





## **FCC §2.1053, §22.917 & §24.238 & §27.53 - SPURIOUS RADIATED EMISSIONS**

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### **Applicable Standards**

FCC § 2.1053, §22.917 and § 24.238 and § 27.53.

For mobile digital stations, the attenuation factor shall be not less than  $40 + 10 \log (P)$  dB on all frequencies between the channel edge and 5 megahertz from the channel edge,  $43 + 10 \log (P)$  dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and  $55 + 10 \log (P)$  dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section. In addition, the attenuation factor shall not be less than  $43 + 10 \log (P)$  dB on all frequencies between 2490.5 MHz and 2496 MHz and  $55 + 10 \log (P)$  dB at or below 2490.5 MHz. Mobile Satellite Service licensees operating on frequencies below 2495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS Channel 1 on the same terms and conditions as adjacent channel BRS or EBS licensees.

### **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.

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 =  $10 \lg (\text{TX pwr in Watts}/0.001)$  – the absolute level

Spurious attenuation limit in dB =  $43 + 10 \text{Log}_{10} (\text{power out in Watts})$

**Test Equipment List and Details**

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Sunol Sciences	Horn Antenna	DRH-118	A052304	2014-12-01	2015-11-30
Sunol Sciences	Broadband Antenna	JB1	A040904-2	2014-12-07	2017-12-06
Rohde & Schwarz	Signal Analyzer	FSIQ26	837405/023	2014-08-22	2015-08-22
Mini-Circuits	Amplifier	ZVA-213+	N/A	NCR	NCR
HP	Amplifier	HP8447E	1937A01046	2014-05-06	2015-05-06
HP	Signal Generator	8341B	2624A00116	2014-06-03	2015-06-03
COM POWER	Dipole Antenna	AD-100	041000	NCR	NCR
A.H. System	Horn Antenna	SAS-200/571	135	2013-02-11	2016-02-10
Rohde & Schwarz	EMI Test Receiver	ESCI	101120	2014-11-03	2015-11-03
Electro-Mechanics	Horn Antenna	3116	9510-2270	2013-10-14	2016-10-13
Rohde & Schwarz	Universal Radio Communication Tester	CMU200	106891	2014-11-23	2015-11-23

\* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements, traceable to National Primary Standards and International System of Units (SI).

**Test Data****Environmental Conditions**

<b>Temperature:</b>	23 °C
<b>Relative Humidity:</b>	51 %
<b>ATM Pressure:</b>	101.0 kPa

*The testing was performed by Simon Wang on 2015-04-06.*

Test mode: Transmitting (Pre-scan with all the bandwidth, and worse case as below)

**30 MHz ~ 10 GHz:**

**Cellular Band (Part 22H)**

Frequency (MHz)	Receiver Reading (dBµV)	Turntable Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	FCC Part 22H	
			Height (m)	Polar (H/V)	SG Level (dBm)	Cable Loss (dB)	Antenna Gain (dB)		Limit (dBm)	Margin (dB)
GSM Mode, Middle channel										
126.9	31.26	272	1.1	H	-65.7	0.26	0	-65.96	-13	52.96
126.9	30.87	267	1.8	V	-66.1	0.26	0	-66.36	-13	53.36
1673.20	42.13	202	1.3	H	-54.0	1.60	6.90	-48.70	-13	35.70
1673.20	43.27	179	2.2	V	-55.0	1.60	6.90	-49.70	-13	36.70
2509.80	39.08	228	2.0	H	-55.5	1.70	8.60	-48.60	-13	35.60
2509.80	47.14	50	2.2	V	-47.5	1.70	8.60	-40.60	-13	27.60
3346.40	41.47	91	1.7	H	-47.6	1.90	9.80	-39.70	-13	26.70
3346.40	41.22	139	1.0	V	-49.4	1.90	9.80	-41.50	-13	28.50
WCDMA Mode, Middle channel										
400.3	37.12	28	1.1	H	-59.9	0.44	0	-60.34	-13	47.34
400.3	38.35	48	2.1	V	-58.6	0.44	0	-59.04	-13	46.04
1673.2	38.89	171	1.6	H	-57.3	1.60	6.90	-52.00	-13	39.00
1673.2	39.28	103	1.3	V	-59.0	1.60	6.90	-53.70	-13	40.70
2509.8	37.59	203	1.2	H	-56.9	1.70	8.60	-50.00	-13	37.00
2509.8	37.39	270	2.3	V	-57.2	1.70	8.60	-50.30	-13	37.30
3346.4	37.32	195	1.1	H	-51.8	1.90	9.80	-43.90	-13	30.90
3346.4	37.76	80	1.2	V	-52.8	1.90	9.80	-44.90	-13	31.90

**30 MHz ~ 20 GHz:**

**PCS Band (Part 24E)**

Frequency (MHz)	Receiver Reading (dBμV)	Turntable Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	FCC Part 24E	
			Height (m)	Polar (H/V)	SG Level (dBm)	Cable Loss (dB)	Antenna Gain (dB)		Limit (dBm)	Margin (dB)
GSM Mode, High channel										
126.9	31.12	13	1.9	H	-65.9	0.26	0	-66.16	-13	53.16
126.9	30.79	208	1.4	V	-66.2	0.26	0	-66.46	-13	53.46
3815.2	50.01	326	1.2	H	-39.9	1.90	9.90	-31.90	-13	18.90
3815.2	51.21	25	1.1	V	-38.9	1.90	9.90	-30.90	-13	17.90
5722.8	48.13	60	1.6	H	-33.8	2.10	10.30	-25.60	-13	12.60
5722.8	49.31	237	2.2	V	-33.6	2.10	10.30	-25.40	-13	12.40
7630.4	37.86	152	2.3	H	-43.8	2.60	10.70	-35.70	-13	22.70
7630.4	43.55	345	1.1	V	-38.4	2.60	10.70	-30.30	-13	17.30
WCDMA Mode, Low channel										
400.3	37.96	114	1.6	H	-59.0	0.44	0	-59.44	-13	46.44
400.3	37.54	46	2.1	V	-59.5	0.44	0	-59.94	-13	46.94
3704.8	36.75	168	2.3	H	-53.1	1.90	9.90	-45.10	-13	32.10
3704.8	36.53	117	1.1	V	-53.6	1.90	9.90	-45.60	-13	32.60

**AWS Band (Part 27)**

Frequency (MHz)	Receiver Reading (dBμV)	Turntable Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	FCC Part 27	
			Height (m)	Polar (H/V)	SG Level (dBm)	Cable Loss (dB)	Antenna Gain (dB)		Limit (dBm)	Margin (dB)
WCDMA Mode, High channel										
400.3	37.25	119	1.3	H	-59.7	0.44	0	-60.14	-13	47.14
400.3	37.89	313	1.1	V	-59.1	0.44	0	-59.54	-13	46.54
3505.2	36.96	49	1.4	H	-53.8	1.90	10.00	-45.70	-13	32.70
3505.2	35.93	348	1.9	V	-55.4	1.90	10.00	-47.30	-13	34.30
7010.4	41.33	143	1.5	H	-39.7	2.50	10.60	-31.60	-13	18.60
7010.4	35.73	251	1.3	V	-47.2	2.50	10.60	-39.10	-13	26.10

Frequency (MHz)	Receiver Reading (dBμV)	Turntable Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	FCC Part 22H&24E&27	
			Height (m)	Polar (H/V)	SG Level (dBm)	Cable Loss (dB)	Antenna Gain (dB)		Limit (dBm)	Margin (dB)
<b>Band 2</b>										
251.7	30.26	76	2.3	H	-66.7	0.32	0	-67.02	-13	54.02
251.7	29.55	171	1.6	V	-67.4	0.32	0	-67.72	-13	54.72
5640.00	37.13	340	1.9	H	-44.8	2.10	10.30	-36.60	-13	23.60
5640.00	34.90	191	1.7	V	-48.0	2.10	10.30	-39.80	-13	26.80
<b>Band 4</b>										
251.7	30.05	146	1.5	H	-66.9	0.32	0	-67.22	-13	54.22
251.7	30.19	219	1.6	V	-66.8	0.32	0	-67.12	-13	54.12
5197.50	36.85	336	1.8	H	-46.3	1.80	10.10	-38.00	-13	25.00
5197.50	34.84	357	2.3	V	-49.0	1.80	10.10	-40.70	-13	27.70
6930.00	41.22	248	2.5	H	-39.8	2.50	10.60	-31.70	-13	18.70
6930.00	37.79	82	2.1	V	-45.2	2.50	10.60	-37.10	-13	24.10
<b>Band 5</b>										
251.7	29.95	260	1.7	H	-67.0	0.32	0	-67.32	-13	54.32
251.7	30.36	134	2.3	V	-66.6	0.32	0	-66.92	-13	53.92
1714.00	47.74	119	1.9	H	-48.4	1.60	6.90	-43.10	-13	30.10
1714.00	53.63	353	2.3	V	-44.6	1.60	6.90	-39.30	-13	26.30
2509.50	37.16	176	1.8	H	-57.4	1.70	8.60	-50.50	-13	37.50
2509.50	37.04	61	1.3	V	-57.6	1.70	8.60	-50.70	-13	37.70
<b>Band 7</b>										
251.7	30.69	263	2.4	H	-66.3	0.32	0	-66.62	-25	41.62
251.7	31.25	108	1.1	V	-65.7	0.32	0	-66.02	-25	41.02
7605.00	37.34	174	1.3	H	-47.2	4.70	10.80	-41.10	-25	16.10
7605.00	38.21	326	2.0	V	-44.8	4.70	10.80	-38.70	-25	13.70
<b>Band 17</b>										
251.7	30.50	147	1.4	H	-66.5	0.32	0	-66.82	-13	53.82
251.7	29.81	208	2.4	V	-67.2	0.32	0	-67.52	-13	54.52
1420.00	37.37	138	2.2	H	-60.9	1.20	6.40	-55.70	-13	42.70
1420.00	40.97	265	1.6	V	-58.1	1.20	6.40	-52.90	-13	39.90

**Note:**

- 1) Absolute Level = SG Level - Cable loss + Antenna Gain
- 2) Margin = Limit- Absolute Level

**FCC §22.917(a) & §24.238(a) & §27.53 - BAND EDGES**

**Applicable Standards**

According to § 22.917(a), the power of any emissions outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log(P)$  dB.

According to §24.238(a), the power of any emissions outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log(P)$  dB.

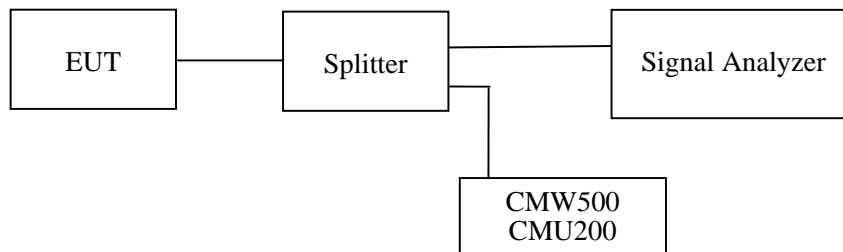
According to FCC §27.53, the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log(P)$  dB.

For mobile digital stations, the attenuation factor shall be not less than  $40 + 10 \log (P)$  dB on all frequencies between the channel edge and 5 megahertz from the channel edge,  $43 + 10 \log (P)$  dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and  $55 + 10 \log (P)$  dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section. In addition, the attenuation factor shall not be less that  $43 + 10 \log (P)$  dB on all frequencies between 2490.5 MHz and 2496 MHz and  $55 + 10 \log (P)$  dB at or below 2490.5 MHz. Mobile Satellite Service licensees operating on frequencies below 2495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS Channel 1 on the same terms and conditions as adjacent channel BRS or EBS licensees.

**Test Procedure**

The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation.

The center of the spectrum analyzer was set to block edge frequency





**Test Equipment List and Details**

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESR	1316.3003K03-101746-zn	2014-06-13	2015-06-13
Rohde & Schwarz	Signal Analyzer	FSIQ26	837405/023	2014-08-22	2015-08-22
Rohde & Schwarz	Universal Radio Communication Tester	CMU200	106891	2014-11-23	2015-11-23

\* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements, traceable to National Primary Standards and International System of Units (SI).

**Test Data**

**Environmental Conditions**

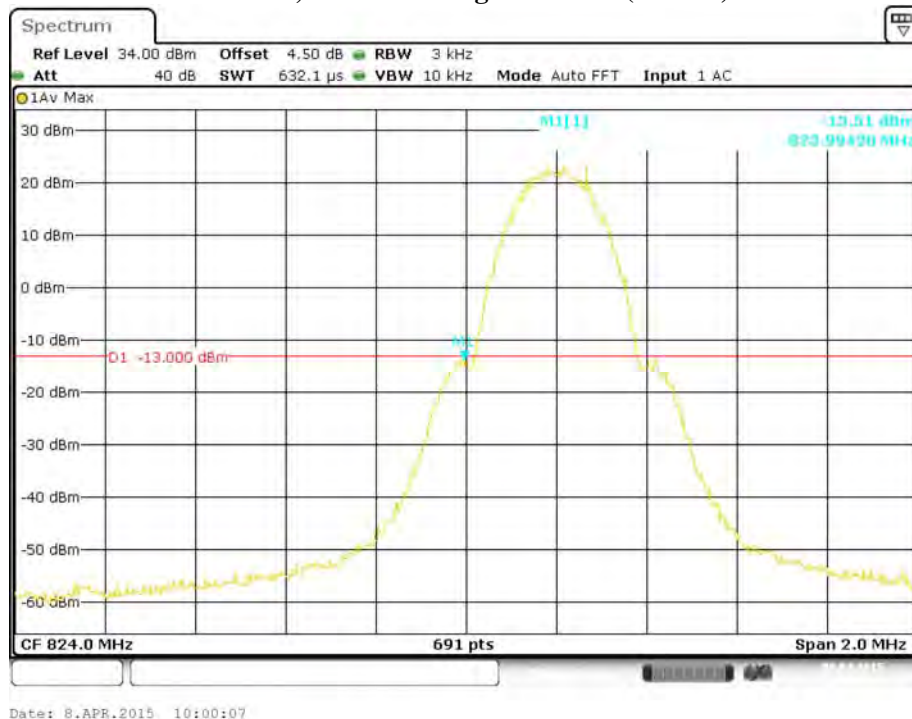
<b>Temperature:</b>	20~26 °C
<b>Relative Humidity:</b>	48~53 %
<b>ATM Pressure:</b>	100.0~101.0 kPa

The testing was performed by Simon Wang from 2015-03-25 to 2015-04-17.

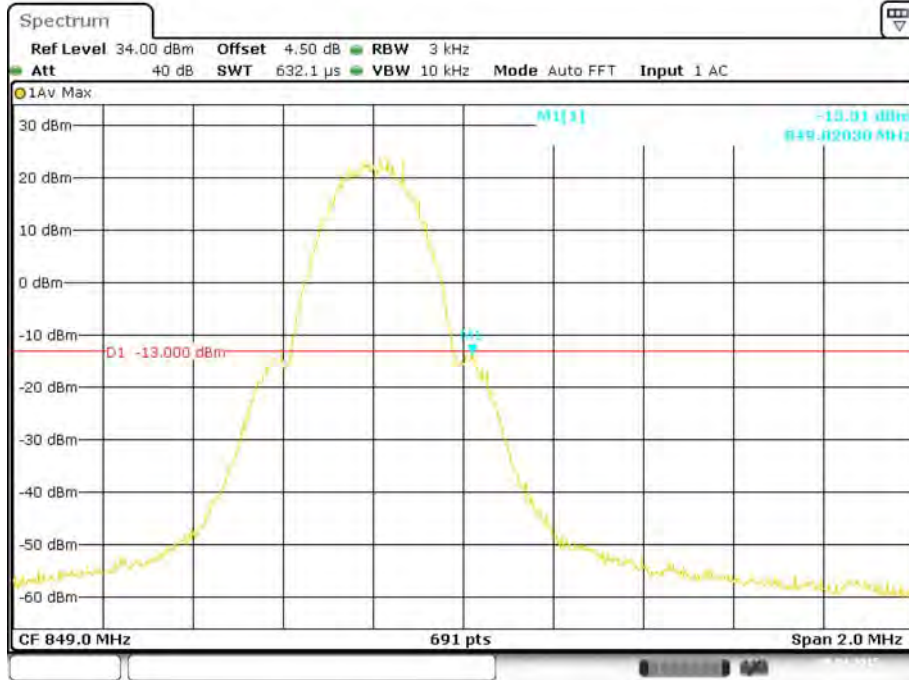
EUT operation mode: Transmitting

Test Result: Compliance. Please refer to the following plots.

