

TEST REPORT

FILTER (M1) FCC Part 27

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-07**, 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
Measurement-7	Section 27.52 and 1.1310, Table 1 (B)	Human Exposure
	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.

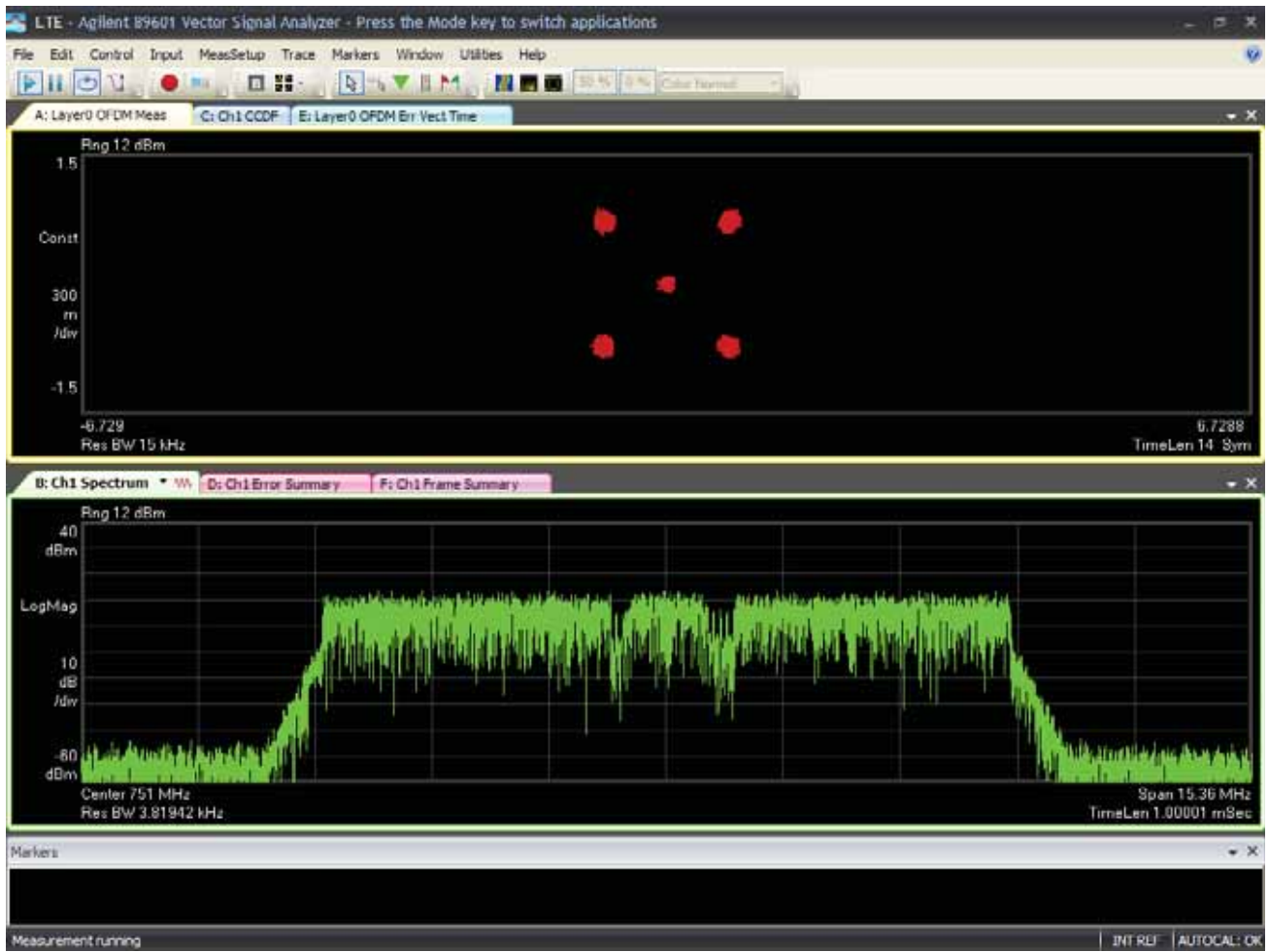
Measurement 2

FCC Section 2.1047 Modulation Characteristics

The modulation techniques used are explained in the submission as part section 2.1033 (c) (13) which is submitted as part of Schematics. T. 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.

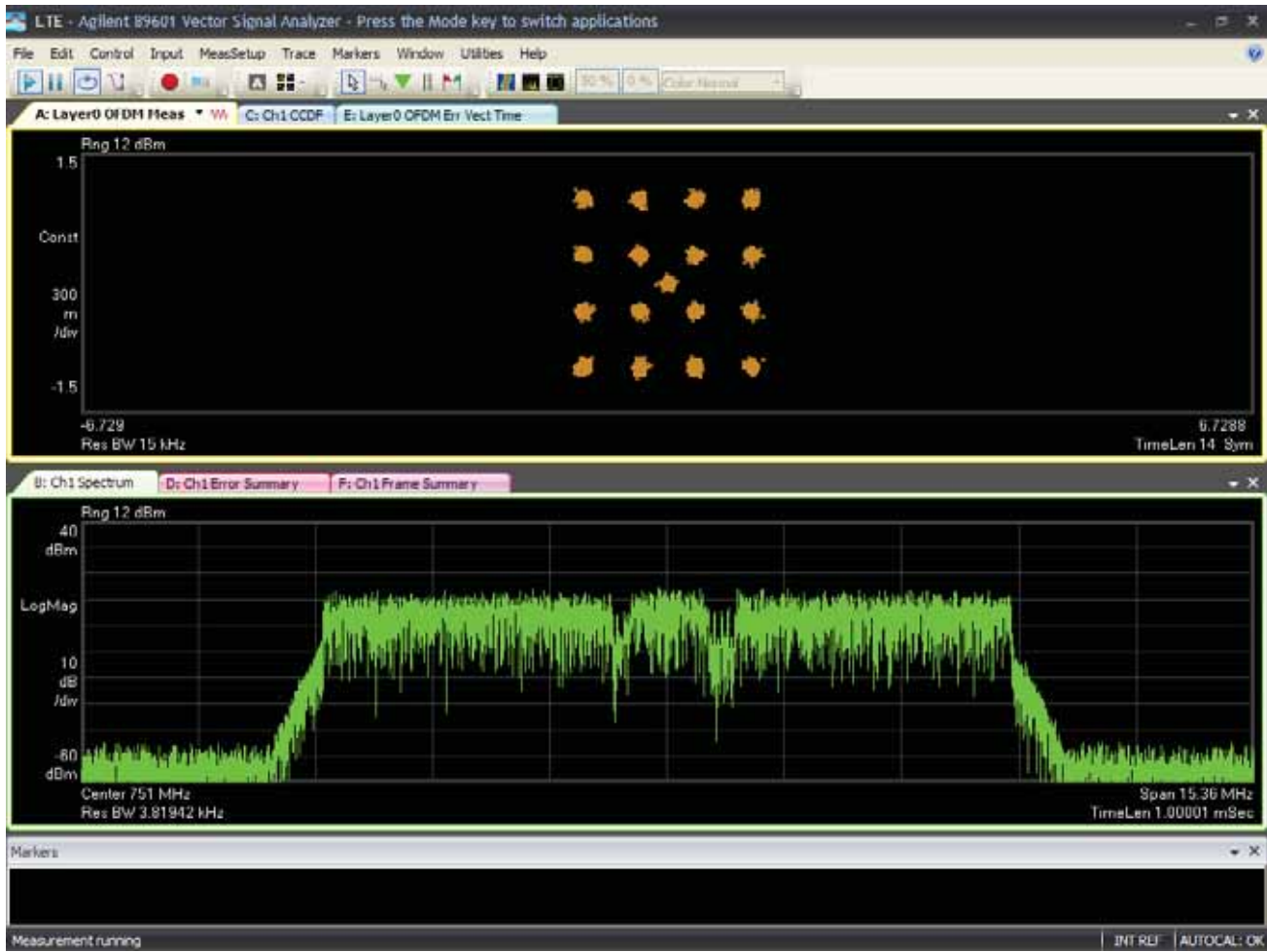
- (1) Quadrature Phase Shift Keying (QPSK) modulation scheme uses 2 bits transmitted simultaneously (one per channel) and a symbol can be represented by 2 bits. Therefore there are $2^2 = 4$ states (Binary 00 to 11). The theoretical bandwidth is 2bits/second/Hz.
- (2) 16 Quadrature Amplitude Modulation (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



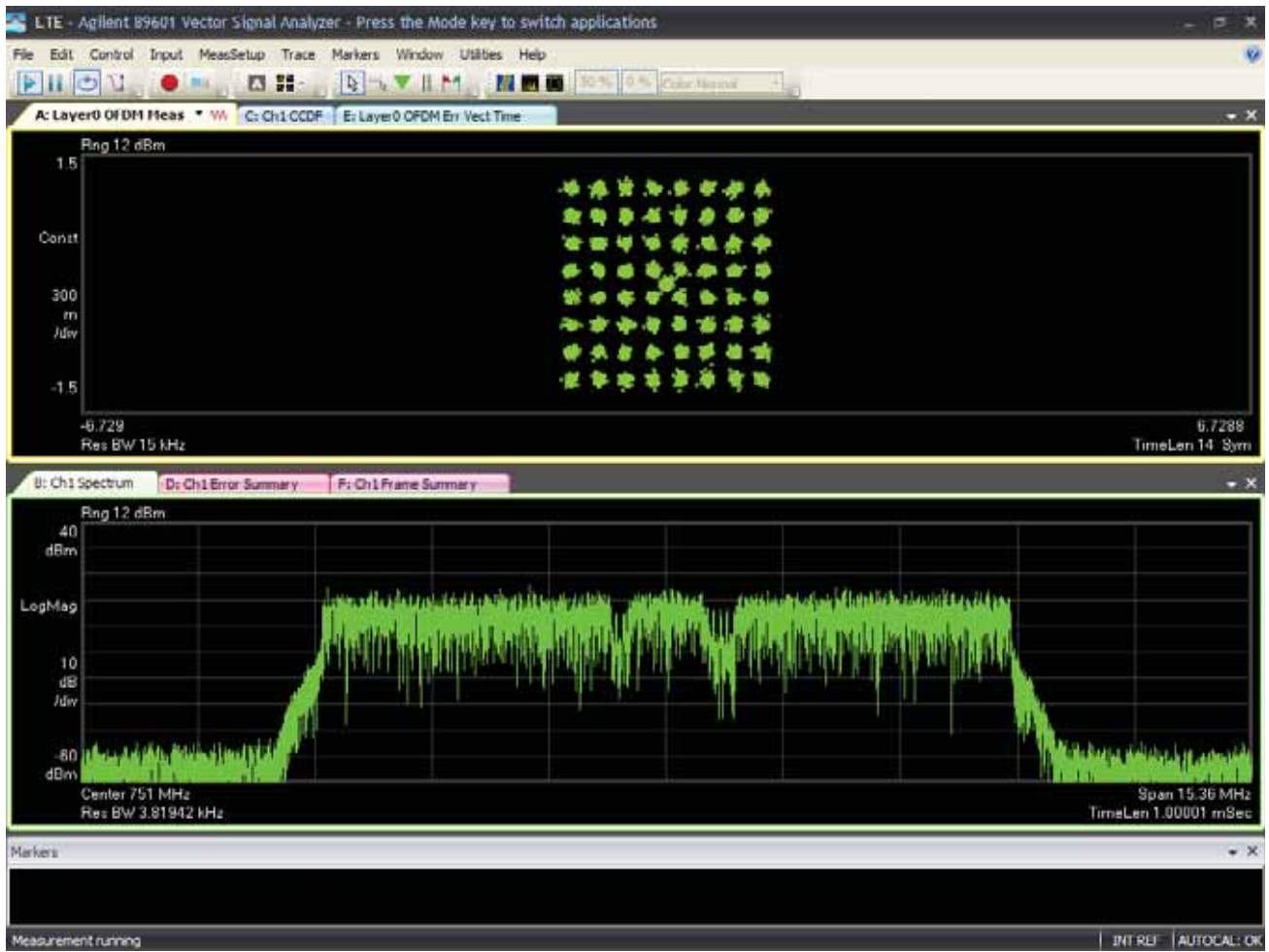
9768 Metro Radio Outdoor (Filter M1)
FCC Part 27.53 Block C; QPSK Modulation; PWR: 1W
FCCID: AS5BBTRX-07
TEST ENGINEER: SEG

16QAM MODULATION



9768 Metro Radio Outdoor (Filter M1)
FCC Part 27.53 Block C; 16QAM Modulation; PWR: 1W
FCCID: AS5BBTRX-07
TEST ENGINEER: SEG

64QAM MODULATION



9768 Metro Radio Outdoor (Filter M1)
FCC Part 27.53 Block C; 64QAM Modulation; PWR: 1W
FCCID: AS5BBTRX-07
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: 9.40 MHz for 10 MHz Bandwidth, and 4.73 MHz for 5 MHz Bandwidth.

Therefore:

Measured Emission type: **9M40F9W** for 10 MHz Bandwidth.

Measured Emission type: **4M73F9W** 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 **9768 Metro Radio Outdoor (Filter M1)** 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 **9768 Metro Radio Outdoor (Filter M1)** with 5 MHz and 10 MHz bandwidths.

The measurements were made on a “**9768 Metro Radio Outdoor (Filter M1)**” 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 **9768 Metro Radio Outdoor (Filter M1)**.

The Measured 99% power bandwidth is 8.95 MHz for 10 MHz band and 4.47 MHz for 5 MHz band.

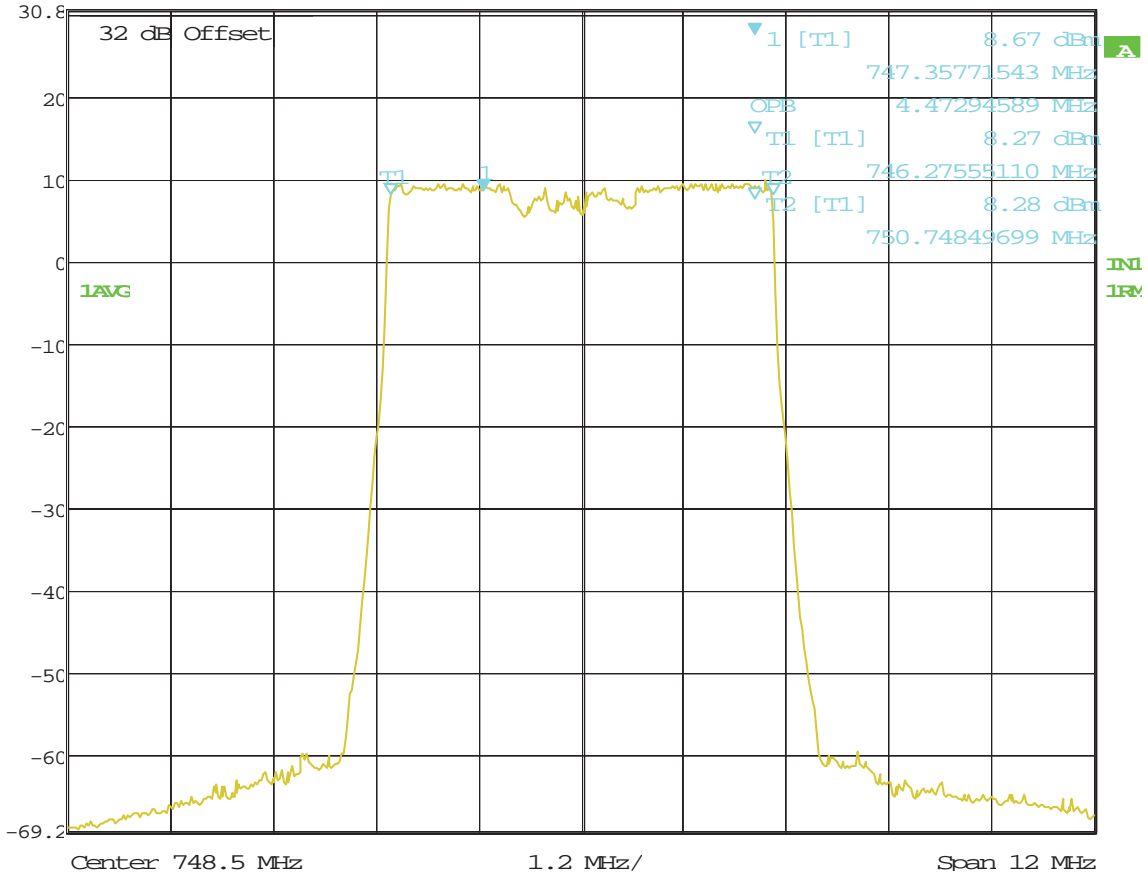
Block: C (Lower)

5 MHz Bandwidth 746 – 751 MHz

(99% Power Bandwidth)



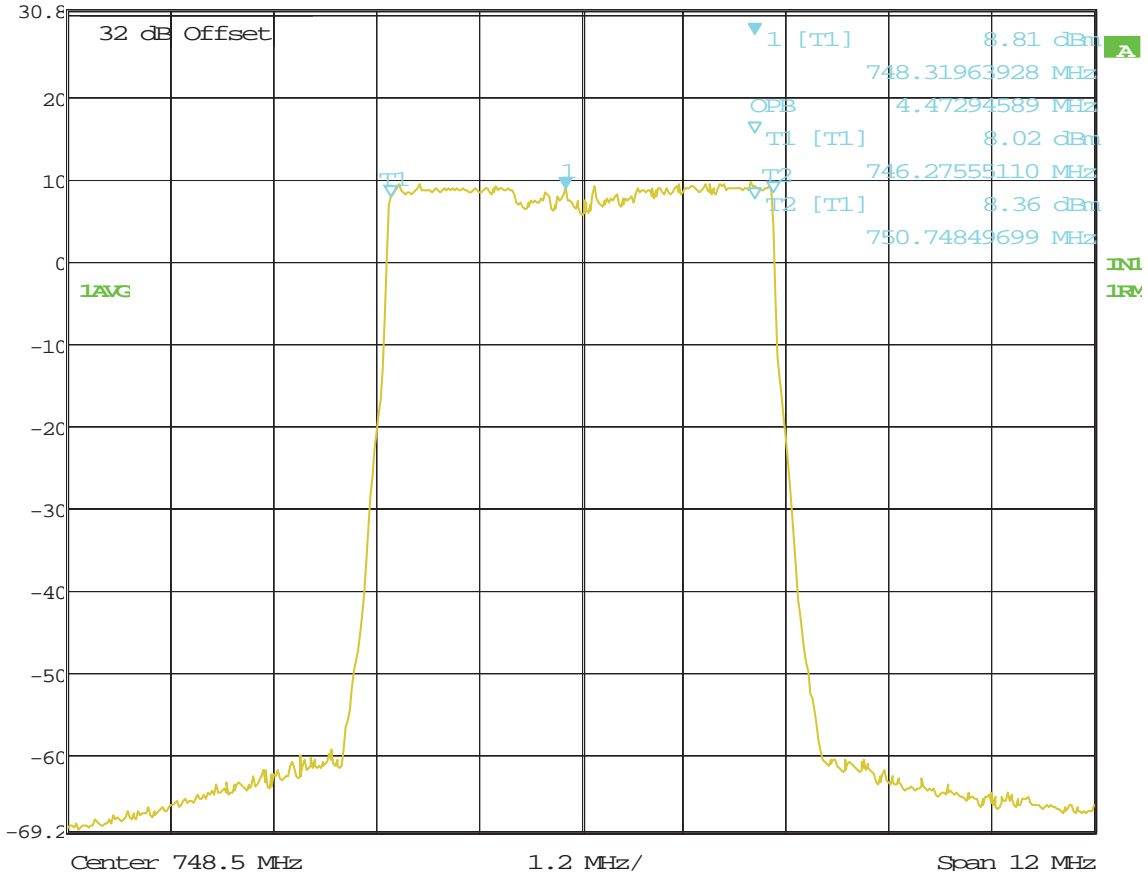
Marker 1 [T1] RBW 30 kHz RF Att 10 dB
 Ref Lvl 8.67 dBm VBW 300 kHz
 30.8 dBm 747.35771543 MHz SWT 34 ms Unit dBm



Title: 99% POWER BANDWIDTH; Test Engineer: SEG
 Comment A: 9768 MRO V1.0 B13 700U Cubedock(FLIR M1); 748.5MHz, QPSK
 PWR: 1W; 2X2 MIMO; FCC PART 27.53(C); FCCID: AS5BBTRX-07
 Date: 17.SEP.2012 11:28:22



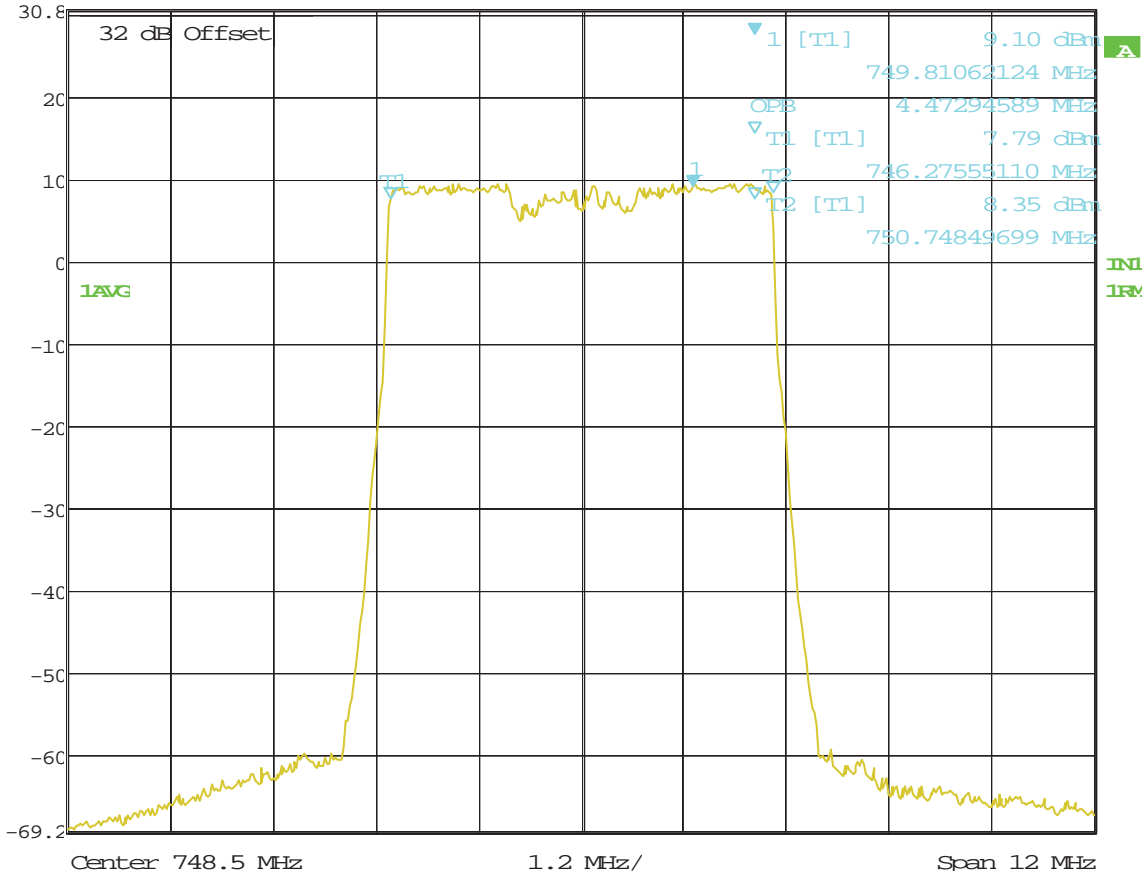
Marker 1 [T1] RBW 30 kHz RF Att 10 dB
Ref Lvl 8.81 dBm VBW 300 kHz
30.8 dBm 748.31963928 MHz SWT 34 ms Unit dBm



Title: 99% POWER BANDWIDTH; Test Engineer: SEG
Comment A: 9768 MRO V1.0 B13 700U Cubedock(FLIR M1); 748.5MHz, 16QAM
PWR: 1W; 2X2 MIMO; FCC PART 27.53(C); FCCID: AS5BBTRX-07
Date: 17.SEP.2012 12:46:03



Marker 1 [T1] RBW 30 kHz RF Att 10 dB
Ref Lvl 9.10 dBm VBW 300 kHz
30.8 dBm 749.81062124 MHz SWT 34 ms Unit dBm



Title: 99% POWER BANDWIDTH; Test Engineer: SEG
Comment A: 9768 MRO V1.0 B13 700U Cubedock(FLIR M1); 748.5MHz, 64QAM
PWR: 1W; 2X2 MIMO; FCC PART 27.53(C); FCCID: AS5BBTRX-07
Date: 17.SEP.2012 13:30:48

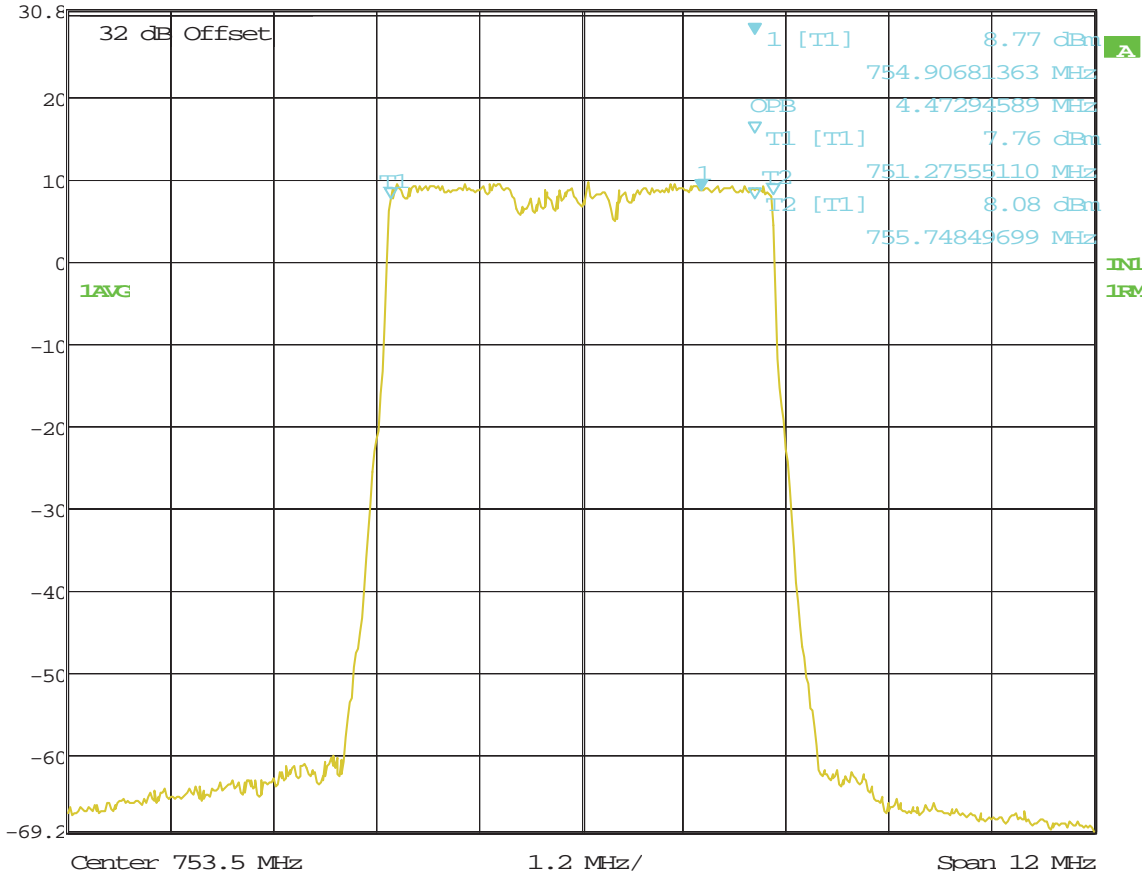
Block: C (Upper)

5 MHz Bandwidth 751 – 756 MHz

(99% Power Bandwidth)



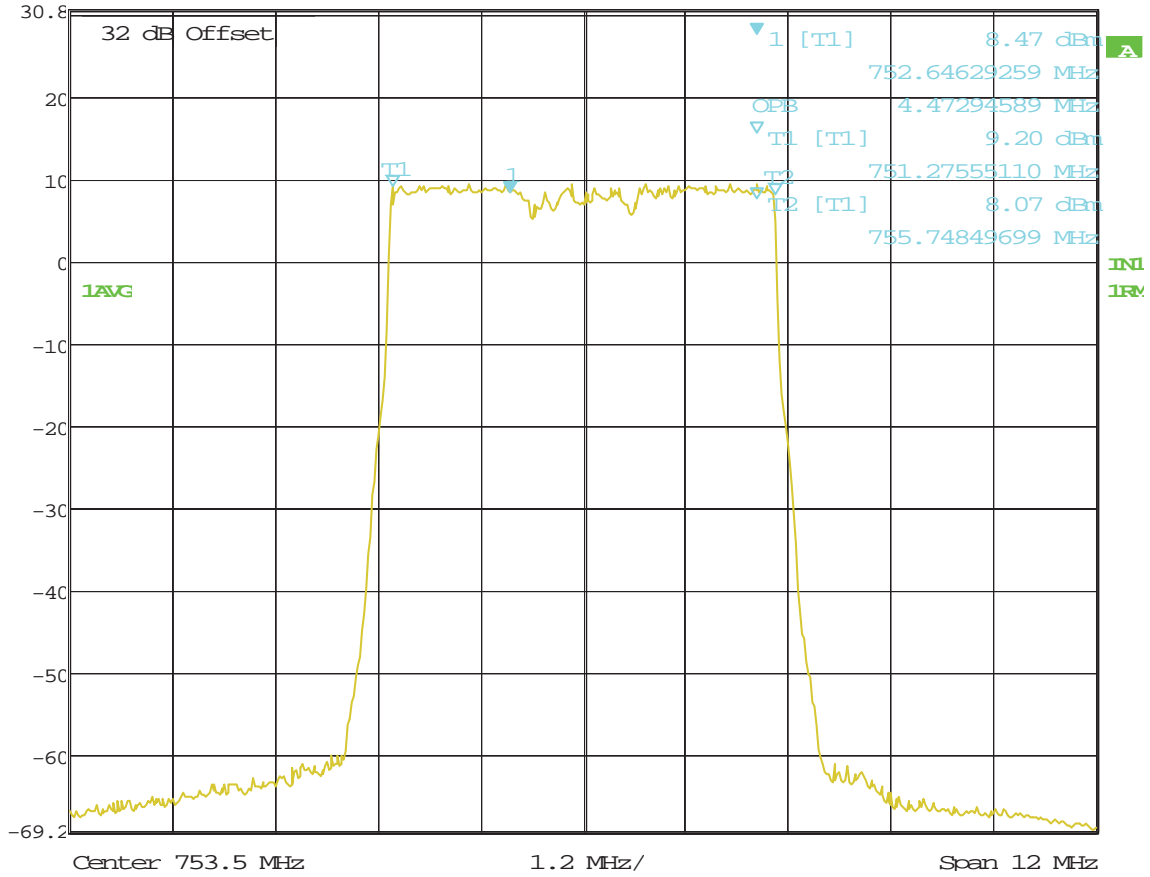
Marker 1 [T1] RBW 30 kHz RF Att 10 dB
 Ref Lvl 8.77 dBm VBW 300 kHz
 30.8 dBm 754.90681363 MHz SWT 34 ms Unit dBm



Title: 99% POWER BANDWIDTH; Test Engineer: SEG
 Comment A: 9768 MRO V1.0 B13 700U Cubedock(FLIR M1); 753.5MHz, QPSK
 PWR: 1W; 2X2 MIMO; FCC PART 27.53(C); FCCID: AS5BBTRX-07
 Date: 18.SEP.2012 07:29:12



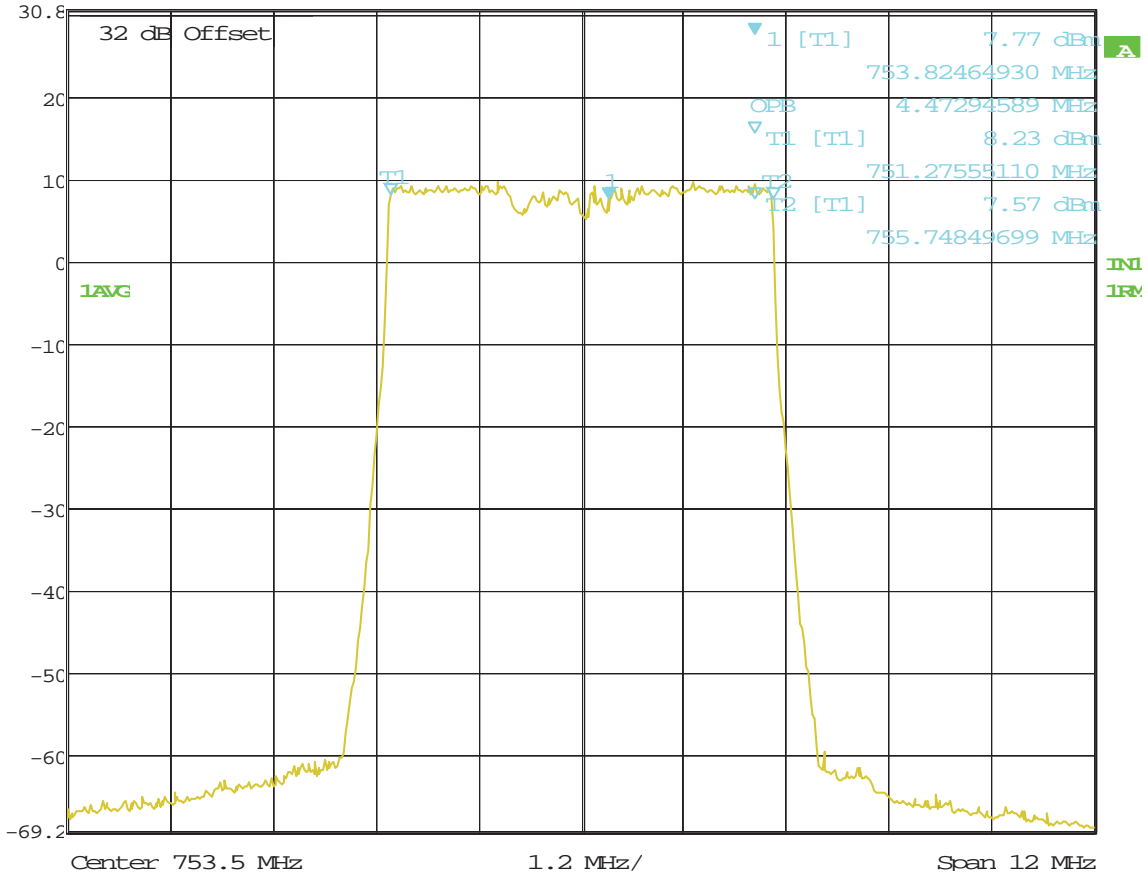
Marker 1 [T1] RBW 30 kHz RF Att 10 dB
 Ref Lvl 8.47 dBm VBW 300 kHz
 30.8 dBm 752.64629259 MHz SWT 34 ms Unit dBm



Title: 99% POWER BANDWIDTH; Test Engineer: SEG
 Comment A: 9768 MRO V1.0 B13 700U Cubedock(FLIR M1); 753.5MHz, 16QAM
 PWR: 1W; 2X2 MIMO; FCC PART 27.53(C); FCCID: AS5BBTRX-07
 Date: 18.SEP.2012 08:44:27



Marker 1 [T1] RBW 30 kHz RF Att 10 dB
 Ref Lvl 7.77 dBm VBW 300 kHz
 30.8 dBm 753.82464930 MHz SWT 34 ms Unit dBm

