency (MHz)	MaxPeak (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Pol	Corr. (dB)
10417.00	45.85	74.00	28.15	V	5.1
11677.50	46.16	74.00	27.84	H	7.0
13296.00	47.02	74.00	26.98	H	9.0
14458.00	47.67	74.00	26.33	V	11.2
16353.50	50.56	74.00	23.44	H	14.4
18000.00	50.84	74.00	23.16	V	15.9

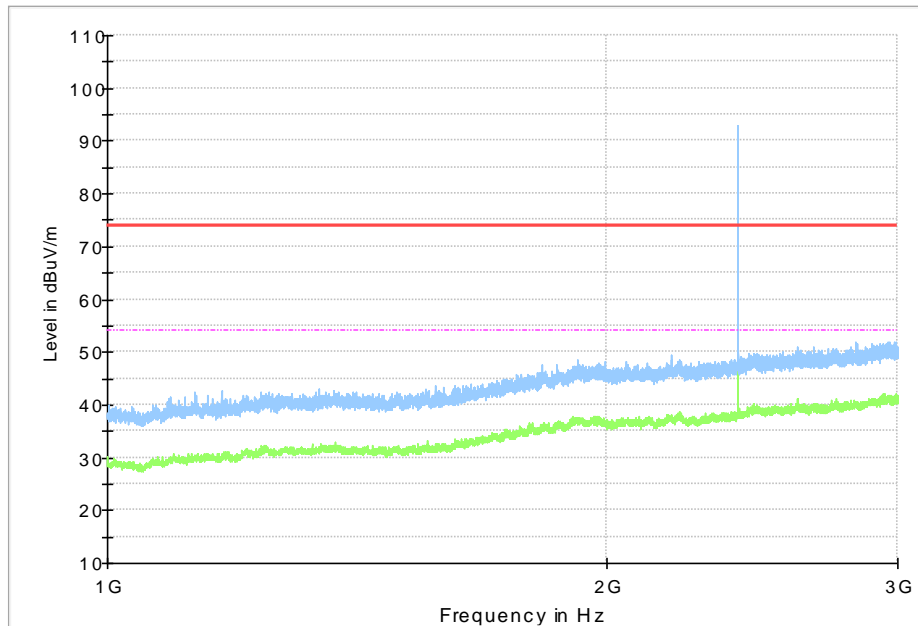
Frequency (MHz)	Average (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Pol	Corr. (dB)
10499.00	35.80	54.00	18.20	H	5.0
11687.50	37.11	54.00	16.89	H	7.1
13122.00	36.57	54.00	17.43	V	8.5
14637.50	38.42	54.00	15.58	H	11.3
17100.50	41.31	54.00	12.69	V	15.1
17916.00	41.56	54.00	12.44	H	16.3

**Note:**

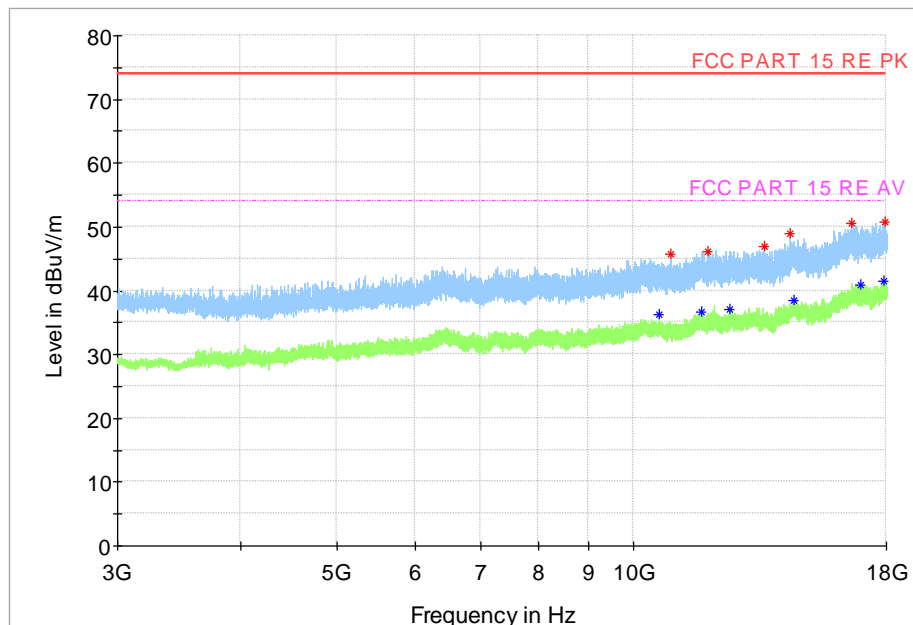
A "reference path loss" is established and the  $A_{Rpl}$  is the attenuation of "reference path loss", and Antenna Factor, the gain of the preamplifier, the cable loss.  $P_{Mea}$  is the field strength recorded from the instrument.

The measurement results are obtained as described below:

$$\text{Result} = P_{Mea} + \text{Cable Loss} + \text{Antenna Factor} - \text{Gain of the preamplifier}$$



