

FCC 47 CFR PART 15 SUBPART C

CERTIFICATION TEST REPORT

FOR

GSM/WCDMA/LTE Phone with BT, DTS/UNII a/b/g/n/ac & NFC

FCC ID: PY7-PM0944

REPORT NUMBER: R11139405A-E6V2

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Prepared for SONY MOBILE COMMUNICATIONS INC. 4-12-3 HIGASHI-SHINAGAWA, SHINAGAWA –KU,TOKYO, 140-0002, JAPAN

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NVLAP Lab code: 200246-0

Revision History

Rev.	Issue Date	Revisions	Revised By
V1	4/20/2016	Initial issue	C. OOI
V2	4/25/2016	Updated Output Power, Device Serial Numbers and Section 6.	C. OOI

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e e	3.5. 8.5. 8.5. 8.5.	AVERAGE TIME OF OCCUPANCY	24 24 26 28
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1. ATTESTATION OF TEST RESULTS

COMPANY NAME:SONY MOBILE COMMUNICATIONS, INC.EUT DESCRIPTION:GSM/WCDMA/LTE Phone with BT, DTS/UNII a/b/g/n/ac & NFCSERIAL NUMBER:Z0ZW, CB5129YMBE, CB5129YM7ADATE TESTED:APRIL 18 - 20, 2016

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart C	Pass

UL LLC reports apply only to the specific samples tested under stated test conditions. All samples tested were in good operating condition throughout the entire test program. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. UL LLC shall have no liability for any deductions, inferences or generalizations drawn by the client or others from UL LLC issued reports. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government.

This report may contain test results that are not covered by the NVLAP or A2LA accreditation. The scope of accreditation is limited to the specific tests that are listed on the NVLAP and/or A2LA websites referenced at the end of this report.

Approved & Released For UL LLC. By:

Prepared By:

FRANK IBRAHIM CONSUMER TECHNOLOGY DIVISION Program Manager

CHOON OOI CONSUMER TECHNOLOGY DIVISION WISE PROJECT LEAD

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC and ANSI C63.10-2013, FCC CFR 47 Part 2, and FCC CFR 47 Part 15.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 12 Laboratory Dr., Research Triangle Park, NC 27709, USA and 2800 Suite B, Perimeter Park Drive, Morrisville, NC 27560.

12 Laboratory Dr., RTP, NC 27709	
Chamber A	
Chamber C	

2800 Suite B Perimeter Park Dr.,				
Morrisville, NC 27560				
Chamber NORTH				
🛛 Chamber SOUTH				

The onsite chambers are covered under Industry Canada company address code 2180C with site numbers 2180C -1 through 2180C-4, respectively.

UL LLC (RTP) is accredited by NVLAP, Laboratory Code 200246-0. The full scope of accreditation can be viewed at http://www.nist.gov/nvlap/

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB) 36.5 dBuV + 18.7 dB/m + 0.6 dB – 26.9 dB = 28.9 dBuV/m

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4.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER		UNCERTAINTY
Total RF power, conducted	+/-	0.45
RF power density, conducted	+/-	1.50
Spurious emissions, conducted	+/-	2.94
All emissions, radiated up to 26 GHz	+/-	5.36
Temperature	+/-	0.07
Humidity	+/-	2.26
DC and low frequency voltages	+/-	1.27
Conducted Disturbance, 0.15 to 30 MHz	+/-	2.37

Uncertainty figures are valid to a confidence level of 95%.

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5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a GSM/WCDMA/LTE Phone with BT, DTS/UNII a/b/g/n/ac & NFC

5.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum peak conducted output power as follows:

Frequency Range	Mode	Output Power	Output Power
(MHz)		(dBm)	(mW)
2402 - 2480	Basic GFSK	10.31	10.74
2402 - 2480	Enhanced 8PSK	8.88	7.73

Note: GFSK, Pi/4-DQPSK, 8PSK average Power are all investigated, The GFSK & 8PSK Power are the worst case. Testing is based on this mode of showing compliance. For average power data, please refer to section 8.7.

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes integrated antenna, with a maximum as below:

Frequency (MHz)	Antenna Gain (dBi)
2.402	-7.0
2.441	-6.2
2.480	-6.9

5.4. SOFTWARE AND FIRMWARE

The firmware/SW installed in the EUT during testing was SONY, s_atp_xxxx_1_600_7_9

The hardware version was A

The test utility software used during testing was Tera Term, rev 4.8.3(SVN#5602)

5.5. WORST-CASE CONFIGURATION AND MODE

Radiated emission and power line conducted emission were performed with the EUT set to transmit on the channel with higher output power as worst-case scenario.

The fundamental of the EUT was investigated in three orthogonal orientations X, Y, Z it was determined that Z orientation was worst-case orientation; therefore, all final radiated testing was performed with the EUT in Z orientation.

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List							
Description Manufacturer Model Serial Number							
AC Adapter	SONY	UCH 20 1295-70821	N/A	N/A			
Earphone	SONY	MH410C	N/A	N/A			
Laptop	Lenovo	T450	PC-0A2UQU	N/A			
Laptop AC Adapter	Lenovo	ADLX65NLC2A	11S45N0263Z1ZS995256HR	N/A			

I/O CABLES

	I/O Cable List							
Cable	Cable Port # of identical Connector Cable Type Cable Remarks							
No		ports	Туре		Length (m)			
1	DC Power	1	Mini-USB	Shielded	1m	N/A		
2	Audio	1	Mini-Jack	Unshielded	1.5m	N/A		

TEST SETUP

The EUT is continuously communicating to the Bluetooth tester during the tests. EUT was set in the Hidden menu mode to enable BLE communications.

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SETUP DIAGRAM FOR TESTS



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6. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

Equip. ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
	0.009-30MHz	(Loop Ant.)			
AT0079	Active Loop Antenna	ETS-Lindgren	6502	2015-12-08	2016-12-31
	30-1000 MHz				
AT0074	Hybrid Broadband Antenna	Sunol Sciences Corp.	JB3	2015-06-10	2016-06-30
	1-18 GHz				
AT0067 (02/28- 03/17/2016)	Double-Ridged Waveguide Horn Antenna, 1 to 18 GHz	ETS Lindgren	3117	2015-03-12	2016-03-31
AT0069 (As of 03/18/2016)	Double-Ridged Waveguide Horn Antenna, 1 to 18 GHz	ETS Lindgren	3117	2016-03-07	2017-03-31
	18-40 GHz				
AT0076	Horn Antenna, 18- 26.5GHz	ARA	MWH-1826/B	2015-08-27	2016-08-31
AT0077	Horn Antenna, 26- 40GHz	ARA	MWH-2640/B	2015-08-27	2016-08-31
	Tuned Dipole Set				
AT0013- AT0016	Four Dipole Antenna Set, 30 to 1000 MHz	EMCO	3121C-DB-1, -2, -3, -4	2015-05-06	2016-05-31
	Gain-Loss Chains				
S-SAC01	Gain-loss string: 0.009-30MHz	Various	Various	2015-10-07	2016-10-31
S-SAC02	Gain-loss string: 30- 1000MHz	Various	Various	2015-06-09	2016-06-30
S-SAC03	Gain-loss string: 1- 18GHz	Various	Various	2015-08-22	2016-08-31
S-SAC04	Gain-loss string: 18- 40GHz	Various	Various	2016-02-29	2017-02-28
	Receiver & Software				
SA0025	Spectrum Analyzer	Agilent	N9030A	2016-03-17	2017-03-31
SA0026 (18- 40GHz RSE)	Spectrum Analyzer	Agilent	N9030A	2016-02-24	2017-02-28
SOFTEMI	EMI Software	UL	Version 9.5	NA	NA
	Additional Equipment used				