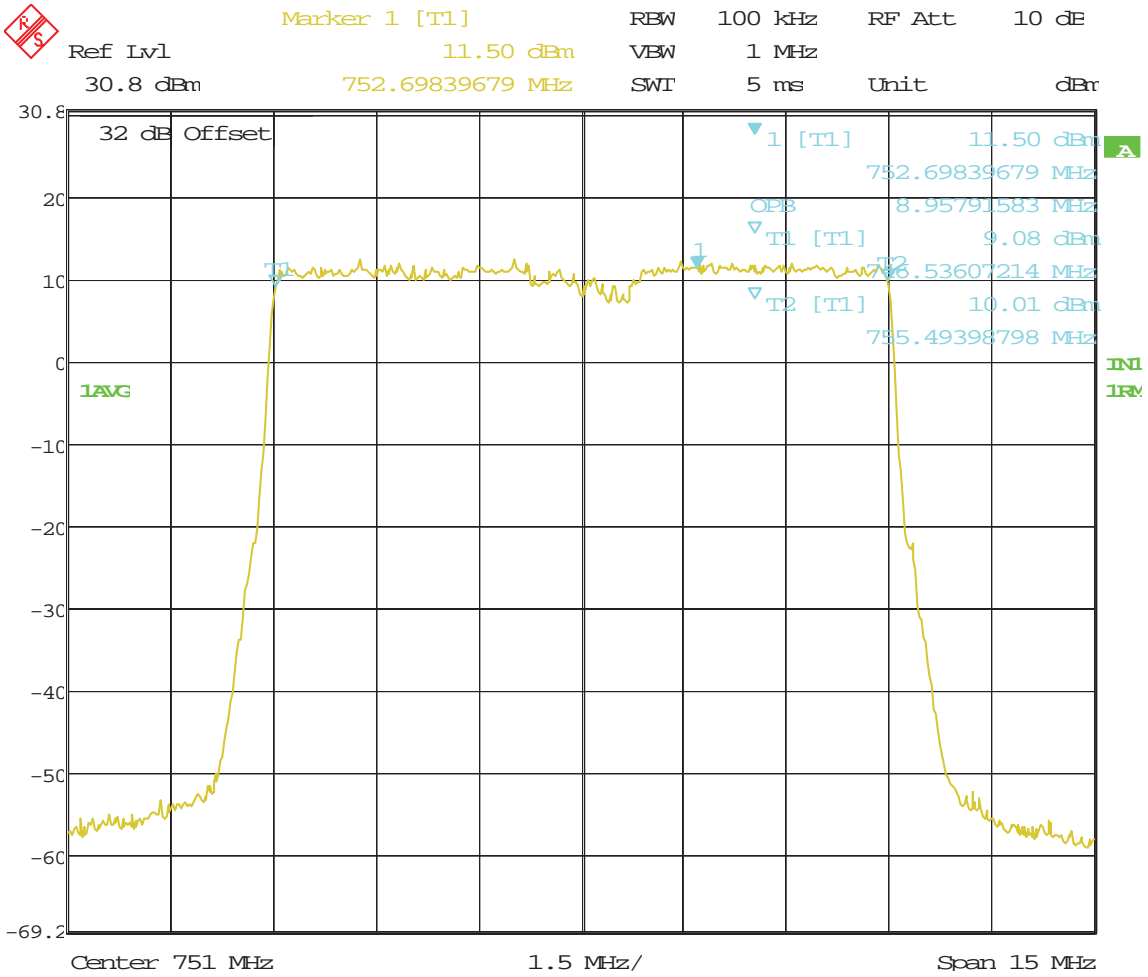


Title: 99% POWER BANDWIDTH; Test Engineer: SEG
 Comment A: 9768 MRO V1.0 B13 700U Cubedock(FLIR M1); 753.5MHz, 64QAM
 PWR: 1W; 2X2 MIMO; FCC PART 27.53(C); FCCID: AS5BBTRX-07
 Date: 18.SEP.2012 09:17:34

Block: C

10 MHz Bandwidth 746 – 756 MHz

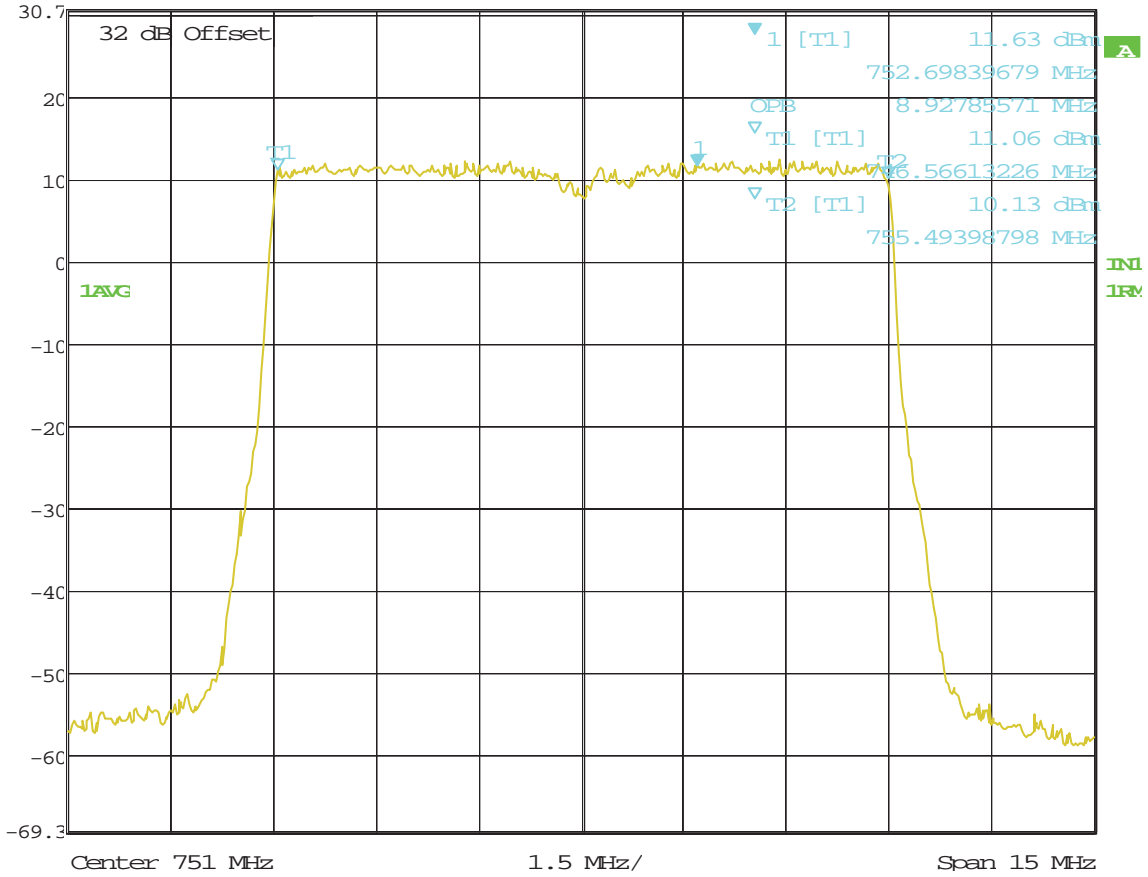
(99% Power Bandwidth)



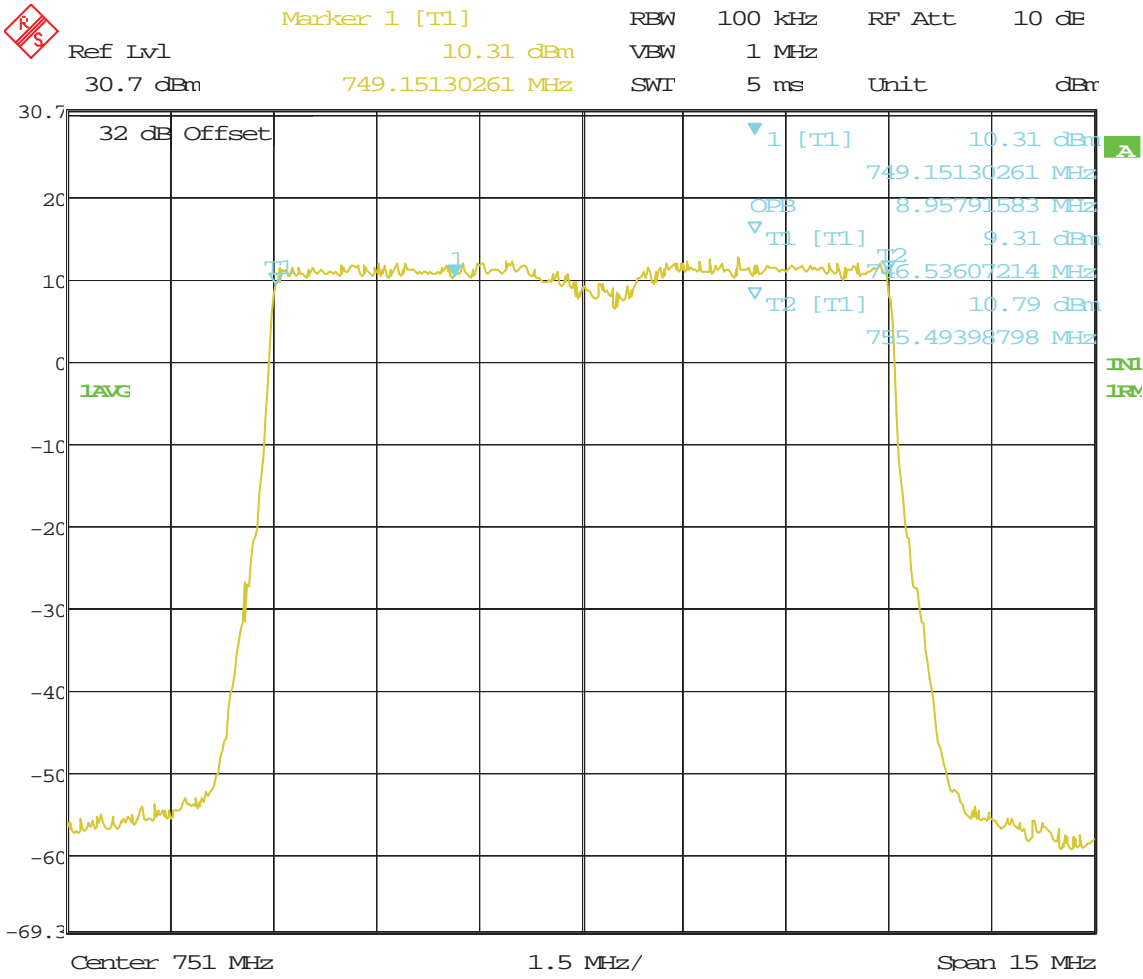
Title: 99% POWER BANDWIDTH; Test Engineer: SEG
 Comment A: 9768 MRO V1.0 B13 700U Cubedock(FLIR M1); 751 MHz, QPSK
 PWR: 1W; 2X2 MIMO, FCC PART 27.5(3); FCCID: AS5BBTRX-07
 Date: 11.SEP.2012 14:43:35



Marker 1 [T1] RBW 100 kHz RF Att 10 dB
Ref Lvl 11.63 dBm VBW 1 MHz
30.7 dBm 752.69839679 MHz SWT 5 ms Unit dBm



Title: 99% POWER BANDWIDTH; Test Engineer: SEG
Comment A: 9768 MRO V1.0 B13 700U Cubedock(FLIR M1); 751 MHz, 16QAM
PWR: 1W; 2X2 MIMO, FCC PART 27.5(3); FCCID: AS5BBTRX-07
Date: 12.SEP.2012 09:22:56



Title: 99% POWER BANDWIDTH; Test Engineer: SEG
 Comment A: 9768 MRO V1.0 B13 700U Cubedock(FLIR M1); 751 MHz, 64QAM
 PWR: 1W; 2X2 MIMO, FCC PART 27.5(3); FCCID: AS5BBTRX-07
 Date: 12.SEP.2012 09:52:58

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

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

The occupied bandwidth of the 9768 Metro Radio Outdoor (Filter M1) 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 “9768 Metro Radio Outdoor (Filter M1)” in the following configurations:

1. QPSK
2. 16 QAM
3. 64 QAM

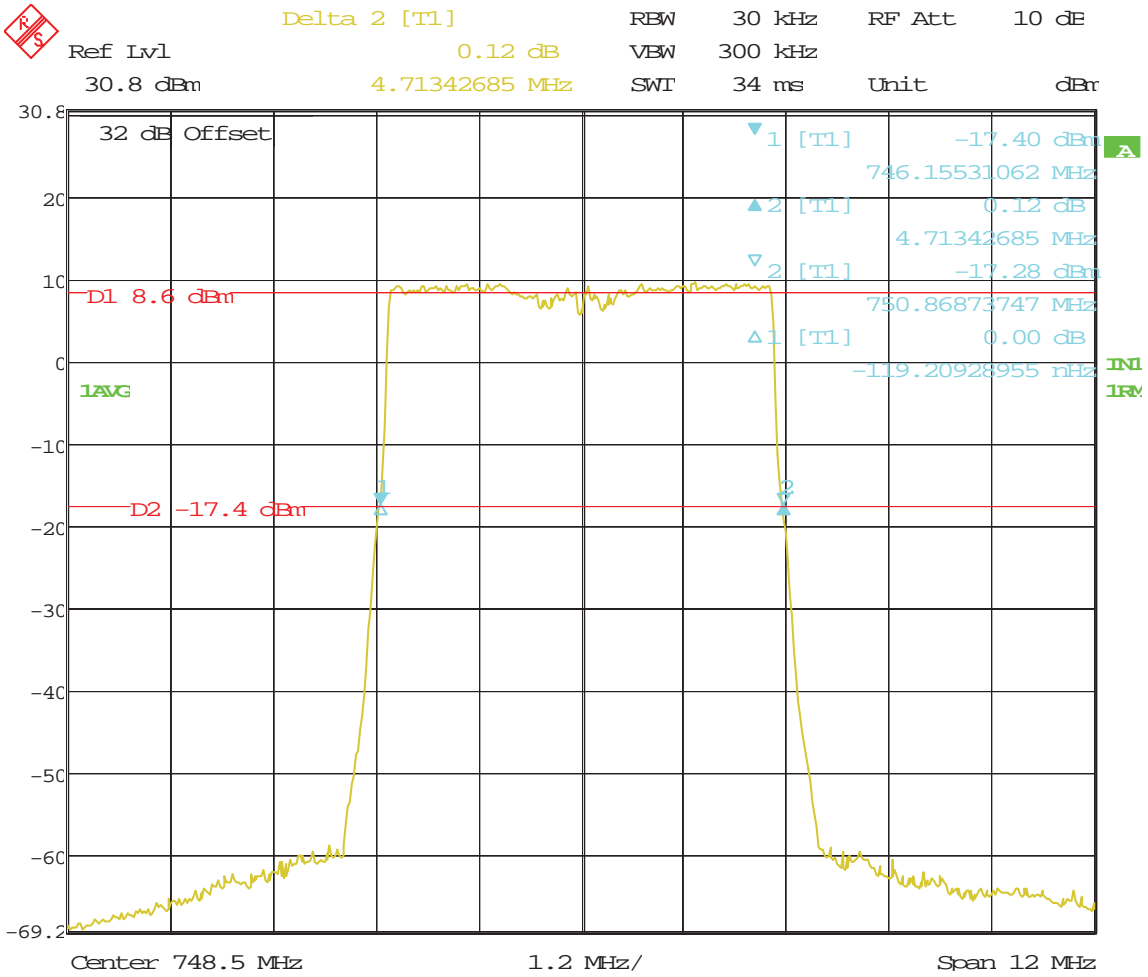
Results:

The plots are provided for QPSK, 16QAM and 64QAM modulations for 5MHz and 10 MHz bands.
The Measured 26dB emissions bandwidth is 4.73 MHz for 5 MHz band and 9.40 MHz for 10 MHz band.

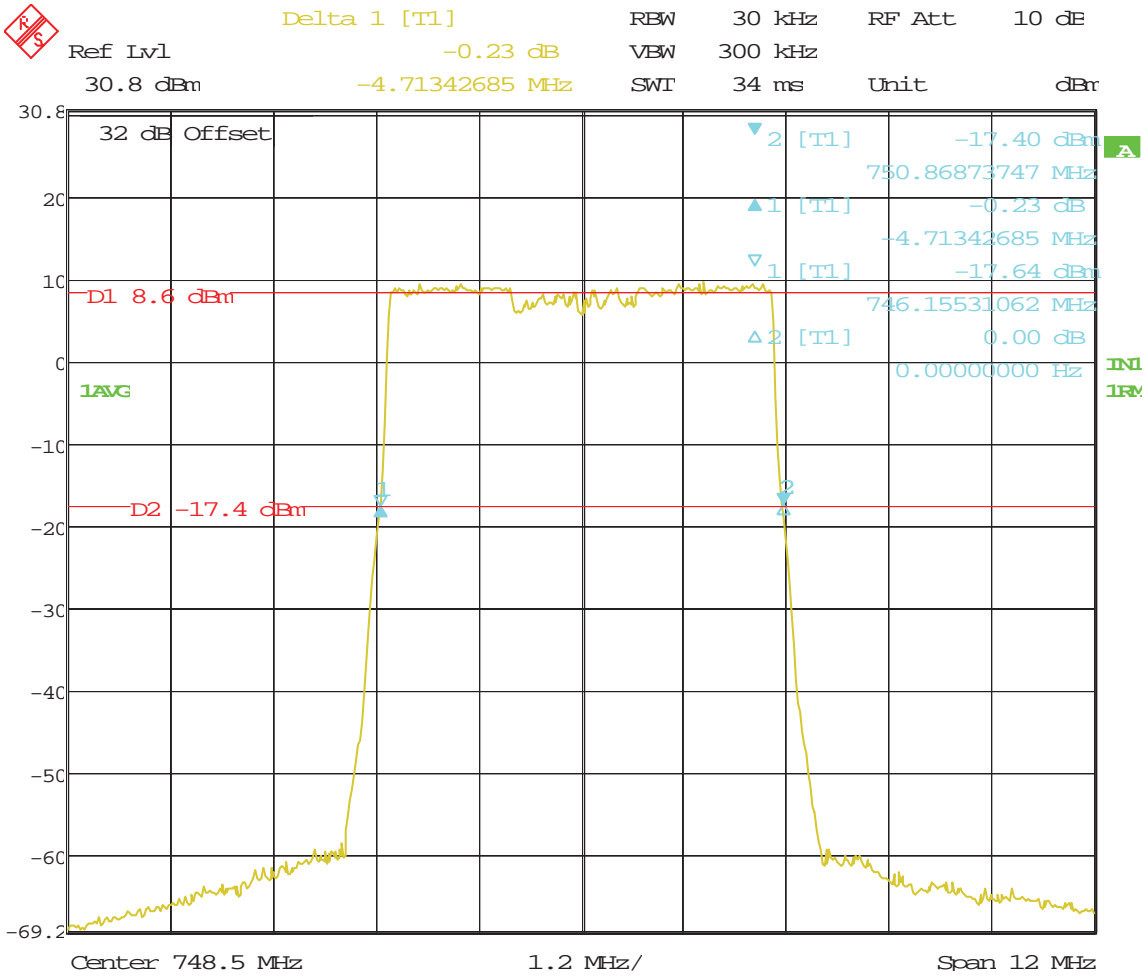
Block: C (Lower)

5 MHz Bandwidth 746 – 751 MHz

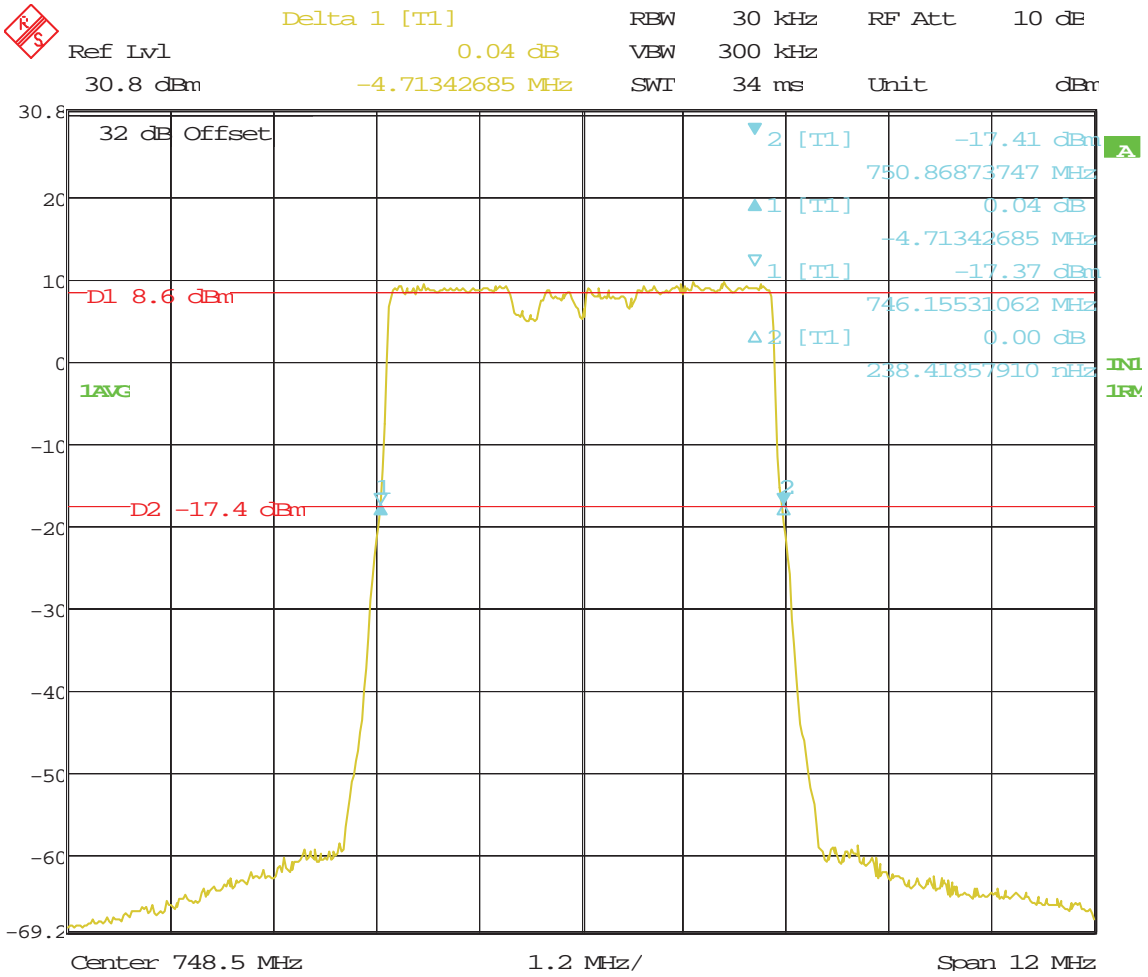
(26dB Bandwidth)



Title: 26dB BANDWIDTH; Test Engineer: SEG
 Comment A: 9768 MRO V1.0 B13 700U Cubedock(FLIR M1); 748.5MHz, QPSK
 PWR: 1W; 2X2 MIMO; FCC PART 27.53(C); FCCID: AS5BBTRX-07
 Date: 17.SEP.2012 11:26:56



Title: 26dB BANDWIDTH; Test Engineer: SEG
 Comment A: 9768 MRO V1.0 B13 700U Cubedock(FLIR M1); 748.5MHz, 16QAM
 PWR: 1W; 2X2 MIMO; FCC PART 27.53(C); FCCID: AS5BBTRX-07
 Date: 17.SEP.2012 12:49:42

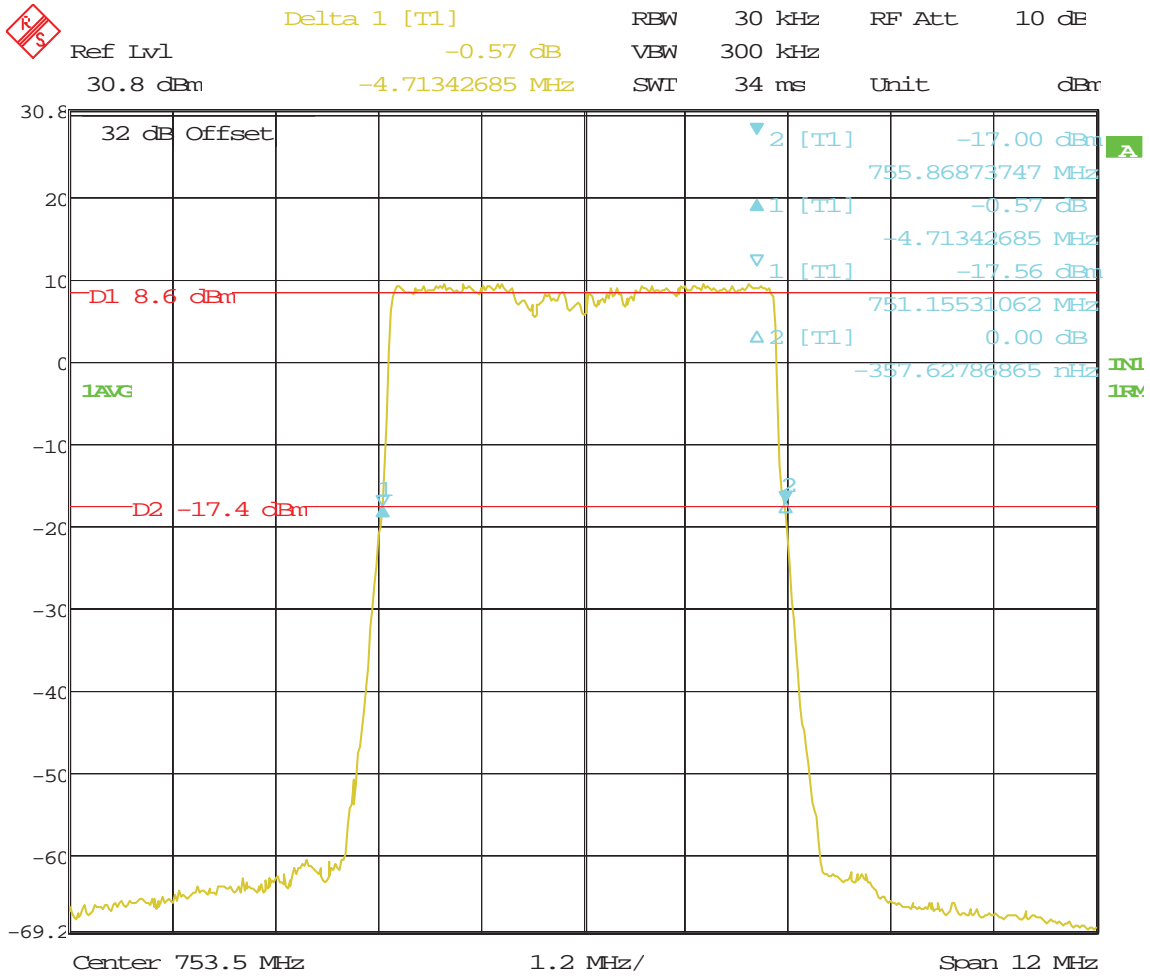


Title: 26dB BANDWIDTH; Test Engineer: SEG
 Comment A: 9768 MRO V1.0 B13 700U Cubedock(FLIR M1); 748.5MHz, 64QAM
 PWR: 1W; 2X2 MIMO; FCC PART 27.53(C); FCCID: AS5BBTRX-07
 Date: 17.SEP.2012 13:35:10

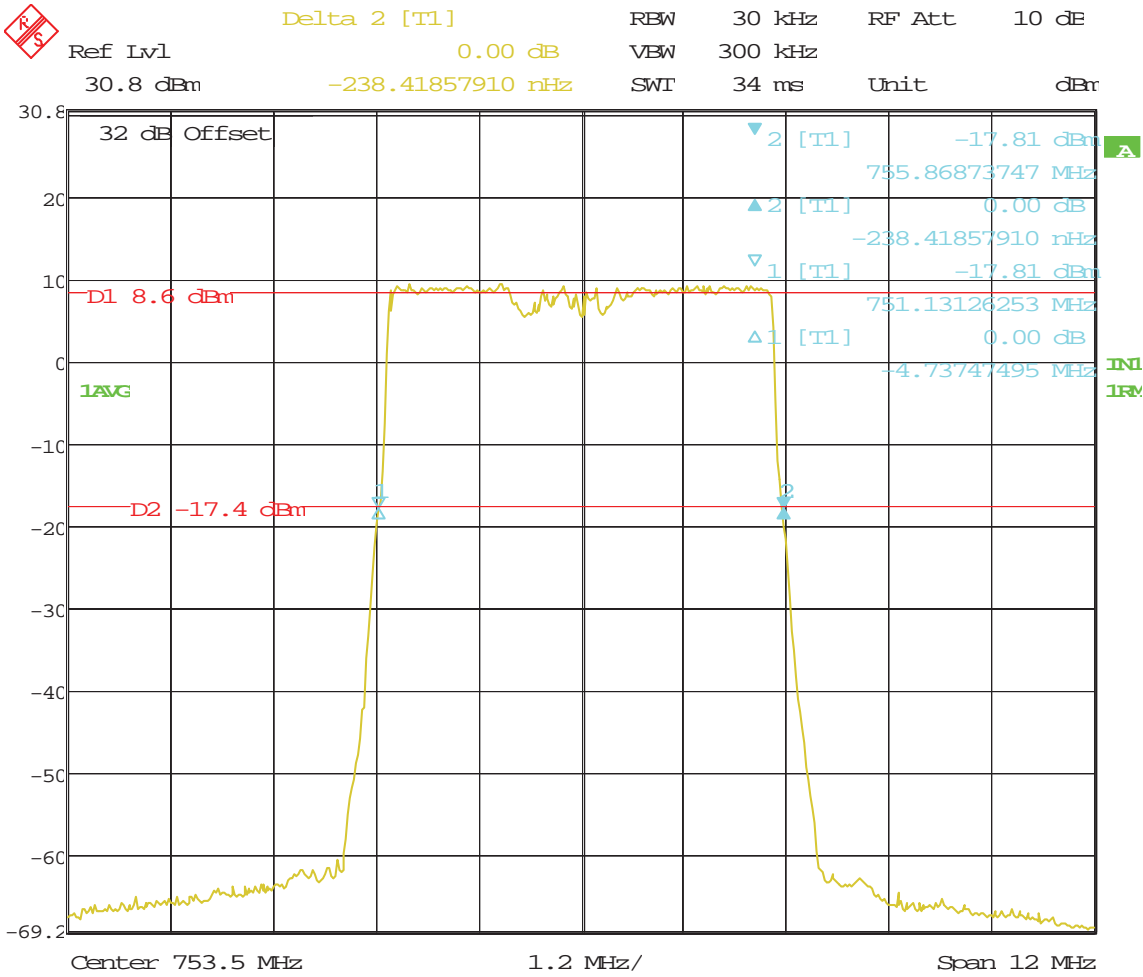
Block: C (Upper)

5 MHz Bandwidth 751 – 756 MHz

(26dB Bandwidth)



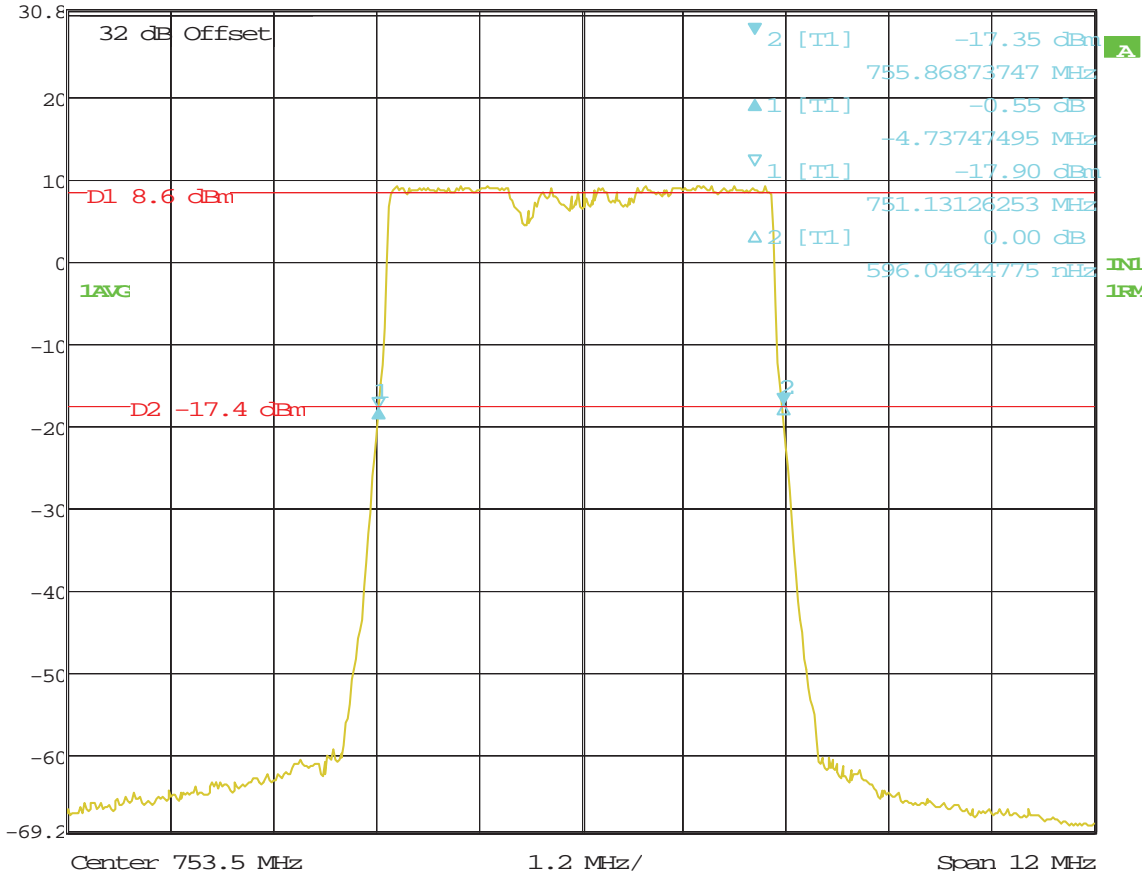
Title: 26dB BANDWIDTH; Test Engineer: SEG
 Comment A: 9768 MRO V1.0 B13 700U Cubedock(FLIR M1); 753.5MHz, QPSK
 PWR: 1W; 2X2 MIMO; FCC PART 27.53(C); FCCID: AS5BBTRX-07
 Date: 18.SEP.2012 07:27:46



Title: 26dB BANDWIDTH; Test Engineer: SEG
 Comment A: 9768 MRO V1.0 B13 700U Cubedock(FLIR M1); 753.5MHz, 16QAM
 PWR: 1W; 2X2 MIMO; FCC PART 27.53(C); FCCID: AS5BBTRX-07
 Date: 18.SEP.2012 08:41:38



Delta 1 [T1] RBW 30 kHz RF Att 10 dB
Ref Lvl -0.55 dB VBW 300 kHz
30.8 dBm -4.73747495 MHz SWI 34 ms Unit dBm

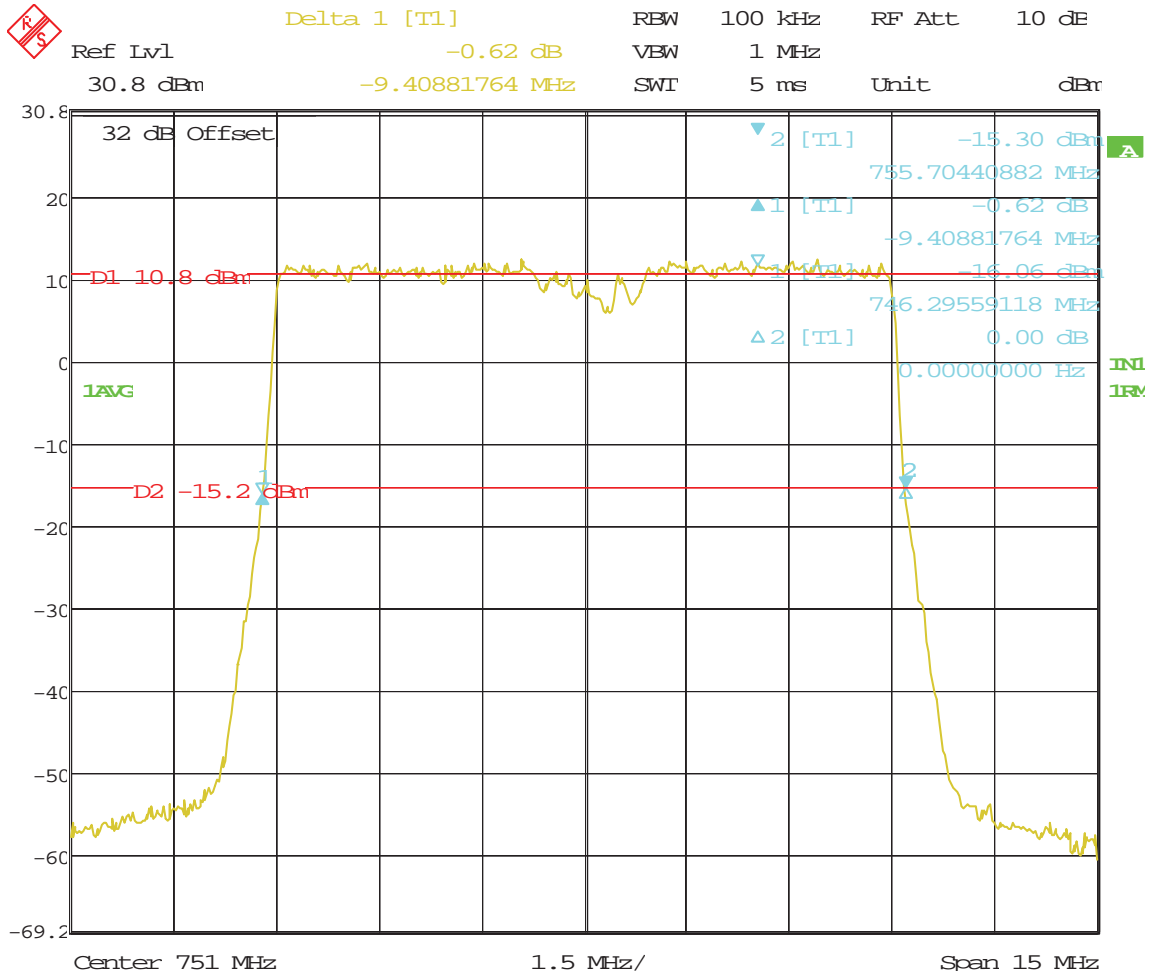


Title: 26dB BANDWIDTH; Test Engineer: SEG
Comment A: 9768 MRO V1.0 B13 700U Cubedock(FLIR M1); 753.5MHz, 64QAM
PWR: 1W; 2X2 MIMO; FCC PART 27.53(C); FCCID: AS5BBTRX-07
Date: 18.SEP.2012 09:15:45