**Fig.39 Radiated Spurious Emission (Ch0, 1 GHz - 3 GHz), 1M**



**Fig.40 Radiated Spurious Emission (Ch0, 3 GHz - 18 GHz), 1M**

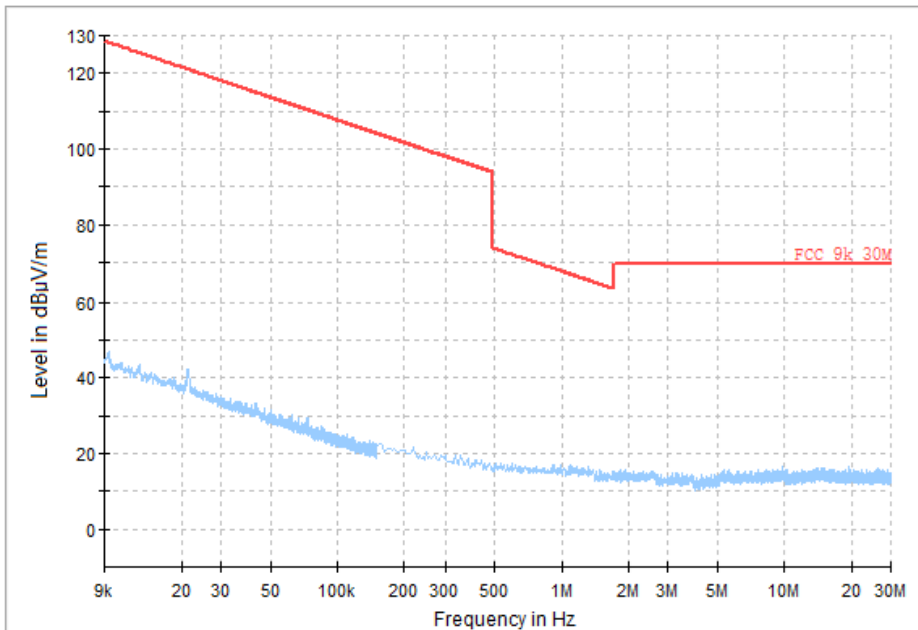


Fig.41 Radiated Spurious Emission (Ch19, 9 kHz - 30 MHz), 1M

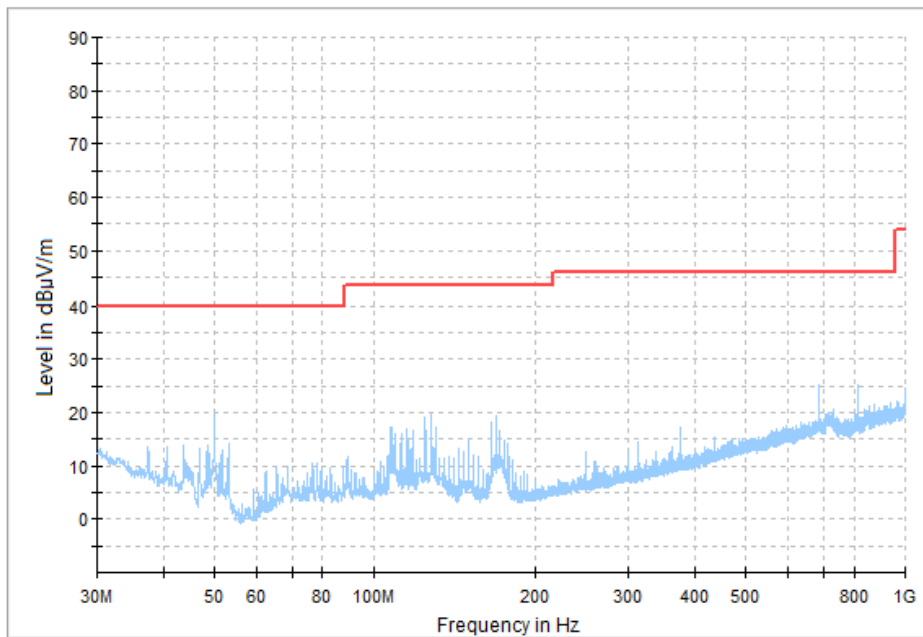


Fig.42 Radiated Spurious Emission (Ch19, 30 MHz - 1 GHz), 1M

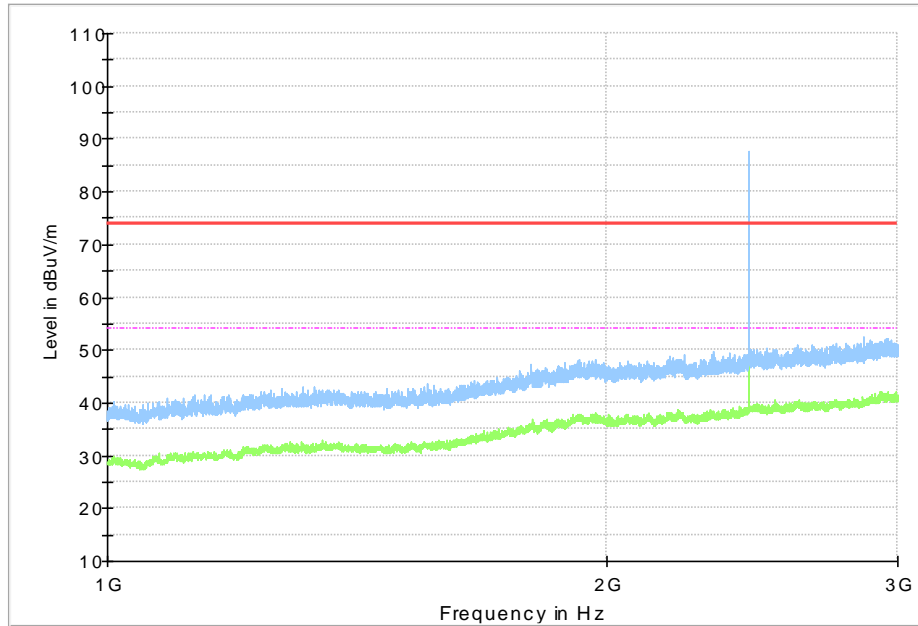


Fig.43 Radiated Spurious Emission (Ch19, 1 GHz - 3 GHz), 1M

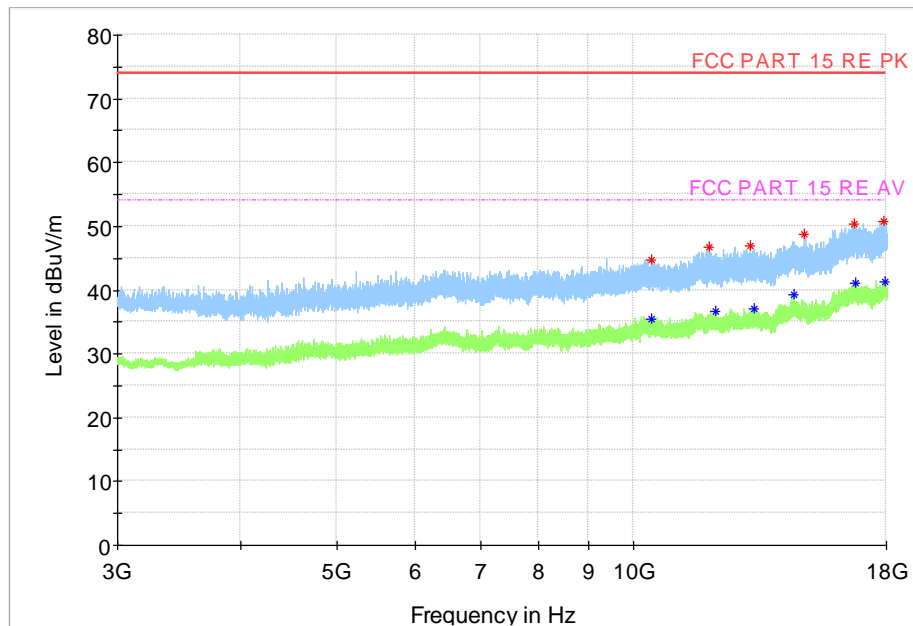
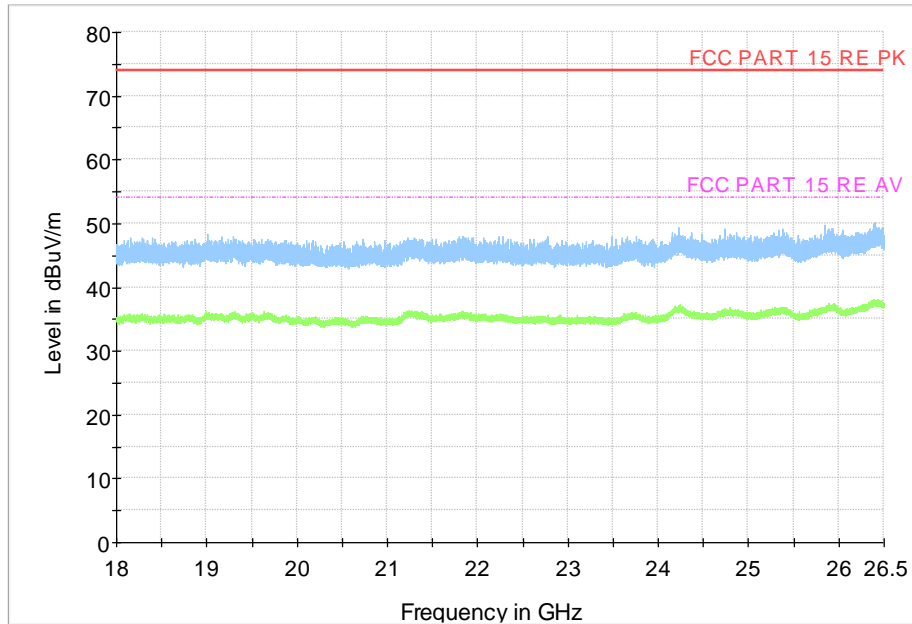
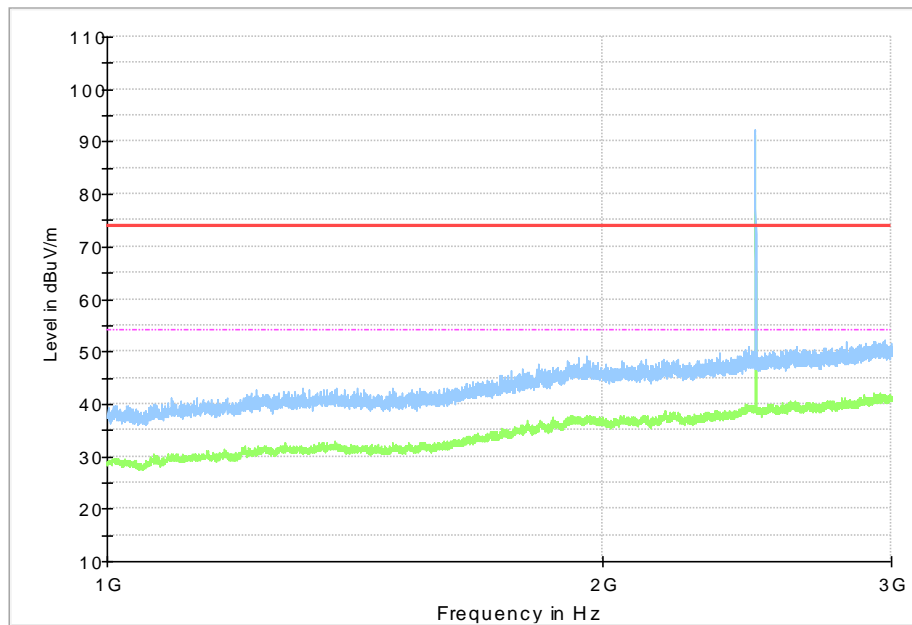


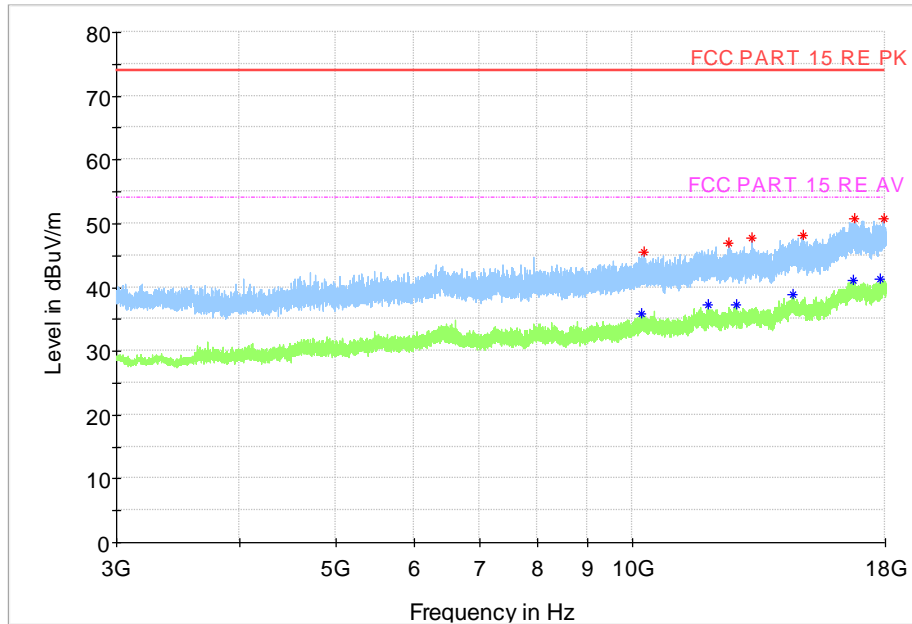
Fig.44 Radiated Spurious Emission (Ch19, 3 GHz - 18 GHz), 1M



