

6.6.3. Test Data

Test Result of ERP

GSM850 (GSM) Radiated Power ERP				
Horizontal Polarization				
Frequency (MHz)	LVL (dBm)	Correction Factor (dB)	ERP (dBm)	ERP (W)
824.20	11.73	21.66	31.24	1.33
836.60	12.2	21.54	31.59	1.44
848.80	12.3	21.46	31.61	1.45
Vertical Polarization				
Frequency (MHz)	LVL (dBm)	Correction Factor (dB)	ERP (dBm)	ERP (W)
824.20	11.34	21.66	30.85	1.22
836.60	11.57	21.54	30.96	1.25
848.80	11.36	21.46	30.67	1.17

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

GSM850 (GPRS class 8) Radiated Power ERP

GSM850 (GPRS class 8) Radiated Power ERP				
Horizontal Polarization				
Frequency (MHz)	LVL (dBm)	Correction Factor (dB)	ERP (dBm)	ERP (W)
824.20	10.86	21.66	30.37	1.09
836.60	10.97	21.54	30.36	1.09
848.80	11.16	21.46	30.47	1.11
Vertical Polarization				
Frequency (MHz)	LVL (dBm)	Correction Factor (dB)	ERP (dBm)	ERP (W)
824.20	10.41	21.66	29.92	0.98
836.60	10.13	21.54	29.52	0.90
848.80	10.30	21.46	29.61	0.91

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

WCDMA Band V (RMC 12.2Kbps) Radiated Power ERP				
Horizontal Polarization				
Frequency (MHz)	LVL (dBm)	Correction Factor (dB)	ERP (dBm)	ERP (W)
826.40	3.12	21.62	22.59	0.18
836.60	3.24	21.57	22.66	0.18
846.60	3.16	21.44	22.45	0.18
Vertical Polarization				
Frequency (MHz)	LVL (dBm)	Correction Factor (dB)	ERP (dBm)	ERP (W)
826.40	2.15	21.62	21.62	0.15
836.60	2.24	21.57	21.66	0.15
846.60	2.17	21.44	21.46	0.14

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

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

Test Result of EIRP

GSM1900 (GSM) Radiated Power EIRP

Horizontal Polarization

Frequency (MHz)	LVL (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (W)
1850.20	7.65	21.66	29.31	0.85
1880.00	7.92	21.54	29.46	0.88
1909.80	7.59	21.46	29.05	0.80

Vertical Polarization

Frequency (MHz)	LVL (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (W)
1850.20	6.53	21.66	28.19	0.66
1880.00	6.46	21.54	28.00	0.63
1909.80	7.23	21.46	27.69	0.59

EIRP = LVL (dBm) + Correction Factor (dB)

GSM1900 (GPRS class 8) Radiated Power EIRP

Horizontal Polarization

Frequency (MHz)	LVL (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (W)
1850.20	7.55	21.66	29.21	0.83
1880.00	7.80	21.54	29.34	0.86
1909.80	7.85	21.46	29.31	0.85

Vertical Polarization

Frequency (MHz)	LVL (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (W)
1850.20	5.64	21.66	27.30	0.54
1880.00	5.28	21.54	26.82	0.48
1909.80	5.49	21.46	26.95	0.50

** EIRP = LVL (dBm) + Correction Factor (dB)*

WCDMA Band II (RMC 12.2Kbps) Radiated Power EIRP

Horizontal Polarization				
Frequency (MHz)	LVL (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (W)
1852.40	10.93	11.23	22.16	0.16
1880.00	10.58	11.56	22.14	0.16
1907.60	11.08	11.39	22.47	0.17
Vertical Polarization				
Frequency (MHz)	LVL (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (W)
1852.40	10.03	11.23	21.26	0.13
1880.00	9.86	11.56	21.42	0.14
1907.60	10.30	11.39	21.69	0.15

* EIRP = LVL (dBm) + Correction Factor (dB)

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

WCDMA Band IV (RMC 12.2Kbps) Radiated Power EIRP				
Horizontal Polarization				
Frequency (MHz)	LVL (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (W)
1712.4	4.15	18.33	22.48	0.18
1732.6	4.39	18.15	22.54	0.18
1752.6	4.57	18.24	22.81	0.19
Vertical Polarization				
Frequency (MHz)	LVL (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (W)
1712.4	3.98	18.33	22.31	0.17
1732.6	4.06	18.15	22.21	0.17
1752.6	4.10	18.24	22.34	0.17

