RF TEST REPORT

Report No.: 17070850-FCC-R1

Supersede Report No.: N/A

Applicant	Wheredouwannago.com LLC
Product Name	Census Smart Counter
Model No.	CSC1
Serial No.	CSC2
Test Standard	FCC Part 22(H):2016 ;FCC Part 24(E):2016; ANSI/TIA-603-D: 2010
Test Date	September 14 to October 19, 2017
Issue Date	October 20, 2017
Test Result	☑ Pass ☐ Fail
Equipment complied with the specification	☑
Equipment did not comply with the specification	☐

Loren Luo	David Huang	
Loren Luo Test Engineer	David Huang Checked By	

This test report may be reproduced in full only

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

Issued by:

SIEMIC (SHENZHEN-CHINA) LABORATORIES

Zone A, Floor 1, Building 2 Wan Ye Long Technology Park

South Side of Zhoushi Road, Bao' an District, Shenzhen, Guangdong China 518108

Phone: +86 0755 2601 4629801 Email: China@siemic.com.cn

Laboratories Introduction

SIEMIC, headquartered in the heart of Silicon Valley, with superior facilities in US and Asia, is one of the leading independent testing and certification facilities providing customers with one-stop shop services for Compliance Testing and Global Certifications.

In addition to testing and certification, SIEMIC provides initial design reviews and compliance management throughout a project. Our extensive experience with China, Asia Pacific, North America, European, and International compliance requirements, assures the fastest, most cost effective way to attain regulatory compliance for the global markets.

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

This page has been left blank intentionally.

CONTENTS

1. REPORT REVISION HISTORY 5

2. CUSTOMER INFORMATION 5

3. TEST SITE INFORMATION 5

4. EQUIPMENT UNDER TEST (EUT) INFORMATION 6

5. TEST SUMMARY 9

6. MEASUREMENTS, EXAMINATION AND DERIVED RESULTS 10

6.1 RF EXPOSURE (SAR) 10

6.2 RF OUTPUT POWER 11

6.3 PEAK-AVERAGE RATIO 21

6.4 OCCUPIED BANDWIDTH 24

6.5 SPURIOUS EMISSIONS AT ANTENNA TERMINALS 33

6.6 SPURIOUS RADIATED EMISSIONS 44

6.7 BAND EDGE 50

6.8 FREQUENCY STABILITY 59

ANNEX A. TEST INSTRUMENT 63

ANNEX B. EUT AND TEST SETUP PHOTOGRAPHS 65

ANNEX C. TEST SETUP AND SUPPORTING EQUIPMENT 76

ANNEX C.II. EUT OPERATING CONKITIONS 78

ANNEX D. USER MANUAL / BLOCK DIAGRAM / SCHEMATICS / PARTLIST 79

ANNEX E. DECLARATION OF SIMILARITY 80

1. Report Revision History

Report No.	Report Version	Description	Issue Date
17070850-FCC-R1	NONE	Original	October 20, 2017

2. Customer information

Applicant Name	Wheredouwannago.com LLC
Applicant Add	521 Garner Park Dr, Georgetown, TX 78628 USA
Manufacturer	Shenzhen ALMsound Technology Ltd
Manufacturer Add	C802 Yinxing Hi-Tech Building, Guanguang Rd,Guanlan St,Longhua Dist, Shenzhen China

3. Test site information

Test Lab A:

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.	535293
IC Test Site No.	4842E-1
Test Software	Radiated Emission Program-To Shenzhen v2.0

Test Lab B:

Lab performing tests	SIEMIC (Nanjing-China) Laboratories
Lab Address	2-1 Longcang Avenue Yuhua Economic and Technology Development Park, Nanjing, China
FCC Test Site No.	694825
IC Test Site No.	4842B-1
Test Software	EZ_EMC(ver.lcp-03A1)

Note: We just perform Radiated Spurious Emission above 18GHz in the test Lab. B.

4. Equipment under Test (EUT) Information

Description of EUT:	Census Smart Counter
Main Model:	CSC1
Serial Model:	CSC2
Date EUT received:	September 13, 2017
Test Date(s):	September 14 to October 19, 2017
Equipment Category：	PCE
Antenna Gain:	GSM850: 0.5dBi PCS1900: 0.5dBi UMTS-FDD Band V: 0.5dBi UMTS-FDD Band II: 0.5dBi WIFI: 0dBi Bluetooth/BLE: 0dBi
Antenna Type:	PIFA antenna
Type of Modulation:	GSM / GPRS: GMSK UMTS-FDD: QPSK 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 V TX: 826.4 ~ 846.6 MHz; RX: 871.4 ~ 891.6 MHz UMTS-FDD Band II TX:1852.4 ~ 1907.6 MHz; RX: 1932.4 ~ 1987.6 MHz WIFI: 802.11b/g/n(20M): 2412-2462 MHz WIFI: 802.11n(40M): 2422-2452 MHz Bluetooth& BLE: 2402-2480 MHz

Maximum Conducted AV Power to Antenna:	GSM Vioce:GSM850: 33.91dBm PCS1900: 30.05 dBm GPRS:GSM850: 34.56dBm PCS1900: 29.70dBm RMC:UMTS-FDD Band V: 23.31 dBm UMTS-FDD Band II: 23.90 dBm HSUPA:UMTS-FDD Band V: 22.78dBm UMTS-FDD Band II: 23.37dBm HSDPA:UMTS-FDD Band V: 22.70dBm UMTS-FDD Band II: 23.25 dBm
ERP/EIRP:	GSM Vioce:GSM850: 32.38dBm / ERP PCS1900: 30.55dBm / EIRP GPRS:GSM850: 32.91dBm / ERP PCS1900: 30.20 dBm / EIRP RMC:UMTS-FDD Band V: 21.66dBm / ERP UMTS-FDD Band II: 24.40 dBm / EIRP HSDPA:UMTS-FDD Band V: 21.13 dBm / ERP UMTS-FDD Band II: 23.87 dBm / EIRP HSUPA:UMTS-FDD Band V: 21.05 dBm / ERP UMTS-FDD Band II: 23.75 dBm / EIRP
Number of Channels:	GSM 850: 124CH PCS1900: 299CH UMTS-FDD Band V: 102CH UMTS-FDD Band II: 277CH WIFI :802.11b/g/n(20M): 11CH WIFI :802.11n(40M): 7CH Bluetooth: 79CH BLE: 40CH
Port:	USB Port

Input Power:	Adapter: Model: TBA0050500100VU-U Input: AC100-240V~50/60Hz,150mA Output: DC5V~1000mA Battery: Spec: 1800~1850mAh Charger Voltage: 4.35~5V
Trade Name :	N/A
GPRS/ EGPRS Multi-slot class	8/10/11/12
FCC ID:	2ANOB001

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) ;	RF Output Power	Compliance
§ 24.232 (d) ;	Peak-Average Ratio	Compliance
§ 2.1049; § 22.905; § 22.917; § 24.238;	99% & -26 dB Occupied Bandwidth	Compliance
§ 2.1051; § 22.917(a); § 24.238(a);	Spurious Emissions at Antenna Terminal	Compliance
§ 2.1053; § 22.917(a); § 24.238(a);	Field Strength of Spurious Radiation	Compliance
§ 22.917(a); § 24.238(a);	Out of band emission, Band Edge	Compliance
§ 2.1055; § 22.355; § 24.235;	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

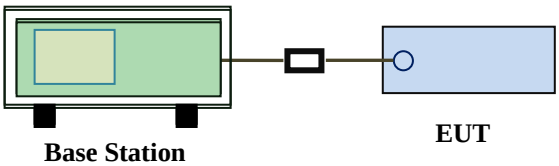
The EUT is a portable device, thus requires SAR evaluation;

Please refer to RF Exposure Evaluation Report: 17070850-FCC-H.

6.2 RF Output Power

Temperature	25℃
Relative Humidity	51%
Atmospheric Pressure	1020mbar
Test date :	October 14, 2017
Tested By :	Loren Luo

Requirement(s):

Spec	Item	Requirement	Applicable
§22.913 (a)	a)	ERP:38.45dBm	☑
§24.232 (c)	b)	EIRP:33dBm	☑
Test Setup			
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: According with KDB 971168 v02r02 - 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				PCS1900			
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	34.03	**33.91**	33.78	34±1	**30.05**	29.68	29.45	30±1
GPRS Multi-Slot Class 8 (1 uplink),GMSK	34.41	**34.56**	34.27	34±1	**29.70**	29.61	29.48	29±1
GPRS Multi-Slot Class 10 (2 uplink),GMSK	34.11	33.99	33.85	34±1	28.54	28.47	28.27	28±1
GPRS Multi-Slot Class 11 (3 uplink) GMSK	30.72	30.54	30.35	31±1	26.75	26.52	26.38	27±1
GPRS Multi-Slot Class 12 (4 uplink) GMSK	29.87	29.74	29.6	30±1	25.52	25.48	25.52	25±1

Remark :

GPRS, CS1 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 11 , Support Max 4 downlink, 2 uplink , 5 working link

Multi-Slot Class 12 , Support Max 4 downlink, 4 uplink , 5 working link

UMTS Mode:

UMTS-FDD Band V

Band/ Time Slot configuration	Channel	Frequency	Average power (dBm)	Tune up Power tolerant
RMC 12.2kbps	4132	826.4	23.31	23±1
	4175	835	23.15	23±1
	4233	846.6	23.23	23±1
HSDPA Subtest1	4132	826.4	22.62	22±1
	4175	835	22.53	22±1
	4233	846.6	22.47	22±1
HSDPA Subtest2	4132	826.4	22.78	22±1
	4175	835	22.64	22±1
	4233	846.6	22.57	22±1
HSDPA Subtest3	4132	826.4	22.63	22±1
	4175	835	22.40	22±1
	4233	846.6	22.47	22±1
HSDPA Subtest4	4132	826.4	22.66	22±1
	4175	835	22.45	22±1
	4233	846.6	22.64	22±1
HSUPA Subtest1	4132	826.4	22.64	22±1
	4175	835	22.47	22±1
	4233	846.6	22.61	22±1
HSUPA Subtest2	4132	826.4	22.52	22±1
	4175	835	22.20	22±1
	4233	846.6	22.48	22±1
HSUPA Subtest3	4132	826.4	22.70	22±1
	4175	835	22.37	22±1
	4233	846.6	22.51	22±1
HSUPA Subtest4	4132	826.4	22.51	22±1
	4175	835	22.21	22±1
	4233	846.6	22.50	22±1
HSUPA Subtest5	4132	826.4	22.52	22±1
	4175	835	22.51	22±1
	4233	846.6	22.66	22±1

UMTS-FDD Band II

Band/ Time Slot configuration	Channel	Frequency	Average power (dBm)	Tune up Power tolerant
RMC 12.2kbps	9262	1852.4	23.90	23±1
	9400	1880	23.73	23±1
	9538	1907.6	23.71	23±1
HSDPA Subtest1	9262	1852.4	23.17	23±1
	9400	1880	23.10	23±1
	9538	1907.6	23.00	23±1
HSDPA Subtest2	9262	1852.4	23.37	23±1
	9400	1880	23.12	23±1
	9538	1907.6	23.20	23±1
HSDPA Subtest3	9262	1852.4	23.25	23±1
	9400	1880	23.07	23±1
	9538	1907.6	23.09	23±1
HSDPA Subtest4	9262	1852.4	23.16	23±1
	9400	1880	23.07	23±1
	9538	1907.6	23.11	23±1
HSUPA Subtest1	9262	1852.4	23.23	23±1
	9400	1880	22.94	23±1
	9538	1907.6	23.03	23±1
HSUPA Subtest2	9262	1852.4	23.25	23±1
	9400	1880	22.89	23±1
	9538	1907.6	22.96	23±1
HSUPA Subtest3	9262	1852.4	23.20	23±1
	9400	1880	23.07	23±1
	9538	1907.6	23.01	23±1
HSUPA Subtest4	9262	1852.4	23.00	23±1
	9400	1880	22.97	23±1
	9538	1907.6	22.75	23±1
HSUPA Subtest5	9262	1852.4	23.12	23±1
	9400	1880	22.96	23±1
	9538	1907.6	23.07	23±1

ERP & EIRP

GSM Voice

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	26.81	V	6.1	0.53	32.38	38.45
824.2	25.85	H	6.1	0.53	31.42	38.45
836.6	26.57	V	6.2	0.53	32.24	38.45
836.6	25.69	H	6.2	0.53	31.36	38.45
848.8	26.39	V	6.2	0.53	32.06	38.45
848.8	25.47	H	6.2	0.53	31.14	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	23.39	V	7.88	0.72	30.55	33
1850.2	22.41	H	7.88	0.72	29.57	33
1880	23.02	V	7.88	0.72	30.18	33
1880	22.08	H	7.88	0.72	29.24	33
1909.8	22.81	V	7.86	0.72	29.95	33
1909.8	21.89	H	7.86	0.72	29.03	33

GPRS:

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	27.34	V	6.1	0.53	32.91	38.45
824.2	26.42	H	6.1	0.53	31.99	38.45
836.6	27.15	V	6.2	0.53	32.82	38.45
836.6	26.2	H	6.2	0.53	31.87	38.45
848.8	26.97	V	6.2	0.53	32.64	38.45
848.8	26.05	H	6.2	0.53	31.72	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	23.04	V	7.88	0.72	30.20	33
1850.2	22.07	H	7.88	0.72	29.23	33
1880	22.95	V	7.88	0.72	30.11	33
1880	22.04	H	7.88	0.72	29.20	33
1909.8	22.84	V	7.86	0.72	29.98	33
1909.8	21.87	H	7.86	0.72	29.01	33

RMC

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	16.09	V	6.1	0.53	21.66	38.45
826.4	14.15	H	6.1	0.53	19.72	38.45
835	15.83	V	6.2	0.53	21.50	38.45
835	13.86	H	6.2	0.53	19.53	38.45
846.6	15.9	V	6.2	0.53	21.57	38.45
846.6	13.97	H	6.2	0.53	19.64	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	17.24	V	7.88	0.72	24.40	33
1852.4	15.27	H	7.88	0.72	22.43	33
1880	17.07	V	7.88	0.72	24.23	33
1880	15.15	H	7.88	0.72	22.31	33
1907.6	17.07	V	7.86	0.72	24.21	33
1907.6	15.21	H	7.86	0.72	22.35	33

HSDPA

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	15.56	V	6.1	0.53	21.13	38.45
826.4	13.6	H	6.1	0.53	19.17	38.45
835	15.32	V	6.2	0.53	20.99	38.45
835	13.45	H	6.2	0.53	19.12	38.45
846.6	15.31	V	6.2	0.53	20.98	38.45
846.6	13.38	H	6.2	0.53	19.05	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	16.71	V	7.88	0.72	23.87	33
1852.4	14.78	H	7.88	0.72	21.94	33
1880	16.46	V	7.88	0.72	23.62	33
1880	14.57	H	7.88	0.72	21.73	33
1907.6	16.56	V	7.86	0.72	23.70	33
1907.6	14.62	H	7.86	0.72	21.76	33

HSUPA

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	15.48	V	6.1	0.53	21.05	38.45
826.4	13.59	H	6.1	0.53	19.16	38.45
835	15.19	V	6.2	0.53	20.86	38.45
835	13.28	H	6.2	0.53	18.95	38.45
846.6	15.34	V	6.2	0.53	21.01	38.45
846.6	13.38	H	6.2	0.53	19.05	38.45

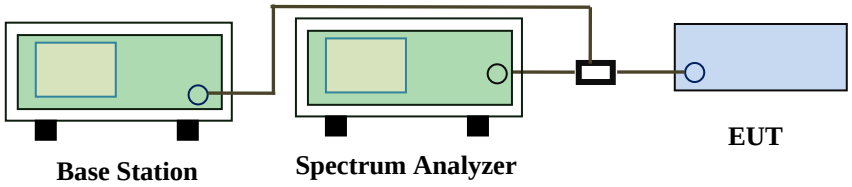
EIRP for UMTS-FDD Band II (Part 24E)

Frequency (MHz)	Substituted level (dBm)	Antenna Polarization	Antenna Gain correction (dBi)	Cable Loss (dB)	Absolute Level (dBm)	Limit (dBm)
1852.4	16.59	V	7.88	0.72	23.75	33
1852.4	14.63	H	7.88	0.72	21.79	33
1880	16.41	V	7.88	0.72	23.57	33
1880	14.47	H	7.88	0.72	21.63	33
1907.6	16.43	V	7.86	0.72	23.57	33
1907.6	14.5	H	7.86	0.72	21.64	33

6.3 Peak-Average Ratio

Temperature	25℃
Relative Humidity	51%
Atmospheric Pressure	1020mbar
Test date :	October 14, 2017
Tested By :	Loren Luo

Requirement(s):

