

FCC - TEST REPORT

Report Number	:	68.930.18.0015.01	Date of Issue:	<u>May 24, 2018</u>
Model	:	SD1		
Product Type	:	Ultrasonic Pocket Doppler		
Applicant	:	EDAN INSTRUMENTS, INC.		
Address	:	#15 Jinhui Road, Jinsha Community, Kengzi Sub-District, Pingshan District. Shenzhen, 518122, China		
Production Facility	:	EDAN INSTRUMENTS, INC.		
Address	:	#15 Jinhui Road, Jinsha Community, Kengzi Sub-District, Pingshan District. Shenzhen, 518122, China		
Test Result	:	<input checked="" type="checkbox"/> Positive <input type="checkbox"/> Negative		
Total pages including Appendices	:	<u>26</u>		

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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

Telephone: 86 755 8828 6998

Fax: 86 755 828 5299

FCC Registration 514049

Number:

IC Registration 10320A-1

Number:

3 Description of the Equipment under Test

Description of the Equipment Under Test

Product: Ultrasonic Pocket Doppler

Model no.: SD1

FCC ID: SMQSD1MEDAN

Options and accessories: NIL

Rating: 3.0VDC (supplied by 2*1.5VDC size AA/LR6 Batteries)

RF Transmission Frequency: 2402-2480MHz

No. of Operated Channel: 40

Modulation: GFSK

Antenna Type: Integrated Antenna

Antenna Gain: 0dBi

Description of the EUT: The Equipment Under Test (EUT) is an Ultrasonic Pocket Doppler operated at 2.4GHz

4 Summary of Test Standards

Test Standards	
FCC Part 15 Subpart C 10-1-2017 Edition	PART 15 - RADIO FREQUENCY DEVICES Subpart C - Intentional Radiators

All the test methods were according to KDB558074 D01 DTS Meas Guidance v04 and ANSI C63.10 (2013).

5 Summary of Test Results

Technical Requirements				
FCC Part 15 Subpart C 10-1-2017 Edition				
Test Condition		Pages	Test Result	Test Site
§15.207	Conducted emission AC power port	--	N/A	--
§15.247(b)(1)	Conducted peak output power	10	Pass	Site 1
§15.247(e)	Power spectral density	14	Pass	Site 1
§15.247(a)(2)	6dB bandwidth	12	Pass	Site 1
§15.247(a)(1)	20dB bandwidth and 99% Occupied Bandwidth	12	Pass	Site 1
§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	Site 1
§15.247(d)	Band edge	20	Pass	Site 1
§15.247(d) & §15.209	Spurious radiated emissions for transmitter and receiver	22	Pass	Site 1
§15.203	Antenna requirement	See note 1	Pass	--

Remark 1: N/A – Not Applicable.

Note 1: The EUT uses an Integrated Antenna, which gain is 0dBi. According to §15.203, it is considered sufficiently to comply with the provisions of this section.

6 General Remarks

Remarks

This submittal(s) (test report) is intended for FCC ID: SMQSD1MEDAN, complies with Section 15.203, 15.209, 15.205, 15.247 of the FCC Part 15 Subpart C 10-1-2017 Edition.

This report is for the Bluetooth Low Energy 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: September 07, 2017

Testing Start Date: September 07, 2017

Testing End Date: January 18, 2018

- TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch -

Reviewed by:



Laurent Yuan
EMC Project Manager

Reviewed by:

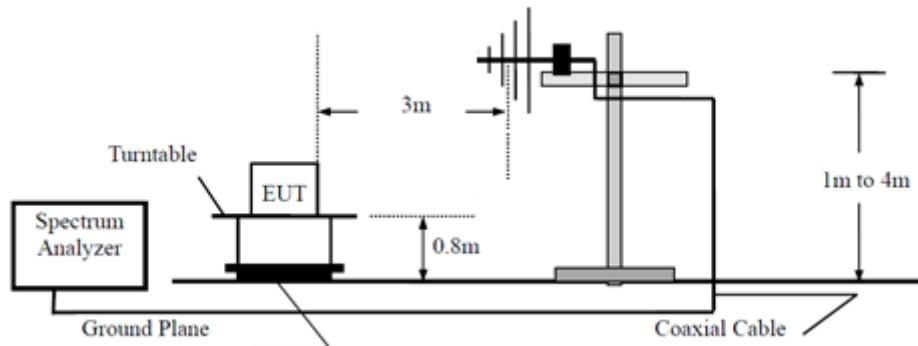


Aaron Lai
EMC Project Engineer

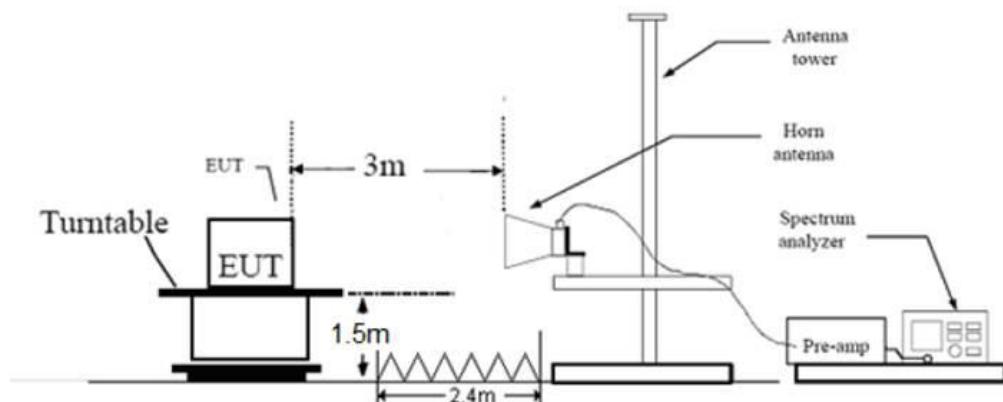
7 Test Setups

7.1 Radiated test setups

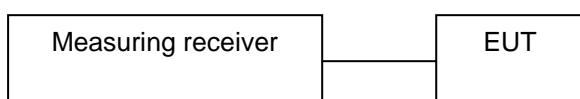
Below 1GHz



Above 1GHz



7.2 Conducted RF test setups



8 Systems test configuration

Auxiliary Equipment Used during Test:

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

Test software: RF test tool, which used to control the EUT in continuous transmitting mode.

