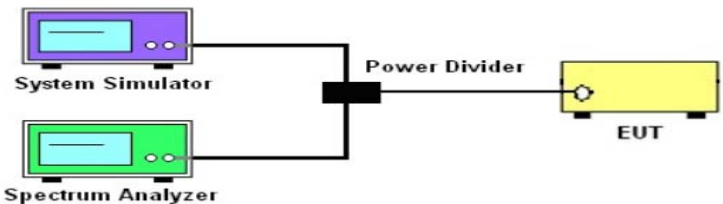


## 6.4. Band Edge and Conducted Spurious Emission Measurement

### 6.4.1. Test Specification

<b>Test Requirement:</b>	FCC part22.917(a) and FCC part24.238(a)
<b>Test Method:</b>	FCC part2.1051
<b>Operation mode:</b>	Refer to item 4.1
<b>Limit:</b>	-13dBm
<b>Test Setup:</b>	
<b>Test Procedure:</b>	<ol style="list-style-type: none"> <li>1. The testing follows FCC KDB 971168 v02r02 Section 6.0.</li> <li>2. The EUT was connected to the spectrum analyzer and system simulator via a power divider.</li> <li>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.</li> <li>4. The band edges of low and high channels for the highest RF powers were measured.</li> <li>5. The conducted spurious emission for the whole frequency range was taken.</li> <li>6. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.</li> <li>7. The limit line is derived from <math>43 + 10\log(P)</math> dB below the transmitter power  <math>P(\text{Watts}) = P(\text{W}) - [43 + 10\log(P)] (\text{dB}) = [30 + 10\log(P)] (\text{dBm}) - [43 + 10\log(P)] (\text{dB}) = -13\text{dBm}</math>.</li> </ol>
<b>Test Result:</b>	PASS

### 6.4.2. Test Instruments

Equipment	Manufacturer	Model	Serial Number	Calibration Due
System simulator	R&S	CMU200	111382	Oct. 13, 2017
Spectrum Analyzer	Agilent	N9020A	MY49100060	Oct. 13, 2017
RF cable (9kHz-40GHz)	TCT	RE-05	N/A	Oct. 13, 2017
Antenna Connector	TCT	RFC-02	N/A	Oct. 13, 2017

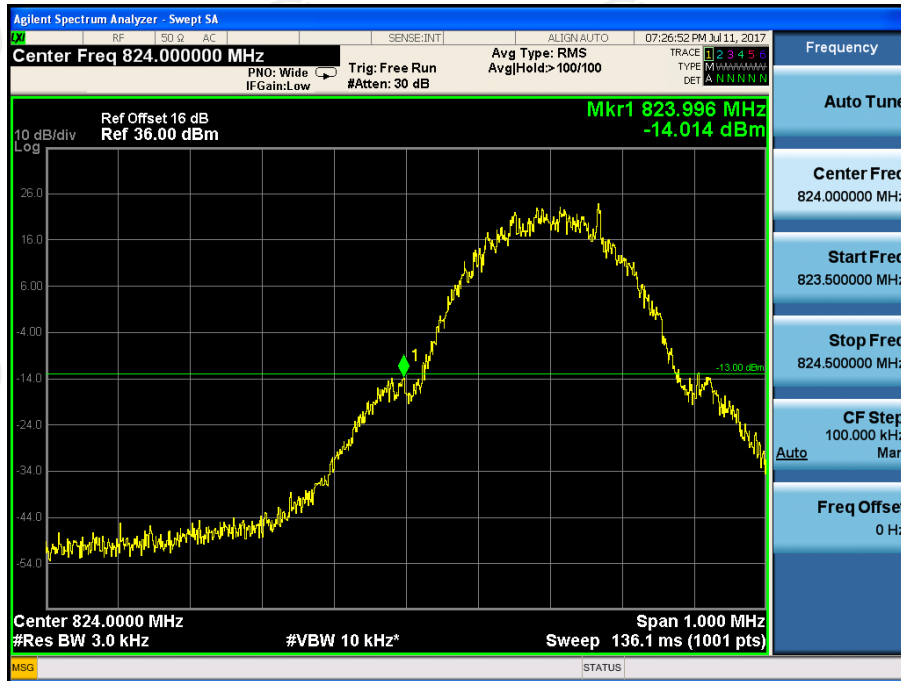
**Note:** The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).

## 6.4.3. Test data

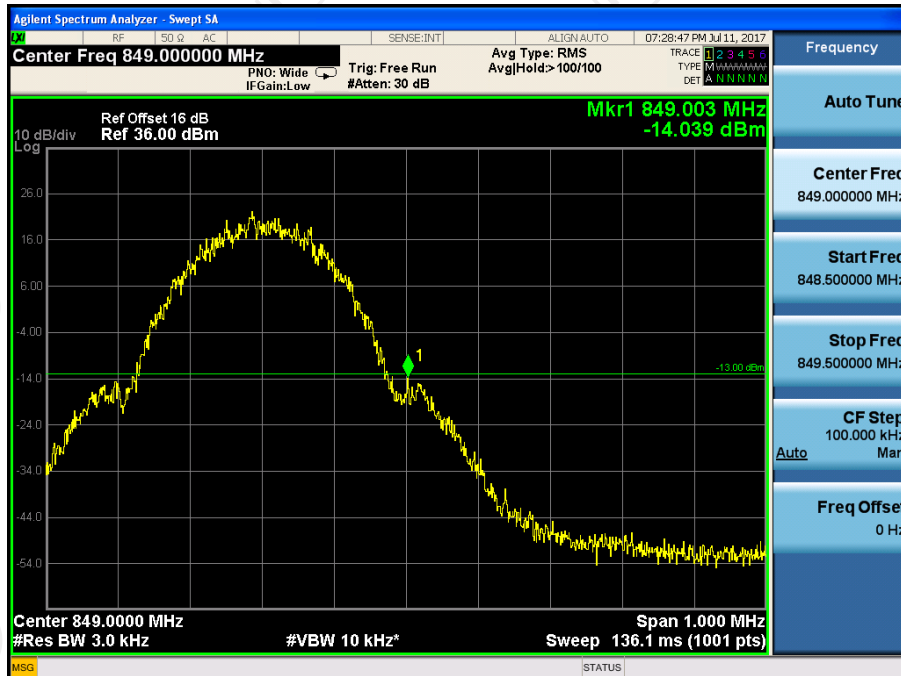
Test plots as follows:

Band:	GSM 850	Test Mode:	GSM Link (GMSK)
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Lower Band Edge Plot on Channel 128

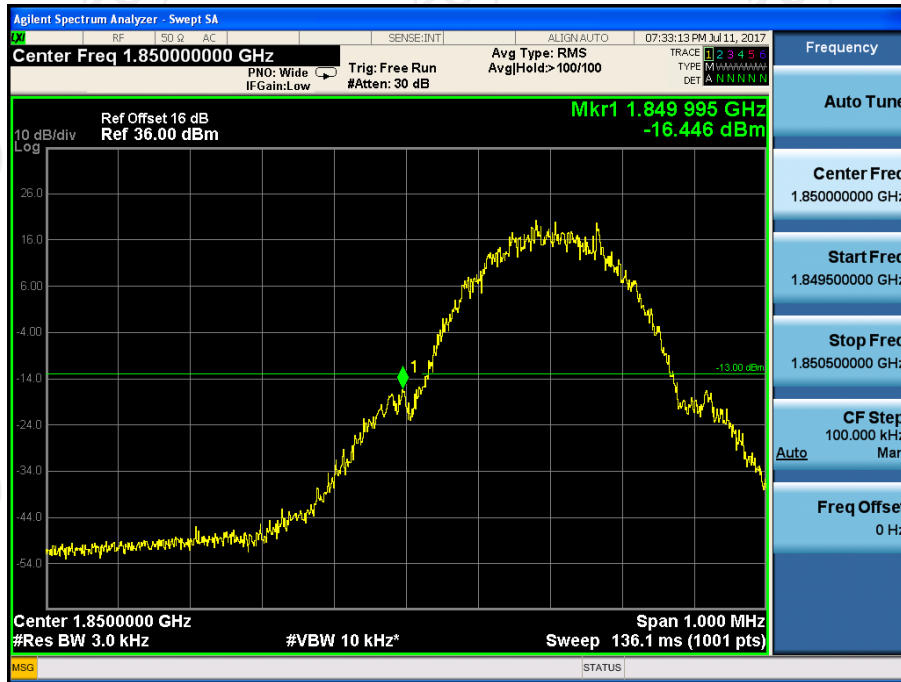


Higher Band Edge Plot on Channel 251

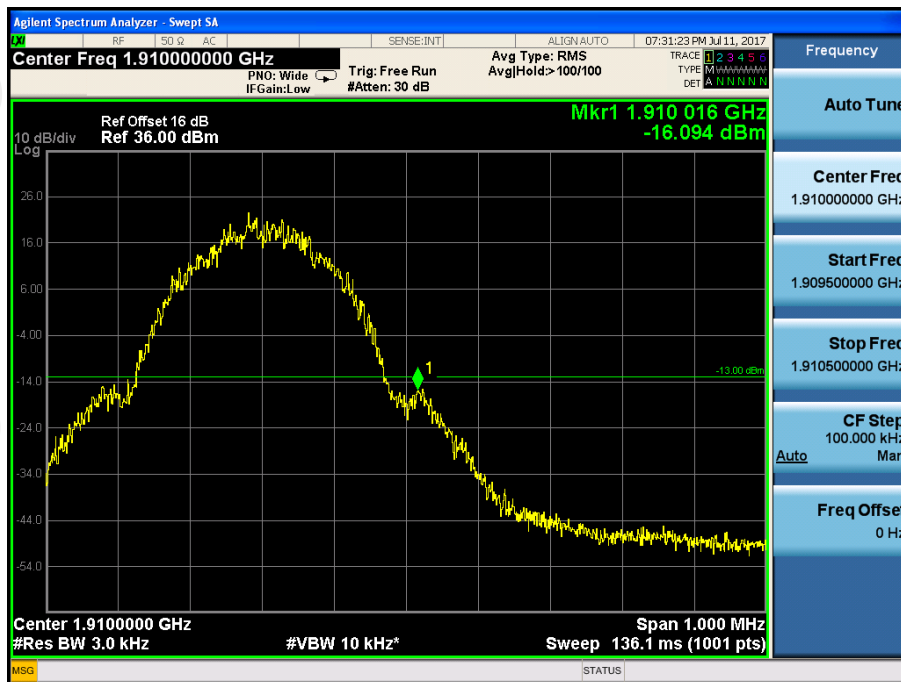


Band:	GSM 1900	Test Mode:	GSM Link (GMSK)
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### Lower Band Edge Plot on Channel 512