Spec	Item	Requirement	Applicable
§24.232(d)	a)	The peak-to-average ratio (PAR) of the transmission may not exceed 13dB.	☑
Test Setup			
Test Procedure	According with KDB 971168 v02r02 5.7.2 Alternate procedure for PAPR 5.1.2 Peak power measurements with a peak power meter The total peak output power may be measured using a broadband peak RF power meter. The power meter must have a video bandwidth that is greater than or equal to the emission bandwidth and utilize a fast-responding diode detector. 5.2.3 Average power measurement with average power meter As an alternative to the use of a spectrum/signal analyzer or EMI receiver to perform a measurement of the total in-band average output power, a wideband RF average power meter with a thermocouple detector or equivalent can be used under certain conditions If the EUT can be configured to transmit continuously (i.e., the burst duty cycle ≥ 98%) and at all times the EUT is transmitting at is maximum output		

	power level, then a conventional wide-band RF power meter can be used. If the EUT cannot be configured to transmit continuously (i.e., the burst duty cycle < 98%), then there are two options for the use of an average power meter. First, a gated average power meter can be used to perform the measurement if the gating parameters can be adjusted such that the power is measured only over active transmission bursts at maximum output power levels. A conventional average power meter can also be used if the measured burst duty cycle is constant (i.e., duty cycle variations are less than ± 2 percent) by performing the measurement over the on/off burst cycles and then correcting (increasing) the measured level by a factor equal to 10log(1/duty cycle)
Remark	
Result	☑ Pass ☐ Fail

Test Data ☑ Yes ☐ N/A

Test Plot ☐ Yes (See below) ☑ N/A

GSM : GSM 1900 PK-AV POWER (PART 24E)

Frequency (MHz)	Conducted power(dBm)		Peak-Average Ratio(PAR)
	Peak	Average	
1850.2	30.88	30.05	0.83
1880	30.45	29.68	0.77
1909.8	30.26	29.45	0.81

GPRS 1900 PK-AV POWER (PART 24E)

Frequency (MHz)	Conducted power(dBm)		Peak-Average Ratio(PAR)
	Peak	Average	
1850.2	30.24	29.7	0.54
1880	30.25	29.61	0.64
1909.8	30.36	29.48	0.88

RMC : UMTS-FDD Band 2 PK-AV POWER (PART 24E)

Frequency (MHz)	Conducted power(dBm)		Peak-Average Ratio(PAR)
	Peak	Average	
1852.4	24.78	23.9	0.88
1880	24.96	23.73	1.23
1907.6	24.78	23.71	1.07

HSDPA : UMTS-FDD Band 2 PK-AV POWER (PART 24E)

Frequency (MHz)	Conducted power(dBm)		Peak-Average Ratio(PAR)
	Peak	Average	
1852.4	24.25	23.17	1.08
1880	24.03	23.1	0.93
1907.6	24.14	23	1.14

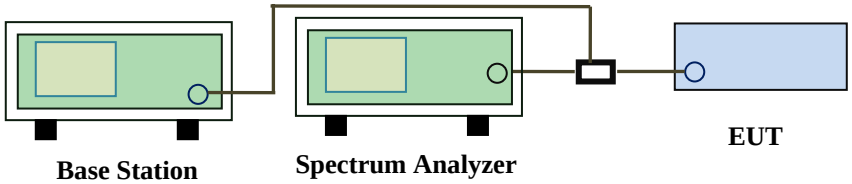
HSUPA : UMTS-FDD Band 2 PK-AV POWER (PART 24E)

Frequency (MHz)	Conducted power(dBm)		Peak-Average Ratio(PAR)
	Peak	Average	
1852.4	24.26	23.23	1.03
1880	23.99	22.94	1.05
1907.6	24.12	23.03	1.09

6.4 Occupied Bandwidth

Temperature	25℃
Relative Humidity	51%
Atmospheric Pressure	1020mbar
Test date :	October 14, 2017
Tested By :	Loren Luo

Requirement(s):

Spec	Item	Requirement	Applicable
§2.1049, §22.917, §22.905 §24.238	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

GSM Voice:

Cellular Band (Part 22H) result

Channel	Frequency (MHz)	99% Occupied Bandwidth (kHz)	26 dB Bandwidth (kHz)
128	824.2	247.47	314.9
190	836.6	248.62	314.0
251	848.8	245.28	316.9

PCS Band (Part 24E) result

Channel	Frequency (MHz)	99% Occupied Bandwidth (kHz)	26 dB Bandwidth (kHz)
512	1850	245.70	312.5
661	1880	247.99	317.3
810	1910	247.18	317.1

GPRS:

Cellular Band (Part 22H) result

Channel	Frequency (MHz)	99% Occupied Bandwidth (kHz)	26 dB Bandwidth (kHz)
128	824.2	248.04	315.6
190	836.6	248.80	311.7
251	848.8	245.71	317.6

PCS Band (Part 24E) result

Channel	Frequency (MHz)	99% Occupied Bandwidth (kHz)	26 dB Bandwidth (kHz)
512	1850	244.91	312.5
661	1880	246.75	314.0
810	1910	247.78	317.0

RMC:

UMTS-FDD Band V (Part 22H)

Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	26 dB Bandwidth (MHz)
4132	826.6	4.1561	4.670
4175	835.0	4.1556	4.672
4233	846.4	4.1544	4.675

UMTS-FDD Band II (Part 24E)

Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	26 dB Bandwidth (MHz)
9262	1853	4.2182	4.863
9400	1880	4.2374	4.857
9538	1907	4.2080	4.870

HSDPA:

UMTS-FDD Band V (Part 22H)

Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	26 dB Bandwidth (MHz)
4132	826.6	4.1577	4.664
4175	835.0	4.1499	4.667
4233	846.4	4.1594	4.682

UMTS-FDD Band II (Part 24E)

Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	26 dB Bandwidth (MHz)
9262	1853	4.1758	4.757
9400	1880	4.2385	4.961
9538	1907	4.6686	4.534

HSUPA:

UMTS-FDD Band V (Part 22H)

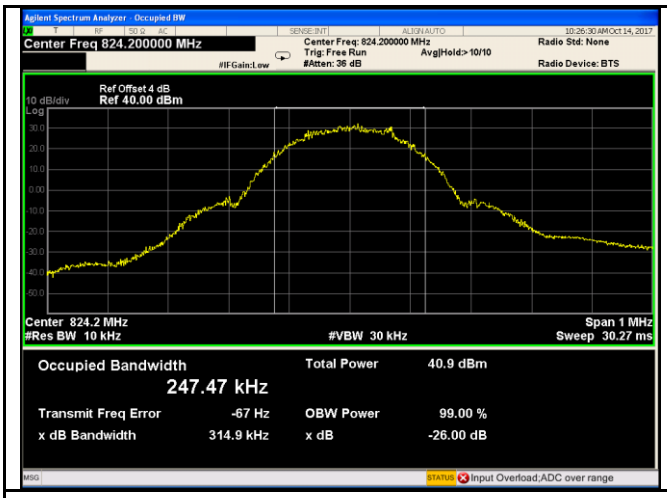
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	26 dB Bandwidth (MHz)
4132	826.6	4.1539	4.670
4175	835.0	4.1508	4.665
4233	846.4	4.1544	4.678

UMTS-FDD Band II (Part 24E)

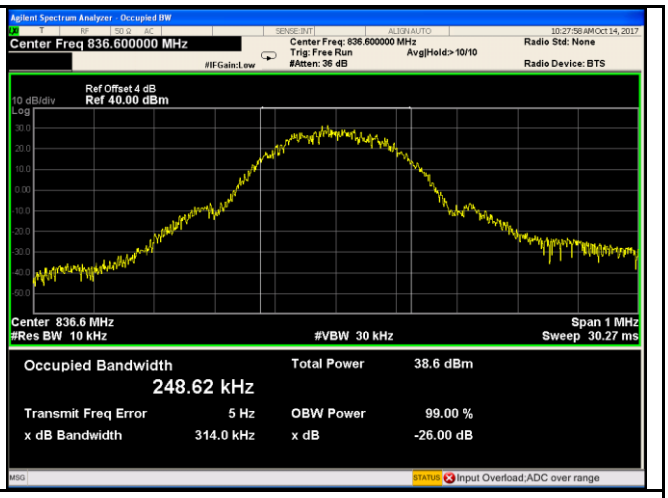
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	26 dB Bandwidth (MHz)
9262	1853	4.1753	4.749
9400	1880	4.2415	4.961
9538	1907	4.6683	4.534

Test Plots

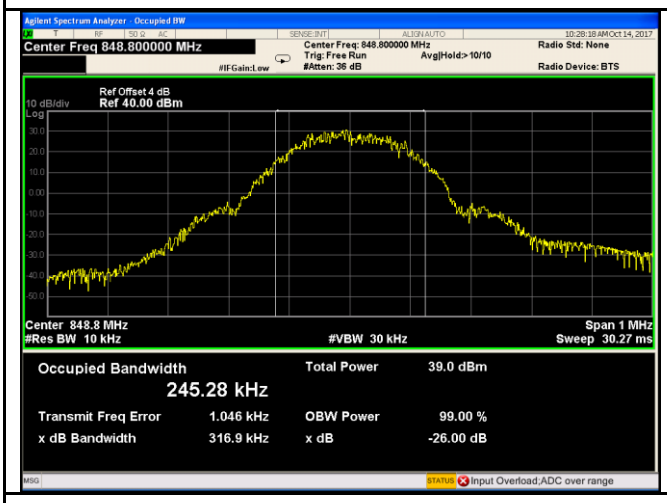
GSM Voice:



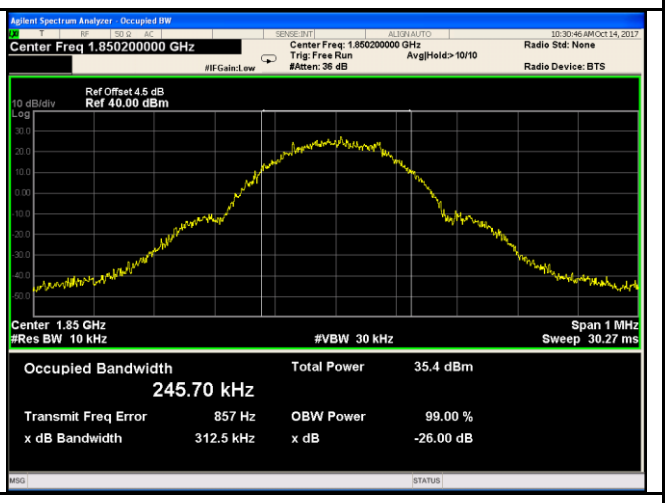
GSM 850 BW - Low CH 824.2MHz



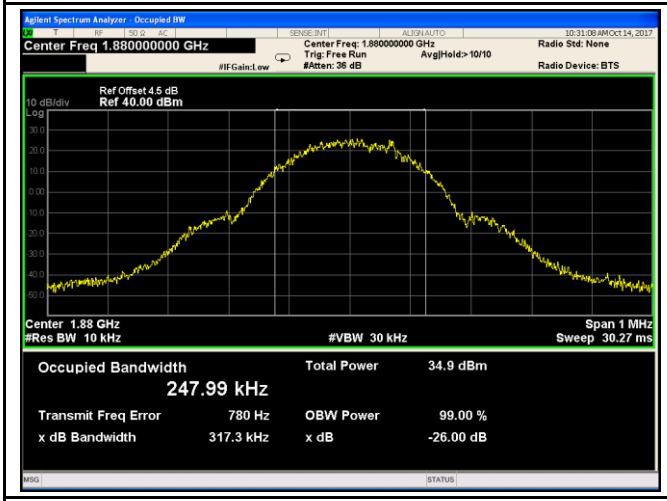
GSM 850 BW - Mid CH 836.6MHz



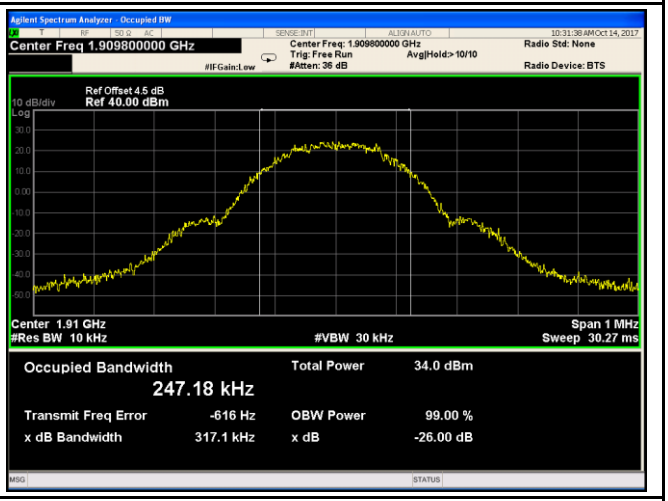
GSM 850 BW - High CH 848.8MHz



PCS 1900 BW - Low CH 1850MHz

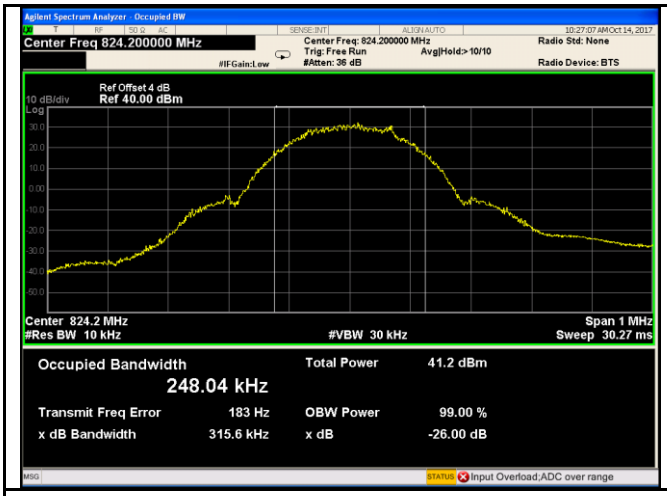


PCS 1900 BW - Mid CH 1880MHz

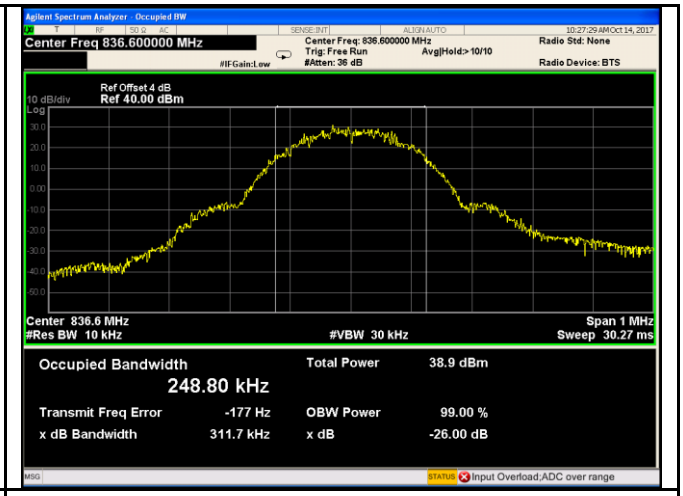


PCS 1900 BW - High CH 1910MHz

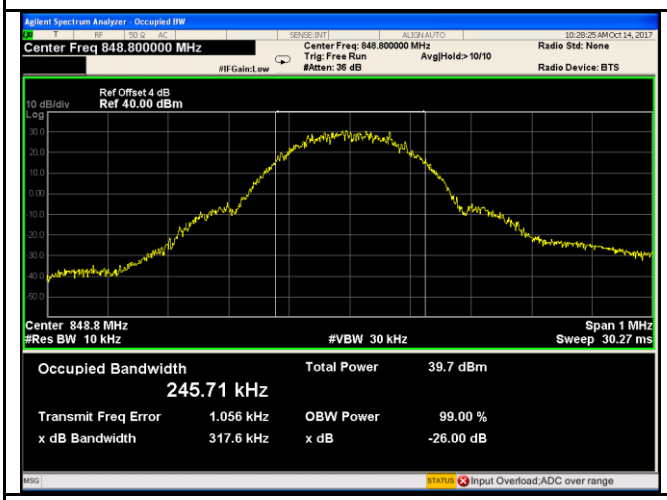
GPRS:



