FCC Test Report

FCC ID	:	**MXF-BC4GMCPG**
Equipment	:	**Router Wireless 4G**
Model No.	:	**BC-4GMCPGa**
Brand Name	:	**Blu-Castle**
Applicant	:	**Gemtek Technology Co., Ltd.**
Address	:	**No. 15-1 Zhonghua Road, Hsinchu Industrial Park, Hukou, Hsinchu, Taiwan, 30352.**
Standard	:	**47 CFR FCC Part 22 Subpart H**
Received Date	:	**Nov. 05, 2016**
Tested Date	:	**Nov. 22 ~ Nov. 25, 2016**

We, International Certification Corp., would like to declare that the tested sample has been evaluated and in compliance with the requirement of the above standards. The test results contained in this report refer exclusively to the product. It may be duplicated completely for legal use with the approval of the applicant. It shall not be reproduced except in full without the written approval of our laboratory.

Reviewed by:

Along Chen / Assistant Manager

Approved by:

Gary Chang / Manager

Testing Laboratory 2732

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Release Record

Report No.	Version	Description	Issued Date
FG6N0501P22	Rev. 01	Initial issue	Dec. 21, 2016

Summary of Test Results

FCC Rules	Test Items	Measured	Result
2.1046 / 22.913(a)(2)	Effective Radiated Power	Power[dBm]: GPRS: 33.28 WCDMA: 26.20	Pass
2.1053 / 22.917(a)	Radiated Emissions	Meet the requirement of limit	Pass
2.1051 / 22.917(a)	Conducted Emissions	Meet the requirement of limit	Pass
2.1051 / 22.917(a)	Band Edge	Meet the requirement of limit	Pass
2.1049	Occupied Bandwidth	Meet the requirement of limit	Pass
-	Peak to average ratio	Meet the requirement of limit	Pass
2.1055 / 22.355	Frequency Stability	Meet the requirement of limit	Pass

1 General Description

1.1 Information

1.1.1 Specification of the Equipment under Test (EUT)

Operating Band	GPRS: 824.2 ~ 848.8 MHz WCDMA: 826.4 ~ 846.6 MHz
Modulation	GPRS / EDGE WCDMA / HSDPA / HSUPA / DC-HSDPA
Multislot Class	33
3GPP Release Version	R5 / R6 / R8

1.1.2 Maximum ERP, Frequency Tolerance and Emission Designator

System	Modulation	Maximum ERP(W)	Frequency Tolerance (ppm)	Emission Designator
GPRS 850	GMSK	2.128	0.050	247KGXW
WCDMA 850	QPSK	0.417	0.039	4M15F9W

1.1.3 Antenna Details

Type	Gain (dBi)	Connector	Remark
Monopole	1.56	No	Internal antenna
Dipole	2.5	R-SMA	External antenna

Note: External antenna is for support unit only.

1.1.4 EUT Operational Condition

Supply Voltage	12Vdc from AC adapter		
Operational Voltage	☒ Vnom (120 V)	☒ Vmax (138 V)	☒ Vmin (102 V)
Operational Climatic	☒ Tnom (20°C)	☒ Tmax (50°C)	☒ Tmin (-30°C)

1.1.5 Accessories

No.	Equipment	Description
1	Adapter	Brand: APD Model: WA-12M12FU I/P: 100-240Vac, 50-60Hz, 0.5A Max. O/P: 12Vdc, 1A Power line: 1.2m non-shielded without core

1.1.6 Operating Channel List

GPRS		
	Channel	**Frequency (MHz)**
Low	128	824.2
Middle	190	836.6
High	251	848.8

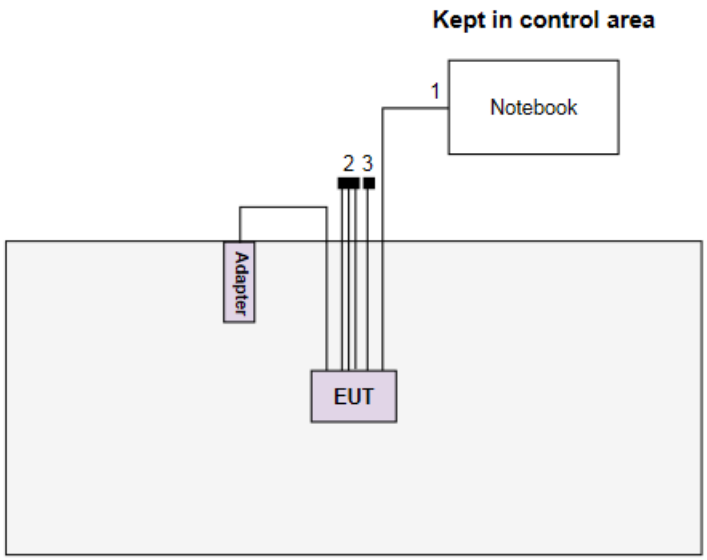
WCDMA		
	Channel	**Frequency (MHz)**
Low	4132	826.4
Middle	4182	836.4
High	4233	846.6

1.2 Local Support Equipment List

Support Equipment List						
No.	**Equipment**	**Brand**	**Model**	**S/N**	**FCC ID**	**Signal cable / Length (m)**
1	Notebook	DELL	Latitude E6430	74GB4X1	DoC	RJ45, 10m non-shielded.
2	RJ45 Load	ICC	---	---	---	RJ45, 1.5m (x3) non-shielded.
3	RJ11 Load	ICC	---	---	---	RJ11, 1.5m non-shielded.

1.3 Test Setup Chart

Test Setup Diagram



1. RJ45, 10m non-shielded
2. RJ45, 1.5m (x3) non-shielded with load
3. RJ11, 1.5m non-shielded with load

1.4 The Equipment List

Test Item	Radiated Emission				
Test Site	966 chamber1 / (03CH01-WS)				
Instrument	**Manufacturer**	**Model No.**	**Serial No.**	**Calibration Date**	**Calibration Until**
Radio Communication Analyzer	Anritsu	MT8820C	6201240341	Mar. 28, 2016	Mar. 27, 2017
Receiver	R&S	ESR3	101657	Jan. 12, 2016	Jan. 11, 2017
Bilog Antenna	SCHWARZBECK	VULB9168	VULB9168-522	Aug. 04, 2016	Aug. 03, 2017
Horn Antenna 1G-18G	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D 1096	Dec. 16, 2015	Dec. 15, 2016
Horn Antenna 18G-40G	SCHWARZBECK	BBHA 9170	BBHA 9170517	Oct. 25, 2016	Oct. 24, 2017
Loop Antenna	R&S	HFH2-Z2	100330	Nov. 10, 2016	Nov. 09, 2017
Loop Antenna Cable	KOAX KABEL	101354-BW	101354-BW	Dec. 10, 2015	Dec. 09, 2016
Preamplifier	EMC	EMC02325	980225	Aug. 05, 2016	Aug. 04, 2017
Preamplifier	Agilent	83017A	MY39501308	Oct. 06, 2016	Oct. 05, 2017
Preamplifier	EMC	EMC184045B	980192	Aug. 24, 2016	Aug. 23, 2017
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16014/4	Dec. 10, 2015	Dec. 09, 2016
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16019/4	Dec. 10, 2015	Dec. 09, 2016
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16139/4	Dec. 10, 2015	Dec. 09, 2016
LF cable 1M	EMC	EMCCFD400-NM-NM-1000	16052	Dec. 10, 2015	Dec. 09, 2016
LF cable 3M	Woken	CFD400NL-LW	CFD400NL-001	Dec. 10, 2015	Dec. 09, 2016
LF cable 10M	Woken	CFD400NL-LW	CFD400NL-002	Dec. 10, 2015	Dec. 09, 2016
Measurement Software	AUDIX	e3	6.120210g	NA	NA
Note: Calibration Interval of instruments listed above is one year.					

