FCC PART 15C
TEST REPORT
No. B17N00006-BLE

for

Huawei Technologies Co., Ltd.

Smart Watch

Model Name: LEO-DLXX

With

Hardware Version: EA1LEOUM

Software Version: sawshark-userdebug7.1.1NFF47

FCC ID: QISLEO-DLXX

Issued Date: 2017-02-14

Test Laboratory:

FCC 2.948 Listed: No.342690

Note:

Test Laboratory:

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

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

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REPORT HISTORY

Report Number	Revision	Description	Issue Date
B17N00006-BLE	Rev.0	1st edition	2017-02-14

CONTENTS

1. Test Laboratory

1.1. Testing Location

Location: 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℃

Extreme Temperature: -10/+55℃

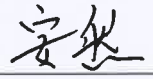
Relative Humidity: 20-75%

1.3. Project data

Testing Start Date: 2017-01-04

Testing End Date: 2017-02-09

1.4. Signature



An Ran

(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:	Huawei Technologies Co., Ltd
Address:	Administration Building，Huawei Base, Bantian, Longgang District, Shenzhen
City:	Shenzhen
Postal Code:	518129
Country:	China
Telephone:	0755-36376815
Fax:	/

2.2. Manufacturer Information

Company Name:	Huawei Technologies Co., Ltd
Address:	Administration Building, Huawei Base, Bantian, Longgang District, Shenzhen
City:	Shenzhen
Postal Code:	518129
Country:	China
Telephone:	0755-36376815
Fax:	/

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

3.1. About EUT

Description	Smart Watch
Model Name	LEO-DLXX
Market Name	/
Frequency Band	2402MHz~2480MHz
Type of Modulation	GFSK
Number of Channels	40
FCC ID	QISLEO-DLXX

3.2. Internal Identification of EUT

EUT ID*	IMEI	HW Version	SW Version	Receive Date
EUT1	/	EA1LEOUM	sawshark-userdebug7.1.1NFF47	2017-01-04

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

3.3. Internal Identification of AE

AE ID*	Description	SN
AE1	Charger	/
AE2	Charger	/
AE3	Charger	/

AE1

Model	HW-050100U01
Manufacturer	DONGGUAN PHITEK ELECTRONICS CO.,LTD.

AE2

Model	HW-050100U01
Manufacturer	SHENZHEN HUNTKEY ELECTRONIC CO.,LTD.

AE3

Model	HW-050100U01
Manufacturer	HUIZHOU BYD ELECTRONIC CO., LTD.

*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	Nov,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	Sub-clause of Part15C	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/manufacturer 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 isotropic 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 did not exceed following limits along the EMC testing

Temperature	Min. = 15 ˚C, Max. = 30 ˚C
Relative humidity	Min. = 35 %, Max. = 60 %
Shielding effectiveness	0.014MHz - 1MHz, >60dB; 1MHz - 1000MHz, >90dB.
Electrical insulation	> 2 MΩ
Ground system resistance	< 4Ω
Normalised site attenuation (NSA)	< ±4dB, 3m/10m distance, from 30 to 1000 MHz
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. = 30 ˚C
Relative humidity	Min. = 35 %, Max. = 60 %
Shielding effectiveness	0.014MHz - 1MHz, >60dB; 1MHz - 1000MHz, >90dB.
Electrical insulation	> 2 MΩ
Ground system resistance	< 4 Ω

Fully-anechoic chamber did not exceed following limits along the EMC testing

Temperature	Min. = 15 ˚C, Max. = 30 ˚C
Relative humidity	Min. = 35 %, Max. = 60 %
Shielding effectiveness	0.014MHz - 1MHz, >60dB; 1MHz - 1000MHz, >90dB.
Electrical insulation	> 2 MΩ
Ground system resistance	< 4Ω
Voltage Standing Wave Ratio (VSWR)	≤6dB, from 1 to 18 GHz,3m distance

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	2017-03-21	1 year

Radiated emission test system

No.	Equipment	Model	Serial Number	Manufacturer	Calibration Due date	Calibration Period
1	LISN	ESH2-Z5	100196	R&S	2018-01-05	1 year
2	Test Receiver	ESCI	100701	R&S	2017-08-09	1 year
3	Loop Antenna	HLA6120	35779	TESEQ	2019-05-02	3 years
4	BiLog Antenna	VULB9163	9163 330	Schwarzbeck	2017-04-22	3 years
5	Horn Antenna	3117	00066585	ETS-Lindgren	2019-03-05	3 years
6	Test Receiver	ESR7	101675	R&S	2017-07-21	1 year
7	Spectrum Analyzer	FSP 40	100378	R&S	2017-12-15	1 year
8	Chamber	FACT5-2.0	4166	ETS-Lindgren	2018-05-13	3 years

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 -5dBi.
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	Fig.1	7.74	P
	19	Fig.2	8.37	P
	39	Fig.3	8.29	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	-5.50	P
	19	Fig.5	-5.11	P
	39	Fig.6	-5.09	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	725.0	P
	19	Fig.8	724.0	P
	39	Fig.9	725.5	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(μV/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:

GFSK	0	1 GHz ~18 GHz	Fig.22	P
	19	9 kHz ~30 MHz	Fig.23	P
		30 MHz ~1 GHz	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(CH39)	2.45 GHz ~ 2.5 GHz	Fig.29	P

GFSK CH0 (1-18GHz)

Frequency (MHz)	MaxPeak (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Corr. (dB)	Pol
14209.50000	54.53	74.00	19.47	11.3	V
14779.50000	54.68	74.00	19.32	11.9	V
15692.50000	56.87	74.00	17.13	12.7	V
16341.50000	57.55	74.00	16.45	13.4	V
16895.50000	57.63	74.00	16.37	14.0	V
17371.50000	58.10	74.00	15.90	14.0	V

Frequency (MHz)	Average (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Corr. (dB)	Pol
14443.00000	42.52	54.00	11.48	11.6	V
15161.00000	43.48	54.00	10.52	12.1	V
15699.00000	45.54	54.00	8.46	12.7	V
16223.50000	45.71	54.00	8.29	13.1	V
16794.50000	46.79	54.00	7.21	13.9	V
17367.50000	46.04	54.00	7.96	14.0	V

GFSK CH19 (1-18GHz)

Frequency (MHz)	MaxPeak (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Corr. (dB)	Pol
14169.50000	54.13	74.00	19.87	11.2	V
14741.50000	55.04	74.00	18.96	11.9	V
15756.50000	56.77	74.00	17.23	12.8	V
16208.00000	57.90	74.00	16.10	13.1	V
16850.50000	57.63	74.00	16.37	13.9	V
17469.50000	58.24	74.00	15.76	14.0	V

Frequency (MHz)	Average (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Corr. (dB)	Pol
13999.50000	42.62	54.00	11.38	10.8	V
15172.00000	43.43	54.00	10.57	12.1	V
15756.50000	45.66	54.00	8.34	12.8	V
16222.50000	45.95	54.00	8.05	13.1	V
16802.00000	46.74	54.00	7.26	13.9	V
17353.00000	46.06	54.00	7.94	14.0	V

GFSK CH39 (1-18GHz)

Frequency (MHz)	MaxPeak (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Corr. (dB)	Pol
14195.00000	54.55	74.00	19.45	11.3	V
15177.50000	55.83	74.00	18.17	12.2	V
15733.00000	57.48	74.00	16.52	12.7	V
16195.00000	56.45	74.00	17.55	13.1	V
16778.50000	58.08	74.00	15.92	13.9	V
17347.00000	57.79	74.00	16.21	14.0	V

Frequency (MHz)	Average (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Corr. (dB)	Pol
14534.50000	43.37	54.00	10.63	11.9	V
15161.00000	44.25	54.00	9.75	12.1	V
15749.00000	45.48	54.00	8.52	12.8	V
16247.00000	45.73	54.00	8.27	13.2	V
16732.50000	46.43	54.00	7.57	13.8	V
17393.50000	45.82	54.00	8.18	14.0	V

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:

BLE (Quasi-peak Limit)-AE1

Frequency range (MHz)	Quasi-peak Limit (dBμV)	Result (dBμV) Traffic	Conclusion
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.			

BLE (Average Limit)-AE1

Frequency range (MHz)	Average-peak Limit (dBμV)	Result (dBμV) Traffic	Conclusion
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.			

BLE (Quasi-peak Limit)-AE1

Frequency range (MHz)	Quasi-peak Limit (dBμV)	Result (dBμV) Idle	Conclusion
0.15 to 0.5	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.			

BLE (Average Limit)-AE1

Frequency range (MHz)	Average-peak Limit (dBμV)	Result (dBμV) Idle	Conclusion
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.			

BLE (Quasi-peak Limit)-AE2

Frequency range (MHz)	Quasi-peak Limit (dBμV)	Result (dBμV) Traffic	Conclusion
0.15 to 0.5	66 to 56	Fig.32	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)-AE2

Frequency range (MHz)	Average-peak Limit (dBμV)	Result (dBμV) Traffic	Conclusion
0.15 to 0.5	56 to 46	Fig.32	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.			

BLE (Quasi-peak Limit)-AE2

Frequency range (MHz)	Quasi-peak Limit (dBμV)	Result (dBμV) Idle	Conclusion
0.15 to 0.5	66 to 56	Fig.33	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)-AE2

Frequency range (MHz)	Average-peak Limit (dBμV)	Result (dBμV) Idle	Conclusion
0.15 to 0.5	56 to 46	Fig.33	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.			

BLE (Quasi-peak Limit)-AE3

Frequency range (MHz)	Quasi-peak Limit (dBμV)	Result (dBμV) Traffic	Conclusion
0.15 to 0.5	66 to 56	Fig.34	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)-AE3

Frequency range (MHz)	Average-peak Limit (dBμV)	Result (dBμV) Traffic	Conclusion
0.15 to 0.5	56 to 46	Fig.34	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.			

BLE (Quasi-peak Limit)-AE3

Frequency range (MHz)	Quasi-peak Limit (dBμV)	Result (dBμV) Idle	Conclusion
0.15 to 0.5	66 to 56	Fig.35	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)-AE3

Frequency range (MHz)	Average-peak Limit (dBμV)	Result (dBμV) Idle	Conclusion
0.15 to 0.5	56 to 46	Fig.35	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:

BLE (Quasi-peak Limit)-AE1

Frequency range (MHz)	Quasi-peak Limit (dBμV)	Result (dBμV) Traffic	Conclusion
0.15 to 0.5	66 to 56	Fig.36	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 (dBμV)	Result (dBμV) Traffic	Conclusion
0.15 to 0.5	56 to 46	Fig.36	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.			

BLE (Quasi-peak Limit)-AE1

Frequency range (MHz)	Quasi-peak Limit (dBμV)	Result (dBμV) Idle	Conclusion
0.15 to 0.5	66 to 56	Fig.37	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 (dBμV)	Result (dBμV) Idle	Conclusion
0.15 to 0.5	56 to 46	Fig.37	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.			

BLE (Quasi-peak Limit)-AE2

Frequency range (MHz)	Quasi-peak Limit (dBμV)	Result (dBμV) Traffic	Conclusion
0.15 to 0.5	66 to 56	Fig.38	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)-AE2

Frequency range (MHz)	Average-peak Limit (dBμV)	Result (dBμV) Traffic	Conclusion
0.15 to 0.5	56 to 46	Fig.38	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.			

BLE (Quasi-peak Limit)-AE2

Frequency range (MHz)	Quasi-peak Limit (dBμV)	Result (dBμV) Idle	Conclusion
0.15 to 0.5	66 to 56	Fig.39	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)-AE2

Frequency range (MHz)	Average-peak Limit (dBμV)	Result (dBμV) Idle	Conclusion
0.15 to 0.5	56 to 46	Fig.39	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.			

BLE (Quasi-peak Limit)-AE3

Frequency range (MHz)	Quasi-peak Limit (dBμV)	Result (dBμV) Traffic	Conclusion
0.15 to 0.5	66 to 56	Fig.40	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)-AE3

Frequency range (MHz)	Average-peak Limit (dBμV)	Result (dBμV) Traffic	Conclusion
0.15 to 0.5	56 to 46	Fig.40	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.			

