

REPORT ESTREPORTReport No:SET2019-09641Product Name:Handheld Data TerminalFCC ID:HLEHT510ABTNUFLModel No:HT510AModel No:HT510AApplicane:unitech Electronics Co., LTDAddresse:SF, No.136, Ln. 235, Baoqiao Rd., Xindian Dist., New Taipei City, TaiwanDetes of Testing:05/01/2019 - 08/07/2019Issued bi:CICL Southern Electronic Product Testing (Shenzhen) Co., Ltd.Lab Location:Bilding 28/29, East of Shigu, Xili Industrial Zone, Xili Road, Nanshan District, Shenzhen, Guangdong, ChinaTet:86 755 26627338Tet:86 755 26627238

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Test Report

Product:	Handheld Data Terminal				
Brand Name:	unitech				
Trade Name:	unitech				
Applicant	unitech Electronics Co., LTD				
Applicant Address:	5F., No.136, Ln. 235, Baoqiao Rd., Xindian Dist., New Taipei City, Taiwan				
Manufacturer	unitech Electronics Co., LTD				
Manufacturer Address:	5F., No.136, Ln. 235, Baoqiao Rd., Xindian Dist., New Taipei City, Taiwan				
Test Standards	47 CFR FCC Part 2/22/24				
Test Result	PASS				
Tested by	Robin Luo 2019.08.05				
Reviewed by:	Robin Luo, Test Engineer Chris Jon 2019.08.05				
	Chris You, Senior Engineer				
Approved by:	Shuangwan Zhang, Manager				



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Change History				
Issue	Date	Reason for change		
1.0	2019.08.05	First edition		



1. GENERAL INFORMATION

1.1 EUT Description

EUT Type	Handheld Data Terminal
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);
Frequency Range	Rx: 1930.2 - 1989.8MHz (at intervals of 200kHz)
Trequency Kange	WCDMA 850MHz
	Tx: 826.4 - 846.6MHz (at intervals of 200kHz);
	Rx: 871.4 - 891.6MHz (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: 32.00dBm
	GSM 1900: 28.34dBm
Maximum Output Power to	EDGE 850: 26.00dBm
Antenna	EDGE 1900: 23.41dBm
	WCDMA 850: 22.28dBm
	WCDMA 1900: 19.15dBm
	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: -2dBi
Antenna Gain	GSM 1900/ WCDMA 1900: -2dBi



1.2	2 Maximum Designator	ERP/EIRP	Power, Freq	quency Tolerance	e, and Emissio	on
	System	Type of Modulation	Emission Designator	Frequency Tolerance (ppm)	Maximum ERP/EIRP(W)	
	GSM 850	GMSK	249KGXW	0.024	1.340	
	GSM 1900	GMSK	250KGXW	0.022	0.767	
	EDGE 850	8PSK	250KG7W	0.037	0.361	
	EDGE 1900	8PSK	253KG7W	0.027	0.319	
	WCDMA 850 RMC 12.2Kbps	QPSK	4M21F9W	0.0015	0.155	
	WCDMA 1900 RMC 12.2Kbps	QPSK	4M21F9W	0.0014	0.160	



1.3 Test Standards and Results

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

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.

No.	Section FCC	Description	Limit	Result
1	2.1046	Conducted Output Power	Reporting Only	PASS
2	24.232(d)	Peak to Average Radio	<13dBm	PASS
3	2.1049 22.917(b) 24.238(b)	Occupied Bandwidth	Reporting Only	PASS
4	2.1055 22.355 24.235	Frequency Stability	$\leq \pm 2.5$ ppm	PASS
5	2.1051 22.917 24.238	Conducted Out of Band Emissions	< 43+10log10 (P[Watts])	PASS
6	2.1051 22.917 24.238	Band GPRS	< 43+10log10 (P[Watts])	PASS
	22.913	Effective Radiated Power	<7Watts	PASS
7	24.232	Equivalent Isotropic Radiated Power	<2Watts	PASS
8	2.1053 22.917 24.238	Radiated Spurious Emissions	< 43+10log10 (P[Watts])	PASS



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.

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			
CO (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			

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.





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 Testing 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

CAB identifier: CN0064

CCIC Southern Testing 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 Dec. 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 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:

GSM850		Burst-Averaged output Power (dBm)			
		128CH	190CH	251CH	
	1 Tx Slot	31.71	32.00	31.62	
GPRS	2 Tx Slots	29.45	29.88	29.39	
(GMSK)	3 Tx Slots	27.65	27.92	27.61	
	4 Tx Slots	26.56	26.95	26.48	
	1 Tx Slot	25.58	26.00	25.49	
EDGE	2 Tx Slots	23.32	23.65	23.41	
(8PSK)	3 Tx Slots	21.54	21.81	21.63	
	4 Tx Slots	20.43	20.87	20.56	
CSI	M1900	Burst-Averaged output Power (dBm)			
GSI	VI1900	512CH	661CH	810CH	
	1 Tx Slot	28.30	28.34	27.63	
GPRS	2 Tx Slots	26.15	26.22	25.57	
(GMSK)	3 Tx Slots	24.46	24.65	24.52	
	4 Tx Slots	23.23	23.58	23.36	
	1 Tx Slot	23.18	23.41	23.33	
EDGE	2 Tx Slots	21.01	21.23	21.10	
(8PSK)	3 Tx Slots	19.32	19.58	19.44	
	4 Tx Slots	18.20	18.42	18.31	



2. WCDMA Model Test Verdict:

UMTS1900		Average Power (dBm)				
(Band II)		9262CH	9400CH	9538cH		
WCDMA	WCDMA 12.2kbps RMC		19.15	18.97		
	Subtest 1	18.94	19.06	18.84		
LICDDA	Subtest 2	18.86	18.93	18.76		
HSDPA	Subtest 3	18.75	18.84	18.65		
	Subtest 4	18.66	18.73	18.53		
	Subtest 1	18.54	18.62	18.43		
	Subtest 2	18.45	18.51	18.32		
HSUPA	Subtest 3	18.37	18.42	18.21		
	Subtest 4	18.26	18.34	18.14		
	Subtest 5	18.15	18.21	18.02		
UM	UMTS850		Average Power (dBm)			
(Band V)						
(B	and V)	4132CH	4183CH	4233CH		
(B WCDMA	and V) 12.2kbps RMC	4132CH 22.18	4183CH 22.28	4233CH 22.26		
WCDMA	12.2kbps RMC	22.18	22.28	22.26		
	12.2kbps RMC Subtest 1	22.18 22.07	22.28 22.17	22.26 22.15		
WCDMA	12.2kbps RMC Subtest 1 Subtest 2	22.18 22.07 21.95	22.28 22.17 22.06	22.26 22.15 21.02		
WCDMA	12.2kbps RMC Subtest 1 Subtest 2 Subtest 3	22.18 22.07 21.95 21.84	22.28 22.17 22.06 21.94	22.26 22.15 21.02 21.91		
WCDMA	12.2kbps RMC Subtest 1 Subtest 2 Subtest 3 Subtest 4	22.18 22.07 21.95 21.84 21.73	22.28 22.17 22.06 21.94 21.86	22.26 22.15 21.02 21.91 21.84		
WCDMA	12.2kbps RMC Subtest 1 Subtest 2 Subtest 3 Subtest 4 Subtest 1	22.18 22.07 21.95 21.84 21.73 21.62	22.28 22.17 22.06 21.94 21.86 21.75	22.26 22.15 21.02 21.91 21.84 21.73		
WCDMA HSDPA	12.2kbps RMC Subtest 1 Subtest 2 Subtest 3 Subtest 4 Subtest 1 Subtest 2	22.18 22.07 21.95 21.84 21.73 21.62 21.51	22.28 22.17 22.06 21.94 21.86 21.75 21.63	22.26 22.15 21.02 21.91 21.84 21.73 21.61		



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:

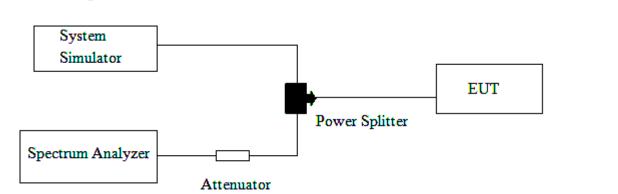
a. Set the CCDF (Complementary Cumulative Distribution Function) option on the spectrum analyzer.

