

# Global United Technology Service Co., Ltd.

环球众一科技有限公司

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Page: 1 of 33 Email: szsale@gtstest.com

# FCC REPORT

Test Result :	PASS *	
Date of Issue:	17 July, 2010	
Date of Test:	15~17 July, 2010	
Date of Receipt:	14 July, 2010	
Standards:	FCC CFR Title 47 Part 15 Subpart C Section 15.247:2008	
FCC ID:	YMKD72TSB	
Operation Frequency:	2400MHz to 2483.5MHz	
Model No.	D72TSB, D73TSB, D365IN, LTF-DV2716, LTF-DV2726, LTF-DV2736, LTF-DV2746, LTF-DV2756	
Name:	7" Wide Screen TFT LCD High-Definition Media Player Monitor	
<b>Equipment Under Test (</b> I	EUT)	
Address of Applicant:	No.1 Saga Road, Shashui District, Songgang Town, Nanhai, Fosha City, Guangdong, P.R. China	
Applicant:	SAGA AUDIO EQUIPMENT CO., LTD.	
Application No:	GTSE100700102RF	

In the configuration tested, the EUT complied with the standards specified above.

Authorized Signature:

Robinson Lo Laboratory Manager

This report details the results of the testing carried out on one sample. The results contained in this test report do not relate to other samples of the same product and does not permit the use of the GTS product certification mark. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.

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## 3 Test Summary

Test Item	Section in CFR 47	Result
Antenna Requirement	15.203/15.247 (c)	Passed
Conducted Peak Output Power	15.247 (b)(1)	Passed
20dB Occupied Bandwidth	15.247 (a)(1)	Passed
Carrier Frequencies Separation	15.247 (a)(1)	Passed
Hopping Channel Number	15.247 (a)(1)	Passed
Dwell Time	15.247 (a)(1)	Passed
Pseudorandom Frequency Hopping Sequence	15.247(b)(4)&TCB Exclusion List	Passed
Radiated Emission	15.205/15.209	Passed
	15.247(b)(4)&	
RF Exposure Compliance Requirement	TCB Exclusion List	Passed
	(7 July 2002)	

#### Remark:

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

Failed: The EUT does not comply with the essential requirements in the standard.

Tx: In this whole report Tx (or tx) means Transmitter. Rx: In this whole report Rx (or rx) means Receiver.



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### **General Information**

### 4.1 Client Information

Applicant:	SAGA AUDIO EQUIPMENT CO., LTD.
Address of Applicant:	No.1 Saga Road, Shashui District, Songgang Town, Nanhai, Foshan City, Guangdong, P.R. China
Manufacturer/Factory:	N/A
Address of Manufacturer/Factory:	N/A

### 4.2 General Description of E.U.T.

Product Name:	7" Wide Screen TFT LCD High-Definition Media Player Monitor
Item No.:	D72TSB, D73TSB, D365IN, LTF-DV2716, LTF-DV2726, LTF-DV2736, LTF-DV2746, LTF-DV2756
Operation Frequency:	2402MHz~2480MHz
Channel numbers:	79
Channel separation:	1MHz
Modulation type:	GFSK
Antenna Type:	Integral
Antenna gain:	2dBi
Power supply:	DC 12.0V

Remark:

Model no:

D72TSB, D73TSB, D365IN, LTF-DV2716, LTF-DV2726, LTF-DV2736, LTF-DV2746, LTF-DV2756 Only the model No. D72TSB was tested, since the electrical circuit design, PCB layout, Electrical Parts and figure are identical to the basic model, except the outer decoration.



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Operation Frequency each of channel							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
1	2402MHz	21	2422MHz	41	2442MHz	61	2462MHz
2	2403MHz	22	2423MHz	42	2443MHz	62	2463MHz
3	2404MHz	23	2424MHz	43	2444MHz	63	2464MHz
4	2405MHz	24	2425MHz	44	2445MHz	64	2465MHz
5	2406MHz	25	2426MHz	45	2446MHz	65	2466MHz
6	2407MHz	26	2427MHz	46	2447MHz	66	2467MHz
7	2408MHz	27	2428MHz	47	2448MHz	67	2468MHz
8	2409MHz	28	2429MHz	48	2449MHz	68	2469MHz
9	2410MHz	29	2430MHz	49	2450MHz	69	2470MHz
10	2411MHz	30	2431MHz	50	2451MHz	70	2471MHz
11	2412MHz	31	2432MHz	51	2452MHz	71	2472MHz
12	2413MHz	32	2433MHz	52	2453MHz	72	2473MHz
13	2414MHz	33	2434MHz	53	2454MHz	73	2474MHz
14	2415MHz	34	2435MHz	54	2455MHz	74	2475MHz
15	2416MHz	35	2436MHz	55	2456MHz	75	2476MHz
16	2417MHz	36	2437MHz	56	2457MHz	76	2477MHz
17	2418MHz	37	2438MHz	57	2458MHz	77	2478MHz
18	2419MHz	38	2439MHz	58	2459MHz	78	2479MHz
19	2420MHz	39	2440MHz	59	2460MHz	79	2480MHz
20	2421MHz	40	2441MHz	60	2461MHz		

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

Channel	Frequency
The lowest channel	2402MHz
The middle channel	2441MHz
The Highest channel	2480MHz



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### 4.3 E.U.T Operation mode

Operating Environment:		
Temperature:	25.0 °C	
Humidity:	45 % RH	
Atmospheric Pressure:	1008 mbar	
Test mode:		
Transmitting mode:	Keep the EUT in transmitting mode with modulation.	



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### 4.4 Test Facility

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

FCC —Registration No.: 600491

Global United Technology Service Co., Ltd., Shenzhen 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 out files. Registration 600491, July 20, 2010.

### 4.5 Test Location

All tests were performed at:

Global United Technology Service Co., Ltd.

Address: 2nd Floor, Block No.2, Laodong Industrial Zone, Xixiang Road Baoan District, Shenzhen,

Tel: 0755-27798480 Fax: 0755-27798960

### 4.6 Other Information Requested by the Customer

None.



