FCC Radio Test Report

FCC ID: ZLE-RG650U

This report concerns: Original Grant

Project No.	: 1810C073
Equipment	: LTE SMARTPHONE
Test Model	: RG650U
Series Model	: N/A
Applicant	: Power Idea Technology (Shenzhen) Co., Ltd.
Address	: 4th Floor, A Section ,Languang Science&technology Xinxi RD, Hi-Tech Industrial Park North, Nanshan, ShenZhen, China

Date of Receipt	: Oct. 18, 2018
Date of Test	: Dec. 10, 2018 ~ Dec. 27, 2018
Issued Date	: Jan. 28, 2019
Tested by	: BTL Inc.

Technical Manager : David Mao

(David Mao)

Authorized Signatory : Steven Lu

(Steven Lu)

BTL INC.

No.3,Jinshagang 1st Road, Shixia,Dalang Town, Dongguan, Guangdong, China.

TEL: +86-769-8318-3000 FAX: +86-769-8319-6000

Certificate #5123.02

Declaration

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BTL's reports apply only to the specific samples tested under conditions. It is manufacture's responsibility to ensure that additional production units of this model are manufactured with the identical electrical and mechanical components. **BTL** shall have no liability for any declarations, inferences or generalizations drawn by the client or others from **BTL** issued reports.

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BTL's laboratory quality assurance procedures are in compliance with the **ISO/IEC 17025** requirements, and accredited by the conformity assessment authorities listed in this test report.

BTL is not responsible for the sampling stage, so the results only apply to the sample as received.

The information, data and test plan are provided by manufacturer which may affect the validity of results, so it is manufacturer's responsibility to ensure that the apparatus meets the essential requirements of applied standards and in all the possible configurations as representative of its intended use.

Limitation

For the use of the authority's logo is limited unless the Test Standard(s)/Scope(s)/Item(s) mentioned in this test report is (are) included in the conformity assessment authorities acceptance respective.

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REPORT ISSUED HISTORY

Report Version	Description	Issued Date
R00	Original Issue.	Jan. 07, 2019
R01	Changed the FCC ID and applicant information.	Jan. 28, 2019

1. GENERAL SUMMARY

Equipment	:	LTE SMARTPHONE
Brand Name	:	RugGear
Test Model	:	RG650U
Series Model	:	N/A
Applicant	:	Power Idea Technology (Shenzhen) Co., Ltd.
Manufacturer	:	RUGGEAR LIMITED
Address	:	RM1301,13/F WING TUCK COMM CTR 177-183 WING LOK ST SHEUNG WAN HONG KONG
Date of Test	:	Dec. 10, 2018 ~ Dec. 27, 2018
Test Sample	:	Engineering Sample No.: D181211334 for conducted, D181211444 for radiated.
Standard(s)	:	47 CFR FCC Part 22 Subpart H 47 CFR FCC Part 2 ANSI/TIA/EIA-603-E-2016 FCC KDB 971168 D01 Power Meas License Digital Systems v03r01

The above equipment has been tested and found compliance with the requirement of the relative standards by BTL Inc.
The test data, data evaluation, and equipment configuration contained in our test report (Ref No. BTL-FCCP-6-1810C073) were obtained utilizing the test procedures, test instruments, test sites that has been accredited by the Authority of A2LA according to the ISO/IEC 17025 quality assessment standard and technical standard(s).

Test results included in this report are only for the GSM850, WCDMA Band V part.

2. SUMMARY OF TEST RESULTS

Test procedures according to the technical standard(s):

FCC Part 22 Subpart H & Part 2			
Standard(s) Section	Test Item	Judgment	Tested By
2.1046 22.913(a)	Radiated power	PASS	Paul Li
2.1046 22.913(a)	Maximum Output Power	PASS	Paul Li
2.1049(h) 22.917(a)	Occupied Bandwidth	PASS	Paul Li
2.1051 22.917(a)	Conducted Spurious Emissions	PASS	Paul Li
2.1053 22.917(a)	Radiated Spurious Emissions	PASS	Paul Li
22.917(a)	Band Edge Measurements	PASS	Paul Li
-	Peak To Average Ratio	PASS	Paul Li
2.1055 22.355	Frequency Stability	PASS	Paul Li

2.1 TEST FACILITY

The test facilities used to collect the test data in this report is at the location of No.3, Jinshagang 1st Road, Shixia, Dalang Town, Dongguan, Guangdong, China.
BTL's Test Firm Registration Number for FCC: 357015
BTL's Designation Number for FCC: CN1240

2.2 MEASUREMENT UNCERTAINTY

The measurement uncertainty figures shall be calculated according the methods described in the ETSI TR 100 028 and shall correspond to an expansion factor (coverage factor) k=1.96 or k=2(which provide confidence levels of respectively 90% and 95.45% in the case where the distributions characterizing the actual measurement uncertainties are normal (Gaussian)). Measurement Uncertainty for a Level of Confidence of 95 %, U=2xUc(y).

The BTL measurement uncertainty as below table:

A. Radiated Measurement :

Test Site	Method	Measurement Frequency Range	Ant. H / V	U,(dB)
DG-CB03	CISPR	9KHz ~ 30MHz	V	3.79
		9KHz ~ 30MHz	H	3.57
		30MHz ~ 200MHz	V	3.82
		30MHz ~ 200MHz	H	3.78
		200MHz ~ 1,000MHz	V	4.10
		200MHz ~ 1,000MHz	H	4.06

Test Site	Method	Measurement Frequency Range	Ant. H / V	U,(dB)
DG-CB03	CISPR	1GHz ~ 18GHz	V	3.12
		1GHz ~ 18GHz	H	3.68

Note: Unless specifically mentioned, the uncertainty of measurement has not been taken into account to declare the compliance or non-compliance to the specification.

3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

Equipment	LTE SMARTPHONE				
Brand Name	RugGear				
Test Model	RG650U				
Series Model	N/A				
Model Difference(s)	N/A				
Hardware Version	V1.0				
Software Version	RG650_US_1.0.0.0.0_1				
Antenna Type	Internal Antenna				
Antenna Gain	GSM850	-1.5 dBi			
	WCDMA V	-1.5 dBi			
IMEI No.	Conducted	860624040000503			
	Radiated	860624040000529			
Modulation Type	GSM/GPRS		GMSK		
	EDGE		GMSK, 8PSK		
	WCDMA		UL: BPSK DL: QPSK		
	WCDMA(HSDPA/HSUPA)		16QAM		
Operation Frequency	GSM /EDGE/GPRS		824.2MHz ~ 848.8MHz		
	WCDMA Band V		826.4MHz ~ 846.6MHz		
Max. ERP Power	GSM/GPRS		GMSK	28.29	dBm
	EDGE		8PSK	23.50	dBm
	WCDMA		BPSK	18.69	dBm
	WCDMA_HSDPA		16QAM	17.77	dBm
	WCDMA_HSUPA		16QAM	16.88	dBm
Power Source	1# DC voltage supplied from AC/DC adapter. Manufacturer / Model: Shenzhen Huntkey Electrio co.,Ltd / HKC0055010-2D 2# Supplied from Li-Polymer battery. Manufacturer / Model: SHENZHEN JIAYUANTONGDA TECHNOLOGY CO.,LTD. / BL420KP 3# Supplied from USB port.				
Power Rating	1# I/P: 100-240V~ 50-60Hz 0.2A O/P: 5V⎓1.0A 2# DC 3.80V/4200mAh (15.96Wh) 3# DC 5V				

Note:
1. For a more detailed features description, please refer to the manufacturer's specifications or the user's manual.

3.2 DESCRIPTION OF TEST MODES AND TEST CONDITION

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, XYZ axis and antenna ports
The worst case was found when positioned on X-plane for EIRP and X-axis for radiated emission.
Following channel(s) was (were) selected for the final test as listed below:

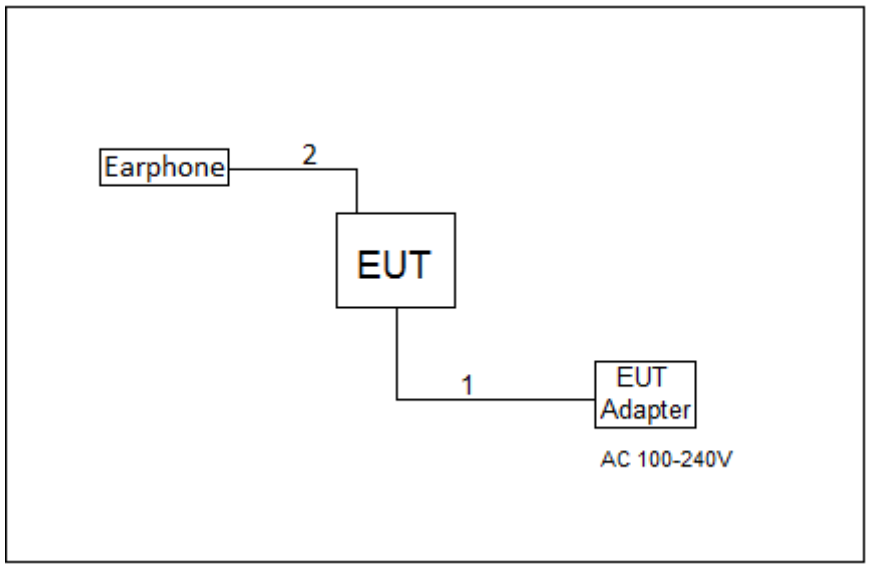
GSM MODE			
Test Item	Available Channel	Tested Channel	Mode
ERP	128 to 251	128, 190, 251	GSM, EDGE
Maximun Output Power	128 to 251	128, 190, 251	GSM, EDGE
Occupied Bandwidth	128 to 251	128, 190, 251	GSM, EDGE
Condcudeted Emission	128 to 251	190	GSM, EDGE
Radiated Emission	128 to 251	190	GSM, EDGE
Band Edge	128 to 251	128, 251	GSM, EDGE
Peak to Average Ratio	128 to 251	128, 190, 251	GSM, EDGE
Frequency Stability	128 to 251	190	GSM

WCDMA MODE			
Test Item	Available Channel	Tested Channel	Mode
ERP	4132 to 4233	4132, 4182, 4233	WCDMA, HSDPA, HSUPA
Maximum Output Power	4132 to 4233	4132, 4182, 4233	WCDMA, HSDPA, HSUPA
Conducted Emission	4132 to 4233	4182	WCDMA, HSDPA, HSUPA
Radiated Emission	4132 to 4233	4182	WCDMA
Band Edge	4132 to 4233	4132, 4233	WCDMA, HSDPA, HSUPA
Peak to Average Ratio	4132 to 4233	4132, 4182, 4233	WCDMA, HSDPA, HSUPA
Frequency Stability	4132 to 4233	4182	WCDMA

EUT TEST CONDITIONS:

Test Item	Environmental Conditions	Test Voltage
ERP	21°C, 50%RH	DC 3.80V
Maximum Output Power	21°C, 50%RH	DC 3.80V
Occupied Bandwidth	21°C, 50%RH	DC 3.80V
Conducted Emission	21°C, 50%RH	DC 3.80V
Radiated Emission	23°C, 49%RH	AC 120V/60Hz
Band Edge	21°C, 50%RH	DC 3.80V
Peak to Average Ratio	21°C, 50%RH	DC 3.80V
Frequency Stability	Normal and Extreme	Normal and Extreme

3.3 BLOCKDIGRAMSHOWINGTHECONFIGURATIONOFSYSTEMTESTED FOR RADIATED



3.4 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Item	Equipment	Mfr/Brand	Model/Type No.	FCC ID	Series No.
-	-	-	-	-	-

Item	Shielded Type	Ferrite Core	Length	Note
1	NO	NO	1.2m	DC Cable
2	NO	NO	1.0m	Audio Cable

4. TEST RESULT

4.1 OUTPUT POWER MEASUREMENT

4.1.1 LIMIT

Mobile / Portable station are limited to 7 watts e.r.p.

4.1.2 TEST PROCEDURE

EIRP/ ERP:

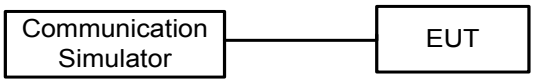
1. EIRP= Output Power +Antenan gain
   ERP power= EIPR power-2.15dBi.

Maximum Output Power:

The EUT was set up for the maximum power with GSM, GPRS, EDGE and WCDMA link data modulation and link up with simulator. Set the EUT to transmit under low, middle and high channel and record the power level shown on simulator.

4.1.3 TESTSETUP LAYOUT

Output Power Measurement



4.1.4 TEST DEVIATION

No deviation

4.1.5 TEST RESULTS

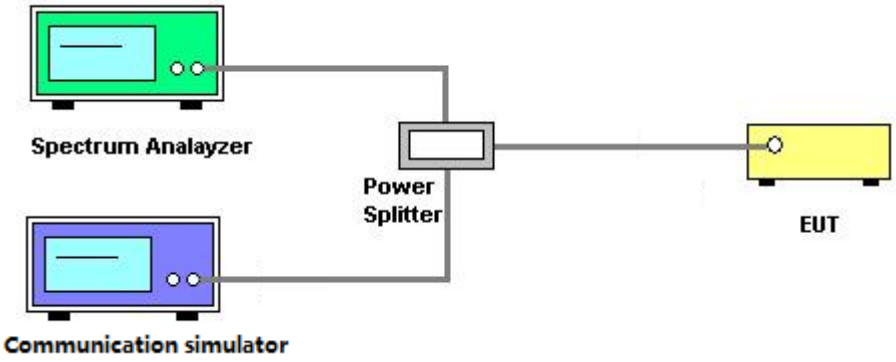
Please refer to the Appendix A.

4.2 OCCUPIED BANDWIDTH MEASUREMENT

4.2.1 TEST PROCEDURE

The EUT makes a call to the communication simulator. All measurements were done at low, middle and high operational frequency range. The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency. Use OBW measurement function of Spectrum analyzer to measure 99 % occupied bandwidth and 26dB bandwidth.

4.2.2 TEST SETUP LAYOUT



4.2.3 TEST DEVIATION

No deviation

4.2.4 TEST RESULTS

Please refer to the Appendix B.

4.3 CONDUCTED EMISSIONS MEASUREMENT

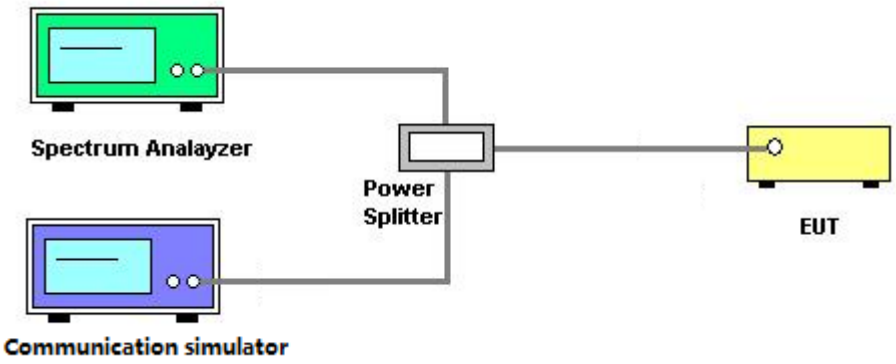
4.3.1 LIMIT

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB. The emission limit equal to -13dBm.

