FCC - TEST REPORT

Report Number	:	**68.930.16.031.01**	Date of Issue:	November 14, 2016
Model	:	**AW-S100**		
Product Type	:	Sense Smart Scale		
Applicant	:	Actxa Pte Ltd		
Address	:	10, Eunos Road 8, #13-08, Singapore Post Centre, Singapore 408600, SINGAPORE		
Production Facility	:	Zhongshan Lifesense Electronics Co., Ltd		
Address	:	No.23 Jin'an Road, Minzhong, 528441 Zhongshan, Guangdong PEOPLE'S REPUBLIC OF CHINA		
Test Result	:	■ **Positive** ☐ **Negative**		
Total pages including Appendices	:	**26**		

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2 Details about the Test Laboratory

Details about the Test Laboratory
Test Site 1

Company name:	TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch Building 12&13, Zhiheng Wisdomland Business Park, Nantou Checkpoint Road 2, Nanshan District, Shenzhen City, 518052, P. R. China
IC Registration No.:	10320A -1
FCC Registration No.:	502708
Telephone:	86 755 8828 6998
Fax:	86 755 8828 5299

3 Description of the Equipment Under Test

Product:	Sense Smart Scale
Model no.:	AW-S100
FCC ID:	2AIPCAW-S100
Options and accessories:	Nil
Rating:	6.0VDC (Supplied by 4*1.5VDC “AAA“ Batteries)
RF Transmission Frequency:	2402MHz-2480MHz
No. of Operated Channel:	40
Modulation:	GFSK
Antenna Type:	Integrated antenna
Antenna Gain:	0dBi
Description of the EUT:	The Equipment Under Test (EUT) is Sense Smart Scale operated at 2.4GHz

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4 Summary of Test Standards

Test Standards	
FCC Part 15 Subpart C 10-1-2015 Edition	PART 15 - RADIO FREQUENCY DEVICES Subpart C - Intentional Radiators

All the test methods were according to FCC KDB 558074 DTS Meas Guidance and ANSI C63.10-2013.

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5 Summary of Test Results

Technical Requirements			
FCC Part 15 Subpart C			
Test Condition		Pages	Test Result
§15.207	Conducted emission AC power port	--	N/A
§15.247(b)(1)	Conducted peak output power	10	Pass
§15.247(e)	Power spectral density	12	Pass
§15.247(a)(2)	6dB bandwidth	14	Pass
§15.247(a)(1)	20dB bandwidth and 99% Occupied Bandwidth	--	N/A
§15.247(a)(1)	Carrier frequency separation	--	N/A
§15.247(a)(1)(iii)	Number of hopping frequencies	--	N/A
§15.247(a)(1)(iii)	Dwell Time	--	N/A
§15.247(d)	Spurious RF conducted emissions	16	Pass
§15.247(d)	Band edge	20	Pass
§15.247(d) & §15.209 &	Spurious radiated emissions for transmitter and receiver	22	Pass
§15.203	Antenna requirement	See note 1	Pass

Note 1: N/A=Not Applicable.
Note 2: The EUT uses an integrated antenna, which gain is 0dBi. In accordance to §15.203, it is considered sufficiently to comply with the provisions of this section.

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6 General Remarks

Remarks

This submittal(s) (test report) is intended for FCC ID: 2AIPCAW-S100 complies with Section 15.205, 15.209, 15.247 of the FCC Part 15, Subpart C.

This report is for the BT 4.0 part.

SUMMARY:

All tests according to the regulations cited on page 5 were

■ - Performed

☐ - **Not** Performed

The Equipment Under Test

■ - **Fulfills** the general approval requirements.

☐ - **Does not** fulfill the general approval requirements.

Sample Received Date: July 25, 2016

Testing Start Date: July 25, 2016

Testing End Date: July 27, 2016

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EMC Project Manager

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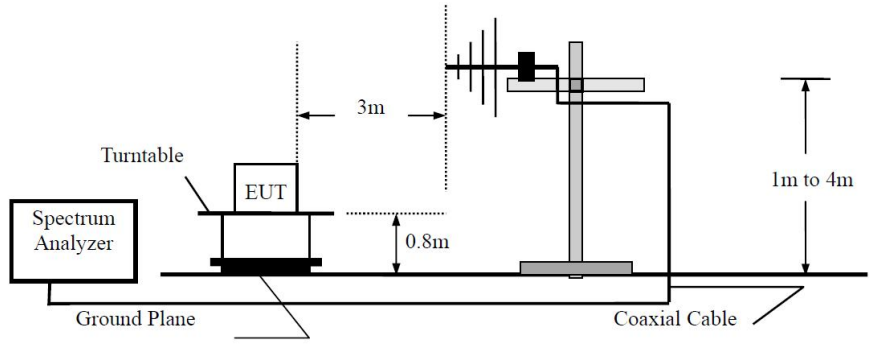
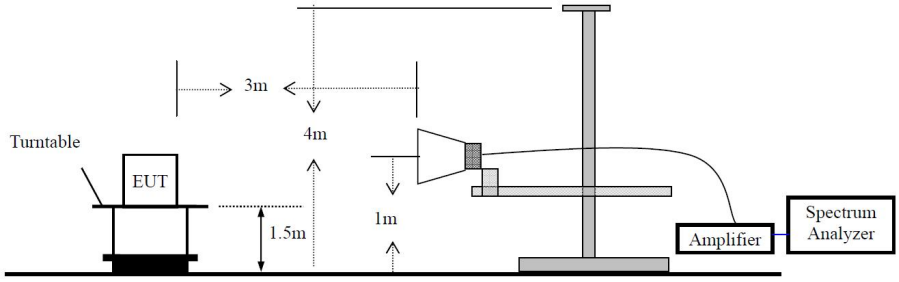
7 Test Setups

