FCC Report

Product Name	:	TLSR8258DK48D
Trade mark	:	N/A
Mode No.	:	TLSR8258DK48D
FCC ID:	:	OEOTLSR8258DK48D
Report Number	:	BLA-EMC-201903-A24-01
Date of sample receipt	:	March 11, 2019
Date of Test:	:	March 11, 2019–March 28, 2019
Date of Issue	:	March 28, 2019
Test standard	:	FCC CFR Title 47 Part 15 Subpart C Section 15.247
Test result	:	PASS

Prepared for:

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Prepared by:

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Date: March 28, 2019

Qianhai BlueAsia of Technical Services(Shenzhen) Co.,Ltd. BLA

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2 Version

Version No.	Date	Description
00	*March 28, 2019*	*Original*

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3 Contents

Page

1 COVER PAGE 1

2 VERSION 2

3 CONTENTS 3

4 TEST SUMMARY 4

5 GENERAL INFORMATION 5

5.1 GENERAL DESCRIPTION OF EUT 5
5.2 TEST MODE 7
5.3 DESCRIPTION OF SUPPORT UNITS 7
5.4 TEST FACILITY 7
5.5 TEST LOCATION 7

6 TEST INSTRUMENTS LIST 8

7 TEST RESULTS AND MEASUREMENT DATA 10

7.1 ANTENNA REQUIREMENT 10
7.2 CONDUCTED EMISSIONS 11
7.3 CONDUCTED OUTPUT POWER 14
7.4 CHANNEL BANDWIDTH 15
7.5 POWER SPECTRAL DENSITY 16
7.6 BAND EDGES 17
7.6.1 Conducted Emission Method 17
7.6.2 Radiated Emission Method 18
7.7 SPURIOUS EMISSION 20
7.7.1 Conducted Emission Method 20
7.7.2 Radiated Emission Method 21

8 TEST SETUP PHOTO 29

9 EUT CONSTRUCTIONAL DETAILS 31

10 APPENDIX 33

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4 Test Summary

Test Item	Section in CFR 47	Result
Antenna requirement	15.203/15.247 (c)	Pass
AC Power Line Conducted Emission	15.207	Pass
Conducted Output Power	15.247 (b)(3)	Pass
Channel Bandwidth	15.247 (a)(2)	Pass
Power Spectral Density	15.247 (e)	Pass
Band Edge	15.247(d)	Pass
Spurious Emission	15.205/15.209	Pass

Pass: The EUT complies with the essential requirements in the standard.

Remark: Test according to ANSI C63.10:2013.

Measurement Uncertainty

Test Item	Frequency Range	Measurement Uncertainty	Notes
Radiated Emission	9kHz ~ 30MHz	± 4.34dB	(1)
Radiated Emission	30MHz ~ 1000MHz	± 4.24dB	(1)
Radiated Emission	1GHz ~ 26.5GHz	± 4.68dB	(1)
AC Power Line Conducted Emission	0.15MHz ~ 30MHz	± 3.45dB	(1)
Note (1): The measurement uncertainty is for coverage factor of k=2 and a level of confidence of 95%.			

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5 General Information

5.1 General Description of EUT

Product Name:	TLSR8258DK48D
Model No.:	TLSR8258DK48D
Serial No.:	C1T139A30_V1.2
Sample(s) Status	Engineer sample
Hardware:	1.0
Software:	1.0
Operation Frequency:	2402MHz-2480MHz
Channel Numbers:	40
Channel Separation:	2MHz
Modulation Type:	GFSK
Antenna Type:	External Antenna
Antenna Gain:	0.0dBi
Power Supply:	DC 3.3V

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Operation Frequency each of channel							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
1	2402MHz	11	2422MHz	21	2442MHz	31	2462MHz
2	2404MHz	12	2424MHz	22	2444MHz	32	2464MHz
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮
9	2418MHz	19	2438MHz	29	2458MHz	39	2478MHz
10	2420MHz	20	2440MHz	30	2460MHz	40	2480MHz

Note:

In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

Channel	Frequency
The lowest channel	2402MHz
The middle channel	2442MHz
The Highest channel	2480MHz

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5.2 Test mode

Transmitting mode	Keep the EUT in continuously transmitting mode.
Remark: During the test, the test voltage was tuned from 85% to 115% of the nominal rated supply voltage, and found that the worst case was under the nominal rated supply condition. So the report just shows that condition's data.	

5.3 Description of Support Units

Manufacturer	Description	Model	Serial Number
Lenovo	Notebook computer	E470C	PF-10FB5C

5.4 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

● **FCC — Designation No.: CN1252**

Qianhai BlueAsia of Technical Services(Shenzhen) Co., Ltd has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in files. Designation CN1252.

●**ISED — CAB identifier No.: CN0028**

Qianhai BlueAsia of Technical Services(Shenzhen) Co., Ltd has been registered by Certification and Engineering Bureau of ISED for radio equipment testing with CAB identifier CN0028

5.5 Test Location

All tests were performed at:

All tests were performed at:
Qianhai BlueAsia of Technical Services(Shenzhen) Co., Ltd.
IOT Test Centre of BlueAsia
No. 448 Bulong Road, Bantian Street, Longgang District, Shenzhen, China
Telephone: TEL: +86-755-28682673 FAX: +86-755-28682673
No tests were sub-contracted.

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6 Test Instruments list

Radiated Emission:						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Serial No.**	**Cal.Date (mm-dd-yy)**	**Cal.Due date (mm-dd-yy)**
1	3m SAC	SKET	9m*6 m*6m	966	06-10-2018	06-09-2023
2	Broadband Antenna	SCHWARZBECK	VULB9168	00836 P:00227	07-14-2018	07-13-2019
3	Horn Antenna	SCHWARZBECK	9120D	01892 P:00331	07-14-2018	07-13-2019
4	EMI Test Software	EZ	EZ	N/A	N/A	N/A
5	Pre-amplifier	SKET	N/A	N/A	07-19-2018	07-18-2019
6	Spectrum analyzer	Rohde & Schwarz	FSP40	100817	05-24-2018	05-23-2019
7	EMI Test Receiver	Rohde & Schwarz	ESR7	101199	03-21-2018	03-20-2019
8	Controller	SKET	N/A	N/A	N/A	N/A
9	Vector Signal Generator	Agilent	E4438C	MY45092582	05-24-2018	05-23-2019
10	Signal Generator	Agilent	E8257D	MY44320250	05-24-2018	05-23-2019

Conducted Emission						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Serial No.**	**Cal.Date (mm-dd-yy)**	**Cal.Due date (mm-dd-yy)**
1	EMI Test Receiver	Rohde & Schwarz	ESPI3	101082	06-10-2018	06-09-2019
2	LISN	CHASE	MN2050D	1447	12-18-2018	12-17-2019
3	LISN	Rohde & Schwarz	ENV216	3560.6550.15	07-19-2018	07-18-2019
4	EMI Test Software	EZ	EZ	N/A	N/A	N/A
5	Temperature Humidity Chamber	Mingle	TH101B	N/A	07-19-2018	07-18-2019

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RF Conducted Test:						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Serial No.**	**Cal.Date (mm-dd-yy)**	**Cal.Due date (mm-dd-yy)**
1	Spectrum Analyzer	Agilent	N9030A	MY50510123	05-24-2018	05-23-2019
2	Spectrum analyzer	Rohde & Schwarz	FSP40	100817	05-24-2018	05-23-2019
3	Vector Signal Generator	Agilent	E4438C	MY45092582	05-24-2018	05-23-2019
4	Signal Generator	Agilent	E8257D	MY44320250	05-24-2018	05-23-2019
5	Power Sensor	D.A.R.E	RPR3006W	17I00015SNO27	05-24-2018	05-23-2019
6	Power Sensor	D.A.R.E	RPR3006W	17I00015SNO28	05-24-2018	05-23-2019
7	DC Power Supply	LODESTAR	LP305DE	N/A	07-19-2018	07-18-2019
8	Temperature Humidity Chamber	Mingle	TH101B	N/A	07-19-2018	07-18-2019

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7 Test results and Measurement Data

7.1 Antenna requirement

Standard requirement:	FCC Part15 C Section 15.203 /247(c)

15.203 requirement:

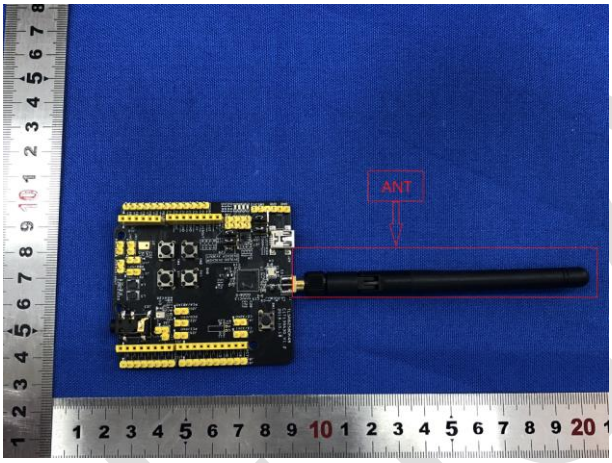
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

15.247(c) (1)(i) requirement:

(i) Systems operating in the 2400-2483.5 MHz band that is used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6dBi.

E.U.T Antenna:

The antenna is External antenna, the best case gain of the antenna is 0.0dBi



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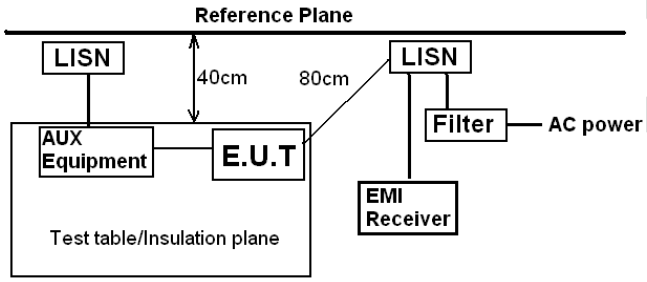
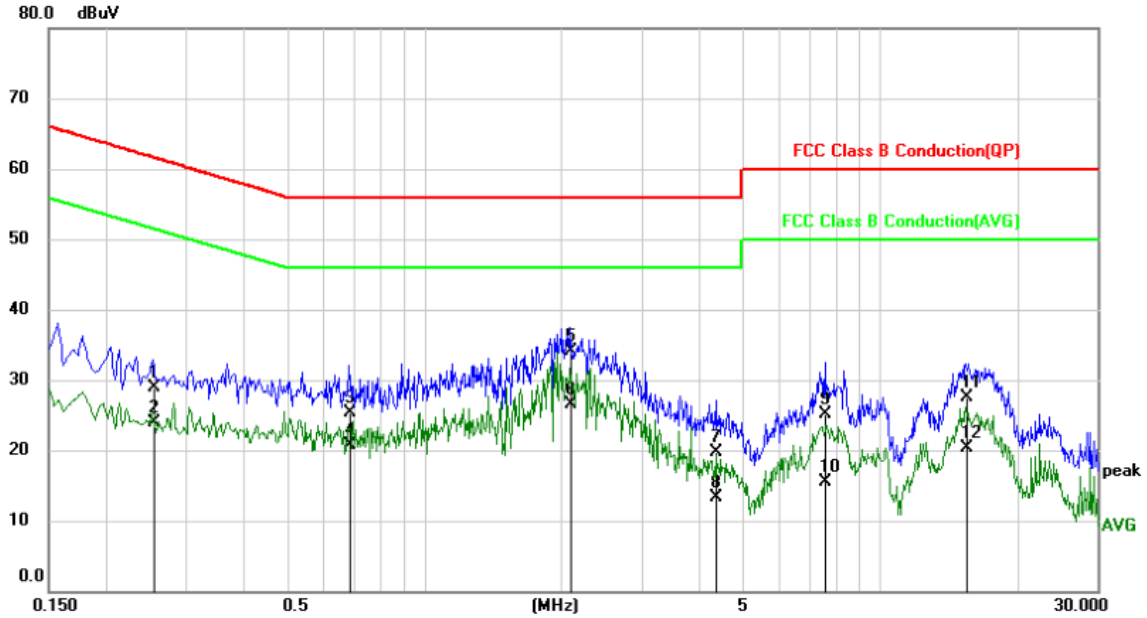
7.2 Conducted Emissions

