



TE	EST REPORT		
Report Reference No	TRE1809010303	R/C: 97269	
FCC ID:	SRQ-ZTER340		
Applicant's name:	ZTE Corporation		
Address	ZTE Plaza, Keji Road South, Sl	henzhen,Guangdong,P.R.China	
Manufacturer	ZTE Corporation		
Address	ZTE Plaza, Keji Road South, Sl	henzhen,Guangdong,P.R.China	
Test item description	Flip feature phone		
Trade Mark	ZTE		
Model/Type reference	ZTE R340		
Listed Model(s)	R340		
Standard:	FCC CFR Title 47 Part 15 Subpart C Section 15.247		
Date of receipt of test sample	Sep 20, 2018		
Date of testing	Sep 21, 2018- Oct 22, 2018		
Date of issue	Oct 23, 2018		
Result	PASS		
Compiled by ( Position+Printed name+Signature):	File administrators Silvia Li	Silvia Li	
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Approved by (Position+Printed name+Signature):	RF Manager Hans Hu	Homsty	
Testing Laboratory Name :	Shenzhen Huatongwei Intern	ational Inspection Co., Ltd.	
Address 1/F, Bldg 3, Hongfa Hi-tech Industrial Park, Genyu Road, Tianliao, Gongming, Shenzhen, China			
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The test report merely correspond to the test sample.

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# 1. TEST STANDARDS AND REPORT VERSION

# 1.1. 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

ANSI C63.10-2013: American National Standard for Testing Unlicensed Wireless Devicese

# 1.2. Report version

Revision No.	Date of issue	Description
N/A	2018-10-23	Original

# 2. TEST DESCRIPTION

Test Item	Section in CFR 47	Result	Test Engineer
Antenna Requirement	15.203/15.247 (c)	PASS	Xiaokang Tan
AC Power Line Conducted Emissions	15.207	PASS	Xiaokang Tan
Conducted Peak Output Power	15.247 (b)(1)	PASS	Xiaokang Tan
20 dB Bandwidth	15.247 (a)(1)	PASS	Xiaokang Tan
Carrier Frequencies Separation	15.247 (a)(1)	PASS	Xiaokang Tan
Hopping Channel Number	15.247 (a)(1)	PASS	Xiaokang Tan
Dwell Time	15.247 (a)(1)	PASS	Xiaokang Tan
Pseudorandom Frequency Hopping Sequence	15.247(b)(4)	PASS	Xiaokang Tan
Restricted band	15.247(d)/15.205	PASS	Shower Dai
Radiated Emissions	15.247(d)/15.209	PASS	Shower Dai

Note: The measurement uncertainty is not included in the test result.

# 3. <u>SUMMARY</u>

# 3.1. Client Information

Applicant:	ZTE Corporation	
Address:	ZTE Plaza, Keji Road South, Shenzhen, Guangdong, P.R. China	
Manufacturer:	ZTE Corporation	
Address:	ZTE Plaza, Keji Road South, Shenzhen, Guangdong, P.R. China	

# 3.2. Product Description

Name of EUT:	Flip feature phone	
Trade Mark:	ZTE	
Model No.:	ZTE R340	
Listed Model(s):	R340	
IMEI:	Conducted: 36252343242559 Radiated: 36252343242645	
Power supply:	DC 3.7V	
Adapter information:	Model:NB-0500500UM-1 Input:100-240Va.c. 50-60Hz 200mA Output:5.0Vd.c. 500mA	
Hardware version:	CS008_V2.0	
Software version:	CLA_CL_ZTE-R340V1.0.0	
Bluetooth		
Version:	Supported BT2.1+EDR	
Modulation:	GFSK, π/4DQPSK, 8DPSK	
Operation frequency:	2402MHz~2480MHz	
Channel number:	79	
Channel separation:	1MHz	
Antenna type:	MONOPOLE Antenna	
Antenna gain:	-0.5dBi	

# 3.3. Operation state

#### Test frequency list

According to section 15.31(m), regards to the operating frequency range over 10 MHz, must select three channel which were tested. the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, please see the above gray bottom.

Channel	Frequency (MHz)
00	2402
01	2403
:	:
39	2441
:	:
77	2479
78	2480

### > <u>TEST MODE</u>

For RF test items:

The engineering test program was provided and enabled to make EUT continuous transmit

For AC power line conducted emissions:

The EUT was set to connect with the Bluetooth instrument under large package sizes transmission.

For Radiated suprious emissions test item:

The engineering test program was provided and enabled to make EUT continuous transmit. The EUT in each of three orthogonal axis emissions had been tested ,but only the worst case (X axis) data recorded in the report.

# 3.4. EUT configuration

#### The following peripheral devices and interface cables were connected during the measurement:

- supplied by the manufacturer
- supplied by the lab

1	Manufacturer:	/
·	Model No.:	/
1	Manufacturer:	/
1	Model No.:	/

# 3.5. Modifications

No modifications were implemented to meet testing criteria.

# 4. TEST ENVIRONMENT

## 4.1. Address of the test laboratory

Laboratory: Shenzhen Huatongwei International Inspection Co., Ltd. Address: 1/F, Bldg 3, Hongfa Hi-tech Industrial Park, Genyu Road, Tianliao, Gongming, Shenzhen, China

# 4.2. Test Facility

#### CNAS-Lab Code: L1225

Shenzhen Huatongwei International Inspection Co., Ltd. has been assessed and proved to be in compliance with CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC17025: 2005 General Requirements) for the Competence of Testing and Calibration Laboratories.

#### A2LA-Lab Cert. No.: 3902.01

Shenzhen Huatongwei International Inspection Co., Ltd. EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

#### FCC-Registration No.: 762235

Shenzhen Huatongwei International Inspection Co., Ltd. EMC Laboratory 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 our files.

#### IC-Registration No.:5377B-1

Two 3m Alternate Test Site of Shenzhen Huatongwei International Inspection Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for the performance of radiated measurements with Registration No.: 5377B-1.

#### ACA

Shenzhen Huatongwei International Inspection Co., Ltd. EMC Laboratory can also perform testing for the Australian C-Tick mark as a result of our A2LA accreditation.

# 4.3. Environmental conditions

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

Temperature:	15~35°C
Relative Humidity:	30~60 %
Air Pressure:	950~1050mba

#### 4.4. 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 in calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report according to TR-100028-01 "Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics; Part 1" and TR-100028-02 "Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics; Part 2" and is documented in the Shenzhen Huatongwei International Inspection Co., Ltd. quality system according to 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.

Here after the best measurement capability for Shenzhen Huatongwei International Inspection Co., Ltd. is reported:

Test Items	Measurement Uncertainty	Notes	
Transmitter power conducted	0.57 dB	(1)	
Transmitter power Radiated	2.20 dB	(1)	
Conducted spurious emissions 9kHz~40GHz	1.60 dB	(1)	
Radiated spurious emissions 9kHz~40GHz	2.20 dB	(1)	
Conducted Emissions 9kHz~30MHz	3.39 dB	(1)	
Radiated Emissions 30~1000MHz	4.24 dB	(1)	
Radiated Emissions 1~18GHz	5.16 dB	(1)	
Radiated Emissions 18~40GHz	5.54 dB	(1)	
Occupied Bandwidth		(1)	

(1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=1.96.

#### **Conducted Emissions** Last Cal. Next Cal. Test Item Model No. Serial No. Manufacturer Equipment (mm-dd-yy) (mm-dd-yy) **EMI** Test R&S ESCI 101247 11/11/2017 11/10/2018 1 Receiver 2 Artificial Mains SCHWARZBECK **NNLK 8121** 11/11/2017 11/10/2018 573 2-Line V-3 R&S 11/11/2017 ESH3-Z5 100049 11/10/2018 Network **Pulse Limiter** ESH3-Z2 11/11/2017 4 R&S 101488 11/10/2018 RF 5 Connection HUBER+SUHNER EF400 N/A 11/21/2017 11/20/2018 Cable 6 **Test Software** R&S ES-K1 N/A N/A N/A Radiated Emissions Last Cal. Next Cal. Test Item Manufacturer Model No. Serial No. Equipment (mm-dd-yy) (mm-dd-yy) Semi-Anechoic C11121 1 Albatross projects SAC-3m-01 10/16/2016 10/15/2019 Chamber **EMI** Test 2 R&S ESCI 100900 11/11/2017 11/10/2018 Receiver 11/19/2020 3 HFH2-Z2 100020 11/20/2017 Loop Antenna R&S Ultra-4 Broadband SCHWARZBECK **VULB9163** 538 4/5/2017 4/4/2020 Antenna Horn Antenna 5 SCHWARZBECK 9120D 1011 3/27/2017 3/26/2020 Broadband **BBHA9170** 6 SCHWARZBECK **BBHA9170** 3/27/2017 3/26/2020 Horn Antenna 472 7 BBV 9743 Pre-amplifier SCHWARZBECK 9743-0022 10/17/2019 10/18/2017 Broadband 8 SCHWARZBECK BBV 9718 9718-248 10/18/2017 10/17/2019 Pre-amplifier Spectrum 9 R&S FSP40 100597 11/11/2017 11/10/2018 Analyzer **RF** Connection HUBER+SUHNE 10 RE-7-FL N/A 11/21/2017 11/20/2018 Cable R **RF** Connection HUBER+SUHNE 11/20/2018 RE-7-FH N/A 11/21/2017 11 Cable R 12 **Test Software** Audix E3 N/A N/A N/A 13 **Test Software** R&S N/A ES-K1 N/A N/A 14 N/A N/A N/A Turntable Maturo Germany TT2.0-1T 15 Antenna Mast CAM-4.0-P-12 N/A N/A N/A Maturo Germany

# 4.5. Equipments Used during the Test

RF Con	RF Conducted Test					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal. (mm-dd-yy)	Next Cal. (mm-dd-yy)
1	Spectrum Analyzer	R&S	FSV40	100048	11/11/2017	11/10/2018
2	EXA Signal Analyzer	Agilent	N9020A	184247	9/22/2017	9/21/2019
3	OSP	R&S	OSP120	101317	N/A	N/A

# 5. TEST CONDITIONS AND RESULTS

# 5.1. Antenna requirement

## <u>Requirement</u>

#### FCC CFR Title 47 Part 15 Subpart C 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. The use of a permanently attached antenna or of anantenna 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.

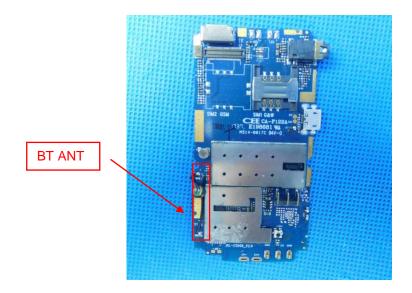
#### FCC CFR Title 47 Part 15 Subpart C Section 15.247(c) (1)(i):

(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 6 dBi 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 6 dBi.

# Test Result:

# ☑ Passed □ Not Applicable

The directional gain of the antenna less than 6 dBi, please refer to the below antenna photo.



