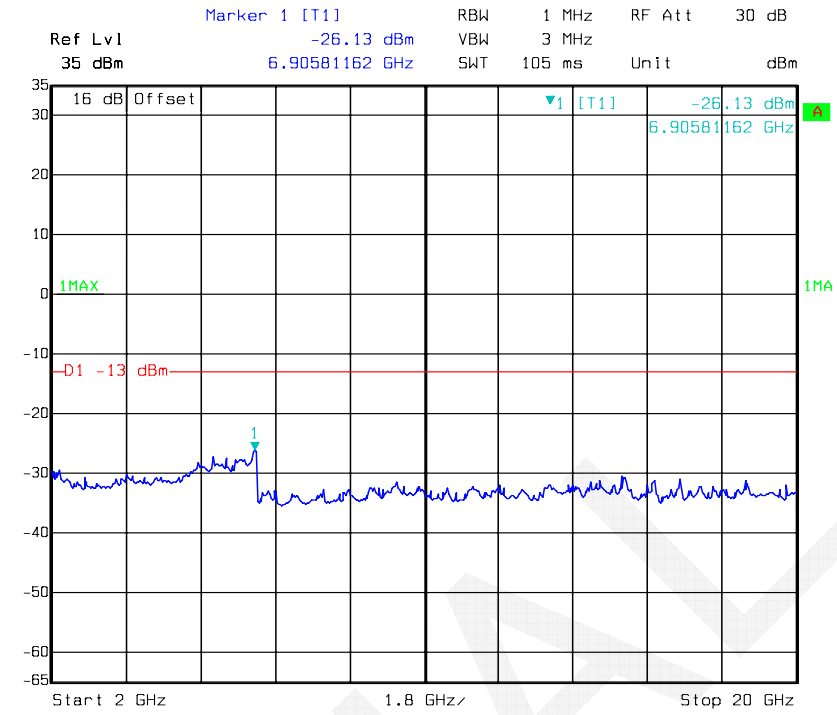
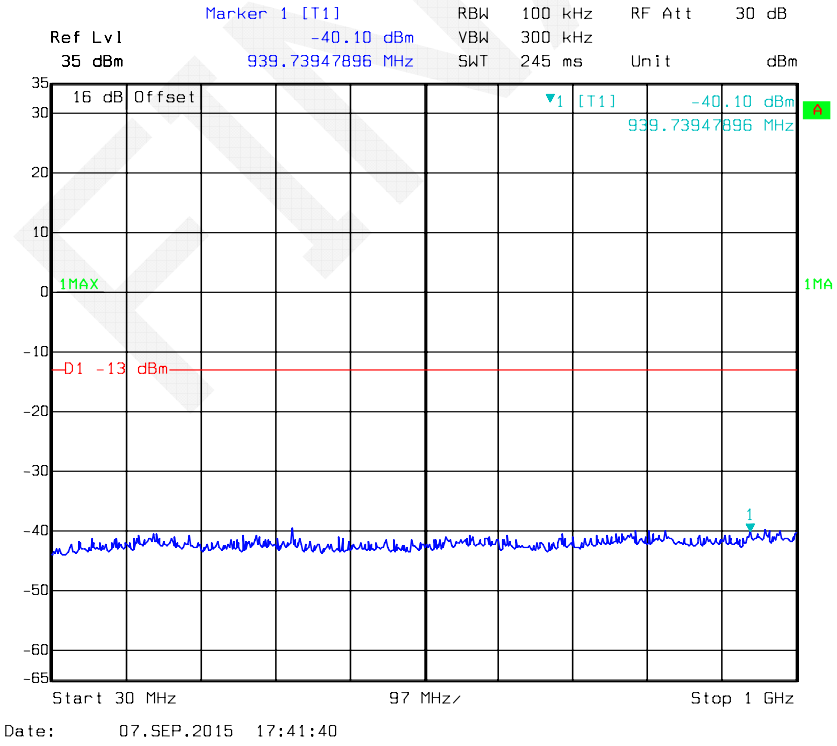
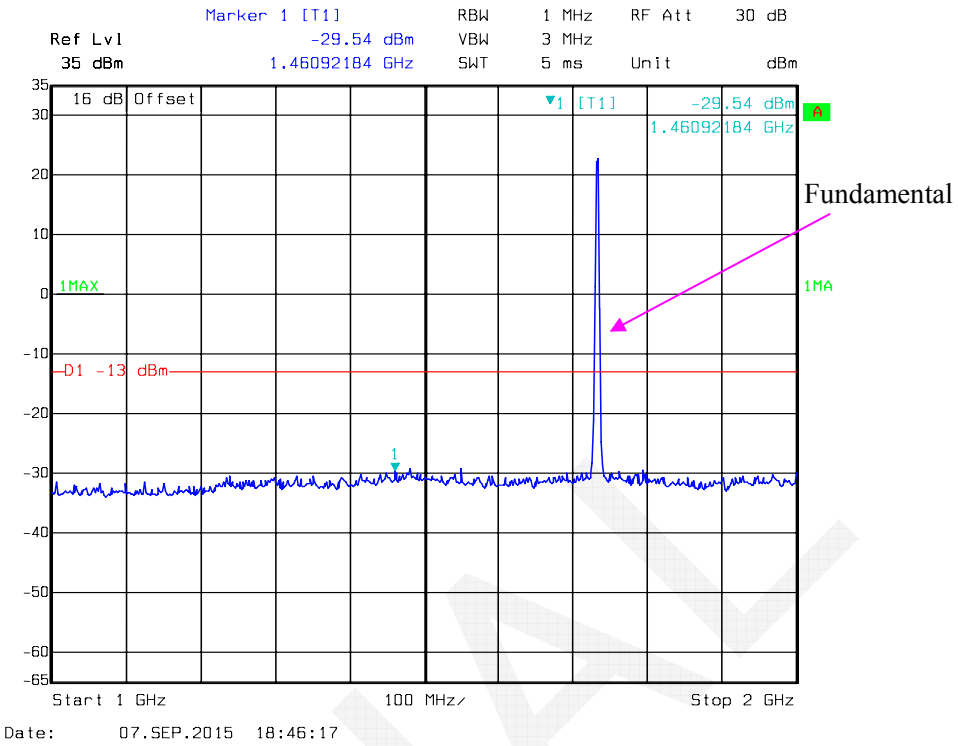
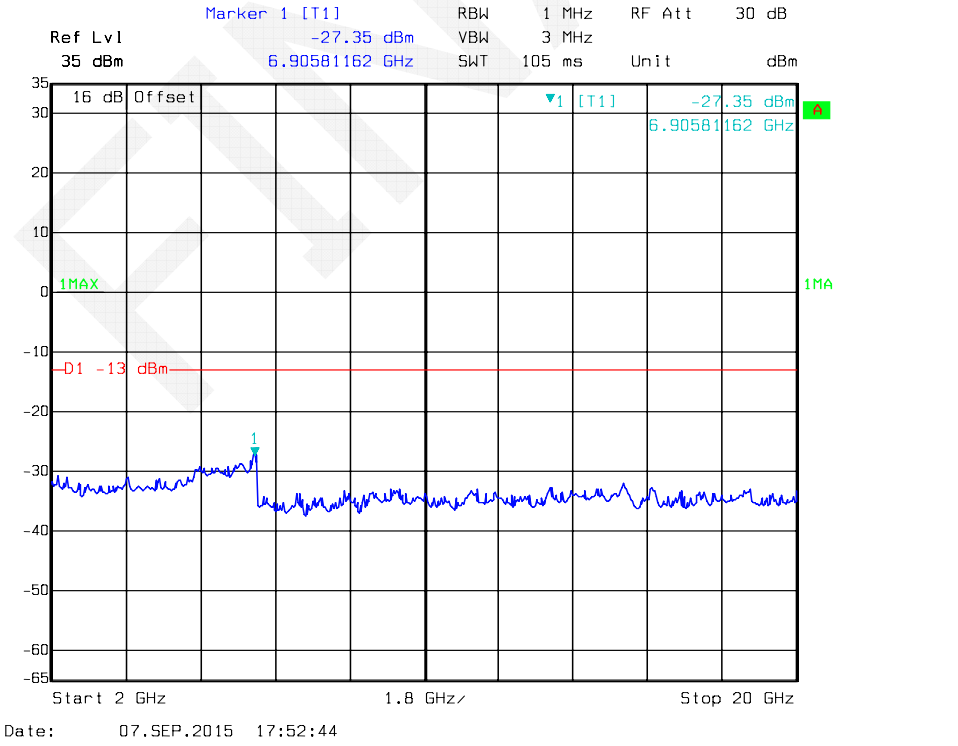


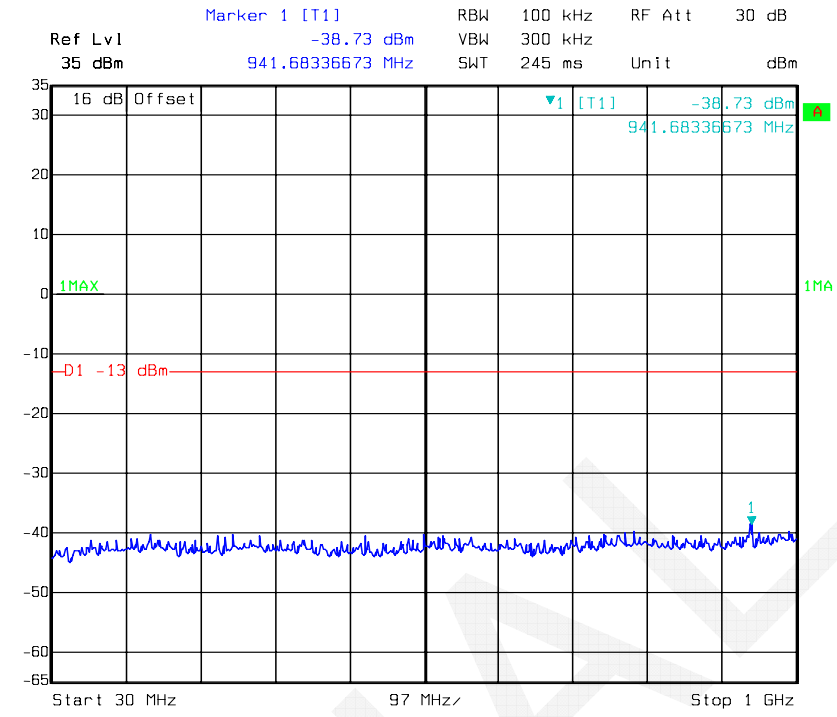
16-QAM, Band 4-3M _ Middle Channel

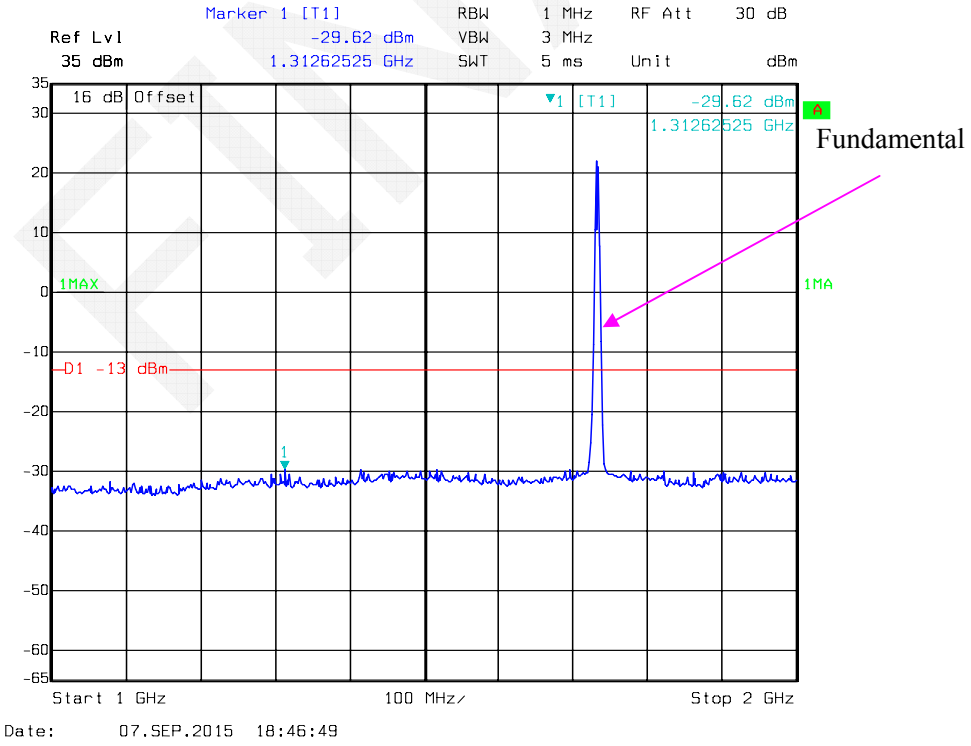


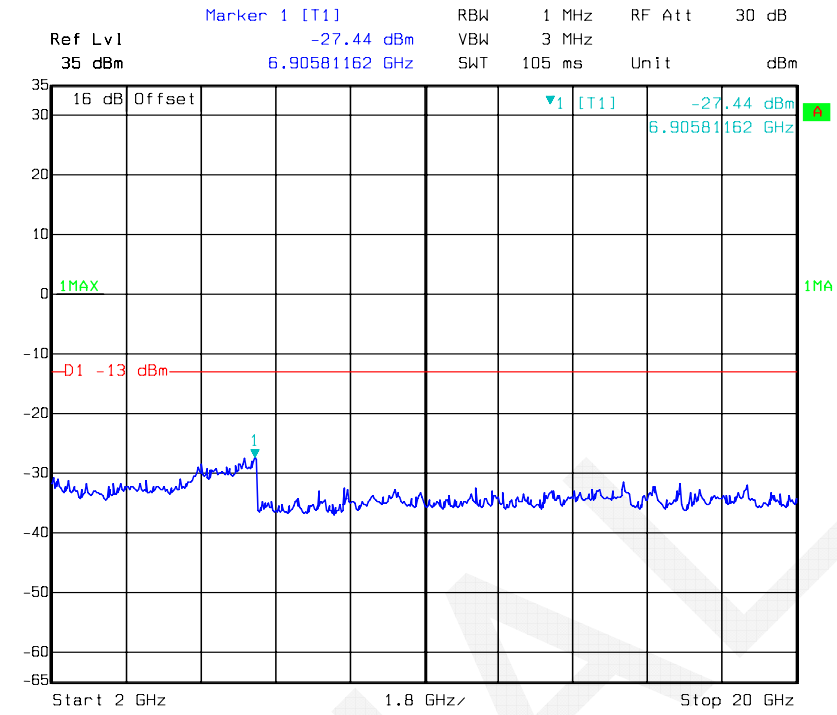

Marker 1 [T1]
RBW 1 MHz
RF Att 30 dB
Ref Lvl
-29.54 dBm
VBW 3 MHz
35 dBm
1.46092184 GHz
SWT 5 ms
Unit dBm
16 dB Offset
[T1] -29.54 dBm
1.46092184 GHz
Fundamental
1MAX
1MA
D1 -13 dBm
Start 1 GHz
100 MHz/
Stop 2 GHz
Date: 07.SEP.2015 18:46:17


Marker 1 [T1]
RBW 1 MHz
RF Att 30 dB
Ref Lvl
-27.35 dBm
VBW 3 MHz
35 dBm
6.90581162 GHz
SWT 105 ms
Unit dBm
16 dB Offset
[T1] -27.35 dBm
6.90581162 GHz
1MAX
1MA
D1 -13 dBm
Start 2 GHz
1.8 GHz/
Stop 20 GHz
Date: 07.SEP.2015 17:52:44

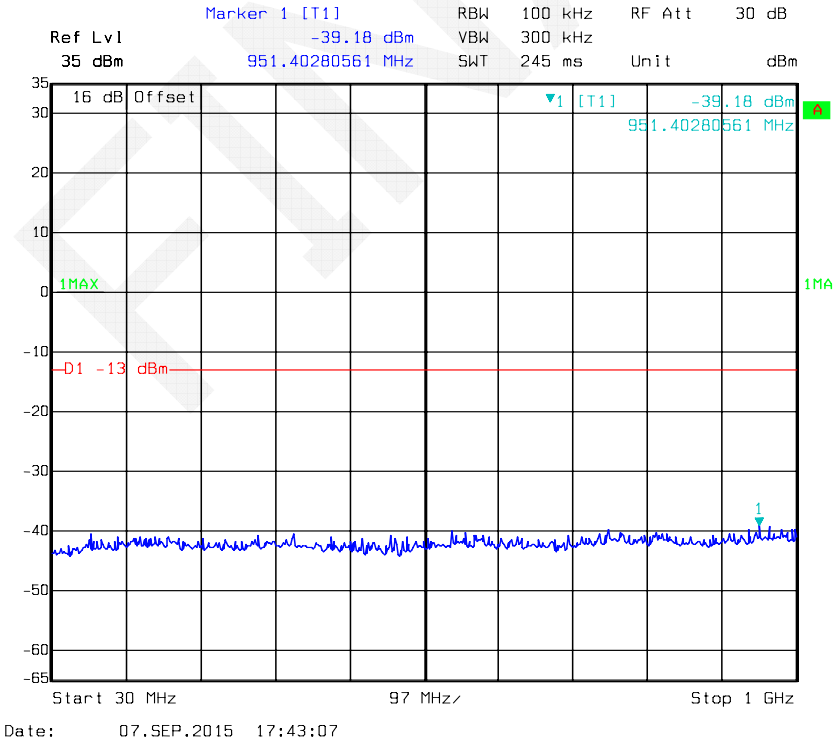
16-QAM, Band 4-5M _ Middle Channel

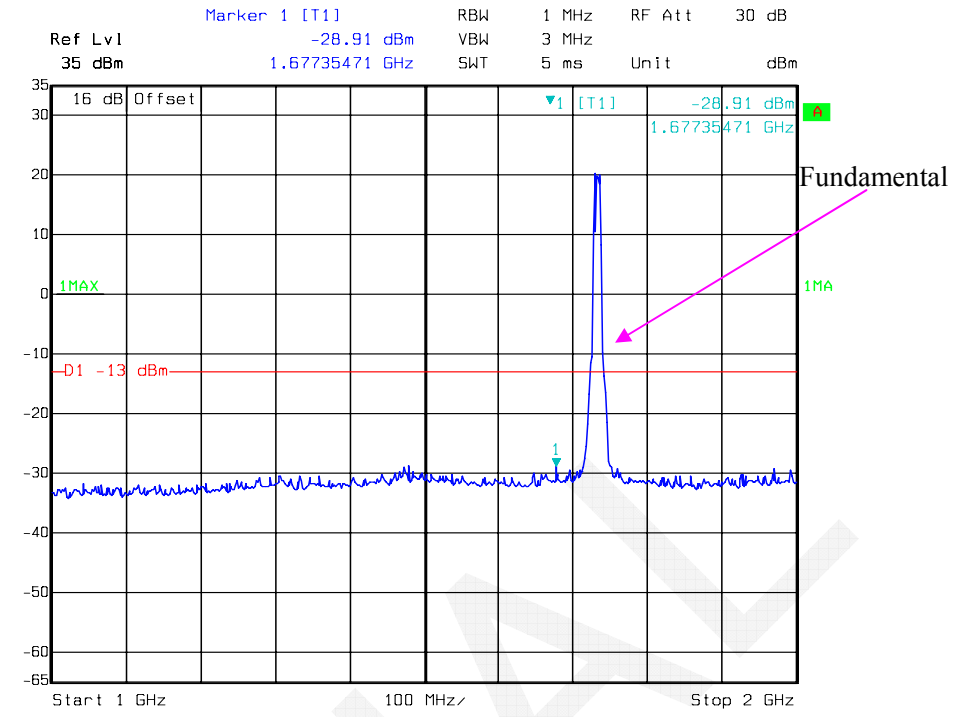


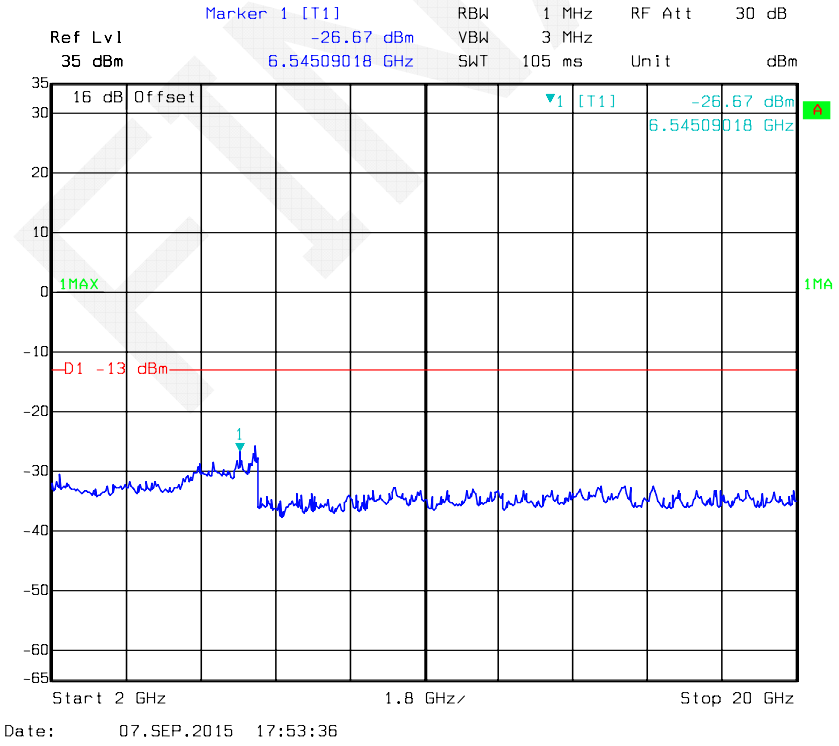




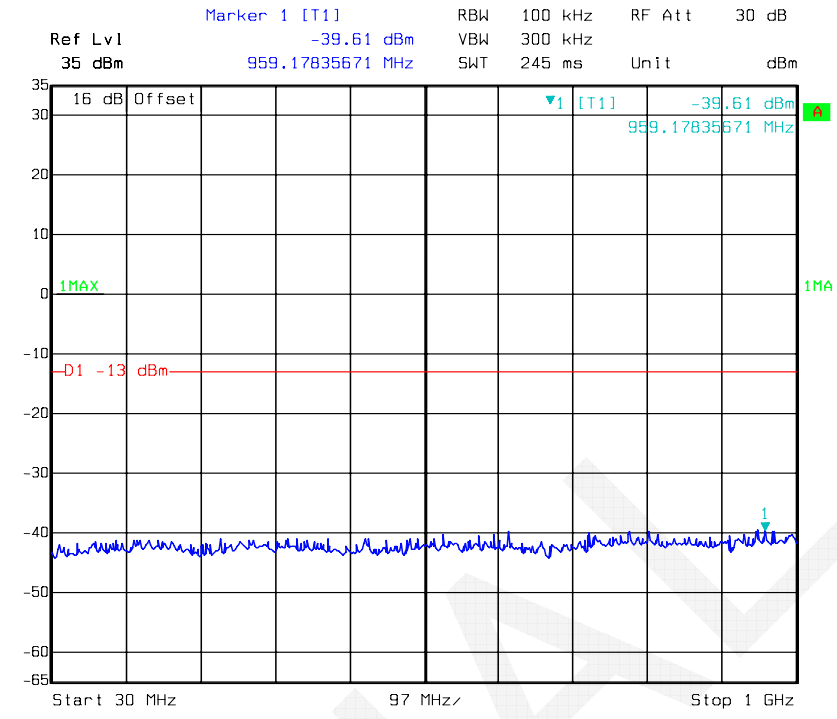
16-QAM, Band 4-10M _ Middle Channel

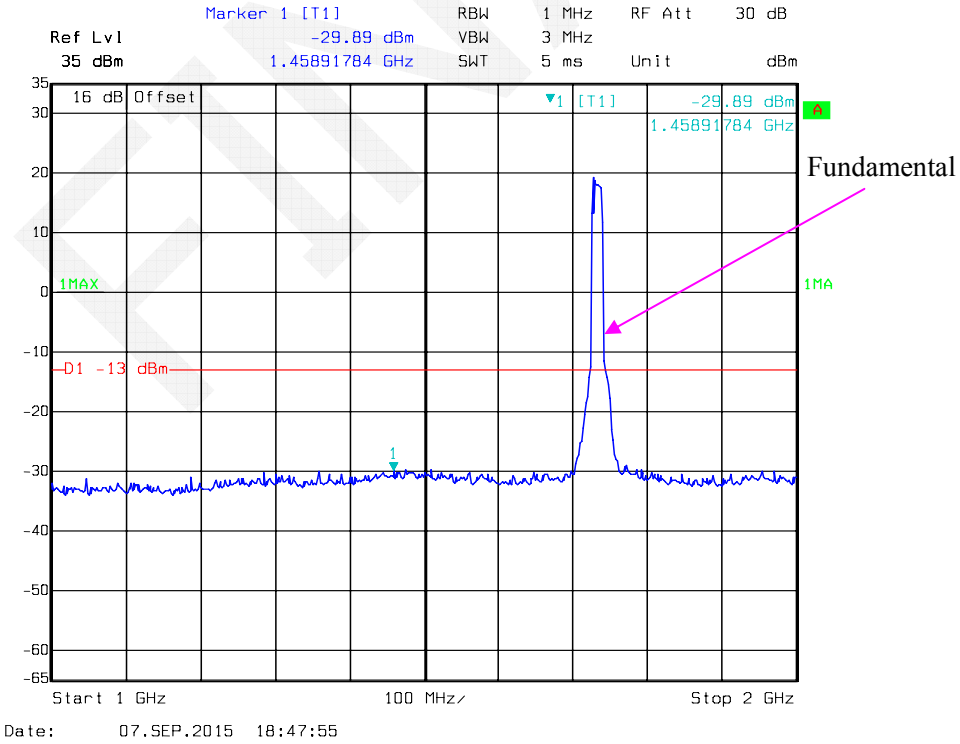


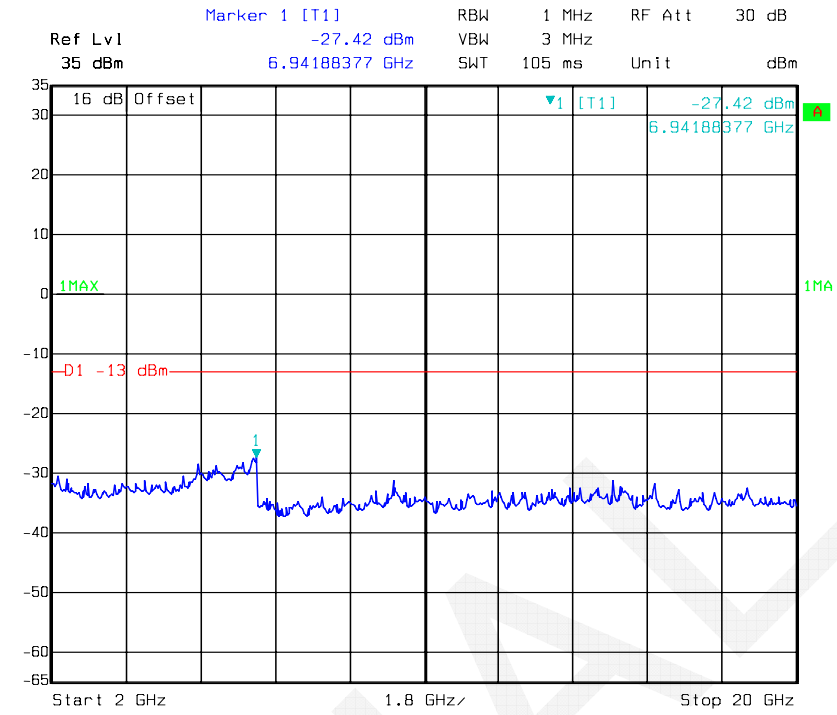

Marker 1 [T1]
RBW 1 MHz
RF Att 30 dB
Ref Lvl
-28.91 dBm
VBW 3 MHz
35 dBm
1.67735471 GHz
SWT 5 ms
Unit dBm
16 dB Offset
1 [T1]
-28.91 dBm
1.67735471 GHz
Fundamental
1MAX
1MA
D1 -13 dBm
Start 1 GHz
100 MHz/
Stop 2 GHz
Date: 07.SEP.2015 18:47:17


Marker 1 [T1]
RBW 1 MHz
RF Att 30 dB
Ref Lvl
-26.67 dBm
VBW 3 MHz
35 dBm
6.54509018 GHz
SWT 105 ms
Unit dBm
16 dB Offset
1 [T1]
-26.67 dBm
6.54509018 GHz
1MAX
1MA
D1 -13 dBm
Start 2 GHz
1.8 GHz/
Stop 20 GHz
Date: 07.SEP.2015 17:53:36

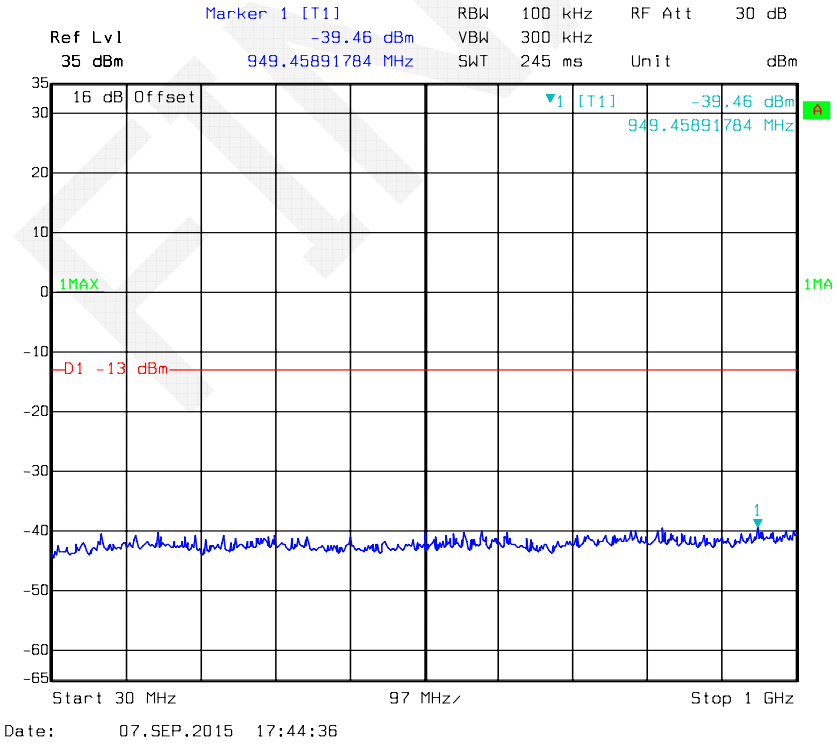
16-QAM, Band 4-15M _ Middle Channel

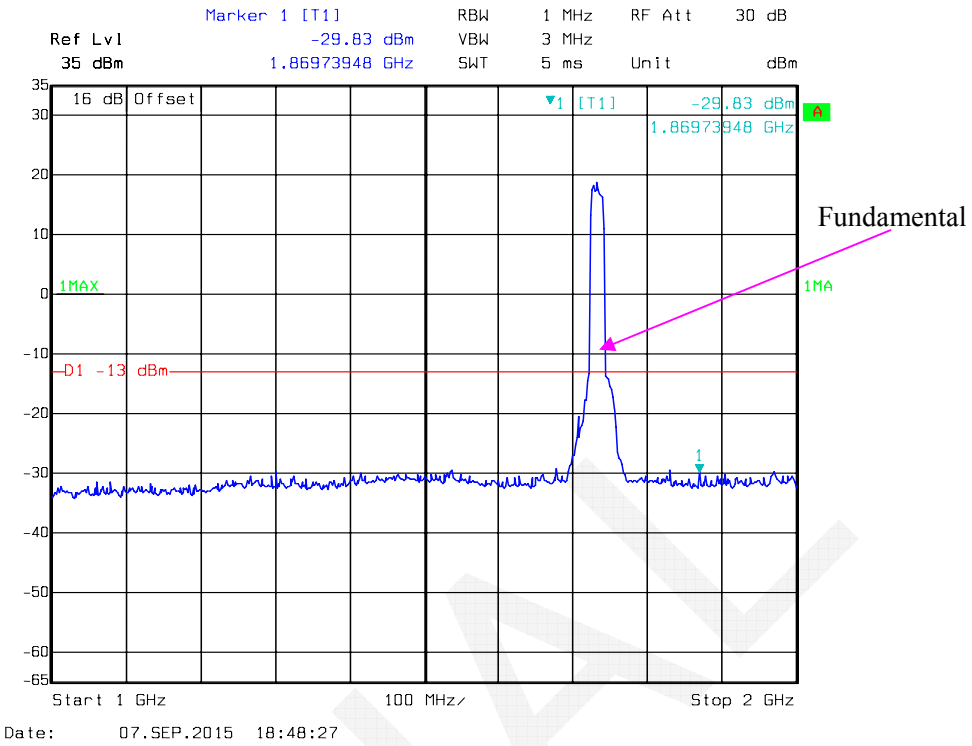


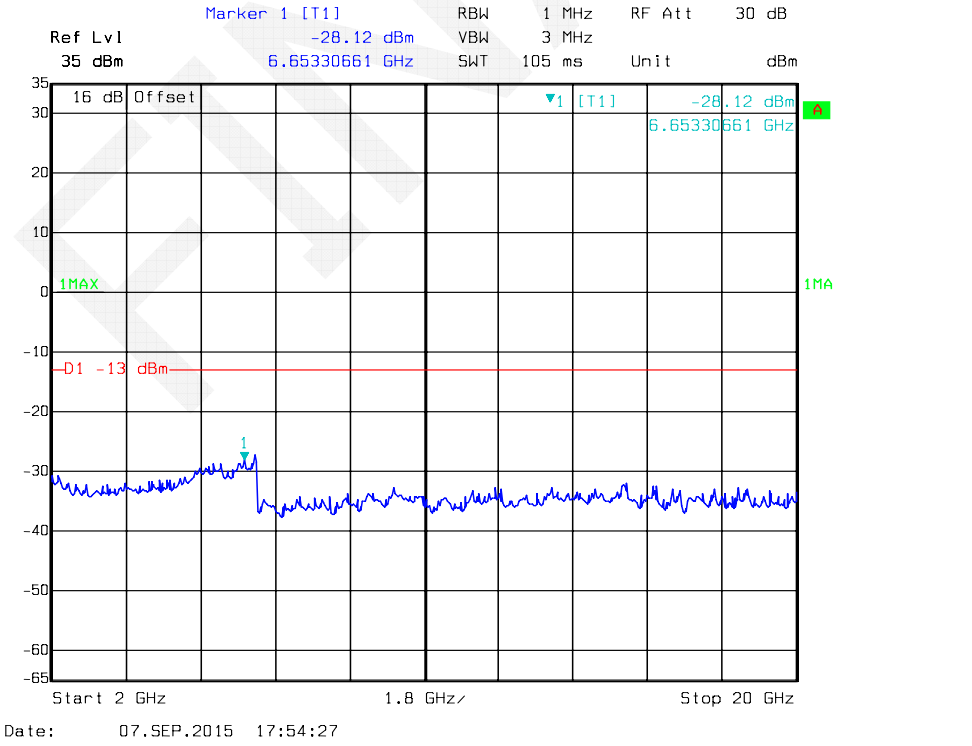




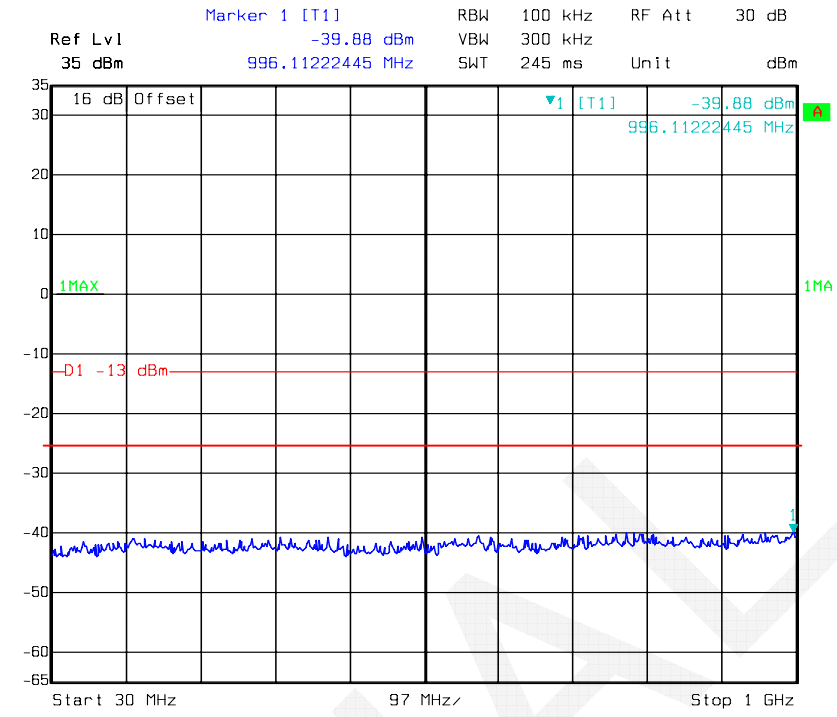
16-QAM, Band 4-20M _ Middle Channel

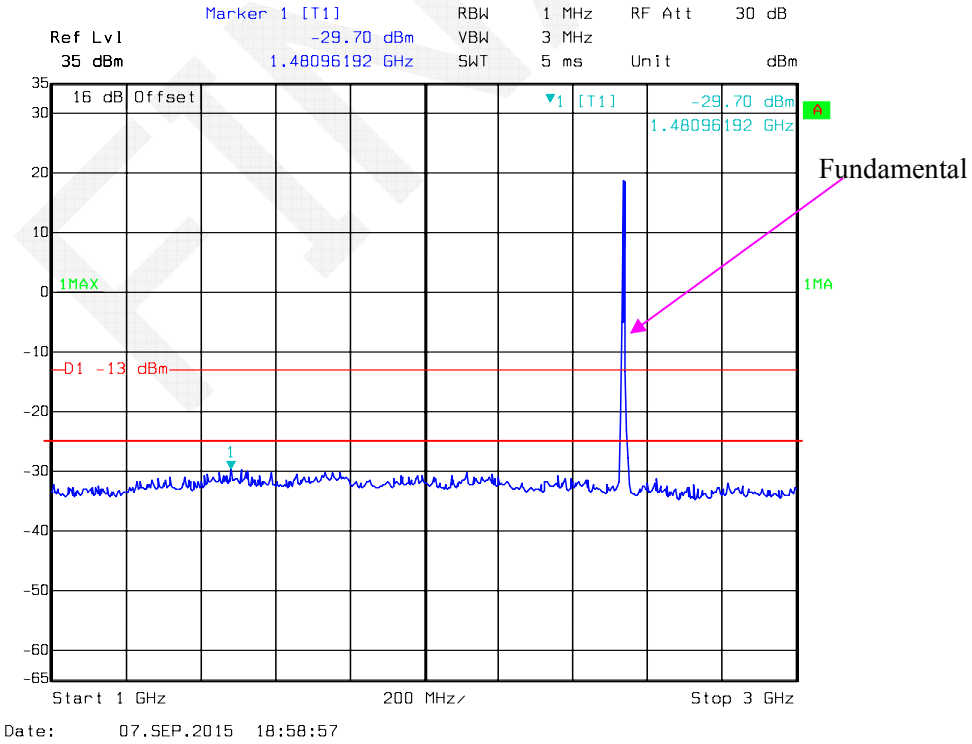


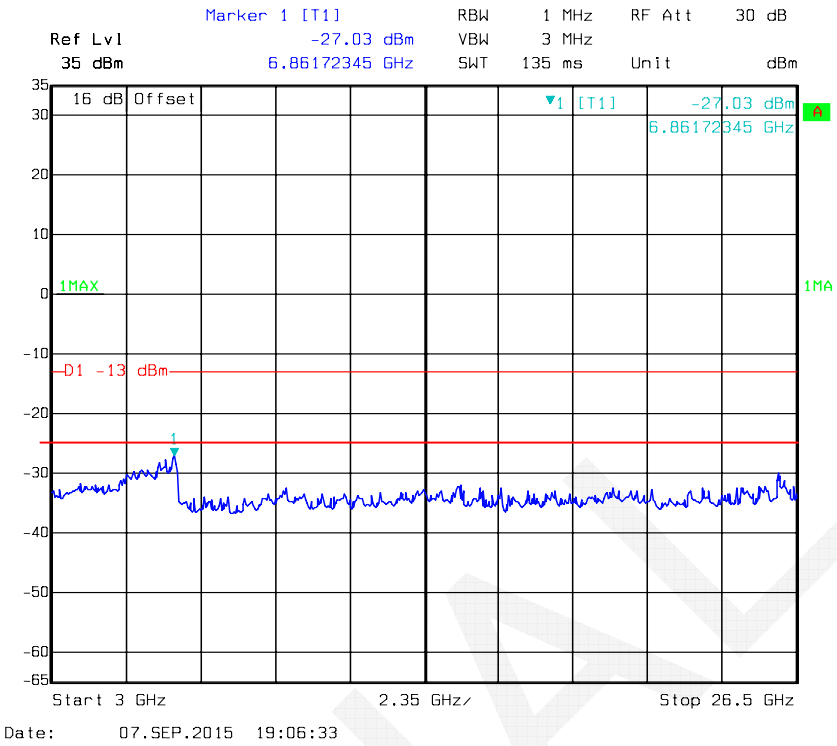

Marker 1 [T1]
Ref Lvl
35 dBm
-29.83 dBm
1.86973948 GHz
RBW 1 MHz
VBW 3 MHz
SWT 5 ms
RF Att 30 dB
Unit dBm
16 dB Offset
1 [T1] -29.83 dBm
1.86973948 GHz
1MAX
1MA
D1 -13 dBm
Fundamental
Start 1 GHz
100 MHz/
Stop 2 GHz
Date: 07.SEP.2015 18:48:27


Marker 1 [T1]
Ref Lvl
35 dBm
-28.12 dBm
6.65330661 GHz
RBW 1 MHz
VBW 3 MHz
SWT 105 ms
RF Att 30 dB
Unit dBm
16 dB Offset
1 [T1] -28.12 dBm
6.65330661 GHz
1MAX
1MA
D1 -13 dBm
Start 2 GHz
1.8 GHz/
Stop 20 GHz
Date: 07.SEP.2015 17:54:27

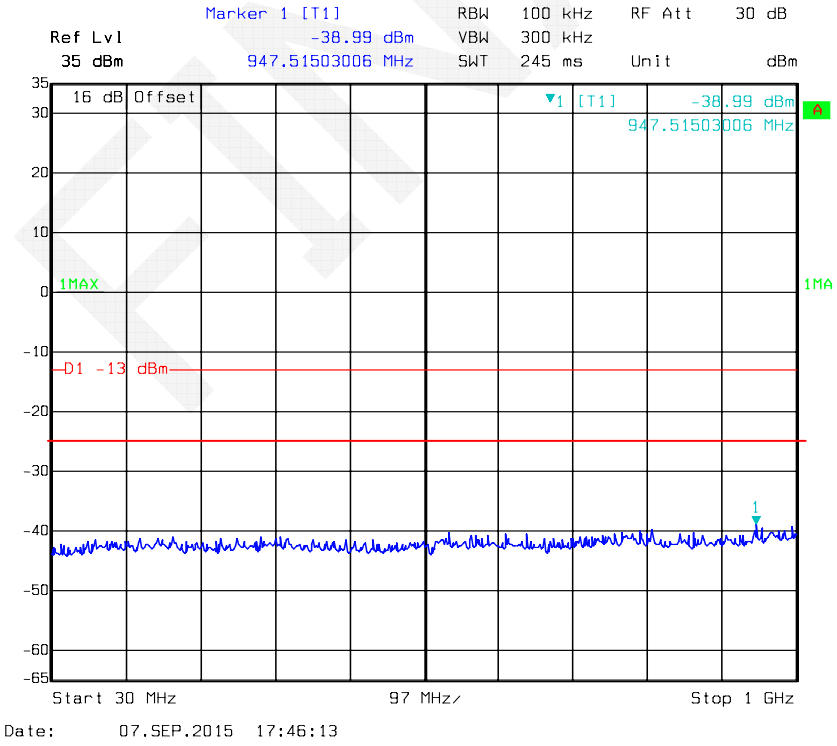
QPSK, Band 7-5M _ Middle Channel

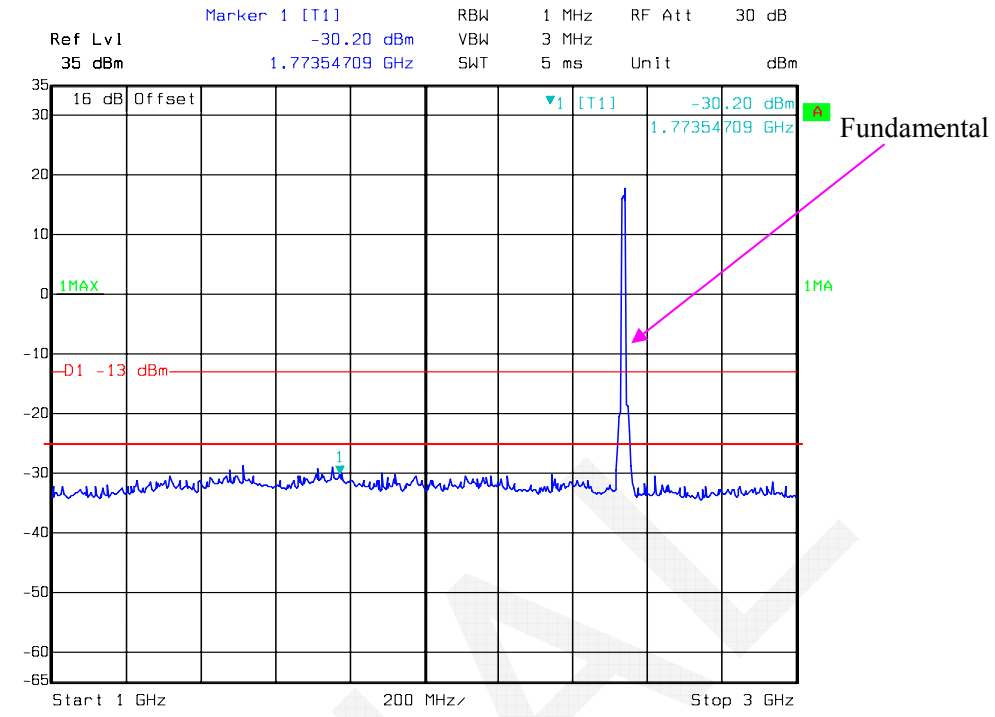


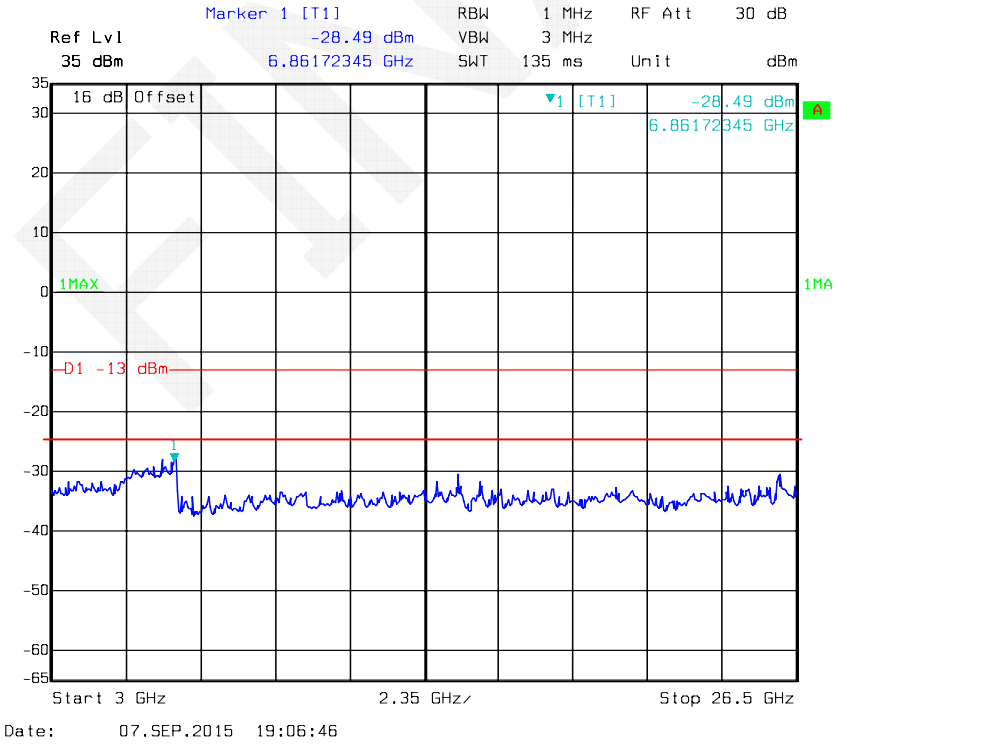




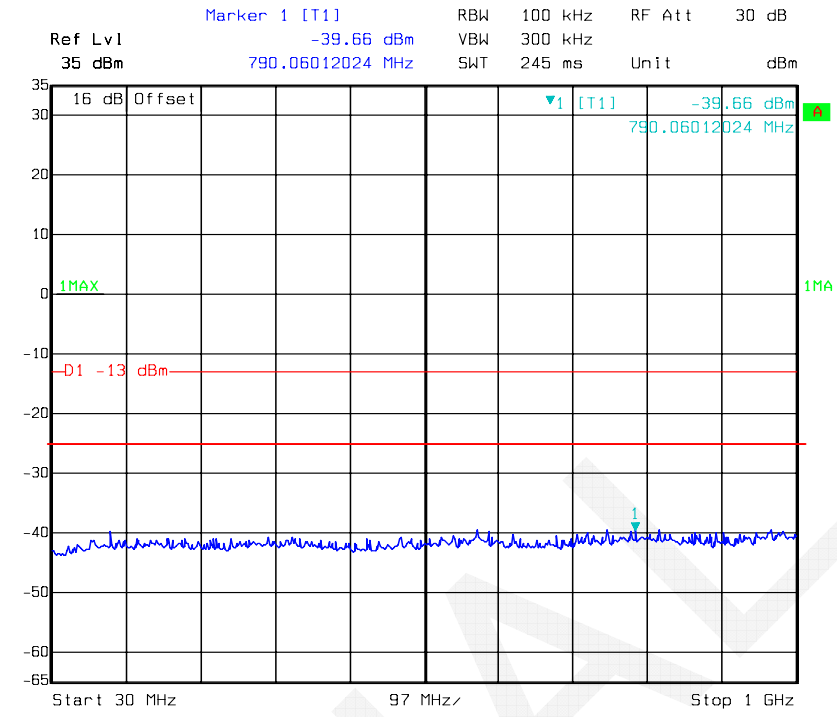
QPSK, Band 7-10M _ Middle Channel

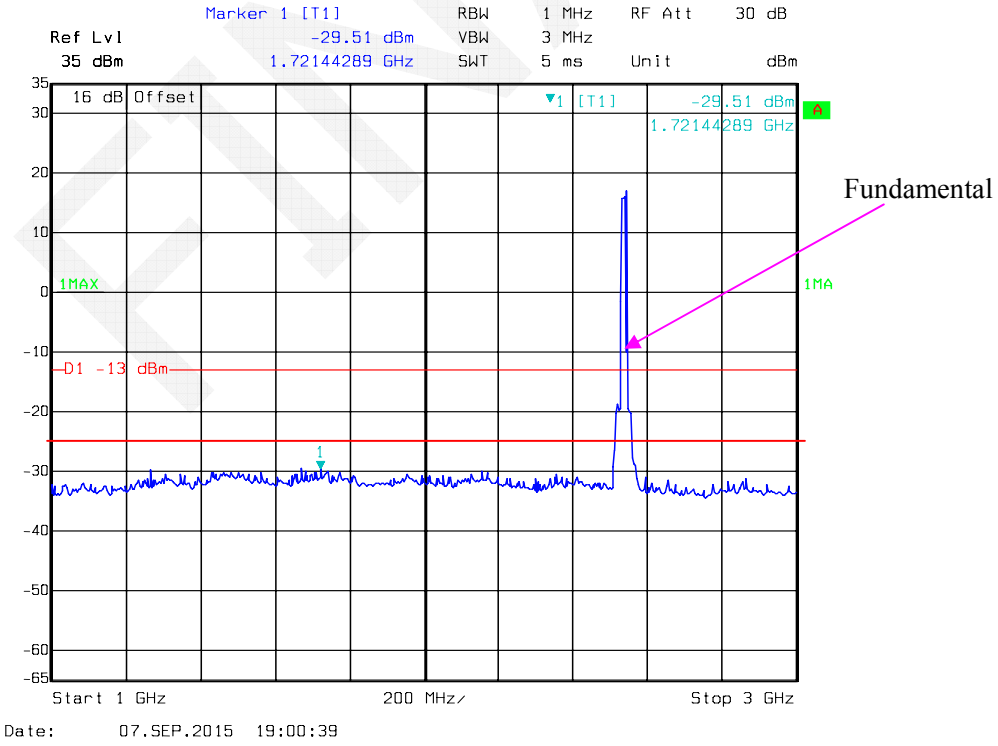


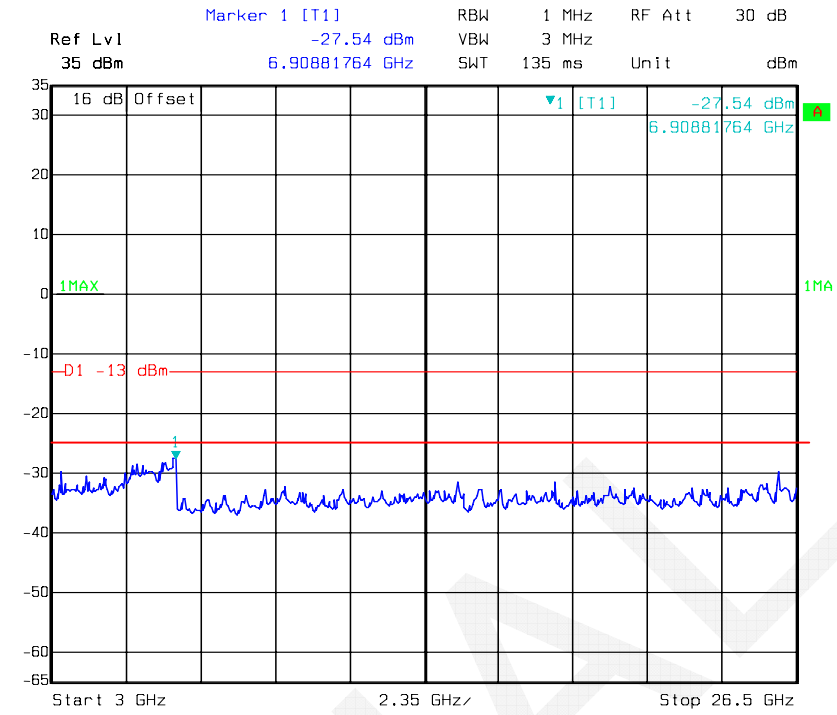

Marker 1 [T1]
RBW 1 MHz
RF Att 30 dB
Ref Lvl
-30.20 dBm
VBW 3 MHz
35 dBm
1.77354709 GHz
SWT 5 ms
Unit dBm
16 dB Offset
[T1] -30.20 dBm
1.77354709 GHz
Fundamental
1MAX
1MA
D1 -13 dBm
Start 1 GHz
200 MHz/
Stop 3 GHz
Date: 07.SEP.2015 18:59:37


Marker 1 [T1]
RBW 1 MHz
RF Att 30 dB
Ref Lvl
-28.49 dBm
VBW 3 MHz
35 dBm
6.86172345 GHz
SWT 135 ms
Unit dBm
16 dB Offset
[T1] -28.49 dBm
6.86172345 GHz
1MAX
1MA
D1 -13 dBm
Start 3 GHz
2.35 GHz/
Stop 26.5 GHz
Date: 07.SEP.2015 19:06:46