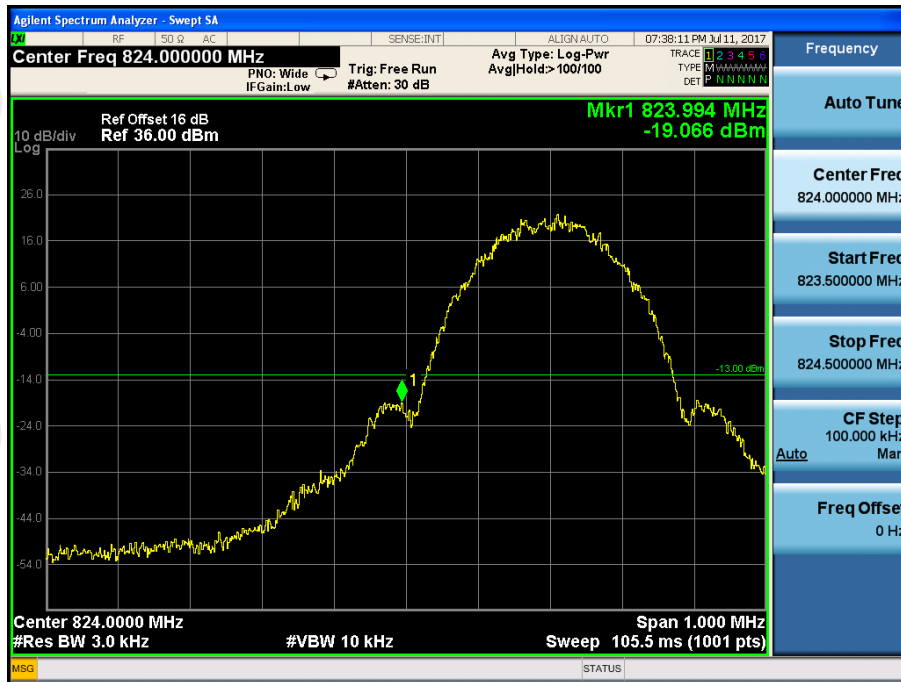


### Higher Band Edge Plot on Channel 810

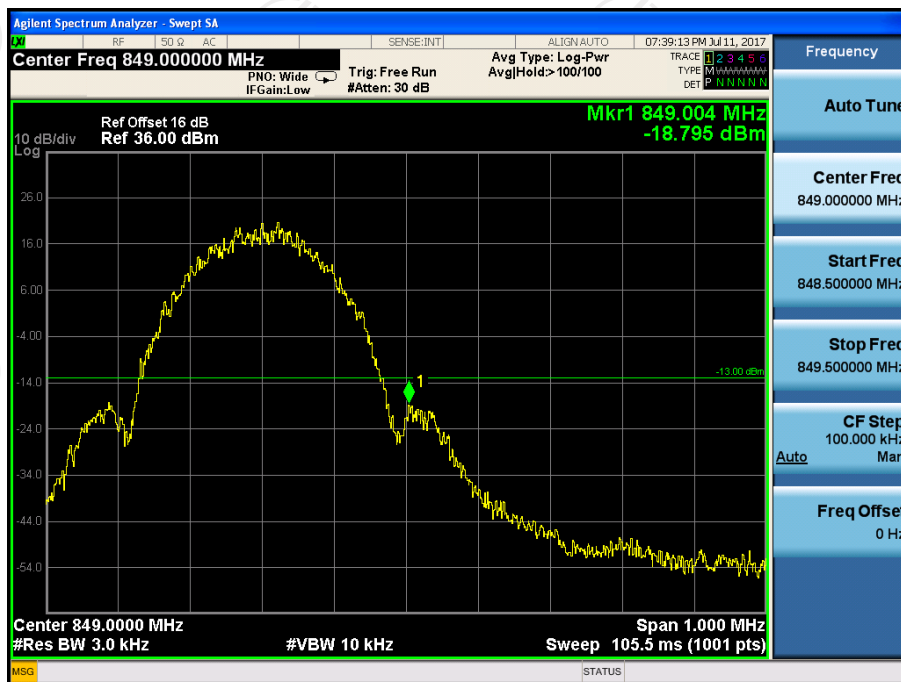


Band:	EGPRS 850	Test Mode:	EGPRS Class 8 Link (8PSK)
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Lower Band Edge Plot on Channel 128

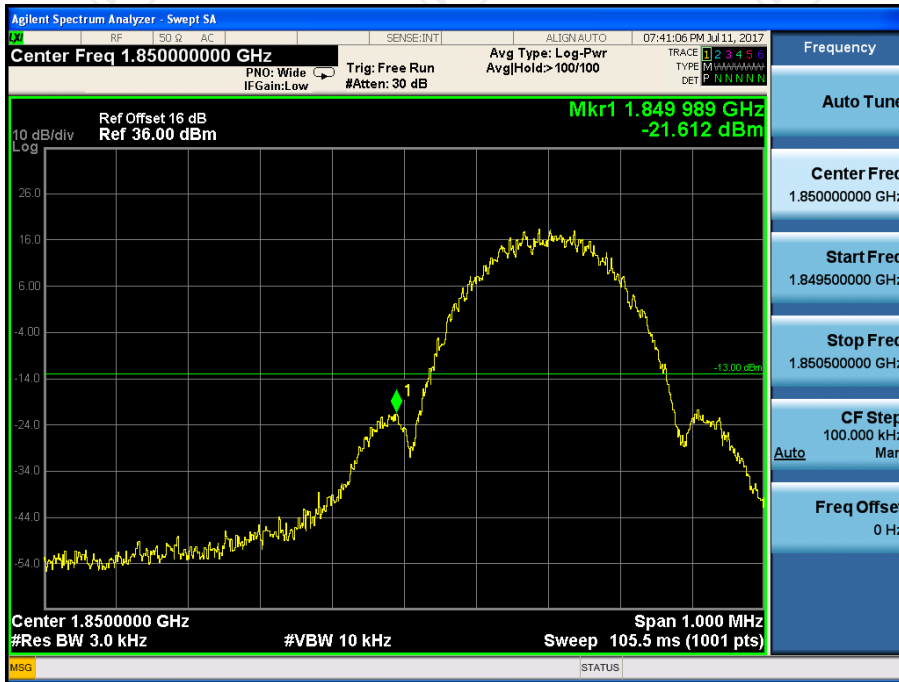


Higher Band Edge Plot on Channel 251

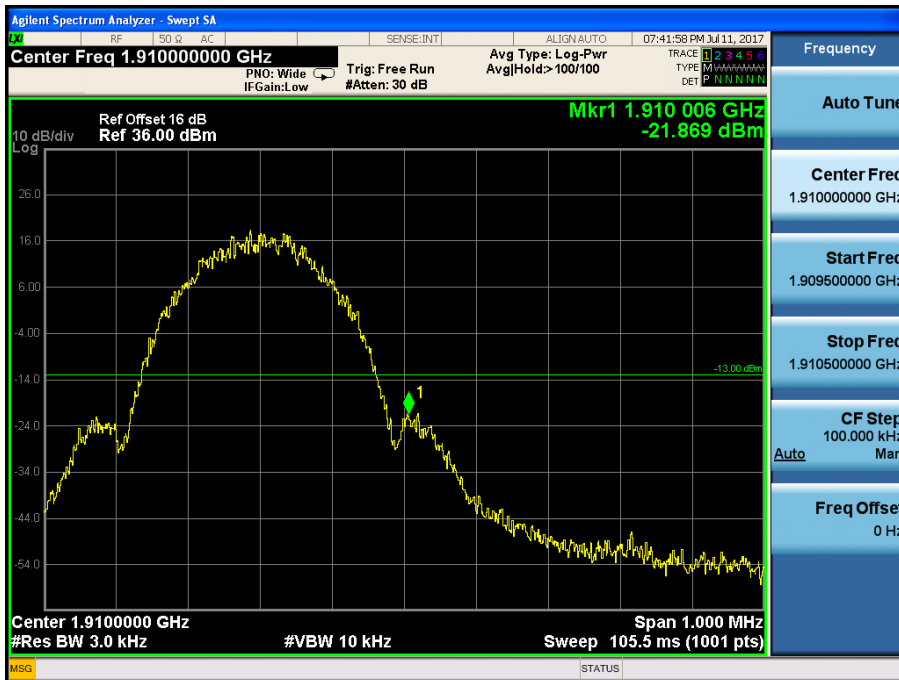


Band:	EGPRS 1900	Test Mode:	EGPRS Class 8 Link (8PSK)
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Lower Band Edge Plot on Channel 512



Higher Band Edge Plot on Channel 810



Band:	WCDMA Band V	Test Mode:	RMC 12.2Kbps Link (QPSK)
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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)
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Lower Band Edge Plot on Channel 9262