Test Item	RF Conducted				
Test Site	(TH01-WS)				
Instrument	**Manufacturer**	**Model No.**	**Serial No.**	**Calibration Date**	**Calibration Until**
Spectrum Analyzer	R&S	FSV40	101063	Feb. 17, 2016	Feb. 16, 2017
Spectrum Analyzer	Agilent	N9010A	MY53400091	Sep. 09, 2016	Sep. 08, 2017
TEMP&HUMIDITY CHAMBER	GIANT FORCE	GCT-225-40-SP-SD	MAF1212-002	Nov. 27, 2015	Nov. 26, 2016
Power Meter	Anritsu	ML2495A	1241002	Oct. 06, 2016	Oct. 05, 2017
Power Sensor	Anritsu	MA2411B	1207366	Oct. 06, 2016	Oct. 05, 2017
Radio Communication Analyzer	Anritsu	MT8820C	6201240341	Mar. 28, 2016	Mar. 27, 2017
AC POWER SOURCE	APC	AFC-500W	F312060012	Oct. 28, 2016	Oct. 27, 2017
Measurement Software	Sporton	Sporton_1	1.3.30	NA	NA
Note: Calibration Interval of instruments listed above is one year.					

1.5 Test Standards

According to the specification of EUT, the EUT must comply with following standards.

47 CFR FCC Part 22 Subpart H
ANSI C63.4-2014
ANSI/TIA-603-D 2010
FCC KDB 971168 D01 Power Meas License Digital Systems v02r02
FCC KDB 412172 D01 Determining ERP and EIRP v01r01

1.6 Measurement Uncertainty

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor (k=2).

Measurement Uncertainty	
Parameters	**Uncertainty**
Bandwidth	±34.134 Hz
Conducted power	±0.808 dB
Frequency error	±34.134 Hz
Conducted emission	±2.670 dB
Radiated emission ≤ 1GHz	±3.66 dB
Radiated emission > 1GHz	±5.63 dB
Temperature	±0.6 ^{o}C

2 Test Configuration

2.1 Testing Condition and Location Information

Test Item	Test Site	Ambient Condition	Tested By
Radiated Emissions	03CH01-WS	24°C / 62%	Vincent Yeh
RF Conducted	TH01-WS	23°C / 64%	Alex Huang

- FCC site registration No.: 181692
- IC site registration No.: 10807A-1

2.2 The Worst Test Modes and Channel Details

Test item	Mode	Test Channel
Effective Radiated Power	GPRS WCDMA	128, 190, 251 4132, 4182, 4233
Radiated Emissions ≤ 1GHz	GPRS WCDMA	190 4132
Radiated Emissions > 1GHz	GPRS WCDMA	128, 190, 251 4132, 4182, 4233
Conducted Emissions	GPRS WCDMA	128, 190, 251 4132, 4182, 4233
Band Edge	GPRS WCDMA	128, 251 4132, 4233
Occupied Bandwidth	GPRS WCDMA	128, 190, 251 4132, 4182, 4233
Peak to average ratio	GPRS WCDMA	128, 190, 251 4132, 4182, 4233
Frequency Stability	GPRS WCDMA	190 4182

NOTE:

1. For Radiated Emissions test, external and internal antenna was tested as below configuration.
   Configuration 1: with internal antenna
   Configuration 2: with external antenna

3 Test Results

3.1 Effective Radiated Power

3.1.1 Limit of Effective Radiated Power

The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.

3.1.2 Test Procedures

For Conducted Power Measurement

1. The EUT links up with simulator and is set to maximum output power level at low / middel / high channel.
2. Measure the output power of low / middle / high channel of the EUT

For ERP Measurement

EPR can be calculated by below formula from KDB 412172 D01.

1. EIRP = $P_T + G_T - L_C$

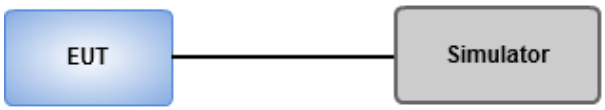
   P_T = transmitter output power, in dBm.

   G_T = gain of the transmitting antenna, in dBi (EIRP).

   L_C = signal attenuation in the connecting cable between the transmitter and antenna, in dB.
2. ERP = EIRP – 2.15 dB.

3.1.3 Test Setup

Conducted Power Measurement



3.1.4 Test Result of Conducted Output Power (dBm)

Band	GPRS 850		
Channel	128	190	251
Frequency (MHz)	824.2	836.6	848.8
GPRS 8 (GMSK, 1 slot)	32.82	**32.93**	32.65
GPRS 10 (GMSK, 2 slots)	32.69	32.88	32.54
GPRS 11 (GMSK, 3 slots)	32.54	32.75	32.40
GPRS 12 (GMSK, 4 slots)	32.37	32.57	32.27
EDGE 8 (8PSK , 1 slot)	29.74	29.90	29.57
EDGE 10 (8PSK, 2 slots)	29.66	29.80	29.49
EDGE 11 (8PSK, 3 slots)	29.57	29.76	29.42
EDGE 12 (8PSK, 4 slots)	29.52	29.72	29.35
GPRS 30 (GMSK, 1 slot)	32.67	32.91	32.64
GPRS 31(GMSK, 2 slots)	32.60	32.88	32.56
GPRS 32(GMSK, 3 slots)	32.46	32.75	32.42
GPRS 33(GMSK, 4 slots)	32.29	32.57	32.24
EDGE 30 (8PSK, 1 slot)	29.74	29.88	29.55
EDGE 31 (8PSK, 2 slots)	29.68	29.81	29.48
EDGE 32 (8PSK, 3 slots)	29.61	29.78	29.41
EDGE 33 (8PSK, 4 slots)	29.57	29.71	29.38

Band	WCDMA V		
Channel	4132	4182	4233
Frequency (MHz)	826.4	836.4	846.6
RMC 12.2kbps	**25.85**	25.84	25.44
HSDPA Subtest-1	23.88	24.8	24.55
HSDPA Subtest-2	24.07	24.72	24.51
HSDPA Subtest-3	23.55	24.24	24.13
HSDPA Subtest-4	23.58	24.34	24.03
DC-HSDPA Subtest-1	23.76	24.74	24.38
DC-HSDPA Subtest-2	23.97	24.61	24.38
DC-HSDPA Subtest-3	23.36	24.09	24.01
DC-HSDPA Subtest-4	23.39	24.17	23.92
HSUPA Subtest-1	23.39	24.78	24.32
HSUPA Subtest-2	23.41	24.43	24.00
HSUPA Subtest-3	22.72	23.56	23.40
HSUPA Subtest-4	23.45	23.94	23.78
HSUPA Subtest-5	23.86	24.69	24.59

3.1.5 Test Result of Effective Radiated Power (dBm)

Mode	GPRS						
Channel	**Frequency (MHz)**	**Max Conducted Output Power (dBm)**	**Max Antenna Gain (dBi)**	**EIRP (dBm)**	**ERP (dBm)**	**ERP (W)**	**Limit (W)**
128	824.2	32.82	2.5	35.32	33.17	2.075	7
190	**836.6**	**32.93**	**2.5**	**35.43**	**33.28**	**2.128**	**7**
251	848.8	32.65	2.5	35.15	33.00	1.995	7

Mode	WCDMA						
Channel	**Frequency (MHz)**	**Max Conducted Output Power (dBm)**	**Max Antenna Gain (dBi)**	**EIRP (dBm)**	**ERP (dBm)**	**ERP (W)**	**Limit (W)**
4132	826.4	25.85	2.5	28.35	26.20	0.417	7
4182	836.4	25.84	2.5	28.34	26.19	0.416	7
4233	846.6	25.44	2.5	27.94	25.79	0.379	7

NOTE: ERP = EIRP - 2.15dB.