**Cellular Band, Left Band Edge for GSM (GMSK) Mode**

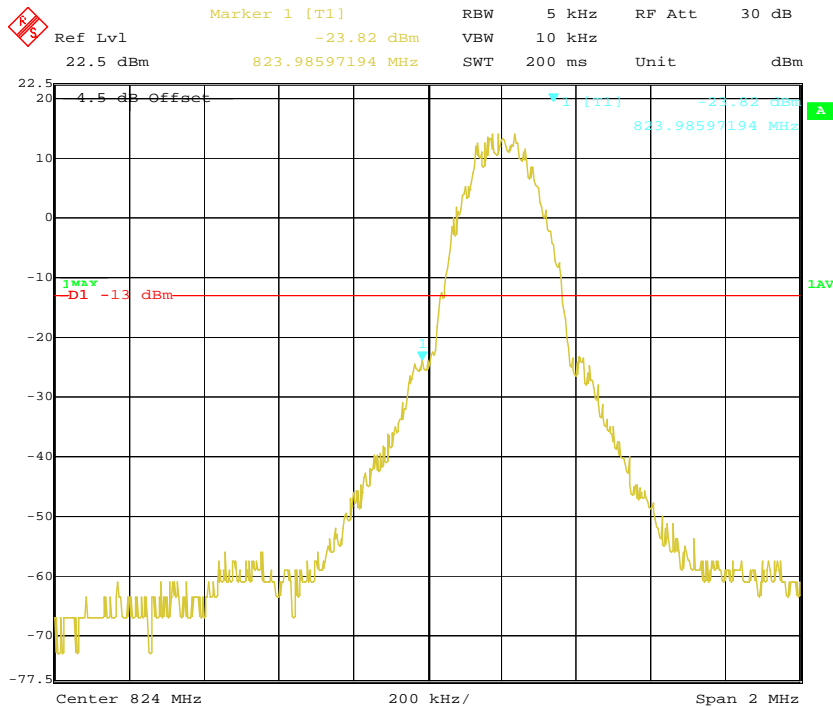


**Cellular Band, Right Band Edge for GSM (GMSK) Mode**



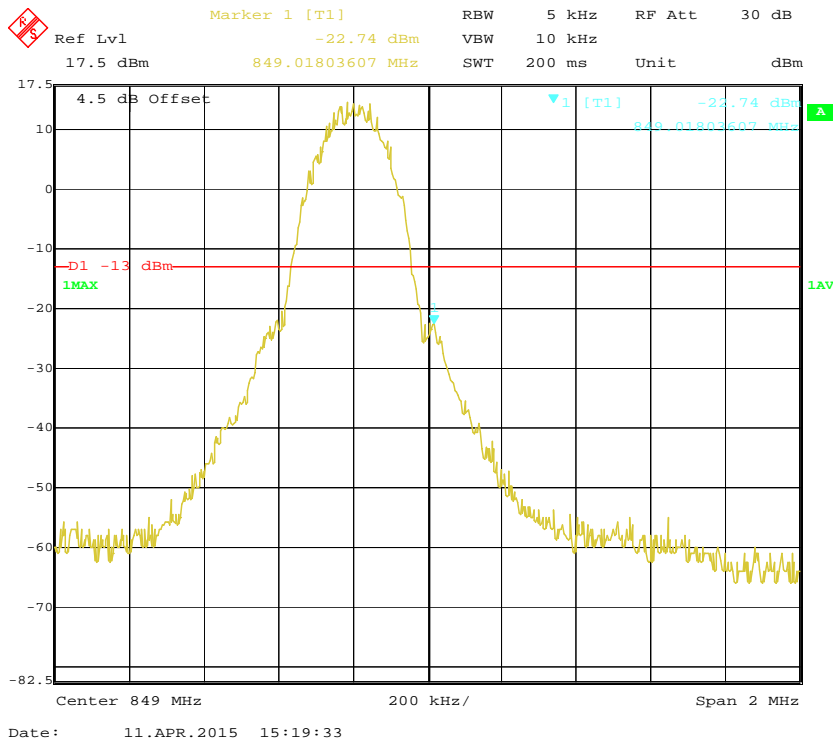
Date: 8.APR.2015 10:01:35

**Cellular Band, Left Band Edge for EGPRS Mode**

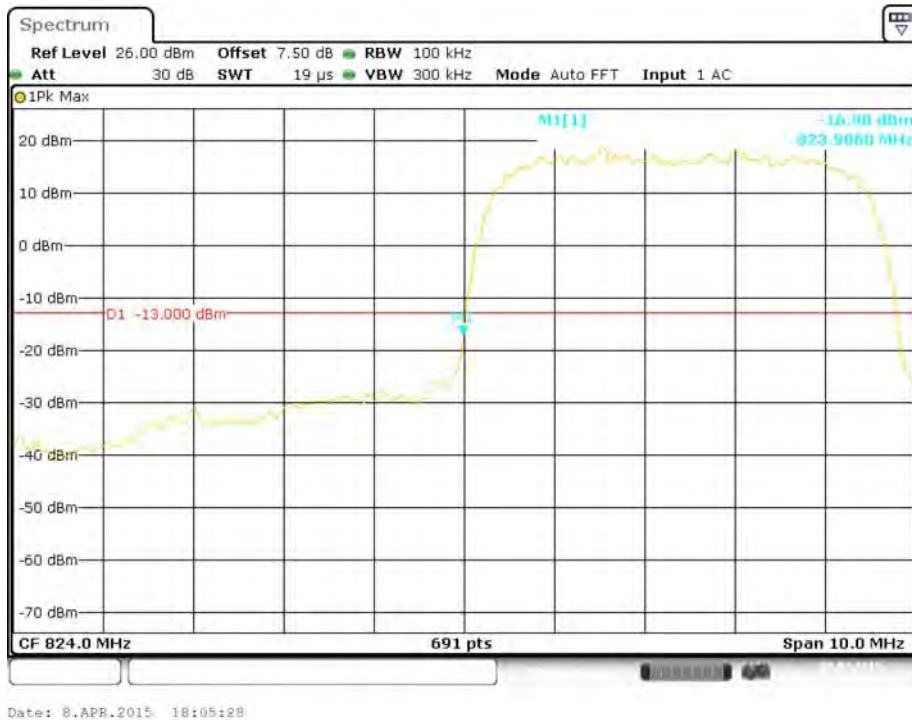


Date: 11.APR.2015 15:17:41

**Cellular Band, Right Band Edge for EGPRS Mode**



**Cellular Band, Left Band Edge for WCDMA (BPSK) Mode**

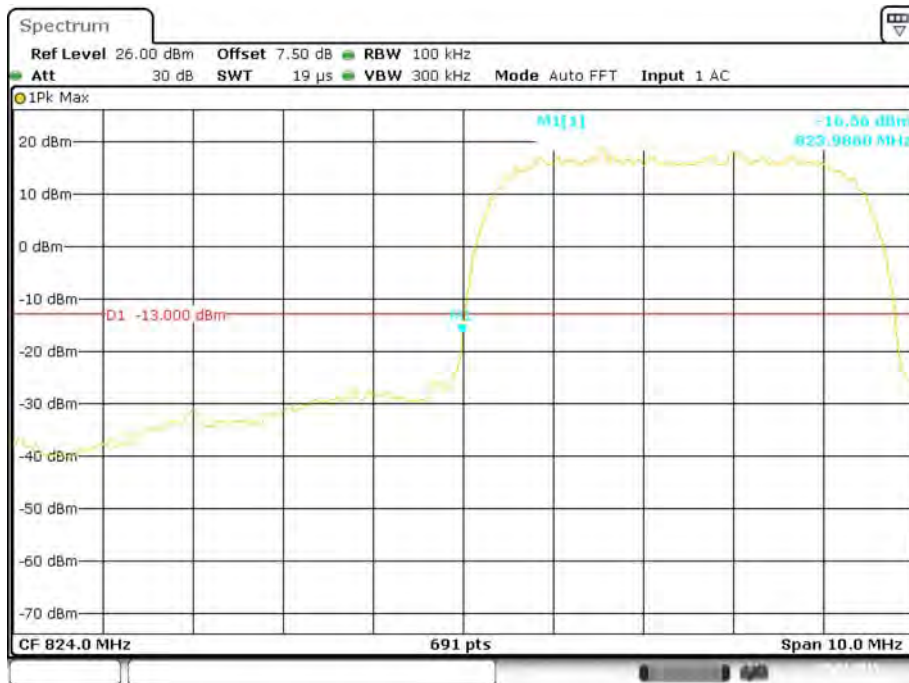


### Cellular Band, Right Band Edge for WCDMA (BPSK) Mode



Date: 8.APR.2015 18:02:56

### Cellular Band, Left Band Edge for HSDPA (16QAM) Mode



Date: 8.APR.2015 18:06:07

### Cellular Band, Right Band Edge for HSDPA (16QAM) Mode



Date: 8.APR.2015 18:04:42

### Cellular Band, Left Band Edge for HSUPA (BPSK) Mode



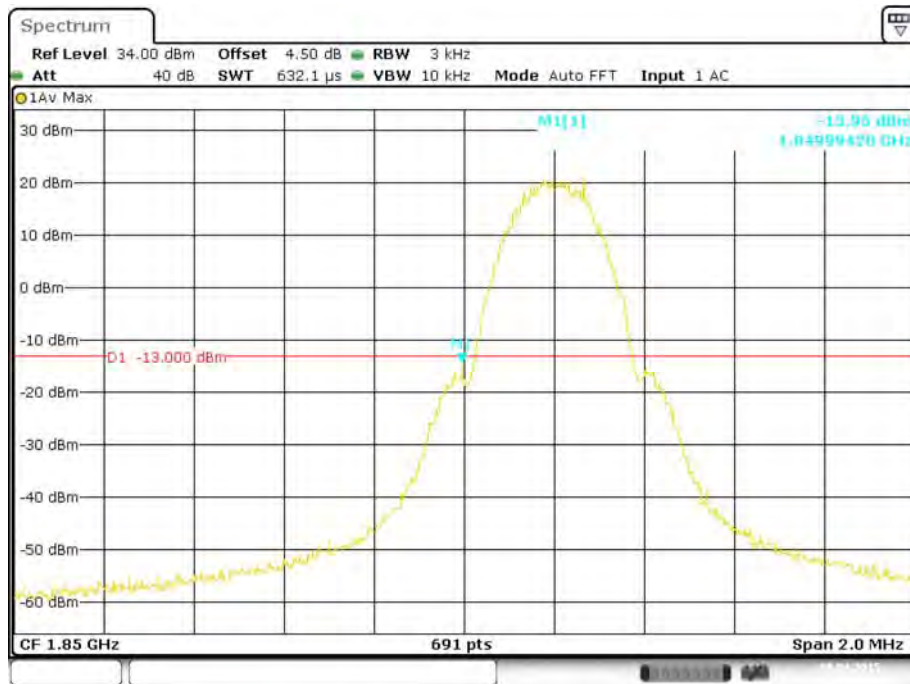
Date: 8.APR.2015 18:06:39

### Cellular Band, Right Band Edge for HSUPA (BPSK) Mode



Date: 8.APR.2015 18:04:06

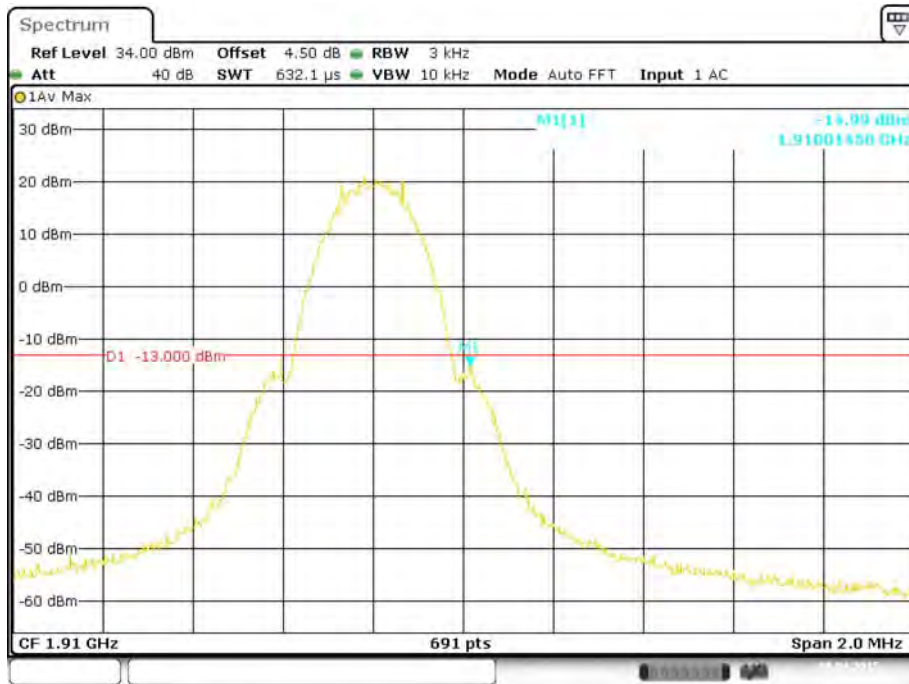
### PCS Band, Left Band Edge for GSM (GMSK) Mode



Date: 8.APR.2015 10:05:24

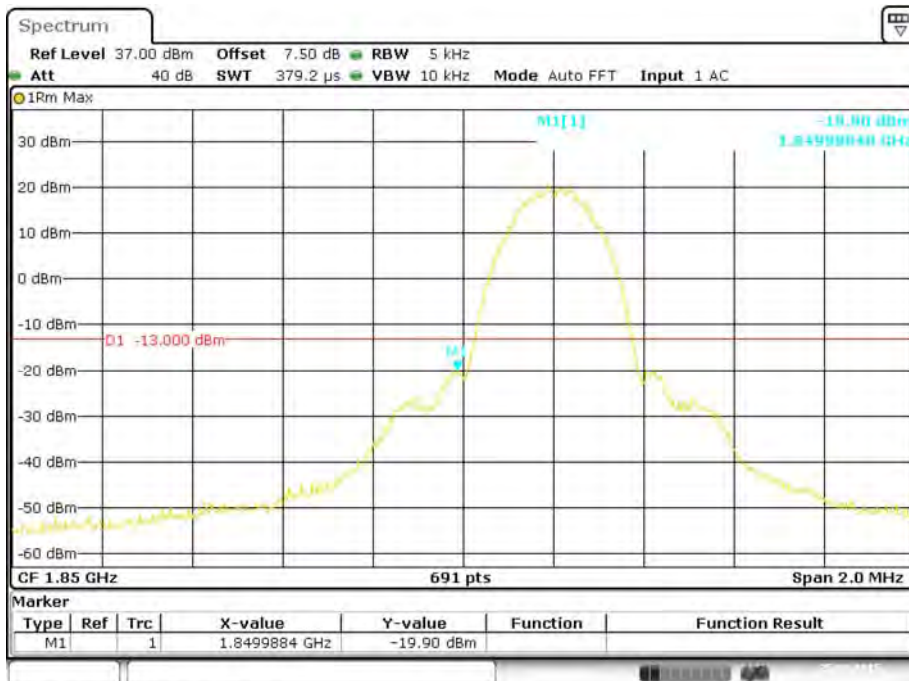


**PCS Band, Right Band Edge for GSM (GMSK) Mode**



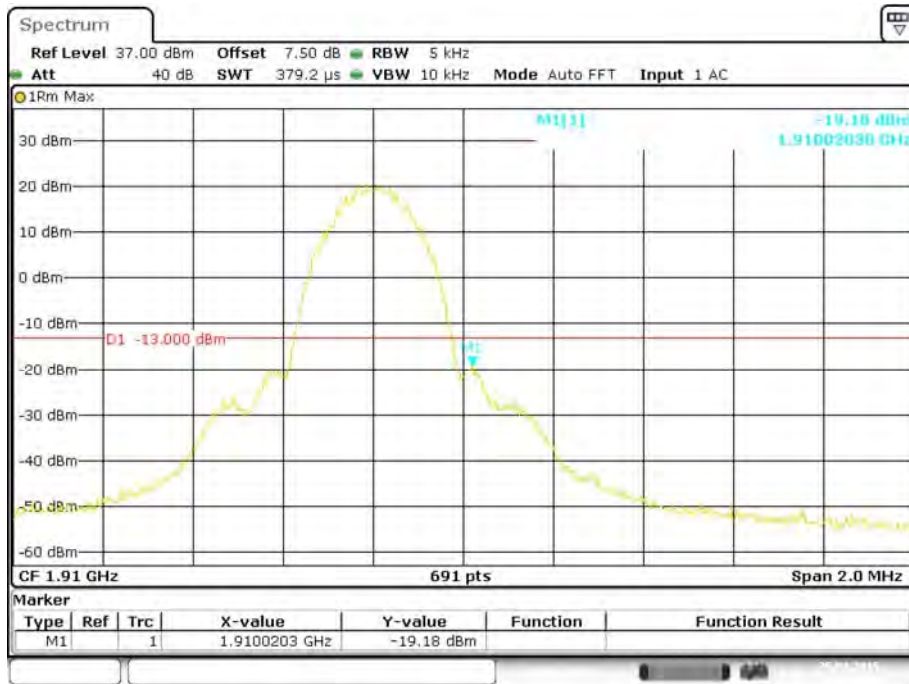
Date: 8.APR.2015 10:06:58

**PCS Band, Left Band Edge for EGPRS Mode**



Date: 25.MAR.2015 16:16:37

**PCS Band, Right Band Edge for EGPRS Mode**



Date: 25.MAR.2015 16:18:27

**PCS Band, Left Band Edge for WCDMA (BPSK) Mode**



Date: 8.APR.2015 18:08:33



### PCS Band, Right Band Edge for WCDMA (BPSK) Mode



Date: 8.APR.2015 18:10:30

### PCS Band, Left Band Edge for HSDPA (16QAM) Mode



Date: 8.APR.2015 18:09:11

### PCS Band, Right Band Edge for HSDPA (16QAM) Mode



Date: 8.APR.2015 18:11:12

### PCS Band, Left Band Edge for HSUPA (BPSK) Mode



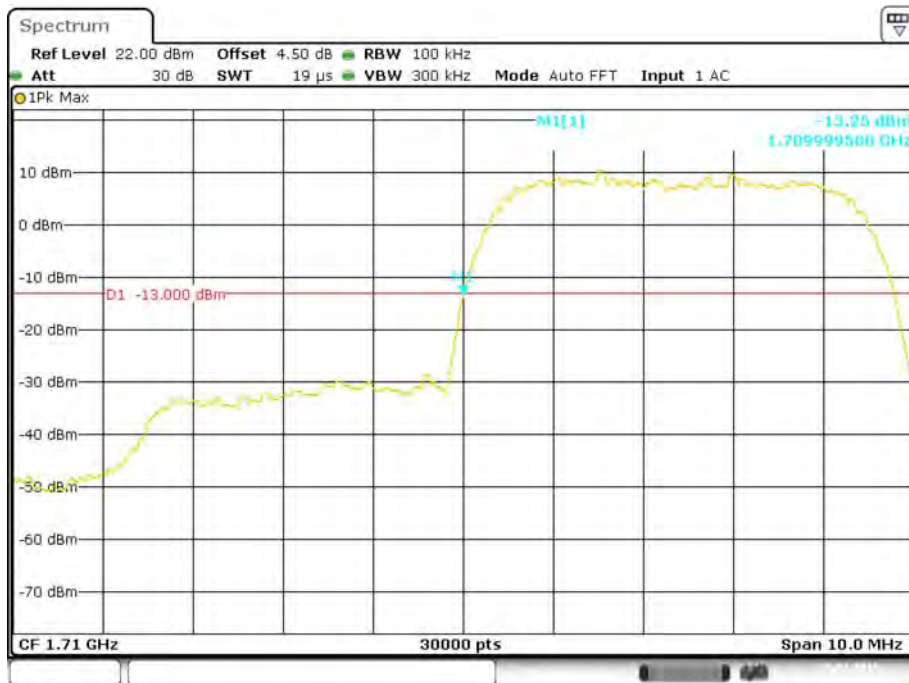
Date: 8.APR.2015 18:09:33

### PCS Band, Right Band Edge for HSUPA (BPSK) Mode



Date: 8.APR.2015 11:21:36

### AWS Band, Left Band Edge for WCDMA (BPSK) Mode



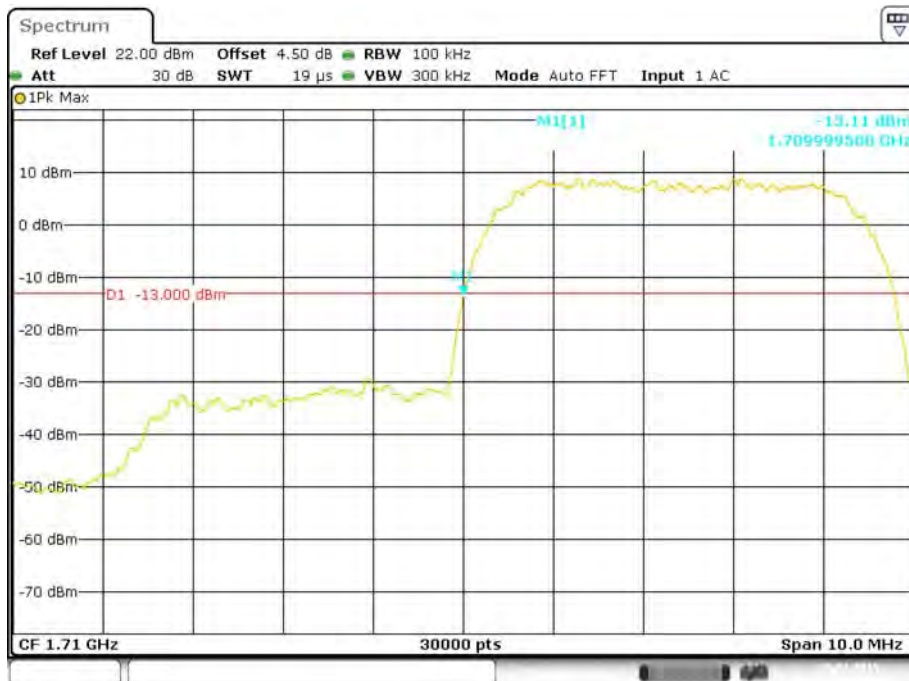
Date: 16.APR.2015 16:04:44

### AWS Band, Right Band Edge for WCDMA (BPSK) Mode



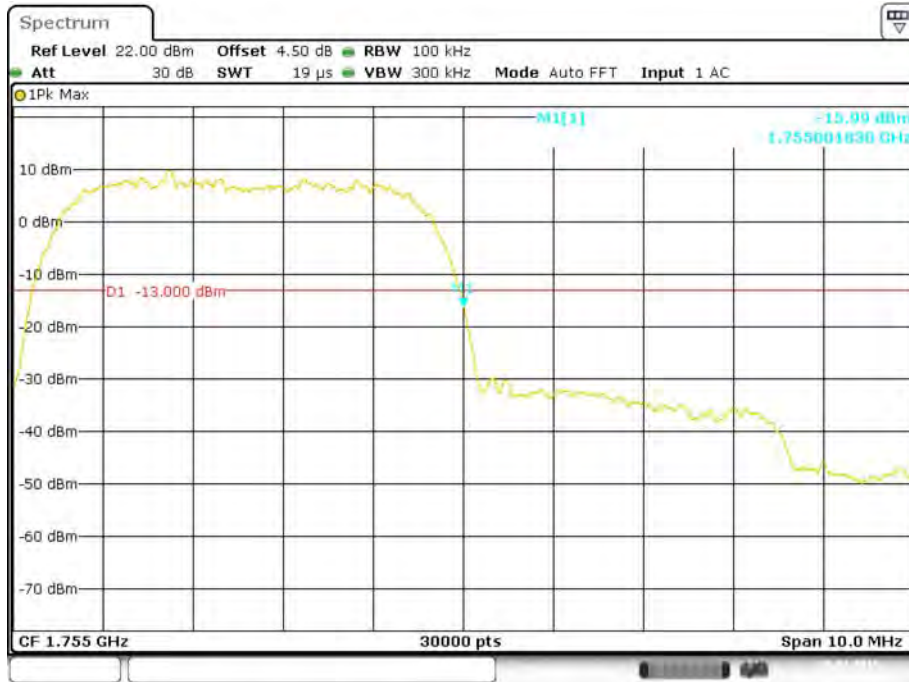
Date: 16.APR.2015 16:07:09

### AWS Band, Left Band Edge for HSDPA (16QAM) Mode



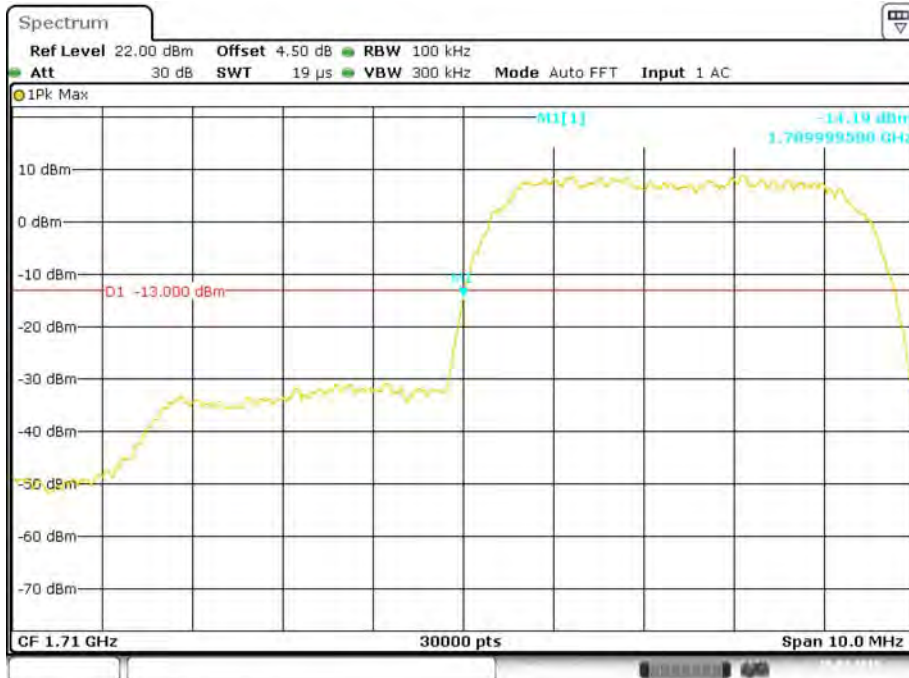
Date: 16.APR.2015 16:05:22

### AWS Band, Right Band Edge for HSDPA (16QAM) Mode



Date: 16.APR.2015 16:08:04

### AWS Band, Left Band Edge for HSUPA (BPSK) Mode



Date: 16.APR.2015 16:09:48





### QPSK (1.4 MHz, FULL RB) - Right Band Edge



Date: 1.APR.2015 17:42:46

### 16-QAM (1.4 MHz, FULL RB) - Left Band Edge



Date: 1.APR.2015 17:52:10

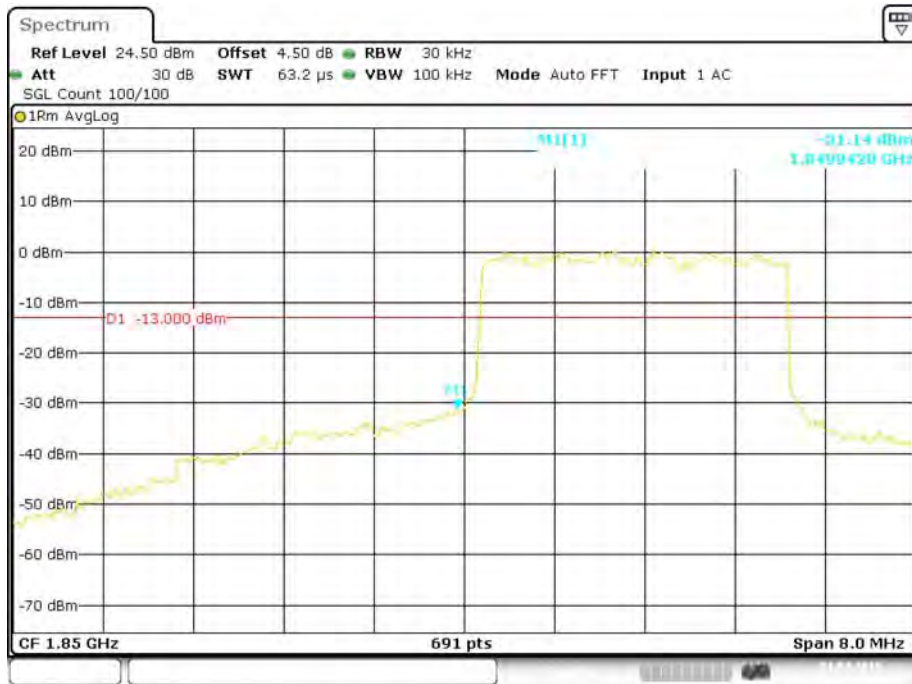
### 16-QAM (1.4 MHz, FULL RB) - Right Band Edge