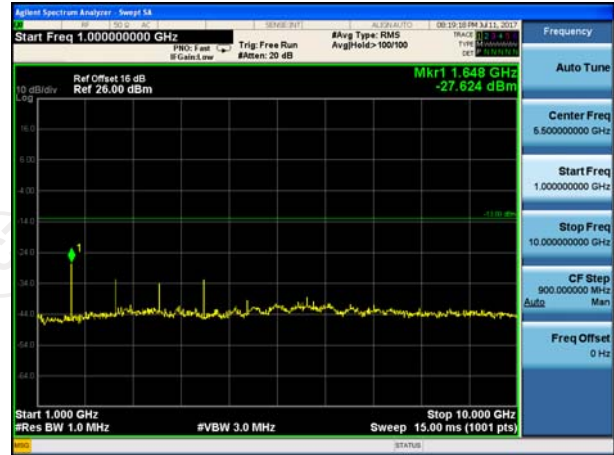
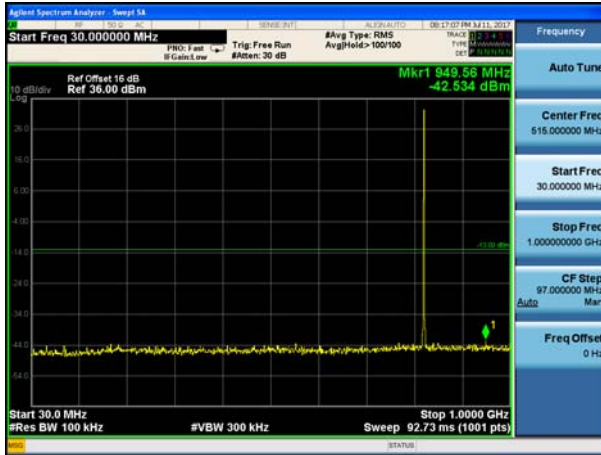


Higher Band Edge Plot on Channel 9538

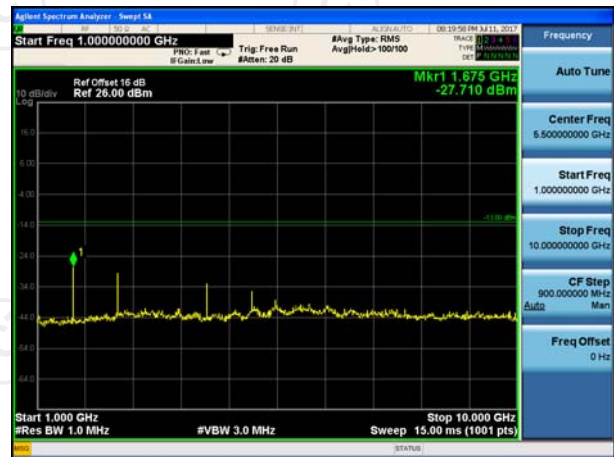
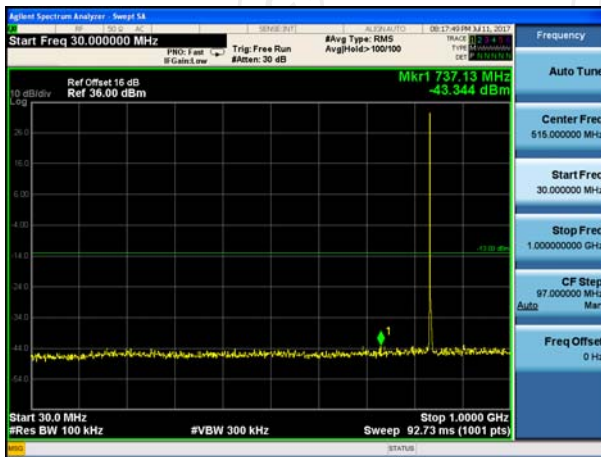


Band: GSM 850 Test Mode: GSM Link (GMSK)

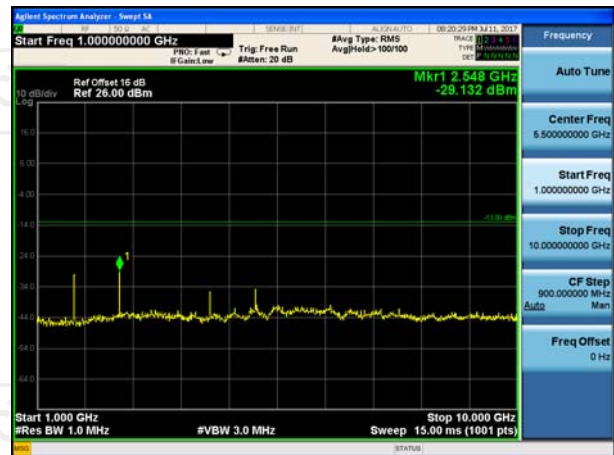
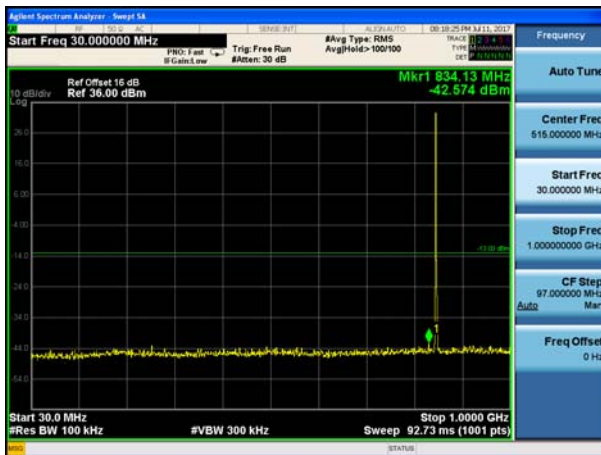
Conducted Spurious Emission on Channel 128



Conducted Spurious Emission on Channel 189



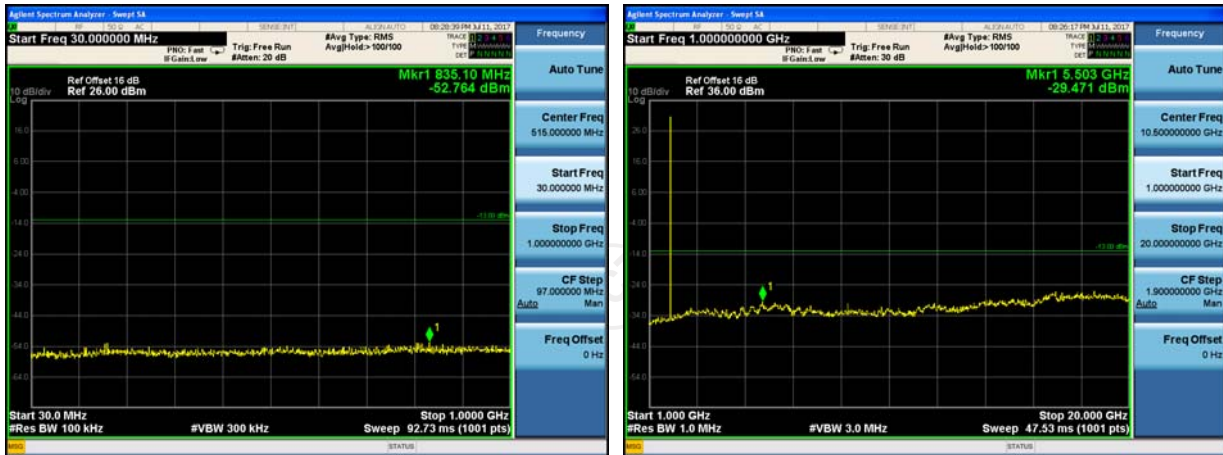
Conducted Spurious Emission on Channel 251



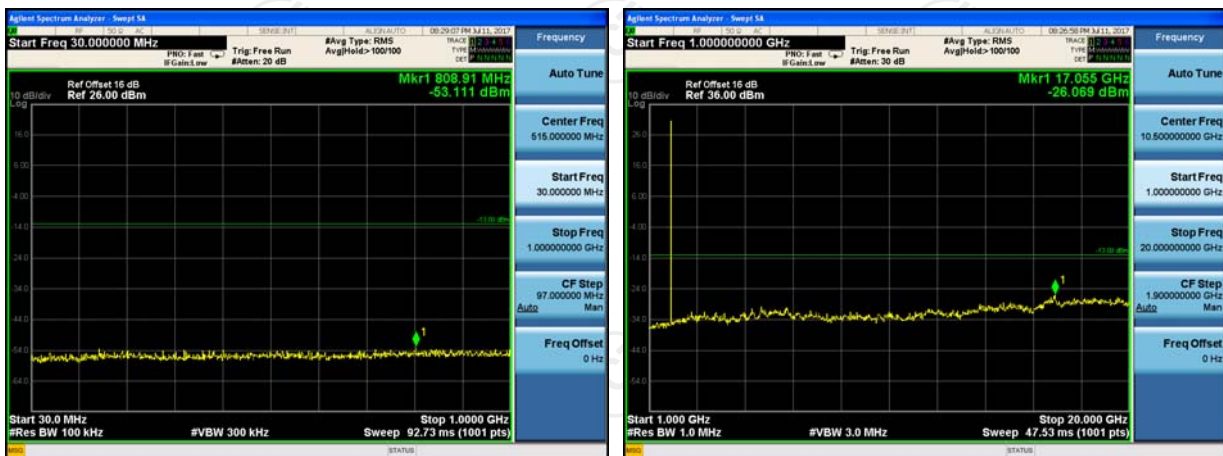


Band:	GSM 1900	Test Mode:	GSM Link (GMSK)
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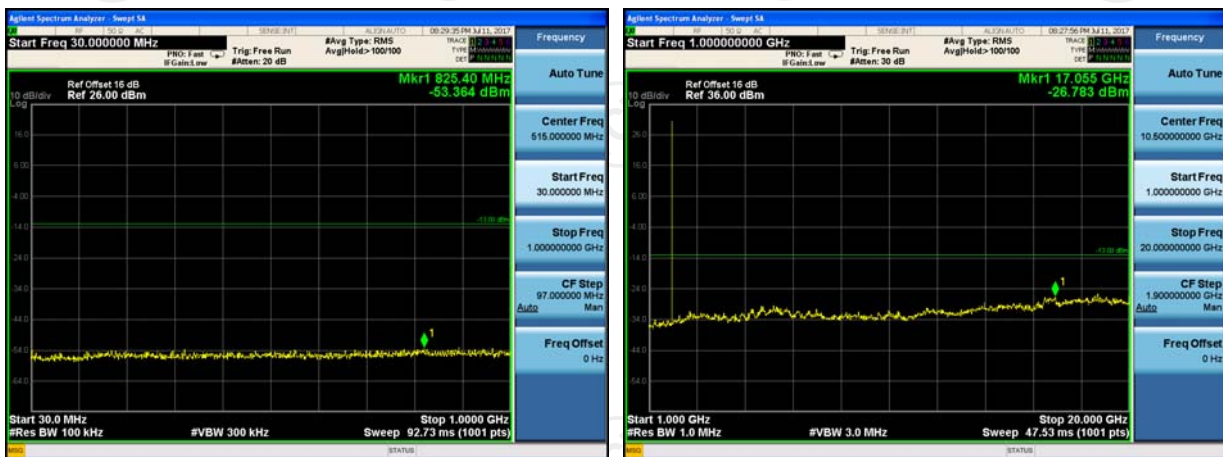
Conducted Spurious Emission on Channel 512