3.2 Radiated Emissions

3.2.1 Limit of Radiated Emissions

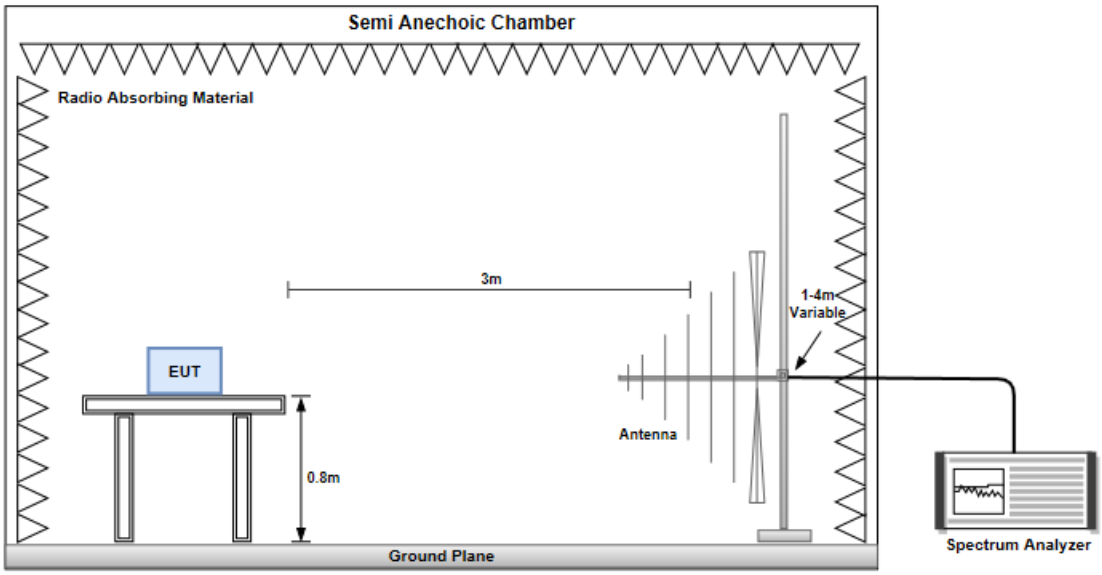
The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB equal to -13dBm.

3.2.2 Test Procedures

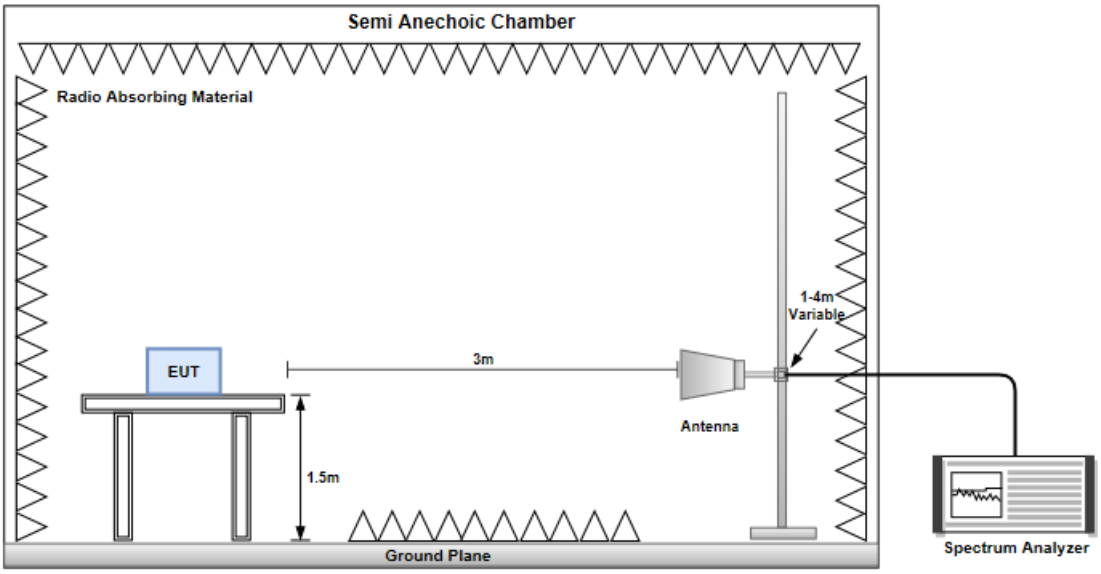
1. Measurement is made at a semi-anechoic chamber that incorporates a turntable allowing a EUT rotation of 360°. A continuously-rotating, remotely-controlled turntable is installed at the test site to support the EUT and facilitate determination of the direction of maximum radiation for each EUT emission frequency. The EUT is placed at test table. For emissions testing at or below 1 GHz, the table height is 80 cm above the reference ground plane. For emission measurements above 1 GHz, the table height is 1.5 m
2. Measurement is made with the antenna positioned in both the horizontal and vertical planes of polarization. The measurement antenna is varied in height (1m ~ 4m) above the reference ground plane to obtain the maximum signal strength. Distance between EUT and antenna is 3 m.
3. This investigation is performed with the EUT rotated 360°, the antenna height scanned between 1 m and 4 m, and the antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations.
4. After finding the max radiated emission, substitution method will be used for getting effective radiated power. EUT will be removed and substitution antenna will be placed at same position. Signal generator will output CW signal to substitution antenna through a RF cable. Rotate turntable and move antenna to find maximum radiated emission. Adjust output power of signal generator to let the maximum radiated emission is same as step 3. Record the output power level.
5. E.I.R.P = output power of step 4 + gain of substitution antenna – cable loss of RF cable. ERP can be calculated by below formula:
   E.R.P= E.I.R.P – 2.15dB

3.2.3 Test Setup

Radiated Emissions below 1 GHz



Radiated Emissions above 1 GHz



Configuration 1: with internal antenna

3.2.4 Test Result of Radiated Emissions below 1GHz

Mode	GPRS, Channel: 190						
Frequency (MHz)	**Antenna Polarity**	**E.R.P (dBm)**	**Limit (dBm)**	**Margin (dB)**	**S.A Reading (dBm)**	**S.G Power Value (dBm)**	**Correction Factor (dB)**
39.70	H	-60.28	-13.00	-47.28	-65.89	-45.80	-12.33
78.50	H	-63.53	-13.00	-50.53	-59.35	-58.58	-2.80
125.06	H	-63.08	-13.00	-50.08	-59.84	-59.97	-0.96
159.01	H	-65.54	-13.00	-52.54	-63.06	-63.08	-0.31
250.19	H	-67.01	-13.00	-54.01	-62.36	-69.32	4.46
715.79	H	-46.39	-13.00	-33.39	-51.87	-47.86	3.62
39.70	V	-54.37	-13.00	-41.37	-50.01	-39.89	-12.33
88.20	V	-58.29	-13.00	-45.29	-56.06	-56.36	0.22
125.06	V	-56.42	-13.00	-43.42	-54.84	-53.31	-0.96
250.19	V	-59.73	-13.00	-46.73	-60.09	-62.04	4.46
573.20	V	-59.13	-13.00	-46.13	-65.38	-60.75	3.77
714.82	V	-46.62	-13.00	-33.62	-53.72	-48.10	3.63

NOTE: ERP = S.G power value + correction factor - 2.15.

Mode	WCDMA, Channel: 4132						
Frequency (MHz)	**Antenna Polarity**	**E.R.P (dBm)**	**Limit (dBm)**	**Margin (dB)**	**S.A Reading (dBm)**	**S.G Power Value (dBm)**	**Correction Factor (dB)**
40.67	H	-61.37	-13.00	-48.37	-66.86	-47.01	-12.21
77.53	H	-65.15	-13.00	-52.15	-61.08	-59.91	-3.09
125.06	H	-61.81	-13.00	-48.81	-58.57	-58.70	-0.96
250.19	H	-67.67	-13.00	-54.67	-63.02	-69.98	4.46
571.26	H	-63.62	-13.00	-50.62	-66.84	-65.26	3.79
713.85	H	-50.50	-13.00	-37.50	-55.90	-51.99	3.64
39.70	V	-54.15	-13.00	-41.15	-49.79	-39.67	-12.33
125.06	V	-56.03	-13.00	-43.03	-54.45	-52.92	-0.96
250.19	V	-60.18	-13.00	-47.18	-60.54	-62.49	4.46
425.76	V	-64.11	-13.00	-51.11	-65.38	-66.11	4.15
565.44	V	-61.69	-13.00	-48.69	-67.63	-63.38	3.84
714.82	V	-43.56	-13.00	-30.56	-50.66	-45.04	3.63

NOTE: ERP = S.G power value + correction factor - 2.15.