Date: 1.APR.2015 17:41:53



### QPSK (3.0 MHz, FULL RB) - Left Band Edge



### QPSK (3.0 MHz, FULL RB) - Right Band Edge

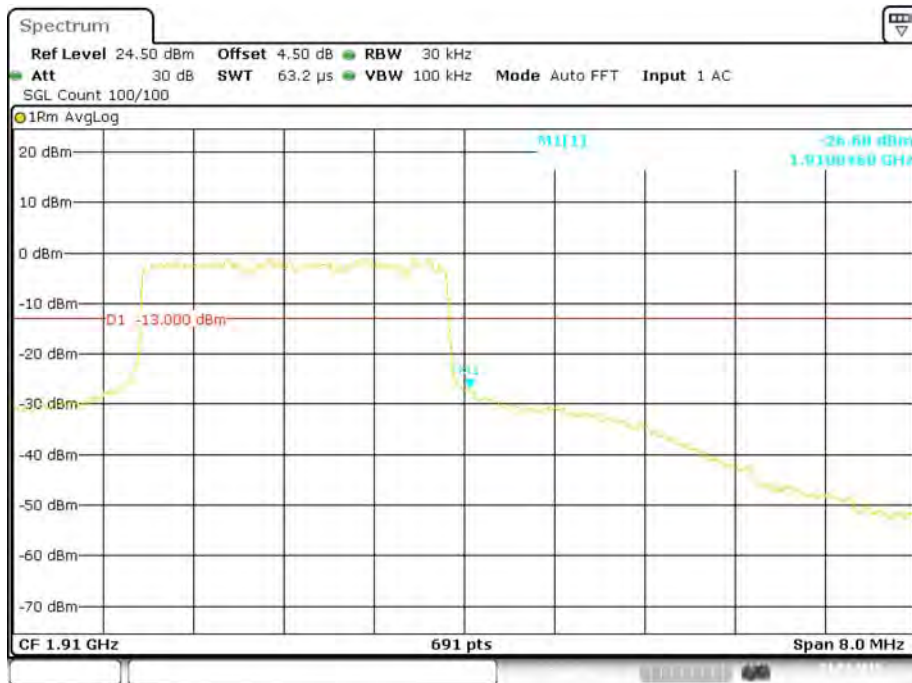


### 16-QAM (3.0 MHz, FULL RB) - Left Band Edge



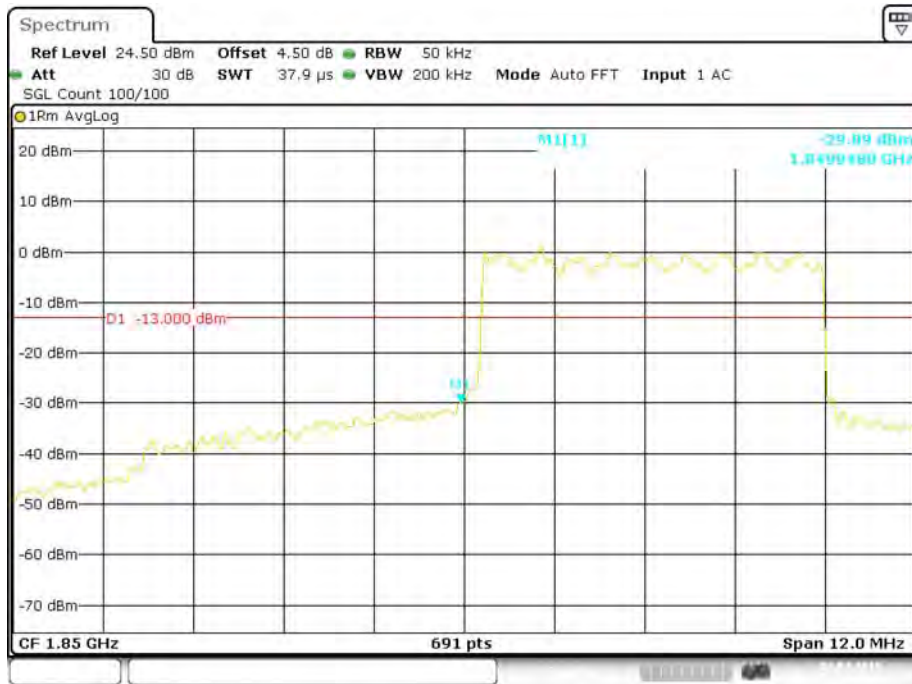
Date: 1.APR.2015 17:59:36

### 16-QAM (3.0 MHz, FULL RB) - Right Band Edge



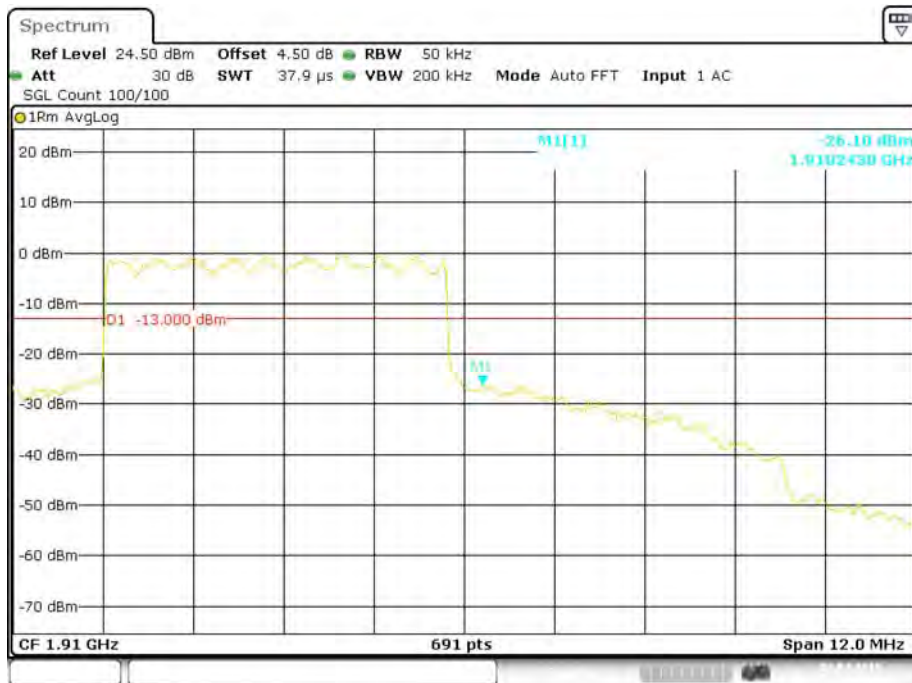
Date: 1.APR.2015 18:04:08

### QPSK (5.0 MHz, FULL RB) - Left Band Edge



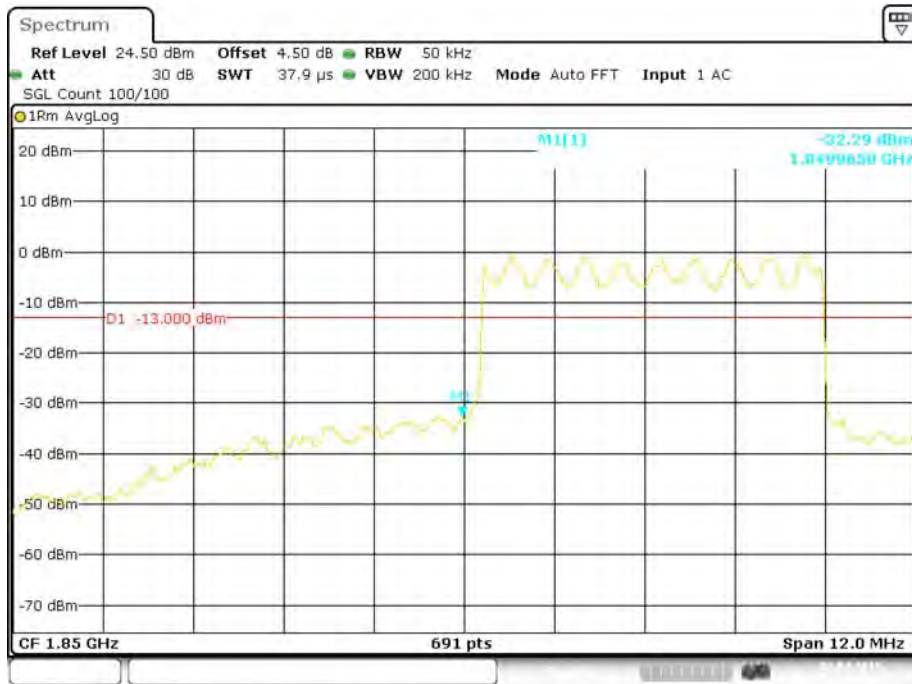
Date: 2.APR.2015 12:35:48

### QPSK (5.0 MHz, FULL RB) - Right Band Edge



Date: 2.APR.2015 12:50:05

### 16-QAM (5.0 MHz, FULL RB) - Left Band Edge



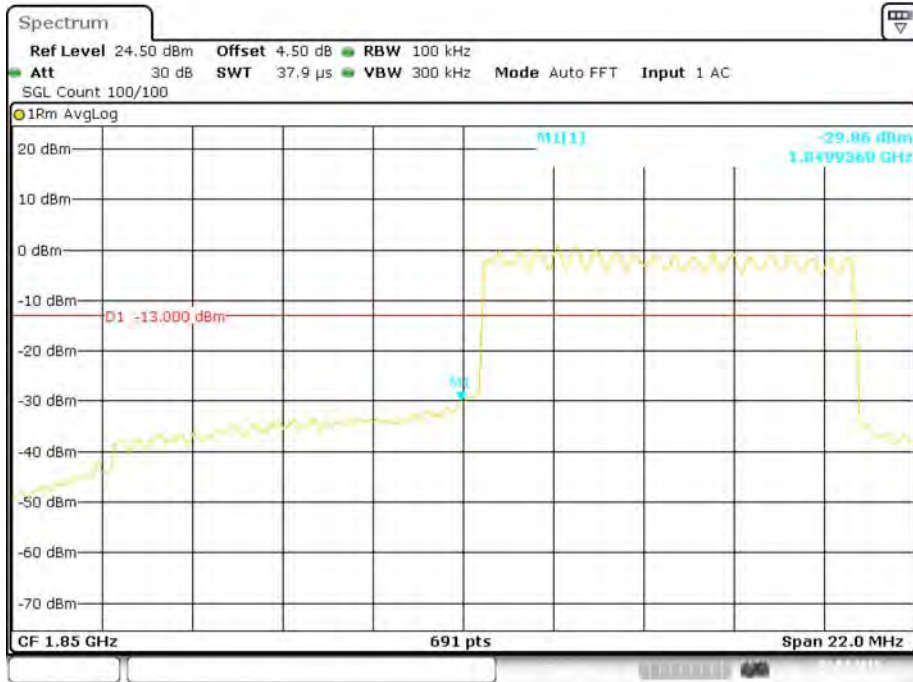
Date: 2.APR.2015 12:37:01

### 16-QAM (5.0 MHz, FULL RB) - Right Band Edge



Date: 2.APR.2015 12:51:09

### QPSK (10.0 MHz, FULL RB) - Left Band Edge

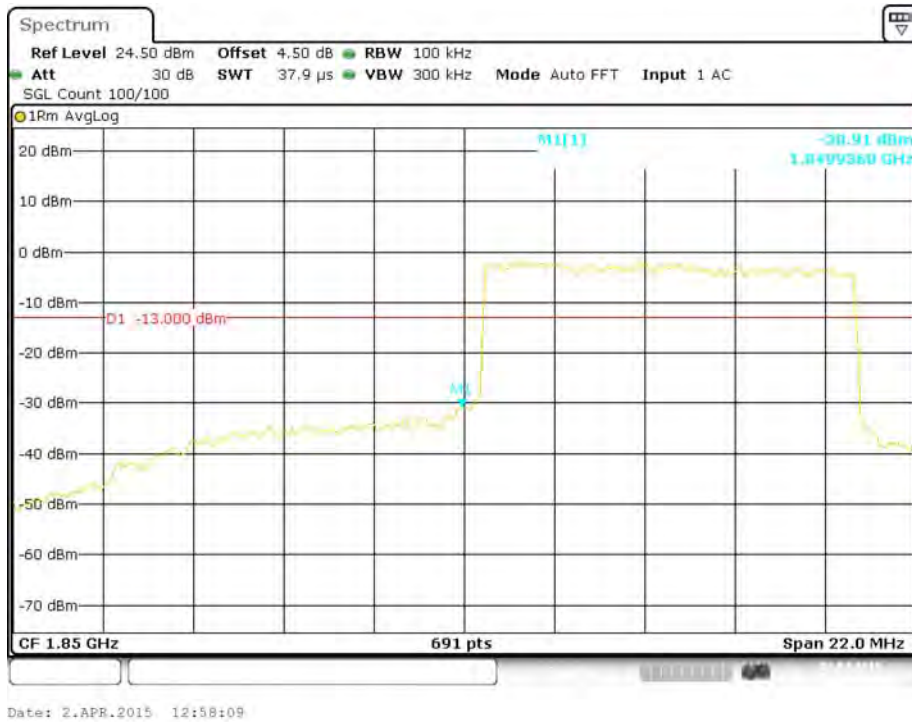


### QPSK (10.0 MHz, FULL RB) - Right Band Edge

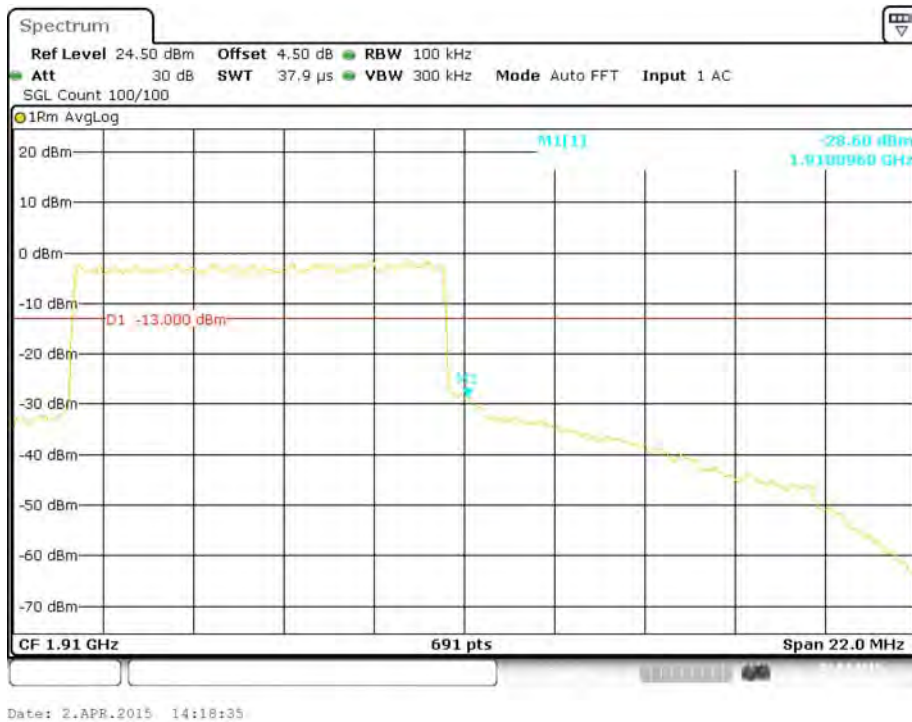




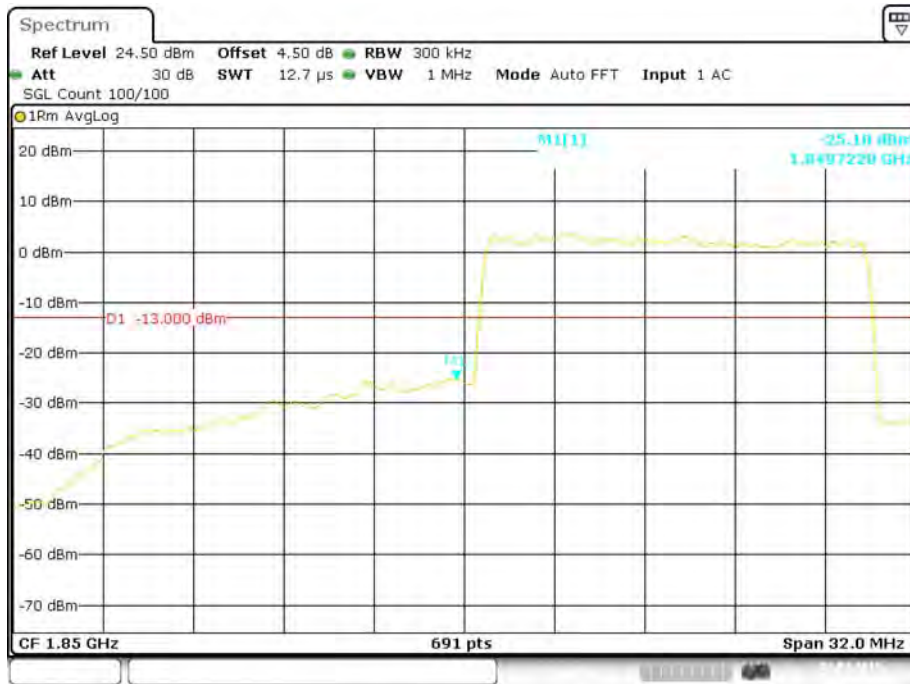
### 16-QAM (10.0 MHz, FULL RB) - Left Band Edge



### 16-QAM (10.0 MHz, FULL RB) - Right Band Edge



### QPSK (15.0 MHz, FULL RB) - Left Band Edge



Date: 2.APR.2015 14:22:21

### QPSK (15.0 MHz, FULL RB) - Right Band Edge



Date: 2.APR.2015 14:29:53

### 16-QAM (15.0 MHz, FULL RB) - Left Band Edge

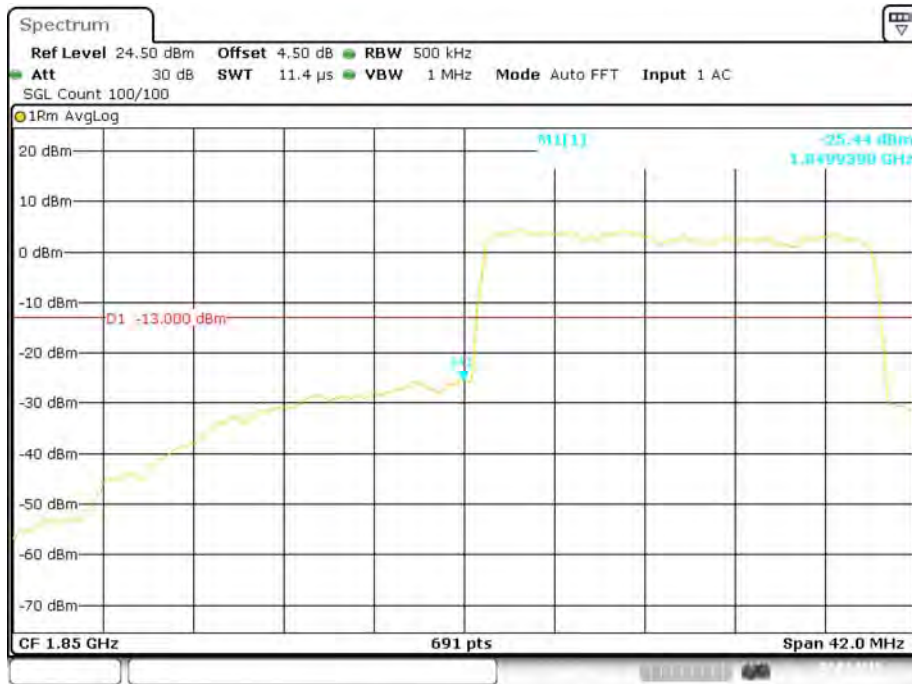


### 16-QAM (15.0 MHz, FULL RB) - Right Band Edge





### QPSK (20.0 MHz, FULL RB) - Left Band Edge



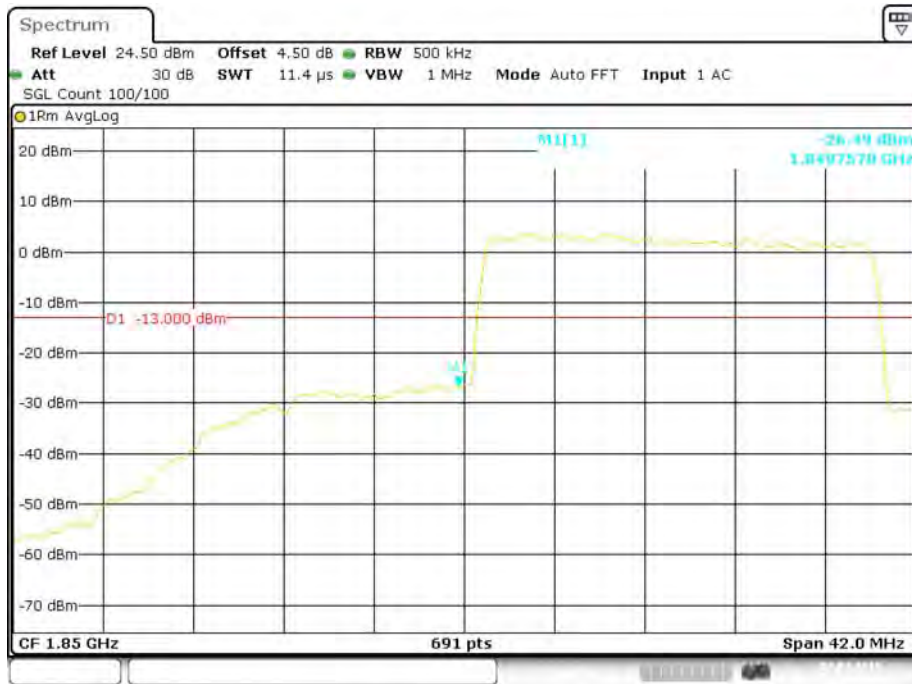
Date: 2.APR.2015 14:41:20

### QPSK (20.0 MHz, FULL RB) - Right Band Edge



Date: 2.APR.2015 14:34:08

### 16-QAM (20.0 MHz, FULL RB) - Left Band Edge



Date: 2.APR.2015 14:40:24

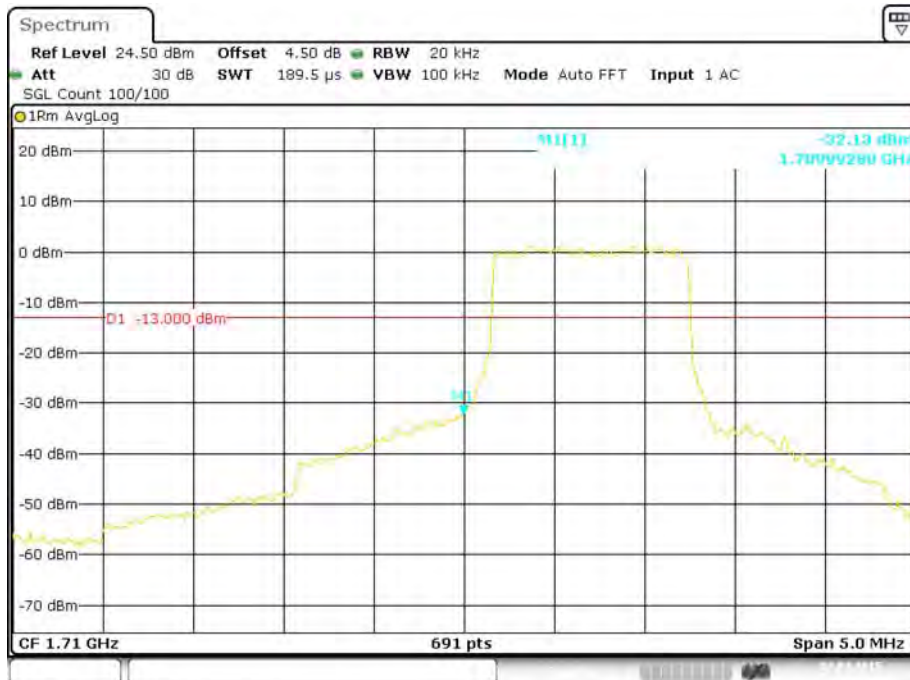
### 16-QAM (20.0 MHz, FULL RB) - Right Band Edge



