

RF TEST REPORT

Report No.: SET2019-10394

Product:	4G Wireless Router				
FCC ID:	SRQ-MF286C				
Model No.:	MF286C				
Applicant:	ZTE Corporation				
Address:	ZTE Plaza, Keji Road South, Shenzhen, China				
Dates of Testing:	08/01/2019 — 08/19/2019				
Issued by:	CCIC Southern Electronic Product Testing (Shenzhen) Co., Ltd.				
Lab Location:	Building 28/29, East of Shigu, Xili Industrial Zone, Xili Road, Nanshan				
	District, Shenzhen, Guangdong, China				
	Tel: 86 755 26627338 Fax: 86 755 26627238				

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Test Report

Product	4G Wireless Router				
Brand Name:	ZTE				
Trade Name:	ZTE				
Applicant:	ZTE Corporation				
Applicant Address:	ZTE Plaza, Keji Road South, Shenzhen, China.				
Manufacturer:	ZTE Corporation				
Manufacturer Address:	ZTE Plaza, Keji Road South, Shenzhen, China.				
Test Standards:	47 CFR FCC Part 2: Frequency Allocations and Radio Treaty Matters; General Rules and Regulations 47 CFR FCC Part 2/22/24/27				
Test Result:	PASS				
Test Result: Tested by					
	Datin Lup				
	Robin Luo 2019.08.19 Robin Luo, Test Engineer				
Tested by:	Robin Luo 2019.08.19 Robin Luo, Test Engineer				
Tested by:	Robin Luo 2019.08.19 Robin Luo, Test Engineer Chris Ion 2019.08.19				
Tested by:	Robin Luo 2019.08.19 Robin Luo, Test Engineer Chris You, Senior Engineer Shuangwan thang				
Tested by:	$\frac{2019.08.19}{2019.08.19}$ Robin Luo, Test Engineer $\frac{2019.08.19}{2019.08.19}$ Chris You, Senior Engineer $\frac{5huangwanthang}{2019.08.19}$				



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Change History				
Issue	Date	Reason for change		
1.0	2019.08.19	First edition		



1. GENERAL INFORMATION

1.1 EUT Description

EUT Type	4G Wireless Router			
EUT supports Radios application	GPRS/EDGE/WCDMA/HSPA			
Multi Slot Class	GPRS: Multi slot Class12, EGPRS: Multi slot Class12			
	GSM 850MHz:			
	Tx: 824.2 - 848.8MHz (at intervals of 200kHz);			
	Rx: 869.2 - 893.8MHz (at intervals of 200kHz)			
	GSM 1900MHz:			
	Tx: 1850.2 - 1909.8MHz (at intervals of 200kHz);			
	Rx: 1930.2 - 1989.8MHz (at intervals of 200kHz)			
	WCDMA 850MHz			
Frequency Range	Tx: 826.4 - 846.6MHz (at intervals of 200kHz);			
	Rx: 871.4 - 891.6MHz (at intervals of 200kHz)			
	WCDMA 1700MHz			
	Tx: 1712.4 - 1752.6MHz (at intervals of 200kHz);			
	Rx: 2112.4 - 2152.6MHz (at intervals of 200kHz)			
	WCDMA 1900MHz			
	Tx: 1852.4 - 1907.6MHz (at intervals of 200kHz);			
	Rx: 1932.4 - 1987.6MHz (at intervals of 200kHz)			
	GSM 850: 32.5dBm			
	GSM 1900: 29.9dBm			
Maximum Output Power to	EDGE 850: 27.0dBm			
Maximum Output Power to Antenna	EDGE 1900: 26.1dBm			
Antenna	WCDMA 850: 22.42dBm			
	WCDMA 1700:22.63dBm			
	WCDMA 1900: 22.52dBm			
	GSM / GPRS:GMSK			
	EDGE:GMSK / 8PSK			
Type of Modulation	WCDMA: QPSK(Uplink)			
	HSDPA:QPSK(Downlink)			
	HSUPA:QPSK(Uplink)			
Antenna Type	Internal Antenna			
	GSM 850/ WCDMA 850: 0.5dBi			
Antenna Gain	GSM 1900/ WCDMA 1900: 1.7dBi			
	WCDMA 1700:1.7dBi			
	1			



1.2 Maximum ERP/EIRP Power, Frequency Tolerance, and Emission

Designator

System	Type of Modulation	Emission Designator	Frequency Tolerance (ppm)	Maximum ERP/EIRP(W)
GPRS 850	GMSK	245KGXW	0.0040	1.923
GPRS 1900	GMSK	245KGXW	0.0037	0.962
EDGE 850	8PSK	245KG7W	0.0044	0.582
EDGE 1900	8PSK	249KG7W	0.0039	0.439
WCDMA 850 RMC 12.2Kbps	QPSK	4M13F9W	0.0042	0.173
WCDMA 1900 RMC 12.2Kbps	QPSK	4M12F9W	0.0028	0.181
WCDMA 1700 RMC 12.2Kbps	QPSK	4M14F9W	0.0062	0.175



1.3 Test Standards and Results

1. 47 CFR Part 2, 22(H), 24(E), 27(L)

2. ANSI / TIA / EIA-603-D-2010

3. FCC KDB 971168 D01 Power Meas. License Digital Systems v03r01

Remark:

1. All test items were verified and recorded according to the standards and without any deviation during the test.

2. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.

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

No.	Section FCC	Description	Limit	Result
1	2.1046	Conducted Output Power	Reporting Only	PASS
2	24.232(d) 27.50(d)	Peak to Average Radio	<13dBm	PASS
3	2.1049 22.917(b) 24.238(b) 27.53(g)	Occupied Bandwidth	Reporting Only	PASS
4	2.1055 22.355 24.235 27.54	Frequency Stability	≤±2.5ppm	PASS
5	2.1051 22.917 24.238 27.53	Conducted Out of Band Emissions	< 43+10log10 (P[Watts])	PASS
6	2.1051 22.917 24.238 27.53	Band Edge	< 43+10log10 (P[Watts])	PASS
	22.913	Effective Radiated Power	<7Watts	PASS
7	24.232	Equivalent Isotropic Radiated Power	<2Watts	PASS
	27.50(d)	Effective Radiated Power	<1Watts	PASS





8	2.1053 22.917 24.238	Radiated Spurious Emissions	< 43+10log10 (P[Watts])	PASS
	27.53			

1.4 Test Configuration of Equipment under Test

Antenna port conducted and radiated test items were performed according to KDB 971168 D01 Power Meas. License Digital Systems v03r01 with maximum output power.

Radiated measurements were performed with rotating EUT in different three orthogonal test planes to find the maximum emission.

Radiated emissions were investigated as following frequency range:

1. 30 MHz to 9000 MHz for GSM850 and WCDMA Band V.

2. 30 MHz to 20000 MHz for GSM1900 and WCDMA Band II.

3. 30 MHz to 18000 MHz for WCDMA Band IV.

All modes and data rates and positions were investigated.

Test modes are chosen to be reported as the worst case configuration below:

Test Modes						
Band	Radiated TCs	Conducted TCs				
CSM 850	GPRS Link	GPRS Link				
GSM 850	GPRS Link	GPRS Link				
CGN 1000	GPRS Link	GPRS Link				
GSM 1900	GPRS Link	GPRS Link				
WCDMA Band V	RMC 12.2Kbps Link	RMC 12.2Kbps Link				
WCDMA Band II	RMC 12.2Kbps Link	RMC 12.2Kbps Link				
WCDMA Band IV	RMC 12.2Kbps Link	RMC 12.2Kbps Link				

Note: The maximum power levels are chosen to test as the worst case configuration as follows: GSM mode for GMSK modulation,

EDGE multi-slot class 8 mode for 8PSK modulation,

RMC 12.2Kbps mode for WCDMA band V,

RMC 12.2Kbps mode for WCDMA band II, only these modes were used for all tests.

RMC 12.2Kbps mode for WCDMA band IV, only these modes were used for all tests.



1.5 Measurement Results Explanation Example

For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuator factor between EUT conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

The spectrum analyzer offset is derived from RF cable loss and attenuator factor.

Offset = RF cable loss + attenuator factor.

Following shows an offset computation example with cable loss 6B and 10dB attenuator.

Example:

Offset (dB) = RF cable loss(dB) + attenuator factor(dB).

= 7.5 + 10 = 17.5(dB)

1.6 Facilities and Accreditations

1.6.1 Test Facilities

NVLAP Lab Code: 201008-0

CCIC-SET is a third party testing organization accredited by NVLAP according to ISO/IEC 17025. The accreditation certificate number is 201008-0.

FCC- Designation Number: CN5031

CCIC Southern Electronic Product Testing (Shenzhen) Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The acceptance letter from the FCC is maintained in our files. Designation Number: CN5031, valid time is until December 31, 2019.

ISED Registration: 11185A-1

CCIC Southern Electronic Product Testing (Shenzhen) Co., Ltd. EMC Laboratory has been registered by Certification and Engineering Bureau of Industry Canada for the performance of radiated measurements with Registration No. 11185A-1 on Aug. 04, 2016, valid time is until Aug. 03, 2019

1.6.2 Test Environment Conditions

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

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



2. 47 CFR PART 2, PART 22H & 24E 27L REQUIREMENTS

2.1 Conducted RF Output Power

2.1.1 Definition

A system simulator was used to establish communication with the EUT. Its parameters were set to enforce EUT transmitting at the maximum power. The measured power in the radio frequency on the transmitter output terminals shall be reported.

2.1.2 Measuring Instruments

The measuring equipment is listed in the section 3 of this test report.

2.1.3 Test Procedures

- 1. The transmitter output port was connected to the system simulator.
- 2. Set EUT at maximum power through system simulator.
- 3. Select lowest, middle, and highest channels for each band and different modulation.
- 4. Measure and record the power level from the system simulator.

2.1.4 Test Setup







2.1.5 Test Results of Conducted Output Power

1. Test Verdict:

Band	Channel	Frequency (MHz)	Measured Output Power dBm	Verdict
CDDS	128	824.2	32.5	PASS
GPRS 850MUz	190	836.6	32.4	PASS
850MHz	251	848.8	32.4	PASS
CDDS	512	1850.2	29.6	PASS
GPRS 1900MHz	661	1880.0	29.8	PASS
	810	1909.8	29.9	PASS
EDCE	128	824.2	27.0	PASS
EDGE 850MHz	190	836.6	27.0	PASS
830IVITZ	251	848.8	26.9	PASS
EDCE	512	1850.2	26.1	PASS
EDGE 1900MHz	661	1880.0	25.7	PASS
THUNKINZ	810	1909.8	25.8	PASS

Note 1: For the GPRS model, all the slots were tested and just the worst data was record in this report.



2. WCDMA Model Test Verdict:

	band	WC	CDMA 8	50	WC	CDMA 19	900	WC	CDMA1'	700	
Item	Frequency	4132	4183	4233	9262	9400	9538	1313	1413	1513	
	Subtest		dBm			dBm			dBm		
WCDMA	RMC 12.2Kbps	22.38	22.42	22.36	22.52	22.31	22.51	22.4	22.54	22.63	
	1	22.32	22.23	22.24	22.12	22.31	22.32	22.24	22.43	22.45	
HSDPA	2	21.75	21.69	21.87	21.78	21.67	21.74	21.55	21.36	21.65	
	3	21.23	21.20	21.22	21.32	21.32	21.31	21.15	21.10	21.13	
	4	21.14	21.18	21.13	21.16	21.23	21.21	21.13	21.15	21.14	
	1	22.62	22.63	22.65	22.37	22.33	22.30	22.43	22.35	22.32	
	2	21.89	21.75	21.88	21.97	21.89	21.69	22.25	22.15	22.16	
HSUPA	3	21.52	21.53	21.54	21.62	21.35	21.32	22.17	22.16	22.13	
	4	21.23	21.27	21.29	21.27	21.24	21.19	21.85	21.95	21.99	
	5	21.22	21.19	21.24	21.13	21.08	21.10	21.66	21.65	21.58	



2.2 Peak to Average Radio

2.2.1 Definition

Power Complementary Cumulative Distribution Function (CCDF) curves provide a means for characterizing the power peaks of a digitally modulated signal on a statistical basis. A CCDF curve depicts the probability of the peak signal amplitude exceeding the average power level. Most contemporary measurement instrumentation include the capability to produce CCDF curves for an input signal provided that the instrument's resolution bandwidth can be set wide enough to accommodate the entire input signal bandwidth. In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

2.2.2 Measuring Instruments

The measuring equipment is listed in the section 3 of this test report.

