

TEST REPORT

LTE TRDU 2x60-7L (BC12/17)

MEASUREMENT PER SECTION 2.1033 (C) (14) OF THE RULES

SECTION 2.1033 (c) (14)

The data required by Section 2.1046 through 2.1057, inclusive, measured in accordance with the procedures set out in Section 2.1041.

RESPONSE:

The following pages include the data required for the **AS5BBTRX-09**, measured in accordance with the procedures set out in Section 2.1033 (c) (14) of the Rules.

Each required measurement and its corresponding exhibit number are:

Measurement: 1	Section 2.1046	RF Power Output - See Measurement 3
Measurement: 2	Section 2.1047	Modulation Characteristics
Measurement: 3	Section 2.1049	(a) Emissions Bandwidth (b) Occupied Bandwidth
Measurement: 4	Section 2.1051	Spurious Emissions at Antenna Terminals
Measurement: 5	Section 2.1053	Field Strength of Spurious Radiation
Measurement: 6	Section 2.1055	Measurement of Frequency Stability
	Section 2.1057	Frequency Spectrum to be Investigated

Measurement 1

FCC Section 2.1046 RF Power output

Refer to Measurement 3 Occupied Bandwidth Measurement during that measurement RF Output was continuously monitored.

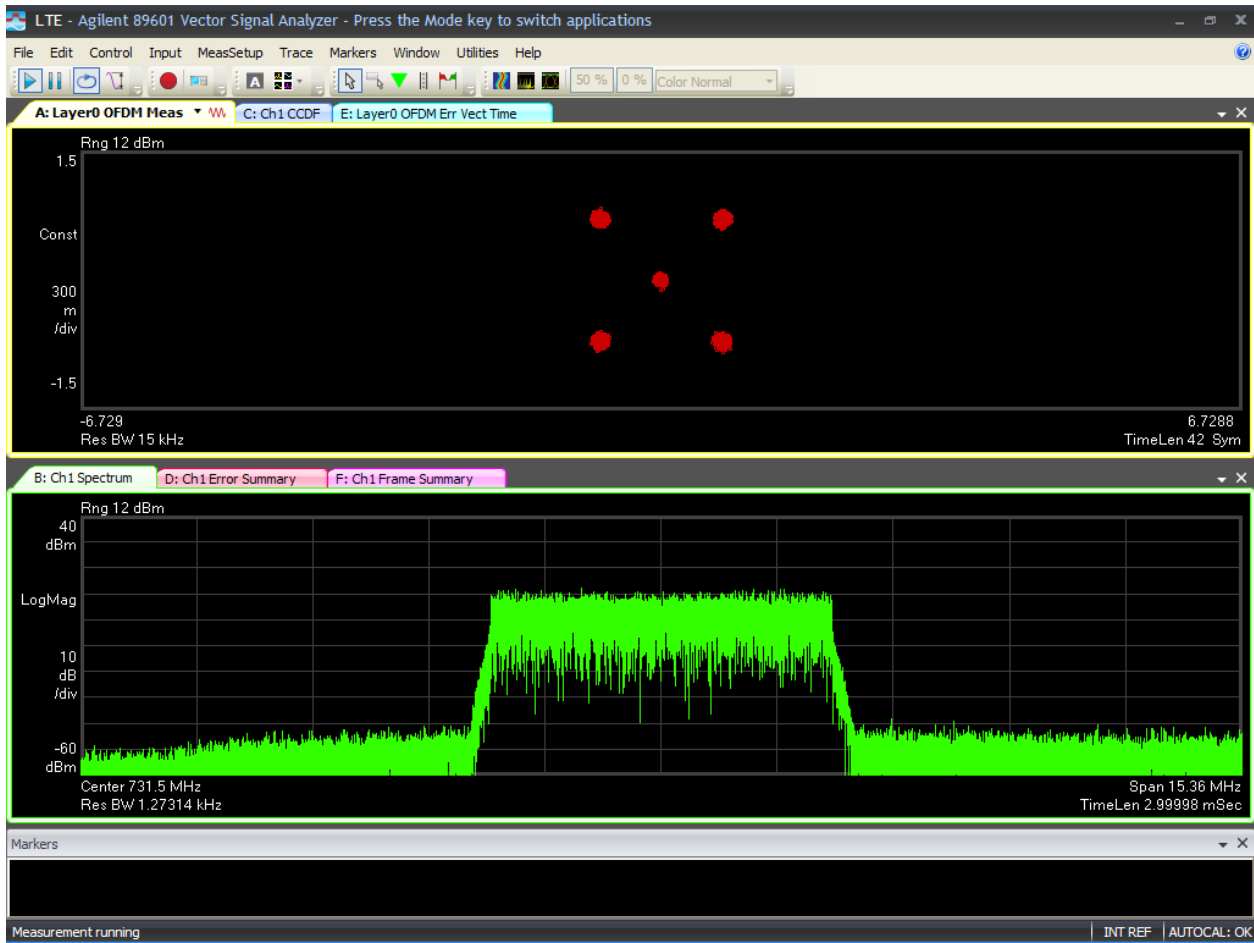
Measurement 2

FCC Section 2.1047 Modulation Characteristics

The modulation techniques used are explained in the submission as part section 2.1033 (c) (13). The RF signal at the antenna port was demodulated and verified for correctness of modulation signal used before each test was performed. The attached plot of graphs shows the modulation components: In phase (I) and Quadrature (Q) components.

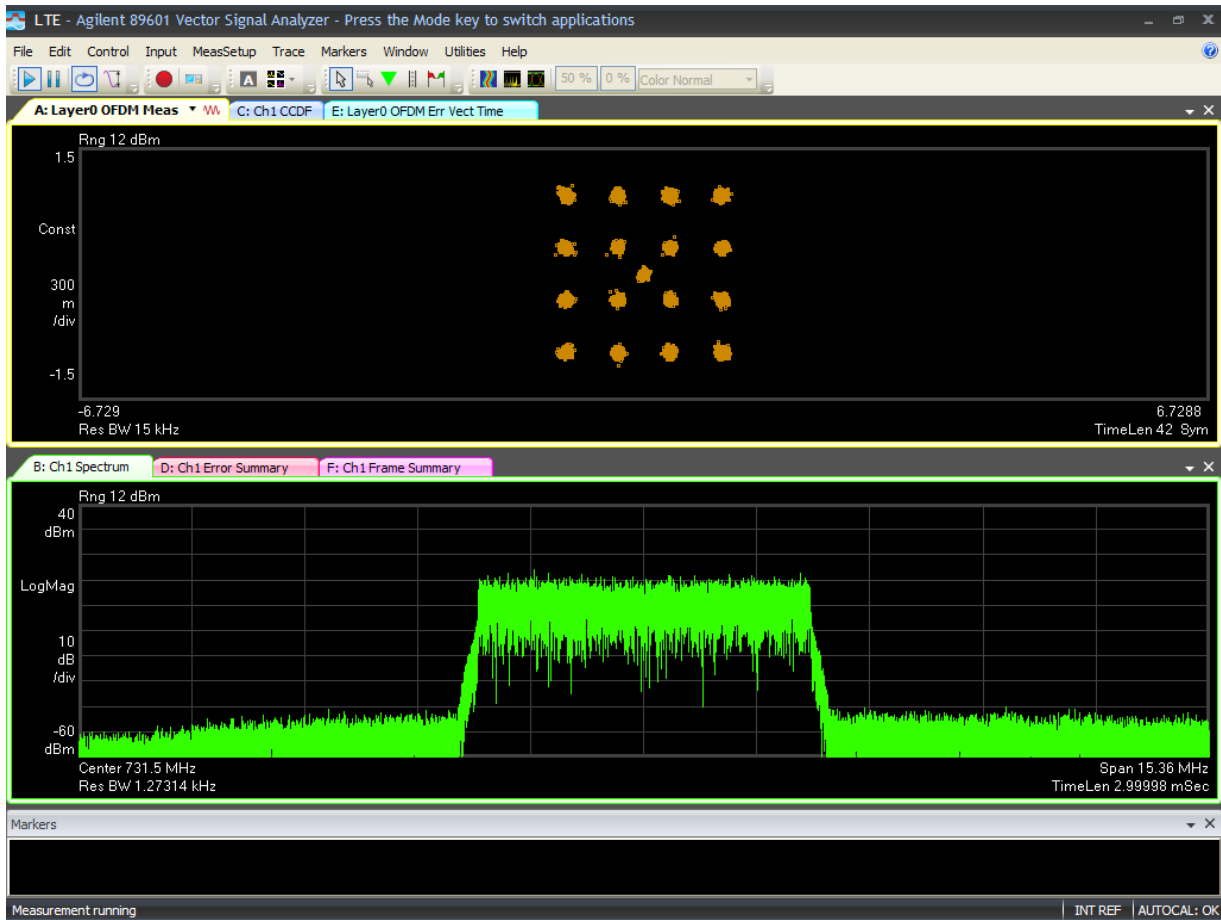
- (1) Quadrature Phase Shift Keying (QPSK) modulation scheme uses 2 bits transmitted simultaneously (one per channel) and a symbol can be represented by 2 bits. Therefore there are $2^2 = 4$ states (Binary 00 to 11). The theoretical bandwidth is 2bits/second/Hz.
- (2) 16 Quadrature Amplitude Modulation (QAM): In 16QAM, there are 16-states. There are four I values and four Q values. Therefore, 4 bits are available to represent a symbol. Therefore there are $2^4 = 16$ states (Binary 0000 to 1111). The theoretical bandwidth is 4bits/second/Hz.
- (3) 64 Quadrature Amplitude Modulation (QAM): In 64QAM: The 64QAM is similar to 16QAM and there will be 64 states and 6 bits are available to represent a symbol.

QPSK MODULATION



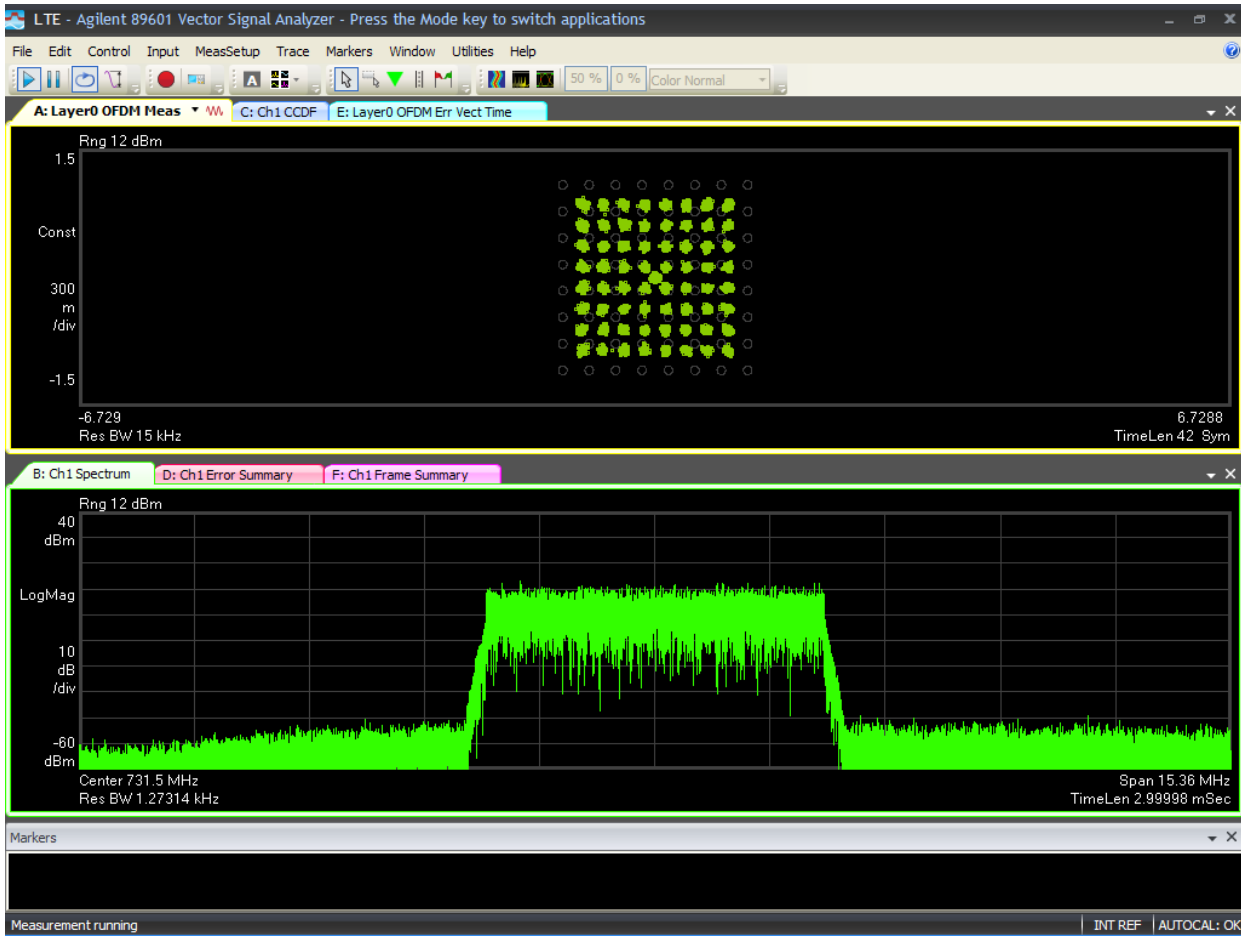
LTE TRDU 2x60-7L (BC12/17)
FCC Part 27.53 Block A; QPSK Modulation; PWR: 60W
FCCID: AS5BBTRX-09
TEST ENGINEER: SEG

16QAM MODULATION



LTE TRDU 2x60-7L (BC12/17)
FCC Part 27.53 Block A; 16QAM Modulation; PWR: 60W
FCCID: AS5BBTRX-09
TEST ENGINEER: SEG

64QAM MODULATION



LTE TRDU 2x60-7L (BC12/17)
FCC Part 27.53 Block A; 64QAM Modulation; PWR: 60W
FCCID: AS5BBTRX-09
TEST ENGINEER: SEG

Measurement 3

FCC Section 2.1049

- (a) Emissions Bandwidth Measurement
- (b) Occupied Bandwidth Measurement showing spurious Emissions 100 kHz close to Block edges.

Spectrum Bandwidth Measurement For Emissions Type

FCC approves two measurement methods for Spectrum Bandwidth.

- (A) 99% Bandwidth
- (B) 26 dB Band width.

Both methods were used to measure the bandwidth at modulations and highest is recorded. The modulations used are:

1. QPSK
2. 16 QAM
3. 64 QAM

Highest Bandwidth is used for Emissions type designation: 9.44 MHz for 10 MHz Bandwidth, and 4.74 MHz for 5 MHz Bandwidth. Therefore,

Measured Emission type: **9M44F9W** for 10 MHz Bandwidth.

Measured Emission type: **4M74F9W** for 5 MHz Bandwidth.

**MEASUREMENT OF OCCUPIED BANDWIDTH
(A) 99% POWER BANDWIDTH**

**MEASUREMENT OF
OCCUPIED BANDWIDTH
For Emissions Type**

The emissions bandwidth is not provided in section 27.53 for 700 MHz bands. The occupied bandwidth of the **LTE TRDU 2x60-7L (BC12/17)** was measured using the Rohde & Schwarz ESI Spectrum analyzer/Receiver designed to measure 99% power bandwidth. The measurements were made on block C, of the **LTE TRDU 2x60-7L (BC12/17)** with 5 MHz and 10 MHz bandwidths.

The measurements were made on a “**LTE TRDU 2x60-7L (BC12/17)**” cabinet in the following modulation configurations:

1. QPSK
2. 16 QAM
3. 64 QAM

This measurement also determines emission type.

Results:

The plots are provided for QPSK, 16QAM and 64QAM modulations of 5 MHz and 10 MHz band of the **LTE TRDU 2x60-7L (BC12/17)**.

The Measured 99% power bandwidth is 8.94 MHz for 10 MHz band and 4.48 MHz for 5 MHz band.

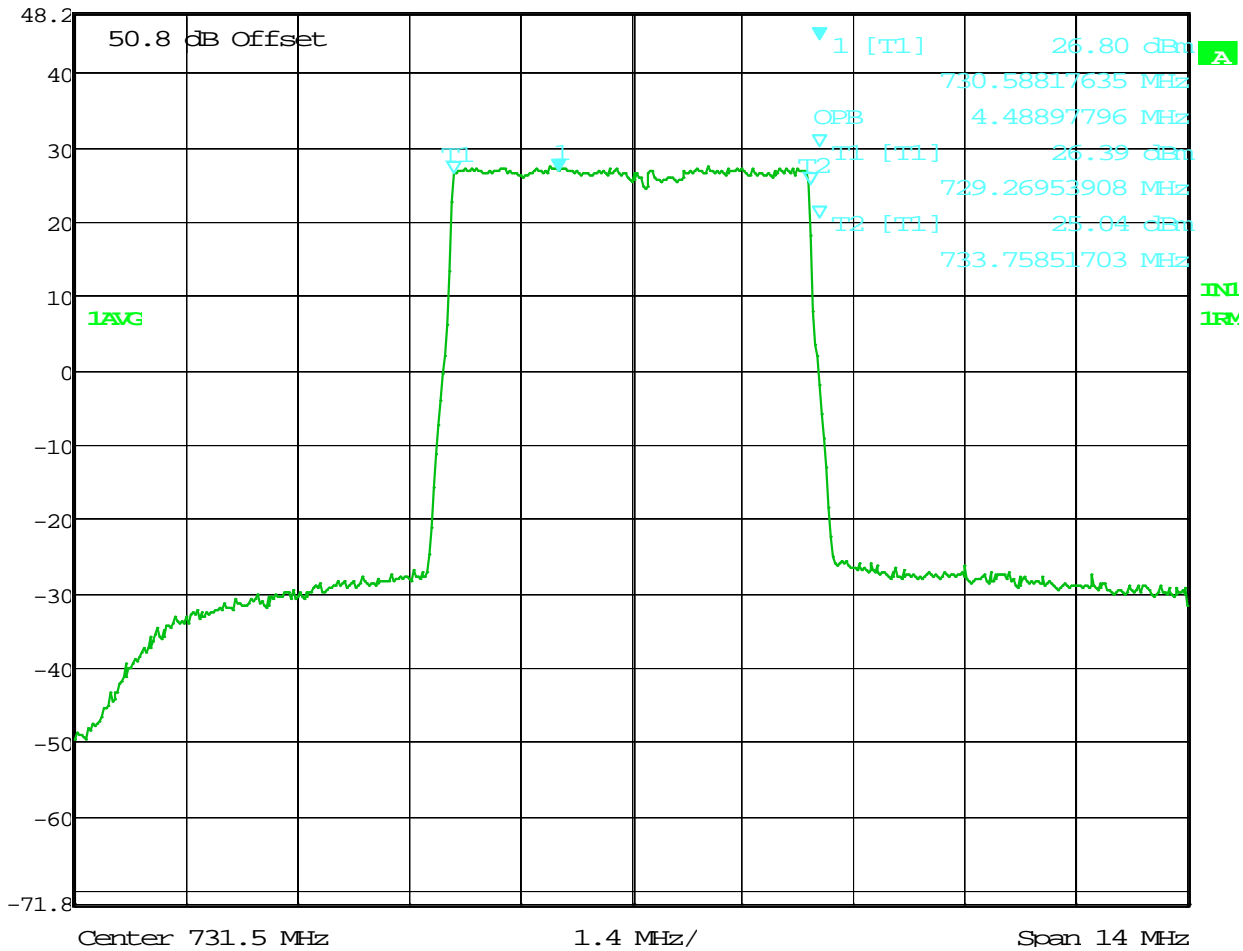
Block: A

5 MHz Bandwidth 729 – 734 MHz

(99% Power Bandwidth)



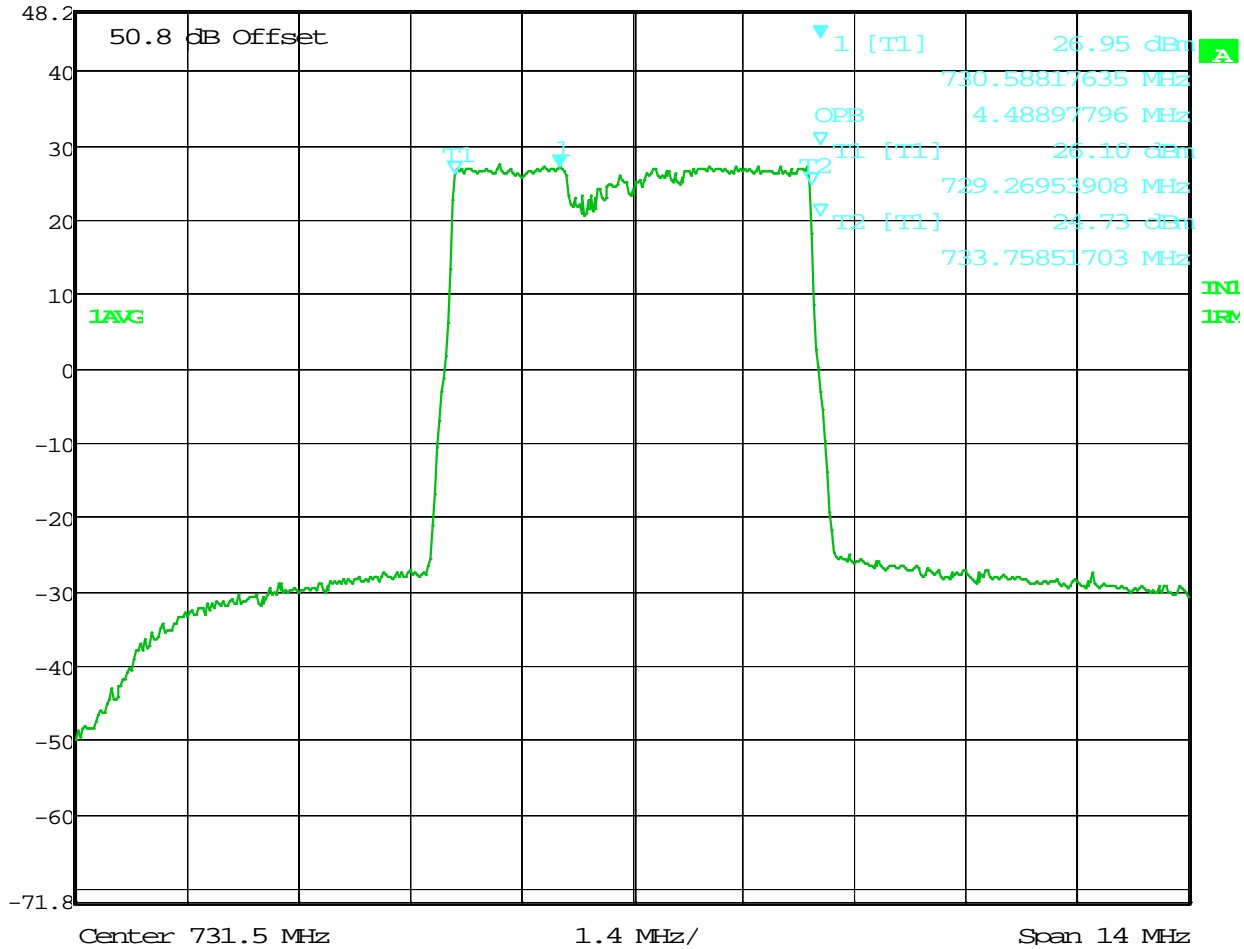
Marker 1 [T1] RBW 30 kHz RF Att 10 dB
 Ref Lvl 26.80 dBm VBW 300 kHz
 48.2 dBm 730.58817635 MHz SWI 39 ms Unit dBm



Title: 99% POWER BANDWIDTH; TEST ENGINEER: SEG
 Comment A: LITE TRDU BC12/17 700 MHz 2X60-7L -48V; Blk A; 729 -
 734 MHz; PWR:60W; QPSK; FCC Prt 27.53; FCCID: AS5BBTRX-09
 Date: 29.NOV.2012 08:16:02



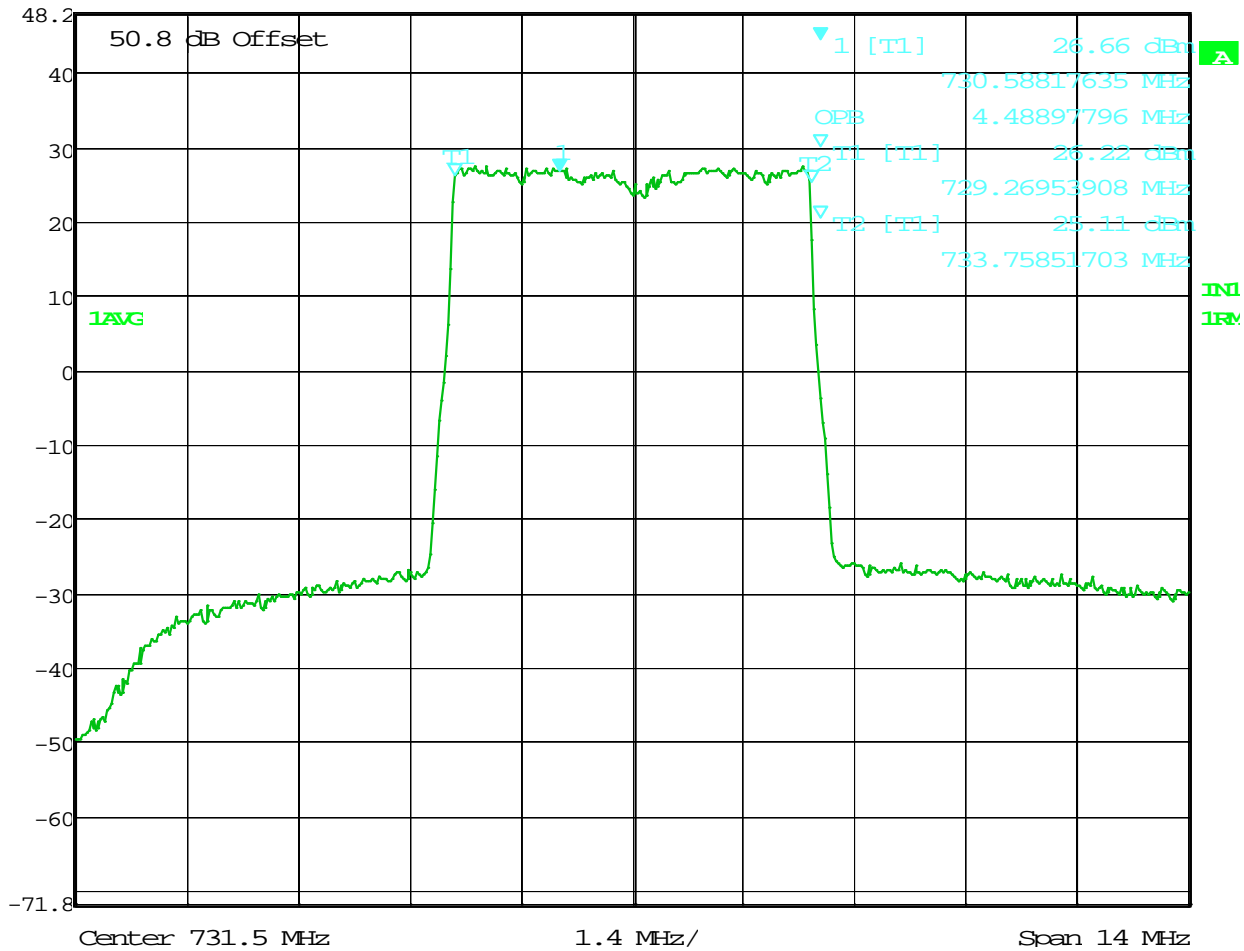
Marker 1 [T1] RBW 30 kHz RF Att 10 dB
 Ref Lvl 26.95 dBm VBW 300 kHz
 48.2 dBm 730.58817635 MHz SWI 39 ms Unit dBm



Title: 99% POWER BANDWIDTH; TEST ENGINEER: SEG
 Comment A: LTE TRDU BC12/17 700 MHz 2X60-7L -48V; Blk A; 729 -
 734 MHz; PWR:60W; 16QAM; FCC Prt 27.53; FCCID: AS5BBTRX-09
 Date: 29.NOV.2012 09:19:29



Marker 1 [T1] RBW 30 kHz RF Att 10 dB
 Ref Lvl 26.66 dBm VBW 300 kHz
 48.2 dBm 730.58817635 MHz SWI 39 ms Unit dBm



Title: 99% POWER BANDWIDTH; TEST ENGINEER: SEG
 Comment A: LTE TRDU BC12/17 700 MHz 2X60-7L -48V; Blk A; 729 -
 734 MHz; PWR:60W; 64QAM; FCC Prt 27.53; FCCID: AS5BBTRX-09
 Date: 29.NOV.2012 09:41:08

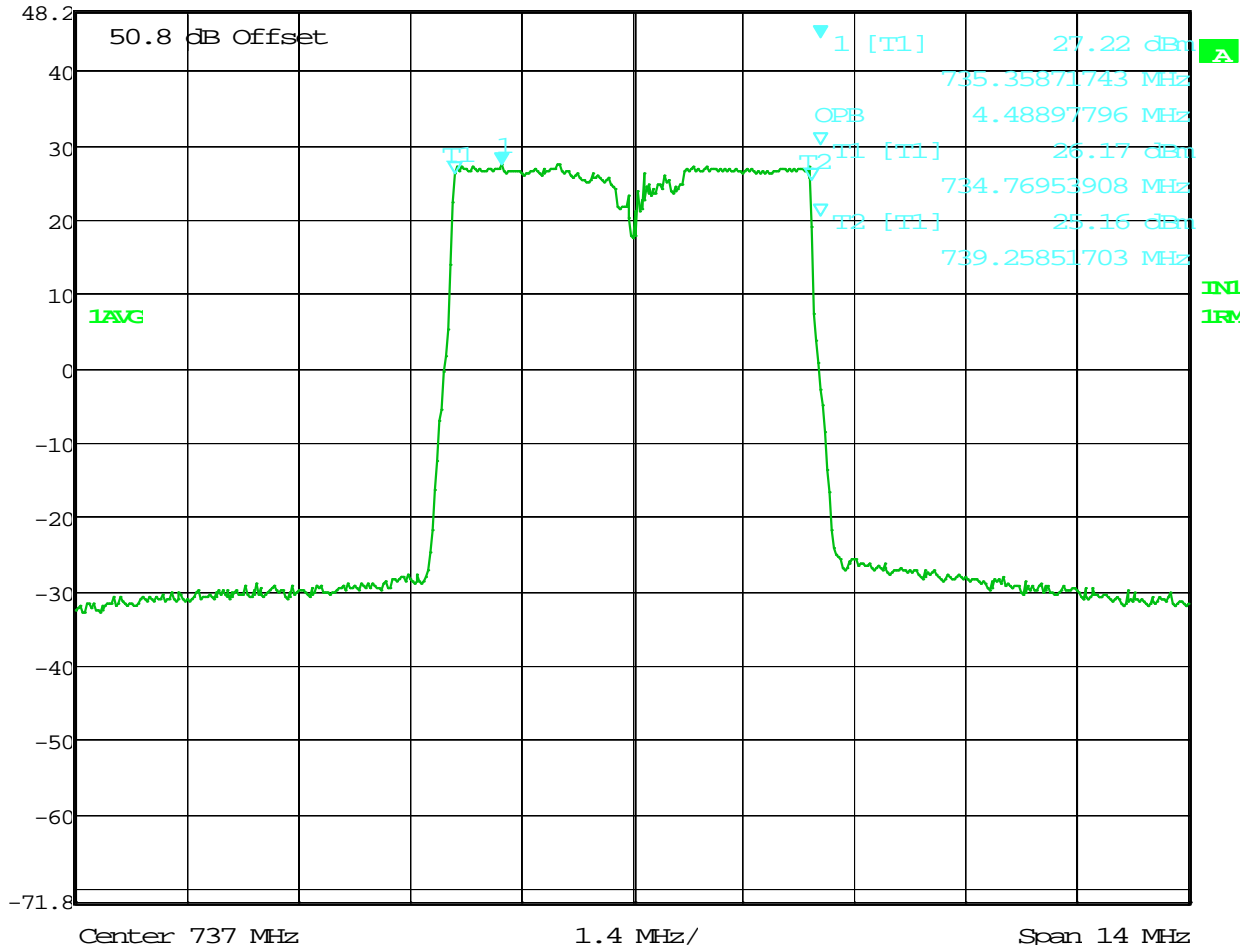
Block: B

5 MHz Bandwidth 734.5 – 739.5 MHz

(99% Power Bandwidth)



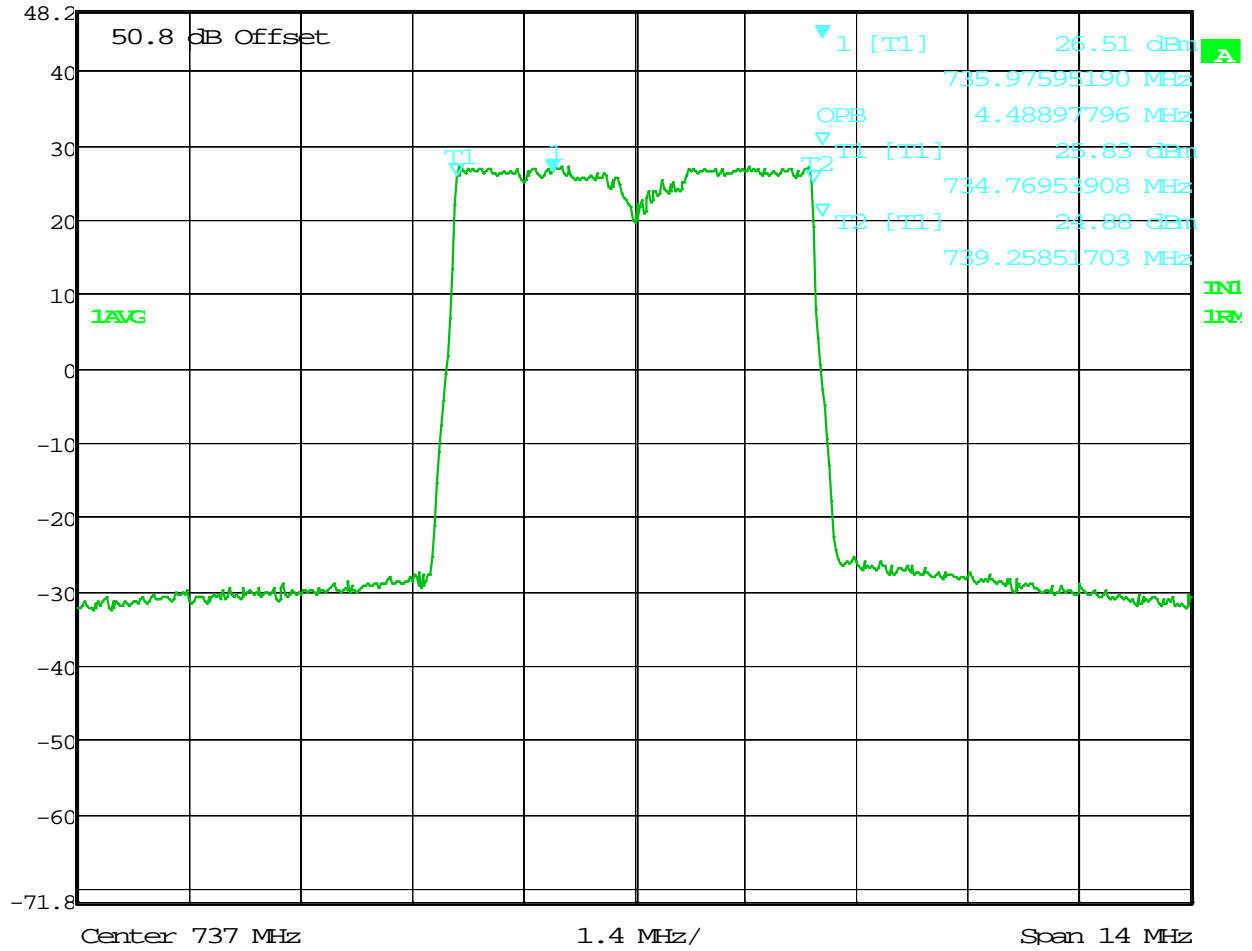
Marker 1 [T1] RBW 30 kHz RF Att 10 dB
 Ref Lvl 27.22 dBm VBW 300 kHz
 48.2 dBm 735.35871743 MHz SWI 39 ms Unit dBm



Title: 99% POWER BANDWIDTH; TEST ENGINEER: SEG
 Comment A: LITE TRDU BC12/17 700 MHz 2X60-7L -48V; Blk B; 734.5 -
 739.5 MHz; PWR:60W; QPSK; FCC Prt 27.53; FCCID: AS5BBTRX-09
 Date: 29.NOV.2012 10:49:56



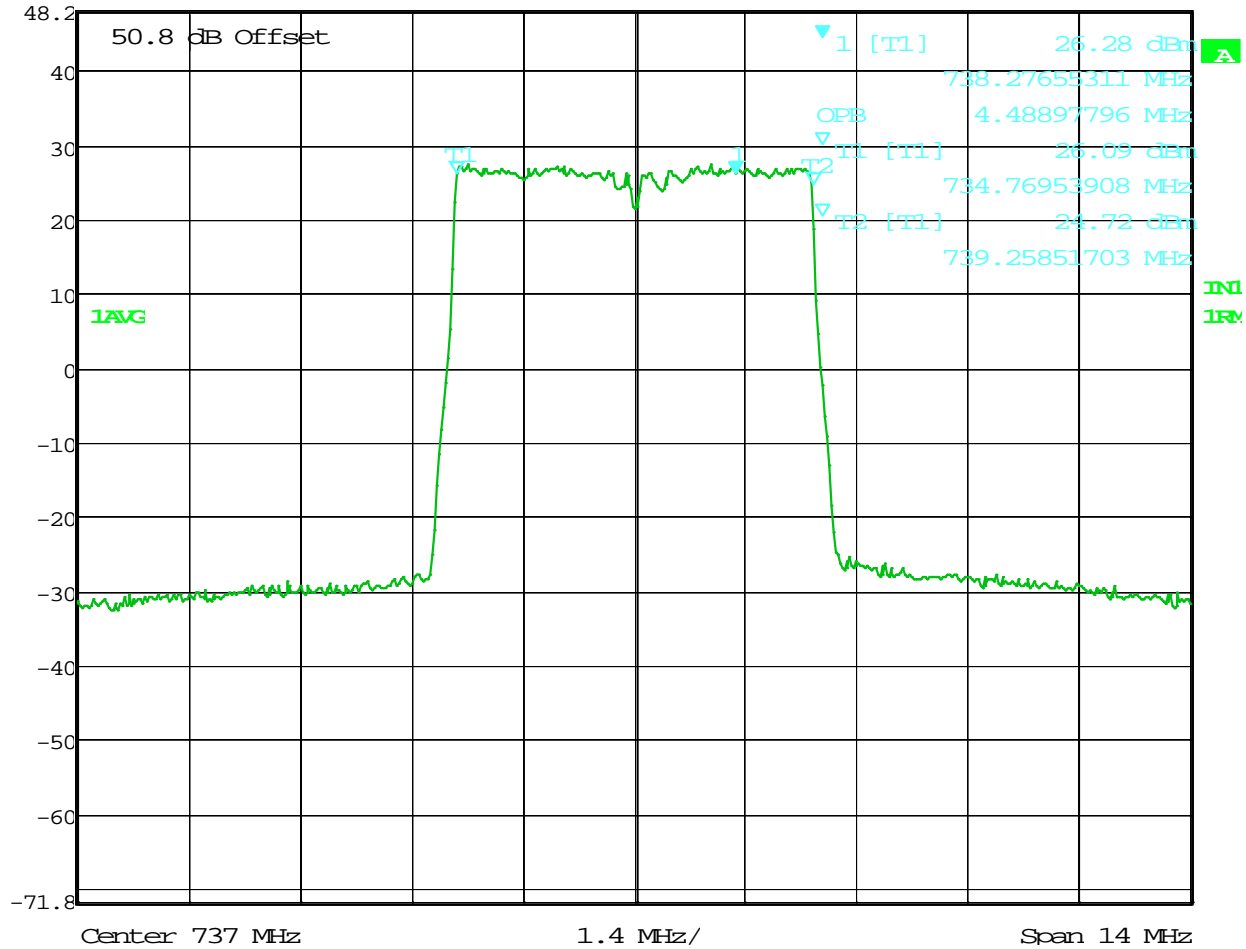
Marker 1 [T1] RBW 30 kHz RF Att 10 dB
 Ref Lvl 26.51 dBm VEW 300 kHz
 48.2 dBm 735.97595190 MHz SWI 39 ms Unit dBm



Title: 99% POWER BANDWIDTH; TEST ENGINEER: SEG
 Comment A: LTE TRDU BC12/17 700 MHz 2X60-7L -48V; Blk B; 734.5 -
 739.5 MHz; PWR:60W; 16QAM; FCC Prt 27.53; FCCID: AS5BBTRX-09
 Date: 29.NOV.2012 11:08:51



Marker 1 [T1] RBW 30 kHz RF Att 10 dB
 Ref Lvl 26.28 dBm VBW 300 kHz
 48.2 dBm 738.27655311 MHz SWI 39 ms Unit dBm



Title: 99% POWER BANDWIDTH; TEST ENGINEER: SEG
 Comment A: LITE TRDU BC12/17 700 MHz 2X60-7L -48V; Blk B; 734.5 -
 739.5 MHz; PWR:60W; 64QAM; FCC Prt 27.53; FCCID: AS5BBTRX-09
 Date: 29.NOV.2012 11:39:12

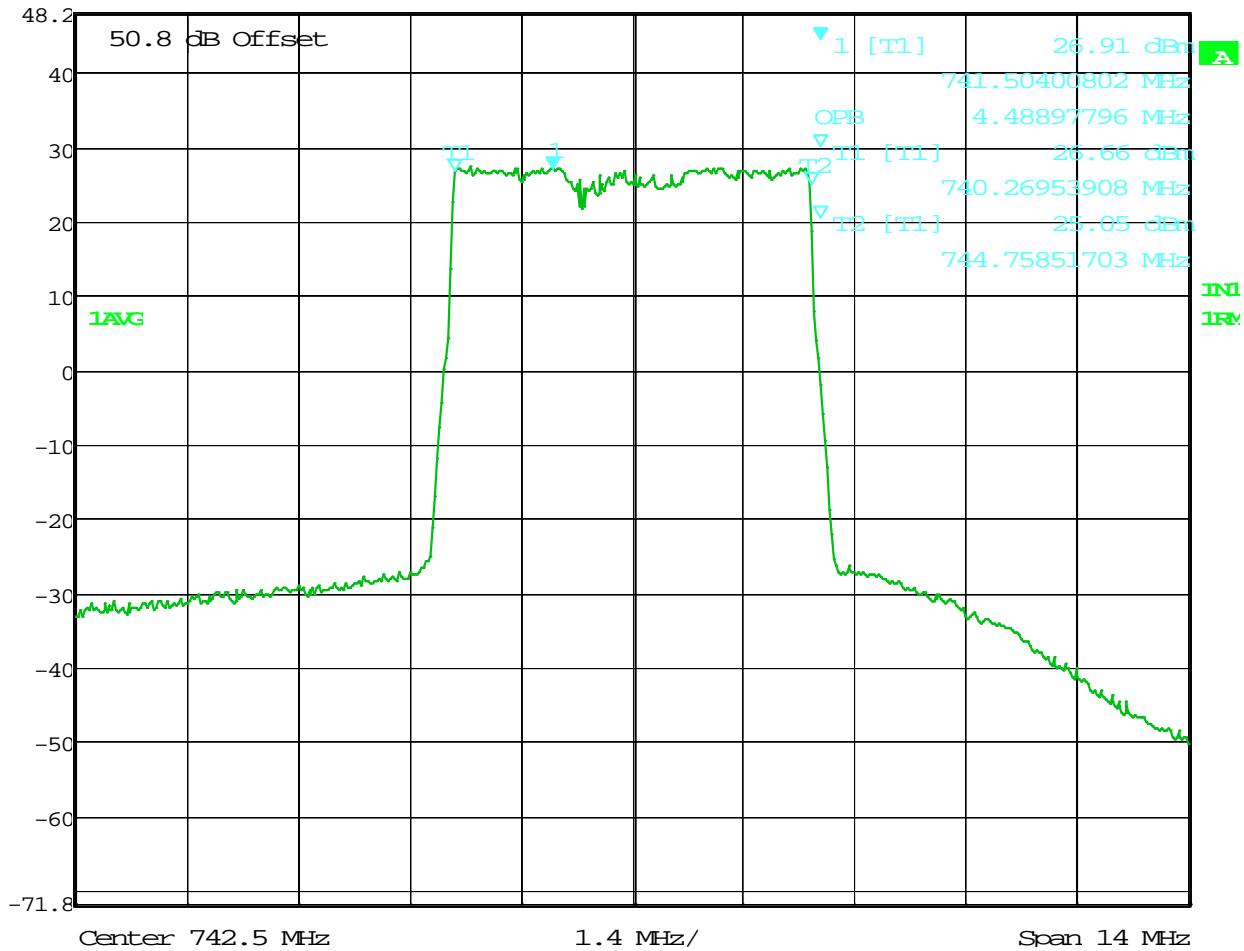
Block: C

5 MHz Bandwidth 740 – 745 MHz

(99% Power Bandwidth)



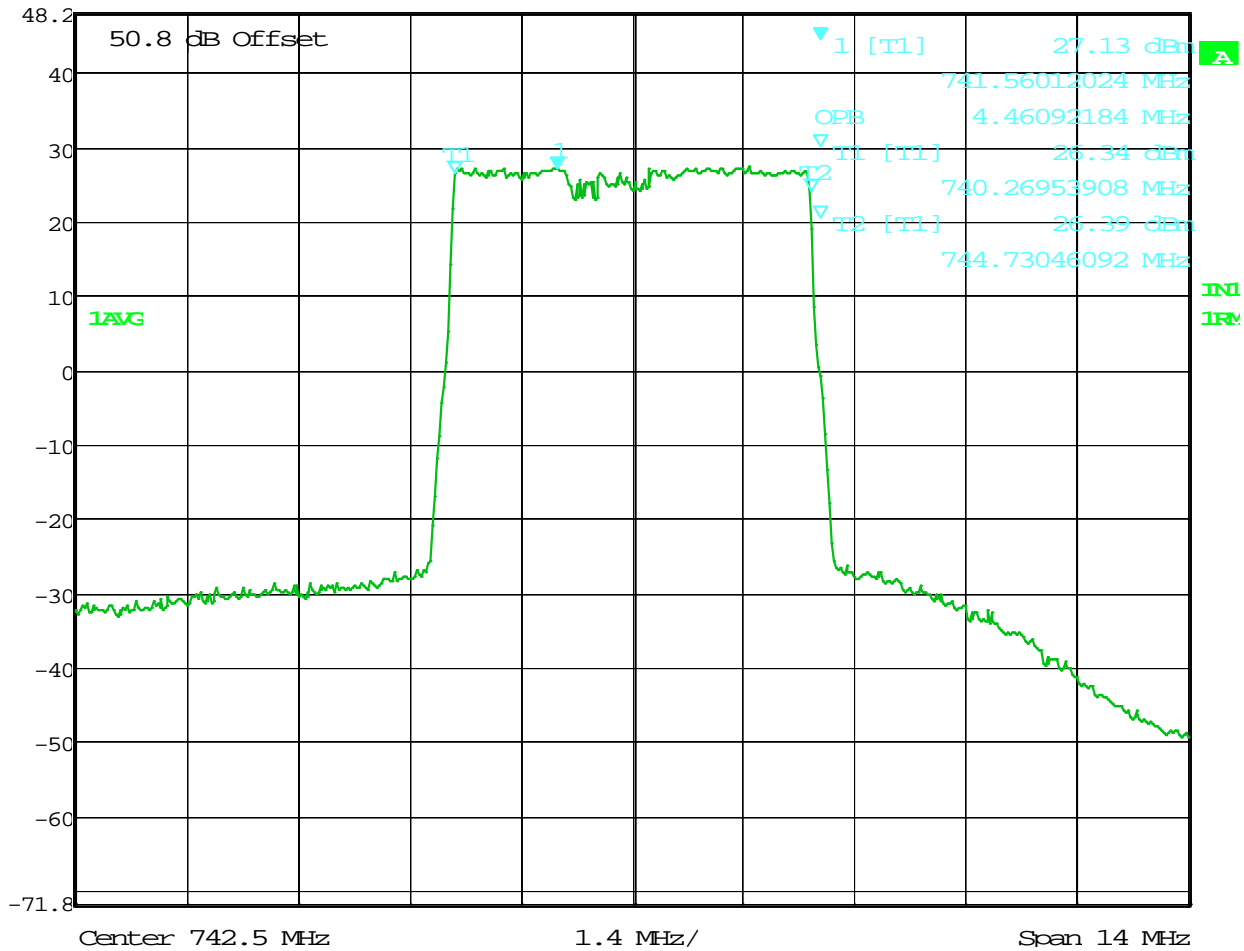
Marker 1 [T1] RBW 30 kHz RF Att 10 dB
 Ref Lvl 26.91 dBm VBW 300 kHz
 48.2 dBm 741.50400802 MHz SWI 39 ms Unit dBm



Title: 99% POWER BANDWIDTH; TEST ENGINEER: SEG
 Comment A: LTE TRDU BC12/17 700 MHz 2X60-7L -48V; Blk C; 740 -
 745 MHz; PWR:60W; QPSK; FCC Prt 27.53; FCCID: AS5BBTRX-09
 Date: 29.NOV.2012 13:22:56



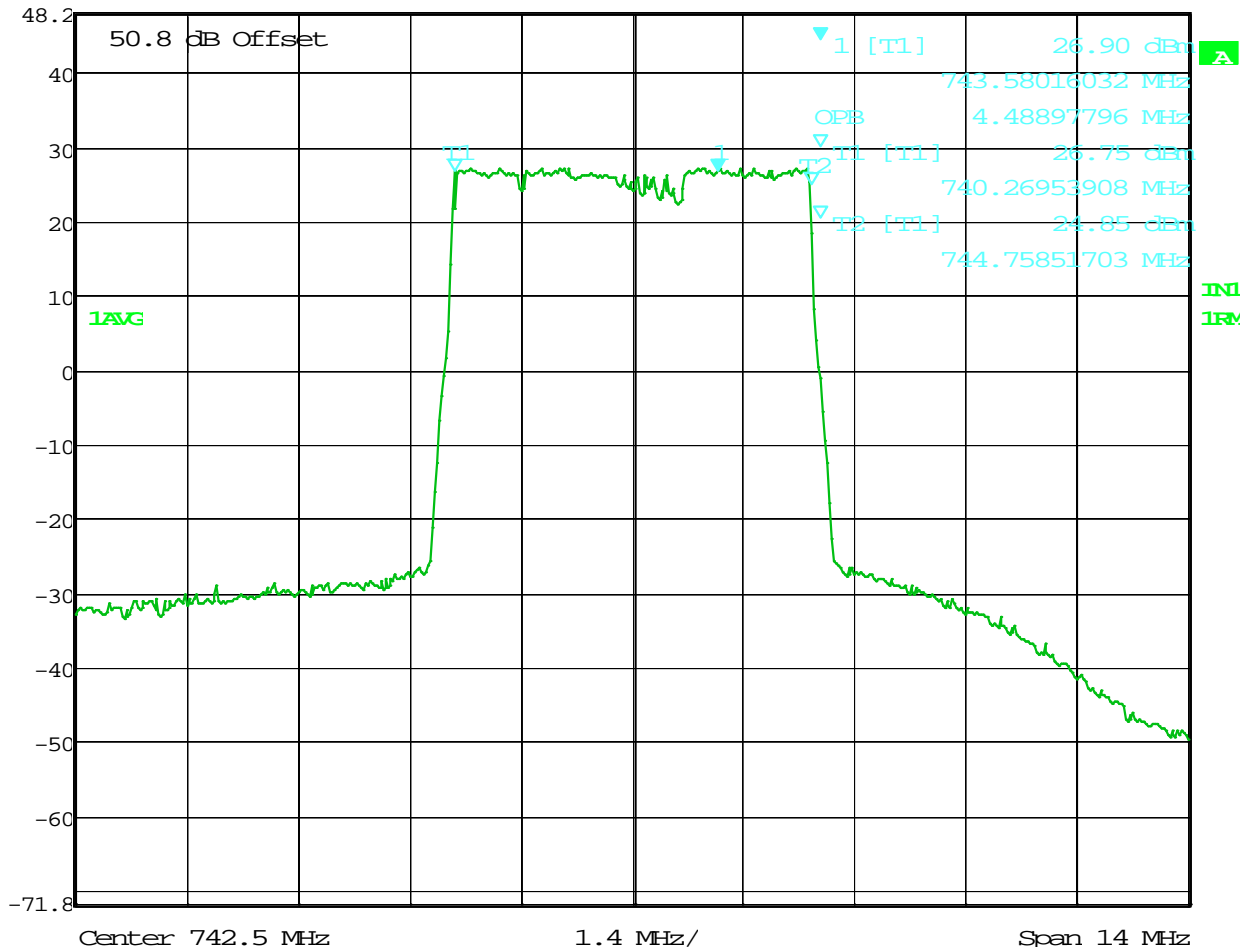
Marker 1 [T1] RBW 30 kHz RF Att 10 dB
 Ref Lvl 27.13 dBm VBW 300 kHz
 48.2 dBm 741.56012024 MHz SWI 39 ms Unit dBm