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### 4.7 Test Instruments list

Radia	Radiated Emission					
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (dd-mm-yy)	Cal.Due date (dd-mm-yy)
1	3m Semi- Anechoic Chamber	ZhongYu Electron	9.2(L)*6.2(W)* 6.4(H)	GTS201	Mar. 30 2010	Mar. 30 2011
2	Control Room	ZhongYu Electron	6.2(L)*2.5(W)* 2.4(H)	GTS202	N/A	N/A
3	EMI Test Receiver	Rohde & Schwarz	ESU26	GTS203	Sep. 10 2009	Sep. 10 2010
4	BiConiLog Antenna	SCHWARZBECK MESS-ELEKTRONIK	VULB9163	GTS204	Feb 26 2009	Sep. 10 2010
5	Double -ridged waveguide horn	SCHWARZBECK MESS-ELEKTRONIK	9120D-829	GTS205	June 30 2010	June 30 2011
6	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
7	Coaxial Cable	GTS	N/A	GTS400	Apr. 01 2010	Apr. 01 2011
8	Coaxial Cable	GTS	N/A	GTS401	Apr. 01 2010	Apr. 01 2011
9	Coaxial cable	GTS	N/A	GTS402	Apr. 01 2010	Apr. 01 2011
10	Coaxial Cable	GTS	N/A	GTS407	Apr. 01 2010	Apr. 01 2011
11	Coaxial Cable	GTS	N/A	GTS408	Apr. 01 2010	Apr. 01 2011
12	Amplifier(10KHz- 5GHz)	Sonnoma Instrument	305-1052	GTS210	Apr. 01 2010	Apr. 01 2011
13	Amplifier(2GHz- 20GHz)	HP	8349B	GTS231	Apr. 01 2010	Apr. 01 2011



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#### 5 **Test results and Measurement Data**

### 5.1 Antenna requirement:

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

15.203 requirement:

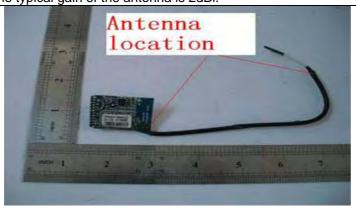
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit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

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

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

E.U.T Antenna:

The EUT make use of an lead antenna, the antenna size: 12cm(L)\* Φ 0.15cm, The typical gain of the antenna is 2dBi.





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### 5.2 Conducted Peak Output Power

Test Requirement:	FCC Part15 C Section 15.247 (b)(3)		
Test Method:	ANSI C63.4:2003 and KDB DA00-705		
Receiver setup:	RBW=1MHz, VBW=1MHz, Detector=Peak		
Limit:	30dBm		
Test setup:	Spectrum Analyzer  E.U.T  Non-Conducted Table		
	Ground Reference Plane		
	Remark: Offset the High-Frequency cable loss 2.5dB in the spectrum analyzer.		
Test Instruments:	Refer to section 4.7 for details		
Test mode:	Non-hopping transmitting with modulation.		
Test results:	Passed		

### **Measurement Data**

Test channel	Peak Output Power (dBm)	Limit (dBm)	Result
Lowest	-3.92	30.00	Pass
Middle	-3.11	30.00	Pass
Highest	-3.54	30.00	Pass



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### 5.3 20dB Occupy Bandwidth

Test Requirement:	FCC Part15 C Section 15.247 (a)(1)	
Test Method:	ANSI C63.4:2003 and KDB DA00-705	
Receiver setup:	RBW=30KHz, VBW=100KHz, detector=Peak	
Limit:	NA	
Test setup:	Spectrum Analyzer  E.U.T  Non-Conducted Table  Ground Reference Plane	
	Remark: Offset the High-Frequency cable loss 0.5dB in the spectrum analyzer.	
Test Instruments:	Refer to section 4.7 for details	
Test mode:	Transmitting mode	
Test results:	Passed	

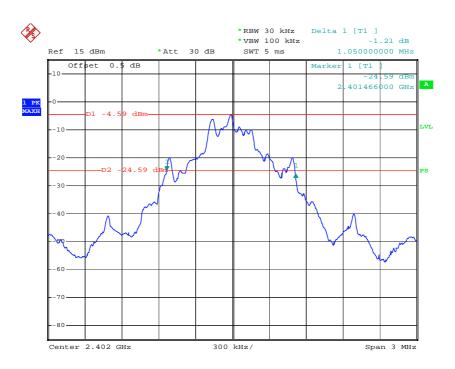
Measurement Data			
Test channel	Lowest	Middle	Highest
20dB Occupy	1050	1056	1056
Bandwidth (KHz)	1050	1000	1056



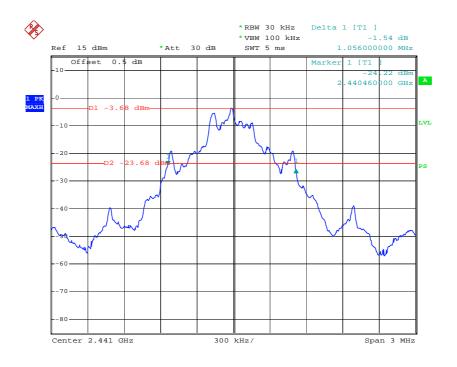
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### Test plot as follows:

Test channel: Lowest



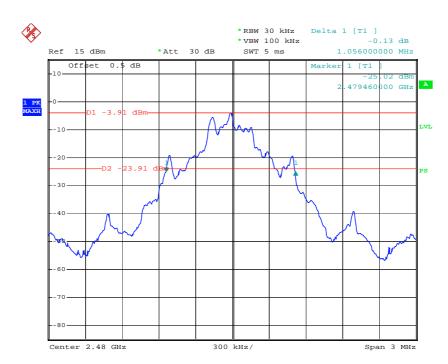
Test channel: Middle





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## 5.4 Carrier Frequencies Separation

Test Requirement:	FCC Part15 C Section 15.247 (a)(1)				
Test Method:	ANSI C63.4:2003 and KDB DA00-705				
Receiver setup:	RBW=30KHz, VBW=100KHz, detector=Peak				
Limit:	0.025MHz or 2/3 of the 20dB bandwidth (whichever is greater)				
Test setup:	Spectrum Analyzer  E.U.T  Non-Conducted Table  Ground Reference Plane				
	773 (00000000000000000000000000000000000				
	Remark: Offset the High-Frequency cable loss 0.5dB in the spectrum analyzer.				
Test Instruments:	Refer to section 4.7 for details				
Test mode:	Hopping transmitting with modulation.				
Test results:	Passed				