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

Band	Channel	Frequency	Peak to Average radio	Limit	Verdict
	Channel	(MHz)	dB	dB	verdict
CSM	512	1850.2	0.20		PASS
GSM 1000MUz	661	1880.0	0.20	13	PASS
1900MHz	810	1909.8	0.20		PASS
EDCE	512	1850.2	2.70		PASS
EDGE	661	1880.0	3.00	13	PASS
1900MHz	810	1909.8	2.70		PASS
WCDMA 1900MHz	9262	1852.4	2.88		PASS
	9400	1880.0	2.83	13	PASS
	9538	1907.6	2.65		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.

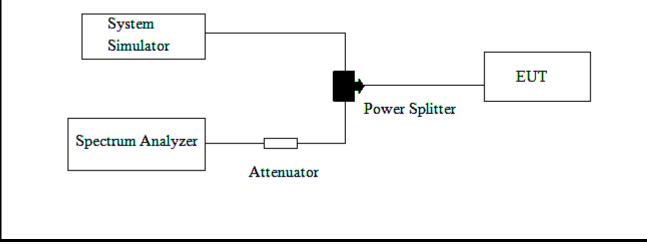
3. The RF output of the EUT was connected to the spectrum analyzer by RF cable and attenuator.

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





			26dB	99% Occupied	
Band	Channel	Frequency	bandwidth	Bandwidth	Refer to Plot
Dand	Channel	(MHz)	(KHz)	(KHz)	
	128	824.2	313.6	245.79	Plot A1
GSM 850MHz	190	836.6	310.6	248.86	Plot A2
	251	848.8	311.2	243.52	Plot A3
	512	1850.2	308.3	245.55	Plot B1
GSM 1900MHz	661	1880.0	308.7	249.59	Plot B2
	810	1909.8	318.6	246.74	Plot B3
	128	824.2	303.4	245.68	Plot C1
EDGE 850MHz	190	836.6	309.2	249.66	Plot C2
	251	848.8	277.1	242.88	Plot C3
	512	1850.2	303.3	250.19	Plot D1
EDGE 1900MHz	661	1880.0	311.5	246.29	Plot D2
	810	1909.8	309.3	253.13	Plot D3
	4132	826.4	4868	4214.2	Plot E1
WCDMA 850MHz	4183	836.6	4840	4198	Plot E2
	4233	846.6	4859	4201.5	Plot E3
	9262	1852.4	4844	4203.4	Plot F1
WCDMA 1900MHz	9400	1880	4876	4206.1	Plot F2
	9538	1907.6	4851	4207.7	Plot F3

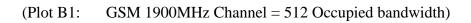
£000/ O ind **B** dwidth 4 764B B 4 D 14 J



2.3.6 Test Results (Plots) of 99% Occupied Bandwidth and 26dB Bandwidth Ref 35.00 Center Fr 824.200000 M 39.6 d 245.79 kHz 1.182 kHz 313.6 kHz x dB 26.00 dB GSM 850MHz Channel = 128 Occupied bandwidth) (Plot A1: 10:14:10 AM May 10 Radio Std: None Ref 35.00 dB Clear Max Ho WBW 10 kH 38.8 4 248.86 kHz 885 Hz 99.00 % (Plot A2: GSM 850MHz Channel = 190 Occupied bandwidth) Ref 35.00 dE Center Fre 848.800000 Mi an 1 W 10 kH .52 kHz 1.302 kHz % of OBW F 99.00 % (Plot A3: GSM 850MHz Channel = 251 Occupied bandwidth)



Center Freq 1.850200000	Trig:	SENSE INT ALI r Freq: 1.85020000 GHz Free Run Avg[Hold>10 x; 36 dB	Radio Str	AK May 10, 2019 1: None vice: BTS	Tracel	Trace/Detector
10 dB/div Ref 35.00 dBm						
Log 25.0 15.0 6.00	Manth	mollicalism			CI	ear Write
500 150 250	on and the second	Jun	hright -			Average
35.0 45.0 Japanene			New Arrest	to 13/mmmun		Max Hole
Center 1.85 GHz #Res BW 3 kHz	#	VBW 10 kHz		oan 1 MHz 105.5 ms		Min Hol
Occupied Bandwidth	1	Total Power	36.5 dBm			COLONG M
24	5.55 kHz					Detecto
Transmit Freq Error	1.917 kHz	% of OBW Power	99.00 %		Auto	Mar
x dB Bandwidth	308.3 kHz	x dB	-26.00 dB			
			STATUS			



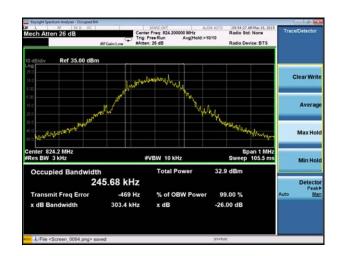


(Plot B2: GSM 1900MHz Channel = 661 Occupied bandwidth)

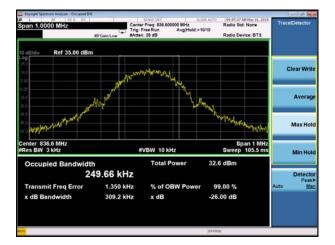


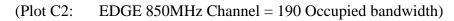
(Plot B3: GSM 1900MHz Channel = 810 Occupied bandwidth)





(Plot C1: EDGE 850MHz Channel = 128 Occupied bandwidth)







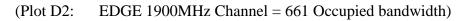
(Plot C3: EDGE 850MHz Channel = 251 Occupied bandwidth)

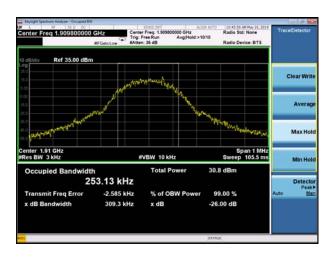




(Plot D1: EDGE 1900MHz Channel = 512 Occupied bandwidth)







(Plot D3: EDGE 1900MHz Channel = 810 Occupied bandwidth)



Center Freq 825.400000 N	Trig:	SINSC 3x1 AL er Freq: 825.400000 MHz Free Run Avg(Hold>1 m: 36 dB	Rad	io Std: None io Device: BTS	Trace/Detector	
10 dB/div Ref 35.00 dBm						
Log 25.0 15.0 6.00		mann			Clear Wri	
5 00 5 00 16.0 25.0			man		Averaç	
350 450 450					Max Ho	
Center 826.4 MHz #Res BW 100 kHz		#VBW 300 kHz		Span 10 MHz Sweep 5 ms	Min Ho	
Occupied Bandwidti 4.2	2142 MHz	Total Power	32.4 dB	m j	Detect	
Transmit Freq Error x dB Bandwidth	6.471 kHz 4.868 MHz	% of OBW Power x dB	99.00 -26.00 d		Pea) Auto <u>M</u> i	
elo.			STATUS			

(Plot E1: WCDMA 850MHz Channel = 4132 Occupied bandwidth)

Kryspit Spectrum Analyse - Occupied III D L 19 56 10 0C Center Freq 836,600000 M	Trig: F	SINSEDVT ALI r Freq: 836.600000 MHz Free Run Avg(Hold>1 1: 36 dB	IN AUTO [02:12:47 PK Hay 10.2 Radio Std: None 0/10 Radio Device: BTS	are Trace/Detector
10 dB/div Ref 35.00 dBm				Clear Write
6 00 6 00 76 0 25 0			Lange and the second	Average
36.0 				Max Hold
Center 836.6 MHz #Res BW 100 kHz Occupied Bandwidt		VBW 300 kHz Total Power	Span 10 M Sweep 5 r 32.2 dBm	Hz ns Min Hold
	1980 MHz -10.335 kHz 4.840 MHz	% of OBW Power x dB	99.00 % -26.00 dB	Detector Peak Auto <u>Man</u>
10			ETATUS	_