7.1 Radiated test setups

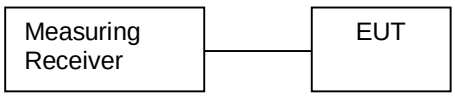
Below 1GHz



Above 1GHz



7.2 Conducted RF test setups



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8 Systems test configuration

Auxiliary Equipment Used during Test:

DESCRIPTION	MANUFACTURER	MODEL NO.(SHIELD)	S/N(LENGTH)
PC	Lenovo	X240	---

Test software: NFgo_Studio, which used to control the EUT in, continues transmitting mode

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9 Technical Requirement

9.1 Conducted peak output power

Test Method

1. Use the following spectrum analyzer settings:
   Span = approximately 5 times the 20 dB bandwidth, centered on a hopping channel
   RBW > the 20 dB bandwidth of the emission being measured, VBW≥RBW,
   Sweep = auto, Detector function = peak, Trace = max hold
2. Add a correction factor to the display.
3. Allow the trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. The indicated level is the peak output power

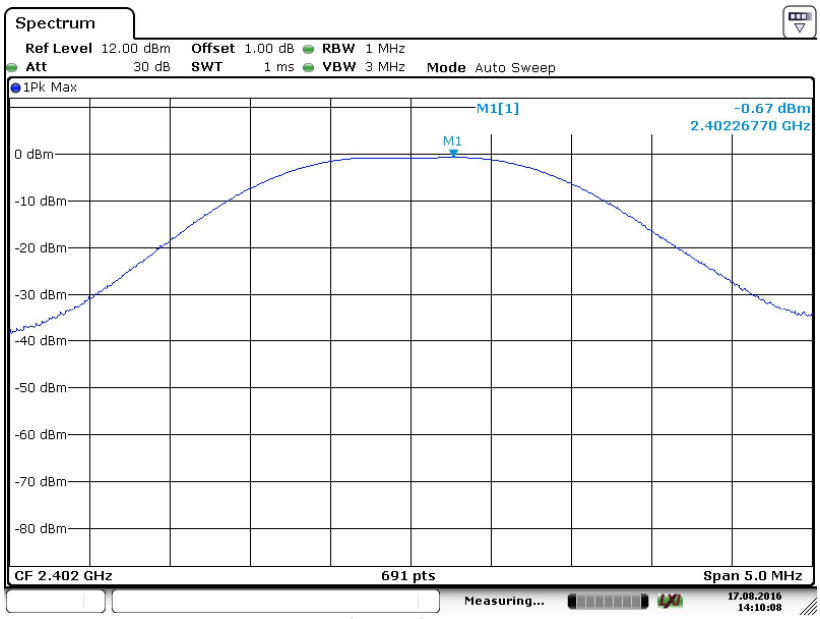
Limits

Frequency Range MHz	Limit W	Limit dBm
2400-2483.5	≤1	≤30

Conducted peak output power

BT 4.0 Bluetooth Mode GFSK modulation Test Result

Frequency MHz	Conducted Peak Output Power dBm	Result
Low channel 2402MHz	-0.67	Pass
Middle channel 2440MHz	-0.91	Pass
High channel 2480MHz	-1.77	Pass



Low channel 2402MHz

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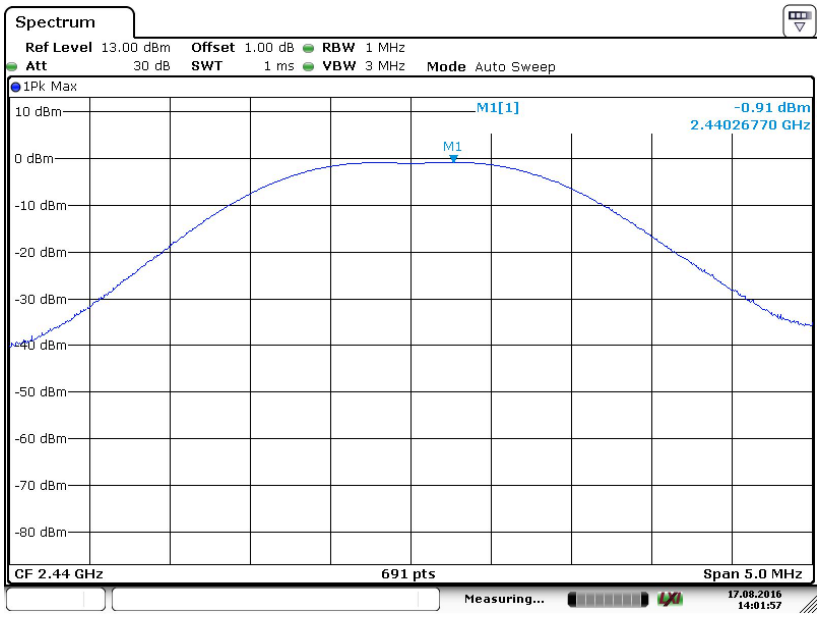
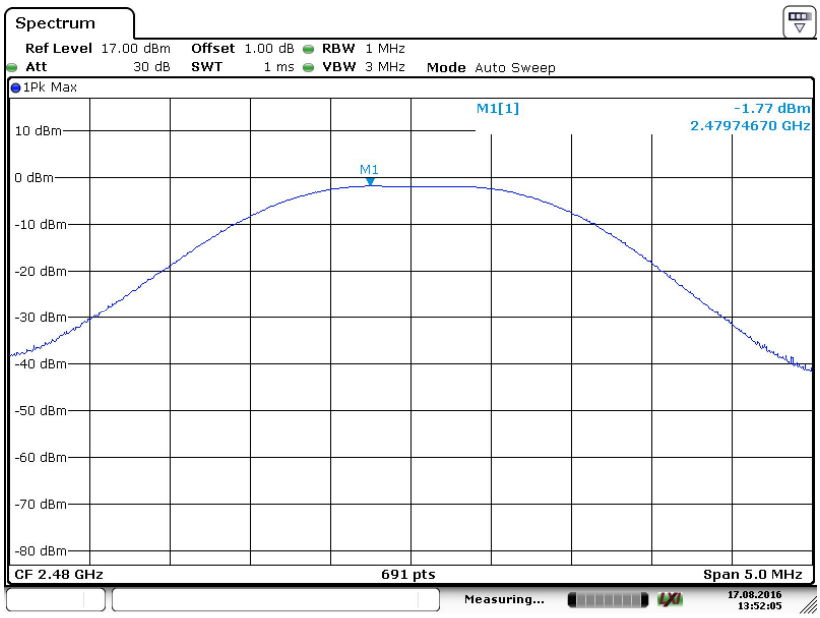


