

RF TEST REPORT				
Report No.:	SET2020-05874			
Product Name:	USB Modem			
FCC ID:	SRQ- MF863			
Model No. :	4002ZT, MF863			
Marketing Name:	Softbank			
Applicant:	ZTE Corporation.			
Address:	ZTE Plaza, Keji Road South, Shenzhen, China.			
Dates of Testing:	05/20/2020 —06/08/2020			
Issued by:	CCIC Southern Testing Co., Ltd.			
Lab Location:	Electronic Testing Building, No. 43 Shahe Road, Xili Street, Nanshan District, Shenzhen, Guangdong, China.			
	Tel: 86 755 26627338 Fax: 86 755 26627238			

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Test Report

Product	USB Modem
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 2/22/24/27
Test Result:	PASS
Tested by	Vincent 2020.06.08
	Vincent, Test Engineer
Reviewed by:	Chris Jon 2020.06.08
	Chris You, Senior Engineer
Approved by:	Shuangwan Zhang 2020.06.08 Shuangwen Zhang, Manager



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	(Change History		
Issue Date Reason for change				
1.0	2020.06.08	First edition		



1. GENERAL INFORMATION

1.1 EUT Description

EUT Type	USB Modem
EUT supports Radios application	GPRS/EDGE/WCDMA/HSPA
Multi Slot Class	GPRS: Multi slot Class12, EGPRS: Multi slot Class12
	GPRS 850MHz:
	Tx: 824.2 - 848.8MHz (at intervals of 200kHz);
	Rx: 869.2 - 893.8MHz (at intervals of 200kHz)
	GPRS 1900MHz:
	Tx: 1850.2 - 1909.8MHz (at intervals of 200kHz);
	Rx: 1930.2 - 1989.8MHz (at intervals of 200kHz)
	WCDMA 850MHz
Test Band	Tx: 826.4 - 846.6MHz (at intervals of 200kHz);
Frequency Range	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)
	WCDMA 1700MHz
	Tx: 1712.4 - 1752.6MHz (at intervals of 200kHz);
	Rx: 2112.4 - 2152.6MHz (at intervals of 200kHz)
	GPRS 850: 32.90dBm
	GPRS 1900: 30.10dBm
Maximum Output Bower to	EDGE 850: 27.30dBm
Maximum Output Power to Antenna	EDGE 1900: 26.70dBm
Antenna	WCDMA 850: 22.76dBm
	WCDMA 1900: 23.25dBm
	WCDMA 1700: 23.58dBm
	GPRS / GPRS:GMSK
	EDGE:GMSK / 8PSK
Type of Modulation	WCDMA: QPSK(Uplink)
	HSDPA:QPSK(Uplink)
	HSUPA:QPSK(Uplink)
Antenna Type	Internal Antenna



1.2	2 Maximum Designator	ERP/EIRP	Power, Freq	luency Tolerance	e, and Emissio	0 n
	System	Type of Modulation	Emission Designator	Frequency Tolerance (ppm)	Maximum ERP/EIRP(W)	
	GPRS 850	GMSK	244KGXW	0.0090	1.811	
	GPRS 1900	GMSK	245KGXW	0.0121	0.971	
	EDGE 850	8PSK	240KG7W	0.0060	0.493	
	EDGE 1900	8PSK	247KG7W	0.0062	0.491	
	WCDMA 850 RMC 12.2Kbps	QPSK	4M14F9W	0.0095	0.188	
	WCDMA 1900 RMC 12.2Kbps	QPSK	4M13F9W	0.0089	0.184	
	WCDMA 1700 RMC 12.2Kbps	QPSK	4M13F9W	0.0078	0.173	





1.3 Test Standards and Results

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

2. ANSI C63.26:2015

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	Description	Limit	Result
110.	FCC	Description	Liiiit	Kesuit
1	2.1046	Conducted Output Power	Reporting Only	PASS
2	24.232(d)	Peak to Average Radio	<13dBm	PASS
2	27.50(d)	Teak to Average Radio		IASS
	2.1049			
3	22.917(b)	Occupied Bandwidth	Reporting Only	PASS
5	24.238(b)	Occupied Baildwidth	Reporting Only	TASS
	27.53(g)			
	2.1055			
4	22.355	Eraguanay Stability	<+2 5mm	PASS
4	24.235	Frequency Stability $\leq \pm 2.5$ ppm		IASS
	27.54			
	2.1051			
5	22.917	Conducted Out of Band	< 43+10log10 (P[Watts])	PASS
3	24.238	Emissions		
	27.53			
	2.1051			
6	22.917	Pand Edga	< 43+10log10	PASS
0	24.238	Band Edge	(P[Watts])	PASS
	27.53			
	22.913	Effective Radiated Power	<7Watts	PASS
7	24.232	Equivalent Isotropic Radiated Power	<2Watts	PASS
	27.50(d)	Effective Radiated Power	<1Watts	PASS





27.53	8	2.1053 22.917 24.238	Radiated Spurious Emissions	< 43+10log10 (P[Watts])	PASS
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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 GPRS850 and WCDMA Band V.
- 2. 30 MHz to 20000 MHz for GPRS1900 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		
GPRS 850	GPRS Link	GPRS Link		
GPRS 850	GPRS Link	GPRS Link		
GPRS 1900	GPRS Link	GPRS Link		
GPK5 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: GPRS 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,

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-SET. 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, 2020.