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Equip. ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
HI0050	Temp/Humid/Pressur e Meter	Cole-Parmer	99760-00	2015-07-01	2016-07-31

Equipment ID Description		Manufacturer	Model Number	Last Cal.	Next Cal.
	Conducted Room 1				
SA0019	Spectrum Analyzer	Agilent Technologies	E4446A	2015-09-02	2016-09-30
PWM004	RF Power Meter	Keysight Technologies	N1911A	2015-06-08	2016-06-08
PWS004	Peak and Avg Power Sensor, 50MHz to 6GHz	Keysight Technologies	E9323A	2015-06-05	2016-06-05
HI0079	Temp/Humid/Pressure Meter	Springfield	PreciseTemp	2015-07-1	2016-07-31
MM0167	True RMS Multimeter	Agilent	U1232A	2015-08-17	2016-08-31
76022	DC Regulated Power Supply	CircuitSpeciali sts.Com	CSI3005X5	NA	NA
T1023	EMPower USB RF Power Sensor, 10MHz to 6GHz	ETS Lindgren	7002-006	2015-10-01	2016-10-01

Test Software List								
Description	Manufacturer	Model	Version					
Radiated Software	UL	UL EMC	Ver 9.5, Aug 20, 2015					
Conducted Software	UL	UL EMC	Ver 9.5, Aug 20, 2015					
Antenna Port Software	UL	UL RF	Ver 4.3, Mar 16, 2016					

7. SUMMARY TABLE

FCC Part Section	RSS Section(s)	Test Description	Test Limit	Test Condition	Test Result
2.1049	RSS-GEN 6.6	Occupied Bandwidth (99%)	N/A		Pass
2.1051, 15.247 (d)	RSS-247 5.5	Band Edge / Conducted Spurious Emission	-20dBc		Pass
15.247 (b)(1)	RSS-247 5.4.2	TX conducted output power	<21dBm		Pass
15.247 (a)(1)	RSS-247 5.1.2	Hopping frequency separation	> 25KHz	Conducted	Pass
15.247 (a)(1)(iii)	RSS-247 5.1.4	Number of Hopping Channels	More than 15 non- overlapping channels		Pass
15.247 (a)(1)(iii)	RSS-247 5.1.4	Avg Time of Occupancy	< 0.4sec		Pass
15.207 (a)	RSS-GEN 8.8	AC Power Line conducted emissions	Section 10		Pass
15.205, 15.209, 15.247(d)	RSS-GEN 8.9/7	Radiated Spurious Emission	< 54dBuV/m	Radiated	Pass

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8. ANTENNA PORT TEST RESULTS

8.1. ON TIME, DUTY CYCLE

LIMITS

None; for reporting purposes only

PROCEDURE

KDB 558074 Zero-Span Spectrum Analyzer Method

RESULTS

			ON TIME	AND DUTY	<u>CYCLE R</u>	ESULTS		
								_
	Mode	ON Time	Period	Duty Cycle	Duty	Duty Cycle	1/T	
		В		x	Cycle	Correction Factor	Minimum VBW	
		(msec)	(msec)	(linear)	(%)	(dB)	(kHz)	
	GFSK	2.885	3.753	0.769	76.87%	1.14	0.347	
	8PSK	2.893	3.753	0.771	77.08%	1.13	0.346	
			[DUTY CYC	LE PLOTS			
		GFSK				8PSK		
APv4.3(0) Ref 20 dE *Peak Log 10 dB/ Offst 10 dB/ Offst 10 dB/ Offst 10 dB/ Center 2. Res BH 8 Marker 18 38	31616),46722, Conducted R 3m #Atter 3m #Atter 4000 GHz 441 0000 GHz MHz 1 Trace Type (1) Time (1) Time	M 1 20 dB	1 0 0 0 0 0 0 0 0 0 0 0 0 0	▲ Mkr3 3.753 ms 0.026 dB 3 	APv4.3(031616),467 Ref 10 dBm	*Pitten 20 dB *VBH 50 MHz Type *VBH 50 MHz Time 1.31 m² Time 1.31 m² Time 1.31 m² Time 3.753 mş	▲ Mkr3	3.753 ms -0.002 dB
	:							

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8.2. 20 dB AND 99% BANDWIDTH

<u>LIMIT</u>

None; for reporting purposes only.

TEST PROCEDURE

DA 00-705: The transmitter output is connected to a spectrum analyzer. The RBW is set to \geq 1% of the 20 dB bandwidth. The VBW is set to \geq RBW. The sweep time is coupled.