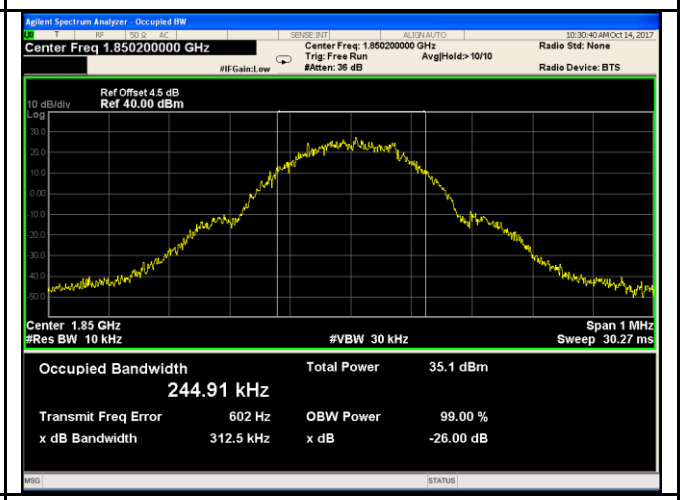
GSM 850 BW - Low CH 824.2MHz



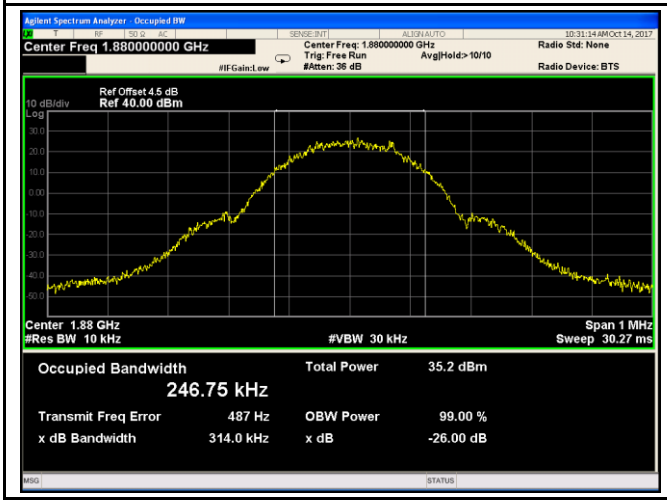
GSM 850 BW - Mid CH 836.6MHz



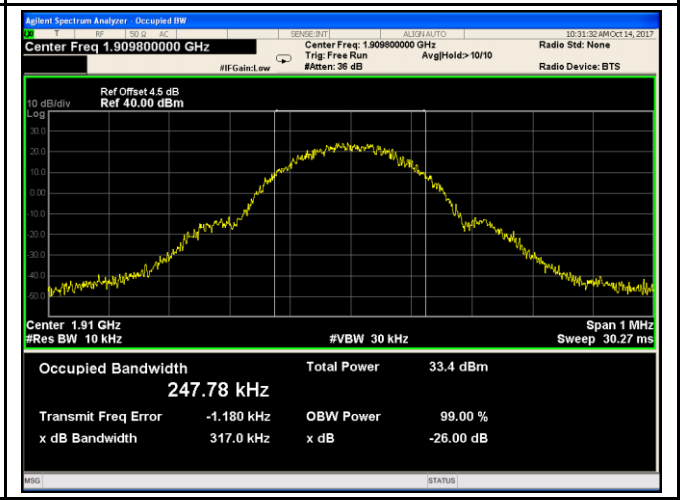
GSM 850 BW - High CH 848.8MHz



PCS 1900 BW - Low CH 1850MHz

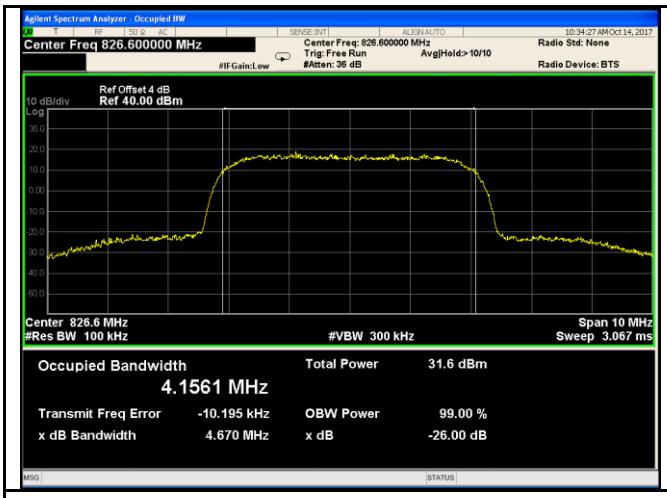


PCS 1900 BW - Mid CH 1880MHz

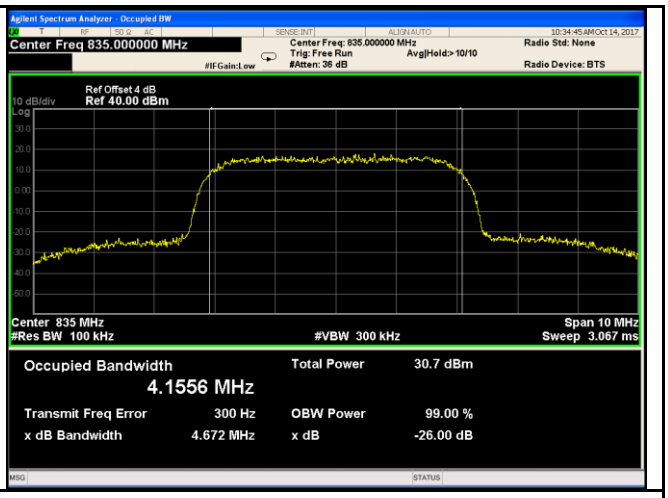


PCS 1900 BW - High CH 1910MHz

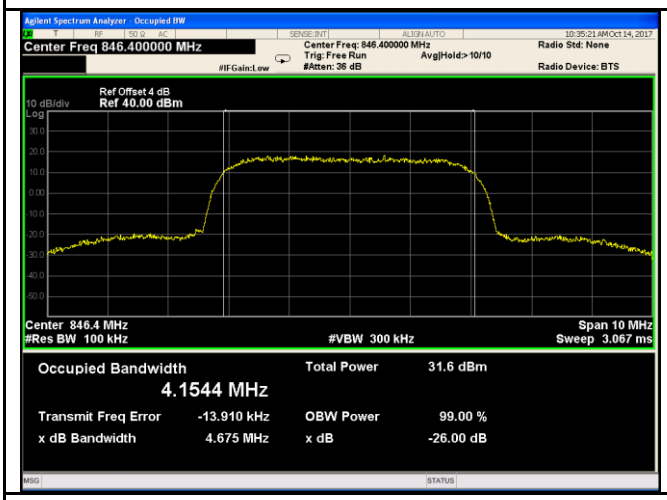
RMC:



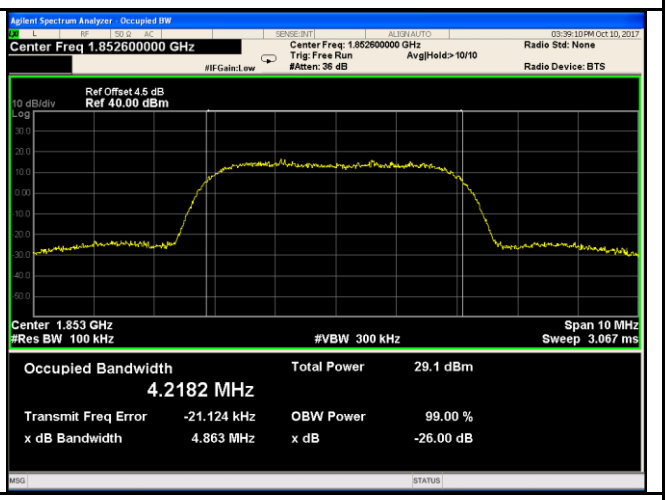
Band V BW - Low CH 826.6 MHz



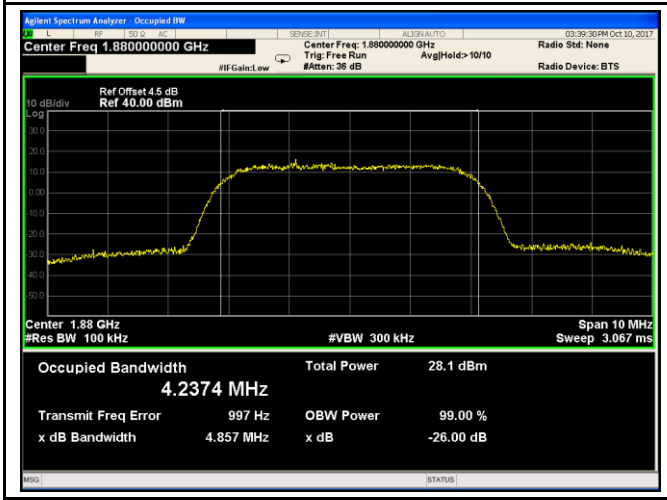
Band V BW - Mid CH 835.0 MHz



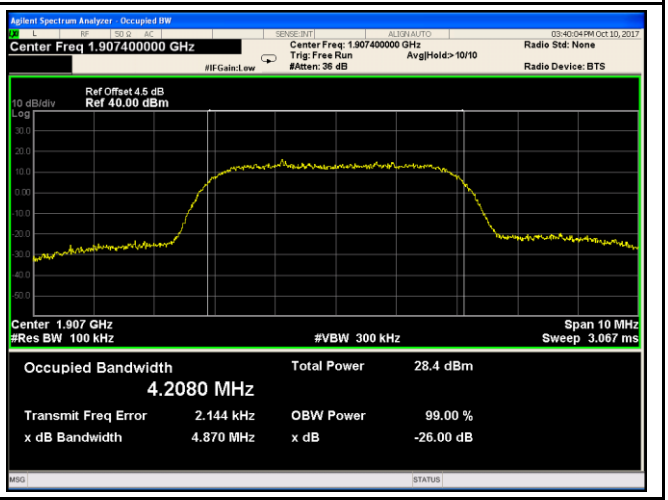
Band V BW - High CH 846.4 MHz



Band II BW - Low CH 1853MHz

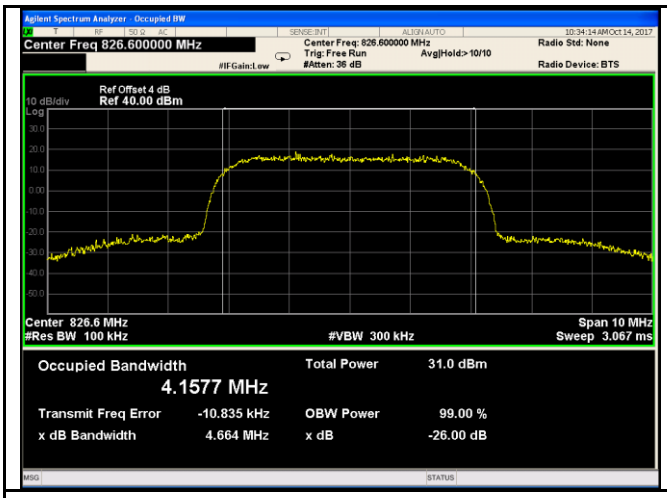


Band II BW - Mid CH 1880MHz

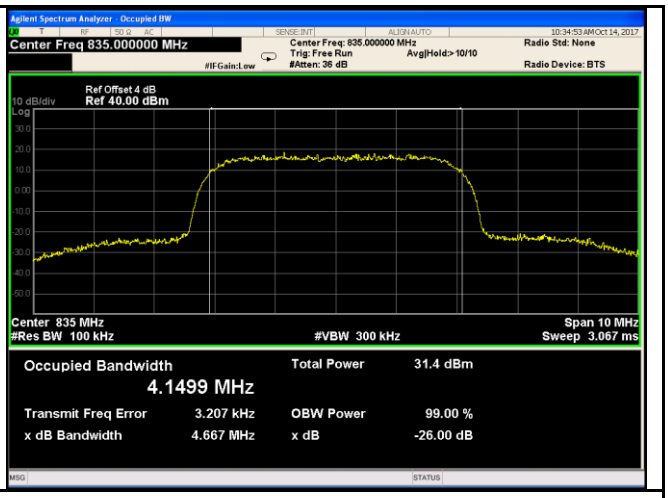


Band II BW - High CH 1907MHz

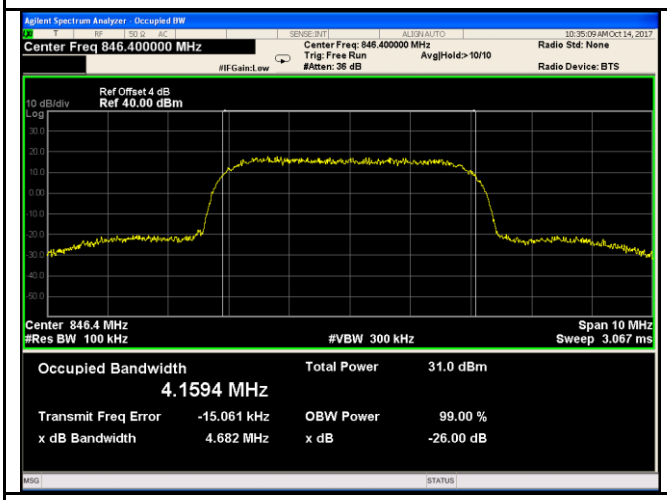
HSDPA:



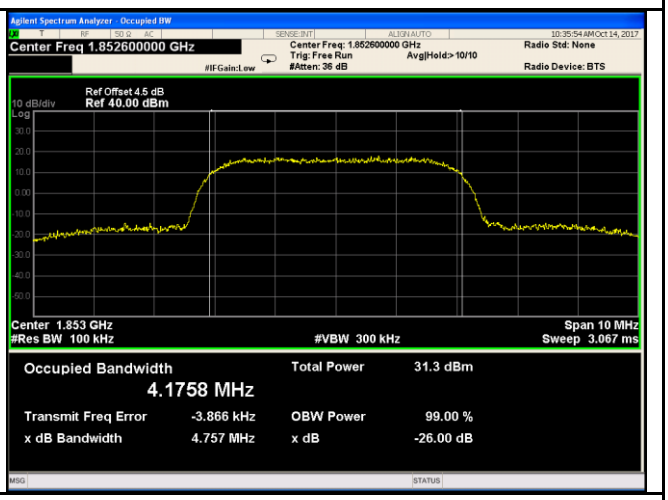
Band V BW - Low CH 826.6 MHz



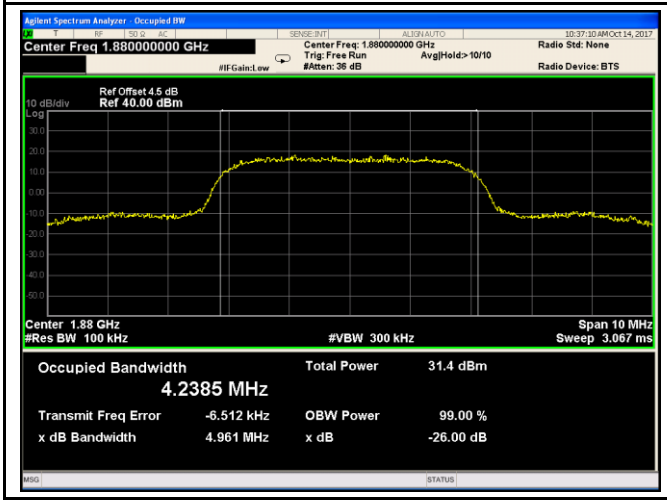
Band V BW - Mid CH 835.0 MHz



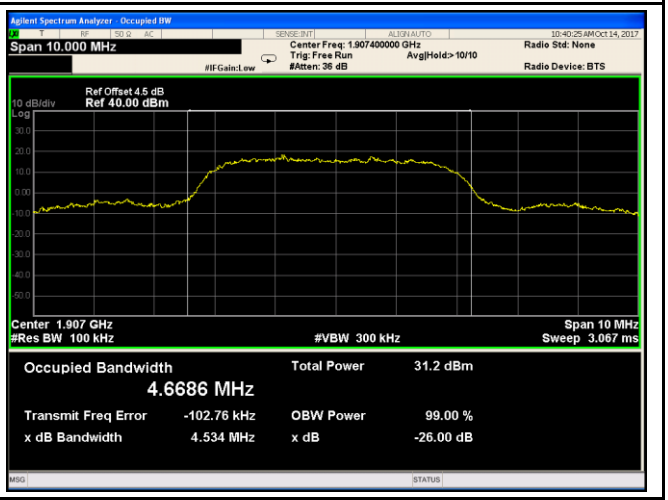
Band V BW - High CH 846.4 MHz



Band II BW - Low CH 1853MHz

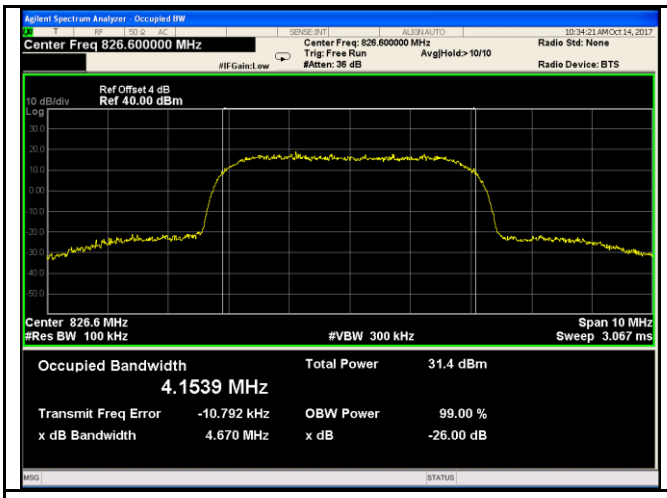


Band II BW - Mid CH 1880MHz

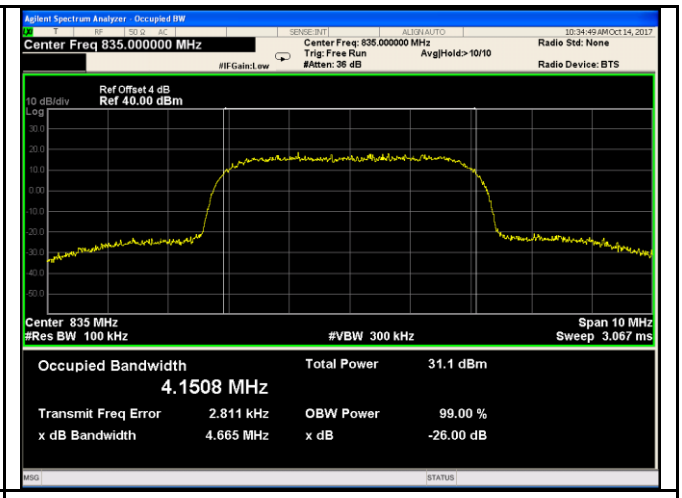


Band II BW - High CH 1907MHz

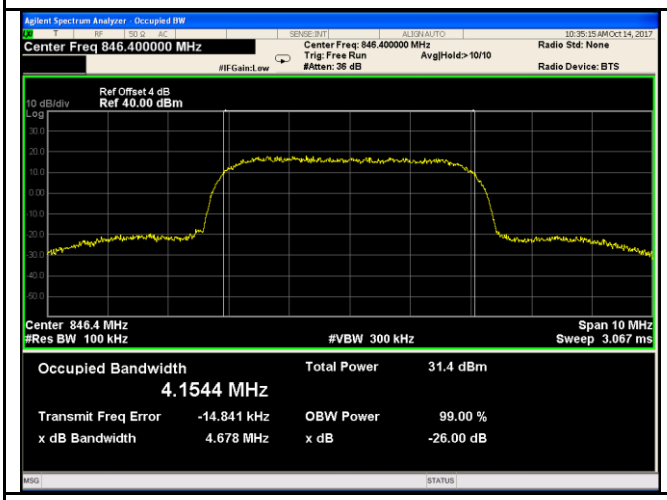
HSUPA:



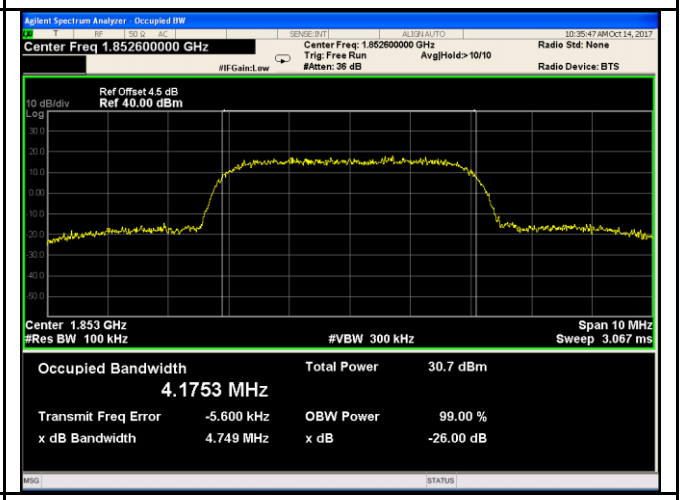
Band V BW - Low CH 826.6 MHz



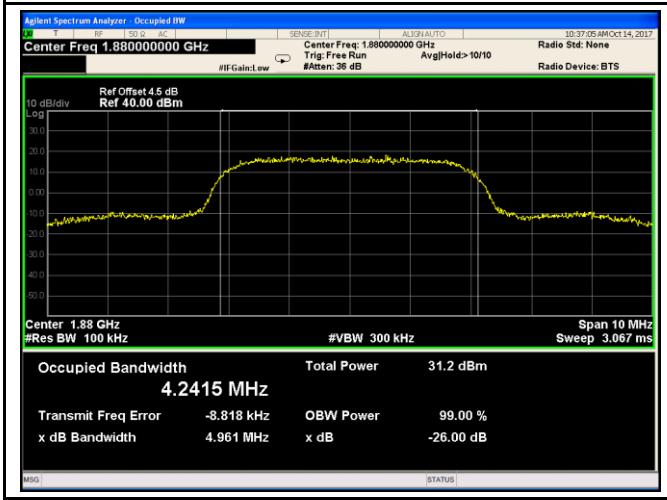
Band V BW - Mid CH 835.0 MHz



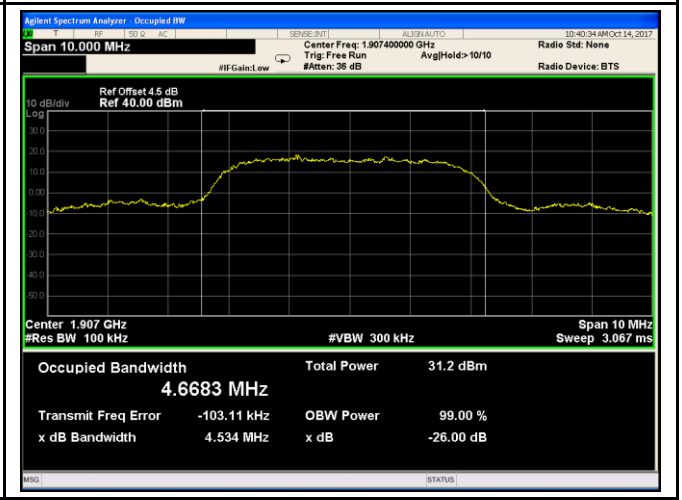
Band V BW - High CH 846.4 MHz



Band II BW - Low CH 1853MHz



Band II BW - Mid CH 1880MHz

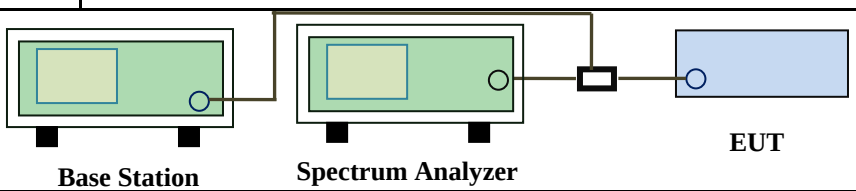


Band II BW - High CH 1907MHz

6.5 Spurious Emissions at Antenna Terminals

Temperature	25℃
Relative Humidity	51%
Atmospheric Pressure	1020mbar
Test date :	October 14, 2017
Tested By :	Loren Luo

Requirement(s):

Spec	Item	Requirement	Applicable
§2.1051, §22.917(a)& §24.238(a)	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		

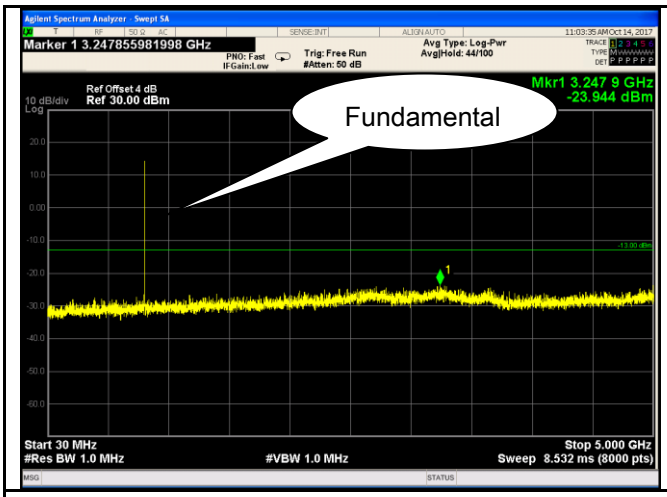
Test Data ☑ Yes ☐ N/A

Test Plot ☑ Yes (See below) ☐ N/A

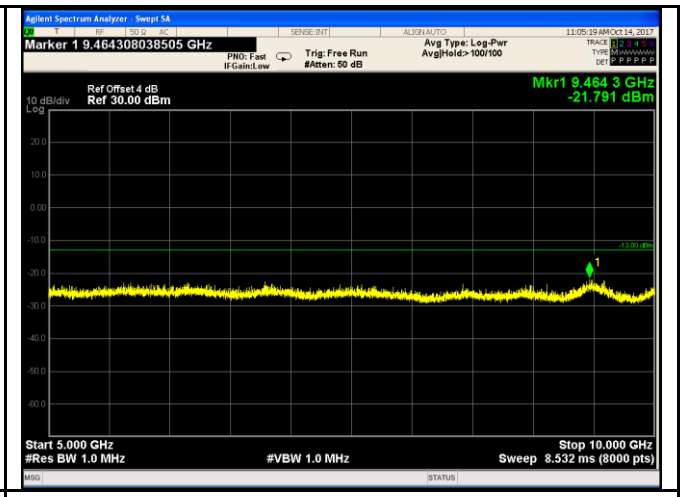
Test Plots

GSM Voice:

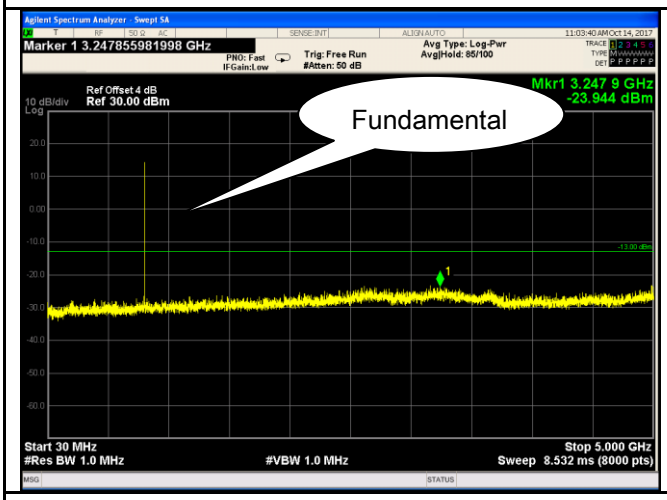
Cellular Band (Part 22H) result



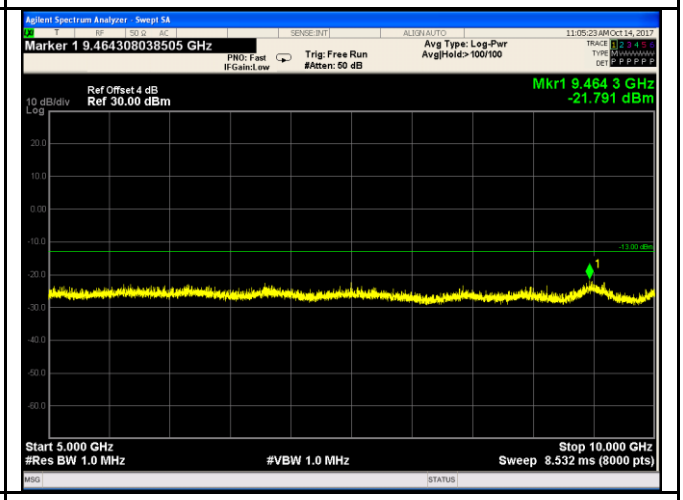
GSM 850 - Low Channel-1



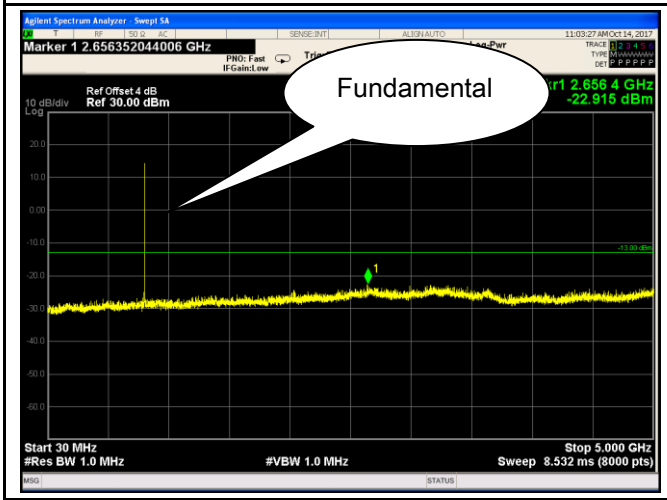
GSM 850 - Low Channel-2



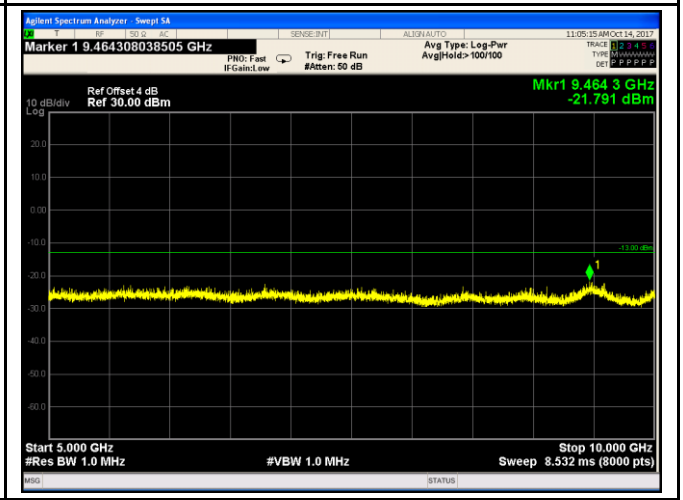
GSM 850 Middle Channel-1



GSM 850 Middle Channel-2

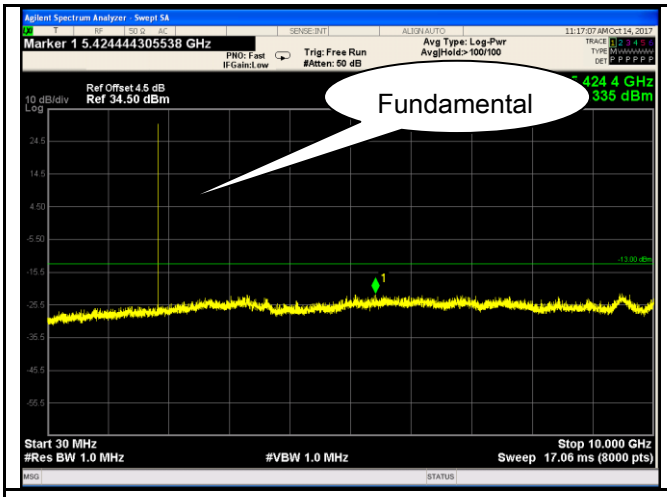


GSM 850 - High Channel-1

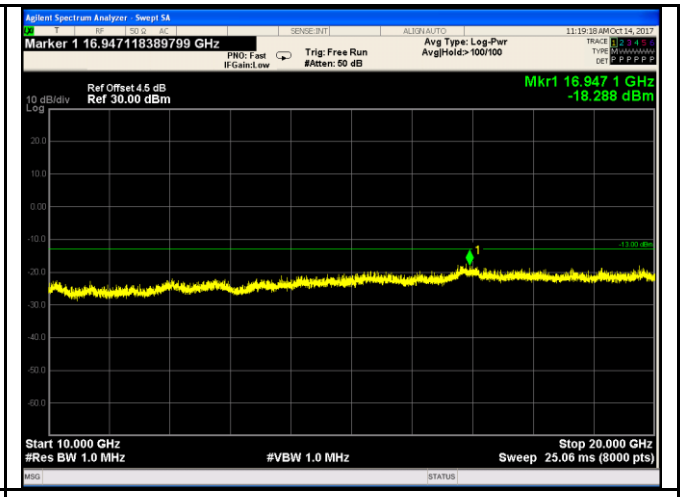


GSM 850 - High Channel-2

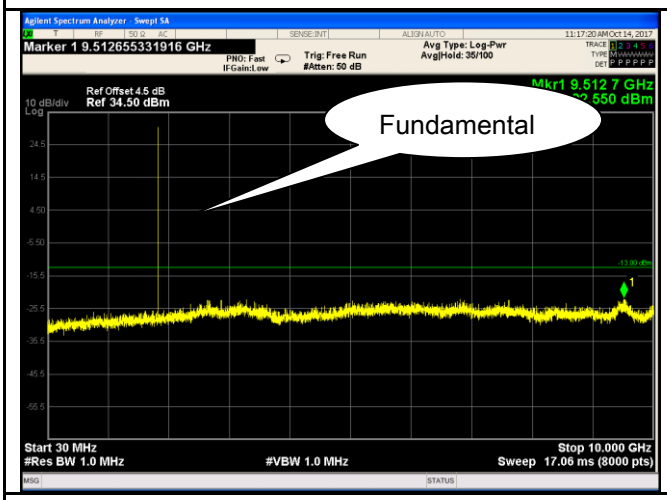
PCS Band (Part24E) result



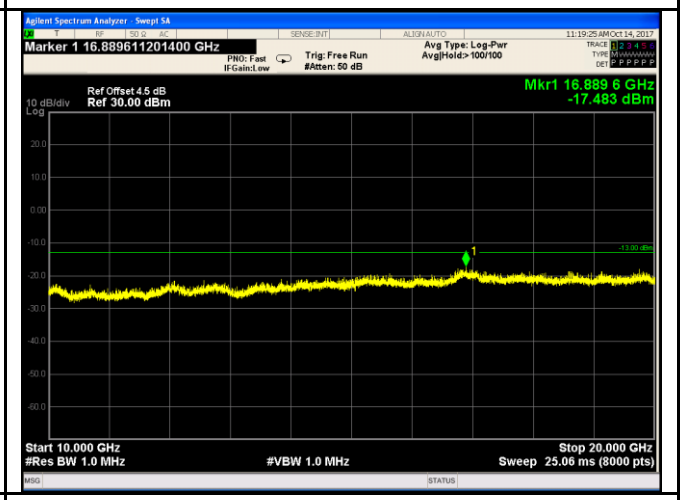
PCS1900 - Low Channel-1



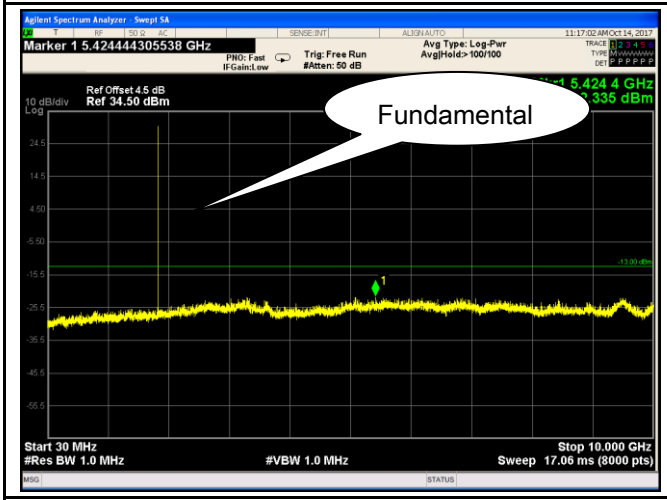
PCS 1900 - Low Channel-2



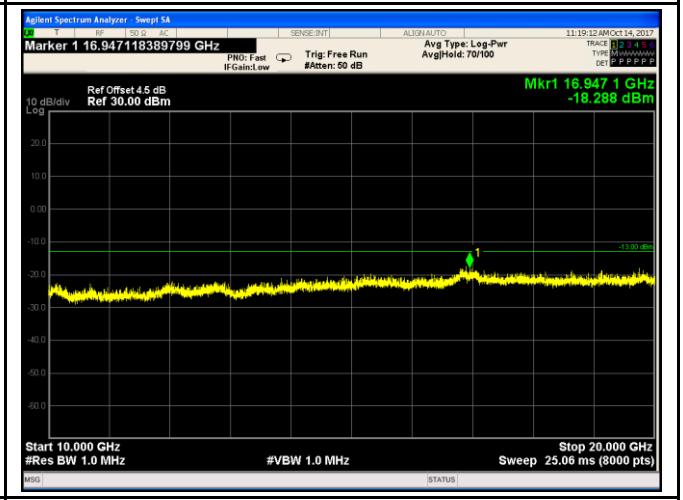
PCS1900 - Middle Channel-1



PCS 1900 - Middle Channel-2



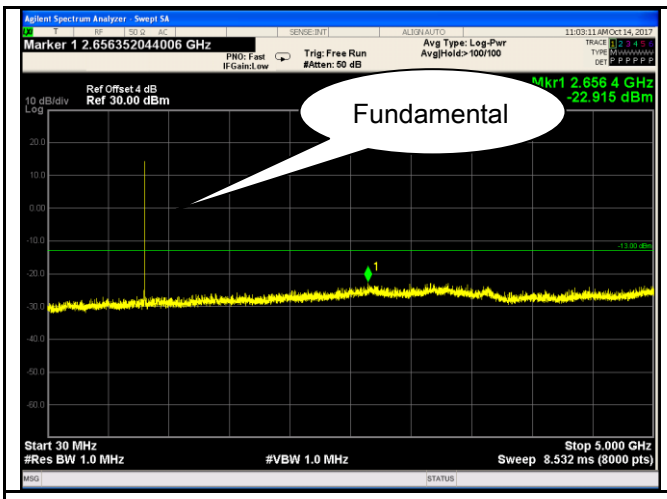
PCS1900 - High Channel-1



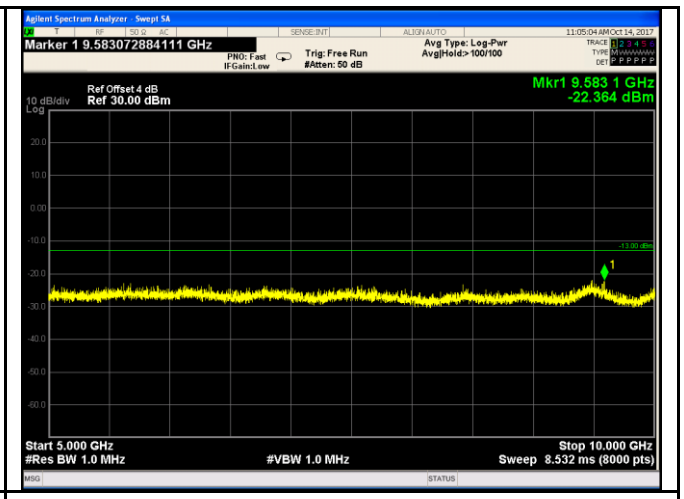
PCS 1900 - High Channel-2

GPRS:

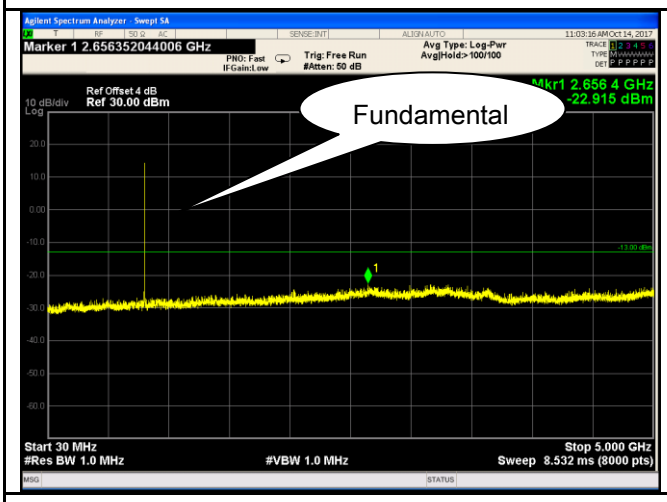
Cellular Band (Part 22H) result



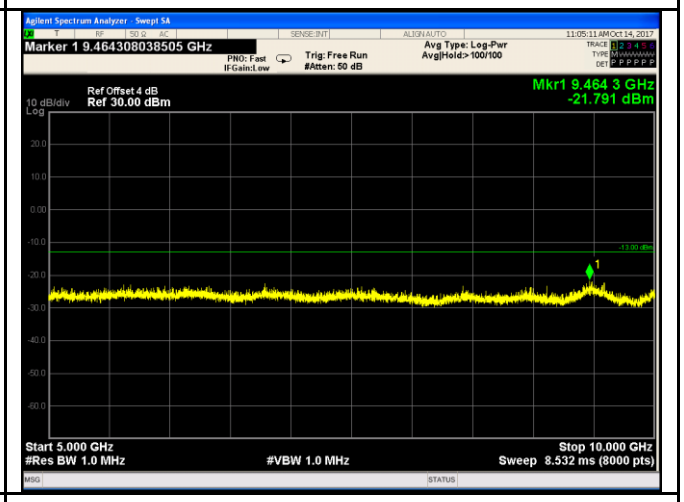
GSM 850 - Low Channel-1



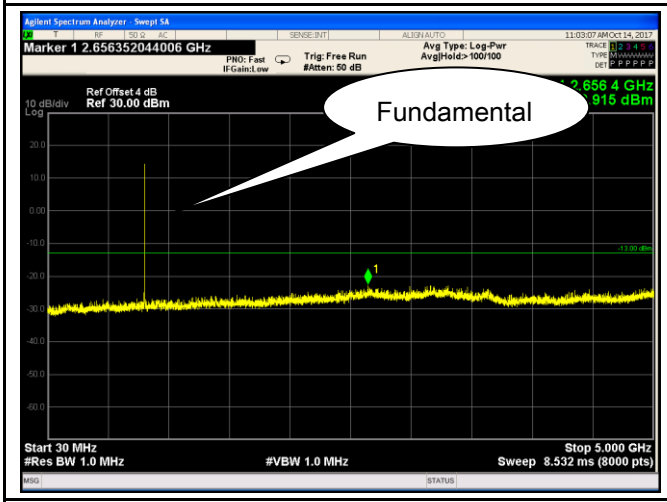
GSM 850 - Low Channel-2



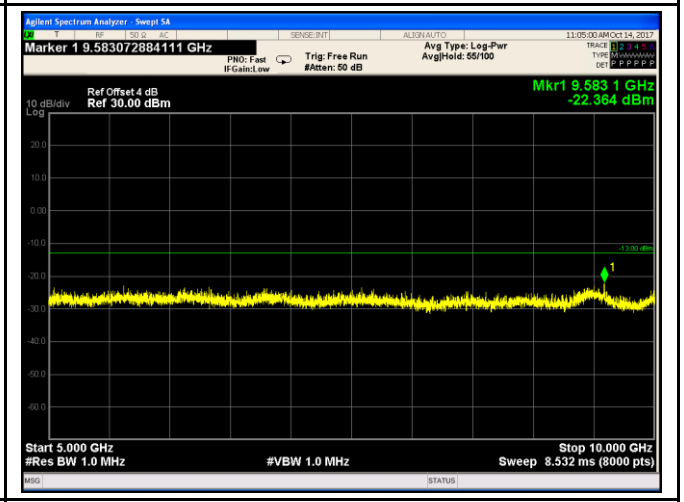
GSM 850 Middle Channel-1



GSM 850 Middle Channel-2

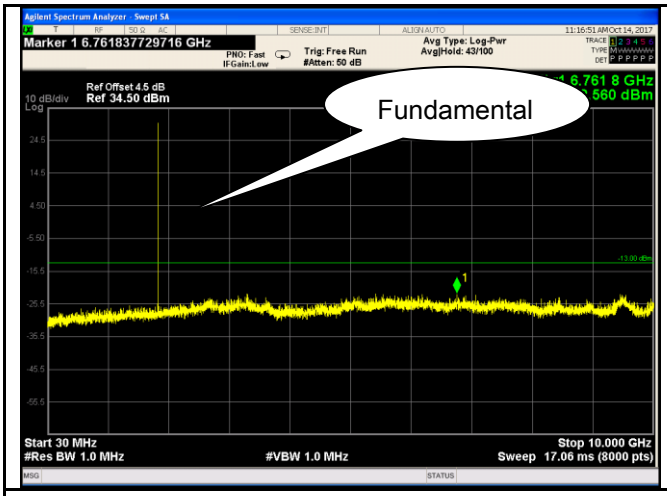


GSM 850 - High Channel-1

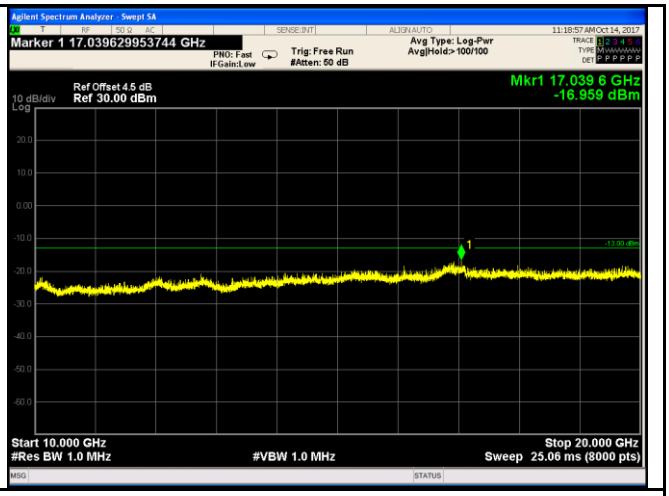


GSM 850 - High Channel-2

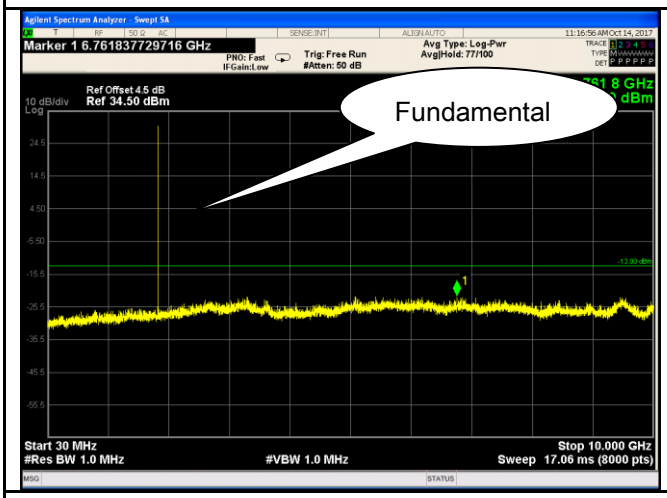
PCS Band (Part24E) result



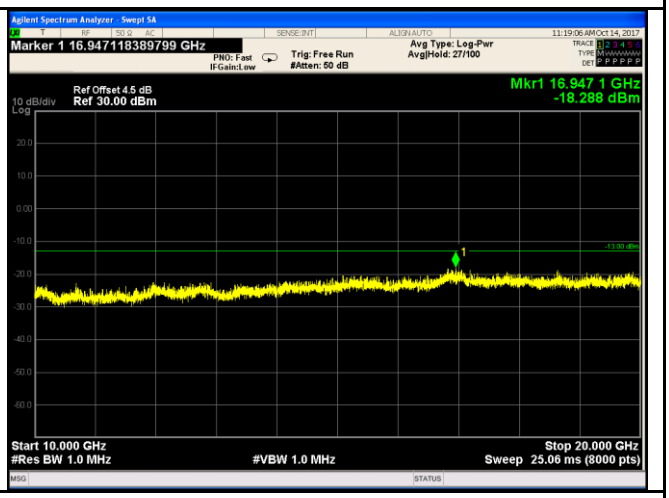
PCS1900 - Low Channel-1



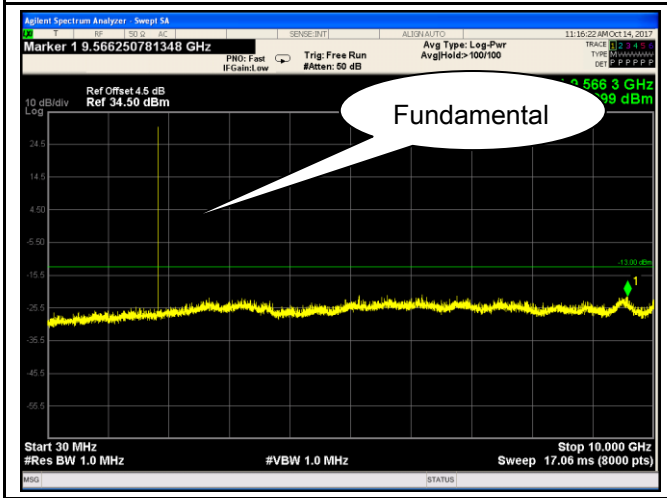
PCS 1900 - Low Channel-2



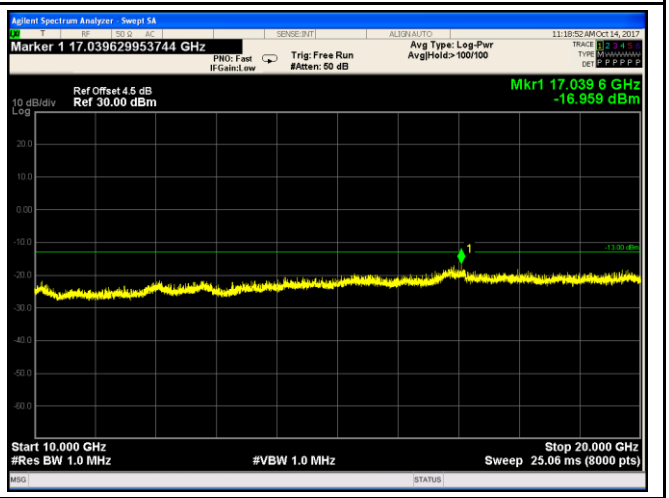
PCS1900 - Middle Channel-1



PCS 1900 - Middle Channel-2



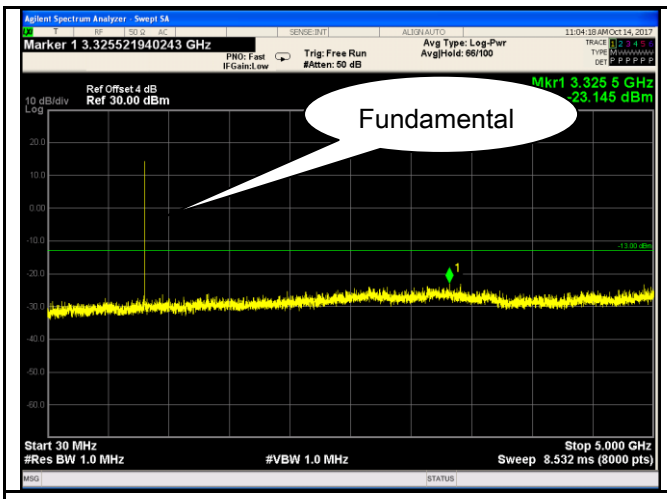
PCS1900 - High Channel-1



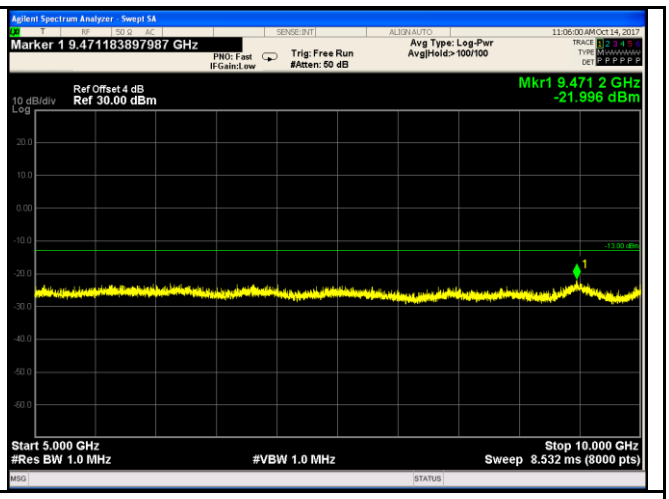
PCS 1900 - High Channel-2

RMC

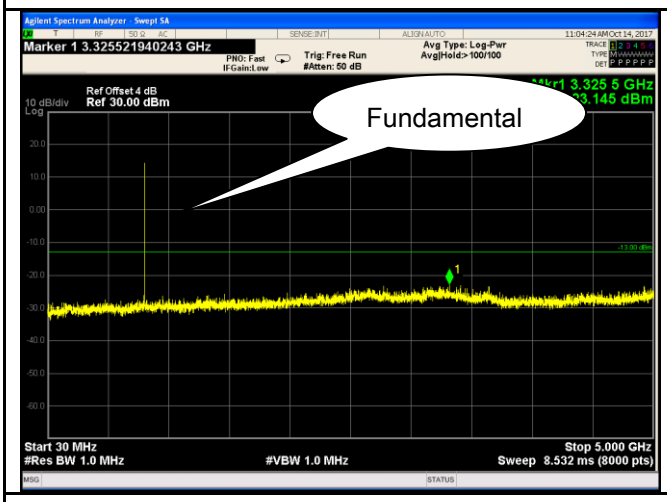
UMTS-FDD Band V (Part 22H)



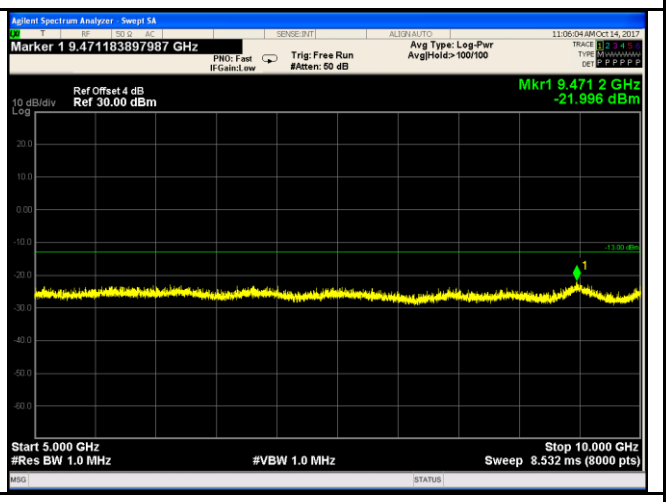
Band V - Low Channel-1



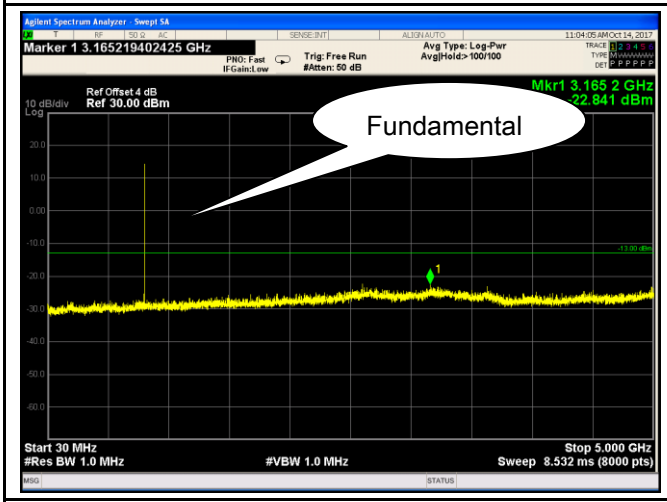
Band V - Low Channel-2



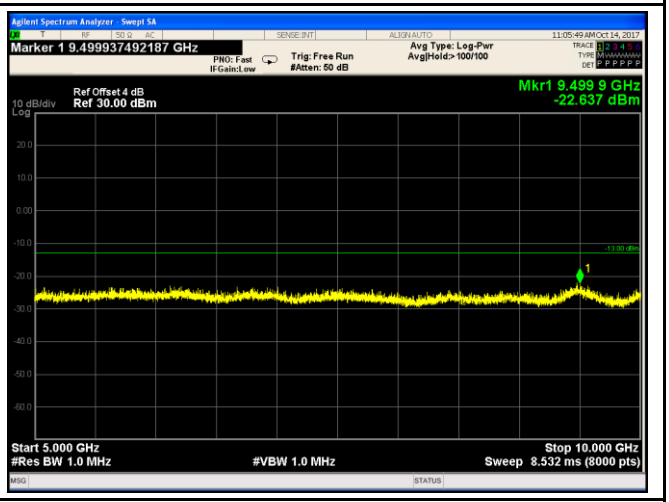
Band V - Middle Channel-1



Band V - Middle Channel-2

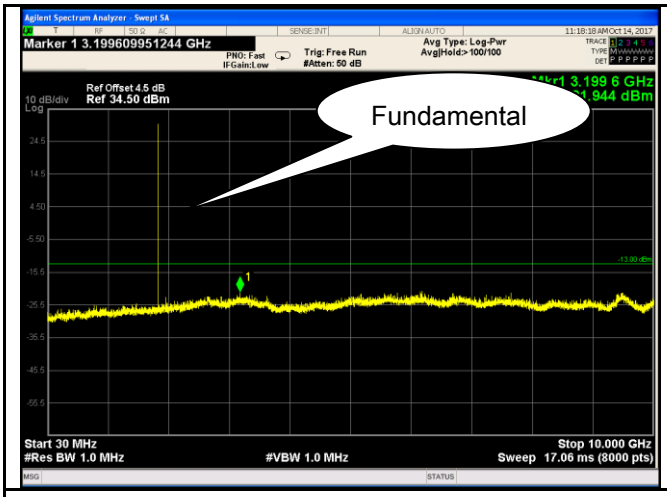


Band V - High Channel-1

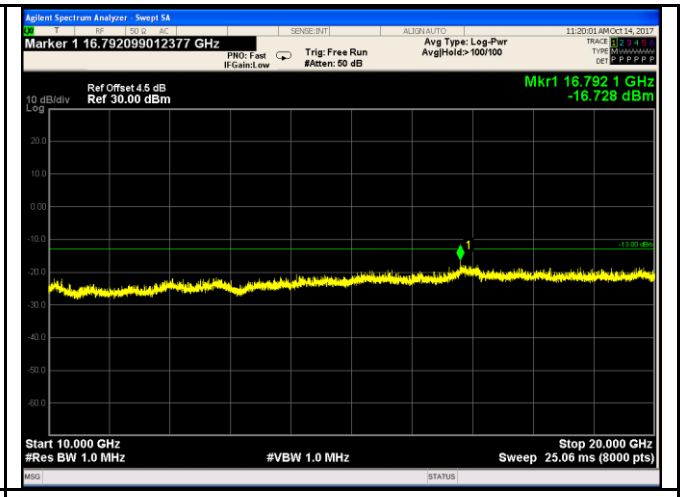


Band V - High Channel-2

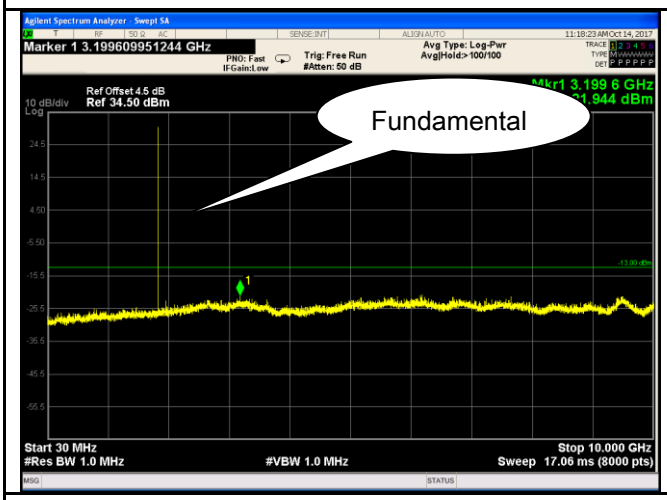
UMTS-FDD Band II (Part 24E)



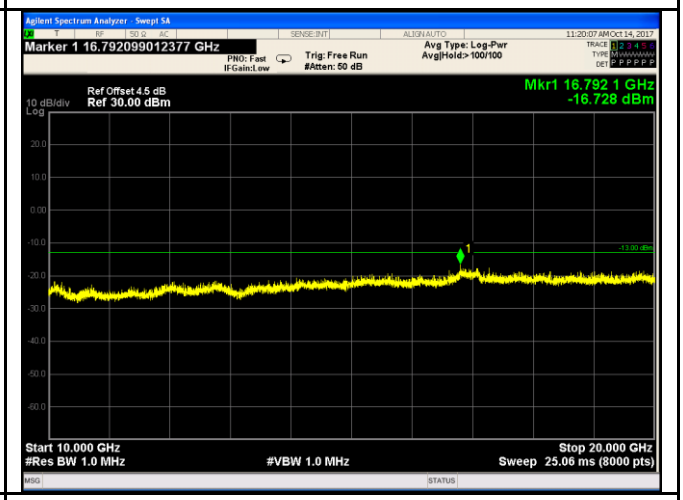
Band II - Low Channel-1



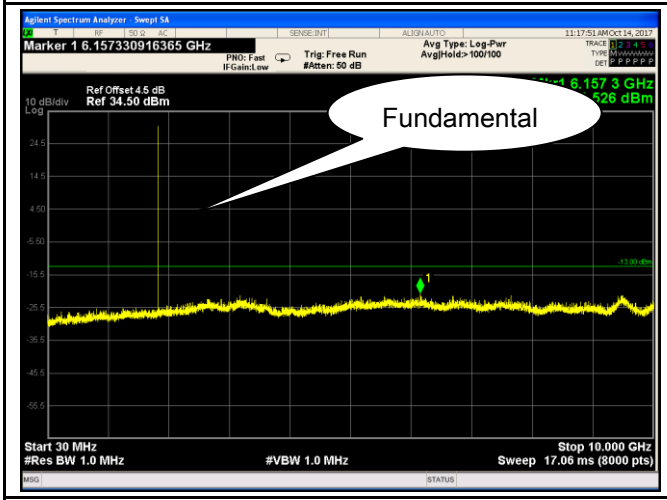
Band II - Low Channel-2



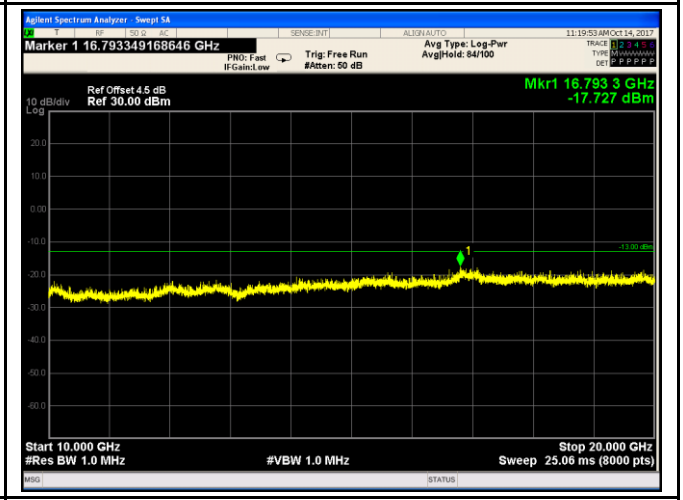
Band II - Middle Channel-1



Band II - Middle Channel-2



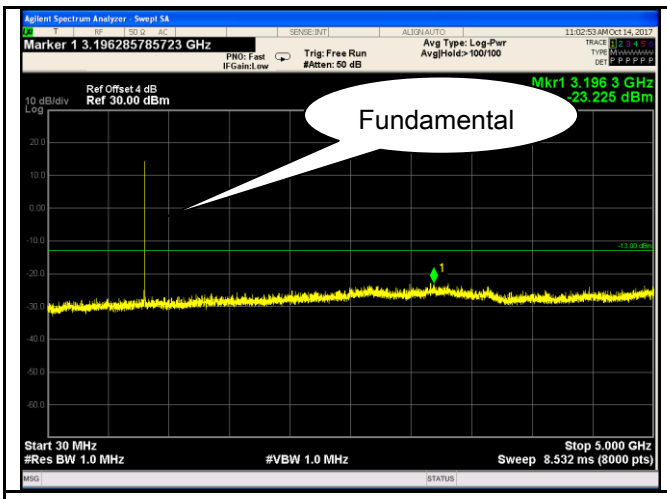
Band II - High Channel-1



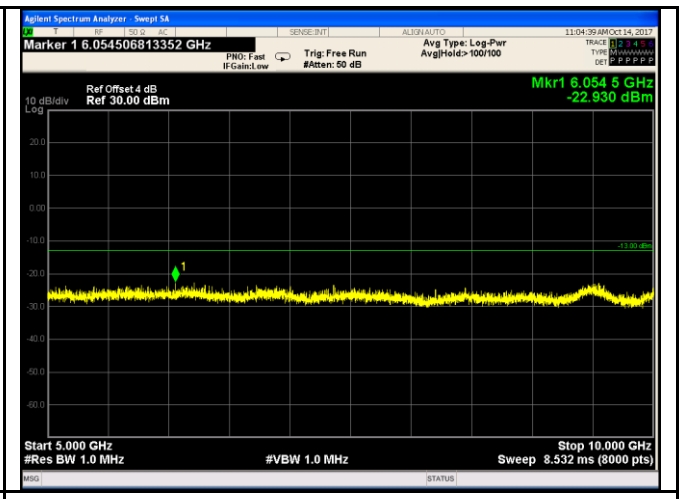
Band II - High Channel-2

HSDPA:

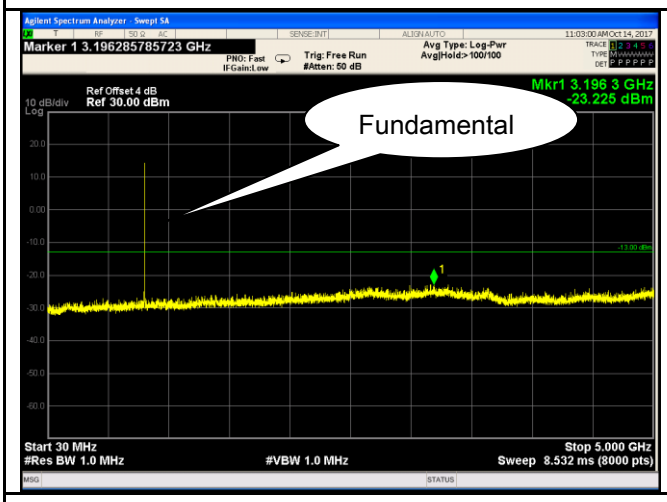
UMTS-FDD Band V (Part 22H)