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

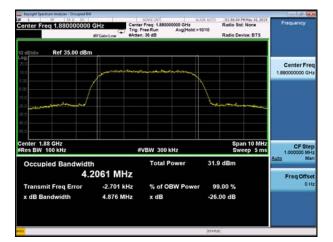




(Plot E3: WCDMA 850MHz Channel = 4233 Occupied bandwidth)



(Plot F1: WCDMA 1900MHz Channel = 9262 Occupied bandwidth)



(Plot F2: WCDMA 1900MHz Channel = 9400 Occupied bandwidth)



(Plot F3: WCDMA 1900MHz Channel = 9538 Occupied bandwidth)



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

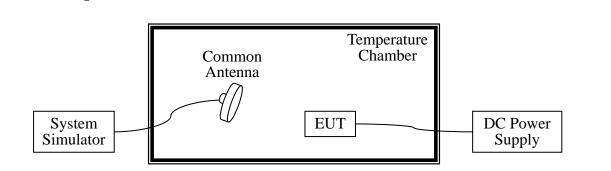
- 1. The testing follows FCC KDB 971168 D01 v03r01 Section 9.0.
- 2. The EUT was set up in the thermal chamber and connected with the system simulator.
- 3. With power OFF, the temperature was decreased to -30°C and the EUT was stabilized before testing. Power was applied and the maximum change in frequency 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:		GS	M 850	Channel:	190
Limit(ppm):		2.5		Frequency:	836.6MHz
Demon	T		GSM	EDGE	
Power (VDC)	Temperatu	ire	Deviation	Deviation	Result
(VDC)	(°C)		(ppm)	(ppm)	
	-30		0.022	0.037	
	-20		0.021	0.025	
	-10		0.019	0.015	
	0		0.019	0.018	
3.8	+10		0.021	0.034	
	+20		0.022	0.036	PASS
	+30		0.021	0.034	
	+40		0.020	0.032	
	+50		0.021	0.029	
4.2	+25		0.024	0.028	
3.5	+25		0.020	0.031	



GSM 1900MHz Band

Band:		GS	M 1900	Channel:	661
Limit(ppm):		2.5		Frequency:	1880.0MHz
Power (VDC)	Temperatu (℃)	ure -	GSM Deviation (ppm)	EDGE Deviation (ppm)	Result
3.8	$ \begin{array}{r} -30 \\ -20 \\ -10 \\ 0 \\ +10 \\ +20 \\ +30 \\ +40 \\ +50 \\ \end{array} $		0.019 0.021 0.019 0.019 0.019 0.020 0.019 0.021 0.020	0.024 0.024 0.020 0.019 0.020 0.014 0.019 0.023 0.020	PASS
4.2	+25		0.022	0.021	
3.5	+25		0.020	0.027	

WCDMA 850MHz Band

Band:		WCDMA Bar	nd V	Channel:	4183
Limit(ppm)	:	2.5		Frequency:	836.6MHz
Power (VDC)		perature (℃)	٦	RMC 12.2Kbps Deviation (ppm)	Result
-		-30 -20 -10		0.0015 0.0014 0.0012	
3.8		0 +10 +20		0.0011 0.0009 0.0013	 PASS
-		+20 +30 +40		0.0007 0.0007	 TASS
4.2		+50 +25		0.0012 0.0011	
3.5		+25		0.0013	





WCDMA 1900MHz Band

Band:		WCDMA	Band II	Channel:	9400
Limit(ppm):		2.5		Frequency:	1880.0MHz
Power (VDC)	-	perature (℃)		IC 12.2Kbps Deviation (ppm)	Result
3.8		-30 -20 -10 0 +10		0.0004 0.0007 0.0012 0.0009 0.0009	
		+20 +30 +40 +50		0.0010 0.0013 0.0011 0.0007	PASS
4.2	-	+25		0.0014	
3.5	-	+25		0.0013	



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.

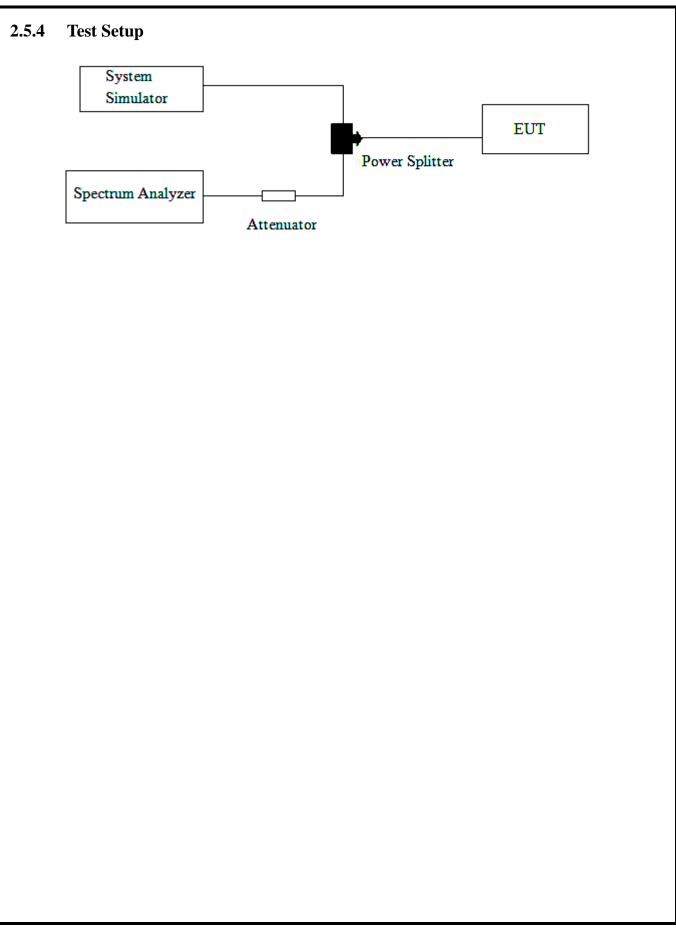
2.5.3 Test Procedures

- 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)

- $= [30 + 10\log(P)] (dBm) [43 + 10\log(P)] (dB)$
- = -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.

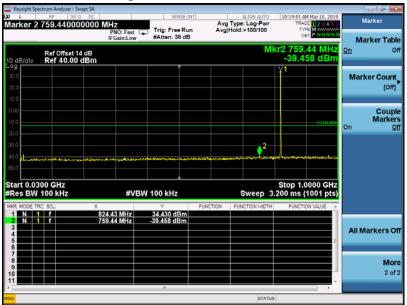






2.5.5 Test Result (Plots) of Conducted Spurious Emission

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



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



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



arker 2 9	RF 50 Q DC	PNO: Fast C	Trig: Free Run #Atten: 36 dB	ALIGN AUTO Avg Type: Log-Pwr Avg[Hold:>100/100	10:19:40 AM May 10, 2019 TRACE 2 3 4 5 6 TYPE M	Peak Search			
0 dB/div									
0.0 20.0 20.0					¥1	Next Pk Ri <u>c</u>			
0.0					-12.00 dDm	Next Pk L			
0.0 0.0 Januar 0.0		ly, ghal yang di alapa gahar ka m		www.www.competing.gov.competing.gov	2	Marker De			
tart 0.030 Res BW 1	00 kHz		W 100 kHz	Sweep 3	Stop 1.0000 GHz .200 ms (1001 pts)	Mkr→			
1 N 1 2 N 1 3 4 5 5	1	837.04 MHz 900.09 MHz	34.372 dBm -40.058 dBm		=	Mkr→Refi			
6 7 8 9 0						M (