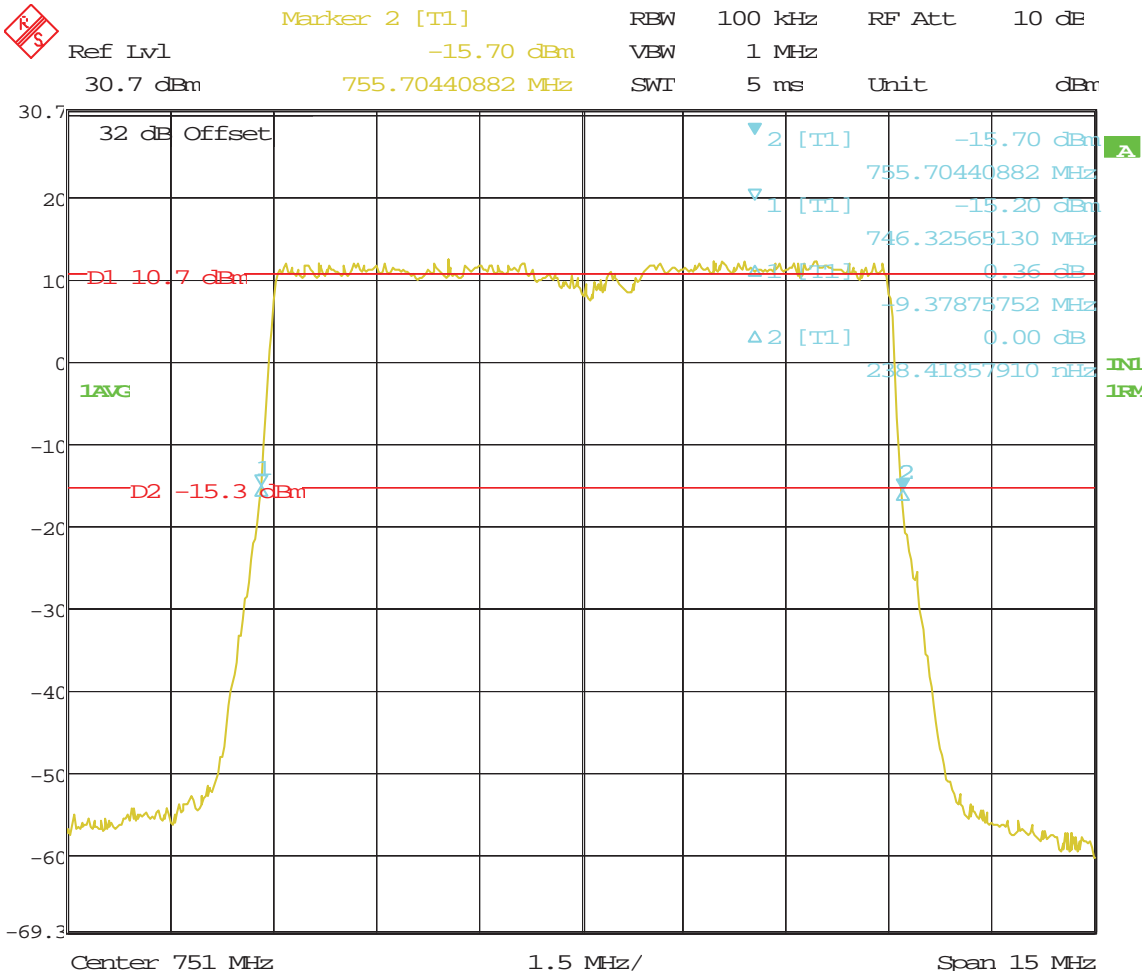
Block: C

10 MHz Bandwidth 746 – 756 MHz

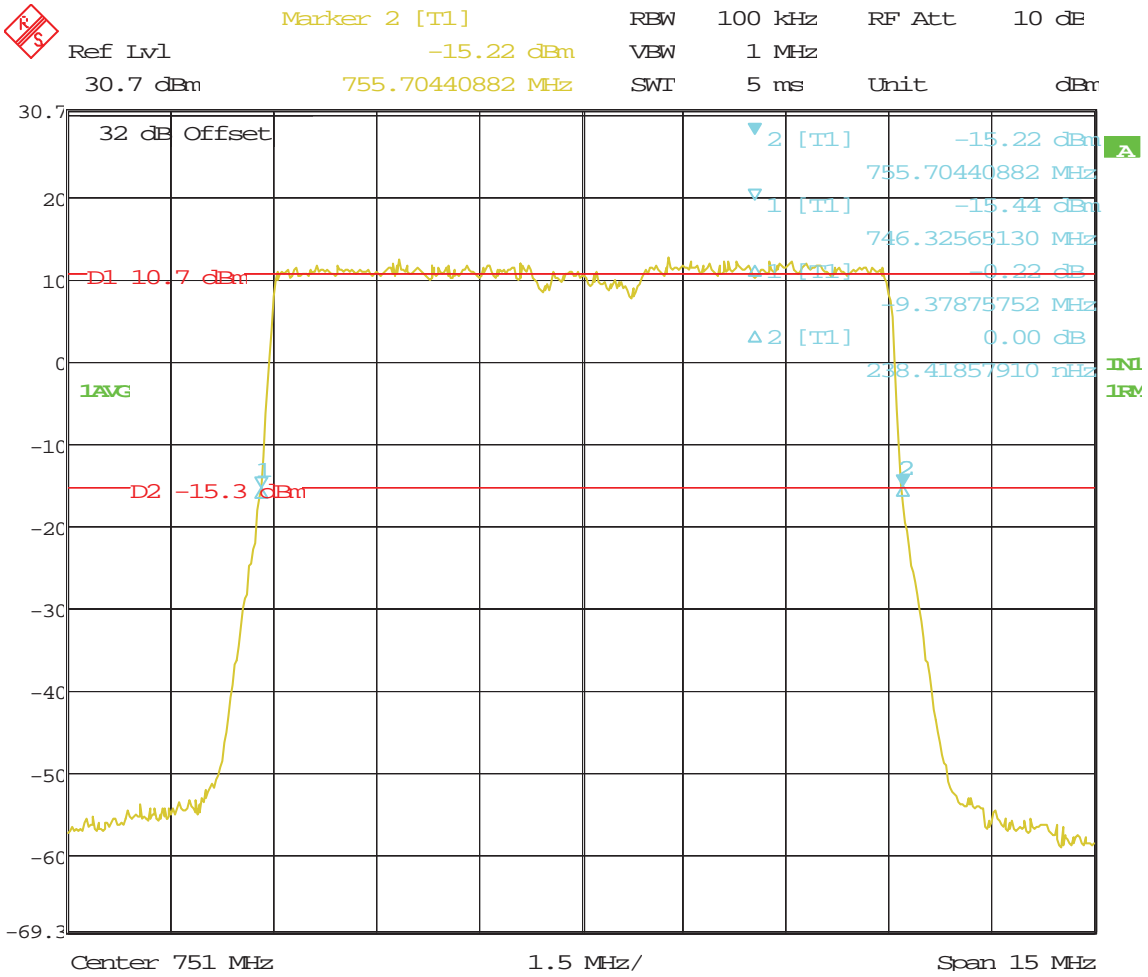
(26dB Bandwidth)



Title: 26dB BANDWIDTH; Test Engineer: SEG
 Comment A: 9768 MRO V1.0 B13 700U Cubedock(FLIR M1); 751 MHz, QPSK
 PWR: 1W; 2X2 MIMO, FCC PART 27.5(3); FCCID: AS5BBTRX-07
 Date: 11.SEP.2012 14:41:14



Title: 26dB BANDWIDTH; Test Engineer: SEG
 Comment A: 9768 MRO V1.0 B13 700U Cubedock(FLIR M1); 751 MHz, 16QAM
 PWR: 1W; 2X2 MIMO, FCC PART 27.5(3); FCCID: AS5BBTRX-07
 Date: 12.SEP.2012 09:27:28



Title: 26dB BANDWIDTH; Test Engineer: SEG
 Comment A: 9768 MRO V1.0 B13 700U Cubedock(FLIR M1); 751 MHz, 64QAM
 PWR: 1W; 2X2 MIMO, FCC PART 27.5(3); FCCID: AS5BBTRX-07
 Date: 12.SEP.2012 09:48:44

**MEASUREMENT OF
SPECTRUM MASK/OCCUPIED BANDWIDTH
(100 kHz ADJACENT TO CHANNEL EDGE)
Section 27.53 (c)**

**MEASUREMENT OF SPECTRUM MASK
OCCUPIED BANDWIDTH**

The Spectrum mask close to the center of the carrier frequency (Occupied bandwidth) of the 9768 Metro Radio Outdoor (Filter M1) 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 9768 Metro Radio Outdoor (Filter M1).

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 1.0 Watt (30.0 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 9768 Metro Radio Outdoor (Filter M1) is capable of operating in the band of 746 MHz to 756 MHz. The Base station presently tested was configured to operate in Block 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(c): 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:

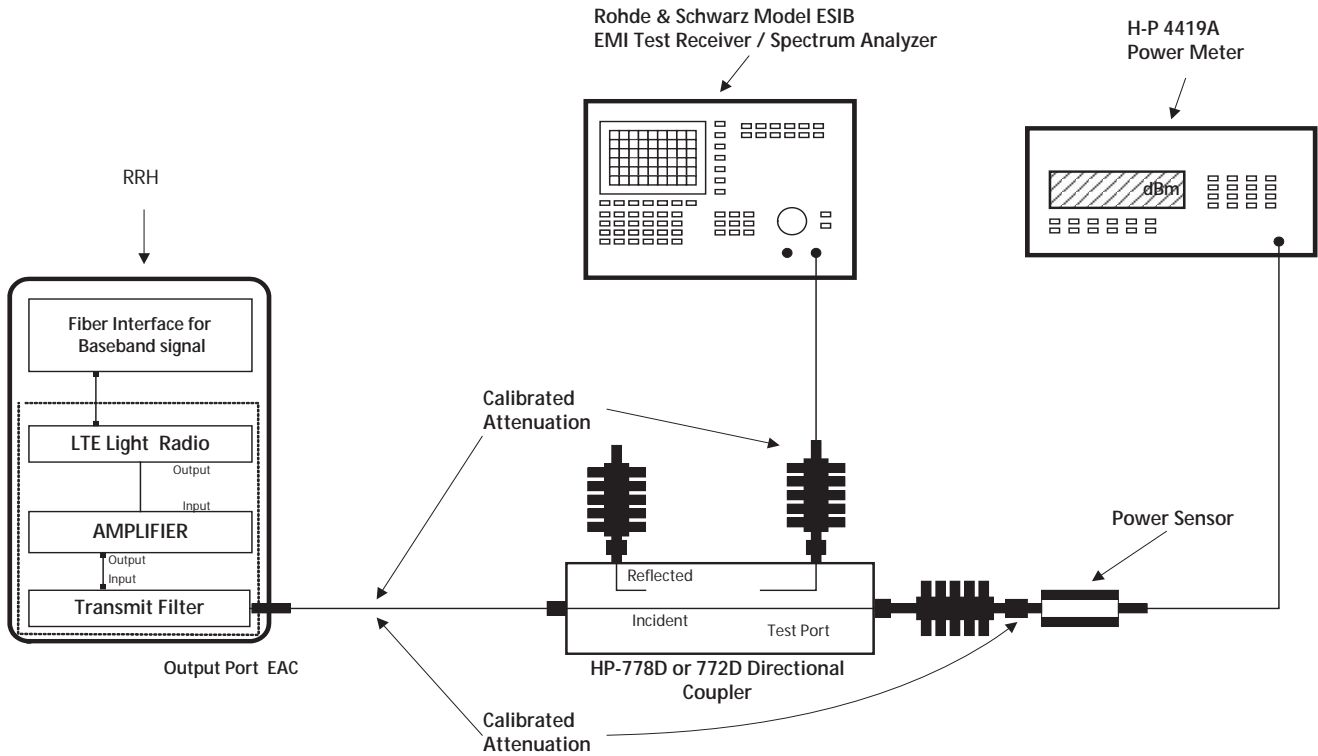
Band	Block	Center Frequency (MHz)	Carrier Bandwidth (MHz)	RF Filter	Power (Watts)
	C (Lower)	748.5	5	M1	1
	C (Upper)	753.5	5	M1	1
	C	751	10	M1	1

Measurement uncertainty:

Frequency: 100 Hz

Amplitude: 0.5 dB

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

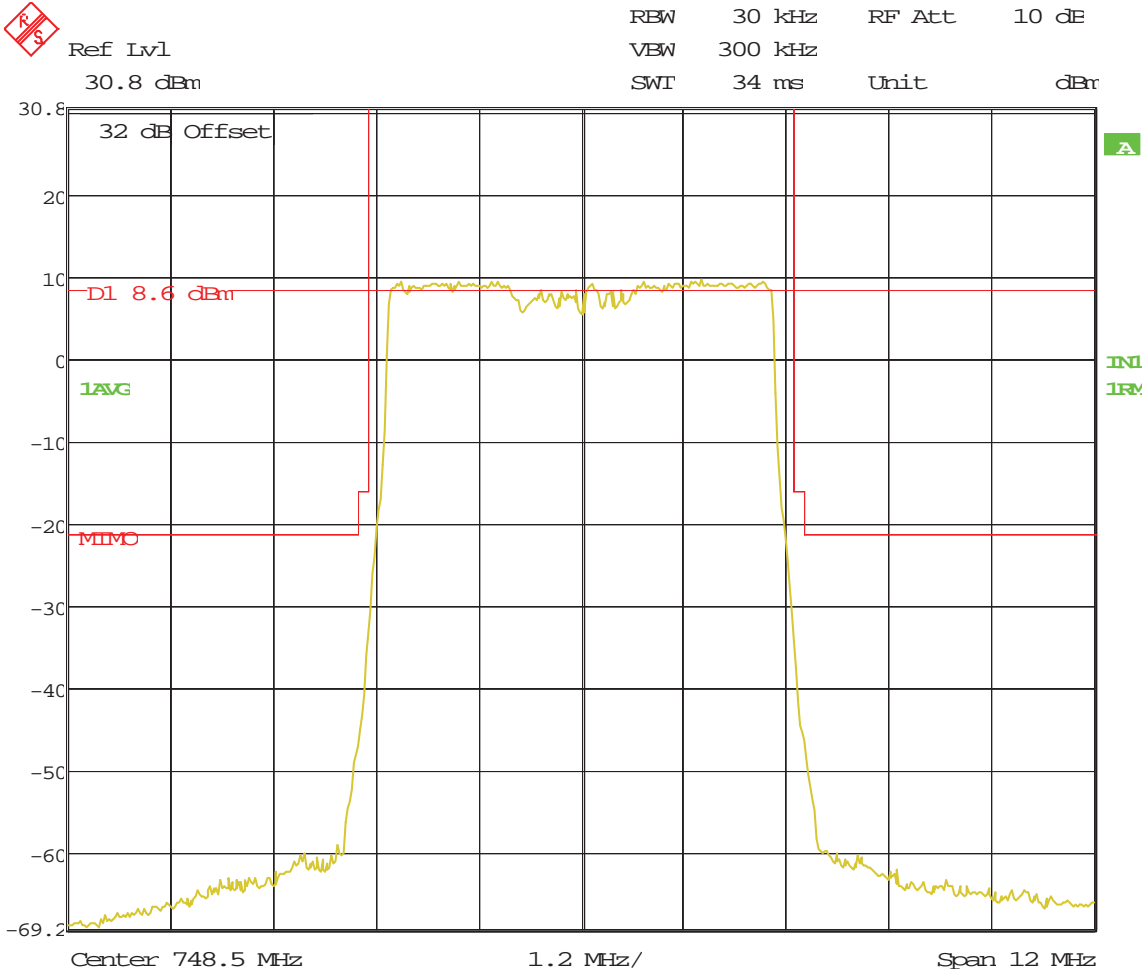


All components are calibrated over the frequency range of interest

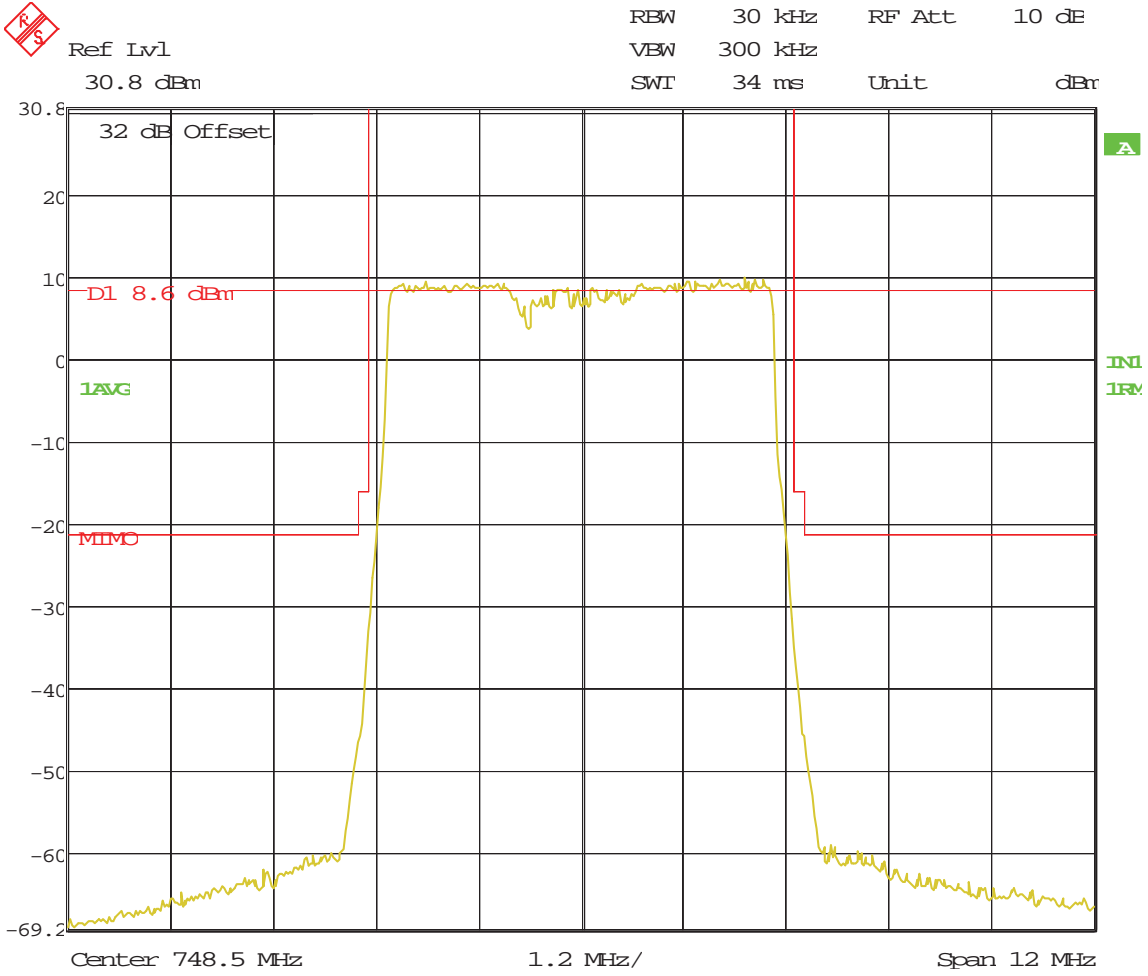
Block: C (Lower)

5 MHz Bandwidth 746 – 751 MHz

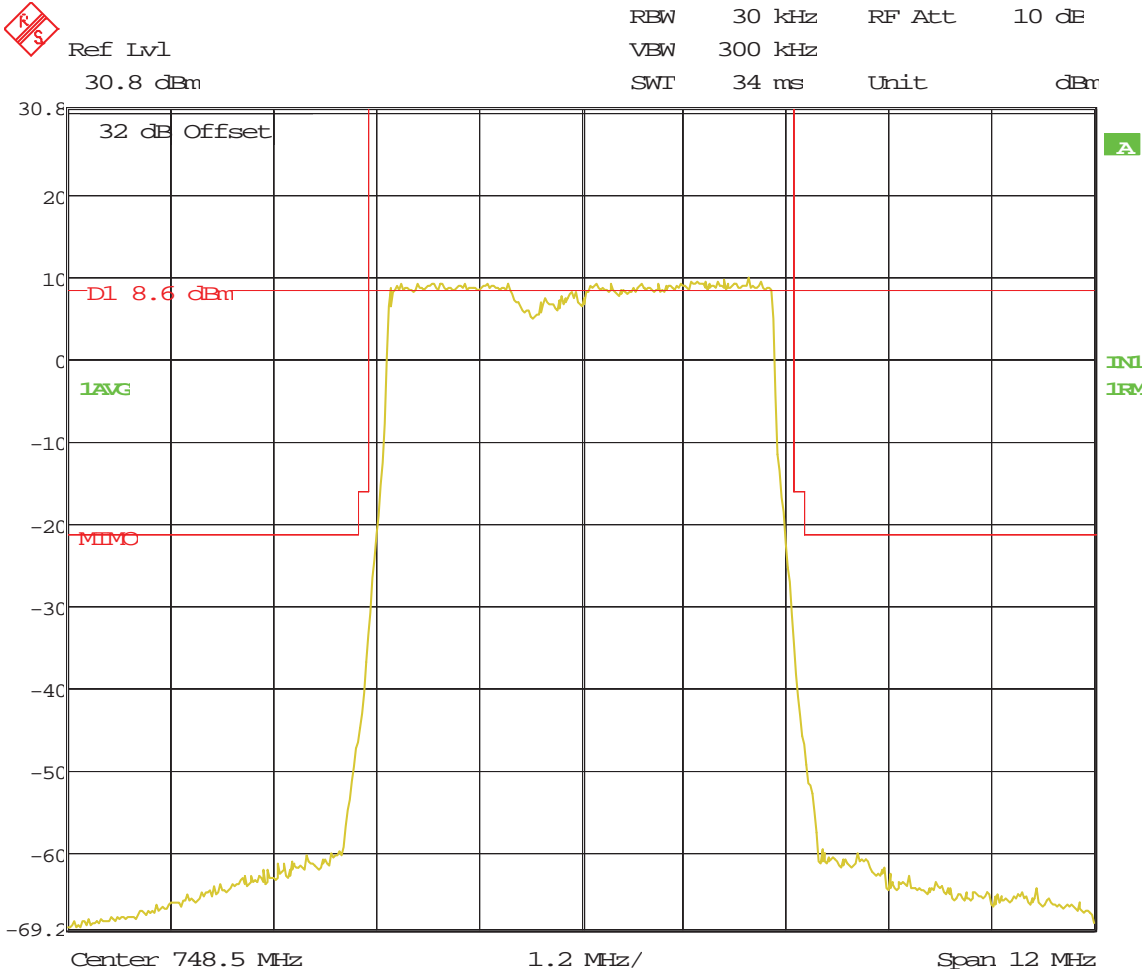
SPECTRUM MASK/OCCUPIED BANDWIDTH



Title: OCCUPIED BANDWIDTH; Test Engineer: SEG
Comment A: 9768 MRO V1.0 B13 700U Cubedock(FLIR M1); 748.5MHz, QPSK
PWR: 1W; 2X2 MIMO; FCC PART 27.53(C); FCCID: AS5BBTRX-07
Date: 17.SEP.2012 11:20:51



Title: OCCUPIED BANDWIDTH; Test Engineer: SEG
Comment A: 9768 MRO V1.0 B13 700U Cubedock(FLIR M1); 748.5MHz, 16QAM
PWR: 1W; 2X2 MIMO; FCC PART 27.53(C); FCCID: AS5BBTRX-07
Date: 17.SEP.2012 12:47:21

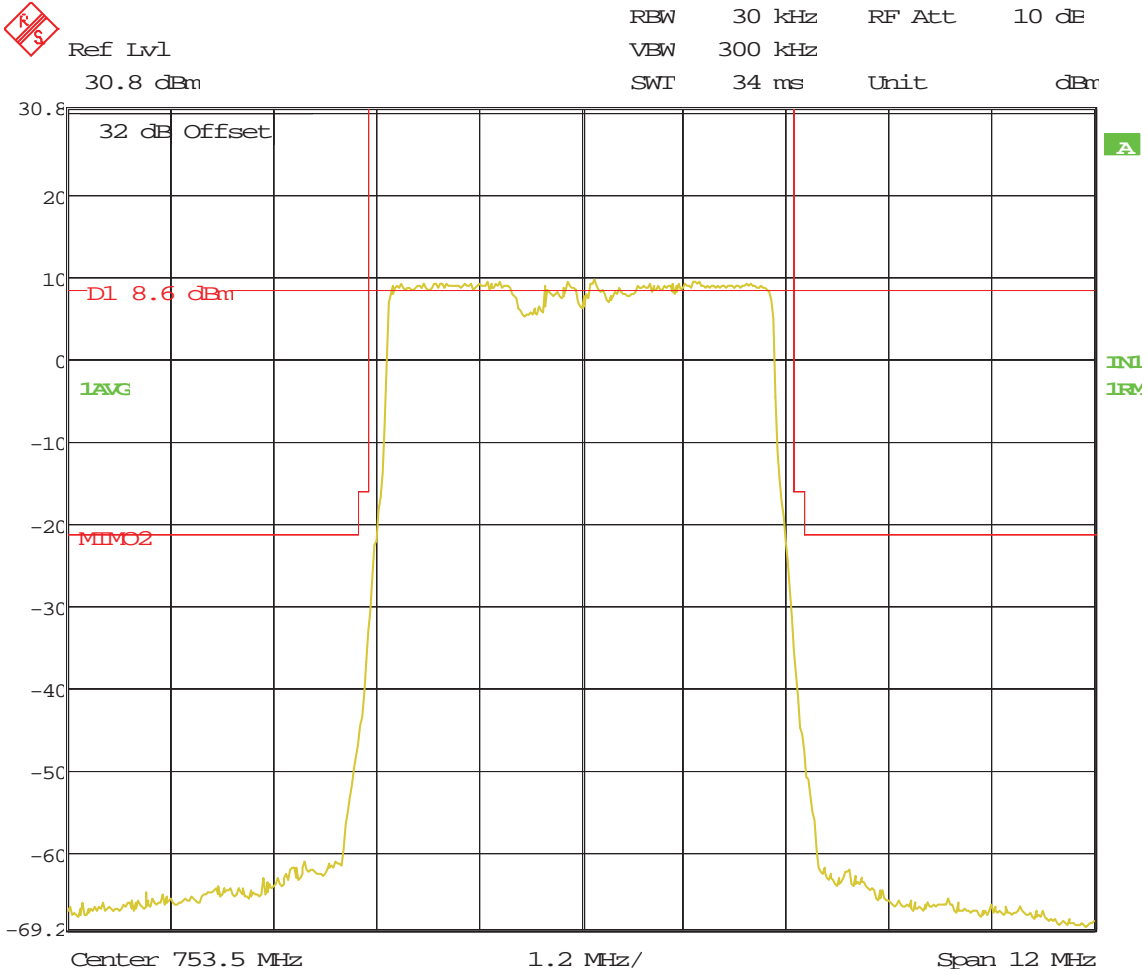


Title: OCCUPIED BANDWIDTH; Test Engineer: SEG
Comment A: 9768 MRO V1.0 B13 700U Cubedock(FLIR M1); 748.5MHz, 64QAM
PWR: 1W; 2X2 MIMO; FCC PART 27.53(C); FCCID: AS5BBTRX-07
Date: 17.SEP.2012 13:31:56

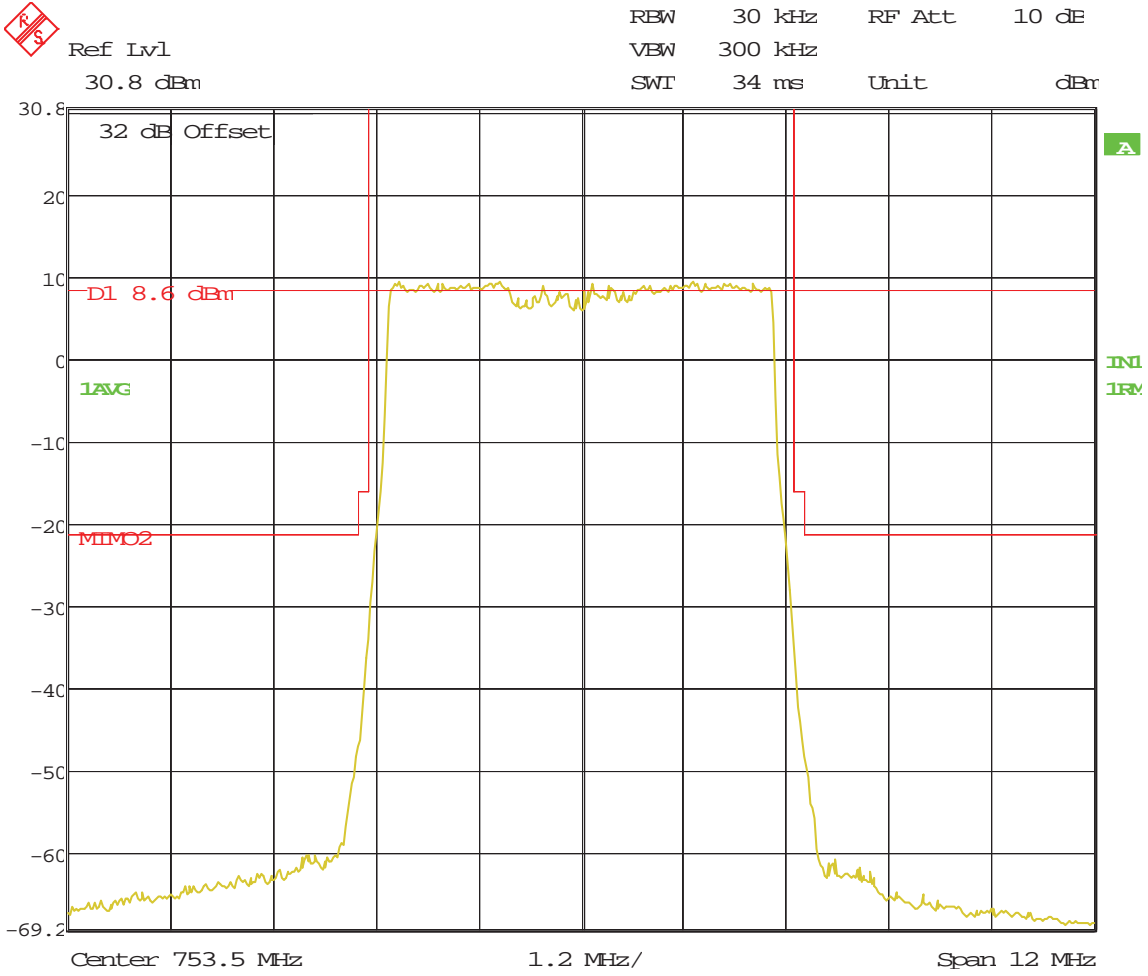
Block: C (Upper)

5 MHz Bandwidth 751 – 756 MHz

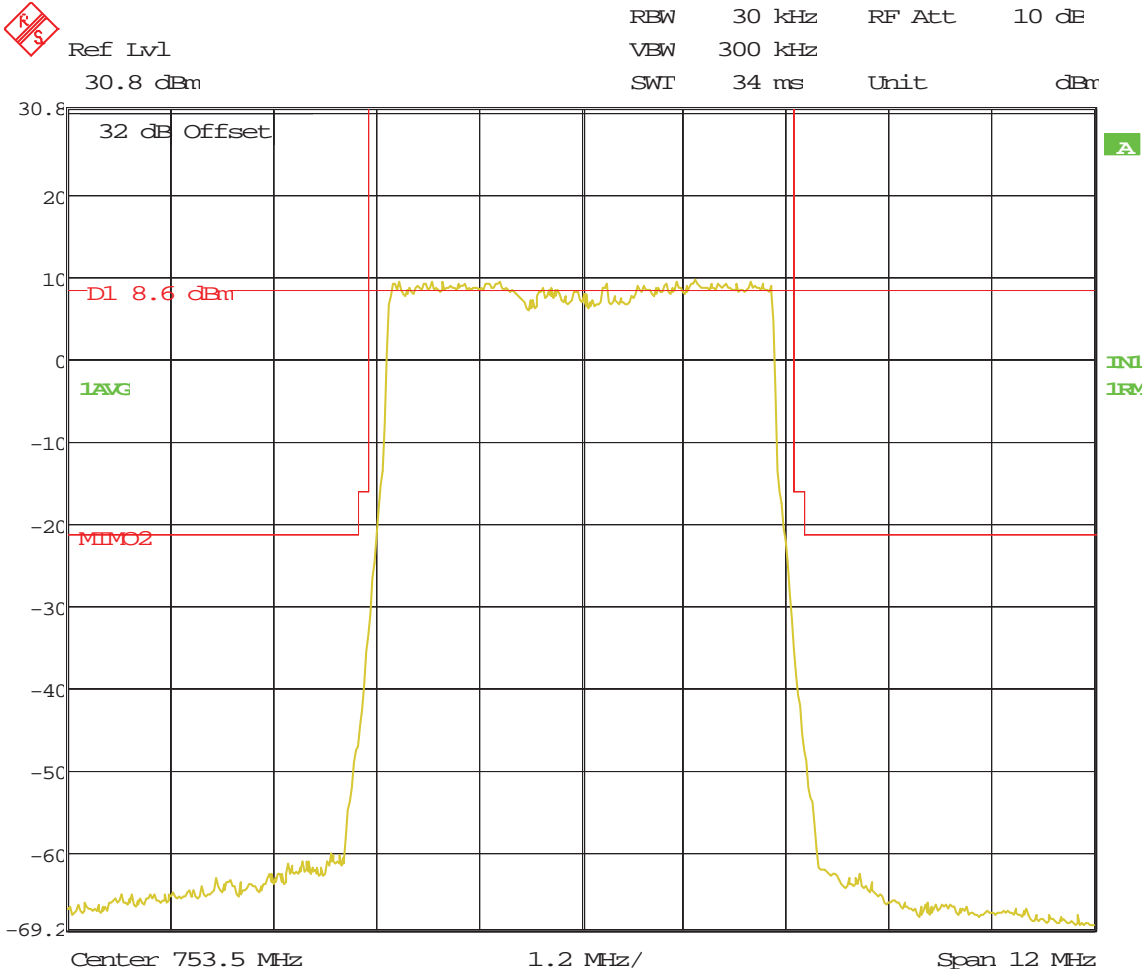
SPECTRUM MASK/OCCUPIED BANDWIDTH



Title: OCCUPIED BANDWIDTH; Test Engineer: SEG
Comment A: 9768 MRO V1.0 B13 700U Cubedock(FLIR M1); 753.5MHz, QPSK
PWR: 1W; 2X2 MIMO; FCC PART 27.53(C); FCCID: AS5BBTRX-07
Date: 18.SEP.2012 08:04:31



