RF TEST REPORT

Report No.: 14070710-FCC-R1

Supersede Report No.: N/A

Applicant	Verykool USA Inc
Product Name	Mobile Phone
Model No.	SL4500
Serial No.	N/A
Test Standard	FCC Part 22(H), FCC Part 24(E), FCC Part 27: 2014; ANSI/TIAC603 D: 2010
Test Date	January 19 to January 24, 2015
Issue Date	February 11, 2015
Test Result	☑ Pass ☐ Fail
Equipment complied with the specification	☑
Equipment did not comply with the specification	☐

Wiky Jam	Alex Liu	
Wiky Jam **Test Engineer**	**Alex Liu** **Checked By**	

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Test result presented in this test report is applicable to the tested sample only

Issued by:

SIEMIC (SHENZHEN-CHINA) LABORATORIES

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Laboratories Introduction

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Accreditations for Conformity Assessment

Country/Region	Scope
USA	EMC, RF/Wireless, SAR, Telecom
Canada	EMC, RF/Wireless, SAR, Telecom
Taiwan	EMC, RF, Telecom, SAR, Safety
Hong Kong	RF/Wireless, SAR, Telecom
Australia	EMC, RF, Telecom, SAR, Safety
Korea	EMI, EMS, RF, SAR, Telecom, Safety
Japan	EMI, RF/Wireless, SAR, Telecom
Singapore	EMC, RF, SAR, Telecom
Europe	EMC, RF, SAR, Telecom, Safety

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1. Report Revision History

Report No.	Report Version	Description	Issue Date
14070710-FCC-R1	NONE	Original	February 11, 2015

2. Customer information

Applicant Name	Verykool USA Inc
Applicant Add	3636 Nobel Drive, Suite 325, San Diego, CA 92122, USA
Manufacturer	Shenzhen BVC Technology Co., LTD
Manufacturer Add	Rainbow Bldg., North, Hi-Tech Industrial Park, Nanshan District, Shenzhen

3. Test site information

Lab performing tests	SIEMIC (Shenzhen-China) LABORATORIES
Lab Address	Zone A, Floor 1, Building 2 Wan Ye Long Technology Park South Side of Zhoushi Road, Bao' an District, Shenzhen, Guangdong China 518108
FCC Test Site No.	718246
IC Test Site No.	4842E-1
Test Software	Radiated Emission Program-To Shenzhen v2.0

4. Equipment under Test (EUT) Information

Description of EUT:	Mobile Phone
Main Model:	SL4500
Serial Model:	N/A
Date EUT received:	January 05, 2015
Test Date(s):	January 19 to January 24, 2015
Equipment Category：	PCE
Antenna Gain:	GSM850/ PCS1900: -2.5 dBi UMTS-FDD Band 5/ Band 2/ Band 4: -2.8 dBi LTE Band 2/ Band 4/ Band 12/ Band 17: -2.5 dBi Bluetooth/BLE: 1 dBi WIFI: 0.5 dBi
Type of Modulation:	GSM / GPRS: GMSK EGPRS: 8PSK UMTS-FDD: QPSK LTE Band: QPSK, 16QAM 802.11b/g/n: DSSS, OFDM Bluetooth: GFSK, π /4DQPSK, 8DPSK BLE: GFSK
RF Operating Frequency (ies):	GSM850 TX: 824.2 ~ 848.8 MHz; RX: 869.2 ~ 893.8 MHz PCS1900 TX: 1850.2 ~ 1909.8 MHz; RX: 1930.2 ~ 1989.8 MHz UMTS-FDD Band 5 TX: 826.4 ~ 846.6 MHz; RX: 871.4 ~ 891.6 MHz UMTS-FDD Band 2 TX:1852.4 ~ 1907.6 MHz; RX: 1932.4 ~ 1987.6 MHz UMTS-FDD Band 4 TX :1712.4 ~ 1752.6 MHz; RX : 2112.4 ~ 2152.6 MHz LTE Band 2 TX: 1852.5 ~ 1907.5 MHz; RX : 1932.5 ~ 1987.5 MHz LTE Band 4 TX: 1712.5 ~ 1752.5 MHz; RX : 2112.5 ~ 2152.5 MHz LTE Band 12 TX: 701.5 ~ 713.5 MHz; RX : 731.5 ~ 743.5 MHz LTE Band 17 TX: 706.5 ~ 713.5 MHz; RX : 736.5 ~ 743.5 MHz

	WIFI:802.11b/g/n(20M): 2412-2462 MHz Bluetooth& BLE: 2402-2480 MHz
Maximum Conducted AV Power to Antenna:	GSM850: 32.35 dBm PCS1900: 30.39 dBm UMTS-FDD Band 5: 22.67 dBm UMTS-FDD Band 2: 21.64 dBm UMTS-FDD Band 4: 21.79 dBm
ERP/EIRP:	GSM850: 25.93 dBm / ERP PCS1900: 22.48 dBm / EIRP UMTS-FDD Band 5: 19.16 dBm / ERP UMTS-FDD Band 2: 18.79 dBm / EIRP UMTS-FDD Band 4: 19.17 dBm / EIRP
Port:	Power Port, Earphone Port, USB Port
Input Power:	Battery: Model: SL4500 Spec: 3.7V 1700mAh Limited charger voltage: 4.2V Adapter: Model: DSA-5PFK-05 FUS 050100a Input: AC 100-240V; 50/60Hz 0.2A Output: DC 5.0V; 1.0A
Trade Name :	verykool
GPRS/EGPRS Multi-slot class	8/10/12
FCC ID:	WA6SL4500

5. Test Summary

The product was tested in accordance with the following specifications.

All testing has been performed according to below product classification:

FCC Rules	Description of Test	Result
§ 1.1307; § 2.1093	RF Exposure (SAR)	Compliance
§2.1046; § 22.913(a); § 24.232(c); § 27.50(c.10); § 27.50(d.4)	RF Output Power	Compliance
§ 24.232 (d); § 27.50(d)	Peak-Average Ratio	Compliance
§ 2.1047	Modulation Characteristics	Compliance
§ 2.1049; § 22.905; § 22.917; § 24.238; § 27.53(a.5)	99% & -26 dB Occupied Bandwidth	Compliance
§ 2.1051; § 22.917(a); § 24.238(a); § 27.53(h)	Spurious Emissions at Antenna Terminal	Compliance
§ 2.1053; § 22.917(a); § 24.238(a); § 27.53(h)	Field Strength of Spurious Radiation	Compliance
§ 22.917(a); § 24.238(a); § 27.53(h)	Out of band emission, Band Edge	Compliance
§ 2.1055; § 22.355; § 24.235; § 27.5(h); § 27.54	Frequency stability vs. temperature Frequency stability vs. voltage	Compliance

Note: Testing was performed by configuring EUT to maximum output power status, the declared output power class for different

Measurement Uncertainty

Emissions		
Test Item	**Description**	**Uncertainty**
Band Edge and Radiated Spurious Emissions	Confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2 (for EUTs < 0.5m X 0.5m X 0.5m)	+5.6dB/-4.5dB
-	-	-

6. MEASUREMENTS, EXAMINATION AND DERIVED RESULTS

6.1 RF Exposure (SAR)

Test Result: Pass

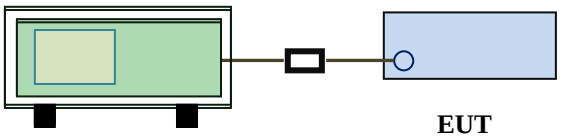
The EUT is a portable device, thus requires SAR evaluation;

Please refer to RF Exposure Evaluation Report: 14070710-FCC-H.

6.2 RF Output Power

Temperature	19°C
Relative Humidity	60%
Atmospheric Pressure	1011mbar
Test date :	January 19 to January 20, 2015
Tested By :	Wiky Jam

Requirement(s):

Spec	Item	Requirement	Applicable
§22.913 (a)	a)	ERP:38.45dBm	☑
§24.232 (c)	b)	EIRP:33dBm	☑
§27.50 (c)	c)	EIRP: 30dBm	☑
Test Setup	 Base Station		
Test Procedure	For Conducted Power: - The transmitter output port was connected to base station. - Set EUT at maximum power through base station. - Select lowest, middle, and highest channels for each band and different test mode. For ERP/EIRP: - The transmitter was placed on a wooden turntable, and it was transmitting into a non-radiating load which was also placed on the turntable. - The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-orthogonal axis. - The frequency range up to tenth harmonic of the fundamental frequency was investigated. - Remove the EUT and replace it with substitution antenna. A signal		

	generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution. - Spurious emissions in dB = 10 log (TX power in Watts/0.001) – the absolute level - Spurious attenuation limit in dB = 43 + 10 Log10 (power out in Watts.
Remark	
Result	☑ Pass ☐ Fail

Test Data ☑ Yes ☐ N/A

Test Plot ☐ Yes (See below) ☑ N/A

Conducted Power

GSM Mode:

Burst Average Power (dBm);								
Band	GSM850				GSM1900			
Channel	128	190	251	Tune up Power tolerant	512	661	810	Tune up Power tolerant
Frequency (MHz)	824.2	836.6	848.8	/	1850.2	1880	1909.8	/
GSM Voice (1 uplink),GMSK	**32.35**	32.31	32.34	32±1	30.33	30.31	**30.39**	30±1
GPRS Multi-Slot Class 8 (1 uplink),GMSK	31.34	31.31	31.32	31±1	29.32	29.28	29.34	29±1
GPRS Multi-Slot Class 10 (2 uplink) GMSK	31.31	31.27	31.31	31±1	29.21	29.14	29.18	29±1
GPRS Multi-Slot Class 12 (4 uplink) GMSK (4 uplink),GMSK	29.59	29.54	29.46	28.6±1	27.42	27.43	27.56	26.6±1
EGPRS Multi-Slot Class 8 (1 uplink) 8PSK MCS5	29.28	29.33	29.34	29±1	28.77	28.69	28.62	28±1
EGPRS Multi-Slot Class 10 (2 uplink) 8PSK MCS5	28.37	28.41	28.43	28±1	27.63	27.66	27.57	27±1
EGPRS Multi-Slot Class 12 (4 uplink) 8PSK MCS5	26.73	26.78	26.64	26±1	26.35	26.51	26.67	26±1
Remark : GPRS, CS1 coding scheme. EGPRS, MCS5 coding scheme. Multi-Slot Class 8 , Support Max 4 downlink, 1 uplink , 5 working link Multi-Slot Class 10 , Support Max 4 downlink, 2 uplink , 5 working link Multi-Slot Class 12 , Support Max 4 downlink, 4 uplink , 5 working link								

Note: Since GSM mode has higher power, so the test items below were not performed to GPRS and EGPRS mode.

UMTS Mode:

UMTS-FDD Band V

Band/ Time Slot configuration	Channel	Frequency	Average power (dBm)
RMC 12.2kbps	4132	826.4	22.59
	4175	835.0	22.58
	4233	846.6	22.65
HSDPA Subtest1	4132	826.4	22.55
	4175	835.0	22.54
	4233	846.6	22.64
HSDPA Subtest2	4132	826.4	22.57
	4175	835.0	22.53
	4233	846.6	**22.67**
HSDPA Subtest3	4132	826.4	22.55
	4175	835.0	22.59
	4233	846.6	22.64
HSDPA Subtest4	4132	826.4	22.57
	4175	835.0	22.53
	4233	846.6	22.64
HSUPA Subtest1	4132	826.4	22.57
	4175	835.0	22.56
	4233	846.6	22.67
HSUPA Subtest2	4132	826.4	22.53
	4175	835.0	22.45
	4233	846.6	22.36
HSUPA Subtest3	4132	826.4	22.45
	4175	835.0	22.56
	4233	846.6	22.45
HSUPA Subtest4	4132	826.4	22.55
	4175	835.0	22.42
	4233	846.6	22.33
HSUPA Subtest5	4132	826.4	22.44
	4175	835.0	22.53
	4233	846.6	22.48

UMTS-FDD Band II

Band/ Time Slot configuration	Channel	Frequency	Average power (dBm)
RMC 12.2kbps	9262	1852.4	21.55
	9400	1880.0	**21.64**
	9538	1907.6	21.45
HSDPA Subtest1	9262	1852.4	21.54
	9400	1880.0	21.64
	9538	1907.6	21.51
HSDPA Subtest2	9262	1852.4	21.61
	9400	1880.0	21.52
	9538	1907.6	21.54
HSDPA Subtest3	9262	1852.4	21.63
	9400	1880.0	21.53
	9538	1907.6	21.51
HSDPA Subtest4	9262	1852.4	21.62
	9400	1880.0	21.54
	9538	1907.6	21.55
HSUPA Subtest1	9262	1852.4	21.61
	9400	1880.0	21.52
	9538	1907.6	21.51
HSUPA Subtest2	9262	1852.4	21.44
	9400	1880.0	21.52
	9538	1907.6	21.53
HSUPA Subtest3	9262	1852.4	21.64
	9400	1880.0	21.55
	9538	1907.6	21.53
HSUPA Subtest4	9262	1852.4	21.61
	9400	1880.0	21.55
	9538	1907.6	21.54
HSUPA Subtest5	9262	1852.4	21.35
	9400	1880.0	21.44
	9538	1907.6	21.42

UMTS-FDD Band IV

Band/ Time Slot configuration	Channel	Frequency	Average power (dBm)
RMC 12.2kbps	1313	1712.6	21.21
	1413	1732.6	**21.79**
	1512	1752.4	21.25
HSDPA Subtest1	1313	1712.6	21.22
	1413	1732.6	21.78
	1512	1752.4	21.24
HSDPA Subtest2	1313	1712.6	21.22
	1413	1732.6	21.77
	1512	1752.4	21.24
HSDPA Subtest3	1313	1712.6	21.25
	1413	1732.6	21.74
	1512	1752.4	21.26
HSDPA Subtest4	1313	1712.6	21.25
	1413	1732.6	21.79
	1512	1752.4	21.25
HSUPA Subtest1	1313	1712.6	21.21
	1413	1732.6	21.79
	1512	1752.4	21.25
HSUPA Subtest2	1313	1712.6	21.21
	1413	1732.6	21.79
	1512	1752.4	21.25
HSUPA Subtest3	1313	1712.6	21.21
	1413	1732.6	21.79
	1512	1752.4	21.25
HSUPA Subtest4	1313	1712.6	21.21
	1413	1732.6	21.79
	1512	1752.4	21.25
HSUPA Subtest5	1313	1712.6	21.21
	1413	1732.6	21.79
	1512	1752.4	21.25

ERP & EIRP

ERP for Cellular Band (Part 22H)

Frequency (MHz)	Substituted level (dBm)	Antenna Polarization	Antenna Gain correction (dBi)	Cable Loss (dB)	Absolute Level (dBm)	Limit (dBm)
824.2	19.49	V	6.8	0.53	25.76	38.45
824.2	19.26	H	6.8	0.53	25.53	38.45
836.6	19.64	V	6.8	0.53	25.91	38.45
836.6	19.78	H	6.8	0.53	26.05	38.45
848.8	19.17	V	6.9	0.53	25.54	38.45
848.8	19.56	H	6.9	0.53	**25.93**	38.45

