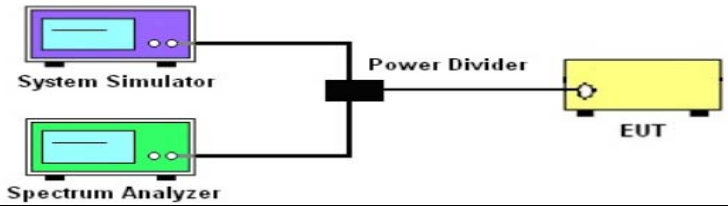
6.4. Band Edge and Conducted Spurious Emission Measurement

6.4.1. Test Specification

Test Requirement:	FCC part22.917(a) and FCC part24.238(a) FCC part27.53(g)
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. 27, 2018
Spectrum Analyzer	Agilent	N9020A	MY49100060	Sep. 27, 2018
RF cable (9kHz-40GHz)	TCT	RE-06	N/A	Sep. 27, 2018
Antenna Connector	TCT	RFC-01	N/A	Sep. 27, 2018

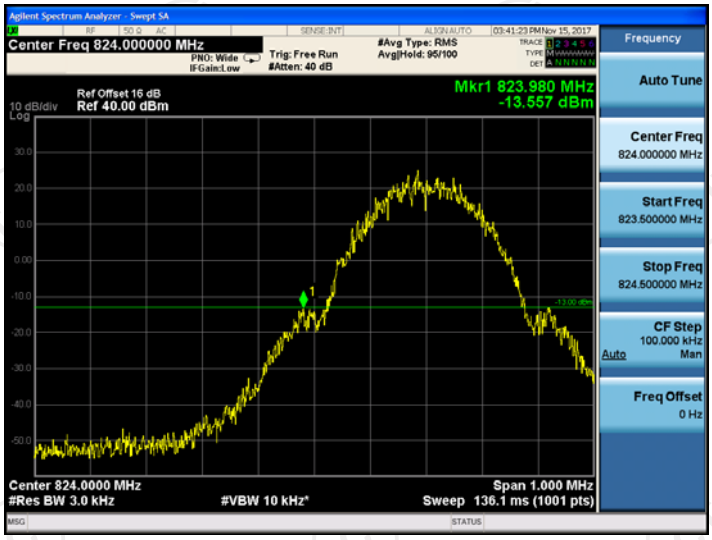
Note: *The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).*

6.4.3. Test data

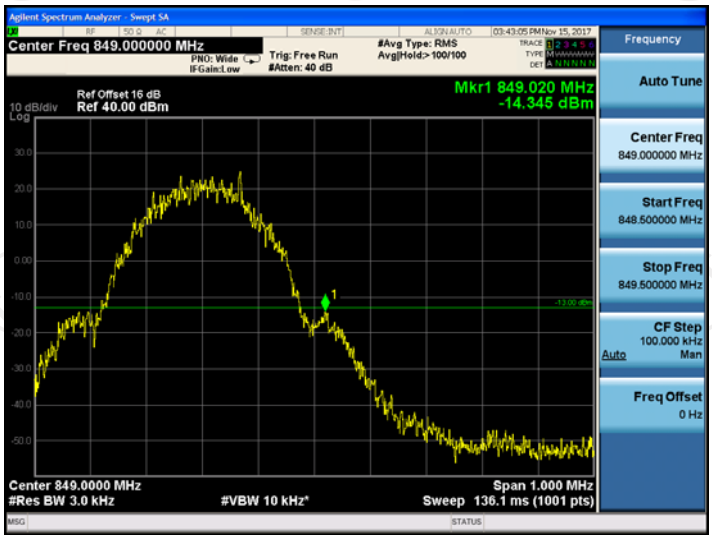
Test plots as follows:

Band:	GPRS 850	Test Mode:	GSM Link (GMSK)

Lower Band Edge Plot on Channel 128

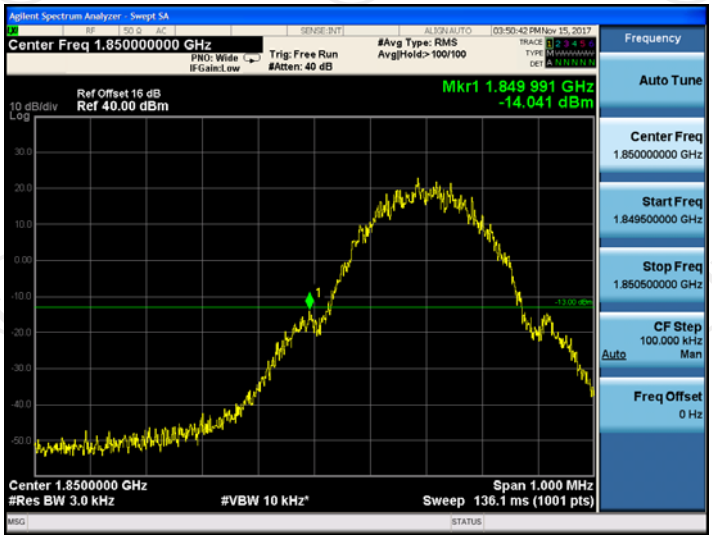


Higher Band Edge Plot on Channel 251

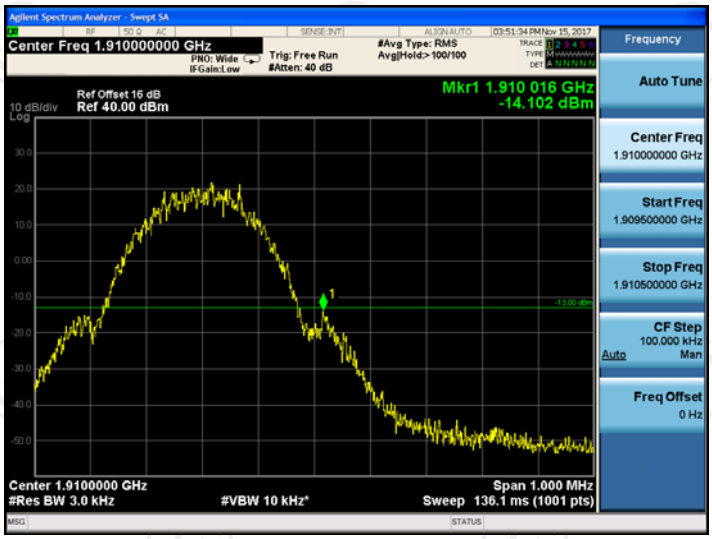


Band:	GPRS 1900	Test Mode:	GSM Link (GMSK)

Lower Band Edge Plot on Channel 512

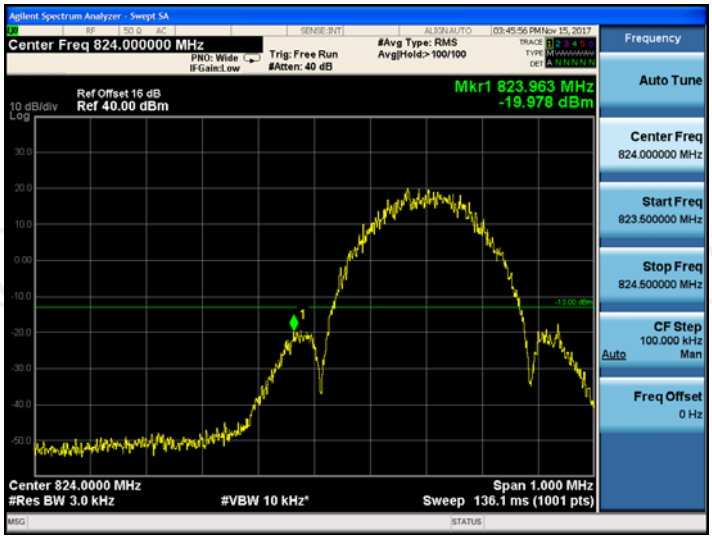


Higher Band Edge Plot on Channel 810

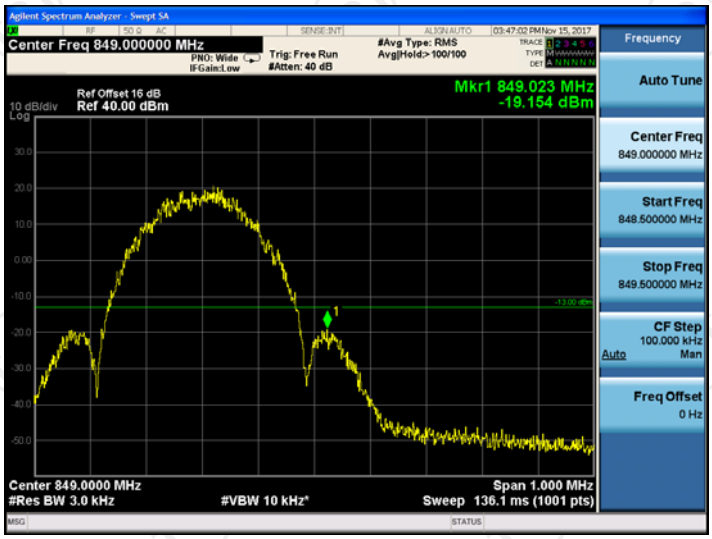


Band:	EGPRS 850	Test Mode:	EGPRS Class 8 Link (8PSK)