2.2.3 Test Procedures

1. The testing follows FCC KDB 971168 D01 v03r01 Section 5.7.1.

2. The EUT was connected to the spectrum analyzer and system simulator via a power divider.

3. For GSM/EGPRS operating modes:

a. Set EUT in maximum power output.

b. Set the RBW = 1MHz, VBW = 3MHz, Peak detector on spectrum analyzer for first trace.

c. Set the RBW = 1MHz, VBW = 3MHz, RMS detector on spectrum analyzer for second

trace.

d. The wanted burst signal is triggered by spectrum analyzer, and measured respectively the peak level and Mean level without burst-off time, after system simulator has synchronized with the spectrum analyzer.

4. For UMTS operating modes:

a. Set the CCDF (Complementary Cumulative Distribution Function) option on the

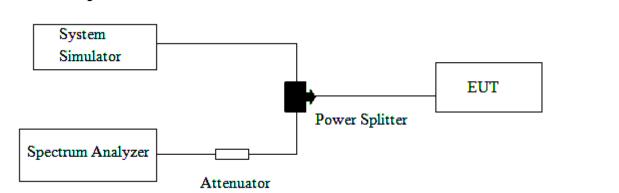
spectrum analyzer.

b. The highest RF powers were measured and recorded the maximum PAPR level associated with a probability of 0.1 %.

5. Record the deviation as Peak to Average Ratio.



2.2.4 Test Setup



2.2.5 Test Results of Peak-to-Average Ratio

Dand	Channel	Frequency	Peak to Average radio	Limit	Manlist
Band	Channel	(MHz)	dB	dB	Verdict
CDDS	512	1850.2	0.20		PASS
GPRS	661	1880.0	0.30	13	PASS
1900MHz	810	1909.8	0.20		PASS
EDGE	512	1850.2	3.20		PASS
_	661	1880.0	3.40	13	PASS
1900MHz	810	1909.8	3.50		PASS
WCDMA	9262	1852.4	3.41		PASS
WCDMA	9400	1880.0	3.70	13	PASS
1900MHz	9538	1907.6	3.73		PASS
WCDMA	1312	1712.4	3.93		PASS
WCDMA 1700MHz	1412	1732.4	4.06	13	PASS
1/00MHZ	1513	1752.6	4.31		PASS



2.3 99% Occupied Bandwidth and 26dB Bandwidth Measurement

2.3.1 Definition

The 99% occupied bandwidth is the width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage 0.5% of the total mean transmitted power.

The emission bandwidth is defined as the width of the signal between two points, located at the 2 sides of the carrier frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

2.3.2 Measuring Instruments

The measuring equipment is listed in the section 3 of this test report.

2.3.3 Test Procedures

1. The testing follows FCC KDB 971168 D01 v03r01 Section 4.2.

2. The EUT was connected to the spectrum analyzer and system simulator via a power divider.

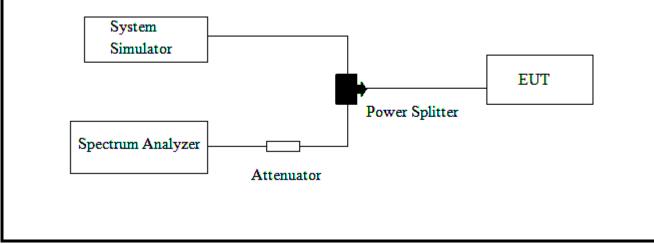
3. The RF output of the EUT was connected to the spectrum analyzer by RF cable and attenuator.

The path loss was compensated to the results for each measurement.

4. The 99% occupied bandwidth were measured, set RBW= 1% of span, VBW= 3*RBW, sample detector, trace maximum hold.

5. The 26dB bandwidth were measured, set RBW= 1% of EBW, VBW= 3*RBW, peak detector, trace maximum hold.

2.3.4 Test Setup



CCIC-SET/T (00)

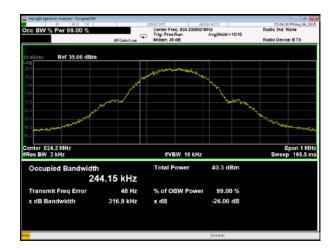


Band	Channel	Frequency (MHz)	26dB bandwidth (KHz)	99% Occupied Bandwidth (KHz)	Refer to Plot
	128	824.2	316.9	244.15	Plot A1
GSM 850MHz	190	836.6	312.5	245.19	Plot A2
	251	848.8	314.7	245.09	Plot A3
	512	1850.2	314.5	243.44	Plot B1
GSM 1900MHz	661	1880.0	313.7	242.61	Plot B2
	810	1909.8	307.6	244.69	Plot B3
	128	824.2	290.9	239.19	Plot C1
EDGE 850MHz	190	836.6	307.4	243.22	Plot C2
	251	848.8	322.5	244.68	Plot C3
	512	1850.2	312.2	248.57	Plot D1
EDGE 1900MHz	661	1880.0	298.7	243.07	Plot D2
	810	1909.8	290.2	238.77	Plot D3
	4132	826.4	4661	4128.6	Plot E1
WCDMA 850MHz	4183	836.6	4651	4112.3	Plot E2
	4233	846.6	4658	4128	Plot E3
	9262	1852.4	4708	4118.5	Plot F1
WCDMA 1900MHz	9400	1880	4676	4119.5	Plot F2
	9538	1907.6	4677	4119.4	Plot F3
	1312	1712.4	4663	4119.3	Plot G1
WCDMA 1700MHz	1412	1732.4	4654	4126.9	Plot G2
	1513	1752.6	4659	413.65	Plot G3

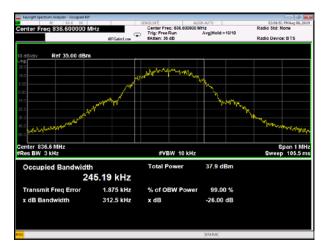
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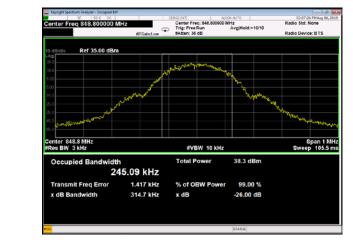
2.3.6 Test Results (Plots) of 99% Occupied Bandwidth and 26dB Bandwidth



(Plot A1: GSM 850MHz Channel = 128 Occupied bandwidth)

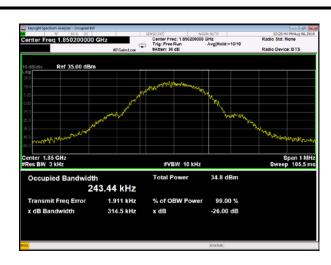


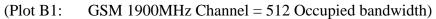
⁽Plot A2: GSM 850MHz Channel = 190 Occupied bandwidth)

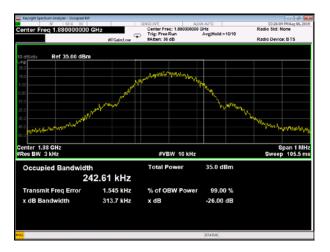


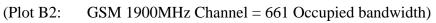
(Plot A3: GSM 850MHz Channel = 251 Occupied bandwidth)

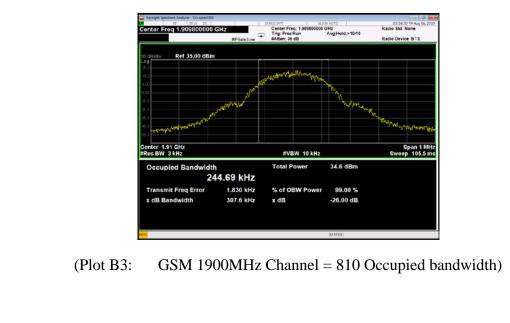






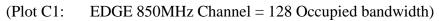


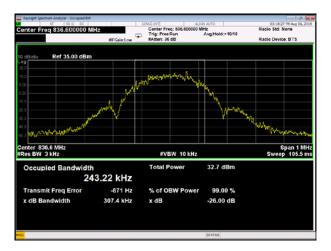


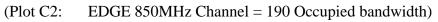


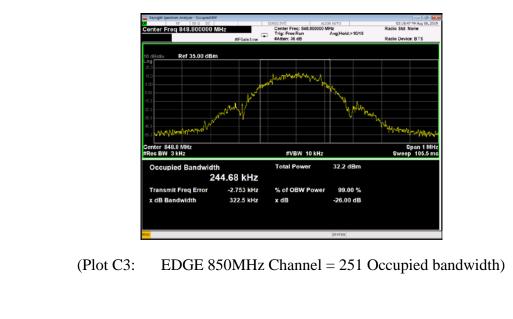






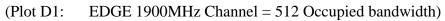


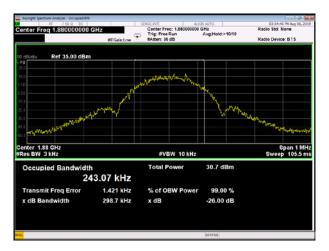




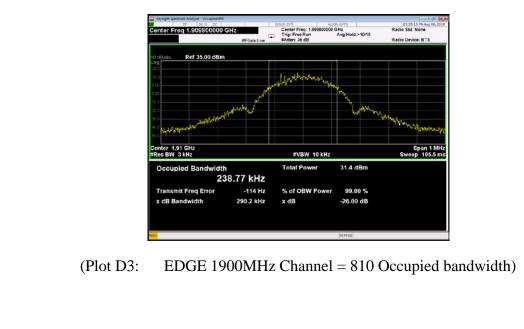






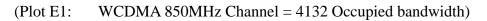


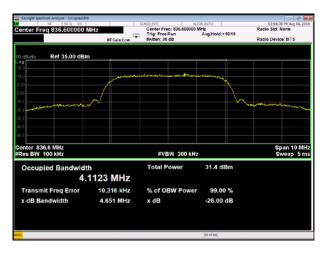
(Plot D2: EDGE 1900MHz Channel = 661 Occupied bandwidth)



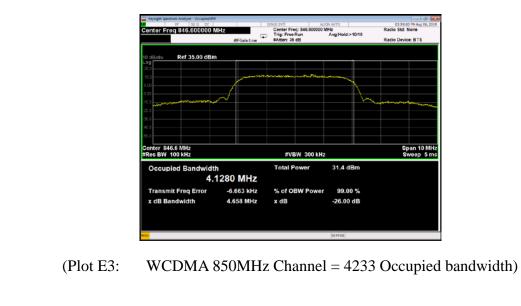


Center Freg 826.400000 M	H7	Center Fred: 826 400000	ION AUTO	03:58:15 PM Aug 06, 2 Radio Std: None
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25.0				
45.0				
55.0				
Center 826.4 MHz #Res BW 100 kHz		#VBW 300 kH	z	Span 10 M Sweep 5 r
Occupied Bandwidth	1	Total Power	31.3 dBm	
4.1	286 MHz			
Transmit Freq Error	2.763 kHz	% of OBW Power	99.00 %	
x dB Bandwidth	4.661 MHz	x dB	-26.00 dB	