* EIRP = LVL (dBm) + Correction Factor (dB)

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

6.7. Field Strength of Spurious Radiation Measurement

6.7.1. Test Specification

Test Requirement:	FCC part 22.917(a) ;FCC part 24.238(a); FCC part 27.53(g) RSS-132 (4.5.1); RSS-133 (6.5.1)
Test Method:	FCC part 2.1053
Limit:	30MHz~20GHz -13dBm
Test setup:	<p>For 30MHz~1GHz</p> <p>1GHz ~20GHz</p>
Test Procedure:	<ol style="list-style-type: none"> The testing follows FCC KDB 971168 v02r02 Section 5.8 and ANSI / TIA-603-D-2010Section 2.2.12. The EUT was placed on a rotatable wooden table 0.8 meters above the ground. The EUT was set 3 meters from the receiving antenna, which was mounted on the antenna tower. The table was rotated 360 degrees to determine the position of the highest spurious emission. 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. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz, taking record of maximum spurious emission. A horn antenna was substituted in place of the EUT and was driven by a signal generator. Tune the output power of signal generator to the

	<p>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 $43 + 10\log(P)$ dB below the transmitter power P(Watts)</p> $= P(W) - [43 + 10\log(P)] \text{ (dB)}$ $= [30 + 10\log(P)] \text{ (dBm)} - [43 + 10\log(P)] \text{ (dB)}$ $= -13 \text{ dBm.}$
Test results:	PASS

6.7.2. 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
Spectrum Analyzer	ROHDE&SCHWARZ	FSEM	848597/001	Sep. 11, 2016
Pre-Amplifier	HP	8447D	2727A05017	Sep. 11, 2016
Pre-Amplifier	EM Electronics Corporation CO.,LTD	EM30265	07032613	Sep. 11, 2016
Broadband Antenna	Schwarzbeck	VULB9163	351	Sep. 13, 2016
Broadband Antenna	Schwarzbeck	VULB9163	340	Sep. 13, 2016
Horn Antenna	Schwarzbeck	BBHA 9120D	631	Sep. 13, 2016
Horn Antenna	Schwarzbeck	BBHA 9120D	629	Sep. 13, 2016
Coax cable	TCT	N/A	N/A	Sep. 11, 2016
Coax cable	TCT	N/A	N/A	Sep. 11, 2016
EMI Test Software	Shurple Technology	EZ-EMC	N/A	N/A
Signal Generator	Maconi	2022D	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

Band	GSM850		Test channel:	Lowest
Test mode:	GSM Link (GMSK)		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
1648.40	Vertical	-38.57	-13.00	PASS
2472.60	V	-41.62		
3296.80	V	-50.63		
1648.40	Horizontal	-43.22		
2472.60	H	-39.59		
3296.80	H	-51.14		
Test mode:	GSM850		Test channel:	Middle
Test mode:	GSM Link (GMSK)		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
1673.20	Vertical	-40.47	-13.00	PASS
2509.80	V	-43.42		
3346.40	V	-51.06		
1673.20	Horizontal	-41.13		
2509.80	H	-39.14		
3346.40	H	-52.70		
Test mode:	GSM850		Test channel:	Highest
Test mode:	GSM Link (GMSK)		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
1697.60	Vertical	-40.80	-13.00	PASS
2546.40	V	-41.34		
3395.20	V	-56.36		
1697.60	Horizontal	-45.14		
2546.40	H	-43.06		
3395.20	H	-55.80		

Band	GSM 1900		Test channel:	Lowest
Test mode:	GSM Link (GMSK)		Temperature :	25°C
Note:	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.		Relative Humidity:	56%
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
3700.40	Vertical	-49.31	-13.00	PASS
5550.60	V	-45.41		
7400.80	V	-52.04		
3700.40	Horizontal	-48.26		
5550.60	H	-50.19		
7400.80	H	-48.90		
Test mode:	GSM 1900		Test channel:	Middle
Test mode:	GSM Link (GMSK)		Temperature :	25°C
Note:	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.		Relative Humidity:	56%
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
3760.00	Vertical	-49.12	-13.00	PASS
5640.00	V	-53.02		
7520.00	V	-47.55		
3760.00	Horizontal	-47.70		
5640.00	H	-50.85		
7520.00	H	-51.20		
Test mode:	GSM 1900		Test channel:	Highest
Test mode:	GSM Link (GMSK)		Temperature :	25°C
Note:	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.		Relative Humidity:	56%
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
3819.60	Vertical	-46.24	-13.00	PASS
5729.40	V	-50.64		
7639.20	V	-54.29		
3819.60	Horizontal	-48.31		
5729.40	H	-50.79		
7639.20	H	-52.69		

