

TEST REPORT

: Reliance Communications LLC **APPLICANT**

PRODUCT NAME : Orbic Joy 2

MODEL NAME : RC656L

BRAND NAME : Orbic

FCC ID : 2ABGH-RC656L

47 CFR Part 2

47 CFR Part 22 Subpart H STANDARD(S)

47 CFR Part 24 Subpart E

47 CFR Part 27 Subpart L

RECEIPT DATE : 2024-02-29

TEST DATE : 2024-04-10 to 2024-04-26

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Shenzhen Morlab Communications Technology Co., Ltd.

Edited by:

Approved by:

Shen Junsheng (Supervisor)

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Change History						
Version	Version Date Reason for change					
1.0	2024-05-21	First edition				





1. Technical Information

Note: Provide by applicant.

1.1. Applicant and Manufacturer Information

Applicant: Reliance Communications LLC		
Applicant Address:555 Wireless Blvd. Hauppauge, NY 11788, USA		
Manufacturer:	SHENZHEN CHINO-E COMMUNICATION CO., LTD	
	No. 503, 505, 5th Floor, Hengjiang Mansion, Intersection of	
Manufacturer Address:	Bulong Road and Renmin Road, Longhua New District,	
	Shenzhen, China.	

1.2. Equipment Under Test (EUT) Description

Orbic Joy 2					
1#					
V1.0					
RC656L_V1.0.15_BLB					
GSM/GPRS Mode with GMSK Modulation					
EDGE Mode with 8	BPSK Modulation				
WCDMA Mode with	n QPSK Modulation				
HSDPA Mode with	QPSK Modulation				
DC-HSDPA Mode with QPSK Modulation					
HSUPA Mode with QPSK Modulation					
HSPA+ Mode with 16QAM Modulation					
GSM 850MHz	Tx: 824MHz-849MHz				
	Rx: 869MHz-894MHz				
GSM 1900MHz	Tx: 1850MHz-1910MHz				
	Rx: 1930MHz-1990MHz				
WCDMA Band V	Tx: 824MHz-849MHz				
	Rx: 869MHz-894MHz				
MODAAA D. LIV	Tx: 1710MHz-1755MHz				
WCDMA Band IV	Rx: 2110MHz-2155MHz				
WCDMA Band II	Tx: 1850MHz-1910MHz				
	Rx: 1930MHz-1990MHz				
	TX: 824MHz-849MHz GSM 1900MHz GSM 1900MHz WCDMA Band II WT.0 RC656L_V1.0.15_BLB GSM/GPRS Mode with GMSK Modulation EDGE Mode with 8PSK Modulation WCDMA Mode with QPSK Modulation HSDPA Mode with QPSK Modulation HSUPA Mode with QPSK Modulation TX: 824MHz-849MHz RX: 869MHz-894MHz TX: 1930MHz-1990MHz TX: 824MHz-849MHz TX: 1930MHz-1990MHz TX: 824MHz-849MHz TX: 1710MHz-1755MHz RX: 2110MHz-2155MHz TX: 1850MHz-1910MHz TX: 1850MHz-1910MHz				







Antonna Typo:	PIFA Antenna			
Antenna Type:				
	Top Antenna	0.05 ID:		
	GSM 850:	-3.05dBi		
	GSM1900:	0.54dBi		
	WCDMA Band V:	-3.05dBi		
	WCDMA Band IV:	0.03dBi		
Antenna Gain:	WCDMA Band II:	0.54dBi		
Antonia Gam	Bottom Antenna			
	GSM 850:	-2.04dBi		
	GSM1900:	0.14dBi		
	WCDMA Band V:	-2.04dBi		
	WCDMA Band IV:	-0.35dBi		
	WCDMA Band II:	0.14dBi		
	Battery			
	Brand Name:	Orbic		
	Model No.:	BTE-5005		
	Serial No.:	N/A		
	Capacity:	5000mAh		
	Rated Voltage:	3.87V		
	Charge Limit:	4.45V		
	Manufacturer:	Shenzhen Aerospace Electronic Co.,Ltd.		
	AC Adapter			
	Brand Name:	Orbic		
Accessory Information:	Model No.:	OACH023US1		
	Serial No.:	N/A		
	Rated Output:	5V=3A, 9V=2A, 12V=1.5A		
	Rated Input:	100-240V~50/60Hz,0.5A		
	Manufacturer 1:	WATAI ELECTRONICS PRIVATE LIMITED		
	Manufacturer 2:	KANGYIN ELECTRONIC TECHNOLOGY CO.,LTD		
	USB Cable			
	Model No.:	HX-YLMK-06		
	Manufacturer:	HUIZHOU WASHIN ELECTRONICS CO.,LTD		

Note 1: The transmitter (Tx) frequency arrangement of the Cellular 850MHz band used by the EUT can be represented with the formula F(n)=824.2+0.2*(n-128), 128 <= n <= 251; the lowest, middle, highest channel numbers (ARFCHs) used and tested in this report are separately 128





(824.2MHz), 189 (836.4MHz) and 251 (848.8MHz).

Note 2: The transmitter (Tx) frequency arrangement of the PCS 1900MHz band used by the EUT can be represented with the formula F(n)=1850.2+0.2*(n-512), 512<=n<=810; the lowest, middle and highest channel numbers (ARFCHs) used and tested in this report are separately 512 (1850.2MHz), 661 (1880.0MHz) and 810 (1909.8MHz).

Note 3: The transmitter (Tx) frequency arrangement of the WCDMA Band V used by the EUT can be represented with the formula F(n)=826.4+0.2*(n-4132), 4132<=n<=4233; the lowest, middle and highest channel numbers (ARFCHs) used and tested in this report are separately 4132 (826.4MHz), 4182(836.4MHz) and 4233 (846.6MHz).

Note 4: The transmitter (Tx) frequency arrangement of the WCDMA IV band used by the EUT can be represented with the formula F(n)=1712.4+0.2*(n-1312), 1312<=n<=1513; the lowest, middle and highest channel numbers (ARFCHs) used and tested in this report are separately 1312 (1712.4MHz), 1413 (1732.6MHz) and 1513 (1752.6MHz).

Note 5: The transmitter (Tx) frequency arrangement of the WCDMA Band II used by the EUT can be represented with the formula F(n)=1852.4+0.2*(n-9262), 9262<=n<=9538; the lowest, middle and highest channel numbers (ARFCHs) used and tested in this report are separately 9262 (1852.4MHz), 9400 (1880MHz) and 9538 (1907.6MHz).

Note 6: All test modes and data rates were considered and evaluated respectively by performing full test. Test modes are chosen to be reported as the worst case below:

GSM mode and EDGE mode for GSM 850;

GSM mode and EDGE mode for GSM 1900;

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WCDMA mode for WCDMA band V;

WCDMA mode for WCDMA band IV:

WCDMA mode for WCDMA band II;

Note 7: For a more detailed description, please refer to Specification or User's Manual supplied by the applicant and/or manufacturer.





1.3. Maximum E.R.P./E.I.R.P. and Emission Designator

Test Mode	Maximum E.R.P./E.I.R.P. (W)	Emission Designator
GSM850(GSM)	0.624	247KGXW
GSM850(EDGE)	0.173	251KG7W
GSM1900(GSM)	0.935	250KGXW
GSM1900(EDGE)	0.377	246KG7W
WCDMA Band V	0.068	4M14F9W
WCDMA Band IV	0.184	4M15F9W
WCDMA Band II	0.200	4M15F9W



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1.4. Test Standards and Results

The objective of the report is to perform testing according to 47 CFR Part 2, Part 22, Part 24 and Part 27 for the EUT FCC ID Certification:

No.	Document Title			
1 47 CFR Part 2 (10-1-12 Edition)		Frequency Allocations and Radio Treaty Matters;		
I	47 CFR Part 2 (10-1-12 Edition)	General Rules and Regulations		
2	47 CFR Part 22 (10-1-12 Edition)	Public Mobile Services		
3	47 CFR Part 24 (10-1-12 Edition)	Personal Communications Services		
4	47.0FD Dart 07./40.4.40 Falition	Miscellaneous Wireless Communications		
4	47 CFR Part 27 (10-1-12 Edition)	Services		

Test detailed items/section required by FCC rules and results are as below:

No.	Section	Description	Test Date	Test Engineer	Result	Method Determination/ Remark
1	2.1046	Conducted RF Output Power	Apr. 10, 2024	Zheng Jianhua	PASS	No deviation
2	24.232(d)	Peak -Average Ratio	Apr. 10, 2024	Gan Jing	PASS	No deviation
3	2.1049	Occupied Bandwidth	Apr. 10, 2024	Gan Jing	PASS	No deviation
4	2.1055, 22.355, 24.235, 27.54	Frequency Stability	Apr. 10, 2024	Gan Jing	PASS	No deviation
5	2.1051, 22.917(a), 24.238(a), 27.53(h)	Conducted Out of Band Emissions	Apr. 10, 2024	Gan Jing	PASS	No deviation
6	2.1051, 22.917(a), 24.238(a), 27.53(h)	Band Edge	Apr. 10, 2024	Gan Jing	PASS	No deviation
7	22.913(a), 24.232(c) 27.50(d)	Transmitter Radiated Power (E.I.P.R./E.R.P.)	Apr. 10, 2024	Gan Jing	PASS	No deviation
8	2.1051, 22.917(a),	Radiated Out of Band Emissions	Apr. 14 to 16, 2024	Li Hanbin	PASS	No deviation



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24.238(a),			
27.53(h)			

Note 1: The tests were performed according to the method of measurements prescribed in KDB971168 D01 v03r01 and ANSI/TIA-603-E-2016.

Note 2: Additions to, deviation, or exclusions from the method shall be judged in the "method determination" column of add, deviate or exclude from the specific method shall be explained in the "Remark" of the above table.

Note 3: When the test result is a critical value, we will use the measurement uncertainty give the judgment result based on the 95% confidence intervals.