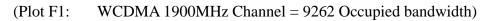


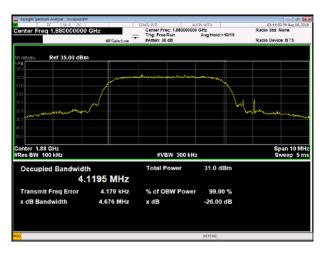
(Plot E2: WCDMA 850MHz Channel = 4183 Occupied bandwidth)

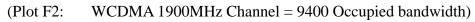


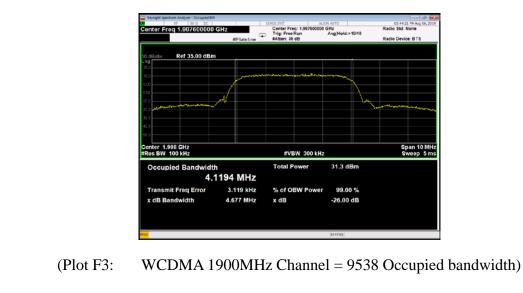


onter Freq 1.852400000	GHz #FGaint.ow	Center Freq: 1.852400000	GHz GHz Avg Hold:>10/10	03:13:41 PN Aug 06 Radio Std: None Radio Device: BTS
dB/div Ref 35.00 dBm				
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S.O wanter and the second s				
enter 1.852 GHz Res BW 100 kHz		#VBW 300 kHz		Span 10 F Sweep 5
Occupied Bandwidtl		Total Power	31.4 dBm	Check C
		Total Power	51.4 dBm	
4.	1185 MHz			
Transmit Freq Error	1.886 kHz	% of OBW Power	99.00 %	
x dB Bandwidth	4.708 MHz	x dB	-26.00 dB	



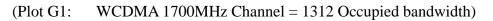


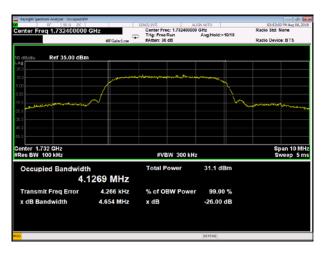




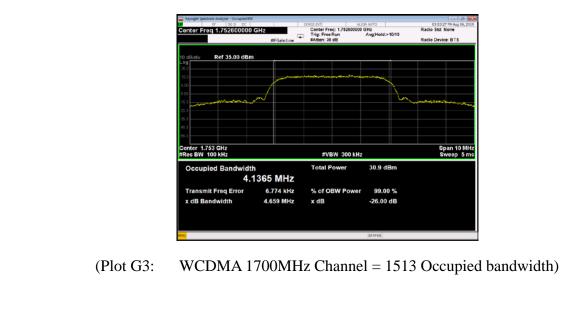


Center Freq 1.712400000		Center Freq: 1.7124000 Trig: Free Run	ALIGN AUTO 000 GHz Avg[Hold:>10/10	03:52:39 PH Aug 06,2 Radio Std: None
	#FGain:Low	#Atten: 36 dB		Radio Device: BTS
10 dB/dly Ref 35.00 dBm				
Log				
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	and the second	Acres Contraction	manne	
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500	_/			
15.0	\sim			
and all and a second se				and a second second of the second
Center 1.712 GHz				
Center 1.712 GHz #Res BW 100 kHz		#VBW 300 k	Hz	Span 10 M Sweep 5
Occupied Bandwidt	h	Total Power	31.7 dBm	
4.1	1193 MHz			
Transmit Freg Error	10.621 kHz	% of OBW Pow	er 99.00 %	
x dB Bandwidth	4.663 MHz	x dB	-26.00 dB	
x db bandwidth	4.003 mmz	A GD	-20.00 dB	











2.4 Frequency Stability

2.4.1 Requirement

The frequency stability shall be measured by variation of ambient temperature and variation of primary supply voltage to ensure that the fundamental emission stays within the authorized frequency block. The frequency stability of the transmitter shall be maintained within $\pm 0.00025\%$ (± 2.5 ppm) of the center frequency.

2.4.2 Measuring Instruments

The measuring equipment is listed in the section 3 of this test report.

2.4.3 Test Procedures for Temperature Variation

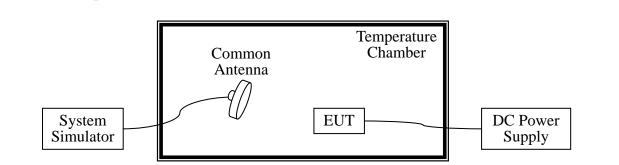
- 1. The testing follows FCC KDB 971168 D01 v03r01 Section 9.0.
- 2. The EUT was set up in the thermal chamber and connected with the system simulator.
- 3. With power OFF, the temperature was decreased to -30°C and the EUT was stabilized before testing. Power was applied and the maximum change in frequency was recorded within one minute.
- 4. With power OFF, the temperature was raised in 10°C steps up to 50°C. The EUT was stabilized at each step for at least half an hour. Power was applied and the maximum frequency change was recorded within one minute.

2.4.4 Test Procedures for Voltage Variation

- 1. The testing follows FCC KDB 971168 D01 v03r01 Section 9.0.
- 2. The EUT was placed in a temperature chamber at 25±5° C and connected with the system simulator.
- 3. The power supply voltage to the EUT was varied from BEP to 115% of the nominal value measured at the input to the EUT.
- 4. The variation in frequency was measured for the worst case.



2.4.5 Test Setup



2.4.6 Test Results of Frequency Stability

GSM 850MHz Band

Band:		GP	RS850	Channel:	190
Limit(ppm):		2.5		Frequency:	836.6MHz
Derror	T		GPRS	EDGE	
Power (VDC)	Temperatu	ıre	Deviation	Deviation	Result
(VDC)	(°C)		(ppm)	(ppm)	
	-30		0.0028	0.0044	
	-20 0.0002		0.0002	0.0042	
	-10		0.0017	0.0038	
	0		0.0010	0.0027	
3.7	+10		0.0009	0.0010	
	+20		0.0012	0.0036	PASS
	+30	+30 0.0015		0.0030	
	+40		0.0019	0.0028	
	+50		0.0040	0.0027	
4.2	+25		0.0030	0.0030	
3.5	+25		0.0038	0.0024	



GSM 1900MHz Band

Band:		GP	PRS 1900	Channel:	661
Limit(ppm):		2.5		Frequency:	1880.0MHz
Power	Temperatu	ıre	GPRS	EDGE	
(VDC)	-	inc.	Deviation	Deviation	Result
(VDC)	(0)		(ppm)	(ppm)	
	-30		0.0025	0.0036	
	-20		0.0032	0.0033	
	-10		0.0031	0.0024	
	0		0.0022	0.0016	
3.7	+10		0.0019	0.0026	
	+20		0.0024	0.0032	PASS
	+30		0.0037	0.0024	
	+40		0.0022	0.0015	
	+50		0.0030	0.0039	
4.2	+25		0.0032	0.0022	
3.5	+25		0.0027	0.0032	

WCDMA 850MHz Band

Band:	WCDMA Bar	nd V Channel:	4183
Limit(ppm)	pm): 2.5 Frequency:		836.6MHz
Power (VDC)	Temperature (°C)	RMC 12.2Kb Deviation (ppm)	ps Result
	-30 -20 -10	0.0009 0.0023 0.0023	
3.7	0 +10	0.0022 0.0021	
	+20 +30 +40	0.0042 0.0017 0.0025	PASS
	+50	0.0018	
4.2 3.5	+25 +25	0.0036	



WCDMA 1900MHz Band WCDMA Band II Channel: 9400 Band: Limit(ppm): 2.5 Frequency: 1880.0MHz RMC 12.2Kbps Temperature Power Deviation Result (VDC) (°C) (ppm) -30 0.0020 -20 0.0009 -10 0.0017 0 0.0026 3.7 +100.0023 +200.0028 PASS +300.0011 +400.0016 0.0017 +504.2 +250.0024

WCDMA 1700MHz Band

+25

3.5

Band:		WCDMA	Band IV	Channel:		1412		
Limit(ppm):		2.5	Frequency:			1732.4MHz		
Power	Tem	perature		AC 12.2Kbps				
(VDC)	1			Deviation (ppm)		Result		
	-	-30		0.0062				
	-	-20		0.0015				
	-	-10		0.0025				
		0	0.0029					
3.7	-	+10		0.0024				
	-	+20		0.0019		PASS		
	-	+30		0.0011				
	-	+40		0.0030				
	-	+50		0.0026				
4.2	-	+25		0.0015				
3.5	-	+25		0.0030				

0.0010



2.5 Conducted Out of Band Emissions

2.5.1 Requirement

The power of any emission outside of the authorized operating frequency ranges must be lower than the transmitter power (P) by a factor of at least $43 + 10 \log (P) dB$.

It is measured by means of a calibrated spectrum analyzer and scanned from 30 MHz up to a frequency including its 10th harmonic.

2.5.2 Measuring Instruments

The measuring equipment is listed in the section 3 of this test report.

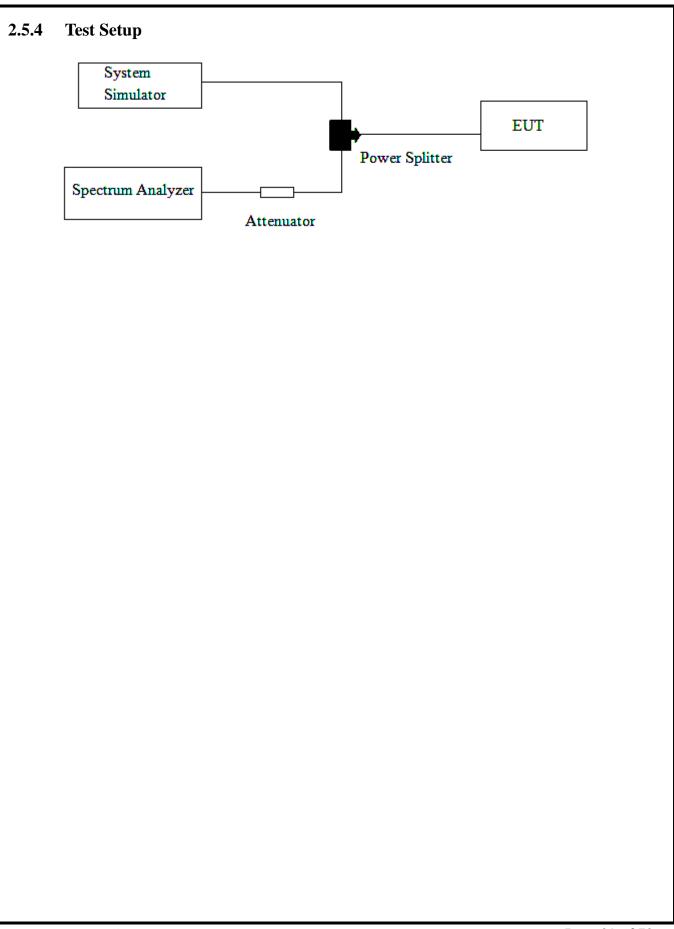
2.5.3 Test Procedures

- 1. The testing follows FCC KDB 971168 D01 v03r01 Section 6.0.
- 2. The EUT was connected to the spectrum analyzer and system simulator via a power divider.
- 3. The RF output of EUT was connected to the spectrum analyzer by an RF cable and attenuator. The path loss was compensated to the results for each measurement.
- 4. The middle channel for the highest RF power within the transmitting frequency was measured.
- 5. The conducted spurious emission for the whole frequency range was taken.
- 6. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
- 7. The limit line is derived from $43 + 10\log(P)$ dB below the transmitter power P(Watts)

= P(W) - [43 + 10log(P)] (dB)

- = [30 + 10log(P)] (dBm) [43 + 10log(P)] (dB)
- = -13dBm.
- For 9KHz to 30MHz: the amplitude of spurious emissions are attenuated by more than 20dB below the permissible value has no need to be reported.