Test Requirement:	FCC Part15 C Section 15.207
Test Method:	ANSI C63.10:2013
Test Frequency Range:	150KHz to 30MHz
Class / Severity:	Class B
Receiver setup:	RBW=9KHz, VBW=30KHz, Sweep time=auto
Limit:	Frequency range (MHz) / Limit (dBuV): Quasi-peak / Average 0.15-0.5: 66 to 56* / 56 to 46* 0.5-5: 56 / 46 5-30: 60 / 50 * Decreases with the logarithm of the frequency.
Test setup:	 *Remark:* *E.U.T: Equipment Under Test* *LISN: Line Impedence Stabilization Network* *Test table height=0.8m*
Test procedure:	1. The E.U.T and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm/50uH coupling impedance for the measuring equipment. 2. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs). 3. Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10:2013 on conducted measurement.
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Measurement data

Line:

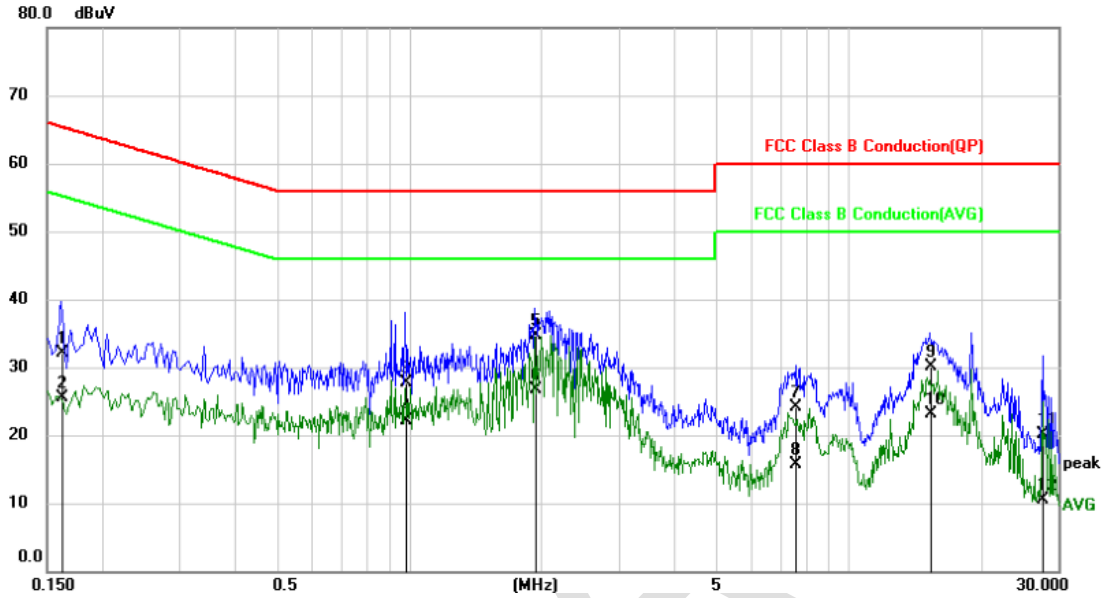
EUT:	TLSR8258DK48D	**Probe:**	L1
Model:	TLSR8258DK48D	**Power Source:**	AC120V/60Hz
Mode:	TX mode	**Test by:**	Joan
Temp./Hum.(%H):	26℃/60%RH		



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector
1		0.2540	19.08	9.84	28.92	61.63	-32.71	QP
2		0.2540	14.01	9.84	23.85	51.63	-27.78	AVG
3		0.6860	15.77	9.57	25.34	56.00	-30.66	QP
4		0.6860	11.14	9.57	20.71	46.00	-25.29	AVG
5		2.0900	24.41	9.73	34.14	56.00	-21.86	QP
6	*	2.0900	16.77	9.73	26.50	46.00	-19.50	AVG
7		4.3740	9.82	9.79	19.61	56.00	-36.39	QP
8		4.3740	3.57	9.79	13.36	46.00	-32.64	AVG
9		7.5700	15.20	9.81	25.01	60.00	-34.99	QP
10		7.5700	5.71	9.81	15.52	50.00	-34.48	AVG
11		15.4020	17.67	9.88	27.55	60.00	-32.45	QP
12		15.4020	10.46	9.88	20.34	50.00	-29.66	AVG

Neutral:

EUT:	TLSR8258DK48D	**Probe:**	N
Model:	TLSR8258DK48D	**Power Source:**	AC120V/60Hz
Mode:	TX mode	**Test by:**	Joan
Temp./Hum.(%H):	26℃/60%RH		

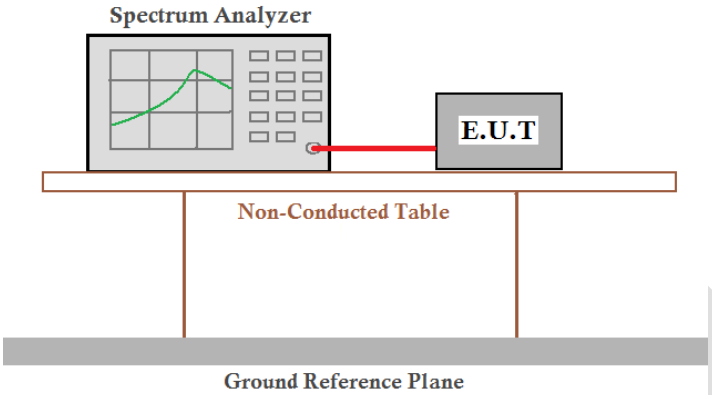


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector
1		0.1620	22.36	9.79	32.15	65.36	-33.21	QP
2		0.1620	15.78	9.79	25.57	55.36	-29.79	AVG
3		0.9820	18.08	9.67	27.75	56.00	-28.25	QP
4		0.9820	12.53	9.67	22.20	46.00	-23.80	AVG
5		1.9380	24.92	9.77	34.69	56.00	-21.31	QP
6	*	1.9380	16.96	9.77	26.73	46.00	-19.27	AVG
7		7.6020	14.33	9.80	24.13	60.00	-35.87	QP
8		7.6020	5.90	9.80	15.70	50.00	-34.30	AVG
9		15.3820	20.26	9.92	30.18	60.00	-29.82	QP
10		15.3820	13.14	9.92	23.06	50.00	-26.94	AVG
11		27.5980	10.19	9.95	20.14	60.00	-39.86	QP
12		27.5980	0.48	9.95	10.43	50.00	-39.57	AVG

Notes:

1. An initial pre-scan was performed on the line and neutral lines with peak detector.
2. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.
3. *Final Level =Receiver Read level + Correct factor*
4. *Correct factor = LISN Factor + Cable Loss*
5. *If the average limit is met when using a quasi-peak detector receiver, the EUT shall be deemed to meet both limits and measurement with the average detector receiver is unnecessary.*

7.3 Conducted Output Power

Test Requirement:	FCC Part15 C Section 15.247 (b)(3)
Test Method:	ANSI C63.10:2013 and KDB558074 D01 DTS Meas Guidance V05
Limit:	30dBm
Test setup:	
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Measurement Data

AppendixC: Maximum conducted output power

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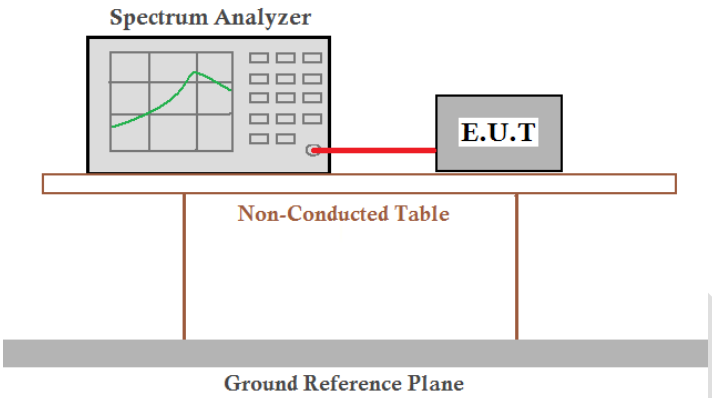
7.4 Channel Bandwidth

Test Requirement:	FCC Part15 C Section 15.247 (a)(2)
Test Method:	ANSI C63.10:2013 and KDB558074 D01 DTS Meas Guidance V05
Limit:	>500KHz
Test setup:	
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Measurement Data

AppendixA: DTS Bandwidth
AppendixB: Occupied Channel Bandwidth

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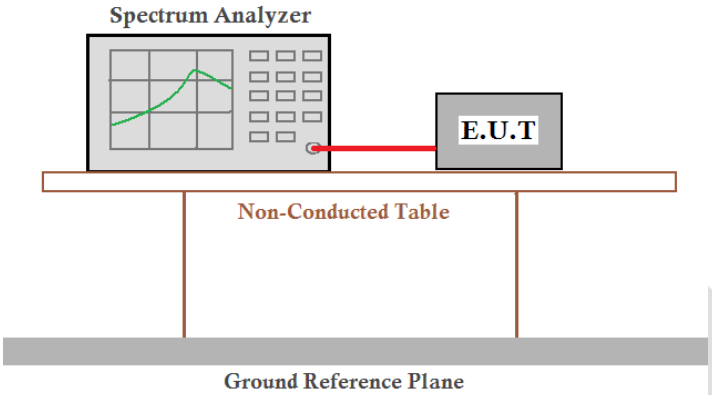
7.5 Power Spectral Density

Test Requirement:	FCC Part15 C Section 15.247 (e)
Test Method:	ANSI C63.10:2013 and KDB558074 D01 DTS Meas Guidance V05
Limit:	8dBm/3kHz
Test setup:	
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Measurement Data

AppendixD: Maximum power spectral density

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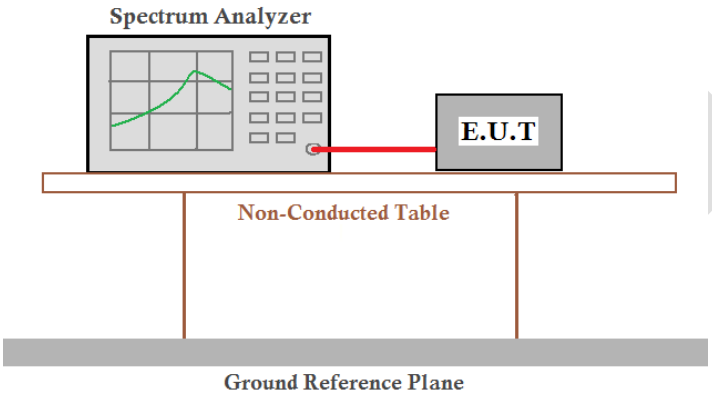
7.6 Band edges

7.6.1 Conducted Emission Method

Test Requirement:	FCC Part15 C Section 15.247 (d)
Test Method:	ANSI C63.10:2013 and KDB558074 D01 DTS Meas Guidance V05
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator 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, based on either an RF conducted or a radiated measurement.
Test setup:	
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Measurement Data

AppendixE:Band edge measurements

7.6.2 Radiated Emission Method

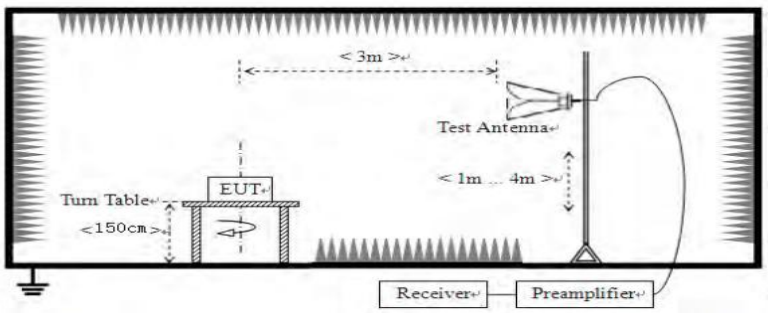
Test Requirement:	FCC Part15 C Section 15.209 and 15.205
Test Method:	ANSI C63.10:2013
Test Frequency Range:	All of the restrict bands were tested, only the worst band's (2310MHz to 2390MHz, 2483.5MHz to 2500MHz) data was showed.
Test site:	Measurement Distance: 3m
Receiver setup:	

Frequency	Detector	RBW	VBW	Value
Above 1GHz	Peak	1MHz	3MHz	Peak
	RMS	1MHz	3MHz	Average

Limit:

Frequency	Limit (dBuV/m @3m)	Value
Above 1GHz	54.00	Average
	74.00	Peak

Test setup:



Test Procedure:

1. The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter camber. 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 antenna height 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 rota table was turned from 0 degrees to 360 degrees to find the maximum reading.
5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
6. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
7. The radiation measurements are performed in X, Y, Z axis positioning. And found the X axis positioning which it is worse case, only the test worst case mode is recorded in the report.

Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Measurement data:

Remark: The pre-test were performed on lowest, middle and highest frequencies, only the worst case's (lowest and highest frequencies) data was showed.

Test channel:	Lowest

Peak value:

Frequency (MHz)	Read Level (dBuV)	Correct factor (dB/m)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2310.00	63.97	-14.56	49.41	74.00	-24.59	Horizontal
2390.00	65.14	-14.19	50.95	74.00	-23.05	Horizontal
2310.00	68.25	-14.85	53.40	74.00	-20.60	Vertical
2390.00	68.57	-14.52	54.06	74.00	-19.94	Vertical

Average value:

Frequency (MHz)	Read Level (dBuV)	Correct factor (dB/m)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2310.00	41.66	-14.56	27.10	54.00	-26.90	Horizontal
2390.00	41.68	-14.19	27.49	54.00	-26.51	Horizontal
2310.00	42.66	-14.85	27.81	54.00	-26.91	Vertical
2390.00	42.91	-14.52	28.40	54.00	-25.60	Vertical

Test channel:	Highest

Peak value:

Frequency (MHz)	Read Level (dBuV)	Correct factor (dB/m)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2483.50	64.21	-13.66	50.55	74.00	-23.45	Horizontal
2500.00	62.96	-13.57	49.39	74.00	-24.61	Horizontal
2483.50	68.12	-14.05	54.07	74.00	-19.93	Vertical
2500.00	67.58	-13.97	53.61	74.00	-20.39	Vertical

Average value:

Frequency (MHz)	Read Level (dBuV)	Correct factor (dB/m)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2483.50	43.89	-13.66	30.23	54.00	-23.77	Horizontal
2500.00	44.21	-13.57	30.64	54.00	-23.36	Horizontal
2483.50	44.39	-14.05	30.34	54.00	-23.66	Vertical
2500.00	43.77	-13.97	29.80	54.00	-24.20	Vertical

Remark:

1. *Final Level =Receiver Read level + Correct factor*
2. *The emission levels of other frequencies are very lower than the limit and not show in test report.*
3. *Correct factor= Antenna Factor + Cable Loss – Preamplifier Factor*

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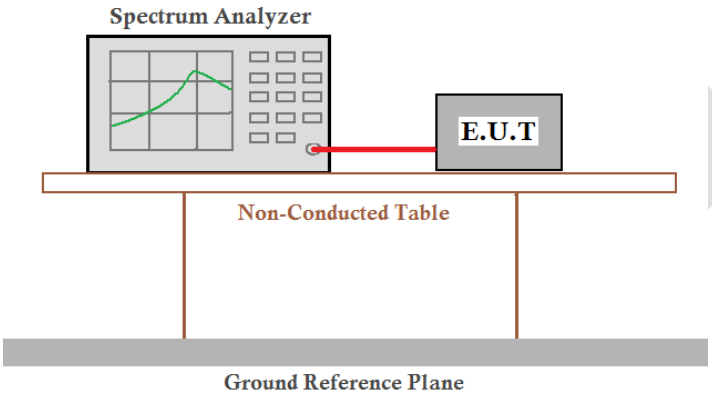
7.7 Spurious Emission

7.7.1 Conducted Emission Method

Test Requirement:	FCC Part15 C Section 15.247 (d)
Test Method:	ANSI C63.10:2013 and KDB558074 D01 DTS Meas Guidance V05
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator 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, based on either an RF conducted or a radiated measurement.
Test setup:	
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Measurement Data

AppendixF:Conducted SpuriousEmission

7.7.2 Radiated Emission Method

Test Requirement:	FCC Part15 C Section 15.209
Test Method:	ANSI C63.10:2013
Test Frequency Range:	9kHz to 25GHz
Test site:	Measurement Distance: 3m
Receiver setup:	

Frequency	Detector	RBW	VBW	Value
9KHz-150KHz	PK,AV,QP	200Hz	600Hz	PK,AV,QP
150KHz-30MHz	PK,AV,QP	9KHz	30KHz	PK,AV,QP
30MHz-1GHz	Quasi-peak	120KHz	300KHz	Quasi-peak
Above 1GHz	Peak	1MHz	3MHz	Peak
	Peak	1MHz	10Hz	Average

Limit:
(Spurious Emissions)

Frequency	Limit (uV/m)	Value	Measurement Distance
0.009MHz-0.490MHz	2400/F(KHz)	PK,AV,QP	300m
0.490MHz-1.705MHz	24000/F(KHz)	QP	30m
1.705MHz-30MHz	30	QP	30m
30MHz-88MHz	100	QP	3m
88MHz-216MHz	150	QP	
216MHz-960MHz	200	QP	
960MHz-1GHz	500	QP	
Above 1GHz	500	Average	
	5000	Peak	

Limit:
(band edge)

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in Section 15.209, whichever is the lesser attenuation.

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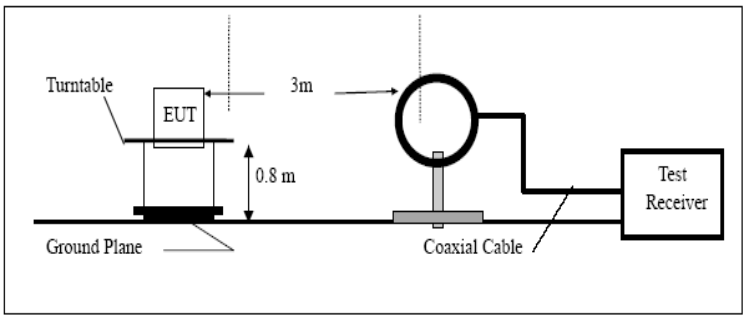
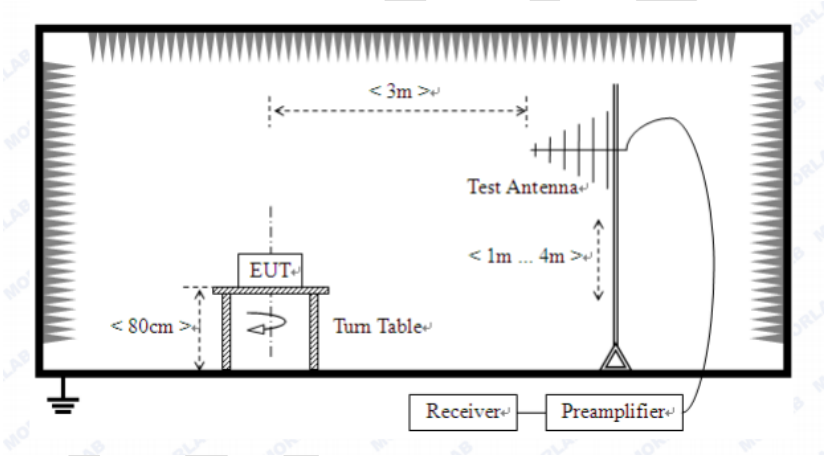
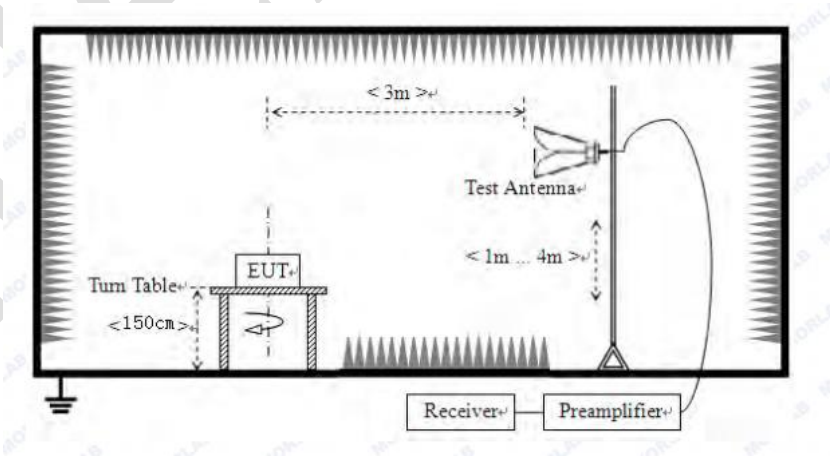
Test setup:	Below 30MHz  Below 1GHz  Above 1GHz 
Test Procedure:	1. The EUT was placed on the top of a rotating table (0.8m for below 1G and 1.5m for above 1G) above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation. 2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. 3. The antenna height 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 rota table was turned from 0 degrees to 360 degrees to find the maximum reading. 5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. 6. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Remark:
Pre-scan all kind of the place mode (X-axis, Y-axis, Z-axis), and found the Y-axis which it is worse case.

Measurement Data

- **9 kHz ~ 30 MHz**

The low frequency, which started from 9 kHz to 30 MHz, was pre-scanned and the result which was 20 dB lower than the limit line per 15.31(o) was not reported.

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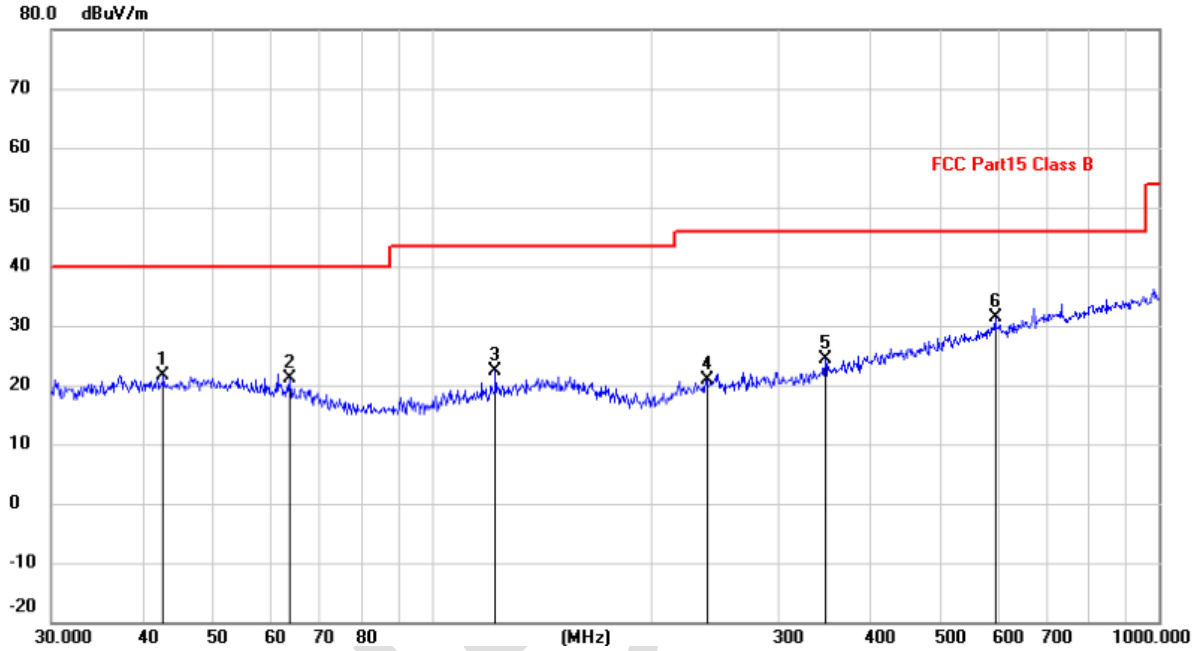
■ **Below 1GHz**

Horizontal:

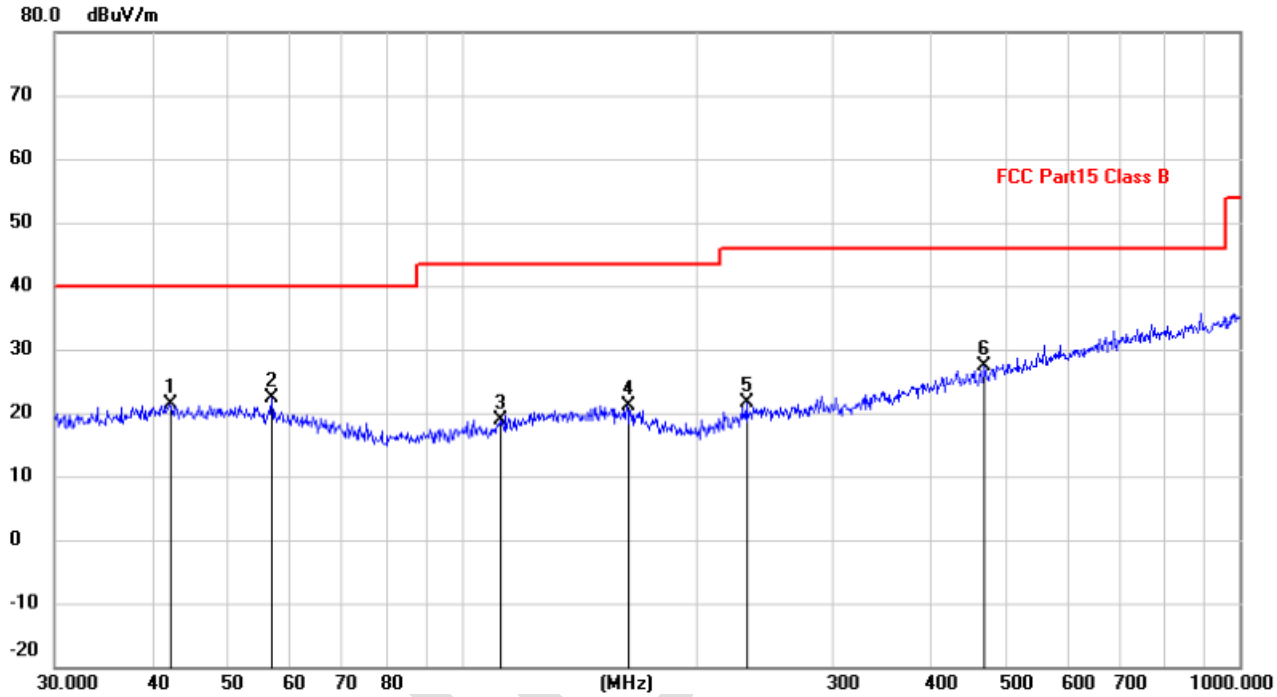
EUT:	TLSR8258DK48D	**Polarziation:**	Horizontal
Model:	TLSR8258DK48D	**Power Source:**	AC120V/60Hz
Mode:	TX mode	**Test by:**	Joan
Temp./Hum.(%H):	26℃/60%RH		



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		42.7496	7.76	13.78	21.54	40.00	-18.46	QP
2		63.7588	8.94	12.10	21.04	40.00	-18.96	QP
3		122.4040	10.03	12.46	22.49	43.50	-21.01	QP
4		238.3102	8.20	12.60	20.80	46.00	-25.20	QP
5		348.0274	9.46	14.93	24.39	46.00	-21.61	QP
6	*	595.1329	10.47	20.84	31.31	46.00	-14.69	QP

Vertical:

EUT:	TLSR8258DK48D	**Polarziation:**	Vertical
Model:	TLSR8258DK48D	**Power Source:**	AC120V/60Hz
Mode:	TX mode	**Test by:**	Joan
Temp./Hum.(%H):	26℃/60%RH		



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		42.1542	7.70	13.77	21.47	40.00	-18.53	QP
2	*	56.9912	9.07	13.25	22.32	40.00	-17.68	QP
3		112.1305	7.26	11.56	18.82	43.50	-24.68	QP
4		163.1818	8.48	12.68	21.16	43.50	-22.34	QP
5		232.5318	9.38	12.19	21.57	46.00	-24.43	QP
6		470.5232	9.23	18.17	27.40	46.00	-18.60	QP

■ **Above 1GHz**

Test channel:	Lowest

Peak value:

Frequency (MHz)	Read Level (dBuV)	Correct factor (dB/m)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4804.00	64.02	-7.43	56.59	74.00	-17.41	Vertical
7206.00	62.26	-2.42	59.84	74.00	-14.16	Vertical
9608.00	60.37	-2.38	57.99	74.00	-16.01	Vertical
12010.00	*			74.00		Vertical
14412.00	*			74.00		Vertical
4804.00	65.18	-7.43	57.75	74.00	-16.25	Horizontal
7206.00	63.38	-2.42	60.96	74.00	-13.04	Horizontal
9608.00	61.24	-2.38	58.86	74.00	-15.14	Horizontal
12010.00	*			74.00		Horizontal
14412.00	*			74.00		Horizontal

Average value:

Frequency (MHz)	Read Level (dBuV)	Correct factor (dB/m)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4804.00	52.75	-7.43	45.32	54.00	-8.68	Vertical
7206.00	48.62	-2.42	46.20	54.00	-7.80	Vertical
9608.00	46.83	-2.38	44.45	54.00	-9.55	Vertical
12010.00	*			54.00		Vertical
14412.00	*			54.00		Vertical
4804.00	49.76	-7.43	42.33	54.00	-11.67	Horizontal
7206.00	46.67	-2.42	44.25	54.00	-9.75	Horizontal
9608.00	45.51	-2.38	43.13	54.00	-10.87	Horizontal
12010.00	*			54.00		Horizontal
14412.00	*			54.00		Horizontal

Remark:

1. *Final Level =Receiver Read level +Correct factor*
2. *"*", means this data is the too weak instrument of signal is unable to test.*
3. *Correct factor = Antenna Factor + Cable Loss – Preamplifier Factor*

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Test channel:	Middle

Peak value:

Frequency (MHz)	Read Level (dBuV)	Correct factor (dB/m)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4884.00	62.82	-7.49	55.33	74.00	-18.67	Vertical
7326.00	61.36	-2.40	58.96	74.00	-15.04	Vertical
9768.00	60.71	-2.38	58.33	74.00	-15.67	Vertical
12210.00	*			74.00		Vertical
14652.00	*			74.00		Vertical
4884.00	69.86	-7.49	62.37	74.00	-11.63	Horizontal
7326.00	64.94	-2.40	62.54	74.00	-11.46	Horizontal
9768.00	61.44	-2.38	59.06	74.00	-14.94	Horizontal
12210.00	*			74.00		Horizontal
14652.00	*			74.00		Horizontal

Average value:

Frequency (MHz)	Read Level (dBuV)	Correct factor (dB/m)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4884.00	50.52	-7.49	43.03	54.00	-10.97	Vertical
7326.00	48.36	-2.40	45.96	54.00	-8.04	Vertical
9768.00	45.57	-2.38	43.19	54.00	-10.81	Vertical
12210.00	*			54.00		Vertical
14652.00	*			54.00		Vertical
4884.00	52.11	-7.49	44.62	54.00	-9.38	Horizontal
7326.00	46.36	-2.40	43.96	54.00	-10.04	Horizontal
9768.00	44.84	-2.38	42.46	54.00	-11.54	Horizontal
12210.00	*			54.00		Horizontal
14652.00	*			54.00		Horizontal

Remark:
1. Final Level =Receiver Read level +Correct factor
2. "", means this data is the too weak instrument of signal is unable to test.*
3 . Correct factor = Antenna Factor + Cable Loss – Preamplifier Factor

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Test channel:	Highest

Peak value:

Frequency (MHz)	Read Level (dBuV)	Correct factor (dB/m)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4960.00	60.47	-7.47	53.00	74.00	-21.00	Vertical
7440.00	58.84	-2.45	56.39	74.00	-17.61	Vertical
9920.00	57.61	-2.37	55.24	74.00	-18.76	Vertical
12400.00	*			74.00		Vertical
14880.00	*			74.00		Vertical
4960.00	61.43	-7.47	53.96	74.00	-20.04	Horizontal
7440.00	60.36	-2.45	57.91	74.00	-16.09	Horizontal
9920.00	58.81	-2.37	56.44	74.00	-17.56	Horizontal
12400.00	*			74.00		Horizontal
14880.00	*			74.00		Horizontal

Average value:

Frequency (MHz)	Read Level (dBuV)	Correct factor (dB/m)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4960.00	46.35	-7.47	38.88	54.00	-15.12	Vertical
7440.00	45.49	-2.45	43.04	54.00	-10.96	Vertical
9920.00	47.11	-2.37	44.74	54.00	-9.26	Vertical
12400.00	*			54.00		Vertical
14880.00	*			54.00		Vertical
4960.00	54.01	-7.47	46.54	54.00	-7.46	Horizontal
7440.00	49.65	-2.45	47.20	54.00	-6.80	Horizontal
9920.00	45.47	-2.37	43.10	54.00	-10.90	Horizontal
12400.00	*			54.00		Horizontal
14880.00	*			54.00		Horizontal

Remark:

1. *Final Level =Receiver Read level + Correct factor.*
2. *"*", means this data is the too weak instrument of signal is unable to test.*
3. *Correct factor = Antenna Factor + Cable Loss – Preamplifier Factor.*