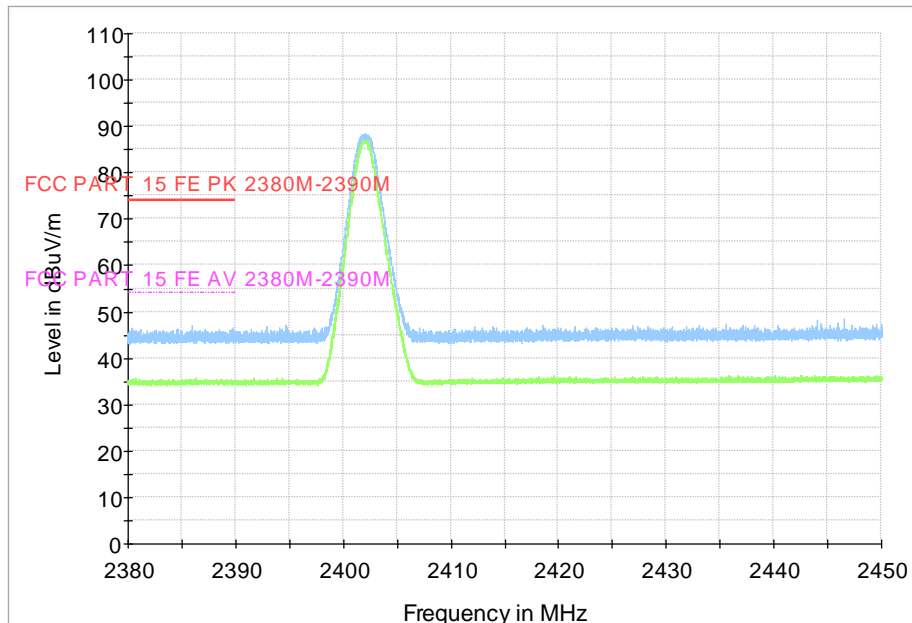
**Fig.45 Radiated Spurious Emission (Ch19, 18 GHz - 26.5 GHz), 1M**



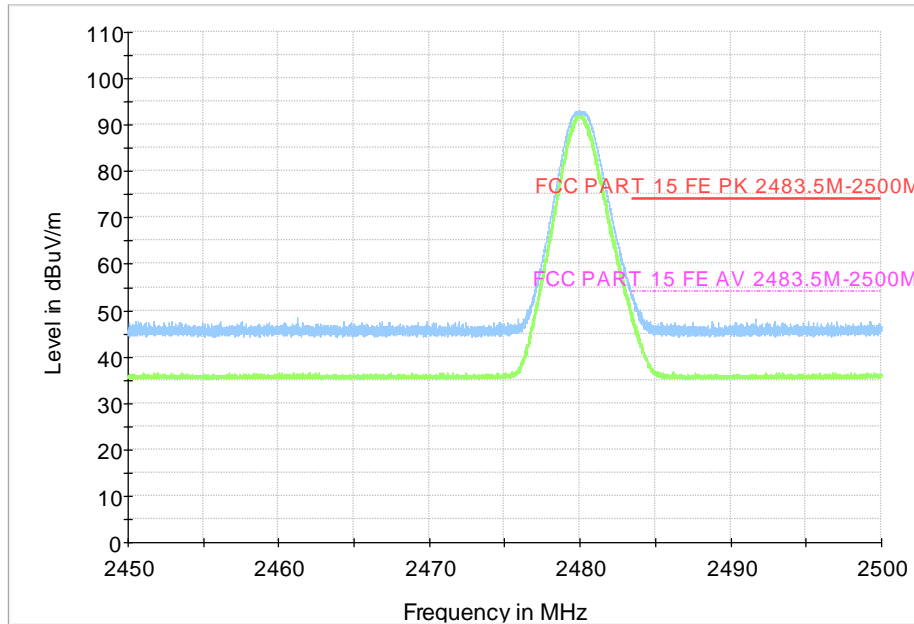
**Fig.46 Radiated Spurious Emission (Ch39, 1 GHz - 3 GHz), 1M**



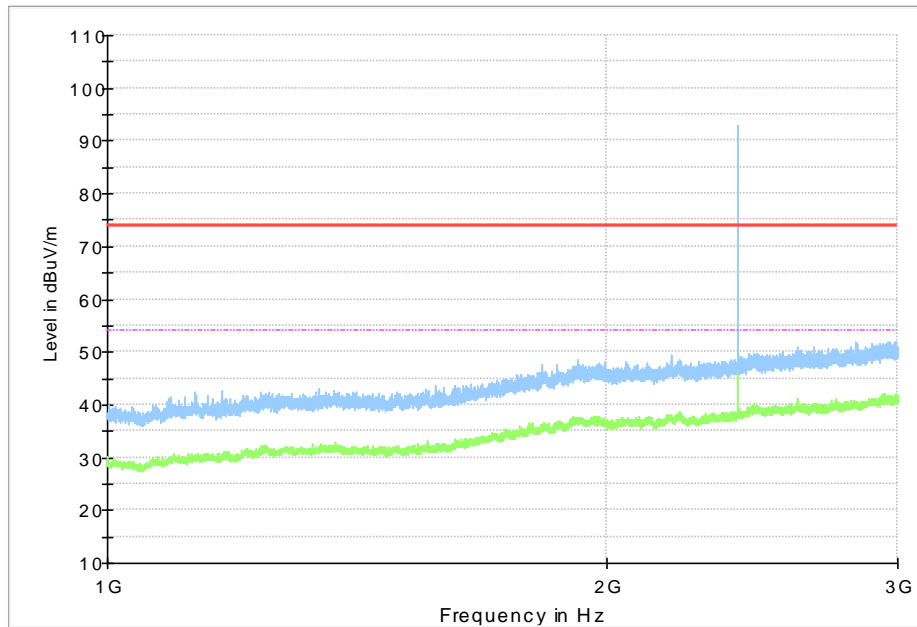
**Fig.47 Radiated Spurious Emission (Ch39, 3 GHz - 18 GHz), 1M**



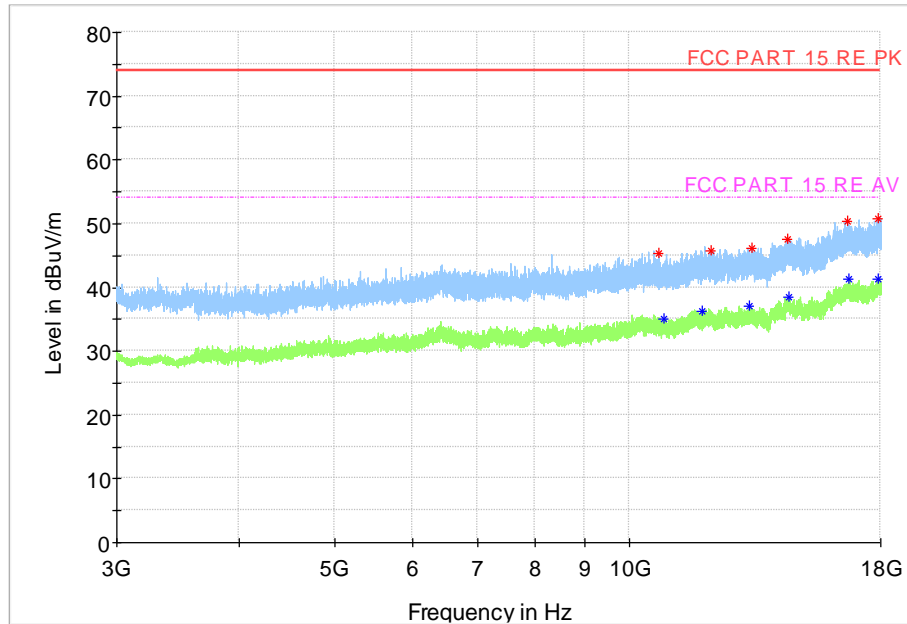
**Fig.48 Radiated Band Edges (Ch0, 2380GHz - 2450GHz), 1M**



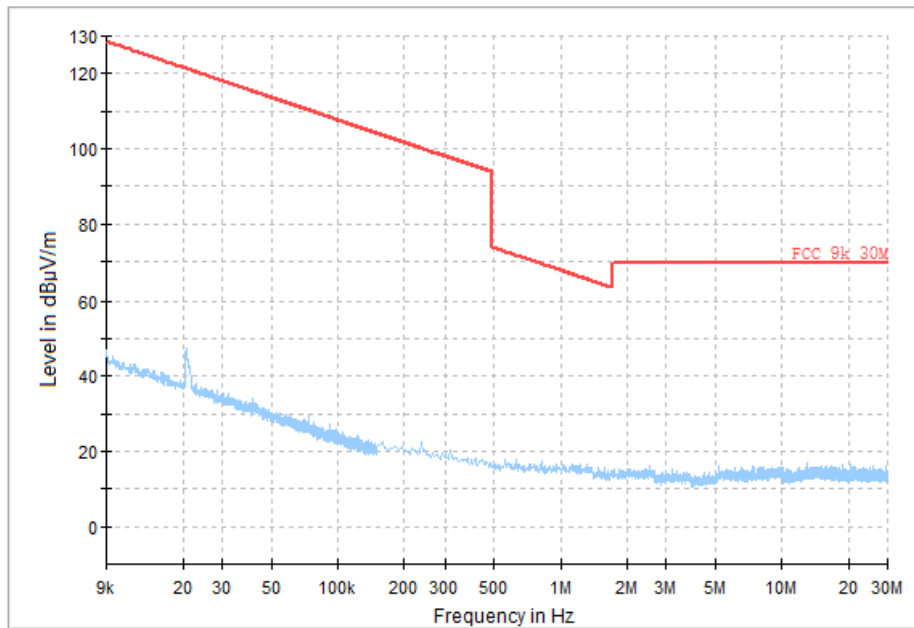
**Fig.49 Radiated Band Edges (Ch39, 2450GHz - 2500GHz), 1M**



