



FCC PART 15C TEST REPORT No. 2013TAR661

for

Sony Mobile Communications AB

GSM/WCDMA/LTE mobile phone

Type: PM-0590-BV

FCC ID: PY7PM-0590

with

Hardware Version: AP1

Software Version: 14.1.F.0.111

Issued Date: 2013-10-15



DAR accreditation (DIN EN ISO/IEC 17025): No. D-PL-12123-01-01

FCC 2.948 Listed: No.733176

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 TMC Beijing.

Test Laboratory:

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1. Test Laboratory

1.1. Testing Location

Company Name: TMC Beijing, Telecommunication Metrology Center of MIIT
Address: No.18A, Kangding Street, Beijing Economical Development Area,
Beijing, China
Postal Code: 100176
Telephone: 00861067857376
Fax: 00861067857376

1.2. Testing Environment

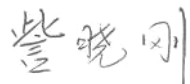
Normal Temperature: 15-35℃
Extreme Temperature: -20/+55℃
Relative Humidity: 30-60%
Air Pressure 990hPa-1040hPa

Note: The climatic requirements above are general exclude the special requirements for dedicated test environments listed in section 5 and some specific test cases in other parts of this report.

1.3. Project data

Project Leader: Zi Xiaogang
Testing Start Date: 2013-08-15
Testing End Date: 2013-09-14

1.4. Signature



Zi Xiaogang
(Prepared this test report)



Sun Xiangqian
(Reviewed this test report)



Lu Bingsong
Deputy Director of the laboratory
(Approved this test report)

2. Client Information

2.1. Applicant Information

Company Name: Sony Mobile Communications AB
Address /Post: Sony Mobile R&D Center, No. 16, Guangshun South Street,
Chaoyang District
City: Beijing
Postal Code: 100102
Country: China
Contact Person: Ma, Gang
Telephone: +86-10-58656312
Fax: +86-10-58659049

2.2. Manufacturer Information

Company Name: Sony Mobile Communications AB
Address /Post: Sony Mobile R&D Center, No. 16, Guangshun South Street,
Chaoyang District
City: Beijing
Postal Code: 100102
Country: China
Contact Person: Ma, Gang
Telephone: +86-10-58656312
Fax: +86-10-58659049

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

3.1. About EUT

Description	GSM/WCDMA/LTE mobile phone
Type	PM-0590-BV
FCC ID	PY7PM-0590
Frequency Range	ISM 2400MHz~2483.5MHz
Type of Modulation	GFSK
Number of Channels	40
Cellular Frequency Band	GSM 850/900/1800/1900 UMTS Band 1/2/4/5/8 LTE Band 4/17
Support Functions	MP3, camera, USB memory, Mobile High-Definition Link (MHL), FM radio, GPS receiver, NFC, Bluetooth (EDR and Low Energy), ANT+, WLAN (802.11 a/ac/b/g/n) and Wi-Fi hotspot functions
Antenna	Integrated Antenna
MAX Radiated Power	-0.01dBm EIRP
MAX Conducted Power	1.45dBm
Power Supply	3.8VDC by Battery

Note: Photographs of EUT are shown in ANNEX C of this test report.

3.2. Internal Identification of EUT used during the test

EUT ID*	S/N	IMEI	HW Version	SW Version
N59	CB5A1U1CCK	004402451409415	AP1	14.1.F.0.111
N56	CB5A1U337R	004402451403483	AP1	14.1.F.0.111

*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	Revision
#22972	Travel Charger	8512W19 100198	1C
#23815	USB Cable	123107D30009FA0	1
#23691	MHL dongle	/	1
AE7	HDMI cable	/	A

#22972

Commercial name	EP880
Type	AC-0400-EU
Manufacturer	SALCOMP
Length of cable	98.5 cm (length of USB cable)

#23815

Commercial name	EC801
Type	AI-0401
Manufacturer	Sony Mobile
Length of cable	98.5 cm

#23691

Type	AI-0200
Manufacturer	Sony Mobile
Length of cable	12.5 cm

AE7

Type	3871
Manufacturer	Monoprice
Length of cable	93 cm

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

3.4. Normal Accessory setting

Fully charged battery was used during the test;

3.5. General Description

The Equipment Under Test (EUT) is a model of GSM/WCDMA/LTE mobile phone with integrated antenna and inbuilt battery.

The EUT supports GSM 850/900/1800/1900MHz bands, WCDMA FDD band 1/2/4/5/8 and LTE FDD bands 4/17. It supports GPRS service with multi-slots class 12 and EGPRS service with multi-slots class 12. The HSDPA and HSUPA features are also supported.

It has MP3, camera, USB memory, Mobile High-Definition Link (MHL), FM radio, GPS receiver, NFC, Bluetooth (EDR and Low Energy), ANT+, WLAN (802.11 a/ac/b/g/n) and Wi-Fi hotspot functions. For WLAN 802.11n, it supports 20MHz bandwidth on 2.4GHz band and 20MHz/40MHz bandwidths on 5GHz/5.8GHz band. For WLAN 802.11 ac, it supports 20MHz/40MHz/80MHz bandwidths.

It includes normal options: travel charger, USB cable, MHL dongle and HDMI cable.

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

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.

	FCC CFR 47, Part 15, Subpart C:	
	15.205 Restricted bands of operation;	10–1–12
FCC Part15	15.209 Radiated emission limits, general requirements;	Edition
	15.247 Operation within the bands 902–928MHz, 2400–2483.5 MHz, and 5725–5850 MHz.	
FCC Part 2	Frequency Allocations and Radio Treaty Matters;	10–1–12
	General Rules and Regulations	Edition
ANSI C63.4	Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz	2003
KDB 558074	Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247	v03r01

5. LABORATORY ENVIRONMENT

Semi-anechoic chamber (23 meters×17meters×10meters) did not exceed following limits along the EMC testing:

Temperature	Min. = 15 °C, Max. = 30 °C
Relative humidity	Min. = 30 %, Max. = 60 %
Shielding effectiveness	> 110 dB
Electrical insulation	> 2 MΩ
Ground system resistance	< 0.5 Ω
Normalised site attenuation (NSA)	< ±3.2 dB, 10 m distance, from 30 to 1000 MHz
Uniformity of field strength	Between 0 and 6 dB, from 80 to 2000 MHz

Control room/ conducted chamber did not exceed following limits along the EMC testing:

Temperature	Min. = 15 °C, Max. = 35 °C
Relative humidity	Min. =20 %, Max. = 80 %
Shielding effectiveness	> 110 dB
Electrical insulation	> 2 MΩ
Ground system resistance	< 0.5 Ω

Fully-anechoic chamber1 (6.8 meters×3.08 meters×3.53 meters) did not exceed following limits along the EMC testing:

Temperature	Min. = 15 °C, Max. = 30 °C
Relative humidity	Min. = 35 %, Max. = 60 %
Shielding effectiveness	> 110 dB
Electrical insulation	> 2 MΩ
Ground system resistance	< 0.5 Ω
Uniformity of field strength	Between 0 and 6 dB, from 80 to 3000 MHz

Fully-anechoic chamber2 (8.6 meters×6.1 meters×3.85 meters) did not exceed following limits along the EMC testing:

Temperature	Min. = 15 °C, Max. = 30 °C
Relative humidity	Min. = 35 %, Max. = 60 %
Shielding effectiveness	> 110 dB
Electrical insulation	> 2 MΩ
Ground system resistance	< 1 Ω
Uniformity of field strength	Between 0 and 6 dB, from 80 to 4000 MHz

Fully-anechoic chamber3 (10 meters×6.7 meters×6.15 meters) did not exceed following limits along the EMC testing:

Temperature	Min. = 15 °C, Max. = 30 °C
Relative humidity	Min. = 35 %, Max. = 60 %
Shielding effectiveness	> 100 dB
Electrical insulation	> 2 MΩ
Ground system resistance	< 0.5 Ω
Site voltage standing-wave ratio (S_{VSWR})	Between 0 and 6 dB, from 1GHz to 18GHz

Additional Humidity Requirements for Electrostatic Discharge Test: Min. = 30%, Max. = 60%.

6. SUMMARY OF TEST RESULTS

6.1. Summary of Test Results

Abbreviations used in this clause:

- P** Pass, The EUT complies with the essential requirements in the standard.
- F** Fail, The EUT does not comply with the essential requirements in the standard
- NA** Not Applicable, The test was not applicable
- NP** Not Performed, The test was not performed by TMC

SUMMARY OF MEASUREMENT RESULTS	Sub-clause	Verdict
Peak Output Power - Conducted	15.247 (b)(1)	P
Frequency Band Edges	15.247 (d)	P
Conducted Emission	15.247 (d)	P
Radiated Emission	15.247, 15.205, 15.209	P
6dB Bandwidth	15.247 (a)(2)	P
Maximum Power Spectral Density Level	15.247(e)	P
20dB Bandwidth	15.247 (a)(1)	P
AC Powerline Conducted Emission	15.107, 15.207	P

Please refer to **ANNEX A** for detail.

6.2. Statements

TMC has evaluated the test cases requested by the applicant /manufacturer as listed in section 6.1 of this report for the EUT specified in section 3 according to the standards or reference documents listed in section 4.2

The EUT met all requirements of the standards or reference documents.

This report only deals with the Bluetooth LE functions among the features described in section 3.

6.3. Test Conditions

T nom	Normal Temperature
T min	Low Temperature
T max	High Temperature
V nom	Normal Voltage
V min	Low Voltage
V max	High Voltage
H nom	Norm Humidity
A nom	Norm Air Pressure

For this report, all the test case listed above are tested under Normal Temperature and Normal Voltage, and also under norm humidity, the specific conditions as following:

Temperature	T nom	25°C
Voltage	V nom	3.8V(By battery)
Humidity	H nom	39%
Air Pressure	A nom	1010hPa

7. Test Equipments Utilized

Conducted test system

No.	Equipment	Model	Serial Number	Manufacturer	Calibration Due date
1	Vector Signal Analyzer	FSU26	200030	Rohde & Schwarz	2014-06-12

Radiated emission test system

No.	Equipment	Model	Serial Number	Manufacturer	Calibration Due date
1	Test Receiver	ESU26	100376	Rohde & Schwarz	2013-11-07
2	EMI Antenna	VULB 9163	9163482	Schwarzbeck	2014-02-17
3	EMI Antenna	3117	00119024	EMCO	2014-02-02
4	Dual-Ridge Waveguide Horn Antenna	3116	2663	ETS-Lindgren	2014-06-30
5	Dual-Ridge Waveguide Horn Antenna	3116	2661	ETS-Lindgren	2014-06-30
6	LISN	ESH2-Z5	829991/012	Rohde & Schwarz	2014-03-17
7	Pre-amplifier(18GHz)	SCU18	1005277	Rohde & Schwarz	/
8	Pre-amplifier(26.5GHz)	SCU26	1006788	Rohde & Schwarz	/

Anechoic chamber

Fully anechoic chamber by Frankonia German.

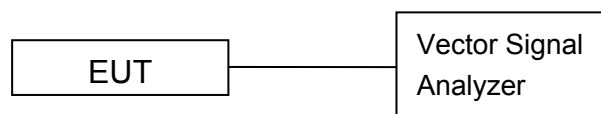
Note : The pre amplifiers is calibrated with routes calibration every time before test, therefore no need for the calibration date.