Middle channel 2440MHz



High channel 2480MHz

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9.2 Power spectral density

Test Method

This procedure shall be used if maximum peak conducted output power was used to demonstrate compliance:

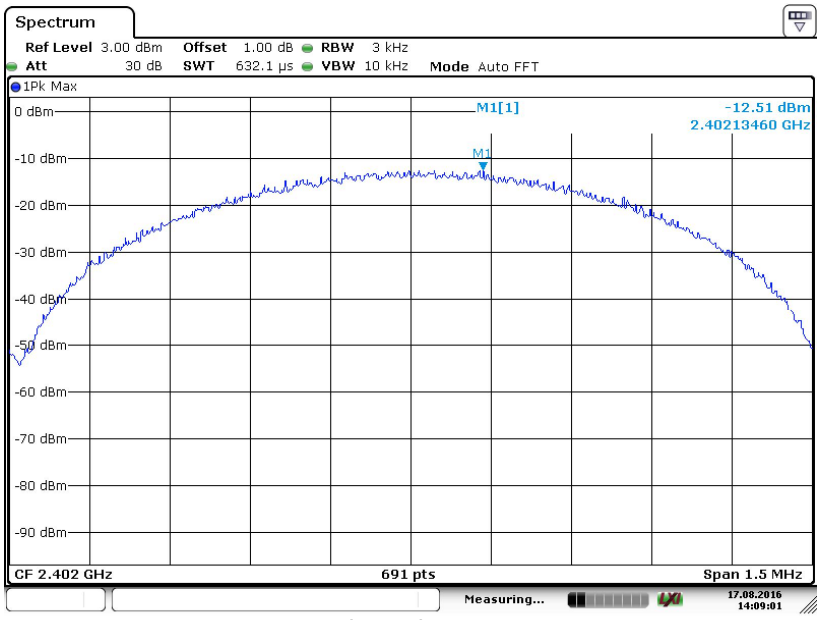
1. Set analyzer center frequency to DTS channel center frequency. RBW=3kHz,VBW≥3RBW,Span=1.5 times DTS bandwidth, Detector=Peak, Sweep=auto, Trace= max hold
2. Allow trace to fully stabilize, use the peak marker function to determine the maximum amplitude level within the RBW.
3. Repeat above procedures until other frequencies measured were completed

Limit

Limit [dBm]
≤8

BT 4.0 Bluetooth Mode GFSK modulation Test Result

Frequency MHz	Power spectral density	Limit dBm	Result
2402	-12.51	8	Pass
2440	-12.82	8	Pass
2480	-13.05	8	Pass



Low channel 2402MHz

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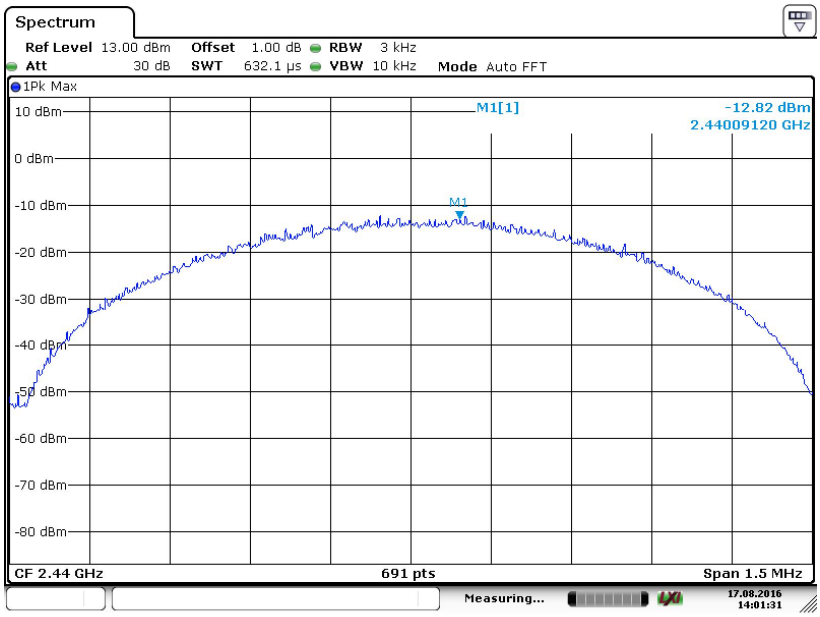
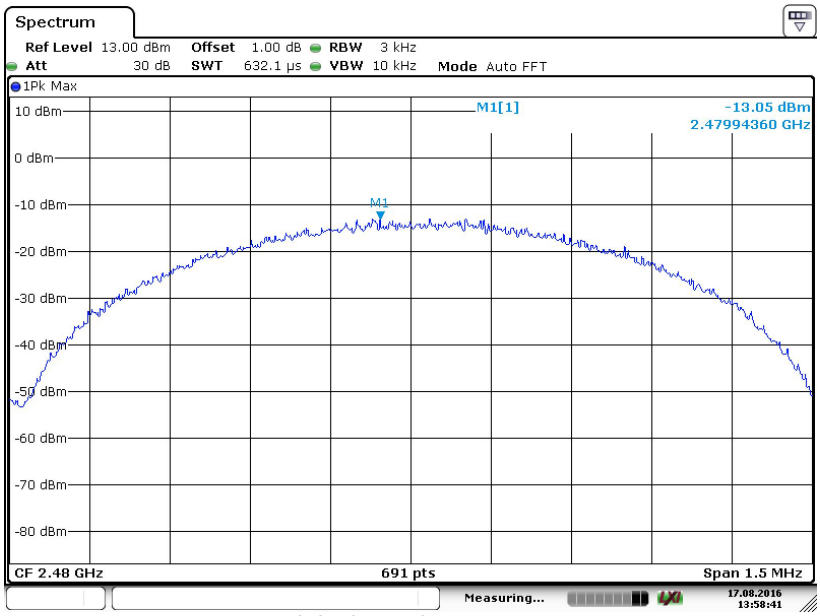


