

FCC RADIO TEST REPORT

FCC ID: 2AMDJMATRIXRTK

Product : MatrixRTK GNSS Receiver

Trade Name : **TERSUS**

Model Name : MatrixRTK

Serial Model : N/A

Report No. : STUEMO017071304116RF1

Prepared for

Tersus GNSS Inc.

Rm 210, Building A, No. 666 Zhangheng Road, Zhangjiang Hi-tech Park,
Pudong, Shanghai, P.R.C

Prepared by

BZT Testing Technology Co., Ltd.

Buliding 17,Xinghua Road Xingwei industrial Park Fuyong,Baoan District
Shenzhen, China

TEST RESULT CERTIFICATION

Applicant's name: Tersus GNSS Inc.

Address: Rm 210, Building A, No. 666 Zhangheng Road, Zhangjiang Hi-tech Park, Pudong, Shanghai, P.R.C

Manufacture's Name: Tersus GNSS Inc.

Address: Rm 210, Building A, No. 666 Zhangheng Road, Zhangjiang Hi-tech Park, Pudong, Shanghai, P.R.C

Product description

Product name: MatrixRTK GNSS Receiver

Model and/or type reference: MatrixRTK

Trade Name **TERSUS**

Standards: FCC Part 22(H):2016; FCC Part 24(E):2016; ANSI/TIA-603-D: 2010

Test procedure..... ANSI/TIA-603-D:2010

This device described above has been tested by BZT, and the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.

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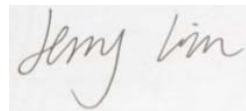
Date of Test

Date (s) of performance of tests: 01 Jun. 2017 ~17 Jun. 2017

Date of Issue: 17 Jun. 2017

Test Result.....: **Pass**

Testing Engineer :



(Jerry Lin)

Technical Manager :



(Jimmy Yao)

Authorized Signatory :



(Terry Yang)

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1. Report Revision History

Report No.	Report Version	Description	Issue Date
STUEMO017071304116RF1	NONE	Original	17 Jun. 2017

2. Test site information

Lab performing tests	BZT Testing Technology Co., Ltd.
Lab Address	Buliding 17,Xinghua Road Xingwei industrial Park Fuyong,Baoan District, Shenzhen,Guangdong,China
FCC Test Site No.	701733

3. Equipment under Test (EUT) Information

Description of EUT:	MatrixRTK GNSS Receiver
Main Model:	MatrixRTK
Equipment Category :	PCE
Antenna Gain:	GSM850: 0.51dBi PCS1900:0.34dBi UMTS-FDD Band V: 0.39dBi UMTS-FDD Band II: 0.37dBi WIFI: 2.0dBi
Antenna Type:	External Antenna
Type of Modulation:	GSM / GPRS: GMSK EGPRS: GMSK UMTS-FDD: QPSK 802.11b/g/n: DSSS, OFDM
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
Maximum Conducted AV Power to Antenna:	GSM :GSM850: 33.52 dBm PCS1900: 29.62 dBm GPRS:GSM850: 33.51 dBm PCS1900: 29.39 dBm EGPRS(MCS1):GSM850: 33.50 dBm PCS1900: 29.19 dBm RMC:UMTS-FDD Band 5: 21.98 dBm UMTS-FDD Band 2: 21.06 dBm HSUPA:UMTS-FDD Band 5: 21.20 dBm

UMTS-FDD Band 2: 20.79 dBm
HSDPA:UMTS-FDD Band 5: 21.05 dBm
UMTS-FDD Band 2: 20.80 dBm

GSM :GSM850: 30.87 dBm / ERP
PCS1900: 30.62 dBm / EIRP
GPRS:GSM850: 30.86 dBm / ERP
PCS1900: 30.39 dBm / EIRP
EGPRS(MCS1):GSM850: 30.85 dBm / ERP
PCS1900: 30.19 dBm / EIRP

ERP/EIRP: RMC:UMTS-FDD Band 5: 19.33 dBm / ERP
UMTS-FDD Band 2: 21.96 dBm / EIRP
HSDPA:UMTS-FDD Band 5: 18.40 dBm / ERP
UMTS-FDD Band 2: 21.70 dBm / EIRP
HSUPA:UMTS-FDD Band 5: 18.55 dBm / ERP
UMTS-FDD Band 2: 21.69 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

Port: USB Port, Earphone Port

Adapter:
Model: GS40A12
AC Power Input: 100-240V~, 50/60Hz, 1A
Input Power: Output: 12.0V---, 3.34A
Battery:
Spec: DC 7.4V, 12500mAH

Trade Name :

TERSUS

GPRS/ EGPRS Multi-slot class 8/10/12

4. 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

Parameter	Uncertainty
AC Power Line Conducted Emissions (150kHz~30MHz)	$\pm 3.71\text{dB}$
Radiated Emission(30MHz~1GHz)	$\pm 5.12\text{dB}$
Radiated Emission(1GHz~6GHz)	$\pm 5.34\text{dB}$

5. MEASUREMENTS, EXAMINATION AND DERIVED RESULTS

6.1 RF Exposure (SAR)

Test Result: Pass

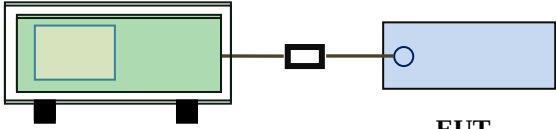
The EUT is a Mobile device, Please refer to MPE Evaluation Report: STUEMO016060204111RF3

6.2 RF Output Power

Temperature	22 °C
Relative Humidity	53%
Atmospheric Pressure	1029mbar

Requirement(s):

Spec	Item	Requirement	Applicable
§22.913 (a)	a)	ERP:38.45dBm	☒
§24.232 (c)	b)	EIRP:33dBm	☒

Test Setup	 Base Station EUT
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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
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	were measured by the substitution. - Spurious emissions in dB = $10 \log (\text{TX power in Watts}/0.001)$ – the absolute level - Spurious attenuation limit in dB = $43 + 10 \text{ Log}_{10} (\text{power out in Watts})$.
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	33.49	33.51	33.52	33.5±1	29.51	29.55	29.62	29.5±1
GPRS Multi-Slot Class 8 (1 uplink),GMSK	33.48	33.5	33.51	33.5±1	29.35	29.39	29.35	29.5±1
GPRS Multi-Slot Class 10 (2 uplink) GMSK	32.69	32.68	32.74	32.5±1	28.53	28.78	28.92	29±1
GPRS Multi-Slot Class 12 (4 uplink) GMSK	29.14	29.06	29.01	29±1	25.7	25.93	26.73	26±1
EGPRS Multi-Slot Class 8 (1 uplink) GMSK MCS1	33.48	33.47	33.5	33.5±1	29.19	29.11	29.17	29.5±1
EGPRS Multi-Slot Class 10 (2 uplink) GMSK MCS1	32.67	32.66	32.71	32.5±1	28.31	28.62	28.76	28.5±1
EGPRS Multi-Slot Class 12 (4 uplink) GMSK MCS1	29.11	29.04	29	29±1	25.47	25.73	26.64	26±1

Remark :

GPRS, CS1 coding scheme.

EGPRS, MCS1 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

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	21.78	21.5±1
	4175	835	21.98	21.5±1
	4233	846.6	21.54	21.5±1
HSDPA Subtest1	4132	826.4	21.01	21.3±1
	4175	835	21.05	21.3±1
	4233	846.6	21.05	21.3±1
HSDPA Subtest2	4132	826.4	20.91	21.3±1
	4175	835	20.92	21.3±1
	4233	846.6	20.9	21.3±1
HSDPA Subtest3	4132	826.4	21.02	21.3±1
	4175	835	21.03	21.3±1
	4233	846.6	21.05	21.3±1
HSDPA Subtest4	4132	826.4	20.92	21.3±1
	4175	835	20.95	21.3±1
	4233	846.6	20.93	21.3±1
HSUPA Subtest1	4132	826.4	21.2	21.3±1
	4175	835	21.16	21.3±1
	4233	846.6	21.18	21.3±1
HSUPA Subtest2	4132	826.4	21.02	21.3±1
	4175	835	21.03	21.3±1
	4233	846.6	21.05	21.3±1
HSUPA Subtest3	4132	826.4	21.13	21.3±1
	4175	835	21.15	21.3±1
	4233	846.6	21.12	21.3±1
HSUPA Subtest4	4132	826.4	20.93	21.3±1
	4175	835	20.95	21.3±1
	4233	846.6	20.91	21.3±1
HSUPA Subtest5	4132	826.4	21.17	21.3±1
	4175	835	21.13	21.3±1
	4233	846.6	21.11	21.3±1

UMTS-FDD Band II

Band/ Time Slot configuration	Channel	Frequency	Average power (dBm)	Tune up Power tolerant
RMC 12.2kbps	9262	1852.4	21.06	21.3±1
	9400	1880	21.01	21.3±1
	9538	1907.6	21.04	21.3±1
HSDPA Subtest1	9262	1852.4	20.75	21.3±1
	9400	1880	20.77	21.3±1
	9538	1907.6	20.8	21.3±1
HSDPA Subtest2	9262	1852.4	20.69	21.3±1
	9400	1880	20.65	21.3±1
	9538	1907.6	20.69	21.3±1
HSDPA Subtest3	9262	1852.4	20.66	21.3±1
	9400	1880	20.61	21.3±1
	9538	1907.6	20.67	21.3±1
HSDPA Subtest4	9262	1852.4	20.79	21.3±1
	9400	1880	20.75	21.3±1
	9538	1907.6	20.73	21.3±1
HSUPA Subtest1	9262	1852.4	20.55	21.3±1
	9400	1880	20.55	21.3±1
	9538	1907.6	20.56	21.3±1
HSUPA Subtest2	9262	1852.4	20.78	21.3±1
	9400	1880	20.79	21.3±1
	9538	1907.6	20.77	21.3±1
HSUPA Subtest3	9262	1852.4	20.53	21.3±1
	9400	1880	20.56	21.3±1
	9538	1907.6	20.54	21.3±1
HSUPA Subtest4	9262	1852.4	20.55	21.3±1
	9400	1880	20.59	21.3±1
	9538	1907.6	20.6	21.3±1
HSUPA Subtest5	9262	1852.4	20.77	21.3±1
	9400	1880	20.73	21.3±1
	9538	1907.6	20.76	21.3±1

ERP & EIRP

GSM

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	24.57	V	6.8	0.53	30.84	38.45
824.2	23.44	H	6.8	0.53	29.71	38.45
836.6	24.59	V	6.8	0.53	30.86	38.45
836.6	23.41	H	6.8	0.53	29.68	38.45
848.8	24.5	V	6.9	0.53	30.87	38.45
848.8	23.46	H	6.9	0.53	29.83	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	23.48	V	7.88	0.85	30.51	33
1850.2	22.41	H	7.88	0.85	29.44	33
1880	23.52	V	7.88	0.85	30.55	33
1880	22.34	H	7.88	0.85	29.37	33
1909.8	23.61	V	7.86	0.85	30.62	33
1909.8	22.52	H	7.86	0.85	29.53	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	24.56	V	6.8	0.53	30.83	38.45
824.2	23.36	H	6.8	0.53	29.63	38.45
836.6	24.58	V	6.8	0.53	30.85	38.45
836.6	23.53	H	6.8	0.53	29.8	38.45
848.8	24.49	V	6.9	0.53	30.86	38.45
848.8	23.42	H	6.9	0.53	29.79	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	23.32	V	7.88	0.85	30.35	33
1850.2	22.19	H	7.88	0.85	29.22	33
1880	23.36	V	7.88	0.85	30.39	33
1880	22.28	H	7.88	0.85	29.31	33
1909.8	23.34	V	7.86	0.85	30.35	33
1909.8	22.27	H	7.86	0.85	29.28	33

EGPRS (MCS1):
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	24.56	V	6.8	0.53	30.83	38.45
824.2	23.47	H	6.8	0.53	29.74	38.45
836.6	24.55	V	6.8	0.53	30.82	38.45
836.6	23.35	H	6.8	0.53	29.62	38.45
848.8	24.48	V	6.9	0.53	30.85	38.45
848.8	14.4	H	6.9	0.53	20.77	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	23.16	V	7.88	0.85	30.19	33
1850.2	22.05	H	7.88	0.85	29.08	33
1880	23.08	V	7.88	0.85	30.11	33
1880	22.02	H	7.88	0.85	29.05	33
1909.8	23.16	V	7.86	0.85	30.17	33
1909.8	12.12	H	7.86	0.85	19.13	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	12.86	V	6.8	0.53	19.13	38.45
826.4	11.68	H	6.8	0.53	17.95	38.45
835	13.06	V	6.8	0.53	19.33	38.45
835	11.88	H	6.8	0.53	18.15	38.45
846.6	12.52	V	6.9	0.53	18.89	38.45
846.6	11.39	H	6.9	0.53	17.76	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	14.93	V	7.88	0.85	21.96	33
1852.4	13.9	H	7.88	0.85	20.93	33
1880	14.88	V	7.88	0.85	21.91	33
1880	13.84	H	7.88	0.85	20.87	33
1907.6	14.93	V	7.86	0.85	21.94	33
1907.6	13.84	H	7.86	0.85	20.85	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	12.1	V	6.8	0.53	18.37	38.45
826.4	10.97	H	6.8	0.53	17.24	38.45
835	12.13	V	6.8	0.53	18.4	38.45
835	11.04	H	6.8	0.53	17.31	38.45
846.6	12.03	V	6.9	0.53	18.4	38.45
846.6	10.92	H	6.9	0.53	17.29	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	14.66	V	7.88	0.85	21.69	33
1852.4	13.52	H	7.88	0.85	20.55	33
1880	14.64	V	7.88	0.85	21.67	33
1880	13.5	H	7.88	0.85	20.53	33
1907.6	14.69	V	7.86	0.85	21.7	33
1907.6	13.47	H	7.86	0.85	20.48	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	12.28	V	6.8	0.53	18.55	38.45
826.4	11.16	H	6.8	0.53	17.43	38.45
835	12.24	V	6.8	0.53	18.51	38.45
835	11.12	H	6.8	0.53	17.39	38.45
846.6	12.16	V	6.9	0.53	18.53	38.45
846.6	10.94	H	6.9	0.53	17.31	38.45

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

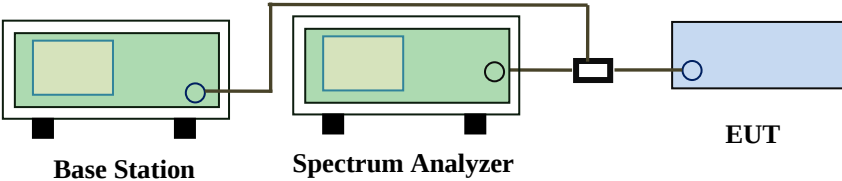
Frequency (MHz)	Substituted level (dBm)	Antenna Polarization	Antenna Gain correction (dBi)	Cable Loss (dB)	Absolute Level (dBm)	Limit (dBm)
1852.4	14.65	V	7.88	0.85	21.68	33
1852.4	13.49	H	7.88	0.85	20.52	33
1880	14.66	V	7.88	0.85	21.69	33
1880	13.61	H	7.88	0.85	20.64	33
1907.6	14.66	V	7.86	0.85	21.67	33
1907.6	13.57	H	7.86	0.85	20.58	33

6.3 Peak-Average Ratio

Temperature	22 °C
Relative Humidity	53%
Atmospheric Pressure	1029mbar

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	 Base Station Spectrum Analyzer EUT
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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 $\geq 98\%$) and at all times the EUT is transmitting at its 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
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	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 $10\log(1/\text{duty cycle})$
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	29.95	29.51	0.44
1880	29.98	29.55	0.43
1909.8	29.87	29.62	0.25

GPRS 1900 PK-AV POWER (PART 24E)

Frequency (MHz)	Conducted power(dBm)		Peak-Average Ratio(PAR)
	Peak	Average	
1850.2	30.16	29.35	0.81
1880	30.04	29.39	0.65
1909.8	30.13	29.35	0.78

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

Frequency (MHz)	Conducted power(dBm)		Peak-Average Ratio(PAR)
	Peak	Average	
1852.4	21.44	21.06	0.38
1880	21.46	21.01	0.45
1907.6	21.42	21.04	0.38

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

Frequency (MHz)	Conducted power(dBm)		Peak-Average Ratio(PAR)
	Peak	Average	
1852.4	21.07	20.75	0.32
1880	21.06	20.77	0.29
1907.6	21.16	20.8	0.36

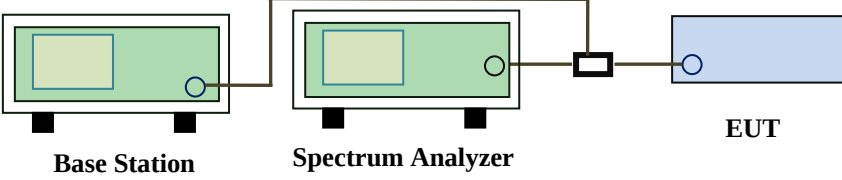
HSUPA : UMTS-FDD Band 2 PK-AV POWER (PART 24E)

Frequency (MHz)	Conducted power(dBm)		Peak-Average Ratio(PAR)
	Peak	Average	
1852.4	20.89	20.55	0.34
1880	20.76	20.55	0.21
1907.6	20.83	20.56	0.27

6.4 Occupied Bandwidth

Temperature	22 °C
Relative Humidity	53%
Atmospheric Pressure	1029mbar

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 :
Cellular Band (Part 22H) result

Channel	Frequency (MHz)	99% Occupied Bandwidth (kHz)	26 dB Bandwidth (kHz)
128	824.2	246.7382	318.013
190	836.6	246.2167	318.711
251	848.8	243.5215	318.443

PCS Band (Part 24E) result

Channel	Frequency (MHz)	99% Occupied Bandwidth (kHz)	26 dB Bandwidth (kHz)
512	1850.2	244.4681	316.633
661	1880.0	245.0898	318.238
810	1909.8	247.8561	321.105

GPRS:
Cellular Band (Part 22H) result

Channel	Frequency (MHz)	99% Occupied Bandwidth (kHz)	26 dB Bandwidth (kHz)
128	824.2	248.7170	320.354
190	836.6	244.2975	316.772
251	848.8	245.5446	320.830

PCS Band (Part 24E) result

Channel	Frequency (MHz)	99% Occupied Bandwidth (kHz)	26 dB Bandwidth (kHz)
512	1850.2	249.6268	316.924
661	1880.0	245.4067	316.320
810	1909.8	246.5661	319.021

EGPRS (MCS 1):**Cellular Band (Part 22H) result**

Channel	Frequency (MHz)	99% Occupied Bandwidth (kHz)	26 dB Bandwidth (kHz)
128	824.2	248.4726	319.475
190	836.6	251.9017	320.655
251	848.8	246.1471	321.055

PCS Band (Part 24E) result

Channel	Frequency (MHz)	99% Occupied Bandwidth (kHz)	26 dB Bandwidth (kHz)
512	1850.2	248.0951	317.589
661	1880.0	245.6015	317.081
810	1909.8	245.0639	321.098

RMC:
UMTS-FDD Band V (Part 22H)

Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	26 dB Bandwidth (MHz)
4132	826.4	4.1555	4.710
4175	835.0	4.1359	4.697
4233	846.6	4.1666	4.708

UMTS-FDD Band II (Part 24E)

Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	26 dB Bandwidth (MHz)
9262	1852.4	4.1634	4.697
9400	1880.0	4.1682	4.718
9538	1907.6	4.1621	4.711

HSDPA:
UMTS-FDD Band V (Part 22H)

Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	26 dB Bandwidth (MHz)
4132	826.4	4.1646	4.714
4175	835.0	4.1455	4.687
4233	846.6	4.1743	4.710

UMTS-FDD Band II (Part 24E)

Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	26 dB Bandwidth (MHz)
9262	1852.4	4.1577	4.711
9400	1880.0	4.1575	4.728
9538	1907.6	4.1600	4.701