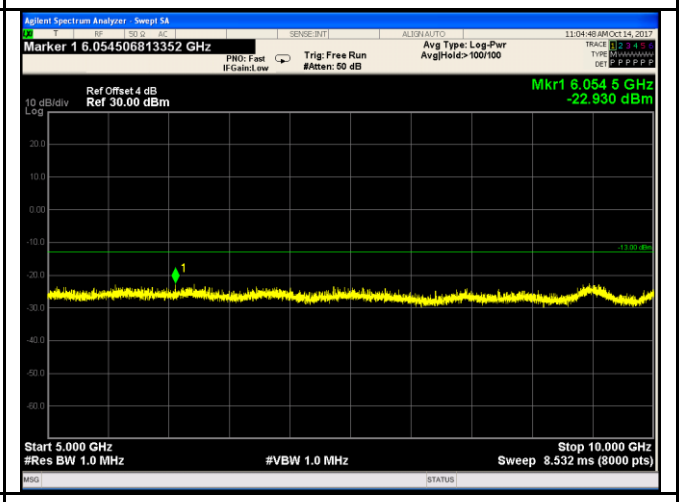
Band V - Low Channel-1



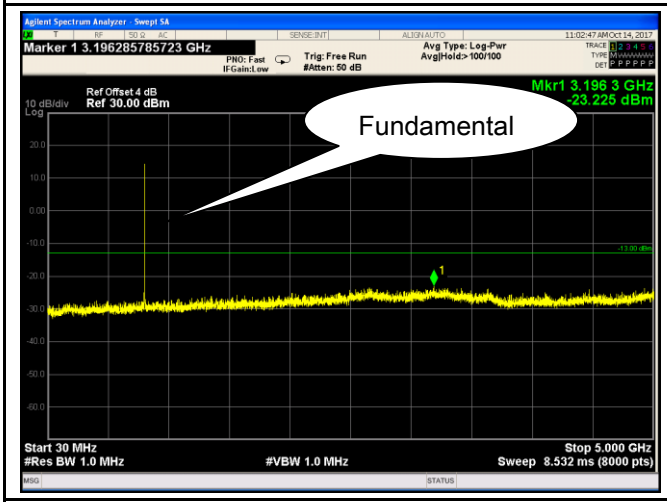
Band V - Low Channel-2



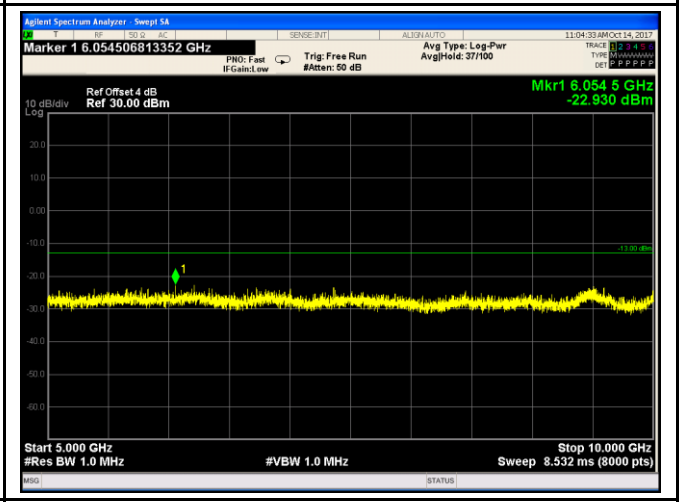
Band V - Middle Channel-1



Band V - Middle Channel-2

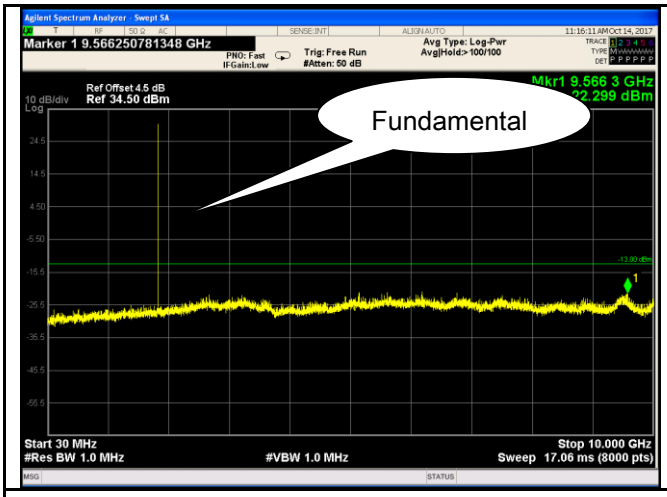


Band V - High Channel-1

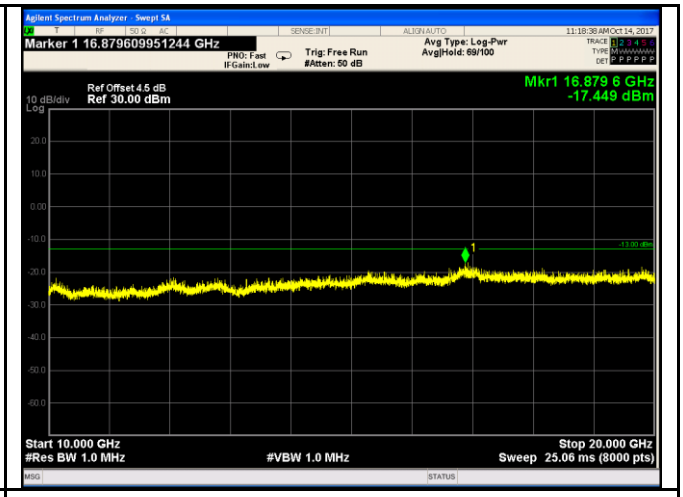


Band V - High Channel-2

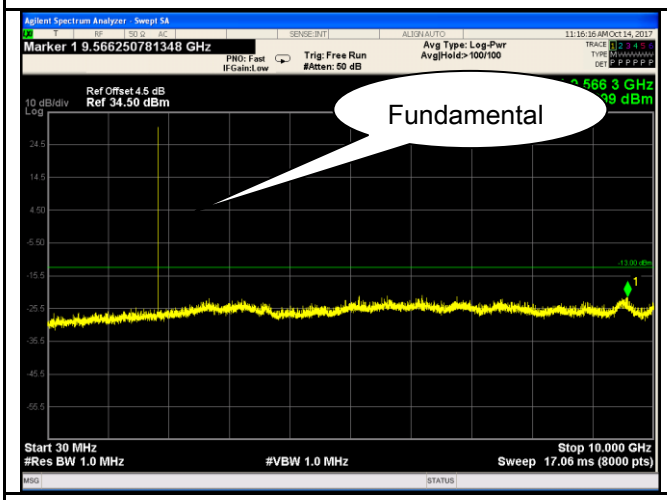
UMTS-FDD Band II (Part 24E)



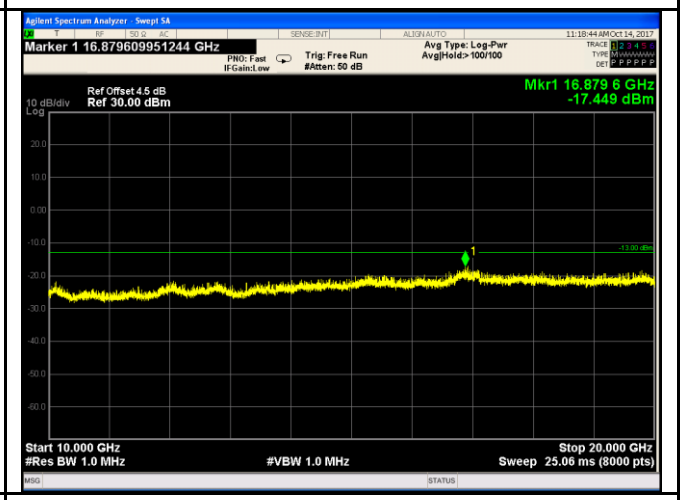
Band II - Low Channel-1



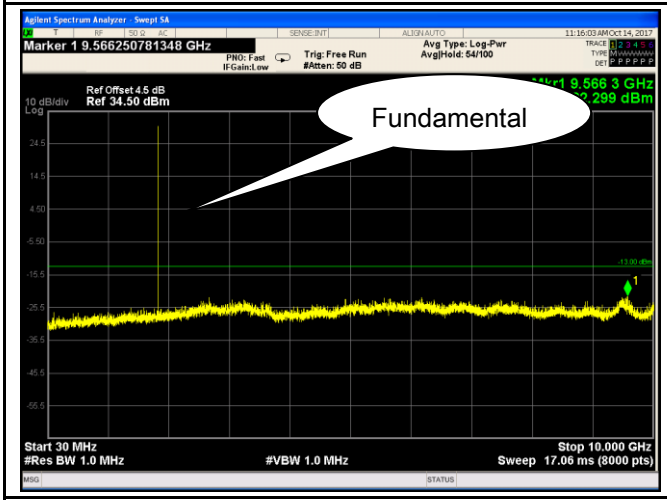
Band II - Low Channel-2



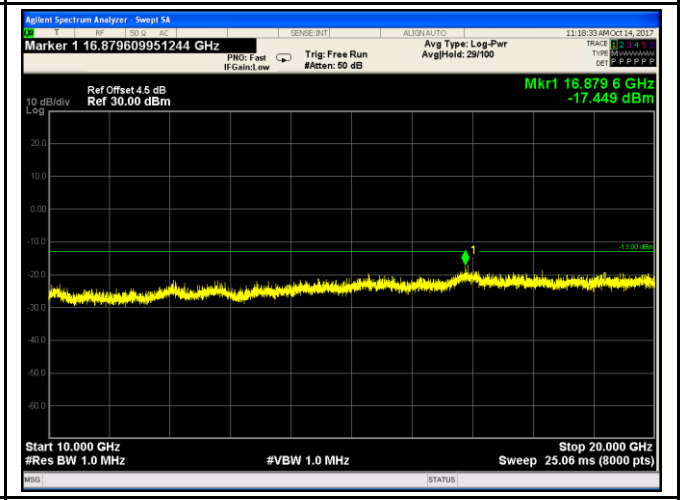
Band II - Middle Channel-1



Band II - Middle Channel-2



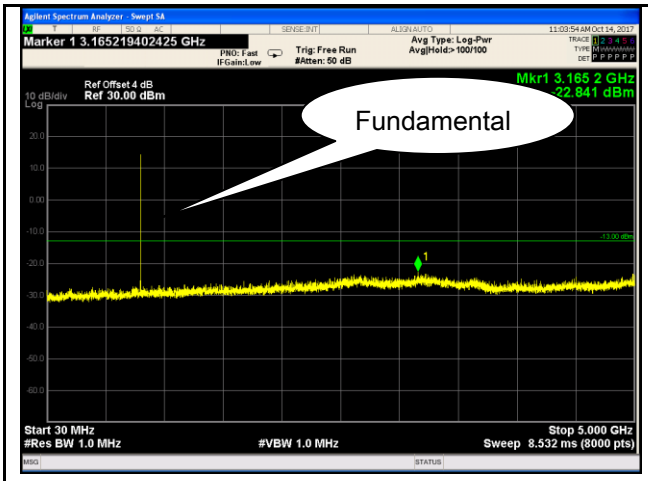
Band II - High Channel-1



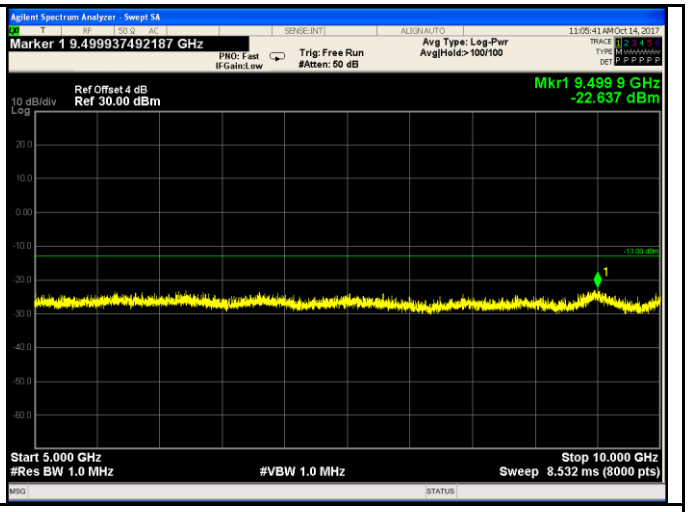
Band II - High Channel-2

HSUPA:

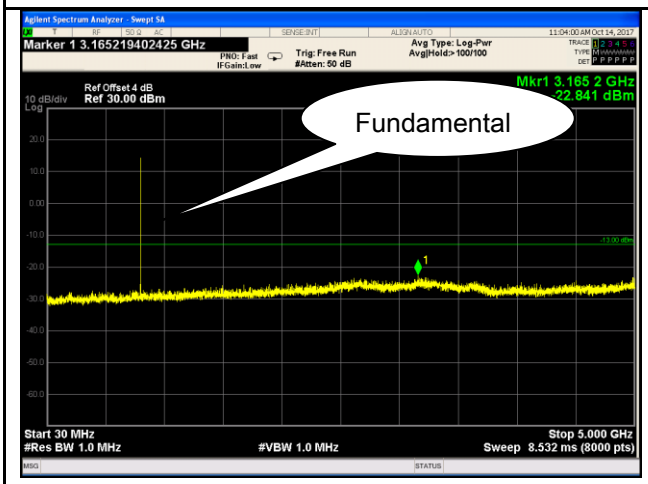
UMTS-FDD Band V (Part 22H)