Lower Band Edge Plot on Channel 128

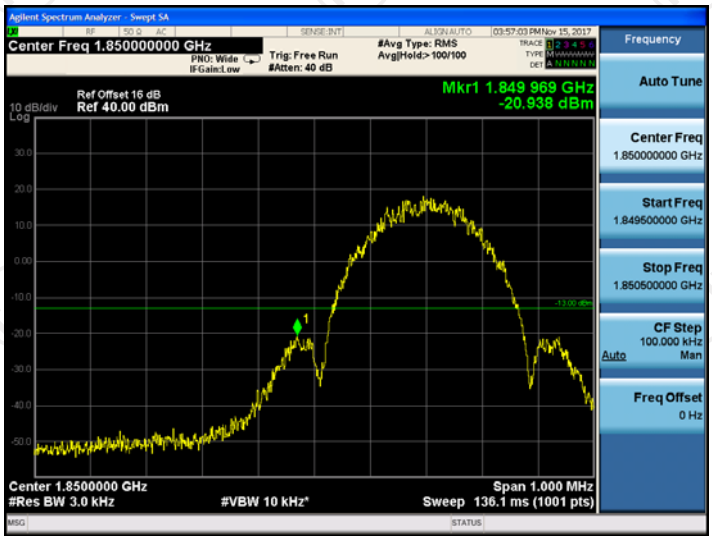


Higher Band Edge Plot on Channel 251

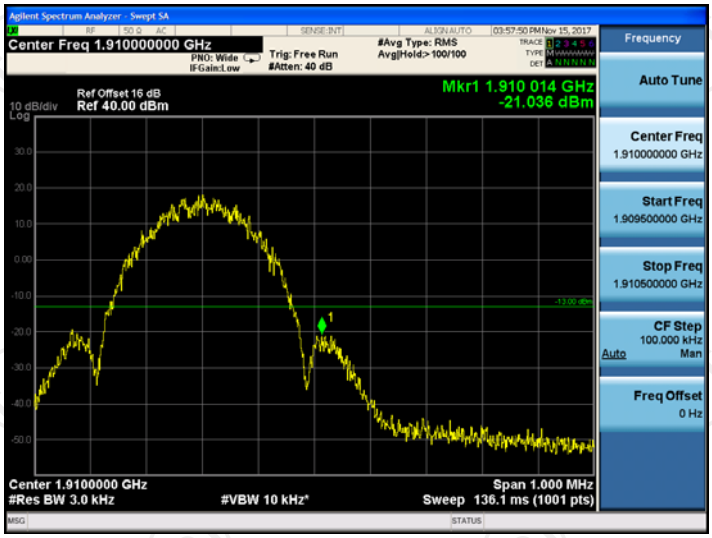


Band:	EGPRS 1900	Test Mode:	EGPRS Class 8 Link (8PSK)

Lower Band Edge Plot on Channel 512

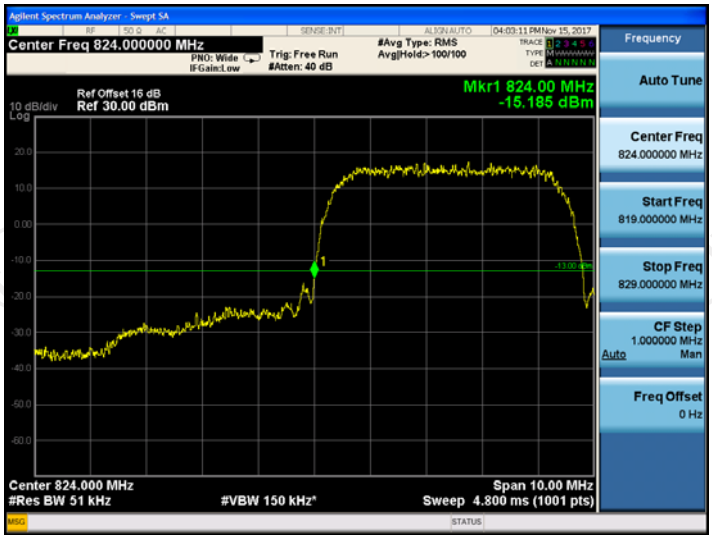


Higher Band Edge Plot on Channel 810



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

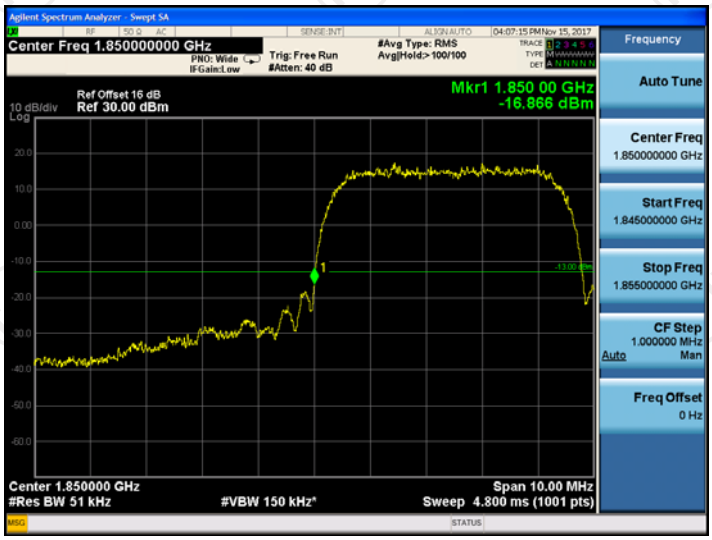
Band:	WCDMA Band IV	Test Mode:	RMC 12.2Kbps Link (QPSK)