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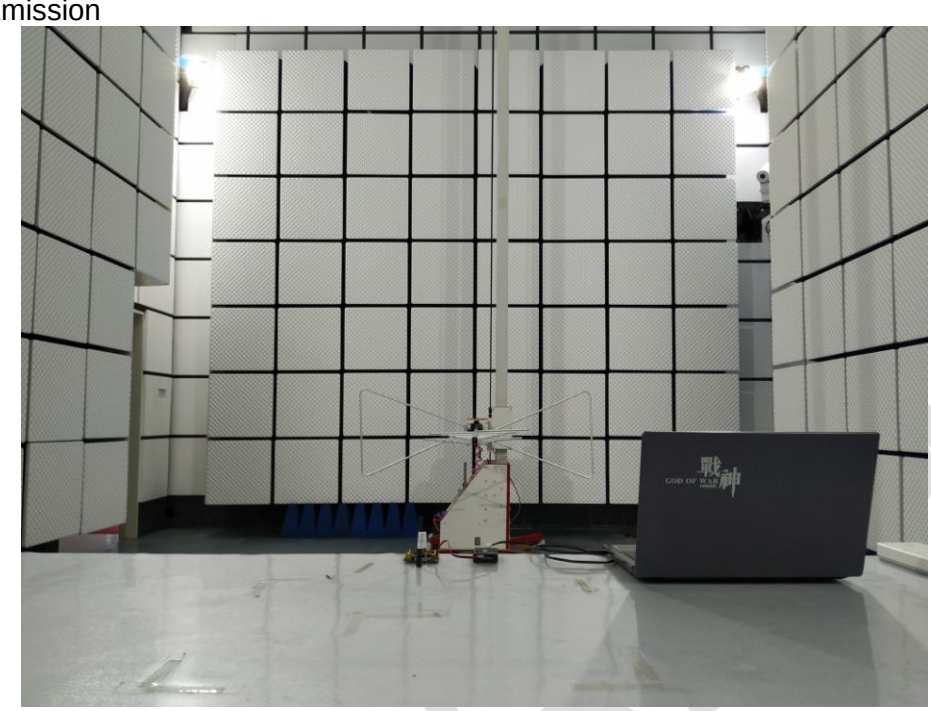
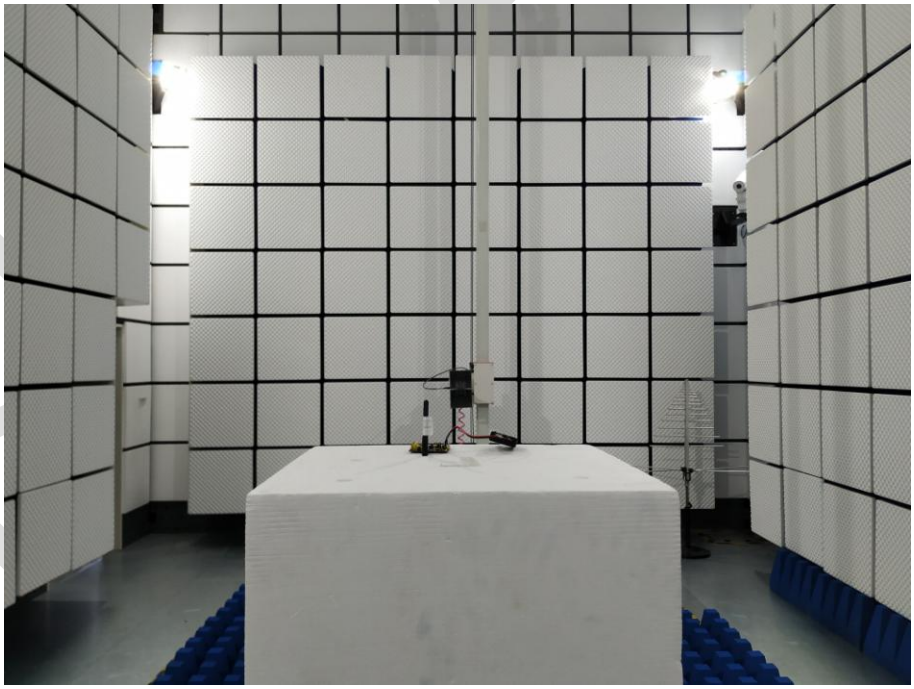
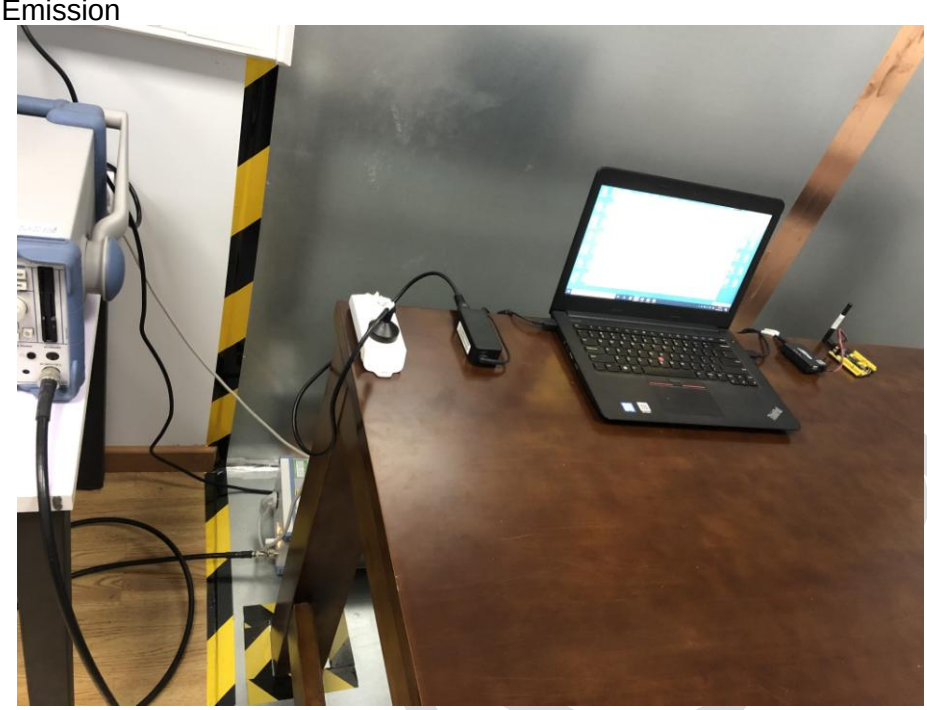
8 Test Setup Photo

Radiated Emission





Conducted Emission



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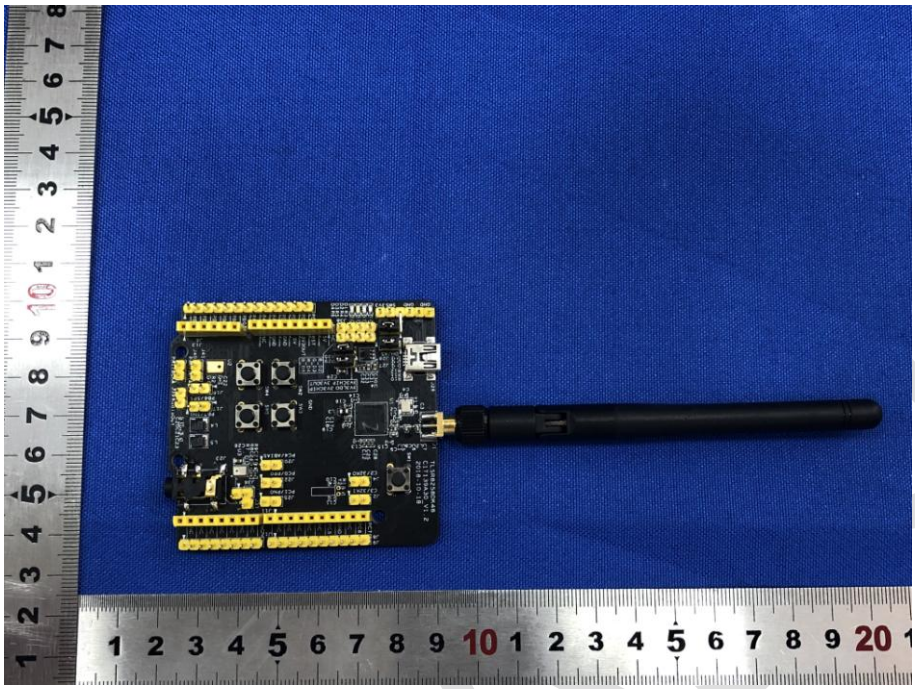
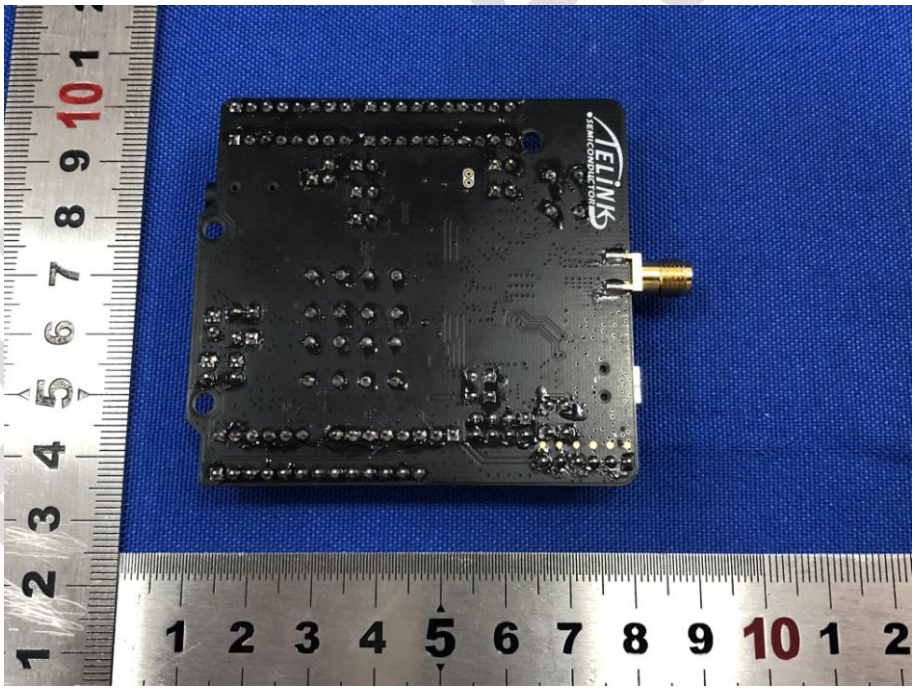
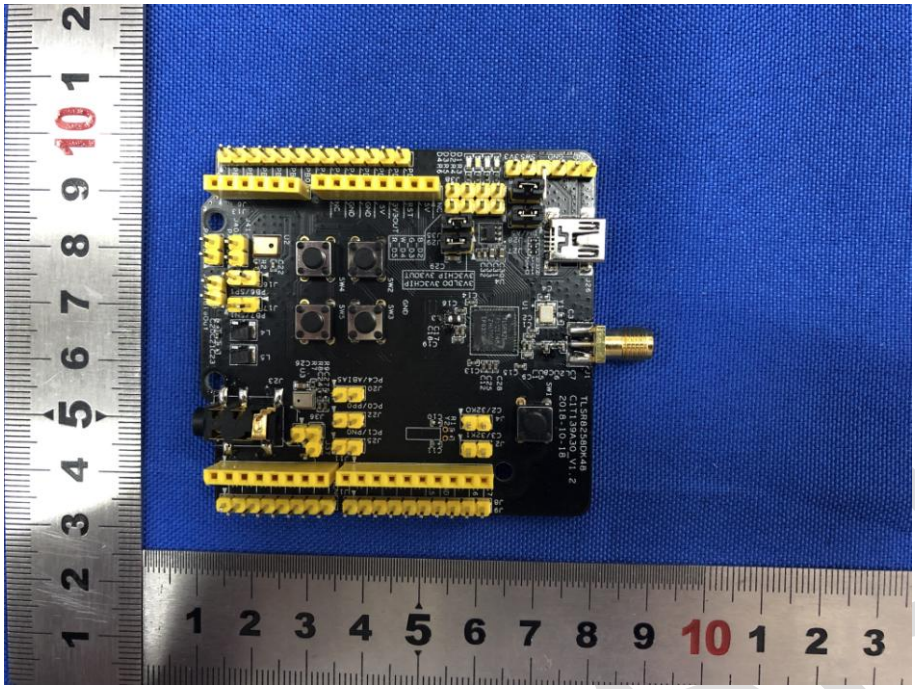
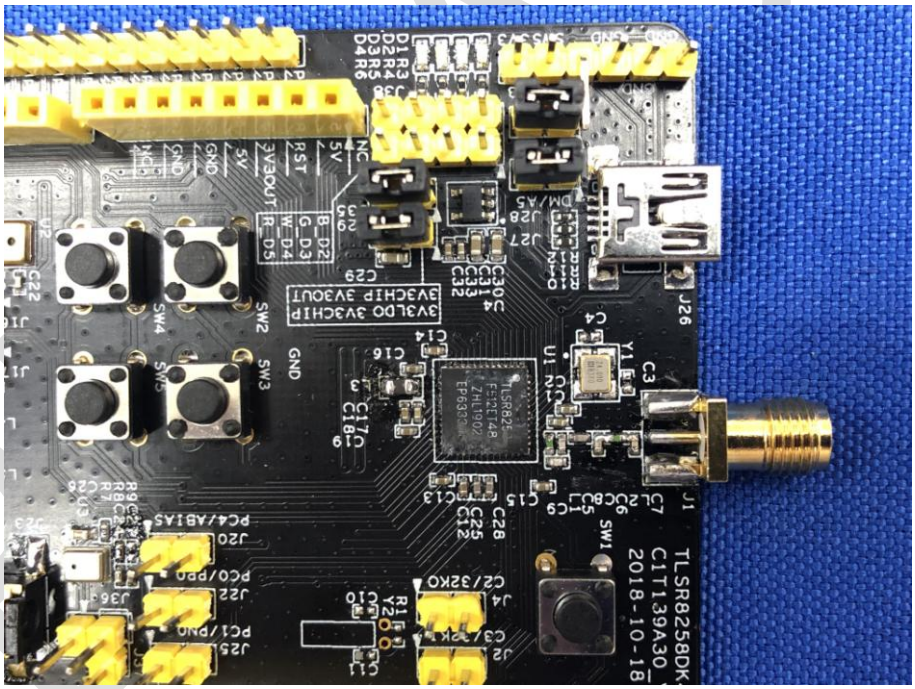
9 EUT Constructional Details








3V3LDO 3V3CHIP
3V3CHIP 3V3OUT
TLSR8258DK
C1T139A30
2018-10-18

10 Appendix

Refer to the following attachments.

*** End of Report ***

The test report is effective only with both signature and specialized stamp, The result(s) shown in this report refer only to the sample(s) tested. Without written approval of BlueAsia, this report can't be reproduced except in full.