4.3.2 TEST PROCEDURES

1. The testing follows FCC KDB 971168 v03r01 Section 6.0.
2. The EUT was connected to spectrum analyzer and system simulator via a power divider.
3. The band edges of low and high channels for the highest RF powers were measured. Set RBW>=1% EBW in the 1MHz band immediately outside and adjacent to the band edge.
4. Set spectrum analyzer with RMS detector.
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+10log(P)dB below the transmitter power P(Watts)
   =P(W)-[43+10log(P)](dB)
   =[30+10log(P)](dBm)-[43+10log(P)](dB)
   =-13dBm

4.3.3 TESTSETUP LAYOUT



4.3.4 TESTDEVIATION

No deviation

4.3.5 TEST RESULTS

Please refer to the Appendix C.

4.4 RADIATED EMISSIONS MEASUREMENT

4.4.1 LIMIT

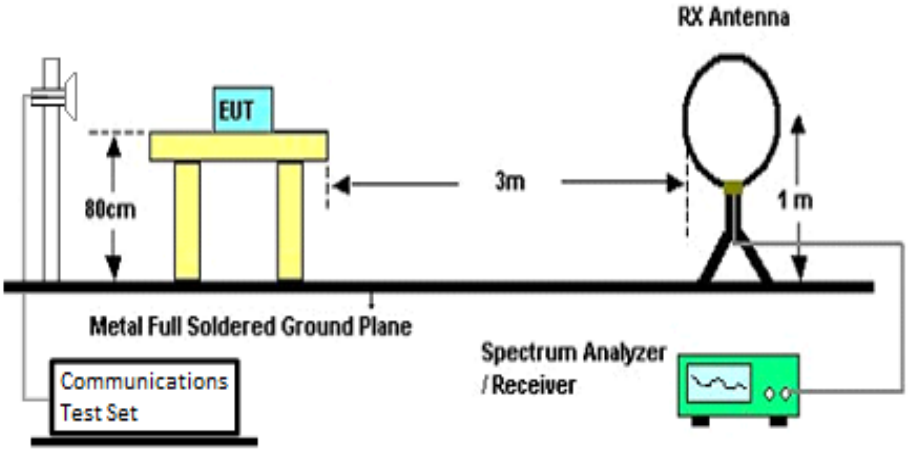
The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB. The emission limit equal to -13dBm.

4.4.2 TEST PROCEDURES

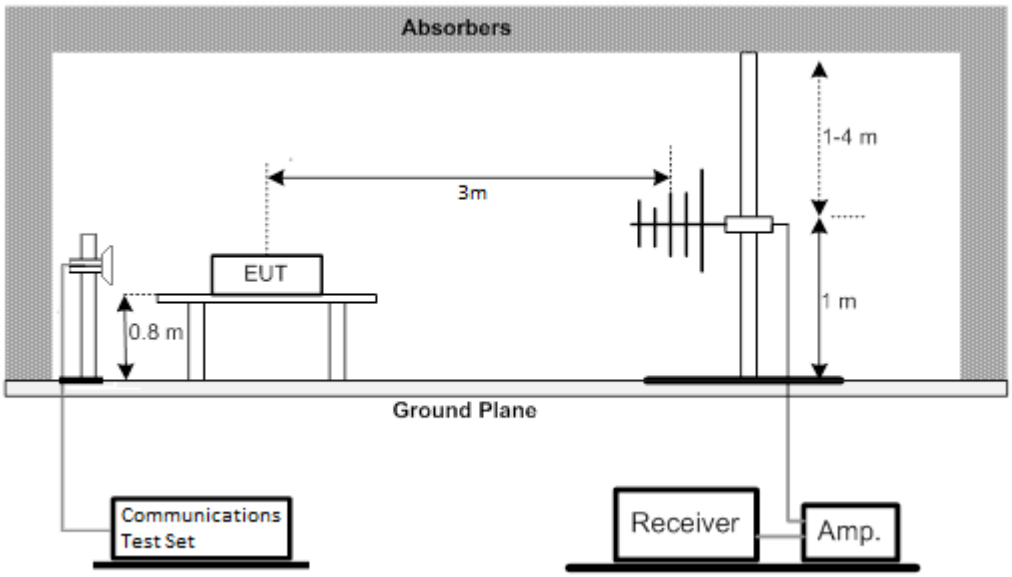
1. Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8m height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1m to 4m to find the maximum polar radiated power. The “Read Value” is the spectrum reading the maximum power value.
2. The substitution horn antenna is substituted for EUT at the same position and signals generator export the CW signal to the substitution antenna via a TX cable. Rotated the Turn Table and moved receiving antenna to find the maximum radiation power. Adjust output power level of S.G to get a Value of spectrum reading equal to “Read Value “ of step a. Record the power level of S.G
3. EIRP = Output power level of S.G – TX cable loss + Antenna gain of substitution horn.
4. E.R.P power can be calculated form E.I.R.P power by subtracting the gain of dipole, E.R.P power = E.I.P.R power - 2.15dBi.
5. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1MHz/3MHz.

4.4.3 TESTSETUP LAYOUT

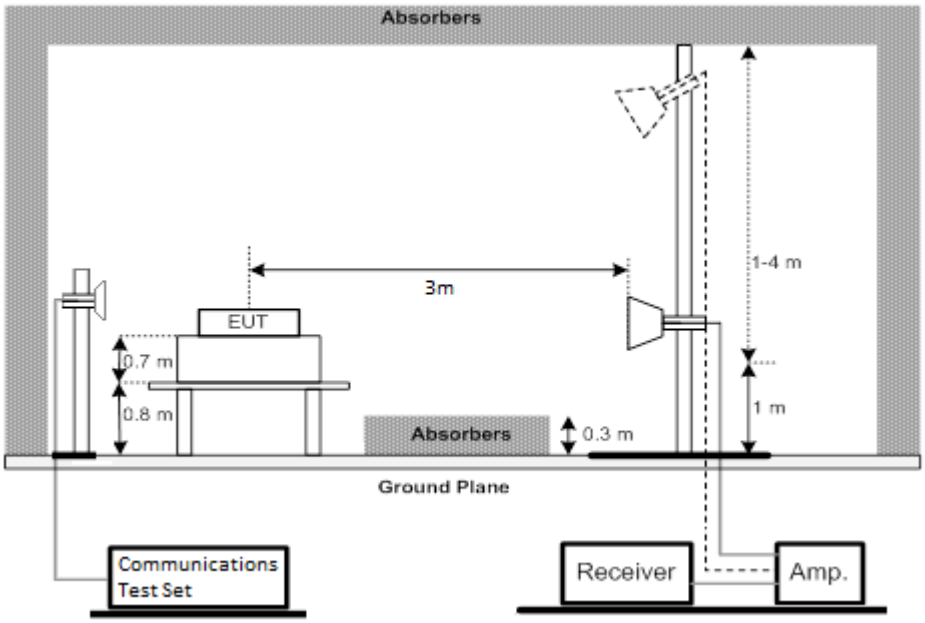
Below 30MHz



30MHz to 1GHz



Above 1GHz



4.4.4 TESTDEVIATION

No deviation

4.4.5 TEST RESULTS (9KHZ TO 30MHZ)

Please refer to the Appendix D.

4.4.6 TEST RESULTS (30MHZ TO 1000MHZ)

Please refer to the Appendix E.

4.4.7 TEST RESULTS (ABOVE 1000MHZ)

Please refer to the Appendix F.

4.5 BAND EDGE MEASUREMENT

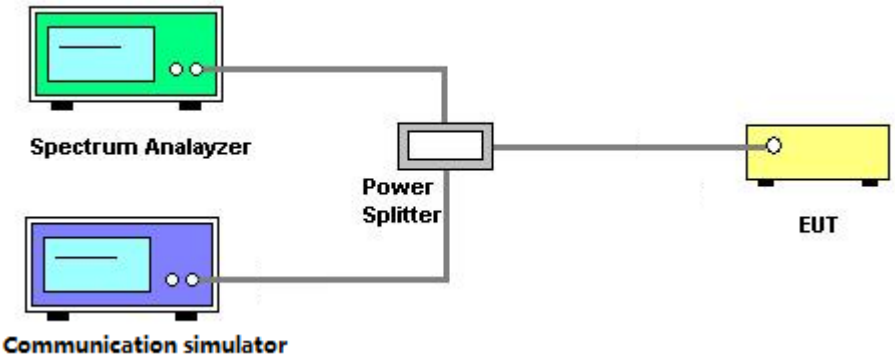
4.5.1 LIMIT

A Power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB. In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.

4.5.2 TEST PROCEDURES

1. All measurements were done at low and high operational frequency range.
2. The center frequency of spectrum is the band edge frequency and span is 1.5MHz. RB of the spectrum is 3kHz and VB of the spectrum is 10kHz (GSM/GPRS/EDGE).
3. The center frequency of spectrum is the band edge frequency and span is 10MHz. RB of the spectrum is 100kHz and VB of the spectrum is 300kHz (WCDMA).
4. Record the max trace plot into the test report.

4.5.3 TESTSETUP LAYOUT



4.5.4 TESTDEVIATION

No deviation

4.5.5 TEST RESULTS

Please refer to the Appendix G.

4.6 PEAK TO AVERAGE RATIO MEASUREMENT

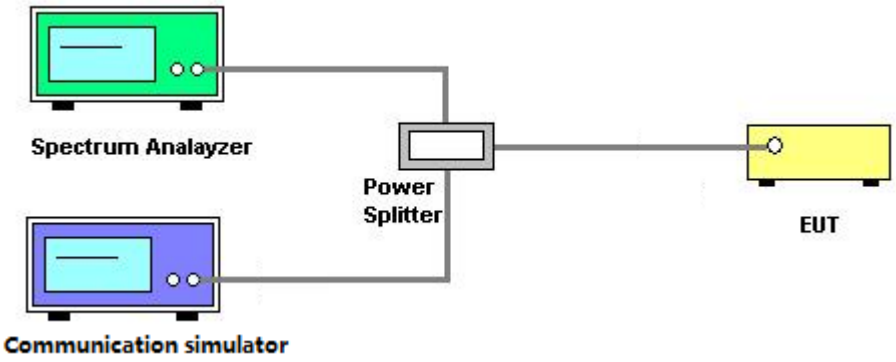
4.6.1 LIMIT

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.

4.6.2 TEST PROCEDURES

1. Set resolution/measurement bandwidth ≥ signal's occupied bandwidth;
2. Set the number of counts to a value that stabilizes the measured CCDF curve;
3. Record the maximum PAPR level associated with a probability of 0.1%.

4.6.3 TESTSETUP LAYOUT



4.6.4 TESTDEVIATION

No deviation

4.6.5 TEST RESULTS

Please refer to the Appendix H.

4.7 FREQUENCY STABILITY MEASUREMENT

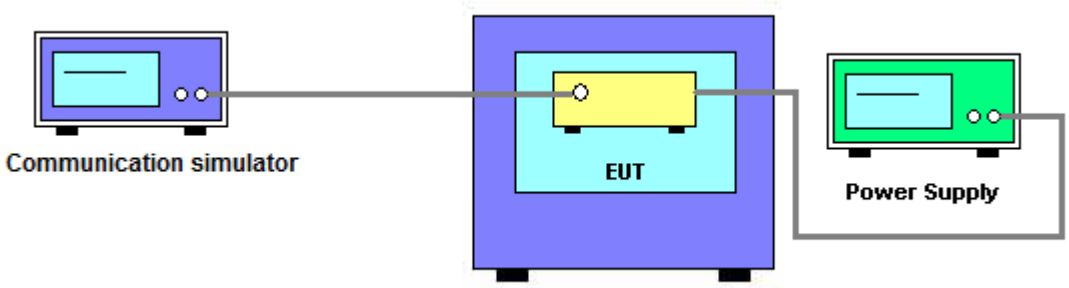
4.7.1 LIMIT

1.5 ppm is for base and fixed station. 2.5 ppm is for mobile station.

4.7.2 TEST PROCEDURES

1. Device is placed at the oven room. The oven room could control the temperatures and humidity. Power warm up is at least 15 min and power applied should perform before recording frequency error.
2. EUT is connected the external power supply to control the DC input power. The test voltage range is from minimum to maximum working voltage. Each step shall be record the frequency error rate.
3. The temperature range step is 10 degrees in this test items. All temperature levels shall be hold the ±0.5°C during the measurement testing. The each temperature step shall be at least 0.5 hours, consider the EUT could be test under the stability condition.
4. The frequency error was recorded frequency error from the communication simulator.

4.7.3 TESTSETUP LAYOUT



4.7.4 TESTDEVIATION

No deviation

4.7.5 TEST RESULTS

Please refer to the Appendix I.

5. LIST OF MEASUREMENT EQUIPMENTS

Radiated Emission Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Antenna	Schwarbeck	VULB9160	9160-3232	Mar. 11, 2019
2	Amplifier	Agilent	8449B	3008A02274	Mar. 11, 2019
3	Amplifier	HP	8447D	2944A09673	Aug. 11, 2019
4	HighPass Filter	Wairrwright Instruments Gmbh	WHK 1.5/15G-10ST	11	Mar. 11, 2019
5	Band Reject Filter	Wairrwright Instruments Gmbh	WRCG 1710/1785-1690/1805-60/12SS	38	Mar. 11, 2019
6	Band Reject Filter	Wairrwright Instruments Gmbh	WRCG 824/849-810/863-60/9SS	7	Mar. 11, 2019
7	Band Reject Filter	Wairrwright Instruments Gmbh	WRCG 880/915-860/935-60/9SS	14	Mar. 11, 2019
8	Band Reject Filter	Wairrwright Instruments Gmbh	WRCG 1850/1910-1830/1930-60/10SS	17	Mar. 11, 2019
9	HighPass Filter	Wairrwright Instruments Gmbh	WHK3.1/18G-10SS	24	Mar. 11, 2019
10	Wireless Communication Test SET	Agilent	E5515C	MY48364183	Mar. 11, 2019
11	Microwave Preamplifier With Adaptor	EMC INSTRUMENT	EMC2654045	980039 & HA01	Mar. 11, 2019
12	Receiver	Agilent	N9038A	MY52130039	Aug. 11, 2019
13	wideband radio communication tester	R&S	CMW500	152372	Mar. 11, 2019
14	Cable	emci	LMR-400(30MHz-1GHz)(8m+5m)	N/A	May 25, 2019
15	Cable	mitron	B10-01-01-12M	18072744	Jul. 30, 2019
16	Controller	ETS-Lindgren	2090	N/A	N/A
17	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A
18	Loop Antenna	EM	EM-6876-1	230	Feb. 07, 2019
19	Double Ridged Guide Antenna	ETS	3115	75789	Mar. 11, 2019
20	Broad-Band Horn Antenna	Schwarzbeck	BBHA 9170	9170319	Jun. 30, 2019

Conducted Emission & Band Edge & Occupied Bandwidth Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Wireless Communication Test SET	Agilent	E5515C	MY48364183	Mar. 11, 2019
2	EXA Spectrum Analyzer	Agilent	N9010A	MY50520044	Mar. 11, 2019
3	POWER SPLITTER	Mini-Circuits	ZFRSC-123-S+	331000910-1	Mar. 11, 2019
4	wideband radio communication tester	R&S	CMW500	152372	Mar. 11, 2019
5	Spectrum Analyzer	R&S	FSP40	100185	Aug. 11, 2019

Frequency Stability Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Wireless Communication Test SET	Agilent	E5515C	MY48364183	Mar. 11, 2019
2*	Multi-output DC Power Supply	GW Instek	GPC-3030DN	EK880675	Sep. 26, 2020
3	POWER SPLITTER	Mini-Circuits	ZFRSC-123-S+	331000910-1	Mar. 11, 2019
4	wideband radio communication tester	R&S	CMW500	152372	Mar. 11, 2019

Remark: ”N/A” denotes no model name, serial no. or calibration specified.
All calibration period of equipment list is one year.
*All calibration period of equipment list is three year.

