



FCC PART 15C TEST REPORT No.I15N01419-BLE

for

Yulong Computer Telecommunication Scientific (Shenzhen)

Co., Ltd

Smart Phone

Model Name: Coolpad 3622A

With

Hardware Version: P2

Software Version: 091.00.160130

FCC ID: R38YL3622A

Issued Date: Feb 22nd, 2016

Test Laboratory:

FCC 2.948 Listed: No.342690

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 CTTL.

Test Laboratory:

CTTL, Telecommunication Technology Labs, Academy of Telecommunication Research, MIIT

No. 52, Huayuan North Road, Haidian District, Beijing, P. R. China 100191.

Tel:+86(0)10-62304633-2512, Fax:+86(0)10-62304633-2504

Email: cttl_terminals@catr.cn, website: www.chinattl.com

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REPORT HISTORY

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1. Test Laboratory

1.1. Testing Location

Location1: CTTL(South Branch)

Address: TCL International E city No. 1001 Zhongshanyuan Road, Nanshan
District, Shenzhen, Guangdong, China 518000

1.2. Testing Environment

Normal Temperature: 15-35°C

Extreme Temperature: -20/+55°C

Relative Humidity: 20-75%

1.3. Project data

Testing Start Date: 2015-12-31

Testing End Date: 2016-02-22

1.4. Signature

Xu Ye

(Prepared this test report)

Tang Weisheng

(Reviewed this test report)

Zhang Bojun

(Approved this test report)



2. Client Information

2.1. Applicant Information

Company Name: Yulong Computer Telecommunication Scientific (Shenzhen) Co., Ltd
Address: Coolpad Information Harbor, 2nd Mengxi Road, Hi-Tech Industrial
Park(North), Nanshan district, Shenzhen, P.R.C
City: Shenzhen
Postal Code: /
Country: China
Telephone: +86 13410415799
Fax: /

2.2. Manufacturer Information

Company Name: Yulong Computer Telecommunication Scientific (Shenzhen) Co., Ltd
Address: Coolpad Information Harbor, 2nd Mengxi Road, Hi-Tech Industrial
Park(North), Nanshan district, Shenzhen, P.R.C
City: Shenzhen
Postal Code: /
Country: China
Telephone: +86 13410415799
Fax: /

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

3.1. About EUT

Description	Smart Phone
Model Name	Coolpad 3622A
Market Name	Coolpad Catalyst
Frequency Band	2402MHz~2480MHz
Type of Modulation	GFSK
Number of Channels	40
FCC ID	R38YL3622A

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

3.2. Internal Identification of EUT

EUT ID*	IMEI	HW Version	SW Version
EUT1	869630020000067	P2	091.00.160130

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

3.3. Internal Identification of AE

AE ID*	Description	Type	SN
AE1	Charger	CYSK05-050100	/

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

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.

Reference	Title	Version
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.	Oct, 2015
ANSI C63.10	American National Standard for Testing Unlicensed Wireless Devices	Jun,2013

5. Test Results

5.1. Summary of Test Results

No	Test cases	Standard Sub-clause	Verdict
0	Antenna Requirement	15.203	P
1	Maximum Peak Output Power	15.247 (b)	P
2	Peak Power Spectral Density	15.247 (e)	P
3	Occupied 6dB Bandwidth	15.247 (a)	P
4	Band Edges Compliance	15.247 (d)	P
5	Transmitter Spurious Emission - Conducted	15.247 (d)	P
6	Transmitter Spurious Emission - Radiated	15.247, 15.205, 15.209	P
7	AC Powerline Conducted Emission	15.107, 15.207	P

See **ANNEX B** and **ANNEX C** for details.

5.2. Statements

CTTL has evaluated the test cases requested by the applicant/manufacture as listed in section 5.1 of this report, for the EUT specified in section 3, according to the standards or reference documents listed in section 4.2

5.3. Terms used in the result table

Terms used in Verdict column

P	Pass
NA	Not Available
F	Fail

Abbreviations

AC	Alternating Current
AFH	Adaptive Frequency Hopping
BW	Band Width
E.I.R.P.	equivalent isotropical radiated power
ISM	Industrial, Scientific and Medical
R&TTE	Radio and Telecommunications Terminal Equipment
RF	Radio Frequency
Tx	Transmitter

5.4. Laboratory Environment

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

Temperature	Min. = 15 °C, Max. = 35 °C
Relative humidity	Min. = 15 %, Max. = 75 %
Shielding effectiveness	0.014MHz - 1MHz, >60dB; 1MHz - 1000MHz, >90dB.
Electrical insulation	> 2 M
Ground system resistance	< 4
Normalised site attenuation (NSA)	< ± 4 dB, 3m/10m distance, from 30 to 1000 MHz
Site voltage standing-wave ratio (S_{VSWR})	Between 0 and 6 dB, from 1GHz to 18GHz
Uniformity of field strength	Between 0 and 6 dB, from 80 to 3000 MHz

Shielded room did not exceed following limits along the EMC testing:

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

6. Test Facilities Utilized

Conducted test system

No.	Equipment	Model	Serial Number	Manufacturer	Calibration Due date	Calibration Period
1	Vector Signal Analyzer	FSV40	100903	Rohde & Schwarz	2016-04-21	1 year

Radiated emission test system

No.	Equipment	Model	Serial Number	Manufacturer	Calibration Due date	Calibration Period
1	Chamber	FACT5-2.0	4166	ETS-Lindgren	2018-05-13	3 years
2	Test Receiver	ESCI	100701	Rohde & Schwarz	2016-08-10	1 year
3	BiLog Antenna	VULB9163	9163 329	Schwarzbeck	2017-01-20	3 years
4	Horn Antenna	3117	00066577	ETS-Lindgren	2016-04-01	3 years
5	Universal Radio Communication Tester	CMU200	114544	Rohde & Schwarz	2016-09-10	1 year
6	Universal Radio Communication Tester	CMW500	152499	Schwarzbeck	2016-07-23	1 year
7	Spectrum Analyser	FSP40	100378	Rohde & Schwarz	2016-12-18	1 year

Anechoic chamber

Fully anechoic chamber by ETS-Lindgren.

ANNEX A: MEASUREMENT RESULTS FOR RECEIVER**A.0 Antenna requirement****Measurement Limit:**

Standard	Requirement
FCC CRF Part 15.203	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.

Conclusion: The Directional gains of antenna used for transmitting is 2.3 dBi.
The RF transmitter uses an integrate antenna without connector.

A.1 Maximum Average Output Power**Measurement Limit:**

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

Measurement Results:

Mode	Channel	Maximum Peak Output Power (dBm)		Conclusion
GFSK	0	1.86	Fig.1	P
	19	2.84	Fig.2	P
	39	1.15	Fig.3	P

See ANNEX C for test graphs.

Conclusion: Pass

A.2 Peak Power Spectral Density**Measurement Limit:**

Standard	Limit
FCC CRF Part 15.247(d)	< 8 dBm/3 kHz

Measurement Results:

Mode	Channel	Peak Power Spectral Density (dBm)		Conclusion
GFSK	0	Fig.4	-14.57	P
	19	Fig.5	-13.13	P
	39	Fig.6	-15.21	P

See ANNEX C for test graphs.

Conclusion: PASS

A.3 Occupied 6dB Bandwidth

Measurement Limit:

Standard	Limit (kHz)
FCC 47 CFR Part 15.247 (a)	≥ 500

Measurement Result:

Mode	Channel	Test Results (kHz)		conclusion
GFSK	0	Fig.7	709.1	P
	19	Fig.8	716.4	P
	39	Fig.9	709.1	P

See ANNEX C for test graphs.

Conclusion: PASS

A.4 Band Edges Compliance

Measurement Limit:

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

Measurement Result:

Mode	Channel	Test Results	Conclusion
GFSK	0	Fig.10	P
	39	Fig.11	P

See ANNEX C for test graphs.

Conclusion: Pass

A.5 Transmitter Spurious Emission

A.5.1 Transmitter Spurious Emission - Conducted

Measurement Limit:

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

Measurement Results:

MODE	Channel	Frequency Range	Test Results	Conclusion
GFSK	0	2.402 GHz	Fig.12	P
		30 MHz-3 GHz	Fig.13	P
		3GHz-18GHz	Fig.14	P
	19	2.440 GHz	Fig.15	P
		30 MHz-3 GHz	Fig.16	P
		3GHz-18GHz	Fig.17	P
	39	2.480 GHz	Fig.18	P
		30 MHz-3 GHz	Fig.19	P
		3GHz-18GHz	Fig.20	P
	All channels	18GHz-26GHz	Fig.21	P

See ANNEX C for test graphs.