# 5.2. Conducted Emissions (AC Main)

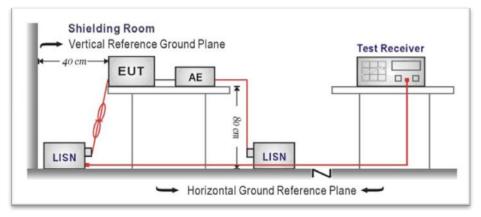
# <u>LIMIT</u>

FCC CFR Title 47 Part 15 Subpart C Section 15.207

	Limit (dBuV)		
Frequency range (MHz)	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 CONFIGURATION**



#### TEST PROCEDURE

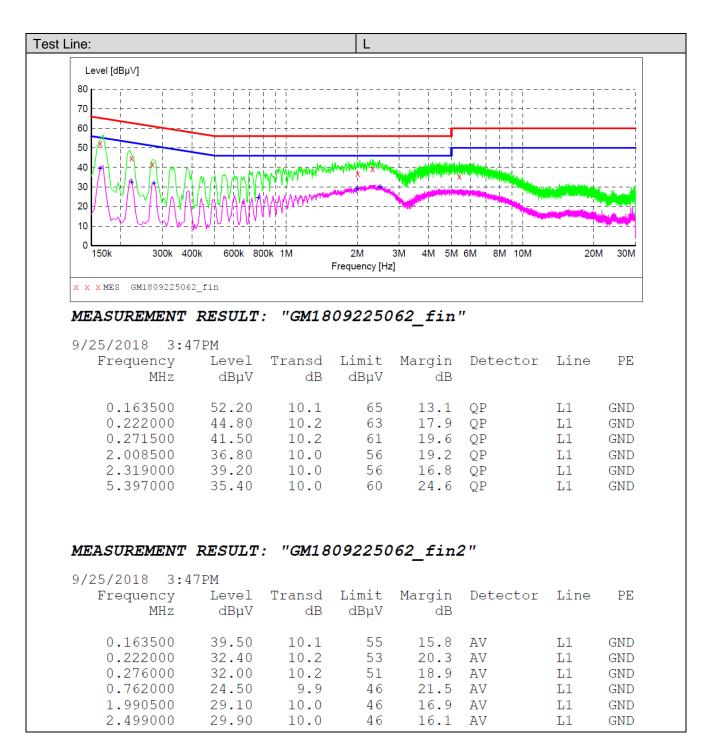
- 1. The EUT was setup according to ANSI C63.10:2013 requirements.
- 2. The EUT was placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The vertical conducting plane was located 40 cm to the rear of the EUT. All other surfaces of EUT were at least 80 cm from any other grounded conducting surface.
- 3. The EUT and simulators are connected to the main power through a line impedances stabilization network (LISN). The LISN provides a 50 ohm /50uH coupling impedance for the measuring equipment.
- 4. The peripheral devices are also connected to the main power through a LISN. (Please refer to the block diagram of the test setup and photographs)
- 5. Each current-carrying conductor of the EUT power cord, except the ground (safety) conductor, was individually connected through a LISN to the input power source.
- 6. The excess length of the power cord between the EUT and the LISN receptacle were folded back and forth at the center of the lead to form a bundle not exceeding 40 cm in length.
- 7. Conducted emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9 kHz.
- 8. During the above scans, the emissions were maximized by cable manipulation.

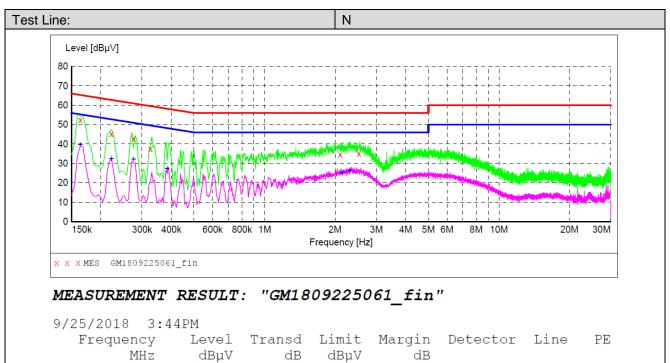
# TEST RESULTS

#### ☑ Passed □ Not Applicable

Note:

- 1) Transd= Cable lose + Pulse Limiter Factor + Artificial Mains Factor
- 2) Margin= Limit Level





0.163500	52.60	10.1	65	12.7	QP	Ν	GND
0.222000	45.30	10.2	63	17.4	QP	Ν	GND
0.276000	42.70	10.2	61	18.2	QP	Ν	GND
0.325500	37.50	10.1	60	22.1	QP	Ν	GND
2.103000	34.50	10.0	56	21.5	QP	Ν	GND
2.521500	35.00	10.0	56	21.0	QP	Ν	GND

#### MEASUREMENT RESULT: "GM1809225061 fin2"

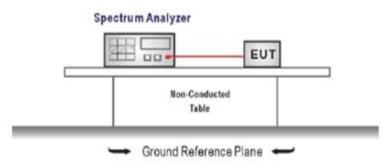
9/25/2018 3:4 Frequency MHz		Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.163500	39.70	10.1	55	15.6	AV	N	GND
0.222000	32.30	10.2	53	20.4	AV	Ν	GND
0.276000	32.10	10.2	51	18.8	AV	Ν	GND
0.384000	27.40	10.1	48	20.8	AV	Ν	GND
2.148000	25.30	10.0	46	20.7	AV	Ν	GND
2.314500	26.30	10.0	46	19.7	AV	Ν	GND

# 5.3. Conducted Peak Output Power

#### <u>LIMIT</u>

FCC CFR Title 47 Part 15 Subpart C Section 15.247 (b)(1): 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 CONFIGURATION**



#### TEST PROCEDURE

- 1. The transmitter output was connected to the spectrum analyzer through an attenuator, the pathloss was compensated to the results for each measurement.
- 2. Set to the maximum power setting and enable the EUT transmit continuously
- Use the following spectrum analyzer settings: Span = approximately 5 times the 20 dB bandwidth, centered on a hopping channel RBW≥ the 20 dB bandwidth of the emission being measured, VBW≥RBW Sweep = auto, Detector function = peak, Trace = max hold
- 4. Measure and record the results in the test report.

#### TEST MODE:

Please refer to the clause 3.3

#### TEST RESULTS

#### ☑ Passed □ Not Applicable

Modulation type	Channel	Output power (dBm)	Limit (dBm)	Result
	00	4.88		
GFSK	39	5.28	≤ 30.00	Pass
	78	5.61		
	00	4.93		
π/4DQPSK	39	5.31	≤ 21.00	Pass
	78	5.66		
	00	4.94		
8DPSK	39	5.31	≤ 21.00	Pass
	78	5.67		

odulation Type:	GFSK
	Spectrum 🕎
	RefLevel 20.00 dBm Offset 8.00 dB  RBW 1 MHz
	_Count 500/500
	●1Pk View M1[1] 4.88 dBm 2.40216640 GHz
	10 dBm M1
	O dBm
	-10 dBm
	-20 dBm
CH00	KO HAMINA AND A
	-40 dBm-
	-50 dBm
	-60 dBm
	-70 dBm
	CF 2.402 GHz 691 pts Span 5.0 MHz
	Metsuchow (Mittal) 44
	Spectrum
	Ref Level 20.00 dBm Offset 8.00 dB 🕢 RBW 1 MHz
	● Att 30 dB SWT 1 ms ● VBW 3 MHz Mode Auto Sweep Count 500/500
	●1Pk View M1[1] 5.28 dBm
	2.44116640 GHz
	Ť.
	0 dBm
	-10 dBm
	-20 dBm
CH39	
	~30 dBm
	-40 dBm-
	-50 dBm-
	-60 dBm-
	-70 dBm
	CF 2.441 GHz 691 pts Span 5.0 MHz
	Nessuring (Caracter ) 49
	Gaastering
	Spectrum RefLevel 20.00 dBm Offset 8.00 dB ⊕ RBW 1 MHz
	Att 30 dB SWT 1 ms
	IPk View
	2.47986250 GHz
	0 dBm
	-10 dBm
	-20 dBm
CH78	like de la marine
	INSIGRAL TO A CONTRACT OF A CONT
	-40 dBm-
	-50 dBm-
	-60 dBm
	-70 dBm
	-70 dBm

Iodulation Type:	π/4DQPSK
	Spectrum 🕎
	RefLevel 20.00 dBm Offset 8.00 dB RBW 2 MHz Att 30 dB SWT 1 ms VBW 5 MHz Mode Auto Sweep
	Count 500/500
	M1[1] 4-93 dBm 2.40213020 GHz
	10 dBm
	0 dBm
	0 dBm
	-20 dBm
CH00	-30 dBm
	-40 dBm
	-50 dBm-
	-60 dBm-
	-70 dBm-
	CF 2.402 GHz 691 pts Span 5.0 MHz
	Measuring
	Spectrum 💭
	RefLevel 20.00 dbm Offset 8.00 dB  RBW 2 MHz Att 30 dB SWT 1 ms VBW 5 MHz Mode Auto Sweep
	Count 500/500
	M1[1] 5.31 dBm 2.44116640 GHz
	10 dBm M1
	0 dBm
	N10 dBm
	-20 dBm
CH39	-30 dBm
	-40 dBm-
	-50 dBm-
	-60 dBm
	-70 dBm
	CF 2.441 GHz 691 pts Span 5.0 MHz
	Measuring
	Spectrum 🕎
	RefLevel 20.00 dbm Offset 8.00 db  RBW 2 MHz Att 30 db SWT 1 ms VBW 5 MHz Mode Auto Sweep
	Count 500/500
	M1[1] 5.66 dBm 2.47984800 GHz
	10 dBm
	0 dBm
	0 dBm
	-20 dBm
CH78	-30 dBm
	-40 dBm
	-50 dbm-
	-60 dBm-
	-70 dBm-
	CF 2.48 GHz         691 pts         Span 5.0 MHz

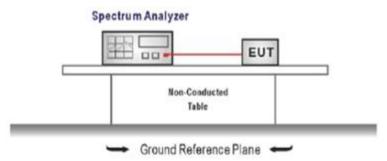
CH00 CH39 CH78 CH78 CH78 CH78 CH78 CH78 CH78 CH78	Modulation Type:	8DPSK
CH00 CH39 CH39 CH39 CH39 CH39 CH39 CH39 CH39	inoutiation Type.	
CHO2		
CHO2		Att 30 dB SWT 1 ms VBW 5 MHz Mode Auto Sweep
CH00 CH02 CH39 CH38 CH78 CH		● 1Pk View
CH00 CH39 CH		2.40185530 GHz
CH00		10 dBm
CH00		0 dBm
CH00		
CH00 CH39 CH78 CH78 CH78 CH70		
CH39	CHOO	-20 d8m
CH39	CIIOO	-30 d8m-
CH39		-40 dBm
CH39		
CH39		-50 dBm
CH39 CH78 CH78 CH78 CH78 CH79 CH79 CH79 CH79 CH79 CH79 CH79 CH79		-60 d8m
CH39 CH39 CH39 CH39 CH39 CH39 CH39 CH39		-70 d8m
CH39 CH39 CH39 CH39 CH39 CH39 CH39 CH39		
CH39		
CH39 CH39 CH39 CH39 CH39 CH39 CH39 CH39		Measuring
CH39 CH39 CH39 CH39 CH39 CH39 CH39 CH39		Spectrum
CH39 CH39 CH39 CH39 CH39 CH39 CH39		Ref Level 20.00 dBm Offset 8.00 dB 🖷 RBW 2 MHz
CH39		Count 500/500
CH39		PIPK View     M1[1] 5.31 dBm
CH39		
CH39 CH39 CH39 CH39 CH39 CH39 CH39 CH39		and the second
CH39		
CH39		410 dBm
CH78		-20 d8m-
CH78	CH39	
CH78		-30 0811
CH78		-40 dBm
CH78		-50 dBm-
CH78		-60 dBm
CH78		
CH78		-70 dBm
CH78		CF 2.441 GHz 691 pts Span 5.0 MHz
CH78  Ref Lova 20.0 dBm Offset 8.00 dB @ RBW 2 MHz  * M 30 dB SWT 1 ms VBW 5 MHz Mode Auto Sweep Count 500/500  FIR View  0 dBm  0 dBm  0 dBm  -20		
CH78		
CH78  Att 30.dB SWT 1ms VBW 5 MH2 Mode Auto Sweep  Court 500/500  P1Pk View  O dBm O		Spectrum Ref Level 20.00 dBm Offset 8.00 dB      RBW 2 MHz
CH78		👄 Att 30 dB SWT 1 ms 👄 VBW 5 MHz Mode Auto Sweep
CH78 $CH78 CH78 CH78 CH78 CH78 CH78 CH78 CH78 $		9 1Pk View
CH78		2.47986980 GHz
CH78		The second
CH78		0 dBm
CH78		10 dBm
CH78		
-30 dBm -40 dBm -50 dBm -50 dBm -50 dBm -50 dBm -50 dBm -50 dBm -50 dBm -60 dBm -70	CH78	
-50 dBm		-30 dBm-
-60 dBm		-40 dBm
-60 dBm		-50 dBm
-70 dbm -70 dbm CF 2.48 CHz CF 2.48 CHz 691 pts Span 5.0 MHz		
CF 2.48 GHz         691 pts         Span 5.0 MHz		-60 dBm
CF 2.48 GHz         691 pts         Span 5.0 MHz		-70 dBm
CF 2.48 GHz 691 pts Span 5.0 MHz		
		CF 2.48 GHz 691 pts Span 5.0 MHz