RESULTS

8.2.1. GFSK 20 dB BANDWIDTH PLOTS AND TABLE

	TEST RESULT	TABLE	LOW CHANNEL	
			★ Agilent 18:05:53 Apr 19, 2016	Measure
			APv4.3(031616),49497, Conducted RM 1 ▲ Mkr1 906 kHz Ref 10 dBm Atten 10 dB -0.148 dB #Peak 0 -0.148 dB	Meas Off
Channel	Frequency	20 dB Bandwidth		Channel Power
Channel	(MHz)	(MHz)		Occupied BW
Low Middle	2402	0.906	-14.2 dBm/ // // // // // // // // // // /	ACP
High	2441	0.910	V1 S2 S3 FS AB	Multi Carrier Power
			€(f): f>50k Swp	Power Stat CCDF
			Сепter 2.402 000 GHz Span 2 MHz •Res BW 22 kHz •VBW 68 kHz Sweep 4 ms (1001 pts)	More 1 of 2
			Copyright 2000–2010 Agilent Technologies	
		NEL	HIGH CHANNEL	
* Agilent 17:49:58 Apr	19, 2016		HIGH CHANNEL	Measure
☆ Agilent 17:49:58 Apr APv4.3(031616),49497, Co Ref 10 dBm Atte #Peak	19, 2016 anducted RM 1 en 10 dB	L Measure ▲ Mkr1 946 kHz -0.018 dB Meas Of	HIGH CHANNEL	Measure Meas Off
Agilent 17:49:58 Apr APv4.3(031616),49497, Cl Cl	19, 2016 onducted RM 1 in 10 dB	NEL L Measure △ Mkr1 946 kHz -0.018 dB Meas Of L Channel Power	HIGH CHANNEL	Measure Meas Off Channel Power
Agilent 17:49:58 Apr APv4.3(031616).49497, Cr Cr Ref 10 Bm Atte Log 10 dB/ 0 dB/ 0ffst 0ffst 10,4 0ffst 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	19, 2016 onducted RM 1 on 10 dB	NEL L Measure △ Mkr1 946 kHz -0.018 dB Meas Off Channel Power Occupied Bł	HIGH CHANNEL	Measure Meas Off Channel Power Occupied BW
Agilent 17:49:58 Apr APV4.3(031616),49497, Ct Ct Ref 10 dBm Atte *Peak Log 10 10 dB/ -18 0ffst -9 -9 10.4 -9 -14.9 0H/ -14.9 -9 20 20 -9	19, 2016 onducted RM 1 on 10 dB	NEL <u>L</u> Measure <u>-0.018 dB</u> Meas Of Channel Power Occupied BL RCF	HIGH CHANNEL ** Agilent 18:09:59 Apr 19, 2016 L Aprilent 18:09:59 Apr 19, 2016 L Ref 10 dBm Atten 10 dB 0.039 dB *Peak Log 0.039 dB 10 dB/ 0.0439 dB 10 dB/ 0.0439 dB 10 dB/ 0.0439 dB 10.4 dB/ 0.0440 dB 10.4 dB/ 0.0440 dB 00 10 0.0440 dB 01 10 10 10.4 10 10 10.4 10 10 10.4 10 10 10.4 10 10 10.4 10 10 10.4 10 10 10.4 10 10 10.4 10 10	Measure Meas Off Channel Power Occupied BW ACP
Agilent 17:49:58 Apr APV4.3(031616),49497, C C Ref 10 dBm Atte *Peak Log 0 10 dBm Atte *Peak Log 0 10 dBm Atte *Peak Log 0 10	19, 2016 onducted RM 1 on 10 dB	INEL L Measure -0.018 dB Meas Off -0.018 dB Channel Power Channel Power Occupied BL ACF Multi Carrier Power	HIGH CHANNEL ** Agilent 18:09:59 Apr 19, 2016 L APV4.3(031616),49497, Conducted RM 1 	Measure Meas Off Channel Power Occupied BW ACP Multi Carrier Power
Agilent 17:49:58 Apr APV4.3(031616),49497, C C Ref 10 dBm Atte *Peak Log 10 10 dB/ 14.9 0ffst -14.9 -14.9 dBm *PAug 20 20 V1 S2 S3 FS AP AP -150 -160 AB	19, 2016 onducted RM 1 on 10 dB	INEL L Measure A Mkr1 946 kHz -0.018 dB Meas Of Channel Power Occupied B Occupied B A Multi Carrier Power Coperation Cope	HIGH CHANNEL ** Agilent 18:09:59 Apr 19, 2016 L APV4.3(031616),49497, Conducted RM 1 	Measure Meas Off Channel Power Occupied BW ACP Multi Carrier Power Stat CCDF
Agilent 17:49:58 Apr APV4.3(031616),49497, C C Ref 10 dBm Atte *Peak Log 10 10 dB/ 11,6 01 0 -14,9 04 -14,9 -14,9 04 -14,9 -14,9 05 -14,9 -14,9 06 -14,9 -14,9 07 -14,9 -14,9 08 -14,9 -14,9 09 20 -20 20 -20 -20 21 -25,05 -25,05 09 -20 -20 20 -20 -20 21 -25,05 -25,05 00 -24,95 -24,95 01 -24,95 -24,95 02 -24,95 -24,95 03 FS -24,95 04 -24,95 -24,95 05,95 -24,95 -24,95 04,95	19, 2016 onducted RM 1 on ducted RM 1 on 10 dB	L Measure ▲ Mkr1 946 kHz -0.018 dB -0.018 dB Meas Off Channel Power Occupied Bł Occupied Bł ACF Power Power Star Span 2 MHz More Sweep 4 ms (1001 pts) 1 of 2	HIGH CHANNEL ** Agilent 18:09:59 Apr 19, 2016 L APV4.3(031616),49497, Conducted RM 1 Mkr1 910 kHz Ref 10 dBm Atten 10 dB 0.039 dB •Peak 0 0.039 dB Log 0 0 0.039 dB 10 dB 0.039 dB 0.039 dB 10 0 0 0.039 dB 10 0 0 0.049 dB 0 0 0 0.049 dB 0 0 0 0 0.049 dB 0 0 0 0 0 0.049 dB 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Measure Meas Off Channel Power Occupied BW ACP Multi Carrier Power Stat CCDF Power Stat CCDF

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8.2.2. GFSK 99% BANDWIDTH PLOTS AND TABLE

TEST RESULT	TABLE	LOW CHANNEL	
		* Agilent 18:06:28 Apr 19, 2016 L	Measure
		Ch Freq 2.402 GHz Trig Free Occupied Bandwidth Averages: 20	Meas Off
			Channel Power
Channel Frequency (MHz)	99% Bandwidth (MHz)	HPv4.3(051616),4949/, Londucted KM 1 Ref 10 dBm	Occupied BW
Low 2402	0.597		ACP
Middle 2441 High 2480	0.577	B B Center 2.402 000 GHz • Res BH 30 kHz • VBH 91 kHz • Sweep 100 ms (100 ms)	Multi Carrier Power
		Occupied Bandwidth Occ BW X Pwr 99.00 X	Power Stat CCDF
		Transmit Freq Error 1.489 kHz x dB Bandwidth 758.038 kHz*	More 1 of 2
		Copyright 2000-2010 Agilent Technologies	
MID CHAN	NEL	HIGH CHANNEL	
Agilent 17:51:06 Apr 19, 2016	L Measur		Measure
Ch Freq 2.441 GHz Occupied Bandwidth Averages	Trig Free Mea	Ch Freq 2.48 GHz Trig Free Occupied Bandwidth Averages: 20	Meas Off
APv4.3(031616),49497, Conducted RM 1	Channel Po	APv4.3(031616),49497, Conducted RM 1	Channel Power
Ref 10 dBm #Atten 20 dB *Samp Log	Cccupie	Ref 10 dBm *Atten 20 dB *Samp Log 10	Occupied BW
dB/ dB/ 0ffst 10.4 4 4 4 4 4 4 4 4 4 4 4 4 4			ACP
dB Center 2.441 000 GHz	Span 2 MHz Po	er Pr Center 2.480 000 GHz Span 2 MHz	Multi Carrier Power
Interset Interset	ep 100 ms (1001 pts) W X Pwr 99.00 X x dB -20.00 dB	at F Occupied Bandwidth Occ BM % Pwr 99.00 % COA CCC 10 ms (1001 pts) Cocupied Bandwidth Coc BM % Pwr 99.00 % COA CCC 10 ms 48 -20 00 AR COA CCC 10 ms 48 -20 00 AR	Power Stat CCDF
S//.400// KHZ Transmit Freq Error 6.168 kHz x dB Bandwidth 762.598 kHz*		Transmit Freq Error 5.997 kHz x dB Eoretical 2 x dB Bandwidth 761.962 kHz* 761.962 kHz*	More 1 of 2