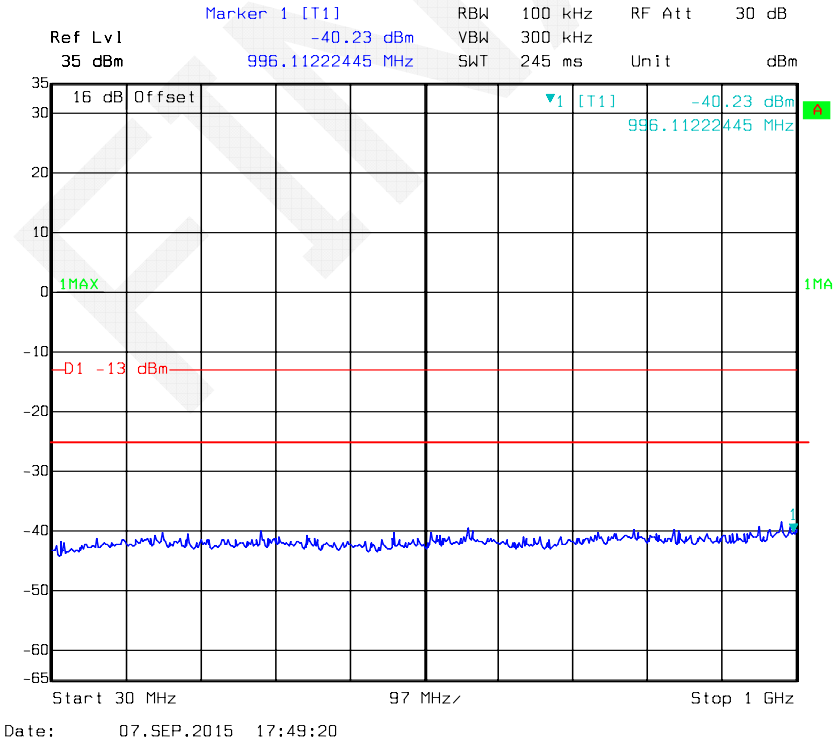
QPSK, Band 7-15M _ Middle Channel

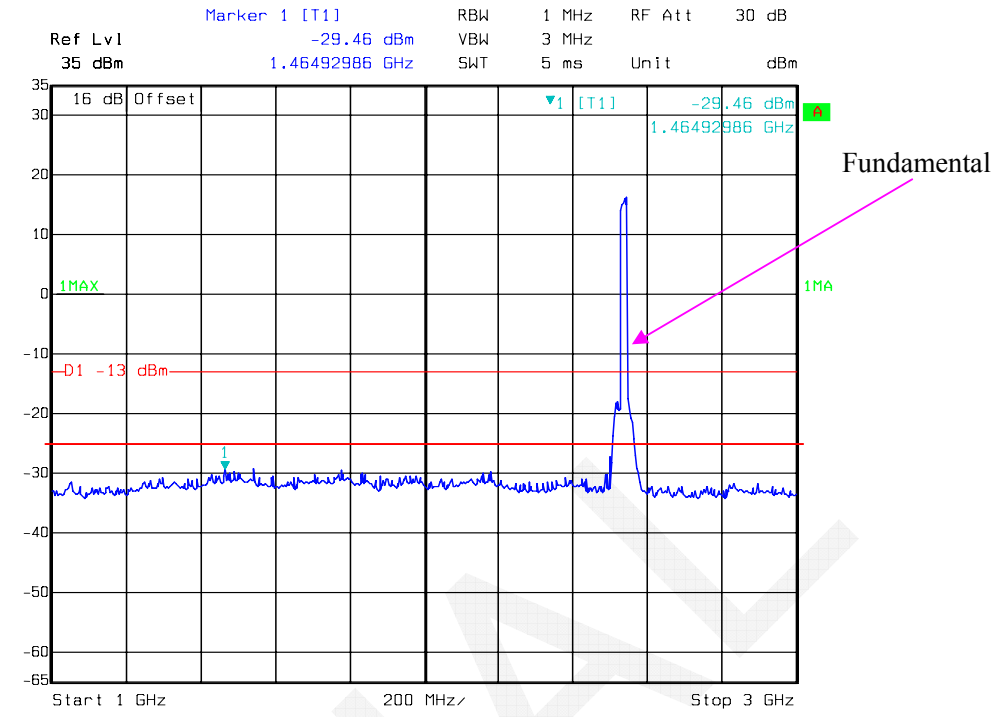


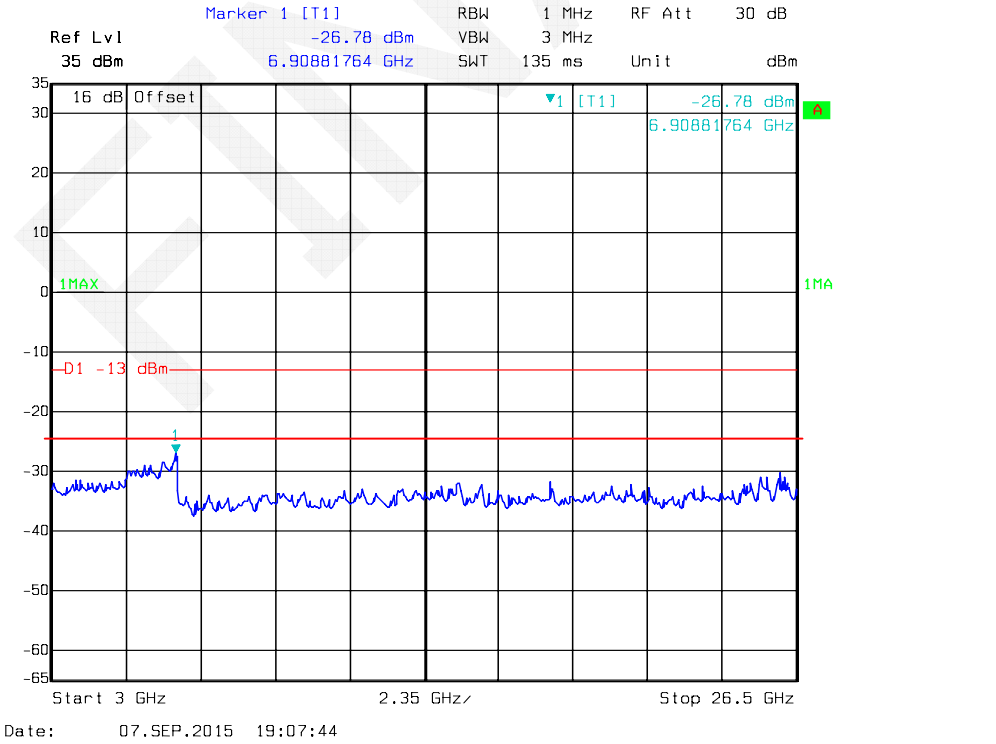




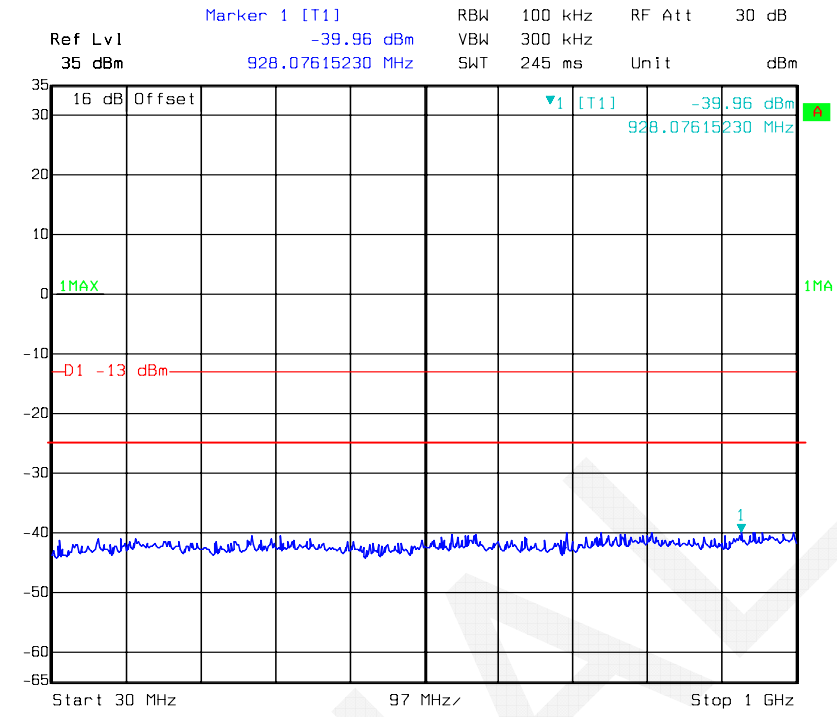
QPSK, Band 7-20M _ Middle Channel

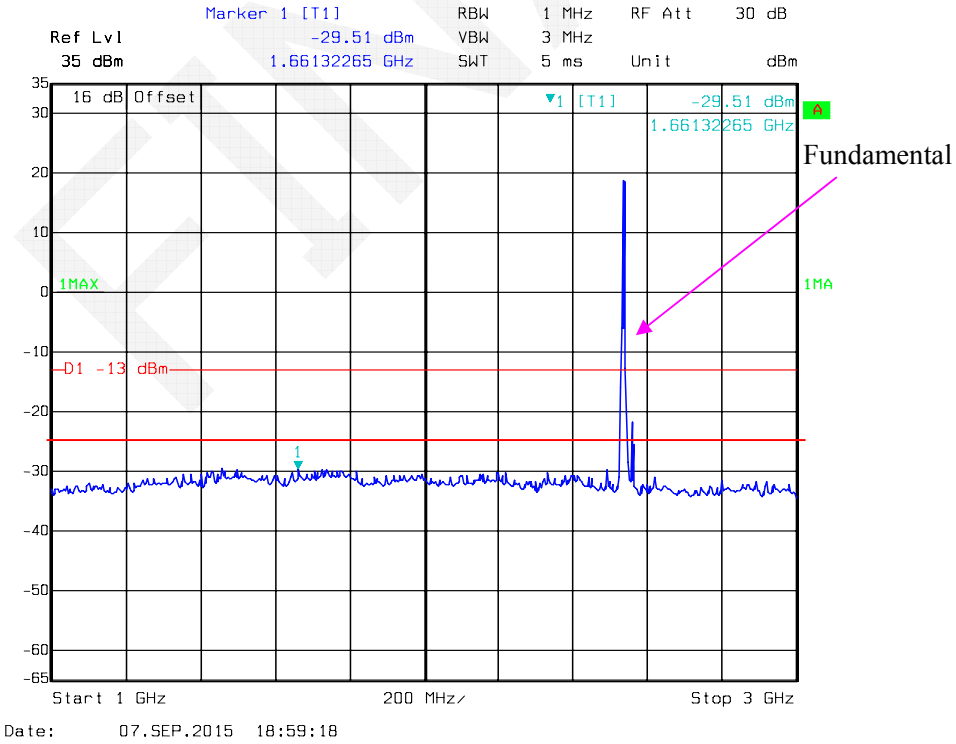


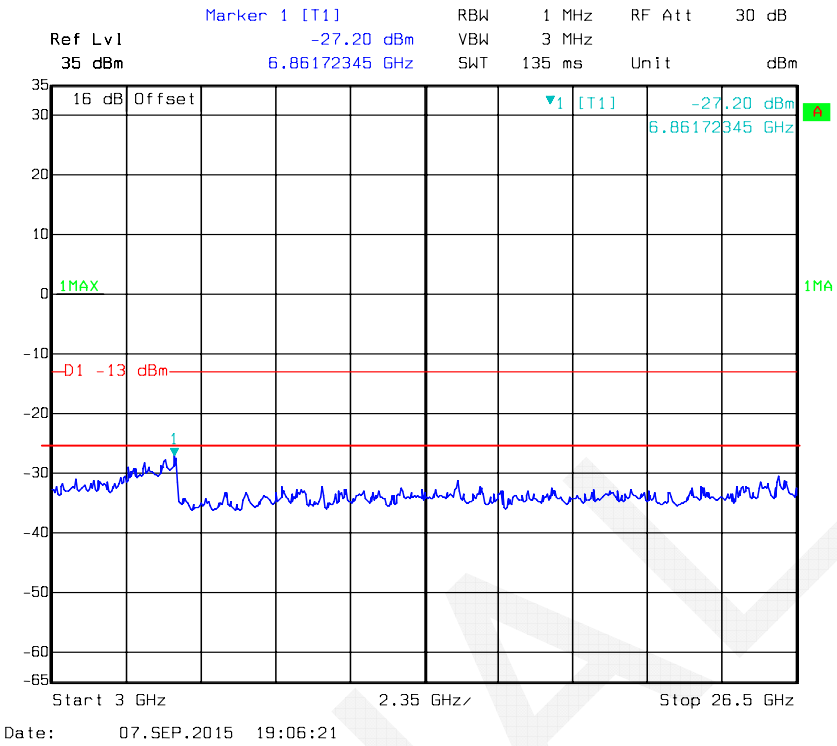

Marker 1 [T1]
RBW 1 MHz
RF Att 30 dB
Ref Lvl
-29.46 dBm
VBW 3 MHz
35 dBm
1.46492986 GHz
SWT 5 ms
Unit dBm
16 dB Offset
[T1]
-29.46 dBm
1.46492986 GHz
Fundamental
1MAX
1MA
D1 -13 dBm
Start 1 GHz
200 MHz/
Stop 3 GHz
Date: 07.SEP.2015 19:01:16


Marker 1 [T1]
RBW 1 MHz
RF Att 30 dB
Ref Lvl
-26.78 dBm
VBW 3 MHz
35 dBm
6.90881764 GHz
SWT 135 ms
Unit dBm
16 dB Offset
[T1]
-26.78 dBm
6.90881764 GHz
1MAX
1MA
D1 -13 dBm
Start 3 GHz
2.35 GHz/
Stop 26.5 GHz
Date: 07.SEP.2015 19:07:44

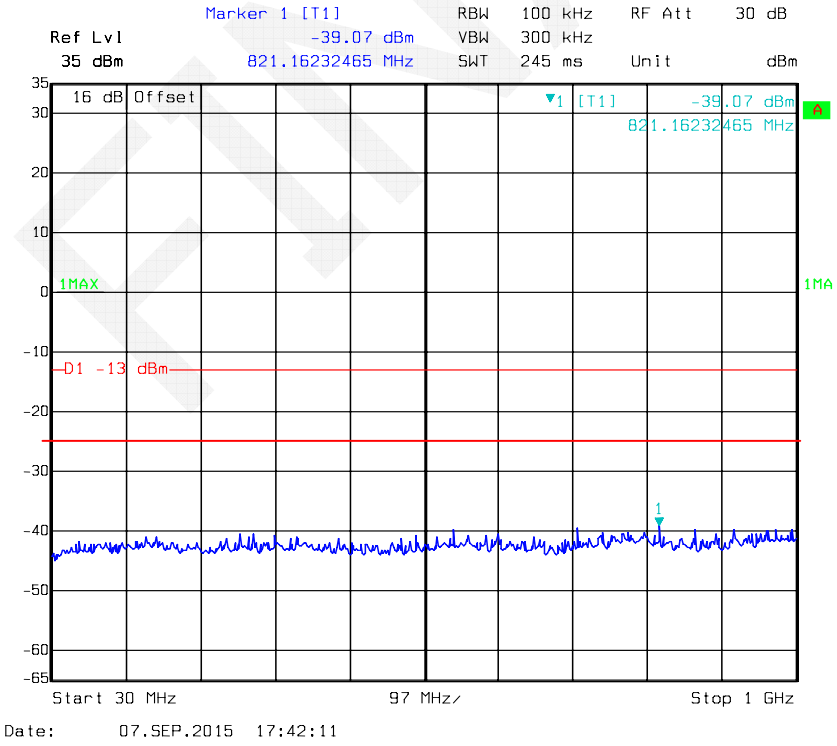
16-QAM, Band 7-5M _ Middle Channel

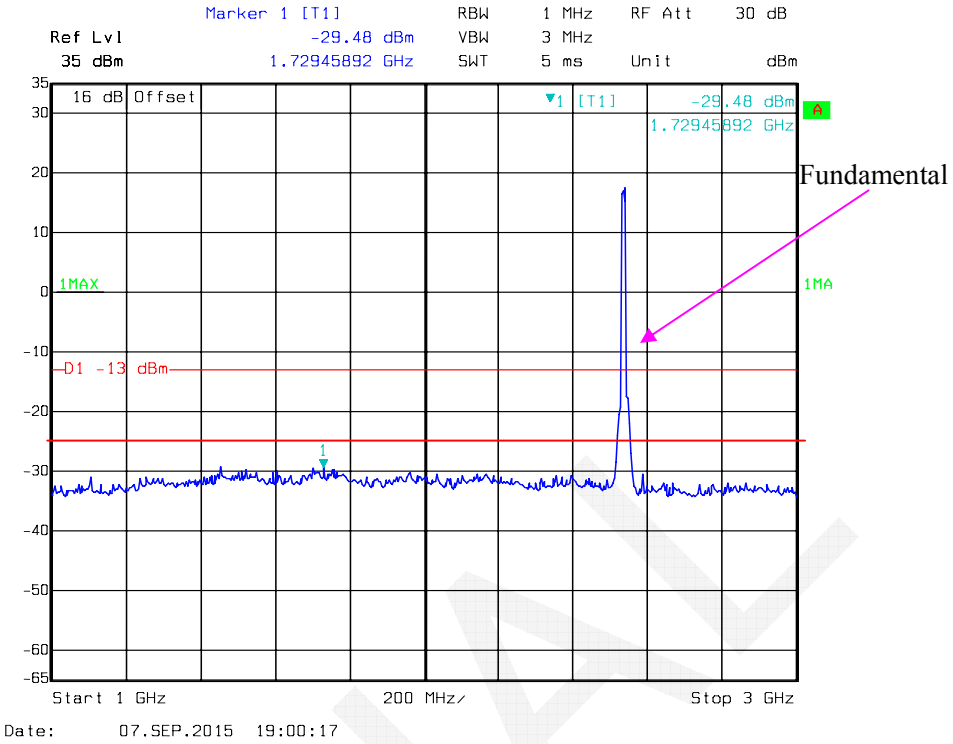




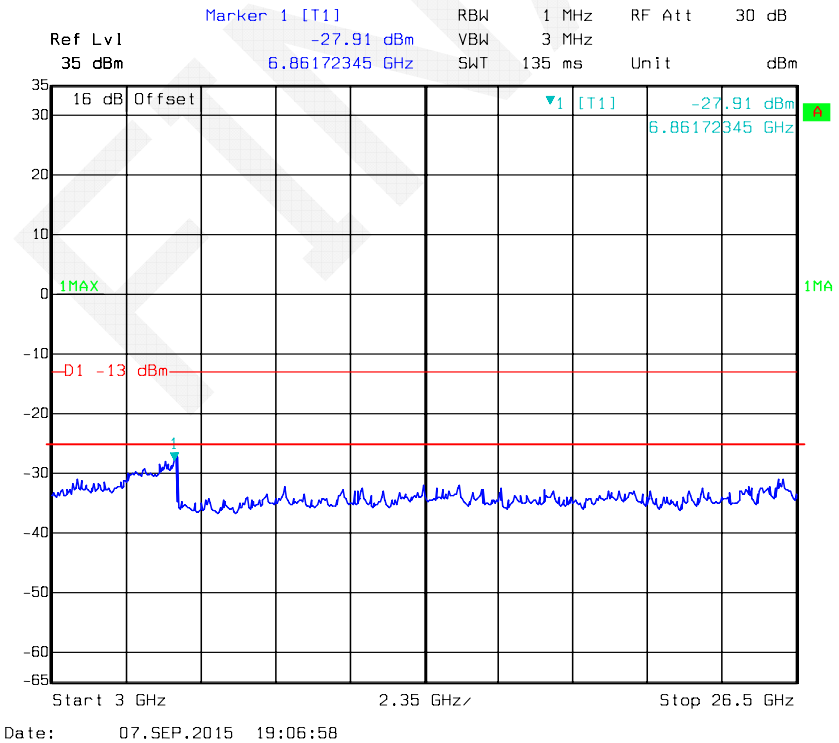


16-QAM, Band 7-10M _ Middle Channel



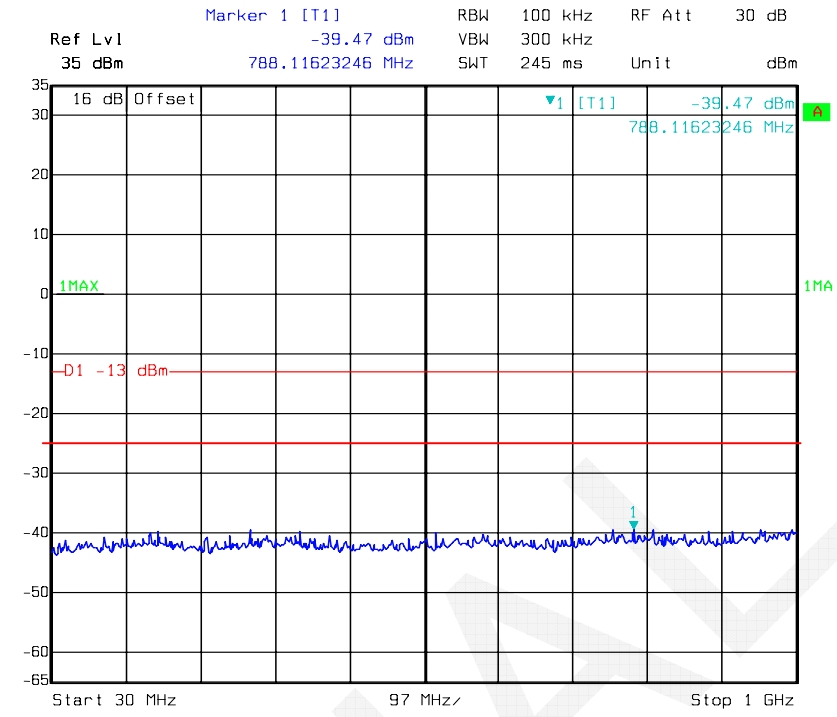


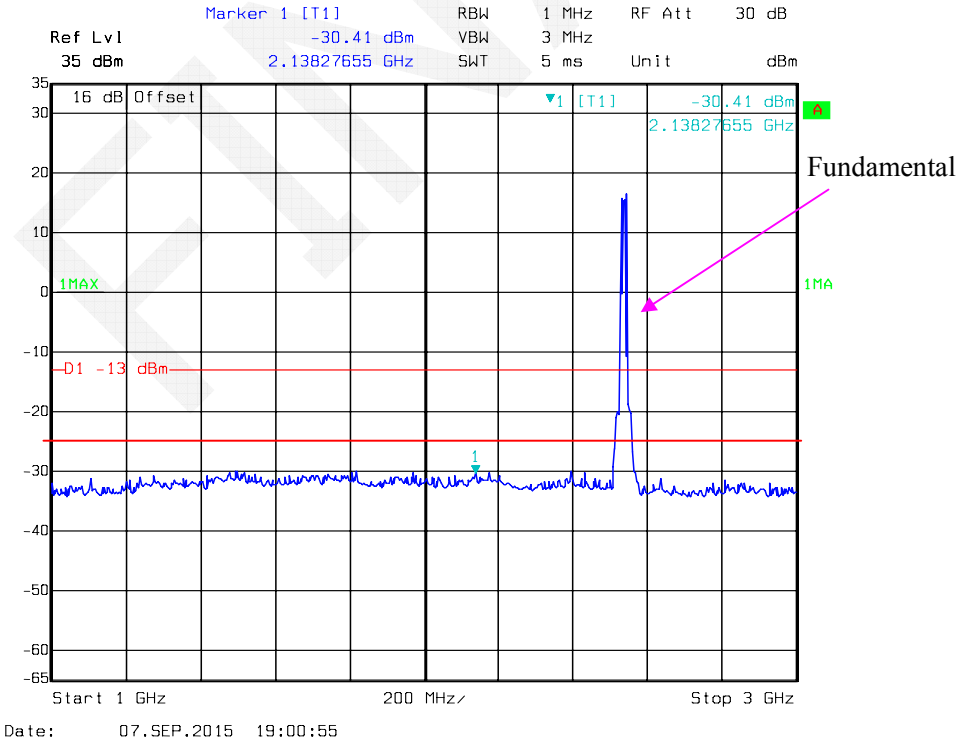
Date: 07.SEP.2015 19:00:17

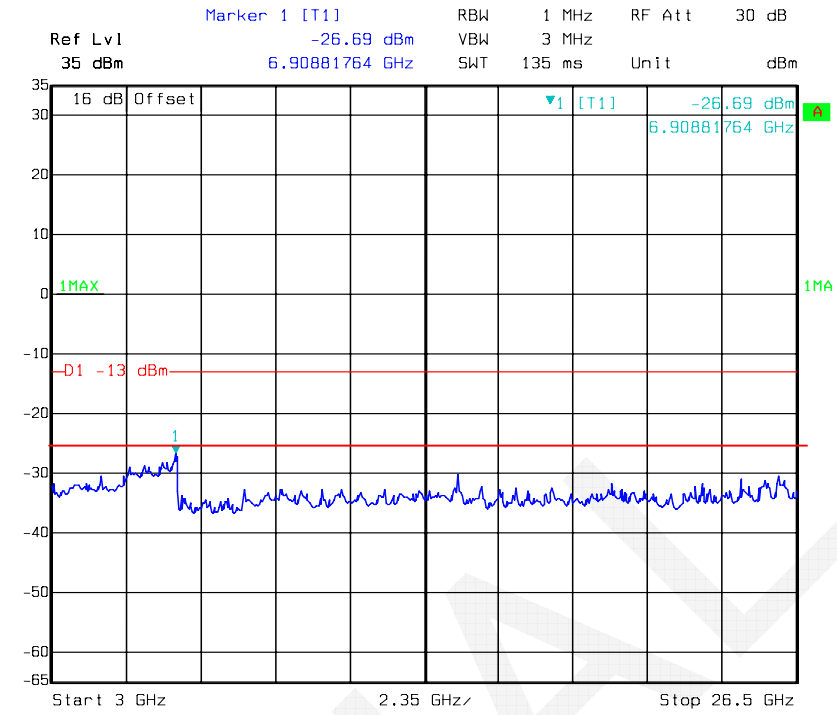


Date: 07.SEP.2015 19:06:58

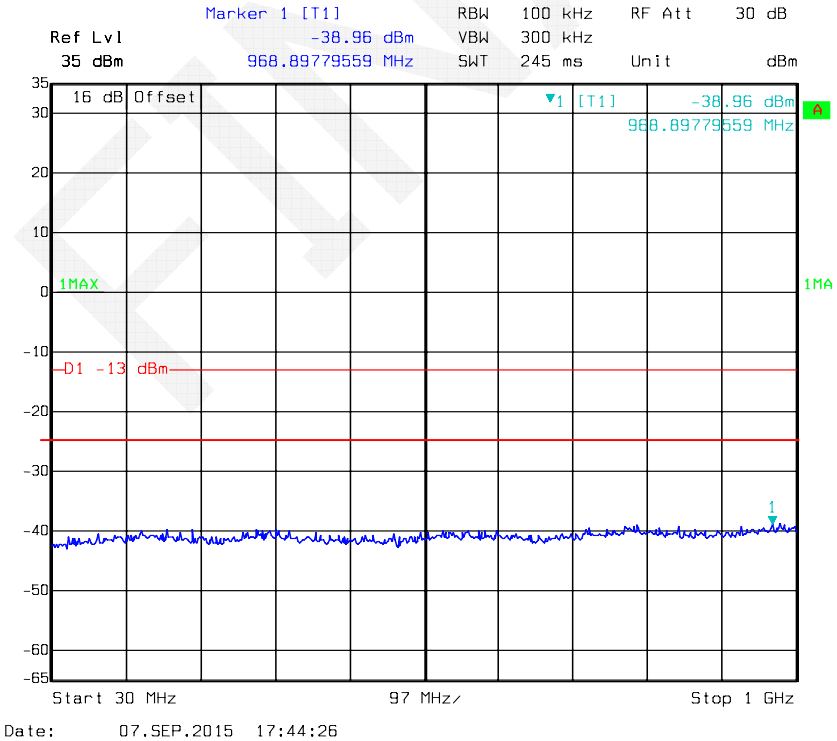
16-QAM, Band 7-15M _ Middle Channel

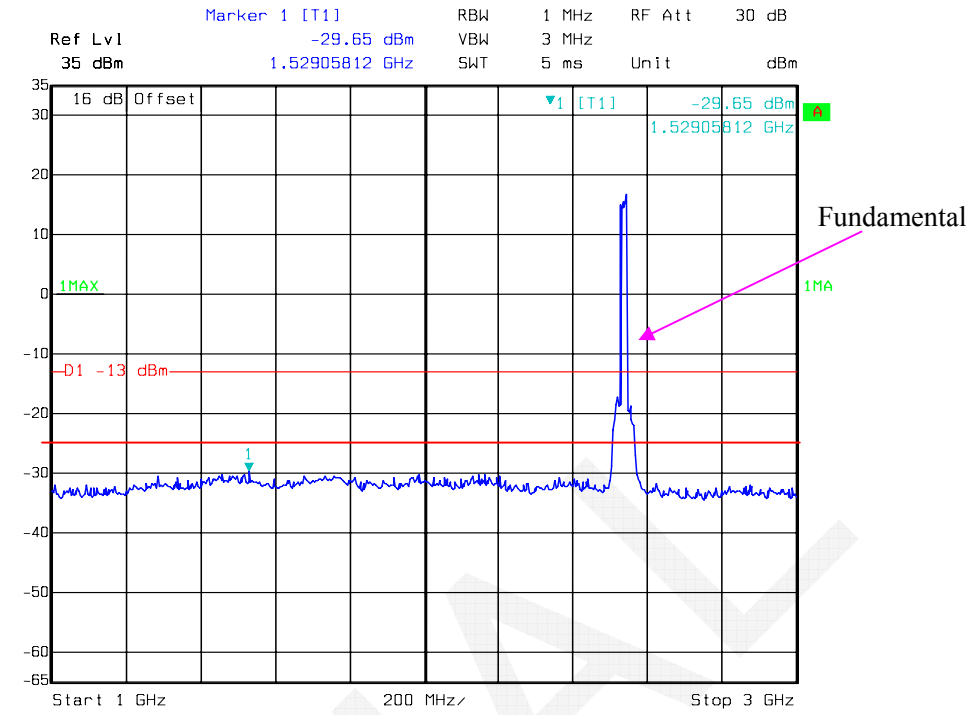


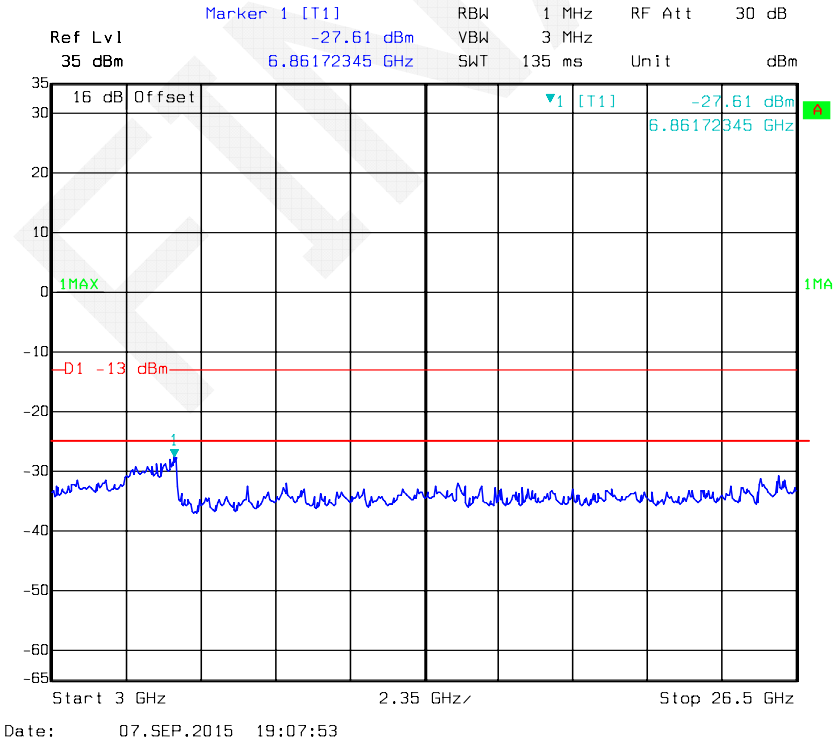




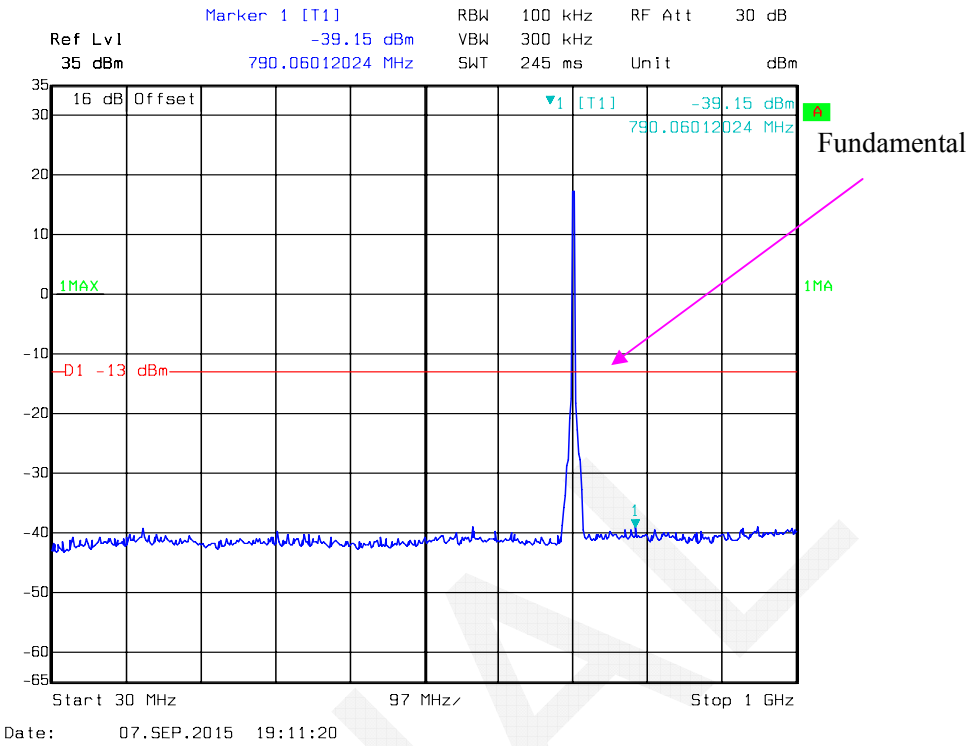
16-QAM, Band 7-20M _ Middle Channel

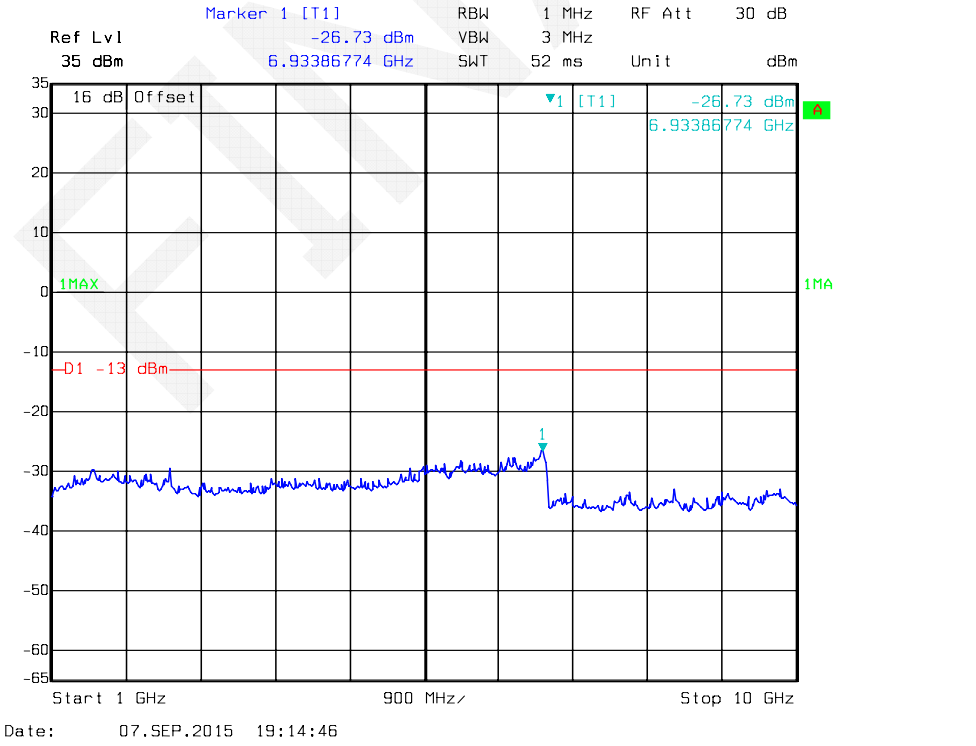



Marker 1 [T1]
RBW 1 MHz
RF Att 30 dB
Ref Lvl
-29.65 dBm
VBW 3 MHz
35 dBm
1.52905812 GHz
SWT 5 ms
Unit dBm
16 dB Offset
[T1] -29.65 dBm
1.52905812 GHz
1MAX
1MA
D1 -13 dBm
Fundamental
Start 1 GHz
200 MHz/
Stop 3 GHz
Date: 07.SEP.2015 19:01:33

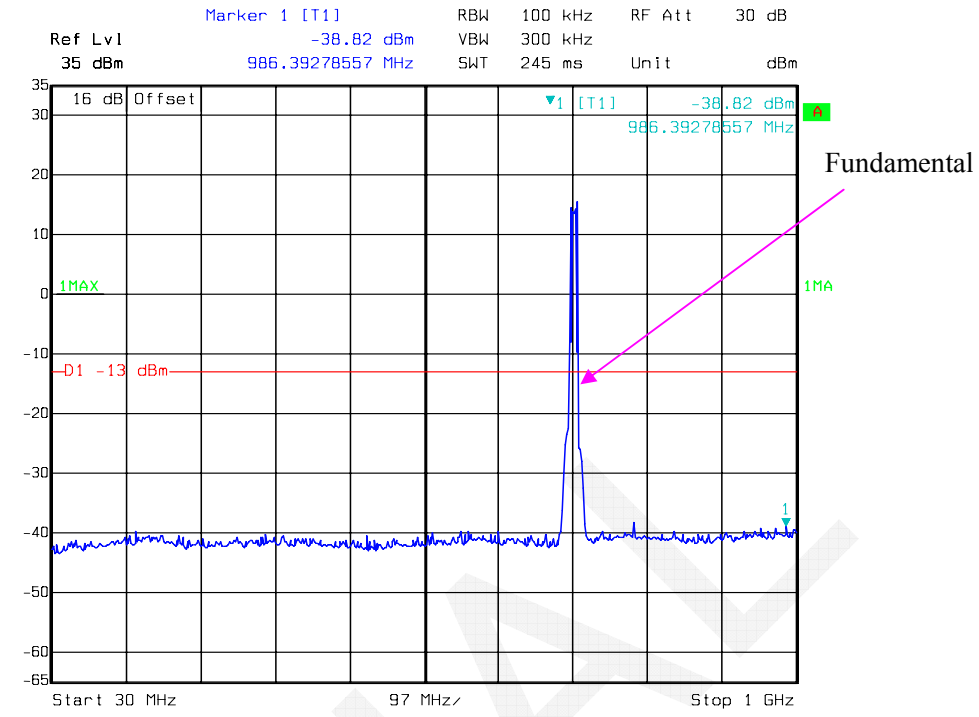

Marker 1 [T1]
RBW 1 MHz
RF Att 30 dB
Ref Lvl
-27.61 dBm
VBW 3 MHz
35 dBm
6.86172345 GHz
SWT 135 ms
Unit dBm
16 dB Offset
[T1] -27.61 dBm
6.86172345 GHz
1MAX
1MA
D1 -13 dBm
Start 3 GHz
2.35 GHz/
Stop 26.5 GHz
Date: 07.SEP.2015 19:07:53

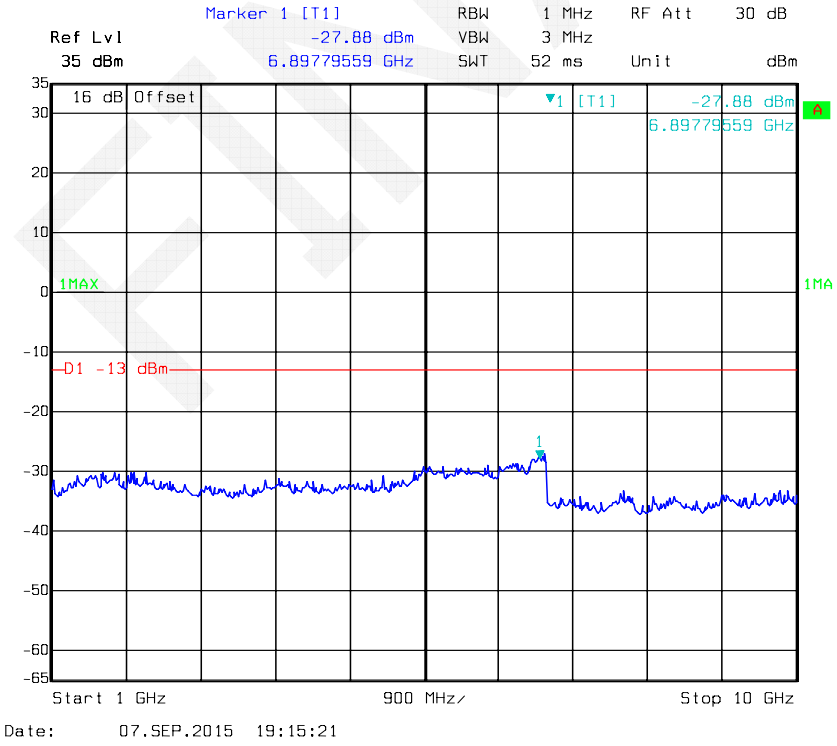
QPSK, Band 17-5M _ Middle Channel



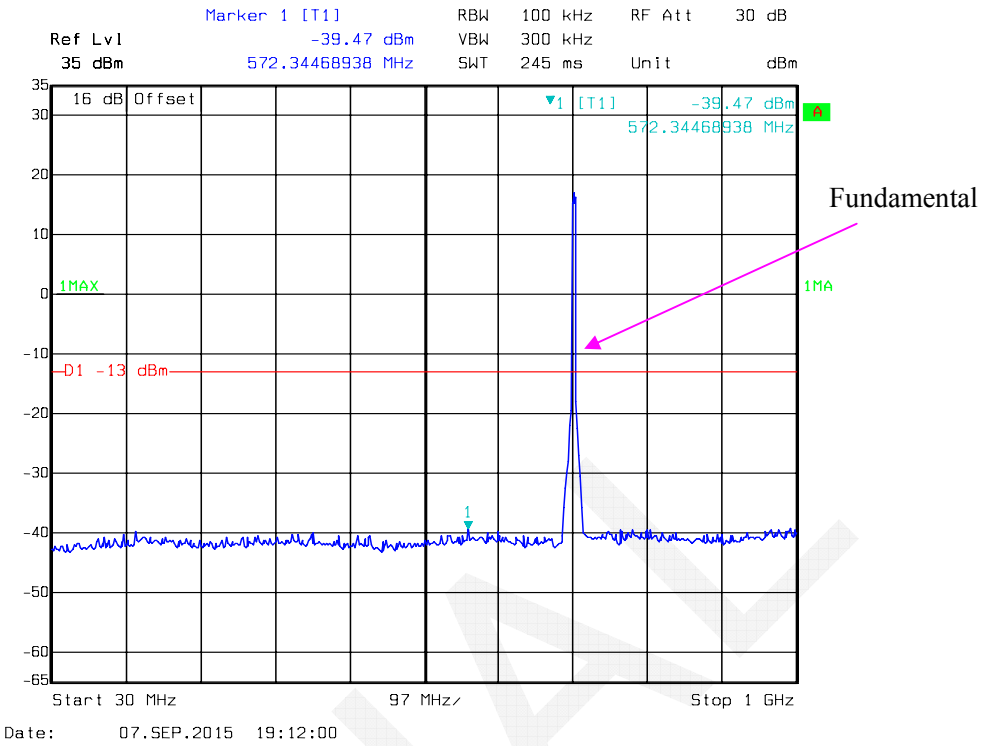


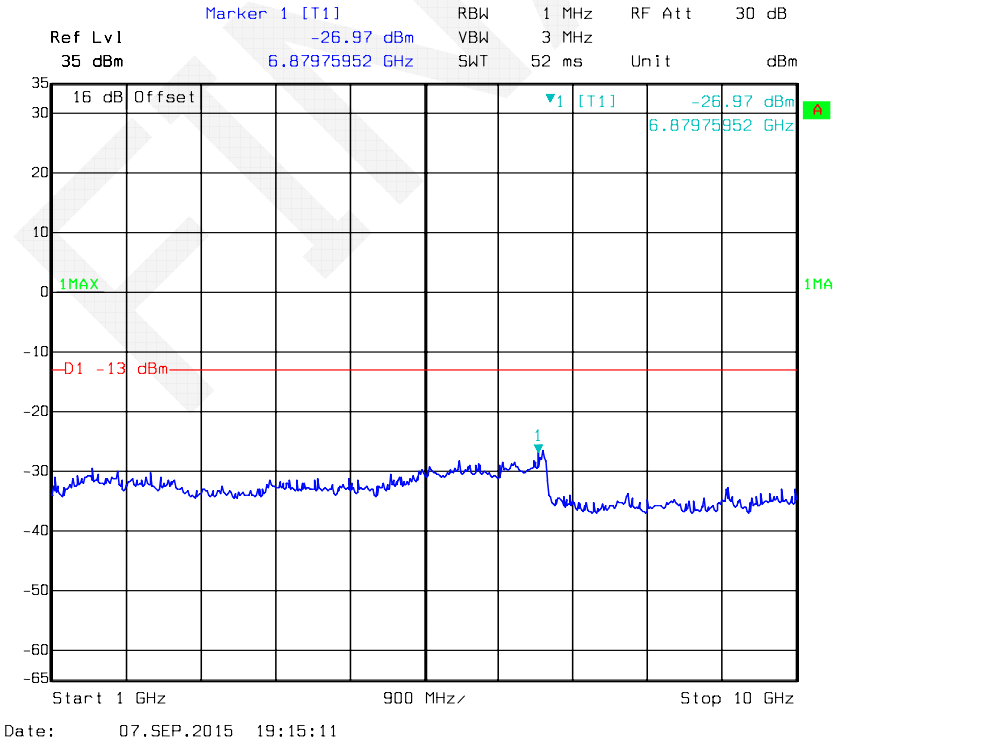
QPSK, Band 17-10M _ Middle Channel



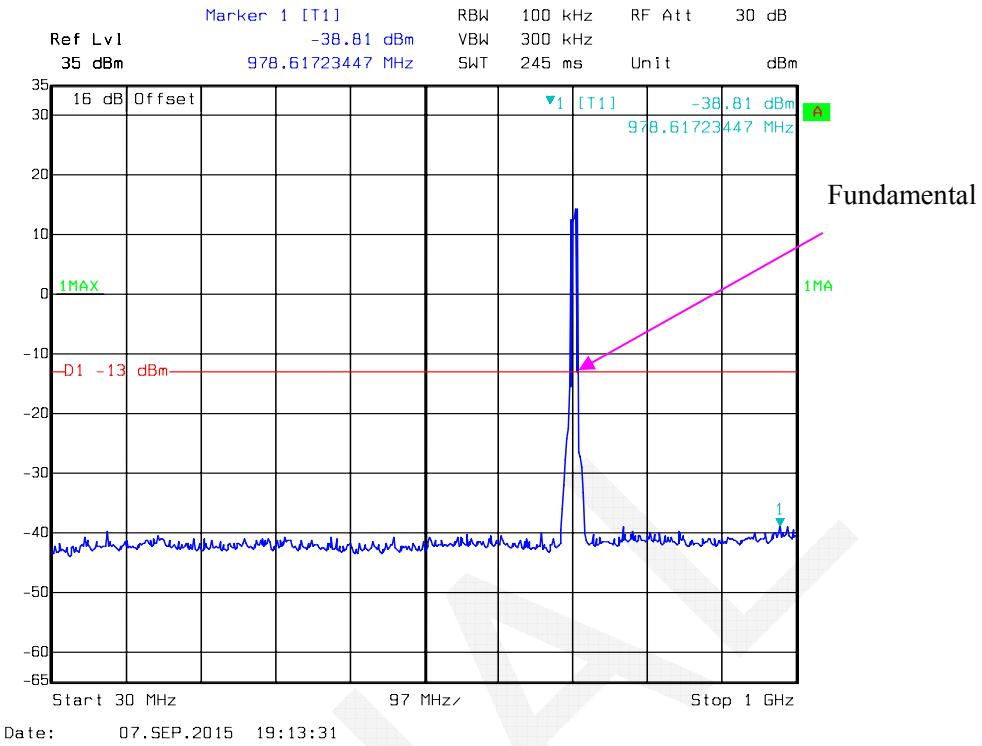


16-QAM, Band 17-5M _ Middle Channel

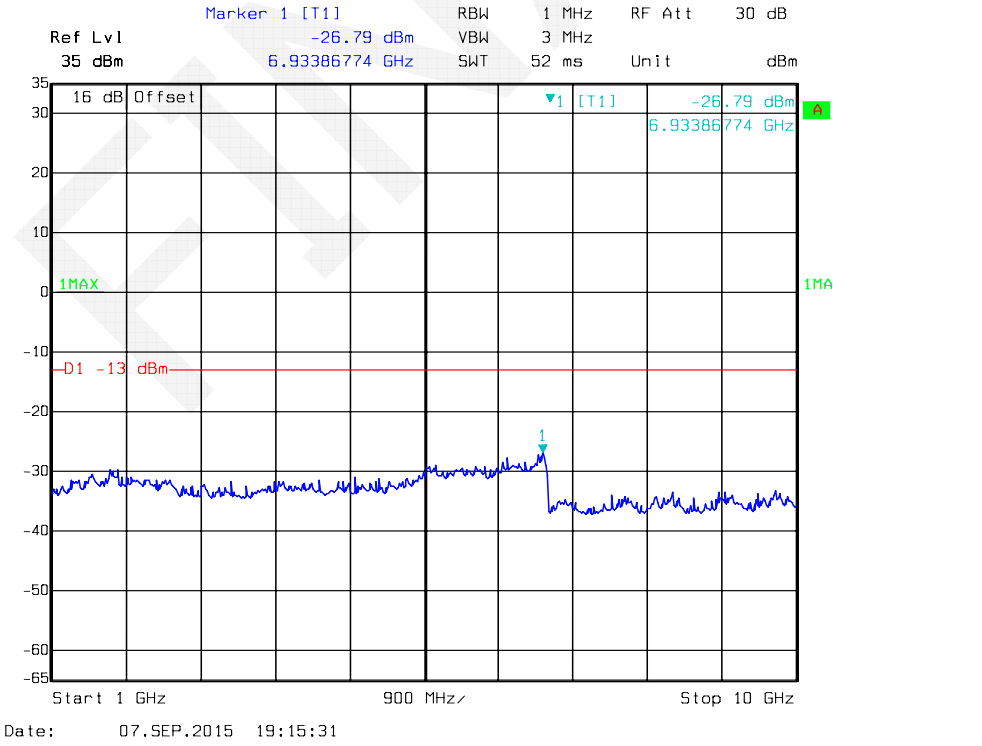




16-QAM, Band 17-10M _ Middle Channel



Fundamental



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

Applicable Standard

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

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 (TXpwr in Watts/0.001) – the absolute level

Spurious attenuation limit in dB = 43 + 10 Log_{10} (power out in Watts)

Spurious attenuation limit in dB = 55 + 10 Log_{10} (power out in Watts) for band 7

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI Test Receiver	ESCI	100224	2015-05-09	2016-05-09
Sunol Sciences	Antenna	JB3	A060611-3	2014-07-28	2017-07-27
HP	Amplifier	8447E	2434A02181	2015-09-01	2016-09-01
R&S	Spectrum Analyzer	FSEM	DE31388	2015-05-09	2016-05-09
ETS LINDGREN	Horn Antenna	3115	000 527 35	2015-09-06	2018-09-06
Mini-Circuit	Amplifier	ZVA-213-S+	054201245	2015-02-19	2016-02-19
Giga	Signal Generator	1026	320408	2015-05-09	2016-05-09
EMCO	Adjustable Dipole Antenna	3121C	9109-753	N/A	N/A
TDK RF	Horn Antenna	HRN-0118	130 084	2015-09-06	2018-09-06

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

Test Data

Environmental Conditions

Temperature:	27.8 °C
Relative Humidity:	49 %
ATM Pressure:	100.2 kPa

The testing was performed by Dean Liu on 2015-09-10.

EUT Operation Mode: Transmitting

Cellular Band (PART 22H)

30 MHz-10 GHz:

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBµV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			S.G. Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
Frequency:836.6 MHz								
1673.200	H	46.06	-55	10.6	1.5	-45.9	-13.0	32.9
1673.200	V	47.24	-54.1	10.6	1.5	-45.0	-13.0	32.0
2509.800	H	48.83	-49.2	13.1	2.8	-38.9	-13.0	25.9
2509.800	V	52.43	-44.7	13.1	2.8	-34.4	-13.0	21.4

For below 1GHz, all spurious emissions are 20dB below the limit or are on the system noise floor level.

WCDMA Band V

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBµV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			S.G. Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
Frequency:836.6 MHz								
1673.200	H	35.78	-65.3	10.6	1.5	-56.2	-13.0	43.2
1673.200	V	39.24	-62.1	10.6	1.5	-53.0	-13.0	40.0

For below 1GHz, all spurious emissions are 20dB below the limit or are on the system noise floor level.

PCS Band (PART 24E)

30 MHz-20 GHz:

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			S.G. Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
Frequency:1880 MHz								
3760.000	H	37.70	-56.6	13.8	2.9	-45.7	-13.0	32.7
3760.000	V	35.23	-57.8	13.8	2.9	-46.9	-13.0	33.9

For below 1GHz, all spurious emissions are 20dB below the limit or are on the system noise floor level.

WCDMA Band II

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			S.G. Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
Frequency:1880 MHz								
3760.000	H	36.43	-57.9	13.8	2.9	-47.0	-13.0	34.0
3760.000	V	34.23	-58.8	13.8	2.9	-47.9	-13.0	34.9

WCDMA Band IV(PART 27)

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			S.G. Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
Frequency:1732.6 MHz								
3465.200	H	35.40	-61.5	13.9	1.9	-49.5	-13.0	36.5
3465.200	V	34.52	-61.6	13.9	1.9	-49.6	-13.0	36.6

For below 1GHz, all spurious emissions are 20dB below the limit or are on the system noise floor level.

Note:

1) The unit of Antenna Gain is dBd for frequency below 1GHz, and the unit of Antenna Gain is dBi for frequency above 1GHz.
2) Absolute Level = SG Level - Cable loss + Antenna Gain
3) Margin = Limit-Absolute Level

LTE Band 2

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			S.G. Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
QPSK, Frequency:1880 MHz								
3760.000	H	37.79	-56.5	13.8	2.9	-45.6	-13.0	32.6
3760.000	V	39.36	-53.7	13.8	2.9	-42.8	-13.0	29.8
5640.000	H	41.42	-50.3	14.0	2.1	-38.4	-13.0	25.4
5640.000	V	42.96	-48.7	14.0	2.1	-36.8	-13.0	23.8
16- QAM, Frequency:1880 MHz								
3760.000	H	37.31	-57	13.8	2.9	-46.1	-13.0	33.1
3760.000	V	39.25	-53.8	13.8	2.9	-42.9	-13.0	29.9
5640.000	H	41.23	-50.5	14.0	2.1	-38.6	-13.0	25.6
5640.000	V	42.80	-48.9	14.0	2.1	-37.0	-13.0	24.0

For below 1GHz, all spurious emissions are 20dB below the limit or are on the system noise floor level.

LTE Band 4

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			S.G. Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
QPSK, Frequency:1732.5 MHz								
3465.000	H	36.68	-60.3	13.9	1.9	-48.3	-13.0	35.3
3465.000	V	37.75	-58.4	13.9	1.9	-46.4	-13.0	33.4
5197.500	H	40.11	-50.9	14.0	2.3	-39.2	-13.0	26.2
5197.500	V	42.26	-50.3	14.0	2.3	-38.6	-13.0	25.6
16- QAM, Frequency: 1732.5 MHz								
3465.000	H	36.20	-60.7	13.9	1.9	-48.7	-13.0	35.7
3465.000	V	37.45	-58.7	13.9	1.9	-46.7	-13.0	33.7
5197.500	H	39.79	-51.2	14.0	2.3	-39.5	-13.0	26.5
5197.500	V	42.04	-50.5	14.0	2.3	-38.8	-13.0	25.8

For below 1GHz, all spurious emissions are 20dB below the limit or are on the system noise floor level.