EIRP for PCS Band (Part 24E)

Frequency (MHz)	Substituted level (dBm)	Antenna Polarization	Antenna Gain correction (dBi)	Cable Loss (dB)	Absolute Level (dBm)	Limit (dBm)
1850.2	14.36	V	7.88	0.85	21.39	33
1850.2	15.27	H	7.88	0.85	22.3	33
1880	14.54	V	7.88	0.85	21.57	33
1880	15.25	H	7.88	0.85	22.28	33
1909.8	14.33	V	7.86	0.85	21.34	33
1909.8	15.47	H	7.86	0.85	**22.48**	33

ERP for UMTS-FDD Band V (Part 22H)

Frequency (MHz)	Substituted level (dBm)	Antenna Polarization	Antenna Gain correction (dBi)	Cable Loss (dB)	Absolute Level (dBm)	Limit (dBm)
826.4	12.55	V	6.8	0.53	18.82	38.45
826.4	12.69	H	6.8	0.53	18.96	38.45
835	12.69	V	6.8	0.53	18.96	38.45
835	12.85	H	6.8	0.53	19.12	38.45
846.6	12.79	V	6.9	0.53	**19.16**	38.45
846.6	12.73	H	6.9	0.53	19.1	38.45

EIRP for UMTS-FDD Band II (Part 24E)

Frequency (MHz)	Substituted level (dBm)	Antenna Polarization	Antenna Gain correction (dBi)	Cable Loss (dB)	Absolute Level (dBm)	Limit (dBm)
1852.4	10.92	V	7.88	0.85	17.95	33
1852.4	11.45	H	7.88	0.85	18.48	33
1880	11.04	V	7.88	0.85	18.07	33
1880	11.76	H	7.88	0.85	**18.79**	33
1907.6	10.98	V	7.86	0.85	17.99	33
1907.6	11.52	H	7.86	0.85	18.53	33

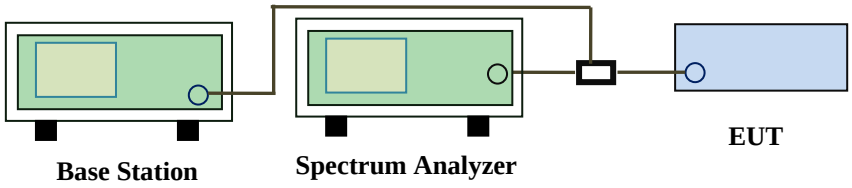
EIRP for UMTS-FDD Band IV (Part 27)

Frequency (MHz)	Substituted level (dBm)	Antenna Polarization	Antenna Gain correction (dBi)	Cable Loss (dB)	Absolute Level (dBm)	Limit (dBm)
1712.4	12.23	V	7.76	0.82	**19.17**	30
1712.4	11.58	H	7.76	0.82	18.52	30
1740	10.74	V	7.76	0.82	17.68	30
1740	11.62	H	7.76	0.82	18.56	30
1752.6	11.23	V	7.74	0.82	18.15	30
1752.6	10.59	H	7.74	0.82	17.51	30

6.3 Peak-Average Ratio

Temperature	19°C
Relative Humidity	60%
Atmospheric Pressure	1011mbar
Test date :	January 19, 2015
Tested By :	Wiky Jam

Requirement(s):

Spec	Item	Requirement	Applicable
§24.232(d) § 27.50(d)	a)	The peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.	☑
Test Setup			
Test Procedure	**According with KDB 971168** 1. The signal analyzer' s CCDF measurement profile is enabled 2. Frequency = carrier center frequency 3. Measurement BW > Emission bandwidth of signal 4. The signal analyzer was set to collect one million samples to generate the CCDF curve 5. The measurement interval was set depending on the type of signal analyzed. For continuous signals (>98% duty cycle), the measurement interval was set to 1ms. For burst transmissions, the spectrum analyzer is set to use an internal " RF Burst" trigger that is synced with an incoming pulse and the measurement interval is set to less than the duration of the " on time" of one burst to ensure that energy is only captured during a time in which the transmitter is operating at maximum power		
Remark			
Result	☑ Pass ☐ Fail		

Test Data ☑ Yes ☐ N/A

Test Plot ☐ Yes (See below) ☑ N/A

PCS1900

Frequency (MHz)	Conducted power(dBm)		Peak-Average Ratio(PAR)
	Peak	Average	
1850.2	30.42	30.42	30.33
1880	30.41	30.41	30.31
1909.8	30.54	30.45	30.39

WCDMA1900

Frequency (MHz)	Conducted power(dBm)		Peak-Average Ratio(PAR)
	Peak	Average	
1852.4	23.58	21.55	2.03
1880	23.68	21.64	2.04
1907.6	23.51	21.45	2.06

WCDMA1700

Frequency (MHz)	Conducted power(dBm)		Peak-Average Ratio(PAR)
	Peak	Average	
1712.6	23.47	21.21	2.26
1732.6	23.69	21.79	1.9
1752.4	23.25	21.25	2

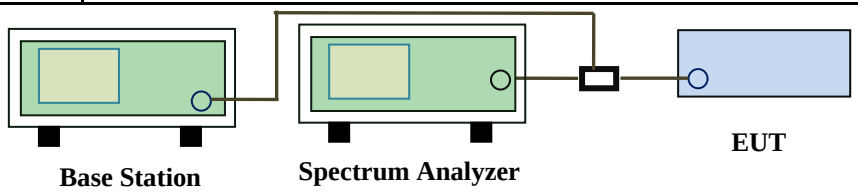
6.4 Modulation Characteristic

According to FCC § 2.1047(d), Part 22H, 24E& Part 27 there is no specific requirement for digital modulation, therefore modulation characteristic is not presented.

6.5 Occupied Bandwidth

Temperature	19°C
Relative Humidity	60%
Atmospheric Pressure	1011mbar
Test date :	January 19, 2015
Tested By :	Wiky Jam

Requirement(s):

Spec	Item	Requirement	Applicable
§2.1049, §22.917, §22.905 §24.238 §27.53(a)	a)	99% Occupied Bandwidth(kHz)	☑
	b)	26 dB Bandwidth(kHz)	☑
Test Setup			
Test Procedure	- The EUT was connected to Spectrum Analyzer and Base Station via power divider. - The 99% and 26 dB occupied bandwidth (BW) of the middle channel for the highest RF powers.		
Remark			
Result	☑ Pass ☐ Fail		

Test Data ☑ Yes ☐ N/A

Test Plot ☑ Yes (See below) ☐ N/A

Cellular Band (Part 22H) result

Channel	Frequency (MHz)	99% Occupied Bandwidth (kHz)	26 dB Bandwidth (kHz)
128	824.2	246.7382	315.410
190	836.6	248.5813	314.396
251	848.8	244.4041	314.605

PCS Band (Part 24E) result

Channel	Frequency (MHz)	99% Occupied Bandwidth (kHz)	26 dB Bandwidth (kHz)
512	1850.2	248.0917	319.328
661	1880.0	244.4054	318.181
810	1909.8	243.8067	318.363

UMTS-FDD Band V (Part 22H)

Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	26 dB Bandwidth (MHz)
4132	826.4	4.1534	4.689
4175	835.0	4.1452	4.678
4233	846.6	4.1453	4.688

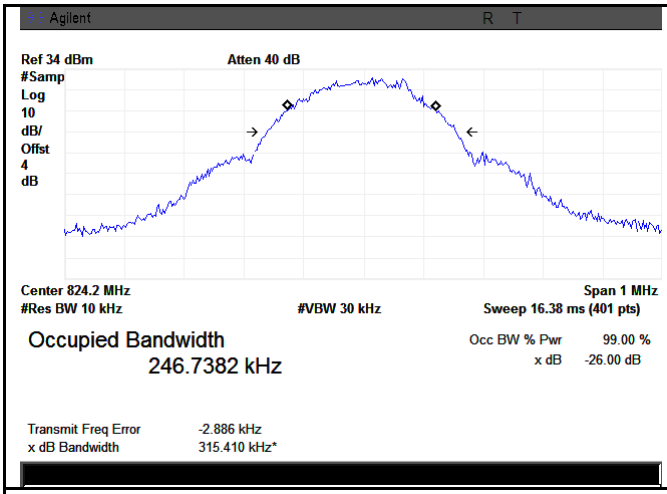
UMTS-FDD Band II (Part 24E)

Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	26 dB Bandwidth (MHz)
9262	1852.4	4.1573	4.706
9400	1880.0	4.1774	4.716
9538	1907.6	4.1397	4.687

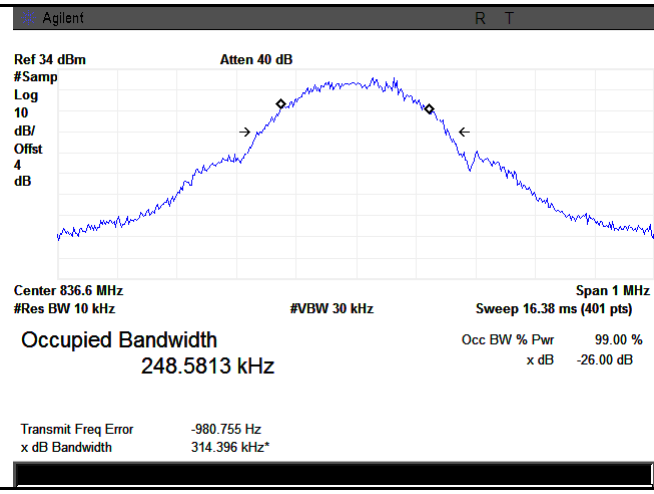
UMTS-FDD Band IV (Part 27)

Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	26 dB Bandwidth (MHz)
1313	1712.4	4.1869	4.744
1413	1732.6	4.1548	4.719
1512	1752.6	4.1762	4.728