ANNEX A: MEASUREMENT RESULTS

A.1. Measurement Method

A.1.1. Conducted Measurements

- 1). Connect the EUT to the test system correctly.
- 2). Set the EUT to the required work mode (Transmitter, receiver or transmitter & receiver).
- 3). Set the EUT to the required channel.
- 4). Set the EUT hopping mode (hopping or hopping off).
- 5). Set the spectrum analyzer to start measurement.
- 6). Record the values. Vector Signal Analyzer



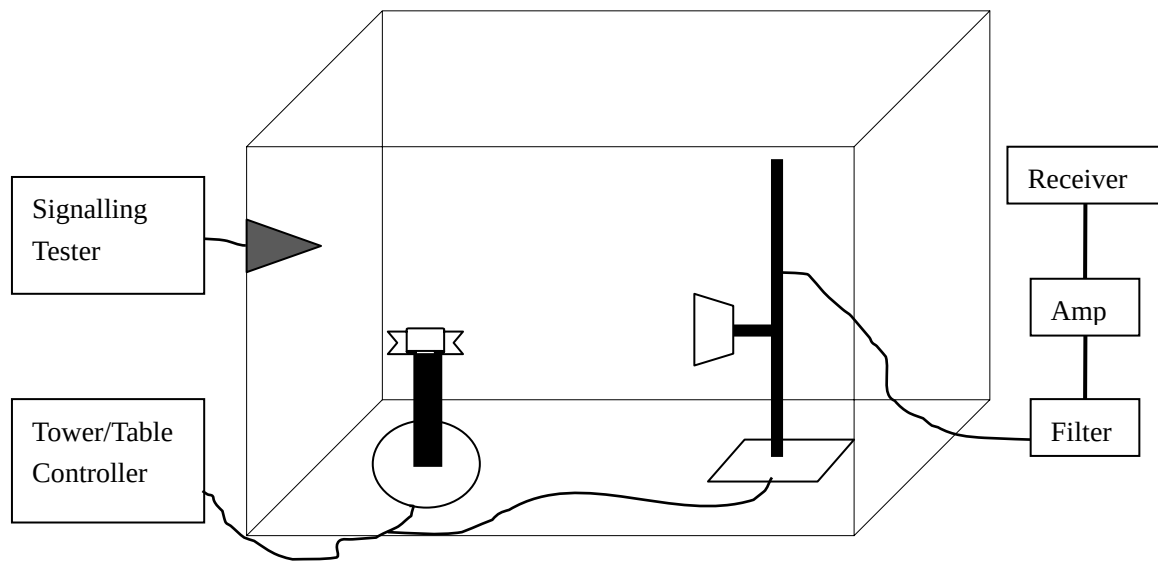
A.1.2. Radiated Emission Measurements

The radiated emission test is performed in semi-anechoic chamber. The distance from the EUT to the reference point of measurement antenna is 3m. The test is carried out on both vertical and horizontal polarization and only maximization result of both polarizations is kept. During the test, the turntable is rotated 360° and the measurement antenna is moved from 1m to 4m to get the maximization result.

In the case of radiated emission, the used settings are as follows,

Sweep frequency from 30 MHz to 1GHz, RBW = 100 kHz, VBW = 300 kHz;

Sweep frequency from 1 GHz to 26GHz, RBW = 1MHz, VBW = 1MHz;



A.2. Peak Output Power

Measurement Limit:

Standard	Limit (dBm)
FCC Part 15.247(b)(1))	< 30

Measurement Results:

A.2.1 Antenna gain

The antenna gain of the complete system is calculated by the difference of DH5 radiated power in EIRP and the DH5 conducted power of the EUT in bluetooth EDR mode.

Channel	2402 MHz	2441 MHz	2480 MHz
Gain(dBi)	-1.09	-1.46	-3.55

A.2.2 Conducted Output Power

Peak(RBW=1MHz;VBW=5MHz;SPAN=0;Detector:Peak)

Frequency	2402 MHz	2440 MHz	2480 MHz	Conclusion
GFSK (dBm)	0.05	1.45	0.67	P

Average(RBW=1MHz;VBW=5MHz;SPAN=0;Detector:RMS)

Frequency	2402 MHz	2440 MHz	2480 MHz	Conclusion
GFSK (dBm)	-0.05	1.36	0.56	P

Measurement Uncertainty: ± 1.17 dB

Conclusion: PASS

A.2.3 Radiated Output Power

Peak(RBW=1MHz;VBW=5MHz;SPAN=0;Detector:Peak)

Frequency	2402 MHz	2440 MHz	2480 MHz	Conclusion
GFSK * (dBm)	-1.04	-0.01	-2.88	P

Average

Frequency	2402 MHz	2440 MHz	2480 MHz	Conclusion
GFSK * (dBm)	-1.14	-0.10	-2.99	P

Note:* These values are calculated with the antenna gain

Measurement Uncertainty: ± 1.98 dB

Conclusion: PASS

A.3. Frequency Band Edges

Measurement Limit:

Standard	Limit (dBc)
FCC 47 CFR Part 15.247 (d)	<-20

The measurement is made according to KDB 558074. Compute the power by integrating the spectrum over 1 MHz using the analyzer's band power measurement function with band limits set equal to the emission frequency (femission) ± 0.5 MHz. If the instrument does not have a band power function, then sum the amplitude levels (in power units) at 100 kHz intervals extending across the 1 MHz spectrum defined by femission ± 0.5 MHz.

The results below are yielded by the result in Fig.1/Fig.2 minus the result in Fig.3/Fig.13.

Measurement Result:

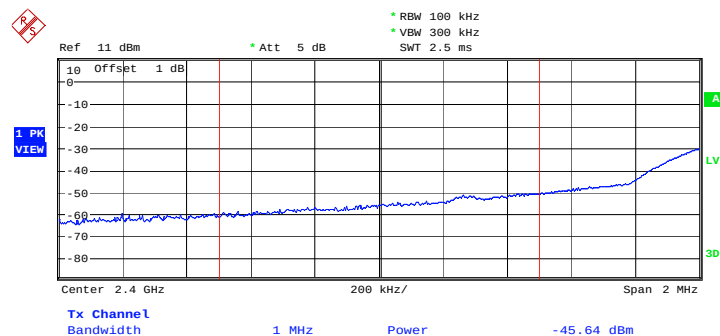
For GFSK

Frequency	Hopping	Band Edge Power (dBc)		Conclusion
2402MHz	Hopping OFF	Fig.1	-45.18	P
2480MHz	Hopping OFF	Fig.2	-52.99	P

Measurement Uncertainty: ± 1.37 dB

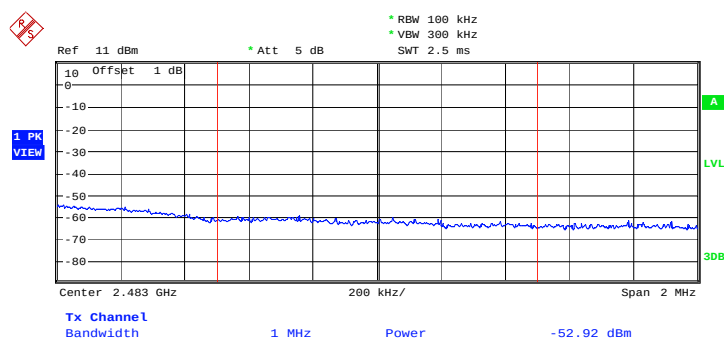
Conclusion: PASS

Test graphs as below



Date: 11,SEP,2013 13:50:07

Fig.1. Frequency Band Edges: GFSK, 2402 MHz, Hopping Off



Date: 11.SEP.2013 14:00:04

Fig.2. Frequency Band Edges: GFSK, 2480 MHz, Hopping Off

A.4. Conducted Emission

Measurement Limit:

Standard	Limit
FCC 47 CFR Part 15.247 (d)	20dB below peak output power in 100 kHz bandwidth

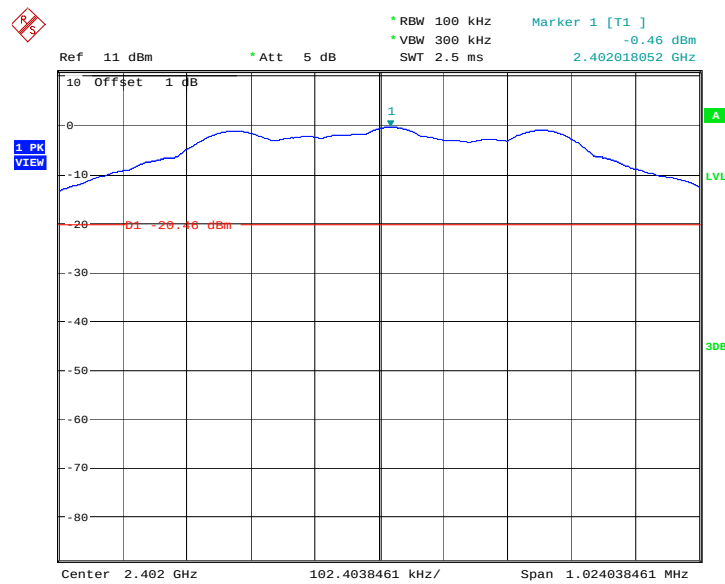
Measurement Results:

For GFSK

Frequency	Frequency Range	Test Results	Conclusion
2402 MHz	Center Frequency	Fig.3	P
	30 MHz ~ 1 GHz	Fig.4	P
	1 GHz ~ 3 GHz	Fig.5	P
	3 GHz ~ 10 GHz	Fig.6	P
	10 GHz ~ 26 GHz	Fig.7	P
2440 MHz	Center Frequency	Fig.8	P
	30 MHz ~ 1 GHz	Fig.9	P
	1 GHz ~ 3 GHz	Fig.10	P
	3 GHz ~ 10 GHz	Fig.11	P
	10 GHz ~ 26 GHz	Fig.12	P
2480 MHz	Center Frequency	Fig.13	P
	30 MHz ~ 1 GHz	Fig.14	P
	1 GHz ~ 3GHz	Fig.15	P
	3 GHz ~ 10 GHz	Fig.16	P
	10 GHz ~ 26 GHz	Fig.17	P

