

FCC PART 15 SUBPART C TEST REPORT

FCC PART 15.247

Report Reference No FCC ID	MWR150900603 RQQHLT-L40SCL	
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Applicant's name	HYUNDAI CORPORATION	
Address	140-2, Kye-dong, Chongro-ku, Seo	ul, South Korea
Test specification:		
Standard:	FCC Part 15.247: Operation withi 2400-2483.5 MHz and 5725-5850	n the bands 902-928 MHz, /Hz
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Test item description	Mobile Phone	
Trade Mark	HYUNDAI	
Manufacturer	Skycom Telecommunications Co	., Limited
Model/Type reference:	L445	
Listed Models	N/A	
Modulation Type	GFSK,8DPSK,π/4DQPSK	
Operation Frequency	From 2402MHz to 2480MHz	
Rating	DC 3.70V	
Hardware version	5096SF_MM1_V01	
Software version:	HYUNDAI_L445_V5.0.2_20150907	
Result	PASS	

TEST REPORT

Test Report No. :		MWR150900603	Sep 22, 2015
·			Date of issue
Equipment under Test	:	Mobile Phone	
Model /Type	:	L445	
Listed Models	:	N/A	
Applicant	:	HYUNDAI CORPORATION	
Address	:	140-2, Kye-dong, Chongro-ku	, Seoul, South Korea
Manufacturer	:	Skycom Telecommunication	ns Co., Limited
Address	:	Rm604, East Block, Shengtan Chegongmiao, Futian District,	g Bldg., No.1, Tairan 9 Rd., Shenzhen, 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. <u>TEST STANDARDS</u>

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 C63.10-2009</u>: American National Standard for Testing Unlicensed Wireless Devices

2. <u>SUMMARY</u>

2.1. General Remarks

Date of receipt of test sample	:	Aug 20, 2015
Testing commenced on	:	Aug 21, 2015
Testing concluded on	:	Sep 22, 2015

2.2. Product Description

The **HYUNDAI CORPORATION**'s Model: L445 or the "EUT" as referred to in this report; more general information as follows, for more details, refer to the user's manual of the EUT.

Name of EUT	Mobile Phone
Model Number	L445
Madilatian Tuna	GMSK for GSM/GPRS, 8-PSK for EDGE,QPSK for UMTS,
	QPSK, 16QAM for LTE
Antenna Type	Internal
UMTS Operation Frequency Band	Device supported UMTS FDD Band II/IV/V
	IEEE 802.11b:2412-2462MHz
WI AN ECC Operation frequency	IEEE 802.11g:2412-2462MHz
	IEEE 802.11n HT20:2412-2462MHz
	IEEE 802.11n HT40:2422-2452MHz
BT FCC Operation frequency	2402MHz-2480MHz
HSDPA Release Version	Release 10
HSUPA Release Version	Release 6
DC-HSUPA Release Version	Not Supported
WCDMA Release Version	R99
LTE Release Version	R8
UMTS Operation Frequency Band	Device supported FDD band 2, FDD band 4, FDD band 5,
	FDD band 7, FDD band 17
	IEEE 802.11b: DSSS(CCK,DQPSK,DBPSK)
WI AN ECC Modulation Type	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)
BT Modulation Type	GFSK (BT 4.0)/GFSK,8DPSK,π/4DQPSK(BT 3.0+EDR)
Hardware version	5096SF_MM1_V01
Software version	HYUNDAI_L445_V5.0.2_20150907
Android version	Android 4.4.2
GPS function	Supported
WLAN	Supported 802.11b/802.11g/802.11n
Bluetooth	Supported BT 4.0/BT 3.0+EDR
GSM/EDGE/GPRS	Supported GSM/GPRS/EDGE
GSM/EDGE/GPRS Power Class	GSM900:Power Class 4/DCS1800:Power Class 1
GSM/EDGE/GPRS Operation Frequency	GSM900 :880MHz-915MHz/DCS1800:1710MHz-1785MHz
GSM/EDGE/GPRS Operation Frequency	GSM900/DCS1800/GPRS900/ GPRS
Band	1800/EDGE900/EDGE1800
GSM Release Version	R99
GPRS/EDGE Multislot Class	GPRS/EDGE: Multi-slot Class 12
Extreme temp. Tolerance	-30°C to +50°C
Extreme vol. Limits	3.40VDC to 4.20VDC (nominal: 3.70VDC)
GPRS operation mode	Class B

2.3. Equipment under Test

Power supply system utilised

Power supply voltage	•	0	120V / 60 Hz	0	115V / 60Hz
		0	12 V DC	0	24 V DC
		ullet	Other (specified in blank bel	ow)

DC 3.70V

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

L445 is subscriber equipment in the WCDMA/GSM /LTE system. The HSPA/UMTS frequency band is Band II, Band IV and Band V, LTE frequency band is band 2.band 4,band 5,band 7,band 17; The GSM/GPRS/EDGE frequency band includes GSM850 and GSM900 and DCS1800 and PCS1900, but only Band II and Band V and GSM850 and PCS1900 bands test data included in this report. The Mobile Phone implements such functions as RF signal receiving/transmitting, HSPA/UMTS ,LTE and GSM/GPRS/EDGE protocol processing, voice, video MMS service, GPS and WIFI etc. Externally it provides micro SD card interface, earphone port (to provide voice service) and SIM card interface. It also provides Bluetooth module to synchronize data between a PC and the phone, or to use the built-in modem of the phone to access the Internet with a PC, or to exchange data with other Bluetooth devices.