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



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



Peak Search	E 1 2 3 4 5 6 E MWWWWWW T P NNNNN	TYP	e: Log-Pwr i:>100/100	Avg T Avg He		Trig: Free I #Atten: 36	PNO: Fast G	00000 N	386.510	ker 2 8	Mar
NextPe	51 MHz 78 dBm		Mł						Ref Offse Ref 40.0		10 di
Next Pk Rig		¥1									Log 30.0 20.0 10.0
Next Pk L	-12.00 dDm										
Marker De	2		ل مرد شرو ^{مع} اول احمی	d e oggetige gener	الإماريين	tan tak tangan			an Au-		
Mkr→	0000 GHz 1001 pts)	200 ms (Sweep 3.	NCTION	FU	100 kHz	#VBW	×	0 GHz 100 kHz		#Re
Mkr→Refl	=					34.334 dBr -39.478 dBr	.65 MHz .51 MHz		1	N 1 N 1	1
Mc 1.c											6 7 8 9

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

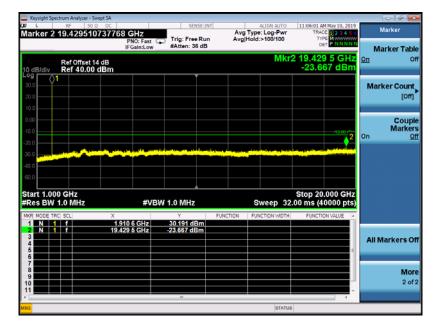


GSM 850MHz Channel = 251, 1GHz to 9GHz



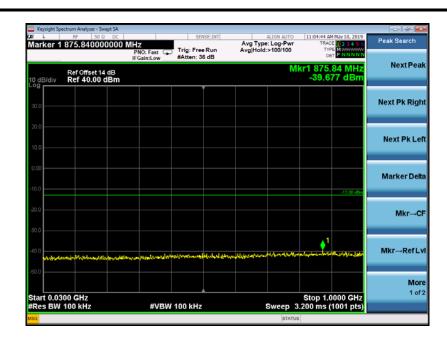
Marker	RF 50 Ω 1 740.040000	0000 MH	Z NO: Fast G Gain:Low			ALIGN AUTO : Log-Pwr :>100/100	TRAC	4 May 10, 2019 E 1 2 3 4 5 6 E M	Peak Search
10 dB/div	Ref Offset 14 Ref 40.00 c					M	kr1 740. -40.0	04 MHz 50 dBm	NextPea
30.0									Next Pk Rig
20.0									Next Pk Le
0.00									Marker De
-20.0								-13.00 dBm	Mkr→C
-30.0	a stare for the set of the set of	ي حداث المدين	مەربىلىرمەر ئ		الالجد لحقد الربيونا	 1	ورويانيونو	- sort second	Mkr→RefL
-50.0									Мо
	300 GHz / 100 kHz		#\/B\/	100 kHz	•	Sween 3	Stop 1.0	0000 GHz 1001 pts)	1 0

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

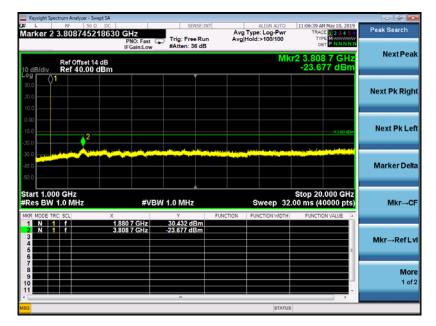


GSM 1900MHz Channel = 512, 1GHz to 20GHz



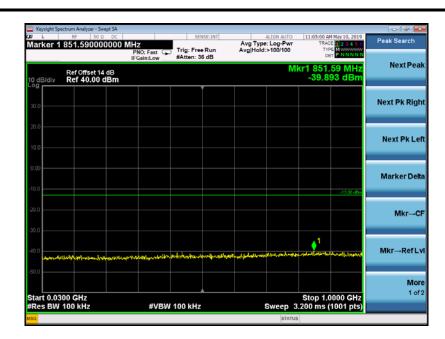


GSM 1900MHz Channel = 661, 30MHz to 1GHz

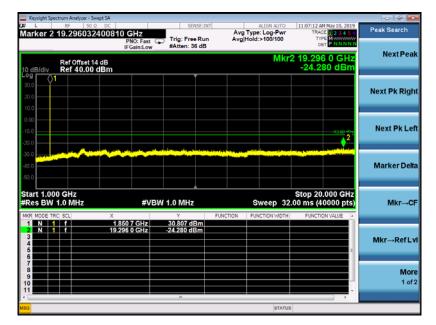


GSM 1900MHz Channel = 661, 1GHz to 20GHz





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



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



Marker	5.6	ACE 1 2 3 4 YPE M	т	ALIGN AUTO : Log-Pwr :>100/100	Avg Ty Avg Ho			PNO: Fast	50 Q DC	^{RF} 904.9	ker 2	x Mar
Marker Table On Off			k r2 9 04	MI		5 dB	#Atten: 3	IFGain:Low	et 14 dB .00 dBm		3/div	10 d8
Marker Cour [Of			¥1									Log 30.0 20.0 10.0
Cou Marke On	<u>20n</u>	-10.00 (0.00 -10.0
		2			ا و برا برد ا	- August Britter		1940 - 1940 - 1940 - 1940 - 1940 - 1940 - 1940 - 1940 - 1940 - 1940 - 1940 - 1940 - 1940 - 1940 - 1940 - 1940 -	6			-20.0 -30.0 -40.0
	Hz ts)	.0000 Gi (1001 pi	Stop 1. .200 ms	Sweep 3.			/ 100 kHz	#VBV		100 GH 100 ki		
	ń	TION VALUE	FUNCT	ICTION WIDTH	ICTION	3m	Y 34.299 dE -38.835 dE	4.43 MHz 4.94 MHz		RC SCL		1
All Markers												3 4 5 6
M												7 8 9

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



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



Marker 2	RF 50 Ω 940.83000	0000 MHz	Fast 🖵	SENSE: Trig: Free Ru #Atten: 36 dE	Avç in Avg	g Type: Log-Pwr Hold:>100/100	10:07:16 AM May 10, 2019 TRACE 2 3 4 5 6 TYPE DET P NNNN	Peak Search
10 dB/div							Next Pea	
20.0							¥1	Next Pk Rig
-10.0							-10.00 dDm	Next Pk Lo
-30.0	ور و بر و المحمد و ا			reard through Jac 1940	ny ny natra ang ng n	e	2 	Marker De
Start 0.03 #Res BW	100 kHz	X	#VBW 1	100 kHz	FUNCTION	Sweep 3	Stop 1.0000 GHz .200 ms (1001 pts)	Mkr⊸(
	1 1	837.04 940.83		34.298 dBm 38.808 dBm	PONCTION	PONCTION WOTH		Mkr→RefL
6 7 8 9 10								Mc 1 o

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



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



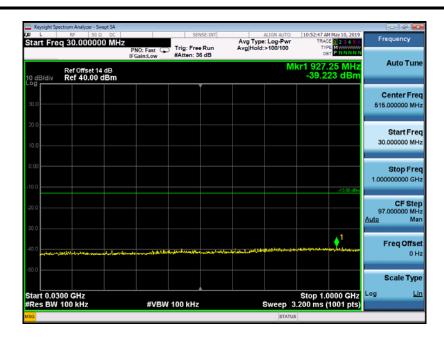
Peak Search	E 1 2 3 4 5 6 E NNNNN	TRAC	ALIGN AUTO e: Log-Pwr :>100/100	Avg T Avg[He		Trig: Fre #Atten: 3	PNO: Fast 😱 FGain:Low	Ω DC 00000 N	®71.960	ker 2	x Ma
NextPea	96 MHz 67 dBm		M						Ref Offse Ref 40.0	B/div	10 0
Next Pk Rig		Υ <u>1</u>									30.1 20.1
Next Pk Lo	-10.00 dDm										10.0 0.00 -10.0
Marker De		2 ²	and a start	ور معالی می اور و		سىرىيەري ا لىدى		ar have been been	dina kana kana kana kana kana kana kana k		-20.0 -30.0 -40.0
Mkr→G		200 ms (1	Sweep 3.			100 kHz	#VBW		00 GHz 100 kHz	rt 0.03 es BW	Sta #Re
Mkr→RefL	N VALUE	FUNCTIO	VCTION WIDTH	NCTION	Bm	Y 34.140 d -41.167 d	68 MHz 96 MHz		1	MODE TF	1
Mc 1 c											6 7 8 9