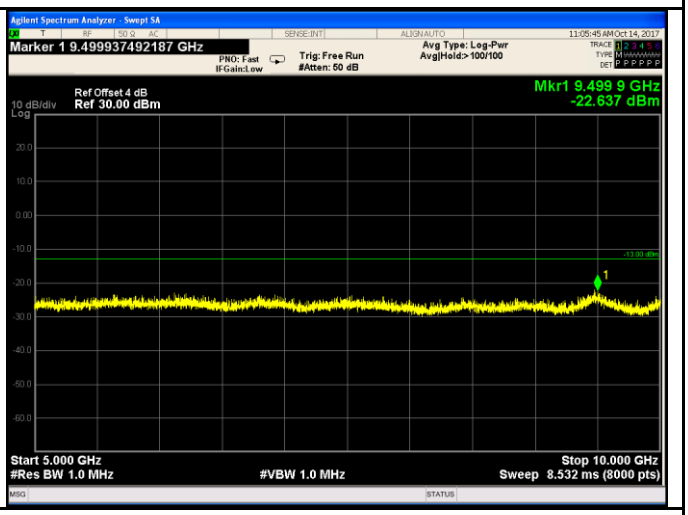
Band V - Low Channel-1



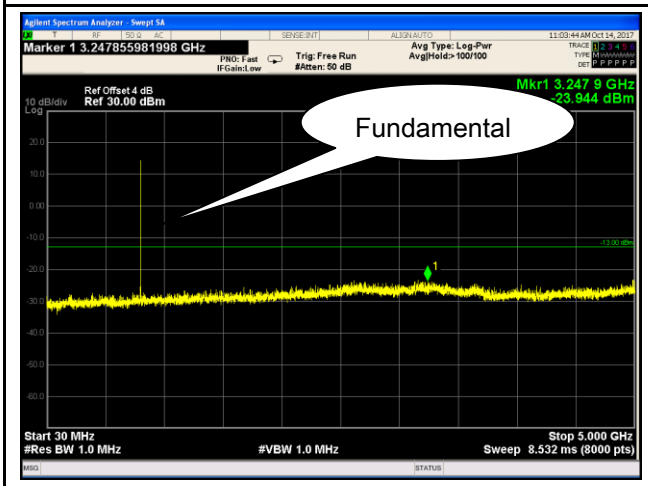
Band V - Low Channel-2



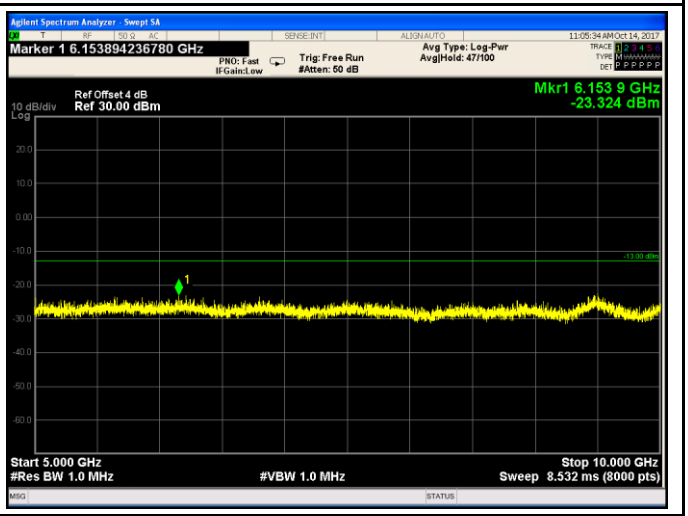
Band V - Middle Channel-1



Band V - Middle Channel-2

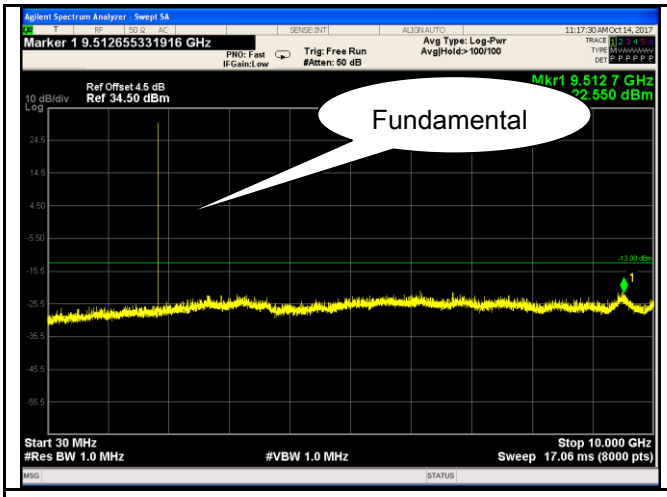


Band V - High Channel-1

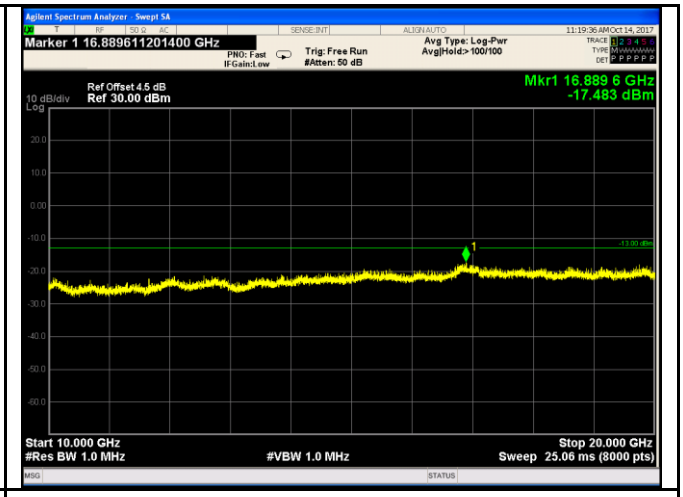


Band V - High Channel-2

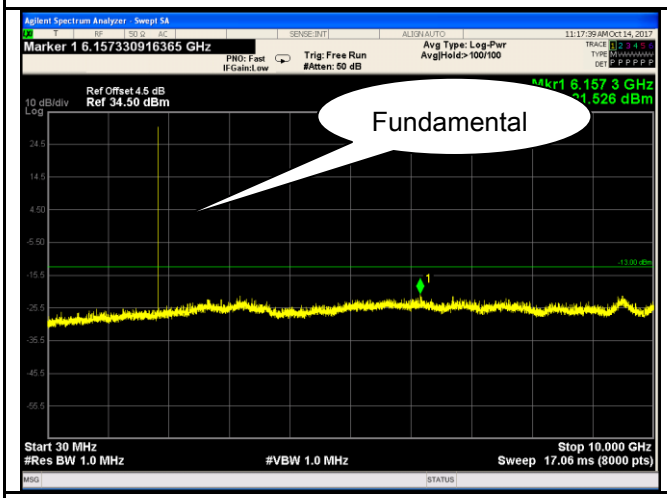
UMTS-FDD Band II (Part 24E)



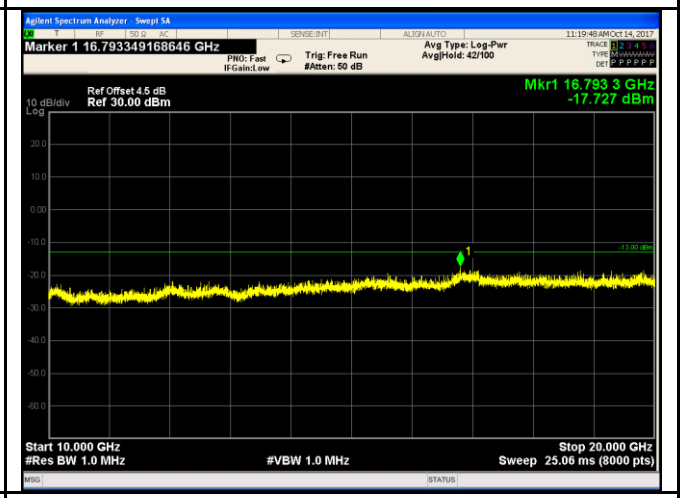
Band II - Low Channel-1



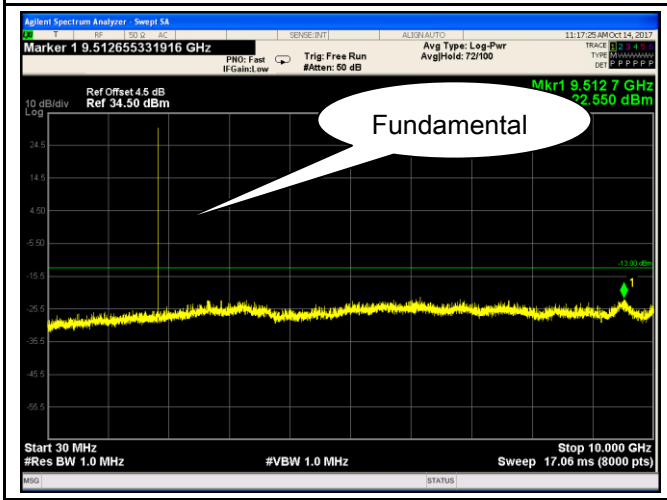
Band II - Low Channel-2



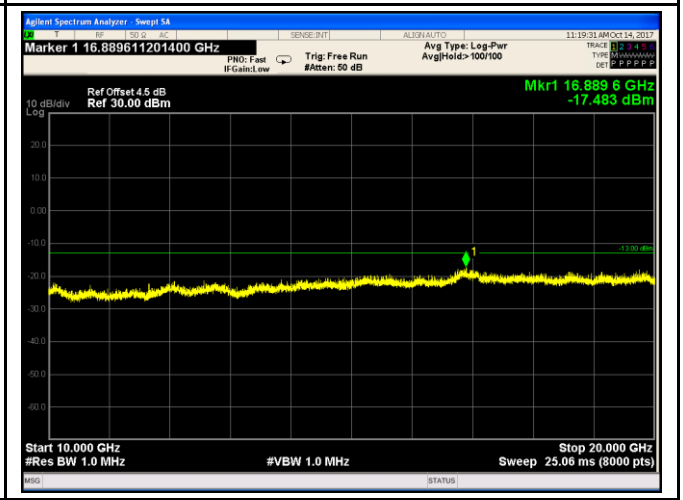
Band II - Middle Channel-1



Band II - Middle Channel-2



Band II - High Channel-1

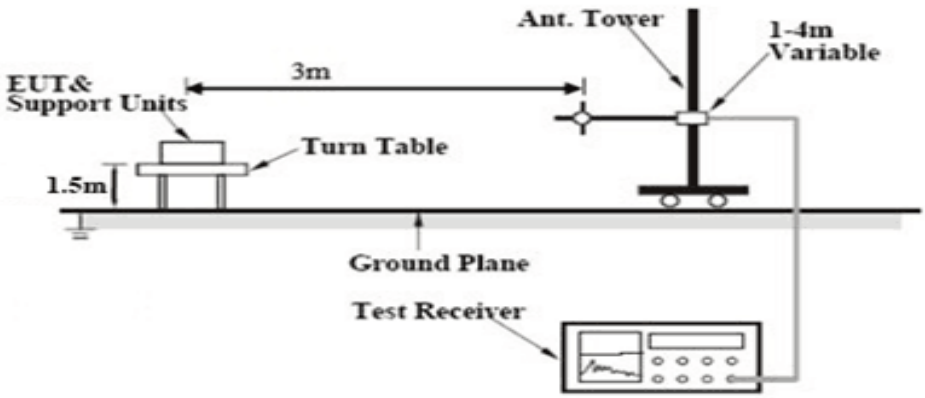


Band II - High Channel-2

6.6 Spurious Radiated Emissions

Temperature	25℃
Relative Humidity	51%
Atmospheric Pressure	1020mbar
Test date :	October 14, 2017
Tested By :	Loren Luo

Requirement(s):

Spec	Item	Requirement	Applicable
§2.1053, §22.917 & §24.238	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	-46.25	V	7.95	0.67	-38.97	-13	-25.97
1648.4	-48.13	H	7.95	0.67	-40.85	-13	-27.85
155.7	-54.87	V	1	0.16	-54.03	-13	-41.03
973.7	-53.11	H	6.35	0.41	-47.17	-13	-34.17

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	-46.12	V	7.95	0.67	-38.84	-13	-25.84
1673.2	-47.61	H	7.95	0.67	-40.33	-13	-27.33
315.7	-56.28	V	5.58	0.25	-50.95	-13	-37.95
544	-54.38	H	6.44	0.33	-48.27	-13	-35.27

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	-46.39	V	7.95	0.68	-39.12	-13	-26.12
1697.6	-48.51	H	7.95	0.68	-41.24	-13	-28.24
242.1	-56.13	V	5.92	0.22	-50.43	-13	-37.43
755.9	-57.84	H	6.41	0.44	-51.87	-13	-38.87

Note:

*1, The testing has been conformed to 10*848.8MHz=8,488MHz*
2, All other emissions more than 30 dB below the limit
3,GSM voice and GPRS mode were investigated. The results above show only the worse cases
4, X-Axis, Y-Axis and Z-Axis were investigated. The results above show only the worst case.

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	-47.19	V	10.25	1	-37.94	-13	-24.94
3700.4	-49.28	H	10.25	1	-40.03	-13	-27.03
108.7	-54.27	V	-0.13	0.16	-54.56	-13	-41.56
702.4	-56.1	H	6.31	0.41	-50.2	-13	-37.20

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	-44.13	V	10.25	1.01	-34.89	-13	-21.89
3760	-45.27	H	10.25	1.01	-36.03	-13	-23.03
164.7	-56.91	V	0.94	0.15	-56.12	-13	-43.12
955.8	-54.38	H	6.21	0.51	-48.68	-13	-35.68

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	-47.12	V	10.36	1.02	-37.78	-13	-24.78
3819.6	-48.52	H	10.36	1.02	-39.18	-13	-26.18
304.6	-56.13	V	5.59	0.28	-50.82	-13	-37.82
570.9	-57.81	H	6.43	0.38	-51.76	-13	-38.76

Note:

*1, The testing has been conformed to 10*1909.8MHz=19,098MHz*
2, All other emissions more than 30 dB below the limit
3, GSM voice and GPRS mode were investigated. The results above show only the worse cases
4, X-Axis, Y-Axis and Z-Axis were investigated. The results above show only the worst case.
5, The radiated spurious test above 18GHz is subcontracted to SIEMIC (Nanjing-China) Laboratories. and found 30dB below the limit at least.

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	-44.13	V	7.95	0.67	-36.85	-13	-23.85
1652.8	-46.82	H	7.95	0.67	-39.54	-13	-26.54
206.2	-58.21	V	3.61	0.22	-54.82	-13	-41.82
142.5	-59.27	H	1.09	0.13	-58.31	-13	-45.31

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	-42.16	V	7.95	0.67	-34.88	-13	-21.88
1670	-43.75	H	7.95	0.67	-36.47	-13	-23.47
283.8	-51.32	V	5.64	0.21	-45.89	-13	-32.89
567.2	-53.26	H	6.47	0.38	-47.17	-13	-34.17

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	-43.29	V	7.95	0.68	-36.02	-13	-23.02
1693.2	-45.81	H	7.95	0.68	-38.54	-13	-25.54
136.5	-59.62	V	0.98	0.2	-58.84	-13	-45.84
960	-57.21	H	6.34	0.52	-51.39	-13	-38.39

Note:

*1, The testing has been conformed to 10*846.6MHz=8,466MHz*
2, All other emissions more than 30 dB below the limit
3,RMC , HSUPA and HSDPA mode were investigated. The results above show only the worse cases
4, X-Axis, Y-Axis and Z-Axis were investigated. The results above show only the worst case.

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	-44.16	V	10.25	1	-34.91	-13	-21.91
3704.8	-46.28	H	10.25	1	-37.03	-13	-24.03
48	-53.18	V	-4.31	0.07	-57.56	-13	-44.56
856.7	-54.27	H	6.27	0.46	-48.46	-13	-35.46

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	-46.1	V	10.25	1.01	-36.86	-13	-23.86
3760	-47.53	H	10.25	1.01	-38.29	-13	-25.29
137.6	-53.28	V	1.04	0.24	-52.48	-13	-39.48
957.9	-54.62	H	6.2	0.43	-48.85	-13	-35.85

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	-45.19	V	10.36	1.02	-35.85	-13	-22.85
3815.2	-47.22	H	10.36	1.02	-37.88	-13	-24.88
301.9	-54.11	V	5.62	0.23	-48.72	-13	-35.72
555.8	-56.29	H	6.45	0.38	-50.22	-13	-37.22

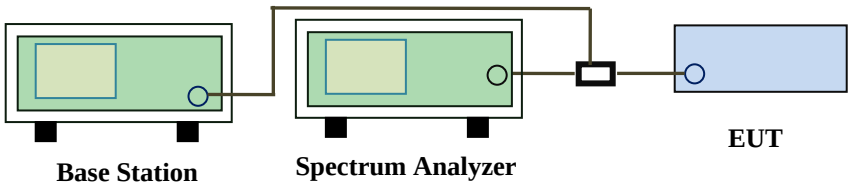
Note:

*1, The testing has been conformed to 10*1907.6MHz=19,076MHz*
2, All other emissions more than 30 dB below the limit
3,RMC , HSUPA and HSDPA mode were investigated. The results above show only the worse cases
4, X-Axis, Y-Axis and Z-Axis were investigated. The results above show only the worst case
5, The radiated spurious test above 18GHz is subcontracted to SIEMIC (Nanjing-China) Laboratories. and found 30dB below the limit at least.

6.7 Band Edge

Temperature	25℃
Relative Humidity	55%
Atmospheric Pressure	1012mbar
Test date :	October 10&14, 2017
Tested By :	Loren Luo

Requirement(s):

Spec	Item	Requirement	Applicable
§22.917(a) §24.238(a)	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

GSM Voice:

Cellular Band (Part 22H) result

Frequency (MHz)	Emission (dBm)	Limit (dBm)
823.996	-17.643	-13
849.019	-18.780	-13

PCS Band (Part24E) result

Frequency (MHz)	Emission (dBm)	Limit (dBm)
1849.995	-15.952	-13
1910.018	-15.779	-13

GPRS:

Cellular Band (Part 22H) result

Frequency (MHz)	Emission (dBm)	Limit (dBm)
823.996	-17.643	-13
849.019	-18.780	-13

PCS Band (Part24E) result

Frequency (MHz)	Emission (dBm)	Limit (dBm)
1849.995	-14.660	-13
1910.017	-16.998	-13

RMC:

UMTS-FDD Band V (Part 22H)

Frequency (MHz)	Emission (dBm)	Limit (dBm)
823.70	-23.591	-13
849.11	-24.690	-13

UMTS-FDD Band II (Part 24E)

Frequency (MHz)	Emission (dBm)	Limit (dBm)
1849.91	-16.873	-13
1910.76	-23.894	-13

HSDPA:

UMTS-FDD Band V (Part 22H)

Frequency (MHz)	Emission (dBm)	Limit (dBm)
824.00	-23.591	-13
849.00	-24.690	-13

UMTS-FDD Band II (Part 24E)

Frequency (MHz)	Emission (dBm)	Limit (dBm)
1848.89	-16.897	-13
1910.04	-23.175	-13

HSUPA:

UMTS-FDD Band V (Part 22H)

Frequency (MHz)	Emission (dBm)	Limit (dBm)
823.70	-23.591	-13
849.76	-22.658	-13

UMTS-FDD Band II (Part 24E)

Frequency (MHz)	Emission (dBm)	Limit (dBm)
1849.88	-16.897	-13
1910.02	-22.847	-13