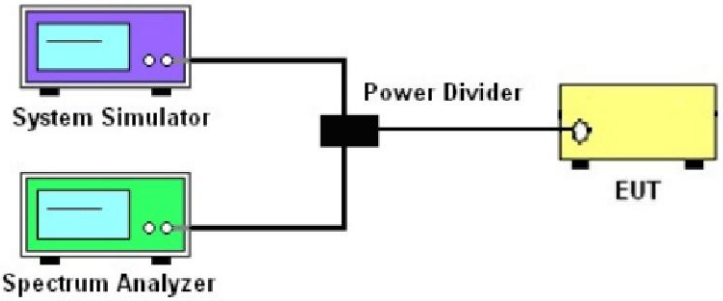
6.4. Band Edge and Conducted Spurious Emission Measurement

6.4.1 Test Specification

Test Requirement:	FCC part22.917(a) and FCC part24.238(a)
Test Method:	FCC part2.1051
Operation mode:	Refer to item 4.1
Limit:	-13dBm
Test Setup:	
Test Procedure:	1. The testing follows FCC KDB 971168 v02r02 Section 6.0. 2. The EUT was connected to the spectrum analyzer and system simulator via a power divider. 3. The RF output of EUT was connected to the spectrum analyzer by an RF cable and attenuator. The path loss was compensated to the results for each measurement. 4. The band edges of low and high channels for the highest RF powers were 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 + 10log(P) dB below the transmitter power P(Watts) = P(W) - [43 + 10log(P)] (dB) = [30 + 10log(P)] (dBm) - [43 + 10log(P)] (dB) = -13dBm.
Test Result:	PASS

6.4.2 Test Instruments

Equipment	Manufacturer	Model	Serial Number	Calibration Due
System simulator	R&S	CMU200	111382	Sep. 11, 2016
Spectrum Analyzer	Agilent	N9020A	MY49100060	Sep. 12, 2016
RF cable	TCT	RE-06	N/A	Sep. 12, 2016
Antenna Connector	TCT	RFC-01	N/A	Sep. 12, 2016

Note: *The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).*

6.4.3 Test data

Test plots as follows:

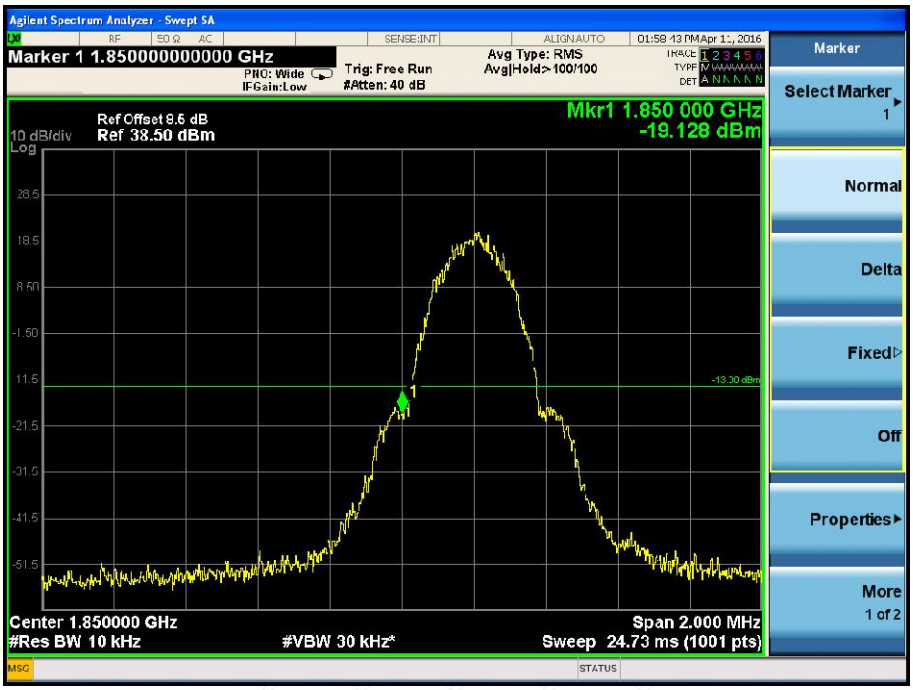
Band:	GSM 850	Test Mode:	GSM

Lower Band Edge Plot on Channel 128

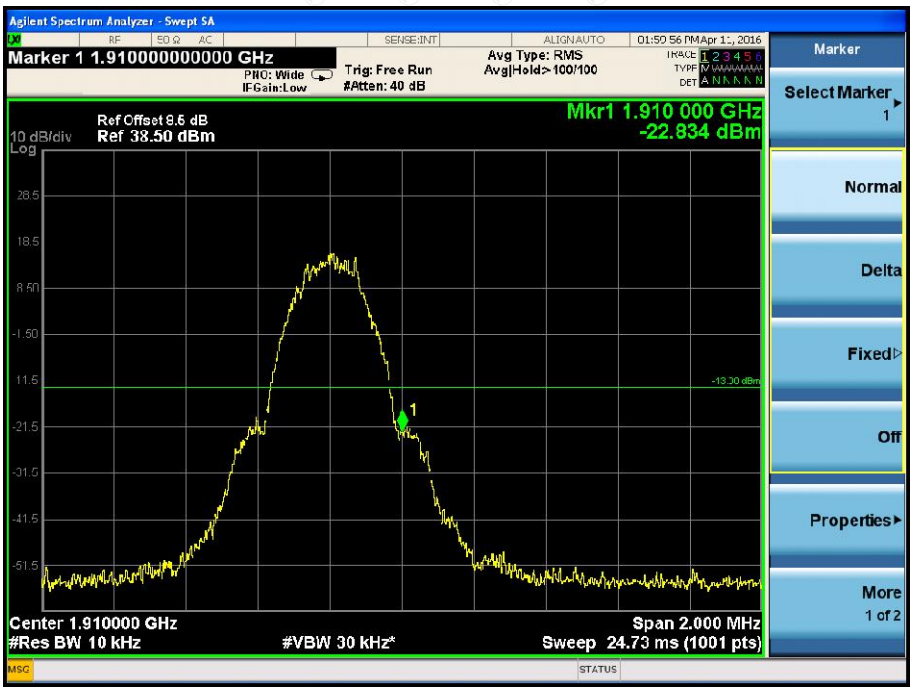
Higher Band Edge Plot on Channel 251

Band:	GSM 1900	Test Mode:	GSM

Lower Band Edge Plot on Channel 512



Higher Band Edge Plot on Channel 810



Band:	GPRS 850	Test Mode:	GPRS Class 8 Link (GMSK)