**Fig.50 Radiated Spurious Emission (Ch0, 1 GHz - 3 GHz), 2M**

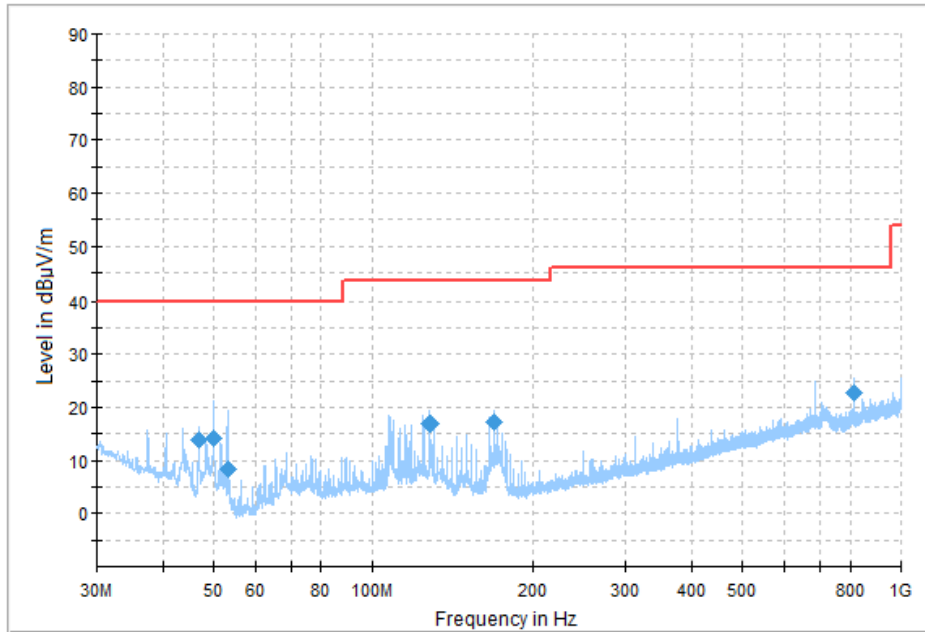


**Fig.51 Radiated Spurious Emission (Ch0, 3 GHz - 18 GHz), 2M**

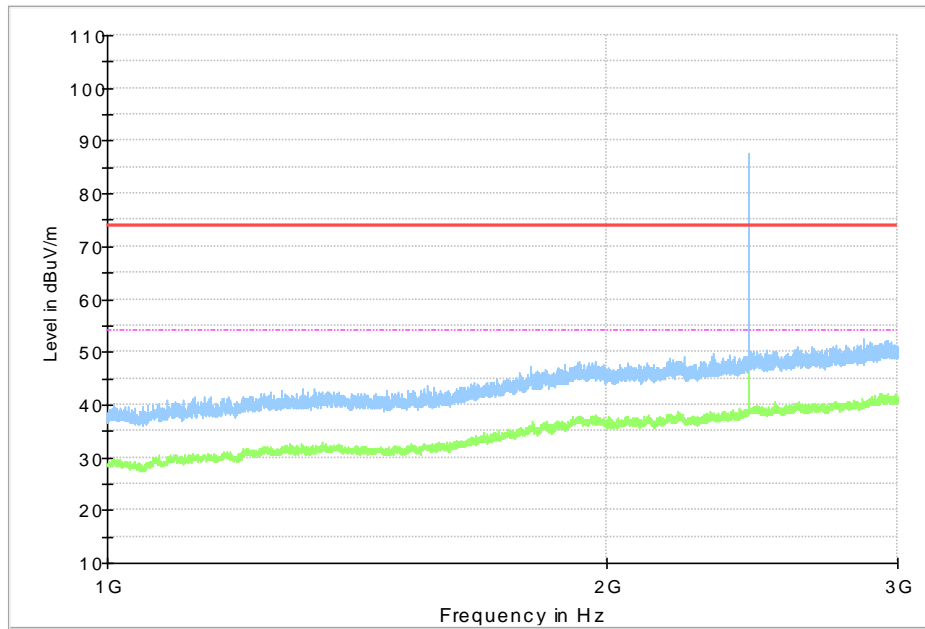


**Fig.52 Radiated Spurious Emission (Ch19, 9 kHz - 30 MHz), 2M**

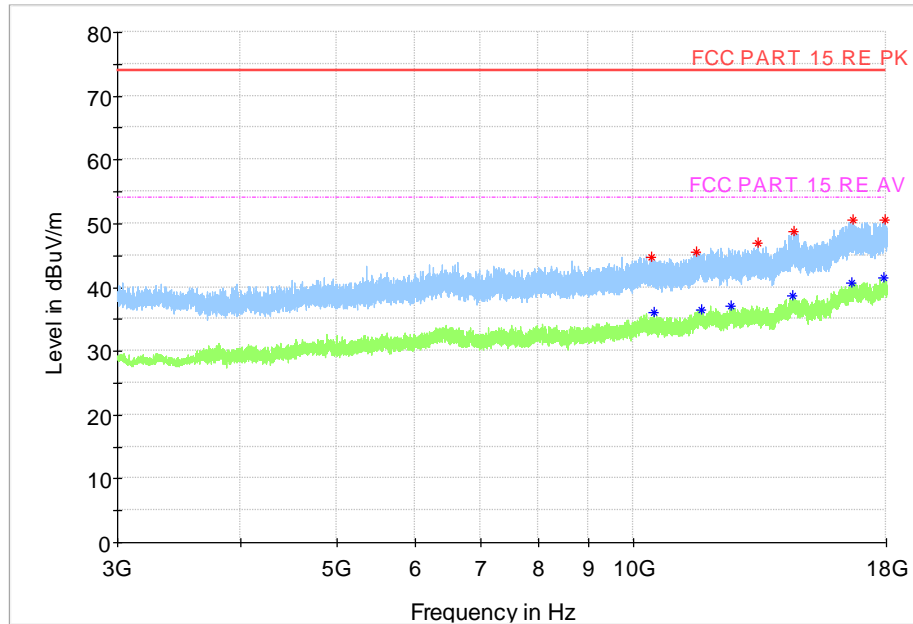




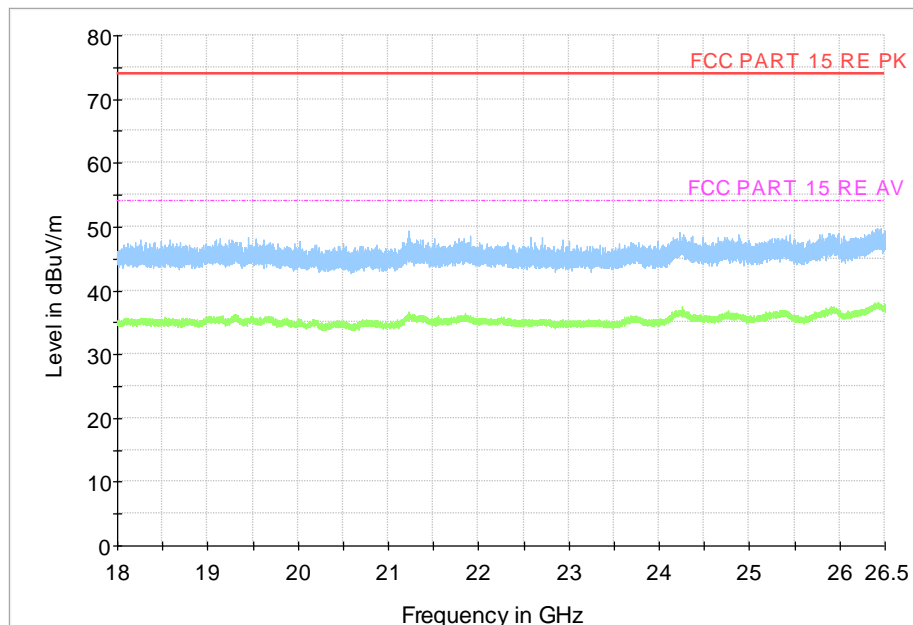
**Fig.53 Radiated Spurious Emission (Ch19, 30 MHz - 1 GHz), 2M**



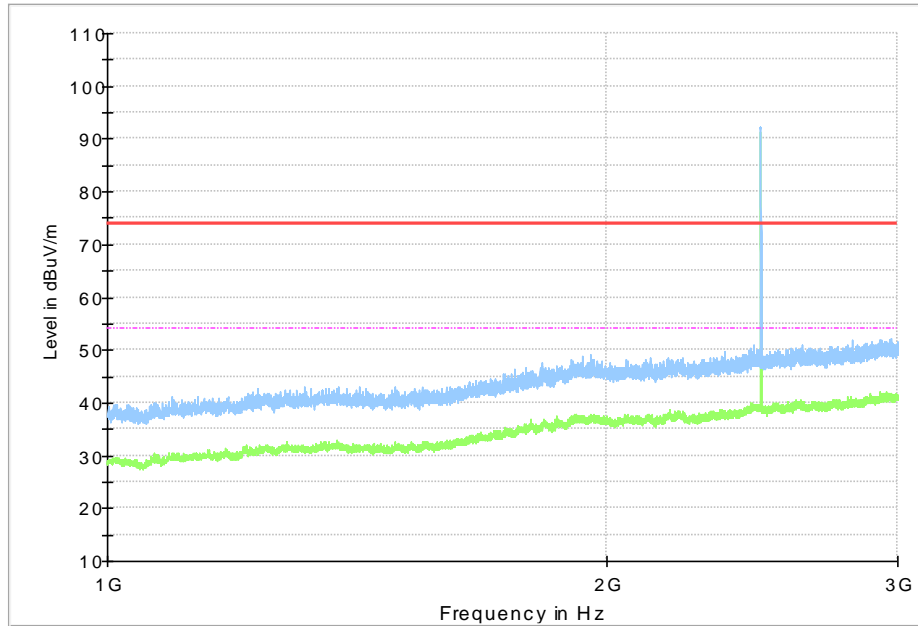
**Fig.54 Radiated Spurious Emission (Ch19, 1 GHz - 3 GHz), 2M**