Middle channel 2440MHz



High channel 2480MHz

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9.3 6 dB Bandwidth and 99% Occupied Bandwidth

Test Method

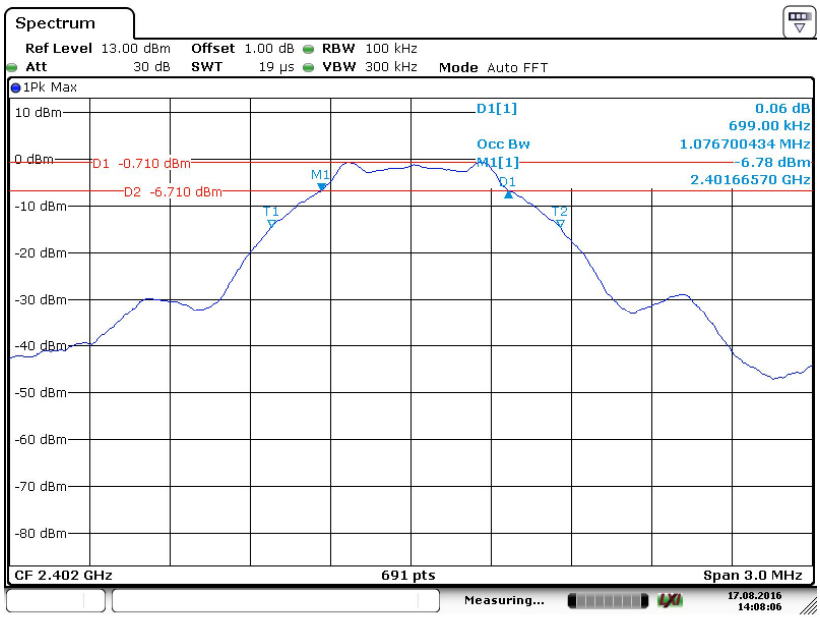
1. Use the following spectrum analyzer settings:
RBW=100K, VBW≥3RBW, Sweep = auto, Detector function = peak, Trace = max hold
2. Use the automatic bandwidth measurement capability of an instrument, may be employed using the X dB bandwidth mode with X set to 6 dB, care shall be taken so that the bandwidth measurement is not influenced by any intermediate power nulls in the fundamental emission that might be ≥ 6 dB.
3. Allow the trace to stabilize, record the X dB Bandwidth value.

Limit

Limit [kHz]
≥500

BT 4.0 Bluetooth Mode GFSK modulation Test Result

Frequency MHz	6 dB Bandwidth kHz	99%Bandwidth kHz	Limit kHz	Result
2402	699.00	1076.70	500	Pass
2440	694.60	1076.70	500	Pass
2480	703.30	1081.04	500	Pass



Low channel 2402MHz

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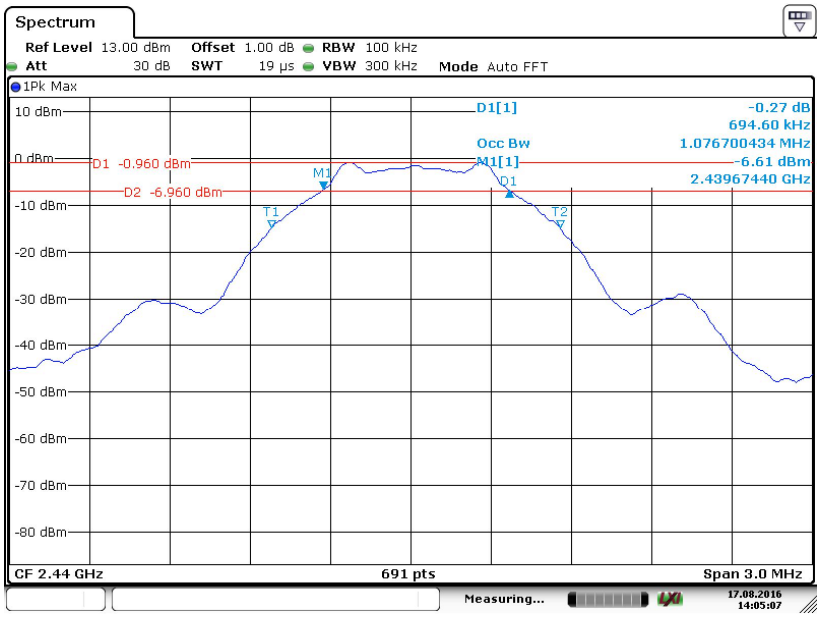
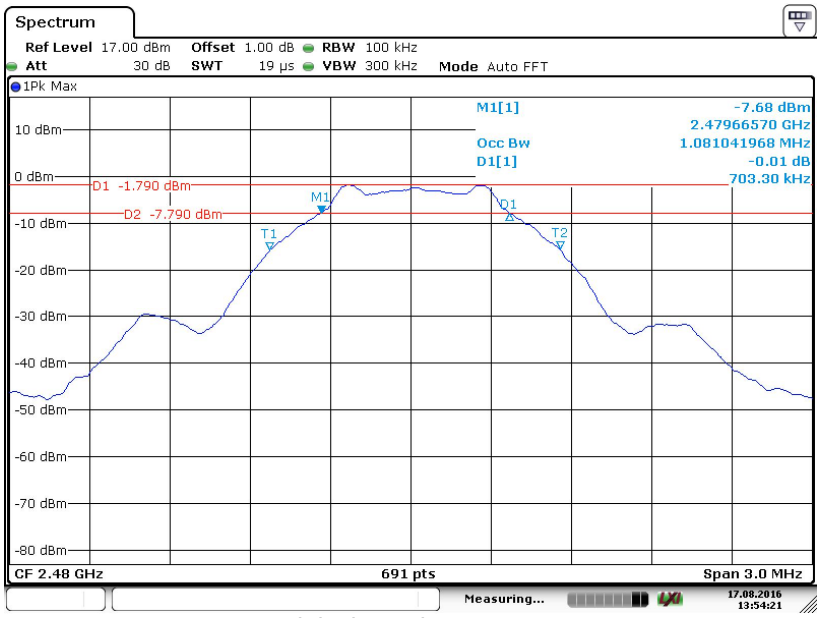
6 dB Bandwidth