BLE (Quasi-peak Limit)-AE3

Frequency range (MHz)	Quasi-peak Limit (dBμV)	Result (dBμV) Idle	Conclusion
0.15 to 0.5	66 to 56	Fig.41	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)-AE3

Frequency range (MHz)	Average-peak Limit (dBμV)	Result (dBμV) Idle	Conclusion
0.15 to 0.5	56 to 46	Fig.41	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

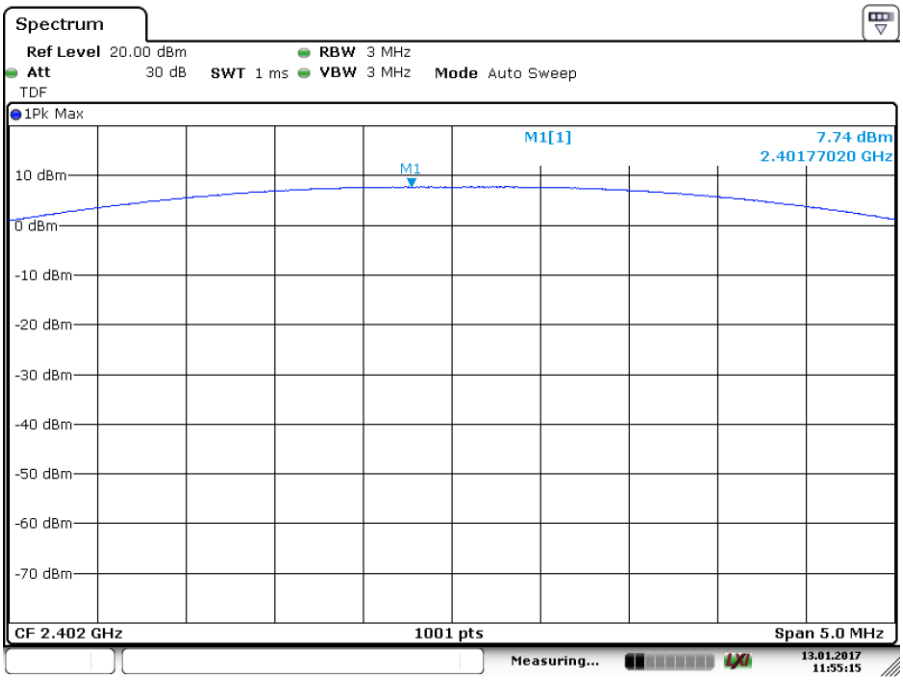


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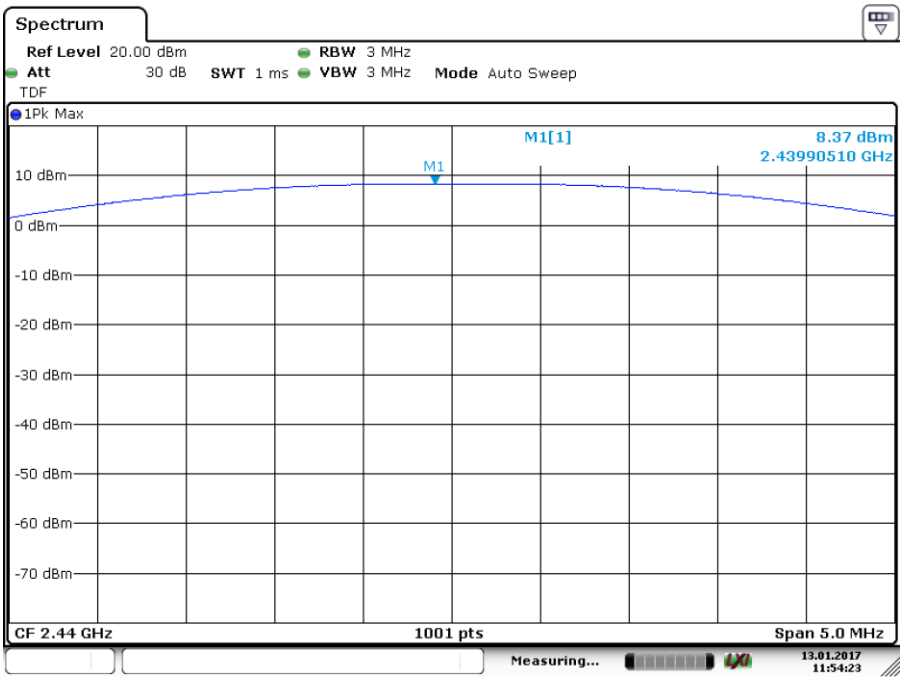
Fig.1 Maximum Peak Output Power(GFSK, Ch 0)



Date: 13.JAN.2017 11:54:23

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

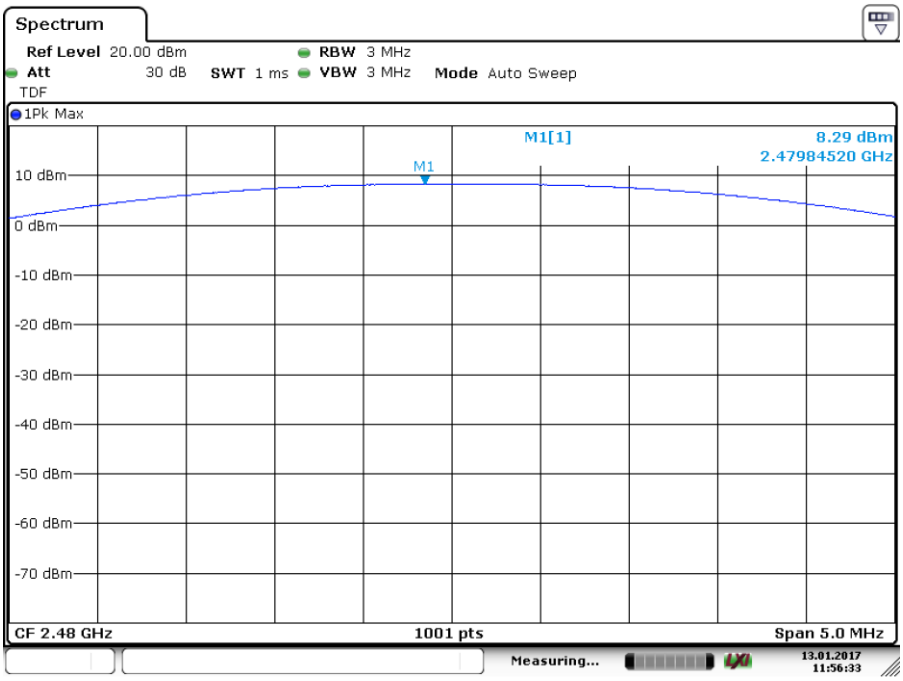


Fig.3 Maximum Peak Output Power(GFSK, Ch 39)

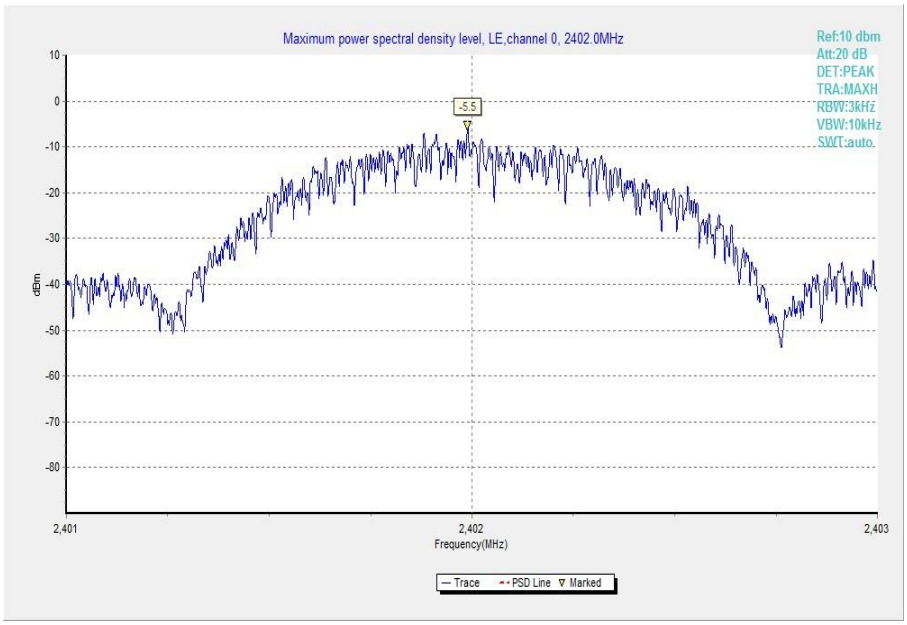


Fig.4 Power Spectral Density (Ch 0)

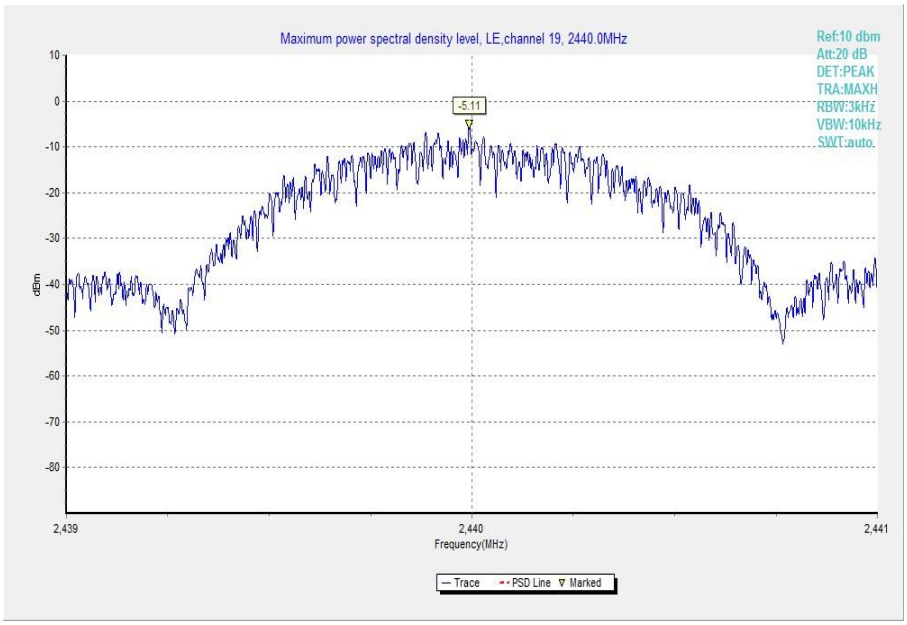


Fig.5 Power Spectral Density (Ch 19)

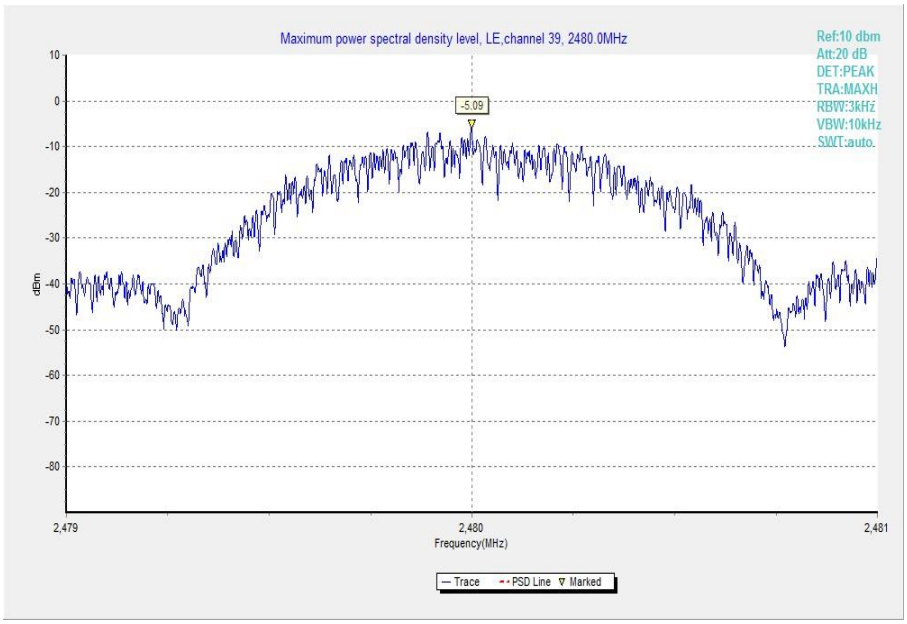


Fig.6 Power Spectral Density (Ch 39)