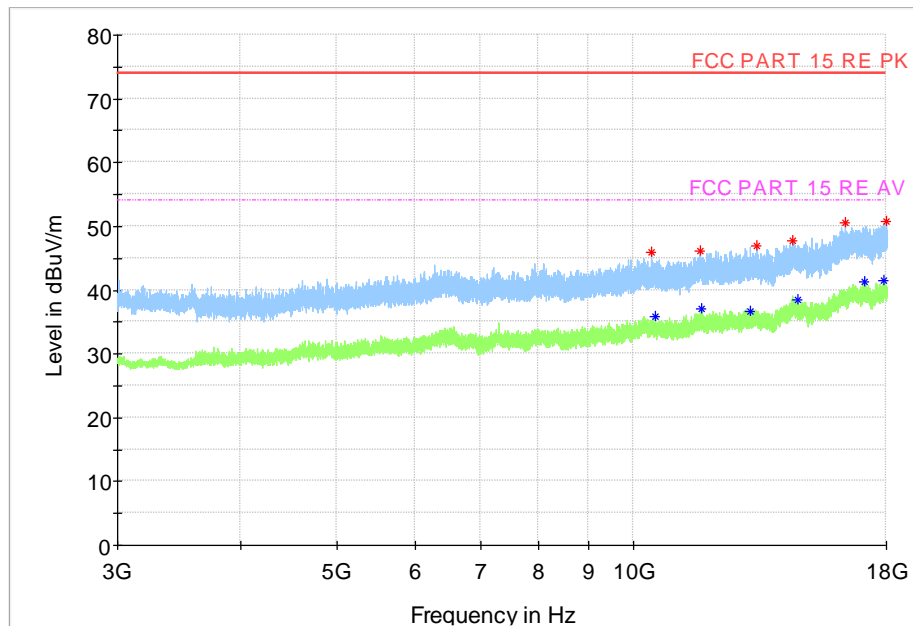
**Fig.55 Radiated Spurious Emission (Ch19, 3 GHz - 18 GHz), 2M**



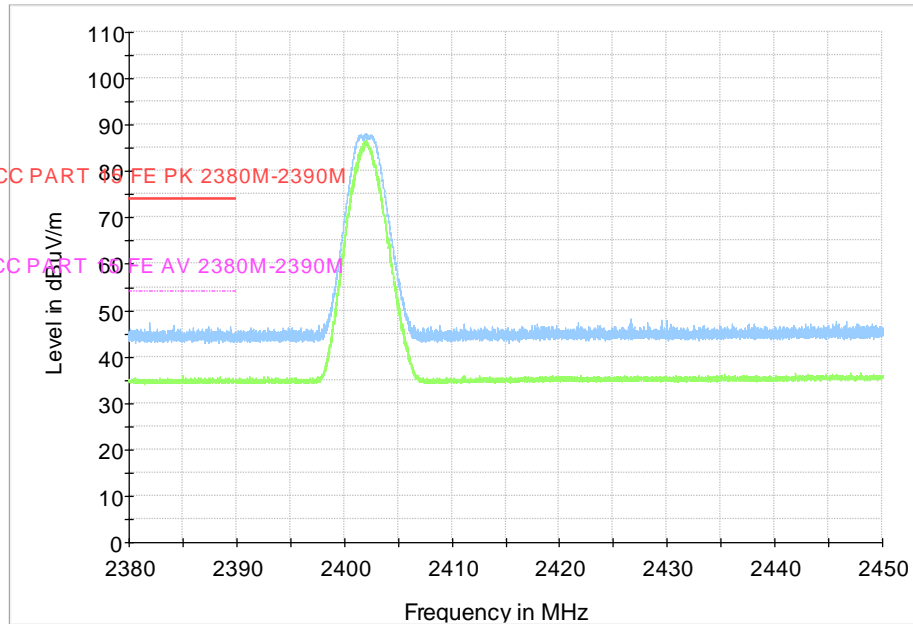
**Fig.56 Radiated Spurious Emission (Ch19, 18 GHz - 26.5 GHz), 2M**



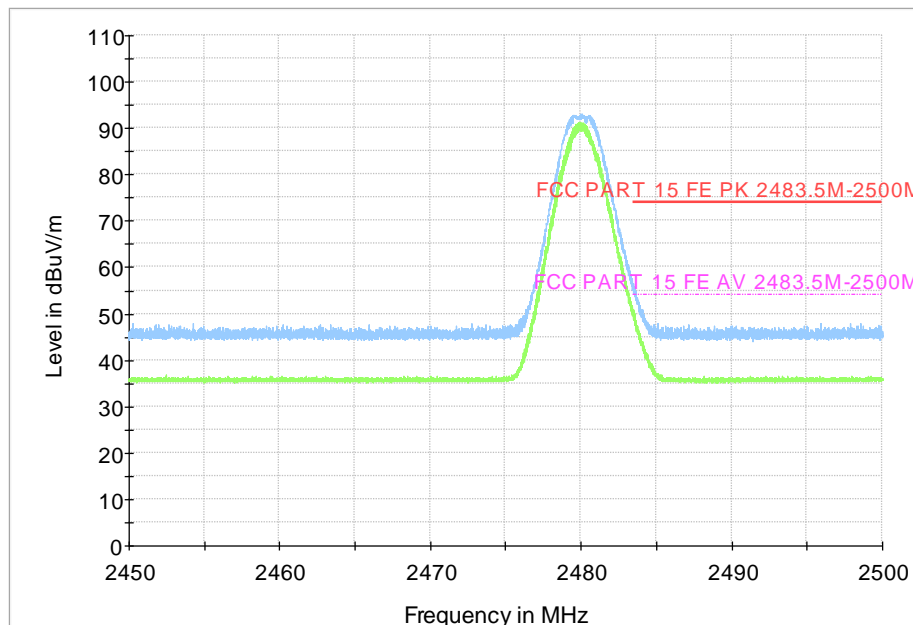
**Fig.57 Radiated Spurious Emission (Ch39, 1 GHz - 3 GHz), 2M**



**Fig.58 Radiated Spurious Emission (Ch39, 3 GHz - 18 GHz), 2M**



**Fig.59 Radiated Band Edges (Ch0, 2380GHz - 2450GHz), 2M**



**Fig.60 Radiated Band Edges (Ch39, 2450GHz - 2500GHz), 2M**

### A.7 AC Power line Conducted Emission

#### Test Condition:

Voltage (V)	Frequency (Hz)
120	60

#### Measurement Result and limit:

##### LE-1M

BLE (Quasi-peak Limit) - AE1

Frequency range (MHz)	Quasi-peak Limit (dB $\mu$ V)	Result (dB $\mu$ V)		Conclusion
		Traffic	Idle	
0.15 to 0.5	66 to 56	Fig.61	Fig.62	P
0.5 to 5	56			
5 to 30	60			

Note: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.

BLE (Average Limit) - AE1

Frequency range (MHz)	Average-peak Limit (dB $\mu$ V)	Result (dB $\mu$ V)		Conclusion
		Traffic	Idle	
0.15 to 0.5	56 to 46	Fig.61	Fig.62	P
0.5 to 5	46			
5 to 30	50			

Note: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.

#### Test Condition:

Voltage (V)	Frequency (Hz)
240	60

#### Measurement Result and limit:

##### LE-1M

BLE (Quasi-peak Limit) - AE1

Frequency range (MHz)	Quasi-peak Limit (dB $\mu$ V)	Result (dB $\mu$ V)		Conclusion
		Traffic	Idle	
0.15 to 0.5	66 to 56	Fig.63	Fig.64	P
0.5 to 5	56			
5 to 30	60			

Note: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.



BLE (Average Limit) - AE1

Frequency range (MHz)	Average-peak Limit (dB $\mu$ V)	Result (dB $\mu$ V)		Conclusion
		Traffic	Idle	
0.15 to 0.5	56 to 46	Fig.63	Fig.64	P
0.5 to 5	46			
5 to 30	50			

Note: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.

Note: The measurement results include the L1 and N measurements.

See below for test graphs.