Title: 99% POWER BANDWIDTH; TEST ENGINEER: SEG
 Comment A: LTE TRDU BC12/17 700 MHz 2X60-7L -48V; Blk C; 740 -
 745 MHz; PWR:60W; 16QAM; FCC Prt 27.53; FCCID: AS5BBTRX-09
 Date: 29.NOV.2012 14:18:21



Marker 1 [T1] RBW 30 kHz RF Att 10 dB
 Ref Lvl 26.90 dBm VBW 300 kHz
 48.2 dBm 743.58016032 MHz SWI 39 ms Unit dBm



Title: 99% POWER BANDWIDTH; TEST ENGINEER: SEG
 Comment A: LITE TRDU BC12/17 700 MHz 2X60-7L -48V; Blk C; 740 -
 745 MHz; PWR:60W; 64QAM; FCC Prt 27.53; FCCID: AS5BBTRX-09
 Date: 29.NOV.2012 14:29:58

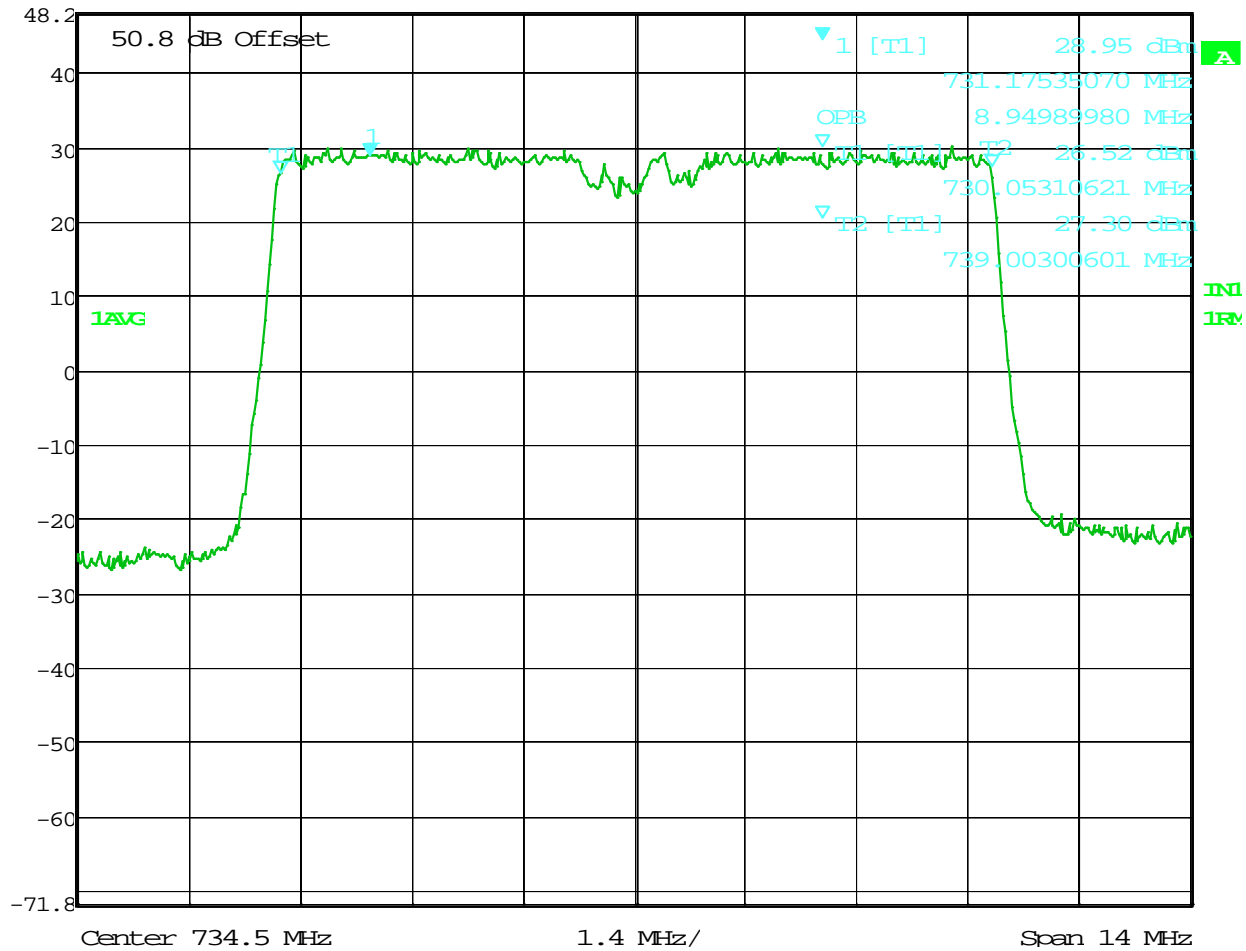
Block: A+B

10 MHz Bandwidth 729.5 – 739.5 MHz

(99% Power Bandwidth)



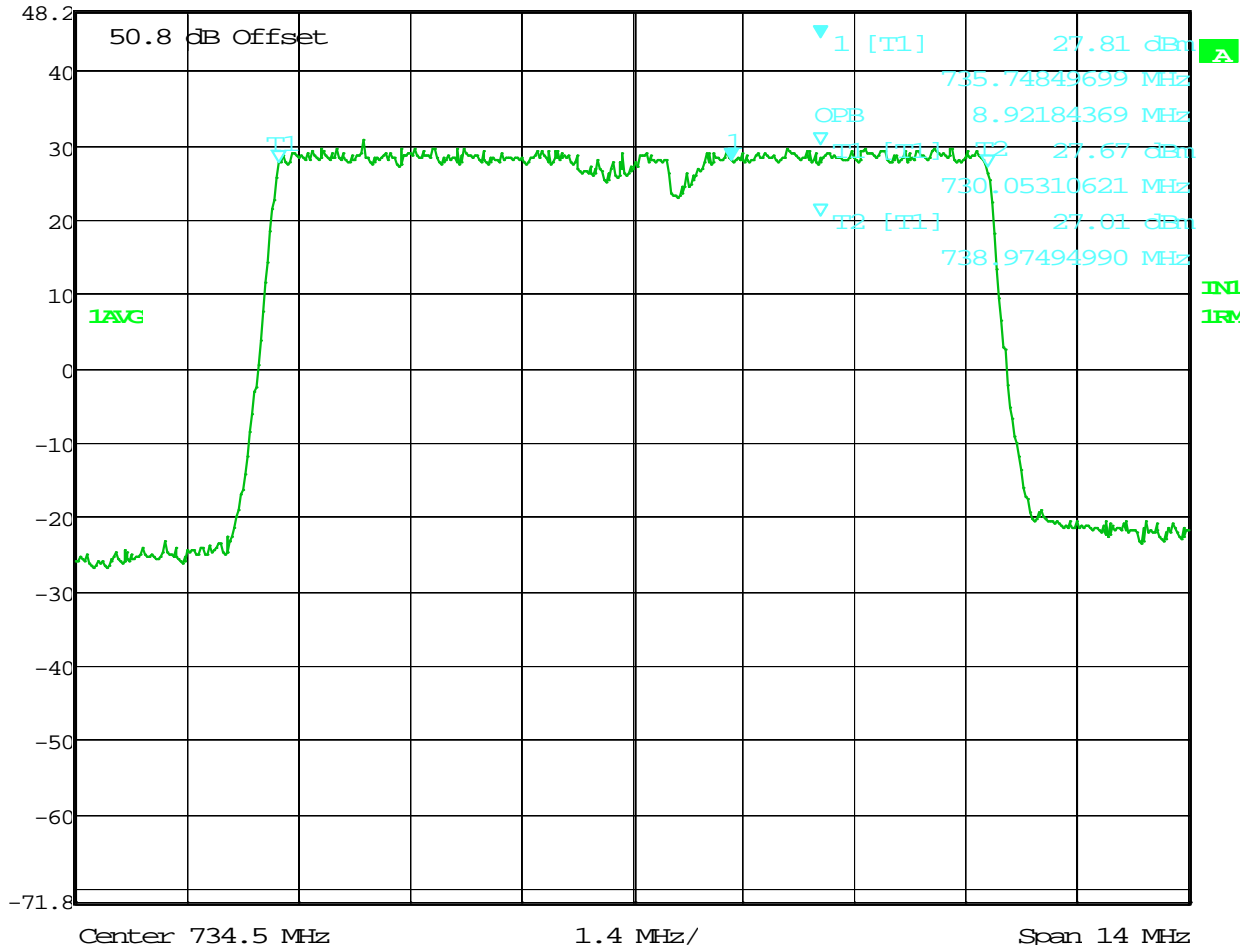
Marker 1 [T1] RBW 100 kHz RF Att 10 dB
 Ref Lvl 28.95 dBm VBW 1 MHz
 48.2 dBm 731.17535070 MHz SWI 5 ms Unit dBm



Title: 99% POWER BANDWIDTH; TEST ENGINEER: SEG
 Comment A: LITE TRDU BC12/17 700 MHz 2X60-7L -48V; Blk A+B; 729.5 -
 739.5 MHz; PWR: 60W; QPSK; FCC Prt 27.53; FCCID: AS5BBTRX-09
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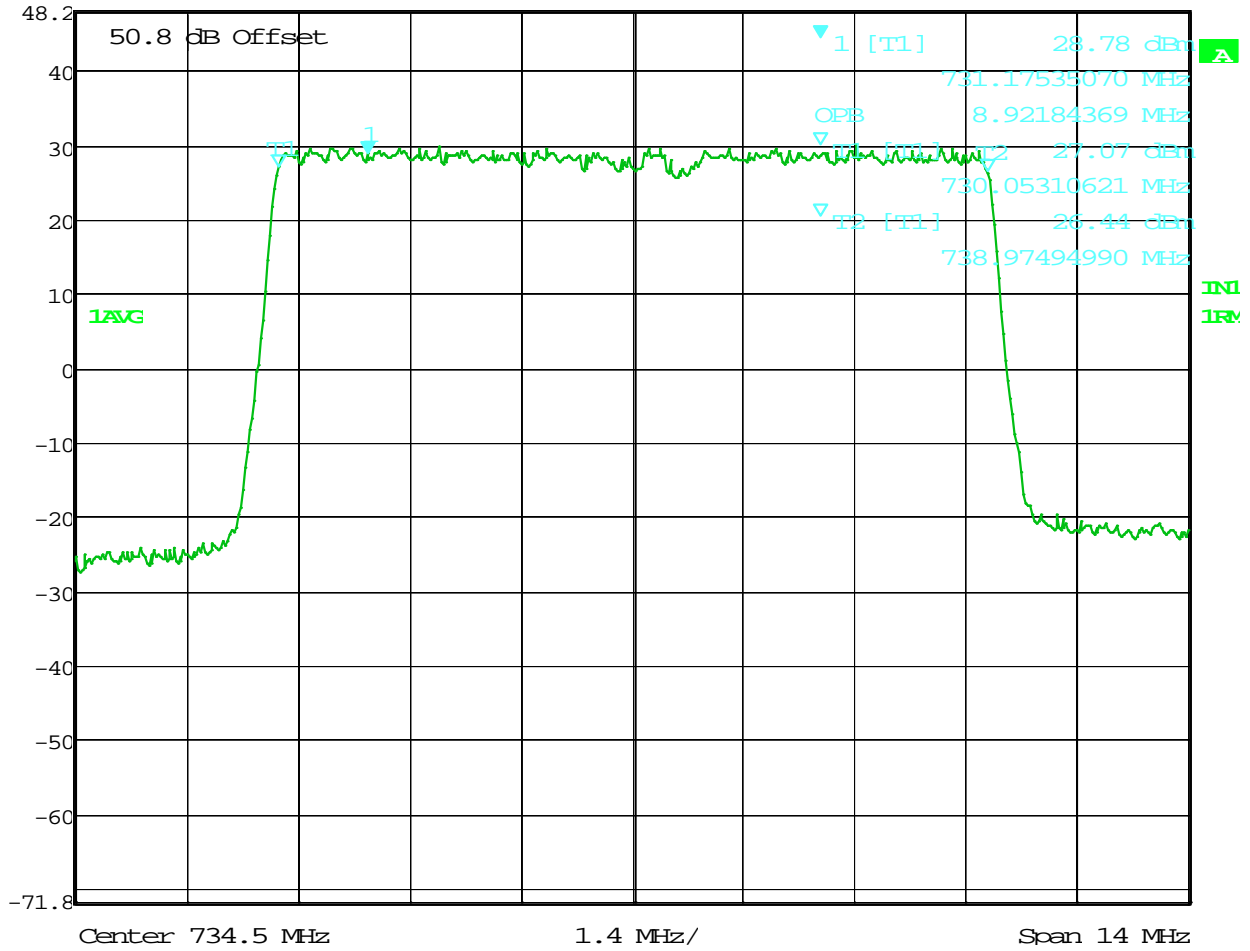
Marker 1 [T1] RBW 100 kHz RF Att 10 dB
 Ref Lvl 27.81 dBm VBW 1 MHz
 48.2 dBm 735.74849699 MHz SWI 5 ms Unit dBm



Title: 99% POWER BANDWIDTH; TEST ENGINEER: SEG
 Comment A: LITE TRDU BC12/17 700 MHz 2X60-7L -48V; Blk A+B; 729.5 -
 739.5 MHz; PWR:60W; 16QAM; FCC Prt 27.53; FCCID: AS5BBTRX-09
 Date: 28.NOV.2012 07:46:06



Marker 1 [T1] REW 100 kHz RF Att 10 dB
 Ref Lvl 28.78 dBm VEW 1 MHz
 48.2 dBm 731.17535070 MHz SWI 5 ms Unit dBm



Title: 99% POWER BANDWIDTH; TEST ENGINEER: SEG/JY
 Comment A: LTE TRDU BC12/17 700 MHz 2X60-7L -48V; Blk A+B; 729.5 -
 739.5 MHz; PWR:60W; 64QAM; FCC Prt 27.53; FCCID: AS5BBTRX-09
 Date: 28.NOV.2012 09:35:39

Block: B+C

10 MHz Bandwidth 734.5 – 744.5 MHz

(99% Power Bandwidth)



Marker 1 [T1]

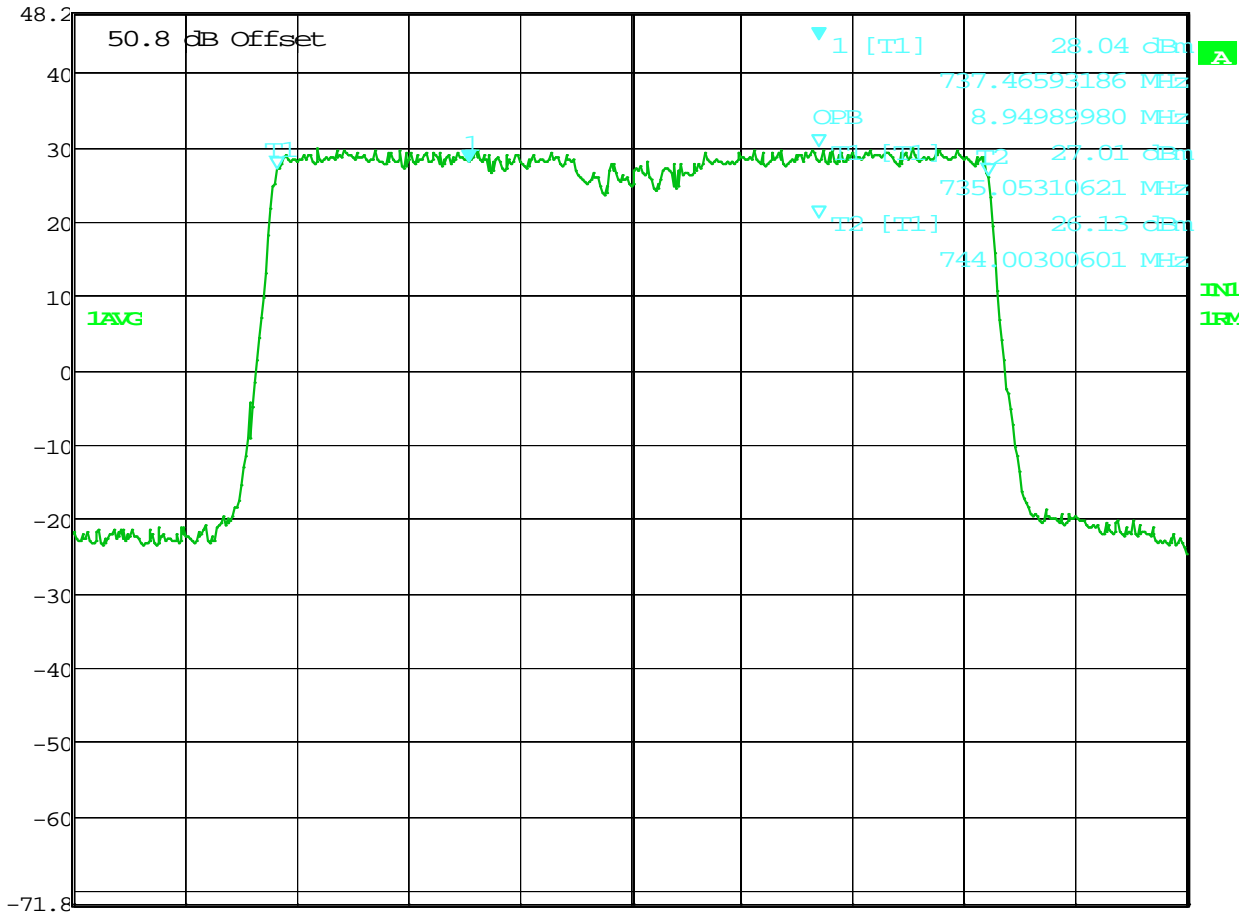
RBW 100 kHz RF Att 10 dB

Ref Lvl 28.04 dBm

VBW 1 MHz

48.2 dBm 737.46593186 MHz

SWT 5 ms Unit dBm



Center 739.5 MHz

1.4 MHz/

Span 14 MHz

Title: 99% POWER BANDWIDTH; TEST ENGINEER: SEG

Comment A: LTE TRDU BC12/17 700 MHz 2X60-7L -48V; Blk B+C; 734.5 - 744.5 MHz; PWR:60W; QPSK; FCC Prt 27.53; FCCID: AS5BBTRX-09

Date: 28.NOV.2012 14:08:02



Marker 1 [T1]

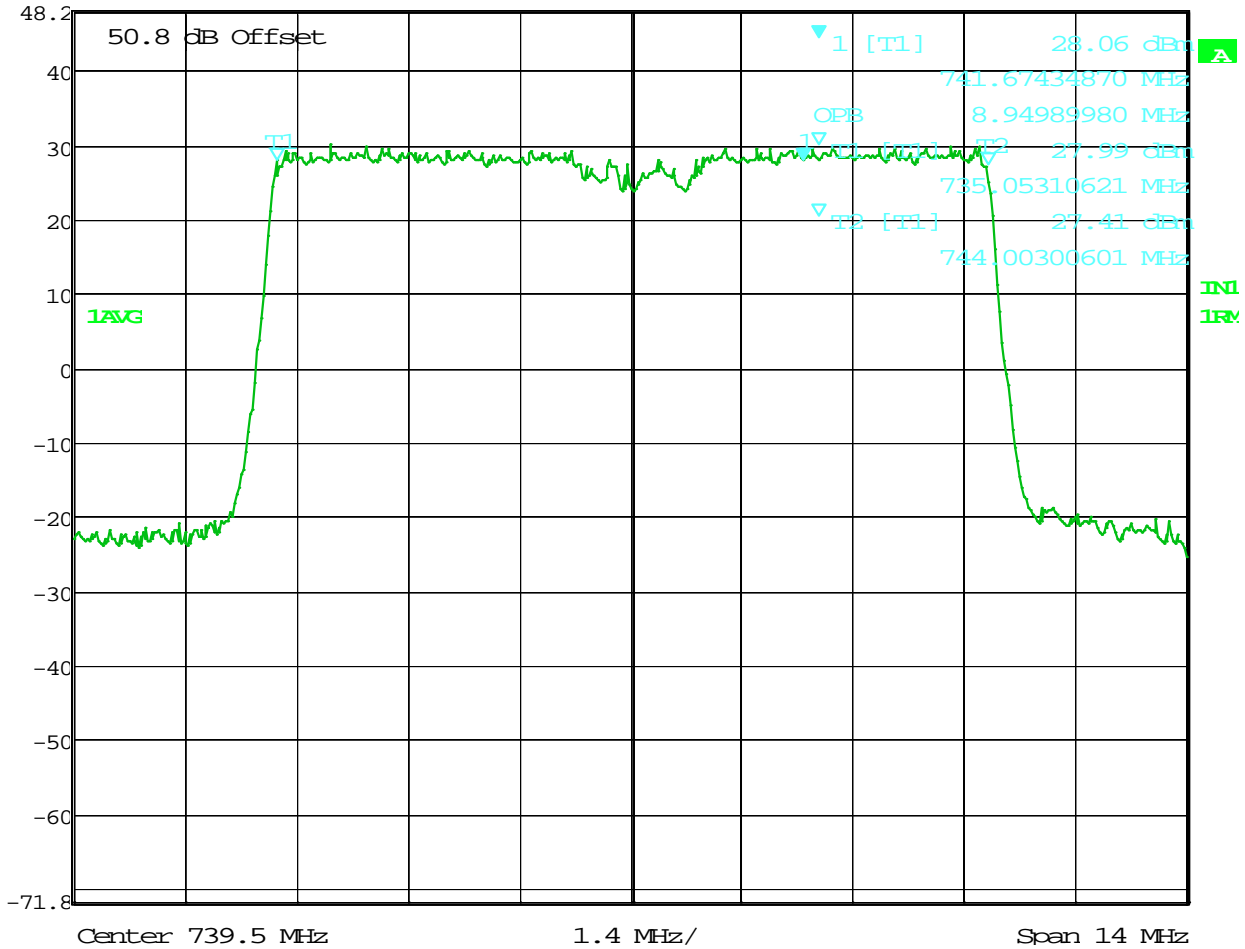
RBW 100 kHz RF Att 10 dB

Ref Lvl 28.06 dBm

VBW 1 MHz

48.2 dBm 741.67434870 MHz

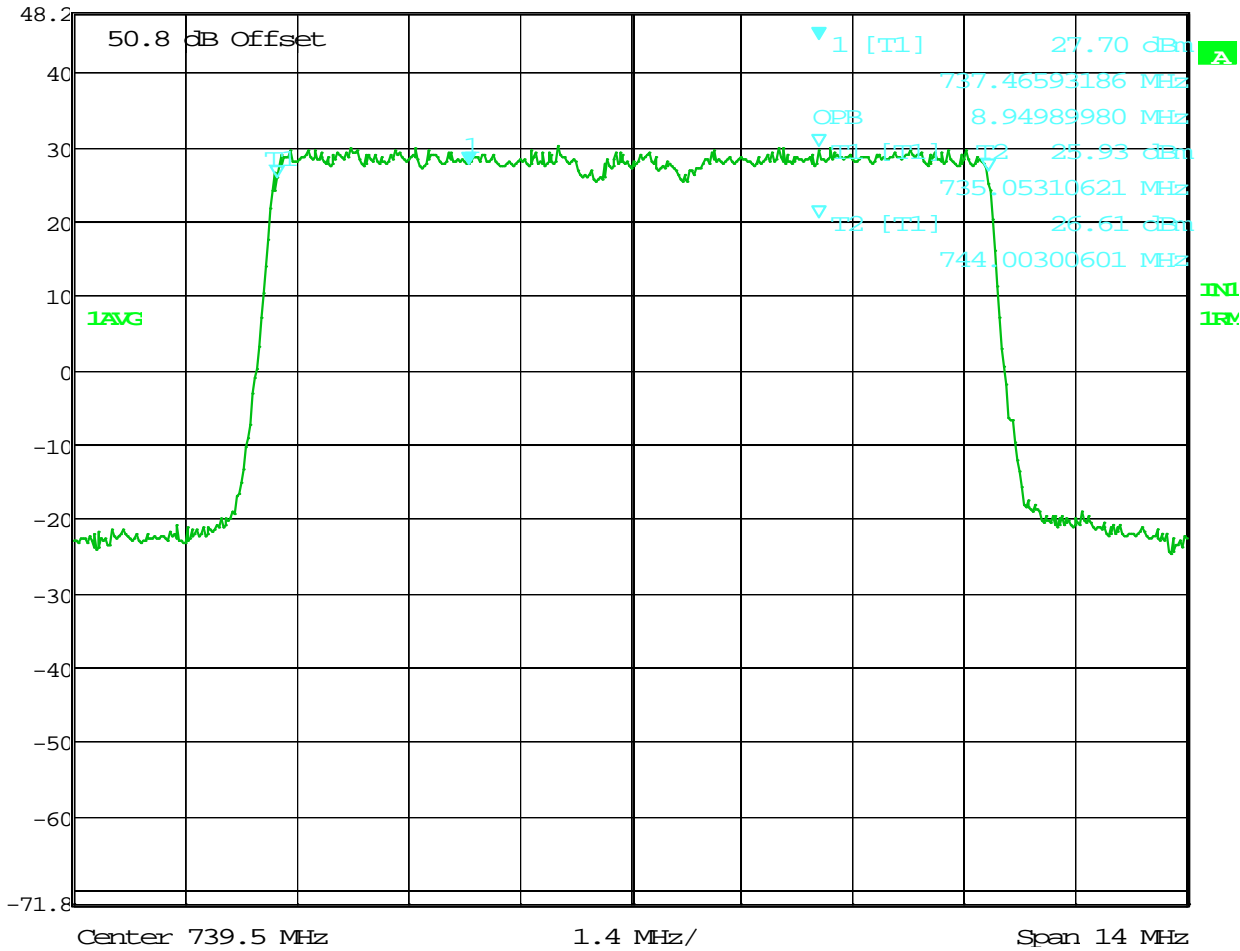
SWI 5 ms Unit dBm



Title: 99% POWER BANDWIDTH; TEST ENGINEER: SEG
 Comment A: LTE TRDU BC12/17 700 MHz 2X60-7L -48V; Blk B+C; 734.5 -
 744.5 MHz; PWR:60W; 16QAM; FCC Prt 27.53; FCCID: AS5BBTRX-09
 Date: 28.NOV.2012 14:04:04



Marker 1 [T1] RBW 100 kHz RF Att 10 dB
Ref Lvl 27.70 dBm VBW 1 MHz
48.2 dBm 737.46593186 MHz SWI 5 ms Unit dBm



Title: 99% POWER BANDWIDTH; TEST ENGINEER: SEG
Comment A: LTE TRDU BC12/17 700 MHz 2X60-7L -48V; Blk B+C; 734.5 -
744.5 MHz; PWR:60W; 64QAM; FCC Prt 27.53; FCCID: AS5BBTRX-09
Date: 28.NOV.2012 14:17:42

**MEASUREMENT OF SPECTRUM BANDWIDTH
26 dB POWER BANDWIDTH**

**(b) MEASUREMENT OF
SPECTRUM BANDWIDTH
For Emissions Type**

The occupied bandwidth of the **LTE TRDU 2x60-7L (BC12/17)** is measured using a Rohde & Schwarz ESI Spectrum Analyzer/Receiver and an HP Model 520 DeskJet Printer. The emissions bandwidth is not provided in the section 27.53 for 700 MHz bands. Therefore emissions band width definition provided in section 27.53 (h) (1) is used. Accordingly “The emissions bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26dB below the transmitter power.”

The measurements were made on a “**LTE TRDU 2x60-7L (BC12/17)**” in the following configurations:

1. QPSK
2. 16 QAM
3. 64 QAM

Results:

The plots are provided for QPSK, 16QAM and 64QAM modulations for 5MHz and 10 MHz bands.
The Measured 26dB emissions bandwidth is 4.74 MHz for 5 MHz band and 9.44 MHz for 10 MHz band.

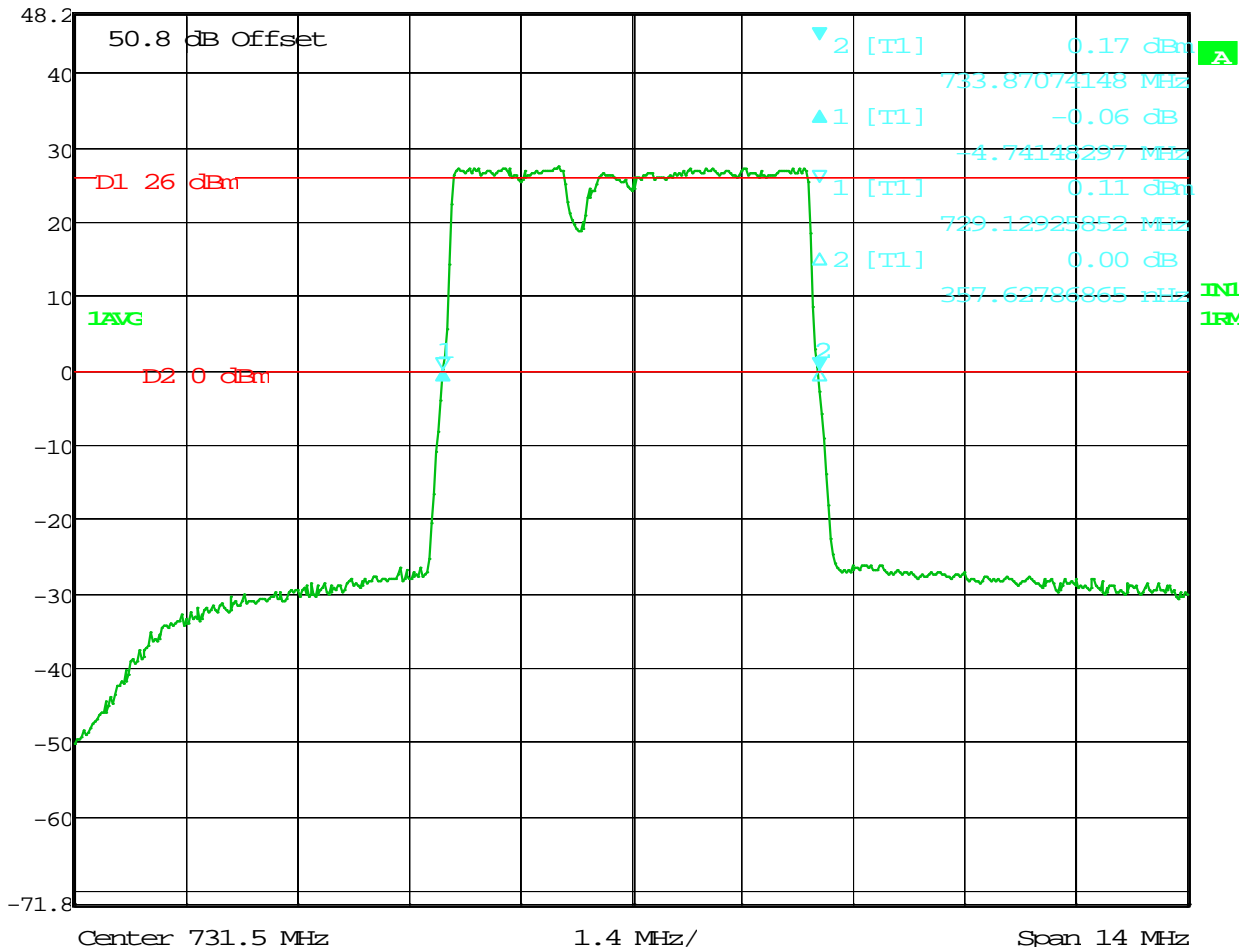
Block: A

5 MHz Bandwidth 729 – 734 MHz

(26dB Bandwidth)



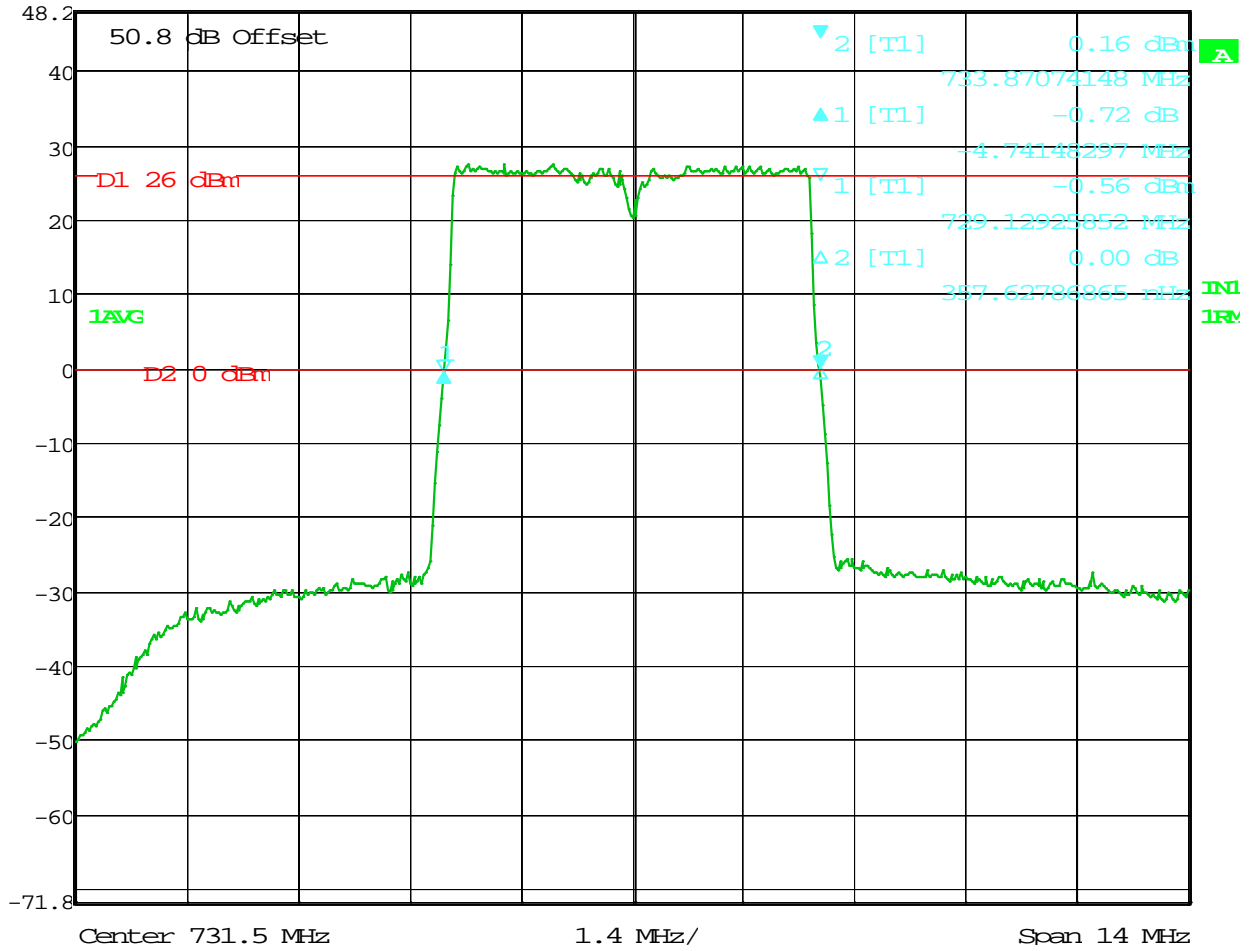
Delta 1 [T1] REBW 30 kHz RF Att 10 dB
 Ref Lvl -0.06 dB VEW 300 kHz
 48.2 dBm -4.74148297 MHz SWI 39 ms Unit dBm



Title: 26dB BANDWIDTH; TEST ENGINEER: SEG
 Comment A: LTE TRDU BC12/17 700 MHz 2X60-7L -48V; Blk A; 729 -
 734 MHz; PWR:60W; QPSK; FCC Prt 27.53; FCCID: AS5BBTRX-09
 Date: 29.NOV.2012 08:14:08



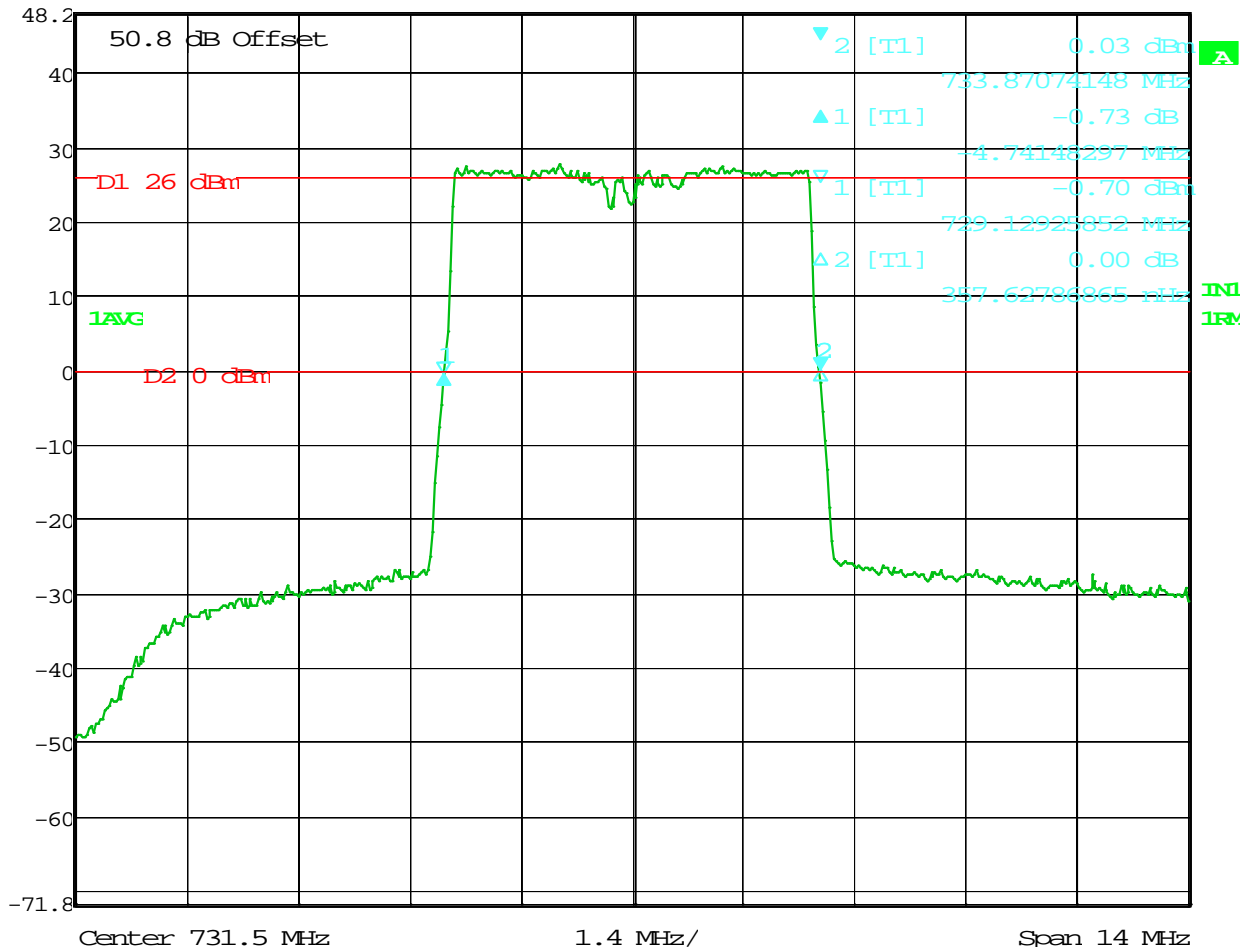
Ref Lvl	Delta 1 [T1]	RBW	30 kHz	RF Att	10 dB
48.2 dBm	-0.72 dB	VBW	300 kHz		
	-4.74148297 MHz	SWI	39 ms	Unit	dBm



Title: 26dB BANDWIDTH; TEST ENGINEER: SEG
 Comment A: LTE TRDU BC12/17 700 MHz 2X60-7L -48V; Blk A; 729 -
 734 MHz; PWR:60W; 16QAM; FCC Prt 27.53; FCCID: AS5BBTRX-09
 Date: 29.NOV.2012 09:16:23



Ref Lvl	Delta 1 [T1]	RBW	30 kHz	RF Att	10 dB
48.2 dBm	-0.73 dB	VBW	300 kHz		
	-4.74148297 MHz	SWI	39 ms	Unit	dBm



Title: 26dB BANDWIDTH; TEST ENGINEER: SEG
 Comment A: LTE TRDU BC12/17 700 MHz 2X60-7L -48V; Blk A; 729 -
 734 MHz; PWR:60W; 64QAM; FCC Prt 27.53; FCCID: AS5BBTRX-09
 Date: 29.NOV.2012 09:44:55

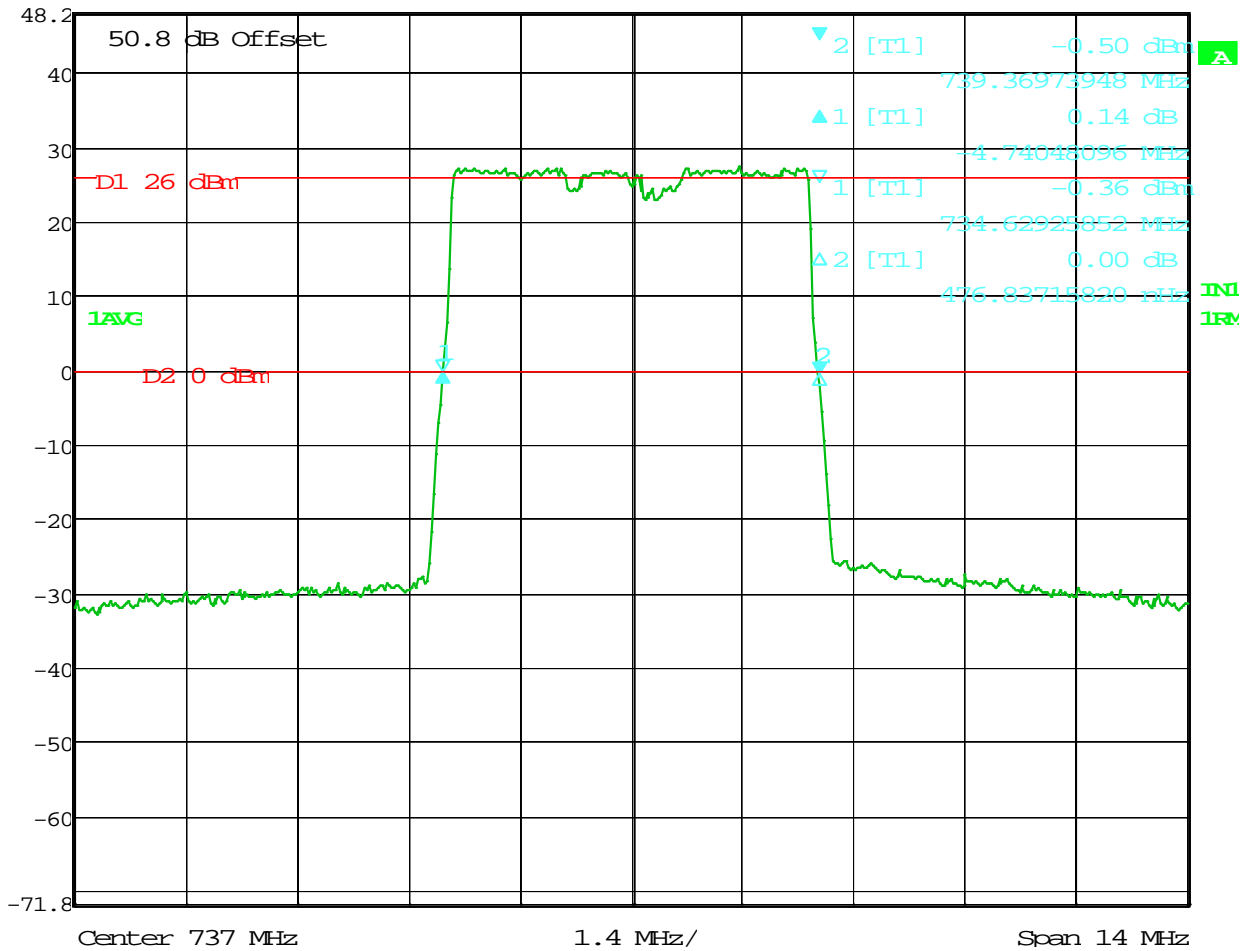
Block: B

5 MHz Bandwidth 734.5 – 739.5 MHz

(26dB Bandwidth)



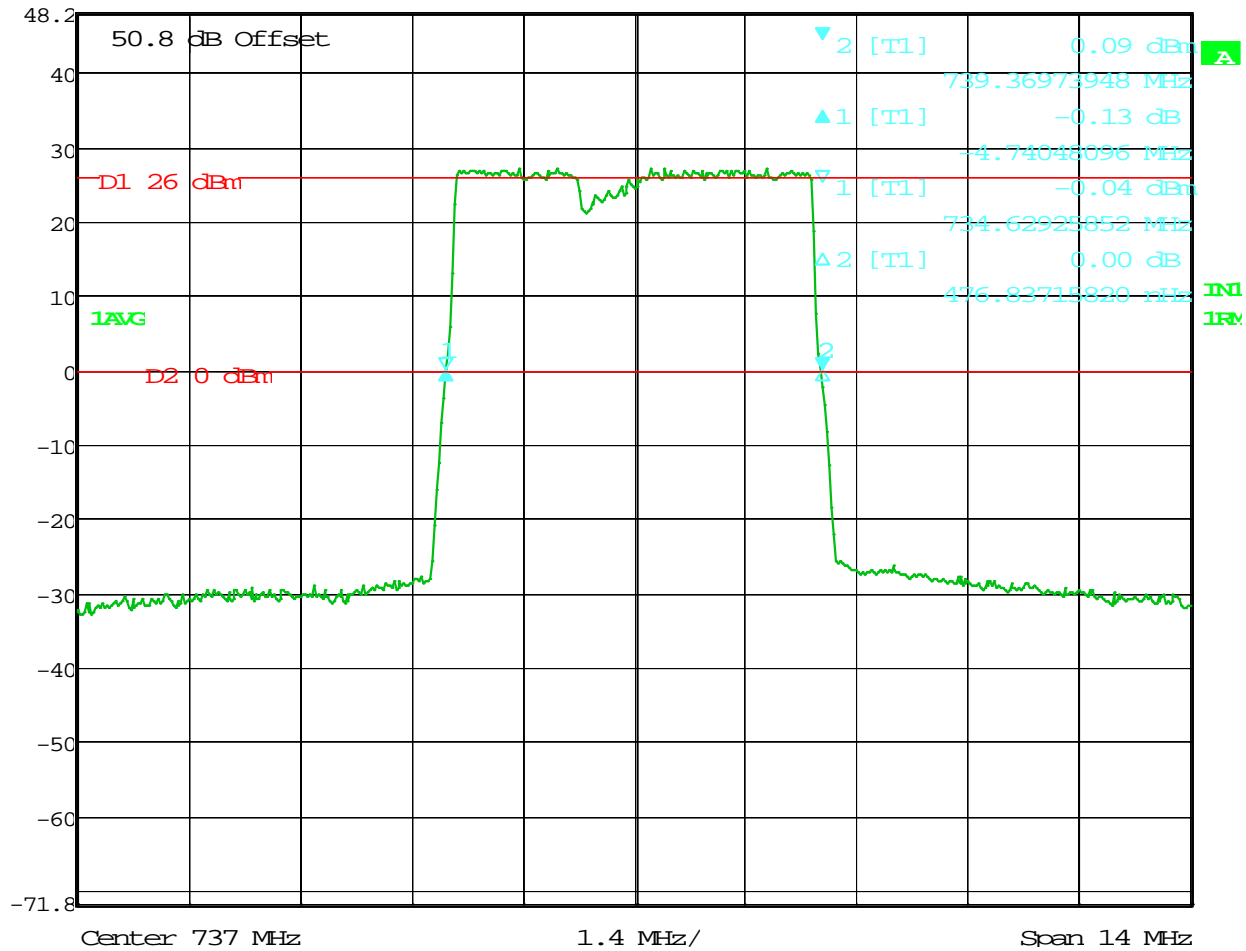
Delta 1 [T1] RBW 30 kHz RF Att 10 dB
 Ref Lvl 0.14 dB VBW 300 kHz
 48.2 dBm -4.74048096 MHz SWI 39 ms Unit dBm



Title: 26dB BANDWIDTH; TEST ENGINEER: SEG
 Comment A: LTE TRDU BC12/17 700 MHz 2X60-7L -48V; Blk B; 734.5 -
 739.5 MHz; PWR:60W; QPSK; FCC Prt 27.53; FCCID: AS5BBTRX-09
 Date: 29.NOV.2012 10:46:48



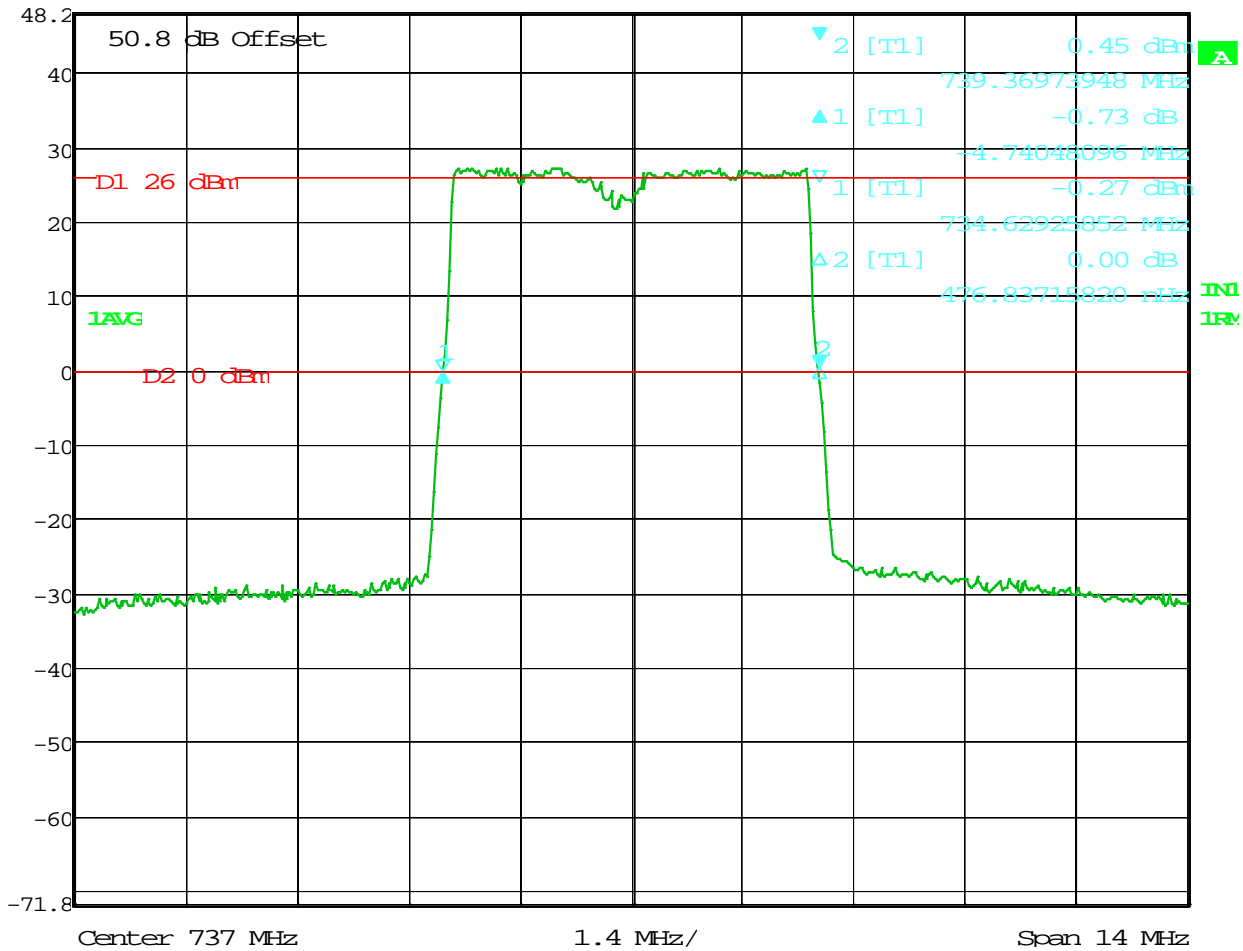
Delta 1 [T1] RBW 30 kHz RF Att 10 dB
 Ref Lvl -0.13 dB VBW 300 kHz
 48.2 dBm -4.74048096 MHz SWI 39 ms Unit dBm