APPENDIX A - MAXIMUM OUTPUT POWER

Maximum Output Power (dBm):

GSM850		Burst Output Power		
		128CH	190CH	251CH
		824.2MHz	836.6MHz	848.8MHz
GSM (CS)		31.82	31.80	31.80
GPRS/EDGE (GMSK)	1 Tx Slot	31.94	31.93	31.92
	2 Tx Slot	31.12	31.13	31.14
	3 Tx Slot	29.38	29.36	29.35
	4 Tx Slot	28.18	28.21	28.22
EDGE (8PSK)	1 Tx Slot	27.15	26.89	26.84
	2 Tx Slot	26.16	25.91	26.04
	3 Tx Slot	24.38	24.14	24.01
	4 Tx Slot	22.50	22.53	22.74

Modulation	Band	WCDMA V		
	Tx Channel	4132CH	4182CH	4233CH
	Frequency	826.4MHz	836.4MHz	846.6MHz
BPSK	RMC 12.2K	22.14	22.13	22.34
	RMC 64K	22.11	22.21	22.31
	RMC 144K	22.20	22.17	22.32
	RMC 384K	22.19	22.25	22.32
16QAM	HSDPA Subtest-1	21.32	21.35	21.42
	HSDPA Subtest-2	21.25	21.21	21.39
	HSDPA Subtest-3	20.72	20.78	20.94
	HSDPA Subtest-4	20.89	20.81	20.94
16QAM	HSUPA Subtest-1	19.67	19.84	19.74
	HSUPA Subtest-2	19.38	19.42	19.36
	HSUPA Subtest-3	20.51	20.47	20.48
	HSUPA Subtest-4	19.97	19.89	19.94
	HSUPA Subtest-5	20.31	20.41	20.53

ERP Power (dBm):

GSM850		ERP Power		
		128CH	190CH	251CH
		824.2MHz	836.6MHz	848.8MHz
GSM (CS)		28.17	28.15	28.15
GPRS/EDGE (GMSK)	1 Tx Slot	28.29	28.28	28.27
	2 Tx Slot	27.47	27.48	27.49
	3 Tx Slot	25.73	25.71	25.70
	4 Tx Slot	24.53	24.56	24.57
EDGE (8PSK)	1 Tx Slot	23.50	23.24	23.19
	2 Tx Slot	22.51	22.26	22.39
	3 Tx Slot	20.73	20.49	20.36
	4 Tx Slot	18.85	18.88	19.09

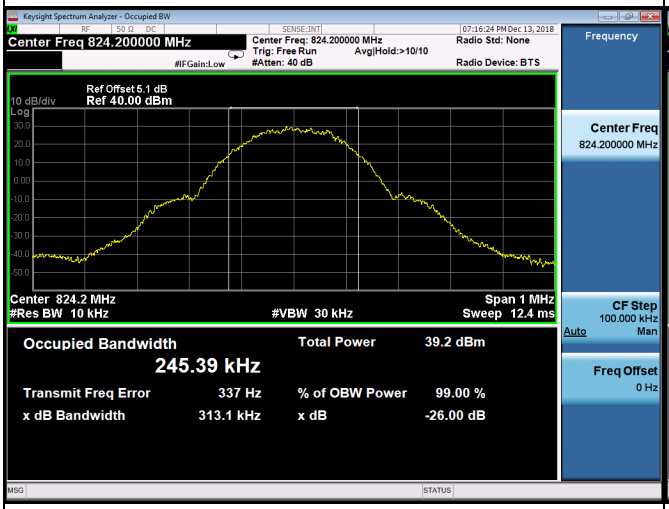
Modulation	Band	WCDMA V		
	Tx Channel	4132CH	4182CH	4233CH
	Frequency	826.4MHz	836.4MHz	846.6MHz
BPSK	RMC 12.2K	18.49	18.48	18.69
	RMC 64K	18.46	18.56	18.66
	RMC 144K	18.55	18.52	18.67
	RMC 384K	18.54	18.60	18.67
16QAM	HSDPA Subtest-1	17.67	17.70	17.77
	HSDPA Subtest-2	17.60	17.56	17.74
	HSDPA Subtest-3	17.07	17.13	17.29
	HSDPA Subtest-4	17.24	17.16	17.29
16QAM	HSUPA Subtest-1	16.02	16.19	16.09
	HSUPA Subtest-2	15.73	15.77	15.71
	HSUPA Subtest-3	16.86	16.82	16.83
	HSUPA Subtest-4	16.32	16.24	16.29
	HSUPA Subtest-5	16.66	16.76	16.88

APPENDIX B - OCCUPIED BANDWIDTH

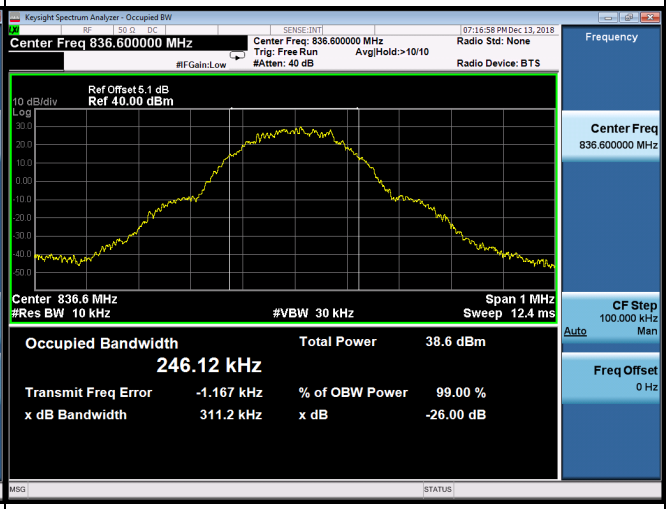
GSM850					
GSM			EDGE		
CS			8PSK		
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)
128	824.2	0.245	128	824.2	0.255
190	836.6	0.246	190	836.6	0.251
251	848.8	0.246	251	848.8	0.252
Channel	Frequency (MHz)	26dB Bandwidth (MHz)	Channel	Frequency (MHz)	26dB Bandwidth (MHz)
128	824.2	0.313	128	824.2	0.328
190	836.6	0.311	190	836.6	0.323
251	848.8	0.318	251	848.8	0.324

Spectrum Plot

GSM -128

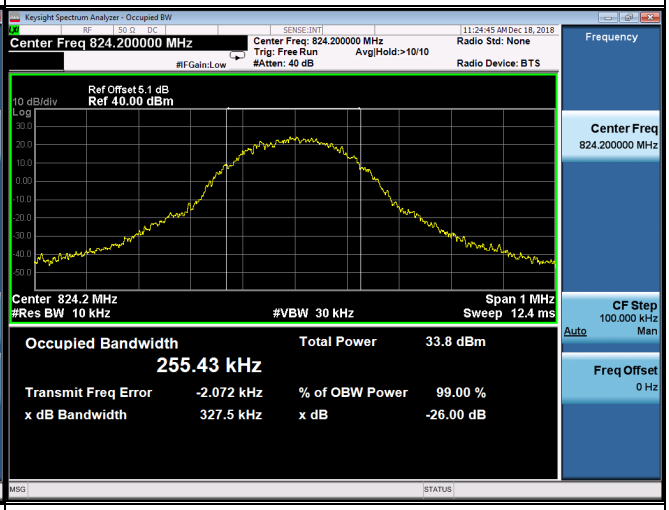


GSM-190



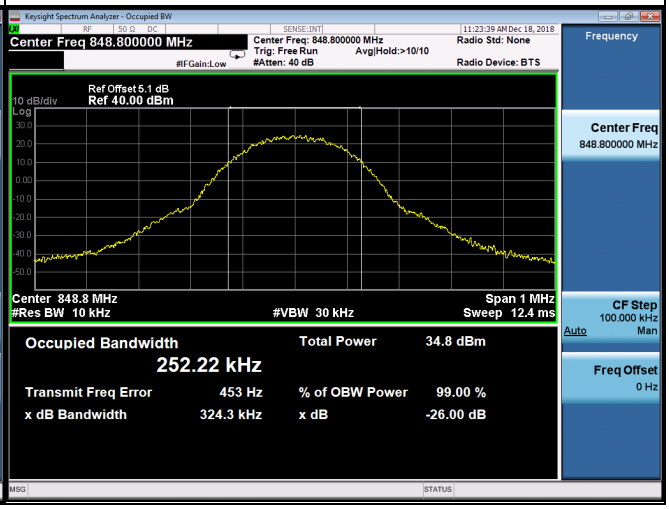
GSM-251

EDGE-128



EDGE-190

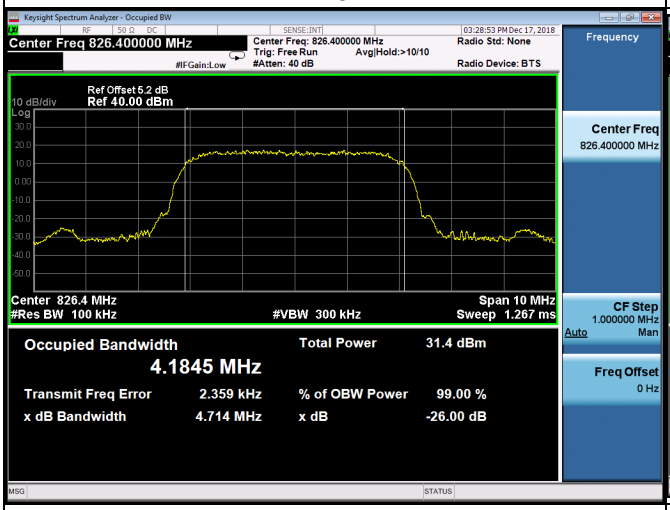
EDGE-251



WCDMA Band V					
BPSK					
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	Channel	Frequency (MHz)	26dB Bandwidth (MHz)
4132	826.4	4.185	4132	826.4	4.714
4182	836.4	4.175	4182	836.4	4.702
4233	846.6	4.177	4233	846.6	4.726

Spectrum Plot

4132



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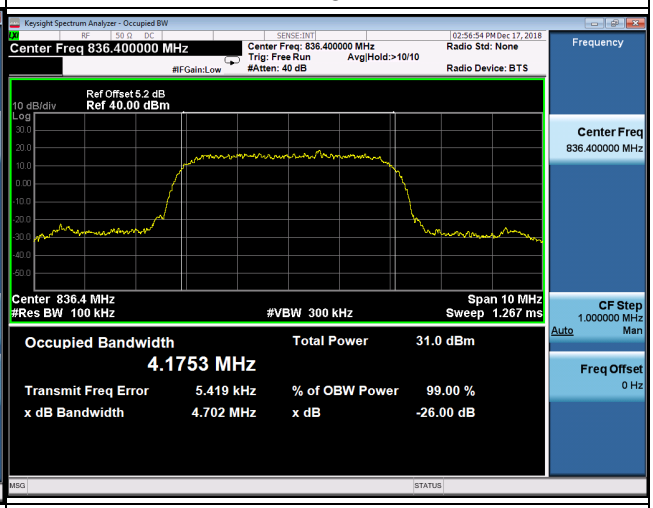

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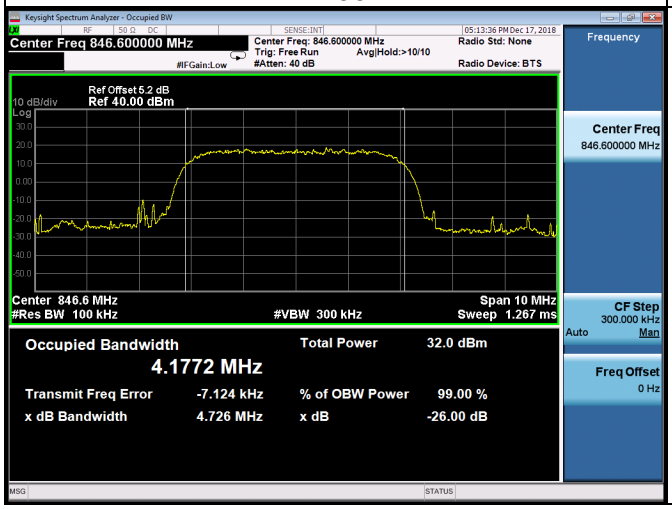

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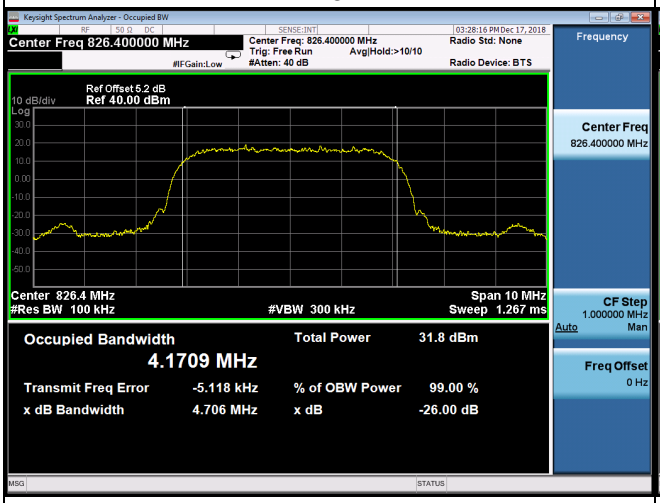
WCDMA_HSDPA Band V					
16QAM					
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	Channel	Frequency (MHz)	26dB Bandwidth (MHz)
4132	826.4	4.171	4132	826.4	4.706
4182	836.4	4.168	4182	836.4	4.717
4233	846.6	4.175	4233	846.6	4.714

Spectrum Plot

4132



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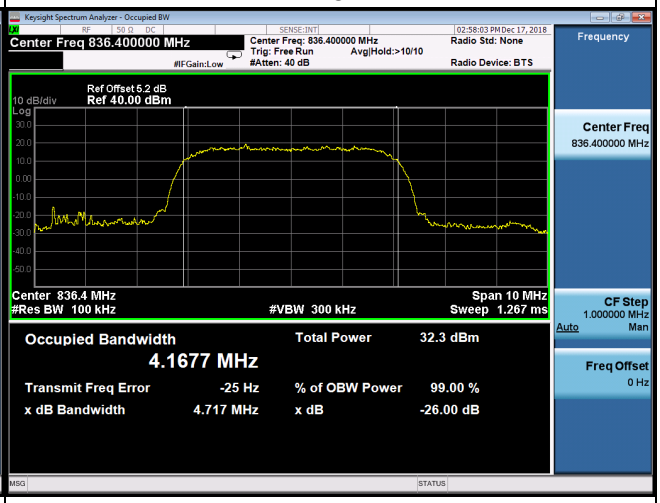