Conclusion: Pass

A.5.2 Transmitter Spurious Emission - Radiated**Measurement Limit:**

Standard	Limit
FCC 47 CFR Part 15.247, 15.205, 15.209	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(μ V/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
GFSK	0	1 GHz ~18 GHz	Fig.22	P
	19	9kHz~30MHz	Fig.23	P
		30MHz~1GHz	Fig.24	P
		1 GHz ~18 GHz	Fig.25	P
		18 GHz~ 26.5 GHz	Fig.26	P
	39	1 GHz ~18 GHz	Fig.27	P
	Power(CH0)	2.38 GHz ~ 2.45 GHz	Fig.28	P
	Power(CH78)	2.45 GHz ~ 2.5 GHz	Fig.29	P

GFSK CH0 (1-18GHz)

Frequency (MHz)	MaxPeak-ClearWrite (dBμV/m)	Polarization	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
14498.500000	57.9	V	13.5	16.1	74.0
15182.000000	59.1	V	14.3	14.9	74.0
15759.000000	60.2	H	14.6	13.8	74.0
16323.000000	60.3	V	15.5	13.7	74.0
16776.500000	60.8	H	15.7	13.2	74.0
17431.000000	61.0	H	16.4	13.0	74.0

Frequency (MHz)	Average-ClearWrite (dBμV/m)	Polarization	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
14537.000000	46.7	H	13.6	7.3	54.0
15170.500000	47.6	V	14.3	6.4	54.0
15676.500000	48.6	V	14.5	5.4	54.0
16210.000000	49.2	V	15.1	4.8	54.0
16774.500000	49.5	V	15.7	4.5	54.0
17336.000000	49.3	V	16.1	4.7	54.0

GFSK CH19 (1-18GHz)

Frequency (MHz)	MaxPeak-ClearWrite (dBμV/m)	Polarization	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
14528.000000	58.8	H	13.6	15.2	74.0
15121.000000	58.9	H	14.2	15.1	74.0
15784.000000	60.4	V	14.7	13.6	74.0
16205.000000	60.5	V	15.1	13.5	74.0
16619.000000	61.4	H	15.9	12.6	74.0
17258.000000	60.3	V	15.7	13.7	74.0

Frequency (MHz)	Average-ClearWrite (dBμV/m)	Polarization	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
14546.500000	46.5	H	13.6	7.5	54.0
15162.000000	47.5	H	14.3	6.5	54.0
15783.500000	48.5	V	14.7	5.5	54.0
16231.000000	48.5	V	15.1	5.5	54.0
16779.500000	48.8	V	15.7	5.2	54.0
17420.000000	48.7	H	16.5	5.3	54.0

GFSK CH39 (1-18GHz)

Frequency (MHz)	MaxPeak-ClearWrite (dBμV/m)	Polarization	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
14526.000000	58.9	H	13.6	15.1	74.0
15159.000000	60.1	H	14.3	13.9	74.0
15702.000000	60.7	H	14.5	13.3	74.0
16225.500000	60.5	H	15.1	13.5	74.0
16771.500000	61.3	H	15.7	12.7	74.0
17251.000000	60.5	V	15.6	13.5	74.0

Frequency (MHz)	Average-ClearWrite (dBμV/m)	Polarization	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
14551.500000	46.6	V	13.7	7.4	54.0
15170.000000	47.7	V	14.3	6.3	54.0
15799.000000	48.6	H	14.8	5.4	54.0
16196.500000	48.5	V	15.1	5.5	54.0
16841.500000	48.7	V	16.1	5.3	54.0
17449.000000	48.8	H	16.4	5.2	54.0

See ANNEX C for test graphs.

Conclusion: Pass

Note:

A "reference path loss" is established and the A_{Rpl} is the attenuation of "reference path loss", and including the gain of receive antenna, 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:

Result= $P_{Mea}+A_{Rpl}=P_{Mea}+Cable\ Loss+Antenna\ Factor$

A.6 AC Powerline Conducted Emission

Test Condition:

Voltage (V)	Frequency (Hz)
120	60

Measurement Result and limit:

BT (Quasi-peak Limit)-AE1- Traffic

Frequency range (MHz)	Quasi-peak Limit (dB μ V)	Result (dB μ V)	Conclusion
		Traffic	
0.15 to 0.5	66 to 56	Fig.30	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.

BT (Average Limit)-AE1-Traffic

Frequency range (MHz)	Average-peak Limit (dB μ V)	Result (dB μ V)	Conclusion
		Traffic	
0.15 to 0.5	56 to 46	Fig.30	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.

BT (Quasi-peak Limit)-AE1-idle

Frequency range (MHz)	Quasi-peak Limit (dB μ V)	Result (dB μ V)	Conclusion
		Traffic	
0.15 to 0.5	Fig.66 to 56	Fig.31	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.

BT (Average Limit)-AE1-idle

Frequency range (MHz)	Average-peak Limit (dB μ V)	Result (dB μ V)	Conclusion
		Traffic	
0.15 to 0.5	56 to 46	Fig.31	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 ANNEX C for test graphs.

Conclusion: Pass

ANNEX B: TEST FIGURE LIST

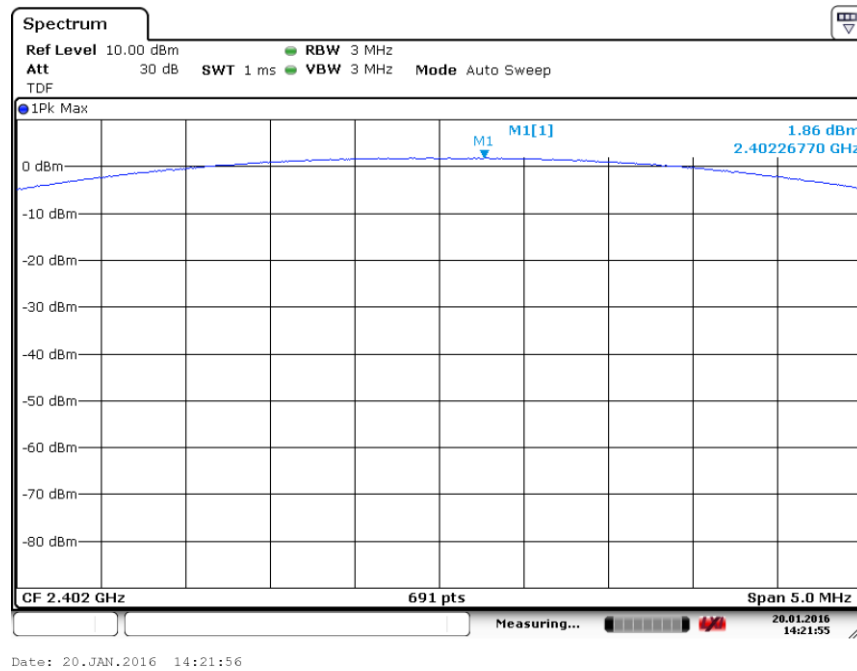


Fig.1 Maximum Peak Output Power(GFSK, Ch 0)

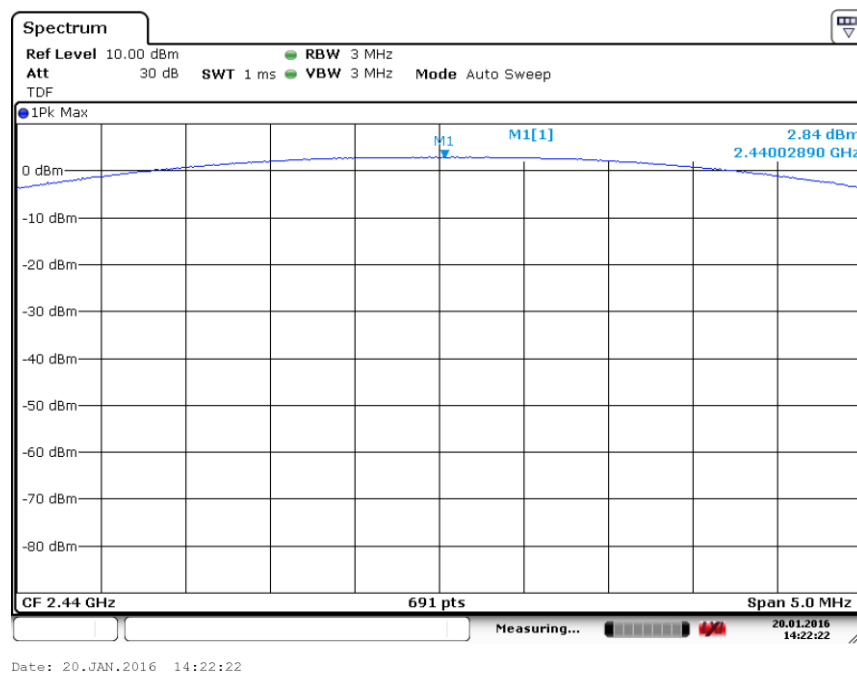


Fig.2 Maximum Peak Output Power(GFSK, Ch 19)

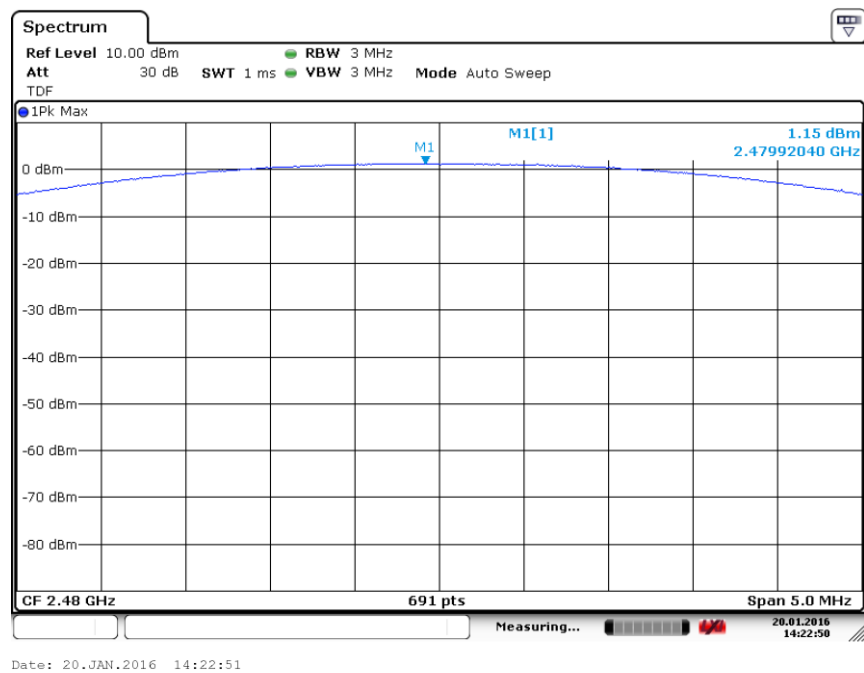


Fig.3 Maximum Peak Output Power(GFSK, Ch 39)