Title: 26dB BANDWIDTH; TEST ENGINEER: SEG
 Comment A: LITE TRDU BC12/17 700 MHz 2X60-7L -48V; Blk B; 734.5 -
 739.5 MHz; PWR:60W; 16QAM; FCC Prt 27.53; FCCID: AS5BBTRX-09
 Date: 29.NOV.2012 11:07:27



Delta 1 [T1] REBW 30 kHz RF Att 10 dB
 Ref Lvl -0.73 dB VEW 300 kHz
 48.2 dBm -4.74048096 MHz SWI 39 ms Unit dBm



Title: 26dB BANDWIDTH; TEST ENGINEER: SEG
 Comment A: LTE TRDU BC12/17 700 MHz 2X60-7L -48V; Blk B; 734.5 -
 739.5 MHz; PWR:60W; 64QAM; FCC Prt 27.53; FCCID: AS5BBTRX-09
 Date: 29.NOV.2012 11:37:15

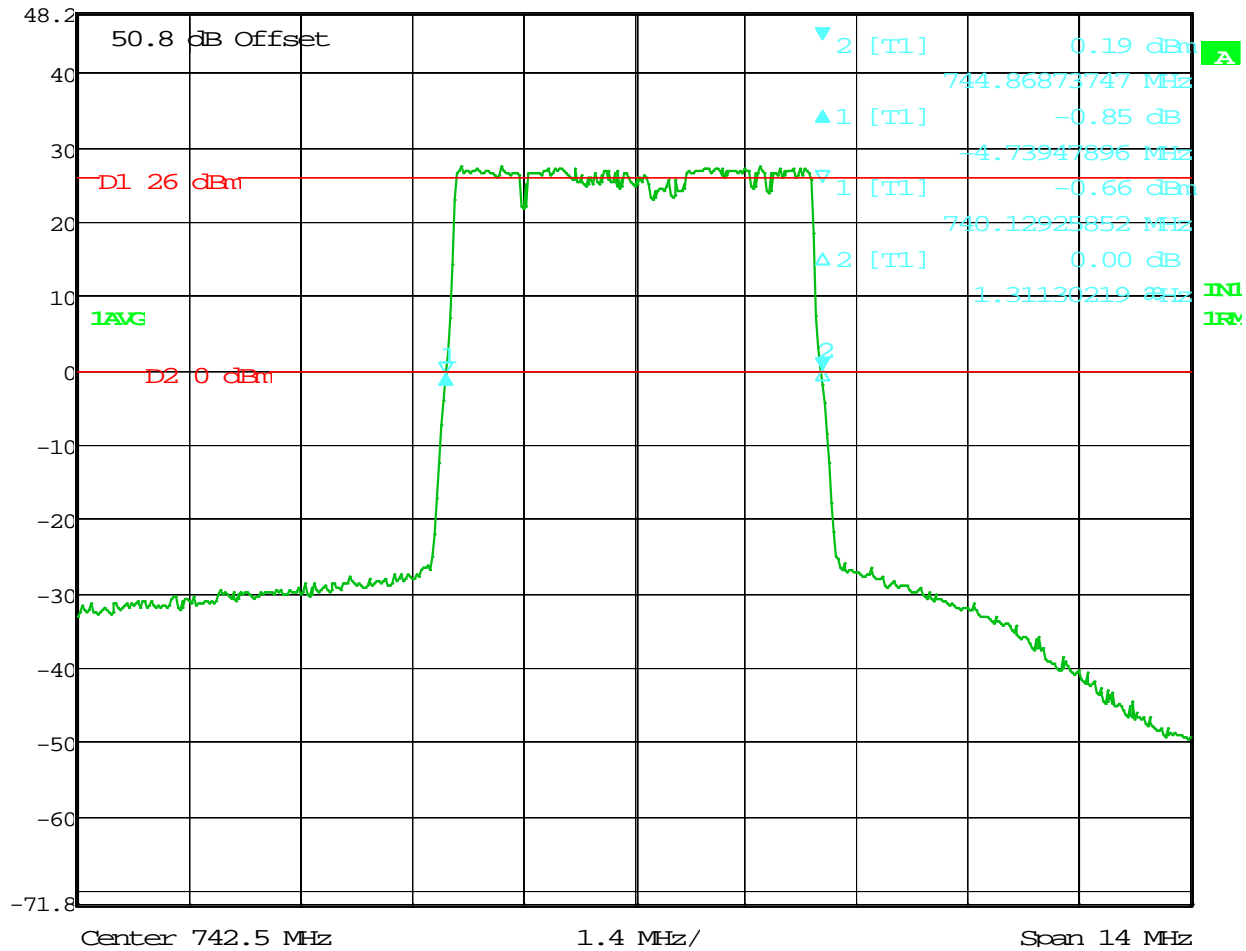
Block: C

5 MHz Bandwidth 740 – 745 MHz

(26dB Bandwidth)



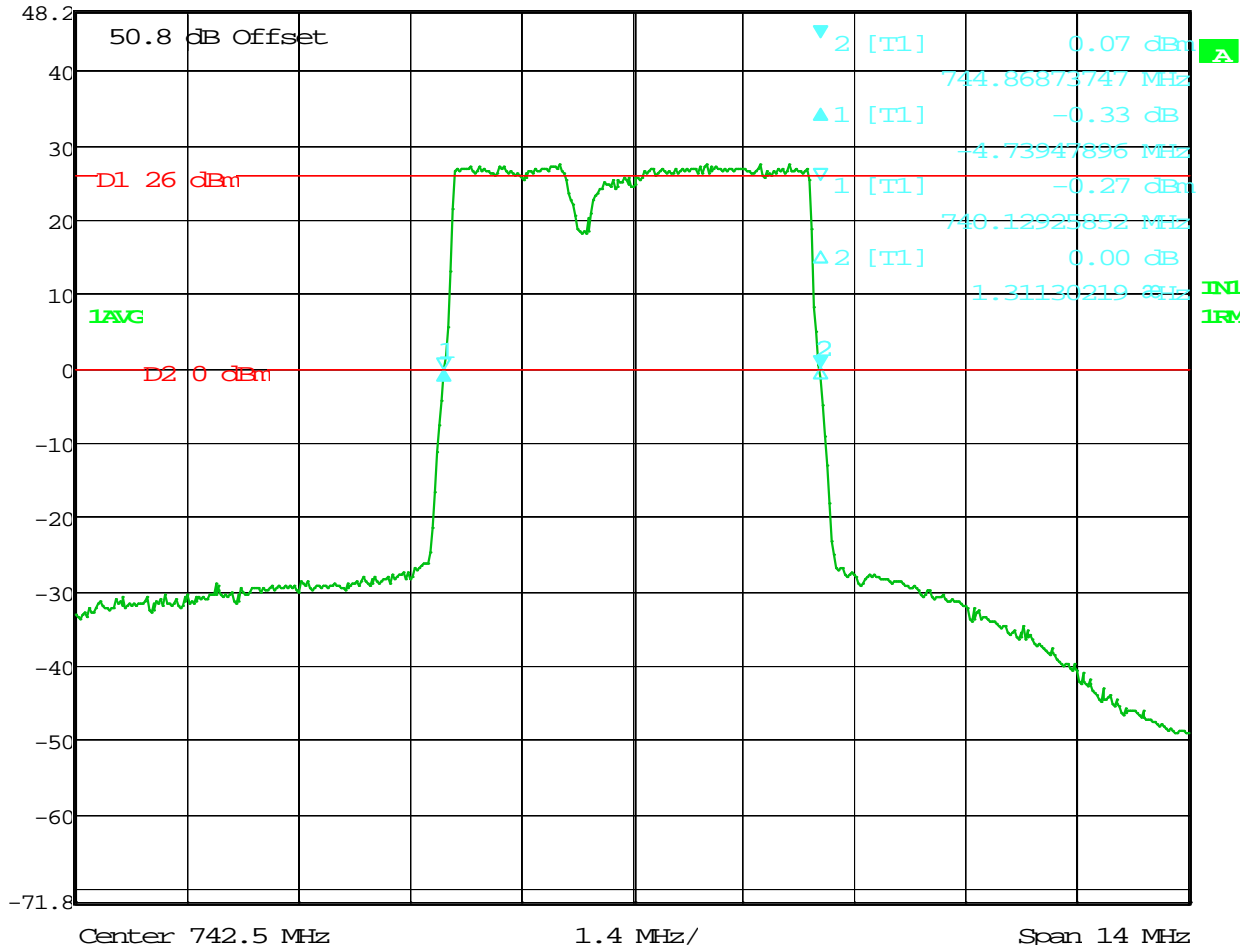
Delta 1 [T1] RBW 30 kHz RF Att 10 dB
 Ref Lvl -0.85 dB VBW 300 kHz
 48.2 dBm -4.73947896 MHz SWI 39 ms Unit dBm



Title: 26dB BANDWIDTH; TEST ENGINEER: SEG
 Comment A: LTE TRDU BC12/17 700 MHz 2X60-7L -48V; Blk C; 740 -
 745 MHz; PWR:60W; QPSK; FCC Prt 27.53; FCCID: AS5BBTRX-09
 Date: 29.NOV.2012 13:31:08



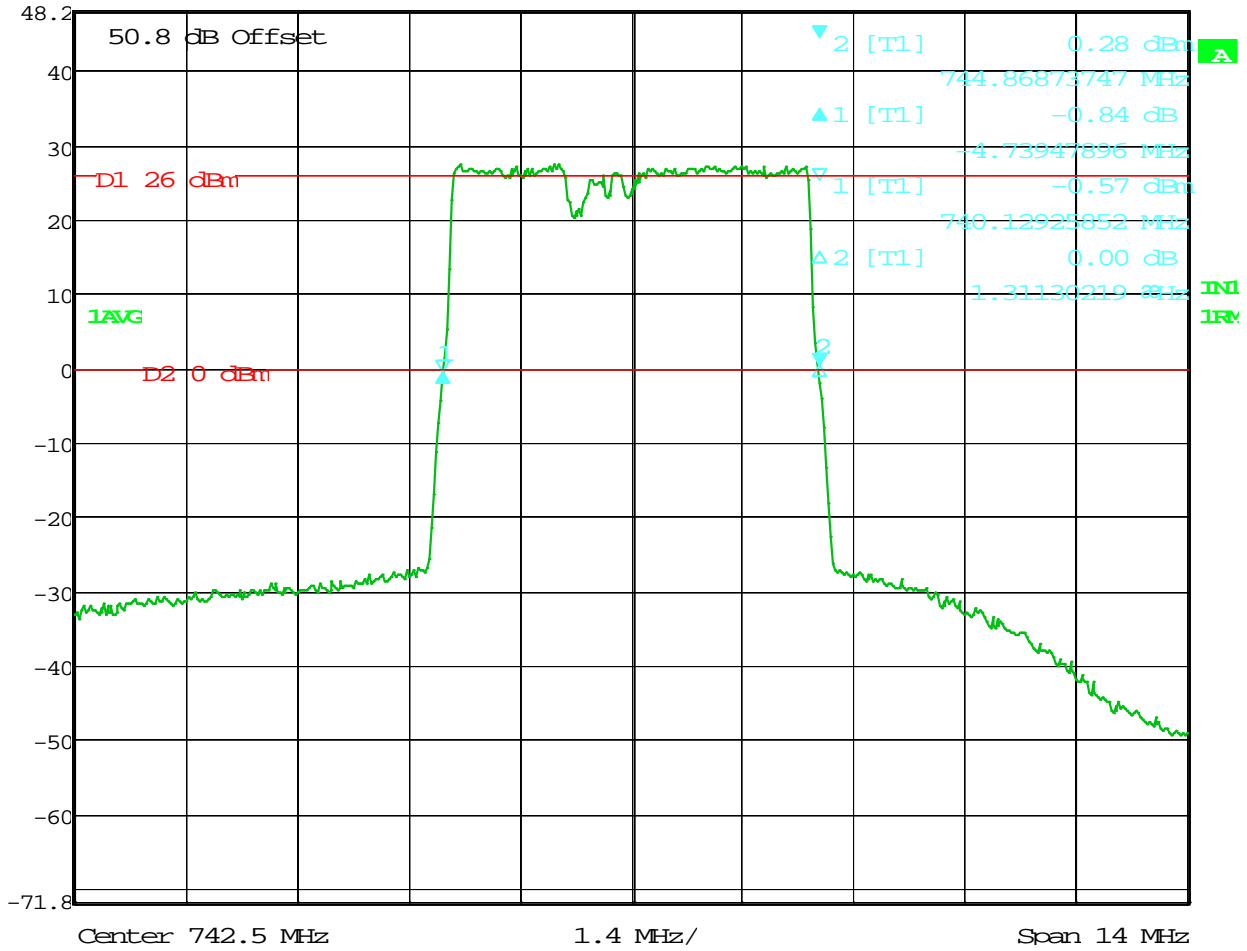
Delta 1 [T1] RBW 30 kHz RF Att 10 dB
 Ref Lvl -0.33 dB VBW 300 kHz
 48.2 dBm -4.73947896 MHz SWI 39 ms Unit dBm



Title: 26dB BANDWIDTH; TEST ENGINEER: SEG
 Comment A: LTE TRDU BC12/17 700 MHz 2X60-7L -48V; Blk C; 740 -
 745 MHz; PWR:60W; 16QAM; FCC Prt 27.53; FCCID: AS5BBTRX-09
 Date: 29.NOV.2012 14:16:39



Delta 1 [T1] REBW 30 kHz RF Att 10 dB
 Ref Lvl -0.84 dB VEW 300 kHz
 48.2 dBm -4.73947896 MHz SWI 39 ms Unit dBm



Title: 26dB BANDWIDTH; TEST ENGINEER: SEG
 Comment A: LTE TRDU BC12/17 700 MHz 2X60-7L -48V; Blk C; 740 -
 745 MHz; PWR:60W; 64QAM; FCC Prt 27.53; FCCID: AS5BBTRX-09
 Date: 29.NOV.2012 14:33:56

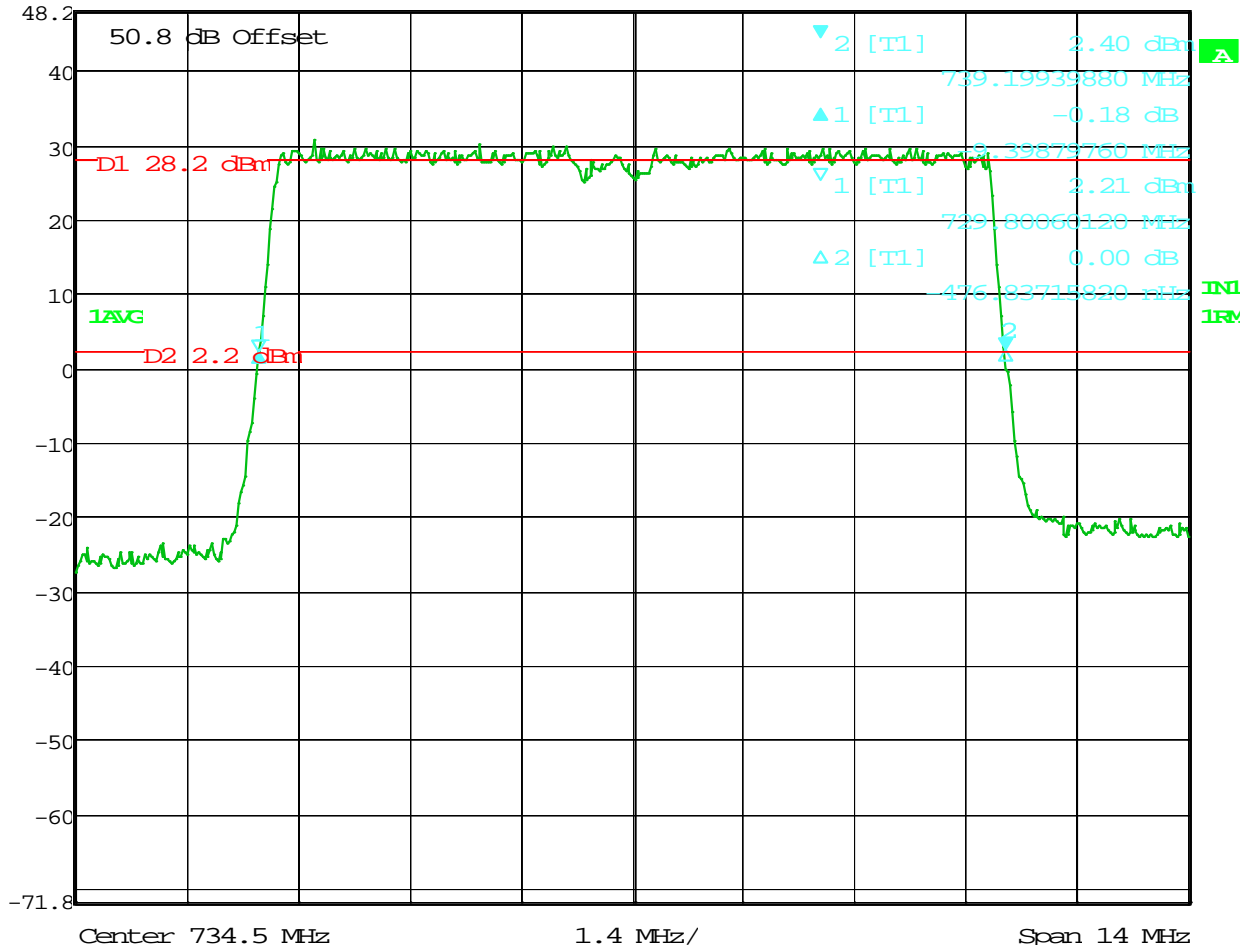
Block: A+B

10 MHz Bandwidth 729.5 – 739.5 MHz

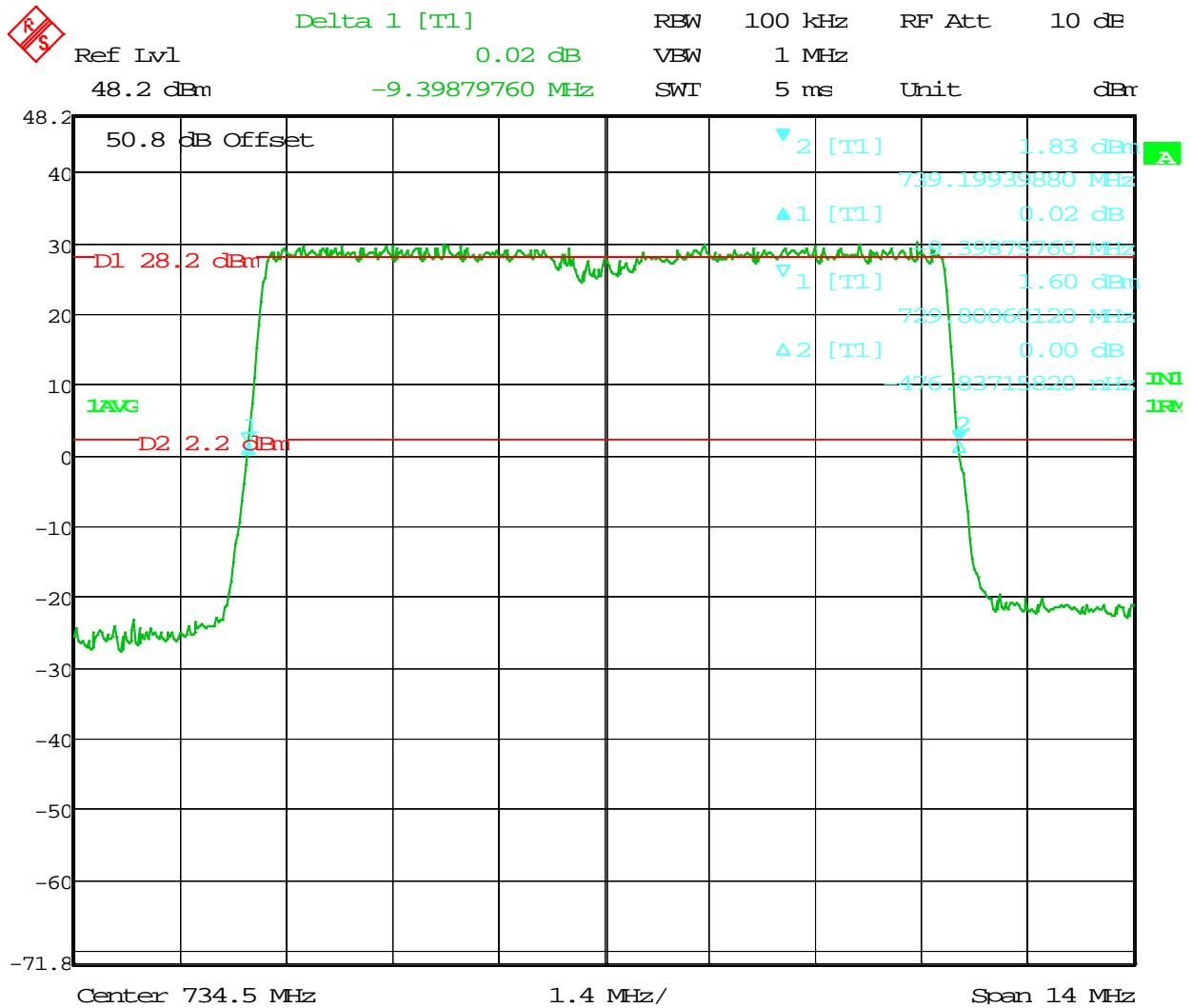
(26dB Bandwidth)



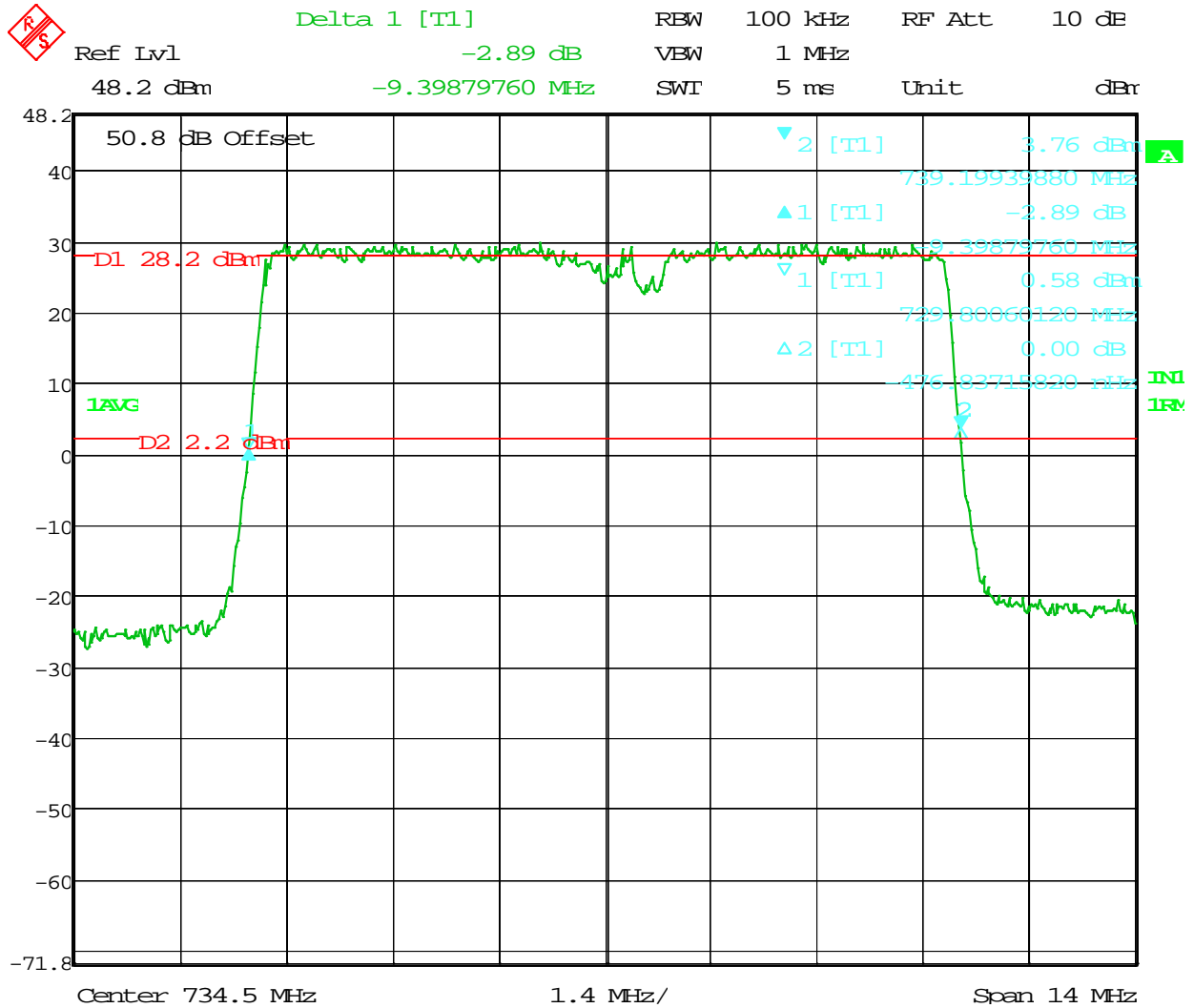
Delta 1 [T1] REBW 100 kHz RF Att 10 dB
 Ref Lvl -0.18 dB VEW 1 MHz
 48.2 dBm -9.39879760 MHz SWI 5 ms Unit dBm



Title: 26dB BANDWIDTH; TEST ENGINEER: SEG
 Comment A: LTE TRDU BC12/17 700 MHz 2X60-7L -48V; Blk A+B; 729.5 -
 739.5 MHz; PWR: 60W; QPSK; FCC Prt 27.53; FCCID: AS5BBTRX-09
 Date: 27.NOV.2012 10:17:33



Title: 26dB BANDWIDTH; TEST ENGINEER: SEG
 Comment A: LTE TRDU BC12/17 700 MHz 2X60-7L -48V; Blk A+B; 729.5 -
 739.5 MHz; PWR:60W; 16QAM; FCC Prt 27.53; FCCID: AS5BBTRX-09
 Date: 28.NOV.2012 07:44:29



Title: 26dB BANDWIDTH; TEST ENGINEER: SEG/JY
 Comment A: LTE TRDU BC12/17 700 MHz 2X60-7L -48V; Blk A+B; 729.5 -
 739.5 MHz; PWR:60W; 64QAM; FCC Prt 27.53; FCCID: AS5BBTRX-09
 Date: 28.NOV.2012 09:28:59

Block: B+C

10 MHz Bandwidth 734.5 – 744.5 MHz

(26dB Bandwidth)



Delta 2 [T1]

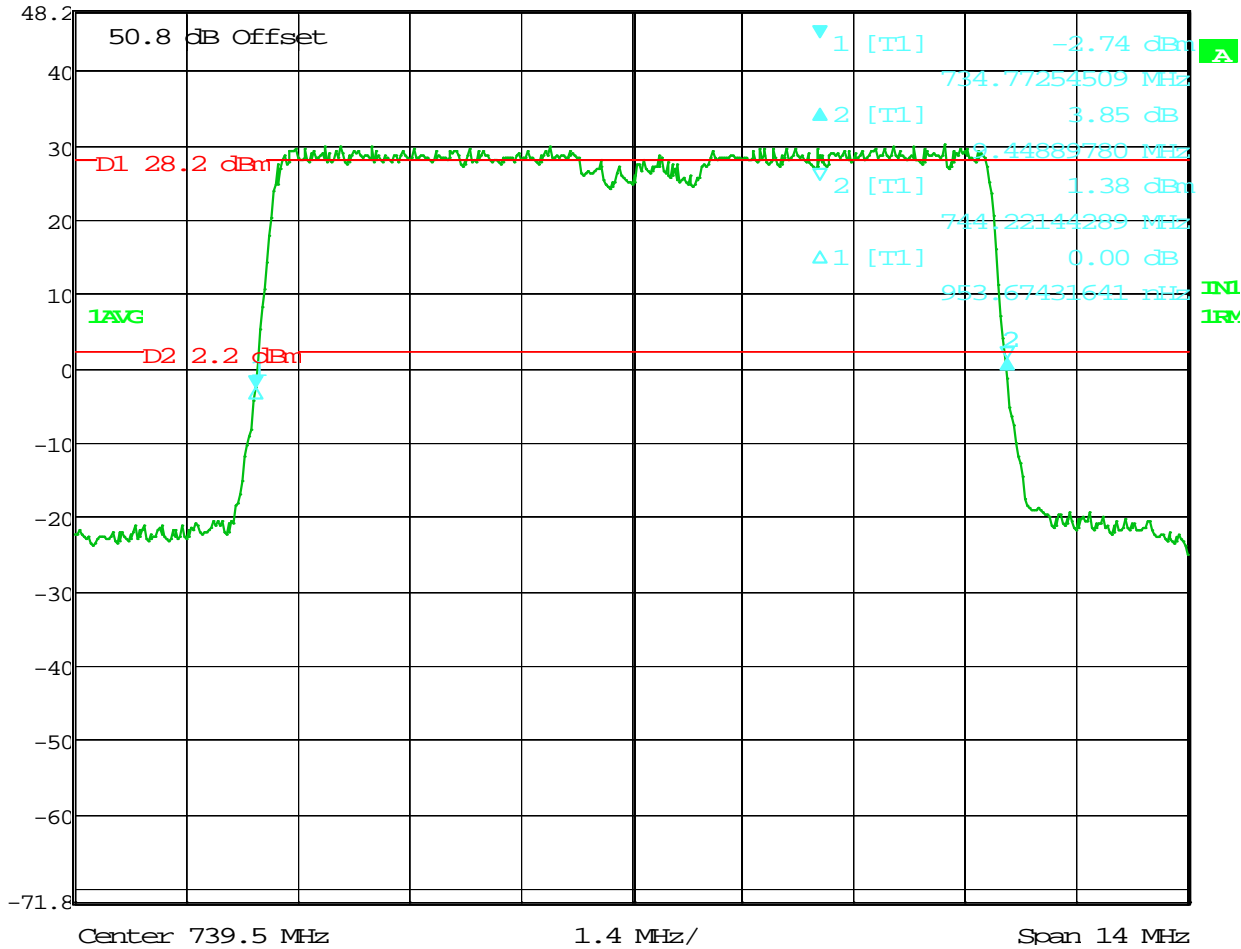
RBW 100 kHz RF Att 10 dB

Ref Lvl 48.2 dBm 3.85 dB

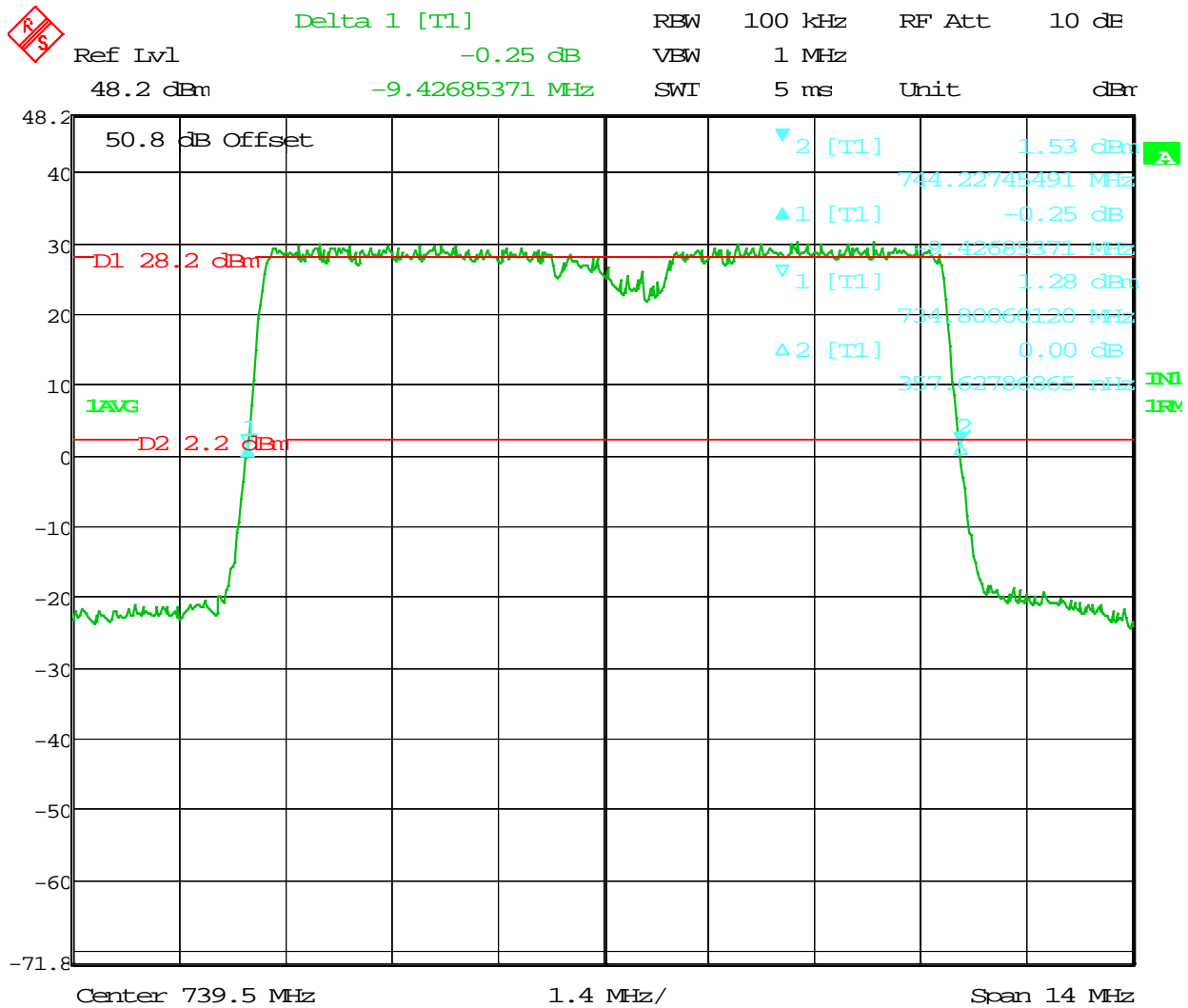
VBW 1 MHz

9.44889780 MHz

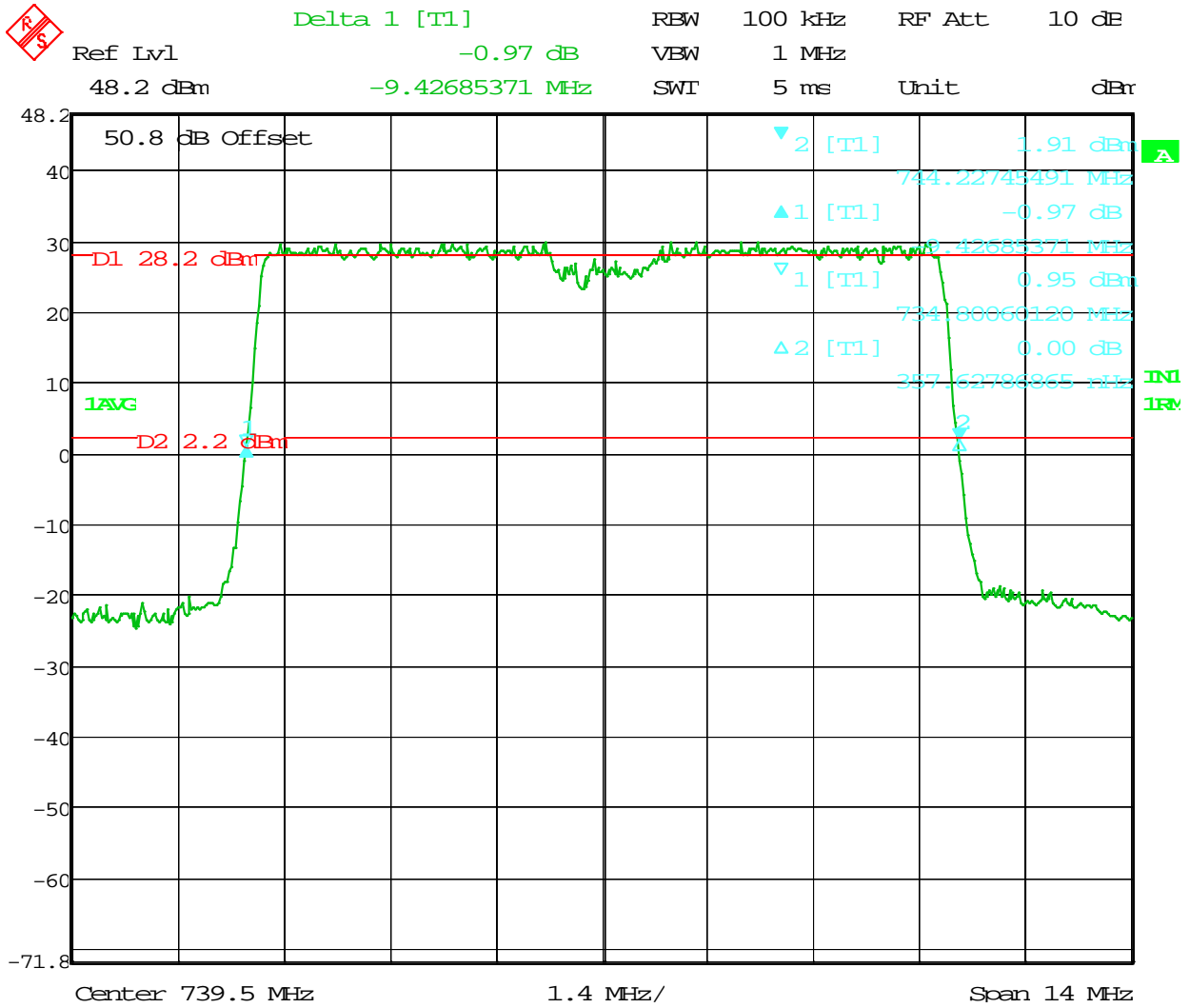
SWI 5 ms Unit dBm



Title: 26dB BANDWIDTH; TEST ENGINEER: SEG/JY
 Comment A: LITE TRDU BC12/17 700 MHz 2X60-7L -48V; Blk B+C; 734.5 -
 744.5 MHz; PWR: 60W; QPSK; FCC Prt 27.53; FCCID: AS5BBTRX-09
 Date: 28.NOV.2012 11:45:37



Title: 26dB BANDWIDTH; TEST ENGINEER: SEG
 Comment A: LITE TRDU BC12/17 700 MHz 2X60-7L -48V; Blk B+C; 734.5 -
 744.5 MHz; PWR:60W; 16QAM; FCC Prt 27.53; FCCID: AS5BBTRX-09
 Date: 28.NOV.2012 13:46:50



Title: 26dB BANDWIDTH; TEST ENGINEER: SEG
 Comment A: LTE TRDU BC12/17 700 MHz 2X60-7L -48V; Blk B+C; 734.5 -
 744.5 MHz; PWR:60W; 64QAM; FCC Prt 27.53; FCCID: AS5BBTRX-09
 Date: 28.NOV.2012 14:25:14

**MEASUREMENT OF
SPECTRUM MASK/OCCUPIED BANDWIDTH
(100 kHz ADJACENT TO CHANNEL EDGE)**

Section 27.53 (g)

**MEASUREMENT OF SPECTRUM MASK
OCCUPIED BANDWIDTH**

The Spectrum mask close to the center of the carrier frequency (Occupied bandwidth) of the **LTE TRDU 2x60-7L (BC12/17)** was measured using a Rohde & Schwarz ESI Spectrum Analyzer/Receiver and an HP Model 520 DeskJet Printer. The RF power level was measured using RF power meter as shown in the test setup in Figure A. The RF output from the LTE EAC port to spectrum analyzer was reduced (to an amplitude usable by the spectrum analyzer) by using a calibrated attenuator. This attenuation was offset on the display and the signal for single carrier was adjusted to the corrected RF power level for a 100 kHz resolution bandwidth for 10MHz wide transmit signal, and 30 kHz resolution bandwidth for 5 MHz wide transmit signal. While adjusting the corrected RF power level in the spectrum analyzer, the attenuator and resolution BW of the spectrum analyzer were considered.

The measurements were made on a **LTE TRDU 2x60-7L (BC12/17)**.

The reference line on the spectrum analyzer display corresponds to level measured by the RF power meter. Occupied Bandwidth plots were made at antenna terminals for an output of 60.0 Watt (47.8 dBm)/carrier.

The frequencies and blocks used were tabulated on the bottom of each plot. The output signals at RF filter were plotted at each frequency/block. The LTE TRDU 2x60-7L (BC12/17) (Filter M1) is capable of operating in the band of 729 MHz to 745 MHz. The Base station presently tested was configured to operate in Blocks A, B, C, A+B & B+C. Plots were provided for a single carrier. These frequencies were chosen to show the occupied bandwidth in the blocks in the frequency band in which this radio can be operated.

Block edge requirements:

FCC Section 27.53(g): Based on measurement instrument employing resolution bandwidth of 100 kHz bands or greater out band shall be attenuated at least 43+10log (P) dB or -13dBm. However in 100 kHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least 30 kHz may be employed. Pursuant to FCC OET RULES 662911 D01 and D02 for two antenna MIMO mode of operations, the FCC limit of -13dBm shall be 3dB more stringent, therefore all channel edge and out of band spurious emissions shall be -16dBm.

Note: For all tests 100 kHz resolution bandwidth was used for the 10 MHz Carrier Bandwidth, while 30 kHz resolution bandwidth was used for the 5 MHz Carrier Bandwidth.

The list of band, channels, RF filters (EAC) and Amplifiers tested are listed below:

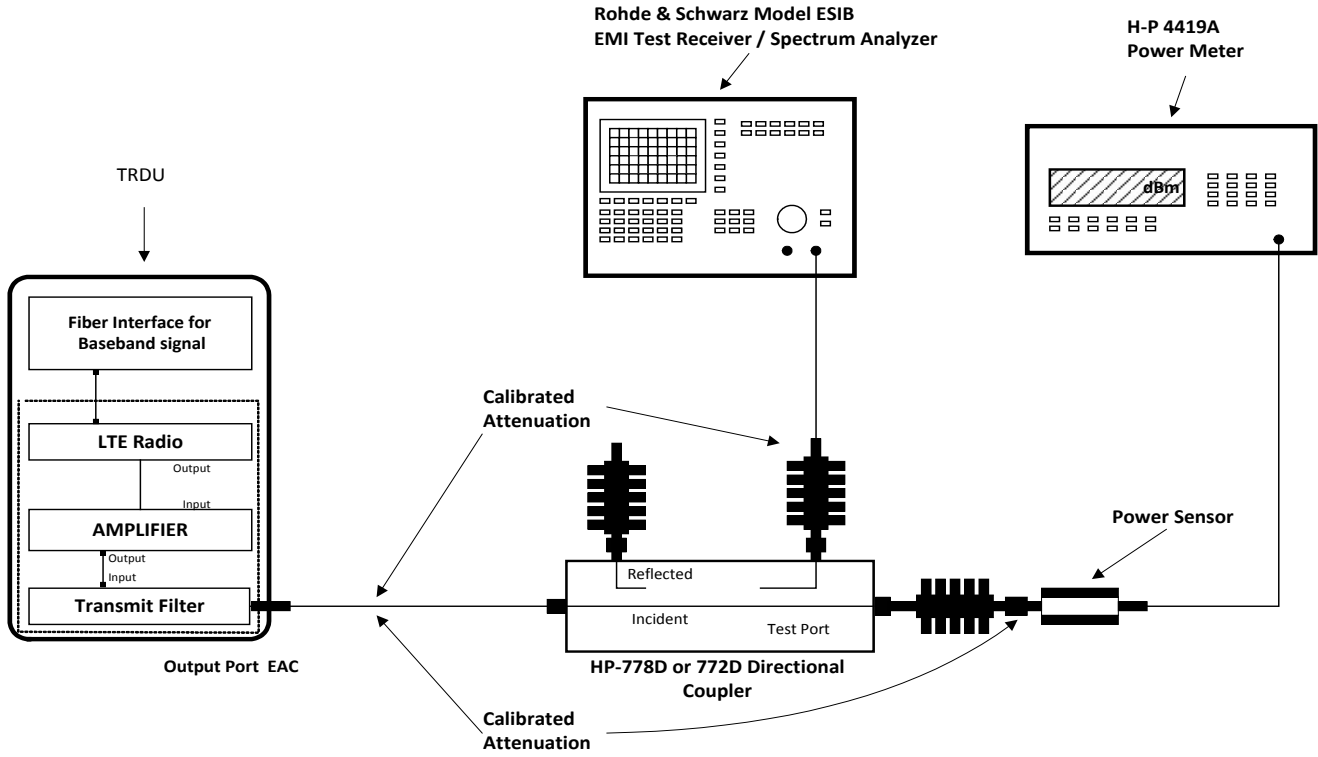
Band	Block	Center Frequency (MHz)	Carrier Bandwidth (MHz)	RF Filter	Power (Watts)
	A	731.5	5	M1	60
	B	737	5	M1	60
	C	742.5	5	M1	60
	A+B	734.5	10	M1	60
	B+C	739.5	10	M1	60

Measurement uncertainty:

Frequency: 100 Hz

Amplitude: 0.5 dB

Figure A. TEST CONFIGURATION FOR SPECTRUM MASK (OCCUPIED BANDWIDTH)



All components are calibrated over the frequency range of interest

Block: A

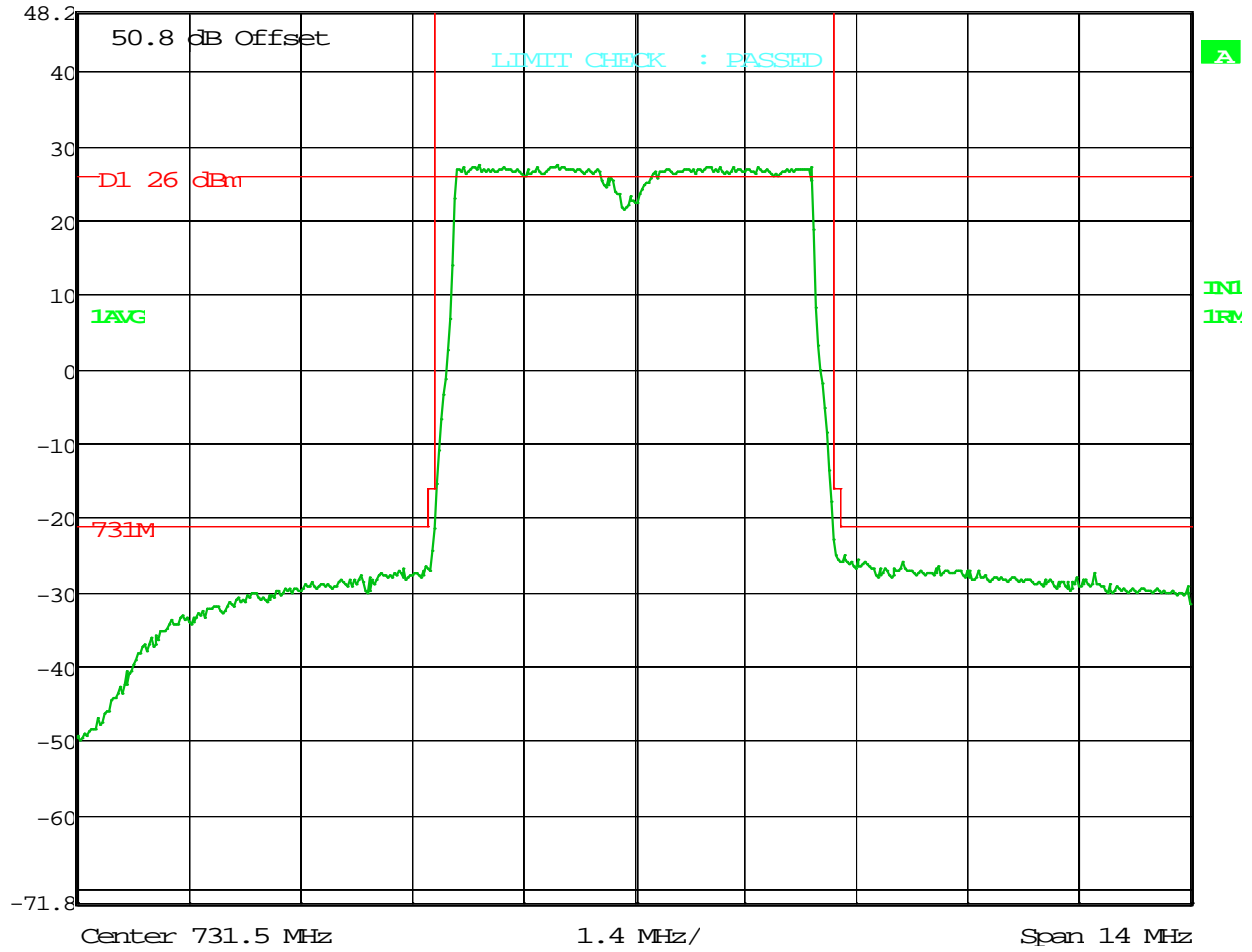
5 MHz Bandwidth 729 – 734 MHz

SPECTRUM MASK/OCCUPIED BANDWIDTH



Ref Lvl
48.2 dBm

RBW 30 kHz RF Att 10 dB
VBW 300 kHz
SWT 39 ms Unit dBm

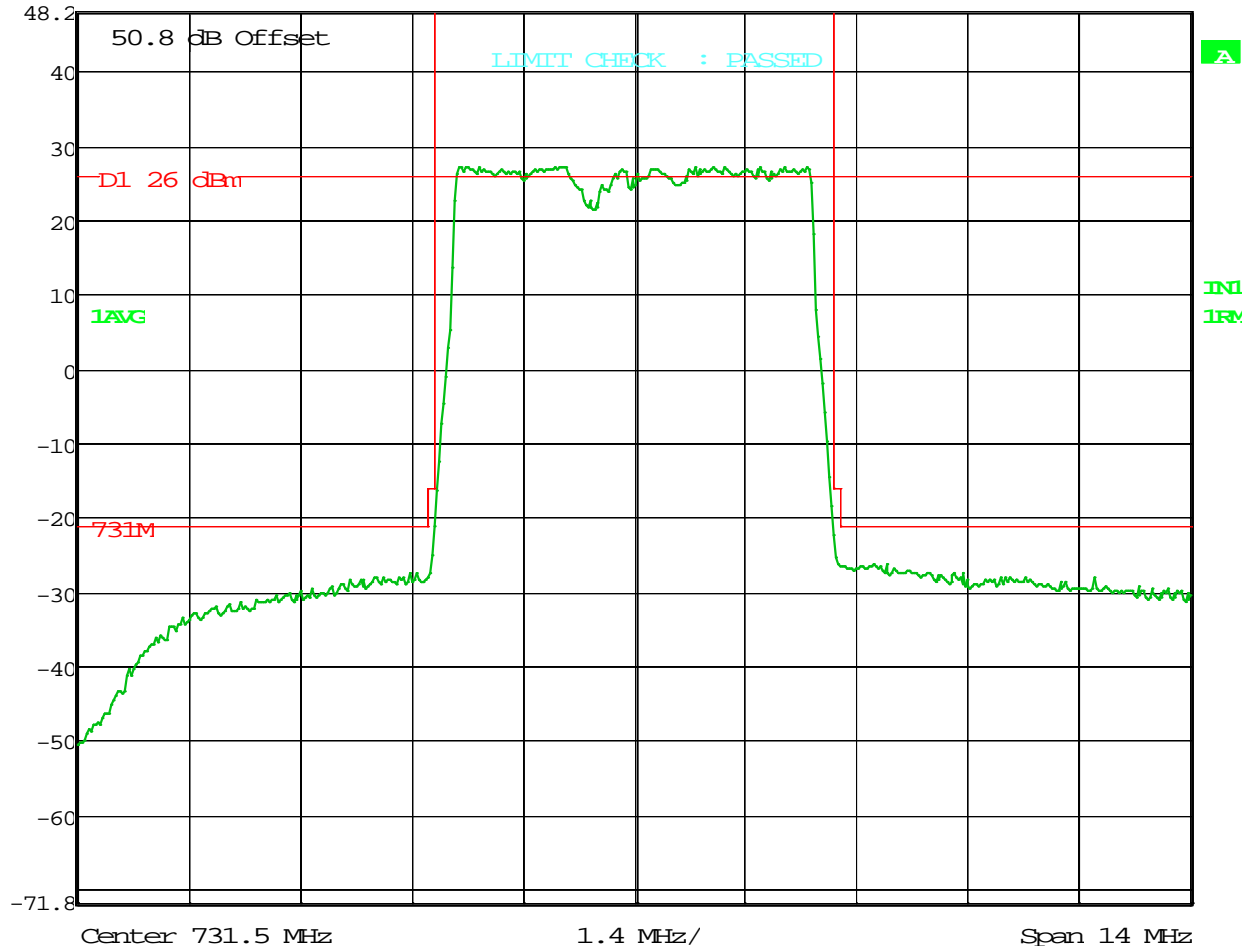


Title: OCCUPIED BANDWIDTH; TEST ENGINEER: SEG
Comment A: LTE TRDU BC12/17 700 MHz 2X60-7L -48V; Blk A; 729 -
734 MHz; PWR:60W; QPSK; FCC Prt 27.53; FCCID: AS5BBTRX-09
Date: 29.NOV.2012 08:05:44