Conducted Spurious Emission on Channel 661

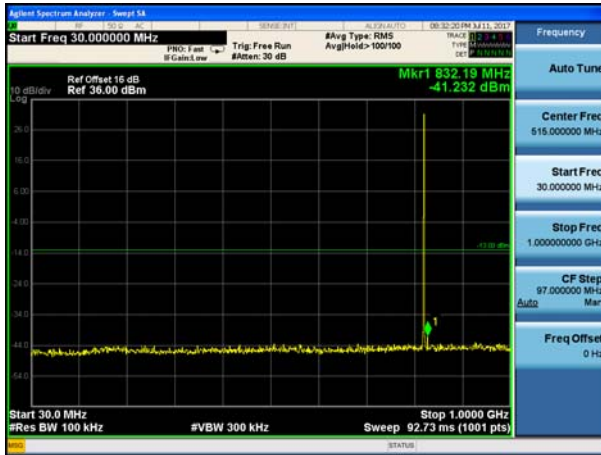


Conducted Spurious Emission on Channel 810

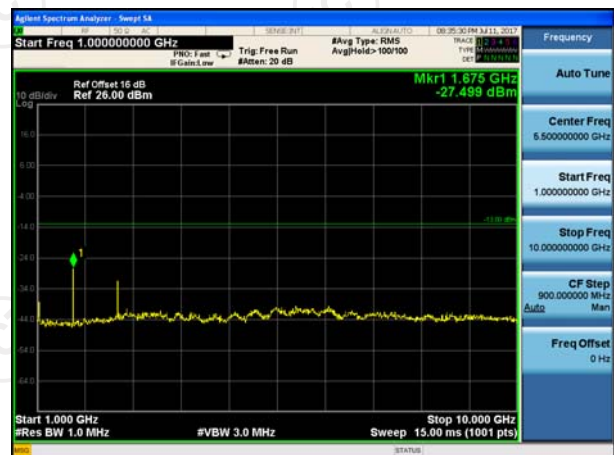
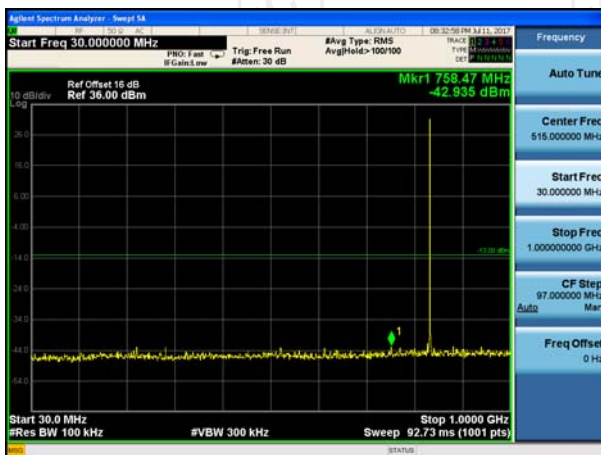


Band:	EGPRS 850	Test Mode:	EGPRS Class 8 Link (8PSK)
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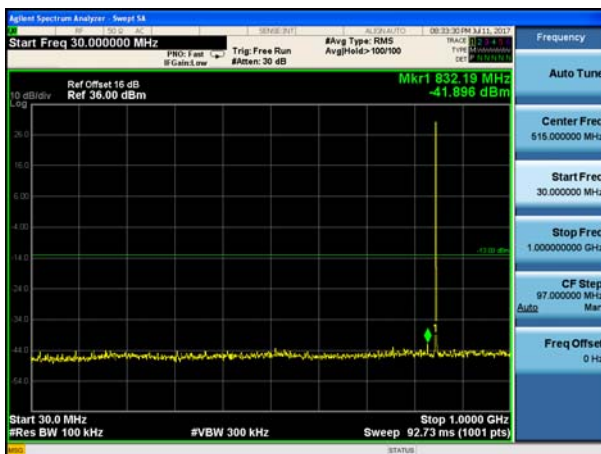
Conducted Spurious Emission on Channel 128



Conducted Spurious Emission on Channel 189

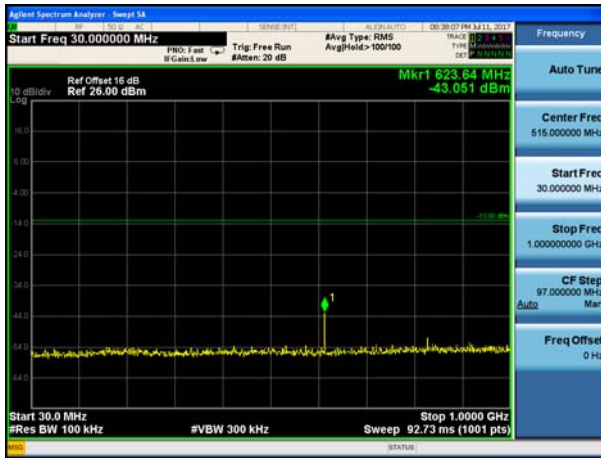


Conducted Spurious Emission on Channel 251

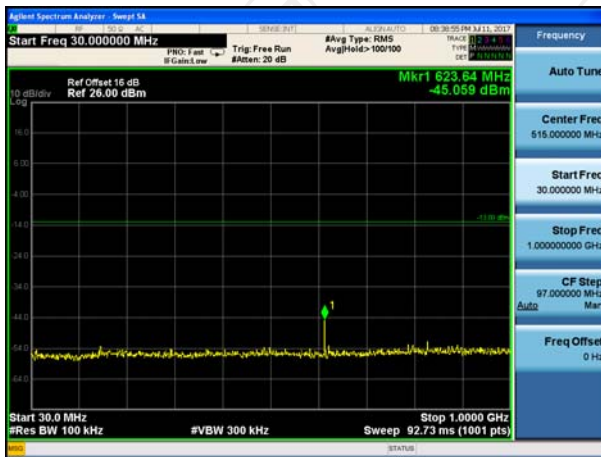


Band:	EGPRS 1900	Test Mode:	EGPRS Class 8 Link (8PSK)
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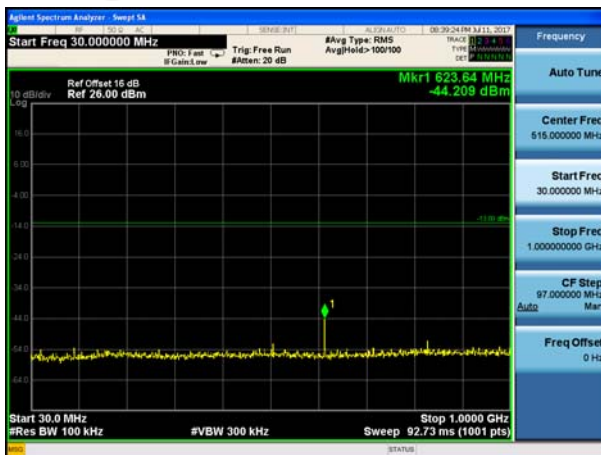
Conducted Spurious Emission on Channel 512



Conducted Spurious Emission on Channel 661

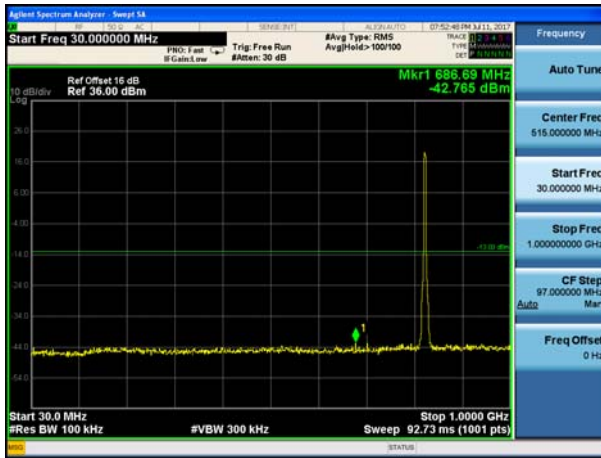


Conducted Spurious Emission on Channel 810

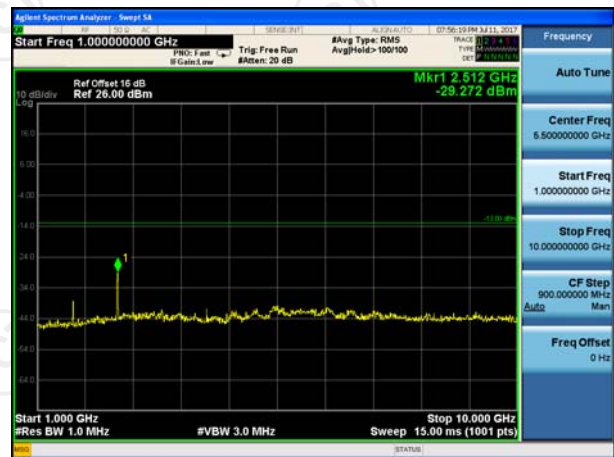
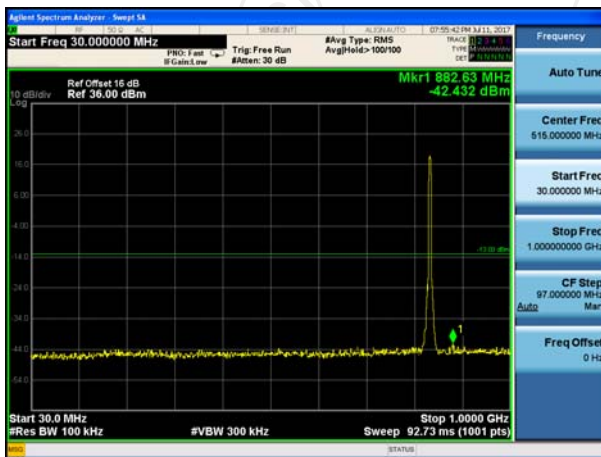