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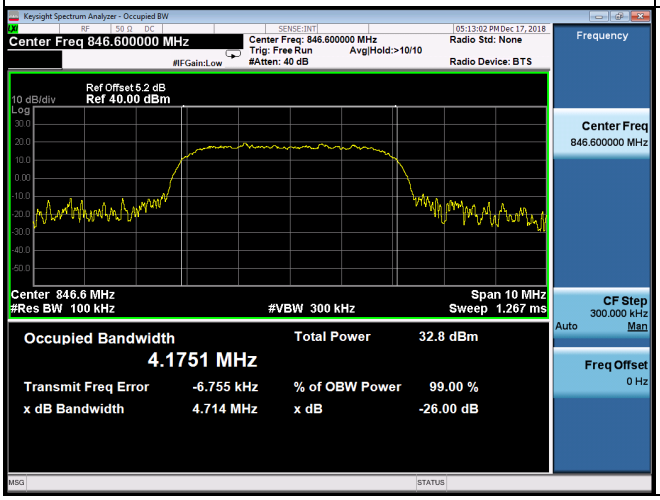

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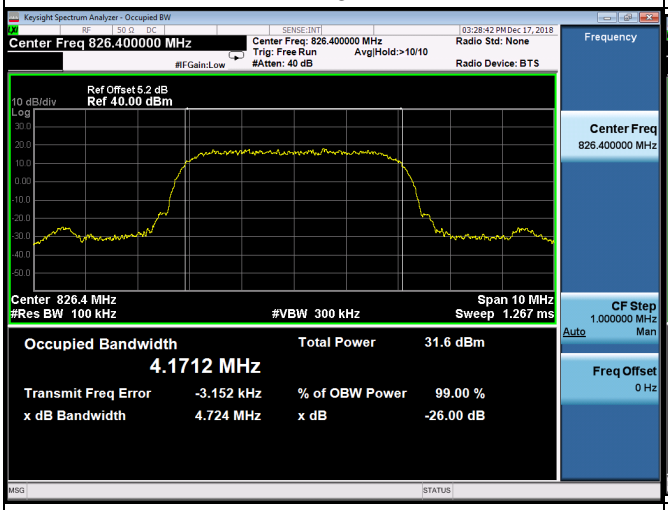
WCDMA_HSUPA Band V					
16QAM					
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	Channel	Frequency (MHz)	26dB Bandwidth (MHz)
4132	826.4	4.171	4132	826.4	4.724
4182	836.4	4.173	4182	836.4	4.722
4233	846.6	4.172	4233	846.6	4.720

Spectrum Plot

4132



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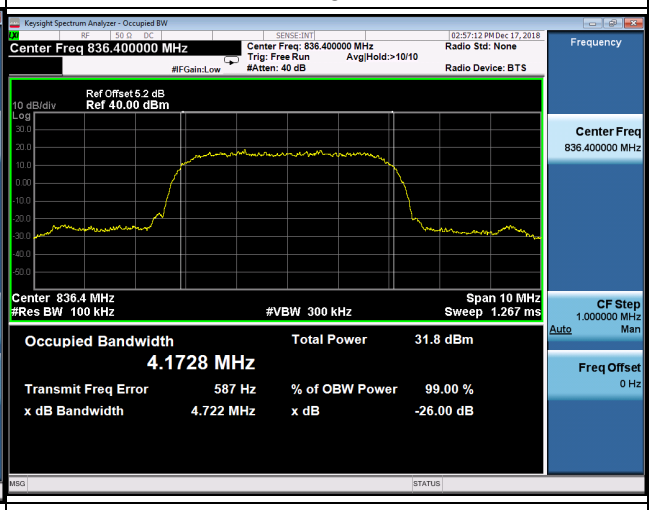

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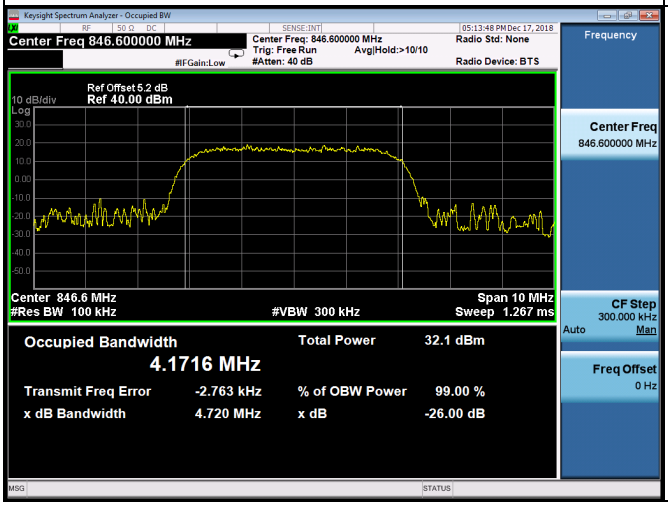

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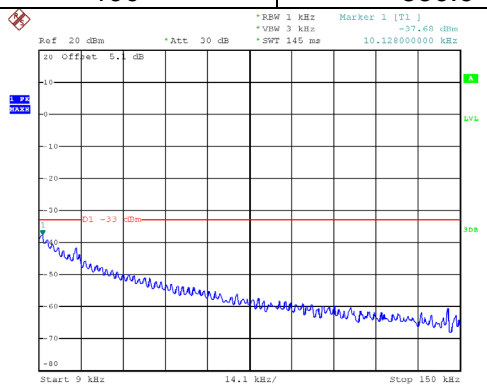
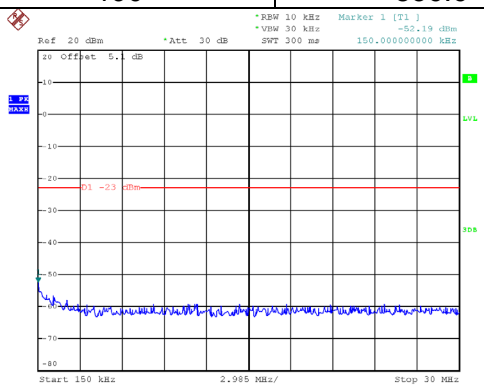
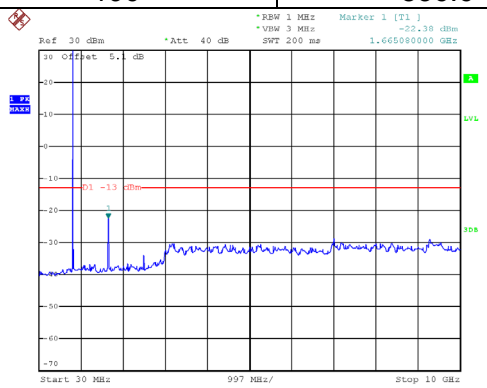
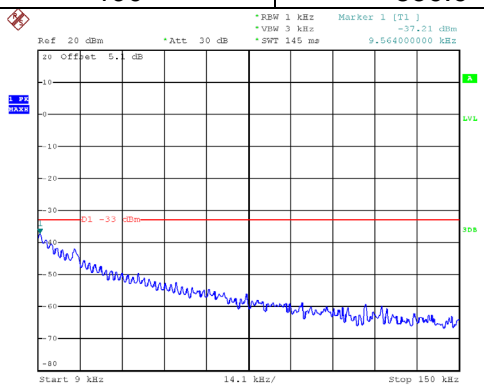
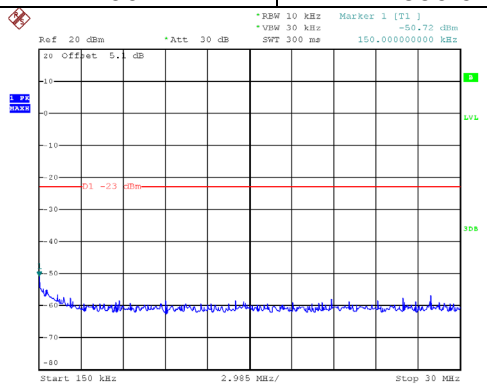
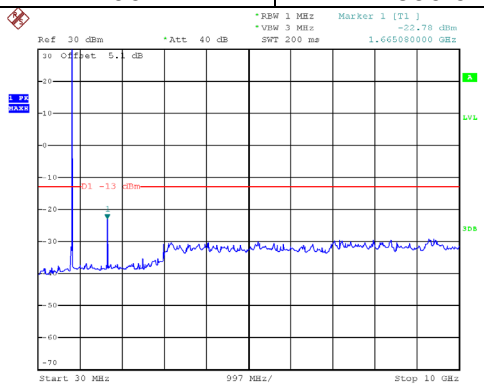
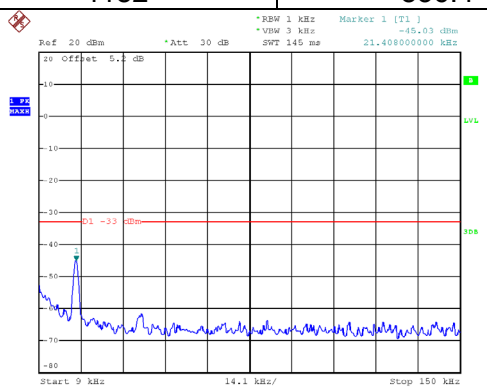
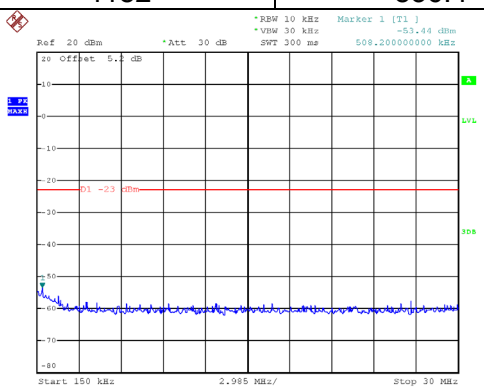
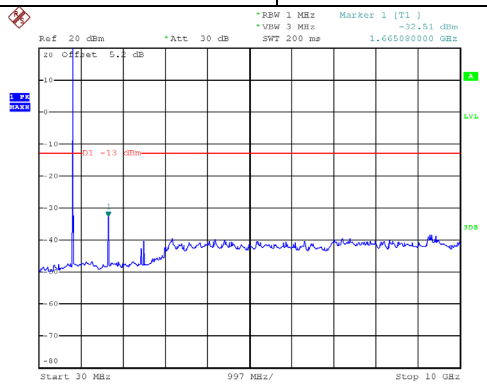
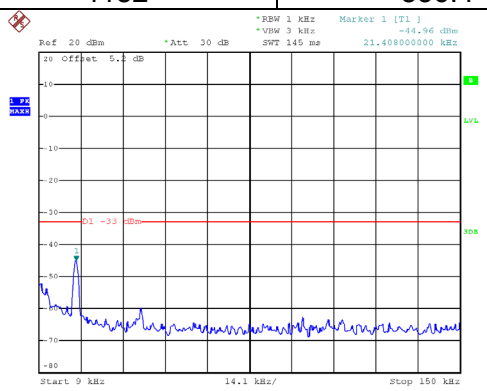
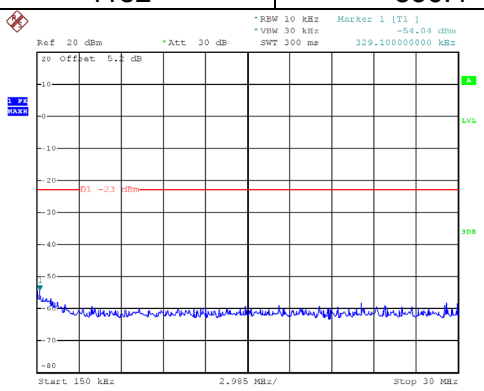
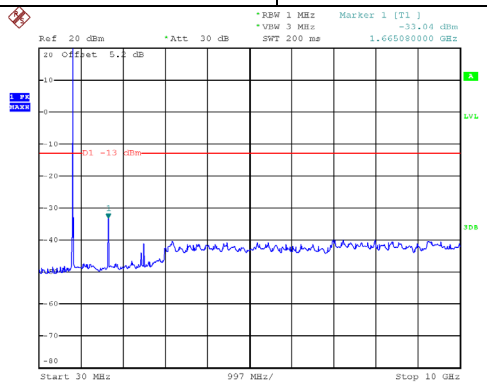
APPENDIX C - CONDUCTED EMISSIONS

GSM850			
GSM		GSM	
Channel	Frequency(MHz)	Channel	Frequency(MHz)
190	836.6	190	836.6
			
GSM		EDGE	
Channel	Frequency(MHz)	Channel	Frequency(MHz)
190	836.6	190	836.6
			
EDGE		EDGE	
Channel	Frequency(MHz)	Channel	Frequency(MHz)
190	836.6	190	836.6
			

WCDMA Band V			
Channel	Frequency(MHz)	Channel	Frequency(MHz)
4182	836.4	4182	836.4
			
Channel	Frequency(MHz)	-	-
4182	836.4	-	-
		-	

WCDMA_HSDPA Band V			
Channel	Frequency(MHz)	Channel	Frequency(MHz)
4182	836.4	4182	836.4
			
