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FCC TEST REPORT

Application No:	HR/2019/20008
Applicant:	Huawei Technologies Co., Ltd.
Address of Applicant	Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen, 518129, P.R.C
Manufacturer:	Huawei Technologies Co., Ltd.
Address of Manufacturer	Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen, 518129, P.R.C
EUT Description:	Smart Phone
Model No.:	MAR-LX1A
Trade Mark:	Huawei
FCC ID:	QISMAR-LX1A
Standards:	47 CFR FCC Part 2, Subpart J
	47 CFR Part 15, Subpart C
Test Method	KDB558074 D01 15.247 Meas Guidance v05 ANSI C63.10 (2013)
Data of Bassint:	2019/3/5
Date of Receipt:	
Date of Test:	2019/3/5 to 2019/3/15
Date of Issue:	2019/3/15
Test Result:	PASS *

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

Authorized Signature:

Derde yang

Derek Yang Wireless Laboratory Manager



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1 Version

Revision Record					
Version	Chapter	Date	Modifier	Remark	
00		2019/3/15		Original	

Authorized for issue by:		
Tested By	Mike Mu	2019/3/15
	(Mike Hu) /Project Engineer	Date
Checked By	David Chen	2019/3/15
	(David Chen) /Reviewer	Date



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2 Test Summary

Test Item	Test Requirement	Test method	Test Result	Result
AC Power Line Conducted Emission	15.207	ANSI C63.10 2013	Clause 4.2	PASS
Radiated Spurious Emissions	15.205/15.209	ANSI C63.10 2013	Clause 4.3	PASS
Restricted bands around fundamental frequency (Radiated Emission)	15.205/15.209	ANSI C63.10 2013	Clause 4.4	PASS



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3 General Information

3.1 Client Information

Applicant:	Huawei Technologies Co., Ltd.
Address of Applicant:	Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen, 518129, P.R.C
Manufacturer:	Huawei Technologies Co., Ltd.
Address of Manufacturer:	Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen, 518129, P.R.C

3.2 Test Location

Company:	SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch
Address:	No. 1 Workshop, M-10, Middle section, Science & Technology Park, Shenzhen, Guangdong, China
Post code:	518057
Telephone:	+86 (0) 755 2601 2053
Fax:	+86 (0) 755 2671 0594
E-mail:	ee.shenzhen@sgs.com

3.3 Test Facility

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

• CNAS (No. CNAS L2929)

CNAS has accredited SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch EMC Lab to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration Laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing.

• A2LA (Certificate No. 3816.01)

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 3816.01.

• VCCI

The 3m Fully-anechoic chamber for above 1GHz, 10m Semi-anechoic chamber for below 1GHz, Shielded Room for Mains Port Conducted Interference Measurement and Telecommunication Port Conducted Interference Measurement of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-20026, R-14188, C-12383 and T-11153 respectively.

• FCC – Designation Number: CN1178

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized as an accredited testing laboratory.

Designation Number: CN1178. Test Firm Registration Number: 406779.

Industry Canada (IC)

Two 3m Semi-anechoic chambers and the 10m Semi-anechoic chamber of SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch EMC Lab have been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 4620C-1, 4620C-2, 4620C-3.



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3.4 General Description of EUT

SG

EUT Description::	Smart Phone
Model No.:	MAR-LX1A
Trade Mark:	Huawei
Hardware Version:	HL3MARLM
Software Version:	9.0.1.118(SP1C900E118R1P6)
Operation Frequency:	2400MHz~2483.5MHz fc = 2402 MHz + N * 2 MHz, where: -fc = "Operating Frequency" in MHz, -N = "Channel Number" with the range from 0 to 39.
Bluetooth Version:	Bluetooth V4.2 LE
Modulation Type:	GFSK
Number of Channel:	40
Sample Type:	⊠ Portable Device, □Module
Antenna Type:	External, 🛛 Integrated
Antenna Gain:	-2.4dBi
Power Supply	AC/DC Adapter; Battery; PoE:; Other:
Adapter	Model: HW-090200EH0 Manufacturer: Huawei Technologies Co.,Ltd. Input Voltage: 100-240V ~50/60Hz 0.5A Output Voltage: 5V === 2A OR 9V === 2A Model: HW-090200BH0 Manufacturer: Huawei Technologies Co.,Ltd. Input Voltage: 100-240V ~50/60Hz 0.5A Output Voltage: 5V === 2A OR 9V === 2A Model: HW-090200UH0 Manufacturer: Huawei Technologies Co.,Ltd. Input Voltage: 100-240V ~50/60Hz 0.5A Output Voltage: 5V === 2A OR 9V === 2A Model: HW-059200EHQ Manufacturer: Huawei Technologies Co.,Ltd. Input Voltage: 100-240V ~50/60Hz 0.5A Output Voltage: 100-240V ~50/60Hz 0.5A Output Voltage: 5V === 2A OR 9V === 2A Model: HW-090200UH1 Manufacturer: Huawei Technologies Co.,Ltd. Input Voltage: 100-240V ~50/60Hz 0.5A Output Voltage: 100-240V ~50/60Hz 0.5A Output Voltage: 100-240V ~50/60Hz 0.5A Output Voltage: 5V === 2A OR 9V ==== 2A Model: HW-090200UH1 Manufacturer: Huawei Technologies Co.,Ltd. Input Voltage: 100-240V ~50/60Hz 0.5A Output Voltage: 5V === 2A OR 9V ==== 2A
Rechargeable Li-ion	Battery Model: HB356687ECW Rated capacity: 3240mAh Nominal Voltage: +3.82V