Band:	WCDMA Band V	Test Mode:	RMC 12.2Kbps Link (QPSK)
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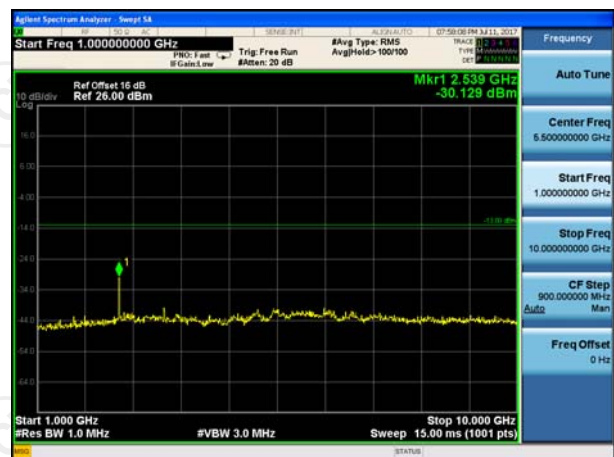
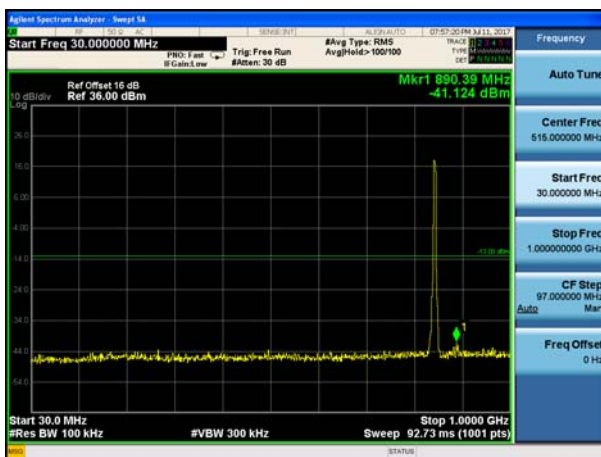
Conducted Spurious Emission on Channel 4132



Conducted Spurious Emission on Channel 4183

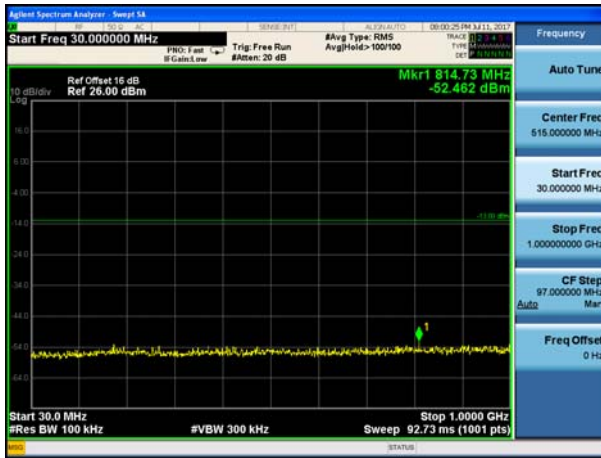


Conducted Spurious Emission on Channel 4233

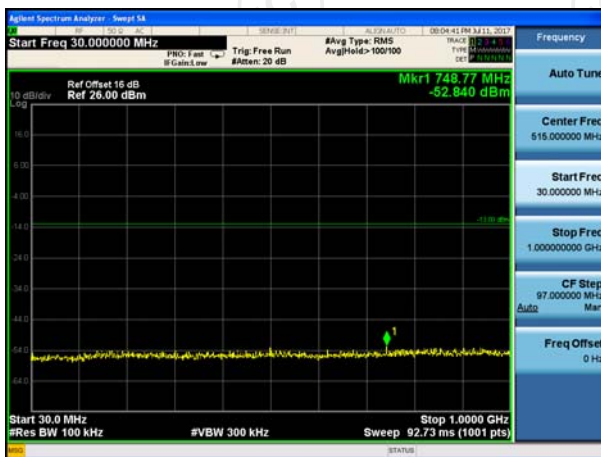


Band:	WCDMA Band II	Test Mode:	RMC 12.2Kbps Link (QPSK)
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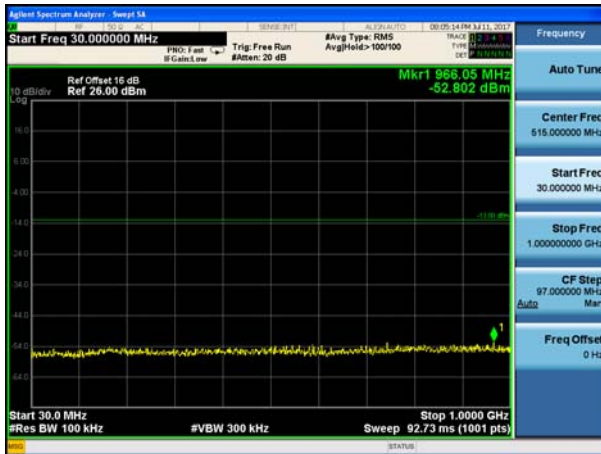
Conducted Spurious Emission on Channel 9262



Conducted Spurious Emission on Channel 9400

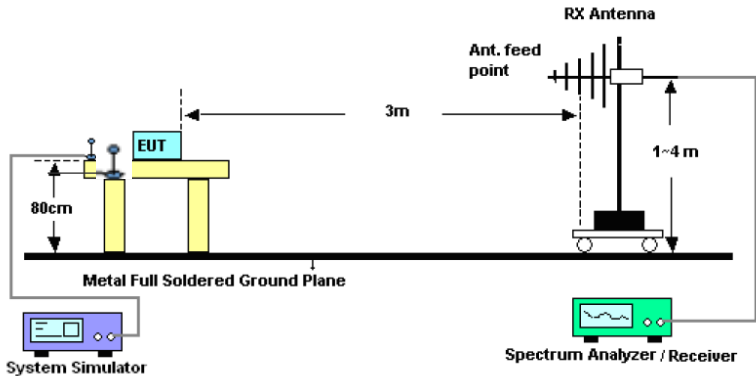
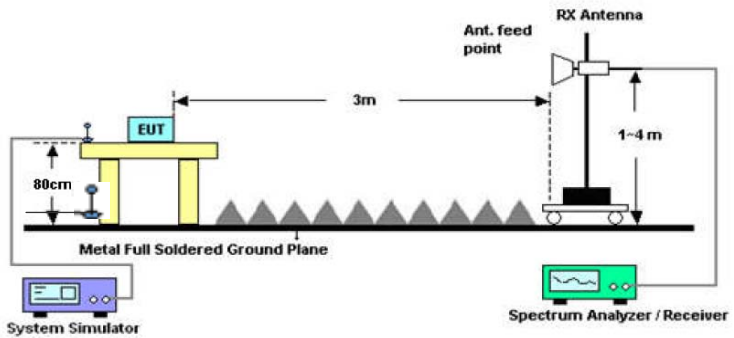


Conducted Spurious Emission on Channel 9538



## 6.5. Effective Radiated Power and Effective Isotropic Radiated Power Measurement

### 6.5.1. Test Specification

<b>Test Requirement:</b>	FCC part 22.913(a) and FCC part 24.232(b)		
<b>Test Method:</b>	FCC part 2.1046		
<b>Receiver Setup:</b>		GSM/GPRS/EDGE	WCDMA/HSPA
	SPAN	500kHz	10MHz
	RBW	10kHz	100kHz
	VBW	30kHz	300kHz
	Detector	RMS	RMS
	Trace	Average	Average
	Average Type	Power	Power
Sweep Count	100	100	
<b>Limit:</b>	GSM850 7W ERP PCS1900 2W EIRP WCDMA Band V: 7W ERP WCDMA Band II: 2W EIRP		
<b>Test Setup:</b>	From 30MHz to 1GHz		
			
<b>Test Setup:</b>	Above 1GHz		
			
<b>Test Procedure:</b>	1. The testing follows FCC KDB 971168 v02r02 Section		

	<p>5.8. and ANSI / TIA-603-D-2010 Section 2.2.17.</p> <p>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.</p> <p>3. Key the transmitter, then rotate the EUT 360° azimuthally and record spectrum analyzer power level (LVL) measurements at angular increments that are sufficiently small to permit resolution of all peaks. If a standard radiation test site is used, raise and lower the test antenna to obtain a maximum reading at each angular increment.</p> <p>4. Replace the transmitter under test with a substitution antenna. The center of the antenna should be at the same location as the center of the antenna under test.</p> <p>5. Connect the antenna to a signal generator with a known output power and record the path loss (in dB) as LOSS. If a standard radiation test site is used, raise and lower the test antenna to obtain a maximum reading. LOSS = Generator Output Power (dBm) - Analyzer reading (dBm)</p> <p>6. Determine the effective radiated output power at each angular position from the readings in steps 3) and 5) using the following equation: ERP (dBm) = LVL (dBm) + LOSS (dB)</p> <p>7. The maximum ERP is the maximum value determined in the preceding step.</p> <p>8. Calculating ERP: ERP (dBm) = Output Power (dBm) - Losses (dB) + Antenna Gain (dBd) Antenna Gain (dBd) = Antenna Gain (dBi) - 2.15 EIRP = ERP - 2.15</p>
<b>Test results:</b>	PASS

