

## **TEST REPORT**

**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-04**, 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**

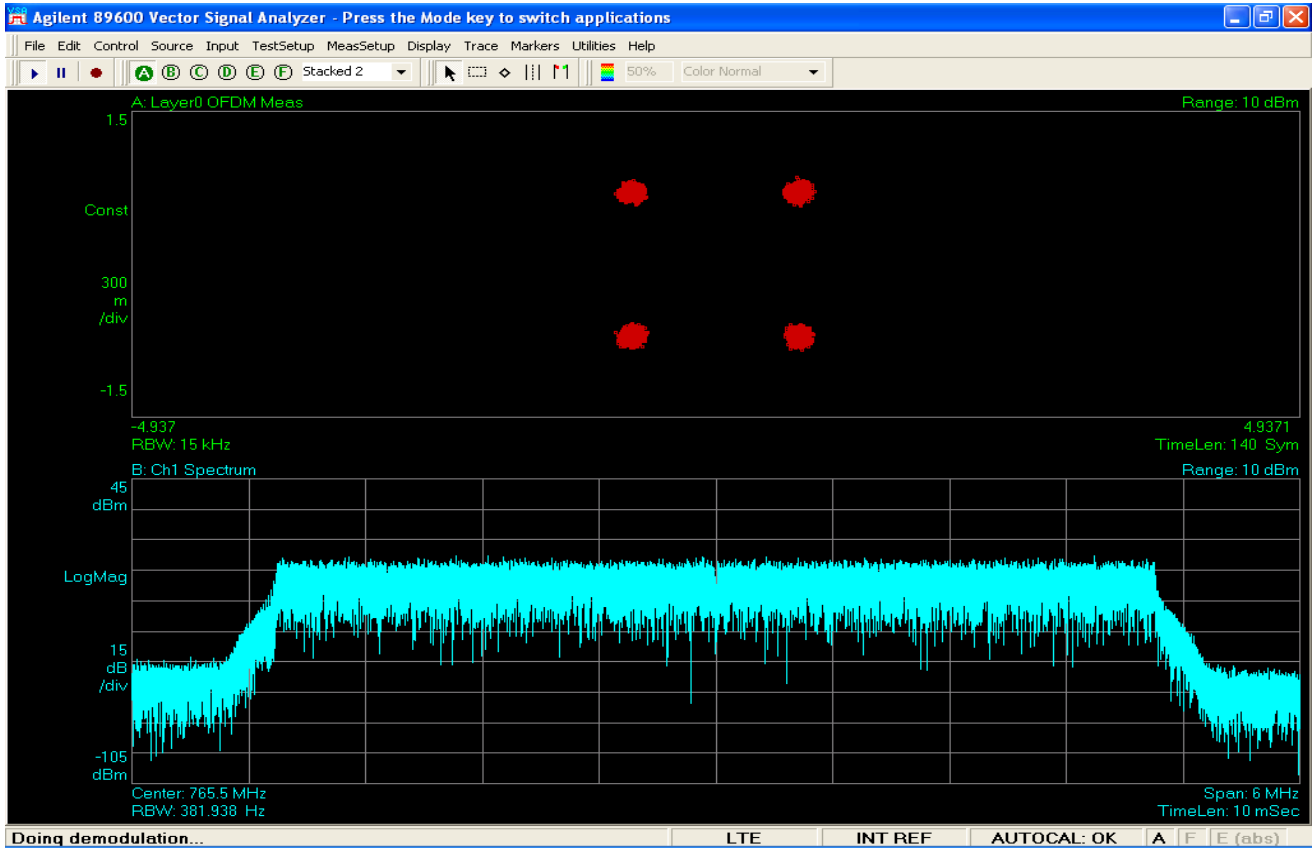
### **FCC Section 2.1047 Modulation Characteristics**

## **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 plots of graphs show the modulation components: In phase (I) and Quadrature (Q) components.

- (1) Quadrature Phase Shift Keying (QPSK) modulation scheme uses 2 bits are 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 16-states. There are four I values and four Q values, therefore 4 bits are available for 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.

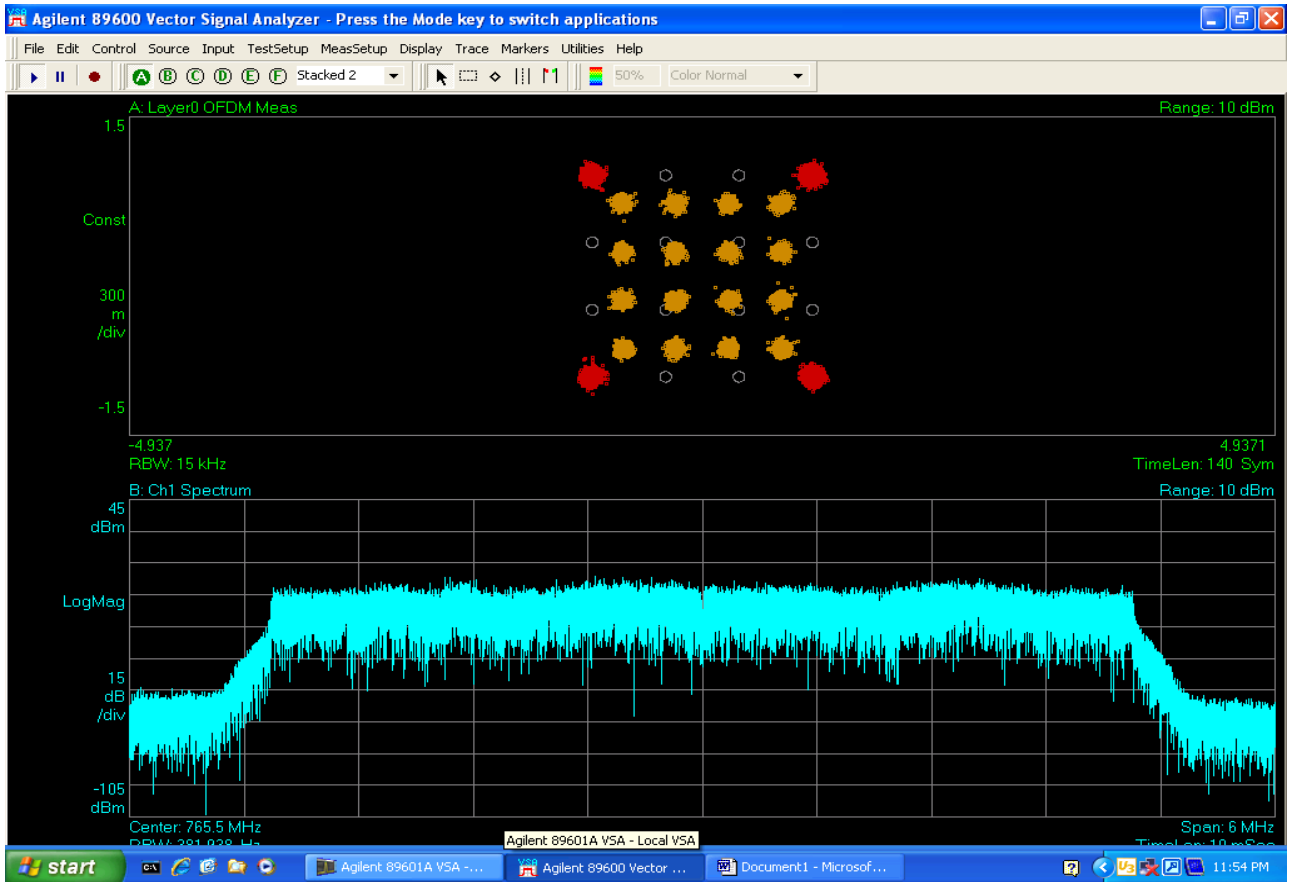
## QPSK MODULATION



LTE 9412 eNodeB Compact  
FCC Part 90 Public Safety; QPSK Modulation; PWR: 40 (2x40W MIMO)  
FCCID: AS5BBTRX-04  
TEST ENGINEER: SEG

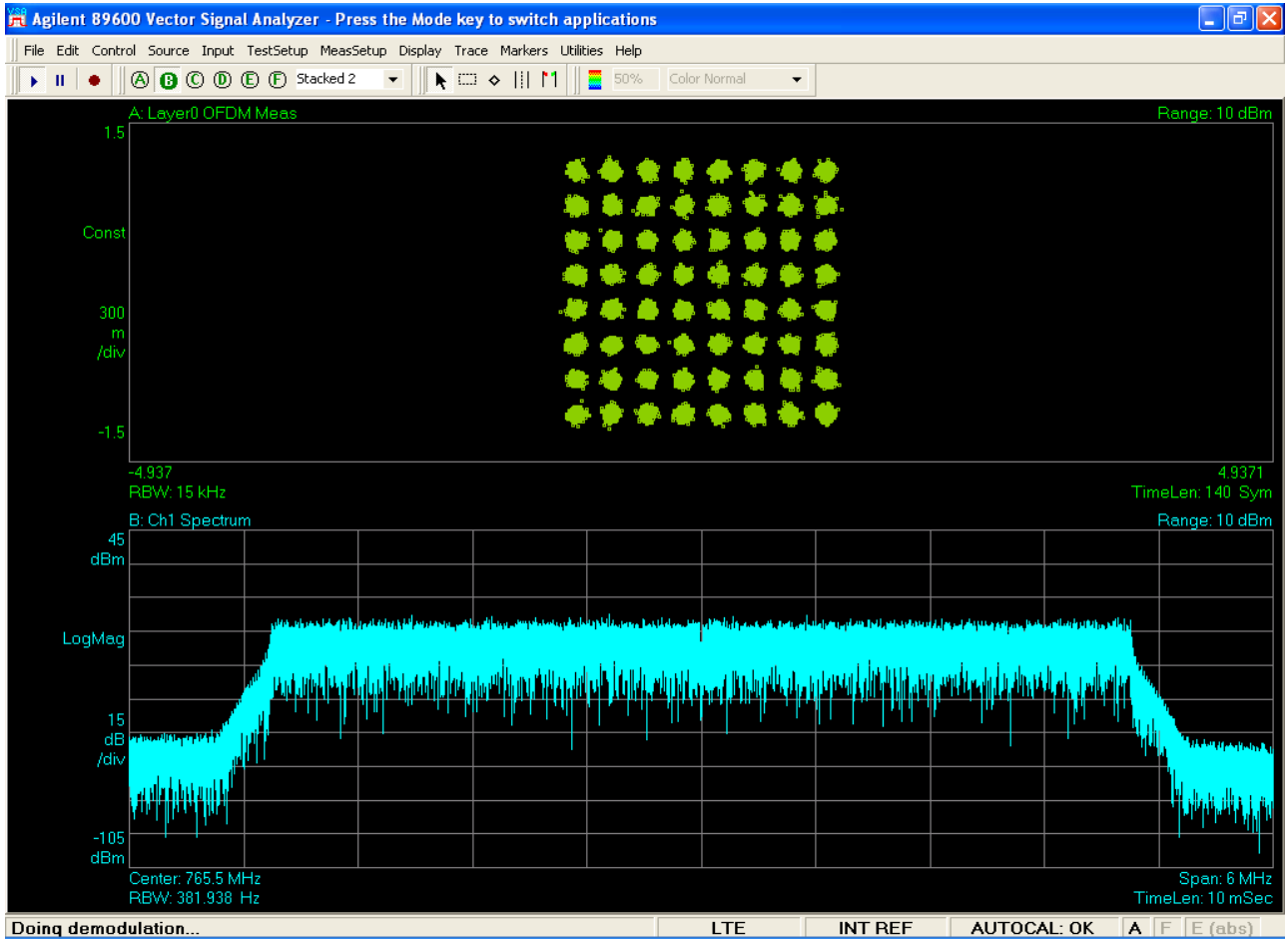
## 16QAM MODULATION





LTE 9412 eNodeB Compact  
FCC Part 90 Public Safety; 16QAM Modulation; PWR: 40 (2x40W MIMO)  
FCCID: AS5BBTRX-04  
TEST ENGINEER: SEG

## 64QAM MODULATION



LTE 9412 eNodeB Compact  
FCC Part 90 Public Safety; 64QAM Modulation; PWR: 40 (2x40W MIMO)  
FCCID: AS5BBTRX-04  
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: 9.43 MHz for 10 MHz Bandwidth, and 4.71 MHz for 5 MHz Bandwidth.

Therefore:

Measured Emission type: **9M43F9W** for 10 MHz Bandwidth.

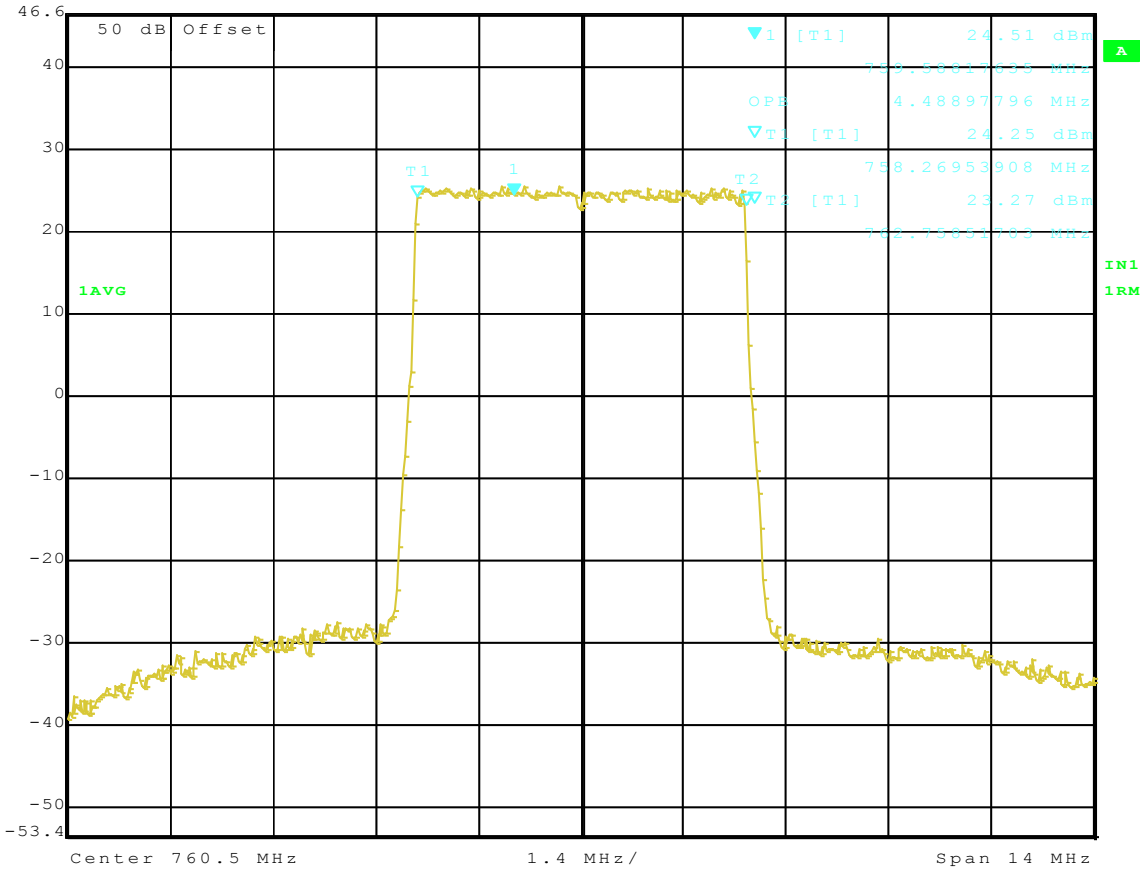
Measured Emission type: **4M71F9W** for 5 MHz Bandwidth.

**MEASUREMENT (A)  
SPECTRUM BANDWIDTH  
99 PERCENT POWER BANDWIDTH**

**Block: D**  
**5 MHz Bandwidth 758 – 763 MHz**  
**QPSK, 16QAM, and 64QAM**  
**5MHz Bandwidth**  
**(99 Percent Power Bandwidth)**



Marker 1 [T1] RBW 30 kHz RF Att 10 dB  
 Ref Lvl 24.51 dBm VBW 300 kHz  
 46.6 dBm 759.58817635 MHz SWT 39 ms Unit dBm

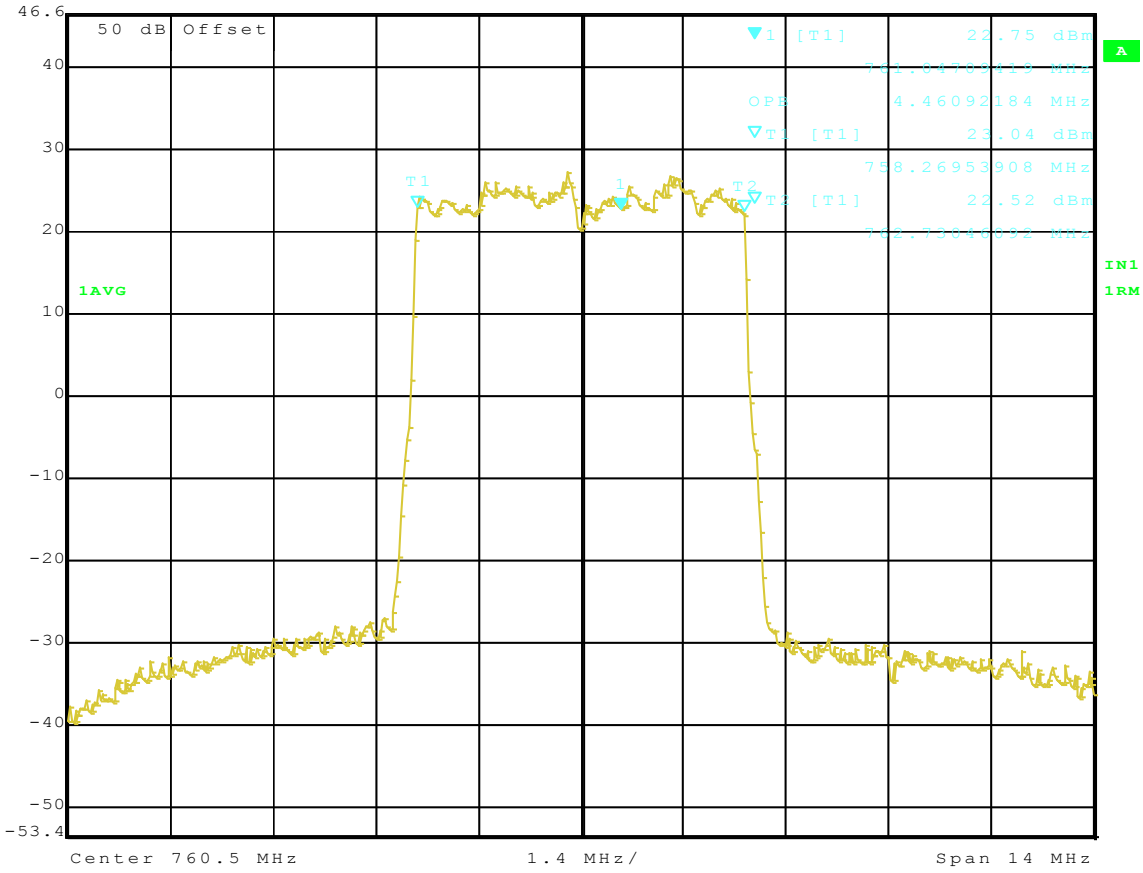


Title: 99 POWER BANDWIDTH: Test Engineer: SEG  
 Comment A: PUBLIC SAFETY B14; PWR: 40W; BLK. D: 758 - 763 MHz  
 QPSK; FCC Prt 27; FCCID: AS5BBTRX-04; TRDU(M1)  
 Date: 13.OCT.2011 14:27:55





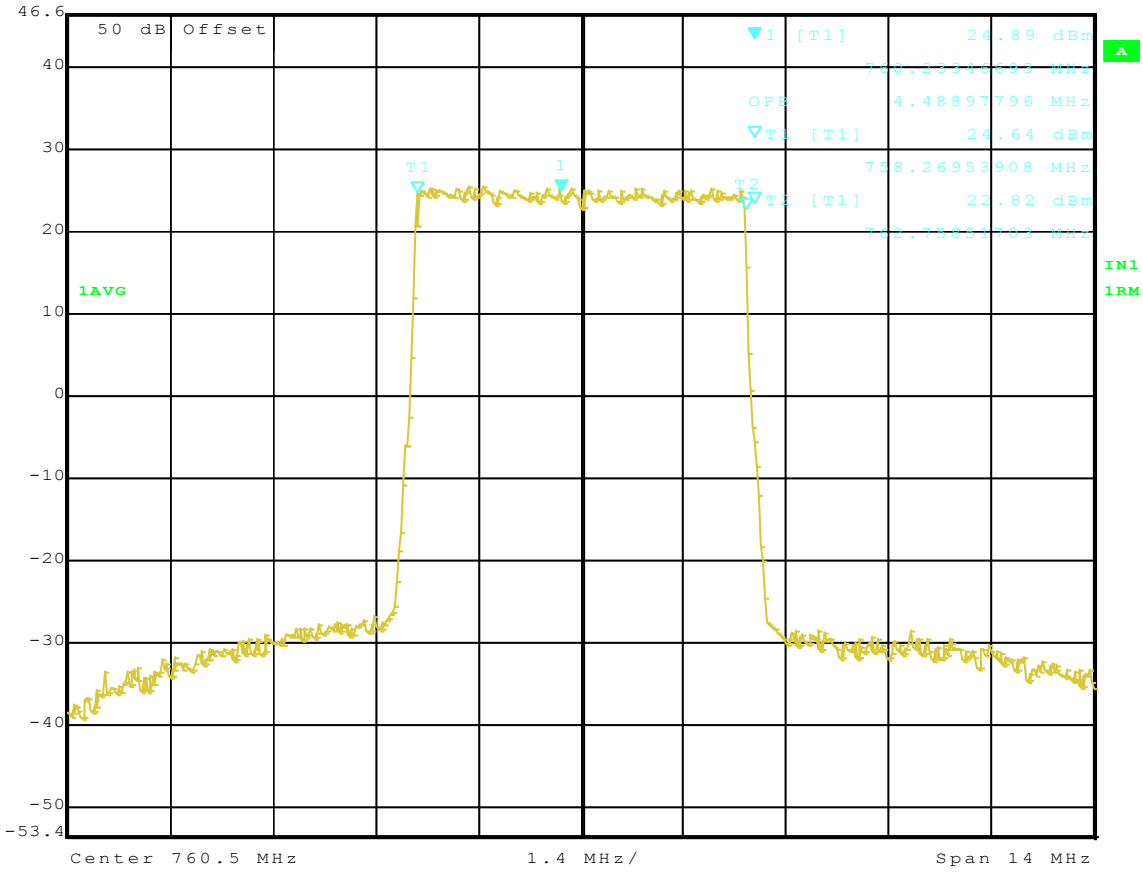
Marker 1 [T1] RBW 30 kHz RF Att 10 dB  
 Ref Lvl 22.75 dBm VBW 300 kHz  
 46.6 dBm 761.04709419 MHz SWT 39 ms Unit dBm



Title: 99 POWER BANDWIDTH: Test Engineer: JY  
 Comment A: PUBLIC SAFETY B14; PWR: 40W; BLK-D: 758 - 763 MHz  
 16QAM; FCC Prt 27; FCCID: AS5BBTRX-04; TRDU(M1)  
 Date: 17.OCT.2011 12:53:16



Marker 1 [T1] RBW 30 kHz RF Att 10 dB  
 Ref Lvl 24.89 dBm VBW 300 kHz  
 46.6 dBm 760.23346693 MHz SWT 39 ms Unit dBm

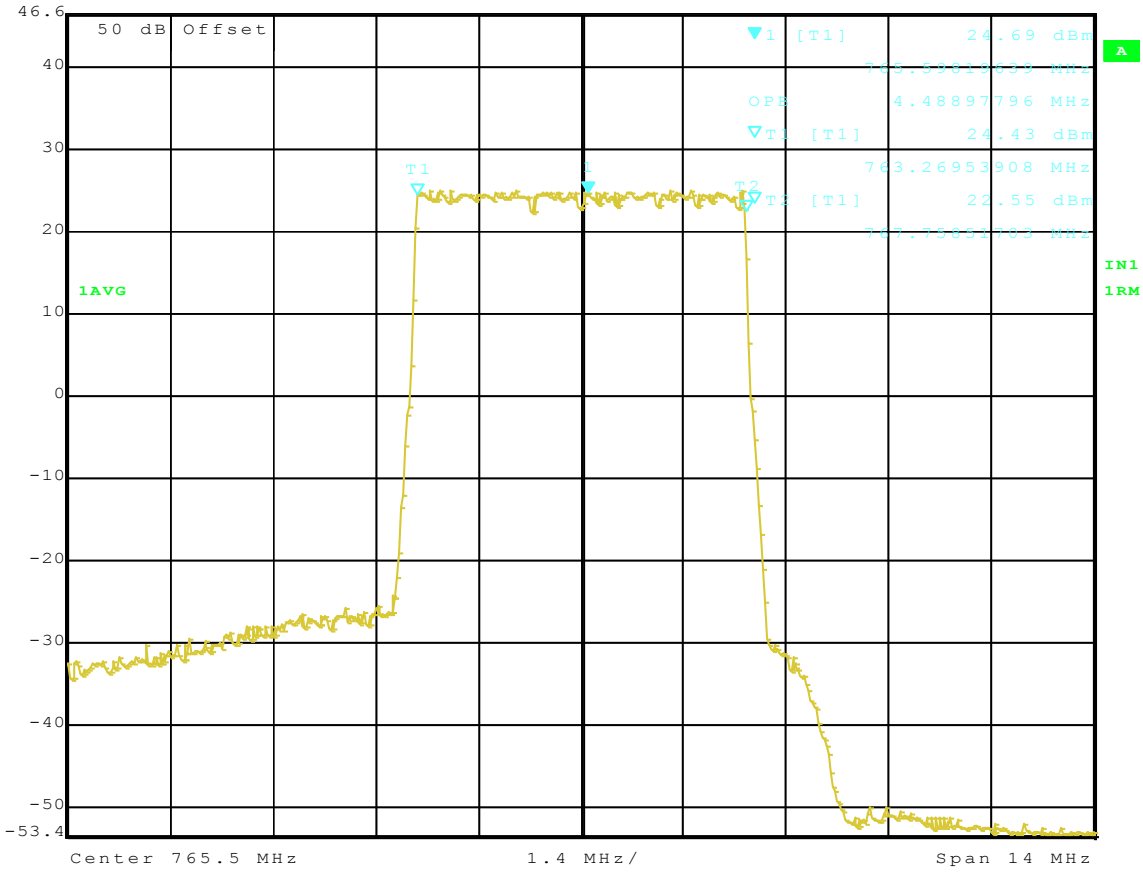


Title: 99 POWER BANDWIDTH: Test Engineer: SEG  
 Comment A: PUBLIC SAFETY B14; PWR: 40W; BLK. D: 758 - 763 MHz  
 64QAM; FCC Prt 27; FCCID: AS5BBTRX-04; TRDU(M1)  
 Date: 13.OCT.2011 15:49:47

**Block: Public Safety**  
**5 MHz Bandwidth 763 – 768 MHz**  
**QPSK, 16QAM, and 64QAM**  
**5MHz Bandwidth**  
**(99 Percent Power Bandwidth)**



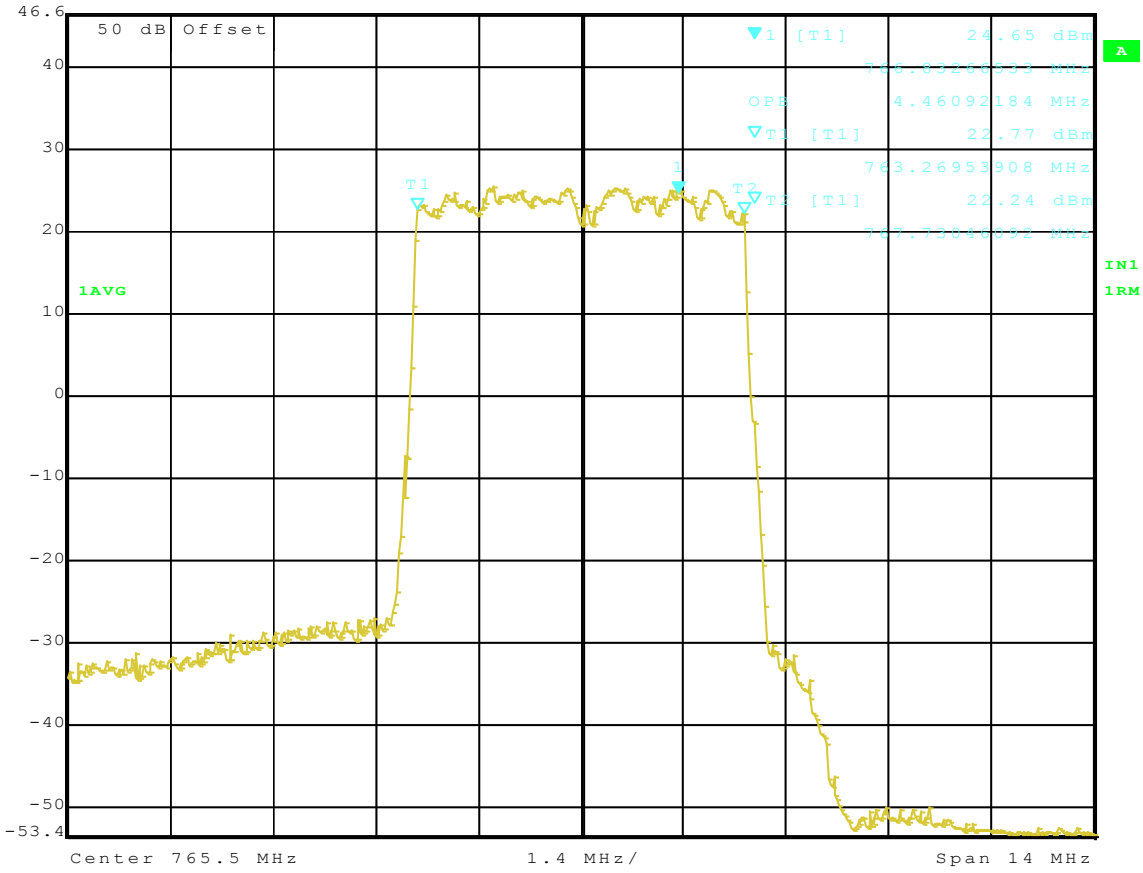
Marker 1 [T1] RBW 30 kHz RF Att 10 dB  
 Ref Lvl 24.69 dBm VBW 300 kHz  
 46.6 dBm 765.59819639 MHz SWT 39 ms Unit dBm



Title: 99 POWER BANDWIDTH: Test Engineer: JY  
 Comment A: PUBLIC SAFETY B14; PWR: 40W; BLK.PS: 763 - 768 MHz  
 QPSK; FCC Prt 27; FCCID: AS5BBTRX-04; TRDU(M1)  
 Date: 16.OCT.2011 10:19:00



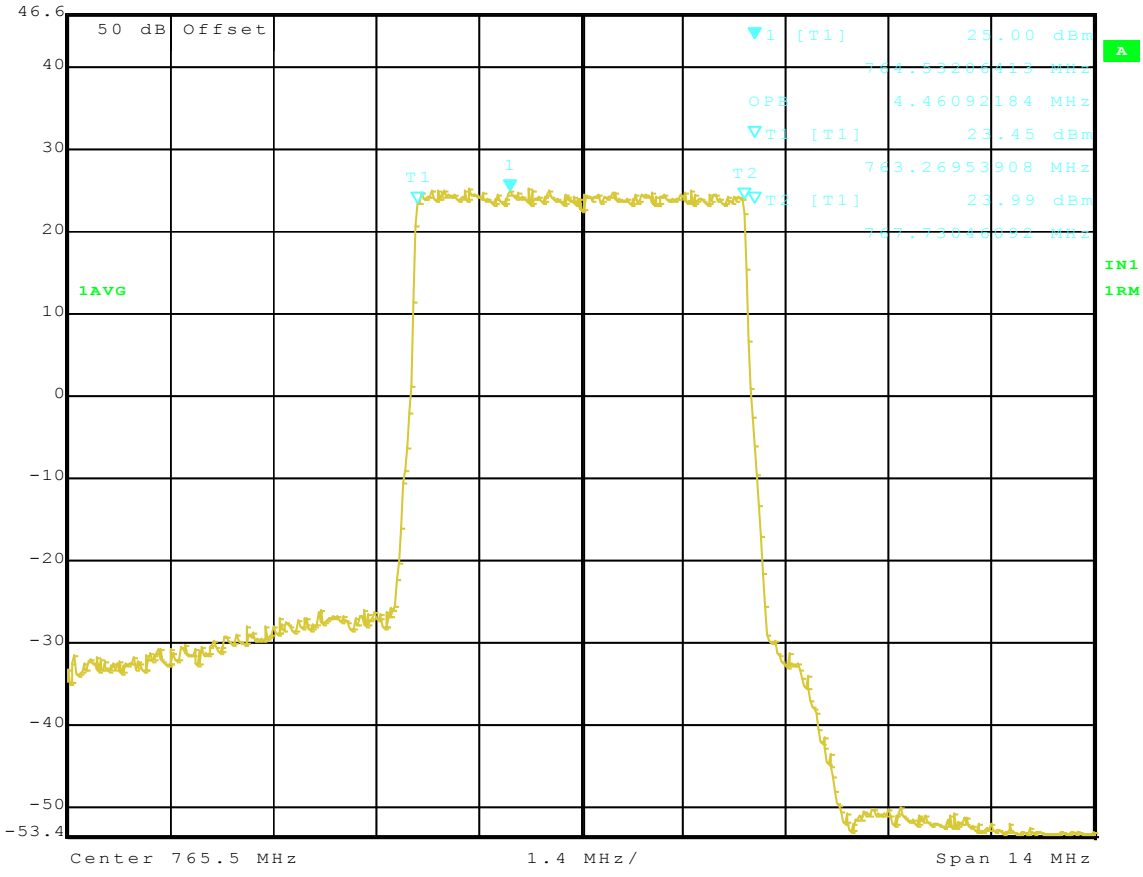
Marker 1 [T1] RBW 30 kHz RF Att 10 dB  
Ref Lvl 24.65 dBm VBW 300 kHz  
46.6 dBm 766.83266533 MHz SWT 39 ms Unit dBm



Title: 99 POWER BANDWIDTH: Test Engineer: JY  
Comment A: PUBLIC SAFETY B14; PWR: 40W; BLK.PS: 763 - 768 MHz  
16QAM; FCC Prt 27; FCCID: AS5BBTRX-04; TRDU(M1)  
Date: 16.OCT.2011 12:17:17



Marker 1 [T1] RBW 30 kHz RF Att 10 dB  
 Ref Lvl 25.00 dBm VBW 300 kHz  
 46.6 dBm 764.53206413 MHz SWT 39 ms Unit dBm

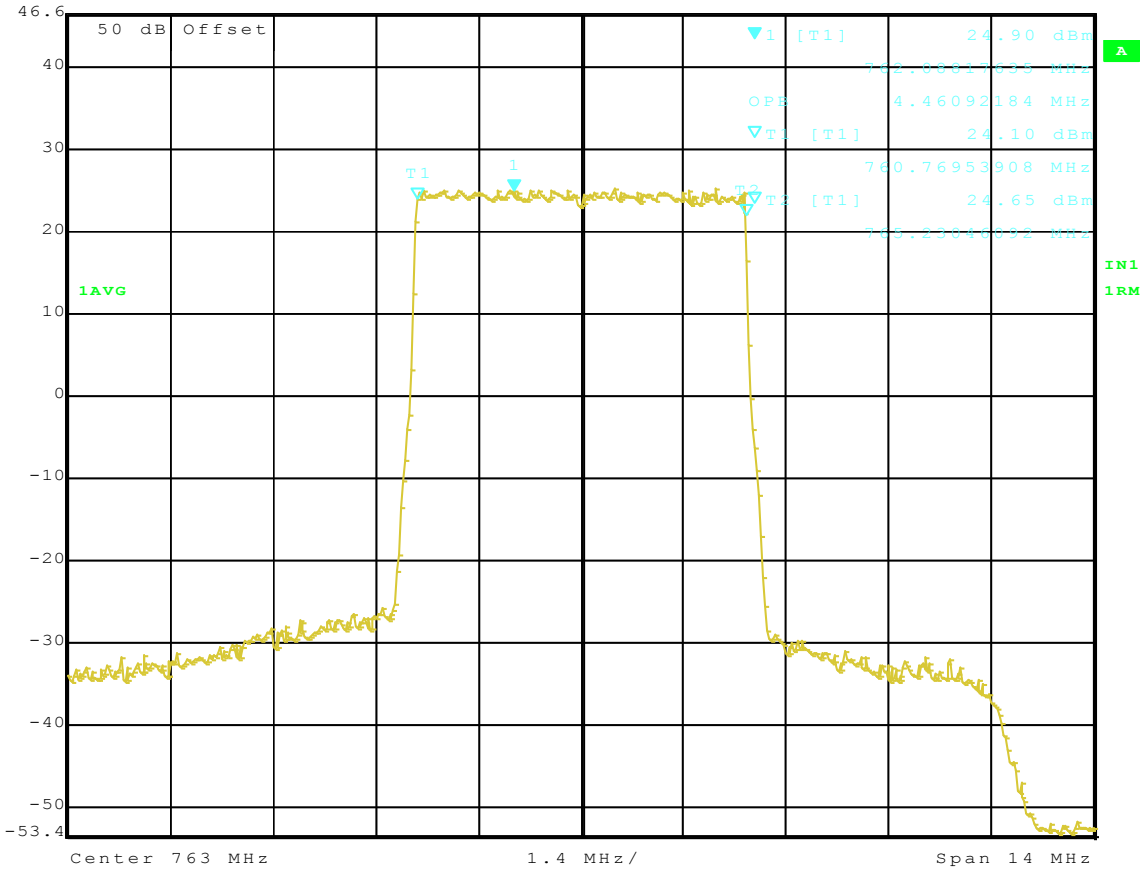


Title: 99 POWER BANDWIDTH: Test Engineer: JY  
 Comment A: PUBLIC SAFETY B14; PWR: 40W; BLK.PS: 763 - 768 MHz  
 64QAM; FCC Prt 27; FCCID: AS5BBTRX-04; TRDU(M1)  
 Date: 16.OCT.2011 11:02:29

**Block: Public Safety & D**  
**5 MHz Bandwidth 760.5 – 765.5 MHz**  
**QPSK, 16QAM, and 64QAM**  
**5 MHz Bandwidth**  
**(99 Percent Power Bandwidth)**



Marker 1 [T1] RBW 30 kHz RF Att 10 dB  
 Ref Lvl 24.90 dBm VBW 300 kHz  
 46.6 dBm 762.08817635 MHz SWT 39 ms Unit dBm

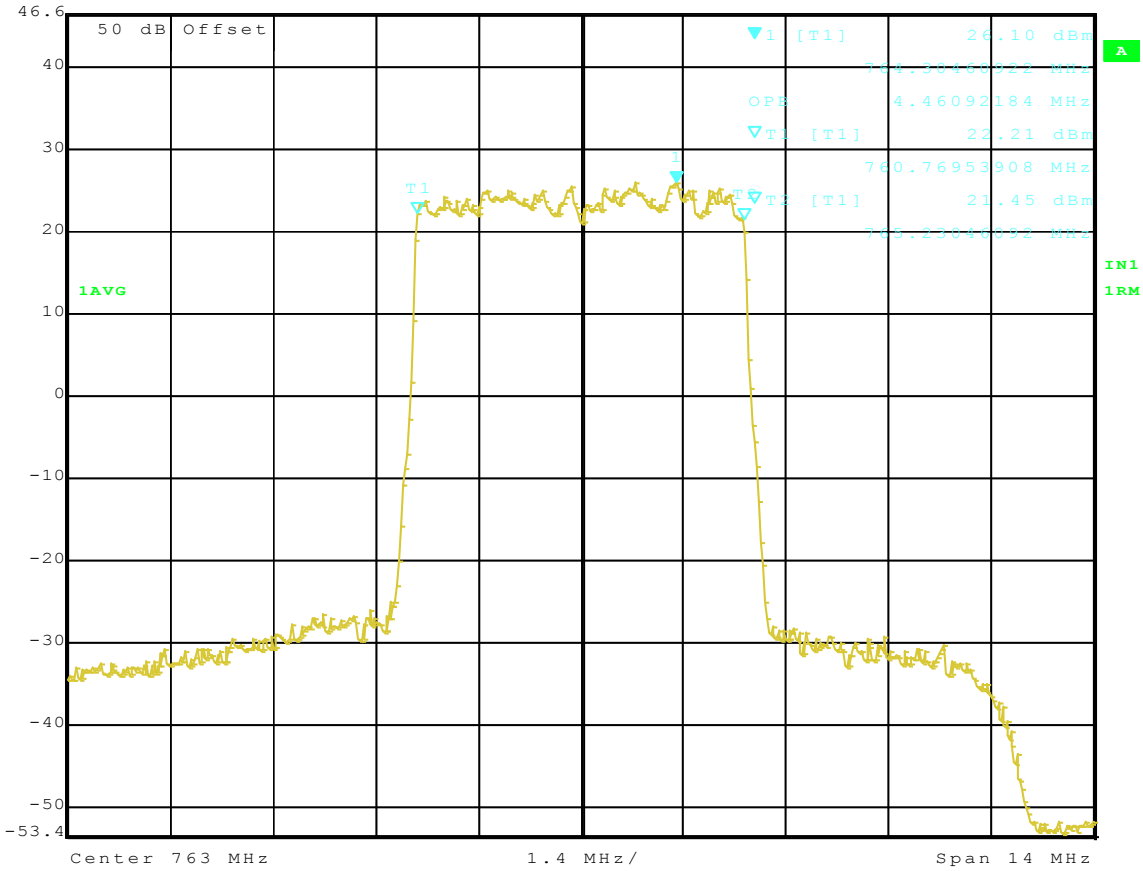


Title: 99 POWER BANDWIDTH: Test Engineer: JY  
 Comment A: PUBLIC SAFETY B14; PWR: 40W; BLK-PS/D: 760.5 - 765.5 MHz  
 QPSK; FCC Prt 27; FCCID: AS5BBTRX-04; TRDU(M1)  
 Date: 17.OCT.2011 08:19:25





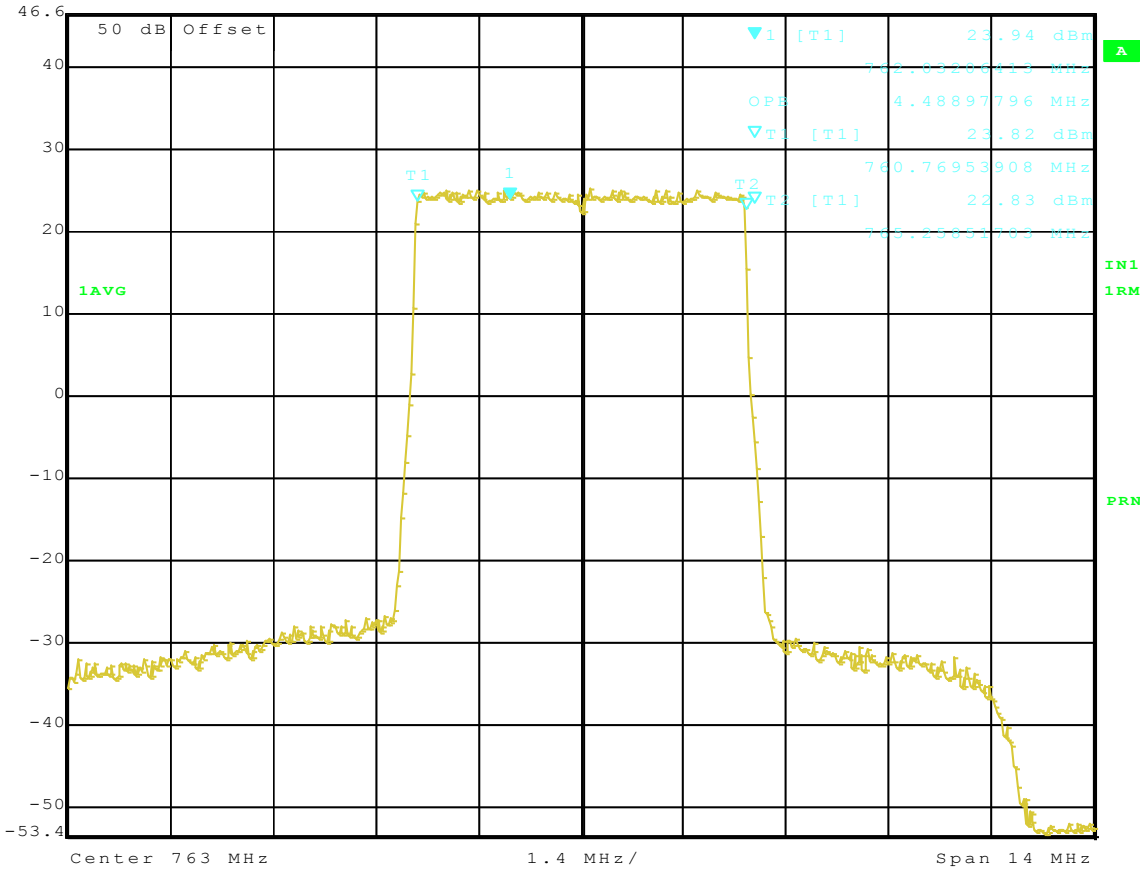
Marker 1 [T1] RBW 30 kHz RF Att 10 dB  
 Ref Lvl 26.10 dBm VBW 300 kHz  
 46.6 dBm 764.30460922 MHz SWT 39 ms Unit dBm



Title: 99 POWER BANDWIDTH: Test Engineer: JY  
 Comment A: PUBLIC SAFETY B14; PWR: 40W; BLK-PS/D: 760.5 - 765.5 MHz  
 16QAM; FCC Pst 27; FCCID: AS5BBTRX-04; TRDU(M1)  
 Date: 17.OCT.2011 08:51:24



Marker 1 [T1] RBW 30 kHz RF Att 10 dB  
 Ref Lvl 23.94 dBm VBW 300 kHz  
 46.6 dBm 762.03206413 MHz SWT 39 ms Unit dBm

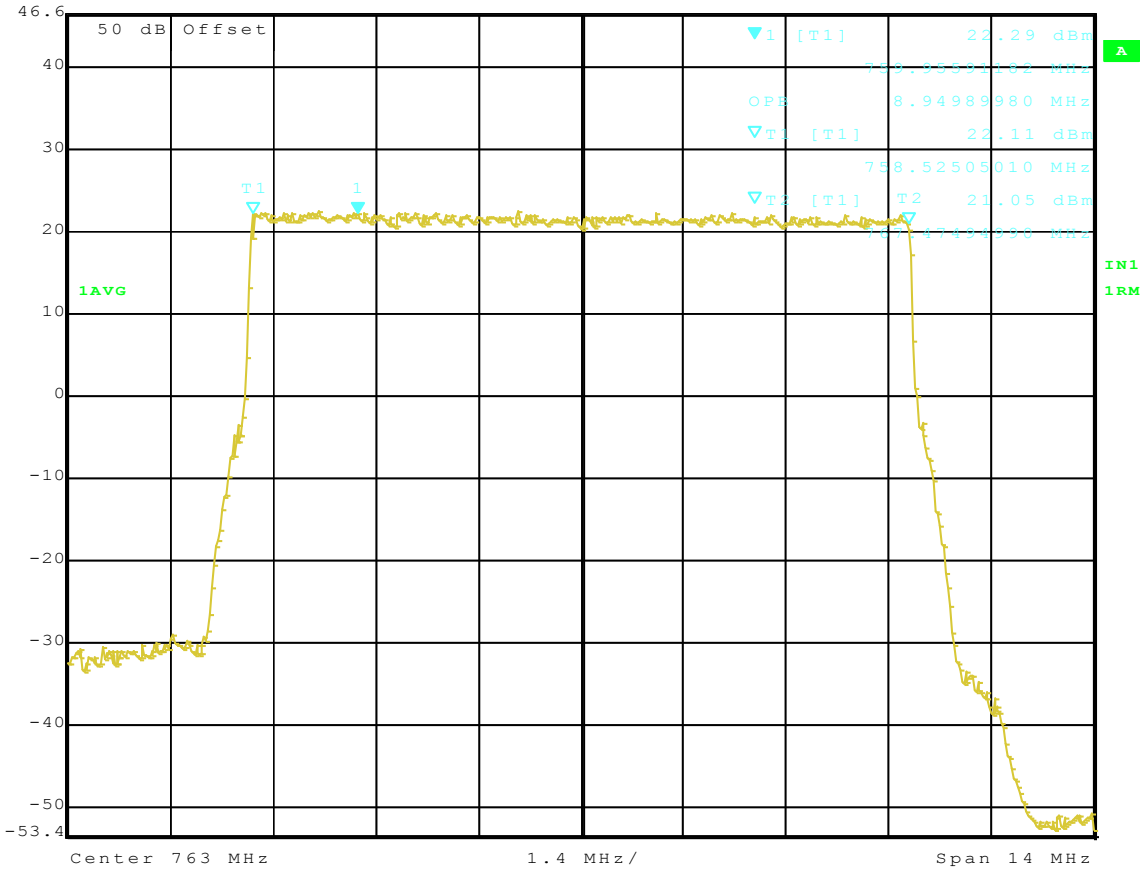


Title: 99 POWER BANDWIDTH: Test Engineer: JY  
 Comment A: PUBLIC SAFETY B14; PWR: 40W; BLK-PS/D: 760.5 - 765.5 MHz  
 64QAM; FCC Prt 27; FCCID: AS5BBTRX-04; TRDU(M1)  
 Date: 17.OCT.2011 08:30:43