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AppendixA: DTS Bandwidth

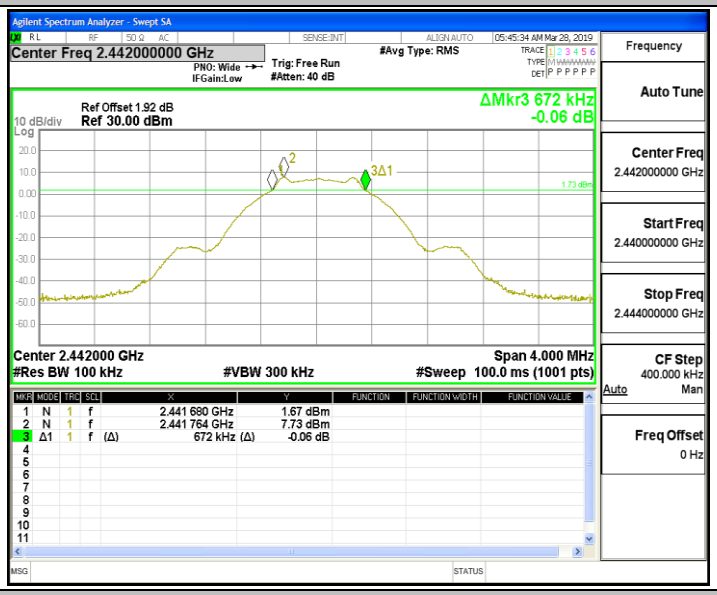
Test Result

TestMode	Antenna	Channel	DTS BW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
TX	Ant1	2402	0.680	2401.676	2402.356	---	PASS
		2442	0.672	2441.680	2442.352	---	PASS
		2480	0.676	2479.680	2480.356	---	PASS

Test Graphs

TX _Ant1_2402

TX _Ant1_2442



TX _Ant1_2480

Agilent Spectrum Analyzer - Swept SA
Center Freq 2.480000000 GHz
PNO: Wide
IFGain:Low
Trig: Free Run
#Atten: 40 dB
#Avg Type: RMS
05:47:59 AM Mar 28, 2019
Ref Offset 1.92 dB
10 dB/div
Ref 30.00 dBm
Log
ΔMkr3 676 kHz
-0.07 dB
Center 2.480000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Span 4.000 MHz
#Sweep 100.0 ms (1001 pts)
1 N 1 f 2.479 680 GHz 1.61 dBm
2 N 1 f 2.480 264 GHz 7.70 dBm
3 Δ1 1 f (Δ) 676 kHz (Δ) -0.07 dB
Frequency
Auto Tune
Center Freq
2.480000000 GHz
Start Freq
2.478000000 GHz
Stop Freq
2.482000000 GHz
CF Step
400.000 kHz
Auto Man
Freq Offset
0 Hz

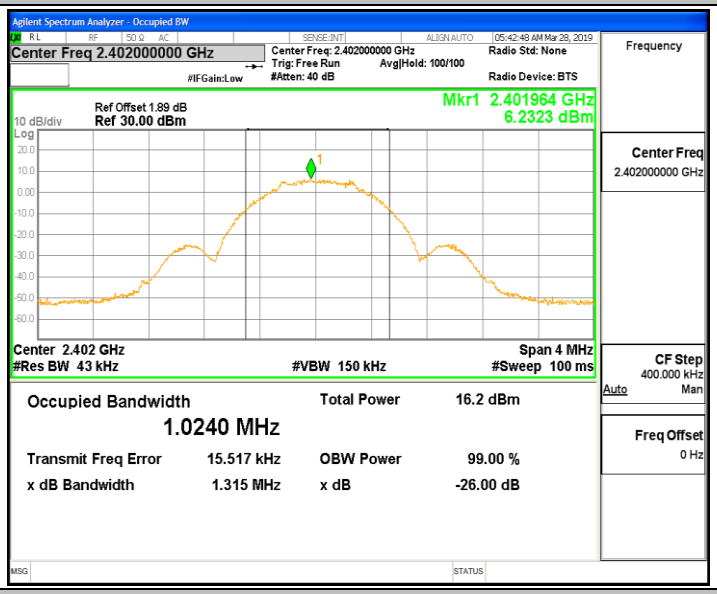
AppendixB: Occupied Channel Bandwidth

Test Result

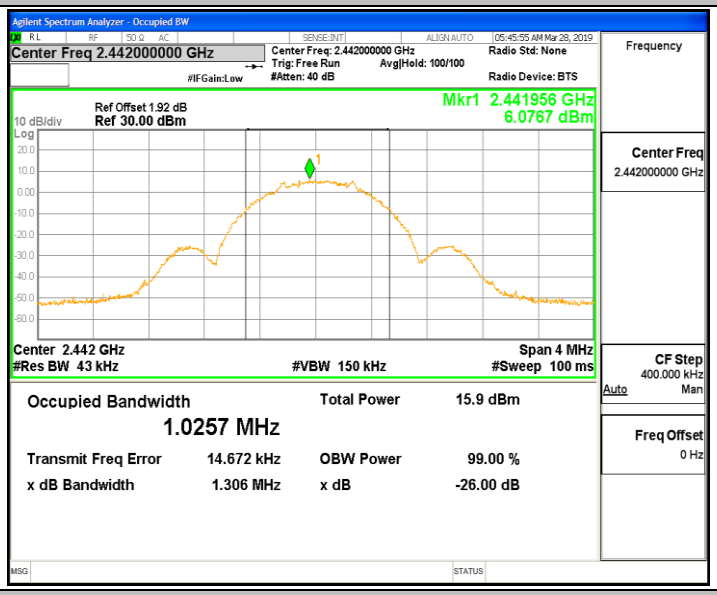
TestMode	Antenna	Channel	OCB [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
TX	Ant1	2402	1.0240	2401.504	2402.528	---	PASS
		2442	1.0257	2441.502	2442.528	---	PASS
		2480	1.0260	2479.503	2480.529	---	PASS

Test Graphs

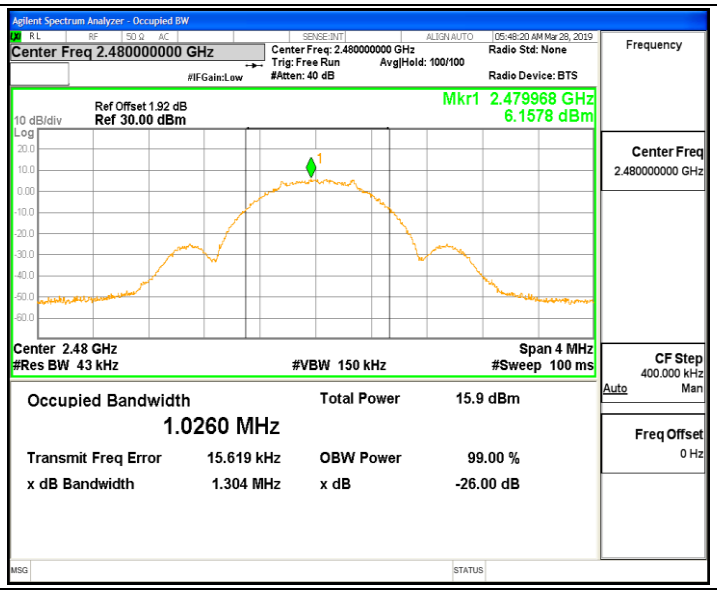
TX _Ant1_2402



TX _Ant1_2442



TX _Ant1_2480


Agilent Spectrum Analyzer - Occupied BW
Center Freq 2.480000000 GHz
Center Freq: 2.480000000 GHz
Trig: Free Run
Avg|Hold: 100/100
#Atten: 40 dB
#IFGain:Low
Radio Std: None
Radio Device: BTS
05:48:20 AM Mar 28, 2019
Frequency
Ref Offset 1.92 dB
Ref 30.00 dBm
10 dB/div
Log
Mkr1 2.479968 GHz
6.1578 dBm
Center 2.48 GHz
#Res BW 43 kHz
#VBW 150 kHz
Span 4 MHz
#Sweep 100 ms
Center Freq
2.480000000 GHz
CF Step
400.000 kHz
Auto
Man
Freq Offset
0 Hz
Occupied Bandwidth
1.0260 MHz
Total Power 15.9 dBm
Transmit Freq Error 15.619 kHz
OBW Power 99.00 %
x dB Bandwidth 1.304 MHz
x dB -26.00 dB
MSG
STATUS

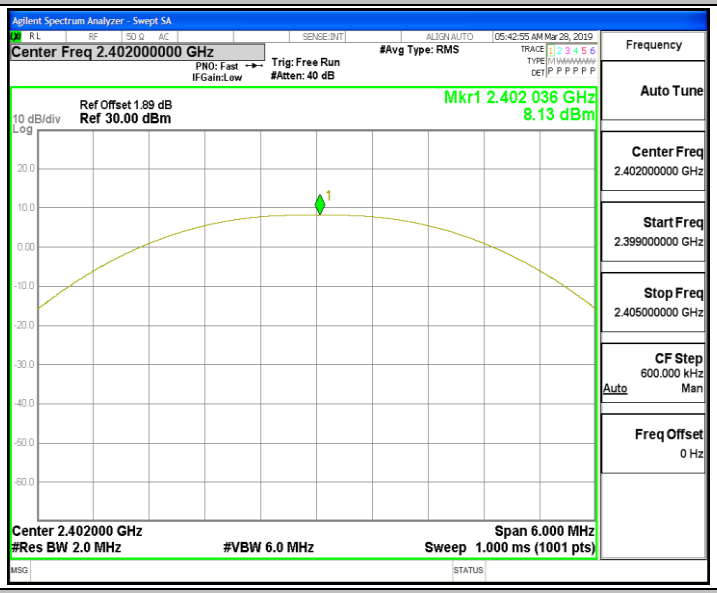
AppendixC: Maximum conducted output power

Test Result

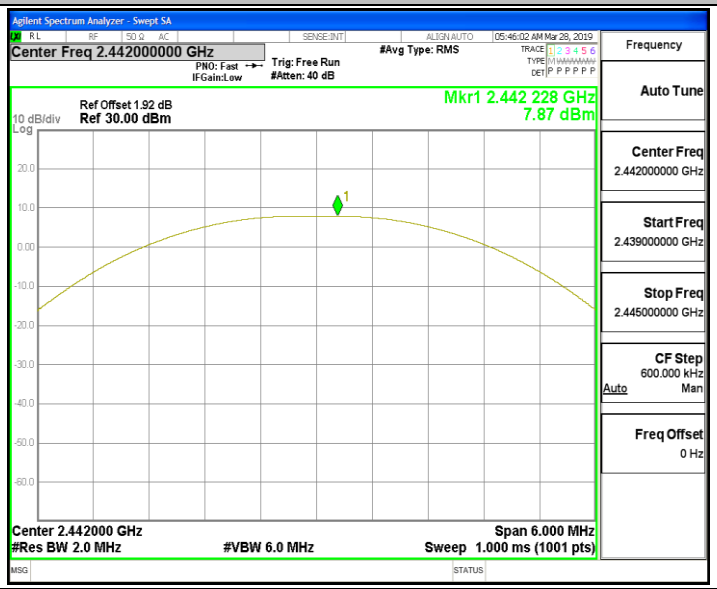
TestMode	Antenna	Channel	Result[dBm]	Limit[dBm]	Verdict
TX	Ant1	2402	8.13	<=30	PASS
		2442	7.87	<=30	PASS
		2480	7.78	<=30	PASS