Conclusion: Pass

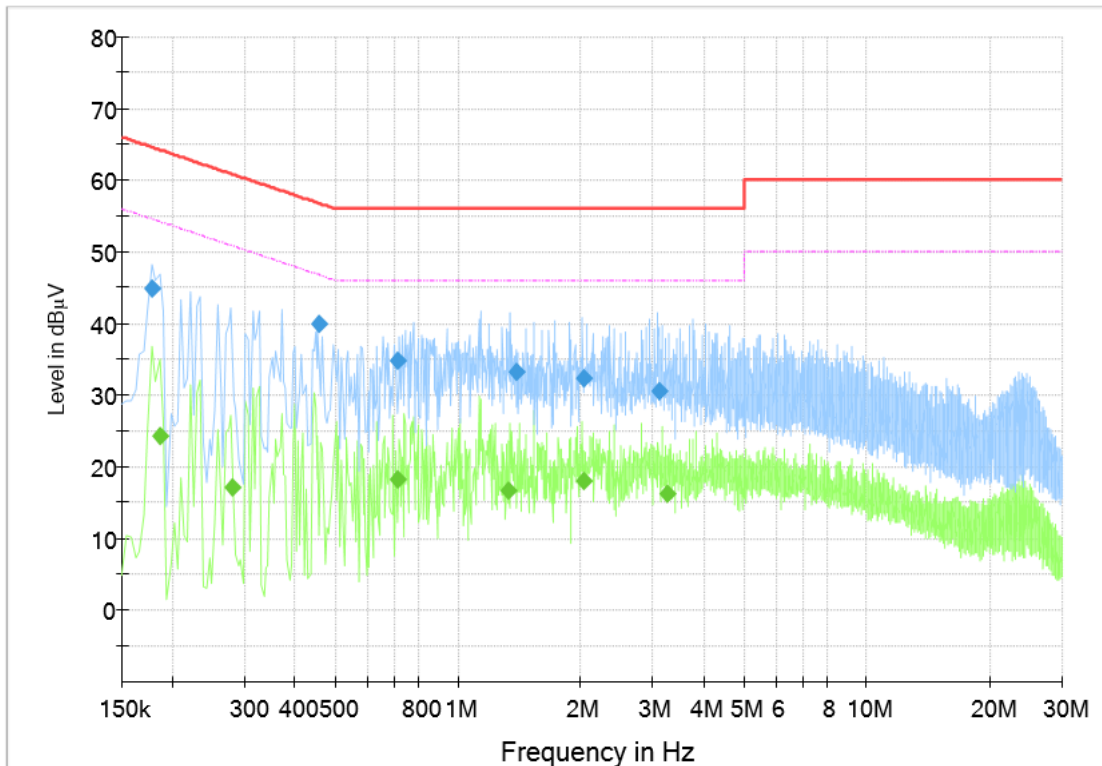


Fig.61 AC Power line Conducted Emission (Traffic, AE1, 120V), 1M

Measurement Results: Quasi Peak

Frequency (MHz)	Quasi Peak (dBµV)	Limit (dBµV)	Margin (dB)	Line	Filter	Corr. (dB)
3.104	30.44	56.00	25.56	N	ON	9.7
2.028	32.25	56.00	23.75	N	ON	9.7
1.388	33.24	56.00	22.76	N	ON	9.7
0.712	34.86	56.00	21.14	N	ON	9.6
0.456	39.83	56.77	16.94	N	ON	9.6
0.178	44.87	64.58	19.71	N	ON	9.6

Measurement Results: Average

Frequency (MHz)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Filter	Corr. (dB)
0.186	24.20	54.21	30.02	N	ON	9.6
0.280	17.06	50.82	33.75	N	ON	9.6
0.712	18.17	46.00	27.83	N	ON	9.6
1.328	16.70	46.00	29.30	N	ON	9.7
2.036	17.88	46.00	28.12	N	ON	9.7
3.240	16.29	46.00	29.71	N	ON	9.7



Full Spectrum

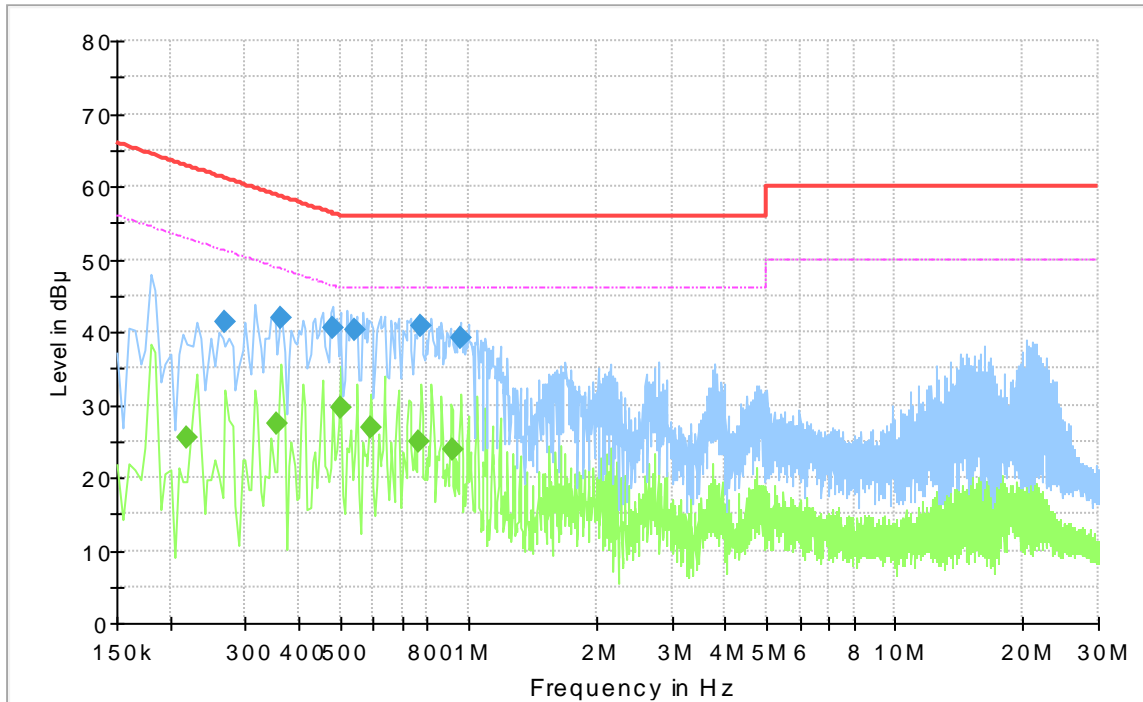


Fig.62 AC Power line Conducted Emission (Idle, AE1, 120V), 1M

Measurement Results: Quasi Peak

Frequency (MHz)	Quasi Peak (dBµV)	Limit (dBµV)	Margin (dB)	Line	Filter	Corr. (dB)
0.186	42.71	64.21	21.51	N	ON	9.6
0.412	32.96	57.61	24.65	N	ON	9.6
0.672	35.46	56.00	20.54	N	ON	9.6
1.184	35.60	56.00	20.40	N	ON	9.6
2.196	32.72	56.00	23.28	N	ON	9.6
4.048	31.52	56.00	24.48	N	ON	9.7

Measurement Results: Average

Frequency (MHz)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Filter	Corr. (dB)
0.182	27.12	54.39	27.28	N	ON	9.6
0.444	20.44	46.99	26.54	N	ON	9.6
0.688	20.68	46.00	25.32	L1	ON	9.6
1.200	17.68	46.00	28.32	N	ON	9.6
2.124	21.46	46.00	24.54	L1	ON	9.6
3.900	17.31	46.00	28.69	N	ON	9.7

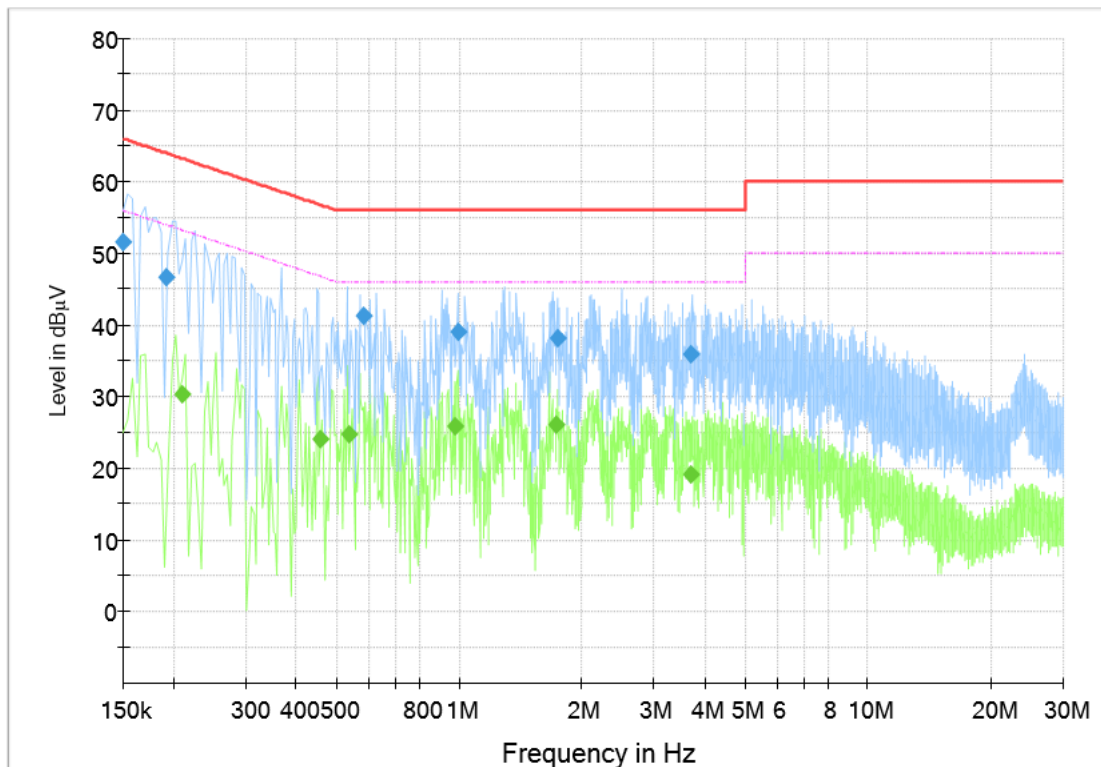


Fig.63 AC Power line Conducted Emission (Traffic, AE1, 240V), 1M

**Measurement Results: Quasi Peak**

Frequency (MHz)	Quasi Peak (dBµV)	Limit (dBµV)	Margin (dB)	Line	Filter	Corr. (dB)
3.668	35.82	56.00	20.18	N	ON	9.7
1.744	38.04	56.00	17.96	N	ON	9.7
0.996	39.01	56.00	16.99	N	ON	9.7
0.580	41.26	56.00	14.74	N	ON	9.6
0.192	46.68	63.95	17.27	N	ON	9.6
0.150	51.60	66.00	14.40	L1	ON	9.6