Date: 2.APR.2015 14:35:14

**Band 4:**

**QPSK (1.4 MHz, FULL RB) - Left Band Edge**



Date: 2.APR.2015 16:09:57

**QPSK (1.4 MHz, FULL RB) - Right Band Edge**



Date: 2.APR.2015 16:14:00

### 16-QAM (1.4 MHz, FULL RB) - Left Band Edge



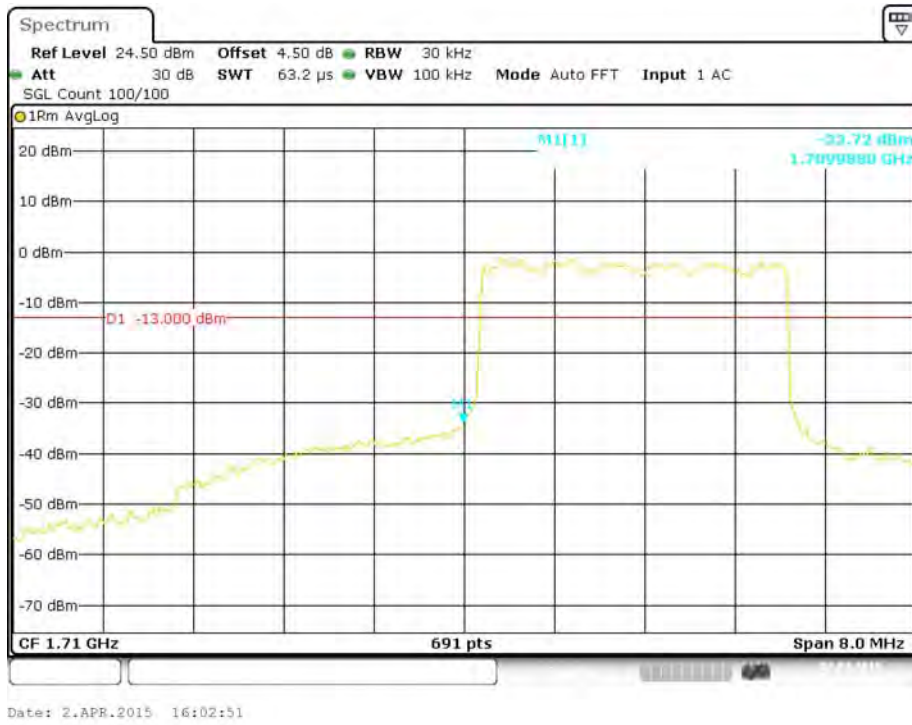
Date: 2.APR.2015 16:09:34

### 16-QAM (1.4 MHz, FULL RB) - Right Band Edge

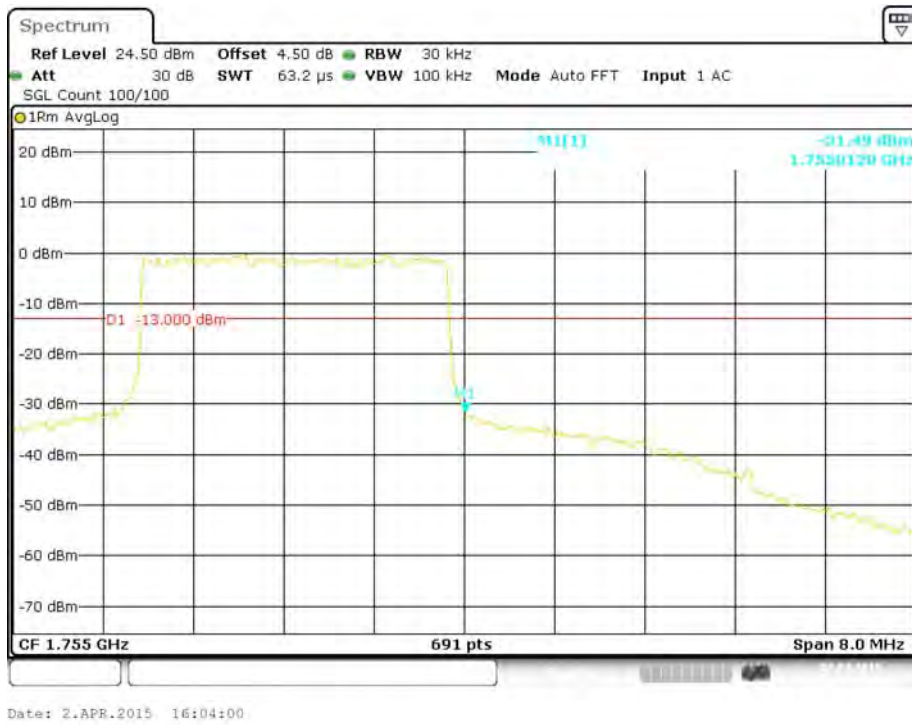


Date: 2.APR.2015 16:14:35

### QPSK (3.0 MHz, FULL RB) - Left Band Edge

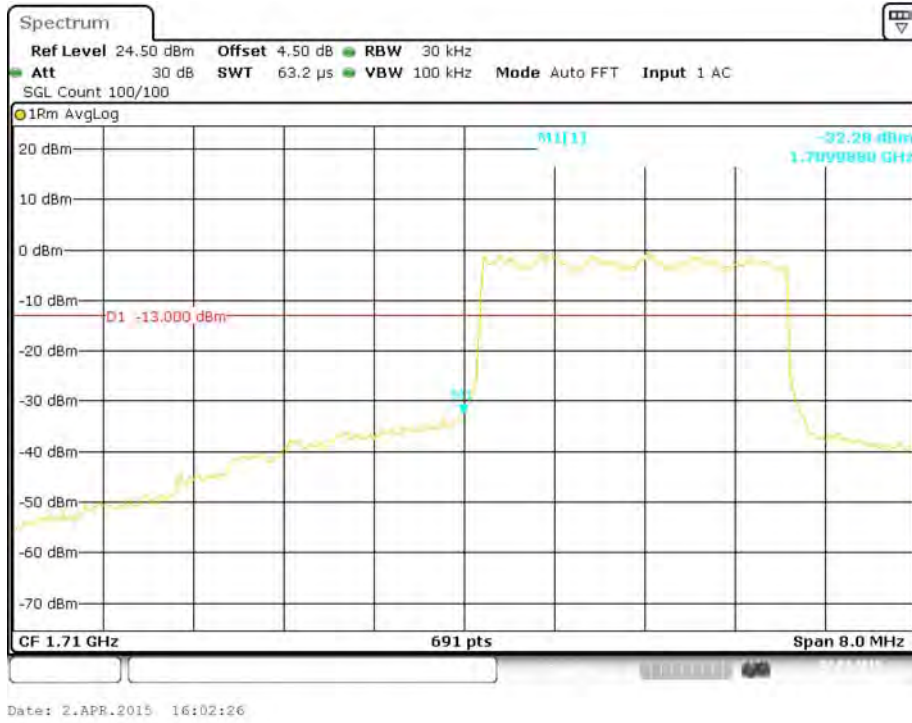


### QPSK (3.0 MHz, FULL RB) - Right Band Edge

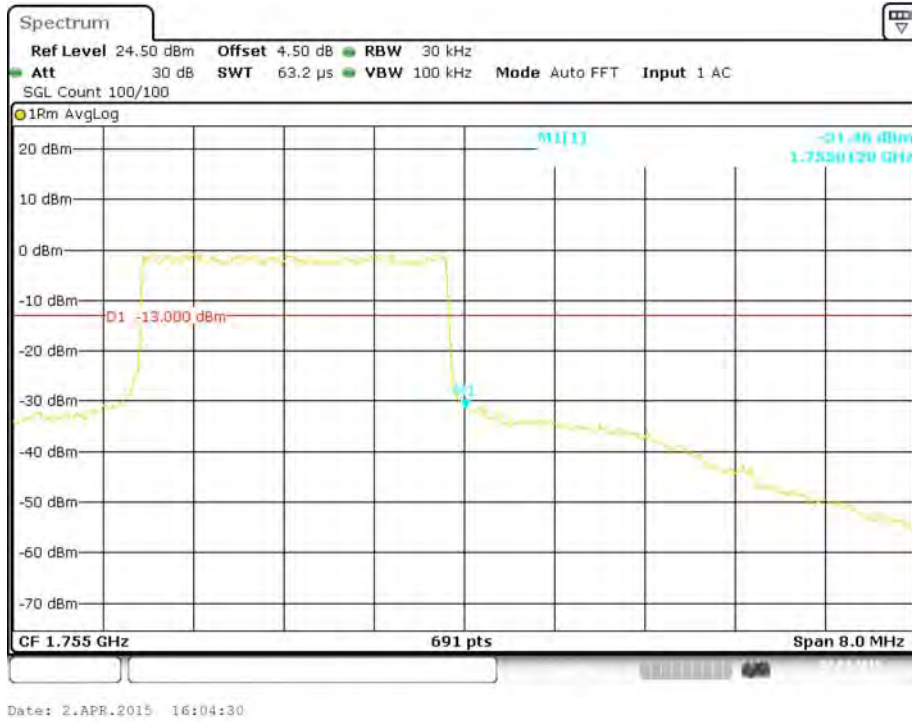




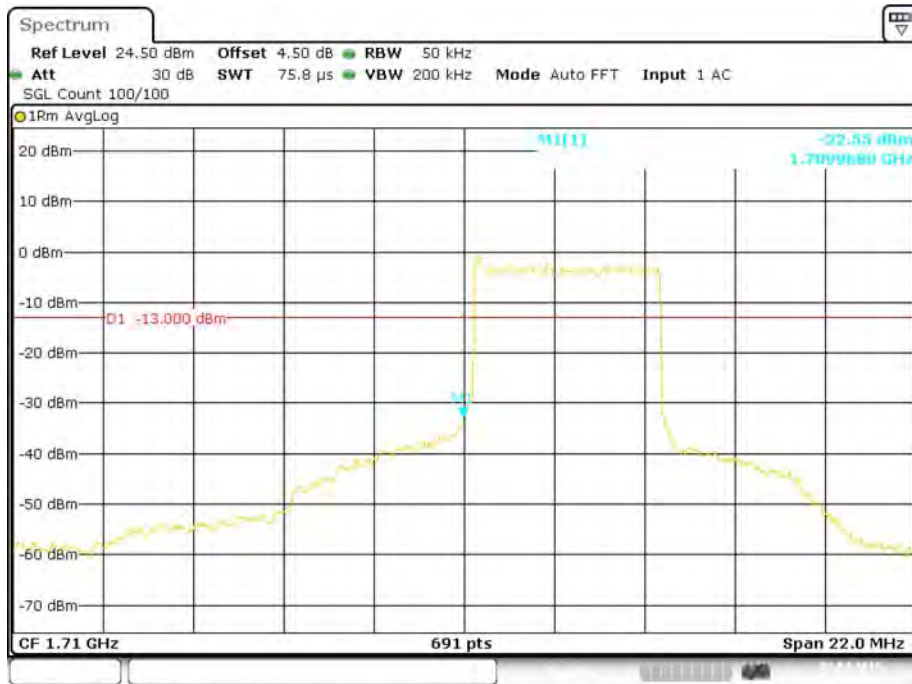
### 16-QAM (3.0 MHz, FULL RB) - Left Band Edge



### 16-QAM (3.0 MHz, FULL RB) - Right Band Edge



### QPSK (5.0 MHz, FULL RB) - Left Band Edge



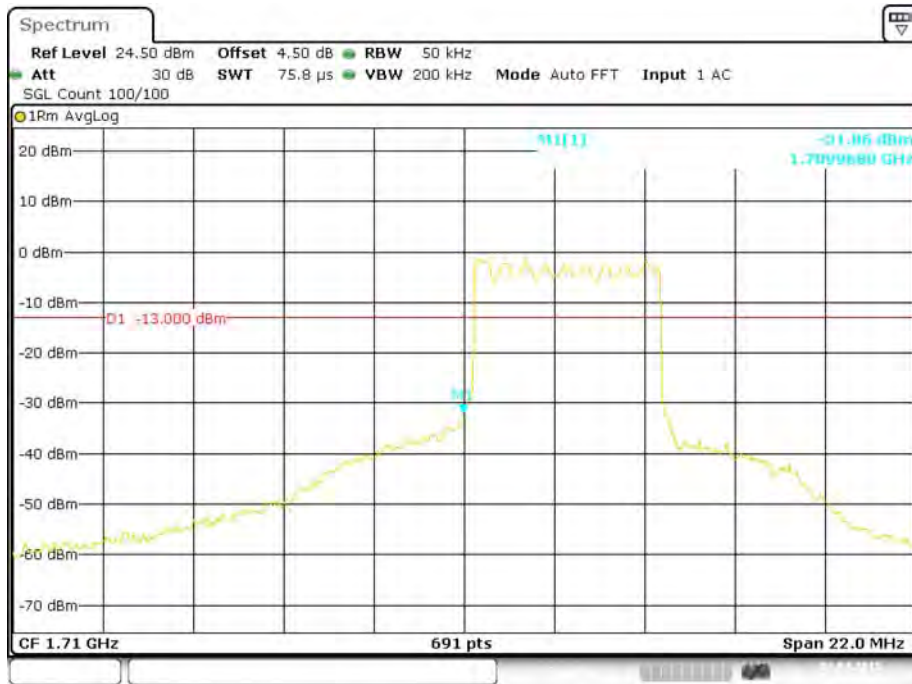
Date: 2.APR.2015 15:53:38

### QPSK (5.0 MHz, FULL RB) - Right Band Edge



Date: 2.APR.2015 15:54:29

### 16-QAM (5.0 MHz, FULL RB) - Left Band Edge



Date: 2.APR.2015 15:53:07

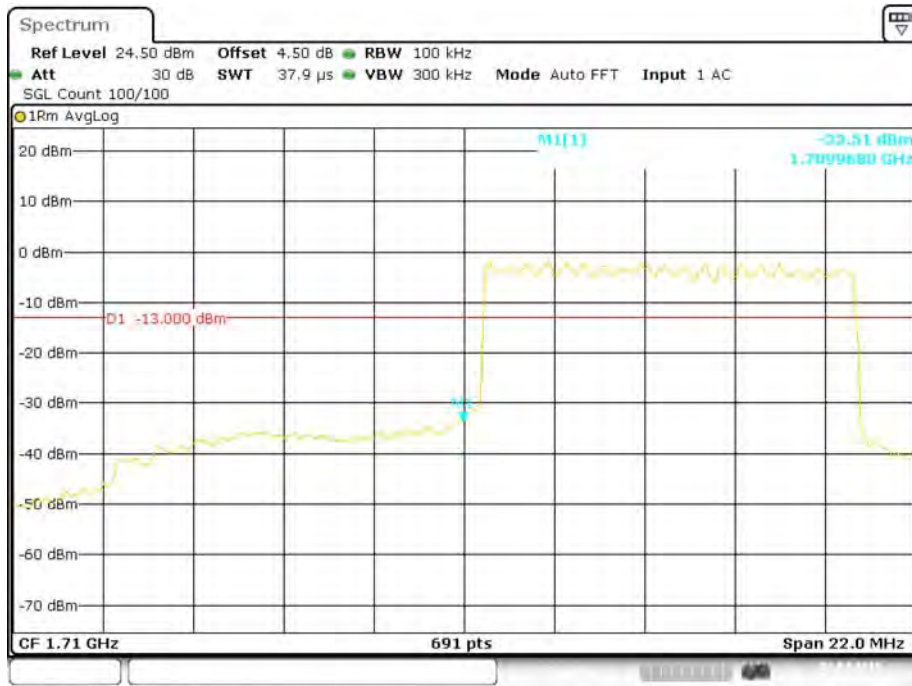
### 16-QAM (5.0 MHz, FULL RB) - Right Band Edge



Date: 2.APR.2015 15:56:25

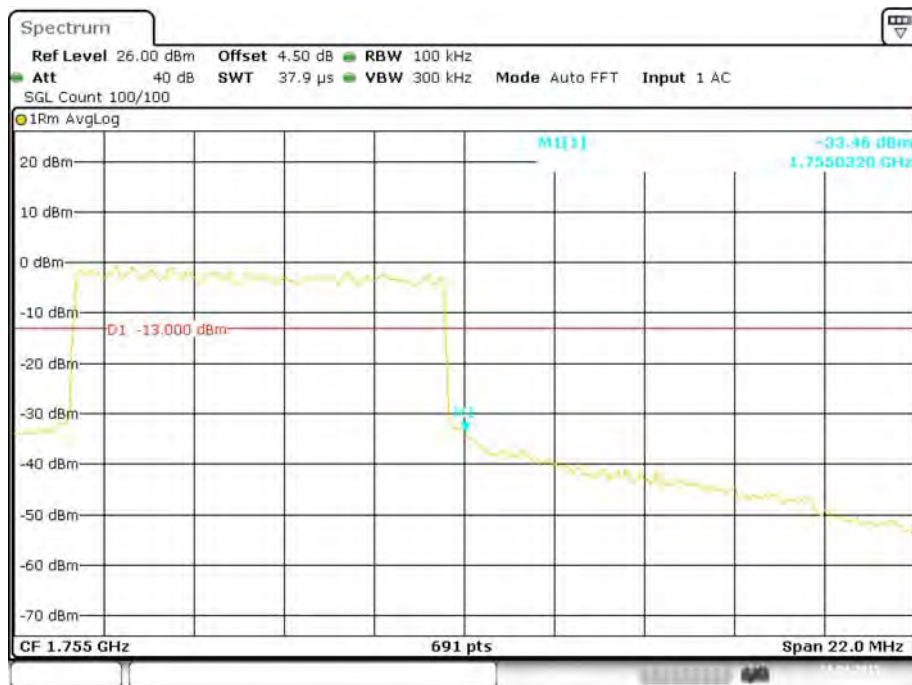


### QPSK (10.0 MHz, FULL RB) - Left Band Edge



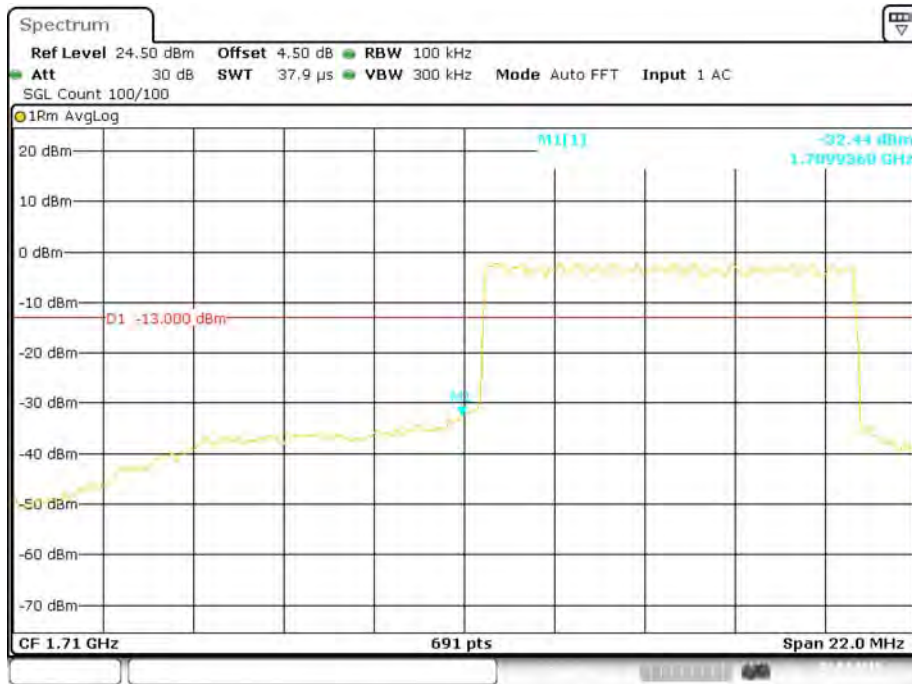
Date: 2.APR.2015 15:40:26

### QPSK (10.0 MHz, FULL RB) - Right Band Edge



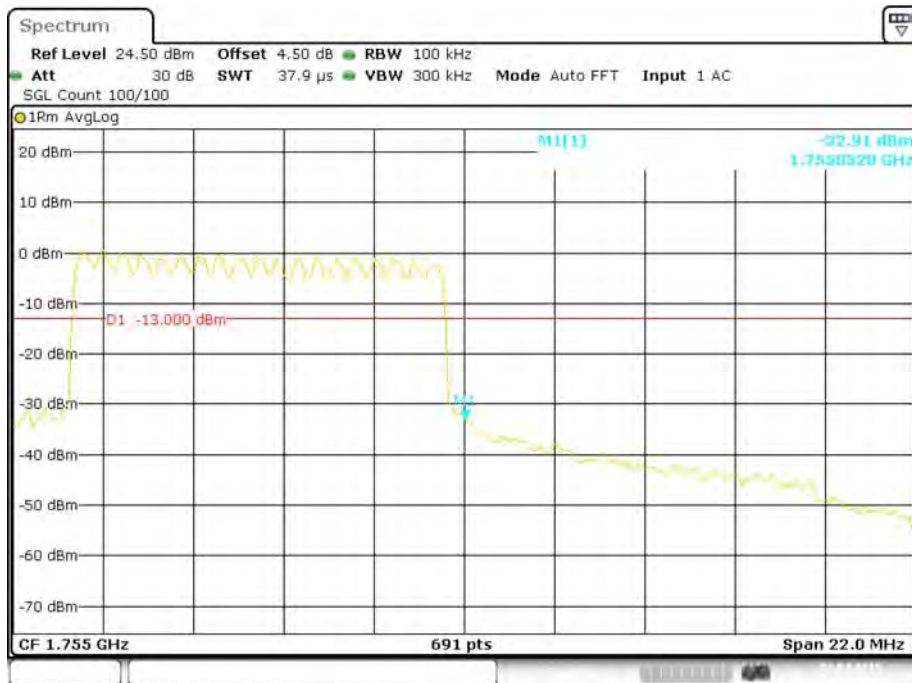
Date: 17.APR.2015 20:26:02

### 16-QAM (10.0 MHz, FULL RB) - Left Band Edge



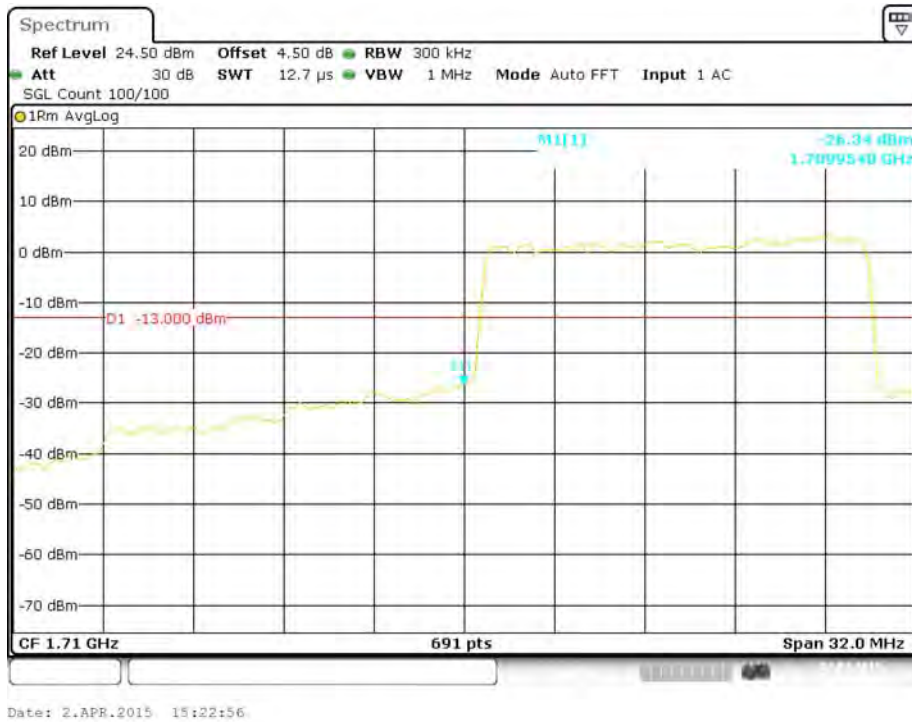
Date: 2.APR.2015 15:41:13

### 16-QAM (10.0 MHz, FULL RB) - Right Band Edge



Date: 2.APR.2015 15:46:43

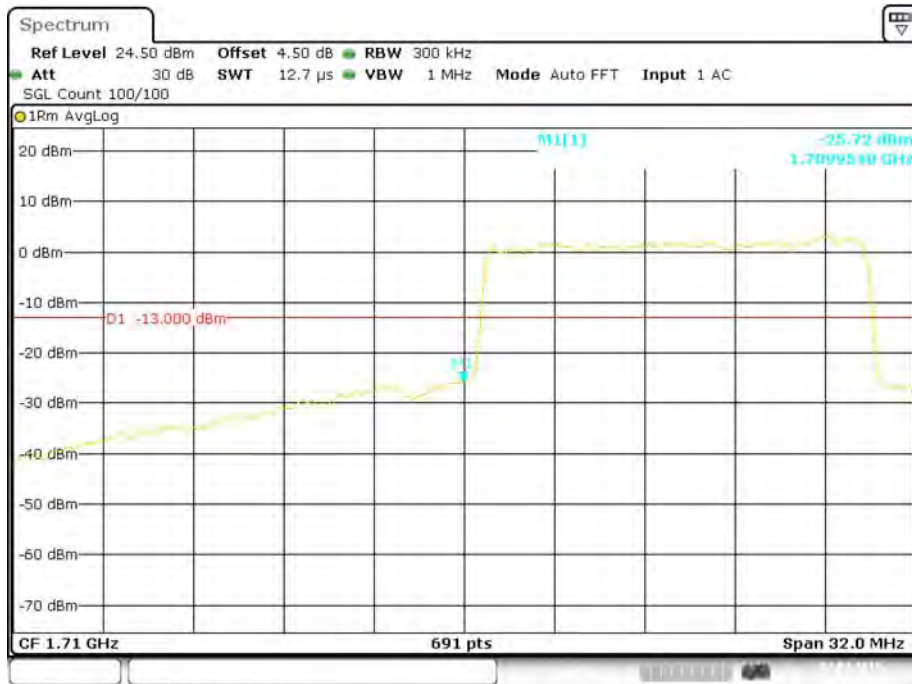
### QPSK (15.0 MHz, FULL RB) - Left Band Edge