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

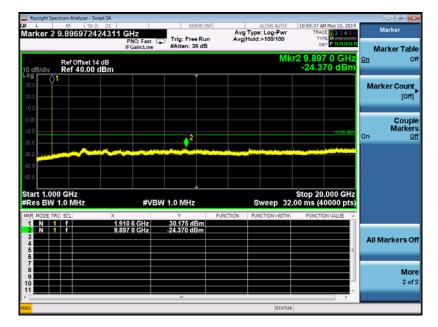


EDGE 850MHz Channel = 251, 1GHz to 9GHz



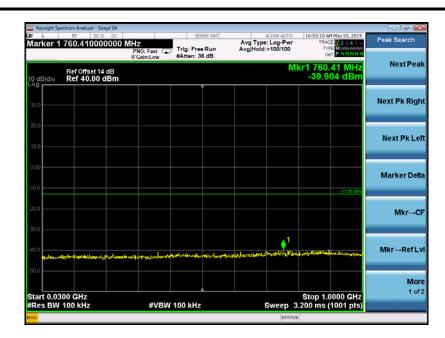


EDGE 1900MHz Channel = 512, 30MHz to 1GHz

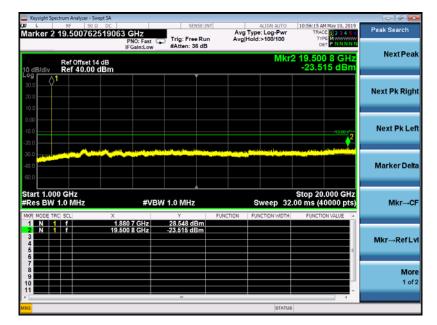


EDGE 1900MHz Channel = 512, 1GHz to 20GHz



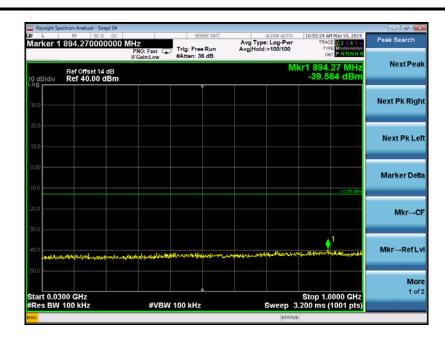


EDGE 1900MHz Channel = 661, 30MHz to 1GHz



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





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



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



Marker 2	RF 50 Q D0 885.54000000		Trig: Free Run #Atten: 36 dB	AUGN AUTO Avg Type: Log-Pwr Avg Hold:>100/100	02:18:09 PMMay 10, 2019 TRACE 1 2 3 4 5 6 TYPE M DET P NNNNN	Peak Search
10 dB/div	Ref Offset 14 dB Ref 40.00 dBn	n		M	kr2 885.54 MHz -39.201 dBm	Next Pe
30.0 20.0 10.0					≬ 1	Next Pk Rig
-10.0						Next Pk L
-30.0 -40.0 -50.0		****			<u>}</u>	Marker De
Start 0.03 #Res BW	100 kHz	#VB	W 100 kHz	Sweep 3	Stop 1.0000 GHz .200 ms (1001 pts)	Mkr⊸
1 N 1 2 N 1 3 4 5	1 1	827.34 MHz 885.54 MHz	19.077 dBm -39.201 dBm		FORCTION VALUE	Mkr→RefL
6 7 8 9 10						Мс 1 с

WCDMA850MHz Channel = 4132, 30MHz to 1GHz



WCDMA850MHz Channel = 4132, 1GHz to 9GHz



Marker 2	RF 50 Q DC 2 900.090000000	MHz PNO: Fast IFGain:Low	Trig: Free Run #Atten: 36 dB	Avg Type: Log-Pwr Avg Hold:>100/100		Peak Search
10 dB/div	Ref Offset 14 dB Ref 40.00 dBm			Ν	1kr2 900.09 MHz -39.691 dBm	Next Pe
20.0					* ¹	Next Pk Rig
10.0 0.00 -10.0 -20.0					-1000 dDm	Next Pk L
-30.0	• • • • • • • • • • • • • • • • • • •		, a secol set over reading a filler a sive	مار و المار و ا	2	Marker De
	100 kHz		W 100 kHz		Stop 1.0000 GHz 3.200 ms (1001 pts)	Mkr⊸
2 N 3 4 5	1 1	836.07 MHz 900.09 MHz	Y 19.966 dBm -39.691 dBm	FUNCTION FUNCTION WIDT	H FUNCTION VALUE	Mkr→Refl
6 7 8 9						Мс 1 с

WCDMA850MHz Channel = 4183, 30MHz to 1GHz



WCDMA850MHz Channel = 4183, 1GHz to 9GHz



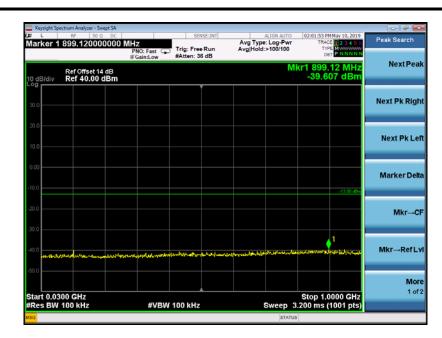
	PNO: Fast (AUGN AUTO Avg Type: Log-Pwr Avg Hold:>100/100	02:19:57 PMMay 10, 2019 TRACE 1 2 3 4 5 6 TYPE M	Peak Search
Ref Offset 14 dB Ref 40.00 dBm			М	kr2 944.71 MHz -39.768 dBm	NextPea
					Next Pk Rig
					Next Pk Lo
	1		ature and the later and the second	2	Marker De
800 GHz 100 kHz	#VB				Mkr⊸0
1		17.633 dBm -39.768 dBm	UNCTION FUNCTION WIDTH	FUNCTION VALUE	Mkr→RefL
					Mo 1 o
	Ref Offset 14 dB Ref 40.00 dBm 300 GHz 100 KHz 7 SCI X	Ref Offset 14 dB Ref Offset 14 dB Ref 40.00 dBm Job Ref 40.00 dBm <td>PF 19 0 PC C SENSE.INT 944.710000000 MHz FN0: Fast Fast Fast Fast Fast Fast Fast Fast</td> <td>Ref 30.0 DC Sense:Rrfl Align autos 944.710000000 MHz Trig: Free Run Avg Type: Log-Pwr Avg Type: Log-Pwr Avg Type: Log-Pwr PR0: Fast Trig: Free Run Avg Type: Log-Pwr Avg Type: Log-Pwr Avg Type: Log-Pwr Ref Offset 14 dB M M M M M Ref 0.00 dBm M M M M M M 000 GHz M M M M M M M 000 GHz #VBW 100 kHz Sweep 3 M M M M 010 kHz #VBW 100 kHz Y FUNCTION FUNCTION MOTH M</td> <td>Ref OO DC Sense:Init Aution autro D2:19:37 PMun; 0:010 944.710000000 MHz IFGainLow Trig: Free Run #Atten: 36 dB Avg Type: Log-Pvr Avg Hold:>100/100 Trig: 2:4:5:4:5:5:5:5:5:5:5:5:5:5:5:5:5:5:5:5:</td>	PF 19 0 PC C SENSE.INT 944.710000000 MHz FN0: Fast Fast Fast Fast Fast Fast Fast Fast	Ref 30.0 DC Sense:Rrfl Align autos 944.710000000 MHz Trig: Free Run Avg Type: Log-Pwr Avg Type: Log-Pwr Avg Type: Log-Pwr PR0: Fast Trig: Free Run Avg Type: Log-Pwr Avg Type: Log-Pwr Avg Type: Log-Pwr Ref Offset 14 dB M M M M M Ref 0.00 dBm M M M M M M 000 GHz M M M M M M M 000 GHz #VBW 100 kHz Sweep 3 M M M M 010 kHz #VBW 100 kHz Y FUNCTION FUNCTION MOTH M	Ref OO DC Sense:Init Aution autro D2:19:37 PMun; 0:010 944.710000000 MHz IFGainLow Trig: Free Run #Atten: 36 dB Avg Type: Log-Pvr Avg Hold:>100/100 Trig: 2:4:5:4:5:5:5:5:5:5:5:5:5:5:5:5:5:5:5:5:

WCDMA850MHz Channel = 4233, 30MHz to 1GHz

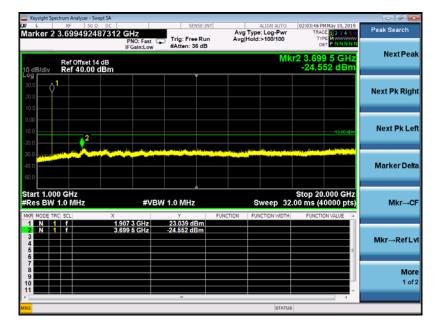


WCDMA850MHz Channel = 4233, 1GHz to 9GHz



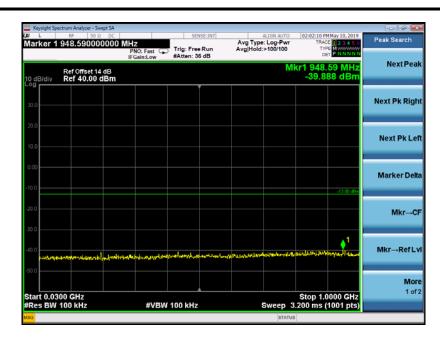


WCDMA1900MHz Channel = 9262, 30MHz to 1GHz

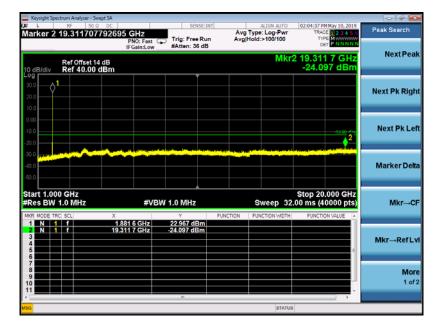


WCDMA1900MHz Channel = 9262, 1GHz to 20GHz



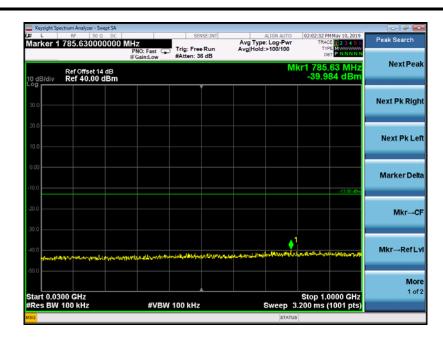


WCDMA1900MHz Channel = 9400, 30MHz to 1GHz

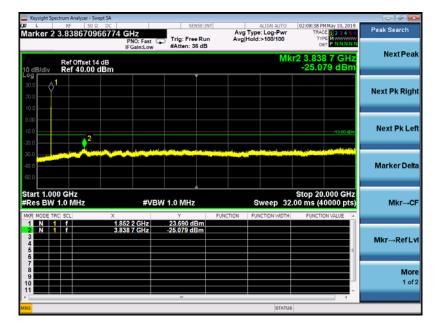


WCDMA1900MHz Channel = 9400, 1GHz to 20GHz





WCDMA1900MHz Channel = 9538, 30MHz to 1GHz



WCDMA1900MHz Channel = 9538 1GHz to 20GHz



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 $43 + 10 \log (P) dB$.

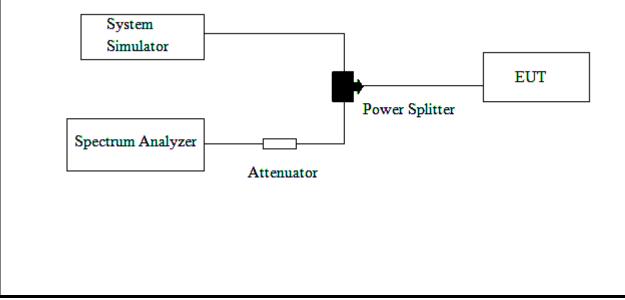
2.6.2 Measuring Instruments

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.