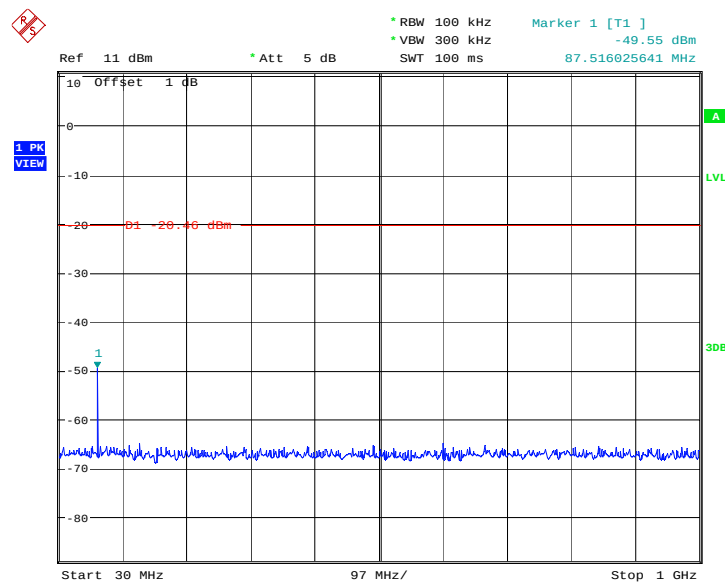
Conclusion: PASS

Test graphs as below



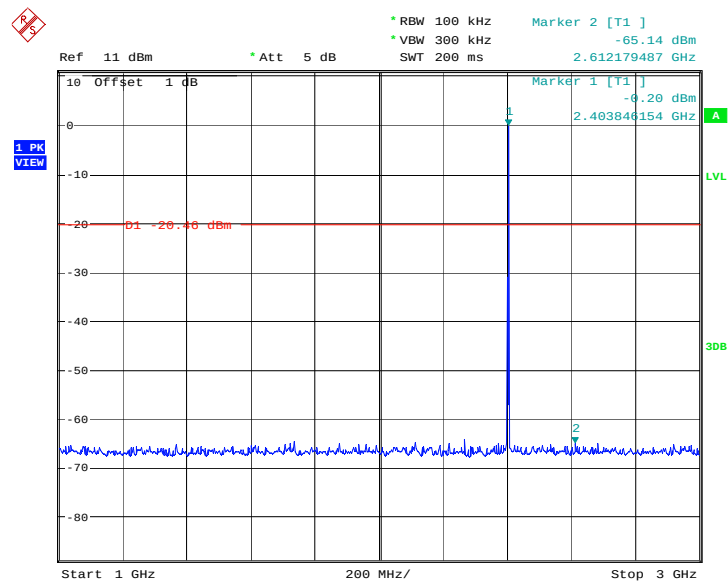
Date: 11.SEP.2013 13:48:22

Fig.3. Conducted spurious emission: GFSK,2402MHz



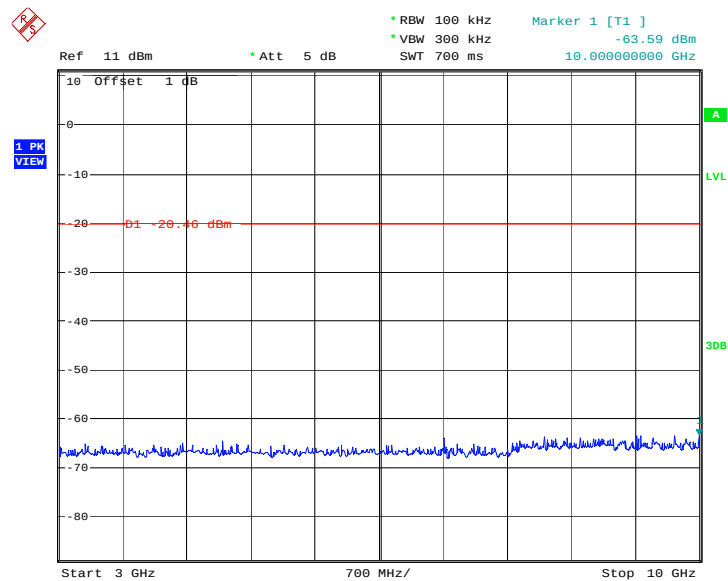
Date: 11.SEP.2013 13:48:38

Fig.4. Conducted spurious emission: GFSK, 2402 MHz, 30MHz - 1GHz



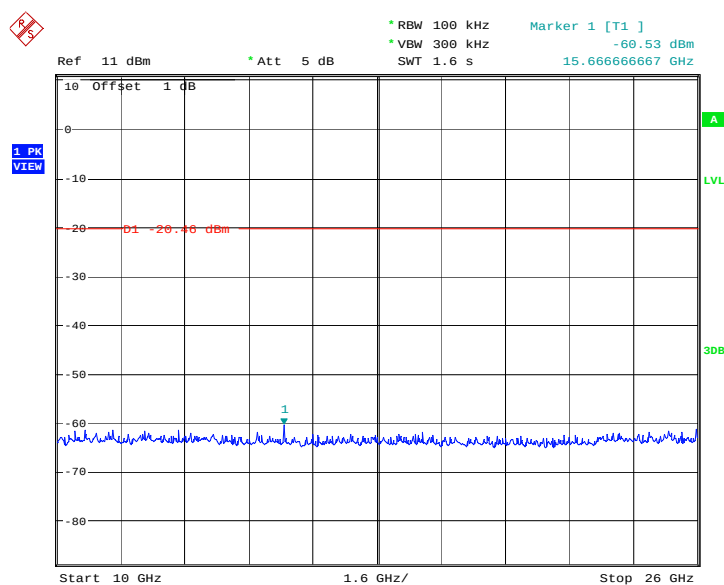
Date: 11.SEP.2013 13:49:10

Fig.5. Conducted spurious emission: GFSK, 2402 MHz, 1GHz - 3GHz



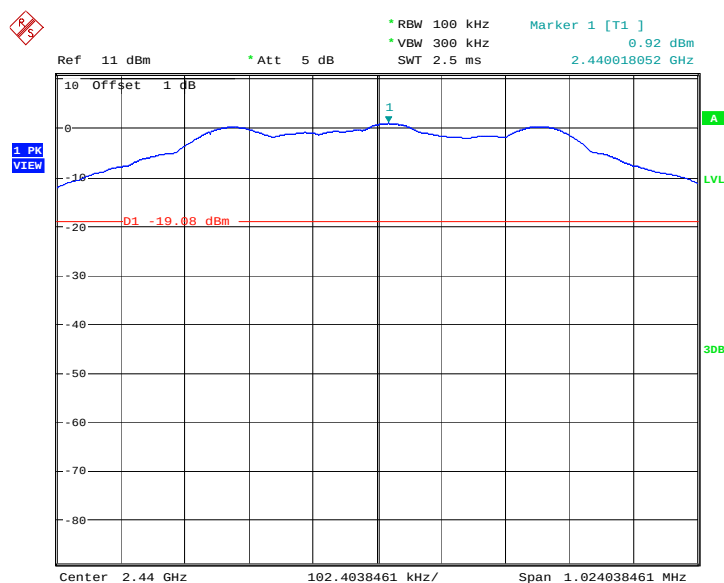
Date: 11.SEP.2013 13:49:27

Fig.6. Conducted spurious emission: GFSK, 2402 MHz, 3GHz - 10GHz



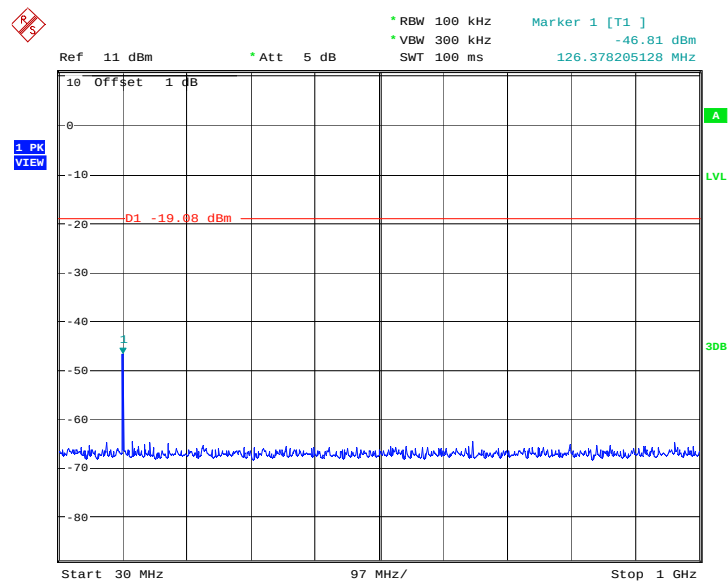
Date: 11.SEP.2013 13:49:43

Fig.7. Conducted spurious emission: GFSK, 2402 MHz, 10GHz - 26GHz



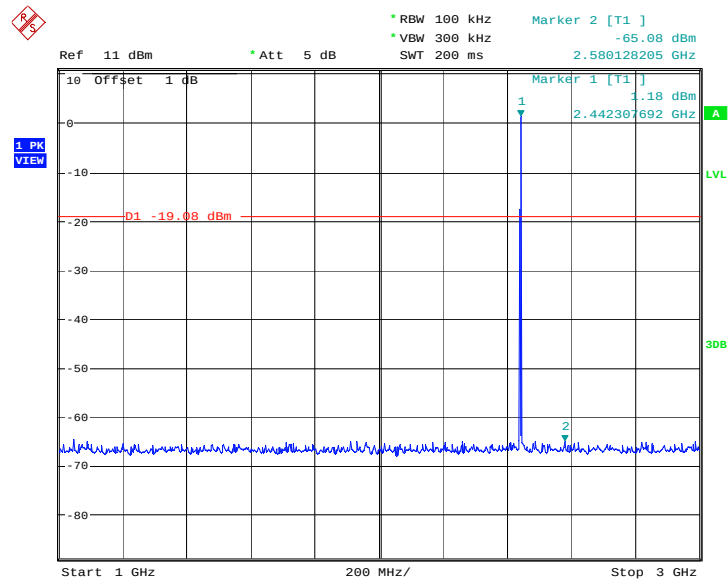
Date: 11.SEP.2013 13:53:41

Fig.8. Conducted spurious emission: GFSK, 2440MHz



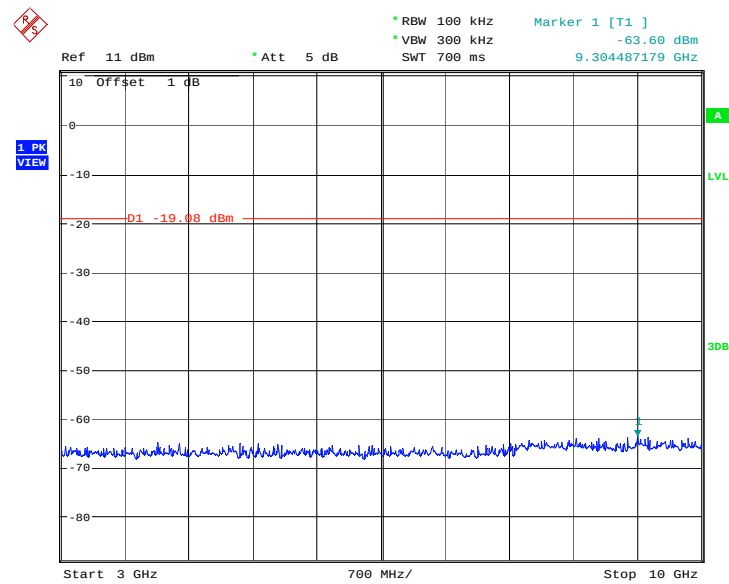
Date: 11.SEP.2013 13:53:57

Fig.9. Conducted spurious emission: GFSK, 2440 MHz, 30MHz - 1GHz



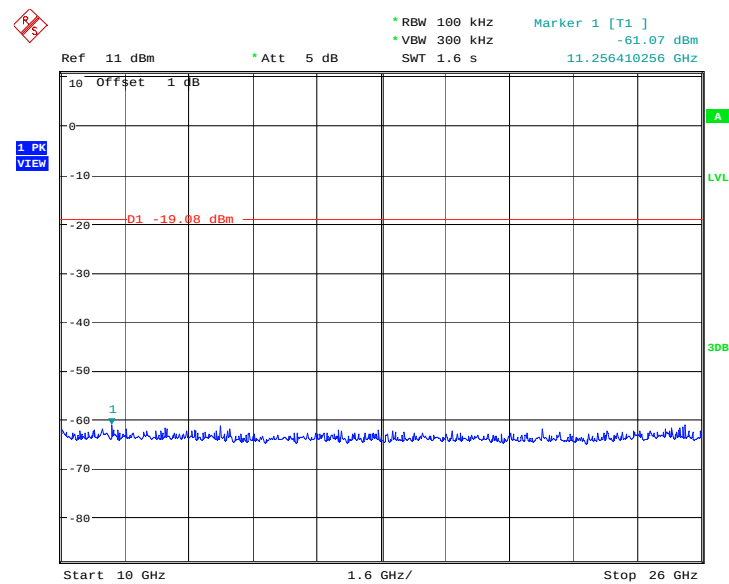
Date: 11.SEP.2013 13:54:29

Fig.10. Conducted spurious emission: GFSK, 2440 MHz, 1GHz – 3GHz



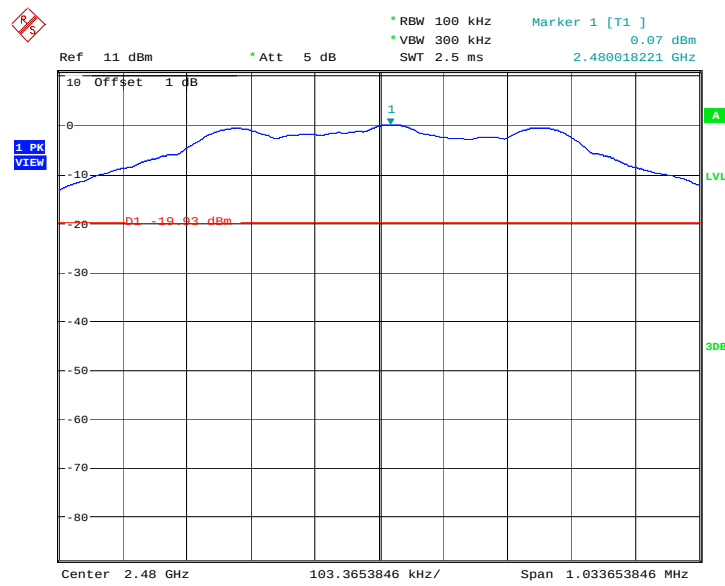
Date: 11.SEP.2013 13:54:46

Fig.11. Conducted spurious emission: GFSK, 2440 MHz, 3GHz – 10GHz



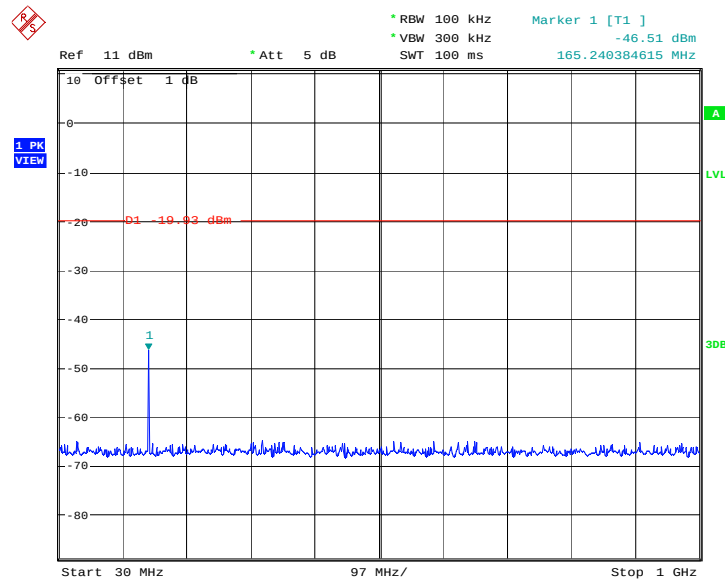
Date: 11.SEP.2013 13:55:02

Fig.12. Conducted spurious emission: GFSK, 2440 MHz, 10GHz – 26GHz



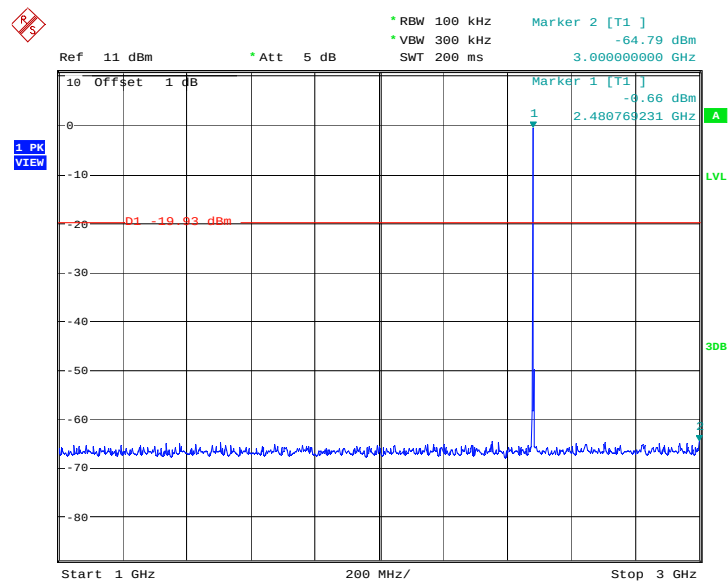
Date: 11.SEP.2013 13:58:19