### QPSK (15.0 MHz, FULL RB) - Right Band Edge

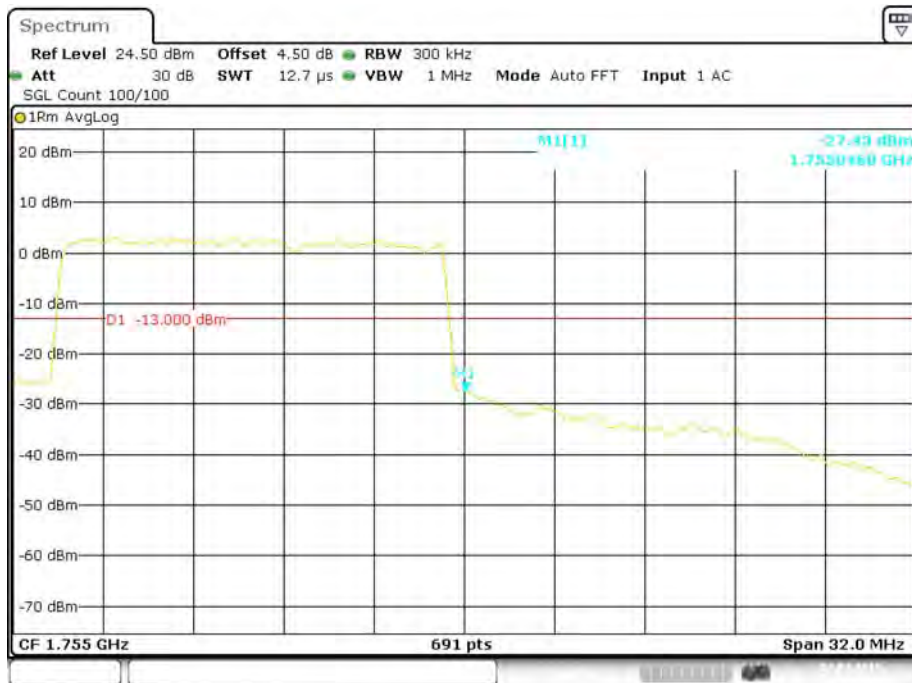


### 16-QAM (15.0 MHz, FULL RB) - Left Band Edge



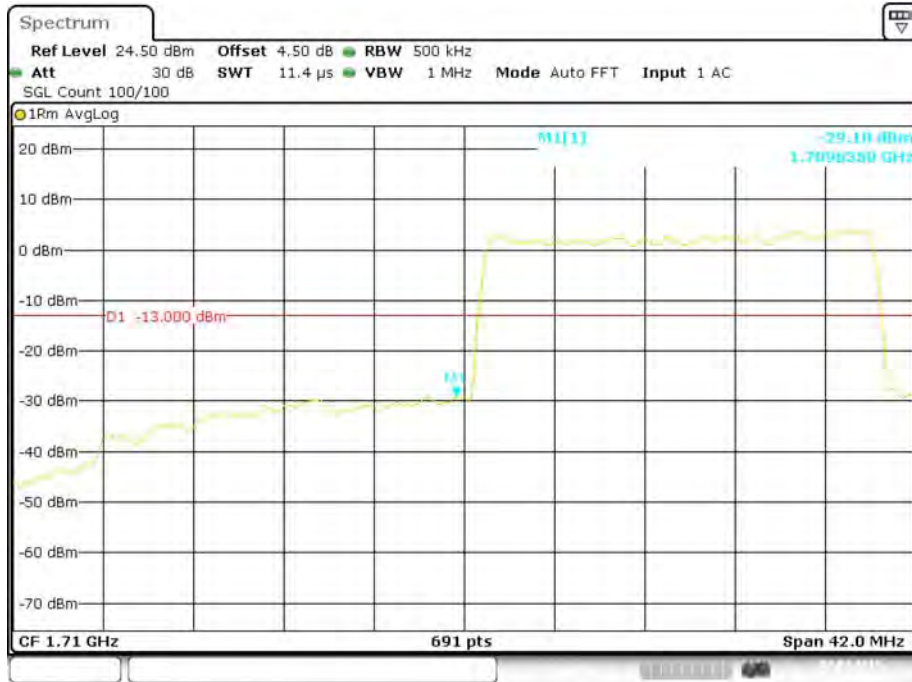
Date: 2.APR.2015 15:24:03

### 16-QAM (15.0 MHz, FULL RB) - Right Band Edge



Date: 2.APR.2015 15:30:46

### QPSK (20.0 MHz, FULL RB) - Left Band Edge

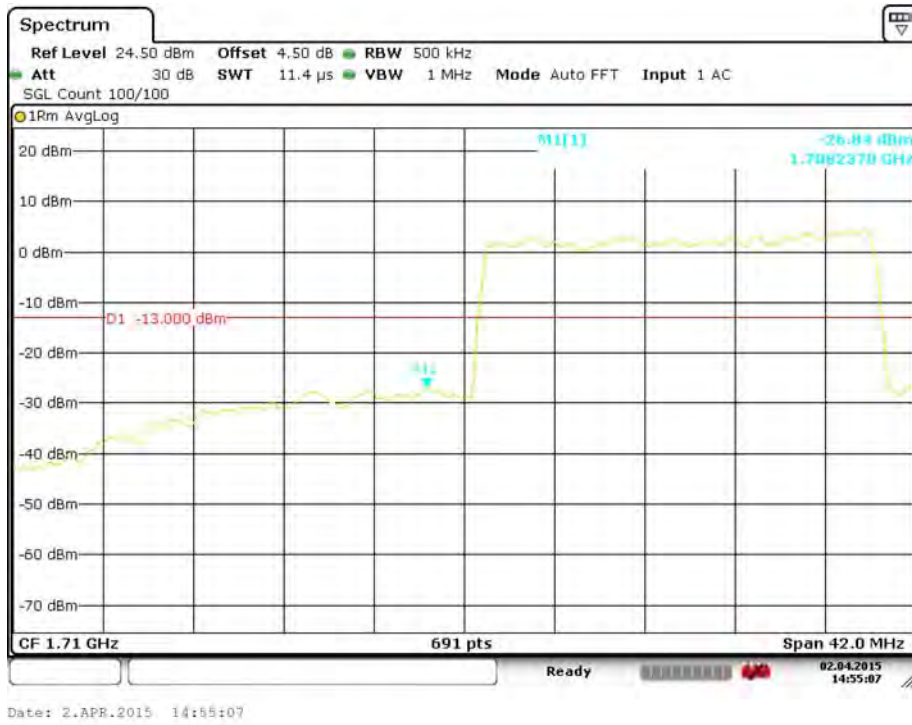


### QPSK (20.0 MHz, FULL RB) - Right Band Edge

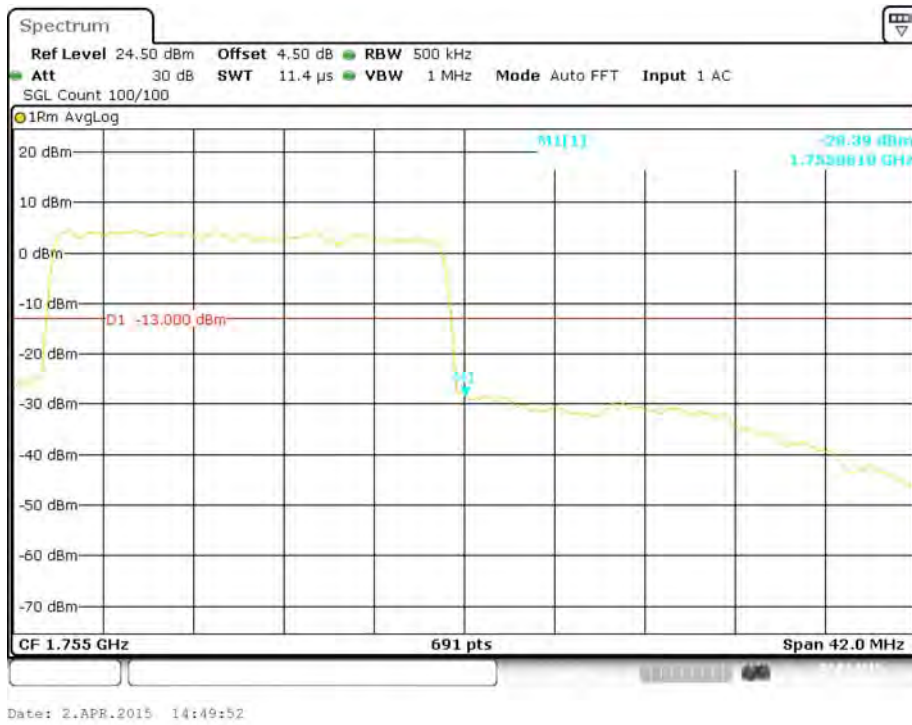




### 16-QAM (20.0 MHz, FULL RB) - Left Band Edge



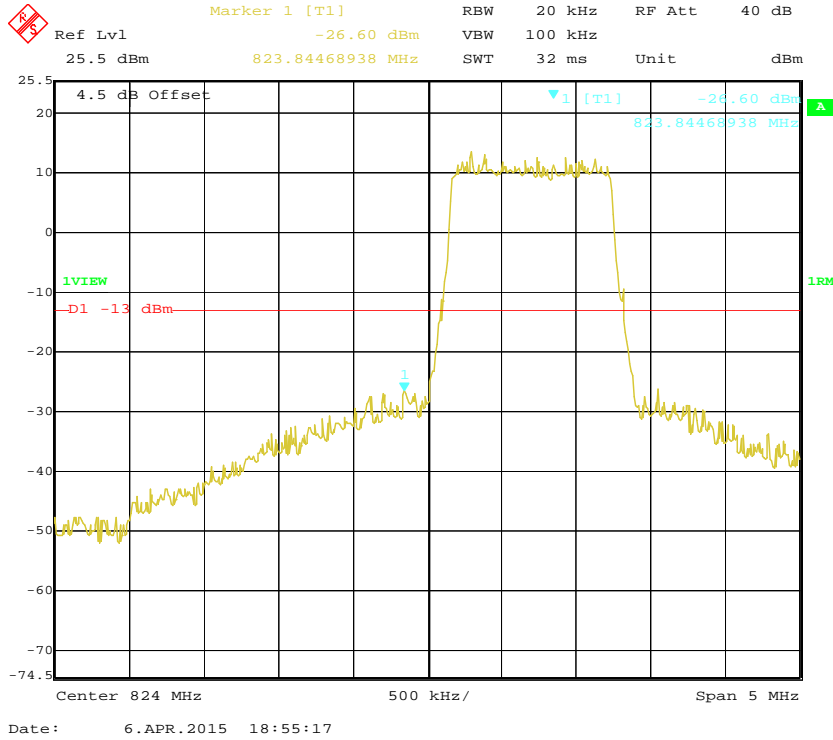
### 16-QAM (20.0 MHz, FULL RB) - Right Band Edge



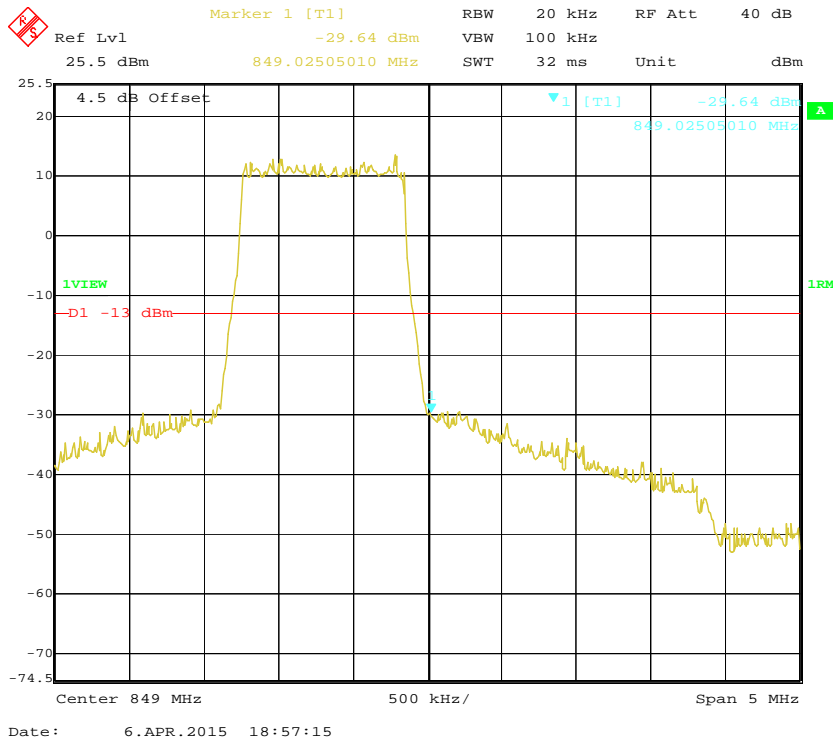


**Band 5:**

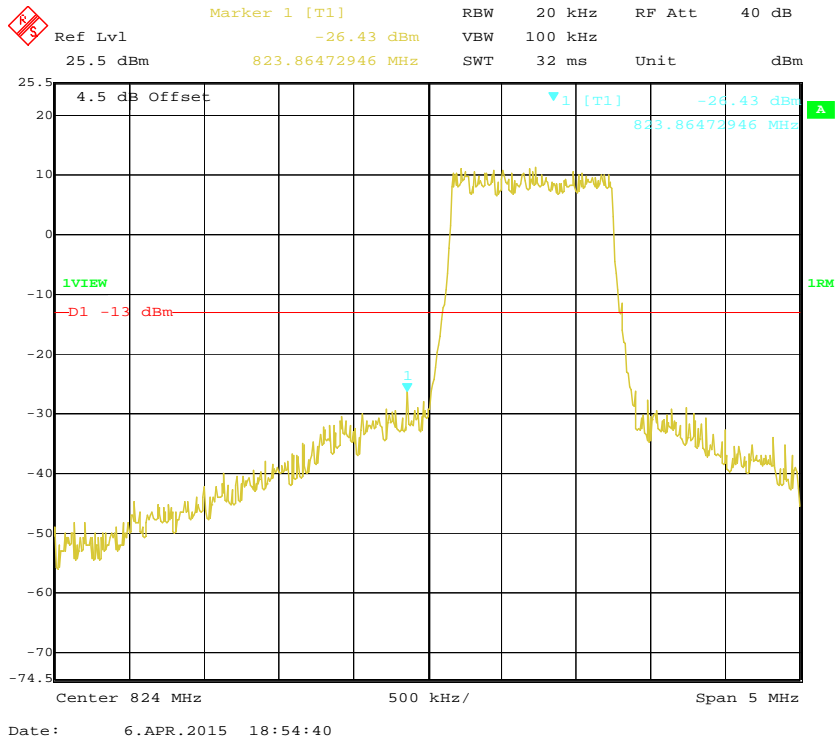
**QPSK (1.4 MHz, FULL RB) - Left Band Edge**



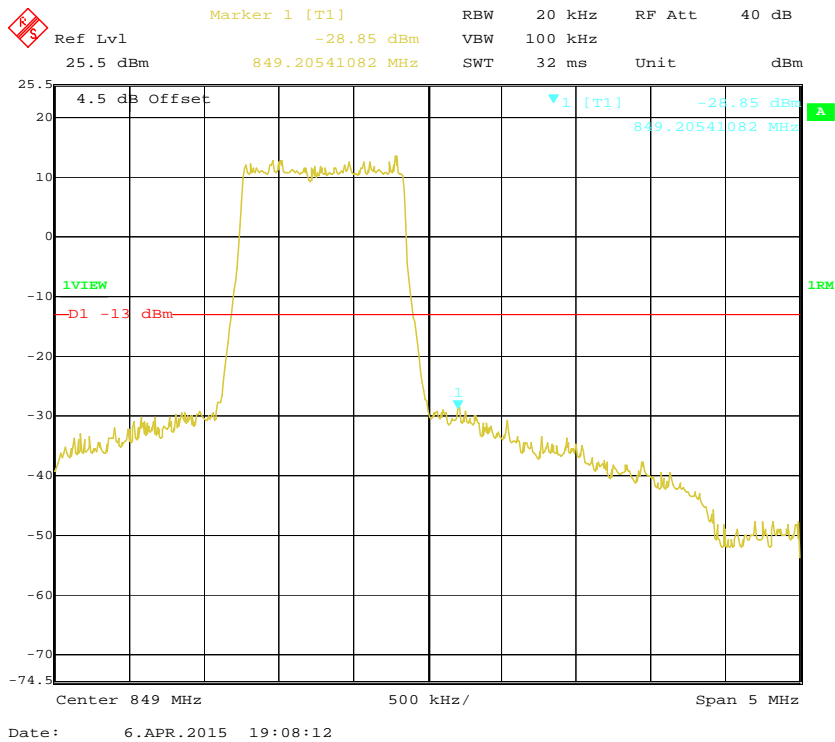
**QPSK (1.4 MHz, FULL RB) - Right Band Edge**



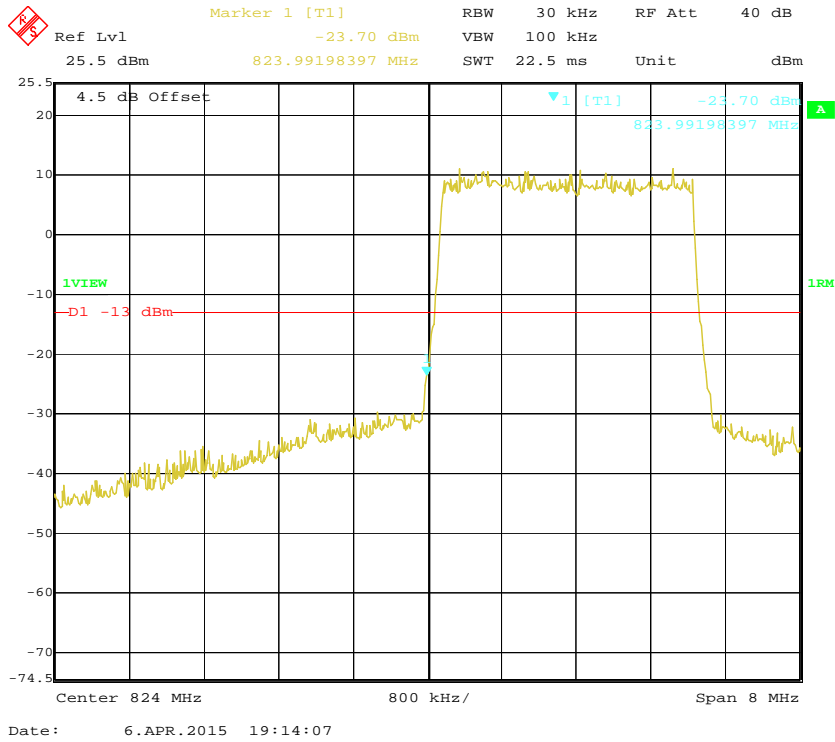
### 16-QAM (1.4 MHz, FULL RB) - Left Band Edge



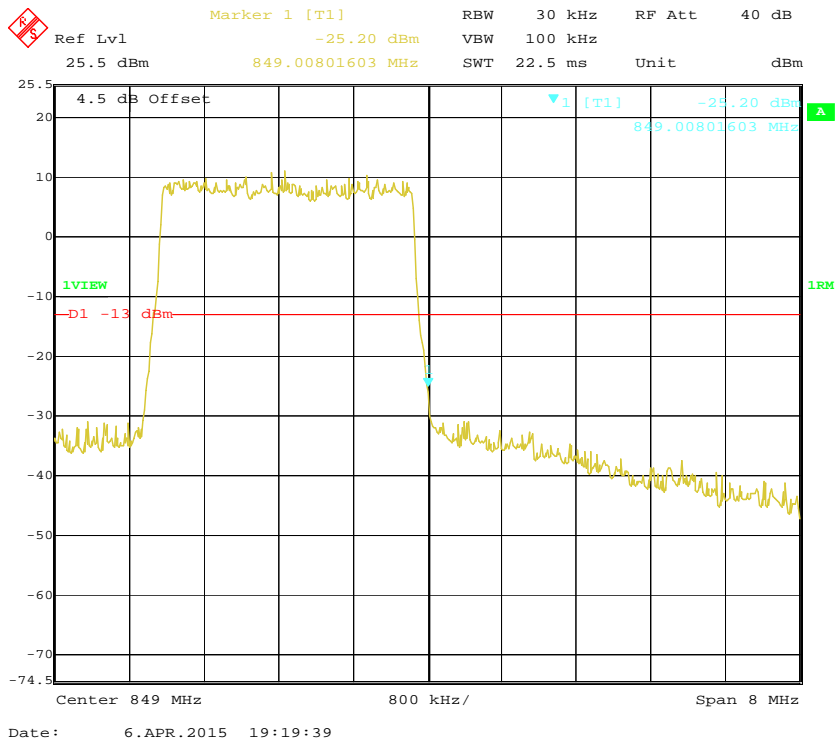
### 16-QAM (1.4 MHz, FULL RB) - Right Band Edge



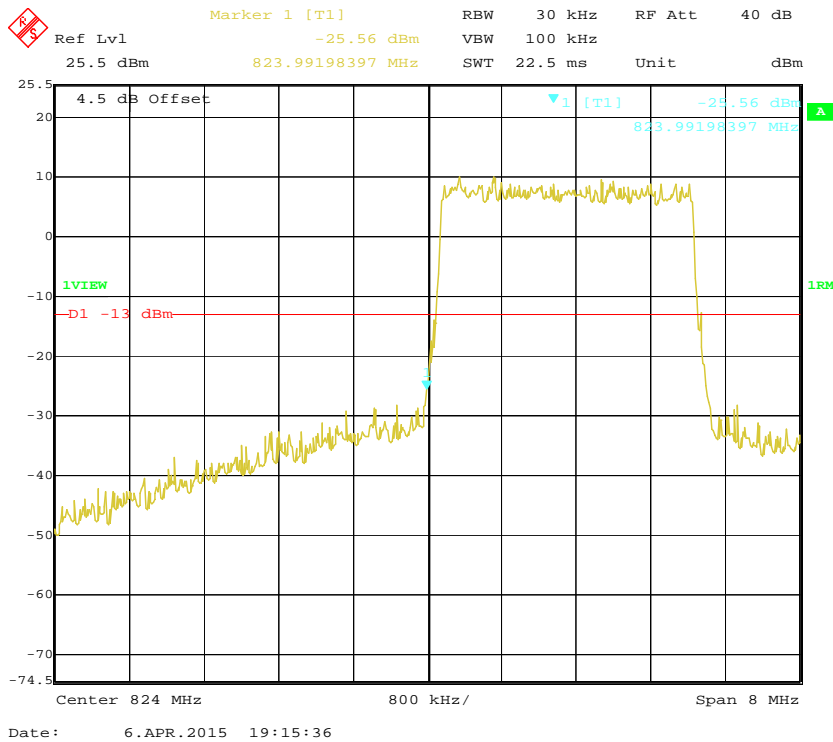
### QPSK (3.0 MHz, FULL RB) - Left Band Edge