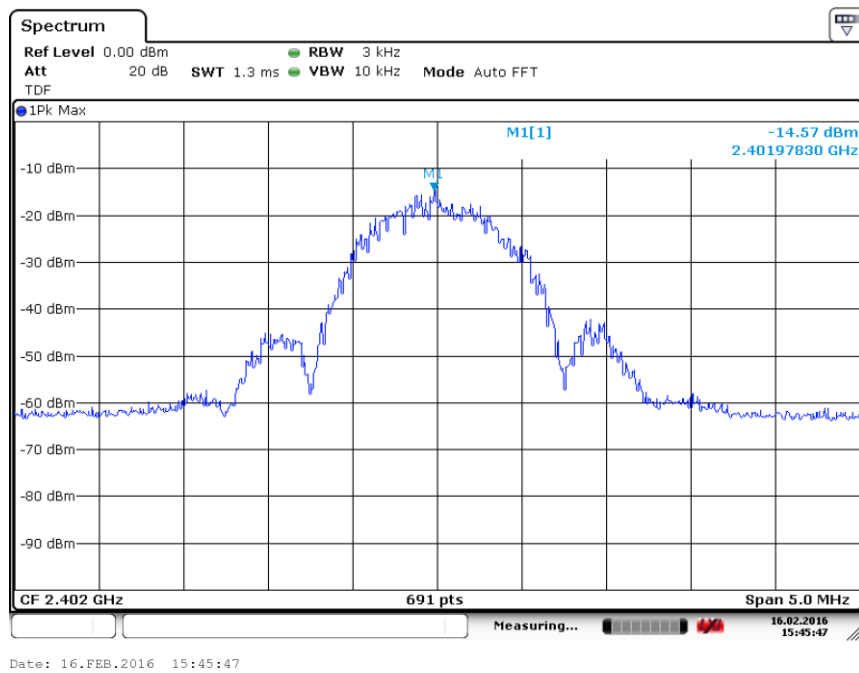


Fig.4 Power Spectral Density (Ch 0)

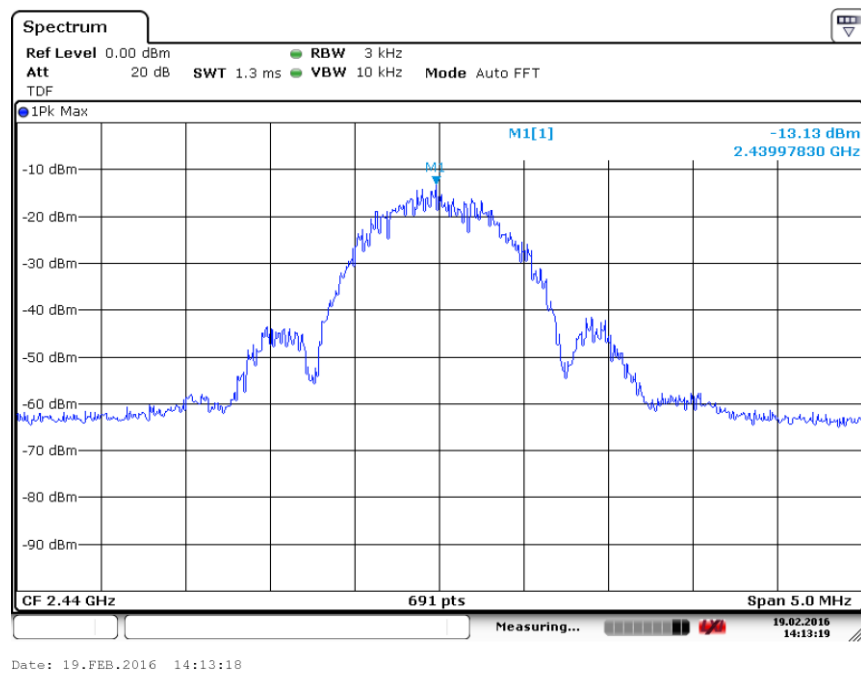


Fig.5 Power Spectral Density (Ch 19)

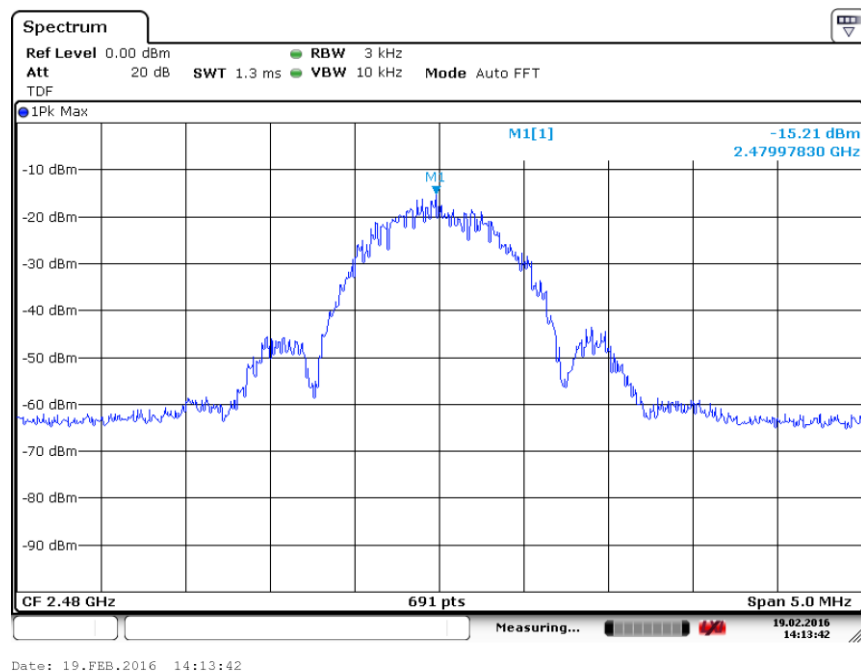


Fig.6 Power Spectral Density (Ch 39)

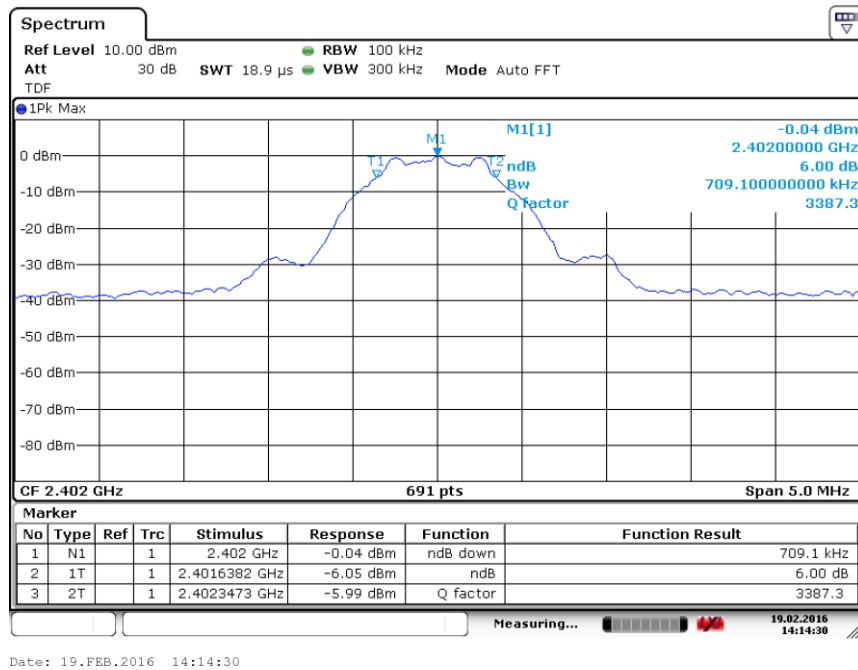


Fig.7 Occupied 6dB Bandwidth (Ch 0)