**Measurement Results: Average**

Frequency (MHz)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Filter	Corr. (dB)
0.210	30.39	53.21	22.81	N	ON	9.6
0.456	23.98	46.77	22.78	N	ON	9.6
0.536	24.65	46.00	21.35	N	ON	9.7
0.972	25.76	46.00	20.24	L1	ON	9.7
1.728	26.15	46.00	19.85	L1	ON	9.7
3.672	19.07	46.00	26.93	N	ON	9.7

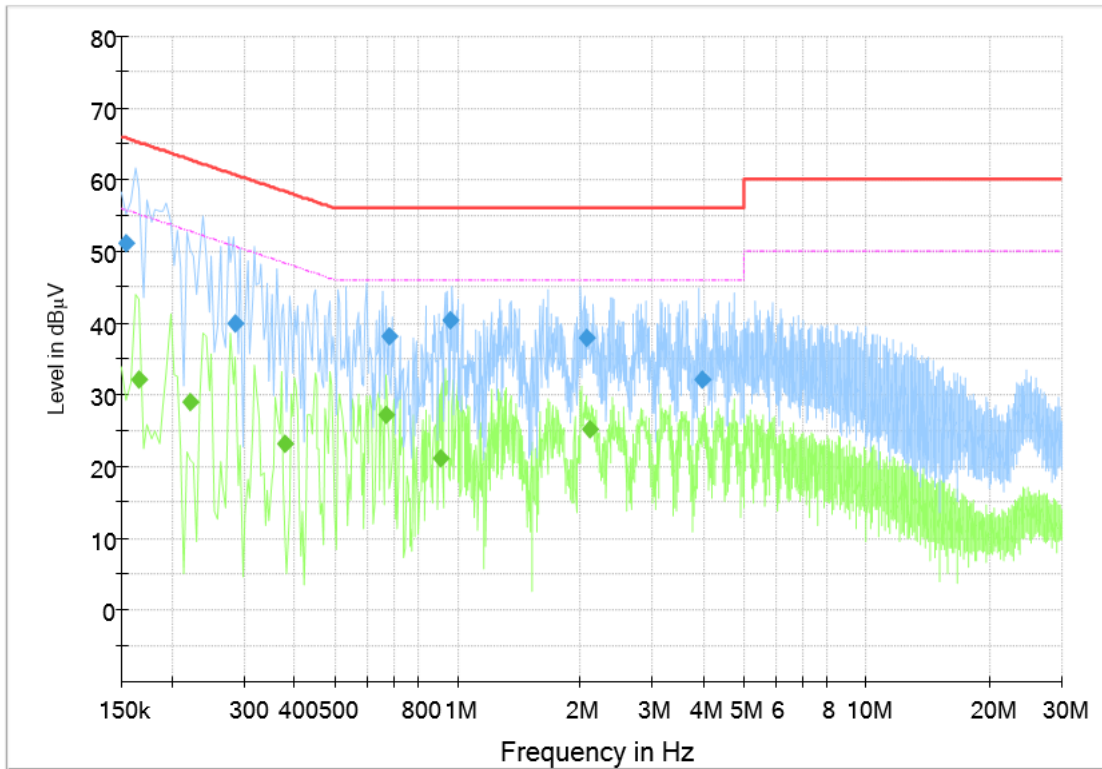


Fig.64 AC Power line Conducted Emission (Idle, AE1, 240V), 1M

Measurement Results: Quasi Peak

Frequency (MHz)	Quasi Peak (dBµV)	Limit (dBµV)	Margin (dB)	Line	Filter	Corr. (dB)
0.154	51.07	65.78	14.71	N	ON	9.6
0.284	40.00	60.70	20.70	L1	ON	9.6
0.680	38.23	56.00	17.77	N	ON	9.7
0.956	40.38	56.00	15.62	N	ON	9.7
2.064	37.89	56.00	18.11	N	ON	9.7
3.968	32.18	56.00	23.82	N	ON	9.8

Measurement Results: Average

Frequency (MHz)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Filter	Corr. (dB)
0.166	32.18	55.16	22.97	L1	ON	9.6
0.222	28.99	52.74	23.76	L1	ON	9.6
0.376	23.17	48.37	25.20	L1	ON	9.7
0.668	27.08	46.00	18.92	L1	ON	9.7
0.904	21.19	46.00	24.81	N	ON	9.7
2.096	25.16	46.00	20.84	L1	ON	9.7

### A.8 Occupied Bandwidth

**Measurement Limit:**

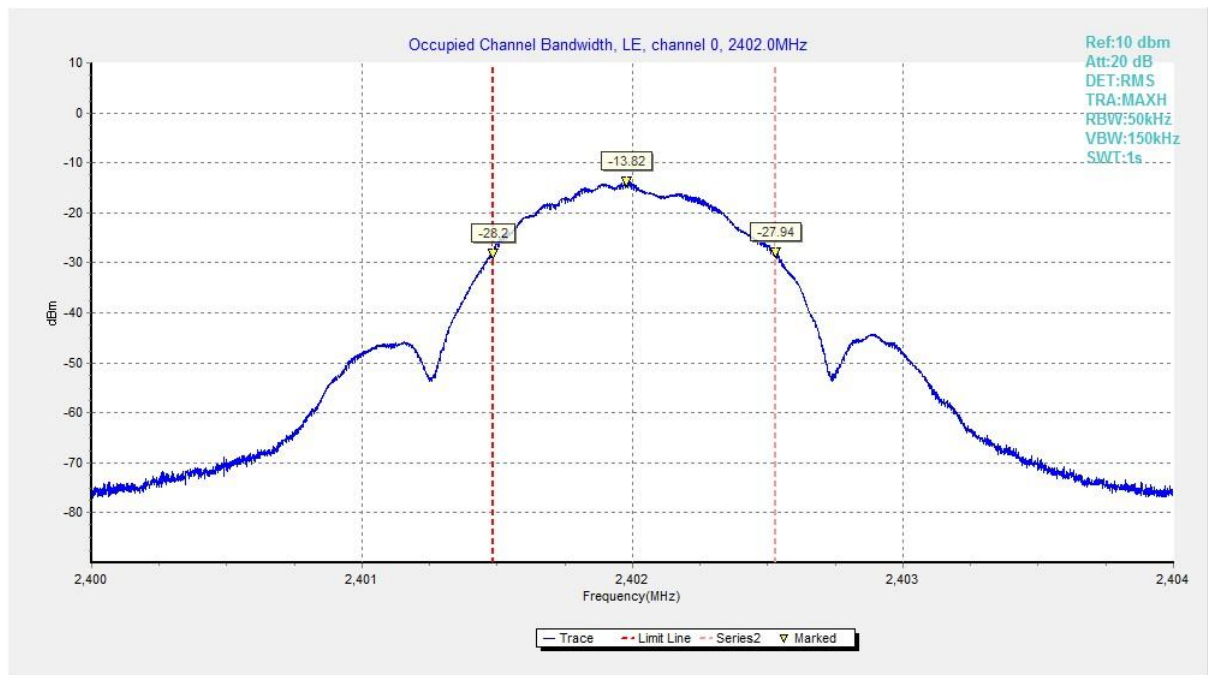
Standard	Limit (kHz)
RSS-Gen section 6.7	/

**Measurement Result:**

Mode	Frequency (MHz)	Test Results (kHz)		Conclusion
LE-1M	2402 (CH0)	Fig.65	1044.00	<b>P</b>
	2440 (CH19)	Fig.66	1045.00	<b>P</b>
	2480 (CH39)	Fig.67	1050.00	<b>P</b>
LE-2M	2402 (CH0)	Fig.68	2059.00	<b>P</b>
	2440 (CH19)	Fig.69	2050.00	<b>P</b>
	2480 (CH39)	Fig.70	2054.00	<b>P</b>

See below for test graphs.

