

FCC PART	15 SUBPART C TEST R	EPORT
	FCC PART 15.247	
Report Reference No: FCC ID	GTS20190612005-1-1 2AQAA-EZBOOKS4	
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Date of issue:	Jul. 17, 2019	
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Applicant's name:	SHENZHEN JUMPER TECHNOL	OGY CO.,LTD
Address	101,102,201,301 No.13-2 Pingxi S Pingdi Street, Longgang District,Sh	
Test specification:		
Standard:	FCC Part 15.247: Operation with 2400-2483.5 MHz and 5725-5850	
TRF Originator	Shenzhen Global Test Service Co.	.,Ltd.
Master TRF	Dated 2014-12	
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Test item description:	Portable computer	
Trade Mark:	N/A	
Manufacturer:	SHENZHEN JUMPER TECHNOLO	OGY CO.,LTD
Model/Type reference:	EZbook S4	
Listed Models	N/A	
Modulation Type:	GFSK,∏/4-DQPSK,8DPSK	
Operation Frequency:	From 2402MHz to 2480MHz	
Hardware Version:	N/A	
Software Version:	N/A	
Rating:	DC 7.6V form battery	
Result:	PASS	

TEST REPORT

Test Report No. :		GTS20190612005-1-1	Jul. 17, 2019 Date of issue
Equipment under Test	:	Portable computer	
Model /Type	:	EZbook S4	
Listed Models	:	N/A	
Applicant	:	SHENZHEN JUMPER TECHNO	LOGY CO.,LTD
Address	:	101,102,201,301 No.13-2 Pingxi Street,Longgang District,Shenzh	South Rd.,Pingxi Community,Pingdi en,GuangDong ,China
Manufacturer	:	SHENZHEN JUMPER TECHNO	LOGY CO.,LTD
Address	:	101,102,201,301 No.13-2 Pingxi Street,Longgang District,Shenzh	South Rd.,Pingxi Community,Pingdi en,GuangDong ,China

Test Result:	PASS
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The test report merely corresponds to the test sample. It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

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1. TEST STANDARDS

The tests were performed according to following standards:

<u>FCC Rules Part 15.247</u>: Frequency Hopping, Direct Spread Spectrum and Hybrid Systems that are in operation within the bands of 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz. <u>ANSI C63.10-2013</u>: American National Standard for Testing Unlicensed Wireless Devices <u>DA 00-705</u>: Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems

2. <u>SUMMARY</u>

2.1. General Remarks

Date of receipt of test sample	:	Jun. 28, 2019
Testing commenced on	:	Jul.17, 2019
Testing concluded on	:	Jul. 17, 2019

2.2. Product Description

Product Name:	Portable computer
Trade Mark:	N/A
Model/Type reference:	EZbook S4
Power supply:	DC 7.6V form battery
WIFI	
WLAN	Supported 802.11 a/b/g/n/ac
Modulation Type	IEEE 802.11a: OFDM(64QAM, 16QAM, QPSK, BPSK) IEEE 802.11b: DSSS(CCK,DQPSK,DBPSK) IEEE 802.11g: OFDM(64QAM, 16QAM, QPSK, BPSK) IEEE 802.11n HT20: OFDM (64QAM, 16QAM, QPSK,BPSK) IEEE 802.11n HT40: OFDM (64QAM, 16QAM, QPSK,BPSK) IEEE 802.11ac20/40/80: OFDM(64QAM, 16QAM, QPSK, BPSK)
Operation frequency	IEEE 802.11a:5180-5240MHz 5745-5825MHz IEEE 802.11b:2412-2462MHz IEEE 802.11g:2412-2462MHz IEEE 802.11n HT20:2412-2462MHz, 5180-5240MHz 5745-5825MHz IEEE 802.11n HT40:2422-2452MHz, 5190-5230MHz 5755-5795MHz IEEE 802.11ac20:5180-5240MHz 5745-5825MHz IEEE 802.11ac20:5180-5240MHz 5755-5795MHz IEEE 802.11ac40:5190-5230MHz 5755-5795MHz IEEE 802.11ac40:5190-5230MHz 5755-5795MHz IEEE 802.11ac80:5210MHz 5775MHz
Channel number	 11 Channels for WIFI 20MHz Bandwidth(802.11b/g/n-HT20) 7 Channels for WIFI 40MHz Bandwidth(802.11n-HT40) 4 channels for 20MHz bandwidth(5180-5240MHz) 2 channels for 40MHz bandwidth(5190~5230MHz) 1 channels for 80MHz bandwidth(5210MHz) 5 channels for 20MHz bandwidth(5745-5825MHz) 2 channels for 40MHz bandwidth(5755~5795MHz) 1 channels for 80MHz bandwidth(5775MHz)
BT	
Operation frequency	2402-2480MHz
Channel Number	79 channels for Bluetooth (DSS) 40 channels for Bluetooth (DTS)
Channel Spacing	1MHz for Bluetooth (DSS) 2MHz for Bluetooth (DTS)
Modulation Type	GFSK, π/4DQPSK, 8DPSK for Bluetooth (DSS) GFSK for Bluetooth (DTS)
Antenna Description	Two same FPC Antenna, but not support MIMO technology ANT0 used for Bluetooth&WIFI TX/RX, 1.23dBi(Max.) for 2.4G Band and 0.88dBi(Max.) for 5G Band ANT1 used for Bluetooth&WIFI TX/RX, 1.23dBi(Max.) for 2.4G Band and 0.88dBi(Max.) for 5G Band

2.3. Equipment Under Test

Power supply system utilised

Power supply voltage	:	0	230V / 50 Hz	0	120V / 60Hz
		Ο	12 V DC	Ο	24 V DC
			Other (specified in blank below))

DC 7.6V form battery

2.4. Short description of the Equipment under Test (EUT)

This is a Portable computer

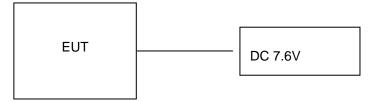
For more details, refer to the user's manual of the EUT.

2.5. EUT operation mode

The Applicant provides communication tools software to control the EUT for staying in continuous transmitting (Duty Cycle more than 98%) and receiving mode for testing .There are 79 channels provided to the EUT. Channel 00/38/78 was selected to test.

Channel	Frequency(MHz)	Channel	Frequency(MHz)
00	2402	40	2442
01	2403	41	2443
02	2404	42	2444
38	2440	78	2480
39	2441		

2.6. Block Diagram of Test Setup



2.7. Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for FCC ID:2AQAA-EZBOOKS4 filing to comply with Section 15.247 of the FCC Part 15, Subpart C Rules.

2.8. Special Accessories

Manufacturer	Description	Model	Serial Number	Certificate
Shenzhen Jihongda Power Co.,Ltd.	Adapter	JHD-AP036U- 120300AA-A		SDOC

2.9. Modifications

No modifications were implemented to meet testing criteria.

3. <u>TEST ENVIRONMENT</u>

3.1. Address of the test laboratory

Shenzhen Global Test Service Co.,Ltd.

No.7-101 and 8A-104, Building 7 and 8, DCC Cultural and Creative Garden, No.98, Pingxin North Road, Shangmugu Community, Pinghu Street, Longgang District, Shenzhen, Guangdong, China, China.

3.2. Test Facility

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

CNAS (No. CNAS L8169)

Shenzhen Global Test Service Co., Ltd. has been assessed and proved to be in compliance with CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC 17025: 2019 General Requirements) for the Competence of Testing and Calibration Laboratories.

A2LA (Certificate No. 4758.01)

Shenzhen Global Test Service Co., Ltd. has been assessed by the American Association for Laboratory Accreditation (A2LA). Certificate No. 4758.01.

3.3. Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature:	15-35 ° C
Humidity:	30-60 %
Atmospheric pressure:	950-1050mbar

3.4. Summary of measurement results

Test Specification clause	Test case	Test Mode	Test Channel	Reco In Re		Pass	Fail	NA	NP	Remark
§15.247(b)(4)	Antenna gain	GFSK	⊠ Lowest ⊠ Middle ⊠ Highest	GFSK	⊠ Lowest ⊠ Middle ⊠ Highest					complies
§15.247(e)	Power spectral density	-/-	-/-	-/-	-/-					Not applicable for FHSS
§15.247(a)(1)	Carrier Frequency separation	GFSK Π/4-DQPSK 8DPSK	⊠ Lowest ⊠ Middle ⊠ Highest	GFSK Π/4-DQPSK 8DPSK	🛛 Middle	\boxtimes				complies
§15.247(a)(1)	Number of Hopping channels	GFSK Π/4-DQPSK 8DPSK	🛛 Full	GFSK Π/4-DQPSK 8DPSK	🛛 Full	\boxtimes				complies
§15.247(a)(1)	Time of Occupancy (dwell time)	GFSK Π/4-DQPSK 8DPSK	⊠ Lowest ⊠ Middle ⊠ Highest	GFSK Π/4-DQPSK 8DPSK	🛛 Middle	\boxtimes				complies
§15.247(a)(1)	Spectrum bandwidth of a FHSS system 20dB bandwidth	GFSK Π/4-DQPSK 8DPSK	⊠ Lowest ⊠ Middle ⊠ Highest	GFSK Π/4-DQPSK 8DPSK	⊠ Lowest ⊠ Middle ⊠ Highest	\boxtimes				complies
§15.247(b)(1)	Maximum output power	GFSK Π/4-DQPSK 8DPSK	⊠ Lowest ⊠ Middle ⊠ Highest	GFSK Π/4-DQPSK 8DPSK	⊠ Lowest ⊠ Middle ⊠ Highest	\boxtimes				complies
§15.247(d)	Band edge compliance conducted	GFSK Π/4-DQPSK 8DPSK	⊠ Lowest ⊠ Highest	GFSK Π/4-DQPSK 8DPSK	⊠ Lowest ⊠ Highest	\boxtimes				complies
§15.205	Band edge compliance radiated	GFSK Π/4-DQPSK 8DPSK	⊠ Lowest ⊠ Highest	GFSK	⊠ Lowest ⊠ Highest	\boxtimes				complies
§15.247(d)	TX spurious emissions conducted	-/-	-/-	-/-	-/-					complies
§15.247(d)	TX spurious emissions radiated	GFSK 8DPSK	⊠ Lowest ⊠ Middle ⊠ Highest	GFSK	⊠ Lowest ⊠ Middle ⊠ Highest	\boxtimes				complies
§15.109	RX spurious emissions radiated	-/-	-/-	-/-	-/-					complies
§15.209(a)	TX spurious Emissions radiated < 30 MHz	-/-	-/-	-/-	-/-					complies
§15.107(a) §15.207	Conducted Emissions < 30 MHz	GFSK	-/-	GFSK	-/-	\boxtimes				complies

Remark:

- The measurement uncertainty is not included in the test result. 1.
- 2.
- NA = Not Applicable; NP = Not PerformedWe tested all test mode and recorded worst case in report 3.
- 4. For π /4-DQPSK its same modulation type with 8-DPSK, and based exploratory test, there is no significant difference of that two types test result, so except output power, all other items final test were only performed with the worse case 8-DPSK and GFSK.