8.2.3. 8PSK 20 dB BANDWIDTH PLOTS AND TABLE

	TEST RESULT	TABLE	LOW CHANNEL		
			* Agilent 18:20:33 Apr 19, 2016 L	leasure	
			APv4.3(031616),49497, Conducted RM 1 ▲ Mkr1 1.287 MHz Ref 10 dBm Atten 10 dB 0.464 dB Peak Log	Meas Off	
Channel	Fraguanay	20 dD Dandwidth		nnel Power	
Channel	(MHz)	20 dB Bandwidth (MHz)		cupied BW	
Low Middle	2402	1.287		ACP	
High	2480	1.275		ulti Carrier Power	
			£(f): f>50k Swp	Power Stat CCDF	
			Center 2.402 000 GHz Span 3 MHz	More 1 of 2	
			Copyright 2000-2010 Agilent Technologies		
	MID CHAN	NEL	Copyright 2000-2010 Agilent Technologies HIGH CHANNEL		
★ Agilent 18:15:35 Apr	MID CHAN	NEL L Measure	Copyright 2000-2010 Agilent Technologies HIGH CHANNEL Agilent 18:24:57 Apr 19, 2016	leasure	
★ Agilent 18:15:35 Apr APV4.3(031616),49497, 0 Ref 10 dBm Att ●Peak	MID CHAN r 19, 2016 Conducted RM 1 en 10 dB	NEL L Measure 	Koro of Lie Mile Koro of Lie Mile <th koro="" lie="" mile<<="" of="" th=""><td>leasure Meas Off</td></th>	<td>leasure Meas Off</td>	leasure Meas Off
★ Agilent 18:15:35 Api APv4.3(031616),49497, 0 Ref 10 dBm Att: #Peak Log 0 0 10 dB/ 0 0 0 0 </td <td>MID CHAN r 19, 2016 Conducted RM 1 en 10 dB</td> <td>NEL Mkr1 1.278 MHz -0.289 dB Meas Of Channel Powe</td> <th>Kos off Ed. Mile Mile Toch of Mile Toch of Mile Mile Toch of Mile Toch of Mile Mile Toch of Mile To</th> <td>leasure Meas Off mel Power</td>	MID CHAN r 19, 2016 Conducted RM 1 en 10 dB	NEL Mkr1 1.278 MHz -0.289 dB Meas Of Channel Powe	Kos off Ed. Mile Mile Toch of Mile Toch of Mile Mile Toch of Mile Toch of Mile Mile Toch of Mile To	leasure Meas Off mel Power	
★ Agilent 18:15:35 Apr APv4.3(031616),49497, (Ref 10 dBm Rtt Peak I I Log I I I 10 dB I I 0 I I I I 0 I I I I I 0 I	MID CHAN r 19, 2016 Conducted RM 1 en 10 dB	NEL Measure Mkr1 1.278 MHz -0.289 dB Meas Of Channel Powe Occupied Bl	Kos off LL ML Andre Andre ML Andre ML	leasure Meas Off mel Power	
Agilent 18:15:35 Api APv4.3(031616),49497, 0 Ref 10 dBm Att *Peak	MID CHAN r 19, 2016 Conducted RM 1 en 10 dB	NEL <u>L</u> Measure -0.289 dB Channel Powe Occupied Bl ACI	Kost of LL ML Autor and Au	Meas Off Meas Off Innel Power Innel BW ACP	
Agilent 18:15:35 Api APv4.3(031616),49497, 0 Ref 10 dBm Att *Peak	MID CHAN r 19, 2016 Conducted RM 1 en 10 dB	NEL L Measure -0.289 dB Channel Powe Occupied B ACI Multi Carrie Powe	Copyright 2000-2010 Agilent Technologies High Channel ** Agilent 18:24:57 Apr 19, 2016 L ** Agilent 18:24:57 Apr 19, 2016 Mer 10 dB •0.174 dB •Peak 10 dB/ •0.174 dB	leasure Meas Off Innel Power Cocupied BW ACP Ulti Carrier Power	
Agilent 18:15:35 Api APv4.3(031616),49497, 0 Ref 10 dBm Att *Peak	MID CHAN r 19, 2016 Conducted RM 1 en 10 dB 38 40 40 40 40 40 40 40 40 40 40	NEL L Measure -0.289 dB Channel Powe Channel Powe Channel Powe Channel Powe Power Sta CCD	Web With 2 Mile Copyright 2000-2010 Agilent Technologies HIGH CHANNEL ** Agilent 18:24:57 Apr 19, 2016 L #Peak Mkr1 1.275 MHz #Peak -0.174 dB *Peak ************************************	leasure Meas Off nnel Power ccupied BW ACP ulti Carrier Power Stat CCDF	
Agilent 18:15:35 April Apr	MID CHAN	NEL L Measure -0.289 dB Channel Powe Channel Powe Channel Powe Channel Powe R Power Sta CD Span 3 MHz p 5.933 ms (1001 pts)	** Agilent 18:24:57 April 19:2016 L ** Agilent 18:24:57 April 19:2016 L #Peak Mkr1 1.275 HIGH CHANNEL ** Agilent 18:24:57 April 19:2016 L #Peak Mkr1 1.275 MHz #Peak Mkr1 -0.174 Mkr1 #Pak Martin -0.174 Mkr1 #Pak Martin -0.174 Mkr1 #Pak Martin -0.174 Mkr1 #Pak Martin -0.174 Mkr1 #B Martin -0.174	leasure Meas Off mel Power ccupied BW ACP ulti Carrier Power Stat CCDF More 1 of 2	

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8.2.4. 8PSK 99% BANDWIDTH PLOTS AND TABLE

	TEST RESULT	TABLE		LOW CHANNEL	
				* Agilent 18:21:16 Apr 19, 2016 L	Measure
				Ch Freq 2.402 GHz Trig Free Occupied Bandwidth Averages: 20	Meas Off
	_			Dud 2(021616) 49497. Conducted DM 1	Channel Power
Channel	Frequency (MHz)	99% Ban (MH	dwidth z)	Ref 10 dBm •Atten 20 dB	Occupied BW
Low	2402	1.20)5	10 dB/ 0ffst 10 4 10 4 10 10 10 10 10 10 10 10 10 10	ACP
High	2441 2480	1.20)6	dB Center 2.402 000 GHz Page Bl 2 kHz system 100 ms (1001 ms)	Multi Carrier Power
				Occupied Bandwidth Occ BW Z Miz Solide J 100 Miz 99.00 X 1 2052 MHz x dB -20.00 dB -20.00 dB -20.00 dB	Power Stat CCDF
				Transmit Freq Error 12.904 kHz × dB Bandwidth 1.261 MHz*	More 1 of 2
				Copyright 2000–2010 Agilent Technologies	
	MID CHAN	NEL		HIGH CHANNEL	
Agilent 18:16:15 Apr	19, 2016	L	Measure		Measure
Ch Freq 2. Occupied Bandwidth	441 GHz Averages	Trig Free s:20	Meas Off	Ch Freq 2.48 GHz Trig Free Occupied Bandwidth Averages: 20	Meas Off
APv4.3(031616),49497, C	onducted RM 1		Channel Power	APv4.3(031616),49497, Conducted RM 1	Channel Power
Ref 10 dBm #Htte #Samp Log	en 20 dB		Occupied BW	Ket 10 dbm +Htten 20 db	Occupied BW
dB/ 0ffst 10.4			ACP	10 dB/ Offst 10.4 10	ACP
dB Center 2.441 000 GHz		Span 5 MHz	Multi Carrier Power	Center 2.480 000 GHz Span 5 MHz	Multi Carrier Power
Occupied Bandwing	**************************************	W % Pwr 99.00 % x dB -20.00 dB	Power Stat CCDF	Image: Wide provide and width Occ BM % Pwr 99.00 % 1 20058 MHz × dB -20.00 dB	Power Stat CCDF
Transmit Freq Error x dB Bandwidth	25.540 kHz 1.251 MHz*		More 1 of 2	Transmit Freq Error 27.069 kHz x dB Bandwidth 1.252 MHz*	More 1 of 2

8.3. HOPPING FREQUENCY SEPARATION

FCC §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 PROCEDURE

DA 00-705: The transmitter output is connected to a spectrum analyzer. The RBW is set to 300 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

RESULTS



8.3.1. BASIC DATA RATE GFSK MODULATION

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8.3.1. ENHANCED DATA RATE 8PSK MODULATION



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8.4. NUMBER OF HOPPING CHANNELS

FCC §15.247 (a) (1) (iii)

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

TEST PROCEDURE

DA 00-705: The transmitter output is connected to a spectrum analyzer. The span is set to cover the entire authorized band, in either a single sweep or in multiple contiguous sweeps. The RBW is set to a maximum of 1 % of the span. The analyzer is set to Max Hold.

RESULTS

Normal Mode: 79 Channels observed.