Lower Band Edge Plot on Channel 128

Higher Band Edge Plot on Channel 251

Band:	GPRS 1900	Test Mode:	GPRS Class 8 Link (GMSK)

Lower Band Edge Plot on Channel 512

Higher Band Edge Plot on Channel 810

Band:	GSM850	Test Mode:	EDGE Class 8 Link (8PSK)

Lower Band Edge Plot on Channel 128

Lower Band Edge Plot on Channel 251

Band:	GPRS 1900	Test Mode:	EDGE Class 8 Link (8PSK)

Lower Band Edge Plot on Channel 512

Lower Band Edge Plot on Channel 810

Band:	WCDMA Band V	Test Mode:	RMC 12.2Kbps Link (QPSK)

Lower Band Edge Plot on Channel 4132

Higher Band Edge Plot on Channel 4233

Band:	WCDMA Band II	Test Mode:	RMC 12.2Kbps Link (QPSK)

Lower Band Edge Plot on Channel 9262

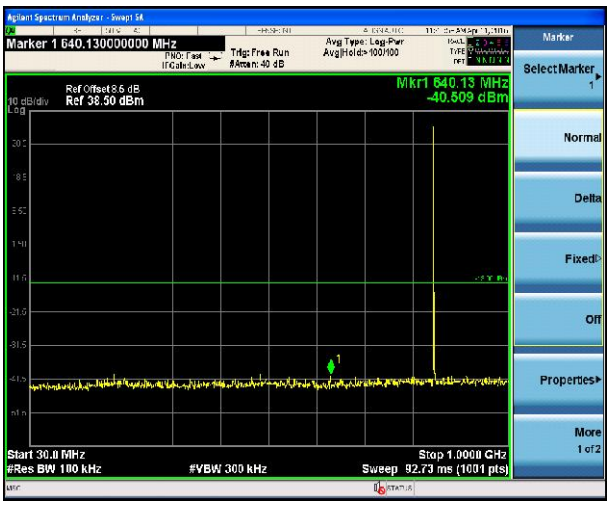
Higher Band Edge Plot on Channel 9538

Band:	GSM 850	Test Mode:	GSM

Conducted Spurious Emission on Channel 128

Conducted Spurious Emission on Channel 190

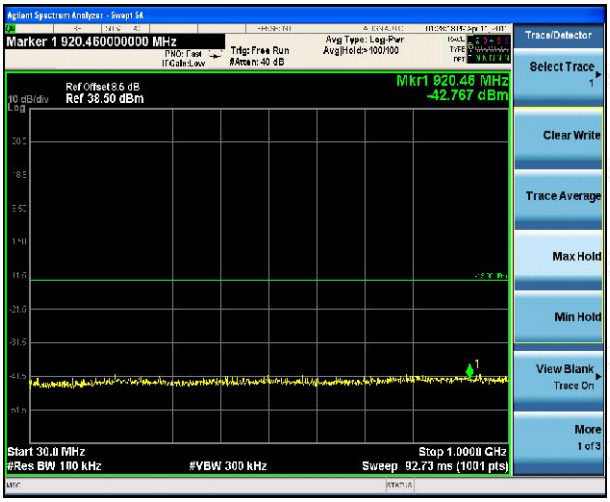
Conducted Spurious Emission on Channel 251



Band:	GSM 1900	Test Mode:	GSM

Conducted Spurious Emission on Channel 512

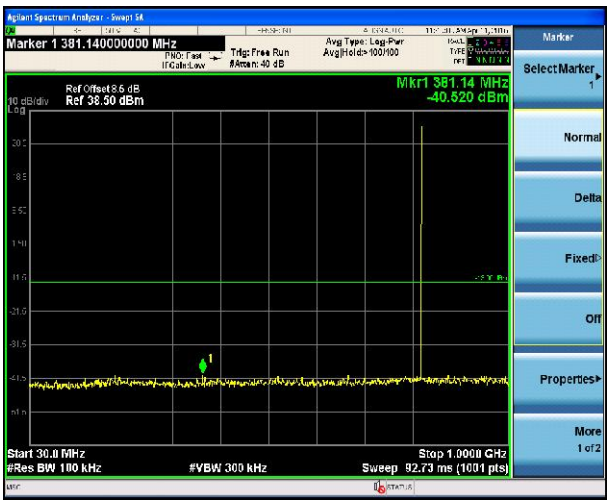
Conducted Spurious Emission on Channel 661



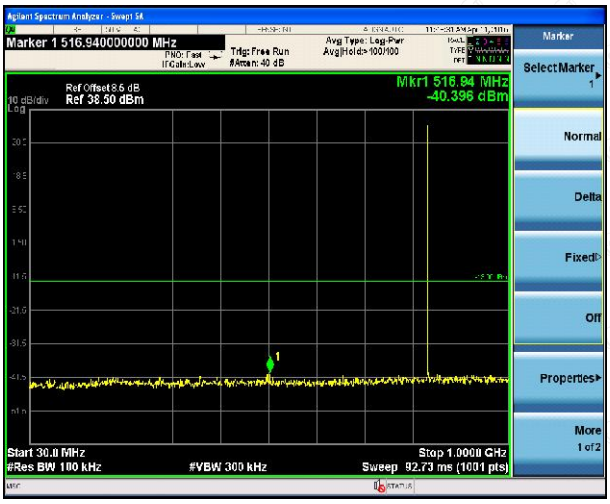
Conducted Spurious Emission on Channel 810

Band:	GPRS 850	Test Mode:	GPRS Class 8 Link (GMSK)

Conducted Spurious Emission on Channel 128



Conducted Spurious Emission on Channel 190



Conducted Spurious Emission on Channel 251

Band:	GPRS 1900	Test Mode:	GPRS Class 8 Link (GMSK)

Conducted Spurious Emission on Channel 512

Conducted Spurious Emission on Channel 661

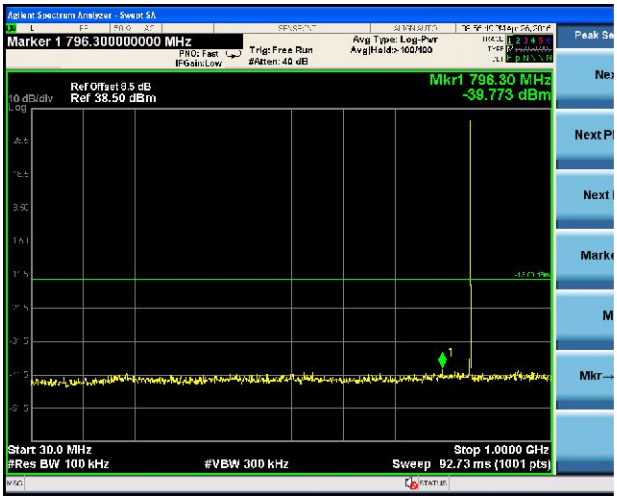
Conducted Spurious Emission on Channel 810