3.5. Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16 - 4 "Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements" and is documented in the Shenzhen Global Test Service Co.,Ltd. quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for Shenzhen GTS laboratory is reported:

Test	Range	Measurement Uncertainty	Notes
Radiated Emission	30~1000MHz	4.10 dB	(1)
Radiated Emission	1~18GHz	4.32 dB	(1)
Radiated Emission	18-40GHz	5.54 dB	(1)
Conducted Disturbance	0.15~30MHz	3.12 dB	(1)

(1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

3.6. Equipments Used during the Test

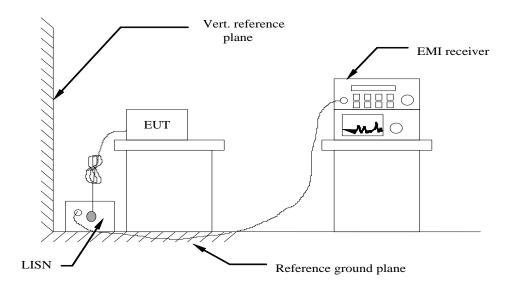
Test Equipment	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Due Date
LISN	R&S	ENV216	3560.6550.08	2018/09/28	2019/09/27
LISN	R&S	ESH2-Z5	893606/008	2018/09/27	2019/09/26
By-log Antenna	SCHWARZBECK	VULB9163	000976	2018/09/29	2019/09/28
EMI Test Receiver	R&S	ESCI	101102	2018/09/26	2019/09/25
Spectrum Analyzer	Agilent	N9020A	MY48010425	2018/09/17	2019/09/16
Spectrum Analyzer	R&S	FSV40-N	101800	2018/09/17	2019/09/16
Controller	EM Electronics	Controller EM 1000	N/A	2018/09/21	2019/09/20
Double Ridged Horn Antenna (1~18GHz)	SCHWARZBECK	BBHA 9120D	01622	2018/09/19	2019/09/18
Double Ridged Horn Antenna	Rohde&Schwarz	HF907	100265	2018/09/19	2019/09/18
Active Loop Antenna	SCHWARZBECK	FMZB1519	1519-037	2018/09/19	2019/09/18
Horn Antenna (18GHz~40GHz)	ETS	3116	00086467	2018/12/29	2019/12/28
Amplifier (26.5GHz~40GHz)	EMCI	EMC2654045	980028	2018/09/18	2019/09/17
Amplifier (0.1GHz~26.5GHz)	EMCI	EMC012645SE	980355	2018/09/19	2019/09/18
Temperature/Humidi ty Meter	Gangxing	CTH-608	02	2018/09/20	2019/09/19
High-Pass Filter	K&L	9SH10- 2700/X12750- O/O	N/A	2018/09/20	2019/09/19
High-Pass Filter	K&L	41H10- 1375/U12750- O/O	N/A	2018/09/20	2019/09/19
Data acquisition card	Agilent	U2531A	TW53323507	2018/09/20	2019/09/19
Power Sensor	Agilent	U2021XA	MY5365004	2018/09/20	2019/09/19
RF Cable	HUBER+SUHNER	RG214	N/A	2018/09/20	2019/09/19
Broadband Antenna	SCHWARZBECK	VULB 9163	00976	2018/09/29	2019/09/28
Conducted Emission	ES-K1	V1.71	N/A	N/A	N/A
Radiated Emission	JS32-RE	V2.5.0.9	N/A	N/A	N/A

Note: The Cal.Interval was one year.

4. TEST CONDITIONS AND RESULTS

4.1. AC Power Conducted Emission

TEST CONFIGURATION



TEST PROCEDURE

1 The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. The EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.10-2013.

2 Support equipment, if needed, was placed as per ANSI C63.10-2013.

3 All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10-2013.

4 The EUT received DC 5V power, the adapter received AC120V/60Hz or AC 240V/50Hz power through a Line Impedance Stabilization Network (LISN) which supplied power source and was grounded to the ground plane.

5 All support equipments received AC power from a second LISN, if any.

6 The EUT test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.

7 Analyzer / Receiver scanned from 150 KHz to 30MHz for emissions in each of the test modes.

8 During the above scans, the emissions were maximized by cable manipulation.

AC Power Conducted Emission Limit

For intentional device, according to § 15.207(a) AC Power Conducted Emission Limits is as following :

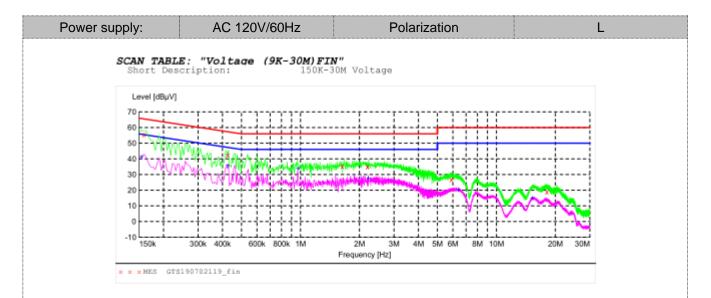
Frequency range (MHz)	Limit (dBuV)			
Frequency range (Mirz)	Quasi-peak	Average		
0.15-0.5	66 to 56*	56 to 46*		
0.5-5	56	46		
5-30	60	50		
* Decreases with the logarithm of the frequency.				

TEST RESULTS

Remark: We measured Conducted Emission at GFSK, π /4-DQPSK and 8DPSK mode in AC 120V/60Hz and AC 240V/50Hz, the worst case was recorded .

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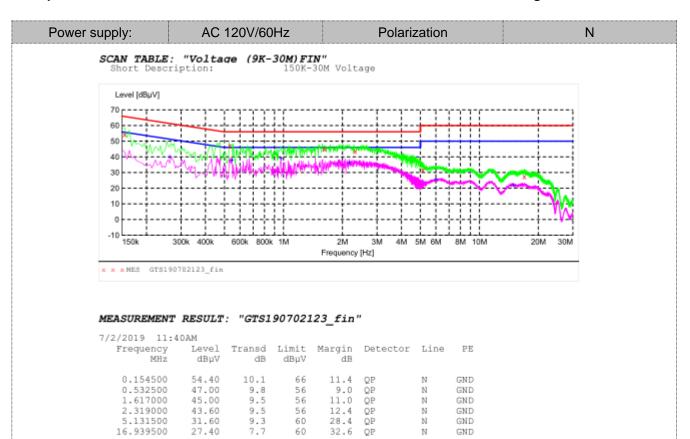
MEASUREMENT RESULT: "GTS190702119_fin"

				_			
7/2/2019 11:2	9AM						
Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	ΡE
0.159000	55.60	10.0	66	9.9	QP	L1	GND
0.424500	42.50	9.8	57	14.9	QP	L1	GND
1.630500	35.30	9.5	56	20.7	QP	L1	GND
2.193000	35.00	9.5	56	21.0	QP	L1	GND
5.887500	26.80	9.2	60	33.2	QP	L1	GND
18.060000	19.10	7.4	60	40.9	QP	L1	GND

MEASUREMENT RESULT: "GTS190702119_fin2"

7/2/2019 11:	29AM						
Frequency	Level	Transd	Limit	Margin	Detector	Line	PE
MHz	dBµV	dB	dBμV	dB			
0.154500	41.40	10.1	56	14.4	AV	L1	GND
0.424500	35.80	9.8	47	11.6	AV	L1	GND
0.969000	33.70	9.6	46	12.3	AV	L1	GND
2.215500	27.70	9.5	46	18.3	AV	L1	GND
6.427500	20.30	9.2	50	29.7	AV	L1	GND
15.288000	15.00	8.1	50	35.0	AV	L1	GND

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12.4 QP 28.4 QP

32.6 QP

Ν

Ν

Ν

GND

GND

GND

MEASUREMENT RESULT: "GTS190702123_fin2"

43.60 31.60 27.40

2.319000

5.131500

16.939500

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.262500	39.90	9.9	51	11.5	AV	N	GND
0.546000	37.90	9.8	46	8.1	AV	N	GND
0.969000	39.00	9.6	46	7.0	AV	N	GND
2.170500	36.30	9.5	46	9.7	AV	N	GND
6.000000	25.80	9.2	50	24.2	AV	N	GND
14.883000	21.80	8.2	50	28.2	AV	N	GND

56

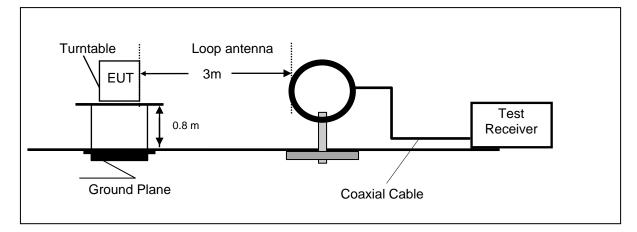
60

60

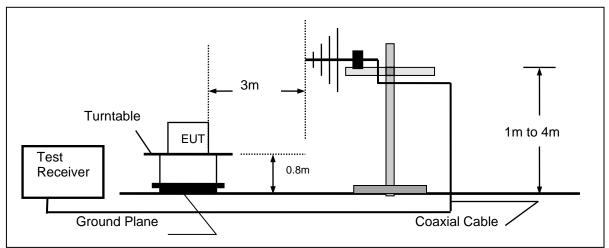
4.2. Radiated Emission

TEST CONFIGURATION

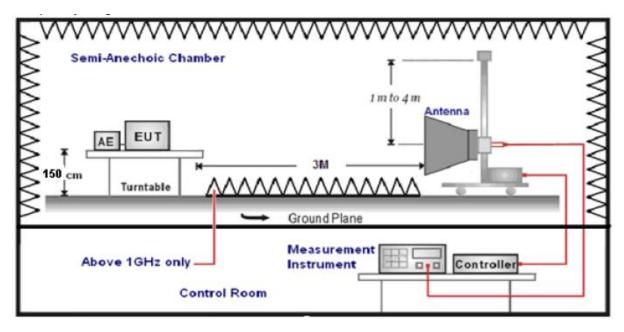
Frequency range 9 KHz – 30MHz



Frequency range 30MHz - 1000MHz



Frequency range above 1GHz-25GHz



TEST PROCEDURE

- 1. The EUT was placed on a turn table which is 0.8m above ground plane when testing frequency range 9 KHz –1GHz;the EUT was placed on a turn table which is 1.5m above ground plane when testing frequency range 1GHz 25GHz.
- 2. Maximum procedure was performed by raising the receiving antenna from 1m to 4m and rotating the turn table from 0° to 360° to acquire the highest emissions from EUT.
- 3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
- 4. Repeat above procedures until all frequency measurements have been completed.
- 5. The EUT minimum operation frequency was 32.768KHz and maximum operation frequency was 2480MHz.so radiated emission test frequency band from 9KHz to 25GHz.
- 6. The distance between test antenna and EUT as following table states:

Test Frequency range	Test Antenna Type	Test Distance
9KHz-30MHz	Active Loop Antenna	3
30MHz-1GHz	Ultra-Broadband Antenna	3
1GHz-18GHz	Double Ridged Horn Antenna	3
18GHz-25GHz	Horn Anternna	1

7. Setting test receiver/spectrum as following table states:

Test Frequency range	Test Receiver/Spectrum Setting	Detector				
9KHz-150KHz	RBW=200Hz/VBW=3KHz,Sweep time=Auto	QP				
150KHz-30MHz	RBW=9KHz/VBW=100KHz,Sweep time=Auto	QP				
30MHz-1GHz	RBW=120KHz/VBW=1000KHz,Sweep time=Auto	QP				
1GHz-40GHz	Peak Value: RBW=1MHz/VBW=3MHz, Sweep time=Auto Average Value: RBW=1MHz/VBW=10Hz, Sweep time=Auto	Peak				

Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor(if any) from the measured reading. The basic equation with a sample calculation is as follows:

FS = RA + AF + CL - AG

Where FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
RA = Reading Amplitude	AG = Amplifier Gain
AF = Antenna Factor	

Transd=AF +CL-AG

RADIATION LIMIT

For intentional device, according to § 15.209(a), the general requirement of field strength of radiated emission from intentional radiators at a distance of 3 meters shall not exceed the following table. According to § 15.247(d), in any 100kHz bandwidth outside the frequency band in which the EUT is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the100kHz bandwidth within the band that contains the highest level of desired power.