Lower Band Edge Plot on Channel 1312

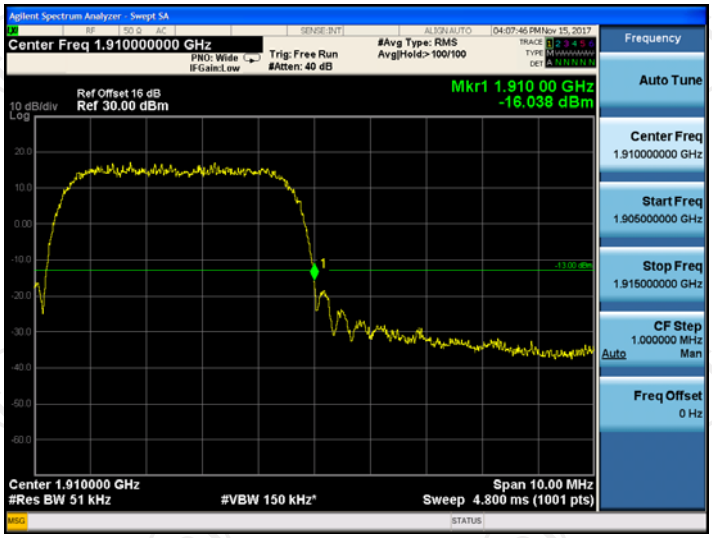
Higher Band Edge Plot on Channel 1513

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

Lower Band Edge Plot on Channel 9262

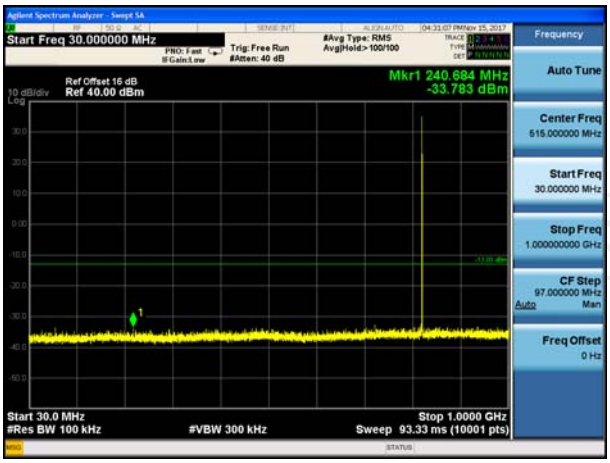


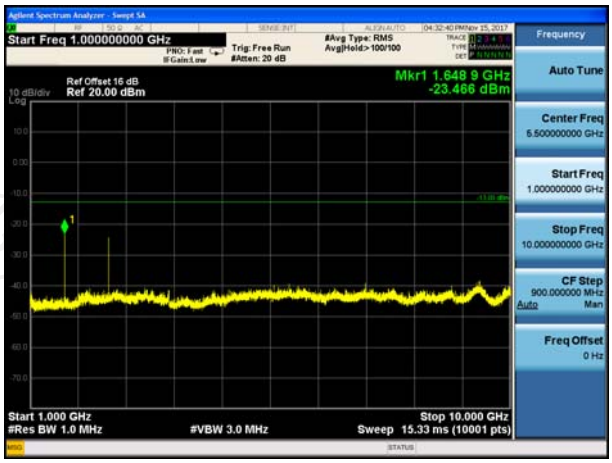
Higher Band Edge Plot on Channel 9538



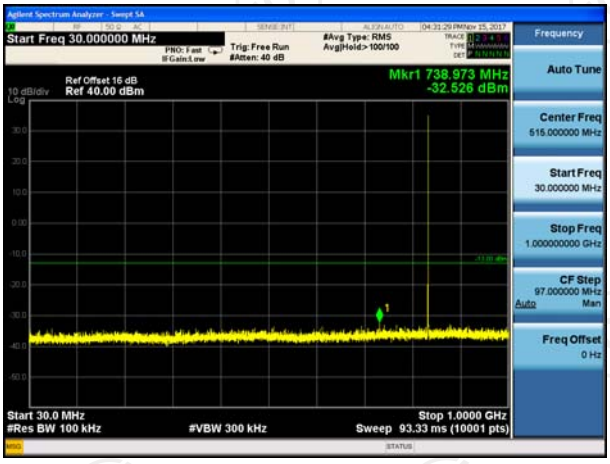
Band:	GPRS 850	Test Mode:	GPRS Class 8 Link (GMSK)

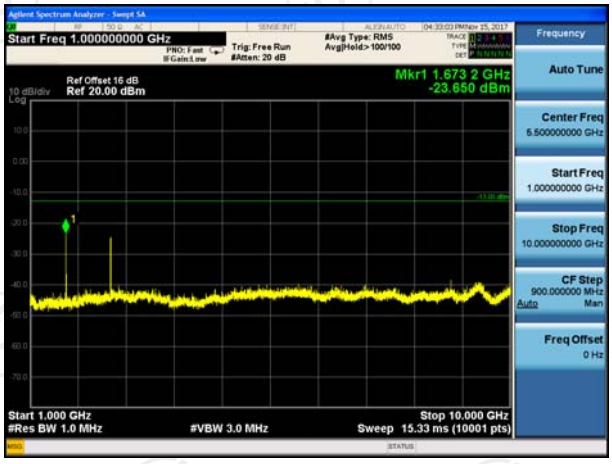
Conducted Spurious Emission on Channel 128



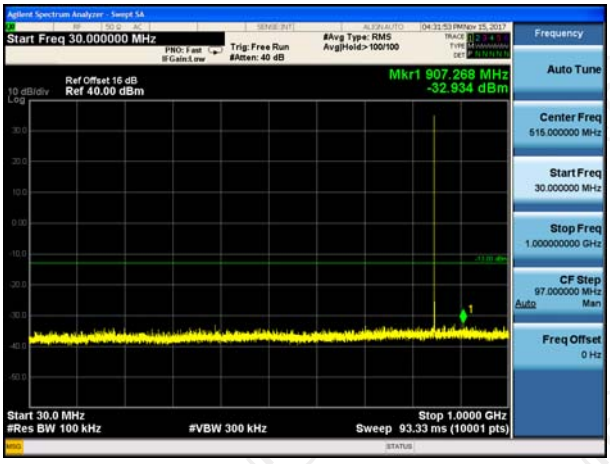


Conducted Spurious Emission on Channel 189



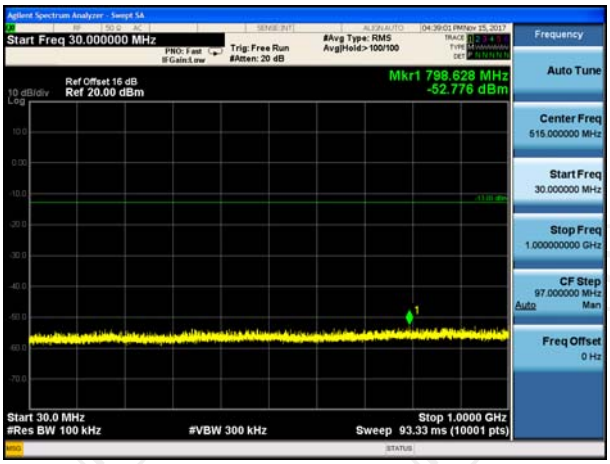


Conducted Spurious Emission on Channel 251

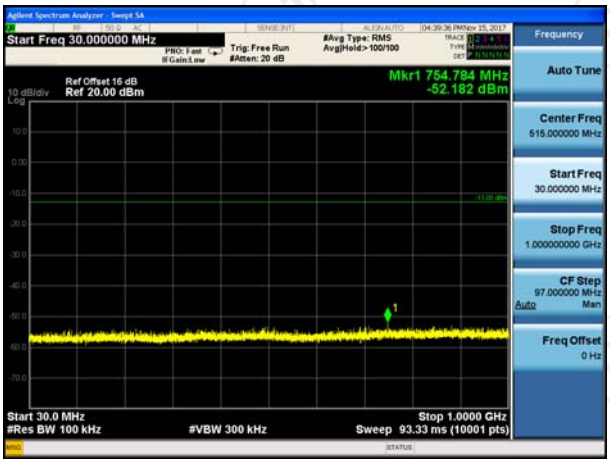


Band:	GPRS 1900	Test Mode:	GPRS Class 8 Link (GMSK)

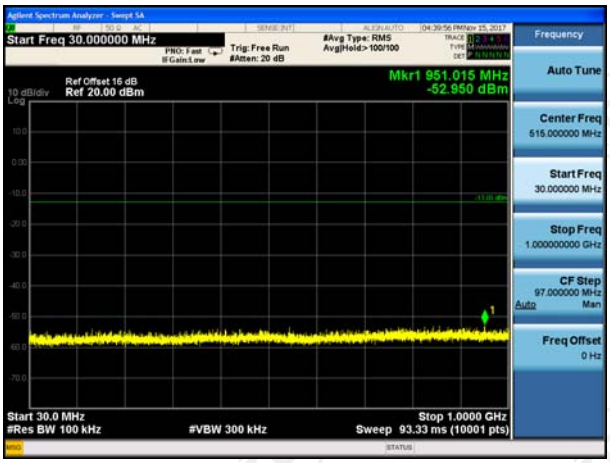
Conducted Spurious Emission on Channel 512



Conducted Spurious Emission on Channel 661

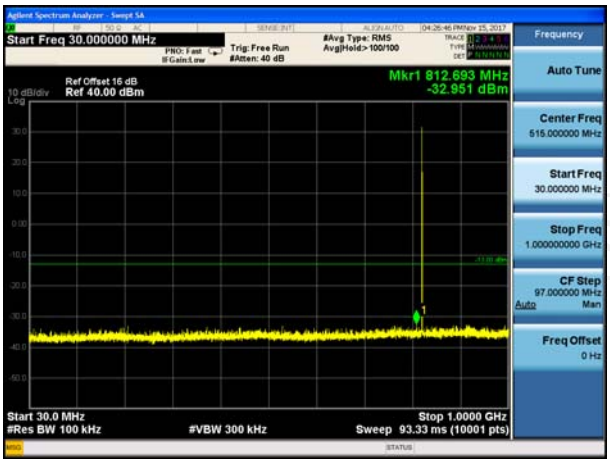


Conducted Spurious Emission on Channel 810

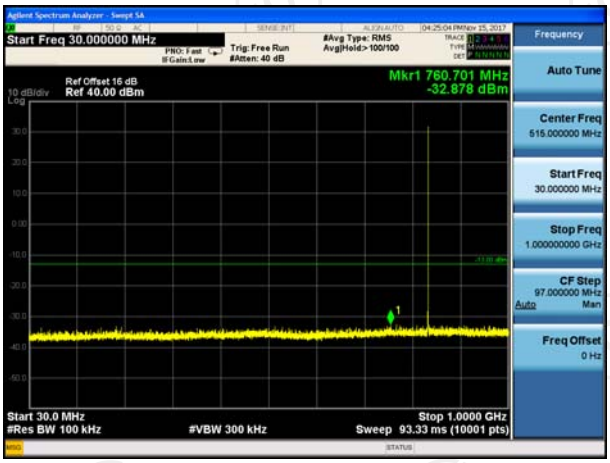


Band:	EGPRS 850	Test Mode:	EGPRS Class 8 Link (8PSK)