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Measurement Data			
Test channel	Carrier Frequencies Separation (KHz)	Limit (KHz)	Result
Lowest	1002	704	Pass
Middle	1002	704	Pass
Highest	1002	704	Pass

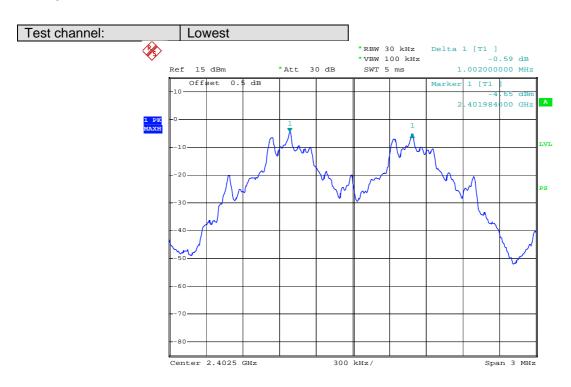
Note: According to section 5.4,

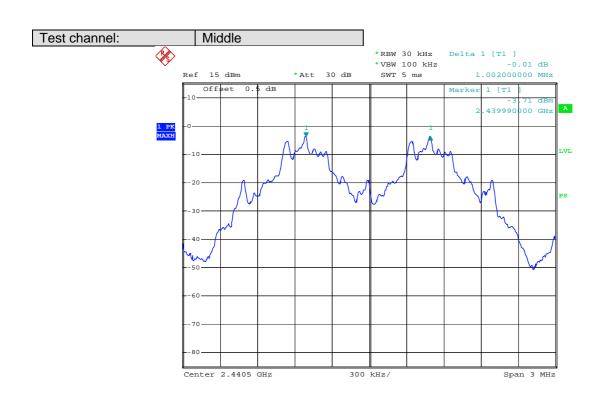
Mode	20dB bandwidth (KHz)	Limit (KHz)
Wode	(worse case)	(Carrier Frequencies Separation)
GFSK	1056	704



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### Test plot as follows:

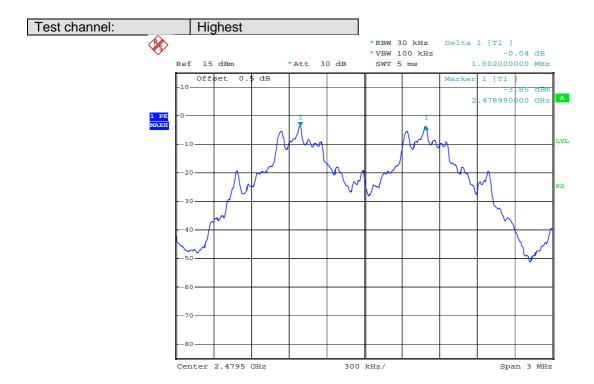






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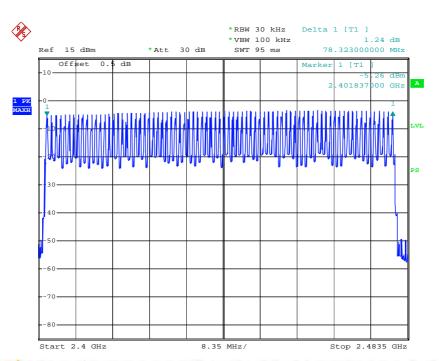
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### 5.5 Hopping Channel Number

Test Requirement:	FCC Part15 C Section 15.247 (a)(1)				
Test Method:	ANSI C63.4:2003 and KDB DA00-705				
Receiver setup:	RBW=30KHz, VBW=100KHz, Frequency range=2400MHz-2483.5MHz, Detector=Peak				
Limit:	75channels				
Test setup:	Spectrum Analyzer  E.U.T  Non-Conducted Table  Ground Reference Plane				
	Remark:  Offset the High-Frequency cable loss 0.5dB in the spectrum analyzer.				
Test Instruments:	Refer to section 4.7 for details				
Test mode:	Hopping transmitting with modulation.				
Test results:	Passed				

Measurement Data	
Hopping channel numbers	79 channel

### Test plot as follows





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### 5.6 Dwell Time

Test Requirement:	FCC Part15 C Section 15.247 (a)(1)			
Test Method:	ANSI C63.4:2003 and KDB DA00-705			
Receiver setup:	RBW=1MHz, VBW=3MHz, Span=0Hz, Detector=Peak			
Limit:	0.4 Second			
Test mode:	Hopping transmitting with modulation.			
Test setup:	Spectrum Analyzer  E.U.T  Non-Conducted Table			
	Ground Reference Plane			
Test Instruments:	Refer to section 4.7 for details			
Test results:	Passed			

Measurement	leasurement Data								
Mode	Packet	Channel	Pulse wide (msec)	Dwell time (sec)	Limit (sec)	Result			
	GFSK DH3	Low Channel	0.485	0.155	0.4	Pass			
		Mid Channel	0.490	0.157	0.4	Pass			
		High Channel	0.490	0.157	0.4	Pass			
		Low Channel	1.760	0.282	0.4	Pass			
GFSK		Mid Channel	1.760	0.282	0.4	Pass			
		High Channel	1.760	0.282	0.4	Pass			
		Low Channel	3.040	0.324	0.4	Pass			
	DH5	Mid Channel	3.040	0.324	0.4	Pass			
		High Channel	3.040	0.324	0.4	Pass			

### Dwell time

DH1: Dwell time = Pulse time\*(1600/2/79)\*31.6S;

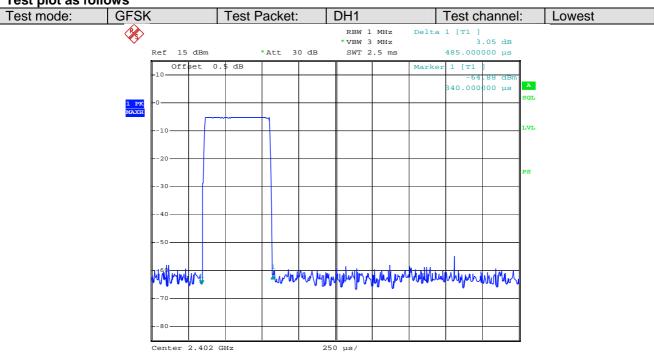
DH3: Dwell time = Pulse time\*(1600/4/79)\*31.6S;