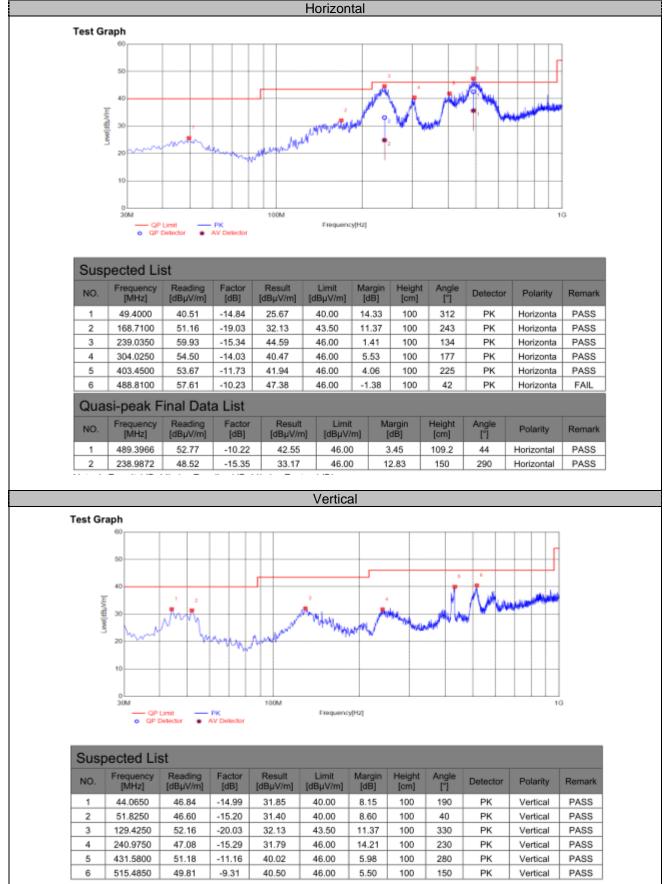
The pre-test have done for the EUT in three axes and found the worst emission at position shown in test setup photos.

Frequency (MHz)	Distance (Meters)	Radiated (dBµV/m)	Radiated (µV/m)
0.009-0.49	3	20log(2400/F(KHz))+40log(300/3)	2400/F(KHz)
0.49-1.705	3	20log(24000/F(KHz))+ 40log(30/3)	24000/F(KHz)
1.705-30	3	20log(30)+ 40log(30/3)	30
30-88	3	40.0	100
88-216	3	43.5	150
216-960	3	46.0	200
Above 960	3	54.0	500

TEST RESULTS

Remark: We measured Radiated Emission at GFSK, π /4-DQPSK and 8DPSK mode from 30MHz to 25GHz and recorded worst case at GFSK mode.

For 30MHz-1GHz



46.92

35.01

39.84

30.66

44.52

34.91

40.27

31.18

16.75

8.66

23.83

13.01

19.19

8.8

23.44

12.53

74

54

74

54

74

54

74

54

Detector

Туре

Pk

AV

Pk

AV

Pk

AV

Pk

AV

Pk

AV

Pk

AV

Comment

Vertical

Vertical

Horizontal

Horizontal

Vertical

Vertical

Horizontal

Horizontal

Vertical

Vertical

Horizontal

Horizontal

Frequency	Meter Reading	Antenna Factor	Cable loss	Preamp factor	Emission Level	Limits	Margin	
(MHz)	(dBµV)	(dB)	(dB)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	
	TX-2402							
4804	46.59	32.44	30.25	7.95	56.73	74	17.27	
4804	36.18	32.44	30.25	7.95	46.32	54	7.68	
4804	38.96	32.44	30.25	7.95	49.1	74	24.9	
4804	30.70	32.44	30.25	7.95	40.84	54	13.16	
	TX-2441							

30.31

30.31

30.31

30.31

30.27

30.27

30.27

30.27

For 1GHz to 25GHz

REMARKS:

4882

4882

4882

4882

4960

4960

4960

4960

1. Emission level (dBuV/m) =Raw Value (dBuV)+Correction Factor (dB/m)

8.12

8.12

8.12

8.12

7.88

7.88

7.88

7.88

2. Correction Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor

57.25

45.34

50.17

40.99

54.81

45.2

50.56

41.47

TX-2480

3. Margin value = Limit value- Emission level.

32.52

32.52

32.52

32.52

32.68

32.68

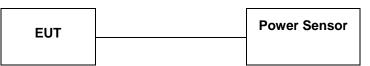
32.68

32.68

- 4. -- Mean the PK detector measured value is below average limit.
- 5. The other emission levels were very low against the limit.

4.3. Maximum Peak Output Power

TEST CONFIGURATION



TEST PROCEDURE

According to ANSI C63.10:2013 Maximum peak conducted output power for HFSS devices:

The maximum peak conducted output power may be measured using a broadband peak RF power meter. The power meter shall have a video bandwidth that is greater than or equal to the HFSS bandwidth and shall utilize a fast-responding diode detector.

The maximum Average conducted output power may be measured using a wideband RF power meter with a thermocouple derector or equivalent. The power meter shall have a video bandwidth that is greater than or equal to the HFSS bandwidth and shall utilize a fast-responding diode detector.

<u>LIMIT</u>

For frequency hopping systems operating in the 2400–2483.5 MHz band employing at least 75 nonoverlapping hopping channels, and all frequency hopping systems in the 5725–5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400–2483.5 MHz band: 0.125 watts.

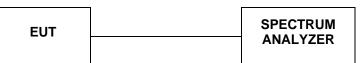
TEST RESULTS

Modulation	Channel	Peak Output power (dBm)	Limit (dBm)	Result
	00	2.81		
GFSK	39	2.61	21	Pass
	78	2.00		
	00	0.39		
π/4-DQPSK	39	0.13	21	Pass
	78	-0.51		
	00	-0.64		
8DPSK	39	-0.86	21	Pass
	78	-1.58		

Note: The test results including the cable lose.

4.4. 20dB Bandwidth

TEST CONFIGURATION



TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with RBW=30KHz and VBW=100KHz. The 20dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 20dB.

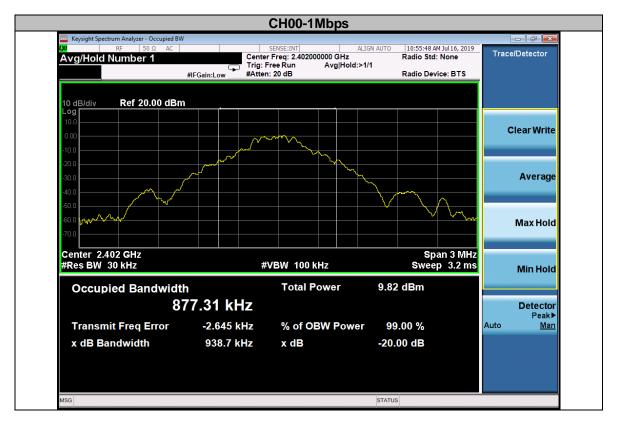
<u>LIMIT</u>

For frequency hopping systems operating in the 2400MHz-2483.5MHz no limit for 20dB bandwith.

TEST RESULTS

Modulation	Frequency	20dB Bandwidth (MHz)	Result
	2402 MHz	0.94	PASS
GFSK	2441 MHz	0.94	PASS
	2480 MHz	0.94	PASS

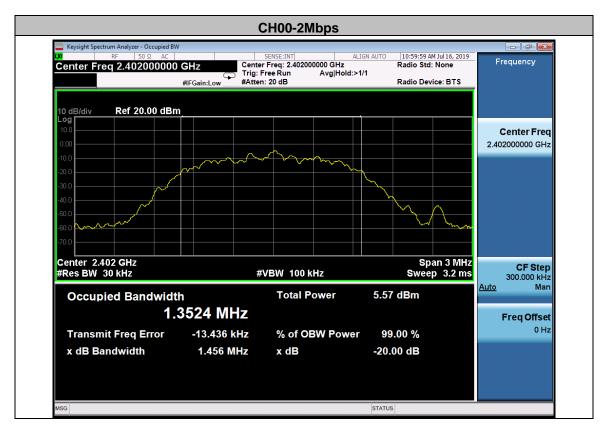
Test plot as follows:

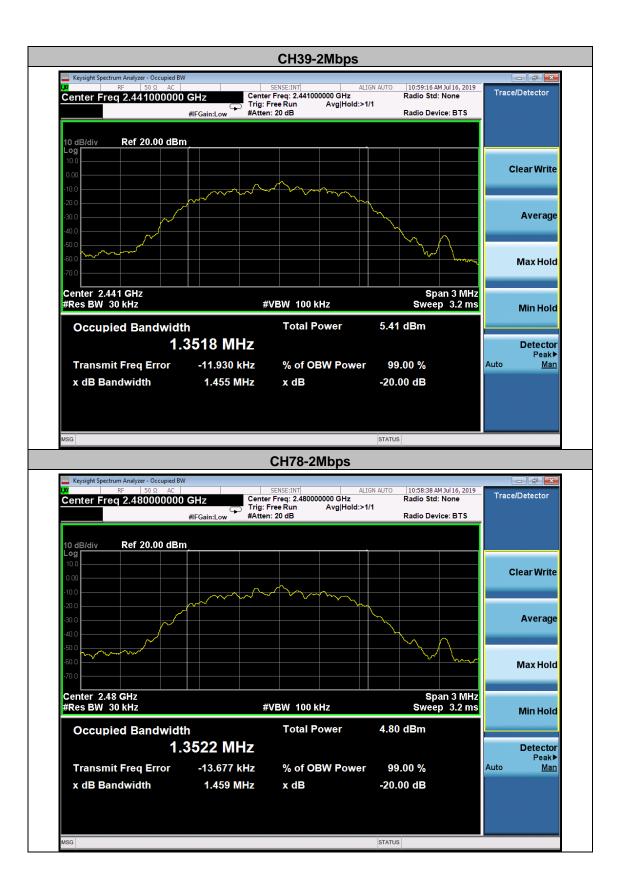




Modulation	Frequency	20dB Bandwidth (MHz)	Result
	2402 MHz	1.46	PASS
π /4-DQPSK	2441 MHz	1.46	PASS
	2480 MHz	1.46	PASS

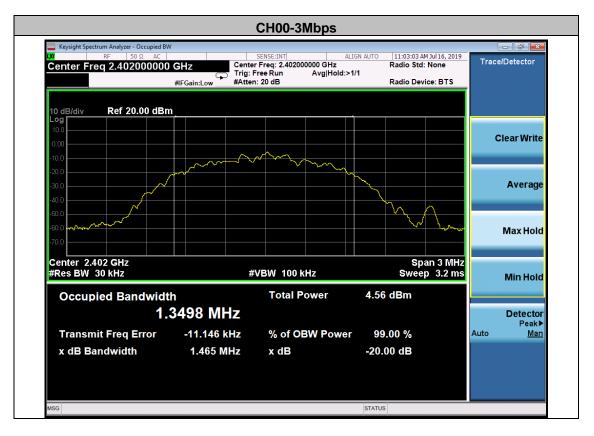
Test plot as follows:

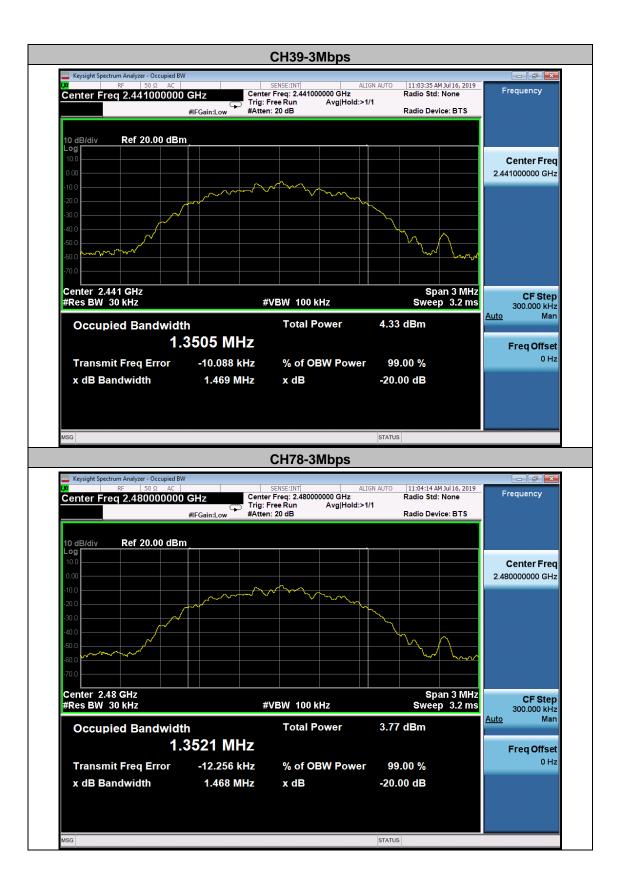




Modulation	Frequency	20dB Bandwidth (MHz)	Result
	2402 MHz	1.47	PASS
8-DPSK	2441 MHz	1.47	PASS
	2480 MHz	1.47	PASS

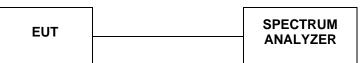
Test plot as follows:





4.5. Frequency Separation

TEST CONFIGURATION



TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with RBW=30KHz and VBW=100KHz.