The system was configured to channel 0, 19, and 39 for the test.

9 Technical Requirement

9.1

9.1 Conducted peak output power

Test Method

1. Use the following spectrum analyzer settings:
RBW > the 6 dB bandwidth of the emission being measured, $VBW \geq 3RBW$, $Span \geq 3RBW$
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

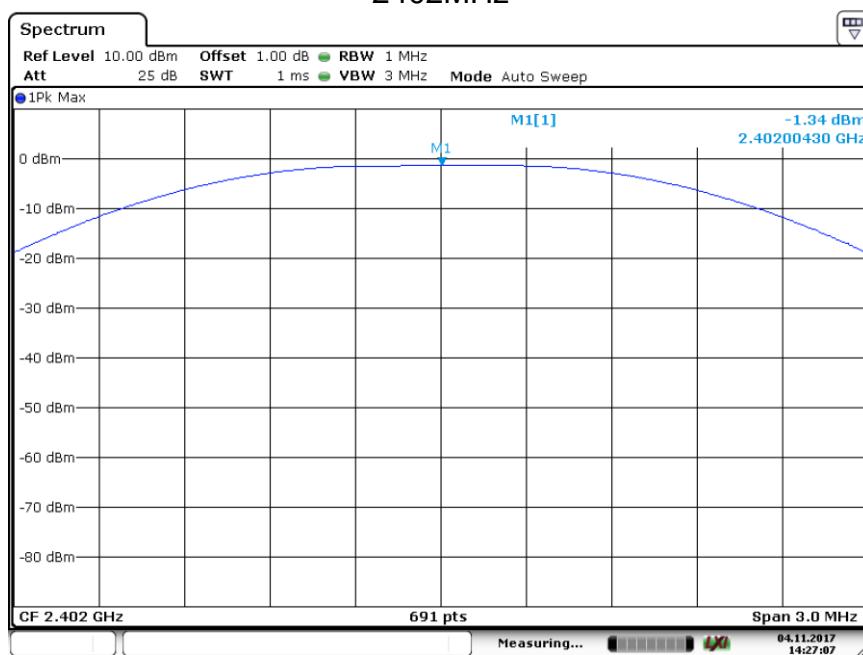
According to §15.247 (b) (1), conducted peak output power limit as below:

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

Test result as below table

Frequency MHz	Conducted Peak Output Power dBm	Result
Top channel 2402MHz	-1.34	Pass
Middle channel 2440MHz	-1.49	Pass
Bottom channel 2480MHz	-2.25	Pass