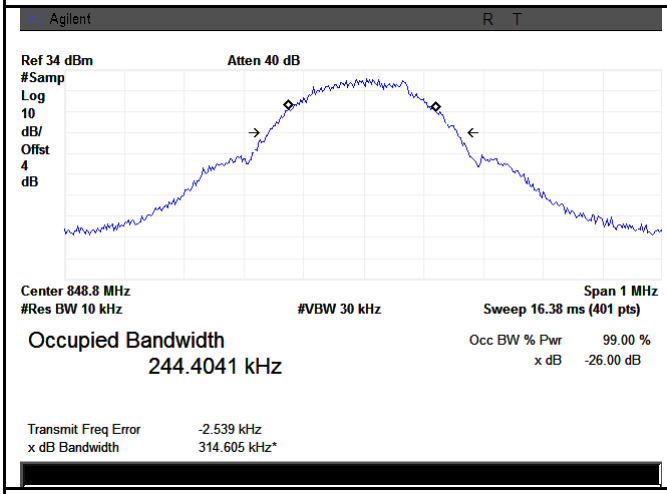
Test Plots



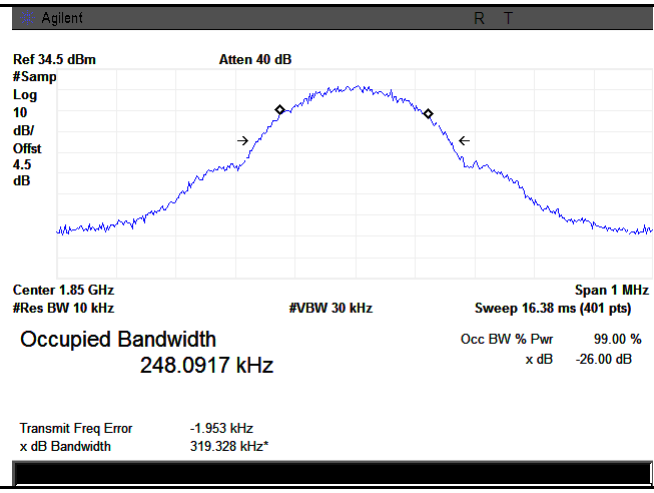
GSM 850 BW - Low CH 824.2MHz



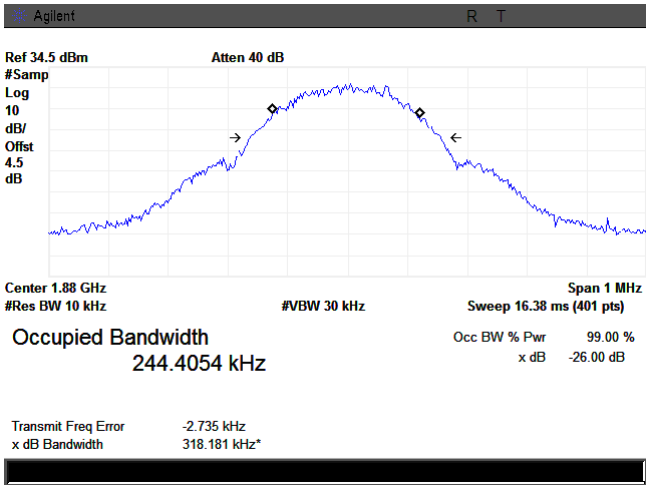
GSM 850 BW - Mid CH 836.6MHz



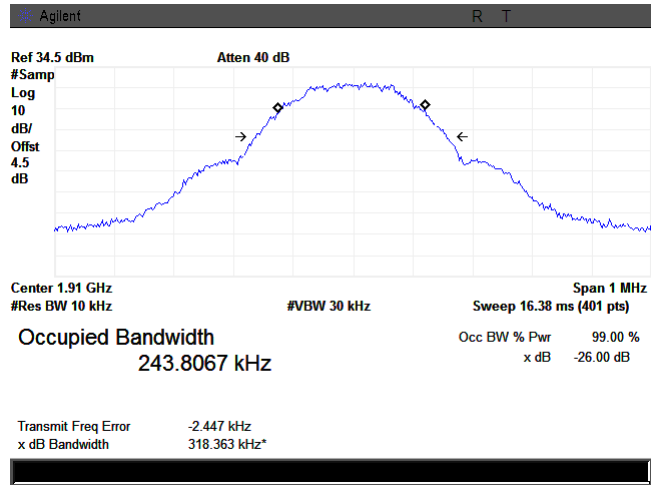
GSM 850 BW - High CH 848.8MHz



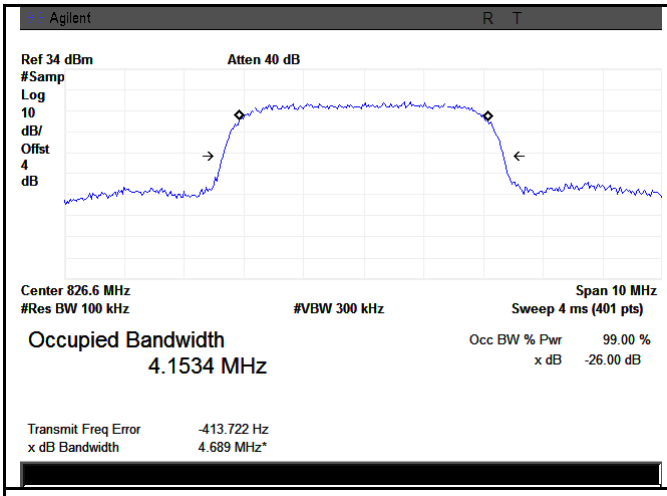
PCS 1900 BW - Low CH 1850.2MHz



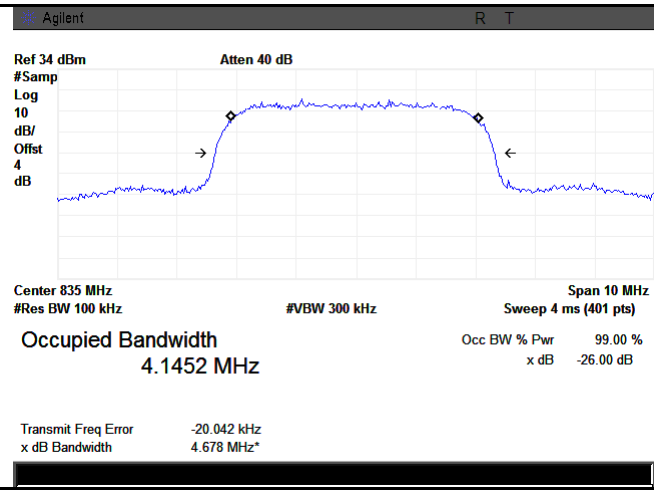
PCS 1900 BW - Mid CH 1880MHz



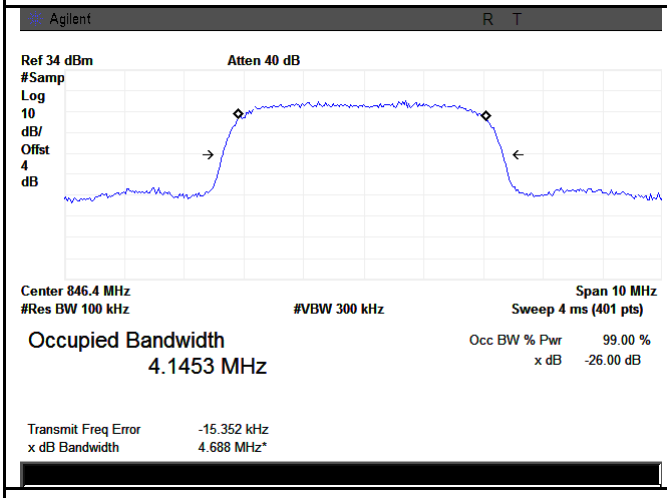
PCS 1900 BW - High CH 1909.8MHz



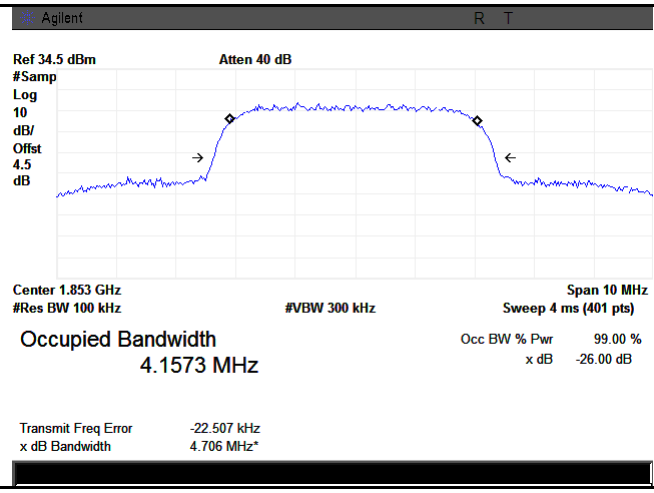
Band V BW - Low CH 826.6 MHz



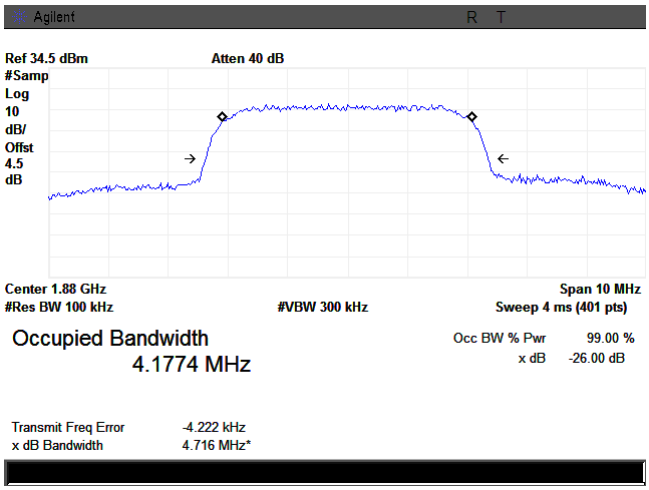
Band V BW - Mid CH 835.0 MHz



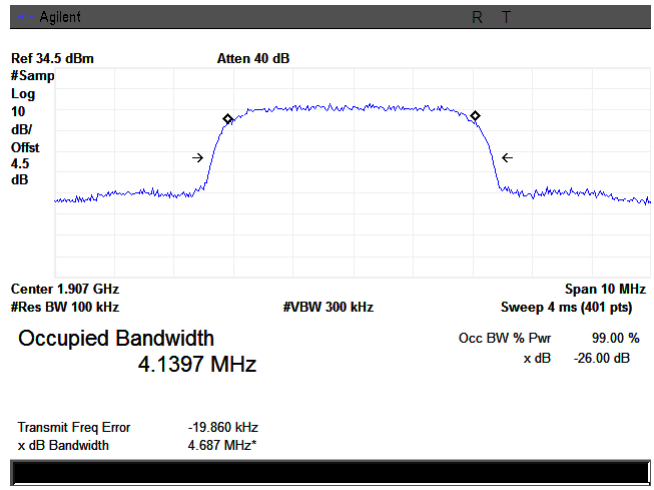
Band V BW - High CH 846.4 MHz



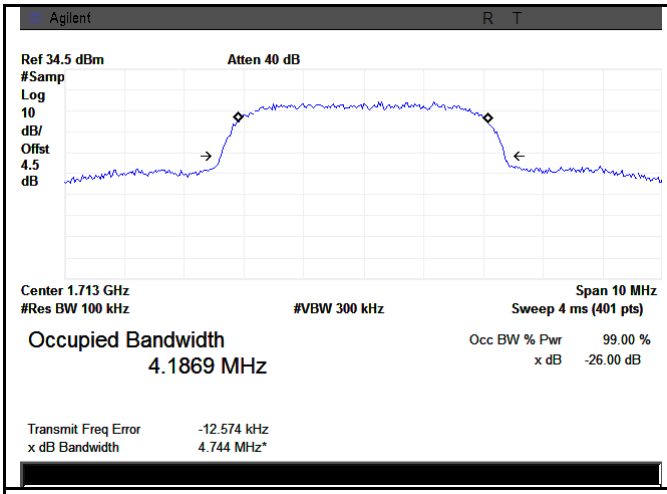
Band II BW - Low CH 1852.4MHz



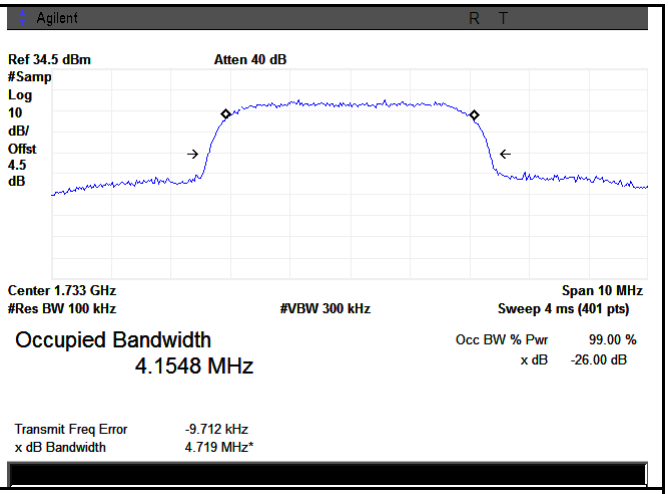
Band II BW - Mid CH 1880MHz



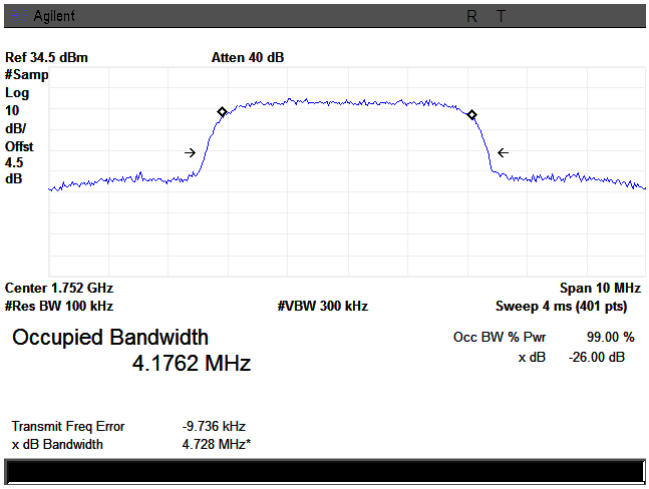
Band II BW - High CH 1907.6MHz



Band IV BW - Low CH 1712.6 MHz



Band IV BW - Mid CH 1740.0 MHz

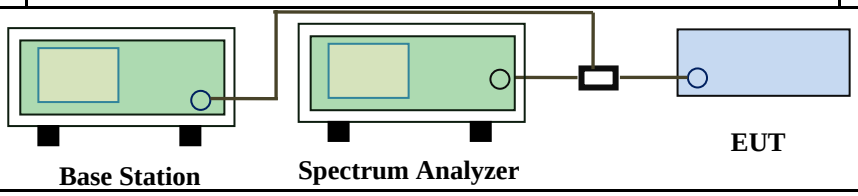


Band IV BW - High CH 1752.4 MHz

6.6 Spurious Emissions at Antenna Terminals

Temperature	22°C
Relative Humidity	56%
Atmospheric Pressure	1012mbar
Test date :	January 24, 2015
Tested By :	Wiky Jam

Requirement(s):

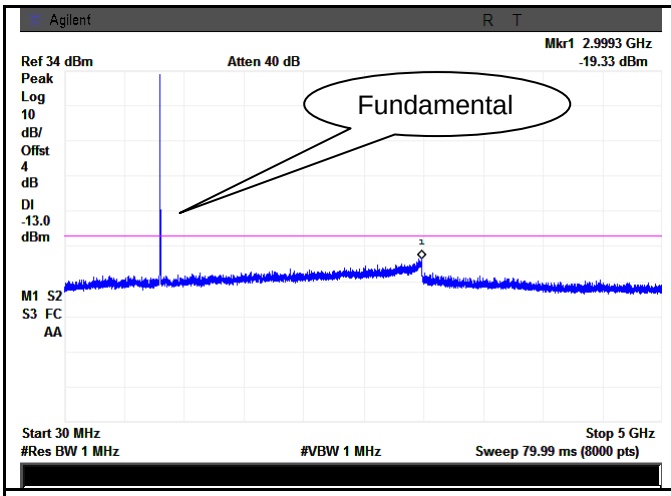
Spec	Item	Requirement	Applicable
§2.1051, §22.917(a)& §24.238(a) § 27.53(h)	a)	The power of any emission outside of the authorized operating frequency ranges must be lower than the transmitter power (P) by a factor of at least 43 + 10 log (P) dB	☑
Test Setup			
Test Procedure	- The EUT was connected to Spectrum Analyzer and Base Station via power divider. - The Band Edges of low and high channels for the highest RF powers were measured. - Setting RBW as roughly BW/100.		
Remark			
Result	☑ Pass ☐ Fail		