**6.5.2. Test Instruments**

Radiated Emission Test Site (966)				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
System simulator	R&S	CMU200	111382	Oct. 13, 2017
Spectrum Analyzer	ROHDE&SCHW ARZ	R&S	FSQ	Oct. 13, 2017
Signal Generator	HP	83623B	3614A00396	Oct. 13, 2017
Broadband Antenna	Schwarzbeck	VULB9163	340	Oct. 13, 2017
Horn Antenna	Schwarzbeck	BBHA 9120D	631	Oct. 13, 2017
Broadband Antenna	Schwarzbeck	VULB9163	412	Oct. 13, 2017
Horn Antenna	Schwarzbeck	BBHA 9120D	1201	Mar. 05, 2018
Dipole Antenna	TCT	TCT-RF	N/A	Oct. 13, 2017
Coax cable (9kHz-1GHz)	TCT	RE-low-01	N/A	Oct. 13, 2017
Coax cable (9kHz-40GHz)	TCT	RE-high-02	N/A	Oct. 13, 2017
Coax cable (9kHz-1GHz)	TCT	RE-low-03	N/A	Oct. 13, 2017
Coax cable (9kHz-40GHz)	TCT	RE-High-04	N/A	Oct. 13, 2017
Antenna Mast	Keleto	CC-A-4M	N/A	N/A
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).



6.5.3. Test Data

Test Result of ERP

GSM850 (GSM) Radiated Power ERP					
Horizontal Polarization (Antenna Pol.)					
Frequency (MHz)	(EUT Pol.)	LVL (dBm)	Correction Factor (dB)	ERP (dBm)	ERP (W)
824.20	H	11.14	21.66	32.80	1.91
836.60	H	11.03	21.54	32.57	1.81
848.80	H	11.38	21.46	32.84	1.92
Vertical Polarization (Antenna Pol.)					
Frequency (MHz)	(EUT Pol.)	LVL (dBm)	Correction Factor (dB)	ERP (dBm)	ERP (W)
824.20	H	10.94	21.66	32.60	1.82
836.60	H	10.81	21.54	32.35	1.72
848.80	H	10.88	21.46	32.34	1.71

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	11.04	21.66	32.70	1.86
836.60	H	10.97	21.54	32.51	1.78
848.80	H	11.12	21.46	32.58	1.81
Vertical Polarization (Antenna Pol.)					
Frequency (MHz)	(EUT Pol.)	LVL (dBm)	Correction Factor (dB)	ERP (dBm)	ERP (W)
824.20	H	10.28	21.66	31.94	1.56
836.60	H	10.41	21.54	31.95	1.57
848.80	H	10.65	21.46	32.11	1.63

EGPRS850 (1-solt) Radiated Power ERP					
Horizontal Polarization (Antenna Pol.)					
Frequency (MHz)	(EUT Pol.)	LVL (dBm)	Correction Factor (dB)	ERP (dBm)	ERP (W)
824.40	H	6.24	21.66	27.90	0.62
836.40	H	6.06	21.54	27.60	0.58
848.80	H	6.32	21.46	27.78	0.60
Vertical Polarization (Antenna Pol.)					
Frequency (MHz)	(EUT Pol.)	LVL (dBm)	Correction Factor (dB)	ERP (dBm)	ERP (W)
824.40	H	5.54	21.66	27.20	0.52
836.40	H	5.27	21.54	26.81	0.48
848.80	H	5.67	21.46	27.13	0.52

**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	3.24	21.62	24.86	0.31
836.60	H	3.07	21.57	24.64	0.29
846.60	H	3.18	21.44	24.62	0.29
Vertical Polarization (Antenna Pol.)					
Frequency (MHz)	(EUT Pol.)	LVL (dBm)	Correction Factor (dB)	ERP (dBm)	ERP (W)
826.40	H	2.87	21.62	24.49	0.28
836.60	H	2.75	21.57	24.32	0.27
846.60	H	2.64	21.44	24.08	0.26

\* ERP = LVL (dBm) + Correction Factor (dB) - 2.15

Correction Factor= S.G. Power - Cable loss + Antenna Gain- SPA. Reading

**Test Result of EIRP**

GSM1900 (GSM) Radiated Power EIRP					
Horizontal Polarization (Antenna Pol.)					
Frequency (MHz)	(EUT Pol.)	LVL (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (W)
1850.20	H	7.61	21.66	29.27	0.85
1880.00	H	7.48	21.54	29.02	0.80
1909.80	H	7.72	21.46	29.18	0.83
Vertical Polarization (Antenna Pol.)					
Frequency (MHz)	(EUT Pol.)	LVL (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (W)
1850.20	H	6.68	21.66	28.34	0.68
1880.00	H	6.54	21.54	28.08	0.64
1909.80	H	6.47	21.46	27.93	0.62

GPRS1900 (1-solt) Radiated Power EIRP					
Horizontal Polarization (Antenna Pol.)					
Frequency (MHz)	(EUT Pol.)	LVL (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (W)
1850.20	H	7.71	21.66	29.37	0.86
1880.00	H	7.26	21.54	28.80	0.76
1909.80	H	7.54	21.46	29.00	0.79
Vertical Polarization (Antenna Pol.)					
Frequency (MHz)	(EUT Pol.)	LVL (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (W)
1850.20	H	6.87	21.66	28.53	0.71
1880.00	H	6.31	21.54	27.85	0.61
1909.80	H	6.45	21.46	27.91	0.62

EGPRS1900 (1-slot) Radiated Power EIRP					
Horizontal Polarization (Antenna Pol.)					
Frequency (MHz)	(EUT Pol.)	LVL (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (W)
1850.20	H	5.51	21.66	27.17	0.52
1880.00	H	5.76	21.54	27.30	0.54
1909.80	H	5.20	21.46	26.66	0.46
Vertical Polarization (Antenna Pol.)					
Frequency (MHz)	(EUT Pol.)	LVL (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (W)
1850.20	H	4.54	21.66	26.20	0.42
1880.00	H	4.38	21.54	25.92	0.39
1909.80	H	4.14	21.46	25.60	0.36

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

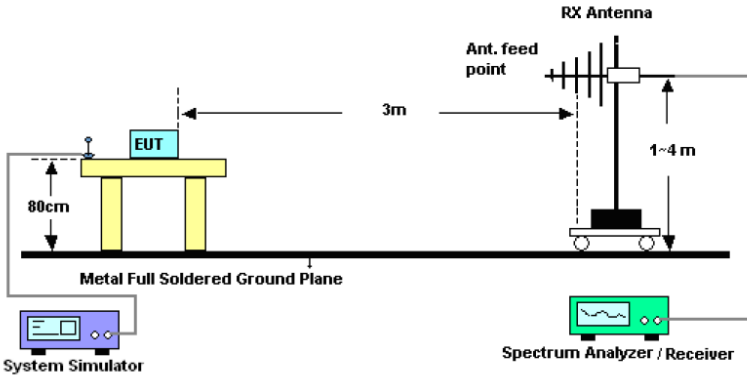
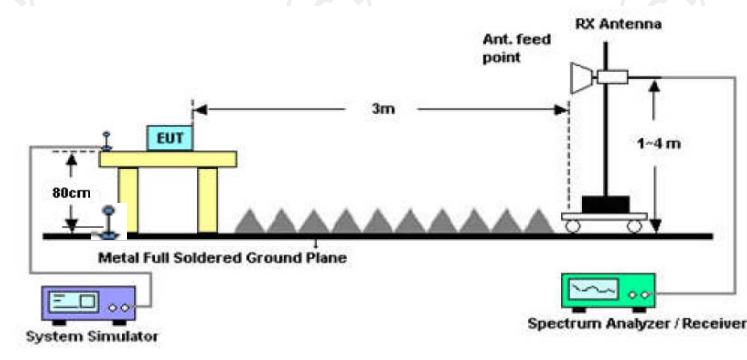
WCDMA Band II (RMC 12.2Kbps) Radiated Power EIRP					
Horizontal Polarization (Antenna Pol.)					
Frequency (MHz)	(EUT Pol.)	LVL (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (W)
1852.40	H	3.21	21.66	24.87	0.31
1880.00	H	3.27	21.54	24.81	0.30
1907.60	H	3.14	21.46	24.60	0.29
Vertical Polarization (Antenna Pol.)					
Frequency (MHz)	(EUT Pol.)	LVL (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (W)
1852.40	H	2.24	21.66	23.90	0.25
1880.00	H	2.42	21.54	23.96	0.25
1907.60	H	2.58	21.46	24.04	0.25

\* 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

<b>Test Requirement:</b>	FCC part 22.917(a) and FCC part 24.238(a)
<b>Test Method:</b>	FCC part 2.1053
<b>Operation mode:</b>	Refer to item 4.1
<b>Limit:</b>	-13dBm
<b>Test setup:</b>	<p>For 30MHz~1GHz</p>  <p>Above 1GHz</p> 
<b>Test Procedure:</b>	<ol style="list-style-type: none"> <li>1. The testing follows FCC KDB 971168 v02r02 Section 5.8 and ANSI / TIA-603-D-2010 Section 2.2.12.</li> <li>2. The EUT was placed on a rotatable wooden table 0.8 meters above the ground.</li> <li>3. The EUT was set 3 meters from the receiving antenna, which was mounted on the antenna tower.</li> <li>4. The table was rotated 360 degrees to determine the position of the highest spurious emission.</li> <li>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.</li> <li>6. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz, taking record of</li> </ol>