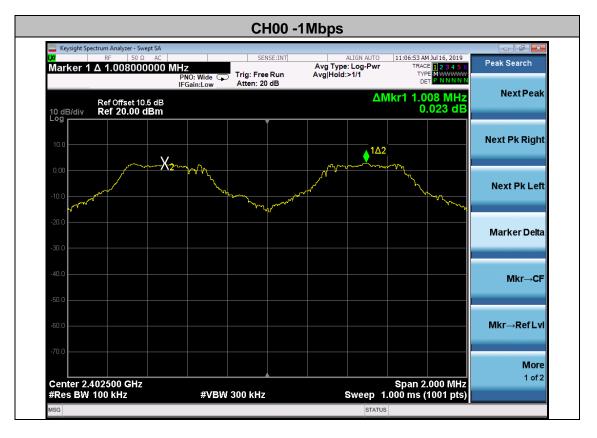
<u>LIMIT</u>

According to 15.247(a)(1), frequency hopping systems shall have hopping channel carrier frequencies separated by minimum of 25KHz or the 2/3*20dB bandwidth of the hopping channel, whichever is greater.

TEST RESULTS

Modulation	Frequency Ch. Separation (MHz)		Limit (MHz)	Result	
	2402 MHz	1.008	0.627	Complies	
GFSK	2441 MHz	1.010	0.627	Complies	
	2480 MHz	1.022	0.627	Complies	

Ch. Separation Limits: > 2/3 of 20dB bandwidth





Modulation	Frequency	Ch. Separation (MHz) Limit (MHz)		Result
	2402 MHz	1.002	0.973	Complies
π /4-DQPSK	2441 MHz	1.010	0.973	Complies
	2480 MHz	1.006	0.973	Complies

Ch. Separation Limits: >2/3 of 20dB bandwidth.



		CH39 -2	2Mbps		
weight Spectrum Analyzer - Swei					
μα Marker 1 Δ 1.010000	000 MHz	SENSE:INT Trig: Free Run Atten: 20 dB	ALIGN AUTO Avg Type: Log-Pwr Avg Hold:>1/1	11:21:00 AM Jul 16, 2019 TRACE 1 2 3 4 5 6 TYPE MWWWW DET PNNNNN	Peak Search
Ref Offset 10.5			ΔΝ	lkr1 1.010 MHz	Next Peal
Ref Offset 10.5 10 dB/div Ref 20.00 d Log	Bm			-0.199 dB	
					Next Pk Righ
10.0					
0.00	X				
-10.0 mmmmmmmmm ****	men al and a company of the second	when the second	male have a	Manuna Manuna M	Next Pk Lef
-20.0					Marker Delt
-30.0					
-40.0					
					Mkr→Cł
-50.0					
-60.0					Mkr→RefLv
70.0					
-70.0					More
Center 2.441500 GHz				Span 2.000 MHz	1 of 2
#Res BW 100 kHz	#VBW 3	00 kHz			
				000 ms (1001 pts)	
MSG			Sweep 1.	.000 ms (1001 pts)	
MSG		CH78 -2	STATUS	000 ms (1001 pts)	
MSG	ot SA	CH78 -2	status 2Mbps		
MSG	AC A	CH78 -2	STATUS 2Mbps ALIGN AUTO Avg Type: Log-Pwr	11:17:26 AM Jul 16, 2019 TRACE 1 2 3 4 5 6 TRACE MUNICIPAL	<mark>⊢⊃ (⊅ ≪</mark> Peak Search
MSG Keysight Spectrum Analyzer - Sweg ΔΔ RF 50 Ω	ot SA AC OOD MH7	CH78 -2	ALIGN AUTO Avg Type: Log-Pwr Avg Hold:>1/1	11:17:26 AM Jul 16, 2019 TRACE 12 3 4 5 6 TYPE MWWWW DET PINNNN	Peak Search
Keysight Spectrum Analyzer - Sweg Μ RF 50 Ω Marker 1 Δ 1.00660000 Ref Offset 10.8 Ref 20.00 d	at SA AC PNO: Wide IFGain:Low	CH78 -2	ALIGN AUTO Avg Type: Log-Pwr Avg Hold:>1/1	11:17:26 AM Jul 16, 2019 TRACE 1 2 3 4 5 6 TRACE MUNICIPAL	Peak Search
MSG Keysight Spectrum Analyzer - Sweg RF 50 Ω Marker 1 Δ 1.0060000 Ref Offset 10.6	at SA AC PNO: Wide IFGain:Low	CH78 -2	ALIGN AUTO Avg Type: Log-Pwr Avg Hold:>1/1	11:17:26 AM Jul 16, 2019 TRACE 12 3 4 5 6 TYPE M DET P NNNN IKR1 1.006 MHZ	Peak Search Next Peal
Keysight Spectrum Analyzer - Sweg Μ RF 50 Ω Marker 1 Δ 1.00660000 Ref Offset 10.8 Ref 20.00 d	at SA AC PNO: Wide IFGain:Low	CH78 -2	ALIGN AUTO Avg Type: Log-Pwr Avg Hold:>1/1	11:17:26 AM Jul 16, 2019 TRACE 12 3 4 5 6 TYPE M DET P NNNN IKR1 1.006 MHZ	Peak Search Next Peal
Keysight Spectrum Analyzer - Swey Keysight Spectrum Analyzer - Swey Marker 1 Δ 1.0060000 Ref Offset 10.8 Ref Offset 10.8 Cog	ot SA AC PNO: Wide IFGain:Low 5 dB Bm	CH78 -2	ALIGN AUTO Avg Type: Log-Pwr Avg Hold:>1/1	11:17:26 AM Jul 16, 2019 TRACE 12 3 4 5 6 TYPE M DET P NNNN IKR1 1.006 MHZ	
MSG Keysight Spectrum Analyzer - Swee RF 50 Ω Marker 1 Δ 1.0060000 Ref Offset 10.6 10 dB/div Ref 20.00 dI 10 0 0.00	at SA AC PNO: Wide IFGain:Low	CH78 -2	Aug Type: Log-Pwr Avg Hold:>1/1	11:17:26 AM Jul 16, 2019 TRACE 12 3 4 5 6 TYPE M DET P NNNN IKR1 1.006 MHZ	Peak Search Next Peal
Keysight Spectrum Analyzer - Sweg Keysight Spectrum Analyzer - Sweg Keysight Spectrum Analyzer - Sweg Marker 1 Δ 1.0060000 Ref Offset 10.6 CondB/div Ref Offset 10.6 10 dB/div	ot SA AC PNO: Wide IFGain:Low 5 dB Bm	CH78 -2	Aug Type: Log-Pwr Avg Hold:>1/1	11:17:26 AM Jul 16, 2019 TRACE 12 3 4 5 6 TYPE MWWWWW DET NNNNN Ikr1 1.006 MHz -0.045 dB	Peak Search Next Peal Next Pk Righ
MSG Keysight Spectrum Analyzer - Swee RF 50 Ω Marker 1 Δ 1.0060000 Ref Offset 10.6 10 dB/div Ref 20.00 dI 10 0 0.00	ot SA AC PNO: Wide IFGain:Low 5 dB Bm	CH78 -2	Aug Type: Log-Pwr Avg Hold:>1/1	11:17:26 AM Jul 16, 2019 TRACE 12 3 4 5 6 TYPE MWWWWW DET NNNNN Ikr1 1.006 MHz -0.045 dB	Peak Search Next Peal Next Pk Righ Next Pk Lef
MSG Keysight Spectrum Analyzer - Sweg Marker 1 Δ 1.0060000 Ref Offiset 10.6 10 dB/div Ref 20.00 dl 10.0 -10.0 -20.0	ot SA AC PNO: Wide IFGain:Low 5 dB Bm	CH78 -2	Aug Type: Log-Pwr Avg Hold:>1/1	11:17:26 AM Jul 16, 2019 TRACE 12 3 4 5 6 TYPE MWWWWW DET NNNNN Ikr1 1.006 MHz -0.045 dB	Peak Search Next Peal Next Pk Righ
MSG Keysight Spectrum Analyzer - Swee RF 50 Ω Marker 1 Δ 1.0060000 Ref Offiset 10.6 10 dB/div Ref 20.00 dI 0.00 10.0	ot SA AC PNO: Wide IFGain:Low 5 dB Bm	CH78 -2	Aug Type: Log-Pwr Avg Hold:>1/1	11:17:26 AM Jul 16, 2019 TRACE 12 3 4 5 6 TYPE MWWWWW DET NNNNN Ikr1 1.006 MHz -0.045 dB	Peak Search Next Peal Next Pk Righ Next Pk Lef
MSG Keysight Spectrum Analyzer - Sweq Marker 1 Δ 1.0060000 Ref Offiset 10.6 10 dB/div Ref 20.00 dl 10.0 -10.0 -20.0	ot SA AC PNO: Wide IFGain:Low 5 dB Bm	CH78 -2	Aug Type: Log-Pwr Avg Hold:>1/1	11:17:26 AM Jul 16, 2019 TRACE 12 3 4 5 6 TYPE MWWWWW DET NNNNN Ikr1 1.006 MHz -0.045 dB	Peak Search Next Peal Next Pk Righ Next Pk Lef
MSG Keysight Spectrum Analyzer - Sweq Marker 1 Δ 1.0060000 Ref Offset 10.0 10.0 dB/div Ref 20.00 d 10.0 -10.0 -20.0 -30.0	ot SA AC PNO: Wide IFGain:Low 5 dB Bm	CH78 -2	Aug Type: Log-Pwr Avg Hold:>1/1	11:17:26 AM Jul 16, 2019 TRACE 12 3 4 5 6 TYPE MWWWWW DET NNNNN Ikr1 1.006 MHz -0.045 dB	Peak Search Next Peal Next Pk Righ Next Pk Lef
MSG Keysight Spectrum Analyzer - Swer Marker 1 Δ 1.0060000 Ref Offset 10.0 10.0 10.0 -0.0	ot SA AC PNO: Wide IFGain:Low 5 dB Bm	CH78 -2	Aug Type: Log-Pwr Avg Hold:>1/1	11:17:26 AM Jul 16, 2019 TRACE 12 3 4 5 6 TYPE MWWWWW DET NNNNN Ikr1 1.006 MHz -0.045 dB	Peak Search Next Peal Next Pk Righ Next Pk Lef Marker Delta Mkr→Cl
MSG Keysight Spectrum Analyzer - Swer Marker 1 Δ 1.0060000 Ref Offset 10.0 10.0 10.0 -20.0 -20.0 -20.0 -20.0 -20.0	ot SA AC PNO: Wide IFGain:Low 5 dB Bm	CH78 -2	Aug Type: Log-Pwr Avg Hold:>1/1	11:17:26 AM Jul 16, 2019 TRACE 12 3 4 5 6 TYPE MWWWWW DET NNNNN Ikr1 1.006 MHz -0.045 dB	Peak Search Next Peal Next Pk Righ Next Pk Lef Marker Delta Mkr→Cl
MSG Keysight Spectrum Analyzer - Swer Marker 1 Δ 1.0060000 Ref Offset 10.0 10.0 10.0 -0.0	ot SA AC PNO: Wide IFGain:Low 5 dB Bm	CH78 -2	Aug Type: Log-Pwr Avg Hold:>1/1	11:17:26 AM Jul 16, 2019 TRACE 12 3 4 5 6 TYPE MWWWWW DET NNNNN Ikr1 1.006 MHz -0.045 dB	Peak Search Next Peal Next Pk Righ Next Pk Lef Marker Deft Mkr→Cl Mkr→Ref Lv
MSG Keysight Spectrum Analyzer - Swee Marker 1 Δ 1.0060000 Ref Offset 10.0 Ref Offset 10.0 Ref 20.00 d -0.00 -0.0	ot SA AC PNO: Wide IFGain:Low 5 dB Bm	CH78 -2	Aug Type: Log-Pwr Avg Hold:>1/1	11:17:26 AM Jul 16, 2019 TRACE 12 3 4 5 6 TYPE WWWWW DET WWWWWW NET 1.006 MHz -0.045 dB	Peak Search Next Peal Next Pk Righ Next Pk Lef Marker Deft Mkr→Cl Mkr→Ref Ly
MSG Keysight Spectrum Analyzer - Swep Marker 1 Δ 1.0060000 Marker 1 Δ 1.0060000 Ref Offset 10.5 Ref 20.00 d -0.00	ot SA AC PNO: Wide IFGain:Low 5 dB Bm	CH78 -2	STATUS	11:17:26 AM Jul 16, 2019 TRACE 12 3 4 5 6 TYPE MWWWWW DET NNNNN Ikr1 1.006 MHz -0.045 dB	Peak Search Next Peal Next Pk Righ Next Pk Lef

Modulation	Frequency	Frequency Ch. Separation (MHz)		Result
	2402 MHz	0.998	0.980	Complies
8-DPSK	2441 MHz	1.002	0.980	Complies
	2480 MHz	0.998	0.980	Complies

Ch. Separation Limits: >2/3 of 20dB bandwidth.