Title: OCCUPIED BANDWIDTH; Test Engineer: SEG
Comment A: 9768 MRO V1.0 B13 700U Cubedock(FLIR M1); 753.5MHz, 16QAM
PWR: 1W; 2X2 MIMO; FCC PART 27.53(C); FCCID: AS5BBTRX-07
Date: 18.SEP.2012 08:38:28

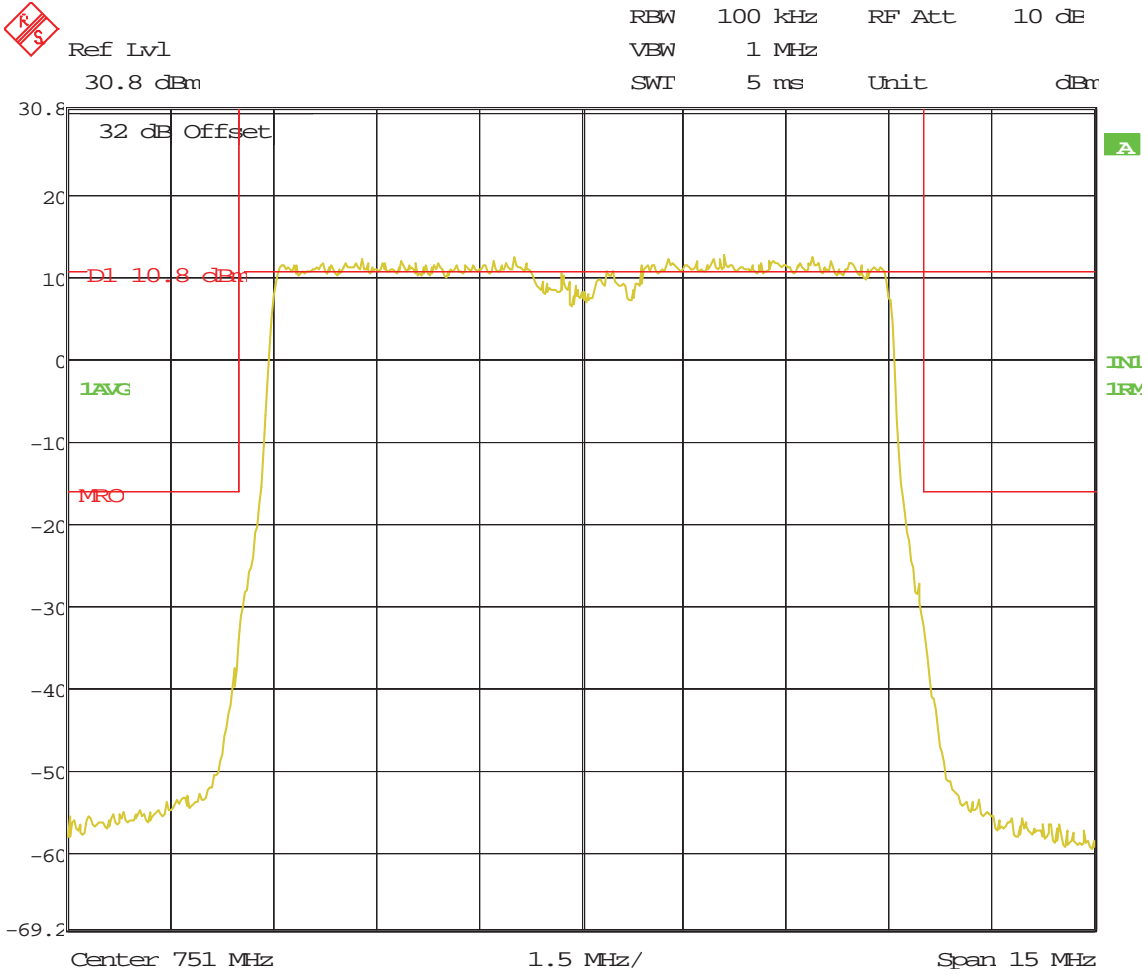


Title: OCCUPIED BANDWIDTH; Test Engineer: SEG
Comment A: 9768 MRO V1.0 B13 700U Cubedock(FLIR M1); 753.5MHz, 64QAM
PWR: 1W; 2X2 MIMO; FCC PART 27.53(C); FCCID: AS5BBTRX-07
Date: 18.SEP.2012 09:11:41

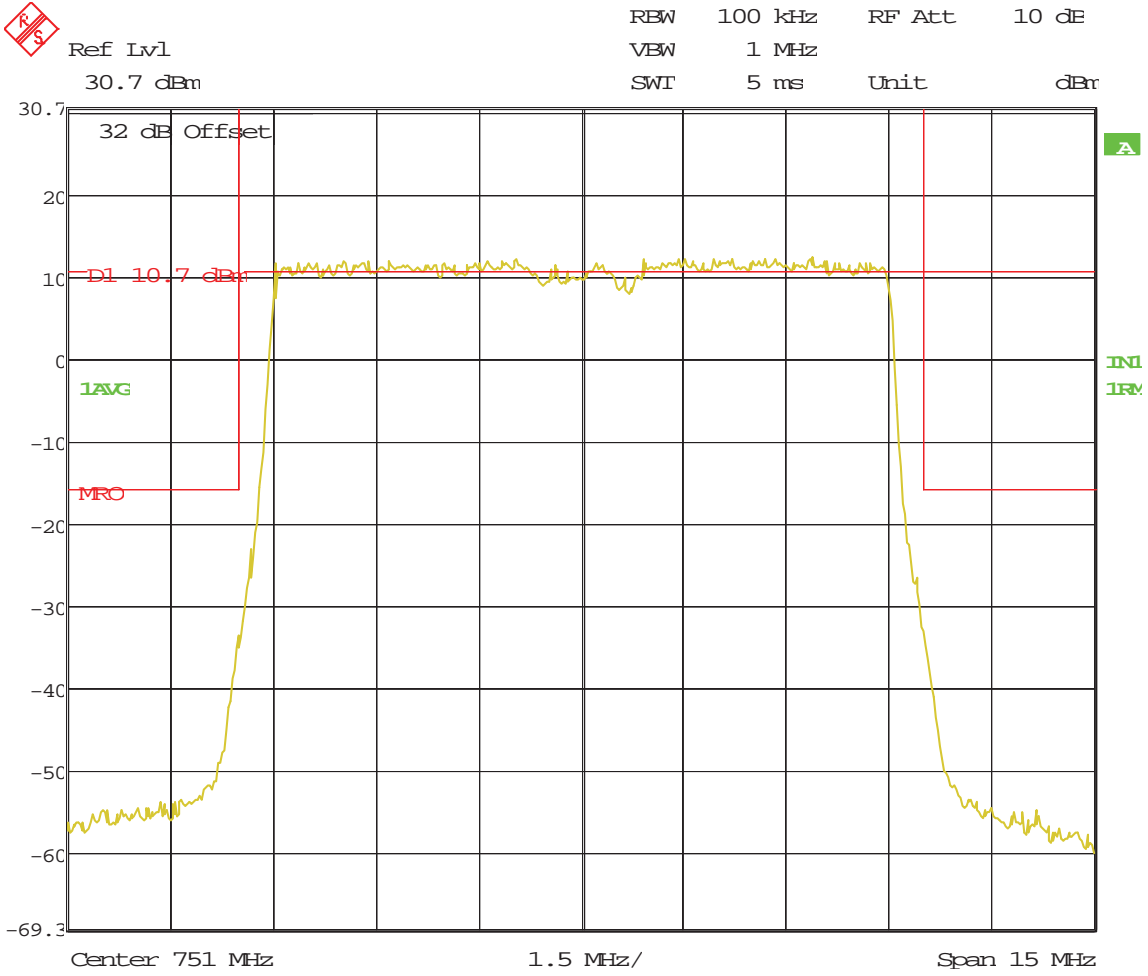
Block: C

10 MHz Bandwidth 746 – 756 MHz

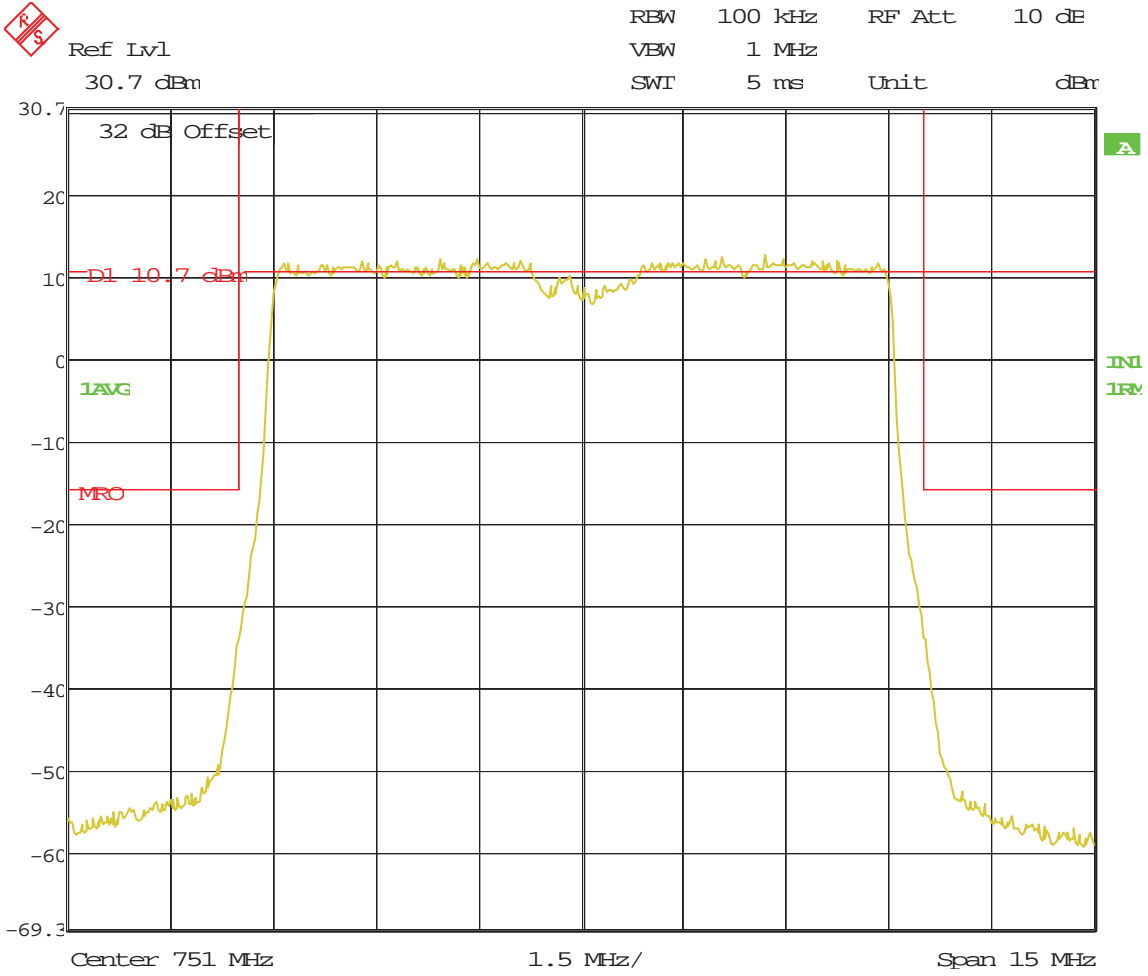
SPECTRUM MASK/OCCUPIED BANDWIDTH



Title: OCCUPIED BANDWIDTH; Test Engineer: SEG
Comment A: 9768 MRO V1.0 B13 700U Cubedock(FLIR M1); 751 MHz, QPSK
PWR: 1W; 2X2 MIMO, FCC PART 27.5(3); FCCID: AS5BBTRX-07
Date: 11.SEP.2012 14:34:44



Title: OCCUPIED BANDWIDTH; Test Engineer: SEG
Comment A: 9768 MRO V1.0 B13 700U Cubedock(FLIR M1); 751 MHz, 16QAM
PWR: 1W; 2X2 MIMO, FCC PART 27.5(3); FCCID: AS5BBTRX-07
Date: 12.SEP.2012 09:24:28



Title: OCCUPIED BANDWIDTH; Test Engineer: SEG
Comment A: 9768 MRO V1.0 B13 700U Cubedock(FLIR M1); 751 MHz, 64QAM
PWR: 1W; 2X2 MIMO, FCC PART 27.5(3); FCCID: AS5BBTRX-07
Date: 12.SEP.2012 09:50:52

Measurement 4

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

Measurement 4

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

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 (c). Measurements were made at 1W per carrier for 10 MHz Bandwidth, and 1W 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)
	C (Lower)	748.5	5	M1	1
	C (Upper)	753.5	5	M1	1
	C	751	10	M1	1

FCC Section 27.53(c): 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. On all frequencies between 763-775 MHz and 793-805 MHz, by a factor not less than $76 + 10\log(P)$ dB in a 6.25 kHz band segment, for base and fixed stations. 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. At frequencies where $76+10\log(P)$ is required, the limit was made 3 dB stringent (for 10 kHz RBW, the limit will be -47dBm).

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(c).

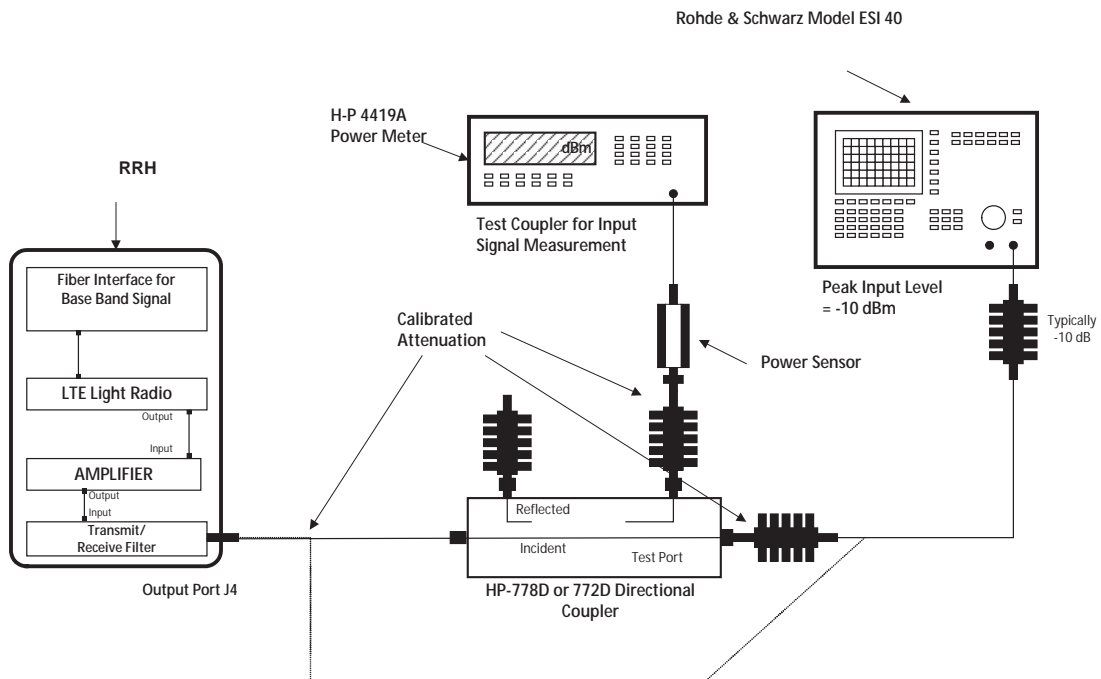
Measurement uncertainty:

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: C (Lower)
QPSK Modulation
Bandwidth 746 – 751 MHz**



Marker 1 [T1]

RBW 10 kHz RF Att 30 dB

Ref Lvl -49.46 dBm

VBW 30 kHz

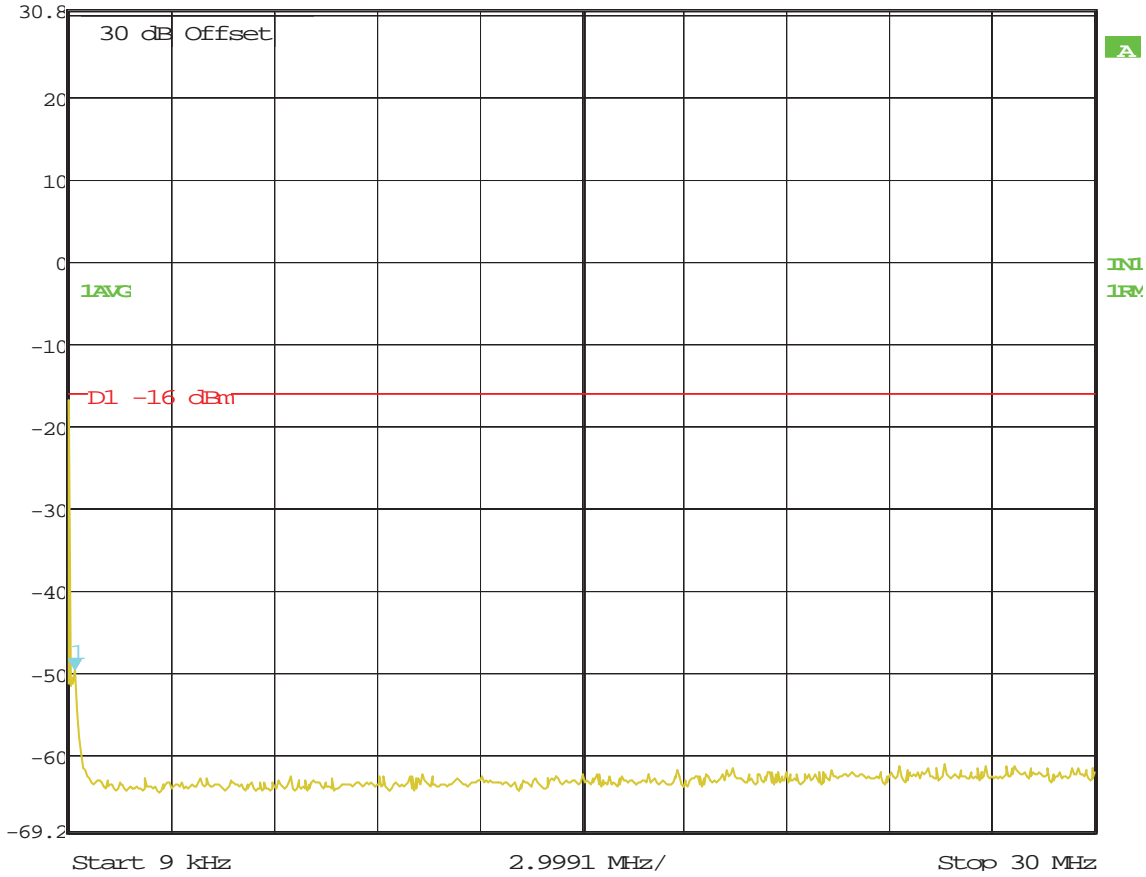
30.8 dBm

189.30661323 kHz

SWT 760 ms

Unit

dBm



Title: SPURIOUS EMISSIONS AT TX ANTIENNA PORT; Test Engineer: SEG
Comment A: 9768 MRO V1.0 B13 700U Cubedock (FLIR M1); 748.5MHz; QPSK
PWR:1W; 2X2 MIMO; FCC PART 27.53(C); FCCID: AS5BBTRX-07
Date: 17.SEP.2012 11:09:59



Marker 1 [T1]

RBW 100 kHz RF Att 20 dB

Ref Lvl 14.46 dBm

VBW 300 kHz

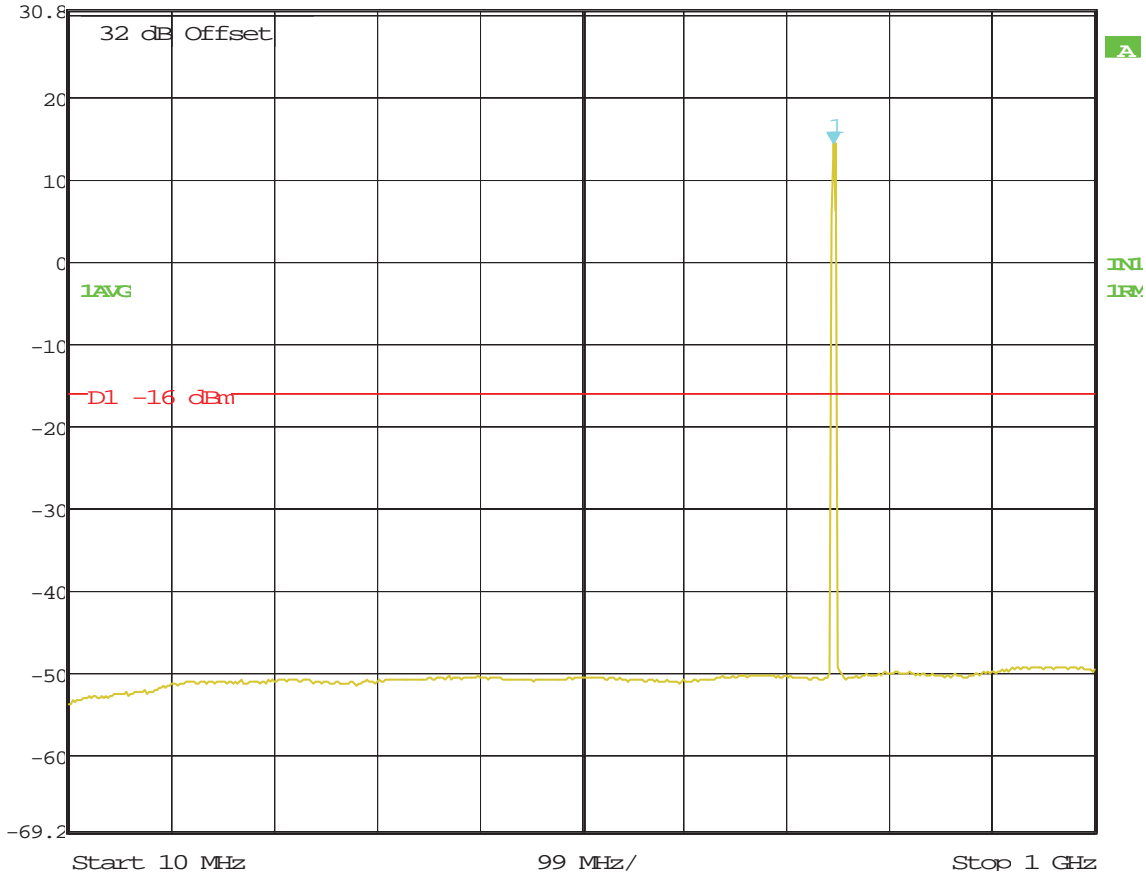
30.8 dBm

748.03607214 MHz

SWT 250 ms

Unit

dBm



Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; Test Engineer: SEG
Comment A: 9768 MRO V1.0 B13 700U Cubedock (FLIR M1); 748.5MHz; QPSK
PWR:1W; 2X2 MIMO; FCC PART 27.53(C); FCCID: AS5BBTRX-07
Date: 17.SEP.2012 11:08:06



Marker 1 [T1]

RBW 1 MHz RF Att 10 dB

Ref Lvl -41.84 dBm

VBW 3 MHz

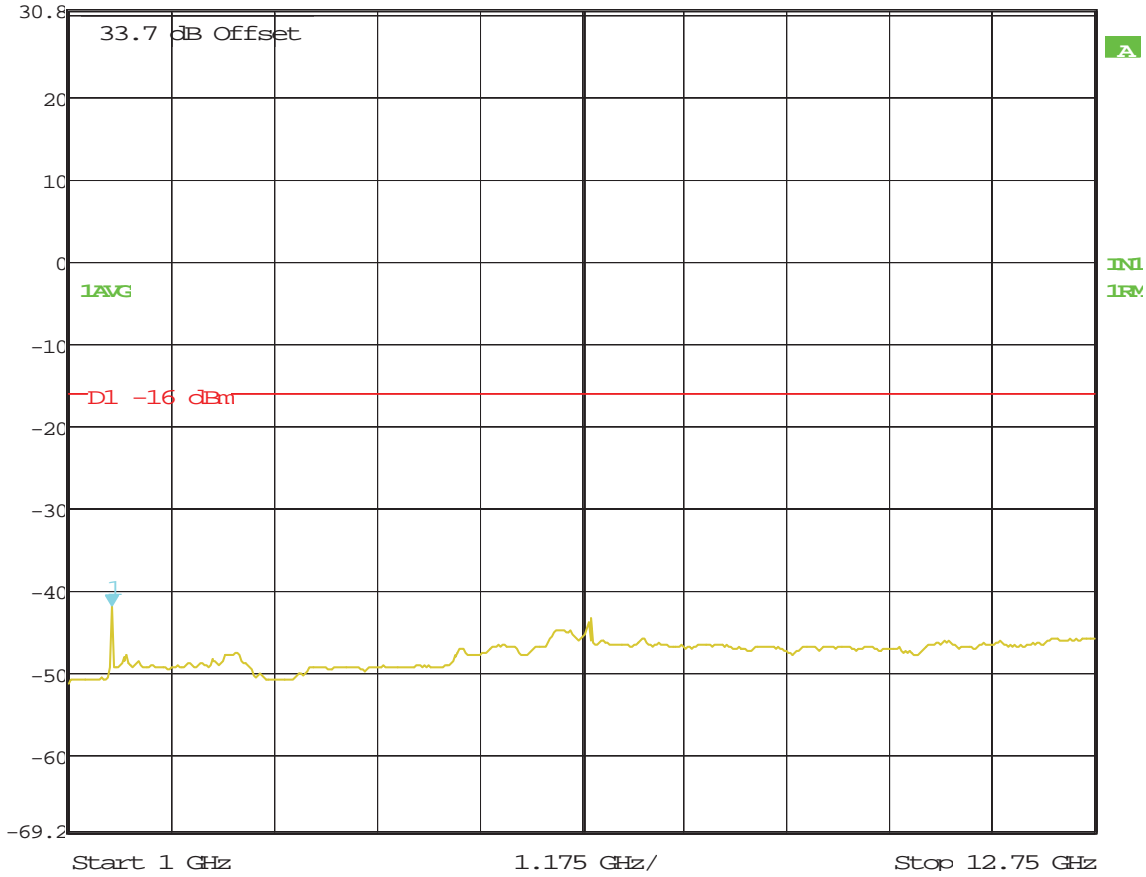
30.8 dBm

1.49448898 GHz

SWT 120 ms

Unit

dBm



Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; Test Engineer: SEG
Comment A: 9768 MRO V1.0 B13 700U Cubedock (FLIR M1); 748.5MHz; QPSK
PWR:1W; 2X2 MIMO; FCC PART 27.53(C); FCCID: AS5BBTRX-07
Date: 17.SEP.2012 11:12:00



Marker 1 [T1]

RBW 10 kHz RF Att 20 dB

Ref Lvl -68.69 dBm

VBW 30 kHz

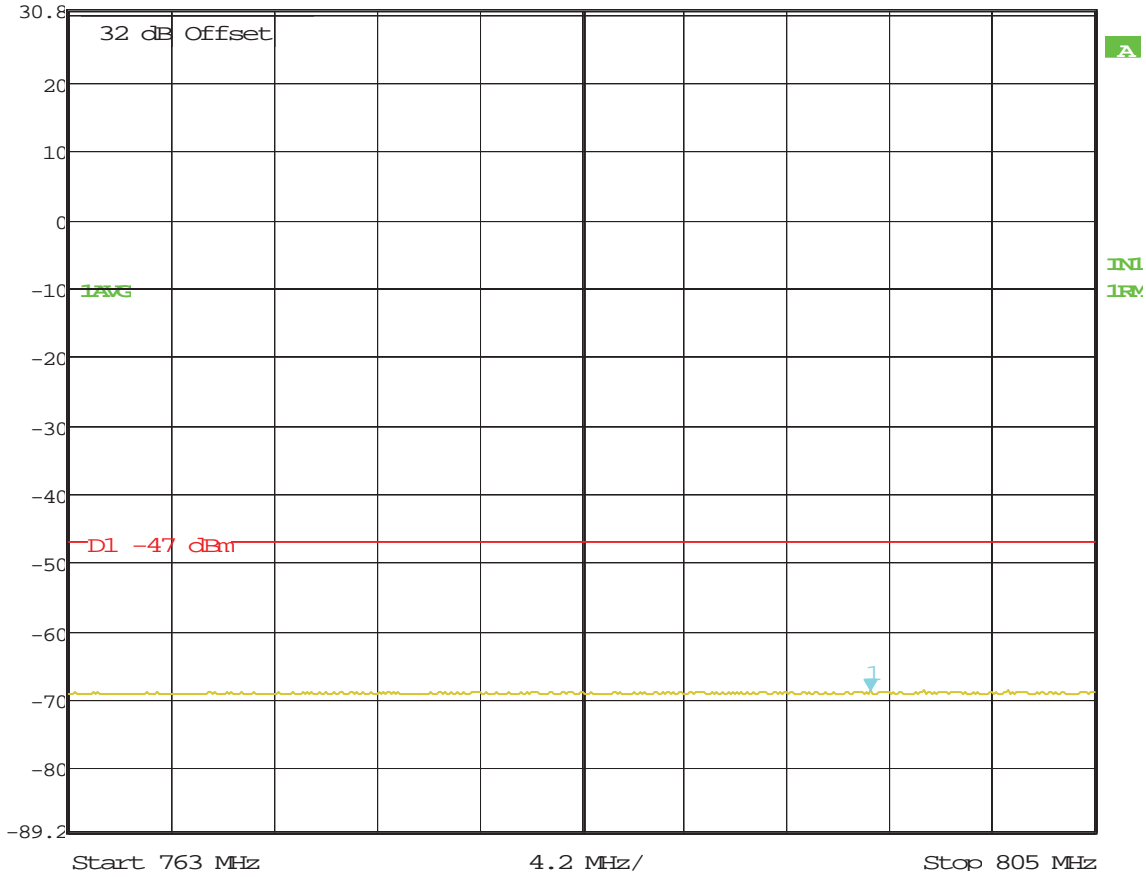
30.8 dBm

795.82565130 MHz

SWT 1.05 s

Unit

dBm



Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; Test Engineer: SEG
Comment A: 9768 MRO V1.0 B13 700U Cubedock (FLIR M1); 748.5MHz; QPSK
PWR:1W; 2X2 MIMO; FCC PART 27.53(C); FCCID: AS5BBTRX-07
Date: 17.SEP.2012 11:16:46

**Transmit Port
Antenna Conducted Spurious Emissions**

**Block: C (Lower)
16QAM Modulation
Bandwidth 746 – 751 MHz**



Marker 1 [T1]

RBW 10 kHz RF Att 30 dB

Ref Lvl -49.13 dBm

VBW 30 kHz

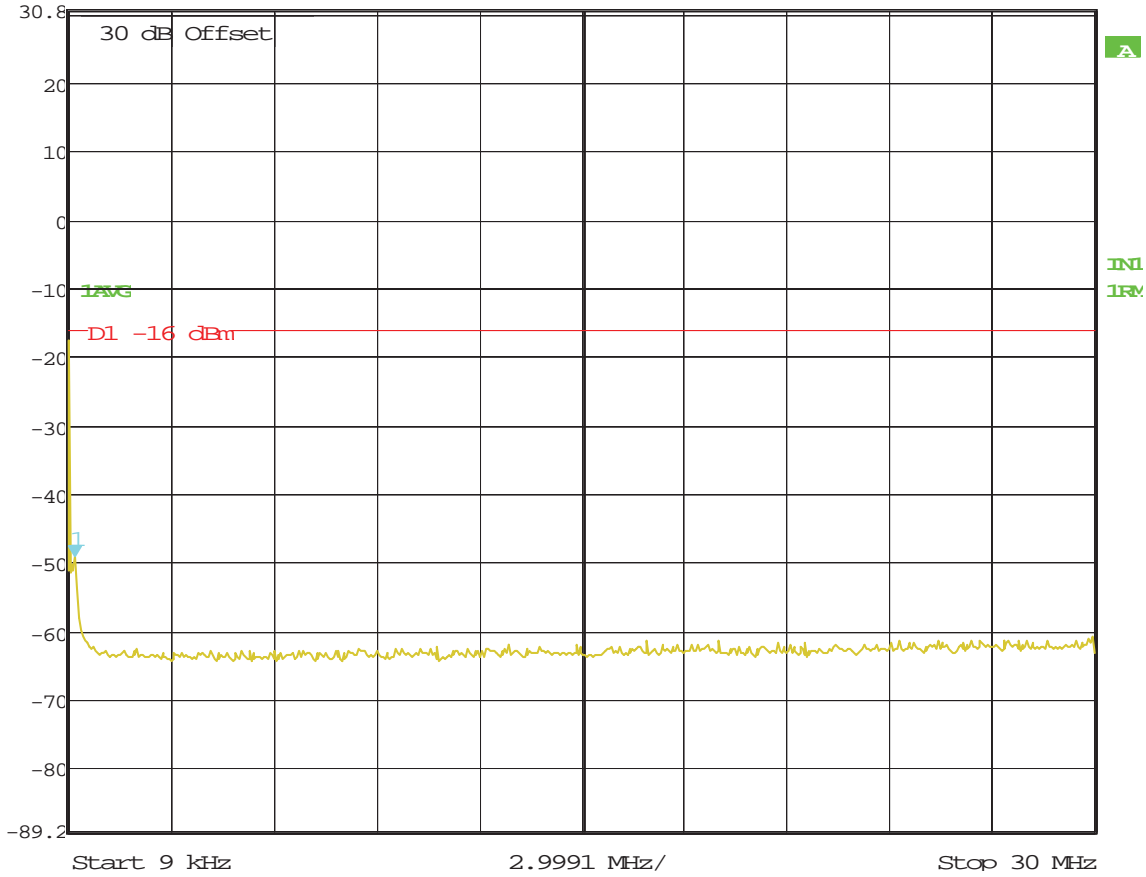
30.8 dBm

189.30661323 kHz

SWT 760 ms

Unit

dBm



Title: SPURIOUS EMISSIONS AT TX ANTIENNA PORT; Test Engineer: SEG
Comment A: 9768 MRO V1.0 B13 700U Cubedock (FLIR M1); 748.5MHz; 16QAM
PWR:1W; 2X2 MIMO; FCC PART 27.53(C); FCCID: AS5BBTRX-07
Date: 17.SEP.2012 12:58:57



Marker 1 [T1]

RBW 100 kHz RF Att 20 dB

Ref Lvl 14.56 dBm

VBW 300 kHz

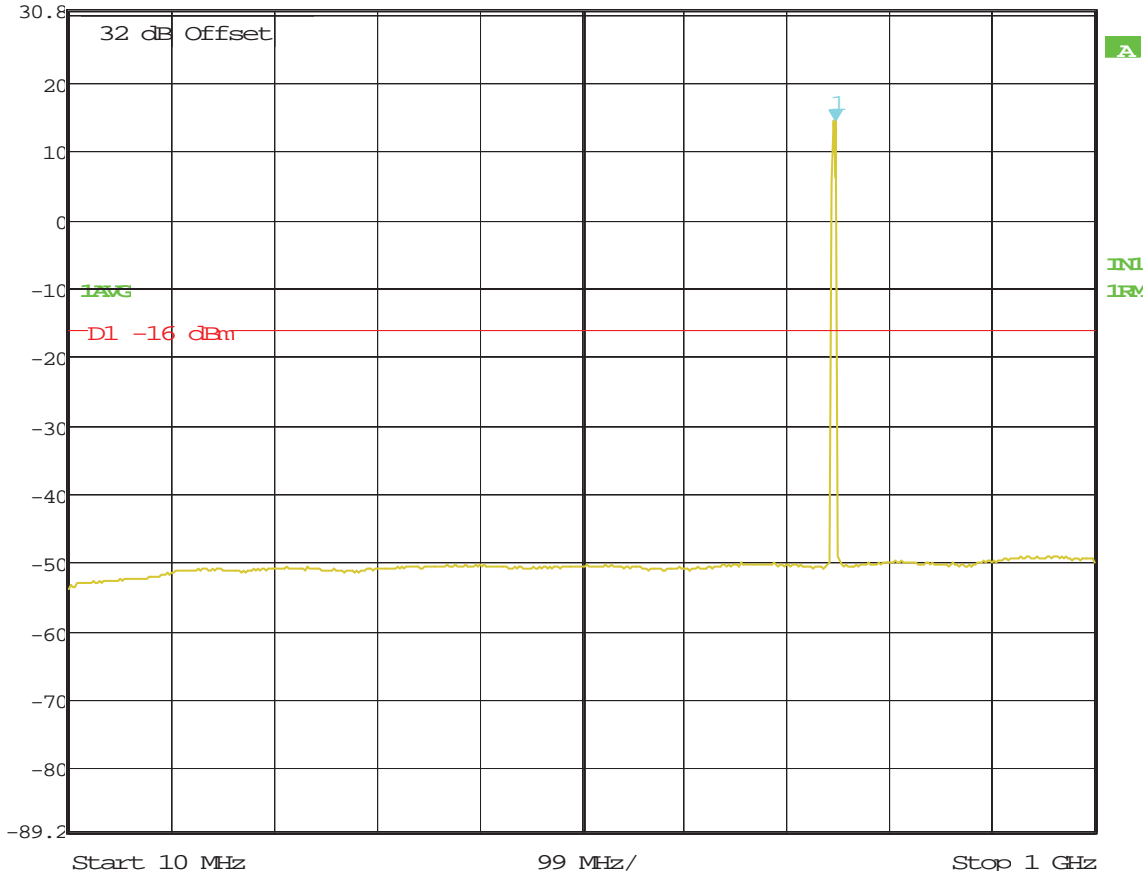
30.8 dBm

750.02004008 MHz

SWT 250 ms

Unit

dBm



Title: SPURIOUS EMISSIONS AT TX ANTIENNA PORT; Test Engineer: SEG
Comment A: 9768 MRO V1.0 B13 700U Cubedock (FLIR M1); 748.5MHz; 16QAM
PWR:1W; 2X2 MIMO; FCC PART 27.53(C); FCCID: AS5BBTRX-07
Date: 17.SEP.2012 12:57:20