Test Data ☑ Yes ☐ N/A

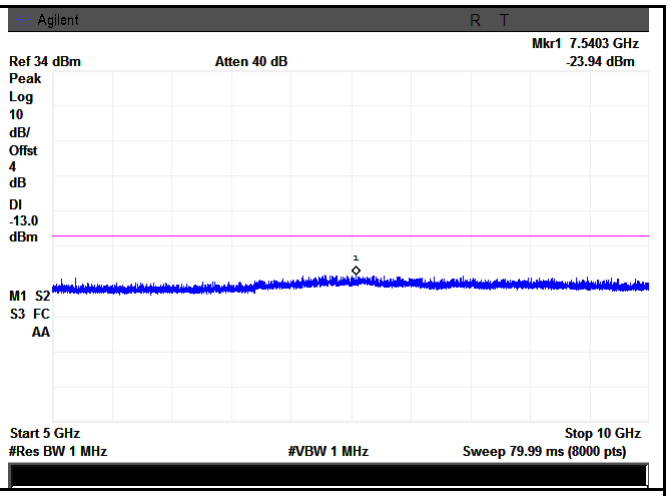
Test Plot ☑ Yes (See below) ☐ N/A

Test Plots

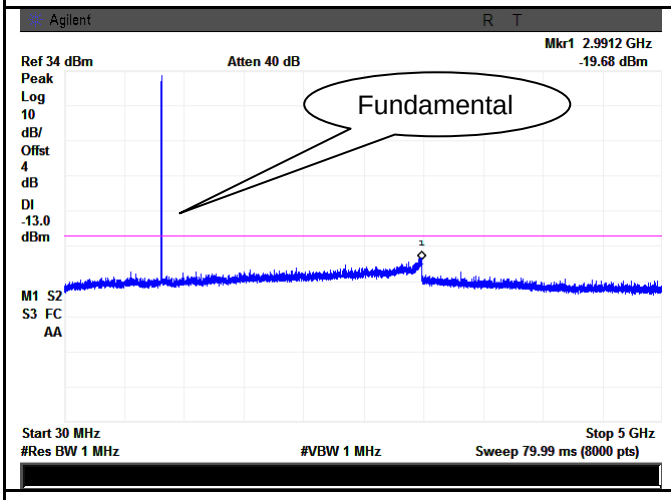
Cellular Band (Part 22H) result



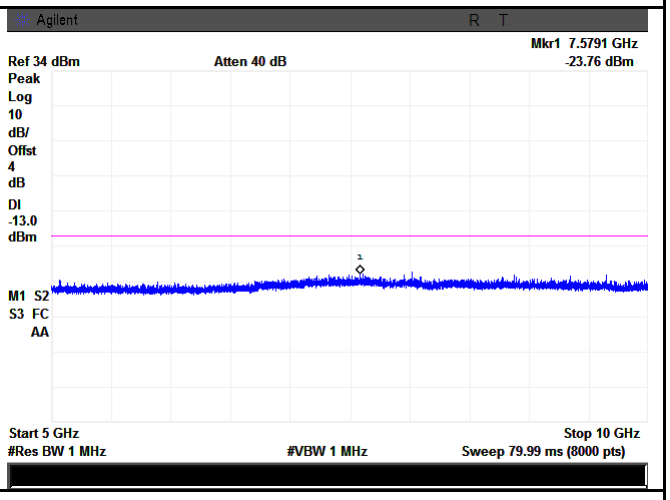
GSM 850 - Low Channel-1



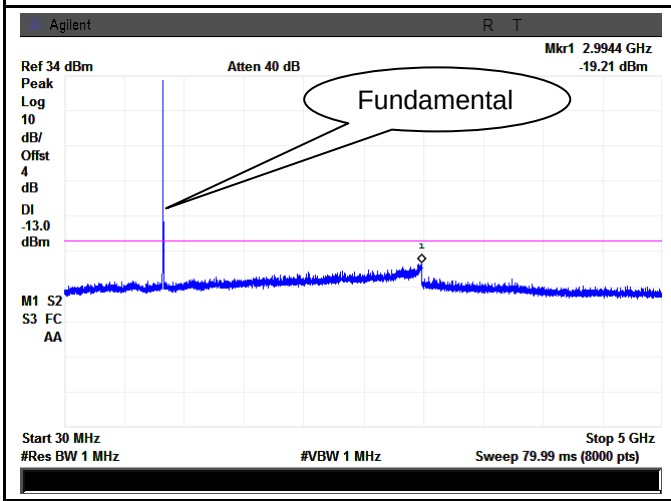
GSM 850 - Low Channel-2



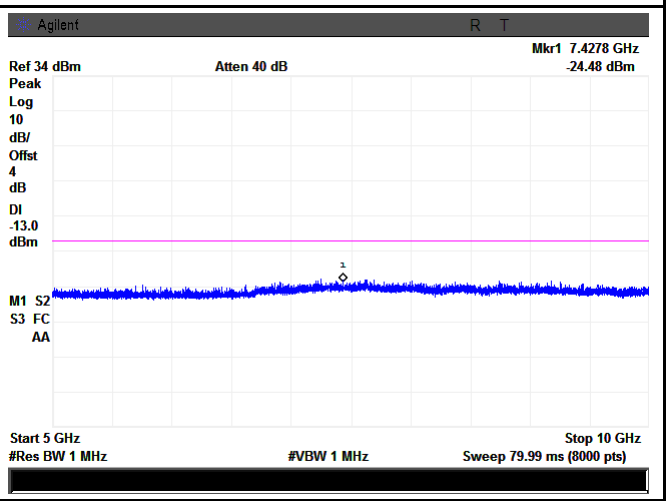
GSM 850 Middle Channel-1



GSM 850 Middle Channel-2

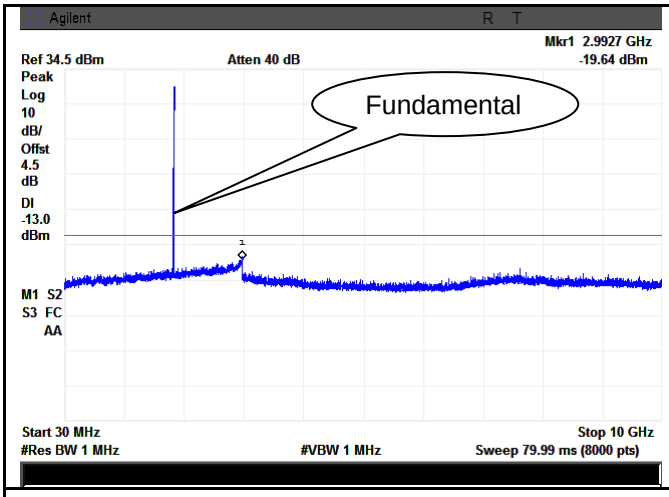


GSM 850 - High Channel-1

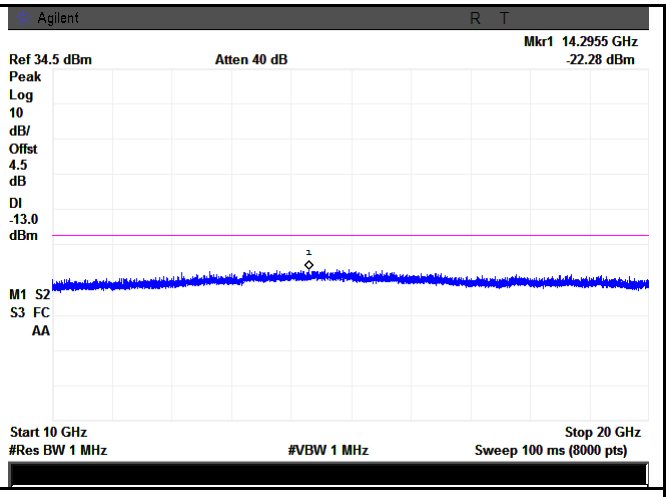


GSM 850 - High Channel-2

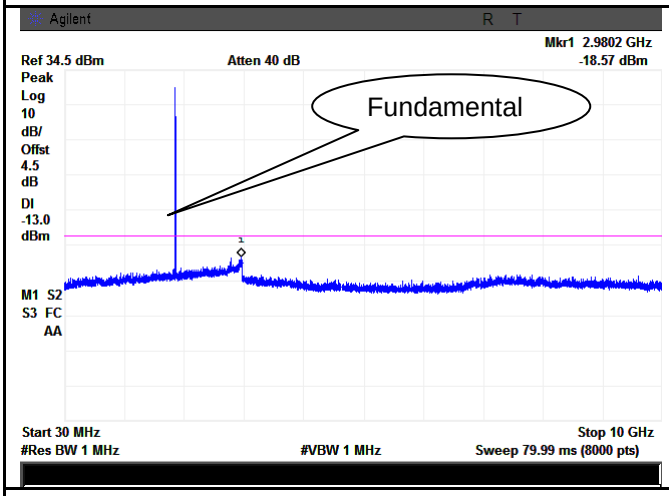
PCS Band (Part24E) result



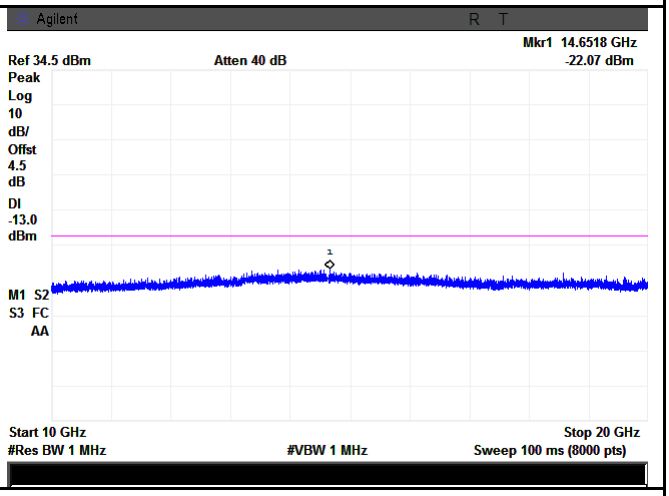
PCS1900 - Low Channel-1



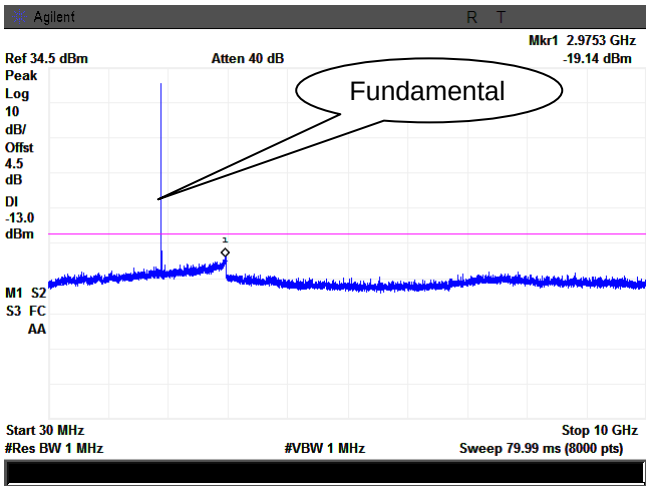
PCS 1900 - Low Channel-2



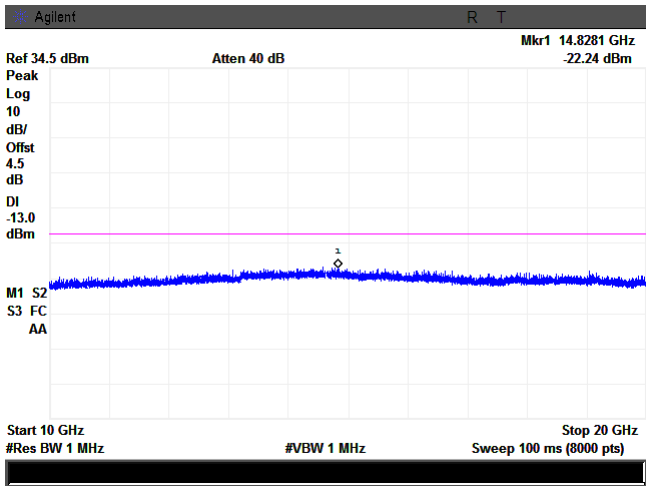
PCS1900 - Middle Channel-1



PCS 1900 - Middle Channel-2

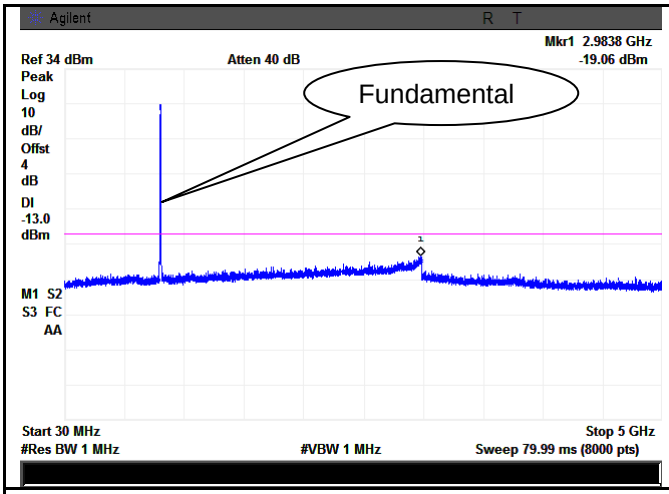


PCS1900 - High Channel-1

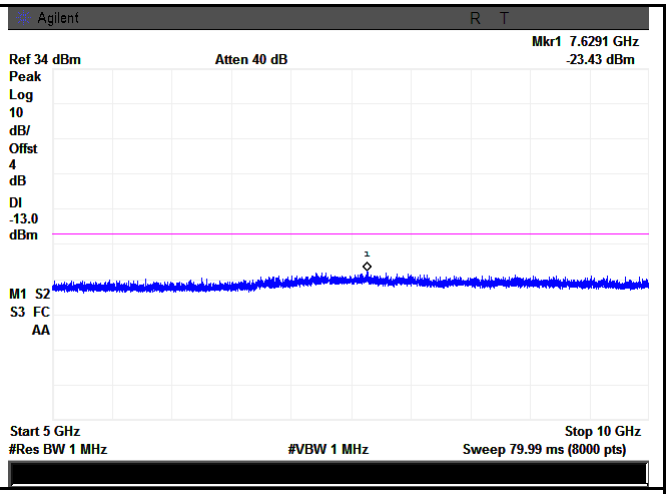


PCS 1900 - High Channel-2

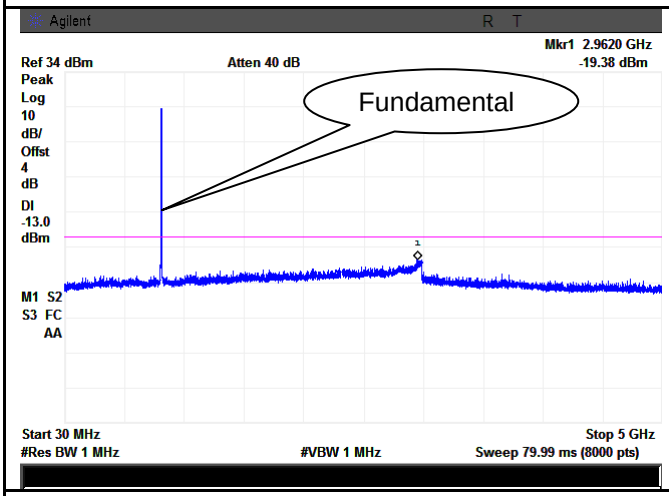
UMTS-FDD Band V (Part 22H)