NOTE: Unless otherwise noted in the report, the functional boards installed in the units shall be selected from the below list, but not means all the functional boards listed below shall be installed in one unit.

2.5. EUT operation mode

The EUT has been tested under typical operating condition. There are EDR (Enhanced Data Rate) and BDR

(Basic Data Rate) mode. The Applicant provides communication tools software to control the EUT for staying

in continous transmitting and receiving mode for testing. There are 79 channels of EUT, and the test carried

out at the lowest channel, middle channel and highest channel .

Channel	Frequency(MHz)	Channel	Frequency(MHz)
00	2402	40	2442
01	2403	41	2443
02	2404	42	2444
03	2405	43	2445
04	2406	44	2446
05	2407	45	2447
06	2408	46	2448
07	2409	47	2449
08	2410	48	2450
09	2411	49	2451
10	2412	50	2452
11	2413	51	2453
12	2414	52	2454
13	2415	53	2455
14	2416	54	2456
15	2417	55	2457
16	2418	56	2458
17	2419	57	2459
18	2420	58	2460
19	2421	59	2461
20	2422	60	2462
21	2423	61	2463
22	2424	62	2464
23	2425	63	2465
24	2426	64	2466
25	2427	65	2467

26	2428	66	2468
27	2429	67	2469
28	2430	68	2470
29	2431	69	2471
30	2432	70	2472
31	2433	71	2473
32	2434	72	2474
33	2435	73	2475
34	2436	74	2476
35	2437	75	2477
36	2438	76	2478
37	2439	77	2479
38	2440	78	2480
39	2441		

2.6. Internal Identification of AE used during the test

AE ID*	Description
AE1	Charger

AE1 Model: TPA-5950100UU INPUT: 100-240V 50/60Hz 0.2A OUTPUT: DC 5.0V,1000mAh

*AE ID: is used to identify the test sample in the lab internally.

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

This submittal(s) (test report) is intended for FCC ID: RQQHLT-L40SCL filing to comply with Section 15.247 of the FCC Part 15, Subpart C Rules.

2.8. Modifications

No modifications were implemented to meet testing criteria.

3. <u>TEST ENVIRONMENT</u>

3.1. Address of the test laboratory

CCIC Southern Electronic Product Testing (Shenzhen) Co., Ltd.

Electronic Testing Building, Shahe Road, Xili, Nanshan District, Shenzhen, 518055, P. R. China The sites are constructed in conformance with the requirements of ANSI C63.4 (2003) and CISPR Publication 22.

3.2. Test Facility

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

FCC-Registration No.: 406086

CCIC Southern Electronic Product Testing (Shenzhen) Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The acceptance letter fr om the FCC is maintained in our files. Registration 406086, valid time is until October 28, 2017.

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. Test Conditions

Tost Case	Test Conditions			
Test Case	Configuration	Description		
	Meas. Method	ANSI C63.10:2009		
20dB Emission	Test Environment	NTNV		
Bandwidth (EBW)	EUT Conf.	TM1_DH5_Ch00,TM1_DH5_Ch39,TM1_DH5_Ch78, TM3_3DH5_Ch00,TM3_3DH5_Ch39,TM3_3DH5_Ch78,		
	Meas. Method	ANSI C63.10:2009		
Separation	Test Environment	NTNV		
Separation	EUT Conf.	TM1_DH5_Hop, TM3_3DH5_Hop,		
Number of Henning	Meas. Method	ANSI C63.10:2009		
	Test Environment	NTNV		
Channel	EUT Conf.	TM1_DH5_Hop ,TM3_3DH5_Hop,		
Time of Occupancy	Meas. Method	ANSI C63.10:2009		
	Test Environment	NTNV		
	EUT Conf.	TM1_DH5_Ch39 ,TM3_3DH5_Ch39.		
	Meas. Method	ANSI C63.10:2009		
Maximum Peak	Test Environment	NTNV		
Conducted Output Power	EUT Conf.	TM1_DH3_Ch00,TM1_DH3_Ch39,TM1_DH3_Ch78,TM2 _2DH3_Ch00,TM2_2DH3_Ch39,TM2_2DH3_Ch78,TM3 _3DH3_Ch00,TM3_3DH3_Ch39,TM3_3DH3_Ch78,		
Randodao spurious	Meas. Method	ANSI C63.10:2009		
emission	Test Environment	NTNV		
(Conducted)	EUT Conf.	TM1_DH3_Ch00,TM1_DH3_Ch78, TM3_3DH3_Ch00,TM3_3DH3_Ch78,		
	Meas. Method	ANSI C63.10:2009		
Conducted RF Spurious Emission	Test Environment	NTNV		
	EUT Conf.	TM1_DH5_Ch00, TM1_DH5_Ch39, TM1_DH5_Ch78, TM3_3DH5_Ch39, TM3_3DH5_Ch39, TM3_3DH5_Ch78.		
Padiated Emissions in		ANSI C63.10:2009		
the Restricted Bands	Meas. Method	30 MHz to 1 GHz:		
		Pre: RBW=100kHz; VBW=300kHz; Det. = Peak.		

	Final: RBW=120kHz; Det. = CISPR Quasi-Peak.
	1 GHz to 26.5GHz:
	Average: RBW=1 MHz; VBW= 10Hz; Det. = Peak;
	Sweep-time= Auto; Trace = Single.
	Peak: RBW=1 MHz; VBW= 3 MHz; Det. = Peak; Sweep-
	time= Auto;
	Trace≥ MaxHold * 100.
Test Environme	nt NTNV
	30 MHz-1GHz TM1_DH5_Ch00 (Worst Conf.).
EUT Conf.	1-18 GHz: TM1 DH5 Ch00, TM1 DH5 Ch39,
	TM1_DH5_Ch78, (Worst Conf.).