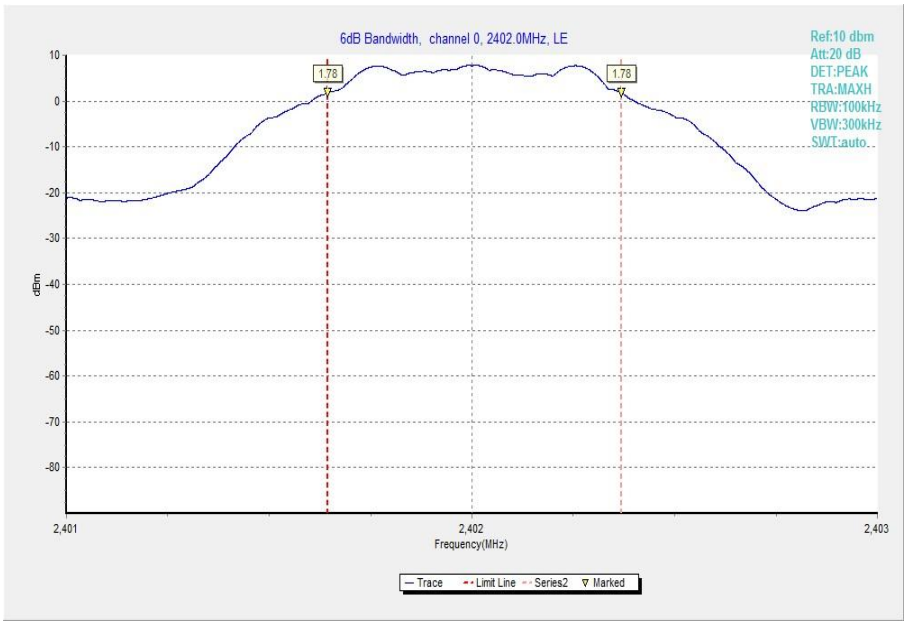


Fig.7 Occupied 6dB Bandwidth (Ch 0)

Fig.8 Occupied 6dB Bandwidth (Ch 19)

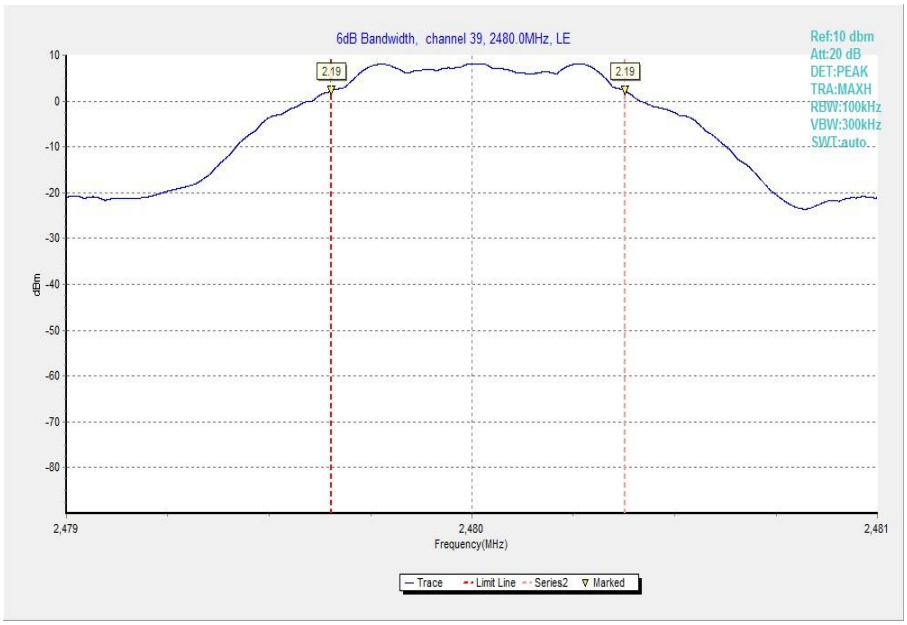


Fig.9 Occupied 6dB Bandwidth (Ch 39)

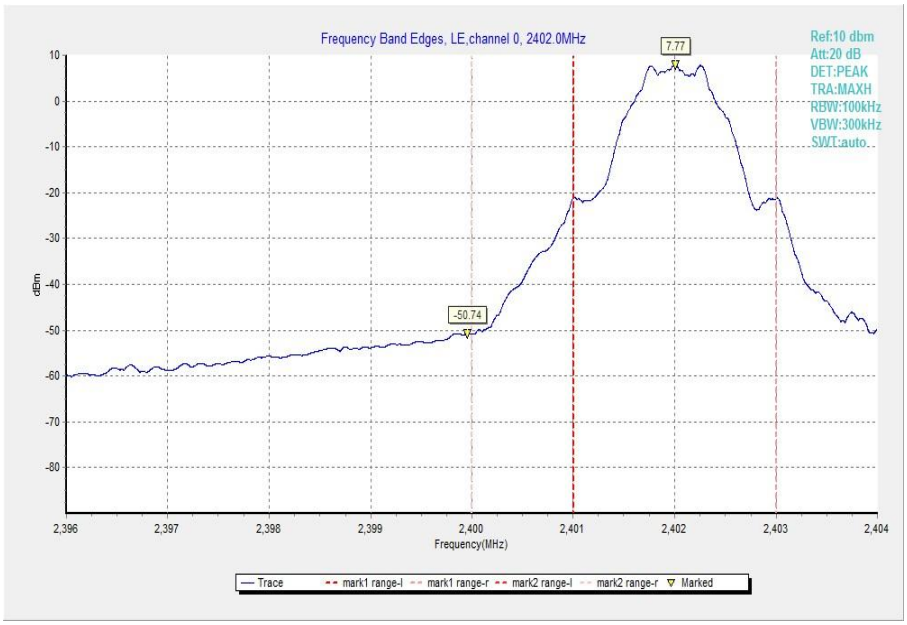


Fig.10 Band Edges (Ch 0)

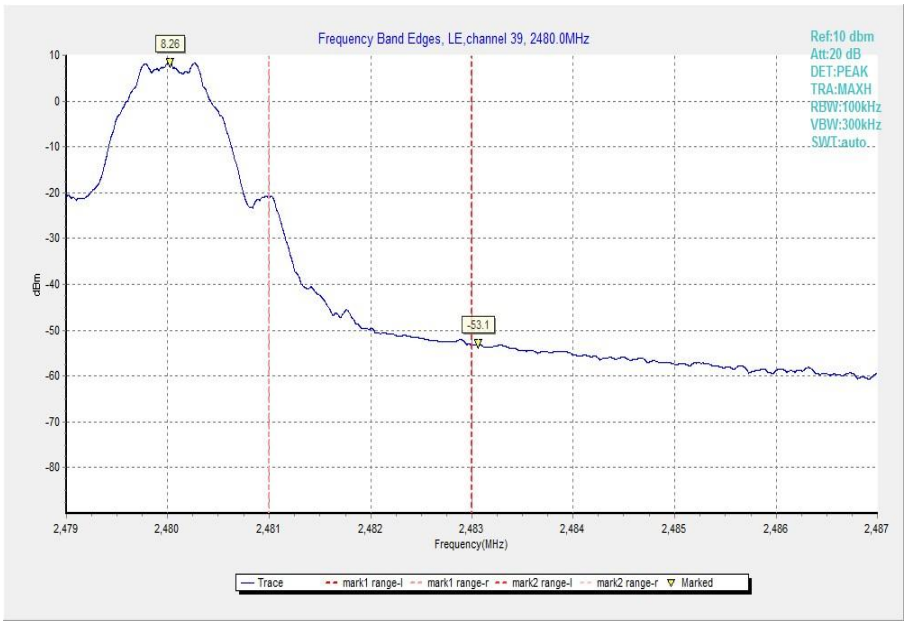


Fig.11 Band Edges (Ch 39)

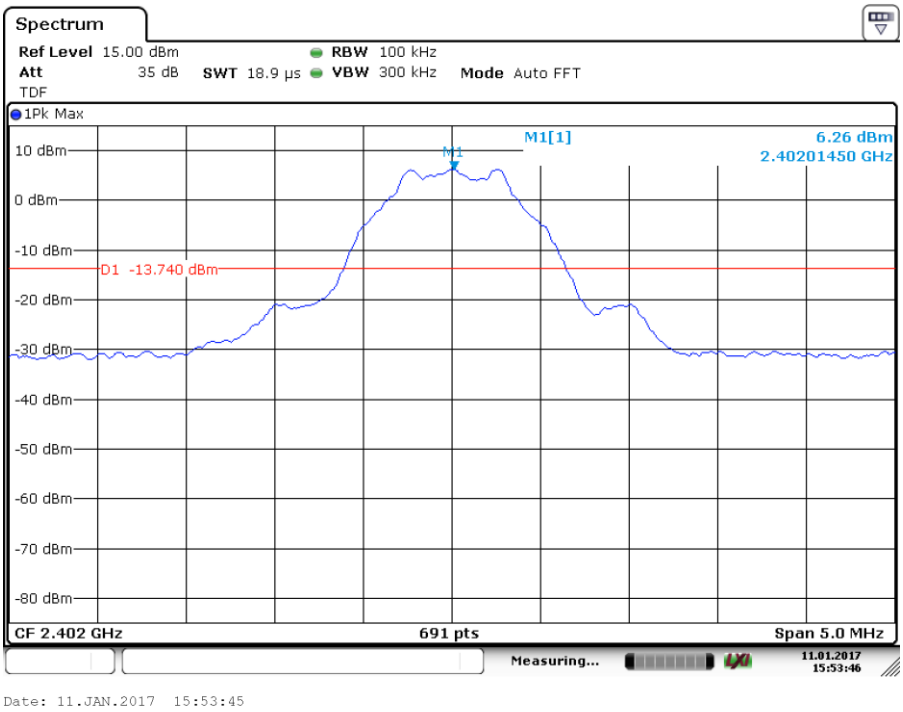


Fig.12 Conducted Spurious Emission (Ch0, Center Frequency)

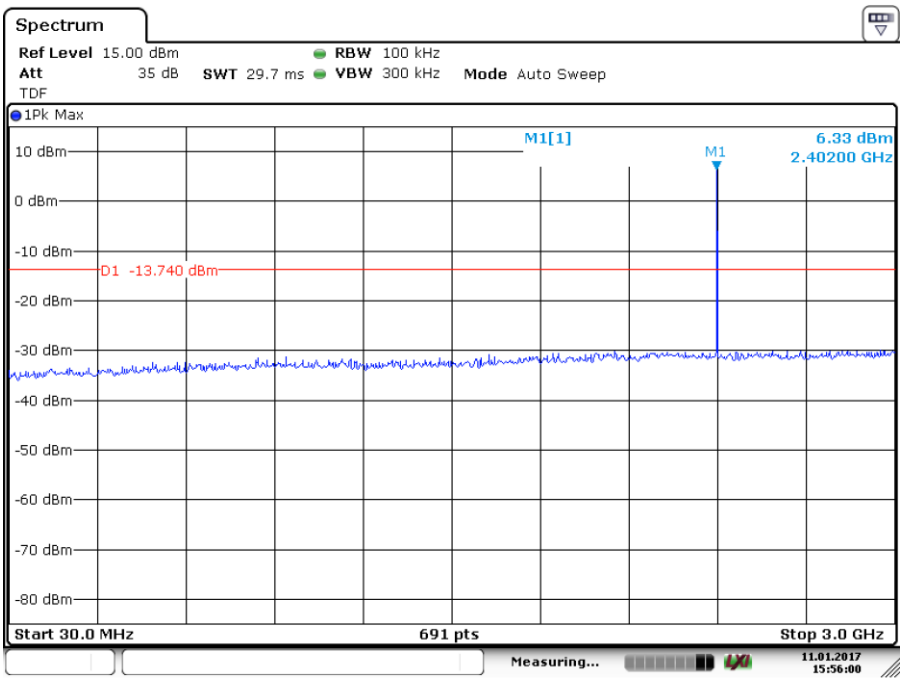


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Fig.13 Conducted Spurious Emission (Ch0, 30 MHz-3 GHz)

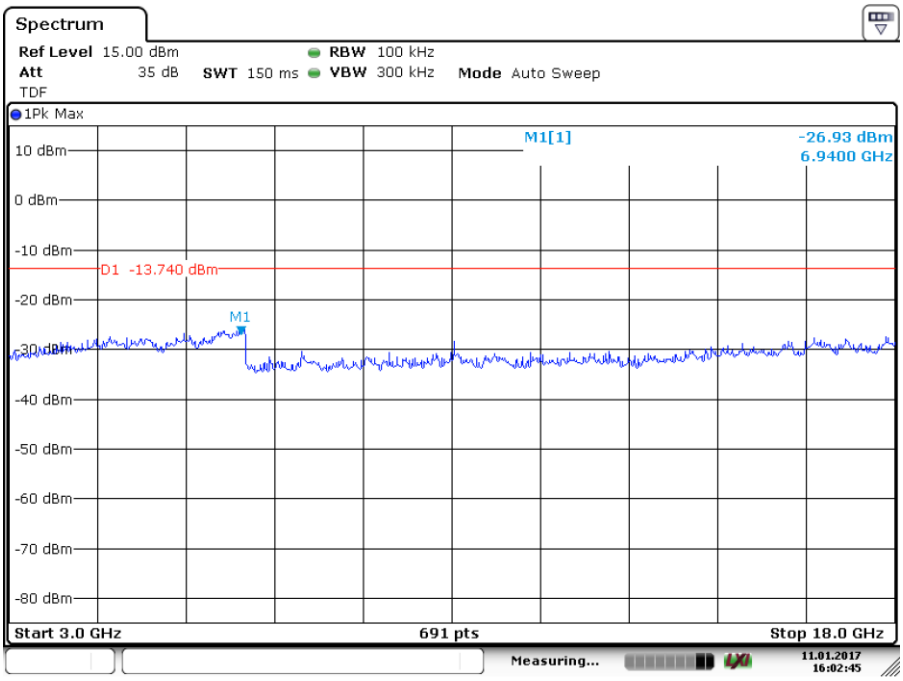

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Fig.14 Conducted Spurious Emission (Ch0, 3 GHz-18 GHz)