# 5.4. 20 dB Bandwidth

## <u>LIMIT</u>

N/A

# **TEST CONFIGURATION**



### TEST PROCEDURE

- 1. The transmitter output was connected to the spectrum analyzer through an attenuator, the path loss was compensated to the results for each measurement.
- 2. Set to the maximum power setting and enable the EUT transmit continuously
- 3. Use the following spectrum analyzer settings:

Span = approximately 2 to 3 times the 20 dB bandwidth, centered on a hopping channel RBW  $\ge$  1% of the 20 dB bandwidth, VBW  $\ge$  RBW

Sweep = auto, Detector function = peak, Trace = max hold

4. Measure and record the results in the test report.

#### TEST MODE:

Please refer to the clause 3.3

#### TEST RESULTS

#### 🛛 Passed

#### Not Applicable

Modulation type	Channel	20 dB Bandwidth (MHz)	Limit (MHz)	Result
	00	0.93		
GFSK	39	0.93	-	Pass
	78	0.93		
	00	1.18		
π/4DQPSK	39	1.18	-	Pass
	78	1.18		
	00	1.17		
8DPSK	39	1.16	-	Pass
	78	1.16		

Modulation Type:	GFSK
	Spectrum 🕎
	Ref Level 20.00 dBm Offset 8.00 dB 🖷 RBW 10 kHz
	Att 30 dB SWT 189.6 µs
	●1Pk View M1[1] -20.91 dBm
	10 dBm 2.40154750 GHz
	0 dBm
	-10 dBm20.834 dBm
	-10 dBm -01 -20.834 dBm - 4 - 4 - 4 - 4 - 4 - 4 - 4 - 4 - 4 -
01100	-30 dBm
CH00	1240 dBm
	-50 dBm
	-60 dBm
	-70 dBm
	CF 2.402 GHz 1001 pts Span 2.5 MHz
	Marker Type Ref Trc X-value Y-value Function Function Result
	M1         1         2.4015475 GHz         -20.91 dBm           M2         1         2.4020575 GHz         -0.83 dBm
	D3 M1 1 927.5 kHz -0.77 dB
	Mexandra 🖬 Halada 🆓
	Spectrum 🕎
	RefLevel 20.00 dBm Offset 8.00 dB ● RBW 10 kHz ● Att 30 dB SWT 189.6 μs ● VBW 30 kHz Mode Auto FFT
	Count 500/500
	M1[1] -20.66 dBn
	10 UBIN M2 M2[1] -0.46 dBm
	-10 dBm - 01 -20.464 dB
CH39	-30 dBm
01100	
	-su duin
	-60 dBm-
	-70 dBm-
	CF 2.441 GHz 1001 pts Span 2.5 MHz Marker
	Type         Ref         Trc         X-value         Y-value         Function         Function Result           M1         1         2.4405475 GHz         -20.66 dBm         <
	M2         1         2.4410575 GHz         -0.46 dBm           D3         M1         1         927.5 kHz         -0.66 dB
	Spectrum         (100)           Ref Level 20.00 dBm         Offset         8.00 dB ●         RBW         10 kHz
	Att 30 dB SWT 189.6 µs → VBW 30 kHz Mode Auto FFT Count 500/500
	P1Fk View     M1[1] -20.24 dBm
	10 dBm
	0 dBm 2,48005500 GHz
	-10 dBm
	-10 d8m - 01 -20.119 d8m - 1 -
	-30 dBm // / / / / / / / / / / / / / /
CH78	Man
	-40 0Bm
	-60 dBm-
	-70 dBm-
	CF 2.48 GHz         1001 pts         Span 2.5 MHz
	Marker
	Type Ref Trc X-value Y-value Function Function Result
	M1 1 2.4795425 GHz -20.24 dBm
	M1         1         2.4795425 GHz         -20.24 dBm           M2         1         2.480055 GHz         -0.12 dBm           D3         M1         1         932.5 KHz         -0.84 dB

Modulation Type:	π/4DQPSK
	Spectrum
	Ref Level 20.00 dBm         Offset 8.00 dB ●         RBW         30 kHz           ● Att         30 dB         SWT         63.1 µs ●         VBW         100 kHz         Mode Auto FFT
	Count 500/500
	●1Pk View M1[1] -17.16 dBm
	10 dBm 2.40140250 GHz
	0 dBm 2.40216500 GHz
	-20 dBm D1 -16.894 dBm 7
	-30 dBm
CH00	40° dBm/
	-50 dBm
	-60 dBm
	-70 dBm
	CF 2.402 GHz 1001 pts Span 2.5 MHz
	Marker Type Ref   Trc   X-value   Y-value   Function   Function Result
	M1         1         2.4014025 GHz         -17.16 dBm         Function Result           M2         1         2.402165 GHz         3.11 dBm         -
	D3 M1 1 1.18 MHz -0.44 dB
	Messaring (Interes II) 440
	Spectrum 🕎
	Ref Level 20.00 dBm         Offset 8.00 dB ●         RBW         30 kHz           ● Att         30 dB         SWT         63.1 µs ●         VBW         100 kHz         Mode Auto FFT
	Count 500/500
	●1Pk View M1[1] -16.51 dBm
	10 dBm 2.44040500 GHz 10 dBm M2 M2[1] 3.50 dBm 2.44116500 CHz
	0 dBm
	-20 dBm 01 -16.499 dBm 7
01100	
CH39	-40 dBm
	-50 dBm
	-60 d8m
	-70 dBm
	CF 2.441 GHz 1001 pts Span 2.5 MHz
	Marker Type Ref Trc X-value Y-value Function Function Result
	M1         1         2.440405 GHz         -16.51 dBm           M2         1         2.441165 GHz         3.50 dBm
	D3 M1 1 1.175 MHz -0.06 dB Nestador
	Spectrum
	RefLevel         20.00 dBm         Offset         8.00 dB         RBW         30 kHz           ● Att         30 dB         SWT         63.1 µs         ♥ VBW         100 kHz         Mode         Auto         FFT
	Count 500/500
	M1[1] -16.45 dBm 2.47940250 GHz 0 dBm M7 bo(1) 0.03 Hz
	10 dBm 0 dBm
	-10 UB/II -20 dBm D1 -16.133 dBm 1 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9
	-20 dam
CH78	to some the second
-	-50 dBm
	-50 dam
	-00 dam-
	CF 2.48 GHz 1001 pts Span 2.5 MHz Marker
	Type         Ref         Trc         X-value         Y-value         Function         Function Result           M1         1         2.4794025 GHz         -16.45 dBm
	M2         1         2.400.65 GHz         3.87 dBm           D3         M1         1         1.175 MHz         0.26 dB

odulation Type:	8DPSK
	Spectrum 🕎
	RefLevel 20.00 dBm Offset 8.00 dB RBW 30 kHz Att 30 dB SWT 63.1 µs VBW 100 kHz Mode Auto FFT
	Count 500/500
	M1[1] -16.32 dBm 2.40141750 GHz
	10 dem M2 M2[1] 3.84 dBm 0.49m 2.40216500 GHz
	-10 dBm 01 -16.159 dBm 2 2 2
	-30 dBm
CH00	40 780 mm
	-50 dBm
	-60 dBm
	-70 dBm-
	CF 2.402 GHz         1001 pts         Span 2.5 MHz
	Marker Type   Ref   Trc   X-value   Y-value   Function   Function Result
	M1         1         2.4021475 GHz         -16.32 dBm           M2         1         2.402165 GHz         3.84 dBm
	D3 M1 1 1.165 MHz -0.03 dB
	Messuring (Although (A))
	Spectrum
	RefLevel 20.00 dBm Offset 8.00 dB
	Count 500/500
	M1[1] -15.82 dBm 2.44042000 GHz
	10 dBm 2.44116500 GHz
	-10 dBm 01 -15,813 dBm 01 - 15,813 dBm 01 - 15
	-20 UBIII
CH39	
	-50 dBm
	-60 dBm
	-70 dBm-
	CF 2.441 GHz 1001 pts Span 2.5 MHz
	Marker
	Type         Ref         Trc         X-value         Y-value         Function         Function Result           M1         1         2.44042 GHz         -15.82 dBm              M2         1         2.44165 GHz         4.19 dBm
	M2         1         2.441165 GHz         4.19 dkm           D3         M1         1         1.16 MHz         -0.10 dk
	Messuring (Alteretal) 40
	Spectrum
	RefLevel 20.00 dBm Offset 8.00 dB RBW 30 kHz Att 30 dB SWT 63.1 µs VBW 100 kHz Mode Auto FFT
	Count 500/500
	M1[1] -15.57 dBm 2.47942000 GHz
	10 delite 10 del
	-10 UBIN 01 +15.500 dBm - 01
	-20 dBm
CH78	-30 UB/m
	-40 dBm
	-50 UB//
	-00 UBIN-
	CF 2.48 GHz 1001 pts Span 2.5 MHz Marker
	Type         Ref         Trc         X-value         Y-value         Function         Function Result           M1         1         2.47942 GHz         -15.57 dBm
	M2         1         2.480165 GHz         4.50 dBm           D3         M1         1         1.16 MHz         -0.06 dB

# 5.5. Carrier Frequencies Separation

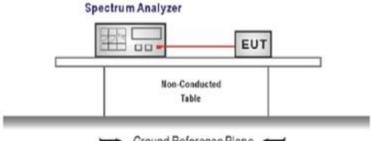
#### LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.247 (a)(1):

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively,

Frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies 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.

#### **TEST CONFIGURATION**



- Ground Reference Plane

#### TEST PROCEDURE

- 1. The transmitter output was connected to the spectrum analyzer through an attenuator, the path loss was compensated to the results for each measurement.
- 2. Set to the maximum power setting and enable the EUT transmit continuously
- Use the following spectrum analyzer settings: Span = wide enough to capture the peaks of two adjacent channels RBW ≥ 1% of the span, VBW ≥ RBW Sweep = auto, Detector function = peak, Trace = max hold
- 4. Measure and record the results in the test report.

#### TEST MODE:

Please refer to the clause 3.3

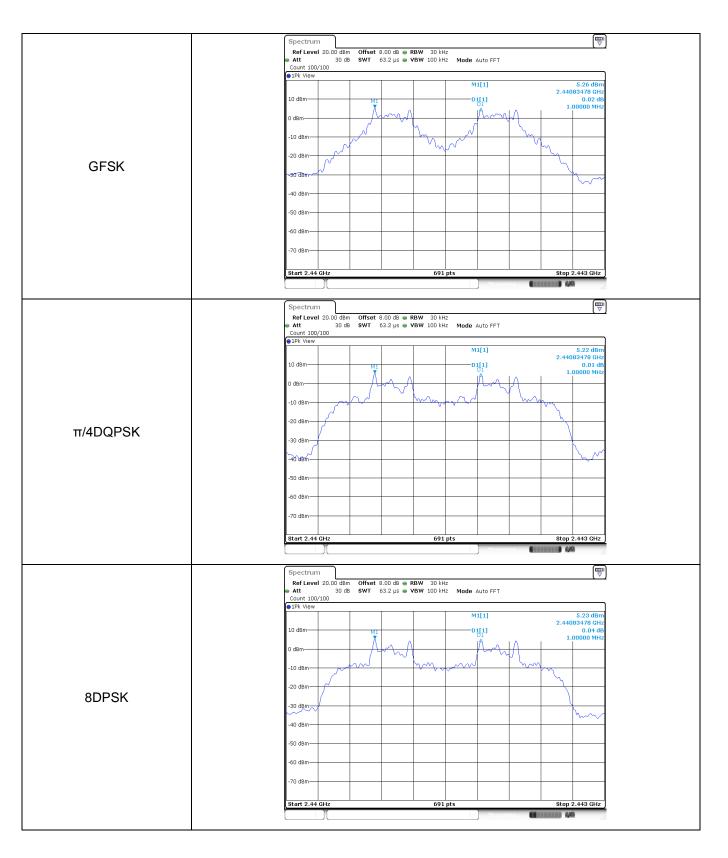
#### TEST RESULTS

#### ☑ Passed □ Not Applicable

Modulation type	Channel	Carrier Frequencies Separation (MHz)	Limit (MHz) *	Result
GFSK	39	1.00	≥0.93	Pass
π/4DQPSK	39	1.00	≥0.79	Pass
8DPSK	39	1.00	≥0.78	Pass

Note:

\*: GFSK limit = The maximum 20 dB Bandwidth for GFSK modulation on the section 5.4.  $\pi$ /4DQPSK limit = 2/3 \* The maximum 20 dB Bandwidth for  $\pi$ /4DQPSK modulation on the section 5.4. 8DPSK limit = 2/3 \* The maximum 20 dB Bandwidth for 8DPSK modulation on the section 5.4

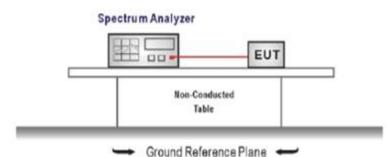


# 5.6. Hopping Channel Number

#### LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.247 (a)(1):Frequency hopping systems in the 2400–2483.5 MHz band shall use at least **15** channels.