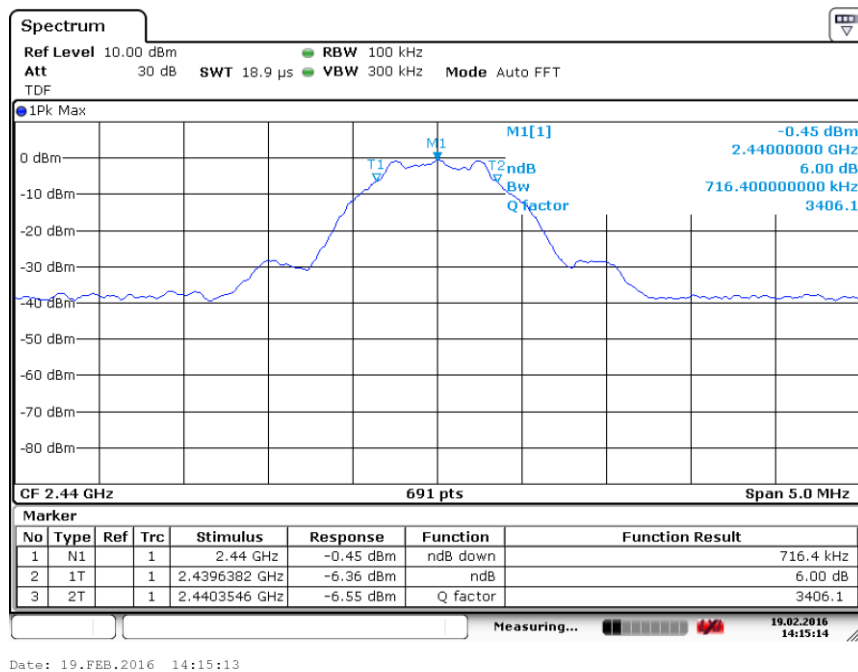


Fig.8 Occupied 6dB Bandwidth (Ch 19)

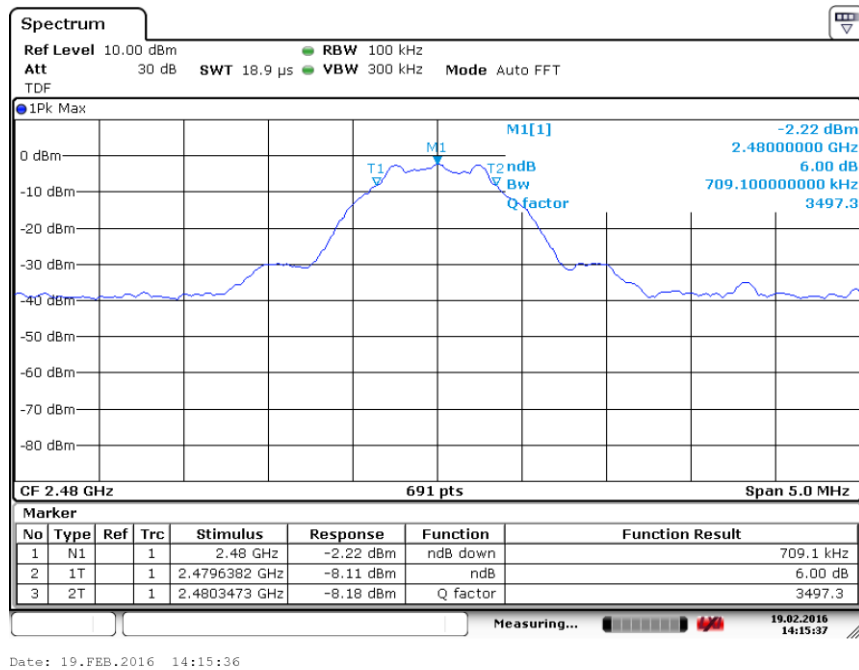


Fig.9 Occupied 6dB Bandwidth (Ch 39)

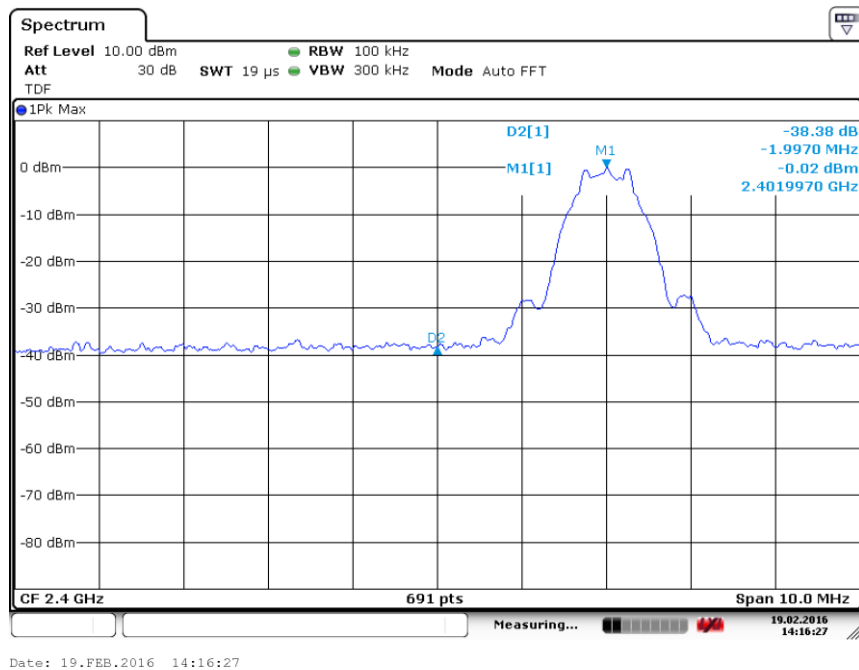


Fig.10 Band Edges (Ch 0)

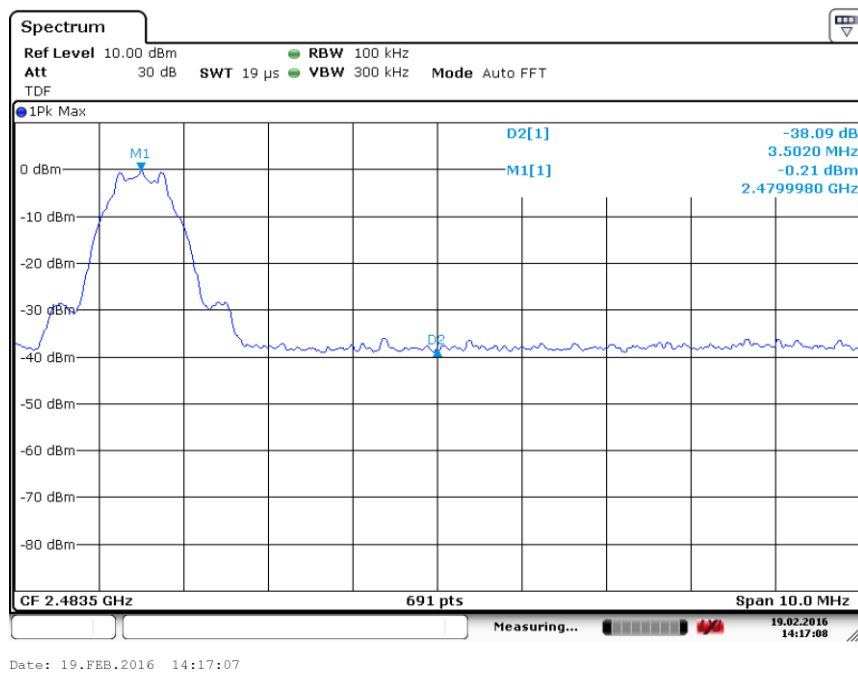


Fig.11 Band Edges (Ch 39)

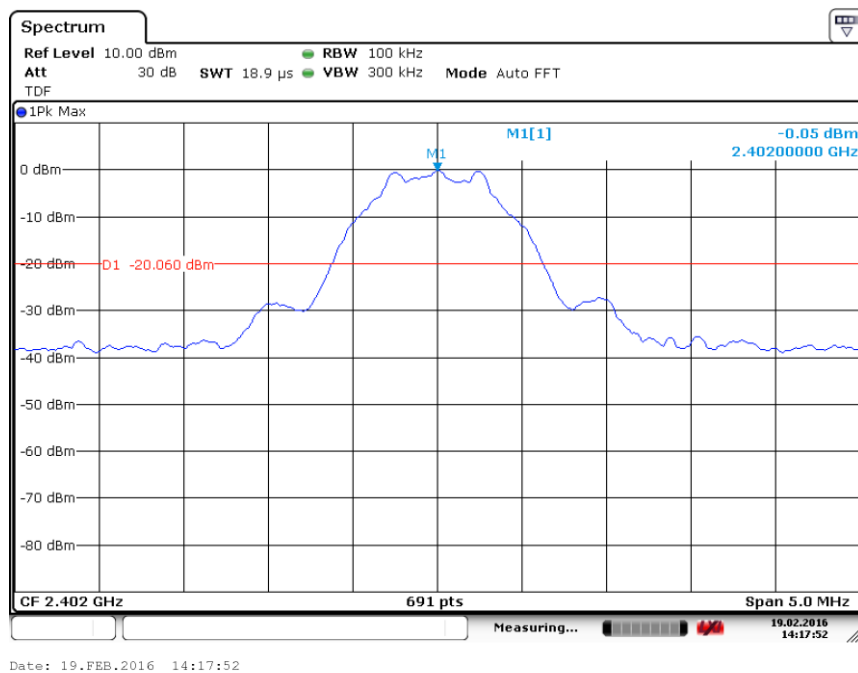


Fig.12 Conducted Spurious Emission (Ch0, Center Frequency)