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REPORT NO: R11139405A-E6V2 FCC ID: PY7-PM0944

8.4.1. NUMBER OF HOPPING CHANNELS PLOTS

Number of Hopping Channels (100 MHz Span)		Number of Hopping Channels (30 MHz Span, 1 st	Segment)
* Agilent 18:45:22 Apr 19, 2016 L	Measure	* Agilent 18:43:29 Apr 19, 2016 L	Measure
APv4.3(031616),49497, Conducted RM 1 Ref 20 dBm Atten 20 dB •Peak	Meas Off	APv4.3(031616),49497, Conducted RM 1 Ref 20 dBm Atten 20 dB #Peak	Meas Off
10 10 dB/ 0ffst	Channel Power		Channel Power
10.4 dB DI -9.8	Occupied BW	10.4 / / / / / / / / / / / / / / / / / / /	Occupied BW
dBm LgAv	ACP	dBm •PAvg	ACP
	Multi Carrier Power	M1 \$2 \$3 FC AA	Multi Carrier Power
ЕСТЛ. FTun Swp	Power Stat CCDF	БСТ7. FTun Sмр	Power Stat CCDF
Center 2.440 00 GHz Span 100 MHz •Res BW 1 MHz •VBW 1 MHz Sweep 20 ms (1001 pts)	More 1 of 2	Center 2.415 00 GHz Span 30 MHz •Res BW 300 kHz •VBW 300 kHz Sweep 20 ms (1001 pts)	More 1 of 2
Copyright 2000-2010 Agilent Technologies	Segment)	Copyright 2000-2010 Agilent Technologies	Sogmont)
Arilant 18:44:07 Apr 19, 2016	Segment)	Adiant 18/14/33 Apr 19, 2016	Segment)
APv4.3(0316)49497, Conducted RM 1 Ref 20 dBm Atten 20 dB	Meas Off	Apple 10.44.30 Thirty, Edit APv4.3(0316)49497, Conducted RM 1 Ref 20 dBm #Peak	Meas Off
10 10 dB/ 0ffst	Channel Power		Channel Power
10.4	Occupied BW	10.4 dB Di	Occupied BW
dBm •PAvg	ACP	ePAvg	ACP
M1 \$2 \$3 FC #A	Multi Carrier Power	M1 52 53 FC AA	Multi Carrier Power
£(f):	Power Stat CCDF	Е(f): FTun Swp	Power Stat CCDF
Image: Center 2.445 00 GHz Span 30 MHz •Res BW 300 kHz •VBW 300 kHz Sweep 20 ms (1001 pts)	More 1 of 2	Center 2.475 00 GHz •Res BW 300 kHz •VBW 300 kHz Sweep 20 ms (1001 pts)	More 1 of 2
Copyright 2000-2010 Agilent Technologies		Copyright 2000–2010 Agilent Technologies	
NOTE:			

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8.5. AVERAGE TIME OF OCCUPANCY

LIMIT

FCC §15.247 (a) (1) (iii)

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the numNumber ober of hopping channels employed.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The span is set to 0 Hz, centered on a single, selected hopping channel. The width of a single pulse is measured in a fast scan. The number of pulses is measured in a 3.16 second scan, to enable resolution of each occurrence.

The average time of occupancy in the specified 31.6 second period (79 channels * 0.4 s) is equal to 10 * (# of pulses in 3.16 s) * pulse width.

For AFH mode, the average time of occupancy in the specified 8 second period (20 channels * 0.4 seconds) is equal to 10 * (# of pulses in 0.8 s) * pulse width.

RESULTS

		AV	ERAGE TIME	OF OCCUPANC	Y		
	DH Packet	Pulse Width (msec)	Number of Pulses in 3.16 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)	
	GFSK Norma	l Mode					
	DH1	0.381	32	0.1219	0.4	-0.2781	
	DH3	1.638	15	0.2457	0.4	-0.1543	
	DH5	2.884	11	0.3172	0.4	-0.0828	
	DH Packet	Pulse Width (sec)	Number of Pulses in 0.8 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)	
	GFSK AFH M	lode					
	DH1	0.381	8	0.03048	0.4	-0.3695	
	DH3	1.638	3.75	0.06143	0.4	-0.3386	
	DH5	2.884	2.75	0.07931	0.4	-0.3207	
NOTE:							

8.5.1. BASIC DATA RATE GFSK MODULATION



Pulse Width and Number of Pulses in 3.16 Seconds Period Plots

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		AV	ERAGE TIME	OF OCCUPANC	Y		
	DH Packet	Pulse Width (msec)	Number of Pulses in 3.16 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)	
	8PSK Norma	l Mode					
	DH1	0.388	31	0.1203	0.4	-0.2797	
	DH3	1.636	15	0.2454	0.4	-0.1546	
	DH5	2.892	8	0.2314	0.4	-0.1686	
	DH Packet	Pulse Width (sec)	Number of Pulses in 0.8 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)	
	8PSK AFH M	ode					
	DH1	0.388	7.75	0.03007	0.4	-0.3699	
	DH3	1.636	3.75	0.06135	0.4	-0.3387	
	DH5	2.892	2	0.05784	0.4	-0.3422	
NOTE:							

8.5.2. ENHANCED DATA RATE 8PSK MODULATION

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Pulse Width and Number of Pulses in 3.16 Seconds Period Plots

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8.6. OUTPUT POWER

<u>LIMIT</u>

§15.247 (b) (1)

The maximum antenna gain is less than 6 dBi, therefore the limit is 21 dBm.

TEST PROCEDURE

DA 00-705: The transmitter output is connected to a power meter with peak detector using gated method.

RESULTS

		BASIC D	ATA RATE GFSK	(
		Frequency	Output	Limit	Margin							
	Channel	(MHz)	Power (dBm)	(dBm)	(dB)							
	Low	2402	8.430	21	-12.57							
	Middle	2441	10.310	21	-10.69							
	High	2480	8.890	21	-12.11							
ΕΝΗΔΝΙζΕΩ ΠΑΤΑ ΒΑΤΕ 8ΠΡSK												
			0,1,1,1,0,1,2,00	- on								
						-						
	Channel	Frequency	Output	Limit	Margin							
	Channer	(MHz)	Power (dBm)	(dBm)	(dB)							
	Low	2402	7.170	21	-13.83]						
	Middle	2441	8.880	21	-12.12]						
	High	2480	7.440	21	-13.56							
NOTE:												

8.7. AVERAGE POWER

None; for reporting purposes only.

TEST PROCEDURE

DA 00-705: The transmitter output is connected to a power meter.

RESULTS

		BASIC DATA R	ATE GFSK	
с	Channel	Frequency (MHz)	Average Power (dBm)	
	Low	2402	8.340	
1	Middle	2441	10.230	
	High	2480	8.800	
_				
		ENHANCED DATA	A RATE 8DPSK	
•	Channel	Frequency (MHz)	Average Power (dBm)	
	Low	2402	4.620]
	Middle	2441	6.330	
	High	2480	4.900	
				_
NOTE:				

8.8. CONDUCTED SPURIOUS EMISSIONS

<u>LIMITS</u>

FCC §15.247 (d)

Limit = -20 dBc

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

The bandedges at 2.4 and 2.4835 GHz are investigated with the transmitter set to the normal hopping mode.