HSUPA:**UMTS-FDD Band V (Part 22H)**

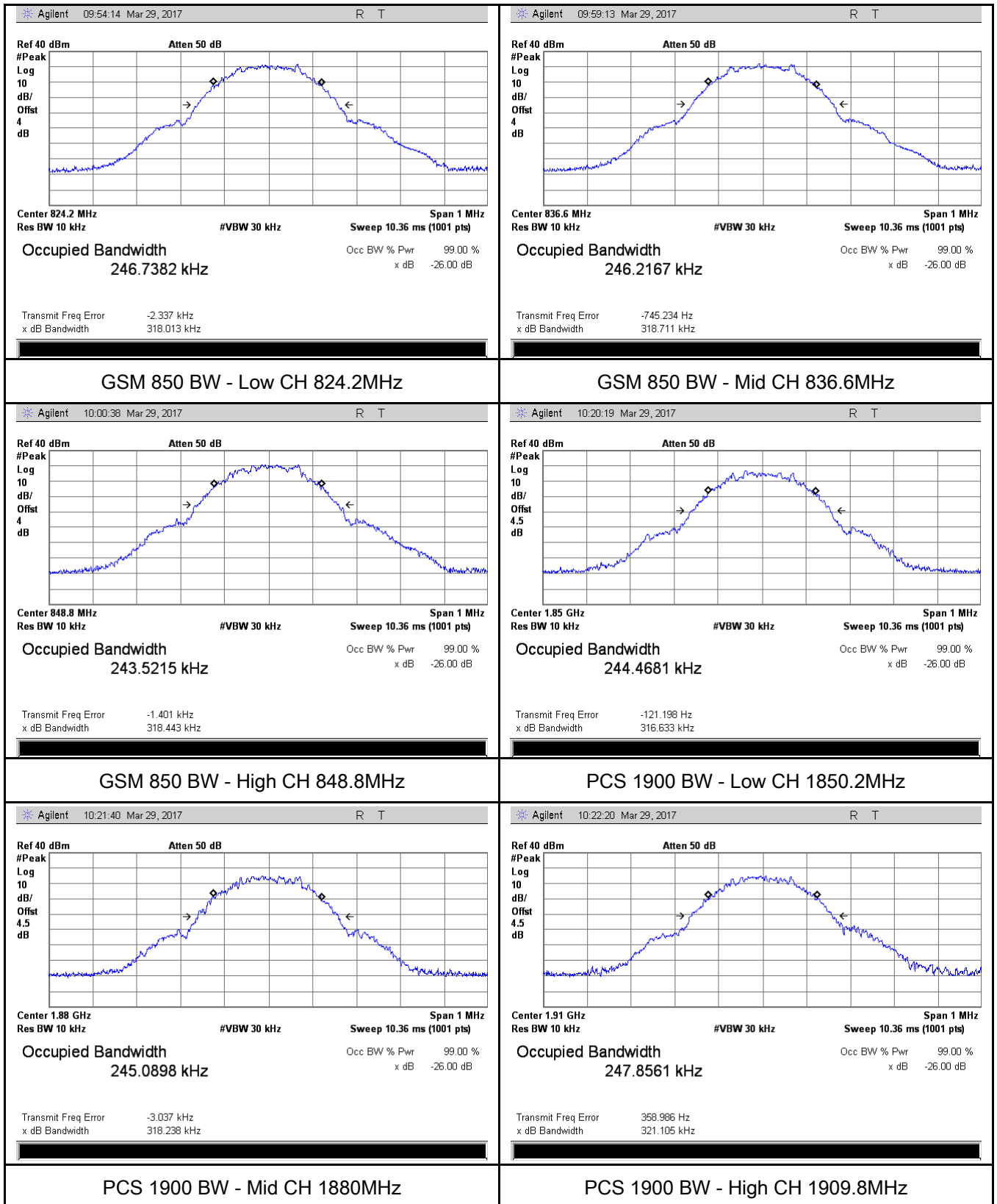
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	26 dB Bandwidth (MHz)
4132	826.4	4.1636	4.706
4175	835.0	4.1398	4.693
4233	846.6	4.1693	4.719

UMTS-FDD Band II (Part 24E)

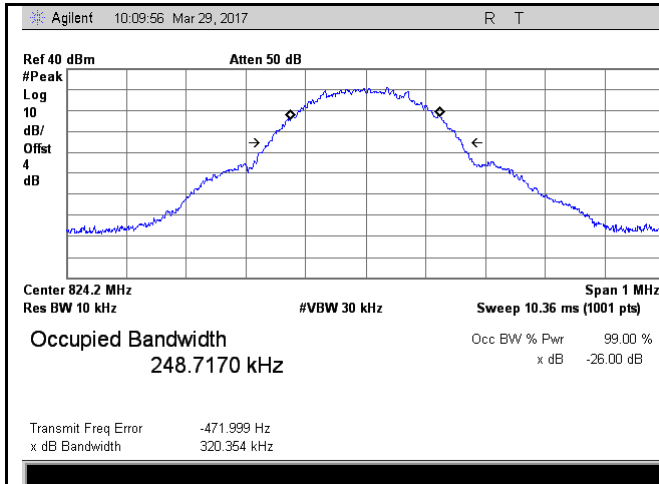
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	26 dB Bandwidth (MHz)
9262	1852.4	4.1729	4.720
9400	1880.0	4.1663	4.712
9538	1907.6	4.1606	4.706

Test Plots

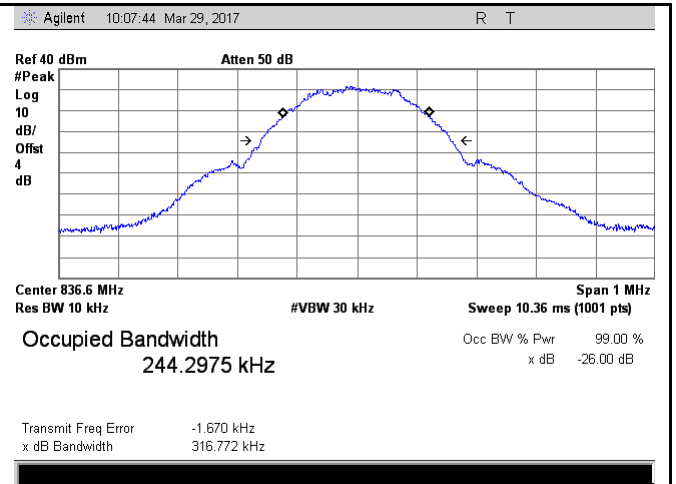
GSM Voice:



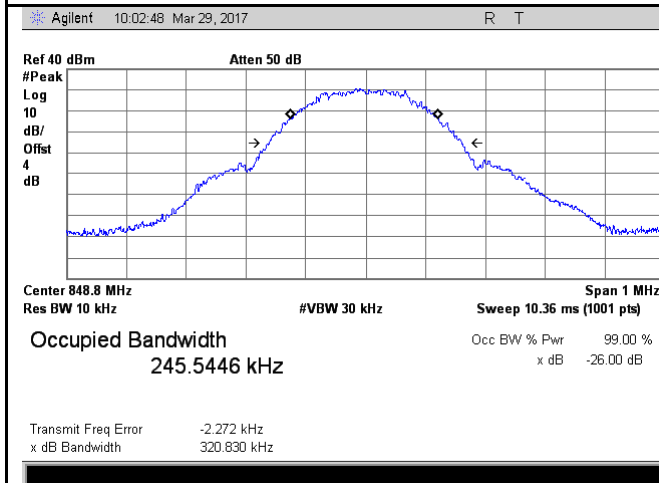
GPRS:



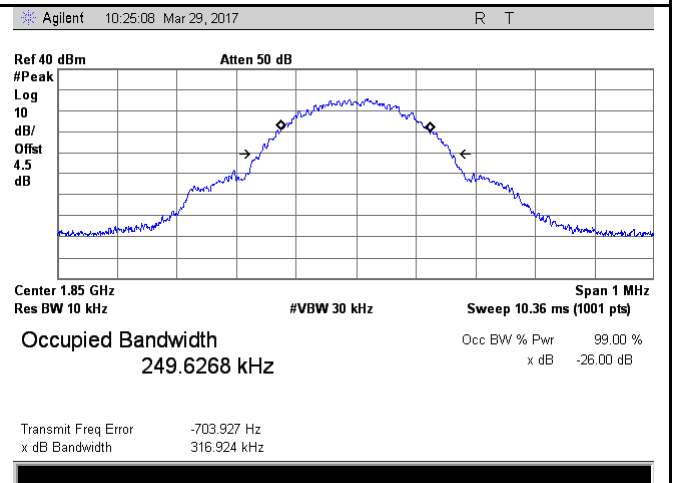
GSM 850 BW - Low CH 824.2MHz



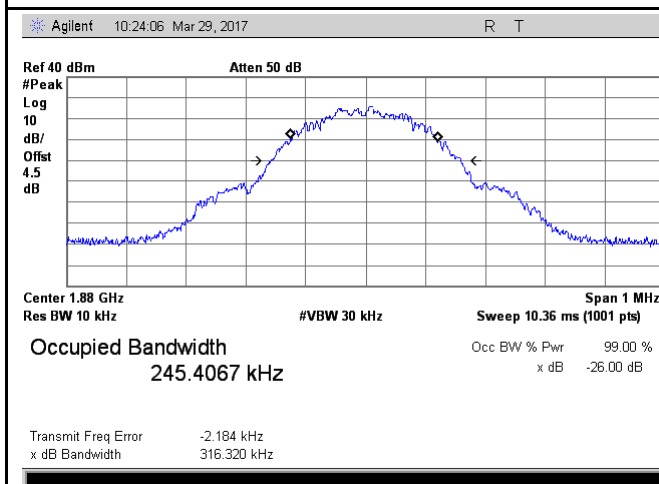
GSM 850 BW - Mid CH 836.6MHz



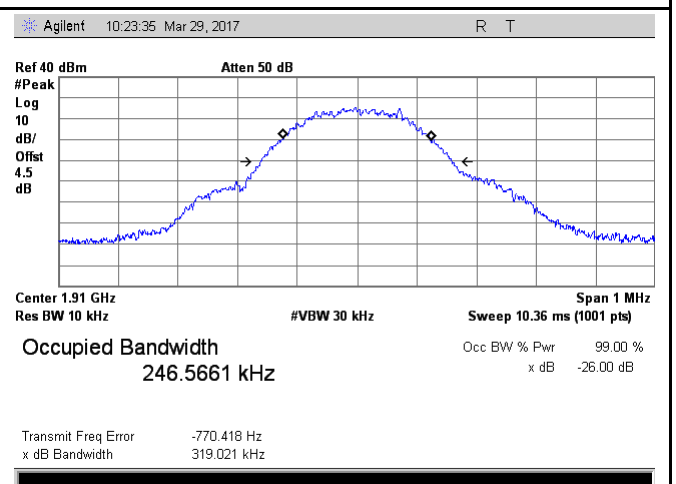
GSM 850 BW - High CH 848.8MHz



PCS 1900 BW - Low CH 1850.2MHz

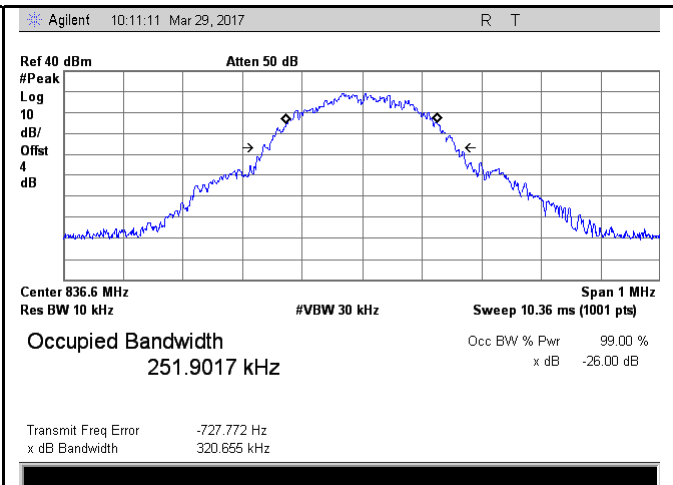
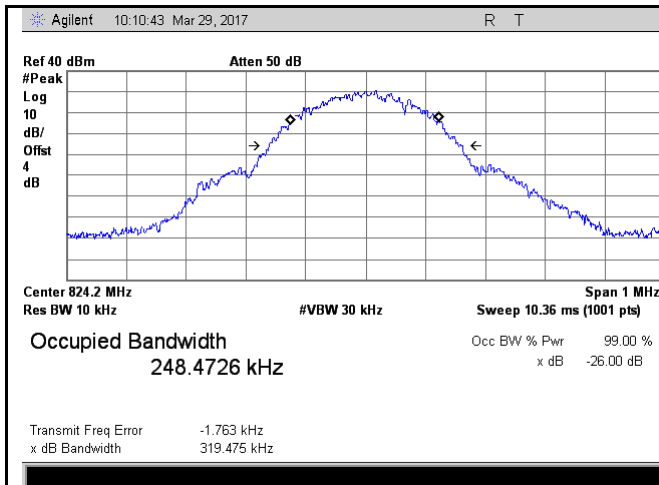


PCS 1900 BW - Mid CH 1880MHz

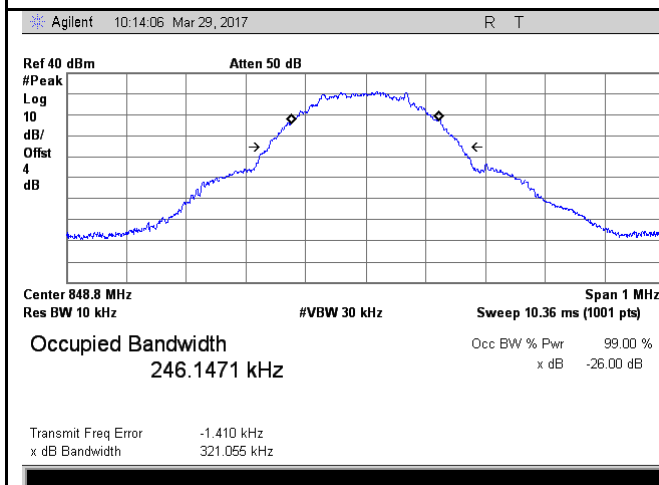


PCS 1900 BW - High CH 1909.8MHz

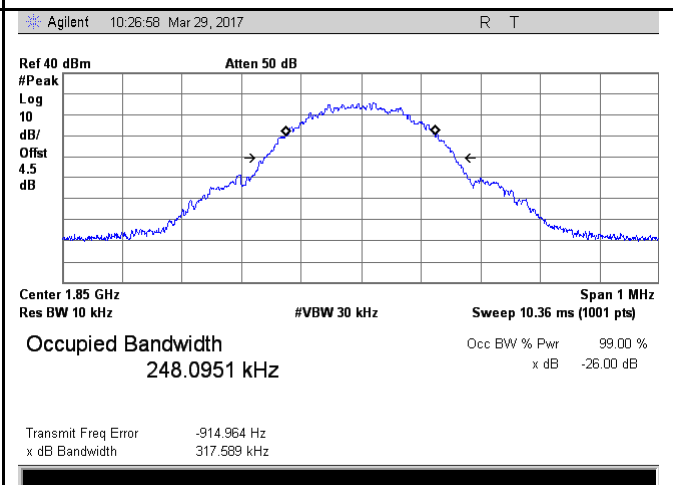
EGPRS (MCS1):



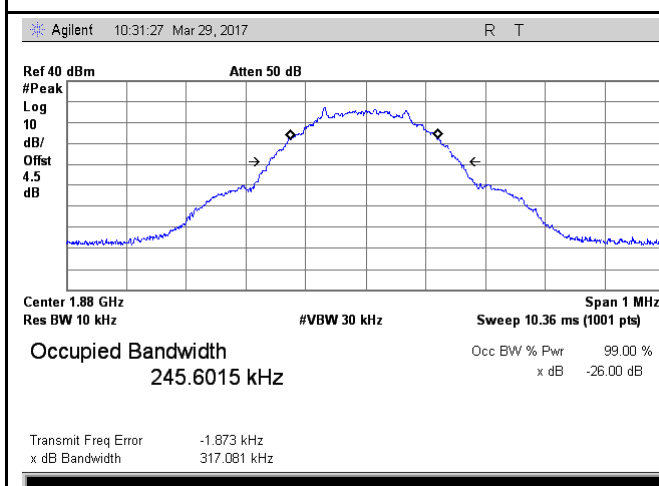
GSM 850 BW - Low CH 824.2MHz



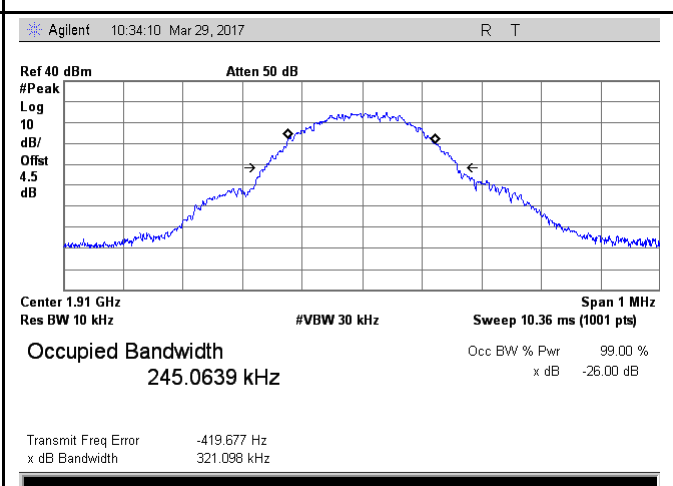
GSM 850 BW - Mid CH 836.6MHz



GSM 850 BW - High CH 848.8MHz



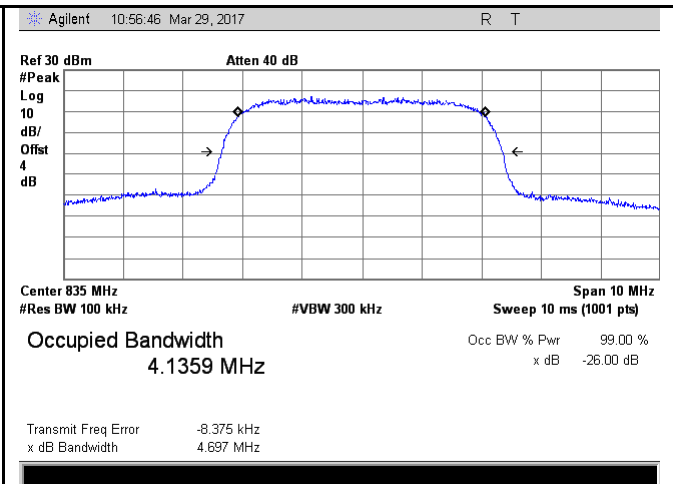
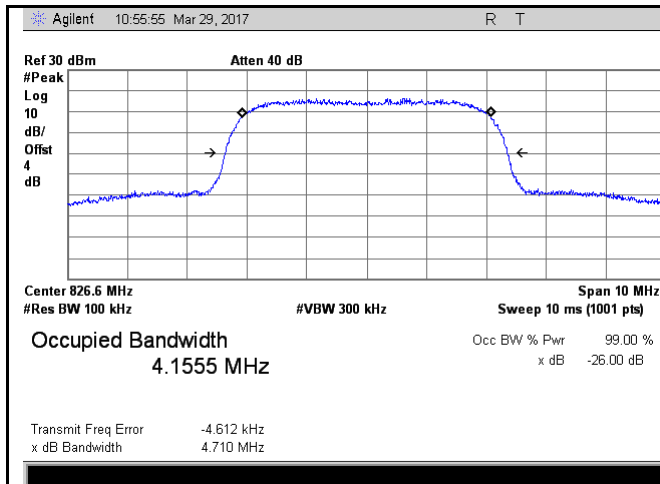
PCS 1900 BW - Low CH 1850.2MHz



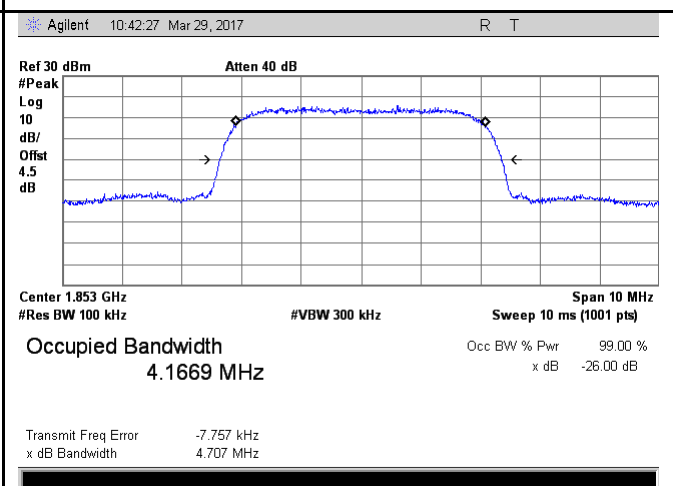
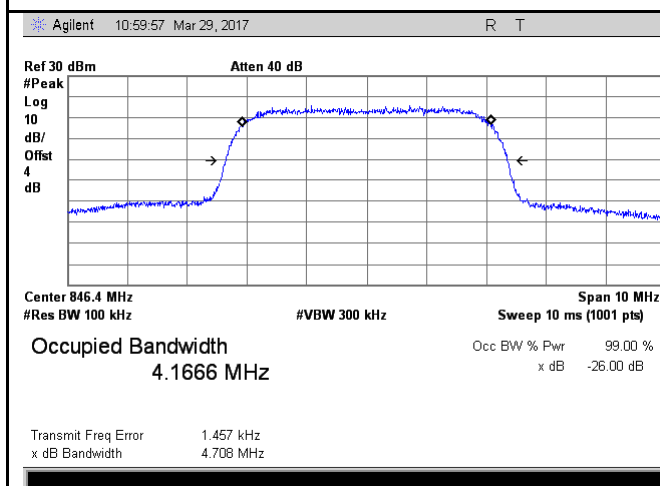
PCS 1900 BW - Mid CH 1880MHz