ISED Registration: 11185A

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. 31, 2020

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	32.9	PASS
GPRS 850MUz	190	836.6	31.8	PASS
850MHz	251	848.8	32.5	PASS
CDDS	512	1850.2	29.9	PASS
GPRS	661	1880.0	30.1	PASS
1900MHz	810	1909.8	30.1	PASS
EDGE	128	824.2	27.1	PASS
850MHz	190	836.6	27.1	PASS
83010112	251	848.8	27.3	PASS
EDGE	512	1850.2	26.7	PASS
EDGE 1900MHz	661	1880.0	26.1	PASS
THUMINZ	810	1909.8	26.3	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:

UM	UMTS1900		Average Power (dBm)		
(E	(Band II)		9400CH	9538cH	
WCDMA	12.2kbps RMC	23.24	23.25	22.79	
	Subtest 1	23.16	22.57	22.11	
	Subtest 2	22.75	22.16	21.70	
HSDPA	Subtest 3	22.36	21.77	21.31	
	Subtest 4	22.15	21.56	21.10	
	Subtest 1	23.06	23.07	22.34	
	Subtest 2	22.61	22.62	21.89	
HSUPA	Subtest 3	22.22	22.23	21.50	
	Subtest 4	21.94	21.95	21.22	
	Subtest 5	21.75	21.76	21.03	
UM	TS1700	Av	erage Power (d	Bm)	
(B	and IV)	1313CH	1413CH	1513CH	
WCDMA	12.2kbps RMC	23.38	22.63	23.58	
	Subtest 1	22.70	21.95	22.90	
	Subtest 2	22.29	21.54	22.49	
HSDPA	Subtest 3	21.90	21.15	22.10	
	Subtest 4	21.69	20.94	21.89	
	Subtest 1	23.26	22.52	23.50	
	Subtest 2	22.46	22.40	23.43	
HSUPA	Subtest 3	22.07	22.01	23.04	
	Subtest 4	21.79	21.73	22.76	
	Subtest 5	21.60	21.54	22.57	
UN	/TS850	Average Power (dBm)		Bm)	
(В	and V)	4132CH	4183CH	4233CH	
WCDMA	12.2kbps RMC	22.76	22.46	22.27	
	Subtest 1	22.68	21.78	21.59	
	Subtest 2	22.27	21.37	21.18	
HSDPA	Subtest 3	21.88	20.98	20.79	
	Subtest 4	21.67	20.77	20.58	
	Subtest 1	22.58	22.28	21.82	
	Subtest 2	22.13	21.83	21.37	
HSUPA	Subtest 3	21.74	21.44	20.98	
	Subtest 4	21.46	21.16	20.70	
	Subtest 5	21.27	20.97	20.51	



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 GPRS/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:

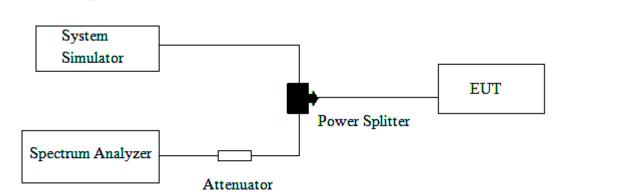
a. Set the CCDF (Complementary Cumulative Distribution Function) option on the spectrum analyzer.

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	Channal	Frequency	Peak to Average radio	Limit	Mandiat
Band	Band Channel		dB	dB	Verdict
CDDS	512	1850.2	0.3		PASS
GPRS 1900MHz	661	1880.0	0.4	13	PASS
1900101112	810	1909.8	0.2		PASS
EDCE	512	1850.2	2.8		PASS
EDGE 1900MHz	661	1880.0	3.5	13	PASS
190010112	810	1909.8	3.1		PASS
WCDMA	9262	1852.4	2.94		PASS
1900MHz	9400	1880.0	3.13	13	PASS
1900101112	9538	1907.6	3.03		PASS
WCDMA	1312	1712.4	2.73		PASS
WCDMA 1700MHz	1412	1732.4	3.15	13	PASS
1700101112	1513	1752.6	2.75		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.

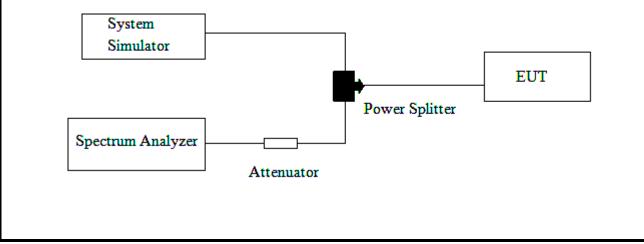
3. The RF output of the EUT was connected to the spectrum analyzer by RF cable and attenuator.

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





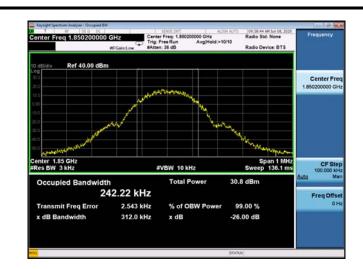
Band	Channel	Frequency (MHz)	26dB bandwidth (KHz)	99% Occupied Bandwidth (KHz)	Refer to Plot
	128	824.2	313.2	243.65	Plot A1
GPRS 850MHz	190	836.6	311.5	238.47	Plot A2
	251	848.8	312.3	241.81	Plot A3
	512	1850.2	312	242.22	Plot B1
GPRS 1900MHz	661	1880.0	312.5	244.66	Plot B2
	810	1909.8	313	242.51	Plot B3
	128	824.2	301.6	240.38	Plot C1
EDGE 850MHz	190	836.6	294.2	238.91	Plot C2
	251	848.8	295.3	236.86	Plot C3
	512	1850.2	308.1	247	Plot D1
EDGE 1900MHz	661	1880.0	309.6	243.76	Plot D2
	810	1909.8	309.5	244.69	Plot D3
	4132	826.4	4750	4142.6	Plot E1
WCDMA 850MHz	4183	836.6	4735	4126	Plot E2
	4233	846.6	4724	4141.1	Plot E3
	9262	1852.4	4707	4118	Plot F1
WCDMA 1900MHz	9400	1880	4701	4125.2	Plot F2
	9538	1907.6	4706	4123.5	Plot F3
	1312	1712.4	4742	4128.5	Plot G1
WCDMA 1700MHz	1412	1732.4	4674	4122.9	Plot G2
	1513	1752.6	4720	4131.2	Plot G3