Band:	GPRS 850	Test Mode:	EDGE Class 8 Link (8PSK)

Conducted Spurious Emission on Channel 128

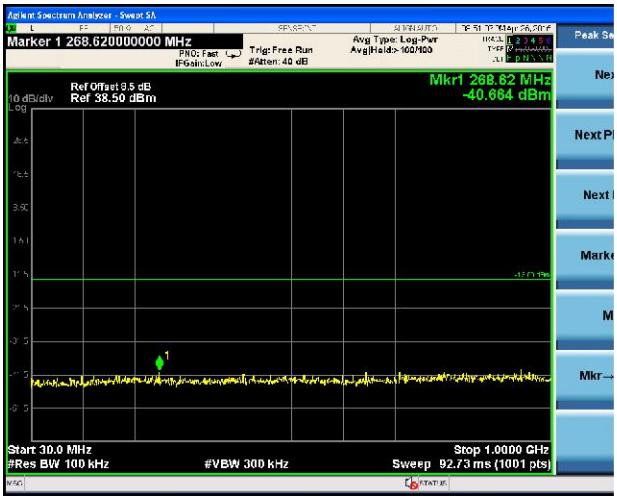
Conducted Spurious Emission on Channel 190

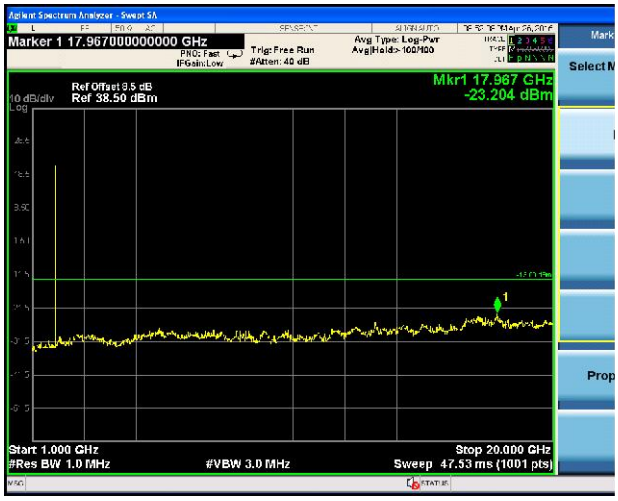
Conducted Spurious Emission on Channel 251



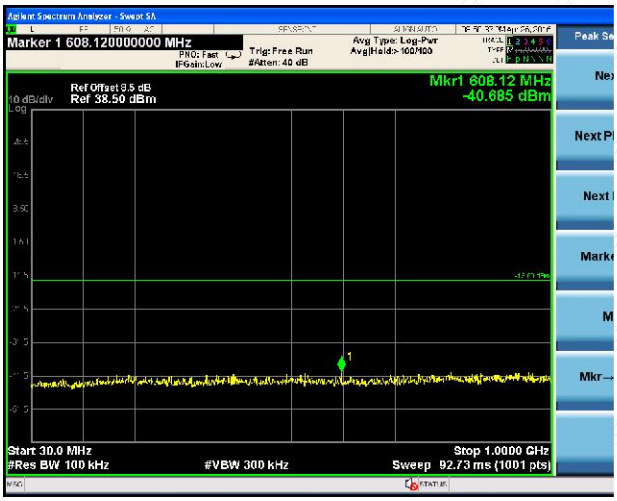
Band:	GPRS 1900	Test Mode:	EDGE Class 8 Link (8PSK)

Conducted Spurious Emission on Channel 512

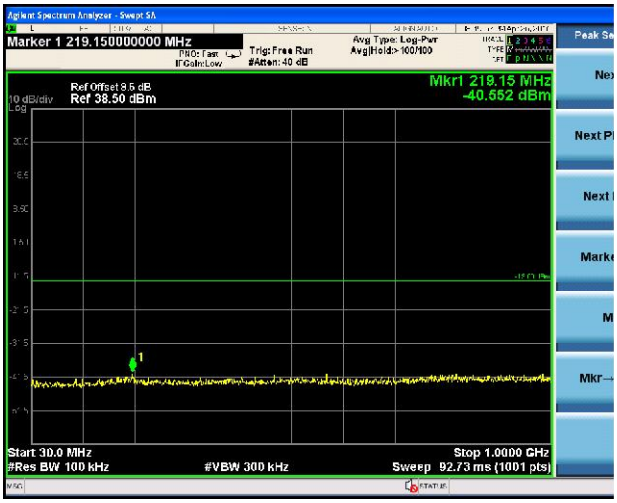




Conducted Spurious Emission on Channel 661



Conducted Spurious Emission on Channel 810



Band:	WCDMA Band V	Test Mode:	RMC 12.2Kbps Link (QPSK)

Conducted Spurious Emission on Channel 4132

Conducted Spurious Emission on Channel 4183

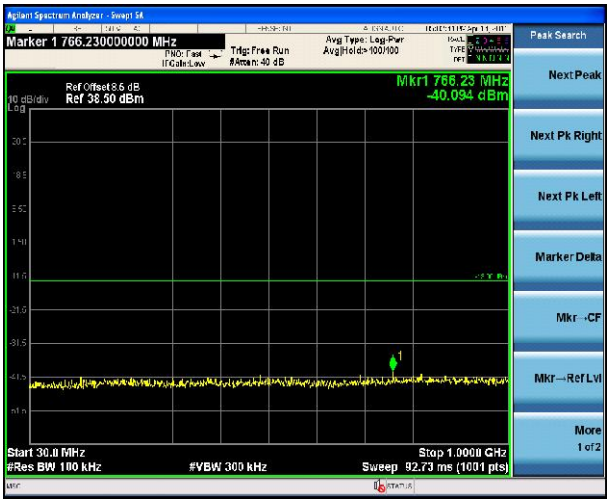
Conducted Spurious Emission on Channel 4233

Band:	WCDMA Band II	Test Mode:	RMC 12.2Kbps Link (QPSK)