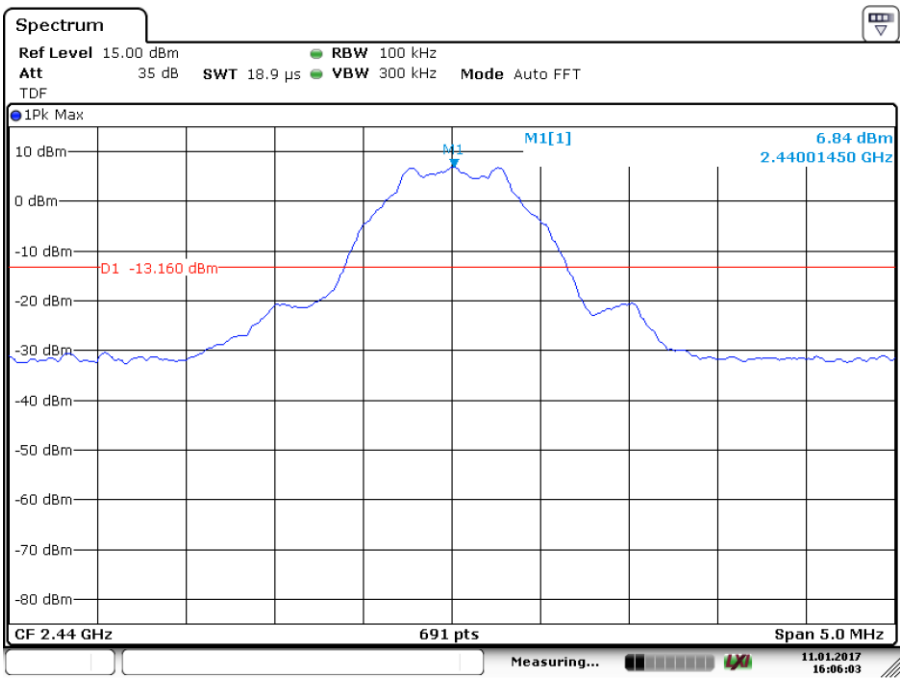

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Fig.15 Conducted Spurious Emission (Ch19, Center Frequency)

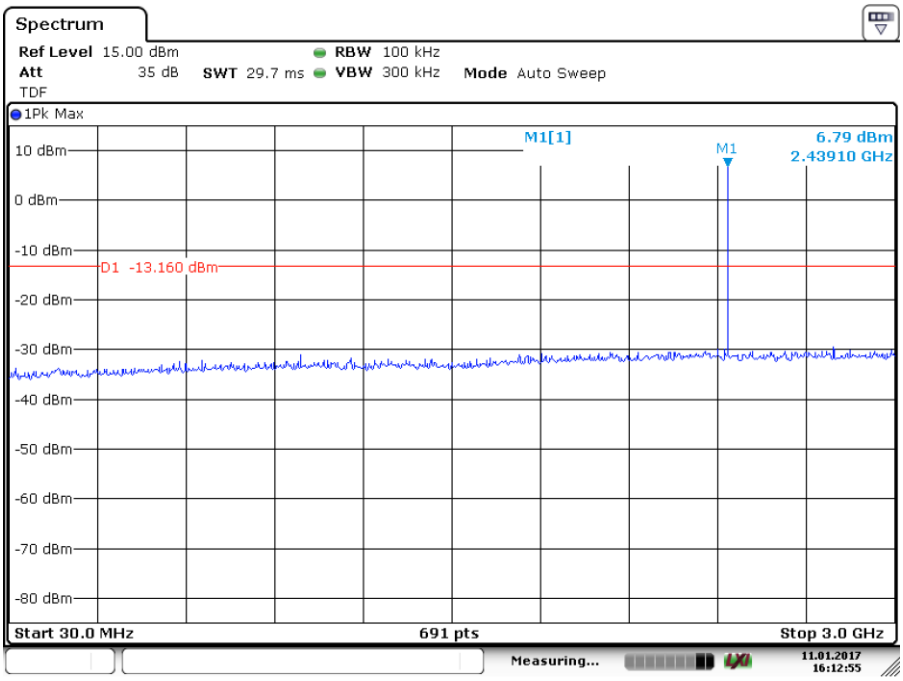

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Fig.16 Conducted Spurious Emission (Ch19, 30 MHz-3 GHz)

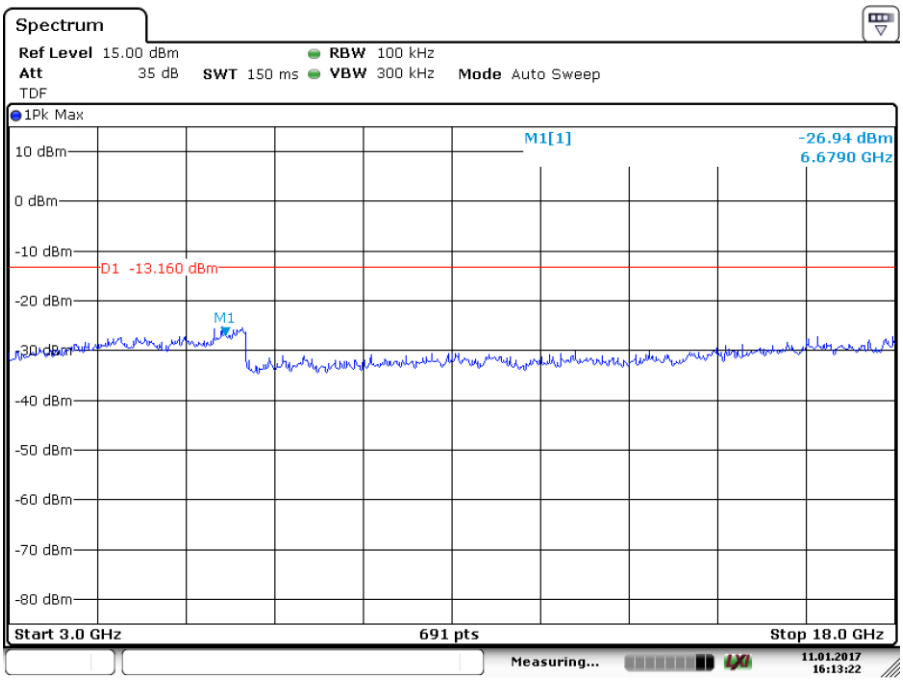

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Fig.17 Conducted Spurious Emission (Ch19, 3 GHz-18 GHz)

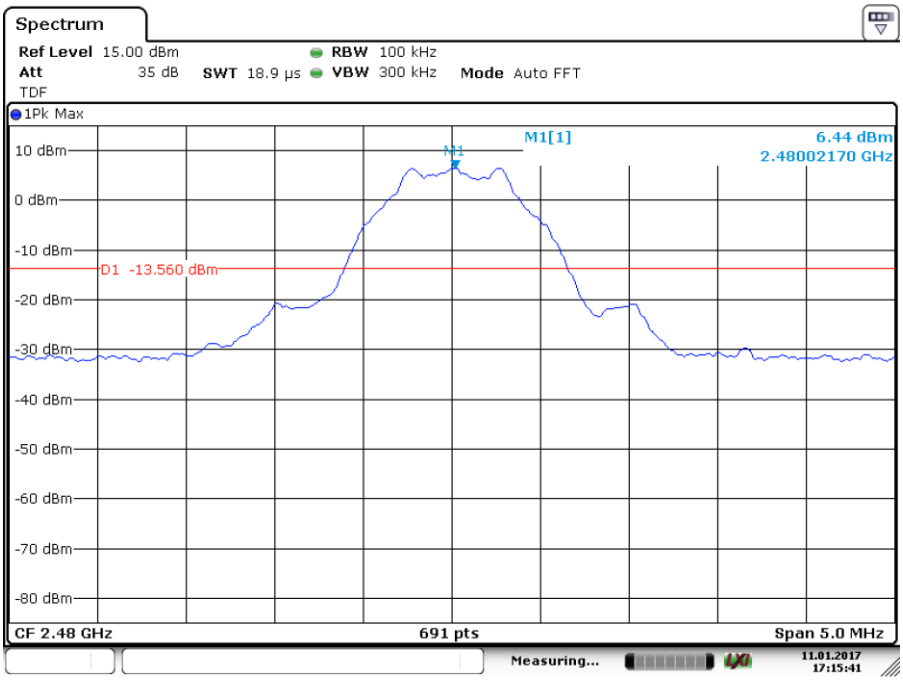

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Fig.18 Conducted Spurious Emission (Ch39, Center Frequency)

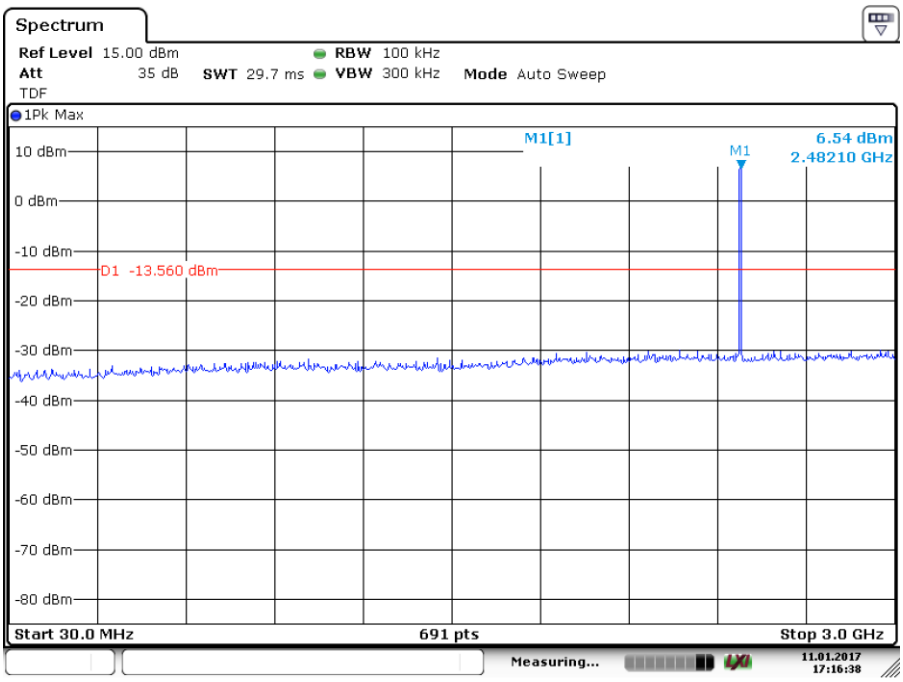

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Fig.19 Conducted Spurious Emission (Ch39, 30 MHz-3 GHz)

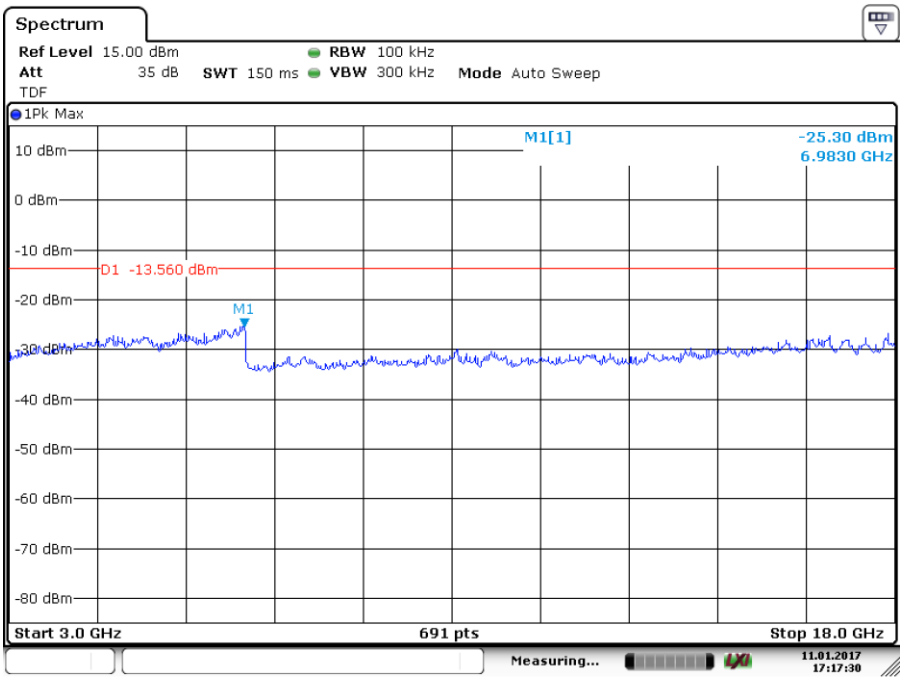

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Fig.20 Conducted Spurious Emission (Ch39, 3 GHz-18 GHz)