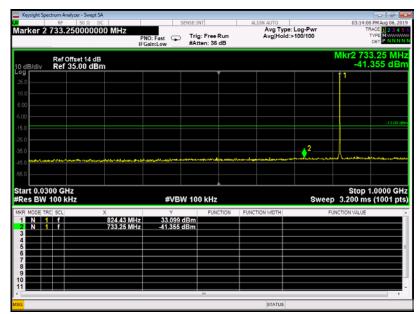


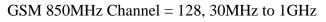


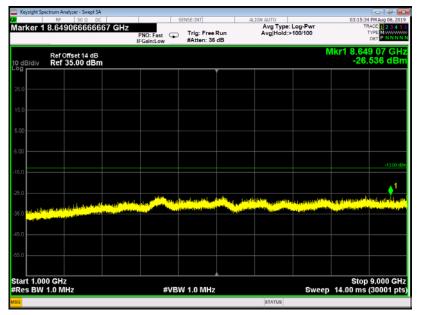


2.5.5 Test Result (Plots) of Conducted Spurious Emission

Note: For 9 KHz to 30MHz: the amplitude of spurious emissions is attenuated by more than 20dB below the permissible value, so we didn't provide the test result here.





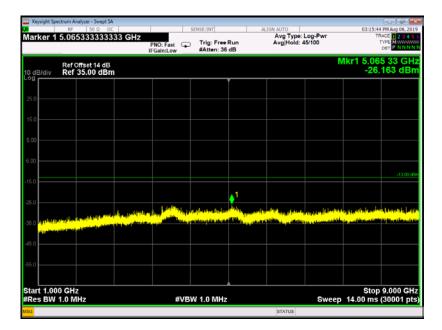


GSM 850MHz Channel = 128, 1GHz to 9GHz



arker 2			0: Fast Tr ain:Low #A	ig: Free Run atten: 36 dB	ALIGN AUTO Avg Typ Avg Hol	e: Log-Pwr d:>100/100	т	7 PM Aug 06, 20 RACE 2 3 4 TYPE MUSIC
0 dB/div	Ref Offset Ref 35.00						Mkr2 70 -40.	1.24 MH 290 dB
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5.00								
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5.0								-13.00 d
.5.0								
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;5.0								
	300 GHz 100 kHz		#VBW 10	00 kHz		Swee	Stop * p 3.200 ms	1.0000 GH 6 (1001 pt
KR MODE T	RC SCL	× 837.04 MHz	Y 32.904 dBm	FUNCTION	FUNCTION WIDTH		FUNCTION VALUE	
2 N 4	i i	701.24 MHz	-40.290 dBm					
6								
8								
9								

GSM 850MHz Channel = 190, 30MHz to 1GHz



GSM 850MHz Channel = 190, 1GHz to 9GHz



	- Swept SA 50 Ω DC	SENSE:	INT	ALIGN AUTO	: Log-Pwr	03:14:49 PM Aug 06, 20 TRACE
arker 1 849.650	F	NO: Fast 🖵 Tri Gain:Low #A	g: Free Run tten: 36 dB	Avg Hold:	>100/100	TYPE MWWW DET P NNN
RefOffse dB/div Ref 35.0					Ν	Akr1 849.65 Mi 32.736 dB
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tart 0.0300 GHz Res BW 100 kHz		#VBW 10	IO KHz		Sweep	Stop 1.0000 GF 3.200 ms (1001 pt
KR MODE TRC SCL	× 849.65 MHz	Y 32.736 dBm	FUNCTION	FUNCTION WIDTH	FUN	CTION VALUE
2 N 1 f	776.90 MHz	-40.831 dBm				
3						
6				+		
7						
9						

GSM 850MHz Channel = 251, 30MHz to 1GHz

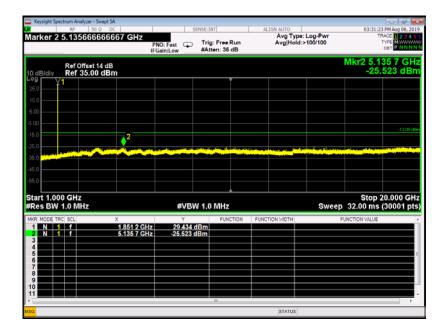


GSM 850MHz Channel = 251, 1GHz to 9GHz



Keysight Sp	ectrum Analyzer - Swept SA					1011 11/20			
larker 1	RF 50 Ω DC 901.06000000			SENSE:INT	AL	IGN AUTO Avg Type:	.og-Pwr		PM Aug 06, 20
iuikei	301.0000000	F	PNO: Fast Gain:Low	Trig: Free #Atten: 36		Avg Hold:>	100/100	T	VPE M
0 dB/div	Ref Offset 14 dB Ref 35.00 dBn	1						Mkr1 901 -40.	1.06 MH 692 dB
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6.0									
tart 0.03	300 GHz 100 kHz		43/15	3W 100 kHz			0	Stop 1 3.200 ms	.0000 GH
Res BW	100 KH2		#VE	SW TOU KHZ			sweep	3.200 ms	(1001 pi

GSM 1900MHz Channel = 512, 30MHz to 1GHz

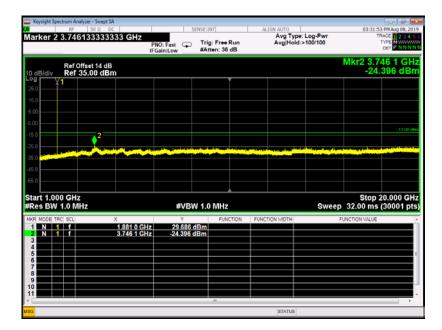


GSM 1900MHz Channel = 512, 1GHz to 20GHz



Keysight Spe	ctrum Analyzer - Swept SA								
-	RF 50 Ω DC			SENSE:INT	AL	IGN AUTO	on Dun		PM Aug 06, 20
larker 1	836.07000000	P	NO: Fast 🖵 Gain:Low	Trig: Free F #Atten: 36		Avg Type: L Avg Hold:>1	100/100	1	DET PNNN
0 dB/div	Ref Offset 14 dB Ref 35.00 dBn	n						Mkr1 83 -41.	6.07 MI 238 dB
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tart 0.03	00 GHz							Stop 1	.0000 GI
Res BW	100 kHz		#VB	W 100 kHz			Sweep	3.200 ms	(1001 p

GSM 1900MHz Channel = 661, 30MHz to 1GHz

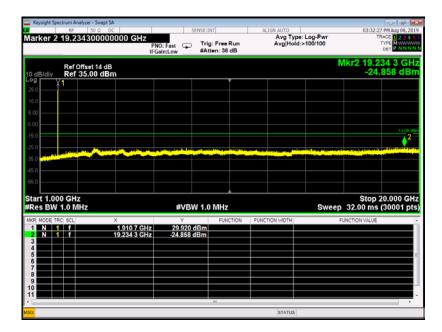


GSM 1900MHz Channel = 661, 1GHz to 20GHz



Keysight Sp	ectrum Analyzer - Swept SA	course and		
larker 1	RF 50 Ω DC 857.410000000 MHz	PNO: Fast Free Run IFGain:Low #Atten: 36 dB	ALIGN AUTO Avg Type: Log-Pwr Avg Hold:>100/100	03:30:41 PM Aug 06, 201 TRACE 2 3 4 5 TYPE M
0 dB/div	Ref Offset 14 dB Ref 35.00 dBm			Mkr1 857.41 MH -40.488 dBi
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	800 GHz 100 kHz	#VBW 100 kHz	Swee	Stop 1.0000 GF p 3.200 ms (1001 pt
			STATUS	

GSM 1900MHz Channel = 810, 30MHz to 1GHz

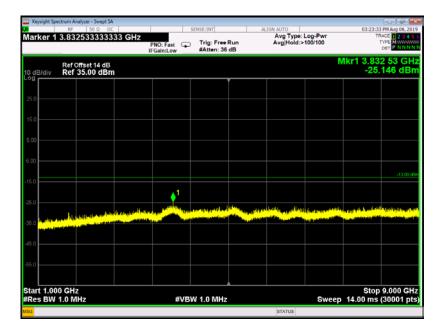


GSM 1900MHz Channel = 810, 1GHz to 20GHz



Keysight Spectrum Analyzer - 5 RF 50	Ω DC	SENSE:	INT	ALIGN AUTO		03:21:54 PM Aug 06,
arker 2 882.6300	PNG): Fast 🖵 Tri iin:Low #A	ig: Free Run tten: 36 dB	Avg Type Avg Hold:	>100/100	TRACE 2 3 TYPE M WWW DET P N N
Ref Offset						Mkr2 882.63 M -41.078 di
9 5.0			Ĭ			<u>†</u> 1
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50						
tart 0.0300 GHz Res BW 100 kHz		#VBW 10	00 kHz		Sweep	Stop 1.0000 C 3.200 ms (1001)
R MODE TRC SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUI	ICTION VALUE
1 N 1 F 2 N 1 F	824.43 MHz 882.63 MHz	32.755 dBm -41.078 dBm				
3	002.00 mm2	41.070 0.011				
5						
6						
8						
1						

EDGE 850MHz Channel = 128, 30MHz to 1GHz

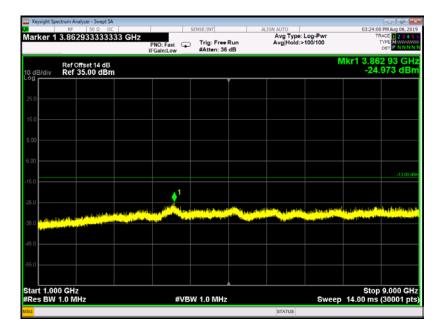


EDGE 850MHz Channel = 128, 1GHz to 9GHz



RF 50 Ω		SENSE:	INT	ALIGN AUTO			9 PM Aug 06, 2
arker 2 914.64000	PNC		g: Free Run tten: 36 dB	Avg Type Avg Hold:	>100/100	1	RACE 234 TYPE MUSER DET PNNN
Ref Offset 14 dB/div Ref 35.00 (Mkr2 91 -40	4.64 Mi .010 dB
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tart 0.0300 GHz Res BW 100 kHz		#VBW 10	0 kHz		Sweep	Stop 3.200 m	1.0000 Gi s (1001 p
KR MODE TRC SCL	X	Y	FUNCTION	FUNCTION WIDTH	F	UNCTION VALUE	
1 N 1 f	837.04 MHz 914.64 MHz	30.392 dBm -40.010 dBm					
3							
6							
7							
8							
0							

EDGE 850MHz Channel = 190, 30MHz to 1GHz



EDGE 850MHz Channel = 190, 1GHz to 9GHz



	Q DC	SENSE:	INT	ALIGN AUTO			- 🕞 🖗
arker 2 936.9500	PNG	D: Fast 🖵 Tri ain:Low #A	g: Free Run tten: 36 dB	Avg Type Avg Hold:	: Log-Pwr >100/100	т	ACE 1 2 3 4 YPE M
Ref Offset	14 dB 0 dBm					Mkr2 936 -40.4	6.95 MH 474 dB
9 5.0						1 T	
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5.0							
5.0							
tart 0.0300 GHz Res BW 100 kHz		#VBW 10	10 kHz		Sweep	Stop 1 3.200 ms	.0000 GI (1001 pi
KRI MODEI TRCI SCLI	X	Y	FUNCTION	FUNCTION WIDTH	FU	NCTION VALUE	
1 N 1 f	849.65 MHz 936.95 MHz	32.833 dBm -40.474 dBm					
3	930.95 MHZ	-40.474 GDM					
5							
6							
8							