Conducted Spurious Emission on Channel 9262

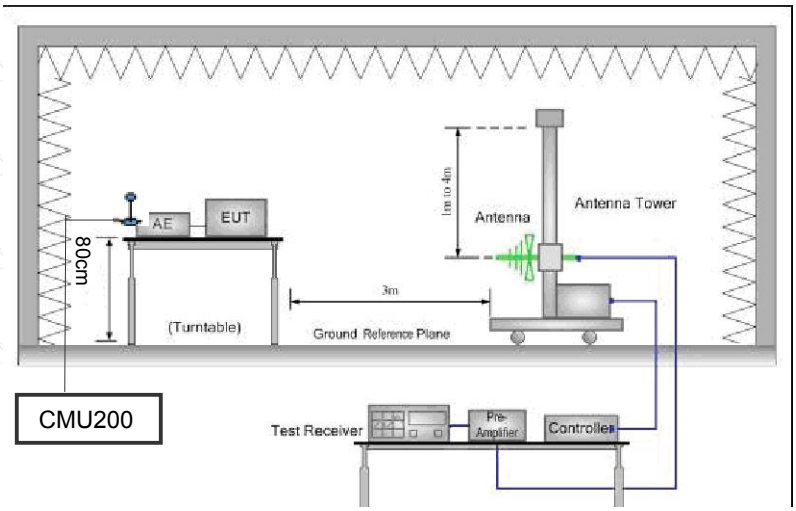
Conducted Spurious Emission on Channel 9400

Conducted Spurious Emission on Channel 9538



6.5 Effective Radiated Power and Effective Isotropic Radiated Power Measurement

6.5.1 Test Specification

<table>
<tr><td>Test Requirement:</td><td>FCC part 22.913(a) and FCC part 24.232(b)</td></tr>
<tr><td>Test Method:</td><td>FCC part 2.1046</td></tr>
<tr><td>Receiver Setup:</td><td>
<table>
<tr><td></td><td>GSM/GPRS/EDGE</td><td>WCDMA/HSPA</td></tr>
<tr><td>SPAN</td><td>500kHz</td><td>10MHz</td></tr>
<tr><td>RBW</td><td>10kHz</td><td>100kHz</td></tr>
<tr><td>VBW</td><td>30kHz</td><td>300kHz</td></tr>
<tr><td>Detector</td><td>RMS</td><td>RMS</td></tr>
<tr><td>Trace</td><td>Average</td><td>Average</td></tr>
<tr><td>Average Type</td><td>Power</td><td>Power</td></tr>
<tr><td>Sweep Count</td><td>100</td><td>100</td></tr>
</table>
</td></tr>
<tr><td>Limit:</td><td>GSM850 7W ERP
PCS1900 2W EIRP
WCDMA Band V: 7W ERP
WCDMA Band II: 2W EIRP</td></tr>
<tr><td>Test Setup：</td><td> 
</td></tr>
<tr><td>Test Procedure:</td><td>1. The testing follows FCC KDB 971168 v02r02 Section 5.2.1. (for CDMA/WCDMA), Section 5.2.2.2 (for GSM/GPRS/EDGE) and ANSI / TIA-603-C-2004 Section 2.2.17.
2. The EUT was placed on a non-conductive rotating platform 0.8 meters high in a semi-anechoic chamber. The radiated emission at the fundamental frequency was measured at 3 m with a test antenna and a spectrum analyzer with RMS detector per section 5. of KDB 971168 D01.
3. During the measurement, the system simulator parameters were set to force the EUT transmitting at</td></tr>
</table>

	maximum output power. The maximum emission was recorded from analyzer power level (LVL) from the 360 degrees rotation of the turntable and the test antenna raised and lowered over a range from 1 to 4 meters in both horizontally and vertically polarized orientations. 4. Effective Isotropic Radiated Power (EIRP) was measured by substitution method according to TIA/EIA-603-C. The EUT was replaced by dipole antenna (substitution antenna) at the same location, and then a known power from S.G. was applied into the dipole antenna through a Tx cable, and then recorded the maximum Analyzer reading through raised and lowered the test antenna. The correction factor (in dB) = S.G. - Tx Cable loss + Substitution antenna gain - Analyzer reading. Then the EUT's EIRP was calculated with the correction factor, EIRP= LVL + Correction factor and ERP = EIRP – 2.15 .
Test results:	PASS

6.5.2 Test Instruments

Radiated Emission Test Site (966)				
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Due**
ESPI Test Receiver	ROHDE&SCHWARZ	ESVD	100008	Sep. 11, 2016
System simulator	R&S	CMU200	111382	Sep. 11, 2016
Spectrum Analyzer	ROHDE&SCHWARZ	FSEM	848597/001	Sep. 11, 2016
Spectrum Analyzer	Agilent	N9020A	MY49100060	Sep. 12, 2016
Pre-amplifier	EM Electronics Corporation CO.,LTD	EM30265	07032613	Sep. 11, 2016
Pre-amplifier	HP	8447D	2727A05017	Sep. 11, 2016
Broadband Antenna	Schwarzbeck	VULB9163	340	Sep. 13, 2016
Horn Antenna	Schwarzbeck	BBHA 9120D	631	Sep. 13, 2016
Broadband Antenna	Schwarzbeck	VULB9163	412	Sep. 13, 2016
Horn Antenna	Schwarzbeck	BBHA 9120D	813	Sep. 13, 2016
Dipole Antenna	TCT	TCT-RF	N/A	Sep. 13, 2016
Coax cable	TCT	RE-low-01	N/A	Sep. 11, 2016
Coax cable	TCT	RE-high-02	N/A	Sep. 11, 2016
Coax cable	TCT	RE-low-03	N/A	Sep. 11, 2016
Coax cable	TCT	RE-High-04	N/A	Sep. 11, 2016
Antenna Mast	CCS	CC-A-4M	N/A	Sep. 12, 2016
EMI Test Software	Shurple Technology	EZ-EMC	N/A	N/A
UNIVERSAL RADIO COMMUNICATION TESTER	CMU200	R&S	Sep. 12, 2015	Sep. 11, 2016

Note: *The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).*

6.5.3 Test Data

Test Result of ERP

GSM850 Radiated Power ERP				
Horizontal Polarization				
Frequency (MHz)	**LVL (dBm)**	**Correction Factor (dB)**	**ERP (dBm)**	**ERP (W)**
824.4	13.09	21.66	32.60	1.818
836.4	13.08	21.54	32.47	1.766
848.8	13.60	21.46	32.91	1.953
Vertical Polarization				
Frequency (MHz)	**LVL (dBm)**	**Correction Factor (dB)**	**ERP (dBm)**	**ERP (W)**
824.4	11.26	22.42	31.53	1.422
836.4	11.86	22.65	32.36	1.720
848.8	11.45	22.26	31.56	1.434