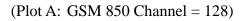
2.6.4 Test Setup





2.6.5 Test Result of Conducted Bandedge













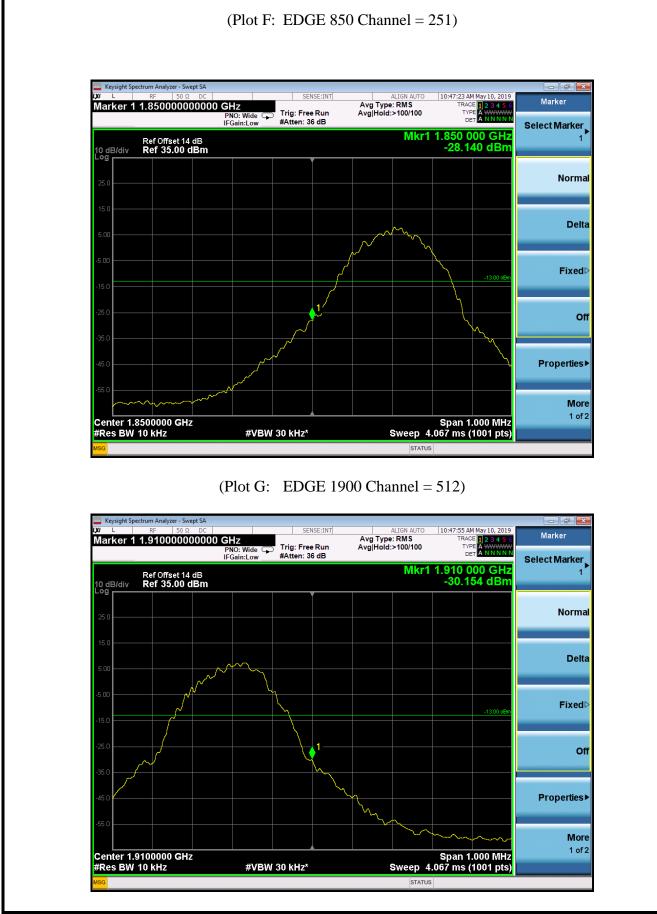






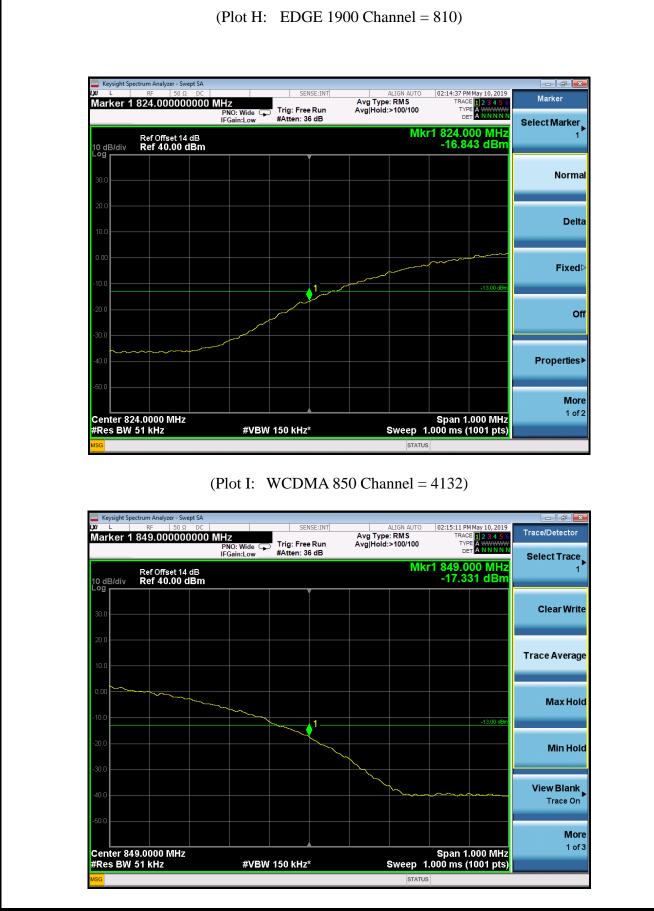




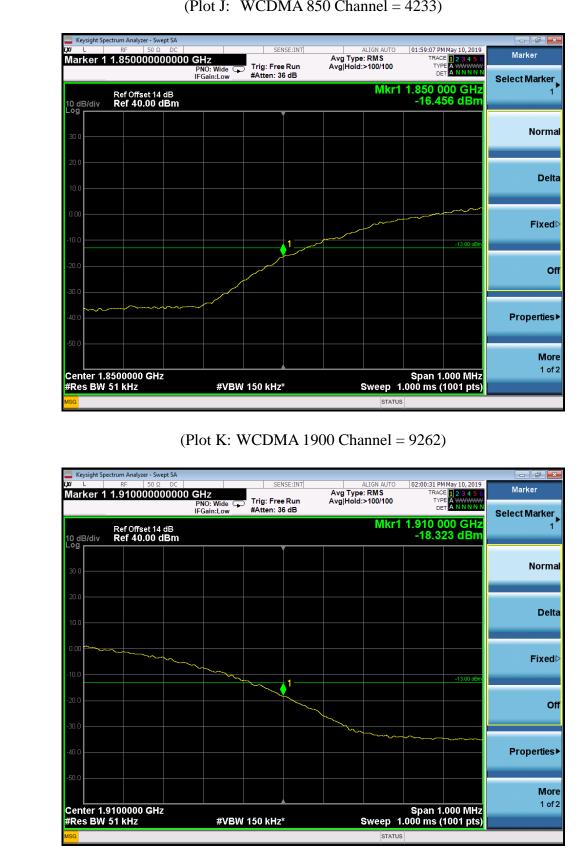


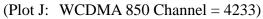


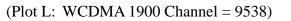














2.7 Transmitter Radiated Power (EIRP/ERP)

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.

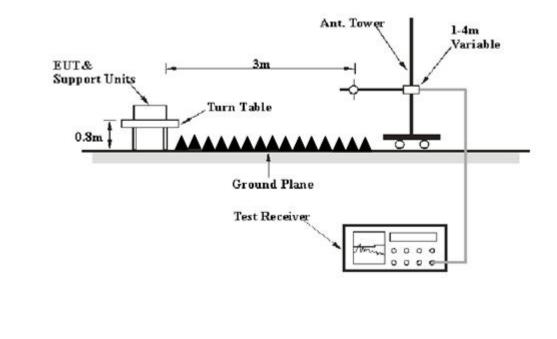
Et = Rt + AF Es = Rs + AF

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	100	824.20	E	Н	31.25		D. CC
		824.20	5	V	28.57	- 38.5	PASS	
GSM	100	836.60	5	Н	31.27		DACC	
850MHz	190	830.00		V	28.63		PASS	
	251	848.80	5	Н	31.24		PASS	
				V	28.95		PASS	

Band	Channel	Frequency (MHz)	PCL	Antenna Pol (H/V)	Measured EIRP dBm	Limit dBm	Verdict
	512	512 1850.2	0	Н	28.47		PASS
			0	V	25.39	- 33	газэ
GSM	<i>cc</i> 1	1 1000.0	0	Н	28.85		DACC
1900MHz	661	1880.0	0	V	25.24		PASS
	910	1000.8	0	Н	28.30		DACC
	810	1909.8	0	V	25.49	1	PASS



Band	Channel	Frequency (MHz)	PCL	Antenna Pol (H/V)	Measured ERP dBm	Limit dBm	Verdict				
	128	120	109	100	100 004.00	024.20	5	Н	25.57		PASS
		824.20	5	V	23.49	38.5	TASS				
EDGE	190	190 836.60	5	Н	25.55		PASS				
850MHz				V	23.19						
	251	848.80) 5	Н	25.37		PASS				
	251			V	23.87						

Band	Channel	Frequency (MHz)	PCL	Antenna Pol (H/V)	Measured EIRP dBm	Limit dBm	Verdict
	512	1850.2	0	Н	25.04		DACC
		1830.2	0	V	23.44	- 33	PASS
EDGE	((1	1 1000.0	0	Н	24.63		PASS
1900MHz	661	1880.0		V	23.20		FASS
	910	1000.8	0	Н	24.83		DASS
	810	1909.8		V	23.37		PASS

Band	Channel	Frequency (MHz)	Antenna Pol (H/V)	Measured ERP dBm	Limit dBm	Verdict	
	4132	4122	976 1	Н	21.78		PASS
		826.4	V	20.27		PASS	
WCDMA	4175	025	Н	21.89	20 5	DACC	
850MHz		835	V	20.37	38.5	PASS	
	4233	846.6	Н	21.35		D. CC	
			V	20.40		PASS	

Dand	Channel	Frequency	Antenna Pol	Measured EIRP	Limit	Vardiat
Band	Channel	(MHz)	(H/V)	dBm	dBm	Verdict
	9262	1952 4	Н	22.00		PASS
		1852.4	V	20.08		PASS
WCDMA	9400	1000	Н	22.03	22	DACC
1900MHz		1880	V	20.11	33	PASS
	9538	538 1907.6	Н	21.84		DLCC
			V	20.16		PASS



2.8 Radiated Spurious Emissions

2.8.1 Requirement

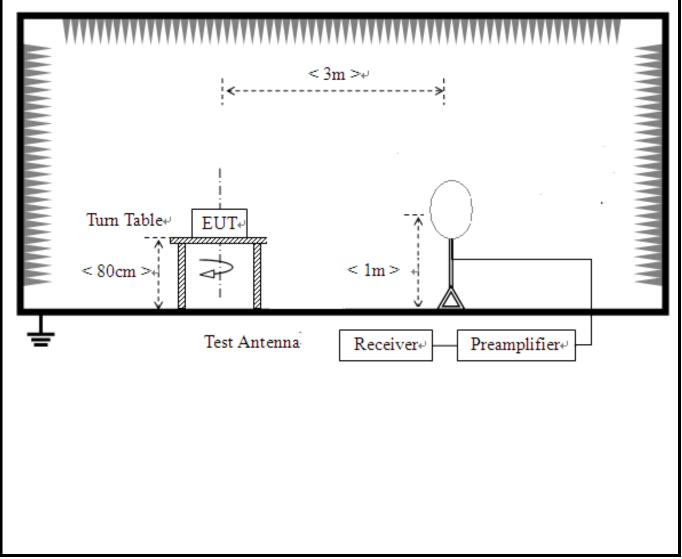
The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitter power (P) by a factor of at least $43 + 10 \log (P) dB$. The spectrum is scanned from 30 MHz up to a frequency including its 10th harmonic.