Test Case	Test Conditions			
Test Case	Configuration	Description		
AC Dower Line Conducted	Measurement Method	AC mains conducted.		
AC Power Line Conducted	Test Environment	NTNV		
ETTISSIOTS	EUT Configuration	TM1_DH5_Ch39. (Worst Conf.).		

Note:

1. For Radiated Emissions, By preliminary testing and verifying three axis (X, Y and Z) position of EUT transmitted status, it was found that "Z axis" position was the worst, then the final test was executed the worst condition and test data were recorded in this report.

2. For $\pi/4$ QPSK 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. Summary of measurement results

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

	radiated							
§15.209(a)	TX spurious Emissions radiated < 30 MHz	GFSK	-/-	GFSK	-/-			complies
§15.107(a) §15.207	Conducted Emissions < 30 MHz	GFSK	-/-	GFSK	-/-			complies

Remark:

The measurement uncertainty is not included in the test result. NA = Not Applicable; NP = Not Performed We tested all test mode and recorded worst case in report 1.

- 2.
- 3.

3.6. Equipments Used during the Test

Description	Manufacturer	Model	Serial No.	Test Date	Due Date
EMI Test Receiver	R&S	ESIB26	A0304218	2015.06.02	2016.06.01
Full-Anechoic Chamber	Albatross	12.8m*6.8m*6 .4m	A0412372	2015.01.05	2016.01.04
Loop Antenna	Schwarz beck	HFH2-Z2	100047	2015.06.02	2016.06.01
Bilog Antenna	Schwarzbec k	VULB 9163	9163-274	2015.06.02	2016.06.01
Bilog Antenna	Schwarzbec k	VULB 9163	9163-276	2015.06.02	2016.06.01
Double ridge horn antenna	R&S	HF960	100150	2015.06.02	2016.06.01
Double ridge horn antenna	R&S	HF960	100155	2015.06.02	2016.06.01
Ultra-wideband antenna	R&S	HL562	100089	2015.06.02	2016.06.01
Ultra-wideband antenna	R&S	HL562	100090	2015.06.02	2016.06.01
Test Antenna – Horn (18-25GHz)	ETS	UG-596A/U	A0902607	2015.06.02	2016.06.01
Test Antenna – Horn (18-25GHz)	ETS	UG-596A/U	A0902611	2015.06.02	2016.06.01
Amplifier 20M~3GHz	R&S	PAP-0203H	22018	2015.06.02	2016.06.01
Ampilier 1G~18GHz	R&S	MITEQ AFS42- 00101800	25-S-42	2015.06.02	2016.06.01
Ampilier 18G~40GHz	R&S	JS42- 18002600-28- 5A	12111.0980.0 0	2015.06.02	2016.06.01
System Simulator	R&S	CMW500	A130101034	2015.06.010	2016.06.09
Signal Analyzer	Agilent	N9030A	MY49430428	2015.06.010	2016.06.09
Power Sensor	R&S	NRP-Z4	823.3618.03	2015.06.02	2016.06.01
Power Meter	R&S	NRVS	1020.1809.02	2015.06.02	2016.06.01
LISN	R&S	ESRV26	A0304221	2015.06.02	2016.06.01
EMI Test Receiver	R&S	ESCS	A0304260	2015.06.02	2016.06.01

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 DC5V power from the adapter, the adapter received AC120V/60Hz 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 :

Eroguopoy	Maximum RF Line Voltage (dBµV)					
Frequency	CLA	SS A	CLASS B			
	Q.P.	Ave.	Q.P.	Ave.		
0.15 - 0.50	79	66	66-56*	56-46*		
0.50 - 5.00	73	60	56	46		
5.00 - 30.0	73	60	60	50		

* Decreasing linearly with the logarithm of the frequency

TEST RESULTS

Note: We tested Conducted Emission of GFSK, $\pi/4$ DQPSK and 8DPSK mode from 0.15 KHz to 30MHz (DH1, DH3 and DH5) and all channels (low, middle and high), recorded the worst case data at GFSK DH5 middle channel.

FCC Part 15 Class B Voltage Test



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FCC Part 15 Class B Voltage Test



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.
- 2. Maximum procedure was performed by raising the receiving antenna from 1m to 4m and rotating the turn table from 0°C to 360°C 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 32.768 KHz and maximum operation frequency was 2480MHz.so radiated emission test frequency band from 9 KHz 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				
	Peak Value: RBW=1MHz/VBW=3MHz,	Peak				
	Sweep time=Auto	(Receiver)				
IGHZ-40GHZ	Average Value: RBW=1MHz/VBW=3MHz,	Average				
	Sweep time=Auto	(Receiver)				

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	

For example

Frequency	FS	RA	AF	CL	AG	Transd
(MHz)	(dBµV/m)	(dBµV/m)	(dB)	(dB)	(dB)	(dB)
300.00	40	58.1	12.2	1.6	31.90	-18.1

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	300	20log(2400/F(KHz))+80	2400/F(KHz)
0.49-1.705	30	20log(24000/F(KHz))+40	24000/F(KHz)
1.705-30	30	20log(30)+40	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:

1. The radiated measurement are performed the each channel (low/mid/high) at all Packet type (DH1, DH3 and DH5) also for difference modulation type (GFSK, 8DPSK), recorded worst case at GFSK_DH5_Low channel (Channel 00) for below 1GHz and GFSK_DH5_Low channel (Channel 00), GFSK_DH5_Middle channel (Channel 39), GFSK_DH5_High channel (Channel 78).