ERP = LVL (dBm) + Correction Factor (dB) – 2.15
Correction Factor= S.G. Power - Cable loss + Substitution Antenna Gain- SPA. Reading

GPRS850 Radiated Power ERP				
Horizontal Polarization				
Frequency (MHz)	**LVL (dBm)**	**Correction Factor (dB)**	**ERP (dBm)**	**ERP (W)**
824.4	7.47	21.66	26.98	0.499
836.4	7.21	21.54	26.60	0.457
824.4	7.47	21.66	26.98	0.499
Vertical Polarization				
Frequency (MHz)	**LVL (dBm)**	**Correction Factor (dB)**	**ERP (dBm)**	**ERP (W)**
824.4	7.44	22.42	27.71	0.590
836.4	7.17	22.65	27.67	0.585
848.8	7.12	22.26	27.23	0.528

ERP = LVL (dBm) + Correction Factor (dB) – 2.15
Correction Factor= S.G. Power - Cable loss + Substitution Antenna Gain- SPA. Reading

EDGE850 Radiated Power ERP				
Horizontal Polarization				
Frequency (MHz)	**LVL (dBm)**	**Correction Factor (dB)**	**ERP (dBm)**	**ERP (W)**
824.4	5.36	21.66	24.87	0.307
836.4	5.61	21.54	25.00	0.316
824.4	5.77	21.46	25.08	0.322
Vertical Polarization				
Frequency (MHz)	**LVL (dBm)**	**Correction Factor (dB)**	**ERP (dBm)**	**ERP (W)**
824.4	6.14	22.42	26.41	0.437
836.4	6.43	22.65	26.93	0.494
848.8	6.34	22.26	26.45	0.442

WCDMA Band V (RMC 12.2Kbps) Radiated Power ERP				
Horizontal Polarization				
Frequency (MHz)	**LVL (dBm)**	**Correction Factor (dB)**	**ERP (dBm)**	**ERP (W)**
826.4	3.18	21.54	22.57	0.181
836.4	2.59	21.48	21.92	0.156
846.6	2.65	21.62	22.12	0.163
Vertical Polarization				
Frequency (MHz)	**LVL (dBm)**	**Correction Factor (dB)**	**ERP (dBm)**	**ERP (W)**
826.4	2.51	22.74	23.10	0.204
836.4	2.24	22.62	22.71	0.187
846.6	2.11	22.56	22.52	0.179

** ERP = LVL (dBm) + Correction Factor (dB) – 2.15*
Correction Factor= S.G. Power - Cable loss + Substitution Antenna Gain- SPA. Reading

Hotline: 400-6611-140 Tel: 86-755-27673339 Fax: 86-755-27673332 http://www.tct-lab.com

Test Result of EIRP

GSM1900 Radiated Power EIRP				
Horizontal Polarization				
Frequency (MHz)	**LVL (dBm)**	**Correction Factor (dB)**	**EIRP (dBm)**	**EIRP (W)**
1850.2	-2.11	30.15	28.04	0.637
1880	-2.18	31.01	28.83	0.764
1909.8	-1.72	30.34	28.62	0.728
Vertical Polarization				
Frequency (MHz)	**LVL (dBm)**	**Correction Factor (dB)**	**EIRP (dBm)**	**EIRP (W)**
1850.2	-2.95	30.52	27.57	0.571
1880	-2.87	31.47	28.60	0.724
1909.8	-2.38	30.67	28.29	0.675

EIRP = LVL (dBm) + Correction Factor (dB)
Correction Factor= S.G. Power - Cable loss + Substitution Antenna Gain- SPA. Reading

GPRS1900 (class 8) Radiated Power EIRP				
Horizontal Polarization				
Frequency (MHz)	**LVL (dBm)**	**Correction Factor (dB)**	**EIRP (dBm)**	**EIRP (W)**
1850.2	-6.67	30.15	23.48	0.223
1880	-6.53	31.01	24.48	0.281
1909.8	-6.39	30.34	23.95	0.248
Vertical Polarization				
Frequency (MHz)	**LVL (dBm)**	**Correction Factor (dB)**	**EIRP (dBm)**	**EIRP (W)**
1850.2	-6.78	30.52	23.74	0.237
1880	-6.26	31.47	25.21	0.332
1909.8	-6.67	30.67	24.00	0.251

EIRP = LVL (dBm) + Correction Factor (dB)
Correction Factor= S.G. Power - Cable loss + Substitution Antenna Gain- SPA. Reading

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EDGE1900 (class 8) Radiated Power EIRP				
Horizontal Polarization				
Frequency (MHz)	**LVL (dBm)**	**Correction Factor (dB)**	**EIRP (dBm)**	**EIRP (W)**
1850.2	-7.25	30.15	22.90	0.195
1880	-7.25	31.01	23.76	0.238
1909.8	-7.38	30.34	22.96	0.198
Vertical Polarization				
Frequency (MHz)	**LVL (dBm)**	**Correction Factor (dB)**	**EIRP (dBm)**	**EIRP (W)**
1850.2	-7.03	30.52	23.49	0.224
1880	-7.08	31.47	24.39	0.275
1909.8	-7.13	30.67	23.54	0.226