EDGE 850MHz Channel = 251, 30MHz to 1GHz

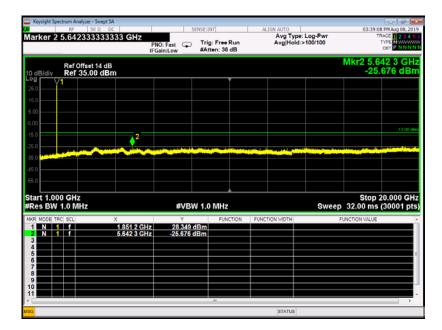


EDGE 850MHz Channel = 251, 1GHz to 9GHz



Keysight Sp	ectrum Analyzer - Swept SA						
laskord	RF 50 Q DC	S	ENSE:INT	ALIGN AUTO Avg Type: I	on-Pwr		PM Aug 06, 20
narker 1	879.720000000 MHz	PNO: Fast 😱 IFGain:Low	Trig: Free Run #Atten: 36 dB	Avg Hold:>	100/100	т	
0 dB/div	Ref Offset 14 dB Ref 35.00 dBm					Mkr1 879 -39.2	0.72 MH 290 dB
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tart 0.03	300 GHz					Stop 1	.0000 GH
Res BW	100 kHz	#VBV	V 100 kHz		Sweep	3.200 ms	(1001 pt

EDGE 1900MHz Channel = 512, 30MHz to 1GHz

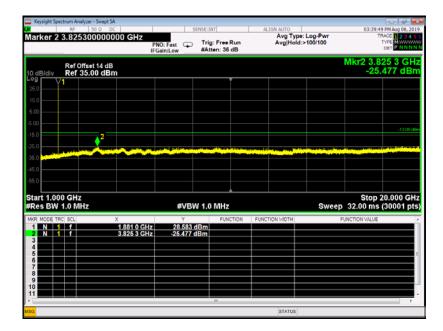


EDGE 1900MHz Channel = 512, 1GHz to 20GHz



Marker 1 560.59000000		SENSE:INT Trig: Free Rui #Atten: 36 dB	ALIGN AUTO Avg Type: L Avg Hold:>1	og-Pwr 00/100	03:38:13 PM Aug 06, 20 TRACE 2 3 4 TYPE M DET P N N N
Ref Offset 14 dB				М	kr1 560.59 MH -40.417 dB
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55.0					
Start 0.0300 GHz #Res BW 100 kHz	#	VBW 100 kHz		Sweep 3	Stop 1.0000 GH .200 ms (1001 pt

EDGE 1900MHz Channel = 661, 30MHz to 1GHz

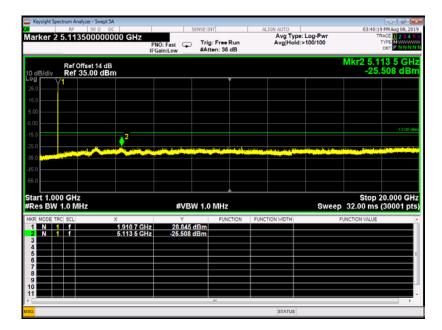


EDGE 1900MHz Channel = 661, 1GHz to 20GHz



Keysigh	ht Spectrum Analyzer - Swept SA			
	RF 50 Ω DC	SENSE:INT	ALIGN AUTO	03:38:17 PM Aug 06, 201
larke	r 1 971.870000000 MH:	PNO: Fast		0/100 TYPE M
0 dB/di	Ref Offset 14 dB iv Ref 35.00 dBm			Mkr1 971.87 MH -40.821 dB
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5.0				
5.0				
	.0300 GHz 3W 100 kHz	#VBW 100 kHz		Stop 1.0000 GF Sweep 3.200 ms (1001 pt
			STATUS	

EDGE 1900MHz Channel = 810, 30MHz to 1GHz

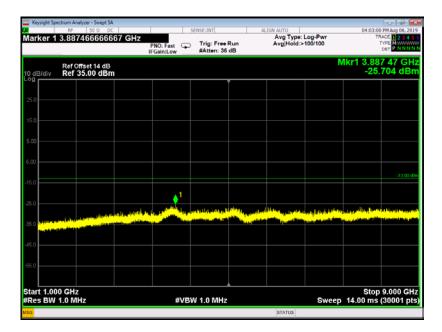


EDGE 1900MHz Channel = 810, 1GHz to 20GHz



RF 50 1arker 2 662.4400	PI		nt g: Free Run tten: 36 dB	ALIGN AUTO Avg Type Avg Hold	: Log-Pwr >100/100	04:01:11 PMAug 06, 2 TRACE 2 3 4 TYPE M DET P NNN
Ref Offset 0 dB/div Ref 35.0						Mkr2 662.44 MI -41.349 dB
.og 25.0			Ĭ			∆ 1
15.0						<u>}</u>
5.00						
5.00						-13.00
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25.0				2		
			*********			I have a second
45.0	water a survey of a star of				41.41.18 Britshow	-/ ¹
45.0 45.0 55.0	nole		****		44	
45 0 55 0 Start 0.0300 GHz		#VBW 10			Swee	Stop 1.0000 G 9 3.200 ms (1001 p
45 0 55 0 Start 0.0300 GHz Res BW 100 kHz 4KR MODE TRC SCL	X	#VBW 10				Stop 1.0000 G p 3.200 ms (1001 p FUNCTION VALUE
550 550 Start 0.0300 GHz Res BW 100 kHz	× 827.34 MHz 662.44 MHz	#VBW 10	0 kHz			ep 3.200 ms (1001 p
45 0 555 0 Start 0.0300 GHz Res BW 100 kHz KR MODE TRC SCL 1 N 1 f	827.34 MHz	#VBW 10	0 kHz			ep 3.200 ms (1001 p
450 550 ttart 0.0300 GHz Res BW 100 kHz 1 N 1 f 3 1 f 3 4 5 5	827.34 MHz	#VBW 10	0 kHz			ep 3.200 ms (1001 p
450 1	827.34 MHz	#VBW 10	0 kHz			ep 3.200 ms (1001 p
450 4 6 1 N 1 1 2 N 1 1 1 3 4 6 6 6	827.34 MHz	#VBW 10	0 kHz			ep 3.200 ms (1001 p

WCDMA850MHz Channel = 4132, 30MHz to 1GHz

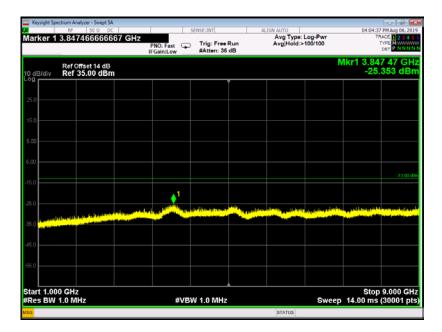


WCDMA850MHz Channel = 4132, 1GHz to 9GHz



arker 2 698.3300	Р	NO: Fast Gain:Low	g: Free Run tten: 36 dB	ALIGN AUTO Avg Typ Avg Hold	e: Log-Pwr :>100/100	04:01:33 PM Aug 06, 2 TRACE 2 3 4 TYPE M
Ref Offset 0 dB/div Ref 35.0						Mkr2 698.33 Mi -41.324 dB
.og 25.0						0 ¹
15.0						+ <mark>``</mark>
5.00						
5.00						-13.00
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25.0						
5 F A						
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45.0 55.0 Start 0.0300 GHz Res BW 100 kHz 4KR MODE TRC SCL	X	#VBW 10		FUNCTION WDTH		Stop 1.0000 Gi p 3.200 ms (1001 p FUNCTION VALUE
45.0 55.0 Gtart 0.0300 GHz Res BW 100 kHz	X 837.04 MHz 698.33 MHz	#VBW 10	0 kHz			p 3.200 ms (1001 p
45 0 55 0 56 0 56 0 57 0	837.04 MHz	#VBW 10 ¥ 18.502 dBm	0 kHz			p 3.200 ms (1001 p
45.0 45.0 55.0 55.0 Res BW 100 GHz Res BW 100 kHz MM MODE TRCI SCLI 1 1 N 1 2 N 1 3 3	837.04 MHz	#VBW 10 ¥ 18.502 dBm	0 kHz			p 3.200 ms (1001 p
450 550 Start 0.0300 GHz Res BW 100 kHz MM MOE TRC SCL 1 N 1 f 3 1 f 3 4 5	837.04 MHz	#VBW 10 ¥ 18.502 dBm	0 kHz			p 3.200 ms (1001 p
450 550 Start 0.0300 GHz Res BW 100 kHz MR MODE TRCI Scl. 1 N 1 f 3 N 1 f 4 6 6 7	837.04 MHz	#VBW 10 ¥ 18.502 dBm	0 kHz			p 3.200 ms (1001 p

WCDMA850MHz Channel = 4183, 30MHz to 1GHz



WCDMA850MHz Channel = 4183, 1GHz to 9GHz



RF 50 G RF 50 G RF 50 G	2 DC	SENSE:1		ALIGN AUTO Avg Type	: Log-Pwr	TRA	PM Aug 06, 20
	PNG		g: Free Run ten: 36 dB	Avg Hold:	>100/100		PPE MWWW DET PNNN
Ref Offset 1 dB/div Ref 35.00						Mkr2 758 -40.5	.47 MH 552 dB
og 15.0						0 ¹	
5.0							
.00							
.00							-13.00 6
5.0						A	
5.0					2		
5.0					s	and have	manana
5.0							
tart 0.0300 GHz						Stop 1	.0000 GI
Res BW 100 kHz		#VBW 10	0 kHz		Sweep	3.200 ms	(1001 pt
KR MODE TRC SCL	х	Y	FUNCTION	FUNCTION WIDTH	F	UNCTION VALUE	
1 N 1 7 2 N 1 F	847.71 MHz 758.47 MHz	17.679 dBm -40.552 dBm					
3							
5							
8							
9							
1							,

WCDMA850MHz Channel = 4233, 30MHz to 1GHz

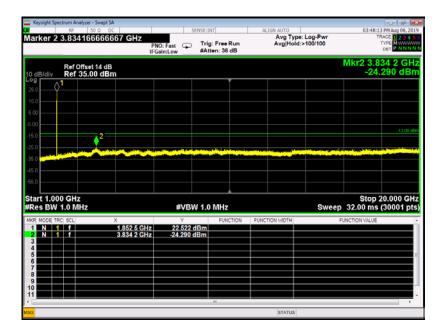


WCDMA850MHz Channel = 4233, 1GHz to 9GHz



offset 14 dB 35.00 dBm						
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						-13.00 d
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iz					Stop 1	.0000 GH
	12 Hz				IZ	Iz Stop 1.