	<p>maximum spurious emission.</p> <p>7. A horn antenna was substituted in place of the EUT and was driven by a signal generator.</p> <p>8. Tune the output power of signal generator to the same emission level with EUT maximum spurious emission.</p> <p>9. Taking the record of output power at antenna port.</p> <p>10. Repeat step 7 to step 8 for another polarization.</p> <p>11. EIRP (dBm) = S.G. Power – Tx Cable Loss + Tx Antenna Gain</p> <p>12. ERP (dBm) = EIRP - 2.15</p> <p>13. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.</p> <p>14. The limit line is derived from 43 + 10log(P) dB below the transmitter power P(Watts)</p> <p>= P(W) - [43 + 10log(P)] (dB)</p> <p>= [30 + 10log(P)] (dBm) - [43 + 10log(P)] (dB)</p> <p>= -13dBm.</p>
<b>Test results:</b>	PASS
<b>Remark:</b>	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
System simulator	R&S	CMU200	111382	Oct. 13, 2017
Spectrum Analyzer	ROHDE&SCHW ARZ	R&S	FSQ	Oct. 13, 2017
Signal Generator	HP	83623B	3614A00396	Oct. 13, 2017
Broadband Antenna	Schwarzbeck	VULB9163	340	Oct. 13, 2017
Horn Antenna	Schwarzbeck	BBHA 9120D	631	Oct. 13, 2017
Broadband Antenna	Schwarzbeck	VULB9163	412	Oct. 13, 2017
Horn Antenna	Schwarzbeck	BBHA 9120D	1201	Mar. 05, 2018
Horn Antenna	Schwarzbeck	BBH 9170	582	Jun. 07, 2018
Dipole Antenna	TCT	TCT-RF	N/A	Oct. 13, 2017
Coax cable (9kHz-1GHz)	TCT	RE-low-01	N/A	Oct. 13, 2017
Coax cable (9kHz-40GHz)	TCT	RE-high-02	N/A	Oct. 13, 2017
Coax cable (9kHz-1GHz)	TCT	RE-low-03	N/A	Oct. 13, 2017
Coax cable (9kHz-40GHz)	TCT	RE-High-04	N/A	Oct. 13, 2017
Antenna Mast	Keleto	CC-A-4M	N/A	N/A
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 (dB $\mu$ V/m)	Limit@3m (dB $\mu$ V/m)
--	--	--
--	--	--
--	--	--
--	--	--

**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



<b>Band</b>	<b>GSM 850</b>		<b>Test channel:</b>	<b>Lowest</b>
<b>Test mode:</b>			<b>Temperature :</b>	<b>25°C</b>
			<b>Relative Humidity:</b>	<b>56%</b>
<b>Note:</b>	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	-40.16	-13.00	PASS
2472.60	V	-39.51		
3296.80	V	-52.09		
1648.40	Horizontal	-42.10		
2472.60	H	-39.29		
3296.80	H	-52.62		
<b>Band</b>	<b>GSM 850</b>		<b>Test channel:</b>	<b>Middle</b>
<b>Test mode:</b>			<b>Temperature :</b>	<b>25°C</b>
			<b>Relative Humidity:</b>	<b>56%</b>
<b>Note:</b>	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	-41.78	-13.00	PASS
2509.80	V	-43.98		
3346.40	V	-52.32		
1673.20	Horizontal	-42.17		
2509.80	H	-39.64		
3346.40	H	-50.88		
<b>Band</b>	<b>GSM 850</b>		<b>Test channel:</b>	<b>Highest</b>
<b>Test mode:</b>			<b>Temperature :</b>	<b>25°C</b>
			<b>Relative Humidity:</b>	<b>56%</b>
<b>Note:</b>	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	-43.05	-13.00	PASS
2546.40	V	-41.65		
3395.20	V	-53.01		
1697.60	Horizontal	-39.70		
2546.40	H	-38.26		
3395.20	H	-51.78		

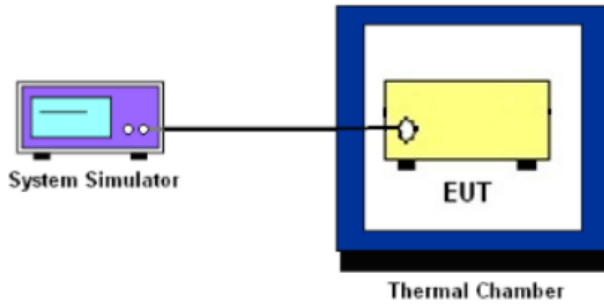
<b>Band</b>	<b>PCS 1900</b>		<b>Test channel:</b>	<b>Lowest</b>
<b>Test mode:</b>			<b>Temperature :</b>	<b>25°C</b>
			<b>Relative Humidity:</b>	<b>56%</b>
<b>Note:</b>	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.			
<b>Frequency (MHz)</b>	<b>Spurious Emission</b>		<b>Limit (dBm)</b>	<b>Result</b>
	<b>Polarization</b>	<b>Level (dBm)</b>		
3700.40	Vertical	-46.41	-13.00	PASS
5550.60	V	-45.79		
7400.80	V	-50.18		
3700.40	Horizontal	-43.81		
5550.60	H	-46.44		
7400.80	H	-49.02		
<b>Test mode:</b>	<b>PCS 1900</b>		<b>Test channel:</b>	<b>Middle</b>
<b>Test mode:</b>			<b>Temperature :</b>	<b>25°C</b>
			<b>Relative Humidity:</b>	<b>56%</b>
<b>Note:</b>	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.			
<b>Frequency (MHz)</b>	<b>Spurious Emission</b>		<b>Limit (dBm)</b>	<b>Result</b>
	<b>Polarization</b>	<b>Level (dBm)</b>		
3760.00	Vertical	-49.34	-13.00	PASS
5640.00	V	-51.55		
7520.00	V	-41.77		
3760.00	Horizontal	-46.40		
5640.00	H	-40.83		
7520.00	H	-50.85		
<b>Test mode:</b>	<b>PCS 1900</b>		<b>Test channel:</b>	<b>Highest</b>
<b>Test mode:</b>			<b>Temperature :</b>	<b>25°C</b>
			<b>Relative Humidity:</b>	<b>56%</b>
<b>Note:</b>	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.			
<b>Frequency (MHz)</b>	<b>Spurious Emission</b>		<b>Limit (dBm)</b>	<b>Result</b>
	<b>Polarization</b>	<b>Level (dBm)</b>		
3819.60	Vertical	-49.87	-13.00	PASS
5729.40	V	-51.10		
7639.20	V	-52.22		
3819.60	Horizontal	-45.65		
5729.40	H	-49.86		
7639.20	H	-52.12		

<b>Band</b>	<b>WCDMA Band V</b>		<b>Test channel:</b>	<b>Lowest</b>
<b>Test mode:</b>	<b>RMC 12.2Kbps Link (QPSK)</b>		<b>Temperature :</b>	<b>25°C</b>
			<b>Relative Humidity:</b>	<b>56%</b>
<b>Note:</b>	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	-52.41	-13.00	PASS
2479.20	V	-53.32		
3305.60	V	-49.42		
1652.80	Horizontal	-52.41		
2479.20	H	-51.53		
3305.60	H	-53.64		
<b>Test mode:</b>	<b>WCDMA Band V</b>		<b>Test channel:</b>	<b>Middle</b>
<b>Test mode:</b>	<b>RMC 12.2Kbps Link (QPSK)</b>		<b>Temperature :</b>	<b>25°C</b>
			<b>Relative Humidity:</b>	<b>56%</b>
<b>Note:</b>	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	-54.34	-13.00	PASS
2509.80	V	-55.85		
3346.40	V	-52.32		
1673.20	Horizontal	-51.78		
2509.80	H	-54.96		
3346.40	H	-57.84		
<b>Test mode:</b>	<b>WCDMA Band V</b>		<b>Test channel:</b>	<b>Highest</b>
<b>Test mode:</b>	<b>RMC 12.2Kbps Link (QPSK)</b>		<b>Temperature :</b>	<b>25°C</b>
			<b>Relative Humidity:</b>	<b>56%</b>
<b>Note:</b>	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	-52.64	-13.00	PASS
2539.80	V	-53.76		
3386.40	V	-54.41		
1693.20	Horizontal	-53.82		
2539.80	H	-52.77		
3386.40	H	-55.44		

<b>Band</b>	<b>WCDMA Band II</b>		<b>Test channel:</b>	<b>Lowest</b>
<b>Test mode:</b>	<b>RMC 12.2Kbps Link (QPSK)</b>		<b>Temperature :</b>	<b>25°C</b>
			<b>Relative Humidity:</b>	<b>56%</b>
<b>Note:</b>	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	-52.79	-13.00	PASS
5557.20	V	-54.82		
7409.60	V	-48.65		
3704.80	Horizontal	-52.65		
5557.20	H	-55.96		
7409.60	H	-56.26		
<b>Test mode:</b>	<b>WCDMA Band II</b>		<b>Test channel:</b>	<b>Middle</b>
<b>Test mode:</b>	<b>RMC 12.2Kbps Link (QPSK)</b>		<b>Temperature :</b>	<b>25°C</b>
			<b>Relative Humidity:</b>	<b>56%</b>
<b>Note:</b>	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	-51.65	-13.00	PASS
5640.00	V	-53.45		
7520.00	V	-56.32		
3760.00	Horizontal	-55.62		
5640.00	H	-48.86		
7520.00	H	-52.84		
<b>Test mode:</b>	<b>WCDMA Band II</b>		<b>Test channel:</b>	<b>Highest</b>
<b>Test mode:</b>	<b>RMC 12.2Kbps Link (QPSK)</b>		<b>Temperature :</b>	<b>25°C</b>
			<b>Relative Humidity:</b>	<b>56%</b>
<b>Note:</b>	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	-51.84	-13.00	PASS
5722.80	V	-54.75		
7630.40	V	-49.42		
3815.20	Horizontal	-51.22		
5722.80	H	-56.66		
7630.40	H	-51.66		