1.5. Environmental Conditions

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

Temperature (°C):	15-35
Relative Humidity (%):	30-60
Atmospheric Pressure (kPa):	86-106



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2.47 CFR Part 2, Part 22H, 24E&27L Requirements

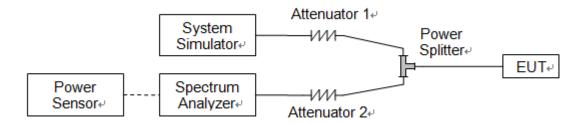
2.1. Conducted RF Output Power

2.1.1.Requirement

According to FCC section 2.1046(a), for transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, power output shall be measured at the RF output terminals when the transmitter is adjusted in accordance with the tune-up procedure to give the values of current and voltage on the circuit elements specified in FCC section 2.1033(c)(8).

2.1.2.Test Description

Test Setup:



The EUT is coupled to the Spectrum Analyzer (SA) and the System Simulator (SS) with Attenuators through the Power Splitter; the RF load attached to the EUT antenna terminal is 500hm; the path loss as the factor is calibrated to correct the reading. The EUT is commanded by the SS to operate at the maximum output power i.e. Power Control Level (PCL) = 5 and Power Class = 4. A call is established between the EUT and the SS.



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2.1.3.Test Results

GSM850	Average Power (dBm)		
TX Channel	128	189	251
Frequency (MHz)	824.2	836.4	848.8
GSM 1 Tx slot	32.10	31.93	31.90
GPRS 1 Tx slot	32.14	31.96	31.93
GPRS 2 Tx slots	28.90	28.95	28.92
GPRS 3 Tx slots	26.64	26.48	26.46
GPRS 4 Tx slots	24.44	24.31	24.27
EDGE 1 Tx slot	26.58	26.48	26.44
EDGE 2 Tx slots	24.55	24.46	24.41
EDGE 3 Tx slots	21.71	21.60	21.67
EDGE 4 Tx slots	20.12	20.01	20.08

GSM1900	Average Power (dBm)		
TX Channel	512	661	810
Frequency (MHz)	1850.2	1880	1909.8
GSM 1 Tx slot	29.52	29.55	29.47
GPRS 1 Tx slot	29.54	29.57	29.49
GPRS 2 Tx slots	28.04	28.05	27.98
GPRS 3 Tx slots	25.87	25.94	25.81
GPRS 4 Tx slots	24.63	24.68	24.57
EDGE 1 Tx slot	25.62	25.53	25.40
EDGE 2 Tx slots	23.68	23.54	23.38
EDGE 3 Tx slots	22.28	22.21	22.02
EDGE 4 Tx slots	21.04	21.01	20.95



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WCDMA Band V		Average Power (dBm))
TX Channel	4132	4182	4233
Frequency (MHz)	826.4	836.4	846.6
RMC 12.2Kbps	22.52	22.54	22.48
HSDPA Subtest-1	21.67	21.57	21.58
HSDPA Subtest-2	21.84	21.69	21.71
HSDPA Subtest-3	21.34	21.19	21.25
HSDPA Subtest-4	21.28	21.24	21.22
DC-HSDPA Subtest-1	21.52	21.46	21.39
DC-HSDPA Subtest-2	21.53	21.45	21.34
DC-HSDPA Subtest-3	21.04	20.92	20.83
DC-HSDPA Subtest-4	21.03	20.92	20.87
HSUPA Subtest-1	21.42	21.43	21.59
HSUPA Subtest-2	20.87	21.07	20.94
HSUPA Subtest-3	21.57	21.34	21.51
HSUPA Subtest-4	21.33	21.33	21.32
HSUPA Subtest-5	21.58	21.28	21.35
HSPA+ (16QAM) Subtest-1	21.64	21.57	21.32

WCDMA Band IV	A	Average Power (dBm)	
TX Channel	1312	1413	1513
Frequency (MHz)	1712.4	1732.6	1752.6
RMC 12.2Kbps	22.93	23.00	22.97
HSDPA Subtest-1	21.64	21.76	21.70
HSDPA Subtest-2	21.91	21.82	21.65
HSDPA Subtest-3	21.12	21.18	21.01
HSDPA Subtest-4	21.14	21.22	21.00
DC-HSDPA Subtest-1	21.35	21.55	21.55
DC-HSDPA Subtest-2	21.41	21.62	21.55
DC-HSDPA Subtest-3	21.00	21.02	21.13
DC-HSDPA Subtest-4	21.10	21.09	21.02
HSUPA Subtest-1	21.59	21.77	21.44
HSUPA Subtest-2	21.22	21.46	21.45
HSUPA Subtest-3	21.65	21.87	21.60
HSUPA Subtest-4	21.64	21.65	21.64
HSUPA Subtest-5	21.57	21.54	21.39
HSPA+ (16QAM) Subtest-1	21.65	21.63	21.46



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WCDMA Band II		Average Power (dBm)
TX Channel	9262	9400	9538
Frequency (MHz)	1852.4	1880.0	1907.6
RMC 12.2Kbps	23.02	22.94	22.98
HSDPA Subtest-1	21.80	21.67	21.71
HSDPA Subtest-2	21.74	21.58	21.60
HSDPA Subtest-3	21.25	21.06	20.96
HSDPA Subtest-4	21.22	21.05	21.01
DC-HSDPA Subtest-1	21.63	21.54	21.55
DC-HSDPA Subtest-2	21.61	21.56	21.61
DC-HSDPA Subtest-3	21.16	21.09	21.11
DC-HSDPA Subtest-4	21.17	21.06	21.10
HSUPA Subtest-1	21.87	21.66	21.49
HSUPA Subtest-2	21.35	21.19	21.18
HSUPA Subtest-3	21.77	21.68	21.36
HSUPA Subtest-4	21.80	21.65	21.74
HSUPA Subtest-5	21.85	21.64	21.55
HSPA+ (16QAM) Subtest-1	21.93	21.83	21.48







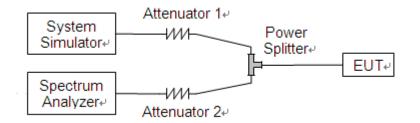
2.2. Peak to Average Ratio

2.2.1.Requirement

According to FCC 24.232(d) and 27.50(d), the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

2.2.2.Test Description

Test Setup:



The EUT is coupled to the Spectrum Analyzer (SA) and the System Simulator (SS) with Attenuators through the Power Splitter; the RF load attached to the EUT antenna terminal is 500hm; the path loss as the factor is calibrated to correct the reading. The EUT is commanded by the SS to operate at the maximum output power i.e. Power Control Level (PCL) = 5 and Power Class = 4. A call is established between the EUT and the SS.

2.2.3.Test procedure

- 1 .For GSM/EDGE operating mode:
- a. Set RBW=1MHz, VBW=3MHz, peak detector in spectrum analyzer.
- b. Set EUT in maximum output power, and triggered the bust signal.
- c. Measured respectively the peak level and mean level, and the deviation was recorded as Peak to Average ratio.
- 2. For UMTS operating mode:
- a. Set the CCDF (Complementary Cumulative Distribution Function) option in spectrum analyzer.
- b. The highest RF powers were measured and recorded the maximum PAPR level associated with a probability of 0.1%.



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2.2.4.Test Result

A. Test Verdict:

	GSM1900								
Mode	Channel	Frequency (MHz)	Peak to Average ratio (dB)	Limit (dB)	Verdict				
	512	1850.2	0.59		PASS				
GSM	661	1880.0	0.59		PASS				
	810	1909.8	0.61	12	PASS				
	512	1850.2	3.35	13	PASS				
EDGE	661	1880.0	3.30		PASS				
	810	1909.8	3.29		PASS				

WCDMA Band IV								
Mode	Mode Channel Frequency (MHz) Peak to Average ratio (dB)							
	1312	1712.4	3.04		PASS			
WCDMA	1413	1732.6	2.99	13	PASS			
	1513	1752.6	3.02		PASS			

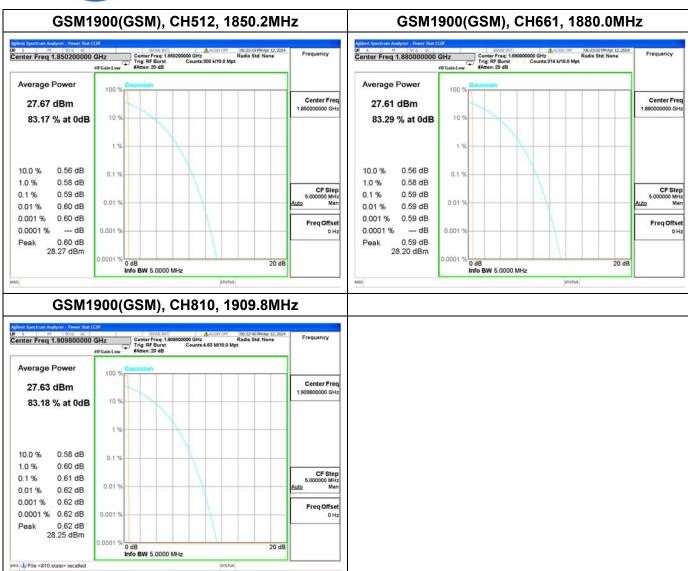
	WCDMA Band II								
Mode	Mode Channel Frequency (MHz) Peak to Average ratio (dB) Limit (vertical vertical ver								
	9262	1852.4	2.96	, ,	PASS				
WCDMA	9400	1880.0	2.99	13	PASS				
	9538	1907.6	2.94	1	PASS				



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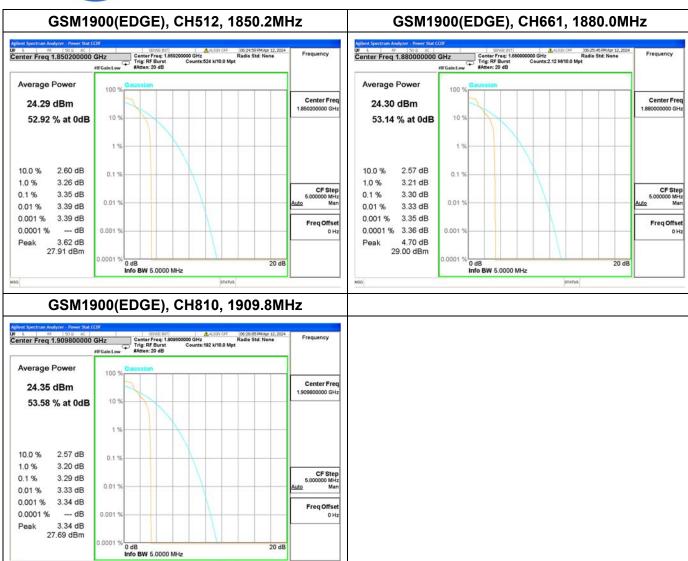