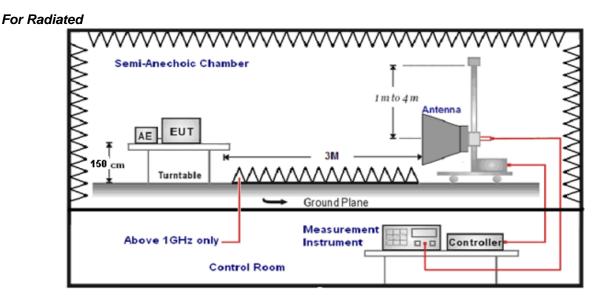
	CH3	9 -3Mbps		
Keysight Spectrum Analyzer - Swept SA				
Marker 1 Δ 1.002000000 M	HZ PNO: Wide Trig: Free Ru IFGain:Low Atten: 20 dB	Avg Type: Log-Pwr n Avg Hold:>1/1	11:34:28 AM Jul 16, 2019 TRACE 2 3 4 5 6 TYPE MWWWW DET P N N N N N	Peak Search
Ref Offset 10.5 dB	IPGam.Low Attent 20 dB		Mkr1 1.002 MHz	NextPeak
10 dB/div Ref 20.00 dBm			-0.134 dB	
(22)				Next Pk Right
10.0				J. J
0.00	~~X2	~ ~ ~~	1Δ2	
-10.0 -10.0	the second sub-	man mar in	a monther	Next Pk Lef
-20.0				
				Marker Delta
-30.0				
-40.0				Mkr→CF
-50.0				
-60.0				Mkr→RefLv
-70.0				More
0				1 of 2
Center 2.441500 GH7			Span 2.000 MHz	1012
Center 2.441500 GHz #Res BW 100 kHz	#VBW 300 kHz		Span 2.000 MHz 1.000 ms (1001 pts)	
	#VBW 300 kHz	Sweep /	1.000 ms (1001 pts)	
			1.000 ms (1001 pts)	
#Res BW 100 kHz	CH7	statu 8 -3Mbps	1.000 ms (1001 pts) s	- g *
#Res BW 100 kHz	CH7 SENSE: Z PNO: Wide Trig: Free Ru	STATU 8 -3Mbps NT ALIGN AUTO Avg Type: Log-Pwr n AvgIybidis.11/1	1.000 ms (1001 pts) s 11:36:54 AM Jul 16, 2019 TRACE 1 2 3 4 5 6 TYPE M	
#Res BW 100 kHz MSG Keysight Spectrum Analyzer - Swept SA (X) RF 50 Ω AC Marker 1 Δ 998.000000 kH	CH7 sense:	STATU 8 -3Mbps NT ALIGN AUTO Avg Type: Log-Pwr n AvgIybidis.11/1	1.000 ms (1001 pts) s 11:36:54 AM Jul 16, 2019 TRACE 12 34 5 6 TYPE MWAWAY DET P. NNNNN AMkr1 998 kHz	- g *
#Res BW 100 kHz	CH7 SENSE: Z PNO: Wide Trig: Free Ru	STATU 8 -3Mbps NT ALIGN AUTO Avg Type: Log-Pwr n AvgIybidis.11/1	1.000 ms (1001 pts) s 11:36:54 AM Jul 16, 2019 TRACE 1 23 4 5 0 TYPE M	Peak Search
#Res BW 100 kHz MSG Keysight Spectrum Analyzer - Swept SA Marker 1 Δ 998.000000 kH Age of Offset 10.5 dB Ref 20.00 dBm	CH7 SENSE: Z PNO: Wide Trig: Free Ru	STATU 8 -3Mbps NT ALIGN AUTO Avg Type: Log-Pwr n AvgIybidis.11/1	1.000 ms (1001 pts) s 11:36:54 AM Jul 16, 2019 TRACE 12 34 5 6 TYPE MWWW DET P.NNNN AMkr1 998 kHz	Peak Search Next Peak
#Res BW 100 kHz MSG Keysight Spectrum Analyzer - Swept SA W RF 50 Ω AC Marker 1 Δ 998.000000 kH Ref Offset 10.5 dB	CH7 SENSE: Z PNO: Wide Trig: Free Ru	STATU 8 -3Mbps NT ALIGN AUTO Avg Type: Log-Pwr n AvgIybidis.11/1	1.000 ms (1001 pts) s 11:36:54 AM Jul 16, 2019 TRACE 2 3 4 5 G TYPE MWWWW DET PINNININ AMkr1 998 kHz -0.143 dB	Peak Search
#Res BW 100 kHz MSG ■ Keysight Spectrum Analyzer - Swept SA W RF 50 Ω AC Marker 1 Δ 998.000000 kH 10 dB/div Ref Offset 10.5 dB Ref Offset 10.5 dB 10 dB/div Ref 20.00 dBm	CH7 SENSE: Z PNO: Wide Trig: Free Ru	STATU 8 -3Mbps NT ALIGN AUTO Avg Type: Log-Pwr Avg Hold:>1/1	1.000 ms (1001 pts) s 11:36:54 AM Jul 16, 2019 TRACE 12 34 5 6 TYPE MWWW DET P.NNNN AMkr1 998 kHz	Peak Search Next Peak Next Pk Right
#Res BW 100 kHz MSG Keysight Spectrum Analyzer - Swept SA W RF 50 Ω AC Marker 1 Δ 998.000000 kH 10 dB/div Ref 20.00 dBm 10 0	CH7 Z PNO: Wide IFGain:Low Trig: Free Ru Atten: 20 dB	STATU 8 -3Mbps NT Align Auto Avg Type: Log-Pwr Avg Hold:>1/1	1.000 ms (1001 pts) s 11:36:54 AMJul 16, 2019 TRACE 2 3 4 5 6 TYPE MWWWW DET PNNNN ΔMkr1 998 kHz -0.143 dB	Peak Search Next Peak
#Res BW 100 kHz MSG Keysight Spectrum Analyzer - Swept SA Keysight Spectrum Analyzer - Swept SA Marker 1 Δ 998.000000 kH Ref Offset 10.5 dB Comparison of the second diagonal d	CH7 Z PNO: Wide IFGain:Low Trig: Free Ru Atten: 20 dB	STATU 8 -3Mbps NT ALIGN AUTO Avg Type: Log-Pwr Avg Hold:>1/1	1.000 ms (1001 pts) s 11:36:54 AM Jul 16, 2019 TRACE [] 23 4 5 6 TYPE MWWW DET P NNNNN ΔMkr1 998 kHz -0.143 dB	Peak Search Next Peak Next Pk Right
#Res BW 100 kHz MSG MSG Keysight Spectrum Analyzer - Swept SA WArker 1 Δ 998.000000 kH Cod B/div Ref Offset 10.5 dB Ref Offset 10.5 dB 10 dB/div Ref 20.00 dBm -10.0 -10.0 -20.0	CH7 Z PNO: Wide IFGain:Low Trig: Free Ru Atten: 20 dB	STATU 8 -3Mbps NT Align Auto Avg Type: Log-Pwr Avg Hold:>1/1	1.000 ms (1001 pts) s 11:36:54 AMJul 16, 2019 TRACE 2 3 4 5 6 TYPE MWWWW DET PNNNN ΔMkr1 998 kHz -0.143 dB	Peak Search Next Peak Next Pk Right
#Res BW 100 kHz MSG	CH7 Z PNO: Wide IFGain:Low Trig: Free Ru Atten: 20 dB	STATU 8 -3Mbps NT Align Auto Avg Type: Log-Pwr Avg Hold:>1/1	1.000 ms (1001 pts) s 11:36:54 AMJul 16, 2019 TRACE 2 3 4 5 6 TYPE MWWWW DET PNNNN ΔMkr1 998 kHz -0.143 dB	Peak Search Next Peak Next Pk Right
#Res BW 100 kHz MSG MSG Keysight Spectrum Analyzer - Swept SA WArker 1 Δ 998.000000 kH Cod B/div Ref Offset 10.5 dB Ref Offset 10.5 dB 10 dB/div Ref 20.00 dBm -10.0 -10.0 -20.0	CH7 Z PNO: Wide IFGain:Low Trig: Free Ru Atten: 20 dB	STATU 8 -3Mbps NT Align Auto Avg Type: Log-Pwr Avg Hold:>1/1	1.000 ms (1001 pts) s 11:36:54 AMJul 16, 2019 TRACE 2 3 4 5 6 TYPE MWWWW DET PNNNN ΔMkr1 998 kHz -0.143 dB	Peak Search Next Peak Next Pk Right
#Res BW 100 kHz MSG	CH7 Z PNO: Wide IFGain:Low Trig: Free Ru Atten: 20 dB	STATU 8 -3Mbps NT Align Auto Avg Type: Log-Pwr Avg Hold:>1/1	1.000 ms (1001 pts) s 11:36:54 AMJul 16, 2019 TRACE 2 3 4 5 6 TYPE MWWWW DET PNNNN ΔMkr1 998 kHz -0.143 dB	Peak Search Next Peak Next Pk Right Next Pk Left
#Res BW 100 kHz MSG	CH7 Z PNO: Wide IFGain:Low Trig: Free Ru Atten: 20 dB	STATU 8 -3Mbps NT Align Auto Avg Type: Log-Pwr Avg Hold:>1/1	1.000 ms (1001 pts) s 11:36:54 AMJul 16, 2019 TRACE 2 3 4 5 6 TYPE MWWWW DET PNNNN ΔMkr1 998 kHz -0.143 dB	Peak Search Next Peak Next Pk Right Next Pk Left Marker Delta
#Res BW 100 kHz MSG	CH7 Z PNO: Wide IFGain:Low Trig: Free Ru Atten: 20 dB	STATU 8 -3Mbps NT Align Auto Avg Type: Log-Pwr Avg Hold:>1/1	1.000 ms (1001 pts) s 11:36:54 AMJul 16, 2019 TRACE 2 3 4 5 6 TYPE MWWWW DET PNNNN ΔMkr1 998 kHz -0.143 dB	Peak Search Next Peak Next Pk Right Next Pk Left
#Res BW 100 kHz MSG	CH7 Z PNO: Wide IFGain:Low Trig: Free Ru Atten: 20 dB	STATU 8 -3Mbps NT Align Auto Avg Type: Log-Pwr Avg Hold:>1/1	1.000 ms (1001 pts) s 11:36:54 AMJul 16, 2019 TRACE 2 3 4 5 6 TYPE MWWWW DET PNNNN ΔMkr1 998 kHz -0.143 dB	Peak Search Next Peak Next Pk Right Next Pk Left Marker Delta Mkr→CF
#Res BW 100 kHz MSG Keysight Spectrum Analyzer - Swept SA Ref Offfset 10.5 dB Ref 20.00 dBm Comparison Ref Offfset 10.5 dB Comparison Ref 20.00 dBm Ref	CH7 Z PNO: Wide IFGain:Low Trig: Free Ru Atten: 20 dB	STATU 8 -3Mbps NT Align Auto Avg Type: Log-Pwr Avg Hold:>1/1	1.000 ms (1001 pts) s 11:36:54 AMJul 16, 2019 TRACE 2 3 4 5 6 TYPE MWWWW DET PNNNN ΔMkr1 998 kHz -0.143 dB	Peak Search Next Peak Next Pk Right Next Pk Left Marker Delta

4.6. Band Edge Compliance of RF Emission

TEST REQUIREMENT

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated 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, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. 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)).