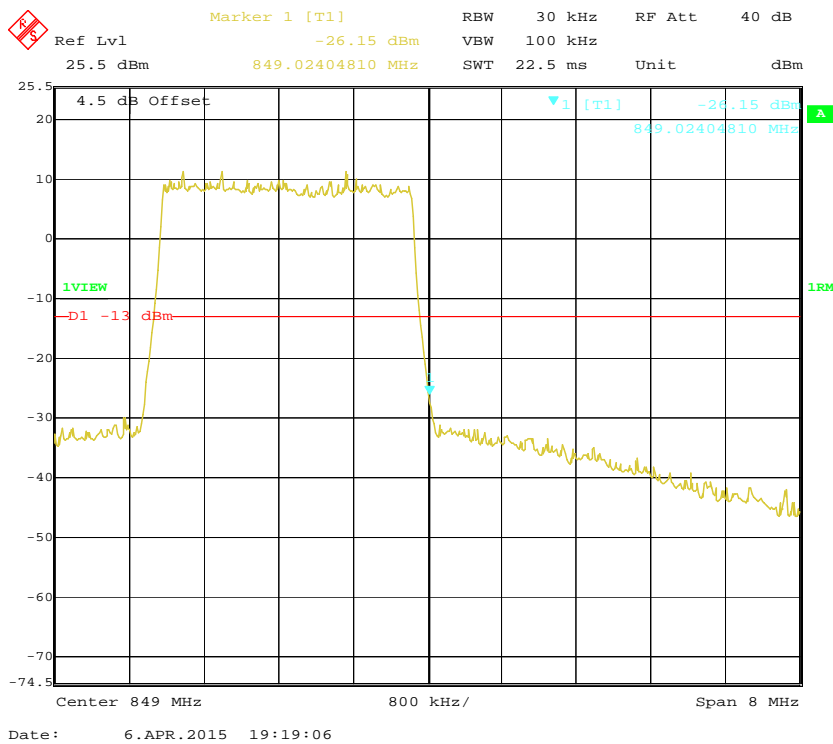
### QPSK (3.0 MHz, FULL RB) - Right Band Edge



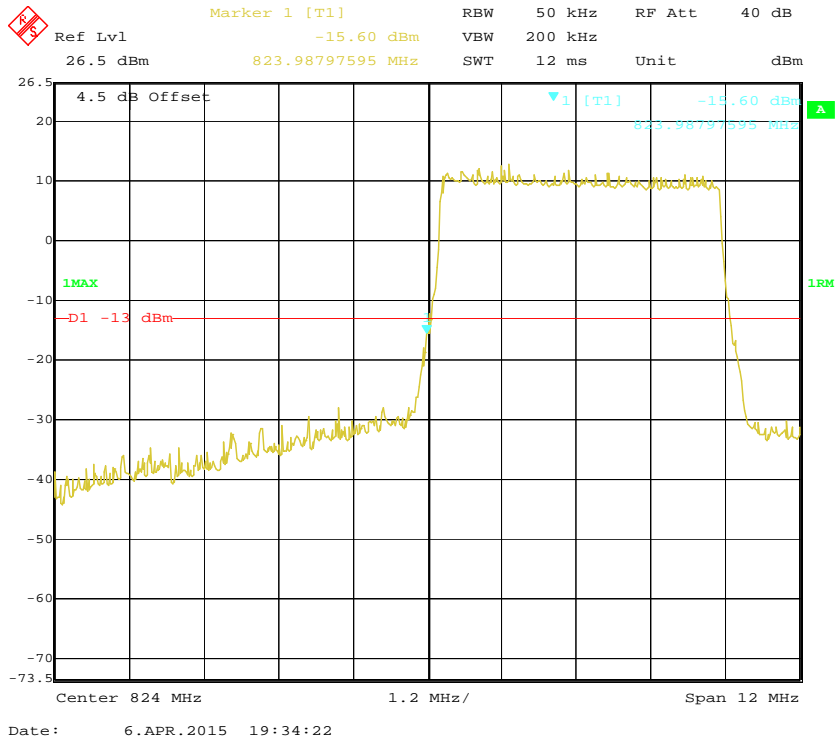
### 16-QAM (3.0 MHz, FULL RB) - Left Band Edge



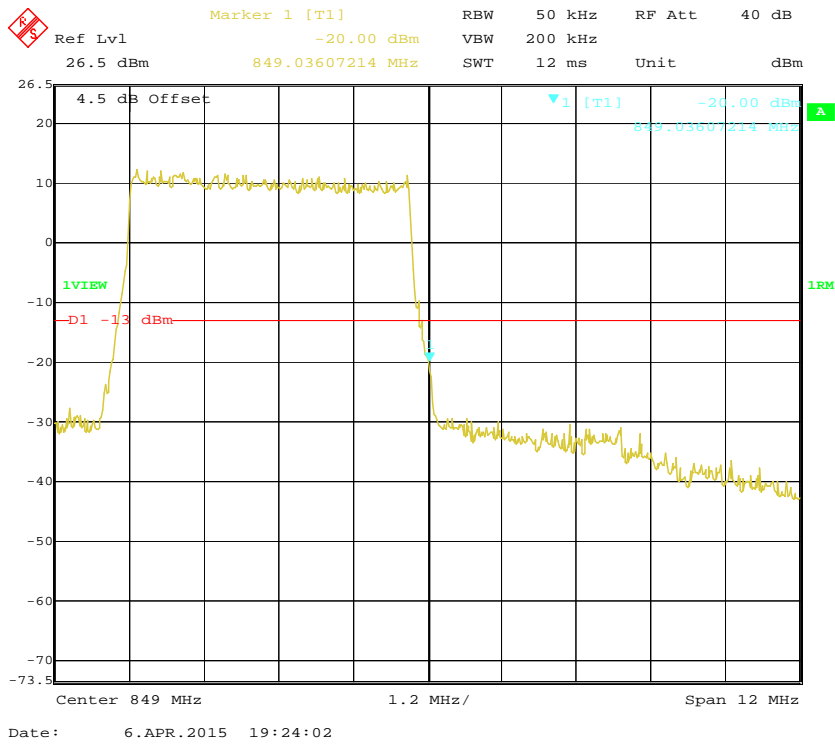
### 16-QAM (3.0 MHz, FULL RB) - Right Band Edge



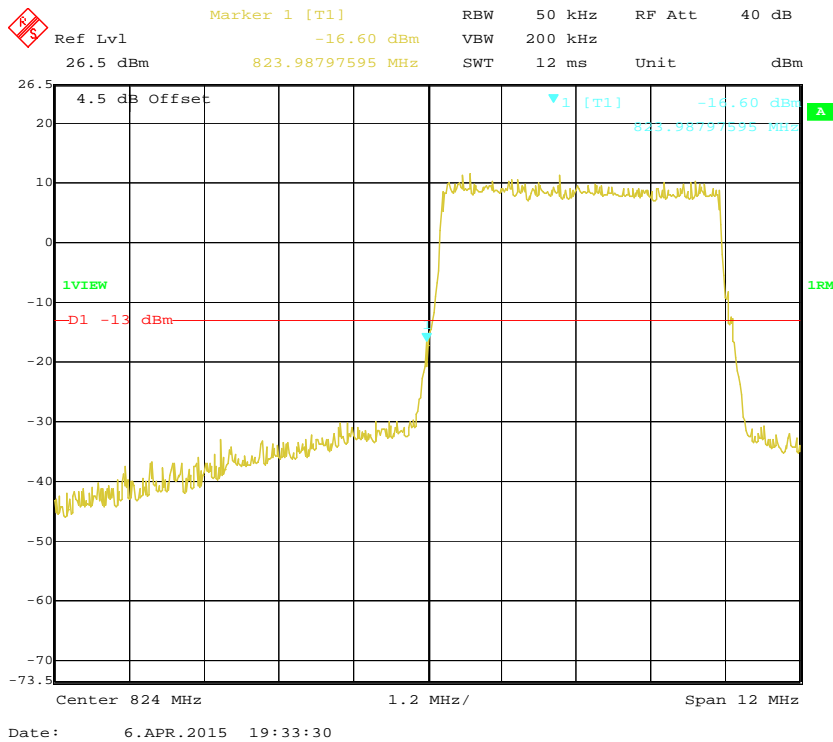
### QPSK (5.0 MHz, FULL RB) - Left Band Edge



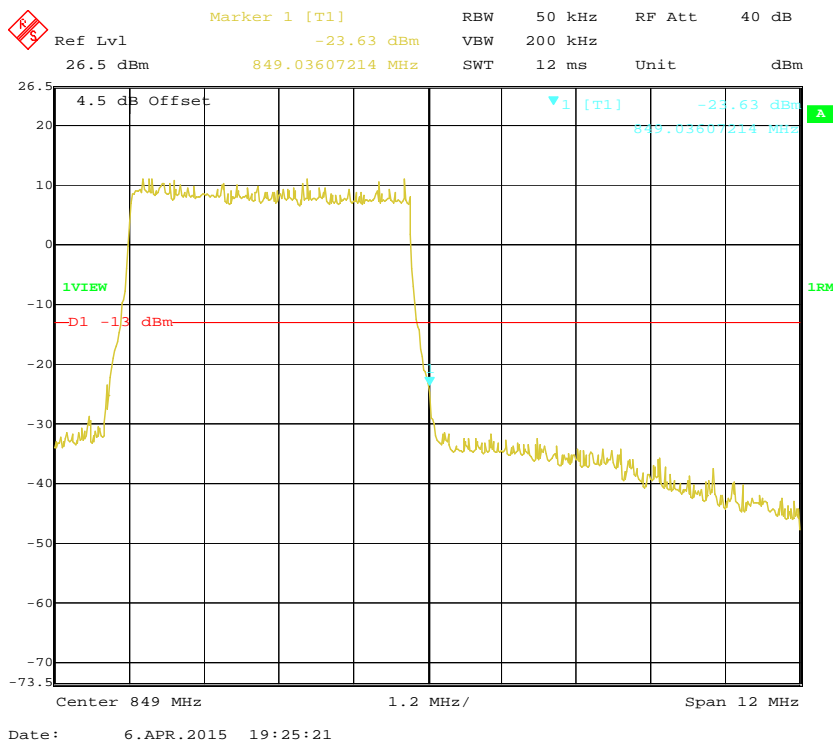
### QPSK (5.0 MHz, FULL RB) - Right Band Edge



### 16-QAM (5.0 MHz, FULL RB) - Left Band Edge

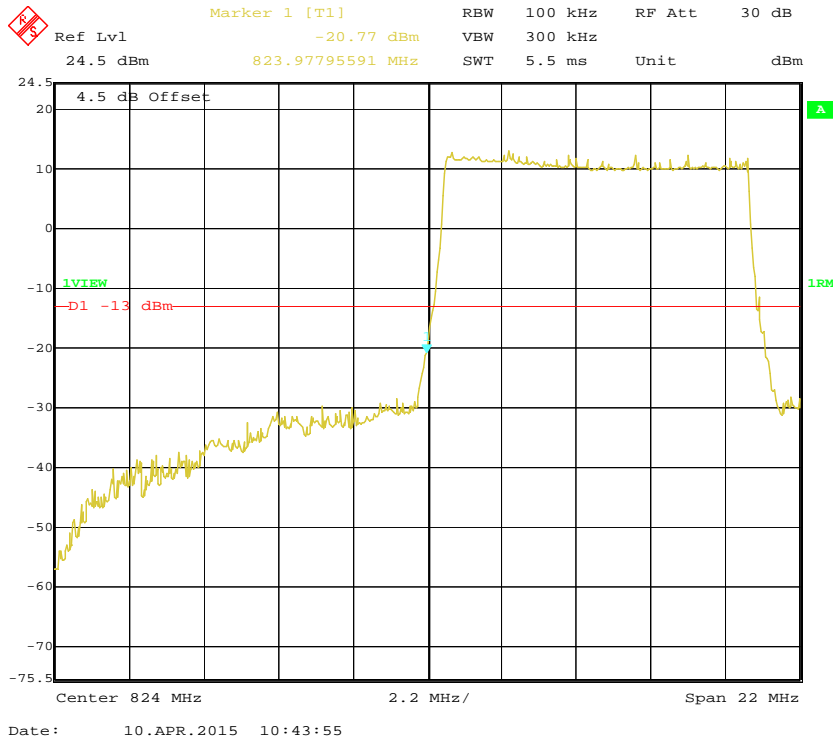


### 16-QAM (5.0 MHz, FULL RB) - Right Band Edge

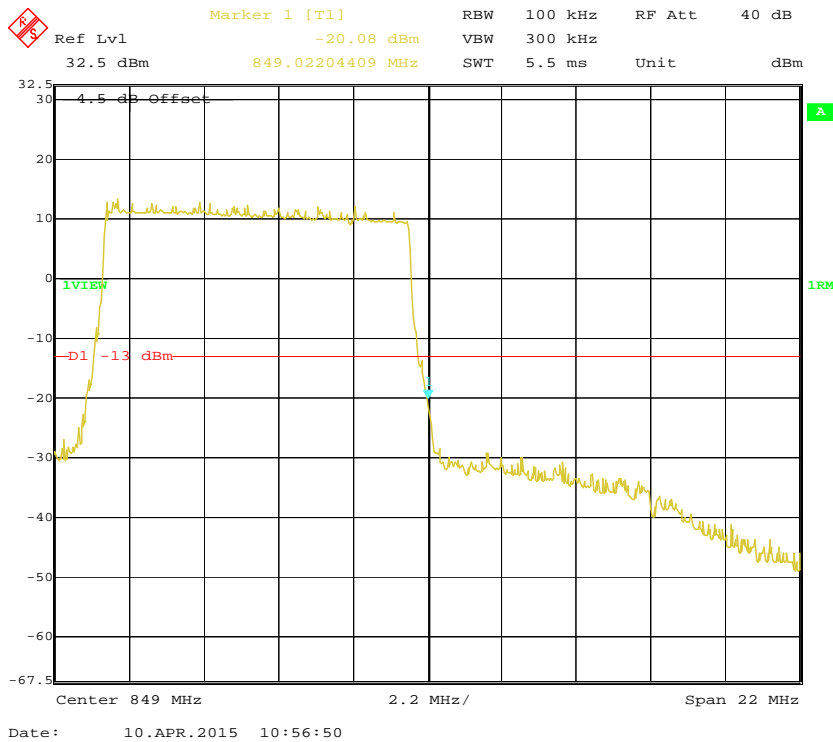




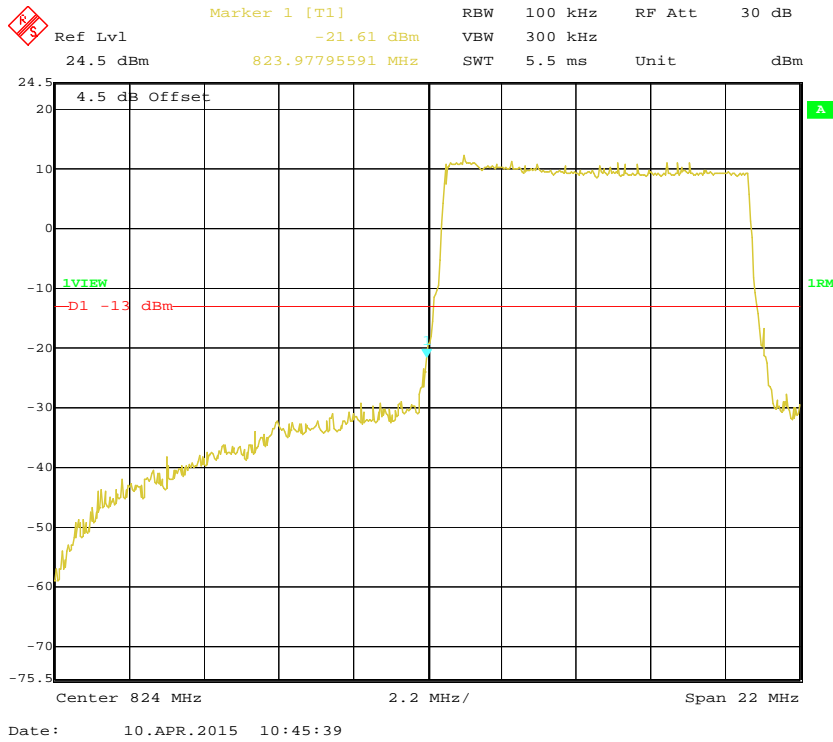
### QPSK (10.0 MHz, FULL RB) - Left Band Edge



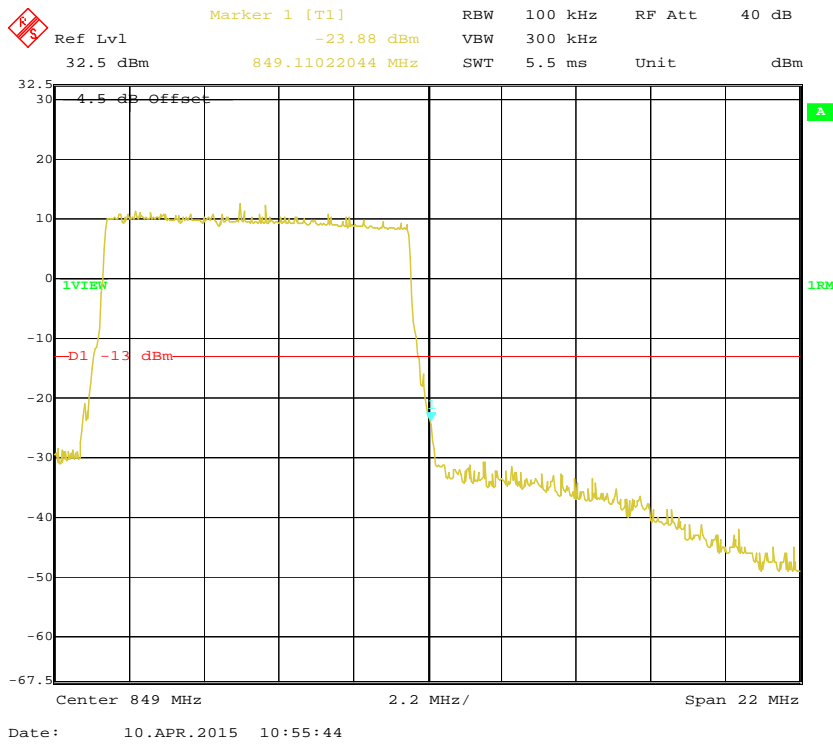
### QPSK (10.0 MHz, FULL RB) - Right Band Edge



### 16-QAM (10.0 MHz, FULL RB) - Left Band Edge



### 16-QAM (10.0 MHz, FULL RB) - Right Band Edge



**Band 7:**

**QPSK (5.0 MHz, FULL RB) - Left Band Edge**



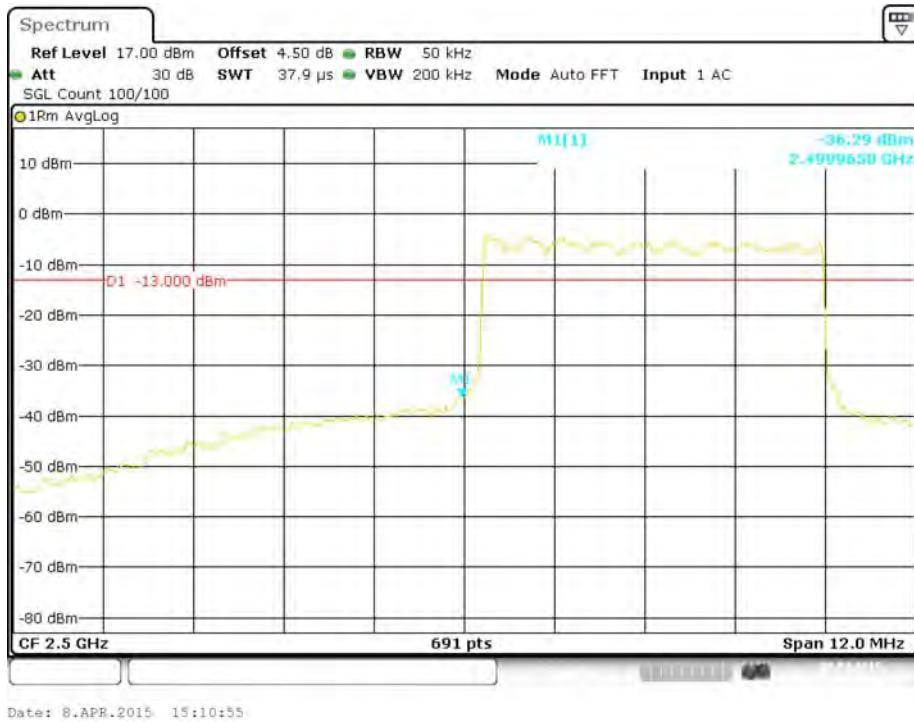
Date: 8.APR.2015 15:10:01

**QPSK (5.0 MHz, FULL RB) - Right Band Edge**

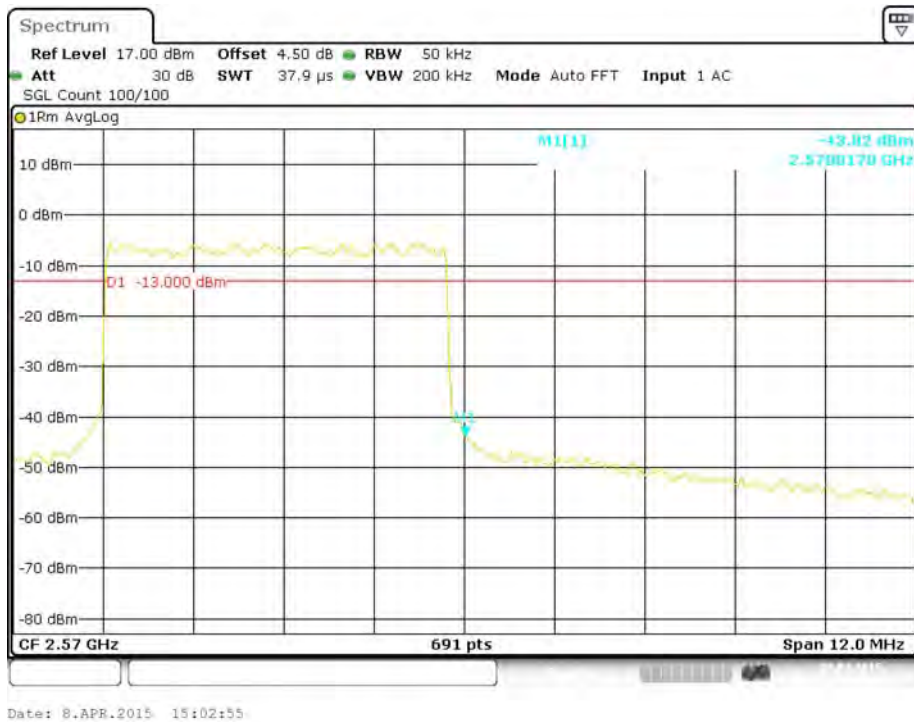


Date: 8.APR.2015 15:04:52

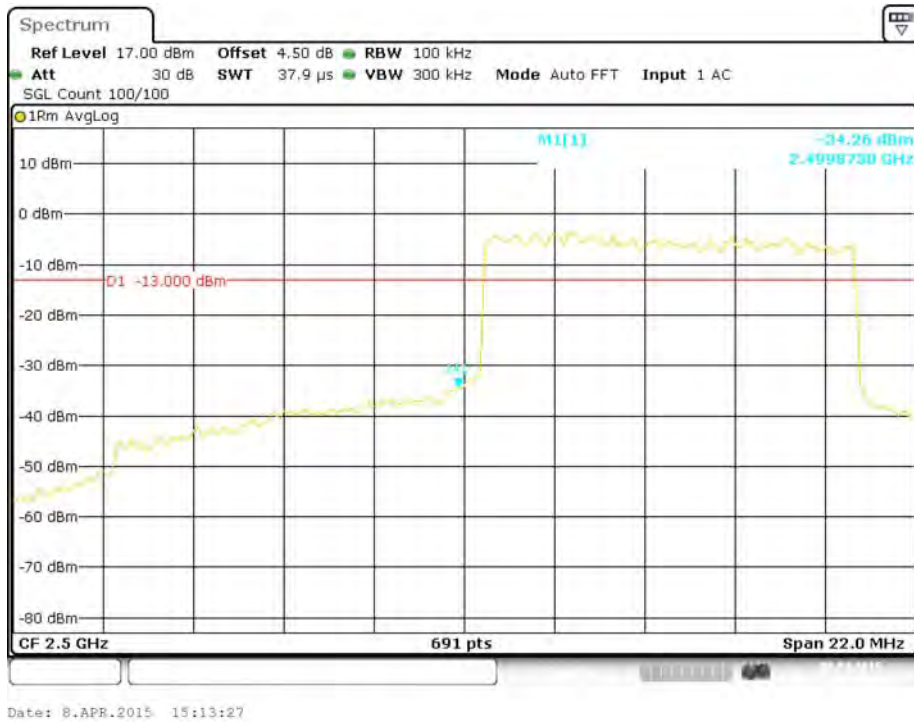
### 16-QAM (5.0 MHz, FULL RB) - Left Band Edge