Band	WCDMA Band II	Test channel:	Lowest
Test mode:	RMC 12.2Kbps Link (QPSK)	Temperature :	23~24°C

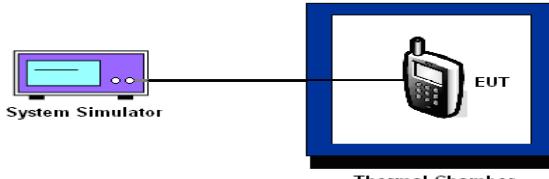
			Relative Humidity:	46~48%
Note:	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.			
Frequency (MHz)	Spurious Emission		Limit (dBm) -13.00	Result PASS
	Polarization	Level (dBm)		
3704.80	Vertical	-52.98		
5557.20	V	-51.32		
7409.60	V	-58.69		
3704.80	Horizontal	-53.63		
5557.20	H	-55.52		
7409.60	H	-58.43		
Test mode:	WCDMA Band II		Test channel:	Middle
Test mode:	RMC 12.2Kbps Link (QPSK)		Temperature :	23~24°C
Note:	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.			
Frequency (MHz)	Spurious Emission		Limit (dBm) -13.00	Result PASS
	Polarization	Level (dBm)		
3760.00	Vertical	-51.74		
5640.00	V	-54.63		
7520.00	V	-57.56		
3760.00	Horizontal	-52.41		
5640.00	H	-56.92		
7520.00	H	-58.67		
Test mode:	WCDMA Band II		Test channel:	Highest
Test mode:	RMC 12.2Kbps Link (QPSK)		Temperature :	23~24°C
Note:	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.			
Frequency (MHz)	Spurious Emission		Limit (dBm) -13.00	Result PASS
	Polarization	Level (dBm)		
3815.20	Vertical	-51.12		
5722.80	V	-54.30		
7630.40	V	-53.82		
3815.20	Horizontal	-53.82		
5722.80	H	-56.96		
7630.40	H	-56.93		

Band	WCDMA Band V		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
1652.80	Vertical	-53.36	-13.00	PASS
2479.20	V	-52.72		
3305.60	V	-52.52		
1652.80	Horizontal	-53.57		
2479.20	H	-52.43		
3305.60	H	-52.31		
Test mode:	WCDMA Band V		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
1673.20	Vertical	-56.24	-13.00	PASS
2509.80	V	-55.45		
3346.40	V	-58.42		
1673.20	Horizontal	-55.62		
2509.80	H	-58.76		
3346.40	H	-59.94		
Test mode:	WCDMA Band V		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
1693.20	Vertical	-56.62	-13.00	PASS
2539.80	V	-56.75		
3386.40	V	-58.32		
1693.20	Horizontal	-55.42		
2539.80	H	-59.76		
3386.40	H	-59.94		

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
2452.3	Vertical	--	-13.00	PASS
3424.8	V	-51.41		
5137.2	V	-55.60		
2452.3	Horizontal	--		
3424.8	H	-54.62		
5137.2	H	-52.45		
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
2641.3	Vertical	-52.46	-13.00	PASS
3465.2	V	-51.50		
5197.8	V	-55.79		
2641.3	Horizontal	-50.43		
3465.2	H	-57.10		
5197.8	H	-56.78		
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
3102.2	Vertical	-50.22	-13.00	PASS
3505.2	V	-53.94		
5257.8	V	-51.82		
3102.2	Horizontal	-52.69		
3505.2	H	-53.76		
5257.8	H	-56.81		

6.8. Frequency Stability Measurement

6.8.1. Test Specification

Test Requirement:	FCC Part 2.1055 ; FCC Part 22.355 ; FCC Part 24.235 FCC Part 27.54 ;RSS-132(4.3);RSS-133(6.3)
Test Method:	FCC Part 2.1055(a)(1)(b)
Limit:	±2.5 ppm
Test Setup:	
Test Procedure:	<p>Test Procedures for Temperature Variation</p> <ol style="list-style-type: none"> 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. <p>Test Procedures for Voltage Variation</p> <ol style="list-style-type: none"> 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

6.8.2. 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
Thermal chamber	JQ	JQ-2000	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).