RESULTS

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8.8.1. BASIC DATA RATE GFSK MODULATION NON-HOPPING MODE BANDEDGE AND SPURIOUS EMISSIONS PLOTS



8.8.2. BASIC DATA RATE GFSK MODULATION HOPPING MODE SPURIOUS BANDEDGE EMISSIONS PLOTS



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8.8.3. ENHANCED DATA RATE 8PSK MODULATION NON-HOPPING MODE BANDEDGE AND SPURIOUS EMISSIONS PLOTS



8.8.4. ENHANCED DATA RATE 8PSK MODULATION HOPPING MODE SPURIOUS BANDEDGE EMISSIONS PLOTS



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9. RADIATED EMISSION TEST

<u>LIMITS</u>

FCC §15.205 and §15.209

Frequency Range (MHz)	Field Strength Limit (uV/m) at 3 m	Field Strength Limit (dBuV/m) at 3 m
30 - 88	100	40
88 - 216	150	43.5
216 - 960	200	46
Above 960	500	54

TEST PROCEDURE

The EUT is placed on a non-conducting table 80 cm above the ground plane for below 1GHz and 150cm for above 1GHz. The antenna to EUT distance is 3 meters. The EUT is configured in accordance with ANSI C63.10. The EUT is set to transmit in a continuous mode.

For measurements below 1 GHz the resolution bandwidth is set to 100 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

For band edge measurements above 1 GHz the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 1 MHz for peak measurements and 1/T (on time) for average measurement.

The spectrum from 30GHzHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in the 2.4 GHz band.

The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized in both the vertical and the horizontal positions.

RESULTS

9.1. TRANSMITTER ABOVE 1 GHz 9.1.1. BASIC DATA RATE GFSK MODULATION

RESTRICTED BANDEDGE (LOW CHANNEL)



HORIZONTAL PEAK AND AVERAGE PLOT

HORIZONTAL DATA

Trace Markers

Marker	Frequency	Meter	Det	AF T119 (dB/m)	Amp/Cbl/Fltr/Pa	Corrected	Average Limit	Margin	Peak Limit	PK Margin	Azimuth	Height	Polarity
	(GHz)	Reading			d (dB)	Reading	(dBuV/m)	(dB)	(dBuV/m)	(dB)	(Degs)	(cm)	
		(dBuV)				(dBuV/m)							
1	* 2.39	35.23	Pk	32.1	-24.8	42.53	-	-	74	-31.47	284	149	Н
2	* 2.386	37.23	Pk	32.1	-24.8	44.53	-	-	74	-29.47	284	149	Н
3	* 2.39	25.17	V1TR	32.1	-24.8	32.47	54	-21.53	-	-	284	149	Н
4	* 2.39	25.34	V1TR	32.1	-24.8	32.64	54	-21.36	-	-	284	149	Н

* - indicates frequency in CFR15.205/IC 8.10 Restricted Band

Pk - Peak detector





VERTICAL PEAK AND AVERAGE PLOT

VERTICAL DATA

Trace Markers

Marker	Frequency	Meter	Det	AF T119 (dB/m)	Amp/Cbl/Fltr/Pa	Corrected	Average Limit	Margin	Peak Limit	PK Margin	Azimuth	Height	Polarity
	(GHz)	Reading			d (dB)	Reading	(dBuV/m)	(dB)	(dBuV/m)	(dB)	(Degs)	(cm)	
		(dBuV)				(dBuV/m)							
1	* 2.39	35.18	Pk	32.1	-24.8	42.48	-		74	-31.52	11	203	V
2	* 2.379	37.47	Pk	32	-24.8	44.67	-	-	74	-29.33	11	203	V
3	* 2.39	25.14	V1TR	32.1	-24.8	32.44	54	-21.56	-	-	11	203	V
4	* 2.389	25.28	V1TR	32.1	-24.8	32.58	54	-21.42	-	-	11	203	V

* - indicates frequency in CFR15.205/IC 8.10 Restricted Band

Pk - Peak detector

AUTHORIZED BANDEDGE (HIGH CHANNEL)



HORIZONTAL PEAK AND AVERAGE PLOT

HORIZONTAL DATA

Trace Markers

Marker	Frequency	Meter	Det	AF T119 (dB/m)	Amp/Cbl/Fltr/Pa	Corrected	Average Limit	Margin	Peak Limit	PK Margin	Azimuth	Height	Polarity
	(GHz)	Reading			d (dB)	Reading	(dBuV/m)	(dB)	(dBuV/m)	(dB)	(Degs)	(cm)	
		(dBuV)				(dBuV/m)							
1	* 2.484	36.68	Pk	32.3	-24.8	44.18	-	-	74	-29.82	289	177	Н
2	* 2.484	39.2	Pk	32.3	-24.8	46.7	-	-	74	-27.3	289	177	Н
3	* 2.484	27.52	V1TR	32.3	-24.8	35.02	54	-18.98	-	-	289	177	Н
4	* 2.484	27.47	V1TR	32.3	-24.8	34.97	54	-19.03	-	-	289	177	Н

* - indicates frequency in CFR15.205/IC 8.10 Restricted Band

Pk - Peak detector





VERTICAL PEAK AND AVERAGE PLOT

VERTICAL DATA

Trace Markers

Marker	Frequency	Meter	Det	AF T119 (dB/m)	Amp/Cbl/Fltr/Pa	Corrected	Average Limit	Margin	Peak Limit	PK Margin	Azimuth	Height	Polarity
	(GHz)	Reading			d (dB)	Reading	(dBuV/m)	(dB)	(dBuV/m)	(dB)	(Degs)	(cm)	
		(dBuV)				(dBuV/m)							
1	* 2.484	37.02	Pk	32.3	-24.8	44.52	-	-	74	-29.48	7	153	V
2	* 2.484	39.35	Pk	32.3	-24.8	46.85	-	-	74	-27.15	7	153	V
3	* 2.484	26.21	V1TR	32.3	-24.8	33.71	54	-20.29	-	-	7	153	Н
4	* 2.484	26.31	V1TR	32.3	-24.8	33.81	54	-20.19	-	-	7	153	Н

* - indicates frequency in CFR15.205/IC 8.10 Restricted Band

Pk - Peak detector

HARMONICS AND SPURIOUS EMISSIONS



Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

LOW CHANNEL DATA

Marker	Frequency	Meter	Det	AF AT0072	Amp/Cbl/Fltr/Pad	Corrected	Avg Limit	Margin	Peak Limit	PK Margin	Azimuth	Height	Polarity
	(GHz)	Reading		(dB/m)	(dB)	Reading	(dBuV/m)	(dB)	(dBuV/m)	(dB)	(Degs)	(cm)	
		(dBuV)				(dBuV/m)							
1	* 1.721	36.3	PK-U	29.4	-24.7	41	-	-	74	-33	178	112	н
	* 1.721	24.24	V1TR	29.4	-24.7	28.94	54	-25.06	-	-	178	112	н
3	* 2.82	37.06	PK-U	32.3	-24.2	45.16	-	-	74	-28.84	328	153	н
	* 2.819	25.06	V1TR	32.3	-24.2	33.16	54	-20.84	-	-	328	153	Н
2	1.835	31.15	Pk	30.7	-24.7	37.15	-	-	-	-	0-360	101	V
4	2.993	32.53	Pk	32.6	-23.5	41.63	-	-	-	-	0-360	101	Н
5	5.79	35.96	Pk	34.7	-32.3	38.36	-	-	-	-	0-360	101	V
6	15.065	32.29	Pk	39.8	-26.9	45.19	-	-	-	-	0-360	101	н

RADIATED EMISSIONS

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band Pk - Peak detector PK-U: Maximum Peak V1TR: VB=1/Ton, RMS Average where: Ton is packet duration FCC Part15C 2.4GHz RSE.TST Rev 9.5 20 Aug 2015

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Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