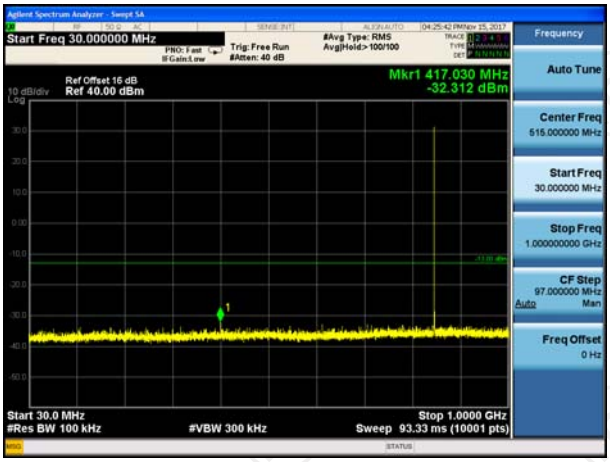
Conducted Spurious Emission on Channel 128



Conducted Spurious Emission on Channel 189

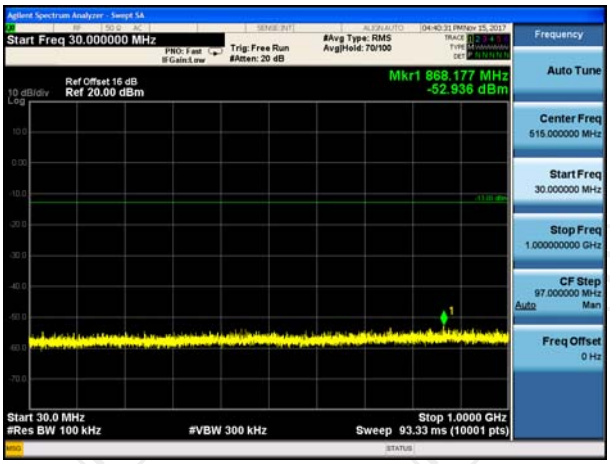


Conducted Spurious Emission on Channel 251

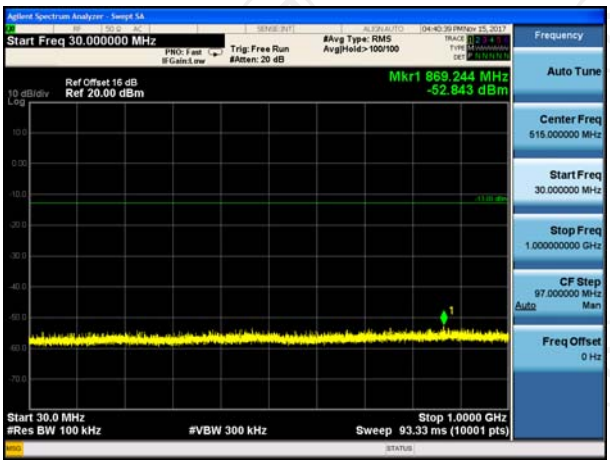


Band:	EGPRS 1900	Test Mode:	EGPRS Class 8 Link (8PSK)

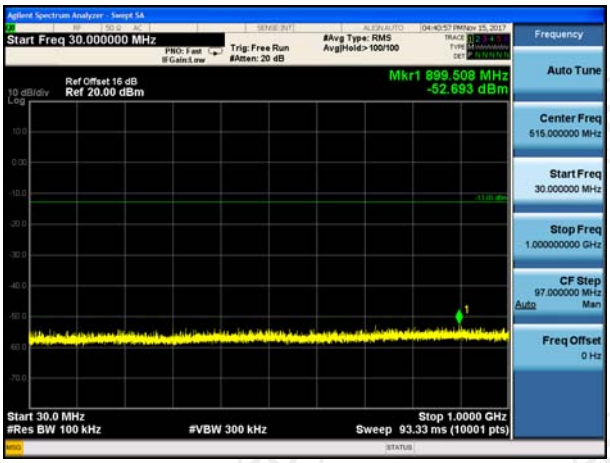
Conducted Spurious Emission on Channel 512



Conducted Spurious Emission on Channel 661

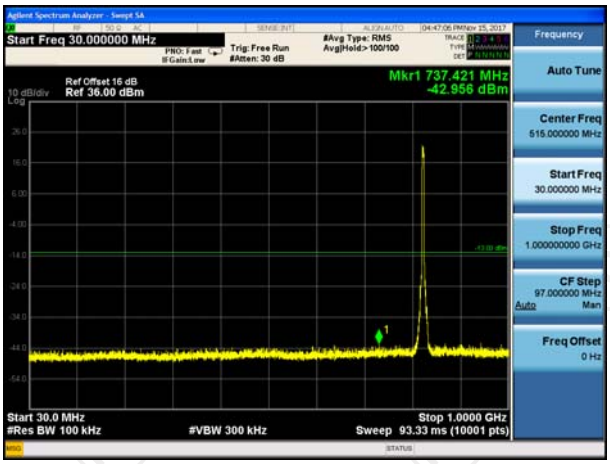


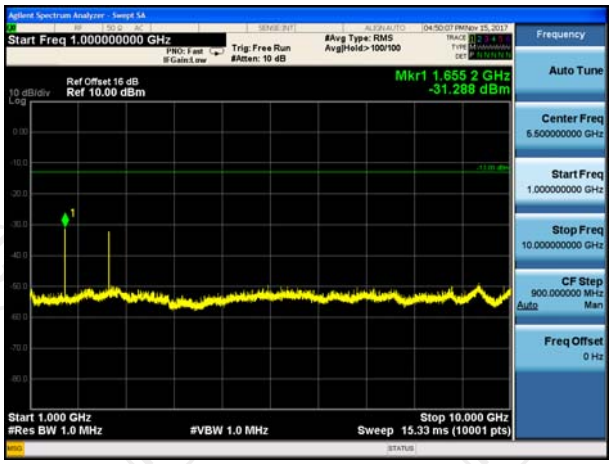
Conducted Spurious Emission on Channel 810



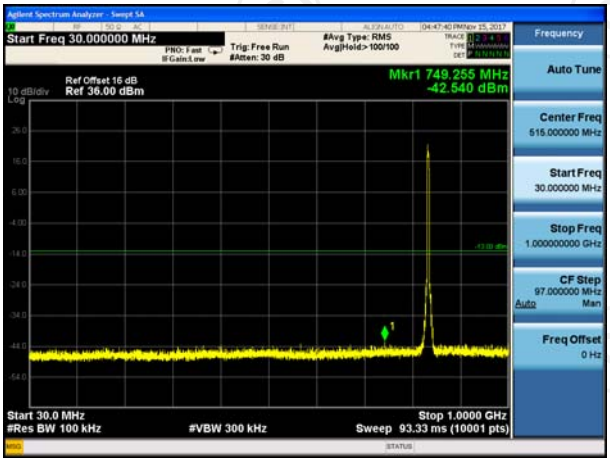
Band:	WCDMA Band V	Test Mode:	RMC 12.2Kbps Link (QPSK)

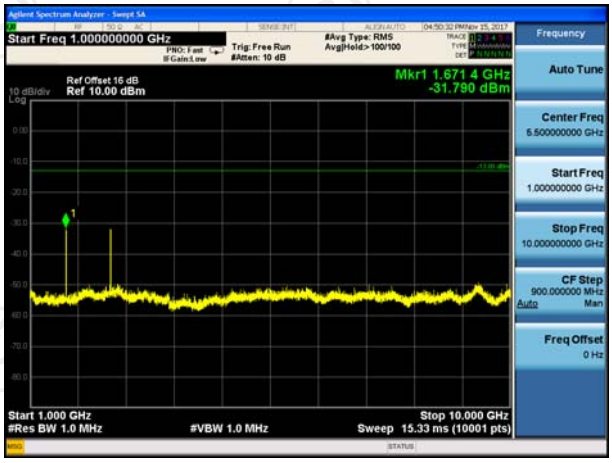
Conducted Spurious Emission on Channel 4132