Fig.13. Conducted spurious emission: GFSK, 2480 MHz



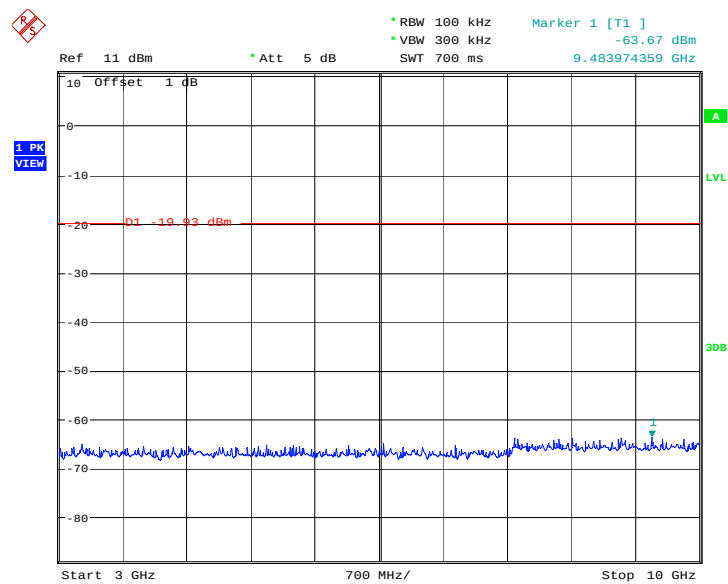
Date: 11.SEP.2013 13:58:35

Fig.14. Conducted spurious emission: GFSK, 2480 MHz, 30MHz - 1GHz



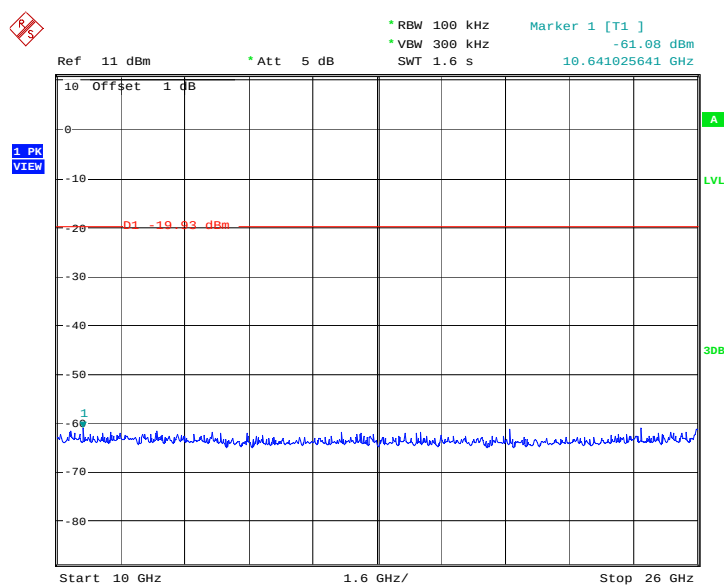
Date: 11.SEP.2013 13:59:07

Fig.15. Conducted spurious emission: GFSK, 2480 MHz, 1GHz - 3GHz



Date: 11.SEP.2013 13:59:24

Fig.16. Conducted spurious emission: GFSK, 2480 MHz, 3GHz - 10GHz



Date: 11.SEP.2013 13:59:40

Fig.17. Conducted spurious emission: GFSK, 2480 MHz, 10GHz - 26GHz

A.5. Radiated Emission

Measurement Limit:

Standard	Limit
FCC 47 CFR Part 15.247, 15.205, 15.209	Listed as follows

Frequency (MHz) Field strength	Field strength (microvolts/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

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(uV/m)	Field strength(dBuV/m)
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

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)
0.009-30	100KHz/300KHz	5
30-1000	100KHz/300KHz	5
1000-4000	1MHz/1MHz	15
4000-18000	1MHz/1MHz	40
18000-26500	1MHz/1MHz	20

For GFSK

Frequency	Frequency Range	Test Results	Conclusion
2402MHz	30 MHz ~ 1 GHz	Fig.18	P
	1 GHz ~ 3 GHz	Fig.19	P
	3 GHz ~ 18 GHz	Fig.20	P
2440 MHz	30 MHz ~ 1 GHz	Fig.21	P
	1 GHz ~ 3 GHz	Fig.22	P
	3 GHz ~ 18 GHz	Fig.23	P
2480 MHz	30 MHz ~ 1 GHz	Fig.24	P
	1 GHz ~ 3 GHz	Fig.25	P
	3 GHz ~ 18 GHz	Fig.26	P
Power	2.38GHz~2.4GHz---L	Fig.27	P
Power	2.45GHz~2.5GHz---H	Fig.28	P
For all channels	18 GHz ~ 26.5 GHz	Fig.29	P

Note: Only worst case result is given.