Configuration 2: with external antenna

3.2.5 Test Result of Radiated Emissions below 1GHz

Mode	GPRS, Channel: 190						
Frequency (MHz)	**Antenna Polarity**	**E.R.P (dBm)**	**Limit (dBm)**	**Margin (dB)**	**S.A Reading (dBm)**	**S.G Power Value (dBm)**	**Correction Factor (dB)**
38.73	H	-62.32	-13.00	-49.32	-67.94	-47.70	-12.47
125.06	H	-62.72	-13.00	-49.72	-59.48	-59.61	-0.96
158.04	H	-64.30	-13.00	-51.30	-61.83	-61.78	-0.37
250.19	H	-66.32	-13.00	-53.32	-61.67	-68.63	4.46
571.26	H	-62.58	-13.00	-49.58	-65.80	-64.22	3.79
713.85	H	-50.29	-13.00	-37.29	-55.69	-51.78	3.64
40.67	V	-44.03	-13.00	-31.03	-39.70	-29.67	-12.21
61.04	V	-56.96	-13.00	-43.96	-52.06	-46.94	-7.87
125.06	V	-58.23	-13.00	-45.23	-56.65	-55.12	-0.96
250.19	V	-65.57	-13.00	-52.57	-65.93	-67.88	4.46
573.20	V	-61.83	-13.00	-48.83	-68.08	-63.45	3.77
714.82	V	-49.50	-13.00	-36.50	-56.60	-50.98	3.63

NOTE: ERP = S.G power value + correction factor - 2.15.

Mode	WCDMA, Channel: 4132						
Frequency (MHz)	**Antenna Polarity**	**E.R.P (dBm)**	**Limit (dBm)**	**Margin (dB)**	**S.A Reading (dBm)**	**S.G Power Value (dBm)**	**Correction Factor (dB)**
39.70	H	-62.48	-13.00	-49.48	-68.09	-48.00	-12.33
125.06	H	-61.16	-13.00	-48.16	-57.92	-58.05	-0.96
156.10	H	-64.57	-13.00	-51.57	-62.12	-61.95	-0.47
250.19	H	-66.83	-13.00	-53.83	-62.18	-69.14	4.46
564.47	H	-63.21	-13.00	-50.21	-66.33	-64.91	3.85
713.85	H	-46.70	-13.00	-33.70	-52.10	-48.19	3.64
40.67	V	-55.60	-13.00	-42.60	-51.27	-41.24	-12.21
87.23	V	-57.42	-13.00	-44.42	-55.02	-55.19	-0.08
125.06	V	-55.37	-13.00	-42.37	-53.79	-52.26	-0.96
250.19	V	-59.88	-13.00	-46.88	-60.24	-62.19	4.46
564.47	V	-62.04	-13.00	-49.04	-67.94	-63.74	3.85
721.61	V	-44.61	-13.00	-31.61	-51.83	-46.05	3.59

NOTE: ERP = S.G power value + correction factor - 2.15.

Configuration 1: with internal antenna

3.2.6 Test Result of Radiated Emissions above 1GHz

Mode	GPRS, Channel: 128						
Frequency (MHz)	**Antenna Polarity**	**E.R.P (dBm)**	**Limit (dBm)**	**Margin (dB)**	**S.A Reading (dBm)**	**S.G Power Value (dBm)**	**Correction Factor (dB)**
1648.40	H	-42.69	-13.00	-29.69	-45.75	-45.34	4.80
2479.20	H	-47.38	-13.00	-34.38	-55.52	-51.29	6.06
3305.60	H	-44.37	-13.00	-31.37	-54.27	-48.66	6.44
1648.40	V	-46.67	-13.00	-33.67	-49.56	-49.32	4.80
2479.20	V	-48.67	-13.00	-35.67	-56.83	-52.58	6.06
3305.60	V	-43.41	-13.00	-30.41	-53.38	-47.70	6.44

Mode	GPRS, Channel: 190						
Frequency (MHz)	**Antenna Polarity**	**E.R.P (dBm)**	**Limit (dBm)**	**Margin (dB)**	**S.A Reading (dBm)**	**S.G Power Value (dBm)**	**Correction Factor (dB)**
1673.20	H	-42.14	-13.00	-29.14	-45.36	-44.85	4.86
2509.80	H	-46.78	-13.00	-33.78	-54.93	-50.70	6.07
3346.40	H	-42.26	-13.00	-29.26	-52.02	-46.64	6.53
1673.20	V	-44.21	-13.00	-31.21	-47.25	-46.92	4.86
2509.80	V	-45.86	-13.00	-32.86	-53.98	-49.78	6.07
3346.40	V	-42.96	-13.00	-29.96	-52.82	-47.34	6.53

Mode	GPRS, Channel: 251						
Frequency (MHz)	**Antenna Polarity**	**E.R.P (dBm)**	**Limit (dBm)**	**Margin (dB)**	**S.A Reading (dBm)**	**S.G Power Value (dBm)**	**Correction Factor (dB)**
1697.60	H	-45.00	-13.00	-32.00	-48.37	-47.78	4.93
2546.40	H	-48.26	-13.00	-35.26	-56.41	-52.19	6.08
3395.20	H	-44.65	-13.00	-31.65	-54.24	-49.11	6.61
1697.60	V	-46.29	-13.00	-33.29	-49.47	-49.07	4.93
2546.40	V	-45.64	-13.00	-32.64	-53.70	-49.57	6.08
3395.20	V	-44.74	-13.00	-31.74	-54.47	-49.20	6.61

NOTE: ERP = S.G power value + correction factor - 2.15.

Mode	WCDMA, Channel: 4132						
Frequency (MHz)	Antenna Polarity	E.R.P (dBm)	Limit (dBm)	Margin (dB)	S.A Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)
1652.80	H	-54.86	-13.00	-41.86	-57.94	-57.52	4.81
2479.20	H	-51.28	-13.00	-38.28	-59.42	-55.19	6.06
3305.60	H	-49.85	-13.00	-36.85	-59.75	-54.15	6.45
1652.80	V	-57.54	-13.00	-44.54	-60.44	-60.20	4.81
2479.20	V	-51.78	-13.00	-38.78	-59.94	-55.69	6.06
3305.60	V	-52.62	-13.00	-39.62	-62.59	-56.92	6.45

Mode	WCDMA, Channel: 4182						
Frequency (MHz)	Antenna Polarity	E.R.P (dBm)	Limit (dBm)	Margin (dB)	S.A Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)
1672.80	H	-54.57	-13.00	-41.57	-57.78	-57.28	4.86
2509.20	H	-51.70	-13.00	-38.70	-59.85	-55.62	6.07
3345.60	H	-52.54	-13.00	-39.54	-62.30	-56.91	6.52
1672.80	V	-52.81	-13.00	-39.81	-55.84	-55.52	4.86
2509.20	V	-51.49	-13.00	-38.49	-59.61	-55.41	6.07
3345.60	V	-51.90	-13.00	-38.90	-61.76	-56.27	6.52

Mode	WCDMA, Channel: 4233						
Frequency (MHz)	Antenna Polarity	E.R.P (dBm)	Limit (dBm)	Margin (dB)	S.A Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)
1693.20	H	-55.99	-13.00	-42.99	-59.33	-58.76	4.92
2539.80	H	-48.53	-13.00	-35.53	-56.68	-52.46	6.08
3386.40	H	-52.83	-13.00	-39.83	-62.46	-57.28	6.60
1693.20	V	-56.63	-13.00	-43.63	-59.78	-59.40	4.92
2539.80	V	-49.54	-13.00	-36.54	-57.61	-53.47	6.08
3386.40	V	-50.32	-13.00	-37.32	-60.07	-54.77	6.60

NOTE: ERP = S.G power value + correction factor - 2.15.