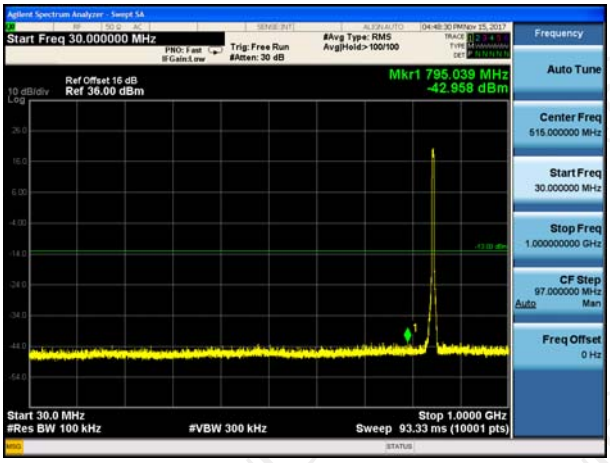


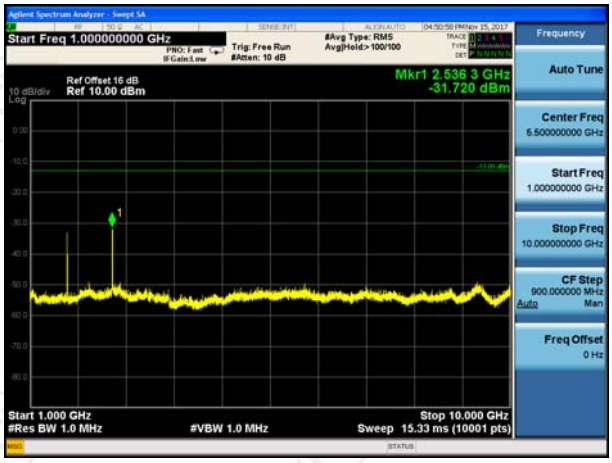
Conducted Spurious Emission on Channel 4183





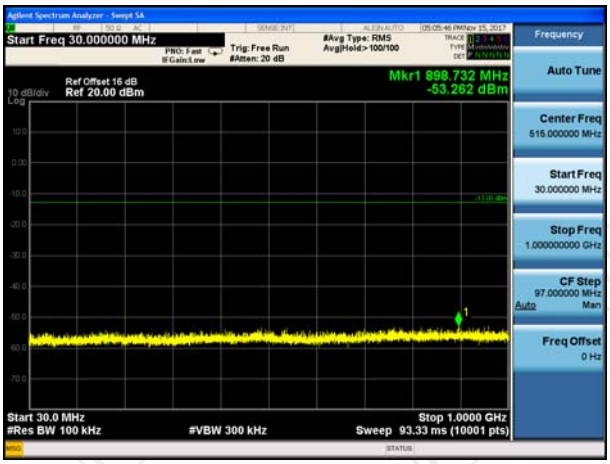
Conducted Spurious Emission on Channel 4233



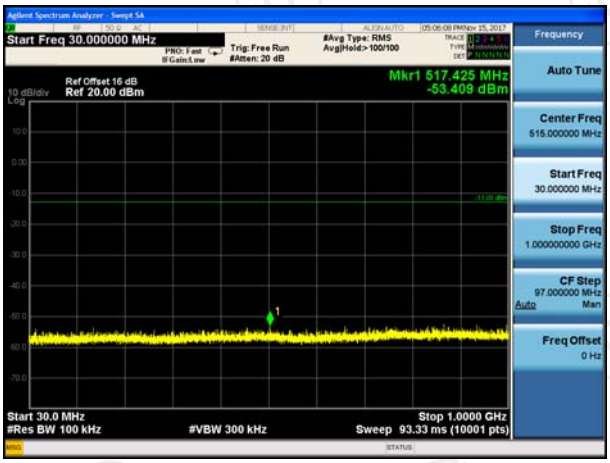


Band:	WCDMA Band IV	Test Mode:	RMC 12.2Kbps Link (QPSK)

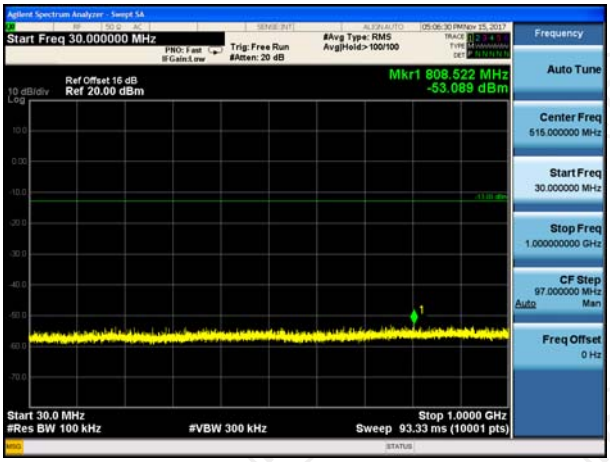
Conducted Spurious Emission on Channel 1312



Conducted Spurious Emission on Channel 1413

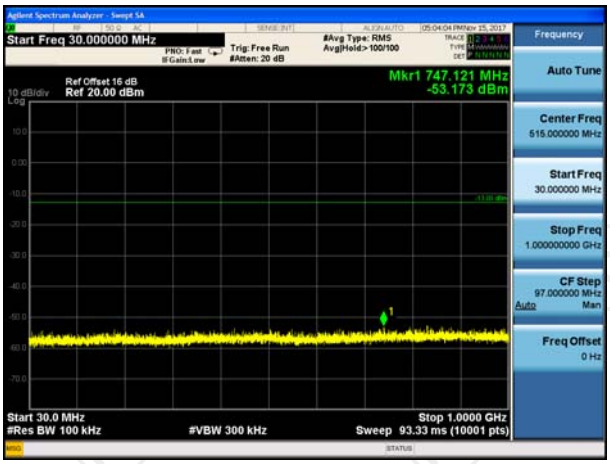


Conducted Spurious Emission on Channel 1513

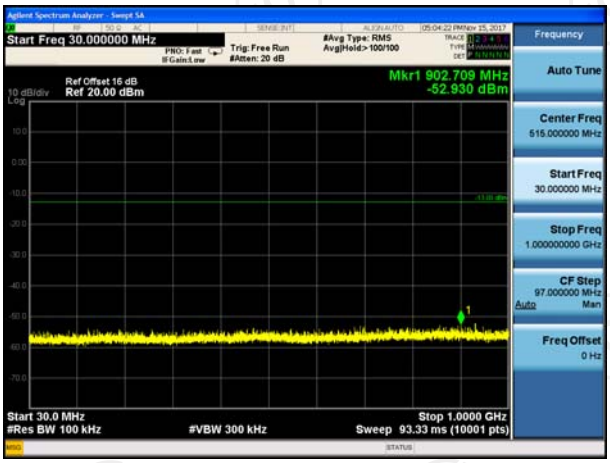


Band:	WCDMA Band II	Test Mode:	RMC 12.2Kbps Link (QPSK)

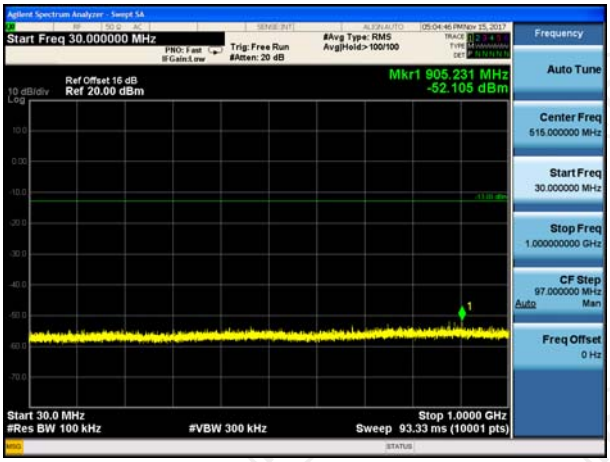
Conducted Spurious Emission on Channel 9262



Conducted Spurious Emission on Channel 9400

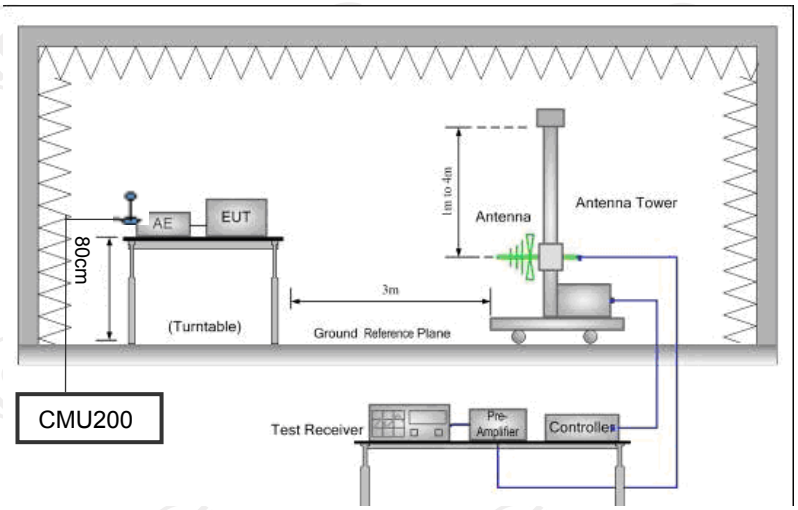


Conducted Spurious Emission on Channel 9538



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)
FCC part 27.50(d)</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
WCDMA Band IV: 1W 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.</td></tr>
</table>