Ref Lvl
48.2 dBm

RBW 30 kHz RF Att 10 dB
VBW 300 kHz
SWT 39 ms Unit dBm

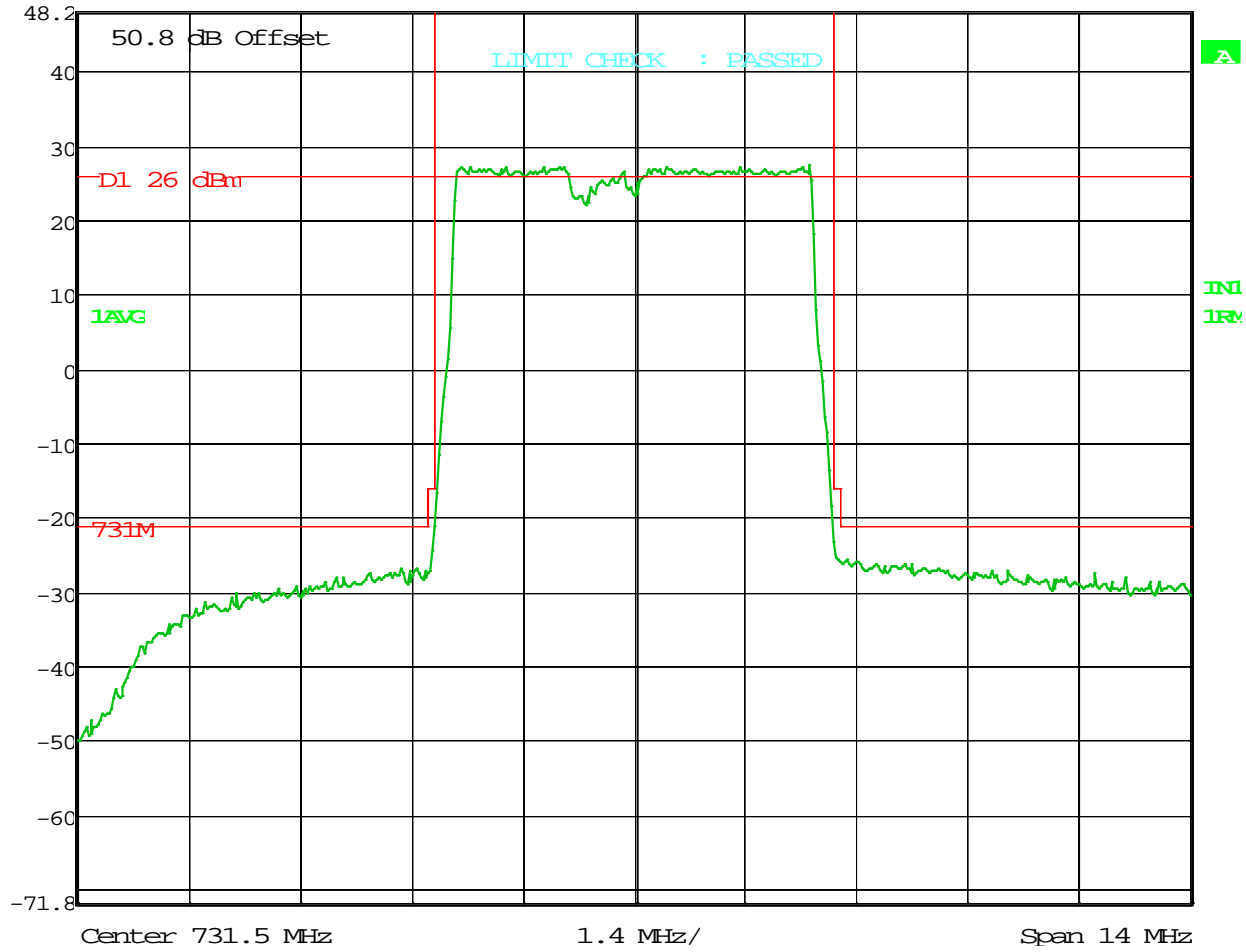


Title: OCCUPIED BANDWIDTH; TEST ENGINEER: SEG
Comment A: LTE TRDU BC12/17 700 MHz 2X60-7L -48V; Blk A; 729 -
734 MHz; PWR:60W; 16QAM; FCC Prt 27.53; FCCID: AS5BBTRX-09
Date: 29.NOV.2012 09:18:10



Ref Lvl
48.2 dBm

RBW 30 kHz RF Att 10 dB
VBW 300 kHz
SWT 39 ms Unit dBm



Title: OCCUPIED BANDWIDTH; TEST ENGINEER: SEG
Comment A: LTE TRDU BC12/17 700 MHz 2X60-7L -48V; Blk A; 729 -
734 MHz; PWR:60W; 64QAM; FCC Prt 27.53; FCCID: AS5BBTRX-09
Date: 29.NOV.2012 09:43:39

Block: B

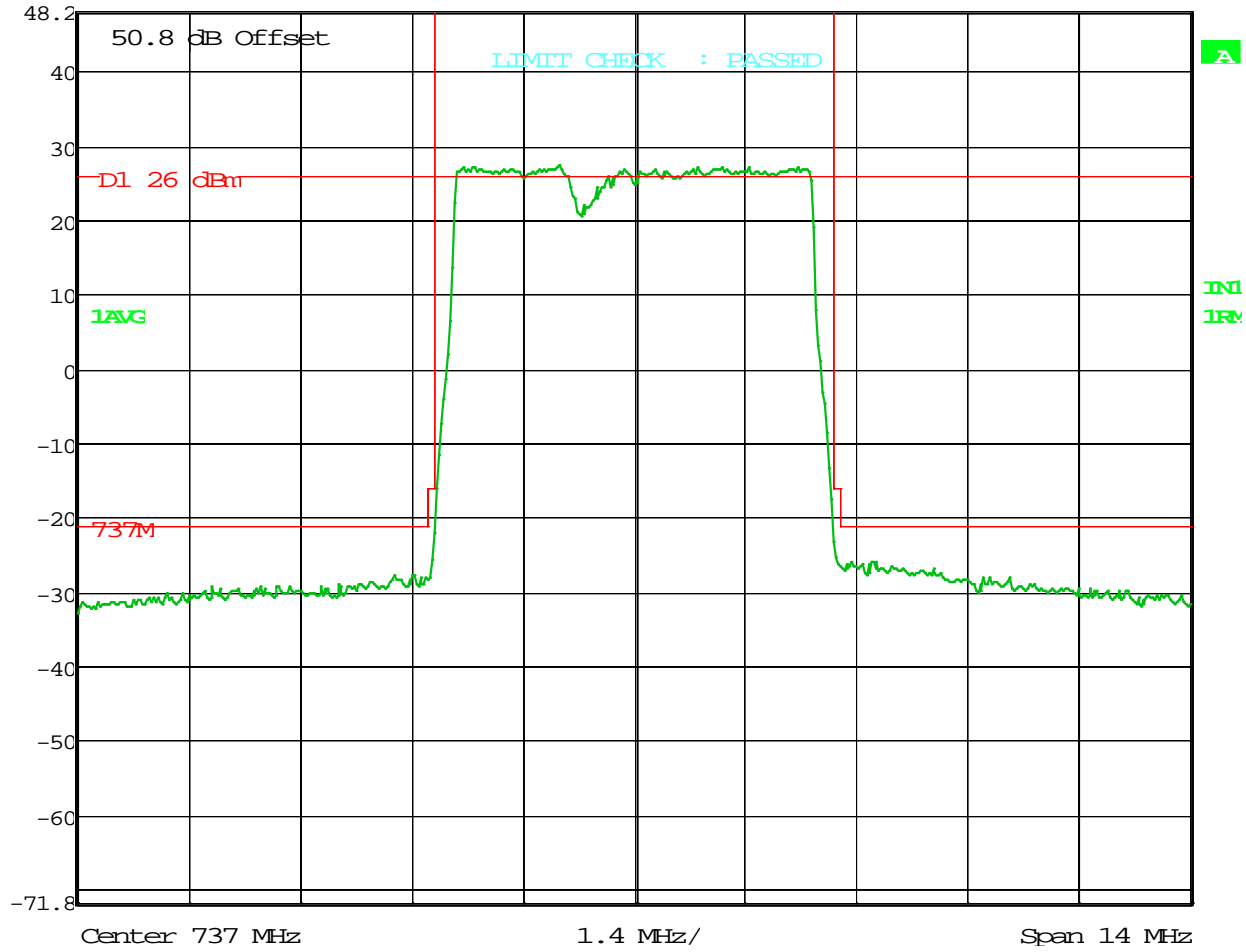
5 MHz Bandwidth 734.5 – 739.5 MHz

SPECTRUM MASK/OCCUPIED BANDWIDTH



Ref Lvl
48.2 dBm

RBW 30 kHz RF Att 10 dB
VBW 300 kHz
SWT 39 ms Unit dBm

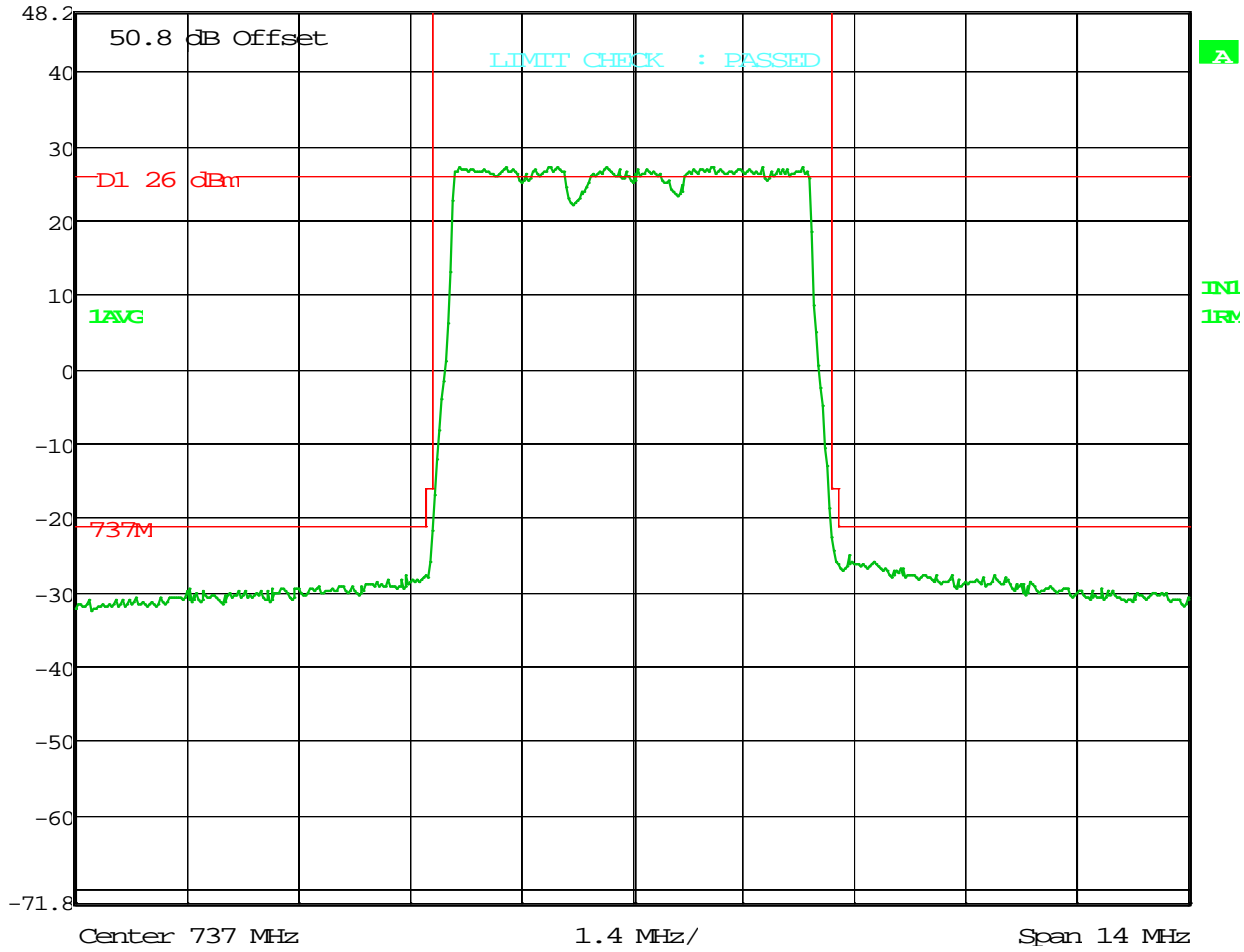


Title: OCCUPIED BANDWIDTH; TEST ENGINEER: SEG
Comment A: LTE TRDU BC12/17 700 MHz 2X60-7L -48V; Blk B; 734.5 -
739.5 MHz; PWR:60W; QPSK; FCC Prt 27.53; FCCID: AS5BBTRX-09
Date: 29.NOV.2012 10:58:09



Ref Lvl
48.2 dBm

RBW 30 kHz RF Att 10 dB
VBW 300 kHz
SWT 39 ms Unit dBm

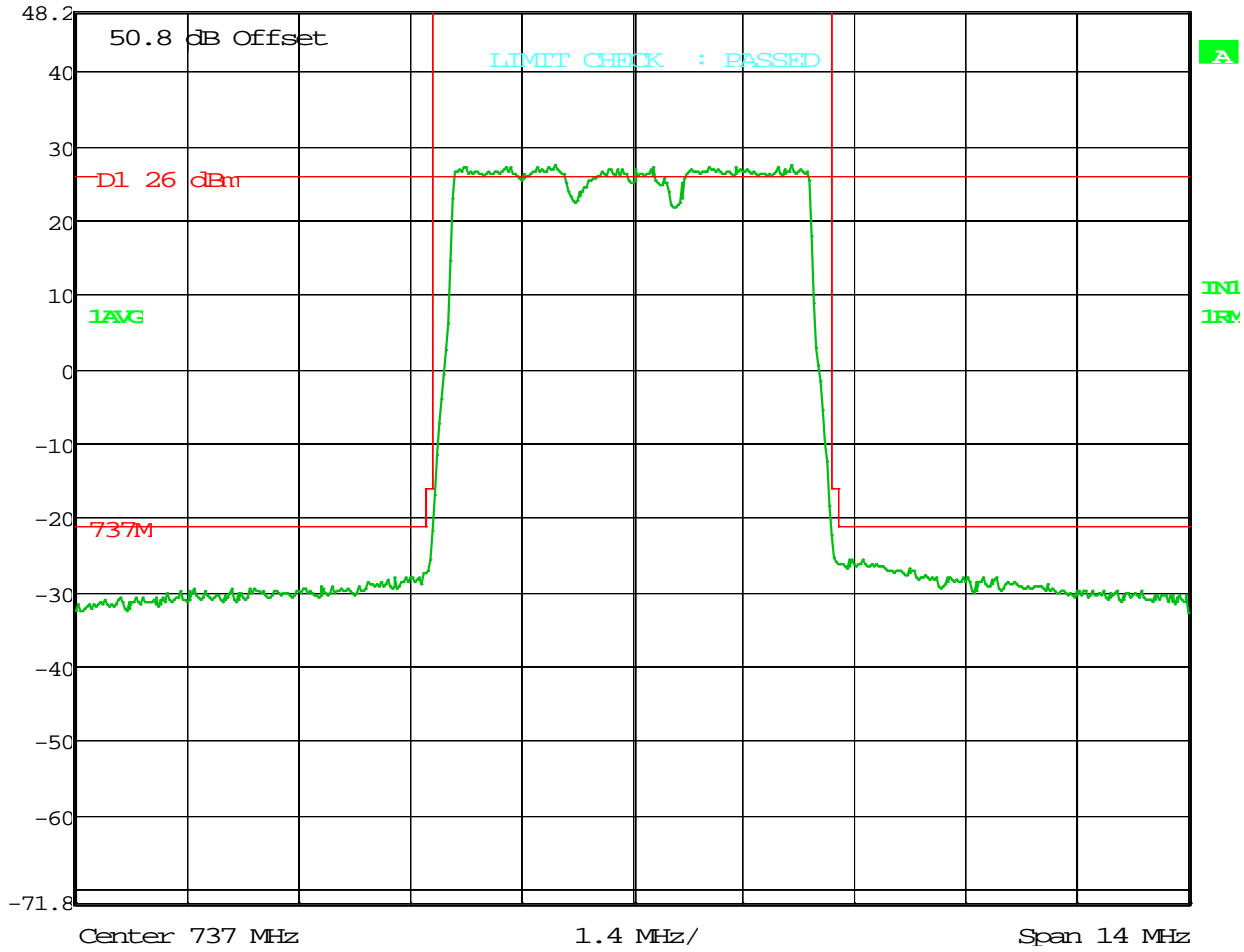


Title: OCCUPIED BANDWIDTH; TEST ENGINEER: SEG
Comment A: LTE TRDU BC12/17 700 MHz 2X60-7L -48V; Blk B; 734.5 -
739.5 MHz; PWR:60W; 16QAM; FCC Prt 27.53; FCCID: AS5BBTRX-09
Date: 29.NOV.2012 11:05:45



Ref Lvl
48.2 dBm

RBW 30 kHz RF Att 10 dB
VBW 300 kHz
SWT 39 ms Unit dBm



Title: OCCUPIED BANDWIDTH; TEST ENGINEER: SEG
Comment A: LTE TRDU BC12/17 700 MHz 2X60-7L -48V; Blk B; 734.5 -
739.5 MHz; PWR:60W; 64QAM; FCC Prt 27.53; FCCID: AS5BBTRX-09
Date: 29.NOV.2012 11:34:38

Block: C

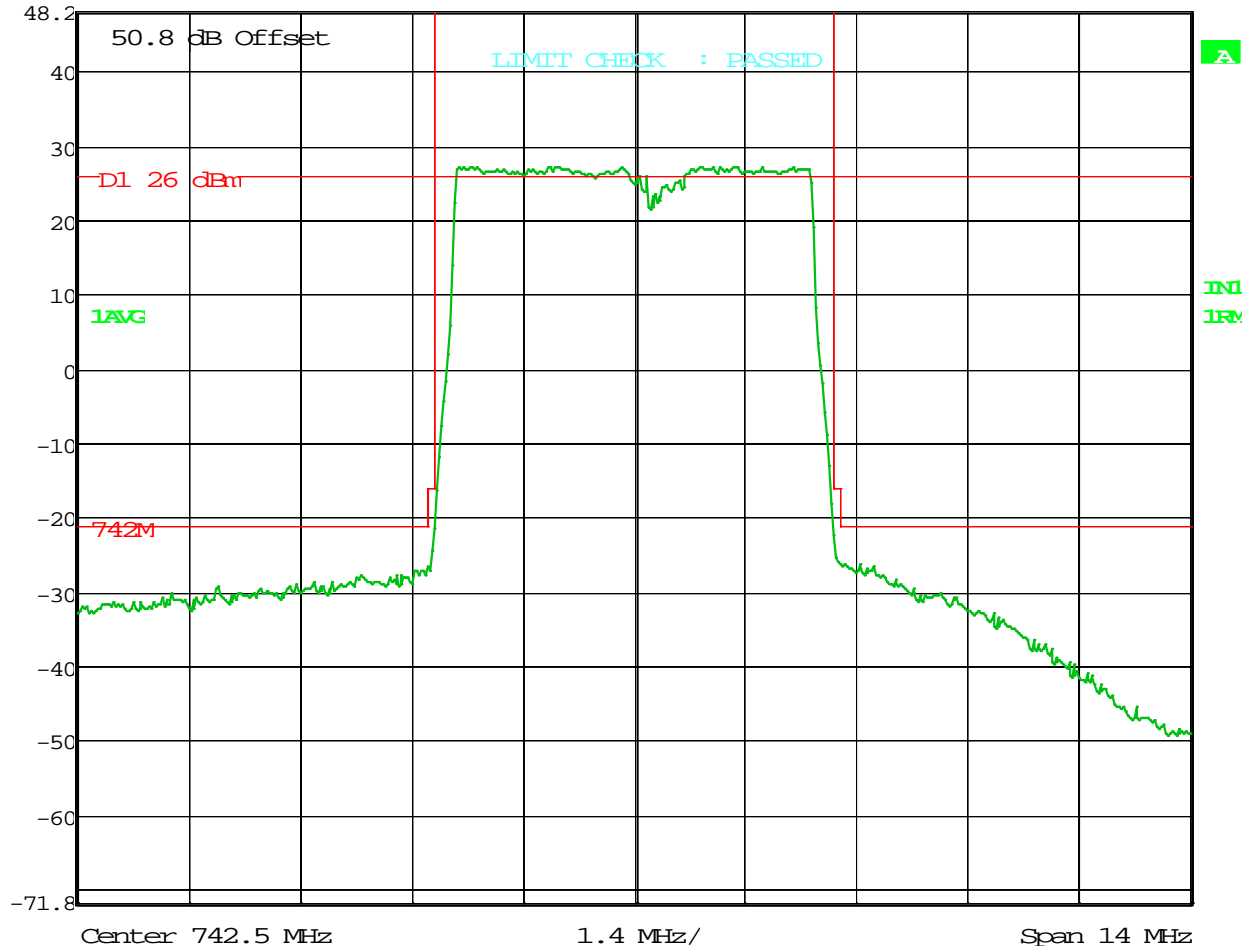
5 MHz Bandwidth 740 – 745 MHz

SPECTRUM MASK/OCCUPIED BANDWIDTH



Ref Lvl
48.2 dBm

RBW 30 kHz RF Att 10 dB
VBW 300 kHz
SWT 39 ms Unit dBm

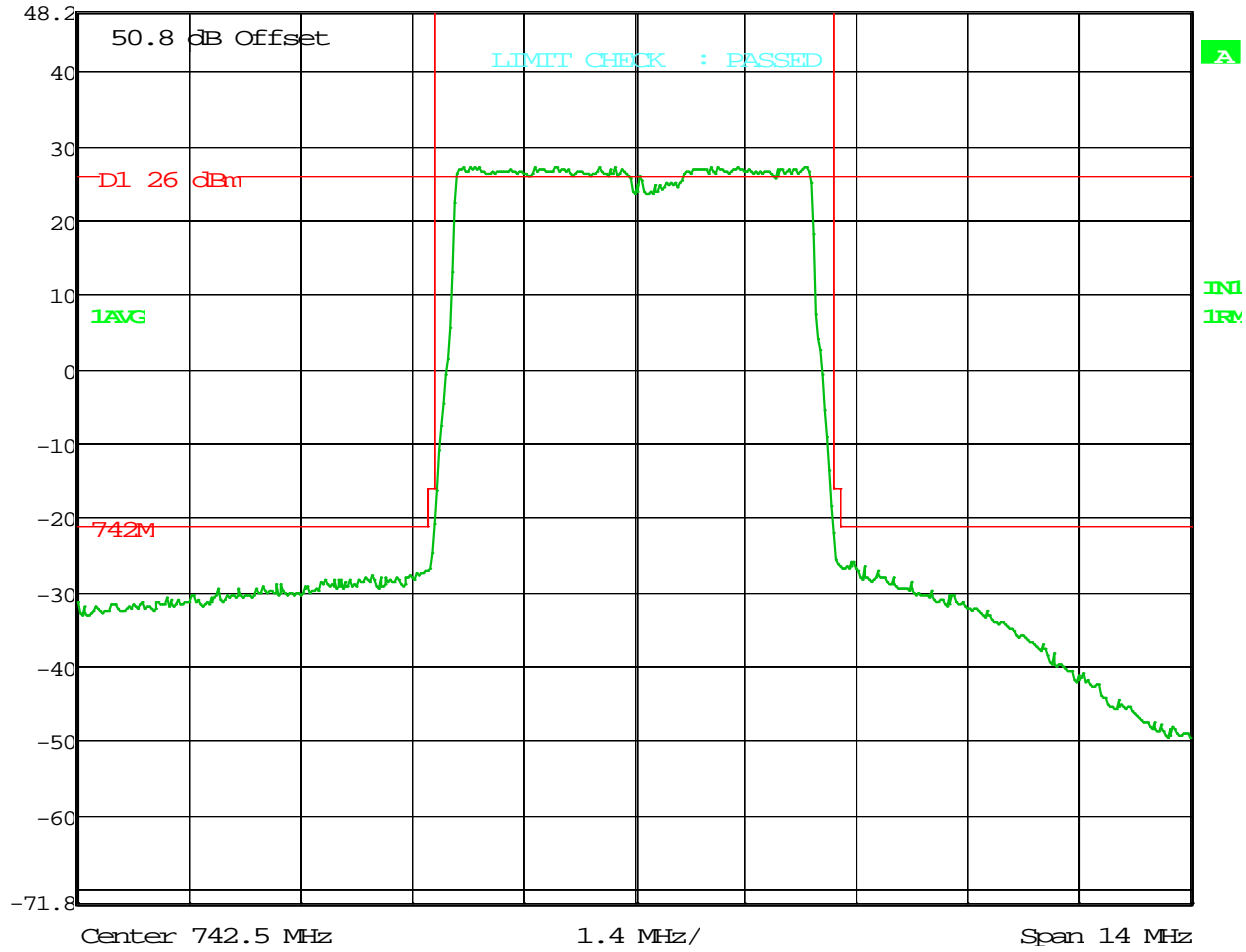


Title: OCCUPIED BANDWIDTH; TEST ENGINEER: SEG
Comment A: LTE TRDU BC12/17 700 MHz 2X60-7L -48V; Blk C; 740 -
745 MHz; PWR:60W; QPSK; FCC Prt 27.53; FCCID: AS5BBTRX-09
Date: 29.NOV.2012 13:33:01



Ref Lvl
48.2 dBm

RBW 30 kHz RF Att 10 dB
VBW 300 kHz
SWT 39 ms Unit dBm

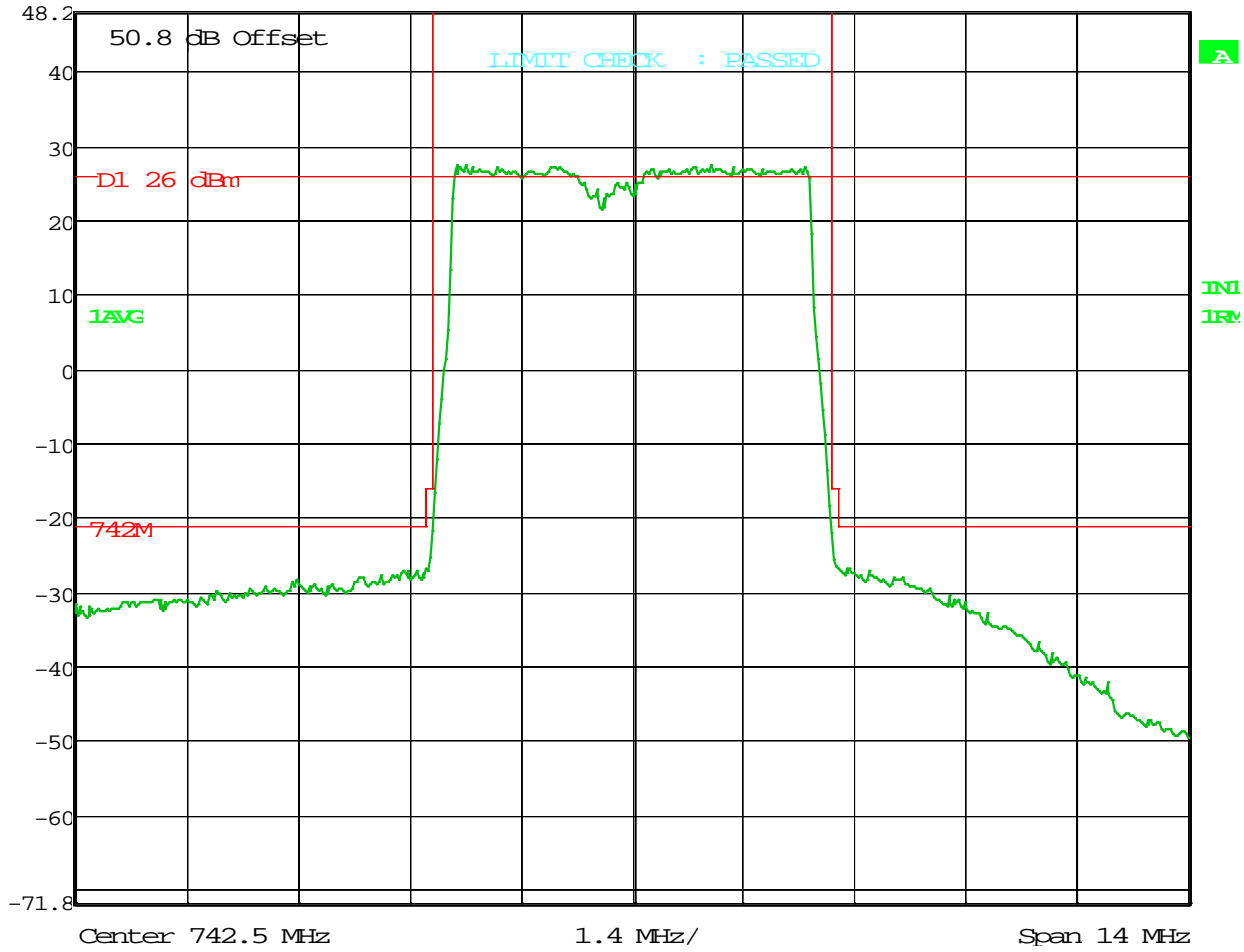


Title: OCCUPIED BANDWIDTH; TEST ENGINEER: SEG
Comment A: LTE TRDU BC12/17 700 MHz 2X60-7L -48V; Blk C; 740 -
745 MHz; PWR:60W; 16QAM; FCC Prt 27.53; FCCID: AS5BBTRX-09
Date: 29.NOV.2012 14:12:32



Ref Lvl
48.2 dBm

RBW 30 kHz RF Att 10 dB
VBW 300 kHz
SWT 39 ms Unit dBm



Title: OCCUPIED BANDWIDTH; TEST ENGINEER: SEG
Comment A: LTE TRDU BC12/17 700 MHz 2X60-7L -48V; Blk C; 740 -
745 MHz; PWR:60W; 64QAM; FCC Prt 27.53; FCCID: AS5BBTRX-09
Date: 29.NOV.2012 14:31:08

Block: A+B

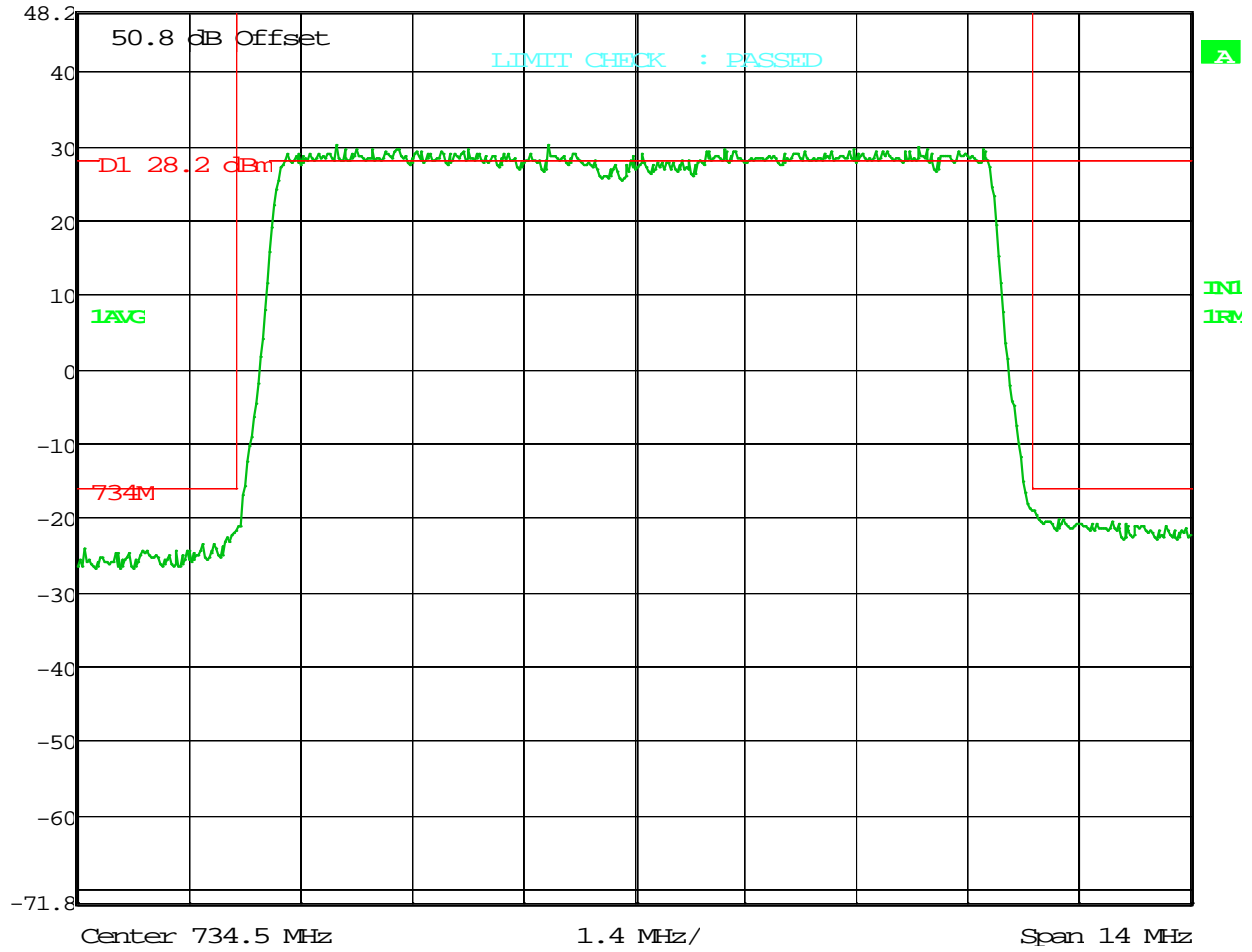
10 MHz Bandwidth 729.5 – 739.5 MHz

SPECTRUM MASK/OCCUPIED BANDWIDTH

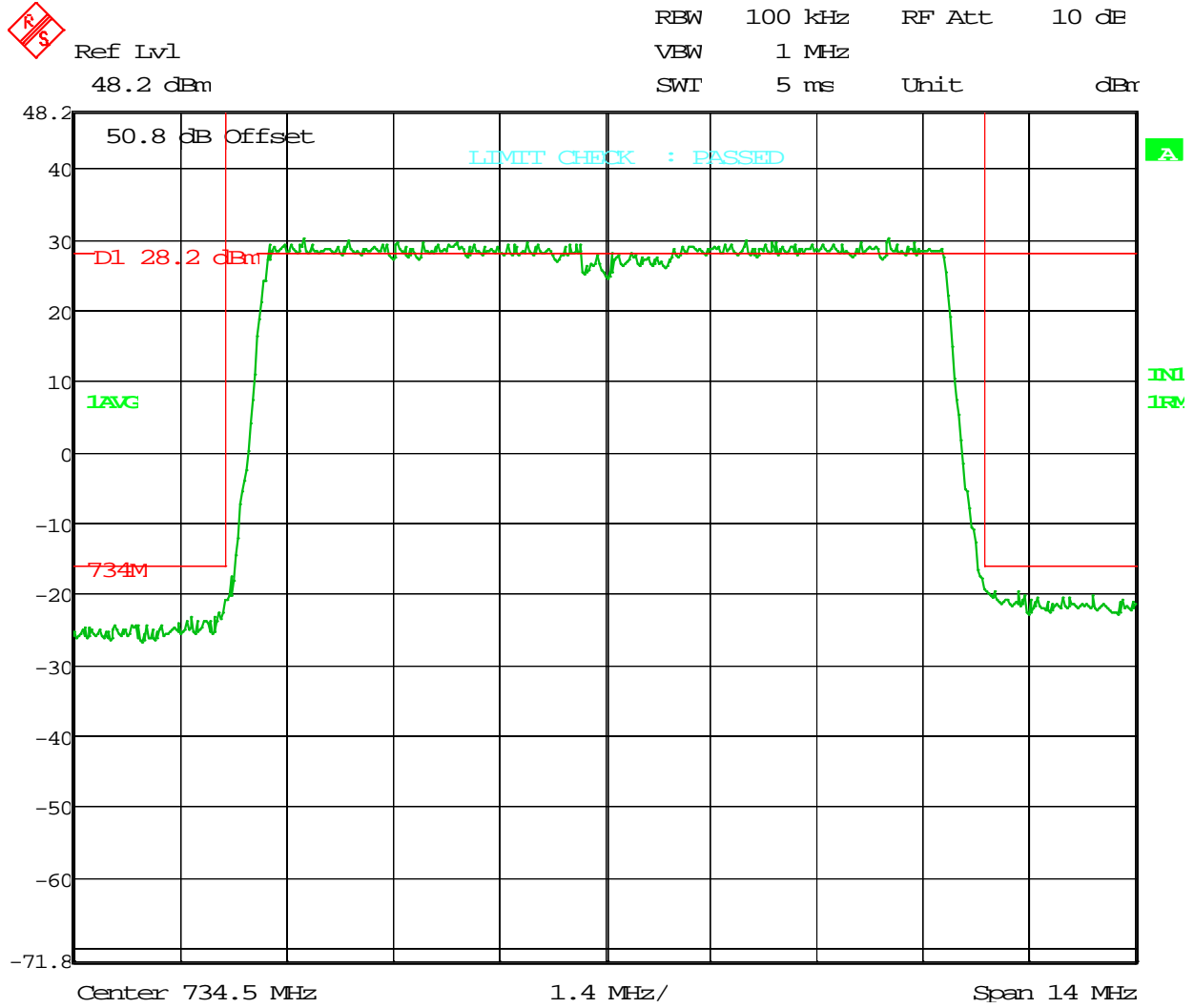


Ref Lvl
48.2 dBm

RBW 100 kHz RF Att 10 dB
VBW 1 MHz
SWT 5 ms Unit dBm



Title: OCCUPIED BANDWIDTH; TEST ENGINEER: SEG
Comment A: LTE TRDU BC12/17 700 MHz 2X60-7L -48V; Blk A+B; 729.5 -
739.5 MHz; PWR: 60W; QPSK; FCC Prt 27.53; FCCID: AS5BBTRX-09
Date: 27.NOV.2012 10:13:30

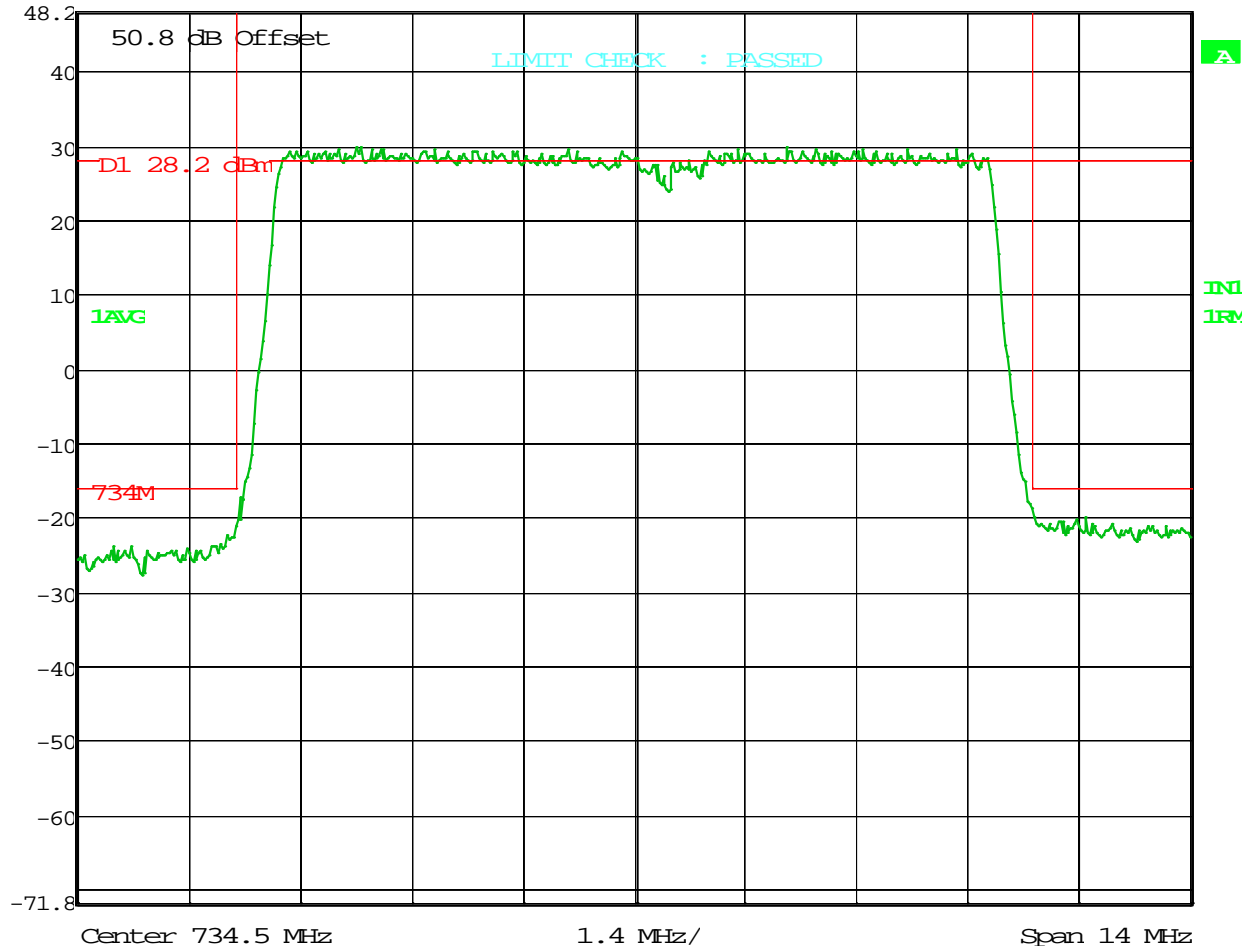


Title: OCCUPIED BANDWIDTH; TEST ENGINEER: SEG
Comment A: LTE TRDU BC12/17 700 MHz 2X60-7L -48V; Blk A+B; 729.5 -
739.5 MHz; PWR:60W; 16QAM; FCC Prt 27.53; FCCID: AS5BBTRX-09
Date: 28.NOV.2012 07:42:13



Ref Lvl
48.2 dBm

RBW 100 kHz RF Att 10 dB
VBW 1 MHz
SWT 5 ms Unit dBm

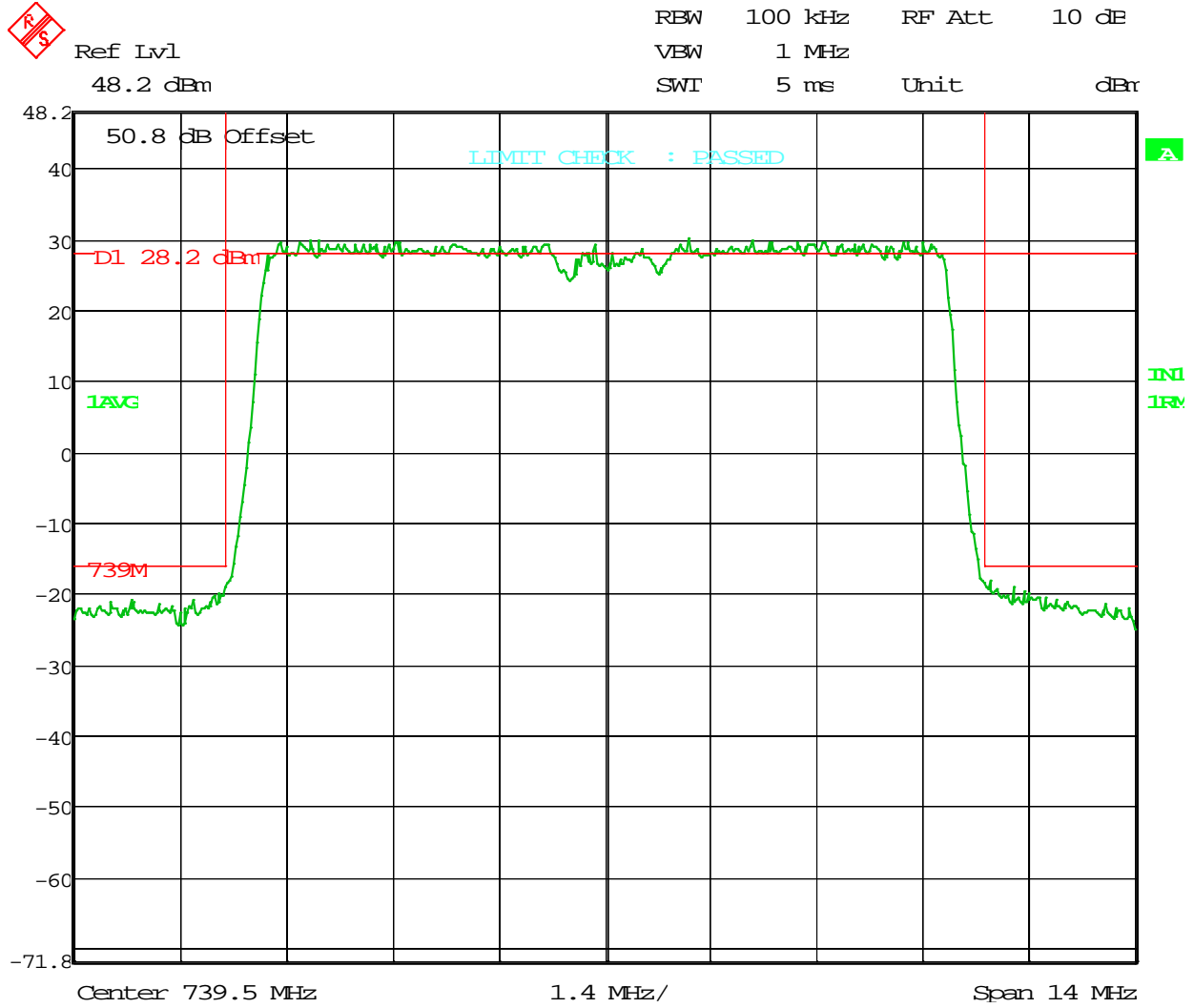


Title: OCCUPIED BANDWIDTH; TEST ENGINEER: SEG/JY
Comment A: LTE TRDU BC12/17 700 MHz 2X60-7L -48V; Blk A+B; 729.5 -
739.5 MHz; PWR:60W; 64QAM; FCC Prt 27.53; FCCID: AS5BBTRX-09
Date: 28.NOV.2012 09:32:42

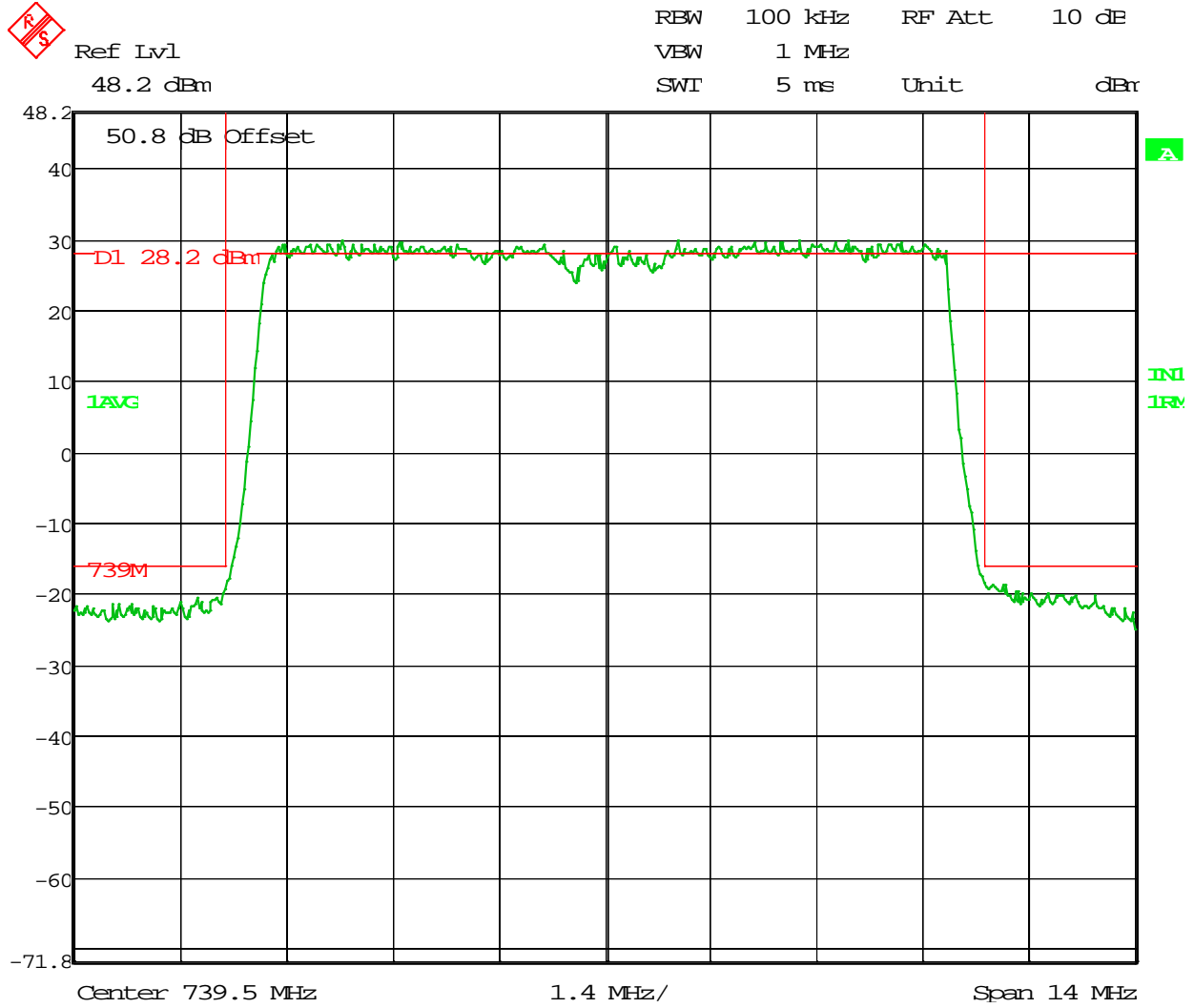
Block: B+C

10 MHz Bandwidth 734.5 – 744.5 MHz

SPECTRUM MASK/OCCUPIED BANDWIDTH



Title: OCCUPIED BANDWIDTH; TEST ENGINEER: SEG/JY
Comment A: LTE TRDU BC12/17 700 MHz 2X60-7L -48V; Blk B+C; 734.5 -
744.5 MHz; PWR: 60W; QPSK; FCC Prt 27.53; FCCID: AS5BBTRX-09
Date: 28.NOV.2012 11:31:34

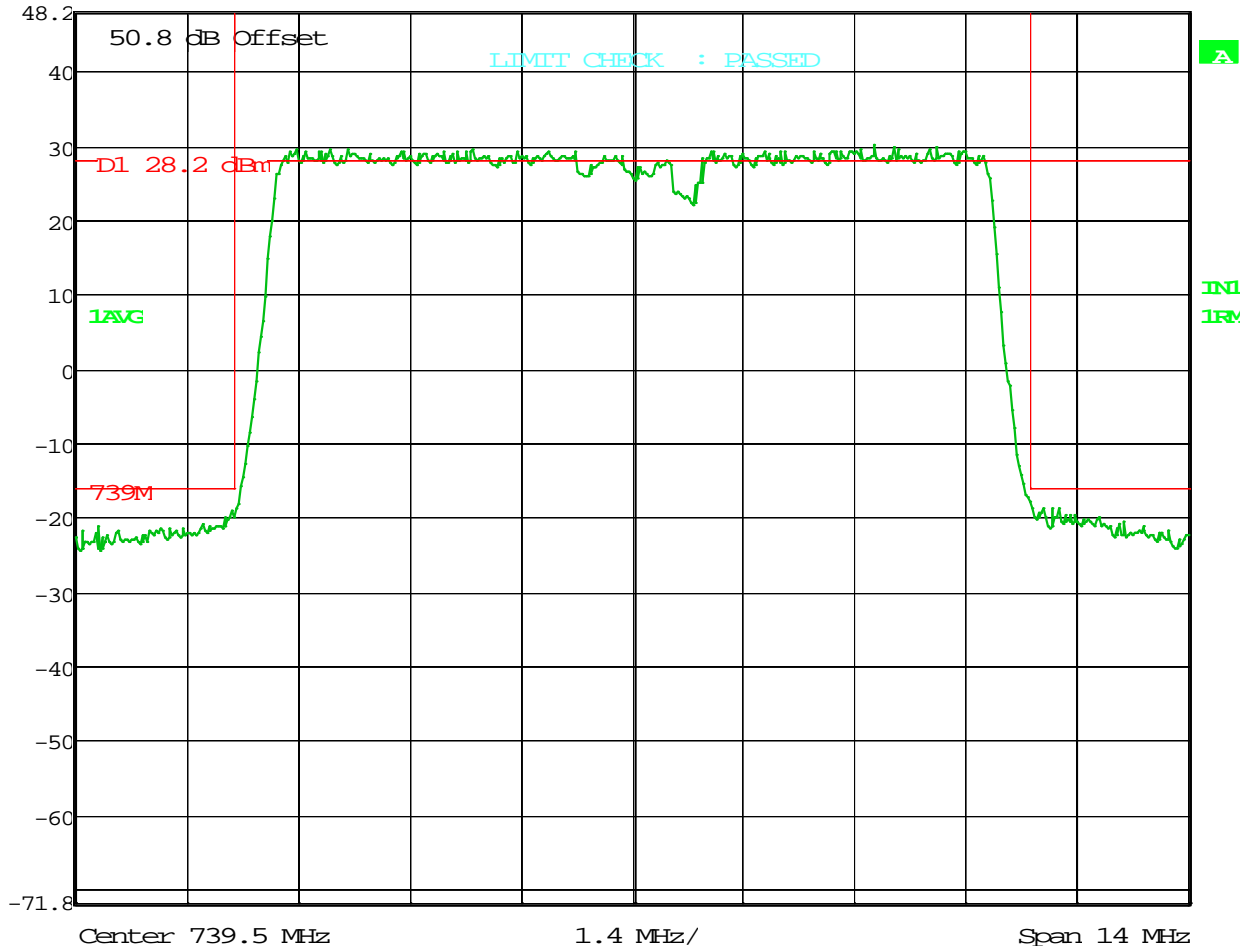


Title: OCCUPIED BANDWIDTH; TEST ENGINEER: SEG
Comment A: LTE TRDU BC12/17 700 MHz 2X60-7L -48V; Blk B+C; 734.5 -
744.5 MHz; PWR:60W; 16QAM; FCC Prt 27.53; FCCID: AS5BBTRX-09
Date: 28.NOV.2012 13:41:43



Ref Lvl
48.2 dBm

RBW 100 kHz RF Att 10 dB
VBW 1 MHz
SWT 5 ms Unit dBm



Title: OCCUPIED BANDWIDTH; TEST ENGINEER: SEG
Comment A: LTE TRDU BC12/17 700 MHz 2X60-7L -48V; Blk B+C; 734.5 -
744.5 MHz; PWR:60W; 64QAM; FCC Prt 27.53; FCCID: AS5BBTRX-09
Date: 28.NOV.2012 14:45:09

Measurement 4

FCC Section 2.1051 and 27.53 (g) Spurious Emissions at Antenna Transmit Terminals

Measurement 4

MEASUREMENT OF SPURIOUS EMISSIONS AT TRANSMIT ANTENNA PORT FCC 27.53 (g)

Spurious Emissions at Transmit Antenna Terminals

Spurious Emissions at the transmit-antenna terminals were investigated over the frequency range of 9 kHz to 12.5 GHz. The test setup is as described in Figure A. Measurements were made using a Rohde & Schwarz ESI 40 (9 kHz to 40 GHz) EMI Test receiver and a HP Model 520 DeskJet Printer. The RF output from the transmitter was reduced (to an amplitude usable by the receivers) using calibrated attenuators. The RF power level was continuously monitored via RF Power Meter as shown in the test setup in Figure A. The required emission limitation is specified in 27.53 (g). Measurements were made at 60W per carrier for 10 MHz Bandwidth, and 60W per carrier for 5MHz Bandwidth at antenna terminals. The measured spurious emission levels were plotted for the frequency range 9 kHz to 12.5 GHz. The measurements were made using following receiver parameters:

Frequency Range	Resolution Bandwidth
9 kHz to 30 MHz	10 kHz
30 MHz to 1 GHz	100 kHz
1 GHz to 12.5 GHz	1 MHz

The list of band, channels, RF filters (J4) and Amplifiers tested are listed below:

Band	Block	Center Frequency (MHz)	Carrier Bandwidth (MHz)	RF Filter	Power (Watts)
	A	731.5	5	M1	60
	B	737	5	M1	60
	C	742.5	5	M1	60
	A+B	734.5	10	M1	60
	B+C	739.5	10	M1	60

FCC Section 27.53(g): Based on measurement instrument employing resolution bandwidth of 100 kHz bands or greater out band emissions shall be attenuated at least 43 + 10log (P) dB or -13dBm. However in 100 kHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least 30 kHz may be employed. Pursuant to FCC OET RULES 662911 D01 and D02 for two antenna MIMO mode of operations, the FCC limit of -13dBm shall be 3dB more stringent, therefore all channel edge and out of band spurious emissions shall be -16dBm.