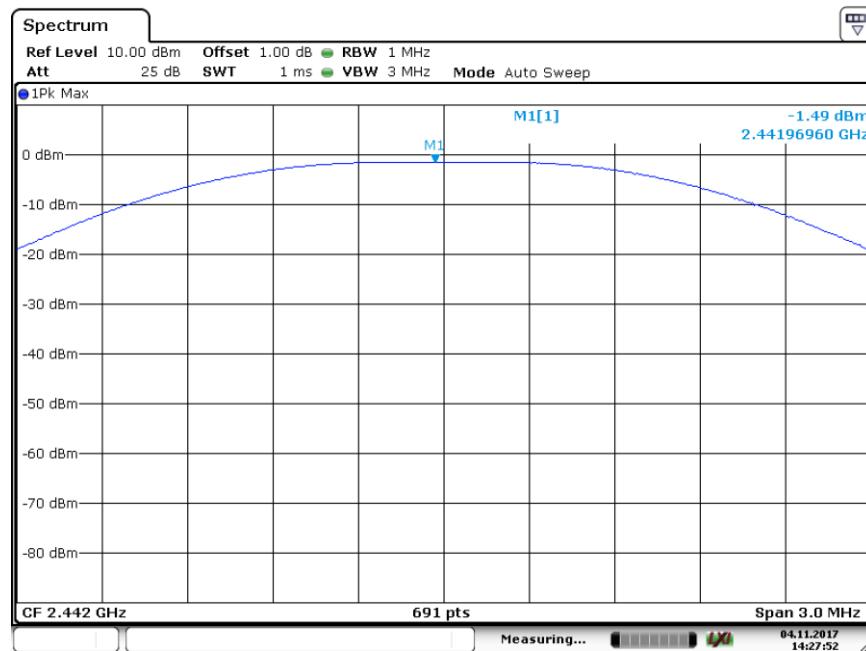
2402MHz



Date: 4.NOV.2017 14:27:07

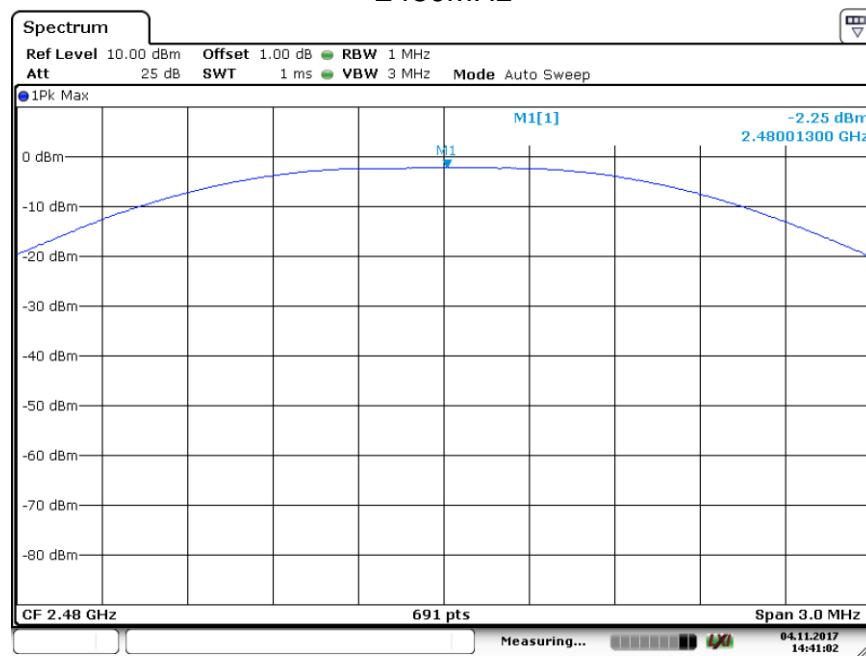
Conducted peak output power

2440MHz



Date: 4.NOV.2017 14:27:52

2480MHz



Date: 4.NOV.2017 14:41:02

9.2 6dB bandwidth

Test Method

1. Use the following spectrum analyzer settings:
RBW=100K, VBW \geq 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 \geq 6 dB.
3. Allow the trace to stabilize, record the X dB Bandwidth value.

Limit

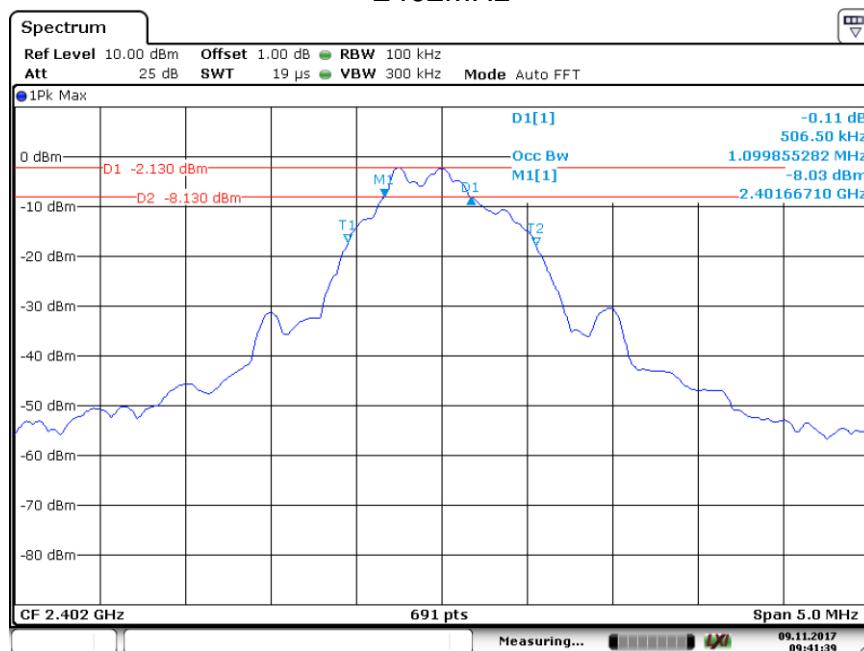
Limit [kHz]

≥ 500

Test result

Frequency MHz	6dB bandwidth kHz	99 bandwidth kHz	Result
Top channel 2402MHz	506.50	1099.85	Pass
Middle channel 2440MHz	521.00	1099.85	Pass
Bottom channel 2480MHz	521.00	1092.61	Pass