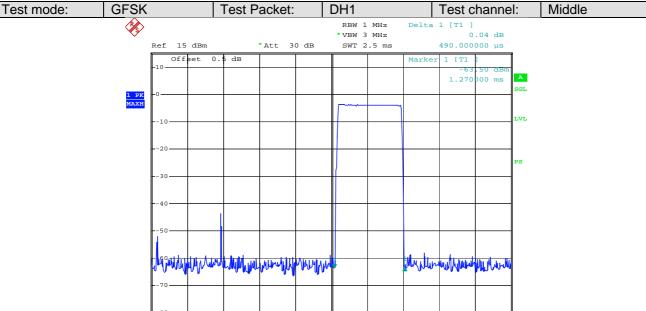
DH5: Dwell time = Pulse time\*(1600/6/79)\*31.6S;



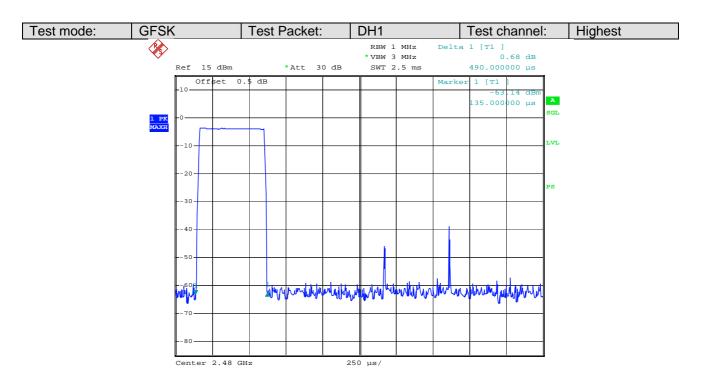
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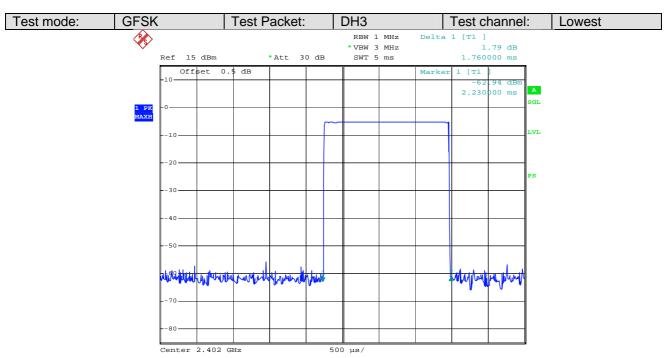
### Test plot as follows