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SGS-CSTC Standards Technical Services Co., Ltd.Shenzhen Branch

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Charging Voltage: --- +4.40V

	Operation Frequency of each channel						
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
0	2402MHz	10	2422MHz	20	2442MHz	30	2462MHz
1	2404MHz	11	2424MHz	21	2444MHz	31	2464MHz
2	2406MHz	12	2426MHz	22	2446MHz	32	2466MHz
3	2408MHz	13	2428MHz	23	2448MHz	33	2468MHz
4	2410MHz	14	2430MHz	24	2450MHz	34	2470MHz
5	2412MHz	15	2432MHz	25	2452MHz	35	2472MHz
6	2414MHz	16	2434MHz	26	2454MHz	36	2474MHz
7	2416MHz	17	2436MHz	27	2456MHz	37	2476MHz
8	2418MHz	18	2438MHz	28	2458MHz	38	2478MHz
9	2420MHz	19	2440MHz	29	2460MHz	39	2480MHz

Remark:

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 (CH0)	2402MHz
The middle channel (CH19)	2440MHz
The highest channel (CH39)	2480MHz

3.5 Test Environment

Operating Environment				
Temperature:	25.0 °C			
Humidity:	50 % RH			
Atmospheric Pressure:	101.32 KPa			

3.6 Description of Support Units

The EUT has been tested independent unit.



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4 Test results and Measurement Data

4.1 Antenna Requirement

Standard requirement:	47 CFR Part 15C 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(b) (4) requirement:

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.

The antenna is integrated on the main PCB and no consideration of replacement. The best case gain of the antenna is -2.4dBi.



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Test Requirement:	47 CFR Part 15C Section 15					
Test Method:	ANSI C63.10: 2013					
Test Frequency Range:	150kHz to 30MHz					
		Limit (dBuV)				
	Frequency range (MHz)	Quasi-peak	Average			
	0.15-0.5	66 to 56*	56 to 46*			
Limit:	0.5-5	56	46			
	5-30	60	50			
	* Decreases with the logarith	nm of the frequency.	I			
Test Procedure:	 The mains terminal disturbance voltage test was conducted in a shielded room. The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a 50Ω/50µH + 5Ω linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded. The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane. The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10: 2013 on conducted measurement. 					
Test Setup:	Shielding Room		st Receiver			

4.2 AC Power Line Conducted Emissions

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Test Mode:	Transmitting with GFSK modulation. Charge +Transmitting mode.
Instruments Used:	Refer to section 5.10 for details.
Test Results:	Pass



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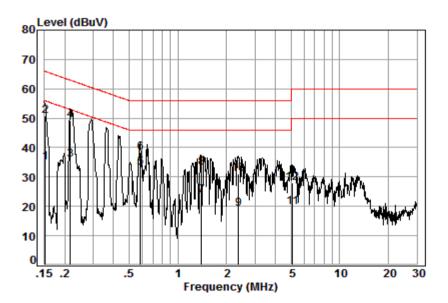
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Measurement Data

An initial pre-scan was performed on the live and neutral lines with peak detector.

Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission were detected.

Live line:



Site :	Shielding	Room
Condition:	Line	
Job No. :	11310CR	
Test mode:	а	

	Freq	Cable Loss	LISN Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB	dBuV	dBuV	dBuV	dB	
1	0.15	0.01	9.66	25.37	35.04	55.91	-20.87	Average
2	0.15	0.01	9.66	40.99	50.66	65.91	-15.25	QP
3	0.22	0.03	9.66	26.13	35.82	52.92	-17.10	Average
4	0.22	0.03	9.66	39.67	49.36	62.92	-13.56	QP
5	0.59	0.07	9.67	23.53	33.27	46.00	-12.73	Average
6	0.59	0.07	9.67	28.48	38.22	56.00	-17.78	QP
7	1.40	0.12	9.73	13.80	23.65	46.00	-22.35	Average
8	1.40	0.12	9.73	23.45	33.30	56.00	-22.70	QP
9	2.37	0.16	9.71	9.19	19.06	46.00	-26.94	Average
10	2.37	0.16	9.71	21.30	31.17	56.00	-24.83	QP
11	5.11	0.17	9.74	9.80	19.71	50.00	-30.29	Average
12	5.11	0.17	9.74	18.11	28.02	60.00	-31.98	QP



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80 Level (dBuV) 70 60 50 40 30 20 10 5 .5 2 10 20 30 .15 .2 1 Frequency (MHz)

Neutral line:

Site :	Shielding	Room
Condition:	Neutral	
Job No. :	11310CR	

Test mode: a

		Cable	LISN	Read		Limit	0ver	
	Freq	Loss	Factor	Level	Level	Line	Limit	Remark
	MHz	dB	dB	dBuV	dBuV	dBuV	dB	
1	0.16	0.01	9,63	14.68	24.32	55.56	-31.24	Average
2	0.16	0.01	9.63	30.67	40.31		-25.25	-
3	0.22	0.03	9.64	23.92	33.59	52.92	-19.33	Äverage
4	0.22	0.03	9.64	39.08	48.75	62.92	-14.17	QP
5	0.52	0.06	9.64	10.22	19.92	46.00	-26.08	Average
6	0.52	0.06	9.64	25.45	35.15	56.00	-20.85	QP
7	1.10	0.10	9.70	2.81	12.61	46.00	-33.39	Average
8	1.10	0.10	9.70	16.02	25.82	56.00	-30.18	QP
9	3.88	0.16	9.69	-1.20	8.65	46.00	-37.35	Average
10	3.88	0.16	9.69	14.84	24.69	56.00	-31.31	QP
11	12.78	0.19	10.17	1.38	11.74	50.00	-38.26	Average
12	12.78	0.19	10.17	9.43	19.79	60.00	-40.21	QP

Remarks:

- 1. The following Quasi-Peak and Average measurements were performed on the EUT:
- 2. Final Test Level =Receiver Reading + LISN Factor + Cable Loss.



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Test Requirement:	47 CFR Part 15C Section 15.209 and 15.205							
Test Method:	ANSI C63.10 :2013 Section 11.12							
Test Site:	Measurement Distance: 3m or 10m (Semi-Anechoic Chamber)							
	Frequency	Detector	RBW	VBW	Remark			
	0.009MHz-0.090MHz	Peak	10kHz	30kHz	Peak			
	0.009MHz-0.090MHz	Average	10kHz	30kHz	Average			
	0.090MHz-0.110MHz	Quasi-peak	10kHz	30kHz	Quasi-peak			
Dessiver Catury	0.110MHz-0.490MHz	Peak	10kHz	30kHz	Peak			
Receiver Setup:	0.110MHz-0.490MHz	Average	10kHz	30kHz	Average			
	0.490MHz -30MHz	Quasi-peak	10kHz	30kHz	Quasi-peak			
	30MHz-1GHz	Quasi-peak	100 kHz	300kHz	Quasi-peak			
		Peak	1MHz	3MHz	Peak			
	Above 1GHz	Peak	1MHz	10Hz	Average			
	Frequency	Field strength (microvolt/meter)	Limit (dBuV/m)	Remark	Measurement distance (m)			
	0.009MHz-0.490MHz	2400/F(kHz)	-	-	300			
	0.490MHz-1.705MHz	24000/F(kHz)	-	-	30			
	1.705MHz-30MHz	30	-	-	30			
	30MHz-88MHz	100	40.0	Quasi-peak	3			
Limit:	88MHz-216MHz	150	43.5	Quasi-peak	3			
	216MHz-960MHz	200	46.0	Quasi-peak	3			
	960MHz-1GHz	500	54.0	Quasi-peak	3			
	Above 1GHz	500	54.0	Average	3			
	Remark: 15.35(b), Unless otherwise specified, the limit on peak radio frequency emissions is 20dB above the maximum permitted average emission limit applicable to the equipment under test. This peak limit applies to the total peak emission level radiated by the device.							