#### **TEST CONFIGURATION**



#### TEST PROCEDURE

- 1. The transmitter output was connected to the spectrum analyzer through an attenuator, the path loss was compensated to the results for each measurement.
- 2. Set to the maximum power setting and enable the EUT transmit continuously
- Use the following spectrum analyzer settings: Span = the frequency band of operation RBW ≥ 1% of the span, VBW ≥ RBW Sweep = auto, Detector function = peak, Trace = max hold
- 4. Measure and record the results in the test report.

#### TEST MODE:

Please refer to the clause 3.3

#### TEST RESULTS

☑ Passed □ Not Applicable

Modulation type	Channel number	Limit	Result
GFSK	79		
π/4DQPSK	79	≥15.00	Pass
8DPSK	79		

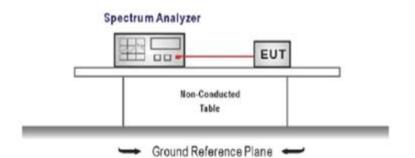
	Spectrum 🕎
	Ref Level         20.00 dBm         Offset         8.00 dB         RBW         100 kHz           Att         30 dB         SWT         1 ms         VBW         300 kHz         Mode         Auto Sweep
	PPk View
	10 dBm
	-10 dBm
	-20 dBm
GFSK	-mab 08-
	/40 dBm
	-50 d8m
	-60 dBm
	-70 dBm-
	Start 2.4 GHz 691 pts Stop 2.4835 GHz
	Spectrum
	RefLevel 20.00 dkm Offset 8.00 dB ● RBW 100 kHz ● Att 30 dB SWT 1 ms ● VBW 300 kHz Mode Auto Sweep ● JPk View
	• IFK VIEW
	10 dBm
	<ul> <li>Participation and the second se</li></ul>
	-10 dBm
	-20 dBm
π/4DQPSK	-80 dBm
	-40 dBm
	-50 dBm
	-60 dBm-
	-70 dBm
	8tart 2.4 GHz 691 pts 8top 2.4835 GHz
	Spectrum         Imp           Ref Level 20.00 dBm         Offset 8.00 dB ● RBW 100 kHz
	Att 30 dB SWT 1 ms VBW 300 kHz Mode Auto Sweep
	10 dBm
	-10 dBm
	-20 dBm
8DPSK	
	-40 dBm
	-50 dBm
	-60 dBm
	-70 dBm-
	Start 2.4 GHz 691 pts Stop 2.4835 GHz

#### 5.7. Dwell Time

#### <u>LIMIT</u>

FCC CFR Title 47 Part 15 Subpart C Section 15.247 (a)(1):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 CONFIGURATION**



#### TEST PROCEDURE

- 1. The transmitter output was connected to the spectrum analyzer through an attenuator, the path loss was compensated to the results for each measurement.
- 2. Set to the maximum power setting and enable the EUT transmit continuously
- Use the following spectrum analyzer settings: Span = zero span, centered on a hopping channel, RBW= 1 MHz, VBW ≥ RBW Sweep = as necessary to capture the entire dwell time per hopping channel, Detector function = peak, Trace = max hold
- 4. Measure and record the results in the test report.

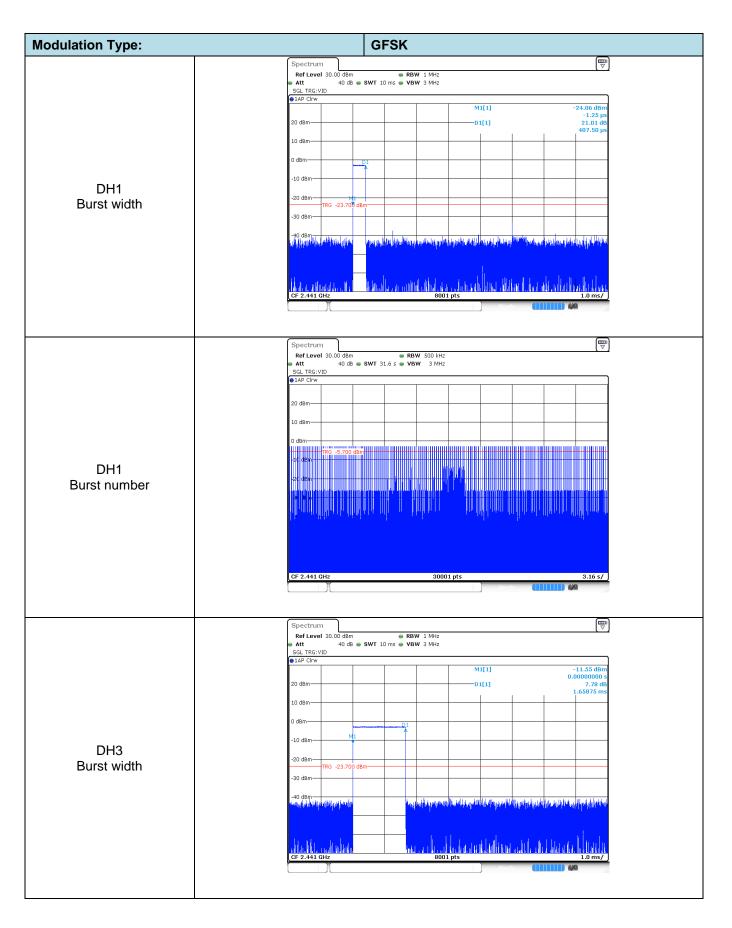
#### TEST MODE:

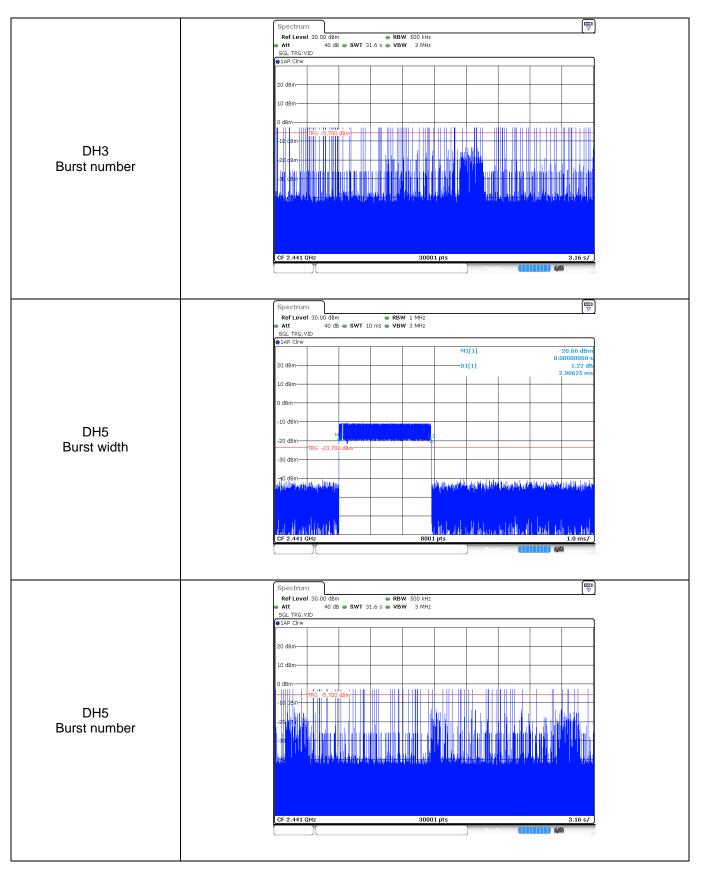
Please refer to the clause 3.3

#### TEST RESULTS

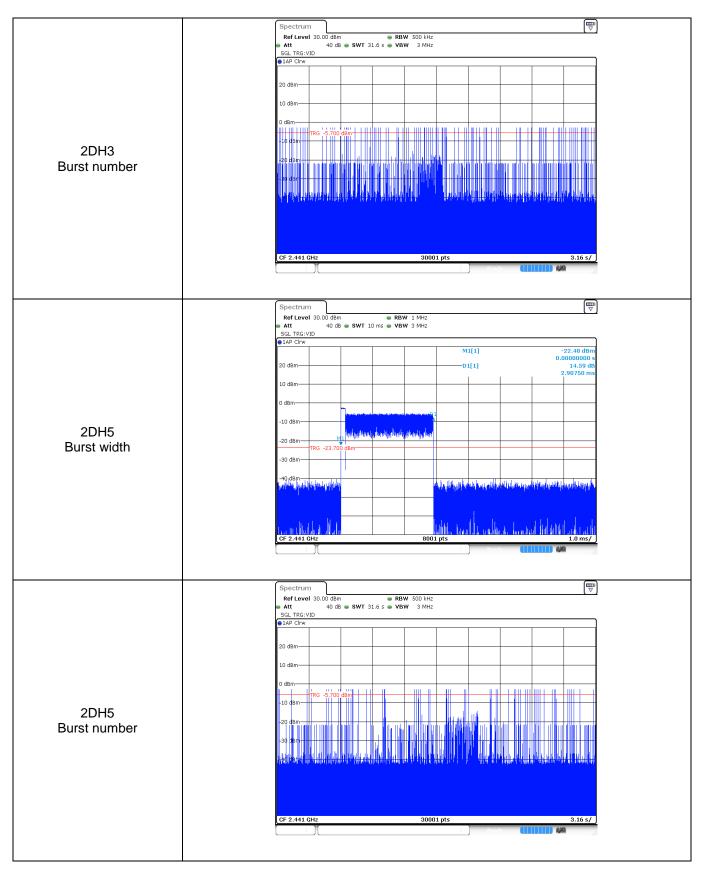
#### ☑ Passed □ Not Applicable

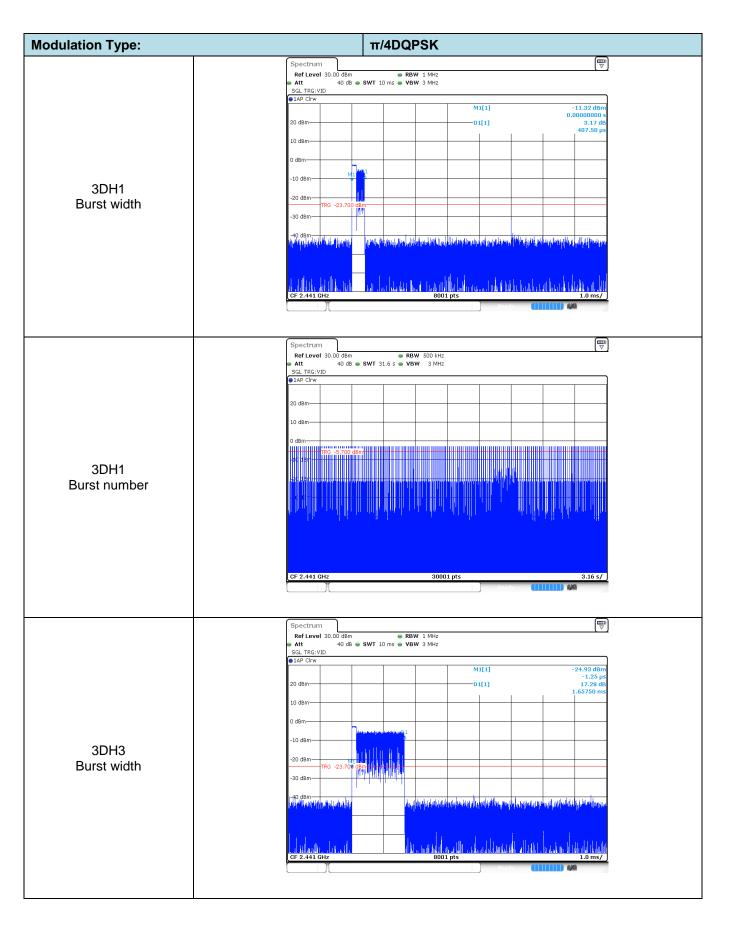
Modulation type	Channel	Burst Width [ms/hop/ch]	Total Hops[hop*ch]	Dwell time (Second)	Limit (Second)	Result
	DH1	0.41	313.00	0.13		
GFSK	DH3	1.66	111.00	0.18	≤ 0.40	Pass
	DH5	2.91	74.00	0.22		
	2DH1	0.41	321.00	0.13		
π/4DQPSK	DQPSK 2DH3	1.66	106.00	0.18	≤ 0.40	Pass
	2DH5	2.91	61.00	0.18		
	3DH1	0.41	321.00	0.13		
8DPSK	3DH3	1.66	117.00	0.19	≤ 0.40	Pass
	3DH5	2.91	67.00	0.20		