2. ULTRA-BROADBAND ANTENNA for the radiation emission test below 1G.

3. HORN ANTENNA for the radiation emission test above 1G.

4. We tested both battery powered and powered by adapter charging mode at three orientate ones, recorded worst case at powered by adapter charging mode.

5. "---" means not recorded as emission levels lower than limit.

6. Margin= Limit - Level

For 9KHz to 30MHz

Frequency (MHz)	Corrected Reading (dBµV/m)@3m	FCC Limit (dBµV/m) @3m	Margin (dB)	Detector	Result
12.00	43.44	69.54	26.10	QP	PASS
24.00	41.25	69.54	28.29	QP	PASS

For 30MHz to 1000MHz



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For 1GHz to 25GHz

Note:We tested GFSK Mode and 8DPSK, rcorded the worst case at the GFSK (DH5) Mode.



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REMARKS:

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

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

3. The other emission levels were very low against the limit.

4. Margin value = Limit value- Emission level.

5. The average measurement was not performed when the peak measured data under the limit of average detection

.

4.3. Maximum Peak Output Power

TEST CONFIGURATION



TEST PROCEDURE

According to ANSI C63.10:2009 Maximum peak conducted output power: Connent antenna port into power meter and reading Peak values.

<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

Remark: We test maximum peak output power at difference Packet Type (DH1, DH3 and DH5), recorded worst case at DH5

4.3.1 GFSK Test Mode

A. Test Verdict

Channel	Frequency (MHz)	Measured Output Peak Power (dBm)	Limits (dBm)	Verdict
00	2402	7.70	30	PASS
39	2441	7.66	30	PASS
78	2480	7.34	30	PASS

Note:

1. The test results including the cable lose.

4.3.2 $\pi/4$ DQPSK Test Mode

A. Test Verdict

Channel	Frequency (MHz)	Measured Output Peak Power (dBm)	Limits (dBm)	Verdict
00	2402	7.70	21	PASS
39	2441	7.66	21	PASS
78	2480	7.34	21	PASS

Note:

1. The test results including the cable lose.

4.3.3 8DPSK Test Mode

A. Test Verdict

Channel	Frequency (MHz)	Measured Output Peak Power (dBm)	Limits (dBm)	Verdict
00	2402	6.46	21	PASS
39	2441	6.52	21	PASS
78	2480	6.29	21	PASS

Note:

1. 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=30 KHz and VBW=100KHz. The 20dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 20dB.

LIMIT

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

TEST RESULTS

Channel	Frequency	20dB Bandy	width (MHz)	Limits	Vardiat
Channel	(MHz)	GFSK	8DPSK	(MHz)	veruici
00	2402	0.8271	1.145	/	PASS
39	2441	0.8254	1.120	/	PASS
78	2480	0.8319	1.118	/	PASS

Note: 1. The test results including the cable lose.

Test Plots for next page



4.5. Band Edge

Applicable Standard

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 PROCEDURE

- 1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- 2. Remove the antenna from the EUT and then connect to a low loss RF cable from the antenna port to a EMI test receiver, then turn on the EUT and make it operate in transmitting mode. Then set it to Low Channel and High Channel within its operating range, and make sure the instrument is operated in its linear range.
- 3. Set both RBW and VBW of spectrum analyzer to 100 kHz with a convenient frequency span including 100kHz bandwidth from band edge, for Radiated emissions restricted band RBW=1MHz, VBW=3MHz.
- 4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
- 5. Repeat above procedures until all measured frequencies were complete.

TEST CONFIGURATION

For Radiated



For Conducted



TEST PROCEDURE

- 1. The EUT was placed on a turn table which is 0.8m 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.

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- 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:

Test Frequency range	Test Receiver/Spectrum Setting	Detector
	Peak Value: RBW=1MHz/VBW=3MHz,	Peak
IGHZ-40GHZ	Sweep time=Auto	(Receiver)
	Average Value: RBW=1MHz/VBW=3MHz,	Average
IGHZ-40GHZ	Sweep time=Auto	(Receiver)

<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:

1. We test Band Edge at difference Packet Type (DH1, DH3 and DH5), recorded worst case at DH5. 2. "---" means not recorded as emission levels lower than limit.

4.5.1 For Radiated Bandedge Measurement

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

4.5.1.1 GFSK Test Mode

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4.5.1.2 8DPSKTest Mode



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4.5.2 For Conducted Bandedge Measurement

4.5.2.1 GFSK Test Mode

We tested hopping mode and non-hopping mode, and recorded the worst case at the hopping mode.

A. Test Plots









4.5.2.2 8DPSK Test Mode

We tested hopping mode and non-hopping mode, and recorded the worst case at the hopping mode.