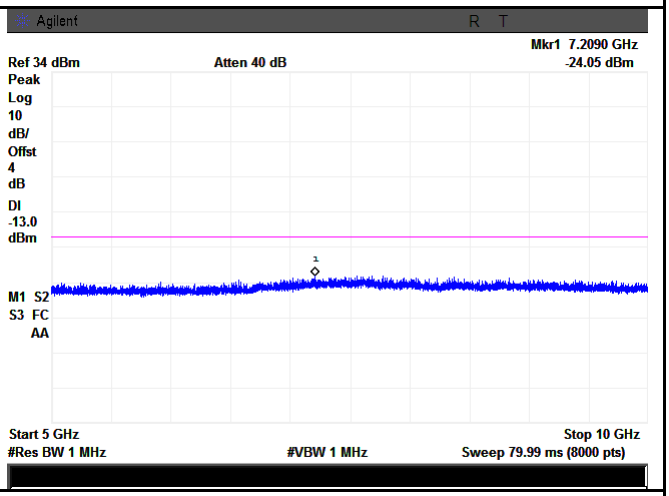
Band V - Low Channel-1



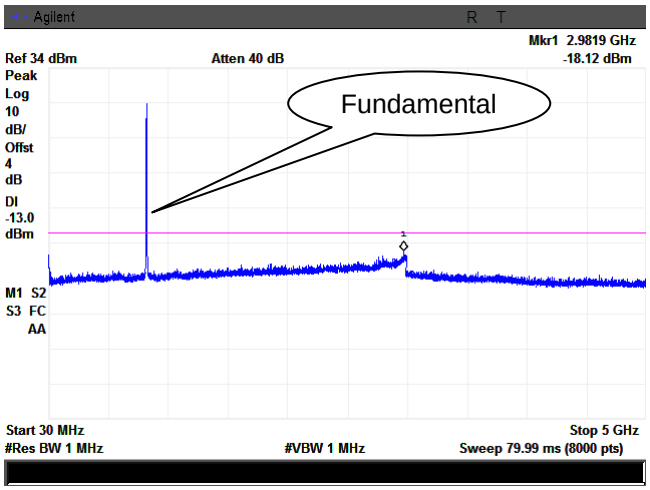
Band V - Low Channel-2



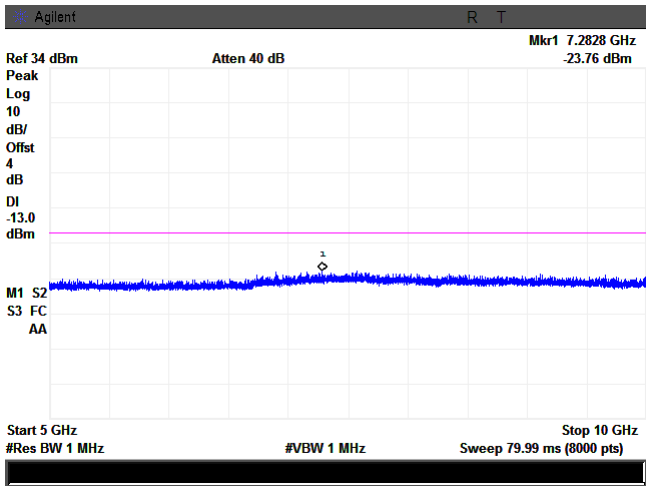
Band V - Middle Channel-1



Band V - Middle Channel-2

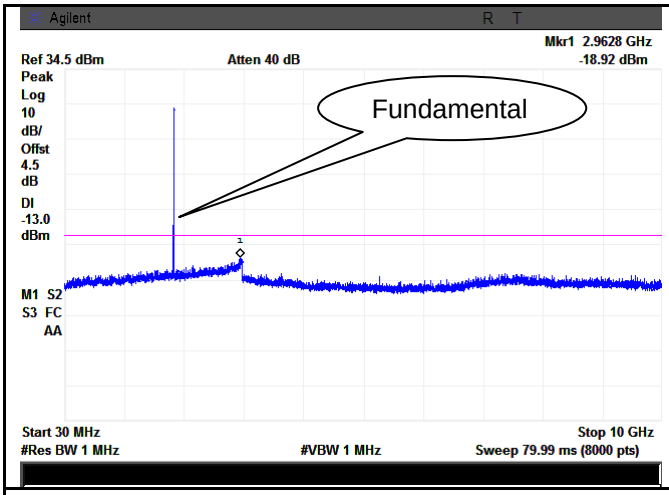


Band V - High Channel-1

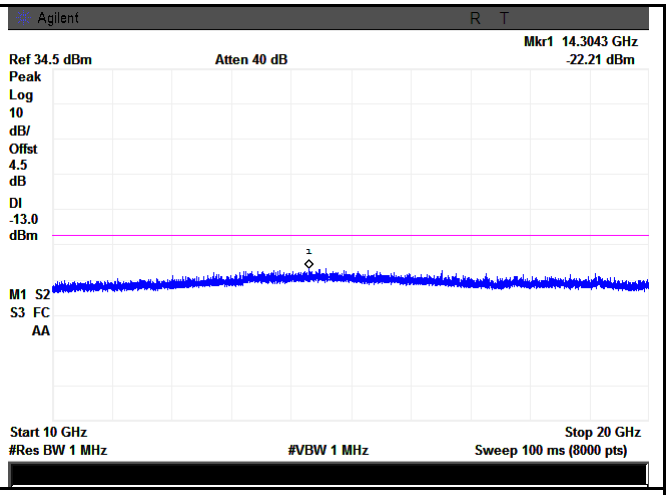


Band V - High Channel-2

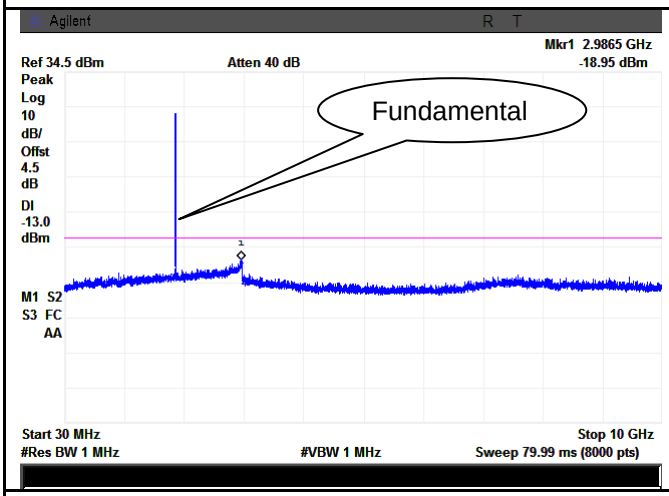
UMTS-FDD Band II (Part 24E)



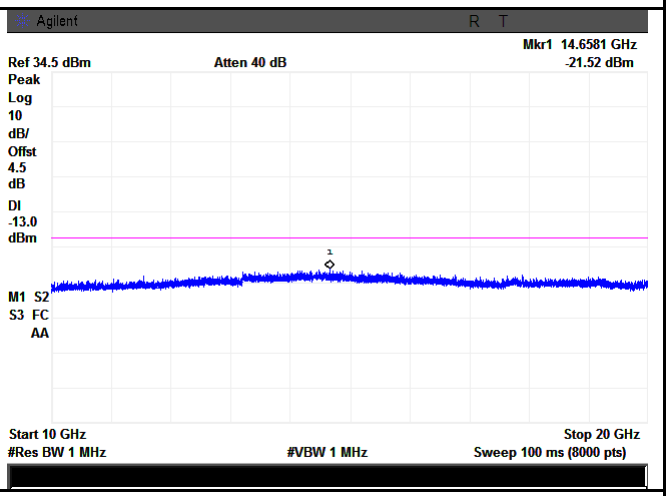
Band II - Low Channel-1



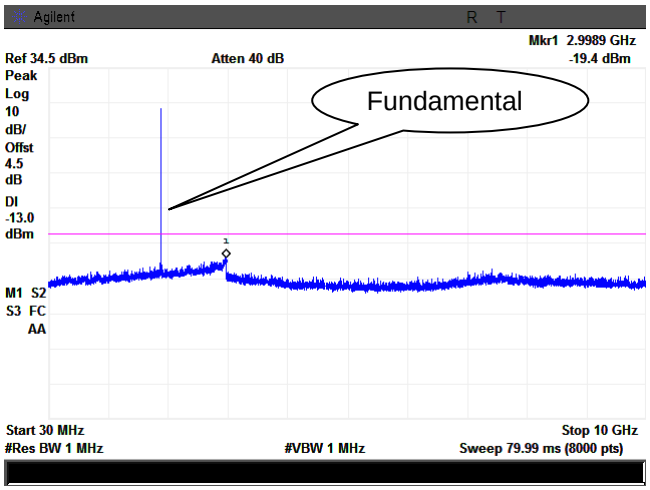
Band II - Low Channel-2



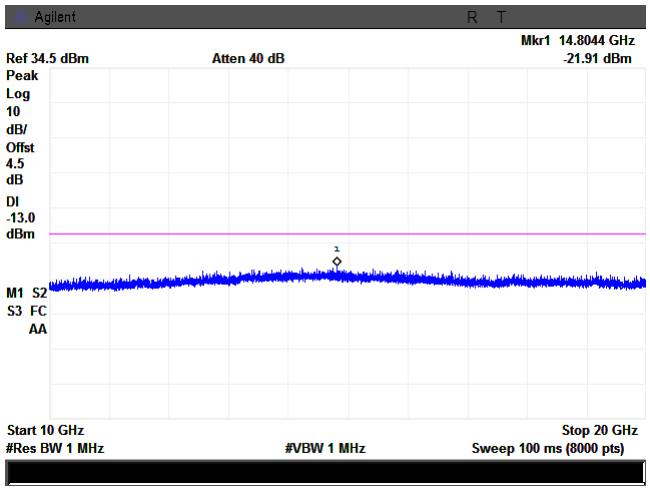
Band II - Middle Channel-1



Band II - Middle Channel-2

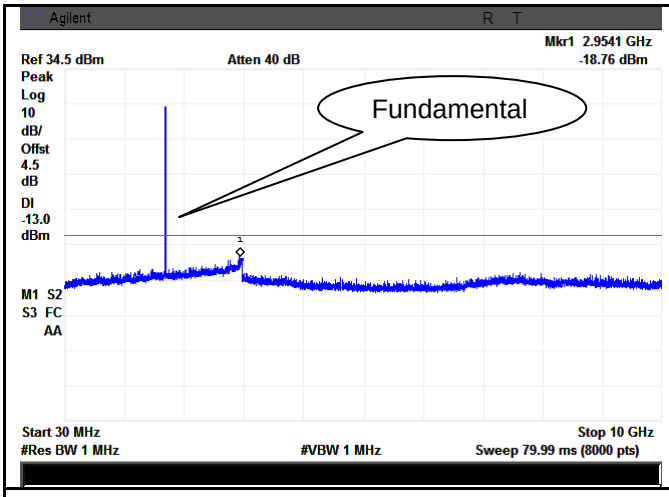


Band II - High Channel-1

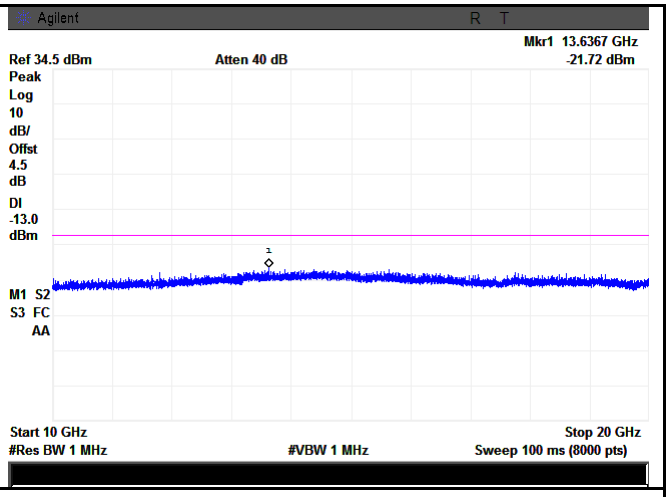


Band II - High Channel-2

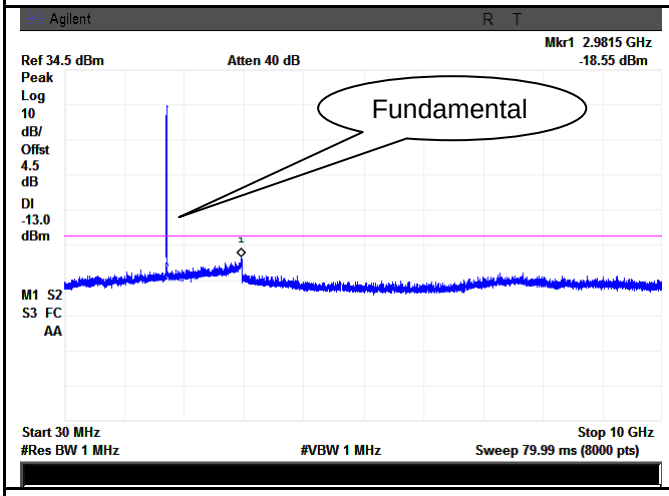
UMTS-FDD Band IV (Part 27)



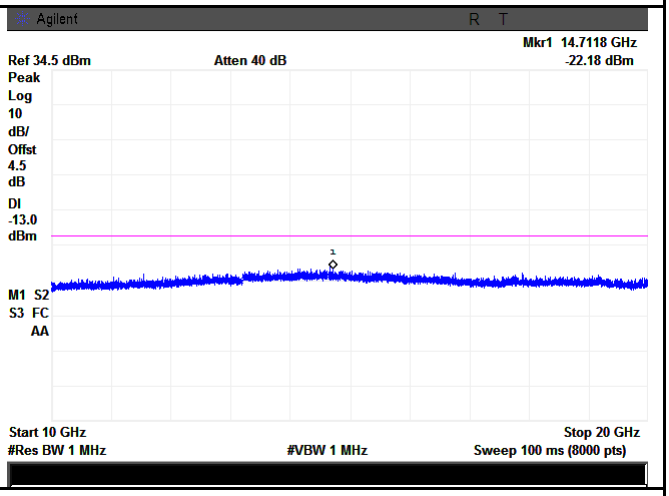
Band IV - Low Channel-1



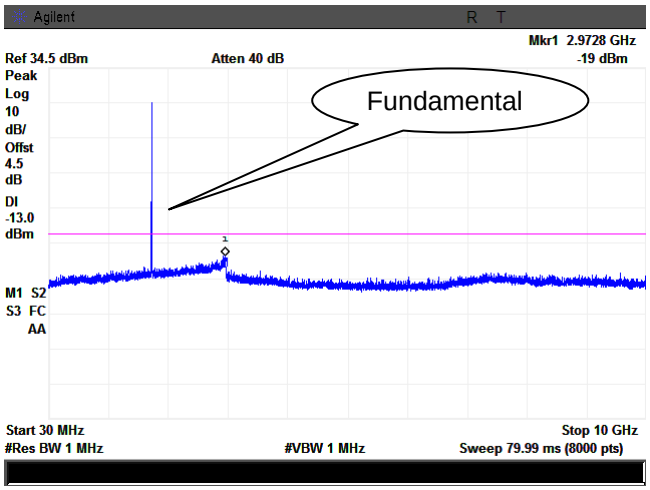
Band IV - Low Channel-2



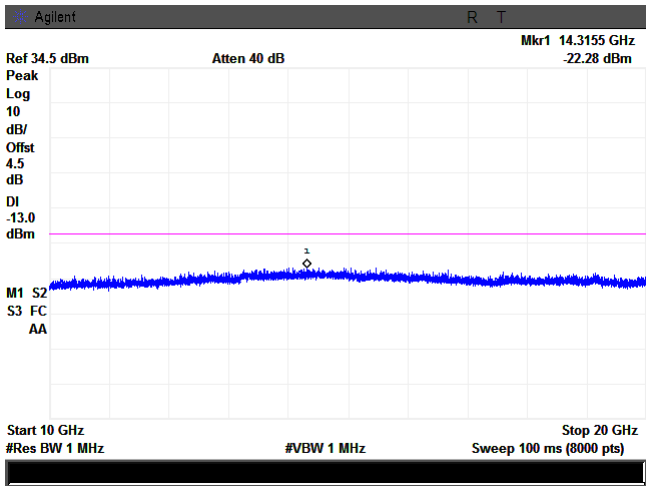
Band IV - Middle Channel-1



Band IV - Middle Channel-2



Band IV - High Channel-1

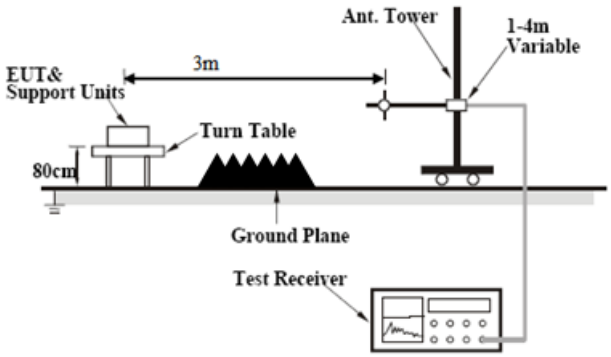


Band IV - High Channel-2

6.7 Spurious Radiated Emissions

Temperature	22°C
Relative Humidity	56%
Atmospheric Pressure	1012mbar
Test date :	January 24, 2015
Tested By :	Wiky Jam