Channel	Frequency(MHz)	-	-
4182	836.4	-	-
		-	

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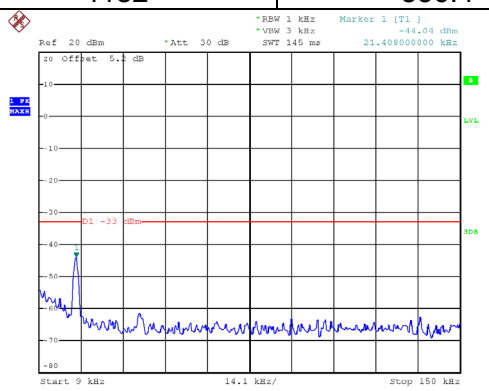
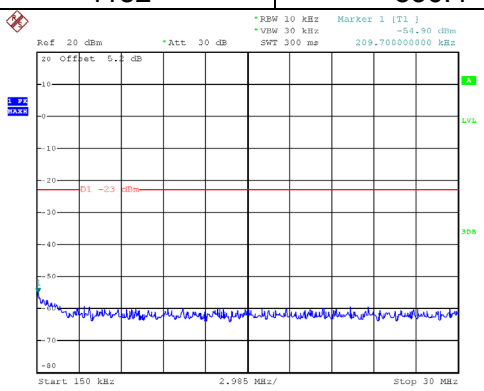
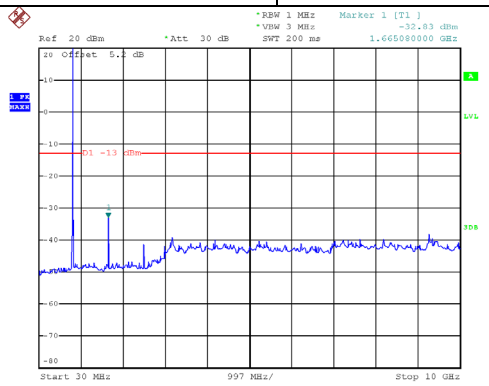
<tr><td>Channel</td><td>Frequency(MHz)</td><td>Channel</td><td>Frequency(MHz)</td></tr>
<tr><td>4182</td><td>836.4</td><td>4182</td><td>836.4</td></tr>
<tr><td> 
</td><td colspan="2"> 
</td></tr>
<tr><td>Channel</td><td>Frequency(MHz)</td><td>-</td><td>-</td></tr>
<tr><td>4182</td><td>836.4</td><td>-</td><td>-</td></tr>
<tr><td> 
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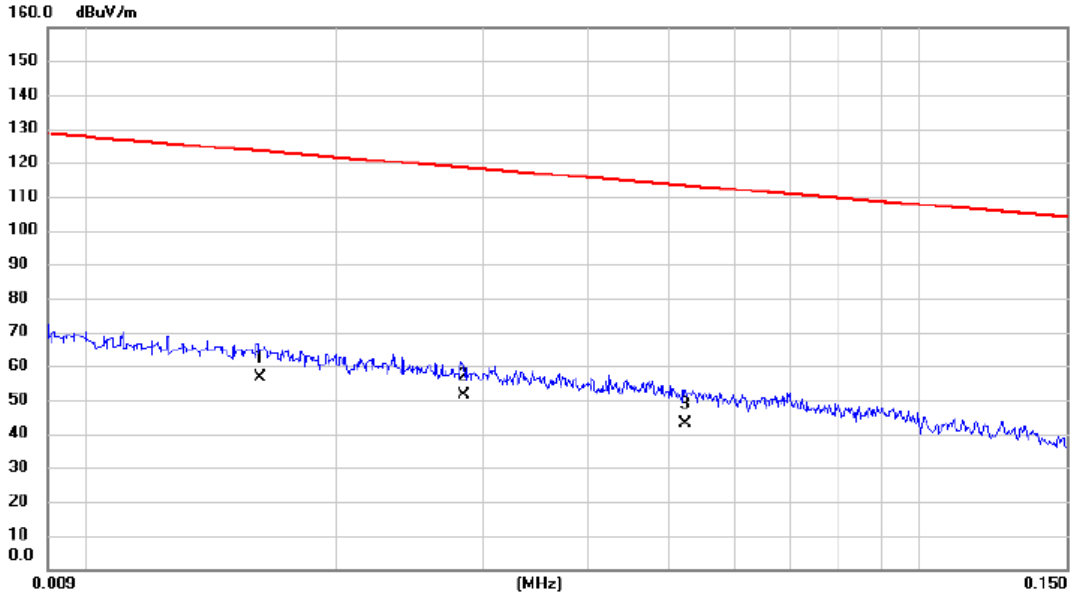
APPENDIX D - RADIATED EMISSION (9KHZ TO 30MHZ)

Test Mode:	TX Mode

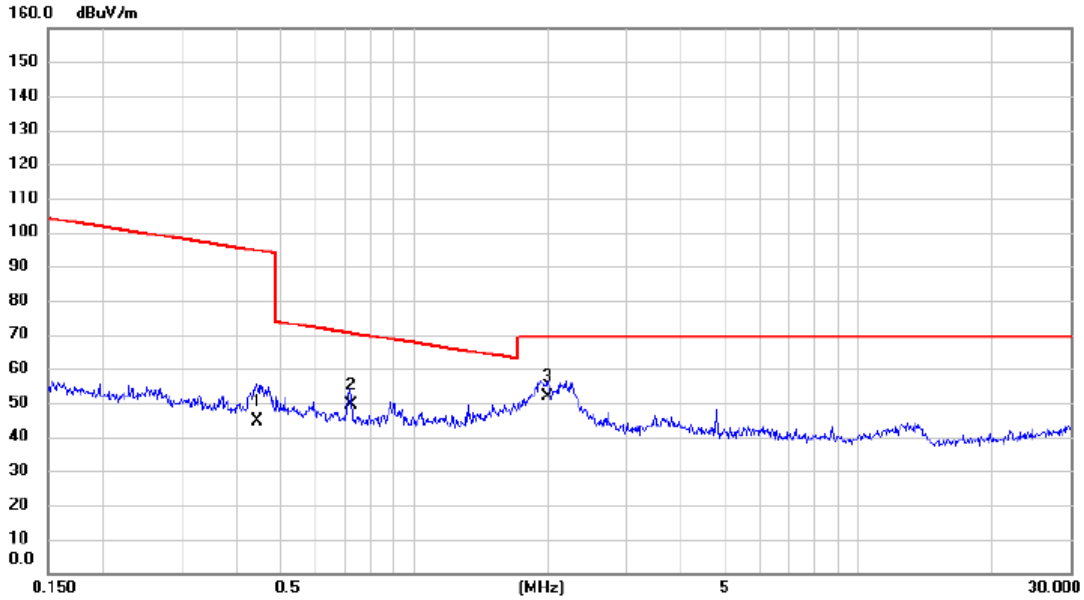
Ant 0°



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	0.0162	36.20	20.55	56.75	123.41	-66.66	AVG	
2		0.0284	31.60	19.88	51.48	118.54	-67.06	AVG	
3		0.0524	23.70	19.48	43.18	113.22	-70.04	AVG	

Test Mode:	TX Mode

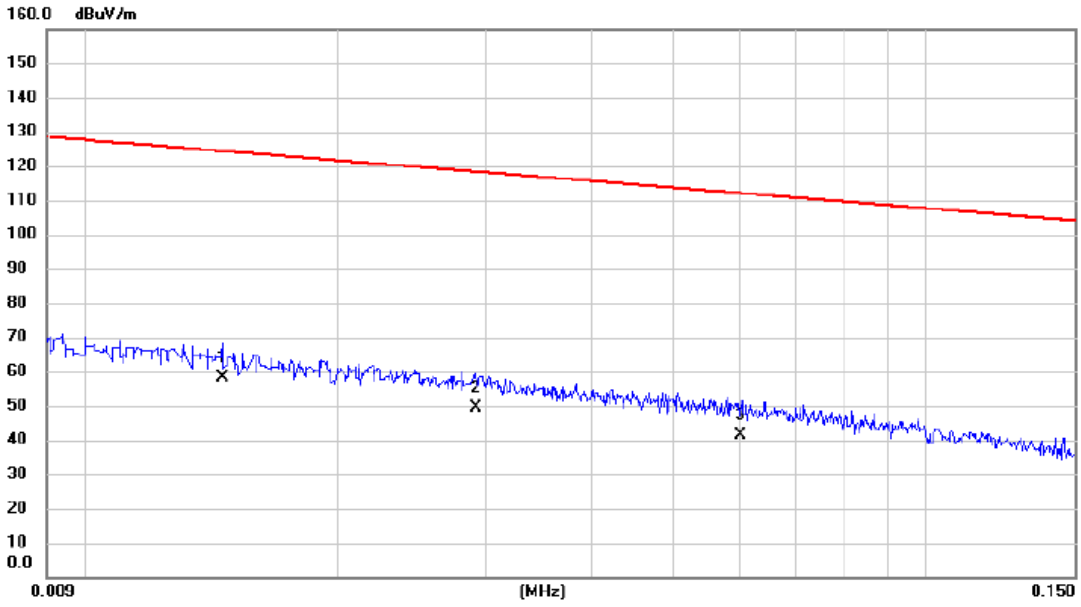
Ant 0°



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		0.4421	27.50	16.98	44.48	94.69	-50.21	AVG	
2		0.7198	32.40	16.89	49.29	70.46	-21.17	QP	
3	*	2.0011	34.50	17.12	51.62	69.54	-17.92	QP	

Test Mode:	TX Mode

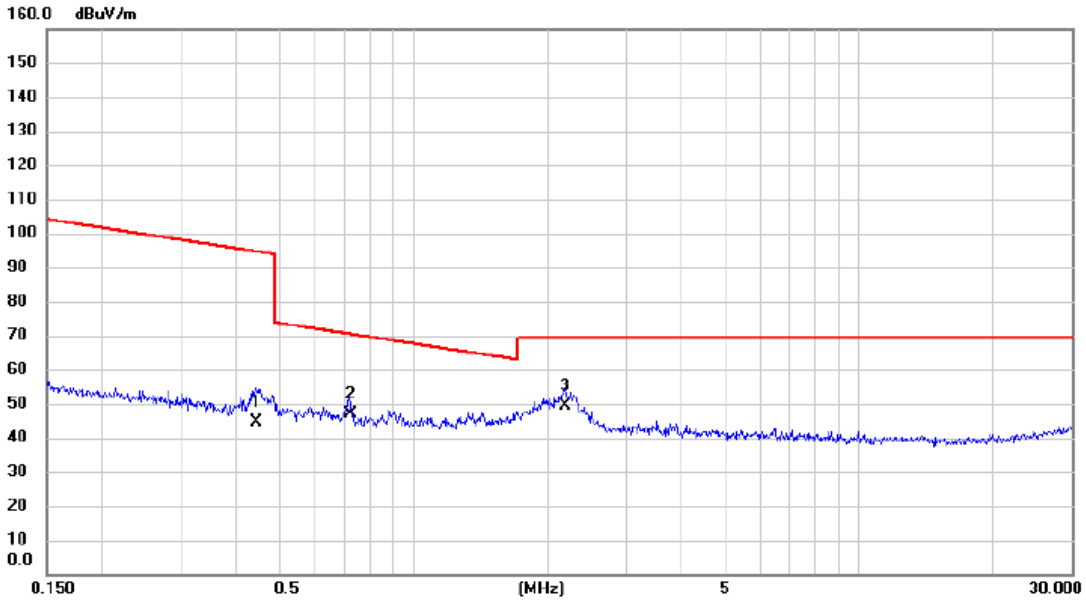
Ant 90°



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	0.0146	37.60	20.78	58.38	124.32	-65.94	AVG	
2		0.0292	29.40	19.87	49.27	118.30	-69.03	AVG	
3		0.0601	22.20	19.33	41.53	112.03	-70.50	AVG	

Test Mode:	TX Mode

Ant 90°

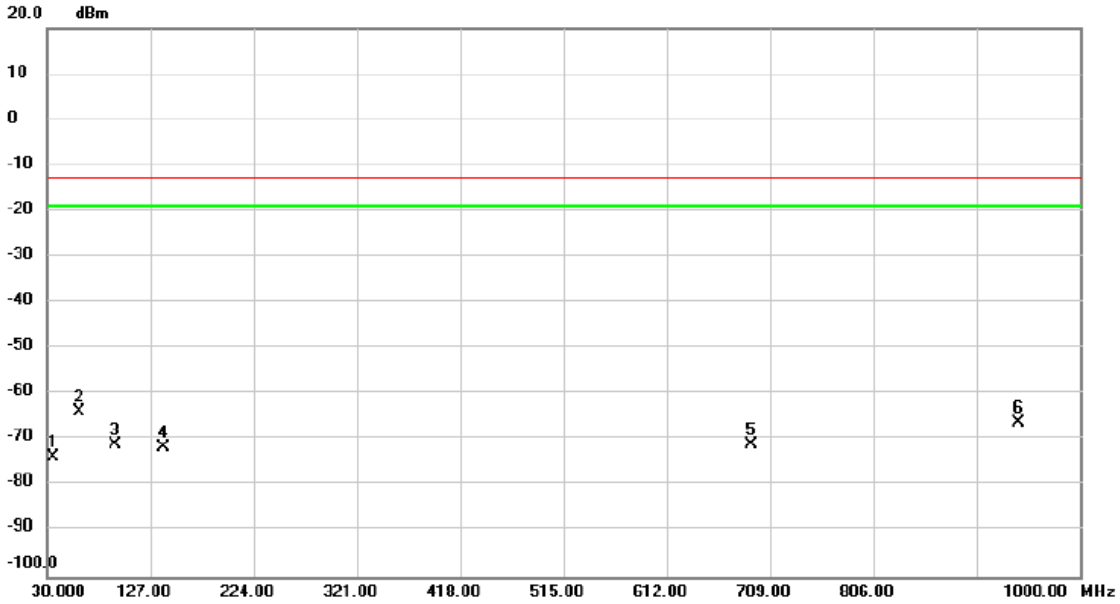


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		0.4421	27.60	16.98	44.58	94.69	-50.11	AVG	
2		0.7198	30.20	16.89	47.09	70.46	-23.37	QP	
3	*	2.1898	32.40	17.01	49.41	69.54	-20.13	QP	

APPENDIX E - RADIATED EMISSION (30MHZ TO 1GHZ)

Test Mode:	GSM850_TX CH190_GSM

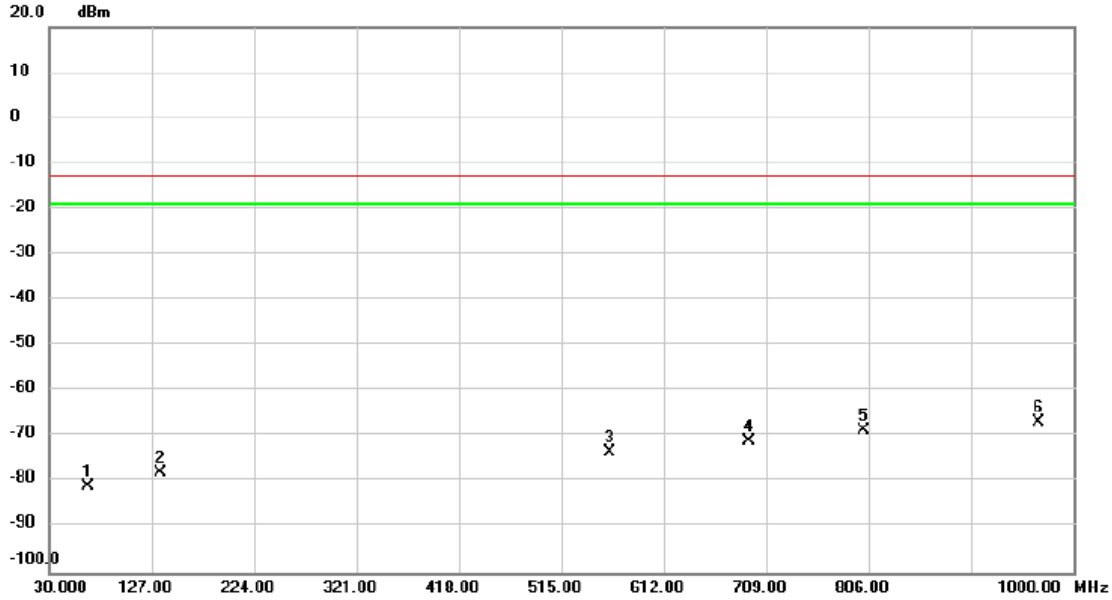
Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBm	dB	dBm	dBm	dB	Detector	Comment
1		36.305	-58.93	-14.93	-73.86	-13.00	-60.86	peak	
2	*	60.555	-48.21	-15.78	-63.99	-13.00	-50.99	peak	
3		94.020	-51.95	-19.11	-71.06	-13.00	-58.06	peak	
4		139.125	-59.49	-12.21	-71.70	-13.00	-58.70	peak	
5		691.540	-67.80	-3.16	-70.96	-13.00	-57.96	peak	
6		941.800	-67.19	1.07	-66.12	-13.00	-53.12	peak	