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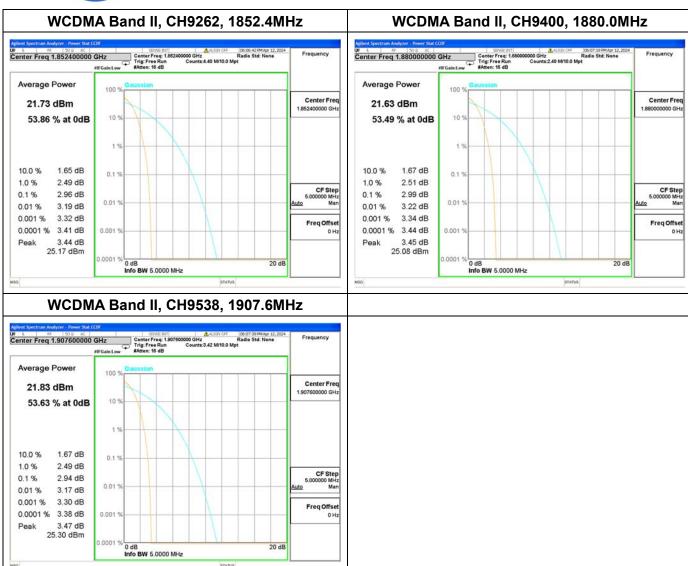
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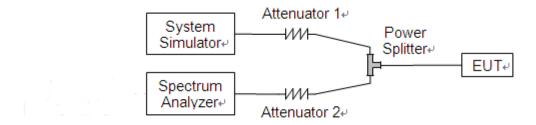
2.3. Occupied Bandwidth

2.3.1.Requirement

According to FCC section 2.1049, the occupied bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission. Occupied bandwidth is also known as the 99% emission bandwidth.

2.3.2.Test Description

Test Setup:



The EUT is coupled to the Spectrum Analyzer (SA) and the System Simulator (SS) with Attenuators through the Power Splitter; the RF load attached to the EUT antenna terminal is 500hm; the path loss as the factor is calibrated to correct the reading. The EUT is commanded by the SS to operate at the maximum output power i.e. Power Control Level (PCL) = 5 and Power Class = 4. A call is established between the EUT and the SS.





2.3.3.Test Result

	GSM850						
Mode	Channel	Frequency (MHz)	99% Occupied Bandwidth (kHz)	26dB Bandwidth (kHz)			
	128	824.2	244.67	309.6			
GSM	189	836.4	246.81	307.1			
	251	848.8	245.40	318.9			
	128	824.2	247.81	304.2			
EDGE	189	836.4	241.42	296.7			
	251	848.8	251.03	311.9			

	GSM1900						
Mode Channel	Frequency	99% Occupied Bandwidth	26dB Bandwidth				
	540	(MHz)	(kHz)	(kHz)			
	512	1850.2	245.53	319.1			
GSM	661	1880.0	243.50	314.7			
	810	1909.8	250.42	312.1			
	512	1850.2	243.28	300.9			
EDGE	661	1880.0	245.83	305.8			
	810	1909.8	246.19	301.2			

WCDMA Band V							
Mode Channel Frequency (MHz) 99% Occupied Bandwidth (MHz) 26dB Bandwidth (MHz)							
	4132	826.4	4.14	4.74			
WCDMA	4182	836.4	4.14	4.69			
	4233	846.6	4.14	4.71			

WCDMA Band IV							
Mode Channel Frequency (MHz) 99% Occupied Bandwidth (MHz) 26dB Bandwidth (MHz)							
	1312	1712.4	4.14	4.70			
WCDMA	1413	1732.6	4.15	4.74			
	1513	1752.6	4.14	4.72			



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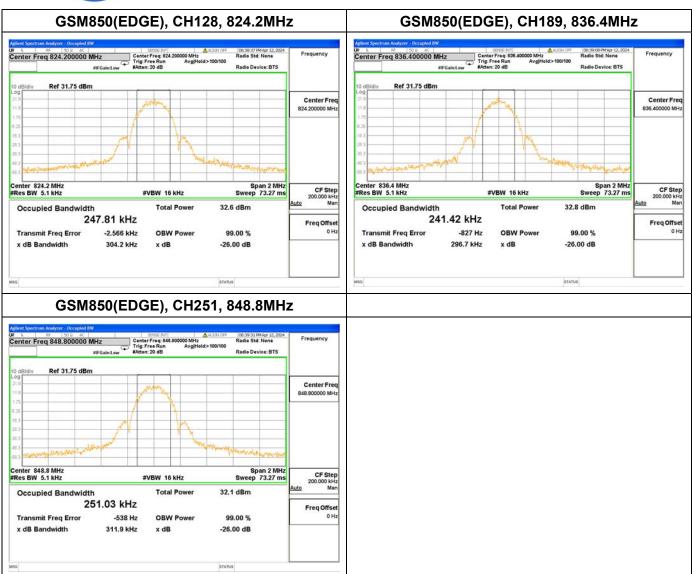


WCDMA Band II							
Mode Channel Frequency 99% Occupied Bandwidth (MHz) 26dB Bandwidth (MHz)							
	9262	1852.4	4.15	4.71			
WCDMA	9400	1880.0	4.15	4.73			
	9538	1907.6	4.15	4.73			

GSM850(GSM), CH128, 824.2MHz GSM850(GSM), CH189, 836.4MHz Center Freq: 824.20 Trig: Free Run #Atten: 20 dB Center Freq 824.200000 MHz Center Freq 836.400000 MHz Radio Device: BTS Radio Device: BTS Ref 31.75 dBm Ref 31.75 dBm Center Free Center Freq Span 2 MHz Sweep 73.27 ms #VBW 16 kHz #VBW 16 kHz Occupied Bandwidth **Total Power** 38.6 dBm Occupied Bandwidth **Total Power** 38.7 dBm 244.67 kHz 246.81 kHz Freq Offset 0 Hz 1.950 kHz 99.00 % Transmit Freg Error -1.140 kHz **OBW Power** 99.00 % Transmit Freg Error **OBW Power** x dB Bandwidth 309.6 kHz x dB -26.00 dB x dB Bandwidth 307.1 kHz x dB -26.00 dB GSM850(GSM), CH251, 848.8MHz OW L 80 500 AC Center Freq 848.800000 MHz Ref 31.75 dBm Center Freq CF Step 200.000 kHz 37.8 dBm Occupied Bandwidth 245.40 kHz Freq Offse OBW Powe Transmit Freq Error 329 Hz 99.00 % x dB Bandwidth 318.9 kHz x dB -26.00 dB







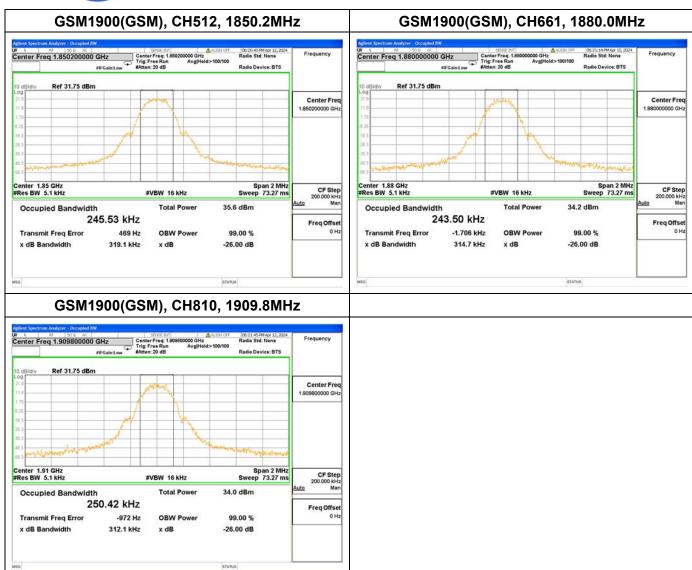


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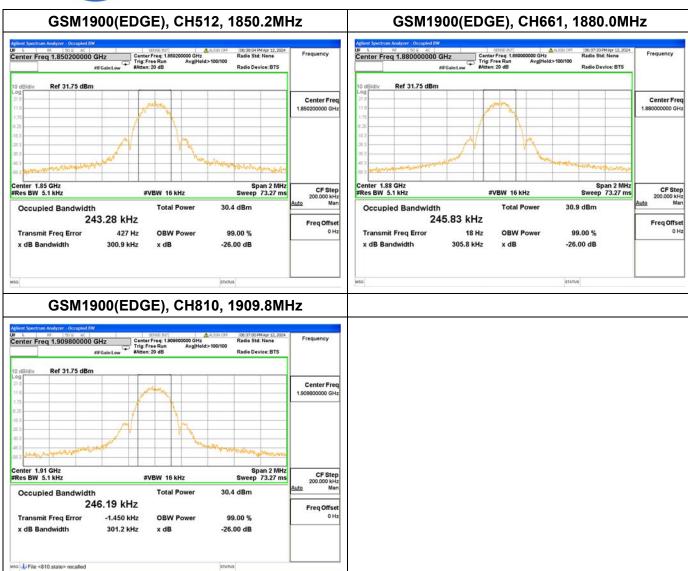
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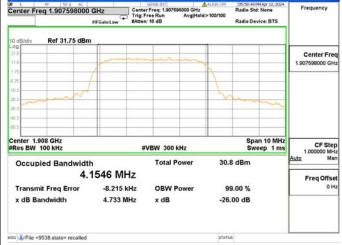