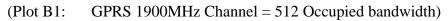
d D 4 764B B 14 £ 000/. A . . idtk

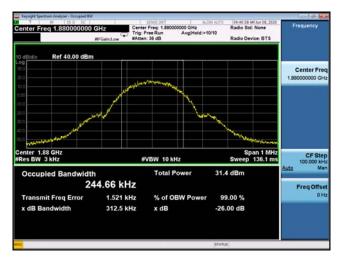


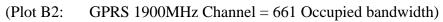
Test Results (Plots) of 99% Occupied Bandwidth and 26dB Bandwidth 2.3.6 Ref Offset 10.5 dB Ref 40.00 dBm Center Fre 824.200000 MI er 824.2 MH BW 3 kHz Span 1 MH ep 136.1 m CF St #VBW 10 kH SI 33.9 dB 243.65 kHz 1.628 kHz nit Freg Erro % of OBW Por 99.00 % 313.2 kHz x dB -26.00 dB GPRS 850MHz Channel = 128 Occupied bandwidth) (Plot A1: 836.60 Radio Device: BTS Ref Offset 10.5 dB Ref 40.00 dBm Center Fr Span 1 Mi p 136.1 n CF St #VBW 10 kHz 33.9 dB 238.47 kHz 700 Hz 99.00 % % of O 311.5 kHz dB (Plot A2: GPRS 850MHz Channel = 190 Occupied bandwidth) Ref Offset 10.5 dB Ref 40.00 dBm Center Fr 848.8 M Span 1 Mi CFS 34.4 dBn 241.81 kHz 1.828 kHz % of OBW Po 312.3 kHz x dB 26.00 dB (Plot A3: GPRS 850MHz Channel = 251 Occupied bandwidth)

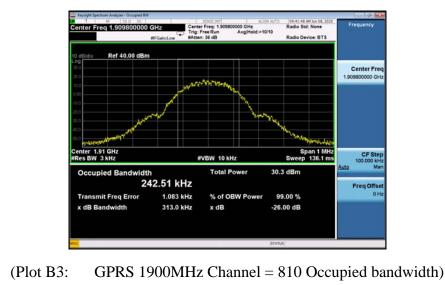




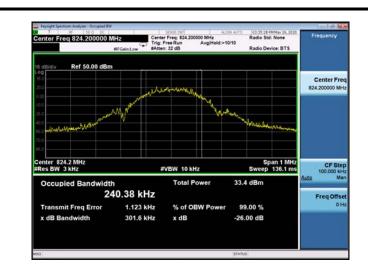


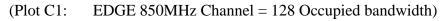




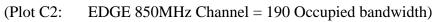








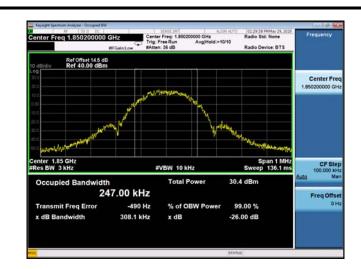


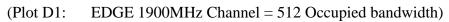


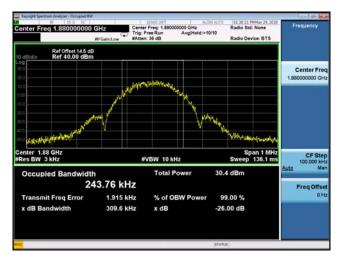


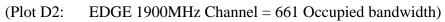
(Plot C3: EDGE 850MHz Channel = 251 Occupied bandwidth)

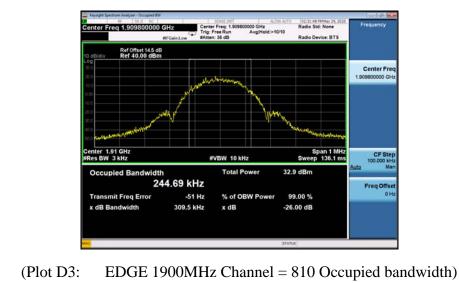






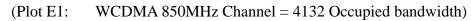






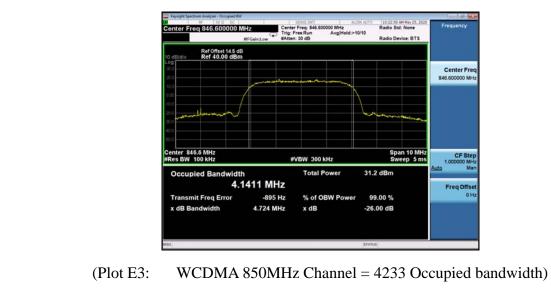


	NF 50 9 DC 9 826.400000 N	Cent Trig	sense INT er Freq: 826.400000 MHz Free Run Avg Hold: in: 30 dB	ALIGN AUTO [19:21:44 AM M Radio Std: Ni >10/10 Radio Device	Frequency
10 dB/div	Ref Offset 14.5 dB Ref 40.00 dBm	3 I			
20.0					Center Fre 825.400000 MH
10.0		1			1.1
10.0					
30.0					~~~~
42.0					
Center 826.	A MH2			Snan '	IO MHZ
#Res BW 10			#VBW 300 kHz	Sweet	5 ms 1,000000 MH
Occupie	ed Bandwidt		Total Power	31.2 dBm	Auto Ma
	4.	1426 MHz			Freq Offse
	Freq Error	-2.756 kHz	% of OBW Powe		01
x dB Ban	idwidth	4.750 MHz	x dB	-26.00 dB	



Keysigit Spectrum Analyse - Occupied In Mr 50 0 DC Center Freq 836.600000	MHz Center Trig: J	SEASE INT 44 r Freq: 836.600000 MHz Free Run Avg Hold:> h: 30 dB	101 40/10 10:22:11 AM May 25, 26 Radio Std: None 10/10 Radio Device: BTS	20 Frequency
Ref Offset 14.5 d 10 dB/div Ref 40.00 dBr	B			
20.0		hand and a second second		Center Freq 836.600000 MHz
0.00	1		\	
10.0 20.0 30.0			hanna	
40.0				
Center 836.6 MHz #Res BW 100 kHz	#	VBW 300 kHz	Span 10 MH Sweep 5 m	5 1,000000 MH
Occupied Bandwid 4.	հ 1260 MHz	Total Power	30.7 dBm	Auto Man Freg Offsel
Transmit Freq Error x dB Bandwidth	-2.899 kHz 4.735 MHz	% of OBW Power x dB	99.00 % -26.00 dB	0 Hz
150			STATUS	