Configuration 2: with external antenna

3.2.7 Test Result of Radiated Emissions above 1GHz

Mode	GPRS, Channel: 128						
Frequency (MHz)	Antenna Polarity	E.R.P (dBm)	Limit (dBm)	Margin (dB)	S.A Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)
1648.40	H	-44.86	-13.00	-31.86	-47.92	-47.51	4.80
2472.60	H	-50.13	-13.00	-37.13	-58.27	-54.04	6.06
3296.80	H	-36.84	-13.00	-23.84	-46.78	-41.13	6.44
1648.40	V	-46.50	-13.00	-33.50	-49.39	-49.15	4.80
2472.60	V	-50.78	-13.00	-37.78	-58.95	-54.69	6.06
3296.80	V	-39.87	-13.00	-26.87	-49.87	-44.16	6.44

Mode	GPRS, Channel: 190						
Frequency (MHz)	Antenna Polarity	E.R.P (dBm)	Limit (dBm)	Margin (dB)	S.A Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)
1673.20	H	-49.59	-13.00	-36.59	-52.81	-52.30	4.86
2509.80	H	-52.87	-13.00	-39.87	-61.02	-56.79	6.07
3346.40	H	-43.68	-13.00	-30.68	-53.44	-48.06	6.53
1673.20	V	-51.90	-13.00	-38.90	-54.94	-54.61	4.86
2509.80	V	-52.66	-13.00	-39.66	-60.78	-56.58	6.07
3346.40	V	-46.98	-13.00	-33.98	-56.84	-51.36	6.53

Mode	GPRS, Channel: 251						
Frequency (MHz)	Antenna Polarity	E.R.P (dBm)	Limit (dBm)	Margin (dB)	S.A Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)
1697.60	H	-45.72	-13.00	-32.72	-49.09	-48.50	4.93
2546.40	H	-51.97	-13.00	-38.97	-60.12	-55.90	6.08
3395.20	H	-37.81	-13.00	-24.81	-47.40	-42.27	6.61
1697.60	V	-47.30	-13.00	-34.30	-50.48	-50.08	4.93
2546.40	V	-52.41	-13.00	-39.41	-60.47	-56.34	6.08
3395.20	V	-40.55	-13.00	-27.55	-50.28	-45.01	6.61

NOTE: ERP = S.G power value + correction factor - 2.15.

Mode	WCDMA, Channel: 4132						
Frequency (MHz)	Antenna Polarity	E.R.P (dBm)	Limit (dBm)	Margin (dB)	S.A Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)
1652.80	H	-56.46	-13.00	-43.46	-59.54	-59.12	4.81
2479.20	H	-52.71	-13.00	-39.71	-60.85	-56.62	6.06
3305.60	H	-51.68	-13.00	-38.68	-61.58	-55.98	6.45
1652.80	V	-58.68	-13.00	-45.68	-61.58	-61.34	4.81
2479.20	V	-53.50	-13.00	-40.50	-61.66	-57.41	6.06
3305.60	V	-53.90	-13.00	-40.90	-63.87	-58.20	6.45

Mode	WCDMA, Channel: 4182						
Frequency (MHz)	Antenna Polarity	E.R.P (dBm)	Limit (dBm)	Margin (dB)	S.A Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)
1672.80	H	-55.98	-13.00	-42.98	-59.19	-58.69	4.86
2509.20	H	-53.30	-13.00	-40.30	-61.45	-57.22	6.07
3345.60	H	-53.48	-13.00	-40.48	-63.24	-57.85	6.52
1672.80	V	-54.62	-13.00	-41.62	-57.65	-57.33	4.86
2509.20	V	-52.40	-13.00	-39.40	-60.52	-56.32	6.07
3345.60	V	-53.79	-13.00	-40.79	-63.65	-58.16	6.52

Mode	WCDMA, Channel: 4233						
Frequency (MHz)	Antenna Polarity	E.R.P (dBm)	Limit (dBm)	Margin (dB)	S.A Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)
1693.20	H	-57.29	-13.00	-44.29	-60.63	-60.06	4.92
2539.80	H	-50.16	-13.00	-37.16	-58.31	-54.09	6.08
3386.40	H	-53.59	-13.00	-40.59	-63.22	-58.04	6.60
1693.20	V	-58.16	-13.00	-45.16	-61.31	-60.93	4.92
2539.80	V	-51.34	-13.00	-38.34	-59.41	-55.27	6.08
3386.40	V	-52.05	-13.00	-39.05	-61.80	-56.50	6.60

NOTE: ERP = S.G power value + correction factor - 2.15.

3.3 Conducted Emissions

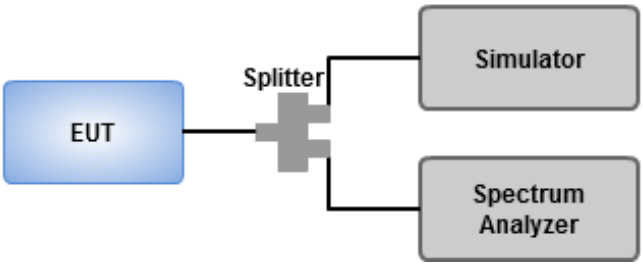
3.3.1 Limit of Conducted Emissions

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 equal to -13dBm.

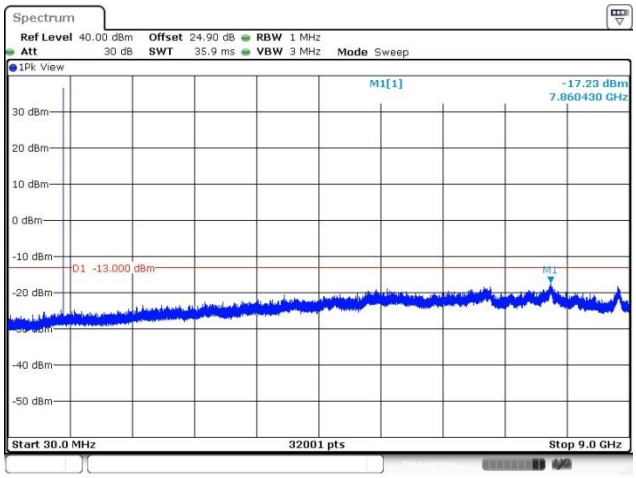
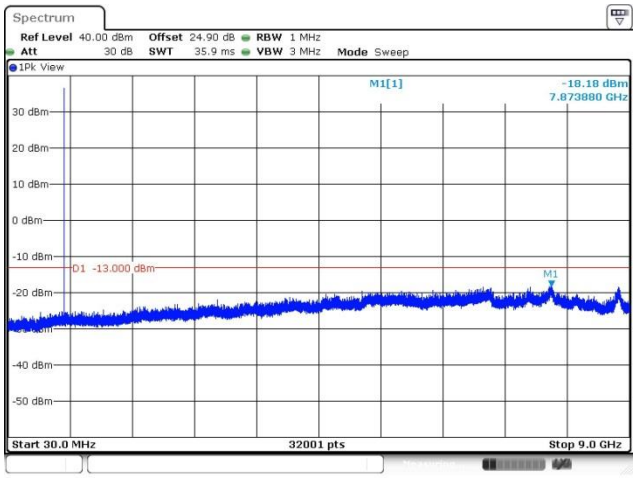
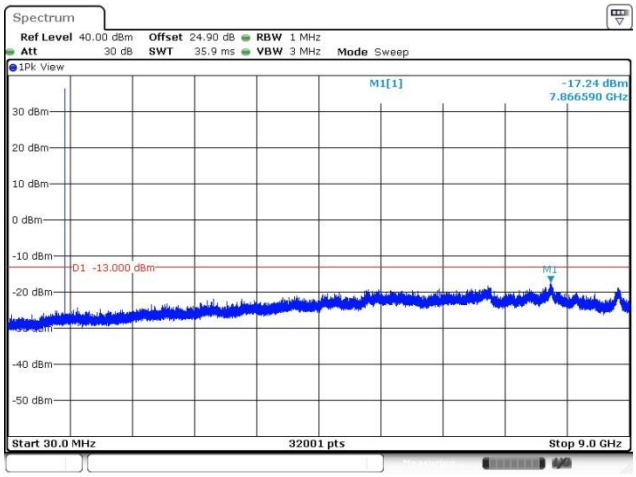
3.3.2 Test Procedures