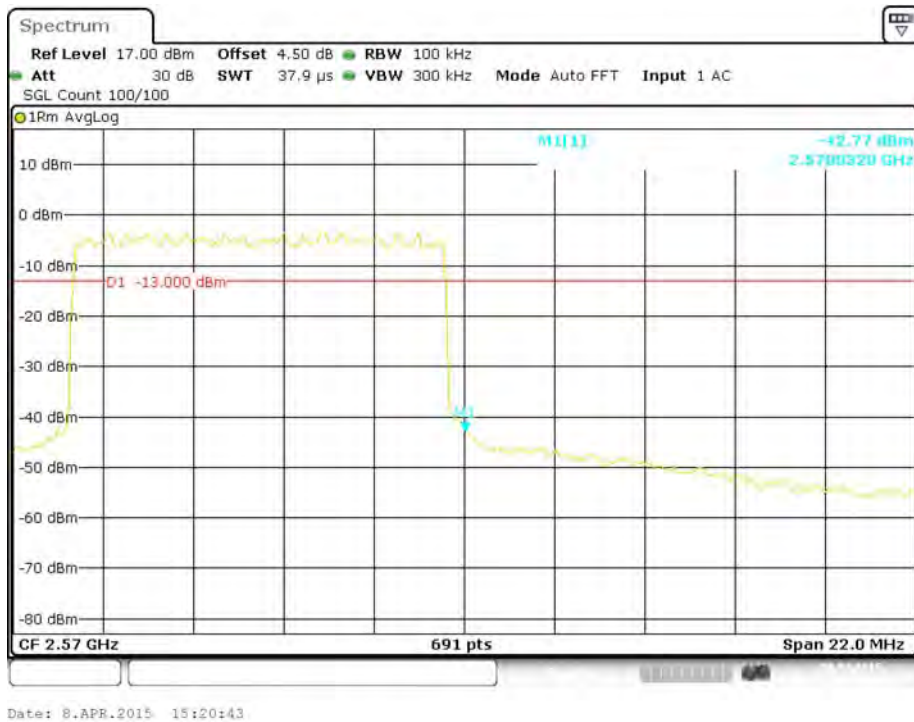
### 16-QAM (5.0 MHz, FULL RB) - Right Band Edge



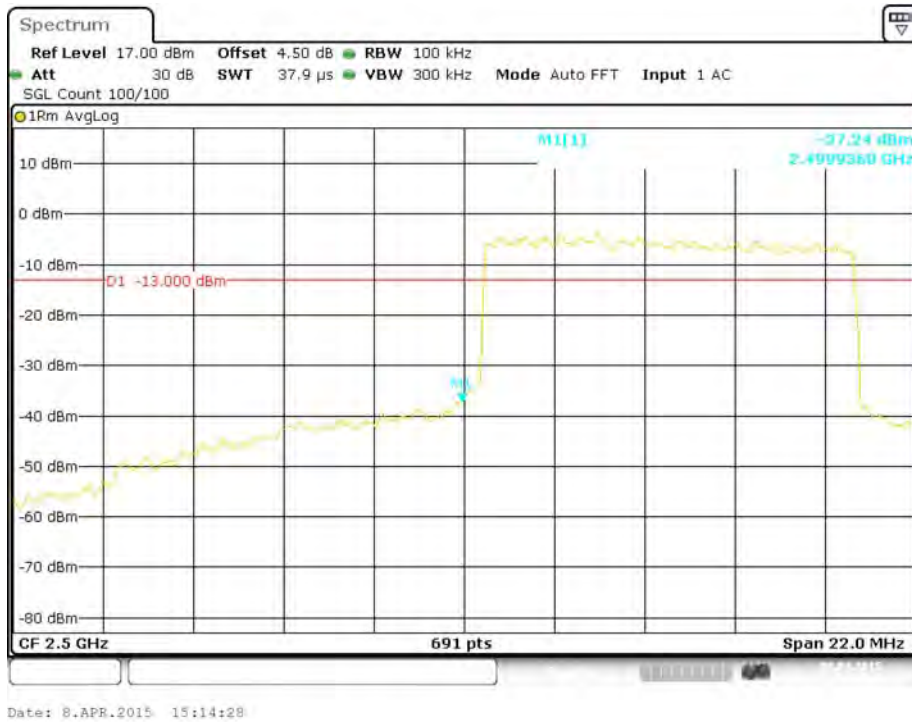
### QPSK (10.0 MHz, FULL RB) - Left Band Edge



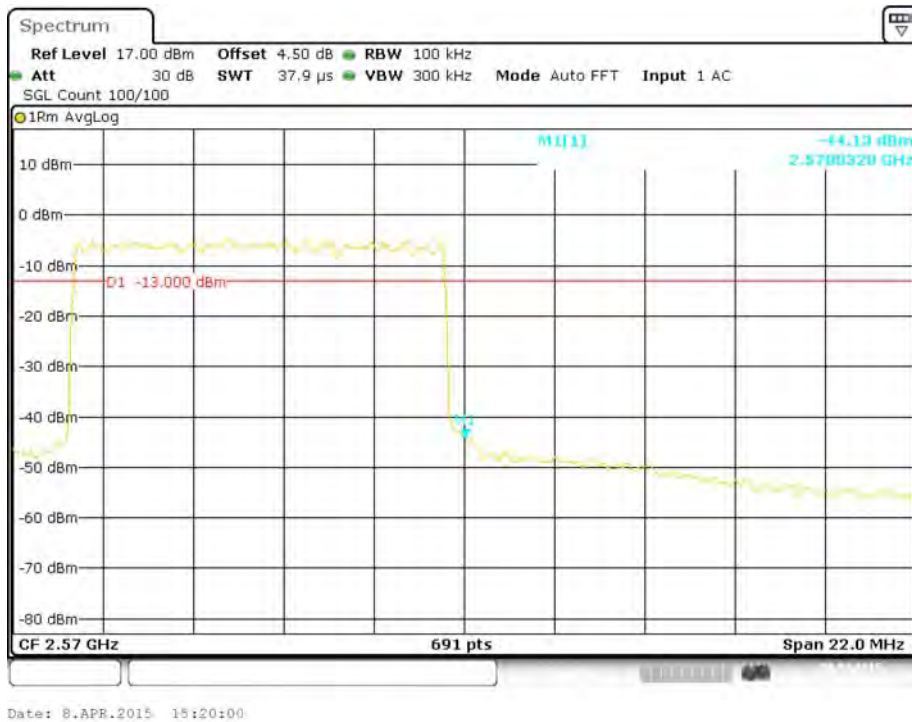
### QPSK (10.0 MHz, FULL RB) - Right Band Edge



### 16-QAM (10.0 MHz, FULL RB) - Left Band Edge

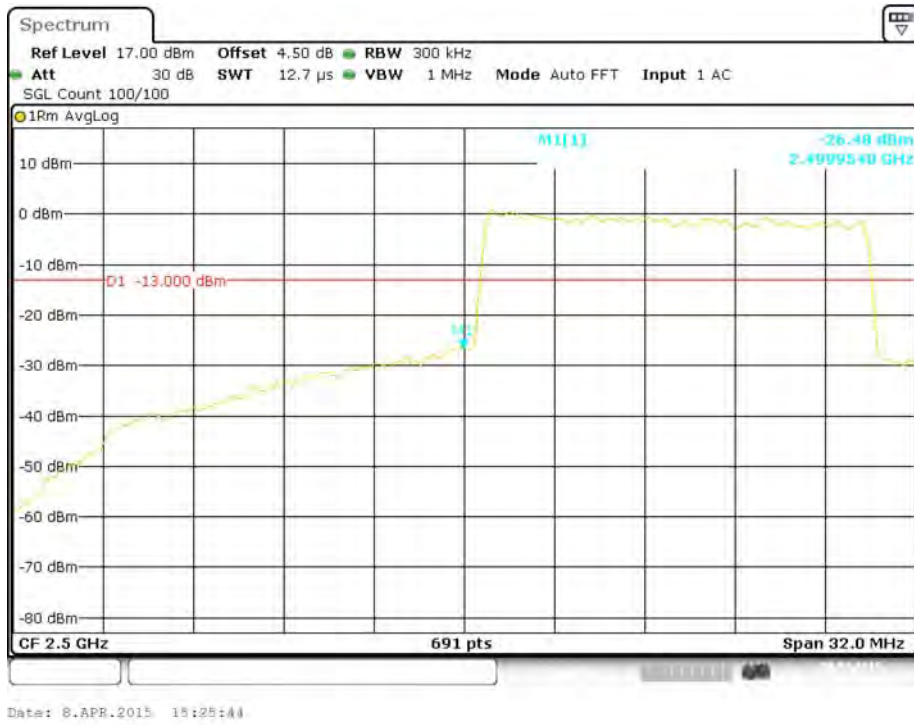


### 16-QAM (10.0 MHz, FULL RB) - Right Band Edge

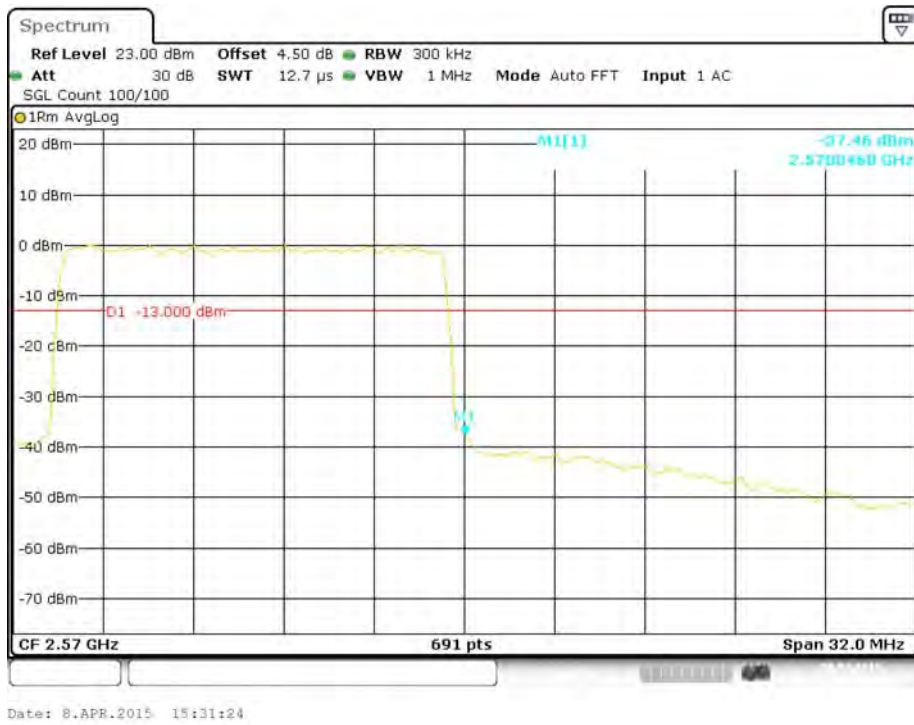




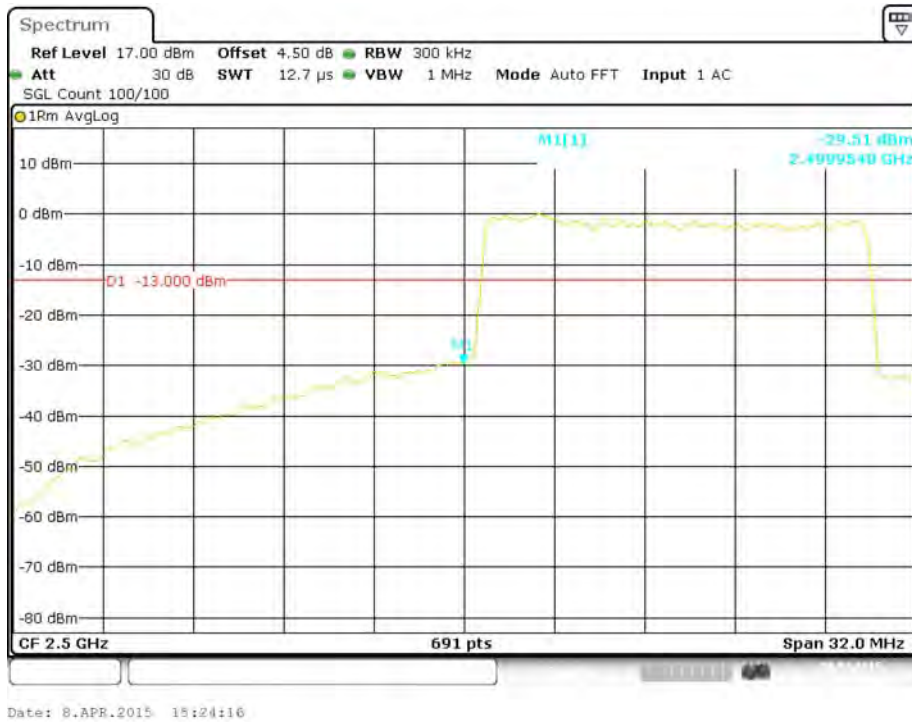
### QPSK (15.0 MHz, FULL RB) - Left Band Edge



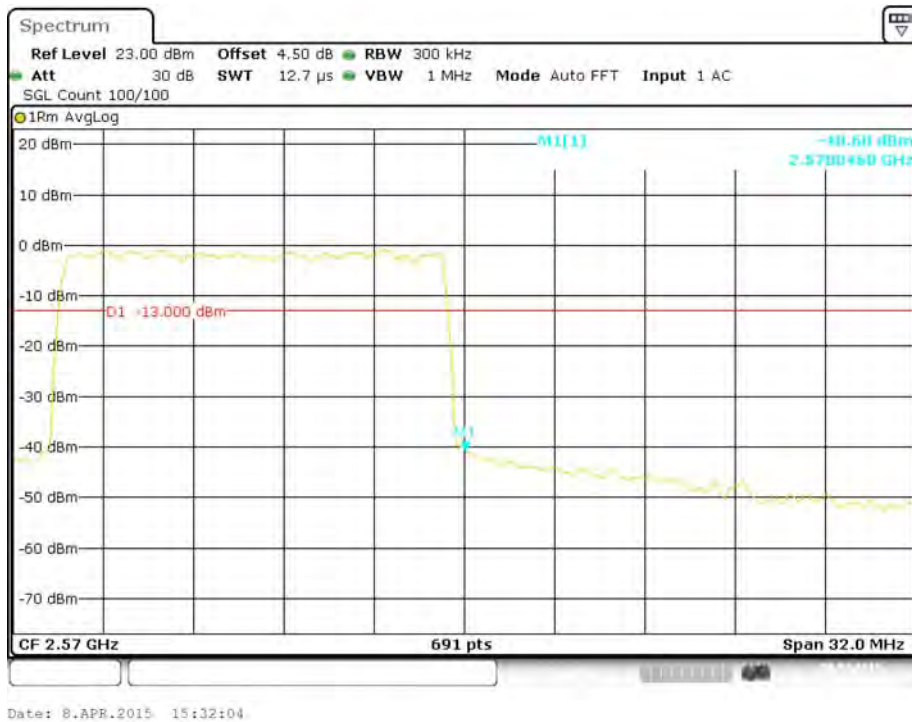
### QPSK (15.0 MHz, FULL RB) - Right Band Edge



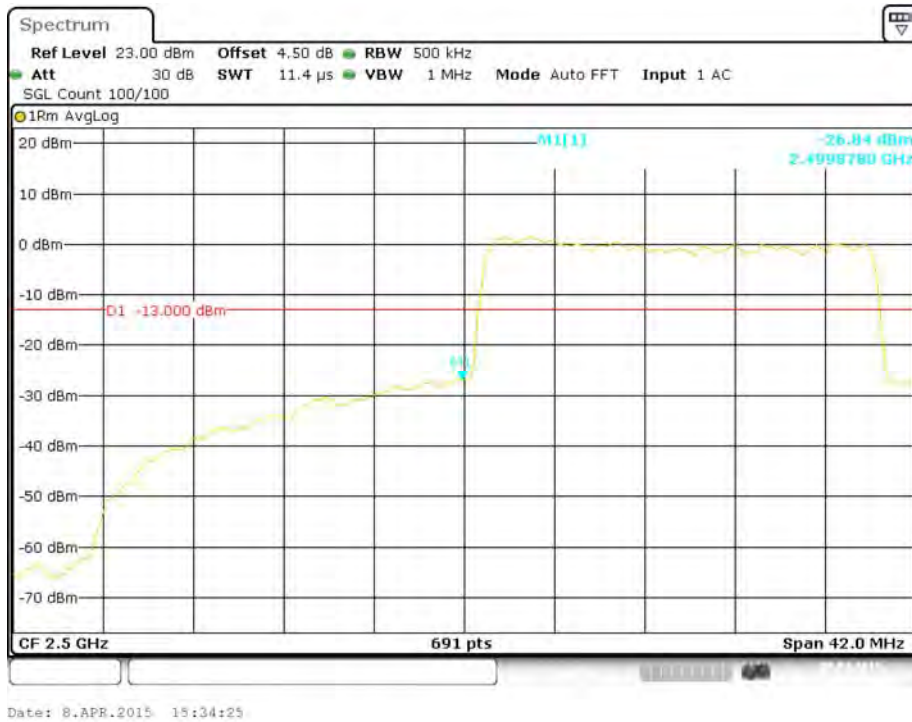
### 16-QAM (15.0 MHz, FULL RB) - Left Band Edge



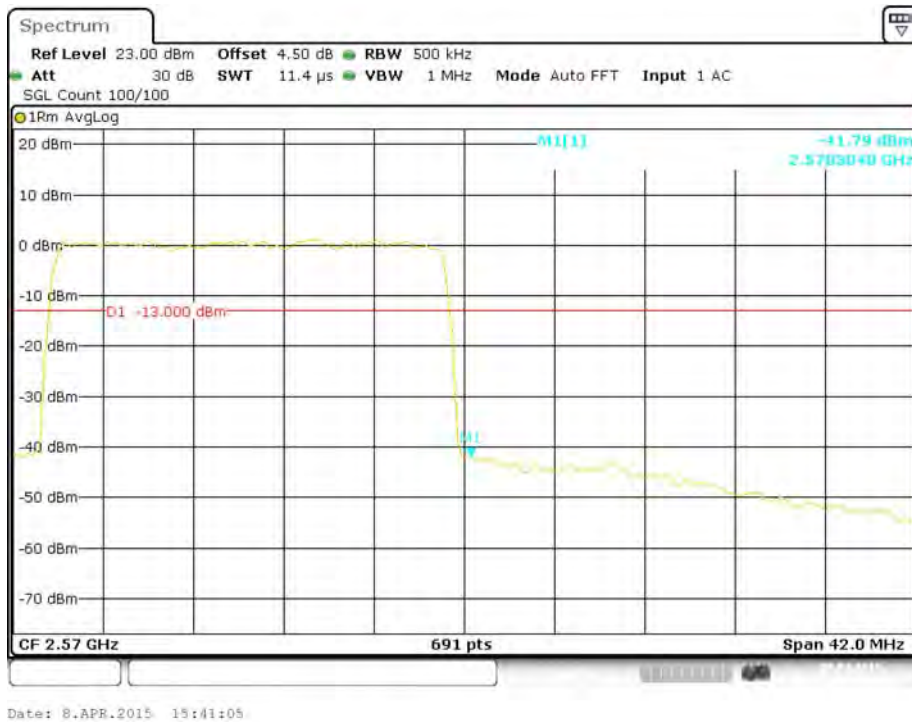
### 16-QAM (15.0 MHz, FULL RB) - Right Band Edge



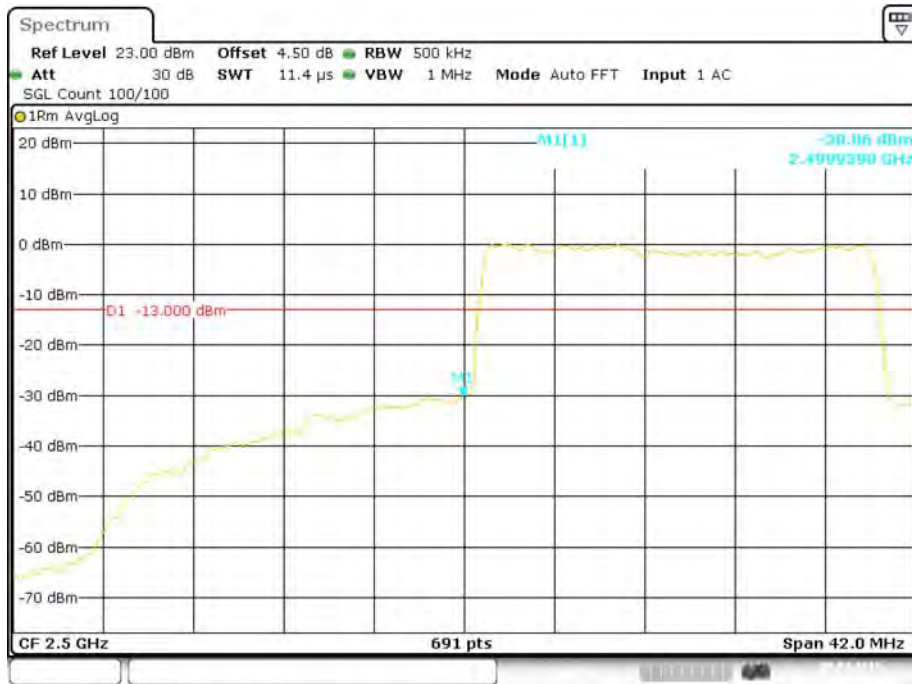
### QPSK (20.0 MHz, FULL RB) - Left Band Edge