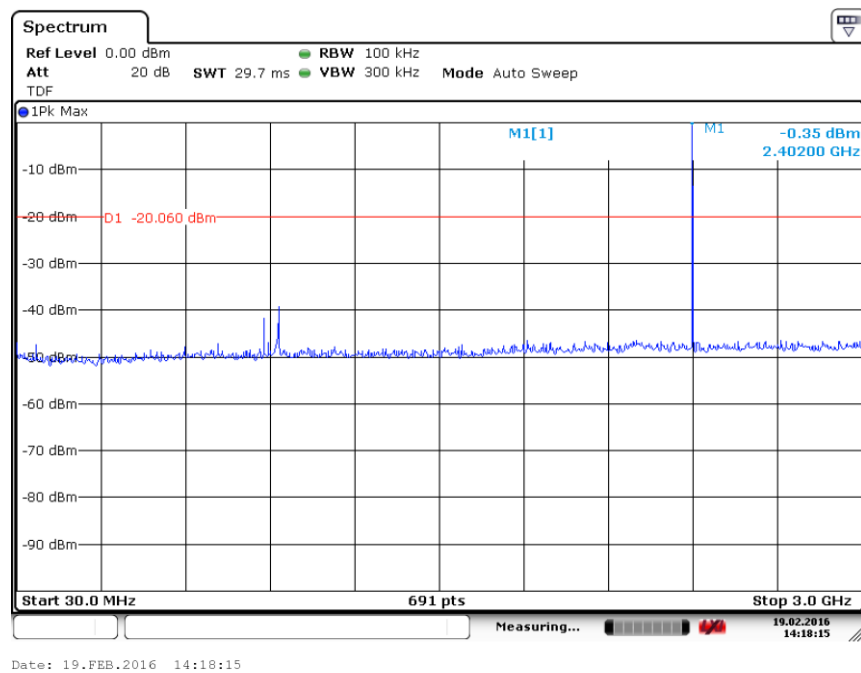


Fig.13 Conducted Spurious Emission (Ch0, 30 MHz-3 GHz)

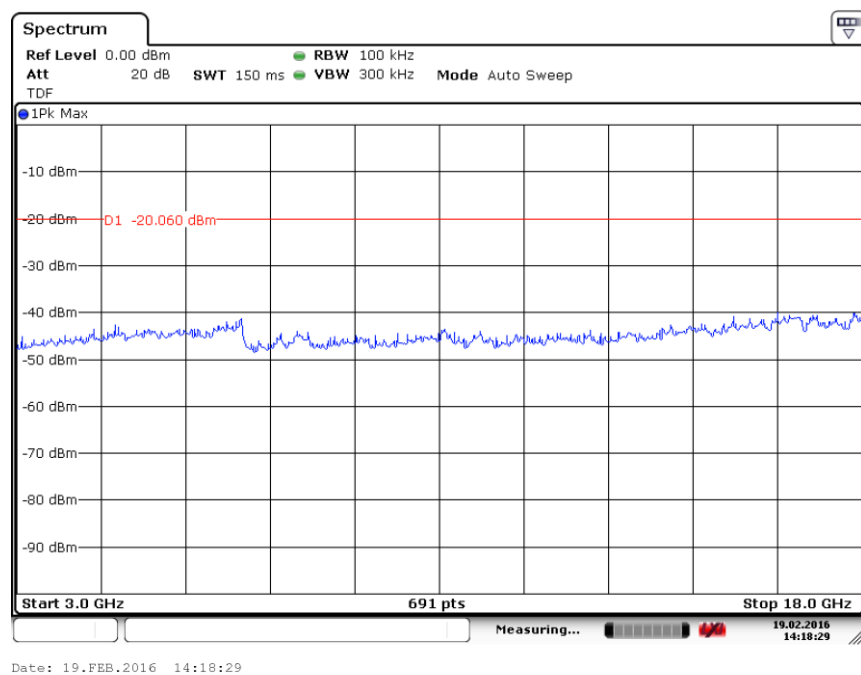


Fig.14 Conducted Spurious Emission (Ch0, 3 GHz-18 GHz)

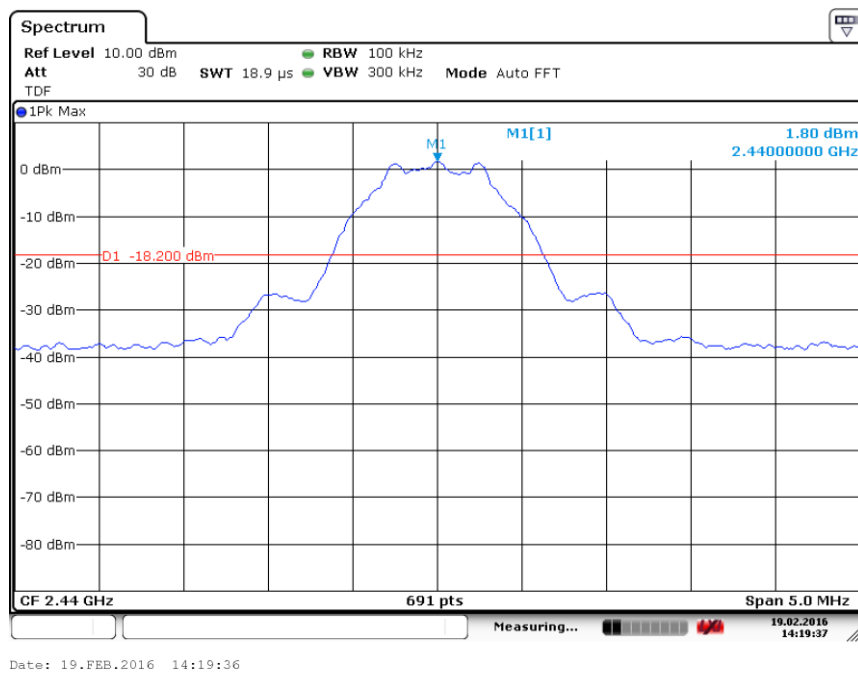


Fig.15 Conducted Spurious Emission (Ch19, Center Frequency)

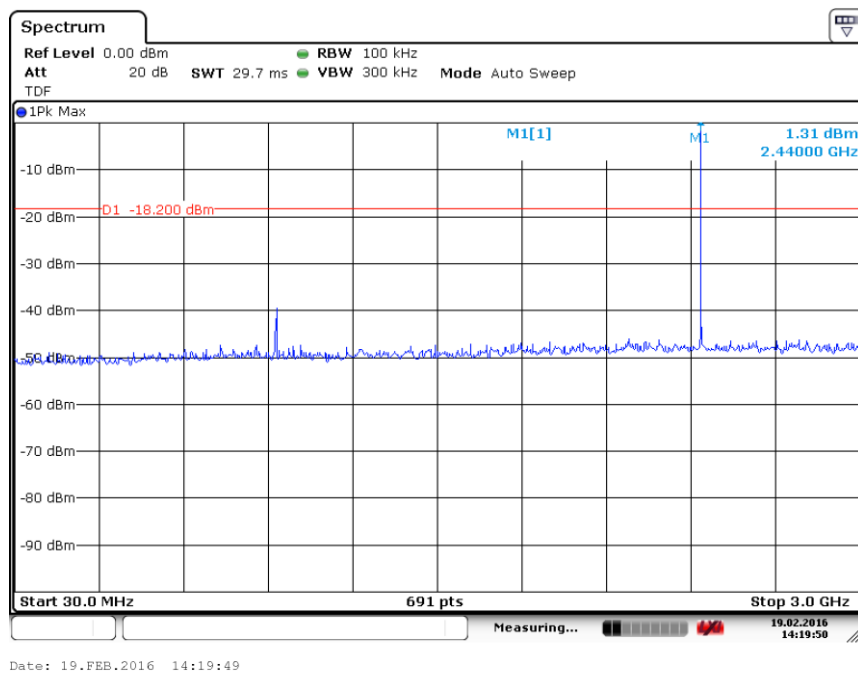


Fig.16 Conducted Spurious Emission (Ch19, 30 MHz-3 GHz)

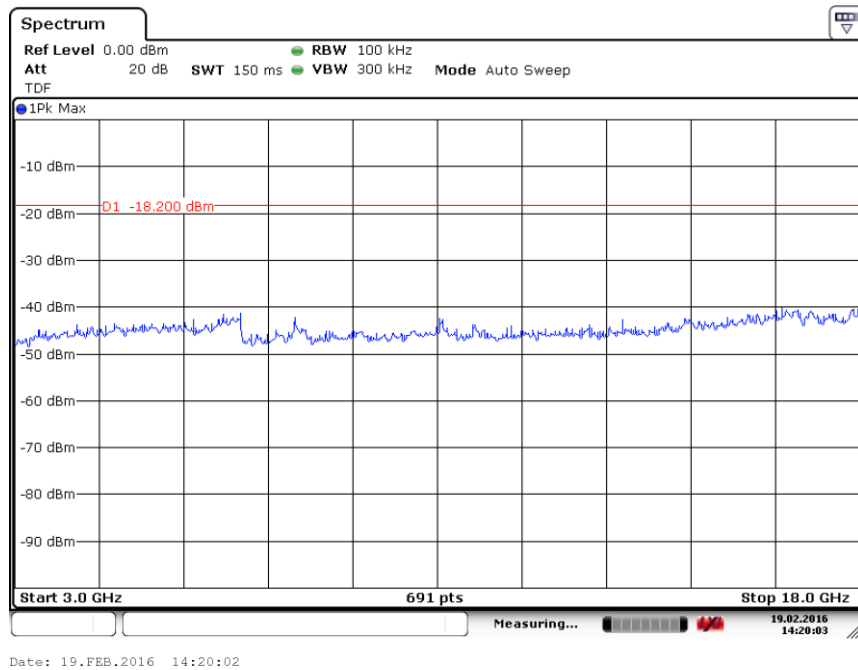


Fig.17 Conducted Spurious Emission (Ch19, 3 GHz-18 GHz)