	3. During the measurement, the system simulator parameters were set to force the EUT transmitting at 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. 27, 2018
System simulator	R&S	CMU200	111382	Sep. 27, 2018
Spectrum Analyzer	ROHDE&SCHWARZ	FSEM	848597/001	Sep. 27, 2018
Spectrum Analyzer	Agilent	N9020A	MY49100060	Sep. 27, 2018
Pre-amplifier	EM Electronics Corporation CO.,LTD	EM30265	07032613	Sep. 27, 2018
Pre-amplifier	HP	8447D	2727A05017	Sep. 27, 2018
Broadband Antenna	Schwarzbeck	VULB9163	340	Sep. 27, 2018
Horn Antenna	Schwarzbeck	BBHA 9120D	631	Sep. 27, 2018
Broadband Antenna	Schwarzbeck	VULB9163	412	Sep. 27, 2018
Horn Antenna	Schwarzbeck	BBHA 9120D	813	Sep. 27, 2018
Dipole Antenna	TCT	TCT-RF	N/A	Sep. 27, 2018
Coax cable (9kHz-40GHz)	TCT	RE-low-01	N/A	Sep. 27, 2018
Coax cable (9kHz-40GHz)	TCT	RE-high-02	N/A	Sep. 27, 2018
Coax cable (9kHz-40GHz)	TCT	RE-low-03	N/A	Sep. 27, 2018
Coax cable (9kHz-40GHz)	TCT	RE-High-04	N/A	Sep. 27, 2018
Antenna Mast	CCS	CC-A-4M	N/A	Sep. 27, 2018
EMI Test Software	Shurple Technology	EZ-EMC	N/A	N/A
UNIVERSAL RADIO COMMUNICATION TESTER	CMU200	R&S	Sep. 12, 2016	Sep. 27, 2018

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

GPRS 850 (1-solt) Radiated Power ERP					
Horizontal Polarization (Antenna Pol.)					
Frequency (MHz)	**(EUT Pol.)**	**LVL (dBm)**	**Correction Factor (dB)**	**ERP (dBm)**	**ERP (W)**
824.20	H	10.71	21.66	32.37	1.73
836.40	H	10.97	21.54	32.51	1.78
848.80	H	11.09	21.46	32.55	1.80
Vertical Polarization (Antenna Pol.)					
Frequency (MHz)	**(EUT Pol.)**	**LVL (dBm)**	**Correction Factor (dB)**	**ERP (dBm)**	**ERP (W)**
824.20	H	10.54	21.66	32.2	1.66
836.40	H	10.32	21.54	31.86	1.53
848.80	H	10.07	21.46	31.53	1.42

EGPRS850 (1-solt) Radiated Power ERP					
Horizontal Polarization (Antenna Pol.)					
Frequency (MHz)	**(EUT Pol.)**	**LVL (dBm)**	**Correction Factor (dB)**	**ERP (dBm)**	**ERP (W)**
824.20	H	7.57	21.66	29.23	0.84
836.40	H	7.22	21.54	28.76	0.75
848.80	H	7.69	21.46	29.15	0.82
Vertical Polarization (Antenna Pol.)					
Frequency (MHz)	**(EUT Pol.)**	**LVL (dBm)**	**Correction Factor (dB)**	**ERP (dBm)**	**ERP (W)**
824.20	H	7.33	21.66	28.99	0.79
836.40	H	7.28	21.54	28.82	0.76
848.80	H	7.66	21.46	29.12	0.82

***Note**: All GPRS slot have been tested, but only the worst GPRS 1-slot show in this test item.*

WCDMA Band V (RMC 12.2Kbps) Radiated Power ERP					
Horizontal Polarization (Antenna Pol.)					
Frequency (MHz)	**(EUT Pol.)**	**LVL (dBm)**	**Correction Factor (dB)**	**ERP (dBm)**	**ERP (W)**
826.40	H	3.39	21.62	25.01	0.32
836.60	H	3.18	21.57	24.75	0.30
846.60	H	3.25	21.44	24.69	0.29
Vertical Polarization (Antenna Pol.)					
Frequency (MHz)	**(EUT Pol.)**	**LVL (dBm)**	**Correction Factor (dB)**	**ERP (dBm)**	**ERP (W)**
826.40	H	2.11	21.62	23.73	0.24
836.60	H	2.37	21.57	23.94	0.25
846.60	H	2.19	21.44	23.63	0.23

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

Test Result of EIRP

GPRS1900 (1-solt) Radiated Power EIRP					
Horizontal Polarization (Antenna Pol.)					
Frequency (MHz)	**(EUT Pol.)**	**LVL (dBm)**	**Correction Factor (dB)**	**ERP (dBm)**	**ERP (W)**
1850.20	H	7.98	21.66	29.64	0.92
1880.00	H	7.16	21.54	28.7	0.74
1909.80	H	7.17	21.46	28.63	0.73
Vertical Polarization (Antenna Pol.)					
Frequency (MHz)	**(EUT Pol.)**	**LVL (dBm)**	**Correction Factor (dB)**	**ERP (dBm)**	**ERP (W)**
1850.20	H	6.83	21.66	28.49	0.71
1880.00	H	6.38	21.54	27.92	0.62
1909.80	H	6.41	21.46	27.87	0.61

EGPRS1900 (1-solt) Radiated Power EIRP					
Horizontal Polarization (Antenna Pol.)					
Frequency (MHz)	**(EUT Pol.)**	**LVL (dBm)**	**Correction Factor (dB)**	**ERP (dBm)**	**ERP (W)**
1850.20	H	5.81	21.66	27.47	0.56
1880.00	H	5.73	21.54	27.27	0.53
1909.80	H	5.65	21.46	27.11	0.51
Vertical Polarization (Antenna Pol.)					
Frequency (MHz)	**(EUT Pol.)**	**LVL (dBm)**	**Correction Factor (dB)**	**ERP (dBm)**	**ERP (W)**
1850.20	H	5.12	21.66	26.78	0.48
1880.00	H	5.38	21.54	26.92	0.49
1909.80	H	5.07	21.46	26.53	0.45

***Note**: All GPRS slot have been tested, but only the worst GPRS 1-slot show in this test item.*

WCDMA Band IV (RMC 12.2Kbps) Radiated Power EIRP					
Horizontal Polarization (Antenna Pol.)					
Frequency (MHz)	**(EUT Pol.)**	**LVL (dBm)**	**Correction Factor (dB)**	**ERP (dBm)**	**ERP (W)**
1712.4	H	4.22	18.33	22.55	0.18
1732.6	H	4.39	18.15	22.54	0.18
1752.6	H	4.68	18.24	22.92	0.20
Vertical Polarization (Antenna Pol.)					
Frequency (MHz)	**(EUT Pol.)**	**LVL (dBm)**	**Correction Factor (dB)**	**ERP (dBm)**	**ERP (W)**
1712.4	H	3.80	18.33	22.13	0.16
1732.6	H	4.12	18.15	22.27	0.17
1752.6	H	4.04	18.24	22.28	0.17