The tests were performed in the following modulation configurations:

- A. QPSK
- B. 16QAM
- C. 64QAM

RESULTS:

The magnitude of spurious emissions is within the specification limits of FCC Part 27.53(g).

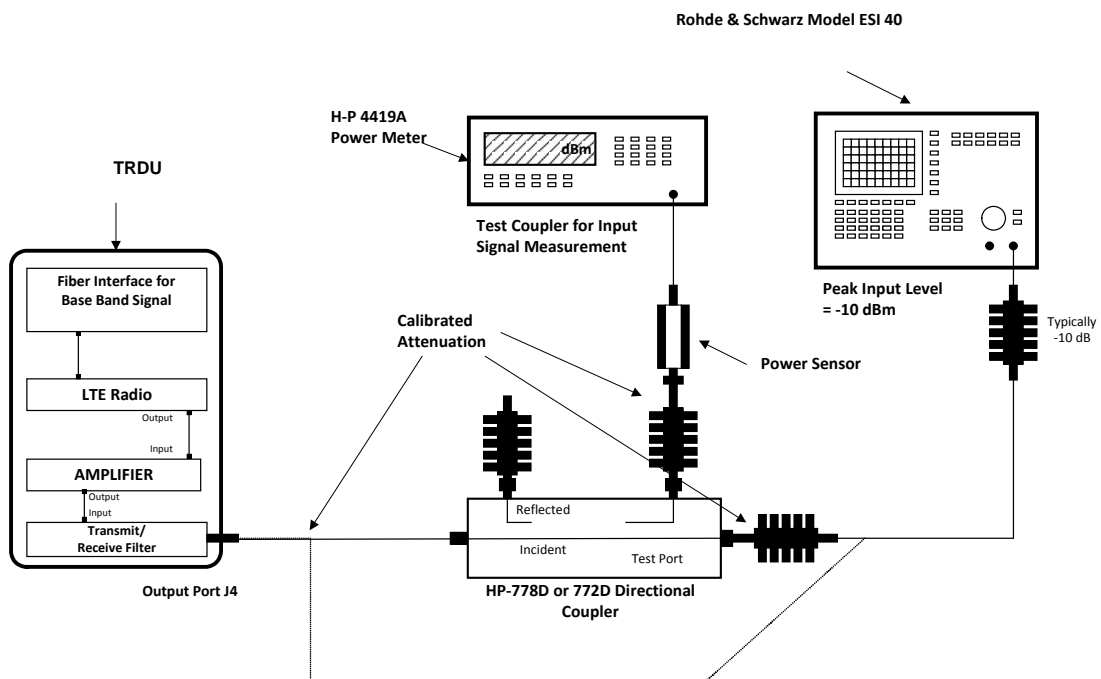
Measurement uncertainty:

9 kHz to 20 MHz: Frequency = 10 Hz, Amplitude = 0.5 dB

20 MHz to 1 GHz: Frequency = 100Hz, Amplitude = 0.5 dB

1 GHz to 10 GHz: Frequency = 10 kHz, Amplitude = 0.5 dB

Figure A. TEST CONFIGURATION FOR CONDUCTED SPURIOUS

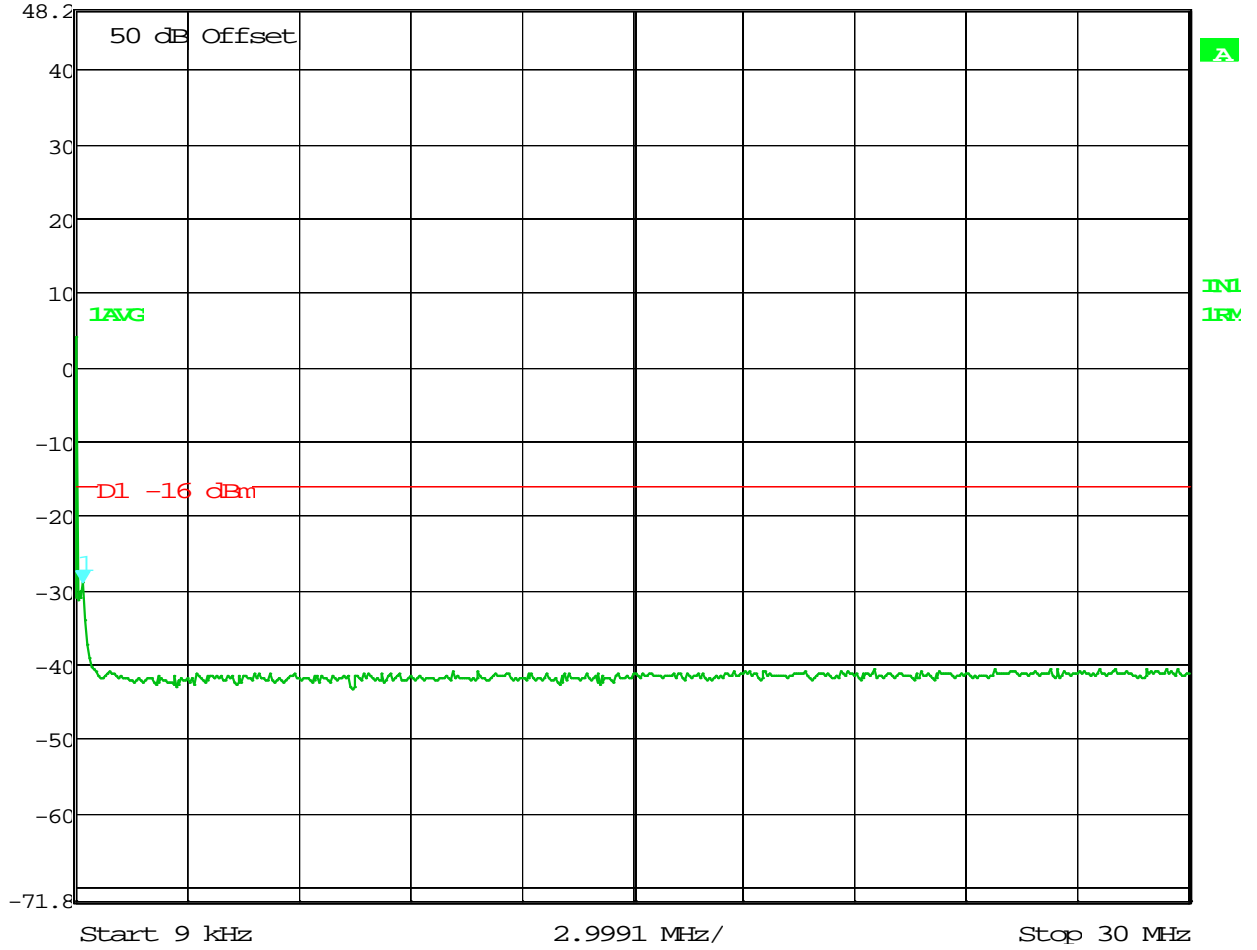


**Transmit Port
Antenna Conducted Spurious Emissions**

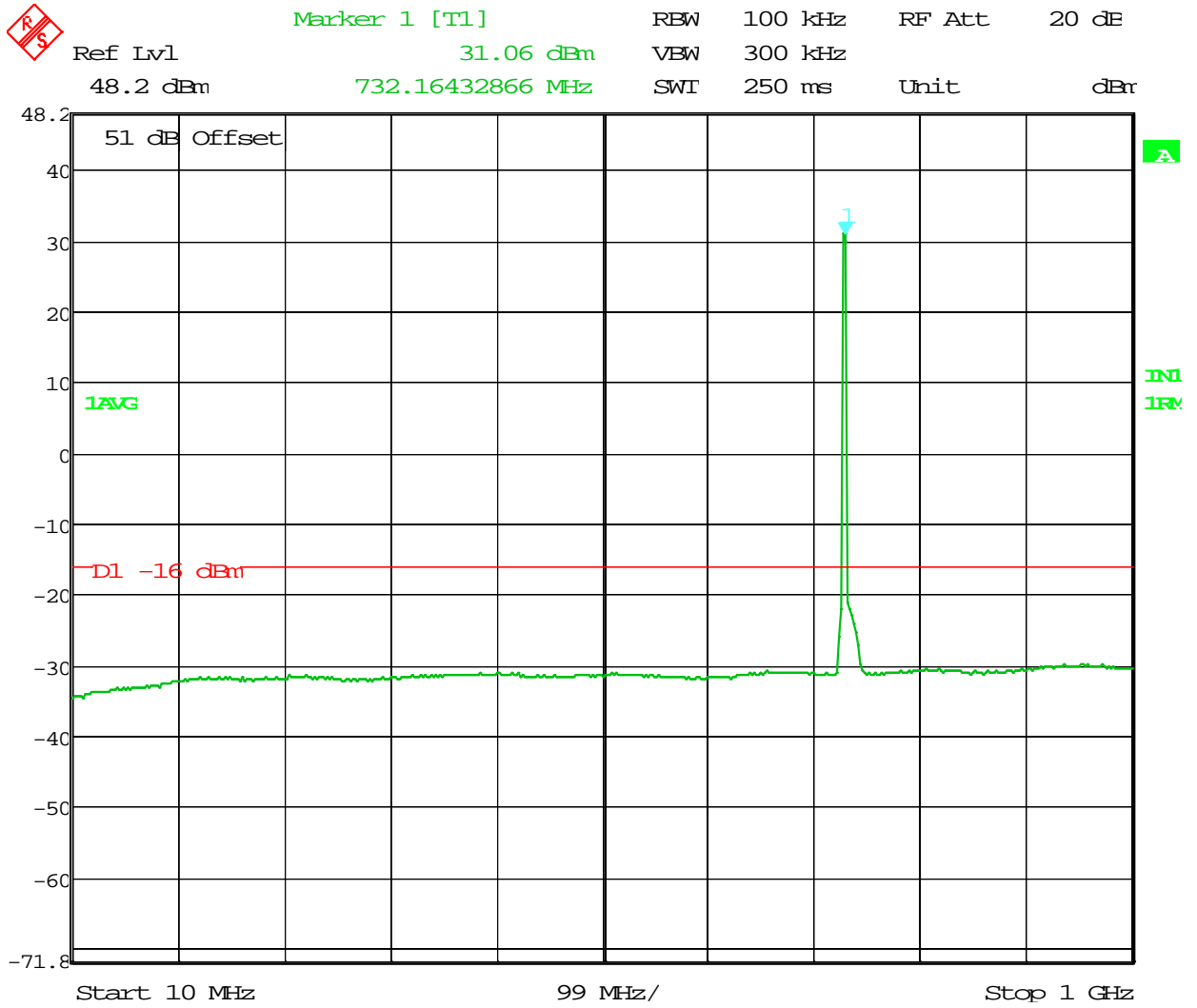
**Block: A
QPSK Modulation
Bandwidth 729 – 734 MHz**



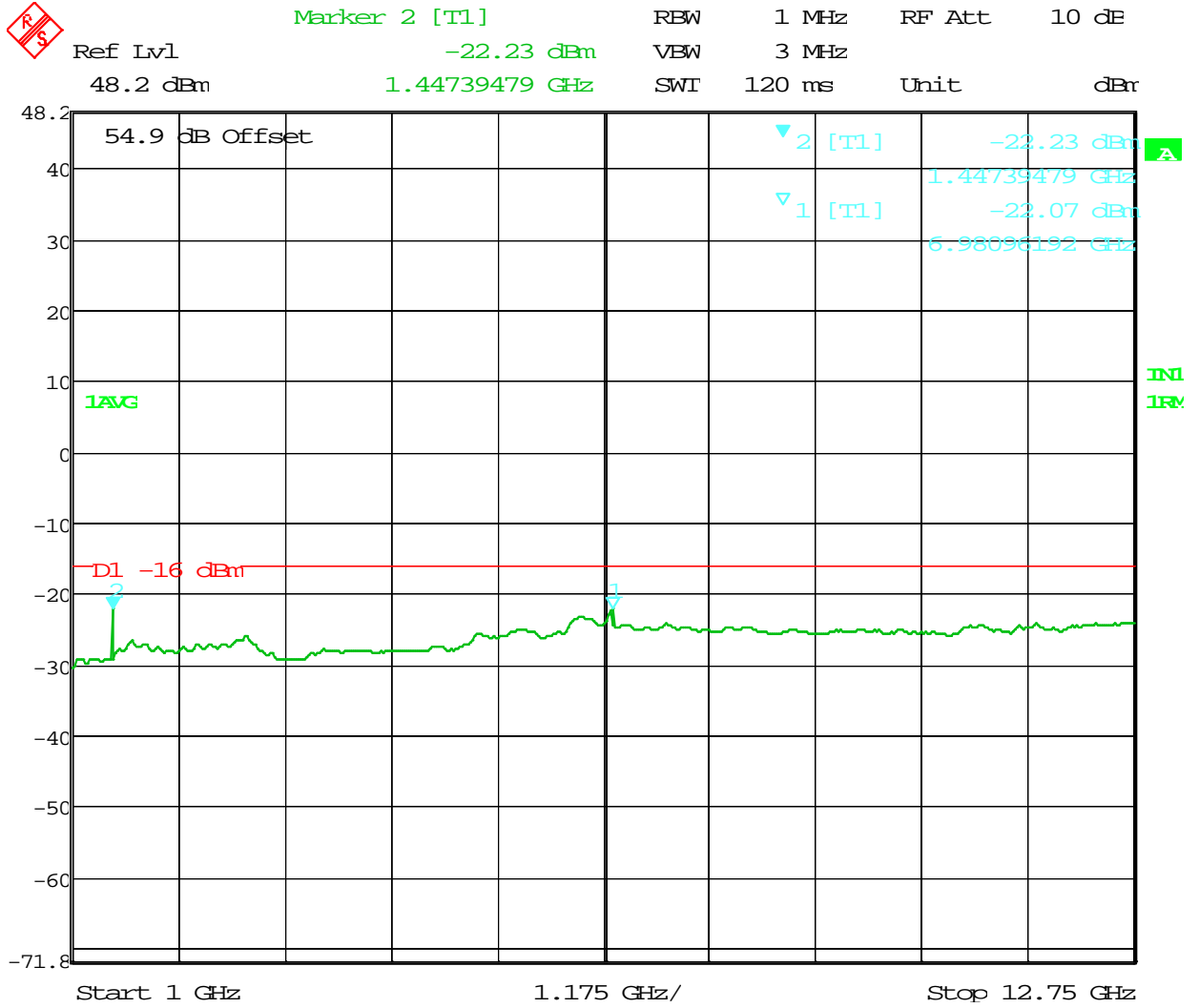
Marker 1 [T1] REW 10 kHz RF Att 30 dB
Ref Lvl -28.97 dBm VBW 30 kHz
48.2 dBm 189.30661323 kHz SWI 760 ms Unit dBm



Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; TEST ENGINEER: SEG
Comment A: LTE TRDU BC12/17 700 MHz 2X60-7L -48V; Blk A; 729 -
734 MHz; PWR:60W; QPSK; FCC Prt 27.53; FCCID: AS5BBTRX-09
Date: 29.NOV.2012 08:26:07



Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; TEST ENGINEER: SEG
Comment A: LTE TRDU BC12/17 700 MHz 2X60-7L -48V; Blk A; 729 -
734 MHz; PWR:60W; QPSK; FCC Prt 27.53; FCCID: AS5BBTRX-09
Date: 29.NOV.2012 08:24:13



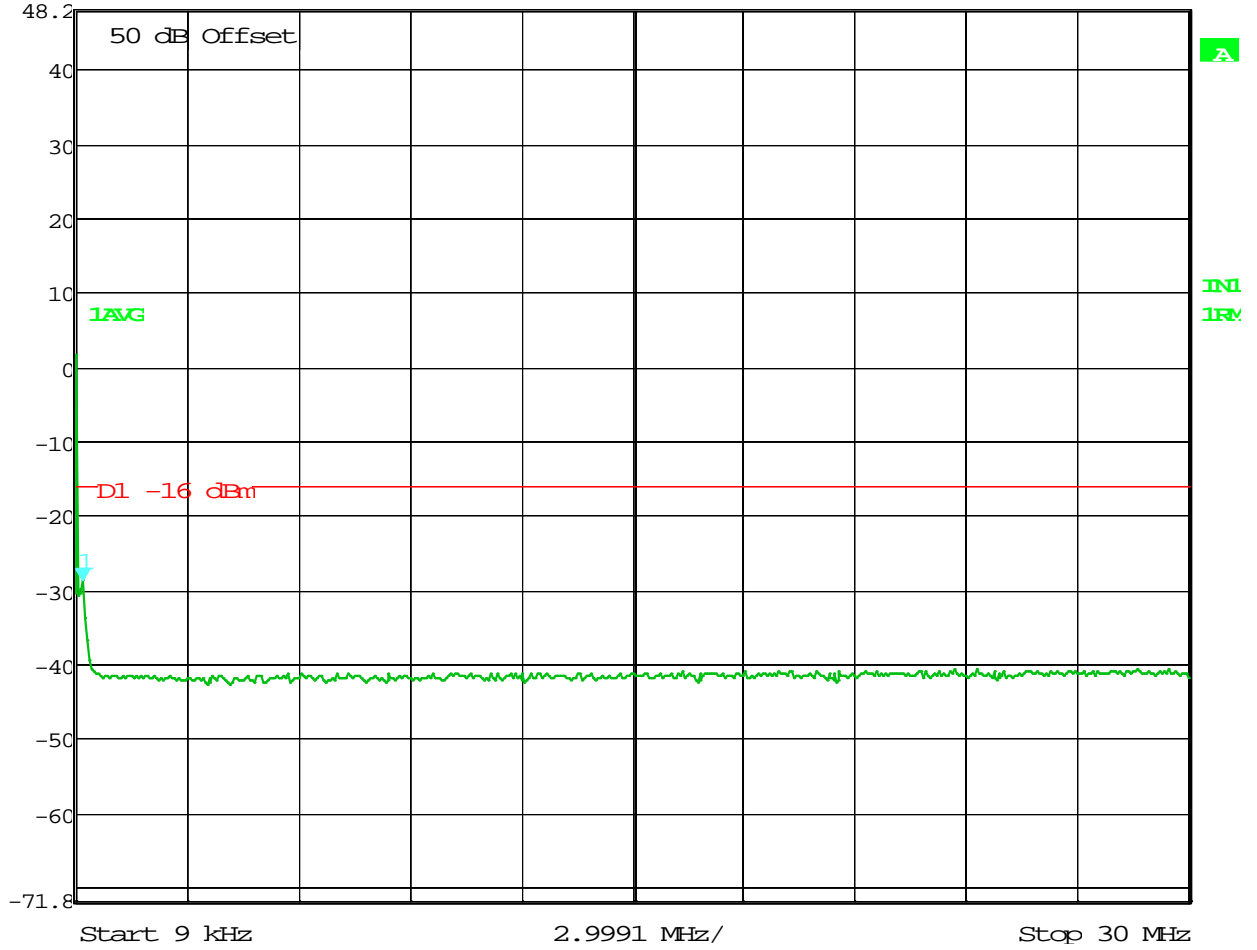
Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; TEST ENGINEER: SEG
Comment A: LTE TRDU BC12/17 700 MHz 2X60-7L -48V; Blk A; 729 -
734 MHz; PWR:60W; QPSK; FCC Prt 27.53; FCCID: AS5BBTRX-09
Date: 29.NOV.2012 08:28:14

**Transmit Port
Antenna Conducted Spurious Emissions**

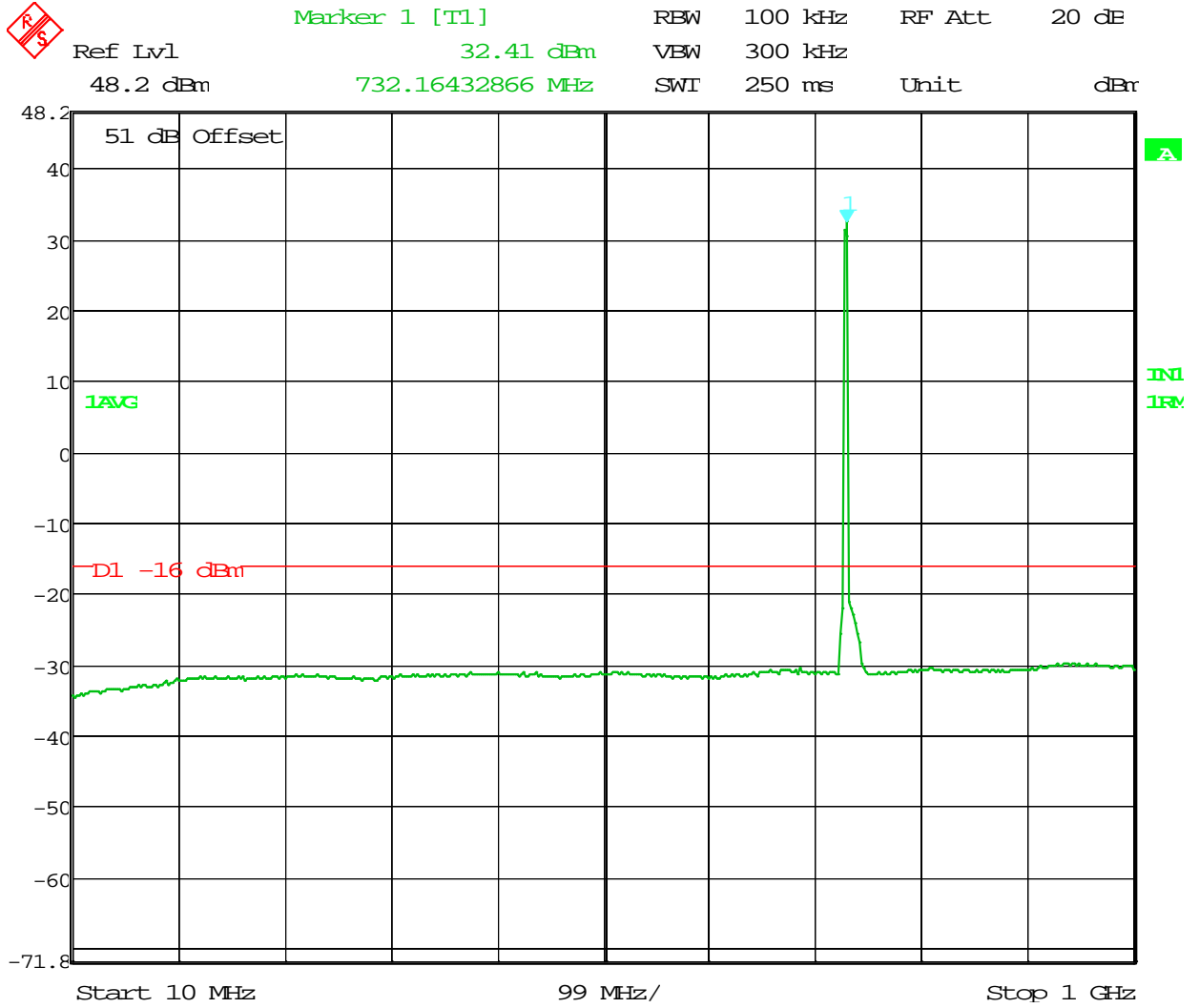
**Block: A
16QAM Modulation
Bandwidth 729 – 734 MHz**



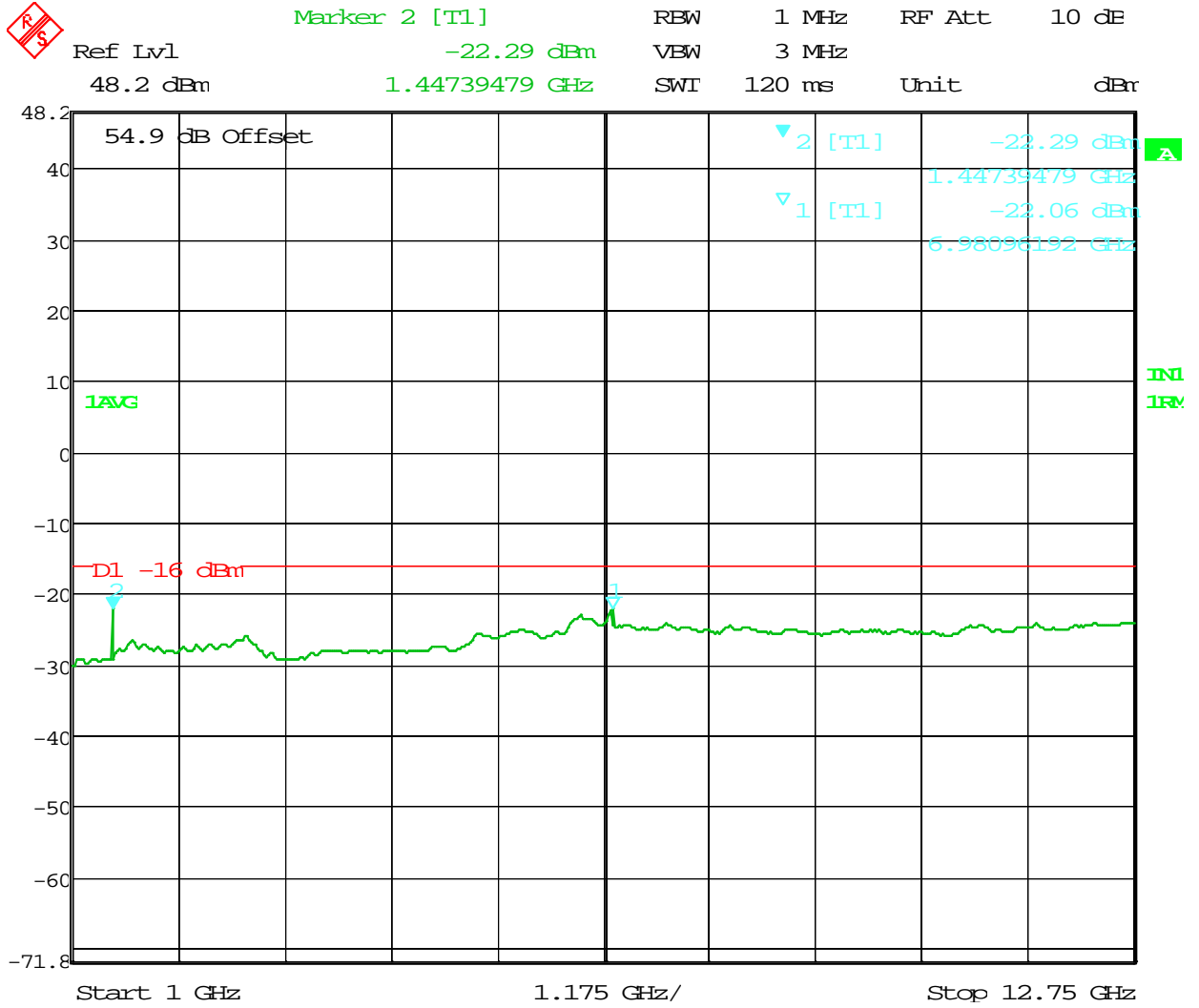
Marker 1 [T1] REW 10 kHz RF Att 30 dB
Ref Lvl -28.73 dBm VBW 30 kHz
48.2 dBm 189.30661323 kHz SWI 760 ms Unit dBm



Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; TEST ENGINEER: SEG
Comment A: LTE TRDU BC12/17 700 MHz 2X60-7L -48V; Blk A; 729 -
734 MHz; PWR:60W; 16QAM; FCC Prt 27.53; FCCID: AS5BBTRX-09
Date: 29.NOV.2012 09:13:36



Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; TEST ENGINEER: SEG
Comment A: LTE TRDU BC12/17 700 MHz 2X60-7L -48V; Blk A; 729 -
734 MHz; PWR:60W; 16QAM; FCC Prt 27.53; FCCID: AS5BBTRX-09
Date: 29.NOV.2012 09:11:52



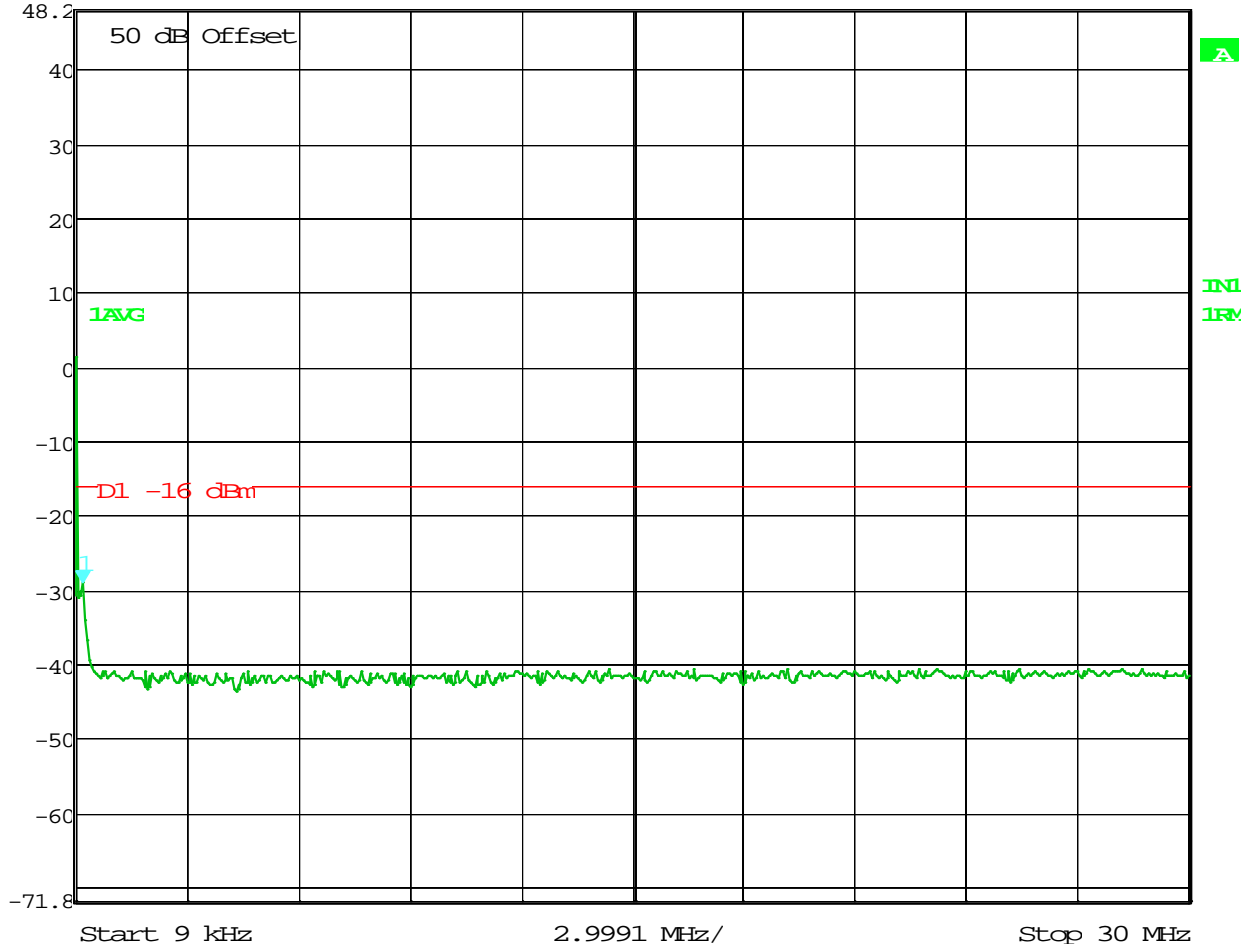
Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; TEST ENGINEER: SEG
Comment A: LTE TRDU BC12/17 700 MHz 2X60-7L -48V; Blk A; 729 -
734 MHz; PWR:60W; 16QAM; FCC Prt 27.53; FCCID: AS5BBTRX-09
Date: 29.NOV.2012 09:10:01

**Transmit Port
Antenna Conducted Spurious Emissions**

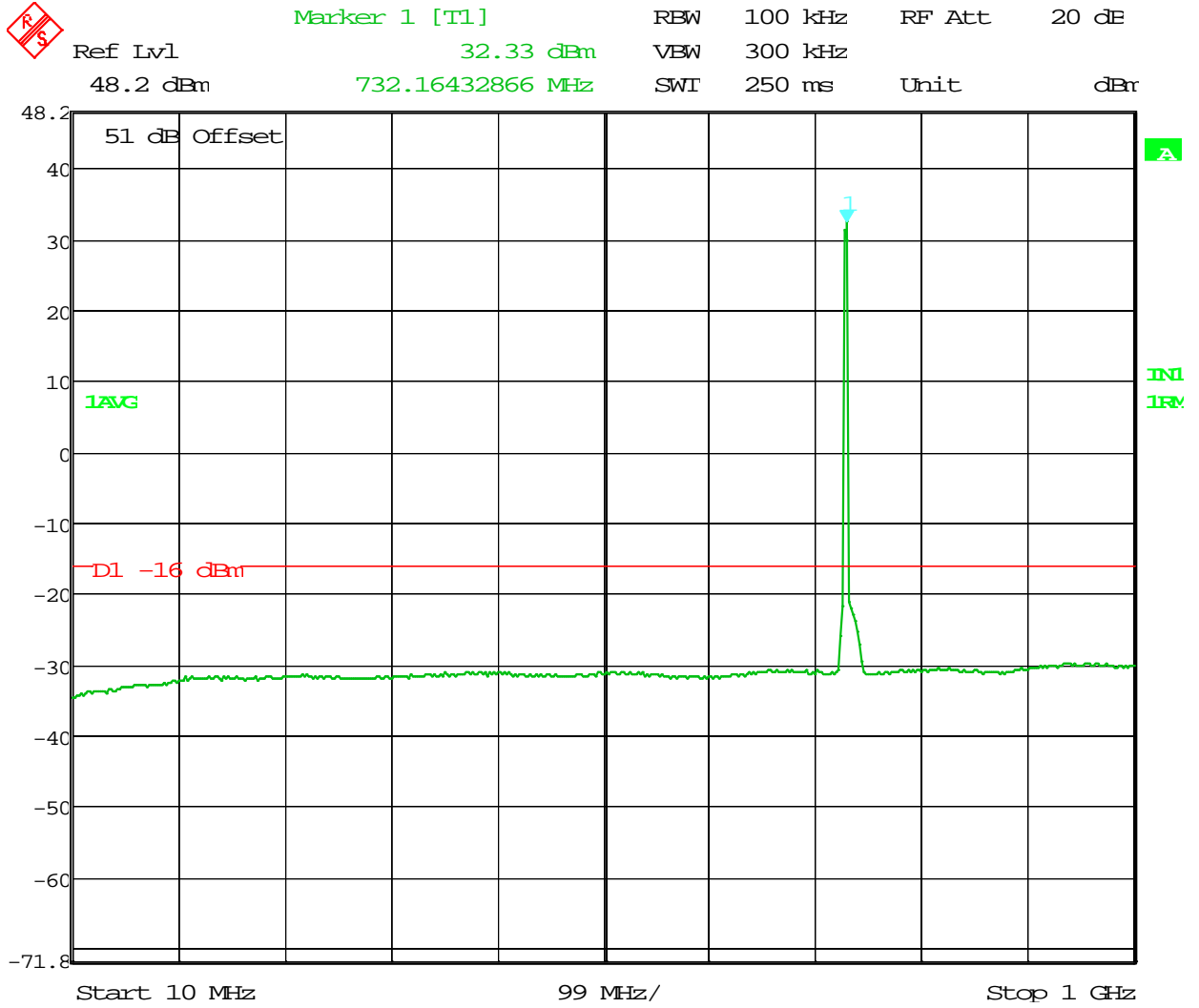
**Block: A
64QAM Modulation
Bandwidth 729 – 734 MHz**



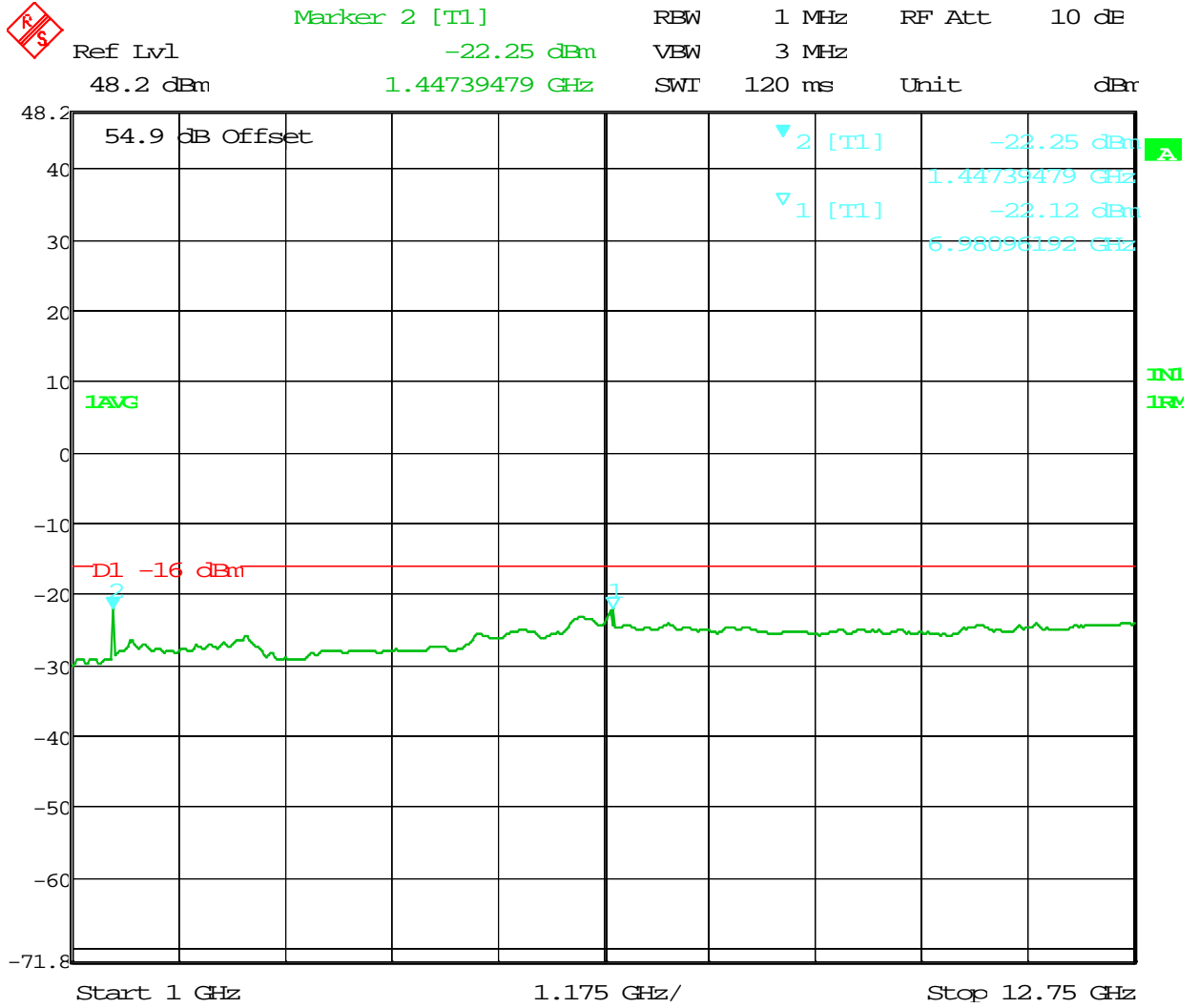
Marker 1 [T1] REW 10 kHz RF Att 30 dB
Ref Lvl -29.15 dBm VBW 30 kHz
48.2 dBm 189.30661323 kHz SWI 760 ms Unit dBm



Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; TEST ENGINEER: SEG
Comment A: LTE TRDU BC12/17 700 MHz 2X60-7L -48V; Blk A; 729 -
734 MHz; PWR:60W; 64QAM; FCC Prt 27.53; FCCID: AS5BBTRX-09
Date: 29.NOV.2012 09:54:38



Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; TEST ENGINEER: SEG
Comment A: LTE TRDU BC12/17 700 MHz 2X60-7L -48V; Blk A; 729 -
734 MHz; PWR:60W; 64QAM; FCC Prt 27.53; FCCID: AS5BBTRX-09
Date: 29.NOV.2012 09:52:52



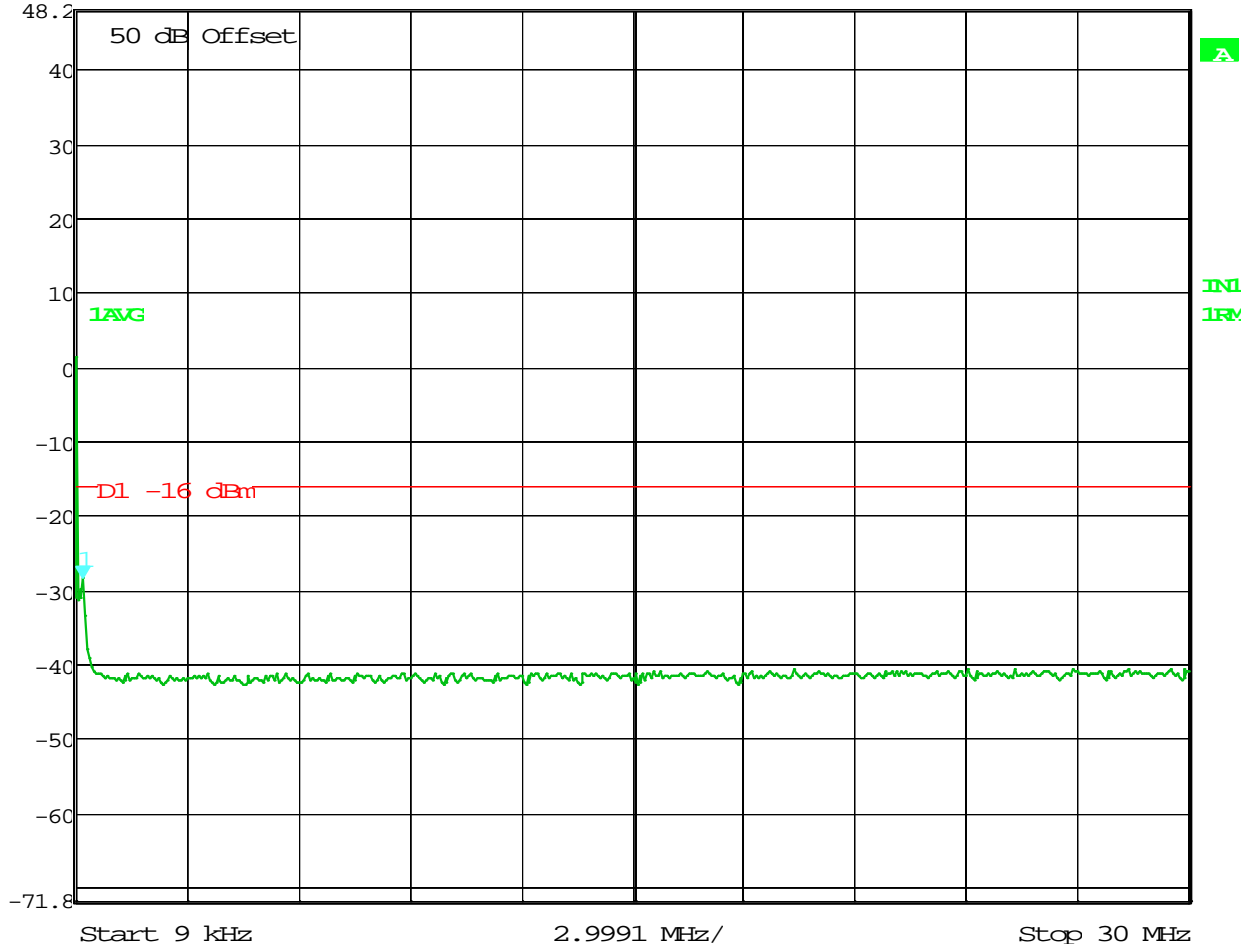
Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; TEST ENGINEER: SEG
Comment A: LTE TRDU BC12/17 700 MHz 2X60-7L -48V; Blk A; 729 -
734 MHz; PWR:60W; 64QAM; FCC Prt 27.53; FCCID: AS5BBTRX-09
Date: 29.NOV.2012 09:50:58