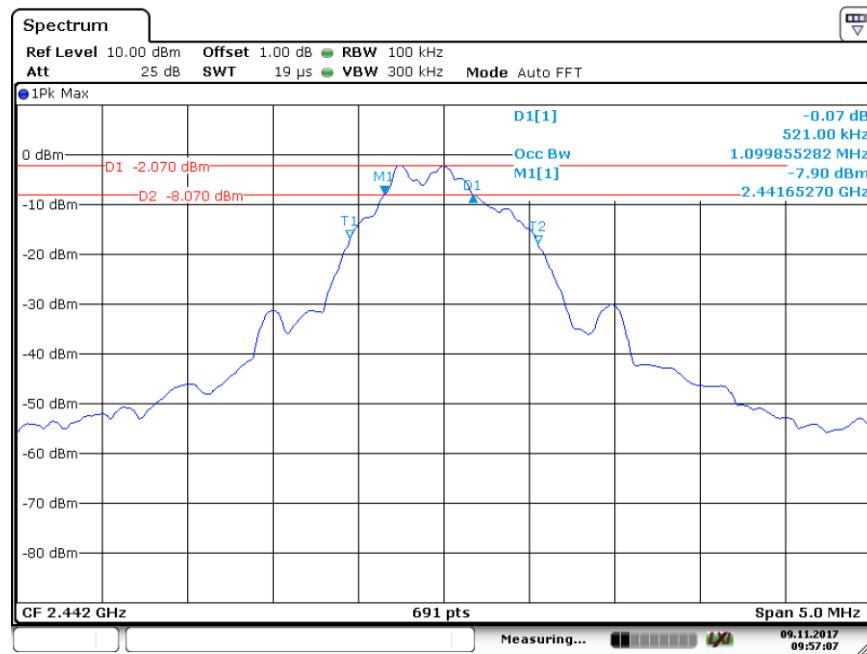
2402MHz



Date: 9.NOV.2017 09:41:40

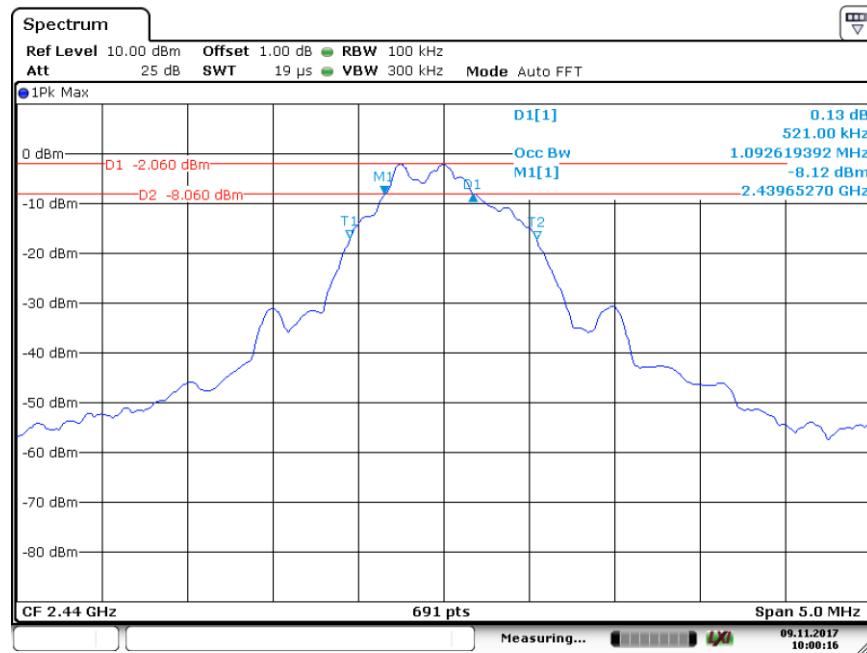
6 dB Bandwidth

2440MHz



Date: 9.NOV.2017 09:57:07

2480MHz



Date: 9.NOV.2017 10:00:16

9.3 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

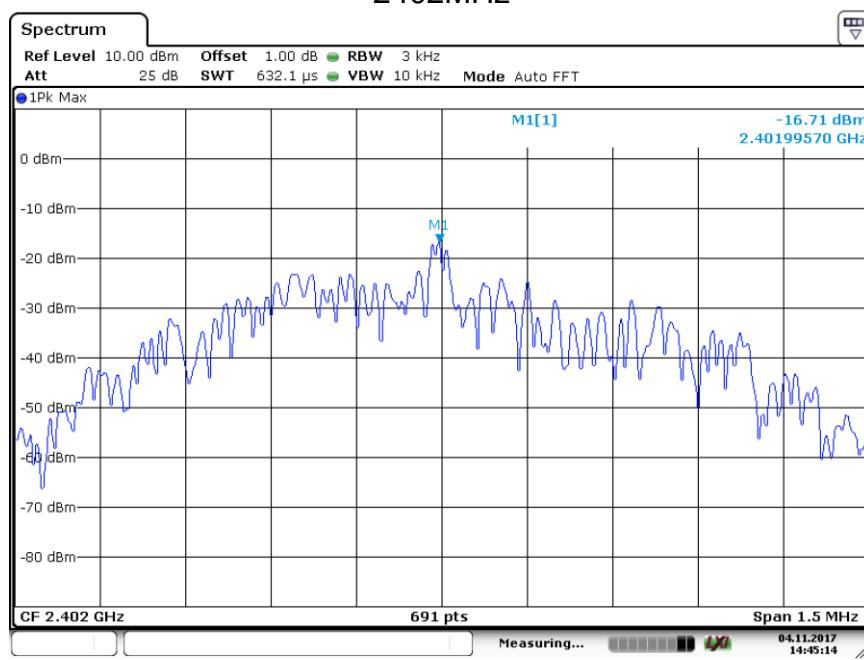
Limit [dBm]

≤8

Test result

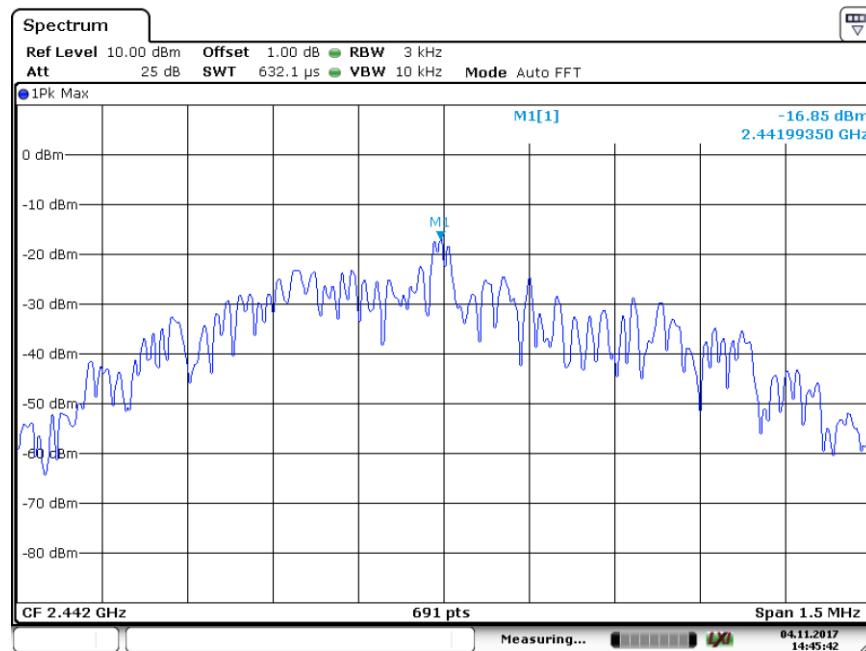
Frequency MHz	Power spectral density dBm	Result
Top channel 2402MHz	-16.71	Pass
Middle channel 2440MHz	-16.85	Pass
Bottom channel 2480MHz	-17.28	Pass