PCS 1900 BW - High CH 1909.8MHz

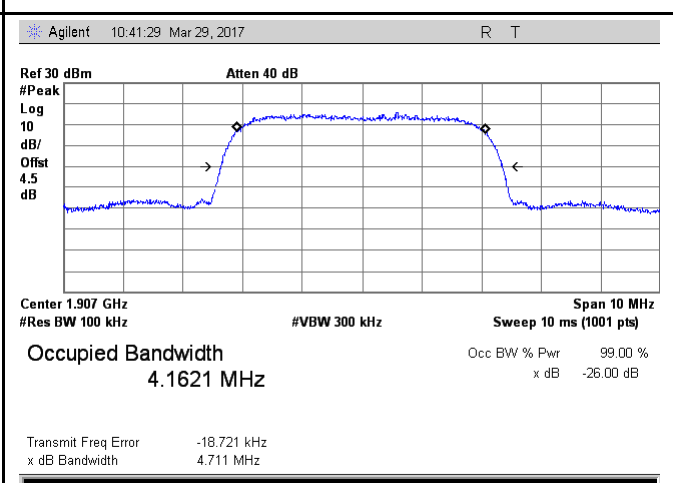
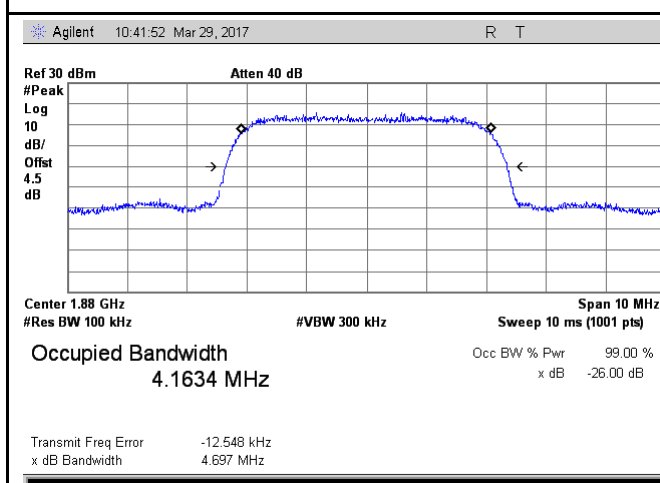
RMC:



Band V BW - Low CH 826.6 MHz

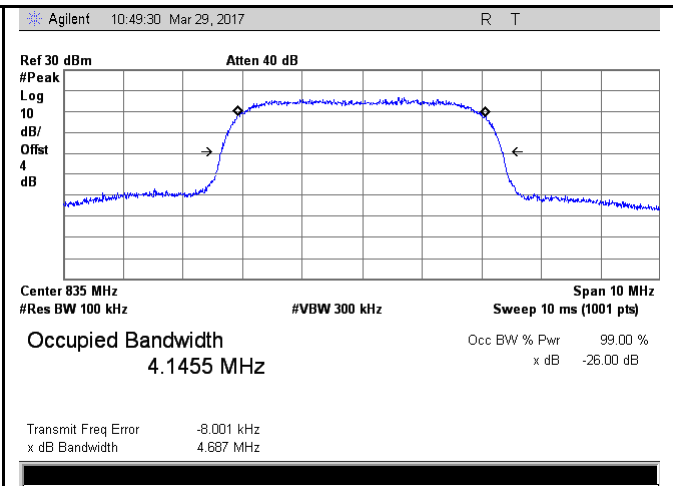
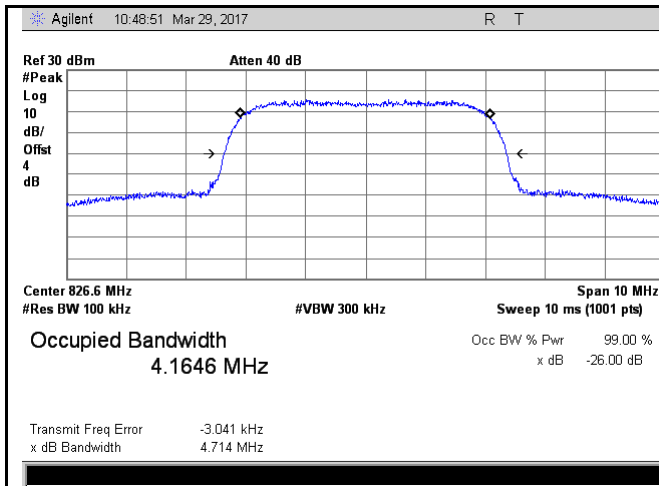
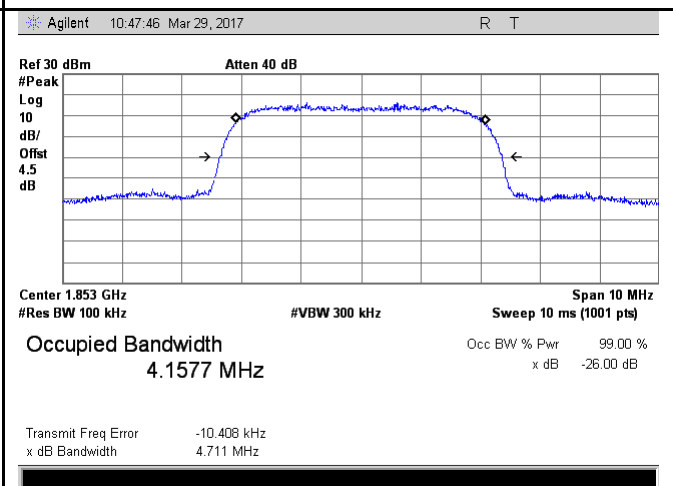
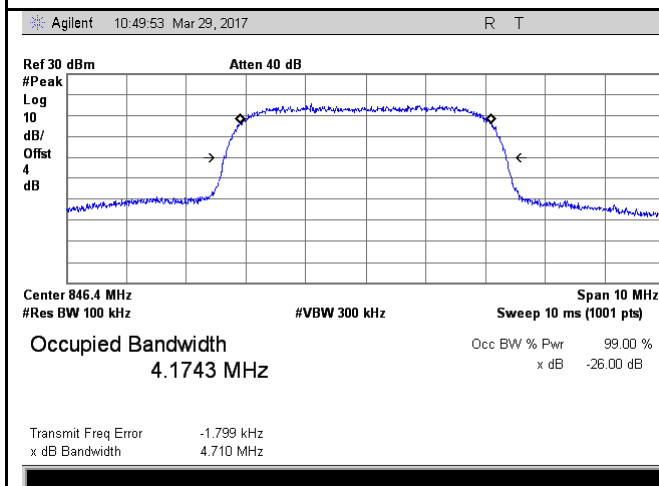
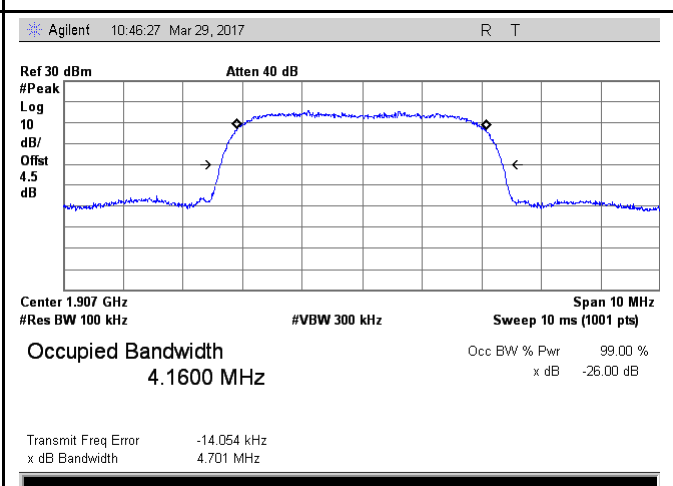
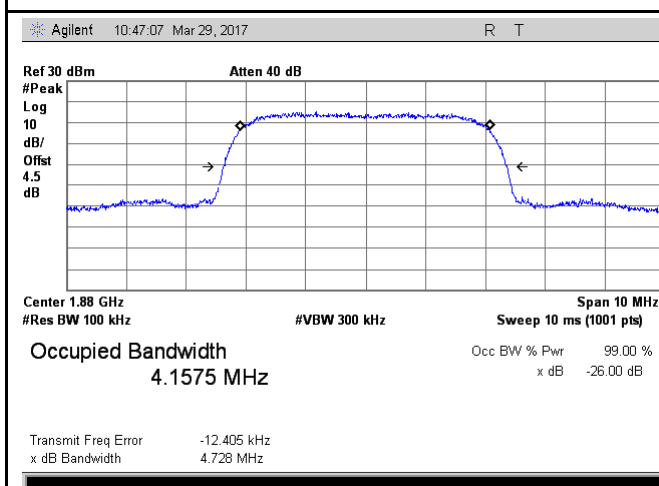


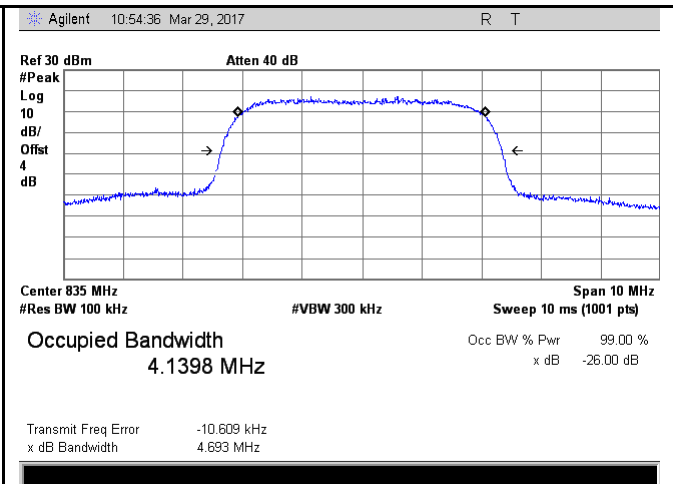
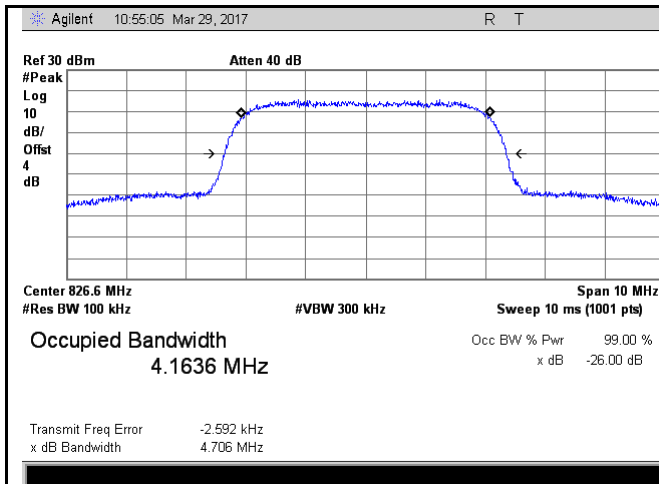
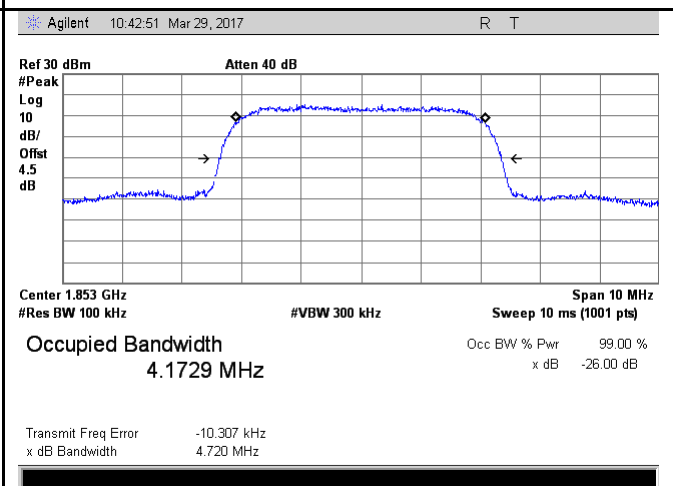
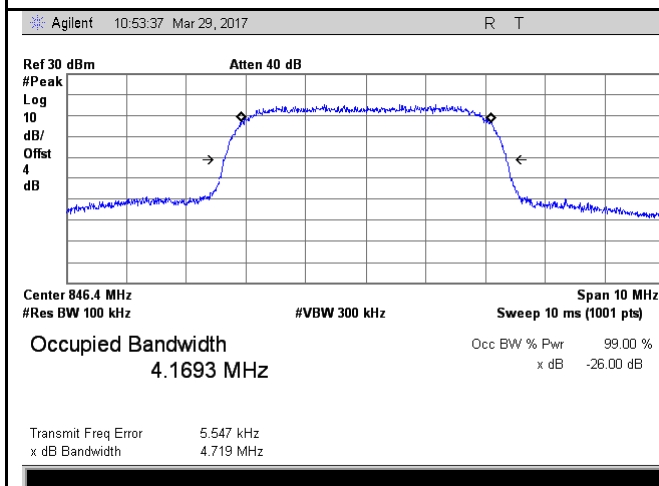
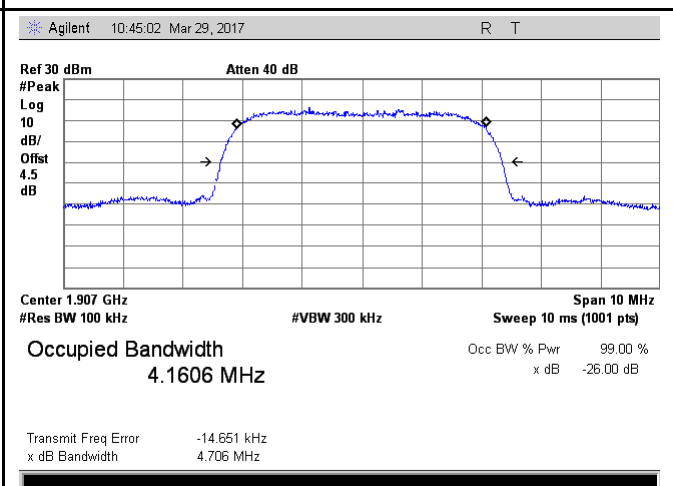
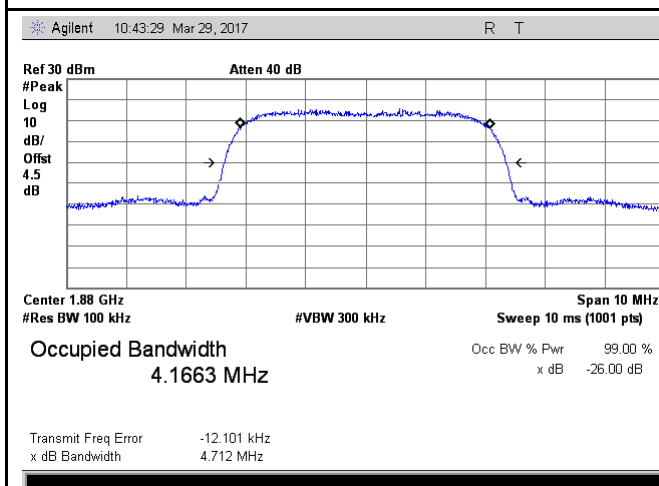
Band V BW - High CH 846.4 MHz



Band II BW - Mid CH 1880MHz

Band II BW - High CH 1907.6MHz

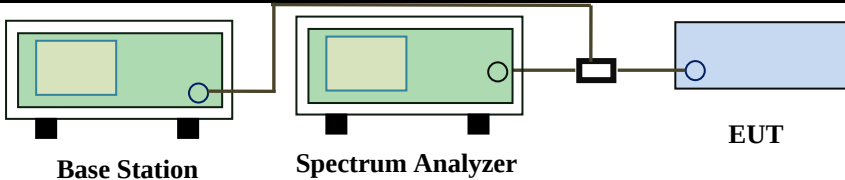
HSDPA:

Band V BW - Low CH 826.6 MHz

Band V BW - High CH 846.4 MHz

Band II BW - Mid CH 1880 MHz
Band II BW - High CH 1907.6 MHz

HSUPA:

Band V BW - Low CH 826.6 MHz

Band V BW - High CH 846.4 MHz

Band II BW - Mid CH 1880 MHz
Band II BW - High CH 1907.6 MHz

6.5 Spurious Emissions at Antenna Terminals

Temperature	22 °C
Relative Humidity	53%
Atmospheric Pressure	1029mbar

Requirement(s):

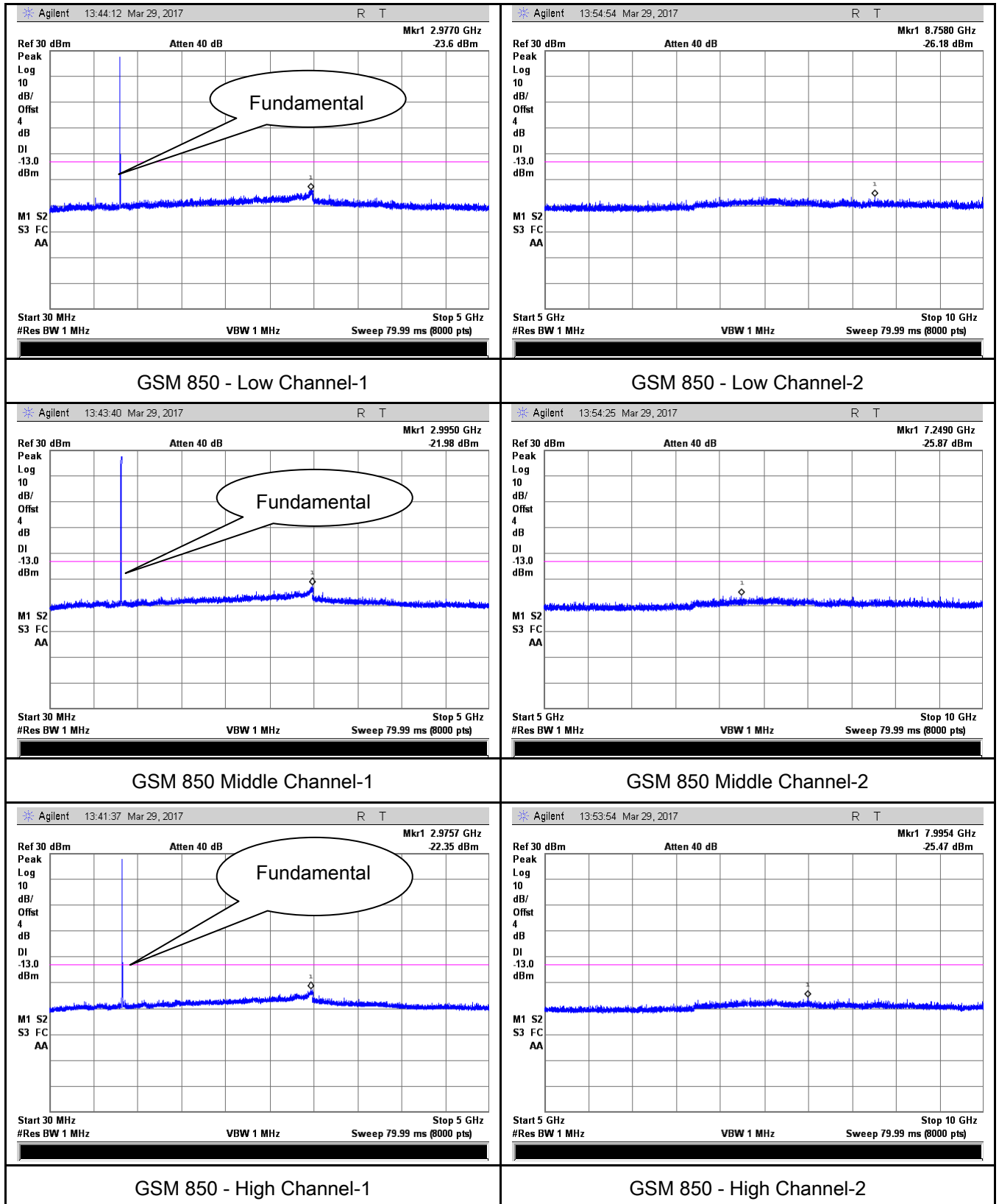
Spec	Item	Requirement	Applicable
§2.1051, §22.917(a)& §24.238(a)	a)	The power of any emission outside of the authorized operating frequency ranges must be lower than the transmitter power (P) by a factor of at least $43 + 10 \log (P)$ dB	☒
Test Setup			
Test Procedure	- The EUT was connected to Spectrum 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