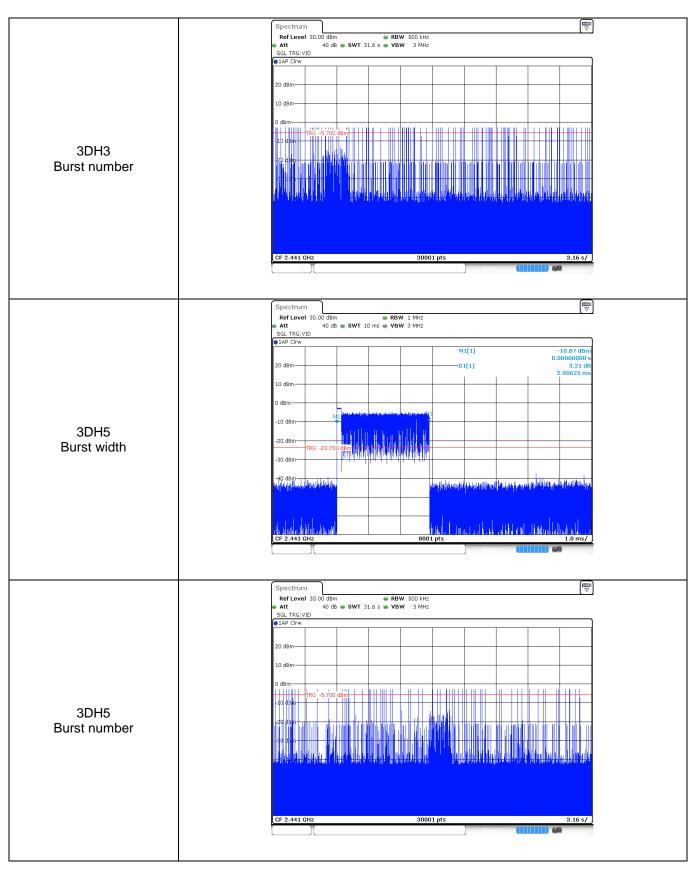




Modulation Type:	π/4DQPSK
2DH1 Burst width	Spectrum       Image: Construction         Ref Level 30.00 dBm       • RBW 1 MHz         Att       40 dB       SWT 10 ms       VBW 3 MHz         SGL TRG:VID       • III 67 dBm       • 0.0000000 s       0.0000000 s         20 dBm       • 0111       0.0000000 s       0.0000000 s         10 dBm       • 0111       0.0000000 s       0.0000000 s         -10 dBm       • 0111       0.0000000 s       0.0000000 s         -20 dBm       • 0111       0.0000000 s       0.0000000 s         -30 dBm       • 0111       • 010 s       • 0111       • 010 s         -30 dBm       • 0111       • 010 s       • 010 s       • 010 s         • 01 dBm       • 010 s       • 010 s       • 010 s       • 010 s         • 01 dBm       • 010 s       • 010 s       • 010 s       • 010 s         • 01 dBm       • 010 s       • 010 s       • 010 s       • 010 s         • 00 dBm       • 010 s       • 010 s       • 010 s       • 010 s         • 01 dBm       • 010 s       • 010 s       • 010 s       • 010 s         • 01 dBm       • 010 s       • 010 s       • 010 s       • 010 s         • 01 dBm       • 010 s       • 010 s       •
2DH1 Burst number	Spectrum       RBW 500 kHz         Att       40 dB       SWT 31.6 s       YBW 3 MHz         SGL TRC:VD       142 Chw       142 Chw         0 dBm       0 dBm       10 dBm       10 dBm         10 dBm       0 dBm       10 dBm       10 dBm         10 dBm       10 dBm       10 dBm       10 dBm         11 dBm       11 dBm       11 dBm       11 dBm         11 dBm       11 dBm       11 dBm       11 dBm         11 dBm       11 dBm       11 dBm       11 dBm         12 dBm       11 dBm       11 dBm       11 dBm         12 dBm       11 dBm       11 dBm       11 dBm         12 dBm       11 dBm
2DH3 Burst width	Spectrum       Image: Constraint of the second







# 5.8. Pseudorandom Frequency Hopping Sequence

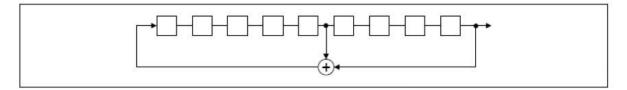
#### <u>LIMIT</u>

FCC CFR Title 47 Part 15 Subpart C Section 15.247 (a)(1):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 chan-nel 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.

#### TEST RESULTS

The pseudorandom frequency hopping sequence may be generated in a nice-stage shift register whose 5<sup>th</sup> and 9<sup>th</sup> stage outputs are added in a modulo-two addition stage. And the result is fed back to the input of the friststage. 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	73	75 7
٦				 <u>F</u>			1			П
							i i			
				1			1			
				 			<u>i</u>		 _Ĺ_	

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.

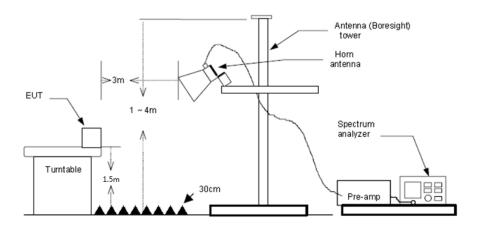
# 5.9. Restricted band (radiated)

#### <u>LIMIT</u>

#### FCC CFR Title 47 Part 15 Subpart C Section 15.247 (d):

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, Radiated Emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the Radiated Emissions limits specified in §15.209(a) (see §15.205(c)).

#### **TEST CONFIGURATION**



#### TEST PROCEDURE

- 1. The EUT was setup and tested according to ANSI C63.10:2013 for compliance to FCC 47CFR 15.247 requirements.
- 2. The EUT is placed on a turn table which is 1.5 meter above ground. The turn table is rotated 360 degrees to determine the position of the maximum emission level.
- 3. The EUT waspositioned such that the distance from antenna to the EUT was 3 meters.
- 4. The antenna is scanned from 1 meter to 4 meters to find out the maximum emission level. This is repeated for both horizontal and vertical polarization of the antenna. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10:2013 on radiated measurement.
- The receiver set as follow: RBW=1 MHz, VBW=3 MHz Peak detector for Peak value RBW=1 MHz, VBW=10 Hz Peak detector for Average value.

#### TEST MODE:

Please refer to the clause 3.3

#### TEST RESULTS

☑ Passed □ Not Applicable

Note:

- 1) Final level= Read level + Antenna Factor+ Cable Loss- Preamp Factor
- 2) Have pre-scan all modulation mode, found the GFSK modulation which it was worst case, so only the worst case's data on the test report.
- 3) The peak level is lower than average limit(54 dBuV/m), this data is the too weak instrument of signal is unable to test.

Test channel:					CH00					
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization	Test value	
2310.00	35.40	28.05	6.62	37.59	32.48	74.00	-41.52	Horizontal	Peak	
2390.03	41.49	27.65	6.75	37.59	38.30	74.00	-35.70	Horizontal	Peak	
2310.00	33.87	28.05	6.62	37.59	30.95	74.00	-43.05	Vertical	Peak	
2388.16	55.22	27.66	6.75	37.59	52.04	74.00	-21.96	Vertical	Peak	
2390.03	42.92	27.65	6.75	37.59	39.73	74.00	-34.27	Vertical	Peak	
2310.00	22.97	28.05	6.62	37.59	20.05	54.00	-33.95	Horizontal	Average	
2331.10	27.03	27.94	6.66	37.59	24.04	54.00	-29.96	Horizontal	Average	
2390.03	22.51	27.65	6.75	37.59	19.32	54.00	-34.68	Horizontal	Average	
2310.00	23.42	28.05	6.62	37.59	20.50	54.00	-33.50	Vertical	Average	
2331.00	29.99	27.94	6.66	37.59	27.00	54.00	-27.00	Vertical	Average	
2390.03	23.57	27.65	6.75	37.59	20.38	54.00	-33.62	Vertical	Average	

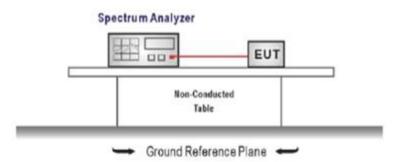
Test channel:					CH78				
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization	Test value
2483.50	62.37	27.26	6.83	37.59	58.87	74.00	-15.13	Horizontal	Peak
2500.00	40.07	27.20	6.84	37.59	36.52	74.00	-37.48	Horizontal	Peak
2483.47	71.96	27.26	6.83	37.59	68.46	74.00	-5.54	Vertical	Peak
2500.00	41.21	27.20	6.84	37.59	37.66	74.00	-36.34	Vertical	Peak
2483.50	27.96	27.26	6.83	37.59	24.46	54.00	-29.54	Horizontal	Average
2500.00	33.34	27.20	6.84	37.59	29.79	54.00	-24.21	Horizontal	Average
2483.50	28.35	27.26	6.83	37.59	24.85	54.00	-29.15	Vertical	Average
2500.00	30.04	27.20	6.84	37.59	26.49	54.00	-27.51	Vertical	Average

## 5.10. Band edge and Spurious Emissions (conducted)

## <u>LIMIT</u>

FCC CFR Title 47 Part 15 Subpart C Section 15.247 (d):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 CONFIGURATION



## TEST PROCEDURE

- 1. The transmitter output was connected to the spectrum analyzer through an attenuator, the path loss was compensated to the results for each measurement.
- 2. Set to the maximum power setting and enable the EUT transmit continuously
- Use the following spectrum analyzer settings: RBW = 100 kHz, VBW ≥ RBW, scan up through 10<sup>th</sup> harmonic. Sweep = auto, Detector function = peak, Trace = max hold
- 4. Measure and record the results in the test report.