**Block: Public Safety & D**  
**10 MHz Bandwidth 758 – 768 MHz**  
**QPSK, 16QAM, and 64QAM**  
**(99 Percent Power Bandwidth)**



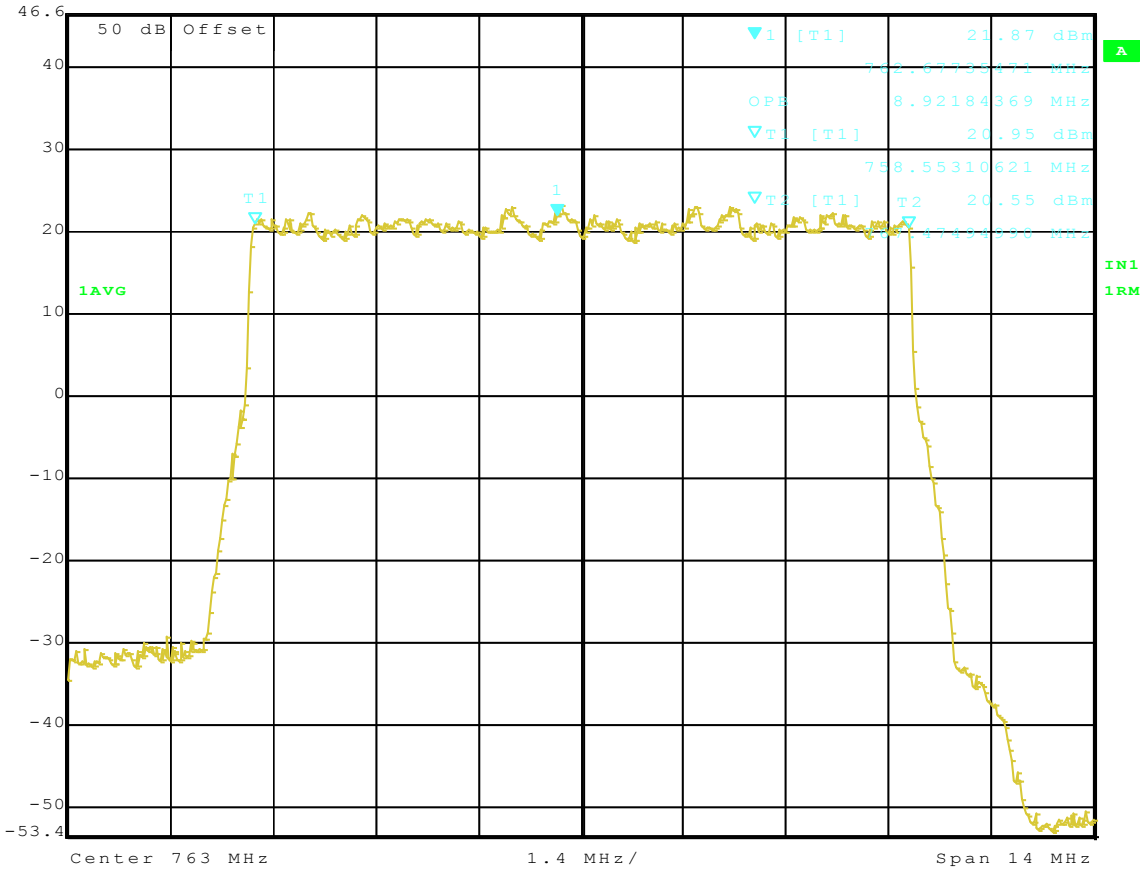
Marker 1 [T1] RBW 30 kHz RF Att 10 dB  
 Ref Lvl 22.29 dBm VBW 300 kHz  
 46.6 dBm 759.95591182 MHz SWT 39 ms Unit dBm



Title: 99 POWER BANDWIDTH: Test Engineer: JY  
 Comment A: PUBLIC SAFETY B14; PWR: 40W; BLK-PS/D: 758- 768 MHz  
 QPSK 10MHz BW; FCC Prt 27; FCCID: AS5BBTRX-04; TRDU(M1)  
 Date: 17.OCT.2011 09:49:56



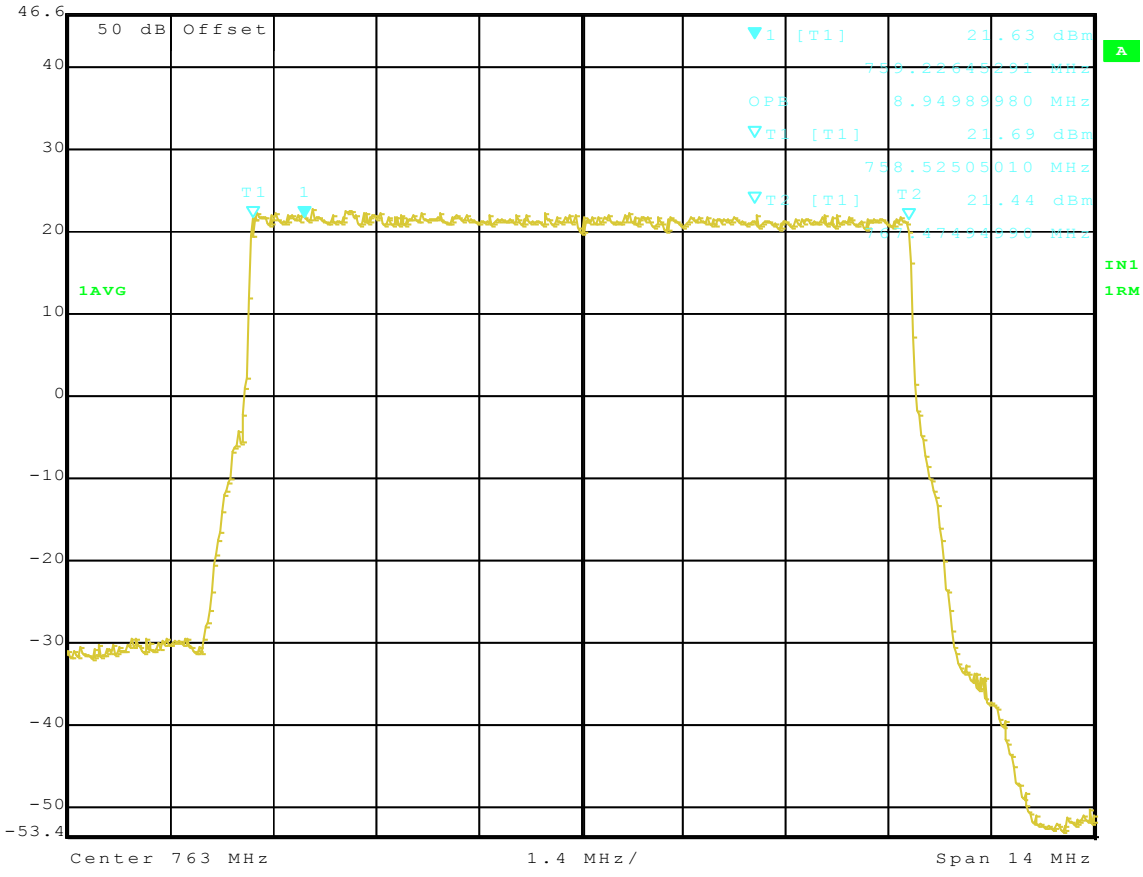
Marker 1 [T1] RBW 30 kHz RF Att 10 dB  
Ref Lvl 21.87 dBm VBW 300 kHz  
46.6 dBm 762.6773471 MHz SWT 39 ms Unit dBm



Title: 99 POWER BANDWIDTH: Test Engineer: JY  
Comment A: PUBLIC SAFETY B14; PWR: 40W; BLK-PS/D: 758- 768 MHz  
16QAM 10MHz BW; FCC Prt 27; FCCID: AS5BBTRX-04; TRDU(M1)  
Date: 17.OCT.2011 10:06:30



Marker 1 [T1] RBW 30 kHz RF Att 10 dB  
 Ref Lvl 21.63 dBm VBW 300 kHz  
 46.6 dBm 759.22645291 MHz SWT 39 ms Unit dBm



Title: 99 POWER BANDWIDTH: Test Engineer: JY  
 Comment A: PUBLIC SAFETY B14; PWR: 40W; BLK-PS/D: 758- 768 MHz  
 64QAM 10MHz BW; FCC Prt 27; FCCID: AS5BBTRX-04; TRDU(M1)  
 Date: 17.OCT.2011 10:21:20

**MEASUREMENT (B)  
SPECTRUM BANDWIDTH  
26 dB POWER BANDWIDTH**

**(B) MEASUREMENT OF SPECTRUM BANDWIDTH FOR Emissions Type**

The occupied bandwidth of the Long Term Evolution (LTE) is measured using a Rohde & Schwarz ESI Spectrum Analyzer/Receiver and an HP Model 520 DeskJet Printer. The emissions bandwidth is defined in section 27.53 (a) (5) 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 700TRDU**” in the following configurations:

1. QPSK
2. 16 QAM
3. 64 QAM

**Results:**

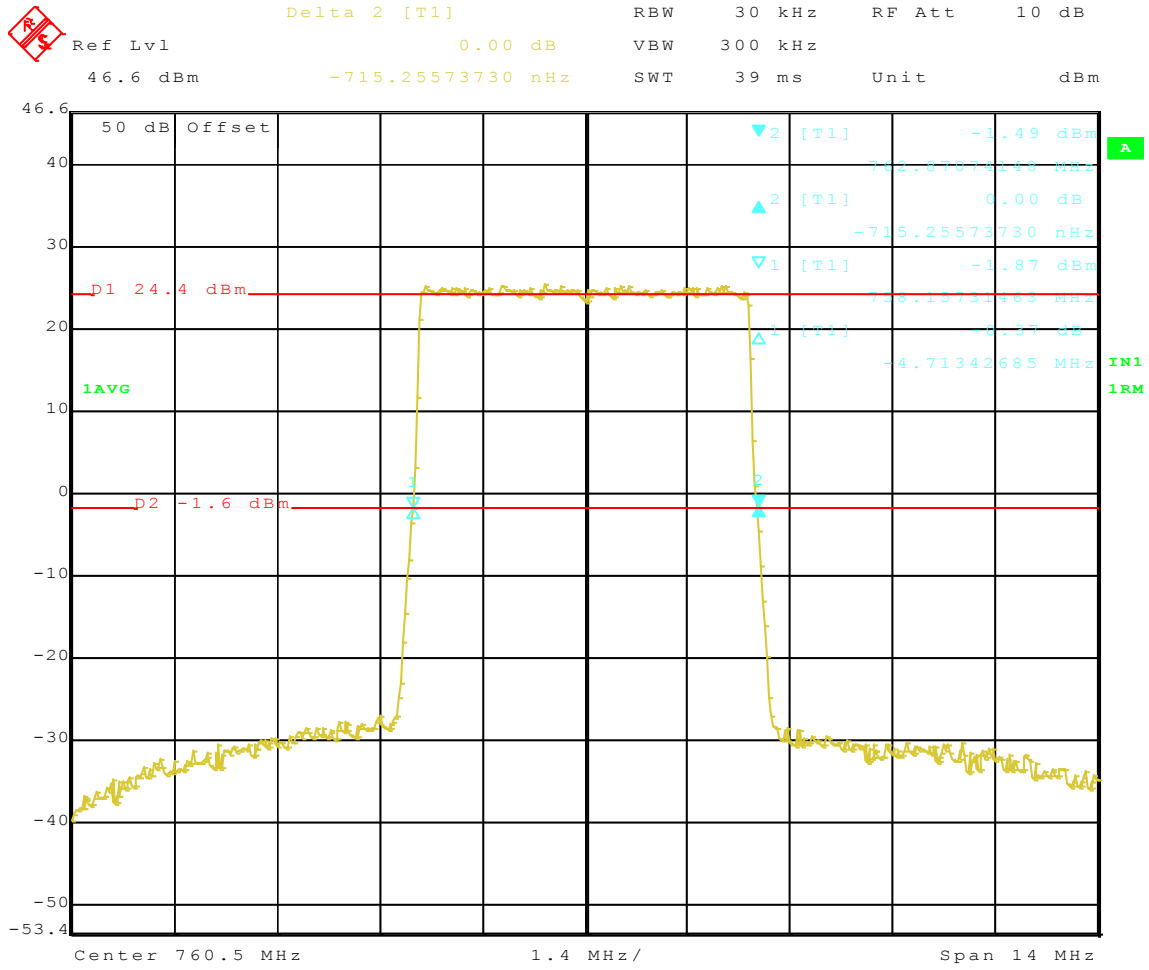
The plots are provided for QPSK, 16QAM and 64QAM modulations for 10 MHz band and 5MHz bands. The Measured 26dB emissions bandwidth is 9.43 MHz for 10MHz band, and 4.71 MHz for 5 MHz bands.



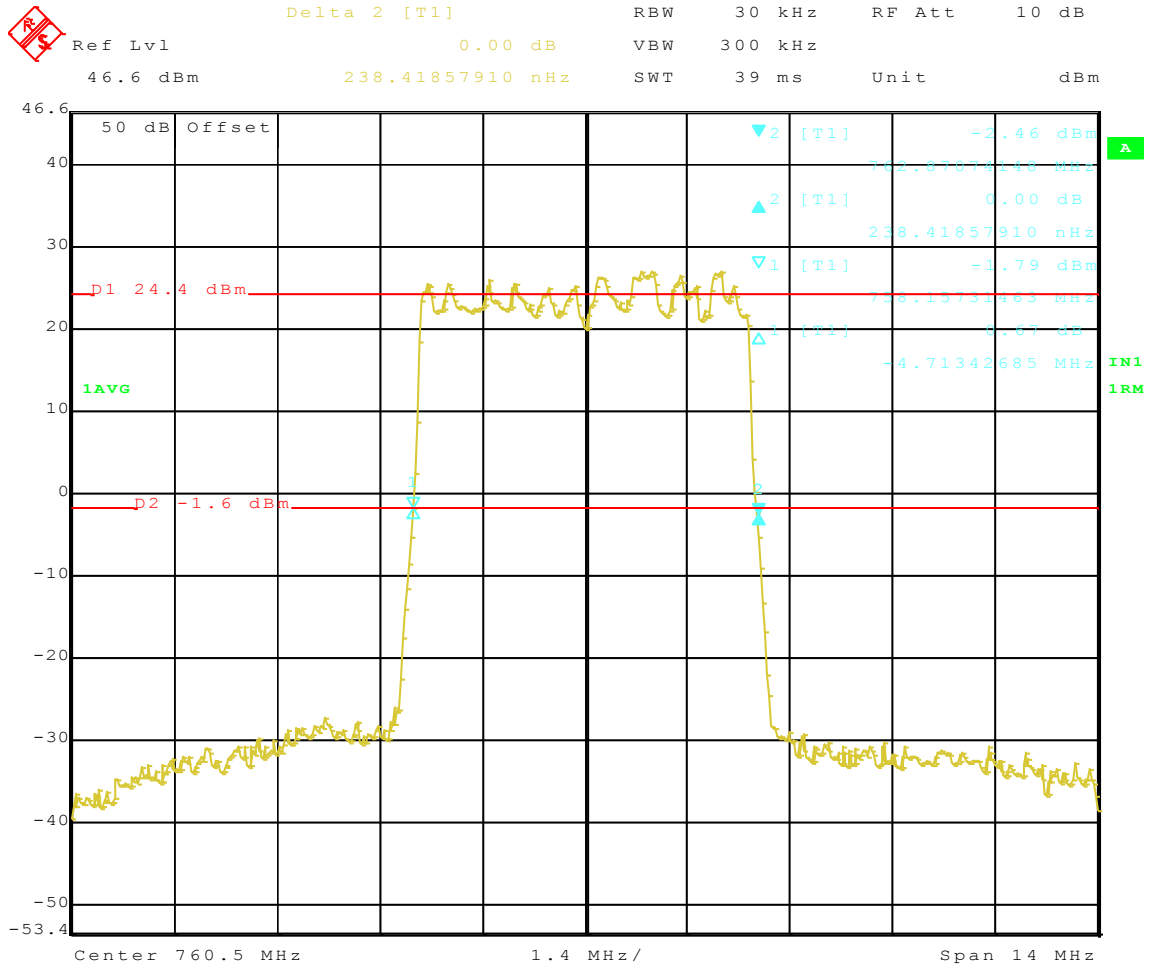
**Block: D**

**5 MHz Bandwidth 758 – 763 MHz  
QPSK, 16QAM and 64QAM**

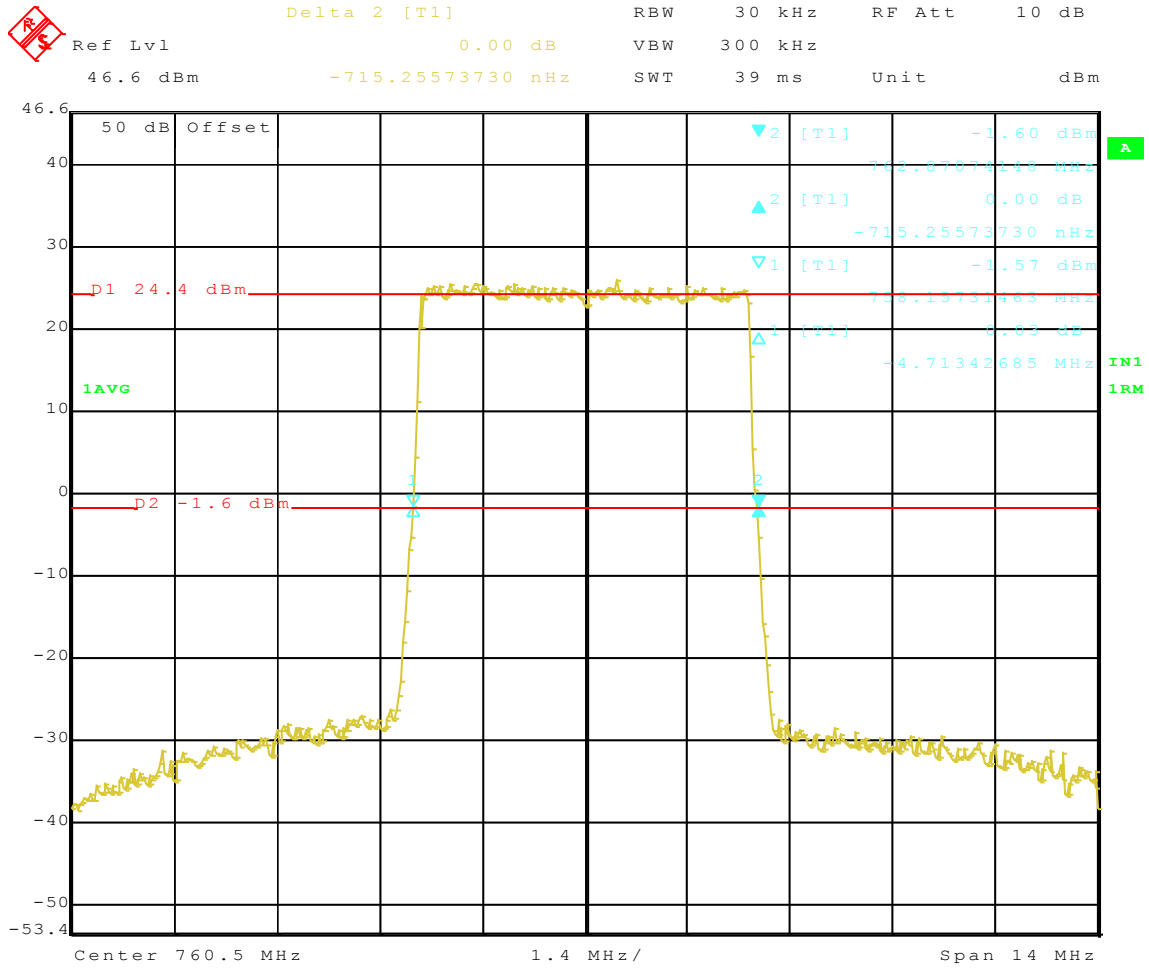
**(26dB Bandwidth)**



Title: 26dB BANDWIDTH: Test Engineer: SEG  
 Comment A: PUBLIC SAFETY B14; PWR: 40W; BLK. D: 758 - 763 MHz  
 QPSK; FCC Prt 27; FCCID: AS5BBTRX-04; TRDU(M1)  
 Date: 13.OCT.2011 14:31:52



Title: 26dB BANDWIDTH: Test Engineer: JY  
 Comment A: PUBLIC SAFETY B14; PWR: 40W; BLK-D: 758 - 763 MHz  
 16QAM; FCC Prt 27; FCCID: AS5BBTRX-04; TRDU(M1)  
 Date: 17.OCT.2011 12:51:02

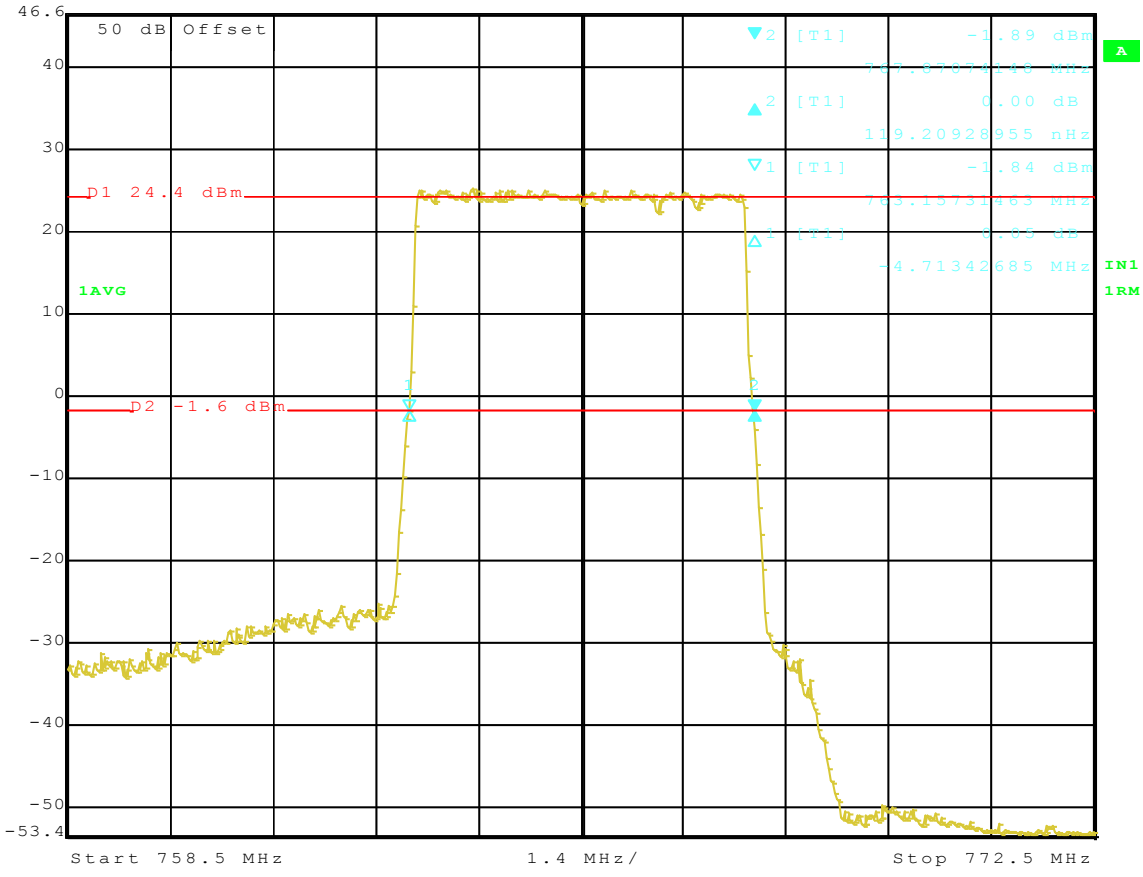


Title: 26dB BANDWIDTH: Test Engineer: SEG  
 Comment A: PUBLIC SAFETY B14; PWR: 40W; BLK. D: 758 - 763 MHz  
 64QAM; FCC Prt 27; FCCID: AS5BBTRX-04; TRDU(M1)  
 Date: 13.OCT.2011 15:47:52

**Block: Public Safety**  
**5 MHz Bandwidth, 763 – 768 MHz**  
**QPSK, 16QAM and 64QAM**  
**(26 dB Power Bandwidth)**



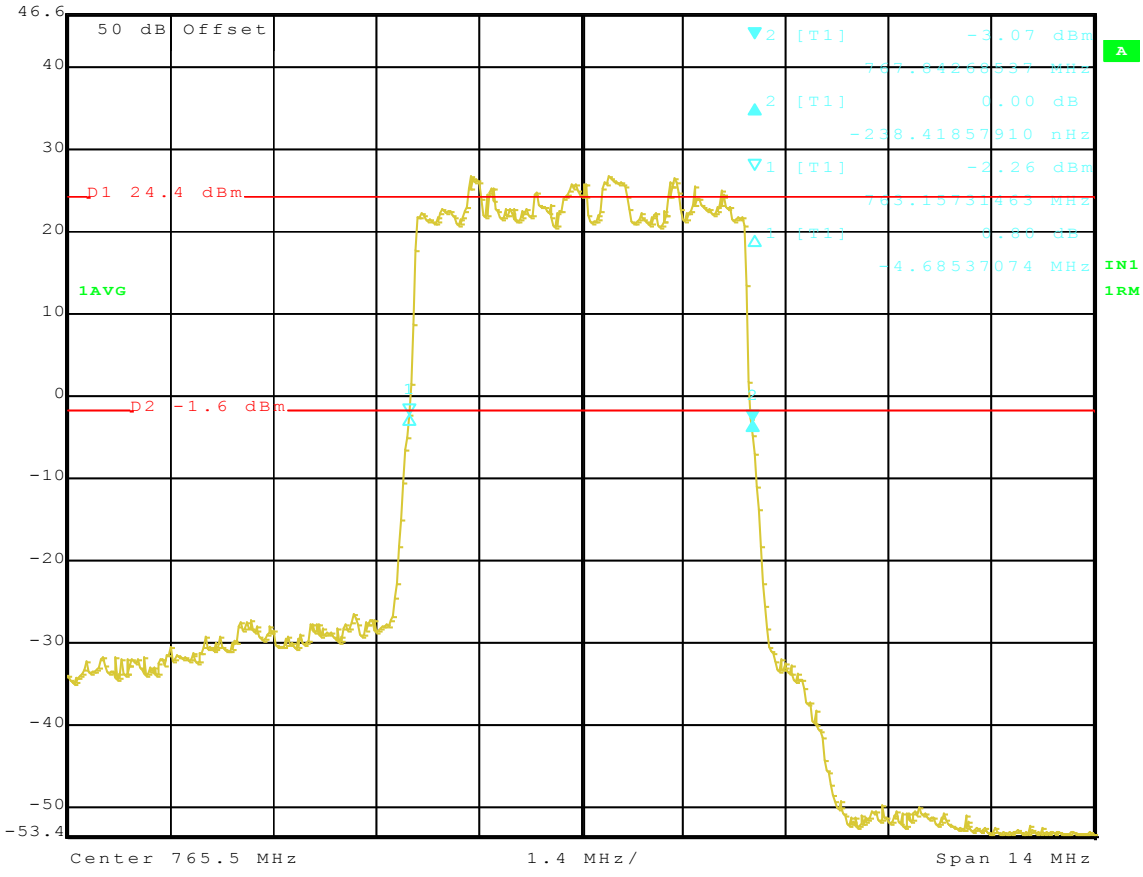
Delta 2 [T1] RBW 30 kHz RF Att 10 dB  
 Ref Lvl 0.00 dB VBW 300 kHz  
 46.6 dBm 119.20928955 nHz SWT 39 ms Unit dBm



Title: 26dB BANDWIDTH: Test Engineer: JY  
 Comment A: PUBLIC SAFETY B14; PWR: 40W; BLK.PS: 763 - 768 MHz  
 QPSK; FCC Prt 27; FCCID: AS5BBTRX-04; TRDU(M1)  
 Date: 16.OCT.2011 10:27:35



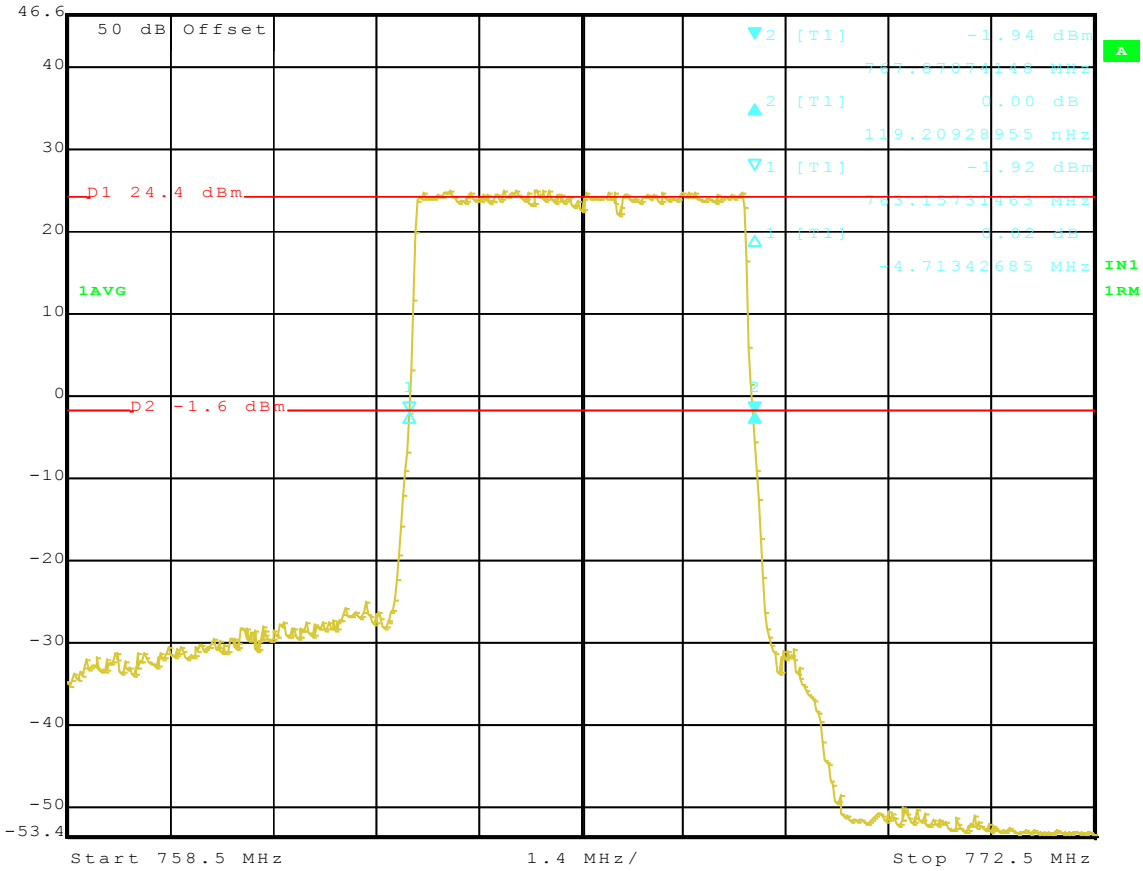
Delta 2 [T1] RBW 30 kHz RF Att 10 dB  
 Ref Lvl 0.00 dB VBW 300 kHz  
 46.6 dBm -238.41857910 nHz SWT 39 ms Unit dBm



Title: 26dB BANDWIDTH: Test Engineer: JY  
 Comment A: PUBLIC SAFETY B14; PWR: 40W; BLK.PS: 763 - 768 MHz  
 16QAM; FCC Prt 27; FCCID: AS5BBTRX-04; TRDU(M1)  
 Date: 16.OCT.2011 12:19:29



Delta 2 [T1] RBW 30 kHz RF Att 10 dB  
 Ref Lvl 0.00 dB VBW 300 kHz  
 46.6 dBm 119.20928955 nHz SWT 39 ms Unit dBm



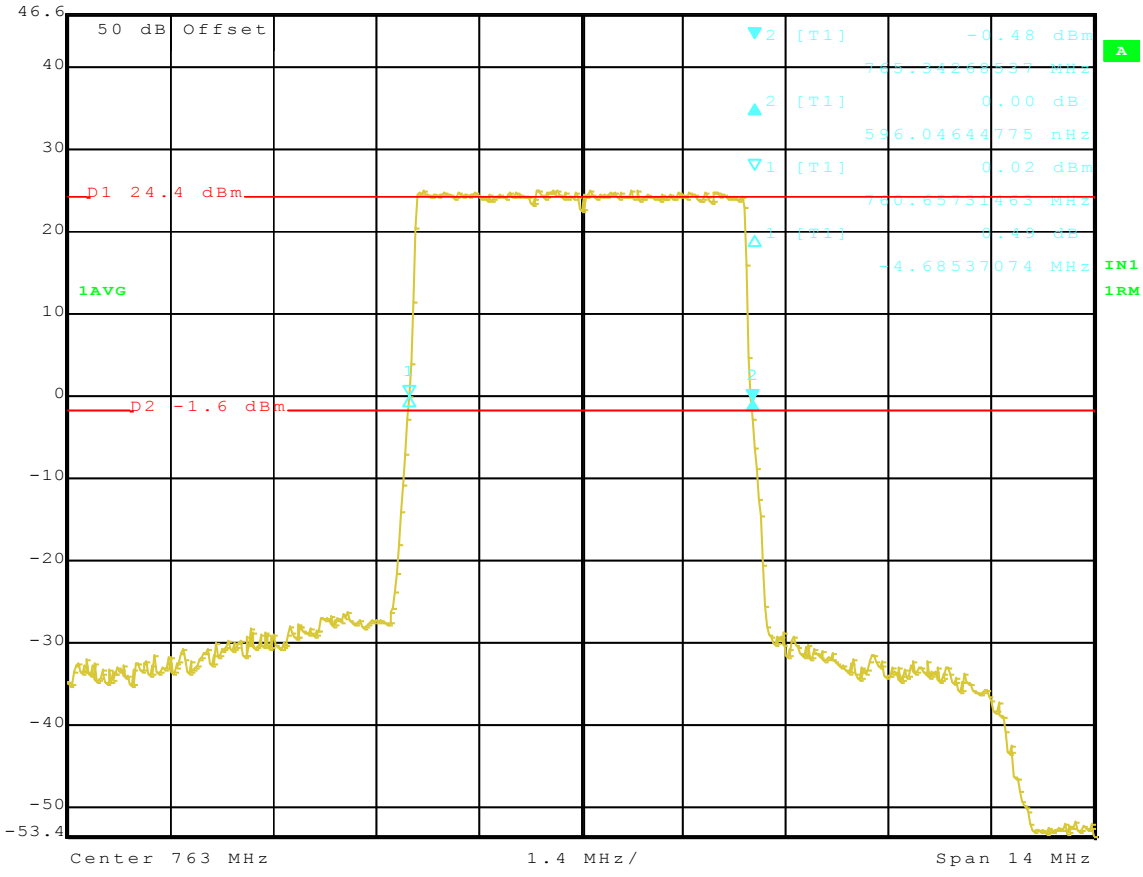
Title: 26dB BANDWIDTH: Test Engineer: JY  
 Comment A: PUBLIC SAFETY B14; PWR: 40W; BLK.PS: 763 - 768 MHz  
 64QAM; FCC Prt 27; FCCID: AS5BBTRX-04; TRDU(M1)  
 Date: 16.OCT.2011 10:59:10



**Block: Public Safety & D**  
**5 MHz Bandwidth 760.5 – 765.5 MHz**  
**QPSK, 16QAM, and 64QAM**  
**(26 dB Power Bandwidth)**



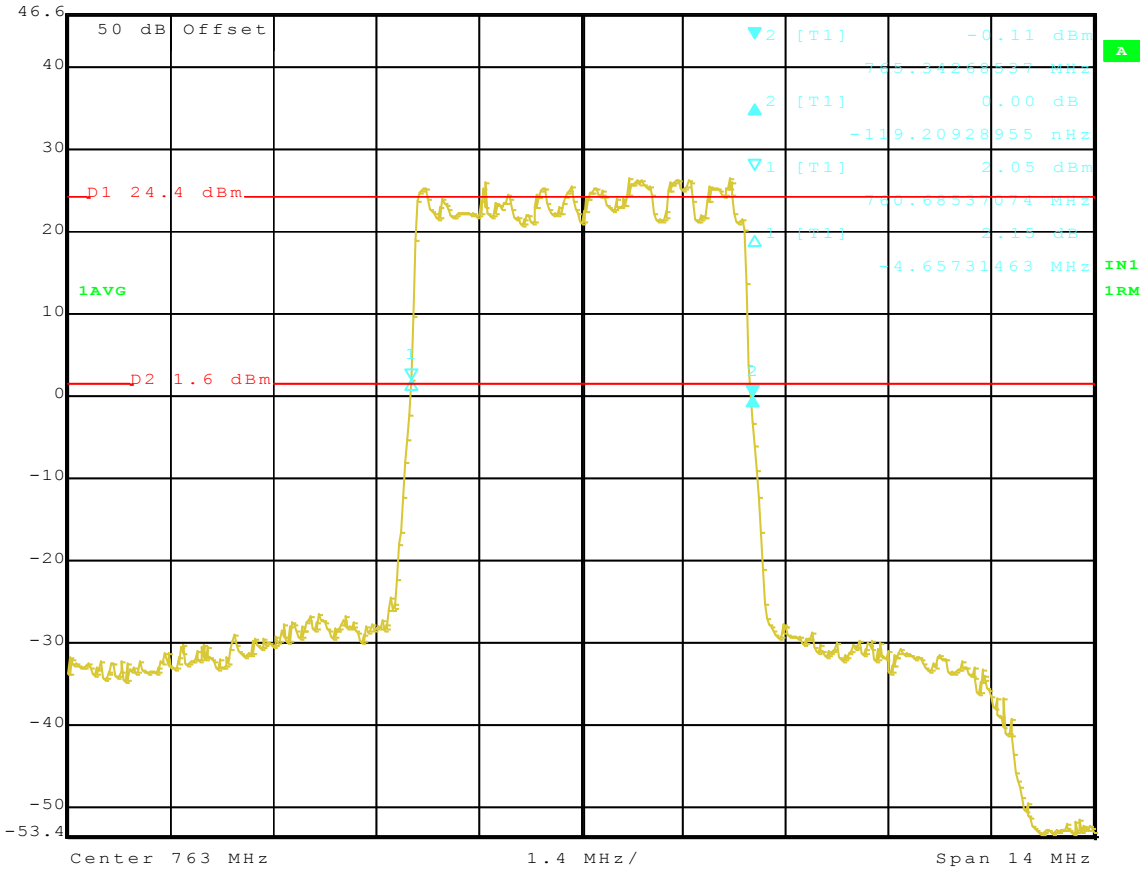
Delta 2 [T1] RBW 30 kHz RF Att 10 dB  
 Ref Lvl 0.00 dB VBW 300 kHz  
 46.6 dBm 596.04644775 nHz SWT 39 ms Unit dBm



Title: 26dB BANDWIDTH: Test Engineer: JY  
 Comment A: PUBLIC SAFETY B14; PWR: 40W; BLK-PS/D: 760.5 - 765.5 MHz  
 QPSK; FCC Prt 27; FCCID: AS5BBTRX-04; TRDU(M1)  
 Date: 17.OCT.2011 08:18:01



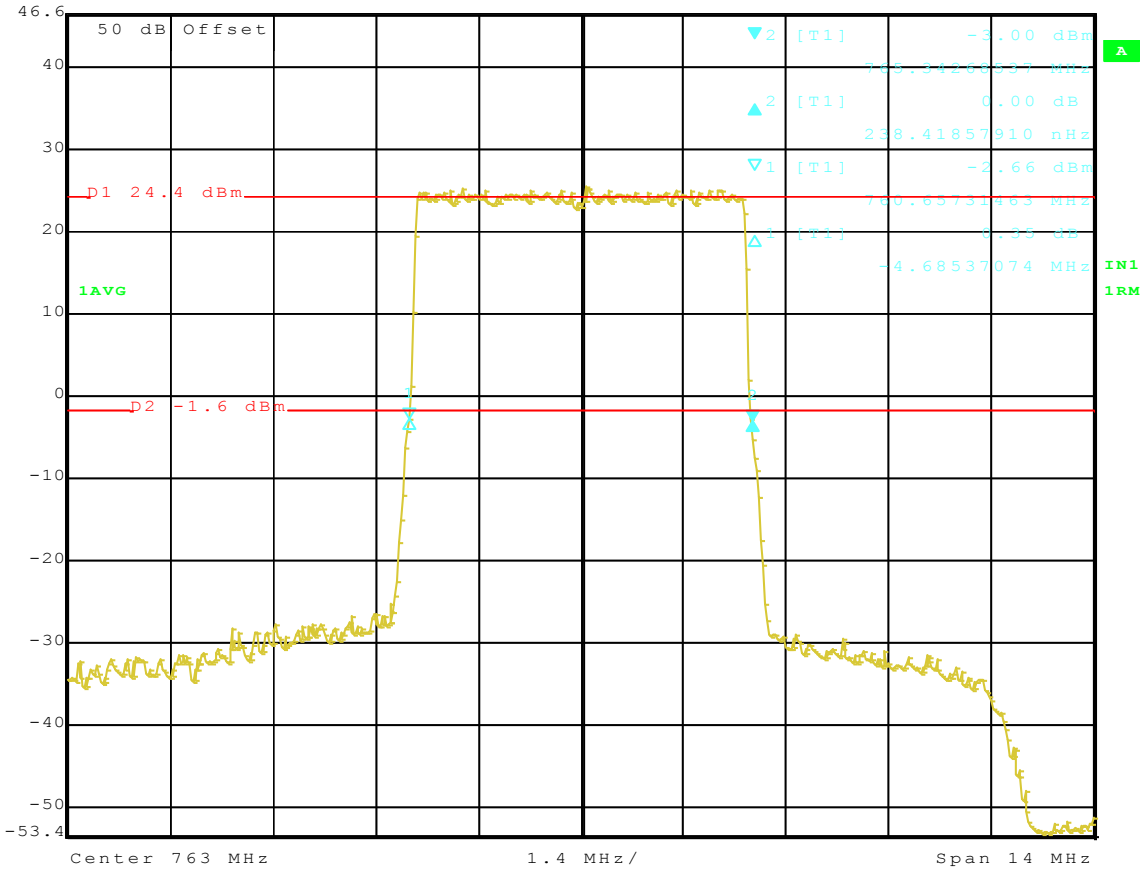
Delta 2 [T1] RBW 30 kHz RF Att 10 dB  
 Ref Lvl 0.00 dB VBW 300 kHz  
 46.6 dBm -119.20928955 nHz SWT 39 ms Unit dBm



Title: 26dB BANDWIDTH; Test Engineer: JY  
 Comment A: PUBLIC SAFETY B14; PWR: 40W; BLK-PS/D: 760.5 - 765.5 MHz  
 16QAM; FCC Prt 27; FCCID: AS5BBTRX-04; TRDU(M1)  
 Date: 17.OCT.2011 08:48:26



Delta 2 [T1] RBW 30 kHz RF Att 10 dB  
 Ref Lvl 0.00 dB VBW 300 kHz  
 46.6 dBm 238.41857910 nHz SWT 39 ms Unit dBm

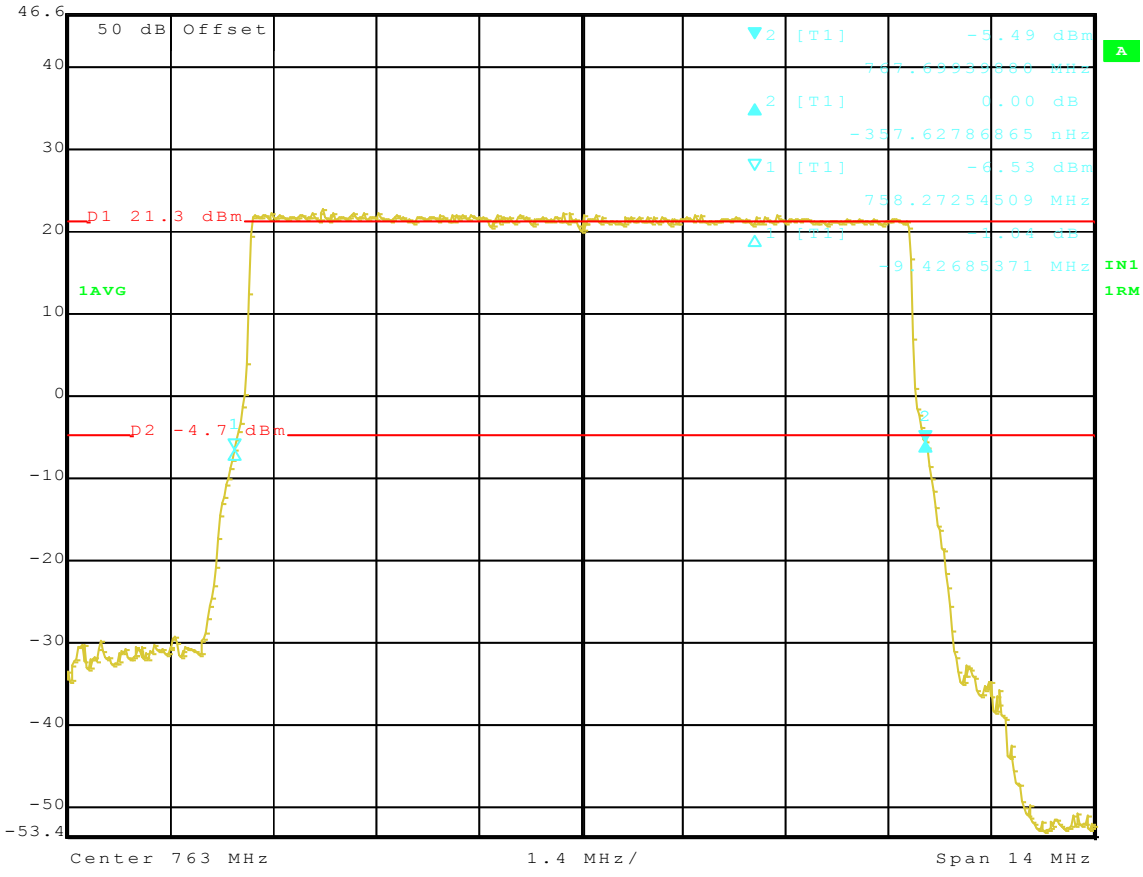


Title: 26dB BANDWIDTH: Test Engineer: JY  
 Comment A: PUBLIC SAFETY B14; PWR: 40W; BLK-PS/D: 760.5 - 765.5 MHz  
 64QAM; FCC Prt 27; FCCID: AS5BBTRX-04; TRDU(M1)  
 Date: 17.OCT.2011 08:33:24

**Block: Public Safety & D**  
**10 MHz Bandwidth 758 – 768 MHz**  
**QPSK, 16QAM, and 64QAM**  
**(26 dB Power Bandwidth)**



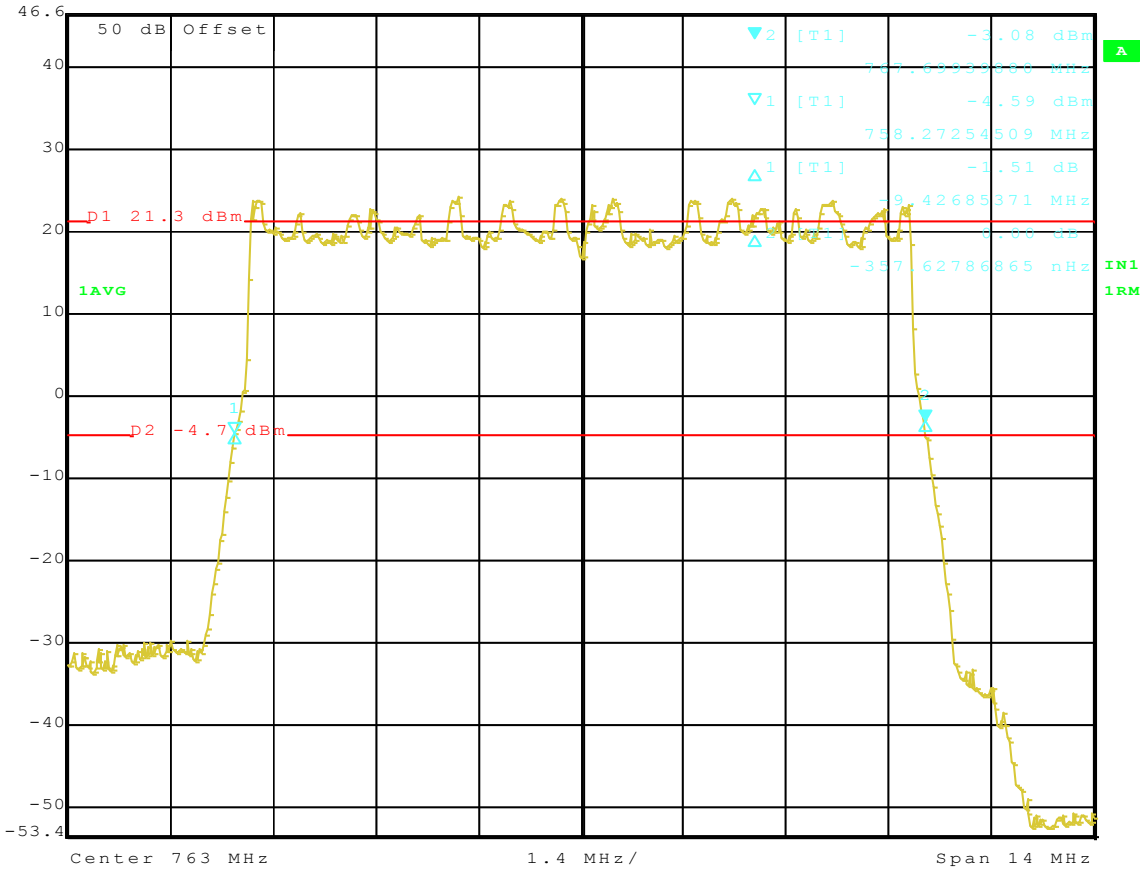
Delta 2 [T1] RBW 30 kHz RF Att 10 dB  
 Ref Lvl 0.00 dB VBW 300 kHz  
 46.6 dBm -357.62786865 nHz SWT 39 ms Unit dBm



Title: 26dB BANDWIDTH: Test Engineer: JY  
 Comment A: PUBLIC SAFETY B14; PWR: 40W; BLK-PS/D: 758- 768 MHz  
 QPSK 10MHz BW; FCC Prt 27; FCCID: AS5BBTRX-04; TRDU(M1)  
 Date: 17.OCT.2011 09:53:51



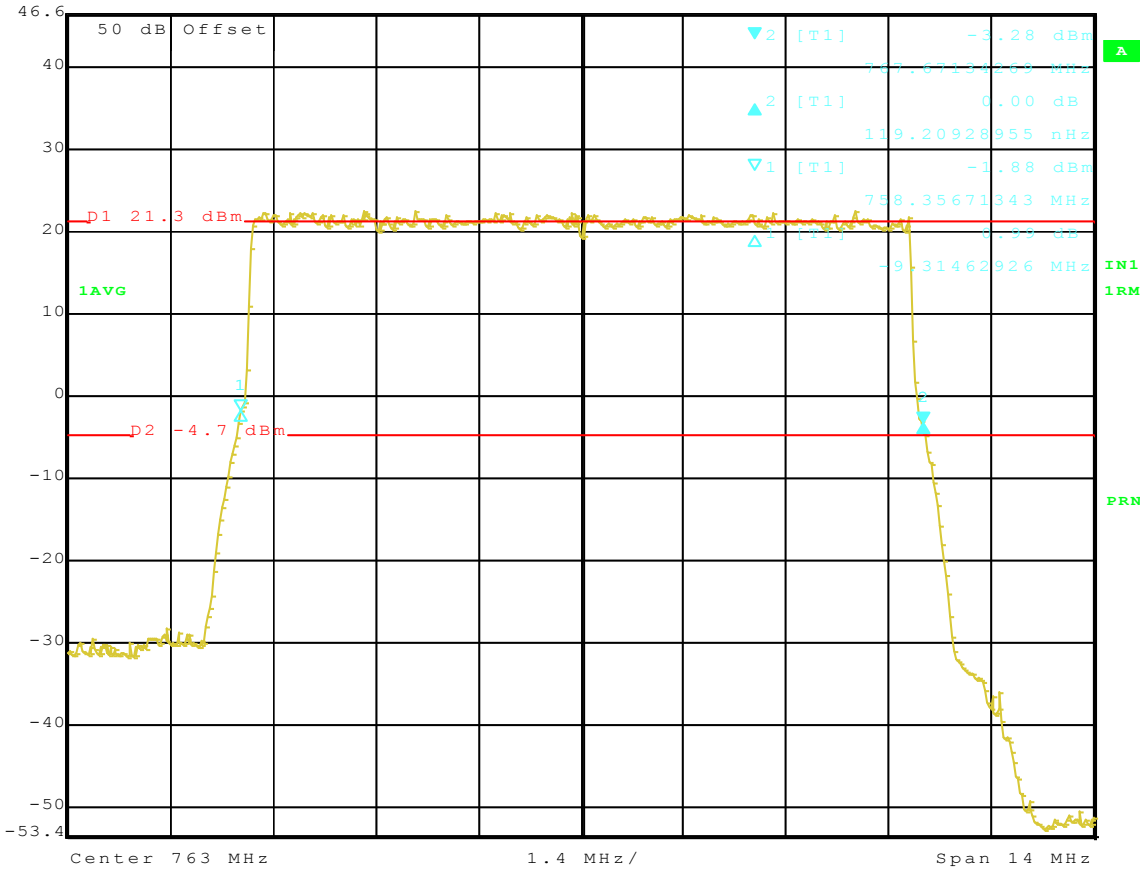
Marker 2 [T1] RBW 30 kHz RF Att 10 dB  
 Ref Lvl -3.08 dBm VBW 300 kHz  
 46.6 dBm 767.69939880 MHz SWT 39 ms Unit dBm



Title: 26dB BANDWIDTH: Test Engineer: JY  
 Comment A: PUBLIC SAFETY B14; PWR: 40W; BLK-PS/D: 758- 768 MHz  
 16QAM 10MHz BW; FCC Prt 27; FCCID: AS5BBTRX-04; TRDU(M1)  
 Date: 17.OCT.2011 10:03:17



Delta 2 [T1] RBW 30 kHz RF Att 10 dB  
 Ref Lvl 0.00 dB VBW 300 kHz  
 46.6 dBm 119.20928955 nHz SWT 39 ms Unit dBm



Title: 26dB BANDWIDTH: Test Engineer: JY  
 Comment A: PUBLIC SAFETY B14; PWR: 40W; BLK-PS/D: 758- 768 MHz  
 64QAM 10MHz BW; FCC Prt 27; FCCID: AS5BBTRX-04; TRDU(M1)  
 Date: 17.OCT.2011 10:22:41



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

**Section 27.53 (d) (5) and 90.543 9 (c)**

Also

*FCC publication FCC 11-6A*

**MEASUREMENT OF SPECTRUM MASK  
OCCUPIED BANDWIDTH**

The Spectrum mask close to the center of the carrier frequency (Occupied bandwidth) of the Long Term Evolution (LTE) Trials were 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 30 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 spectrum analyzer were considered.