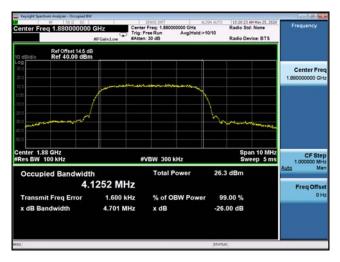
(Plot E2: WCDMA 850MHz Channel = 4183 Occupied bandwidth)



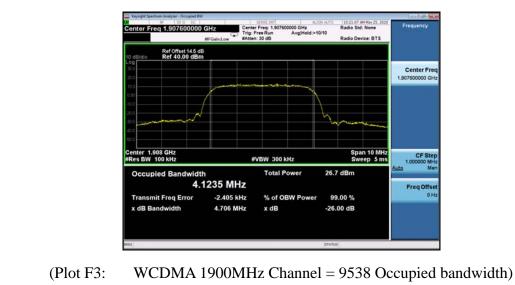


Center Freq 1.8524000	Trig:	stree INT 41 r Freq: 1.852400000 GHz Free Run Avg[Hold:>1 n: 30 dB	0/10 10:18:39 AM Nay 25, 26 Radio Std: None Radio Device: BTS	Frequency
10 dB/div Ref 0ffset 14.				
20.0				Center Free 1.852400000 GH
10.0			1	
300 Balannes Marson	A		Windimetalance	
40.0 				
Center 1.852 GHz #Res BW 100 kHz		VBW 300 kHz	Span 10 MH Sweep 5 m	5 1,000000 MH
Occupied Bandw	dth 4.1180 MHz	Total Power	30.3 dBm	Auto Ma
Transmit Freq Error x dB Bandwidth	3.216 kHz 4.707 MHz	% of OBW Power x dB	99.00 % -26.00 dB	он
wso JFile <screen 0009.png<="" td=""><td></td><td></td><td>STATUS</td><td></td></screen>			STATUS	





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





<figure><figure><figure><figure></figure></figure></figure></figure>		
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<figure></figure>		
Occupied Bandwidth Total Power 28.8 dBm Transmit Freq Error 5.87 kHz % of OBW Power 99.00 % % x dB Bandwidth 4.674 MHz x dB -26.00 dB 0 Hz w w w w w w w (Plot G2: WCDMA 1700 MHz Channel = 1412 bandwidth) Constraint Constraint <thconstraint< th=""> Constraint</thconstraint<>		
Expert Section Center Freq Expert Section Center Freq Center Freq <th <="" colspan="2" td=""></th>		
Center Freq 1.752600000 GHz #IG: Freq 1.752600000 GHz #IG: Freq 1.752600000 GHz #IG: Freq 1.75260000 GHz #IG: Freq 1.75260000 GHz #IG: Freq 1.75260000 GHz Center Freq 1.75260000 GHz Center Freq 1.75260000 GHz Center Freq 1.75260000 GHz Center Freq 1.75260000 GHz #VBW 300 kHz Span 10 MHz Freq Offset 4.1312 MHz Transmit Freq Error -10.536 kHz % of OBW Power 99.00 % x dB Bandwidth 4.720 MHz x dB -26.00 dB Tentos		
11/52800000 GHz 11/5280000 GHz 11/528000 GHz <t< td=""></t<>		
Occupied Bandwidth Total Power 26.9 dBm 4.1312 MHz Freq Offset Transmit Freq Error -10.536 kHz % of OBW Power 99.00 % x dB Bandwidth 4.720 MHz x dB -26.00 dB		
(Plot G3: WCDMA 1700 MHz Channel = 1513 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

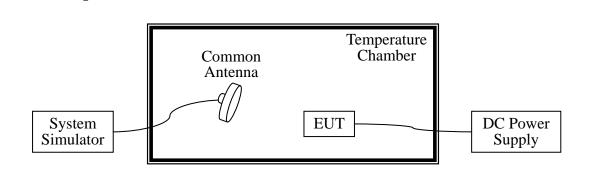
- 1. The testing follows FCC KDB 971168 D01 v03r01 Section 9.0.
- 2. The EUT was set up in the thermal chamber and connected with the system simulator.
- 3. With power OFF, the temperature was decreased to -30°C and the EUT was stabilized before testing. Power was applied and the maximum change in frequency 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

GPRS 850MHz Band

Band: C		GPRS 850		Channel:	190		
Limit(ppm):		2.5		Frequency:	836.6MHz		
Power	Tomporate	1400	GPRS	EDGE			
	Temperatu	ire	Deviation	Deviation	Result		
(VDC)	(°C)		(ppm)	(ppm)			
	-30		0.0012	0.0018			
	-20		0.0023	0.0024			
	-10		0.0018	0.0033			
	0		0.0090	0.0025			
5.0	+10		0.0025	0.0012			
	+20		0.0030	0.0035	PASS		
	+30		0.0028	0.0029			
	+40		0.0025	0.0024			
	+50		0.0015	0.0017			
5.5	+25		0.0032	0.0009			
4.5	+25		0.0008	0.0060			