6.8.3. Test Data

Test Result of Temperature Variation

Band :	GSM 850	Channel:	189
Limit (ppm) :	2.5ppm	Frequency:	836.6
Temperature (°C)	GSM Deviation (ppm)	GPRS Class8 Deviation (ppm)	Result
50	+0.010	+0.009	
40	+0.013	+0.012	
30	+0.013	+0.011	
20	+0.008	+0.007	
10	+0.012	+0.011	PASS
0	+0.013	+0.012	
-10	+0.009	+0.008	
-20	+0.011	+0.009	
-30	+0.012	+0.011	

Band :	GSM 1900	Channel:	661
Limit (ppm) :	2.5ppm	Frequency:	1880
Temperature (°C)	GSM Deviation (ppm)	GPRS Class8 Deviation (ppm)	Result
50	+0.023	+0.019	
40	+0.025	+0.022	
30	+0.021	+0.018	
20	+0.019	+0.017	
10	+0.023	+0.021	PASS
0	+0.025	+0.023	
-10	+0.019	+0.018	
-20	+0.018	+0.016	
-30	+0.023	+0.021	

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:	836.6	
Temperature (°C)	RMC 12.2Kbps Deviation (ppm)		Result	
50	-0.005		PASS	
40	-0.007			
30	-0.007			
20	-0.006			
10	-0.005			
0	-0.007			
-10	-0.006			
-20	-0.007			
-30	-0.005			

Band :	WCDMA Band II	Channel:	9400	
Limit (ppm) :	2.5ppm	Frequency:	1880	
Temperature (°C)	RMC 12.2Kbps Deviation (ppm)		Result	
50	-0.005		PASS	
40	-0.004			
30	-0.004			
20	-0.005			
10	-0.004			
0	-0.005			
-10	-0.004			
-20	-0.005			
-30	-0.005			

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

Band :	WCDMA Band IV	Channel:	1413	
Limit (ppm) :	2.5ppm	Frequency:	1732.6	
Temperature (°C)	RMC 12.2Kbps Deviation (ppm)		Result	
50	-0.003		PASS	
40	-0.005			
30	-0.004			
20	-0.005			
10	-0.005			
0	-0.003			
-10	-0.004			
-20	-0.005			
-30	-0.003			