The measurements were made on a “**LTE 700TRDU**”.

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 40 Watts (46.0 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 700TRDUs are capable of operating in the band of 758 MHz to 768 MHz (Block D and Public safety). The Base station presently tested was configured to operate at all blocks and bands listed in Table below 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. All tests were performed for QPSK, 16QAM and 64QAM modulations.*

**Block edge requirements:**

*FCC Section 27.53(d)(5): 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 30 kHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least 30 kHz may be employed.*

*FCC publication FCC 11-6A.pdf January 26, 2011 section 52 and FCC Section 90.543 (c): This section provides guidance similar to 27.53 (d)(5) as stated above.*

The list of Blocks, and Power measured at External Antenna Connector (EAC)

Block	Frequency (MHz)	Power (Watts)
D	758 - 763	40
Public Safety	763 – 768	40
D and Public safety	760.5-765.5	40
D and Public safety	758 - 763	40

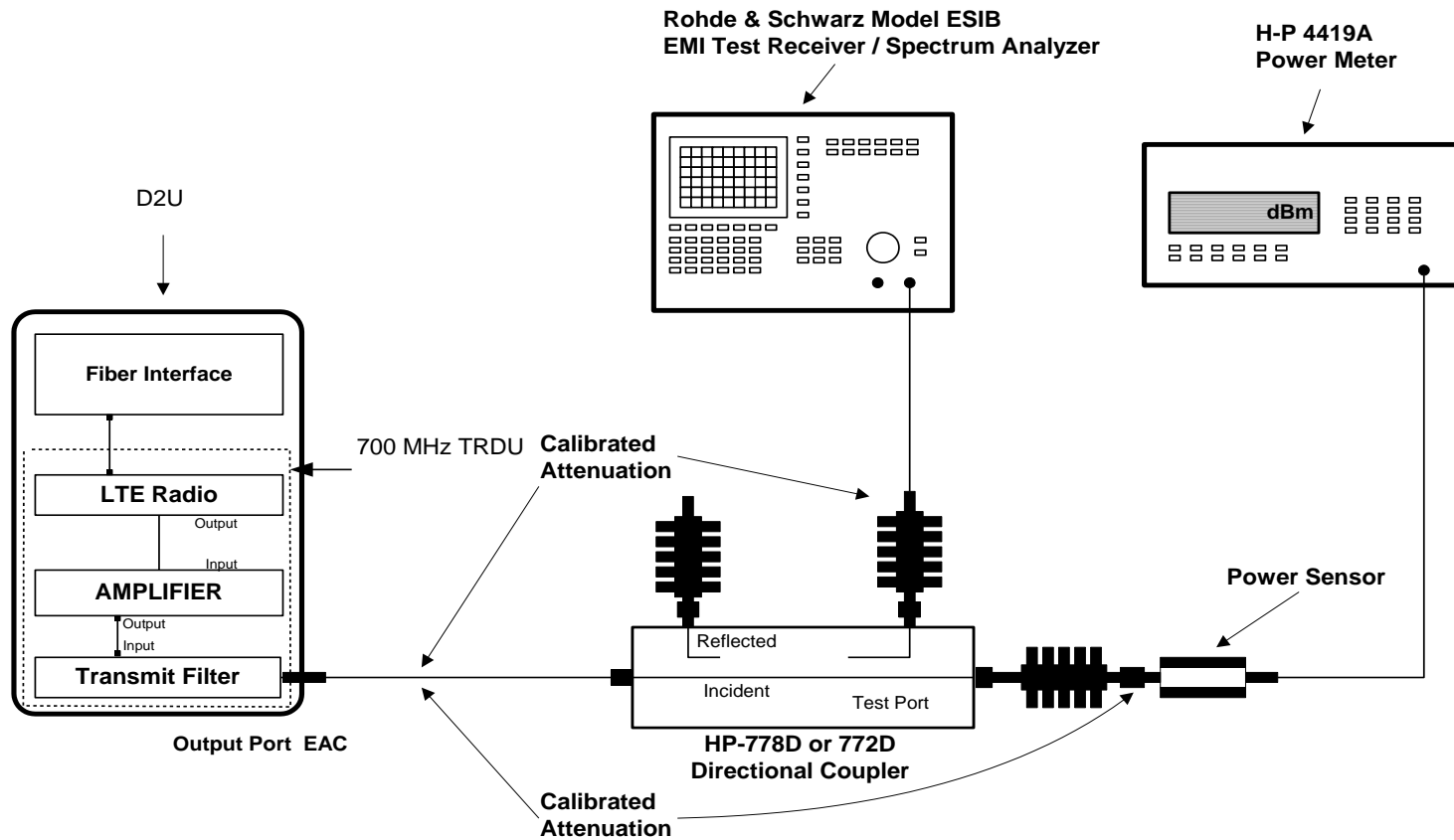
**Measurement uncertainty:**

Frequency: 100 Hz  
Amplitude: 0.5 dB

APPLICANT: **Alcatel-Lucent**

FCC ID: **AS5BBTRX-04**

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

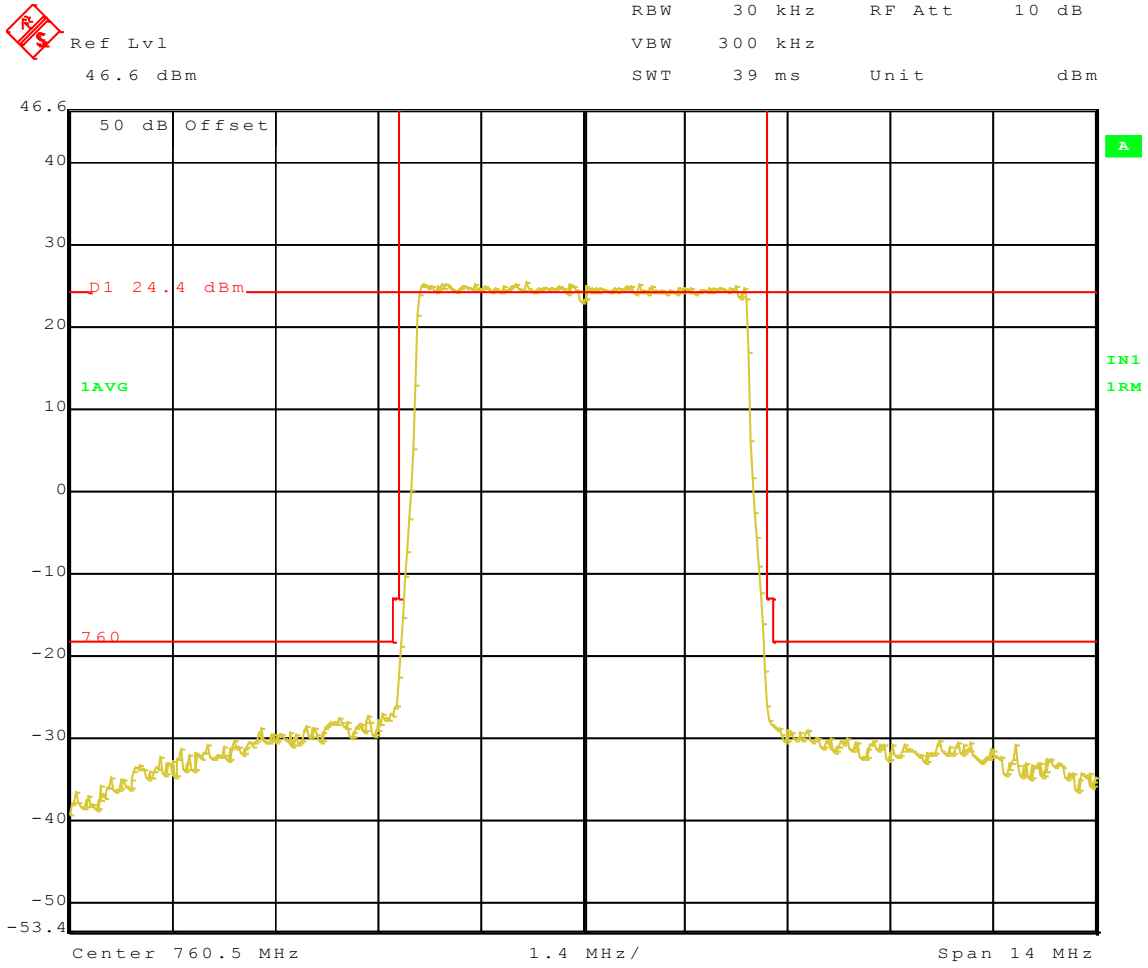


All components are calibrated over the frequency range of interest

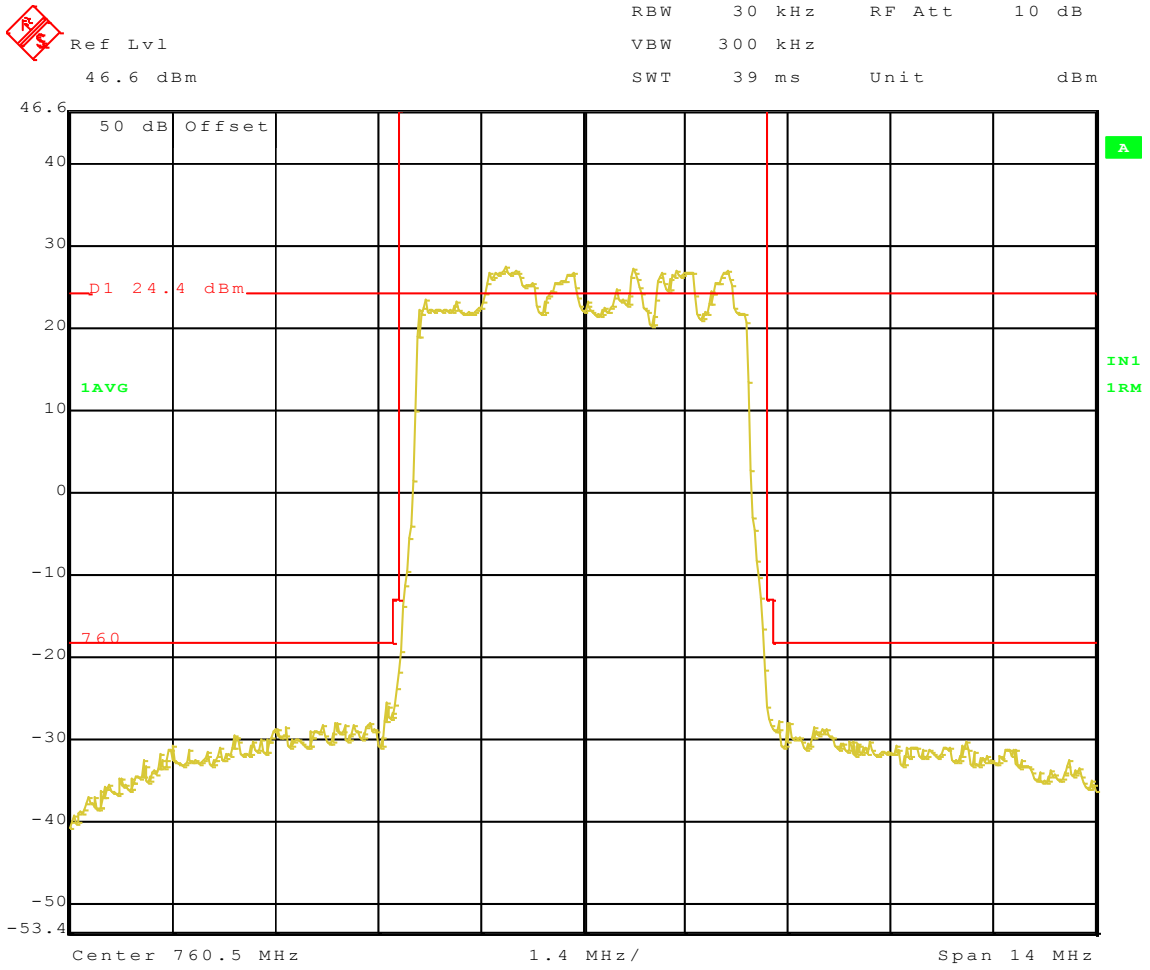
**Block: D**

**5 MHz Bandwidth 758 - 763 MHz  
QPSK, 16QAM and 64QAM**

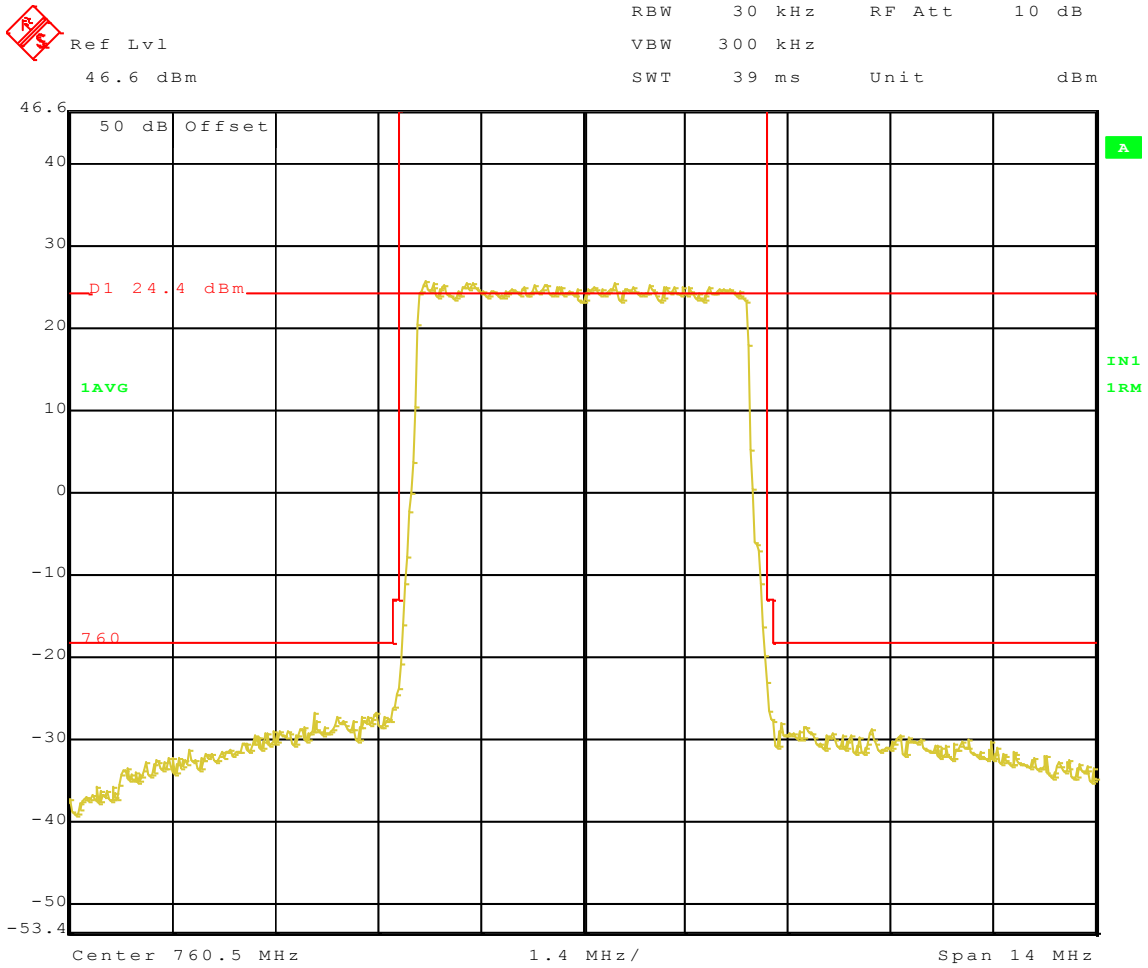
**SPECTRUM MASK/OCCUPIED BANDWIDTH**



Title: OCCUPIED BANDWIDTH: Test Engineer: SEG  
Comment A: PUBLIC SAFETY B14; PWR: 40W; BLK. D: 758 - 763 MHz  
QPSK; FCC Prt 27; FCCID: AS5BBTRX-04; TRDU(M1)  
Date: 13.OCT.2011 14:18:19



Title: OCCUPIED BANDWIDTH: Test Engineer: JY  
Comment A: PUBLIC SAFETY B14; PWR: 40W; BLK-D: 758 - 763 MHz  
16QAM; FCC Pkt 27; FCCID: AS5BBTRX-04; TRDU(M1)  
Date: 17.OCT.2011 12:58:44



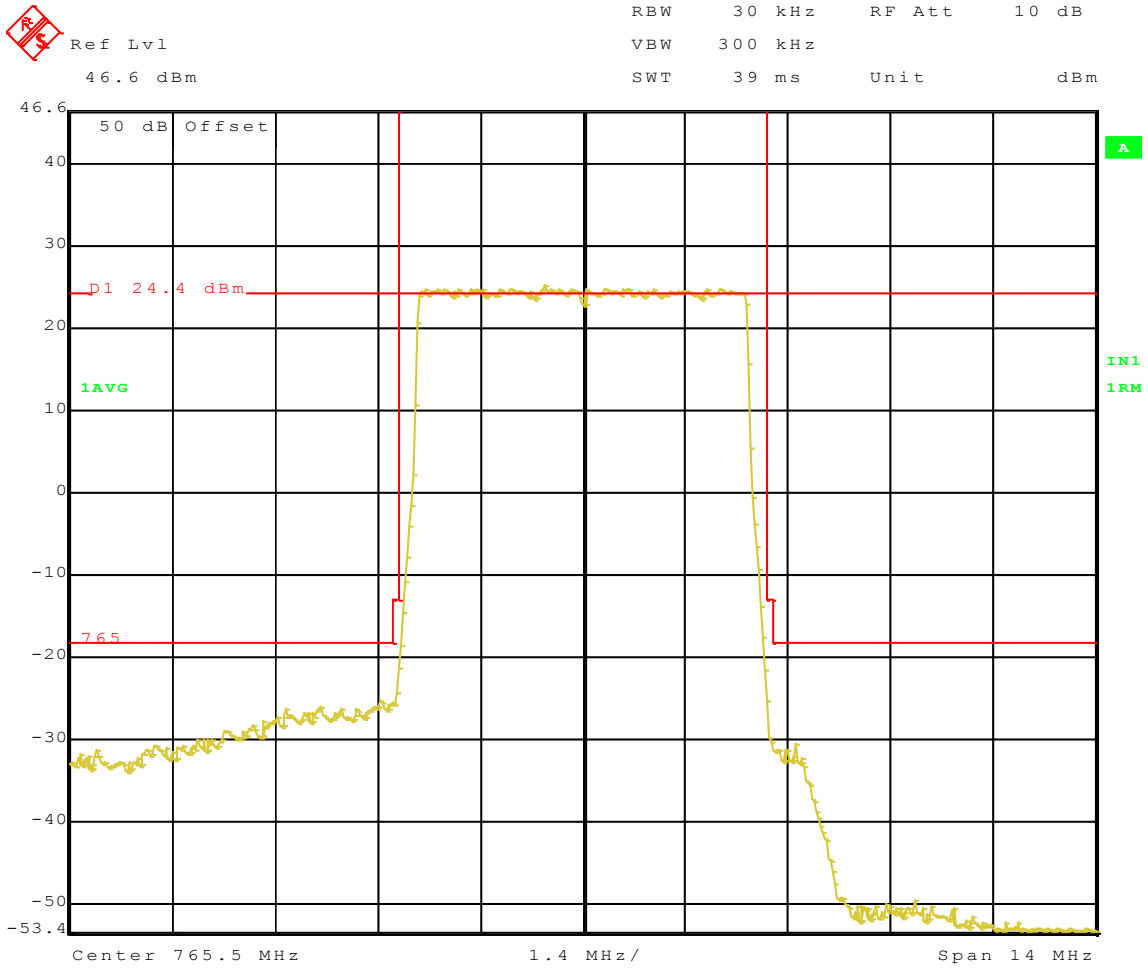
Title: OCCUPIED BANDWIDTH: Test Engineer: SEG  
Comment A: PUBLIC SAFETY B14; PWR: 40W; BLK. D: 758 - 763 MHz  
64QAM; FCC Pkt 27; FCCID: AS5BBTRX-04; TRDU(M1)  
Date: 13.OCT.2011 15:52:21



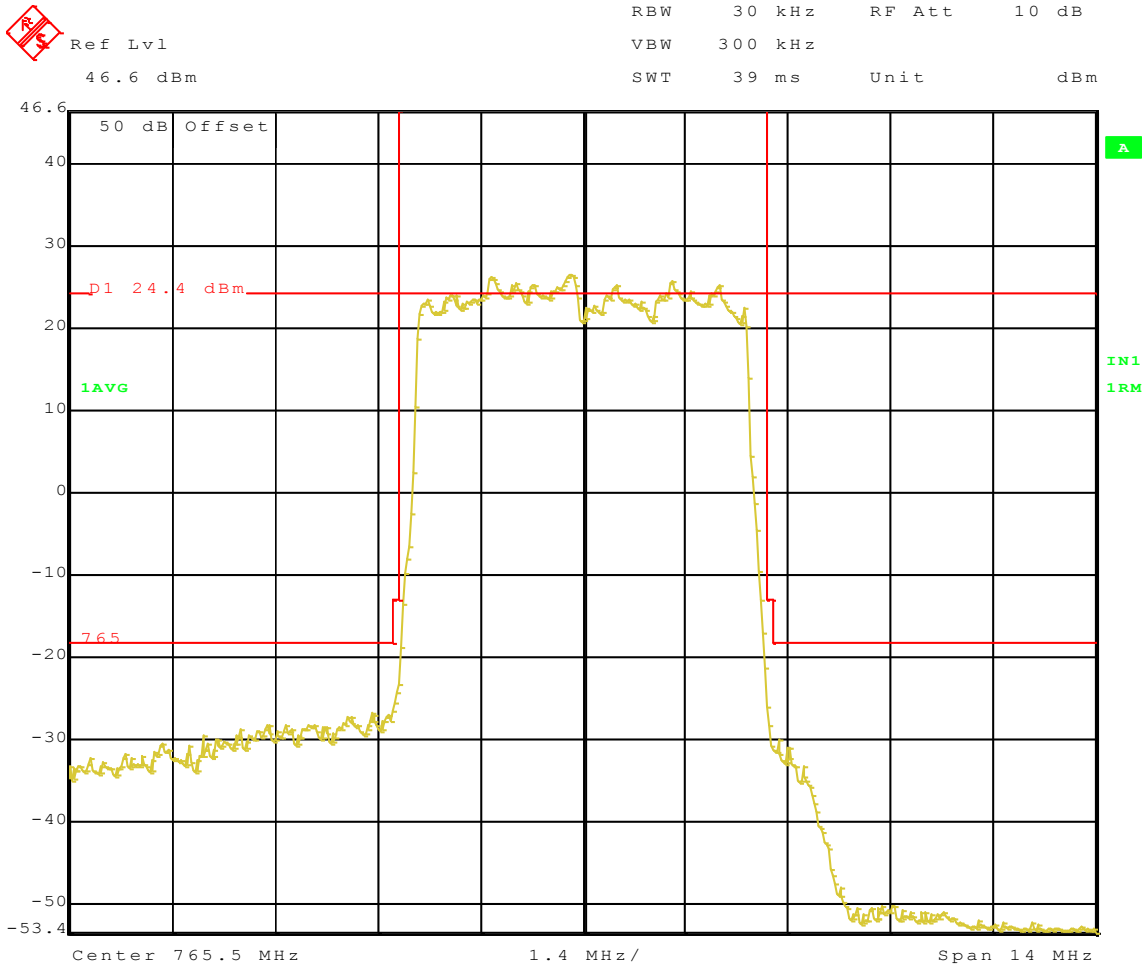
**Block: Public Safety**

**5 MHz Bandwidth 763 – 768 MHz  
QPSK, 16QAM and 64QAM**

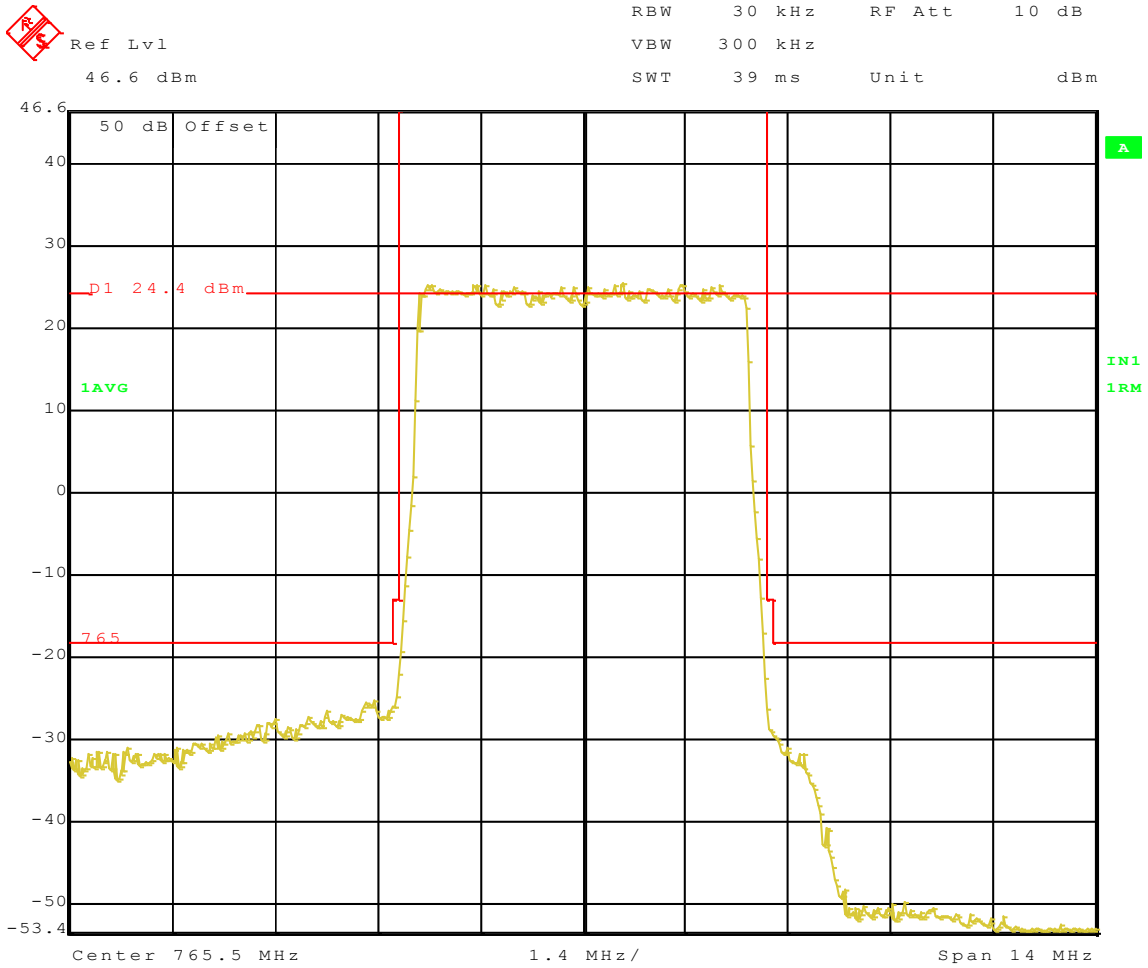
**SPECTRUM MASK/OCCUPIED BANDWIDTH**



Title: OCCUPIED BANDWIDTH: Test Engineer: JY  
Comment A: PUBLIC SAFETY B14; PWR: 40W; BLK.PS: 763 - 768 MHz  
QPSK; FCC Prt 27; FCCID: AS5BBTRX-04; TRDU(M1)  
Date: 16.OCT.2011 10:09:49



Title: OCCUPIED BANDWIDTH: Test Engineer: JY  
Comment A: PUBLIC SAFETY B14; PWR: 40W; BLK.PS: 763 - 768 MHz  
16QAM; FCC Prt 27; FCCID: AS5BBTRX-04; TRDU(M1)  
Date: 16.OCT.2011 12:13:14

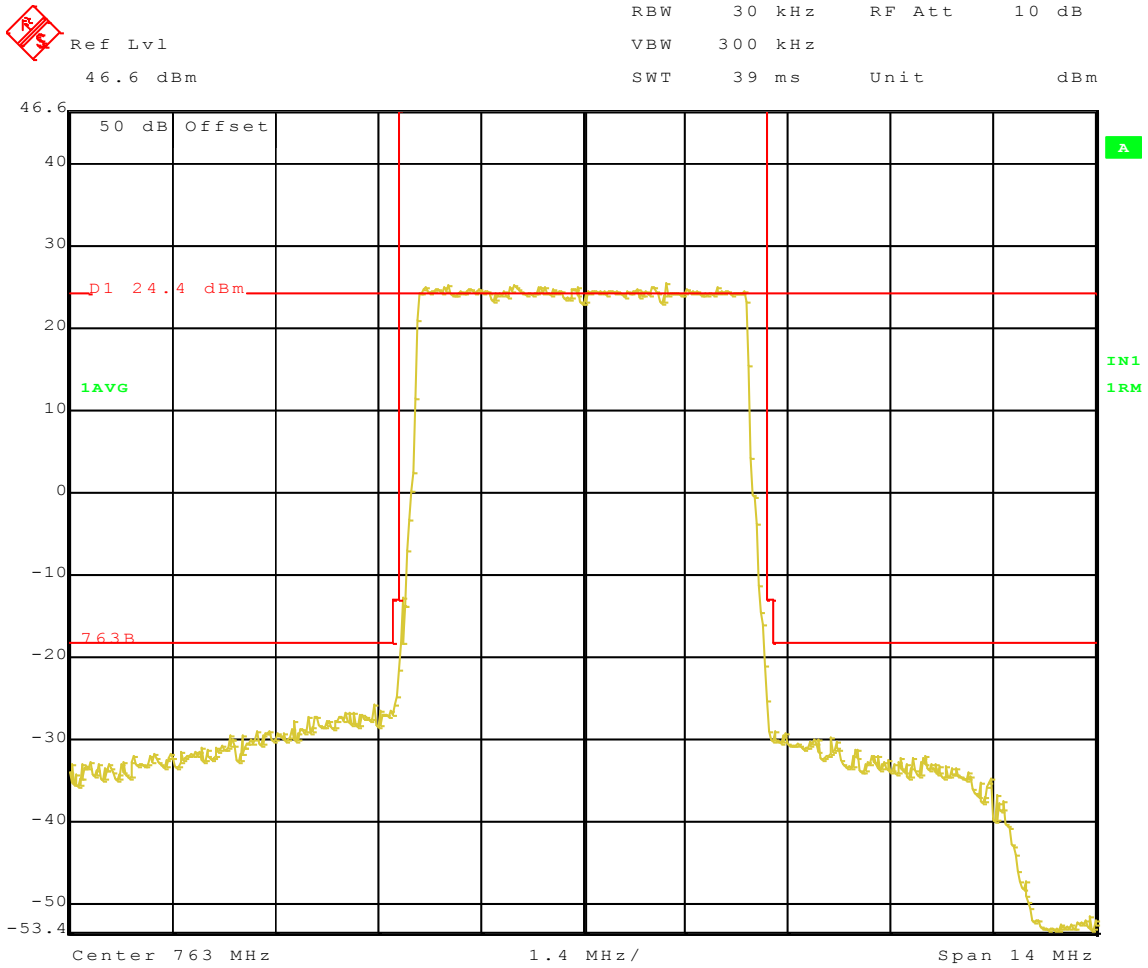


Title: OCCUPIED BANDWIDTH: Test Engineer: JY  
Comment A: PUBLIC SAFETY B14; PWR: 40W; BLK.PS: 763 - 768 MHz  
64QAM; FCC Prt 27; FCCID: AS5BBTRX-04; TRDU(M1)  
Date: 16.OCT.2011 11:05:01

**Block: Public Safety & D**

**5 MHz Bandwidth 760.5 – 765.5 MHz  
QPSK, 16QAM and 64QAM**

**SPECTRUM MASK/OCCUPIED BANDWIDTH**

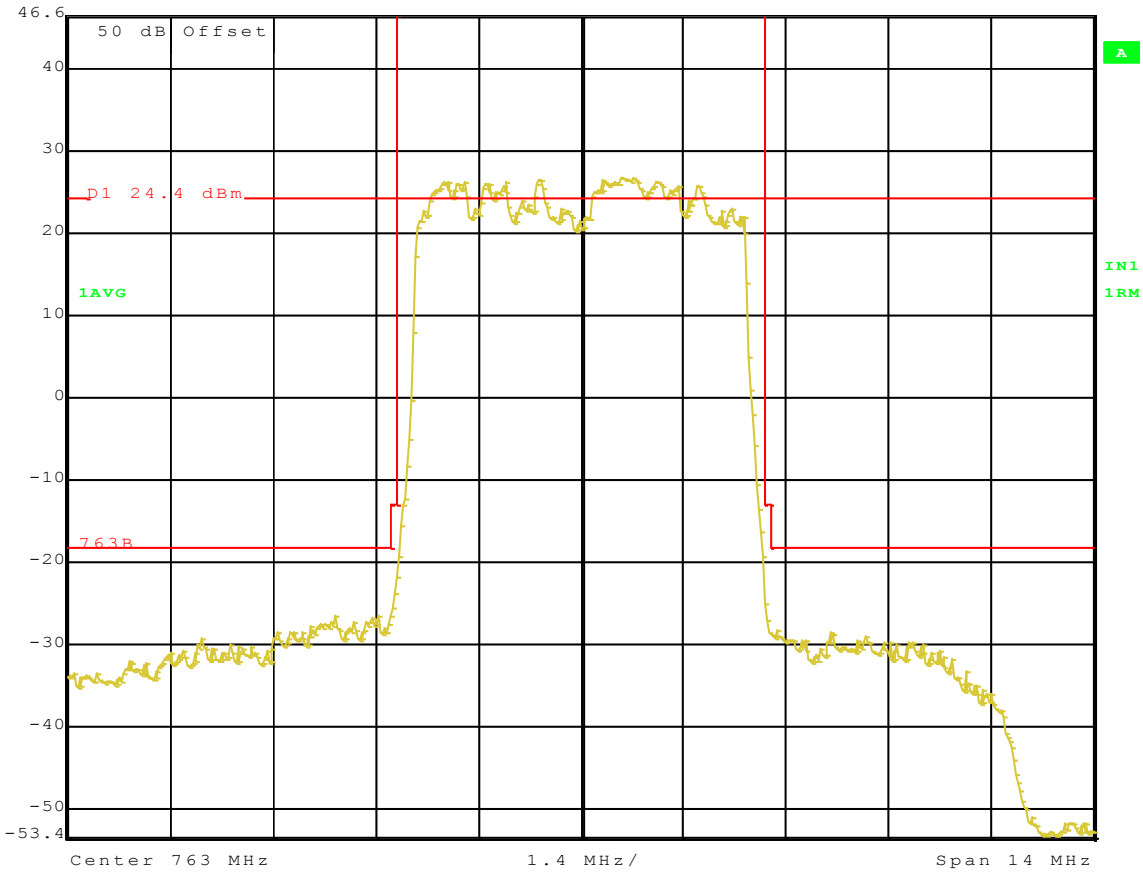


Title: OCCUPIED BANDWIDTH: Test Engineer: JY  
Comment A: PUBLIC SAFETY B14; PWR: 40W; BLK-PS/D: 760.5 - 765.5 MHz  
QPSK; FCC Prt 27; FCCID: AS5BBTRX-04; TRDU(M1)  
Date: 17.OCT.2011 08:21:27

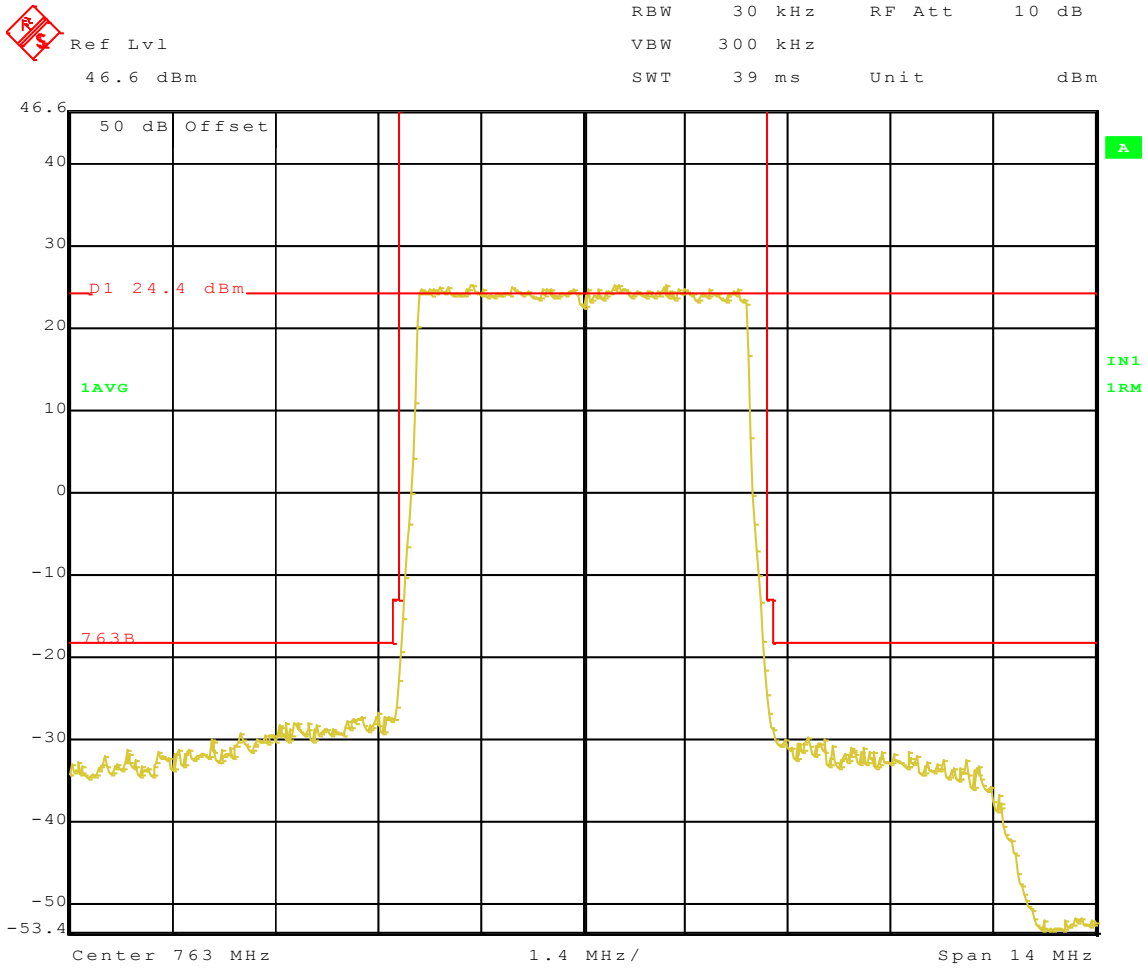


Ref Lvl  
46.6 dBm

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



Title: OCCUPIED BANDWIDTH: Test Engineer: JY  
Comment A: PUBLIC SAFETY B14; PWR: 40W; BLK-PS/D: 760.5 - 765.5 MHz  
16QAM; FCC Prt 27; FCCID: AS5BBTRX-04; TRDU(M1)  
Date: 17.OCT.2011 08:53:19



Title: OCCUPIED BANDWIDTH: Test Engineer: JY  
Comment A: PUBLIC SAFETY B14; PWR: 40W; BLK-PS/D: 760.5 - 765.5 MHz  
64QAM; FCC Pkt 27; FCCID: AS5BBTRX-04; TRDU(M1)  
Date: 17.OCT.2011 08:28:06



**Block: Public Safety & D**

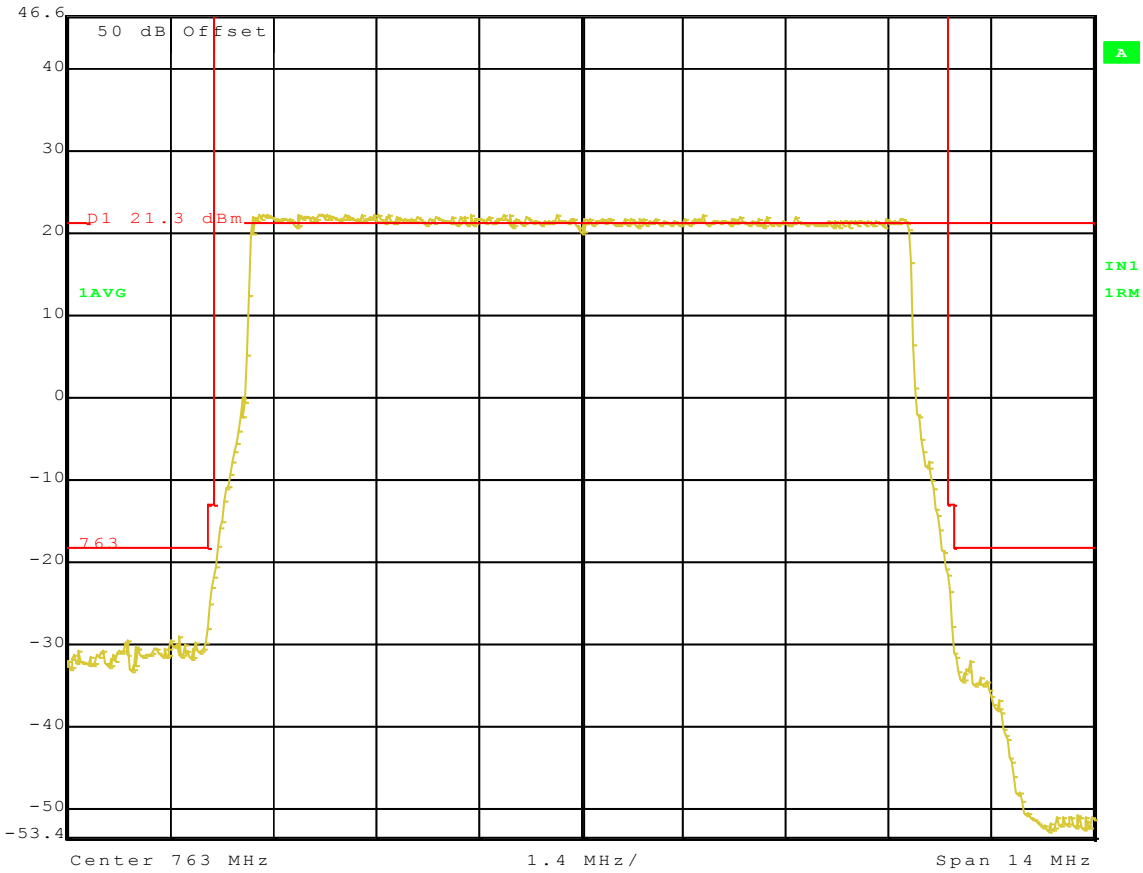
**10 MHz Bandwidth 758 – 768 MHz  
QPSK, 16QAM and 64QAM**