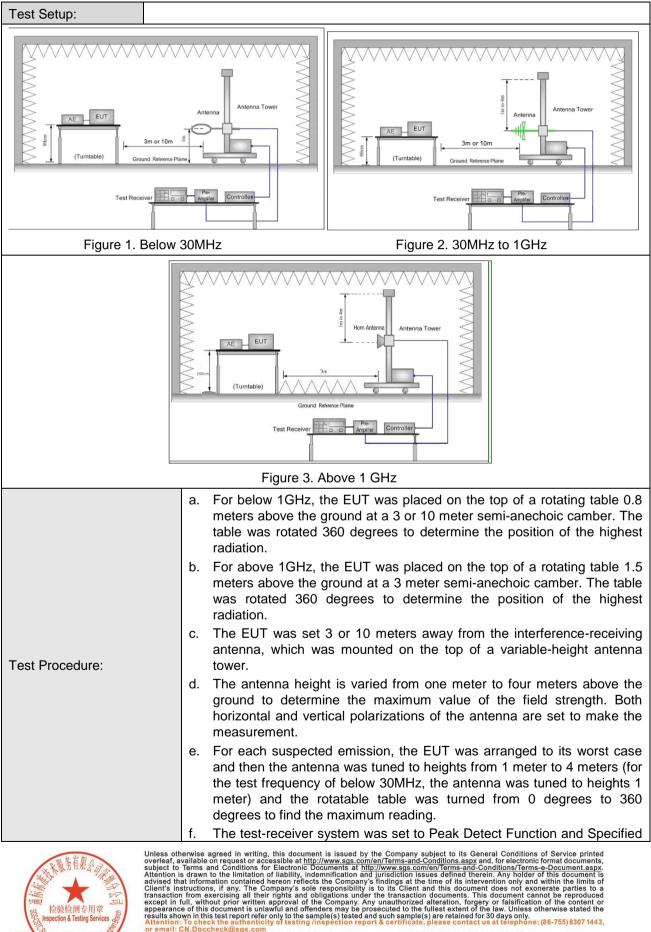
4.3 Radiated Spurious Emission

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	Bandwidth with Maximum Hold Mode.				
	 g. 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, quasi-peak or average method as specified and then reported in a data sheet. h. Test the EUT in the lowest channel (2402MHz),the middle channel (2440MHz),the Highest channel (2480MHz) 				
	i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.				
	j. Repeat above procedures until all frequencies measured was complete.				
Exploratory Test Mode:	Transmitting with GFSK modulation.				
Exploratory Test Mode:	Charge + Transmitting mode.				
	Transmitting with GFSK modulation.				
Final Test Mode:	Pretest the EUT at Charge + Transmitting mode,				
Tinal Test Node.	For below 1GHz part, through pre-scan, the worst case is the lowest channel.Only the worst case is recorded in the report.				
Instruments Used:	Refer to section 5.10 for details.				
Test Results:	Pass				

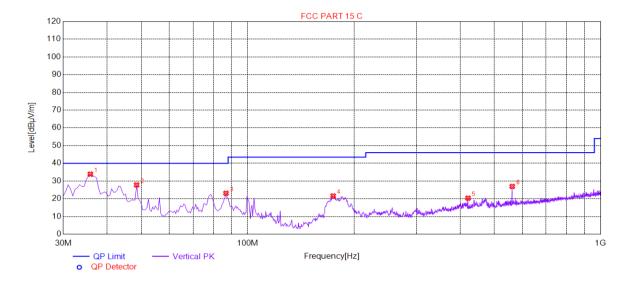


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4.3.1 Radiated Emission below 1GHz

4.3.1.1 Charge + Transmitting, Vertical

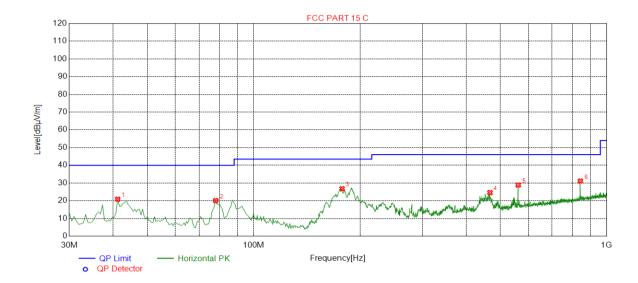


Susp	Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity	
1	35.8229	33.88	-32.50	40.00	6.12	100	138	Vertical	
2	48.4392	27.80	-30.19	40.00	12.20	100	173	Vertical	
3	86.7734	23.10	-34.20	40.00	16.90	100	107	Vertical	
4	174.602	21.61	-33.29	43.50	21.89	200	288	Vertical	
5	421.105	20.34	-24.42	46.00	25.66	100	360	Vertical	
6	561.825	26.95	-21.13	46.00	19.05	100	173	Vertical	



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4.3.1.2 Charge + Transmitting, Horizontal

S

Suspe	ected List			-	_	-		
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	41.1606	20.87	-30.94	40.00	19.13	200	125	Horizontal
2	78.0390	20.09	-35.54	40.00	19.91	200	20	Horizontal
3	177.999	26.79	-33.05	43.50	16.71	200	224	Horizontal
4	467.203	24.58	-23.48	46.00	21.42	200	97	Horizontal
5	561.825	28.87	-21.13	46.00	17.13	200	240	Horizontal
6	842.781	31.09	-16.18	46.00	14.91	100	292	Horizontal

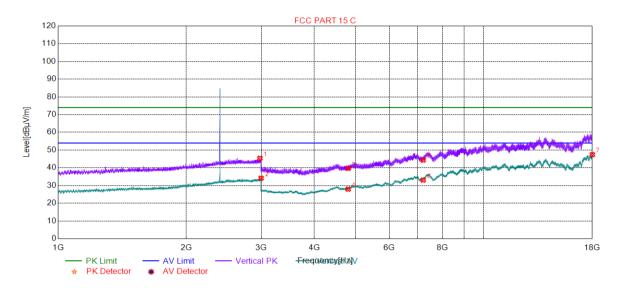


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4.3.2 Transmitter Emission above 1GHz

4.3.2.1 GFSK _Lowest Channel_ Peak_ Vertical



Suspe	ected List							
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2979.49	45.37	2.32	74.00	28.63	150	293	Vertical
2	2998.49	34.15	2.33	54.00	19.85	150	311	Vertical
3	4804.00	39.67	-20.38	74.00	34.33	150	277	Vertical
4	4804.00	27.97	-20.38	54.00	26.03	150	81	Vertical
5	7206.00	44.36	-12.76	74.00	29.64	150	114	Vertical
6	7206.00	33.08	-12.76	54.00	20.92	150	326	Vertical
7	17999.5	47.42	-0.35	54.00	6.58	150	249	Vertical

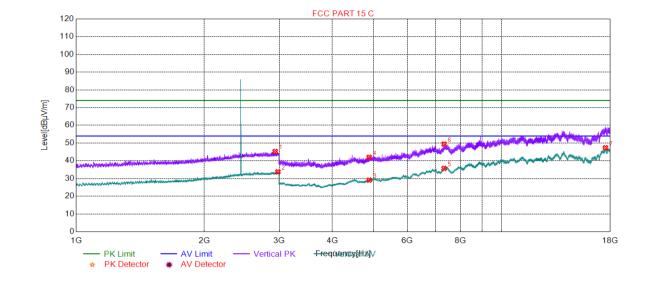


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GFSK Middle Channel Vertical