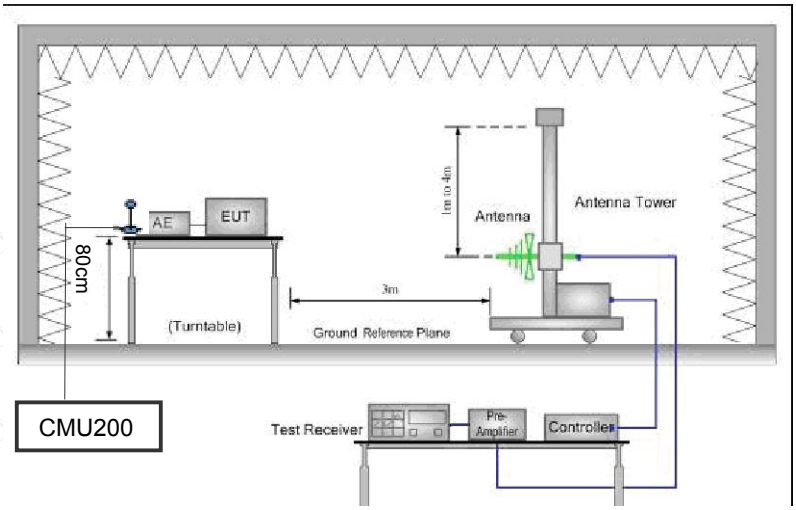
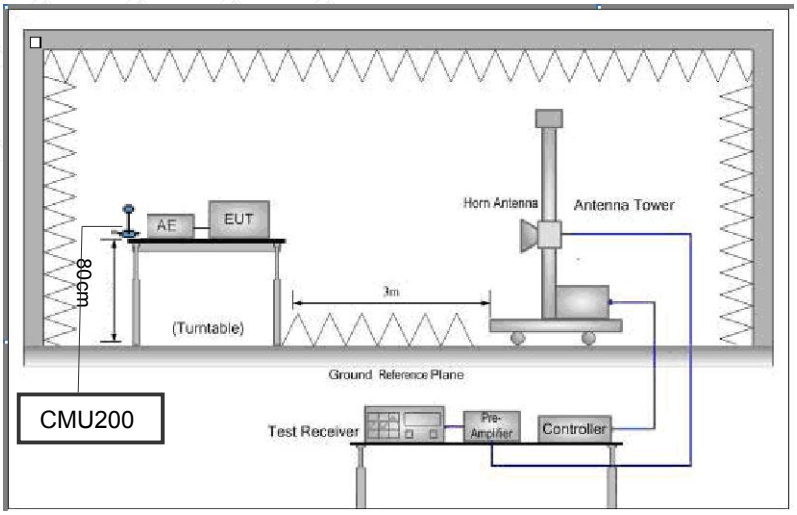
WCDMA Band II (RMC 12.2Kbps) Radiated Power EIRP				
Horizontal Polarization				
Frequency (MHz)	**LVL (dBm)**	**Correction Factor (dB)**	**EIRP (dBm)**	**EIRP (W)**
1852.4	-14.24	31.78	17.54	0.057
1880	-14.23	31.63	17.40	0.055
1907.6	-14.51	31.75	17.24	0.053
Vertical Polarization				
Frequency (MHz)	**LVL (dBm)**	**Correction Factor (dB)**	**EIRP (dBm)**	**EIRP (W)**
1852.4	-15.24	31.85	16.61	0.046
1880	-15.37	31.39	16.02	0.040
1907.6	-15.49	31.67	16.18	0.041

** EIRP = LVL (dBm) + Correction Factor (dB)*
Correction Factor= S.G. Power - Cable loss + Substitution Antenna Gain- SPA. Reading

Hotline: 400-6611-140 Tel: 86-755-27673339 Fax: 86-755-27673332 http://www.tct-lab.com

6.6 Field Strength of Spurious Radiation Measurement

6.6.1 Test Specification

Test Requirement:	FCC part 22.917(a) and FCC part 24.238(a)
Test Method:	FCC part 2.1053
Operation mode:	Refer to item 4.1
Limit:	-13dBm
Test setup:	For 30MHz~1GHz  Above 1GHz 
Test Procedure:	1. The testing follows FCC KDB 971168 v02r02 Section 5.8 and ANSI / TIA-603-C-2004 Section 2.2.12. 2. The EUT was placed on a rotatable wooden table 0.8 meters above the ground. 3. The EUT was set 3 meters from the receiving antenna, which was mounted on the antenna tower. 4. The table was rotated 360 degrees to determine the position of the highest spurious emission.

	5. The height of the receiving antenna is varied between one meter and four meters to search for the maximum spurious emission for both horizontal and vertical polarizations. 6. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz, taking record of maximum spurious emission. 7. A horn antenna was substituted in place of the EUT and was driven by a signal generator. 8. Tune the output power of signal generator to the same emission level with EUT maximum spurious emission. 9. Taking the record of output power at antenna port. 10. Repeat step 7 to step 8 for another polarization. 11. EIRP (dBm) = S.G. Power – Tx Cable Loss + Tx Antenna Gain 12. ERP (dBm) = EIRP - 2.15 13. The RF fundamental frequency should be excluded against the limit line in the operating frequency band. 14. 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.
Test results:	PASS

6.6.2 Test Instruments

Radiated Emission Test Site (966)				
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Due**
ESPI Test Receiver	ROHDE&SCHWARZ	ESVD	100008	Sep. 11, 2016
System simulator	R&S	CMU200	111382	Sep. 11, 2016
Spectrum Analyzer	ROHDE&SCHWARZ	FSEM	848597/001	Sep. 11, 2016
Spectrum Analyzer	Agilent	N9020A	MY49100060	Sep. 12, 2016
Pre-amplifier	EM Electronics Corporation CO.,LTD	EM30265	07032613	Sep. 11, 2016
Pre-amplifier	HP	8447D	2727A05017	Sep. 11, 2016
Loop antenna	ZHINAN	ZN30900A	12024	Sep. 13, 2016
Broadband Antenna	Schwarzbeck	VULB9163	340	Sep. 13, 2016
Horn Antenna	Schwarzbeck	BBHA 9120D	631	Sep. 13, 2016
Horn Antenna	Schwarzbeck	BBHA 9170	373	Sep. 13, 2016
Dipole Antenna	TCT	TCT-RF	N/A	Sep. 13, 2016
Coax cable	TCT	RE-low-01	N/A	Sep. 11, 2016
Coax cable	TCT	RE-high-02	N/A	Sep. 11, 2016
Coax cable	TCT	RE-low-03	N/A	Sep. 11, 2016
Coax cable	TCT	RE-High-04	N/A	Sep. 11, 2016
Antenna Mast	CCS	CC-A-4M	N/A	Sep. 12, 2016
EMI Test Software	Shurple Technology	EZ-EMC	N/A	N/A

Note: *The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).*

6.6.3 Test Data

Frequency Range (9 kHz-30MHz)

Frequency (MHz)	Level@3m (dBμV/m)	Limit@3m (dBμV/m)
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Note: *1. Emission Level=Reading+ Cable loss-Antenna factor-Amp factor*

2. The emission levels are 20 dB below the limit value, which are not reported. It is deemed to comply with the requirement