Middle channel 2440MHz



High channel 2480MHz

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9.4 Spurious RF conducted emissions

Test Method

1. Use the following spectrum analyzer settings:
   Span = wide enough to capture the peak level of the in-band emission and all spurious emissions (e.g., harmonics) from the lowest frequency generated in the EUT up through the 10th harmonic. Typically, several plots are required to cover this entire span.
   RBW = 100 kHz, VBW≥RBW, Sweep = auto, Detector function = peak, Trace = max hold
2. Allow the trace to stabilize. Set the marker on the peak of any spurious emission recorded.
3. The level displayed must comply with the limit specified in this Section. Submit these plots.
4. Repeat above procedures until all frequencies measured were complete.

Limit

Frequency Range MHz	Limit (dBc)
30-25000	-20

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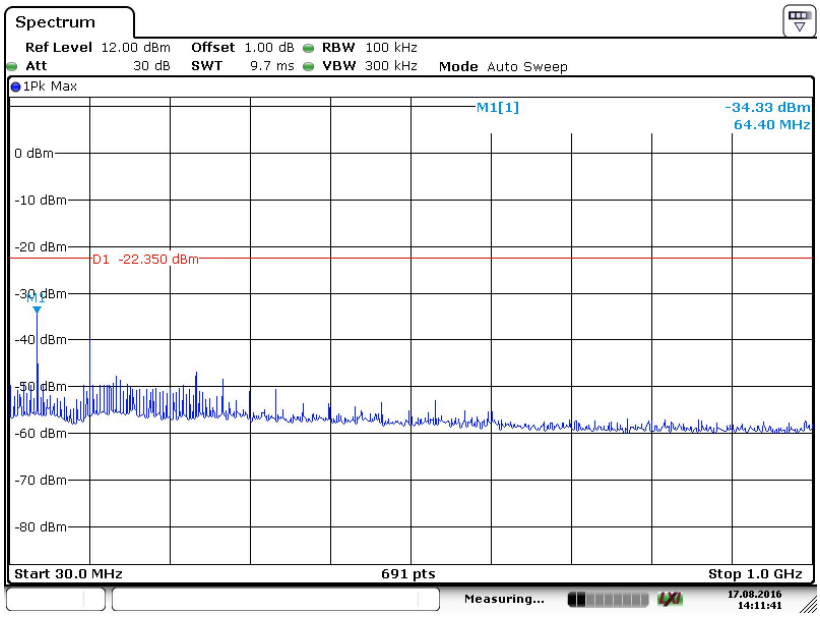
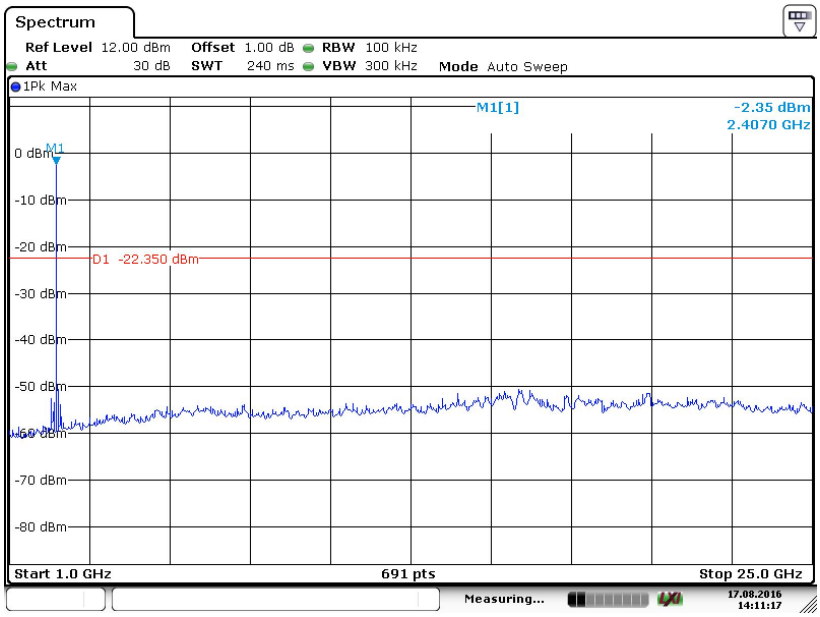
Spurious RF conducted emissions