**Transmit Port
Antenna Conducted Spurious Emissions**

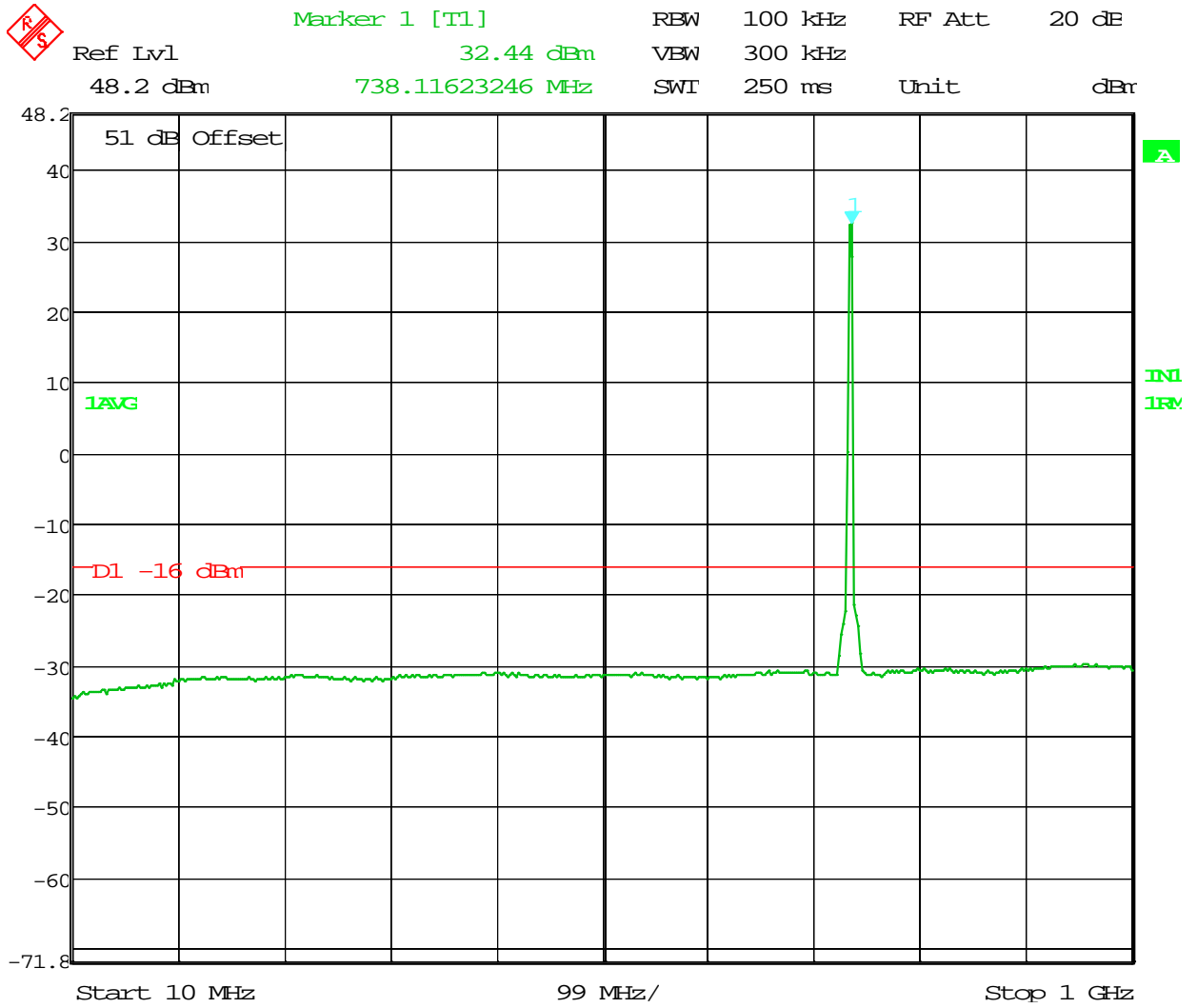
**Block: B
QPSK Modulation
Bandwidth 734.5 – 739.5 MHz**



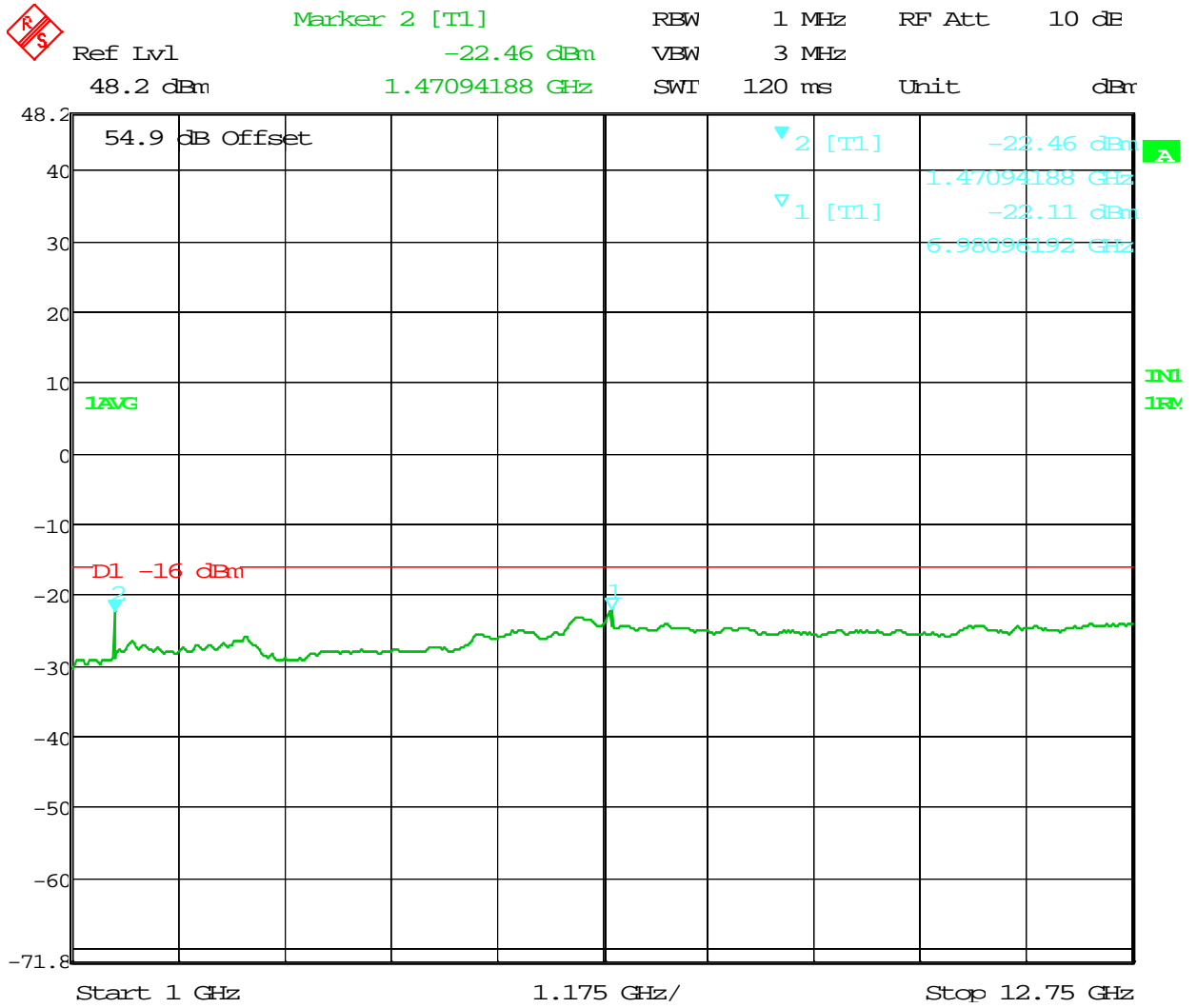
Marker 1 [T1] REW 10 kHz RF Att 30 dB
Ref Lvl -28.58 dBm VBW 30 kHz
48.2 dBm 189.30661323 kHz SWI 760 ms Unit dBm



Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; TEST ENGINEER: SEG
Comment A: LTE TRDU BC12/17 700 MHz 2X60-7L -48V; Blk B; 734.5 -
739.5 MHz; PWR:60W; QPSK; FCC Prt 27.53; FCCID: AS5BBTRX-09
Date: 29.NOV.2012 10:40:42



Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; TEST ENGINEER: SEG
Comment A: LTE TRDU BC12/17 700 MHz 2X60-7L -48V; Blk B; 734.5 -
739.5 MHz; PWR:60W; QPSK; FCC Prt 27.53; FCCID: AS5BBTRX-09
Date: 29.NOV.2012 10:38:51



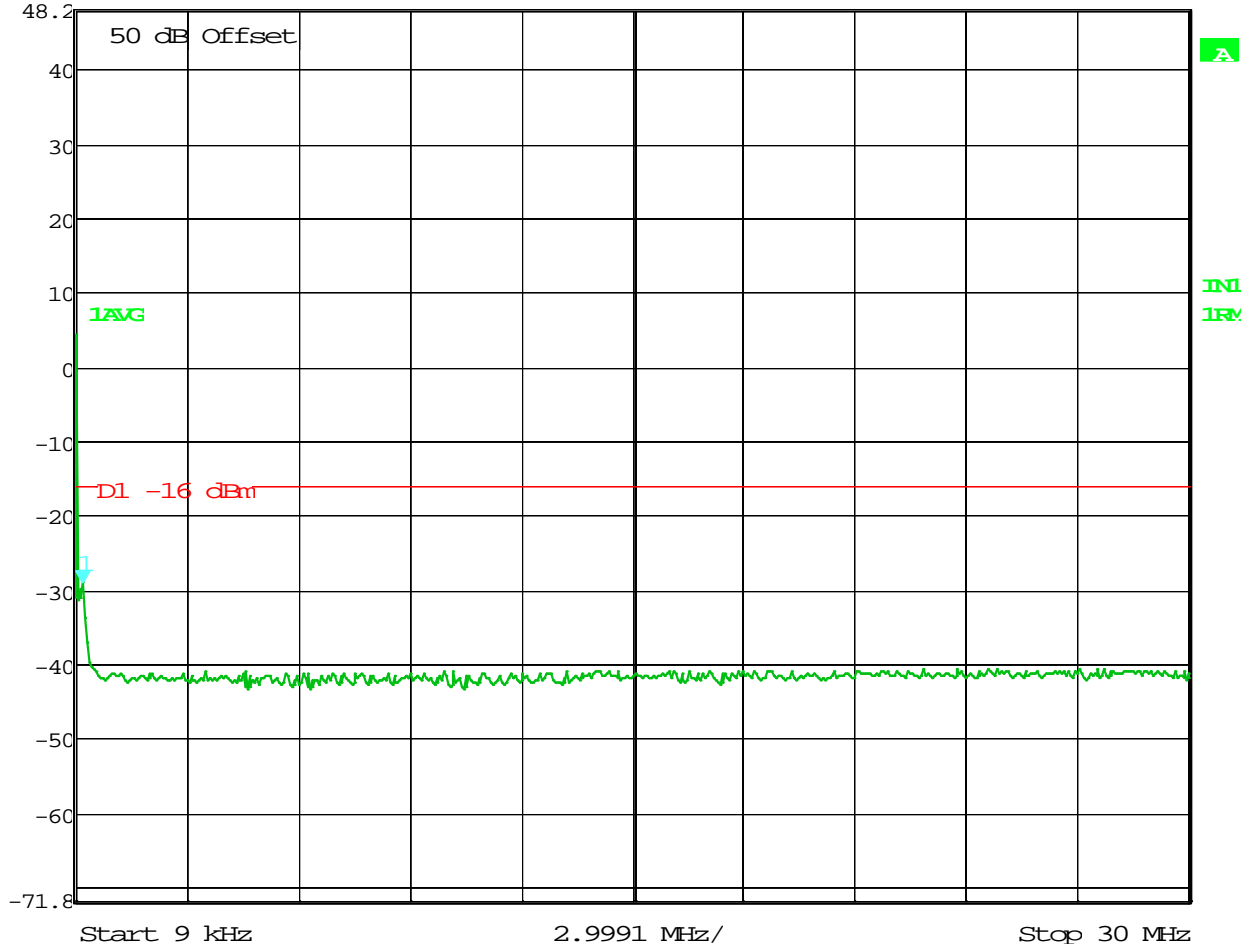
Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; TEST ENGINEER: SEG
 Comment A: LTE TRDU BC12/17 700 MHz 2X60-7L -48V; Blk B; 734.5 -
 739.5 MHz; PWR:60W; QPSK; FCC Pkt 27.53; FCCID: AS5BBTRX-09
 Date: 29.NOV.2012 10:37:38

**Transmit Port
Antenna Conducted Spurious Emissions**

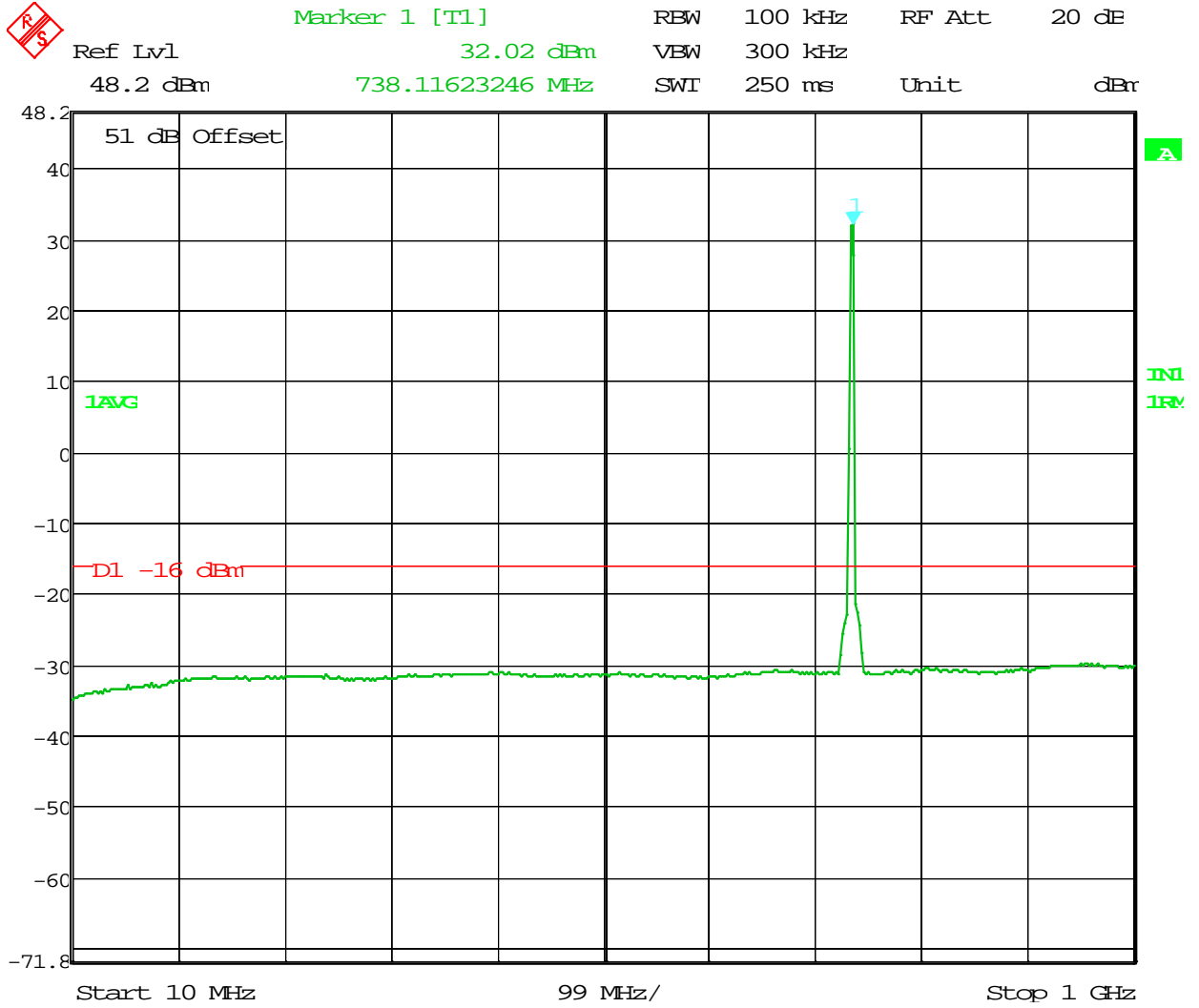
**Block: B
16QAM Modulation
Bandwidth 734.5 – 739.5 MHz**



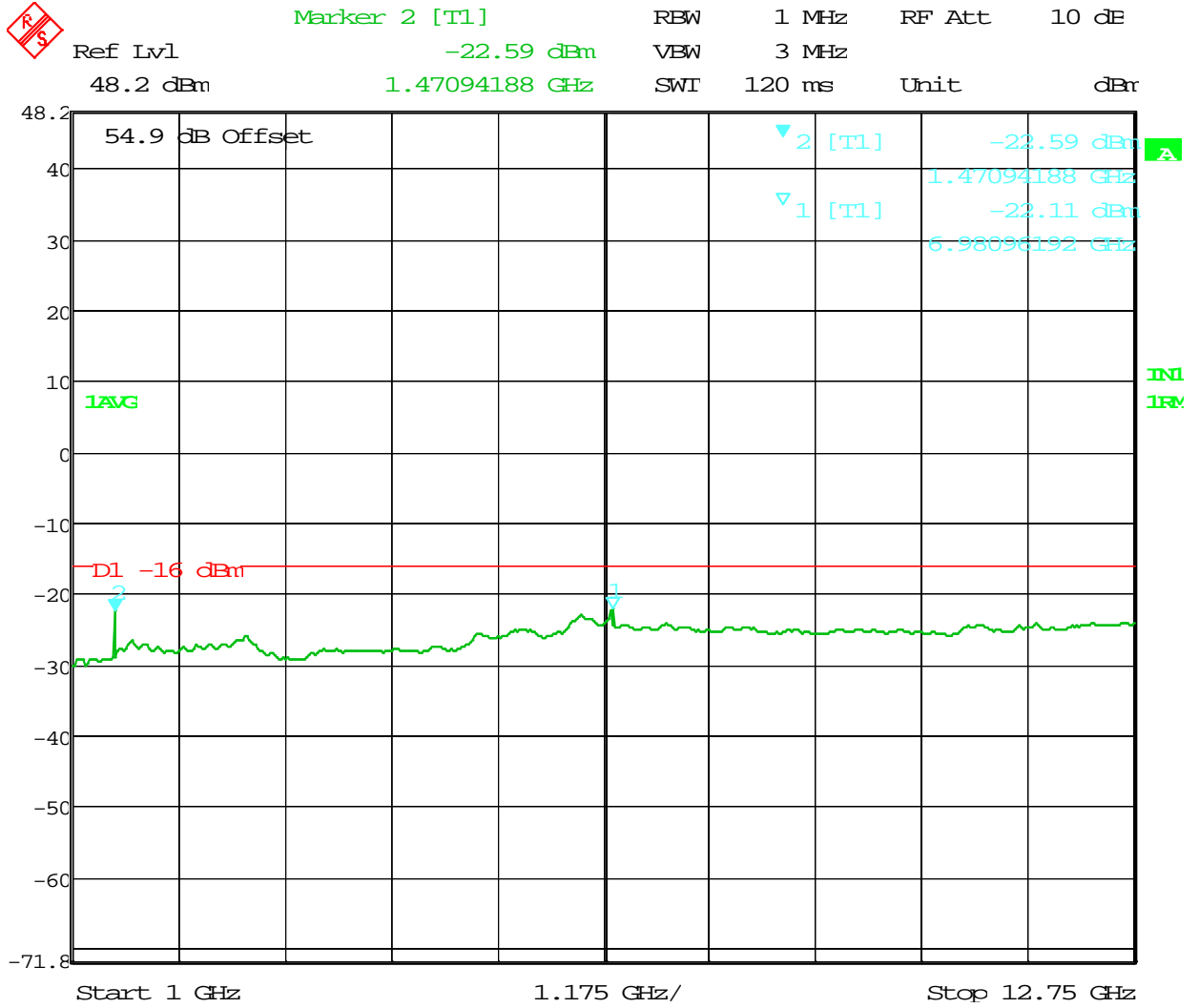
Marker 1 [T1] REW 10 kHz RF Att 30 dB
Ref Lvl -29.12 dBm VBW 30 kHz
48.2 dBm 189.30661323 kHz SWI 760 ms Unit dBm



Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; TEST ENGINEER: SEG
Comment A: LTE TRDU BC12/17 700 MHz 2X60-7L -48V; Blk B; 734.5 -
739.5 MHz; PWR:60W; 16QAM; FCC Prt 27.53; FCCID: AS5BBTRX-09
Date: 29.NOV.2012 11:10:19



Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; TEST ENGINEER: SEG
Comment A: LTE TRDU BC12/17 700 MHz 2X60-7L -48V; Blk B; 734.5 -
739.5 MHz; PWR:60W; 16QAM; FCC Prt 27.53; FCCID: AS5BBTRX-09
Date: 29.NOV.2012 11:12:02



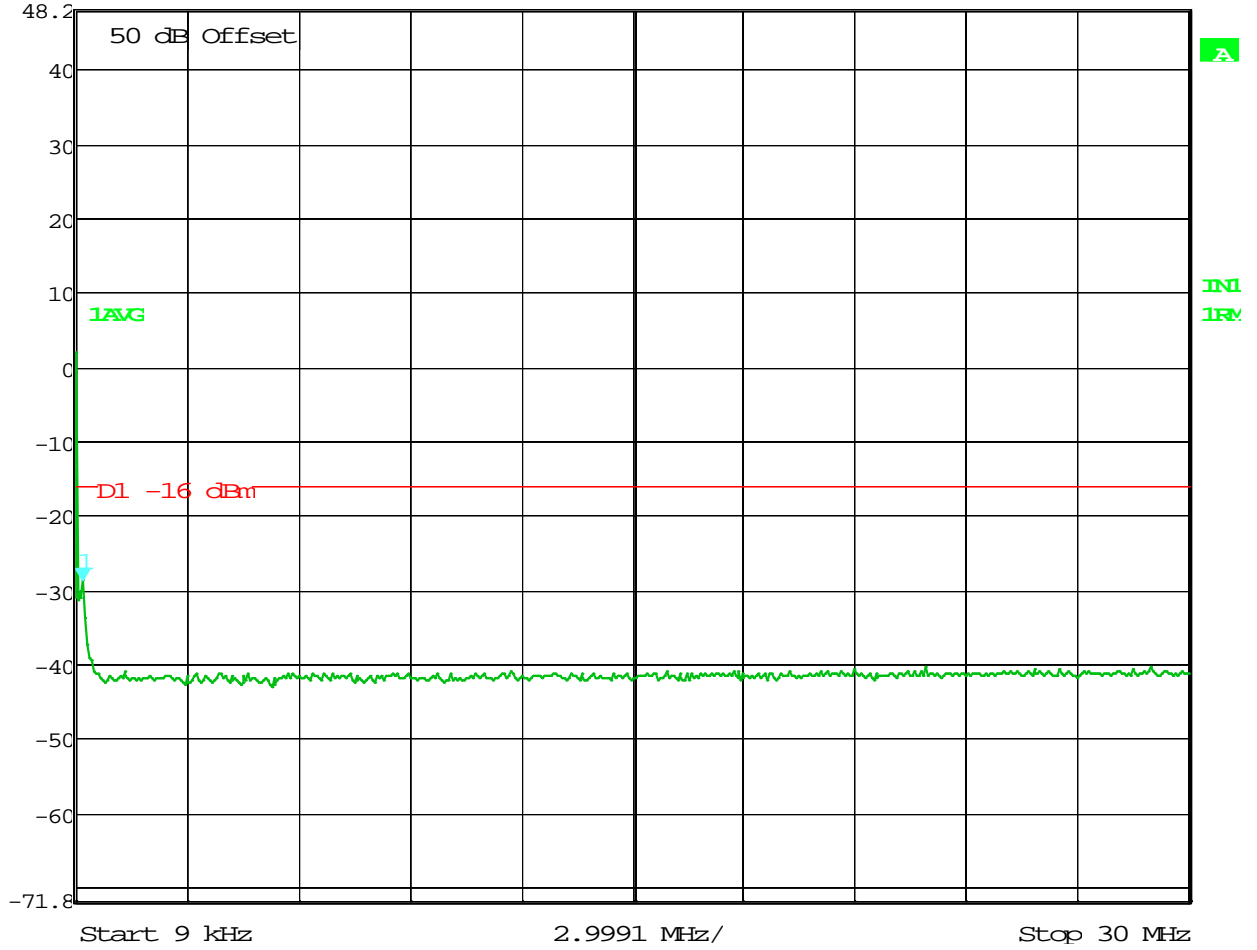
Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; TEST ENGINEER: SEG
Comment A: LTE TRDU BC12/17 700 MHz 2X60-7L -48V; Blk B; 734.5 -
739.5 MHz; PWR:60W; 16QAM; FCC Prt 27.53; FCCID: AS5BBTRX-09
Date: 29.NOV.2012 11:13:24

**Transmit Port
Antenna Conducted Spurious Emissions**

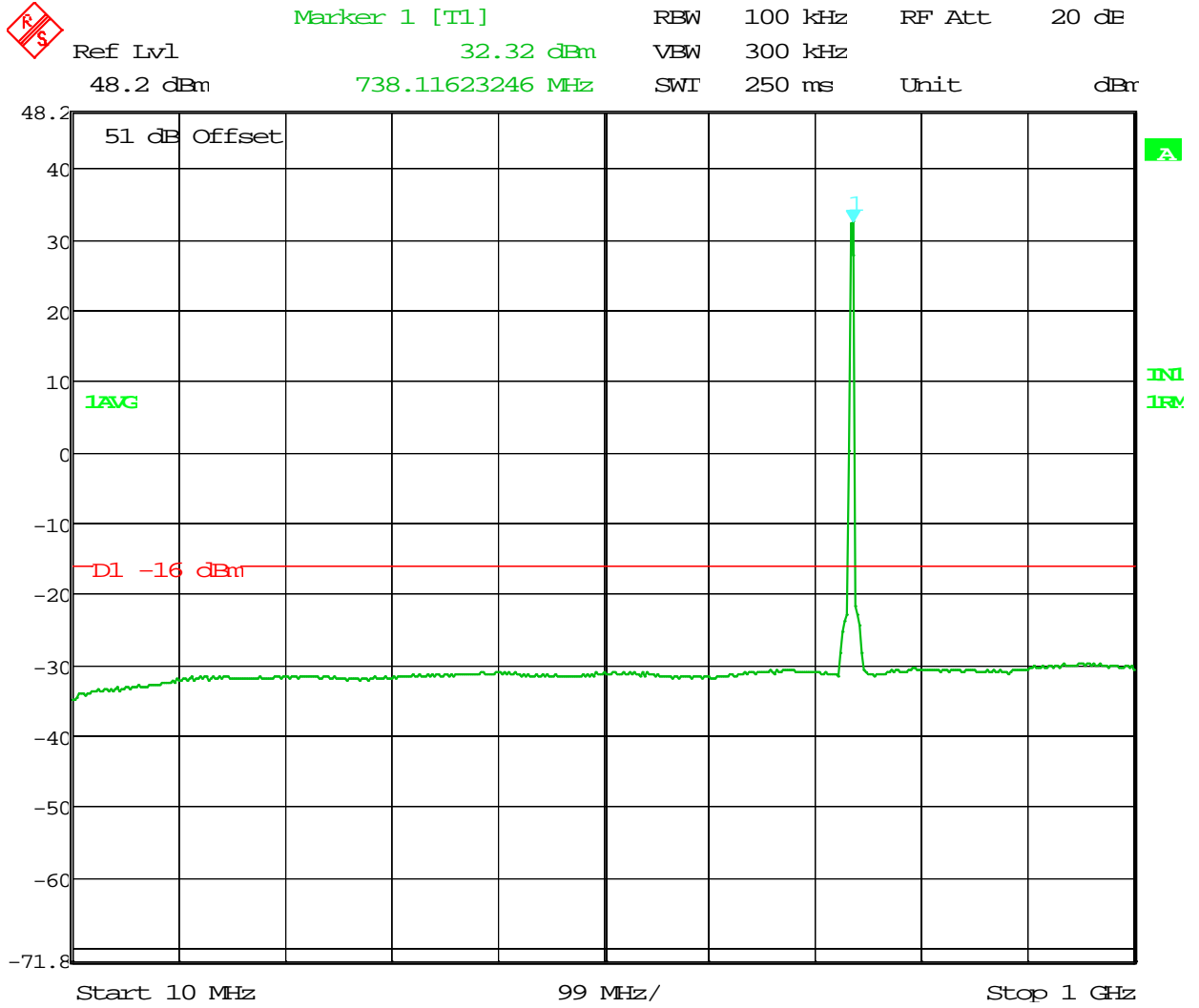
**Block: B
64QAM Modulation
Bandwidth 734.5 – 739.5 MHz**



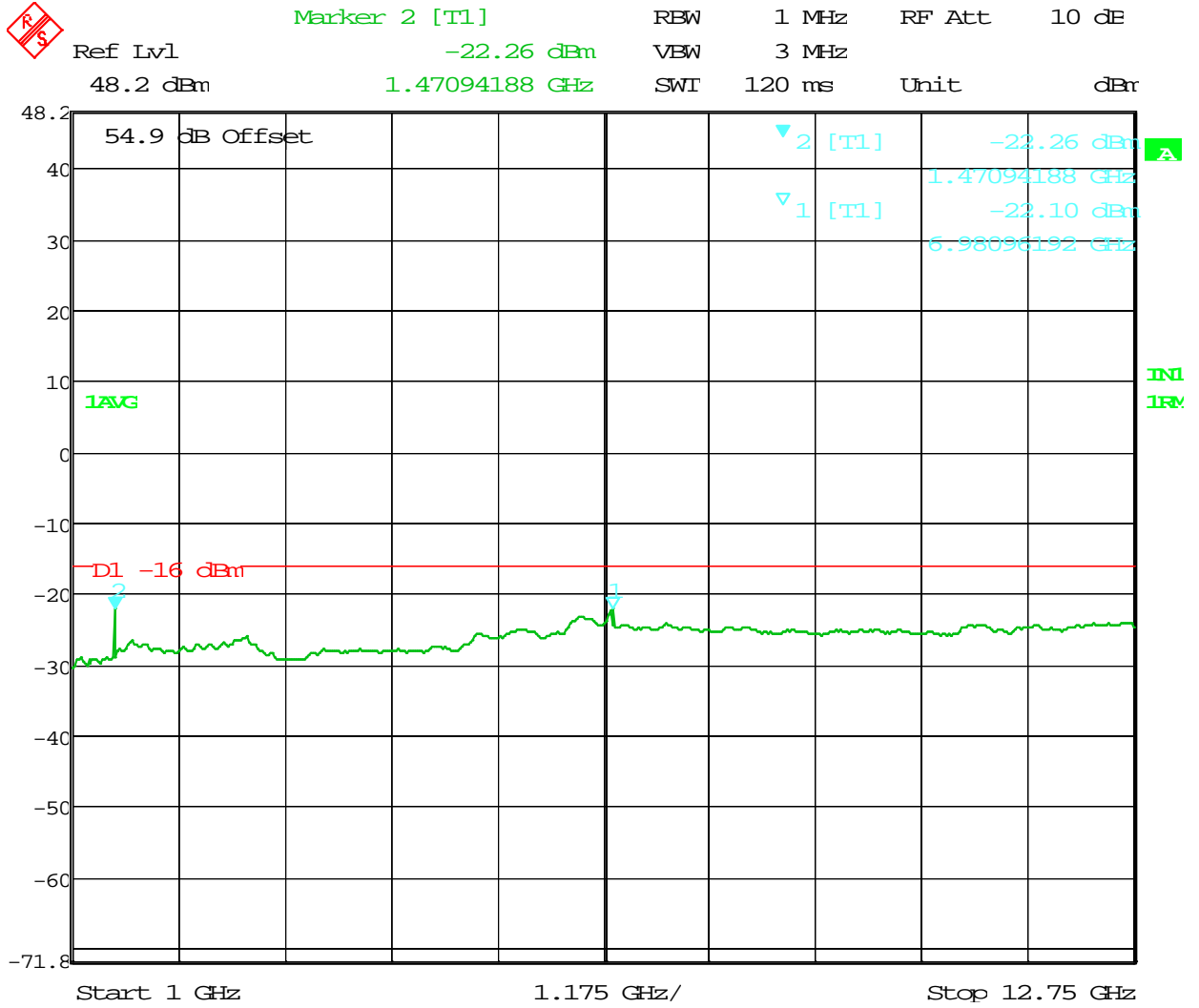
Marker 1 [T1] REW 10 kHz RF Att 30 dB
Ref Lvl -28.80 dBm VBW 30 kHz
48.2 dBm 189.30661323 kHz SWI 760 ms Unit dBm



Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; TEST ENGINEER: SEG
Comment A: LTE TRDU BC12/17 700 MHz 2X60-7L -48V; Blk B; 734.5 -
739.5 MHz; PWR:60W; 64QAM; FCC Prt 27.53; FCCID: AS5BBTRX-09
Date: 29.NOV.2012 11:33:08



Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; TEST ENGINEER: SEG
Comment A: LTE TRDU BC12/17 700 MHz 2X60-7L -48V; Blk B; 734.5 -
739.5 MHz; PWR:60W; 64QAM; FCC Prt 27.53; FCCID: AS5BBTRX-09
Date: 29.NOV.2012 11:31:18



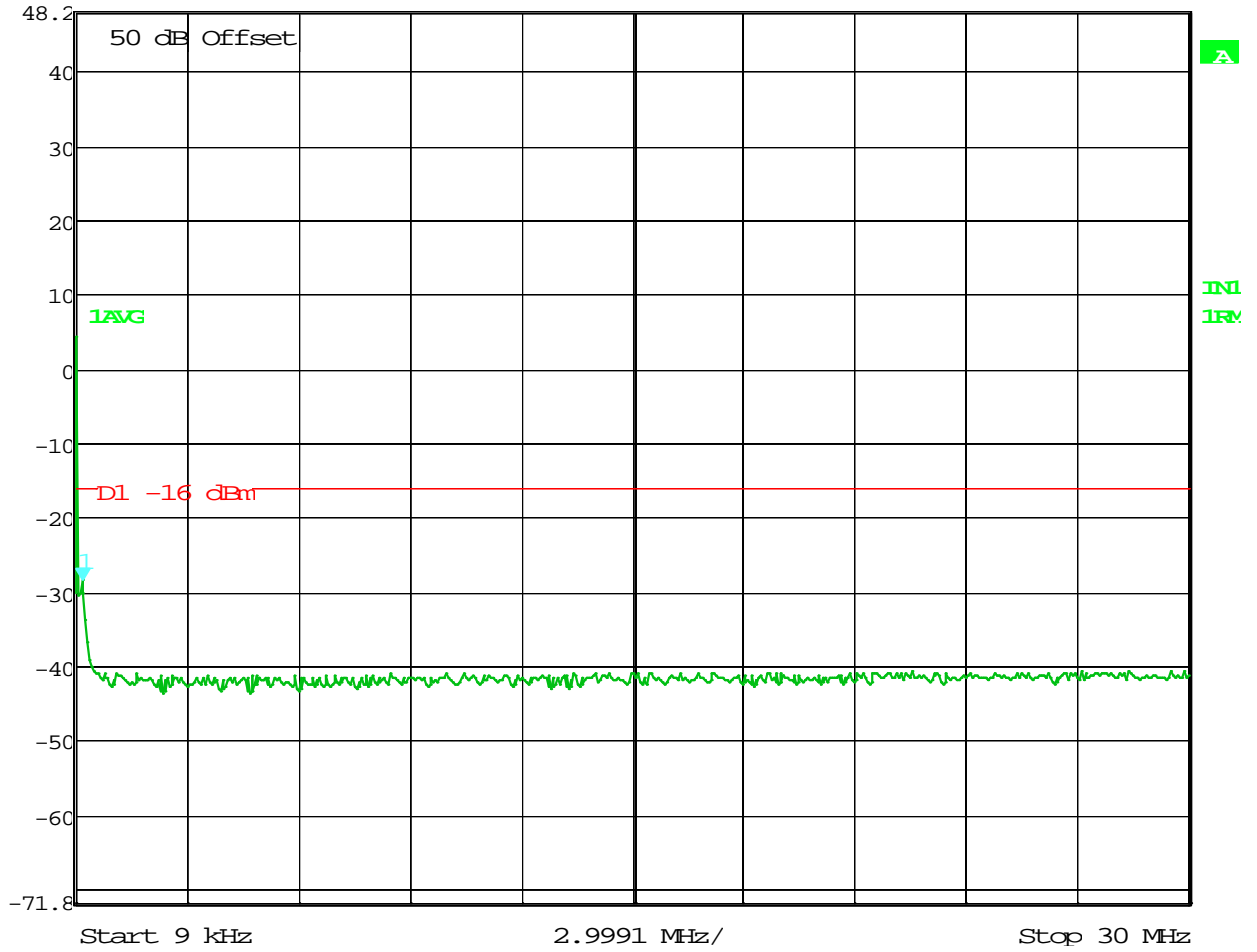
Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; TEST ENGINEER: SEG
Comment A: LTE TRDU BC12/17 700 MHz 2X60-7L -48V; Blk B; 734.5 -
739.5 MHz; PWR:60W; 64QAM; FCC Prt 27.53; FCCID: AS5BBTRX-09
Date: 29.NOV.2012 11:30:17

**Transmit Port
Antenna Conducted Spurious Emissions**

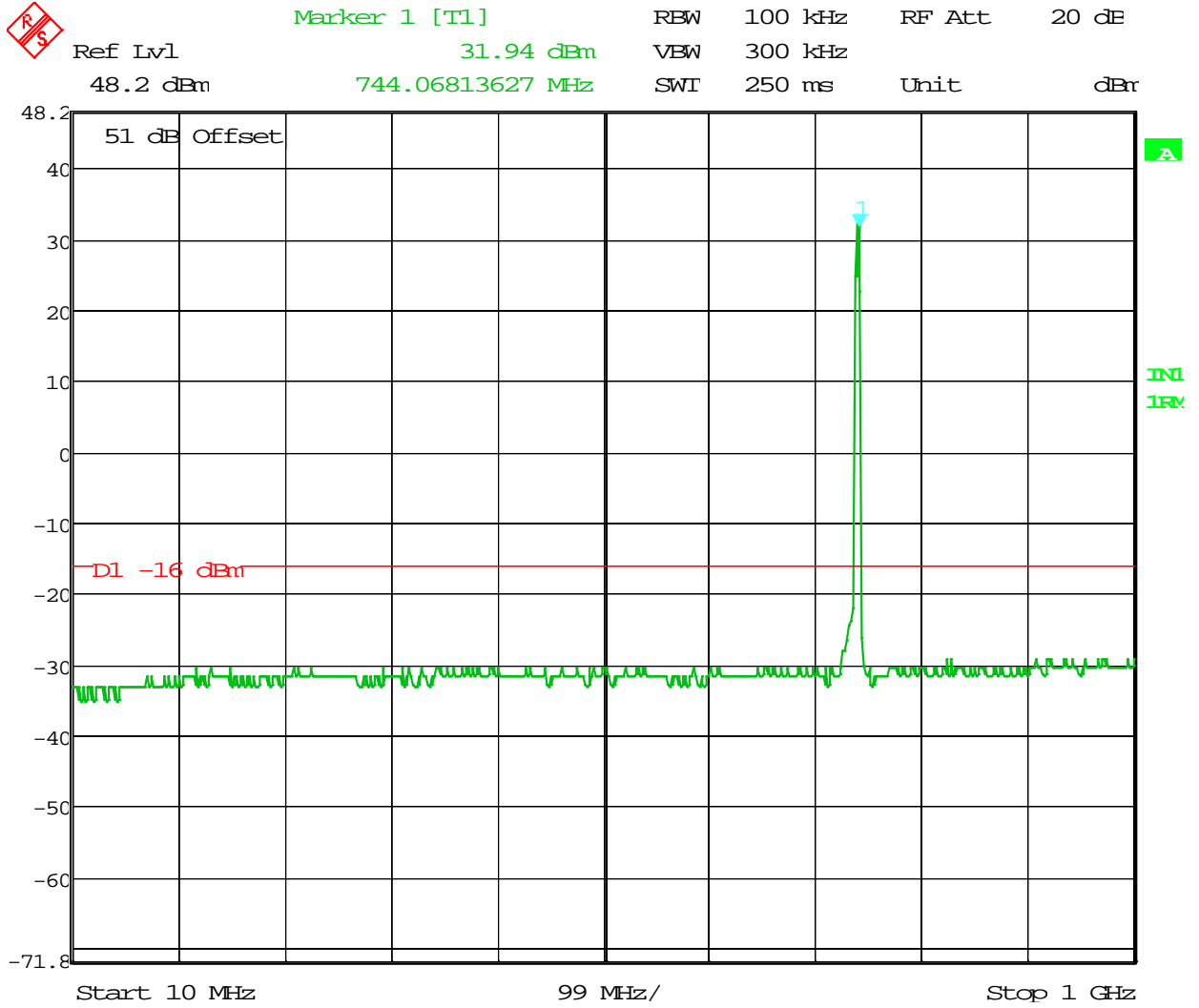
**Block: C
QPSK Modulation
Bandwidth 740 – 745 MHz**



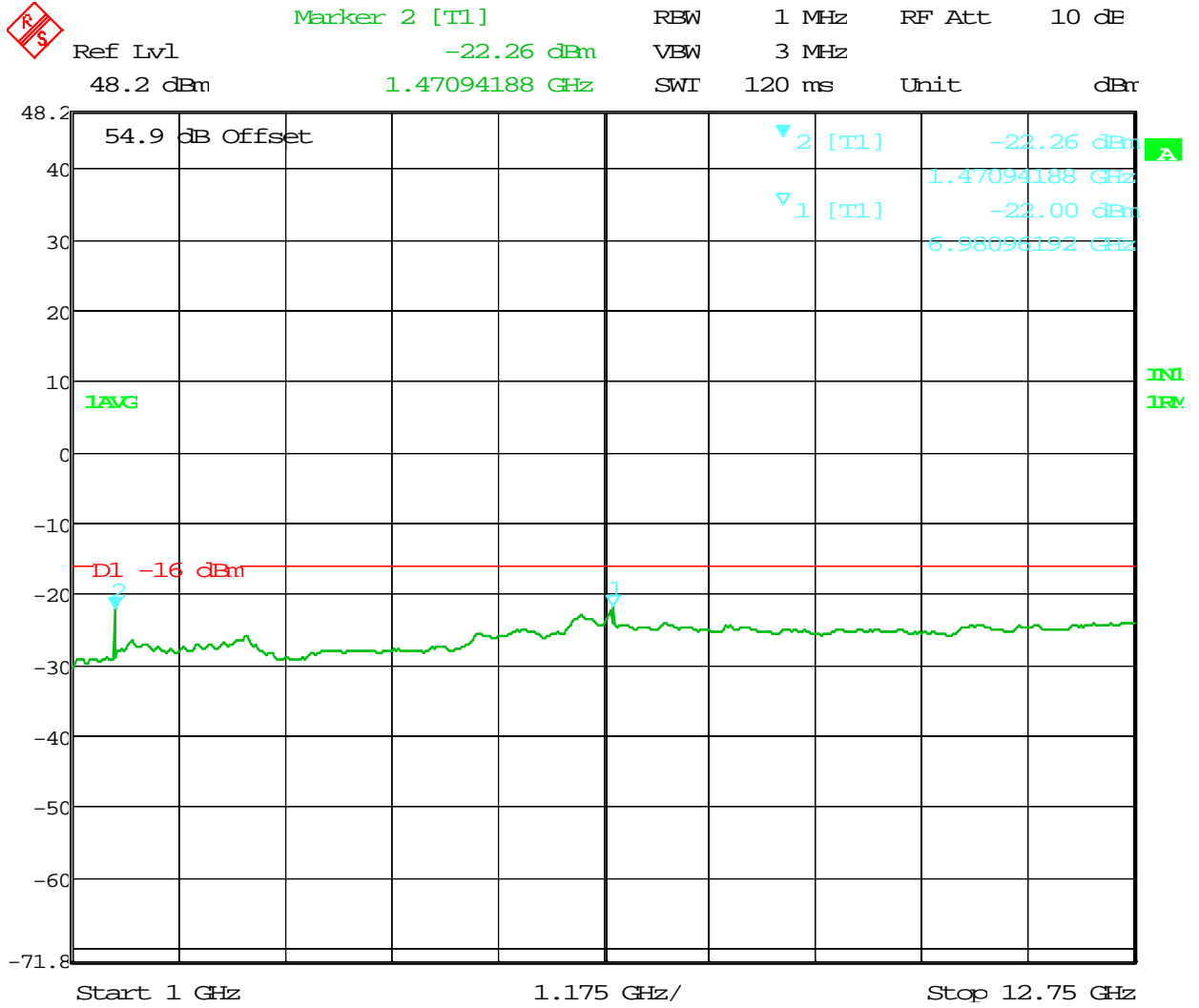
Marker 1 [T1] REW 10 kHz RF Att 30 dB
Ref Lvl -28.55 dBm VBW 30 kHz
48.2 dBm 189.30661323 kHz SWI 760 ms Unit dBm



Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; TEST ENGINEER: SEG
Comment A: LTE TRDU BC12/17 700 MHz 2X60-7L -48V; Blk C; 740 -
745 MHz; PWR:60W; QPSK; FCC Prt 27.53; FCCID: AS5BBTRX-09
Date: 29.NOV.2012 13:35:17



Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; TEST ENGINEER: SEG
Comment A: LTE TRDU BC12/17 700 MHz 2X60-7L -48V; Blk C; 740 -
745 MHz; PWR:60W; QPSK; FCC Prt 27.53; FCCID: AS5BBTRX-09
Date: 29.NOV.2012 13:39:14



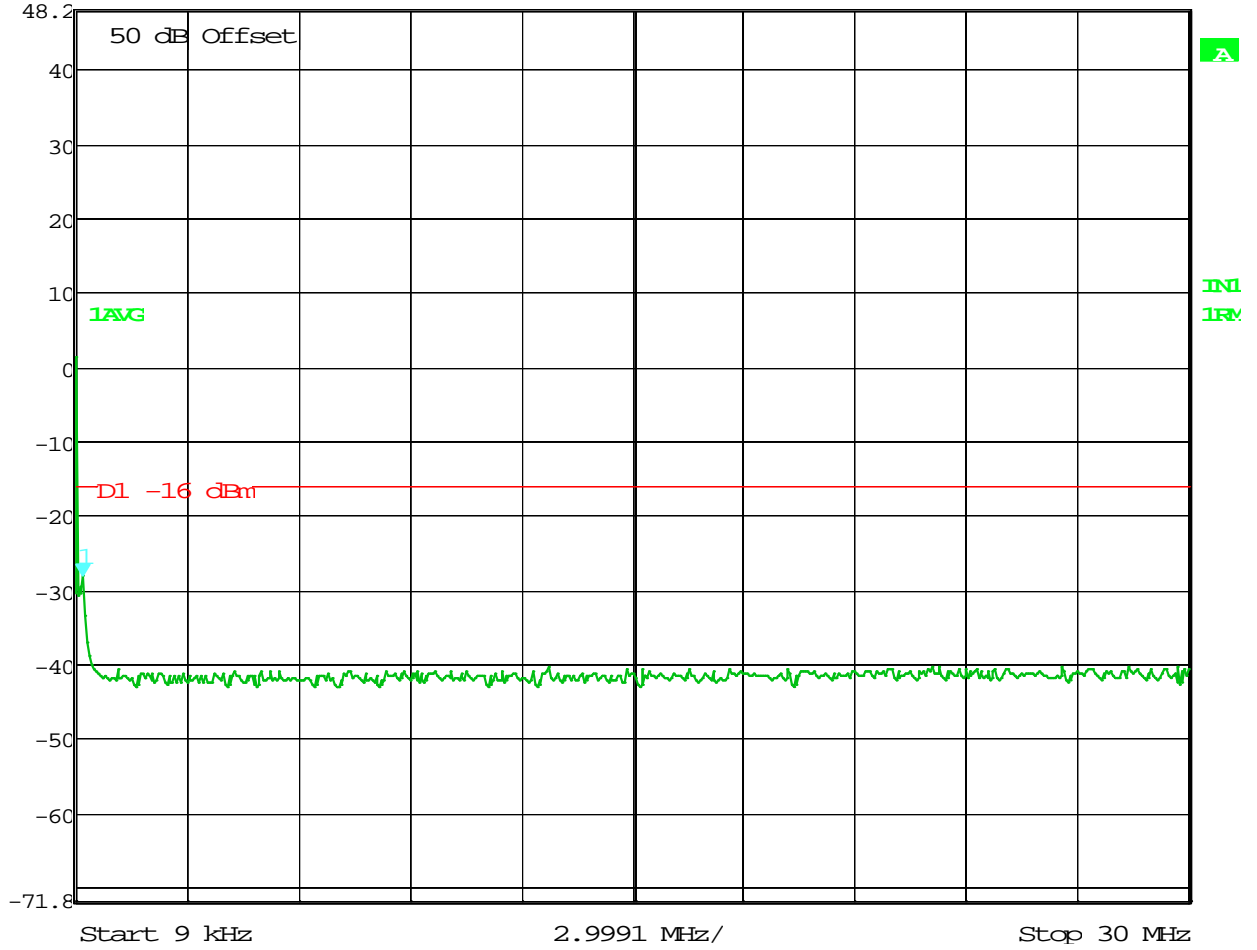
Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; TEST ENGINEER: SEG
Comment A: LTE TRDU BC12/17 700 MHz 2X60-7L -48V; Blk C; 740 -
745 MHz; PWR:60W; QPSK; FCC Prt 27.53; FCCID: AS5BBTRX-09
Date: 29.NOV.2012 13:44:06

**Transmit Port
Antenna Conducted Spurious Emissions**

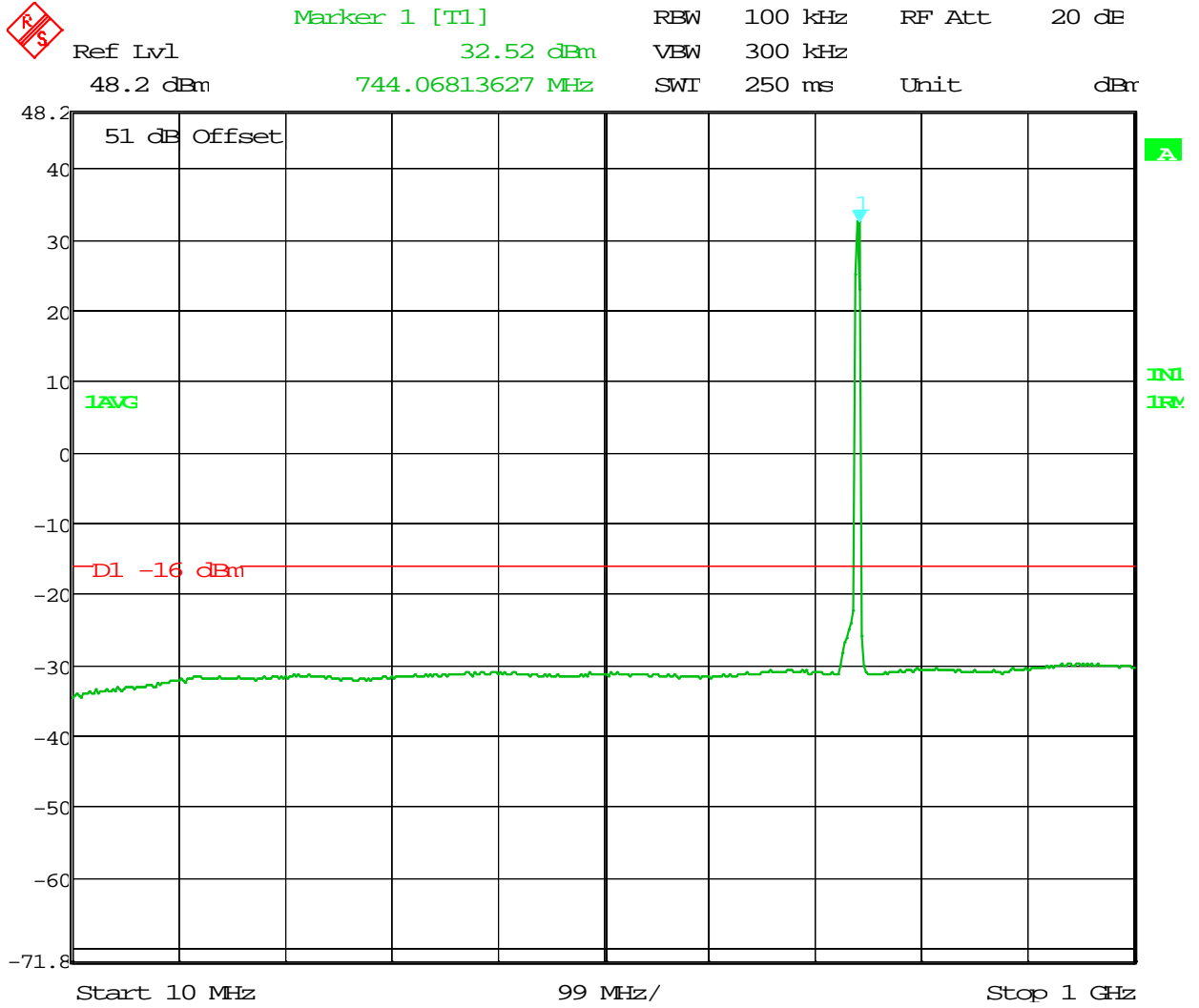
**Block: C
16QAM Modulation
Bandwidth 740 – 745 MHz**