Conclusion: PASS

Test graphs as below:

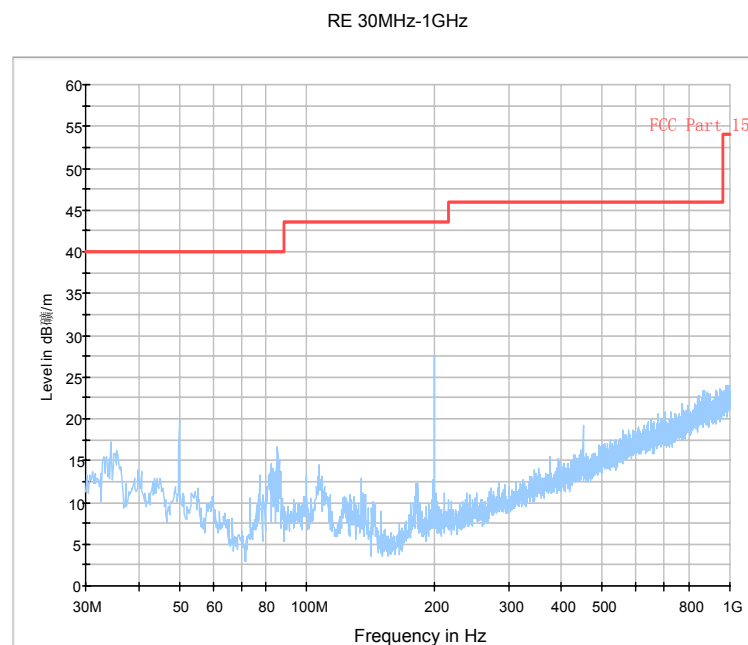


Fig.18. Radiated emission: GFSK, 2402MHz, 30 MHz - 1 GHz

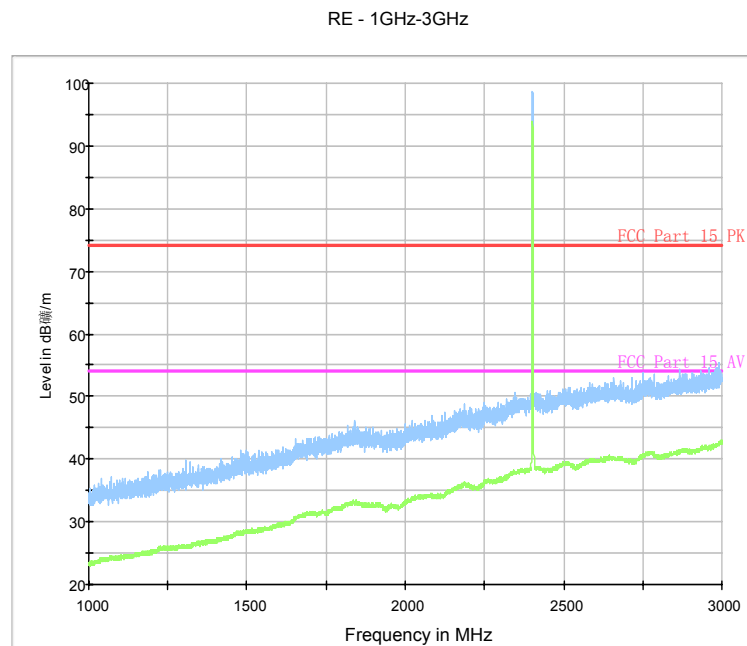


Fig.19. Radiated emission: GFSK, 2402MHz, 1 GHz - 3 GHz

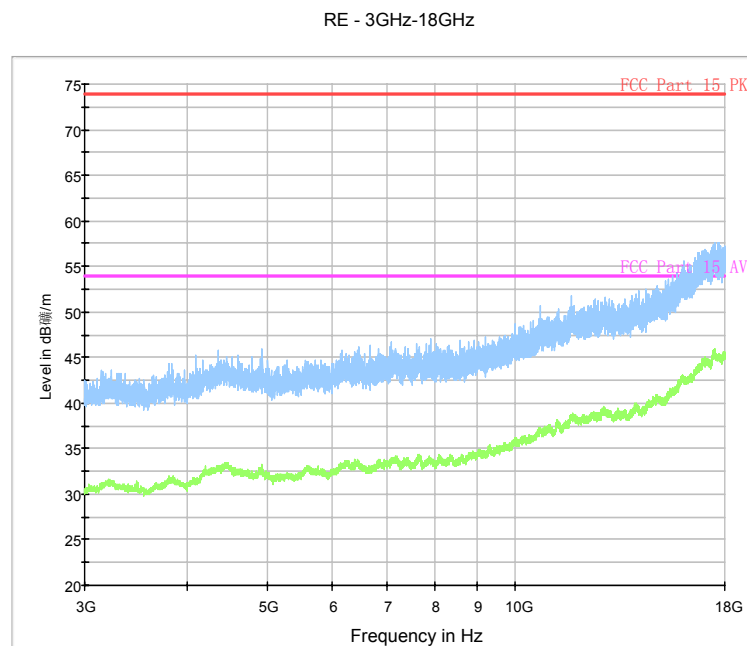


Fig.20. Radiated emission: GFSK, 2402MHz, 3 GHz - 18 GHz

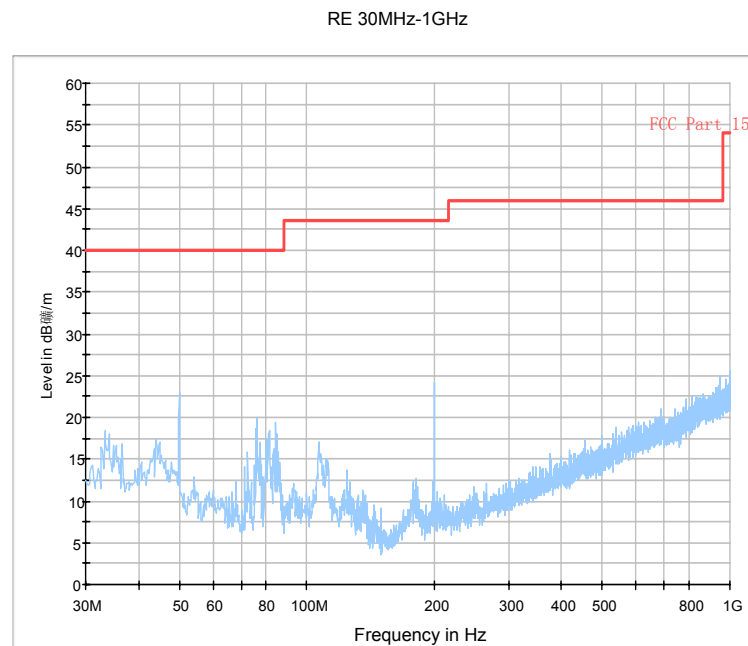


Fig.21. Radiated emission: GFSK, 2440MHz, 30 MHz - 1 GHz

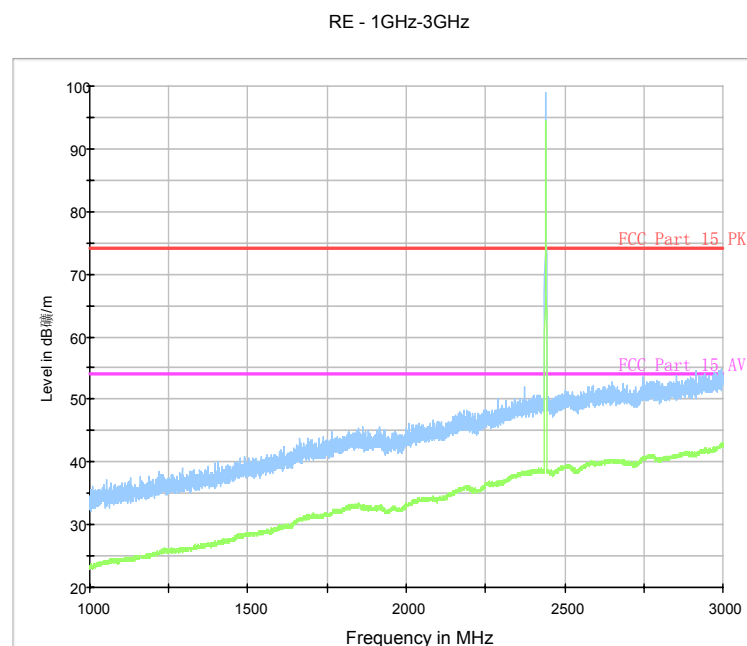


Fig.22. Radiated emission: GFSK, 2440MHz, 1 GHz - 3 GHz

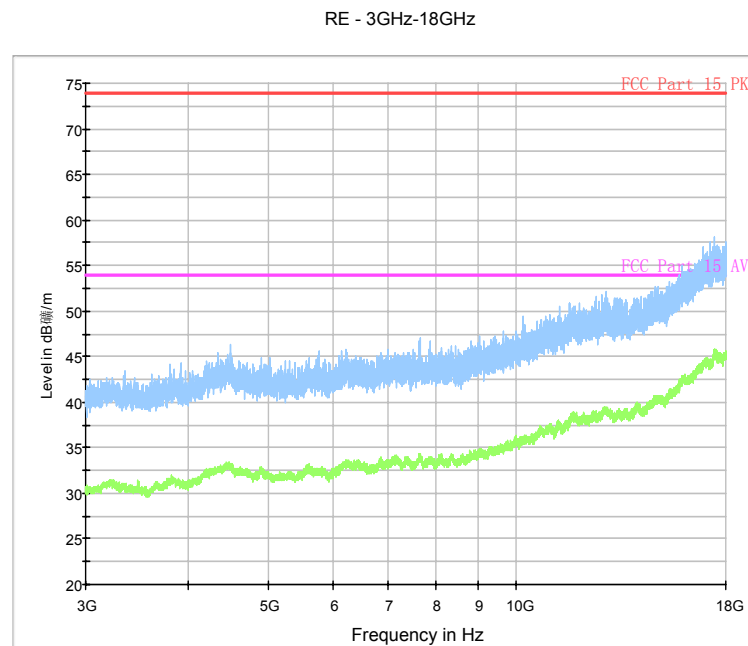


Fig.23. Radiated emission: GFSK, 2440MHz, 3 GHz - 18 GHz

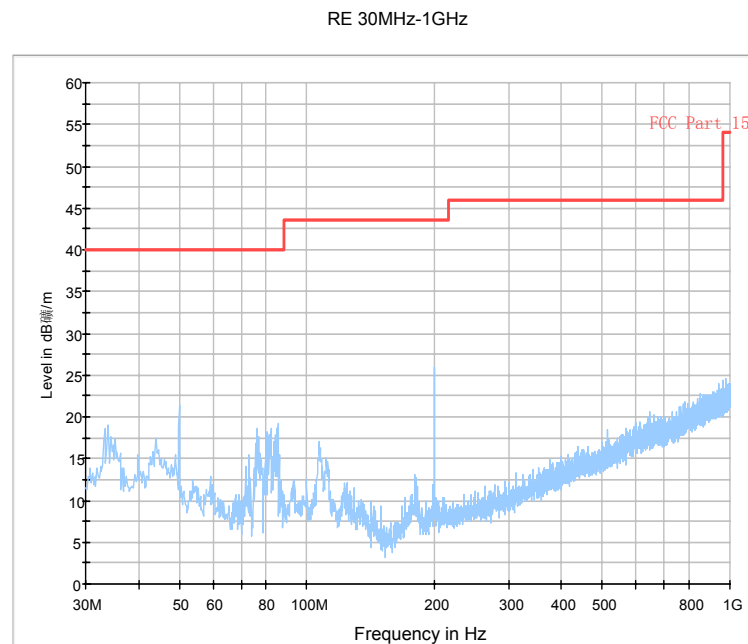


Fig.24. Radiated emission: GFSK, 2480MHz, 30 MHz - 1 GHz

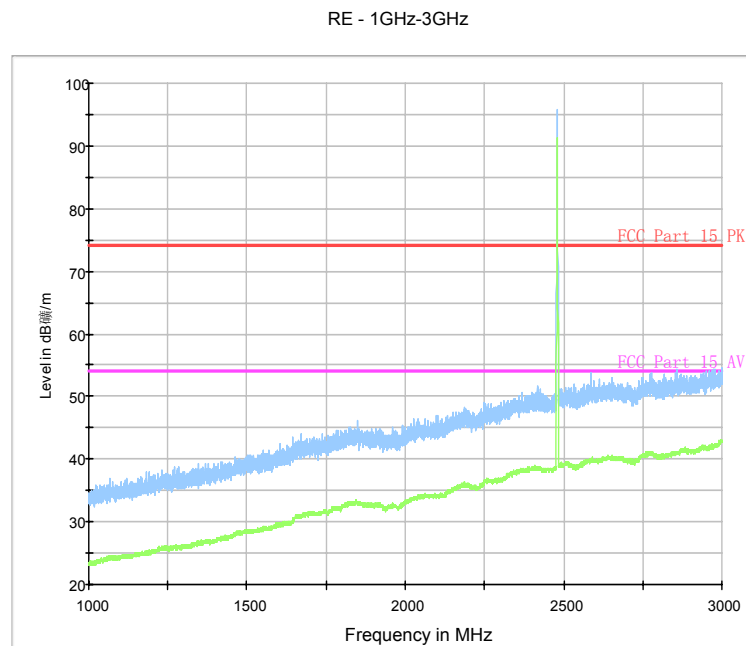


Fig.25. Fig.47 Radiated emission: GFSK, 2480MHz, 1 GHz - 3 GHz

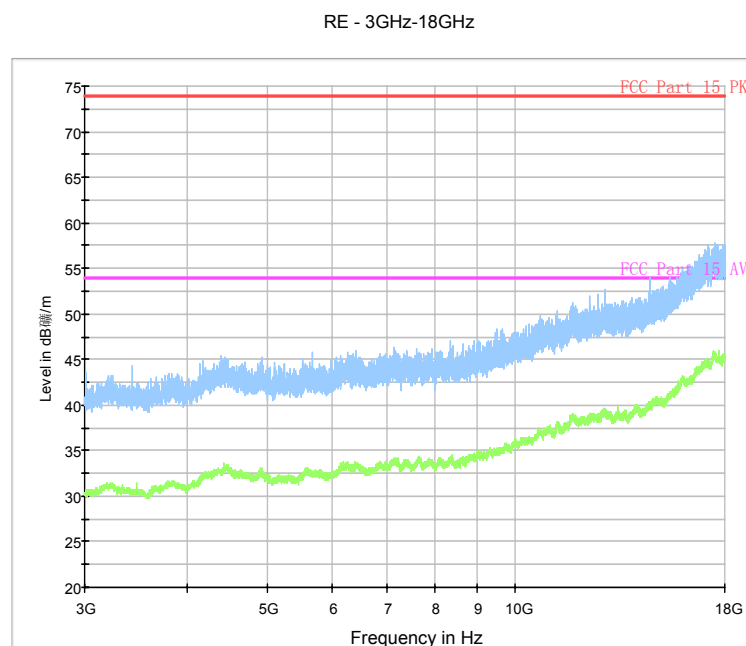


Fig.26. Radiated emission: GFSK, 2480MHz, 3 GHz - 18 GHz

RE - Power-2.38GHz-2.45GHz

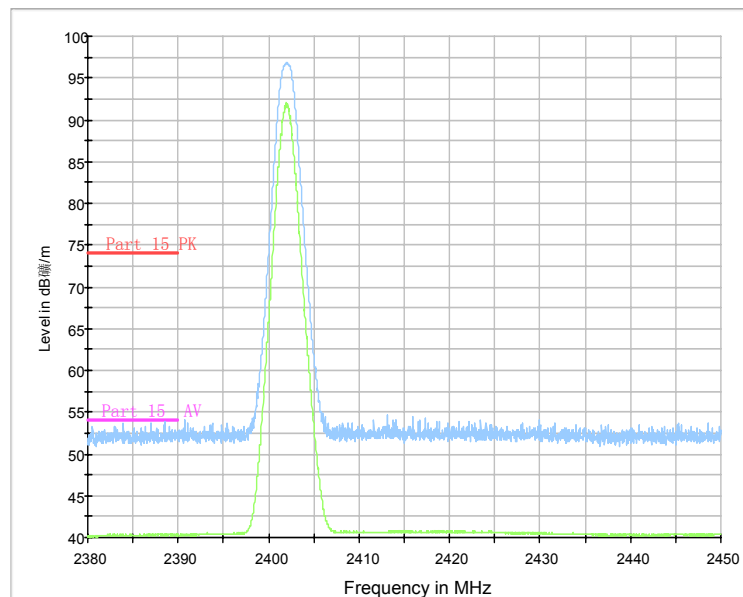


Fig.27. Radiated emission (Power): GFSK, low channel

RE - Power-2.45GHz-2.5GHz

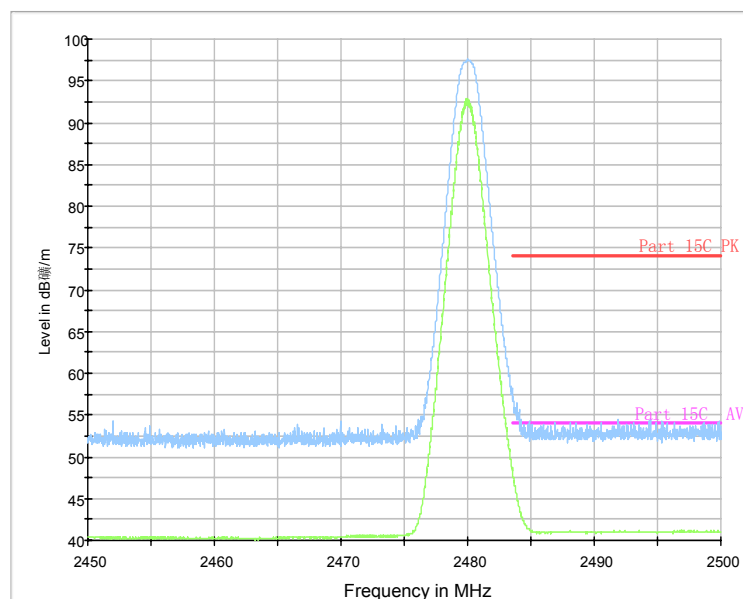


Fig.28. Radiated emission (Power) GFSK, high channel