2402MHz



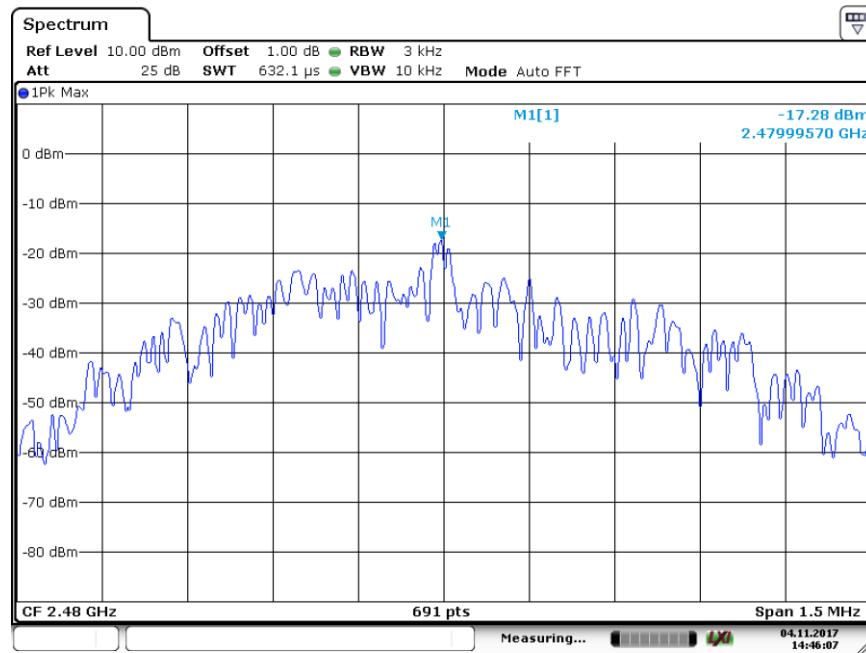
Power spectral density

2440MHz



Date: 4.NOV.2017 14:45:42

2480MHz



Date: 4.NOV.2017 14:46:07

9.4 Spurious RF conducted emissions

Test Method

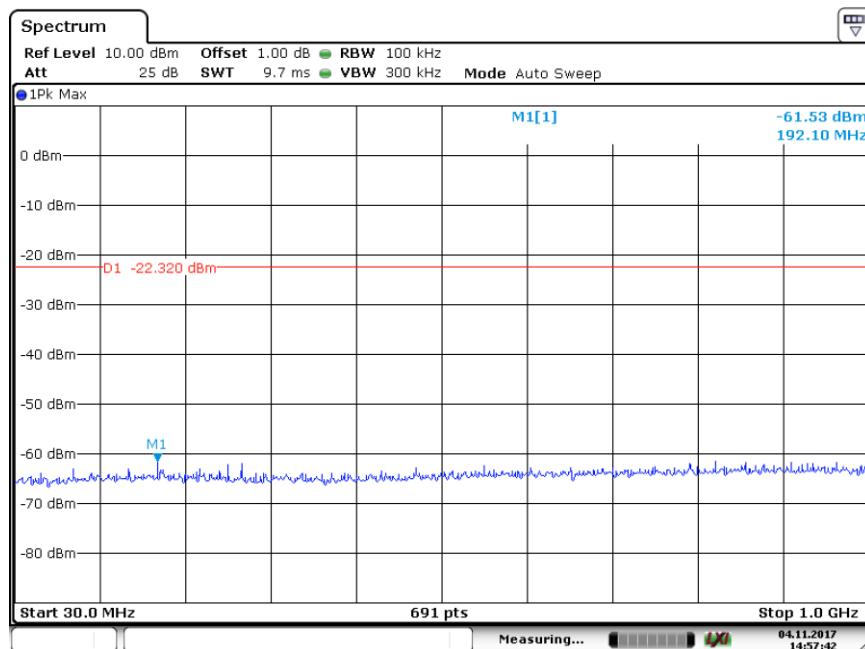
1. Establish a reference level by using the following procedure:
 - a. Set RBW=100 kHz. VBW \geq 3RBW. Detector =peak, Sweep time = auto couple, Trace mode = max hold.
 - b. Allow trace to fully stabilize, use the peak marker function to determine the maximum PSD level.
2. Use the maximum PSD level to establish the reference level.
 - a. Set the center frequency and span to encompass frequency range to be measured.
 - b. Use the peak marker function to determine the maximum amplitude level. Ensure that the amplitude of all unwanted emissions outside of the authorized frequency band (excluding restricted frequency bands) are attenuated by at least the minimum requirements, report the three highest emissions relative to the limit.
3. Repeat above procedures until other frequencies measured were completed.

Limit

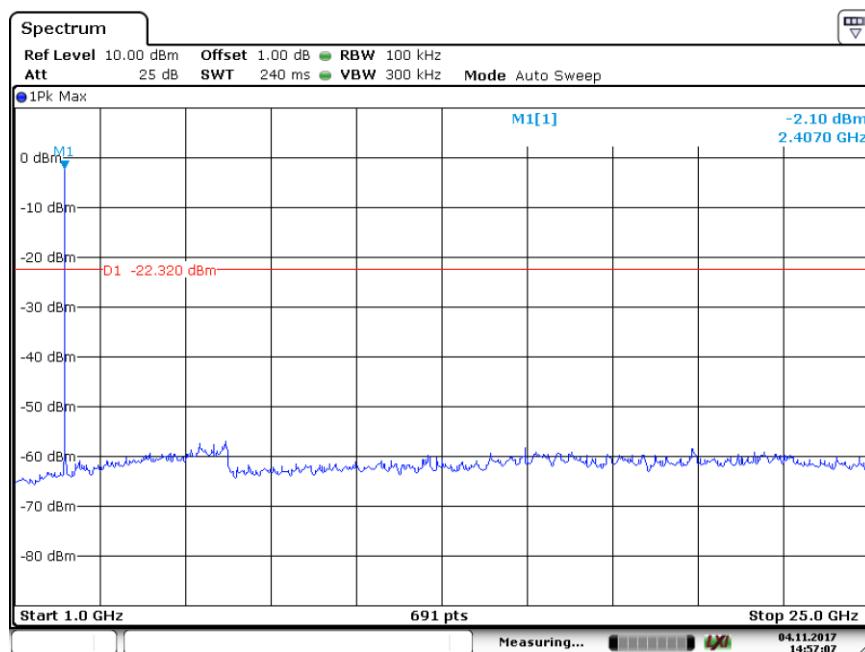
Frequency Range MHz	Limit (dBc)
30-25000	-20