LTE Band 7

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			S.G. Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
QPSK, Frequency: 2535 MHz								
5070.000	H	36.33	-55	13.9	2.4	-43.5	-25.0	18.5
5070.000	V	37.01	-55.1	13.9	2.4	-43.6	-25.0	18.6
7605.000	H	38.34	-49.1	13.2	3.1	-39	-25.0	14.0
7605.000	V	39.48	-48	13.2	3.1	-37.9	-25.0	12.9
16- QAM, Frequency: 2535 MHz								
5070.000	H	35.97	-55.4	13.9	2.4	-43.9	-25.0	18.9
5070.000	V	36.78	-55.4	13.9	2.4	-43.9	-25.0	18.9
7605.000	H	38.09	-49.4	13.2	3.1	-39.3	-25.0	14.3
7605.000	V	39.35	-48.1	13.2	3.1	-38	-25.0	13.0

For below 1GHz, all spurious emissions are 20dB below the limit or are on the system noise floor level.

LTE Band 17

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			S.G. Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
QPSK, Frequency:710 MHz								
1420.000	H	36.97	-63.9	9.1	1.3	-56.1	-13.0	43.1
1420.000	V	38.32	-62.3	9.1	1.3	-54.5	-13.0	41.5
2130.000	H	42.58	-53.4	11.2	1.4	-43.6	-13.0	30.6
2130.000	V	47.21	-47.6	11.2	1.4	-37.8	-13.0	24.8
16- QAM, Frequency: 710 MH								
1420.000	H	36.65	-64.2	9.1	1.3	-56.4	-13.0	43.4
1420.000	V	38.01	-62.6	9.1	1.3	-54.8	-13.0	41.8
2130.000	H	42.27	-53.7	11.2	1.4	-43.9	-13.0	30.9
2130.000	V	46.73	-48.1	11.2	1.4	-38.3	-13.0	25.3

For below 1GHz, all spurious emissions are 20dB below the limit or are on the system noise floor level.

Note:
1) The unit of Antenna Gain is dBd for frequency below 1GHz, and the unit of Antenna Gain is dBi for frequency above 1GHz.
2) Absolute Level = SG Level - Cable loss + Antenna Gain
3) Margin = Limit-Absolute Level

FCC §22.917(a) & §24.238(a) & §27.53(g)§27.53(h) §27.53(m) - BAND EDGES

Applicable Standard

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 §27.53 (g), For operations in the 600 MHz band and the 698-746 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least 43 + 10 log (P) dB. Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kilohertz or greater. However, in the 100 kilohertz bands immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed.

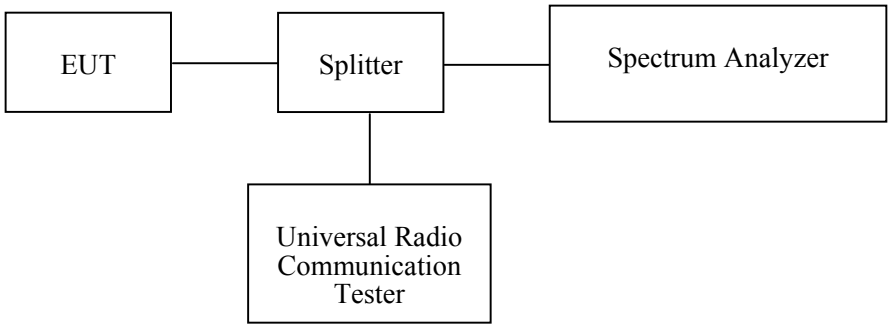
According to §27.53 (h), AWS emission limits—(1) General protection levels. Except as otherwise specified below, for operations in the 1695-1710 MHz, 1710-1755 MHz, 1755-1780 MHz, 1915-1920 MHz, 1995-2000 MHz, 2000-2020 MHz, 2110-2155 MHz, 2155-2180 MHz, and 2180-2200 bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least 43 + 10 log10 (P) dB.

According to §27.53 (m), (4) 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
R&S	Spectrum Analyzer	FSP 38	100478	2015-05-09	2016-05-09

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

Test Data

Environmental Conditions

Temperature:	27.1~27.8 °C
Relative Humidity:	56~60 %
ATM Pressure:	99.9~100.3 kPa

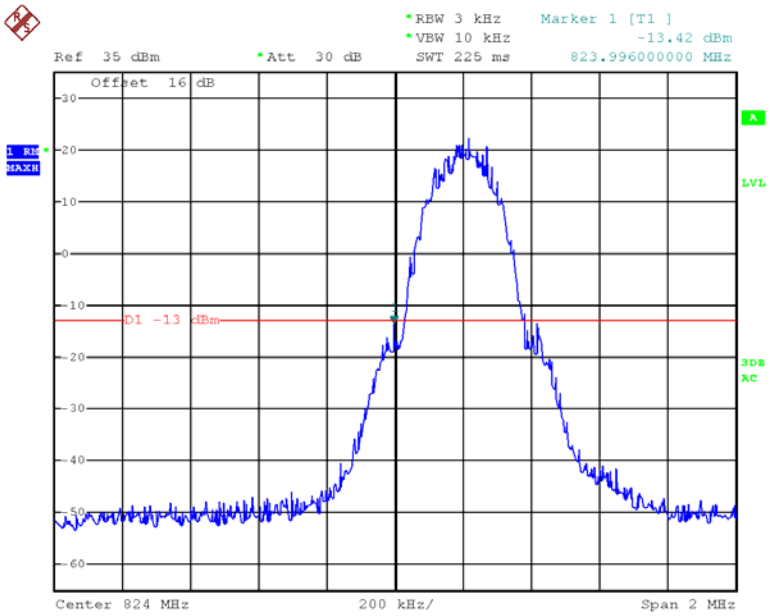
The testing was performed by Dean Liu from 2015-09-06 to 2015-09-09.

Test Mode: Transmitting

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

FINAL

GSM 850, Left Band Edge



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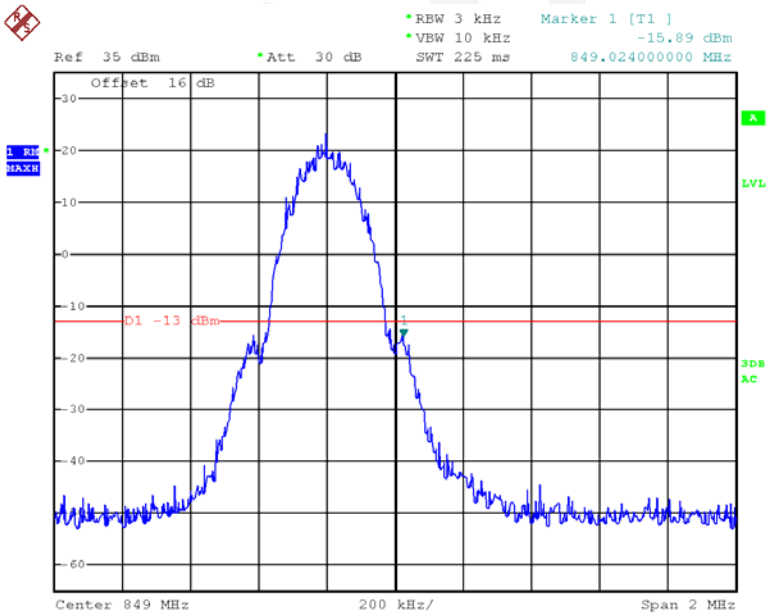
GSM 850, Right Band Edge



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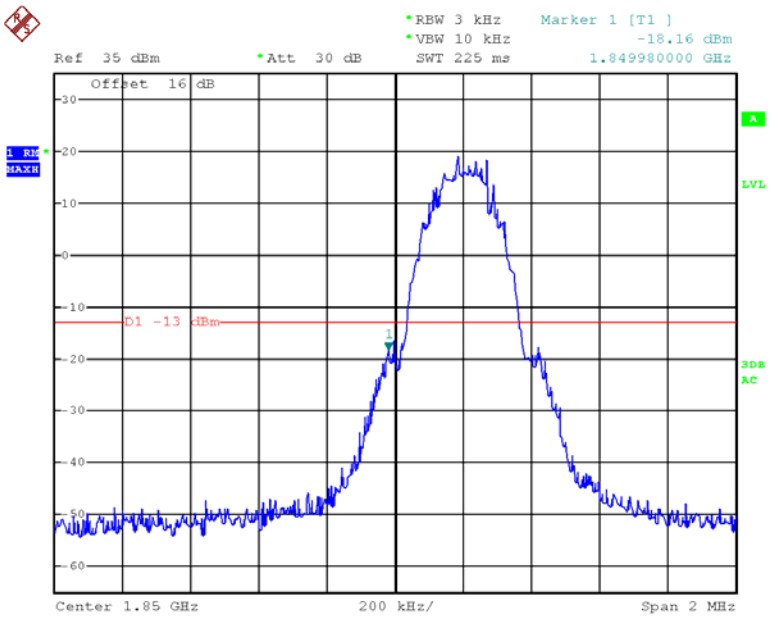
GSM 1900, Left Band Edge



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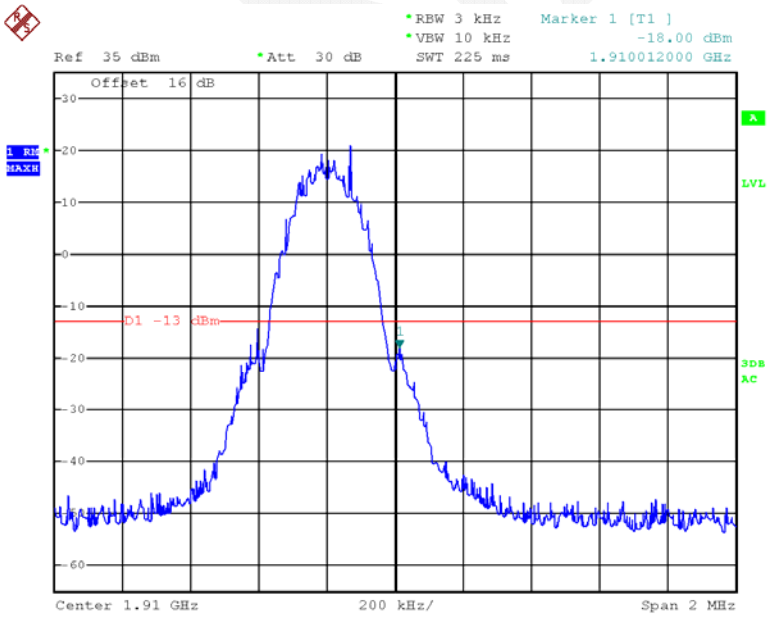
GSM 1900, Right Band Edge



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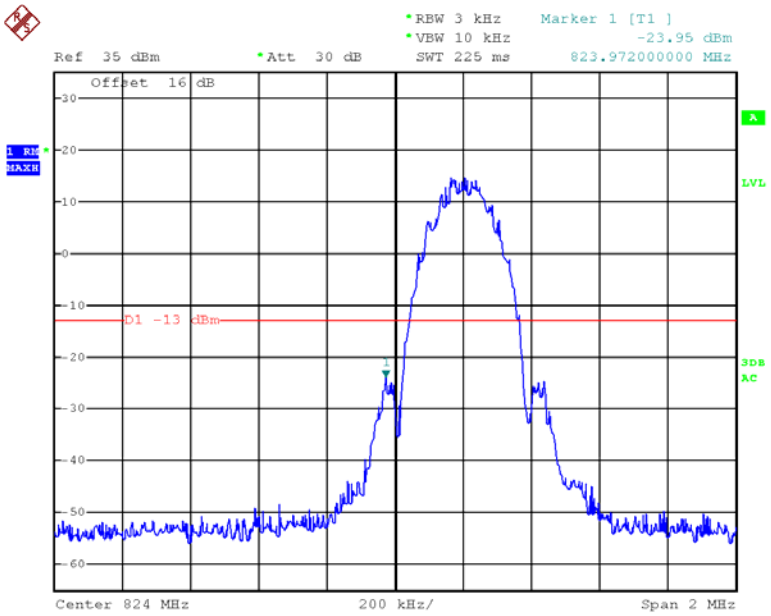
EDGE 850, Left Band Edge



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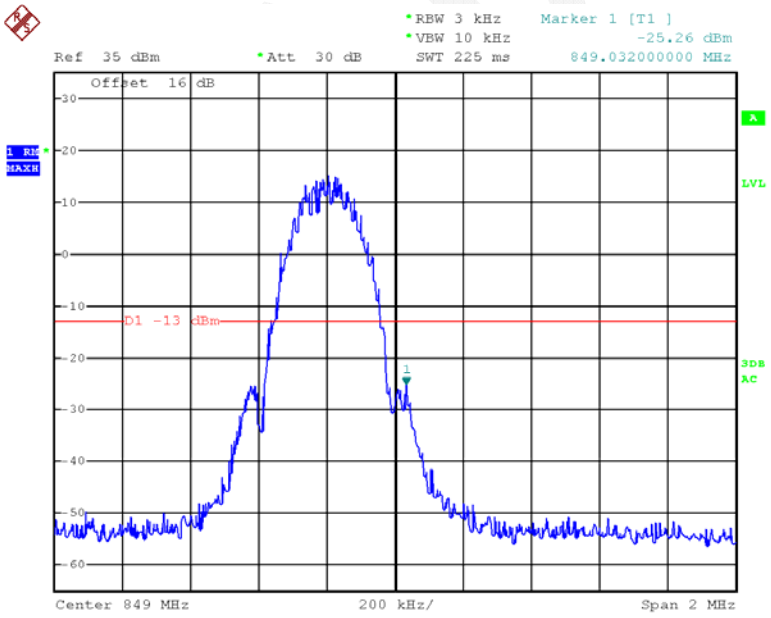
EDGE 850, Right Band Edge



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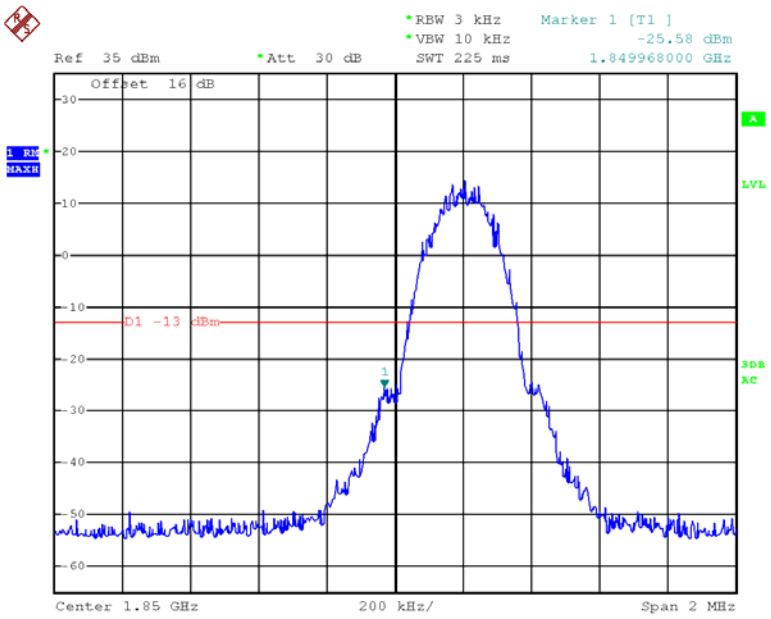
EDGE 1900, Left Band Edge



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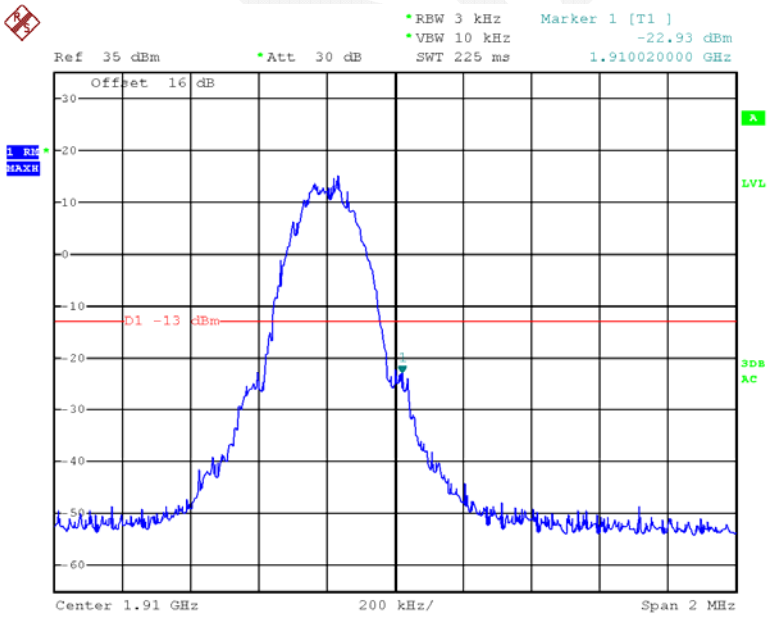
EDGE 1900, Right Band Edge



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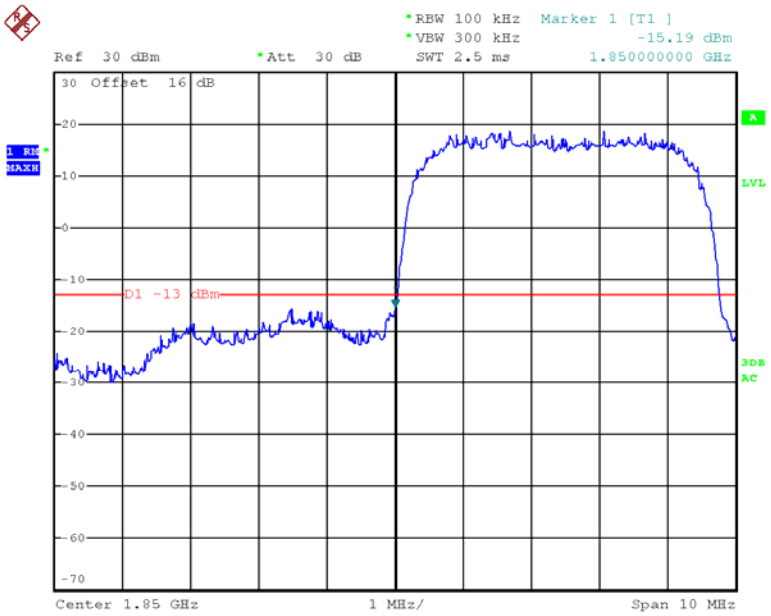
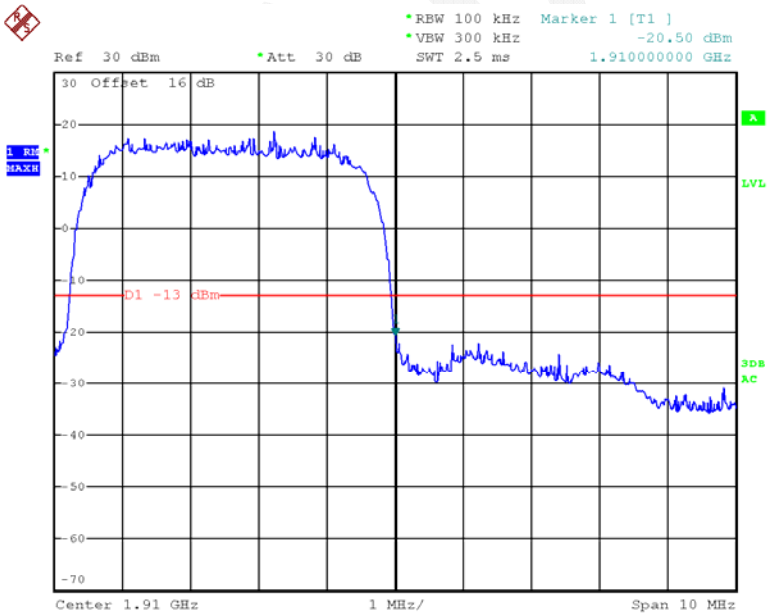
REL99 Band II, Left Band Edge



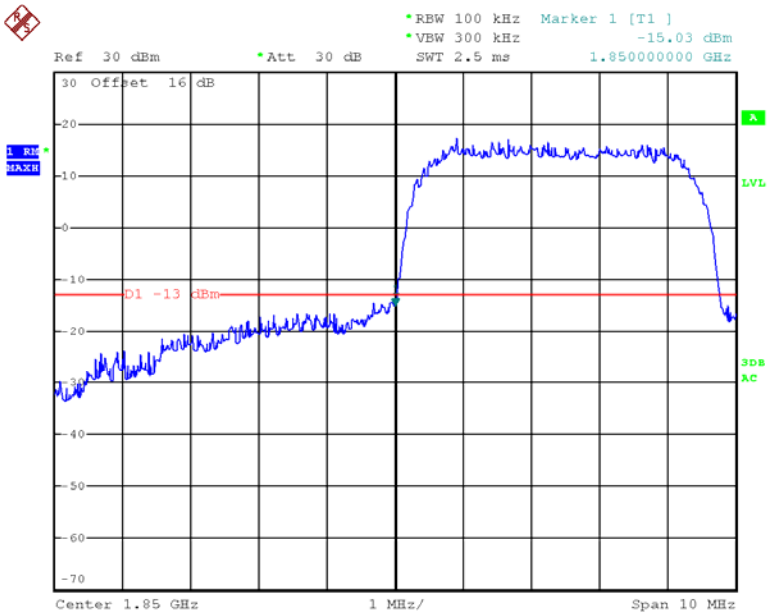
Date: 6.SEP.2015 14:08:24

REL99 Band II, Right Band Edge



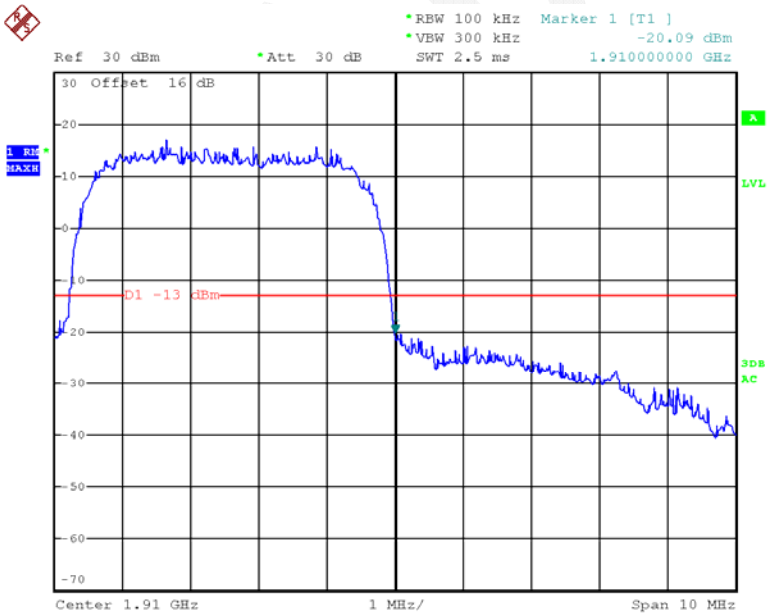
Date: 6.SEP.2015 14:08:42

HSDPA Band II, Left Band Edge



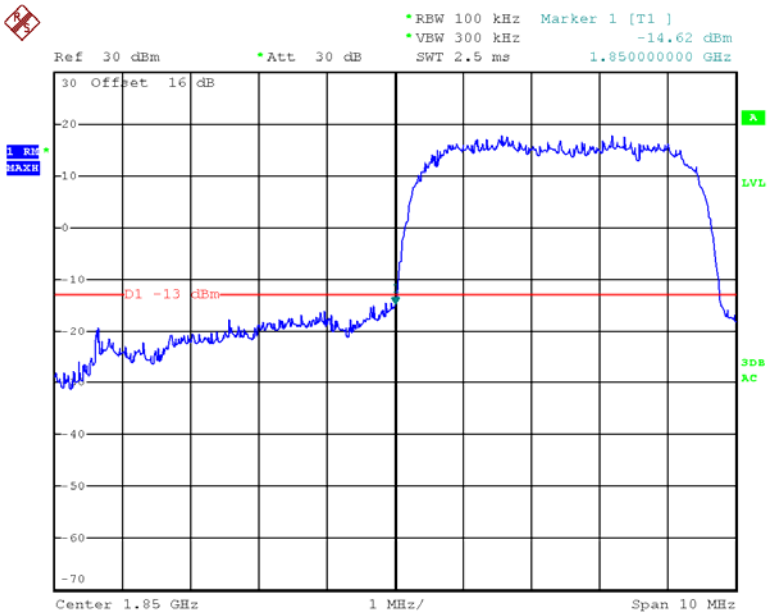
Date: 6.SEP.2015 14:08:00

HSDPA Band II, Right Band Edge



Date: 6.SEP.2015 14:07:27

HSUPA Band II, Left Band Edge



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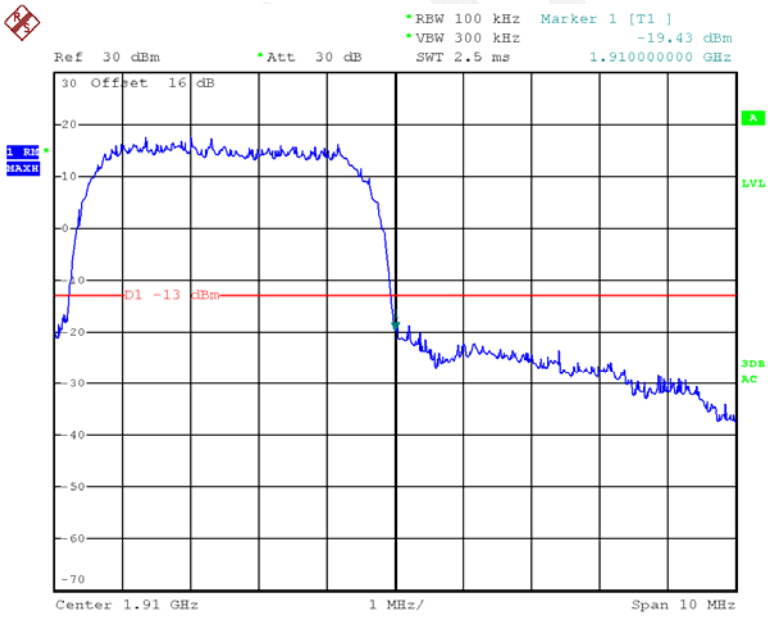
HSUPA Band II, Right Band Edge



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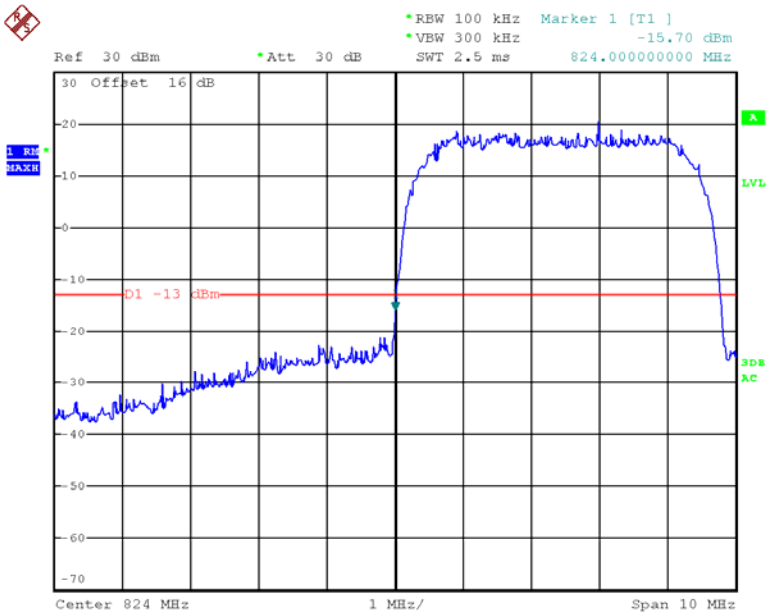
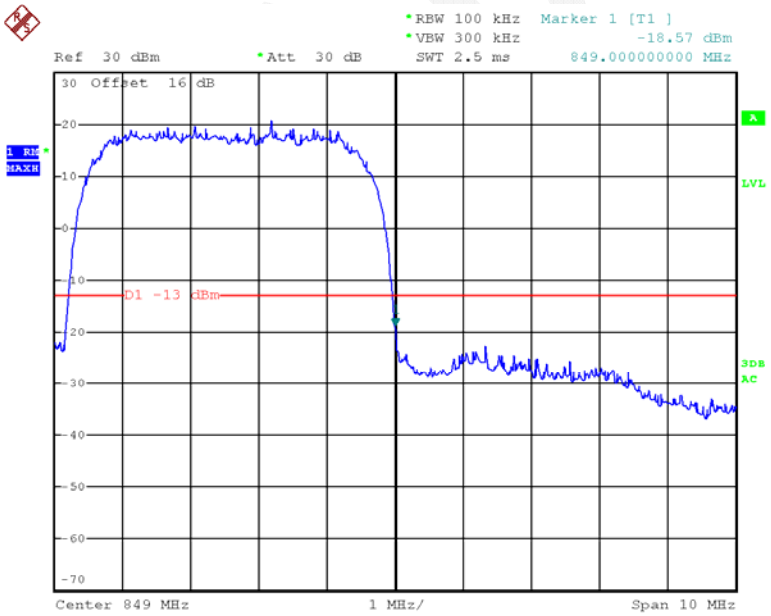
REL99 Band V, Left Band Edge