A. Test Plots

Agilent Spectrum Analyzer - Sv	vept SA				
Center Freq 2.3900	00000 GHz	SENSE:INT	ALIGNAUTC #Avg Type: RMS	05:49:58 PM Sep 12, 2015 TRACE 1 2 3 4 5 6	Frequency
Ref Offset 0	PNO: Wide IFGain:Low 9 dB	→ Trig: Free Run #Atten: 30 dB	Avg Hold: 100/100	r4 2.383 04 GHz	Auto Tune
10.9 48/div Ref 20.90					Center Freq 2.390000000 GHz
-19.1					Start Freq 2.375000000 GHz
-59.1 -69.1		***************	ution and a second s	hu A.	Stop Freq 2.405000000 GHz
Start 2.37500 GHz #Res BW 100 kHz	#VE	W 300 kHz	Sweep	Stop 2.40500 GHz 2.93 ms (1001 pts)	CF Step 3.000000 MHz
MKR MODE TRC SCL	× 2 403 02 GHz	Y 5.906 dBm	FUNCTION FUNCTION WIDT	H FUNCTION VALUE	<u>Auto</u> Man
2 N 1 F 3 N 1 F 4 N 1 F 5 6	2,400 00 GHz 2,390 00 GHz 2,383 04 GHz	-54,516 dBm -60.246 dBm -59.460 dBm			Freq Offset 0 Hz
7 8 9 10 11 11					
MSG			STAT	B	





(Plot 4.5.2.2 B: Hopping Mode @ 8DPSK)

4.6. 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=30 KHz 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

Remark: 1. We test Frequency Separation at difference Packet Type (DH1, DH3 and DH5) and all test channels, recorded worst case at DH5 and middle channel.

4.6.1 GFSK Test Mode

A. Test Verdict

Channel	Frequency (MHz)	Channel Separation (MHz)	Refer to Plot	Limits (MHz)	Verdict
38	2440	1.002	Plot 1 6 1 A	0 8702	DASS
39	2441		FIUL 4.0.1 A	0.0702	FA33

B. Test Plots



(Plot 4.6.1 A: Channel 39: 2441MHz @ GFSK)

4.6.2 8DPSK Test Mode

A. Test Verdict

Channel	Frequency (MHz)	Channel Separation (MHz)	Refer to Plot	Limits (MHz)	Verdict
38	2440	0.999	Plot 4 6 2 A	0 84036	DASS
39	2441		PIOL 4.0.2 A	0.04930	PASS

B. Test Plots

Agilent Spectrum Analyzer - Swept SA					
	0 GHz	SENSE:INT	#Avg Type: RMS	05:50:52 PM Sep 12, 2015 TRACE 1 2 3 4 5 6	Frequency
	PNO: Wide +++ IFGain:Low	Trig: Free Run #Atten: 40 dB	AvgjHold: 100/100		Auto Tuno
Ref Offset 0.9 dB 10 dB/div Ref 30.00 dBm			ΔΝ	/lkr1 1.004 MHz -0.001 dB	Auto Tune
20.0 10.0	X2			1Δ2	Center Freq 2.440500000 GHz
-10.0		Lunga Jung			Start Freq 2.439500000 GHz
-40.0 -50.0 -60.0					Stop Freq 2.441500000 GHz
Start 2.439500 GHz #Res BW 100 kHz	#VBW	300 kHz	Sweep	Stop 2.441500 GHz 1.00 ms (1001 pts)	CF Step 200.000 kHz
	1 004 MHz (A)	Y FI	UNCTION FUNCTION WIDTH	FUNCTION VALUE	<u>Auto</u> Man
2 F 1 F 2.4 3 4 5 6 6	40 158 GHz	6.305 dBm			Freq Offset 0 Hz
7 8 9 10 11 12					
MSG			STATU	5	

(Plot 4.6.2 A: Channel 39: 2441MHz @ 8DPSK)

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=100 KHz and VBW=300 KHz.

<u>LIMIT</u>

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

TEST RESULTS

Remark: 1. We test Frequency Separation at difference Packet Type (DH1, DH3 and DH5), recorded worst case at DH5.

4.7.1 GFSK Test Mode

A. Test Verdict

Hopping Channel Frequency Range (MHz)	Number of Hopping Channel	Refer to Plot	Limit	Verdict
2400-2483.5	79	Plot 4.7.1 A1	≥15	PASS

B. Test Plots



(Plot 4.7.1 A1: @ GFSK)

4.7.2 8DPSK Test Mode

A. Test Verdict

Hopping Channel Frequency Range (MHz)	Number of Hopping Channel	Refer to Plot	Limit	Verdict
2400-2483.5	79	Plot 4.7.2 A1	≥15	PASS

B. Test Plots

Agilent Spectrum Analyzer - Swept SA				
(X) RL RF 50Ω AC	SENSE:INT	ALIGN AUTO	05:48:53 PM Sep 12, 2015	Frequency
Center Freq 2.44 17 5000	PNO: Fast +++ Trig: Free Run IFGain:Low #Atten: 40 dB	Avg Hold: 100/100		
Ref Offset 0.9 dB		ΔMkr1	77.989 0 MHz -0.914 dB	Auto Tune
	WARAMIMAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA	MMARAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA	102 MAANMMA	Center Freq 2.441750000 GHz
-10.0		11 11 11 11 11 11 11		Start Freq 2.400000000 GHz
-40.0				Stop Freq 2.483500000 GHz
Start 2.40000 GHz #Res BW 100 kHz	#VBW 300 kHz	Sweep 8	Stop 2.48350 GHz .00 ms (1001 pts)	CF Step 8.350000 MHz
MKR MODE TRC SCL		FUNCTION FUNCTION WIDTH	FUNCTION VALUE	<u>Auto</u> Man
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	2 171 0 GHz 5.969 dBm			Freq Offset 0 Hz
7 8 9 9 10 11 11 12 12 12 12 12 12 12 12 12 12 12				
MSG		STATUS		

(Plot 4.7.2 A1: @ 8DPSK)

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

The Dwell Time=Burst Width*Total Hops. The detailed calculations are showed as follows:

The duration for dwell time calculation:0.4[s]*hopping number=0.4[s]*79[ch]=31.6[s*ch];

The burst width [ms/hop/ch], which is directly measured, refers to the duration on one channel hop. The hops per second for all channels: The selected EUT Conf uses a slot type of 5-Tx&1-Rx and a hopping

rate of 1600 [ch*hop/s] for all channels. So the final hopping rate for all channels is 1600/6=266.67 [ch*hop/s] The hops per second on one channel: 266.67 [ch*hop/s]/79 [ch]=3.38 [hop/s];

The total hops for all channels within the dwell time calculation duration: 3.38 [hop/s]*31.6[s*ch]=106.67 [hop*ch];

The dwell time for all channels hopping: 106.67 [hop*ch]*Burst Width [ms/hop/ch].

Remark: 1. We test Frequency Separation at all test channels, recorded worst case at middle channel.

4.8.1 GFSK Test Mode

A. Test Verdict

GFSK:

Mode	Frequency (MHz)	Pulse Width Dwell Time (ms) (S)		Limit (S)	Refer to Plot	Verdict			
	2441	0.370	0.118	0.4	Plot 4.8.1 A	PASS			
DHI	Note: Dwell time=Pulse time (ms) × (1600 ÷ 2 ÷ 79) ×31.6 Second								
גחט	2441	1.626	0.260	0.4	Plot 4.8.1 B	PASS			
ЪЦЭ	Note: Dwell time=Pulse time (ms) × (1600 ÷ 4 ÷ 79) ×31.6 Second								
	2441	2.873	0.307	0.4	Plot 4.8.1 C	PASS			
DUD	Note: Dwell tin	ne=Pulse Time (ms) × (1600 ÷ 6	÷ 79) ×31.6 Sec	cond				

4.8.2 8DPSK Test Mode

Mode	Frequency (MHz)	Pulse Width (ms)	Pulse Width Dwell Time (ms) (S)		Refer to Plot	Verdict				
	2441	0.378	0.121	0.4	Plot 4.8.2 A	PASS				
	Note: Dwell time=Pulse time (ms) × (1600 ÷ 2 ÷ 79) ×31.6 Second									
002	2441	1.629	0.261	0.4	Plot 4.8.2 B	PASS				
ОПЗ	Note: Dwell time=Pulse time (ms) × (1600 ÷ 4 ÷ 79) ×31.6 Second									
DUE	2441	2.879	0.307	0.4	Plot 4.8.2 C	PASS				
DHS	Note: Dwell tin	Note: Dwell time=Pulse Time (ms) × (1600 ÷ 6 ÷ 79) ×31.6 Second								

B. Test Plots

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Agilent Spectrur	m Analyzer -	Swept SA								
	RF 5	00 AC	17	SEN	SE:INT	#Avg Ty	ALIGNAUTO pe: RMS	05:54:04 F	M Sep 12, 2015	Frequency
10 dB/div	Ref 20.0	PN IFG	IO: Wide ← Sain:Low	Trig: Free #Atten: 30	Run dB			™ ■ Mkr3 1. 5.	[₽] ₽ 971 ms 35 dBm	Auto Tune
Log 10.0 0.00	X ₂	142	3							Center Freq 2.441000000 GHz
-20.0 -30.0 -40.0										Start Freq 2.441000000 GHz
-50.0 -60.0 -70.0		n a fina fan tra fina fina fina A fina fina fina fina fina fina fina fina				dan data ang sind ng sing sing sing sing sing sing sing si	n in the second se	dia destrictive "Native" (Second	telant adapt	Stop Freq 2.441000000 GHz
Center 2.44 Res BW 1.0	41000000 0 MHz	0 GHz	#VB	W 3.0 MHz	ELIN		Sweep 6	5.400 ms (pan 0 Hz 8001 pts)	CF Step 1.000000 MHz Auto Man
1 A2 1 2 F 1 3 N 1 4 5 6 7 7 8 9 9 10 11 11	t (Δ) t	37 72 1.9	0.4 µs (∆ 0.8 µs 71 ms	.) -1.25 d 3.48 dE 5.35 dE						Freq Offset 0 Hz



Agilent Spectrum Analyzer - Swept SA					
Center Freg 2.441000000	GHz	SENSE:INT #Avg T	ALIGNAUTO ype: RMS	05:54:43 PM Sep 12, 2015 TRACE 1 2 3 4 5 6	Frequency
10 dB/div Ref 20.00 dBm	PNO: Wide ↔ Trig: Fi IFGain:Low #Atten:	ree Run : 30 dB		Ukr3 4.099 ms 3.85 dBm	Auto Tune
10.0 0.00 -10.0	2. 2	1∆2 <u>3</u>			Center Freq 2.441000000 GHz
-20.0					Start Freq 2.441000000 GHz
-50.0 -60.0 -70.0		dia anta a dia da da da da Tajago interneta ya n		enternitet production A both at the data of the state of	Stop Freq 2.441000000 GHz
Center 2.441000000 GHz Res BW 1.0 MHz MKR MODE TRC SCL × 1 Δ2 1 t (Δ)	#VBW 3.0 MH	FUNCTION	Sweep 6.4	Span 0 Hz 100 ms (8001 pts) FUNCTION VALUE	CF Step 1.000000 MHz <u>Auto</u> Man
2 F 1 t 3 N 1 t 4 5 6 8	1.599 ms 3.84 4.099 ms 3.85	dBm dBm			Freq Offset 0 Hz
7 8 9 10 11 12					
MSG			STATUS		