Test Graphs

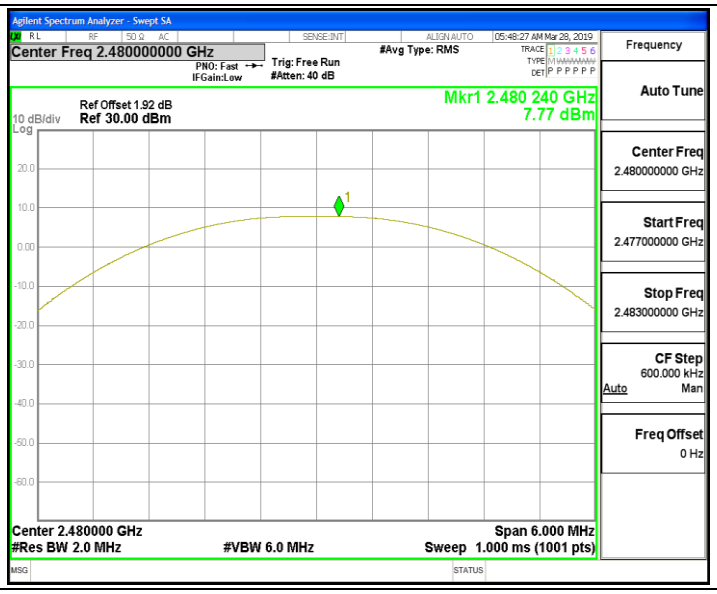
TX _Ant1_2402



TX _Ant1_2442



TX _Ant1_2480


Agilent Spectrum Analyzer - Swept SA
Center Freq 2.480000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 40 dB
#Avg Type: RMS
05:48:27 AM Mar 28, 2019
Ref Offset 1.92 dB
10 dB/div
Ref 30.00 dBm
Log
Mkr1 2.480 240 GHz
7.77 dBm
Center 2.480000 GHz
#Res BW 2.0 MHz
#VBW 6.0 MHz
Span 6.000 MHz
Sweep 1.000 ms (1001 pts)
Frequency
Auto Tune
Center Freq
2.480000000 GHz
Start Freq
2.477000000 GHz
Stop Freq
2.483000000 GHz
CF Step
600.000 kHz
Auto
Man
Freq Offset
0 Hz

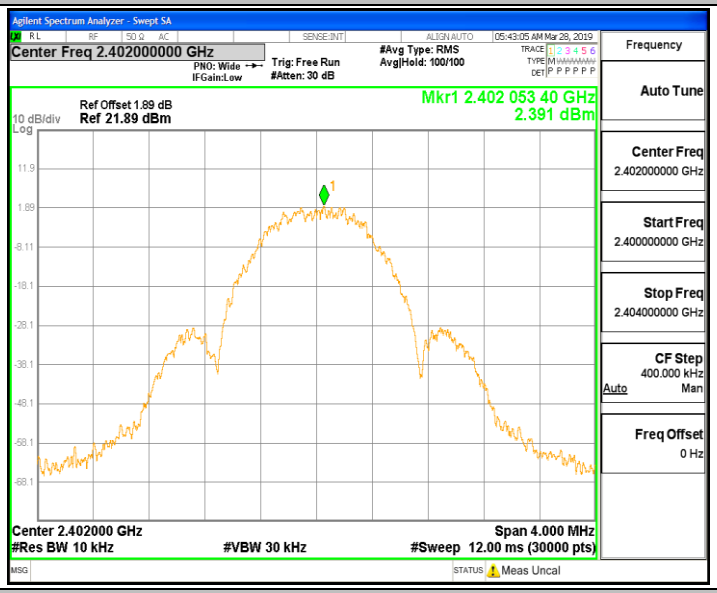
AppendixD: Maximum power spectral density

Test Result

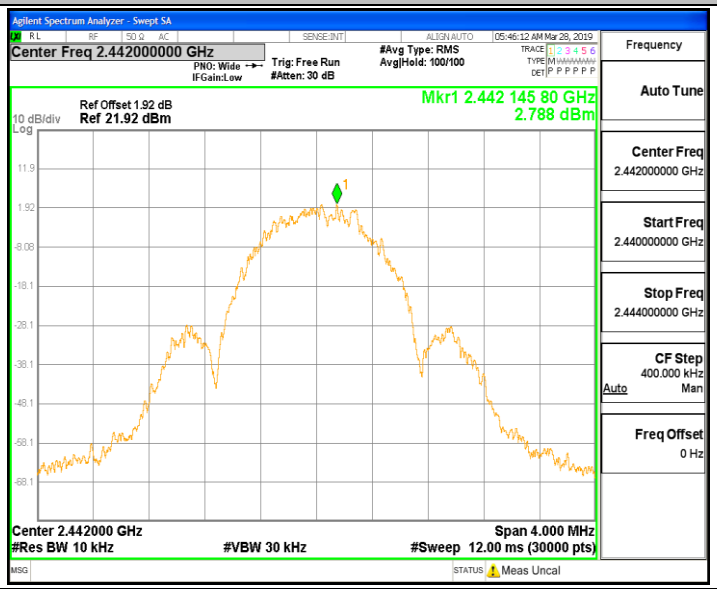
TestMode	Antenna	Channel	Result[dBm/3-100kHz]	Limit[dBm/3kHz]	Verdict
TX	Ant1	2402	2.39	<=8	PASS
		2442	2.79	<=8	PASS
		2480	2.65	<=8	PASS

Test Graphs

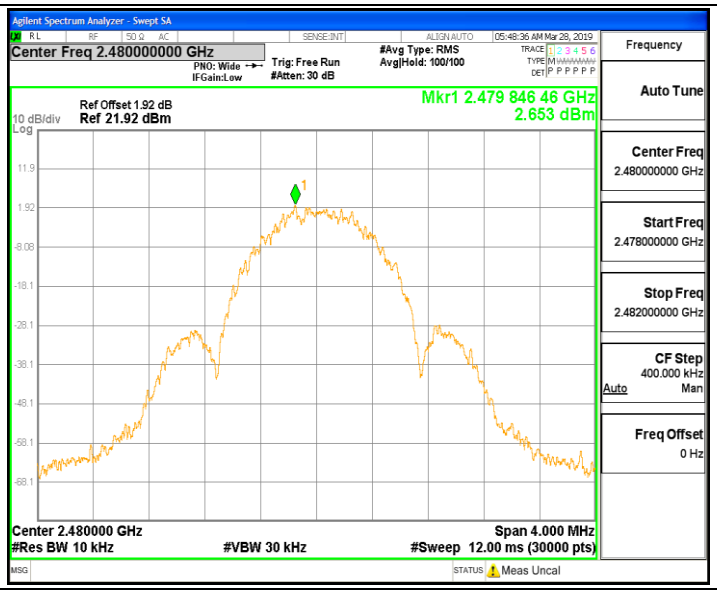
TX _Ant1_2402



TX _Ant1_2442



TX _Ant1_2480


Agilent Spectrum Analyzer - Swept SA
Center Freq 2.480000000 GHz
PNO: Wide
IFGain:Low
Trig: Free Run
#Atten: 30 dB
#Avg Type: RMS
Avg|Hold: 100/100
05:48:36 AM Mar 28, 2019
Ref Offset 1.92 dB
10 dB/div
Ref 21.92 dBm
Log
Mkr1 2.479 846 46 GHz
2.653 dBm
11.9
1.92
-8.08
-18.1
-28.1
-38.1
-48.1
-58.1
-68.1
Center 2.480000 GHz
#Res BW 10 kHz
#VBW 30 kHz
Span 4.000 MHz
#Sweep 12.00 ms (30000 pts)
Meas Uncal
Frequency
Auto Tune
Center Freq
2.480000000 GHz
Start Freq
2.478000000 GHz
Stop Freq
2.482000000 GHz
CF Step
400.000 kHz
Auto
Man
Freq Offset
0 Hz

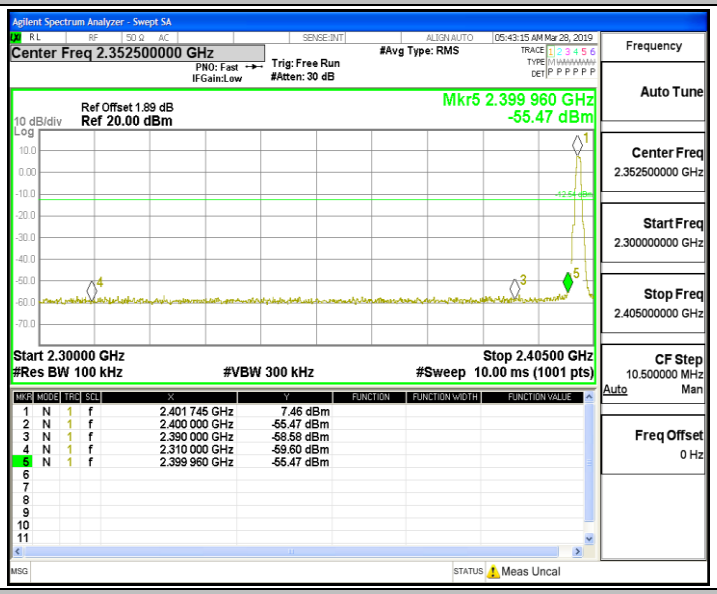
AppendixE:Band edge measurements

Test Result

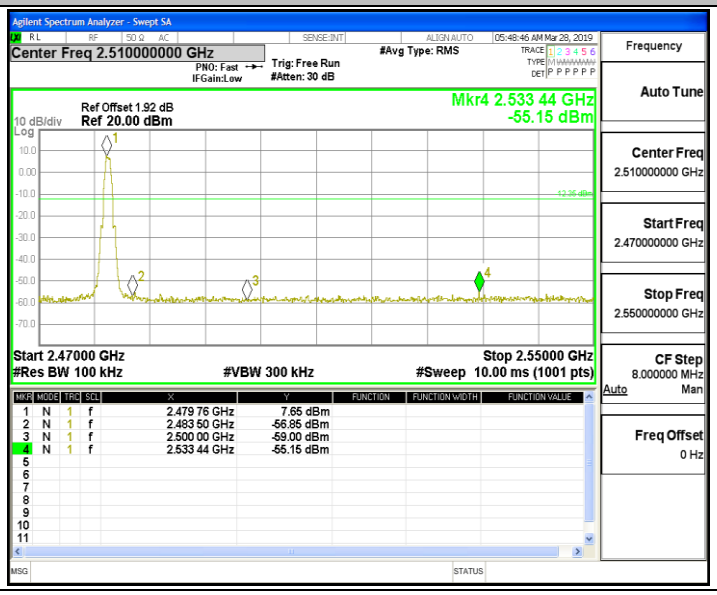
TestMode	Antenna	ChName	Channel	RefLevel[dBm]	Result[dBm]	Limit[dBm]	Verdict
TX	Ant1	Low	2402	7.47	-55.47	<=-12.54	PASS
		High	2480	7.65	-55.15	<=-12.35	PASS