WCDMA1900MHz Channel = 9262, 30MHz to 1GHz

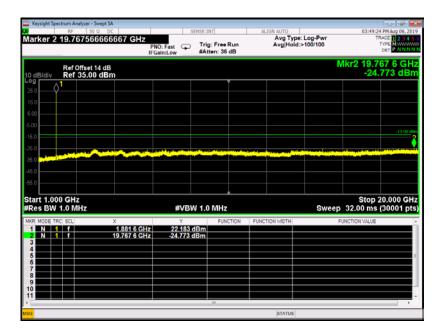


WCDMA1900MHz Channel = 9262, 1GHz to 20GHz



a	RF 50 Ω DC 711.910000000 MHz	PNO: Fast	SE:INT Trig: Free Run #Atten: 36 dB	ALIGN AUTO Avg Type: Lo Avg Hold:>10	g-Pwr 0/100	TRAC	MAug 06, 201 CE 1 2 3 4 5 PE M
0 dB/div	Ref Offset 14 dB Ref 35.00 dBm	IFGain:Low	Atten: 50 db			Mkr1 711. -40.4	.91 MH 31 dB
			Ĭ				
25.0							
15.0							
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5.00							
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15.0 Marin	er-material and a state of the second state of the second state of the second state of the second state of the s	manufundam	mergenserver	warman	whenthe	louble have been all and a second	Abdrew Angele
55.0							
	300 GHz 100 kHz	#VBW	100 kHz		Sween	Stop 1.0 3.200 ms (0000 GH
sg	100 1112	#* DV*		STATUS	ewcep	0.200 1115	ree r pr

WCDMA1900MHz Channel = 9400, 30MHz to 1GHz

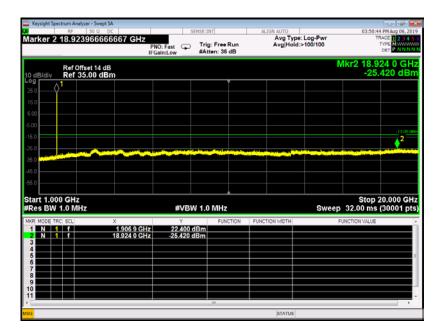


WCDMA1900MHz Channel = 9400, 1GHz to 20GHz



	RF 50 Q DC		ENSE:INT	ALIGN AUTO		03:47:26 PM Aug 06, 201
larker 1	836.070000000 MH	PNO: Fast G	Trig: Free Run #Atten: 36 dB	Avg Type: Log Avg Hold:>100	-Pwr /100	TRACE 234 TYPE M DET P NNNN
0 dB/div	Ref Offset 14 dB Ref 35.00 dBm				Mk	r1 836.07 MH -40.813 dBi
- G						
25.0						
15.0						
5.00						
5.00						
15.0						-13.00 c
25.0						
>5.0					•	1
15.0	han contracted and and a sport courses	ahaaraayaabababbby	West and south and and a second	ine here was defensed	en ander ange en de la de l La de la d	Hendrich Andrewski wa
55.0						
tart 0.03	300 GHz 100 kHz	#)/2)/	v 100 kHz		Sween 2	Stop 1.0000 GI 200 ms (1001 pi
Res BW	100 KH2	#484	100 KH2	STATUS	sweep 3.	200 ms (1001 pt

WCDMA1900MHz Channel = 9538, 30MHz to 1GHz

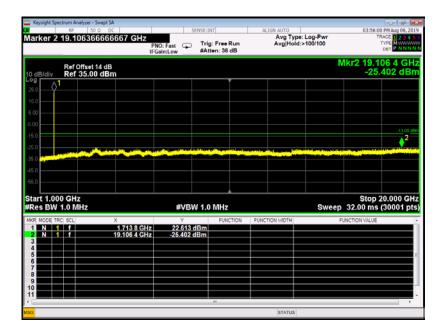


WCDMA1900MHz Channel = 9538 1GHz to 20GHz



Marker 1	RF 50 Q DC 1 788.540000000	PN	0: Fast 😱	Trig: Free R #Atten: 36 c	tun	Avg Type: I Avg Hold:>	.og-Pwr 100/100	TR	3 PM Aug 06, 201 RACE 1 2 3 4 5 TYPE NNNN DET PNNNN
10 dB/div	Ref Offset 14 dB Ref 35.00 dBm							Mkr1 78 -40.	8.54 MH 822 dBr
				Ĩ					
25.0									
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-55.0									
Start 0.03	300 GHz							Stop	1.0000 GH
	100 kHz		#VBV	V 100 kHz			Sweep	3.200 ms	s (1001 pt

WCDMA1700MHz Channel = 1312, 30MHz to 1GHz

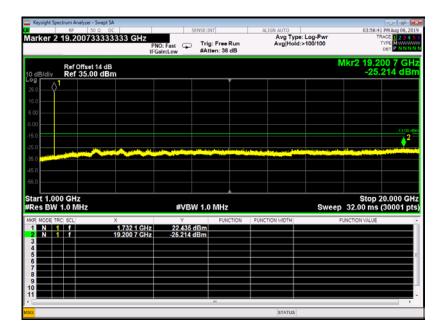


WCDMA1700MHz Channel = 1312, 1GHz to 18GHz



Marker (RF 50 Ω DC 1 866.140000000 MHz		g: Free Run tten: 36 dB	ALIGN AUTO Avg Type: Log-F Avg Hold:>100/1	wr T	17 PMAug 06, 201 RACE 2 3 4 5 TYPE M DET P NNNN
10 dB/div	Ref Offset 14 dB Ref 35.00 dBm				Mkr1 86 -40	86.14 MH .949 dBr
25.0						
15.0						
5.00						
5.00						
15.0						
25.0						
35.0					1	
الغريطة 65.0	หละปละเวลาะ ไปของห่องเป็นของไป เป็นประชาติท	ndelanderse for the state of th	langith management	demonstration of the second	han manager and a start of the second se	the state of the s
55.0						
Start 0.0	300 GHz				Stop	1.0000 GH
	300 GH2 / 100 kHz	#VBW 10	0 kHz	STATUS	Sweep 3.200 m	s (1001 p

WCDMA1700MHz Channel = 1412, 30MHz to 1GHz

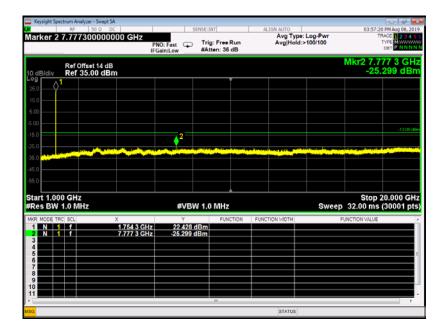


WCDMA1700MHz Channel = 1412, 1GHz to 18GHz



arker 1 840.92	50 R DC 20000000 MHz	PNO: Fast	Trig: Free Ru #Atten: 36 dB	n Avg Hol	e: Log-Pwr d:>100/100	TYP	Aug 06, 20
) dB/div Ref 35	set 14 dB i.00 dBm	Ir Gain.Low	Witten: 00 da	,		Mkr1 840. -40.18	92 MH 33 dBi
^g			Ĭ				
5.0							
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5.0							
tart 0.0300 GHz Res BW 100 kHz			W 100 kHz			Stop 1.0 3.200 ms (*	000 GH

WCDMA1700MHz Channel = 1513, 30MHz to 1GHz



WCDMA1700MHz Channel = 1513, 1GHz to 18GHz



2.6 Bandedge

2.6.1 Requirement

The power of any emission outside of the authorized operating frequency ranges must be lower than the transmitter power (P) by a factor of at least $43 + 10 \log (P) dB$.

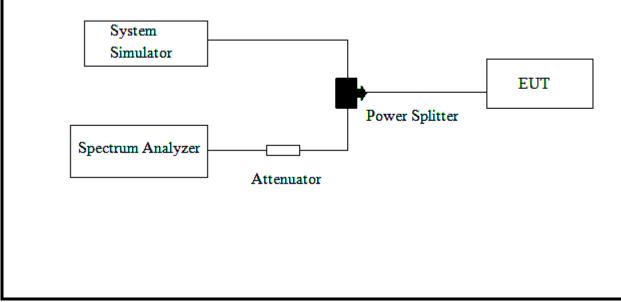
2.6.2 Measuring Instruments

The measuring equipment is listed in the section 3 of this test report.

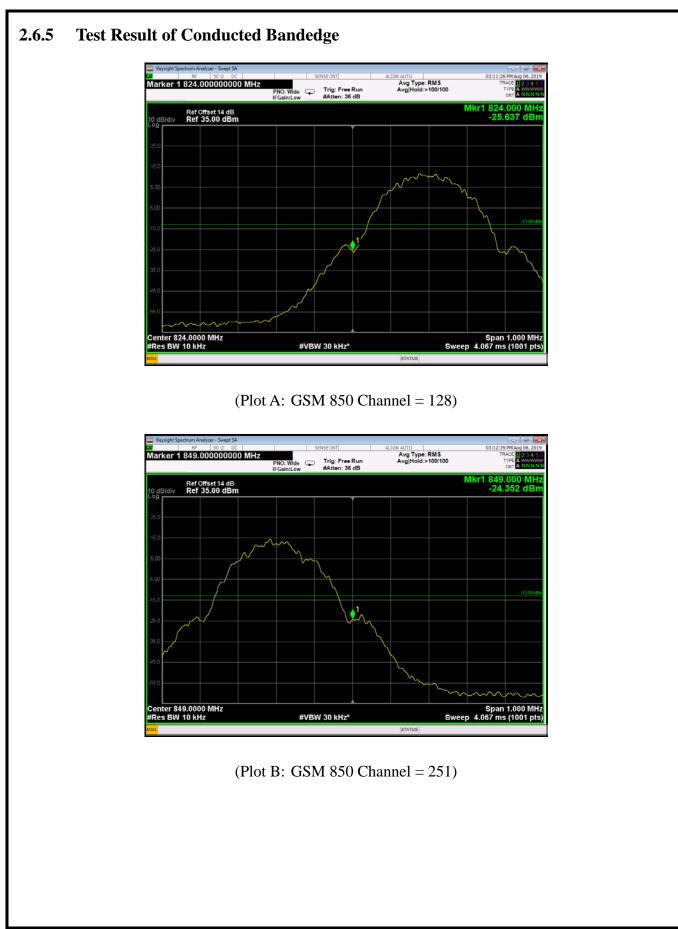
2.6.3 Test Procedures

- 1. The testing follows FCC KDB 971168 D01 v03r01 Section 6.0.
- 2. The EUT was connected to the spectrum analyzer and system simulator via a power divider.
- 3. The RF output of EUT was connected to the spectrum analyzer by an RF cable and attenuator. The path loss was compensated to the results for each measurement.
- 4. The band GPRSs of low and high channels for the highest RF powers were measured.
- 5. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
- 6. The limit line is derived from $43 + 10\log(P) dB$ below the transmitter power P(Watts) = P(W) - [43 + 10log(P)] (dB)
 - $= [30 + 10\log(P)] (dBm) [43 + 10\log(P)] (dB)$
 - = -13dBm.