### TEST MODE:

Please refer to the clause 3.3

### TEST RESULTS

☑ Passed □ Not Applicable

Test Item:	Band edge	M	odulation	type:	GFSK	
	Spectr				 [₩]	
		el 20.00 dBm Offset 8	3.00 dB	Hz Hz <b>Mode</b> Auto Sweep		
	Count 5		1.1 m <b>e 15</b> m 550 k	ine mode Addo Sweep		
				M1[1]	4.56 dBm 2.402180 <mark>G</mark> Hz	
	10 dBm 0 dBm			M2[1]	-22.06 dBm 2.400000 GHz	
	-10 dBm-				2.40000 (112	
	-20 dBm	D1 -15.440 dBm			MB	
	-30 dBm-					
CH00	-40 dBm-				Marrie	
No hopping mode	\$59,d8m		wanter	- warden warden to	metrusonta	
	-60 dBm					
	-70 dBm·					
	Start 2. Marker	1 GHz	69	1 pts	Stop 2.405 GHz	
		ef Trc X-value 1 2.402	e Y-value 18 GHz 4.56 d	Function Bm	Function Result	
	M2 M3	1 2	.4 GHz -22.06 d 39 GHz -47.54 d	Bm		
	M4 M5	1 2.3 1 2.39990	31 GHz -52.37 d	Bm		
				Measurin		
	Creature					
		el 20.00 dBm Offset 8			[♡]	
	Att Count 5		1.1 ms 👄 <b>VBW</b> 300 k	Hz Mode Auto Sweep		
	● 1Pk Ma			M1[1]	3.82 dBm	
	10 dBm-			M2[1]	2.403970 GHz -44.88 dBma	
	0 dBm				2.400000 <b>GH</b> 2	
	-10 dBm	D1 -16.180_dBm			////	
	-20 dBm -30 dBm					
CH00	-40 dBm				-202	
Hopping mode	450.d8m	the second lade as remaining the	mannon	-	M3	
3	-60 dBm					
	-70 dBm					
	Start 2.	1 GHz	693	1 pts	Stop 2.405 GHz	
		ef Trc X-value		Function	Function Result	
	M1 M2	1 2	97 GHz 3.82 d .4 GHz -44.88 d	Bm		
	M3 M4 M5		39 GHz -51.13 d 31 GHz -52.51 d 17 GHz -46.57 d	Bm		
		][	1/GHZ -40.5/U	Measurin	4/4	
	Spectr Ref Le	m el 20.00 dBm Offset 8	3.00 dB 😑 RBW 100 k	Hz		
	Att     Count 5	0/500	56.9 µs 👄 <b>VBW</b> 300 k	Hz Mode Auto FFT		
	● 1Pk Ma			M1[1]	5.19 dBm	
	10 dBm+			M2[1]	2.4798310 GHz -43.56 dBm	
	0 dBm-				2.4835000 GHz	
	-10 dBm	D1 -14.810 dBm				
	-20 dBm					
CH78	-30 d <mark>a</mark> m-	h				
No hopping mode	u=40 dBm-	MPs MPs	my man and			
	-50 dBm-		Contraction (States)	mon and all	white when we will	
	-50 dBm-					
	Start 2. Marker			1 pts	Stop 2.5 GHz	
	M1	ef Trc X-value 1 2.4798	31 GHz 5.19 d		Function Result	
	M2 M3	1 2.48	35 GHz -43.56 d .5 GHz -52.41 d	Bm Bm		
	M4	1 2.48361	16 GHz -44.12 d	Bm	<b>(</b> )	

## Report No.: TRE1809010303

	Spectrum           Ref Level 20.00 dBm         Offset 8.00 dB           Att         30 dB         SWT         56.9 μs           Count 500/500	RBW 100 kHz     VBW 300 kHz     Mode Auto FFT	( ∀
	1Pk Max		
		M1[1] M2[1]	5.61 dBm 2.4791620 GHz -48.32 dBm 2.4835000 GHz
	-10 dBm		
CH78	-30 dBm		
lopping mode	-50 dBm	and the second second	man human
	-60 d8m		
	Start 2.478 GHz	691 pts	Stop 2.5 GHz
	Marker		
	Type         Ref         Trc         X-value           M1         1         2.479162 GHz	Y-value Function 5.61 dBm	Function Result
	M2         1         2.4835 GHz           M3         1         2.5 GHz           M4         1         2.4844725 GHz	-48.32 dBm -51.88 dBm -44.72 dBm	
		Measuri	na ( <b>1</b> ) 4/4

Fest Item:	Band edge		Modula	ation ty	ype:	π/4D	QPSK
	Spec Ref ● Att	30 dB 3	Offset 8.00 dB	RBW 100 kHz		)	
	Coun ● IPk 10 dB 0 dBm	m			M1[1]		4.57 dBm 402180,GHz -27.90 dBm 400000 GHz
CH00	-10 dt -20 dt -30 dt	D1 -15.430 dBr	n				
No hopping mode	-40 dt 59.dt -60 dt -70 dt	3m	entroportestor	ມູບານຈານທີ່ເຫັດແຫຼ່ງແມ່ນ.		mummenter May	
	Marke	e Ref Trc 1	X-value 2.40218 GHz 2.4 GHz	691 p Y-value 4.57 dBm -27.90 dBm	Function	Stop Function Resu	1 2.405 GHz
	m M M	3 1 4 1	2.39 GHz 2.31 GHz 2.39963 GHz	-49.79 dBm -49.79 dBm -52.51 dBm -26.30 dBm	1	ing	
	Ref e Att		Offset 8.00 dB 👄 SWT 1.1 ms 👄		Mode Auto Sweep	)	
	● 1Pk 10 dB 0 dBm	m-			M1[1]	2	4.65 dBm .403830 GHz ~43.74 dBm .400000 ពុំអត្ថ
01100	-10 dt -20 dt -30 dt	D1 -15.350 dBr	n				M5
CH00 Hopping mode	-40 de 450 de -60 de	3m <del></del>	and an	naanaan	gent-galation and generative	M3	
	Marke	2.31 GHz er e Ref Trc	X-value 2.40383 GHz	691 p Y-value 4.65 dBm	Function	Stop Function Resu	1 2.405 GHz
	M M M M	2 1 3 1 4 1	2.4 GHz 2.39 GHz 2.31 GHz 2.398254 GHz	-43.74 dBm -51.33 dBm -51.23 dBm -29.04 dBm	1		20
	Ref Att	ctrum Level 20.00 dBm 30 dB			Mode Auto FFT		
	Coun ● 1 Pk 10 dB 0 dBm	m Mi			M1[1] M2[1]		5.57 dBm 801810 GHz -44.28 dBm 835000 GHz
	-10 de -20 de -30 de	3m D1 -14.430 dBr	n				
CH78 No hopping mode	یں ہے۔ 150 de -50 de	3m	MAN WWW	mmm		Munnun	www.w
	Marke	2.478 GHz	V-ualuo	691 p			top 2.5 GHz
	M M	1 1 2 1 3 1	X-value 2.480181 GHz 2.4835 GHz 2.5 GHz 2.4838667 GHz	Y-value 5.57 dBm -44.28 dBm -52.43 dBm -45.05 dBm	1	Function Resu	

## Report No.: TRE1809010303

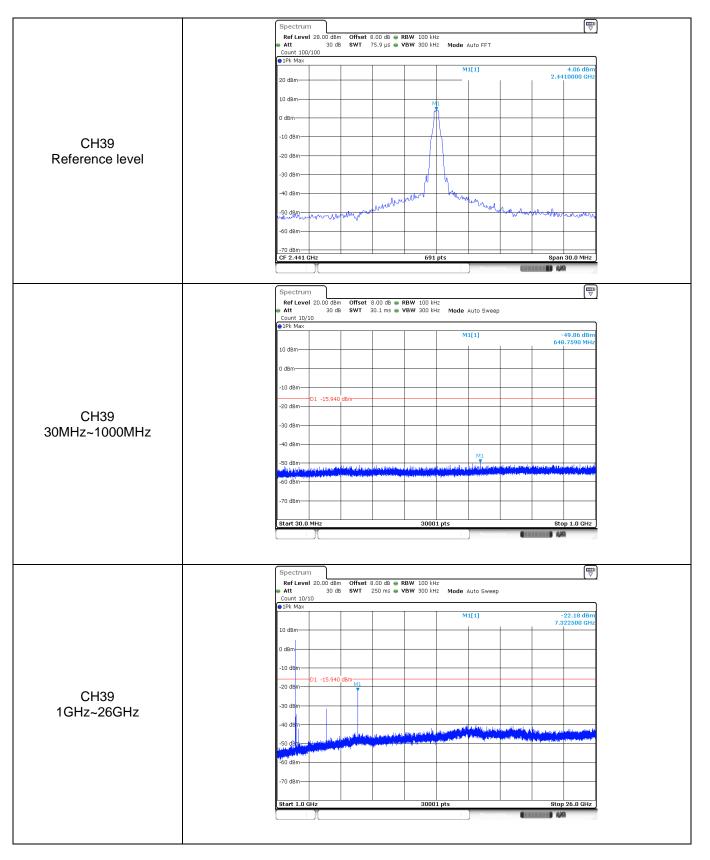
	Count 500/500	RBW 100 kHz VBW 300 kHz Mode Auto FFT	
CH78 Hopping mode	1Pk Max     10 #3m     0 dBm     -10 dBm     -20 dBm     -30 dBm     -50 dBm     -50 dBm     -70 dBm	M1[1] M2[1]	4.32 dBm 2.4790030 GHz -47.49 dBm 2.4835000 GHz
	Start 2.478 GHz	691 pts	Stop 2.5 GHz
	Marker		
	Type         Ref         Trc         X-value           M1         1         2.479003 GHz	Y-value Function 4.32 dBm	Function Result
	M2         1         2.4835 GHz           M3         1         2.5 GHz           M4         1         2.4847594 GHz	-47.49 dBm -52.96 dBm -47.45 dBm	
		Measurin	a (1997) 4/4

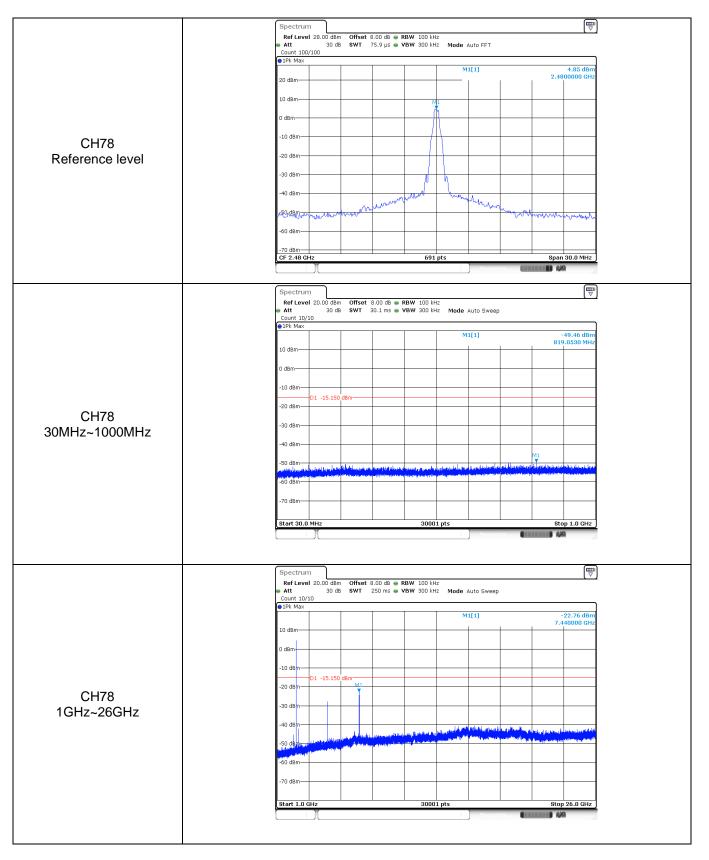
Test Item:	Band edge		Modula	ation type:	8DPSK
		<ul> <li>Att 30 dB Count 500/500</li> </ul>	Offset 8.00 dB .		
		IPk Max     I0 dBm     O dBm		M1[1] M2[1]	4.57 dBm 2.402180,GHz -28.30 d6m 2.400000 6Hz
CH00		-10 dBm D1 -15,430 dB	m		MS/
No hopping mode		-40 dBm	un and the second second	and a second	M3/W U
		Start 2.31 GHz           Marker           Type         Ref           M1         1	X-value 2.40218 GHz	691 pts Y-value Function 4.57 dBm co.00 dbm	Stop 2.405 GHz
		M2         1           M3         1           M4         1           M5         1	2.4 GHz 2.39 GHz 2.31 GHz 2.399906 GHz	-28.30 dBm -47.14 dBm -52.01 dBm -28.03 dBm	(
			Offset 8.00 dB ● 1 SWT 1.1 ms ● 1	RBW 100 kHz VBW 300 kHz Mode Auto Sweep	( <sup>m</sup> <sub>♥</sub> )
		1Pk Max     10 dBm     0 dBm		M1[1] M2[1]	4.43 dBm 2.403280 GHz -41.34 dBm 2.400000 GHz
CH00		-10 dBm	m		MS ME
Hopping mode		-40 dBm	www.www.com		Ma Ma Ma
		Start 2.31 GHz           Marker           Type         Ref           M1         1	X-value 2.40328 GHz	691 pts Y-value Function 4.43 dBm	Stop 2.405 GHz Function Result
		M2         1           M3         1           M4         1           M5         1	2.4 GHz 2.39 GHz 2.31 GHz 2.396739 GHz	-41.34 dBm -52.11 dBm -51.83 dBm -34.42 dBm	((((((((((((((((((((((((((((((((((((((
		Spectrum           Ref Level 20.00 dBm           Att         30 dB           Count 500/500		RBW 100 kHz VBW 300 kHz Mode Auto FFT	( <sup>m</sup> ⊽
		10 dBm 0 dBm		M1[1] M2[1]	5.58 dBm 2.4801810 GHz - 44.77 dBm 2.4835000 GHz
01170		-10 dBm D1 -14.420 dB	m		
CH78 No hopping mode			Muniqueso	mundumunt	market Warnen Hurling
		-70 dBm Start 2.478 GHz Marker Type   Ref   Trc	X-value	691 pts Y-value Function	Stop 2.5 GHz Function Result
		M1         1           M2         1           M3         1           M4         1	2.480181 GHz 2.4835 GHz 2.5 GHz 2.4835797 GHz	5.59 dBm -44.77 dBm -53.57 dBm -42.81 dBm	(Ennema) 459