18G-26.5G RE

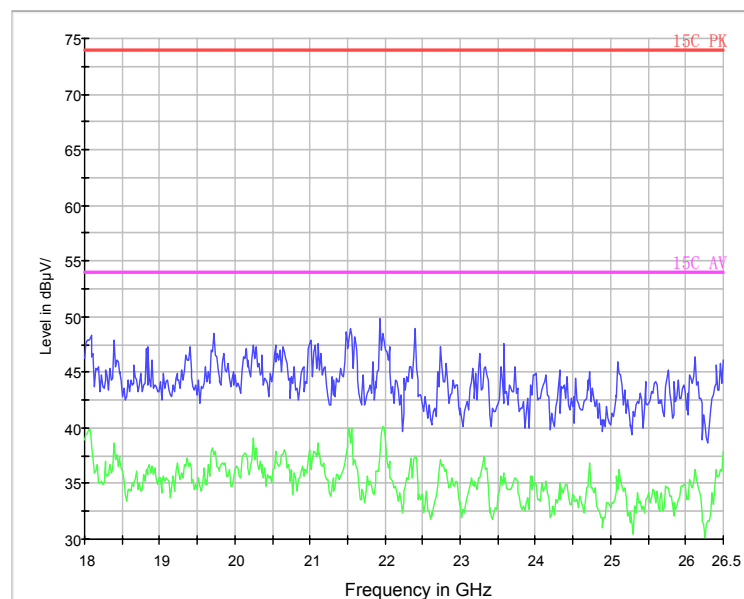


Fig.29. Radiated emission: GFSK, 18 GHz – 26.5 GHz

A.6. 6dB Bandwidth

Measurement Limit:

Standard	Limit
FCC 47 CFR Part 15.247(a)(2)	$\geq 500\text{KHz}$

The measurement is made according to KDB 558074.

Measurement Results:

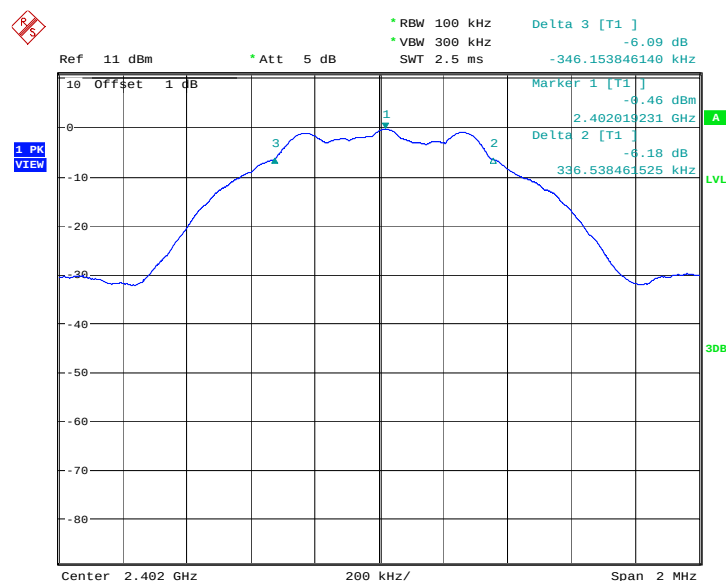
For GFSK

Channel	6dB Bandwidth (kHz)		Conclusion
2402MHz	Fig.30.	682.69	P
2440MHz	Fig.31.	682.69	P
2480MHz	Fig.32.	685.90	P

Measurement Uncertainty: $\pm 1.1\text{KHz}$

Conclusion: PASS

Test graphs as below:



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Fig.30. 6dB Bandwidth: GFSK, 2402 MHz



Fig.31. 6dB Bandwidth: GFSK, 2440 MHz

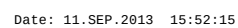


Fig.32. 6dB Bandwidth: GFSK, 2480 MHz

A.7. Maximum Power Spectral Density Level

Measurement Limit:

Standard	Limit
FCC 47 CFR Part 15.247(e)	$\leq 8.0\text{dBm}$

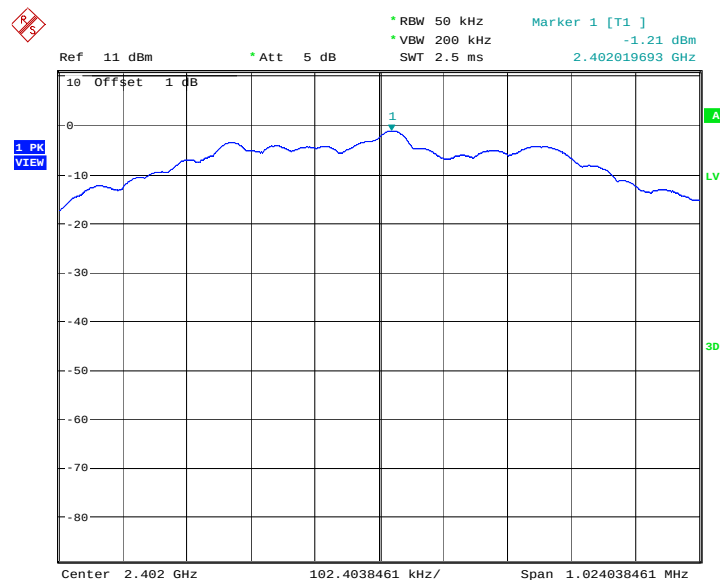
The measurement is made according to KDB 558074 in which the RBW of spectrum analyzer is required to be set between 3 KHz to 100 KHz. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat. The RBW is set to 50KHz in measurement which corresponds to the KDB 558074.