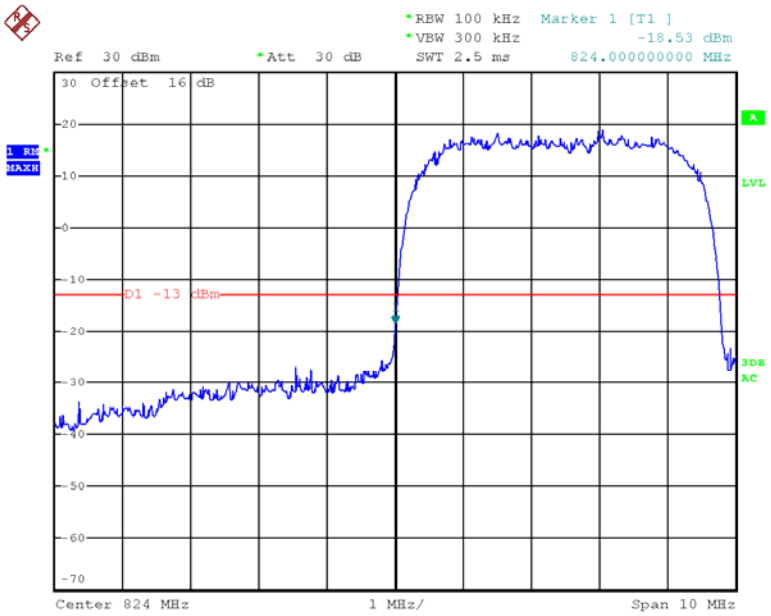
Date: 6.SEP.2015 13:50:04

REL99 Band V Right Band Edge



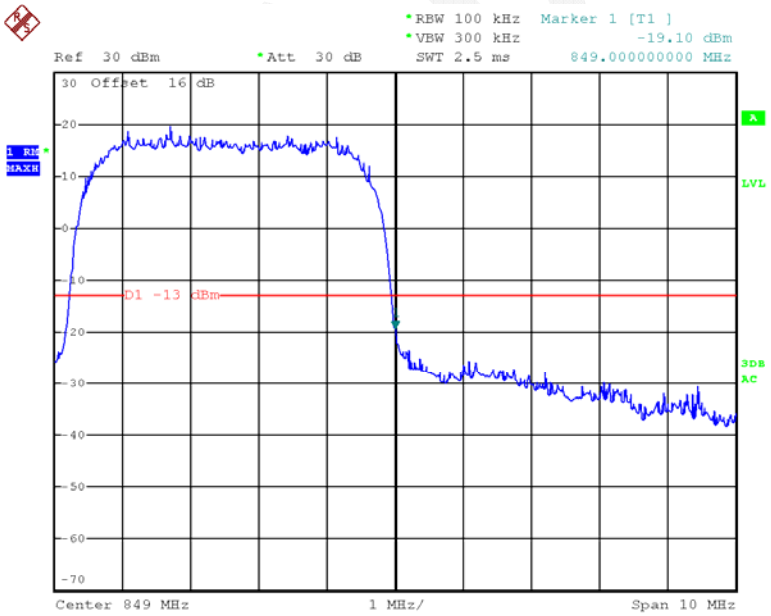
Date: 6.SEP.2015 13:50:43

HSDPA Band V, Left Band Edge



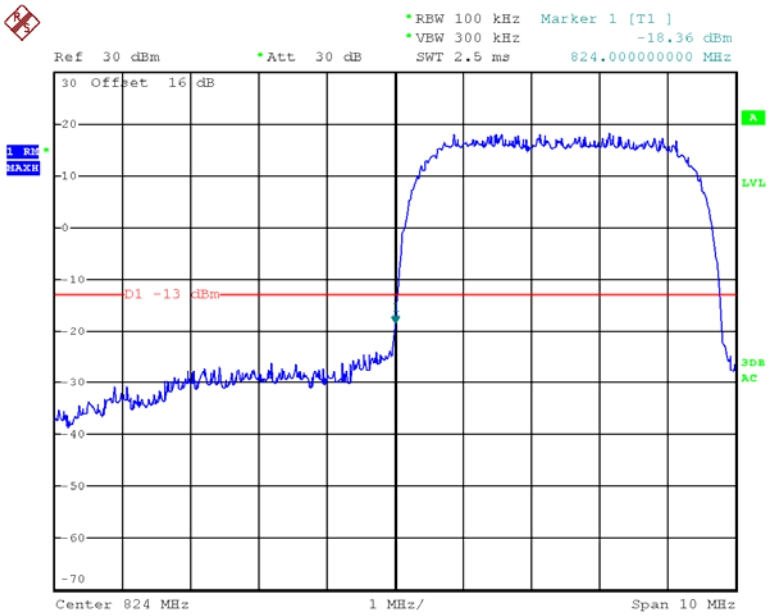
Date: 6.SEP.2015 13:45:24

HSDPA Band V, Right Band Edge



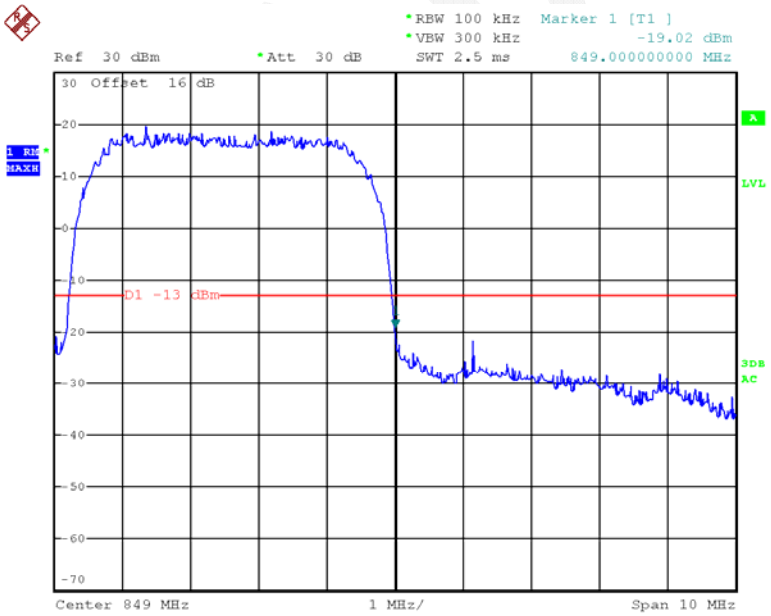
Date: 6.SEP.2015 13:46:24

HSUPA Band V, Left Band Edge



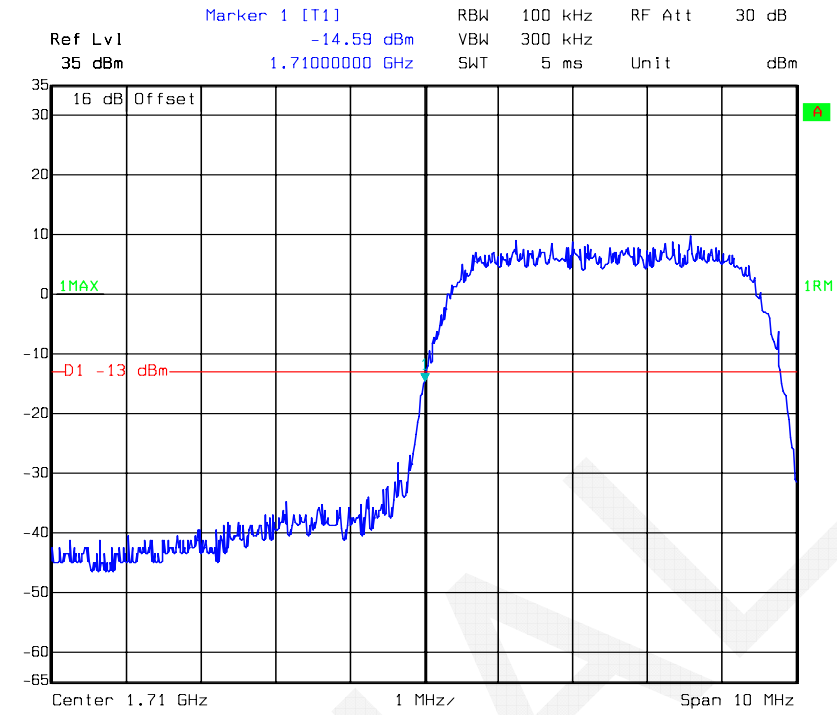
Date: 6.SEP.2015 13:49:03

HSUPA Band V, Right Band Edge

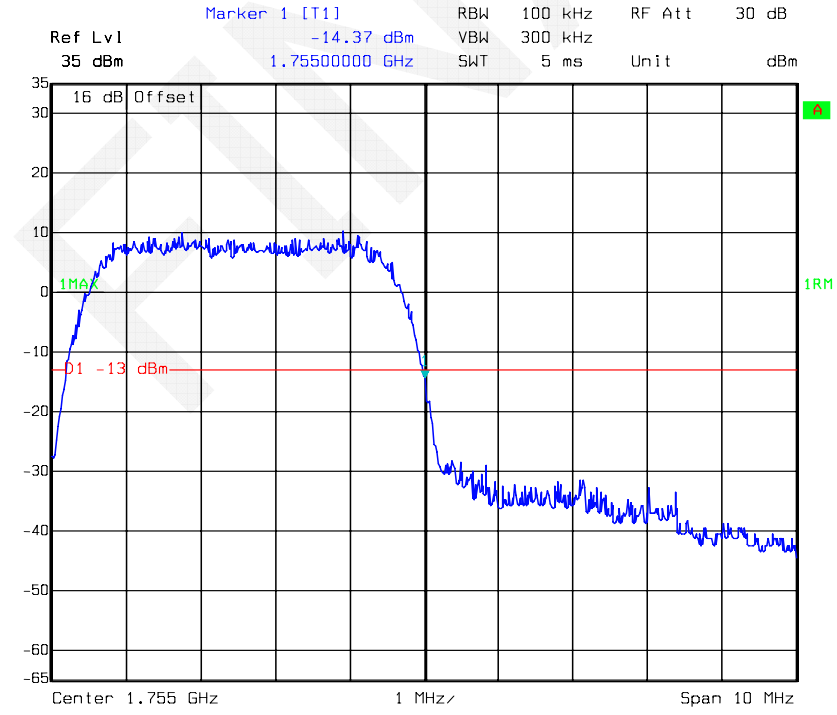


Date: 6.SEP.2015 13:48:19

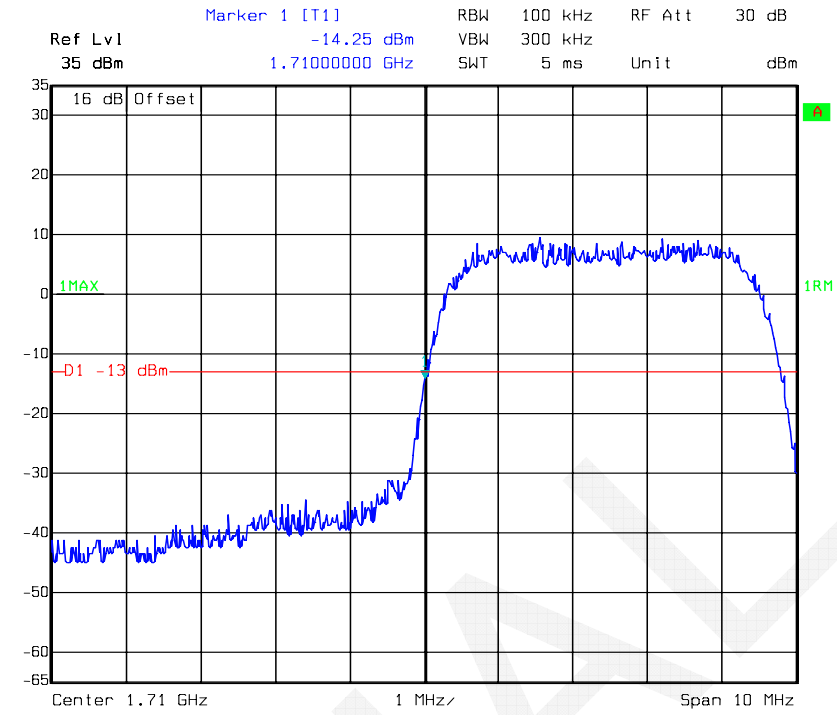
REL99 Band IV, Left Band Edge



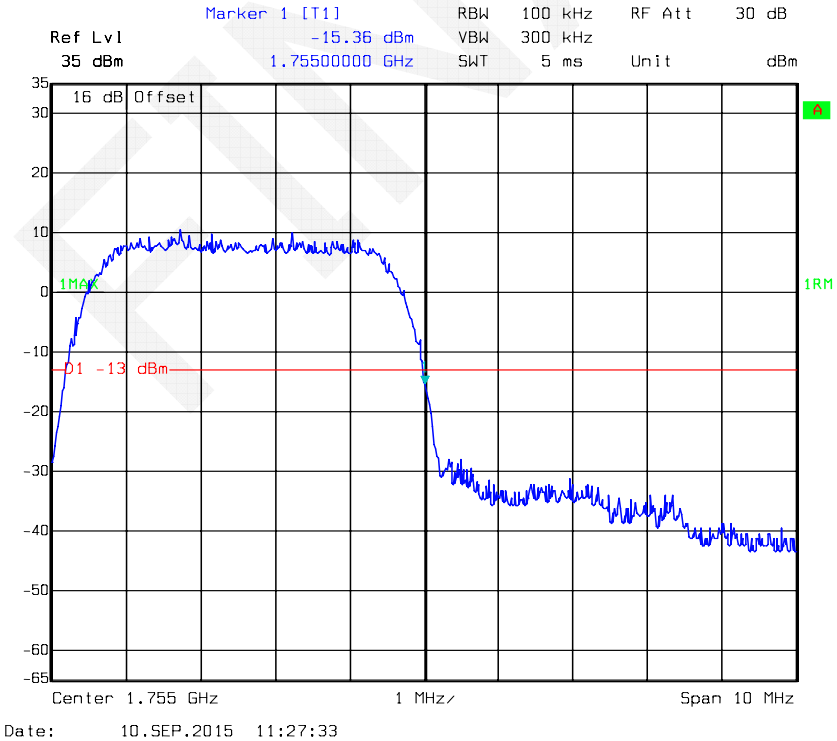
REL99 Band IV Right Band Edge



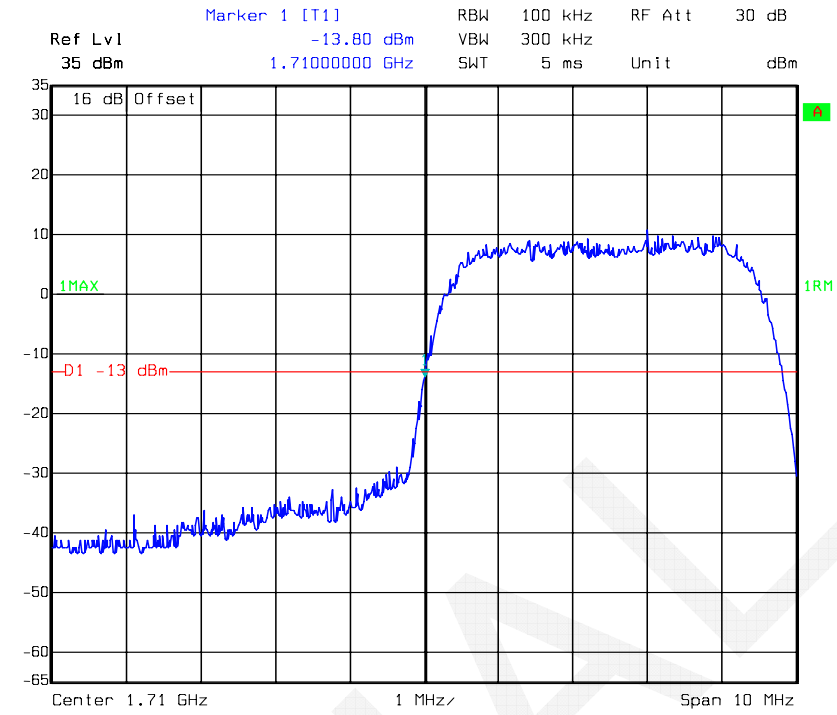
HSDPA Band IV, Left Band Edge



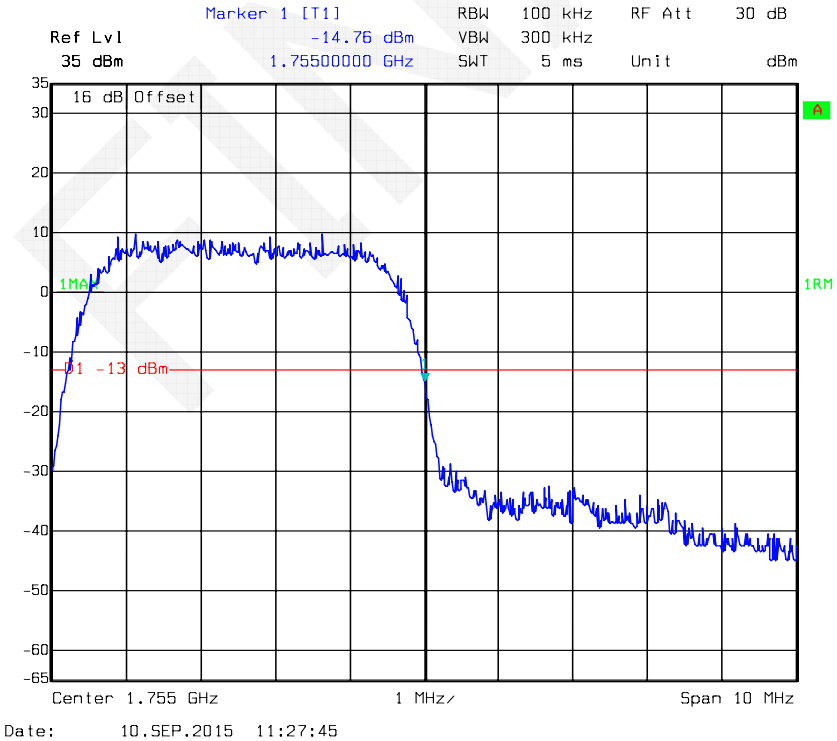
HSDPA Band IV, Right Band Edge



HSUPA Band IV, Left Band Edge

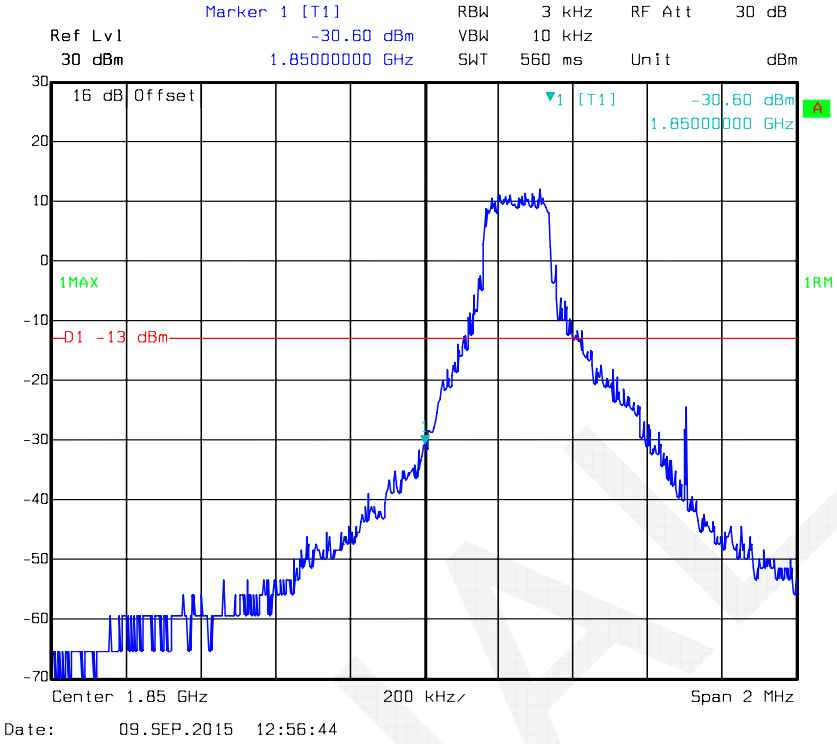


HSUPA Band IV, Right Band Edge

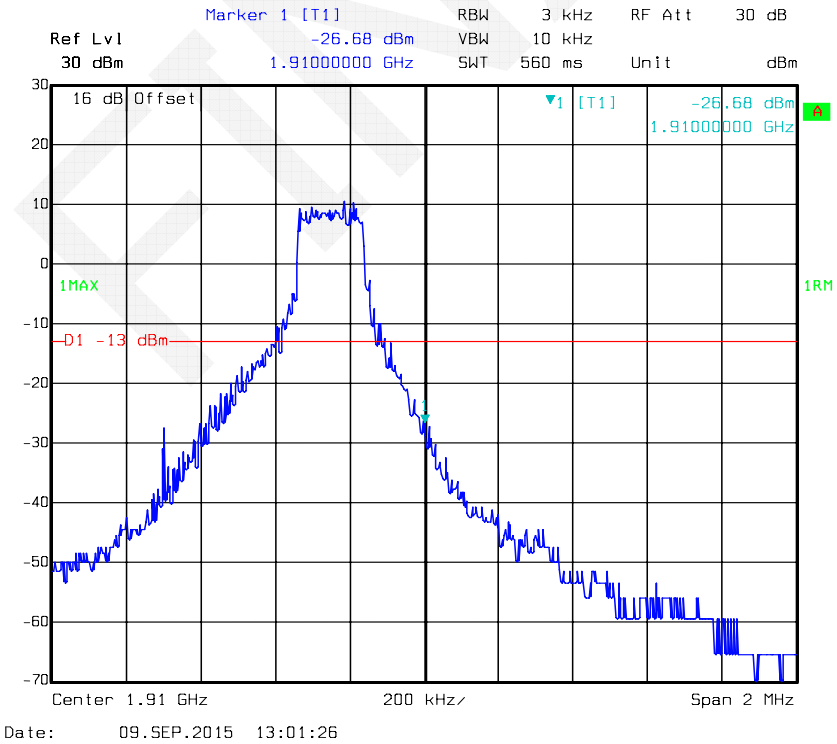


LTE Band 2

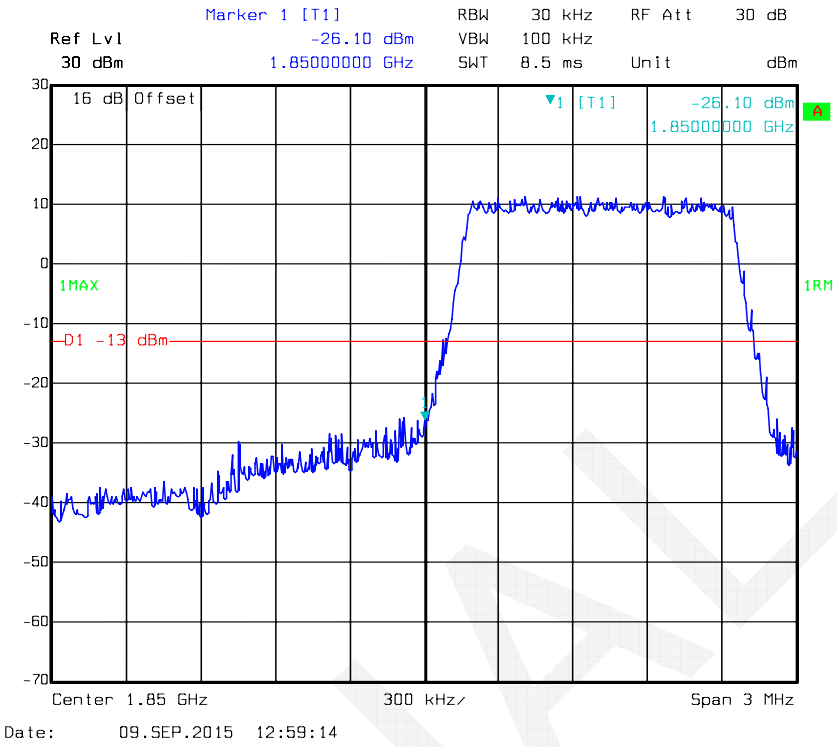
QPSK-1.4M 1RB, Left Band Edge



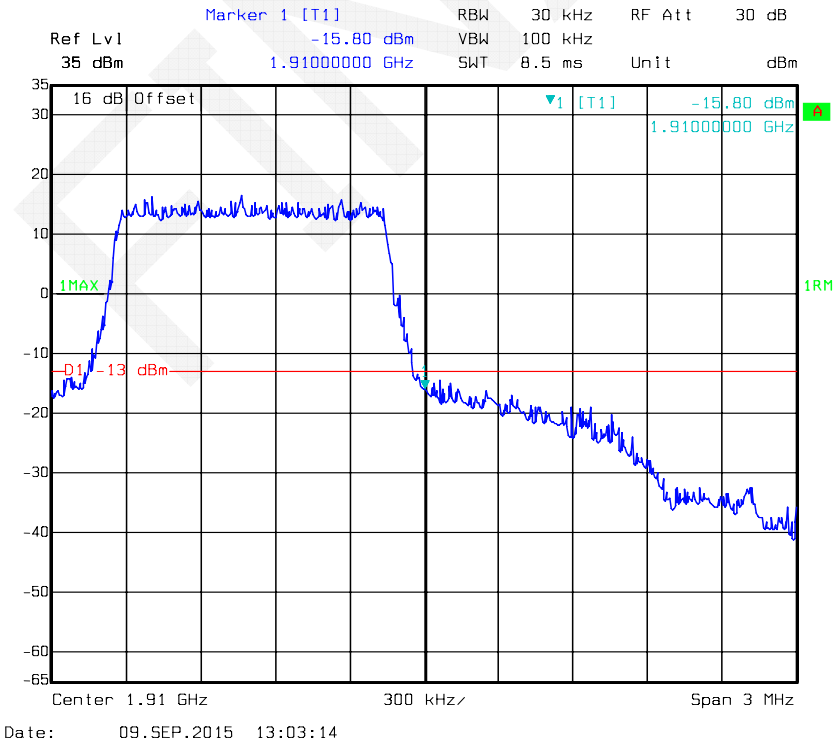
QPSK-1.4M 1RB, Right Band Edge



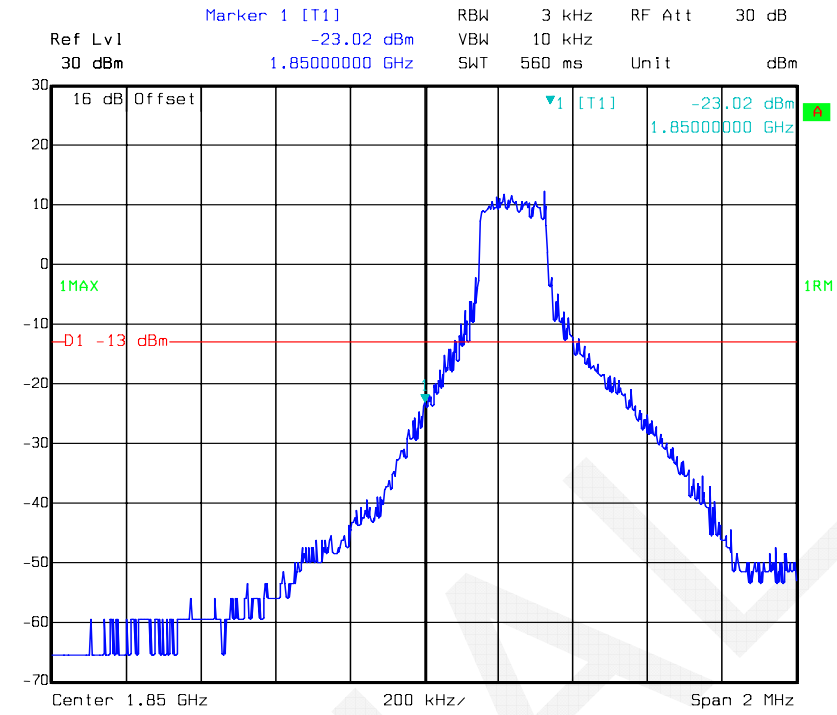
QPSK-1.4M Full RB, Left Band Edge



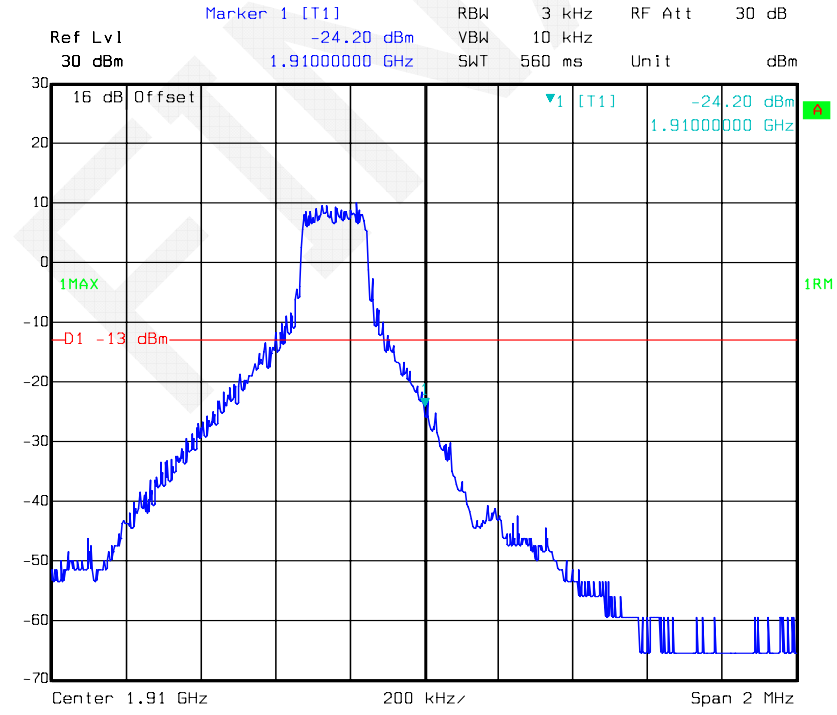
QPSK-1.4M Full RB, Right Band Edge



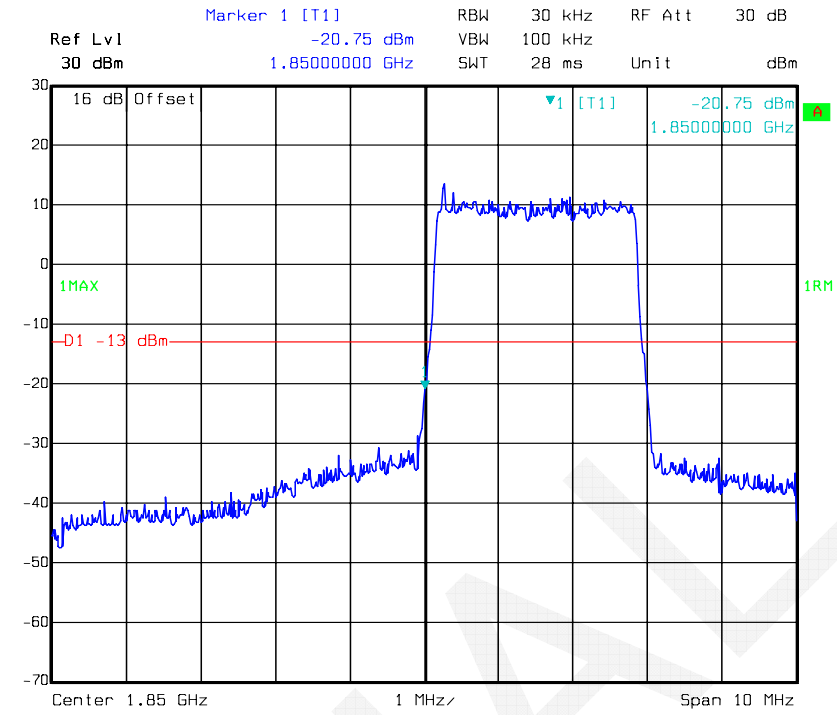
QPSK-3M 1RB, Left Band Edge



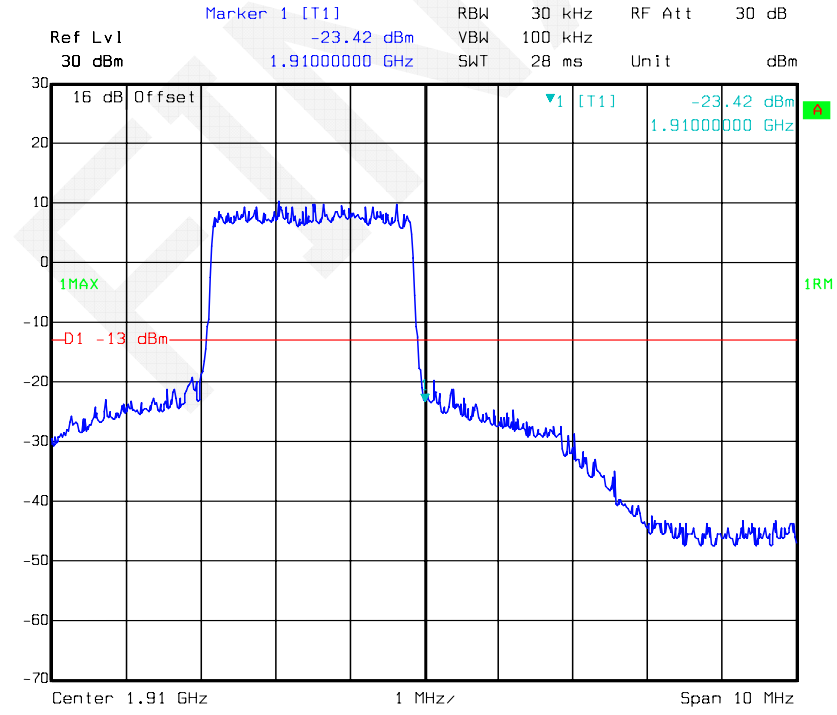
QPSK-3M 1RB, Right Band Edge



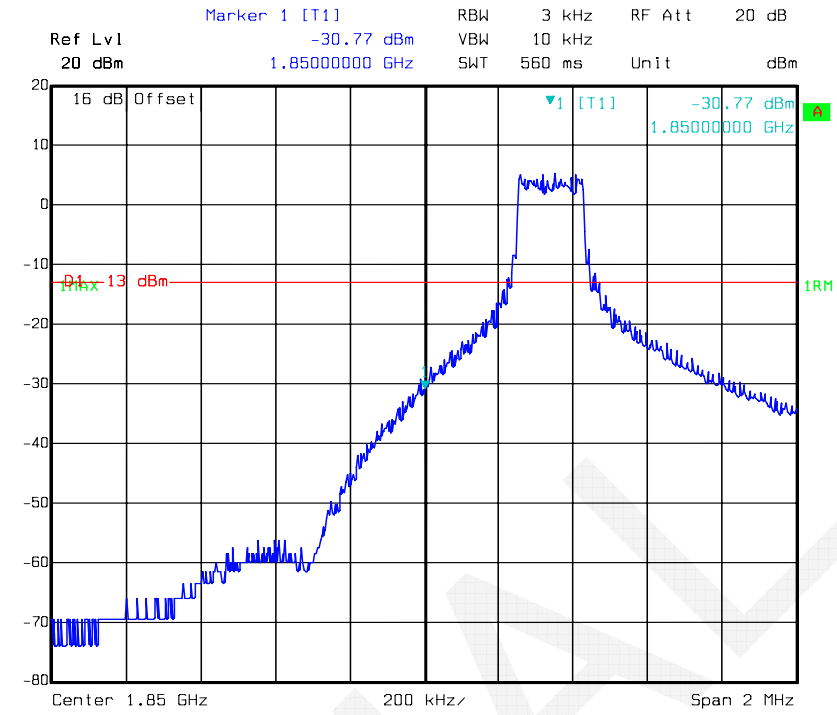
QPSK-3M Full RB, Left Band Edge



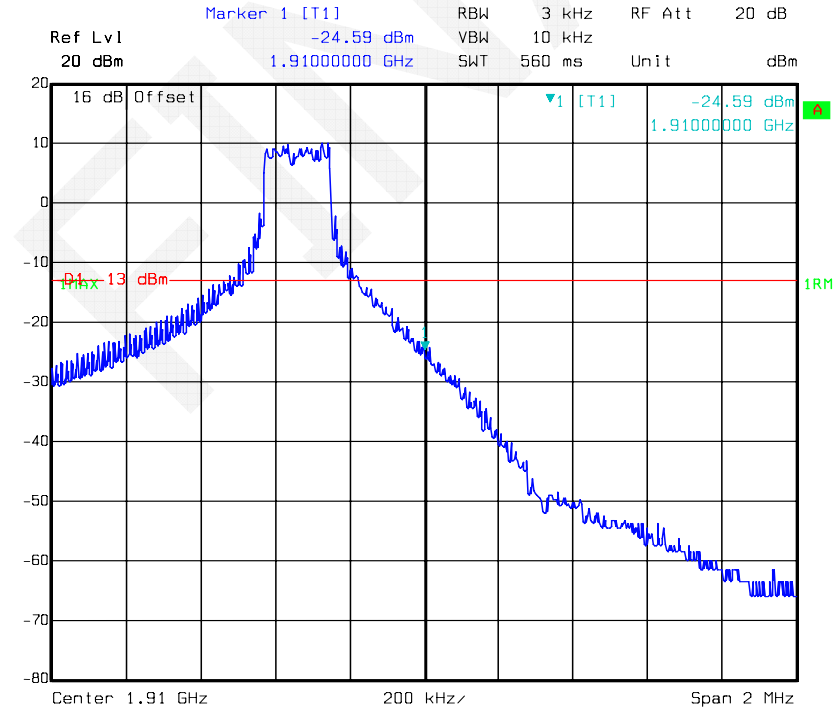
QPSK-3M Full RB, Right Band Edge



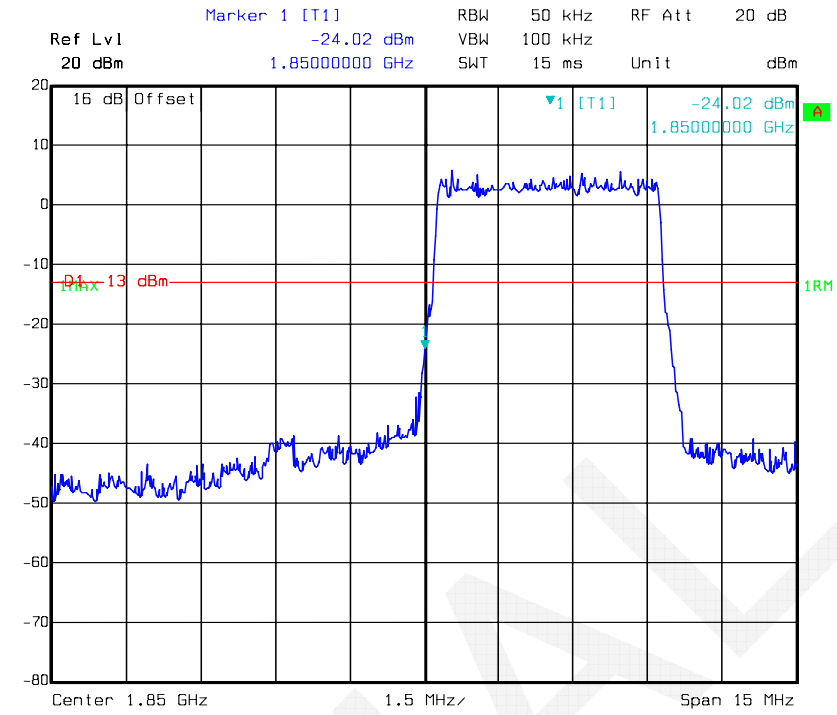
QPSK-5M 1RB, Left Band Edge



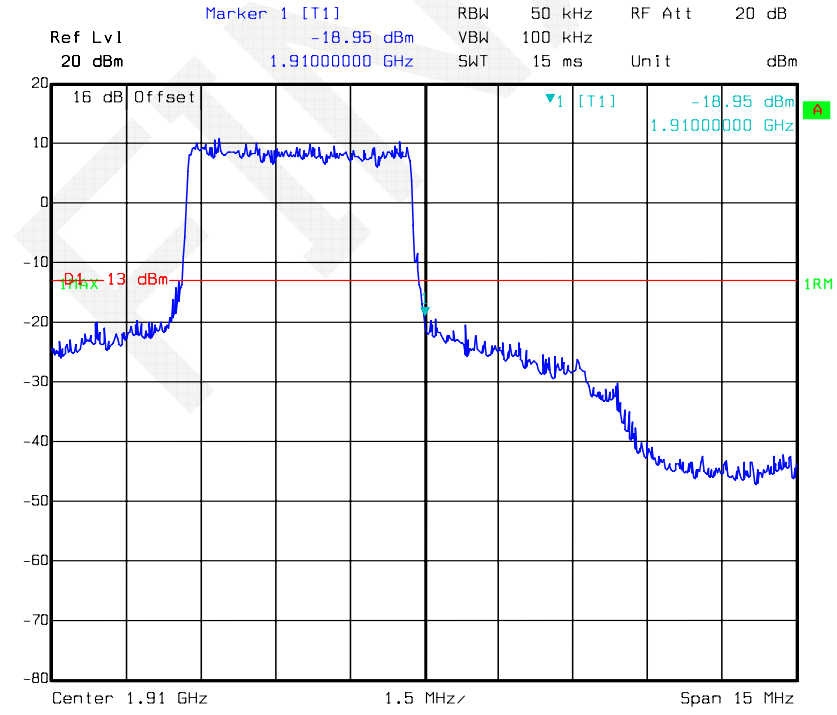
QPSK-5M 1RB, Right Band Edge



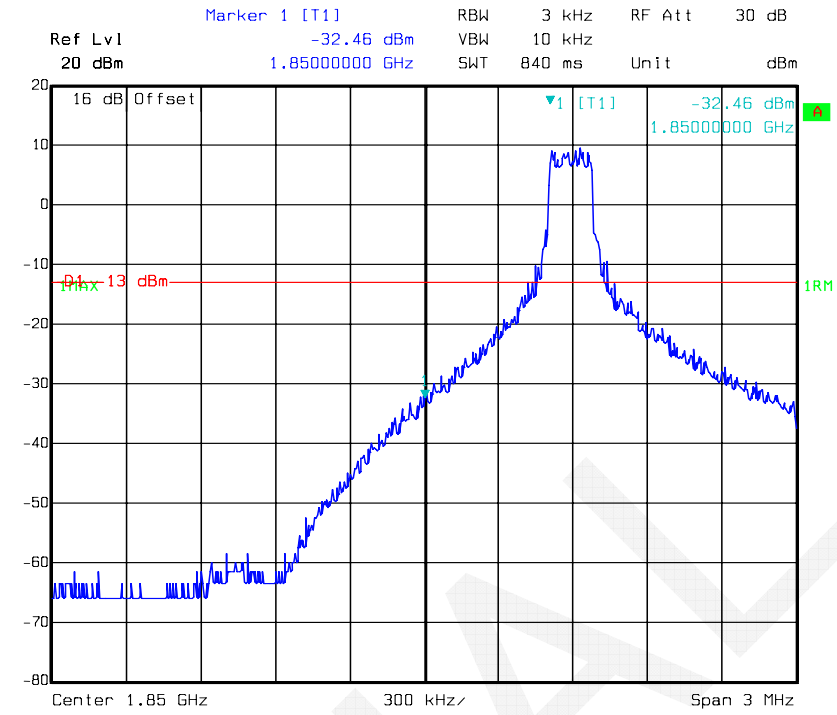
QPSK-5M Full RB, Left Band Edge



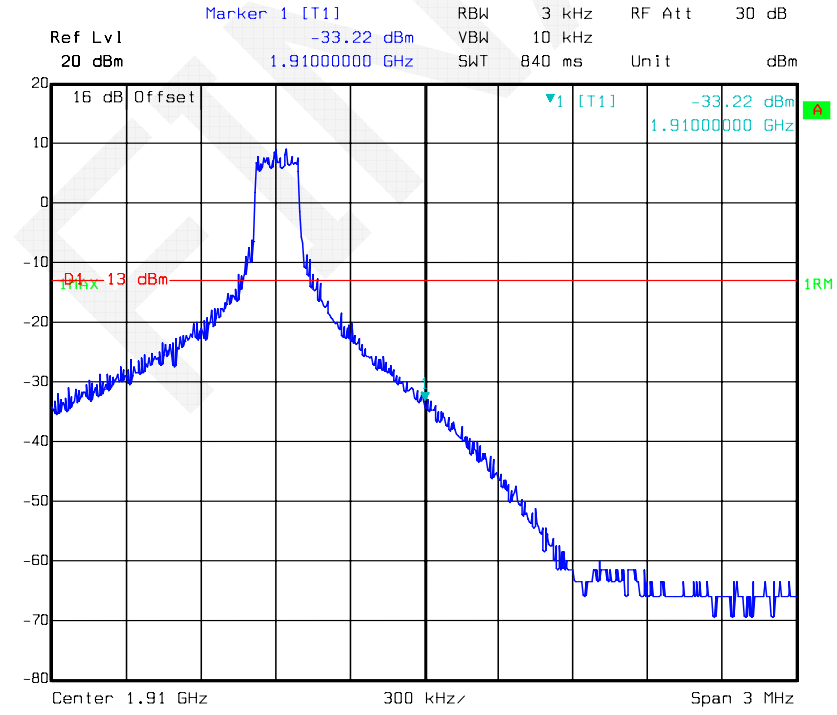
QPSK-5M Full RB, Right Band Edge



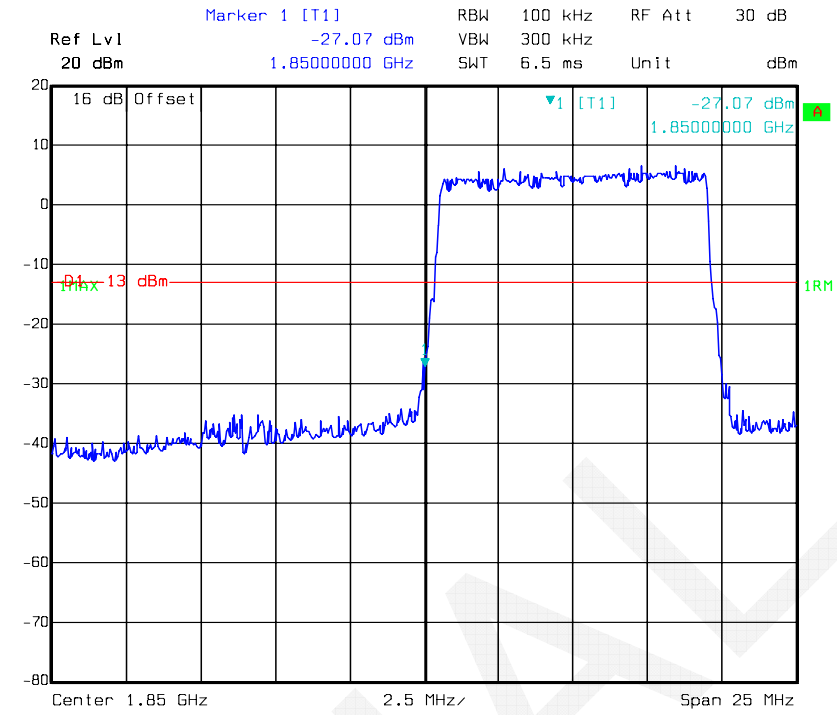
QPSK-10M 1RB, Left Band Edge



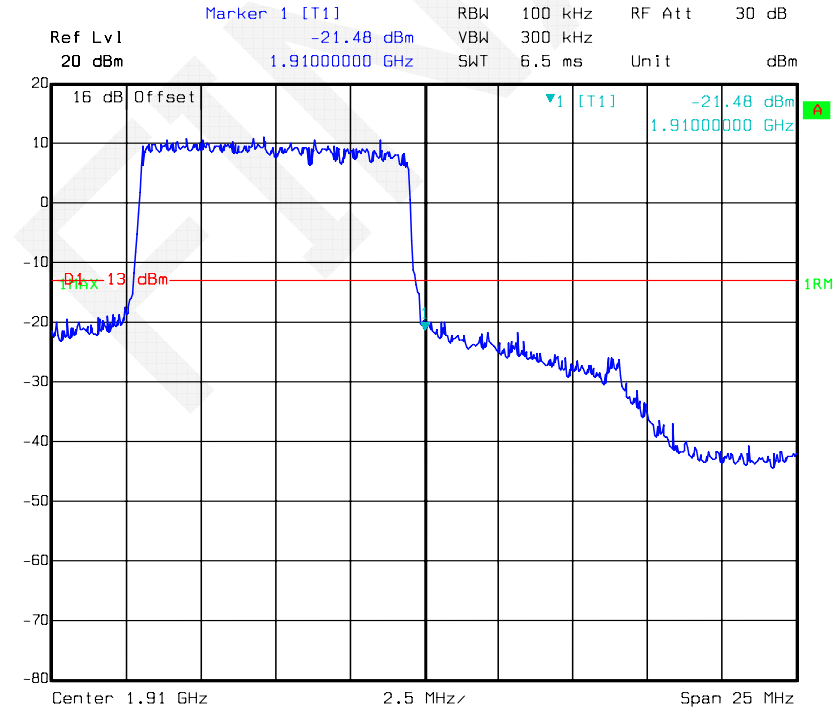
QPSK-10M 1RB, Right Band Edge



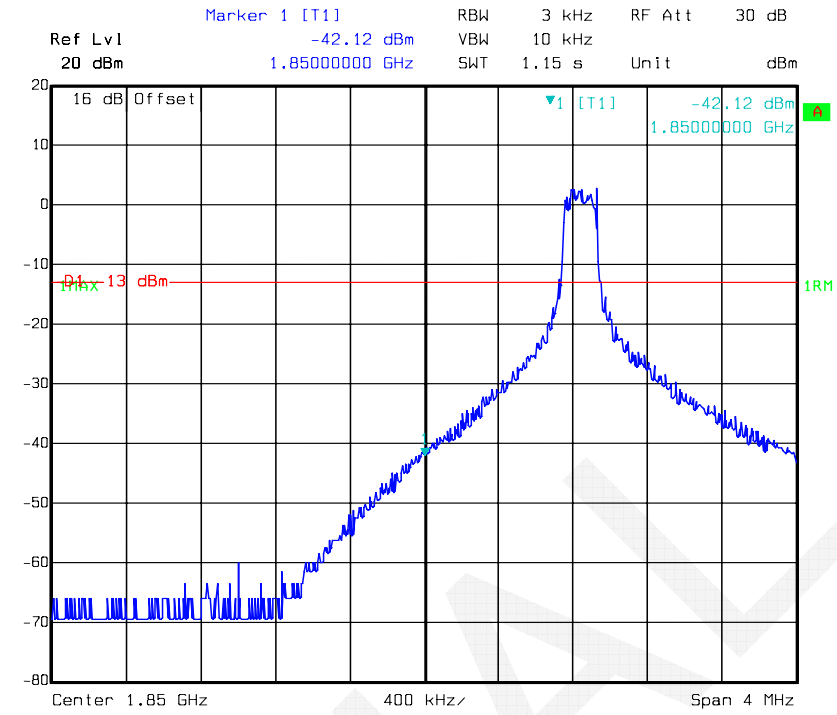
QPSK-10M Full RB, Left Band Edge



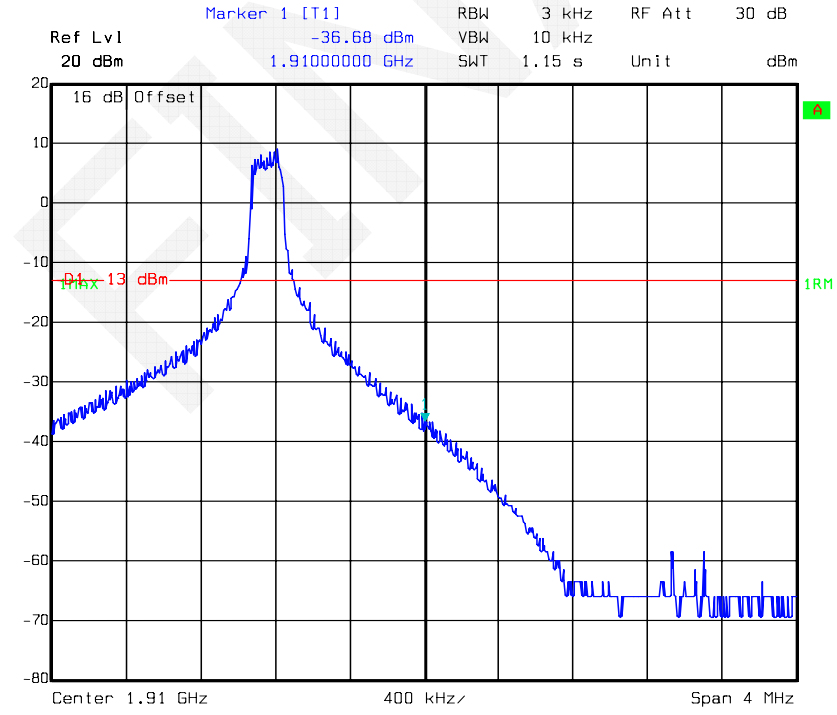
QPSK-10M Full RB, Right Band Edge



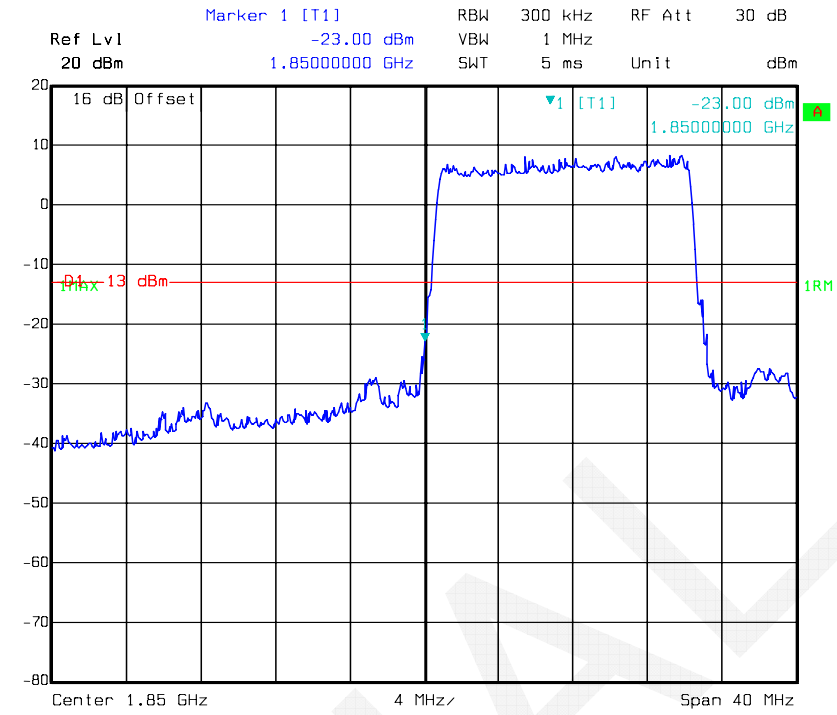