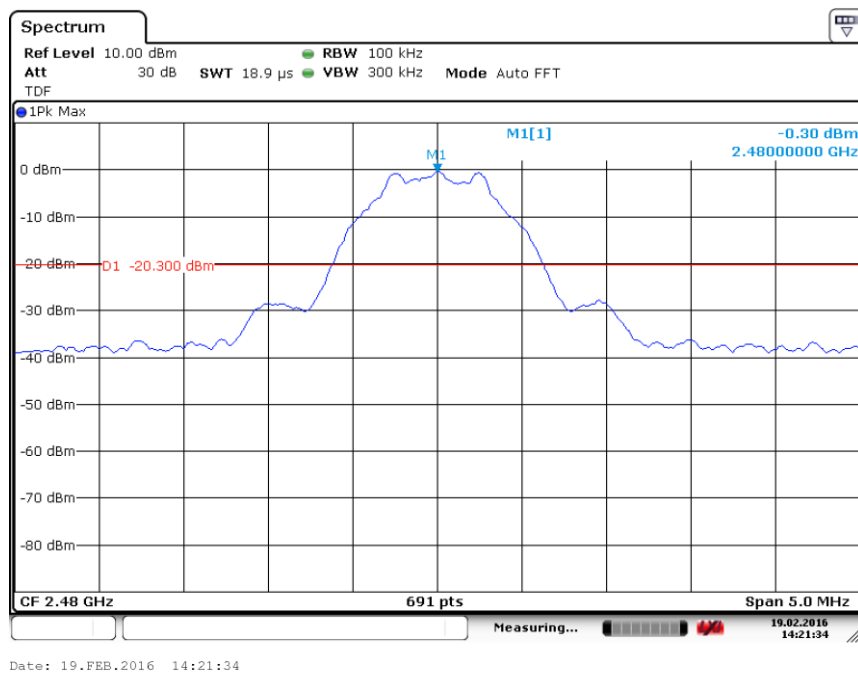


Fig.18 Conducted Spurious Emission (Ch39, Center Frequency)

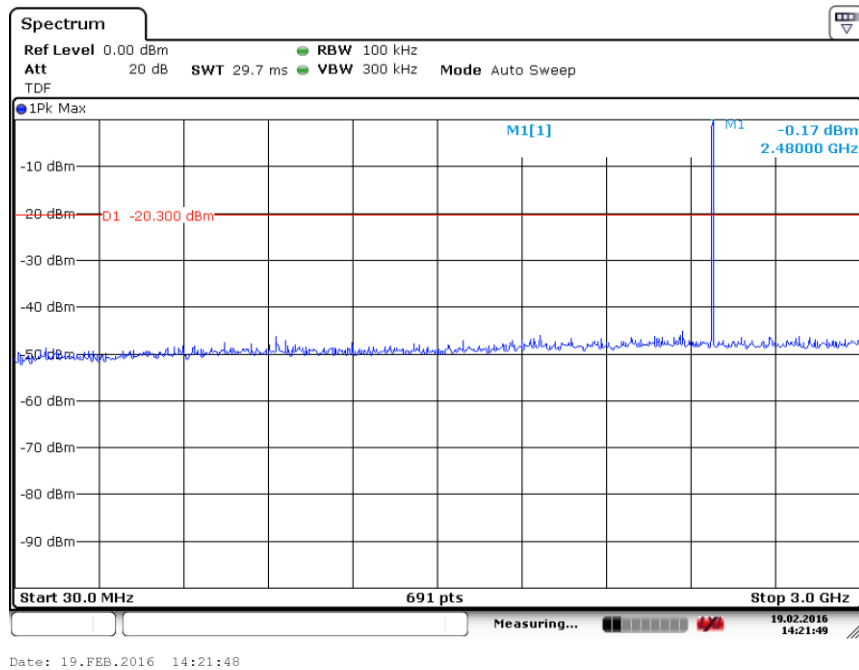


Fig.19 Conducted Spurious Emission (Ch39, 30 MHz-3 GHz)

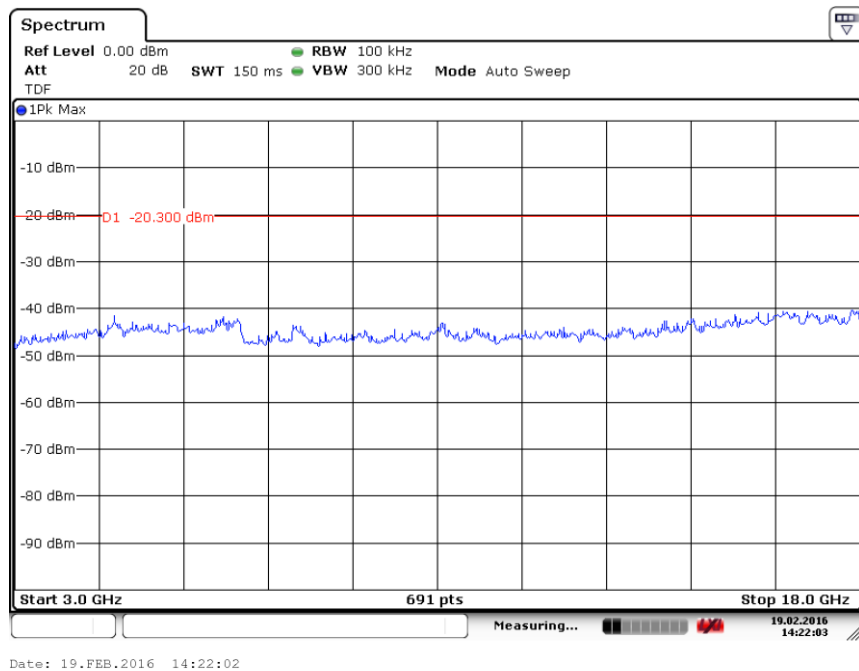


Fig.20 Conducted Spurious Emission (Ch39, 3 GHz-18 GHz)

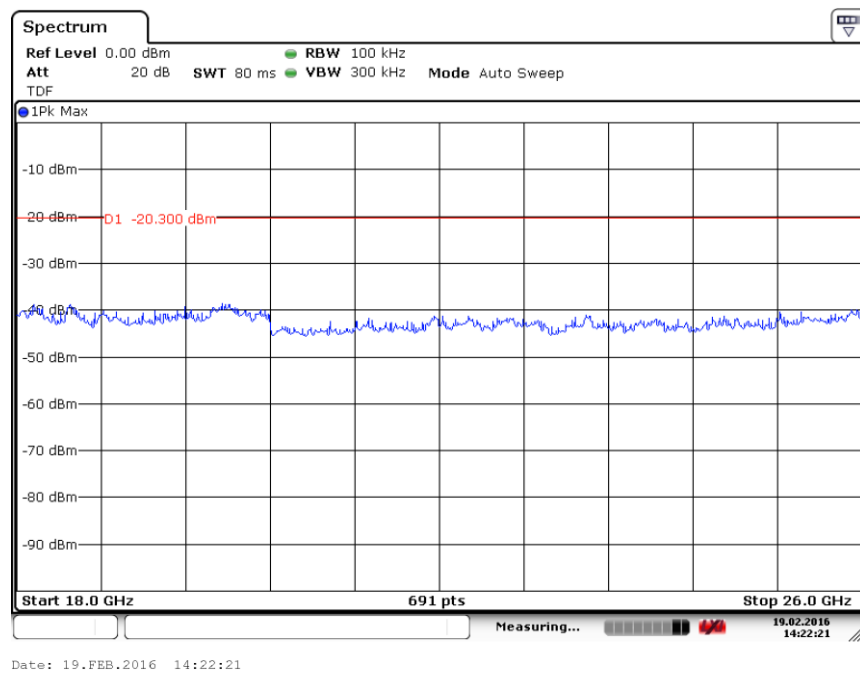


Fig.21 Conducted Spurious Emission (All channels, 18 GHz-26 GHz)

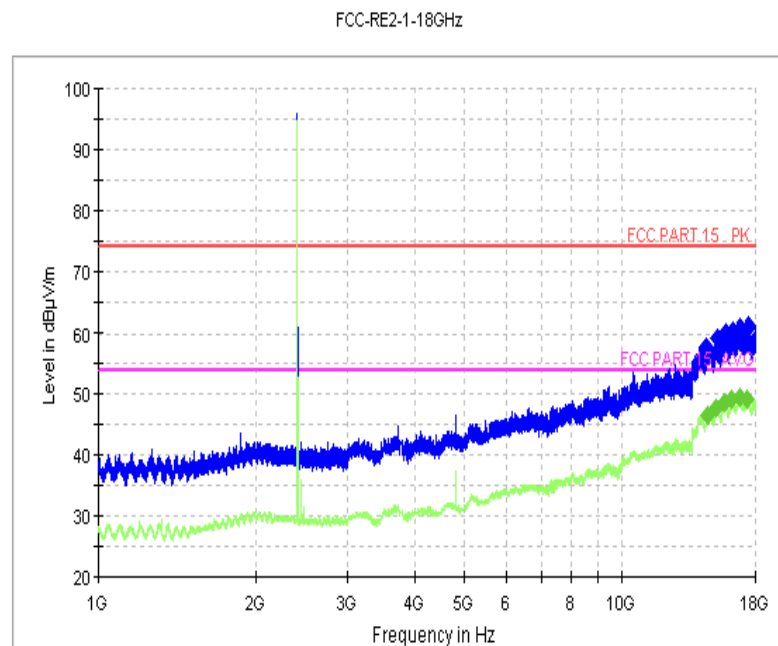


Fig.22 Radiated Spurious Emission (Ch0, 1 GHz-18 GHz)