Measurement Results:

For GFSK

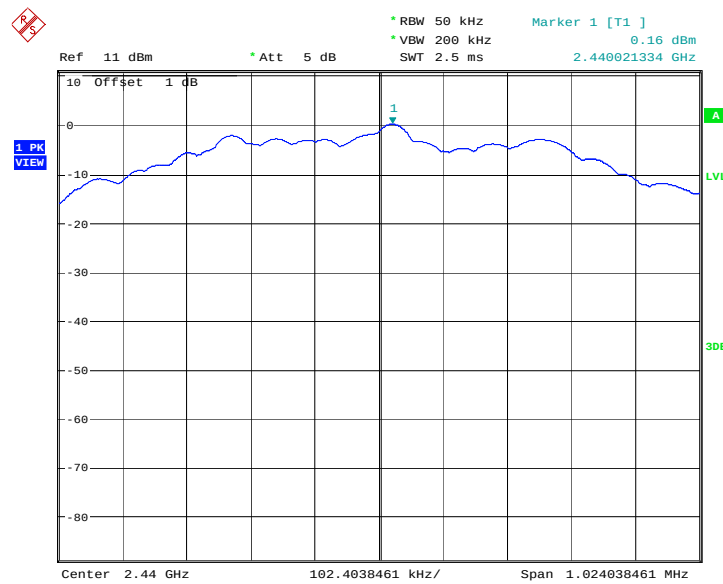
Frequency	Maximum Power Spectral Density Level(dBm)	Conclusion
2402MHz	Fig.33.	P
2440MHz	Fig.34.	P
2480MHz	Fig.35.	P

Test graphs as below:



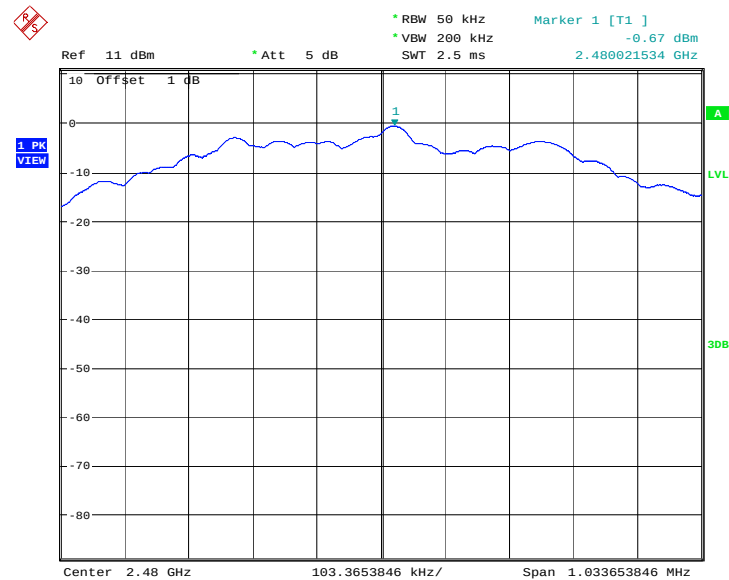
Date: 11.SEP.2013 13:48:03

Fig.33. Maximum Power Spectral Density Level Function: GFSK, 2402 MHz



Date: 11.SEP.2013 13:53:22

Fig.34. Maximum Power Spectral Density Level Function: GFSK, 2440 MHz



Date: 11.SEP.2013 13:58:00

Fig.35. Maximum Power Spectral Density Level Function: GFSK, 2480 MHz

A.8. 20dB Bandwidth

Measurement Limit:

Standard	Limit
FCC 47 CFR Part 15.247(a)(1)	N/A

Measurement Condition:

RBW=30KHz; VBW=30KHz; SPAN = 2MHz; Detector:peak

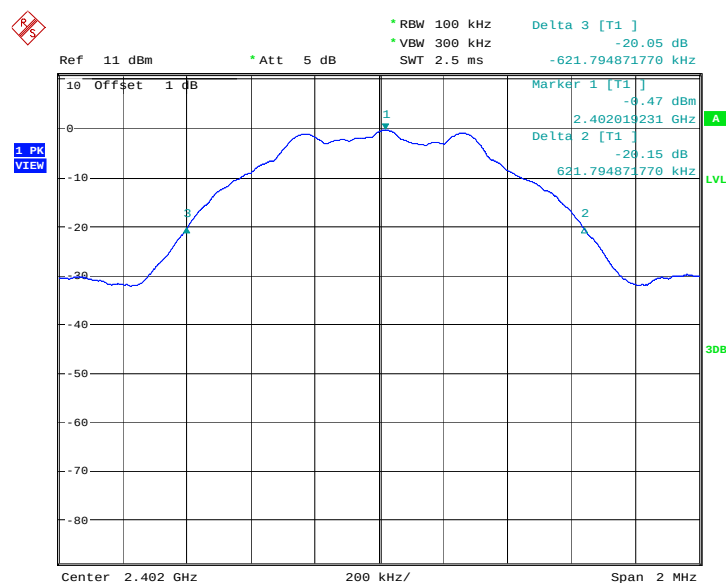
Measurement Results:

For GFSK

Channel	20dB Bandwidth (kHz)		Conclusion
2402MHz	Fig.36.	1243.59	P
2440MHz	Fig.37.	1243.59	P
2480MHz	Fig.38.	1243.59	P

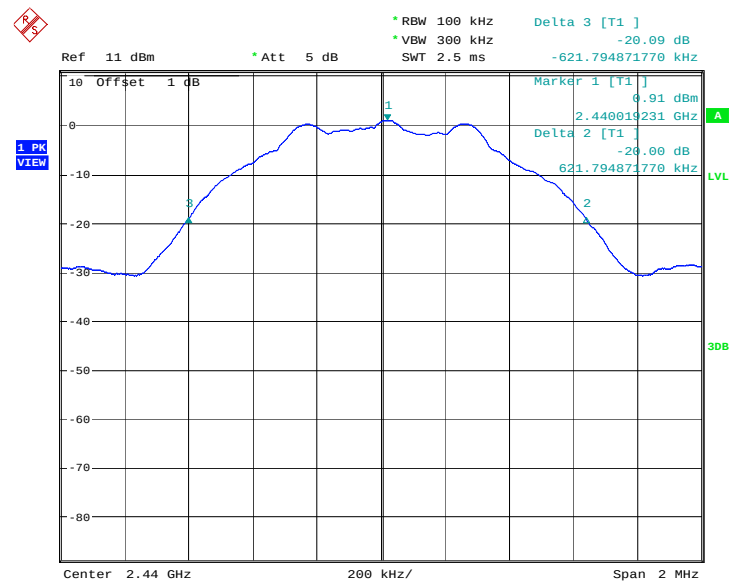
Conclusion:PASS

Test graphs as below:



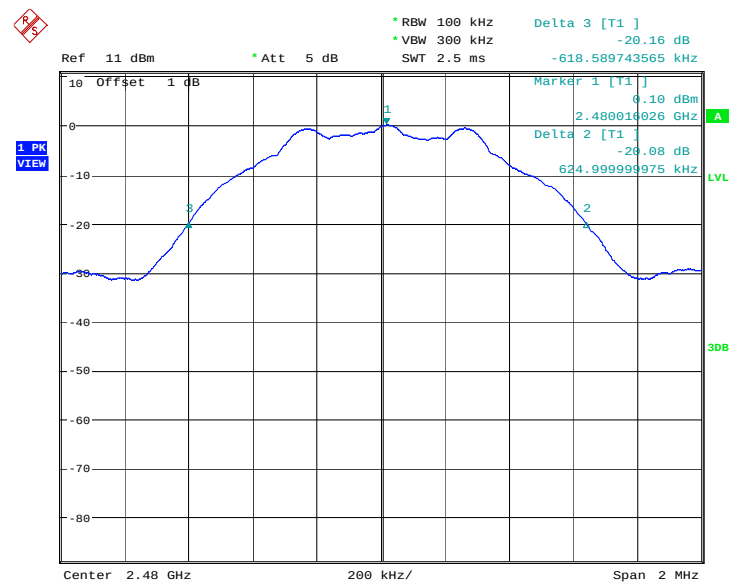
Date: 11.SEP.2013 13:51:00

Fig.36. 20dB Bandwidth: GFSK, 2402 MHz



Date: 11.SEP.2013 13:55:58

Fig.37. 20dB Bandwidth: GFSK, 2440 MHz



Date: 11.SEP.2013 14:00:57

Fig.38. 20dB Bandwidth: GFSK, 2480 MHz

A.9. AC Powerline Conducted Emission

Test Condition

Voltage (V)	Frequency (Hz)
120	60

Measurement Result and limit:

Bluetooth (Quasi-peak Limit)

Frequency range (MHz)	Quasi-peak Limit (dBμV)	Conclusion
0.15 to 0.5	66 to 56	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.		

Bluetooth (Average Limit)

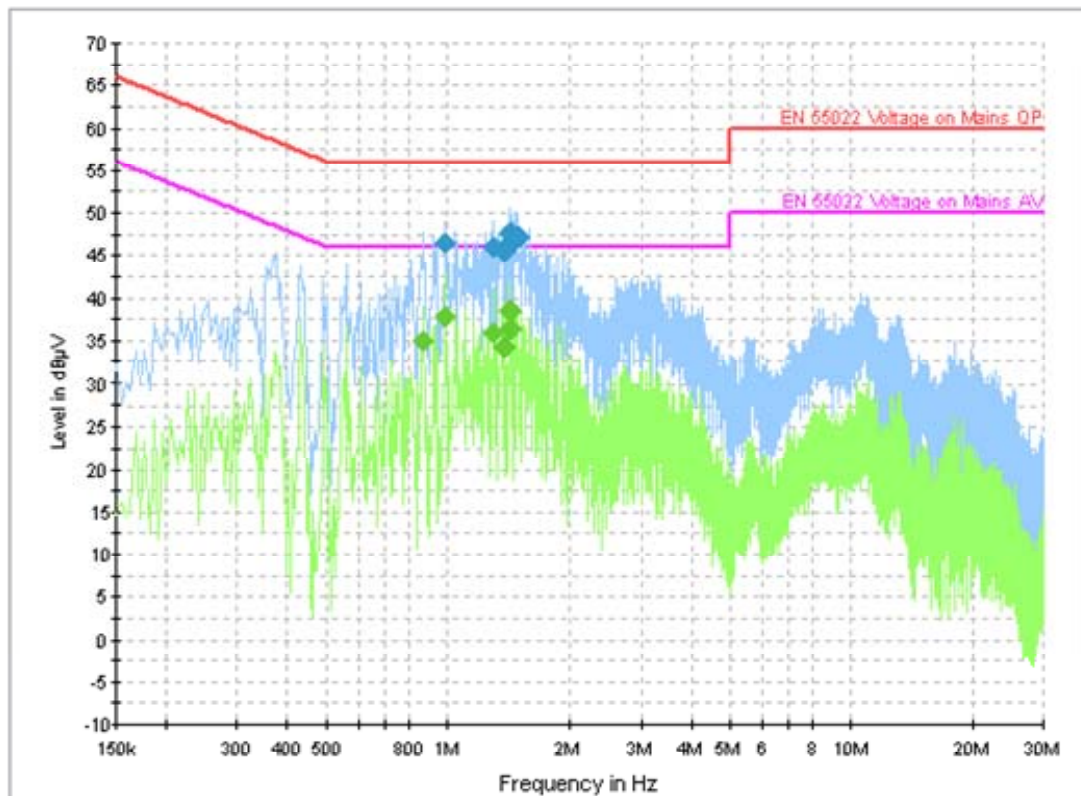
Frequency range (MHz)	Average Limit (dBμV)	Conclusion
0.15 to 0.5	56 to 46	P
0.5 to 5	46	
5 to 30	50	
NOTE: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.		