### QPSK (20.0 MHz, FULL RB) - Right Band Edge

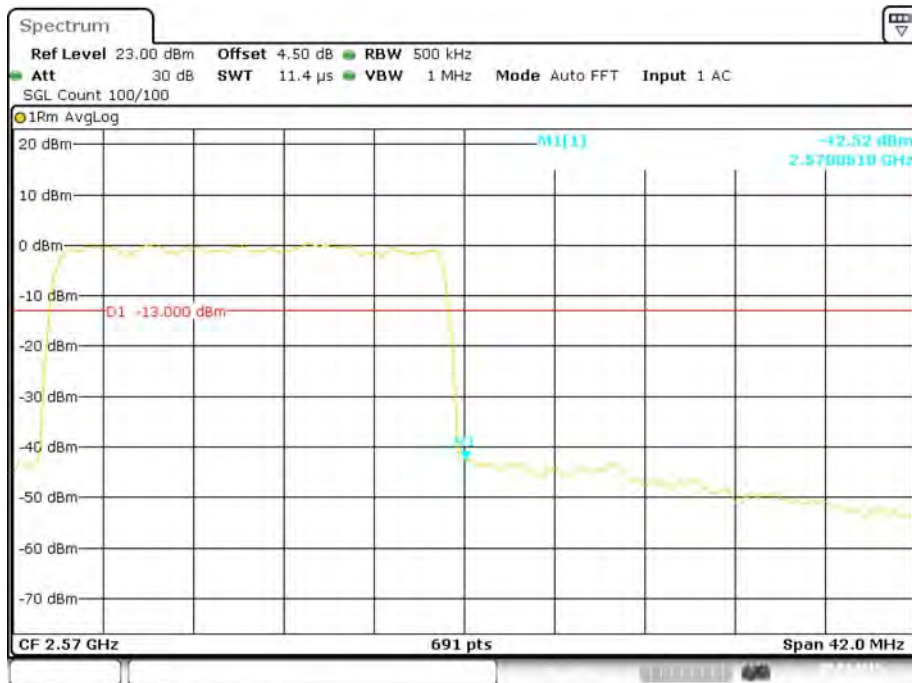


### 16-QAM (20.0 MHz, FULL RB) - Left Band Edge



Date: 8.APR.2015 15:35:25

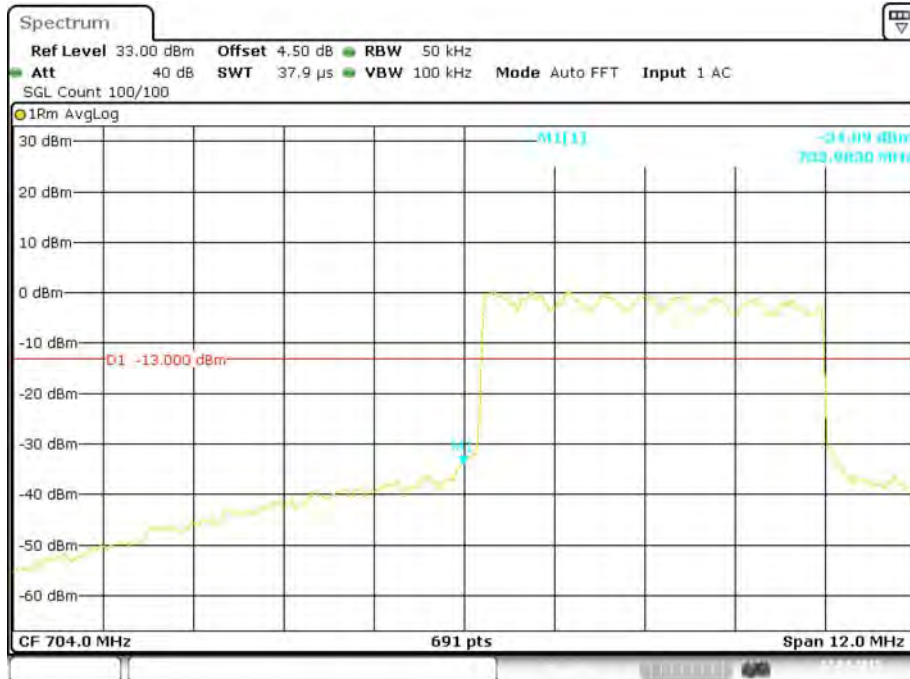
### 16-QAM (20.0 MHz, FULL RB) - Right Band Edge



Date: 8.APR.2015 15:40:03

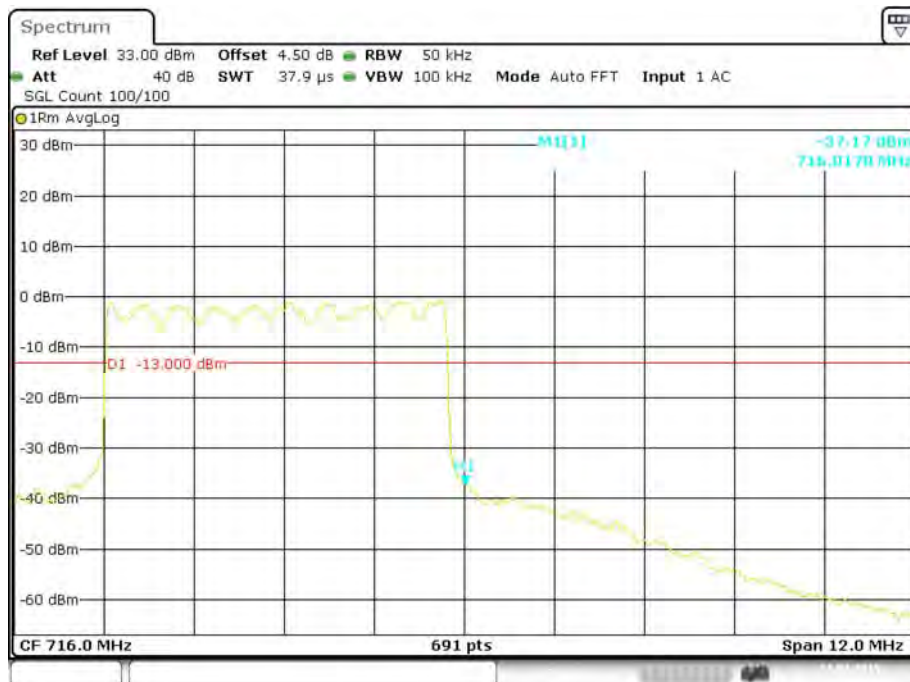
**Band 17:**

**QPSK (5.0 MHz, FULL RB) - Left Band Edge**



Date: 17.APR.2015 18:17:06

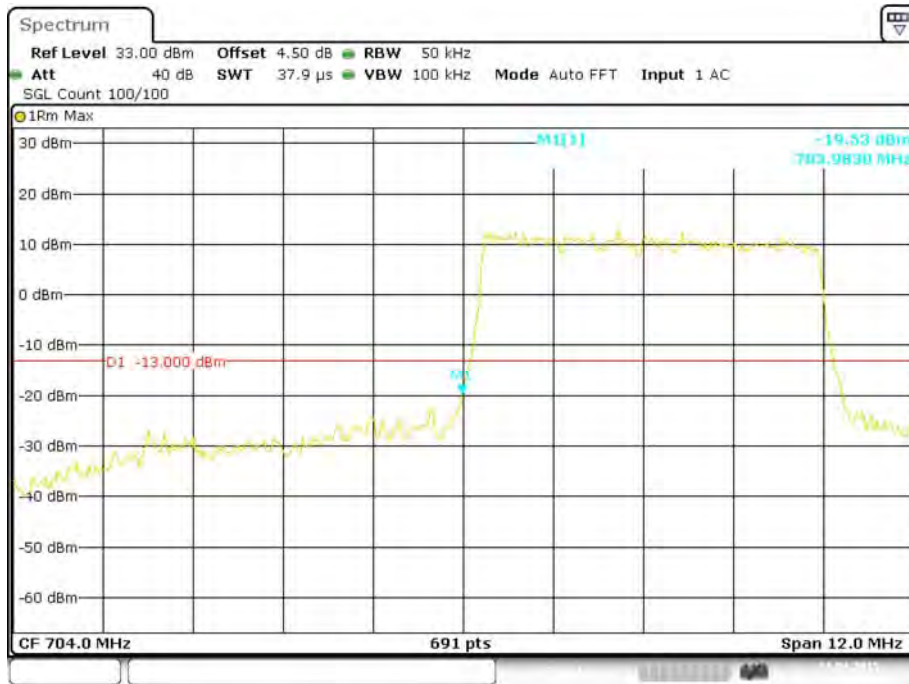
**QPSK (5.0 MHz, FULL RB) - Right Band Edge**



Date: 17.APR.2015 18:14:48



### 16-QAM (5.0 MHz, FULL RB) - Left Band Edge



Date: 17.APR.2015 18:06:00

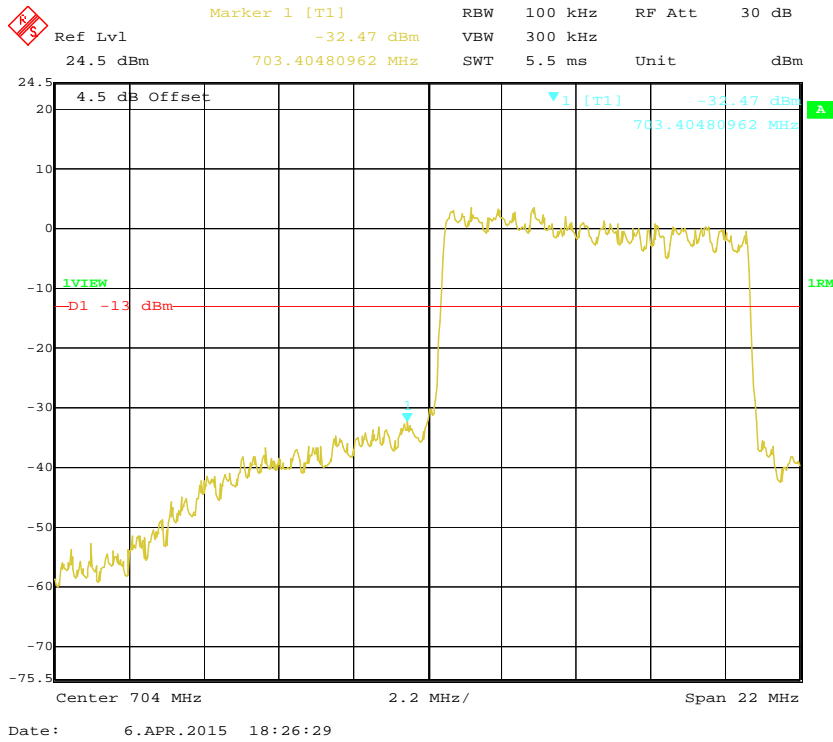
### 16-QAM (5.0 MHz, FULL RB) - Right Band Edge



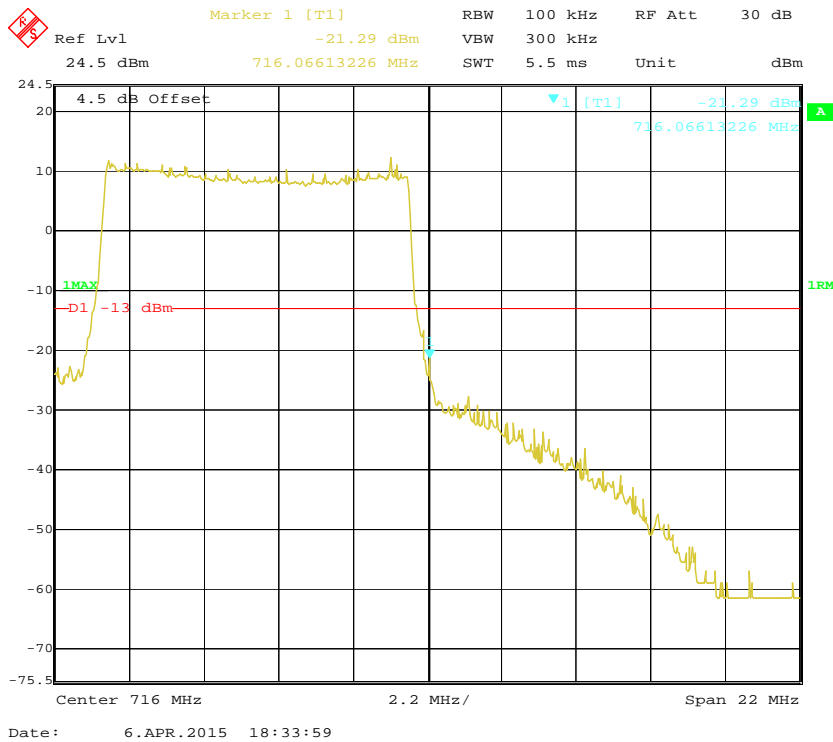
Date: 17.APR.2015 18:15:44



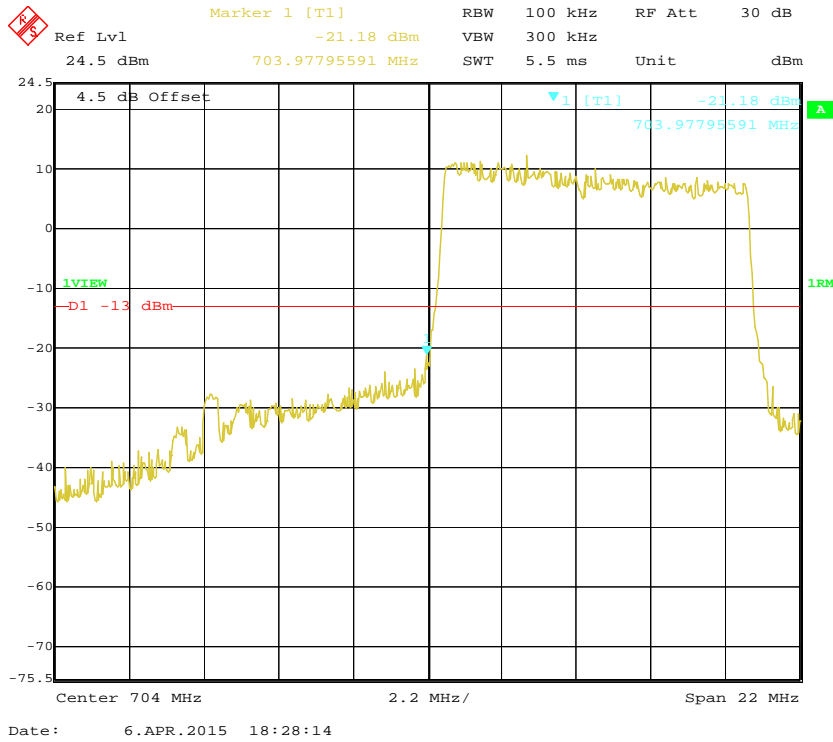
### QPSK (10.0 MHz, FULL RB) - Left Band Edge



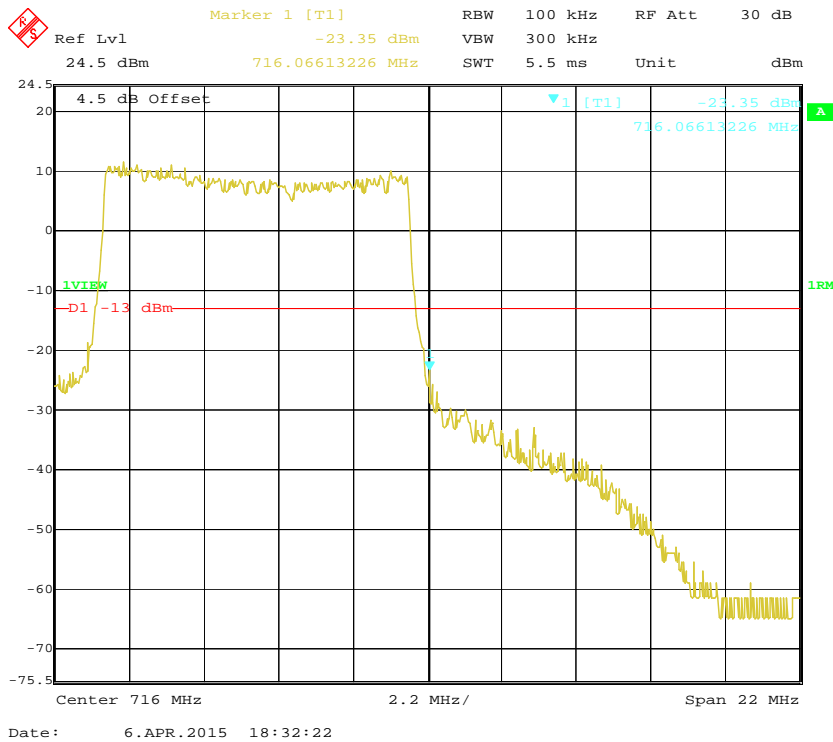
### QPSK (10.0 MHz, FULL RB) - Right Band Edge



### 16-QAM (10.0 MHz, FULL RB) - Left Band Edge



### 16-QAM (10.0 MHz, FULL RB) - Right Band Edge



## **FCC §2.1055, §22.355 & §24.235 & §27.54 - FREQUENCY STABILITY**

### **Applicable Standards**

FCC § 2.1055, §22.355, §24.235 and § 27.54.

According to FCC §2.1055, the frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

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

Frequency Range (MHz)	Base, fixed (ppm)	Mobile > 3 watts (ppm)	Mobile ≤ 3 watts (ppm)
25 to 50	20.0	20.0	50.0
50 to 450	5.0	5.0	50.0
450 to 512	2.5	5.0	5.0
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

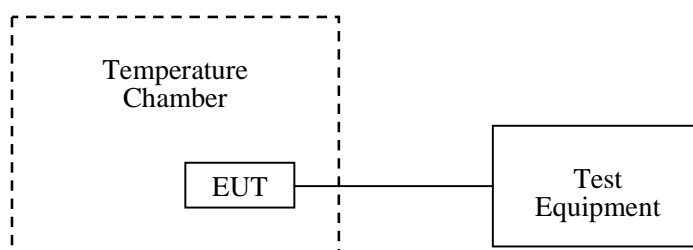
According to §24.235, the frequency stability shall be sufficient to ensure that the fundamental emissions stays within the authorized frequency block.

### **Test Procedure**

**Frequency Stability vs. Temperature:** The equipment under test was connected to an external DC power supply and the RF output was connected to communication test set via feed-through attenuators. The EUT was placed inside the temperature chamber. The DC leads and RF output cable exited the chamber through an opening made for the purpose.

After the temperature stabilized for approximately 20 minutes, the frequency output was recorded from the communication test set.

**Frequency Stability vs. Voltage:** For hand carried, battery powered equipment; reduce primary supply voltage to the battery operating end point which shall be specified by the manufacturer.



**Test Equipment List and Details**

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
ESPEC	Temperature & Humidity Chamber	EL-10KA	09107726	2014-11-01	2015-11-01
Rohde & Schwarz	Universal Radio Communication Tester	CMU200	106891	2014-11-23	2015-11-23

\* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements, traceable to National Primary Standards and International System of Units (SI).

**Test Data**

**Environmental Conditions**

<b>Temperature:</b>	23 °C
<b>Relative Humidity:</b>	51 %
<b>ATM Pressure:</b>	101.0 kPa

The testing was performed by Simon Wang on 2015-04-06.

EUT operation mode: Transmitting

Test Result: Compliance. Please refer to the following tables.

**Cellular Band (Part 22H)**

**GSM Mode**

Middle Channel, $f_0 = 836.6$ MHz				
Temperature (°C)	Power Supplied (V <sub>DC</sub> )	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-30	3.8	-8	-0.00956	2.5
-20		-6	-0.00717	2.5
-10		-5	-0.00598	2.5
0		-7	-0.00837	2.5
10		-9	-0.01076	2.5
20		-10	-0.01195	2.5
30		-6	-0.00717	2.5
40		-11	-0.01315	2.5
50		-10	-0.01195	2.5
25		V min.= 3.5	-4	-0.00478
25	V max.= 4.35	-3	-0.00359	2.5

**EDGE Mode**

Middle Channel, $f_0 = 836.6$ MHz				
Temperature (°C)	Power Supplied (V <sub>DC</sub> )	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-30	3.8	-6	-0.00717	2.5
-20		-3	-0.00359	2.5
-10		-4	-0.00478	2.5
0		-9	-0.01076	2.5
10		-1	-0.00120	2.5
20		-8	-0.00956	2.5
30		-6	-0.00717	2.5
40		-7	-0.00837	2.5
50		-8	-0.00956	2.5
25	V min.= 3.5	-5	-0.00598	2.5
25	V max.= 4.35	-2	-0.00239	2.5

**WCDMA Mode**

Middle Channel, $f_0 = 836.6$ MHz				
Temperature (°C)	Power Supplied (V <sub>DC</sub> )	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-30	3.8	-9	-0.01076	2.5
-20		-4	-0.00478	2.5
-10		-8	-0.00956	2.5
0		-5	-0.00598	2.5
10		-7	-0.00837	2.5
20		-3	-0.00359	2.5
30		-6	-0.00717	2.5
40		-5	-0.00598	2.5
50		-8	-0.00956	2.5
25	V min.= 3.5	-2	-0.00239	2.5
25	V max.= 4.35	-4	0.03705	2.5

**PCS Band (Part 24E)**

**GSM Mode**

Middle Channel, $f_0 = 1880.0$ MHz				
Temperature (°C)	Power Supplied (V <sub>DC</sub> )	Frequency Error (Hz)	Frequency Error (ppm)	Result
-30	3.8	-6	-0.00319	Pass
-20		-9	-0.00479	Pass
-10		-12	-0.00638	Pass
0		-13	-0.00691	Pass
10		-10	-0.00532	Pass
20		-8	-0.00426	Pass
30		-7	-0.00372	Pass
40		-5	-0.00266	Pass
50		-13	-0.00691	Pass
25		V min.= 3.5	-4	-0.00213
25	V max.= 4.35	-6	-0.00319	Pass

**EDGE Mode**

Middle Channel, $f_0 = 1880.0$ MHz				
Temperature (°C)	Power Supplied (V <sub>DC</sub> )	Frequency Error (Hz)	Frequency Error (ppm)	Result
-30	3.8	5	0.00266	Pass
-20		8	0.004255	Pass
-10		9	0.004787	Pass
0		10	0.005319	Pass
10		7	0.003723	Pass
20		6	0.003191	Pass
30		4	0.002128	Pass
40		5	0.00266	Pass
50		9	0.004787	Pass
25		V min.= 3.5	2	0.001064
25	V max.= 4.35	3	0.001596	Pass



**WCDMA Mode**

<b>Middle Channel, <math>f_0=1880.0</math> MHz</b>				
<b>Temperature (°C)</b>	<b>Power Supplied (V<sub>DC</sub>)</b>	<b>Frequency Error (Hz)</b>	<b>Frequency Error (ppm)</b>	<b>Result</b>
-30	3.8	10	0.005319	Pass
-20		8	0.004255	Pass
-10		6	0.003191	Pass
0		7	0.003723	Pass
10		6	0.003191	Pass
20		9	0.004787	Pass
30		4	0.002128	Pass
40		5	0.002660	Pass
50		9	0.004787	Pass
25	V min.= 3.5	2	0.001064	Pass
25	V max.= 4.35	4	0.002128	Pass

**AWS Band**

<b>Middle Channel, <math>f_0=1732.6</math> MHz</b>				
<b>Temperature (°C)</b>	<b>Power Supplied (V<sub>DC</sub>)</b>	<b>Frequency Error (Hz)</b>	<b>Frequency Error (ppm)</b>	<b>Result</b>
-30	3.8	-8	-0.00462	Pass
-20		-5	-0.00289	Pass
-10		-4	-0.00231	Pass
0		-7	-0.00404	Pass
10		-9	-0.00519	Pass
20		-6	-0.00346	Pass
30		-2	-0.00115	Pass
40		-4	-0.00231	Pass
50		-8	-0.00462	Pass
25	V min.= 3.5	-1	-0.00058	Pass
25	V max.= 4.35	-3	-0.00173	Pass

**Band 2:**

	Temperature (°C)	QPSK (Hz)	QPSK (ppm)	Result
<b>10.0 MHz, Middle Channel</b>	-30	-18	-0.010	Pass
	-20	-19	-0.010	Pass
	-10	-14	-0.007	Pass
	0	-14	-0.007	Pass
	10	-16	-0.009	Pass
	20	-20	-0.011	Pass
	30	-16	-0.009	Pass
	40	-15	-0.008	Pass
	50	-19	-0.010	Pass
	Voltage (V <sub>DC</sub> )	QPSK (Hz)	QPSK (ppm)	Result
	3.8	-17	-0.009	Pass
	3.5	-19	-0.010	Pass
	4.35	-16	-0.009	Pass

**Band 4:**

	Temperature (°C)	QPSK (Hz)	QPSK (ppm)	Result
<b>10.0 MHz, Middle Channel</b>	-30	-12	-0.007	Pass
	-20	-13	-0.008	Pass
	-10	-17	-0.010	Pass
	0	-19	-0.011	Pass
	10	-20	-0.012	Pass
	20	-17	-0.010	Pass
	30	-18	-0.010	Pass
	40	-14	-0.008	Pass
	50	-17	-0.010	Pass
	Voltage (V <sub>DC</sub> )	QPSK (Hz)	QPSK (ppm)	Result
	3.8	-20	-0.012	Pass
	3.5	-19	-0.011	Pass
	4.35	-17	-0.010	Pass