BT4.0 GFSK Modulation:
2402MHz



30MHz – 1GHz



1GHz – 25GHz

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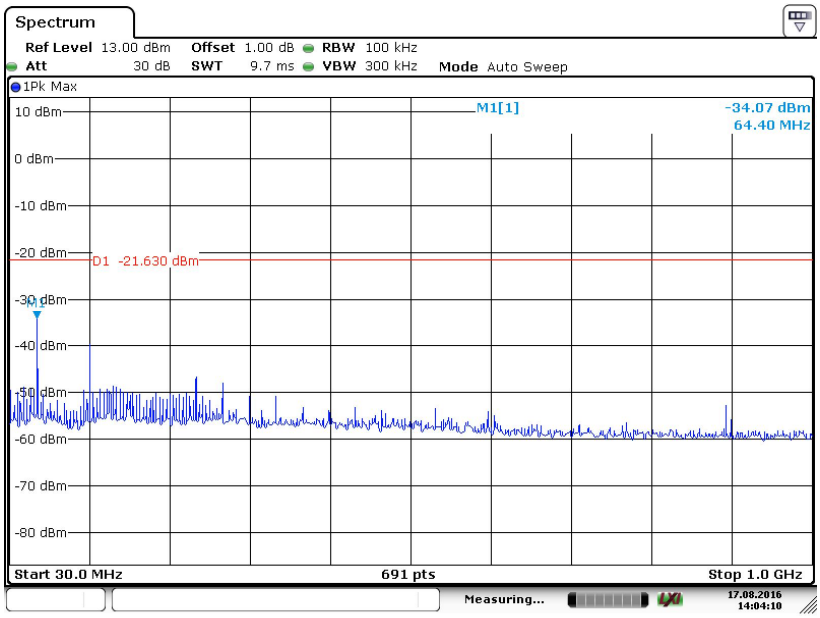
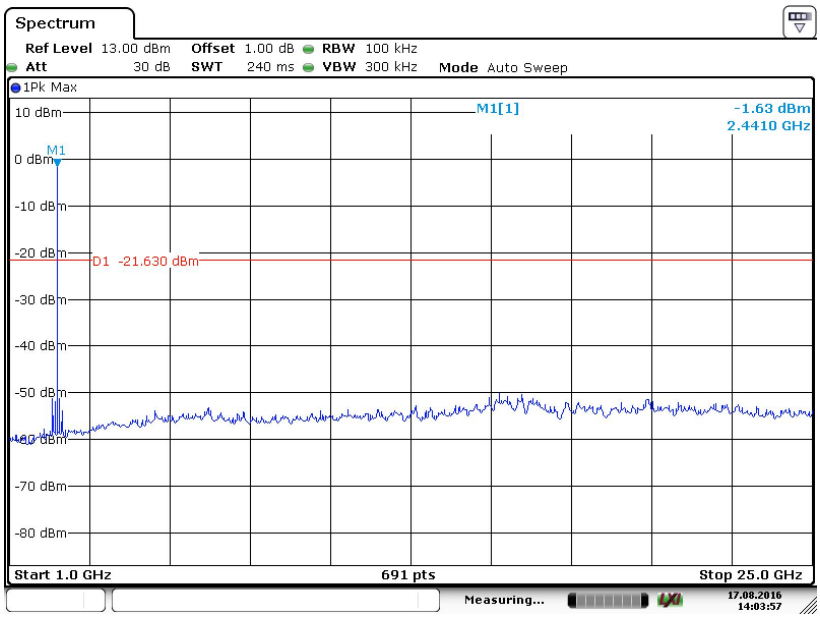
2440MHz



30MHz – 1GHz



1GHz – 25GHz

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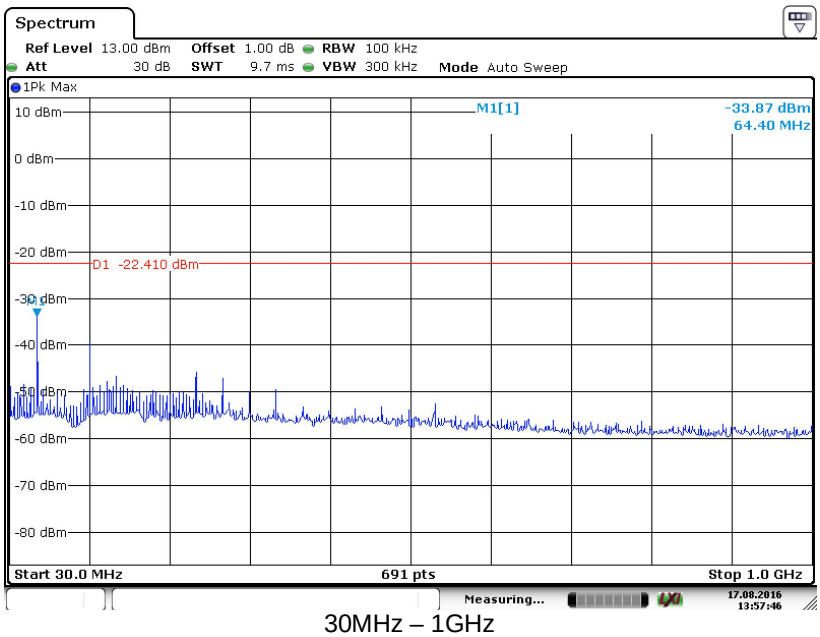
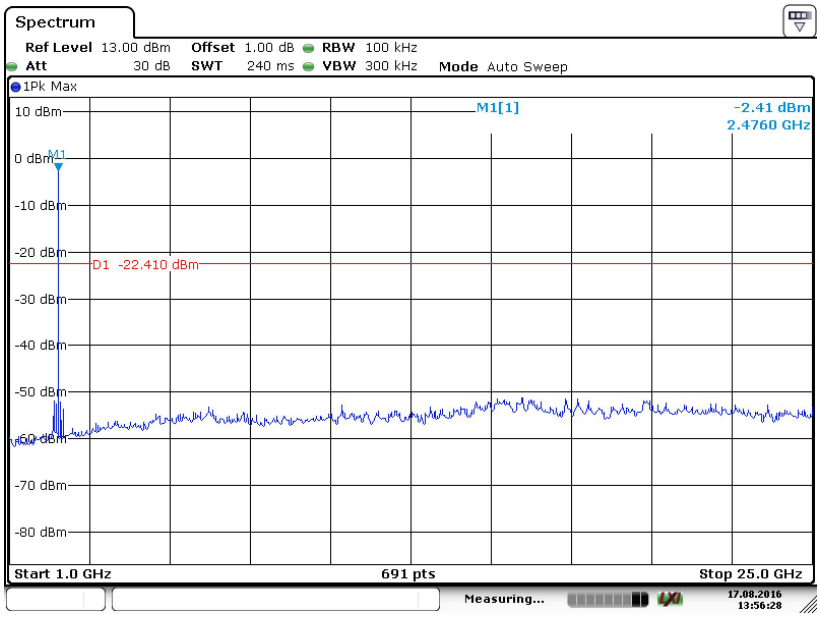
2480MHz