TEST CONFIGURATION



For Conducted



TEST PROCEDURE

- 1. The EUT was placed on a turn table which is 1.5m above ground plane.
- 2. Maximum procedure was performed by raising the receiving antenna from 1m to 4m and rotating the turn table from 0° to 360° to acquire the highest emissions from EUT.
- 3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
- 4. Repeat above procedures until all frequency measurements have been completed..
- 5. The distance between test antenna and EUT was 3 meter:
- 6. Setting test receiver/spectrum as following table states:

· .	Detaing test receiver/spectrum as following table states.							
	Test Frequency range	Test Receiver/Spectrum Setting	Detector					
	1GHz-40GHz	Peak Value: RBW=1MHz/VBW=3MHz, Sweep time=Auto Average Value: RBW=1MHz/VBW=10Hz, Sweep time=Auto	Peak					

<u>LIMIT</u>

Below -20dB of the highest emission level in operating band.

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)

TEST RESULTS

Remark: we measured all conditions(DH1,DH3,DH5) and recorded worst case at DH1.

4.6.1 For Radiated Bandedge Measurement

Remark: we tested radiated bandedge at both hopping and no-hopping modes,recorded worst case at no-hopping mode

GFSK											
Frequency	Frequency(MHz): 2402					Polarity: HORIZONTAL				NTAL	
Frequency (MHz)	Emiss Leve (dBuV	el	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre- amplifi er	Correction Factor (dB/m)
2390.00	49.33	PK	74	24.67	1	114	54.64	27.49	3.32	36.12	-5.31
2390.00	38.08	AV	54	15.92	1	114	43.39	27.49	3.32	36.12	-5.31
Frequenc	y(MHz):			2402			Polarity:			VERTI	CAL
Frequency (MHz)	Emiss Leve (dBuV	el	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre- amplifi er	Correction Factor (dB/m)
2390.00	47.84	PK	74	26.16	1	195	53.15	27.49	3.32	36.12	-5.31
2390.00	38.13	AV	54	15.87	1	195	43.44	27.49	3.32	36.12	-5.31
Frequency	y(MHz):		2480			Polarity:			HORIZONTAL		
Frequency (MHz)	Emiss Leve (dBuV	el	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre- amplifi er	Correction Factor (dB/m)
2483.50	48.23	PK	74	24.67	1	102	53.95	27.45	3.38	36.55	-5.72
2483.50	38.33	AV	54	12.37	1	102	44.05	27.45	3.38	36.55	-5.72
Frequenc	y(MHz):			2480		Polarity:		VERTICAL			
Frequency (MHz)	Emiss Leve (dBuV	el	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre- amplifi er	Correction Factor (dB/m)
2483.50	48.43	PK	74	24.67	1	255	54.15	27.45	3.38	36.55	-5.72
2483.50	38.03	AV	54	12.37	1	255	43.75	27.45	3.38	36.55	-5.72

4.6.2 For Conducted Bandedge Measurement

Keysight Spectrum Analyzer - Swept SA			
RF 50 Ω AC Marker 2 2.399970000000 C	GHz PNO: Wide	ALIGN AUTO 11:40:31 AM Jul 16, Avg Type: Log-Pwr TRACE 2 2 Avg Hold:>1/1 TYPE	2019 4 5 6 WWW
Ref Offset 10.5 dB 10 dB/div Ref 20.00 dBm	IFGain:Low Atten: 20 dB	Mkr2 2.399 97 G -43.797 d	NNN Hz NextPea Bm
Log 10.0 0.00 -10.0			Next Pk Rig
20.0 30.0 40.0	2	47:	Next Pk Lo
50.0 60.0 70.0	Mar Mar		Marker De
Center 2.400000 GHz Res BW 100 kHz		Span 10.00 I Sweep 1.000 ms (1001	pts) <mark>Mkr→</mark>
	02 00 GHz 2.876 dBm 99 97 GHz -43.797 dBm		Mkr→RefL
9 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0			Mc 1 c
sg	III	STATUS	4

BDR mode	(GESK)	· Band	Edge-	eft Side
		. Danu	Luye-	

🔤 Keysight Spe	ectrum Analyzer -									
Marker 2	RF 50	Ω AC 00000 G	Hz		SE:INT		ALIGN AUTO e: Log-Pwr	TRAC	M Jul 16, 2019 E <mark>1 2 3 4 5</mark> 6	Peak Search
		F	NO: Fast Gain:Low	Trig: Free Atten: 20		Avg Hold	1:>1/1			
	Ref Offset	40.5 -10					Mk	r2 2.38	3 8 GHz	Next Peak
10 dB/div	Ref 20.0							-55.0	68 dBm	
Log 10.0					1					
0.00					4564440777774		ATTACANA AND AND AND AND AND AND AND AND AND	nynder son yn de		Next Pk Right
-10.0					,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	الموحدادة	ի ուրեգը.	رغا المصغار		
-20.0									-17.10 dBm	
-30.0										Next Pk Left
-40.0										
-50.0				→ ²						
-60.0		r-und-salatesharelaa	indrahan series and a series of the series o	an a					^{TU I} YANNA MINA	Marker Delta
-70.0										
Center 2.4	4000 GHz							Span 2	00.0 MHz	
#Res BW			#VBW	/ 300 kHz			Sweep 1	9.13 ms (1001 pts)	Mkr→CF
MKR MODE TH		Х		Y	FUNC	TION FU	NCTION WIDTH	FUNCTION	ON VALUE	
1 N 1 2 N 1	f f		0 GHz 8 GHz	2.942 dE -55.068 dE						
3 4									_	Mkr→RefLvi
5									=	
7										
9										More 1 of 2
10									-	1 01 2
<				m				1	E E	
MSG 🐼 No P	eak Found						STATUS	S		

Keysight Spectrum Analyzer - Swept SA			,	- # X	
	SENSE:INT	ALIGN AUTO	11:48:33 AM Jul 16, 2019 TRACE 1 2 3 4 5 6	Peak Search	
Marker 2 2.48500000000 GHz PNO: Wide IFGain:Low	Trig: Free Run Atten: 20 dB	Avg Hold:>1/1			
Ref Offset 10.5 dB 10 dB/div Ref 20.00 dBm		Mkr	2 2.485 00 GHz -39.640 dBm	Next Peak	
				Next Pk Right	
-20.0		2	-18.00 dBm	Next Pk Left	
-50.0 ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~	and have many	- Anna	man har and her and her	Marker Delta	
Center 2.483500 GHz #Res BW 100 kHz #VBW	/ 300 kHz	-	Span 10.00 MHz 000 ms (1001 pts)	Mkr→CF	
1 N 1 f 2.480 00 GHz 2 N 1 f 2.485 00 GHz 3 4 5 6 6	2.050 dBm -39.640 dBm		E	Mkr→RefLvl	
7 8 9 10 11			* •	More 1 of 2	
MSG					

EDR mode (GFSK): Band Edge-Right Side

ysight Spectrum Analyzer -						
ker 2 2.483900	Ω AC 000000 GHz PNO: Fast	SENSE:IN	Avg Type: Log-Pwr	11:46:37 AM Jul 16, 2019 TRACE 1 2 3 4 5 6 TYPE MWWWW	Peak Search	
Ref Offset B/div Ref 20.0	IFGain:Lov		Mk	r2 2.483 9 GHz -40.029 dBm	NextPea	
					Next Pk Righ	
	lunun atomat statu tala farata	2		-17.20 dBm	Next Pk Le	
hepetthsuater[cdawaayndawlaadarfaawaalaan daaraalaan kaar	NYANYAWAYAN MANYANYANA	Marker Del	
ter 2.4835 GHz s BW 100 kHz		/BW 300 kHz		Span 200.0 MHz 9.13 ms (1001 pts)	Mkr→C	
MODE TRC SCL N 1 f N 1 f	× 2.425 1 GHz 2.483 9 GHz		FUNCTION FUNCTION WIDTH	FUNCTION VALUE	Mkr→RefL	
					Moi 1 of	
		m	STATUS			



EDR mode (π /4-DQPSK): Band Edge-Left Side

								rum Analyzer -	ysight Spec
Peak Search	12:02:24 PM Jul 16, 2019 TRACE 1 2 3 4 5 6 TYPE MWWWW DET P N N N N N	ALIGN AUTO /pe: Log-Pwr bld:>1/1				GHz PNO: Fast IFGain:Low	0 Ω AC		ker 2 2
Next Pea	2.399 4 GHz -56.294 dBm	Mkr		U UD	Atten: 20	IFGain:Low		Ref Offset Ref 20.0	B/div
Next Pk Righ	Halland Yallah	http://www.weiter	JANN ALANA MARANA	MIM					
Next Pk Le	21.70 dBm								
Marker Del	- Harwar			2	ool, may a baared by the deal	ร _{างสา} นและสุดในใหญ่ประเทศ	ner akan ferrar an Alda	ر	
Mkr→C	Span 200.0 MHz 13 ms (1001 pts) FUNCTION VALUE	Sweep 19	FUNCTION	z	W 300 kHz Y	#VI	X	000 GHz 00 kHz	
Mkr→RefL	=				-1.718 dE -56.294 dE	408 0 GHz 399 4 GHz		f f	N 1 N 1
Mor 1 of									
	•	STATUS			m				

No.	and as heat of	Caracte		Analyzer - Sw												
LXI		İ	RF	50 Ω	AC			SEN	ISE:INT			ALIGN AUTO		M Jul 16, 201		Peak Search
Mar	ker	22	.48	349900	00000			Trig: Free	Pup	Avg Avg		: Log-Pwr		CE 1234 PE MWWW		Peak Search
						PNO: IFGair	Wide 🖵 n:Low	Atten: 20		A ABI	ioiu.	~ // 1		et P NNNI		
												Mkr	2 2.484	99 GH		Next Peak
<u>1</u> 0 d	B/div			Offset 10 5 20.00 (-39.6	15 dBr	n	
Log 10.0)								
				1												Next Pk Right
0.00				~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~												
-10.0	\vdash		7		1											
-20.0		=			+									-22.70 df	Brn	New Phylor
-30.0	\vdash	+			+						2—					Next Pk Left
-40.0	\vdash	+			+	$\wedge \vdash$				$+ \lambda$						
-50.0	m	/			Ŷ	4				m						
-60.0	<u> </u>					∽	w	Mr. Alman	mont	~	m	-Anger	human	-	v.	Marker Delta
-70.0																
_																
Cen #Re	ter :	2.48	335	00 GHz			#\/D\/	300 kHz				woon 1	5 Span) 000 ms.	0.00 MH		Mkr→CF
				RI 12			# ¥ D ¥ ¥								2	WIKI→CI
MKR	MODE	TRC 1	SCL		× 2.49	0 00 G	Hz	Y -2.669 dE		NCTION	FUN	CTION WIDTH	FUNCTI	ON VALUE	Â	
2	Ň	1	f			4 99 G		-39.615 dE	Bm							
3																Mkr→RefLvl
5															Ξ	
7																
8																More
10																1 of 2
11								III						E F	Ŧ	
MSG												STATUS	5			
	_	_	_								_				_	