Note: the graphic result above is the maximum of the measurements for both phase line and neutral line.

Conclusion: PASS

Test graphs as below:

Traffic:



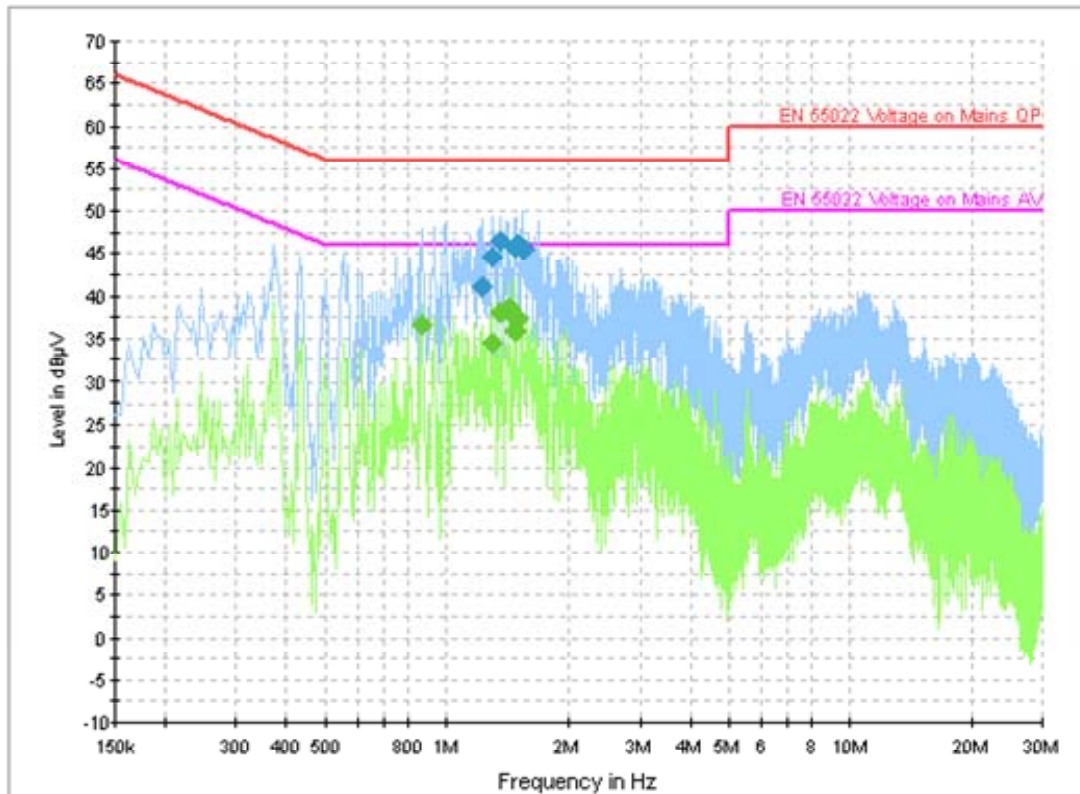
Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.991501	46.5	GND	L1	9.9	9.5	56.0
1.306501	46.1	GND	L1	9.9	9.9	56.0
1.374001	45.6	GND	L1	9.9	10.4	56.0
1.419001	46.5	GND	L1	9.9	9.5	56.0
1.432501	47.7	GND	L1	9.9	8.3	56.0
1.486501	47.1	GND	L1	9.9	8.9	56.0

Final Result 2

Frequency (MHz)	CAverage (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.874501	35.0	GND	L1	9.9	11.0	46.0
0.991501	37.8	GND	L1	9.9	8.2	46.0
1.306501	36.0	GND	L1	9.9	10.0	46.0
1.374001	34.2	GND	L1	9.9	11.8	46.0
1.419001	36.3	GND	L1	9.9	9.7	46.0
1.428001	38.4	GND	L1	9.9	7.6	46.0

Idle:



Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
1.234501	41.0	GND	L1	9.9	15.0	56.0
1.302001	44.5	GND	L1	9.9	11.5	56.0
1.365001	46.4	GND	L1	9.9	9.6	56.0
1.477501	45.7	GND	L1	9.9	10.3	56.0
1.491001	45.9	GND	L1	9.9	10.1	56.0
1.540501	45.5	GND	L1	9.9	10.5	56.0

Final Result 2

Frequency (MHz)	CAverage (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.870001	36.7	GND	L1	9.9	9.3	46.0
1.302001	34.4	GND	L1	9.9	11.6	46.0
1.365001	38.0	GND	L1	9.9	8.0	46.0
1.428001	38.5	GND	L1	9.9	7.5	46.0
1.477501	35.8	GND	L1	9.9	10.2	46.0
1.486501	37.4	GND	L1	9.9	8.6	46.0

A.10 Receiver Radiation Emission

Reference

FCC: CFR Part 15.109, 2.1053

A.10.1 Method of Measurement

The measurement procedure in ANSI C63.4-2003 is used. The EUT is placed on a 80cm height non-conductive table locating on the center of turntable. From 30MHz-1GHz, the measurement distance is 10m. For frequency range above 1GHz, the measurement distance is 3m.

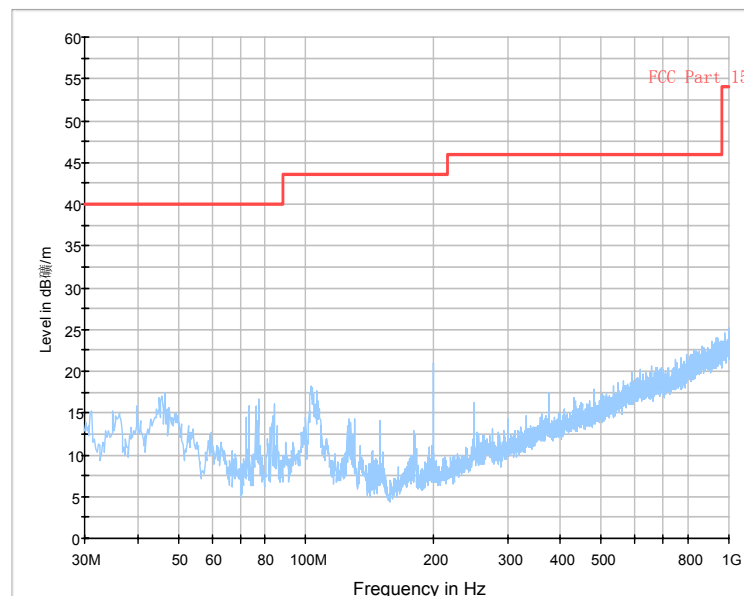
The EUT is measured with travel charger and the operating mode is idle without CMU200's signaling.

A.10.2 Method of Measurement

Frequency of Emission (MHz)	Limit (dB μ V/m)	Measurement Distance (m)
30-88	30	10
88-216	33.5	10
216-960	36	10
960-1000	44	10
>1000	54	3

A. 10.3 Measurement results

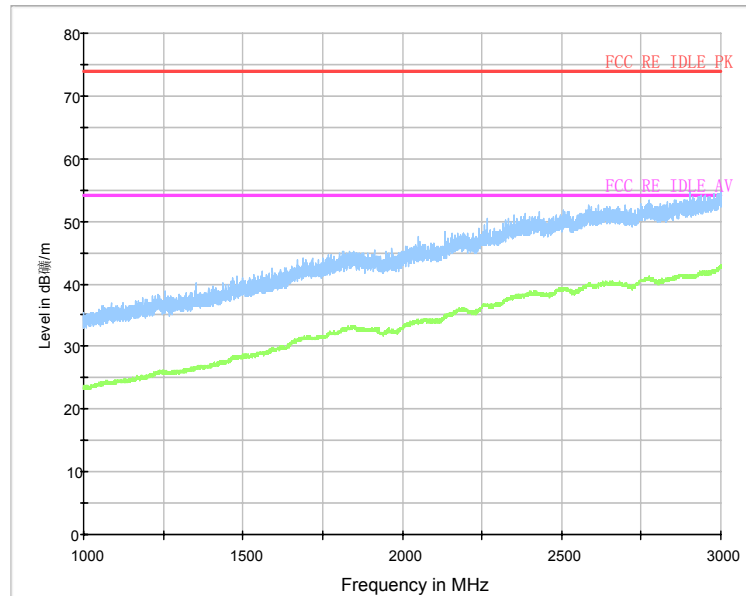
RE 30MHz-1GHz



IF bandwidth: 120 kHz

Idle Mode: 30MHz-1GHz

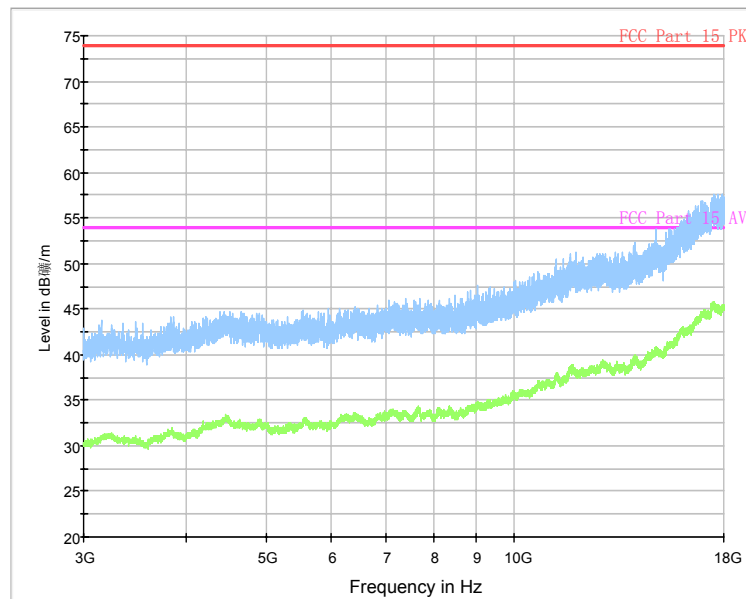
RE - 1GHz-3GHz



RBW / VBW 1 MHz

Idle Mode: 1GHz-3GHz

RE - 3GHz-18GHz



RBW / VBW 1 MHz

Idle Mode: 3GHz-18GHz