GPRS 1900M	IHz Band				
Band:		GPRS 1900		Channel:	661
Limit(ppm):		2.5		Frequency:	1880.0MHz
Derror	Tama anota		GPRS	EDGE	
Power (VDC)	(°C)	ire	Deviation	Deviation	Result
(VDC)	(°C)		(ppm)	(ppm)	
	-30		0.0035	0.0037	
	-20		0.0027	0.0028	
	-10		0.0018	0.0031	
	0		0.0027	0.0029	
5.0	+10		0.0030	0.0027	
	+20		0.0018	0.0045	PASS
	+30		0.0057	0.0044	
	+40		0.0121	0.0054	
	+50		0.0033	0.0055	
5.5	+25		0.0074	0.0062	
4.5	4.5 +25		0.0028	0.0028	

WCDMA 850MHz Band

Band:	WCDMA Ba	nd V Channel:	4183
Limit(ppm)	2.5	Frequency:	836.6MHz
Power (VDC)	Temperature (℃)	RMC 12.2Kbps Deviation (ppm)	Result
	-30 -20 -10	0.0055 0.0058 0.0068	
5.0	0 +10	0.0078 0.0095	
	+20 +30 +40	0.0072 0.0061 0.0073	PASS
5.5	+40 +50 +25	0.0073	
4.5	+25	0.0061	



Band:		WCDMA	Rand II	Channel:	9400
Limit(ppm):		2.5		Frequency:	1880.0MHz
_	_		R	MC 12.2Kbps	
Power (VDC)	-	perature	Deviation (ppm)		Result
		-30		0.0070	
		-20		0.0050	
		-10		0.0021	
		0		0.0089	
5.0	-	+10		0.0075	
	-	+20		0.0045	PASS
	-	+30		0.0049	
	-	+40		0.0023	
	-	+50	0.0028		
5.5	-	+25	0.0035		
4.5	-	+25		0.0046	

WCDMA 1700MHz Band

Band:	Band: WCDMA		and IV	Channel:	1412	
Limit(ppm):	Limit(ppm): 2.5		Frequency:		1732.4MHz	
Power (VDC)	Temper (℃		RMC 12.2Kbps Deviation (ppm)		Result	
	-30 -20			0.0070 0.0076		
5.0	-10 0 +10		0.0078 0.0021 0.0040			
5.0	+1 +2 +3	0		0.0059 0.0053	PASS	
	+40 +50		0.0033		-	
5.5			0.0036		-	
4.5	4.5 +25		0.0049			



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.

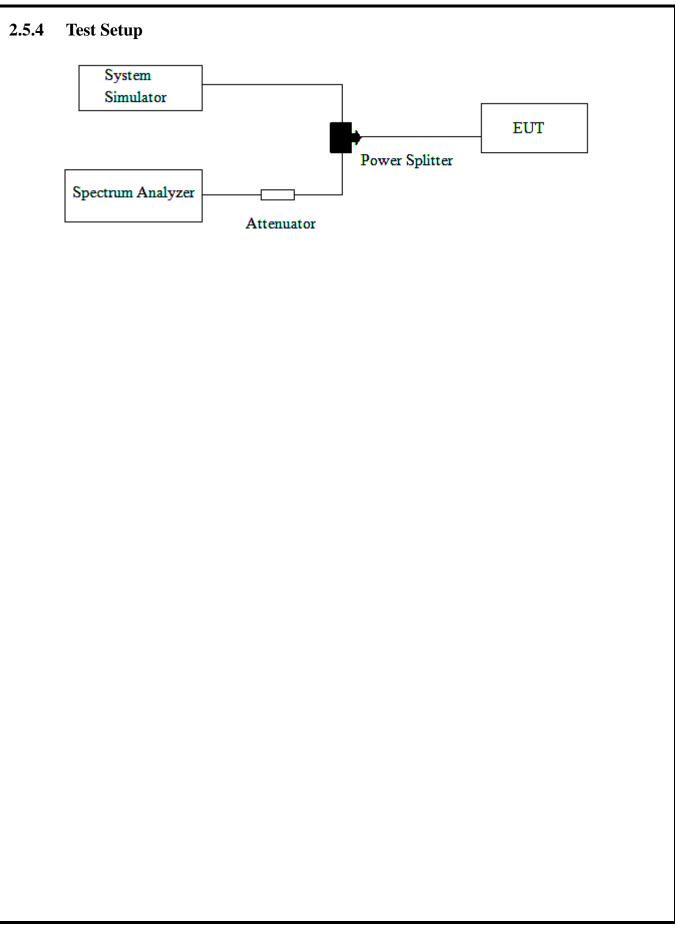
2.5.3 Test Procedures

- 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.
- 8. 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.

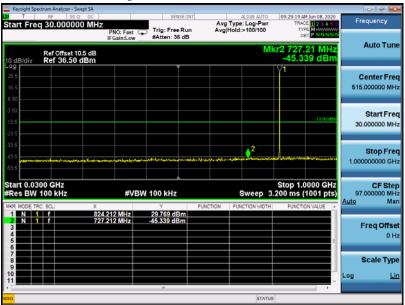




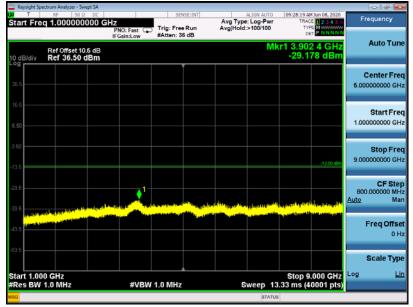


2.5.5 Test Result (Plots) of Conducted Spurious Emission

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.