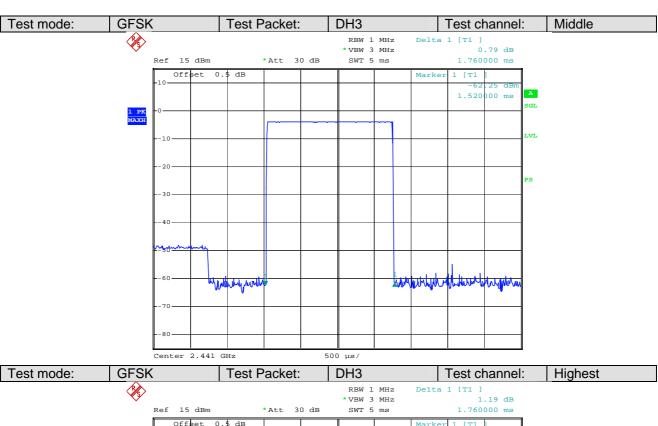


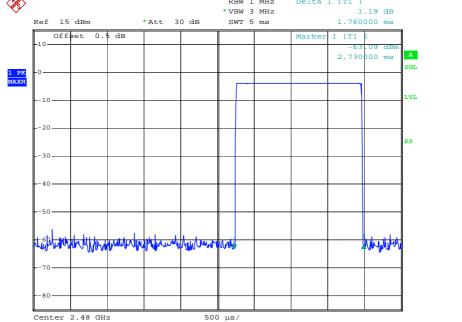




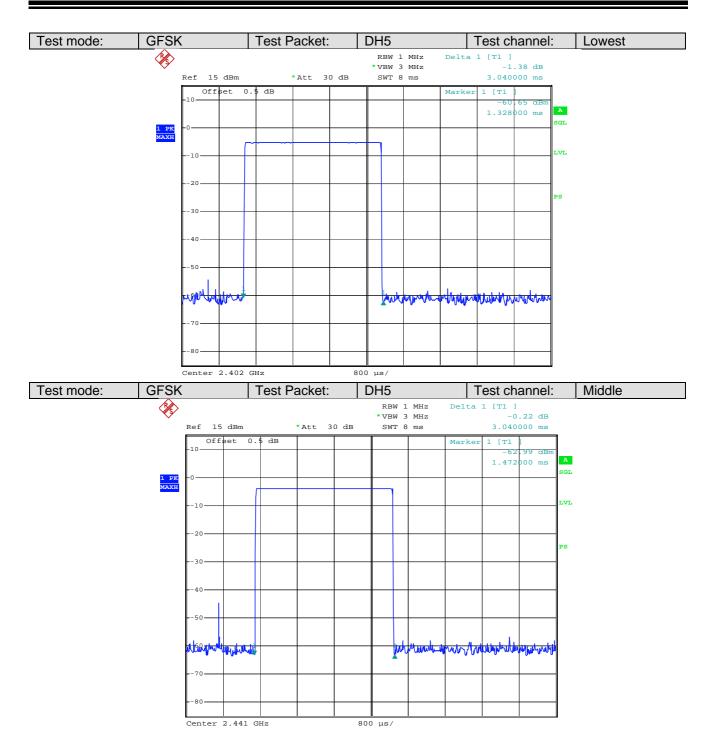




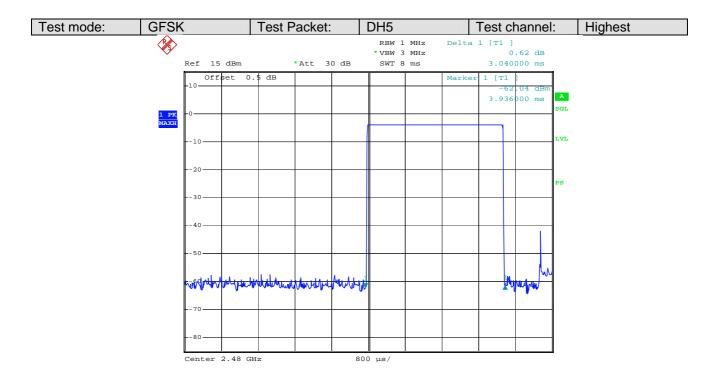














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## 5.7 Band Edge

Test Requirement:	FCC Part15 C Section 15.209 and 15.205							
Test Method:	ANSI C63.4: 20	ANSI C63.4: 2003						
Test Frequency Range:	2400MHz to 24	2400MHz to 2483.5MHz						
Test site:	Measurement	Distance: 3m (	Semi-Anec	hoic Cham	ber)			
Receiver setup:					-			
	Frequency	Detector	RBW	VBW	Remark			
	Above 1GHz	Peak Peak	1MHz 1MHz	3MHz 10Hz	Peak Value Average Value			
Limit:		reak	TIVITIZ	10112	Average value			
	Above 1GHz		54.0		Average Value			
			74.0		Peak Value			
Test setup:	the ground rotated 360 radiation.  b. The EUT wantenna, who tower.  c. The antennation ground to do horizontal at the measured.  d. For each succase and the meters and degrees to e. The test-reading specified B. If the emission the limit specified B. If the emission of the EUT have 10dB peak or aversheet.  g. The radiation	at a 3 meter ser degrees to determine the maind vertical polar ement. Uspected emissionen the rotable table find the maximulation level of the lecified, then test would be report margin would be	mi-anechoice away from ed on the to ed from one eaximum valurizations of on, the EUT was tuned to ewas turne am reading. as set to Period as set to Period EUT in peal ting could be ed. Otherwise re-tested of specified as ts are performance that is a performance that is a performance to the ed.	the interference of a varial meter to foue of the fiethe antennation heights field from 0 decays and the emissione by one and then represent in X, with in the research of the second of the second of the emissione by one and then represent in X, with in the research of the second of the emissione by one and then represent in X, with in the research of the second of the emissione by one and then represent in X, with in the research of the second of the emissione by one and then represent in X, with in the research of the second of the emission of the emi	ence-receiving able-height antenna our meters above the ald strength. Both a are set to make ged to its worst from 1 meter to 4 agrees to 360.  Function and and the peak values assions that did not using peak, quasi-ported in a data.			
	Turn. Table 0.8es 1m Aespiifier							
Test Instruments:	Refer to section							
Test mode:	Non-hopping t	ransmitting wit	th modulati	ion.				
Test results:	Passed							



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Test mode:	Trans	mitting	Test chann	el· Lov	vest	Remark:	Pea	k
Tool mode.	Trans	imitally	TOST GHAINT	OI.   LOV	VOOL	Troman.	T Cu	IX.
Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB/m)	Preamp Factor (dB)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
2390	6.28	32.24	39.03	58.76	58.25	74	-15.75	Vertical
2400	6.34	32.25	38.87	60.22	59.94	74	-14.06	Vertical
2390	6.28	32.24	39.03	55.29	54.78	74	-19.22	Horizontal
2400	6.34	32.25	38.87	56.37	56.09	74	-17.91	Horizontal
		<u> </u>	<u> </u>			<u> </u>	<u>I</u>	
Test mode:	Trans	mitting	Test chann	el: Lov	vest	Remark:	Ave	rage
				•		1		
Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB/m)	Preamp Factor (dB)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
2390	6.28	32.24	39.03	48.36	47.85	54	-6.15	Vertical
2400	6.34	32.25	38.87	49.01	48.73	54	-5.27	Vertical
2390	6.28	32.24	39.03	44.98	44.47	54	-9.53	Horizontal
2400	6.34	32.25	38.87	46.72	46.44	54	-7.56	Horizontal
Test mode:	Trans	mitting	Test chann	el: Hig	hest	Remark:	Pea	k
Frequency (MHz)	Cable	Antenna Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit	
	Loss (dB)	(dB/m)	(dB)	(dBuV)	(dBuV/m)	(dBuV/m)	(dB)	polarization
2483.5	6.22				(dBuV/m) 56.28	(dBuV/m) 74		polarization Vertical
2483.5 2500		(dB/m)	(dB)	(dBuV)	,	,	(dB)	
	6.22	(dB/m) 32.29	(dB) 39.53	(dBuV) 57.3	56.28	74	(dB) -17.72	Vertical
2500	6.22 5.76	(dB/m) 32.29 32.30	(dB) 39.53 39.15	(dBuV) 57.3 56.82	56.28 55.73	74 74	(dB) -17.72 -18.27	Vertical Vertical
2500 2483.5	6.22 5.76 6.22	(dB/m) 32.29 32.30 32.29	(dB) 39.53 39.15 39.53	(dBuV) 57.3 56.82 55.82	56.28 55.73 54.8	74 74 74	(dB) -17.72 -18.27 -19.20	Vertical Vertical Horizontal
2500 2483.5	6.22 5.76 6.22 5.76	(dB/m) 32.29 32.30 32.29	(dB) 39.53 39.15 39.53	(dBuV) 57.3 56.82 55.82 55.1	56.28 55.73 54.8	74 74 74	(dB) -17.72 -18.27 -19.20	Vertical Vertical Horizontal Horizontal
2500 2483.5 2500	6.22 5.76 6.22 5.76	(dB/m) 32.29 32.30 32.29 32.30	(dB) 39.53 39.15 39.53 39.15	(dBuV) 57.3 56.82 55.82 55.1	56.28 55.73 54.8 54.01	74 74 74 74	(dB) -17.72 -18.27 -19.20 -19.99	Vertical Vertical Horizontal Horizontal
2500 2483.5 2500	6.22 5.76 6.22 5.76	(dB/m) 32.29 32.30 32.29 32.30	(dB) 39.53 39.15 39.53 39.15	(dBuV) 57.3 56.82 55.82 55.1	56.28 55.73 54.8 54.01	74 74 74 74	(dB) -17.72 -18.27 -19.20 -19.99	Vertical Vertical Horizontal Horizontal
2500 2483.5 2500 Test mode:	6.22 5.76 6.22 5.76 Trans	(dB/m) 32.29 32.30 32.29 32.30 mitting  Antenna Factor	(dB) 39.53 39.15 39.53 39.15  Test channer  Preamp Factor	(dBuV) 57.3 56.82 55.82 55.1 el: Hig	56.28 55.73 54.8 54.01 hest	74 74 74 74 Remark:	(dB) -17.72 -18.27 -19.20 -19.99  Ave	Vertical Vertical Horizontal Horizontal rage
2500 2483.5 2500 Test mode: Frequency (MHz)	6.22 5.76 6.22 5.76 Trans Cable Loss (dB)	(dB/m) 32.29 32.30 32.29 32.30 mitting  Antenna Factor (dB/m)	(dB) 39.53 39.15 39.53 39.15  Test channer  Preamp Factor (dB)	(dBuV) 57.3 56.82 55.82 55.1 el: Hig Read Level (dBuV)	56.28 55.73 54.8 54.01 hest	74 74 74 74 Remark:	(dB) -17.72 -18.27 -19.20 -19.99  Avel	Vertical Vertical Horizontal Horizontal rage
2500 2483.5 2500 Test mode: Frequency (MHz) 2483.5	6.22 5.76 6.22 5.76 Trans Cable Loss (dB) 6.22	(dB/m) 32.29 32.30 32.29 32.30 mitting  Antenna Factor (dB/m) 32.29	(dB) 39.53 39.15 39.53 39.15  Test channer  Preamp Factor (dB) 39.53	(dBuV) 57.3 56.82 55.82 55.1 el: Hig Read Level (dBuV) 47.35	56.28 55.73 54.8 54.01 hest Level (dBuV/m) 46.33	74 74 74 74 Remark: Limit Line (dBuV/m) 54	(dB) -17.72 -18.27 -19.20 -19.99  Average   Over   Limit   (dB) -7.67	Vertical Vertical Horizontal Horizontal rage polarization Vertical