QPSK-15M 1RB, Left Band Edge



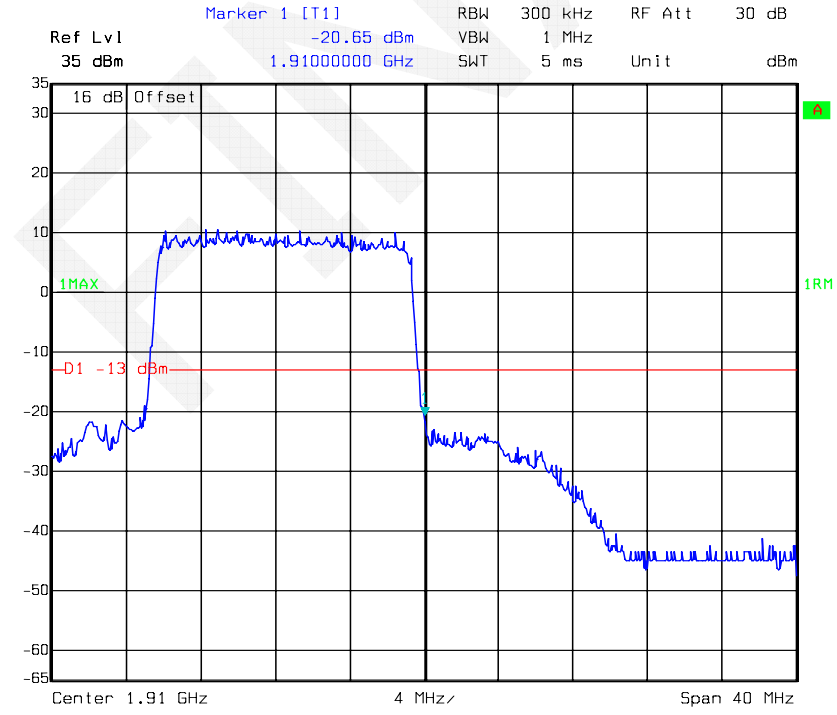
QPSK-15M 1RB, Right Band Edge



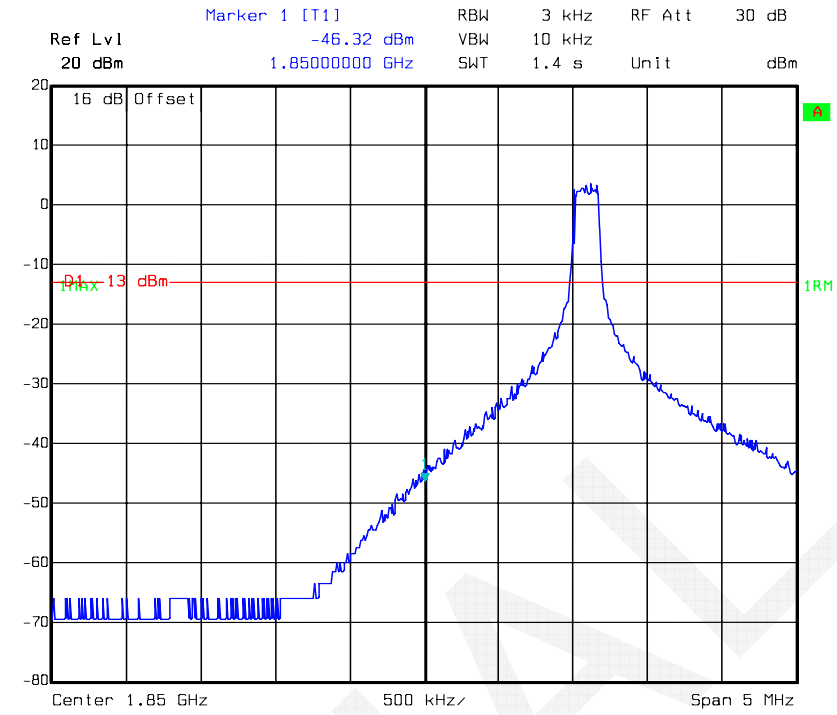
QPSK-15M Full RB, Left Band Edge



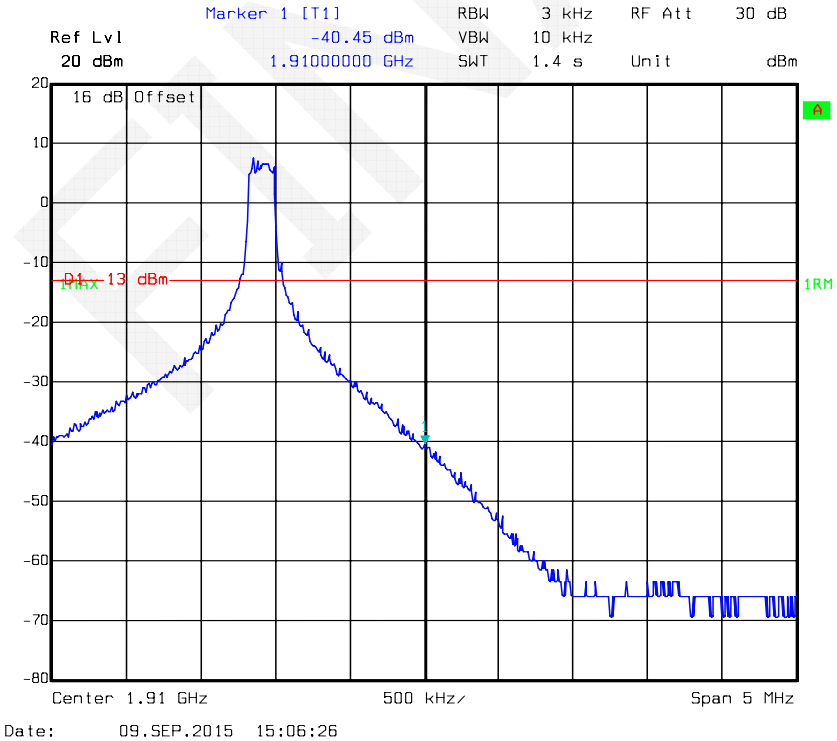
QPSK-15M Full RB, Right Band Edge



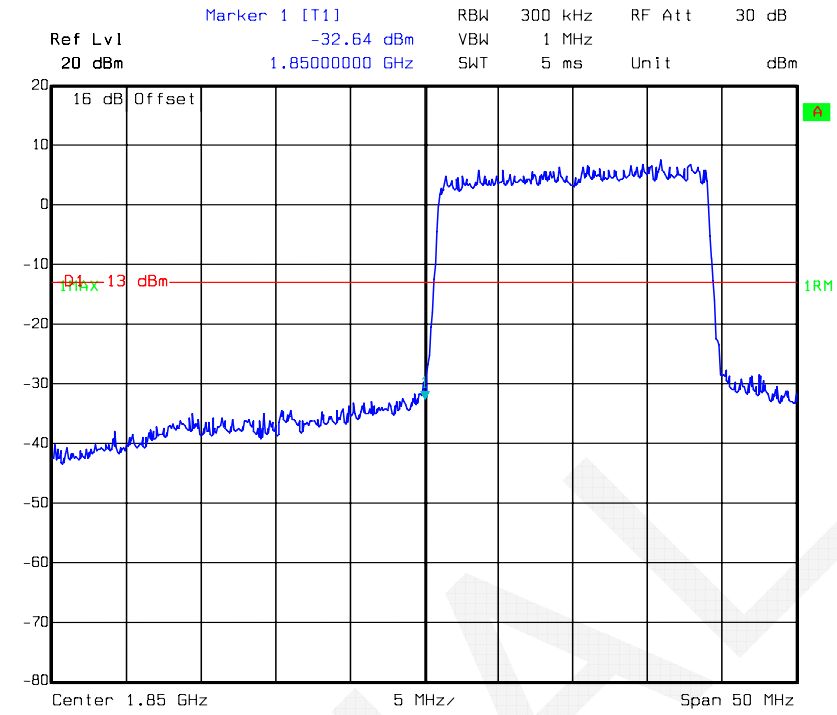
QPSK-20M 1RB, Left Band Edge



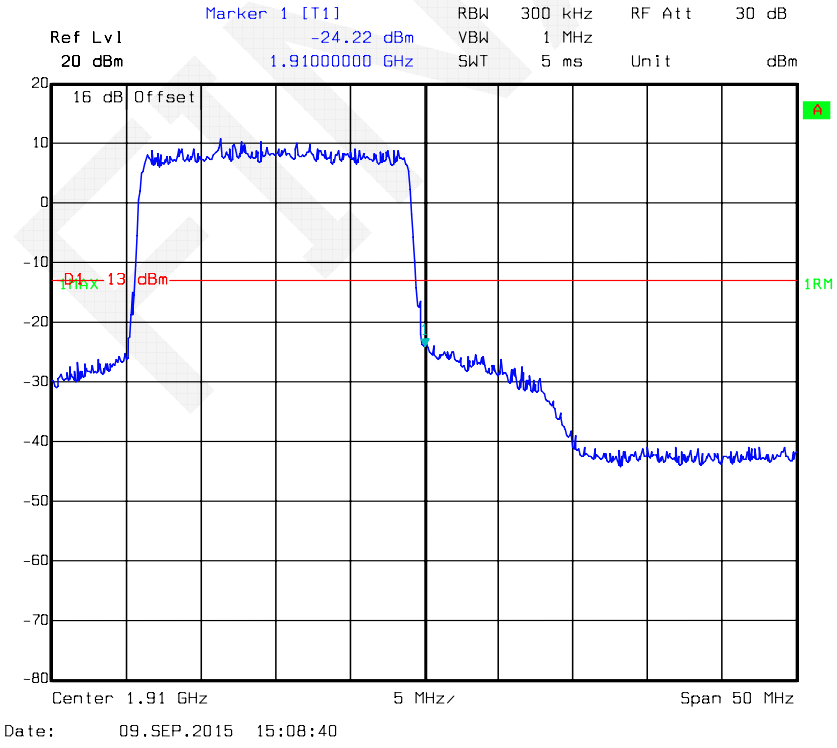
QPSK-20M 1RB, Right Band Edge



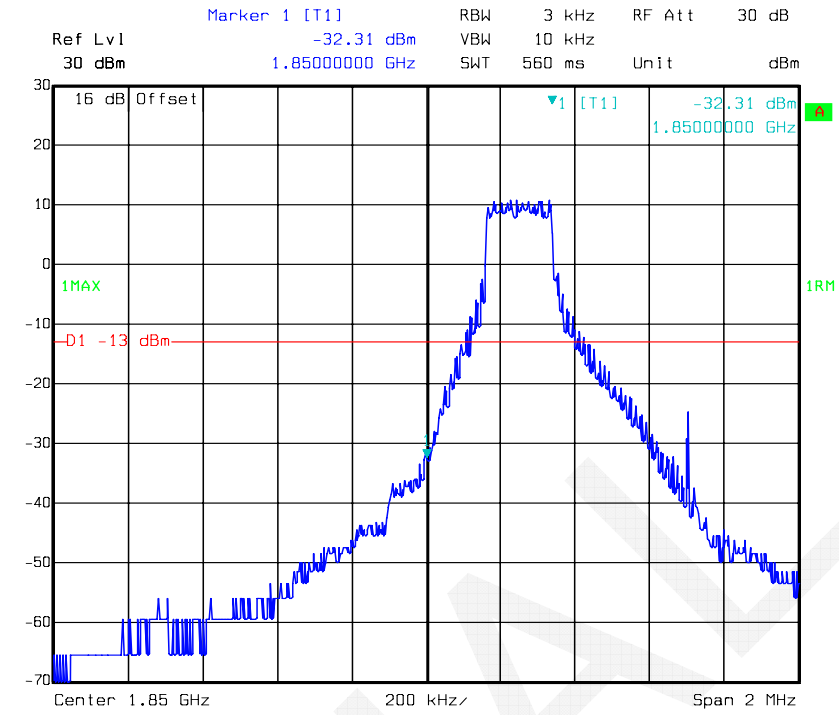
QPSK-20M Full RB, Left Band Edge



QPSK-20M Full RB, Right Band Edge

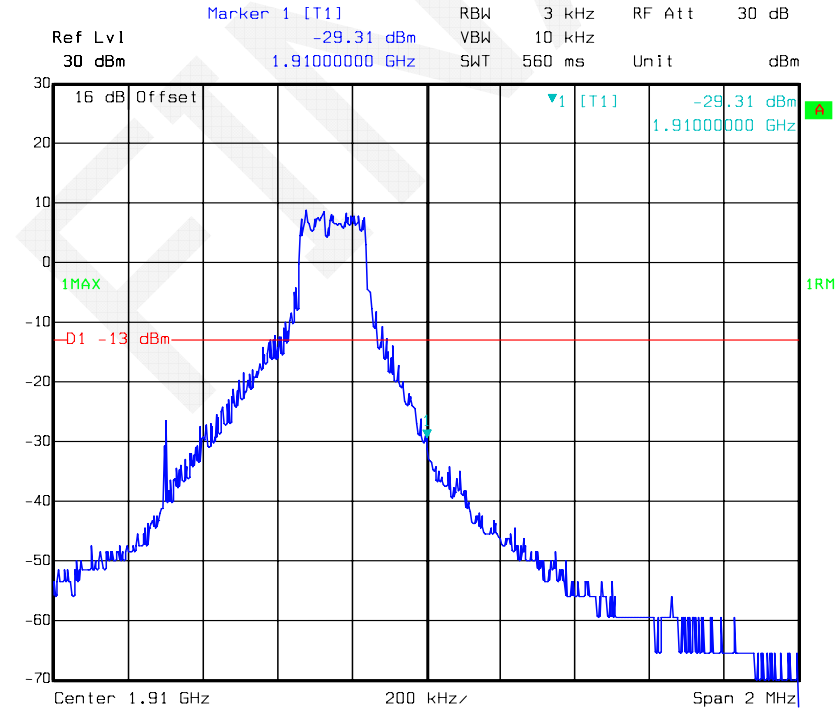


16QAM -1.4M 1RB, Left Band Edge



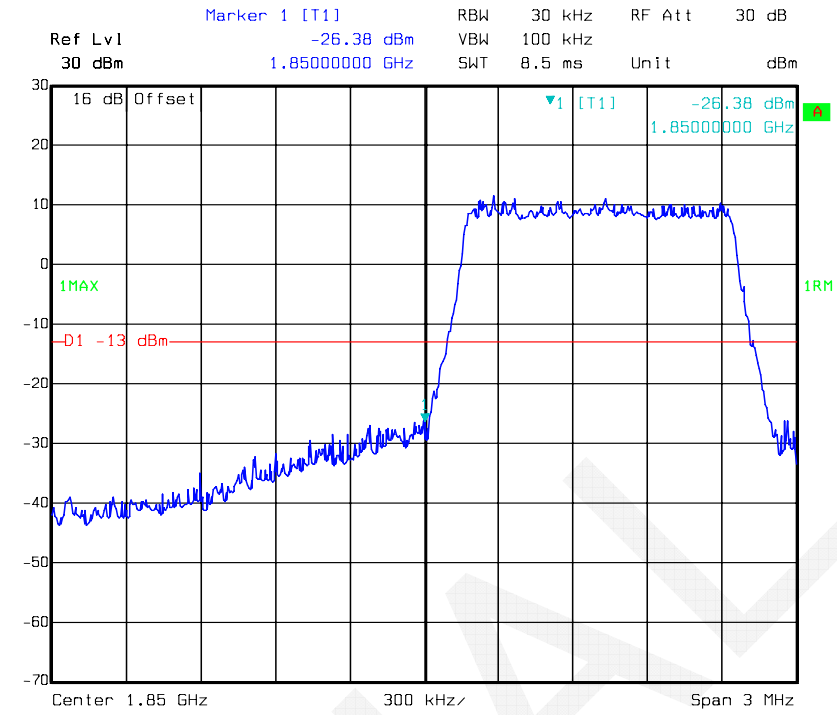
Date: 09.SEP.2015 12:57:04

16QAM -1.4M 1RB, Right Band Edge



Date: 09.SEP.2015 13:01:43

16QAM -1.4M Full RB, Left Band Edge

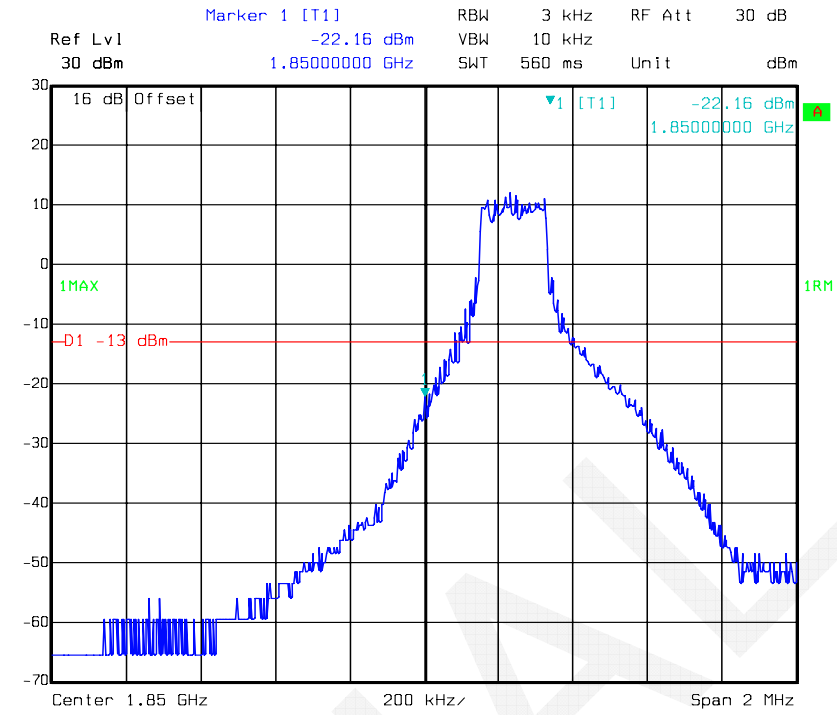


Date: 09.SEP.2015 12:58:54

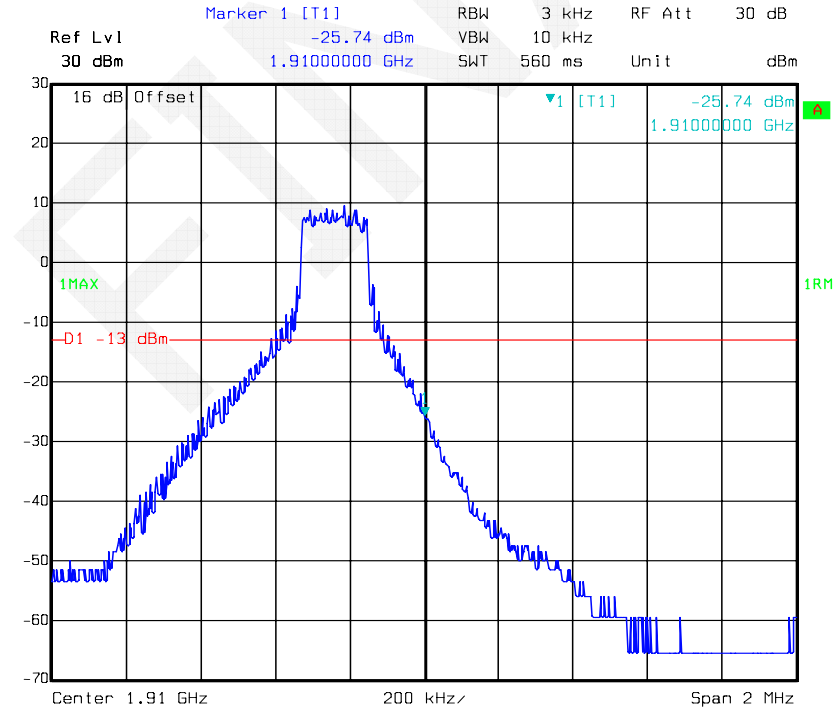
16QAM -1.4M Full RB, Right Band Edge

Date: 09.SEP.2015 13:02:54

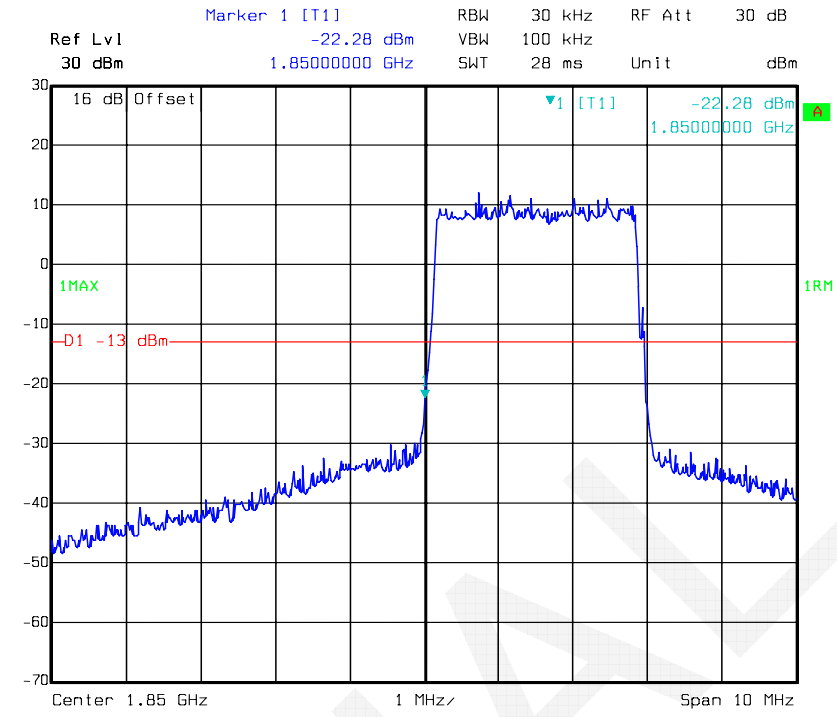
16QAM -3M 1RB, Left Band Edge



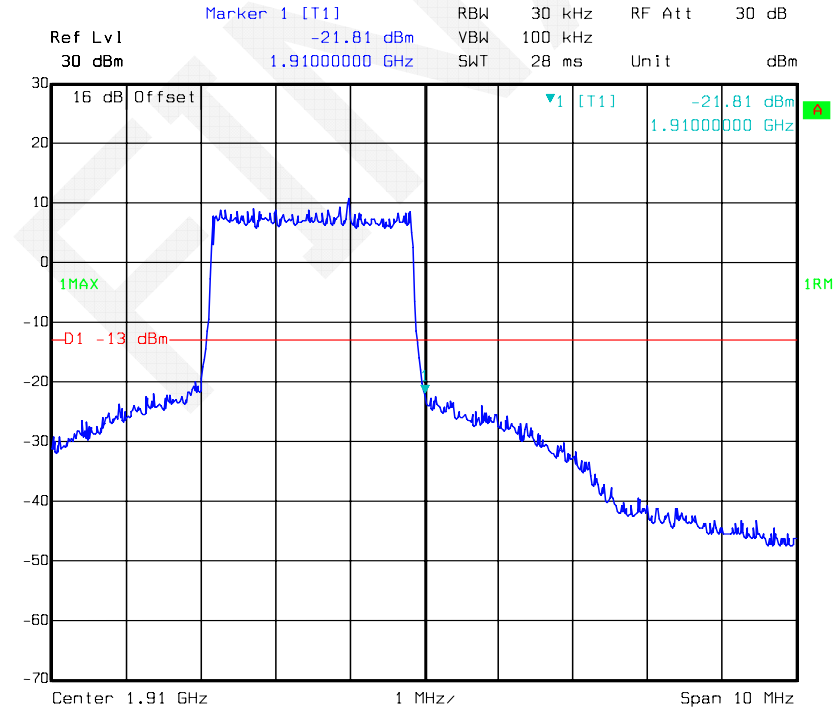
16QAM -3M 1RB, Right Band Edge



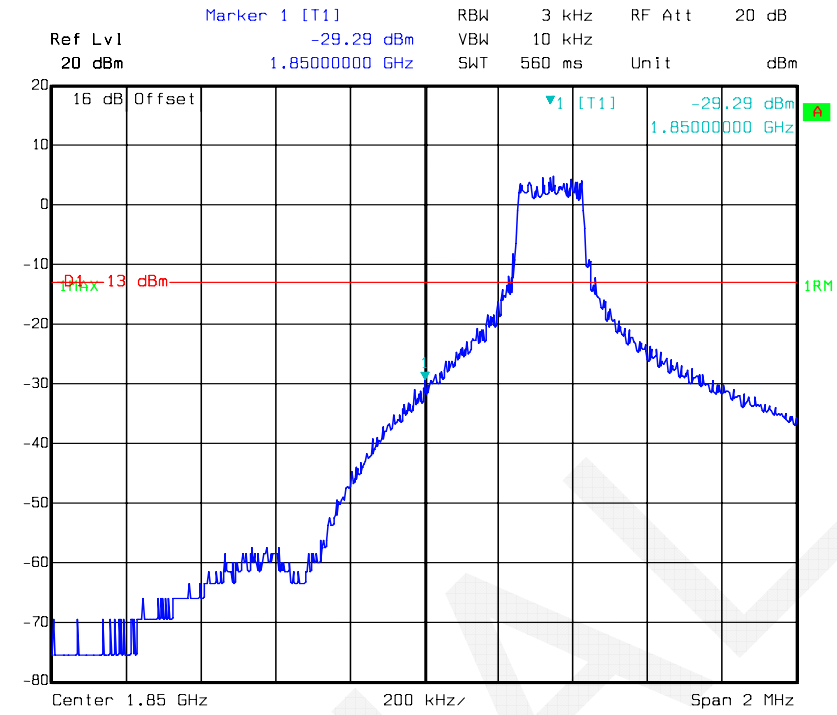
16QAM -3M Full RB, Left Band Edge



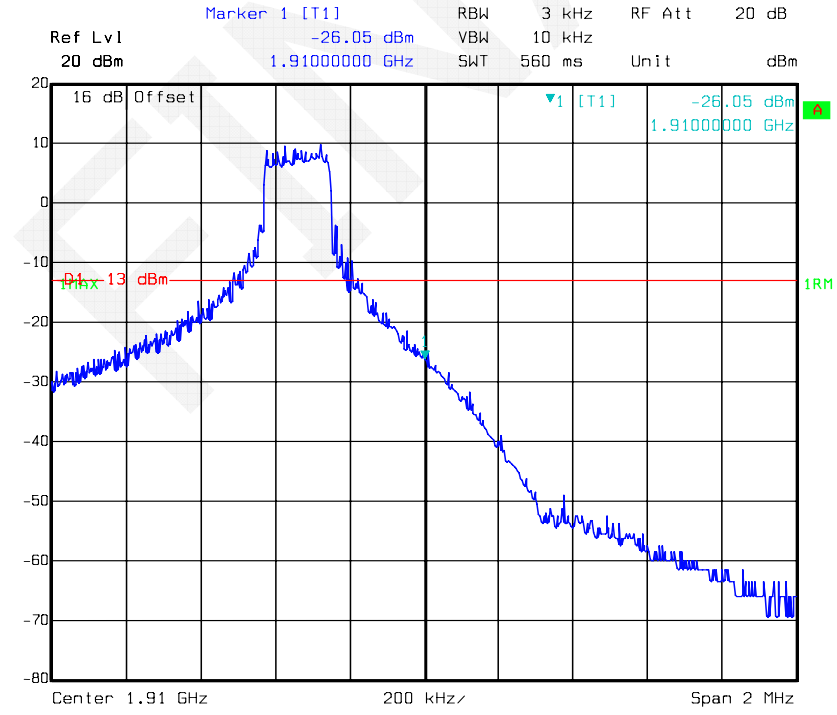
16QAM -3M Full RB, Right Band Edge



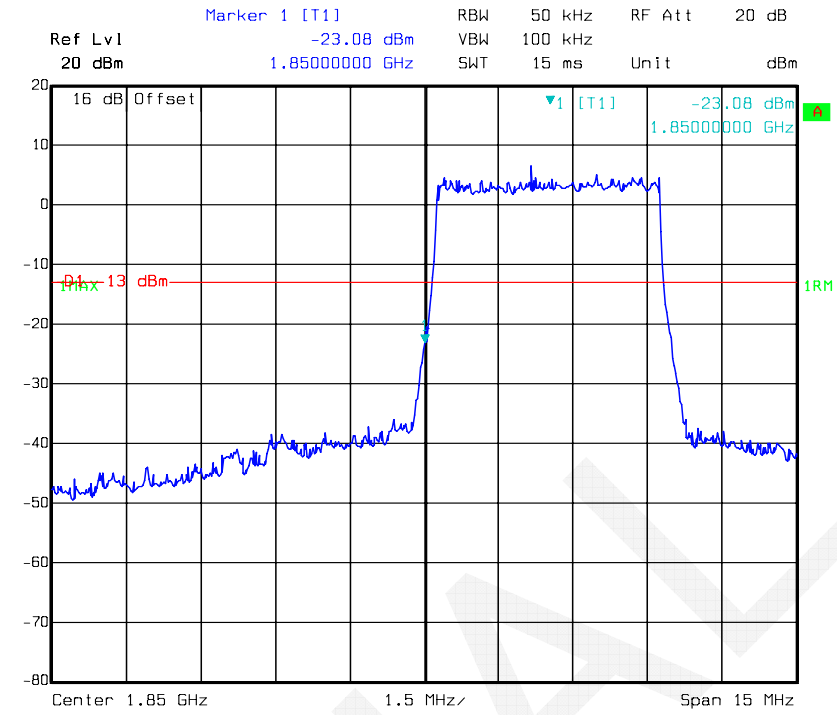
16QAM -5M 1RB, Left Band Edge



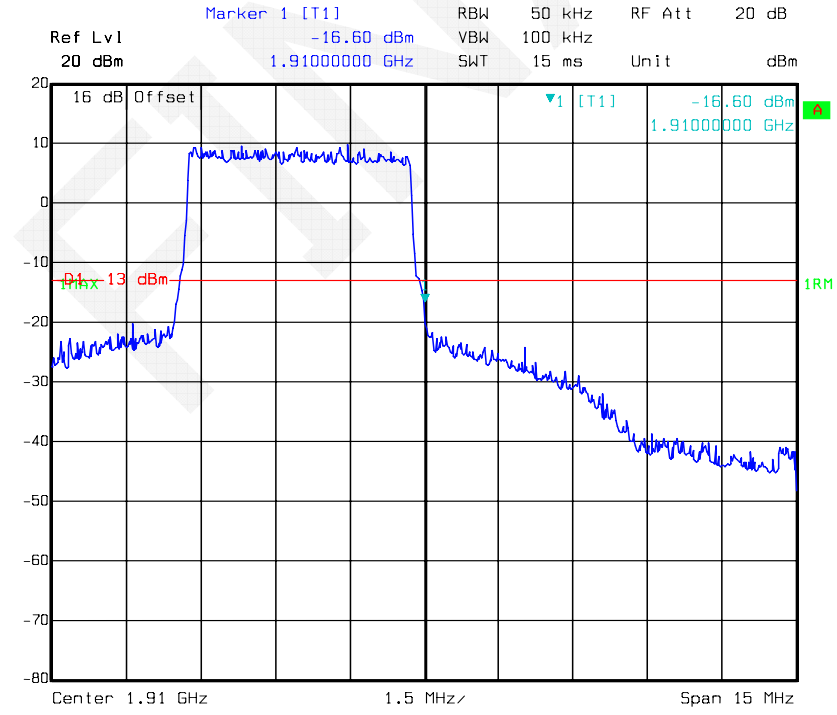
16QAM -5M 1RB, Right Band Edge



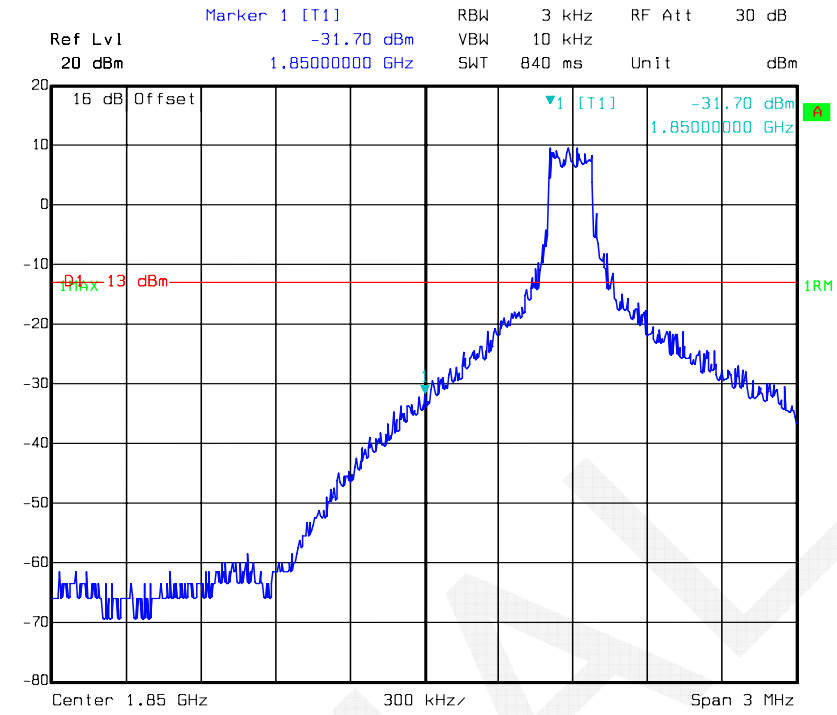
16QAM -5M Full RB, Left Band Edge



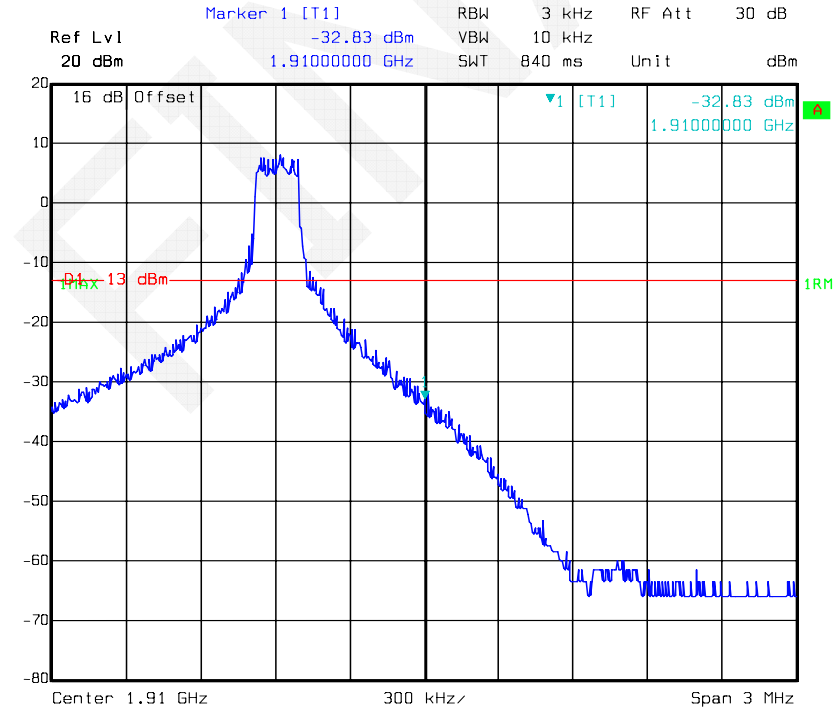
16QAM -5M Full RB, Right Band Edge



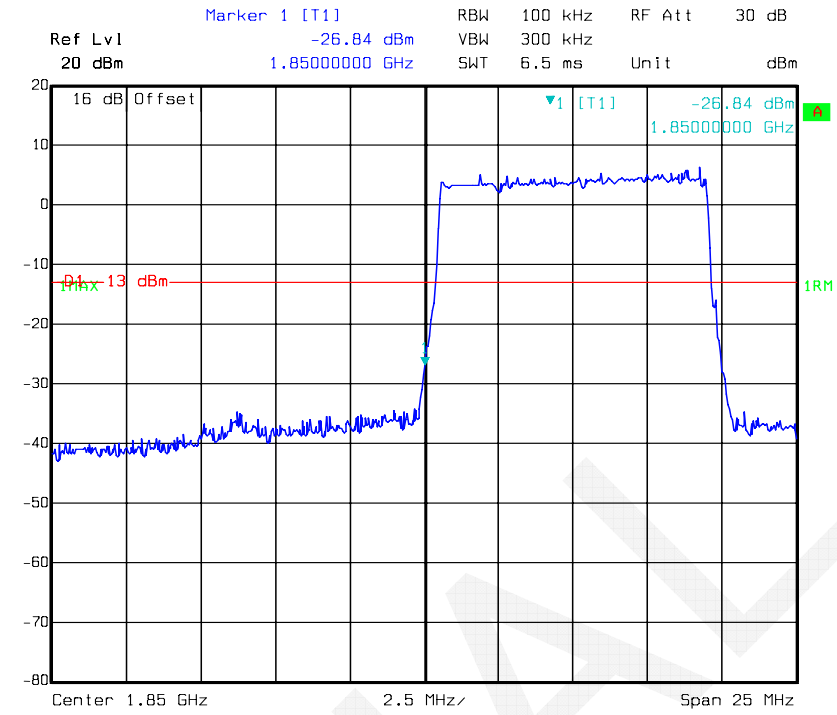
16QAM -10M 1RB, Left Band Edge



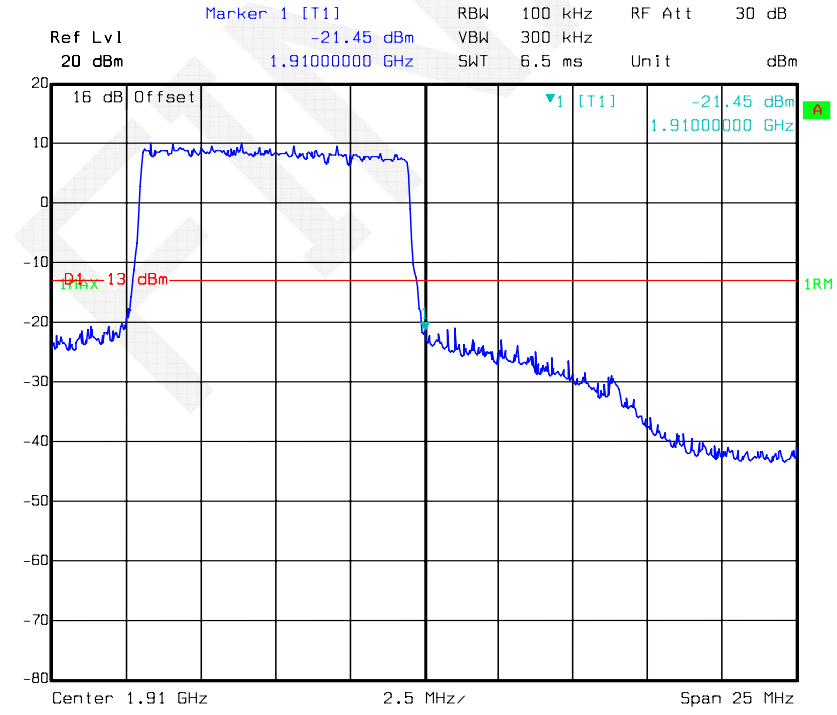
16QAM -10M 1RB, Right Band Edge



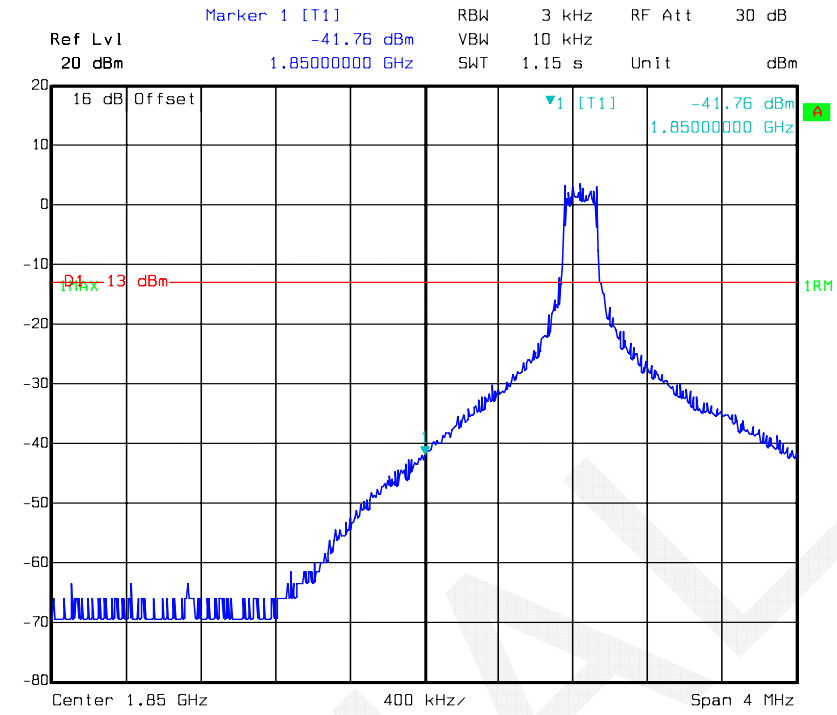
16QAM -10M Full RB, Left Band Edge



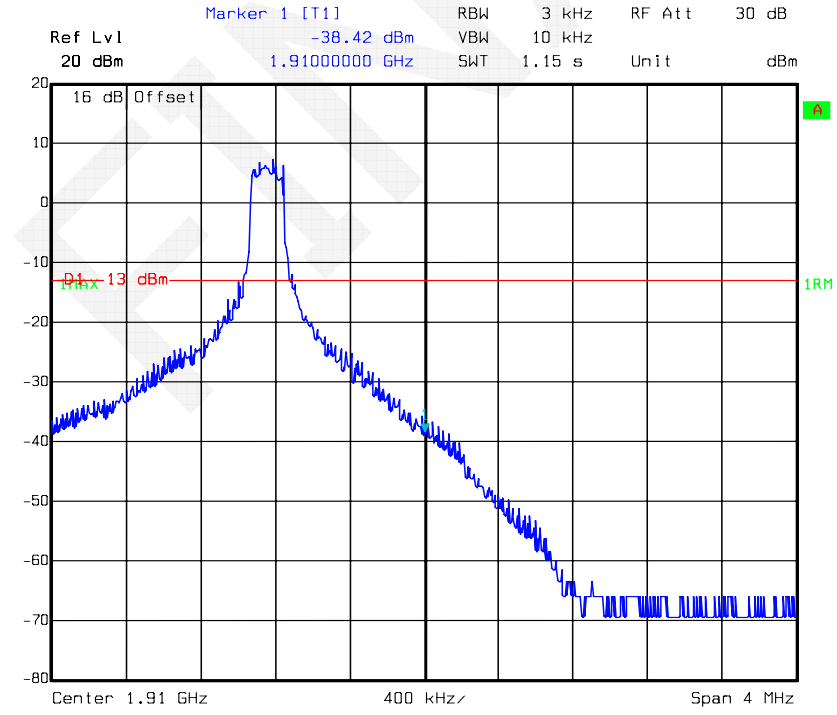
16QAM -10M Full RB, Right Band Edge



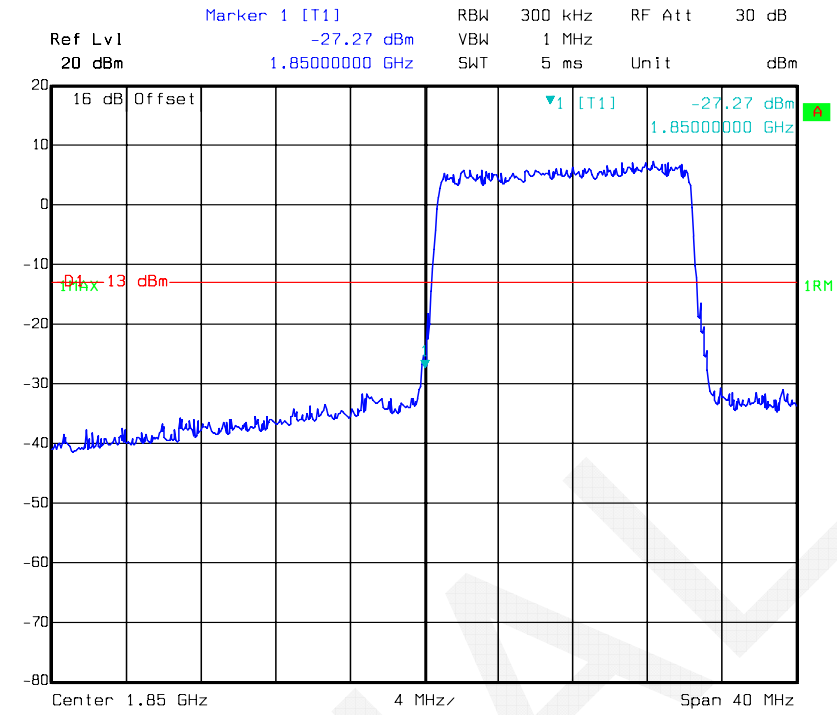
16QAM -15M 1RB, Left Band Edge



16QAM -15M 1RB, Right Band Edge

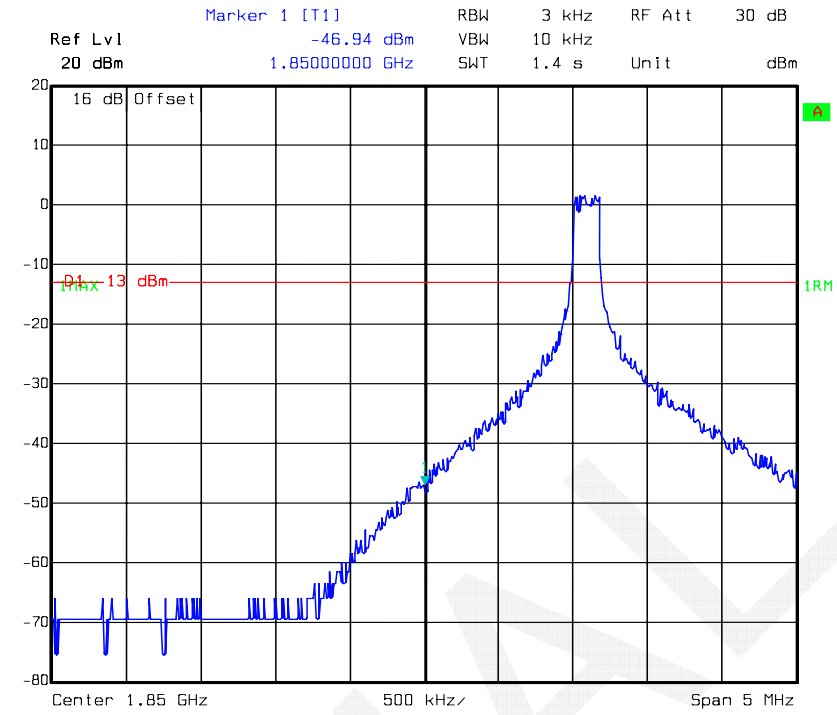


16QAM -15M Full RB, Left Band Edge

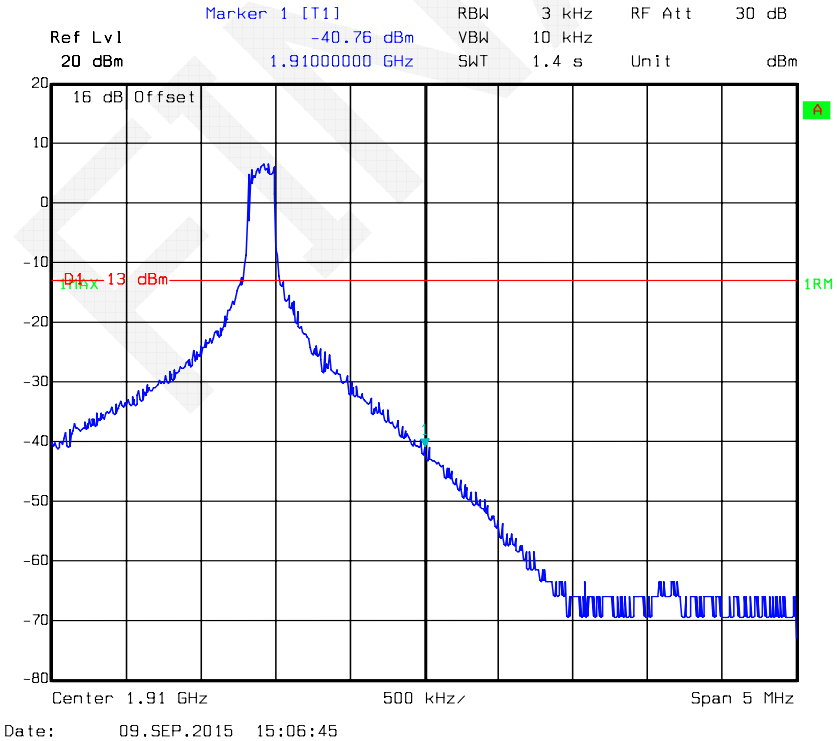


16QAM -15M Full RB, Right Band Edge

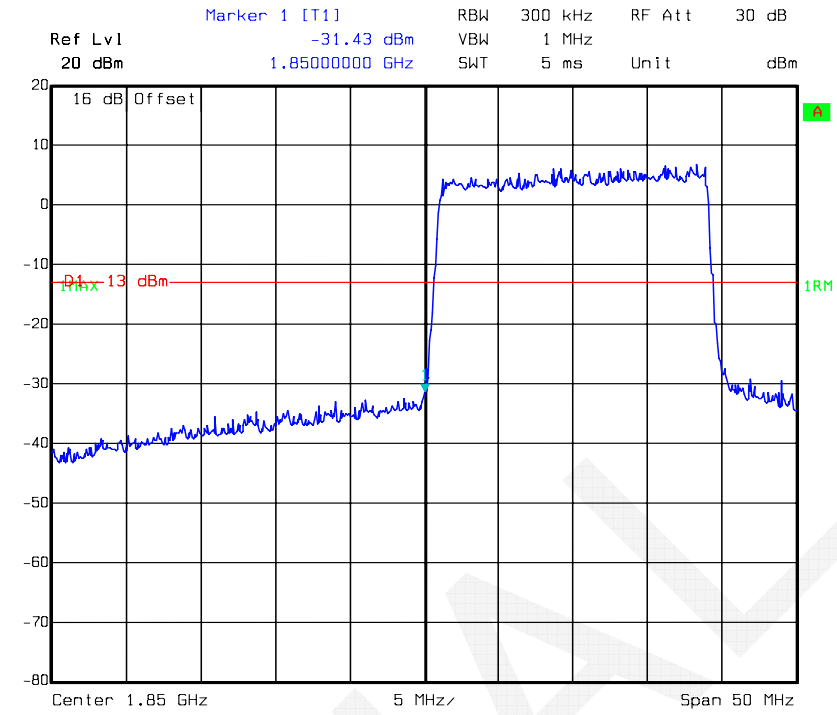
16QAM -20M 1RB, Left Band Edge



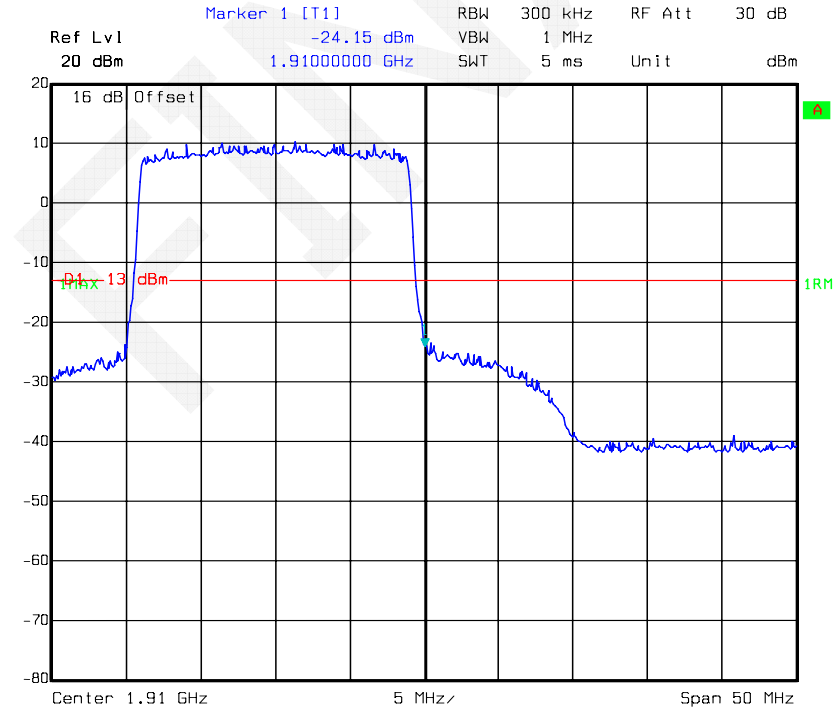
16QAM -20M 1RB, Right Band Edge