MID CHANNEL DATA

RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF AT0072 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1.245	36.08	PK-U	29.1	-26.2	38.98	-	-	74	-35.02	360	200	Н
	* 1.245	24.69	V1TR	29.1	-26.2	27.59	54	-26.41	-	-	360	200	Н
2	* 2.209	36.61	PK-U	31.7	-24.7	43.61	-	-	74	-30.39	360	102	н
	* 2.211	24.79	V1TR	31.7	-24.7	31.79	54	-22.21	-	-	360	102	Н
4	* 7.673	38.04	PK-U	35.6	-29.8	43.84	-	-	74	-30.16	253	199	Н
	* 7.672	26.71	V1TR	35.6	-29.8	32.51	54	-21.49	-	-	253	199	Н
3	* 4.58	41.99	PK-U	34.1	-32.9	43.19	-	-	74	-30.81	253	102	V
	* 4.58	29.72	V1TR	34.1	-32.9	30.92	54	-23.08	-	-	253	102	V
5	17.034	31.04	Pk	41.9	-25.8	47.14	-	-	-	-	0-360	200	V
6	17.683	30.39	Pk	41.4	-24.3	47.49	-	-	-	-	0-360	200	Н

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band Pk - Peak detector PK-U: Maximum Peak V1TR: VB=1/Ton, RMS Average where: Ton is packet duration FCC Part15C 2.4GHz RSE.TST Rev 9.5 20 Aug 2015

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Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

HIGH CHANNEL DATA

RADIATED EMISSIONS

Marker	Frequency	Meter	Det	AF AT0072	Amp/Cbl/Fltr/Pad	Corrected	Avg Limit	Margin	Peak Limit	PK Margin	Azimuth	Height	Polarity
	(GHz)	Reading		(dB/m)	(dB)	Reading	(dBuV/m)	(dB)	(dBuV/m)	(dB)	(Degs)	(cm)	
		(dBuV)				(dBuV/m)							
1	* 1.366	36.13	PK-U	28.9	-25.7	39.33	-	-	74	-34.67	360	200	Н
	* 1.367	24.65	V1TR	28.9	-25.7	27.85	54	-26.15	-	-	360	200	Н
3	* 7.672	37.7	PK-U	35.6	-29.8	43.5	-	-	74	-30.5	360	102	Н
	* 7.673	26.7	V1TR	35.6	-29.8	32.5	54	-21.5	-	-	360	102	Н
2	* 4.7	41.55	PK-U	34.2	-33.2	42.55	-	-	74	-31.45	213	102	V
	* 4.701	30.35	V1TR	34.2	-33.2	31.35	54	-22.65	-	-	213	102	V
4	10.317	30.04	Pk	37.3	-26.4	40.94	-	-	-	-	0-360	101	V
5	16.73	30.62	Pk	42	-25.2	47.42	-	-	-	-	0-360	101	V
6	17.674	30.98	Pk	41.4	-24.3	48.08	-	-	-	-	0-360	200	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band Pk - Peak detector PK-U: Maximum Peak V1TR: VB=1/Ton, RMS Average where: Ton is packet duration FCC Part15C 2.4GHz RSE.TST Rev 9.5 20 Aug 2015

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9.1.2. ENHANCED DATA RATE 8PSK MODULATION

RESTRICTED BANDEDGE (LOW CHANNEL)



HORIZONTAL PEAK AND AVERAGE PLOT

HORIZONTAL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T119 (dB/m)	Amp/Cbl/Fitr/Pa d (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	35.08	Pk	32.1	-24.8	42.38	-	-	74	-31.62	286	214	Н
2	* 2.375	37.38	Pk	32	-24.8	44.58	-	-	74	-29.42	286	214	Н
3	* 2.39	25.05	V1TR	32.1	-24.8	32.35	54	-21.65	-	-	286	214	Н
4	* 2.389	25.24	V1TR	32.1	-24.8	32.54	54	-21.46	-	-	286	214	Н

* - indicates frequency in CFR15.205/IC 8.10 Restricted Band Pk - Peak detector V1TR: VB=1/Ton, RMS Average where: Ton is packet duration



125 UL Morrisville - North Chamber 20 Apr 2016 12:58:39 Restricted Bandedge Project Number:11139405 Client:SOMC Config:2.46 Sample #1 Chrgr & Earphones Mode:BT 8PSK 2402MHz Tested by:Brian Kiewra / John Manser 115 105 95 85 (dBuU/m) Peak Limit (dBuV/m 75 65 .imit (dBuV/m) Avenade 55 45 35 43 10.5MHz/ 2.31 2.415 Frequency (GHz) RBW/VBW Range (GHz) RBI//UBJ Ref/Attn Det/Avg Type Sweep Pts #Swps/Mode Label Range (GHz) 1:2:.1-2.415 IM(-6dB)/3M 187/18 PEAK/Pair Avg(RM5) 28isec(Auto) 6881 MiXH Vertical 2:2:.31-2.415 Ref/Attn Det/Avg Type Sweep Pis #Swps/Mode Label 187/18 PERK/Fwn Ryg(RMS) 1.2sec(Auto) 8681 64/HAXH Vertic ∉ CH Bandedge - V.TST Rev 9.5 28 Aug 2015

VERTICAL PEAK AND AVERAGE PLOT

VERTICAL DATA

Trace Markers

Marker	Frequency	Meter	Det	AF T119 (dB/m)	Amp/Cbi/Fitr/Pa	Corrected	Average Limit	Margin	Peak Limit	PK Margin	Azimuth	Height	Polarity
	(GHz)	Reading			d (dB)	Reading	(dBuV/m)	(dB)	(dBuV/m)	(dB)	(Degs)	(cm)	
		(dBuV)				(dBuV/m)							
1	* 2.39	35.02	Pk	32.1	-24.8	42.32	-	-	74	-31.68	8	181	V
2	* 2.325	37.26	Pk	31.7	-24.7	44.26	-	-	74	-29.74	8	181	V
3	* 2.39	25.12	V1TR	32.1	-24.8	32.42	54	-21.58	-	-	8	181	V
4	* 2.389	25.32	V1TR	32.1	-24.8	32.62	54	-21.38	-	-	8	181	V

* - indicates frequency in CFR15.205/IC 8.10 Restricted Band Pk - Peak detector

AUTHORIZED BANDEDGE (HIGH CHANNEL)



HORIZONTAL PEAK AND AVERAGE PLOT

HORIZONTAL DATA

Trace Markers

Marker	Frequency	Meter	Det	AF T119 (dB/m)	Amp/Cbl/Fltr/Pa	Corrected	Average Limit	Margin	Peak Limit	PK Margin	Azimuth	Height	Polarity
	(GHz)	Reading			d (dB)	Reading	(dBuV/m)	(dB)	(dBuV/m)	(dB)	(Degs)	(cm)	
		(dBuV)				(dBuV/m)							
1	* 2.484	36.87	Pk	32.3	-24.8	44.37	-	-	74	-29.63	289	179	Н
2	* 2.484	38.32	Pk	32.3	-24.8	45.82	-	-	74	-28.18	289	179	Н
3	* 2.484	26.3	V1TR	32.3	-24.8	33.8	54	-20.2	-	-	289	179	Н
4	* 2.484	26.3	V1TR	32.3	-24.8	33.8	54	-20.2	-	-	289	179	Н