Requirement(s):

Spec	Item	Requirement	Applicable
§2.1053, §22.917 & §24.238 § 27.53(h)	a)	The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitter power (P) by a factor of at least 43 + 10 log (P) dB. The spectrum is scanned from 30 MHz up to a frequency including its 10th harmonic.	☑
Test setup			
Test Procedure	1. The transmitter was placed on a wooden turntable, and it was transmitting into a non-radiating load which was also placed on the turntable. 2. The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-orthogonal axis. 3. Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution. Sample Calculation: EUT Field Strength = Raw Amplitude (dBμV/m) – Amplifier Gain (dB) + Antenna Factor (dB) + Cable Loss (dB) + Filter Attenuation (dB, if used)		
Remark			

Result	☑ Pass	☐ Fail

Test Data ☑ Yes ☐ N/A

Test Plot ☐ Yes (See below) ☑ N/A

Cellular Band (Part 22H) result

Low channel

Frequency (MHz)	Substituted level (dBm)	Polarity (H/V)	Antenna Gain Correction (dB)	Cable Loss (dB)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
1648.4	-41.26	V	7.95	0.78	-34.09	-13	-21.09
1648.4	-41.63	H	7.95	0.78	-34.46	-13	-21.46
268.1	-51.14	V	5.4	0.24	-45.98	-13	-32.98
685.4	-50.74	H	7	0.39	-44.13	-13	-31.13

Middle channel

Frequency (MHz)	Substituted level (dBm)	Polarity (H/V)	Antenna Gain Correction (dB)	Cable Loss (dB)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
1673.2	-41.59	V	7.95	0.78	-34.42	-13	-21.42
1673.2	-41.57	H	7.95	0.78	-34.4	-13	-21.4
269.3	-52.14	V	5.4	0.24	-46.98	-13	-33.98
686.2	-50.28	H	7	0.39	-43.67	-13	-30.67

High channel

Frequency (MHz)	Substituted level (dBm)	Polarity (H/V)	Antenna Gain Correction (dB)	Cable Loss (dB)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
1697.6	-41.74	V	7.95	0.78	-34.57	-13	-21.57
1697.6	-41.16	H	7.95	0.78	-33.99	-13	-20.99
267.8	-53.82	V	5.4	0.24	-48.66	-13	-35.66
684.9	-50.41	H	7	0.39	-43.8	-13	-30.8

PCS Band (Part24E) result

Low channel

Frequency (MHz)	Substituted level (dBm)	Polarity (H/V)	Antenna Gain Correction (dB)	Cable Loss (dB)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
3700.4	-49.24	V	10.25	2.73	-41.72	-13	-28.72
3700.4	-47.42	H	10.25	2.73	-39.9	-13	-26.9
269.6	-54.82	V	5.4	0.24	-49.66	-13	-36.66
687.2	-51.49	H	7	0.39	-44.88	-13	-31.88

Middle channel

Frequency (MHz)	Substituted level (dBm)	Polarity (H/V)	Antenna Gain Correction (dB)	Cable Loss (dB)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
3760	-50.14	V	10.25	2.73	-42.62	-13	-29.62
3760	-47.58	H	10.25	2.73	-40.06	-13	-27.06
270.2	-53.47	V	5.4	0.24	-48.31	-13	-35.31
684.1	-50.57	H	7	0.39	-43.96	-13	-30.96

High channel

Frequency (MHz)	Substituted level (dBm)	Polarity (H/V)	Antenna Gain Correction (dB)	Cable Loss (dB)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
3819.6	-49.87	V	10.36	2.73	-42.24	-13	-29.24
3819.6	-47.88	H	10.36	2.73	-40.25	-13	-27.25
269.7	-54.28	V	5.4	0.24	-49.12	-13	-36.12
687.3	-51.67	H	7	0.39	-45.06	-13	-32.06

UMTS-FDD Band V (Part 22H)

Low channel

Frequency (MHz)	Substituted level (dBm)	Polarity (H/V)	Antenna Gain Correction (dB)	Cable Loss (dB)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
1652.8	-46.75	V	7.95	0.78	-39.58	-13	-26.58
1652.8	-46.17	H	7.95	0.78	-39	-13	-26
268.5	-54.78	V	5.4	0.24	-49.62	-13	-36.62
689.2	-51.48	H	7	0.39	-44.87	-13	-31.87

Middle channel

Frequency (MHz)	Substituted level (dBm)	Polarity (H/V)	Antenna Gain Correction (dB)	Cable Loss (dB)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
1670	-48.72	V	7.95	0.78	-41.55	-13	-28.55
1670	-47.26	H	7.95	0.78	-40.09	-13	-27.09
269.4	-54.57	V	5.4	0.24	-49.41	-13	-36.41
689.6	-51.67	H	7	0.39	-45.06	-13	-32.06

High channel

Frequency (MHz)	Substituted level (dBm)	Polarity (H/V)	Antenna Gain Correction (dB)	Cable Loss (dB)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
1693.2	-48.73	V	7.95	0.78	-41.56	-13	-28.56
1693.2	-47.38	H	7.95	0.78	-40.21	-13	-27.21
267.2	-54.83	V	5.4	0.24	-49.67	-13	-36.67
684.4	-51.72	H	7	0.39	-45.11	-13	-32.11

UMTS-FDD Band II (Part 24E)

Low channel

Frequency (MHz)	Substituted level (dBm)	Polarity (H/V)	Antenna Gain Correction (dB)	Cable Loss (dB)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
3704.8	-48.55	V	10.25	2.73	-41.03	-13	-28.03
3704.8	-50.02	H	10.25	2.73	-42.5	-13	-29.5
269.5	-54.19	V	5.4	0.24	-49.03	-13	-36.03
690.2	-51.62	H	7	0.39	-45.01	-13	-32.01

Middle channel

Frequency (MHz)	Substituted level (dBm)	Polarity (H/V)	Antenna Gain Correction (dB)	Cable Loss (dB)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
3760	-48.66	V	10.25	2.73	-41.14	-13	-28.14
3760	-50.31	H	10.25	2.73	-42.79	-13	-29.79
270.6	-55.06	V	5.4	0.24	-49.9	-13	-36.9
690.3	-51.27	H	7	0.39	-44.66	-13	-31.66

High channel

Frequency (MHz)	Substituted level (dBm)	Polarity (H/V)	Antenna Gain Correction (dB)	Cable Loss (dB)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
3815.2	-48.42	V	10.36	2.73	-40.79	-13	-27.79
3815.2	-49.72	H	10.36	2.73	-42.09	-13	-29.09
270.7	-55.64	V	5.4	0.24	-50.48	-13	-37.48
689.1	-49.21	H	7	0.39	-42.6	-13	-29.6

UMTS-FDD Band IV (Part 27)

Low channel

Frequency (MHz)	Substituted level (dBm)	Polarity (H/V)	Antenna Gain Correction (dB)	Cable Loss (dB)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
3424.8	-45.26	V	10.07	2.52	-37.71	-13	-24.71
3424.8	-44.81	H	10.07	2.52	-37.26	-13	-24.26
291.3	-54.28	V	6	0.25	-48.53	-13	-35.53
652.3	-51.46	H	6.7	0.39	-45.15	-13	-32.15

Middle channel

Frequency (MHz)	Substituted level (dBm)	Polarity (H/V)	Antenna Gain Correction (dB)	Cable Loss (dB)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
3480	-48.59	V	10.09	2.52	-41.02	-13	-28.02
3480	-48.61	H	10.09	2.52	-41.04	-13	-28.04
292.6	-53.69	V	6	0.25	-47.94	-13	-34.94
653.4	-52.49	H	6.7	0.39	-46.18	-13	-33.18

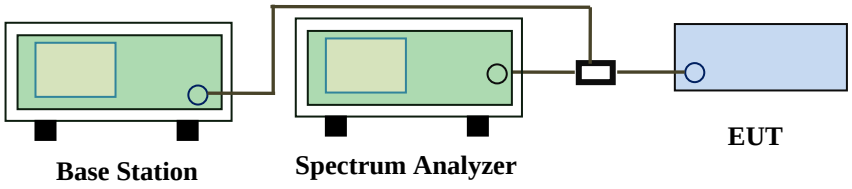
High channel

Frequency (MHz)	Substituted level (dBm)	Polarity (H/V)	Antenna Gain Correction (dB)	Cable Loss (dB)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
3505.2	-45.17	V	10.09	2.52	-37.6	-13	-24.6
3505.2	-46.82	H	10.09	2.52	-39.25	-13	-26.25
295.1	-53.67	V	6	0.25	-47.92	-13	-34.92
654.7	-51.73	H	6.7	0.39	-45.42	-13	-32.42

6.8 Band Edge

Temperature	21°C
Relative Humidity	56%
Atmospheric Pressure	1010mbar
Test date :	January 23, 2015
Tested By :	Wiky Jam

Requirement(s):

Spec	Item	Requirement	Applicable
§22.917(a) §24.238(a) § 27.53(h)	a)	The power of any emission outside of the authorized operating frequency ranges must be lower than the transmitter power (P) by a factor of at least 43 + 10 log (P) dB.	☑
Test setup			
Procedure	- The EUT was connected to Spectrum Analyzer and Base Station via power divider. - The Band Edges of low and high channels for the highest RF powers were measured. Setting RBW as roughly BW/100.		
Remark			
Result	☑ Pass ☐ Fail		

Test Data ☑ Yes ☐ N/A

Test Plot ☑ Yes (See below) ☐ N/A

Cellular Band (Part 22H) result

Frequency (MHz)	Emission (dBm)	Limit (dBm)
823.9775	-13.41	-13
849.0200	-13.55	-13

PCS Band (Part24E) result

Frequency (MHz)	Emission (dBm)	Limit (dBm)
1850.0000	-15.61	-13
1910.0200	-14.71	-13

UMTS-FDD Band V (Part 22H)

Frequency (MHz)	Emission (dBm)	Limit (dBm)
823.9775	-24.20	-13
849.0200	-24.56	-13

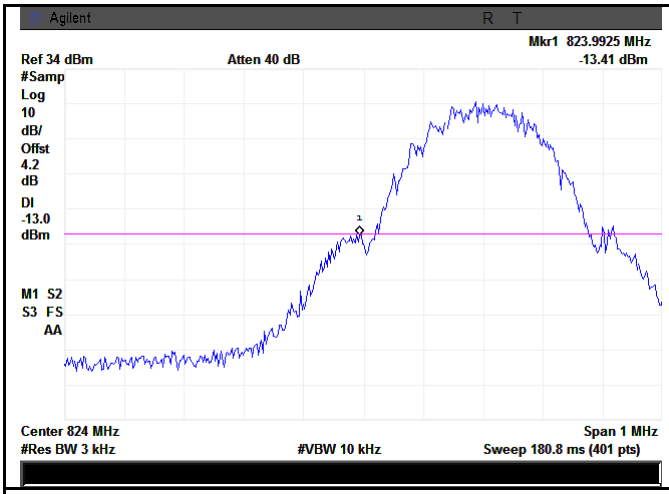
UMTS-FDD Band II (Part 24E)

Frequency (MHz)	Emission (dBm)	Limit (dBm)
1850.0000	-17.80	-13
1910.0200	-25.42	-13

UMTS-FDD Band IV (Part 27)

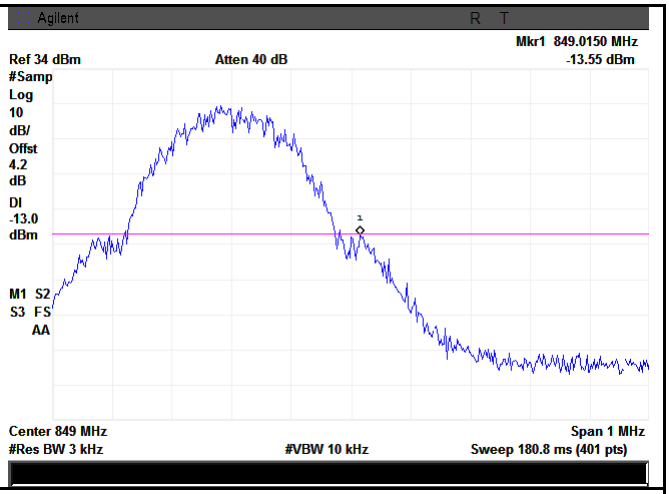
Frequency (MHz)	Emission (dBm)	Limit (dBm)
1710.0000	-23.88	-13
1755.0000	-18.60	-13