## Report No.: TRE1809010303

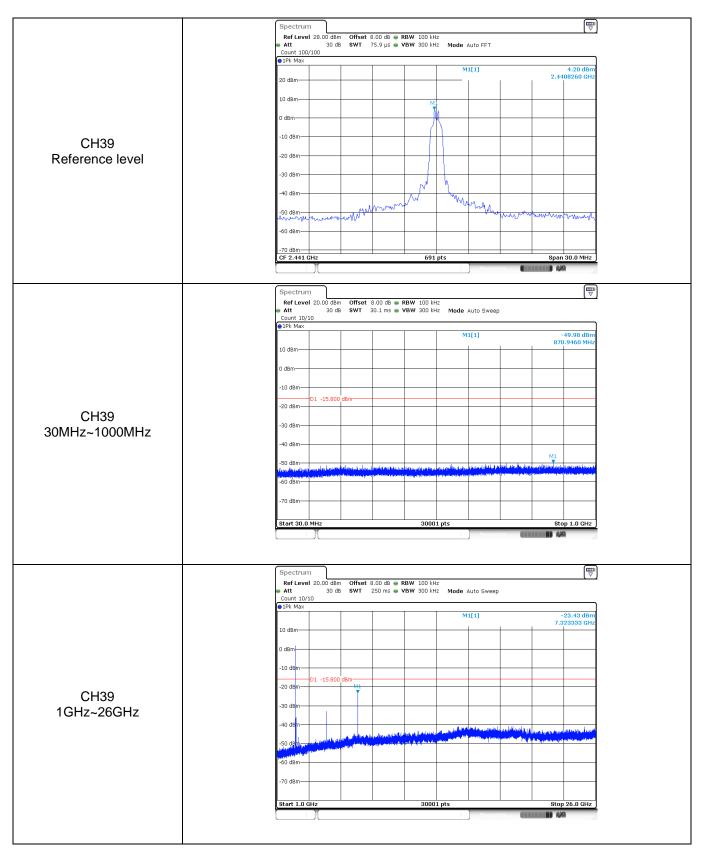
	Spectrum           Ref Level         20.00 dBm         Offset         8.00 dB         RBW         100 kl           Att         30 dB         SWT         56.9 μs         VBW         300 kl           Count         500/5500         SWT         56.9 μs         VBW         300 kl	
CH78 Hoppig mode	-10 dBm -10 dBm -10 dBm -20 dBm -30 dBm -40 dBm	M1[1] 5.67 dBm 2.4791620 GHz 38.63 dBm 2.4835000 GHz 2.4835000 GHz
	Marker	t pts Stop 2.5 GHz
	Type         Ref         Trc         X-value         Y-value           M1         1         2.479162 GHz         5.67 dHz           M2         1         2.4395 GHz         38.63 dHz           M3         1         2.5 GHz         -51.24 dHz           M4         1         2.4838966 GHz         -39.36 dHz	Bm Bm

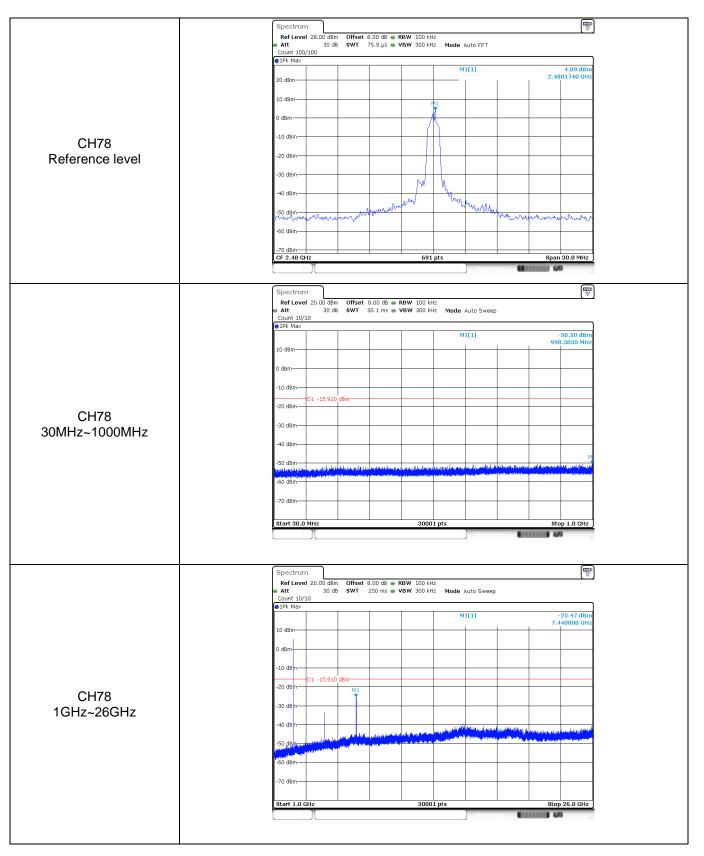
Test Item:	SE		Modula	ation type	<b>:</b>	GFSK	
		Spectrum           Ref Level 28.00 dBm           Att         30 dB	0ffset 8.00 dB 🖷 1				
CH00 Reference level		Att         30 dB           Count 100/100           1Pk Max           20 dBm           10 dBm           -10 dBm           -20 dBm           -30 dBm	SWT 75.9 µs • '	March 1997	M1[1]	3.93 dBm 2.4018260 GHz	
CH00 30MHz~1000MHz				RBW 100 kHz Mo	de Auto Sweep  M1[1]  M1[1]  M1[1]  M1	Stop 1.0 GHz	
CH00 1GHz~26GHz					M1[1]	-23.66 dBm 7.205000 GHz	



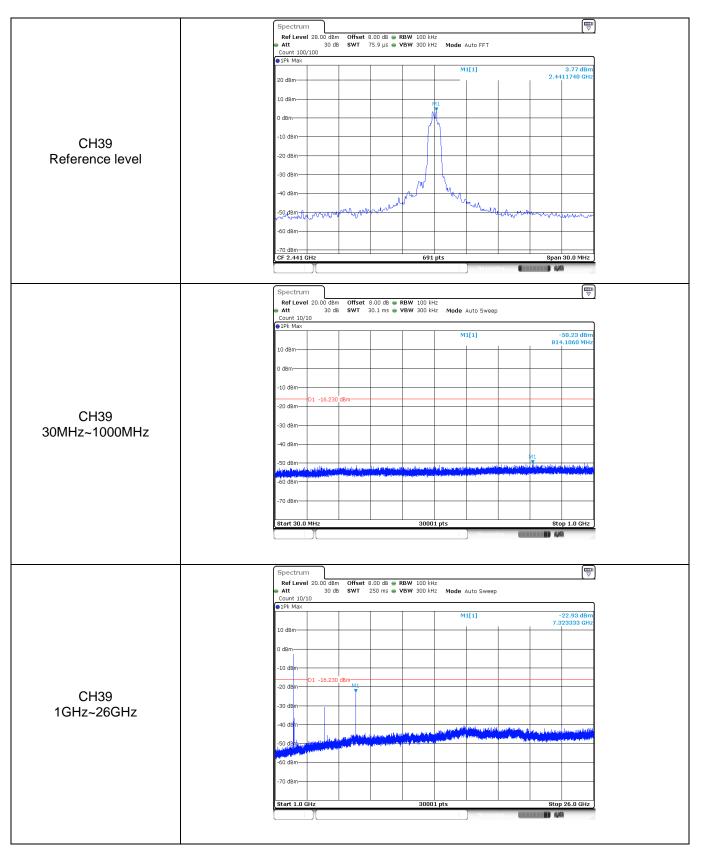


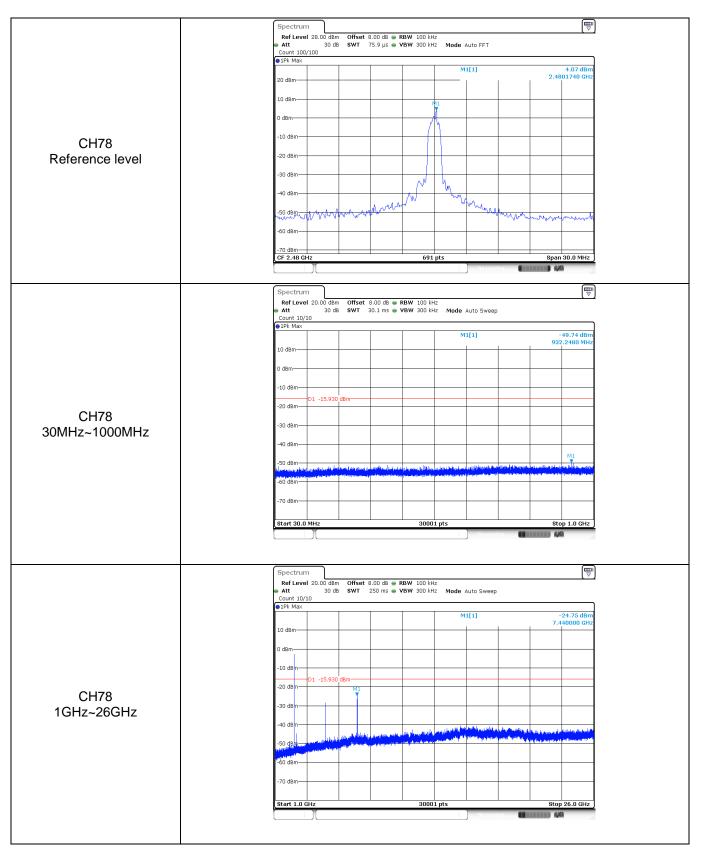
est Item:	SE		Modulat	ion type:	π/4	DQPSK
		Spectrum				
				W 100 kHz W 300 kHz Mode Auto I	FT	
		Count 100/100 PIPk Max				
		20 dBm		M1[1]	1 1	3.36 dBm 2.4021740 GHz
		10 dBm				
		0 dBm		11		
		-10 dBm				
CH00						
Reference level		-20 dBm				
		-30 dBm		Nh		
		-40 dBm		nor have		
		-50 dBm	mon mar and Mr	· WWW	all when when	mul ha Manuarab
		-60 dBm				
		-70 dBm				
		CF 2.402 GHz		691 pts	leasuring	Span 30.0 MHz
		Spectrum				
		Ref Level 20.00 dBm			Gueon	
		Att 30 dB Count 10/10 9 1Pk Max	awi sulims 🖶 VE	SW 300 kHz Mode Auto	эмеер	
		TEN MIGA		M1[1]		-50.18 dBm 885.2690 MHz
		10 dBm				31101 00 00 00
		0 dBm				
		-10 dBm				
		-20 dBm D1 -16.640 df	im			
CH00		-30 dBm				
30MHz~1000MHz						
		-40 dBm				MI
		-50 dBm	terreter op in the production of provident of the production of the production of the production of the production of the production of		يان از اين مايندون دراز (در معار المعان). ماين از اين مايندون معان المعان معان معان معان م	
		-60 dBm				
		-70 dBm				
		Start 30.0 MHz		30001 pts		Stop 1.0 GHz
					leasuring	
		Spectrum				
		Ref Level 20.00 dBm Att 30 dB Count 10/10		W 100 kHz W 300 kHz Mode Auto	Sweep	
		Count T0/10     IPk Max		M1[1]		-22.75 dBm
		10 dBm		M1[1]		-23.75 dBm 7.205000 GHz
		0 dBm				
		-10 dBm	m			
CH00		-20 dBm	M1			
1GHz~26GHz		-30 dBm				
		-40 dB m		يعادلها الألارية إربابه الله المراجع	Laber Constant	مرارد میں اور
		-50 de harrende inderende inde			and the second	and the last of the second
		-60 dBm				
		-70 dBm				
	1			1	- I	
		Start 1.0 GHz		30001 pts	leasuring	Stop 26.0 GHz