30MHz – 1GHz



1GHz – 25GHz

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9.5 Band edge testing

Test Method

1 Use the following spectrum analyzer settings:
Span = wide enough to capture the peak level of the in-band emission and all spurious
RBW = 100 kHz, VBW≥RBW, Sweep = auto, Detector function = peak, Trace = max hold
2 Allow the trace to stabilize, use the peak and delta measurement to record the result.
3 The level displayed must comply with the limit specified in this Section. .
4 Repeat the test at the hopping off and hopping on mode, submit all the plots.

Limit:

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced shall be at least 20 dB below that in the100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided that the transmitter demonstrates compliance with the peak conducted power limits.

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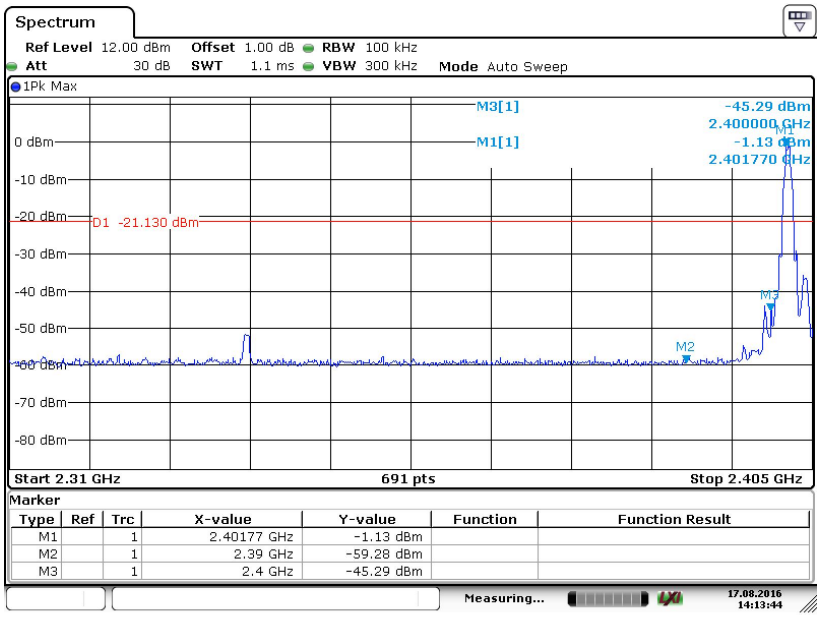
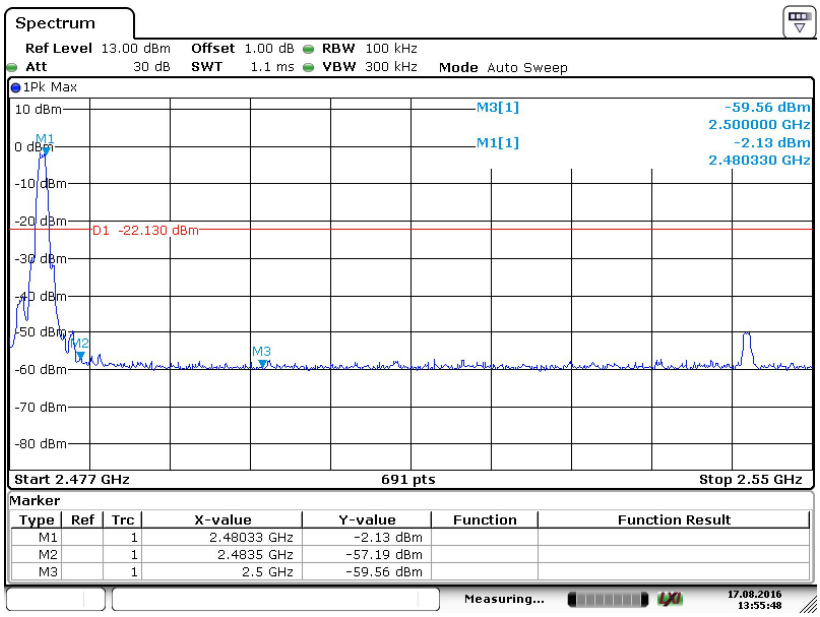
Band edge testing

BT4.0 GFSK Modulation Test Result





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9.6 Spurious radiated emissions for transmitter

Test Method

1: The EUT was place on a turn table which is 1.5m above ground plane for above 1GHz and 0.8m above ground for below 1GHz at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.