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### 5.8 Pseudorandom Frequency Hopping Sequence

Test Requirement:

FCC Part15 C Section 15.247 (a)(1) requirement:

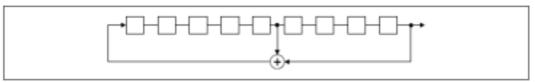
Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

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. The system shall hop to channel frequencies that are selected at the system hopping rate from a Pseudorandom ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

#### **EUT Pseudorandom Frequency Hopping Sequence**

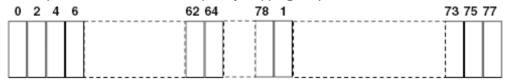
The pseudorandom sequence may be generated in a nine-stage shift register whose 5th and 9th stage outputs are added in a modulo-two addition stage. And the result is fed back to the input of the first stage. The sequence begins with the first ONE of 9 consecutive ONEs; i.e. the shift register is initialized with nine ones.

- Number of shift register stages: 9
- Length of pseudo-random sequence:  $2^9 1 = 511$  bits
- Longest sequence of zeros: 8 (non-inverted signal)



Linear Feedback Shift Register for Generation of the PRBS sequence

An example of Pseudorandom Frequency Hopping Sequence as follow:



Each frequency used equally on the average by each transmitter.

The system receivers have input bandwidths that match the hopping channel bandwidths of their

corresponding transmitters and shift frequencies in synchronization with the transmitted signals.



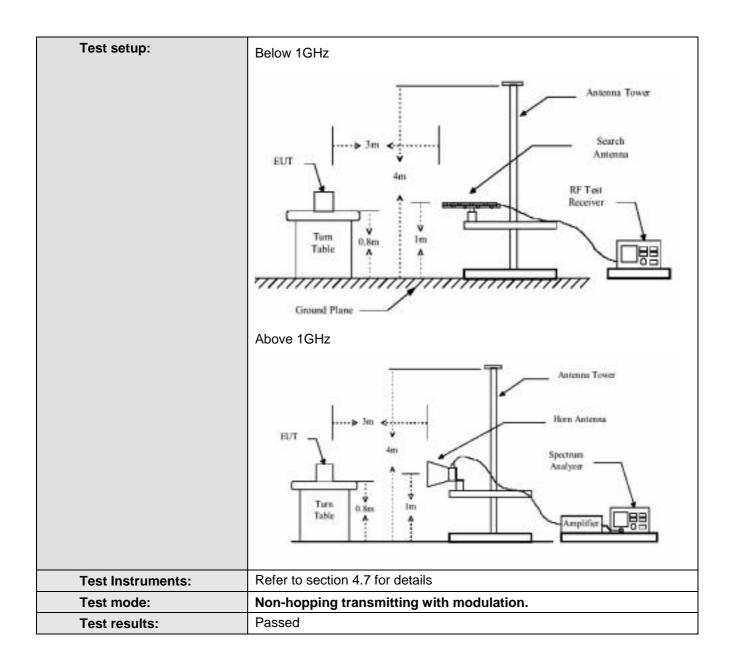
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### 5.9 Radiated Emission

Test Requirement:	FCC Part15 C Section 15.209 and 15.205							
Test Method:	ANSI C63.4: 2003							
Test Frequency Range:	30MHz to 25GH	łz						
Test site:	Measurement	Distance: 3m	(Semi-Anec	hoic Cham	ber)			
Receiver setup:								
•								
	30MHz-1GHz	Quasi-peak	100KHz	300KHz	Quasi-peak Value			
	Above 1GHz Peak		1MHz 1MHz	3MHz	Peak Value			
		Peak	10Hz	Average Value				
Limit:	Fraguency Limit (dRuV/m @2m) Romark							
	Frequency Limit (dBuV/m @3m) Remark							
	30MHz-88MHz 40.0 Quasi-peak V 88MHz-216MHz 43.5 Quasi-peak V							
	216MHz-9		43.5 46.0		Quasi-peak Value Quasi-peak Value			
					•			
					•			
	Above 1	II Above 1GHz						
Test Procedure:	the ground rotated 360 radiation.  b. The EUT wantenna, whatower.  c. The antennation ground to depression degrees to see and the meters and degrees to see an end the second see and the meters and degrees to see an end the second	Above 1GHz  54.0  Above 1GHz  54.0  Average Value  74.0  Reak Value  a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation.  b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.  c. The antenna height is varied from one meter to four meters above th ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.  d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotable table was turned from 0 degrees to 360 degrees to find the maximum reading.  e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.  f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasipeak or average method as specified and then reported in a data sheet.						