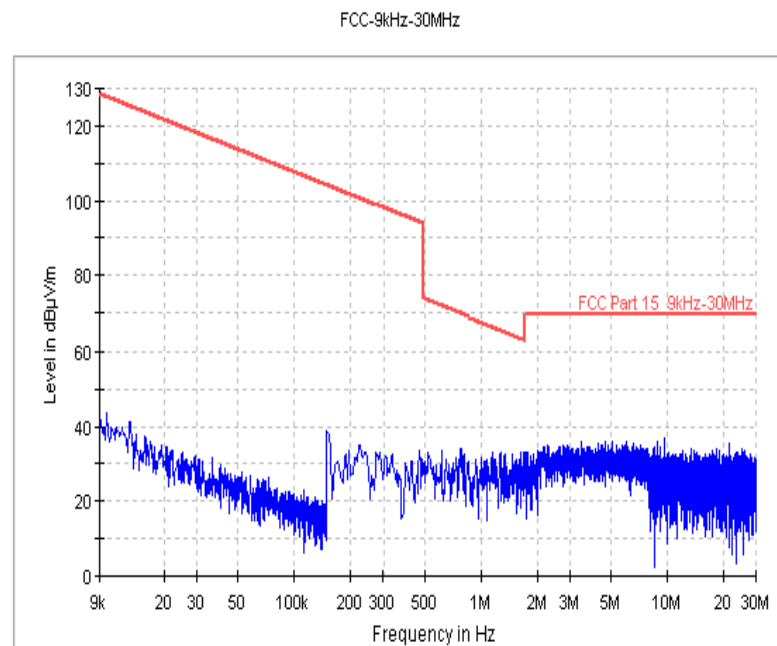


Fig.23 Radiated Spurious Emission (Ch19, 9 kHz ~30MHz)

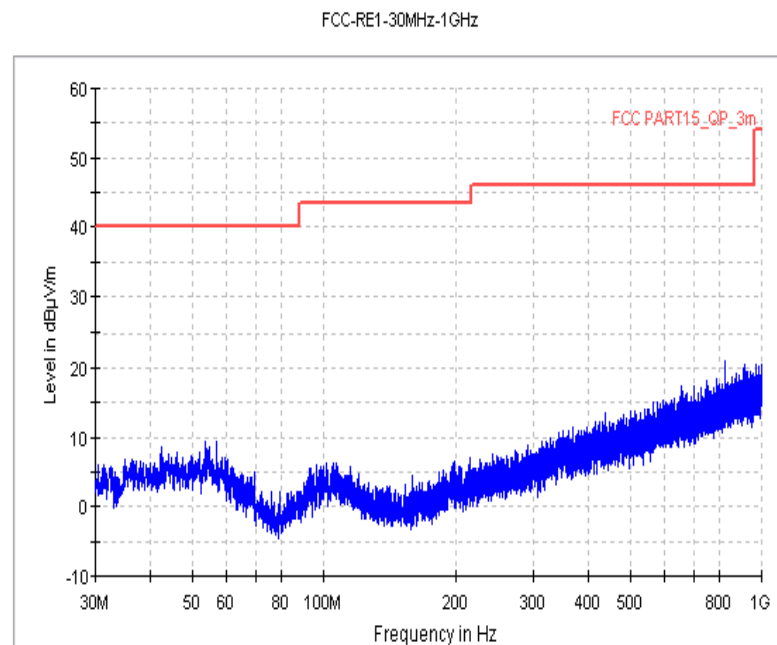


Fig.24 Radiated Spurious Emission (Ch19, 30 MHz ~1 GHz,AE1)

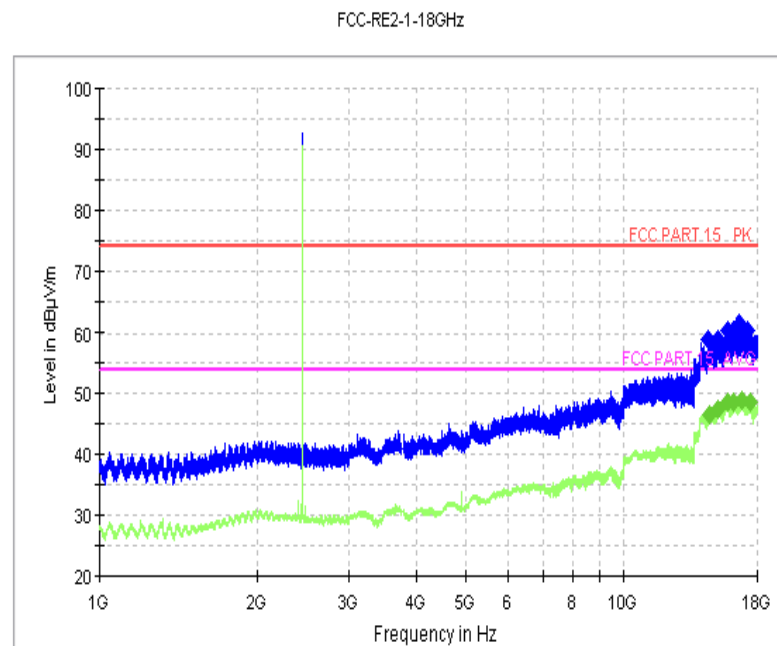


Fig.25 Radiated Spurious Emission (Ch19, 1 GHz-18 GHz)

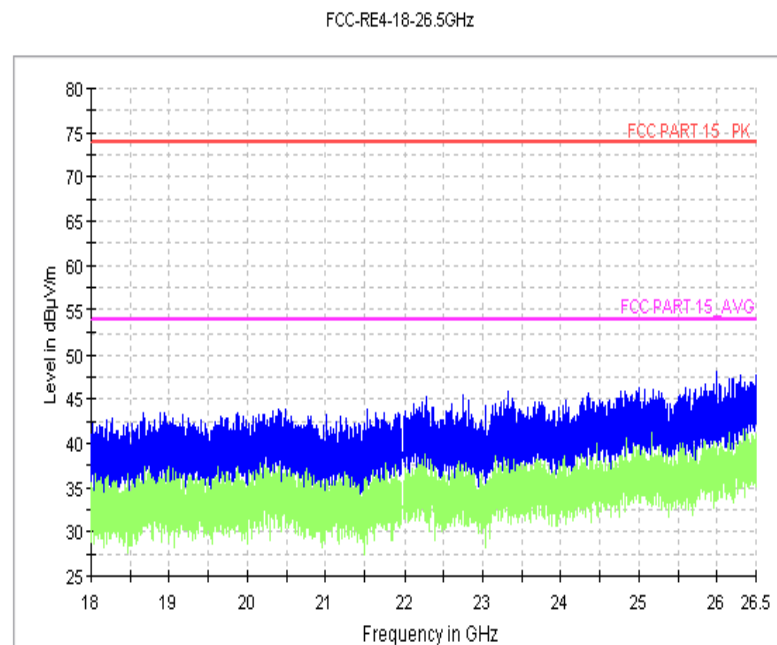


Fig.26 Radiated Spurious Emission (Ch19, 18 GHz-26.5 GHz)

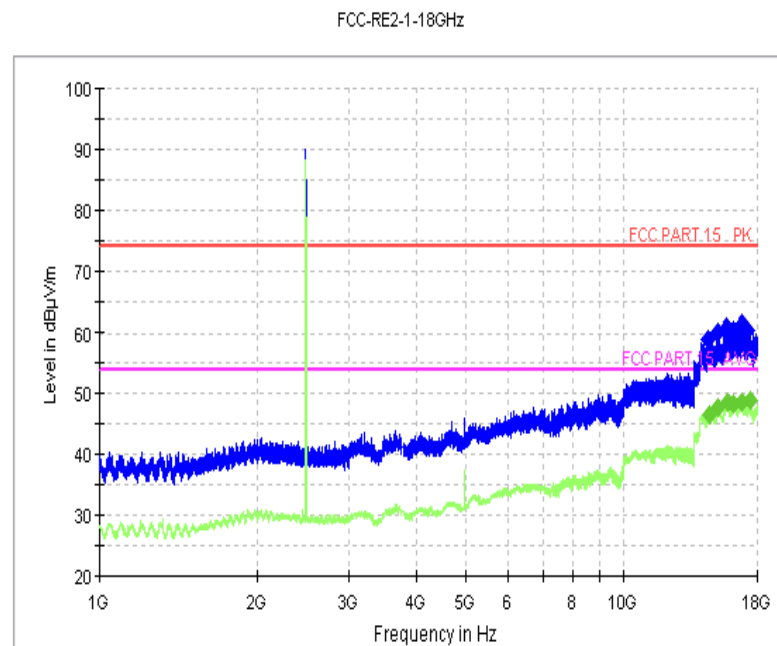


Fig.27 Radiated Spurious Emission (Ch39, 1 GHz-18 GHz)