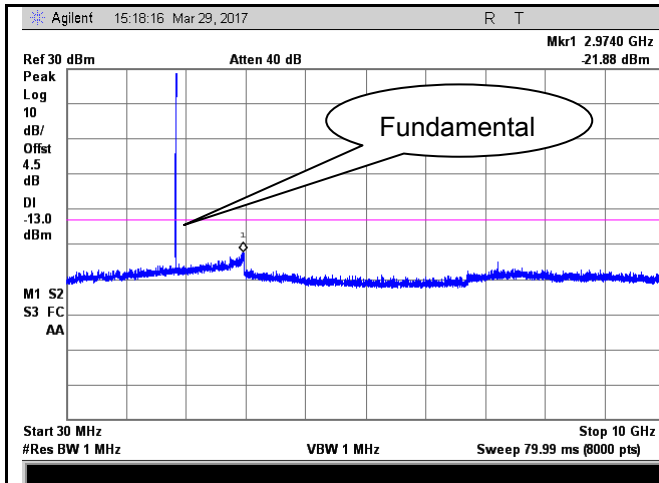
Test Plots

GSM :

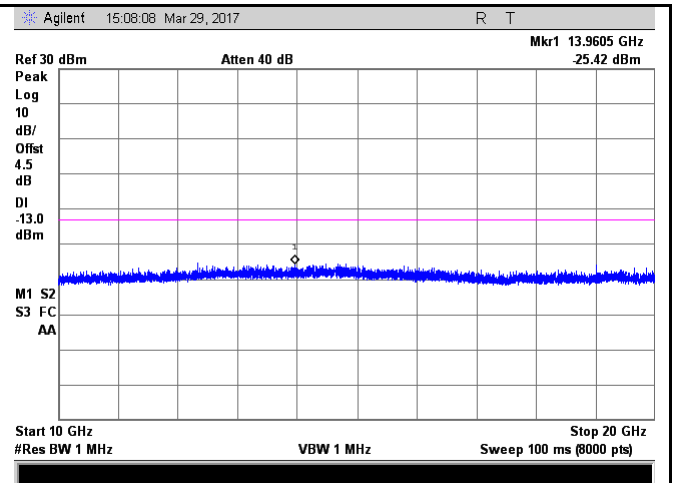
Cellular Band (Part 22H) result



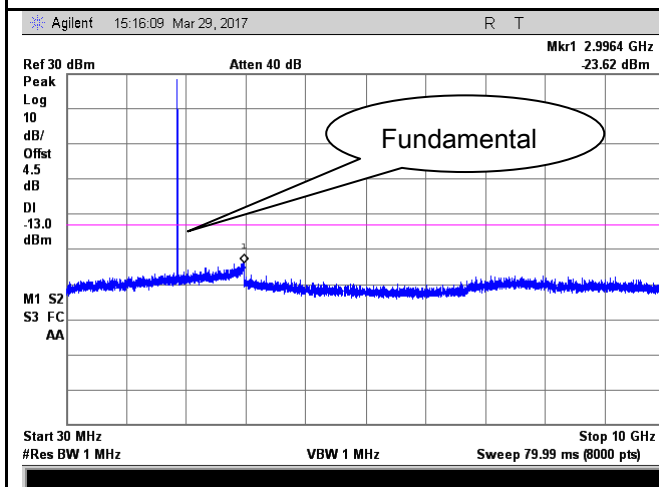
PCS Band (Part24E) result



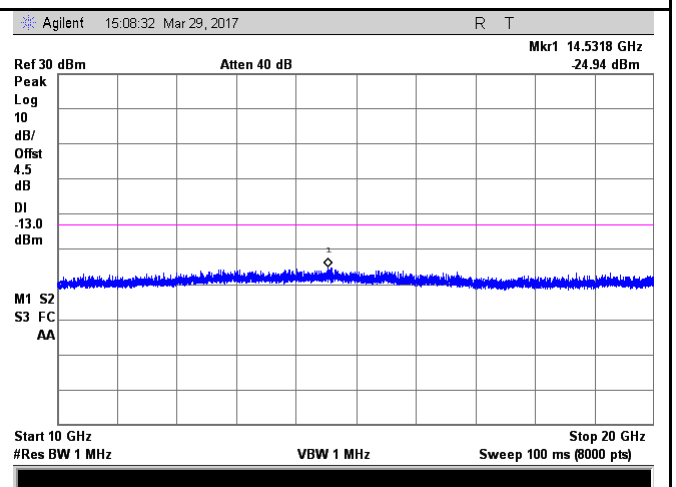
PCS1900 - Low Channel-1



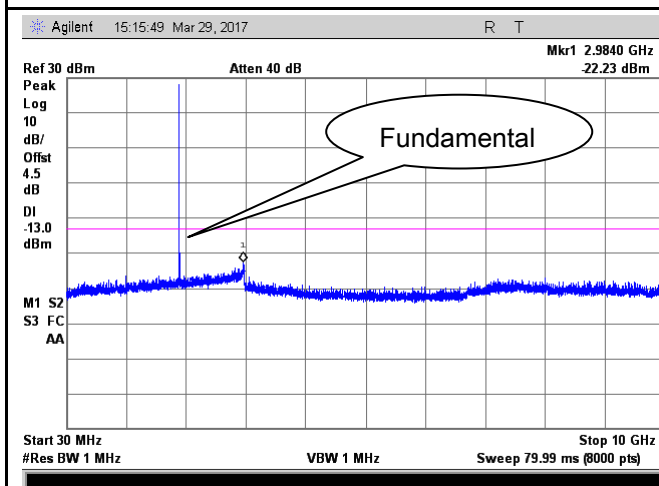
PCS 1900 - Low Channel-2



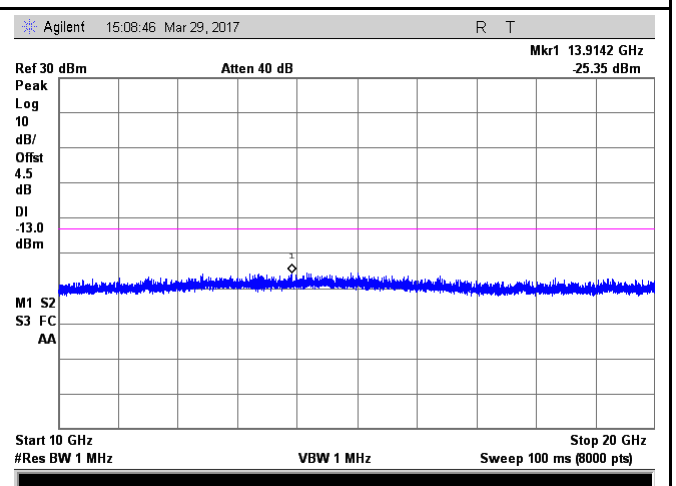
PCS1900 - Middle Channel-1



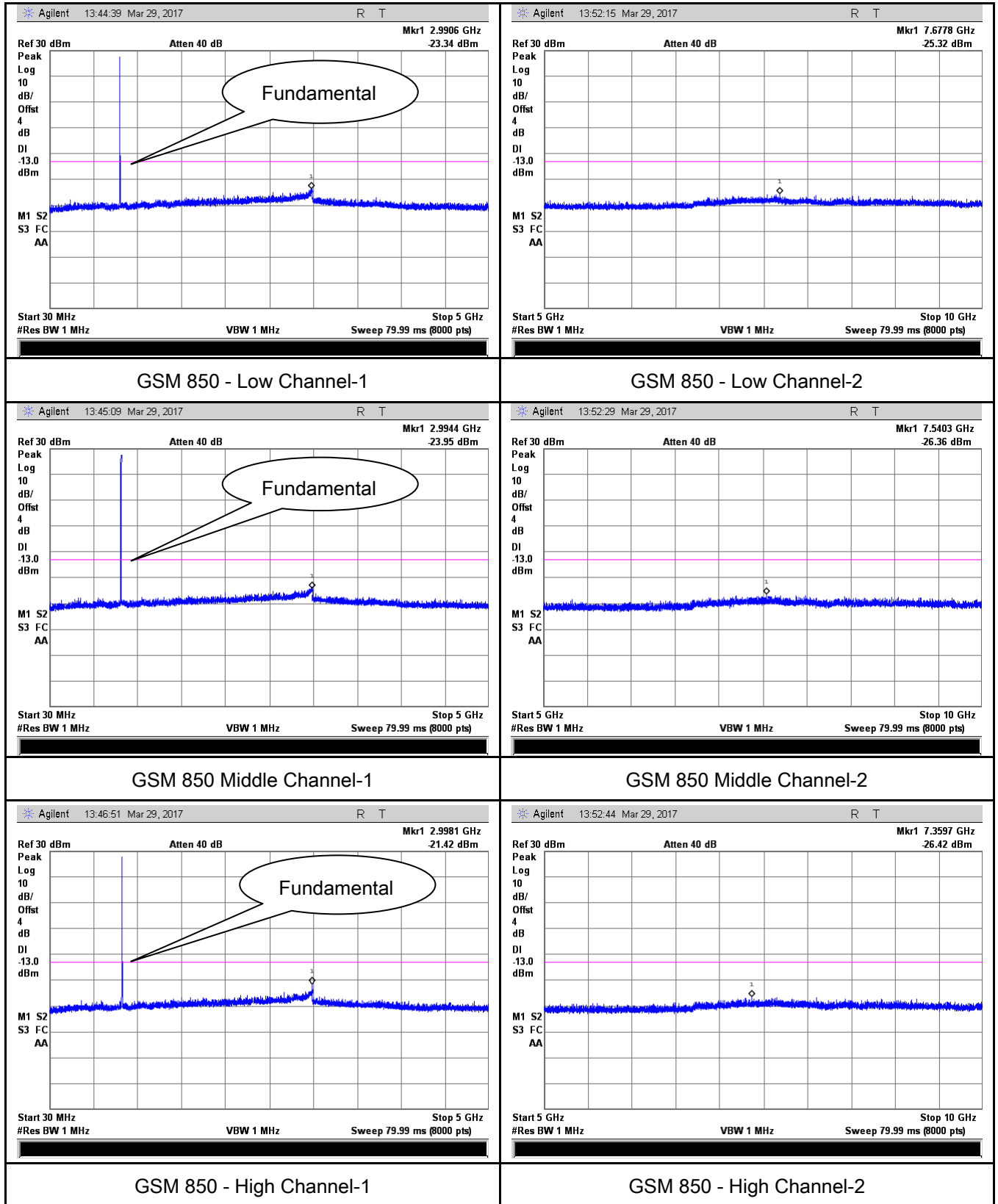
PCS 1900 - Middle Channel-2



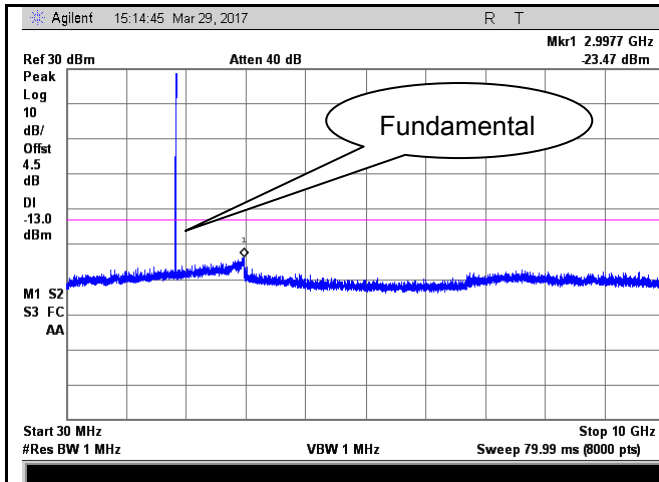
PCS1900 - High Channel-1



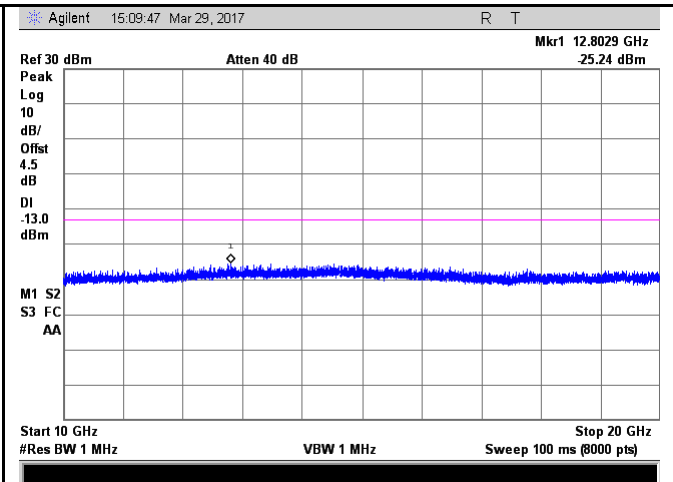
PCS 1900 - High Channel-2

GPRS:
Cellular Band (Part 22H) result


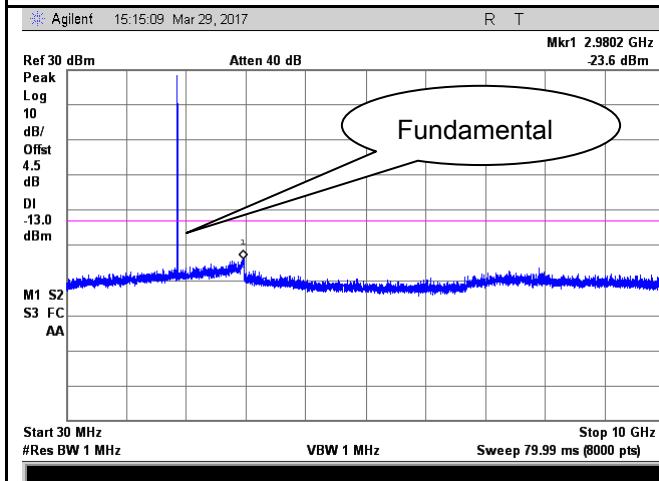
PCS Band (Part24E) result



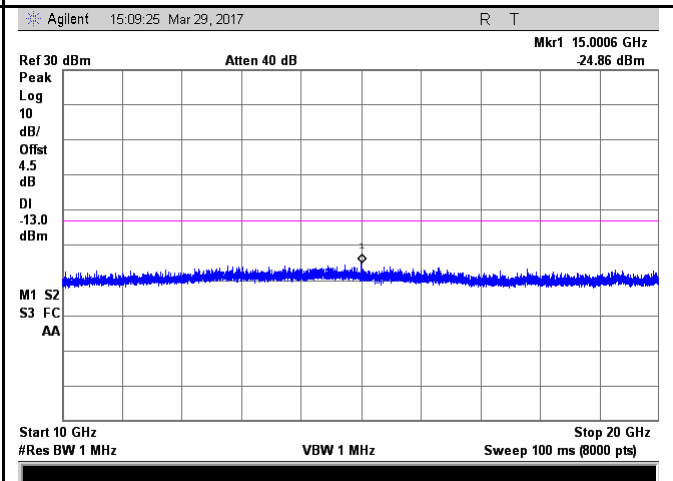
PCS1900 - Low Channel-1



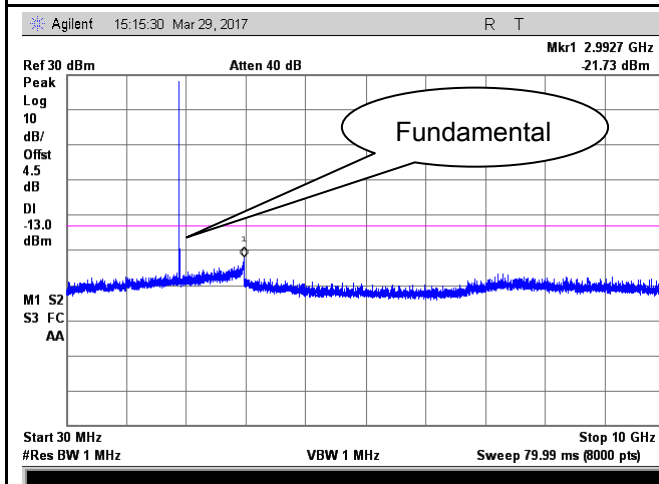
PCS 1900 - Low Channel-2



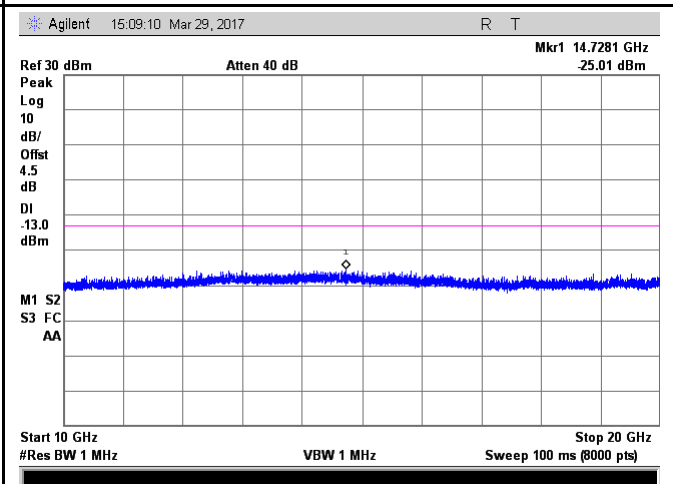
PCS1900 - Middle Channel-1



PCS 1900 - Middle Channel-2



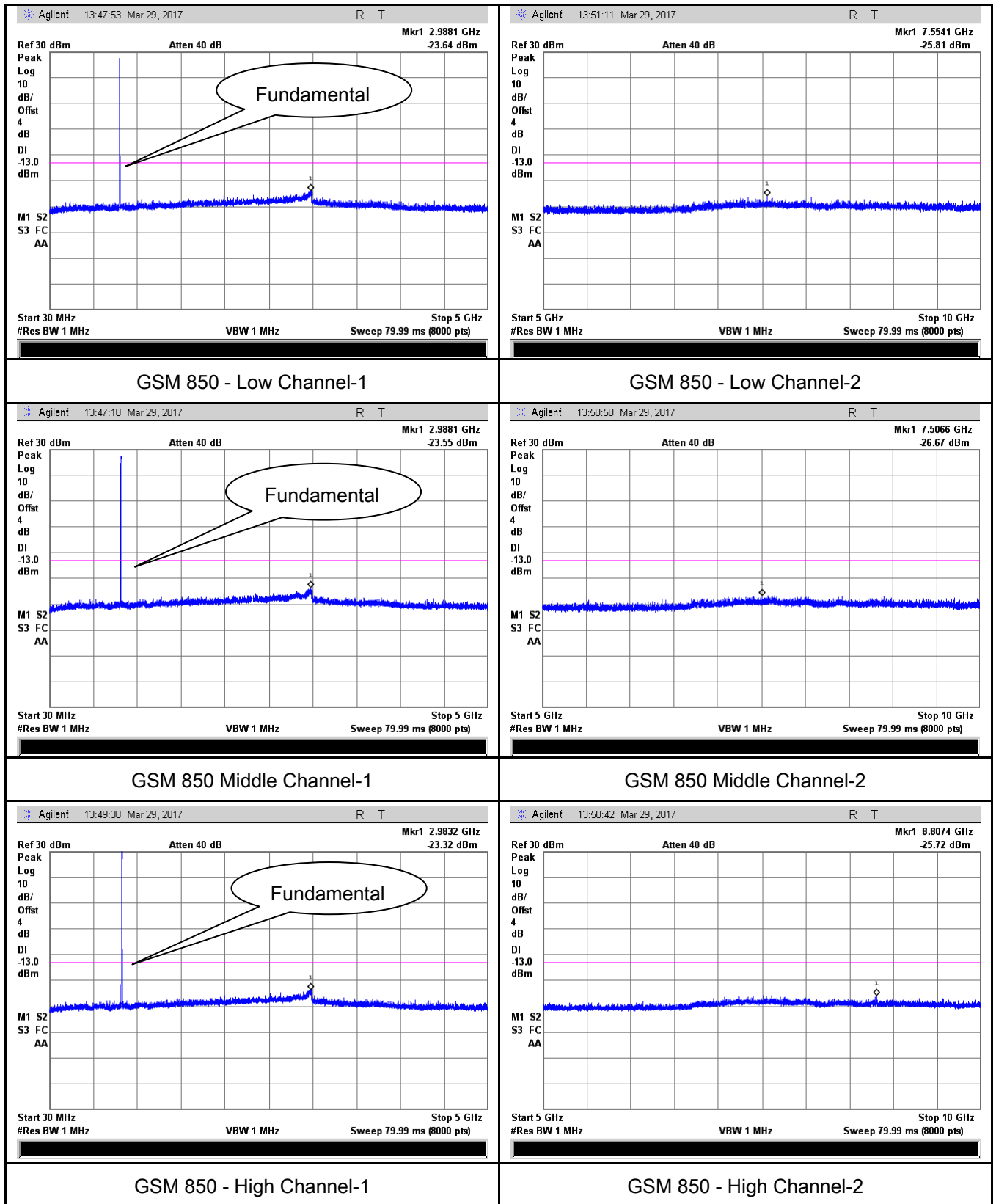
PCS1900 - High Channel-1



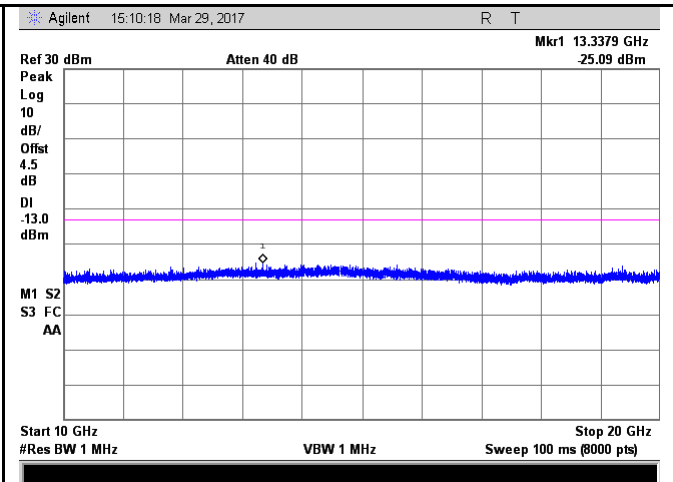
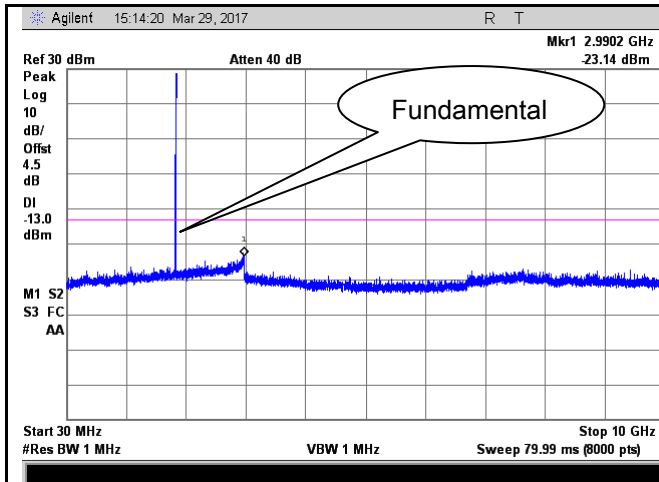
PCS 1900 - High Channel-2