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#### Note:

The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

Final Test Level = Receiver Reading + Antenna Factor + Cable Factor - Preamplifier Factor



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### 5.9.1 Radiated emission below 1GHz

Test channel: Lowest

Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB/m)	Preamp Factor (dB)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
56.792	0.69	12.61	25.71	51.18	38.77	40.0	-1.23	Vertical
79.8	0.96	12.14	25.68	48.57	35.99	40.0	-4.01	Vertical
147.921	1.5	10.06	25.64	55.54	41.46	43.5	-2.04	Vertical
170.793	1.64	13.36	25.63	51.85	41.22	43.5	-2.28	Vertical
307.831	2.09	16.66	25.59	49.32	42.48	46.0	-3.52	Vertical
330.195	16.45	16.86	25.58	48.68	42.09	46.0	-3.91	Vertical
56.991	0.69	10.55	25.71	50.77	36.3	40.0	-3.7	Horizontal
125.446	1.35	11.41	25.65	51.46	38.57	43.5	-4.93	Horizontal
147.921	1.5	10.2	25.64	56.07	42.13	43.5	-1.37	Horizontal
170.793	1.64	10.58	25.63	56.54	43.13	43.5	-0.37	Horizontal
193.773	1.74	11.28	25.62	52.64	40.04	43.5	-3.46	Horizontal
558.73	2.58	21.34	25.54	41.52	39.9	46.0	-6.1	Horizontal

Test channel: Middle

Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB/m)	Preamp Factor (dB)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
56.991	0.69	12.61	25.71	51.9	39.49	40.0	-0.51	Vertical
79.8	0.96	12.14	25.68	48.51	35.93	40.0	-4.07	Vertical
122.404	1.34	10.8	25.65	50.49	36.98	43.5	-6.52	Vertical
147.921	1.5	10.06	25.64	54.98	40.9	43.5	-2.6	Vertical
170.793	1.64	13.36	25.63	52.37	41.74	43.5	-1.76	Vertical
307.831	2.09	16.66	25.59	50.44	43.6	46.0	-2.4	Vertical
56.792	0.69	10.55	25.71	44.39	29.92	40.0	-10.08	Horizontal
79.8	0.96	7.43	25.68	49.44	32.15	40.0	-7.85	Horizontal
147.921	1.5	10.2	25.64	53.44	39.5	43.5	-4.0	Horizontal
170.793	1.64	10.58	25.63	55.32	41.91	43.5	-1.59	Horizontal
193.773	1.74	11.28	25.62	53.77	41.17	43.5	-2.33	Horizontal
475.499	2.37	20.83	25.55	42.66	40.31	46.0	-5.69	Horizontal

Test channel: Highest

Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB/m)	Preamp Factor (dB)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
56.792	0.69	12.61	25.71	51.54	39.13	40.0	-0.87	Vertical
79.8	0.96	12.14	25.68	51.93	39.35	40.0	-0.65	Vertical
122.404	1.34	10.8	25.65	54.55	41.04	43.5	-2.46	Vertical
153.2	1.53	10.56	25.64	56.46	42.91	43.5	-0.59	Vertical
170.793	1.64	13.36	25.63	53.1	42.47	43.5	-1.03	Vertical
357.929	2.18	16.98	25.57	50.09	43.68	46.0	-2.32	Vertical
122.404	1.34	11.71	25.65	52.48	39.88	43.5	-3.62	Horizontal
147.921	1.5	10.2	25.64	54.11	40.17	43.5	-3.33	Horizontal
170.793	1.64	10.58	25.63	55.25	41.84	43.5	-1.66	Horizontal
193.773	1.74	11.28	25.62	55.27	42.67	43.5	-0.83	Horizontal
214.514	1.84	11.69	25.61	54.06	41.98	43.5	-1.52	Horizontal
490.745	2.39	20.85	25.55	46.86	44.55	46.0	-1.45	Horizontal



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### 5.9.2 Transmitter emission above 1GHz

Test channel:	Lowest	Remark:	Peak

Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB/m)	Preamp Factor (dB)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
2395	4.97	32.24	37.65	60.08	59.64	74.00	-14.36	Vertical
4804	9.36	34.25	41.53	41.12	43.20	74.00	-30.80	Vertical
7206	13.38	37.23	40.98	37.40	47.03	74.00	-26.97	Vertical
9608	13.39	37.99	37.56	35.10	48.92	74.00	-25.08	Vertical
12010	16.45	39.10	39.09	36.20	52.66	74.00	-21.34	Vertical
2394	4.97	32.24	37.65	60.16	59.72	74.00	-14.28	Horizontal
4804	9.36	34.25	41.53	39.58	41.66	74.00	-32.34	Horizontal
7206	13.38	37.23	40.98	38.65	48.28	74.00	-25.72	Horizontal
9608	13.39	37.99	37.56	34.62	48.44	74.00	-25.56	Horizontal
12010	16.45	39.10	39.09	34.97	51.43	74.00	-22.57	Horizontal

Test channel: Lowest	Remark:	Average
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Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB/m)	Preamp Factor (dB)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
2394	4.97	32.24	37.65	40.40	39.96	54.00	-14.04	Vertical
4804	9.36	34.25	41.53	29.96	32.04	54.00	-21.96	Vertical
7206	13.38	37.23	40.98	26.34	35.97	54.00	-18.03	Vertical
9608	13.39	37.99	37.56	23.39	37.21	54.00	-16.79	Vertical
12010	16.45	39.10	39.09	23.98	40.44	54.00	-13.56	Vertical
2394	4.97	32.24	37.65	39.30	38.86	54.00	-15.14	Horizontal
4804	9.36	34.25	41.53	28.14	30.22	54.00	-23.78	Horizontal
7206	13.38	37.23	40.98	26.41	36.04	54.00	-17.96	Horizontal
9608	13.39	37.99	37.56	23.41	37.23	54.00	-16.77	Horizontal
12010	16.45	39.10	39.09	23.97	40.43	54.00	-13.57	Horizontal