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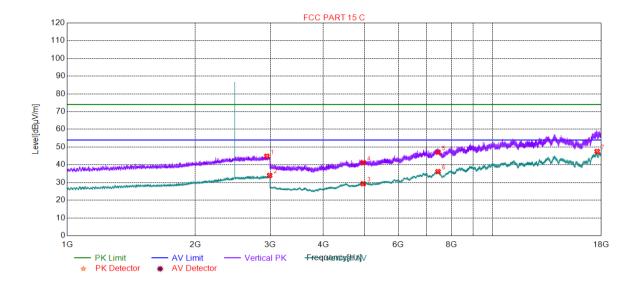
Suspe	ected List							
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2935.98	45.25	2.29	74.00	28.75	150	360	Vertical
2	2978.49	33.75	2.31	54.00	20.25	150	186	Vertical
3	4882.00	29.11	-19.26	54.00	24.89	150	40	Vertical
4	4882.00	41.97	-19.26	74.00	32.03	150	300	Vertical
5	7323.00	35.70	-11.38	54.00	18.30	150	24	Vertical
6	7323.00	49.41	-11.38	74.00	24.59	150	138	Vertical
7	17531.4	47.32	0.75	54.00	6.68	150	278	Vertical



4.3.2.2

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Suspe	ected List							
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2945.98	44.83	2.29	74.00	29.17	150	143	Vertical
2	2990.99	34.01	2.32	54.00	19.99	150	188	Vertical
3	4960.00	29.32	-18.67	54.00	24.68	150	49	Vertical
4	4960.00	41.13	-18.67	74.00	32.87	150	163	Vertical
5	7440.00	47.06	-10.72	74.00	26.94	150	65	Vertical
6	7440.00	36.12	-10.72	54.00	17.88	150	82	Vertical
7	17601.4	47.52	1.59	54.00	6.48	150	161	Vertical

4.3.2.3

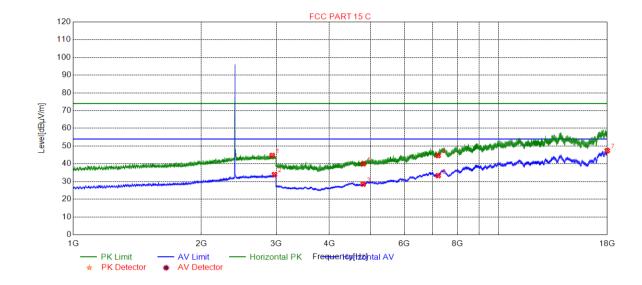
GFSK _High Channel_ Vertical



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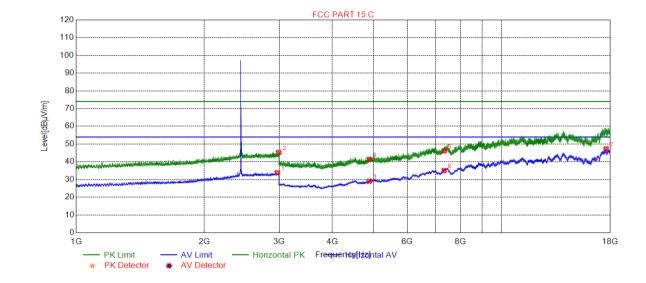
Suspe	ected List					-		
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2935.98	44.74	2.29	74.00	29.26	150	166	Horizontal
2	2971.99	33.92	2.31	54.00	20.08	150	227	Horizontal
3	4804.00	28.51	-20.38	54.00	25.49	150	164	Horizontal
4	4804.00	39.97	-20.38	74.00	34.03	150	131	Horizontal
5	7206.00	44.65	-12.76	74.00	29.35	150	16	Horizontal
6	7206.00	33.31	-12.76	54.00	20.69	150	48	Horizontal
7	17989.4	47.43	-0.43	54.00	6.57	150	220	Horizontal



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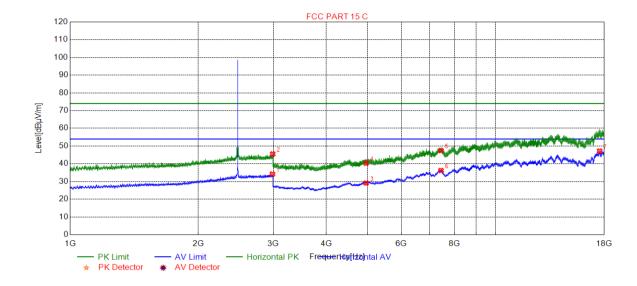
GFSK _Middle Channel_ Horizontal

Suspe	ected List			_	_	-		
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2968.99	33.83	2.31	54.00	20.17	150	6	Horizontal
2	2990.99	45.27	2.32	74.00	28.73	150	58	Horizontal
3	4882.00	29.01	-19.26	54.00	24.99	150	50	Horizontal
4	4882.00	41.38	-19.26	74.00	32.62	150	228	Horizontal
5	7323.00	46.19	-11.38	74.00	27.81	150	244	Horizontal
6	7323.00	35.03	-11.38	54.00	18.97	150	195	Horizontal
7	17598.9	47.26	1.62	54.00	6.74	150	105	Horizontal