**SPECTRUM MASK/OCCUPIED BANDWIDTH**

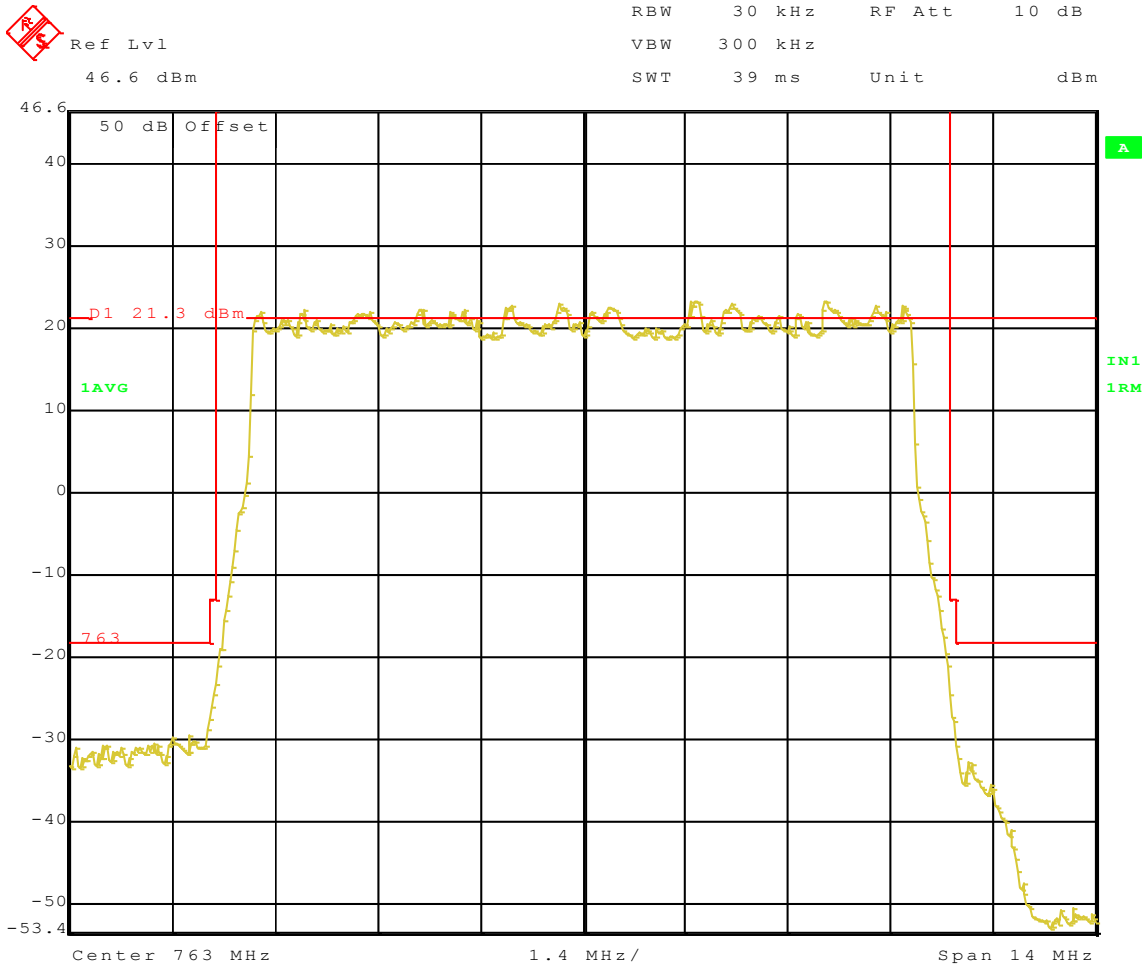


Ref Lvl  
46.6 dBm

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



Title: OCCUPIED BANDWIDTH: Test Engineer: JY  
Comment A: PUBLIC SAFETY B14; PWR: 40W; BLK-PS/D: 758- 768 MHz  
QPSK 10MHz BW; FCC Prt 27; FCCID: AS5BBTRX-04; TRDU(M1)  
Date: 17.OCT.2011 09:46:56

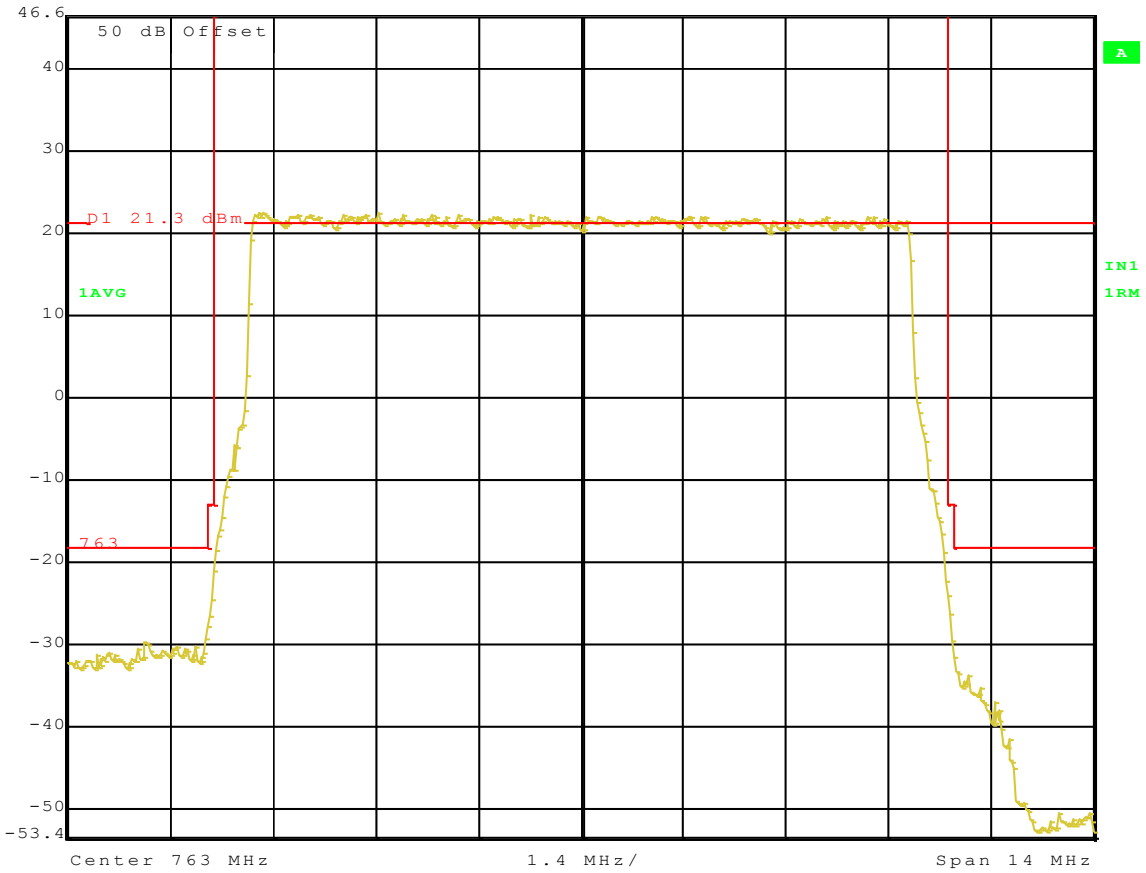


Title: OCCUPIED BANDWIDTH: Test Engineer: JY  
Comment A: PUBLIC SAFETY B14; PWR: 40W; BLK-PS/D: 758- 768 MHz  
16QAM 10MHz BW; FCC Prt 27; FCCID: AS5BBTRX-04; TRDU (M1)  
Date: 17.OCT.2011 10:08:26



Ref Lvl  
46.6 dBm

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



Title: OCCUPIED BANDWIDTH: Test Engineer: JY  
Comment A: PUBLIC SAFETY B14; PWR: 40W; BLK-PS/D: 758- 768 MHz  
64QAM 10MHz BW; FCC Prt 27; FCCID: AS5BBTRX-04; TRDU (M1)  
Date: 17.OCT.2011 10:18:37

## **Measurement 4**

**FCC Section 2.1051, 27.53 (d) and 90.543 (c) and (e)**

Also

*FCC publication FCC 11-6A*

**Spurious Emissions at Antenna Transmit Terminals**

## **Measurement -4**

**MEASUREMENT OF  
SPURIOUS EMISSIONS  
AT TRANSMIT ANTENNA PORT  
FCC 27.53 (d) and 90.543 (c) and (e)**

Also

*FCC publication FCC 11-6A*

**Spurious Emissions at Transmit Antenna Terminals**

Spurious Emissions at the transmit-antenna terminals were investigated over the frequency range of 9 kHz to the 22 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 section 27.53 and 90.543. Measurements were made at 40W per carrier for 10 MHz Bandwidth, and 40W per carrier for 5MHz Bandwidth at antenna terminals. The measured spurious emission levels were plotted for the frequency range 9 kHz to 12.75 GHz. The measurements were made using following receiver parameters:

The list of blocks and bands, tested are listed below:

Block	Frequency (MHz)	Power (Watts)
D	758 - 763	40
Public Safety	763 – 768	40
D and Public safety	760.5-765.5	40
D and Public safety	758 - 763	40

***FCC Limits for Operation in Band 758-763 MHz:***

- (1) FCC section 27.53 (d)(1): On all frequencies between 769-775 MHz and 799-805 MHz by a factor not less than  $76+10 \log (P)$  or -46dBm in a 6.25 kHz band segments.***
- (2) FCC Section 27.53(d)(4) and (5): on all frequency bands other than indicated (1) above will be based on measurement instrument employing resolution bandwidth of 100 kHz bands or greater out band emissions shall be attenuated at least  $43 + 10\log (P)$  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***

***FCC limits for operation in 763-768 MHz:***

- (1) FCC section 90.543(e): On all frequencies between 769-775 MHz and 799-805 MHz by a factor not less than  $76+10 \log (P)$  or -46dBm in a 6.25 kHz band segments.***
- (2) FCC section 90.543(f): All emissions including harmonics in the band 1559-1610 MHz shall be limited to -70dBW/MHz or -40dBm/MHz isotropically radiated power for wide band signals. For the purpose of equipment authorization, a transmitter must be tested with antenna that is representative of type that will be used. In this case if antenna gain of 0 dBi and cable loss 0 dB is assumed, the antenna terminal spurious emissions at 1559-1610 MHz will be -40dBm/MHz***

**(3) FCC publication FCC 11-6A.pdf January 26, 2011 section 51: On any frequency outside the 763-768 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least  $43 + 10 \log (P)$  dB using 30 KHz.**

The tests were performed in following modulation configurations:

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

**RESULTS:**

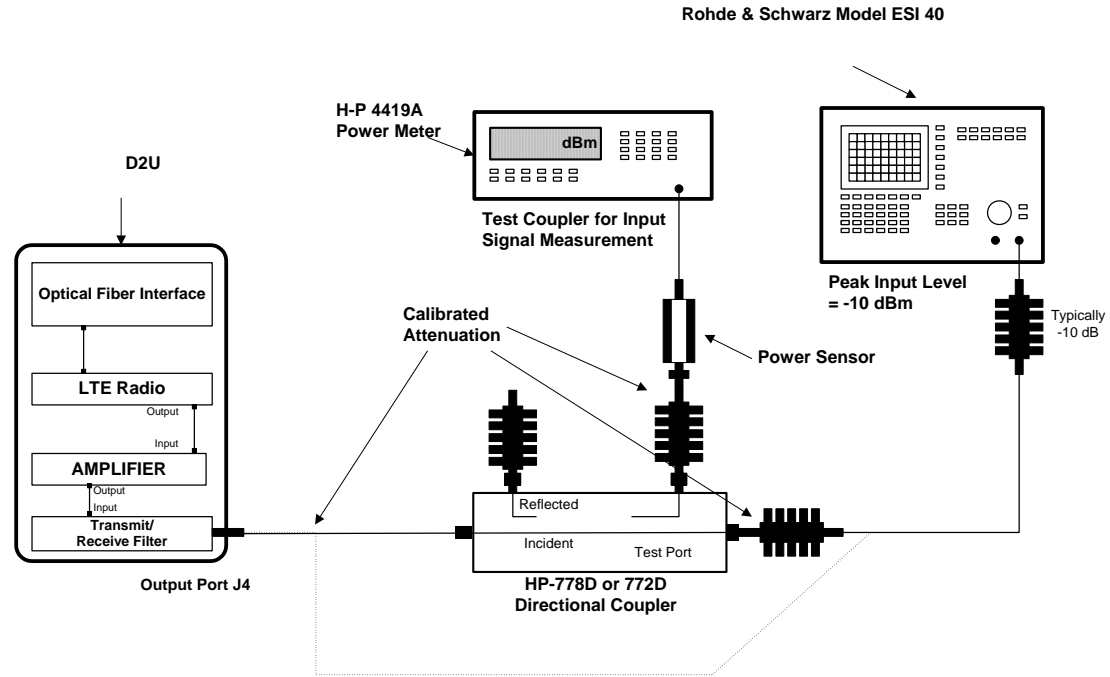
The magnitude of spurious emissions is within the specification limits of FCC Part 27.53(d), 90.543 and *FCC publication FCC 11-6A*.

Measurement uncertainty:

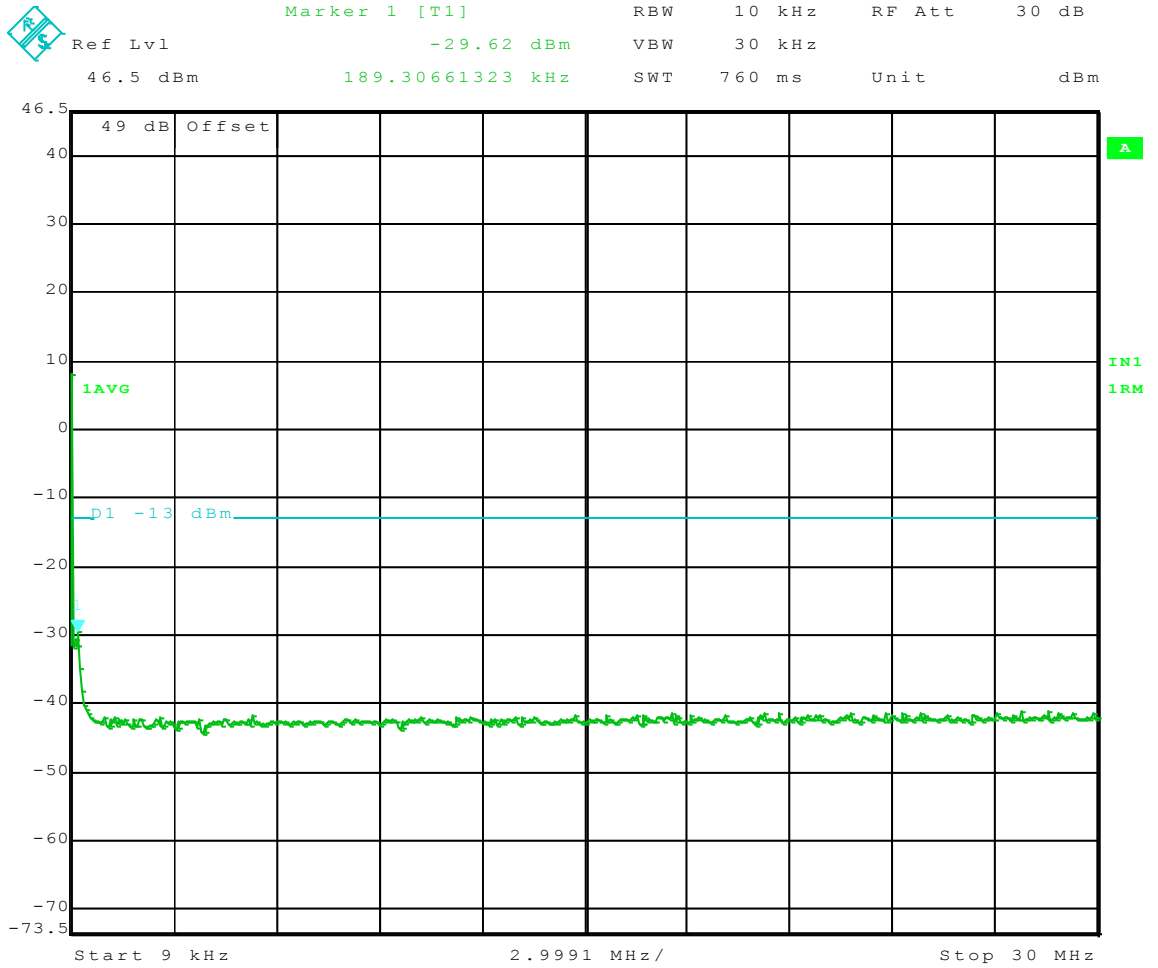
- 9 kHz to 20 MHz: Frequency = 10 Hz, Amplitude = 0.5 dB
- 20 MHz to 1 GHz: Frequency = 100Hz, Amplitude = 0.5 dB
- 1 GHz to 10 GHz: Frequency = 10 kHz, Amplitude = 0.5 dB



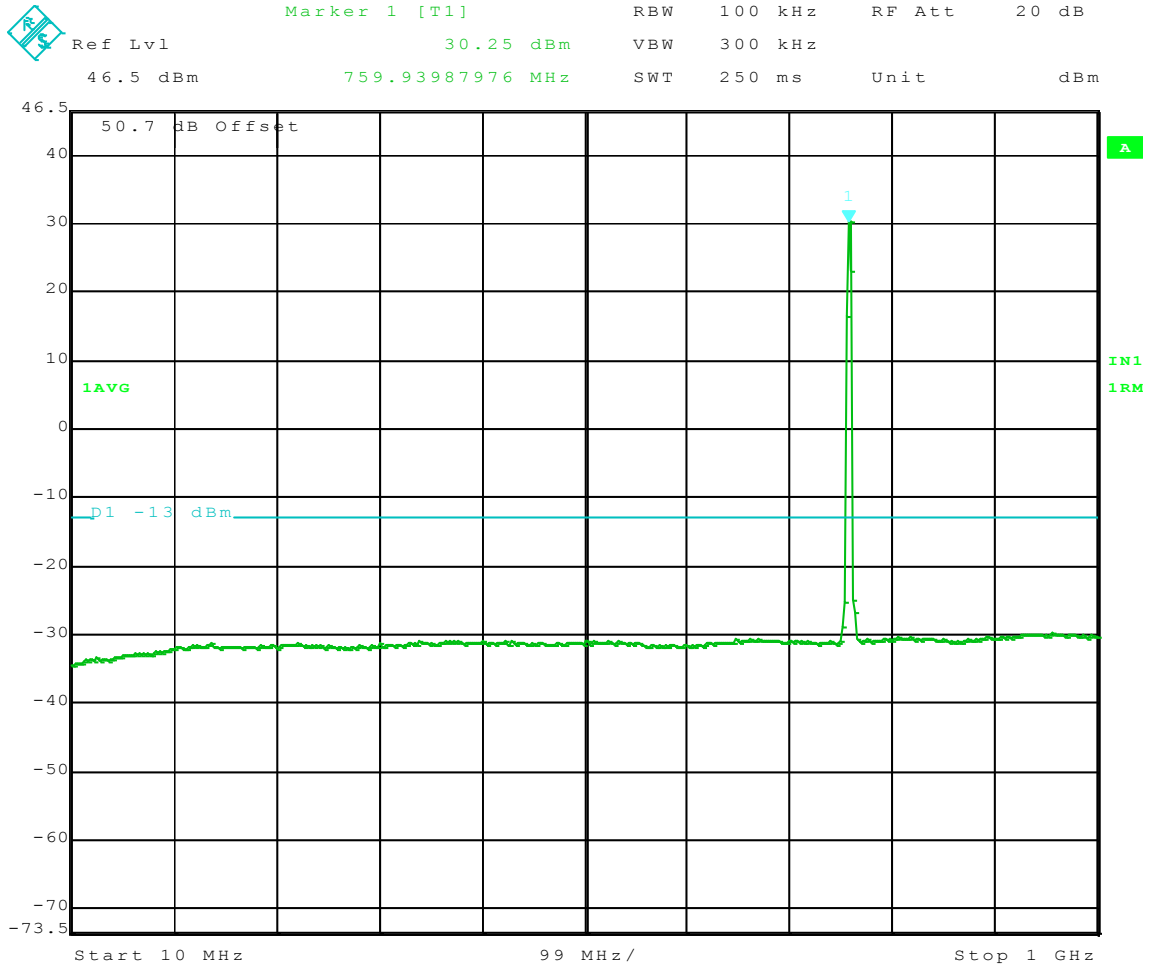
Figure A. TEST CONFIGURATION FOR CONDUCTED SPURIOUS



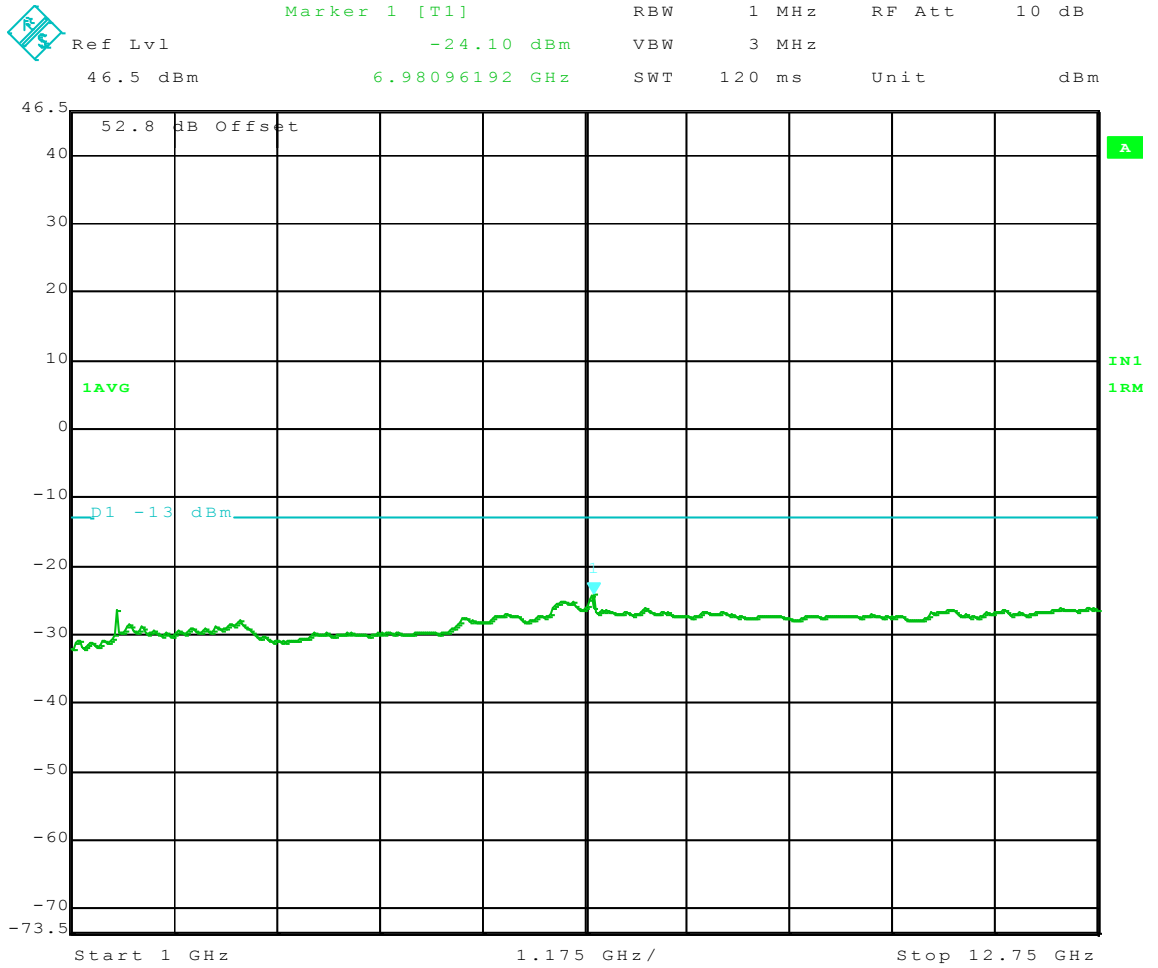
**Transmit Port  
Antenna Conducted Spurious Emissions  
Part 27  
Block: D  
QPSK Modulation  
Bandwidth 758 – 763 MHz**




Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; Test Engineer: SEG  
Comment A: PUBLIC SAFETY B14; PWR: 40W; BLK. D: 758 - 763 MHz  
QPSK; FCC Prt 27; FCCID: AS5BBTRX-04; TRDU(M1)  
Date: 24.AUG.2011 10:12:21

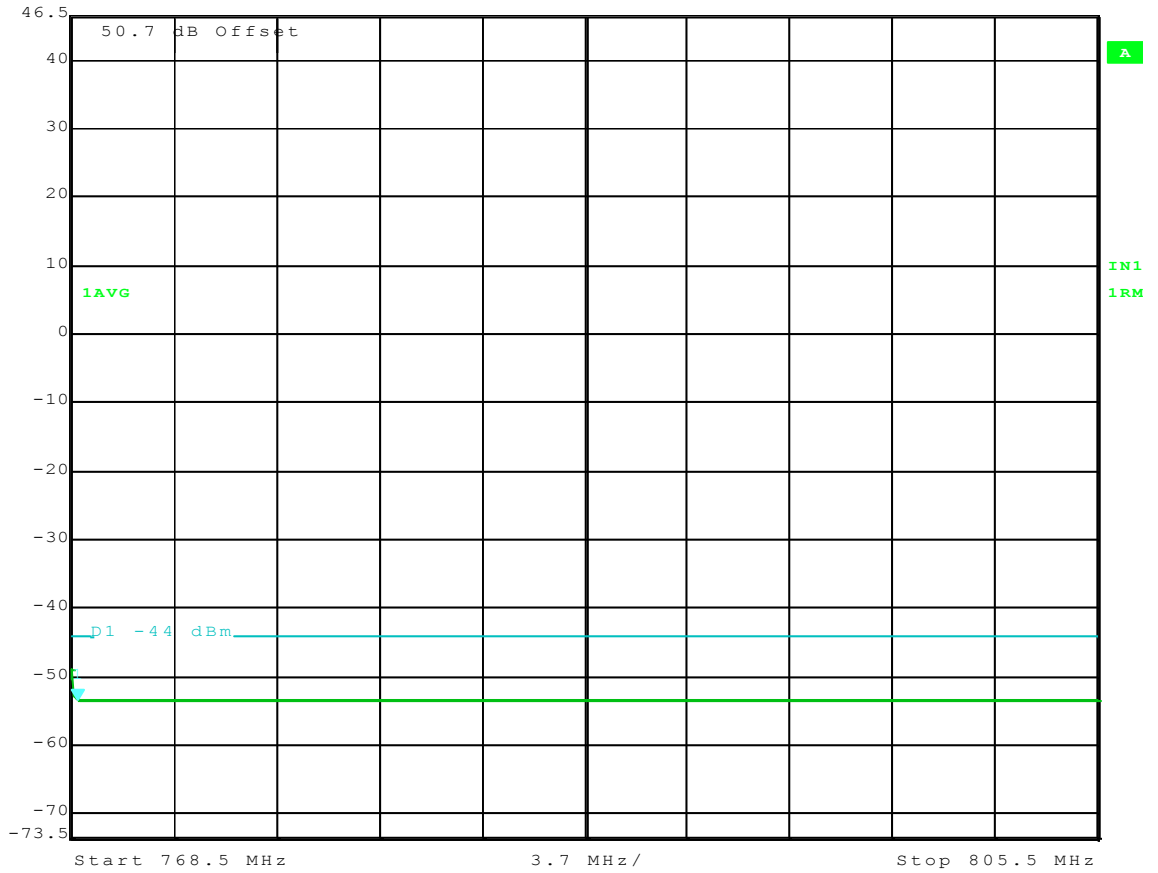


Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; Test Engineer: SEG  
Comment A: PUBLIC SAFETY B14; PWR: 40W; BLK. D: 758 - 763 MHz  
QPSK; FCC Prt 27; FCCID: AS5BBTRX-04; TRDU(M1)  
Date: 24.AUG.2011 10:14:38



Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; Test Engineer: SEG  
Comment A: PUBLIC SAFETY B14; PWR: 40W; BLK. D: 758 - 763 MHz  
QPSK; FCC Prt 27; FCCID: AS5BBTRX-04; TRDU(M1)  
Date: 24.AUG.2011 10:17:12

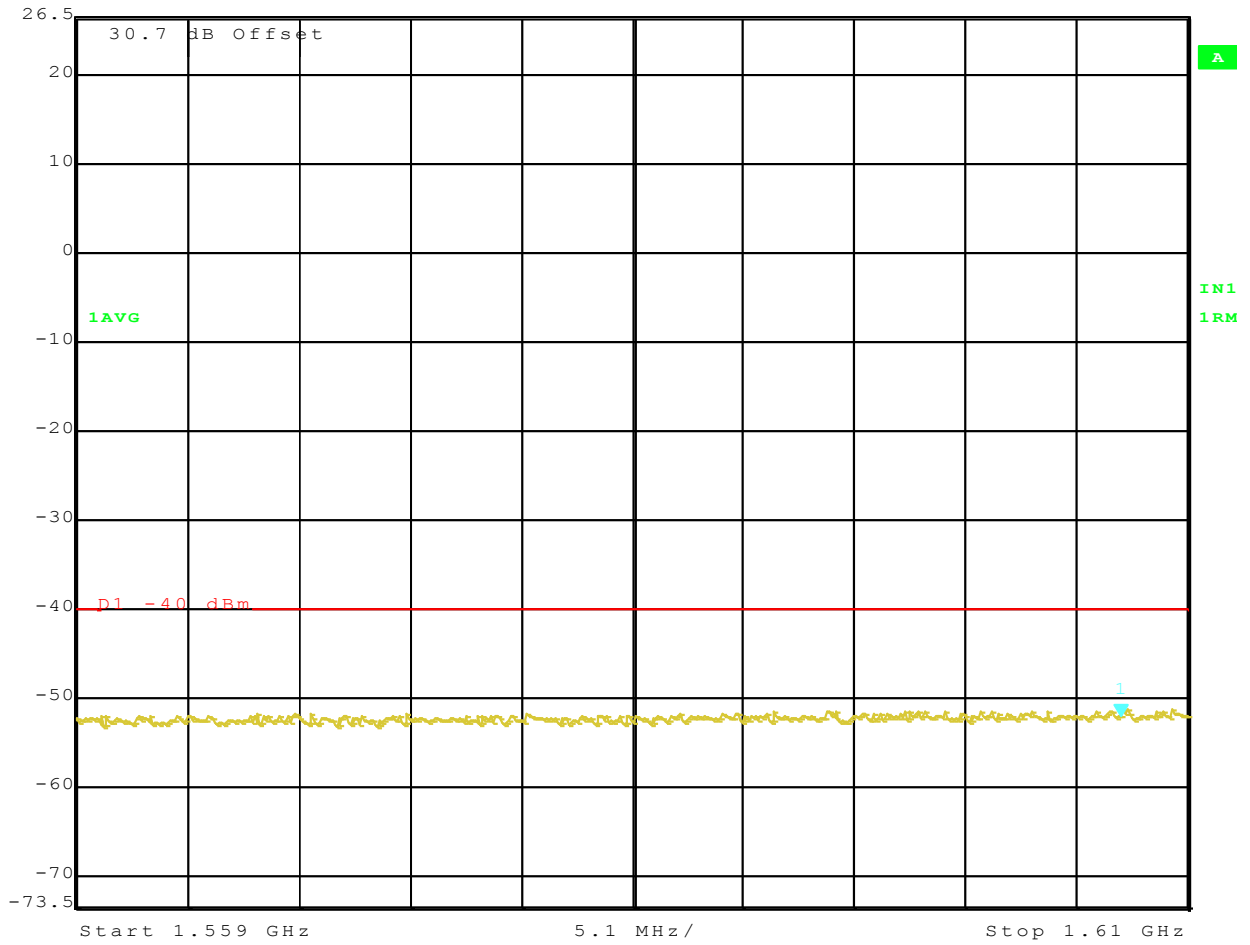
 Marker 1 [T1] RBW 10 kHz RF Att 10 dB  
Ref Lvl -53.50 dBm VBW 30 kHz  
46.5 dBm 768.72244489 MHz SWT 940 ms Unit dBm



Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; Test Engineer: SEG  
Comment A: PUBLIC SAFETY B14; PWR: 40W; BLK. D: 758 - 763 MHz  
QPSK; FCC Prt 27; FCCID: AS5BBTRX-04; TRDU(M1)  
Date: 24.AUG.2011 10:24:53



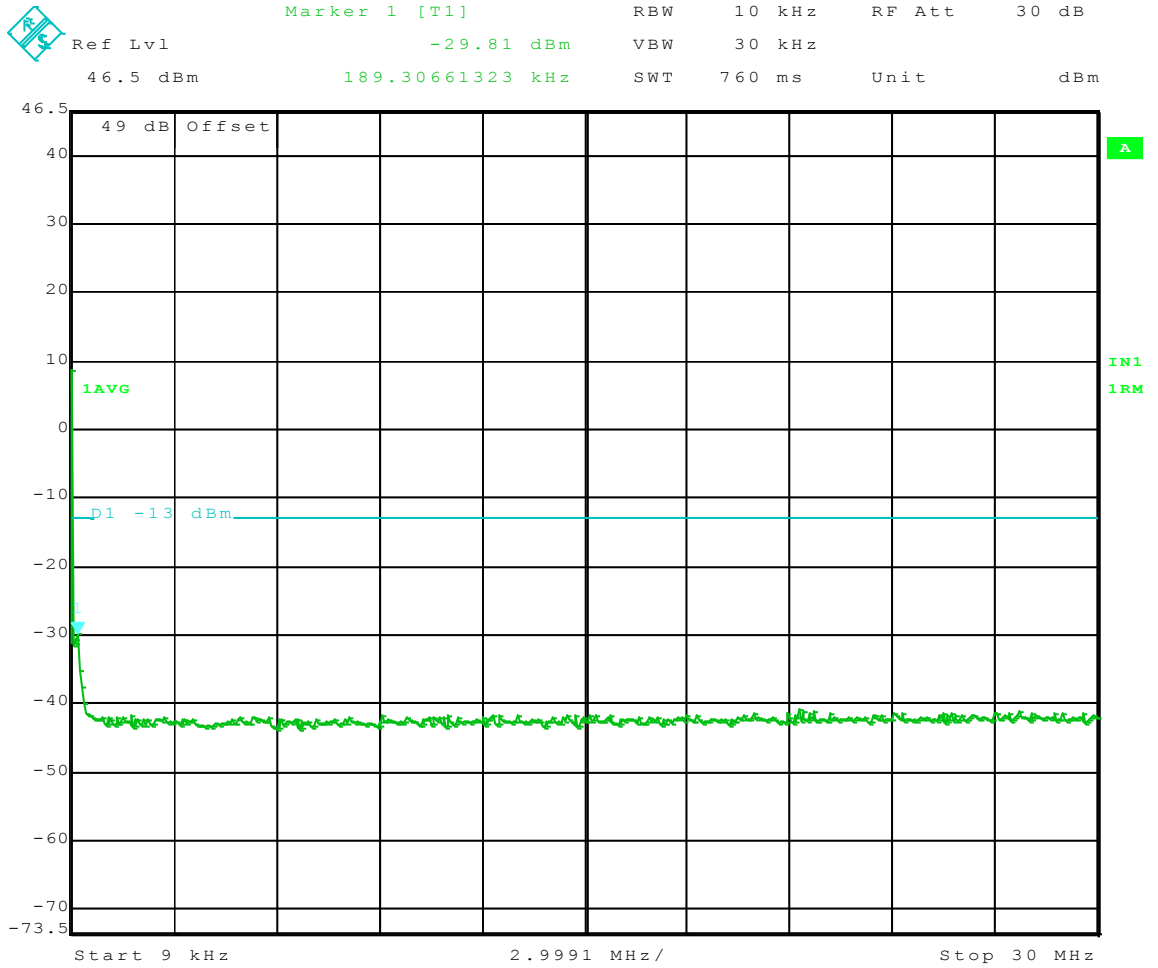
Marker 1 [T1] RBW 1 MHz RF Att 10 dB  
Ref Lvl -52.14 dBm VBW 3 MHz  
26.5 dBm 1.60693387 GHz SWT 5 ms Unit dBm



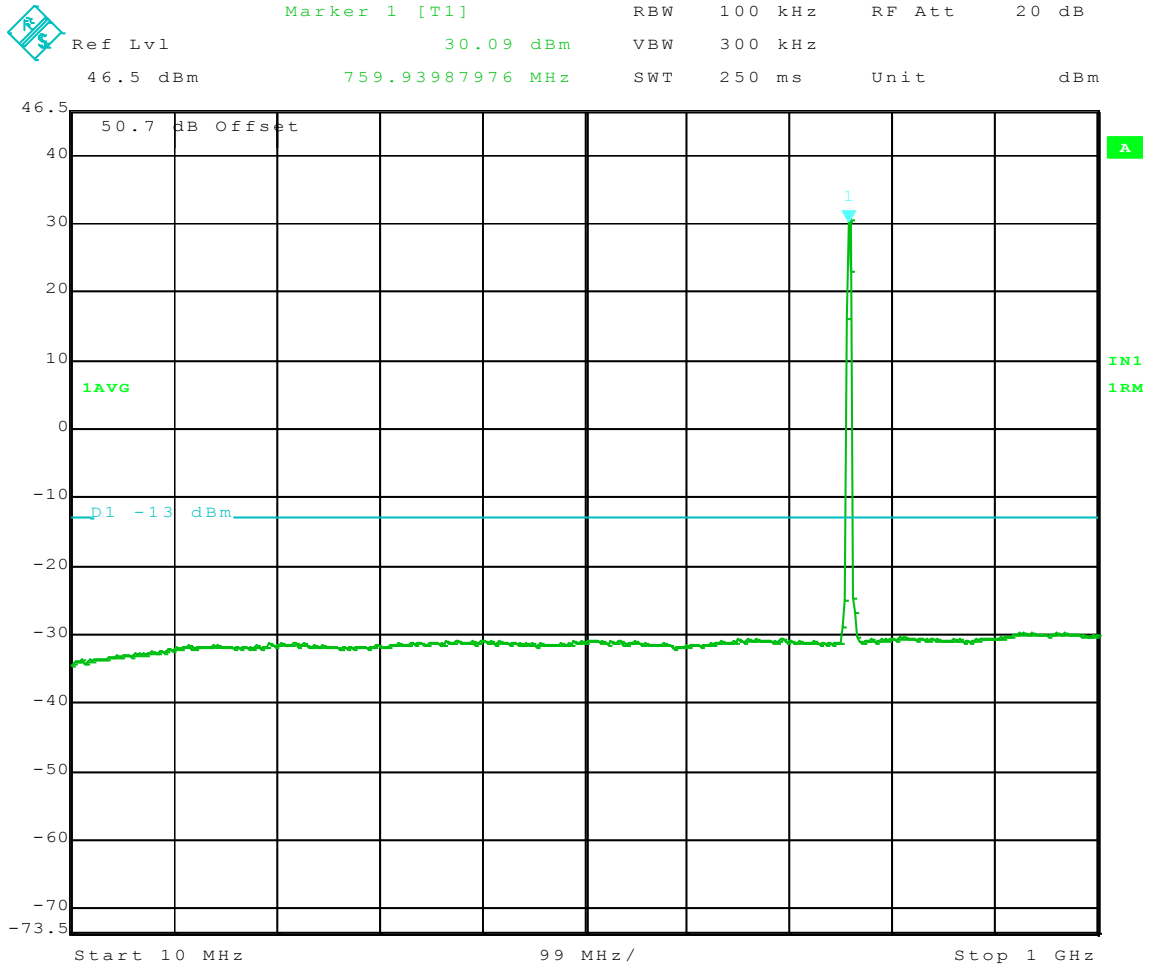
Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; Test Engineer:JY  
Comment A: PUBLIC SAFETY B14; PWR: 40W BLK.D 758 - 763 MHz; QPSK  
FCC Prt 27; FCCID: AS5BBTRX-04; TRDU(M1); HPF Used.  
Date: 19.OCT.2011 11:19:58

**Transmit Port  
Antenna Conducted Spurious Emissions  
Part 27  
Block: D  
16QAM Modulation  
Bandwidth 758 – 763 MHz**

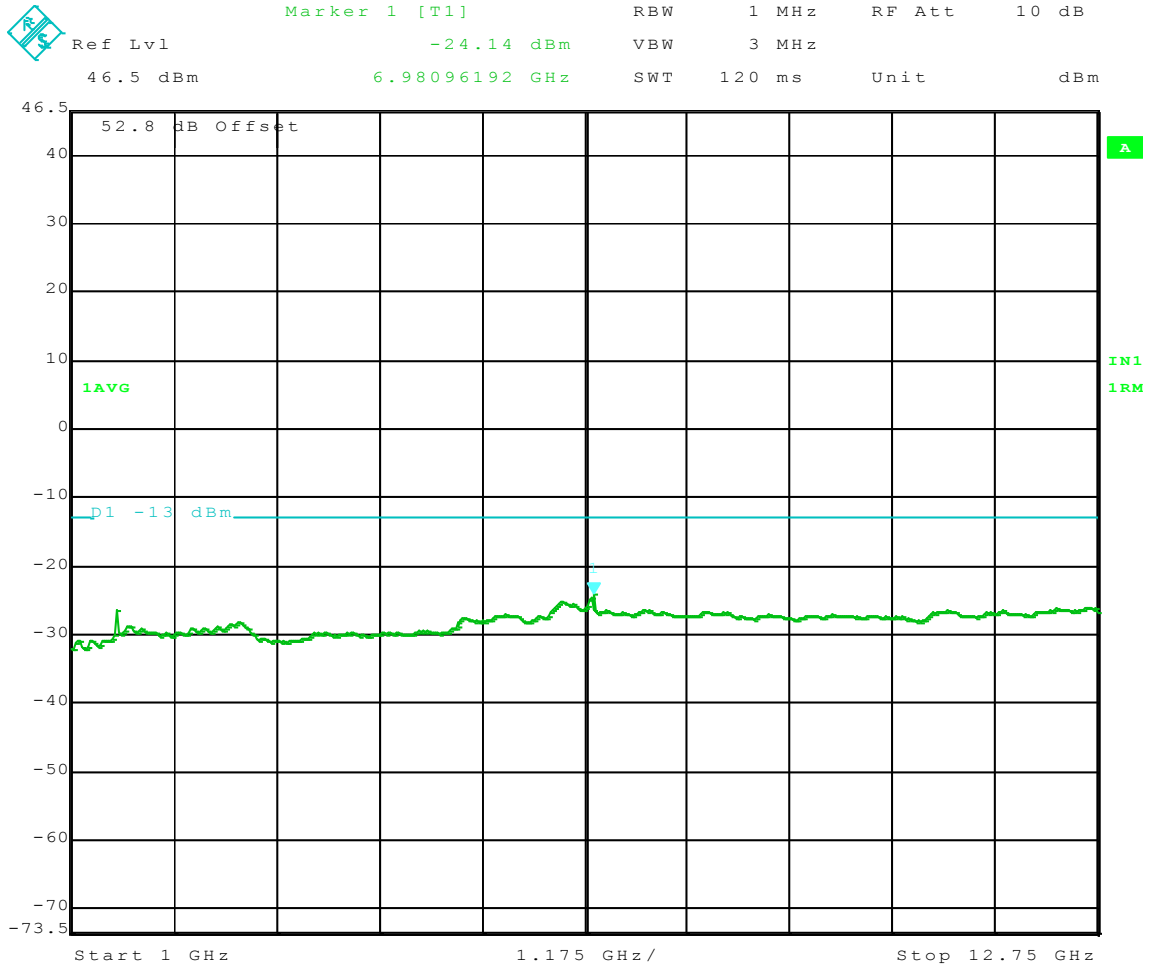




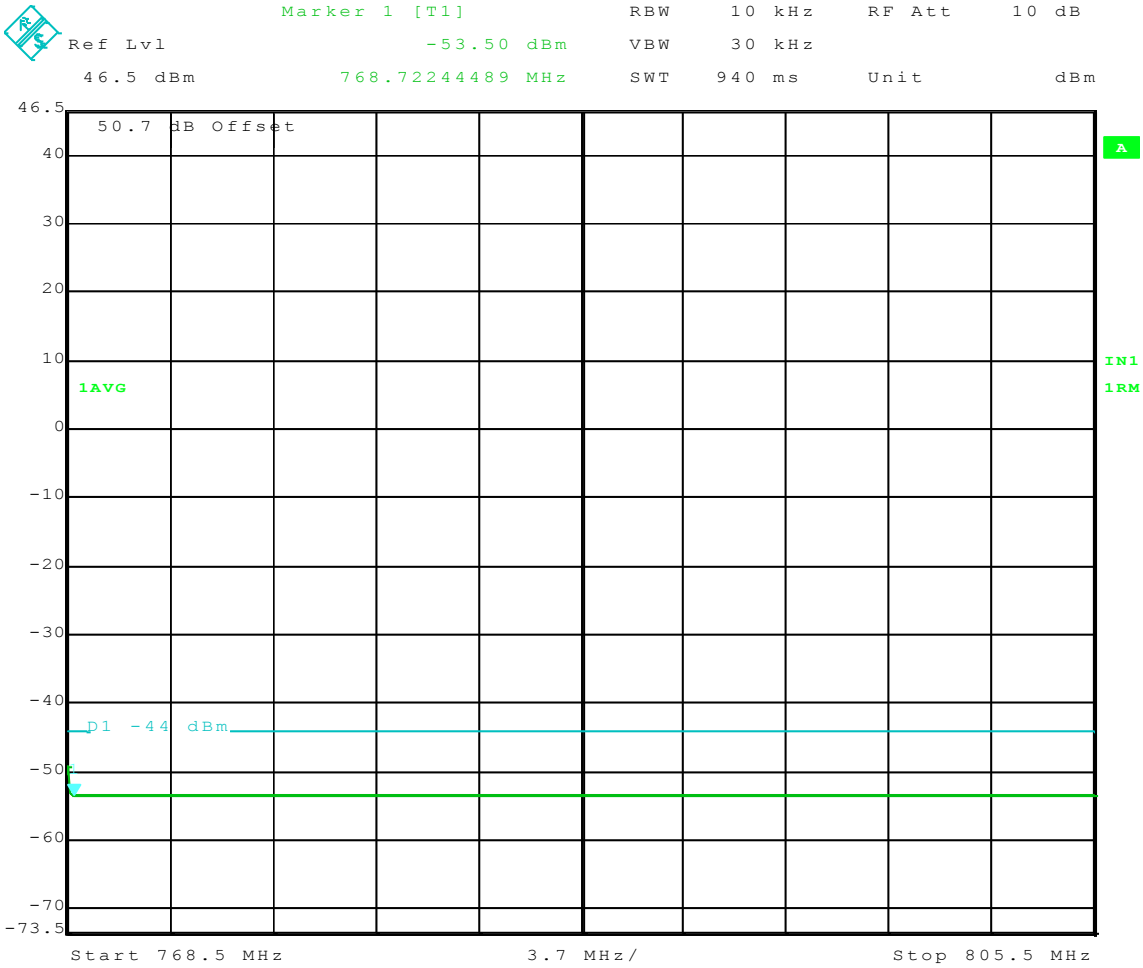
Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; Test Engineer: SEG  
Comment A: PUBLIC SAFETY B14; PWR: 40W; BLK. D: 758 - 763 MHz  
16QAM; FCC Prt 27; FCCID: AS5BBTRX-04; TRDU(M1)  
Date: 24.AUG.2011 11:05:15



Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; Test Engineer: SEG  
Comment A: PUBLIC SAFETY B14; PWR: 40W; BLK. D: 758 - 763 MHz  
16QAM; FCC Prt 27; FCCID: AS5BBTRX-04; TRDU(M1)  
Date: 24.AUG.2011 11:03:32



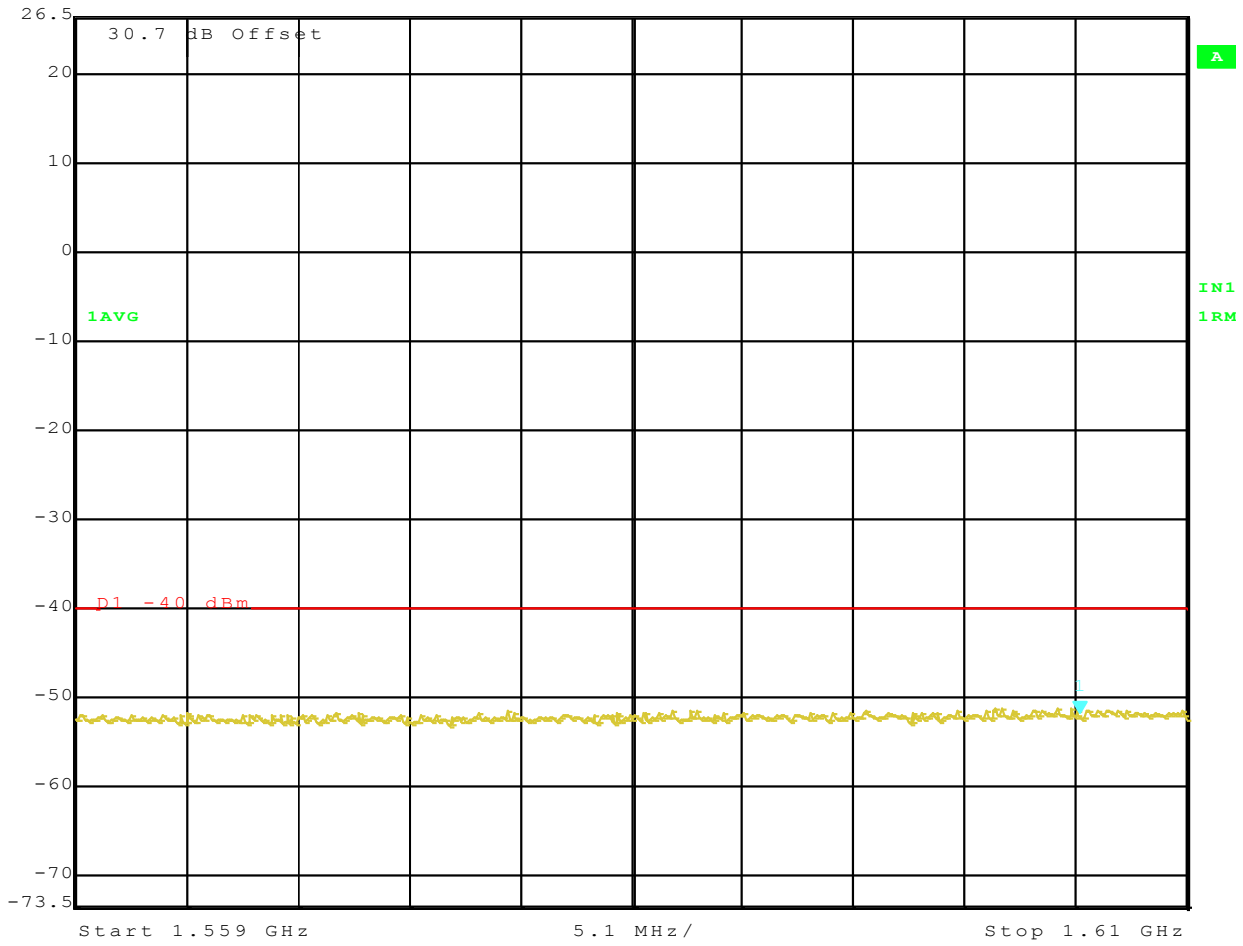
Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; Test Engineer: SEG  
Comment A: PUBLIC SAFETY B14; PWR: 40W; BLK. D: 758 - 763 MHz  
16QAM; FCC Prt 27; FCCID: AS5BBTRX-04; TRDU(M1)  
Date: 24.AUG.2011 11:01:05



Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; Test Engineer: SEG  
Comment A: PUBLIC SAFETY B14; PWR: 40W; BLK. D: 758 - 763 MHz  
16QAM; FCC Prt 27; FCCID: AS5BBTRX-04; TRDU(M1)  
Date: 24.AUG.2011 10:58:09

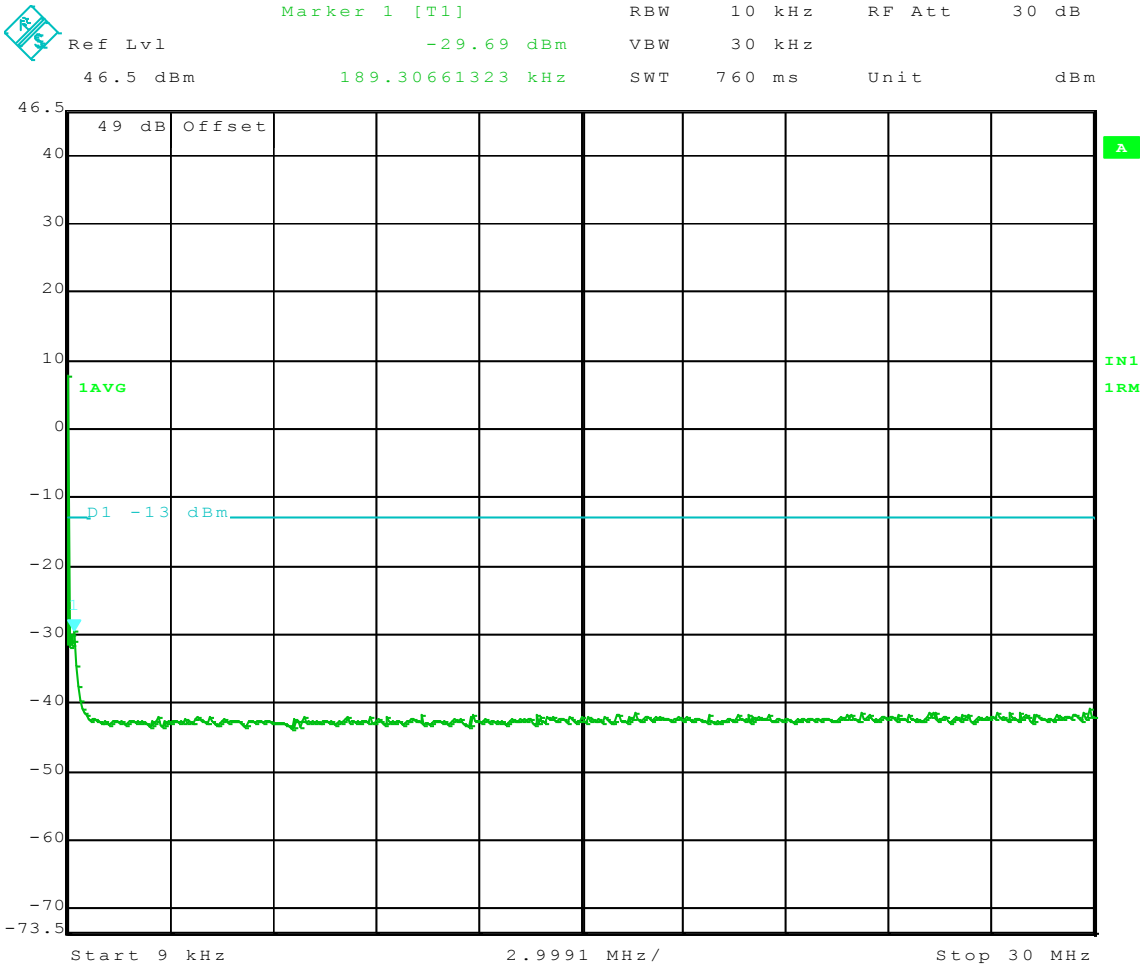


Marker 1 [T1] RBW 1 MHz RF Att 10 dB  
Ref Lvl -51.86 dBm VBW 3 MHz  
26.5 dBm 1.60509419 GHz SWT 5 ms Unit dBm



Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; Test Engineer:JY  
Comment A: PUBLIC SAFETY B14; PWR: 40W BLK.D 758 - 763 MHz 16QAM  
FCC Prt 27; FCCID: AS5BBTRX-04; TRDU(M1); HPF Used.  
Date: 19.OCT.2011 11:42:26

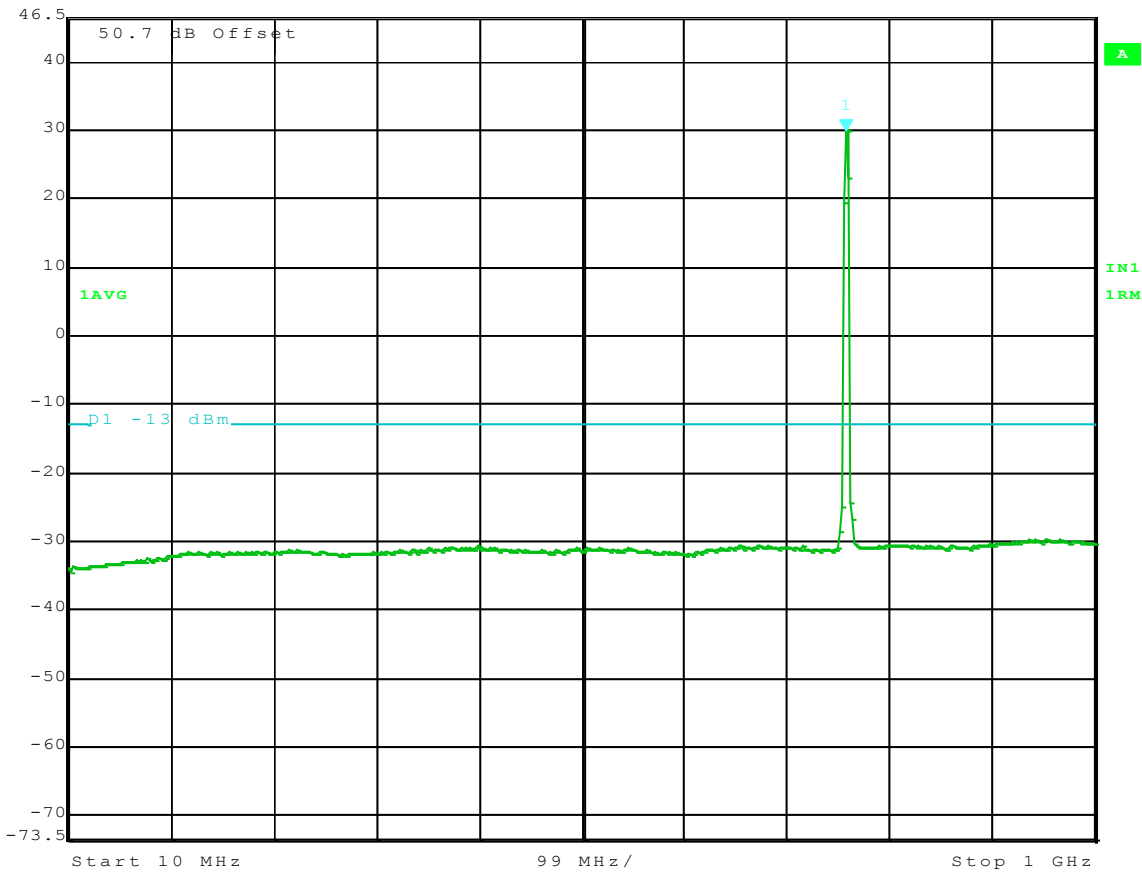
**Transmit Port**  
**Antenna Conducted Spurious Emissions**  
**Part 27**  
**Block: D**  
**64QAM Modulation**  
**Bandwidth 758 – 763 MHz**



Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; Test Engineer: SEG  
Comment A: PUBLIC SAFETY B14; PWR: 40W; BLK. D: 758 - 763 MHz  
64QAM; FCC Prt 27; FCCID: AS5BBTRX-04; TRDU(M1)  
Date: 24.AUG.2011 13:46:35



Marker 1 [T1] RBW 100 kHz RF Att 20 dB  
Ref Lvl 29.90 dBm VBW 300 kHz  
46.5 dBm 759.93987976 MHz SWT 250 ms Unit dBm

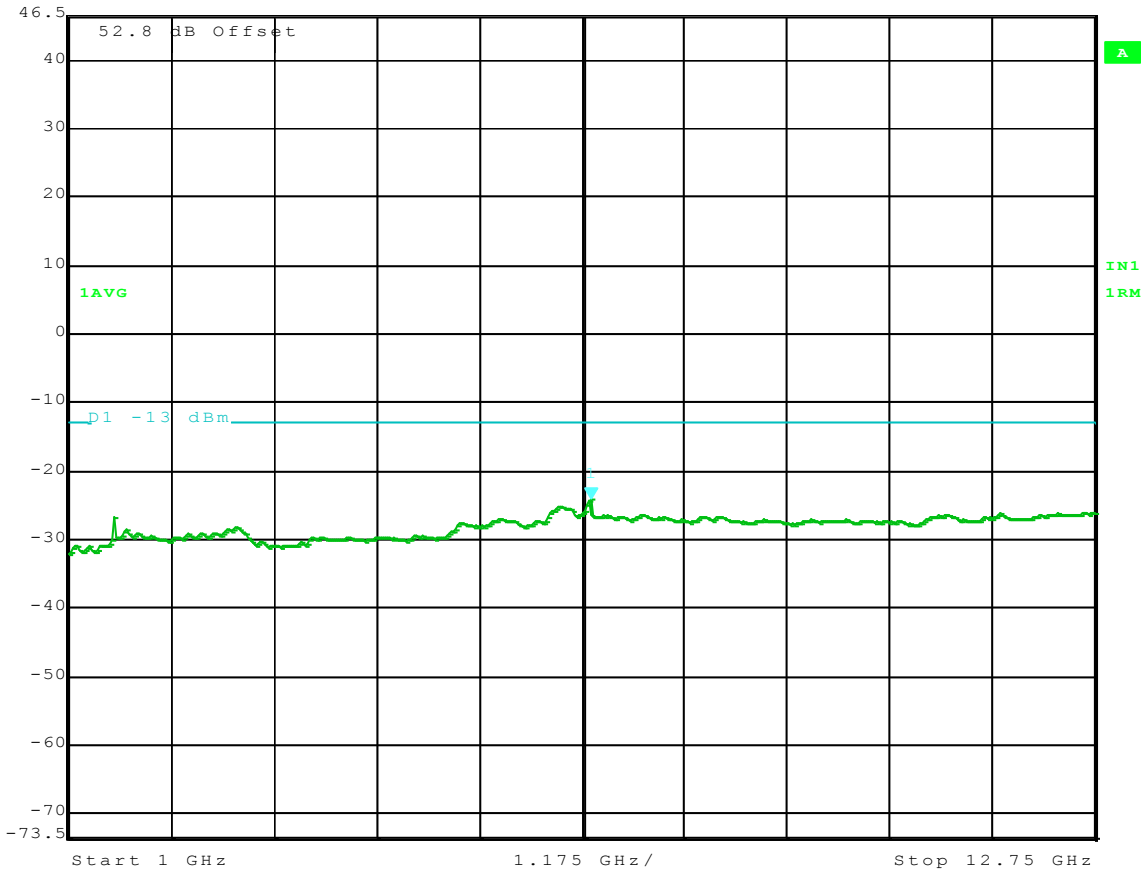


Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; Test Engineer: SEG  
Comment A: PUBLIC SAFETY B14; PWR: 40W; BLK. D: 758 - 763 MHz  
64QAM; FCC Prt 27; FCCID: AS5BBTRX-04; TRDU(M1)  
Date: 24.AUG.2011 13:48:20





Marker 1 [T1] RBW 1 MHz RF Att 10 dB  
Ref Lvl -24.05 dBm VBW 3 MHz  
46.5 dBm 6.98096192 GHz SWT 120 ms Unit dBm



Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; Test Engineer: SEG  
Comment A: PUBLIC SAFETY B14; PWR: 40W; BLK. D: 758 - 763 MHz  
64QAM; FCC Prt 27; FCCID: AS5BBTRX-04; TRDU(M1)  
Date: 24.AUG.2011 14:08:13



Marker 1 [T1]

RBW 10 kHz RF Att 10 dB

Ref Lvl -53.50 dBm

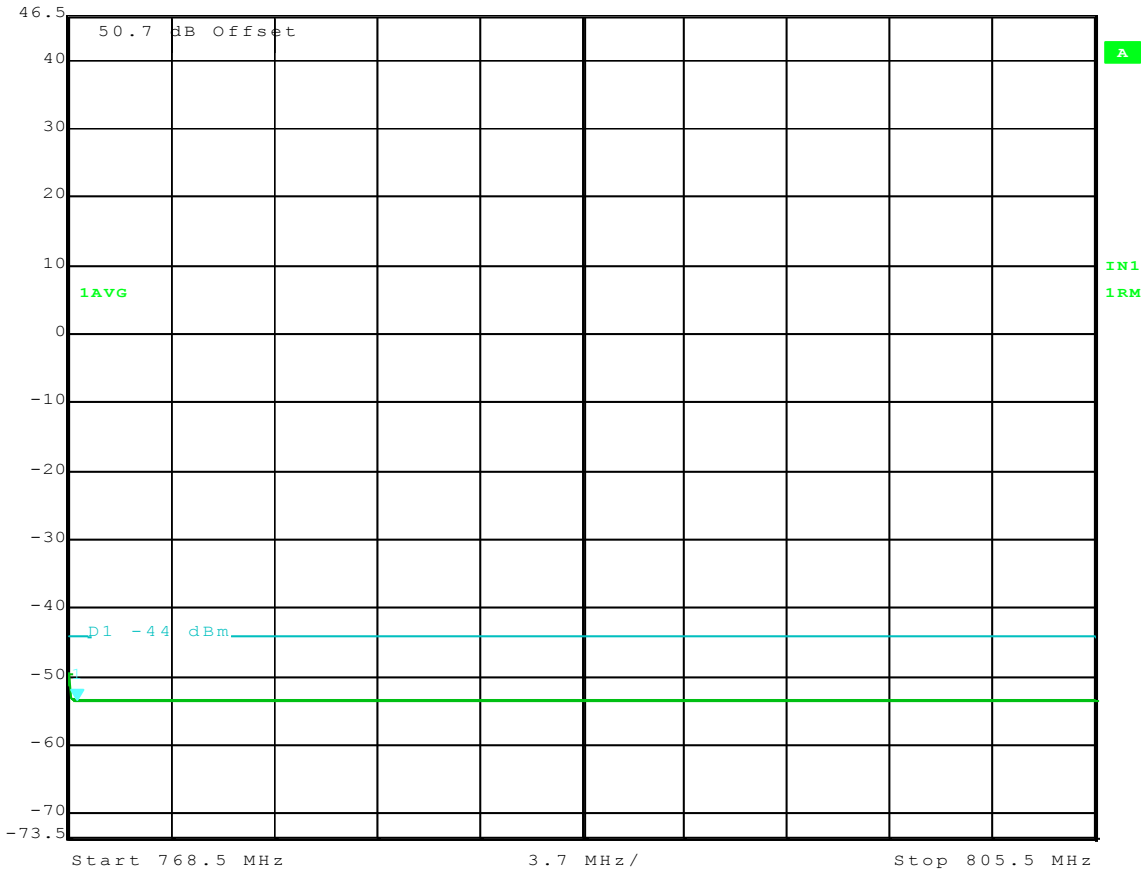
VBW 30 kHz

46.5 dBm

768.79659319 MHz

SWT 940 ms

Unit dBm



Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; Test Engineer: SEG  
Comment A: PUBLIC SAFETY B14; PWR: 40W; BLK. D: 758 - 763 MHz  
64QAM; FCC Prt 27; FCCID: AS5BBTRX-04; TRDU(M1)  
Date: 24.AUG.2011 14:00:04



Marker 1 [T1]

RBW 1 MHz RF Att 10 dB

Ref Lvl -52.16 dBm

VBW 3 MHz

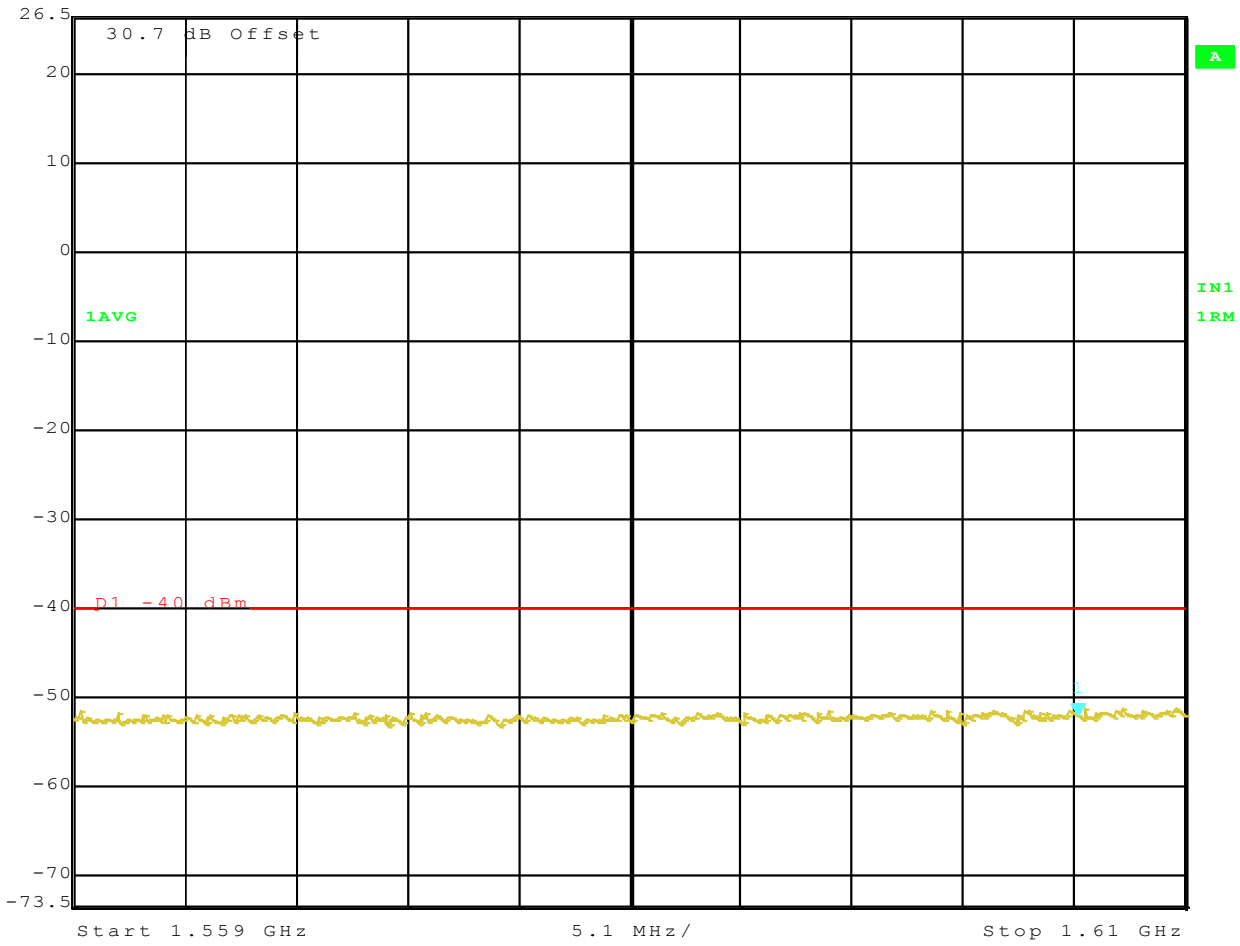
26.5 dBm

1.60509419 GHz

SWT 5 ms

Unit

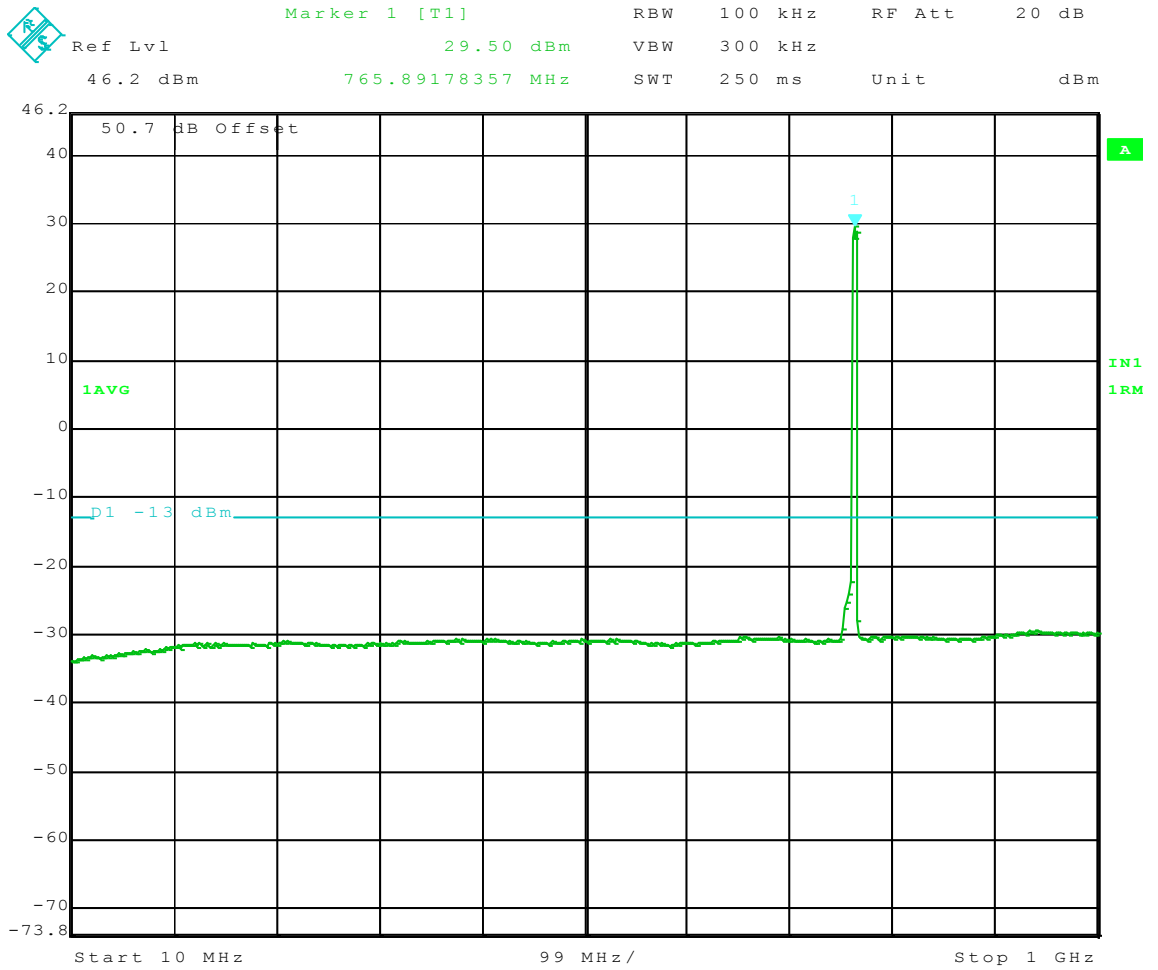
dBm



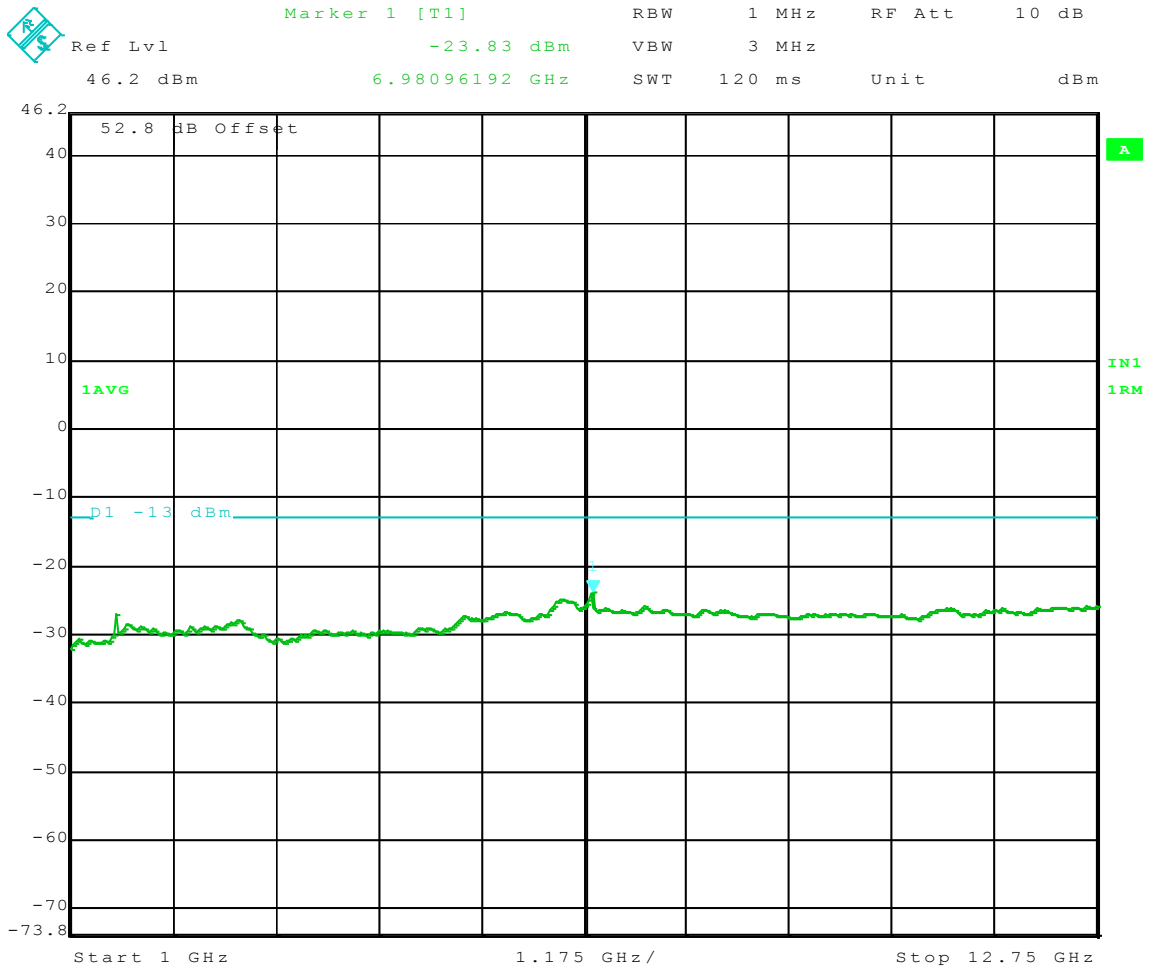
Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; Test Engineer:JY  
Comment A: PUBLIC SAFETY B14; PWR: 40W BLK.D 758 - 763 MHz 64QAM  
FCC Prt 27; FCCID: AS5BBTRX-04; TRDU(M1); HPF Used.  
Date: 19.OCT.2011 11:45:14

**Transmit Port  
Antenna Conducted Spurious Emissions  
Part 90  
Block: Public Safety  
QPSK Modulation  
Bandwidth 763 – 768 MHz**

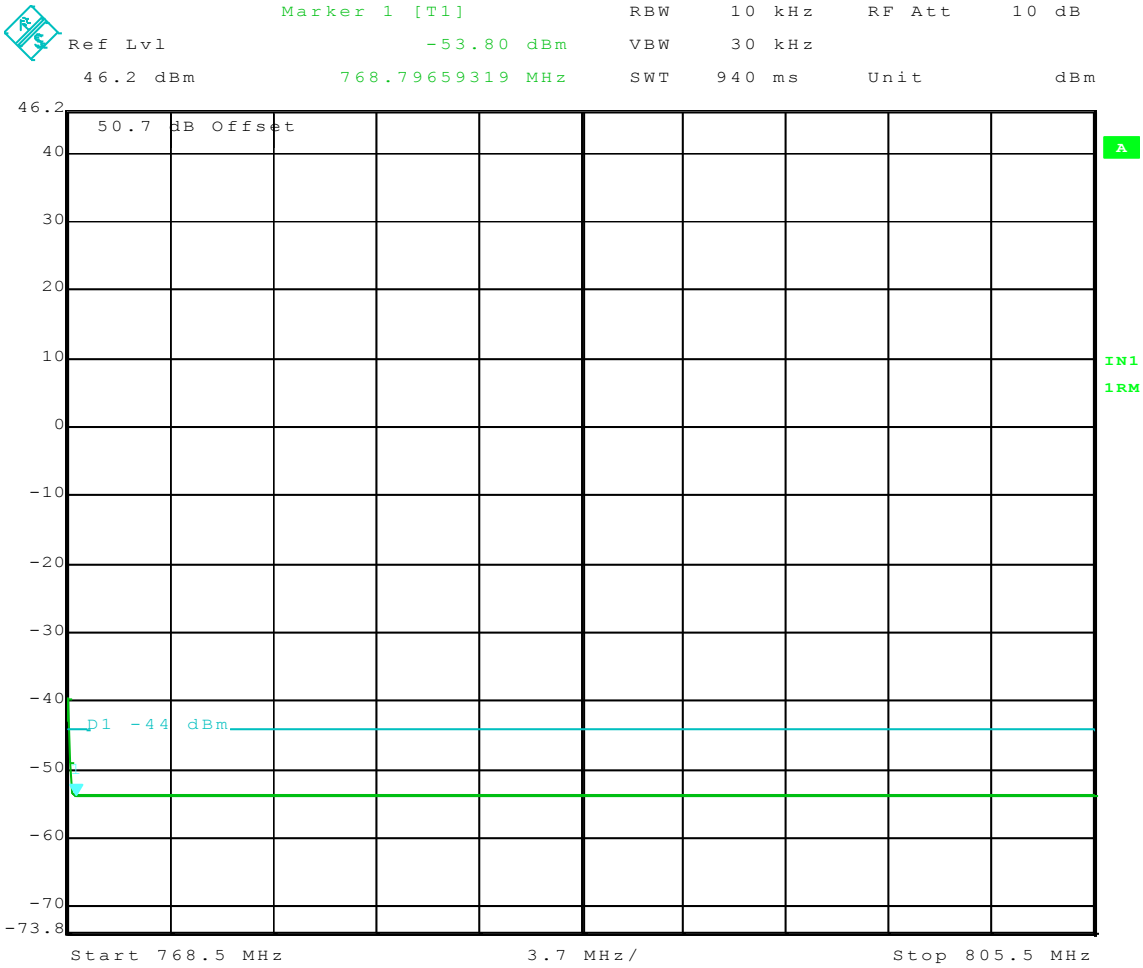




Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; Test Engineer: SEG  
Comment A: PUBLIC SAFETY B14; PWR: 40W; PUBLIC SAFETY ;763-768 MHz  
QPSK; FCC PRT 90.543; FCCID: AS5BBTRX-04; TRDU (M1)  
Date: 23.AUG.2011 20:34:08



Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; Test Engineer: SEG  
Comment A: PUBLIC SAFETY B14; PWR: 40W; PUBLIC SAFETY ;763-768 MHz  
QPSK; FCC PRT 90.543; FCCID: AS5BBTRX-04; TRDU (M1)  
Date: 23.AUG.2011 20:37:01

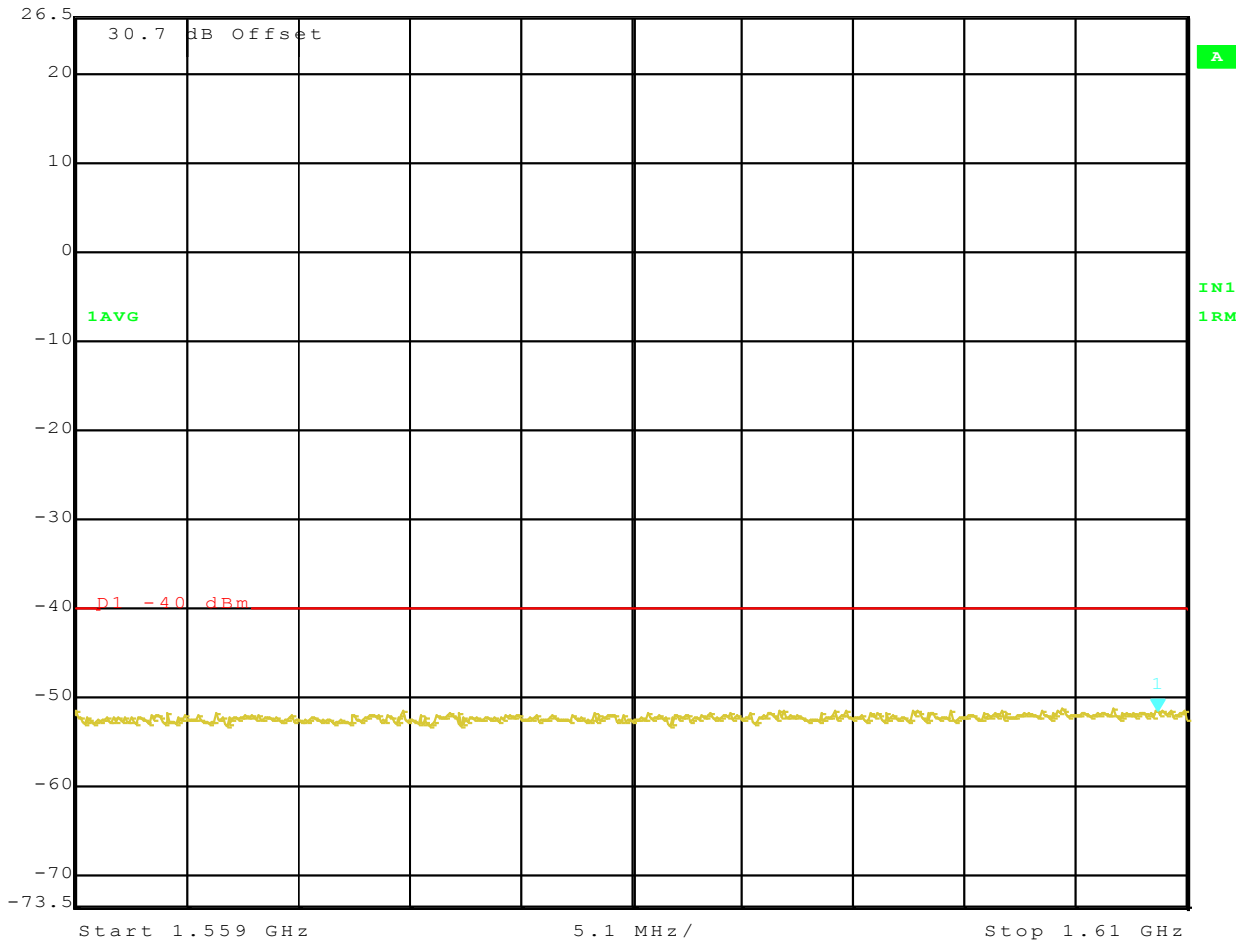


Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; Test Engineer: SEG  
Comment A: PUBLIC SAFETY B14; PWR: 40W; PUBLIC SAFETY ;763-768 MHz  
QPSK; FCC PRT 90.543; FCCID: AS5BBTRX-04; TRDU (M1)  
Date: 23.AUG.2011 04:01:58



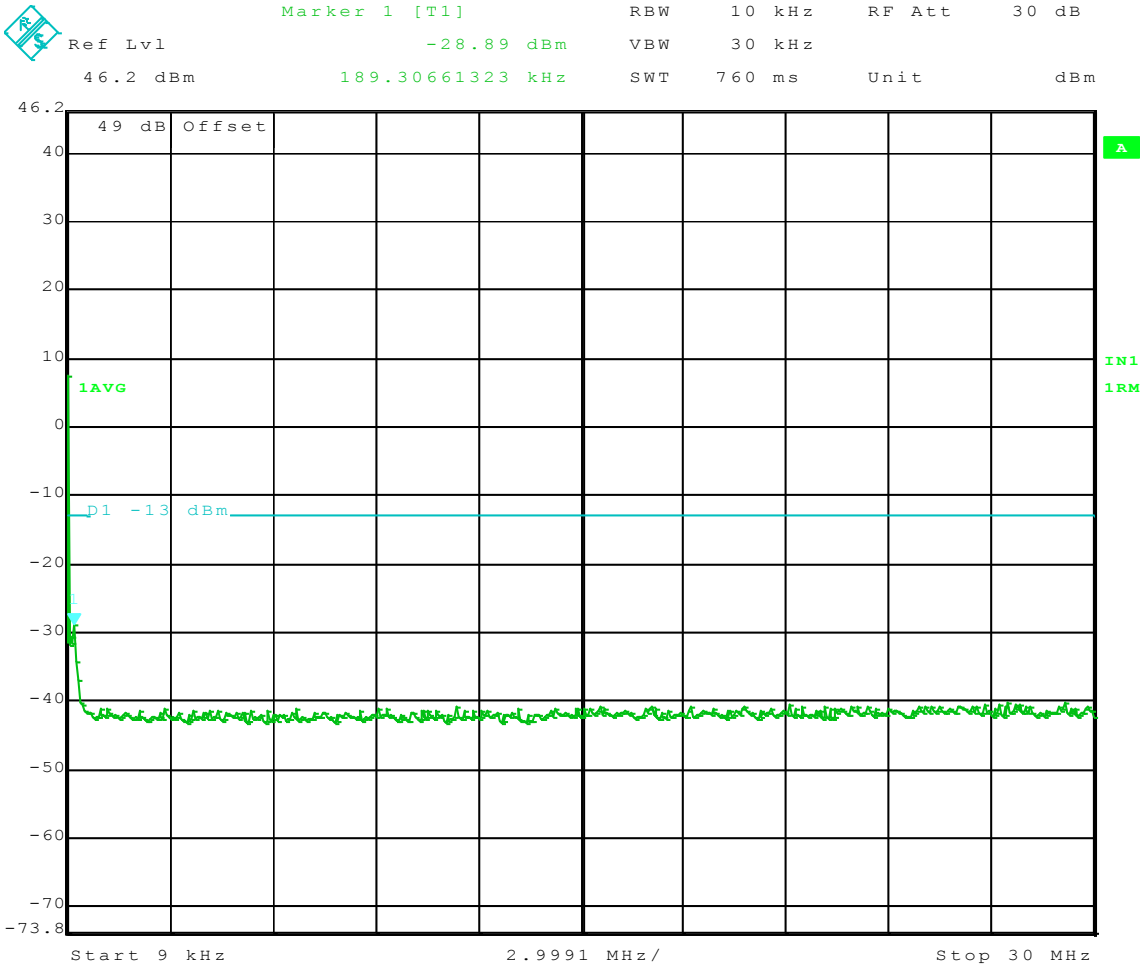


Marker 1 [T1] RBW 1 MHz RF Att 10 dB  
Ref Lvl -51.53 dBm VBW 3 MHz  
26.5 dBm 1.60867134 GHz SWT 5 ms Unit dBm

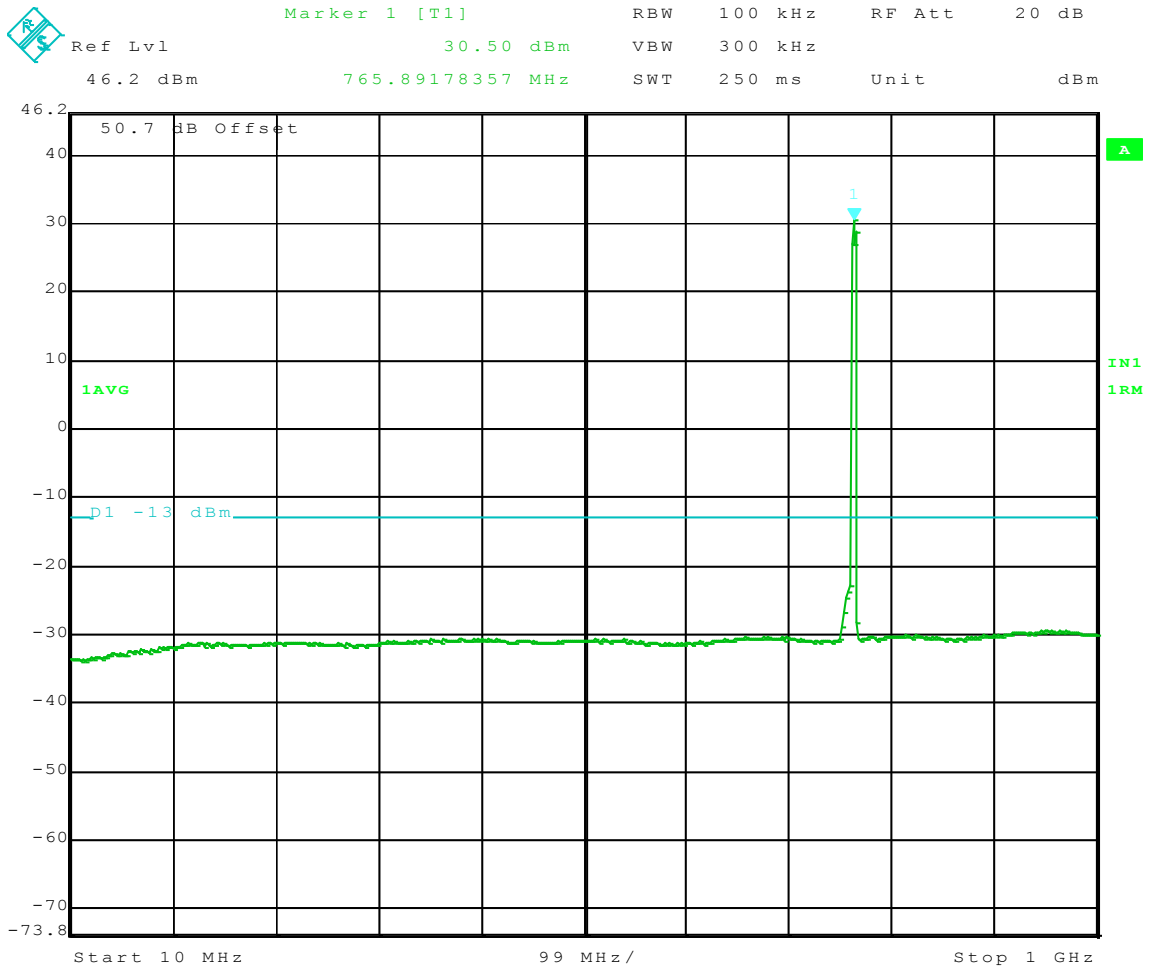


Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; Test Engineer:JY  
Comment A: PUBLIC SAFETY B14; PWR: 40W BLK.PS 763 - 768 MHz QPSK  
FCC Prt 90.543; FCCID: AS5BBTRX-04; TRDU(M1); HPF Used.  
Date: 19.OCT.2011 11:48:58

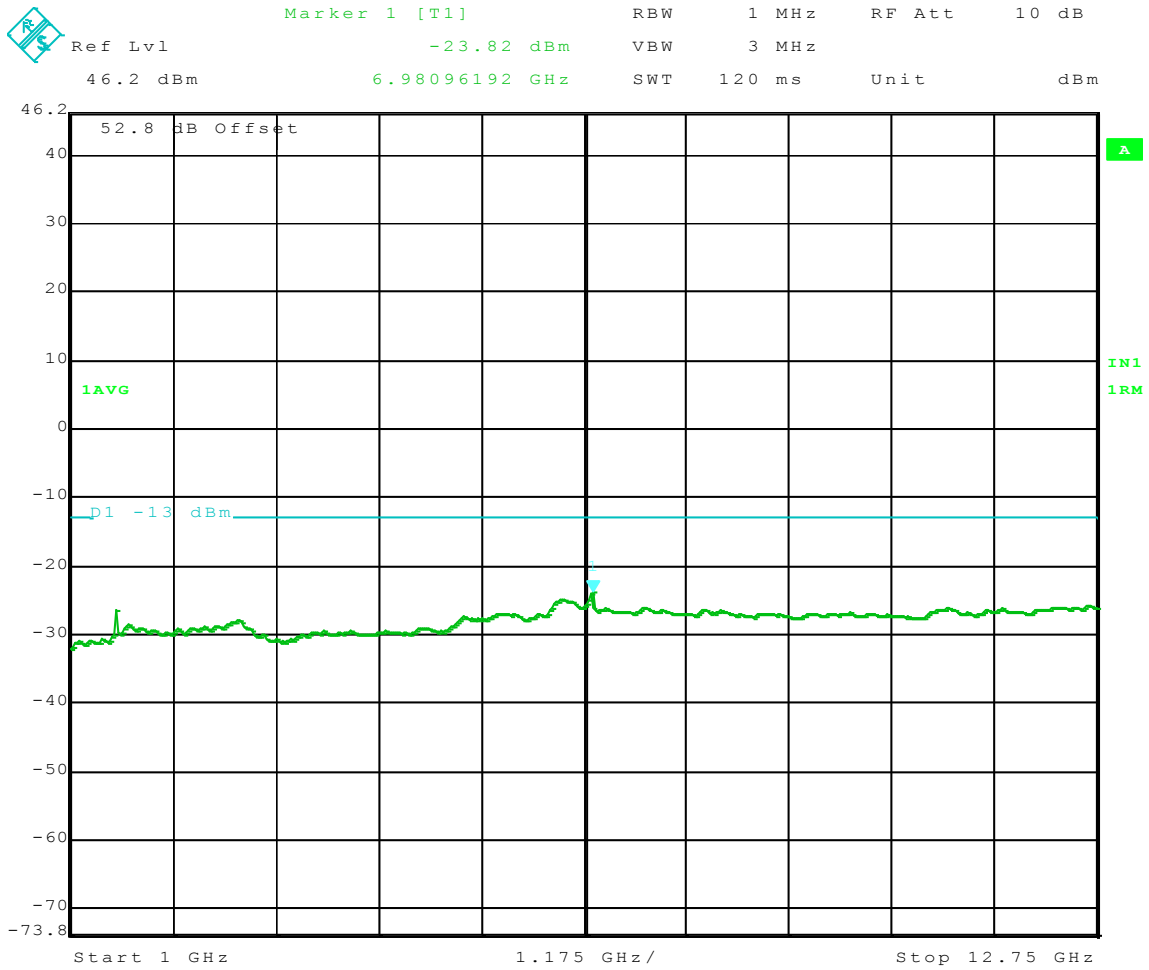
**Transmit Port  
Antenna Conducted Spurious Emissions  
Part 90  
Block: Public Safety  
16QAM Modulation  
Bandwidth 763 – 768 MHz**



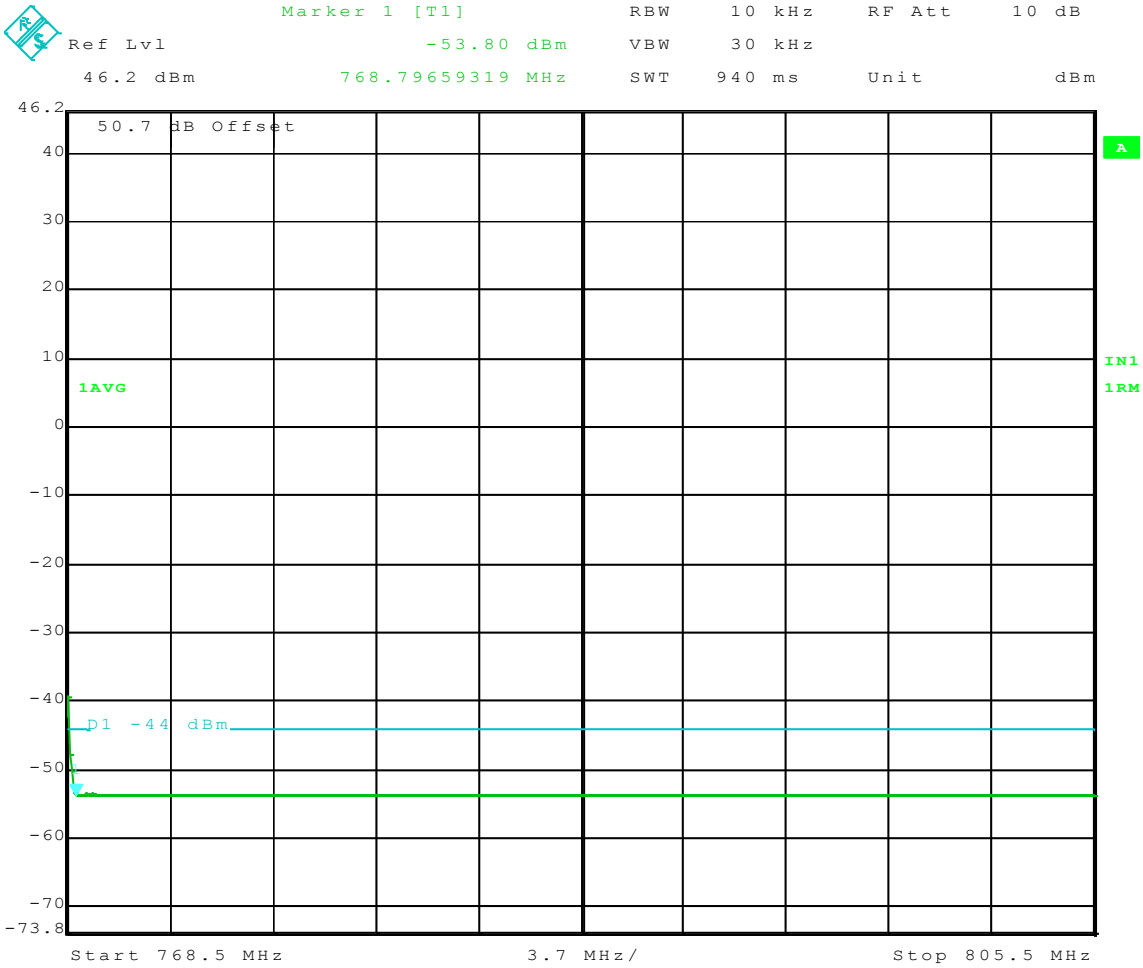
Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; Test Engineer: SEG  
Comment A: PUBLIC SAFETY B14; PWR: 40W; PUBLIC SAFETY ;763-768 MHz  
16QAM; FCC PRT 90.543; FCCID: AS5BBTRX-04; TRDU (M1)  
Date: 23.AUG.2011 22:21:08



Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; Test Engineer: SEG  
Comment A: PUBLIC SAFETY B14; PWR: 40W; PUBLIC SAFETY ;763-768 MHz  
16QAM; FCC PRT 90.543; FCCID: AS5BBTRX-04; TRDU (M1)  
Date: 23.AUG.2011 22:20:01



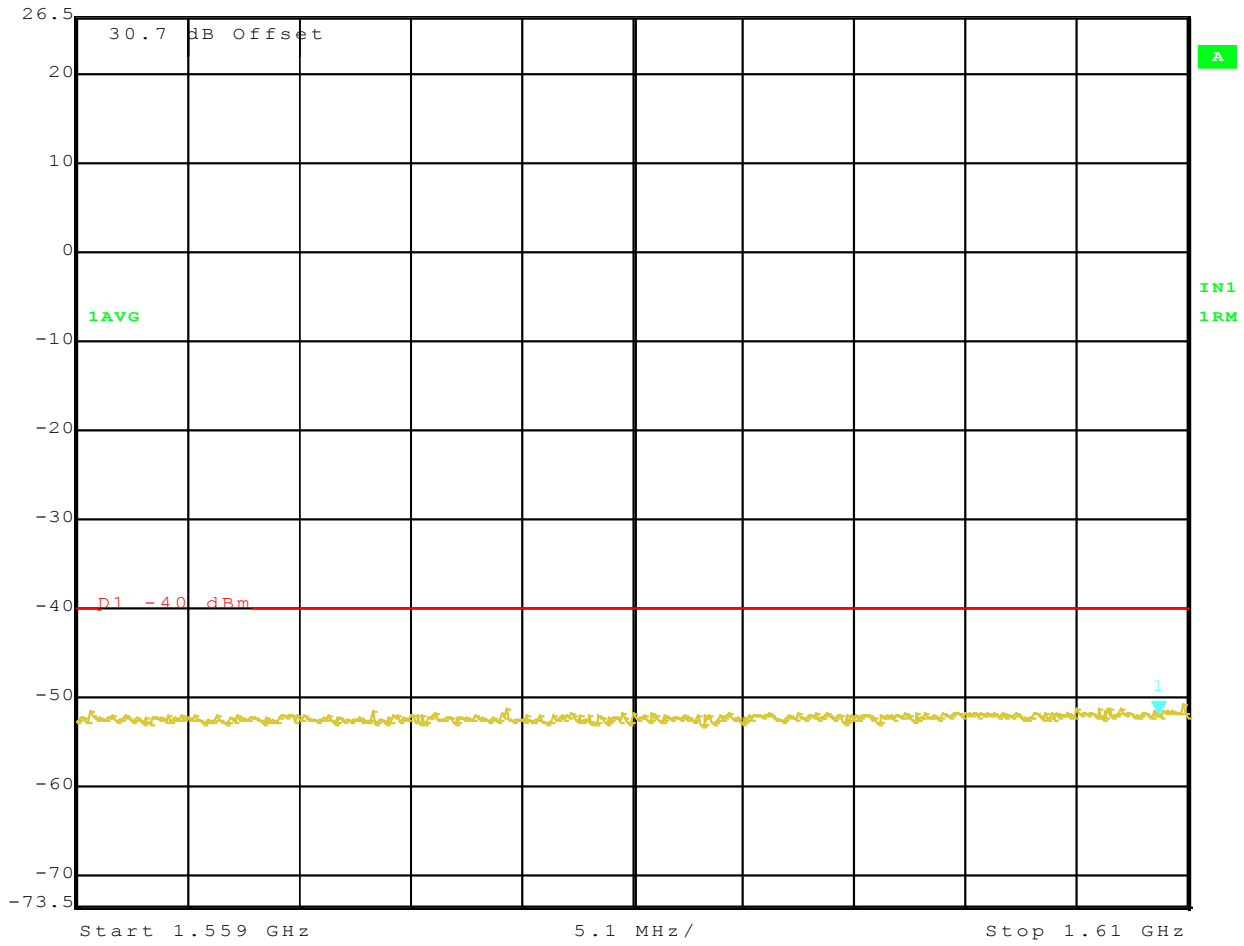
Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; Test Engineer: SEG  
Comment A: PUBLIC SAFETY B14; PWR: 40W; PUBLIC SAFETY ;763-768 MHz  
16QAM; FCC PRT 90.543; FCCID: AS5BBTRX-04; TRDU (M1)  
Date: 23.AUG.2011 22:17:45



Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; Test Engineer: SEG  
Comment A: PUBLIC SAFETY B14; PWR: 40W; PUBLIC SAFETY ;763-768 MHz  
16QAM; FCC PRT 90.543; FCCID: AS5BBTRX-04; TRDU (M1)  
Date: 23.AUG.2011 22:24:07



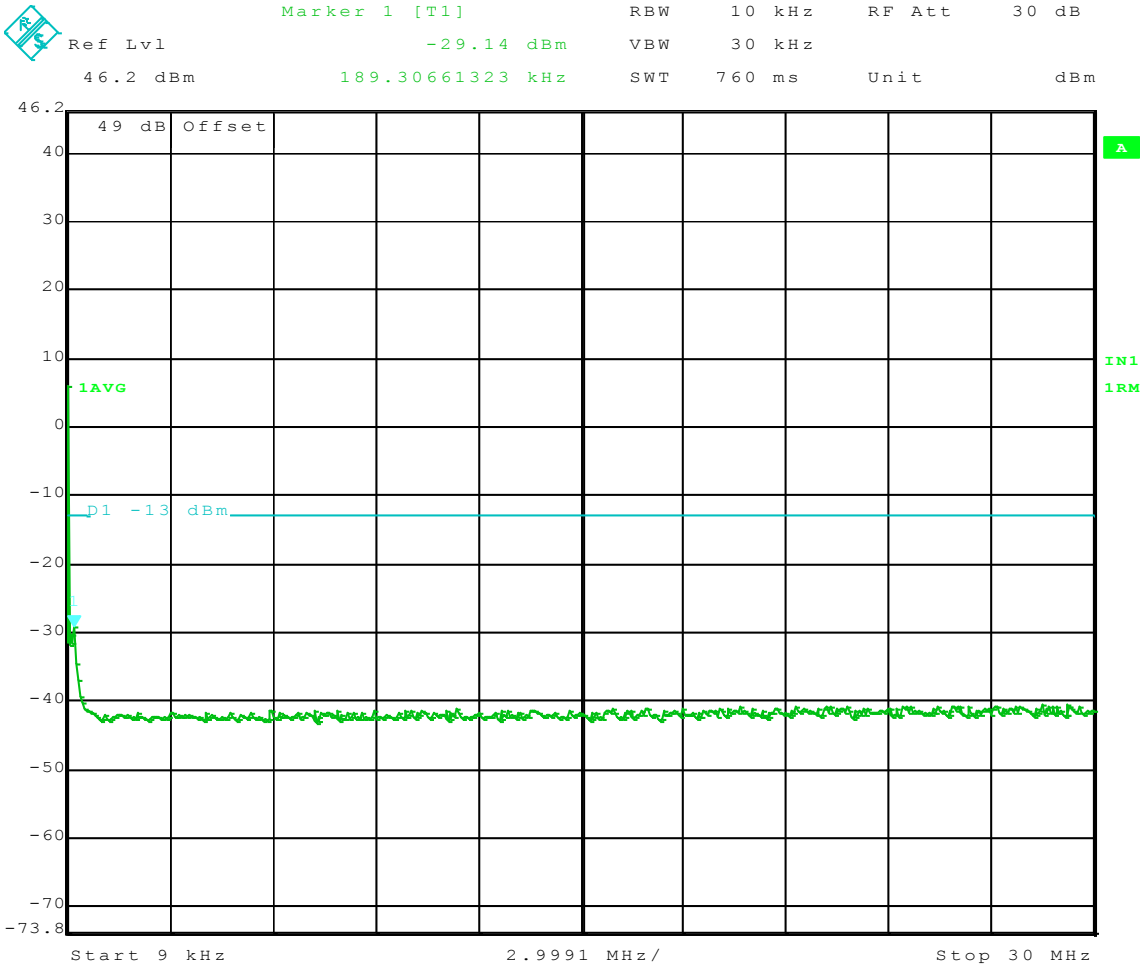
Marker 1 [T1] RBW 1 MHz RF Att 10 dB  
Ref Lvl -51.93 dBm VBW 3 MHz  
26.5 dBm 1.60867134 GHz SWT 5 ms Unit dBm



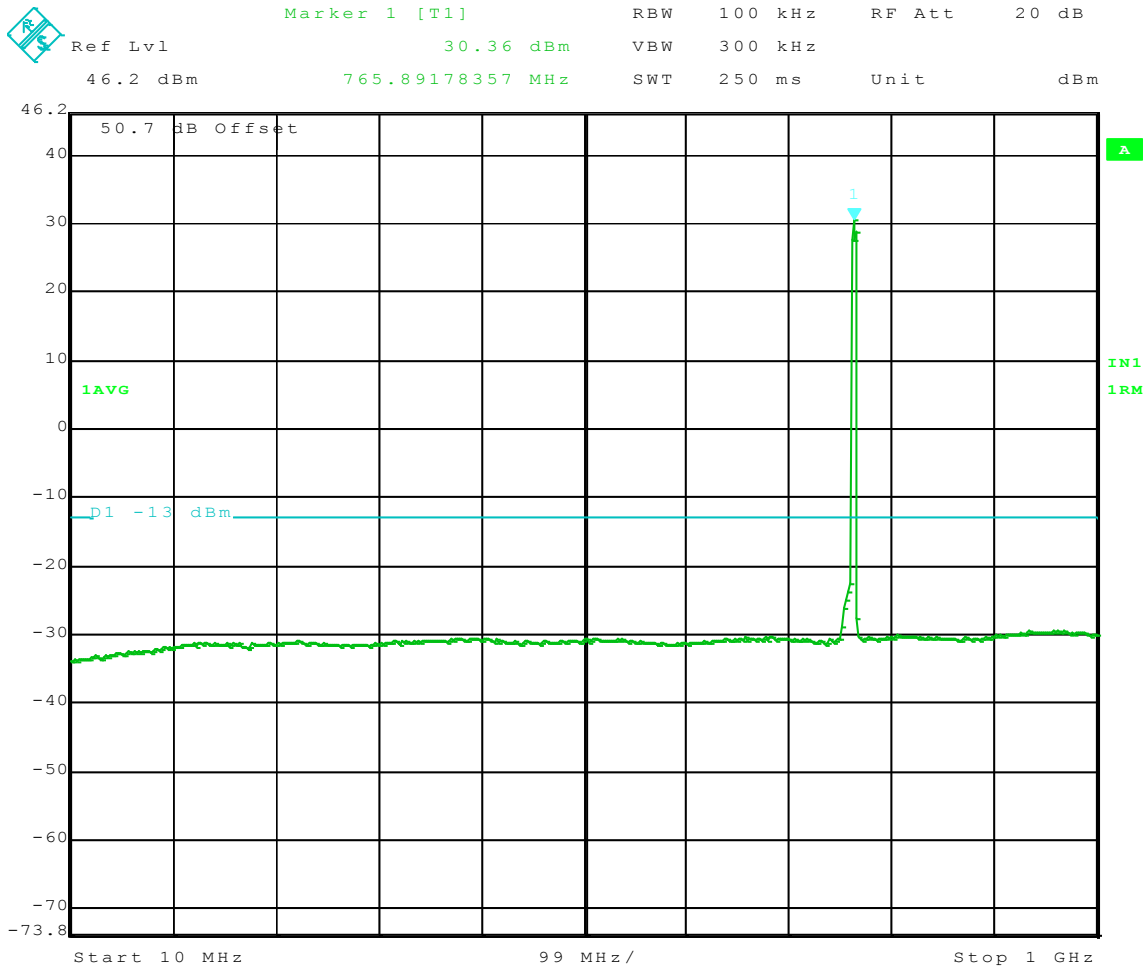
Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; Test Engineer: JY  
Comment A: PUBLIC SAFETY B14; PWR: 40W BLK.PS 763 - 768 MHz 16QAM  
FCC Prt 90.543; FCCID: AS5BBTRX-04; TRDU(M1); HPF Used.  
Date: 19.OCT.2011 11:52:41

**Transmit Port**  
**Antenna Conducted Spurious Emissions**  
**Part 90**  
**Block: Public Safety**  
**64QAM Modulation**  
**Bandwidth 763 – 768 MHz**

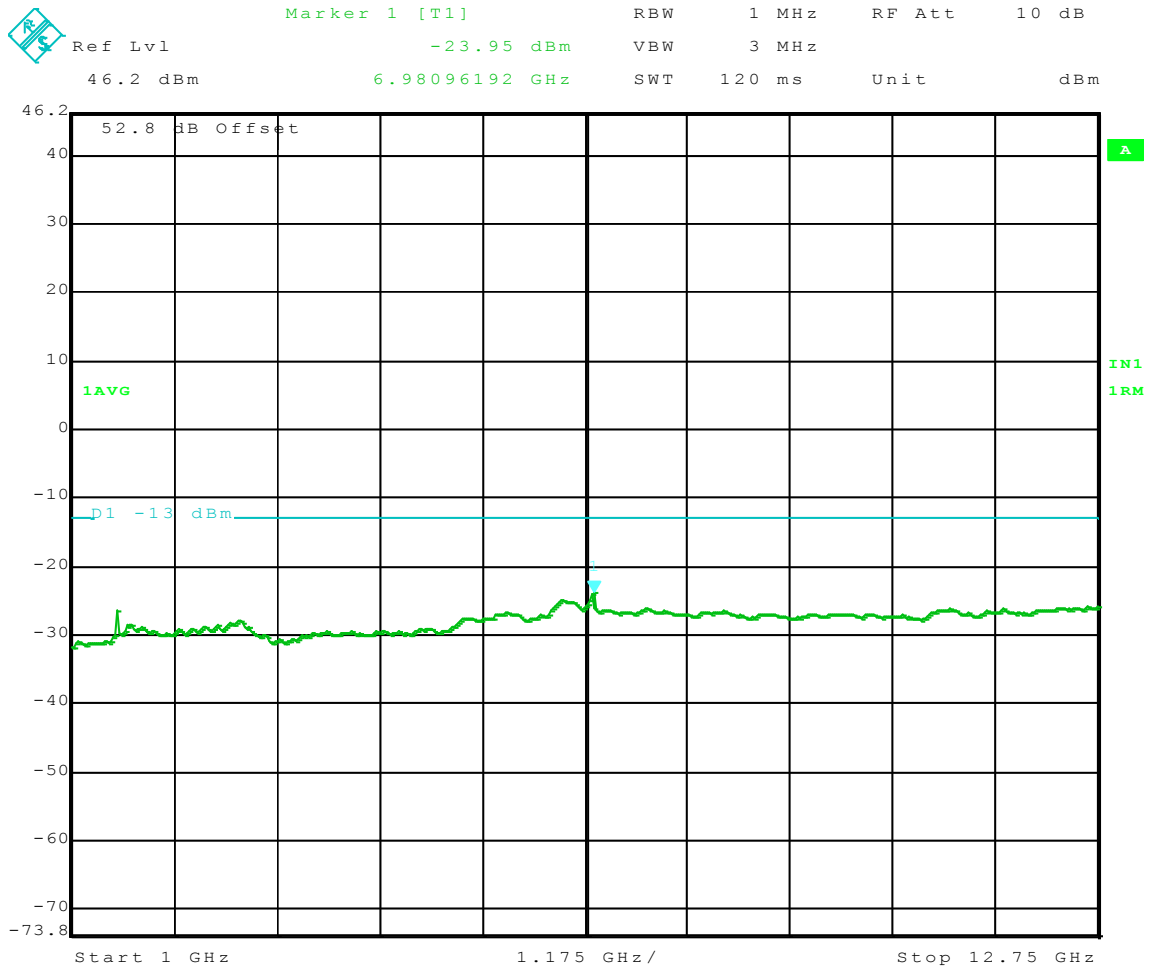




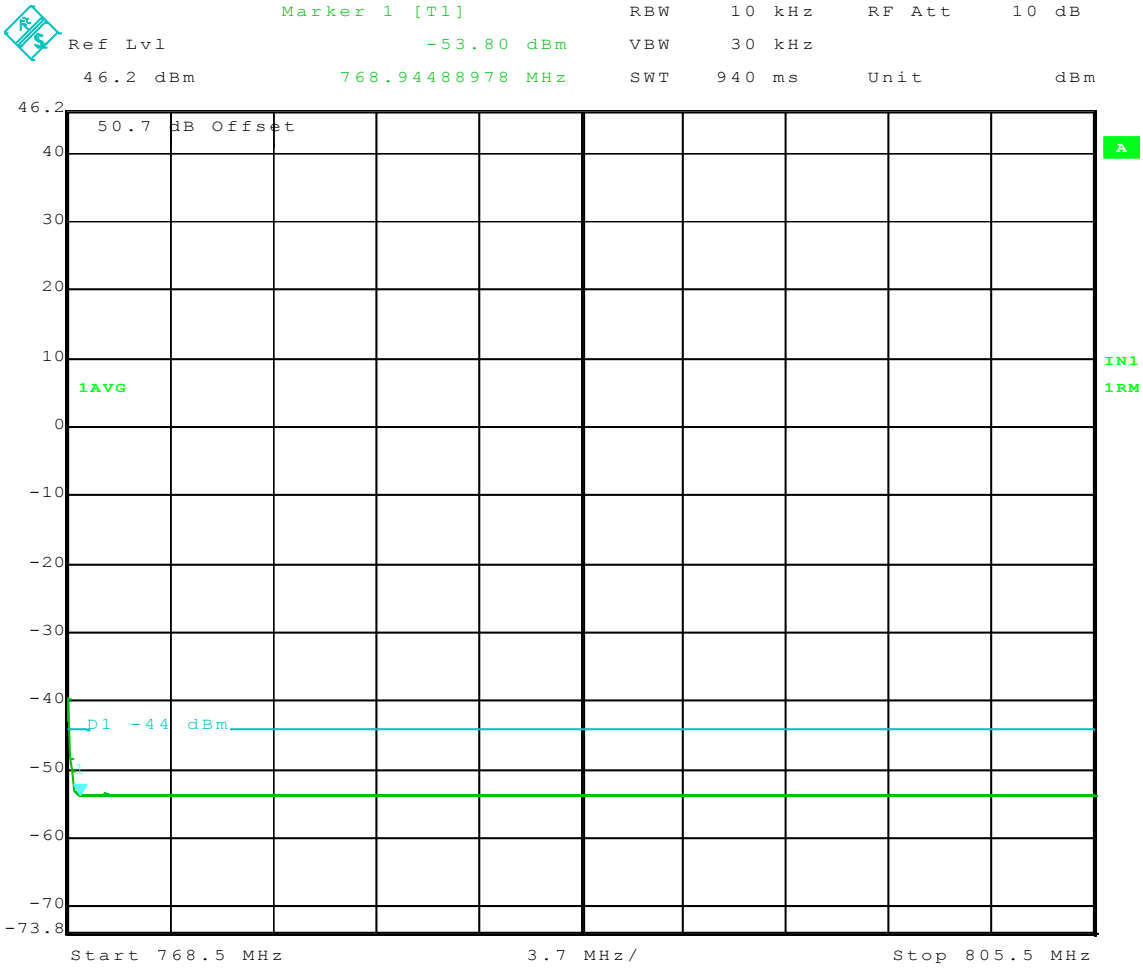
Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; Test Engineer: SEG  
Comment A: PUBLIC SAFETY B14; PWR: 40W; PUBLIC SAFETY ;763-768 MHz  
64QAM; FCC PRT 90.543; FCCID: AS5BBTRX-04; TRDU (M1)  
Date: 23.AUG.2011 22:53:47



Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; Test Engineer: SEG  
Comment A: PUBLIC SAFETY B14; PWR: 40W; PUBLIC SAFETY ;763-768 MHz  
64QAM; FCC PRT 90.543; FCCID: AS5BBTRX-04; TRDU (M1)  
Date: 23.AUG.2011 22:51:47



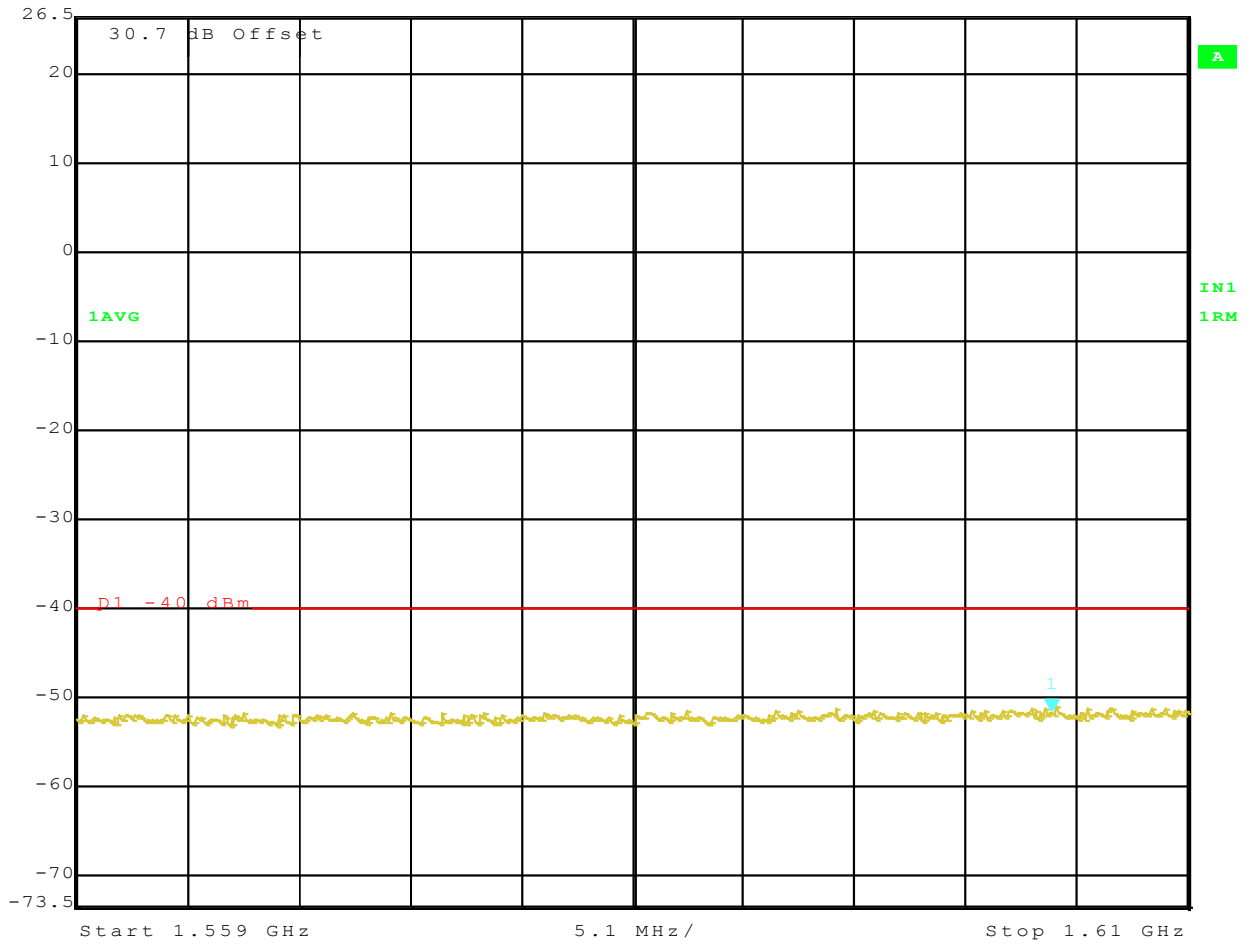
Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; Test Engineer: SEG  
Comment A: PUBLIC SAFETY B14; PWR: 40W; PUBLIC SAFETY ;763-768 MHz  
64QAM; FCC PRT 90.543; FCCID: AS5BBTRX-04; TRDU (M1)  
Date: 23.AUG.2011 22:50:01



Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; Test Engineer: SEG  
Comment A: PUBLIC SAFETY B14; PWR: 40W; PUBLIC SAFETY ;763-768 MHz  
64QAM; FCC PRT 90.543; FCCID: AS5BBTRX-04; TRDU (M1)  
Date: 23.AUG.2011 22:46:41

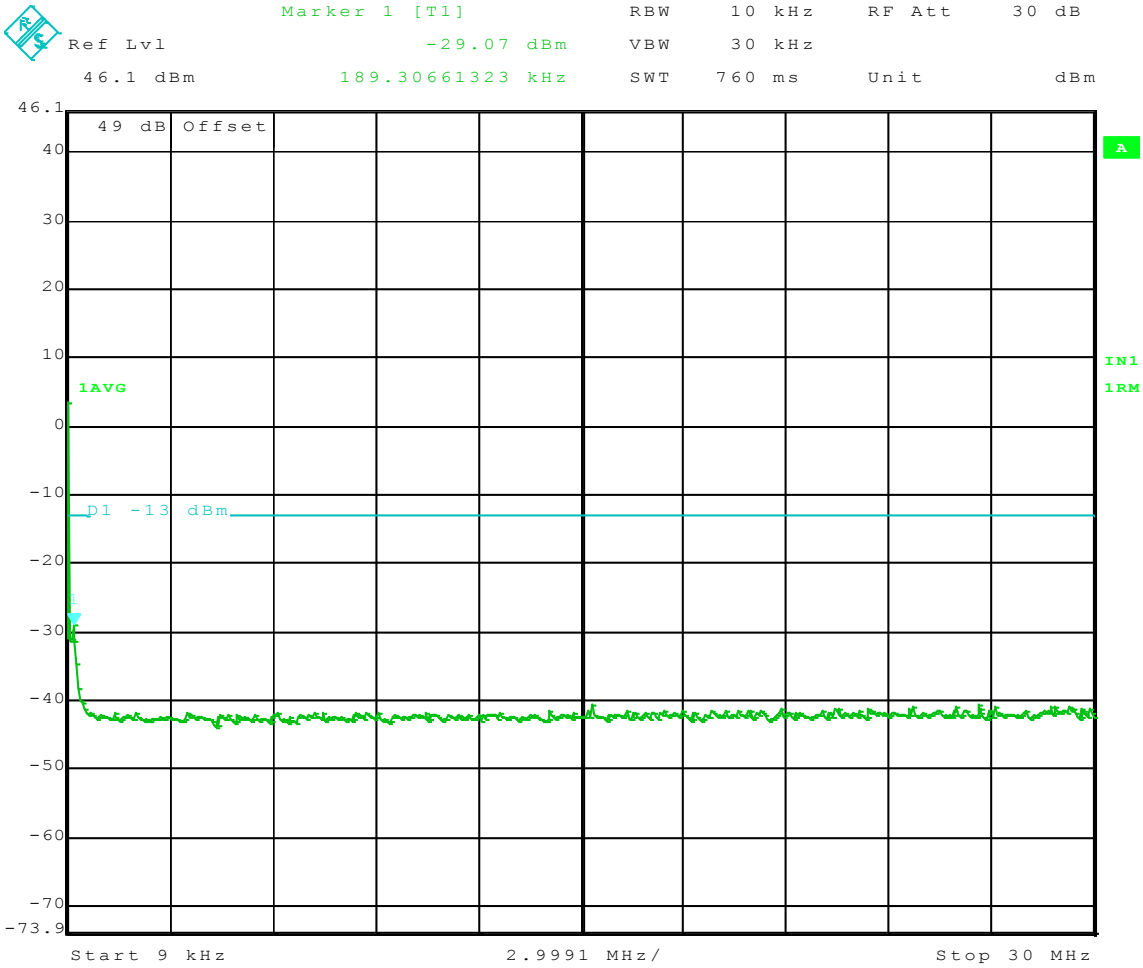


Marker 1 [T1] RBW 1 MHz RF Att 10 dB  
Ref Lvl -51.72 dBm VBW 3 MHz  
26.5 dBm 1.60376553 GHz SWT 5 ms Unit dBm

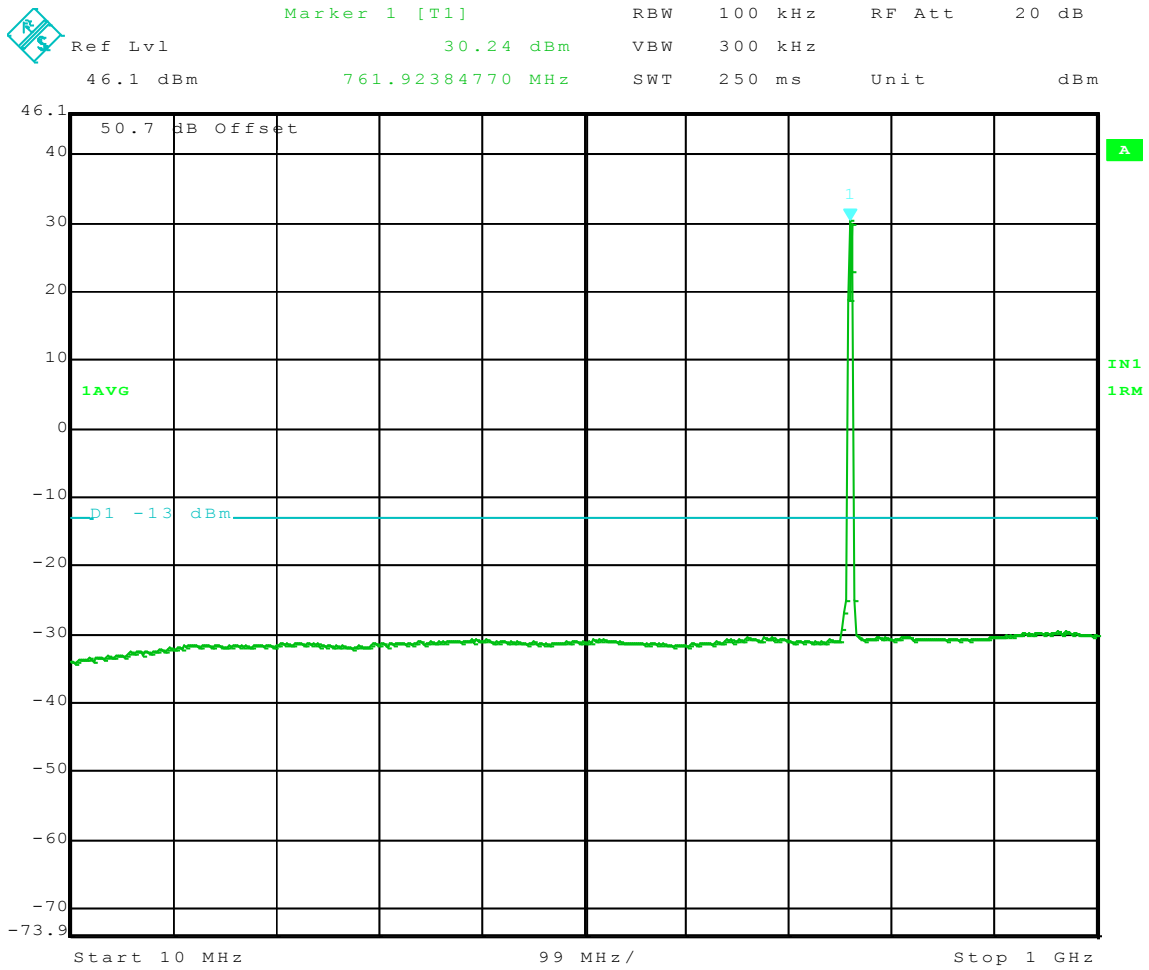


Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; Test Engineer: JY  
Comment A: PUBLIC SAFETY B14; PWR: 40W BLK.PS 763 - 768 MHz 64QAM  
FCC Prt 90.543; FCCID: AS5BBTRX-04; TRDU(M1); HPF Used.  
Date: 19.OCT.2011 11:56:03

**Transmit Port  
Antenna Conducted Spurious Emissions  
Part 27 & 90  
Block: Public Safety  
QPSK Modulation  
Bandwidth 760.5 – 765.5 MHz**

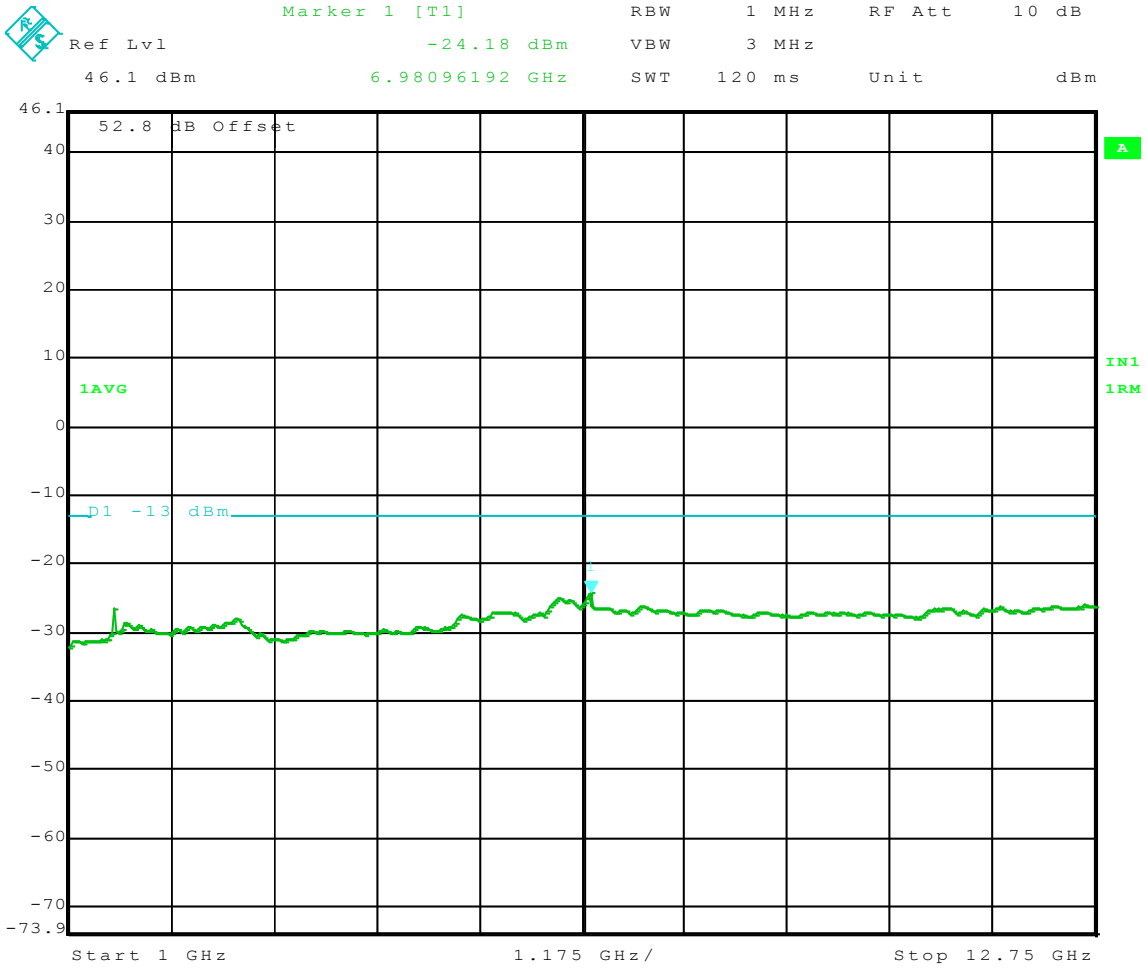


Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; Test Engineer: SEG  
Comment A: PUBLIC SAFETY B14; PWR: 40W; BLK.D & PS: 760.5 - 765.5 MHz  
QPSK; FCC Prt 27 & 90.543; FCCID: AS5BBTRX-04; TRDU(M1)  
Date: 25.AUG.2011 09:34:34

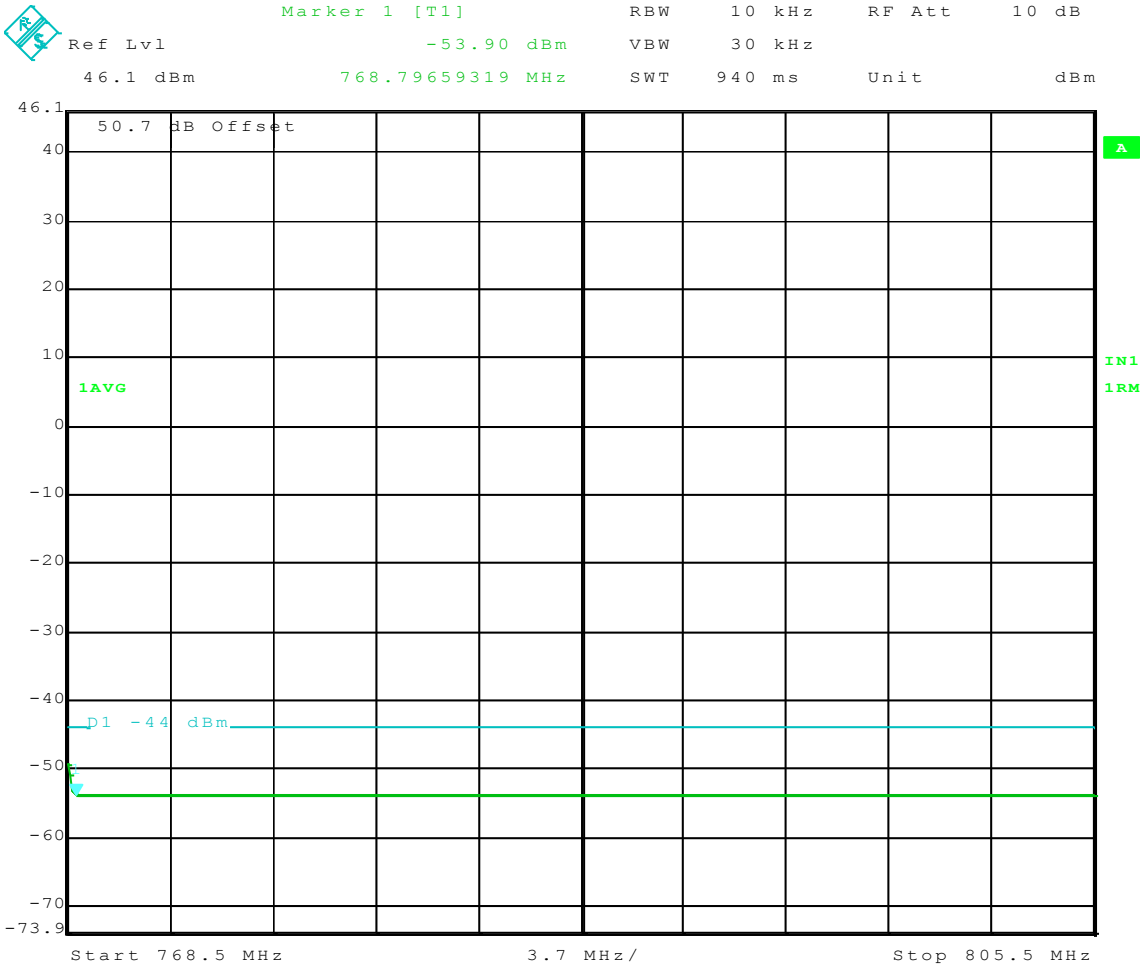


Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; Test Engineer: SEG  
Comment A: PUBLIC SAFETY B14; PWR: 40W; BLK.D & PS: 760.5 - 765.5 MHz  
QPSK; FCC Prt 27 & 90.543; FCCID: AS5BBTRX-04; TRDU(M1)  
Date: 25.AUG.2011 09:36:40





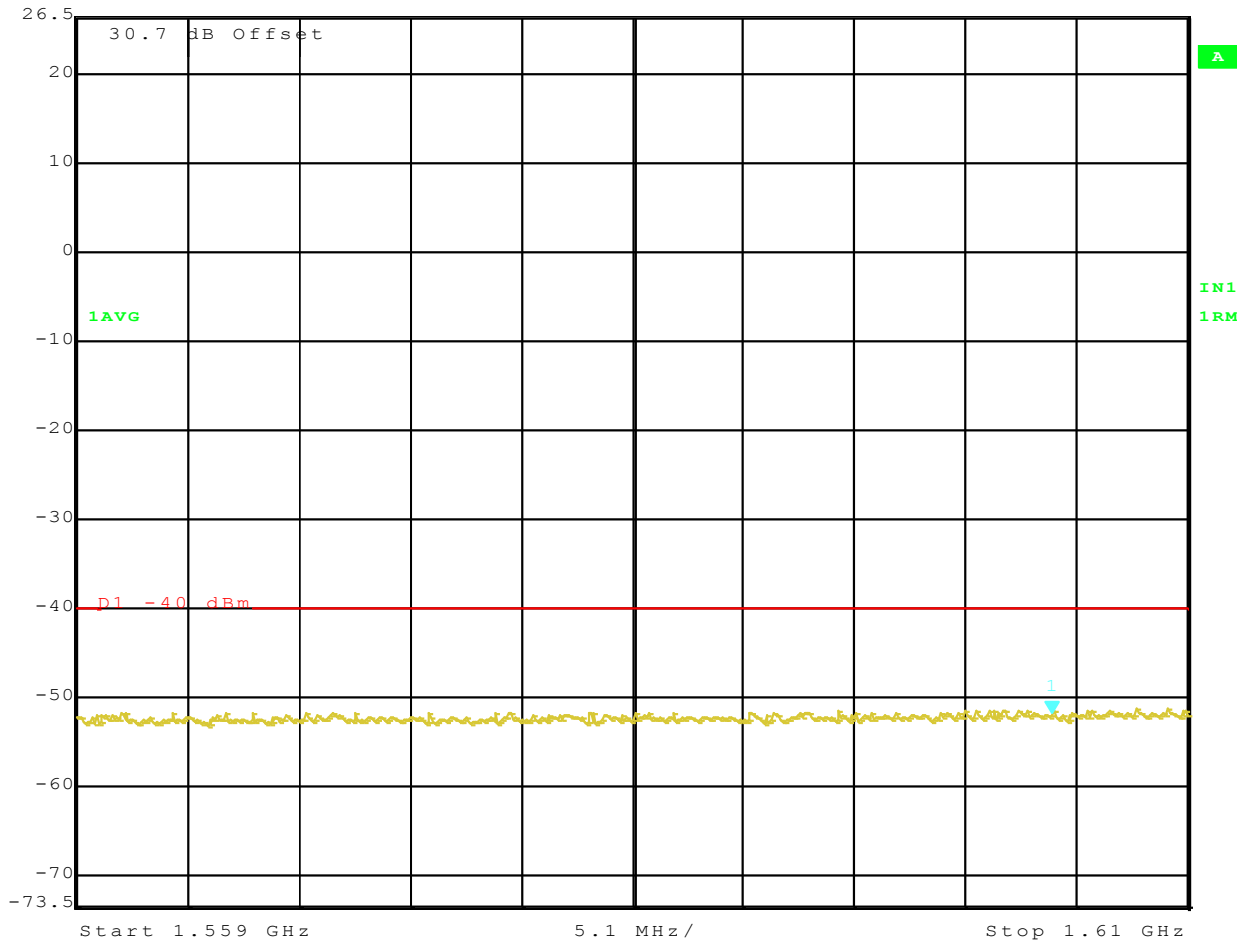
Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; Test Engineer: SEG  
Comment A: PUBLIC SAFETY B14; PWR: 40W; BLK.D & PS: 760.5 - 765.5 MHz  
QPSK; FCC Prt 27 & 90.543; FCCID: AS5BBTRX-04; TRDU (M1)  
Date: 25.AUG.2011 09:37:52



Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; Test Engineer: SEG  
Comment A: PUBLIC SAFETY B14; PWR: 40W; BLK.D & PS: 760.5 - 765.5 MHz  
QPSK; FCC Prt 27 & 90.543; FCCID: AS5BBTRX-04; TRDU(M1)  
Date: 25.AUG.2011 09:43:28

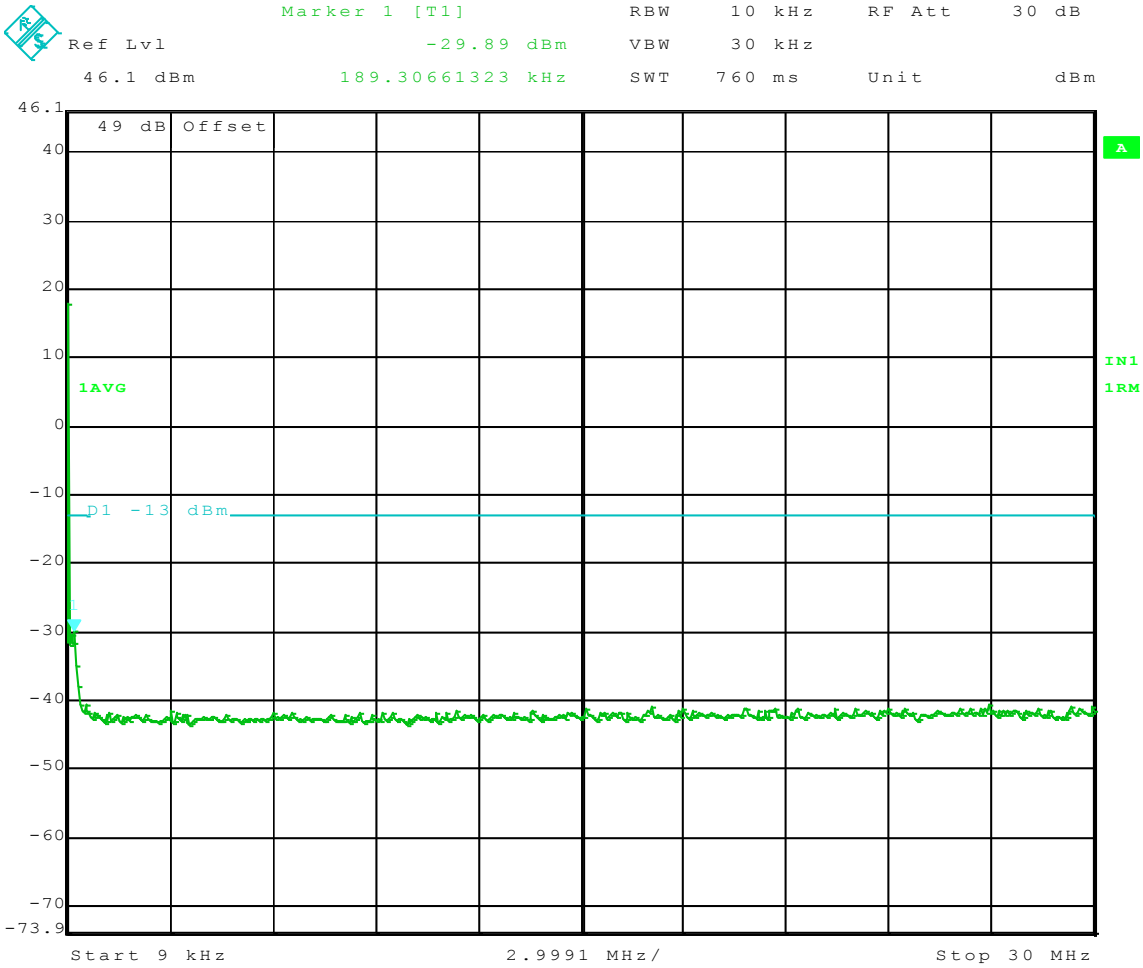


Marker 1 [T1] RBW 1 MHz RF Att 10 dB  
Ref Lvl -51.75 dBm VBW 3 MHz  
26.5 dBm 1.60376553 GHz SWT 5 ms Unit dBm