Test channel:	Middle	Remark:	Peak
i rest channel.	i iviidale	Remark.	reak

Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB/m)	Preamp Factor (dB)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4882	10.57	34.35	40.33	42.84	47.43	74.00	-26.57	Vertical
7323	12.91	37.31	40.40	36.75	46.57	74.00	-27.43	Vertical
9764	13.89	38.03	37.94	31.46	45.44	74.00	-28.56	Vertical
12205	17.95	39.23	39.30	33.57	51.45	74.00	-22.55	Vertical
14646	17.18	41.27	45.96	31.81	44.30	74.00	-29.70	Vertical
4882	10.57	34.35	40.33	41.52	46.11	74.00	-27.89	Horizontal
7323	12.91	37.31	40.40	39.26	49.08	74.00	-24.92	Horizontal
9764	13.89	38.03	37.94	33.60	47.58	74.00	-26.42	Horizontal
12205	17.95	39.23	39.30	35.45	53.33	74.00	-20.67	Horizontal
14646	17.18	41.27	45.96	34.01	46.50	74.00	-27.50	Horizontal



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Test channel:	Middle	Remark:	Average

Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB/m)	Preamp Factor (dB)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4882	10.57	34.35	40.33	31.02	35.61	54.00	-18.39	Vertical
7323	12.91	37.31	40.40	26.36	36.18	54.00	-17.82	Vertical
9764	13.89	38.03	37.94	20.38	34.36	54.00	-19.64	Vertical
12205	17.95	39.23	39.30	22.27	40.15	54.00	-13.85	Vertical
14646	17.18	41.27	45.96	20.70	33.19	54.00	-20.81	Vertical
4882	10.57	34.35	40.33	29.34	33.93	54.00	-20.07	Horizontal
7323	12.91	37.31	40.40	27.33	37.15	54.00	-16.85	Horizontal
9764	13.89	38.03	37.94	22.26	36.24	54.00	-17.76	Horizontal
12205	17.95	39.23	39.30	24.21	42.09	54.00	-11.91	Horizontal
14646	17.18	41.27	45.96	22.68	35.17	54.00	-18.83	Horizontal

Toot abanaali	I limboot	Damarik	Dools
Test channel:	Highest	Remark:	Peak

Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB/m)	Preamp Factor (dB)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
2480.3	5.08	32.29	37.64	59.55	59.28	74.00	-14.72	Vertical
4960	10.43	34.45	41.03	42.42	46.27	74.00	-27.73	Vertical
7440	12.72	37.37	40.01	37.66	47.74	74.00	-26.26	Vertical
9920	14.24	38.08	37.78	30.66	45.20	74.00	-28.80	Vertical
12400	17.55	39.34	39.48	33.21	50.62	74.00	-23.38	Vertical
14880	16.69	41.16	46.61	32.98	44.22	74.00	-29.78	Vertical
2480.3	5.08	32.29	37.64	62.47	62.20	74.00	-11.80	Horizontal
4960	10.43	34.45	41.03	39.10	42.95	74.00	-31.05	Horizontal
7440	12.72	37.37	40.01	37.14	47.22	74.00	-26.78	Horizontal
9920	14.24	38.08	37.78	30.45	44.99	74.00	-29.01	Horizontal
12400	17.55	39.34	39.48	34.21	51.62	74.00	-22.38	Horizontal
14880	16.69	41.16	46.61	32.43	43.67	74.00	-30.33	Horizontal

Test channel:	Highest	Remark:	Average
rest chamilei.	nignesi	Kelliaik.	Average

Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB/m)	Preamp Factor (dB)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
2480.3	5.08	32.29	37.64	44.66	44.39	54.00	-9.61	Vertical
4960	10.43	34.45	41.03	30.98	34.83	54.00	-19.17	Vertical
7440	12.72	37.37	40.01	26.21	36.29	54.00	-17.71	Vertical
9920	14.24	38.08	37.78	18.57	33.11	54.00	-20.89	Vertical
12400	17.55	39.34	39.48	22.21	39.62	54.00	-14.38	Vertical
14880	16.69	41.16	46.61	20.96	32.20	54.00	-21.80	Vertical
2480.3	5.08	32.29	37.64	46.73	46.46	54.00	-7.54	Horizontal
4960	10.43	34.45	41.03	27.88	31.73	54.00	-22.27	Horizontal
7440	12.72	37.37	40.01	26.20	36.28	54.00	-17.72	Horizontal
9920	14.24	38.08	37.78	18.63	33.17	54.00	-20.83	Horizontal
12400	17.55	39.34	39.48	22.20	39.61	54.00	-14.39	Horizontal
14880	16.69	41.16	46.61	20.82	32.06	54.00	-21.94	Horizontal



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#### 5.10 **RF Exposure Compliance Requirement**

### 5.10.1 Standard requirement

15.247(b)(4) requirement:

(4) The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section. if transmitting antennas of directional gain greater than 6 dBi are used. the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1). (b)(2). and (b)(3) of this section. as appropriate. by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

### 5.10.2 EUT RF Exposure

Predication of MPE limit at a given distance

 $S = PG/4\pi R^2$ 

S = power density (in appropriate units, e.g. mW/cm2)

P = power input to the antenna (in appropriate units, e.g., mW).

G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor, is normally numeric gain.

R = distance to the center of radiation of the antenna (appropriate units, e.g., cm)

Maximum peak output power at antenna input terminal: -3.11dBm (0.489mw)

Prediction distance: >20 (cm) Predication frequency: 2402 (MHz) Antenna Gain (typical): 2.0(dBi) Antenna Gain (typical): 1.58 (numeric)

The worst case is power density at predication frequency at 20 cm:

Power density S =  $PG/4\pi R^2 = 0.489 \text{mW} \times 1.58 / (4 \times 3.14 \times 20^2)$ 

 $= 0.000154 \text{ mW/cm}^2$ 

MPE limit for general population exposure at prediction frequency:1 (mW/cm2)

So the SAR report is not required.

Note: For mobile or fixed location transmitters, the minimum separation distance is 20cm, even if calculations indicate that the MPE distance would be less.