Spurious RF conducted emissions

2402MHz



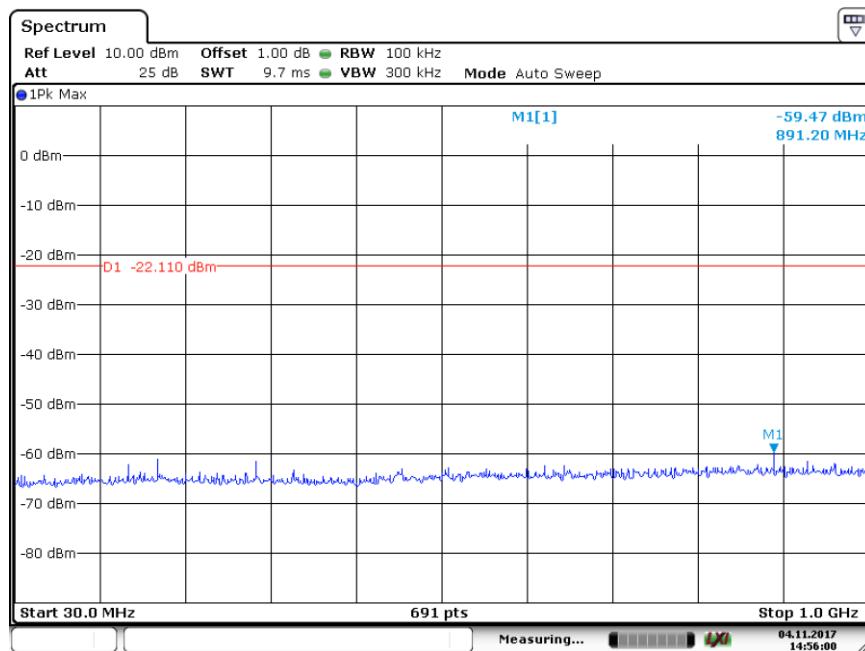
Date: 4.NOV.2017 14:57:43



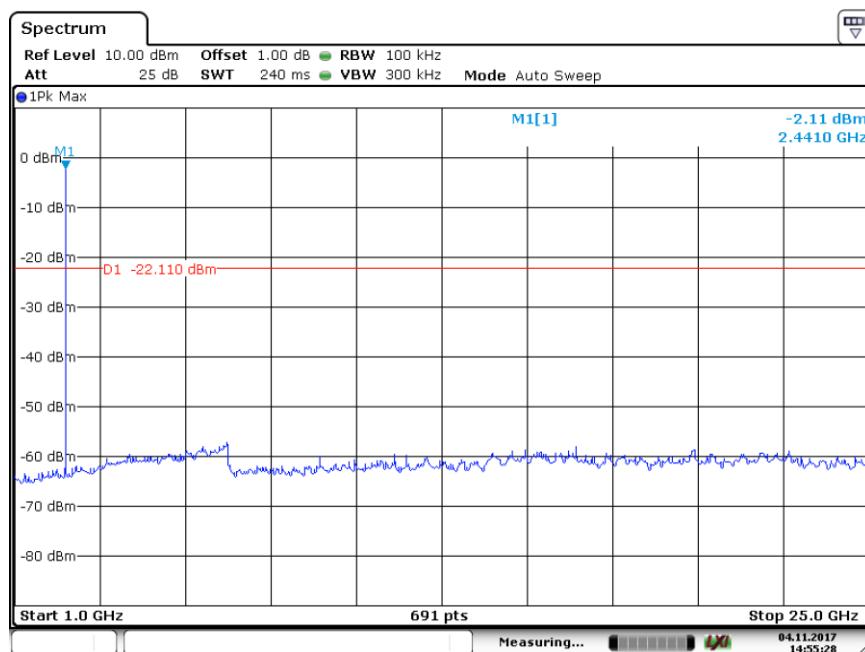
Date: 4.NOV.2017 14:57:07

Spurious RF conducted emissions

2440MHz



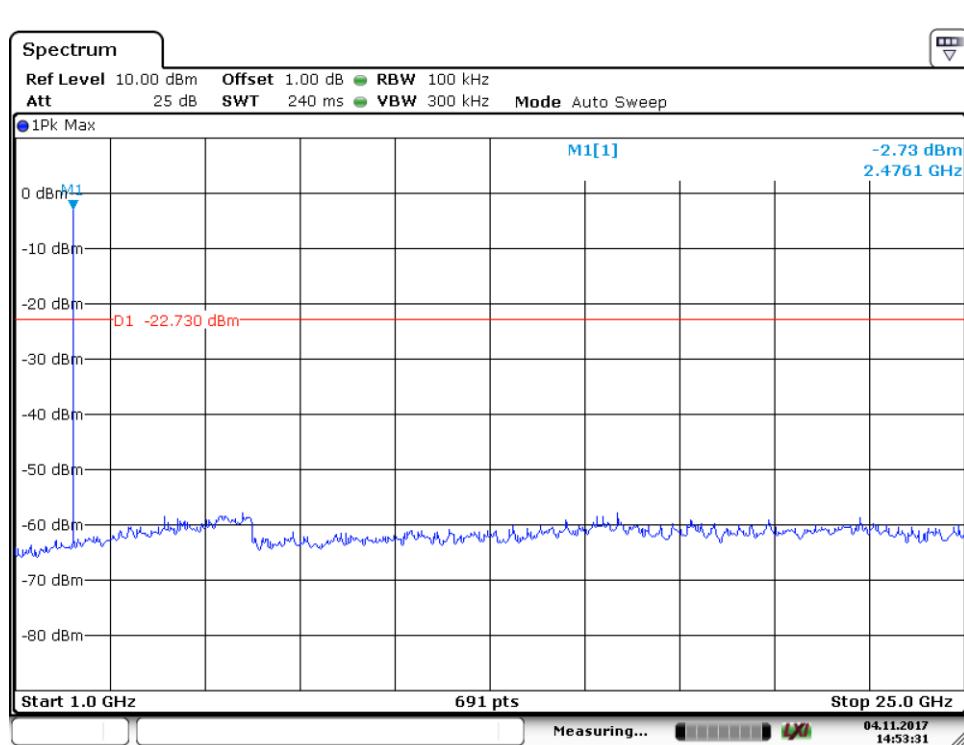
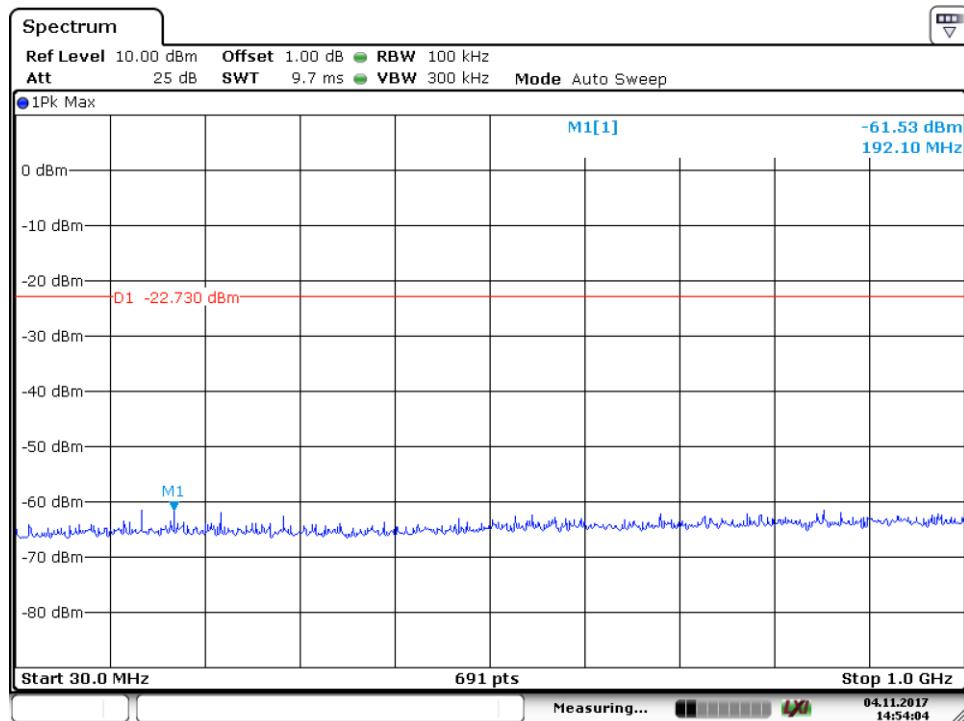