## 6.7. Frequency Stability Measurement

### 6.7.1. Test Specification

<b>Test Requirement:</b>	FCC Part 2.1055 ; FCC Part 22.355 ; FCC Part 24.235
<b>Test Method:</b>	FCC Part 2.1055(a)(1)(b)
<b>Operation mode:</b>	Refer to item 4.1
<b>Limit:</b>	±2.5 ppm
<b>Test Setup:</b>	 <p>The diagram illustrates the test setup. On the left is a purple 'System Simulator' with a screen and buttons. A black line representing a connection cable extends from the simulator to a yellow rectangular 'EUT' (Equipment Under Test) located inside a blue-bordered 'Thermal Chamber'.</p>
<b>Test Procedure:</b>	<p><b>Test Procedures for Temperature Variation</b></p> <ol style="list-style-type: none"> <li>1. The testing follows FCC KDB 971168 v02r02 Section 9.0.</li> <li>2. The EUT was set up in the thermal chamber and connected with the system simulator.</li> <li>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.</li> <li>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.</li> </ol> <p><b>Test Procedures for Voltage Variation</b></p> <ol style="list-style-type: none"> <li>1. The testing follows FCC KDB 971168 v02r02 Section 9.0.</li> <li>2. The EUT was placed in a temperature chamber at 25±5° C and connected with the system simulator.</li> <li>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.</li> <li>4. The variation in frequency was measured for the worst case.</li> </ol>
<b>Test Result:</b>	PASS
<b>Remark:</b>	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	Oct. 13, 2017
Programable tempratuce and humidity chamber	JQ	JQ-2000	N/A	Oct. 13, 2017
DC power supply	Kingrang	KR3005K 30V/5A	N/A	Oct. 13, 2017
RF cable (9kHz-40GHz)	TCT	RE-04	N/A	Oct. 13, 2017
Antenna Connector	TCT	RFC-03	N/A	Oct. 13, 2017

**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

<b>Band :</b>	<b>GSM 850</b>	<b>Channel:</b>	<b>190</b>
<b>Limit (ppm) :</b>	<b>2.5</b>	<b>Frequency:</b>	<b>836.6MHz</b>
<b>Temperature (°C)</b>	<b>Deviation (ppm)</b>		<b>Result</b>
50	0.012		PASS
40	0.020		
30	0.012		
20	0.018		
10	0.011		
0	0.019		
-10	0.008		
-20	0.010		
-30	0.007		

<b>Band :</b>	<b>GSM 1900</b>	<b>Channel:</b>	<b>661</b>
<b>Limit (ppm) :</b>	<b>Note</b>	<b>Frequency:</b>	<b>1880MHz</b>
<b>Temperature (°C)</b>	<b>Deviation (ppm)</b>		<b>Result</b>
50	0.026		PASS
40	0.020		
30	0.017		
20	0.018		
10	0.022		
0	0.020		
-10	0.018		
-20	0.015		
-30	0.019		

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

<b>Band :</b>	<b>WCDMA Band V</b>	<b>Channel:</b>	<b>4183</b>
<b>Limit (ppm) :</b>	<b>2.5ppm</b>	<b>Frequency:</b>	<b>836.6MHz</b>
<b>Temperature (°C)</b>	<b>RMC 12.2Kbps Deviation (ppm)</b>		<b>Result</b>
50	0.009		PASS
40	0.010		
30	0.001		
20	0.007		
10	0.016		
0	0.012		
-10	0.018		
-20	0.021		
-30	0.011		

<b>Band :</b>	<b>WCDMA Band II</b>	<b>Channel:</b>	<b>9400</b>
<b>Limit (ppm) :</b>	<b>Note</b>	<b>Frequency:</b>	<b>1880MHz</b>
<b>Temperature (°C)</b>	<b>RMC 12.2Kbps Deviation (ppm)</b>		<b>Result</b>
50	0.021		PASS
40	0.018		
30	0.014		
20	0.022		
10	0.016		
0	0.012		
-10	0.011		
-20	0.019		
-30	0.017		

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



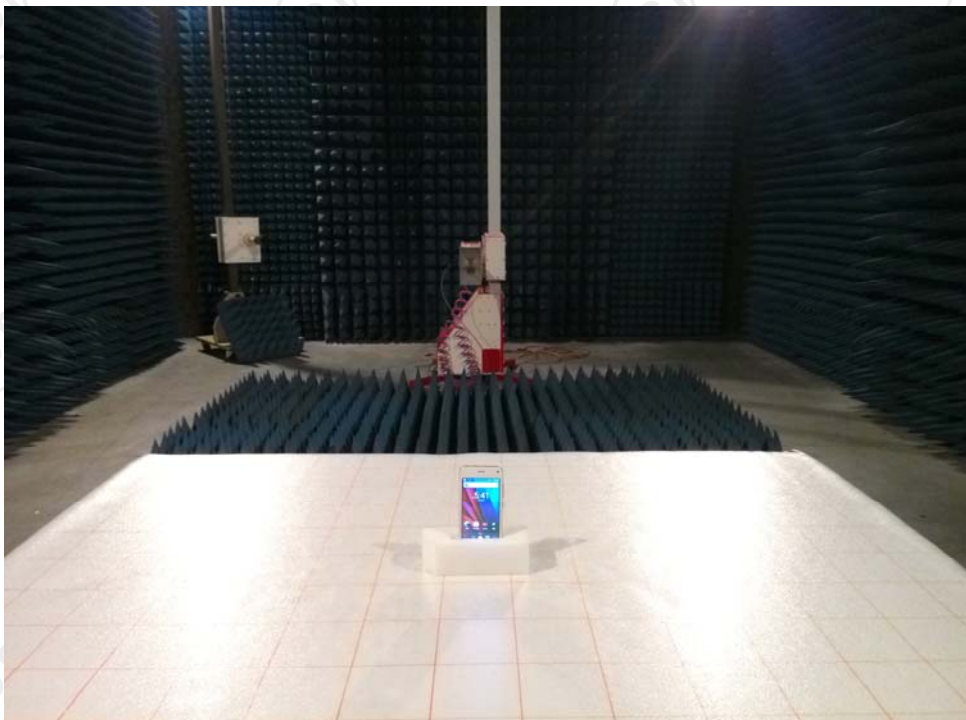
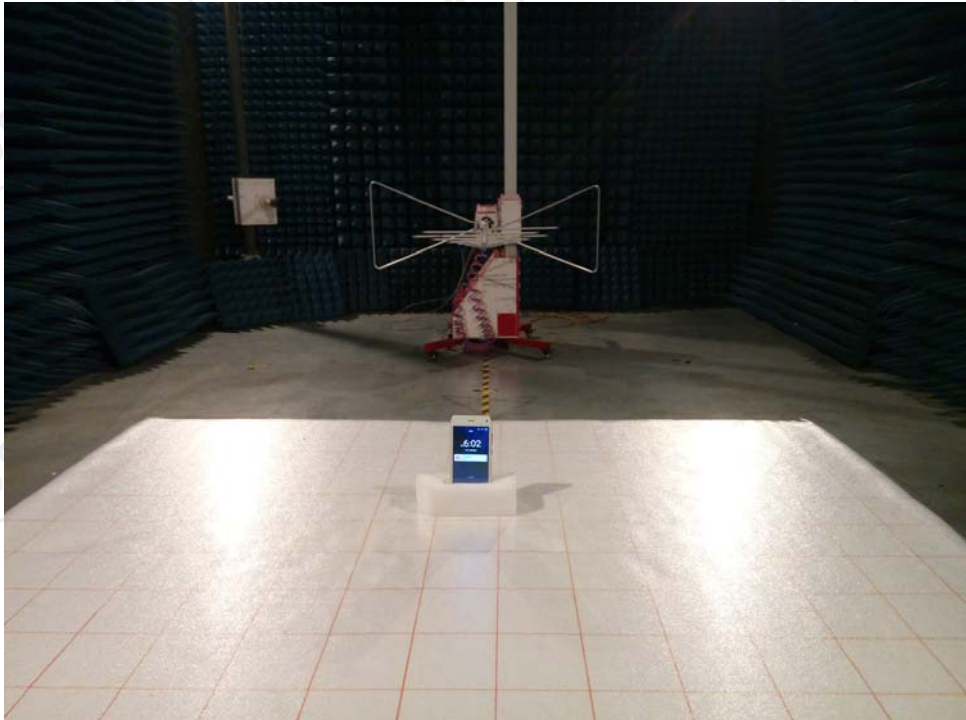
**Test Result of Voltage Variation**

Band & Channel	Mode	Voltage (Volt)	Deviation (ppm)	Limit (ppm)	Result
GSM 850 CH190	GSM	4.2	+0.018	2.5	PASS
		3.8	+0.009		
		BEP	+0.013		
GSM 850 CH190	EGPRS Class 12	4.2	+0.020	2.5	
		3.7	+0.025		
		BEP	+0.006		
GSM 1900 CH661	GSM	4.2	+0.021	(Note 3.)	
		3.8	+0.025		
		BEP	+0.019		
GSM 1900 CH661	EGPRS Class 12	4.2	+0.005	(Note 3.)	
		3.7	+0.011		
		BEP	+0.022		
WCDMA Band V CH4182	RMC 12.2Kbps	4.2	-0.021	2.5	
		3.7	-0.018		
		BEP	-0.019		
WCDMA Band II CH9400	RMC 12.2Kbps	4.2	-0.012	(Note 3.)	
		3.7	-0.020		
		BEP	-0.016		

**Note:**

1. Normal Voltage = 3.7V.
2. Battery End Point (BEP) = 3.40V.
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



## Appendix B: Photographs of EUT

Refer to test report TCT170721E003

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