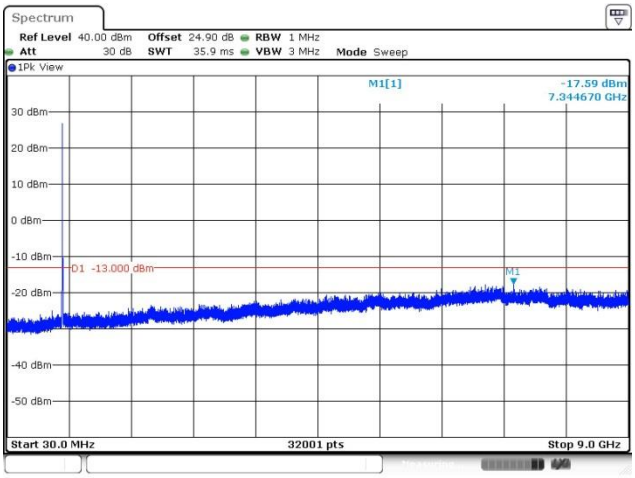
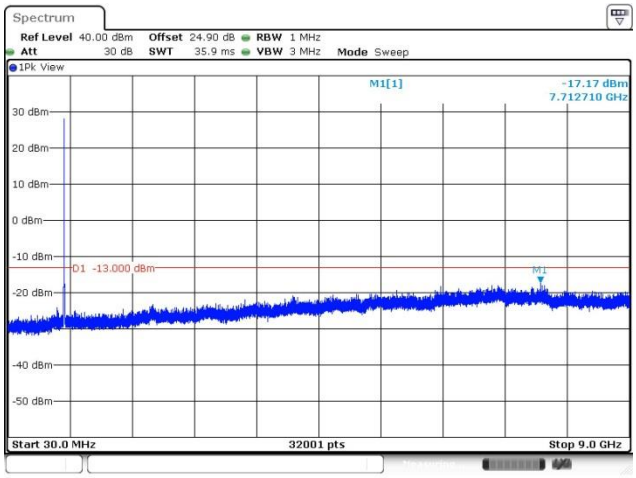
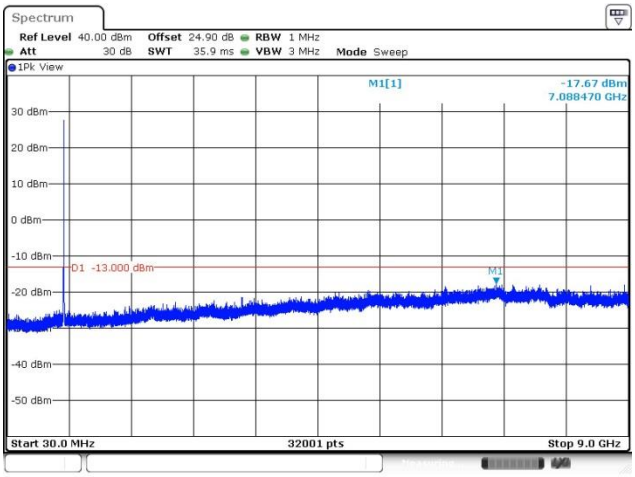
1. Lowest, middle and highest operating channels are tested for this item.
2. Scan frequency range is from 30MHz~9GHz.
3. Set RBW = 1MHz, VBW = 3MHz, detector = Peak, sweep time = auto.
4. Record the max trace value and capture the test plot of each sub frequency band.

3.3.3 Test Setup



3.3.4 Test Result of Conducted Emissions

Mode	GPRS		
Channel	128	Channel	190
			
Channel	251	---	
		---	

Mode	WCDMA		
Channel	4132	Channel	4182
			
Channel	4233	---	
		---	

3.4 Band Edge

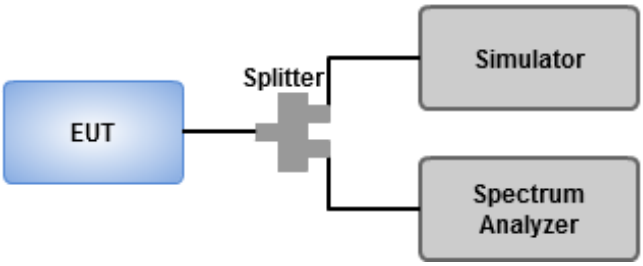
3.4.1 Limit of Band Edge

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 equal to -13dBm.

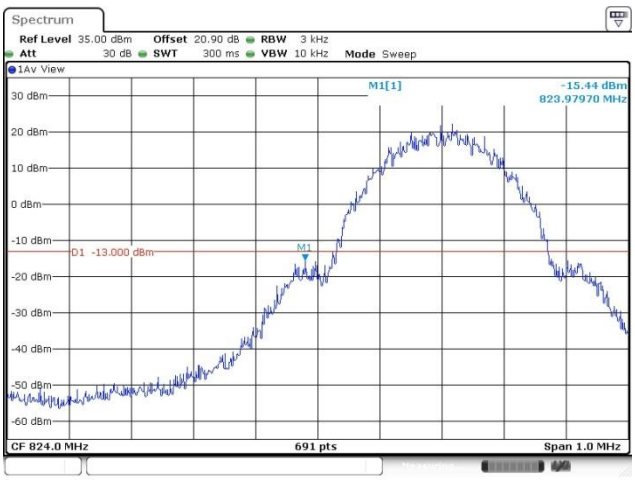
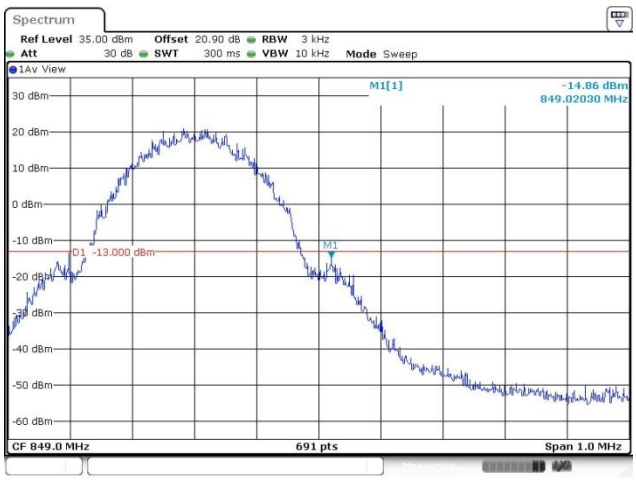
3.4.2 Test Procedures