Test Mode:	GSM850_ TX CH190_GSM

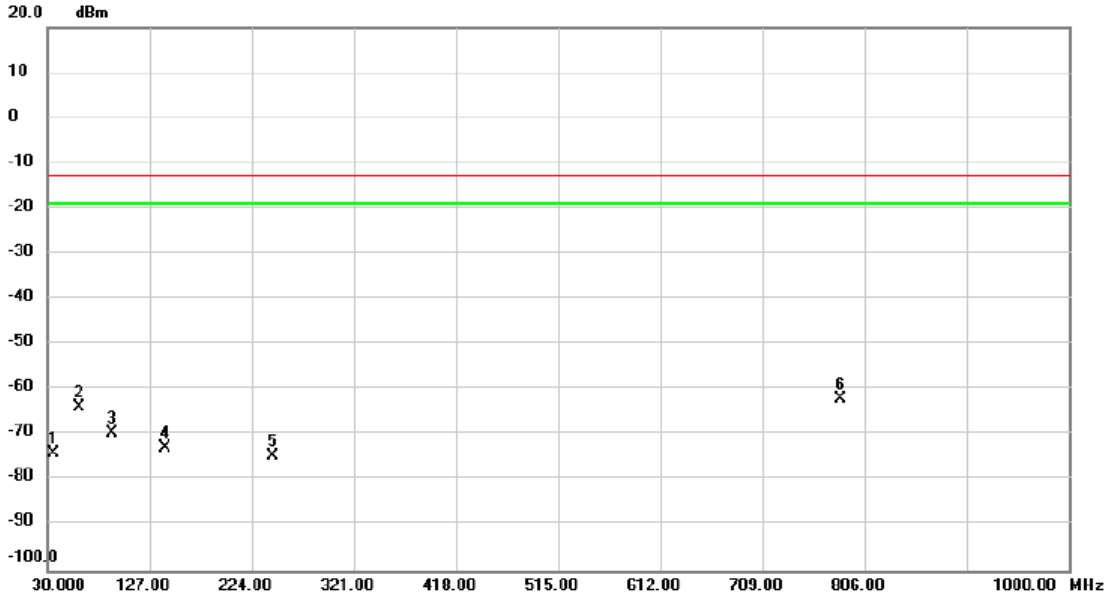
Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBm	dB	dBm	dBm	dB	Detector	Comment
1		66.375	-64.14	-16.76	-80.90	-13.00	-67.90	peak	
2		134.760	-65.27	-12.78	-78.05	-13.00	-65.05	peak	
3		560.590	-67.71	-5.65	-73.36	-13.00	-60.36	peak	
4		692.995	-68.02	-3.09	-71.11	-13.00	-58.11	peak	
5		801.150	-67.72	-1.07	-68.79	-13.00	-55.79	peak	
6	*	966.535	-67.89	1.02	-66.87	-13.00	-53.87	peak	

Test Mode:	GSM850_ TX CH190_EDGE

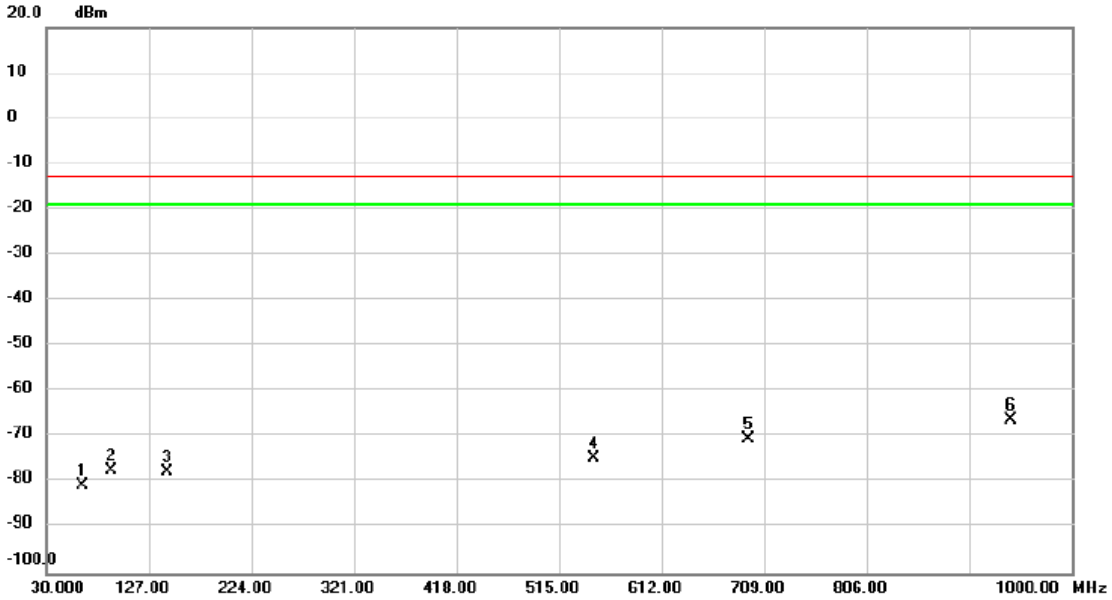
Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBm	dB	dBm	dBm	dB	Detector	Comment
1		36.305	-59.15	-14.93	-74.08	-13.00	-61.08	peak	
2		60.070	-48.19	-15.69	-63.88	-13.00	-50.88	peak	
3		91.595	-50.36	-19.32	-69.68	-13.00	-56.68	peak	
4		141.550	-60.74	-12.00	-72.74	-13.00	-59.74	peak	
5		244.370	-60.23	-14.51	-74.74	-13.00	-61.74	peak	
6	*	783.205	-60.11	-2.05	-62.16	-13.00	-49.16	peak	

Test Mode:	GSM850_ TX CH190_EDGE

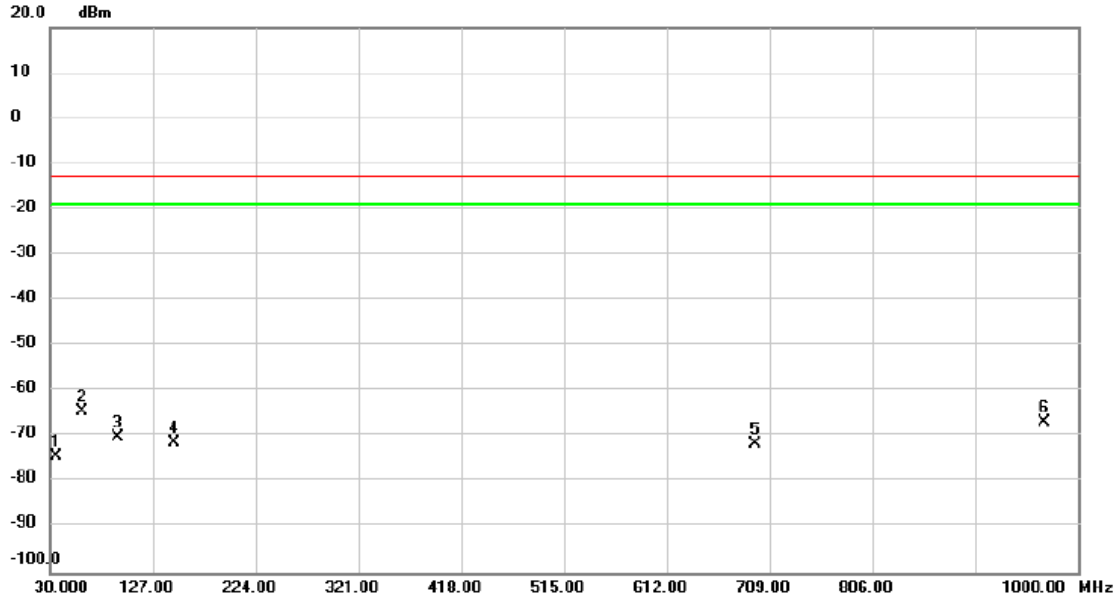
Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBm	dB	dBm	dBm	dB	Detector	Comment
1		64.435	-64.19	-16.44	-80.63	-13.00	-67.63	peak	
2		91.595	-57.93	-19.32	-77.25	-13.00	-64.25	peak	
3		143.975	-65.89	-11.86	-77.75	-13.00	-64.75	peak	
4		547.495	-69.01	-5.62	-74.63	-13.00	-61.63	peak	
5		693.965	-67.39	-3.05	-70.44	-13.00	-57.44	peak	
6	*	941.800	-67.34	1.07	-66.27	-13.00	-53.27	peak	

Test Mode:	WCDMA Band V_TX CH4182

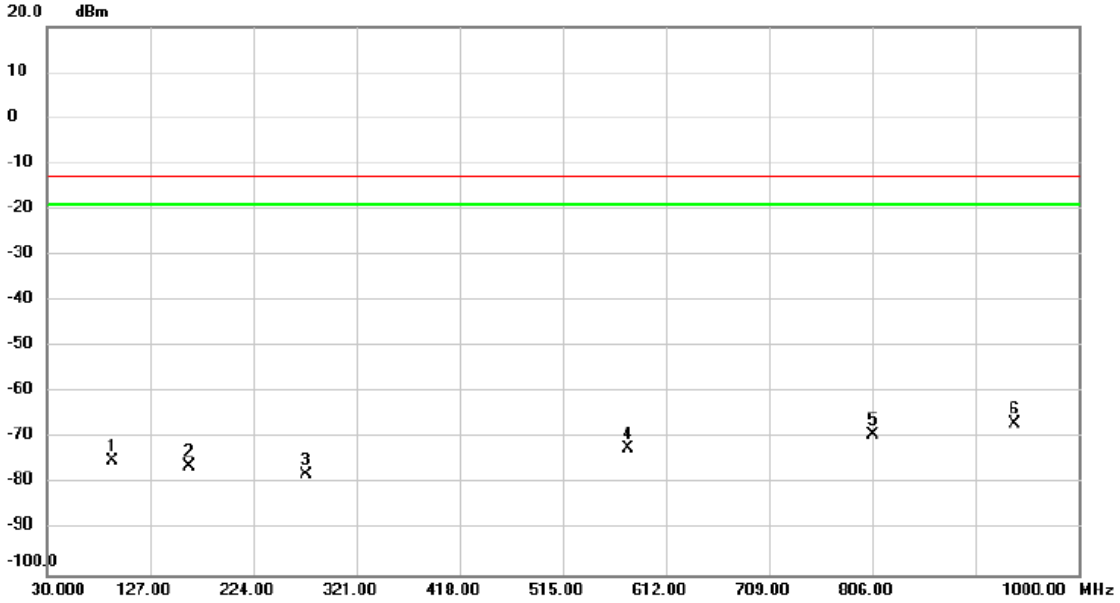
Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBm	dB	dBm	dBm	dB	Detector	Comment
1		36.305	-59.37	-14.93	-74.30	-13.00	-61.30	peak	
2	*	60.070	-48.78	-15.69	-64.47	-13.00	-51.47	peak	
3		94.020	-50.94	-19.11	-70.05	-13.00	-57.05	peak	
4		146.885	-59.71	-11.69	-71.40	-13.00	-58.40	peak	
5		695.905	-68.69	-2.95	-71.64	-13.00	-58.64	peak	
6		968.475	-67.93	0.97	-66.96	-13.00	-53.96	peak	

Test Mode:	WCDMA Band V_TX CH4182

Horizontal

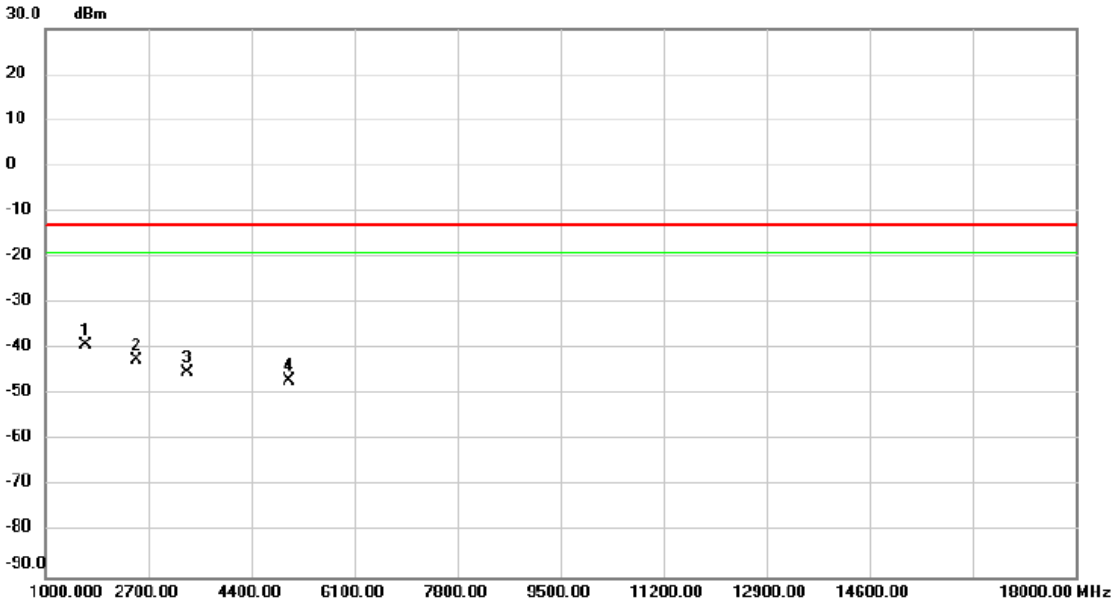


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBm	dB	dBm	dBm	dB	Detector	Comment
1		91.110	-55.62	-19.37	-74.99	-13.00	-61.99	peak	
2		163.375	-65.33	-10.81	-76.14	-13.00	-63.14	peak	
3		273.955	-65.88	-12.05	-77.93	-13.00	-64.93	peak	
4		576.110	-66.22	-5.90	-72.12	-13.00	-59.12	peak	
5		806.970	-68.12	-1.14	-69.26	-13.00	-56.26	peak	
6	*	940.345	-67.75	1.02	-66.73	-13.00	-53.73	peak	

APPENDIX F - RADIATED EMISSION (ABOVE 1GHZ)