2: The EUT was set 3 meters away from the interference – receiving antenna, which was mounted on the top of a variable – height antenna tower.

3: The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

4: For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

5: Use the following spectrum analyzer settings According to C63.10:

For Above 1GHz

Span = wide enough to capture the peak level of the in-band emission and all spurious RBW = 1MHz, VBW≥RBW for peak measurement and VBW = 10Hz for average measurement, Sweep = auto, Detector function = peak, Trace = max hold.

For Below 1GHz

Use the following spectrum analyzer settings:

Span = wide enough to capture the peak level of the in-band emission and all spurious RBW = 100 KHz, VBW≥RBW for peak measurement, Sweep = auto, Detector function = peak, Trace = max hold.

Note:

1: The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 KHz for Quasi-peak detection (QP) at frequency below 1GHz.

2: The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 3MHz for peak detection (PK) at frequency above 1GHz.

3: The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 3MHz for RMS Average ((duty cycle < 98%) for Average detection (AV) at frequency above 1GHz, then the measurement results was added to a correction factor (20log(1/duty cycle)).

4: The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 10Hz (duty cycle > 98%) for Average detection (AV) at frequency above 1GHz.

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Limit

The radio emission outside the operating frequency band shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power. Radiated emissions which fall in the restricted bands, as defined in section15.205, must comply with the radiated emission limits specified in section 15.209.

Frequency MHz	Field Strength uV/m	Field Strength dBµV/m	Detector
30-88	100	40	QP
88-216	150	43.5	QP
216-960	200	46	QP
960-1000	500	54	QP
Above 1000	500	54	AV
Above 1000	5000	74	PK

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Spurious radiated emissions for transmitter

According to C63.10, if the peak (or quasi-peak) measured value complies with the average limit, it is unnecessary to perform an average measurement, so AV emission value did not show in below table if the peak value complies with average limit.

Transmitting spurious emission test result as below:

BT4.0 GFSK Modulation 2402MHz Test Result

Frequency band	Frequency	Emission Level	Polarization	Limit	Detector	Margin	Result
	MHz	dBuV/m		dBµV/m		dBuV/m	
30-1000MHz	876.702222	32.65	H	46	QP	13.35	Pass
	885.917222	29.82	V	46	QP	16.18	Pass
1000-25000MHz	4803.4666 *	48.77	H	74	PK	25.23	Pass
	4803.4666 *	41.97	V	74	PK	32.03	Pass

BT4.0 GFSK Modulation 2440MHz Test Result

Frequency band	Frequency	Emission Level	Polarization	Limit	Detector	Margin	Result
	MHz	dBuV/m		dBµV/m		dBuV/m	
30-1000MHz	--	--	H	43.5	QP	--	Pass
	--	--	H	46	QP	--	Pass
1000-25000MHz	4879.4000 *	42.96	H	74	PK	31.04	Pass
	4879.4000 *	45.61	V	74	PK	28.39	Pass

BT4.0 GFSK Modulation 2480MHz Test Result

Frequency band	Frequency	Emission Level	Polarization	Limit	Detector	Margin	Result
	MHz	dBuV/m		dBµV/m		dBuV/m	
30-1000MHz	--	--	H	43.5	QP	--	Pass
	--	--	H	46	QP	--	Pass
1000-25000MHz	4959.3000 *	38.56	H	74	PK	35.44	Pass
	4960.4333 *	40.54	H	74	PK	33.46	Pass

Remark:

(1) Data of measurement within this frequency range shown "-" in the table above means the reading of emissions are attenuated more than 20db below the permissible limits or the field strength is too small to be measured.

(2) "*" means the emission(s) appear within the restrict bands shall follow the requirement of section 15.205.

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10 Test Equipment List

List of Test Instruments

	DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL. DUE DATE
C	Signal Generator	Rohde & Schwarz	SMB100A	108272	2017-7-15
	Signal Analyzer	Rohde & Schwarz	FSV40	101030	2017-7-15
	Vector Signal Generator	Rohde & Schwarz	SMU 200A	105324	2017-7-15
	RF Switch Module	Rohde & Schwarz	OSP120/OSP-B157	101226/100851	2017-7-15
RE	EMI Test Receiver	Rohde & Schwarz	ESR 26	101269	2017-7-15
	Trilog Super Broadband Test Antenna	Schwarzbeck	VULB 9163	707	2017-8-14
	Horn Antenna	Rohde & Schwarz	HF907	102294	2017-7-24
	Pre-amplifier	Rohde & Schwarz	SCU 18	102230	2017-7-15
	3m Semi-anechoic chamber	TDK	9X6X6	----	2019-5-29

C - Conducted RF tests

- Conducted peak output power
- 6dB bandwidth
- Power spectral density*
- Spurious RF conducted emissions
- Band edge

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11 System Measurement Uncertainty

For a 95% confidence level, the measurement expanded uncertainties for defined systems, in accordance with the recommendations of ISO 17025 were:

System Measurement Uncertainty	
Test Items	Extended Uncertainty
Uncertainty for Radiated Emission in 3m chamber 30MHz-1000MHz	Horizontal: 4.83dB; Vertical: 4.91dB;
Uncertainty for Radiated Emission in 3m chamber 1000MHz-18000MHz	Horizontal: 4.89dB; Vertical: 4.88dB;
Uncertainty for Conducted Emission 150KHz-30MHz	U=3.5dB(k=2)

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