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4.3.2.6

GFSK _High Channel_ Horizontal

Suspe	ected List					-	-	
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2987.49	34.18	2.32	54.00	19.82	150	122	Horizontal
2	2991.99	45.52	2.32	74.00	28.48	150	113	Horizontal
3	4960.00	29.10	-18.67	54.00	24.90	150	48	Horizontal
4	4960.00	40.30	-18.67	74.00	33.70	150	162	Horizontal
5	7440.00	47.44	-10.72	74.00	26.56	150	342	Horizontal
6	7440.00	36.20	-10.72	54.00	17.80	150	146	Horizontal
7	17545.9	47.22	0.94	54.00	6.78	150	219	Horizontal

Remark:

1) 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

- 2) Scan from 9kHz to 25GHz, the disturbance between 9KHz to 30MHz was very low, and the above harmonics were the highest point could be found when testing, The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.
- 3) As shown in this section, for frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. So, only the peak measurements were shown in the report.
- 4) All Modes have been tested, but only the worst case data displayed in this report.



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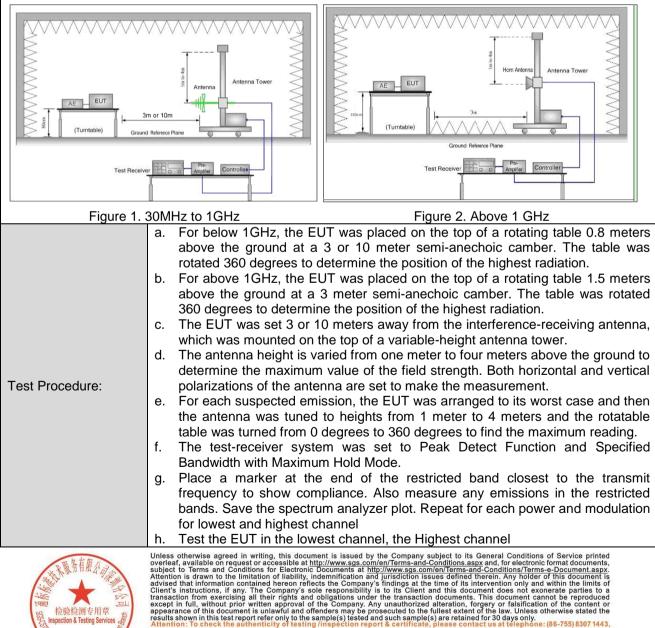
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4.4 Restricted bands around fundamental frequency

Test Requirement:	47 CFR Part 15C Sectio	47 CFR Part 15C Section 15.209 and 15.205							
Test Method:	ANSI C63.10: 2013 Sec	ANSI C63.10: 2013 Section 11.12							
Test Site:	Measurement Distance:	Measurement Distance: 3m or 10m (Semi-Anechoic Chamber)							
	Frequency	Limit (dBuV/m @3m)	Remark						
	30MHz-88MHz	40.0	Quasi-peak Value						
	88MHz-216MHz	43.5	Quasi-peak Value Quasi-peak Value						
Limit:	216MHz-960MHz	46.0							
	960MHz-1GHz	54.0	Quasi-peak Value						
	Above 1GHz	54.0	Average Value						
	Above IGHZ	74.0	Peak Value						

Test Setup:







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	 The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case. Repeat above procedures until all frequencies measured was complete.
Exploratory Test Mode:	Transmitting with GFSK modulation. Charge + Transmitting mode.
Final Test Mode:	Transmitting with GFSK modulation. Pretest the EUT at Charge + Transmitting mode. Only the worst case is recorded in the report.
Instruments Used:	Refer to section 5.10 for details.
Test Results:	Pass

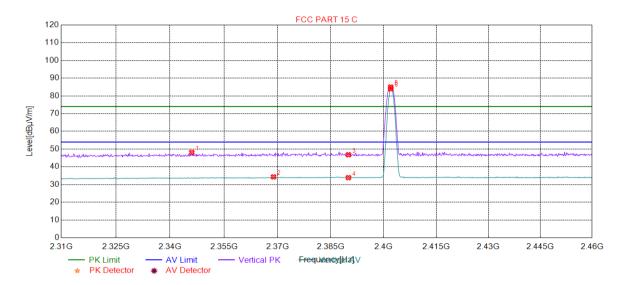


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4.4.1 Test plots



4.4.1.1 Worst Case Mode(GFSK) Lowest Channel_ Vert	ical
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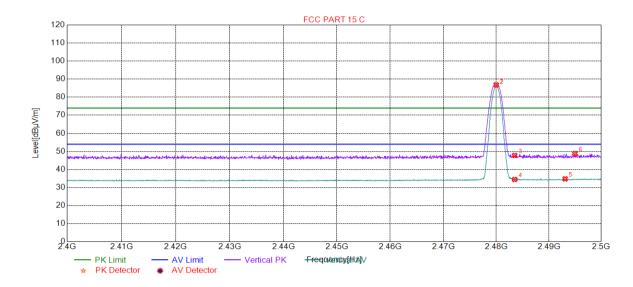
Suspe	Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity	
1	2346.03	48.08	1.05	74.00	25.92	150	256	Vertical	
2	2368.85	34.32	1.15	54.00	19.68	150	159	Vertical	
3	2390.00	46.80	1.25	54.00	7.20	150	283	Vertical	
4	2390.00	33.88	1.25	54.00	20.12	150	26	Vertical	
5	2402.00	85.00	1.30	74.00	-11.00	150	192	Vertical	
6	2402.00	84.01	1.30	54.00	-30.01	150	184	Vertical	