(Plot 4.8.1.B: Channel 39: 2441MHz @ GFSK @ DH3)

Agilent Sp	ectrum Analyzer - Swep	t SA					
Center	RF 50 Ω	AC DOOD GHz	SENSE:II	IT AVg	ALIGN AUTO	05:14:25 PM Sep 12, 2015 TRACE 1 2 3 4 5 6	Frequency
Control		PNO: Wide IFGain:Low	++++ Trig: Free Rur #Atten: 20 dB	1			Auto Tuno
10 dB/di	v Ref 10.00 di	Зm				Mkr3 5.295 ms 4.23 dBm	Auto Tune
-10.0	X ₂		<u></u> 1Δ2 X	3			Center Freq 2.441000000 GHz
-30.0							Start Freq 2.441000000 GHz
-60.0 -70.0 -80.0	ling of the part of the late and by party members		atilistan takk print praticipation print praticipation			They are stated for They are a stated for the state of the state of	Stop Freq 2.441000000 GHz
Center Res BV	2.441000000 GH V 1.0 MHz	Hz #VE	3W 3.0 MHz	E INICE ION	Sweep 1	Span 0 Hz 0.13 ms (8001 pts)	CF Step 1.000000 MHz
MKR MUU 1 Δ2 2 F 3 N 4	1 t (Δ) 1 t 1 t	× 2.873 ms(1.545 ms 5.295 ms	Δ) -0.02 dB 6.13 dBm 4.23 dBm	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	Freq Offset
5 6 7 8 9 10							0 Hz
12					STATUS		





(Plot 4.8.2.A: Channel 39: 2441MHz @ 8DPSK @ DH1)

Agilent Spectr	um Analyzer - Swept SA						
Center Fi	RF 50 Ω AC req 2.441000000	GHz	SENSE:IN	vr #Avg	ALIGN AUTO Type: RMS	05:56:37 PM Sep 12, 2015 TRACE 1 2 3 4 5 6 TYPE WAAAAAA	Frequency
10 dB/div	Ref 20.00 dBm	PNO: Wide ↔ IFGain:Low	#Atten: 30 dB	•		Mkr3 3.929 ms 1.15 dBm	Auto Tune
10.0 0.00				×3			Center Freq 2.441000000 GHz
-20.0							Start Freq 2.441000000 GHz
-50.0 -60.0 -70.0						tan administration stars and military and provide the provided in the second	Stop Freq 2.441000000 GHz
Center 2.4 Res BW 1 MKR MODE TF	441000000 GHz .0 MHz	#VBW	/ 3.0 MHz	FUNCTION	Sweep 6.	Span 0 Hz 400 ms (8001 pts) FUNCTION VALUE	CF Step 1.000000 MHz <u>Auto</u> Man
2 F 1 3 N 1 4 5 6 7 8 9 10		1.429 ms 3.929 ms	1.14 dBm 1.15 dBm				Freq Offset 0 Hz
12 MSG					STATUS	1	



Agilent Spectrum Analyzer - Swept SA				
Center Freq 2 441000000	GH7	E:INT ALIGN AUTO #Avg Type: RMS	05:23:55 PM Sep 12, 2015 TRACE 1 2 3 4 5 5	Frequency
	PNO: Wide Trig: Free F IFGain:Low #Atten: 26 of	Run dB		Auto Tune
10 dB/div Ref 15.00 dBm			4.83 dBm	
5.00 X2				Center Freq 2.441000000 GHz
-25.0 -35.0 -45.0				Start Freq 2.441000000 GHz
-65.0 -65.0 -75.0		te danı stradır. Afrik fişmi filişmi		Stop Freq 2.441000000 GHz
Center 2.441000000 GHz Res BW 1.0 MHz	#VBW 3.0 MHz	Sweep 10	Span 0 Hz (8001 pts), Span 0	CF Step 1.000000 MHz
MKR MODE TRC SCL X	2 879 ms (A) -1 25 d	FUNCTION FUNCTION WIDTH	FUNCTION VALUE	<u>Auto</u> Man
2 F 1 t 3 N 1 t 5 6	340.7 µs 3.85 dBi 4.091 ms 4.83 dBi	m m m		Freq Offset 0 Hz
7 8 9 10 11 12				
MSG		STATUS		

(Plot 4.8.2.C: Channel 39: 2441MHz @ 8DPSK @ DH5)

4.9. Spurious RF Conducted Emission

TEST CONFIGURATION



TEST PROCEDURE

The Spurious RF conducted emissions compliance of RF radiated emission should be measured by following the guidance in ANSI C63.10-2009 with respect to maximizing the emission by rotating the EUT, measuring the emission while the EUT is situated in three orthogonal planes (if appropriate), adjusting the measurement antenna height and polarization etc. Set RBW=100kHz and VBM= 300KHz to measure the peak field strength , and measurement frequency range from 9KHz to 26.5GHz.

<u>LIMIT</u>

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

2. Fall in the restricted bands listed in section 15.205. The maximum permitted average field strength is listed in section 15.209.

TEST RESULTS

Remark:

1. We test Frequency Separation at difference Packet Type (DH1, DH3 and DH5), recorded worst case at DH5.

2.For 9KHz -30MHz,Because there was only background, So We did not recorded data.