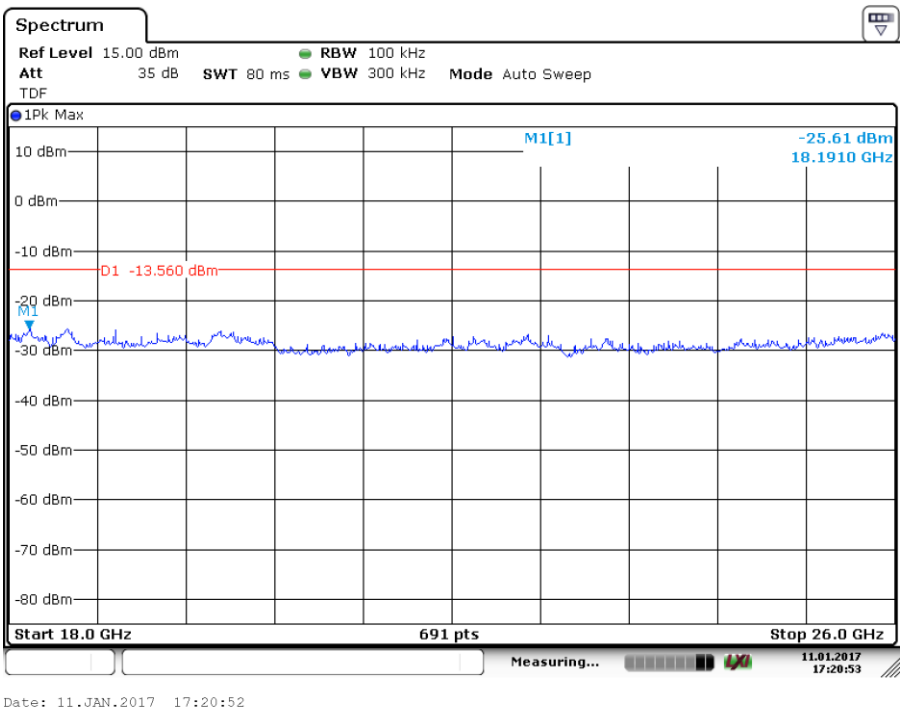

Fig.21 Conducted Spurious Emission (All channels, 18 GHz-26 GHz)

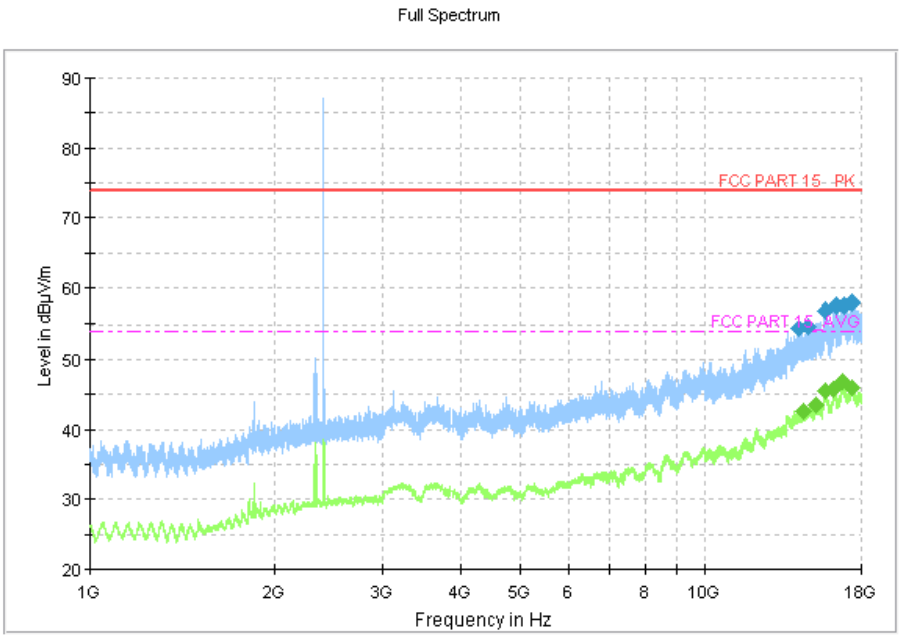

Fig.22 Radiated Spurious Emission (GFSK, Ch0, 1 GHz ~18 GHz)

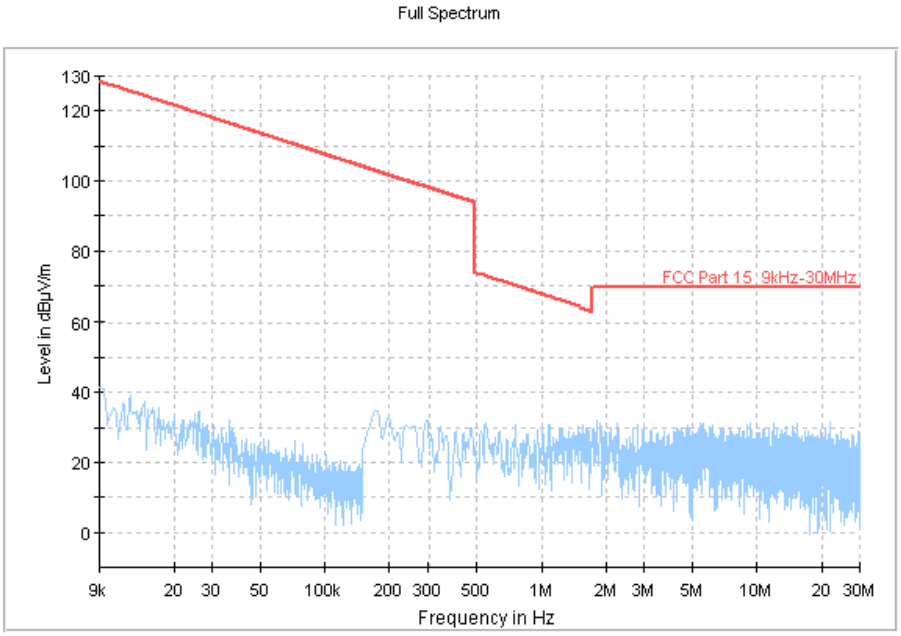

Fig.23 Radiated Spurious Emission (Ch19, 9 kHz-30 MHz)

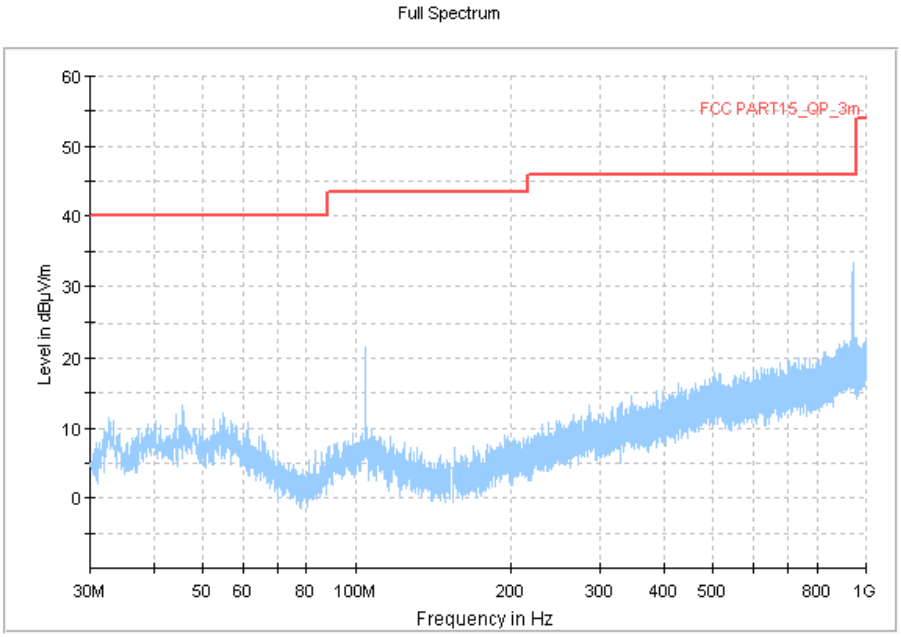

Fig.24 Radiated Spurious Emission (Ch19, 30 MHz-1 GHz)

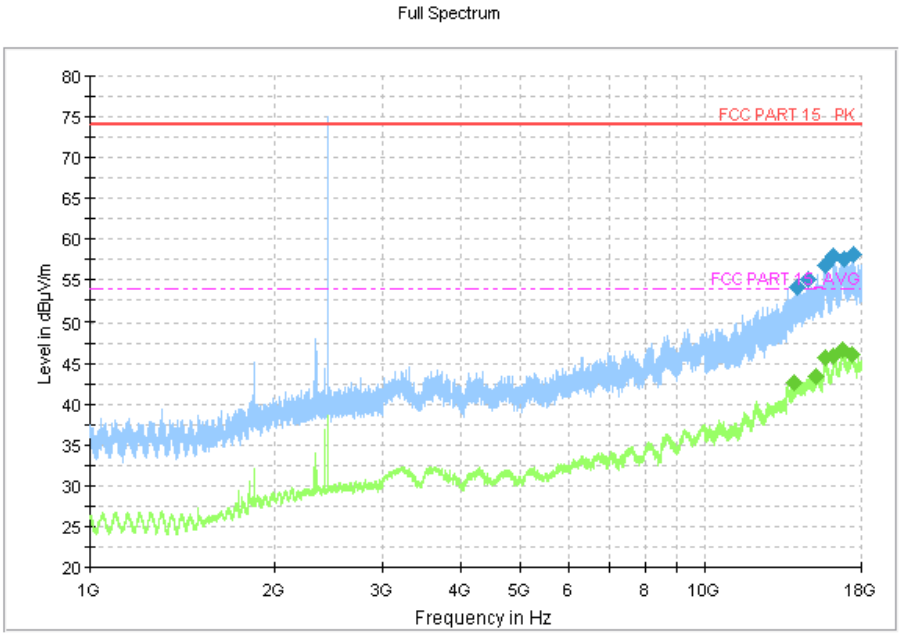

Fig.25 Radiated Spurious Emission (Ch19, 1 GHz- 18 GHz)

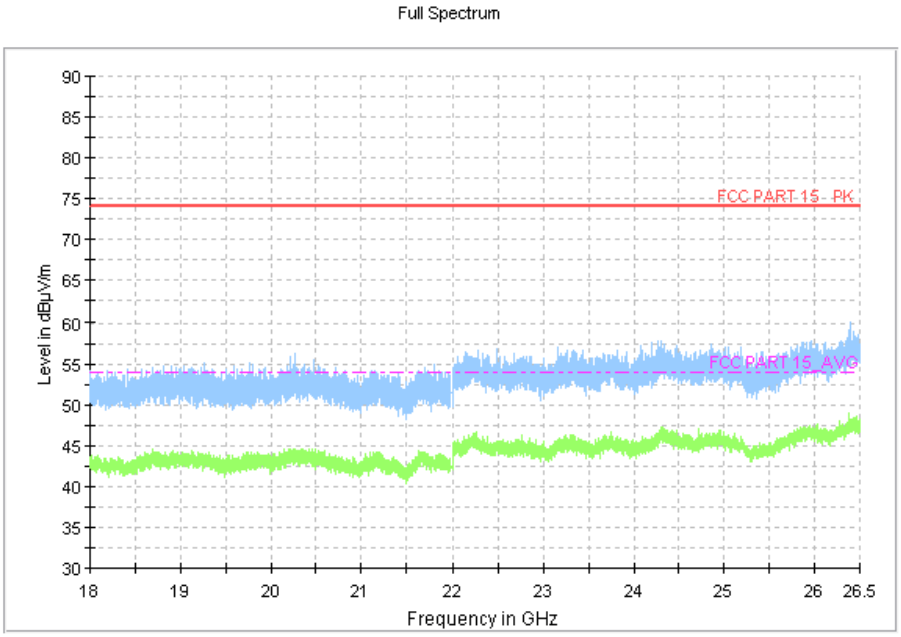

Fig.26 Radiated Spurious Emission (Ch19, 18 GHz-26.5 GHz)