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Worst Case Mode(GFSK) Highest Channel_ Vertical

Suspe	Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity	
1	2480.00	86.80	1.51	74.00	-12.80	150	189	Vertical	
2	2480.00	86.24	1.51	54.00	-32.24	150	185	Vertical	
3	2483.50	47.75	1.52	74.00	26.25	150	216	Vertical	
4	2483.50	34.45	1.52	54.00	19.55	150	201	Vertical	
5	2493.09	34.77	1.55	54.00	19.23	150	18	Vertical	
6	2494.94	48.85	1.56	74.00	25.15	150	293	Vertical	

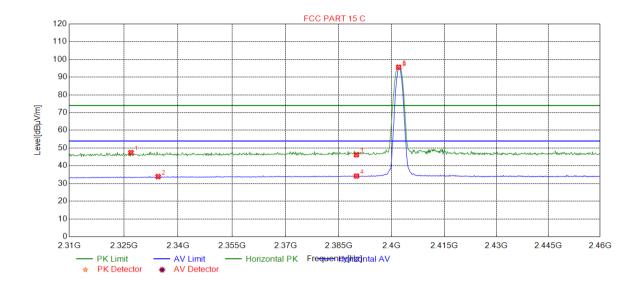


4.4.1.2

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Worst Case Mode(GFSK) Lowest Channel_ Horizontal

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2326.96	47.44	0.97	74.00	26.56	150	240	Horizontal
2	2334.47	33.90	1.00	54.00	20.10	150	207	Horizontal
3	2390.00	46.20	1.25	74.00	27.80	150	198	Horizontal
4	2390.00	34.23	1.25	54.00	19.77	150	213	Horizontal
5	2402.00	95.63	1.30	74.00	-21.63	150	225	Horizontal
6	2402.00	94.90	1.30	54.00	-40.90	150	228	Horizontal

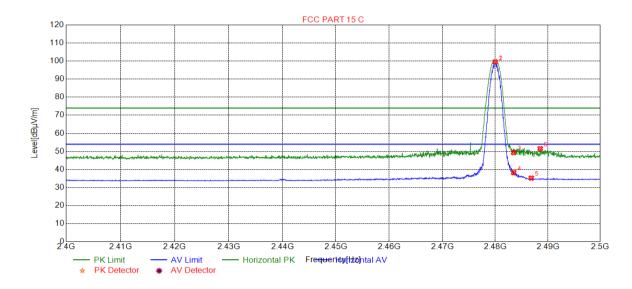


4.4.1.3

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Worst Case Mode(GFSK) Highest Channel_ Horizontal

Suspe	Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity	
1	2480.00	99.53	1.51	74.00	-25.53	150	225	Horizontal	
2	2480.00	99.07	1.51	54.00	-45.07	150	225	Horizontal	
3	2483.50	49.33	1.52	74.00	24.67	150	214	Horizontal	
4	2483.50	38.24	1.52	54.00	15.76	150	225	Horizontal	
5	2486.84	35.20	1.53	54.00	18.80	150	221	Horizontal	
6	2488.54	51.51	1.54	74.00	22.49	150	225	Horizontal	

Remark:

4.4.1.4

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 All Modes have been tested, but only the worst case data displayed in this report.



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5 Measurement Uncertainty (95% confidence levels, k=2)

No.	Item	Measurement Uncertainty	
1	Total RF power, conducted	±0.75dB	
2	RF power density, conducted	±2.84dB	
3	Spurious emissions, conducted	±0.75dB	
4	Padiated Spurious amigaian test	±4.5dB (30MHz-1GHz)	
4	Radiated Spurious emission test	±4.8dB (1GHz-25GHz)	
5	Conduct emission test	±3.12 dB(9KHz- 30MHz)	
6	Temperature test	±1°C	
7	Humidity test	±3%	
8	DC and low frequency voltages	±0.5%	



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6 Equipment List

Conducted Emission									
Test Equipment	Manufacturer	Model No.	Inventory No.	Cal. date	Cal.Duedate				
rest Equipment	Wanuacturer	WOULD NO.	inventory No.	(yyyy-mm-dd)	(yyyy-mm-dd)				
Shielding Room	ZhongYu Electron	GB-88	SEM001-06	2017/5/10	2020/5/9				
LISN	Rohde & Schwarz	ENV216	SEM007-01	2018/9/2	2019/9/2				
LISN	ETS-LINDGREN	Feb-16	SEM007-02	2018/4/2	2019/4/1				
Measurement Software	AUDIX	e3 V5.4.1221d	N/A	N/A	N/A				
Coaxial Cable	SGS	N/A	SEM024-01	2018/7/12	2019/7/11				
2 Line ISN	Fischer Custom Communications Inc.	FCC-TLISN-T2-02	EMC0122	2019/2/11	2020/2/10				
EMI Test Receiver	Rohde & Schwarz	ESCI	SEM004-02	2018/4/2	2019/4/1				