Marker 1 [T1]

RBW 1 MHz RF Att 10 dB

Ref Lvl -42.22 dBm

VBW 3 MHz

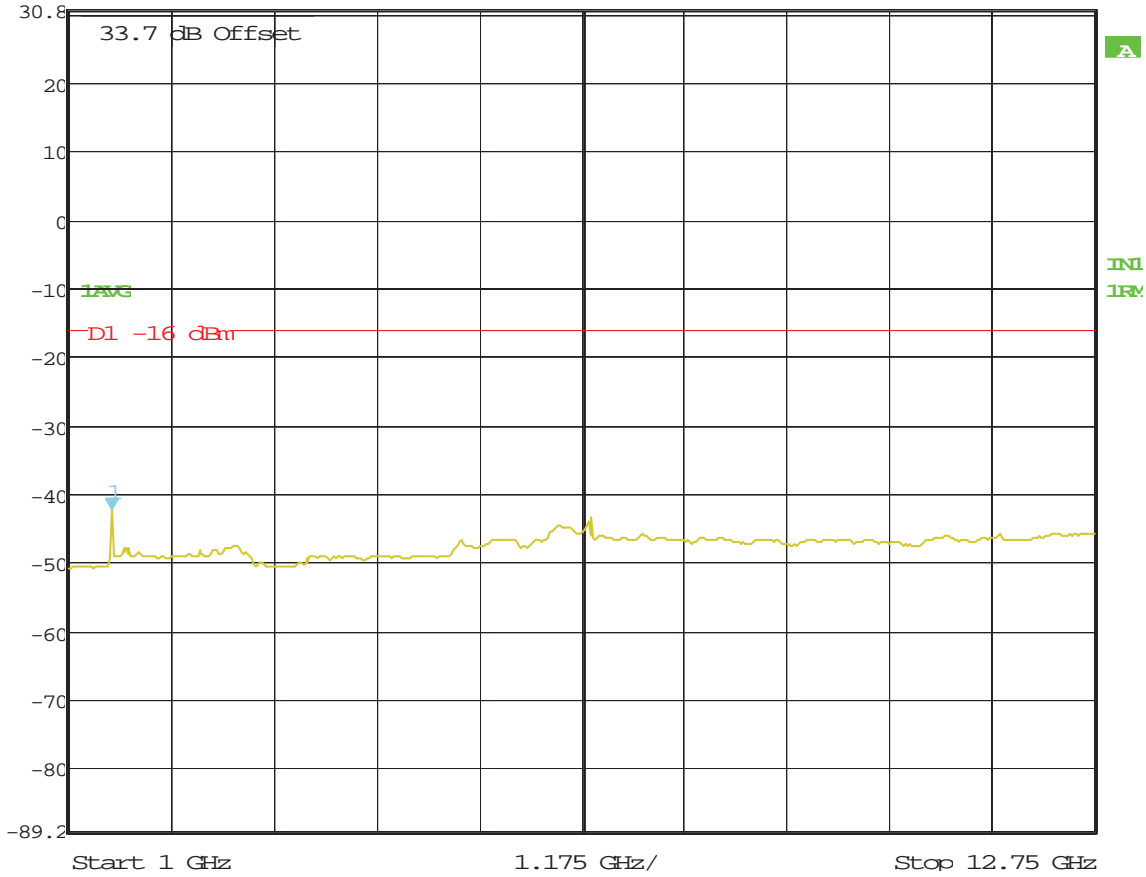
30.8 dBm

1.49448898 GHz

SWT 120 ms

Unit

dBm



Title: SPURIOUS EMISSIONS AT TX ANTIENNA PORT; Test Engineer: SEG
Comment A: 9768 MRO V1.0 B13 700U Cubedock (FLIR M1); 748.5MHz; 16QAM
PWR:1W; 2X2 MIMO; FCC PART 27.53(C); FCCID: AS5BBTRX-07
Date: 17.SEP.2012 12:55:51



Marker 1 [T1]

RBW 10 kHz RF Att 20 dB

Ref Lvl -68.48 dBm

VBW 30 kHz

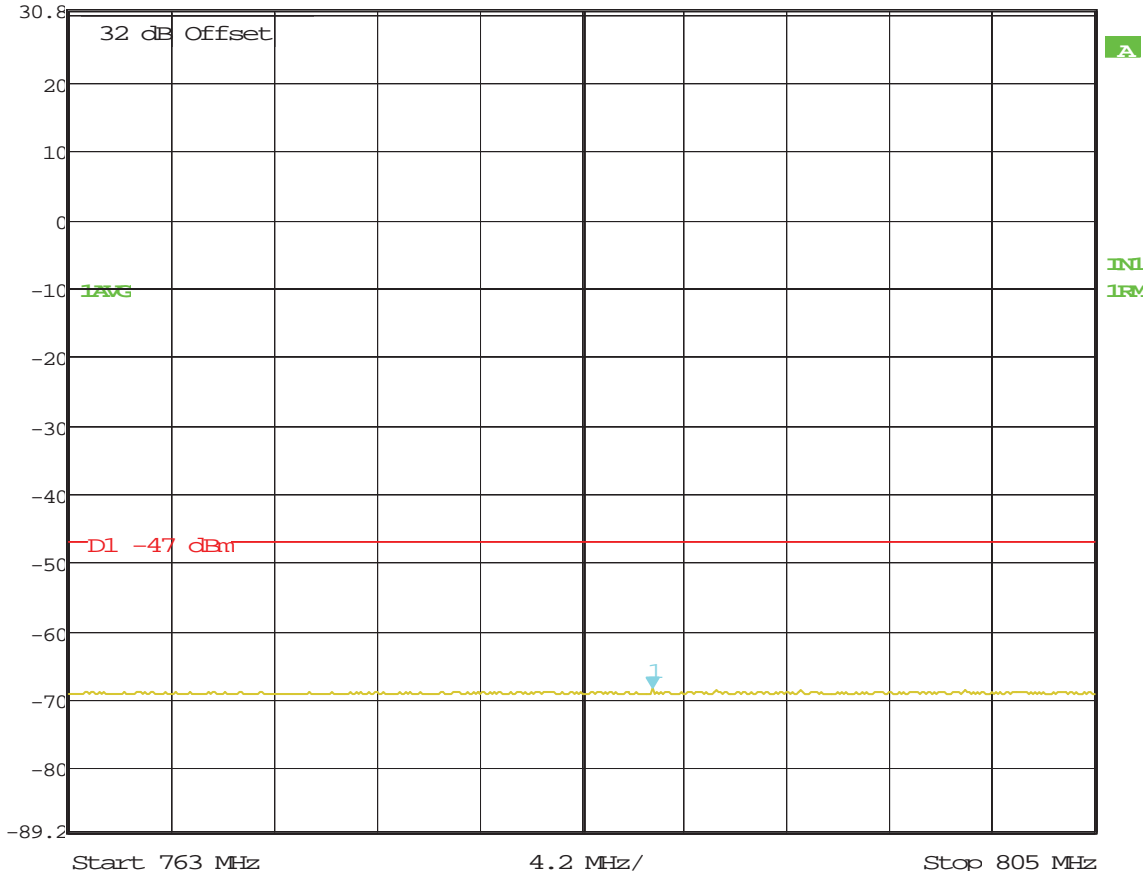
30.8 dBm

786.90380762 MHz

SWT 1.05 s

Unit

dBm



Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; Test Engineer: SEG
Comment A: 9768 MRO V1.0 B13 700U Cubedock (FLIR M1); 748.5MHz; 16QAM
PWR:1W; 2X2 MIMO; FCC PART 27.53(C); FCCID: AS5BBTRX-07
Date: 17.SEP.2012 12:53:49

**Transmit Port
Antenna Conducted Spurious Emissions**

**Block: C (Lower)
64QAM Modulation
Bandwidth 746 – 751 MHz**



Marker 1 [T1]

RBW 10 kHz RF Att 30 dB

Ref Lvl -49.29 dBm

VBW 30 kHz

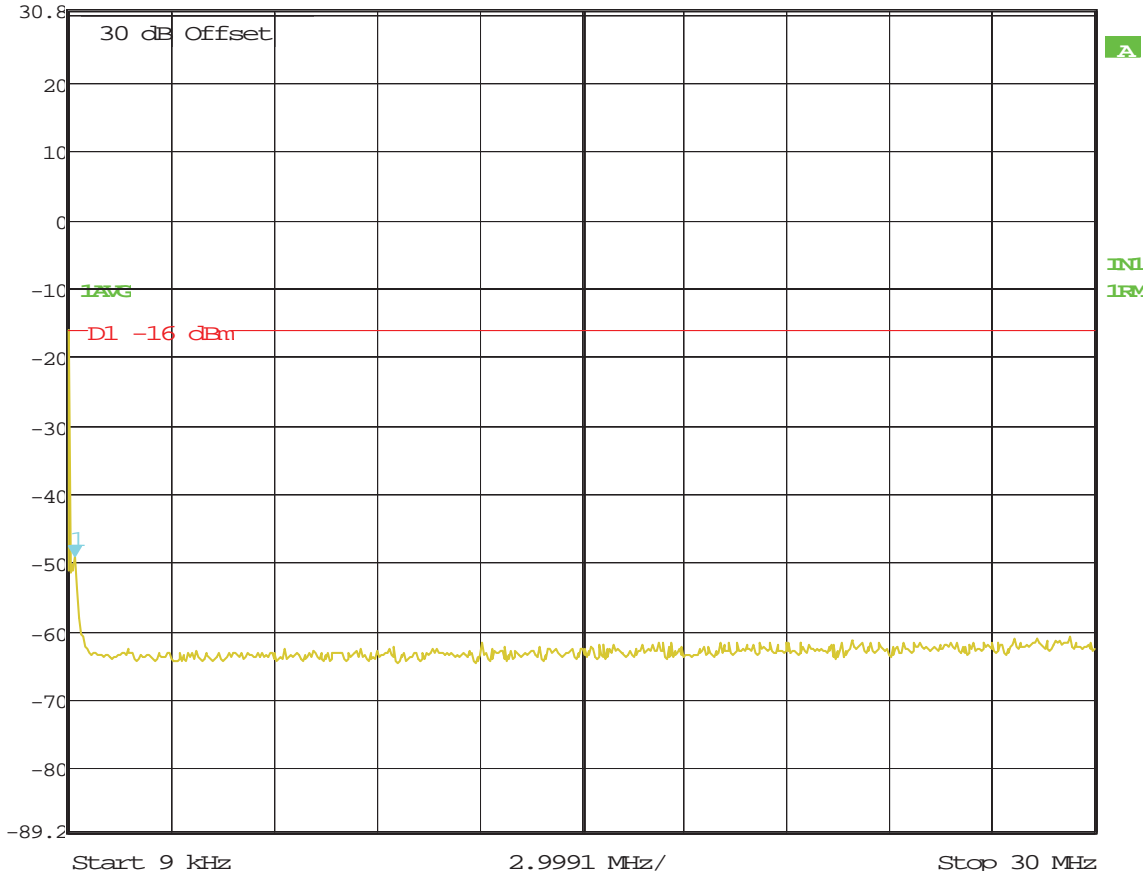
30.8 dBm

189.30661323 kHz

SWT 760 ms

Unit

dBm



Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; Test Engineer: SEG
Comment A: 9768 MRO V1.0 B13 700U Cubedock (FLIR M1); 748.5MHz; 64QAM
PWR:1W; 2X2 MIMO; FCC PART 27.53(C); FCCID: AS5BBTRX-07
Date: 17.SEP.2012 13:12:33



Marker 1 [T1]

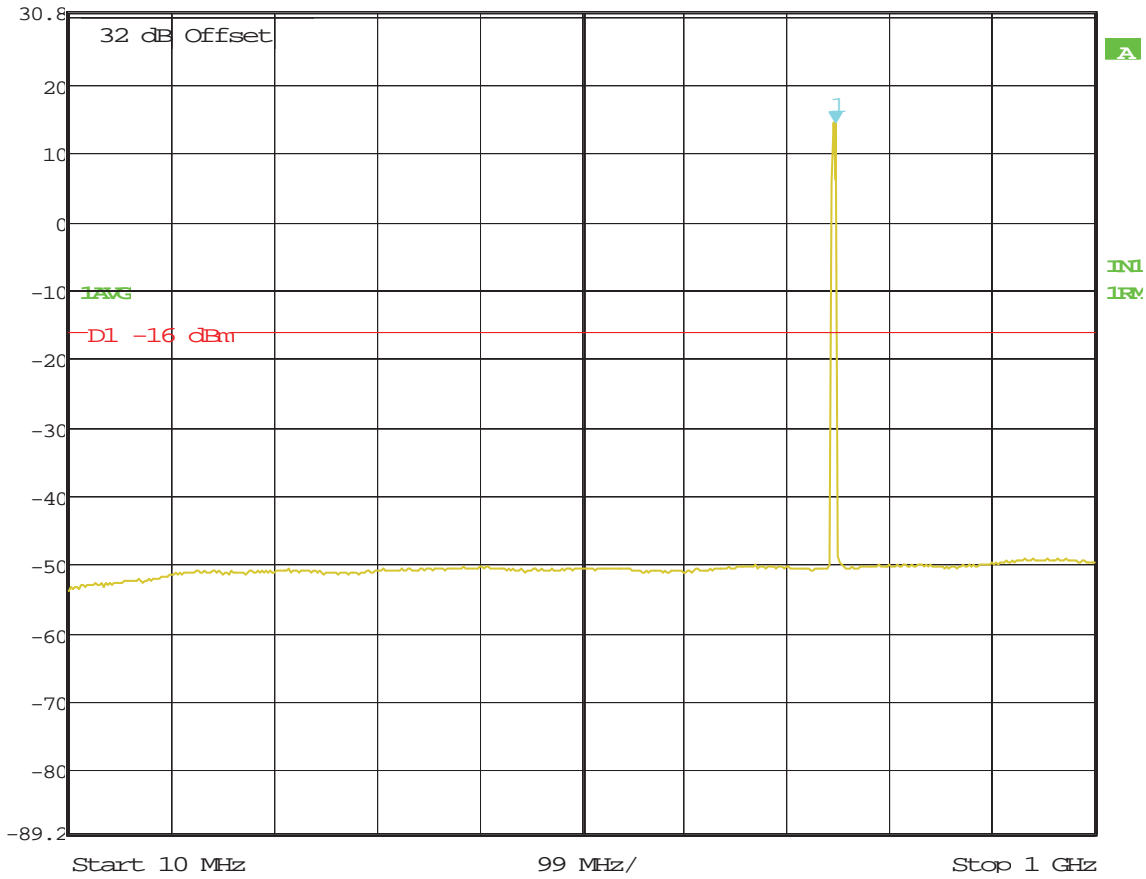
RBW 100 kHz RF Att 20 dB

Ref Lvl 14.52 dBm

VBW 300 kHz

30.8 dBm 750.02004008 MHz

SWT 250 ms Unit dBm



Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; Test Engineer: SEG
Comment A: 9768 MRO V1.0 B13 700U Cubedock (FLIR M1); 748.5MHz; 64QAM
PWR:1W; 2X2 MIMO; FCC PART 27.53(C); FCCID: AS5BBTRX-07
Date: 17.SEP.2012 13:14:11



Marker 1 [T1]

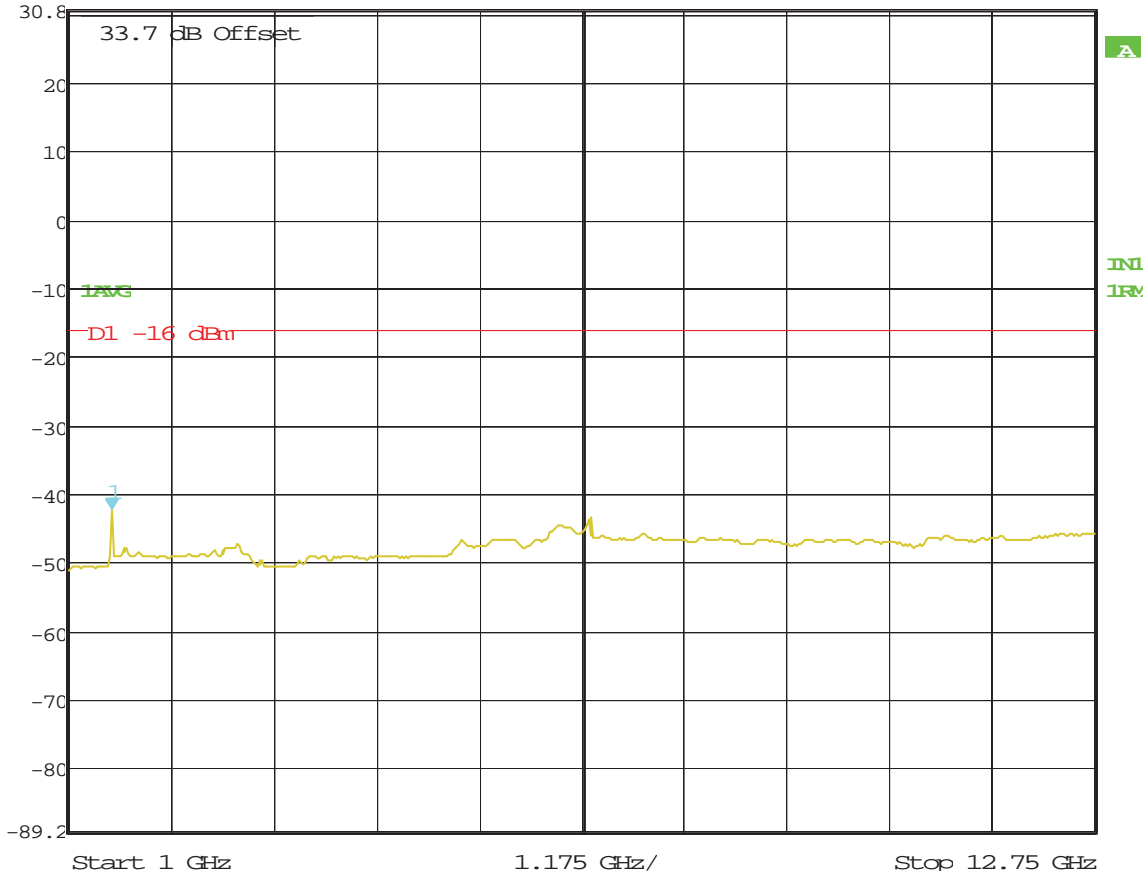
RBW 1 MHz RF Att 10 dB

Ref Lvl -42.29 dBm

VBW 3 MHz

30.8 dBm 1.49448898 GHz

SWT 120 ms Unit dBm



Title: SPURIOUS EMISSIONS AT TX ANTIENNA PORT; Test Engineer: SEG
Comment A: 9768 MRO V1.0 B13 700U Cubedock (FLIR M1); 748.5MHz; 64QAM
PWR:1W; 2X2 MIMO; FCC PART 27.53(C); FCCID: AS5BBTRX-07
Date: 17.SEP.2012 13:15:18



Marker 1 [T1]

RBW 10 kHz RF Att 20 dB

Ref Lvl -68.73 dBm

VBW 30 kHz

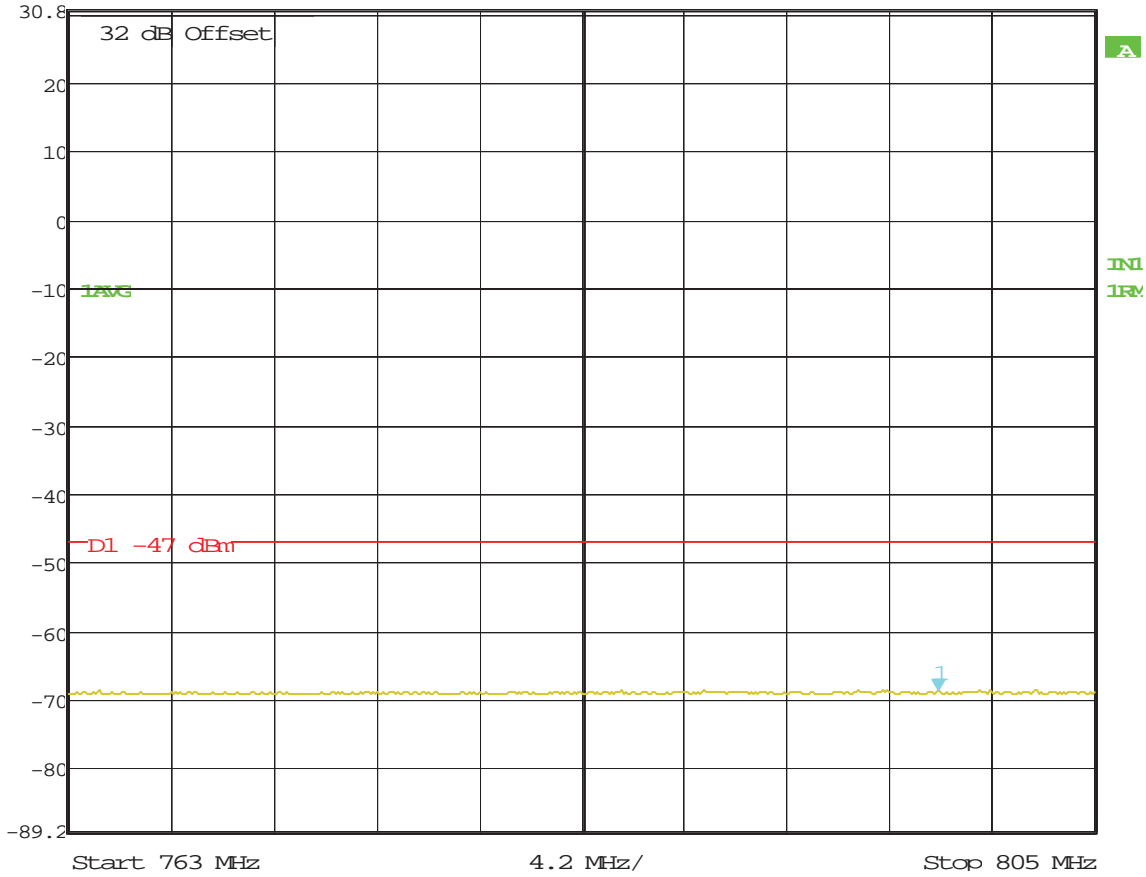
30.8 dBm

798.60320641 MHz

SWT 1.05 s

Unit

dBm



Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; Test Engineer: SEG
Comment A: 9768 MRO V1.0 B13 700U Cubedock (FLIR M1); 748.5MHz; 64QAM
PWR:1W; 2X2 MIMO; FCC PART 27.53(C); FCCID: AS5BBTRX-07
Date: 17.SEP.2012 13:18:28

Transmit Port
Antenna Conducted Spurious Emissions

Block: C (Upper)
QPSK Modulation
Bandwidth 751 – 756 MHz



Marker 1 [T1]

RBW 10 kHz RF Att 30 dB

Ref Lvl -49.17 dBm

VBW 30 kHz

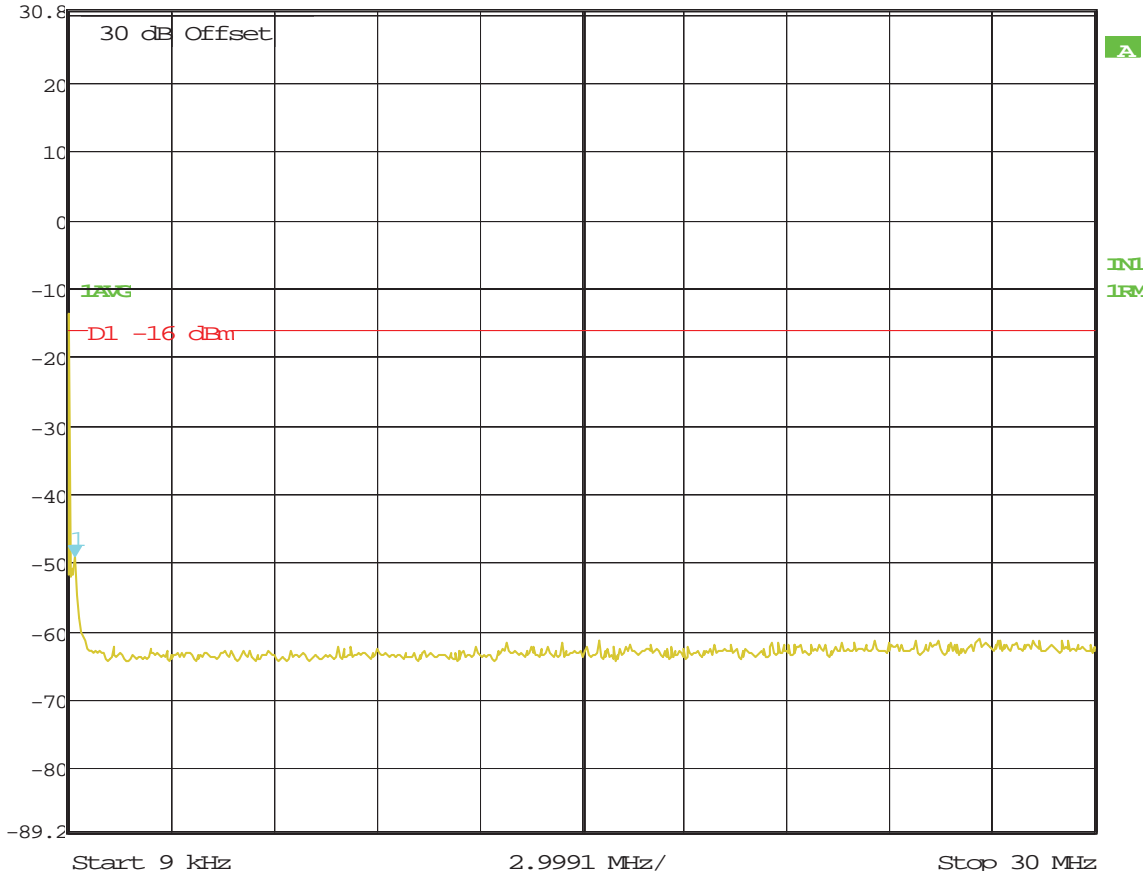
30.8 dBm

189.30661323 kHz

SWT 760 ms

Unit

dBm



Title: SPURIOUS EMISSIONS AT TX ANTIENNA PORT; Test Engineer: SEG
Comment A: 9768 MRO V1.0 B13 700U Cubedock (FLIR M1); 753.5MHz; QPSK
PWR: 1W; 2X2 MIMO; FCC PART 27.53(C); FCCID: AS5BBTRX-07
Date: 18.SEP.2012 07:36:49



Marker 1 [T1]

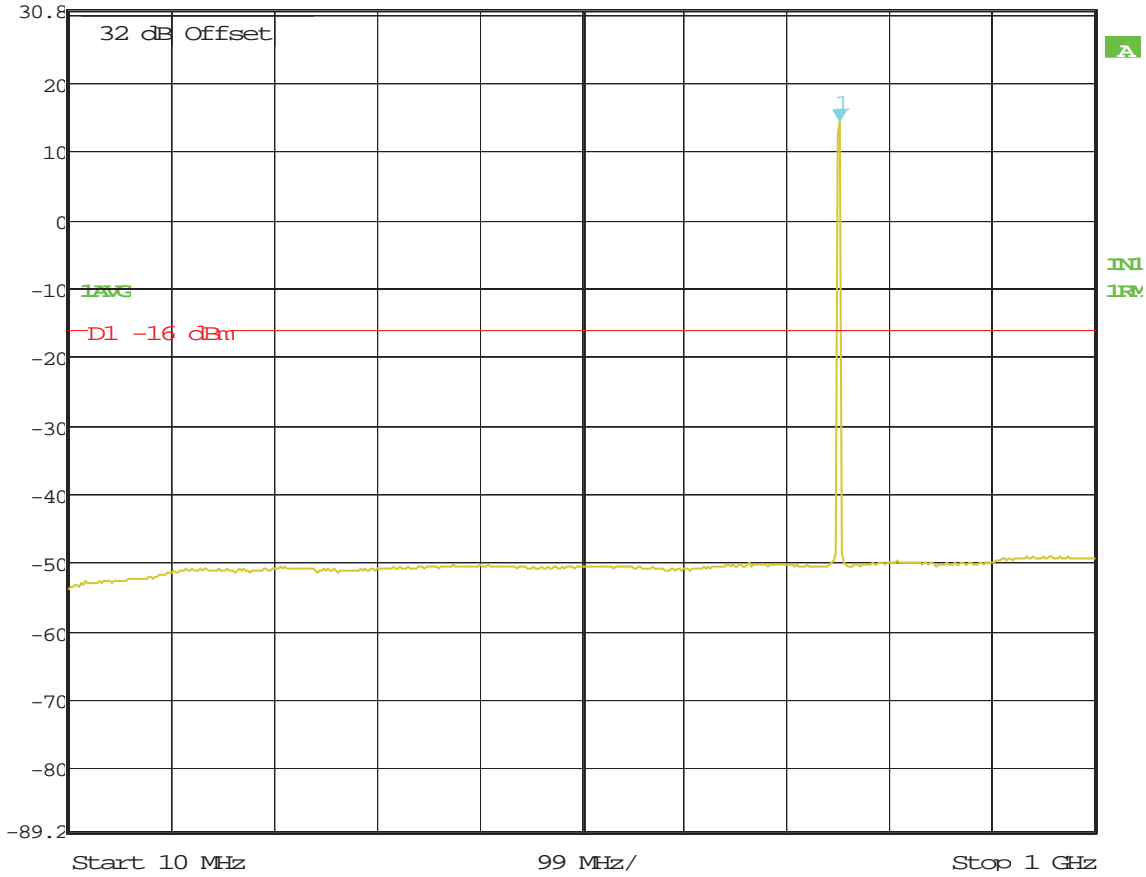
RBW 100 kHz RF Att 20 dB

Ref Lvl 14.43 dBm

VBW 300 kHz

30.8 dBm 753.98797595 MHz

SWT 250 ms Unit dBm



Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; Test Engineer: SEG
Comment A: 9768 MRO V1.0 B13 700U Cubedock (FLIR M1); 753.5MHz; QPSK
PWR: 1W; 2X2 MIMO; FCC PART 27.53(C); FCCID: AS5BBTRX-07
Date: 18.SEP.2012 07:35:25



Marker 1 [T1]

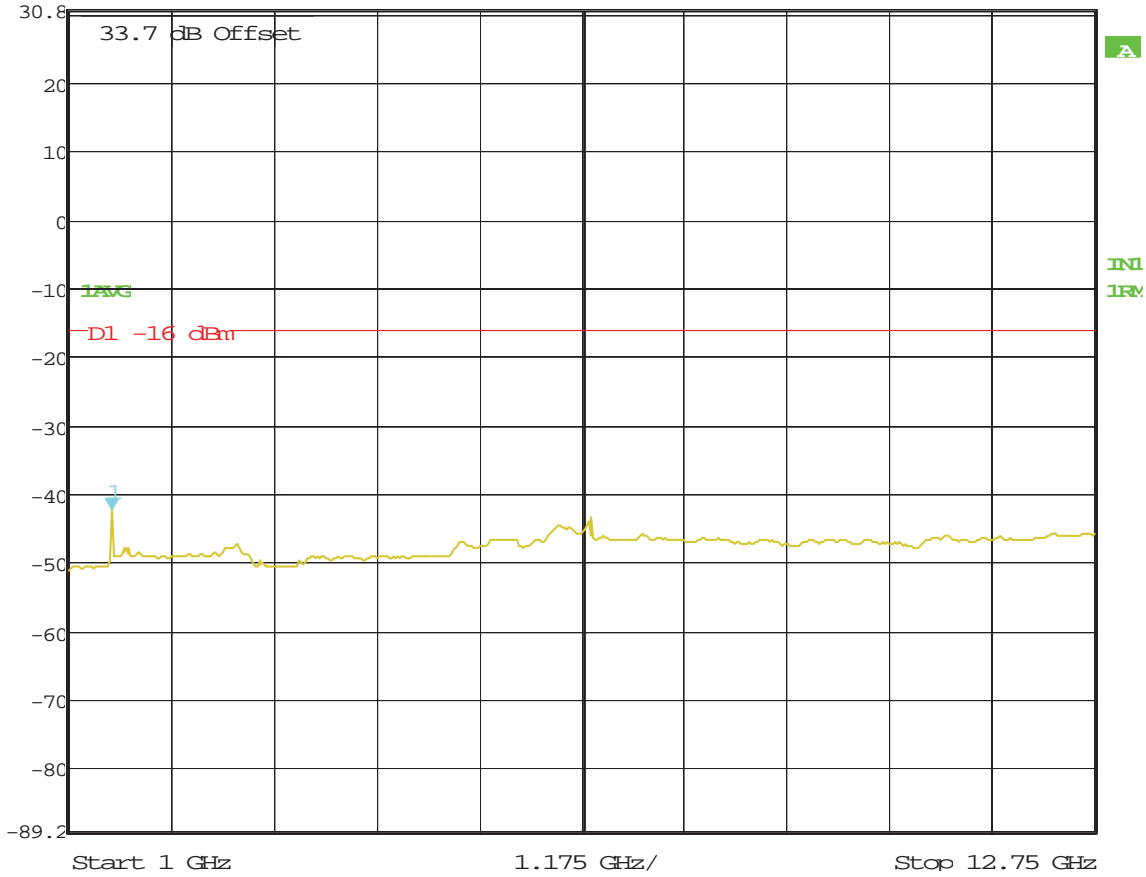
RBW 1 MHz RF Att 10 dB

Ref Lvl -42.37 dBm

VBW 3 MHz

30.8 dBm 1.49448898 GHz

SWT 120 ms Unit dBm



Title: SPURIOUS EMISSIONS AT TX ANIENNA PORT; Test Engineer: SEG
Comment A: 9768 MRO V1.0 B13 700U Cubedock (FLIR M1); 753.5MHz; QPSK
PWR: 1W; 2X2 MIMO; FCC PART 27.53(C); FCCID: AS5BBTRX-07
Date: 18.SEP.2012 07:33:45



Marker 1 [T1]