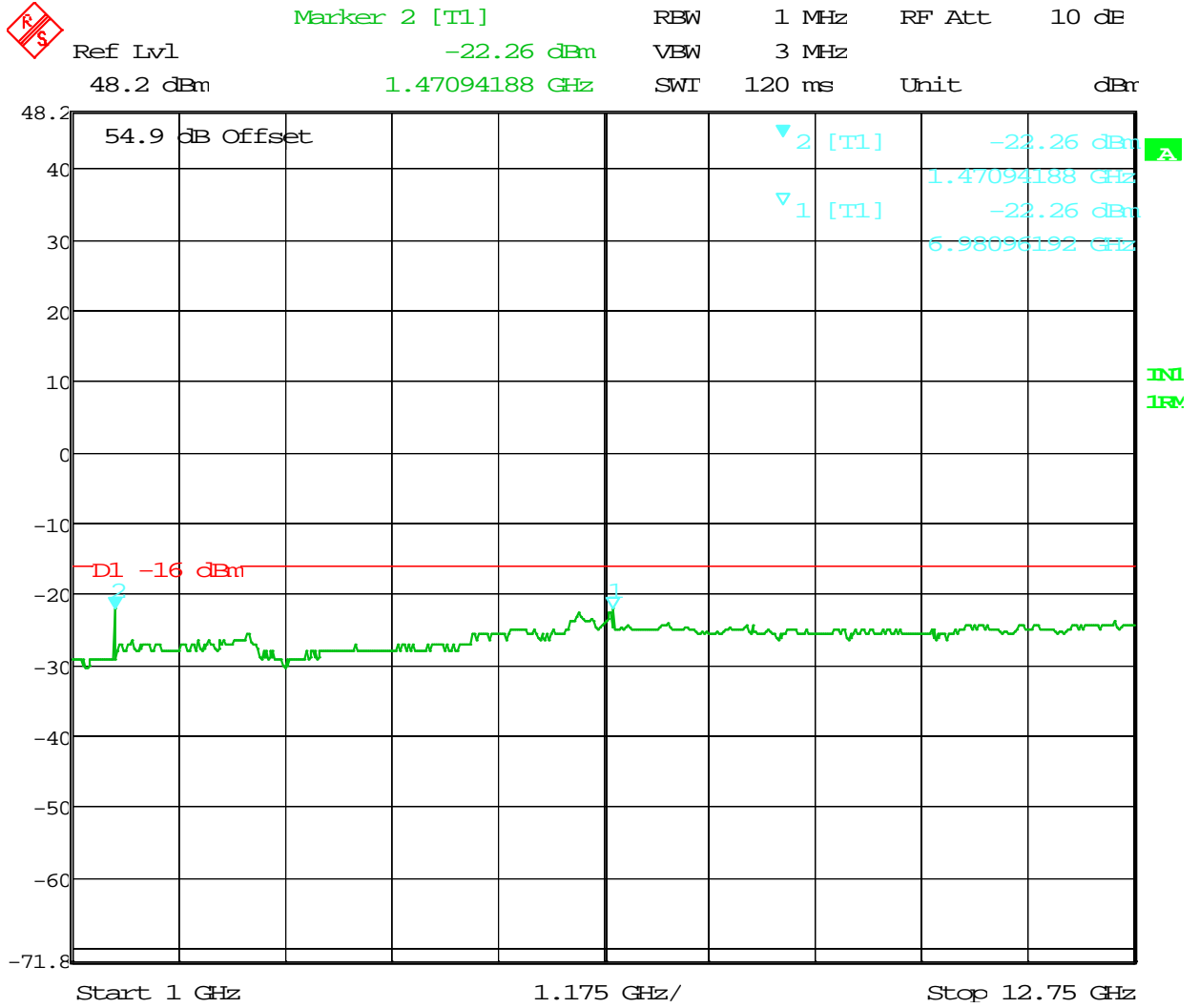
Marker 1 [T1] REW 10 kHz RF Att 30 dB
Ref Lvl -28.25 dBm VBW 30 kHz
48.2 dBm 189.30661323 kHz SWI 760 ms Unit dBm



Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; TEST ENGINEER: SEG
Comment A: LTE TRDU BC12/17 700 MHz 2X60-7L -48V; Blk C; 740 -
745 MHz; PWR:60W; 16QAM; FCC Prt 27.53; FCCID: AS5BBTRX-09
Date: 29.NOV.2012 14:10:59



Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; TEST ENGINEER: SEG
Comment A: LTE TRDU BC12/17 700 MHz 2X60-7L -48V; Blk C; 740 -
745 MHz; PWR:60W; 16QAM; FCC Prt 27.53; FCCID: AS5BBTRX-09
Date: 29.NOV.2012 14:09:55



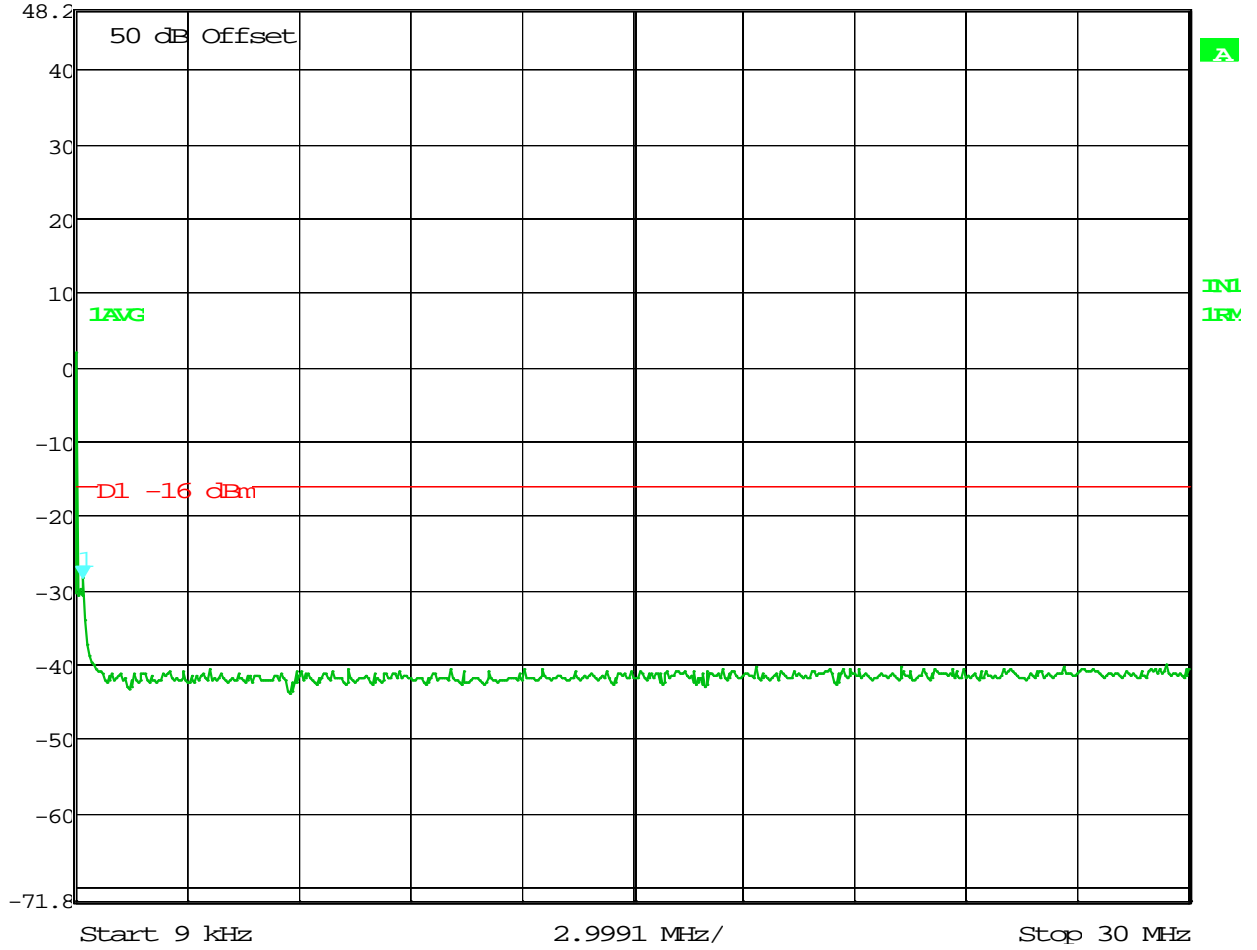
Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; TEST ENGINEER: SEG
Comment A: LTE TRDU BC12/17 700 MHz 2X60-7L -48V; Blk C; 740 -
745 MHz; PWR:60W; 16QAM; FCC Prt 27.53; FCCID: AS5BBTRX-09
Date: 29.NOV.2012 14:08:28

**Transmit Port
Antenna Conducted Spurious Emissions**

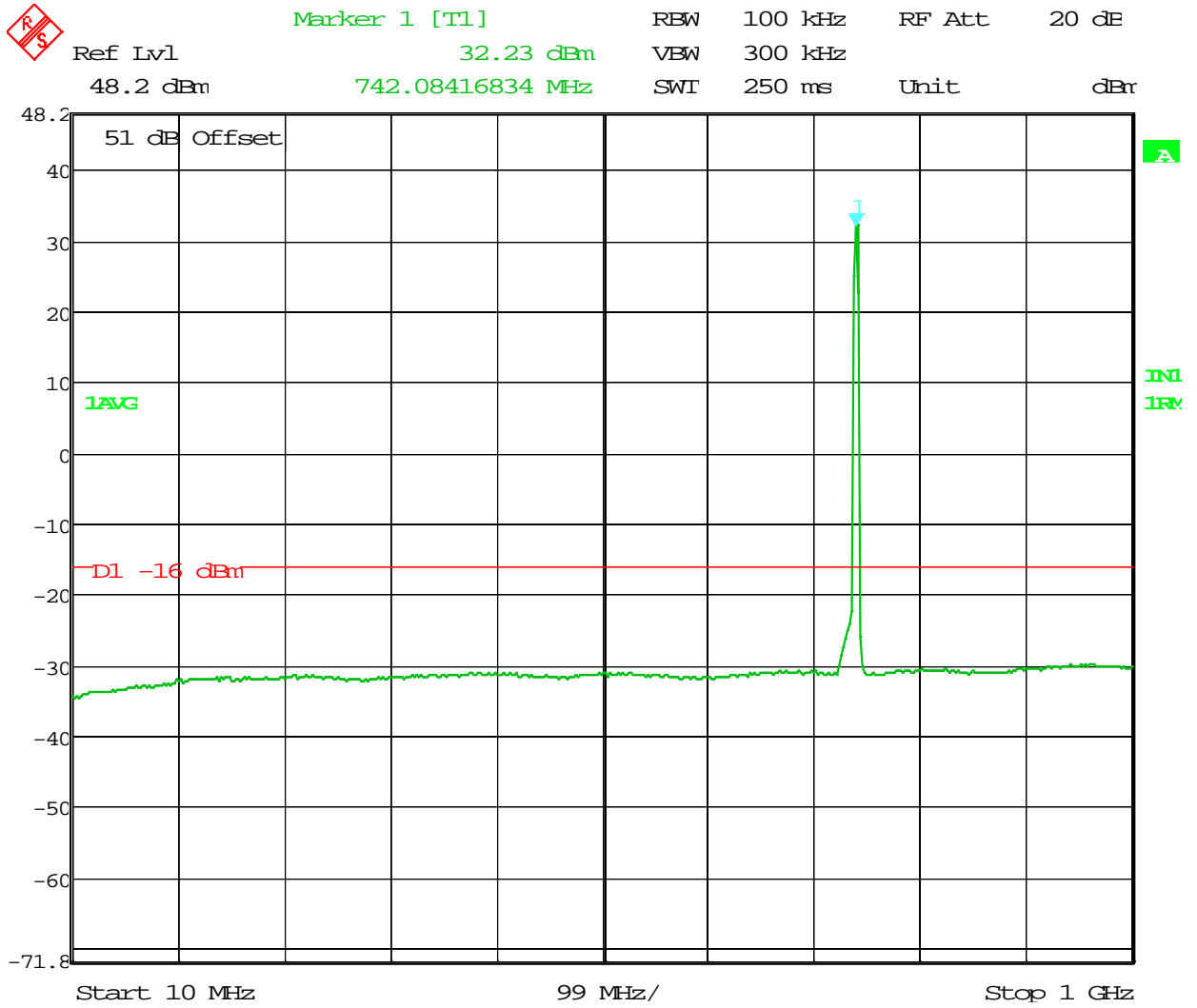
**Block: C
64QAM Modulation
Bandwidth 740 – 745 MHz**



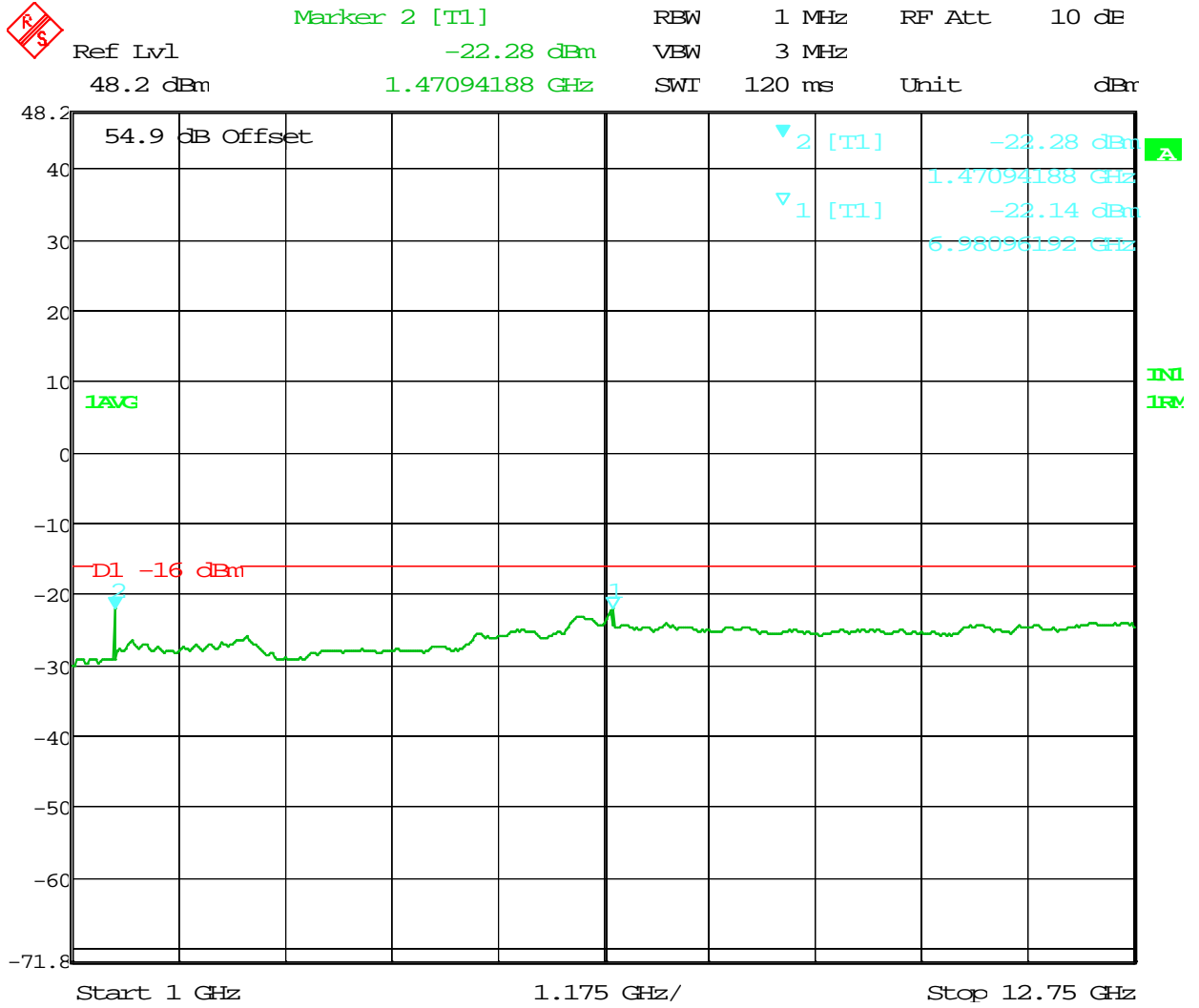
Marker 1 [T1] REW 10 kHz RF Att 30 dB
Ref Lvl -28.47 dBm VBW 30 kHz
48.2 dBm 189.30661323 kHz SWI 760 ms Unit dBm



Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; TEST ENGINEER: SEG
Comment A: LTE TRDU BC12/17 700 MHz 2X60-7L -48V; Blk C; 740 -
745 MHz; PWR:60W; 64QAM; FCC Prt 27.53; FCCID: AS5BBTRX-09
Date: 29.NOV.2012 14:41:36



Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; TEST ENGINEER: SEG
Comment A: LTE TRDU BC12/17 700 MHz 2X60-7L -48V; Blk C; 740 -
745 MHz; PWR:60W; 64QAM; FCC Prt 27.53; FCCID: AS5BBTRX-09
Date: 29.NOV.2012 14:40:18



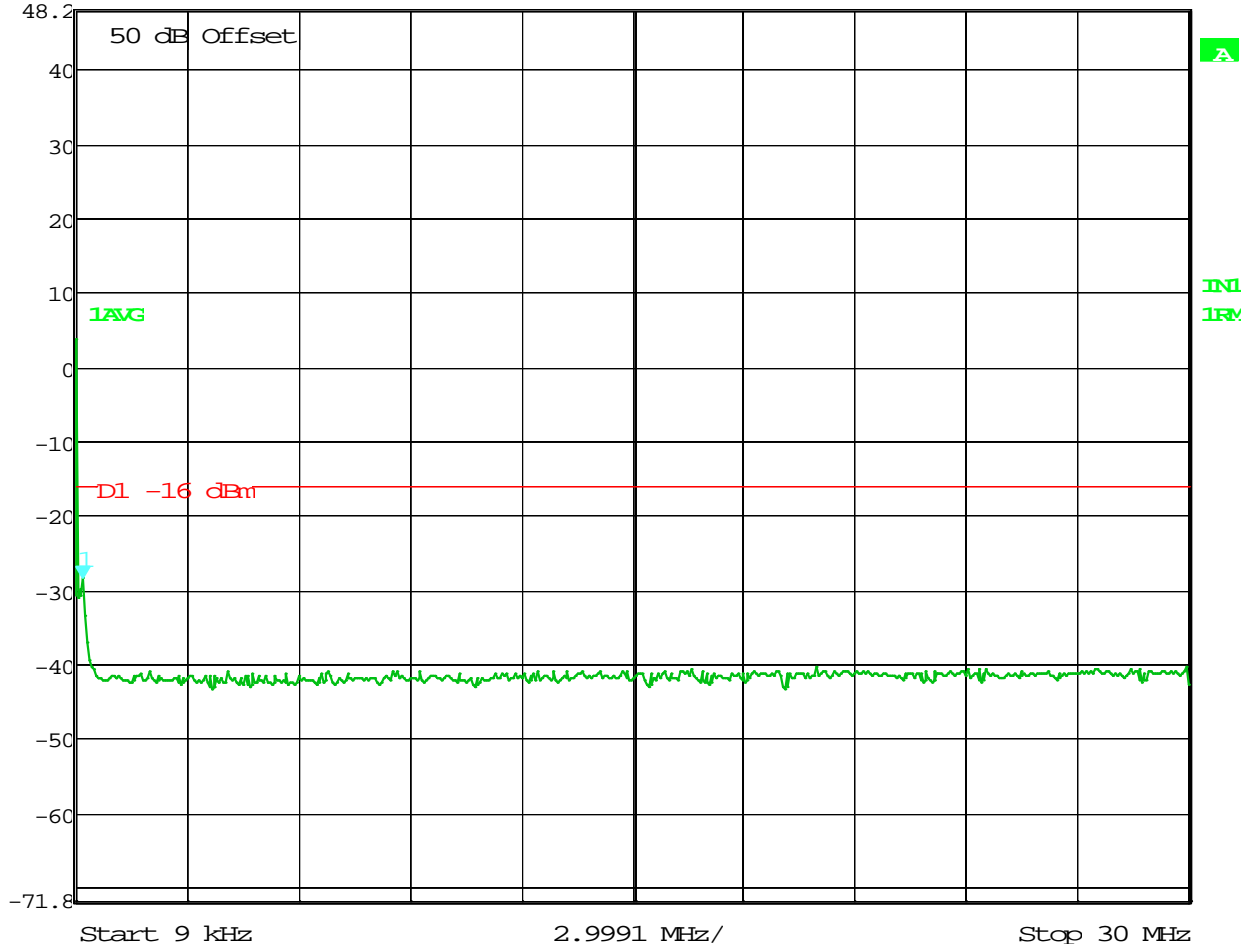
Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; TEST ENGINEER: SEG
Comment A: LTE TRDU BC12/17 700 MHz 2X60-7L -48V; Blk C; 740 -
745 MHz; PWR:60W; 64QAM; FCC Prt 27.53; FCCID: AS5BBTRX-09
Date: 29.NOV.2012 14:38:46

**Transmit Port
Antenna Conducted Spurious Emissions**

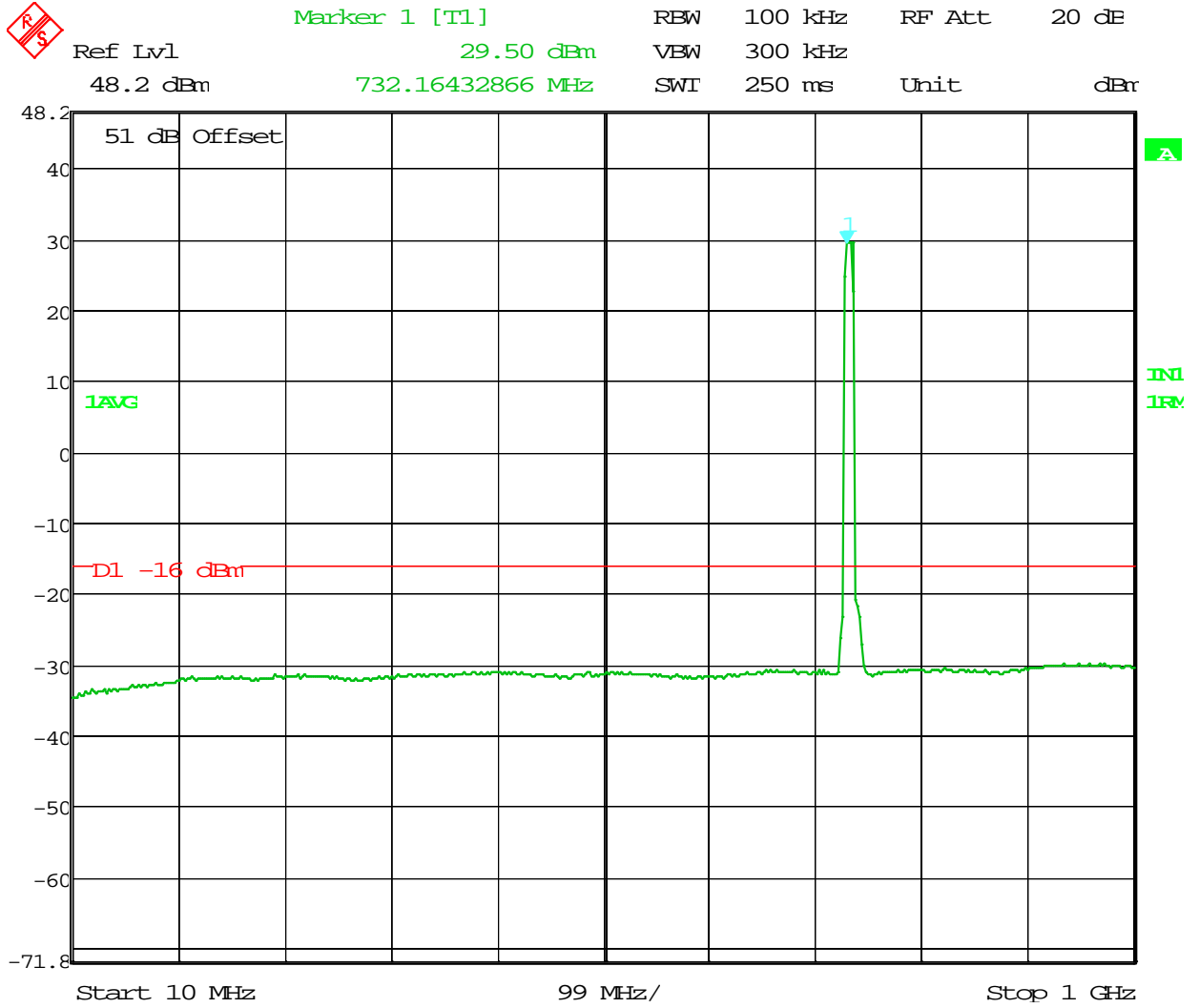
**Block: A+B
QPSK Modulation
Bandwidth 729.5 – 739.5 MHz**



Marker 1 [T1] REW 10 kHz RF Att 30 dB
Ref Lvl -28.43 dBm VBW 30 kHz
48.2 dBm 189.30661323 kHz SWI 760 ms Unit dBm



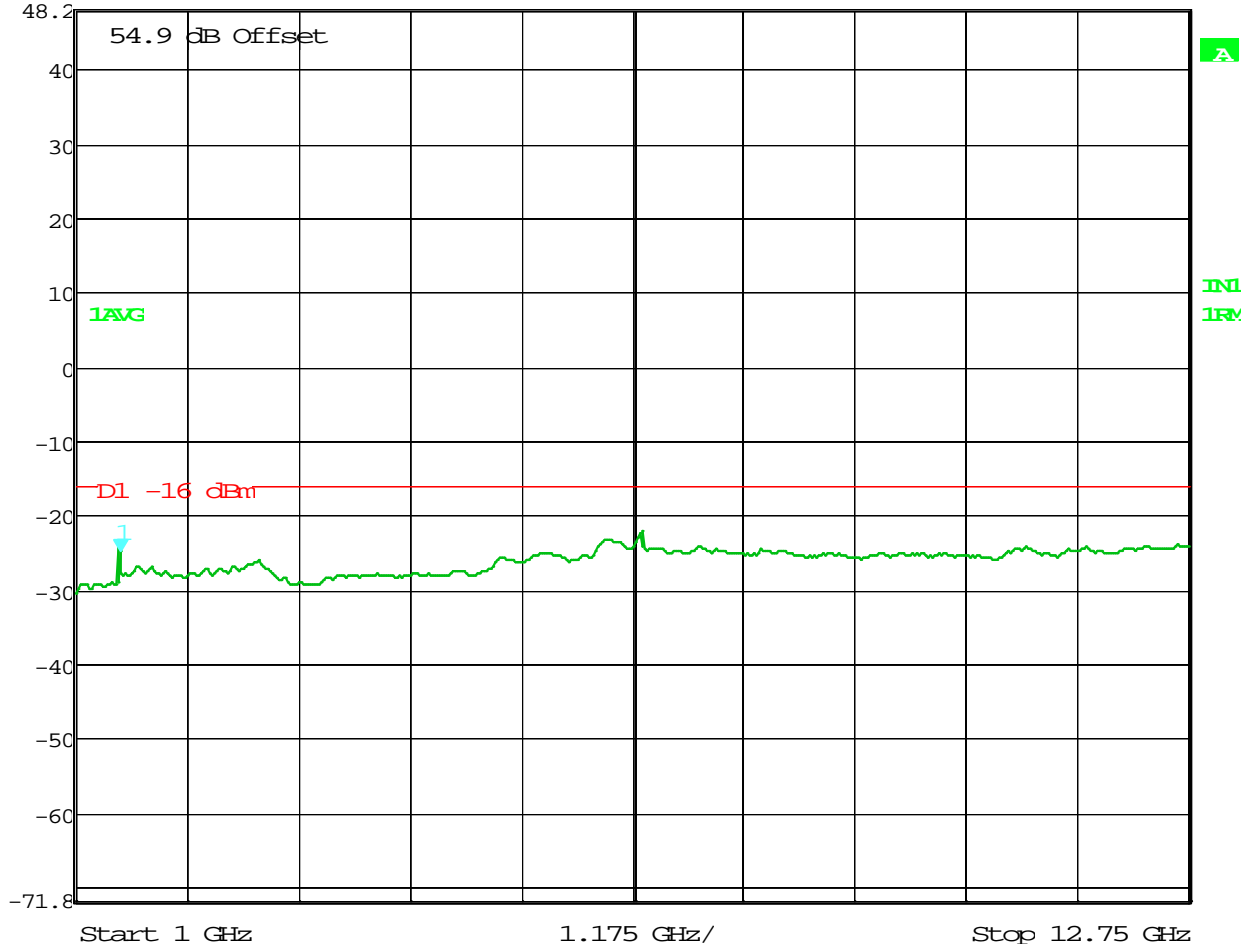
Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; TEST ENGINEER: SEG
Comment A: LTE TRDU BC12/17 700 MHz 2X60-7L -48V; Blk A+B; 729.5 -
739.5 MHz; PWR: 60W; QPSK; FCC Prt 27.53; FCCID: AS5BBTRX-09
Date: 27.NOV.2012 12:46:03



Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; TEST ENGINEER: SEG
Comment A: LTE TRDU BC12/17 700 MHz 2X60-7L -48V; Blk A+B; 729.5 -
739.5 MHz; PWR: 60W; QPSK; FCC Prt 27.53; FCCID: AS5BBTRX-09
Date: 27.NOV.2012 12:44:42



Marker 1 [T1] REW 1 MHz RF Att 10 dB
Ref Lvl -24.95 dBm VBW 3 MHz
48.2 dBm 1.46292585 GHz SWI 120 ms Unit dBm



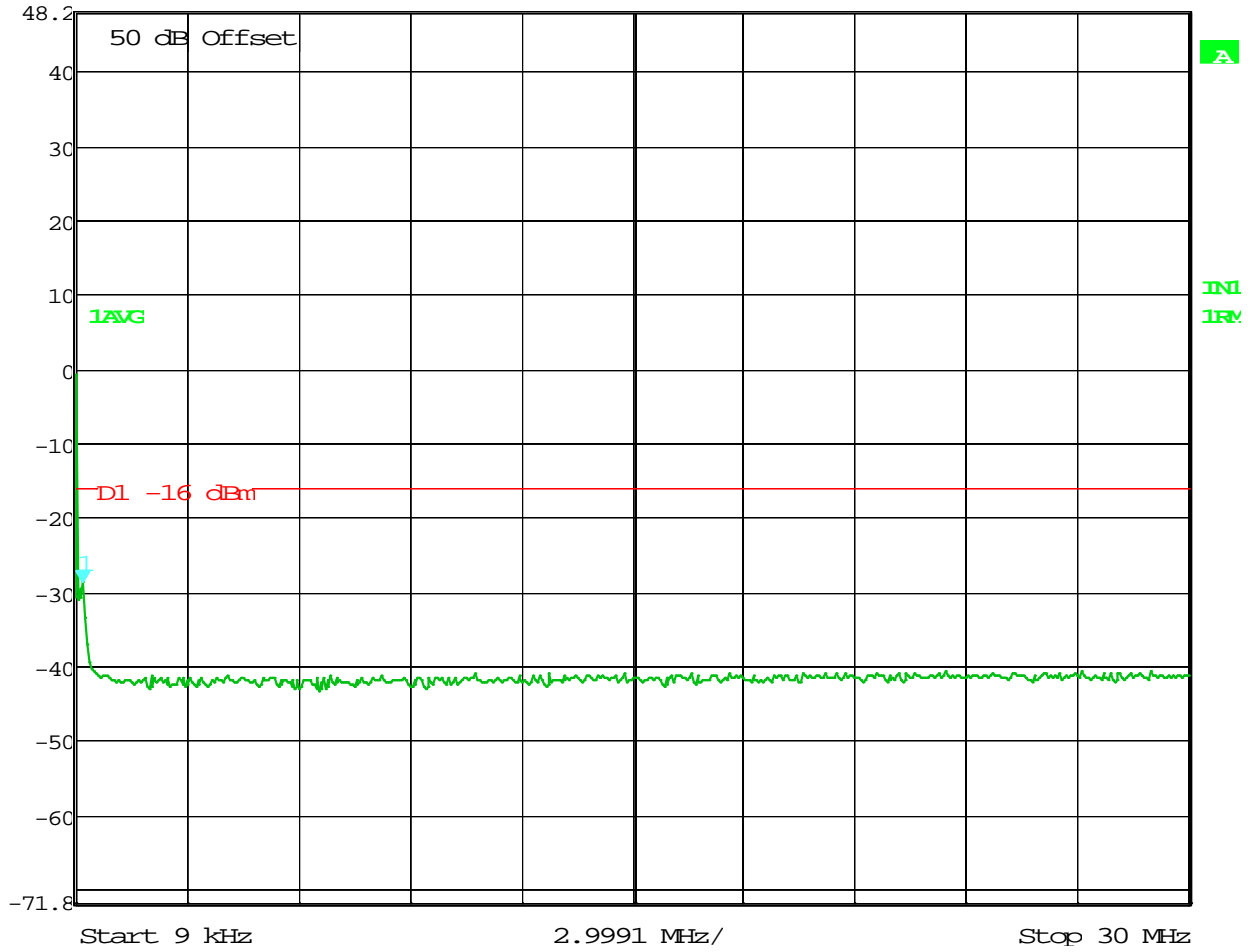
Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; TEST ENGINEER: SEG
Comment A: LTE TRDU BC12/17 700 MHz 2X60-7L -48V; Blk A+B; 729.5 -
739.5 MHz; PWR: 60W; QPSK; FCC Prt 27.53; FCCID: AS5BBTRX-09
Date: 27.NOV.2012 12:43:05

**Transmit Port
Antenna Conducted Spurious Emissions**

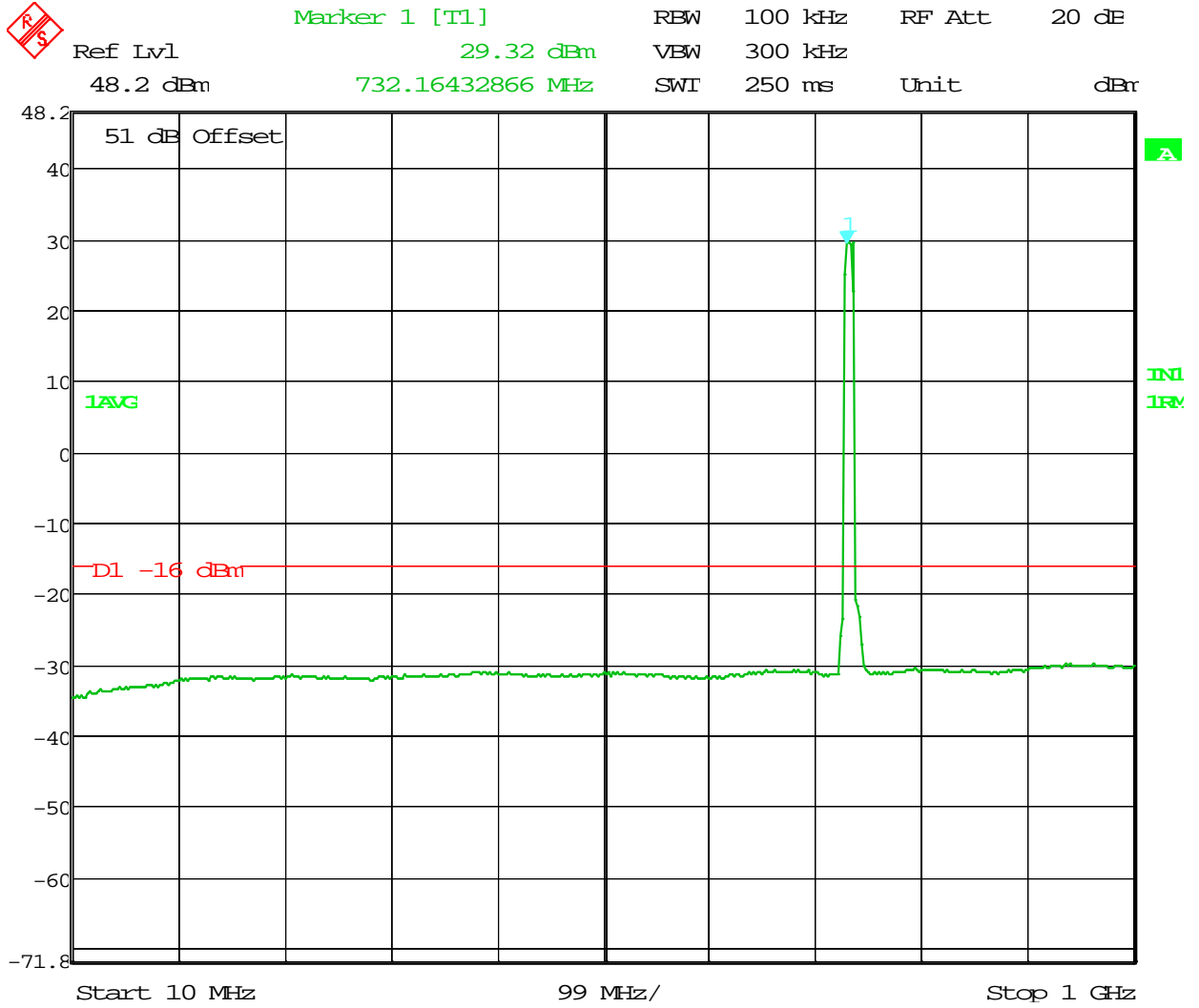
**Block: A+B
16QAM Modulation
Bandwidth 729.5 – 739.5 MHz**



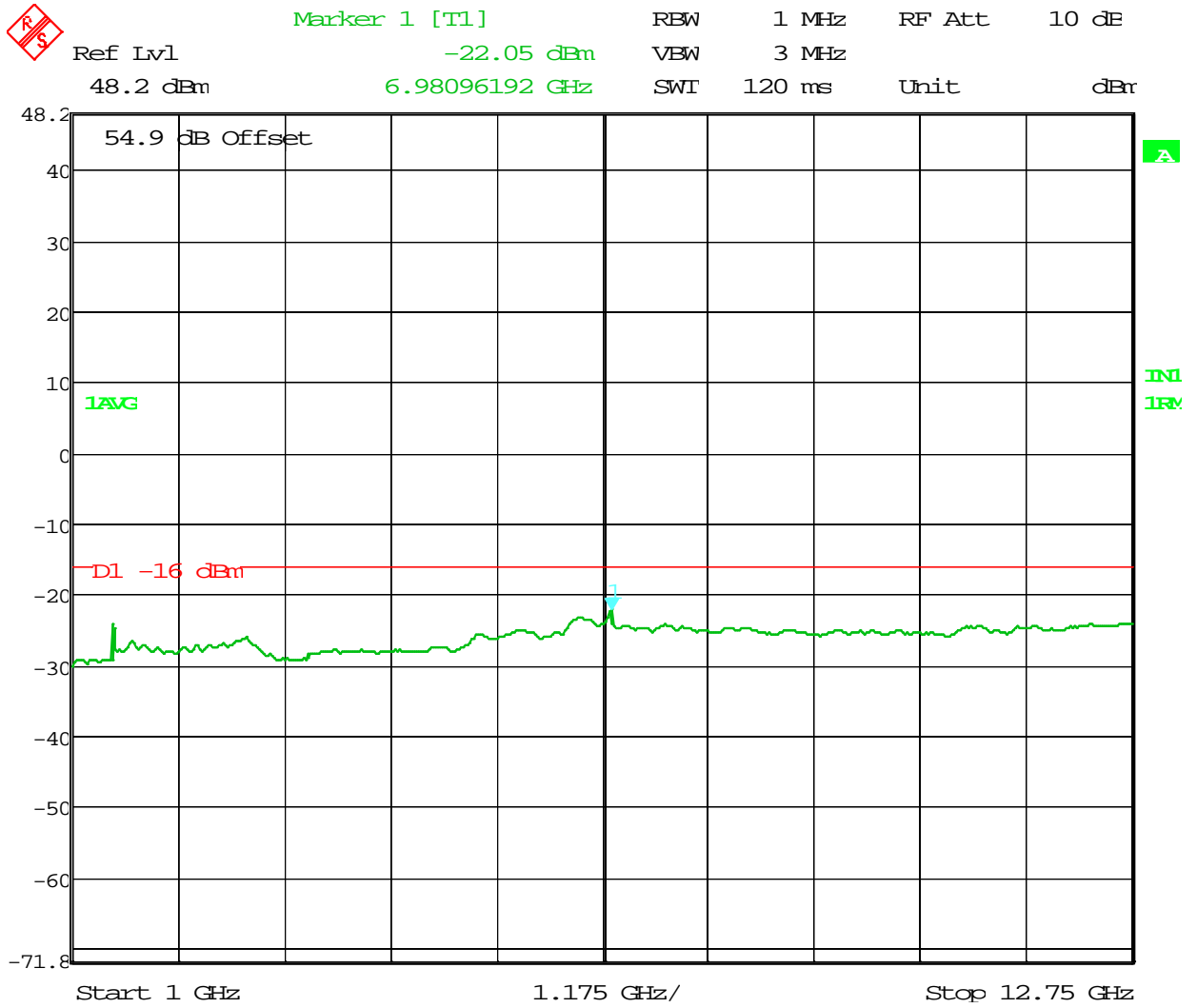
Marker 1 [T1] REW 10 kHz RF Att 30 dB
Ref Lvl -28.74 dBm VBW 30 kHz
48.2 dBm 189.30661323 kHz SWI 760 ms Unit dBm



Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; TEST ENGINEER: SEG
Comment A: LTE TRDU BC12/17 700 MHz 2X60-7L -48V; Blk A+B; 729.5 -
739.5 MHz; PWR:60W; 16QAM; FCC Prt 27.53; FCCID: AS5BBTRX-09
Date: 28.NOV.2012 07:51:25



Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; TEST ENGINEER: SEG
Comment A: LTE TRDU BC12/17 700 MHz 2X60-7L -48V; Blk A+B; 729.5 -
739.5 MHz; PWR:60W; 16QAM; FCC Prt 27.53; FCCID: AS5BBTRX-09
Date: 28.NOV.2012 07:53:12



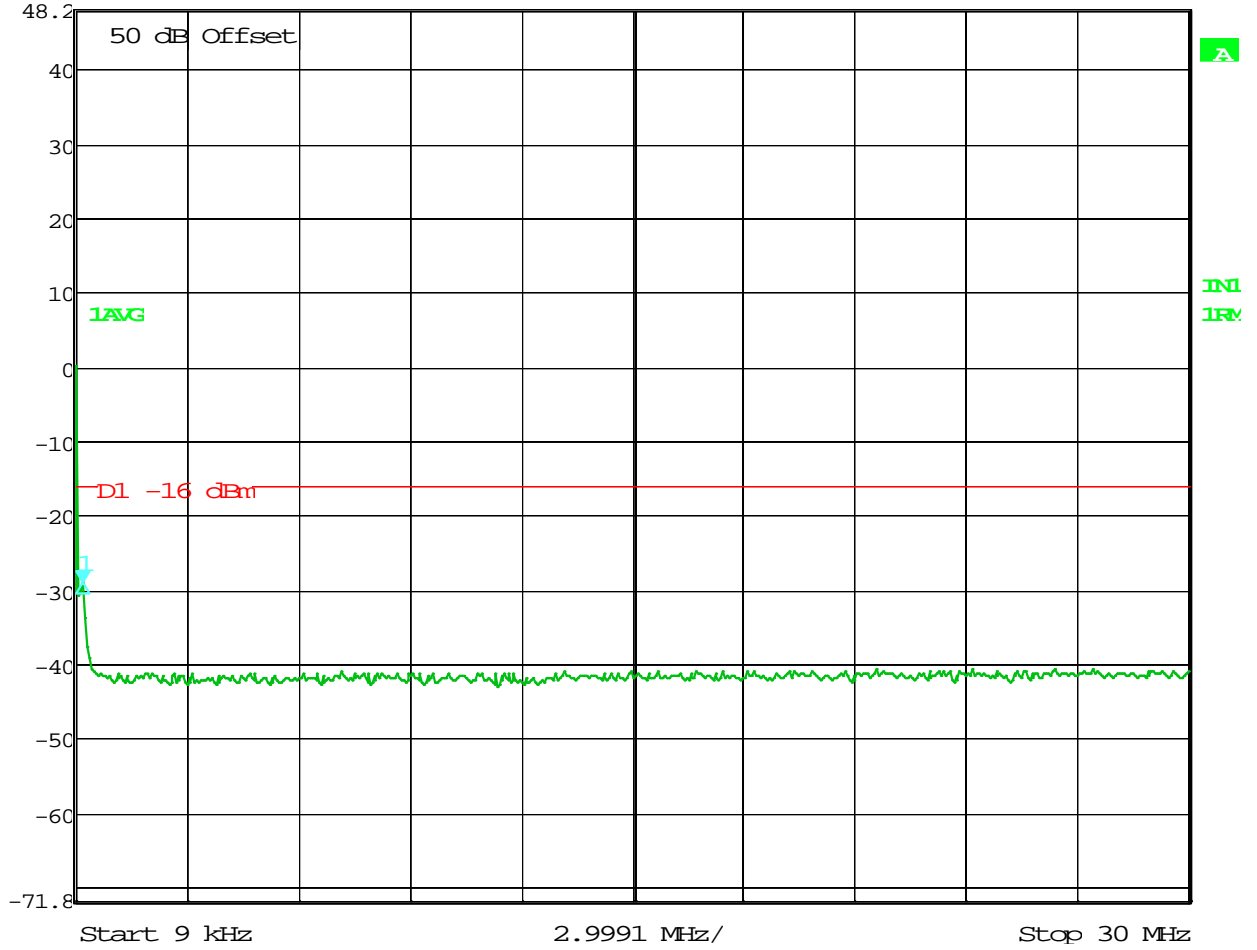
Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; TEST ENGINEER: SEG
Comment A: LTE TRDU BC12/17 700 MHz 2X60-7L -48V; Blk A+B; 729.5 -
739.5 MHz; PWR:60W; 16QAM; FCC Prt 27.53; FCCID: AS5BBTRX-09
Date: 28.NOV.2012 07:57:04

**Transmit Port
Antenna Conducted Spurious Emissions**

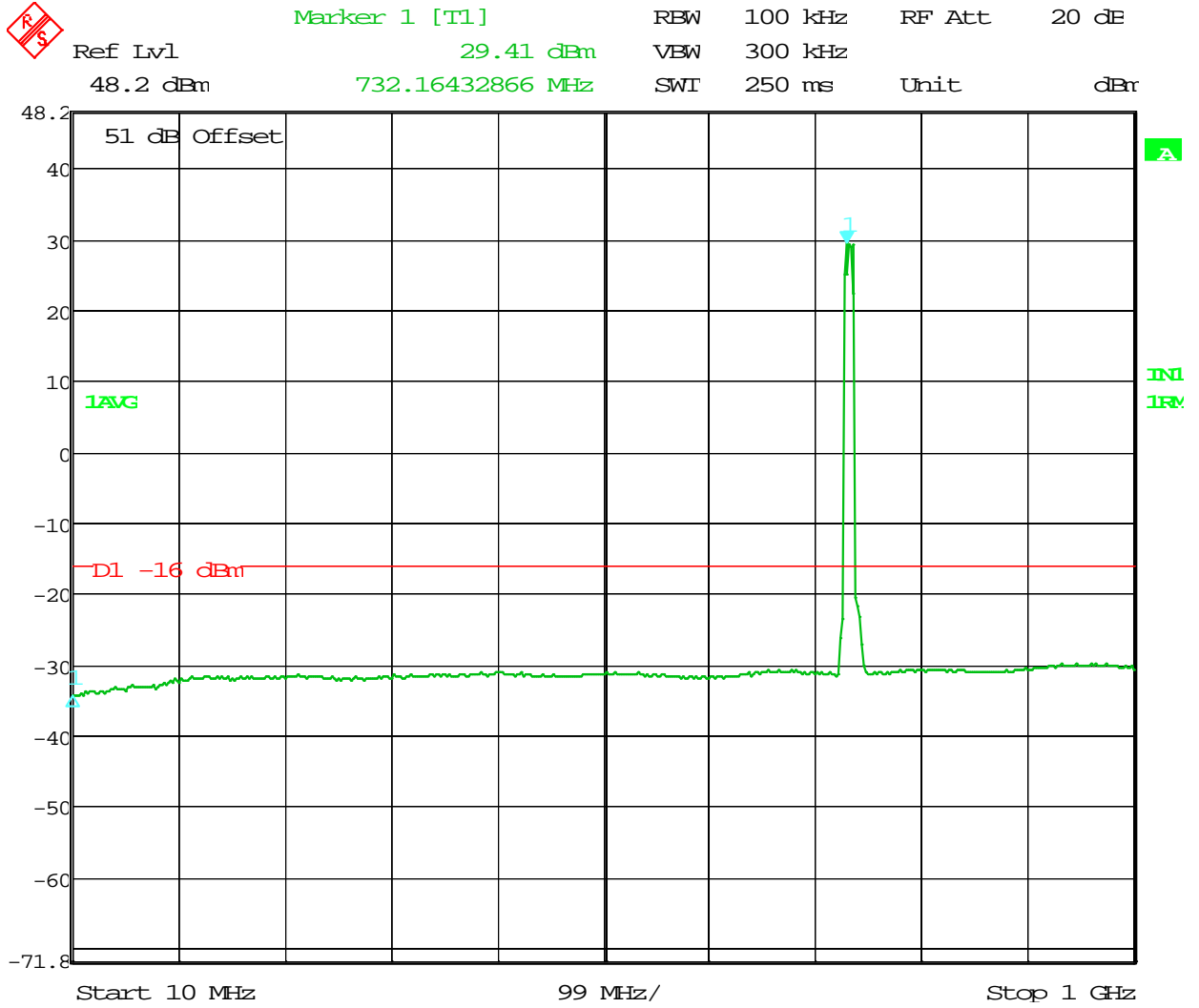
**Block: A+B
64QAM Modulation
Bandwidth 729.5 – 739.5 MHz**