WCDMA Band IV, CH1312, 1712.4MHz WCDMA Band IV, CH1413, 1732.6MHz Center Freq 1.732600000 GHz Center Free Center 1.712 GHz #Res BW 100 kHz Span 10 MHz Sweep 1 ms Span 10 MHz Sweep 1 ms Center 1.733 GHz #Res BW 100 kHz CF Step 1.000000 MHz Man CF Step 1.000000 MHz Man #VBW 300 kHz **#VBW 300 kHz** 30.7 dBm 30.7 dBm Occupied Bandwidth Total Power Occupied Bandwidth **Total Power** 4.1530 MHz 4.1412 MHz Freq Offset Freq Offset Transmit Freq Error -1.874 kHz OBW Power 99.00 % Transmit Freq Error 1.030 kHz OBW Power 99.00 % x dB Bandwidth 4.698 MHz -26.00 dB 4.737 MHz -26.00 dB x dB x dB Bandwidth x dB WCDMA Band IV, CH1513, 1752.6MHz Center Freq 1.752600000 GHz Ref 31.75 dBm Center Free Center 1.753 GHz #Res BW 100 kHz Span 10 MHz CF Step 1.000000 MHz Man **#VBW 300 kHz** Total Power Occupied Bandwidth 4.1354 MHz Freq Offse Transmit Freq Error -3.752 kHz OBW Power 99.00 % x dB Bandwidth 4.725 MHz -26.00 dB



WCDMA Band II, CH9262, 1852.4MHz WCDMA Band II, CH9400, 1880.0MHz Center Freq: 1.852400000 GHz Trig: Free Run Avg|Held>100/100 #Atten: 16 dB Center Freq Center Freq Span 10 MHz Sweep 1 ms Center 1.852 GHz #Res BW 100 kHz Span 10 MHz Center 1.88 GHz #Res BW 100 kHz CF Step 1.000000 MHz Man CF Step 1.000000 MHz Man #VBW 300 kHz **#VBW 300 kHz** 30.7 dBm Total Power Occupied Bandwidth 30.5 dBm Occupied Bandwidth **Total Power** 4.1499 MHz 4.1525 MHz Freq Offset Freq Offset Transmit Freq Error 3.764 kHz OBW Power Transmit Freq Error -5.438 kHz OBW Power 99.00 % x dB Bandwidth x dB -26.00 dB 4.734 MHz -26.00 dB x dB Bandwidth x dB WCDMA Band II, CH9538, 1907.6MHz Center Freq 1.907598000 GHz



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2.4. Frequency Stability

2.4.1.Requirement

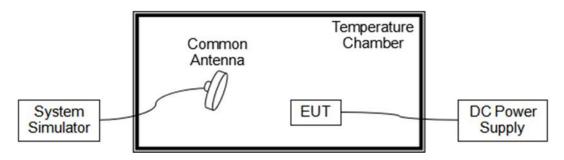
According to FCC section 22.355, 24.235 and 27.54 the frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. According to FCC section 2.1055, the test conditions are:

- (a) The temperature is varied from-30°C to +50°C at intervals of not more than 10°C.
- (b) For hand carried battery powered equipment, the primary supply voltage is reduced to the battery operating end point which shall be specified by the manufacture. The supply voltage shall be measured at the input to the cable normally provided with the equipment, or at the power supply terminals if cables are not normally provided.

Note: The operating temperature of EUT is from 0°C to 40°C, which are specified by the applicant.

2.4.2.Test Description

Test Setup:



The EUT, which is powered by the DC Power Supply directly, is located in the Temperature Chamber. The EUT is commanded by the System Simulator (SS) to operate at the maximum output power i.e. Power Control Level (PCL) = 5 and Power Class = 4. A call is established between the EUT and the SS via a Common Antenna.





2.4.3.Test Result

The nominal, highest and lowest extreme voltages are separately 3.87V, 4.45V and 3.40V, which are specified by the applicant; the normal temperature here used is 20°C.

	GSM850(GSM), CH189, 836.4MHz Limit =±2.5ppm							
Voltage (%) Power (VDC) Temp (°C) Fre. Dev. Deviation (Hz) (ppm)								
Normal		+20(Ref)	5	0.006				
Normal	3.87	0	17	0.020	1			
Normal		+10	-21	-0.025	1			
Normal		+20	13	0.016	PASS			
Normal		+30	15	0.018	PASS			
Normal	4.45	+40	20	0.024				
High		+20	13	0.016				
BATT.ENDPOINT	3.40	+20	-19	-0.023				

GSM850(EDGE), CH189, 836.4MHz Limit =±2.5ppm						
Voltage (%)	Power (VDC)	Temp (°C)	Fre. Dev. (Hz)	Deviation (ppm)	Result	
Normal	3.87 4.45 3.40	+20(Ref)	16	0.019		
Normal		0	20	0.024		
Normal		+10	16	0.019		
Normal		+20	18	0.022	PASS	
Normal		+30	-1	-0.001	PASS	
Normal		+40	18	0.022		
High		+20	17	0.020		
BATT.ENDPOINT		+20	19	0.023		





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GSM1900(GSM), CH661, 1880.0MHz Limit =Within Authorized Band						
Voltage (%)	Power (VDC)	Temp (°C)	Fre. Dev. (Hz)	Deviation (ppm)	Result	
Normal	3.87	+20(Ref)	14	0.007	DACC	
Normal		0	19	0.010		
Normal		+10	20	0.011		
Normal		+20	16	0.009		
Normal		+30	-21	-0.011	PASS	
Normal		+40	-19	-0.010		
High		+20	5	0.003		
BATT.ENDPOINT	3.40	+20	16	0.009	1	

GSM1900(EDGE), CH661, 1880.0MHz							
Limit =Within Authorized Band							
Voltage (9/)	Power (VDC)	Temp (°C)	Fre. Dev.	Deviation	Result		
Voltage (%)	Power (VDC)		(Hz)	(ppm)			
Normal		+20(Ref)	-13	-0.007			
Normal	3.87 4.45 3.40	0	-11	-0.006			
Normal		+10	20	0.011			
Normal		+20	14	0.007	PASS		
Normal		+30	14	0.007	PASS		
Normal		+40	17	0.009			
High		+20	-22	-0.012			
BATT.ENDPOINT		+20	-17	-0.009			









WCDMA Band V, CH4182, 836.4MHz Limit =±2.5ppm						
Voltage (%)	Power (VDC)	Temp (°C)	Fre. Dev. (Hz)	Deviation (ppm)	Result	
Normal	3.87	+20(Ref)	10	0.012	PASS	
Normal		0	15	0.018		
Normal		+10	16	0.019		
Normal		+20	14	0.017		
Normal		+30	-8	-0.010		
Normal		+40	19	0.023		
High	4.45	+20	13	0.016		
BATT.ENDPOINT	3.40	+20	18	0.022		

WCDMA Band IV, CH1413, 1732.6MHz						
Limit =Within Authorized Band						
Valtage (0/)	Power	Temp (°C)	Fre. Dev.	Deviation	Result	
Voltage (%)	(VDC)		(Hz)	(ppm)	Resuit	
Normal	7.78 8.96 6.30	+20(Ref)	16	0.009		
Normal		0	16	0.009		
Normal		+10	18	0.010		
Normal		+20	15	0.009	PASS	
Normal		+30	-11	-0.006	PASS	
Normal		+40	18	0.010		
High		+20	20	0.012		
BATT.ENDPOINT		+20	-3	-0.002		







WCDMA Band II, CH9400, 1880.0MHz Limit =Within Authorized Band						
Voltage (%)	Power (VDC)	Temp (°C)	Fre. Dev. (Hz)	Deviation (ppm)	Result	
Normal	3.87	+20(Ref)	-4	-0.002		
Normal		0	16	0.009		
Normal		+10	15	0.008		
Normal		+20	-15	-0.008	PASS	
Normal		+30	-4	-0.002	PASS	
Normal		+40	14	0.007		
High	4.45	+20	15	0.008		
BATT.ENDPOINT	3.40	+20	-15	-0.008		







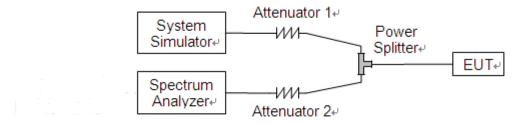
2.5. Conducted Out of Band Emissions

2.5.1.Requirement

According to FCC section 22.917(a), 24.238(a) and 27.53(h) the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43+10*log(P)dB. This calculated to be -13dBm. The measurement frequency range is from 30MHz to the 10th harmonic of the fundamental frequency.

2.5.2.Test Description

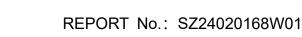
Test Setup:



The EUT is coupled to the Spectrum Analyzer (SA) and the System Simulator (SS) with Attenuators through the Power Splitter; the RF load attached to the EUT antenna terminal is 500hm; the path loss as the factor is calibrated to correct the reading. The EUT is commanded by the SS to operate at the maximum output power i.e. Power Control Level (PCL) = 5 and Power Class = 4. A call is established between the EUT and the SS.