EGPRS (MCS1):

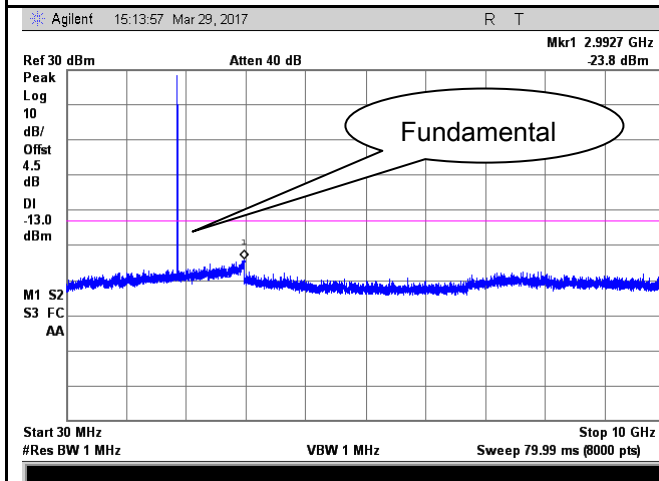
Cellular Band (Part 22H) result



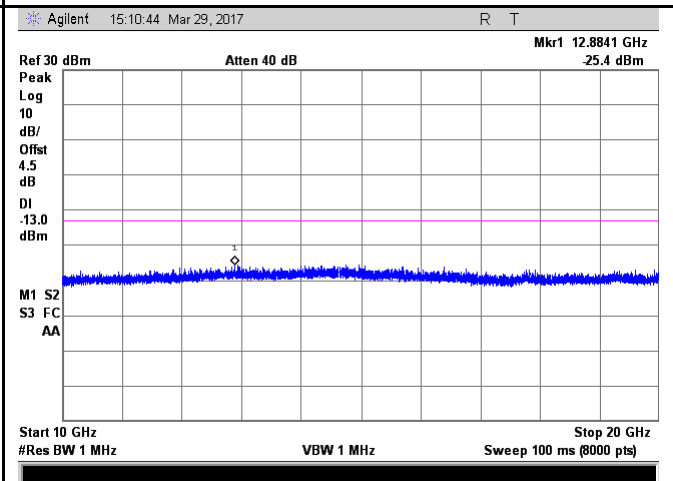
PCS Band (Part24E) result



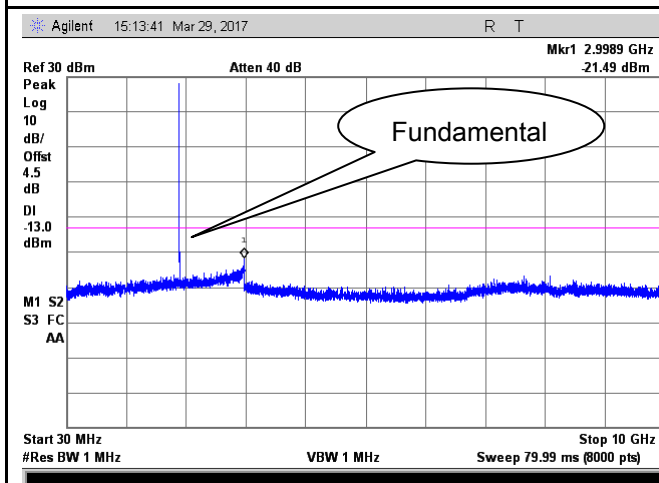
PCS1900 - Low Channel-1



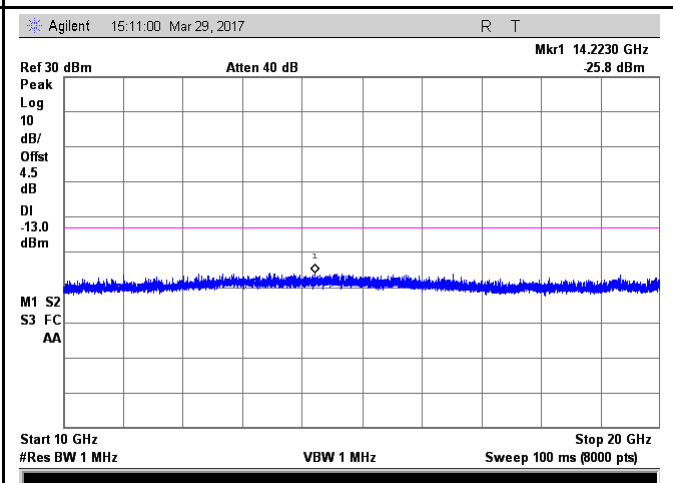
PCS 1900 - Low Channel-2



PCS1900 - Middle Channel-1



PCS 1900 - Middle Channel-2

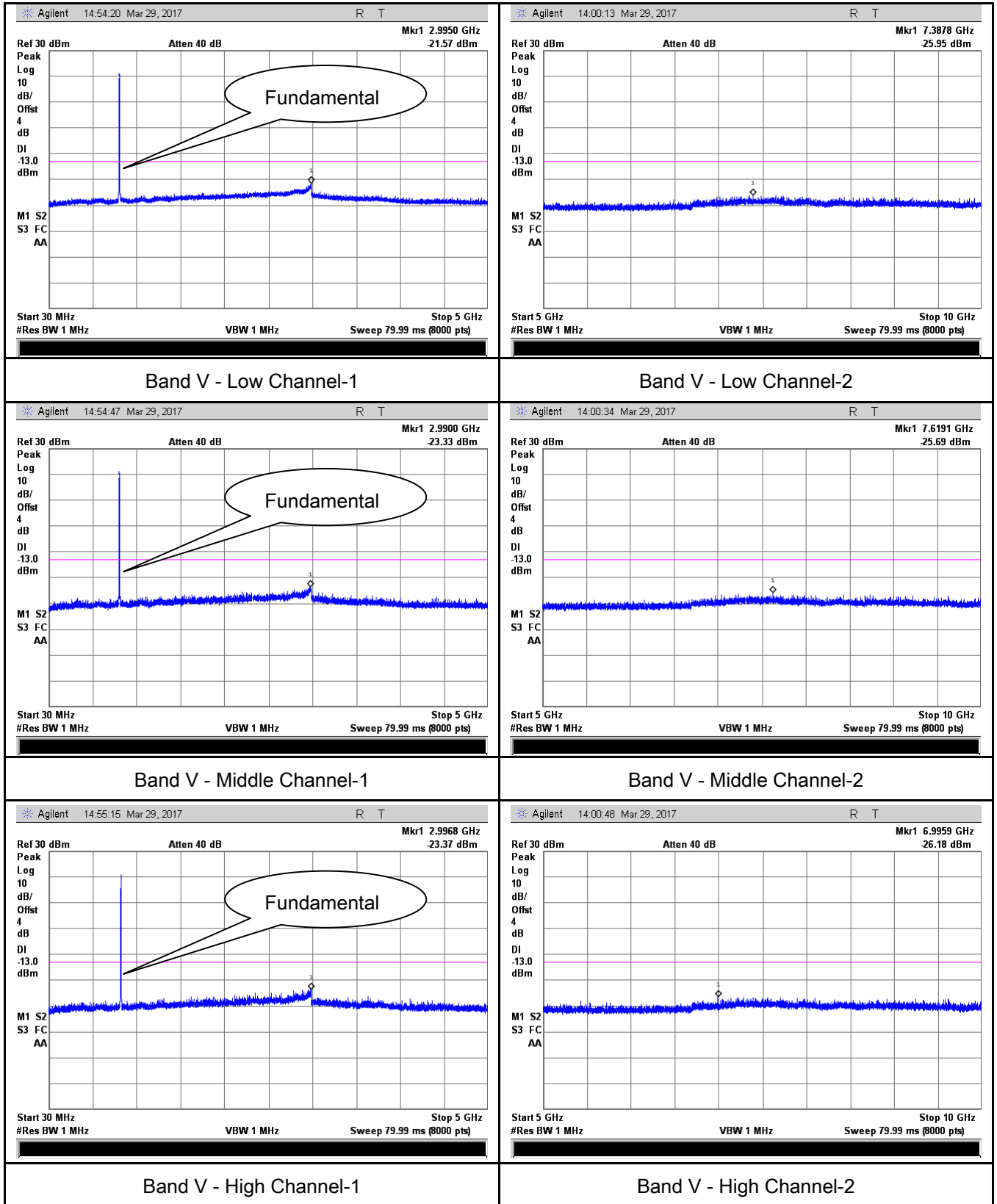


PCS1900 - High Channel-1

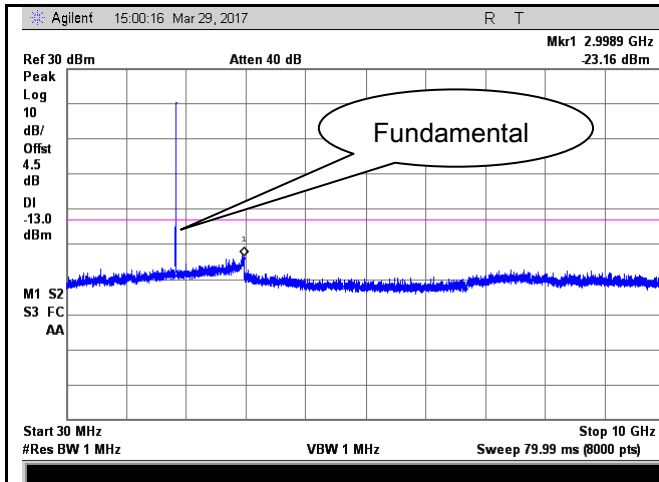
PCS 1900 - High Channel-2

RMC

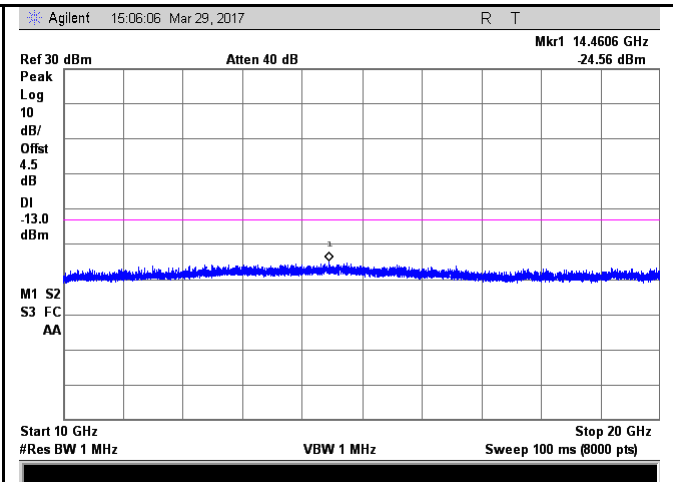
UMTS-FDD Band V (Part 22H)



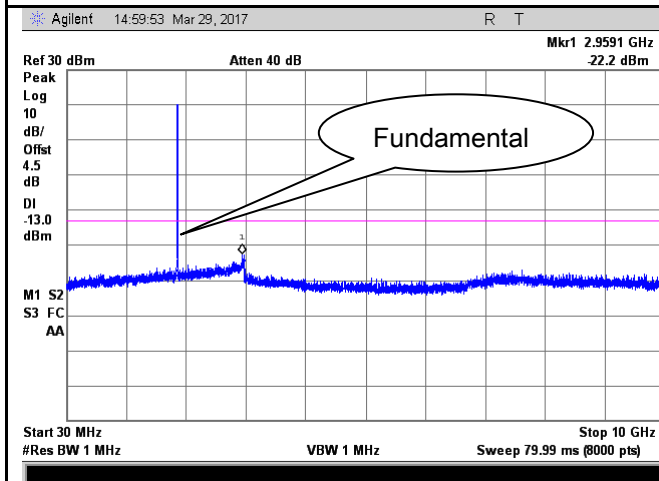
UMTS-FDD Band II (Part 24E)



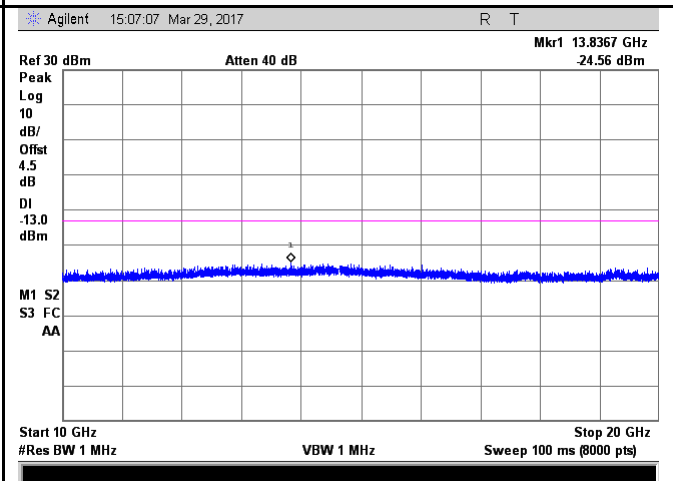
Band II - Low Channel-1



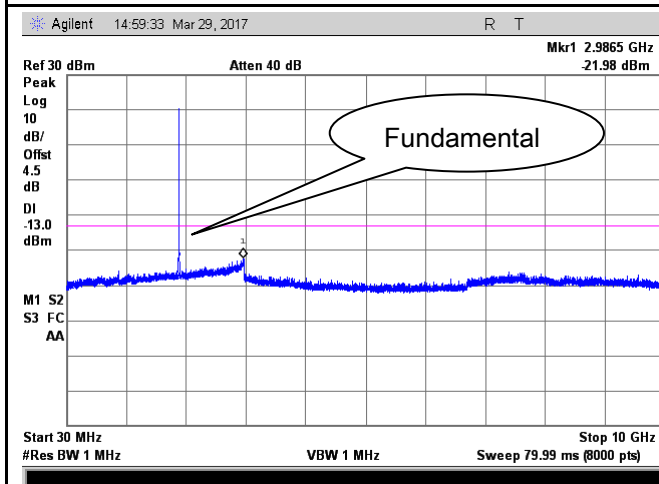
Band II - Low Channel-2



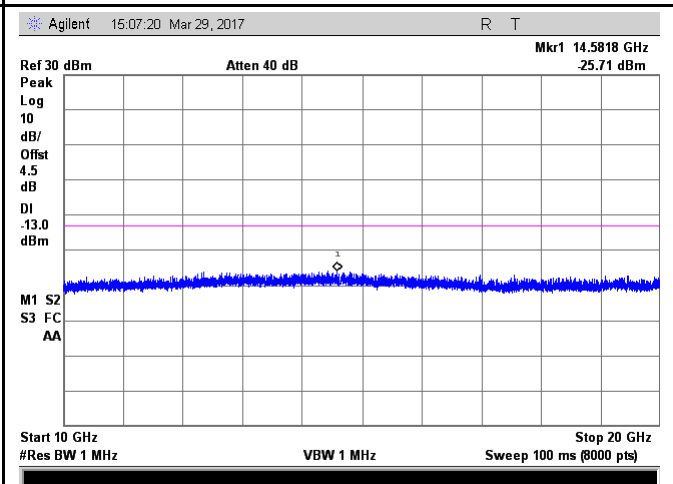
Band II - Middle Channel-1



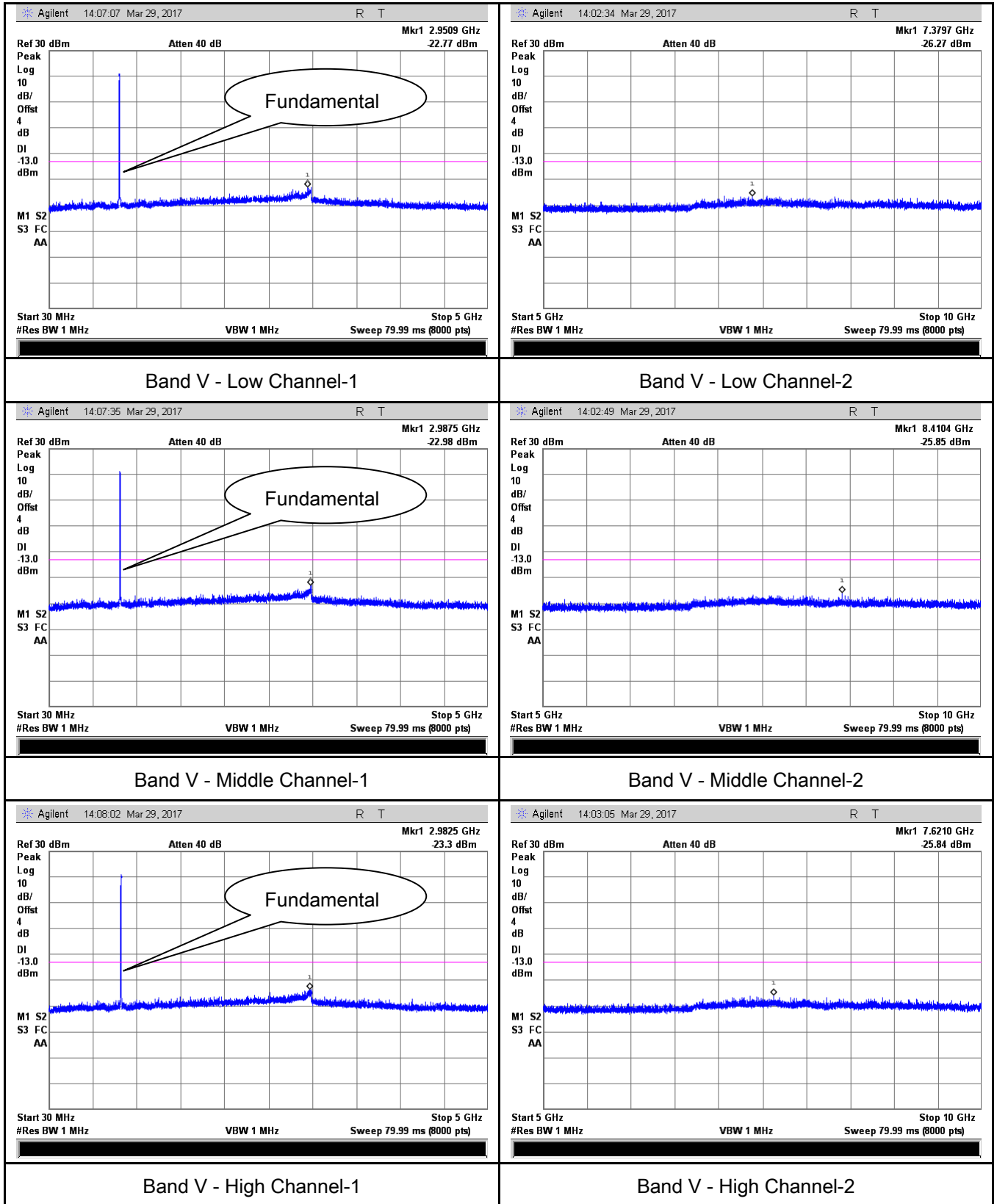
Band II - Middle Channel-2



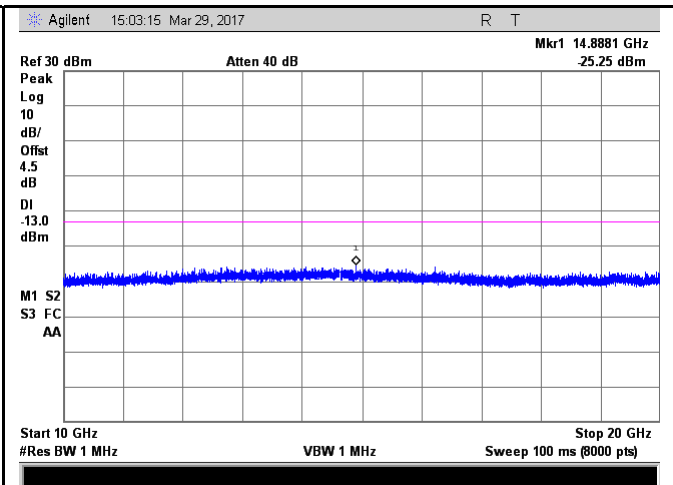
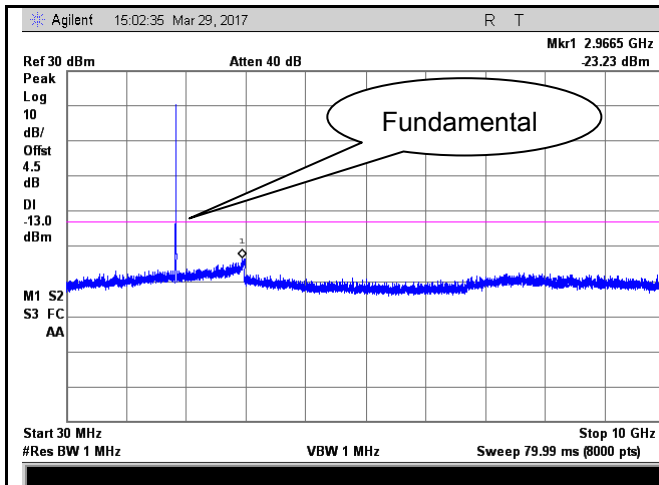
Band II - High Channel-1