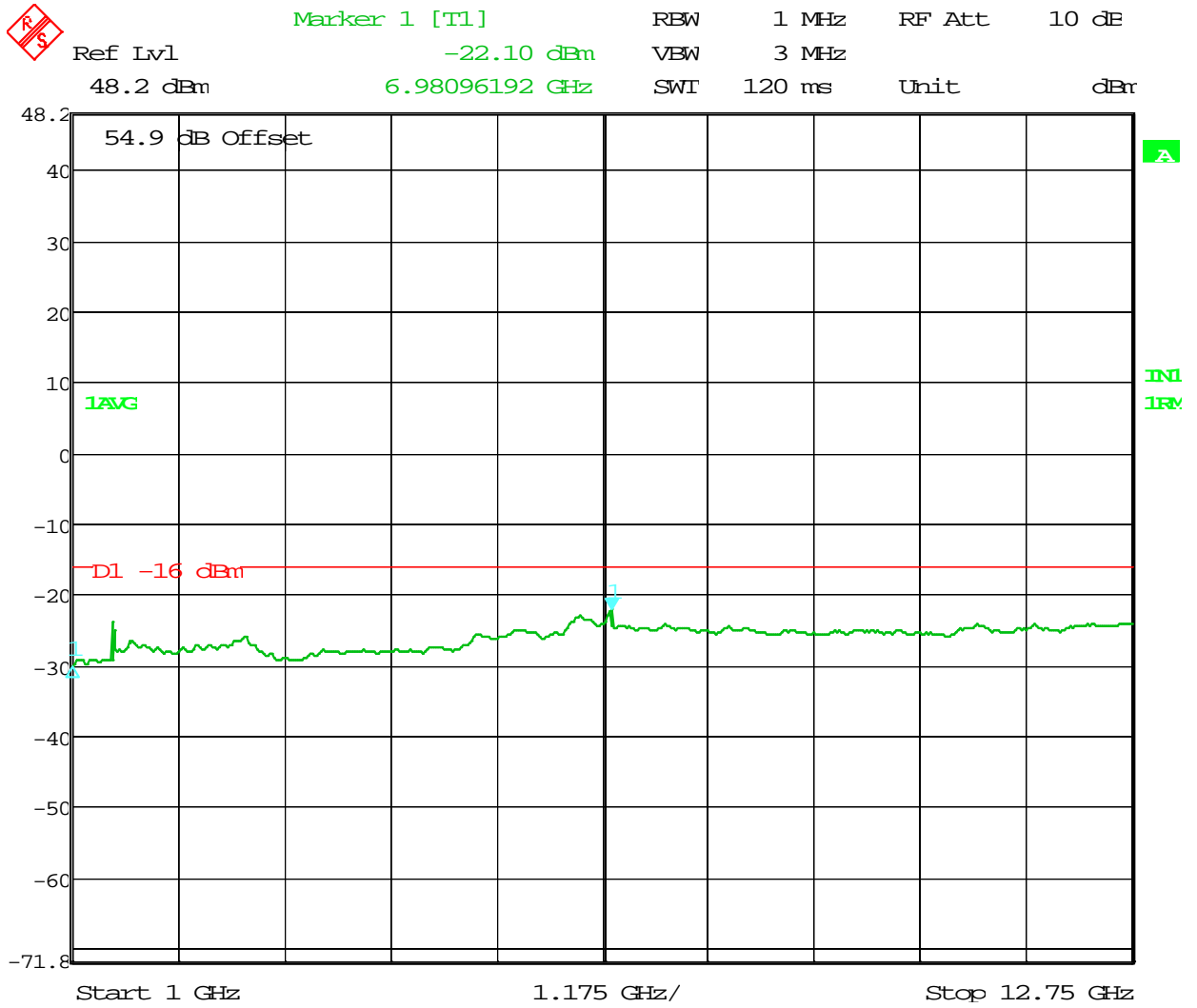
Marker 1 [T1] REW 10 kHz RF Att 30 dB
Ref Lvl -29.00 dBm VBW 30 kHz
48.2 dBm 189.30661323 kHz SWI 760 ms Unit dBm



Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; TEST ENGINEER: SEG/JY
Comment A: LTE TRDU BC12/17 700 MHz 2X60-7L -48V; Blk A+B; 729.5 -
739.5 MHz; PWR:60W; 64QAM; FCC Prt 27.53; FCCID: AS5BBTRX-09
Date: 28.NOV.2012 09:15:00



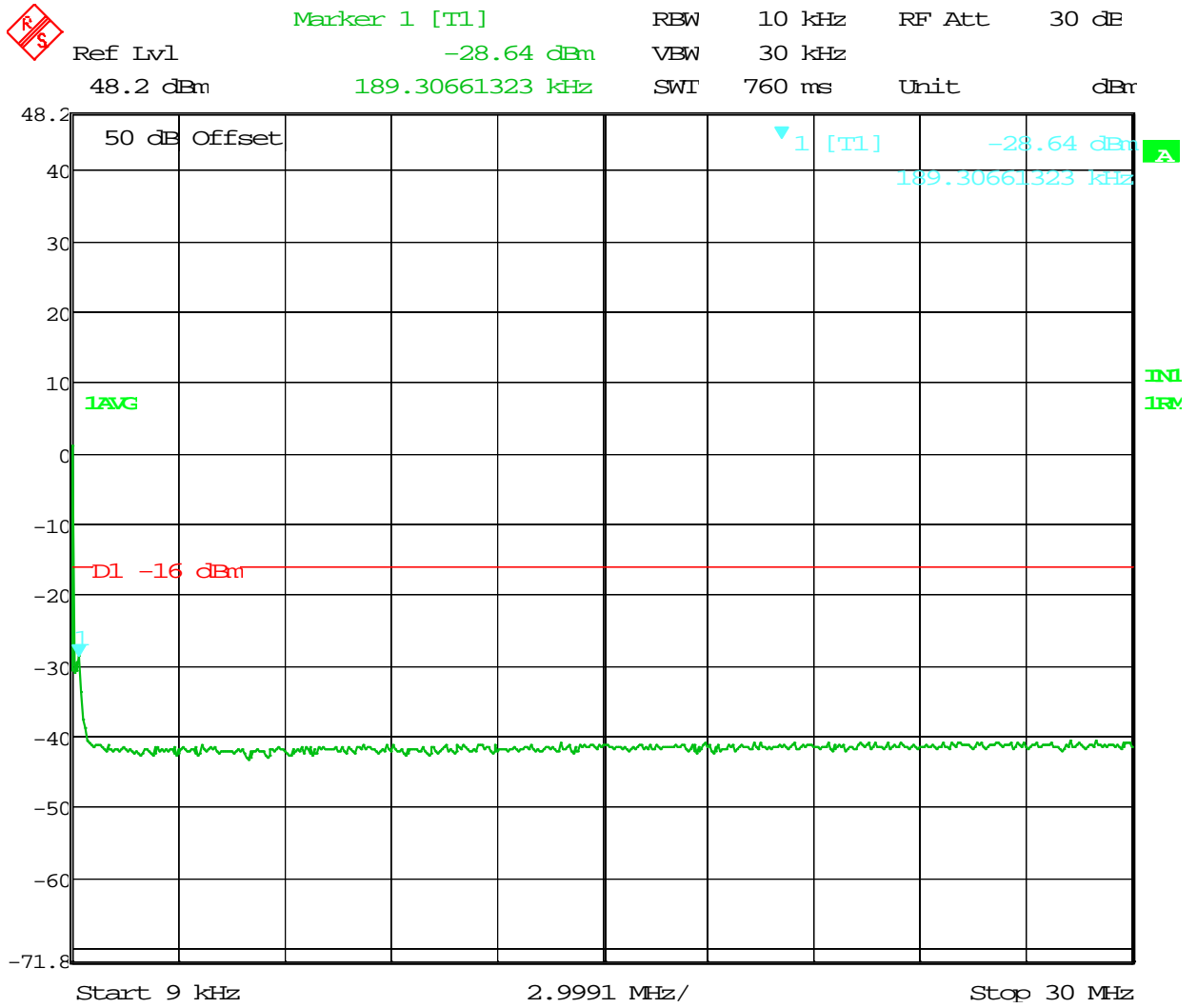
Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; TEST ENGINEER: SEG/JY
Comment A: LTE TRDU BC12/17 700 MHz 2X60-7L -48V; Blk A+B; 729.5 -
739.5 MHz; PWR:60W; 64QAM; FCC Prt 27.53; FCCID: AS5BBTRX-09
Date: 28.NOV.2012 09:16:54



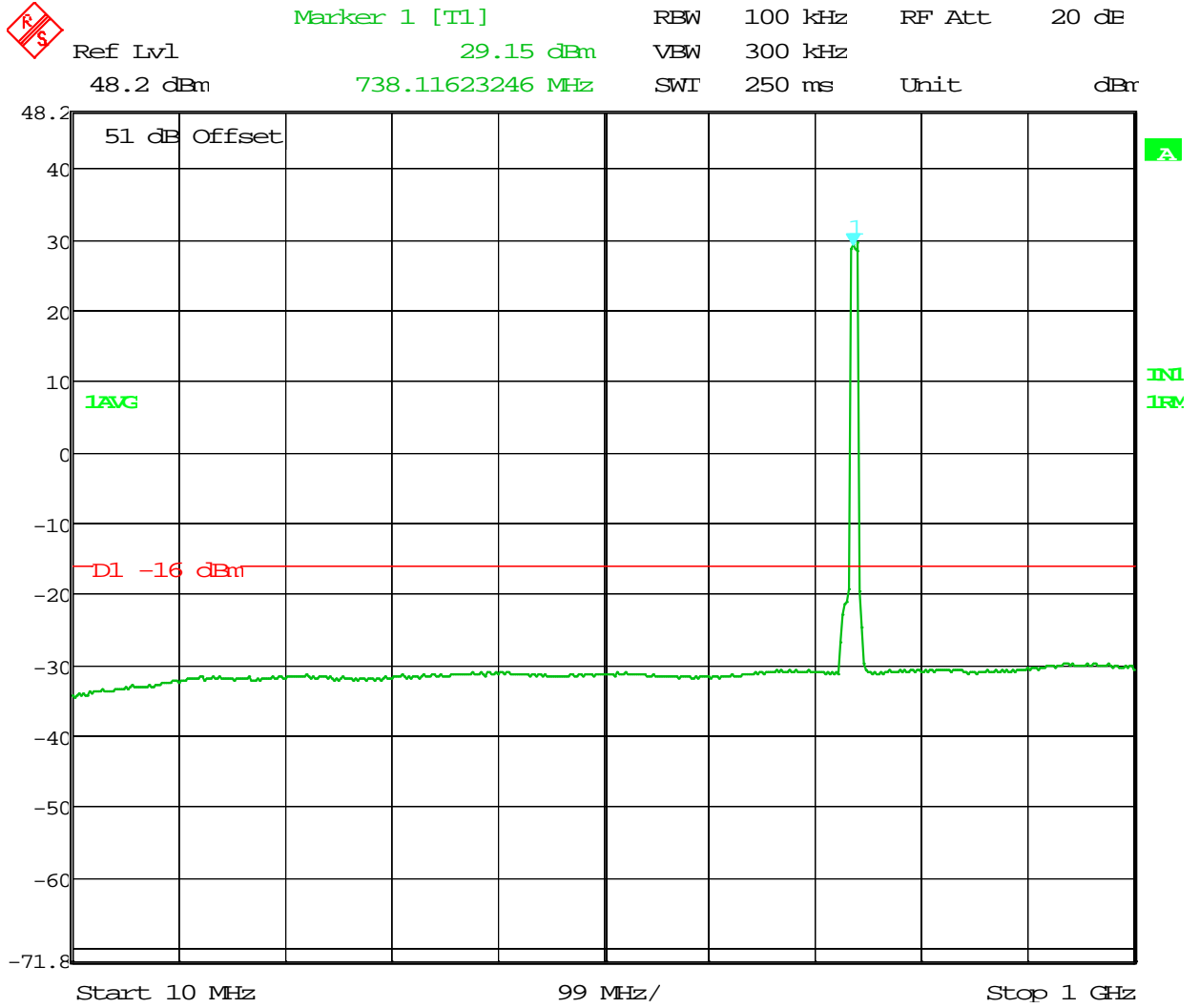
Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; TEST ENGINEER: SEG/JY
Comment A: LTE TRDU BC12/17 700 MHz 2X60-7L -48V; Blk A+B; 729.5 -
739.5 MHz; PWR:60W; 64QAM; FCC Prt 27.53; FCCID: AS5BBTRX-09
Date: 28.NOV.2012 09:19:16

**Transmit Port
Antenna Conducted Spurious Emissions**

**Block: B+C
QPSK Modulation
Bandwidth 734.5 – 744.5 MHz**



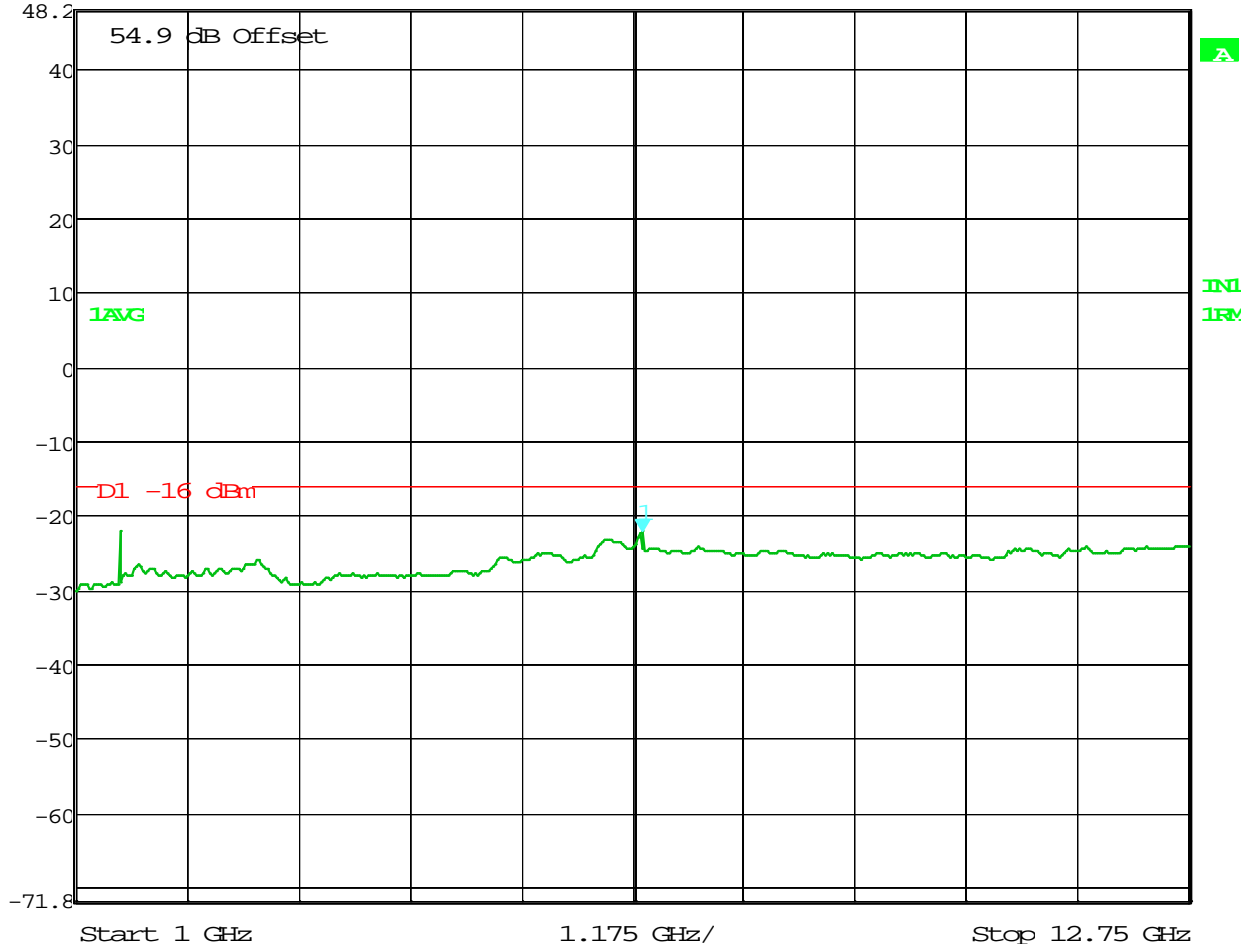
Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; TEST ENGINEER: SEG/JY
Comment A: LTE TRDU BC12/17 700 MHz 2X60-7L -48V; Blk B+C; 734.5 -
744.5 MHz; PWR:60W; QPSK; FCC Prt 27.53; FCCID: AS5BBTRX-09
Date: 28.NOV.2012 11:34:59



Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; TEST ENGINEER: SEG/JY
Comment A: LTE TRDU BC12/17 700 MHz 2X60-7L -48V; Blk B+C; 734.5 -
744.5 MHz; PWR:60W; QPSK; FCC Prt 27.53; FCCID: AS5BBTRX-09
Date: 28.NOV.2012 11:36:55



Marker 1 [T1] REW 1 MHz RF Att 10 dB
Ref Lvl -22.11 dBm VBW 3 MHz
48.2 dBm 6.98096192 GHz SWI 120 ms Unit dBm



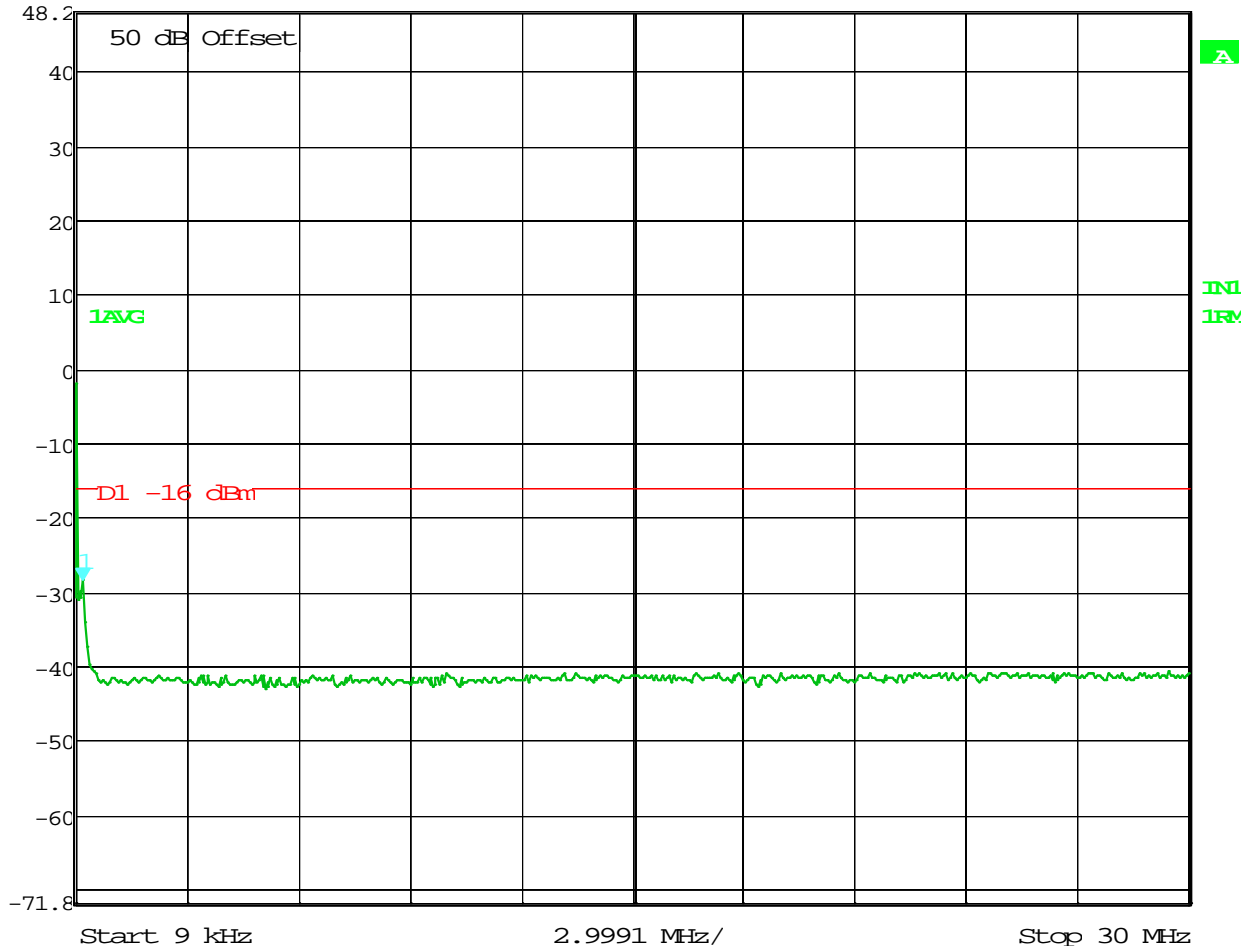
Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; TEST ENGINEER: SEG/JY
Comment A: LTE TRDU BC12/17 700 MHz 2X60-7L -48V; Blk B+C; 734.5 -
744.5 MHz; PWR:60W; QPSK; FCC Prt 27.53; FCCID: AS5BBTRX-09
Date: 28.NOV.2012 11:38:29

**Transmit Port
Antenna Conducted Spurious Emissions**

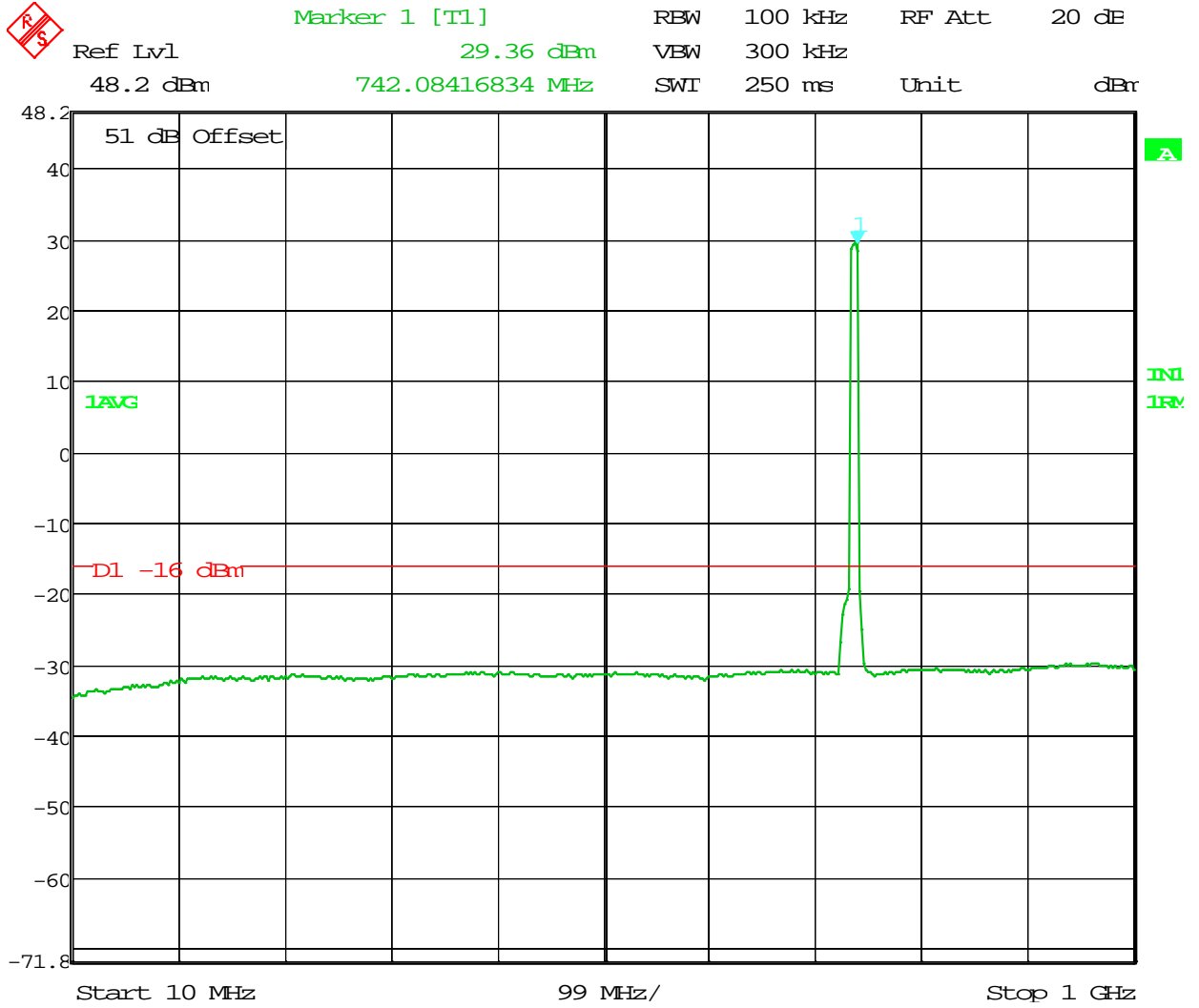
**Block: B+C
16QAM Modulation
Bandwidth 734.5 – 744.5 MHz**



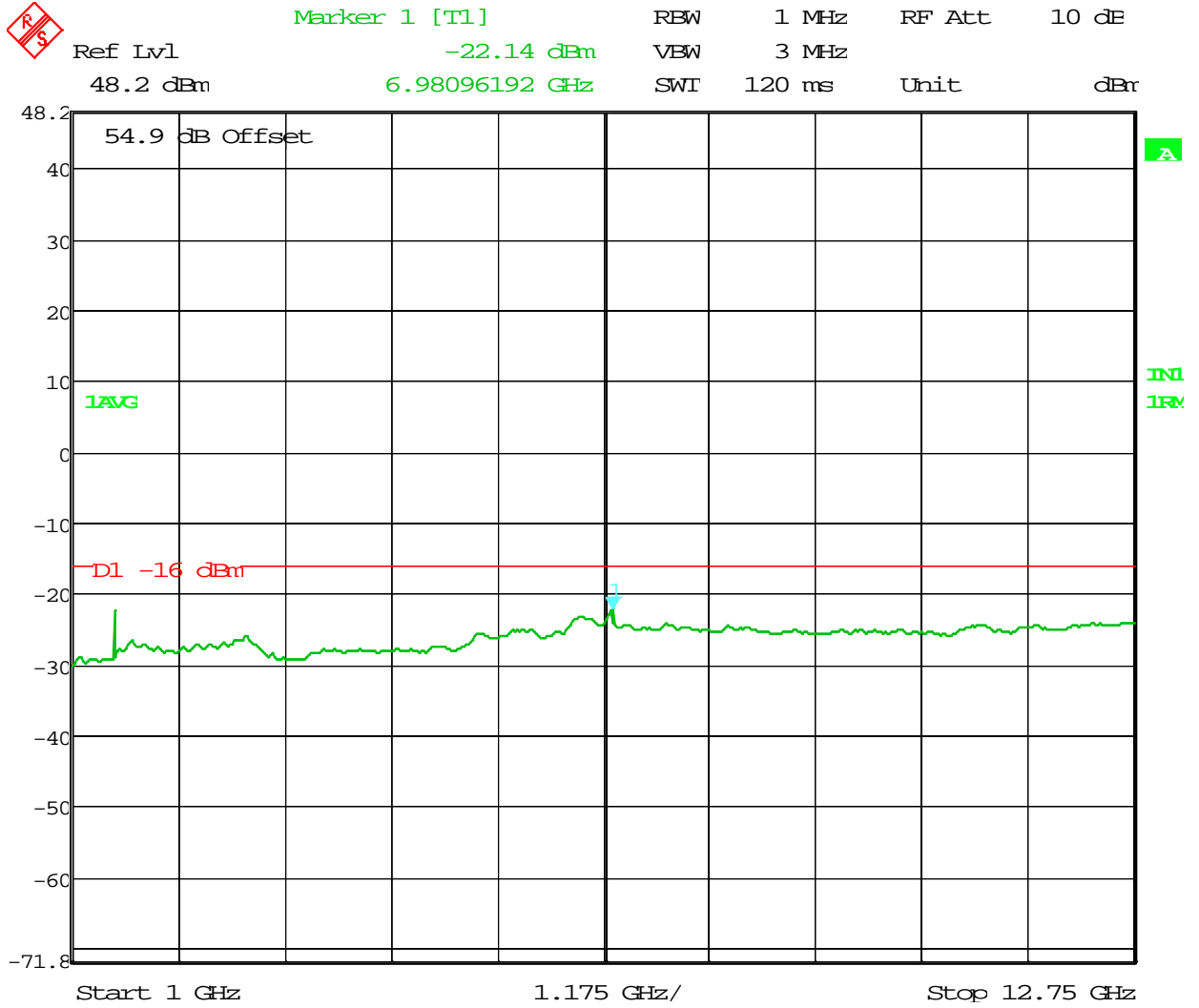
Marker 1 [T1] REW 10 kHz RF Att 30 dB
Ref Lvl -28.51 dBm VBW 30 kHz
48.2 dBm 189.30661323 kHz SWI 760 ms Unit dBm



Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; TEST ENGINEER: SEG
Comment A: LTE TRDU BC12/17 700 MHz 2X60-7L -48V; Blk B+C; 734.5 -
744.5 MHz; PWR:60W; 16QAM; FCC Prt 27.53; FCCID: AS5BBTRX-09
Date: 28.NOV.2012 13:38:54



Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; TEST ENGINEER: SEG
Comment A: LTE TRDU BC12/17 700 MHz 2X60-7L -48V; Blk B+C; 734.5 -
744.5 MHz; PWR:60W; 16QAM; FCC Prt 27.53; FCCID: AS5BBTRX-09
Date: 28.NOV.2012 13:33:22



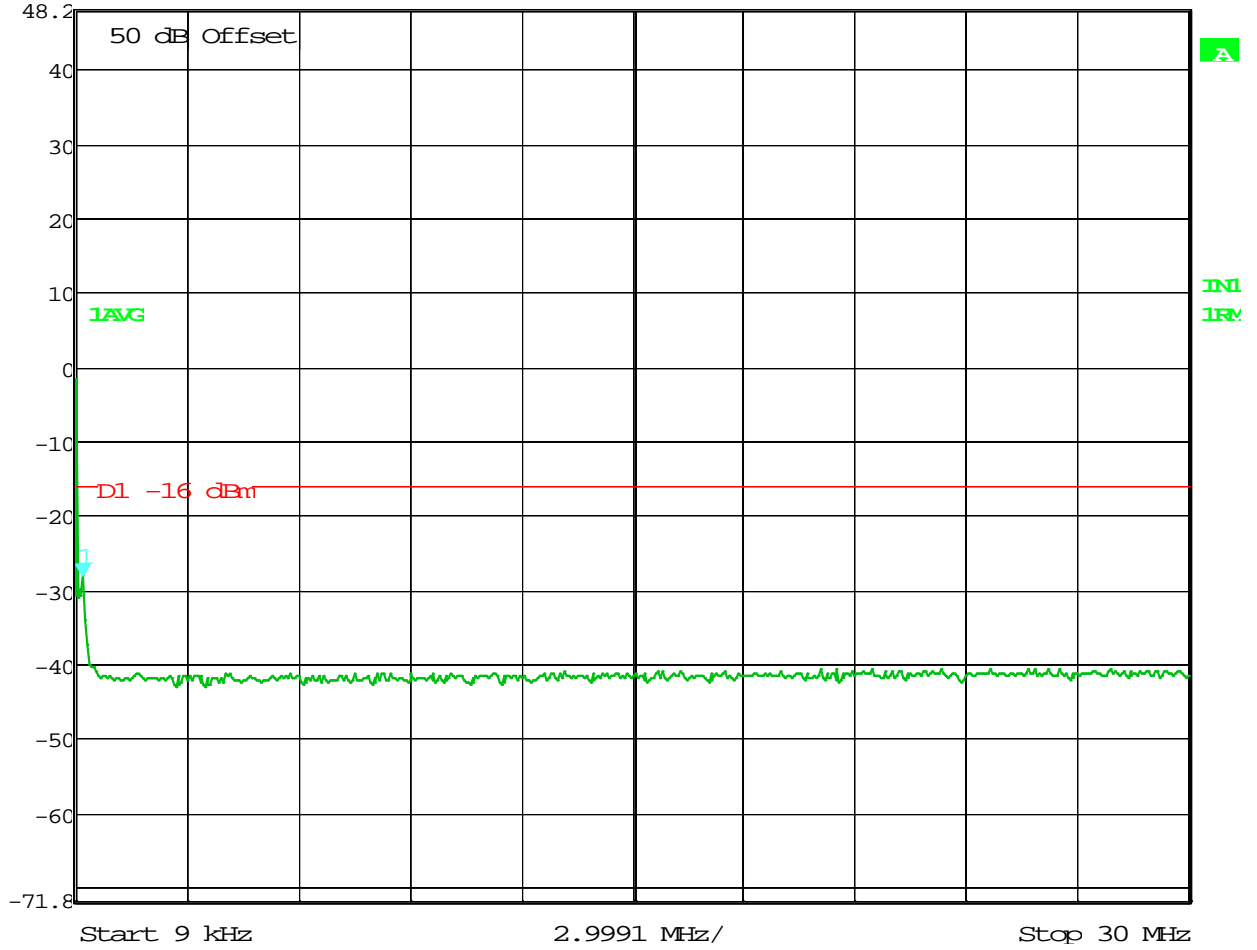
Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; TEST ENGINEER: SEG
Comment A: LTE TRDU BC12/17 700 MHz 2X60-7L -48V; Blk B+C; 734.5 -
744.5 MHz; PWR:60W; 16QAM; FCC Prt 27.53; FCCID: AS5BBTRX-09
Date: 28.NOV.2012 13:29:17

**Transmit Port
Antenna Conducted Spurious Emissions**

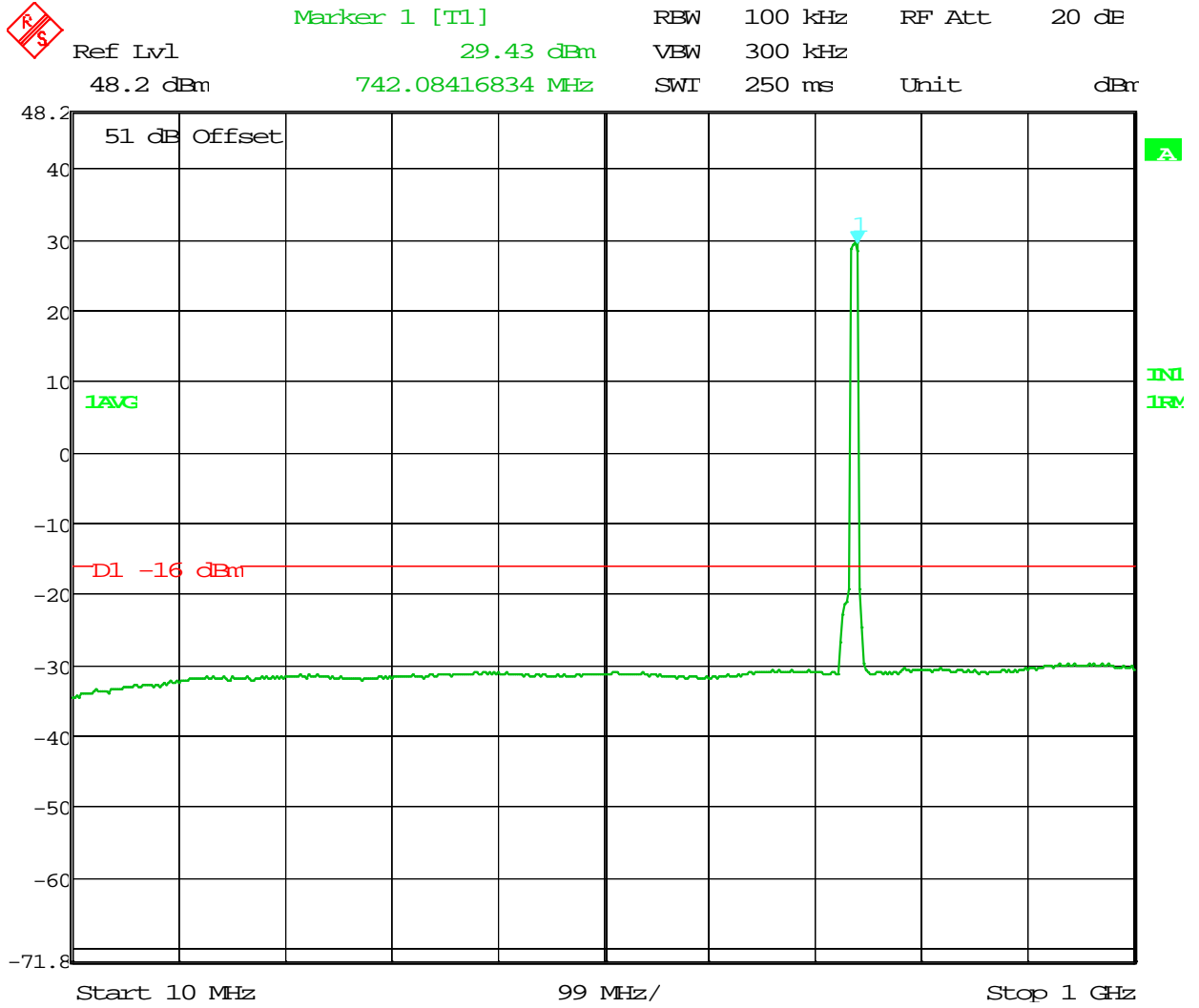
**Block: B+C
64QAM Modulation
Bandwidth 734.5 – 744.5 MHz**



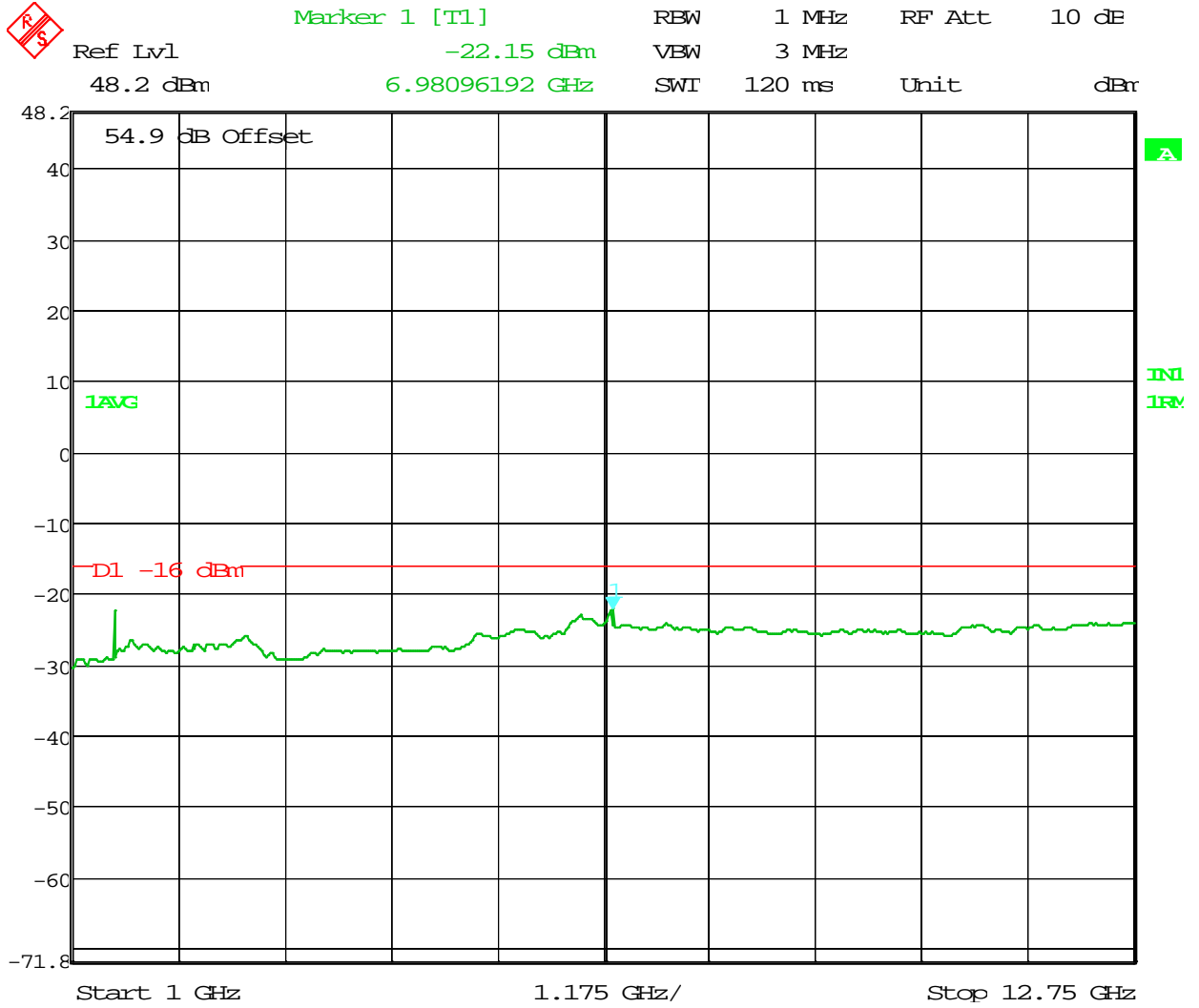
Marker 1 [T1] REW 10 kHz RF Att 30 dB
Ref Lvl 48.2 dBm -28.16 dBm VBW 30 kHz
189.30661323 kHz SWI 760 ms Unit dBm



Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; TEST ENGINEER: SEG
Comment A: LTE TRDU BC12/17 700 MHz 2X60-7L -48V; Blk B+C; 734.5 -
744.5 MHz; PWR:60W; 64QAM; FCC Prt 27.53; FCCID: AS5BBTRX-09
Date: 28.NOV.2012 14:32:35



Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; TEST ENGINEER: SEG
Comment A: LTE TRDU BC12/17 700 MHz 2X60-7L -48V; Blk B+C; 734.5 -
744.5 MHz; PWR:60W; 64QAM; FCC Prt 27.53; FCCID: AS5BBTRX-09
Date: 28.NOV.2012 14:30:42



Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; TEST ENGINEER: SEG
Comment A: LTE TRDU BC12/17 700 MHz 2X60-7L -48V; Blk B+C; 734.5 -
744.5 MHz; PWR:60W; 64QAM; FCC Prt 27.53; FCCID: AS5BBTRX-09
Date: 28.NOV.2012 14:28:56

TEST INSTRUMENTATION

Manufacturer	Model	Serial #	Description	Manual #	Last Cal Date	Cal Cycle Month
Rohde & Schwarz	ESIB40	100044	EMI Test Receiver (20Hz to 40 GHz)-150 +30dBm	E567	6/27/2012	14
Hewlett Packard	8481A	3318A90195	Power Sensor .10 MHz-18 GHz	E752	7/26/2012	12
Hewlett Packard	437B	3125U21135	RF Power Meter	E879	10/2/2012	12
Weinschel	66-20-34	BW7320	Attenuator 20dB 150W DC-18 GHz	E815	8/31/2011	15
Weinschel	48-30-33	AY8323	Attenuator DC - 18GHz 100 Watt	E961	N/A	N/A
Hewlett Packard	778D	18655	Dual Directional Coupler 0.1-2.0 GHz 20 dB	E1122	N/A	N/A
Agilent	N9020A	MY50510383	MXA Signal Analyzer 20Hz – 3.6GHz	N/A	4/7/11	24

Measurement -5

FIELD STRENGTH OF SPURIOUS RADIATION SECTION 2.1053 and 27.53 (g)

LTE TRDU 2x60-7L (BC12/17)**SECTION 2.1053****FIELD STRENGTH OF SPURIOUS RADIATION**

Field strength measurements of radiated spurious emissions were made at 3 m semi anechoic room of Global Product Compliance Laboratory of Alcatel-Lucent Murray Hill. A complete description and full measurement data for the site is on file with the Commission (FCC File 515091).

The “**LTE TRDU 2x60-7L (BC12/17)** with FCCID: AS5BBTRX-09” was tested at a RF output of **60 W at Antenna Interface Connector (AIC)**. These tests were performed in an indoor LTE 9412 cabinet with (3) **LTE TRDU 2x60-7L (BC12/17)** and three D2UV5 Base band units (BBU). Each TRDU is designed to provide (2) 60 Watts LTE Carriers. The interconnection between the TRDU and D2U was through optical fiber. The radiated emissions tests were performed serially with the TRDUs were operating with 5 MHz and 10 MHz bandwidths in the frequency blocks A, C, A+C and B+C. All tests were performed with the TRDU operating in QPSK, 16QAM and 64QAM modulations simultaneously. During testing, the TRDU AIC were terminated with 50 ohm load. The spectrum from 10 MHz to the 10th harmonic (8GHz) of the carrier was searched for spurious radiation. Measurements were made according to ANSI C63.4. All emissions more than 20 dB below the specification limit were considered not reportable (Section 2.1057(c)).

All emissions more than 20 dB below the specification limit were considered not reportable (Section 2.1057(c)).

The calculated emission levels were found by:

$$\text{Measured level (dB}\mu\text{V)} + \text{Cable Loss (dB)} + \text{Antenna Factor (dB)} = \text{Field Strength (dB}\mu\text{V/m)}$$

Section 27.53 and 2.1053 contains the requirements for the levels of spurious radiation as a function of frequency.

FCC Section 27.53(g): Based on measurement instrument employing resolution bandwidth of 100 kHz bands or greater out band shall be attenuated at least $43+10\log(P)$ dB or -13dBm. Pursuant to FCC OET RULES 662911 D01 and D02 for two antenna MIMO mode of operations, the FCC limit of -13dBm shall be 3dB more stringent, therefore all channel edge and out of band spurious emissions shall be -16dBm.

The reference level for the un-modulated carriers is calculated as the field produced by an ideal isotropic antenna excited by the transmitter output power according to the following relation taken from Reference Data for Radio Engineers, Page 27-7 6th edition, IT&T Corp

$$E = [(30 * P)^{1/2}] / R$$

$$20 \log(E * 106) - (46 + 10 \log P) = 79.2 \text{ dB } \mu\text{V/meter}$$

E = Field Intensity in Volts/meter

P = Transmitted Power in Watts

R = Distance from the ideal isotropic antenna in meters = 3 m

RESULTS:

For this particular test, the field strength of any spurious radiation is required to be less than 79.2 dB μ V/meter. Reportable measurements are equal to or greater than 59.2 dB μ V/meter. Over the spectrum investigated, 10 MHz to 10th of the carrier (8 GHz), no reportable spurious emissions were detected. This demonstrates that the “**LTE TRDU 2x60-7L (BC12/17)**” the subject of this application, complies with Sections 2.1053, 27.53 (g) and 2.1057 of the Rules.

TEST INSTRUMENTATION

Manufacturer	Model#	Description	Serial#	Last Cal	Next Cal
A.H. Systems	SAS-521-2	Biological Antenna 25 - 2000 MHz	410/E602	10/1/2012	10/1/2014
Weinschel	2-6	6 dB Attenuator DC-18GHz 5 Watt	BX3438	1/23/2012	1/23/2013
Hewlett Packard	8593E	Spectrum Analyzer 9 KHz- 22 GHz	3911A04009	9/22/2011	12/22/2012
Hewlett Packard	8447D	RF Amplifier 0.1-1300 MHz	2944A09820	9/10/2012	9/10/2013
EMCO	3115	Double Ridged Horn 1-18 Ghz	9903-5769	1/17/2012	1/17/2013
Hewlett Packard	8449B	Preamplifier 1-26.5 GHz	3008A01270	9/10/2012	9/10/2013
Rohde & Schwarz	ESIB40	EMI Test Receiver (20Hz to 40 GHz) -150 +30dBm	100100	3/28/2012	3/28/2013

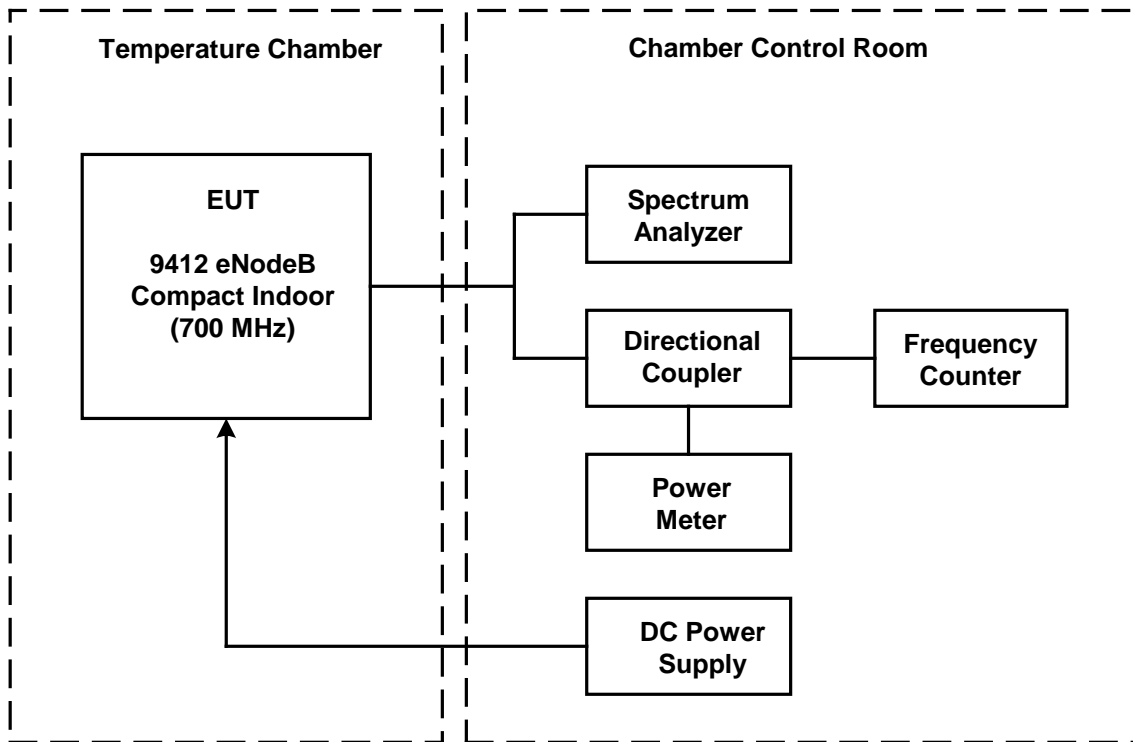
Measurement -6

MEASUREMENT OF FREQUENCY STABILITY

MEASUREMENT OF FREQUENCY STABILITY

The frequency stabilization and accuracy of the LTE signals modulated and amplified by the **LTE TRDU 2x60-7L (BC12/17)** is a function of the input signal which is derived from GPS signals. The system provide for automatic timing synchronization upon reacquisition of GPS lock.

The 9412 eNodeB Compact indoor cube was subjected to the FCC specified environments while operating at full rated power of 2x60W at External Antenna Connector (EAC) port. The carrier Frequency deviations were measured. The nominal Voltage input to this device is -48V DC. The 9412 eNodeB Compact indoor cube is designed to operate in the Voltage range of -48.8V to 55.2V and in the temperature range of -5C to 50C. The Base-Band Unit provided with a sensor circuit that makes sure that **TRDU 2x60-7L (BC12/17)** do not operate below -6C. The carrier frequency is designed to be within an accuracy of 750 mHz in the temperature range -30C to 50C. The frequency stability tests were for the voltage -40 to 57 VDC range and for the temperature -5C to 50 C range. The measurement setup is depicted in Block diagram A.



**Frequency Stability Test Set-up Block Diagram
9412 eNodeB Compact Indoor (700 MHz)**

Block Diagram A

FREQUENCY STABILITY TEST

Frame Tested:

9412 RACK MOUNT BAND 12/17 -014 Indoor -48V 3s

Transmit Frequency Deviation at -48VDC Over Temperature Range

Temperature in C	TX Frequency Deviation in (Hz)
25	0.201
30	0.183
40	0.221
50	0.223
40	0.106
30	0.286
20	-0.193
10	-0.242
0	0.233
-5	-0.140
-10	No carrier (RUC circuit shuts down)
0	-0.247
10	-0.161
20	-0.205
25	-0.147

Transmit Frequency Deviation at 25C Over Voltage Range

Voltage in DC	TX Frequency Deviation in (Hz)
-48	-0.147
-47	-0.318
-46	0.235
-45	0.300
-44	-0.318
-43	-0.305
-42	-0.245
-41	-0.186
-40	-0.152
-41	0.118
-42	0.214
-43	0.216
-44	0.135
-45	0.123
-46	-0.105
-47	-0.136
-48	-0.121
-49	0.100
-50	0.147
-51	0.276
-52	-0.104
-53	0.122

-54	0.216
-55	0.148
-56	-0.132
-57	0.187

Instrument Used for Measurement

Instrument Type	Serial Number	Vendor	Expiration Date
MXA Signal Analyzer	MY50200375	Agilent N9020A	3/12/2013
Power Meter	GB37170338	HP EPM -442A	01/4/2013
Power Sensor	MY52280011	Agilent E9301A	10/12/2013
MV2000 Logger	S5JC04823	Yokogawa	3/15/2013

THERMO LOGER: YOKOGAWA MV 2000

S/N S5JC94823

CALIBRATION DATE: 15 MARCH 12

DUE: 15 MARCH 13.

**FREQUENCY SPECTRUM TO BE INVESTIGATED
SECTION 2.1057**

SECTION 2.1057

FREQUENCY SPECTRUM TO BE INVESTIGATED

Frequency Spectrum to be investigated, Measurement Bandwidth and detector functions used meet or exceed the Specification contained in Section 2.1057, 27, and 3GPP TS36.104 V8.4.0 (2008-12)

Measurement Instrumentation and Antennas

All instrumentations, antennas and test Chamber used for the purpose of tests contained in the report were in calibration and calibrations are traceable to NIST