Test Plots



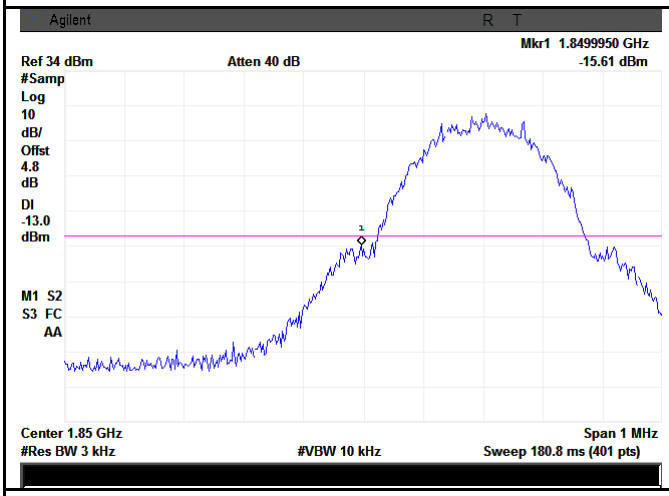
Cellular Band - Low Channel

Note: Offset=Cable loss (4.0) + 10log (3.15/3)=4.0+0.2=4.2 dB



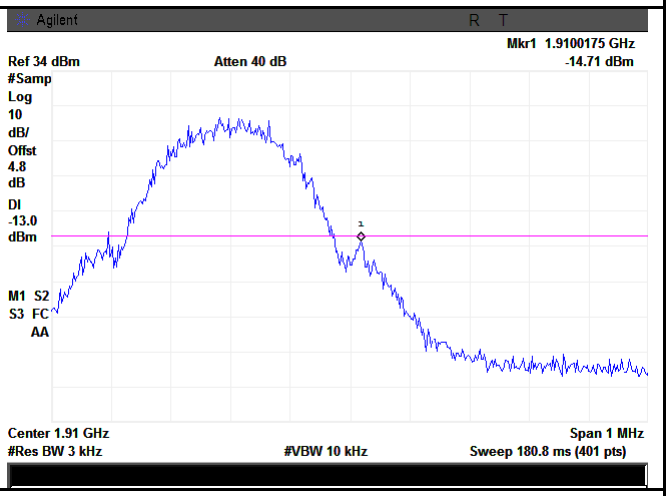
Cellular Band - High Channel

Note: Offset=Cable loss (4.0) + 10log (3.15/3)=4.0+0.2=4.2 dB



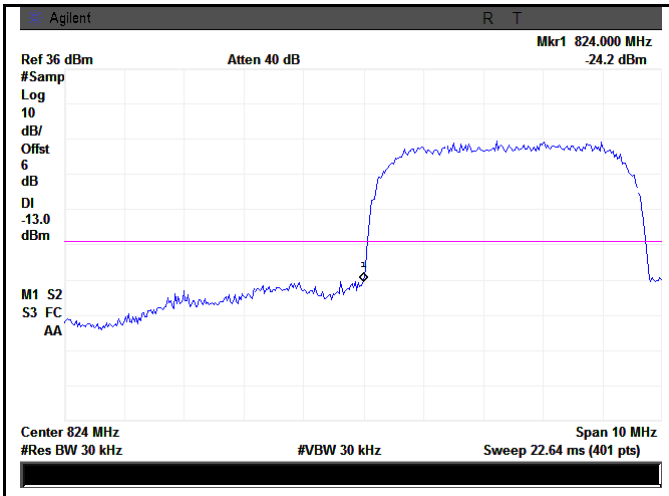
PCS Band - Low Channel

Note: Offset=Cable loss (4.5) + 10log (3.19/3)=4.5+0.3=4.8 dB



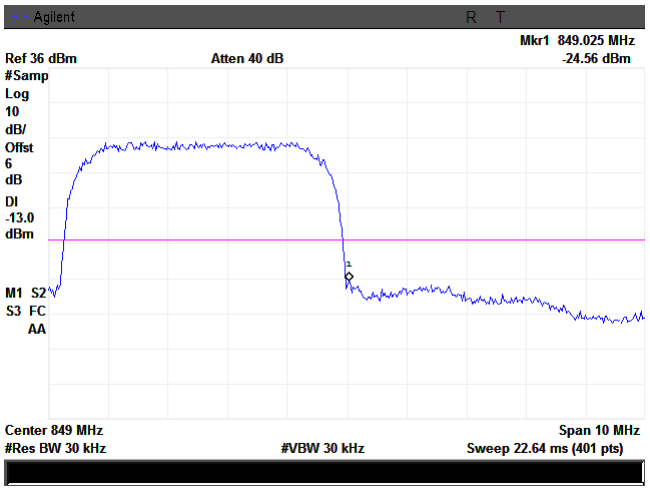
PCS Band - High Channel

Note: Offset=Cable loss (4.5) + 10log (3.18/3)=4.5+0.3=4.8 dB



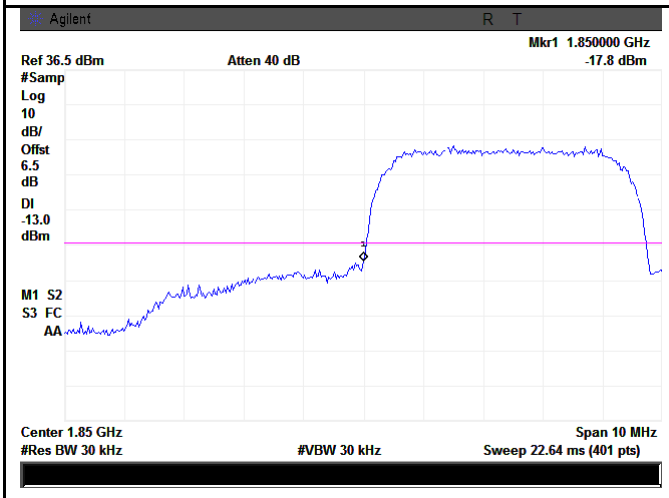
UMTS-FDD Band V - Low Channel

Note: Offset=Cable loss (4.0) + 10log (46.89/30)=4.0+2.0=6.0 dB



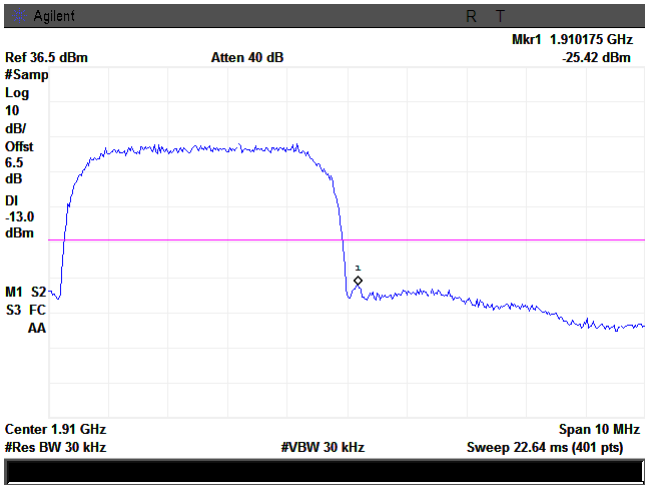
UMTS-FDD Band V - High Channel

Note: Offset=Cable loss (4.0) + 10log (46.88/30)=4.0+2.0=6.0 dB



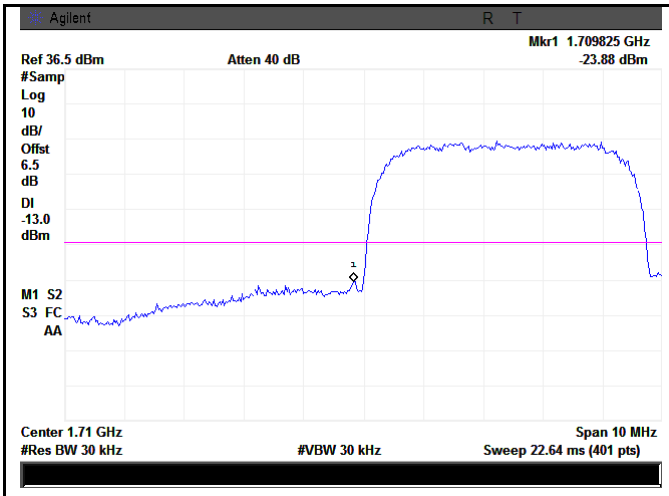
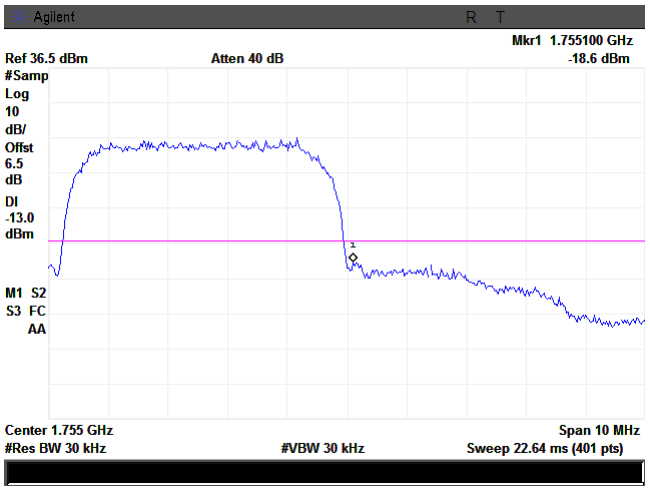
UMTS-FDD Band II - Low Channel

Note: Offset=Cable loss (4.5) + 10log (47.06/30)=4.5+2.0=6.5 dB



UMTS-FDD Band II - High Channel

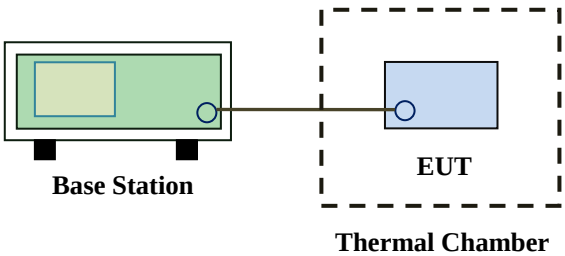
Note: Offset=Cable loss (4.5) + 10log (46.87/30)=4.5+2.0=6.5 dB

	
UMTS-FDD Band IV - Low Channel	UMTS-FDD Band IV - High Channel
Note: Offset=Cable loss (4.5) + 10log (47.44/30)=4.5+2.0=6.5 dB	Note: Offset=Cable loss (4.5) + 10log (47.28/30)=4.5+2.0=6.5 dB

6.9 Frequency Stability

Temperature	21°C
Relative Humidity	56%
Atmospheric Pressure	1010mbar
Test date :	January 23, 2015
Tested By :	Wiky Jam

Requirement(s):

<table>
<tr><th>Spec</th><th>Item</th><th>Requirement</th><th>Applicable</th></tr>
<tr><td>§2.1055, §22.355 & §24.235 § 27.5(h); § 27.54</td><td>a)</td><td>According to §22.355, the carrier frequency of each transmitter in the Public Mobile Services must be maintained within the tolerances given in Table below:
Frequency Tolerance for Transmitters in the Public Mobile Services
<table>
<tr><th>Frequency Range (MHz)</th><th>Base, fixed (ppm)</th><th>Mobile ≤ 3 watts (ppm)</th><th>Mobile ≤ 3 watts (ppm)</th></tr>
<tr><td>25 to 50</td><td>20.0</td><td>20.0</td><td>50.0</td></tr>
<tr><td>50 to 450</td><td>5.0</td><td>5.0</td><td>50.0</td></tr>
<tr><td>450 to 512</td><td>2.5</td><td>5.0</td><td>5.0</td></tr>
<tr><td>821 to 896</td><td>1.5</td><td>2.5</td><td>2.5</td></tr>
<tr><td>928 to 29.</td><td>.0</td><td>N/A</td><td>N/A</td></tr>
<tr><td>929 to 960.</td><td>1.5</td><td>N/A</td><td>N/A</td></tr>
<tr><td>2110 to 2220</td><td>10.0</td><td>N/A</td><td>N/A</td></tr>
</table>
According to §24.235, the frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized frequency block.</td><td>☑</td></tr>
<tr><td>Test setup</td><td colspan="3"> 
</td></tr>
</table>

Procedure	A communication link was established between EUT and base station. The frequency error was monitored and measured by base station under variation of ambient temperature and variation of primary supply voltage. Limit: The frequency stability of the transmitter shall be maintained within ±0.00025% (±2.5ppm) of the center frequency.
Remark	
Result	☑ Pass ☐ Fail

Test Data ☑ Yes ☐ N/A

Test Plot ☐ Yes (See below) ☑ N/A

Cellular Band (Part 22H) result

Middle Channel, f_o = 836.6 MHz				
Temperature (℃)	Power Supplied (V_{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-10	3.7	21	0.0251	2.5
0		20	0.0239	2.5
10		17	0.0203	2.5
20		12	0.0143	2.5
30		15	0.0179	2.5
40		20	0.0239	2.5
50		25	0.0299	2.5
55		32	0.0383	2.5
25	4.2	21	0.0251	2.5
	3.5	23	0.0275	2.5

PCS Band (Part 24E) result

Middle Channel, f_o = 1880 MHz				
Temperature (℃)	Power Supplied (V_{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-10	3.7	29	0.0154	2.5
0		22	0.0117	2.5
10		19	0.0101	2.5
20		12	0.0064	2.5
30		18	0.0096	2.5
40		21	0.0112	2.5
50		23	0.0122	2.5
55		28	0.0149	2.5
25	4.2	22	0.0117	2.5
	3.5	25	0.0133	2.5

UMTS-FDD Band V (Part 22H)

Middle Channel, f_o = 835 MHz				
Temperature (℃)	Power Supplied (V_{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-10	3.7	17	0.0204	2.5
0		15	0.0180	2.5
10		11	0.0132	2.5
20		10	0.0120	2.5
30		13	0.0156	2.5
40		15	0.0180	2.5
50		21	0.0251	2.5
55		23	0.0275	2.5
25	4.2	18	0.0216	2.5
	3.5	15	0.0180	2.5

UMTS-FDD Band II (Part 24E)

Middle Channel, f_o = 1880 MHz				
Temperature (℃)	Power Supplied (V_{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-10	3.7	15	0.0080	2.5
0		12	0.0064	2.5
10		8	0.0043	2.5
20		5	0.0027	2.5
30		7	0.0037	2.5
40		13	0.0069	2.5
50		15	0.0080	2.5
55		20	0.0106	2.5
25	4.2	9	0.0048	2.5
	3.5	11	0.0059	2.5

UMTS-FDD Band IV (Part 27)

Middle Channel, f_o = 1880 MHz				
Temperature (℃)	Power Supplied (V_{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-10	3.7	10	0.0053	2.5
0		8	0.0043	2.5
10		5	0.0027	2.5
20		4	0.0021	2.5
30		6	0.0032	2.5
40		7	0.0037	2.5
50		9	0.0048	2.5
55		15	0.0080	2.5
25	4.2	12	0.0064	2.5
	3.5	15	0.0080	2.5

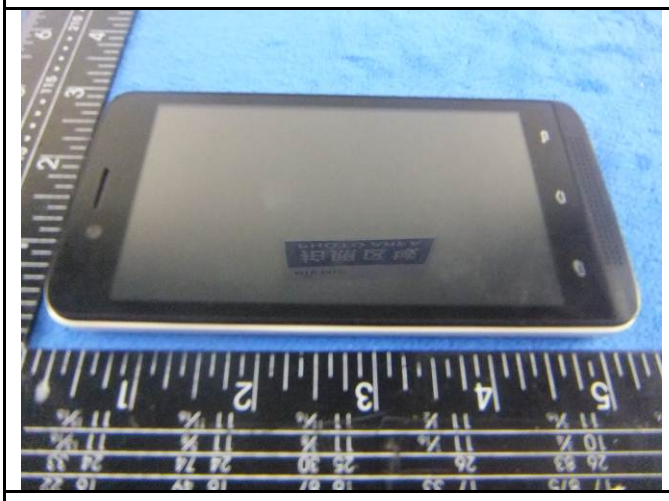
Annex A. TEST INSTRUMENT

Instrument	Model	Serial #	Cal Date	Cal Due	In use
RF Conducted Test					
Agilent ESA-E SERIES SPECTRUM ANALYZER	E4407B	MY45108319	09/17/2014	09/16/2015	☑
Power Splitter	1#	1#	09/02/2014	09/01/2015	☑
Universal Radio Communication Tester	CMU200	121393	09/26/2014	09/25/2015	☑
Temperature/Humidity Chamber	UHL-270	001	10/10/2014	10/09/2015	☑
DC Power Supply	E3640A	MY40004013	09/18/2014	09/17/2015	☑
Radiated Emissions					
EMI test receiver	ESL6	100262	09/18/2014	09/17/2015	☑
OPT 010 AMPLIFIER (0.1-1300MHz)	8447E	2727A02430	09/02/2014	09/01/2015	☑
Microwave Preamplifier (0.5 ~ 18GHz)	PAM-118	443008	09/02/2014	09/01/2015	☑
Bilog Antenna (30MHz~6GHz)	JB6	A110712	09/22/2014	09/21/2015	☑
Bilog Antenna (30MHz~2GHz)	JB1	A112017	09/22/2014	09/21/2015	☑
Double Ridge Horn Antenna (1 ~18GHz)	AH-118	71259	09/25/2014	09/24/2015	☑
Double Ridge Horn Antenna (1 ~18GHz)	AH-118	71283	09/25/2014	09/24/2015	☑
SYNTHESIZED SIGNAL GENERATOR	8665B	3744A01293	09/18/2014	09/17/2015	☑
Tunable Notch Filter	3NF-800/1000-S	AA4	09/02/2014	09/01/2015	☑
Tunable Notch Filter	3NF-1000/2000-S	AM 4	09/02/2014	09/01/2015	☑