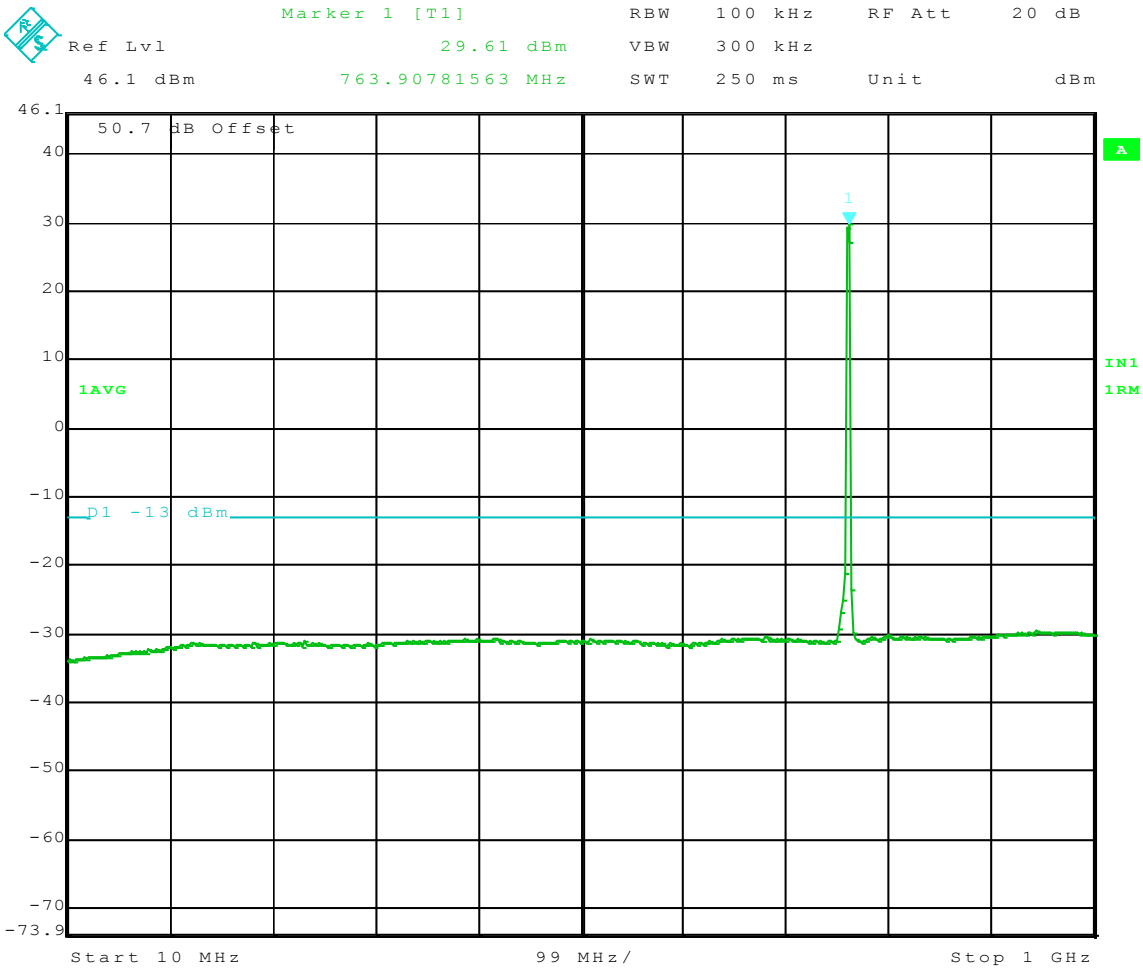


Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; Test Engineer: JY  
Comment A: PUBLIC SAFETY B14; PWR: 40W BLK.PS/D 760.5 - 765.5 MHz QPSK  
FCC Prt 90.543; FCCID: AS5BBTRX-04; TRDU(M1); HPF Used.  
Date: 19.OCT.2011 11:59:44

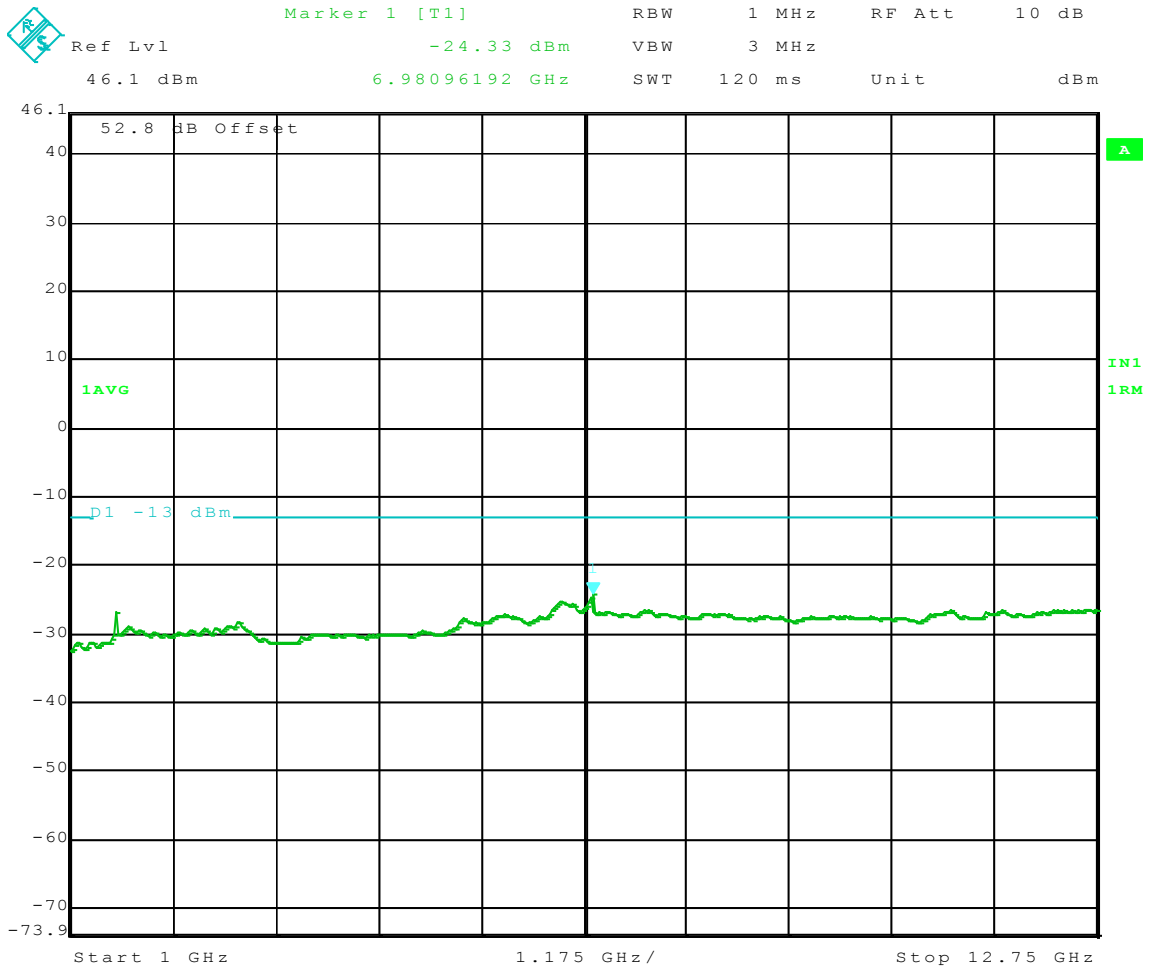
**Transmit Port**  
**Antenna Conducted Spurious Emissions**  
**Part 27 & 90**  
**Block: Public Safety**  
**16QAM Modulation**  
**Bandwidth 760.5 – 765.5 MHz**



Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; Test Engineer: SEG  
Comment A: PUBLIC SAFETY B14; PWR: 40W; BLK.D & PS: 760.5 - 765.5 MHz  
16QAM FCC Prt 27 & 90.543; FCCID: AS5BBTRX-04; TRDU(M1)  
Date: 29.AUG.2011 13:36:46



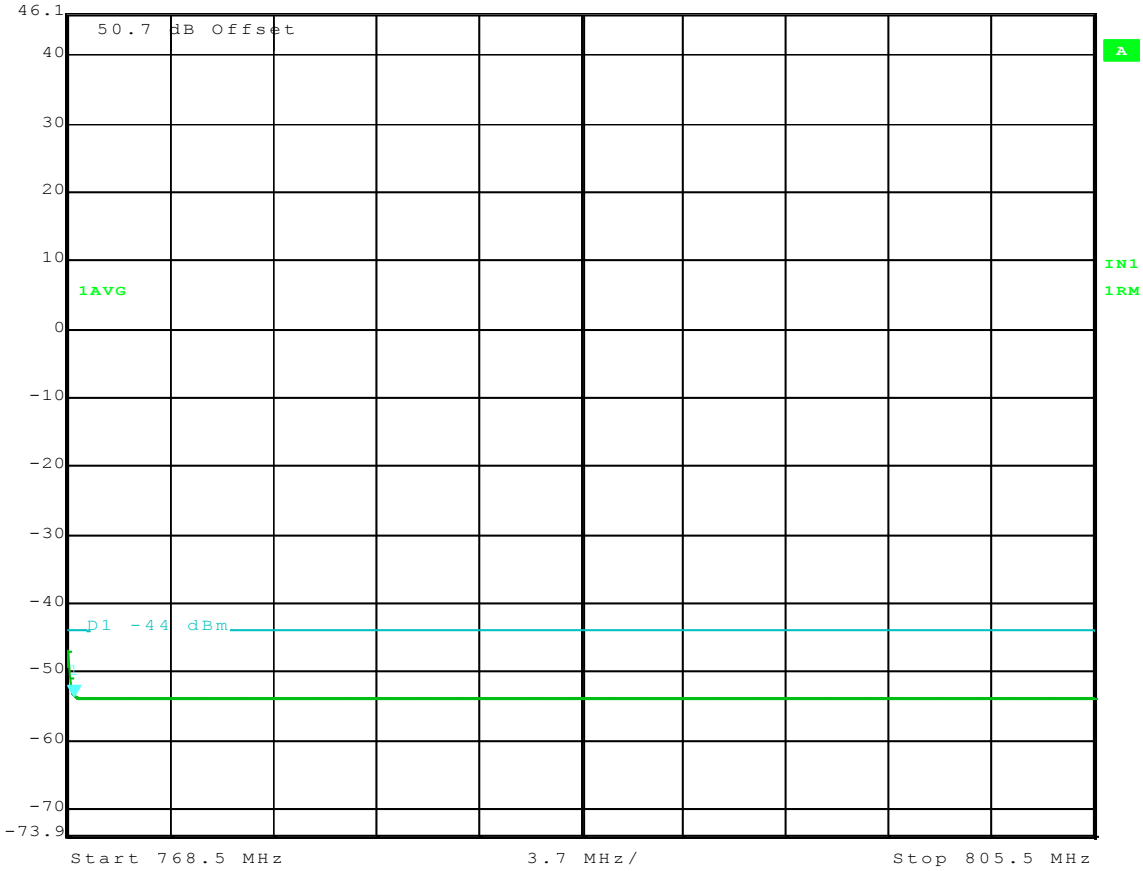
Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; Test Engineer: SEG  
Comment A: PUBLIC SAFETY B14; PWR: 40W; BLK.D & PS: 760.5 - 765.5 MHz  
16QAM FCC Prt 27 & 90.543; FCCID: AS5BBTRX-04; TRDU(M1)  
Date: 29.AUG.2011 13:35:10



Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; Test Engineer: SEG  
Comment A: PUBLIC SAFETY B14; PWR: 40W; BLK.D & PS: 760.5 - 765.5 MHz  
16QAM FCC Prt 27 & 90.543; FCCID: AS5BBTRX-04; TRDU(M1)  
Date: 29.AUG.2011 13:32:21



Marker 1 [T1] RBW 10 kHz RF Att 10 dB  
Ref Lvl -53.71 dBm VBW 30 kHz  
46.1 dBm 768.72244489 MHz SWT 940 ms Unit dBm

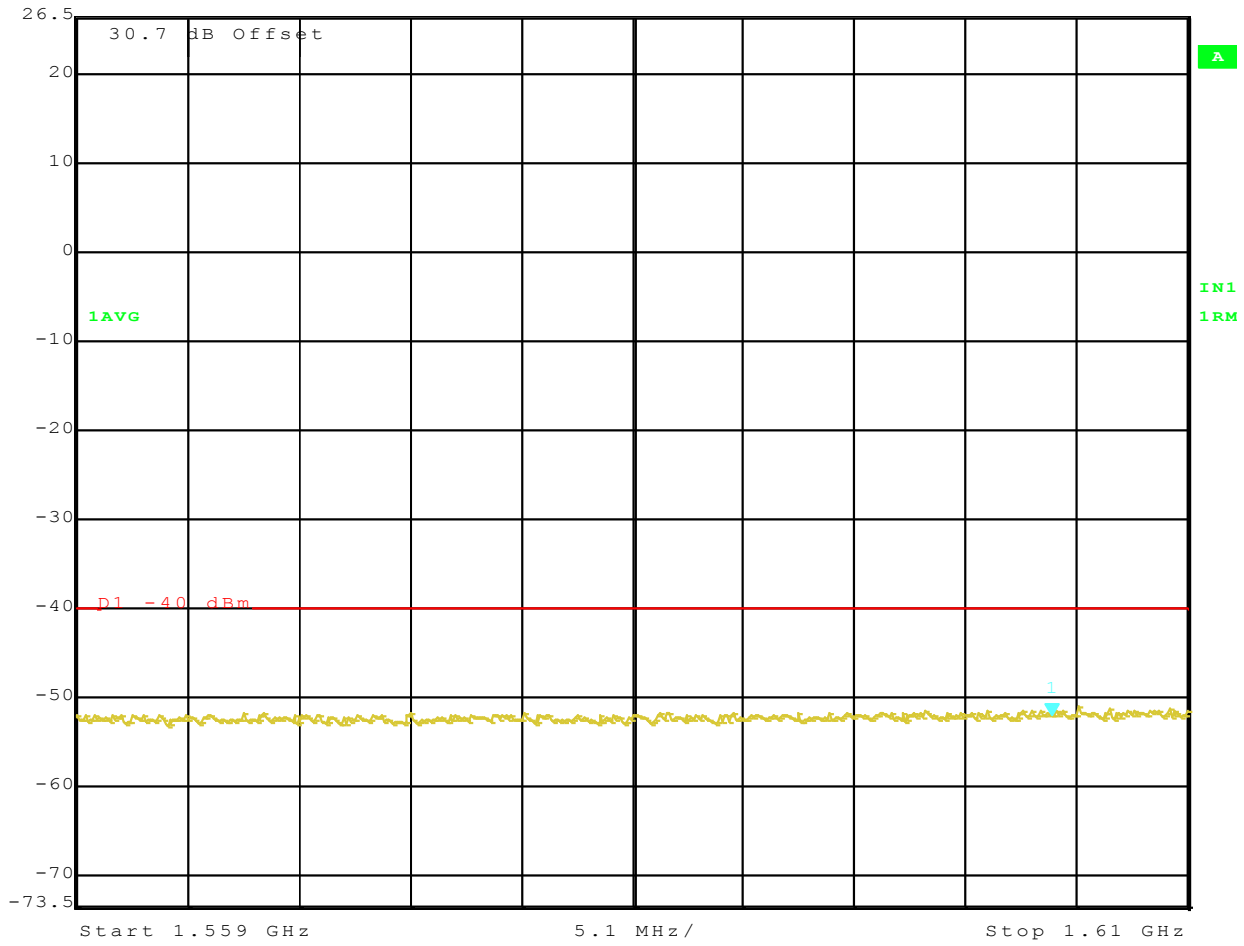


Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; Test Engineer: SEG  
Comment A: PUBLIC SAFETY B14; PWR: 40W; BLK.D & PS: 760.5 - 765.5 MHz  
16QAM FCC Prt 27 & 90.543; FCCID: AS5BBTRX-04; TRDU(M1)  
Date: 29.AUG.2011 13:30:27



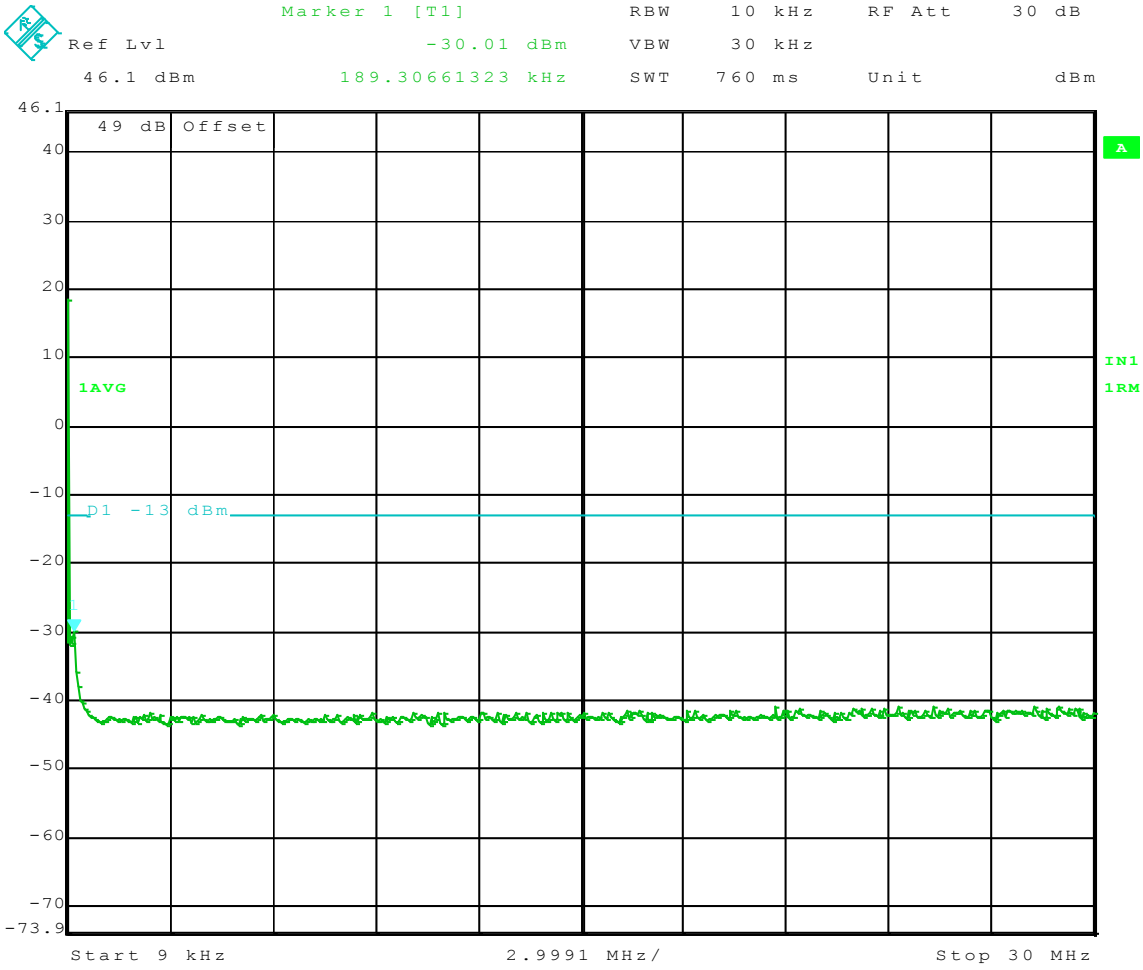


Marker 1 [T1] RBW 1 MHz RF Att 10 dB  
Ref Lvl -52.13 dBm VBW 3 MHz  
26.5 dBm 1.60376553 GHz SWT 5 ms Unit dBm

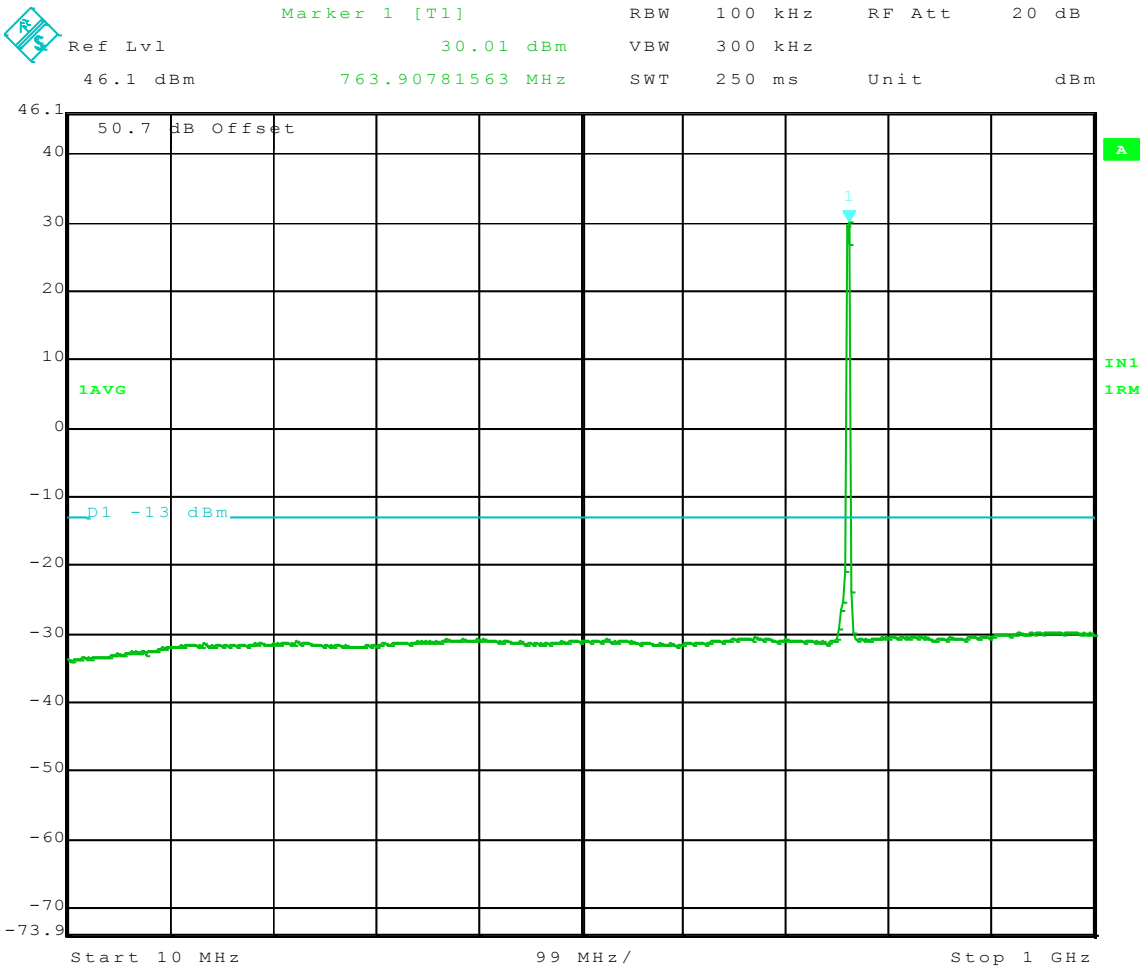


Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; Test Engineer:JY  
Comment A: PUBLIC SAFETY B14; PWR: 40W BLK.PS/D 760.5 - 765.5 MHz 16QAM  
FCC Prt 90.543; FCCID: AS5BBTRX-04; TRDU(M1); HPF Used.  
Date: 19.OCT.2011 12:03:09

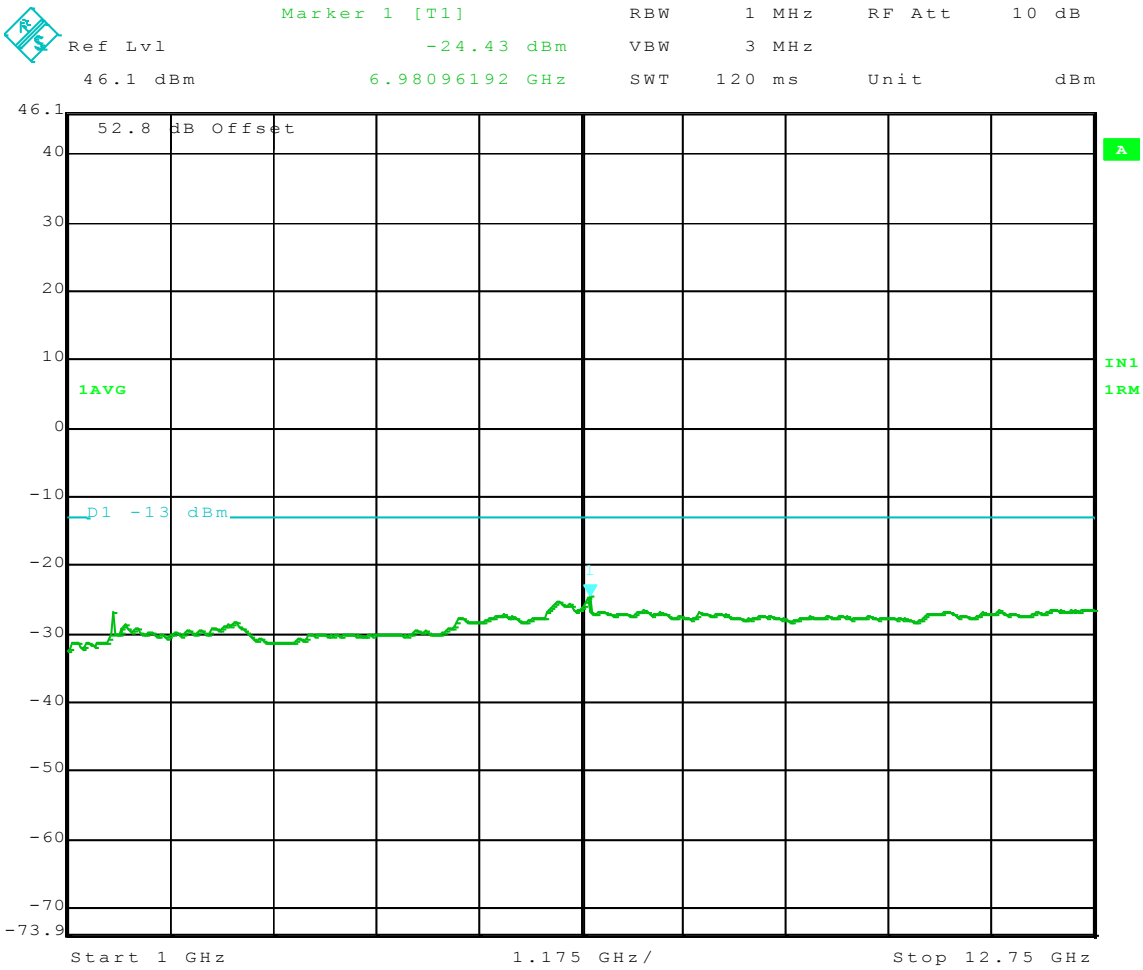
**Transmit Port  
Antenna Conducted Spurious Emissions  
Part 27 & 90  
Block: Public Safety  
16QAM Modulation  
Bandwidth 760.5 – 765.5 MHz**



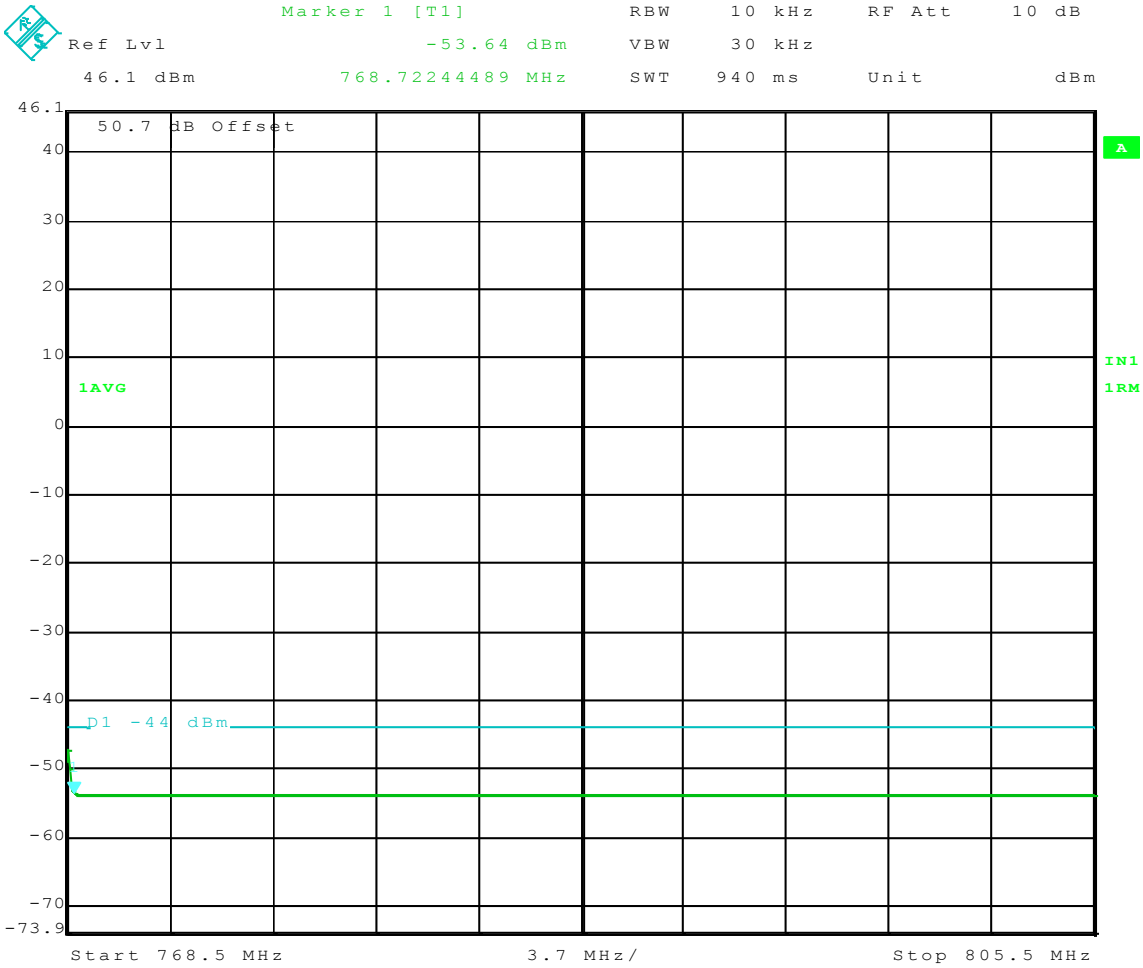
Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; Test Engineer: SEG  
Comment A: PUBLIC SAFETY B14; PWR: 40W; BLK.D & PS: 760.5 - 765.5 MHz  
64QAM FCC Prt 27 & 90.543; FCCID: AS5BBTRX-04; TRDU(M1)  
Date: 29.AUG.2011 14:29:12



Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; Test Engineer: SEG  
Comment A: PUBLIC SAFETY B14; PWR: 40W; BLK.D & PS: 760.5 - 765.5 MHz  
64QAM FCC Prt 27 & 90.543; FCCID: AS5BBTRX-04; TRDU(M1)  
Date: 29.AUG.2011 14:31:48



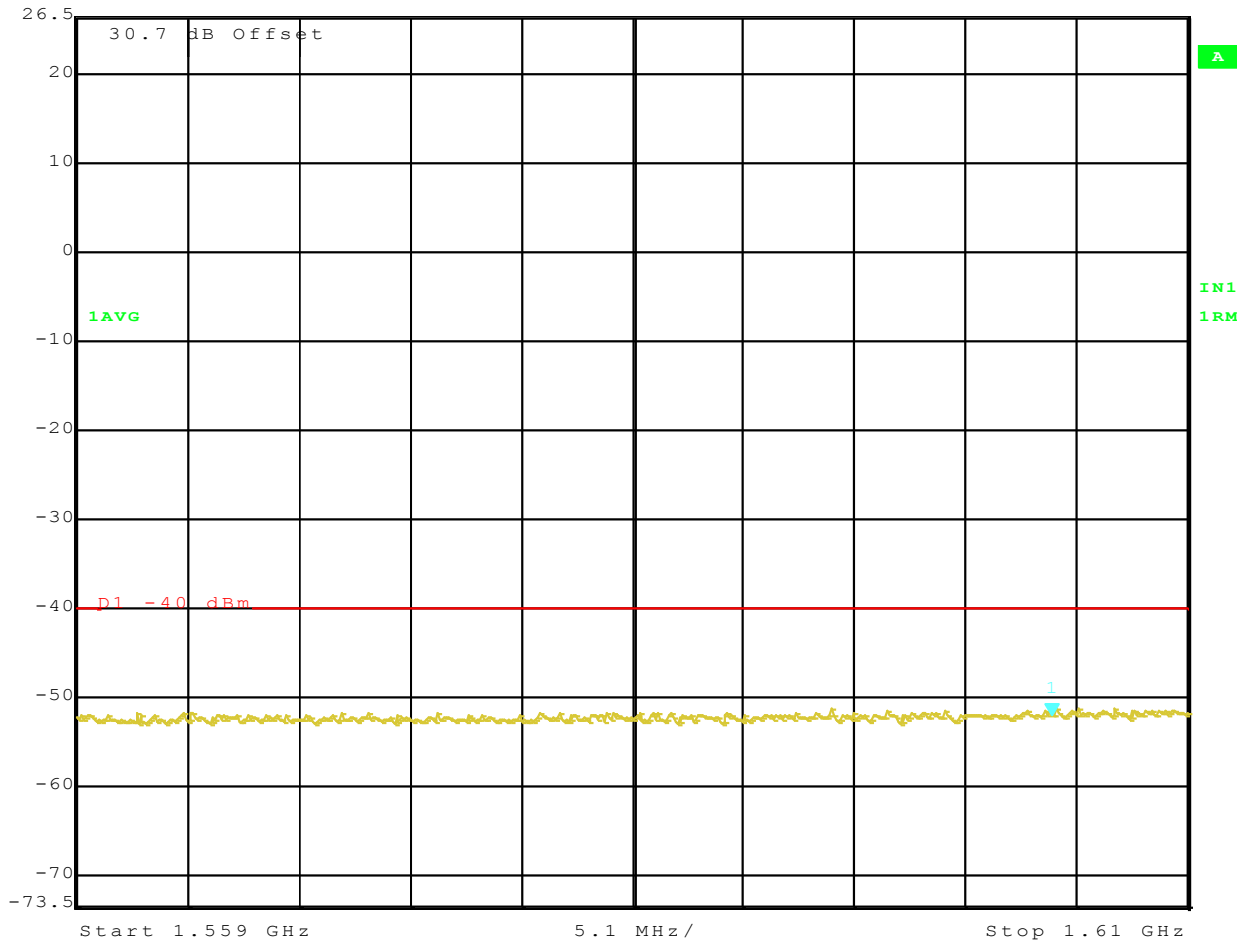
Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; Test Engineer: SEG  
Comment A: PUBLIC SAFETY B14; PWR: 40W; BLK.D & PS: 760.5 - 765.5 MHz  
64QAM FCC Prt 27 & 90.543; FCCID: AS5BBTRX-04; TRDU(M1)  
Date: 29.AUG.2011 14:34:10



Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; Test Engineer: SEG  
Comment A: PUBLIC SAFETY B14; PWR: 40W; BLK.D & PS: 760.5 - 765.5 MHz  
64QAM FCC Prt 27 & 90.543; FCCID: AS5BBTRX-04; TRDU(M1)  
Date: 29.AUG.2011 14:36:15



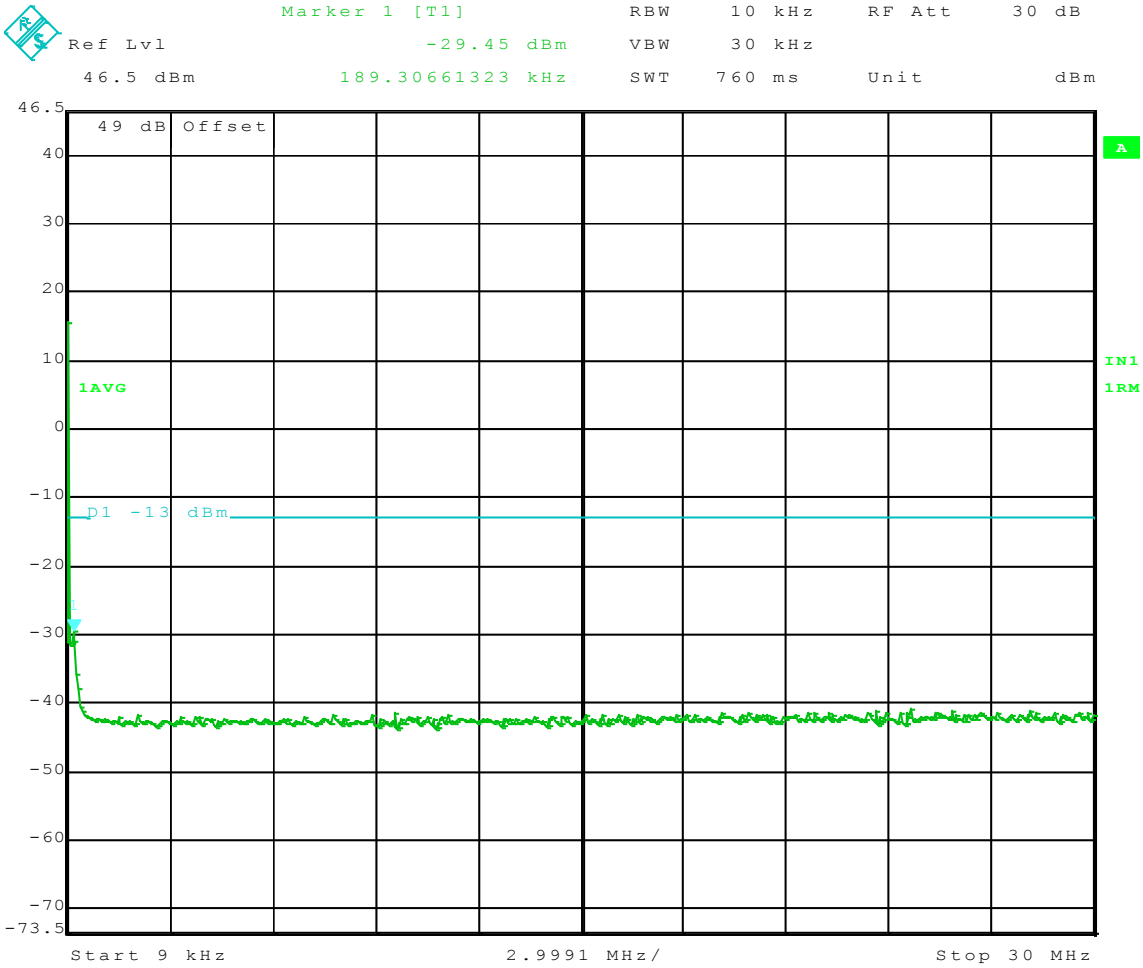
Marker 1 [T1] RBW 1 MHz RF Att 10 dB  
Ref Lvl -52.21 dBm VBW 3 MHz  
26.5 dBm 1.60376553 GHz SWT 5 ms Unit dBm



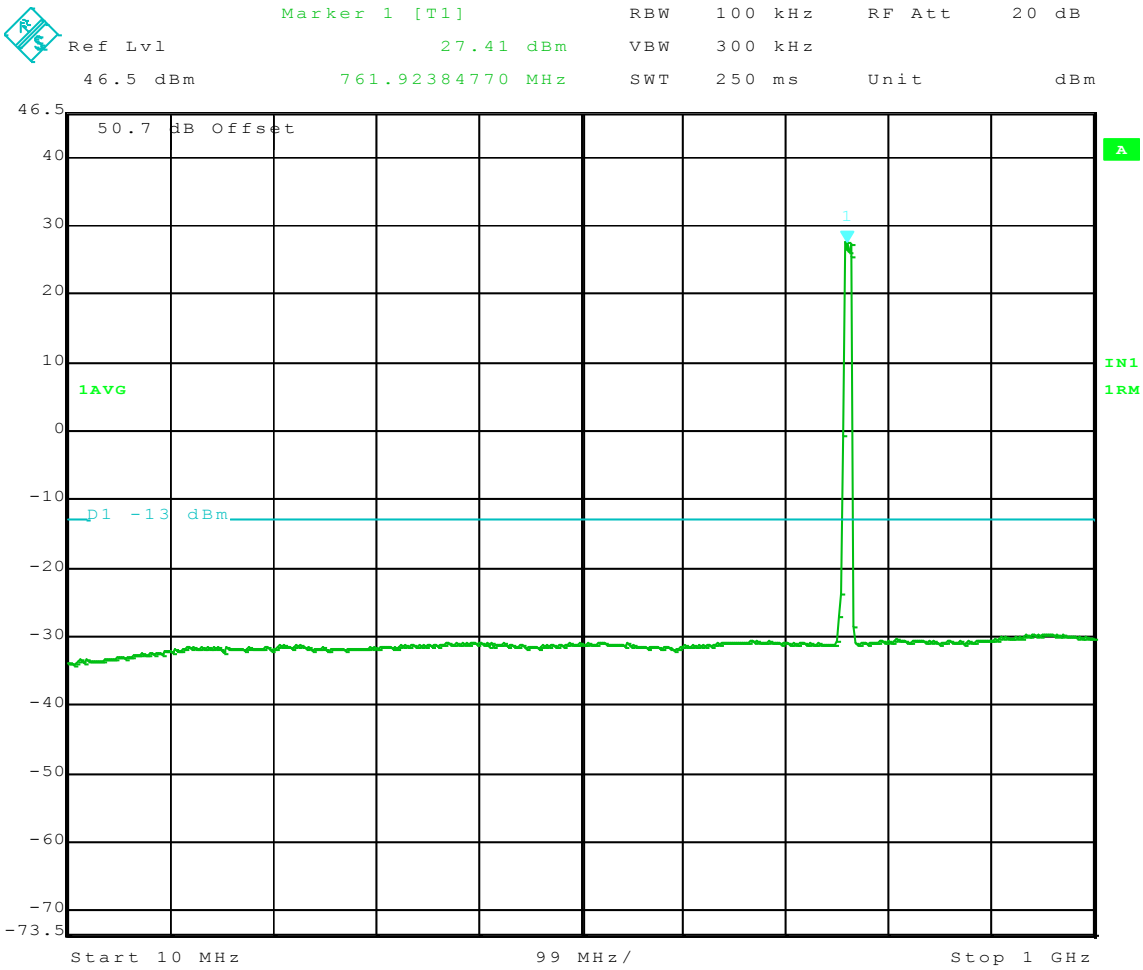
Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; Test Engineer:JY  
Comment A: PUBLIC SAFETY B14; PWR: 40W BLK.PS/D 760.5 - 765.5 MHz 64QAM  
FCC Prt 90.543; FCCID: AS5BBTRX-04; TRDU(M1); HPF Used.  
Date: 19.OCT.2011 12:18:51

**Transmit Port**  
**Antenna Conducted Spurious Emissions**  
**Part 27 & 90**  
**Block: Public Safety & D**  
**QPSK Modulation**  
**Bandwidth 758 – 768 MHz**

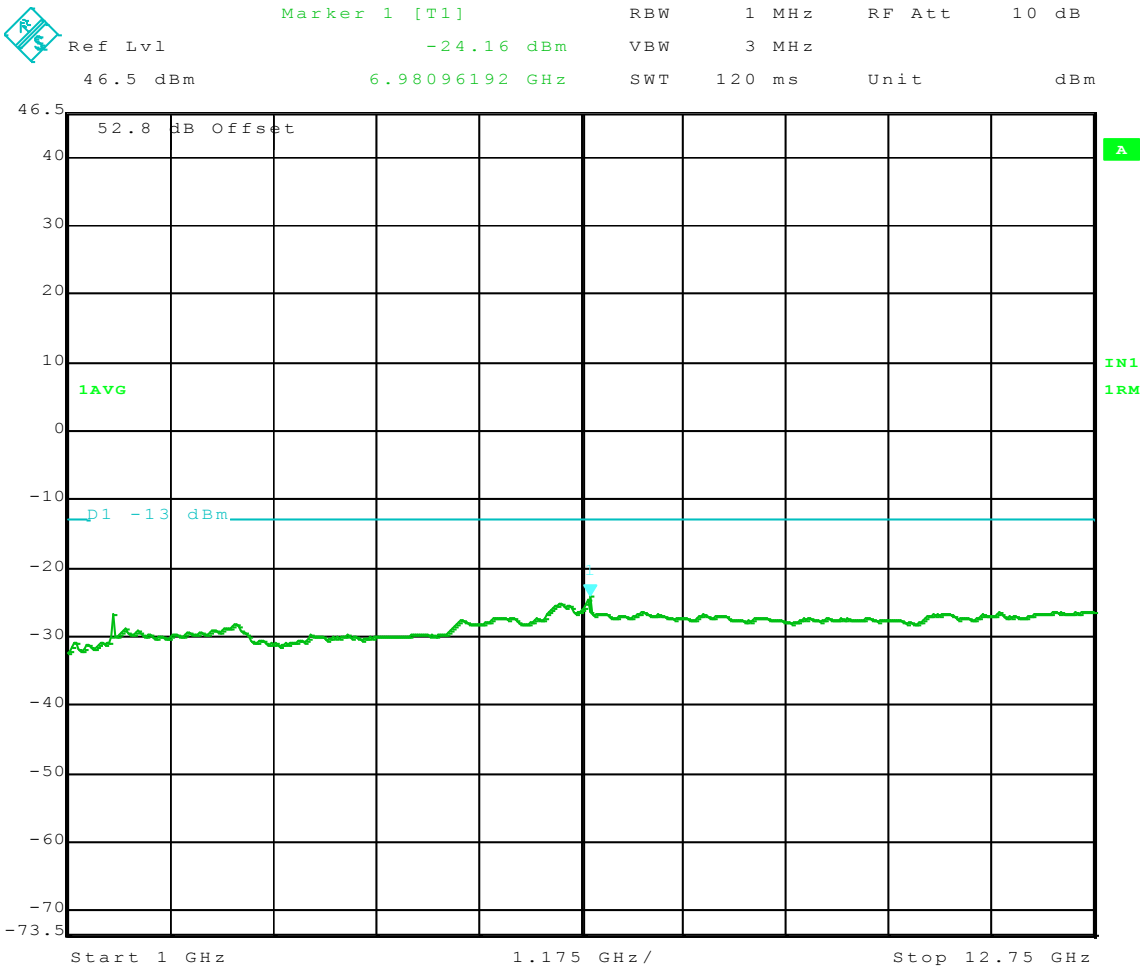




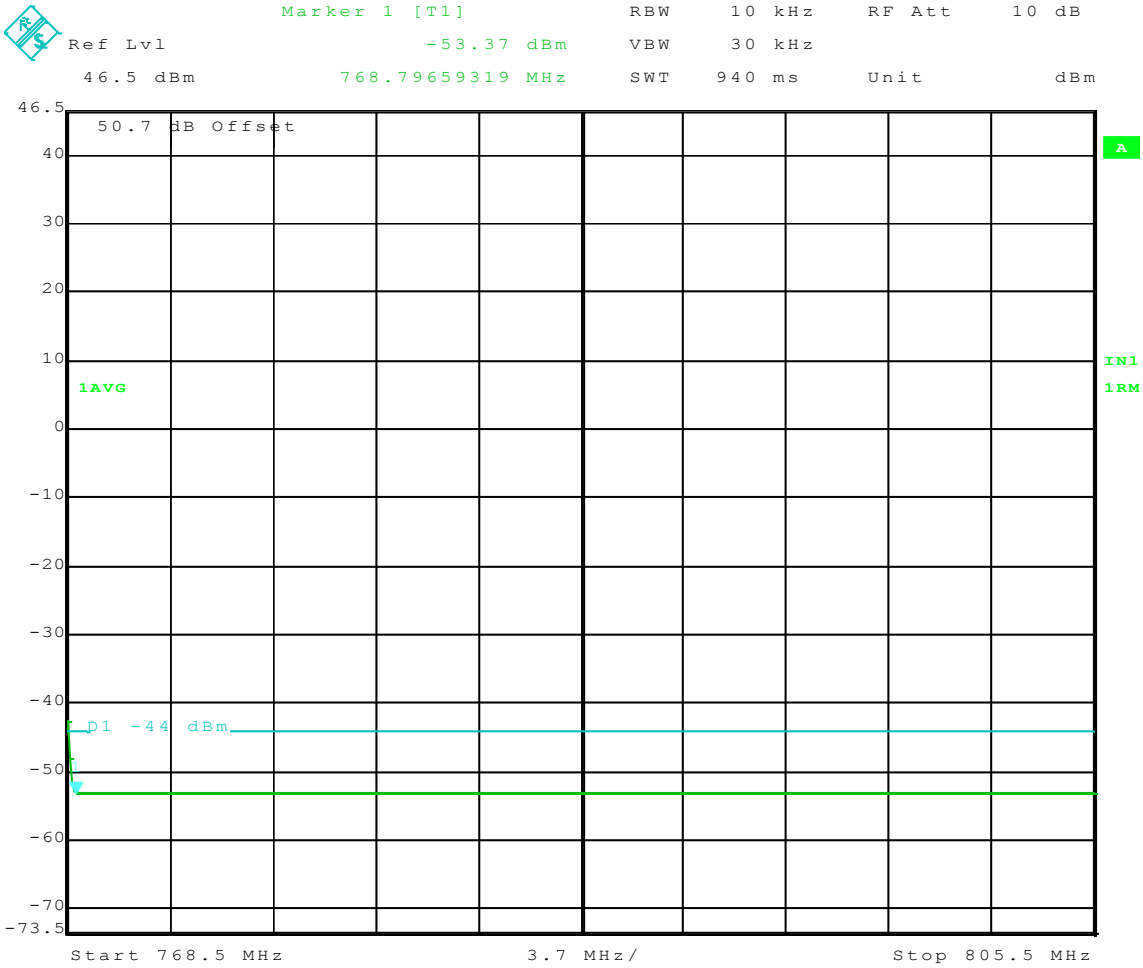
Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; Test Engineer: SEG  
Comment A: PUBLIC SAFETY B14; PWR: 40W; BLK.D & PS: 758 - 768 MHz  
QPSK; FCC Prt 27 & 90.543; FCCID: AS5BBTRX-04; TRDU(M1)  
Date: 29.AUG.2011 09:34:33



Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; Test Engineer: SEG  
Comment A: PUBLIC SAFETY B14; PWR: 40W; BLK.D & PS: 758 - 768 MHz  
QPSK; FCC Prt 27 & 90.543; FCCID: AS5BBTRX-04; TRDU(M1)  
Date: 29.AUG.2011 09:22:23



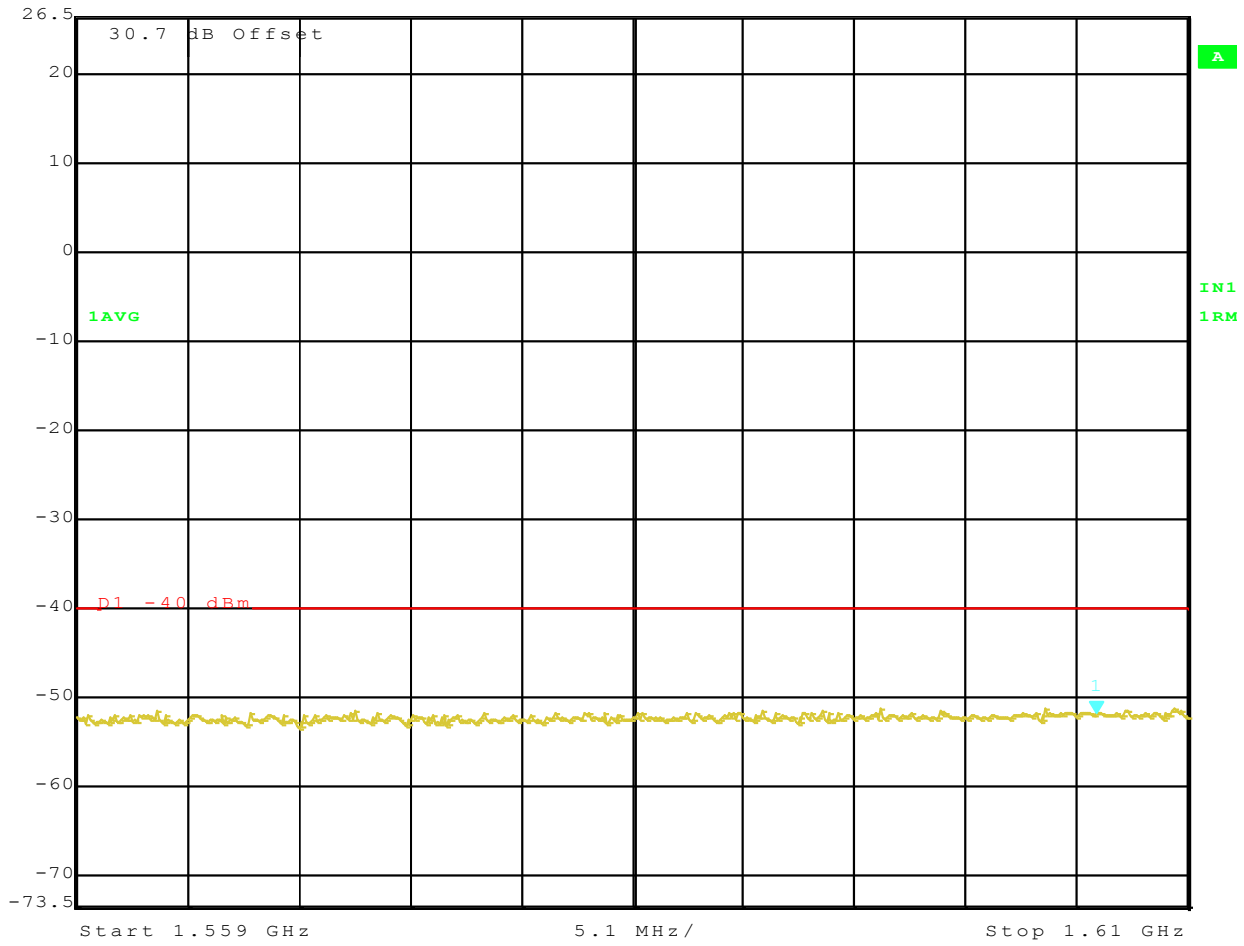
Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; Test Engineer: SEG  
Comment A: PUBLIC SAFETY B14; PWR: 40W; BLK.D & PS: 758 - 768 MHz  
QPSK; FCC Prt 27 & 90.543; FCCID: AS5BBTRX-04; TRDU(M1)  
Date: 29.AUG.2011 09:20:53



Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; Test Engineer: SEG  
Comment A: PUBLIC SAFETY B14; PWR: 40W; BLK.D & PS: 758 - 768 MHz  
QPSK; FCC Prt 27 & 90.543; FCCID: AS5BBTRX-04; TRDU(M1)  
Date: 29.AUG.2011 09:42:55

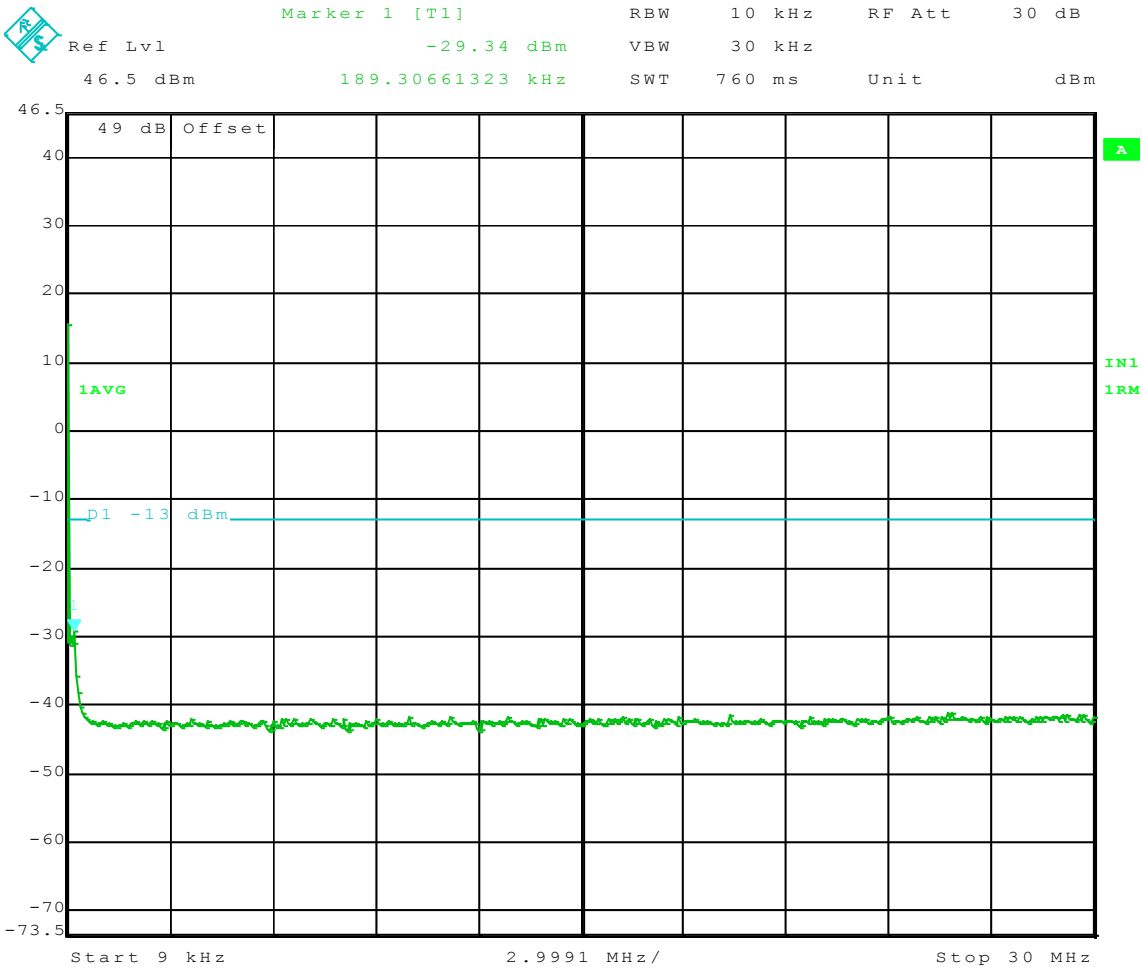


Marker 1 [T1] RBW 1 MHz RF Att 10 dB  
Ref Lvl -51.96 dBm VBW 3 MHz  
26.5 dBm 1.60580962 GHz SWT 5 ms Unit dBm



Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; Test Engineer: JY  
Comment A: PUBLIC SAFETY B14; PWR: 40W BLK.PS/D 758 - 768 MHz QPSK  
FCC Prt 90.543; FCCID: AS5BBTRX-04; TRDU(M1); HPF Used.  
Date: 19.OCT.2011 12:22:55

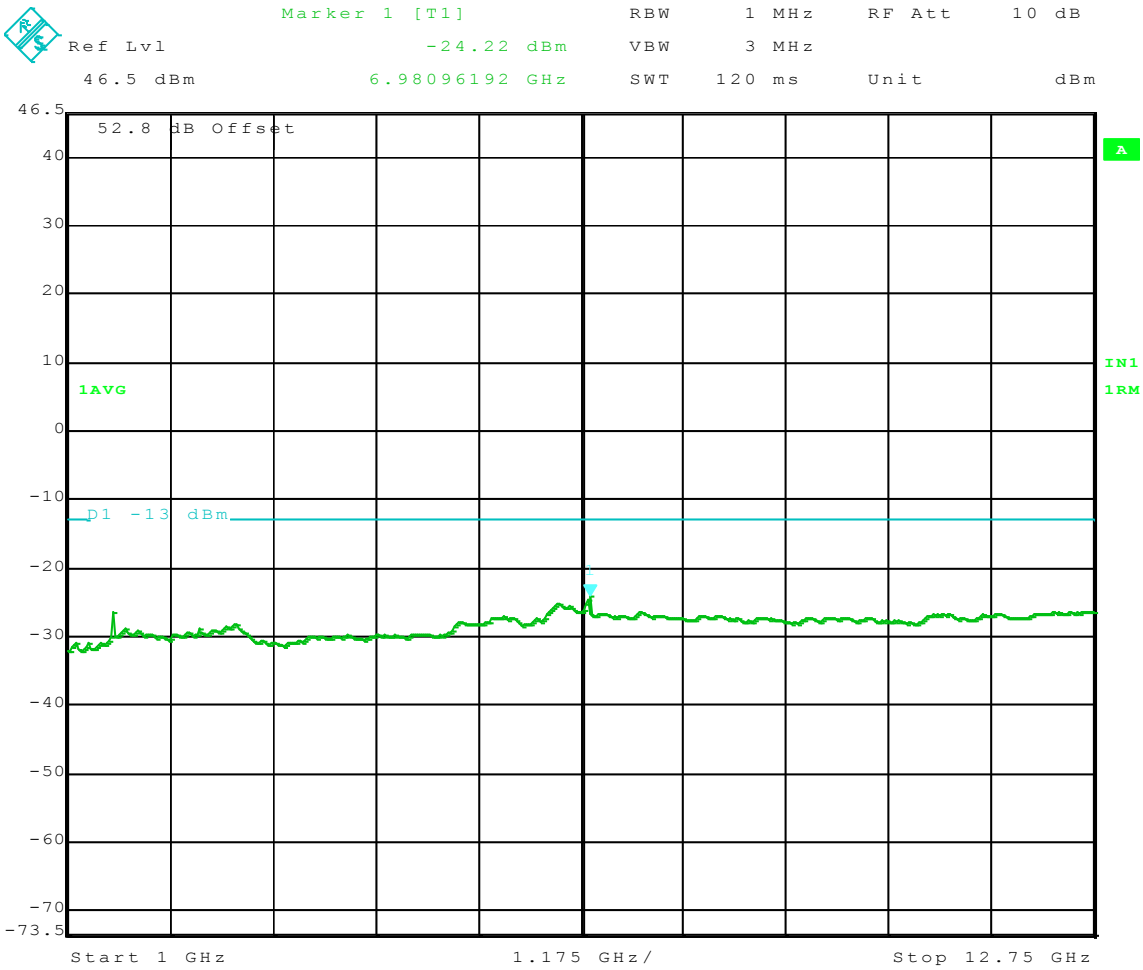
**Transmit Port  
Antenna Conducted Spurious Emissions  
Part 27 & 90  
Block: Public Safety & D  
16QAM Modulation  
Bandwidth 758 – 768 MHz**



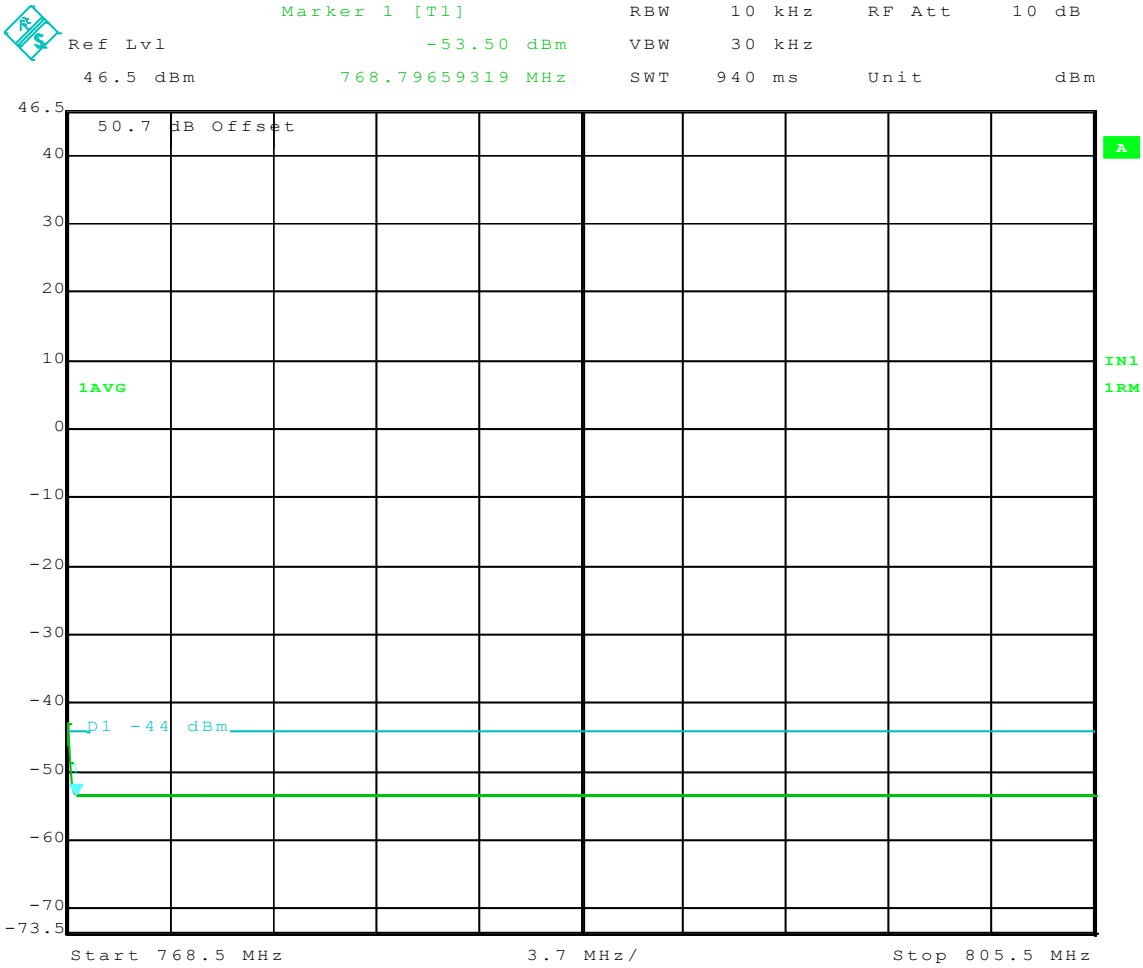
Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; Test Engineer: SEG  
Comment A: PUBLIC SAFETY B14; PWR: 40W; BLK.D & PS: 758 - 768 MHz  
16QAM; FCC Prt 27 & 90.543; FCCID: AS5BBTRX-04; TRDU(M1)  
Date: 29.AUG.2011 10:10:08







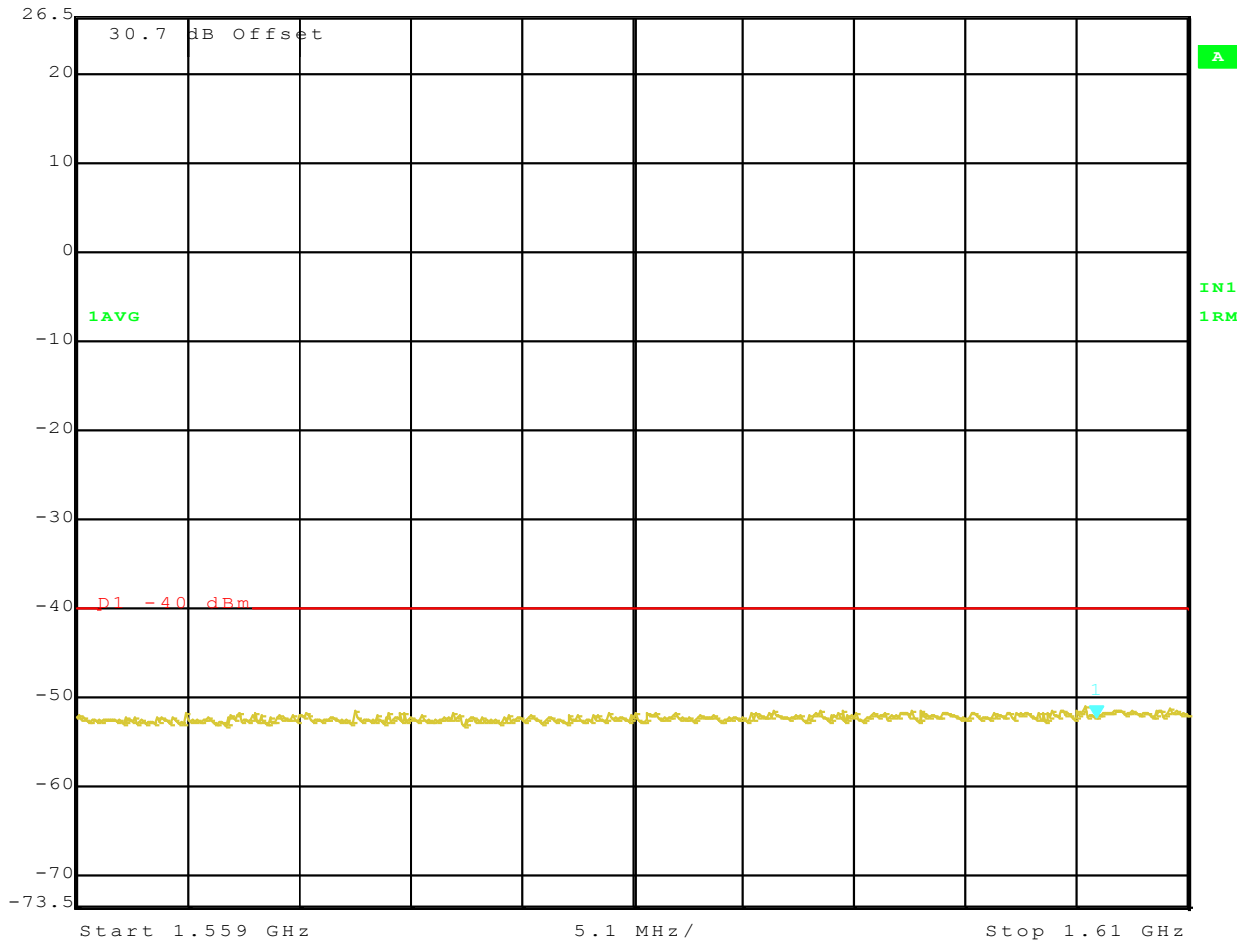
Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; Test Engineer: SEG  
Comment A: PUBLIC SAFETY B14; PWR: 40W; BLK.D & PS: 758 - 768 MHz  
16QAM; FCC Prt 27 & 90.543; FCCID: AS5BBTRX-04; TRDU(M1)  
Date: 29.AUG.2011 10:03:01



Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; Test Engineer: SEG  
Comment A: PUBLIC SAFETY B14; PWR: 40W; BLK.D & PS: 758 - 768 MHz  
16QAM; FCC Prt 27 & 90.543; FCCID: AS5BBTRX-04; TRDU(M1)  
Date: 29.AUG.2011 09:59:29

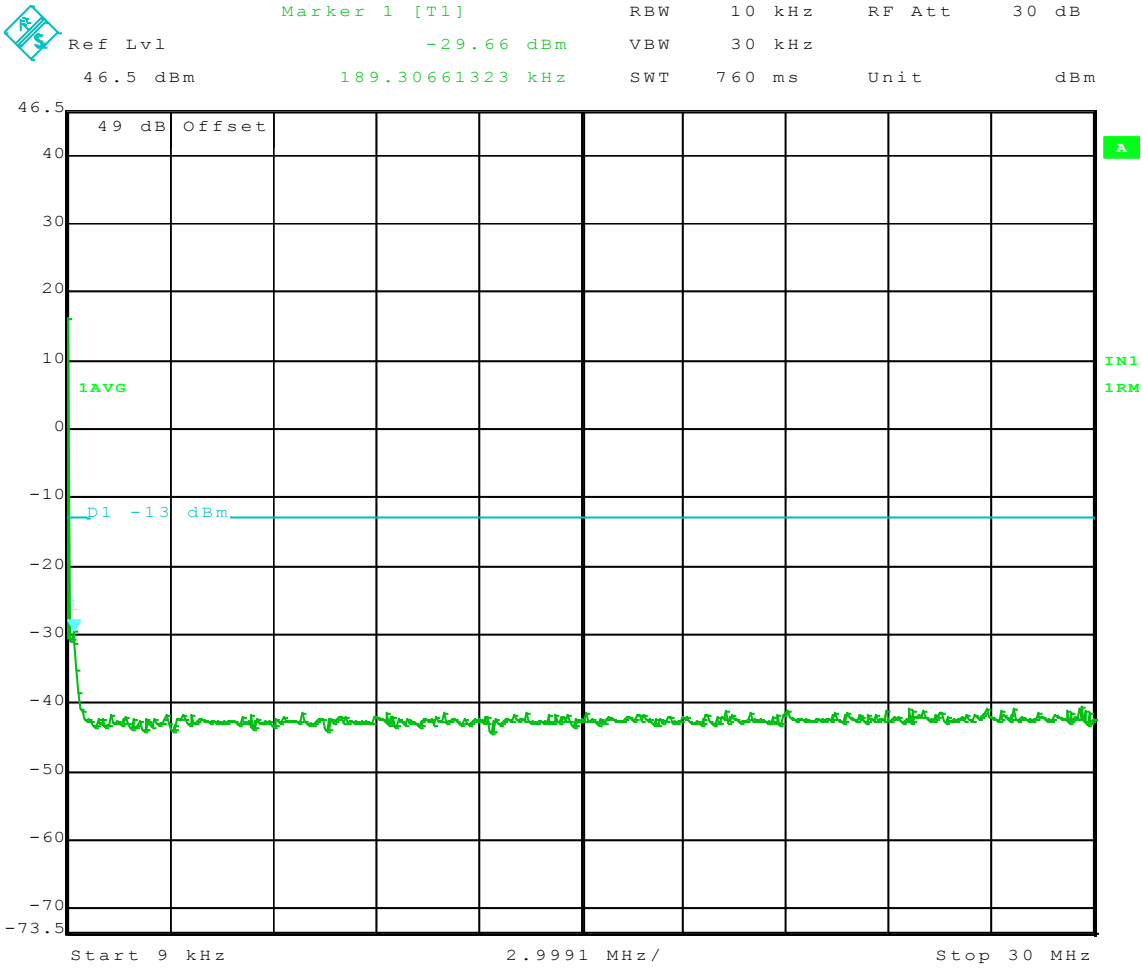


Marker 1 [T1] RBW 1 MHz RF Att 10 dB  
Ref Lvl -52.39 dBm VBW 3 MHz  
26.5 dBm 1.60580962 GHz SWT 5 ms Unit dBm

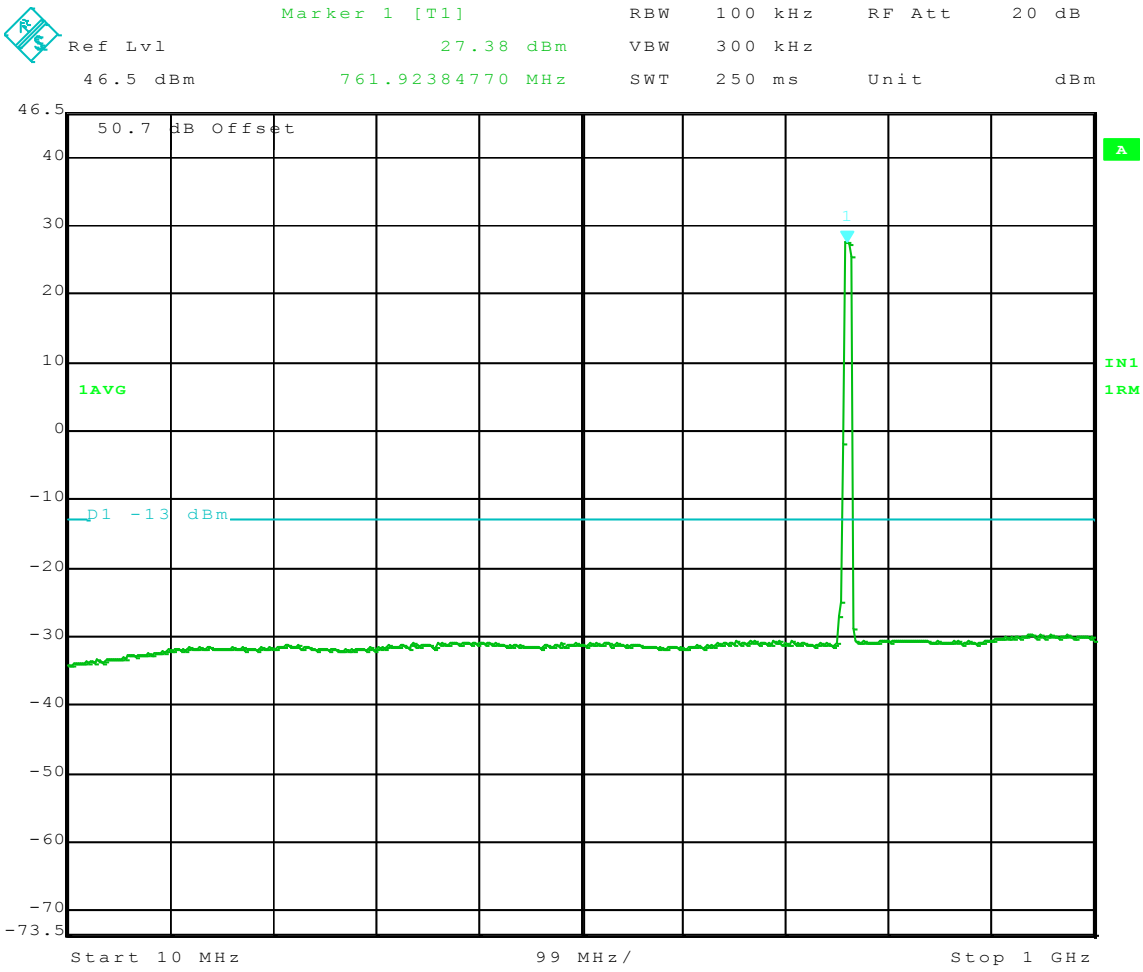


Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; Test Engineer: JY  
Comment A: PUBLIC SAFETY B14; PWR: 40W BLK.PS/D 758 - 768 MHz 16QAM  
FCC Prt 90.543; FCCID: AS5BBTRX-04; TRDU(M1); HPF Used.  
Date: 19.OCT.2011 12:30:30

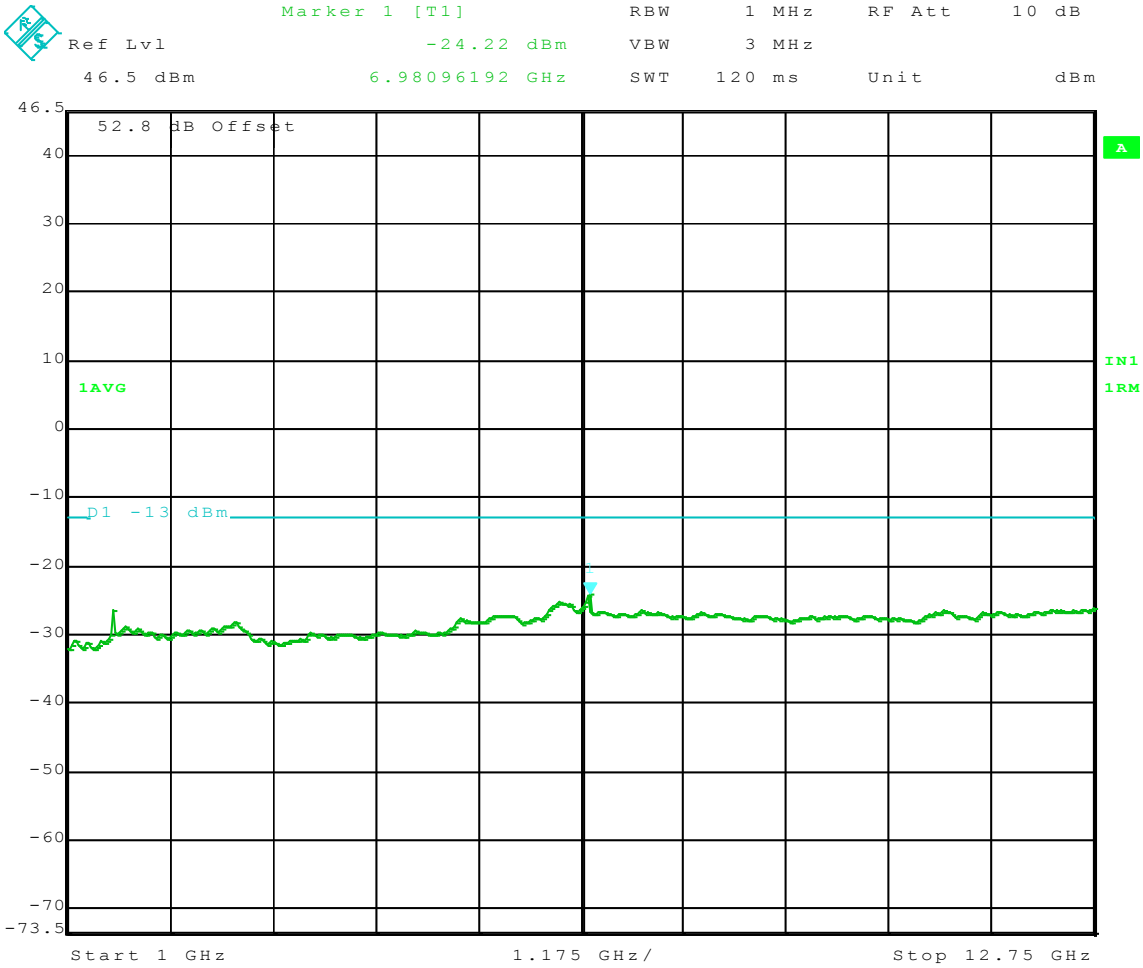
**Transmit Port  
Antenna Conducted Spurious Emissions  
Part 27 & 90  
Block: Public Safety & D  
64QAM Modulation  
Bandwidth 758 – 768 MHz**



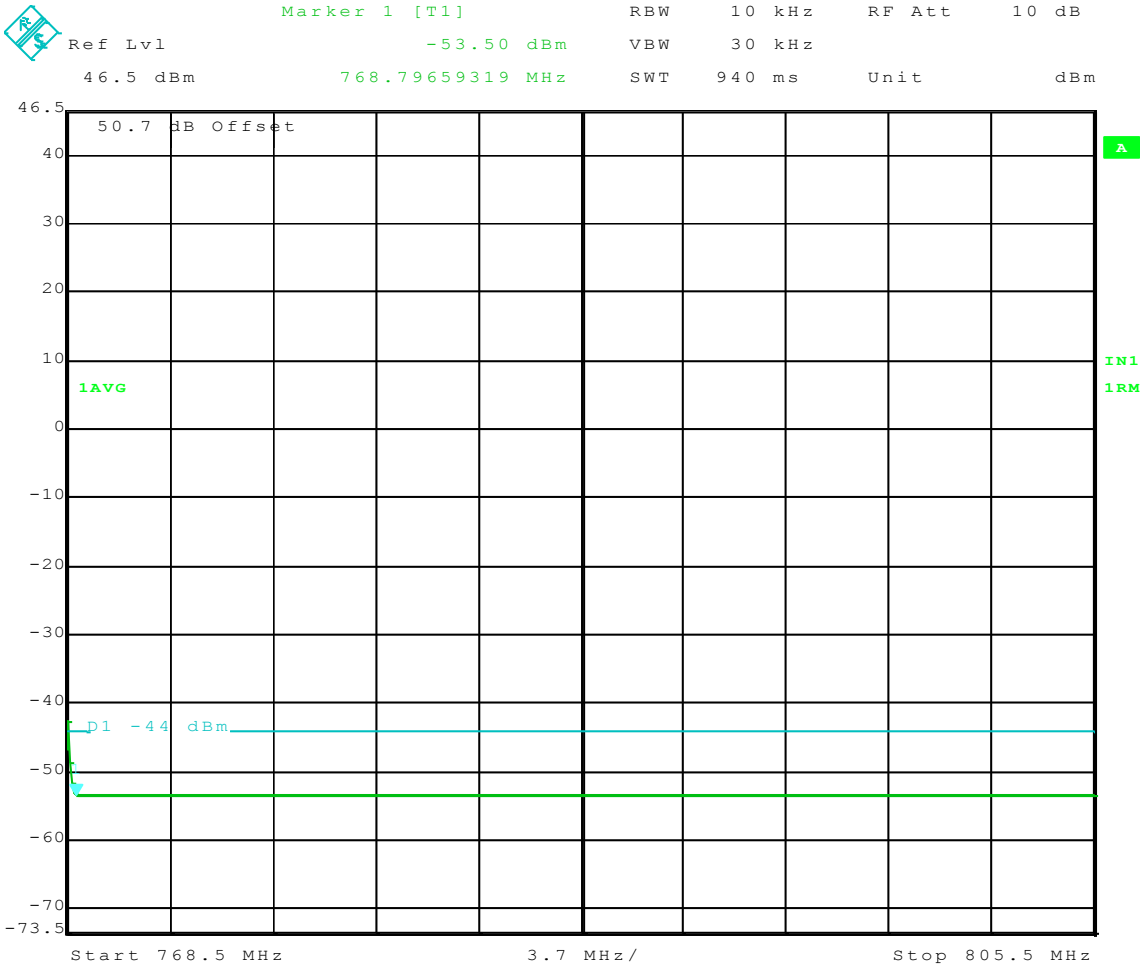
Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; Test Engineer: SEG  
Comment A: PUBLIC SAFETY B14; PWR: 40W; BLK.D & PS: 758 - 768 MHz  
64QAM; FCC Prt 27 & 90.543; FCCID: AS5BBTRX-04; TRDU(M1)  
Date: 29.AUG.2011 10:39:31



Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; Test Engineer: SEG  
Comment A: PUBLIC SAFETY B14; PWR: 40W; BLK.D & PS: 758 - 768 MHz  
64QAM; FCC Prt 27 & 90.543; FCCID: AS5BBTRX-04; TRDU(M1)  
Date: 29.AUG.2011 10:41:18



Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; Test Engineer: SEG  
Comment A: PUBLIC SAFETY B14; PWR: 40W; BLK.D & PS: 758 - 768 MHz  
64QAM; FCC Prt 27 & 90.543; FCCID: AS5BBTRX-04; TRDU(M1)  
Date: 29.AUG.2011 10:43:00

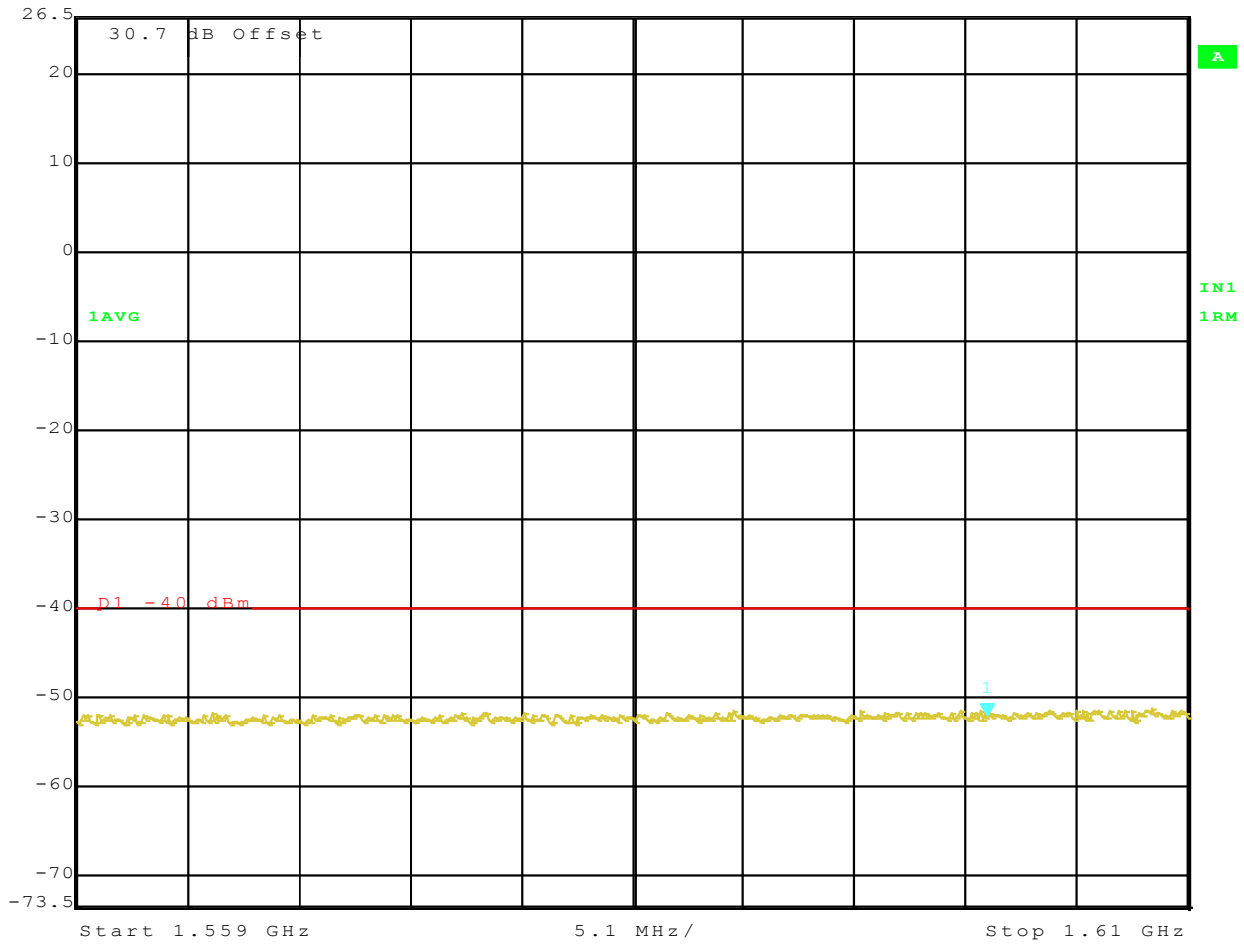


Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; Test Engineer: SEG  
Comment A: PUBLIC SAFETY B14; PWR: 40W; BLK.D & PS: 758 - 768 MHz  
64QAM; FCC Prt 27 & 90.543; FCCID: AS5BBTRX-04; TRDU(M1)  
Date: 29.AUG.2011 10:44:33





	Marker 1 [T1]	RBW	1 MHz	RF Att	10 dB
Ref Lvl	-52.17 dBm	VBW	3 MHz		
26.5 dBm	1.60080160 GHz	SWT	5 ms	Unit	dBm



Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; Test Engineer: JY  
 Comment A: PUBLIC SAFETY B14; PWR: 40W BLK.PS/D 758 - 768 MHz 64QAM  
 FCC Prt 90.543; FCCID: AS5BBTRX-04; TRDU(M1); HPF Used.  
 Date: 19.OCT.2011 12:34:06

**Measurement -5**

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

**MEASUREMENT: 5****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 Laboratories of Alcatel-Lucent Murray Hill, NJ. A complete description and full measurement data for the site is on file with the Commission (FCC File 515091).

The “**9412 eNodeB Compact**” was tested with 700 MHz TRDU operating with a RF output of 40Wx2 in MIMO mode at EAC. The operation of “**9412 eNodeB Compact**” was simulated using Base Band Unit called D2U circuit packs which is part of another cabinet. The test cabinet was equipped with three 700 MHz TRDUs and another cabinet was equipped with 3 D2Us. Both cabinets were tested installed on a rack. Both test cabinets were outdoor cabinets. The radiated emissions tests were performed with amplifiers operating with 10 MHz bandwidth and 5MHz Bandwidths. The External Antenna Connector (EAC) of RF filters that were connected to amplifiers were terminated with 50 ohm loads. The spectrum from 10 MHz to the 10 GHz (more than 10th harmonic of the carrier) was searched for spurious radiation. Measurements were made according to ANSI C63.4. A special attention was taken for measuring in the frequency range 769 to 805 MHz and 1159 to 1610MHz. In these bands there were no measurable radiated emissions were observed.

Measurements were made in following modulations.

1. Three 700 MHz TRDUs operating QPSK mode (Each of the TRDUs tuned to 758-763 MHz, 763-768MHz and 758-768 MHz)
2. Three 700 MHz TRDUs operating in 16 QAM mode (Each of the TRDUs tuned to 758-763 MHz, 763-768MHz and 758-768 MHz)
3. Three 700 MHz TRDUs operating in 64 QAM mode (Each of the TRDUs tuned to 758-763 MHz, 763-768MHz and 758-768 MHz)
4. Each of the 700 MHz TRDUs operating in QPSK, 16 QAM and 64 QAM modes respectively (TRDUs tuned 758-768 MHz).

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 90.543 and 2.1053 contains the requirements for the levels of spurious radiation as a function of the level of the unmodulated carrier. The reference level for the unmodulated carrier is calculated as the field produced by an ideal dipole excited by the transmitter output power according to the following relation taken from Reference Data for Radio Engineers, page 676, 4<sup>th</sup> edition, IT&T Corp.

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

$$20 \log (E \cdot 10^6) - (43 + 10 \log P) = 82.2 \text{ dB } \mu\text{V/meter}$$

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 82.2 dB $\mu$ V/meter. Reportable measurements are equal to or greater than 62.2 dB $\mu$ V/meter. Over the spectrum investigated, 10 MHz to 10th of the carrier, no reportable spurious emissions were detected. This demonstrates that the “**9412 eNodeB Compact with LTE 700TRDUs**” the subject of this application, complies with Sections 2.1053, 27.53, 90.543 and 2.1057 of the Rules.

## Measurement -6

# MEASUREMENT OF FREQUENCY STABILITY

## **Measurement -6**

# **MEASUREMENT OF FREQUENCY STABILITY**

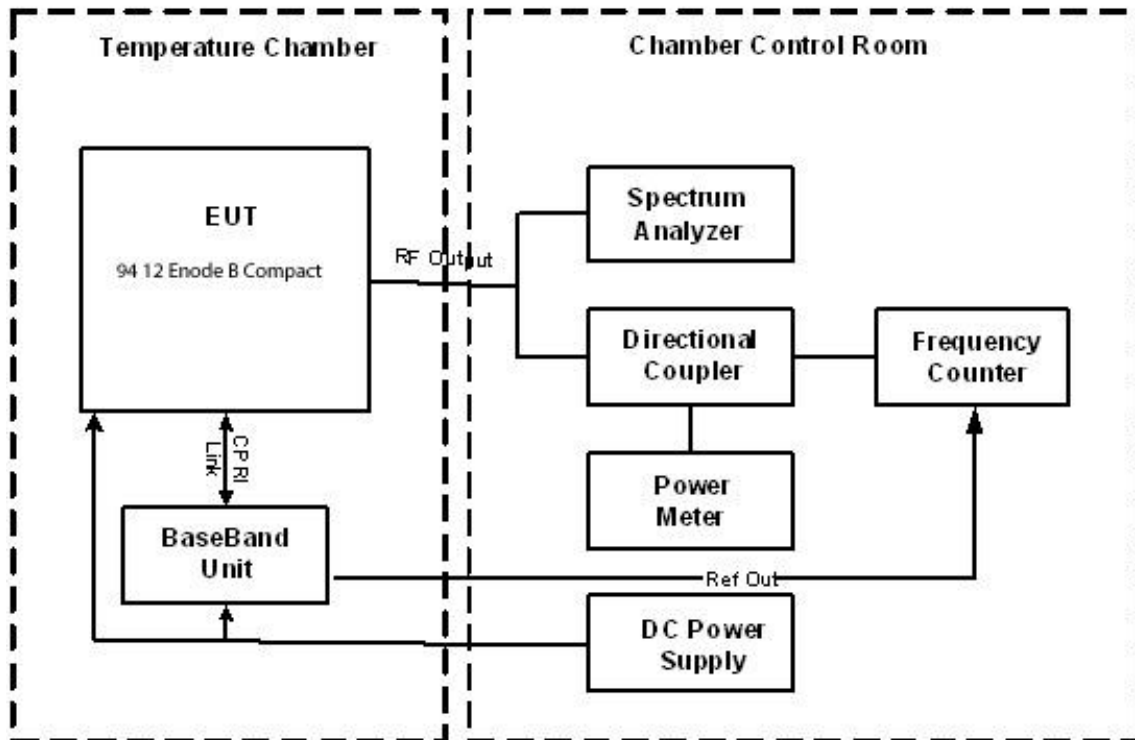
Alcatel-Lucent 9412eNodeB Compact

### MEASUREMENT OF FREQUENCY STABILITY

The frequency stabilization and accuracy of the LTE signals modulated and amplified by the 700 MHz Transmitter is a function of the input signal which is derived from the CPRI link coming from the Baseband Unit.

The 9412eNodeB Compact outdoor which contains 700 MHz Transceiver Duplexer Units (TRDUs) were subjected to the FCC specified environments while operating at full rated power of 2x40W at External Antenna Connector (EAC) port. The carrier Frequency deviations were measured. The nominal Voltage input to this device is -48V DC. The 700 MHz Transceiver Duplexer Unit is designed to operate in the Voltage range of 40.0V to 56.5V and in the temperature range of -40C to +55C.

The measurement setup is depicted in Block diagram A.



Frequency Stability Test Set -up Block Diagram

94 12 Enode B Compact

Block Diagram A

### TEST RESULTS:

### Transmit Frequency Deviation at -48VDC Over Temperature Range

760.5 MHZ Transmit Frequency Deviation at -48VDC Over Temperature Range

Temperature in C	TX Frequency Deviation in (Hz)
25	2.89
30	3.12
40	2.91
50	2.77
40	1.94
30	2.14
20	1.98
10	1.87
0	1.18
-10	2.86
-20	2.92
-30	2.46
-40	3.10
-30	2.35
-20	2.58
-10	2.64
0	1.94
10	2.39
20	1.21
25	2.24

Transmit Frequency Deviation at 25C Over Voltage Range

Voltage in DC	TX Frequency Deviation in (Hz)
-48	3.07
-47	2.63
-46	2.82
-45	3.19
-44	2.46
-43	2.28
-42	2.51
-41	3.46
-40	3.41
-41	2.68
-42	2.91
-43	2.94
-44	1.57
-45	2.27
-46	3.14
-47	2.08
-48	2.96
-49	1.56
-50	2.80
-51	2.44
-52	3.11
-53	2.67

-54	1.63
-55	3.16
-56	2.19
-57	3.05

765.5 MHZ Transmit Frequency Deviation at -48VDC Over Temperature Range

Temperature in C	TX Frequency Deviation in (Hz)
25	2.54
30	2.64
40	1.39
50	1.85
40	1.69
30	2.42
20	1.93
10	1.61
0	1.39
-10	2.62
-20	2.12
-30	3.18
-40	2.89
-30	2.81
-20	3.01
-10	2.38
0	1.80
10	2.12
20	1.38
25	1.12

Transmit Frequency Deviation at 25C Over Voltage Range

Voltage in DC	TX Frequency Deviation in (Hz)
-48	2.78
-47	1.31
-46	1.72
-45	2.37
-44	2.92
-43	1.98
-42	1.85
-41	2.44
-40	1.88
-41	2.51
-42	2.44
-43	1.88
-44	2.51
-45	2.37
-46	1.82
-47	2.06
-48	2.72



-49	2.38
-50	2.17
-51	1.79
-52	2.14
-53	2.31
-54	1.52
-55	1.83
-56	1.96
-57	2.98

**Conclusions**

The 9412 eNodeB Compact outdoor cabinet met the Frequency Stability requirement over the temperature range -40 to 55C and voltage range 40 to 56.5VDC.

**Instrument Used for Measurement**

Instrument Type	Serial Number	Vendor	Expiration Date
Frequency Counter	3418A00309	HP	March 30, 2012
MXA Signal Analyzer	MY49060086	Agilent Technology	April 4, 2012
Power Meter	GB37170388	HP	NOV 11, 2012

**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 function 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