Date: 4.NOV.2017 14:56:00



Date: 4.NOV.2017 14:55:27

Spurious RF conducted emissions

2480MHz



9.5 Band edge

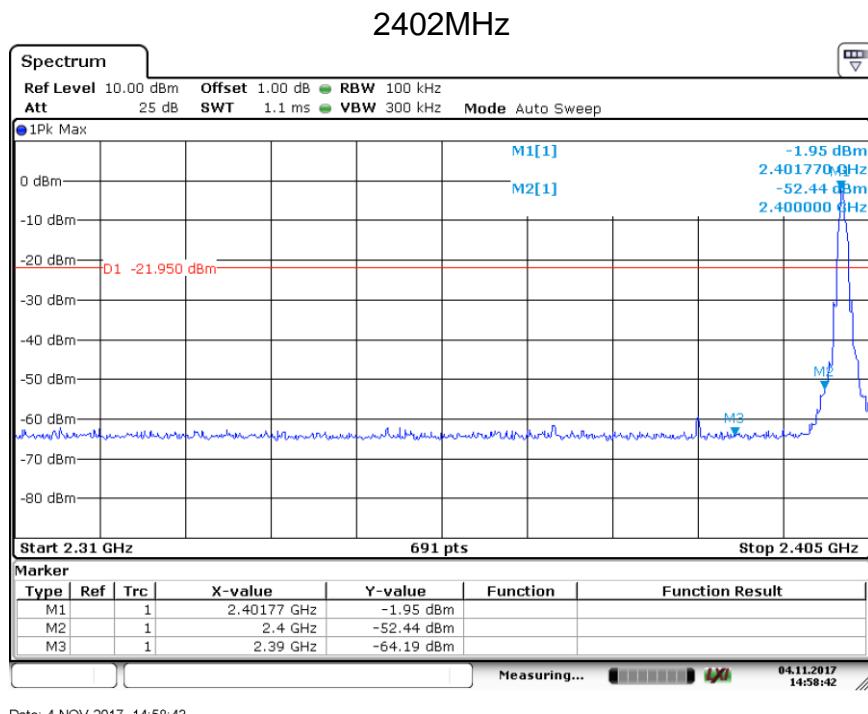
Test Method

- 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 \geq 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.