Test Graphs

BLE_BT4.0_Ant1_Low_2402



BLE_BT4.0_Ant1_High_2480



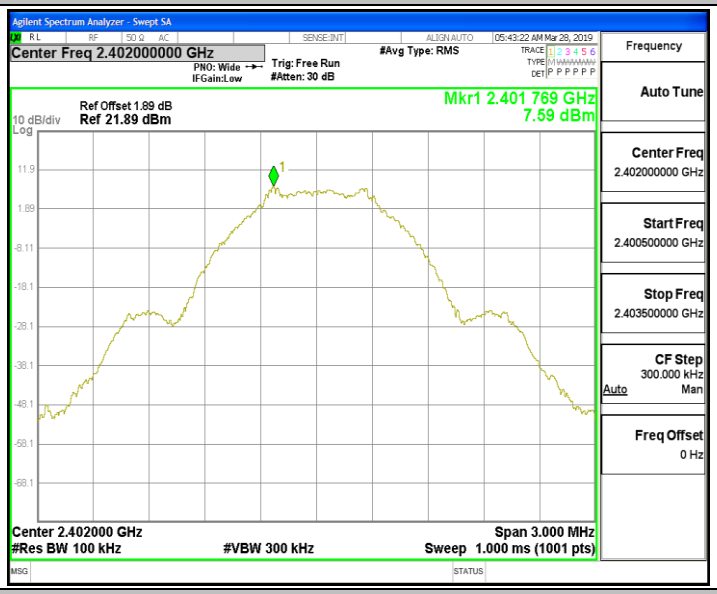
AppendixF:Conducted SpuriousEmission

Test Result

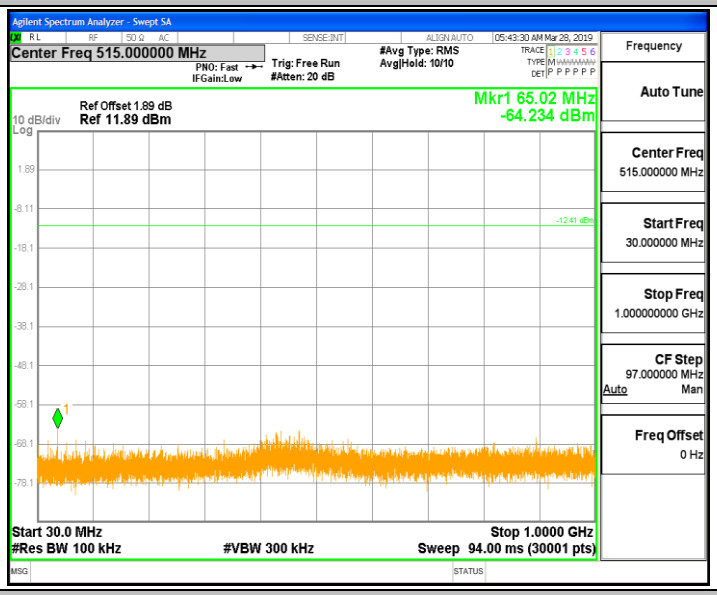
TestMode	Antenna	Channel	FreqRange [MHz]	RefLevel [dBm]	Result[dBm]	Limit[dBm]	Verdict
TX	Ant1	2402	Reference	7.59	7.59	---	PASS
			30~1000	30~1000	-64.234	<=-12.41	PASS
			1000~26500	1000~26500	-46.881	<=-12.41	PASS
		2442	Reference	7.66	7.66	---	PASS
			30~1000	30~1000	-64.893	<=-12.341	PASS
			1000~26500	1000~26500	-45.281	<=-12.341	PASS
		2480	Reference	7.39	7.39	---	PASS
			30~1000	30~1000	-64.644	<=-12.613	PASS
			1000~26500	1000~26500	-45.366	<=-12.613	PASS

Test Graphs

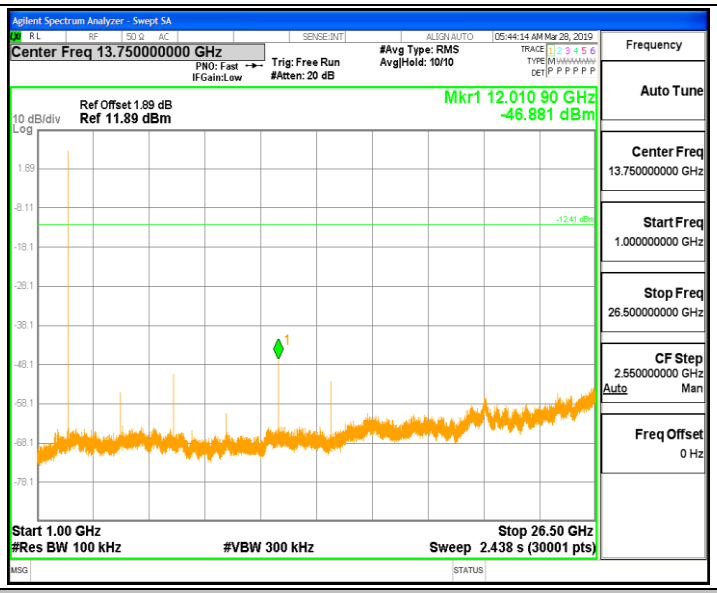
TX _Ant1_2402_0~Reference



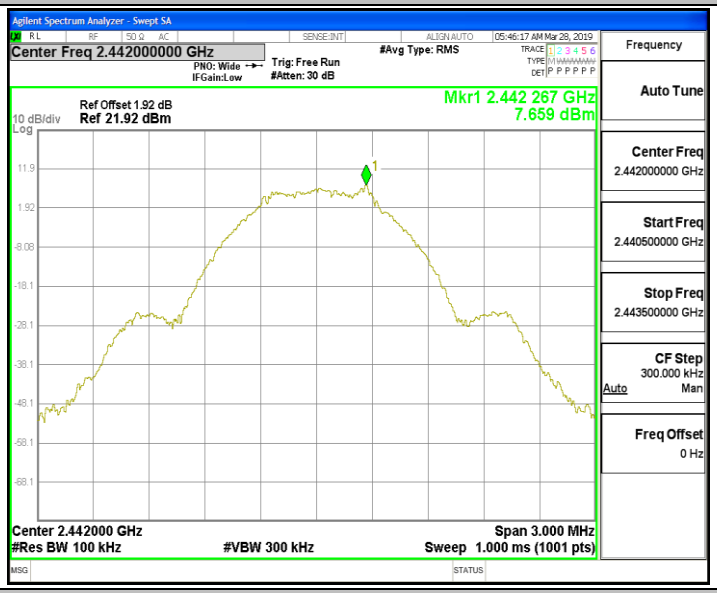
TX _Ant1_2402_30~1000



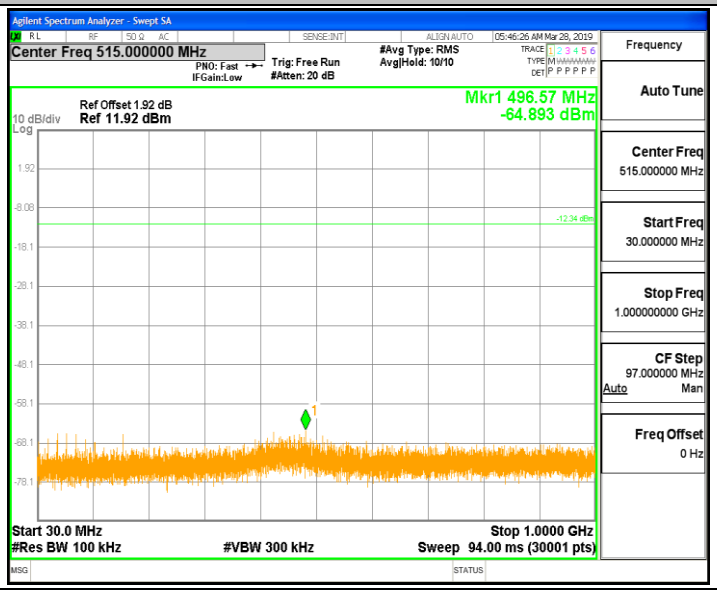
TX _Ant1_2402_1000~26500



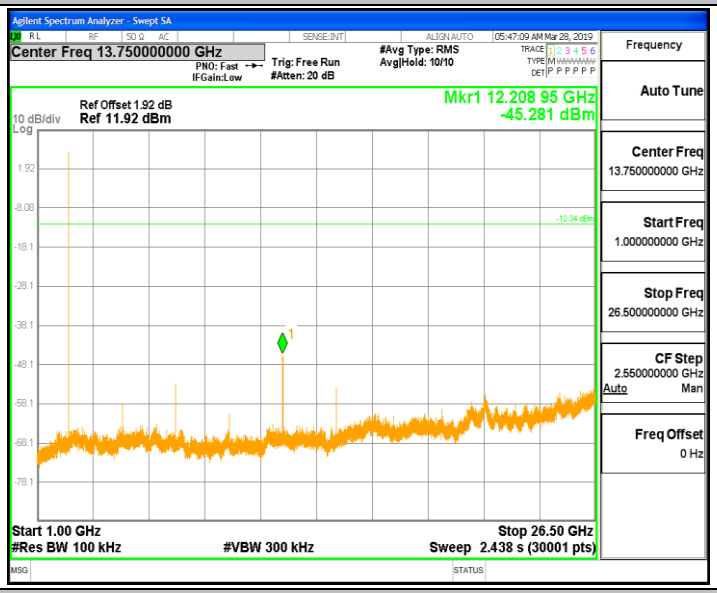
TX _Ant1_2442_0~Reference



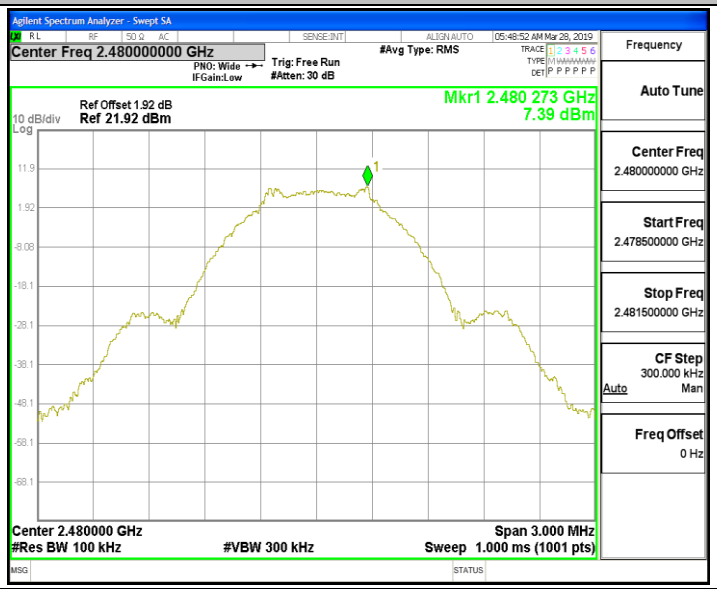
TX _Ant1_2442_30~1000



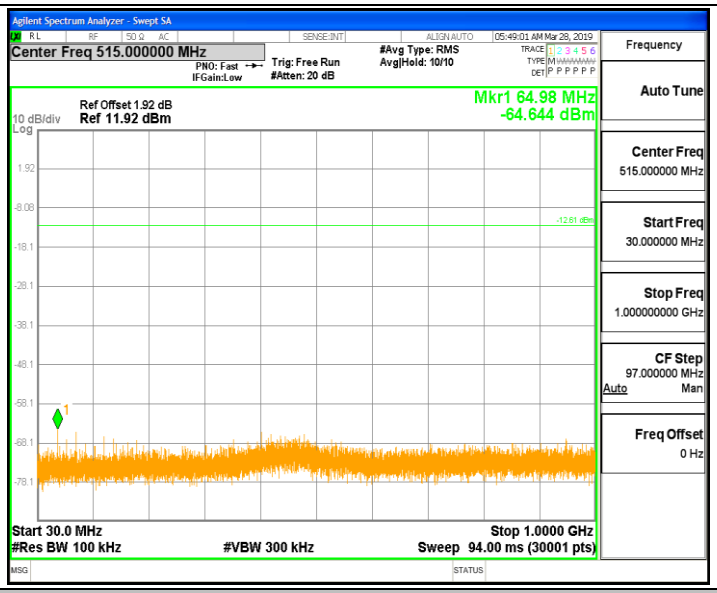
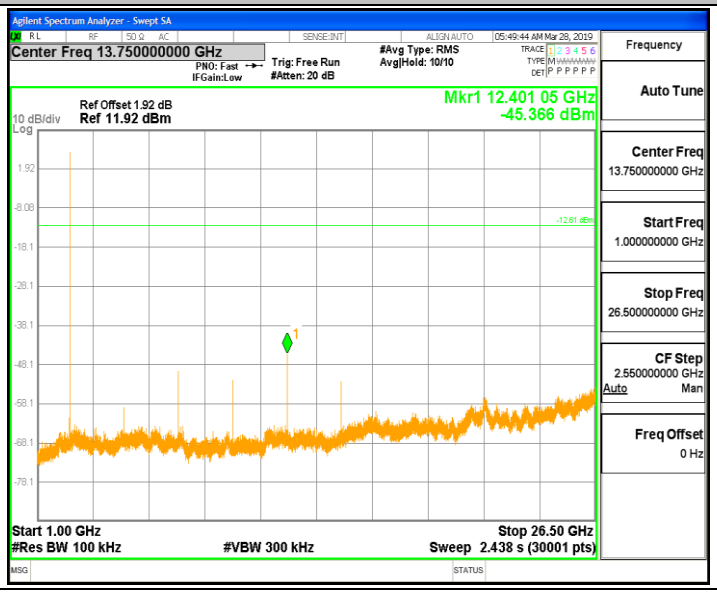
TX _Ant1_2442_1000~26500



TX _Ant1_2480_0~Reference



TX _Ant1_2480_30~1000



TX _Ant1_2480_1000~26500