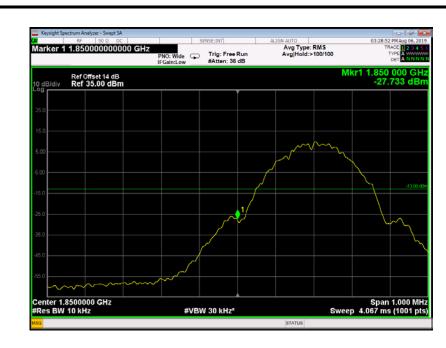
2.6.4 Test Setup











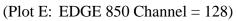


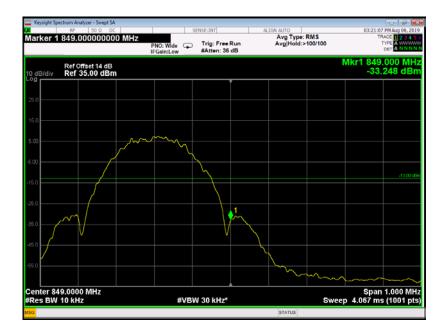


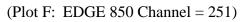




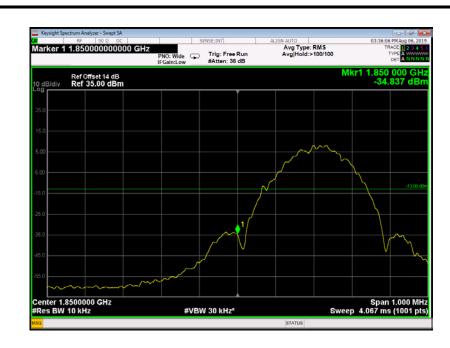


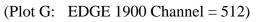


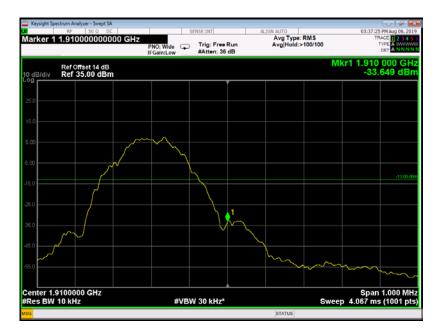








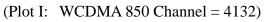




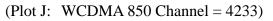
(Plot H: EDGE 1900 Channel = 810)





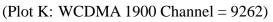




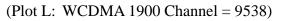
















(Plot M: WCDMA 1700 Channel = 1312)



(Plot N: WCDMA 1700 Channel = 1513)



2.7 Transmitter Radiated Power (EIRP/ERP)

2.7.1 Requirement

The substitution method, in ANSI / TIA / EIA-603-D-2010, was used for ERP/EIRP measurement, and the spectrum analyzer configuration follows KDB 971168 D01 Power Meas. License Digital Systems v03r01. The ERP of mobile transmitters must not exceed 7 Watts (Cellular Band) and the EIRP of mobile transmitters are limited to 2 Watts (PCS Band) and 1 Watts (AWS Band).

2.7.2 Measuring Instruments

The measuring equipment is listed in the section 3 of this test report.

2.7.3 Test Procedures

- 1. The testing follows FCC KDB 971168 D01 v03r01 Section 5.2.1. (for CDMA/WCDMA), Section 5.2.2.2 (for GSM/GSM/GPRS) and ANSI / TIA-603-D-2010 Section 2.2.17.
- 2. The EUT was placed on a turntable 1.5 meters high in a fully anechoic chamber.
- 3. The EUT was placed 3 meters from the receiving antenna, which was mounted on the antenna tower.
- 4. GSM operating modes: Set RBW= 1MHz, VBW= 3MHz, RMS detector over burst;

UMTS operating modes: Set RBW= 100 kHz, VBW= 300 kHz, RMS detector over frame, and use channel power option with bandwidth=5MHz, per KDB 971168 D01 v03r01.

- 5. The table was rotated 360 degrees to determine the position of the highest radiated power.
- 6. The height of the receiving antenna is adjusted to look for the maximum ERP/EIRP.
- 7. Taking the record of maximum ERP/EIRP.
- 8. A dipole antenna was substituted in place of the EUT and was driven by a signal generator.





9. The conducted power at the terminal of the dipole antenna is measured.

10. Repeat step 3 to step 5 to get the maximum ERP/EIRP of the substitution antenna.

11. ERP/EIRP = Ps + Et - Es + Gs = Ps + Rt - Rs + Gs

Ps (dBm): Input power to substitution antenna.

Gs (dBi or dBd): Substitution antenna Gain.

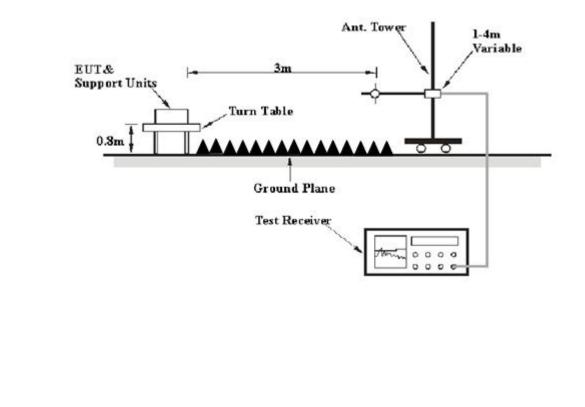
Et = Rt + AF Es = Rs + AF

AF (dB/m): Receive antenna factor

Rt: The highest received signal in spectrum analyzer for EUT.

Rs: The highest received signal in spectrum analyzer for substitution antenna.

2.7.4 Test Setup





2.7.5 Test Result of Transmitter Radiated Power

Test Notes:

1. This device employs GMSK technology with GSM capabilities. All configurations were investigated and the worst case emissions were found in GSM mode.

2. This device employs UMTS technology with WCDMA (AMR/RMC), HSDPA, HSUPA capabilities. All configurations were investigated and the worst case UMTS emissions were found in RMC WCDMA mode at 12.2Kbps.

3. This unit was tested with its standard battery.

4. The worst case test configuration was found in the vertical positioning where the EUT is laying on its side. The data reported in the tables below were measured in this test setup.

Band	Channel	Frequency (MHz)	PCL	Antenna Pol (H/V)	Measured ERP dBm	Limit dBm	Verdict
	128	824.20	5	Н	30.25		PASS
	120	024.20		V	32.30	- 38.5	
GPRS	190	836.60	5	Н	30.65		PASS
850MHz				V	32.84		
	251	848.80	5	Н	30.12		PASS
				V	32.58		

Band	Channel	Frequency (MHz)	PCL	Antenna Pol (H/V)	Measured EIRP dBm	Limit dBm	Verdict
	512	1850.2	0	Н	27.32		PASS
				V	29.41	- 33	
GPRS	661	1880.0	0	Н	27.24		PASS
1900MHz				V	29.52		
	810	1909.8	0	Н	27.27		D. CC
				V	29.83		PASS

Band	Channel	Frequency (MHz)	PCL	Antenna Pol (H/V)	Measured ERP dBm	Limit dBm	Verdict
	128	824.20	5	Н	25.24		PASS
	120	024.20		V	27.30	- 38.5	
EDGE	190	836.60	5	Н	25.16		PASS
850MHz				V	27.48		
	251	848.80	5	Н	25.32		PASS
				V	27.65		



Band	Channel	Frequency	PCL	Antenna Pol	Measured EIRP	Limit	Verdict
Dand		(MHz)	ICL	(H/V)	dBm	dBm	veruict
	512	1850.2	0	Н	24.25		PASS
				V	26.42		
EDGE	661	1880.0	0	Н	24.09		PASS
1900MHz				V	25.85	33	
	810	1000.8	0	Н	24.39		PASS
		1909.8		V	26.12]	

Band	Channel	Frequency	Antenna Pol	Measured ERP	Limit	Verdict
Dallu		(MHz)	(H/V)	dBm	dBm	verdict
	4132	826.4	Н	21.34		PASS
			V	22.12		rass
WCDMA	4175	835	Н	21.39	20 5	DAGG
850MHz			V	22.28	38.5	PASS
	4022	846.6	Н	21.32		DAGG
	4233		V	22.39		PASS

Band	Channel	Frequency (MHz)	Antenna Pol (H/V)	Measured EIRP dBm	Limit dBm	Verdict
	9262	1852.4	Н	21.12		PASS
			V	22.58		rass
WCDMA	9400	1880	Н	21.13	22	DACC
1900MHz			V	22.25	33	PASS
	9538	1907.6	Н	21.09		DAGG
	9338		V	22.34		PASS

Dand	Channal	Frequency	Antenna Pol	Measured EIRP	Limit	Vardiat
Band	Channel	(MHz)	(H/V)	dBm	dBm	Verdict
	1312	1712.4	V	21.26		PASS
	1512		Н	22.29		radd F
WCDMA	1413	1732.4	V	21.25	30	DACC
1700MHz			Н	22.25	50	PASS
	1512	1752.6	V	21.32		DAGG
	1513		Н	22.43		PASS



2.8 Radiated Spurious Emissions

2.8.1 Requirement

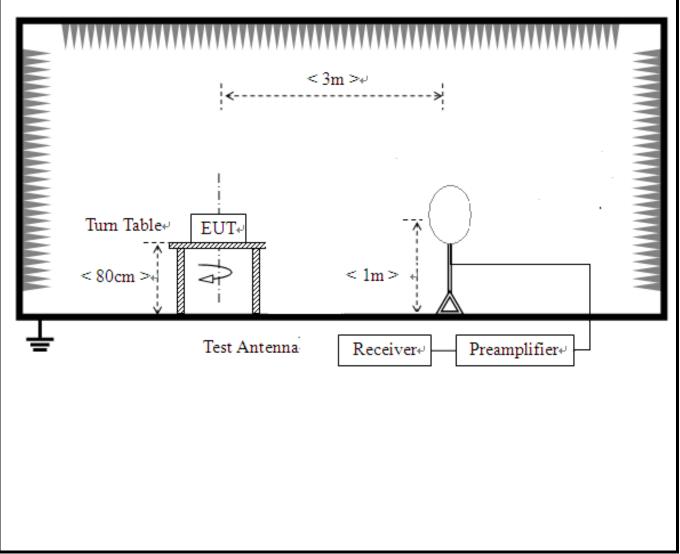
The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitter power (P) by a factor of at least $43 + 10 \log (P) dB$. The spectrum is scanned from 30 MHz up to a frequency including its 10th harmonic.

2.8.2 Measuring Instruments

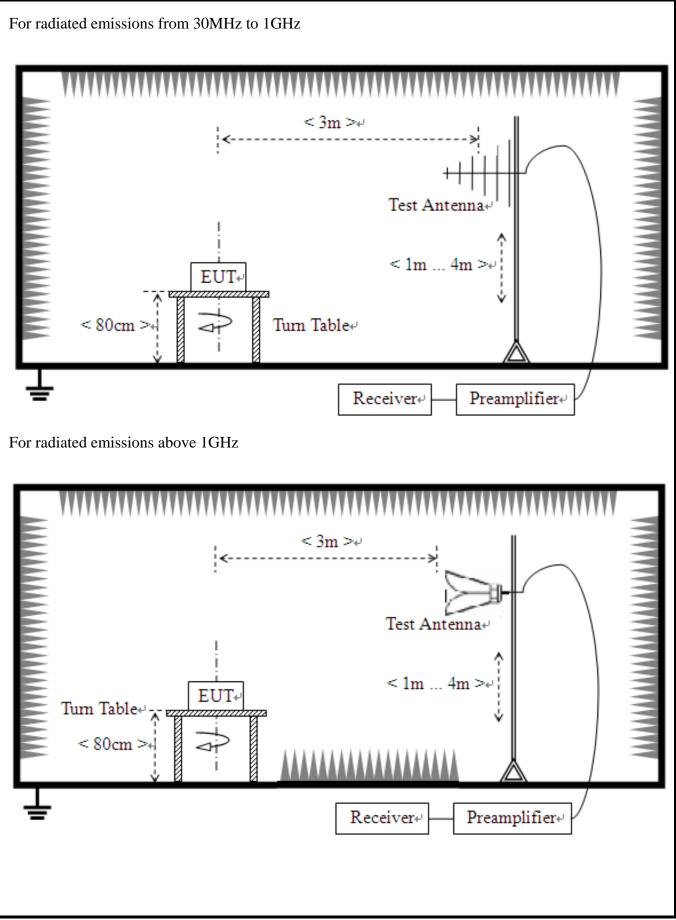
The measuring equipment is listed in the section 3 of this test report.