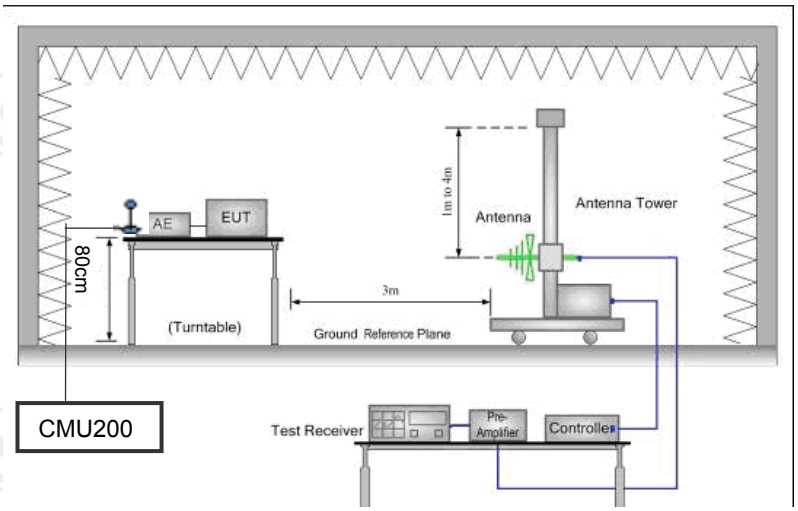
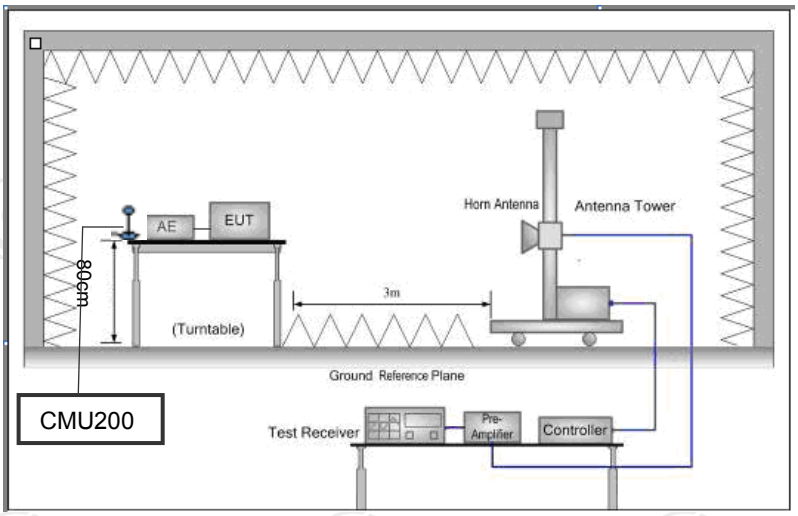
** EIRP = LVL (dBm) + Correction Factor (dB)*
Correction Factor= S.G. Power - Cable loss + Antenna Gain- SPA. Reading

WCDMA Band II (RMC 12.2Kbps) Radiated Power EIRP					
Horizontal Polarization (Antenna Pol.)					
Frequency (MHz)	**(EUT Pol.)**	**LVL (dBm)**	**Correction Factor (dB)**	**ERP (dBm)**	**ERP (W)**
1852.40	H	-11.23	31.78	20.55	0.11
1880.00	H	-11.32	31.63	20.31	0.11
1907.60	H	-11.92	31.75	19.83	0.09
Vertical Polarization (Antenna Pol.)					
Frequency (MHz)	**(EUT Pol.)**	**LVL (dBm)**	**Correction Factor (dB)**	**ERP (dBm)**	**ERP (W)**
1852.40	H	-10.57	31.85	21.28	0.13
1880.00	H	-10.01	31.39	21.38	0.14
1907.60	H	-10.37	31.67	21.3	0.13

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

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) FCC part 27.53(g)
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
Remark:	All modulations have been tested, but only the worst modulation show in this test item.

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. 27, 2018
System simulator	R&S	CMU200	111382	Sep. 27, 2018
Spectrum Analyzer	ROHDE&SCHWARZ	FSEM	848597/001	Sep. 27, 2018
Spectrum Analyzer	Agilent	N9020A	MY49100060	Sep. 27, 2018
Pre-amplifier	EM Electronics Corporation CO.,LTD	EM30265	07032613	Sep. 27, 2018
Pre-amplifier	HP	8447D	2727A05017	Sep. 27, 2018
Loop antenna	ZHINAN	ZN30900A	12024	Sep. 27, 2018
Broadband Antenna	Schwarzbeck	VULB9163	340	Sep. 27, 2018
Horn Antenna	Schwarzbeck	BBHA 9120D	631	Sep. 27, 2018
Horn Antenna	Schwarzbeck	BBHA 9170	373	Sep. 27, 2018
Dipole Antenna	TCT	TCT-RF	N/A	Sep. 27, 2018
Coax cable (9kHz-40GHz)	TCT	RE-low-01	N/A	Sep. 27, 2018
Coax cable (9kHz-40GHz)	TCT	RE-high-02	N/A	Sep. 27, 2018
Coax cable (9kHz-40GHz)	TCT	RE-low-03	N/A	Sep. 27, 2018
Coax cable (9kHz-40GHz)	TCT	RE-High-04	N/A	Sep. 27, 2018
Antenna Mast	CCS	CC-A-4M	N/A	Sep. 27, 2018
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

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

Band	GSM 850		Test channel:	Lowest
Test mode:			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	-42.75	-13.00	PASS
2472.60	V	-39.76		
3296.80	V	-51.88		
1648.40	Horizontal	-42.62		
2472.60	H	-38.47		
3296.80	H	-51.91		
Band	GSM 850		Test channel:	Middle
Test mode:			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	-41.66	-13.00	PASS
2509.80	V	-44.72		
3346.40	V	-52.48		
1673.20	Horizontal	-41.62		
2509.80	H	-39.87		
3346.40	H	-52.29		
Band	GSM 850		Test channel:	Highest
Test mode:			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	-40.82	-13.00	PASS
2546.40	V	-44.71		
3395.20	V	-52.58		
1697.60	Horizontal	-41.43		
2546.40	H	-40.90		
3395.20	H	-52.21		

Band	PCS 1900		Test channel:	Lowest
Test mode:			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	-49.35	-13.00	PASS
5550.60	V	-47.37		
7400.80	V	-52.92		
3700.40	Horizontal	-49.88		
5550.60	H	-50.82		
7400.80	H	-52.59		
Test mode:	PCS 1900		Test channel:	Middle
Test mode:			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	-49.62	-13.00	PASS
5640.00	V	-53.42		
7520.00	V	-45.87		
3760.00	Horizontal	-47.12		
5640.00	H	-53.28		
7520.00	H	-53.43		
Test mode:	PCS 1900		Test channel:	Highest
Test mode:			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	-47.42	-13.00	PASS
5729.40	V	-50.15		
7639.20	V	-53.17		
3819.60	Horizontal	-48.12		
5729.40	H	-52.39		
7639.20	H	-53.10		

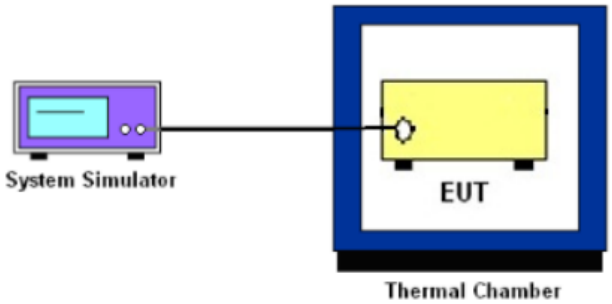
Band	WCDMA Band V		Test channel:	Lowest
Test mode:	RMC 12.2Kbps Link (QPSK)		Temperature :	25°C
			Relative Humidity:	56%
Note:	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.			
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
1652.80	Vertical	-52.24	-13.00	PASS
2479.20	V	-53.17		
3305.60	V	-52.73		
1652.80	Horizontal	-53.48		
2479.20	H	-50.98		
3305.60	H	-52.99		
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	-53.13	-13.00	PASS
2509.80	V	-52.86		
3346.40	V	-52.72		
1673.20	Horizontal	-54.78		
2509.80	H	-51.42		
3346.40	H	-53.86		
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	-56.26	-13.00	PASS
2539.80	V	-51.24		
3386.40	V	-52.99		
1693.20	Horizontal	-52.91		
2539.80	H	-51.82		
3386.40	H	-54.09		

Band	WCDMA Band IV		Test channel:	Lowest
Test mode:	RMC 12.2Kbps Link (QPSK)		Temperature :	23~24°C
			Relative Humidity:	46~48%
Note:	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.			
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
2452.3	Vertical	--	-13.00	PASS
3424.8	V	-52.52		
5137.2	V	-54.71		
2452.3	Horizontal	--		
3424.8	H	-53.47		
5137.2	H	-51.83		
Test mode:	WCDMA Band IV		Test channel:	Middle
Test mode:	RMC 12.2Kbps Link (QPSK)		Temperature :	23~24°C
			Relative Humidity:	46~48%
Note:	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.			
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
2641.3	Vertical	-53.55	-13.00	PASS
3465.2	V	-50.42		
5197.8	V	-54.68		
2641.3	Horizontal	-51.51		
3465.2	H	-56.09		
5197.8	H	-53.22		
Test mode:	WCDMA Band IV		Test channel:	Highest
Test mode:	RMC 12.2Kbps Link (QPSK)		Temperature :	23~24°C
			Relative Humidity:	46~48%
Note:	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.			
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
3102.2	Vertical	-51.36	-13.00	PASS
3505.2	V	-52.82		
5257.8	V	-49.06		
3102.2	Horizontal	-53.68		
3505.2	H	-51.42		
5257.8	H	-55.65		

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	-51.47	-13.00	PASS
5557.20	V	-53.02		
7409.60	V	-53.09		
3704.80	Horizontal	-53.24		
5557.20	H	-51.97		
7409.60	H	-53.21		
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	-53.67	-13.00	PASS
5640.00	V	-52.39		
7520.00	V	-52.34		
3760.00	Horizontal	-54.06		
5640.00	H	-50.72		
7520.00	H	-53.55		
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	-55.93	-13.00	PASS
5722.80	V	-52.17		
7630.40	V	-52.22		
3815.20	Horizontal	-52.89		
5722.80	H	-51.47		
7630.40	H	-54.90		

6.7. Frequency Stability Measurement

6.7.1. Test Specification

Test Requirement:	FCC Part 2.1055 ; FCC Part 22.355 ; FCC Part 24.235 FCC Part 27.54
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 0°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 45°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
Remark:	All three channels of all modulations have been tested, but only the worst channel and the worst modulation show in this test item.