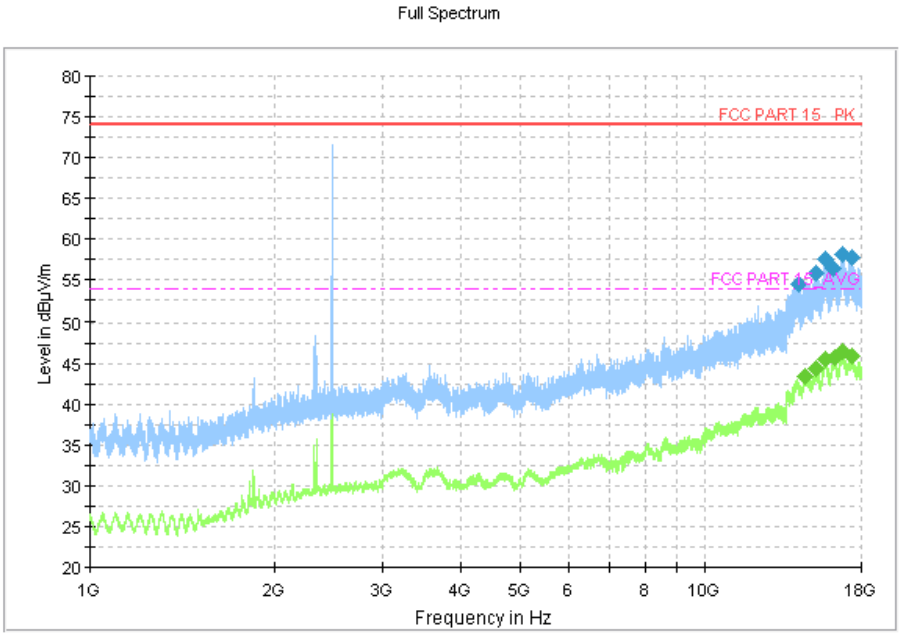

Fig.27 Radiated Spurious Emission (Ch39, 1 GHz-18 GHz)

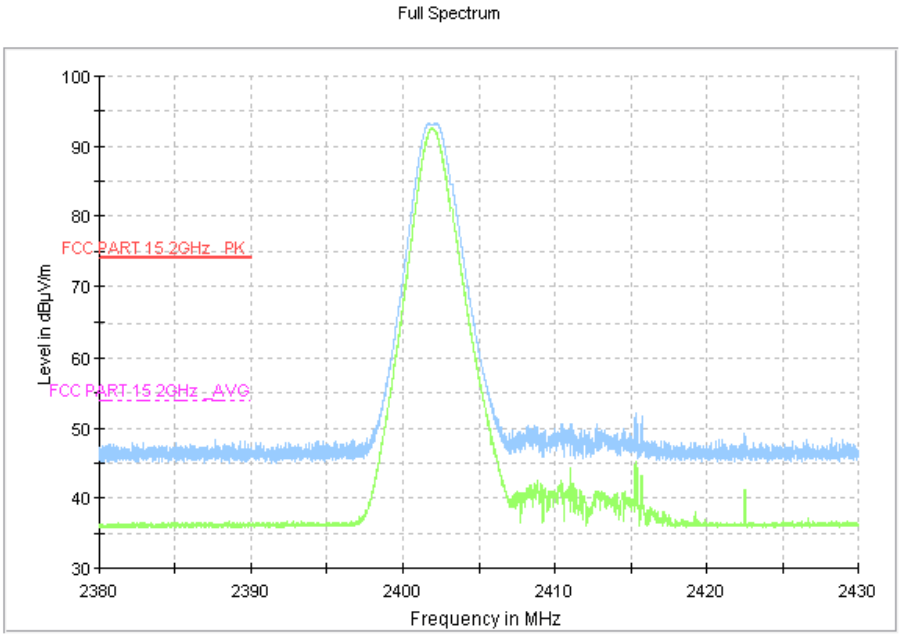

Fig.28 Radiated Emission Power (GFSK, Ch0, 2380GHz~2450GHz)

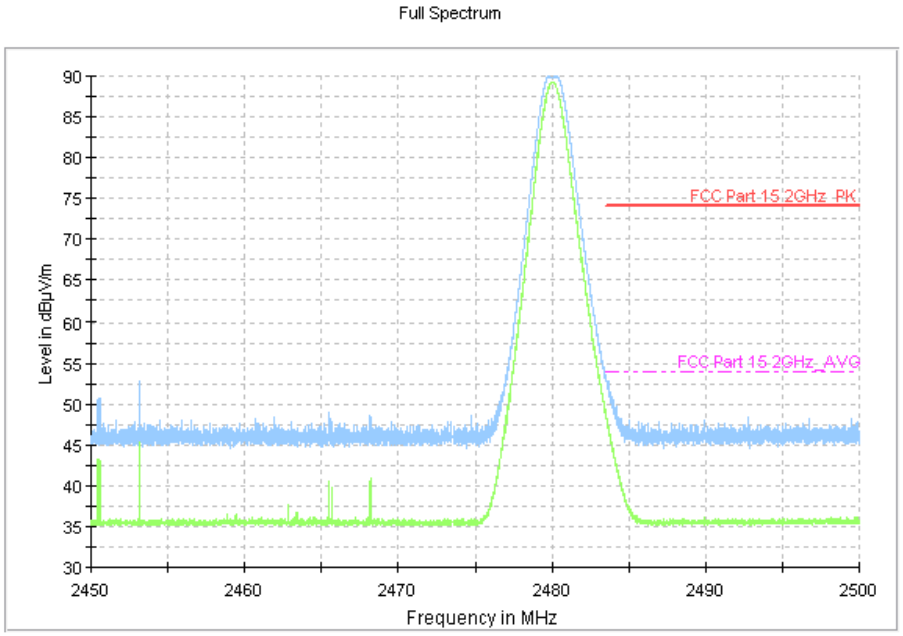

Fig.29 Radiated Emission Power (GFSK, Ch39, 2450GHz~2500GHz)

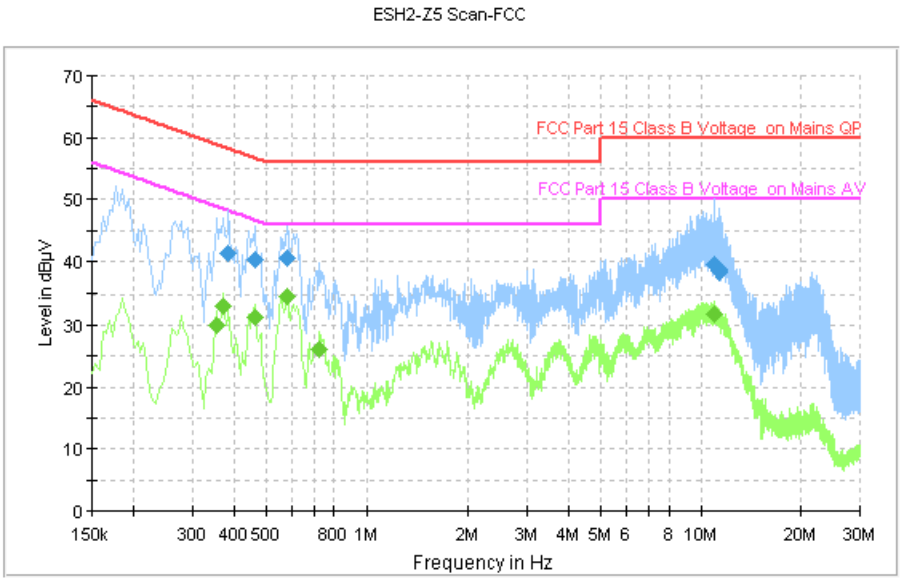

Fig.30 AC Powerline Conducted Emission (Traffic, AE1)

MEASUREMENT RESULT: " QuasiPeak "

Frequency (MHz)	QuasiPeak (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.386000	41.3	GND	N	9.6	16.9	58.1
0.462000	40.2	GND	N	9.7	16.5	56.7
0.578000	40.5	GND	N	9.6	15.5	56.0
10.998000	39.5	GND	N	9.9	20.5	60.0
11.302000	38.5	GND	N	9.9	21.5	60.0
11.366000	38.7	GND	N	9.9	21.3	60.0

MEASUREMENT RESULT: " Average "

Frequency (MHz)	Average (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.354000	30.1	GND	N	9.6	18.8	48.9
0.370000	32.9	GND	N	9.6	15.6	48.5
0.462000	31.3	GND	N	9.7	15.3	46.7
0.578000	34.7	GND	N	9.6	11.3	46.0
0.722000	26.0	GND	N	9.5	20.0	46.0
11.014000	31.8	GND	N	9.9	18.2	50.0

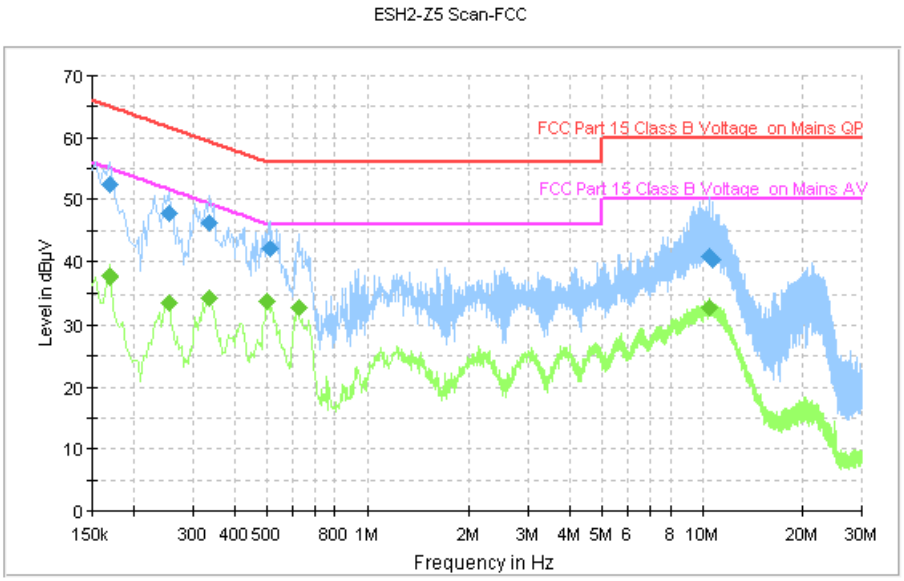

Fig.31 AC Power line Conducted Emission (Idle, AE1)

MEASUREMENT RESULT: " QuasiPeak "

Frequency (MHz)	QuasiPeak (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.170000	52.4	GND	N	9.6	12.6	65.0
0.254000	47.8	GND	N	9.6	13.9	61.6
0.338000	46.2	GND	N	9.6	13.1	59.3
0.514000	42.2	GND	N	9.7	13.8	56.0
10.534000	40.8	GND	N	9.9	19.2	60.0
10.694000	40.2	GND	N	9.9	19.8	60.0

MEASUREMENT RESULT: " Average "

Frequency (MHz)	Average (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.170000	37.6	GND	N	9.6	17.4	55.0
0.254000	33.5	GND	N	9.6	18.1	51.6
0.338000	34.2	GND	N	9.6	15.0	49.3
0.502000	33.8	GND	N	9.7	12.2	46.0
0.622000	32.8	GND	N	9.6	13.2	46.0
10.518000	32.8	GND	N	9.9	17.2	50.0

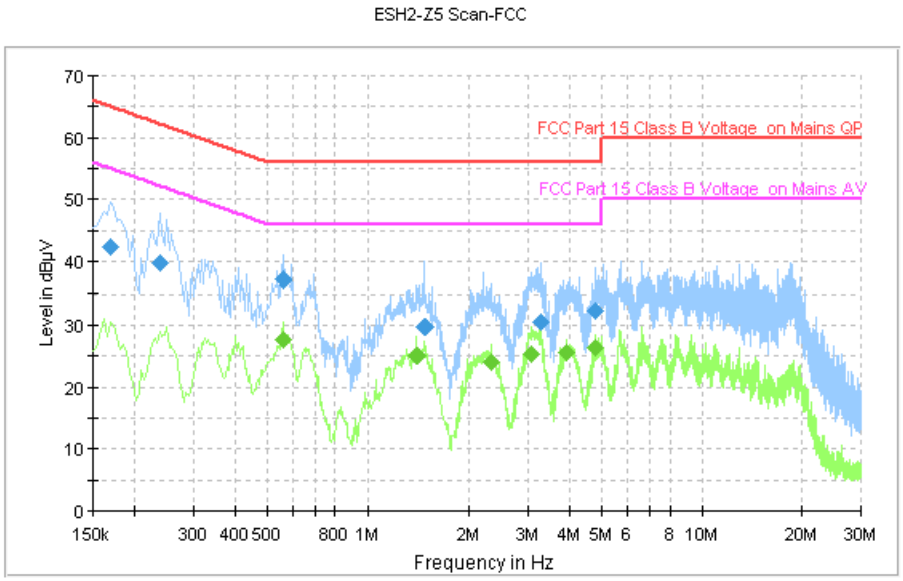

Fig.32 AC Powerline Conducted Emission (Traffic, AE2)