Limit

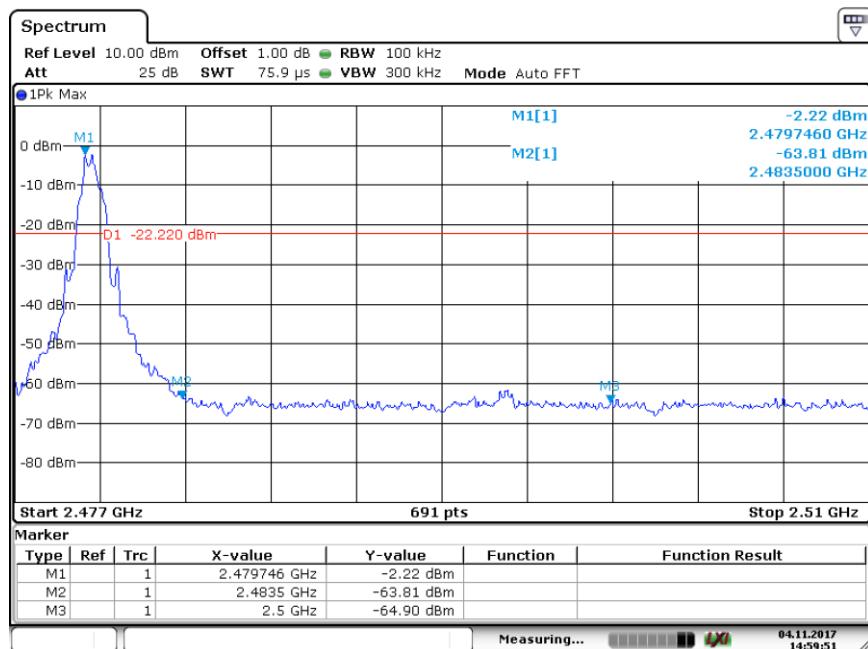
Frequency Range MHz	Limit (dBc)
30-25000	-20

Test result



Band edge

2480MHz



Date: 4.NOV.2017 14:59:51

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 \geq 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 \geq 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.

Spurious radiated emissions for transmitter

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 section 15.205, must comply with the radiated emission limits specified in section 15.209.

Frequency MHz	Field Strength uV/m	Field Strength dB μ V/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

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:

2402MHz

Frequency Band	Frequency	Emission Level	Polarization	Limit	Detector	Margin	Corr.	Result
30-1000MHz	863.89	39.72	H	46.00	QP	6.28	29.60	Pass
	948.28	35.41	V	46.00	QP	10.59	31.40	Pass
1000-25000MHz	5344.68	37.51	H	74.00	PK	36.49	2.9	Pass
	--	--	H	54.00	AV	--	--	Pass
	5196.09	36.58	V	74.00	PK	37.42	3.0	Pass
	--	--	V	54.00	AV	--	--	Pass

2440MHz

Frequency Band	Frequency	Emission Level	Polarization	Limit	Detector	Margin	Corr.	Result
30-1000MHz	--	--	H	43.5	QP	--	--	Pass
	--	--	H	46	QP	--	--	Pass
1000-25000MHz	6000.00	37.89	H	74.00	PK	36.11	3.7	Pass
	--	--	H	54.00	AV	--	--	Pass
	6000.00	38.27	V	74.00	PK	35.73	3.8	Pass
	--	--	V	54.00	AV	--	--	Pass

2480MHz

Frequency Band	Frequency	Emission Level	Polarization	Limit	Detector	Margin	Corr.	Result
30-1000MHz	--	--	H	43.5	QP	--	--	Pass
	--	--	H	46	QP	--	--	Pass
1000-25000MHz	6000.00	38.44	H	74	PK	35.56	3.7	Pass
	--	--	H	54	AV	--	--	Pass
	*4867.03	35.98	V	74	PK	38.02	2.6	Pass
	--	--	V	54	AV	--	--	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.
- (3) Corrector factor = Antenna Factor + Cable Loss

10 Test Equipment List

List of Test Instruments

DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL. DUE DATE
EMI Test Receiver	Rohde & Schwarz	ESR 26	101269	2018-7-14
Trilog Super Broadband Test Antenna	Schwarzbeck	VULB 9163	707	2018-7-14
Horn Antenna	Rohde & Schwarz	HF907	102294	2018-7-14
Pre-amplifier	Rohde & Schwarz	SCU 18	102230	2018-7-14
Signal Generator	Rohde & Schwarz	SMY01	839369/005	2018-7-7
Attenuator	Agilent	8491A	MY39264334	2018-7-7
3m Semi-anechoic chamber	TDK	9X6X6	----	2020-7-7
Test software	Rohde & Schwarz	EMC32	Version 9.15.00	N/A

DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL. DUE DATE
Signal Generator	Rohde & Schwarz	SMB100A	108272	2018-7-7
Vector Signal Generator	Rohde & Schwarz	SMBV100A	262825	2018-7-23
Communication Synthetical Test Instrument	Rohde & Schwarz	CMW 270	101251	2019-2-15
Signal Analyzer	Rohde & Schwarz	FSV40	101030	2018-7-7
Vector Signal Generator	Rohde & Schwarz	SMU 200A	105324	2018-7-7
RF Switch Module	Rohde & Schwarz	OSP120/OSP-B157	101226/100851	2018-7-7
Power Splitter	Weinschel	1580	SC319	2018-7-7
10dB Attenuator	Weinschel	56-10	58764	2018-7-14
10dB Attenuator	R&S	DNF	DNF-001	2018-7-14
10dB Attenuator	R&S	DNF	DNF-002	2018-7-14
10dB Attenuator	R&S	DNF	DNF-003	2018-7-14
10dB Attenuator	R&S	DNF	DNF-004	2018-7-14
Test software	Rohde & Schwarz	EMC32	Version 10.38.00	N/A
Test software	Tonscend	System for BT/WIFI	Version 2.6	N/A

C - Conducted RF tests

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

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	
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 RF test	Power level test involved: 2.13dB Frequency test involved: 0.6×10^{-7}