6.7.2. Test Instruments

Equipment	Manufacturer	Model	Serial Number	Calibration Due
System simulator	R&S	CMU200	111382	Sep. 27, 2018
RF cable (9kHz-40GHz)	TCT	RE-06	N/A	Sep. 27, 2018
Antenna Connector	TCT	RFC-01	N/A	Sep. 27, 2018

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) :	2.5	Frequency:	836.6MHz

Temperature (°C)	Deviation (ppm)	Result
45	0.013	PASS
40	0.015	
30	0.011	
20	0.009	
10	0.013	
0	0.012	

Band :	GSM 1900	Channel:	661
Limit (ppm) :	*Note*	Frequency:	1880MHz

Temperature (°C)	Deviation (ppm)	Result
45	0.022	PASS
40	0.027	
30	0.019	
20	0.015	
10	0.020	
0	0.028	

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)	RMC 12.2Kbps Deviation (ppm)	Result
45	0.018	PASS
40	0.015	
30	0.002	
20	0.007	
10	0.014	
0	0.013	

Band :	WCDMA Band IV	Channel:	1413
Limit (ppm) :	2.5ppm	Frequency:	1732.6

Temperature (°C)	RMC 12.2Kbps Deviation (ppm)	Result
45	0.014	PASS
40	0.017	
30	0.018	
20	0.013	
10	0.007	
0	0.015	

Band :	WCDMA Band II	Channel:	9400
Limit (ppm) :	*Note*	Frequency:	1880MHz

Temperature (°C)	RMC 12.2Kbps Deviation (ppm)	Result
45	0.017	PASS
40	0.019	
30	0.014	
20	0.012	
10	0.016	
0	0.023	

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

Test Result of Voltage Variation

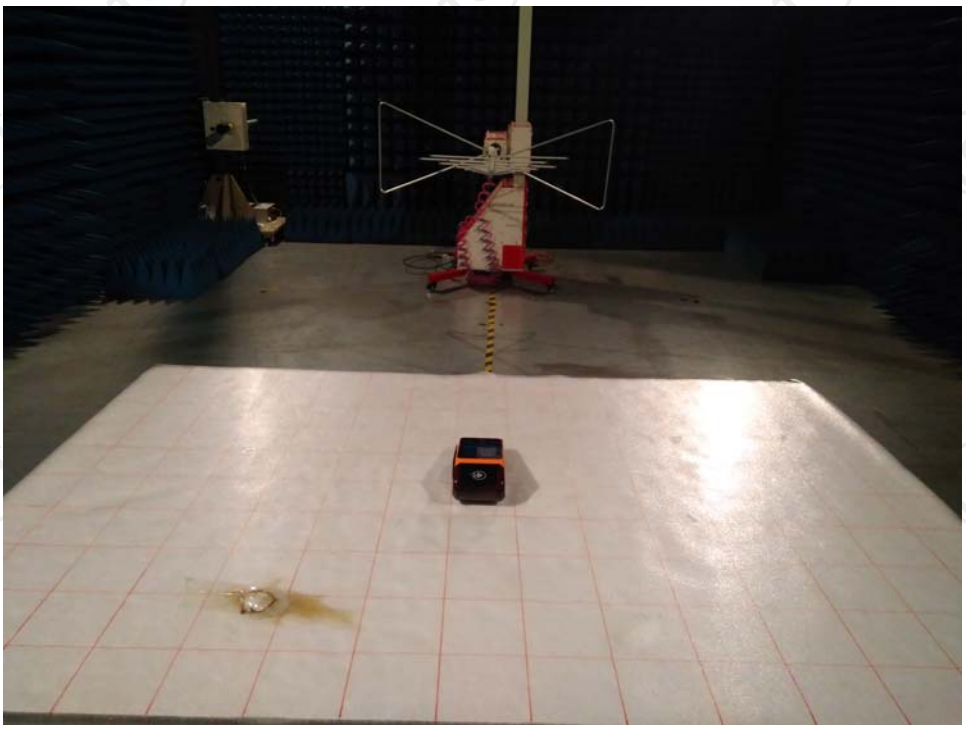
Band & Channel	Mode	Voltage (Volt)	Deviation (ppm)	Limit (ppm)	Result
GSM 850 CH190	GPRS	8.4	+0.012	2.5	PASS
		7.4	+0.009		
		BEP	+0.015		
GSM 850 CH190	EGPRS Class 12	8.4	+0.027	2.5	
		7.4	+0.022		
		BEP	+0.013		
GSM 1900 CH661	GPRS	8.4	+0.021	(Note 3.)	
		7.4	+0.024		
		BEP	+0.017		
GSM 1900 CH661	EGPRS Class 12	8.4	+0.004	(Note 3.)	
		7.4	+0.018		
		BEP	+0.023		
WCDMA Band IV CH1413	RMC 12.2Kbps	8.4	-0.007	2.5	
		7.4	-0.015		
		BEP	-0.019		
WCDMA Band V CH4182	RMC 12.2Kbps	8.4	-0.022		
		7.4	-0.008		
		BEP	-0.028		
WCDMA Band II CH9400	RMC 12.2Kbps	8.4	-0.014	(Note 3.)	
		7.4	-0.005		
		BEP	-0.011		

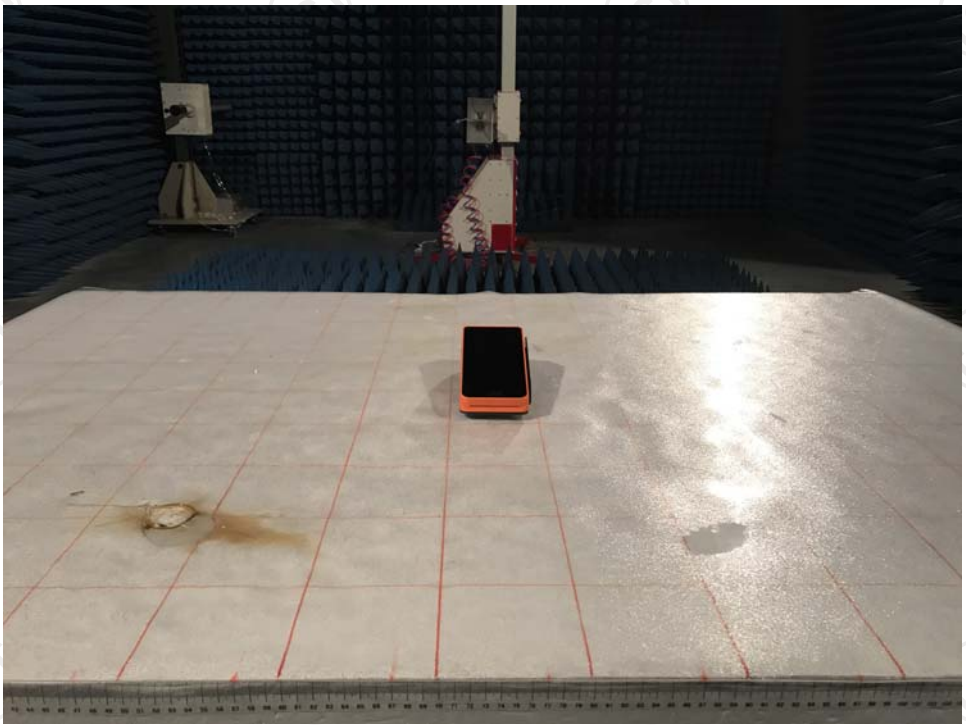
Note:

1. Normal Voltage = 7.4V.
2. Battery End Point (BEP) = 7.1 V.
3. The frequency fundamental emissions stay within the authorized frequency block based on the frequency deviation measured is small.

Appendix A: Photographs of Test Setup

Radiated Emission





Appendix B: Photographs of EUT

Refer to test report TCT171110E003

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