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

Test Result of Voltage Variation

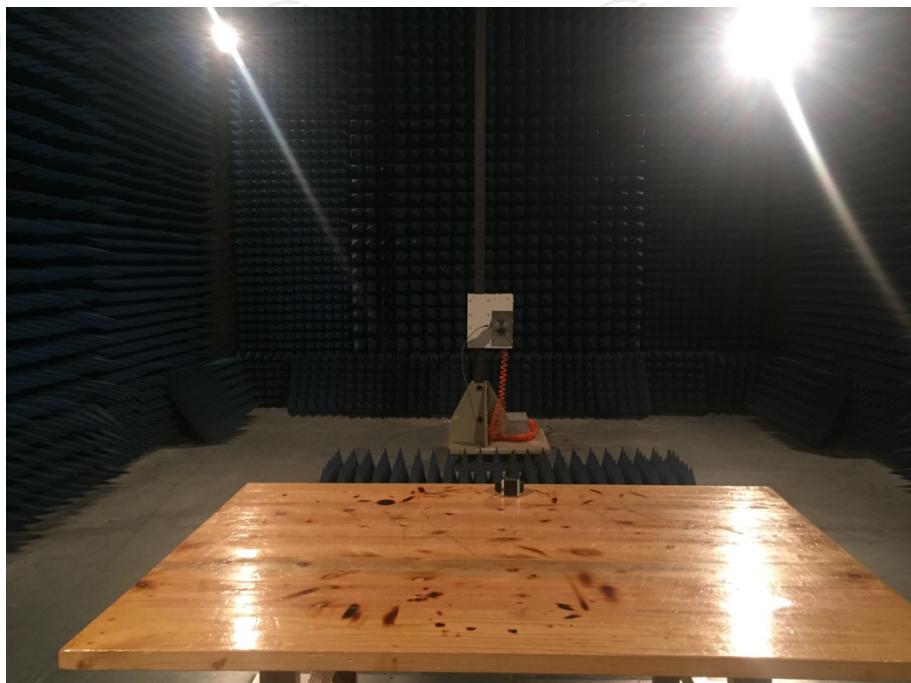
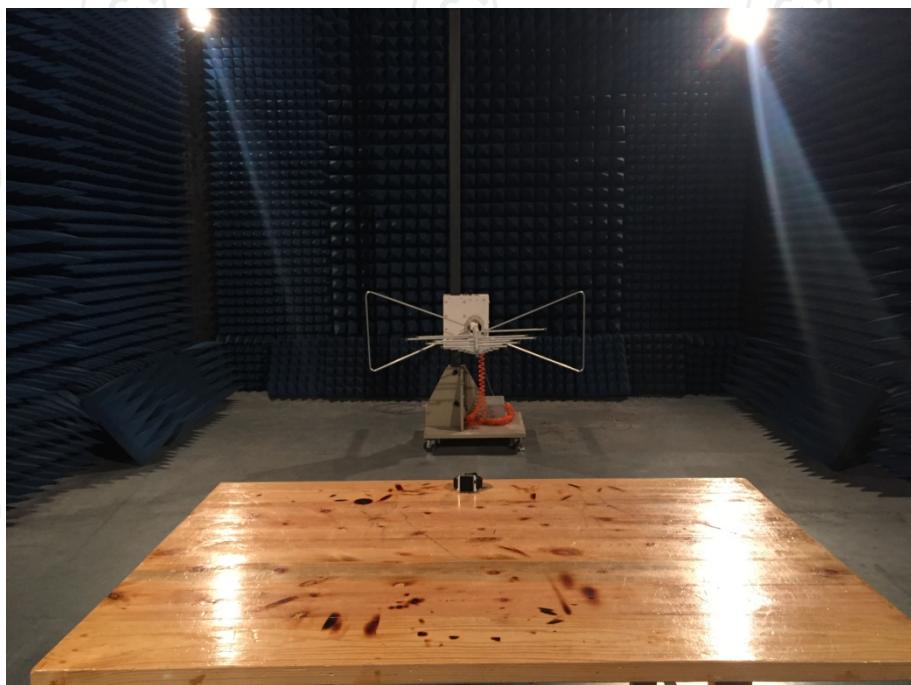
Band & Channel	Mode	Voltage (Volt)	Deviation (ppm)	Limit (ppm)	Result
GSM 850 CH189	GSM	4.2	+0.011	2.5	
		3.8	+0.009		
		BEP	+0.012		
	GPRS class 8	4.2	+0.027		
		3.8	+0.029		
		BEP	+0.031		
GSM 1900 CH661	GSM	4.2	+0.022	(Note 3.)	PASS
		3.8	+0.021		
		BEP	+0.023		
	GPRS class 8	4.2	+0.024		
		3.8	+0.024		
		BEP	+0.025		
WCDMA Band V CH4183	RMC 12.2Kbps	4.2	-0.007	2.5	
		3.8	-0.005		
		BEP	-0.006		
WCDMA Band II CH9400	RMC 12.2Kbps	4.2	-0.005	(Note 3.)	
		3.8	-0.004		
		BEP	-0.005		
WCDMA Band IV CH1413	RMC 12.2Kbps	4.2	-0.008	2.5	
		3.8	-0.014		
		BEP	-0.016		

Note:

1. Normal Voltage = 3.8V.
2. Battery End Point (BEP) = 3.40 V.
3. The frequency fundamental emissions stay within the authorized frequency block based on the frequency deviation measured is small.