16QAM -20M Full RB, Left Band Edge

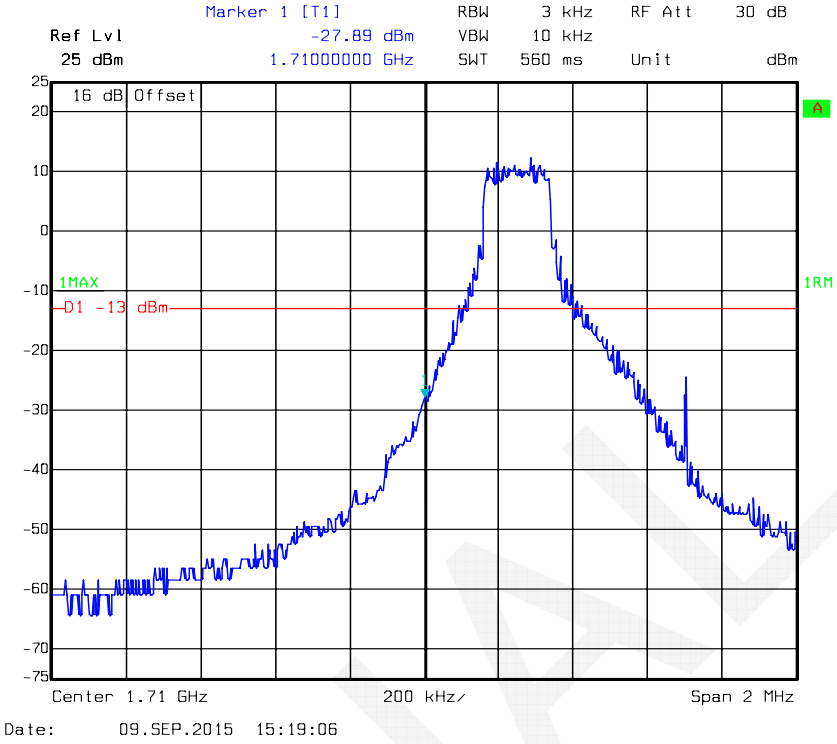


16QAM-20M Full RB, Right Band Edge

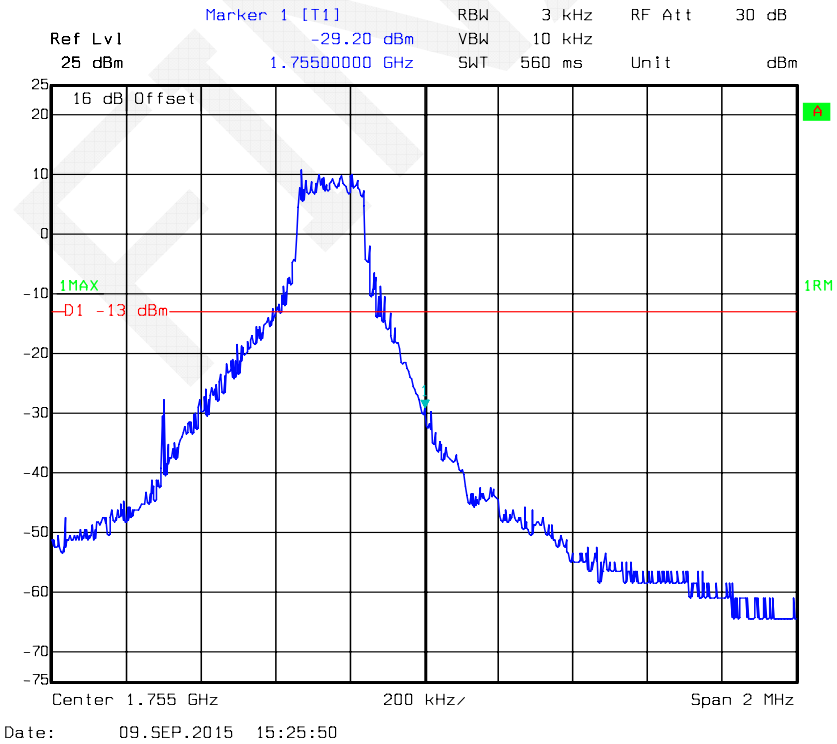


LTE Band 4

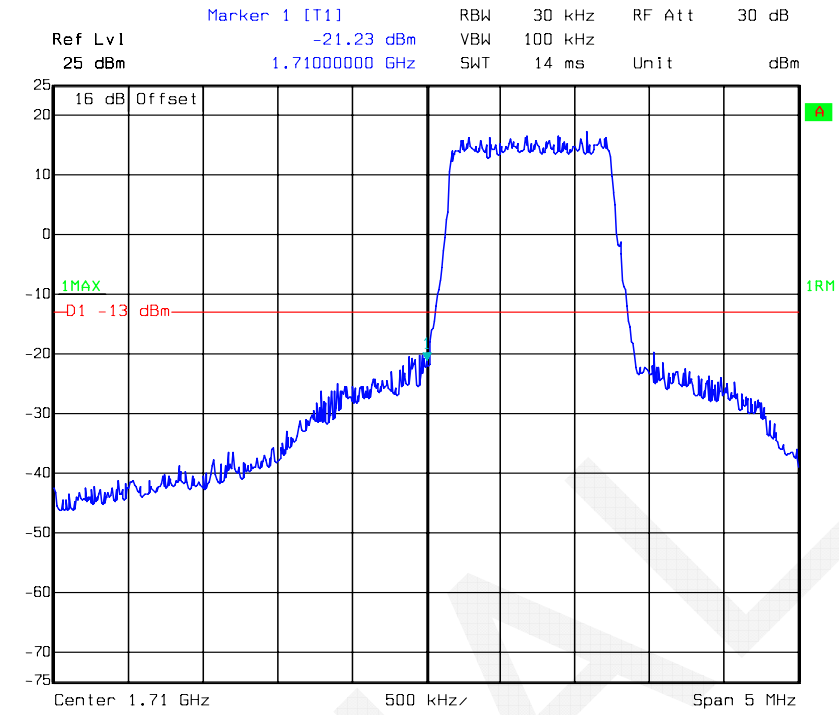
QPSK-1.4M 1RB, Left Band Edge



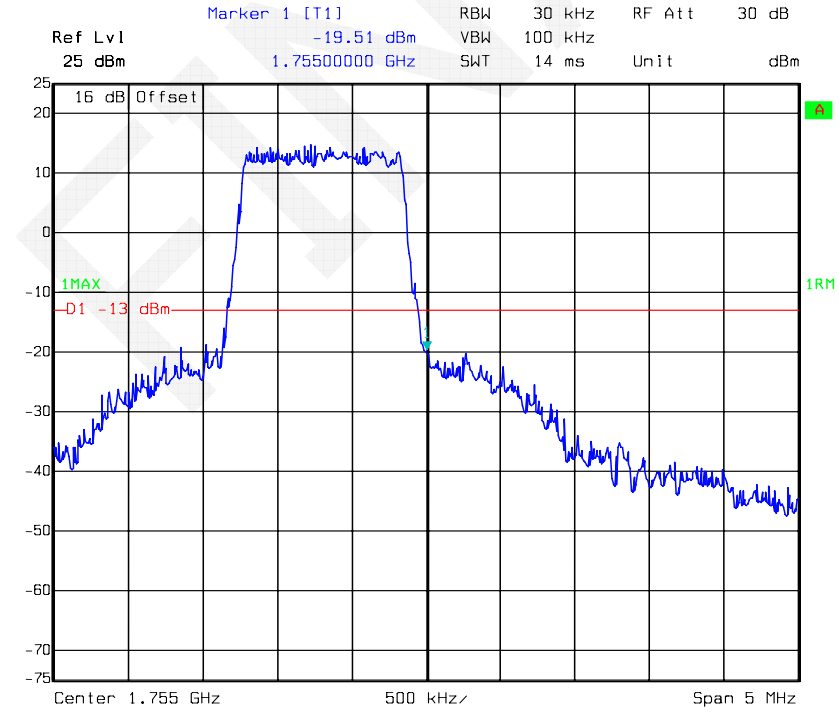
QPSK-1.4M 1RB, Right Band Edge



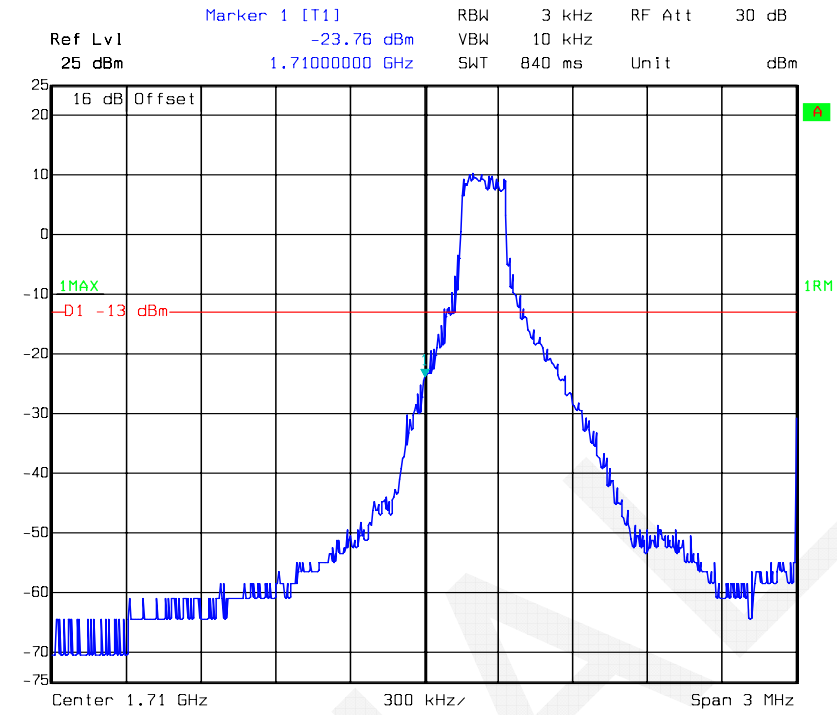
QPSK-1.4M Full RB, Left Band Edge



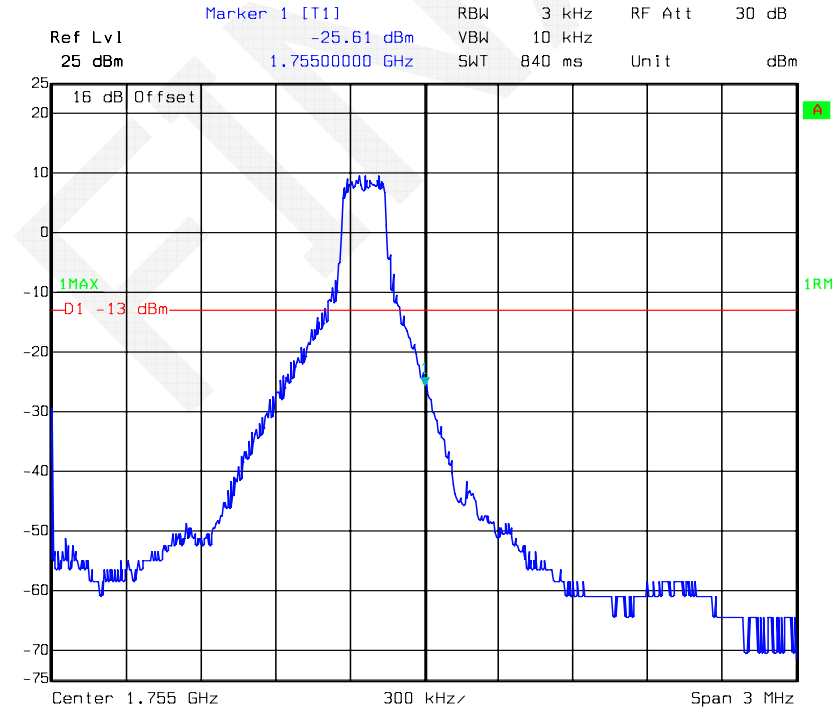
QPSK-1.4M Full RB, Right Band Edge



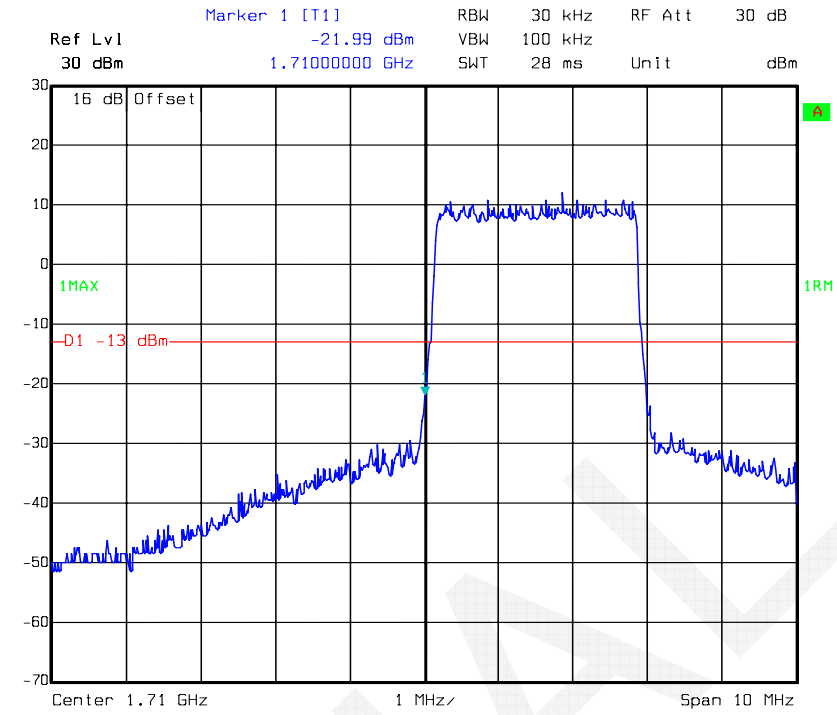
QPSK-3M 1RB, Left Band Edge



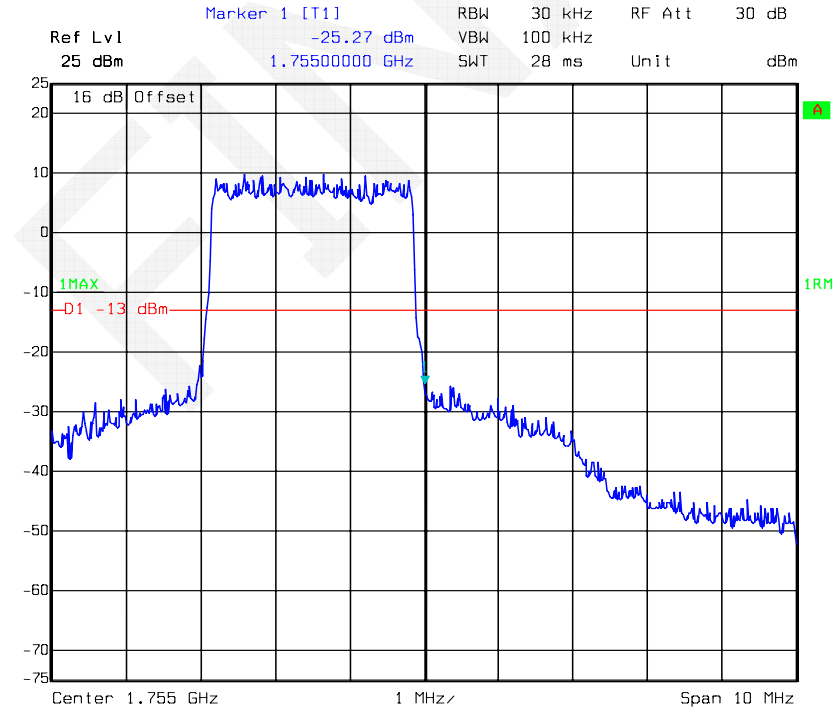
QPSK-3M 1RB, Right Band Edge



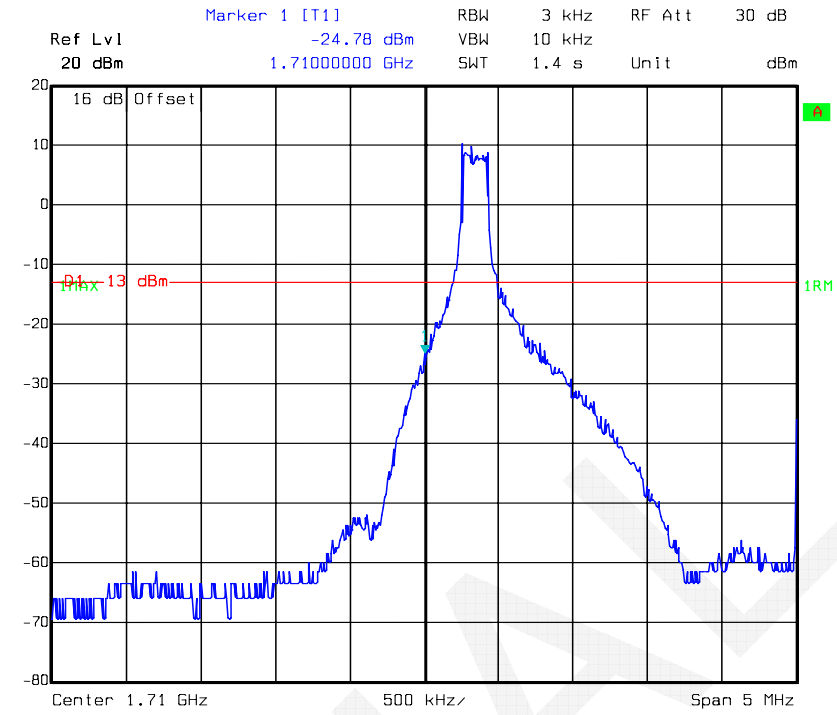
QPSK-3M Full RB, Left Band Edge



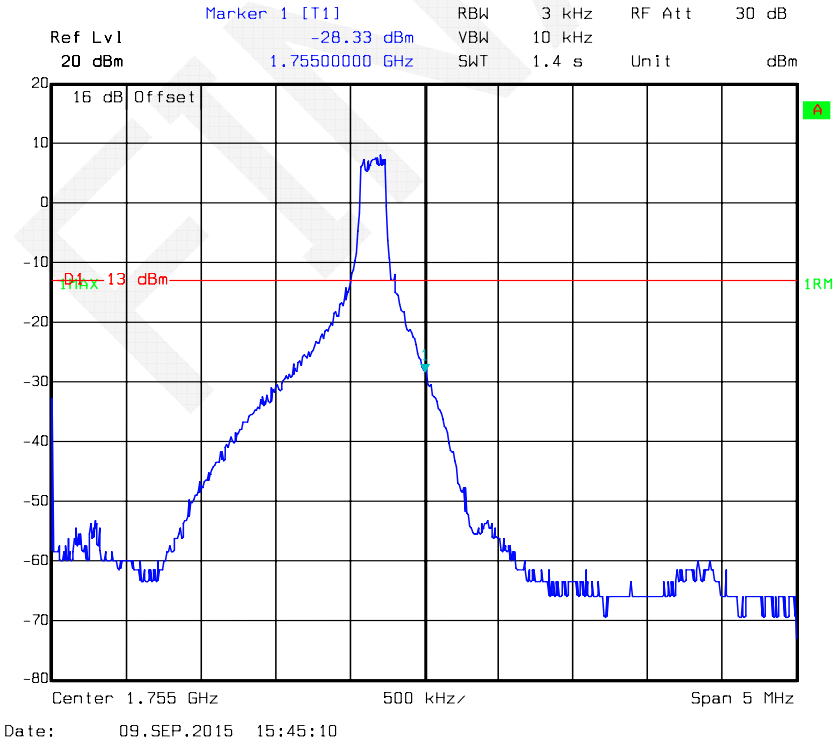
QPSK-3M Full RB, Right Band Edge



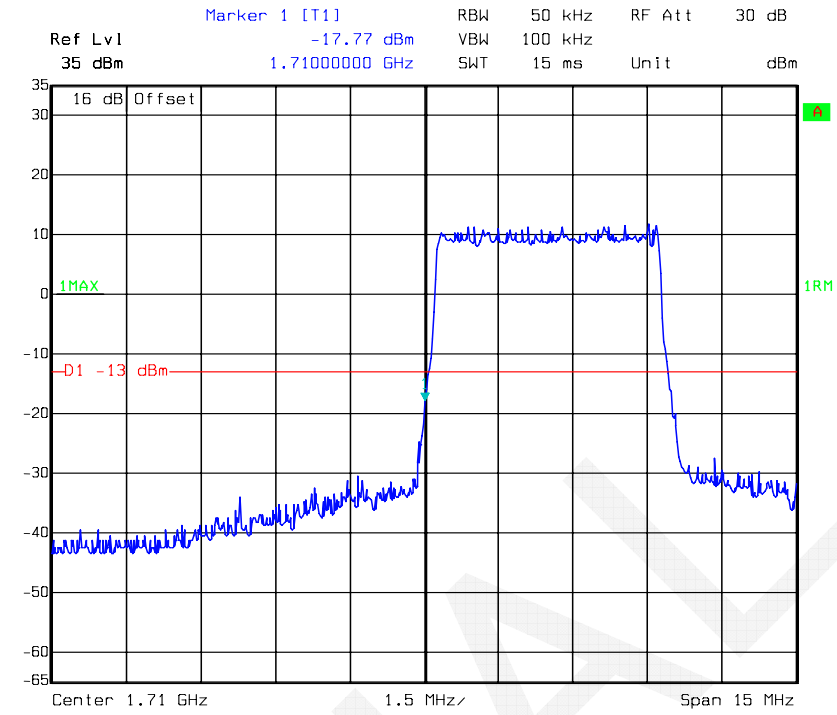
QPSK-5M 1RB, Left Band Edge



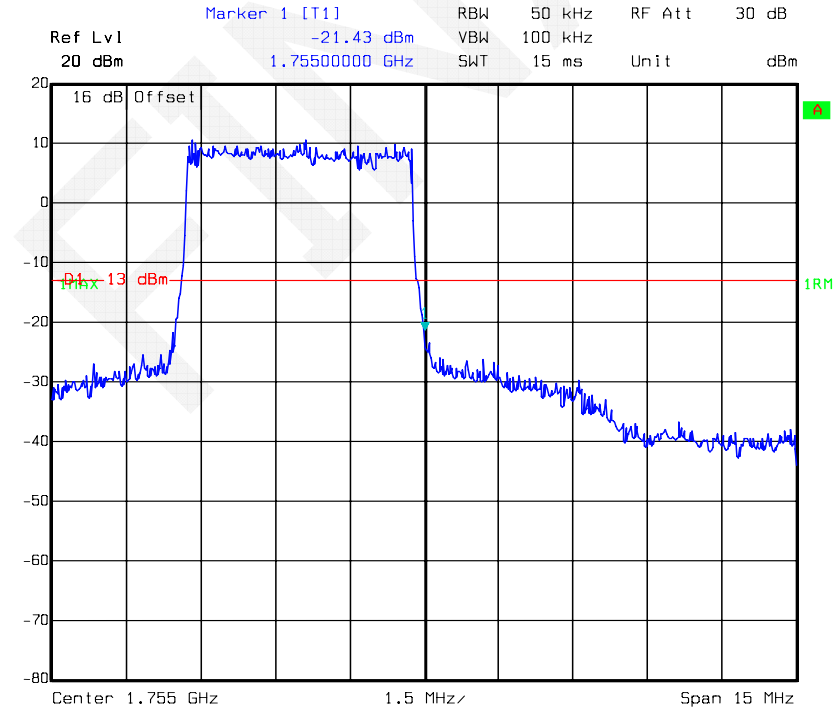
QPSK-5M 1RB, Right Band Edge



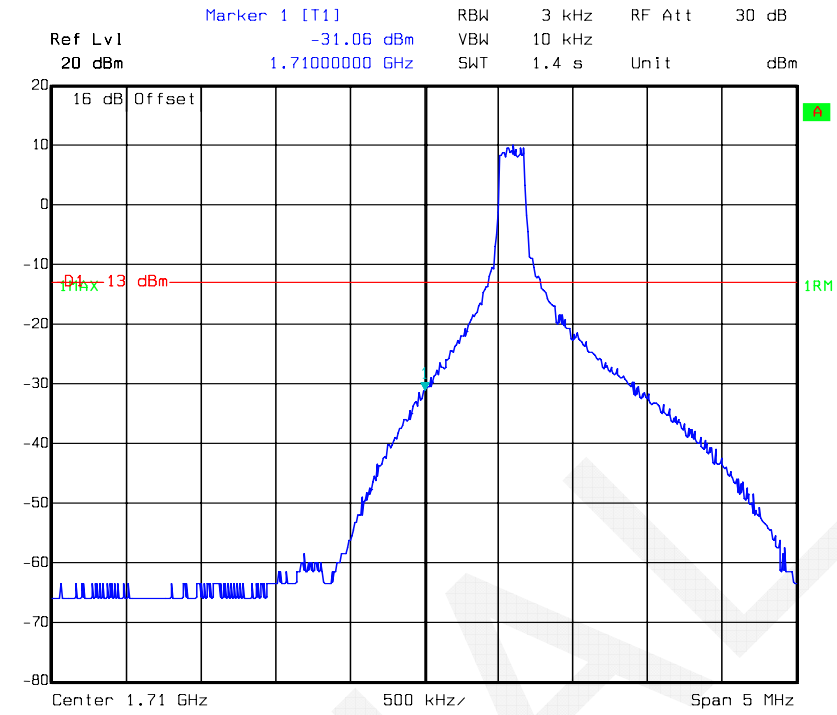
QPSK-5M Full RB, Left Band Edge



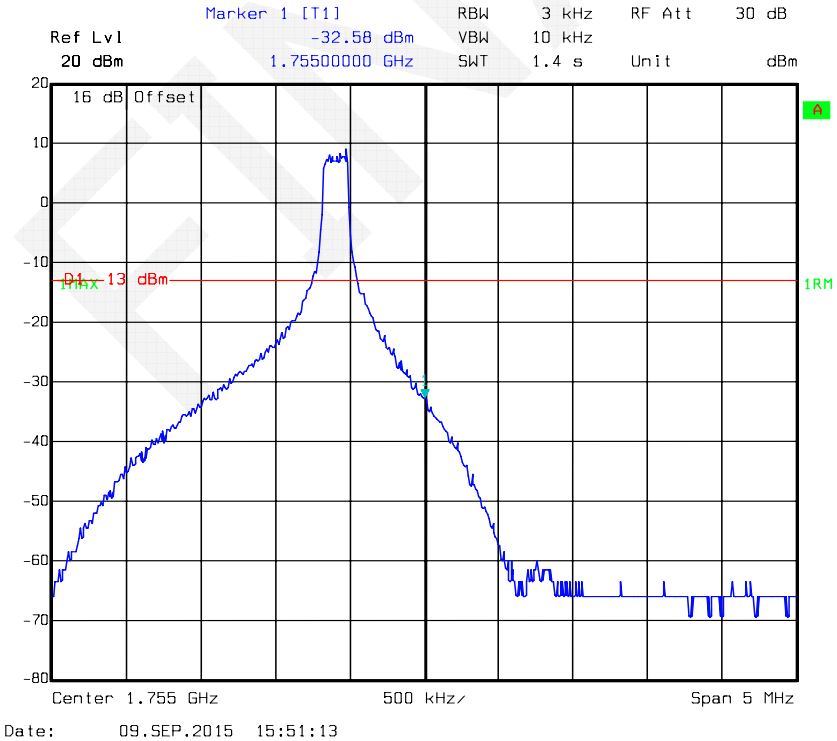
QPSK-5M Full RB, Right Band Edge



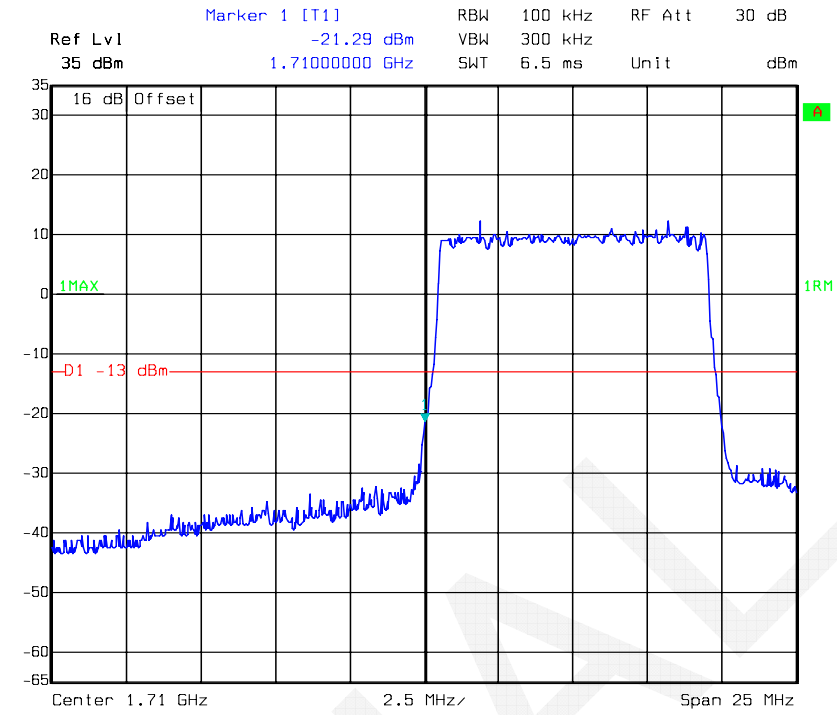
QPSK-10M 1RB, Left Band Edge



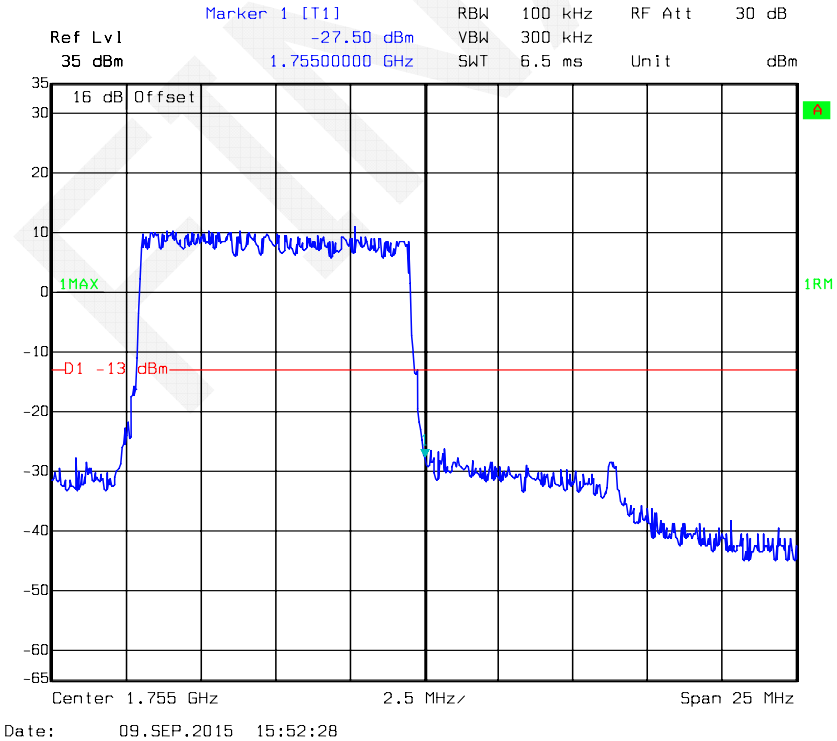
QPSK-10M 1RB, Right Band Edge



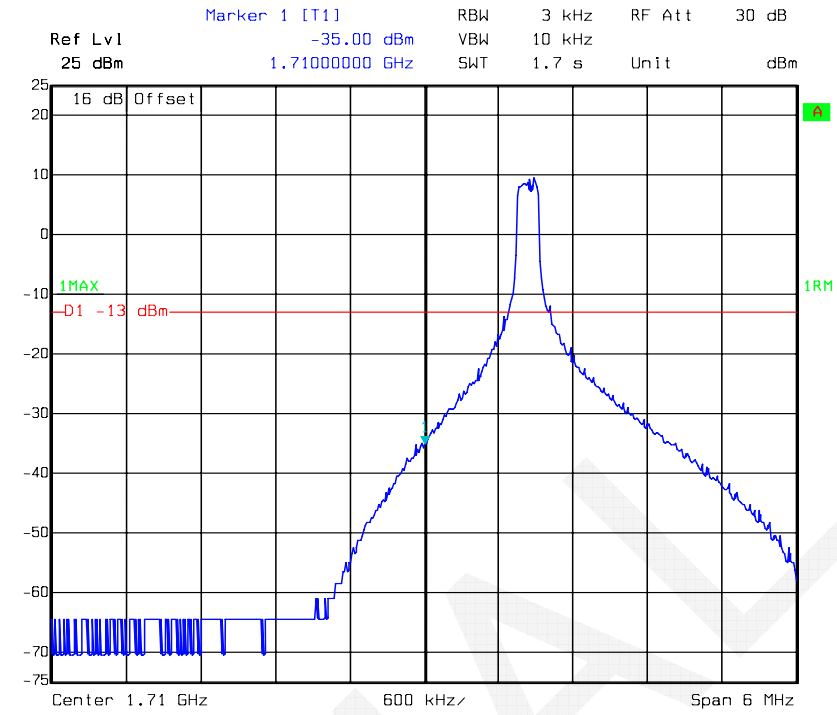
QPSK-10M Full RB, Left Band Edge



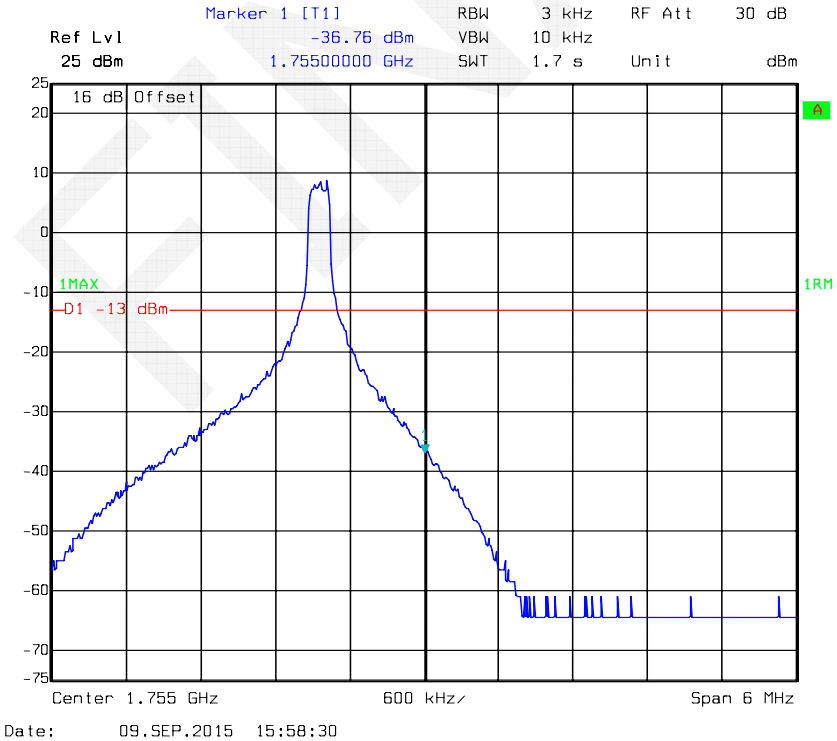
QPSK-10M Full RB, Right Band Edge



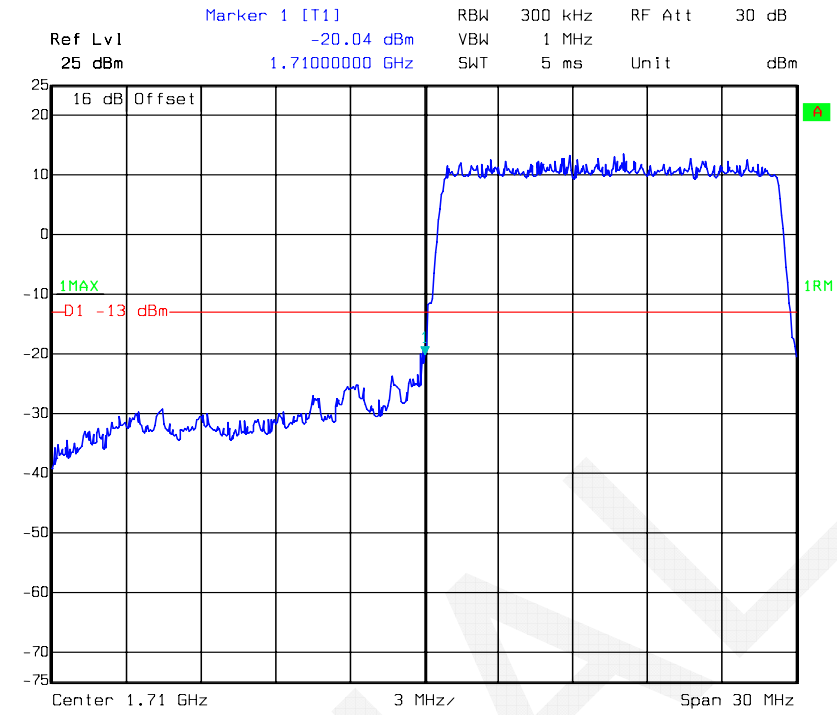
QPSK-15M 1RB, Left Band Edge



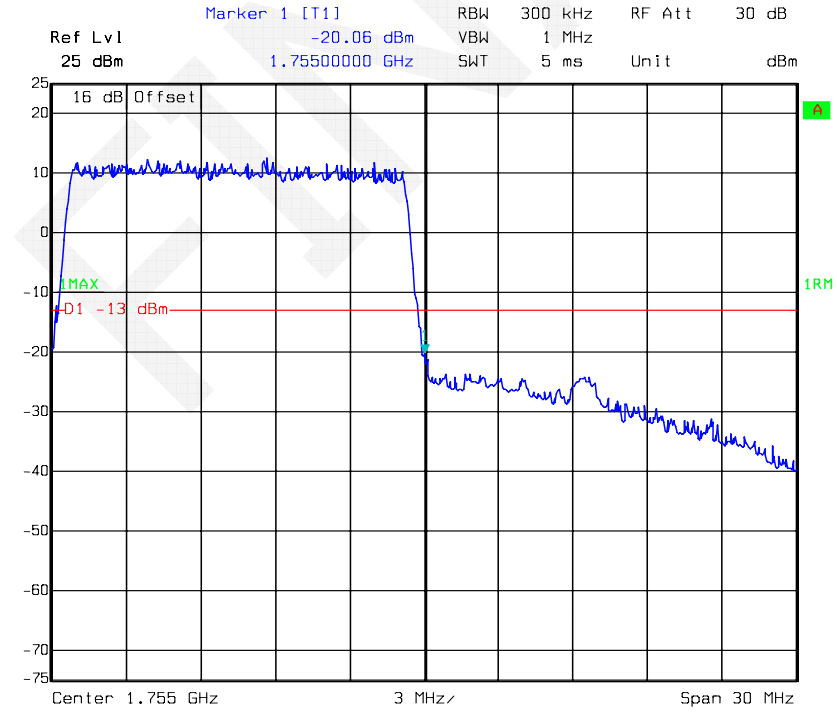
QPSK-15M 1RB, Right Band Edge



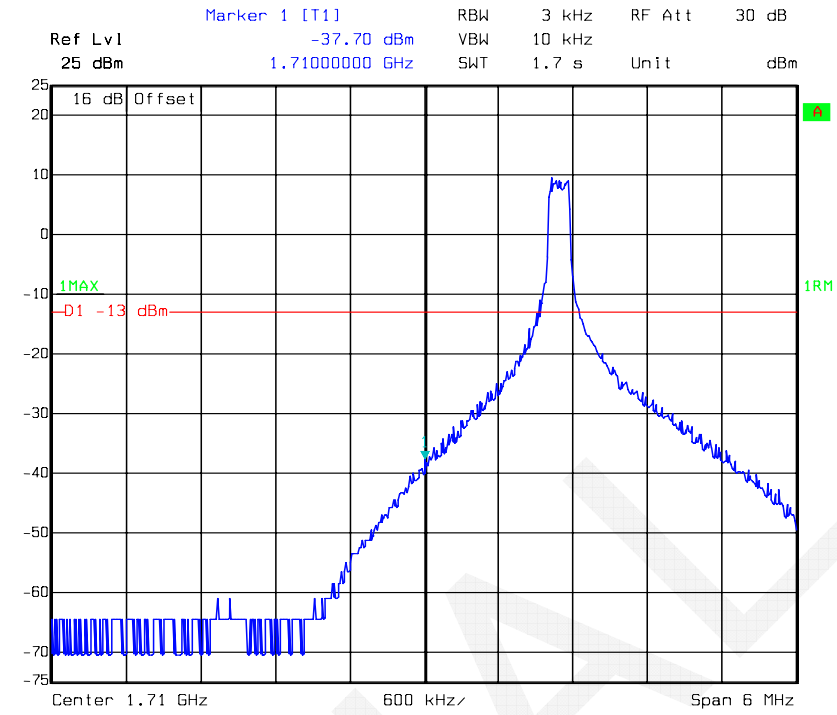
QPSK-15M Full RB, Left Band Edge



QPSK-15M Full RB, Right Band Edge



QPSK-20M 1RB, Left Band Edge



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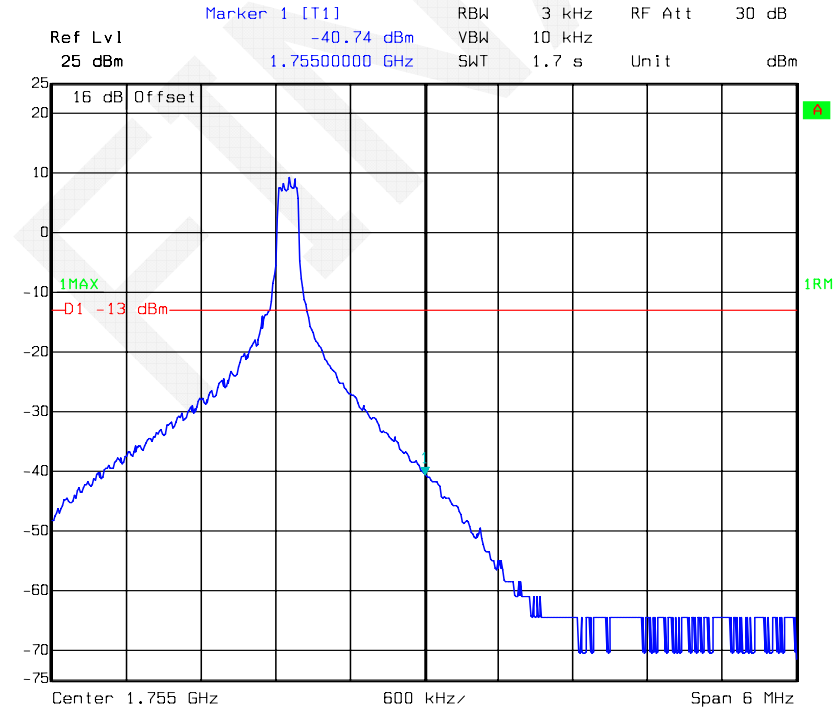
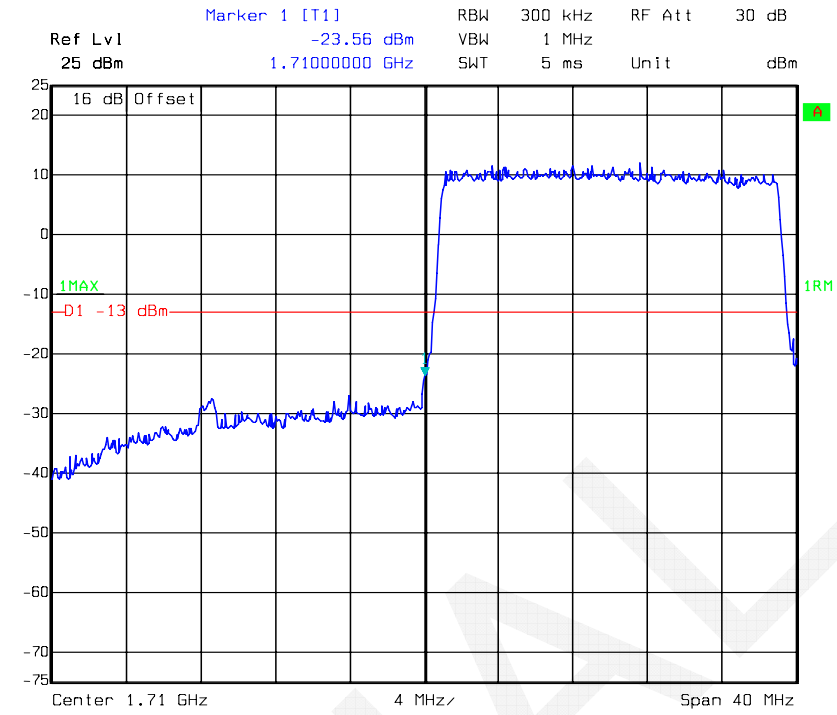
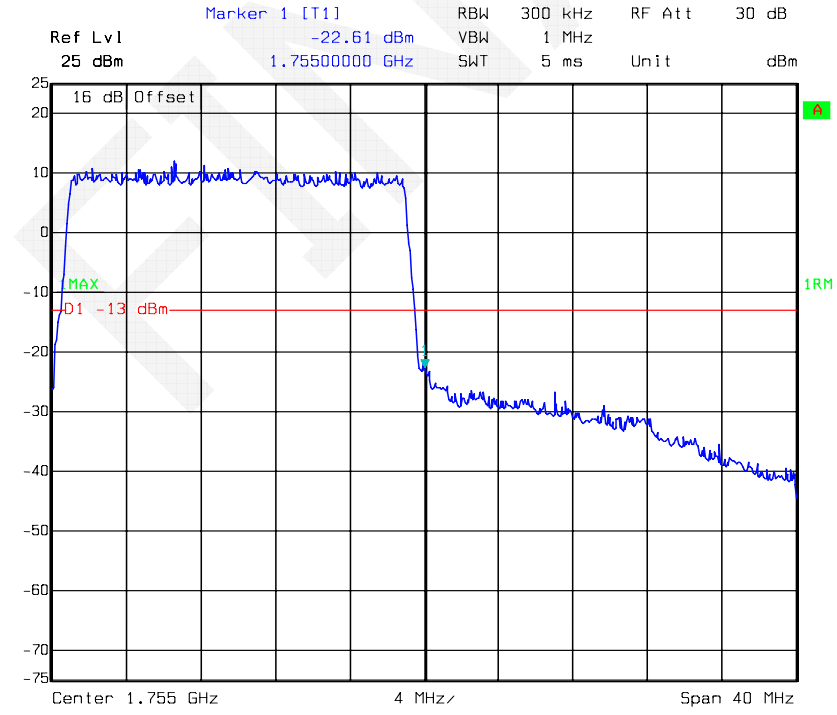


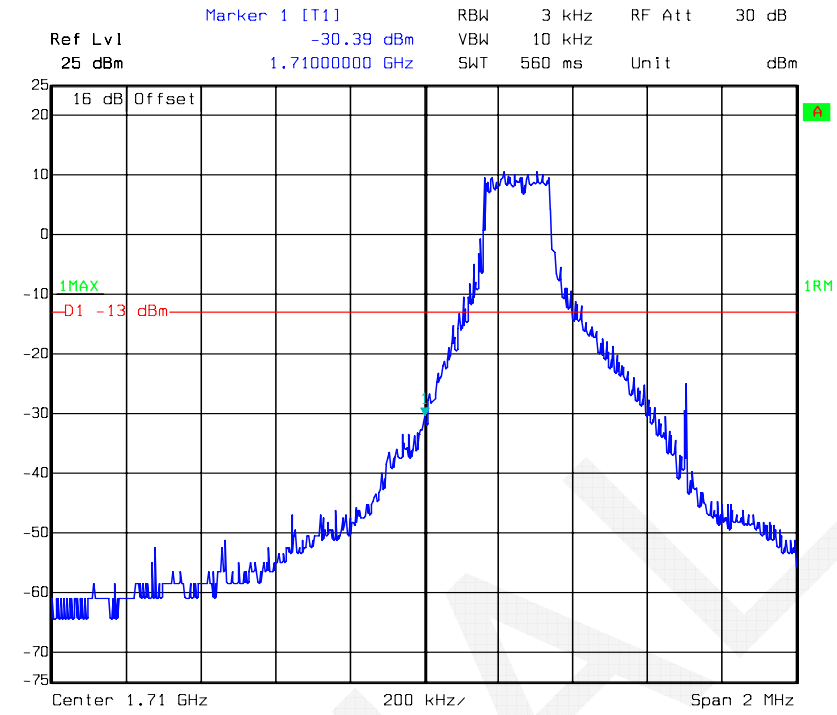
QPSK-20M Full RB, Left Band Edge



QPSK-20M Full RB, Right Band Edge



16QAM -1.4M 1RB, Left Band Edge



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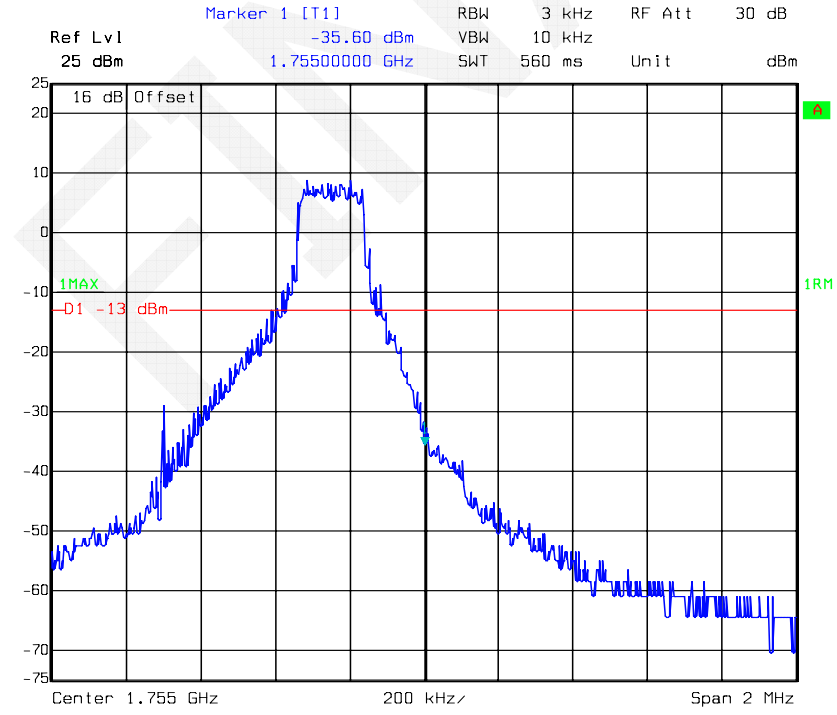
16QAM -1.4M 1RB, Right Band Edge



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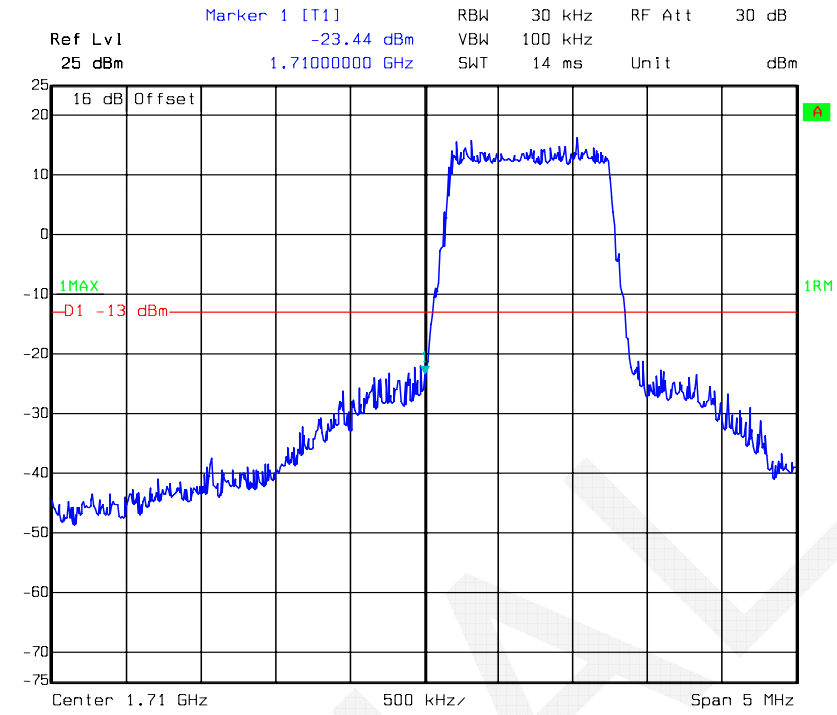
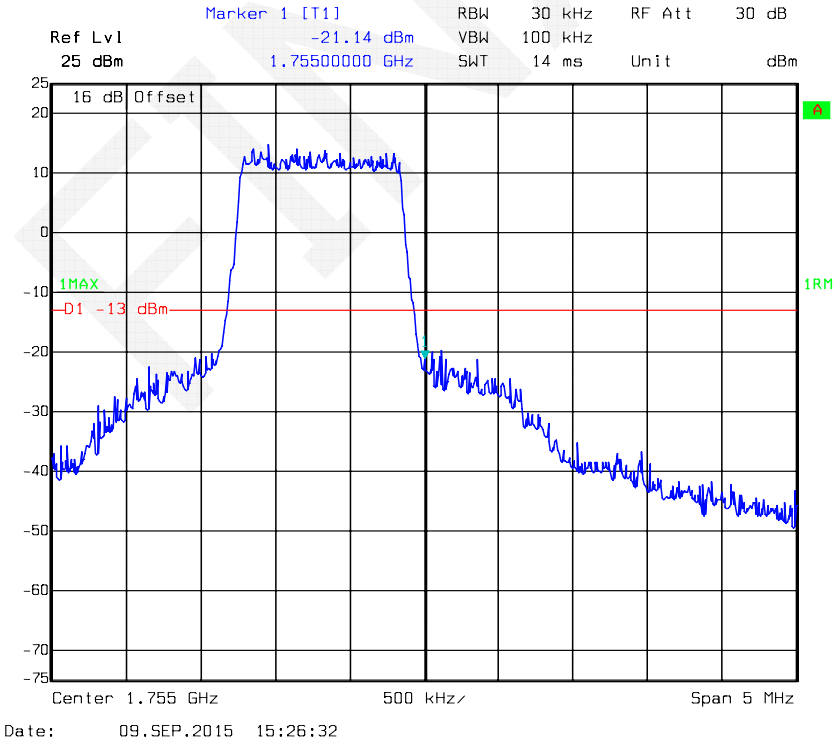
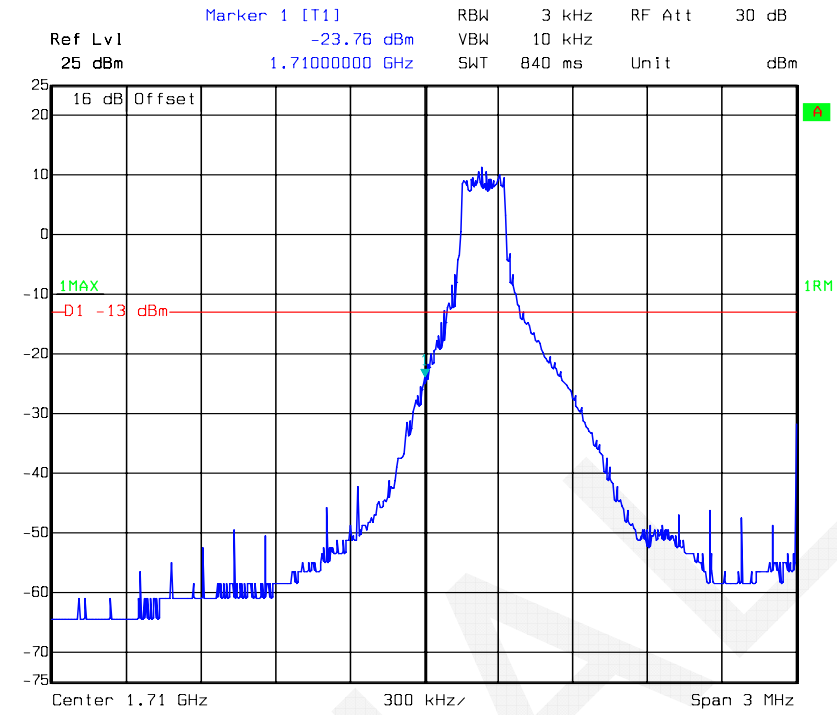