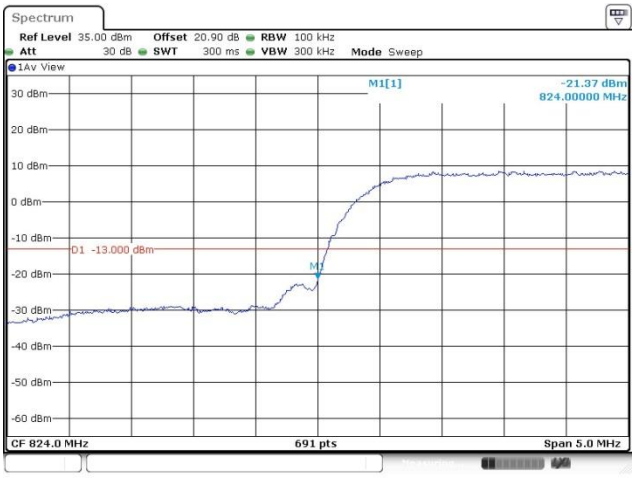
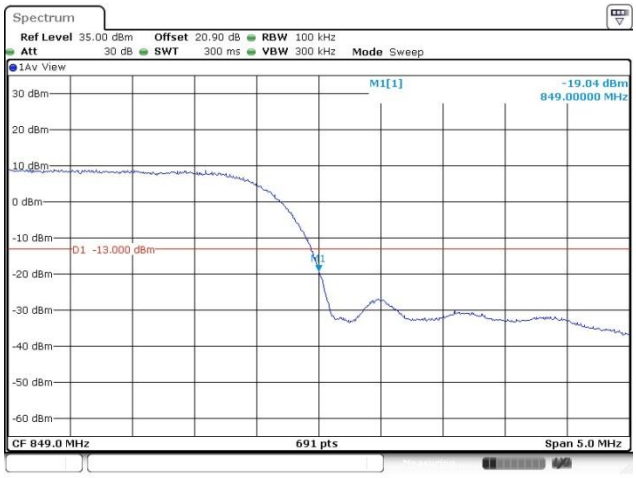
1. Lowest and highest operating channels are tested for this item.
2. The center frequency of spectrum analyzer will be set to 824 and 849 MHz.
3. Set RBW = 3kHz, VBW = 10kHz, span = 1 MHz, detector =RMS, sweep time = auto for GPRS.
   Set RBW =100kHz, VBW = 300kHz, span = 5 MHz, detector = RMS, sweep time = auto for WCDMA.
4. Record the max trace value and capture the test plot.

3.4.3 Test Setup



3.4.4 Test Result of Band Edge

Mode	GPRS		
Channel	128	Channel	251
			

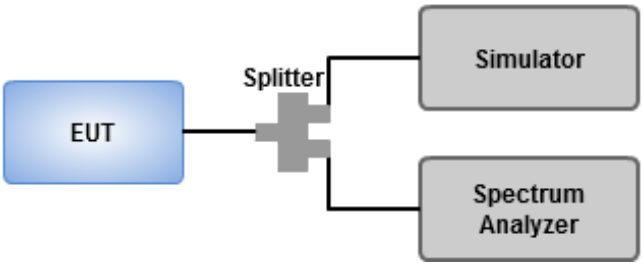
Mode	WCDMA		
Channel	4132	Channel	4233
			

3.5 Occupied Bandwidth and 26dBc Bandwidth

3.5.1 Test Procedures

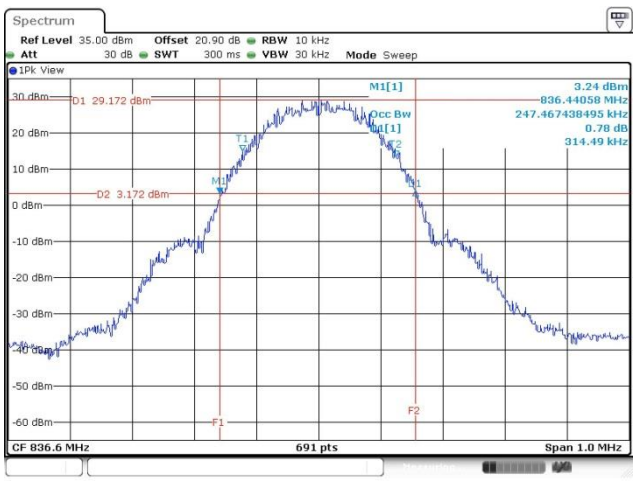
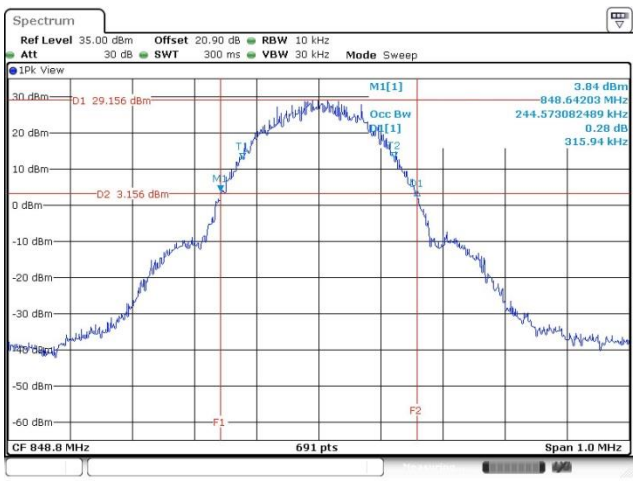
1. Set RBW = 10kHz, VBW = 30kHz for GPRS mode.
   Set RBW = 100kHz, VBW = 300kHz for WCDMA mode.
2. Detector = Peak, Trace mode = max hold.
3. Sweep = auto couple, Allow the trace to stabilize.
4. Using occupied bandwidth measurement function of spectrum analyzer to measure occupied bandwidth
5. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower) that are attenuated by 26dB relative to the maximum level measured in the fundamental emission.

3.5.2 Test Setup

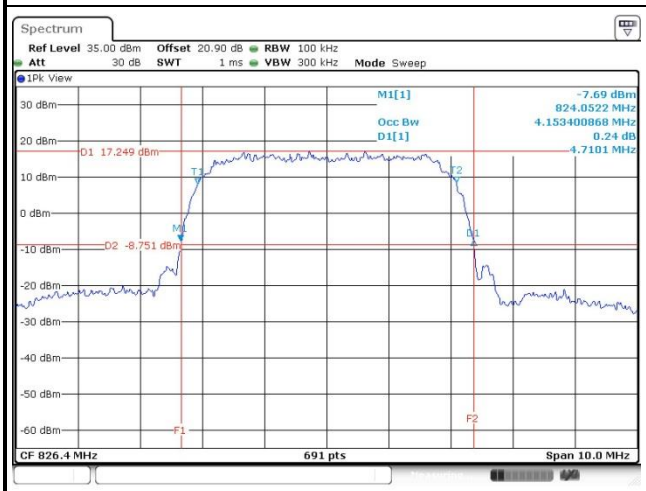
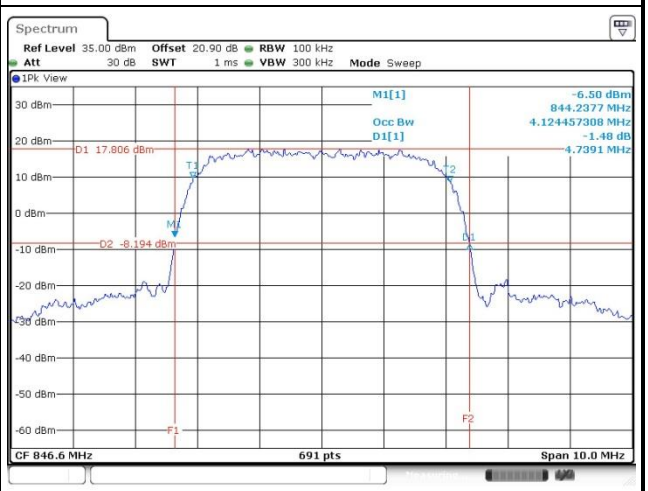