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Above 1GHz

Band	**GSM 850**		**Test channel:**	**Lowest**
Test mode:	**GPRS Link (GPRS Class 8)**		**Temperature :**	**25°C**
			Relative Humidity:	**56%**
Note:	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.			
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
1648.40	Vertical	-43.26	-13.00	PASS
2472.60	V	-40.29		
3296.80	V	-50.18		
1648.40	Horizontal	-43.61		
2472.60	H	-39.54		
3296.80	H	-52.09		
Band	**GSM 850**		**Test channel:**	**Middle**
Test mode:	**GPRS Link (GPRS Class 8)**		**Temperature :**	**25°C**
			Relative Humidity:	**56%**
Note:	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.			
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
1673.20	Vertical	-42.06	-13.00	PASS
2509.80	V	-43.94		
3346.40	V	-51.46		
1673.20	Horizontal	-40.28		
2509.80	H	-41.43		
3346.40	H	-51.22		
Band	**GSM 850**		**Test channel:**	**Highest**
Test mode:	**GPRS Link (GPRS Class 8)**		**Temperature :**	**25°C**
			Relative Humidity:	**56%**
Note:	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.			
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
1697.60	Vertical	-41.34	-13.00	PASS
2546.40	V	-42.64		
3395.20	V	-51.73		
1697.60	Horizontal	-42.46		
2546.40	H	-41.98		
3395.20	H	-52.41		

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Band	PCS 1900		Test channel:	Lowest
Test mode:	GPRS Link (Class 8)		Temperature :	25°C
			Relative Humidity:	56%
Note:	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.			
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
3700.40	Vertical	-48.36	-13.00	PASS
5550.60	V	-46.53		
7400.80	V	-51.95		
3700.40	Horizontal	-48.29		
5550.60	H	-51.24		
7400.80	H	-51.61		
Test mode:	PCS 1900		Test channel:	Middle
Test mode:	GPRS Link (Class 8)		Temperature :	25°C
			Relative Humidity:	56%
Note:	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.			
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
3760.00	Vertical	-48.59	-13.00	PASS
5640.00	V	-54.26		
7520.00	V	-42.65		
3760.00	Horizontal	-46.37		
5640.00	H	-54.33		
7520.00	H	-54.15		
Test mode:	PCS 1900		Test channel:	Highest
Test mode:	GPRS Link (Class 8)		Temperature :	25°C
			Relative Humidity:	56%
Note:	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.			
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
3819.60	Vertical	-46.38	-13.00	PASS
5729.40	V	-49.62		
7639.20	V	-51.56		
3819.60	Horizontal	-49.61		
5729.40	H	-53.26		
7639.20	H	-53.31		

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Band	GSM 850		Test channel:	Lowest
Test mode:	EDGE Link (EDGE Class 8)		Temperature :	25°C
			Relative Humidity:	56%
Note:	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.			
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
1648.40	Vertical	-43.43	-13.00	PASS
2472.60	V	-40.46		
3296.80	V	-50.26		
1648.40	Horizontal	-43.94		
2472.60	H	-39.53		
3296.80	H	-51.93		
Band	GSM 850		Test channel:	Middle
Test mode:	EDGE Link (EDGE Class 8)		Temperature :	25°C
			Relative Humidity:	56%
Note:	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.			
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
1673.20	Vertical	-42.07	-13.00	PASS
2509.80	V	-43.80		
3346.40	V	-51.48		
1673.20	Horizontal	-40.70		
2509.80	H	-41.33		
3346.40	H	-51.08		
Band	GSM 850		Test channel:	Highest
Test mode:	EDGE Link (EDGE Class 8)		Temperature :	25°C
			Relative Humidity:	56%
Note:	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.			
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
1697.60	Vertical	-41.87	-13.00	PASS
2546.40	V	-42.79		
3395.20	V	-51.62		
1697.60	Horizontal	-42.74		
2546.40	H	-41.99		
3395.20	H	-52.32		

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Band	PCS 1900		Test channel:	Lowest
Test mode:	EDGE Link (Class 8)		Temperature :	25°C
			Relative Humidity:	56%
Note:	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.			
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
3700.40	Vertical	-49.07	-13.00	PASS
5550.60	V	-46.47		
7400.80	V	-52.21		
3700.40	Horizontal	-48.46		
5550.60	H	-51.11		
7400.80	H	-52.06		
Test mode:	PCS 1900		Test channel:	Middle
Test mode:	EDGE Link (Class 8)		Temperature :	25°C
			Relative Humidity:	56%
Note:	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.			
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
3760.00	Vertical	-48.93	-13.00	PASS
5640.00	V	-54.48		
7520.00	V	-42.98		
3760.00	Horizontal	-46.32		
5640.00	H	-54.35		
7520.00	H	-54.17		
Test mode:	PCS 1900		Test channel:	Highest
Test mode:	EDGE Link (Class 8)		Temperature :	25°C
			Relative Humidity:	56%
Note:	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.			
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
3819.60	Vertical	-46.32	-13.00	PASS
5729.40	V	-49.86		
7639.20	V	-51.88		
3819.60	Horizontal	-50.14		
5729.40	H	-53.76		
7639.20	H	-53.93		

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Band	WCDMA Band V		Test channel:	Lowest
Test mode:	RMC 12.2Kbps Link (QPSK)		Temperature :	25°C
			Relative Humidity:	56%
Note:	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.			
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
1652.80	Vertical	-53.19	-13.00	PASS
2479.20	V	-52.91		
3305.60	V	-53.06		
1652.80	Horizontal	-54.72		
2479.20	H	-52.15		
3305.60	H	-54.50		
Test mode:	WCDMA Band V		Test channel:	Middle
Test mode:	RMC 12.2Kbps Link (QPSK)		Temperature :	25°C
			Relative Humidity:	56%
Note:	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.			
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
1673.20	Vertical	-56.18	-13.00	PASS
2509.80	V	-51.45		
3346.40	V	-53.54		
1673.20	Horizontal	-53.16		
2509.80	H	-51.80		
3346.40	H	-54.45		
Test mode:	WCDMA Band V		Test channel:	Highest
Test mode:	RMC 12.2Kbps Link (QPSK)		Temperature :	25°C
			Relative Humidity:	56%
Note:	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.			
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
1693.20	Vertical	-52.49	-13.00	PASS
2539.80	V	-53.59		
3386.40	V	-53.31		
1693.20	Horizontal	-53.51		
2539.80	H	-51.03		
3386.40	H	-53.59		

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Band	WCDMA Band II		Test channel:	Lowest
Test mode:	RMC 12.2Kbps Link (QPSK)		Temperature :	25°C
			Relative Humidity:	56%
Note:	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.			
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
3704.80	Vertical	-51.99	-13.00	PASS
5557.20	V	-53.18		
7409.60	V	-53.07		
3704.80	Horizontal	-53.97		
5557.20	H	-52.39		
7409.60	H	-53.10		
Test mode:	WCDMA Band II		Test channel:	Middle
Test mode:	RMC 12.2Kbps Link (QPSK)		Temperature :	25°C
			Relative Humidity:	56%
Note:	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.			
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
3760.00	Vertical	-53.77	-13.00	PASS
5640.00	V	-52.68		
7520.00	V	-52.71		
3760.00	Horizontal	-54.77		
5640.00	H	-51.39		
7520.00	H	-53.30		
Test mode:	WCDMA Band II		Test channel:	Highest
Test mode:	RMC 12.2Kbps Link (QPSK)		Temperature :	25°C
			Relative Humidity:	56%
Note:	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.			
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
3815.20	Vertical	-56.05	-13.00	PASS
5722.80	V	-52.34		
7630.40	V	-52.03		
3815.20	Horizontal	-52.92		
5722.80	H	-52.01		
7630.40	H	-54.80		