2.8.2 Measuring Instruments

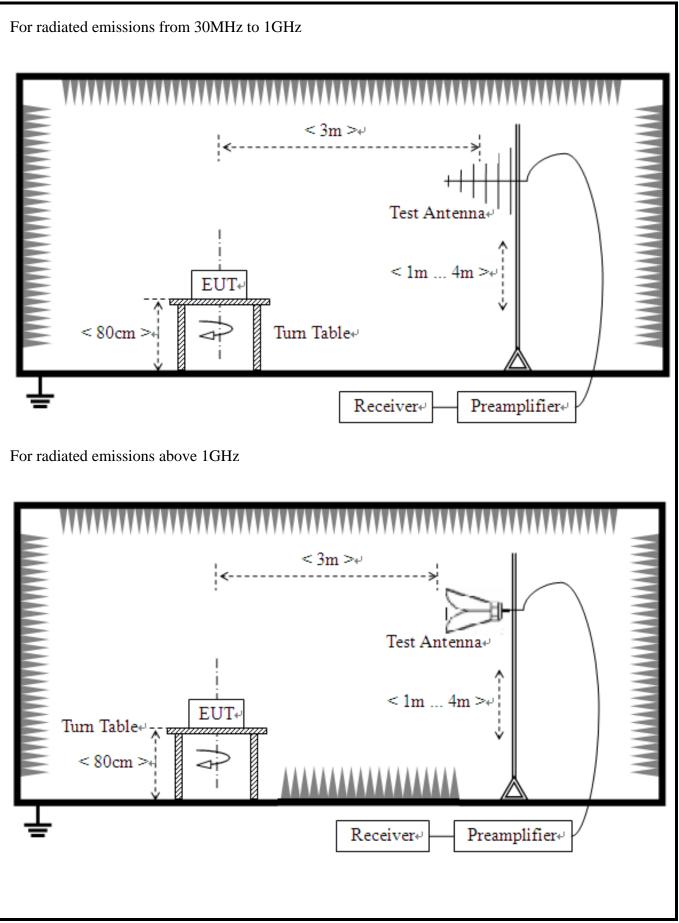
The measuring equipment is listed in the section 3 of this test report.

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 + 10log(P)] (dBm) [43 + 10log(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.
- 18. 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

Note: 1. (Absolute)Level=Reading Level + Factor

Worst-Case test data provide as below:

GSM850 Middle Channel

Susp	ected List						
	Freq.	Reading	Level	Limit	Margin	Factor	Delerity
NO.	[MHz]	[dBm]	[dBm]	[dBm]	[dB]	[dB]	Polarity
1	36.7923	-92.68	-67.74	-13.00	54.74	24.94	Horizontal
2	40.0267	-92.05	-67.89	-13.00	54.89	24.16	Horizontal
3	328.212	-97.78	-68.91	-13.00	55.91	28.87	Horizontal
4	1776.38	-53.33	-52.14	-13.00	39.14	1.19	Horizontal
5	2880.94	-57.89	-50.31	-13.00	37.31	7.58	Horizontal
6	5106.05	-59.33	-47.17	-13.00	34.17	12.16	Horizontal
Susp	ected List						
NO.	Freq.	Reading	Level	Limit	Margin	Factor	Delerity
NO.	[MHz]	[dBm]	[dBm]	[dBm]	[dB]	[dB]	Polarity
1	35.1751	-94.22	-70.82	-13.00	57.82	23.40	Vertical
2	101.157	-99.59	-73.04	-13.00	60.04	26.55	Vertical
3	329.829	-97.84	-70.76	-13.00	57.76	27.08	Vertical
4	1712.35	-49.28	-50.26	-13.00	37.26	-0.98	Vertical
5	2508.75	-51.02	-47.67	-13.00	34.67	3.35	Vertical
6	5042.02	-59.33	-45.38	-13.00	32.38	13.95	Vertical



Worst-Case test data provide as below:

GSM1900 Middle Channel

30MHz~20GHz:

Suspected List							
NO.	Freq.	Reading	Level	Limit	Margin	Factor	Polarity
	[MHz]	[dBm]	[dBm]	[dBm]	[dB]	[dB]	
1	36.7923	-93.08	-71.43	-13.00	58.43	21.65	Horizontal
2	173.607	-99.45	-78.62	-13.00	65.62	20.83	Horizontal
3	330.153	-99.24	-73.40	-13.00	60.40	25.84	Horizontal
4	2995.33	-56.92	-48.50	-13.00	35.50	8.42	Horizontal
5	3905.30	-58.34	-48.68	-13.00	35.68	9.66	Horizontal
6	10337.4	-60.54	-36.40	-13.00	23.40	24.14	Horizontal
Sus	pected List	:					
	Freq.	Reading	Level	Limit	Margin	Factor	Delevitu
NO.	[MHz]	[dBm]	[dBm]	[dBm]	[dB]	[dB]	Polarity
1	36.7923	-93.68	-73.79	-13.00	60.79	19.89	Vertical
2	117.329	-100.14	-78.36	-13.00	65.36	21.78	Vertical
3	328.212	-99.97	-76.08	-13.00	63.08	23.89	Vertical
4	3920.30	-57.55	-47.56	-13.00	34.56	9.99	Vertical
5	5140.71	-58.99	-45.68	-13.00	32.68	13.31	Vertical
6	10367.4	-61.24	-36.93	-13.00	23.93	24.31	Vertical





Worst-Case test data provide as below:

WCDMA 850 Middle Channel

30MHz~10GHz:

Suspected List								
NO.	Freq.	Reading	Level	Limit	Margin	Factor	Polarity	
	[MHz]	[dBm]	[dBm]	[dBm]	[dB]	[dB]		
1	36.7968	-91.85	-66.91	-13.00	53.91	24.94	Horizontal	
2	326.146	-100.75	-72.03	-13.00	59.03	28.72	Horizontal	
3	2016.50	-57.09	-55.54	-13.00	42.54	1.55	Horizontal	
4	3228.11	-57.85	-49.14	-13.00	36.14	8.71	Horizontal	
5	6000.00	-92.78	-45.27	-13.00	32.27	47.51	Horizontal	
6	9955.97	-60.47	-37.50	-13.00	24.50	22.97	Horizontal	
Sus	Suspected List							
	Freq.	Reading	Level	Limit	Margin	Factor	Delerity	
NO.	[MHz]	[dBm]	[dBm]	[dBm]	[dB]	[dB]	Polarity	
1	36.7968	-94.37	-71.19	-13.00	58.19	23.18	Vertical	
2	100.880	-100.79	-74.22	-13.00	61.22	26.57	Vertical	
3	330.030	-100.92	-73.83	-13.00	60.83	27.09	Vertical	
4	3186.09	-58.25	-49.05	-13.00	36.05	9.20	Vertical	
5	5096.54	-59.00	-44.75	-13.00	31.75	14.25	Vertical	
6	10580.2	-59.68	-36.04	-13.00	23.04	23.64	Vertical	



Worst-Case test data provide as below:

WCDMA 1900 Middle Channel

30MHz~20GHz:

Suspected List									
NO.	Freq.	Reading	Level	Limit	Margin	Factor	Polarity		
	[MHz]	[dBm]	[dBm]	[dBm]	[dB]	[dB]			
1	36.7968	-93.83	-72.18	-13.00	59.18	21.65	Horizontal		
2	175.645	-99.66	-78.74	-13.00	65.74	20.92	Horizontal		
3	328.088	-99.34	-73.63	-13.00	60.63	25.71	Horizontal		
4	3190.59	-58.54	-49.42	-13.00	36.42	9.12	Horizontal		
5	6342.17	-61.22	-43.22	-13.00	30.22	18.00	Horizontal		
6	10574.2	-61.26	-37.38	-13.00	24.38	23.88	Horizontal		
Sus	Suspected List								
	Freq.	Reading	Level	Limit	Margin	Factor	Delerity		
NO.	[MHz]	[dBm]	[dBm]	[dBm]	[dB]	[dB]	Polarity		
1	36.7968	-91.74	-71.85	-13.00	58.85	19.89	Vertical		
2	328.088	-100.37	-76.48	-13.00	63.48	23.89	Vertical		
3	1201.10	-59.74	-61.61	-13.00	48.61	-1.87	Vertical		
4	3231.11	-58.03	-49.20	-13.00	36.20	8.83	Vertical		
5	5105.55	-58.19	-44.04	-13.00	31.04	14.15	Vertical		
6	10682.3	-60.71	-36.97	-13.00	23.97	23.74	Vertical		



3. LIST OF MEASURING EQUIPMENT

Description	Manufactur er	Model	Serial No.	Cal. Date	Due Date	Remark
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
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	2020.10.8	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
Temperature chamber	espec	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

** END OF REPORT **