Annex B. EUT And Test Setup Photographs

Annex B.i. Photograph: EUT External Photo

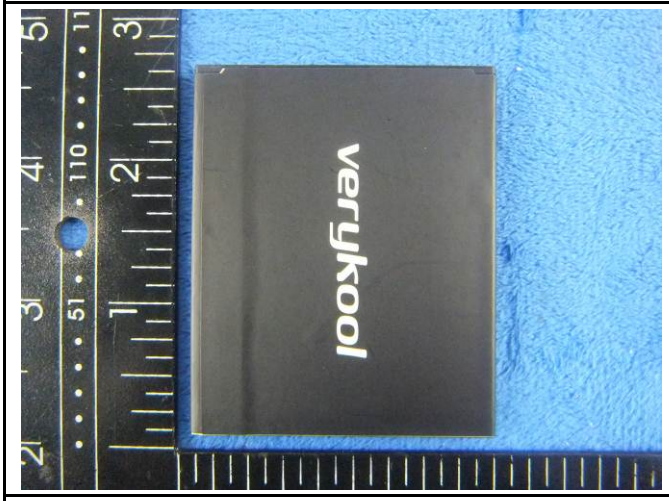
	
Whole Package - Top View	Adapter - Front View
	
EUT - Front View	EUT - Rear View

	
EUT - Top View	EUT - Bottom View
	
EUT - Left View	EUT - Right View

Annex B.ii. Photograph: EUT Internal Photo

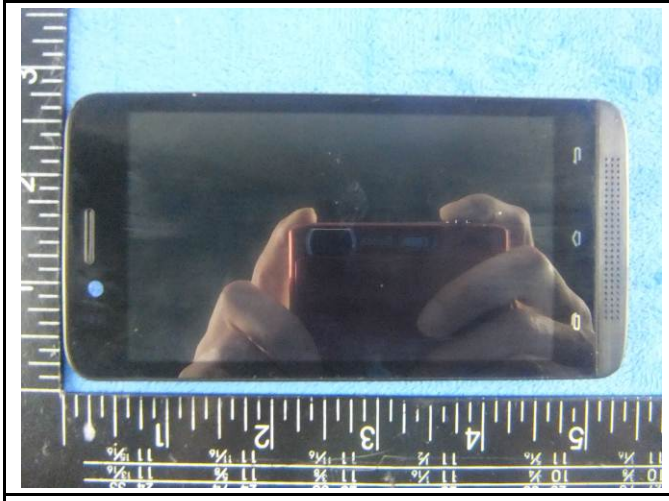
Cover Off - Top View 1

Cover Off - Top View 2

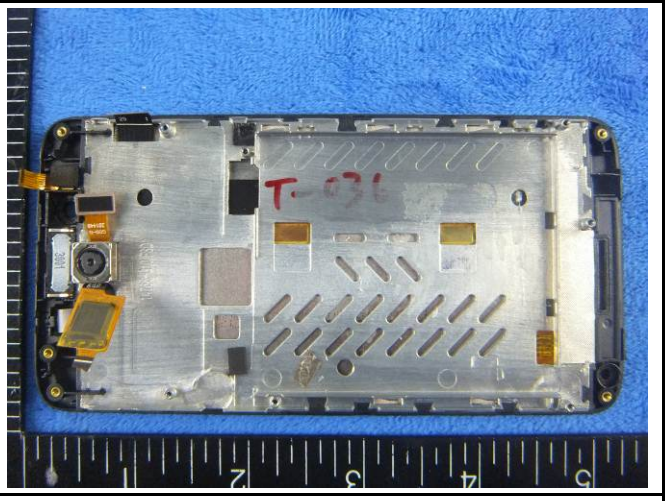


Battery - Top View

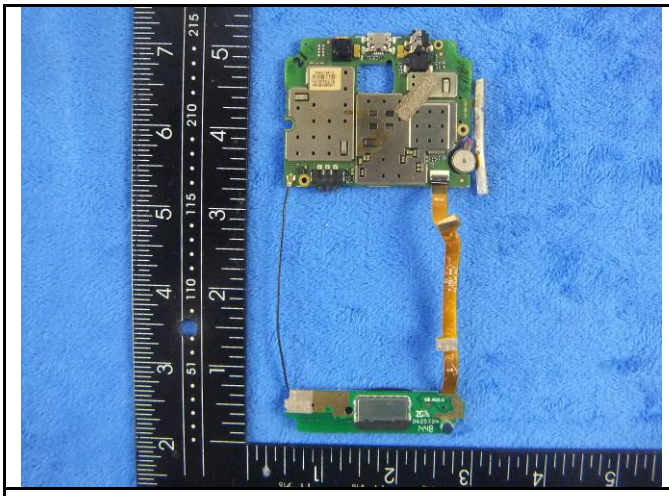
Battery - Bottom View



LCD - Front View

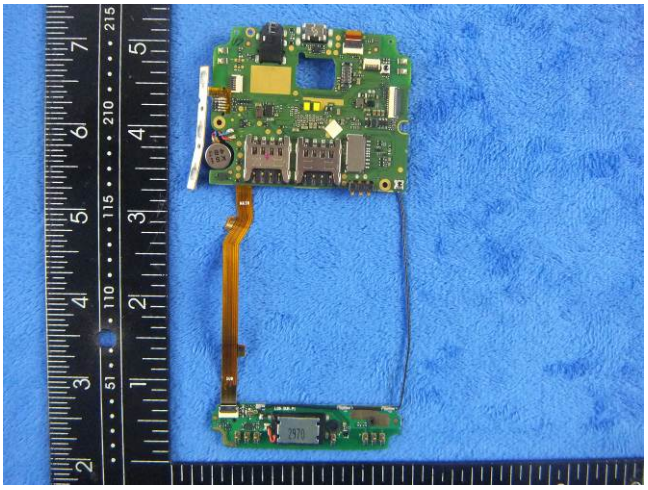


LCD - Rear View



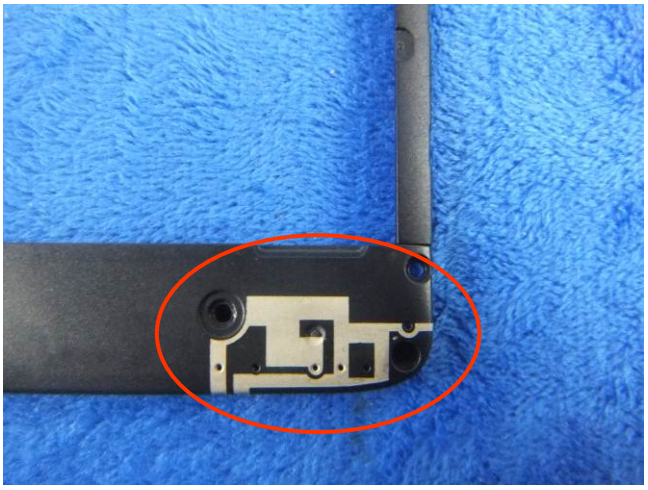
Mainborad With Shielding - Front View

Mainborad Without Shielding - Front View



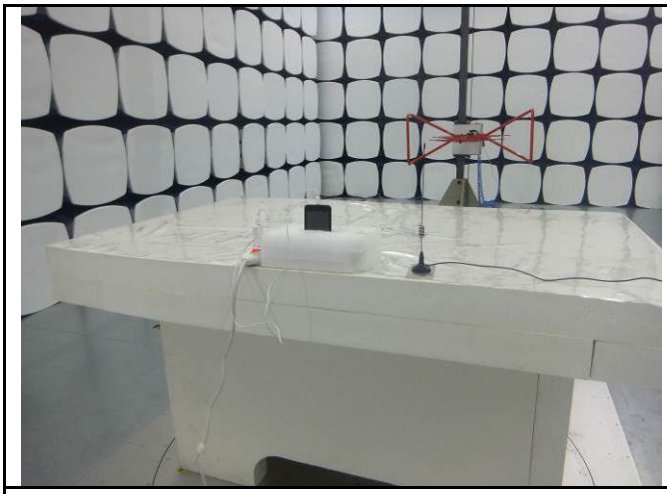
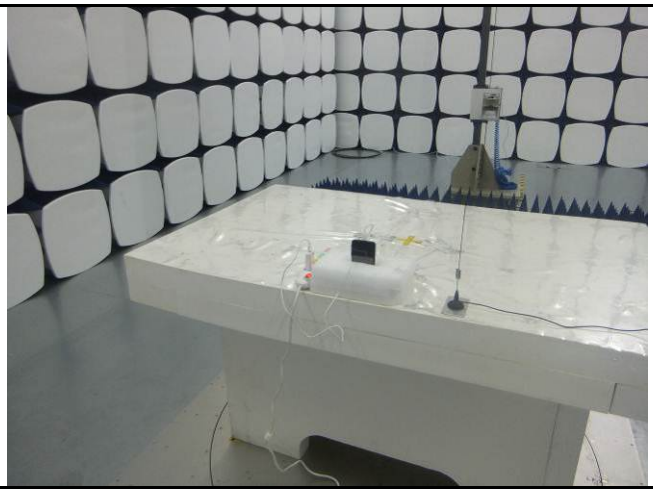
Mainborad - Rear View

BT/BLE/WIFI Antenna View



GSM/PCS/UMTS-FDD/LTE Antenna View

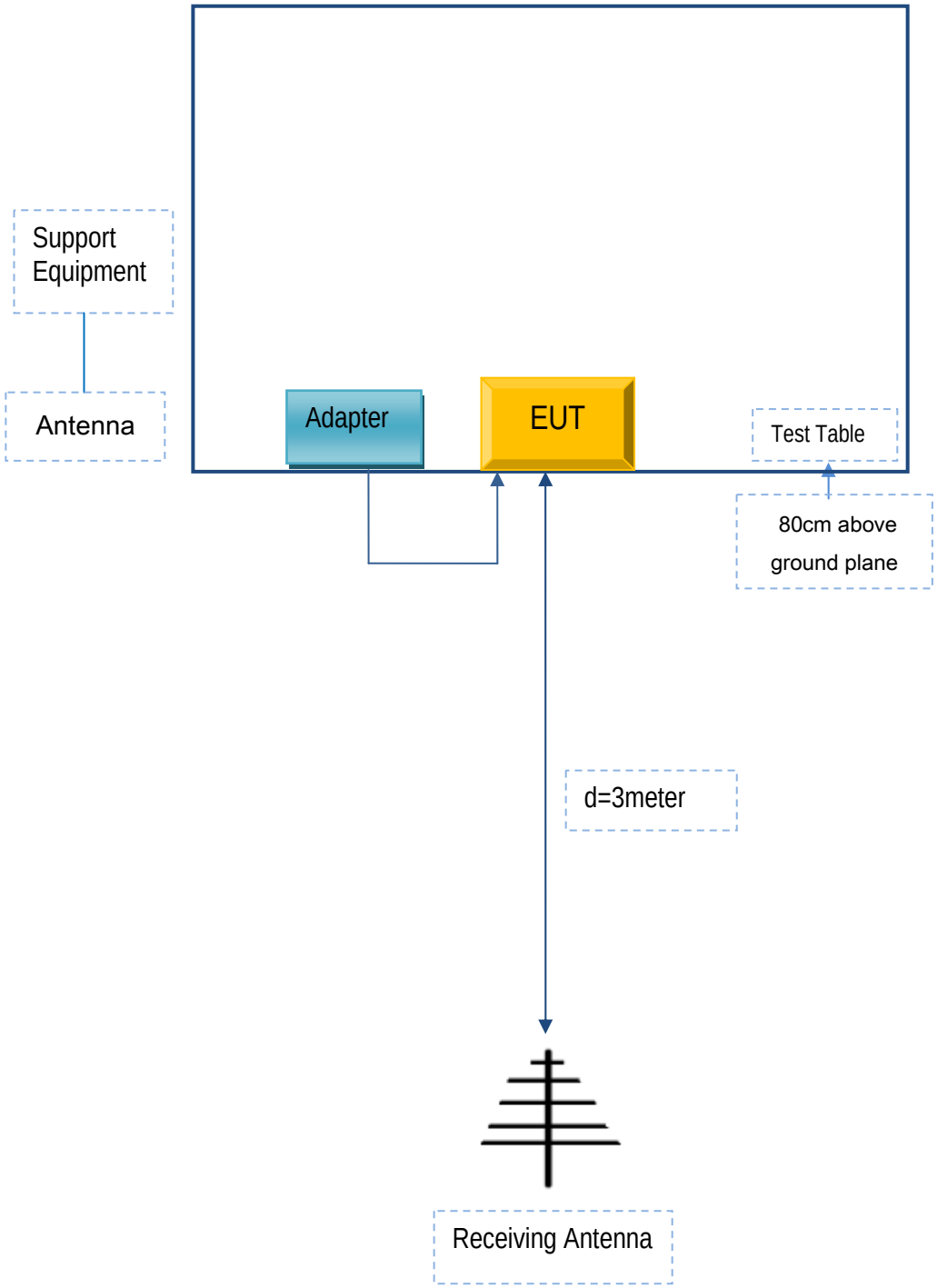
Annex B.iii. Photograph: Test Setup Photo

	
Radiated Spurious Emissions Test Setup Below 1GHz	Radiated Spurious Emissions Test Setup Above 1GHz

Annex C. TEST SETUP AND SUPPORTING EQUIPMENT

Annex C.ii. TEST SET UP BLOCK

Block Configuration Diagram for Radiated Emissions



Annex C. il. SUPPORTING EQUIPMENT DESCRIPTION

The following is a description of supporting equipment and details of cables used with the EUT.

Manufacturer	Equipment Description	Model	Calibration Date	Calibration Due Date
N/A	N/A	N/A	N/A	N/A

Annex C.ii. EUT OPERATING CONKITIONS

The following is the description of how the EUT is exercised during testing.

Test	Description Of Operation
Emissions Testing	The EUT was communicating with base station and set to work at maximum output power.
Others Testing	The EUT was communicating with base station and set to work at maximum output power.

Annex D. User Manual / Block Diagram / Schematics / Partlist

Please see attachment

Annex E. DECLARATION OF SIMILARITY

N/A