MEASUREMENT RESULT: " QuasiPeak "

Frequency (MHz)	QuasiPeak (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.170000	42.3	GND	N	9.6	22.6	65.0
0.238000	39.9	GND	N	9.6	22.3	62.2
0.562000	37.1	GND	N	9.7	18.9	56.0
1.482000	29.8	GND	N	9.6	26.2	56.0
3.278000	30.5	GND	N	9.6	25.5	56.0
4.790000	32.2	GND	N	9.6	23.8	56.0

MEASUREMENT RESULT: " Average "

Frequency (MHz)	Average (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.558000	27.6	GND	N	9.7	18.4	46.0
1.402000	25.1	GND	N	9.6	20.9	46.0
2.330000	24.0	GND	N	9.6	22.0	46.0
3.062000	25.2	GND	N	9.6	20.8	46.0
3.930000	25.6	GND	N	9.6	20.4	46.0
4.798000	26.4	GND	N	9.6	19.6	46.0

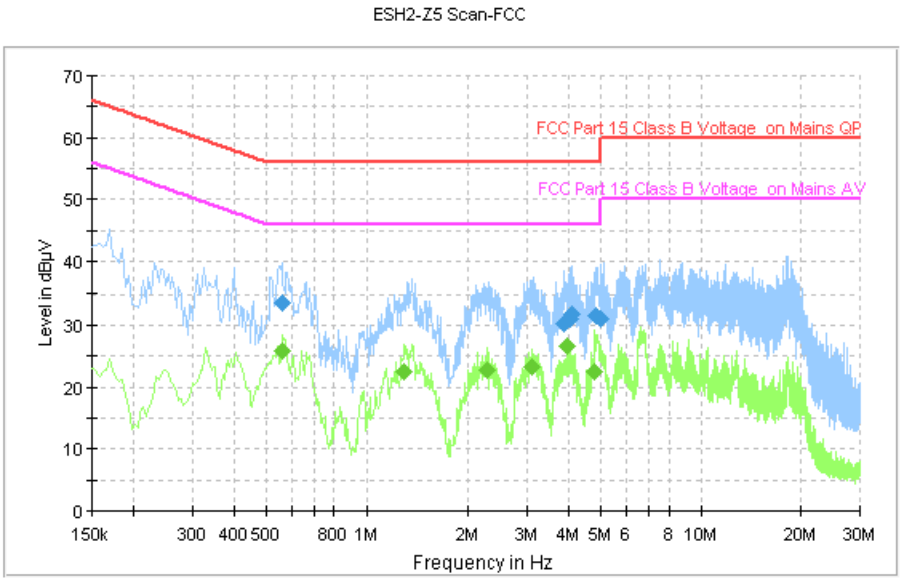

Fig.33 AC Power line Conducted Emission (Idle, AE2)

MEASUREMENT RESULT: " QuasiPeak "

Frequency (MHz)	QuasiPeak (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.558000	33.6	GND	N	9.7	22.4	56.0
3.870000	30.3	GND	N	9.6	25.7	56.0
4.050000	31.0	GND	N	9.6	25.0	56.0
4.086000	31.7	GND	N	9.6	24.3	56.0
4.822000	31.4	GND	N	9.6	24.6	56.0
4.978000	31.0	GND	N	9.6	25.0	56.0

MEASUREMENT RESULT: " Average "

Frequency (MHz)	Average (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.562000	25.8	GND	N	9.7	20.2	46.0
1.298000	22.5	GND	N	9.6	23.6	46.0
2.290000	22.7	GND	N	9.6	23.3	46.0
3.118000	23.2	GND	N	9.6	22.8	46.0
3.950000	26.7	GND	N	9.6	19.3	46.0
4.786000	22.4	GND	N	9.6	23.6	46.0

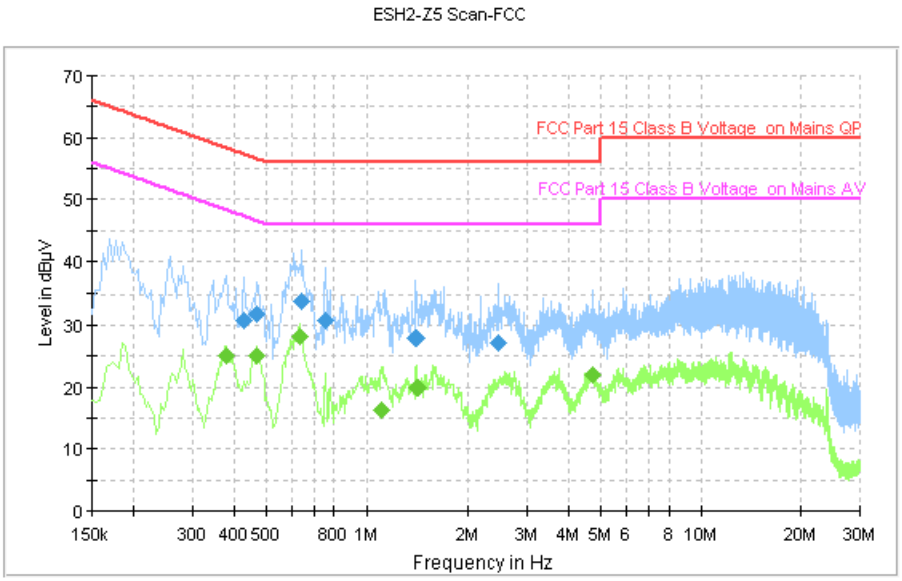

Fig.34 AC Powerline Conducted Emission (Traffic, AE3)

MEASUREMENT RESULT: " QuasiPeak "

Frequency (MHz)	QuasiPeak (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.430000	30.8	GND	N	9.7	26.4	57.3
0.470000	31.8	GND	N	9.7	24.7	56.5
0.642000	33.9	GND	N	9.6	22.1	56.0
0.754000	30.7	GND	N	9.6	25.3	56.0
1.406000	27.9	GND	N	9.5	28.2	56.0
2.466000	27.2	GND	N	9.6	28.8	56.0

MEASUREMENT RESULT: " Average "

Frequency (MHz)	Average (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.378000	25.0	GND	N	9.6	23.4	48.3
0.470000	25.0	GND	N	9.7	21.6	46.5
0.630000	28.2	GND	N	9.6	17.8	46.0
1.106000	16.3	GND	N	9.6	29.7	46.0
1.410000	19.8	GND	N	9.5	26.2	46.0
4.714000	22.0	GND	N	9.6	24.0	46.0

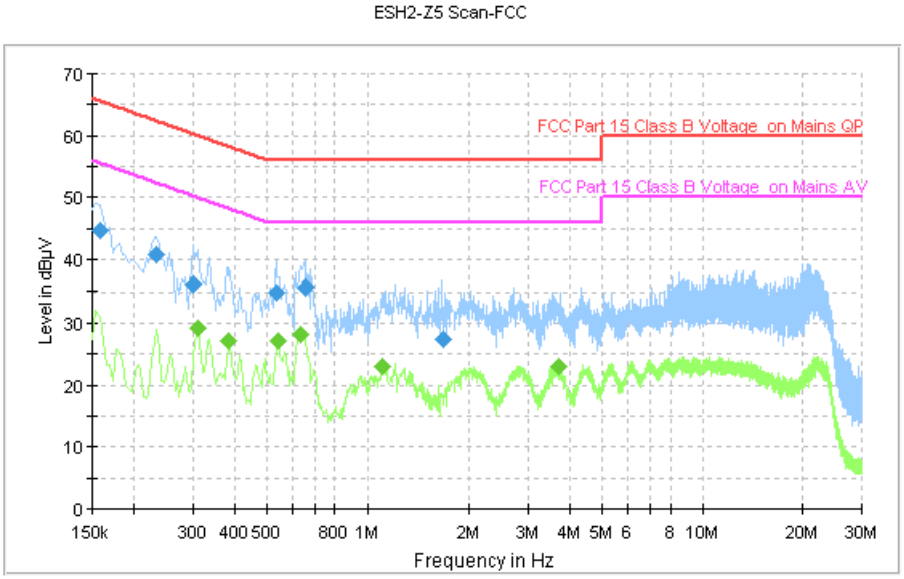

Fig.35 AC Power line Conducted Emission (Idle, AE3)

MEASUREMENT RESULT: " QuasiPeak "

Frequency (MHz)	QuasiPeak (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.158000	44.8	GND	N	9.6	20.8	65.6
0.234000	40.8	GND	N	9.6	21.6	62.3
0.302000	36.3	GND	N	9.6	23.9	60.2
0.534000	34.9	GND	N	9.7	21.1	56.0
0.650000	35.8	GND	N	9.6	20.2	56.0
1.670000	27.3	GND	N	9.5	28.7	56.0

MEASUREMENT RESULT: " Average "

Frequency (MHz)	Average (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.310000	29.1	GND	N	9.6	20.9	50.0
0.386000	27.1	GND	N	9.6	21.1	48.1
0.542000	27.1	GND	N	9.7	18.9	46.0
0.630000	28.2	GND	N	9.6	17.8	46.0
1.106000	22.9	GND	N	9.6	23.1	46.0
3.714000	23.0	GND	N	9.6	23.0	46.0

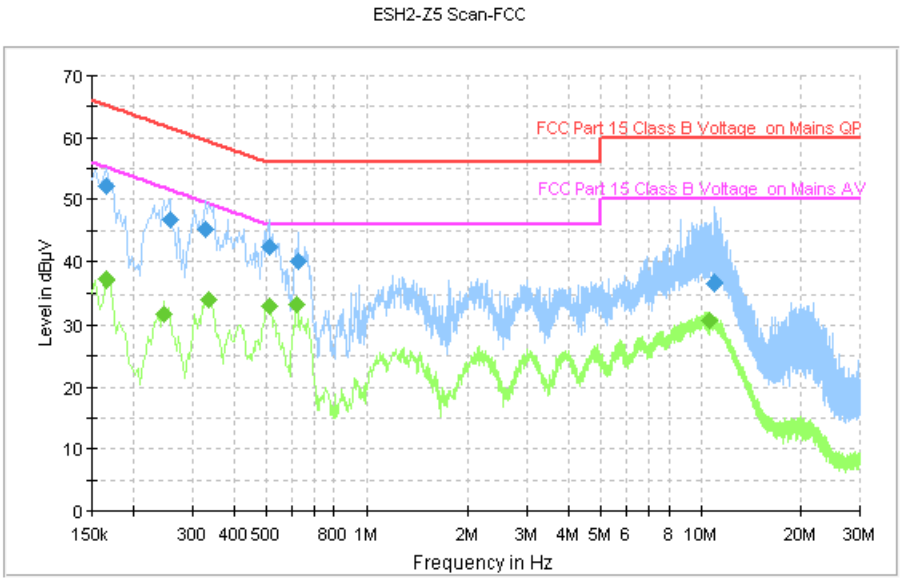

Fig.36 AC Powerline Conducted Emission (Traffic, AE1)

MEASUREMENT RESULT: " QuasiPeak "

Frequency (MHz)	QuasiPeak (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.166000	52.1	GND	N	9.6	13.1	65.2
0.258000	46.7	GND	N	9.6	14.8	61.5
0.330000	45.1	GND	N	9.6	14.3	59.5
0.514000	42.5	GND	N	9.7	13.5	56.0
0.622000	40.1	GND	N	9.6	15.9	56.0
10.926000	36.8	GND	N	9.9	23.2	60.0

MEASUREMENT RESULT: " Average "

Frequency (MHz)	Average (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.166000	37.2	GND	N	9.6	17.9	55.2
0.246000	31.7	GND	N	9.6	20.2	51.9
0.338000	34.0	GND	N	9.6	15.2	49.3
0.514000	33.2	GND	N	9.7	12.8	46.0
0.618000	33.3	GND	N	9.6	12.7	46.0
10.650000	30.8	GND	N	9.9	19.2	50.0

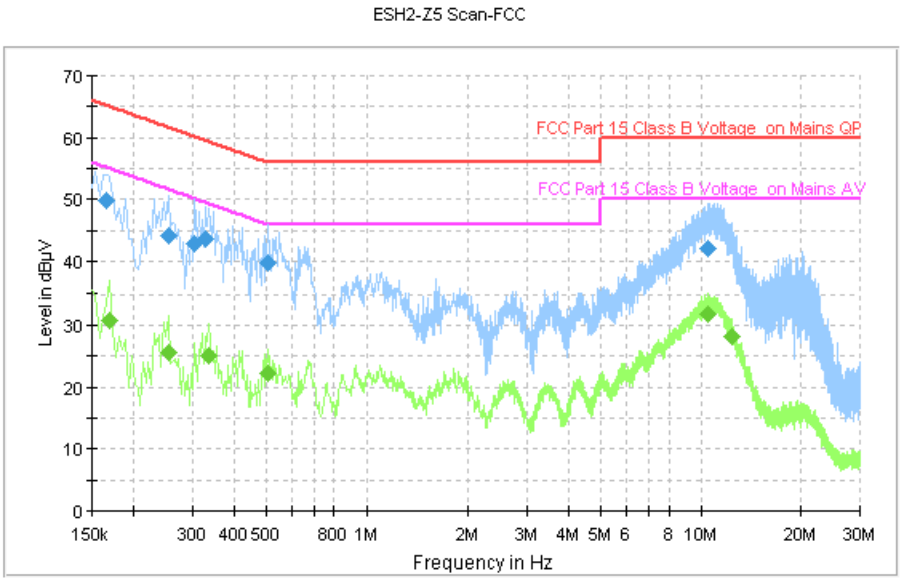

Fig.37 AC Power line Conducted Emission (Idle, AE1)