RF conducted test									
Test Equipment	Manufacturer	Model No.	Inventory No.	Cal. date	Cal.Duedate				
rest Equipment	Wallulacturer	Woder No.	inventory No.	(yyyy-mm-dd)	(yyyy-mm-dd)				
DC Power Supply	Agilent Technologies Inc	66311B	W009-09	2018/9/15	2019/9/15				
Signal Analyzer	Rohde & Schwarz	FSV	W025-05	2019/1/13	2020/1/12				
Coaxial Cable	SGS	N/A	SEM031-01	2018/7/13	2019/7/12				
Attenuator	Weinschel Associates	WA41	SEM021-09	N/A	N/A				
Signal Generator	KEYSIGHT	N5173B	SEM006-05	2018/9/2	2019/9/2				
Temperature Chamber	GIANT FORCE	ICT-150-40-CP-AR	W027-03	2018/11/27	2019/11/27				
Power Meter	Rohde & Schwarz	NRVS	SEM014-02	2018/9/2	2019/9/2				



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RE in Chamber								
Test Equipment	Manufacturer	Model No.	Inventory No.	Cal. date	Cal.Due date			
rest Equipment	Wallulacturer	Woder No.	inventory No.	(yyyy-mm-dd)	(yyyy-mm-dd)			
3m Semi-Anechoic Chamber	ETS-LINDGREN	N/A	SEM001-01	2017/8/5	2020/8/4			
Measurement Software	AUDIX	e3 V8.2014-6-27	N/A	N/A	N/A			
Coaxial Cable	SGS	N/A	SEM025-01	2018/7/12	2019/7/11			
MXE EMI Receiver (20Hz- 8.4GHz)	Agilent Technologies	N9038A	SEM004-05	2018/9/2	2019/9/2			
BiConiLog Antenna (26- 3000MHz)	ETS-LINDGREN	3142C	SEM003-01	2017/6/27	2020/6/26			
Pre-amplifier (0.1-1.3GHz)	Agilent Technologies	8447D	SEM005-01	2018/4/2	2019/4/1			

RE in Chamber									
Test Equipment	Manufacturer	Model No.	Inventory No.	Cal. date	Cal.Due date				
	inanalaotaron	incuci nei		(yyyy-mm-dd)	(yyyy-mm-dd)				
3m Semi-Anechoic Chamber	AUDIX	N/A	SEM001-02	2018/3/13	2021/3/12				
Measurement Software	AUDIX	e3V8.2014-6-27	N/A	N/A	N/A				
Coaxial Cable	SGS	N/A	SEM026-01	2018/7/12	2019/7/11				
EXA Signal Analyzer (10Hz- 26.5GHz)	Agilent Technologies Inc	N9010A	SEM004-09	2018/4/13	2019/4/12				
BiConiLog Antenna (26- 3000MHz)	ETS-Lindgren	3142C	SEM003-01	2017/6/27	2020/6/26				
Horn Antenna (0.8-18GHz)	Rohde & Schwarz	HF907	SEM003-07	2018/4/13	2021/4/12				
Pre-amplifier(0.1-1.3GHz)	HP	8447D	SEM005-02	2018/9/2	2019/9/2				
Low Noise Amplifier(100MHz- 18GHz)	Black Diamond Series	BDLNA-0118- 352810	SEM005-05	2018/9/27	2019/9/27				
Horn Antenna (15-40GHz)	Schwarzbeck	BBHA 9170	SEM003-15	2017/10/17	2020/10/16				
Pre-amplifier(18-26GHz)	Rohde & Schwarz	CH14-H052	SEM005-17	2018/4/2	2019/4/1				
Band filter	N/A	N/A	SEM023-01	N/A	N/A				

RE in Chamber									
Test Equipment	Manufacturer	Model No.	Inventory No.	Cal. Date (yyyy-mm-dd)	Cal. Due date (yyyy-mm-dd)				
10m Semi-Anechoic Chamber	SAEMC	FSAC1018	SEM001-03	2018/3/31	2021/3/30				
EMI Test Receiver (9k-7GHz)	Rohde & Schwarz	ESR	SEM004-03	2018/4/2	2019/4/1				
Trilog-Broadband Antenna(25M- 2GHz)	Schwarzbeck	VULB9168	SEM003-18	2016/6/29	2019/6/28				
Pre-amplifier (9k-1GHz)	Sonoma	310N	SEM005-03	2018/4/13	2019/4/12				
Loop Antenna (9kHz-30MHz)	ETS-Lindgren	6502	SEM003-08	2017/8/22	2020/8/21				
Measurement Software	AUDIX	e3 V8.2014-6-27	N/A	N/A	N/A				
Coaxial Cable	SGS	N/A	SEM029-01	2018/7/12	2019/7/11				

7 Photographs - EUT Constructional Details

Refer to Appendix A - Photographs of EUT Constructional Details for HR/2019/20008.

The End



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