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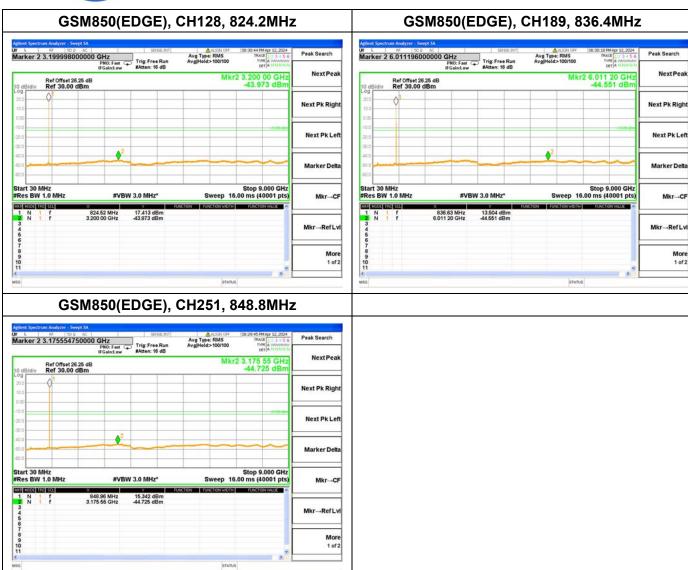


2.5.3.Test Result











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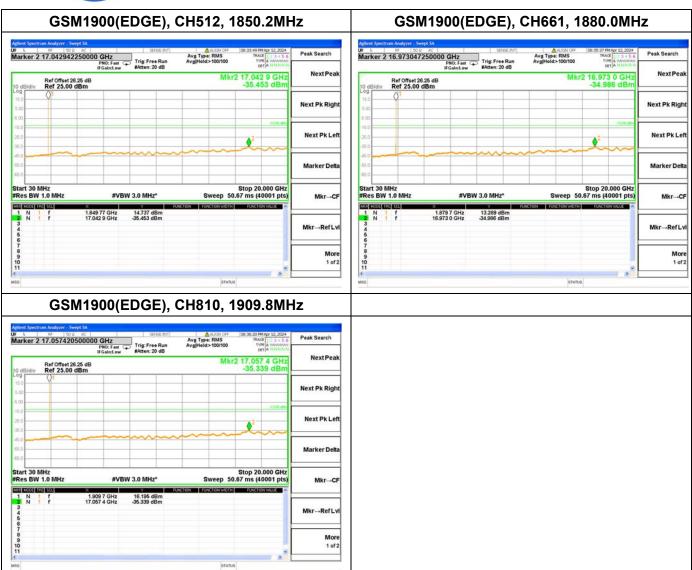


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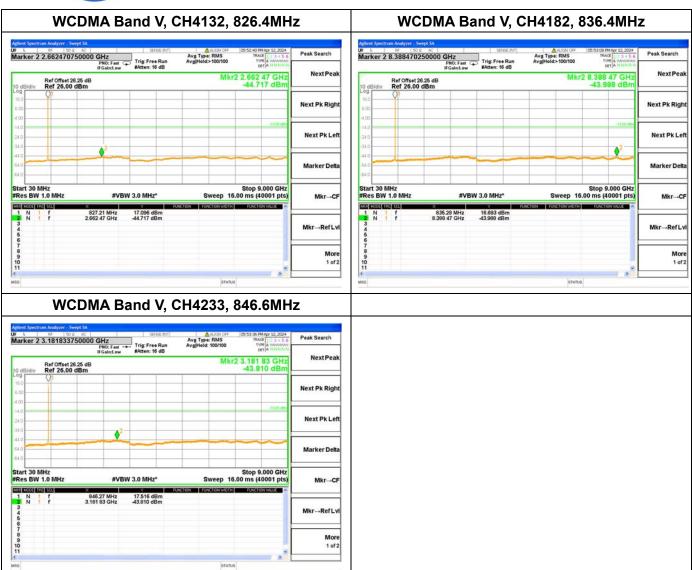
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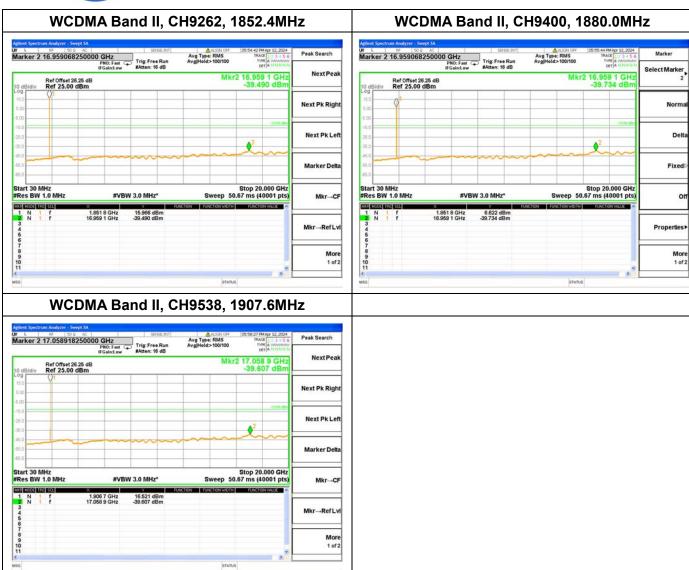




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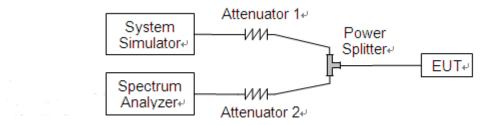
2.6. Band Edge

2.6.1.Requirement

According to FCC section 22.917(a), 24.238(a) and 27.53(h) the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43+10*log(P)dB.

2.6.2.Test Description

Test Setup:



The EUT is coupled to the Spectrum Analyzer (SA) and the System Simulator (SS) with Attenuators through the Power Splitter; the RF load attached to the EUT antenna terminal is 500hm; the path loss as the factor is calibrated to correct the reading. The EUT is commanded by the SS to operate at the maximum output power i.e. Power Control Level (PCL) = 5 and Power Class = 4. A call is established between the EUT and the SS.



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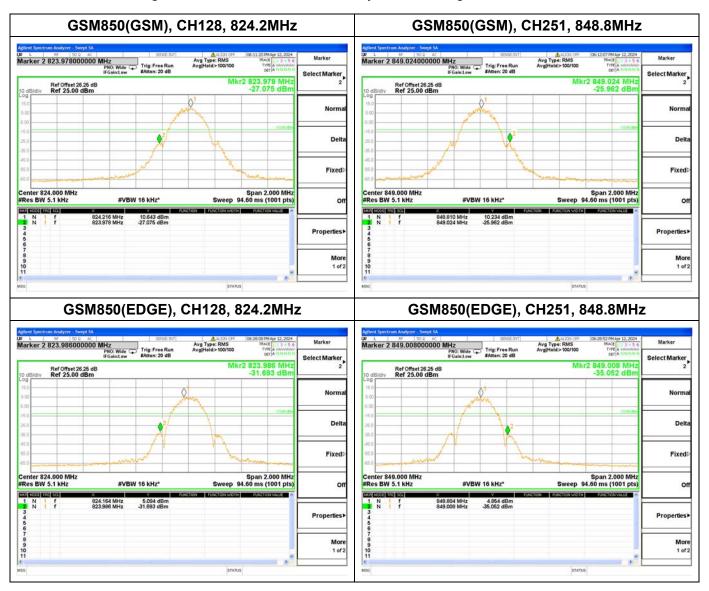
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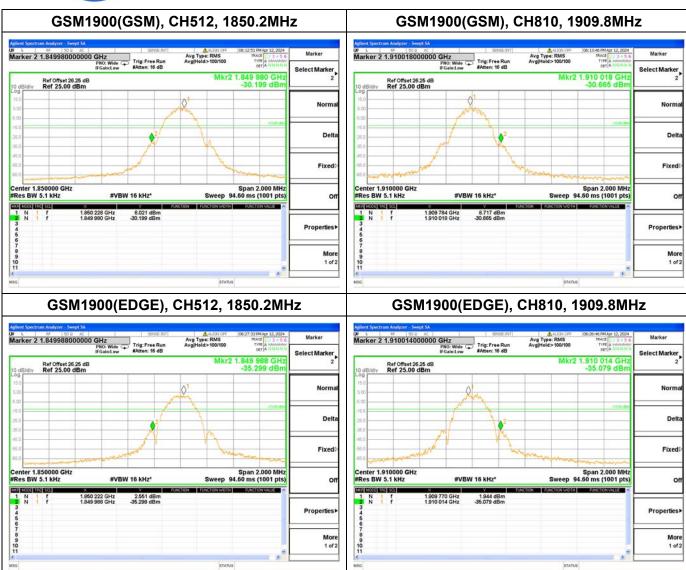
2.6.3.Test Result

The lowest and highest channels are tested to verify the band edge emissions.













WCDMA Band V, CH4132, 826.4MHz WCDMA Band V, CH4233, 846.6MHz Marker 2 824.000000000 MHz PNO: Wide Scioled may Aften: 16 dB Marker 2 849.000000000 MHz PNO: Wide Alter: 16 dB Avg Type: RMS AvgiHeld>100Hov Avg Type: RMS AvglHold>100/100 From File From File Ref Offset 26.25 dB Ref 25.00 dBm Ref Offset 26.25 dB Ref 25.00 dBm Edit Register Edit Register Names Register 1 Last: 3/12/2019 3:54:55 PM Register 1 Last: 3/12/2019 3:54:55 PM Register 2 (empty) Register 2 (empty) Span 2.000 MHz Sweep 1.000 ms (1001 pts) Register 3 Register 3 (empty) #VBW 160 kHz Register 4 More 1 of 3 Mon WCDMA Band IV, CH1312, 1712.4MHz WCDMA Band IV, CH1513, 1752.6MHz Marker 2 1.710000000000 GHz PNO: Wide Proceedings of the service Marker 2 1.755000000000 GHz PNO: Wide Aften: 16 dB Avg Type: RMS AvgiHeid>100/10 Avg Type: RMS Avg|Hold>10040 Recall State From File. From File. Mkr2 1.755 000 GH -27.531 dB Ref Offset 26.25 dB Ref 25.00 dBm Ref Offset 26.25 dB Ref 25.00 dBm **Edit Register** Edit Register 0 Register Last: 3/12/2019 3:54:55 Pt Register 1 Last: 3/12/2019 3:54:55 PM Register 2 (empty) Register 2 (empty) Span 2.000 MHz Sweep 1.000 ms (1001 pts Span 2.000 MH: Sweep 1.000 ms (1001 pts Register 3 (empty) Register 3 (empty) #VBW 160 kHz* #VBW 160 kHz* 1 N 1 f Register 4 (empty) Register 4 (empty) Mor More 1 of 3 1 of 3 WCDMA Band II, CH9262, 1852.4MHz WCDMA Band II, CH9538, 1907.6MHz Center Freq 1.850000000 GHz Trig: Free Run #Atten: 16 dB Marker 2 1.910000000000 GHz PNO: Wide After: 16 dB Avg Type: RMS Avg|Hold>100/10 Avg Type: RMS AvailHold>100/10 Ref Offset 26.25 dB Ref 25.00 dBm Ref Offset 26.25 dB Ref 25.00 dBm Edit Register 0 Norm Names Delt Register 2 Fixed enter 1.850000 GHz Res BW 51 kHz Span 2.000 MHz Sweep 1.000 ms (1001 pts) Center 1.910000 GHz #Res BW 51 kHz Span 2.000 MH: Sweep 1.000 ms (1001 pts Register 3 #VBW 160 kHz* #VBW 160 kHz* Register 4 (empty) More 1 of 2 1 of 3 ↓File <9262.state> recalled



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2.7. Determining E.R.P. and/or E.I.R.P. from conducted RF output power measurements

2.7.1.Requirement

According to FCC section 22.913, the Effective Radiated Power (E.R.P.) of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.