**Conclusion: PASS**



**Fig.65 Occupied Bandwidth (Ch 0), 1M**

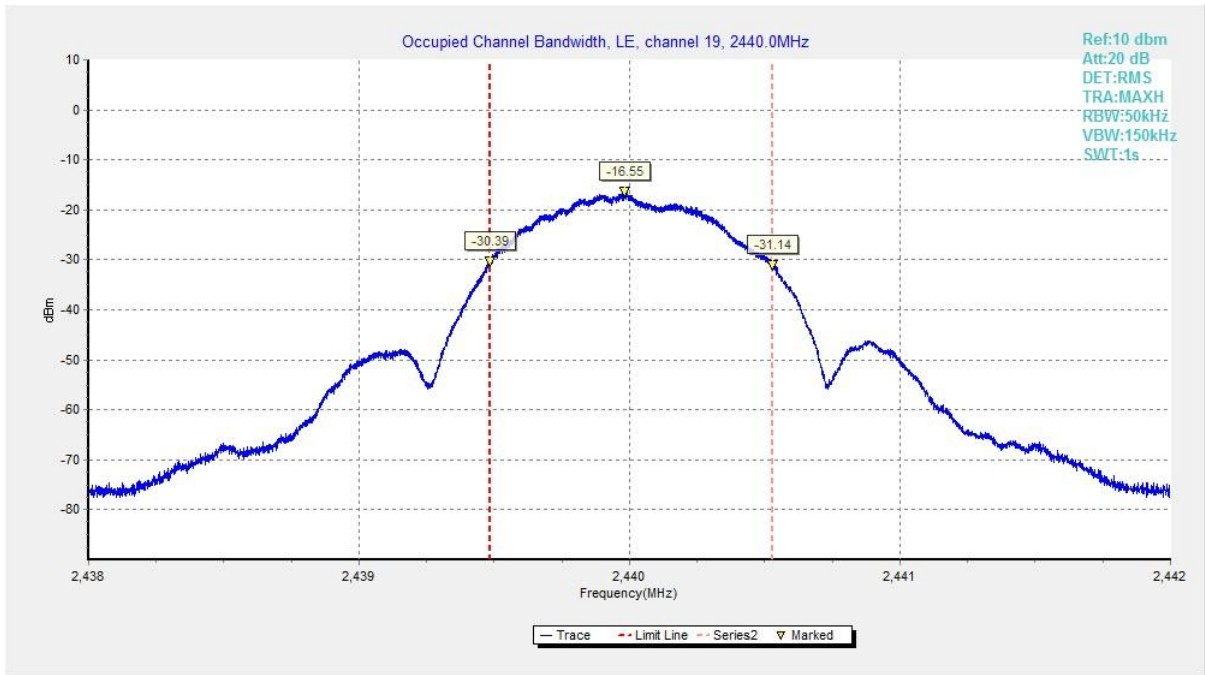


Fig.66 Occupied Bandwidth (Ch 19), 1M

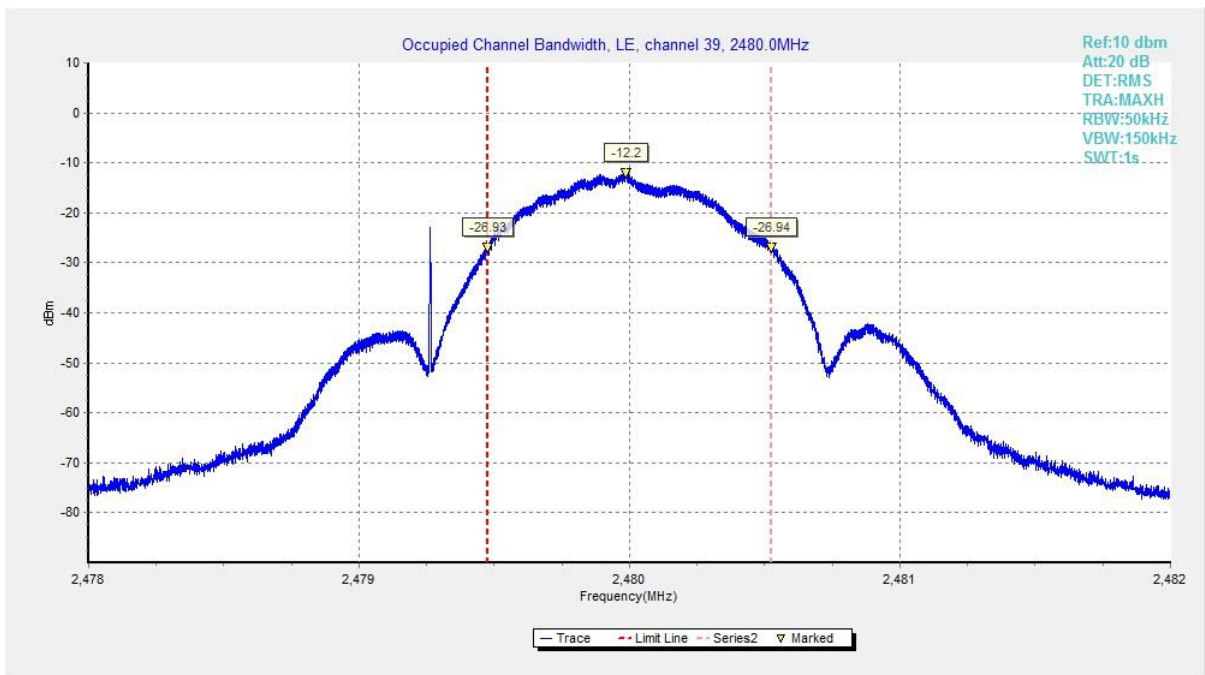
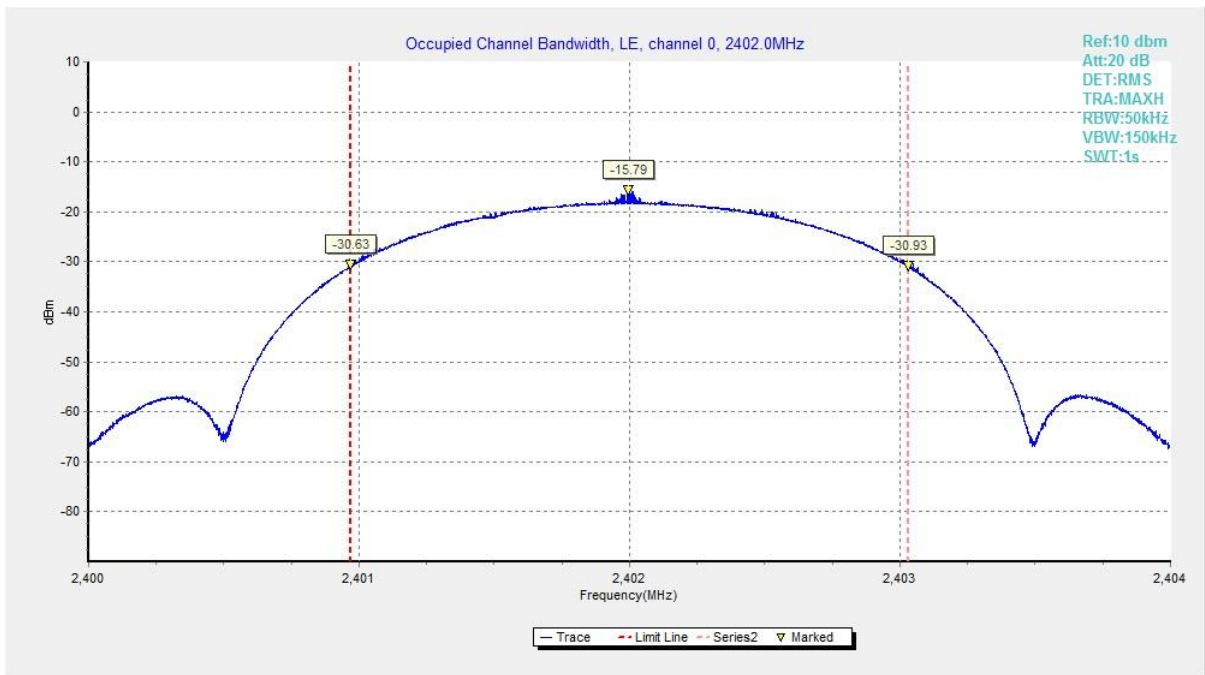
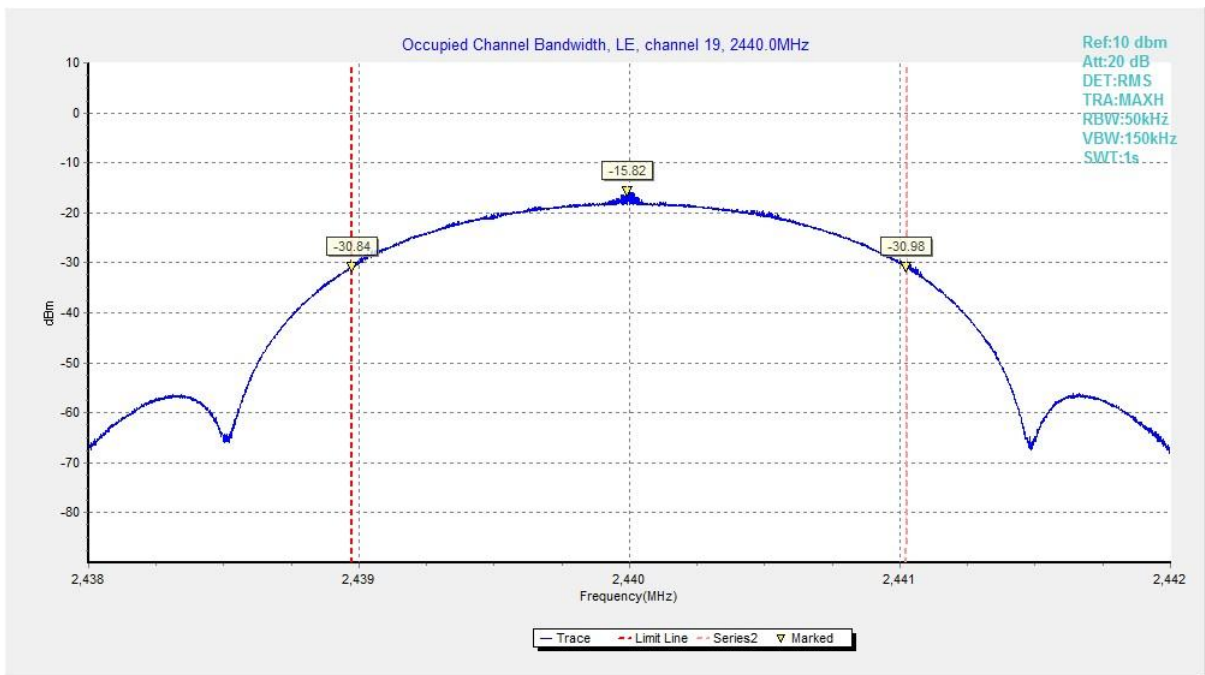


Fig.67 Occupied Bandwidth (Ch 39), 1M



**Fig.68 Occupied Bandwidth (Ch 0), 2M**



**Fig.69 Occupied Bandwidth (Ch 19), 2M**



Fig.70 Occupied Bandwidth (Ch 39), 2M

\*\*\*END OF REPORT\*\*\*