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



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



Keysight Spe	RF S0 Q DC		SENSE:IN		ALIGN AUTO	00.20.20 0	M Jun 08, 2020	
tart Fre	q 30.000000 MHz	PNO: Fast		Avg	Type: Log-Pwr Hold:>100/100	TRAC	M Jun 08, 2020 2 1 2 3 4 5 6 2 M M M M M M M M M M M M M M M M M M M	Frequency
0 dB/div	Ref Offset 10.5 dB Ref 36.50 dBm	I GAINEON			M	(r2 740. -46.3	04 MHz 67 dBm	Auto Tu
.og 26.5 16.5 6.50						\?1		Center Fr 515.000000 M
3.50 13.5 23.5							-13.00 dðin	Start Fr 30.000000 M
43.5 53.5		مۇدەر بۇ يوغان ^م ىرمىيەن	ur sin or hours drugt for	deep-date U.c.s.cs	2	aga lassa anta	anad for the second	Stop Fr 1.000000000 G
tart 0.03 Res BW	100 kHz	#VB	W 100 kHz	FUNCTION	Sweep 3	.200 ms (0000 GHz 1001 pts)	CF St 97.000000 M Auto M
1 N 1	1 8	37.04 MHz 40.04 MHz	29.773 dBm -46.367 dBm					Freq Offs 0
7 8 9 10								Scale Ty
11							, -	
_					STATUS			

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



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



T	ectrum Analyzer - Swept SA RF 50 Ω DC q 30.000000 M		Trig: Free Rur #Atten: 36 dB	Avg	ALIGN AUTO Type: Log-Pwr Hold:>100/100	TRAC	M Jun 08, 2020 DE 1 2 3 4 5 6 PE M W W W W W	Frequency
0 dB/div	Ref Offset 10.5 d Ref 36.50 dBr	8			MI		04 MHz 81 dBm	Auto Tu
-og 26.5 16.5 6.50						∲1		Center Fr 515.000000 M
3.50 -13.5 -23.5							-13.00 dBm	Start Fr 30.000000 M
-43.5 -53.5	n 19, 1979 Starked	مىر مەربىلەر يەر بەر بەر بەر بەر بەر بەر	A to mail to mainte a special set	2	والإدافاتين ودارسه وتحريرا		a dharat tagan a sa sa sa sa	Stop Fr 1.000000000 G
Start 0.03 #Res BW	100 kHz	#VB	W 100 kHz	FUNCTION	Sweep 3	.200 ms (0000 GHz 1001 pts)	CF St 97.000000 M Auto M
2 N 1 3 4 5	f f	848.68 MHz 643.04 MHz	29.583 dBm -45.681 dBm				_	Freq Off 0
6 7 8 9								Scale Ty
11			н					Log
sg					STATUS	5		

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



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



RF 50 Ω DC 30.000000 MHz			SE:INT		ALIGN AUTO	09:35:16 AM Jun 08.	2020	
	PNO: Fast 😱 IFGain:Low	Trig: Free #Atten: 36	Run	Avg Type Avg Hold:	: Log-Pwr	TRACE 1 2 3 TYPE MUN DET PINN	456	Frequency
Ref Offset 10.5 dB Ref 36.50 dBm					М	kr1 750.71 N -43.122 d	iHz Bm	Auto Tur
								Center Fre
								Start Fre 30.000000 Mi
						49	00 atim 1.	Stop Fr .000000000 GI
							Aut	CF Ste 97.000000 MI 9 M
مەك ىتىلىرىق _{ئورى} رىيېرىلۇنىقىدىرىم	and water and the second	forther george	Unit-factor Magnet	n an	1 salashumah	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	han i	Freq Offs
								Scale Ty
0 GHz 00 kHz	#VBW	100 kHz		#5	Sweep 3	Stop 1.0000 0 .200 ms (1001	anz	· <u> </u>
	Ref 36.50 dBm	Ref 36.50 dBm	Ref 36.50 dBm	Ref 36.50 dBm	Ref 36.50 dBm	Ver Umaet 10.8 db Ver Umaet 10.8 db	-43.122 d	Ref 36.50 dBm -43.122 dBm

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



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



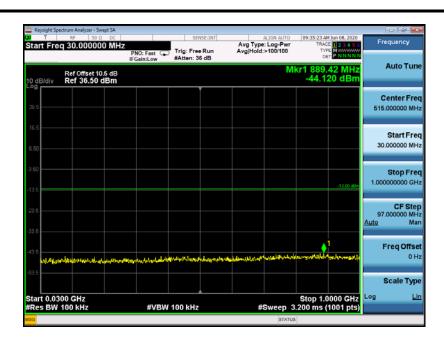
Frequency	20 AM Jun 08, 2020 TRACE 1 2 3 4 5 6	TR	ALIGN AUTO	Avg	NSE:INT	SEI		Ω DC	trum Analyzer - 5 RF 50 30.0000	T	XI I
		T	d:>100/100	Avgi		Trig: Free #Atten: 3	PNO: Fast 😱 FGain:Low	0011112	00.0000		
Auto Tu	70.99 MHz I.179 dBm	kr1 870 -44.	M						Ref Offset 1 Ref 36.50	3/div	l0 de
Center Fr											.08
515.000000 M											
Start Fr											
30.000000 M										<u> </u>	
Oton Er											
Stop Fr 1.000000000 G	-13.00 dBm										
CF Sto 97.000000 M Auto M											
<u>Auto</u> M										<u> </u>	
Freq Offs	1	Ó									
0	and a start of the start of	-()	na maile	munitat	Marriely	hand we have	hally-philosophis	the planusta	page of the sector	Hendomeni	
Scale Ty											
Log j	1.0000 GHz is (1001 pts)		#Sween 2			100 kHz	#\/B\/		0 GHz 100 kHz		
	is (1001 pts)	_	status			100 KH2	# V D V V		100 KH2	5 BW	sa