According to FCC section 24.232, the broadband PCS mobile station is limited to 2 Watts e.i.r.p. peak power.

According to FCC section 27.50, mobile, and portable (hand-held) stations is limited to 1 Watts e.i.r.p. peak power.

2.7.2.Test Description

The test setups refer to section 2.1.3

A call is established between the EUT and the SS via a Common Antenna. The EUT is commanded by the SS to operate at the maximum and minimum output power (i.e. GSM850MHz band Power Control Level (PCL) = 5/19 and Power Class = 4, GSM1900MHz band Power Control Level (PCL) = 0/15 and Power Class = 1), and only the test result of the maximum output power was recorded. Please refer to section 2.1.3 of this report.

The relevant equation for determining the maximum E.R.P. or E.I.R.P. from the measured RF output power is given in Equation (1) as follows:

E.R.P. or E.I.R.P. = $P_{Meas} + G_{T}$

Where:

E.R.P. or E.I.R.P. effective radiated power or equivalent isotropically radiated power, respectively (expressed in the same units as P_{Meas}, e.g., dBm or dBW)

P_{Meas} measured transmitter output power or PSD, in dBm or dBW

G_T gain of the transmitting antenna, in dBd (E.R.P.) or dBi (E.I.R.P.)

For devices utilizing multiple antennas, see ANSI C63.25-2015 6.4 for guidance with respect to determining the effective array transmit antenna gain term to be used in the above equation.

The following equations demonstrate the mathematical relationship between E.R.P. and E.I.R.P.:

- a) E.R.P. = E.I.R.P. 2.15, where E.R.P. and E.I.R.P. are expressed in consistent units.
- b) E.I.R.P. = E.R.P. + 2.15, where E.R.P. and E.I.R.P. are expressed in consistent units.



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2.7.3.Test Result

GSM850								
Dond	Channel	Frequency	PCL	Measured E.R.P.		Limit		Voudiat
Band		(MHz)		dBm	W	dBm	n W	Verdict
GSM	128	824.20	5	27.91	0.618		7	PASS
	189	836.40	5	27.74	0.594	38.5		PASS
	251	848.80	5	27.71	0.590			PASS
GPRS	128	824.20	5	27.95	0.624	38.5	7	PASS
	189	836.40	5	27.77	0.598			PASS
	251	848.80	5	27.74	0.594			PASS
EDGE	128	824.20	5	22.39	0.173			PASS
	189	836.40	5	22.29	0.169	38.5	7	PASS
	251	848.80	5	22.25	0.168			PASS

Note 1: For the GPRS and EDGE mode, all the slots were tested and just the worst data were recorded in this report.

GSM1900									
Band	Channel	Frequency (MHz)	PCL	Measured E.I.R.P.		Limit		Vandiat	
				dBm	W	dBm	W	Verdict	
GSM	512	1850.2	0	29.66	0.925	33	2	PASS	
	661	1880.0	0	29.69	0.931			PASS	
	810	1909.8	0	29.61	0.914			PASS	
GPRS	512	1850.2	0	29.68	0.929	33	2	PASS	
	661	1880.0	0	29.71	0.935			PASS	
	810	1909.8	0	29.63	0.918			PASS	
EDGE	512	1850.2	0	25.76	0.377			PASS	
	661	1880.0	0	25.67	0.369	33	2	PASS	
	810	1909.8	0	25.54	0.358			PASS	

Note 1: For the GPRS and EDGE mode, all the slots were tested and just the worst data were recorded in this report.



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WCDMA Band V								
Dond	Channel	Frequency	Measure	Lin	Limit			
Band		(MHz)	dBm	W	dBm	W	Verdict	
WCDMA	4132	826.4	18.33	0.068			PASS	
	4182	836.4	18.35	0.068	38.5	7	PASS	
	4233	846.6	18.29	0.067			PASS	
HSDPA	4132	826.4	17.65	0.058		7	PASS	
	4182	836.4	17.50	0.056	38.5		PASS	
	4233	846.6	17.52	0.056			PASS	
DC	4132	826.4	17.34	0.054		7	PASS	
DC- HSDPA	4182	836.4	17.27	0.053	38.5		PASS	
	4233	846.6	17.20	0.052			PASS	
	4132	826.4	17.39	0.055			PASS	
HSUPA	4182	836.4	17.24	0.053	38.5	7	PASS	
	4233	846.6	17.40	0.055			PASS	
HSPA+	4132	826.4	17.45	0.056			PASS	
	4182	836.4	17.38	0.055	38.5	7	PASS	
	4233	846.6	17.13	0.052			PASS	

Note 1: For the HSDPA and HSUPA mode, all the subtests were tested and just the worst data were recorded in this report.



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WCDMA Band IV								
Band	Channel	Frequency	ed E.I.R.P.	Lin	nit	\/ ! - 4		
		(MHz)	dBm	W	dBm	W	Verdict	
WCDMA	1312	1712.4	22.58	0.181		1	PASS	
	1413	1732.6	22.65	0.184	30		PASS	
	1513	1752.6	22.62	0.183			PASS	
	1312	1712.4	21.56	0.143		1	PASS	
HSDPA	1413	1732.6	21.47	0.140	30		PASS	
	1513	1752.6	21.35	0.136			PASS	
DC	1312	1712.4	21.06	0.128		1	PASS	
DC-	1413	1732.6	21.27	0.134	30		PASS	
HSDPA	1513	1752.6	21.20	0.132			PASS	
	1312	1712.4	21.30	0.135		1	PASS	
HSUPA	1413	1732.6	21.52	0.142	30		PASS	
	1513	1752.6	21.29	0.135			PASS	
HSPA+	1312	1712.4	21.30	0.135			PASS	
	1413	1732.6	21.28	0.134	30	1	PASS	
	1513	1752.6	21.11	0.129			PASS	

Note 1: For the HSDPA and HSUPA mode, all the subtests were tested and just the worst data were recorded in this report.





WCDMA Band II								
Band	Channel	Frequency	Measured	I E.I.R.P.	Limit		\/!! - 4	
		(MHz)	dBm	W	dBm	W	Verdict	
WCDMA	9262	1852.4	23.02	0.200			PASS	
	9400	1880.0	22.94	0.197	33	2	PASS	
	9538	1907.6	22.98	0.199			PASS	
HSDPA	9262	1852.4	21.80	0.151		2	PASS	
	9400	1880.0	21.67	0.147	33		PASS	
	9538	1907.6	21.71	0.148			PASS	
DC	9262	1852.4	21.63	0.146	33	2	PASS	
DC-	9400	1880.0	21.56	0.143			PASS	
HSDPA	9538	1907.6	21.61	0.145			PASS	
	9262	1852.4	21.87	0.154			PASS	
HSUPA	9400	1880.0	21.68	0.147	33	2	PASS	
	9538	1907.6	21.74	0.149			PASS	
HSPA+	9262	1852.4	21.93	0.156			PASS	
	9400	1880.0	21.83	0.152	33	2	PASS	
	9538	1907.6	21.48	0.141			PASS	

Note 1: For the HSDPA and HSUPA mode, all the subtests were tested and just the worst data were recorded in this report.



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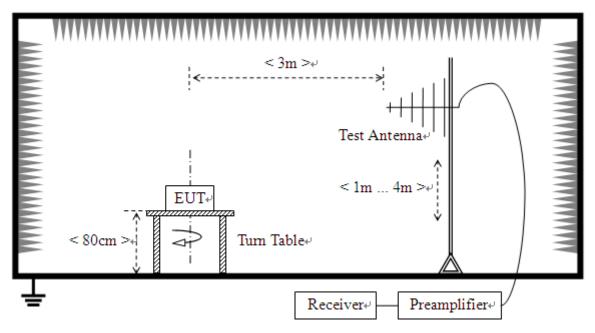


2.8. Radiated Out of Band Emissions

2.8.1.Requirement

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43+10*log(P)dB. This calculated to be -13dBm. The measurement frequency range is from 30MHz to the 10th harmonic of the fundamental frequency.

2.8.2.Test Description



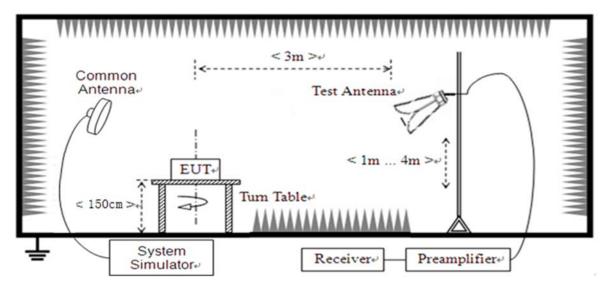
(For the test frequency from 30MHz to1GHz)



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(For the test frequency above 1GHz)

The EUT is located in a 3m Full-Anechoic Chamber, the cable loss, air loss and so on of the site as factors are pre-calibrated using the "Substitution" method, and calculated to correct the reading.

A call is established between the EUT and the SS via a Common Antenna. The EUT is commanded by the SS to operate at the maximum and minimum output power and only the test result of the maximum output power was recorded.

In the frequency range above 30MHz, Bi-Log Test Antenna (30MHz to 1GHz) and Horn Test Antenna (above 1GHz) are used. Test Antenna is 3m away from the EUT. Test Antenna height is varied from 1m to 4m above the ground and the Turn Table is actuated to turn from 0° to 360° to determine the maximum value of the radiated power. The emission levels at both horizontal and vertical polarizations should be tested. The Filters consists of Notch Filters and High Pass Filter.