RBW 10 kHz RF Att 20 dB

Ref Lvl -69.20 dBm

VBW 30 kHz

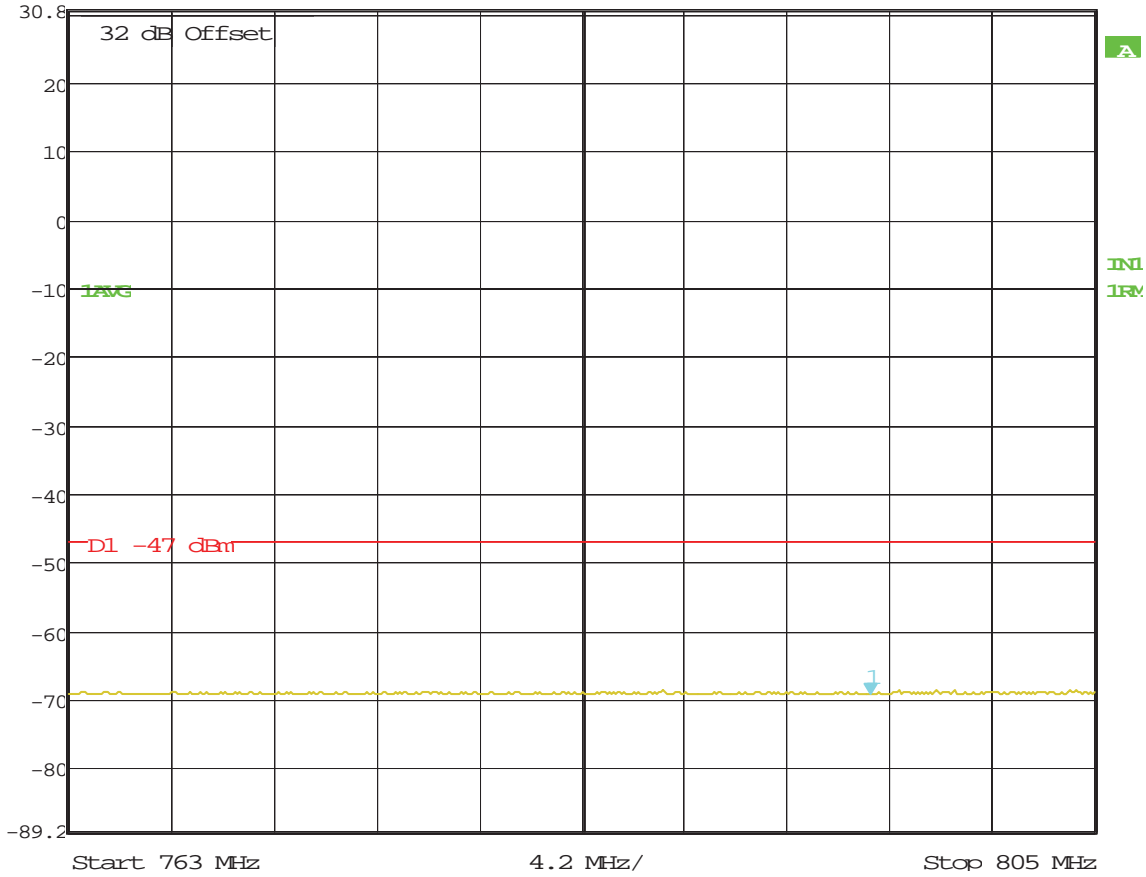
30.8 dBm

795.82565130 MHz

SWT 1.05 s

Unit

dBm



Title: SPURIOUS EMISSIONS AT TX ANTIENNA PORT; Test Engineer: SEG
Comment A: 9768 MRO V1.0 B13 700U Cubedock (FLIR M1); 753.5MHz; QPSK
PWR: 1W; 2X2 MIMO; FCC PART 27.53(C); FCCID: AS5BBTRX-07
Date: 18.SEP.2012 07:32:08

**Transmit Port
Antenna Conducted Spurious Emissions**

**Block: C (Upper)
16QAM Modulation
Bandwidth 751 – 756 MHz**



Marker 1 [T1]

RBW 10 kHz RF Att 30 dB

Ref Lvl -49.36 dBm

VBW 30 kHz

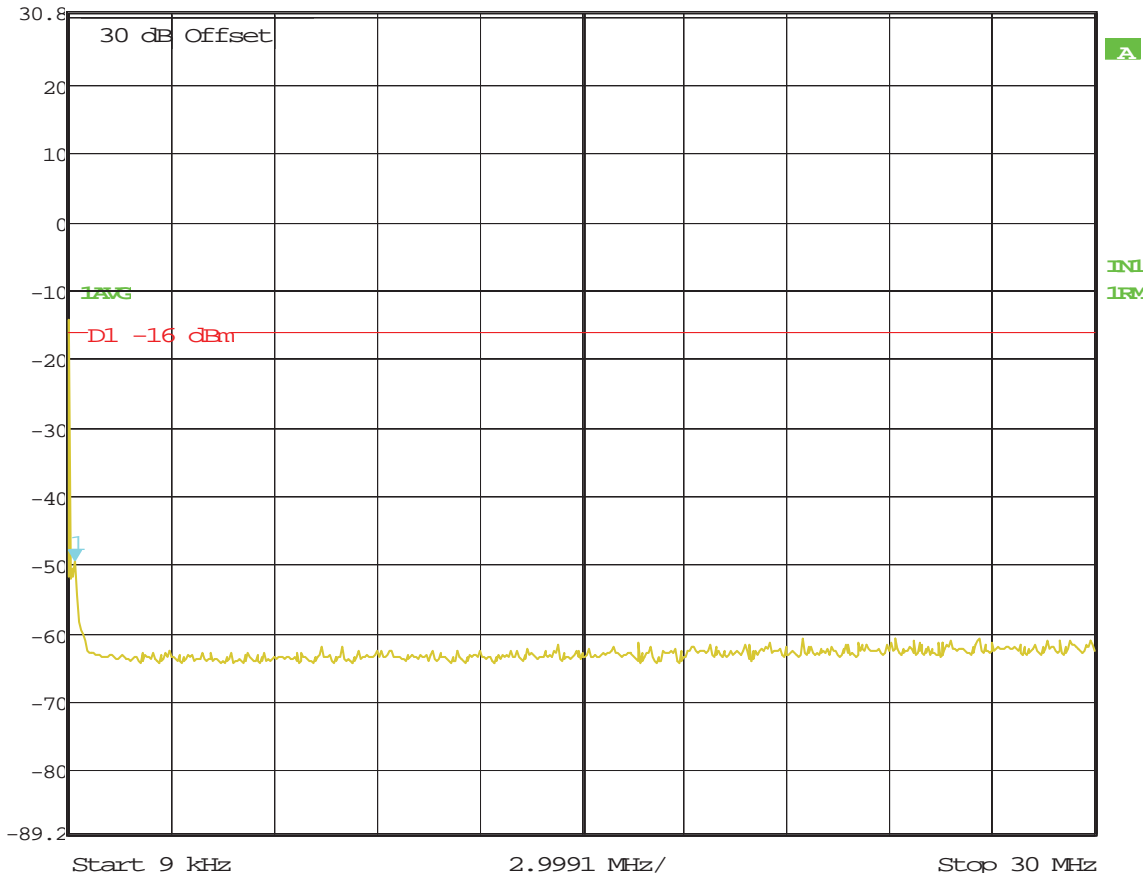
30.8 dBm

189.30661323 kHz

SWT 760 ms

Unit

dBm



Title: SPURIOUS EMISSIONS AT TX ANTIENNA PORT; Test Engineer: SEG
Comment A: 9768 MRO V1.0 B13 700U Cubedock (FLIR M1); 753.5MHz; 16QAM
PWR: 1W; 2X2 MIMO; FCC PART 27.53(C); FCCID: AS5BBTRX-07
Date: 18.SEP.2012 08:53:02



Marker 1 [T1]

RBW 100 kHz RF Att 20 dB

Ref Lvl 14.03 dBm

VBW 300 kHz

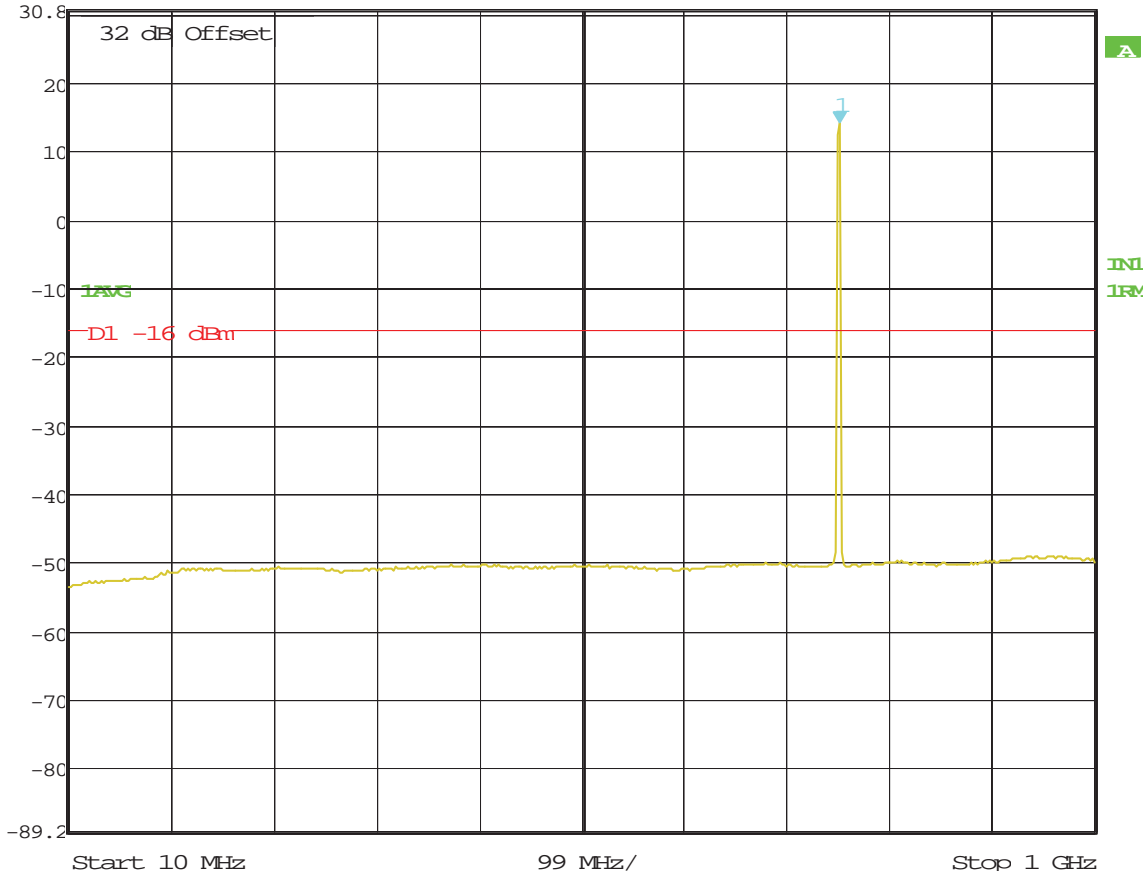
30.8 dBm

753.98797595 MHz

SWT 250 ms

Unit

dBm



Title: SPURIOUS EMISSIONS AT TX ANTIENNA PORT; Test Engineer: SEG
Comment A: 9768 MRO V1.0 B13 700U Cubedock (FLIR M1); 753.5MHz; 16QAM
PWR: 1W; 2X2 MIMO; FCC PART 27.53(C); FCCID: AS5BBTRX-07
Date: 18.SEP.2012 08:51:47



Marker 1 [T1]

RBW 1 MHz RF Att 10 dB

Ref Lvl -42.13 dBm

VBW 3 MHz

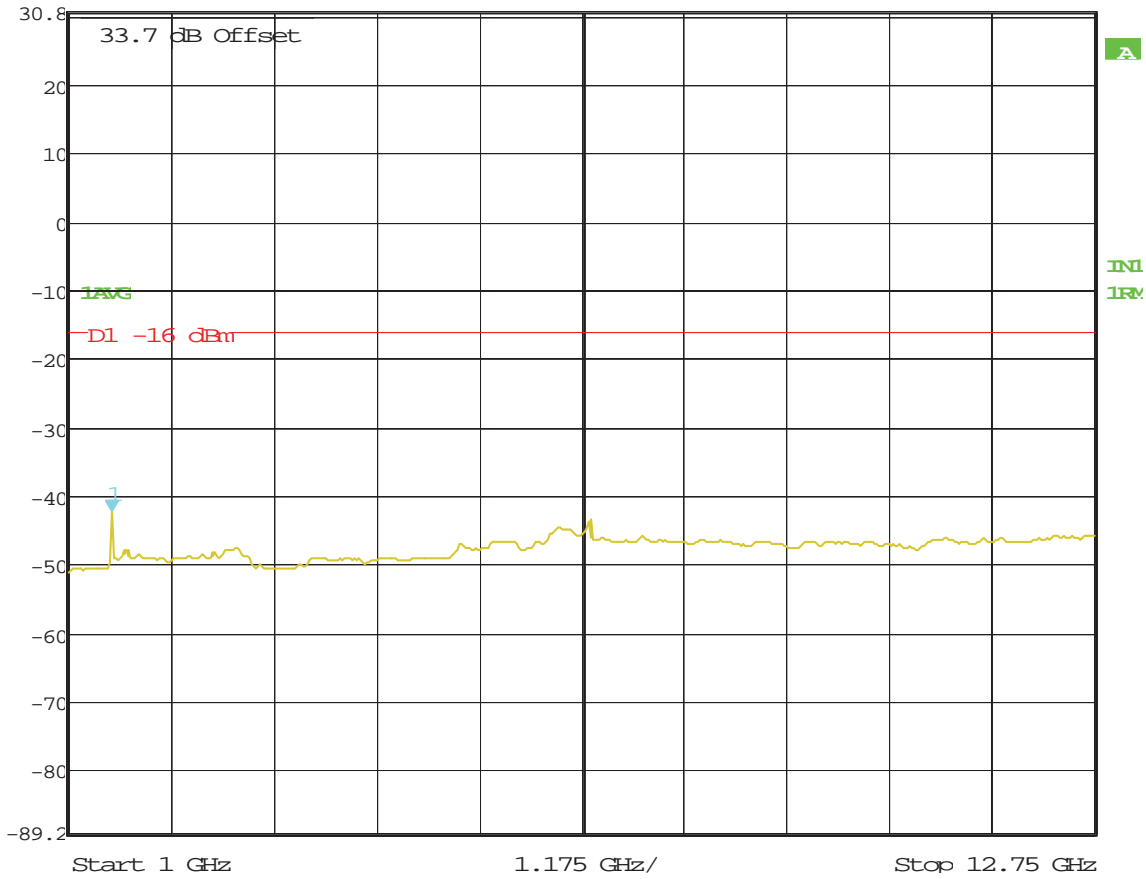
30.8 dBm

1.49448898 GHz

SWT 120 ms

Unit

dBm



Title: SPURIOUS EMISSIONS AT TX ANTIENNA PORT; Test Engineer: SEG
Comment A: 9768 MRO V1.0 B13 700U Cubedock (FLIR M1); 753.5MHz; 16QAM
PWR: 1W; 2X2 MIMO; FCC PART 27.53(C); FCCID: AS5BBTRX-07
Date: 18.SEP.2012 08:49:15



Marker 1 [T1]

RBW 10 kHz RF Att 20 dB

Ref Lvl -68.91 dBm

VBW 30 kHz

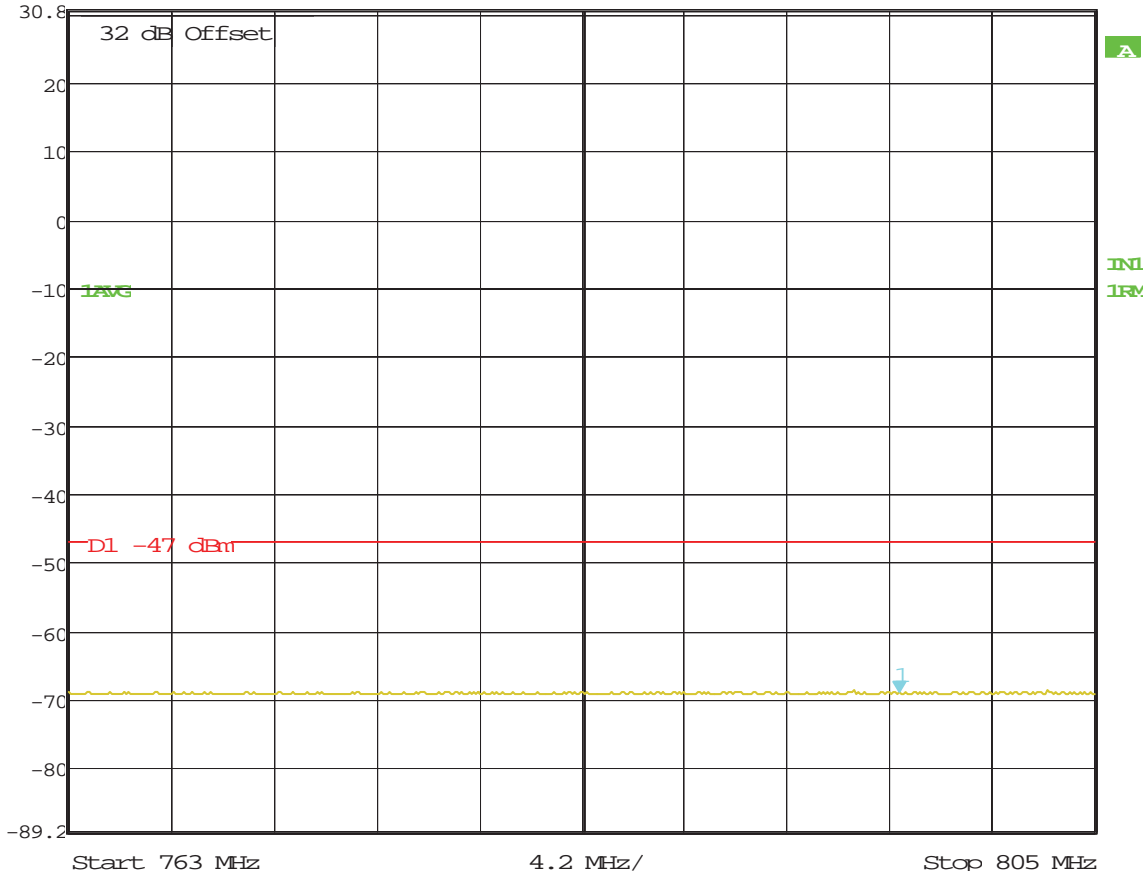
30.8 dBm

797.00400802 MHz

SWT 1.05 s

Unit

dBm



Title: SPURIOUS EMISSIONS AT TX ANTIENNA PORT; Test Engineer: SEG
Comment A: 9768 MRO V1.0 B13 700U Cubedock (FLIR M1); 753.5MHz; 16QAM
PWR: 1W; 2X2 MIMO; FCC PART 27.53(C); FCCID: AS5BBTRX-07
Date: 18.SEP.2012 08:47:44

**Transmit Port
Antenna Conducted Spurious Emissions**

**Block: C (Upper)
64QAM Modulation
Bandwidth 751 – 756 MHz**



Marker 1 [T1]

RBW 10 kHz RF Att 30 dB

Ref Lvl -49.24 dBm

VBW 30 kHz

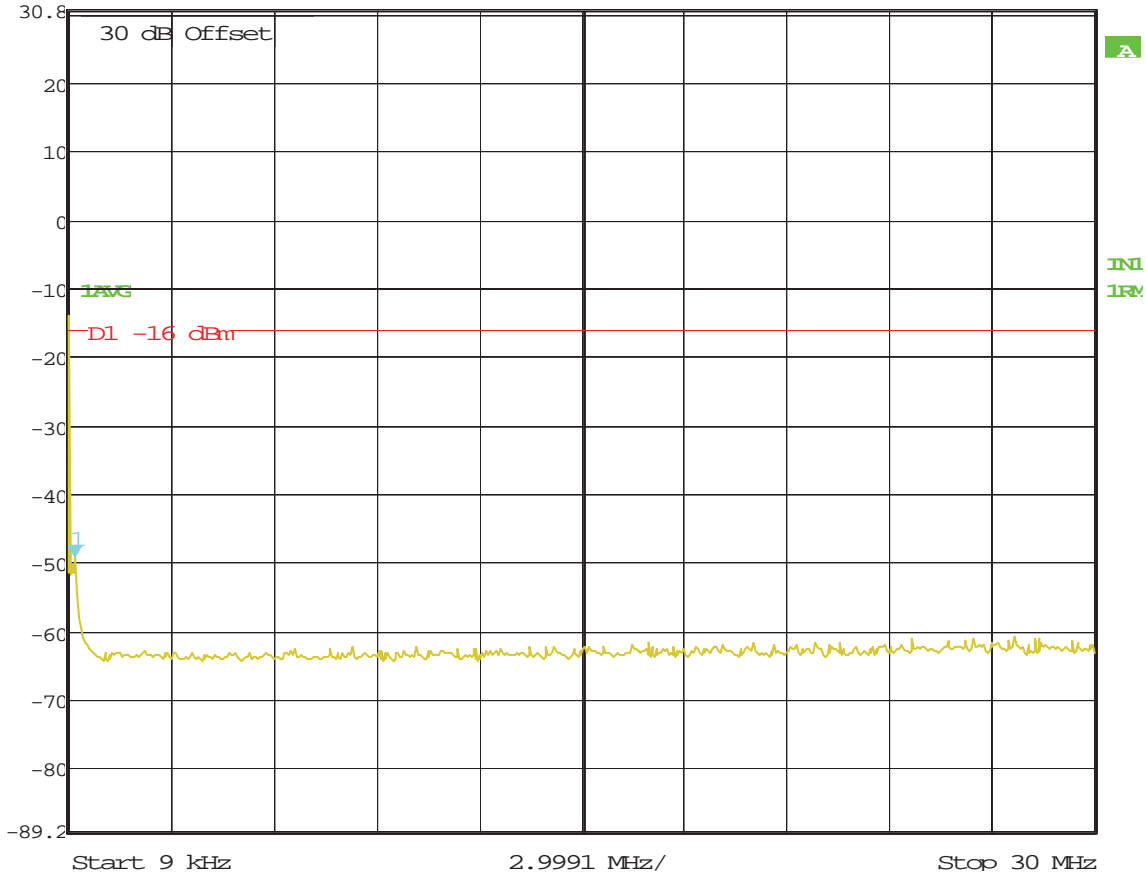
30.8 dBm

189.30661323 kHz

SWT 760 ms

Unit

dBm



Title: SPURIOUS EMISSIONS AT TX ANTIENNA PORT; Test Engineer: SEG
Comment A: 9768 MRO V1.0 B13 700U Cubedock (FLIR M1); 753.5MHz; 64QAM
PWR: 1W; 2X2 MIMO; FCC PART 27.53(C); FCCID: AS5BBTRX-07
Date: 18.SEP.2012 09:04:17



Marker 1 [T1]

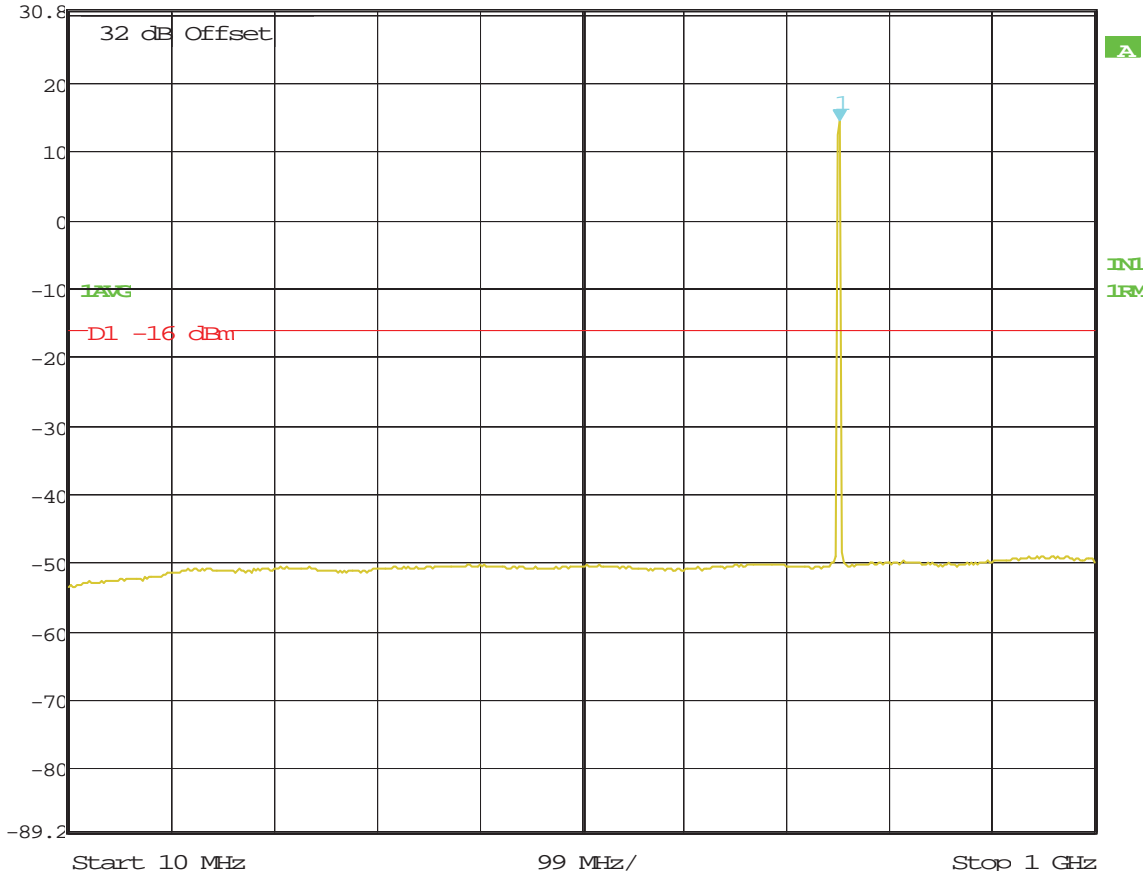
RBW 100 kHz RF Att 20 dB

Ref Lvl 14.49 dBm

VBW 300 kHz

30.8 dBm 753.98797595 MHz

SWT 250 ms Unit dBm



Title: SPURIOUS EMISSIONS AT TX ANTIENNA PORT; Test Engineer: SEG
Comment A: 9768 MRO V1.0 B13 700U Cubedock (FLIR M1); 753.5MHz; 64QAM
PWR: 1W; 2X2 MIMO; FCC PART 27.53(C); FCCID: AS5BBTRX-07
Date: 18.SEP.2012 09:05:56



Marker 1 [T1]

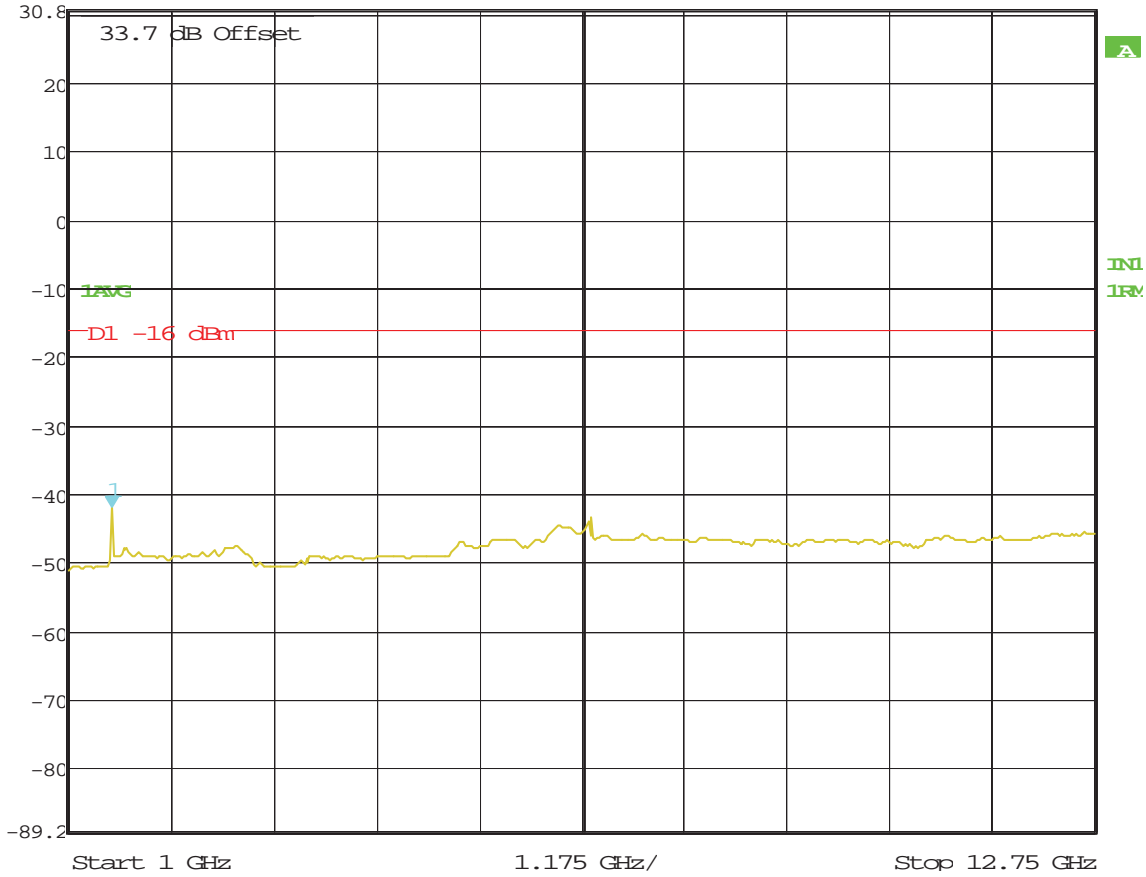
RBW 1 MHz RF Att 10 dB

Ref Lvl -41.87 dBm

VBW 3 MHz

30.8 dBm 1.49448898 GHz

SWT 120 ms Unit dBm



Title: SPURIOUS EMISSIONS AT TX ANIENNA PORT; Test Engineer: SEG
Comment A: 9768 MRO V1.0 B13 700U Cubedock (FLIR M1); 753.5MHz; 64QAM
PWR: 1W; 2X2 MIMO; FCC PART 27.53(C); FCCID: AS5BBTRX-07
Date: 18.SEP.2012 09:07:23



Marker 1 [T1]

RBW 10 kHz RF Att 20 dB

Ref Lvl -68.48 dBm

VBW 30 kHz

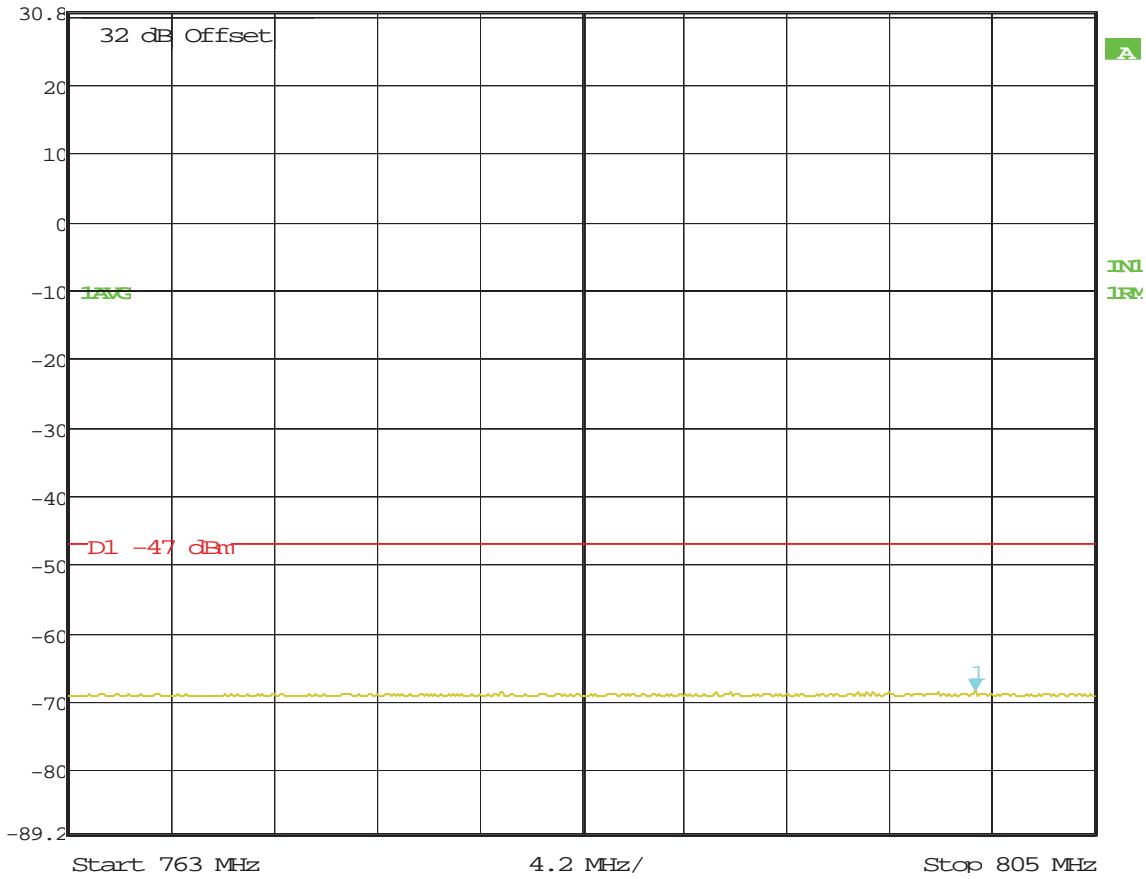
30.8 dBm

800.11823647 MHz

SWT 1.05 s

Unit

dBm



Title: SPURIOUS EMISSIONS AT TX ANTIENNA PORT; Test Engineer: SEG
Comment A: 9768 MRO V1.0 B13 700U Cubedock (FLIR M1); 753.5MHz; 64QAM
PWR: 1W; 2X2 MIMO; FCC PART 27.53(C); FCCID: AS5BBTRX-07
Date: 18.SEP.2012 09:09:26

**Transmit Port
Antenna Conducted Spurious Emissions**

**Block: C
QPSK Modulation
Bandwidth 746 – 756 MHz**



Marker 1 [T1]

RBW 10 kHz RF Att 30 dB

Ref Lvl -48.65 dBm

VBW 30 kHz

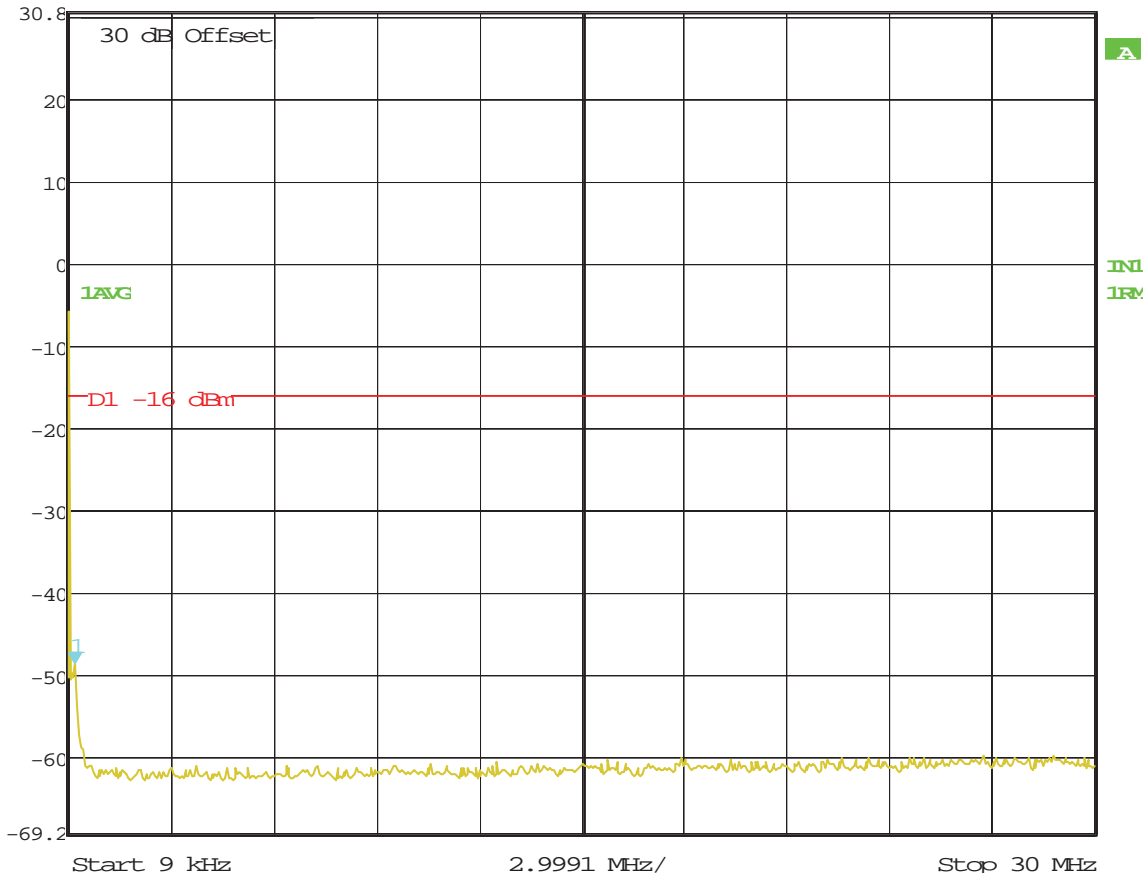
30.8 dBm

189.30661323 kHz

SWT 760 ms

Unit

dBm



Title: SPURIOUS EMISSIONS AT TX ANTIENNA PORT; Test Engineer: SEG
Comment A: 9768 MRO V1.0 B13 700U Cubedock (FLIR M1); 751 MHz, QPSK
PWR: 1W; 2X2 MIMO, FCC PART 27.5(3); FCCID: AS5BBTRX-07;
Date: 11.SEP.2012 15:15:54