4.9.1 GFSK Test Mode

Channel	Frequency (MHz)	Frequency Range	Refer to Plot	Limit (dBc)	Verdict
		2.402 GHz	Plot 4.9.1 A1		PASS
		30MHz-3GHz	Plot 4.9.1 A2	-20	PASS
00	2402	3GHz-5GHz	Plot 4.9.1 A3	-20	PASS
00	2402	5GHz-10GHz	Plot 4.9.1 A4	-20	PASS
		10GHz-15GHz	Plot 4.9.1 A5	-20	PASS
		15GHz-25GHz	Plot 4.9.1 A6	-20	PASS
		2.441 GHz	Plot 4.9.1 B1		PASS
		30MHz-3GHz	Plot 4.9.1 B2	-20	PASS
20	2441	3GHz-5GHz	Plot 4.9.1 B3	-20	PASS
39		5GHz-10GHz	Plot 4.9.1 B4	-20	PASS
		10GHz-15GHz	Plot 4.9.1 B5	-20	PASS
		15GHz-25GHz	Plot 4.9.1 B6	-20	PASS
		2.480 GHz	Plot 4.9.1 C1		PASS
		30MHz-3GHz	Plot 4.9.1 C2	-20	PASS
70	2490	3GHz-5GHz	Plot 4.9.1 C3	-20	PASS
10	2480	5GHz-10GHz	Plot 4.9.1 C4	-20	PASS
		10GHz-15GHz	Plot 4.9.1 C5	-20	PASS
		15GHz-25GHz	Plot 4.9.1 C6	-20	PASS

A. Test Verdict

Note:

1. The test results including the cable lose.

B. Test Plots

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(Plot 4.9.1 A2: Channel 00: 2402MHz @ GFSK)

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Agilen	Agilent Spectrum Analyzer - Swept SA										
Cen	ter Fr	eq 4.0000	00000 GH	lz	SEI	NSE:INT	#Avg Type	ALIGNAUTO	05:13:32P TRAC	M Sep 12, 2015	Frequency
			P IEC	NO: Fast 🔸	#Atten: 30	e Run)dB	Avg Hold:	12/100	TYI DI		
10 di	B/div	Ref Offset 0.9 Ref 20.90	9 dB dBm					Mkr	1 4.803 -45.2	75 GHz 48 dBm	Auto Tune
10.9				C							Center Freq 4.000000000 GHz
0.900 -9.10										-12.55 dBm	Start Freq 3.000000000 GHz
-19.1 -29.1											Stop Freq 5.000000000 GHz
-39.1										1	CF Step 200.000000 MHz <u>Auto</u> Man
-49.1	e elle elle dere	li alihi kasa ta safali kasa sa Na kasa ng kasa	h a lin a hilina ol di Ny Franz States a di fi	i kali di angana na kangana Mangana na kangana na kangana Mangana na kangana na kangana na kangana na kangana na kangana na kangana na kang	li den de la la factoria de Anti-Anti-Anti-Anti-Anti-Anti-Anti-Anti-		i Marian Angelan Majagan Sara (para	alighter (to get alf	an an a dhan a da an a Tu an a dhan an an a da	ilii Ayyyyyyyyyyyyyyyyyy	Freq Offset 0 Hz
-69.1											
Star #Re:	t 3.00 s BW	0 GHz 100 kHz		#VBW	300 kHz			Sweep	Stop 5 191 m <u>s (</u>	.000 GHz 8001 pt <u>s)</u>	
MSG								STATUS			





(Plot 4.9.1 A4: Channel 00: 2402MHz @ GFSK)

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Agilen	Agilent Spectrum Analyzer - Swept SA										
Cen	ter Fro	RF 50 ຊ ອຸ ດ. 12,500	AC 000000	Hz	SE	NSE:INT	#Avg Type	ALIGNAUTO e: RMS	05:13:45 P	M Sep 12, 2015 E 1 2 3 4 5 6	Frequency
			P	NO: Fast ++ Gain:Low	Trig: Free #Atten: 30	e Run)dB	Avg Hold:	8/100	TYF DE	E M WWWWWW T P P P P P P	
10 dE	3/div	Ref Offset 0. Ref 20.90	9 dB dBm					Mkr1 1	14.715 6 -52.9	25 GHz 76 dBm	Auto Tune
10.9			5	9						<u></u>	Center Freq 12.500000000 GHz
0.900 -9.10										-12.55 dBm	Start Freq 10.000000000 GHz
-19.1 -29.1			5 5								Stop Freq 15.000000000 GHz
-39.1 -49.1										1	CF Step 500.000000 MHz <u>Auto</u> Man
-59.1			al talaan in pada da da da Maria ya maya ya talahiri da	an hadd later bitte		ite a ti lan utani. Mangana	Electrolite Life de Life Antonio Application (1997)			alak publi puter telah Programi kaja atent	Freq Offset 0 Hz
-69.1 Star	t 10.00	0 GHz							Stop 15	.000 GHz	
#Re	SBW 1	UU KHZ		#VBW	300 KHZ			Sweep	478 ms (8001 pts)	
-39.1 -49.1 -59.1 -69.1 Star #Res	t 10.00 s BW 1	0 GHz 00 kHz	al yalaan ta ji midadda dig al yalaan ta ji midadda dig al yalaan ya af digaa	#VBW	1 Juli ale de la composición de la comp	in la kit kits portas a ring ang nang gana a	t daa maa kara ta'u dhi u dhi maa aha ay maa dha ay maa dha ay maa	Sweep	Stop 15 478 ms (11	CF Step 500.000000 MHz <u>Auto</u> Man Freq Offset 0 Hz





(Plot 4.9.1 A6: Channel 00: 2402MHz @ GFSK)