est Item:	SE		Modu	lation	type:		8	DPS	K
				<b>RBW</b> 100 kH	łz	uto FFT			
		Count 100/100 100/100			M1				3.35 dBm
		20 dBm						2.40	21740 GHz
		0 dBm			41 4				
CH00		-10 dBm							
Reference level		-20 dBm							
		-40 dBm		M	M				
		-50 dBm	munun	J. Mar	6	mulmur	man	www.inu	Muhahn
		-60 dBm							
		CF 2.402 GHz		691	pts	Measuring			30.0 MHz )
		Spectrum							
		Ref Level 20.00 dBm	Offset 8.00 dB SWT 30.1 ms	<ul> <li>RBW 100 kł</li> <li>VBW 300 kł</li> </ul>	Hz Hz Mode A	uto Sweep			[ ]
		IPk Max			M1	[1]		810	-50.40 dBm ).0000 MHz
		10 dBm							
		-10 dBm		_					
CH00		-20 dBm	dBm						
0MHz~1000MHz		-30 dBm							
		-50 dBm	ord featured and a set of the same	يتمع بدرقام إفحن ساعداديد	والمؤرب والمراد	ta ta sa pita se forma fi	N National Astronom	1 Judiodka dh	and and a strain
		-60 dBm	a topografication for a provide signal	na na historia a sa na na historia da sa na historia da sa na historia da sa na historia da sa na historia da s	1	upe in out in the state	a franciska se statu		
		-70 dBm		3000	1 pts			Str	op 1.0 GHz
						Measuring			
		Spectrum Ref Level 20.00 dBm	Offset 8.00 dB	■ <b>RBW</b> 100 kH	Iz				
		<ul> <li>Att 30 dB</li> <li>Count 10/10</li> <li>1Pk Max</li> </ul>	SWT 250 ms	● <b>VBW</b> 300 kH					
		10 dBm			M1	[1]		7.2	21.71 dBm 05000 GHz
		0 dBm							
		-10 dBm D1 -16.650	dBm <sub>M1</sub>						
CH00 GHz~26GHz		-30 dBm		_					
		-40 dBm	presidente a presidente	and the state of the	the subset of the	11 Magazal Magazaran Manang Sana Karang Sana		nski jiharkonen yör Tellanes forsentetetet	ې د وې د وې وې وې وې وې وې وې د وې
		-50 dBb		Sector Street					
		-70 dBm							
		Start 1.0 GHz	I	3000	1 pts	Measuring		Stop	26.0 GHz





## 5.11. Spurious Emissions (radiated)

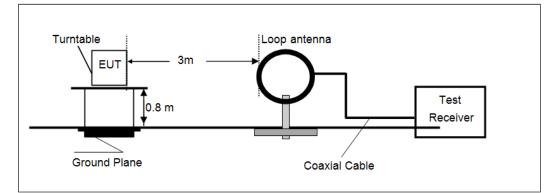
## <u>LIMIT</u>

## FCC CFR Title 47 Part 15 Subpart C Section 15.209

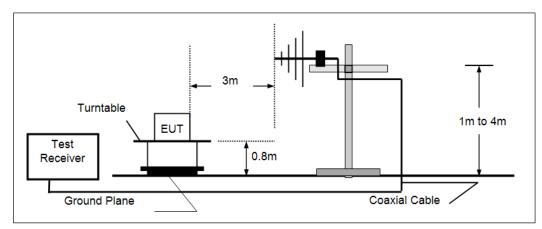
Frequency	Limit (dBuV/m @3m)	Value	
30 MHz ~ 88 MHz	40.00	Quasi-peak	
88 MHz ~ 216 MHz	43.50	Quasi-peak	
216 MHz ~ 960 MHz	46.00	Quasi-peak	
960 MHz ~ 1 GHz	54.00	Quasi-peak	
Above 1 GHz	54.00	Average	
	74.00	Peak	

## **TEST CONFIGURATION**

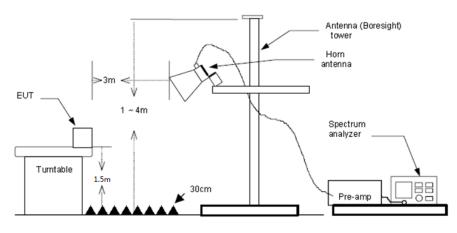
Below 30 MHz



## > 30 MHz ~1000 MHz



> Above 1 GHz



## TEST PROCEDURE

- 1. The EUT was tested according to ANSI C63.10:2013.
- 2. The EUT is placed on a turn table with 0.8 meter above ground for below 1GHz, 1.5 meter above ground for above 1GHz.
- 3. The EUT was set 3 meters from the receiving antenna, which was mounted on the top of a variable height antenna tower.
- 4. For each suspected emission, the EUT was arranged to its worst case and then tune the Antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level to comply with the guidelines.
- 5. Set to the maximum power setting and enable the EUT transmit continuously.
- 6. Use the following spectrum analyzer settings
  - (1) Span shall wide enough to fully capture the emission being measured;
    - (2) Below 1 GHz:

RBW=120 kHz, VBW=300 kHz, Sweep=auto, Detector function=peak, Trace=max hold; If the emission level of the EUT measured by the peak detectoris 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.

 (3) From 1 GHz to 10<sup>th</sup> harmonic: RBW=1 MHz, VBW=3 MHz Peak detector for Peak value RBW=1 MHz, VBW=10 Hz Peak detector for Average value.

### TEST MODE:

Please refer to the clause 3.3

### TEST RESULTS

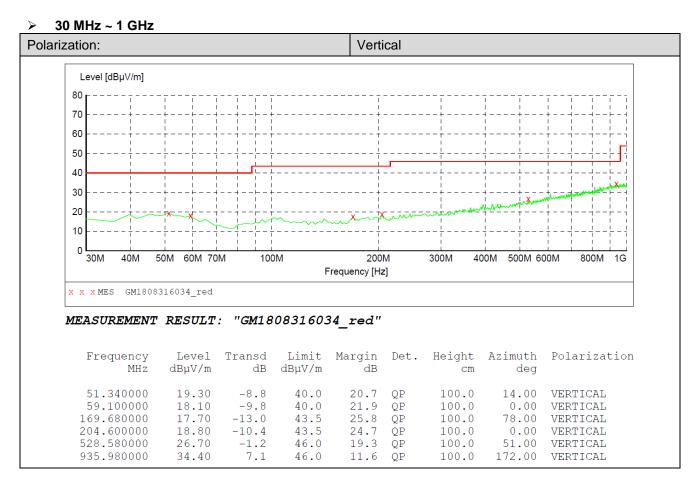
☑ Passed □ Not Applicable

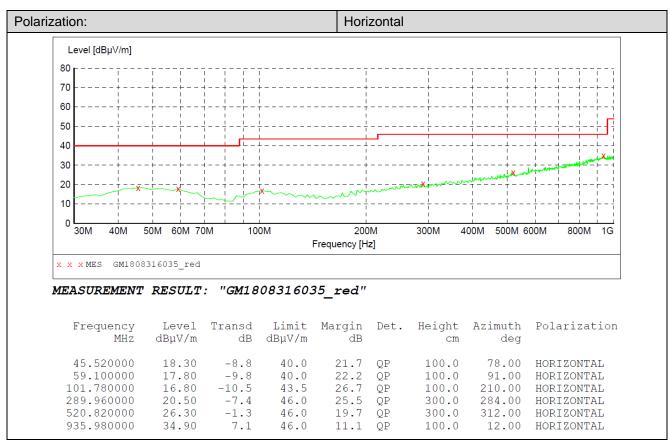
#### Note:

- 1) Final Level = Receiver Read level + Antenna Factor + Cable Loss Preamplifier Factor
- 2) The emission levels of other frequencies are very lower than the limit and not show in test report.
- 3) Below 1 GHz, Have pre-scan all modulation mode, found the GFSK modulation High channel which it was worst case, so only the worst case's data on the test report.
- 4) Above 1 GHz, Have pre-scan all modulation mode, found the GFSK modulation which it was worst case, so only the worst case's data on the test report
- 5) The peak level is lower than average limit(54 dBuV/m), this data is the too weak instrument of signal is unable to test.

### ➢ 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.





➤ 1 GHz ~ 25 GHz
------------------

	CH00											
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization	Test value			
2218.32	36.55	27.61	6.47	37.60	33.03	74.00	-40.97	Vertical	Peak			
3543.55	38.39	29.13	8.18	37.11	38.59	74.00	-35.41	Vertical	Peak			
4809.50	38.76	31.58	9.55	35.72	44.17	74.00	-29.83	Vertical	Peak			
7209.02	34.01	36.21	11.87	33.51	48.58	74.00	-25.42	Vertical	Peak			
1617.86	37.89	24.95	5.60	37.21	31.23	74.00	-42.77	Horizontal	Peak			
3120.06	37.50	28.80	7.62	37.47	36.45	74.00	-37.55	Horizontal	Peak			
4809.50	38.59	31.58	9.55	35.72	44.00	74.00	-30.00	Horizontal	Peak			
7209.02	34.05	36.21	11.87	33.51	48.62	74.00	-25.38	Horizontal	Peak			

CH39									
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization	Test value
2195.85	36.63	27.47	6.44	37.60	32.94	74.00	-41.06	Vertical	Peak
3543.55	38.71	29.13	8.18	37.11	38.91	74.00	-35.09	Vertical	Peak
4883.52	40.24	31.43	9.59	35.58	45.68	74.00	-28.32	Vertical	Peak
7319.96	34.17	36.30	11.99	33.32	49.14	74.00	-24.86	Vertical	Peak
1689.41	37.45	25.17	5.74	37.29	31.07	74.00	-42.93	Horizontal	Peak
2201.45	36.67	27.51	6.44	37.60	33.02	74.00	-40.98	Horizontal	Peak
4883.52	41.63	31.43	9.59	35.58	47.07	74.00	-26.93	Horizontal	Peak
7338.62	35.44	36.30	12.01	33.29	50.46	74.00	-23.54	Horizontal	Peak

CH78										
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization	Test value	
1715.41	38.05	25.23	5.80	37.32	31.76	74.00	-42.24	Vertical	Peak	
3653.46	37.99	29.30	8.33	37.02	38.60	74.00	-35.40	Vertical	Peak	
4958.68	41.47	31.46	9.64	35.45	47.12	74.00	-26.88	Vertical	Peak	
7451.57	34.53	36.20	12.24	33.10	49.87	74.00	-24.13	Vertical	Peak	
1630.26	37.81	24.99	5.63	37.22	31.21	74.00	-42.79	Horizontal	Peak	
3176.16	37.70	28.80	7.69	37.42	36.77	74.00	-37.23	Horizontal	Peak	
4958.68	42.03	31.46	9.64	35.45	47.68	74.00	-26.32	Horizontal	Peak	
7451.57	35.30	36.20	12.24	33.10	50.64	74.00	-23.36	Horizontal	Peak	

Remark:

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss - Preamplifier Factor

2. The peak level is lower than average limit(54 dBuV/m), this data is the too weak instrument of signal is unable to test.

3. The emission levels of other frequencies are very lower than the limit and not show in test report.

# 6. TEST SETUP PHOTOS

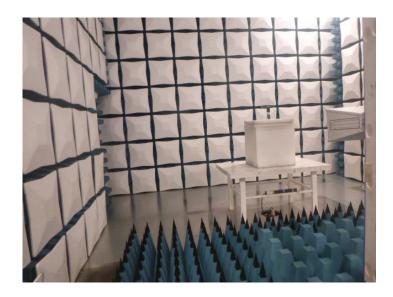
Conducted Emissions (AC Mains)



**Radiated Emissions** 







## 7. EXTERANAL AND INTERNAL PHOTOS

Reference to the test report No.: TRE1809010301

-----End of Report------