Band II - High Channel-2

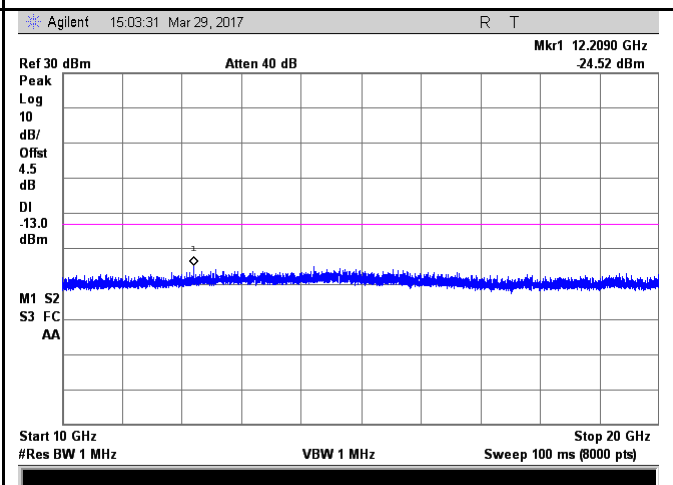
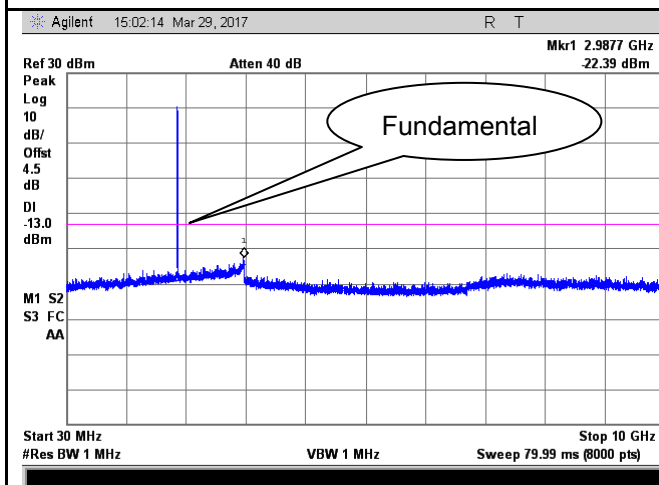
HSDPA:
UMTS-FDD Band V (Part 22H)


UMTS-FDD Band II (Part 24E)



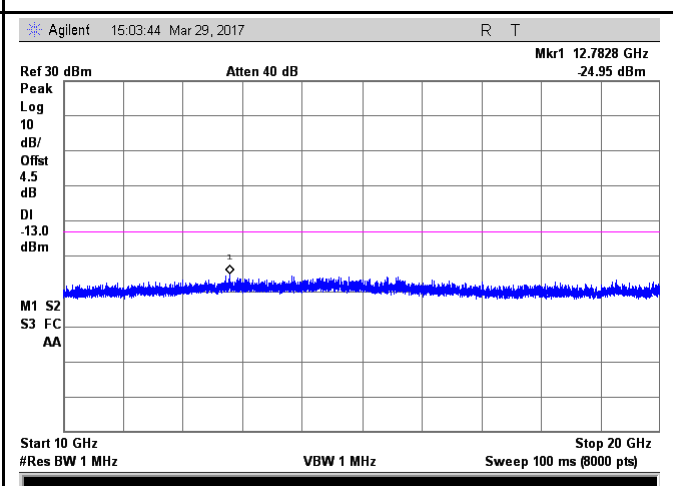
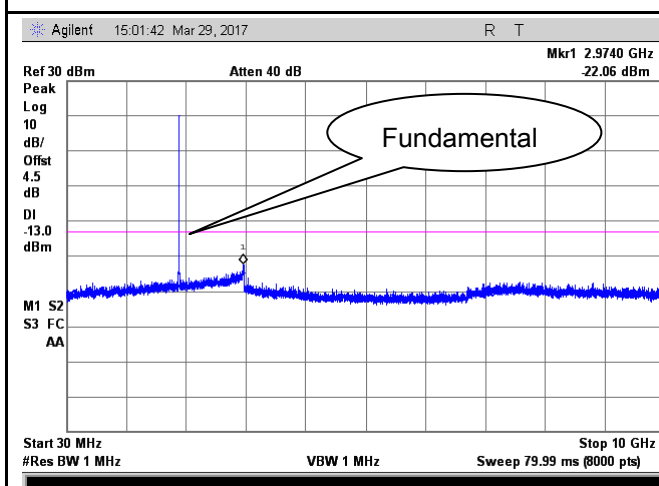
Band II - Low Channel-1

Band II - Low Channel-2



Band II - Middle Channel-1

Band II - Middle Channel-2

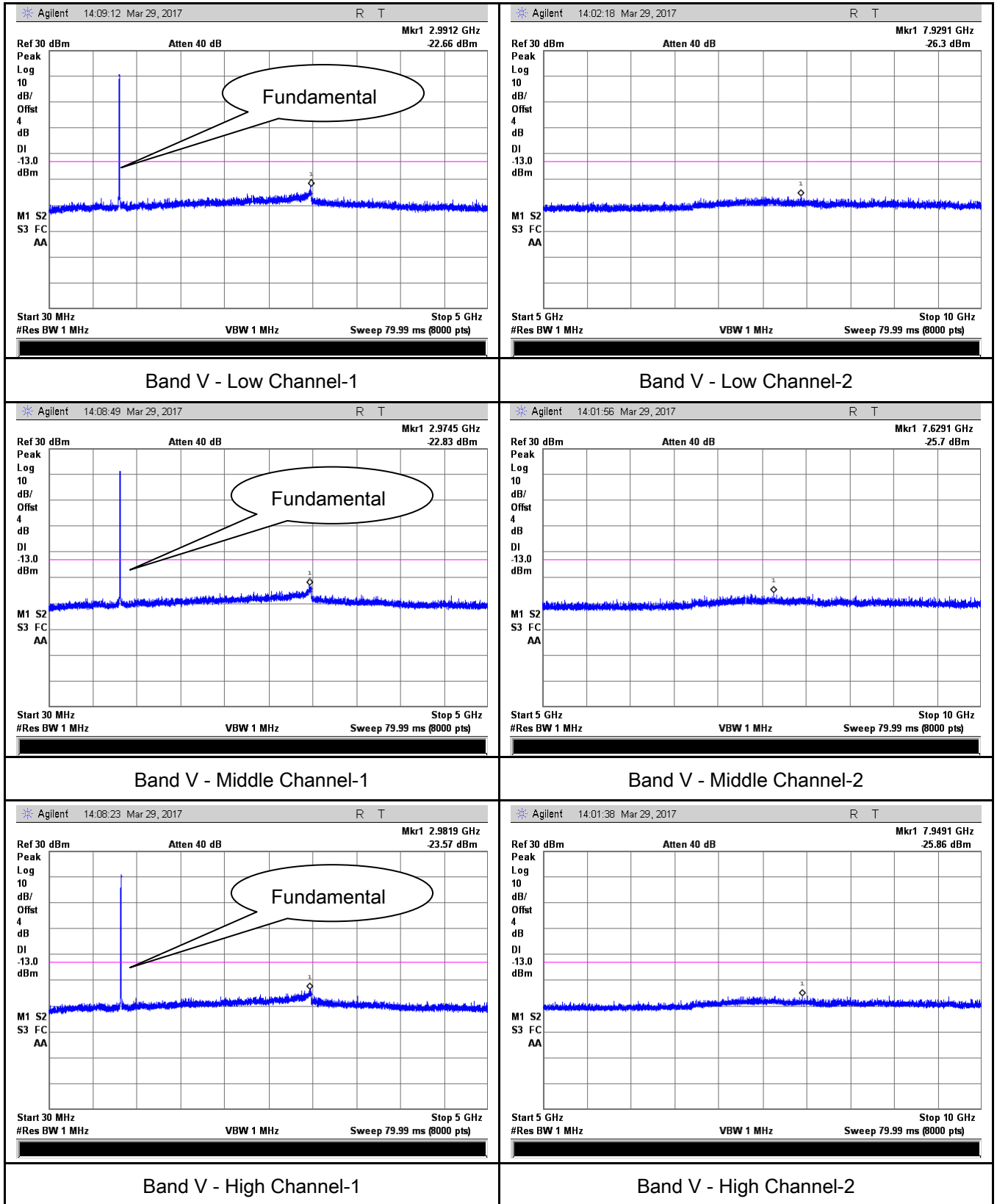


Band II - High Channel-1

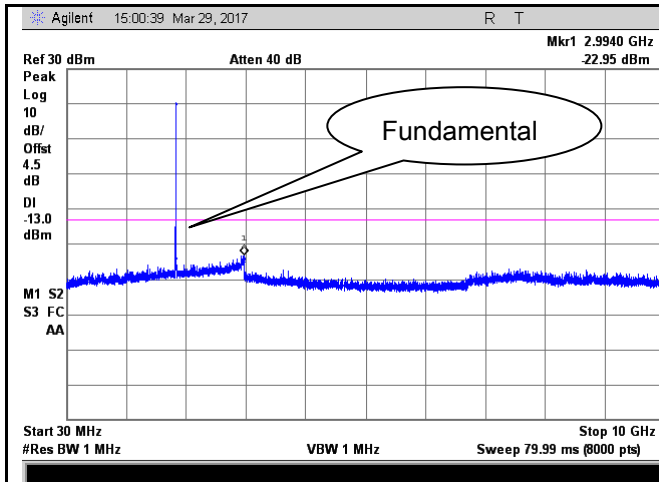
Band II - High Channel-2

HSUPA:

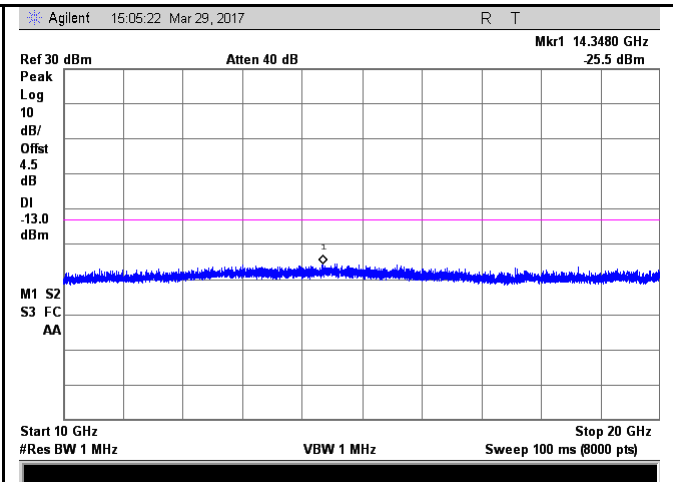
UMTS-FDD Band V (Part 22H)



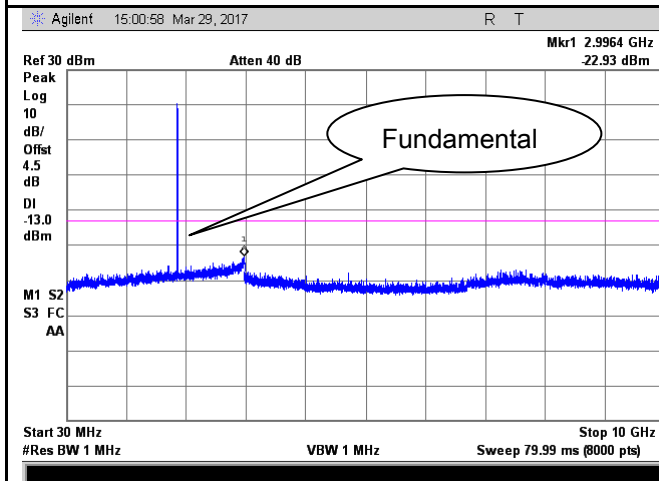
UMTS-FDD Band II (Part 24E)



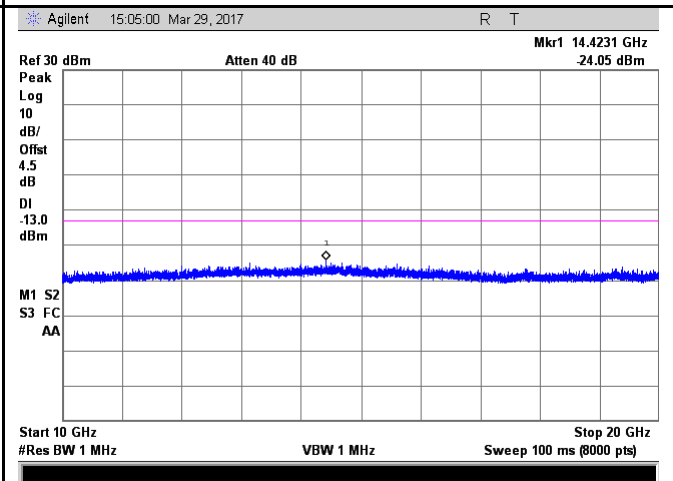
Band II - Low Channel-1



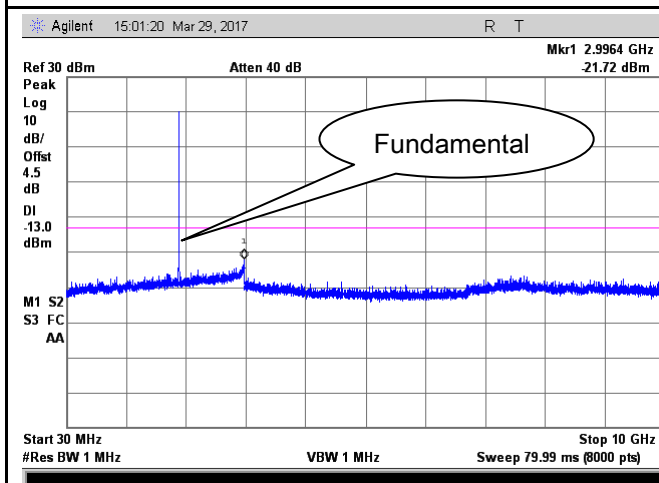
Band II - Low Channel-2



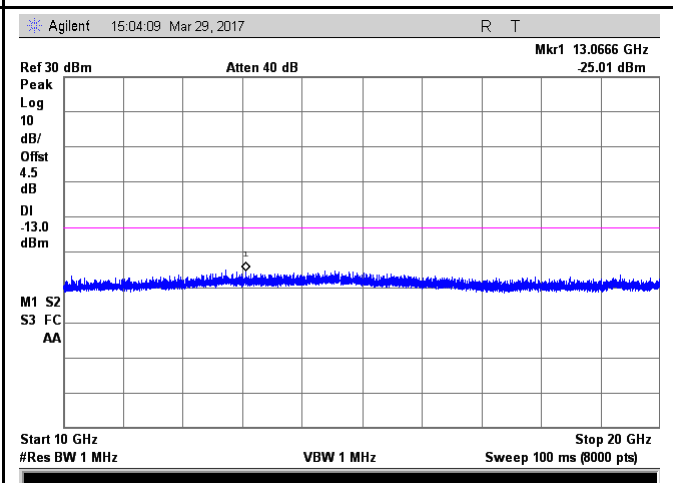
Band II - Middle Channel-1



Band II - Middle Channel-2



Band II - High Channel-1

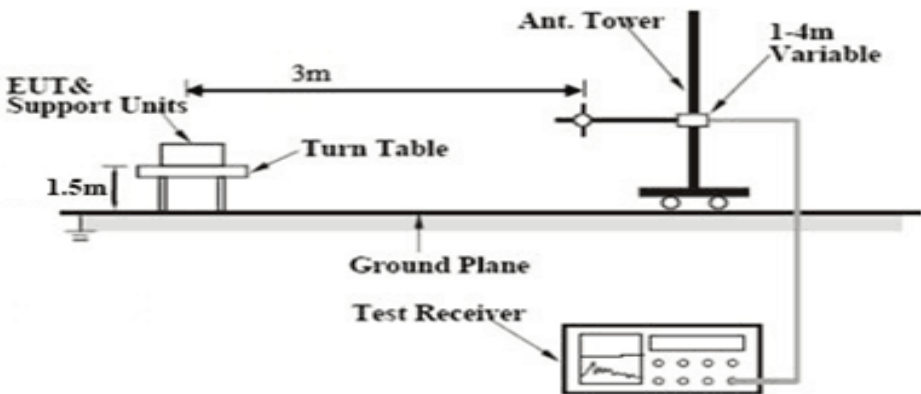


Band II - High Channel-2

6.6 Spurious Radiated Emissions

Temperature	23 °C
Relative Humidity	54%
Atmospheric Pressure	1030mbar

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	- 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. - 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: $\text{EUT Field Strength} = \text{Raw Amplitude (dB}\mu\text{V/m)} - \text{Amplifier Gain (dB)} + \text{Antenna Factor (dB)} + \text{Cable Loss (dB)} + \text{Filter Attenuation (dB, if used)}$		
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	-42.75	V	7.95	0.78	-35.58	-13	-22.58
1648.4	-43.26	H	7.95	0.78	-36.09	-13	-23.09
326.5	-52.18	V	6.4	0.26	-46.04	-13	-33.04
606.1	-52.13	H	6.8	0.37	-45.7	-13	-32.7

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	-43.02	V	7.95	0.78	-35.85	-13	-22.85
1673.2	-43.37	H	7.95	0.78	-36.2	-13	-23.2
326.8	-52.29	V	6.4	0.26	-46.15	-13	-33.15
606.4	-52.31	H	6.8	0.37	-45.88	-13	-32.88

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	-42.83	V	7.95	0.78	-35.66	-13	-22.66
1697.6	-43.33	H	7.95	0.78	-36.16	-13	-23.16
325.3	-52.21	V	6.4	0.26	-46.07	-13	-33.07
606.5	-52.14	H	6.8	0.37	-45.71	-13	-32.71

Note:

1, The testing has been conformed to $10 \times 848.8 \text{ MHz} = 8,488 \text{ MHz}$

2, All other emissions more than 30 dB below the limit

3, GSM voice, GPRS and EGPRS 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	-48.93	V	10.25	2.73	-41.41	-13	-28.41
3700.4	-49.37	H	10.25	2.73	-41.85	-13	-28.85
322.4	-53.46	V	6.4	0.26	-47.32	-13	-34.32
607.8	-53.85	H	6.8	0.37	-47.42	-13	-34.42

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	-48.89	V	10.25	2.73	-41.37	-13	-28.37
3760	-49.65	H	10.25	2.73	-42.13	-13	-29.13
322.7	-53.48	V	6.4	0.26	-47.34	-13	-34.34
607.5	-53.79	H	6.8	0.37	-47.36	-13	-34.36

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	-48.91	V	10.36	2.73	-41.28	-13	-28.28
3819.6	-49.73	H	10.36	2.73	-42.1	-13	-29.1
322.1	-53.66	V	6.4	0.26	-47.52	-13	-34.52
607.3	-52.28	H	6.8	0.37	-45.85	-13	-32.85

Note:

1, The testing has been conformed to $10 \times 1909.8 \text{ MHz} = 19,098 \text{ MHz}$