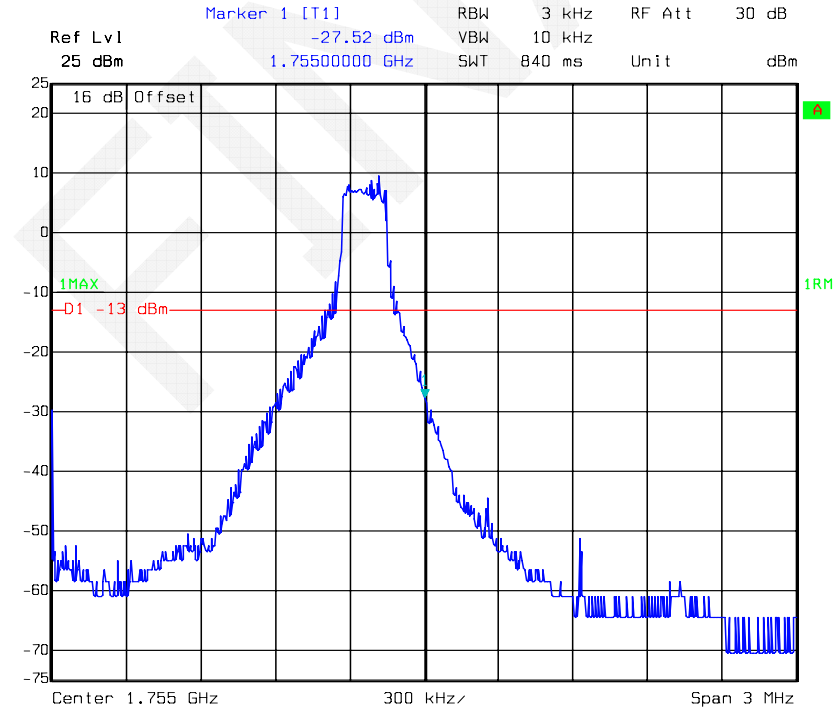
16QAM -1.4M Full RB, Right Band Edge



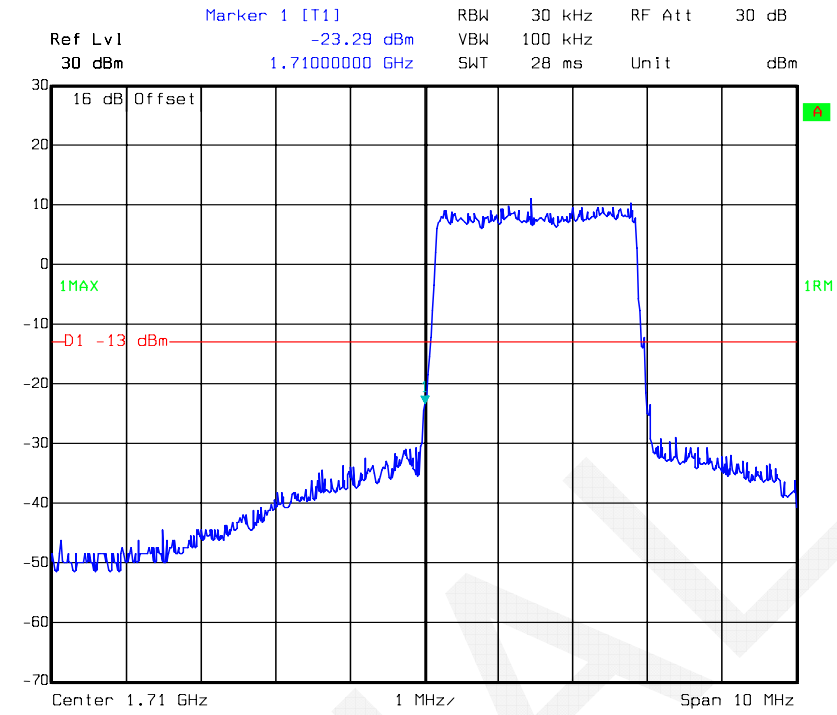
16QAM -3M 1RB, Left Band Edge



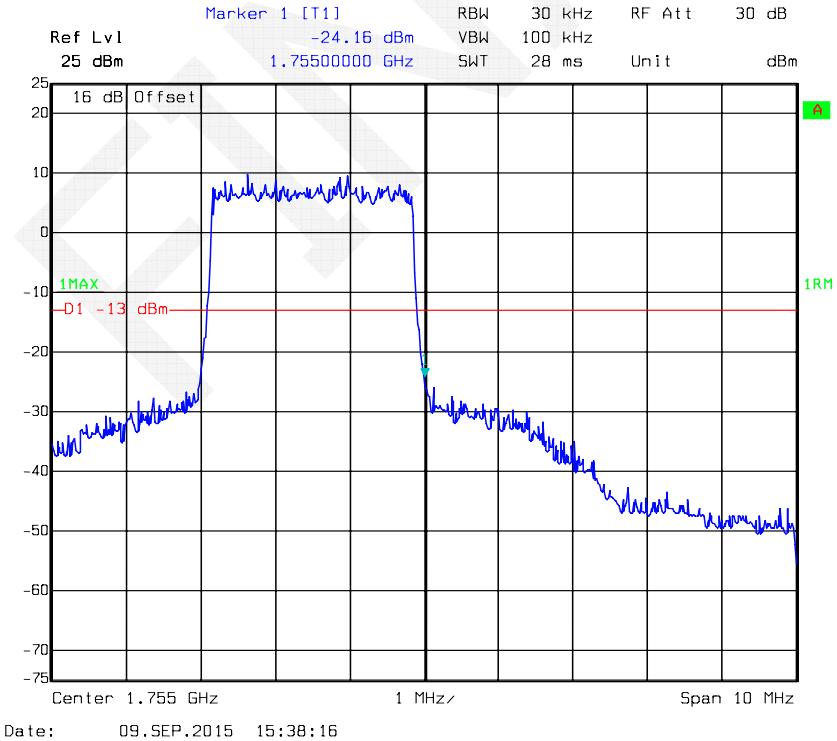
16QAM -3M 1RB, Right Band Edge



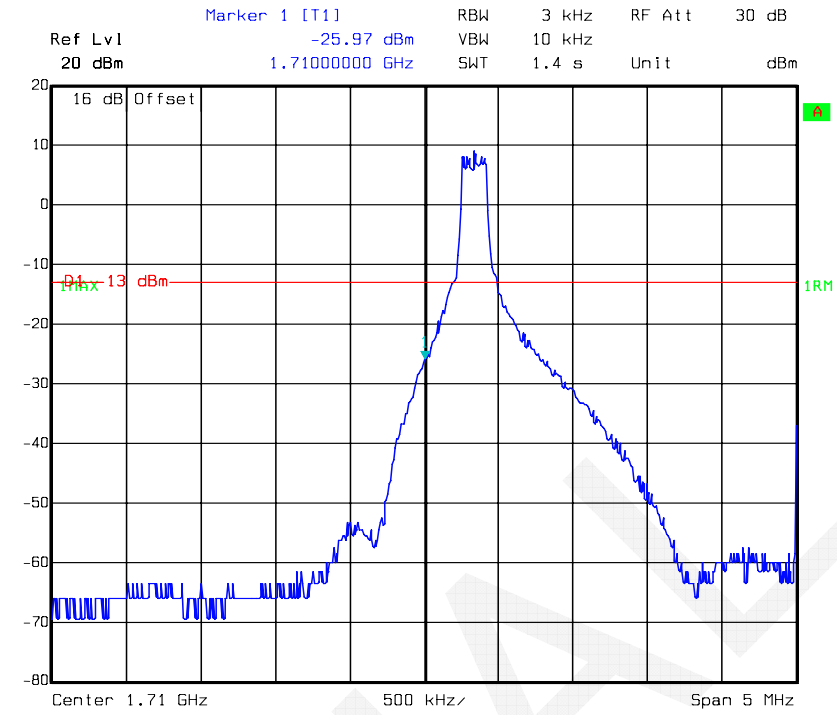
16QAM -3M Full RB, Left Band Edge



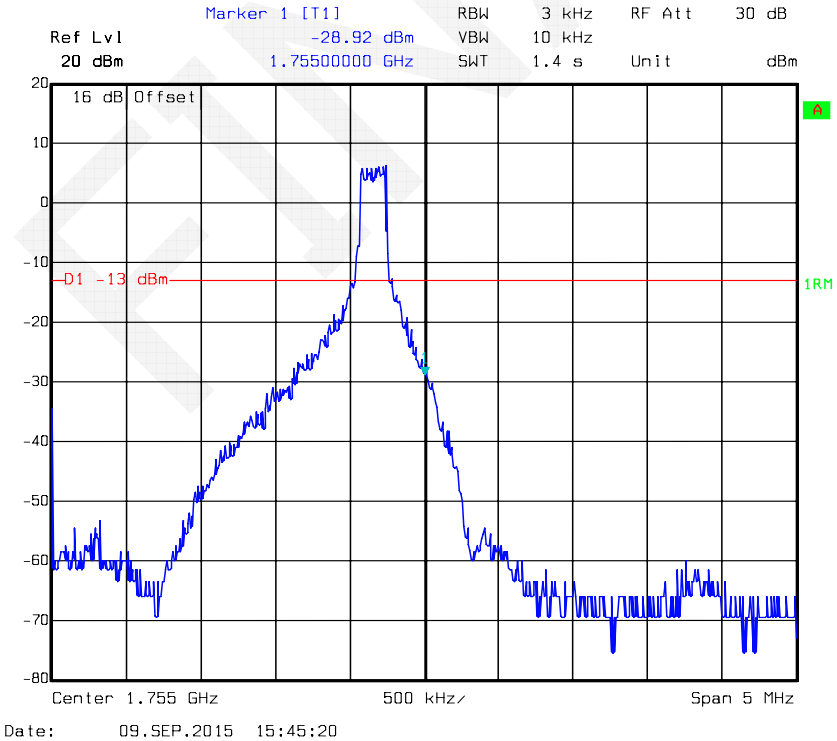
16QAM -3M Full RB, Right Band Edge



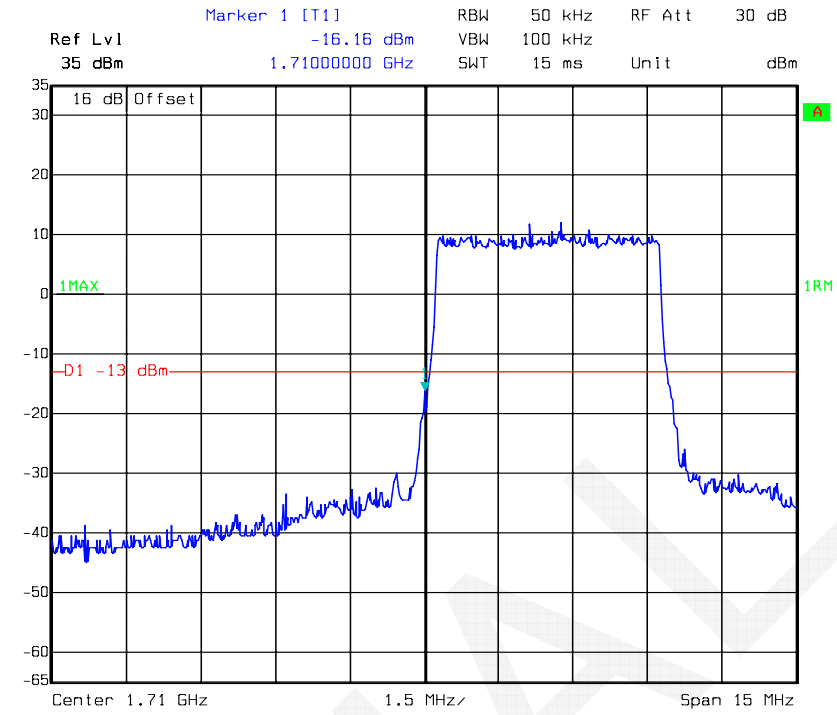
16QAM -5M 1RB, Left Band Edge



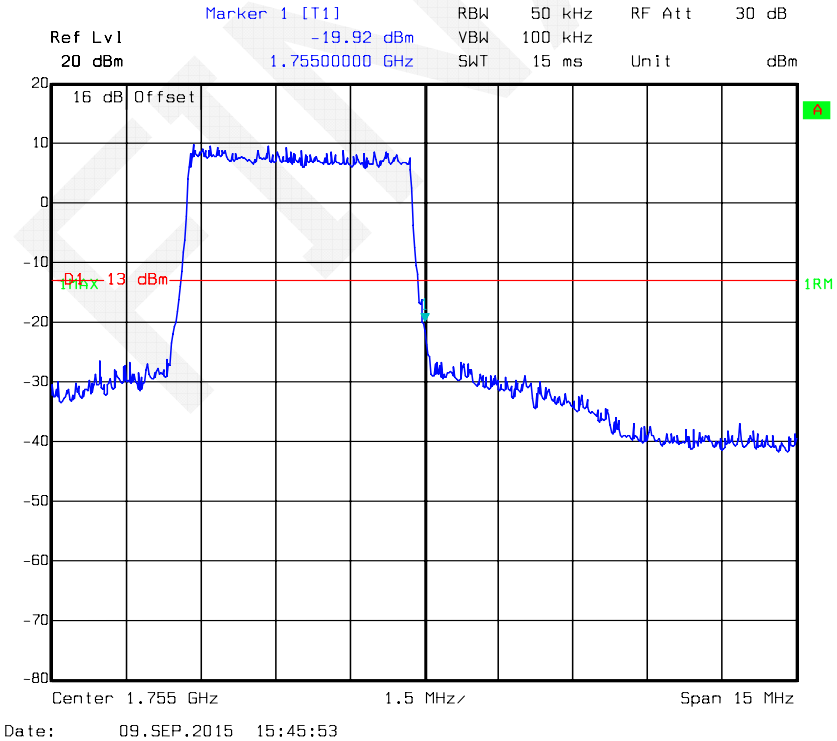
16QAM -5M 1RB, Right Band Edge



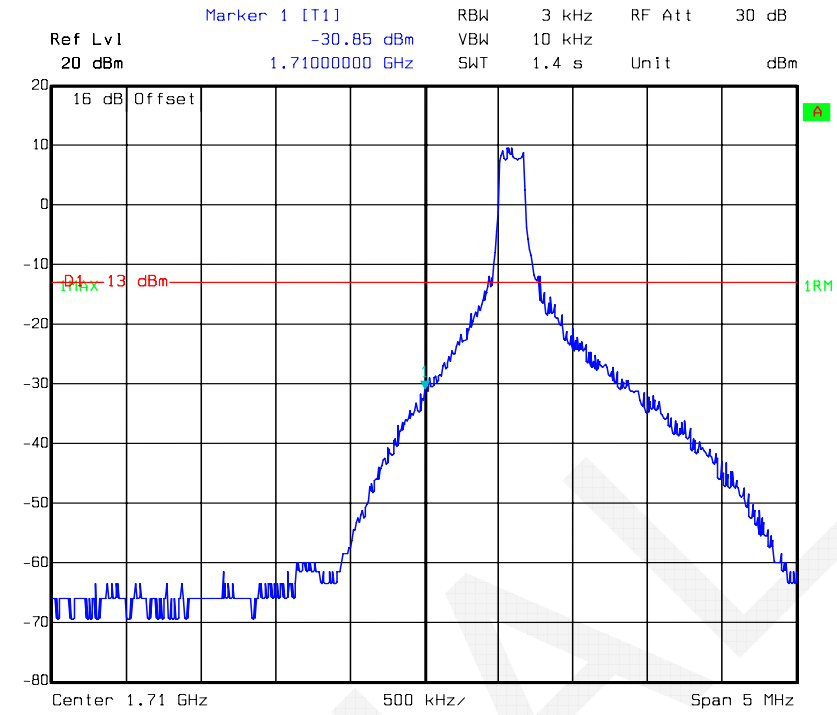
16QAM -5M Full RB, Left Band Edge



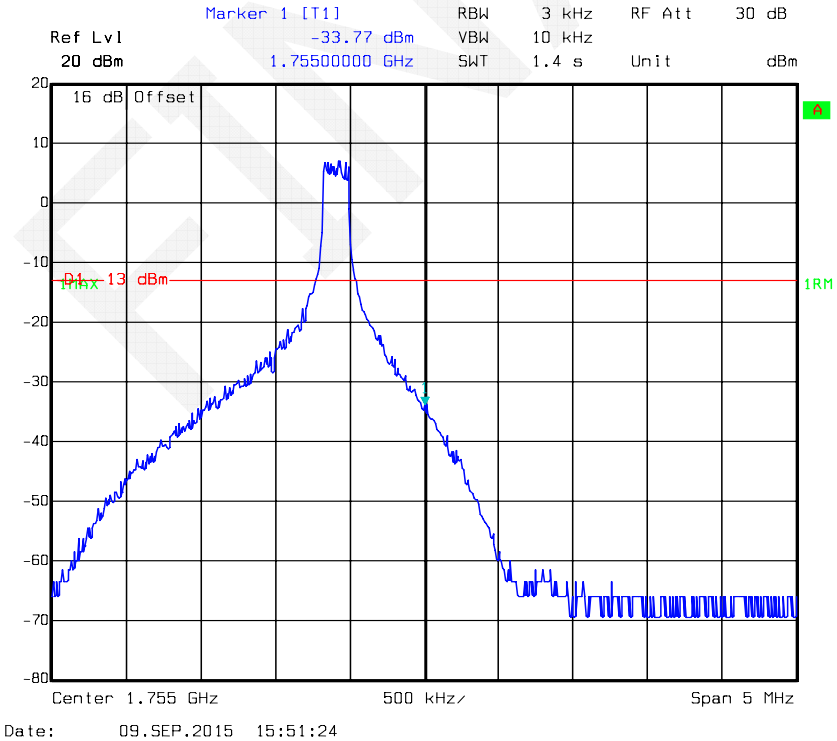
16QAM -5M Full RB, Right Band Edge



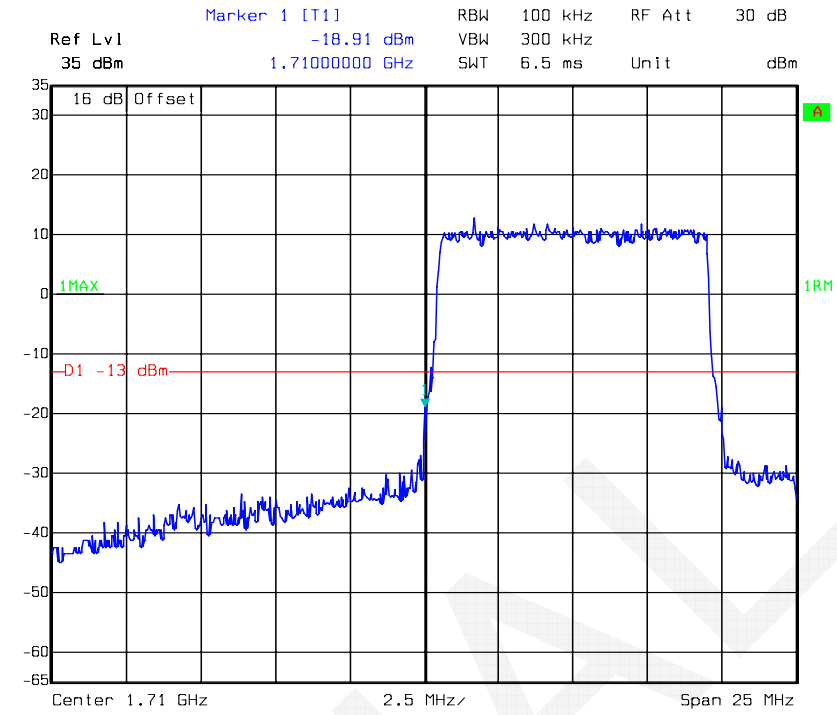
16QAM -10M 1RB, Left Band Edge



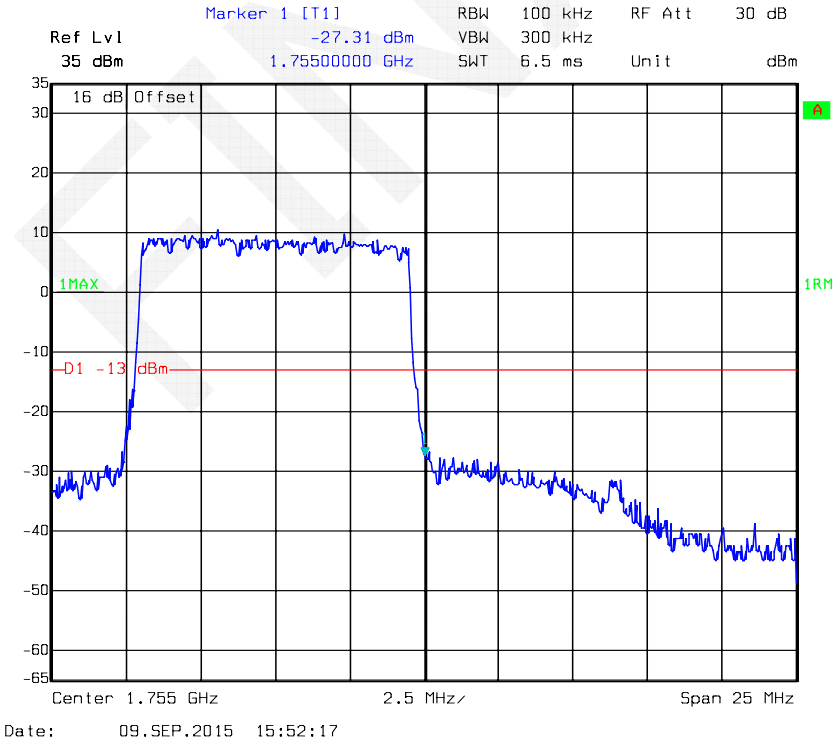
16QAM -10M 1RB, Right Band Edge



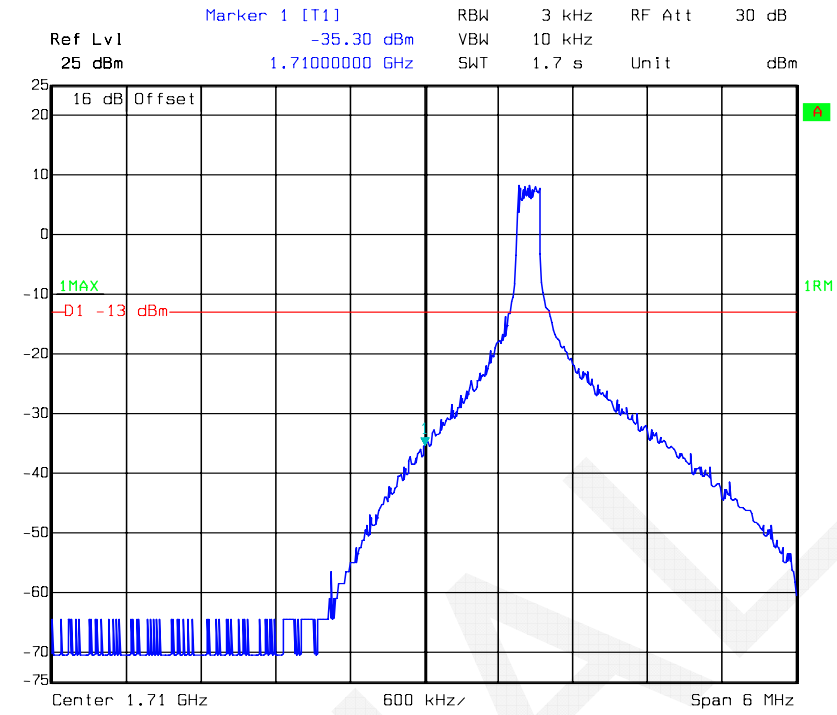
16QAM -10M Full RB, Left Band Edge



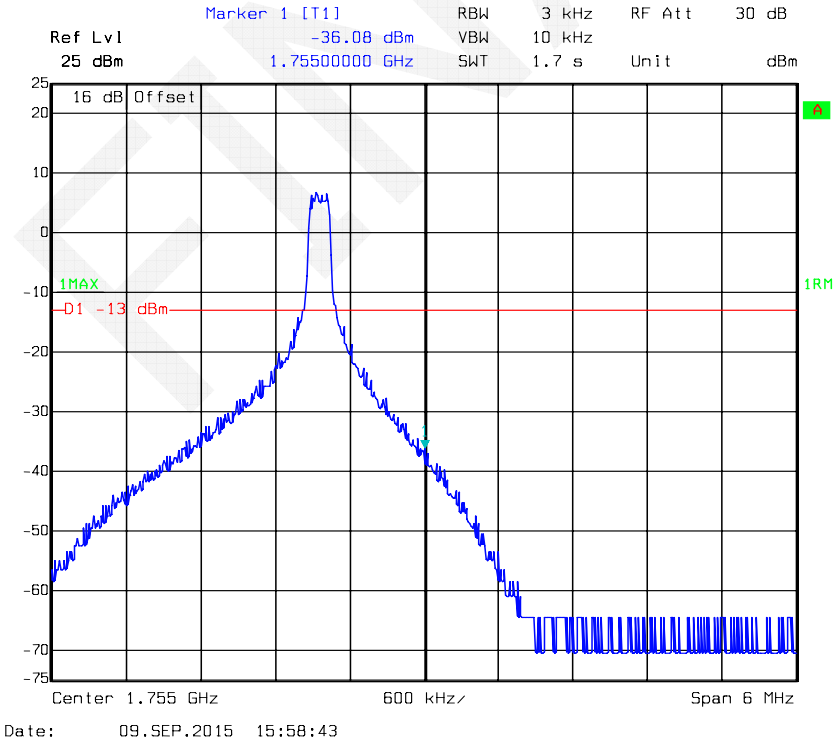
16QAM -10M Full RB, Right Band Edge



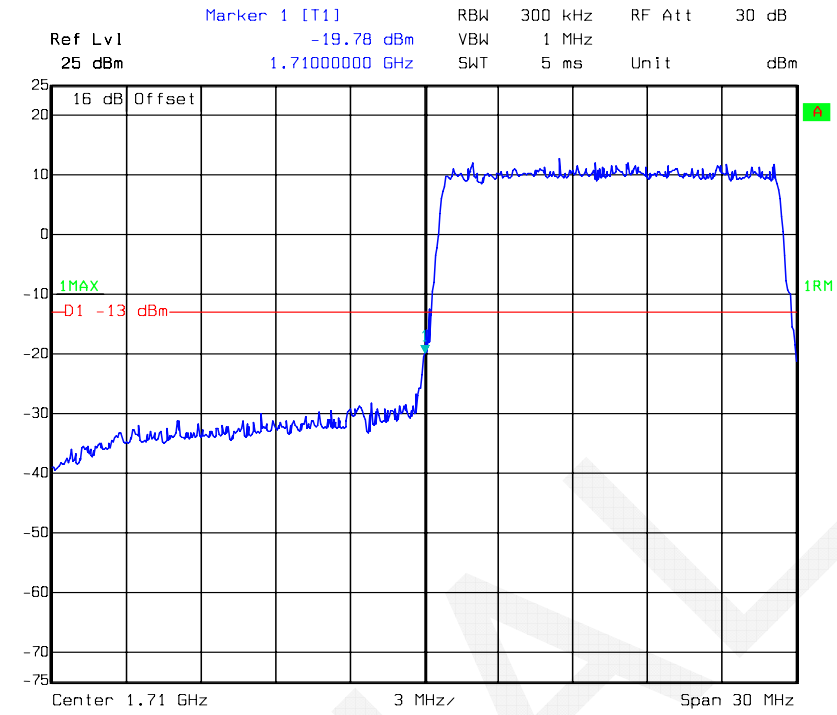
16QAM -15M 1RB, Left Band Edge



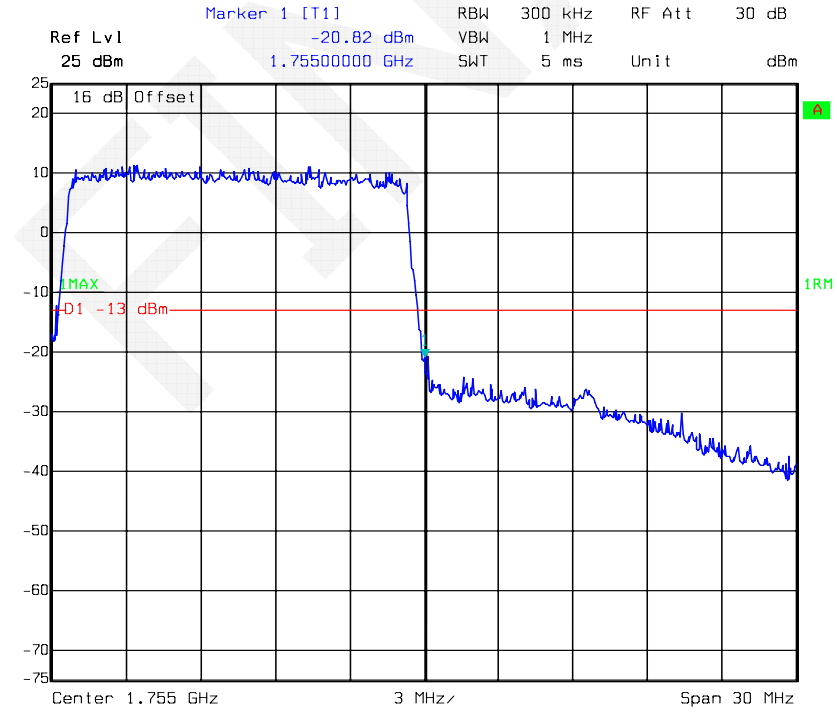
16QAM -15M 1RB, Right Band Edge



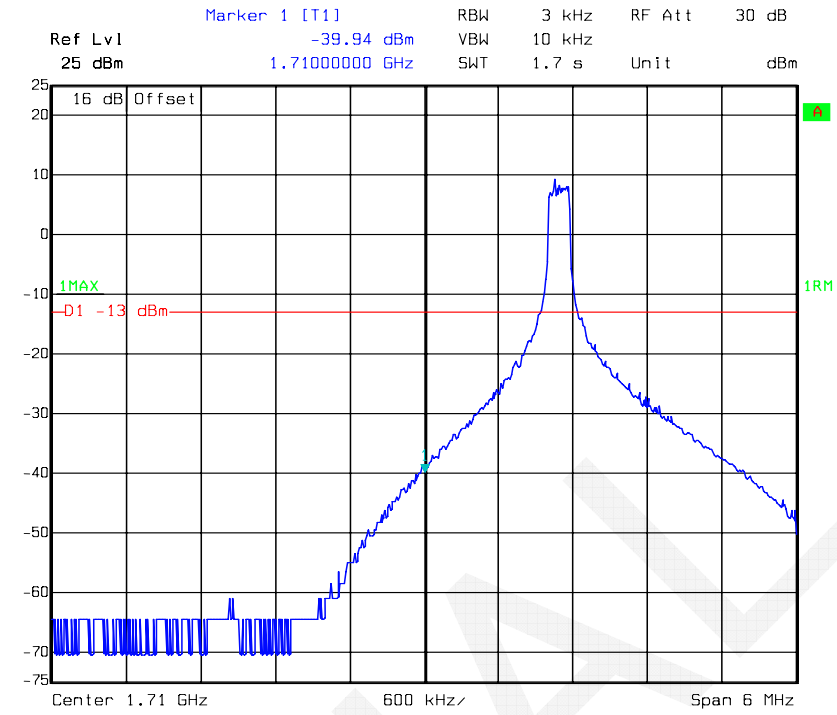
16QAM -15M Full RB, Left Band Edge



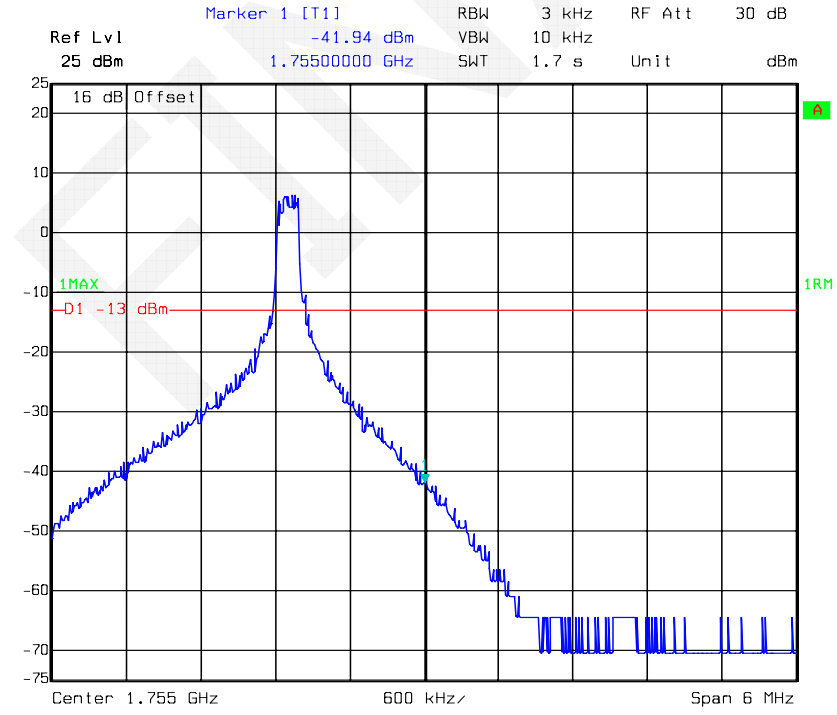
16QAM -15M Full RB, Right Band Edge



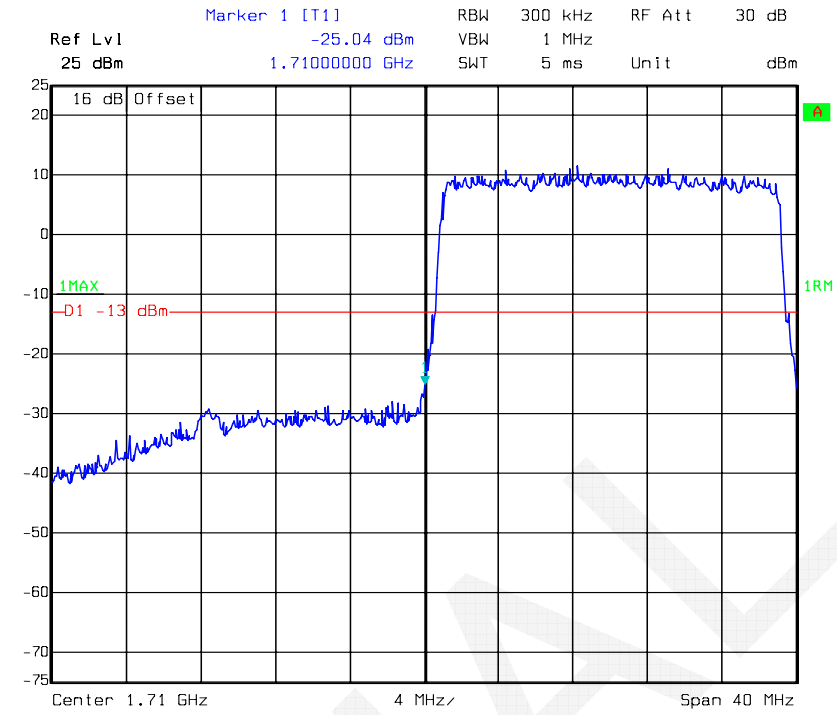
16QAM -20M 1RB, Left Band Edge



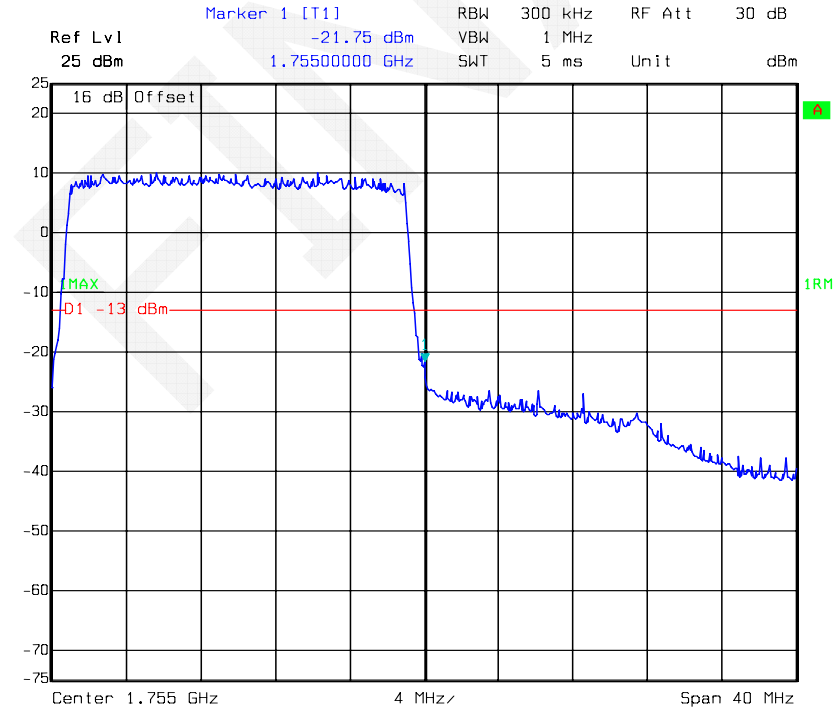
16QAM -20M 1RB, Right Band Edge



16QAM -20M Full RB, Left Band Edge

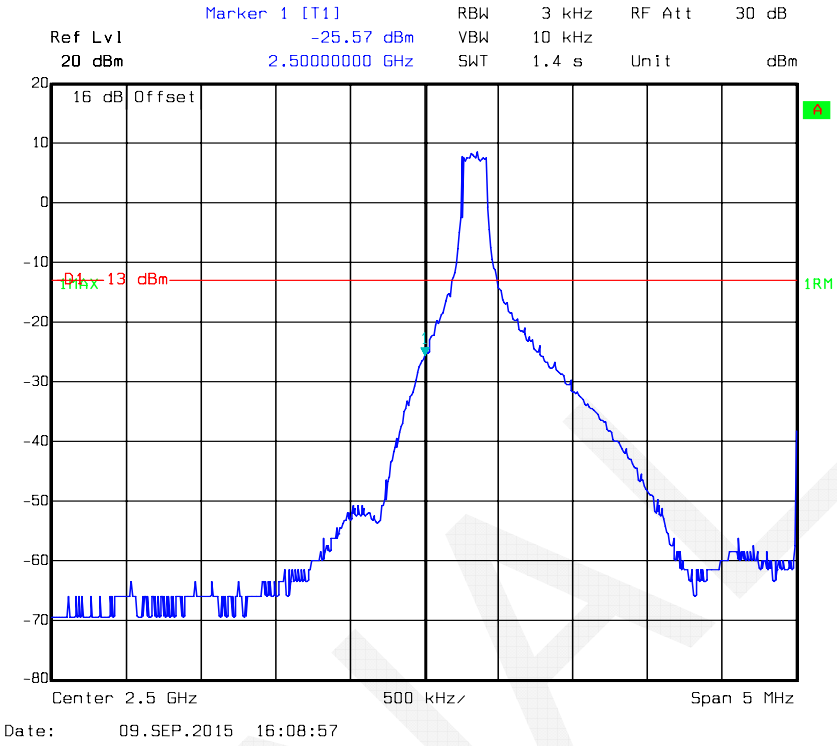


16QAM-20M Full RB, Right Band Edge

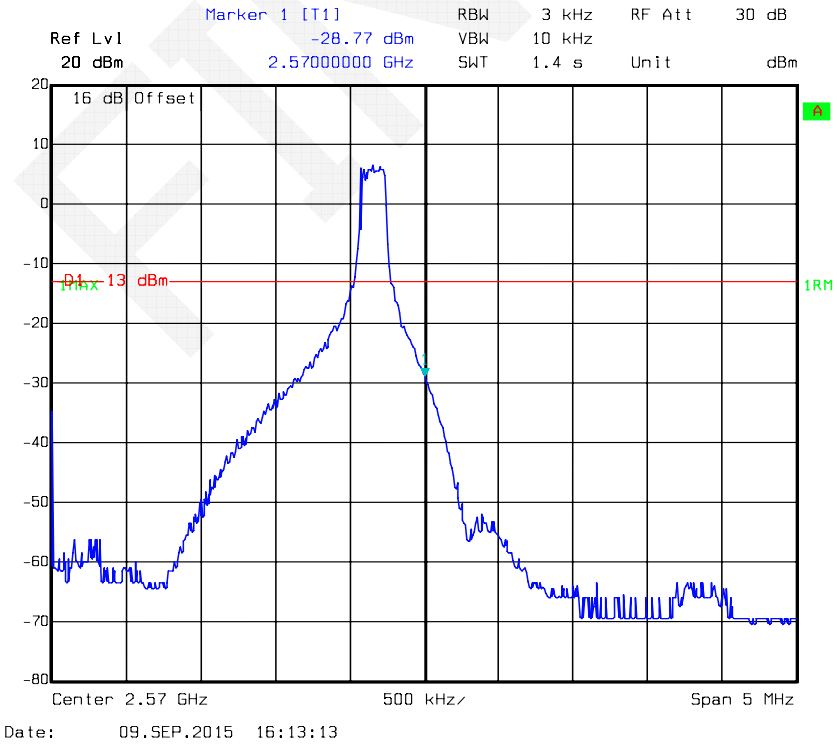


LTE Band 7

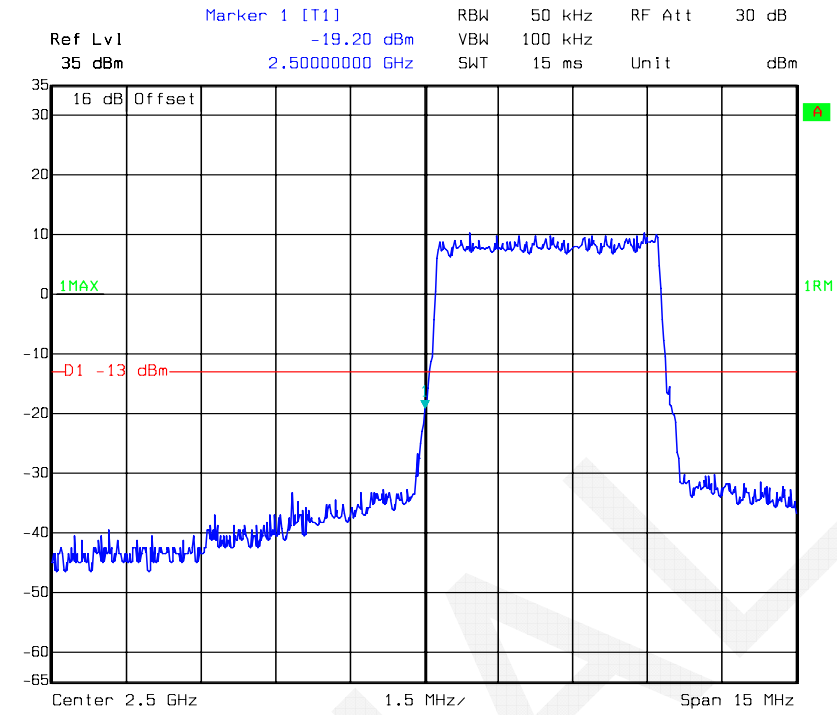
QPSK-5M 1RB, Left Band Edge



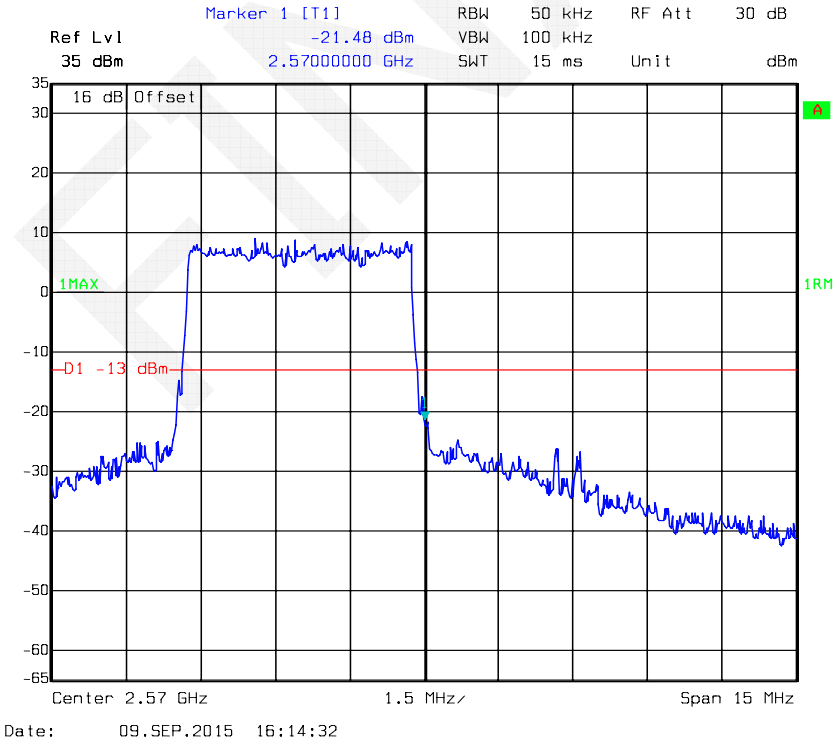
QPSK-5M 1RB, Right Band Edge



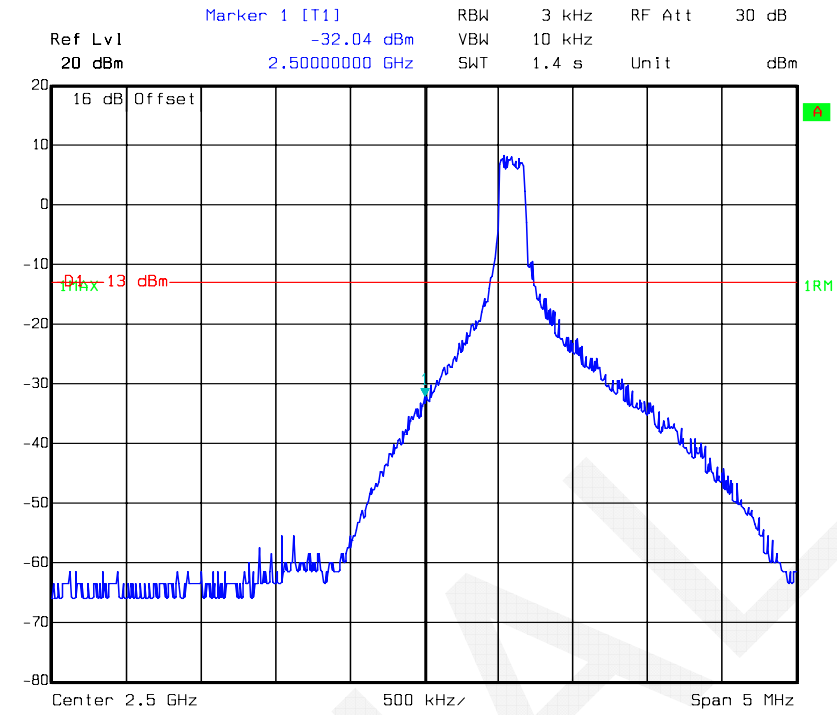
QPSK-5M Full RB, Left Band Edge



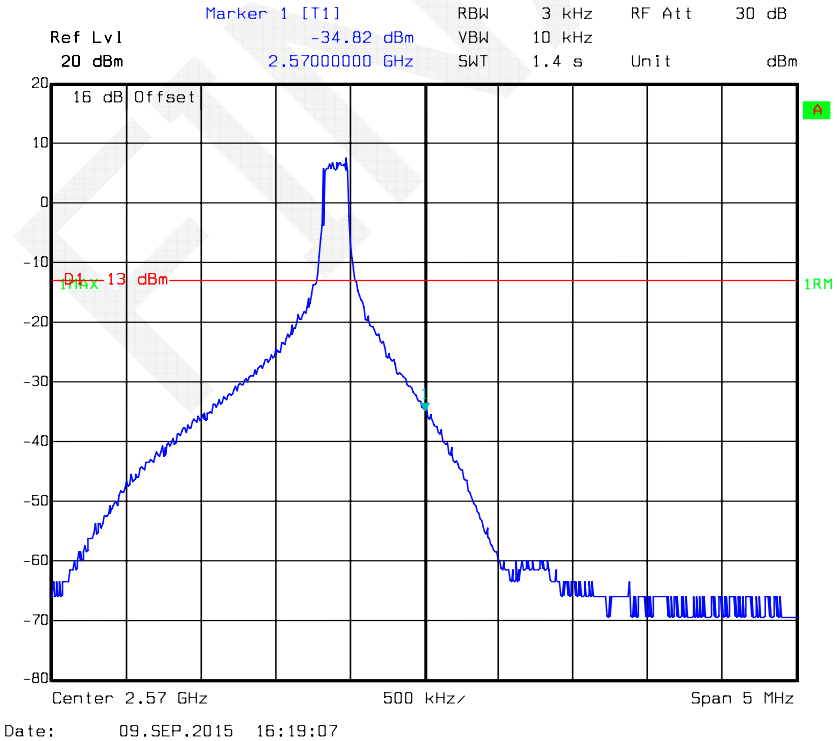
QPSK-5M Full RB, Right Band Edge



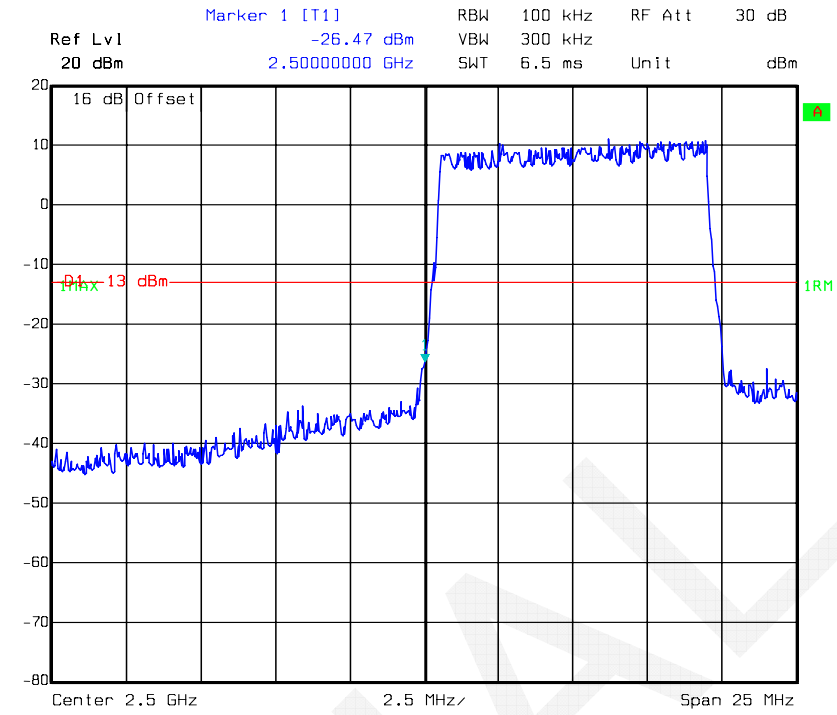
QPSK-10M 1RB, Left Band Edge



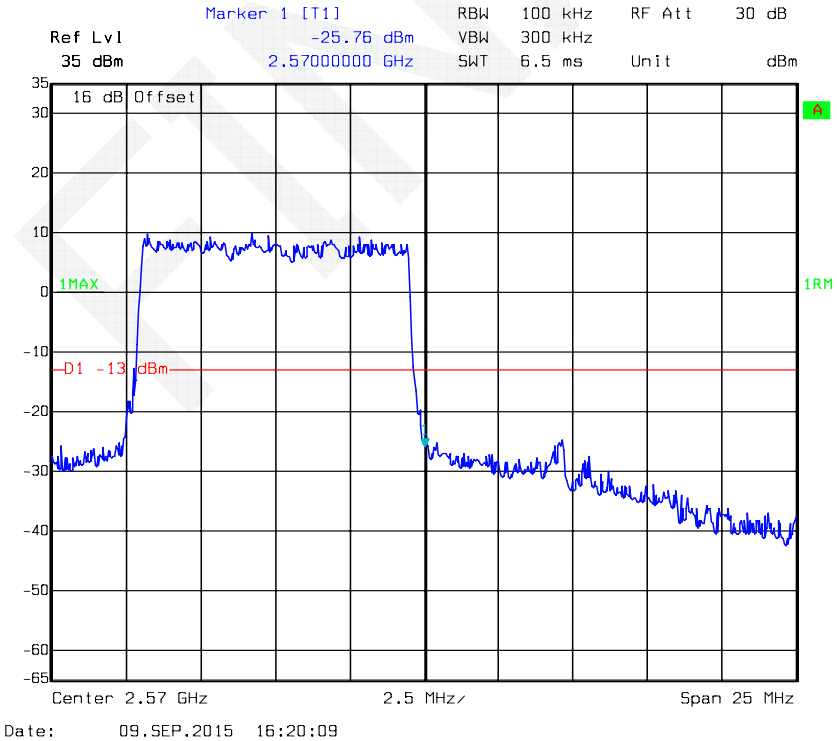
QPSK-10M 1RB, Right Band Edge



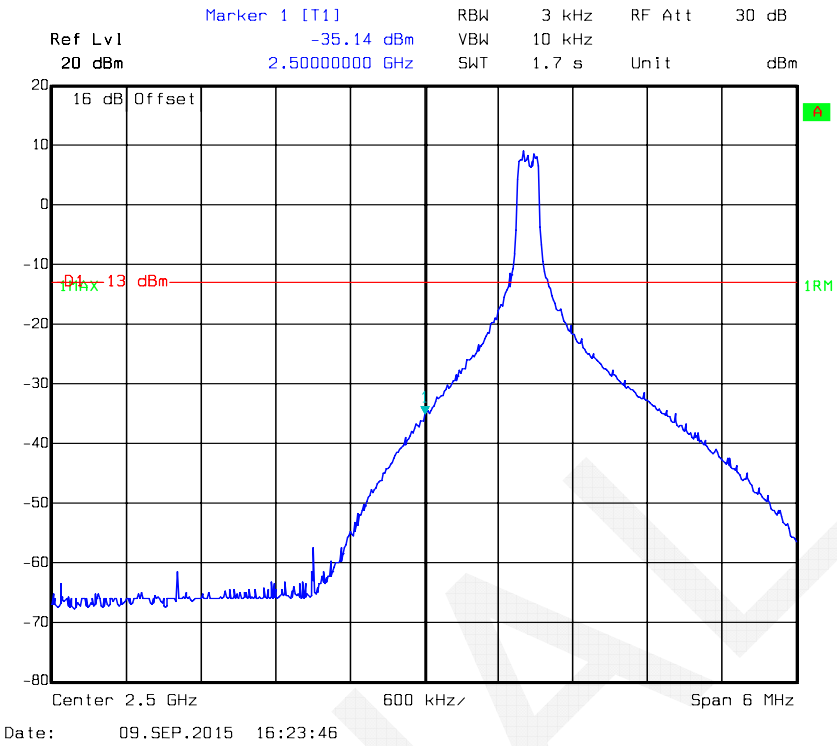
QPSK-10M Full RB, Left Band Edge



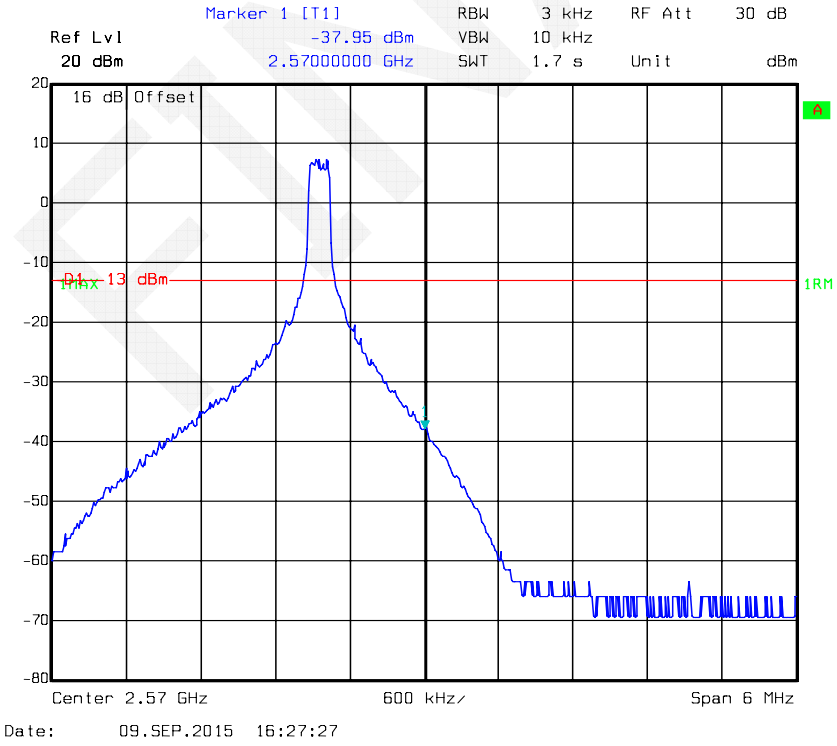
QPSK-10M Full RB, Right Band Edge



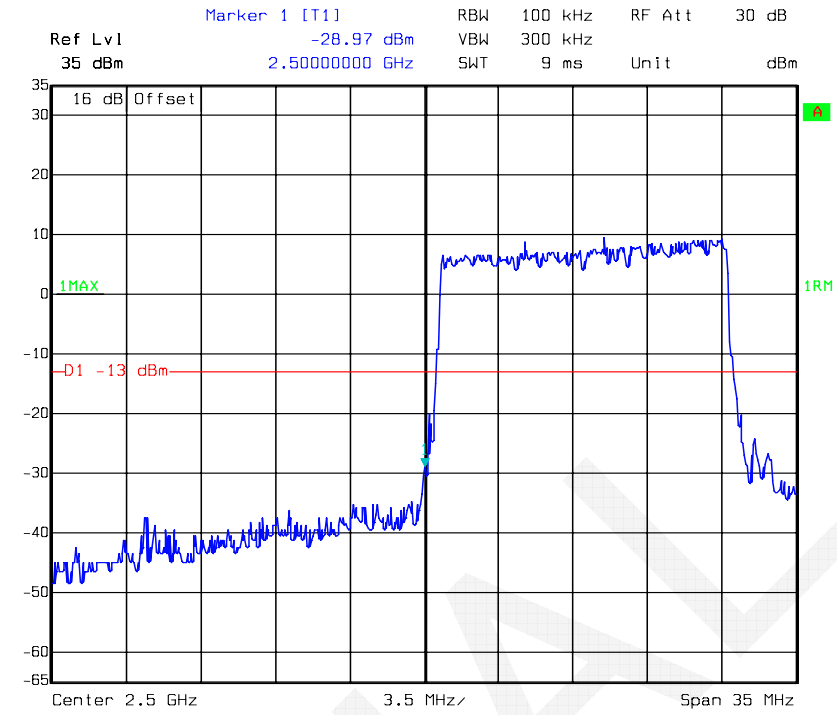
QPSK-15M 1RB, Left Band Edge



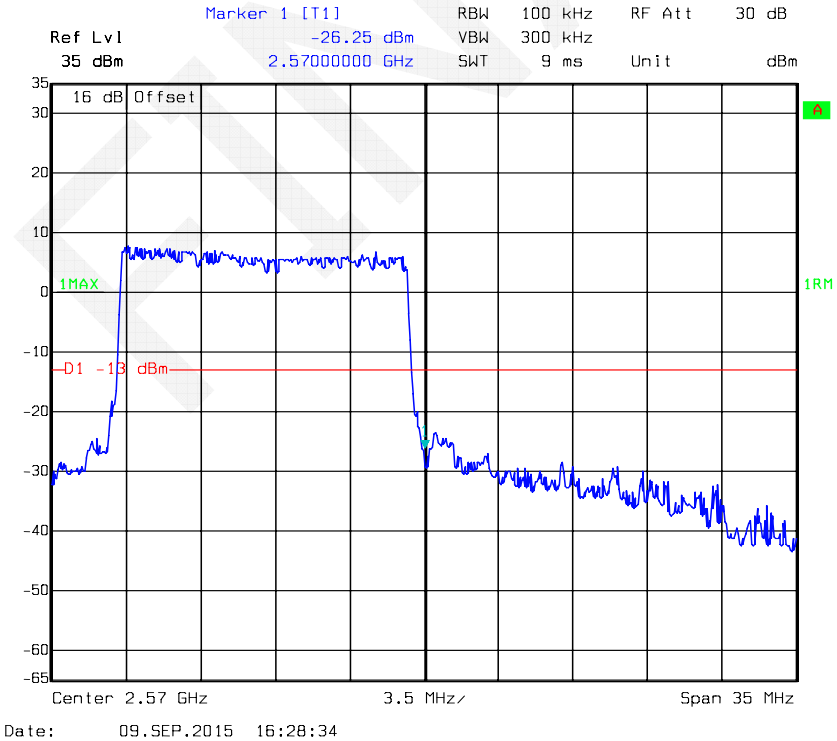
QPSK-15M 1RB, Right Band Edge



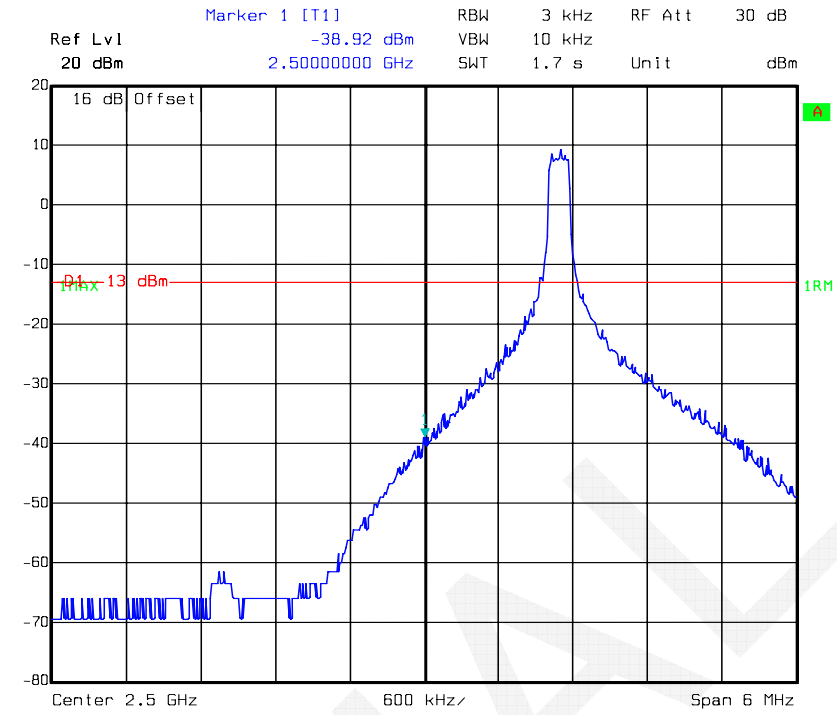
QPSK-15M Full RB, Left Band Edge



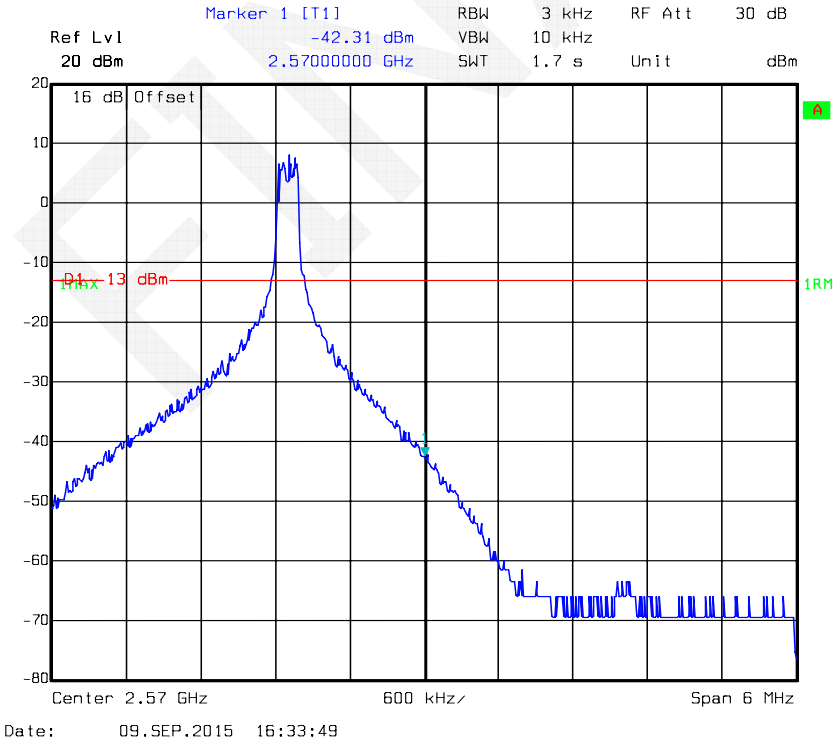
QPSK-15M Full RB, Right Band Edge



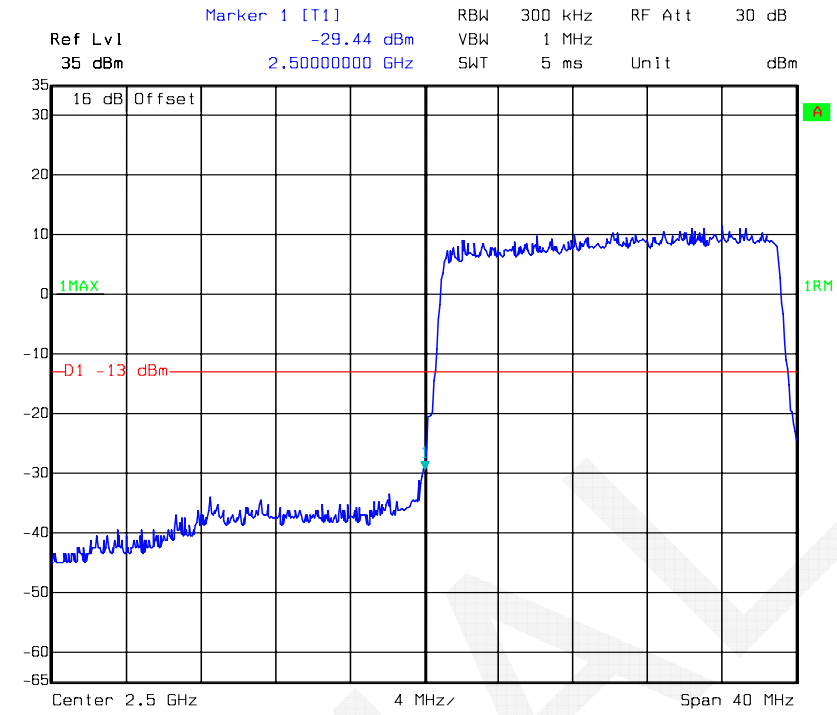
QPSK-20M 1RB, Left Band Edge



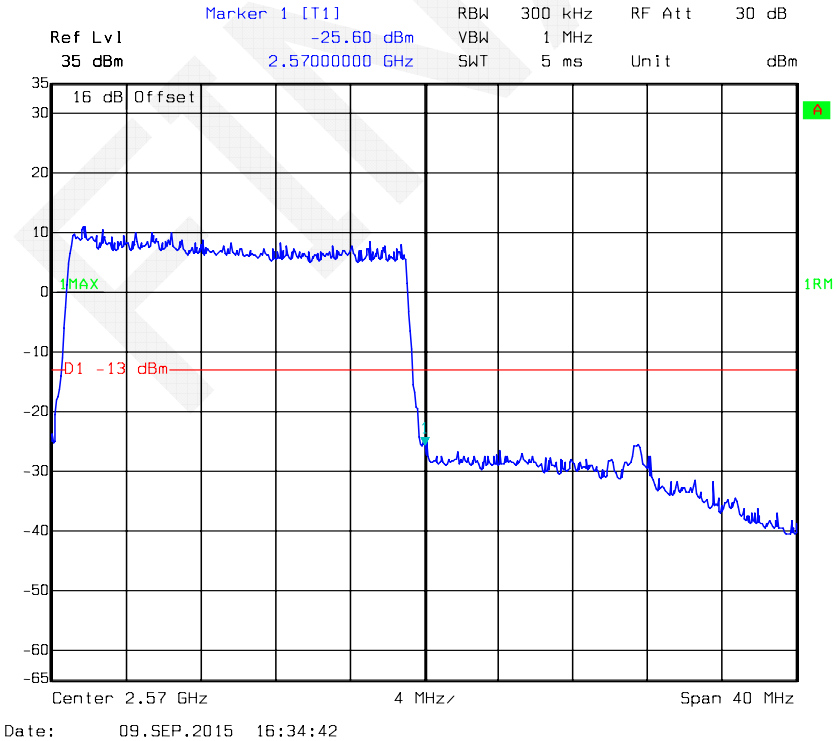
QPSK-20M 1RB, Right Band Edge



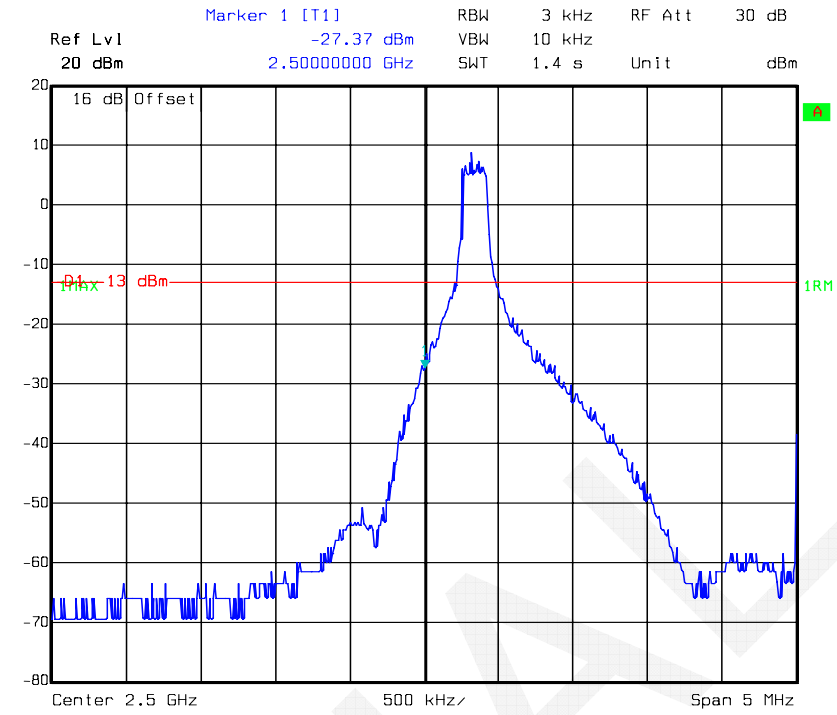
QPSK-20M Full RB, Left Band Edge



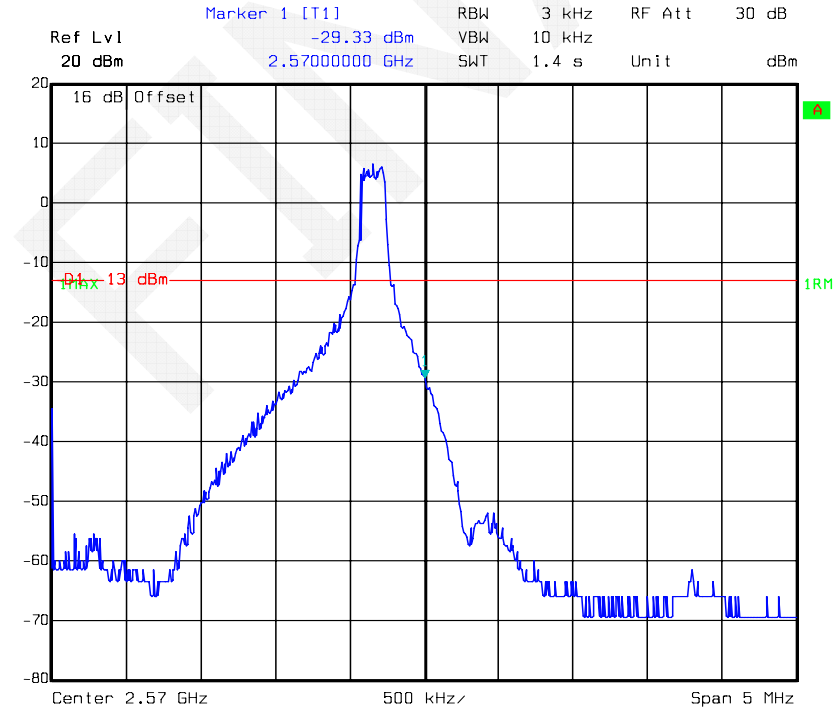
QPSK-20M Full RB, Right Band Edge



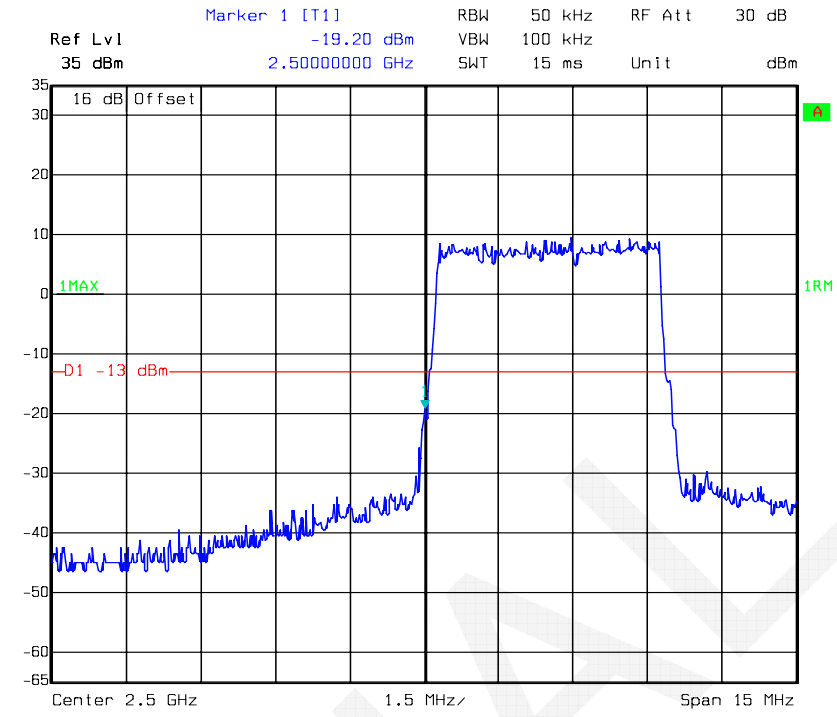
16QAM -5M 1RB, Left Band Edge



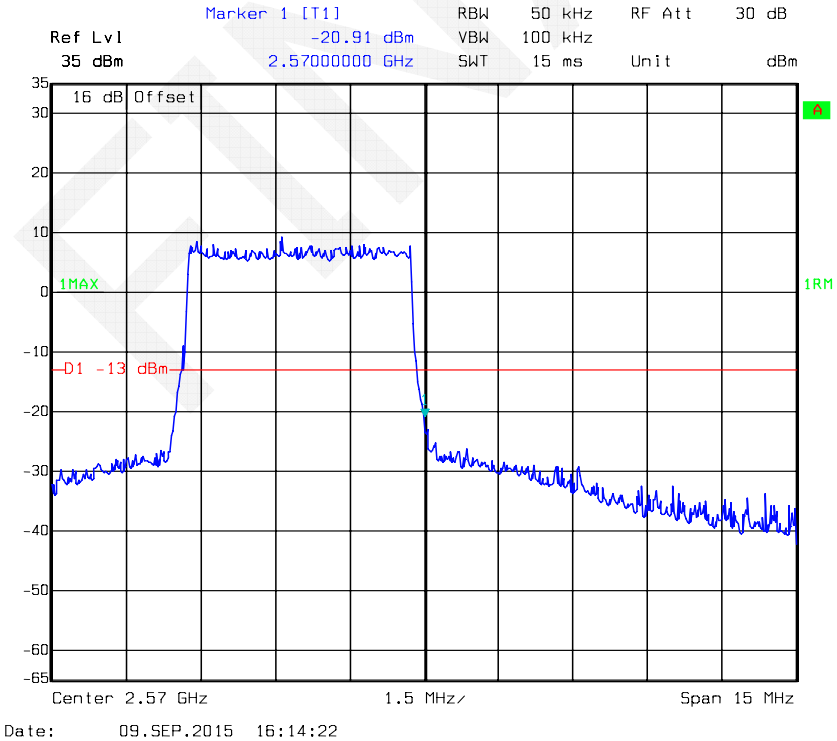
16QAM -5M 1RB, Right Band Edge



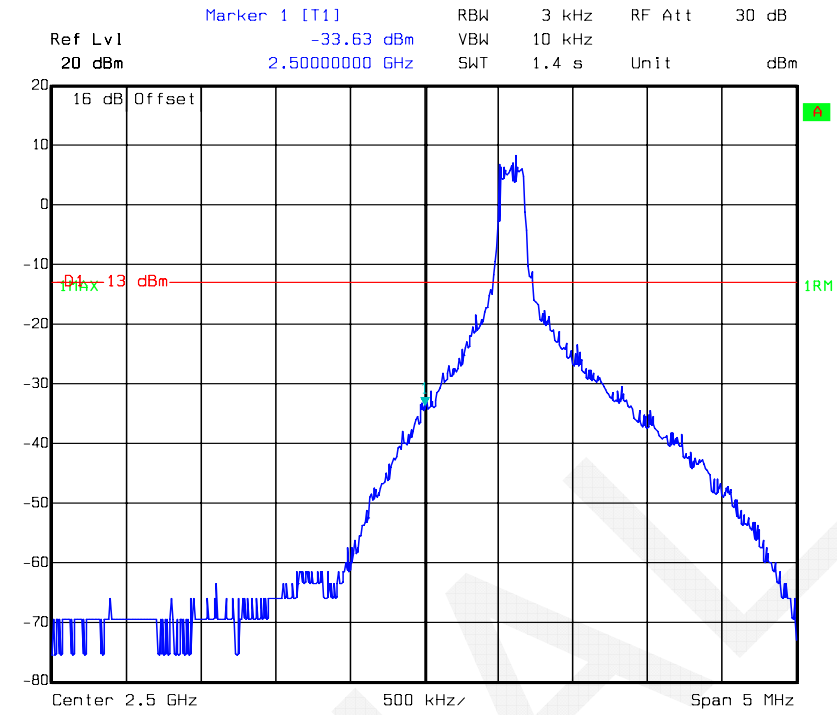
16QAM -5M Full RB, Left Band Edge



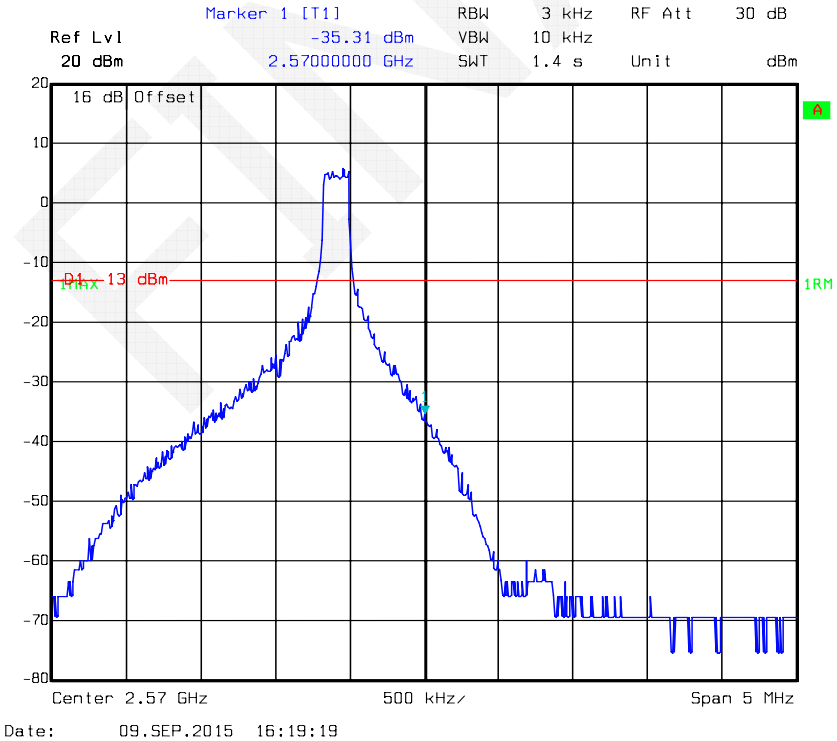
16QAM -5M Full RB, Right Band Edge



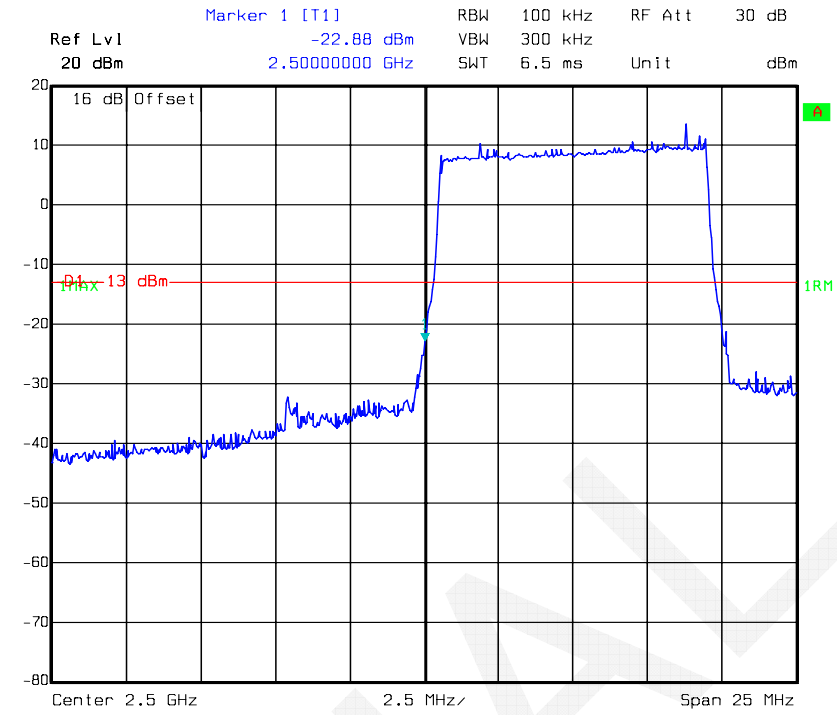
16QAM -10M 1RB, Left Band Edge



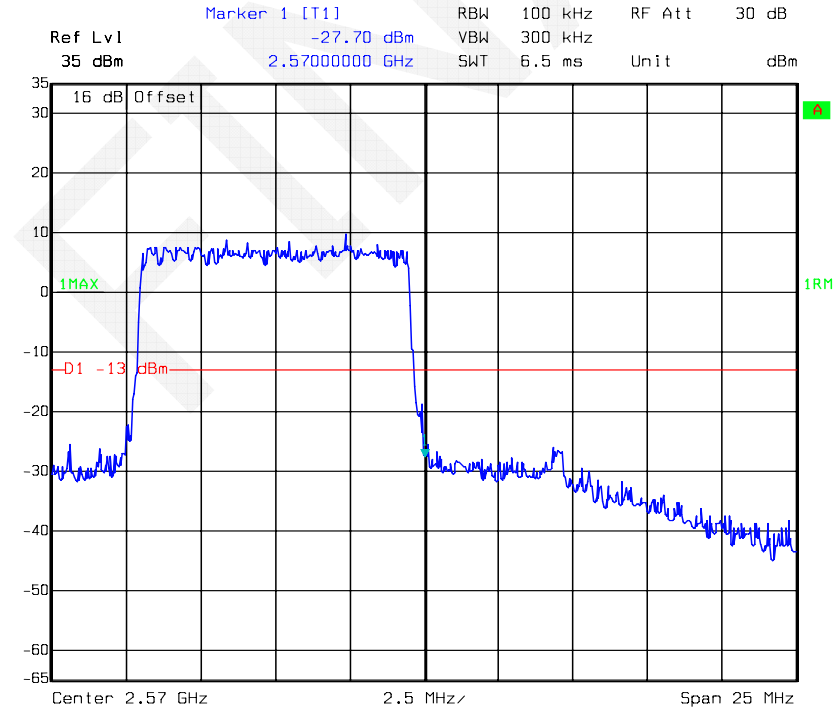
16QAM -10M 1RB, Right Band Edge



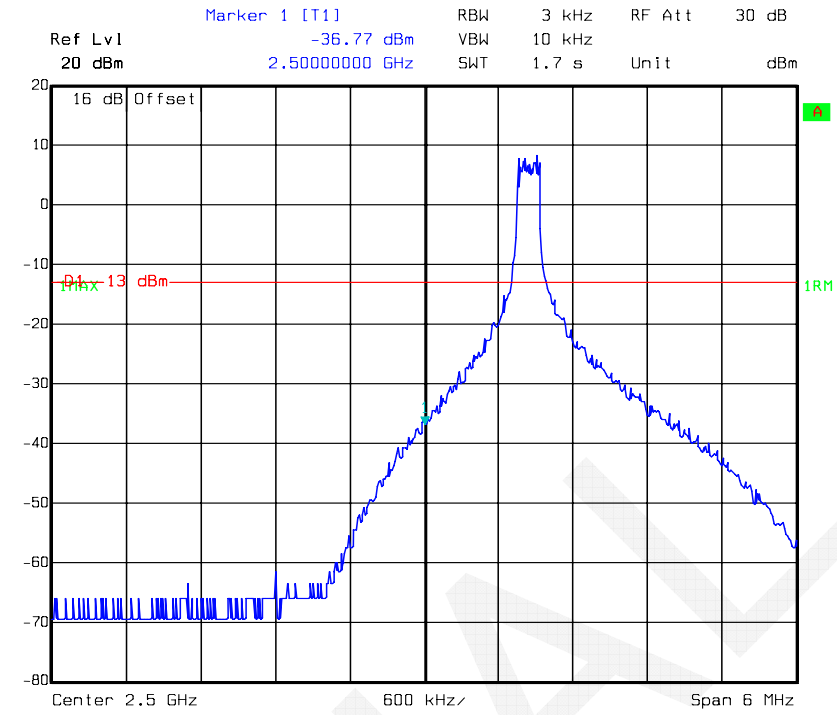
16QAM -10M Full RB, Left Band Edge



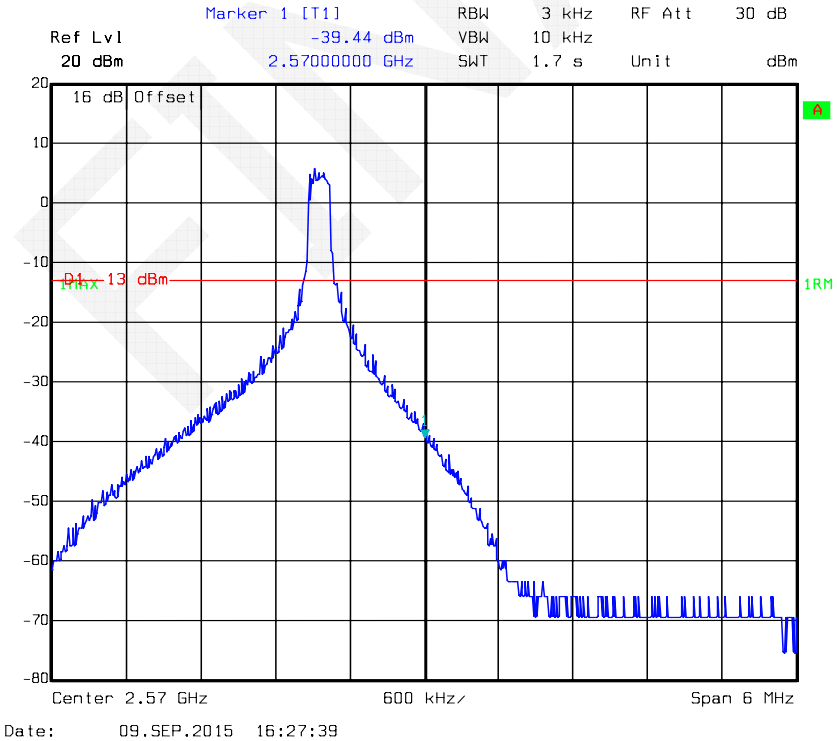
16QAM -10M Full RB, Right Band Edge



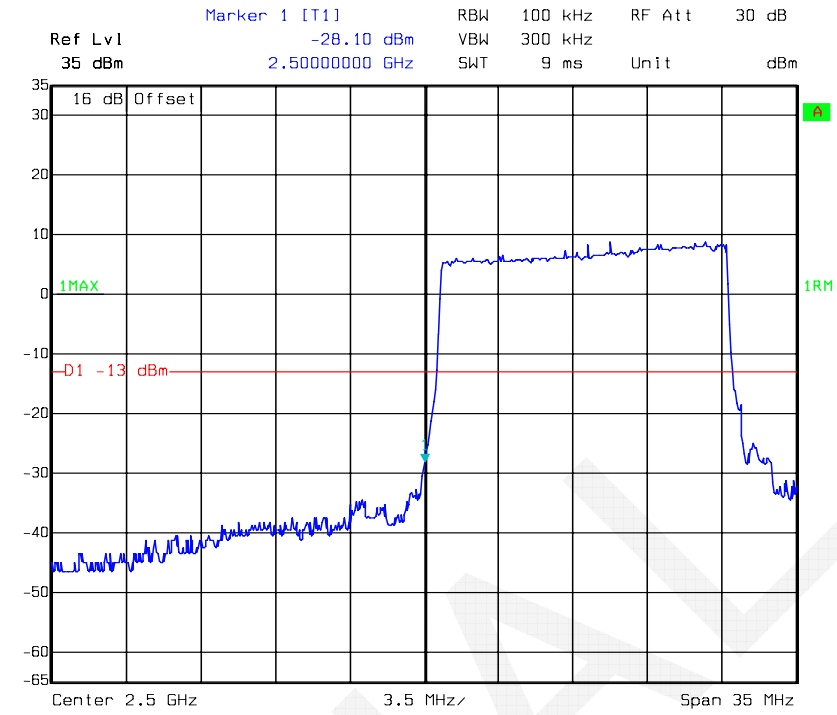
16QAM -15M 1RB, Left Band Edge



16QAM -15M 1RB, Right Band Edge

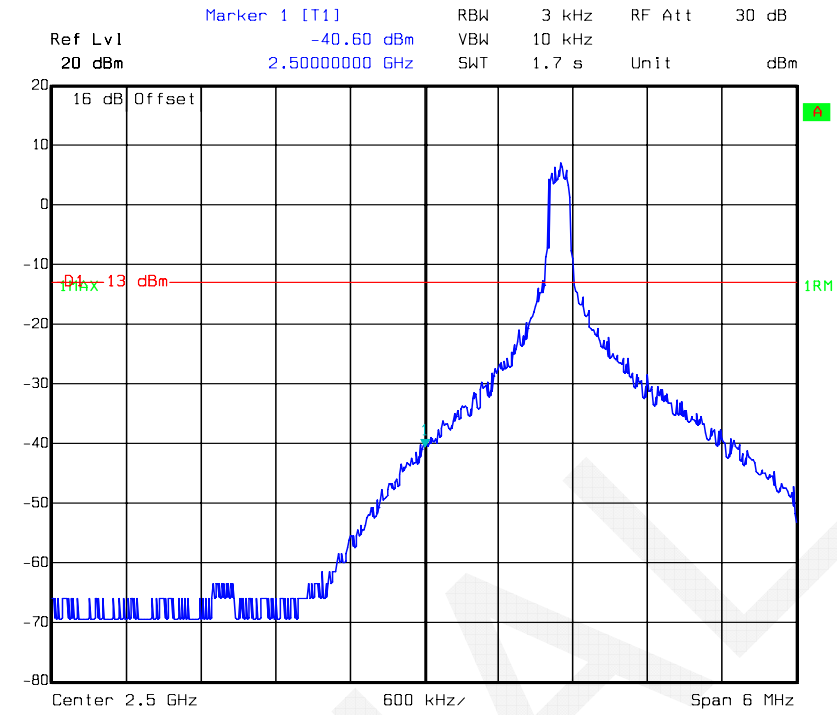


16QAM -15M Full RB, Left Band Edge

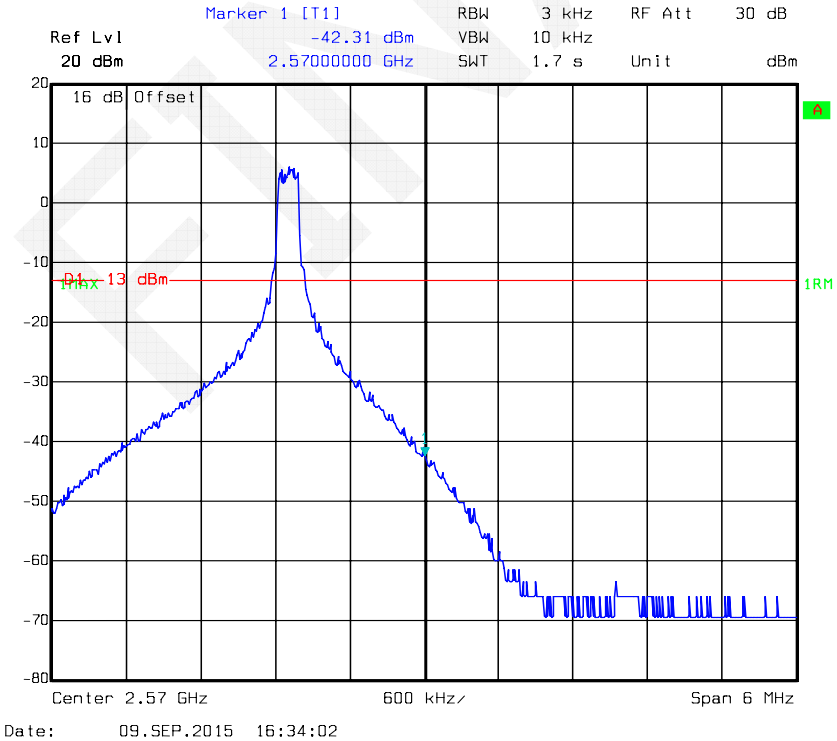


16QAM -15M Full RB, Right Band Edge

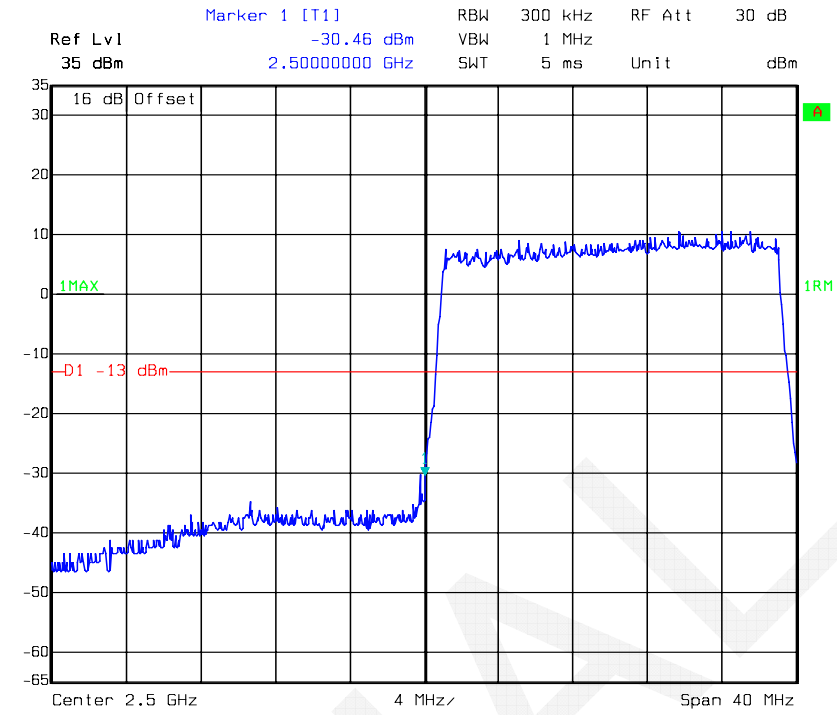
16QAM -20M 1RB, Left Band Edge



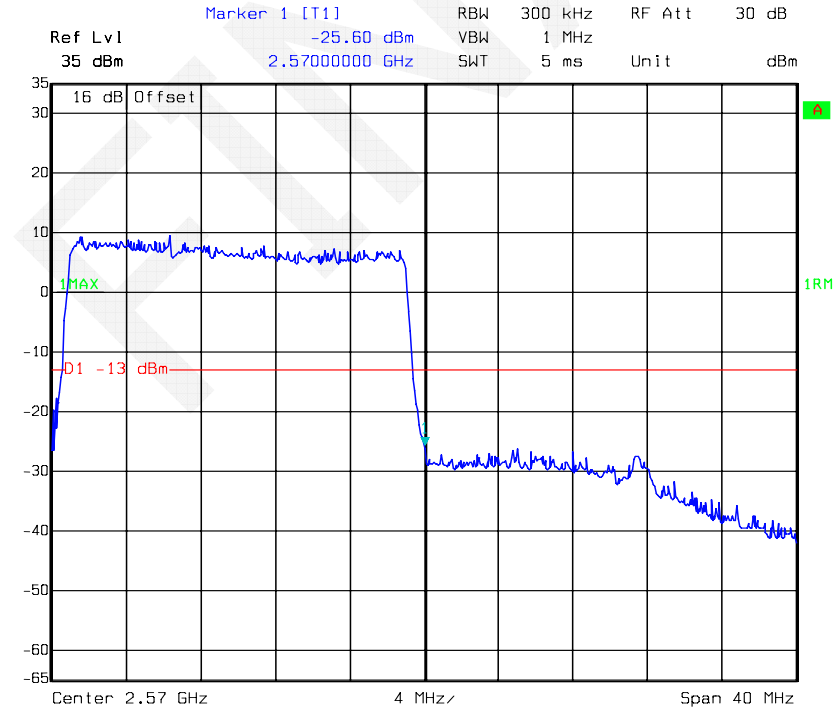
16QAM -20M 1RB, Right Band Edge



16QAM -20M Full RB, Left Band Edge

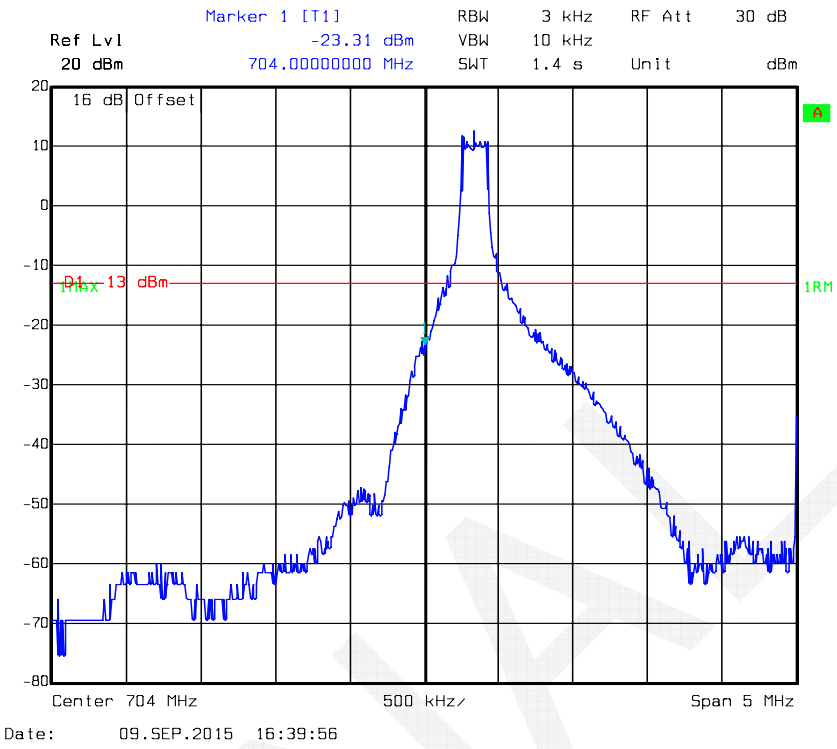


16QAM-20M Full RB, Right Band Edge

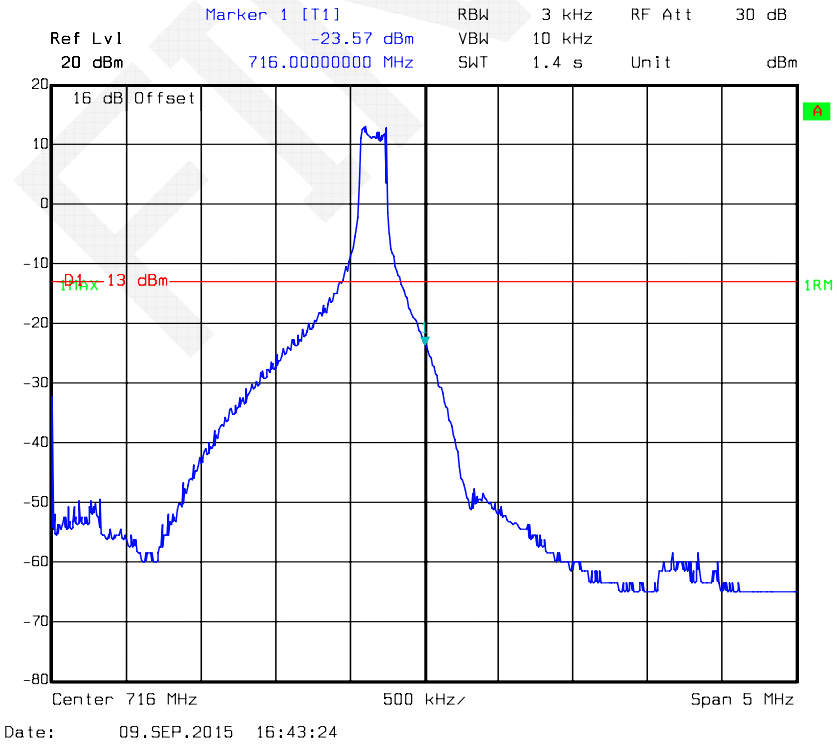


LTE Band 17

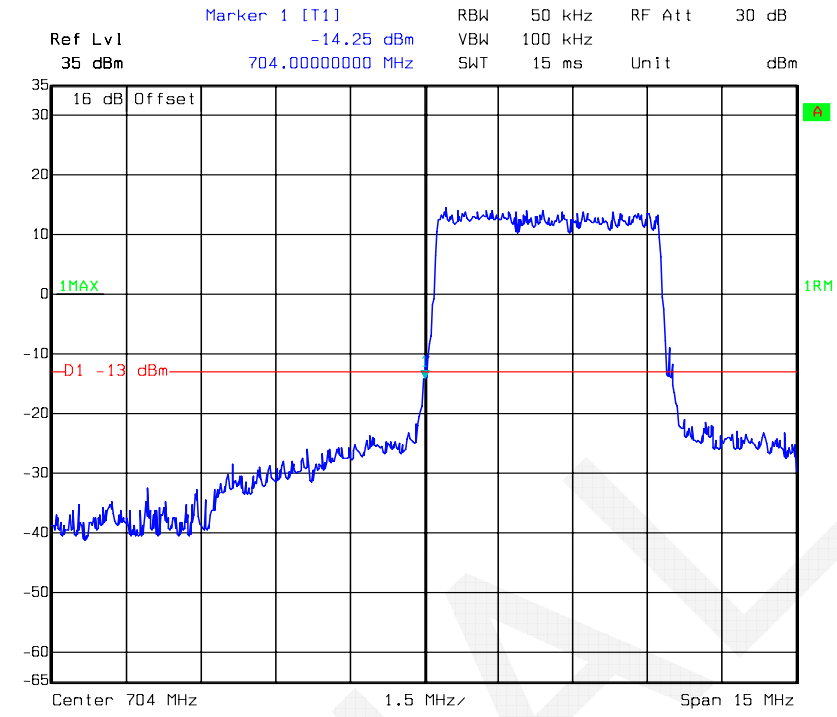
QPSK-5M 1RB, Left Band Edge



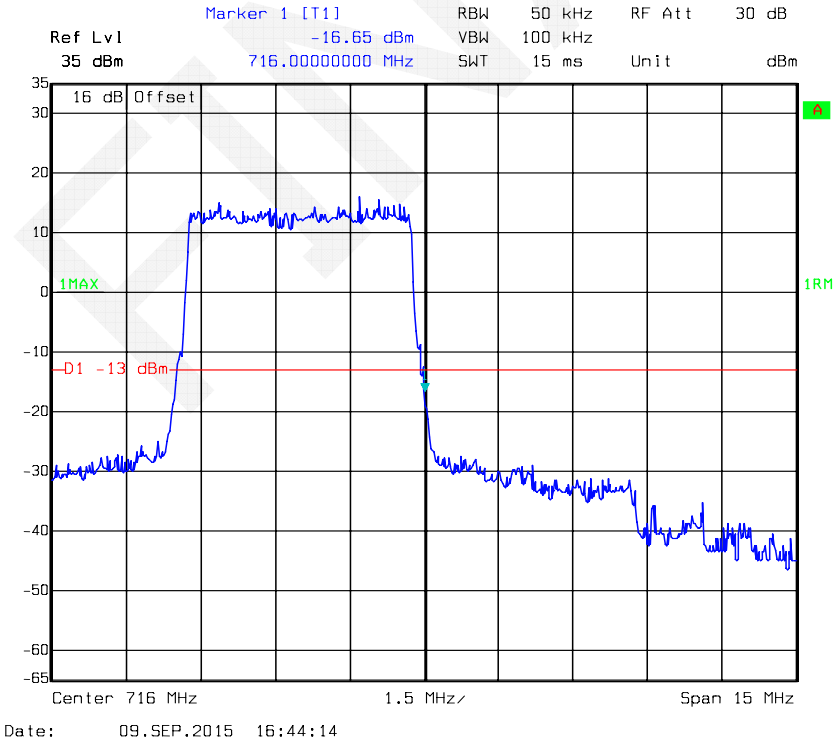
QPSK-5M 1RB, Right Band Edge



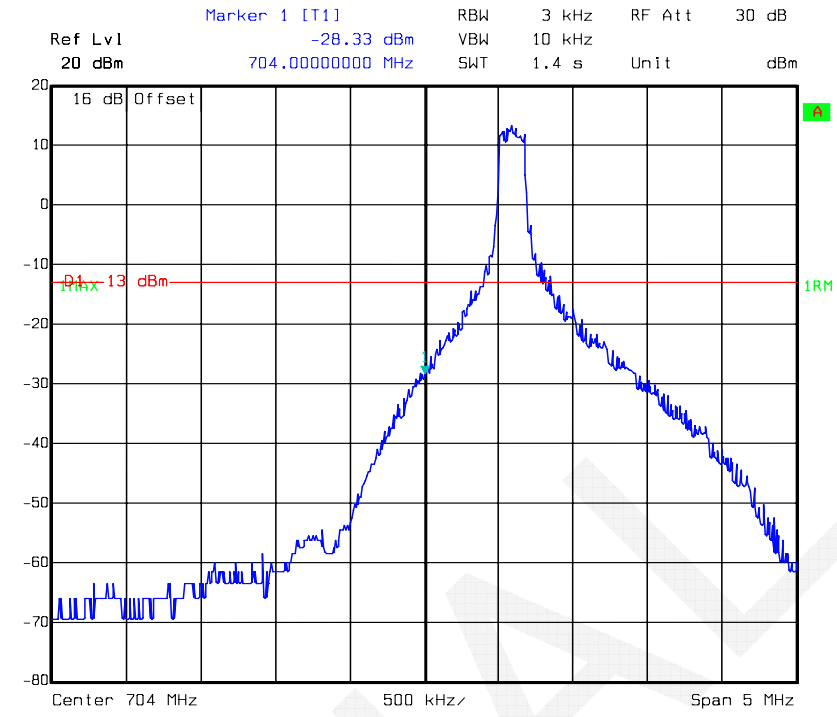
QPSK-5M Full RB, Left Band Edge



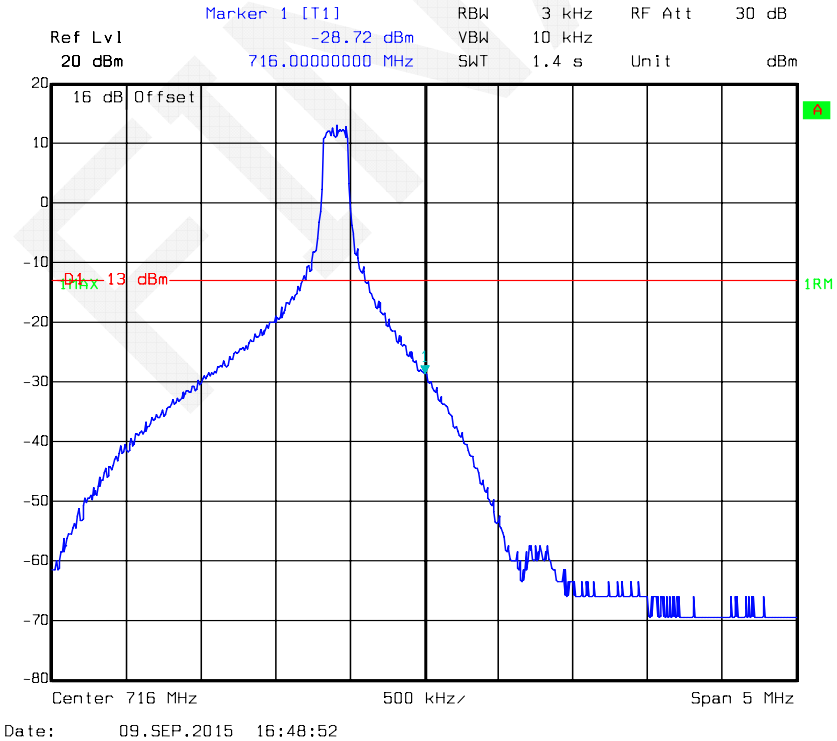
QPSK-5M Full RB, Right Band Edge



QPSK-10M 1RB, Left Band Edge

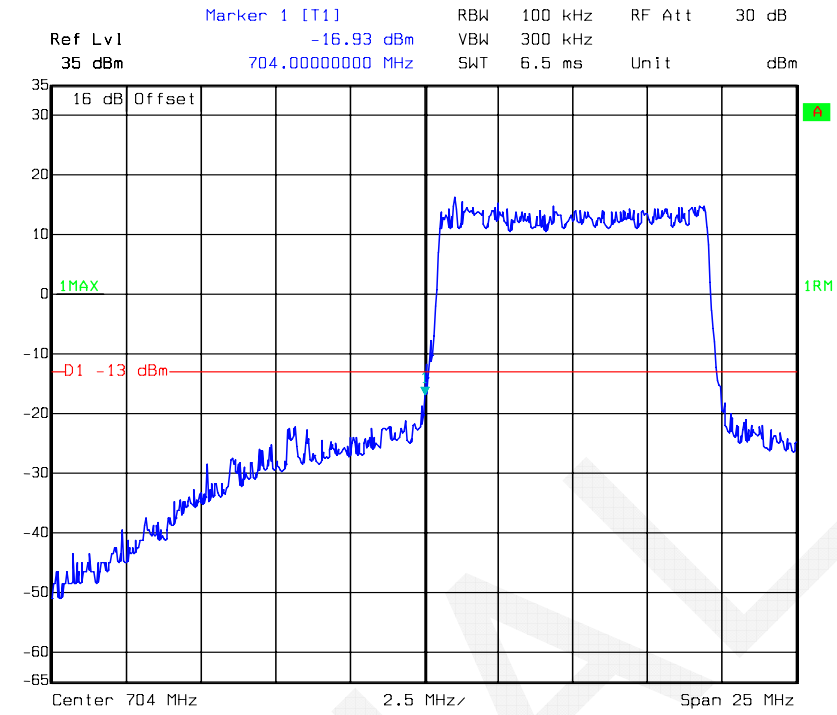


QPSK-10M 1RB, Right Band Edge

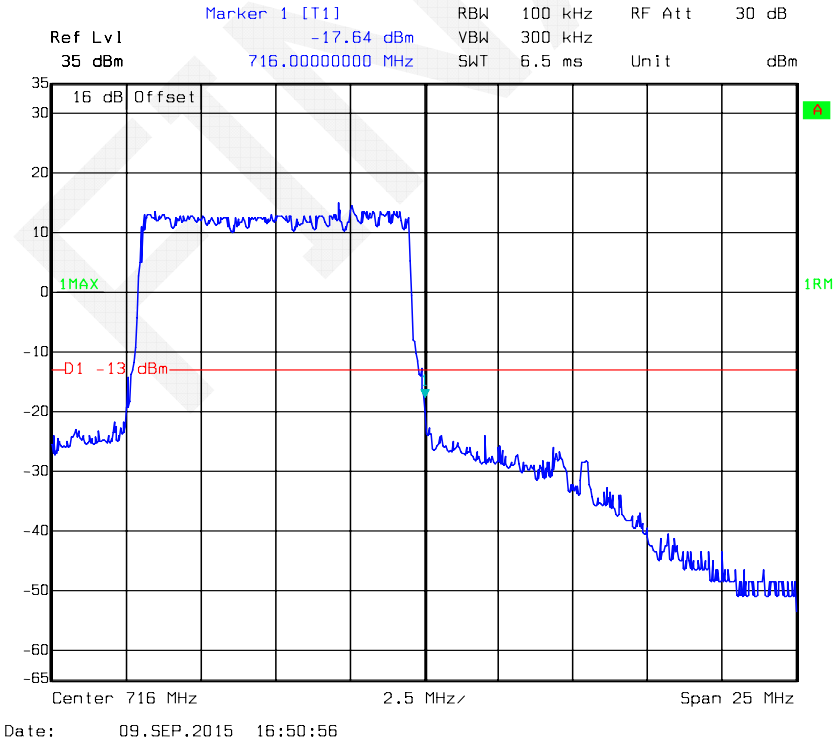


FINAL

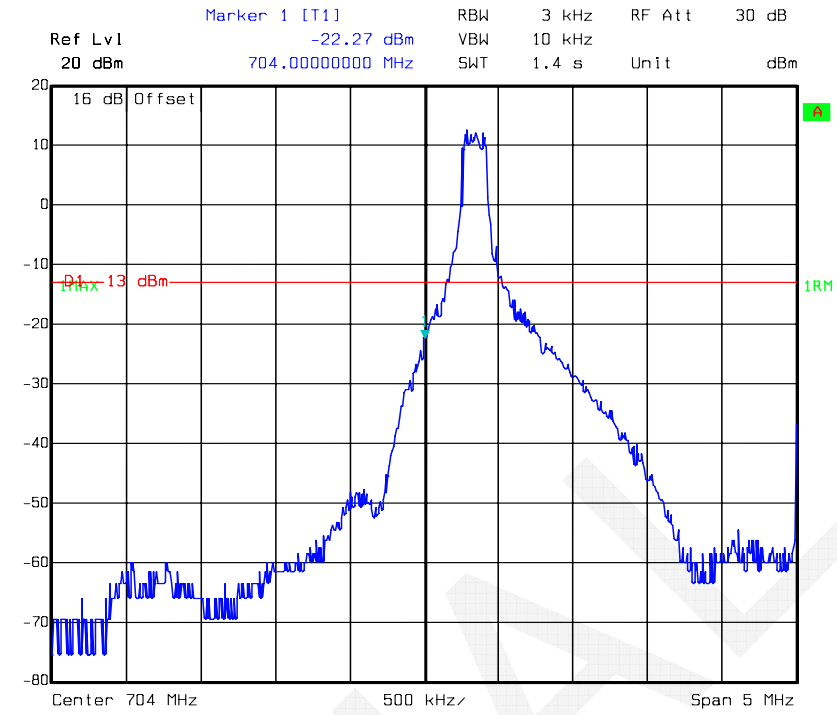
QPSK-10M Full RB, Left Band Edge



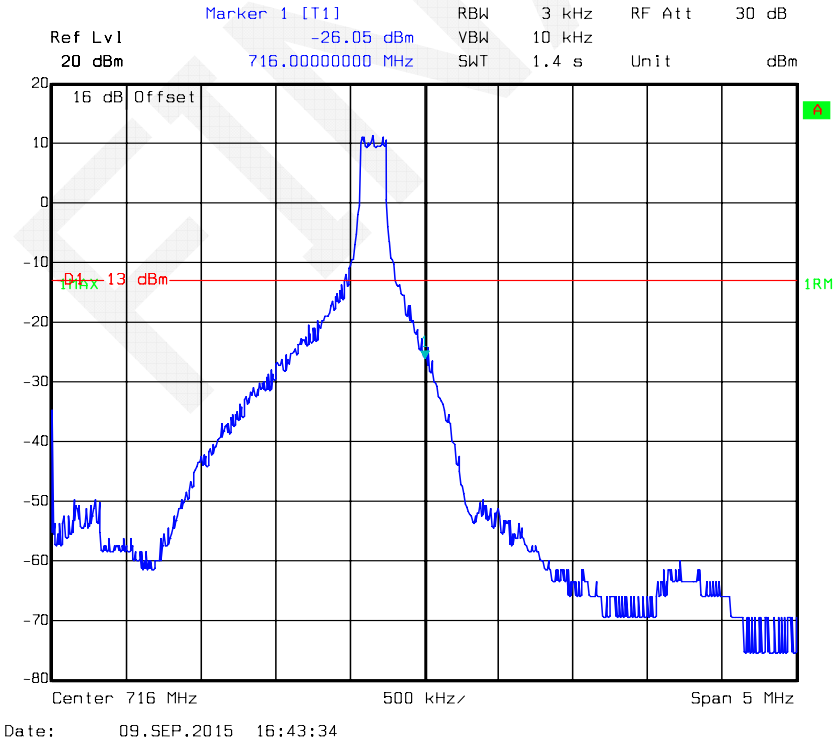
QPSK-10M Full RB, Right Band Edge



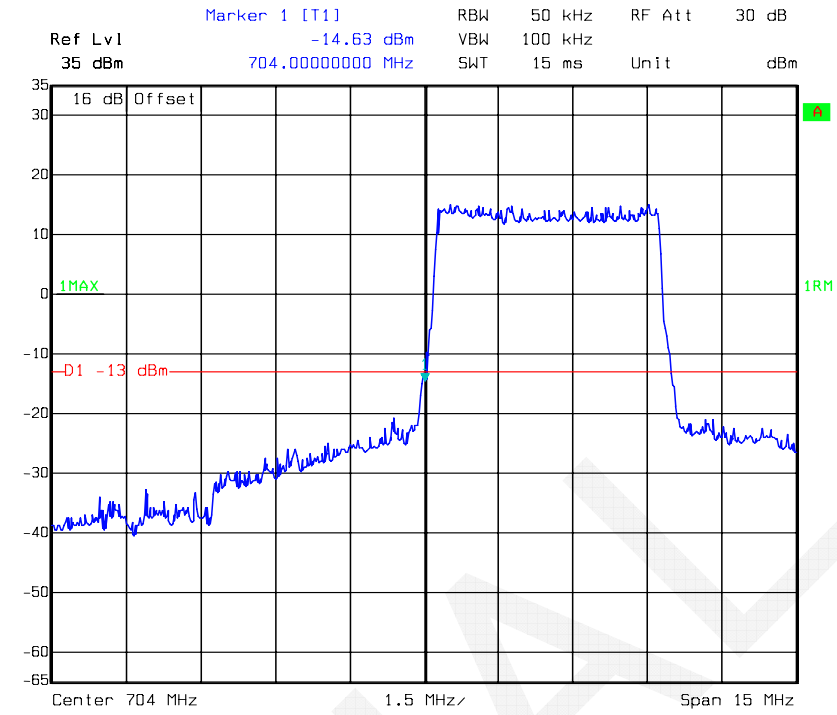
16QAM -5M 1RB, Left Band Edge



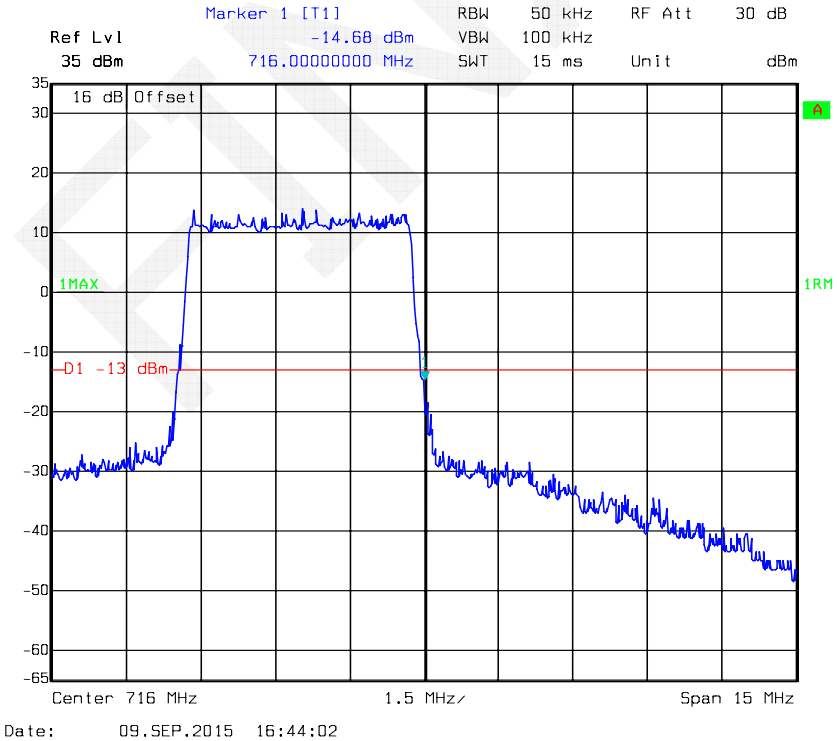
16QAM -5M 1RB, Right Band Edge



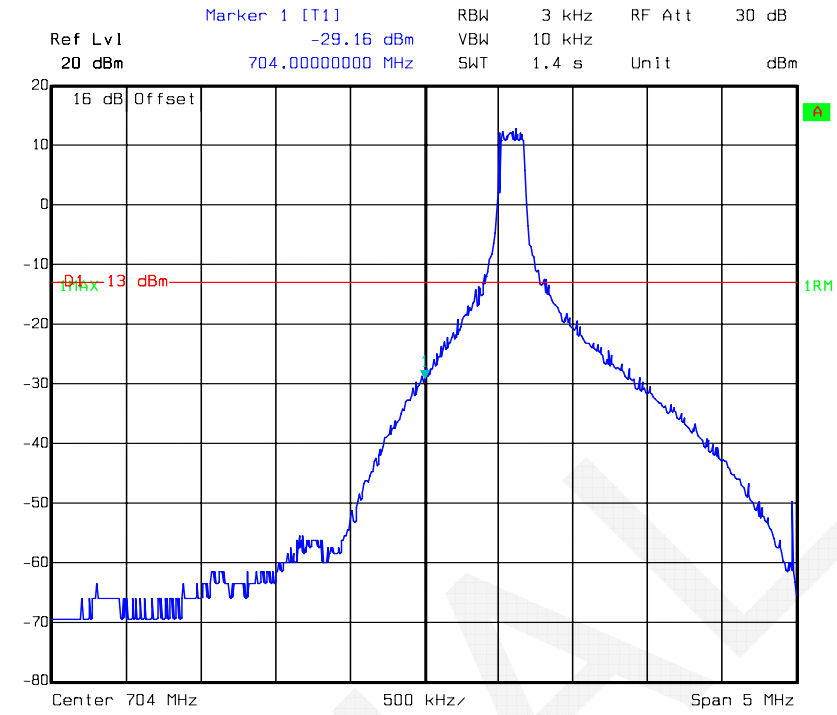
16QAM -5M Full RB, Left Band Edge



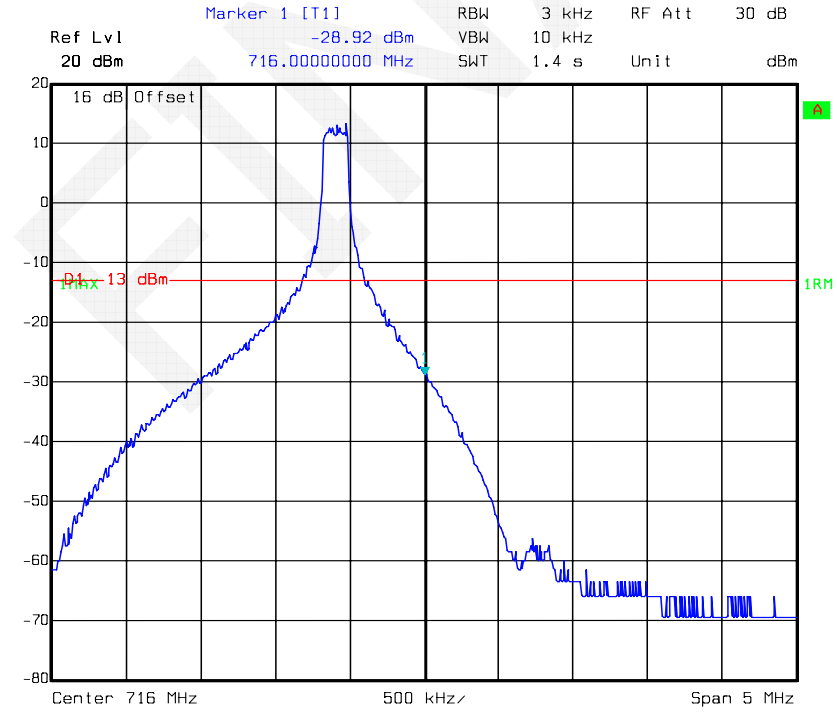
16QAM -5M Full RB, Right Band Edge



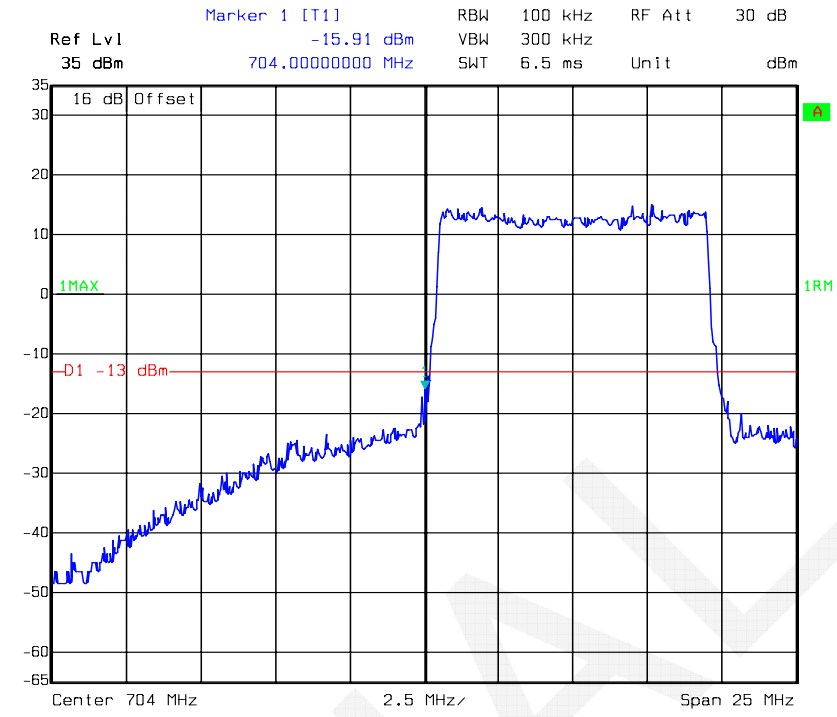
16QAM -10M 1RB, Left Band Edge



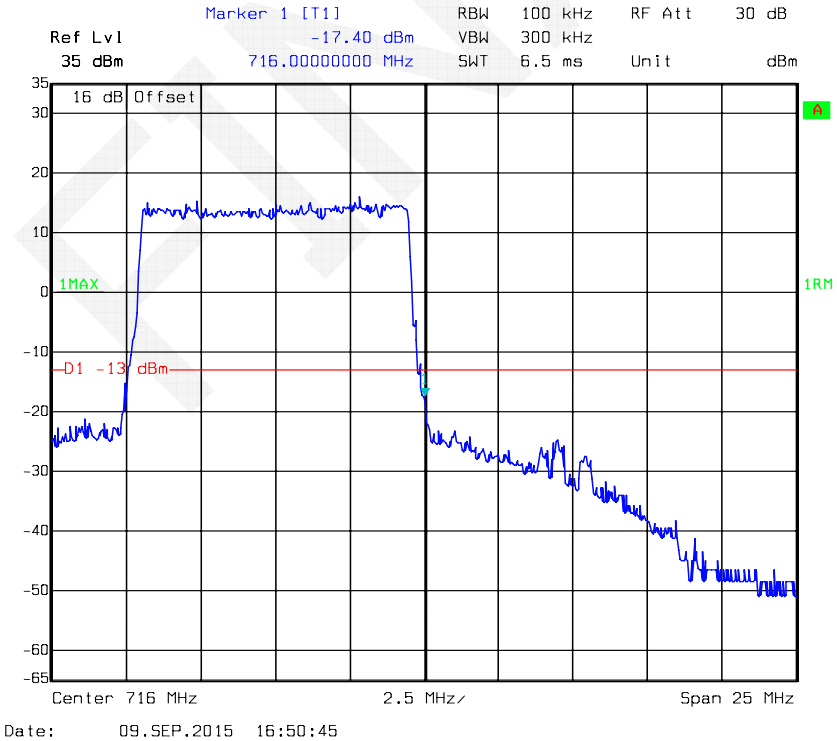
16QAM -10M 1RB, Right Band Edge



16QAM -10M Full RB, Left Band Edge



16QAM -10M Full RB, Right Band Edge



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

Applicable Standard

FCC § 2.1055 (a), § 2.1055 (d), §22.355, §24.235，§27.54

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

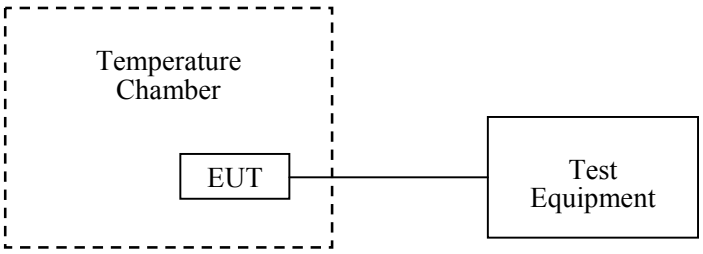
According to §24.235, the frequency stability shall be sufficient to ensure that the fundamental emissions stays within the authorized frequency block.

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: An external variable DC power supply was connected to the battery terminals of the equipment under test. The voltage was set from 85% to 115% of the nominal value and was then decreased until the transmitter light no longer illuminated; i.e., the battery end point. The output frequency was recorded for each battery voltage.



Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Dongzhixu	High Temperature Test Chamber	DP1000	201105083-3	2015-08-01	2016-08-01
R&S	Universal Radio Communication Tester	CMU200	109 038	2015-05-09	2016-05-09
R&S	Wideband Radio Communication Tester	CMW500	106891	2014-11-23	2015-11-23

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

Test Data

Environmental Conditions

Temperature:	27.1 °C
Relative Humidity:	59%
ATM Pressure:	99.5 kPa

The testing was performed by Dean Liu on 2015-7-20.

Cellular Band (Part 22H)

GMSK, Middle Channel, f_c = 836.6 MHz				
Temperature	**Voltage**	**Frequency Error**	**Frequency Error**	**Limit**
℃	**V_{DC}**	**Hz**	**ppm**	**ppm**
-30	3.7	22	0.026	2.5
-20	3.7	20	0.024	2.5
-10	3.7	29	0.035	2.5
0	3.7	23	0.027	2.5
10	3.7	26	0.031	2.5
20	3.7	26	0.031	2.5
30	3.7	24	0.029	2.5
40	3.7	23	0.027	2.5
50	3.7	22	0.026	2.5
25	3.5	26	0.031	2.5
25	4.2	27	0.032	2.5

EDGE, Middle Channel, f_c = 836.6 MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Limit
℃	V_{DC}	Hz	ppm	ppm
-30	3.7	20	0.024	2.5
-20	3.7	16	0.019	2.5
-10	3.7	13	0.016	2.5
0	3.7	20	0.024	2.5
10	3.7	16	0.019	2.5
20	3.7	15	0.018	2.5
30	3.7	17	0.020	2.5
40	3.7	16	0.019	2.5
50	3.7	24	0.029	2.5
25	3.5	23	0.027	2.5
25	4.2	19	0.023	2.5

WCDMA Band V: Re199

Middle Channel, f_c = 836.6 MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Limit
℃	V_{DC}	Hz	ppm	ppm
-30	3.7	17	0.020	2.5
-20	3.7	23	0.027	2.5
-10	3.7	24	0.029	2.5
0	3.7	19	0.023	2.5
10	3.7	18	0.022	2.5
20	3.7	16	0.019	2.5
30	3.7	15	0.018	2.5
40	3.7	22	0.026	2.5
50	3.7	19	0.023	2.5
25	3.5	15	0.018	2.5
25	4.2	12	0.014	2.5

WCDMA Band V: HSDPA

Middle Channel, f_c = 836.6 MHz				
Temperature	**Voltage**	**Frequency Error**	**Frequency Error**	**Limit**
℃	**V_{DC}**	**Hz**	**ppm**	**ppm**
-30	3.7	30	0.036	2.5
-20	3.7	32	0.038	2.5
-10	3.7	32	0.038	2.5
0	3.7	29	0.035	2.5
10	3.7	27	0.032	2.5
20	3.7	30	0.036	2.5
30	3.7	27	0.032	2.5
40	3.7	32	0.038	2.5
50	3.7	33	0.039	2.5
25	3.5	35	0.042	2.5
25	4.2	30	0.036	2.5

WCDMA Band V: HSUPA

Middle Channel, f_c = 836.6 MHz				
Temperature	**Voltage**	**Frequency Error**	**Frequency Error**	**Limit**