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

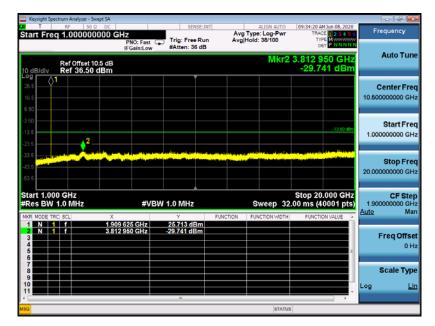


GPRS 1900MHz Channel = 661, 1GHz to 20GHz





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



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



Start Fre	g 30.00000		st 😱 Trig: F	ree Run 36 dB	Avg Ty Avg Ho	ALIGN AUTO /pe: Log-Pwr bid:>100/100	03:43:20 PMI TRACE TYPE DET	123456 M PNNNNN	Frequency
10 dB/div	Ref Offset 14 Ref 40.00					M	r2 630.4 -43.21		Auto Tu
20.0							¢1		Center Fr 515.000000 M
0.00 -10.0 -20.0									Start Fr 30.000000 M
-30.0 -40.0 -50.0	an a	ويقدونها الإلغام الجريف من	upperter formulari	الي اليكوني اليوني	2	and a straight of the state of	.A.st. pummers	and an a star of a st	Stop Fr 1.000000000 G
Start 0.03 #Res BW	100 kHz	#	VBW 100 kł			#Sweep 32	Stop 1.00 2.00 ms (1)	001 pts)	CF St 97.000000 M Auto M
1 N 2 2 N 4 5	1 1	824.43 MH 630.43 MH		dBm					Freq Offs 0
6 7 8 9									Scale Ty
10 11									Log j

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



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



Start Free	RF 50 q 30.0000	00 MHz	PNO: Fast G	Trig: Free Ru Atten: 36 dB	Avg	Type: Log-Pwr Hold:>100/100	03:43:38 PM May 26, 202 TRACE 2 3 4 5 TYPE MUNICIPAL OF PINNIN	Frequency
10 dB/div	Ref Offset 1 Ref 40.00					M	r2 740.04 MH -42.383 dBn	
20.0							♦ ¹	Center Fr 515.000000 M
0.00 -10.0 -20.0								Start Fr 30.000000 M
-30.0 -40.0 -50.0	ر موالمار و مغر العالي	un organisti pertos	wasyn sy sty	-contestinguised	h, he willing of the (1) Pilg the	2		Stop Fr 1.000000000 G
Start 0.03 #Res BW	100 kHz	X	#VB\	V 100 kHz	FUNCTION	#Sweep 3	Stop 1.0000 GH 2.00 ms (1001 pts	CF St 97.000000 M Auto M
1 N 1 2 N 1 3 4 5	1		04 MHz 04 MHz	29.071 dBm -42.383 dBm				Freq Off
6 7 8 9								Scale Ty
10								Log

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

Keysight Sp	ectrum Analyzer - Swept SA		1	es nal					_	- 2
Start Fre	RF 50 Ω DC 2q 1.000000000	GHZ PNO: Fast		Run	Avg Type Avg Hold:	LIGN AUT Log-Pw 13/100	r TRAC	MMay 26, 2020	Fn	equency
10 dB/div	Ref Offset 14.5 dB Ref 40.00 dBm	IFGain:Low	Atten: 36				Mkr1 8.21 -26.6			Auto Tun
30.0										enter Fre
10.0									1.000	Start Fre
10.00									9.000	Stop Fr 0000000 Gi
20.0					0.46			-13.00 dBn	800 <u>Auto</u>	CF Ste .000000 MI M
30.0 40.0 <mark>-000-05</mark>	an an haife an an haife an an h- an gun an h-an an taon an h-an an taonach an gun an h-an an taonach		relation datas. Valadatin a Mar		in to de tra Finis de tra	and a star grant a star			F	Freq Offs
50.0										Scale Ty
Start 1.00 #Res BW	00 GHz 1.0 MHz	#VBW	1.0 MHz		#S	weep	Stop 9 32.00 ms (4	.000 GHZ	Log	L
tSG						STA				

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



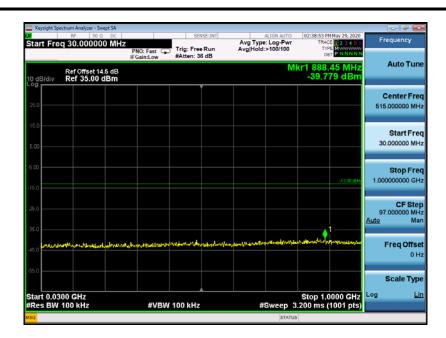
Start Fre	r,⊧ q 30.000	50 R DC 000 MHz	PNO: Fast	Trig: Free Ru Atten: 36 dB	Avg	ALIGN AUTO Type: Log-Pwr Hold:>100/100	03:43:55 PM May 26, 2020 TRACE 1 2 3 4 5 TYPE M	Frequency
10 dB/div	Ref Offse Ref 40.0		in dume of			M	cr2 654.68 MHz -43.216 dBm	
20.0							Ŷ1	Center Fr 515.000000 M
0.00 -10.0 -20.0							-40.00 dDr	Start Fr 30.000000 M
-30.0 -40.0 -60.0	are and	140.00 (m2.0	monthquarte		-1	2 voutelPalminner	nyandar (haran madaganaya ng ng ng ng ng	Stop Fr 1.0000000000 G
Start 0.0 #Res BW	100 kHz	x		W 100 kHz	FUNCTION	#Sweep 3	Stop 1.0000 GHz 2.00 ms (1001 pts FUNCTION VALUE	CF St 97.000000 M <u>Auto</u> M
1 N 2 N 3 4 5 6			3.68 MHz 1.68 MHz	33,131 dBm -43,216 dBm				Freq Offs 0
7 8 9 10								Scale Ty