Marker 1 [T1]

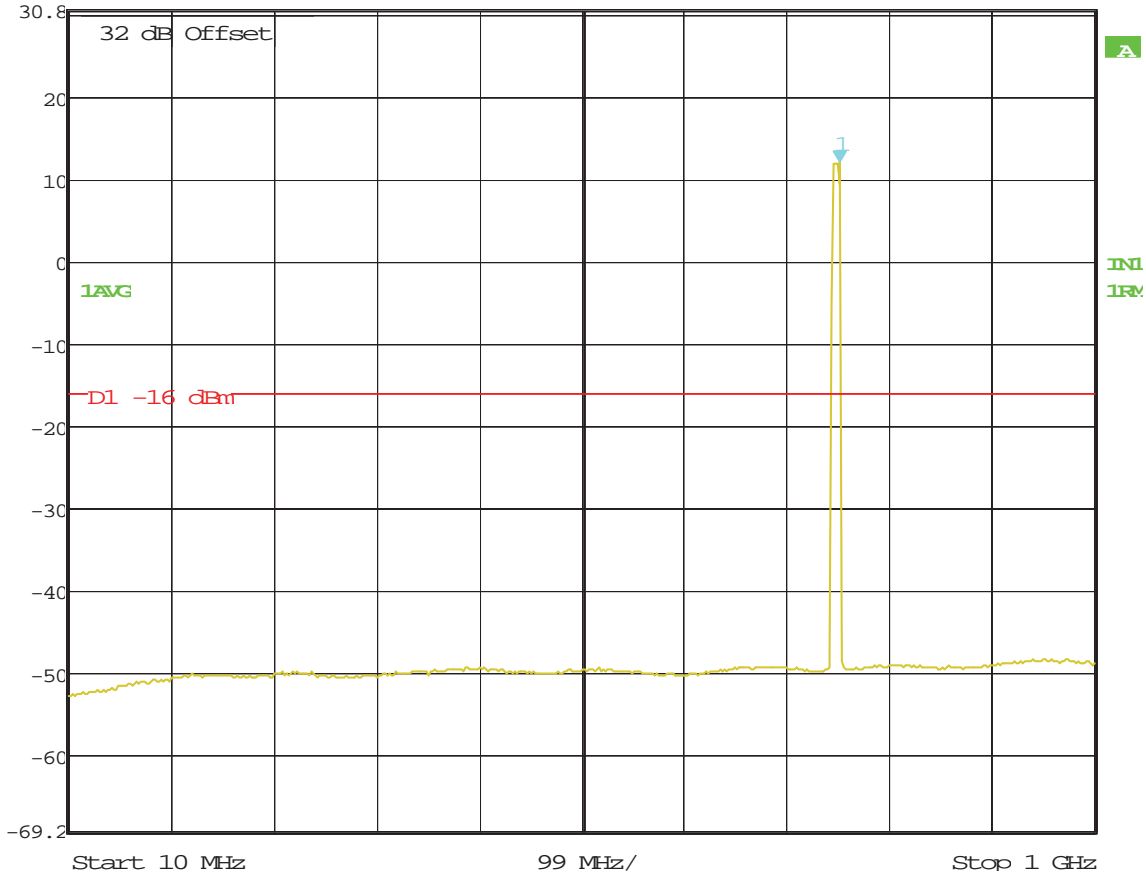
RBW 100 kHz RF Att 20 dB

Ref Lvl 12.16 dBm

VBW 300 kHz

30.8 dBm 753.98797595 MHz

SWT 250 ms Unit dBm



Title: SPURIOUS EMISSIONS AT TX ANTIENNA PORT; Test Engineer: SEG
Comment A: 9768 MRO V1.0 B13 700U Cubedock (FLIR M1); 751 MHz, QPSK
PWR: 1W; 2X2 MIMO, FCC PART 27.5(3); FCCID: AS5BBTRX-07;
Date: 11.SEP.2012 15:02:03



Marker 1 [T1]

RBW 1 MHz RF Att 10 dB

Ref Lvl -41.44 dBm

VBW 3 MHz

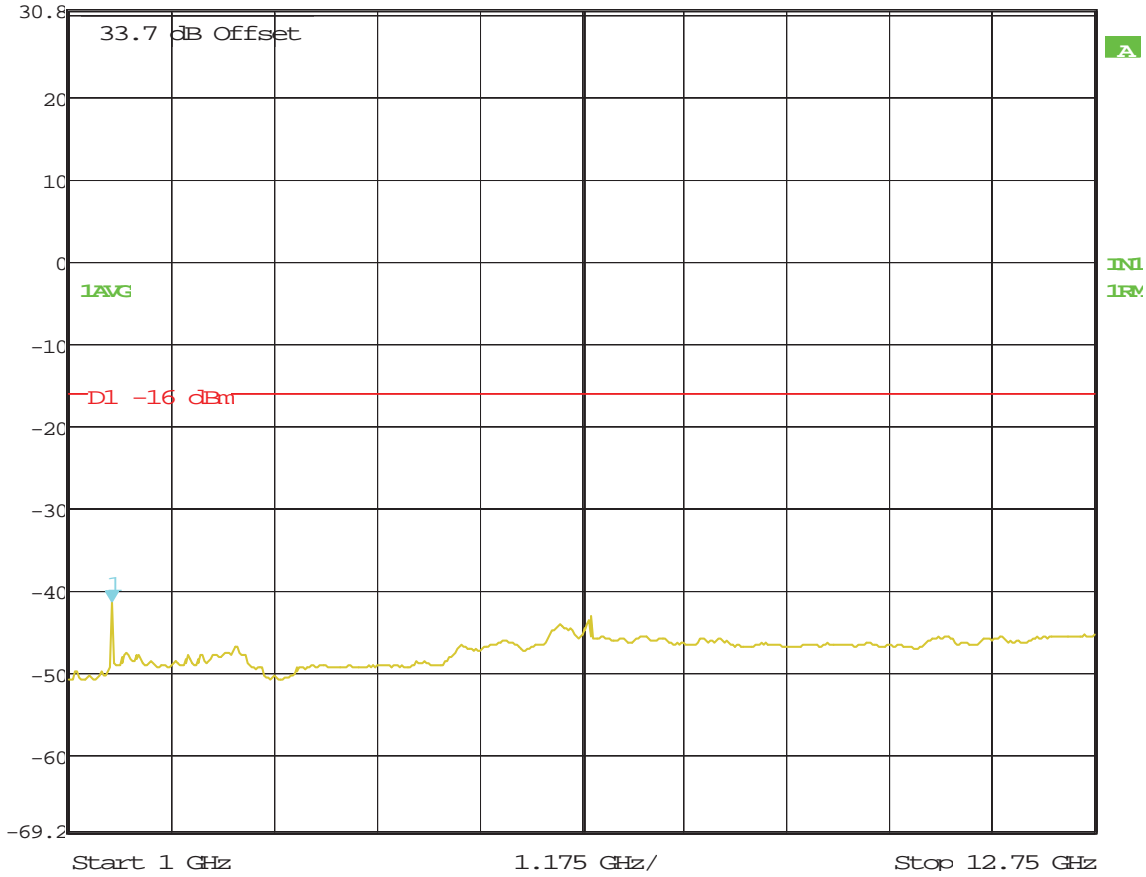
30.8 dBm

1.49448898 GHz

SWT 120 ms

Unit

dBm



Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; Test Engineer: SEG
Comment A: 9768 MRO V1.0 B13 700U Cubedock (FLIR M1); 751 MHz, QPSK
PWR: 1W; 2X2 MIMO, FCC PART 27.5(3); FCCID: AS5BBTRX-07;
Date: 11.SEP.2012 14:59:09



Marker 1 [T1]

RBW 10 kHz RF Att 20 dB

Ref Lvl -68.96 dBm

VBW 30 kHz

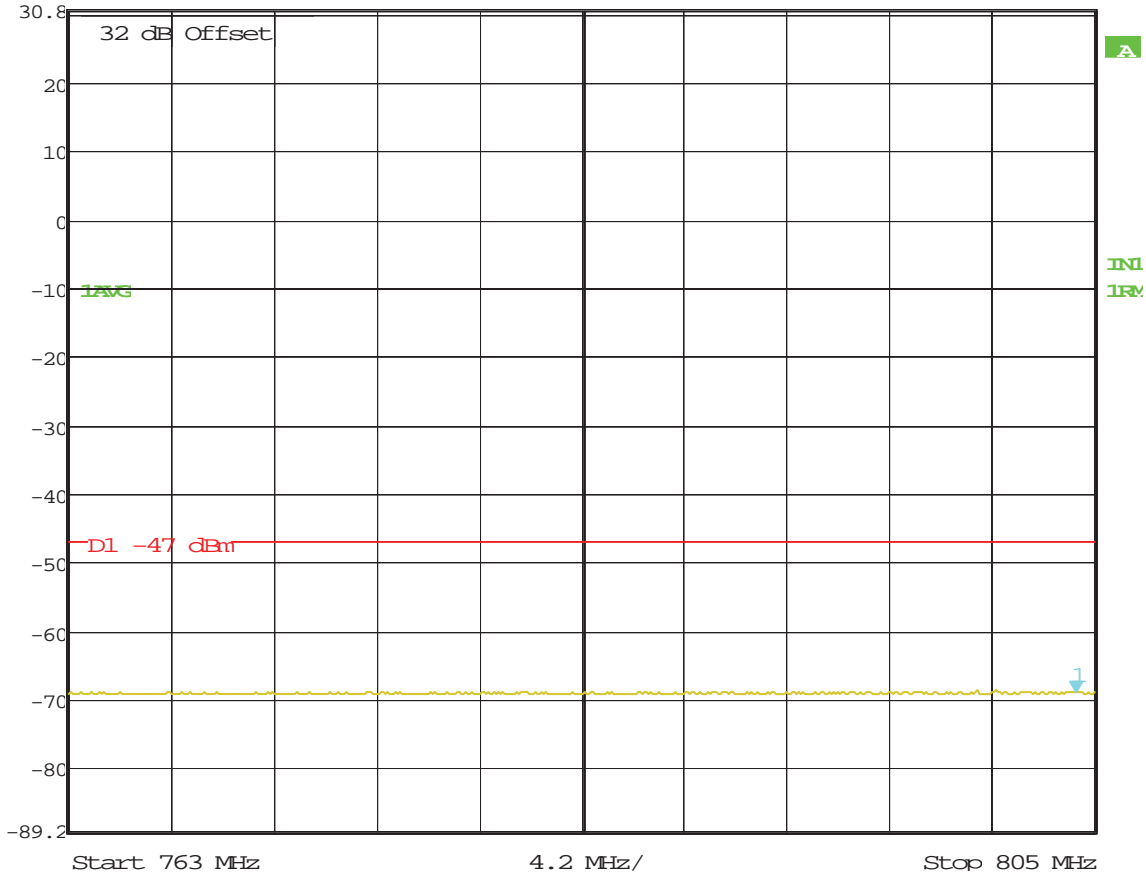
30.8 dBm

804.24248497 MHz

SWT 1.05 s

Unit

dBm

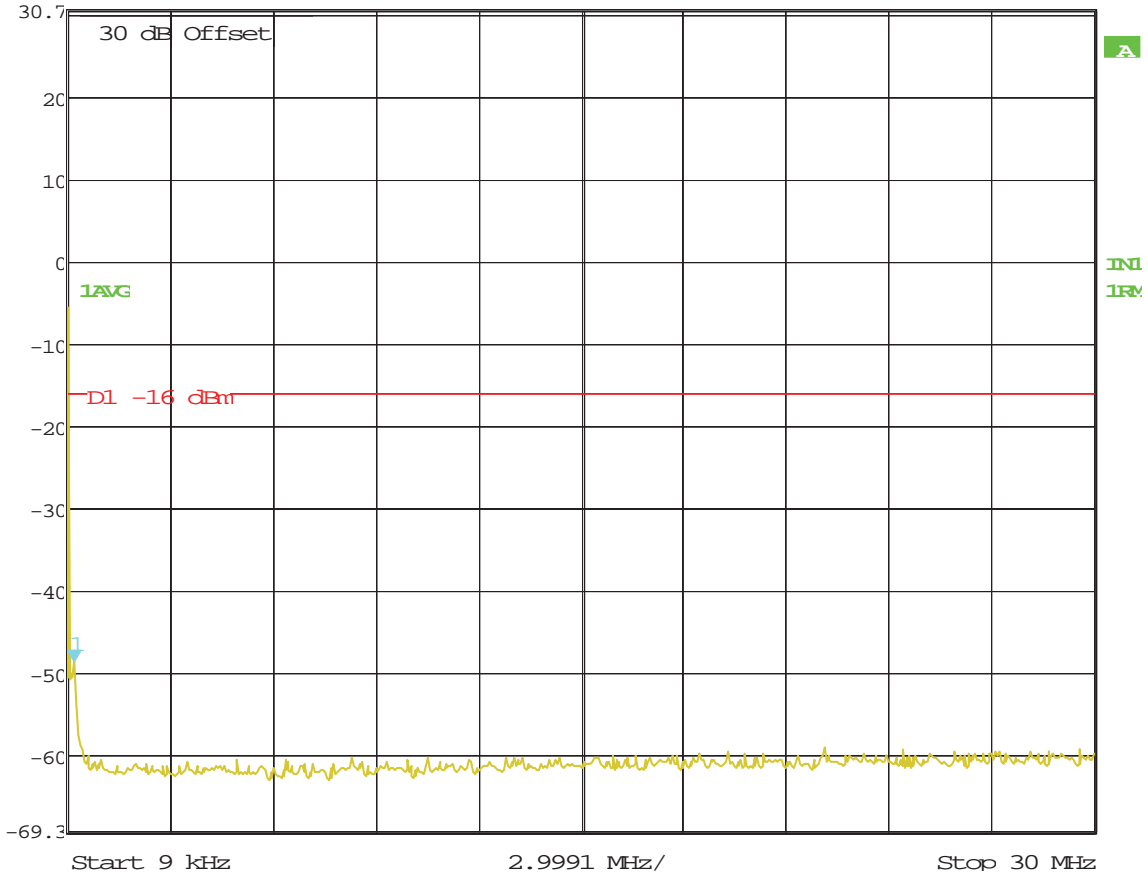


Title: SPURIOUS EMISSIONS AT TX ANTIENNA PORT; Test Engineer: SEG
Comment A: 9768 MRO V1.0 B13 700U Cubedock(FLIR M1); 751 MHz, QPSK
PWR: 1W; 2X2 MIMO, FCC PART 27.53(C); FCCID: AS5BBTRX-07
Date: 20.SEP.2012 09:06:57

**Transmit Port
Antenna Conducted Spurious Emissions**

**Block: C
16QAM Modulation
Bandwidth 746 – 756 MHz**

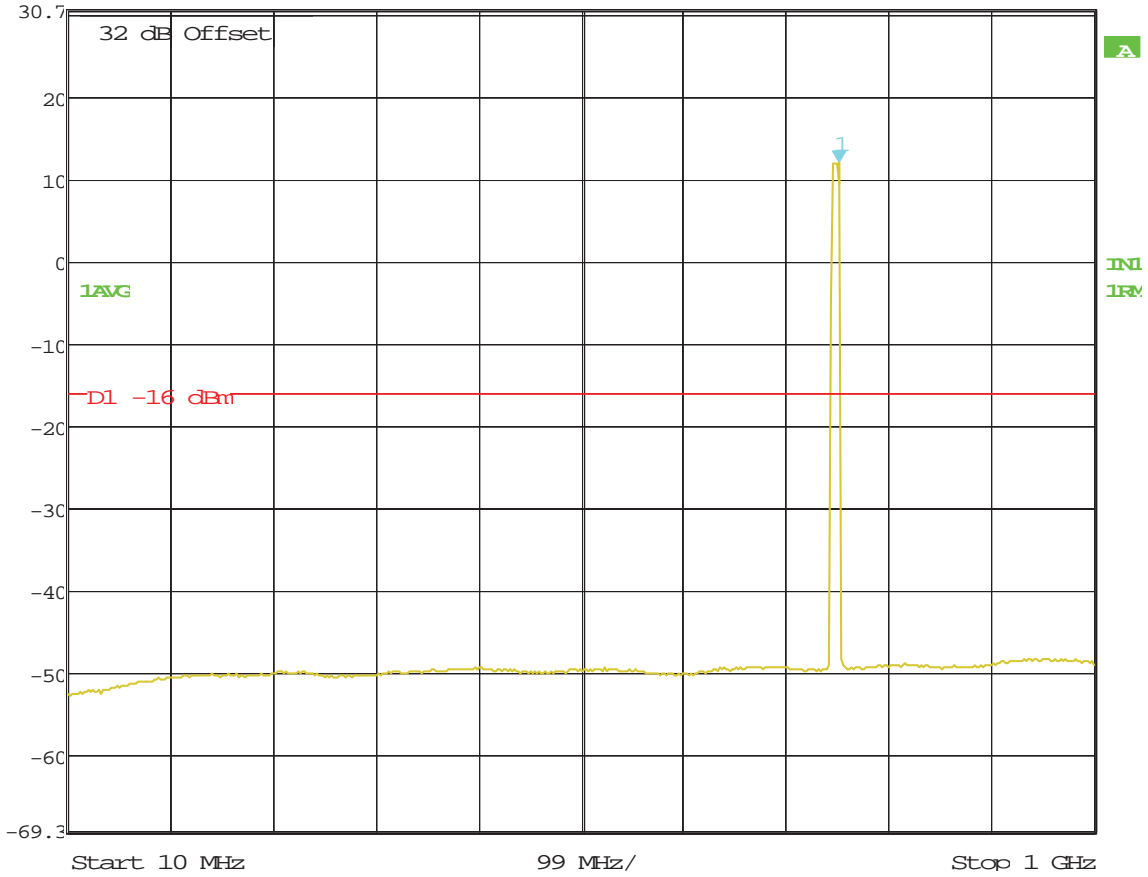
 Marker 1 [T1] RBW 10 kHz RF Att 30 dB
Ref Lvl -48.61 dBm VBW 30 kHz
30.7 dBm 189.30661323 kHz SWI 760 ms Unit dBm



Title: SPURIOUS EMISSIONS AT TX ANIENNA PORT; Test Engineer: SEG
Comment A: 9768 MRO V1.0 B13 700U Cubedock (FLIR M1); 751 MHz, 16QAM
PWR: 1W; 2X2 MIMO, FCC PART 27.5(3); FCCID: AS5BBTRX-07;
Date: 12.SEP.2012 09:17:28



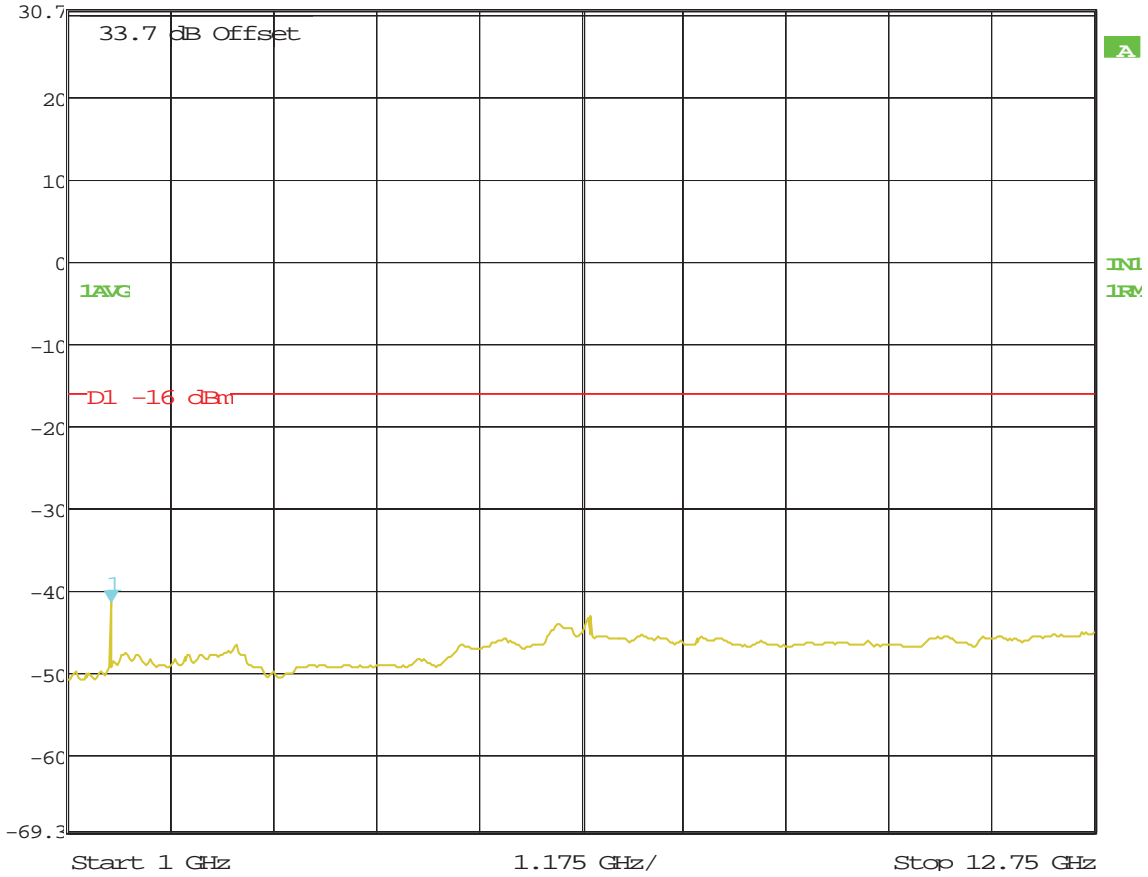
Marker 1 [T1] RBW 100 kHz RF Att 20 dB
Ref Lvl 12.16 dBm VBW 300 kHz
30.7 dBm 753.98797595 MHz SWT 250 ms Unit dBm



Title: SPURIOUS EMISSIONS AT TX ANIENNA PORT; Test Engineer: SEG
Comment A: 9768 MRO V1.0 B13 700U Cubedock (FLIR M1); 751 MHz, 16QAM
PWR: 1W; 2X2 MIMO, FCC PART 27.5(3); FCCID: AS5BBTRX-07;
Date: 12.SEP.2012 09:19:29



Marker 1 [T1] RBW 1 MHz RF Att 10 dB
Ref Lvl -41.52 dBm VBW 3 MHz
30.7 dBm 1.49448898 GHz SWT 120 ms Unit dBm



Title: SPURIOUS EMISSIONS AT TX ANTIENNA PORT; Test Engineer: SEG
Comment A: 9768 MRO V1.0 B13 700U Cubedock (FLIR M1); 751 MHz, 16QAM
PWR: 1W; 2X2 MIMO, FCC PART 27.5(3); FCCID: AS5BBTRX-07;
Date: 12.SEP.2012 10:09:41



Marker 1 [T1]

RBW 10 kHz RF Att 20 dB

Ref Lvl -68.66 dBm

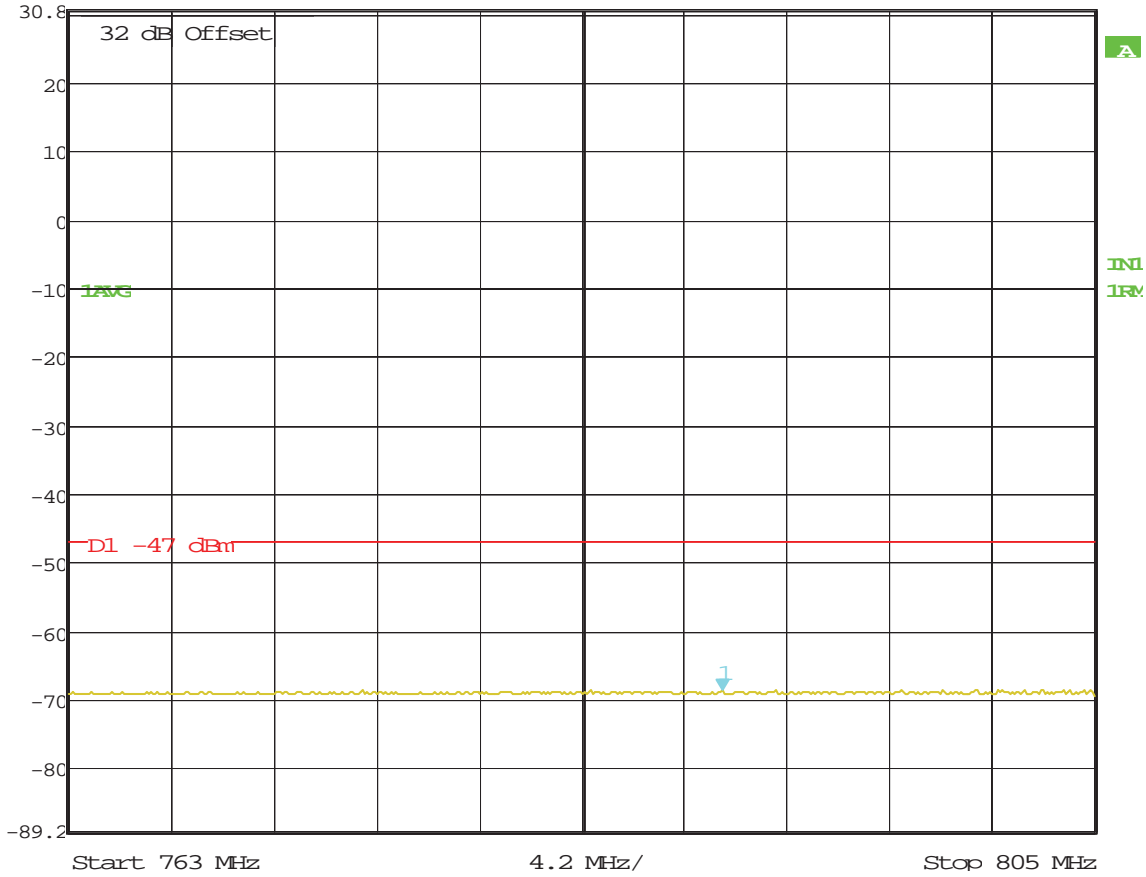
VBW 30 kHz

30.8 dBm

789.76553106 MHz

SWT 1.05 s

Unit dBm



Title: SPURIOUS EMISSIONS AT TX ANTIENNA PORT; Test Engineer: SEG
Comment A: 9768 MRO V1.0 B13 700U Cubedock(FLIR M1); 751 MHz, 16QAM
PWR: 1W; 2X2 MIMO, FCC PART 27.53(C); FCCID: AS5BBTRX-07
Date: 20.SEP.2012 09:11:11

**Transmit Port
Antenna Conducted Spurious Emissions**

**Block: C
64QAM Modulation
Bandwidth 746 – 756 MHz**



Marker 1 [T1]

RBW 10 kHz RF Att 30 dB

Ref Lvl -48.55 dBm

VBW 30 kHz

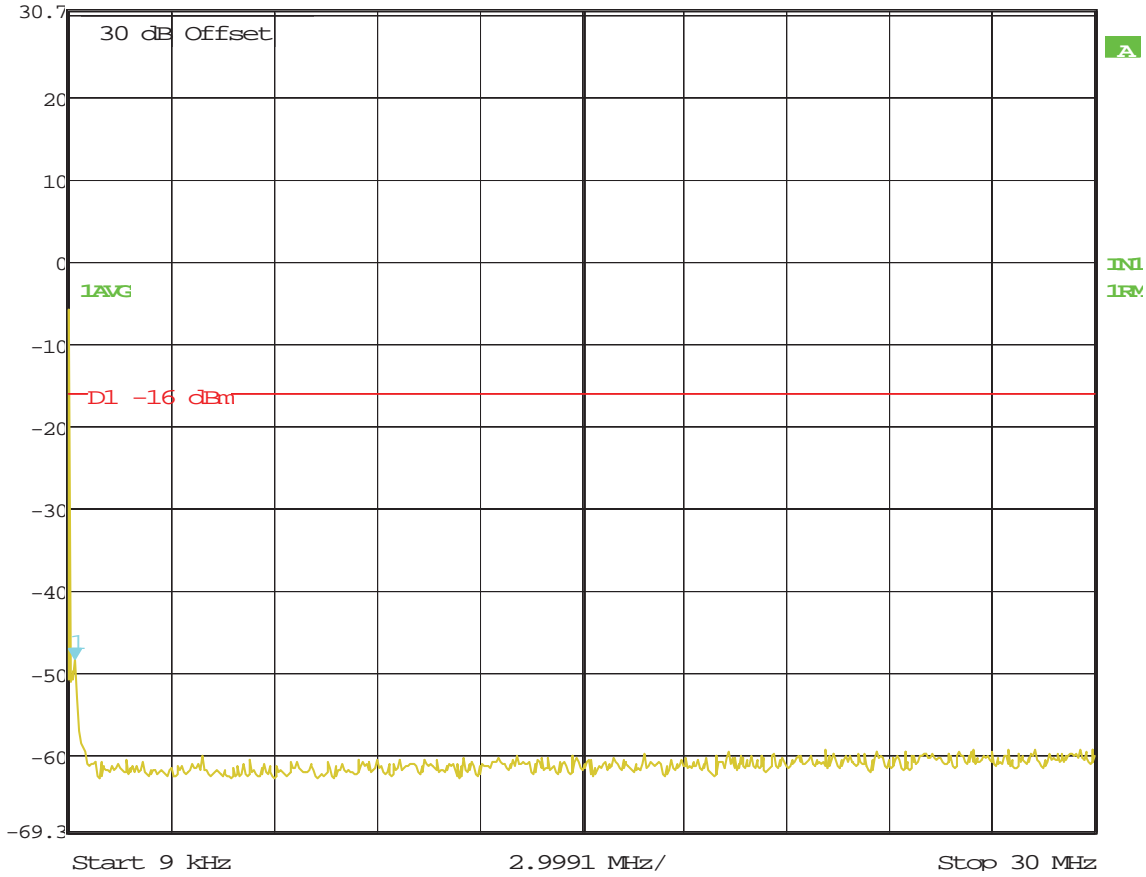
30.7 dBm

189.30661323 kHz

SWT 760 ms

Unit

dBm



Title: SPURIOUS EMISSIONS AT TX ANTIENNA PORT; Test Engineer: SEG
Comment A: 9768 MRO V1.0 B13 700U Cubedock (FLIR M1); 751 MHz, 64QAM
PWR: 1W; 2X2 MIMO, FCC PART 27.5(3); FCCID: AS5BBTRX-07;
Date: 12.SEP.2012 10:03:26



Marker 1 [T1]

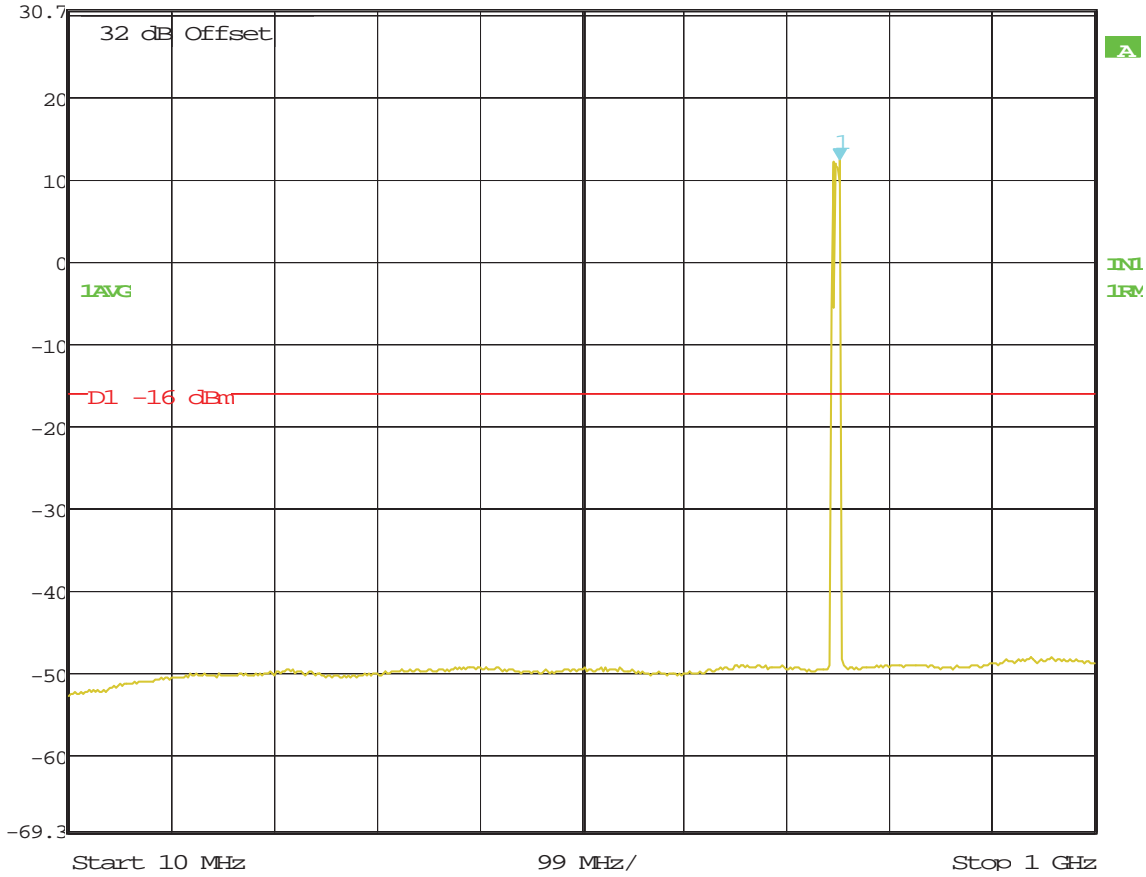
RBW 100 kHz RF Att 20 dB

Ref Lvl 12.20 dBm

VBW 300 kHz

30.7 dBm 753.98797595 MHz

SWT 250 ms Unit dBm



Title: SPURIOUS EMISSIONS AT TX ANTIENNA PORT; Test Engineer: SEG
Comment A: 9768 MRO V1.0 B13 700U Cubedock (FLIR M1); 751 MHz, 64QAM
PWR: 1W; 2X2 MIMO, FCC PART 27.5(3); FCCID: AS5BBTRX-07;
Date: 12.SEP.2012 09:56:03



Marker 1 [T1]