EDR mode (π /4-DQPSK): Band Edge- Right Side

Keysight Spectrum Analyzer - Swept SA				
α RF 50 Ω AC Marker 2 2.483900000000	PNO: Fast 😱 Trig: Free Run	ALIGN AUTO Avg Type: Log-Pwr Avg Hold:>1/1	12:00:21 PM Jul 16, 2019 TRACE 1 2 3 4 5 6 TYPE MWWWWW DET P NNNNN	Peak Search
Ref Offset 10.5 dB 10 dB/div Ref 20.00 dBm	IFGain:Low Atten: 20 dB	Mk	r2 2.483 9 GHz -40.490 dBm	Next Peak
-og 10.0 0.00 10.0 10.0	Propublic Antion and Antion antio			Next Pk Right
20.0	2		-21.70 dBm	Next Pk Left
50.0 60.0 		yeeneed and see the second	เป็นสมาริหญิโปเลยีให้หลางหมายที่เรองได	Marker Delta
Center 2.4835 GHz Res BW 100 kHz	#VBW 300 kHz	Sweep 1	Span 200.0 MHz 9.13 ms (1001 pts) FUNCTION VALUE	Mkr→CF
	09 1 GHz -1.681 dBm 83 9 GHz -40.490 dBm		E	Mkr→RefLv
7 8 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9			•	More 1 of 2
sg	m	STATUS		

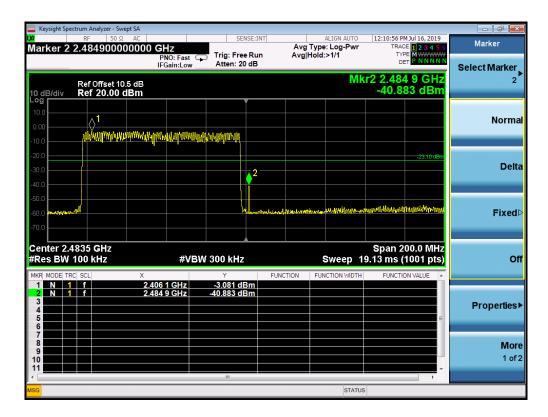
Keysight Spectrum Analyzer - Swept S RF 50 Ω A		SENSE:INT	ALIGN AUTO	12:06:18 PM Jul 16, 2019	
rker 2 2.3999900000			Avg Type: Log-Pwr Avg Hold:>1/1	TRACE 1 2 3 4 5 6 TYPE M WWWW DET P N N N N N	Peak Search
Ref Offset 10.5 d B/div Ref 20.00 dBr			Mkr	2 2.399 99 GHz -51.736 dBm	Next Pea
			1		Next Pk Rig
				-23:10 dBm	Next Pk L
0 0	mar Marine	2 www.www.		V monton	Marker De
enter 2.400000 GHz les BW 100 kHz	#VBV	V 300 kHz		Span 10.00 MHz 000 ms (1001 pts)	Mkr→
R MODE TRC SCL	× 2.402 00 GHz 2.399 99 GHz	Y FU -3.120 dBm -51.736 dBm	NCTION FUNCTION WIDTH	FUNCTION VALUE	Mkr→RefL
					M c 1 c
No Peak Found		m	STATUS	• • •	

EDR mode(8DPSK): Band Edge-Left Side

Keysight Spectrum Analyzer - Swept SA					
RF 50 Ω AC Marker 2 2.399600000000		e Run Avg Hol	be: Log-Pwr	08:42 PM Jul 16, 2019 TRACE 1 2 3 4 5 6 TYPE MWWWW DET P N N N N N	Recall
Ref Offset 10.5 dB 10 dB/div Ref 20.00 dBm				2.399 6 GHz 54.707 dBm	State►
10.0 0.00			Munda Laba-Peda Long dimiti Ana una	1975. M. L.	Trace (+ State)
-10.0		Marayayayayayayayayayayayaya 	International Contraction of the second s	-23.00 dDm	
-30.0		2			
-60.0	n degad yn y de genegenetyf o dd af yn	۹ 			Data (Import)↓ Trace 1
Center 2.4000 GHz #Res BW 100 kHz	#VBW 300 kHz		Sp Sweep 19.13	oan 200.0 MHz ms (1001 pts)	
	409 0 GHz -3.015 dB 399 6 GHz -54.707 dB	3m	JNCTION WIDTH	FUNCTION VALUE	
4 5 6 7				=	
8 9 10 11				_	
≺	m		STATUS	4	

- d x					ectrum Analyzer - Swept SA	Keysight Spect
Marker	12:12:27 PM Jul 16, 2019 TRACE 1 2 3 4 5 6 TYPE M WWWWW	ALIGN AUTO pe: Log-Pwr ld:>1/1	Avg	SENSE:I	RF 50 Ω AC 2.484990000000 GHz	u
Select Marker	DET P NNNNN 2.484 99 GHz			Atten: 20 dB	PNO: Wide IFGain:Low Ref Offset 10.5 dB	
Norma	-40.169 dBm				Ref 20.00 dBm	- og 10.0 0.00
Delt	-24.UU dBm					10.0 20.0 30.0 40.0
Fixed	ngagalhar fungaga gan di tinggi pangalan ng filinang		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	᠁᠆ᠧᠬᠬᡐ᠋ᡔᡙᡧᠬᠬ		50.0 60.0 70.0
o	Span 10.00 MHz 10 ms (1001 pts)	Sweep 1.0	FUNCTION	300 kHz		Center 2.43 Res BW 1
				-4.004 dBm		
Properties	E			-40.169 dBm -40.169 dBm	2.400 00 0112	1 N 1 2 N 1 3 4 5 6
Properties Moi 1 of				-4.004 0Bm -40.169 dBm		2 N 1 3

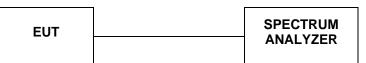
EDR mode(8DPSK): Band Edge-Right Side



NOTE: Hopping enabled and disabled have evaluated, and the worst data was reported.

4.7. Number of hopping frequency

TEST CONFIGURATION



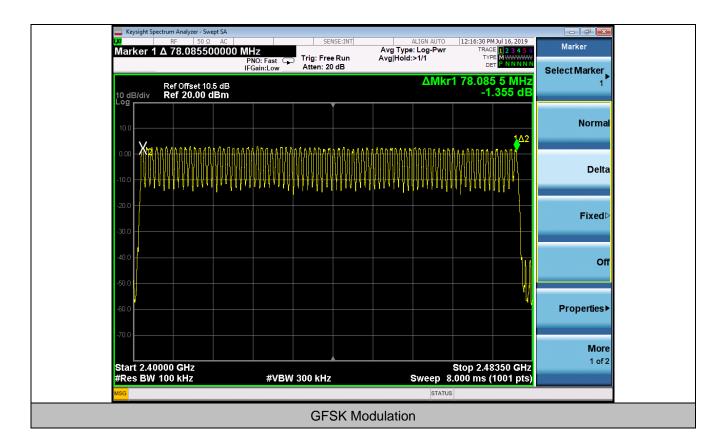
TEST PROCEDURE

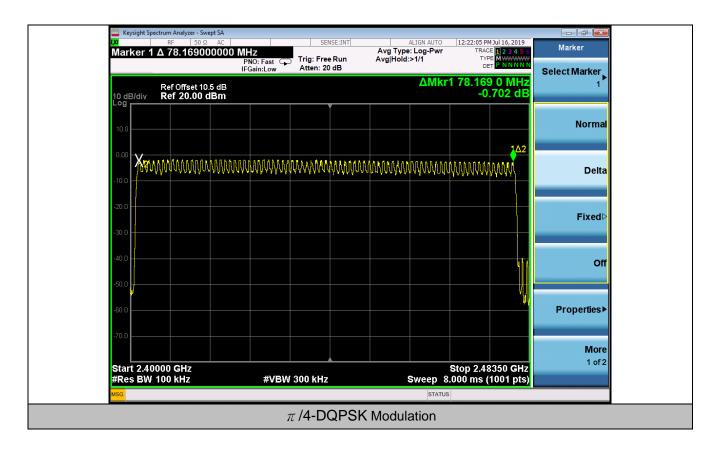
The transmitter output was connected to the spectrum analyzer through an attenuator.Set spectrum analyzer start 2400MHz to 2483.5MHz with RBW=1MHz and VBW=3MHz.

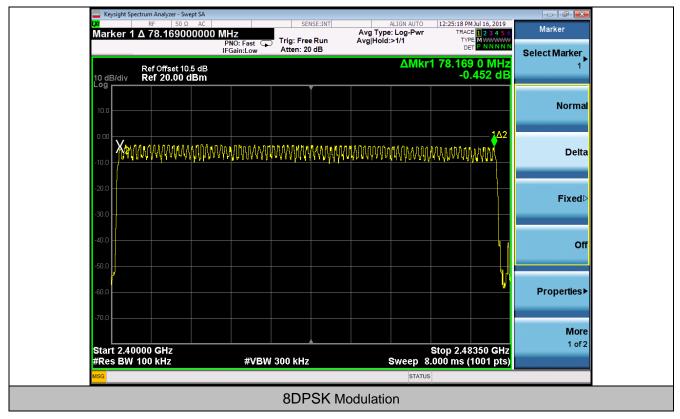
<u>LIMIT</u>

Frequency hopping systems in the 2400–2483.5MHz band shall use at least 15 channels.

Modulation	Number of Hopping Channel	Limit	Result
GFSK	79	≥15	Pass
π /4-DQPSK	79	≥15	Pass
8DPSK	79	≥15	Pass







4.8. Time Of Occupancy(Dwell Time)

TEST CONFIGURATION



TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer through an attenuator. Set center frequency of spectrum analyzer=operating frequency with RBW=1MHz and VBW=3MHz,Span=0Hz.

<u>LIMIT</u>

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a pe-riod of 0.4 seconds multiplied by the number of hopping channels employed.

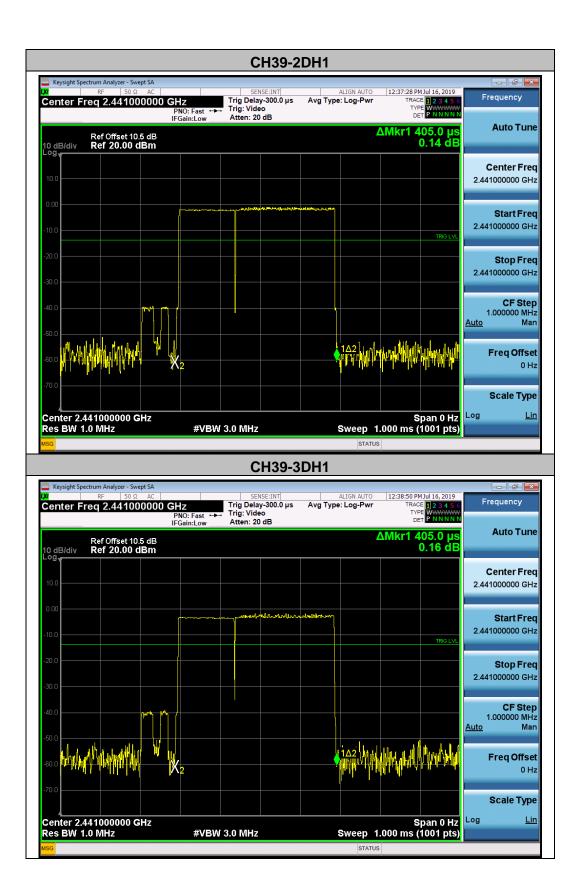
TEST RESULTS

Report No.: GTS20190612005-1-1

Modulation	Data Packet	Frequency	Pulse Duration	Dwell Time	Limits
			(ms)	(s)	(s)
	DH1	2441 MHz	0.392	0.13	0.4
GFSK	2DH1	2441 MHz	0.405	0.13	0.4
	3DH1	2441 MHz	0.405	0.13	0.4

Test plot as follows:

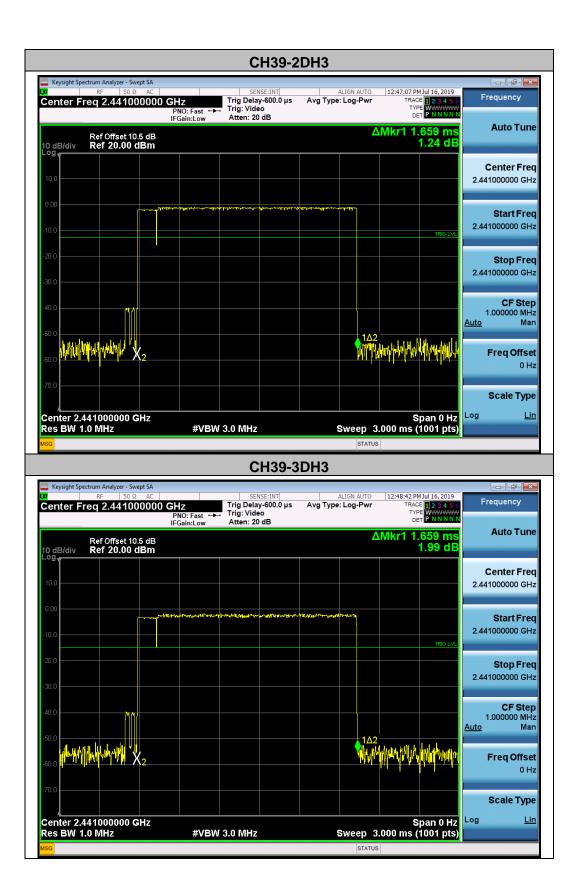
w Video Tri	RF ∣50Ω AC g Level -8.10 d	Bm PNO: Fast ↔ IFGain:Low	SENSE:INT Trig Delay-300.0 µs Trig: Video Atten: 20 dB	ALIGN AUTO Avg Type: Log-Pwr	12:34:03 PM Jul 16, 2019 TRACE 1 2 3 4 5 6 TYPE WWWWWW DET P N N N N N	Video Setup Trigger Level
10 dB/div Log	Ref Offset 10.5 dB Ref 20.00 dBm			Ĺ	Mkr1 392.0 µs 3.04 dB	-8.10 dBm
10.0						Trig Slope <u>Pos</u> Neg
-10.0					TRIG LVL	Trig Delay -300.0 μs <u>On</u> Off
-20.0						
-30.0						
-40.0	le l					
-60.0		1 X2			aller her starter and start	
-70.0						
Center 2.4 Res BW 1	41000000 GHz .0 MHz	#VBW	3.0 MHz	Sweep 1	Span 0 Hz 000 ms (1001 pts)	



Modulation	Data Packet	Frequency	Pulse Duration	Dwell Time	Limits
			(ms)	(s)	(s)
	DH3	2441 MHz	1.659	0.27	0.4
π/4-DQPSK	2DH3	2441 MHz	1.659	0.27	0.4
	3DH3	2441 MHz	1.659	0.27	0.4

Test plot as follows:

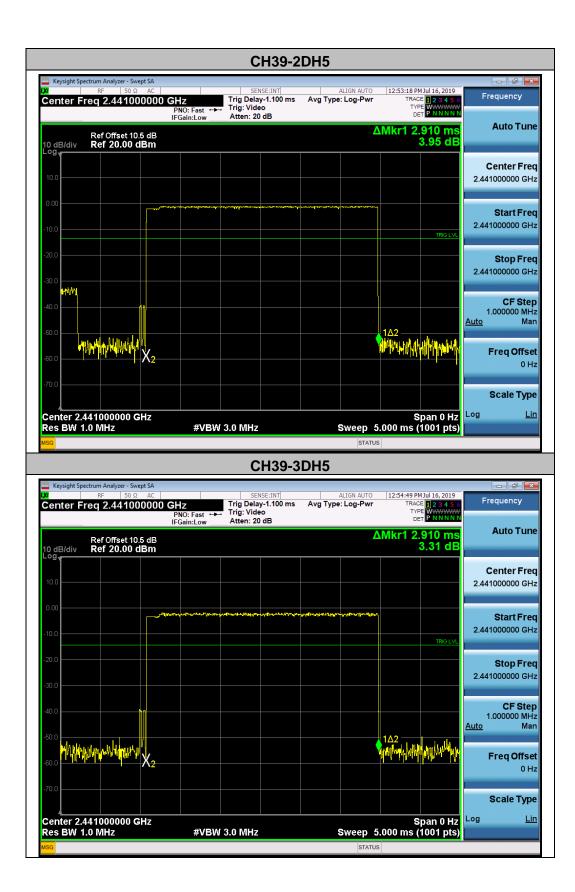
	CH39-	·DH3		
Keysight Spectrum Analyzer - Swept SA RF 50 Ω AC Center Freq 2.441000000 C	SENSE:INT Trig Delay-600.0 µs PNO: Fast →→ Trig: Video IFGain:Low Atten: 20 dB	ALIGN AUTO Avg Type: Log-Pwr	12:44:58 PMJul 16, 2019 TRACE 123456 TYPE WWWWW DET PNNNNN	Frequency
Ref Offset 10.5 dB 10 dB/div Ref 20.00 dBm		L	Mkr1 1.659 ms 2.54 dB	Auto Tune
10.0				Center Freq 2.441000000 GHz
-10.0				Start Freq 2.441000000 GHz
-20.0				Stop Freq 2.441000000 GHz
-40.0		-102		CF Step 1.000000 MHz <u>Auto</u> Man
			wrthy longen the party	Freq Offset 0 Hz
-70.0 Center 2.441000000 GHz			Span 0 Hz	Scale Type
Res BW 1.0 MHz	#VBW 3.0 MHz	Sweep 3	8.000 ms (1001 pts)	



Modulation	Data Packet	Frequency	Pulse Duration	Dwell Time	Limits
			(ms)	(s)	(s)
	DH5	2441 MHz	2.910	0.31	0.4
8-DPSK	2DH5	2441 MHz	2.910	0.31	0.4
	3DH5	2441 MHz	2.910	0.31	0.4

Test plot as follows:

	CH39-	DH5		
weysight Spectrum Analyzer - Swept SA				
	Hz Trig Delay-1.100 ms PNO: Fast ↔ Trig: Video FGain:Low Atten: 20 dB	ALIGN AUTO Avg Type: Log-Pwr	12:51:24 PM Jul 16, 2019 TRACE 123456 TYPE WWWWWW DET PNNNNN	Frequency
Ref Offset 10.5 dB 10 dB/div Ref 20.00 dBm		Δ	Mkr1 2.910 ms 2.49 dB	Auto Tune
10.0				Center Freq 2.441000000 GHz
-10.0			TRIG LVL	Start Freq 2.441000000 GHz
-20.0				Stop Freq 2.441000000 GHz
-40.0				CF Step 1.000000 MHz <u>Auto</u> Man
				Freq Offset 0 Hz
-70.0 Center 2.441000000 GHz			Span 0 Hz	Scale Type
Res BW 1.0 MHz	#VBW 3.0 MHz	Sweep 5	.000 ms (1001 pts)	
MSG		STATUS	3	



4.9. Pseudorandom Frequency Hopping Sequence

TEST APPLICABLE

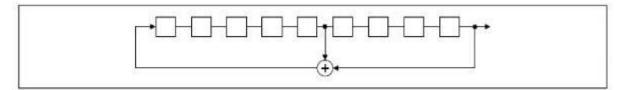
For 47 CFR Part 15C section 15.247 (a)(1) requirement:

Frequency hopping systems shall have hopping channel carrier fre-quencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hop-ping channel, whichever is greater. Al-ternatively, frequency hopping systems operating in the 2400–2483.5 MHz band may have hopping channel carrier fre-quencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW. The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudo ran-domly ordered list of hopping fre-quencies. Each frequency must be used equally on the average by each trans-mitter. The system receivers shall have input bandwidths that match the hop-ping channel bandwidths of their cor-responding transmitters and shall shift frequencies in synchronization with the transmitted signals.

EUT Pseudorandom Frequency Hopping Sequence Requirement

The pseudorandom frequency hopping sequence may be generated in a nice-stage shift register whose 5th and 9th stage outputs are added in a modulo-two addition stage. And the result is fed back to the input of the frist stage. The sequence begins with the frist one of 9 consecutive ones, for example: the shift register is initialized with nine ones.

- Number of shift register stages:9
- Length of pseudo-random sequence:29-1=511 bits
- Longest sequence of zeros:8(non-inverted signal)



Linear Feedback Shift Register for Generation of the PRBS sequence

An explame of pseudorandom frequency hopping sequence as follows:

0 2 4 6	62 64	78 1	
	1 3		

Each frequency used equally one the average by each transmitter.

The system receiver have input bandwidths that match the hopping channel bandwidths of their corresponding transmitter and shift frequencies in synchronization with the transmitted signals.

4.10. Antenna Requirement

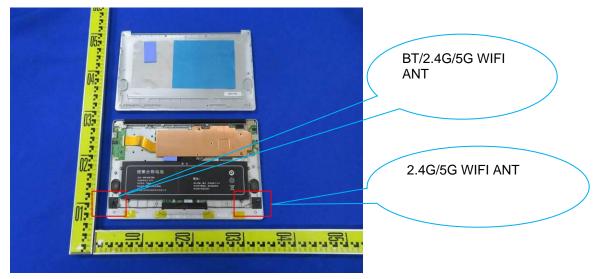
Standard Applicable

For intentional device, according to FCC 47 CFR Section 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.

And according to FCC 47 CFR Section 15.247 (c), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

Test Result

The antenna used for this product is FPC Antenna and that no antenna other than that furnished by the responsible party shall be used with the device, the maximum peak gain of the transmit antenna is only 1.23dBi.



5. Test Setup Photos of the EUT

Radiated Emission Test



Fig.1



Conducted Emission



6. External and Internal Photos of the EUT

External Photos



Fig.1



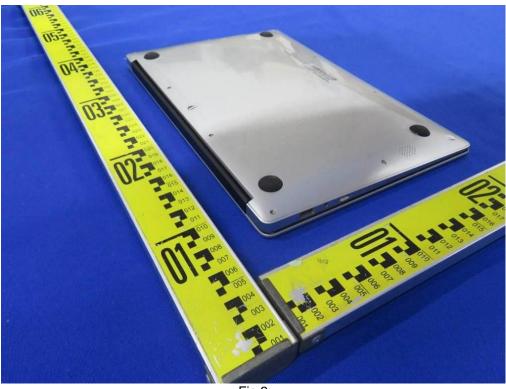


Fig.3







Fig.6



Internal Photos

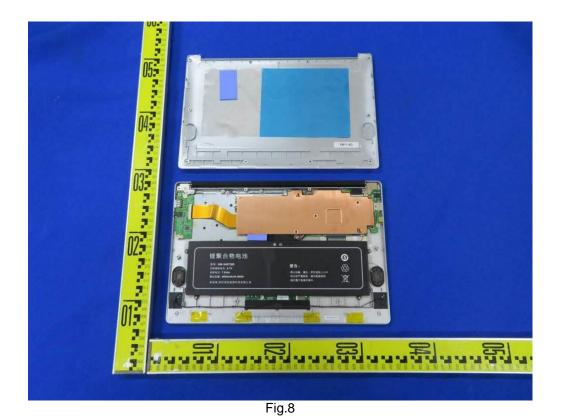




Fig.9



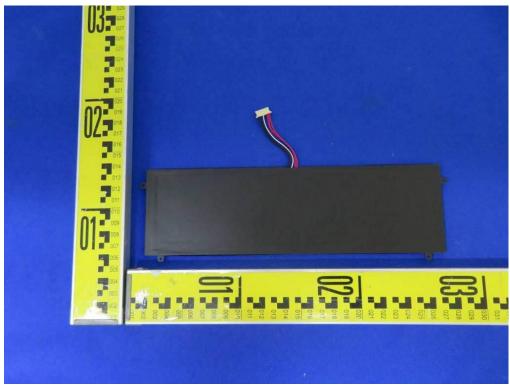


Fig.11

.....End of Report.....