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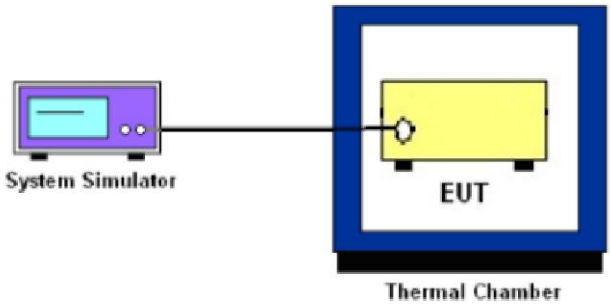
6.7 Frequency Stability Measurement

6.7.1 Test Specification

Test Requirement:	FCC Part 2.1055(a)(1)(b)
Test Method:	FCC Part 2.1055(a)(1)(b)
Operation mode:	Refer to item 4.1
Limit:	±2.5 ppm
Test Setup:	
Test Procedure:	**Test Procedures for Temperature Variation** 1. The testing follows FCC KDB 971168 v02r02 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. **Test Procedures for Voltage Variation** 1. The testing follows FCC KDB 971168 v02r02 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.
Test Result:	PASS

6.7.2 Test Instruments

Equipment	Manufacturer	Model	Serial Number	Calibration Due
System simulator	R&S	CMU200	111382	Sep. 11, 2016

RF cable	TCT	RE-06	N/A	Sep. 12, 2016
Antenna Connector	TCT	RFC-01	N/A	Sep. 12, 2016

Note: *The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).*

6.7.3 Test Data

Test Result of Temperature Variation

Band :	GSM 850	Channel:	190
Limit (ppm) :	2.5ppm	Frequency:	836.6MHz
Temperature (°C)	Frequency Deviation (Hz)	Frequency Deviation (ppm)	Result
50	16	0.019	PASS
40	27	0.032	
30	13	0.016	
20	36	0.043	
10	37	0.044	
0	47	0.056	
-10	40	0.048	
-20	35	0.042	
-30	44	0.053	

Band :	PCS 1900	Channel:	661
Limit (ppm) :	*Note*	Frequency:	1880MHz
Temperature (°C)	Frequency Deviation (Hz)	Frequency Deviation (ppm)	Result
50	47	0.025	PASS
40	45	0.024	
30	43	0.023	
20	43	0.023	
10	27	0.014	
0	26	0.014	
-10	37	0.020	
-20	22	0.012	
-30	36	0.019	

Note: *The frequency fundamental emissions stay within the authorized frequency block based on the frequency deviation measured is small.*

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Band :	EDGE 850	Channel:	190
Limit (ppm) :	2.5ppm	Frequency:	836.6MHz
Temperature (°C)	Frequency Deviation (Hz)	Frequency Deviation (ppm)	Result
50	29	0.035	PASS
40	28	0.033	
30	14	0.017	
20	29	0.035	
10	32	0.038	
0	43	0.051	
-10	30	0.036	
-20	46	0.055	
-30	41	0.049	

Band :	EDGE 1900	Channel:	661
Limit (ppm) :	*Note*	Frequency:	1880MHz
Temperature (°C)	Frequency Deviation (Hz)	Frequency Deviation (ppm)	Result
50	49	0.026	PASS
40	46	0.024	
30	35	0.019	
20	38	0.020	
10	38	0.020	
0	20	0.011	
-10	31	0.016	
-20	22	0.012	
-30	43	0.023	

Note: *The frequency fundamental emissions stay within the authorized frequency block based on the frequency deviation measured is small.*

Band :	WCDMA Band V	Channel:	4183
Limit (ppm) :	2.5ppm	Frequency:	836.6MHz
Temperature (°C)	Frequency Deviation (Hz)	Frequency Deviation (ppm)	Result
50	16	0.019	PASS
40	27	0.032	
30	15	0.018	
20	32	0.038	
10	33	0.039	
0	38	0.045	
-10	44	0.053	
-20	36	0.043	
-30	32	0.038	

Band :	WCDMA Band II	Channel:	9400
Limit (ppm) :	*Note*	Frequency:	1880MHz
Temperature (°C)	Frequency Deviation (Hz)	Frequency Deviation (ppm)	Result
50	43	0.023	PASS
40	51	0.027	
30	38	0.020	
20	35	0.019	
10	40	0.021	
0	14	0.007	
-10	40	0.021	
-20	20	0.011	
-30	39	0.021	

Note: *The frequency fundamental emissions stay within the authorized frequency block based on the frequency deviation measured is small.*

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Test Result of Voltage Variation

Band & Channel	Mode	Voltage (Volt)	Deviation (ppm)	Limit (ppm)	Result
GSM 850 CH190	GSM	4.2	0.035	2.5	PASS
		3.7	0.022		
		BEP	0.015		
GSM 850 CH190	GPRS	4.2	0.031	2.5	
		3.7	0.019		
		BEP	0.019		
GSM 850 CH190	EDGE	4.2	0.012	2.5	
		3.7	0.009		
		BEP	0.001		
GSM 1900 CH661	GSM	4.2	0.013	(Note 3.)	
		3.7	0.001		
		BEP	-0.004		
GSM 1900 CH661	GPRS	4.2	-0.003	(Note 3.)	
		3.7	0.011		
		BEP	0.017		
GSM 1900 CH661	EDGE	4.2	0.002	(Note 3.)	
		3.7	0.014		
		BEP	0.02		
WCDMA Band V CH4182	RMC 12.2Kbps	4.2	0.019	2.5	
		3.7	0.019		
		BEP	0.026		
WCDMA Band II CH9400	RMC 12.2Kbps	4.2	0.006	(Note 3.)	
		3.7	0.024		
		BEP	0.014		

Note:

1. Normal Voltage = 3.7V.
2. Battery End Point (BEP) = 3.5 V.
3. The frequency fundamental emissions stay within the authorized frequency block based on the frequency deviation measured is small.

********END OF REPORT********

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