* - indicates frequency in CFR15.205/IC 8.10 Restricted Band Pk - Peak detector

V1TR: VB=1/Ton, RMS Average where: Ton is packet duration

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VERTICAL DATA

Trace Markers

Marker	Frequency	Meter	Det	AF T119 (dB/m)	Amp/Cbl/Fltr/Pa	Corrected	Average Limit	Margin	Peak Limit	PK Margin	Azimuth	Height	Polarity
	(GHz)	Reading			d (dB)	Reading	(dBuV/m)	(dB)	(dBuV/m)	(dB)	(Degs)	(cm)	
		(dBuV)				(dBuV/m)							
1	* 2.484	35.83	Pk	32.3	-24.8	43.33	-	-	74	-30.67	4	152	V
2	* 2.484	38.05	Pk	32.3	-24.8	45.55	-	-	74	-28.45	4	152	V
3	* 2.484	26.42	V1TR	32.3	-24.8	33.92	54	-20.08	-	-	4	152	V
4	* 2.484	26.4	V1TR	32.3	-24.8	33.9	54	-20.1	-	-	4	152	V

* - indicates frequency in CFR15.205/IC 8.10 Restricted Band Pk - Peak detector

HARMONICS AND SPURIOUS EMISSIONS



LOW CHANNEL

Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

LOW CHANNEL DATA

RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF AT0072 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
6	* 17.794	35.3	PK-U	41.5	-23.9	52.9	-	-	74	-21.1	126	101	Н
	* 17.794	23.82	V1TR	41.5	-23.9	41.42	54	-12.58	-	-	126	101	н
1	2.08	31.43	Pk	31.2	-24.7	37.93	-	-	-	-	0-360	200	Н
2	6.361	34.14	Pk	35.4	-30.5	39.04	-	-	-	-	0-360	199	V
3	8.866	32.97	Pk	35.9	-29.7	39.17	-	-	-	-	0-360	199	н
4	13.083	30.69	Pk	39.2	-26.6	43.29	-	-	-	-	0-360	199	V
5	16.908	29.52	Pk	42	-24.4	47.12	-	-	-	-	0-360	101	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

PK-U: Maximum Peak

V1TR: VB=1/Ton, RMS Average where: Ton is packet duration FCC Part15C 2.4GHz RSE.TST Rev 9.5 20 Aug 2015

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Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

MID CHANNEL DATA

RADIATED EMISSIONS

Marker	Frequenc y (GHz)	Meter Reading (dBuV)	Det	AF AT0072 (dB/m)	Amp/Cbl/Fltr/Pa d (dB)	Correcte d Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	2.174	31.24	Pk	31.6	-24.7	38.14	-	-	-	-	0-360	200	V
2	2.984	32.19	Pk	32.5	-23.5	41.19	-	-	-	-	0-360	200	V
3	6.37	34.02	Pk	35.4	-30.6	38.82	-	-	-	-	0-360	200	Н
4	10.32	30.65	Pk	37.3	-26.3	41.65	-	-	-	-	0-360	101	Н
5	13.069	31.57	Pk	39.2	-26.6	44.17	-	-	-	-	0-360	200	H
6	16.984	31.49	Pk	41.9	-25.6	47.79	-	-	-	-	0-360	200	Н

* - indicates frequency in CFR15.205/IC 8.10 Restricted Band

Pk - Peak detector FCC Part15C 2.4GHz RSE.TST Rev 9.5 20 Aug 2015

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Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

HIGH CHANNEL DATA

RADIATED EMISSIONS

Marker	Frequenc y (GHz)	Meter Reading (dBuV)	Det	AF AT0072 (dB/m)	Amp/Cbl/Fitr/Pa d (dB)	Correcte d Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1.485	36.43	PK-U	28	-25.2	39.23	-	-	74	-34.77	1	101	Η
	* 1.486	24.14	V1TR	28	-25.2	26.94	54	-27.06	-	-	1	101	Н
3	* 4.752	41.81	PK-U	34.1	-32.8	43.11	-	-	74	-30.89	1	101	Н
	* 4.753	30.09	V1TR	34.1	-32.8	31.39	54	-22.61	-	-	1	101	Н
2	2.46	34.05	Pk	32.3	-24.8	41.55	-	-	-	-	0-360	101	V
4	15.006	32.46	Pk	39.8	-26.7	45.56	-	-	-	-	0-360	101	V
5	16.924	29.44	Pk	42	-24.6	46.84	-	-	-	-	0-360	200	V
6	17.393	30.94	Pk	41.4	-25.5	46.84	-	-	-	-	0-360	200	H
7	17.576	30.67	Pk	41.4	-25.3	46.77	-	-	-	-	0-360	200	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band Pk - Peak detector PK-U: Maximum Peak V1TR: VB=1/Ton, RMS Average where: Ton is packet duration FCC Part15C 2.4GHz RSE.TST Rev 9.5 20 Aug 2015

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GFSK SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, HORIZONTAL)



BELOW 1 GHz TABLE

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AT0073 AF (dB/m)	Amp/Cbl (dB)	Correcte d Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	30.1396	37.55	Qp	26	-31.6	31.95	40	-8.05	86	119	V
4	52.355	39.14	Pk	12.1	-31.2	20.04	40	-19.96	0-360	399	Н
2	69.525	41.32	Pk	12.4	-31.1	22.62	40	-17.38	0-360	103	V
3	102.4625	37.99	Pk	15.1	-30.8	22.29	43.52	-21.23	0-360	103	V
5	290	32.9	Pk	17.9	-29.5	21.3	46.02	-24.72	0-360	103	Н
6	847.9	29.77	Pk	26.3	-27.2	28.87	46.02	-17.15	0-360	199	Н

Pk - Peak detector

Qp - Quasi-Peak detector FCC Part 15C 30-1000MHz.TST Rev 9.5 20 Aug 2015

UL LLC.

10. AC POWER LINE CONDUCTED EMISSIONS

<u>LIMITS</u>

FCC §15.207 (a)

Frequency of Emission (MHz)	Conducted	Limit (dBuV)
	Quasi-peak	Average
0.15 – 0.5	66 to 56	56 to 46
0.5 - 5	56	46
5 - 30	60	50

*Decreases with the logarithm of the frequency.

TEST PROCEDURE

The EUT is placed on a non-conducting table 40 cm from the vertical ground plane and 80 cm above the horizontal ground plane. The EUT is configured in accordance with ANSI C63.10.

The receiver is set to a resolution bandwidth of 9 kHz. Peak detection is used unless otherwise noted as quasi-peak or average.

Line conducted data is recorded for both NEUTRAL and HOT lines.

RESULTS

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<u>6 WORST EMISSIONS</u>



RESULT

Trace Markers

Marker	Frequenc y (MHz)	Meter Reading (dBuV)	Det	LISN VCF [dB]	Cbl/Limiter (dB)	Correcte d Reading	QP Limit	Margin (dB)	Avg Limit	Margin (dB)				
						dBuV								
	Range 1 (Line 1)													
1	.489	22.88	Pk	.1	10	32.98	56.18	-23.2	-	-				
2	.498	-3.42	Av	.1	10	6.68	-	-	46.03	-39.35				
3	16.467	18.64	Pk	.2	10.5	29.34	60	-30.66	-	-				
4	16.401	-4.54	Av	.2	10.5	6.16	-	-	50	-43.84				
	Range 2 (Line 2)													
5	.156	24.34	Pk	.2	10	34.54	65.67	-31.13	-	-				
6	.156	-1.58	Av	.2	10	8.62	-	-	55.67	-47.05				
7	.498	29.31	Pk	.1	10	39.41	56.03	-16.62	-	-				
8	.501	-1.33	Av	0	10	8.67	-	-	46	-37.33				
9	.738	18.7	Pk	0	10	28.7	56	-27.3	-	-				
10	.735	-3.64	Av	0	10	6.36	-	-	46	-39.64				
11	28.956	20.46	Pk	.3	10.7	31.46	60	-28.54	-	-				
12	28.956	-3.41	Av	.3	10.7	7.59	-	-	50	-42.41				

Pk - Peak detector

Av - Average detection