2, All other emissions more than 30 dB below the limit

3, GSM voice, GPRS and EGPRS 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 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	-46.66	V	7.95	0.78	-39.49	-13	-26.49
1652.8	-45.94	H	7.95	0.78	-38.77	-13	-25.77
321.9	-52.85	V	6.4	0.26	-46.71	-13	-33.71
604.7	-53.21	H	6.8	0.37	-46.78	-13	-33.78

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	-46.67	V	7.95	0.78	-39.5	-13	-26.5
1670	-45.76	H	7.95	0.78	-38.59	-13	-25.59
321.5	-52.61	V	6.4	0.26	-46.47	-13	-33.47
604.3	-52.98	H	6.8	0.37	-46.55	-13	-33.55

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	-46.68	V	7.95	0.78	-39.51	-13	-26.51
1693.2	-45.73	H	7.95	0.78	-38.56	-13	-25.56
321.7	-52.79	V	6.4	0.26	-46.65	-13	-33.65
604.8	-53.16	H	6.8	0.37	-46.73	-13	-33.73

Note:

1, The testing has been conformed to $10 \times 846.6 \text{ MHz} = 8,466 \text{ MHz}$

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	-49.76	V	10.25	2.73	-42.24	-13	-29.24
3704.8	-49.93	H	10.25	2.73	-42.41	-13	-29.41
324.7	-53.64	V	6.4	0.26	-47.5	-13	-34.5
608.8	-53.52	H	6.8	0.37	-47.09	-13	-34.09

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	-49.45	V	10.25	2.73	-41.93	-13	-28.93
3760	-49.81	H	10.25	2.73	-42.29	-13	-29.29
324.1	-53.73	V	6.4	0.26	-47.59	-13	-34.59
608.6	-53.46	H	6.8	0.37	-47.03	-13	-34.03

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	-49.37	V	10.36	2.73	-41.74	-13	-28.74
3815.2	-49.61	H	10.36	2.73	-41.98	-13	-28.98
324.5	-53.54	V	6.4	0.26	-47.4	-13	-34.4
608.9	-53.85	H	6.8	0.37	-47.42	-13	-34.42

Note:

1, The testing has been conformed to $10 \times 1907.6 \text{ MHz} = 19,076 \text{ MHz}$

2, All other emissions more than 30 dB below the limit

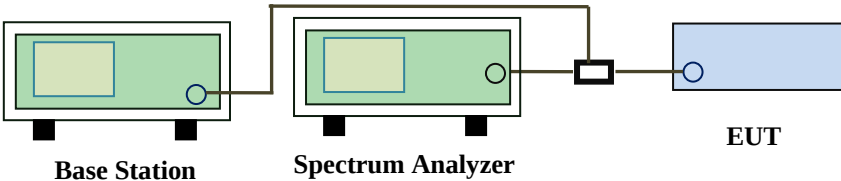
3, RMC, HSUPA and HSDPA mode were investigated. The results above show only the worse cases

4, X-Axis, Y-Axis and Z-Axis were investigated. The results above show only the worst case

6.7 Band Edge

Temperature	22 °C
Relative Humidity	53%
Atmospheric Pressure	1029mbar

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	 The diagram illustrates the test setup. A Base Station (green box) is connected to a Spectrum Analyzer (green box) via a cable. The Spectrum Analyzer is then connected to an EUT (blue box) through a power divider (black box). The EUT is labeled 'EUT'.		
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 :

Cellular Band (Part 22H) result

Frequency (MHz)	Emission (dBm)	Limit (dBm)
823.9975	-15.81	-13
849.0025	-15.63	-13

PCS Band (Part24E) result

Frequency (MHz)	Emission (dBm)	Limit (dBm)
1849.9975	-17.89	-13
1910.0225	-16.83	-13

GPRS:

Cellular Band (Part 22H) result

Frequency (MHz)	Emission (dBm)	Limit (dBm)
823.9800	-17.44	-13
849.0200	-16.05	-13

PCS Band (Part24E) result

Frequency (MHz)	Emission (dBm)	Limit (dBm)
1849.9975	-20.69	-13
1910.0250	-16.49	-13

EGPRS (MCS1):
Cellular Band (Part 22H) result

Frequency (MHz)	Emission (dBm)	Limit (dBm)
823.9989	-16.33	-13
849.0025	-16.62	-13

PCS Band (Part24E) result

Frequency (MHz)	Emission (dBm)	Limit (dBm)
1849.9975	-17.10	-13
1910.0200	-17.59	-13

RMC:
UMTS-FDD Band V (Part 22H)

Frequency (MHz)	Emission (dBm)	Limit (dBm)
824.000	-30.42	-13
849.275	-30.34	-13

UMTS-FDD Band II (Part 24E)

Frequency (MHz)	Emission (dBm)	Limit (dBm)
1849.925	-28.96	-13
1910.075	-30.42	-13

HSDPA:
UMTS-FDD Band V (Part 22H)

Frequency (MHz)	Emission (dBm)	Limit (dBm)
823.550	-29.93	-13
849.200	-31.26	-13

UMTS-FDD Band II (Part 24E)

Frequency (MHz)	Emission (dBm)	Limit (dBm)
1849.900	-28.65	-13
1910.050	-30.38	-13

HSUPA:
UMTS-FDD Band V (Part 22H)

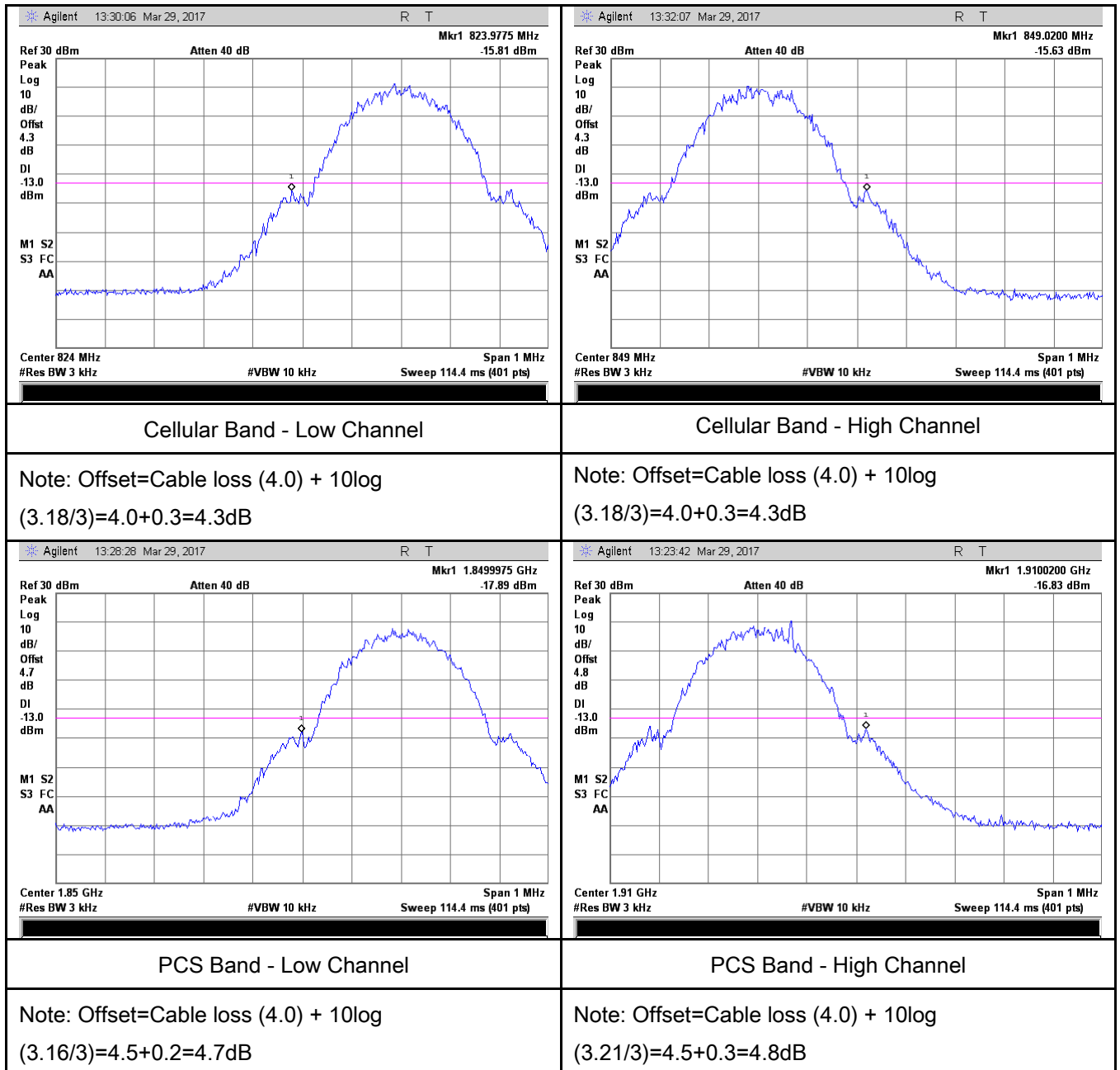
Frequency (MHz)	Emission (dBm)	Limit (dBm)
823.825	-30.62	-13
849.875	-31.26	-13

UMTS-FDD Band II (Part 24E)

Frequency (MHz)	Emission (dBm)	Limit (dBm)
1849.925	-29.22	-13
1910.025	-30.68	-13

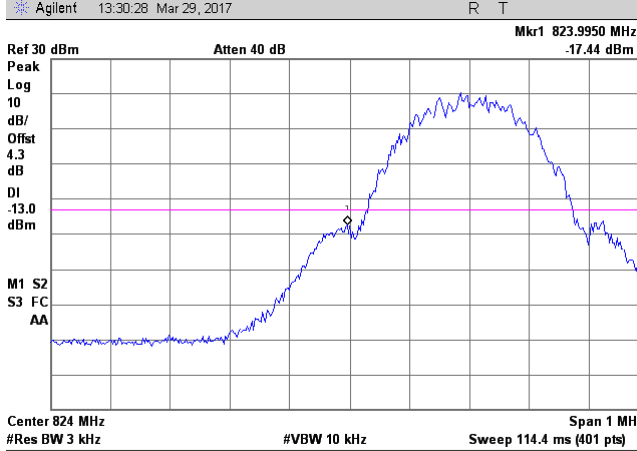
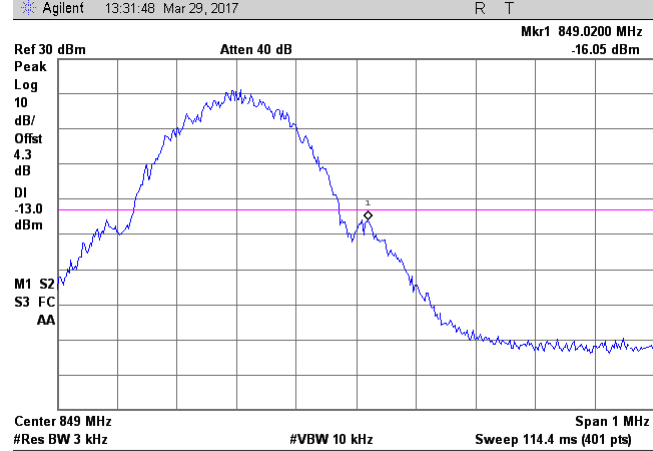
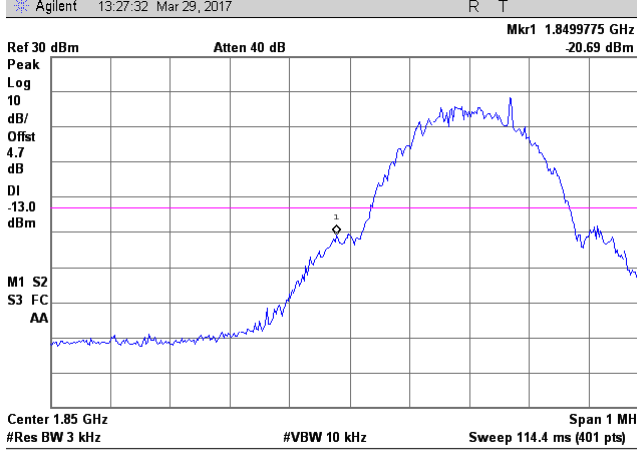
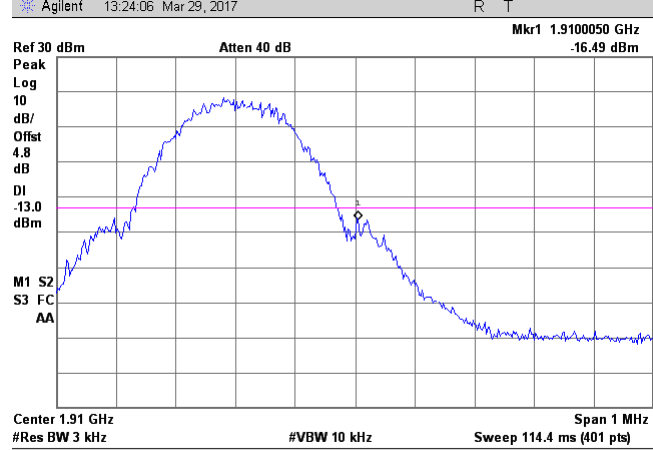
GSM Voice:

Test Plots



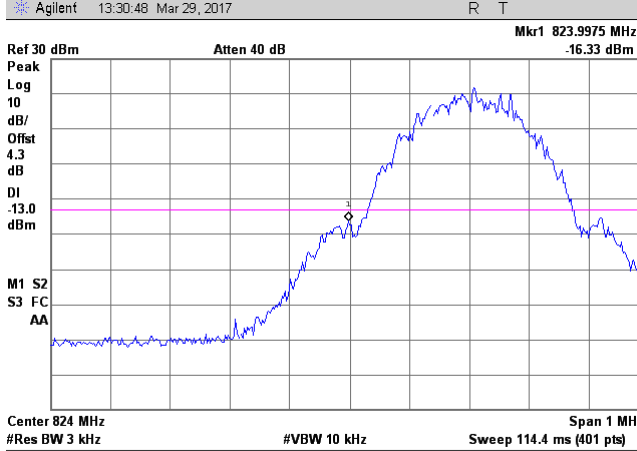
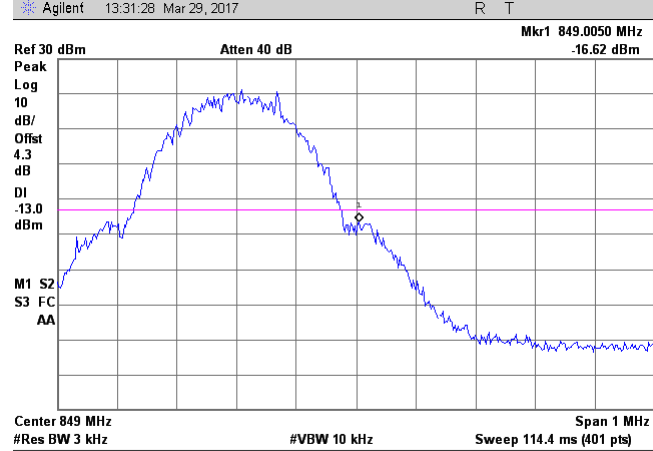
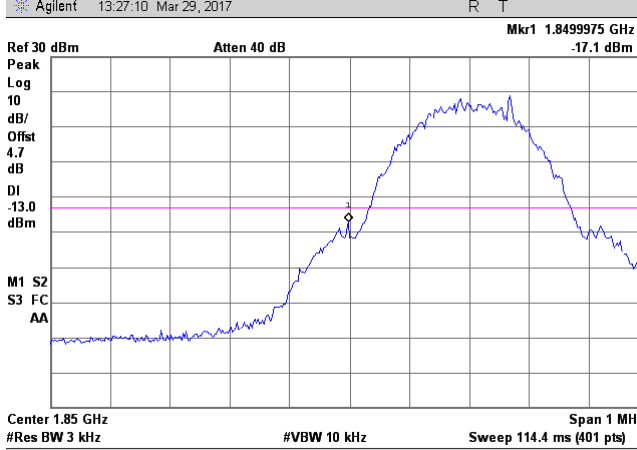
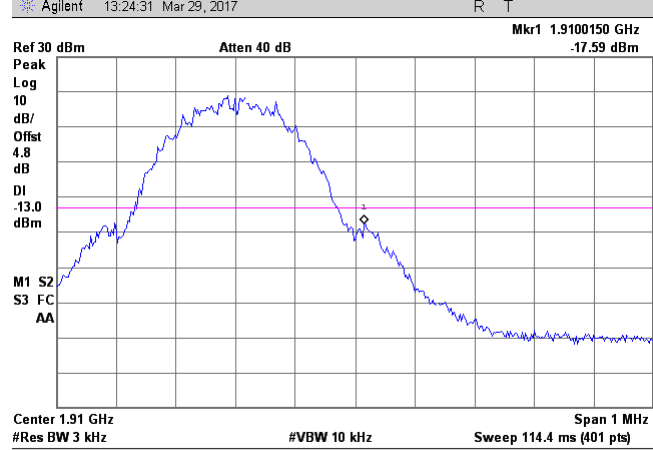
GPRS:

Test Plots

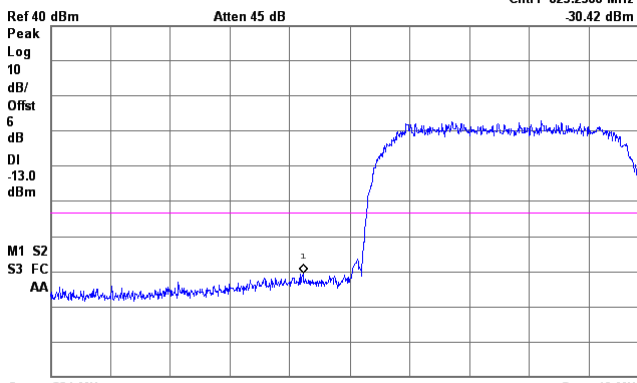
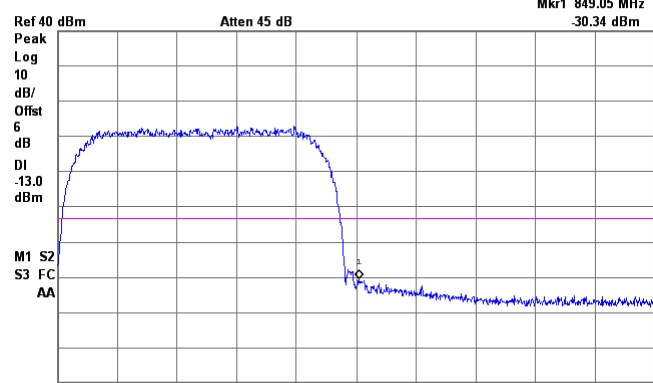
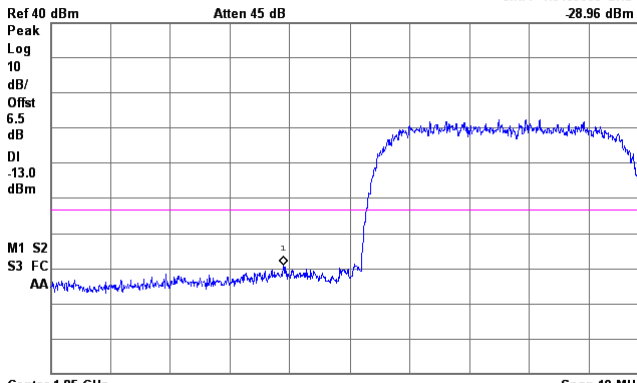
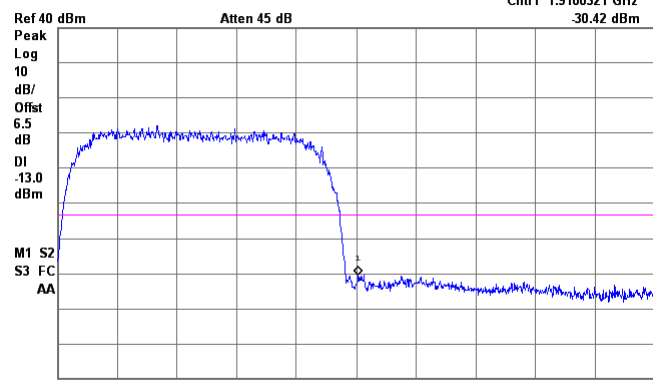
 Agilent 13:30:28 Mar 29, 2017 R T Ref 30 dBm Atten 40 dB Mkr1 823.9950 MHz -17.44 dBm Peak Log 10 dB/Offset 4.3 dB DI -13.0 dBm M1 S2 S3 FC AA Center 824 MHz Span 1 MHz #Res BW 3 kHz #VBW 10 kHz Sweep 114.4 ms (401 pts)	 Agilent 13:31:48 Mar 29, 2017 R T Ref 30 dBm Atten 40 dB Mkr1 849.0200 MHz -16.05 dBm Peak Log 10 dB/Offset 4.3 dB DI -13.0 dBm M1 S2 S3 FC AA Center 849 MHz Span 1 MHz #Res BW 3 kHz #VBW 10 kHz Sweep 114.4 ms (401 pts)
Cellular Band - Low Channel	Cellular Band - High Channel
Note: Offset=Cable loss (4.0) + 10log (3.20/3)=4.0+0.3=4.3dB	Note: Offset=Cable loss (4.0) + 10log (3.20/3)=4.0+0.3=4.3dB
 Agilent 13:27:32 Mar 29, 2017 R T Ref 30 dBm Atten 40 dB Mkr1 1.8499775 GHz -20.69 dBm Peak Log 10 dB/Offset 4.7 dB DI -13.0 dBm M1 S2 S3 FC AA Center 1.85 GHz Span 1 MHz #Res BW 3 kHz #VBW 10 kHz Sweep 114.4 ms (401 pts)	 Agilent 13:24:06 Mar 29, 2017 R T Ref 30 dBm Atten 40 dB Mkr1 1.9100050 GHz -16.49 dBm Peak Log 10 dB/Offset 4.8 dB DI -13.0 dBm M1 S2 S3 FC AA Center 1.91 GHz Span 1 MHz #Res BW 3 kHz #VBW 10 kHz Sweep 114.4 ms (401 pts)
PCS Band - Low Channel	PCS Band - High Channel
Note: Offset=Cable loss (4.5) + 10log (3.16/3)=4.5+0.2=4.7dB	Note: Offset=Cable loss (4.5) + 10log (3.19/3)=4.5+0.3=4.8dB