2.8.3 Test Setup

For radiated emissions from 9 kHz to 30MHz









2.8.4 Test Procedures

- 1. The testing follows FCC KDB 971168 D01 v03r01 Section 5.8 and ANSI / TIA-603-D-2010 Section 2.2.12.
- 2. The EUT was placed on a rotatable wooden table 0.8 meters above the ground.
- 3. The EUT was set 3 meters from the receiving antenna, which was mounted on the antenna tower.
- 4. The table was rotated 360 degrees to determine the position of the highest spurious emission.
- 5. The height of the receiving antenna is varied between one meter and four meters to search for the maximum spurious emission for both horizontal and vertical polarizations.
- 6. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz, taking record of maximum spurious emission.
- 7. A horn antenna was substituted in place of the EUT and was driven by a signal generator.
- 8. Tune the output power of signal generator to the same emission level with EUT maximum spurious emission.
- 9. Taking the record of output power at antenna port.
- 10. Repeat step 7 to step 8 for another polarization.
- 11. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
- 12. The limit line is derived from 43 + 10log(P) dB below the transmitter power P(Watts)
 - = P(W) [43 + 10log(P)] (dB)
 - $= [30 + 10\log(P)] (dBm) [43 + 10\log(P)] (dB)$
 - = -13dBm.
- 13. This device employs GMSK technology with GSM and GSM capabilities. All configurations were investigated and the worst case emissions were found in GSM mode.
- 14. This device employs UMTS technology with WCDMA (AMR/RMC), HSDPA, HSUPA capabilities. All configurations were investigated and the worst case UMTS emissions were found in RMC WCDMA mode at 12.2Kbps.
- 15. This unit was tested with its standard battery.
- 16. All Spurious Emission tests were performed in X, Y, Z axis direction and low, middle, high channel. And only the worst axis test condition was recorded in this test report.
- 17. The spectrum is measured from 9 KHz to the 10th harmonic of the fundamental frequency



of the transmitter using CISPR quasi peak detector below 1GHz. The worst case emissions are reported however emissions whose levels were not within 20dB of the respective limits were not reported.

 For 9KHz to 30MHz: the amplitude of spurious emissions are attenuated by more than 20dB below the permissible value has no need to be reported.





2.8.5 Test Results of Radiated Spurious Emissions

Worst-Case test data provide as below:

Note: 1. within 30MHz-1GHz were found more than 20dB below limit line

Note: 2. Absolute Level=Reading Level + Factor

Susp	Suspected List										
NO.	Freq.	Reading	Level	Limit	Margin	Factor	Deleritri				
	[MHz]	[dBm]	[dBm]	[dBm]	[dB]	[dB]	Polarity				
1	34.8549	-85.95	-61.14	-13.00	48.14	24.81	Horizontal				
2	62.0420	-85.49	-64.19	-13.00	51.19	21.30	Horizontal				
3	1766.38	-57.33	-56.42	-13.00	43.42	0.91	Horizontal				
4	2949.97	-57.73	-50.01	-13.00	37.01	7.72	Horizontal				
5	6828.78	-58.26	-42.81	-13.00	29.81	15.45	Horizontal				
6	10623.4	-61.31	-36.58	-13.00	23.58	24.73	Horizontal				

Susp	Suspected List									
	Freq.	Reading	Level	Limit	Margin	Factor	Polarity			
NO.	[MHz]	[dBm]	[dBm]	[dBm]	[dB]	[dB]				
1	34.8549	-86.81	-63.96	-13.00	50.96	22.85	Vertical			
2	60.1001	-86.90	-64.85	-13.00	51.85	22.05	Vertical			
3	1830.41	-55.43	-55.02	-13.00	42.02	0.41	Vertical			
4	3141.44	-58.22	-49.76	-13.00	36.76	8.46	Vertical			
5	5107.05	-59.68	-45.57	-13.00	32.57	14.11	Vertical			
6	10369.8	-61.18	-36.85	-13.00	23.85	24.33	Vertical			



Worst-Case test data provide as below:

30MHz~20GHz:

Suspected List								
NO.	Freq.	Reading	Level	Limit	Margin	Factor	Delerity	
	[MHz]	[dBm]	[dBm]	[dBm]	[dB]	[dB]	Polarity	
1	34.8549	-85.47	-60.66	-13.00	47.66	24.81	Horizontal	
2	57.1872	-82.86	-61.57	-13.00	48.57	21.29	Horizontal	
3	203.803	-95.36	-70.25	-13.00	57.25	25.11	Horizontal	
4	2710.85	-57.75	-49.35	-13.00	36.35	8.40	Horizontal	
5	5424.08	-58.80	-47.29	-13.00	34.29	11.51	Horizontal	
6	9721.11	-60.59	-36.48	-13.00	23.48	24.11	Horizontal	

PCS1900 (Mid Channel)

Susp	Suspected List								
	Freq.	Reading	Level	Limit	Margin	Factor	Delerity		
NO.	[MHz]	[dBm]	[dBm]	[dBm]	[dB]	[dB]	Polarity		
1	34.8549	-86.32	-63.47	-13.00	50.47	22.85	Vertical		
2	57.1872	-85.89	-64.19	-13.00	51.19	21.70	Vertical		
3	87.2873	-91.47	-66.43	-13.00	53.43	25.04	Vertical		
4	2694.84	-57.78	-48.78	-13.00	35.78	9.00	Vertical		
5	5014.38	-59.77	-46.29	-13.00	33.29	13.48	Vertical		
6	10325.9	-60.10	-36.17	-13.00	23.17	23.93	Vertical		





Worst-Case test data provide as below:

30MHz~10GHz:

Suspected List								
	Freq.	Reading	Level	Limit	Margin	Factor	Delerity	
NO.	[MHz]	[dBm]	[dBm]	[dBm]	[dB]	[dB]	Polarity	
1	34.8549	-85.59	-60.19	-13.00	47.19	25.40	Horizontal	
2	58.1582	-84.61	-62.84	-13.00	49.84	21.77	Horizontal	
3	1899.44	-52.84	-53.75	-13.00	40.75	-0.91	Horizontal	
4	3187.59	-58.02	-48.93	-13.00	35.93	9.09	Horizontal	
5	6168.08	-72.66	-44.19	-13.00	31.19	28.47	Horizontal	
6	10556.2	-60.20	-36.48	-13.00	23.48	23.72	Horizontal	

Suspected List								
	Freq.	Reading	Level	Limit	Margin	Factor	Polarity	
NO.	[MHz]	[dBm]	[dBm]	[dBm]	[dB]	[dB]		
1	34.8549	-85.11	-61.67	-13.00	48.67	23.44	Vertical	
2	61.0711	-85.77	-63.15	-13.00	50.15	22.62	Vertical	
3	1761.38	-56.77	-56.61	-13.00	43.61	0.16	Vertical	
4	2437.71	-52.93	-49.67	-13.00	36.67	3.26	Vertical	
5	3205.60	-57.98	-48.66	-13.00	35.66	9.32	Vertical	
6	5047.02	-59.04	-45.26	-13.00	32.26	13.78	Vertical	

Worst-Case test data provide as below:



30MHz~20GHz:

WCDMA Band II (Mid Channel)

Susp	Suspected List								
	Freq.	Reading	Level	Limit	Margin	Factor	Delority		
NO.	[MHz]	[dBm]	[dBm]	[dBm]	[dB]	[dB]	Polarity		
1	34.8549	-87.40	-65.28	-13.00	52.28	22.12	Horizontal		
2	59.1291	-84.58	-66.16	-13.00	53.16	18.42	Horizontal		
3	202.832	-94.45	-72.58	-13.00	59.58	21.87	Horizontal		
4	874.744	-99.13	-65.53	-13.00	52.53	33.60	Horizontal		
5	2946.97	-56.78	-48.61	-13.00	35.61	8.17	Horizontal		
6	7524.76	-57.96	-41.28	-13.00	28.28	16.68	Horizontal		

Susp	Suspected List								
	Freq.	Reading	Level	Limit	Margin	Factor	Delority		
NO.	[MHz]	[dBm]	[dBm]	[dBm]	[dB]	[dB]	Polarity		
1	34.8549	-87.83	-67.67	-13.00	54.67	20.16	Vertical		
2	59.1291	-85.50	-66.45	-13.00	53.45	19.05	Vertical		
3	3135.06	-57.72	-49.36	-13.00	36.36	8.36	Vertical		
4	5066.53	-59.35	-45.38	-13.00	32.38	13.97	Vertical		
5	7518.75	-56.52	-40.32	-13.00	27.32	16.20	Vertical		
6	10334.1	-60.67	-37.15	-13.00	24.15	23.52	Vertical		



Worst-Case test data provide as below:

30MHz~20GHz: WCDMA Band IV

WCDMA Band IV (Mid Channel)

Susp	Suspected List							
NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Polarity	
1	658.218	-104.52	-72.00	-13.00	59.00	32.52	Horizontal	
2	3195.09	-54.59	-45.65	-13.00	32.65	8.94	Horizontal	
3	6600.30	-54.61	-39.96	-13.00	26.96	14.65	Horizontal	
4	10052.0	-56.96	-40.93	-13.00	27.93	16.03	Horizontal	
5	12765.3	-57.12	-36.58	-13.00	23.58	20.54	Horizontal	
6	17393.6	-58.53	-31.98	-13.00	18.98	26.55	Horizontal	
Sus	pected List	:						
NO.	Freq.	Reading	Level	Limit	Margin	Factor	Delarity	
NO.	[MHz]	[dBm]	[dBm]	[dBm]	[dB]	[dB]	Polarity	
1	64.9550	-98.31	-79.71	-13.00	66.71	18.60	Vertical	
2	3421.71	-51.27	-44.25	-13.00	31.25	7.02	Vertical	
3	5104.05	-54.13	-43.20	-13.00	30.20	10.93	Vertical	
4	6480.24	-55.71	-40.81	-13.00	27.81	14.90	Vertical	
5	7950.97	-55.84	-41.55	-13.00	28.55	14.29	Vertical	
6	12687.3	-57.11	-36.04	-13.00	23.04	21.07	Vertical	



3. LIST OF MEASURING EQUIPMENT

Description	Manufactu	Model	Serial No.	Cal. Date	Due Date	Remark	
Description	rer	1110401	Seria 100.	Cui: Duto	Due Duie	Roman	
EMI Test Receiver	R&S	ESIB26	A0304218	2018.09.03	2019.09.20	Radiation	
Loop Antenna	Schwarz beck	HFH2-Z2	100047	2019.04.26	2022.04.25	Radiation	
Broadband antenna (30MHz~1GHz)	R&S	HL562	101341	2017.07.14	2020.07.13	Radiation	
Broadband antenna (30MHz~1GHz)	R&S	HL562	101339	2017.07.14	2020.07.13	Radiation	
Double ridge horn antenna (1GHz~18GHz)	R&S	HF906	100150	2019.04.27	2022.04.26	Radiation	
Double ridge horn antenna (1GHz~18GHz)	R&S	HF906	100149	2019.04.17	2022.04.16	Radiation	
Horn antenna (18GHz~26.5GHz)	AR	AT4002A	305753	2017.11.10	2020.11.09	Radiation	
Horn antenna (18GHz~26.5GHz)	AR	AT4003A	0329293	2018.09.17	2020.09.16	Radiation	
Amplifier 1GHz-18GHz	AR	25S1G4AM1	22018	2018.09.17	2020.09.16	Radiation	
Ampilier 20M~3GHz	MILMEGA	80RF1000-250	1064573	2017.10.09	2020.10.08	Radiation	
Spectrum Analyzer	KEYSIGHT	N9030A	A160702554	2018.11.15	2019.11.14	Conducted	
LISN	ROHDE&SC HWARZ	ESH2-Z5	A0304221	2019.04.30	2020.04.29	Conducted	
Test Receiver	R&S	ESCS30	A0304260	2019.05.25	2020.05.24	Conducted	
Temperature chamber	Dongguan gaoda instrument CO.LTD	GD-7005-100	130130101	2019.04.22	2020.04.21	Conducted	
Wideband Radio Communication tester	R&S	CMW500	149332	2019.04.01	2020.03.31	Conducted	
Power Supply	R&S	NGMO1	101037	2019.08.03	2020.08.02	Conducted	