Test Mode:	GSM850_ TX CH190_GSM

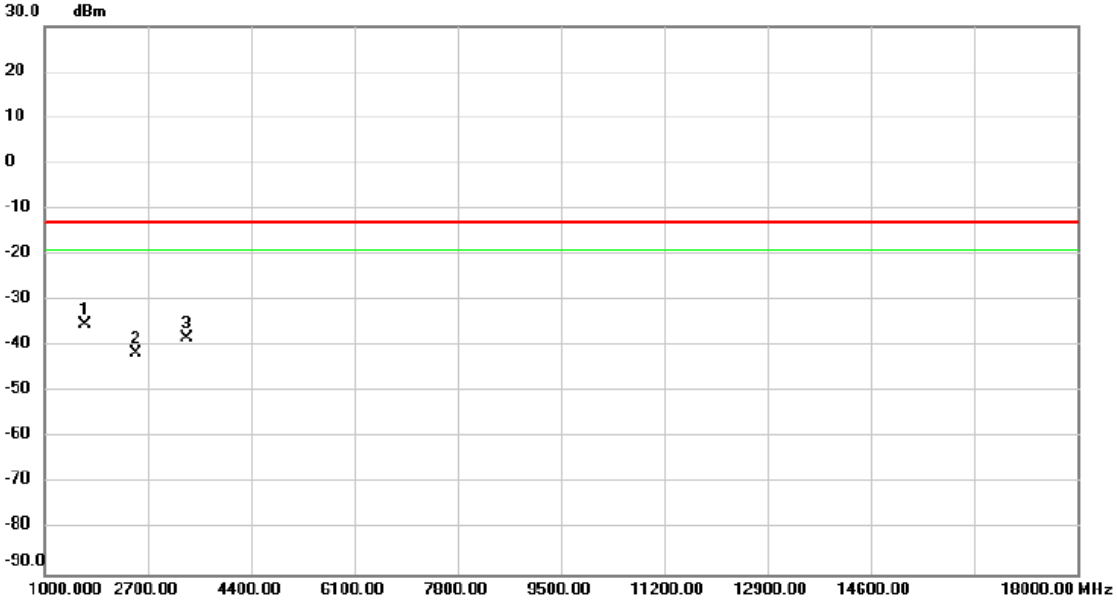
Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBm	dB	dBm	dBm	dB	Detector	Comment
1	*	1671.500	-35.00	-4.22	-39.22	-13.00	-26.22	peak	
2		2513.000	-39.63	-2.87	-42.50	-13.00	-29.50	peak	
3		3346.000	-45.97	0.84	-45.13	-13.00	-32.13	peak	
4		5020.500	-51.55	4.64	-46.91	-13.00	-33.91	peak	

Test Mode:	GSM850_ TX CH190_GSM

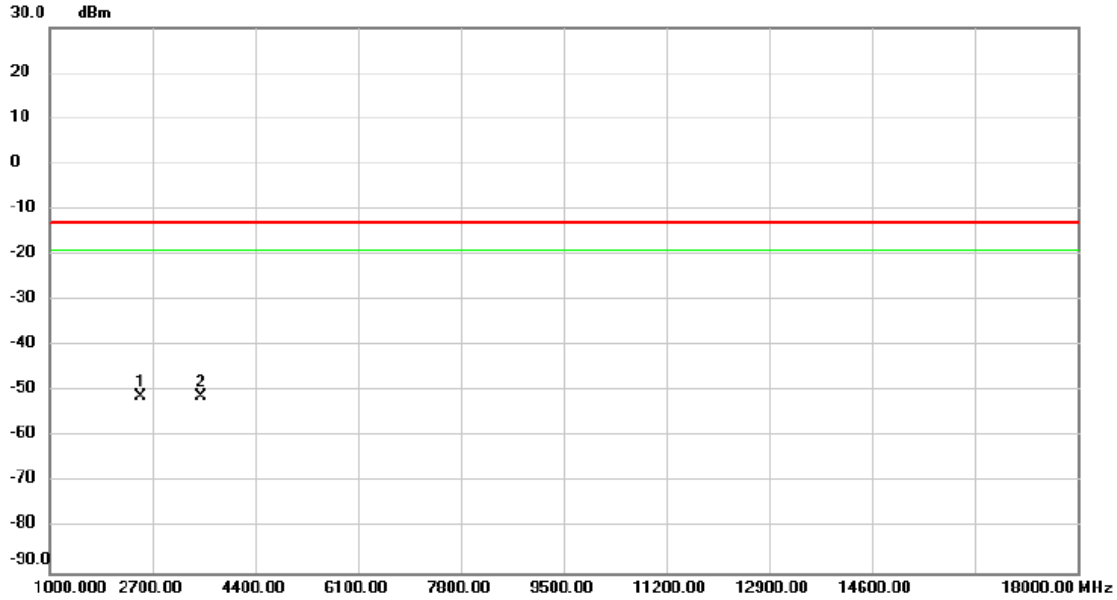
Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBm	dB	dBm	dBm	dB	Detector	Comment
1	*	1671.500	-30.96	-4.22	-35.18	-13.00	-22.18	peak	
2		2513.000	-38.55	-2.87	-41.42	-13.00	-28.42	peak	
3		3346.000	-38.98	0.84	-38.14	-13.00	-25.14	peak	

Test Mode:	GSM850_ TX CH190_EDGE

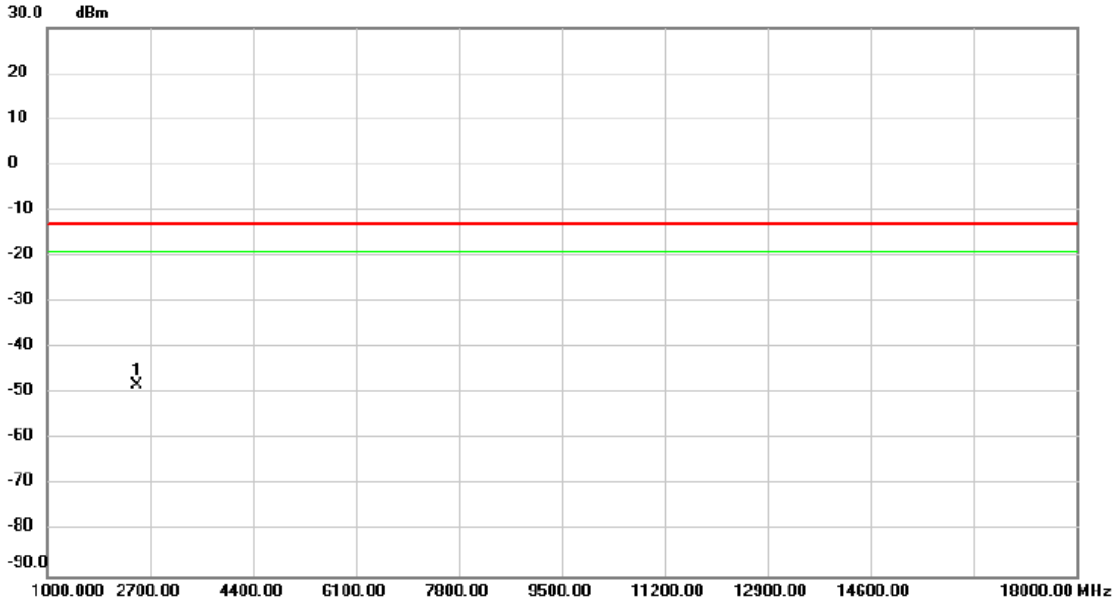
Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBm	dB	dBm	dBm	dB	Detector	Comment
1	*	2496.000	-48.31	-2.96	-51.27	-13.00	-38.27	peak	
2		3499.000	-52.21	0.92	-51.29	-13.00	-38.29	peak	

Test Mode:	GSM850_ TX CH190_EDGE

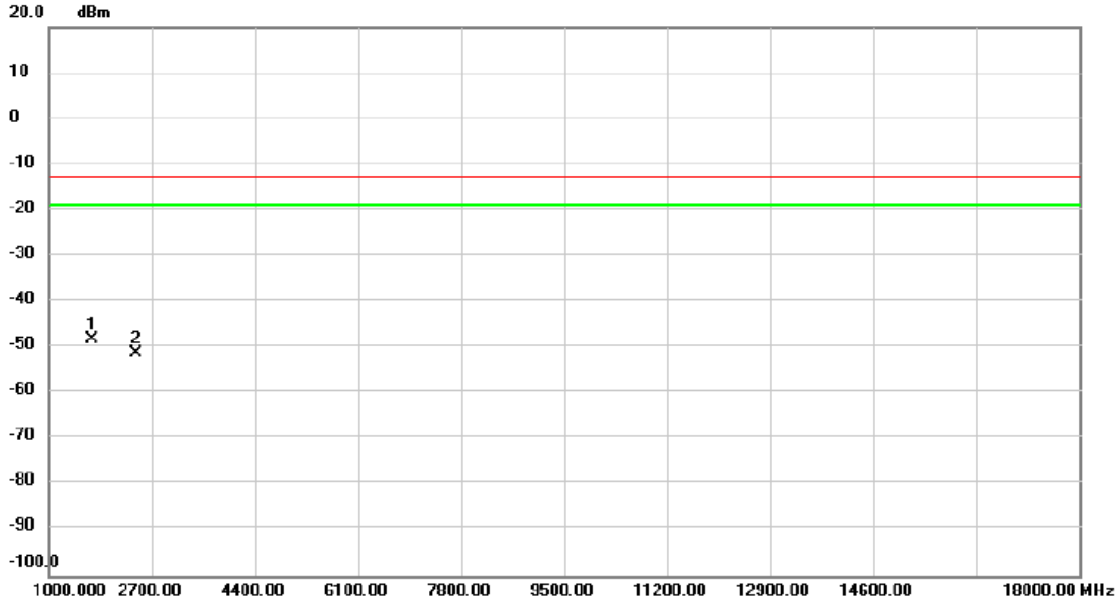
Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBm	dB	dBm	dBm	dB	Detector	Comment
1	*	2487.500	-45.19	-2.96	-48.15	-13.00	-35.15	peak	

Test Mode:	WCDMA Band V_TX CH4182

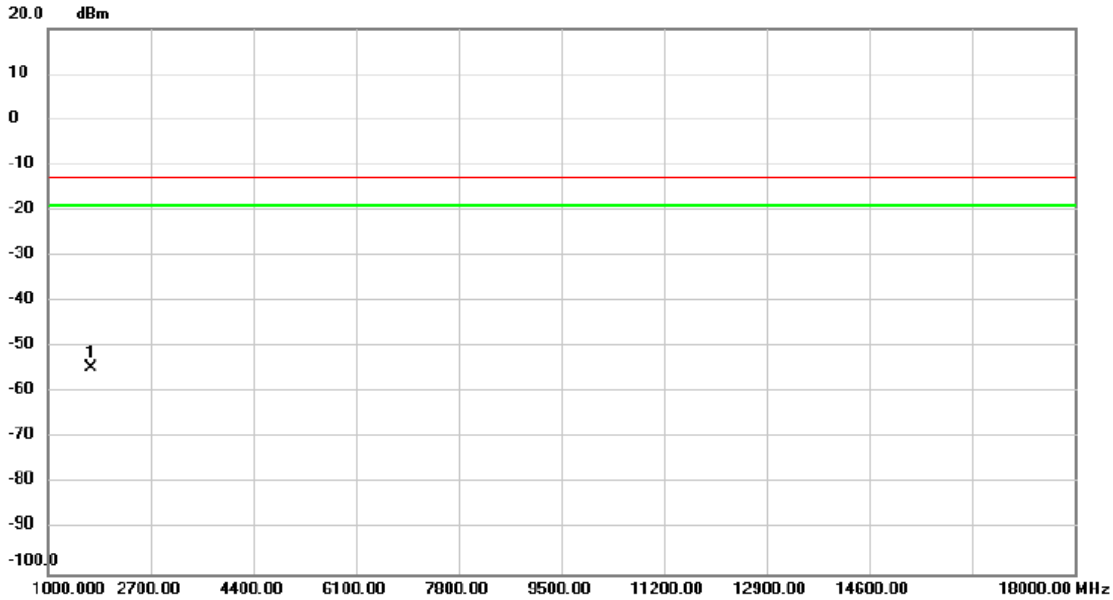
Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBm	dB	dBm	dBm	dB	Detector	Comment
1	*	1714.000	-44.13	-4.07	-48.20	-13.00	-35.20	peak	
2		2445.000	-48.16	-2.97	-51.13	-13.00	-38.13	peak	

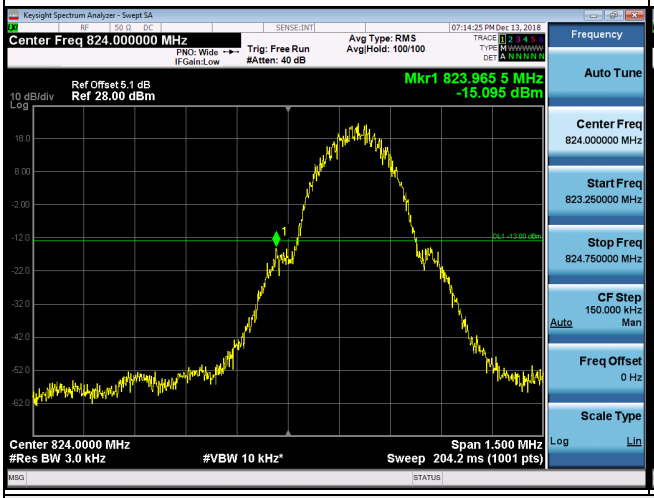
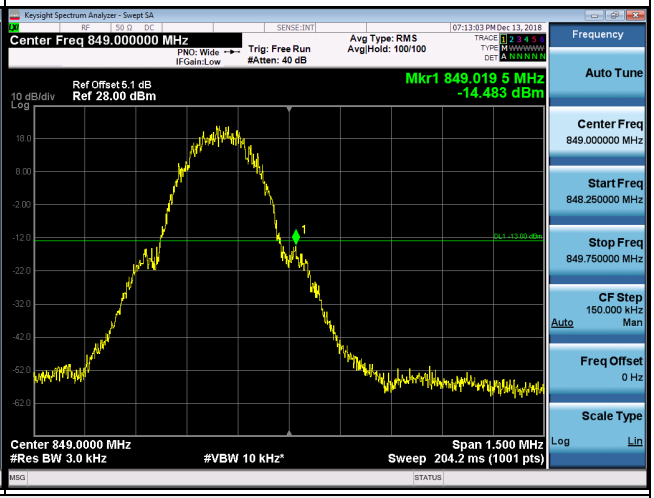
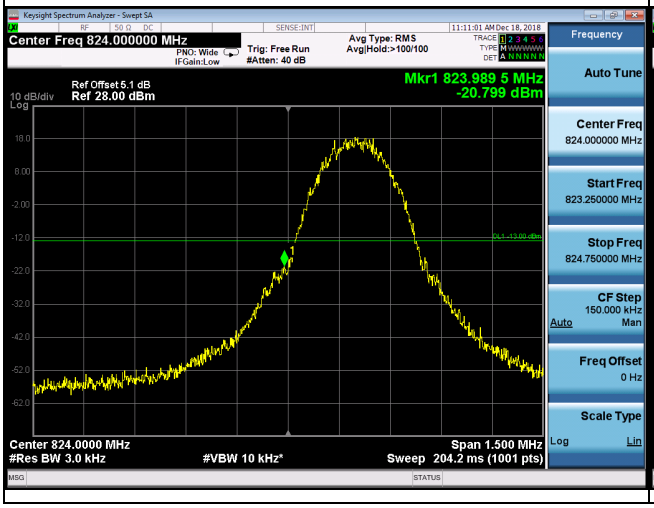
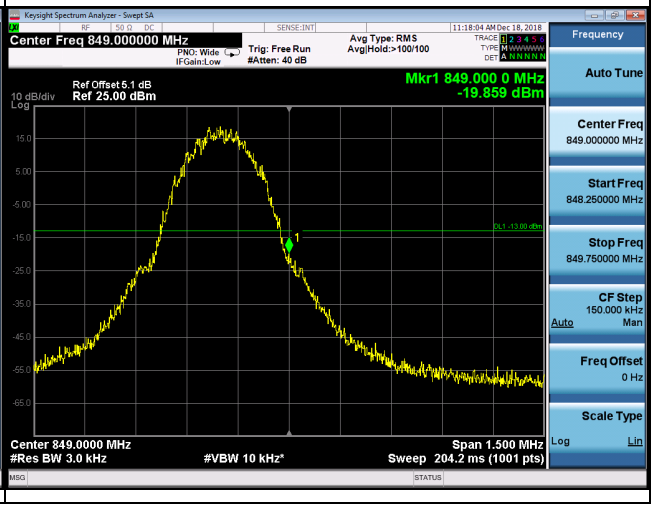
Test Mode:	WCDMA Band V_TX CH4182