℃	**V_{DC}**	**Hz**	**ppm**	**ppm**
-30	3.7	22	0.026	2.5
-20	3.7	26	0.031	2.5
-10	3.7	22	0.026	2.5
0	3.7	19	0.023	2.5
10	3.7	23	0.027	2.5
20	3.7	17	0.020	2.5
30	3.7	16	0.019	2.5
40	3.7	23	0.027	2.5
50	3.7	19	0.023	2.5
25	3.5	16	0.019	2.5
25	4.2	26	0.031	2.5

PCS Band (Part 24E)

GMSK, Middle Channel, f_c = 1880.0 MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Result
℃	V_{DC}	Hz	ppm	
-30	3.7	18	0.010	Compliance
-20	3.7	11	0.006	Compliance
-10	3.7	13	0.007	Compliance
0	3.7	20	0.011	Compliance
10	3.7	22	0.012	Compliance
20	3.7	16	0.009	Compliance
30	3.7	15	0.008	Compliance
40	3.7	17	0.009	Compliance
50	3.7	19	0.010	Compliance
25	3.5	20	0.011	Compliance
25	4.2	16	0.009	Compliance

EDGE, Middle Channel, f_c = 1880.0 MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Result
℃	V_{DC}	Hz	ppm	
-30	3.7	17	0.009	Compliance
-20	3.7	15	0.010	Compliance
-10	3.7	23	0.006	Compliance
0	3.7	24	0.007	Compliance
10	3.7	26	0.006	Compliance
20	3.7	16	0.009	Compliance
30	3.7	15	0.009	Compliance
40	3.7	11	0.008	Compliance
50	3.7	13	0.006	Compliance
25	3.5	17	0.007	Compliance
25	4.2	18	0.010	Compliance

WCDMA Band II: Re199

Middle Channel, f_c = 1880.0 MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Result
℃	V_{DC}	Hz	ppm	
-30	3.7	15	0.008	Compliance
-20	3.7	19	0.010	Compliance
-10	3.7	16	0.009	Compliance
0	3.7	19	0.010	Compliance
10	3.7	12	0.006	Compliance
20	3.7	16	0.009	Compliance
30	3.7	18	0.010	Compliance
40	3.7	14	0.007	Compliance
50	3.7	18	0.010	Compliance
25	3.5	15	0.008	Compliance
25	4.2	16	0.009	Compliance

WCDMA Band II: HSDPA

Middle Channel, f_c = 1880.0 MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Result
℃	V_{DC}	Hz	ppm	
-30	3.7	28	0.015	Compliance
-20	3.7	25	0.013	Compliance
-10	3.7	22	0.012	Compliance
0	3.7	30	0.016	Compliance
10	3.7	28	0.015	Compliance
20	3.7	20	0.011	Compliance
30	3.7	23	0.012	Compliance
40	3.7	25	0.013	Compliance
50	3.7	27	0.014	Compliance
25	3.5	26	0.014	Compliance
25	4.2	22	0.012	Compliance

WCDMA Band II: HSUPA

Middle Channel, f_c = 1880.0 MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Result
℃	V_{DC}	Hz	ppm	
-30	3.7	28	0.015	Compliance
-20	3.7	26	0.014	Compliance
-10	3.7	24	0.013	Compliance
0	3.7	29	0.015	Compliance
10	3.7	26	0.014	Compliance
20	3.7	25	0.013	Compliance
30	3.7	19	0.010	Compliance
40	3.7	23	0.012	Compliance
50	3.7	23	0.012	Compliance
25	3.5	27	0.014	Compliance
25	4.2	22	0.012	Compliance

PART 27:

WCDMA Band IV: Re199

Middle Channel, f_c = 1732.6 MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Result
℃	V_{DC}	Hz	ppm	
-30	3.7	25	0.014	Compliance
-20	3.7	24	0.014	Compliance
-10	3.7	26	0.015	Compliance
0	3.7	20	0.012	Compliance
10	3.7	25	0.014	Compliance
20	3.7	23	0.013	Compliance
30	3.7	21	0.012	Compliance
40	3.7	25	0.014	Compliance
50	3.7	24	0.014	Compliance
25	3.5	20	0.012	Compliance
25	4.2	22	0.013	Compliance

WCDMA Band IV: HSDPA

Middle Channel, f_c = 1732.6 MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Result
℃	V_{DC}	Hz	ppm	
-30	3.7	36	0.021	Compliance
-20	3.7	38	0.022	Compliance
-10	3.7	36	0.021	Compliance
0	3.7	35	0.020	Compliance
10	3.7	29	0.017	Compliance
20	3.7	35	0.020	Compliance
30	3.7	38	0.022	Compliance
40	3.7	35	0.020	Compliance
50	3.7	36	0.021	Compliance
25	3.5	39	0.023	Compliance
25	4.2	32	0.018	Compliance

WCDMA Band IV: HSUPA

Middle Channel, f_c = 1732.6 MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Result
℃	V_{DC}	Hz	ppm	
-30	3.7	45	0.026	Compliance
-20	3.7	42	0.024	Compliance
-10	3.7	39	0.023	Compliance
0	3.7	42	0.024	Compliance
10	3.7	45	0.026	Compliance
20	3.7	45	0.026	Compliance
30	3.7	41	0.024	Compliance
40	3.7	46	0.027	Compliance
50	3.7	39	0.023	Compliance
25	3.5	45	0.026	Compliance
25	4.2	42	0.024	Compliance

LTE Band 2:

QPSK, Channel Bandwidth:10MHz Middle Channel, f_c = 1880 MHz				
Temperature	**Voltage**	**Frequency Error**	**Frequency Error**	**Result**
℃	**V_{DC}**	**Hz**	**ppm**	
-30	3.7	9.34	0.0050	Compliance
-20	3.7	9.25	0.0049	Compliance
-10	3.7	9.6	0.0051	Compliance
0	3.7	10.21	0.0054	Compliance
10	3.7	9.63	0.0051	Compliance
20	3.7	9.34	0.0050	Compliance
30	3.7	9.42	0.0050	Compliance
40	3.7	9.62	0.0051	Compliance
50	3.7	9.52	0.0051	Compliance
25	3.5	9.11	0.0048	Compliance
25	4.2	9.35	0.0050	Compliance

16QAM, Channel Bandwidth:10MHz Middle Channel, f_c = 1880 MHz				
Temperature	**Voltage**	**Frequency Error**	**Frequency Error**	**Result**
℃	**V_{DC}**	**Hz**	**ppm**	
-30	3.7	13.63	0.0073	Compliance
-20	3.7	13.86	0.0074	Compliance
-10	3.7	13.54	0.0072	Compliance
0	3.7	13.66	0.0073	Compliance
10	3.7	13.85	0.0074	Compliance
20	3.7	13.81	0.0073	Compliance
30	3.7	13.5	0.0072	Compliance
40	3.7	13.92	0.0074	Compliance
50	3.7	13.63	0.0073	Compliance
25	3.5	13.51	0.0072	Compliance
25	4.2	13.64	0.0073	Compliance

LTE Band 4:

QPSK, Channel Bandwidth:10MHz Middle Channel, f_c = 1732.5 MHz				
Temperature	**Voltage**	**Frequency Error**	**Frequency Error**	**Result**
℃	**V_{DC}**	**Hz**	**ppm**	
-30	3.7	-23.45	-0.0135	Compliance
-20	3.7	-23.32	-0.0135	Compliance
-10	3.7	-23.85	-0.0138	Compliance
0	3.7	-23.89	-0.0138	Compliance
10	3.7	-23.61	-0.0136	Compliance
20	3.7	-23.52	-0.0136	Compliance
30	3.7	-23.68	-0.0137	Compliance
40	3.7	-23.71	-0.0137	Compliance
50	3.7	-23.23	-0.0134	Compliance
25	3.5	-23.67	-0.0137	Compliance
25	4.2	-23.62	-0.0136	Compliance

16QAM, Channel Bandwidth:10MHz Middle Channel, f_c = 1732.5 MHz				
Temperature	**Voltage**	**Frequency Error**	**Frequency Error**	**Result**
℃	**V_{DC}**	**Hz**	**ppm**	
-30	3.7	32.62	0.0188	Compliance
-20	3.7	33.05	0.0191	Compliance
-10	3.7	33.24	0.0192	Compliance
0	3.7	32.68	0.0189	Compliance
10	3.7	32.65	0.0188	Compliance
20	3.7	33.62	0.0194	Compliance
30	3.7	32.85	0.0190	Compliance
40	3.7	32.84	0.0190	Compliance
50	3.7	32.56	0.0188	Compliance
25	3.5	33.12	0.0191	Compliance
25	4.2	33.18	0.0192	Compliance

LTE Band 7:

QPSK, Channel Bandwidth:10MHz Middle Channel, f_c = 2535 MHz				
Temperature	**Voltage**	**Frequency Error**	**Frequency Error**	**Result**
℃	**V_{DC}**	**Hz**	**ppm**	
-30	3.7	21.38	0.0084	Compliance
-20	3.7	22.57	0.0089	Compliance
-10	3.7	21.62	0.0085	Compliance
0	3.7	22.25	0.0088	Compliance
10	3.7	22.63	0.0089	Compliance
20	3.7	22.34	0.0088	Compliance
30	3.7	22.21	0.0088	Compliance
40	3.7	22.17	0.0087	Compliance
50	3.7	22.32	0.0088	Compliance
25	3.5	21.95	0.0087	Compliance
25	4.2	21.58	0.0085	Compliance

16QAM, Channel Bandwidth:10MHz Middle Channel, f_c = 2535 MHz				
Temperature	**Voltage**	**Frequency Error**	**Frequency Error**	**Result**
℃	**V_{DC}**	**Hz**	**ppm**	
-30	3.7	20.36	0.0080	Compliance
-20	3.7	20.45	0.0081	Compliance
-10	3.7	20.62	0.0081	Compliance
0	3.7	20.36	0.0080	Compliance
10	3.7	20.24	0.0080	Compliance
20	3.7	19.97	0.0079	Compliance
30	3.7	19.96	0.0079	Compliance
40	3.7	20.08	0.0079	Compliance
50	3.7	20.21	0.0080	Compliance
25	3.5	20.16	0.0080	Compliance
25	4.2	19.76	0.0078	Compliance

LTE Band 17:

QPSK, Channel Bandwidth:10MHz Middle Channel, f_c = 710 MHz				
Temperature	**Voltage**	**Frequency Error**	**Frequency Error**	**Result**
℃	**V_{DC}**	**Hz**	**ppm**	
-30	3.7	-19.63	-0.0276	Compliance
-20	3.7	-19.48	-0.0274	Compliance
-10	3.7	-19.86	-0.0280	Compliance
0	3.7	-19.36	-0.0273	Compliance
10	3.7	-19.95	-0.0281	Compliance
20	3.7	-19.48	-0.0274	Compliance
30	3.7	-19.69	-0.0277	Compliance
40	3.7	-19.48	-0.0274	Compliance
50	3.7	-19.83	-0.0279	Compliance
25	3.5	-19.66	-0.0277	Compliance
25	4.2	-19.25	-0.0271	Compliance

16QAM, Channel Bandwidth:10MHz Middle Channel, f_c = 710 MHz				
Temperature	**Voltage**	**Frequency Error**	**Frequency Error**	**Result**
℃	**V_{DC}**	**Hz**	**ppm**	
-30	3.7	-15.85	-0.0223	Compliance
-20	3.7	-15.69	-0.0221	Compliance
-10	3.7	-15.82	-0.0223	Compliance
0	3.7	-15.16	-0.0214	Compliance
10	3.7	-15.52	-0.0219	Compliance
20	3.7	-15.87	-0.0224	Compliance
30	3.7	-15.98	-0.0225	Compliance
40	3.7	-15.35	-0.0216	Compliance
50	3.7	-15.48	-0.0218	Compliance
25	3.5	-15.69	-0.0221	Compliance
25	4.2	-15.72	-0.0221	Compliance

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

******* END OF REPORT *******