EGPRS (MCS1):

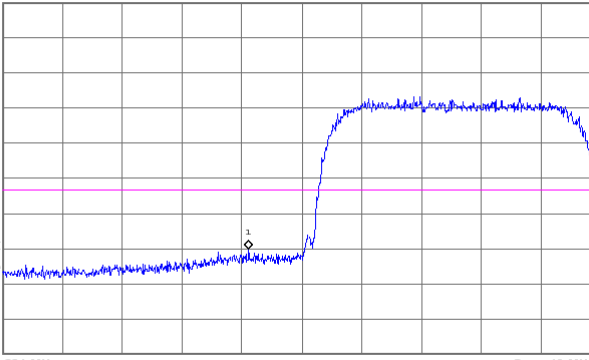
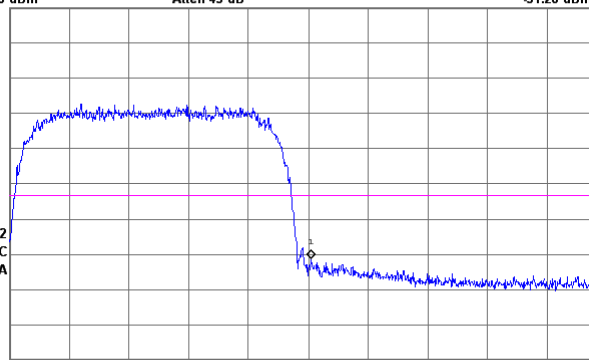
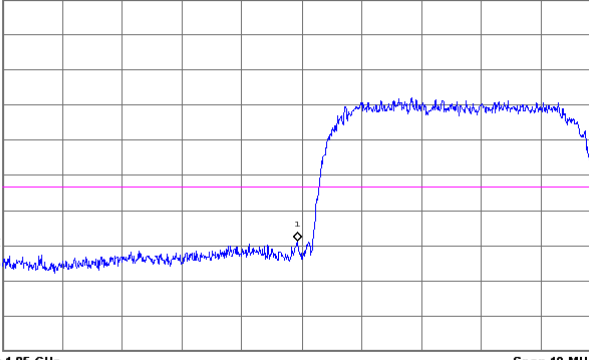
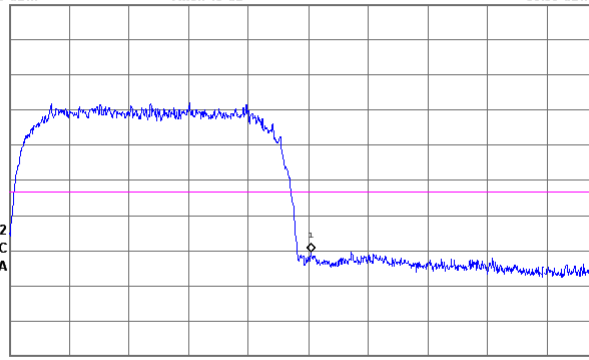
Test Plots

 Agilent 13:30:48 Mar 29, 2017 R T Mkr1 823.9975 MHz -16.33 dBm Ref 30 dBm Atten 40 dB Peak Log 10 dB/Offset 4.3 dB DI -13.0 dBm M1 S2 S3 FC AA Center 824 MHz Span 1 MHz #Res BW 3 kHz #VBW 10 kHz Sweep 114.4 ms (401 pts)	 Agilent 13:31:28 Mar 29, 2017 R T Mkr1 849.0050 MHz -16.62 dBm Ref 30 dBm Atten 40 dB Peak Log 10 dB/Offset 4.3 dB DI -13.0 dBm M1 S2 S3 FC AA Center 849 MHz Span 1 MHz #Res BW 3 kHz #VBW 10 kHz Sweep 114.4 ms (401 pts)
Cellular Band - Low Channel	Cellular Band - High Channel
Note: Offset=Cable loss (4.0) + 10log (3.19/3)=4.0+0.3=4.3dB	Note: Offset=Cable loss (4.0) + 10log (3.21/3)=4.0+0.3=4.3dB
 Agilent 13:27:10 Mar 29, 2017 R T Mkr1 1.8499975 GHz -17.1 dBm Ref 30 dBm Atten 40 dB Peak Log 10 dB/Offset 4.7 dB DI -13.0 dBm M1 S2 S3 FC AA Center 1.85 GHz Span 1 MHz #Res BW 3 kHz #VBW 10 kHz Sweep 114.4 ms (401 pts)	 Agilent 13:24:31 Mar 29, 2017 R T Mkr1 1.9100150 GHz -17.59 dBm Ref 30 dBm Atten 40 dB Peak Log 10 dB/Offset 4.8 dB DI -13.0 dBm M1 S2 S3 FC AA Center 1.91 GHz Span 1 MHz #Res BW 3 kHz #VBW 10 kHz Sweep 114.4 ms (401 pts)
PCS Band - Low Channel	PCS Band - High Channel
Note: Offset=Cable loss (4.5) + 10log (3.17/3)=4.5+0.2=4.7dB	Note: Offset=Cable loss (4.5) + 10log (3.21/3)=4.5+0.3=4.8dB

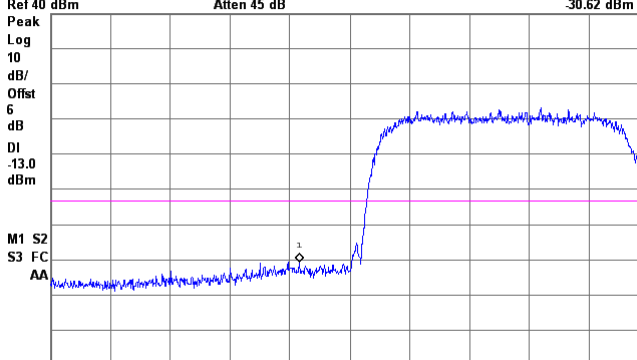
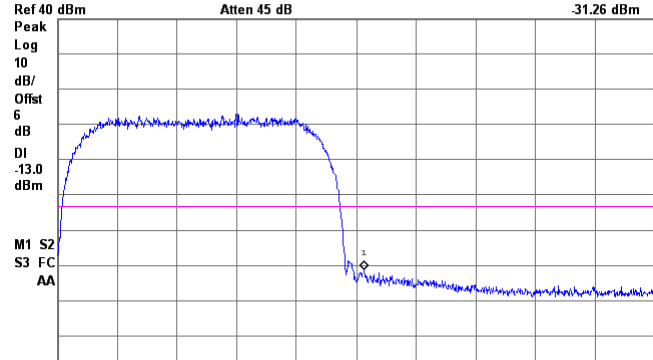
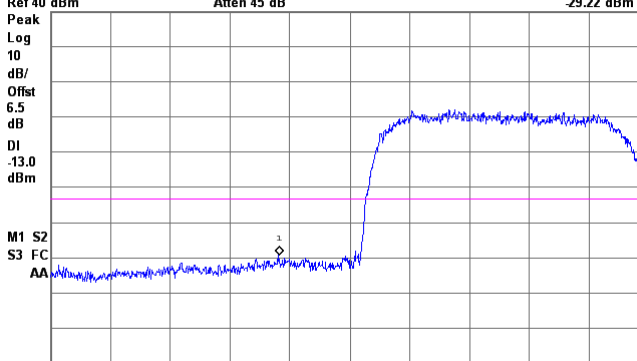
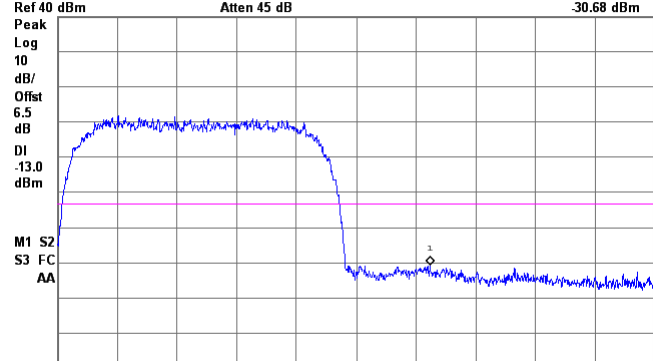
RMC:

Agilent 11:51:04 Mar 29, 2017 R T Ref 40 dBm Atten 45 dB Cntr1 823.2306 MHz -30.42 dBm  Center 824 MHz #Res BW 30 kHz #VBW 30 kHz Sweep 14.32 ms (1001 pts) Span 10 MHz	Agilent 11:48:22 Mar 29, 2017 R T Ref 40 dBm Atten 45 dB Mkr1 849.05 MHz -30.34 dBm  Center 849 MHz #Res BW 30 kHz #VBW 30 kHz Sweep 14.32 ms (1001 pts) Span 10 MHz
UMTS-FDD Band V - Low Channel	UMTS-FDD Band V - High Channel
Note: Offset=Cable loss (4.0) + 10log (47.10/30)=4.0+2.0=6.0 dB	Note: Offset=Cable loss (4.0) + 10log (47.08/30)=4.0+2.0=6.0 dB
Agilent 11:52:21 Mar 29, 2017 R T Ref 40 dBm Atten 45 dB Cntr1 1.8489003 GHz -28.96 dBm  Center 1.85 GHz #Res BW 30 kHz #VBW 30 kHz Sweep 14.32 ms (1001 pts) Span 10 MHz	Agilent 11:54:41 Mar 29, 2017 R T Ref 40 dBm Atten 45 dB Cntr1 1.9100321 GHz -30.42 dBm  Center 1.91 GHz #Res BW 30 kHz #VBW 30 kHz Sweep 14.32 ms (1001 pts) Span 10 MHz
UMTS-FDD Band II - Low Channel	UMTS-FDD Band II - High Channel
Note: Offset=Cable loss (4.5) + 10log (46.97/30)=4.5+2.0=6.5 dB	Note: Offset=Cable loss (4.5) + 10log (47.11/30)=4.5+2.0=6.5 dB

HSDPA:

Agilent 11:49:54 Mar 29, 2017 R T Ref 40 dBm Atten 45 dB Cntr1 823.1216 MHz 29.93 dBm  Center 824 MHz Span 10 MHz #Res BW 30 kHz #VBW 30 kHz Sweep 14.32 ms (1001 pts)	Agilent 11:49:09 Mar 29, 2017 R T Ref 40 dBm Atten 45 dB Cntr1 849.0426 MHz 31.26 dBm  Center 849 MHz Span 10 MHz #Res BW 30 kHz #VBW 30 kHz Sweep 14.32 ms (1001 pts)
UMTS-FDD Band V - Low Channel	UMTS-FDD Band V - High Channel
Note: Offset=Cable loss (4.0) + 10log (47.14/30)=4.0+2.0=6.0 dB	Note: Offset=Cable loss (4.0) + 10log (47.10/30)=4.0+2.0=6.0 dB
Agilent 11:53:12 Mar 29, 2017 R T Ref 40 dBm Atten 45 dB Cntr1 1.8499204 GHz 28.65 dBm  Center 1.85 GHz Span 10 MHz #Res BW 30 kHz #VBW 30 kHz Sweep 14.32 ms (1001 pts)	Agilent 11:53:48 Mar 29, 2017 R T Ref 40 dBm Atten 45 dB Cntr1 1.9100423 GHz 30.38 dBm  Center 1.91 GHz Span 10 MHz #Res BW 30 kHz #VBW 30 kHz Sweep 14.32 ms (1001 pts)
UMTS-FDD Band II - Low Channel	UMTS-FDD Band II - High Channel
Note: Offset=Cable loss (4.5) + 10log (47.11/30)=4.0+2.0=6.5 dB	Note: Offset=Cable loss (4.5) + 10log (47.01/30)=4.0+2.5=6.5 dB

HSUPA:

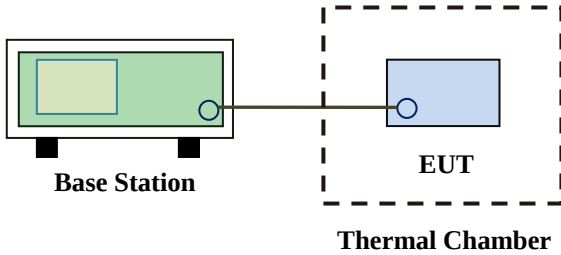
Agilent 11:50:21 Mar 29, 2017 R T Ref 40 dBm Atten 45 dB Cntr1 823.1603 MHz -30.62 dBm  Center 824 MHz Span 10 MHz #Res BW 30 kHz #VBW 30 kHz Sweep 14.32 ms (1001 pts)	Agilent 11:48:45 Mar 29, 2017 R T Ref 40 dBm Atten 45 dB Mkr1 849.12 MHz -31.26 dBm  Center 849 MHz Span 10 MHz #Res BW 30 kHz #VBW 30 kHz Sweep 14.32 ms (1001 pts)
UMTS-FDD Band V - Low Channel	UMTS-FDD Band V - High Channel
Note: Offset=Cable loss (4.0) + 10log (47.06/30)=4.0+2.0=6.0 dB	Note: Offset=Cable loss (4.0) + 10log (47.19/30)=4.0+2.0=6.0 dB
Agilent 11:52:52 Mar 29, 2017 R T Ref 40 dBm Atten 45 dB Cntr1 1.8488316 GHz -29.22 dBm  Center 1.85 GHz Span 10 MHz #Res BW 30 kHz #VBW 30 kHz Sweep 14.32 ms (1001 pts)	Agilent 11:54:13 Mar 29, 2017 R T Ref 40 dBm Atten 45 dB Cntr1 1.9112298 GHz -30.68 dBm  Center 1.91 GHz Span 10 MHz #Res BW 30 kHz #VBW 30 kHz Sweep 14.32 ms (1001 pts)
UMTS-FDD Band II - Low Channel	UMTS-FDD Band II - High Channel
Note: Offset=Cable loss (4.5) + 10log (47.20/30)=4.5+2.0=6.5dB	Note: Offset=Cable loss (4.5) + 10log (47.06/30)=4.5+2.0=6.5 dB

6.8 Frequency Stability

Temperature	25°C
Relative Humidity	52%
Atmospheric Pressure	1028mbar

Requirement(s):

Spec	Item	Requirement	Applicable																																
§2.1055, §22.355 & §24.235	a)	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 border="1"> <thead> <tr> <th>Frequency Range (MHz)</th><th>Base, fixed (ppm)</th><th>Mobile ≤ 3 watts (m)</th><th>Mobile ≤ 3 watts (ppm)</th></tr> </thead> <tbody> <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>45 to 512</td><td>2.5</td><td>5.0</td><td>.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 929</td><td>5.0</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> </tbody> </table> According to §24.235, the frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized frequency block.	Frequency Range (MHz)	Base, fixed (ppm)	Mobile ≤ 3 watts (m)	Mobile ≤ 3 watts (ppm)	25 to 50	20.0	20.0	50.0	50 to 450	5.0	5.0	50.0	45 to 512	2.5	5.0	.0	821 to 896	1.5	2.5	2.5	928 to 929	5.0	N/A	N/A	929 to 960.	1.5	N/A	N/A	2110 to 2220	10.0	N/A	N/A	
Frequency Range (MHz)	Base, fixed (ppm)	Mobile ≤ 3 watts (m)	Mobile ≤ 3 watts (ppm)																																
25 to 50	20.0	20.0	50.0																																
50 to 450	5.0	5.0	50.0																																
45 to 512	2.5	5.0	.0																																
821 to 896	1.5	2.5	2.5																																
928 to 929	5.0	N/A	N/A																																
929 to 960.	1.5	N/A	N/A																																
2110 to 2220	10.0	N/A	N/A																																

Test setup	 Base Station EUT Thermal Chamber
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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
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	±0.00025% (±2.5ppm) of the center frequency.
Remark	
Result	☒ Pass ☐ Fail

Test Data ☒ Yes ☐ N/A
 Test Plot ☐ Yes (See below) ☒ N/A

GSM:

Cellular Band (Part 22H) result

Middle Channel, $f_0 = 836.6$ MHz				
Temperature (°C)	Power Supplied (V _{bc})	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-10	3.7	20	0.0239	2.5
0		15	0.0179	2.5
10		16	0.0191	2.5
20		15	0.0179	2.5
30		12	0.0143	2.5
40		15	0.0179	2.5
50		20	0.0239	2.5
55		19	0.0227	2.5
25	4.2	20	0.0239	2.5
	3.5	18	0.0215	2.5

PCS Band (Part 24E) result

Middle Channel, $f_0 = 1880$ MHz				
Temperature (°C)	Power Supplied (V _{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-10	3.7	12	0.0064	2.5
0		15	0.0080	2.5
10		12	0.0064	2.5
20		16	0.0085	2.5
30		15	0.0080	2.5
40		16	0.0085	2.5
50		14	0.0074	2.5
55		19	0.0101	2.5
25	4.2	15	0.0080	2.5
	3.5	20	0.0106	2.5

RMC:

UMTS-FDD Band V (Part 22H)

Middle Channel, $f_0 = 835$ MHz				
Temperature (°C)	Power Supplied (V _{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-10	3.7	15	0.0180	2.5
0		12	0.0144	2.5
10		14	0.0168	2.5
20		15	0.0180	2.5
30		13	0.0156	2.5
40		10	0.0120	2.5
50		19	0.0228	2.5
55		15	0.0180	2.5
25	4.2	15	0.0180	2.5
	3.5	13	0.0156	2.5

UMTS-FDD Band II (Part 24E)

Middle Channel, $f_0 = 1880$ MHz				
Temperature (°C)	Power Supplied (V _{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-10	3.7	15	0.0080	2.5
0		11	0.0059	2.5
10		14	0.0074	2.5
20		12	0.0064	2.5
30		10	0.0053	2.5
40		16	0.0085	2.5
50		10	0.0053	2.5
55		12	0.0064	2.5
25	4.2	17	0.0090	2.5
	3.5	13	0.0069	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	09/15/2016	09/14/2017	☒
Power Splitter	1#	1#	08/31/2016	08/30/2017	☒
Universal Radio Communication Tester	CMU200	121393	09/24/2016	09/23/2017	☒
Temperature/Humidity Chamber	UHL-270	001	10/08/2016	10/07/2017	☒
DC Power Supply	E3640A	MY40004013	09/16/2016	09/15/2017	☒
RF Power Sensor	Dare RPR3006C/P/W	AY554013	09/16/2016	09/15/2017	☒
Radiated Emissions					
EMI test receiver	ESL6	100262	09/16/2016	09/15/2017	☒
OPT 010 AMPLIFIER (0.1-1300MHz)	8447E	2727A02430	08/31/2016	08/30/2017	☒
Microwave Preamplifier (1 ~ 26.5GHz)	8449B	3008A02402	03/23/2017	03/22/2018	☒
Bilog Antenna (30MHz~6GHz)	JB6	A110712	09/20/2016	09/19/2017	☒
Bilog Antenna (30MHz~2GHz)	JB1	A112017	09/20/2016	09/19/2017	☒
Double Ridge Horn Antenna (1 ~18GHz)	AH-118	71259	09/23/2016	09/22/2017	☒
Double Ridge Horn Antenna (1 ~18GHz)	AH-118	71283	09/23/2016	09/22/2017	☒
SYNTHESIZED SIGNAL GENERATOR	8665B	3744A01293	09/16/2016	09/15/2017	☒
Power Amplifier	SMC150D	R1553-0313	03/08/2017	03/07/2018	☒
Power Amplifier	S41-25D	R1553-0314	05/27/2016	05/26/2017	☒
Tunable Notch Filter	3NF-800/1000-S	AA4	08/31/2016	08/30/2017	☒

Tunable Notch Filter	3NF- 1000/2000-S	AM 4	08/31/2016	08/30/2017	☒
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Annex B. EUT Test Setup Photographs