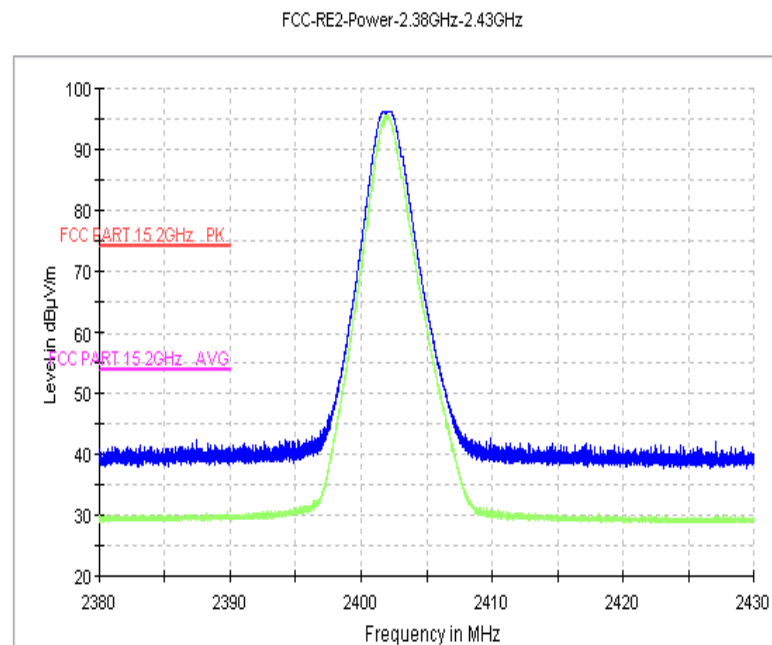


Fig.28 Radiated Emission Power (GFSK, Ch0, 2380GHz~2450GHz)

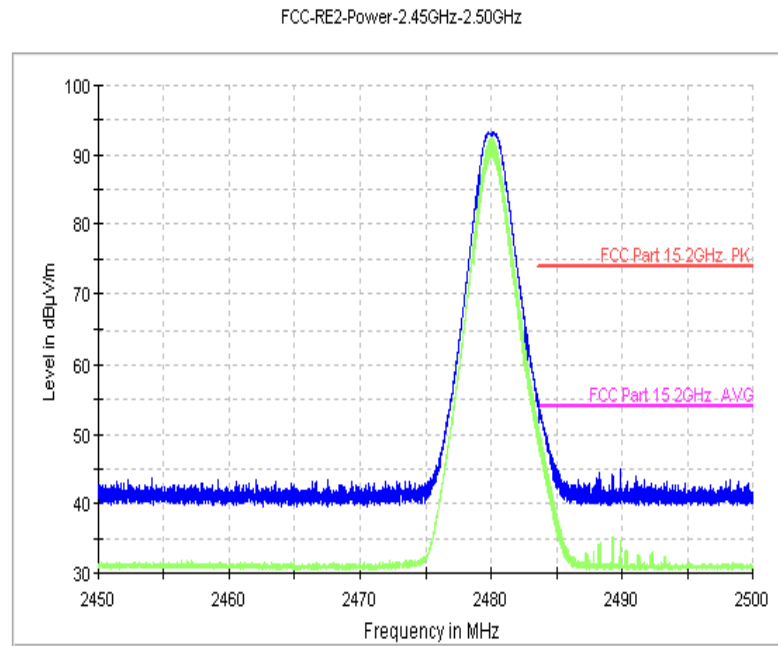


Fig.29 Radiated Emission Power (GFSK, Ch39, 2450GHz~2500GHz)

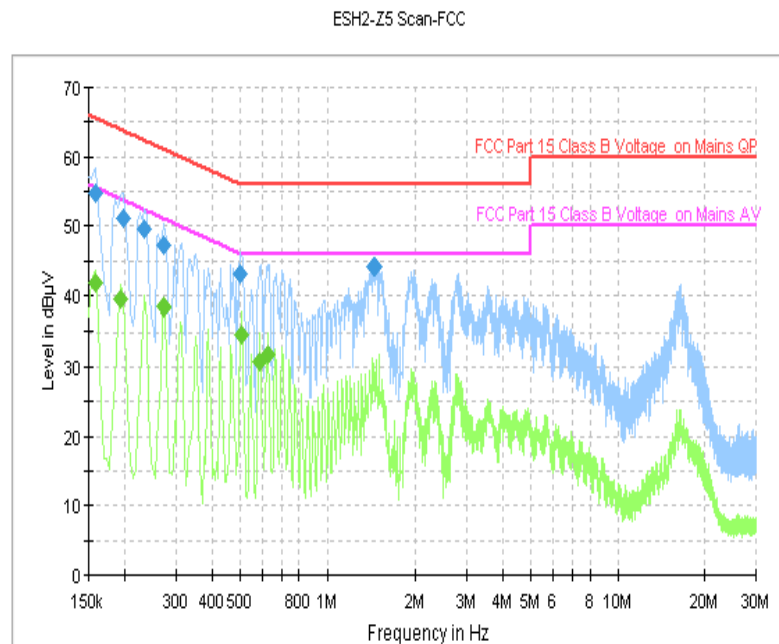


Fig. 30 AC Power line Conducted Emission (Traffic, AE1)

MEASUREMENT RESULT: " QuasiPeak "

Frequency (MHz)	QuasiPeak (dBuV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.158000	54.7	GND	L1	10.0	10.8	65.6
0.198000	51.3	GND	L1	10.0	12.4	63.7
0.234000	49.5	GND	L1	10.0	12.8	62.3
0.274000	47.2	GND	L1	10.0	13.8	61.0
0.502000	43.0	GND	L1	10.0	13.0	56.0
1.454000	44.1	GND	L1	10.1	11.9	56.0

MEASUREMENT RESULT: " Average "

Frequency (MHz)	Average (dBuV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.158000	41.8	GND	N	10.1	13.7	55.6
0.194000	39.4	GND	N	10.1	14.4	53.9
0.274000	38.4	GND	L1	10.0	12.6	51.0
0.506000	34.6	GND	L1	10.0	11.4	46.0
0.582000	30.8	GND	L1	10.1	15.2	46.0
0.622000	31.7	GND	L1	10.0	14.3	46.0

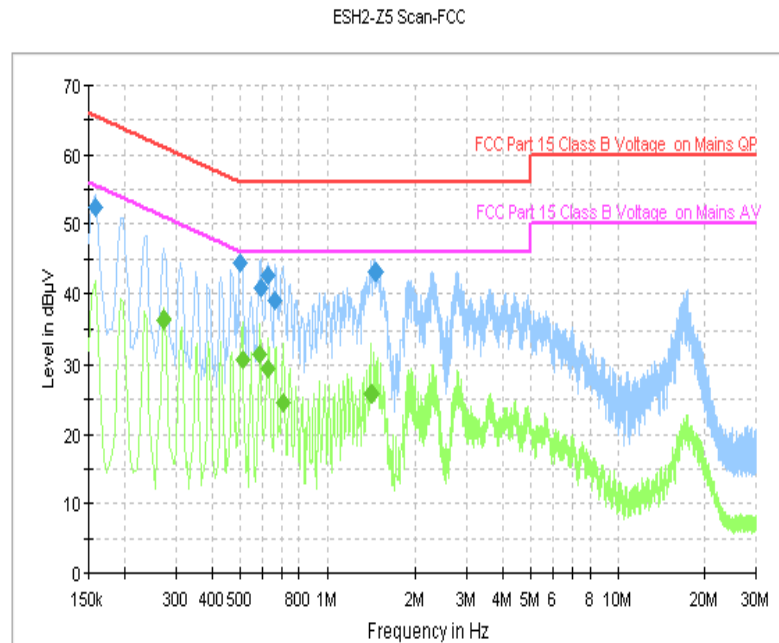


Fig. 31 AC Power line Conducted Emission (Idle, AE1)

MEASUREMENT RESULT: " QuasiPeak "

Frequency (MHz)	QuasiPeak (dBuV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.158000	52.4	GND	L1	10.0	13.1	65.6
0.502000	44.4	GND	L1	10.0	11.6	56.0
0.590000	40.7	GND	L1	10.1	15.3	56.0
0.626000	42.7	GND	L1	10.0	13.3	56.0
0.658000	38.9	GND	N	10.0	17.1	56.0
1.458000	43.3	GND	L1	10.1	12.7	56.0

MEASUREMENT RESULT: " Average "

Frequency (MHz)	Average (dBuV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.274000	36.3	GND	L1	10.0	14.7	51.0
0.510000	30.8	GND	L1	10.0	15.2	46.0
0.586000	31.5	GND	L1	10.1	14.5	46.0
0.626000	29.4	GND	L1	10.0	16.6	46.0
0.706000	24.4	GND	L1	10.0	21.6	46.0
1.410000	25.9	GND	L1	10.1	20.1	46.0

ANNEX C: Persons involved in this testing

Test Name	Tester
Maximum Peak Output Power	Xu Ye, Tang Weisheng
Peak Power Spectral Density	Xu Ye, Tang Weisheng
Occupied 6dB Bandwidth	Xu Ye, Tang Weisheng
Band Edges Compliance	Xu Ye, Tang Weisheng
Transmitter Spurious Emission - Conducted	Xu Ye, Tang Weisheng
Transmitter Spurious Emission - Radiated	Xu Ye, Tang Weisheng
AC Powerline Conducted Emission	Xu Ye, Tang Weisheng

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