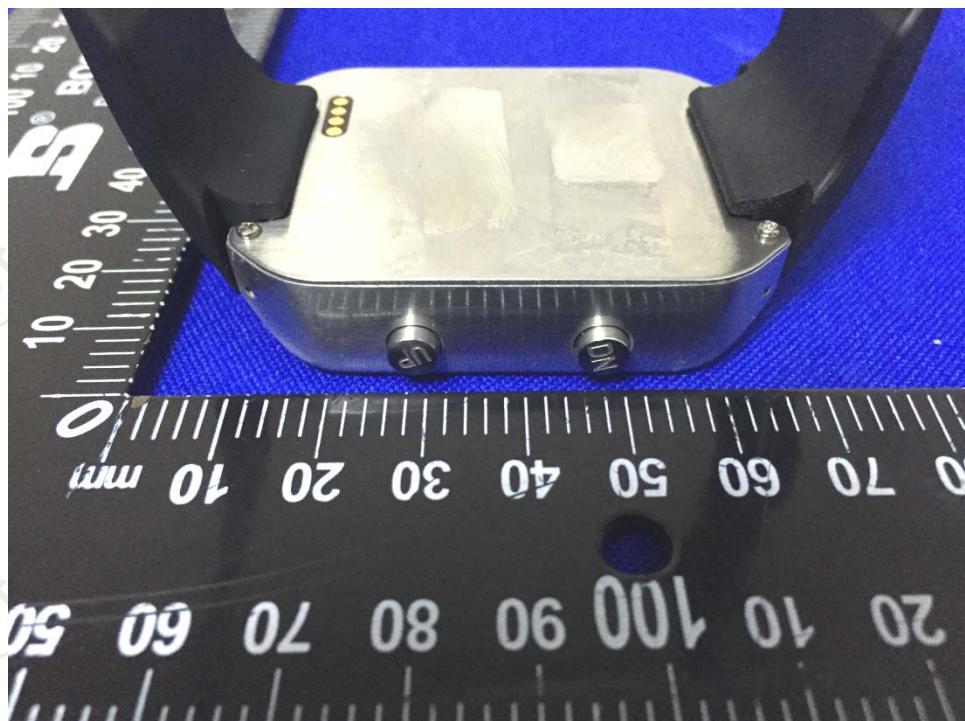
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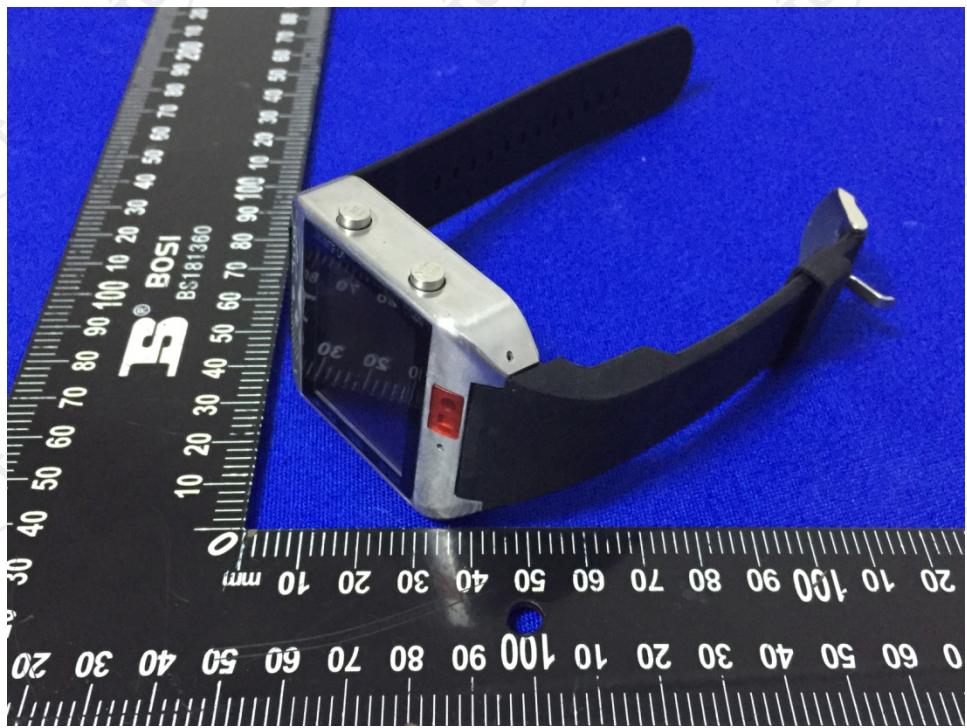
Appendix A: Photographs of Test Setup
Radiated Emission



Appendix B: Photographs of EUT
Model: ADWAT102G
External Photos









**Model: ADWAT102G
Internal Photos**