Note: When doing measurements above 1GHz, the EUT has been within the 3dB cone width of the horn antenna during horizontal antenna.

2.8.3.Test Procedure

For measurements below 1 GHz the resolution bandwidth is set to 100 kHz for peak detection measurements.

For measurements above 1GHz the resolution bandwidth is set to 1MHz, the video band width is set to 3MHz for peak measurements.



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2.8.4.Test Result

The measurement frequency range is from 30MHz to the 10th harmonic of the fundamental frequency. The Turn Table is actuated to turn from 0° to 360°, and both horizontal and vertical polarizations of the Test Antenna are used to find the maximum radiated power. The lowest, middle and highest channels are tested to verify the out of band emissions.

The substitution corrections are obtained as described below:

A_{SUBST} = P_{SUBST TX} - P_{SUBST RX} - L_{SUBST CABLES} + G_{SUBST TX ANT}

 $A_{TOT} = L_{CABLES} + A_{SUBST}$

Where A_{SUBST} is the final substitution correction including receive antenna gain.

P_{SUBST_TX} is signal generator level,

P_{SUBST RX} is receiver level,

L_{SUBST CABLES} is cable losses including TX cable,

G_{SUBST TX} ANT is substitution antenna gain.

A_{TOT} is total correction factor including cable loss and substitution correction

During the test, the data of A_{TOT} was added in the test spectrum analyze, so spectrum analyze reading is the final values which contain the data of A_{TOT} .

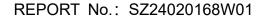
Note1: The power of the EUT transmitting frequency should be ignored.

Note2: All test mode and condition mentioned were considered and evaluated respectively by performing full test, only the worst data were recorded and reported.

Note3: All spurious emission tests were performed in X, Y, Z axis direction. And only the worst axis test condition was recorded in this test report.

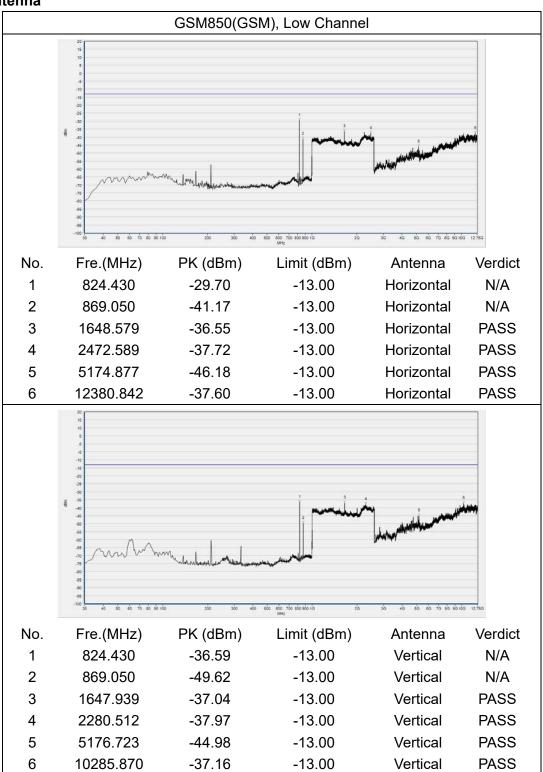
Note4: N/A means the frequency is the basic frequency or the base station frequency, they are no need to verdict.