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

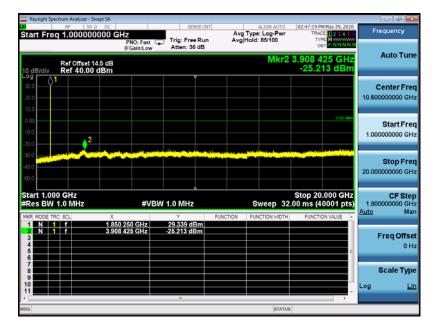
	RF 50 Ω DC									_
Start Freq	1.000000000	SHz PNO: Fast		Run	Avg Type Avg Hold		r TRA	M May 26, 2020 CE 1 2 3 4 5 6 PE M	Free	quency
	Ref Offset 14.5 dB Ref 40.00 dBm	IFGain:Low	Atten: 38				1kr1 3.71	4 2 GHz 91 dBm	£	luto Tun
30.0										enter Fre
10.0										Start Fre
10.00										Stop Fre
20.0			half a such a	ên	alas sta			-13.00 dBn	800.0 <u>Auto</u>	CF Ste 00000 Mi Mi
30.0 40.0 <mark>40.0 40.0 40.0 40.0 40.0 40.0 40.0</mark>	a la constante de la constante Millon de la constante de la co Millon de la constante de la co	Aller Angel	, in president and the set	della seguite		ang terti ng terting terting ng terting terting		, policypered a	FI	eq Offs 0 I
50.0									S	cale Tyj
Start 1.000 #Res BW 1.		#VBW	/ 1.0 MHz		#S	weep_	Stop 9 32.00 ms (4	9.000 GHZ	209	

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



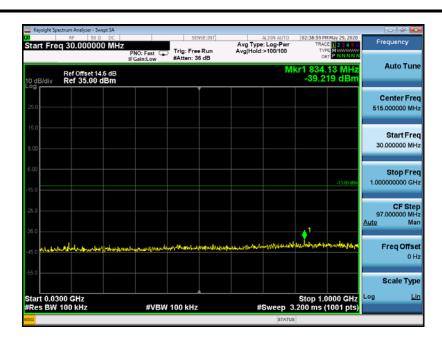


EDGE 1900MHz Channel = 512, 30MHz to 1GHz

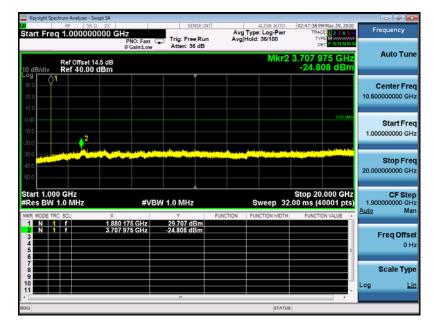


EDGE 1900MHz Channel = 512, 1GHz to 20GHz



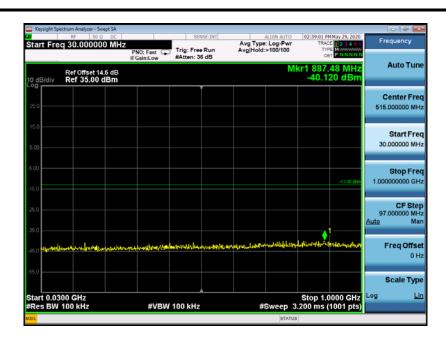


EDGE 1900MHz Channel = 661, 30MHz to 1GHz

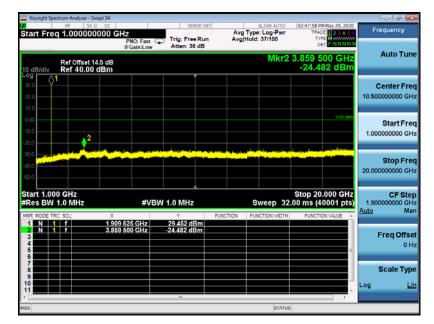


EDGE 1900MHz Channel = 661, 1GHz to 20GHz





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



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



× Start Fre	⊮େ <u>50 ହ</u> ସ 30.000000	DC) MHZ PNO: Fast (IFGain:Low	Trig: Free Run Atten: 36 dB	ALIGN AUTO Avg Type: Log-Pwr Avg Hold:>100/100	10:43:43 AM May 25, 2020 TRACE 1 2 3 4 5 6 TYPE M	Frequency
10 dB/div	Ref Offset 14 Ref 40.00 d	5 dB	Pittern oo ob	M	kr2 922.40 MHz -42.175 dBm	Auto Tu
20.0 10.0					¢ ¹	Center Fr 515.000000 M
0.00 -10.0 -20.0					-10.00 dDn	Start Fr 30.000000 M
-30.0 -40.0 -50.0	mining a fair an	and the second	ىرىلى بىرىمىتىتەتلەرلۇم _ق ىر		2 	Stop Fr 1.000000000 G
Start 0.03 #Res BW	100 kHz	#VB	W 100 kHz	#Sweep 3	Stop 1.0000 GHz .200 ms (1001 pts)	CF St 97.000000 M <u>Auto</u> M
1 N 2 2 N 3 4 5	1 1	825.40 MHz 922.40 MHz	18.733 dBm -42.175 dBm			Freq Offs 0
6 7 8 9						Scale Ty
10					-	Log

WCDMA850MHz Channel = 4132, 30MHz to 1GHz



WCDMA850MHz Channel = 4132, 1GHz to 9GHz



x Start Fro	RF 5 eq 30.0000	0 Q DC DOO MHZ PNO: Fa IFGain:L		Avg un Avg	ALIGN AUTO Type: Log-Pwr Hold:>100/100	10:43:26 AM May 25, 2021 TRACE 1 2 3 4 5 TYPE M	Frequency
10 dB/div	Ref Offset Ref 40.0				M	r2 934.04 MHz -40.538 dBm	
20.0						Ŷ	Center Fre 515.000000 Mi
0.00 -10.0						-10.00 dDr	Start Fre 30.000000 MH
-30.0	anyt new metromole		an the second second second second	الاجدادام والمراد ومعالمهمي	ومدد درمانه والإعلام والمقصول ريع	²	Stop Fre 1.000000000 GF
	300 GHz / 100 kHz		VBW 100 kHz	FUNCTION	#Sweep 3.	Stop 1.0000 GHz 200 ms (1001 pts	CF Ste 97.000000 MI <u>Auto</u> M
1 N 2 N 3 4 5		835.10 MH 934.04 MH	z 18.434 dBm				Freq Offs 01
6 7 8 9							Scale Ty
10							Log L

WCDMA850MHz Channel = 4183, 30MHz to 1GHz



WCDMA850MHz Channel = 4183, 1GHz to 9GHz