Horizontal

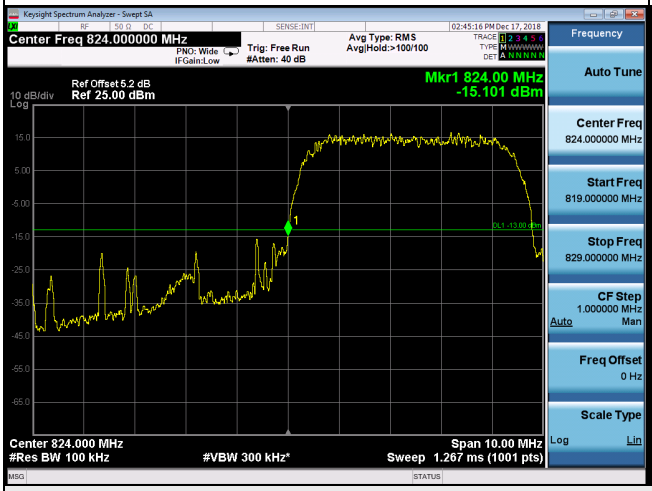


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBm	dB	dBm	dBm	dB	Detector	Comment
1	*	1714.000	-50.36	-4.07	-54.43	-13.00	-41.43	peak	

APPENDIX G - BAND EDGE

GSM850			
GSM			
Channel	128	Channel	251
			
EDGE			
Channel	128	Channel	251
			

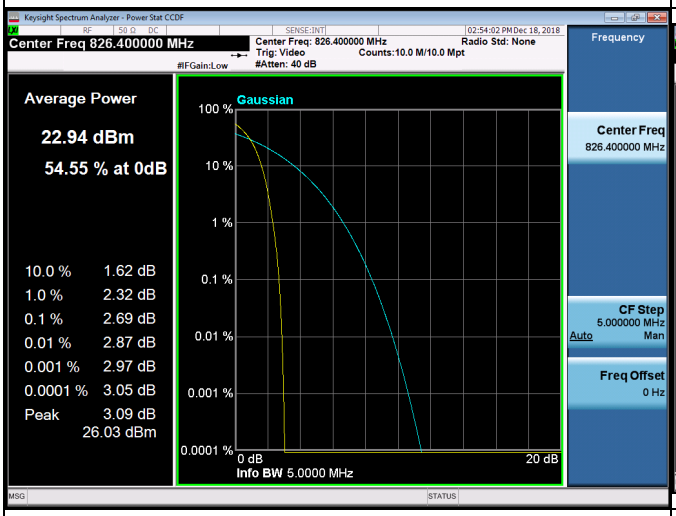
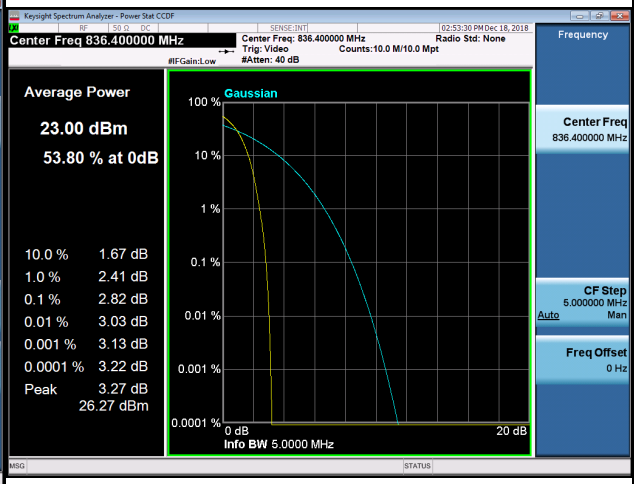
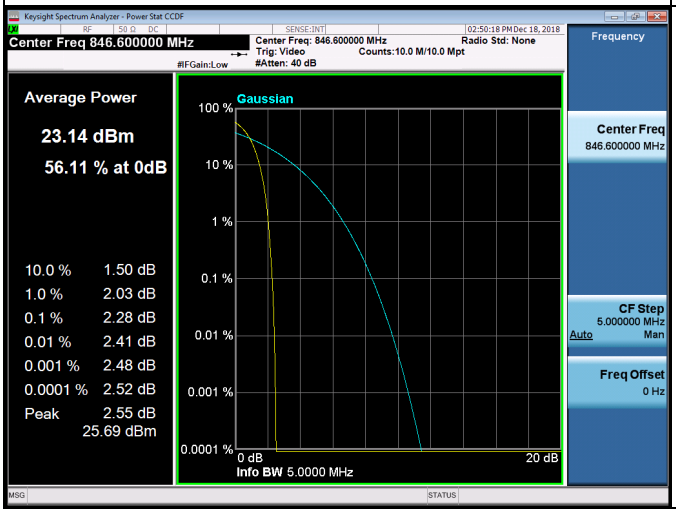
WCDMA Band V			
Channel	4132	Channel	4233
			

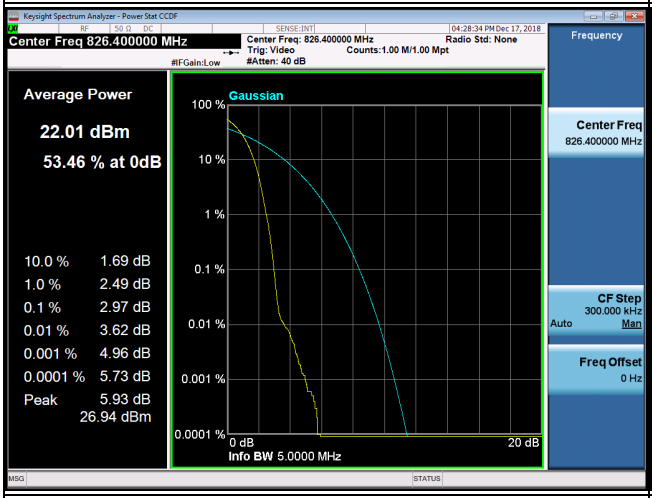
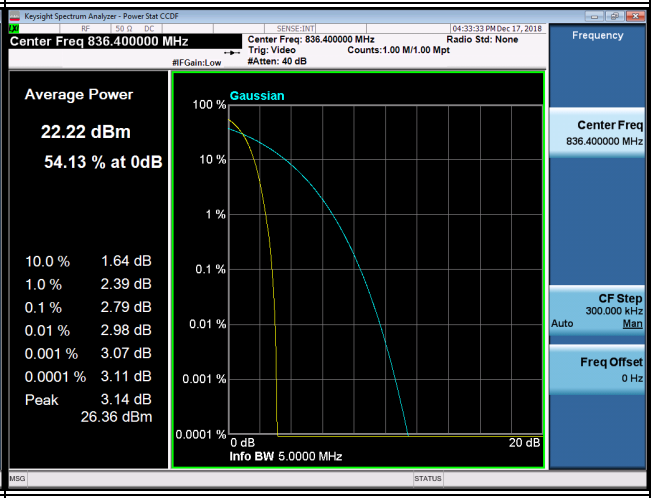
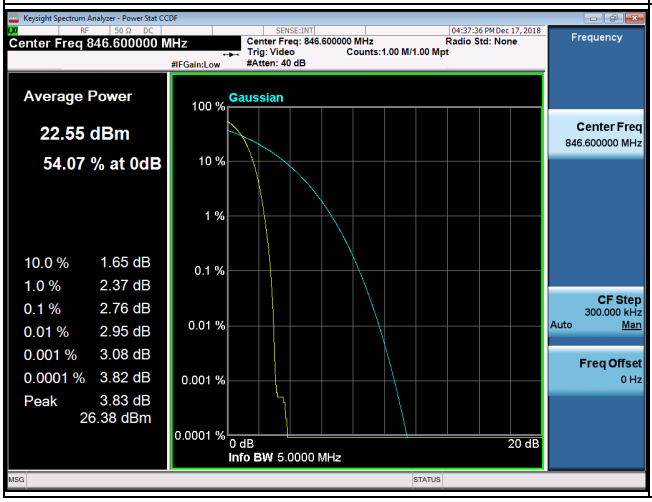
WCDMA_HSDPA Band V			
Channel	4132	Channel	4233
			

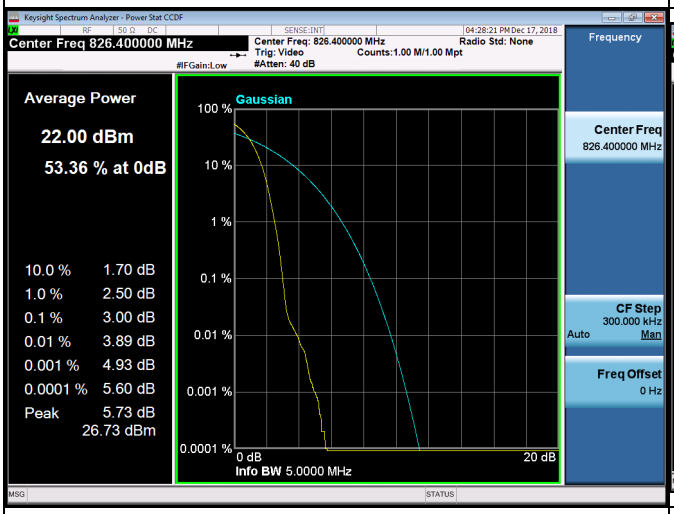
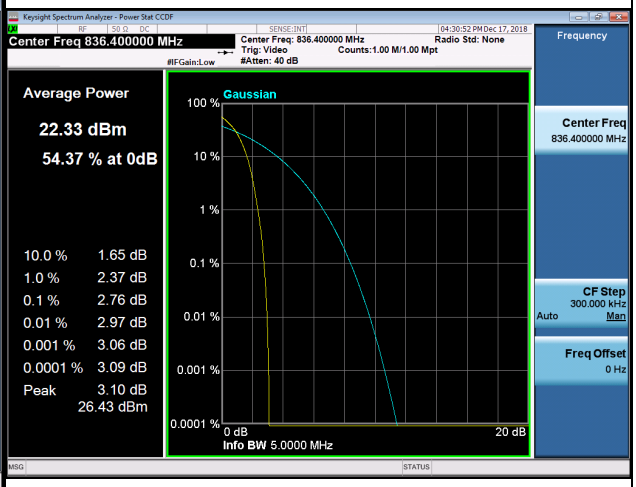
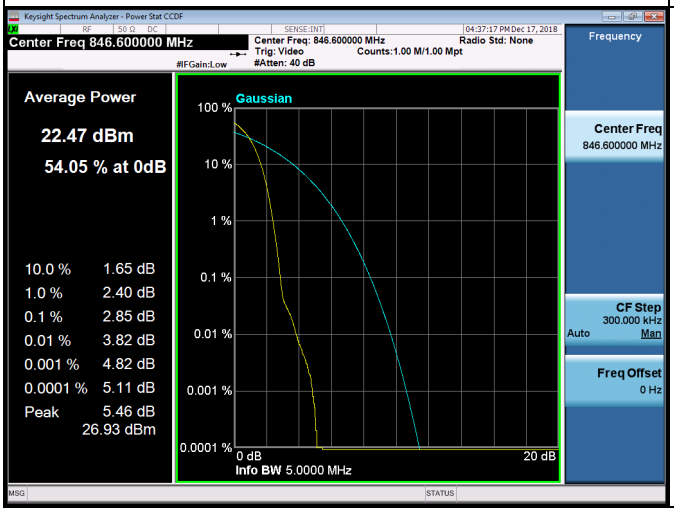
WCDMA_HSUPA Band V			
Channel	4132	Channel	4233
			

APPENDIX H - PEAK TO AVERAGE RATIO

GSM850							
GSM				EDGE			
CS				8PSK			
Channel	Frequency (MHz)	PAPR (dB)	Limit (dB)	Channel	Frequency (MHz)	PAPR (dB)	Limit (dB)
128	824.2	0.81	13	128	824.2	3.19	13
190	836.6	0.81	13	190	836.6	3.15	13
251	848.8	0.81	13	251	848.8	3.17	13

WCDMA Band V Spectrum Plot	
4132	4182
	
4233	-
	-

WCDMA_HSDPA Band V Spectrum Plot	
4132	4182
	
4233	-
	-

WCDMA_HSUPA Band V Spectrum Plot	
4132	4182
	
4233	-
	-

APPENDIX G - FREQUENCY STABILITY

Test Mode:	GSM850_CH190

Temperature vs. Frequency Stabiility

Temperature(℃)	Frequency Error (Hz)	Frequency Error (ppm)	Limit(ppm)
-10	5.33	0.006371026	±2.5
0	5.60	0.00714798	
10	6.52	0.005594071	
20	4.95	0.008044466	
30	7.00	0.006562276	
40	5.76	0.007817356	
50	6.81	0.00821181	
60	7.14	0.007554387	
Max. Deviation (ppm)	7.14	0.00821181	

Voltage vs. Frequency Stability

Voltage(Volts)	Frequency Error (Hz)	Frequency Error (ppm)	Limit(ppm)
4.35	3.45	0.0038011	±2.5
3.80	4.21	0.004709539	
3.50	3.85	0.004279225	
Max. Deviation (ppm)	4.21	0.004709539	

Test Mode:	WCDMA Band V_CH4182

Temperature vs. Frequency Stabiility

Temperature(℃)	Frequency Error (Hz)	Frequency Error (ppm)	Limit(ppm)
-10	4.60	0.006371026	±2.5
0	3.59	0.00714798	
10	7.53	0.005594071	
20	4.14	0.008044466	
30	8.77	0.006562276	
40	8.21	0.007817356	
50	2.71	0.00821181	
60	6.61	0.007554387	
Max. Deviation (ppm)	8.77	0.00821181	

Voltage vs. Frequency Stability

Voltage(Volts)	Frequency Error (Hz)	Frequency Error (ppm)	Limit(ppm)
4.35	3.65	0.0038011	±2.5
3.80	1.58	0.004709539	
3.50	4.23	0.004279225	
Max. Deviation (ppm)	4.23	0.004709539	

End of Test Report