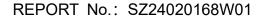




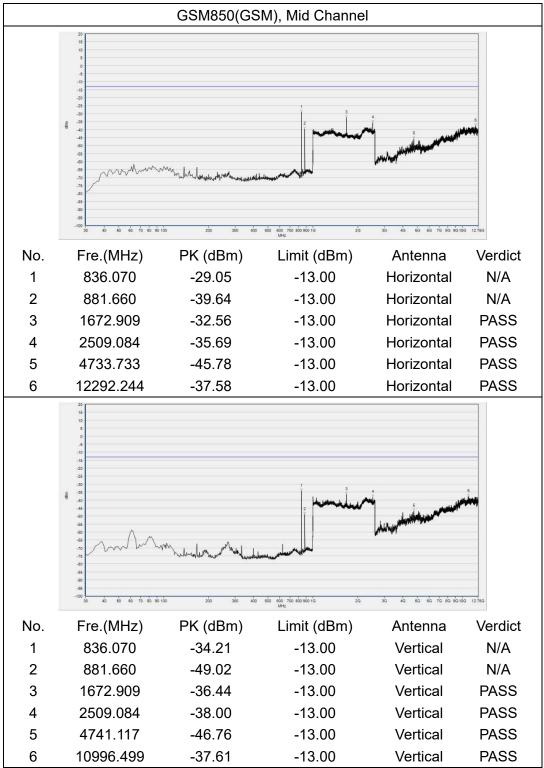
Top Antenna



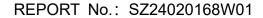




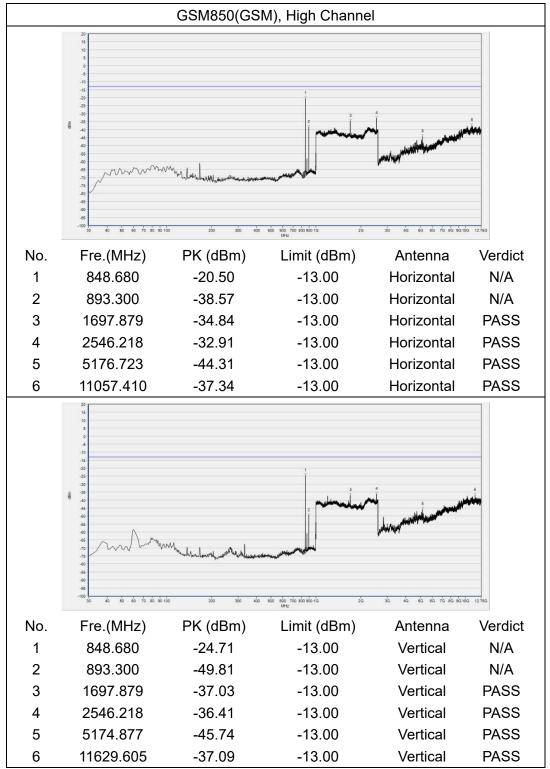




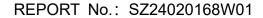




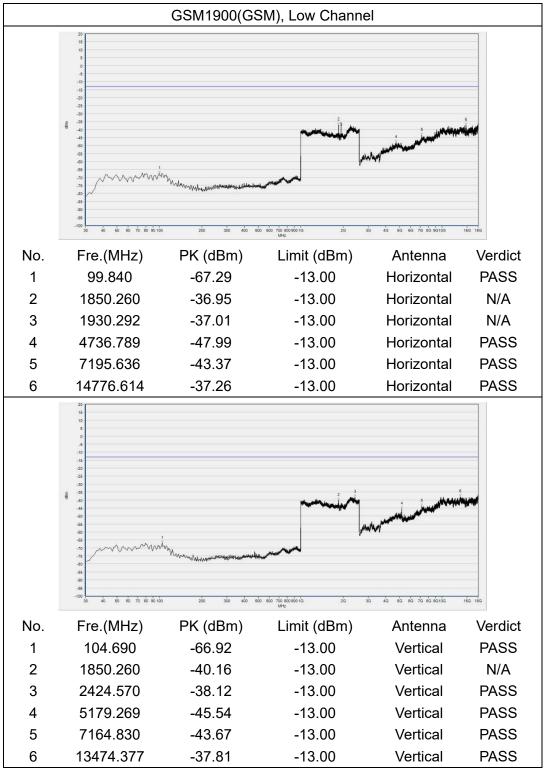








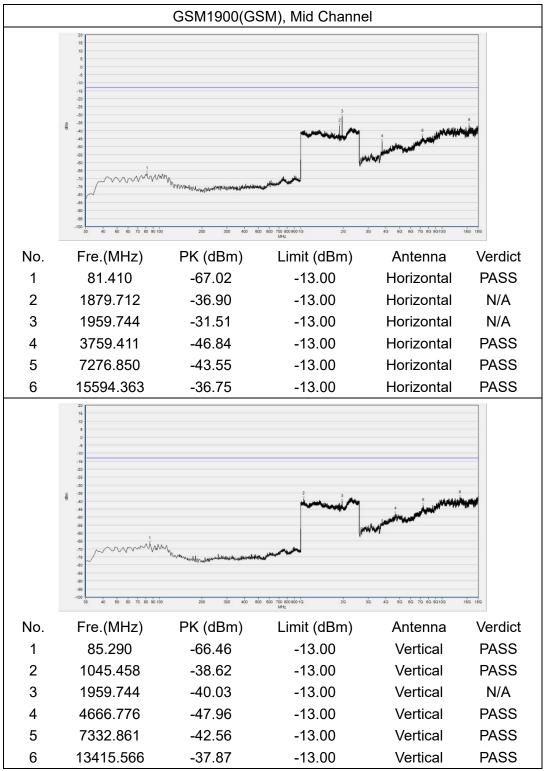












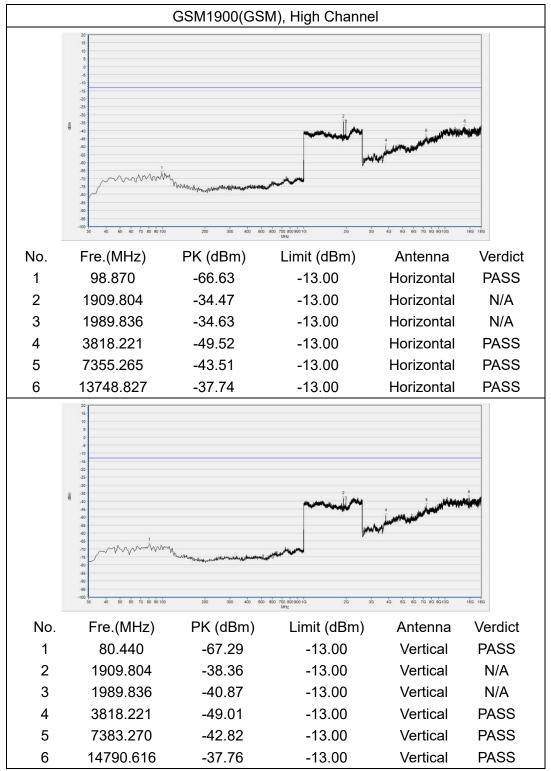


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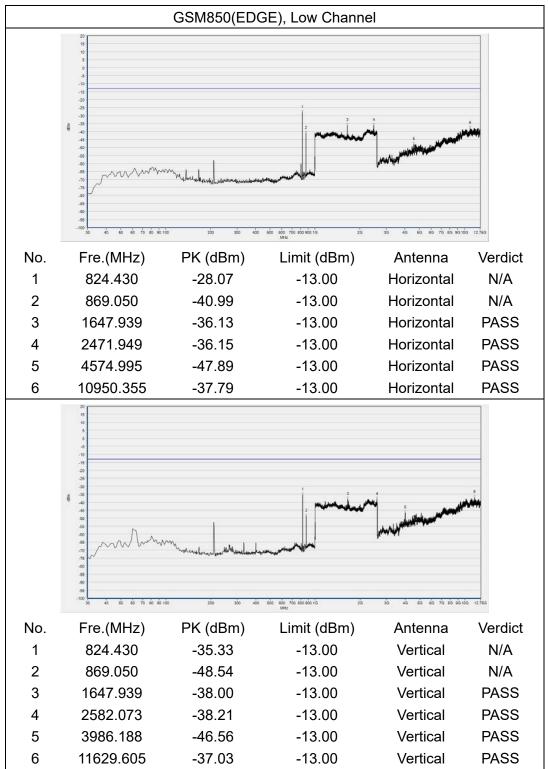








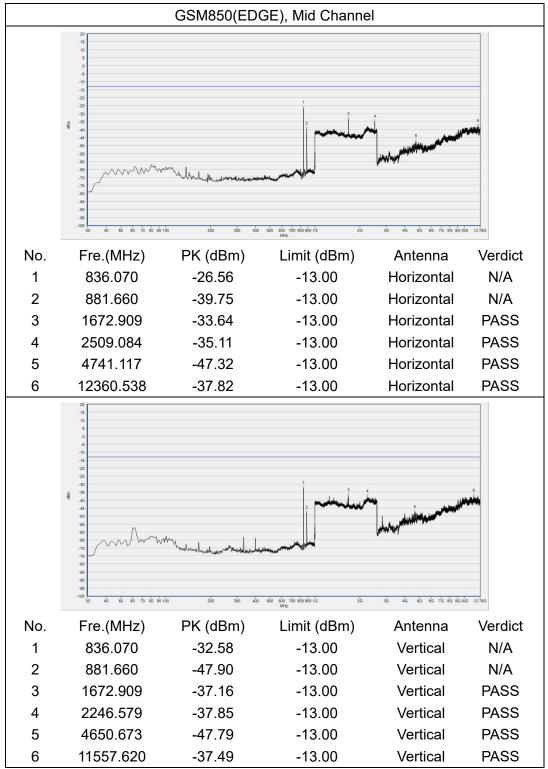








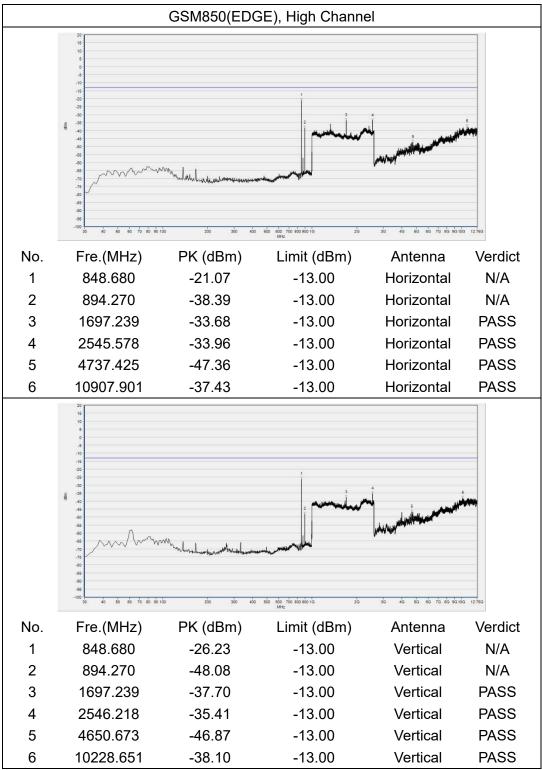








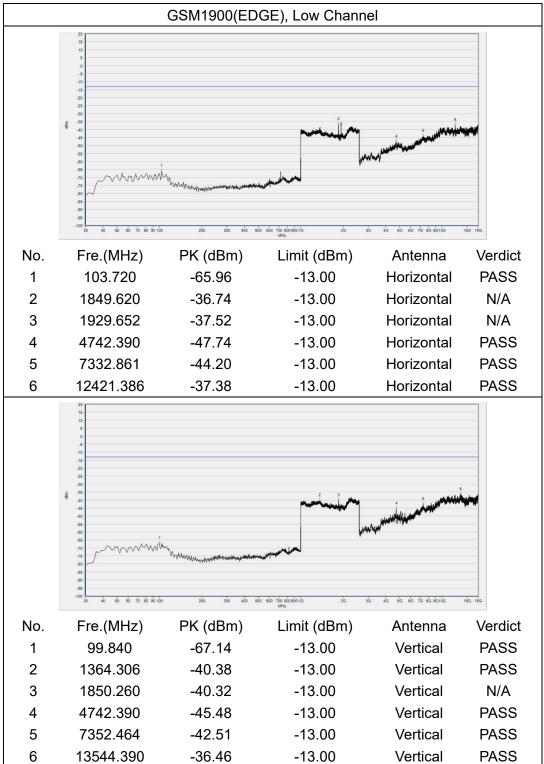




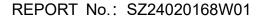




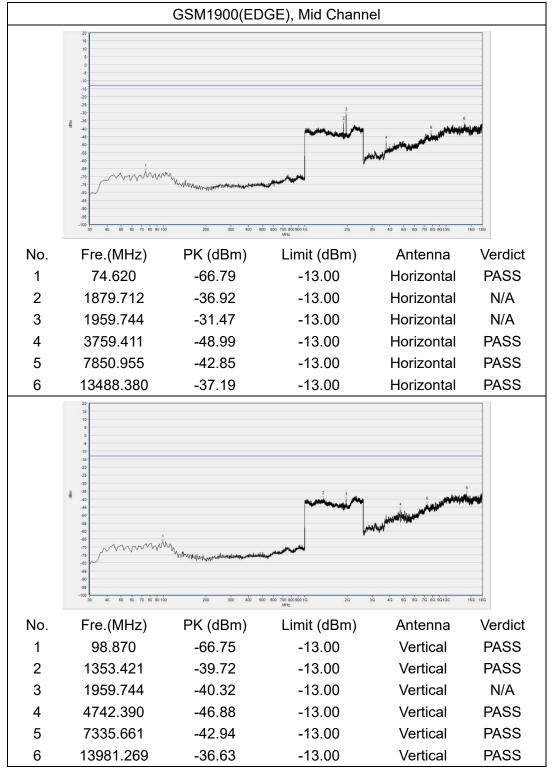




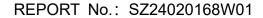




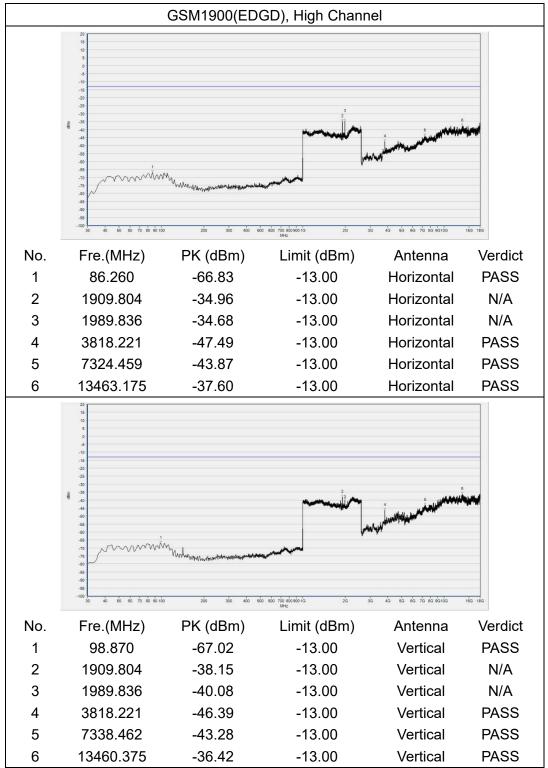






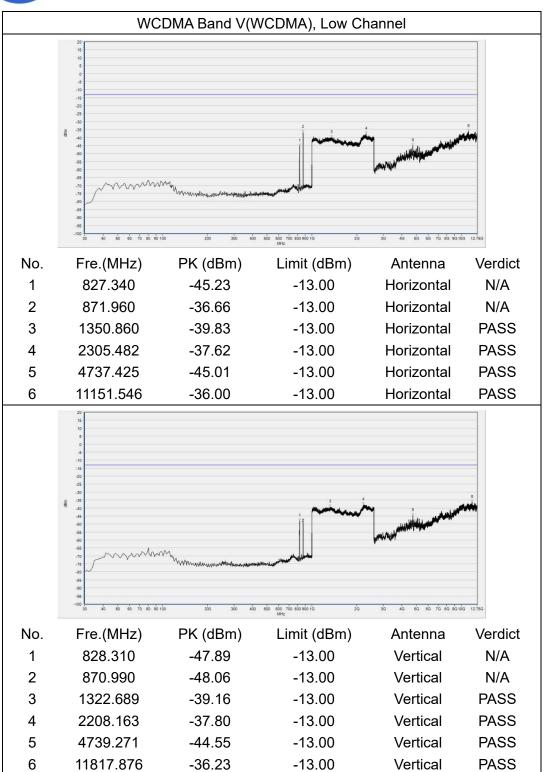














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