MEASUREMENT RESULT: " QuasiPeak "

Frequency (MHz)	QuasiPeak (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.166000	49.8	GND	N	9.6	15.3	65.2
0.254000	44.3	GND	N	9.6	17.4	61.6
0.306000	42.9	GND	N	9.6	17.2	60.1
0.330000	43.6	GND	N	9.6	15.9	59.5
0.506000	39.7	GND	N	9.7	16.3	56.0
10.450000	42.2	GND	N	9.9	17.8	60.0

MEASUREMENT RESULT: " Average "

Frequency (MHz)	Average (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.170000	30.7	GND	N	9.6	24.2	55.0
0.254000	25.5	GND	N	9.6	26.1	51.6
0.338000	25.1	GND	N	9.6	24.2	49.3
0.506000	22.1	GND	N	9.7	23.9	46.0
10.450000	31.8	GND	N	9.9	18.2	50.0
12.406000	28.1	GND	N	9.9	21.9	50.0

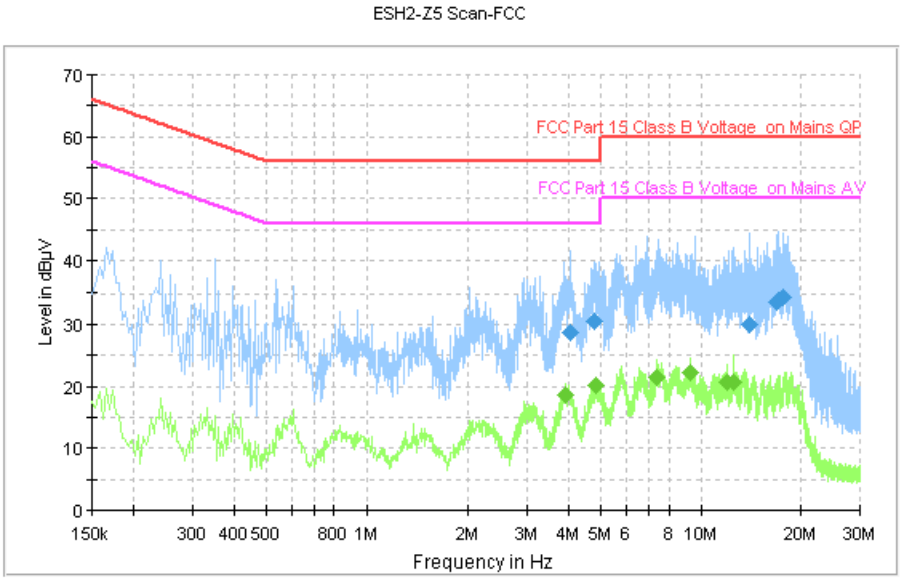

Fig.38 AC Powerline Conducted Emission (Traffic, AE2)

MEASUREMENT RESULT: " QuasiPeak "

Frequency (MHz)	QuasiPeak (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
4.054000	28.7	GND	N	9.6	27.3	56.0
4.802000	30.5	GND	N	9.6	25.5	56.0
14.006000	29.8	GND	N	9.9	30.2	60.0
16.938000	33.6	GND	N	9.9	26.4	60.0
16.986000	33.9	GND	N	9.9	26.1	60.0
17.670000	34.5	GND	N	9.9	25.5	60.0

MEASUREMENT RESULT: " Average "

Frequency (MHz)	Average (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
3.938000	18.6	GND	N	9.6	27.4	46.0
4.810000	20.1	GND	N	9.6	25.9	46.0
7.350000	21.4	GND	N	9.8	28.6	50.0
9.258000	22.2	GND	N	9.8	27.8	50.0
11.950000	20.6	GND	N	9.9	29.4	50.0
12.538000	20.6	GND	N	9.9	29.4	50.0

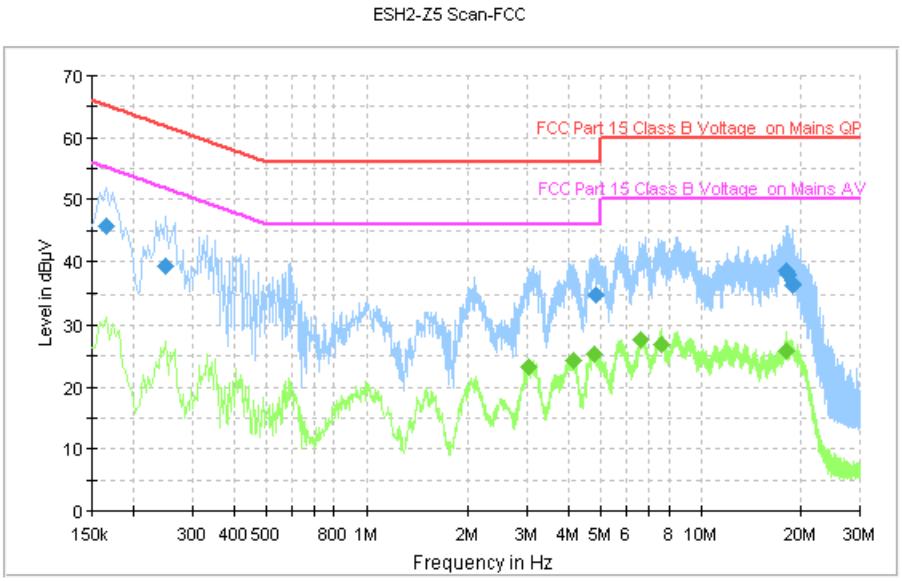

Fig.39 AC Power line Conducted Emission (Idle, AE2)

MEASUREMENT RESULT: " QuasiPeak "

Frequency (MHz)	QuasiPeak (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.166000	45.8	GND	N	9.6	19.4	65.2
0.250000	39.2	GND	N	9.6	22.5	61.8
4.830000	34.9	GND	N	9.6	21.1	56.0
18.050000	38.4	GND	N	9.9	21.6	60.0
18.306000	37.9	GND	N	9.9	22.1	60.0
18.762000	36.4	GND	N	9.9	23.6	60.0

MEASUREMENT RESULT: " Average "

Frequency (MHz)	Average (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
3.054000	23.3	GND	N	9.6	22.7	46.0
4.130000	24.3	GND	N	9.6	21.7	46.0
4.774000	25.4	GND	N	9.6	20.6	46.0
6.614000	27.7	GND	N	9.7	22.3	50.0
7.630000	27.0	GND	N	9.8	23.0	50.0
18.038000	25.8	GND	N	9.9	24.2	50.0

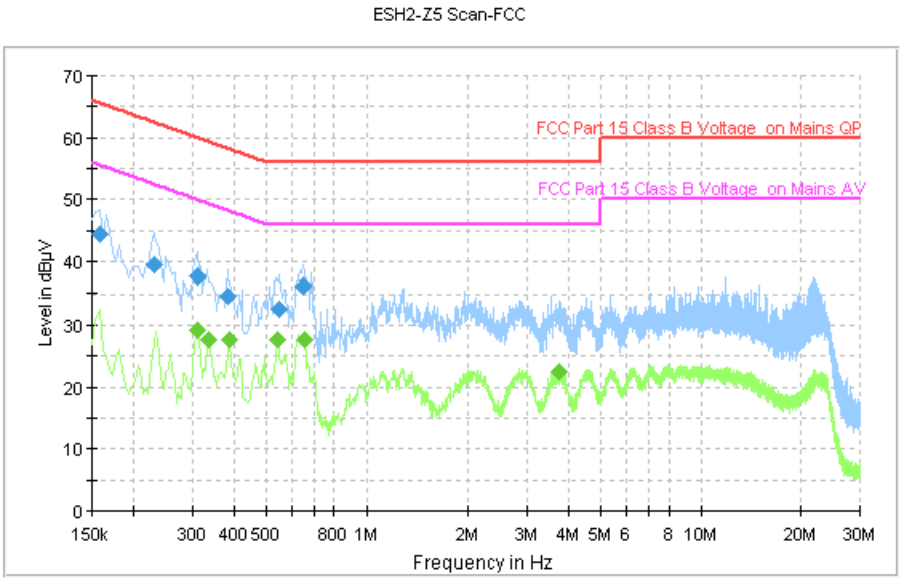

Fig.40 AC Powerline Conducted Emission (Traffic, AE3)

MEASUREMENT RESULT: " QuasiPeak "

Frequency (MHz)	QuasiPeak (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.158000	44.3	GND	N	9.6	21.3	65.6
0.230000	39.6	GND	N	9.6	22.9	62.4
0.310000	37.7	GND	N	9.6	22.2	60.0
0.382000	34.7	GND	N	9.6	23.5	58.2
0.550000	32.5	GND	N	9.7	23.5	56.0
0.646000	36.2	GND	N	9.6	19.8	56.0

MEASUREMENT RESULT: " Average "

Frequency (MHz)	Average (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.310000	29.2	GND	N	9.6	20.7	50.0
0.338000	27.6	GND	N	9.6	21.7	49.3
0.390000	27.6	GND	N	9.6	20.4	48.1
0.542000	27.7	GND	N	9.7	18.3	46.0
0.650000	27.5	GND	N	9.6	18.5	46.0
3.742000	22.5	GND	N	9.6	23.5	46.0

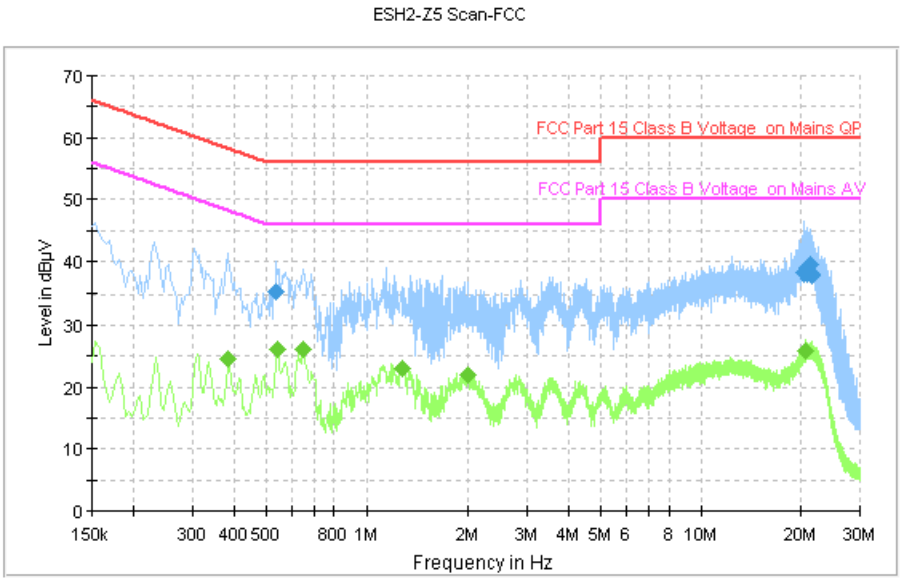

Fig.41 AC Power line Conducted Emission (Idle, AE3)

MEASUREMENT RESULT: " QuasiPeak "

Frequency (MHz)	QuasiPeak (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.538000	35.4	GND	N	9.7	20.6	56.0
20.310000	38.2	GND	N	10.0	21.8	60.0
20.826000	38.9	GND	N	10.0	21.1	60.0
20.926000	38.2	GND	N	10.0	21.8	60.0
21.202000	39.5	GND	N	10.0	20.5	60.0
21.438000	37.9	GND	N	10.0	22.1	60.0

MEASUREMENT RESULT: " Average "

Frequency (MHz)	Average (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.386000	24.4	GND	N	9.6	23.7	48.1
0.542000	26.0	GND	N	9.7	20.0	46.0
0.646000	26.2	GND	N	9.6	19.8	46.0
1.278000	23.1	GND	N	9.6	22.9	46.0
1.994000	22.0	GND	N	9.6	24.0	46.0
20.634000	25.8	GND	N	10.0	24.2	50.0

ANNEX C: Persons involved in this testing

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

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