3.5.3 Test Result of Occupied Bandwidth

MODE	Channel	Frequency (MHz)	OBW (kHz)	26dB bandwidth(kHz)
GPRS	128	824.2	243.13	314.49
GPRS	190	836.6	247.47	314.49
GPRS	251	848.8	244.57	315.94

Worst plot – OBW	Worst plot – 26dB BW
	

MODE	Channel	Frequency (MHz)	OBW (MHz)	26dB bandwidth(MHz)
WCDMA	4132	826.4	4.15	4.7101
WCDMA	4182	836.4	4.14	4.7246
WCDMA	4233	846.6	4.12	4.7391

Worst plot – OBW	Worst plot – 26dB BW
	

3.6 Peak to Average Ratio

3.6.1 Limit of Peak to Average Ratio

Peak-to-average ratio (PAR) of the transmission may not exceed 13 dB

3.6.2 Test Procedures

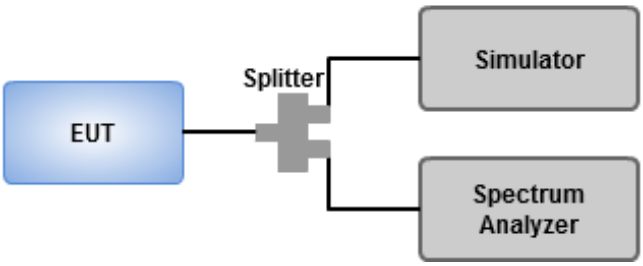
For GPRS mode

1. Set RBW=1MHz, RBW=3MHz, Peak detector in Trace 1.
2. Set RBW=1MHz, RBW=3MHz, RMs detector in Trace 2.
3. Trigger function is enabled for measuring singal at burst on time. Measure the difference between trace1 and trace 2.

For WCDMA mode

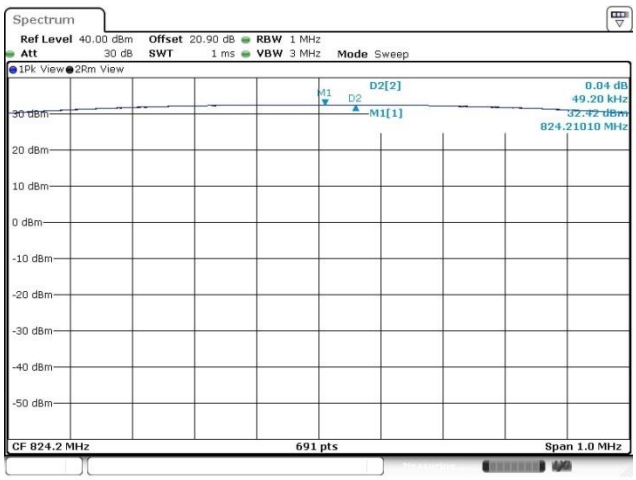
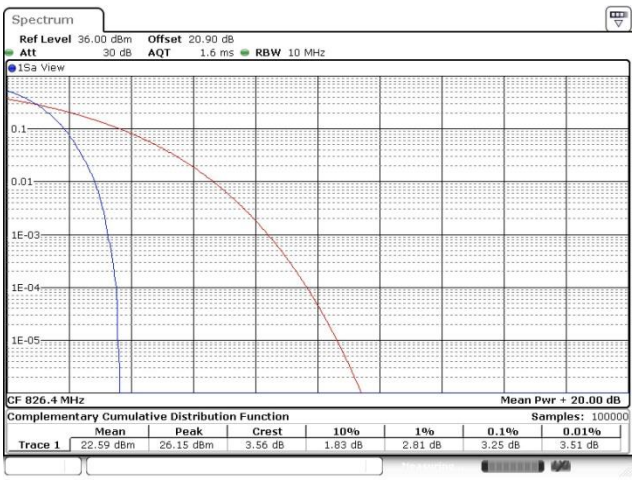
1. Enable CCDF function of spectrum analyzer and set RBW=10MHz.
2. Set the number of counts to a value that stabilizes the measured CCDF curve.
3. Record the maximum PAPR level associated with a probability of 0.1%.

3.6.3 Test Setup



3.6.4 Test Result of Peak to Average Ratio

MODE	Channel	Frequency (MHz)	Peak to Average ratio (dB)
GPRS	128	824.2	0.04
GPRS	190	836.6	0.01
GPRS	251	848.8	0.01
WCDMA	4132	826.4	3.25
WCDMA	4182	836.4	2.72
WCDMA	4233	846.6	2.55

Worst plots	
Peak to Average ratio of GPRS	**Peak to Average ratio of WCDMA**
	

3.7 Frequency Stability

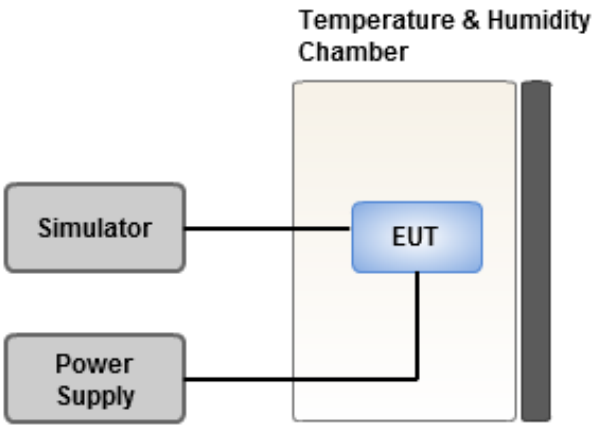
3.7.1 Limit of Frequency Stability

The frequency stability shall be less +/- 2.5ppm.

3.7.2 Test Procedures

1. EUT was placed at temperature chamber and connected to an external power supply.
2. Temperature and voltage condition shall be tested to confirm frequency stability.
3. Temperature range is from -30~50°C and voltage range is from lowest to highest working voltage.
4. Link up EUT and simulator. Confirm frequency drift value of simulator and record it.

3.7.3 Test Setup



3.7.4 Test Result of Frequency Stability

Temperature (°C)	Voltage (dc)	Frequency Drift (ppm)		Limit (ppm)
		GPRS	WCDMA	
20	138	0.036	0.027	2.5
20	102	0.038	0.027	2.5
50	120	0.042	0.030	2.5
40	120	0.033	0.026	2.5
30	120	0.041	0.030	2.5
20	120	0.043	0.031	2.5
10	120	0.050	0.032	2.5
0	120	0.031	0.033	2.5
-10	120	0.038	0.024	2.5
-20	120	0.048	0.039	2.5
-30	120	0.045	0.024	2.5

4 Test laboratory information

Established in 2012, ICC provides foremost EMC & RF Testing and advisory consultation services by our skilled engineers and technicians. Our services employ a wide variety of advanced edge test equipment and one of the widest certification extents in the business.

International Certification Corp (EMC and Wireless Communication Laboratory), it is our definitive objective is to institute long term, trust-based associations with our clients. The expectation we set up with our clients is based on outstanding service, practical expertise and devotion to a certified value structure. Our passion is to grant our clients with best EMC / RF services by oriented knowledgeable and accommodating staff.

Our Test sites are located at Linkou District and Kwei Shan District. Location map can be found on our website http://www.icertifi.com.tw.

Linkou	**Kwei Shan**	**Kwei Shan Site II**
Tel: 886-2-2601-1640	Tel: 886-3-271-8666	Tel: 886-3-271-8640
No. 30-2, Ding Fwu Tsuen, Lin Kou District, New Taipei City, Taiwan, R.O.C.	No. 3-1, Lane 6, Wen San 3rd St., Kwei Shan District, Tao Yuan City 333, Taiwan, R.O.C.	No. 14-1, Lane 19, Wen San 3rd St., Kwei Shan District, Tao Yuan City 333, Taiwan, R.O.C..

If you have any suggestion, please feel free to contact us as below information

Tel: 886-3-271-8666
Fax: 886-3-318-0155
Email: ICC_Service@icertifi.com.tw

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