RBW 1 MHz RF Att 10 dB

Ref Lvl -41.55 dBm

VBW 3 MHz

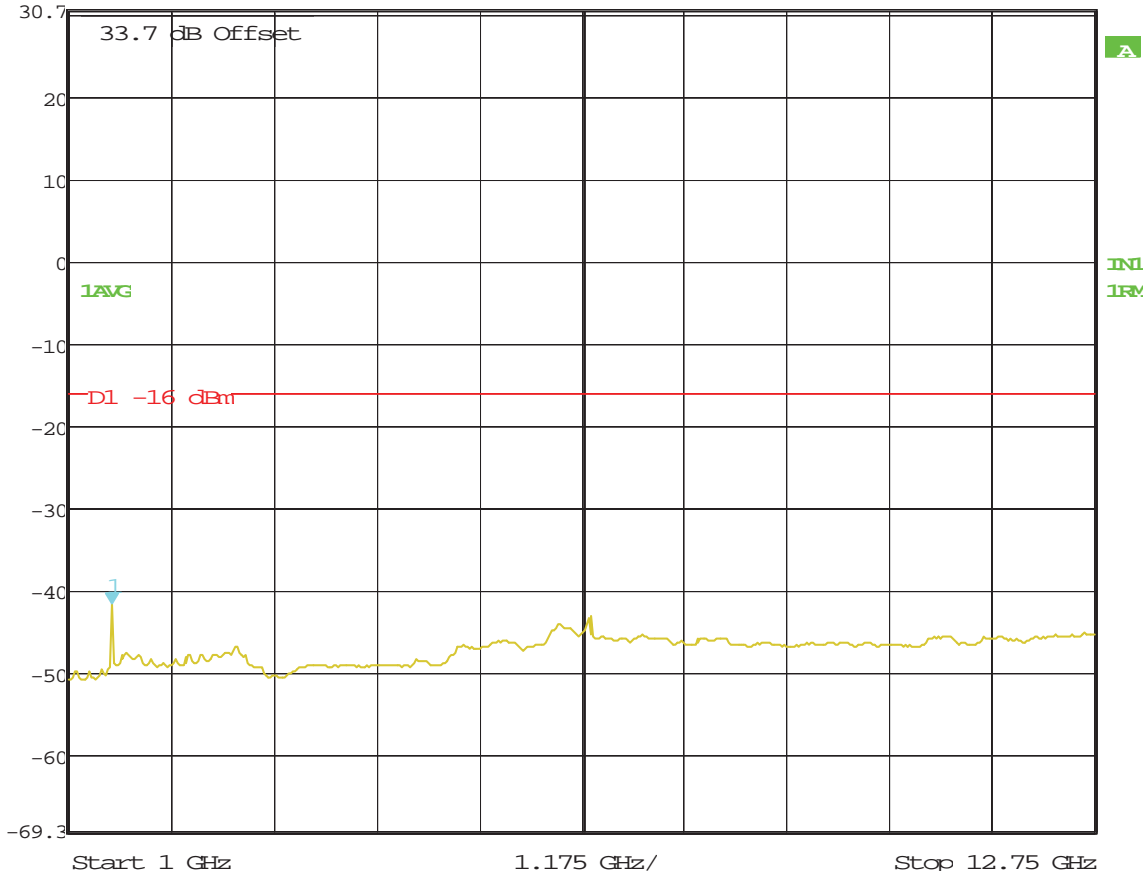
30.7 dBm

1.49448898 GHz

SWT 120 ms

Unit

dBm



Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; Test Engineer: SEG
Comment A: 9768 MRO V1.0 B13 700U Cubedock (FLIR M1); 751 MHz, 64QAM
PWR: 1W; 2X2 MIMO, FCC PART 27.5(3); FCCID: AS5BBTRX-07;
Date: 12.SEP.2012 10:06:01



Marker 1 [T1]

RBW 10 kHz RF Att 20 dB

Ref Lvl -68.47 dBm

VBW 30 kHz

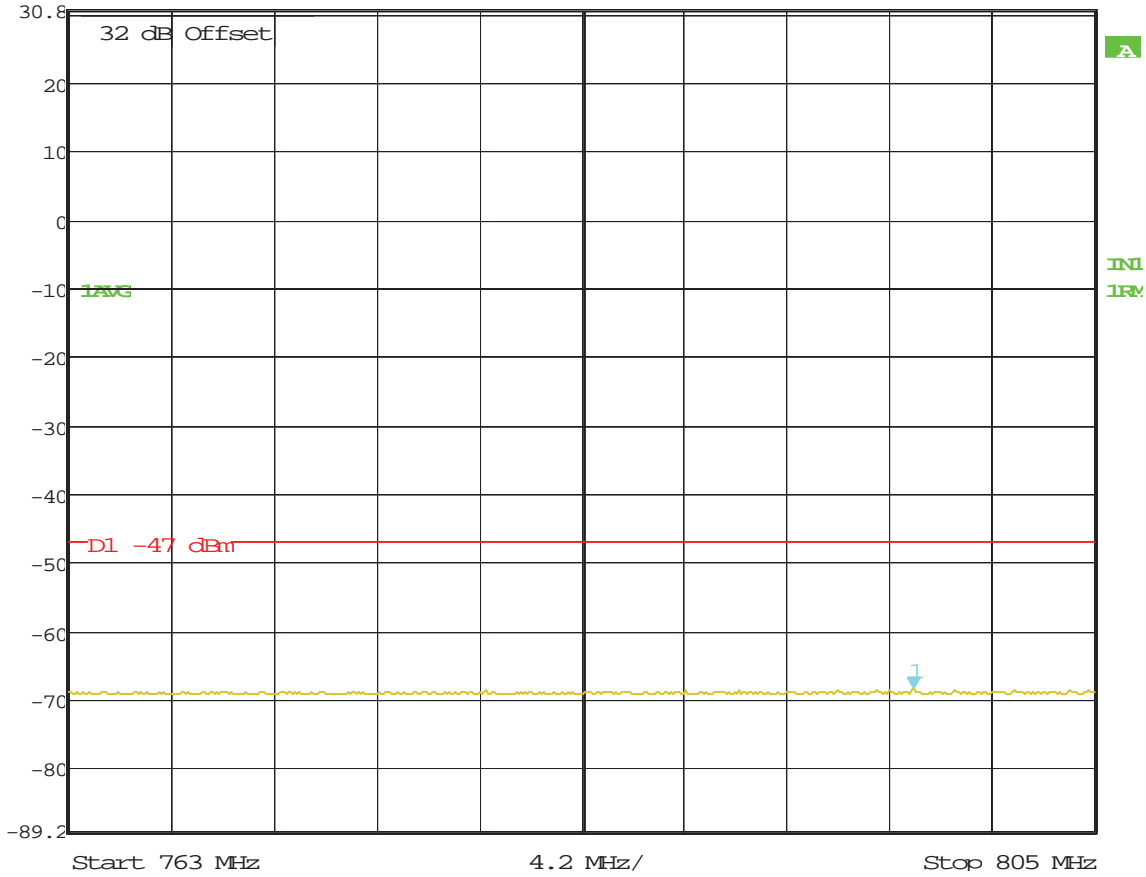
30.8 dBm

797.59318637 MHz

SWT 1.05 s

Unit

dBm



Title: SPURIOUS EMISSIONS AT TX ANTIENNA PORT; Test Engineer: SEG
Comment A: 9768 MRO V1.0 B13 700U Cubedock(FLIR M1); 751 MHz, 64QAM
PWR: 1W; 2X2 MIMO, FCC PART 27.53(C); FCCID: AS5BBTRX-07
Date: 20.SEP.2012 10:09:37

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	3125U06345	RF Power Meter	E782	3/6/2012	12
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

Measurement -5

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

FILTER- M1

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 353147).

The “9768 Metro Radio Outdoor (Filter M1) with FCCID: AS5BBTRX-07” was tested at a RF output of **1W at Antenna Interface Connector (AIC)**. The operation of MRO was simulated using Base Band Unit (BBU)/(D2U placed outside the chamber. The interconnection between MRO and D2U was through optical fiber. The radiated emissions tests were performed serially with MRO operating with 5 MHz and 10 MHz bandwidths in the frequency block C. All tests were performed with the MRO operating in QPSK, 16QAM and 64QAM modulations. During testing, the MRO 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 the level of the un-modulated carrier.

FCC Section 27.53(c): 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. 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 measurements at frequencies 763-775 MHz and 793-805 MHz, emissions limit shall be -37dBm for measurement resolution bandwidth of 100 kHz.

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

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

$$20 \log (E * 10^6) - (46 + 10 \log P) = 79.2 \text{ dB } \mu\text{V/meter}$$

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 dBμV/meter. Reportable measurements are equal to or greater than 38.2 dBμV/meter. Over the spectrum investigated, 10 MHz

to 10th of the carrier (8 GHz), no reportable spurious emissions were detected. This demonstrates that the “9768 Metro Radio Outdoor (Filter M1)” the subject of this application, complies with Sections 2.1053, 27.53 (c) and 2.1057 of the Rules.

APPLICANT: **Alcatel-Lucent**

FCC ID: **AS5BBTRX-07**

TEST INSTRUMENTATION

Manufacturer	Model	Serial #	Description	Manual #	Last Cal Date	Cal Cycle Month
Hewlett Packard	8593E	3911A04003	Spectrum Analyzer 9kHz-22GHz	E374	4/4/2012	12
Sonoma Instrument Co.	310N	186747	Amplifier 9kHz-1GHz	E814	8/18/2012	12
Weinschel	2-6	BX3430	6 dB Attenuator DC-18GHz 5 Watt	E887	1/23/2012	12
A.H.Systems	SAS-521-2	408	Biological Antenna 25-2000MHz	E601	2/7/2012	12
Rohde & Schwarz	ESIB40	100100	EMI Test Receiver (20Hz to 40 GHz) -150 +30dBm	E908	3/28/2012	12
Hewlett Packard	8449B	3008A00426	Preamplifier 1-26.5GHz	E123	7/23/2012	12
ETS Lindgren	3117	00135198	Double-Ridged Waveguide Horn 1-18GHz	E1073	9/9/2012	24

TEST REPORT

FILTER (M2)

FCC Part 27 Data for Second RF Filter

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-07**, 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 1

FCC Section 2.1046 RF Power output

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

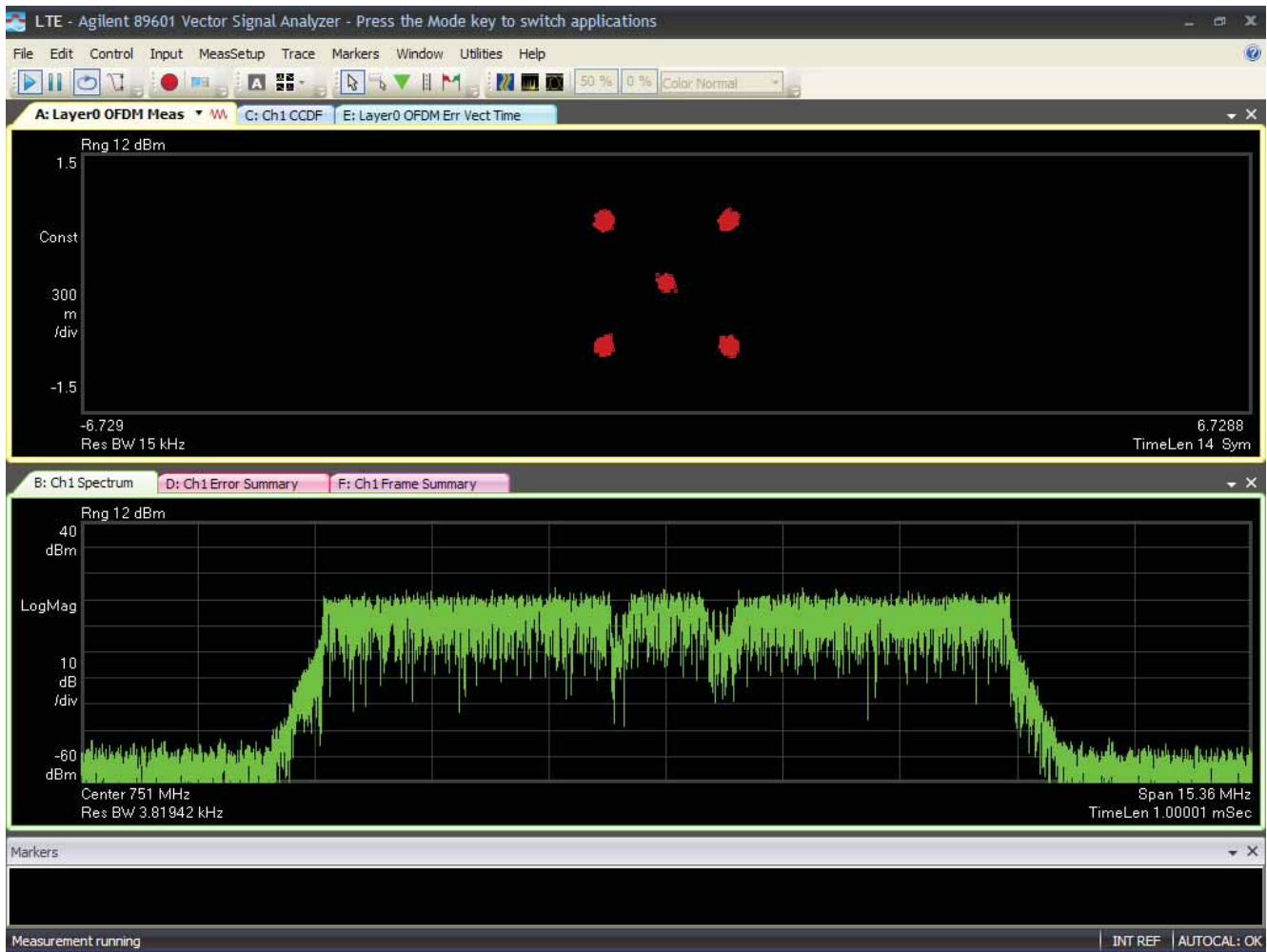
Measurement 2

FCC Section 2.1047 Modulation Characteristics

The modulation techniques used are explained in the submission as part section 2.1033 (c) (13) which is submitted as part of Schematics. 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.

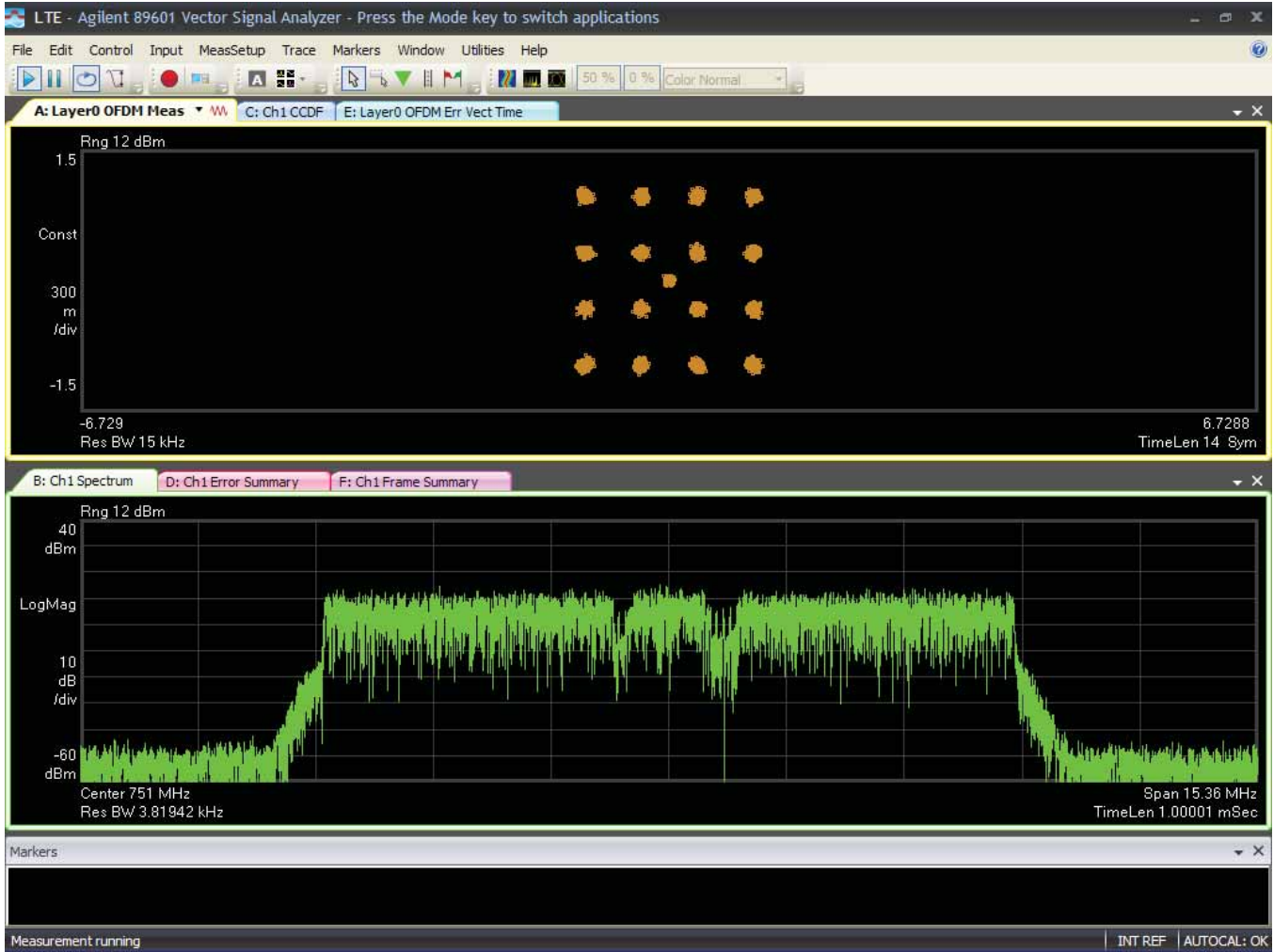
- (4) Quadrature Phase Shift Keying (QPSK) modulation scheme uses 2 bits transmitted simultaneously (one per channel) and a symbol can be represented by 2 bits. Therefore there are $2^2 = 4$ states (Binary 00 to 11). The theoretical bandwidth is 2bits/second/Hz.
- (5) 16 Quadrature Amplitude Modulation (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.
- (6) 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



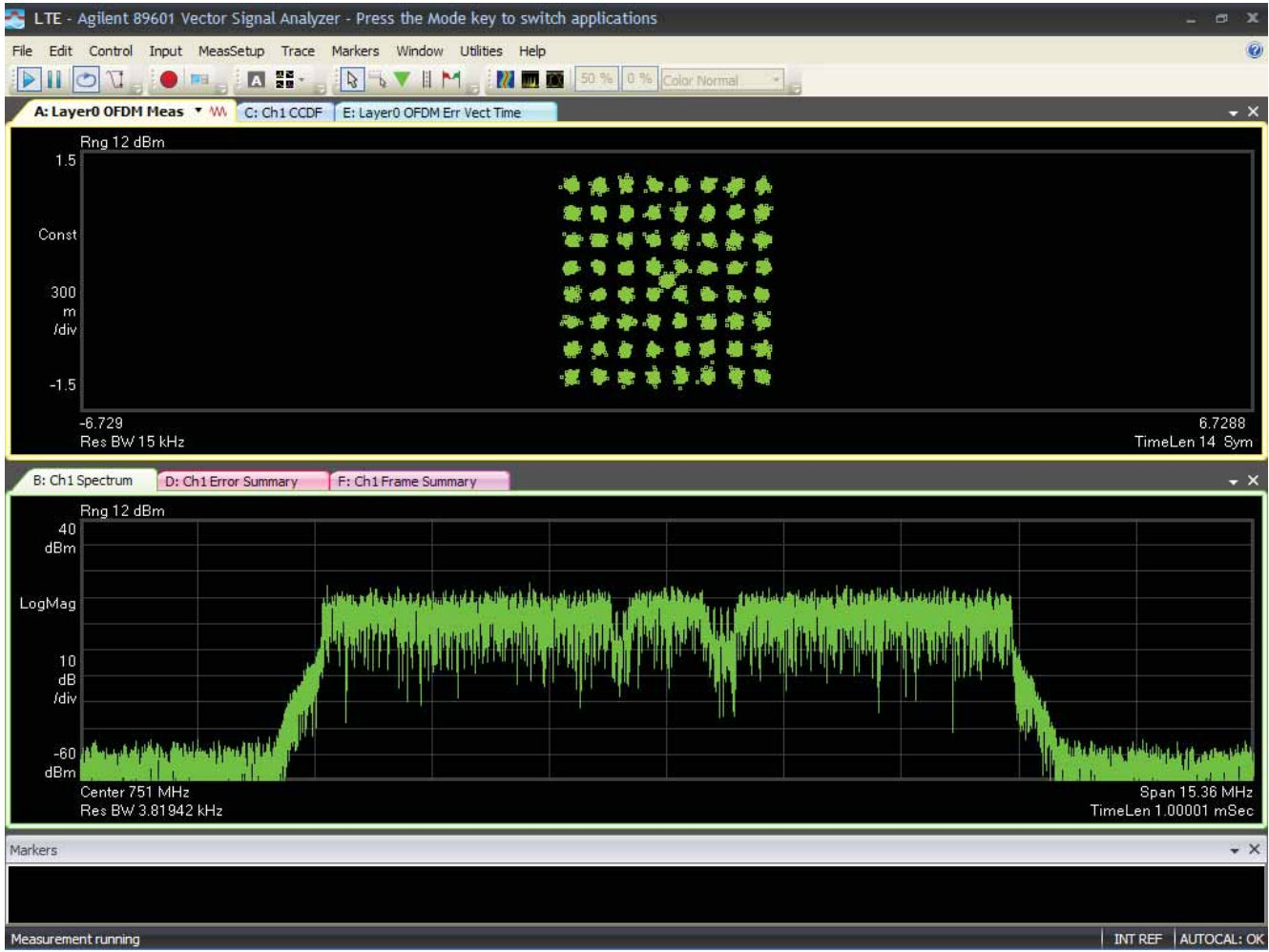
9768 Metro Radio Outdoor (Filter M2)
FCC Part 27.53 Block C; QPSK Modulation; PWR: 1W
FCCID: AS5BBTRX-07
TEST ENGINEER: SEG

16QAM MODULATION



9768 Metro Radio Outdoor (Filter M2)
FCC Part 27.53 Block C; 16QAM Modulation; PWR: 1W
FCCID: AS5BBTRX-07
TEST ENGINEER: SEG

64QAM MODULATION



9768 Metro Radio Outdoor (Filter M2)
FCC Part 27.53 Block C; 64QAM Modulation; PWR: 1W
FCCID: AS5BBTRX-07
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.

- (C) 99% Bandwidth
- (D) 26 dB Band width.

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

- 4. QPSK
- 5. 16 QAM
- 6. 64 QAM

Highest Bandwidth is used for Emissions type designation: 9.40 MHz for 10 MHz Bandwidth, and 4.73 MHz for 5 MHz Bandwidth.

Therefore:

Measured Emission type: **9M40F9W** for 10 MHz Bandwidth.

Measured Emission type: **4M73F9W** 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 **9768 Metro Radio Outdoor (Filter M2)** 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 **9768 Metro Radio Outdoor (Filter M2)** with 5 MHz and 10 MHz bandwidths.

The measurements were made on a “**9768 Metro Radio Outdoor (Filter M2)**” cabinet in the following modulation configurations:

4. QPSK
5. 16 QAM
6. 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 **9768 Metro Radio Outdoor (Filter M2)**.

The Measured 99% power bandwidth is 8.95 MHz for 10 MHz band and 4.47 MHz for 5 MHz band.

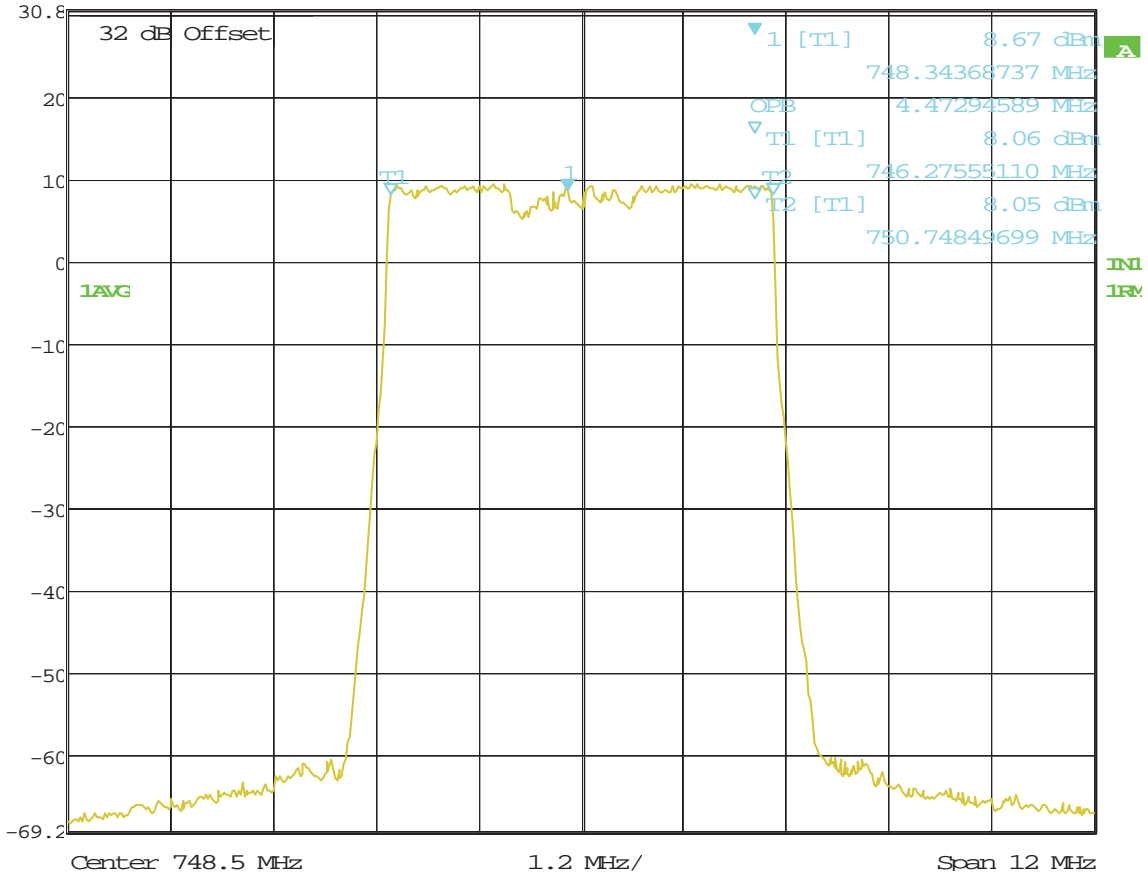
Block: C (Lower)

5 MHz Bandwidth 746 – 751 MHz

(99% Power Bandwidth)



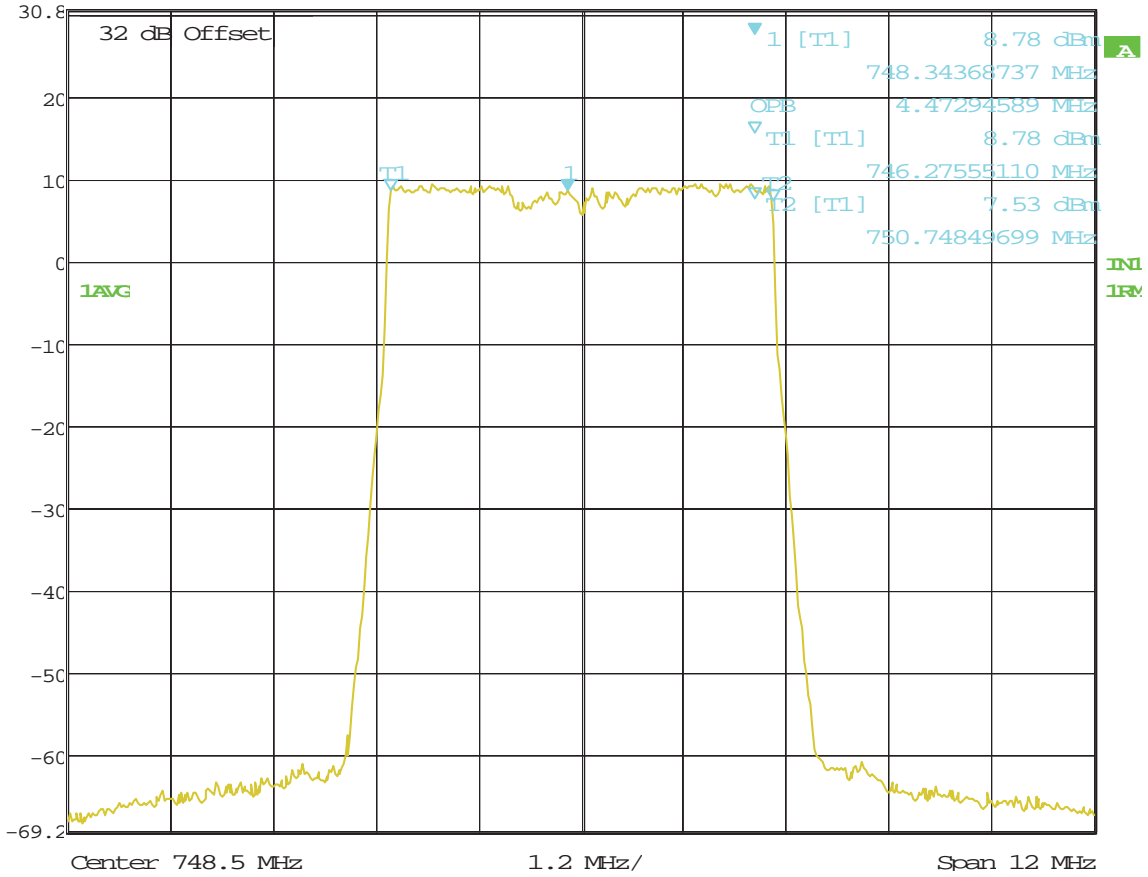
Marker 1 [T1] RBW 30 kHz RF Att 10 dB
 Ref Lvl 8.67 dBm VBW 300 kHz
 30.8 dBm 748.34368737 MHz SWT 34 ms Unit dBm



Title: 99% POWER BANDWIDTH; Test Engineer: SEG
 Comment A: 9768 MRO V1.0 B13 700U Cubedock(FLIR M2); 748.5MHz, QPSK
 PWR: 1W; 2X2 MIMO; FCC PART 27.53(C); FCCID: AS5BBTRX-07
 Date: 18.SEP.2012 11:42:31



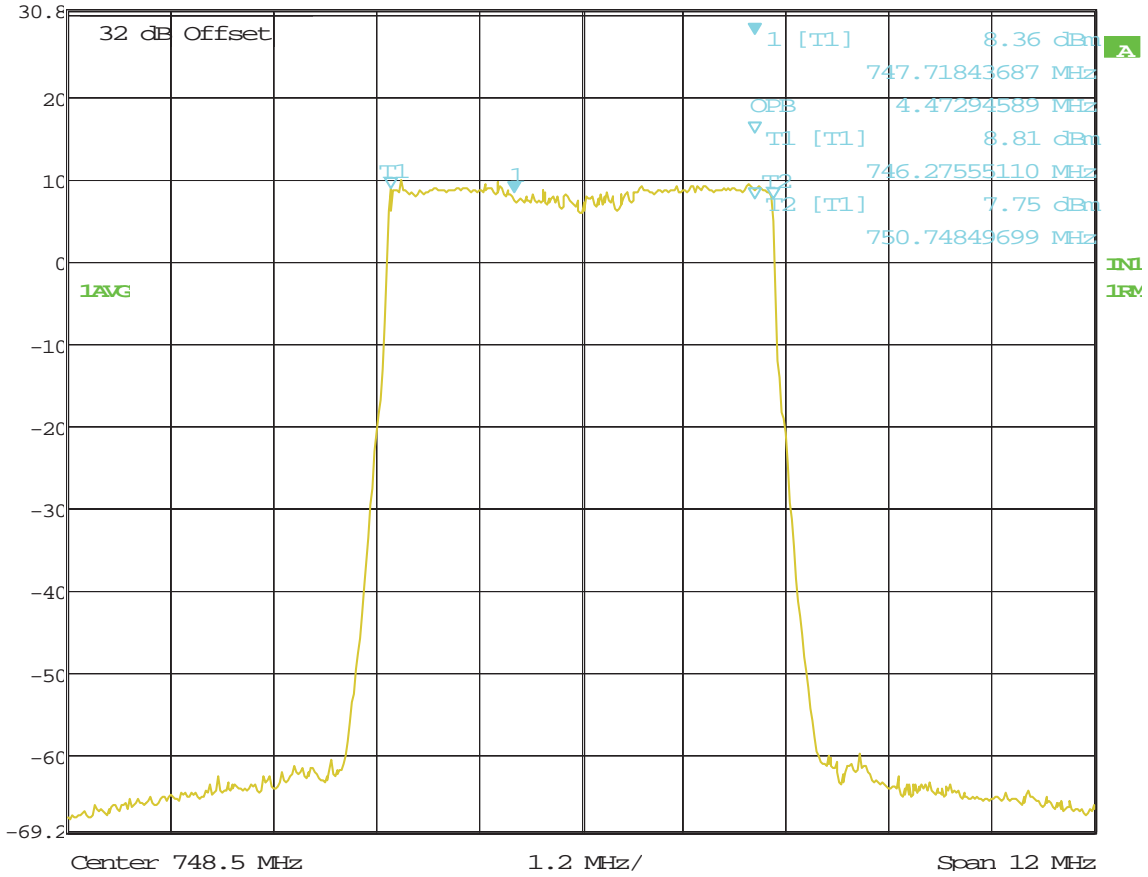
Marker 1 [T1] RBW 30 kHz RF Att 10 dB
 Ref Lvl 8.78 dBm VBW 300 kHz
 30.8 dBm 748.34368737 MHz SWI 34 ms Unit dBm



Title: 99% POWER BANDWIDTH; Test Engineer: SEG
 Comment A: 9768 MRO V1.0 B13 700U Cubedock(FLIR M2); 748.5MHz, 16QAM
 PWR: 1W; 2X2 MIMO; FCC PART 27.53(C); FCCID: AS5BBTRX-07
 Date: 18.SEP.2012 12:40:49



Marker 1 [T1] RBW 30 kHz RF Att 10 dB
 Ref Lvl 8.36 dBm VBW 300 kHz
 30.8 dBm 747.71843687 MHz SWT 34 ms Unit dBm



Title: 99% POWER BANDWIDTH; Test Engineer: SEG
 Comment A: 9768 MRO V1.0 B13 700U Cubedock(FLIR M2); 748.5MHz, 64QAM
 PWR: 1W; 2X2 MIMO; FCC PART 27.53(C); FCCID: AS5BBTRX-07
 Date: 19.SEP.2012 07:38:40

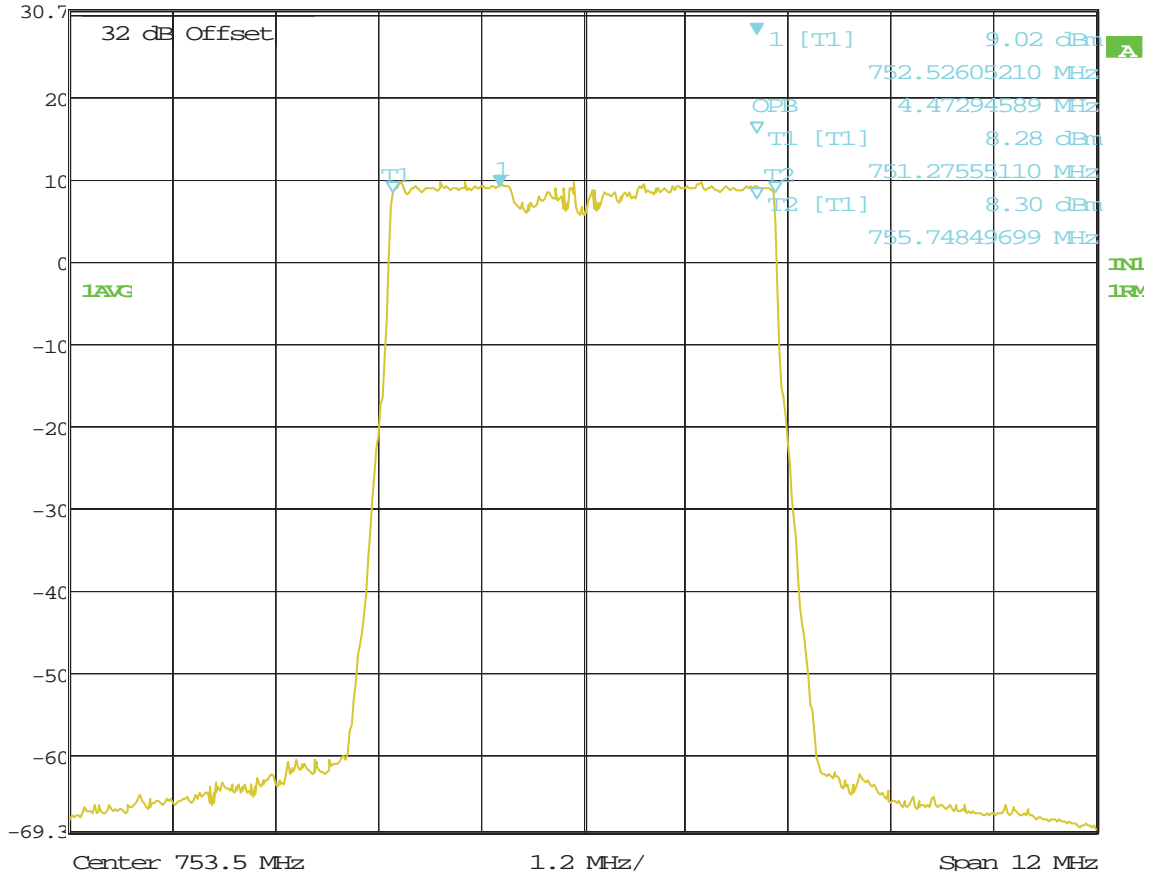
Block: C (Upper)

5 MHz Bandwidth 751 – 756 MHz

(99% Power Bandwidth)



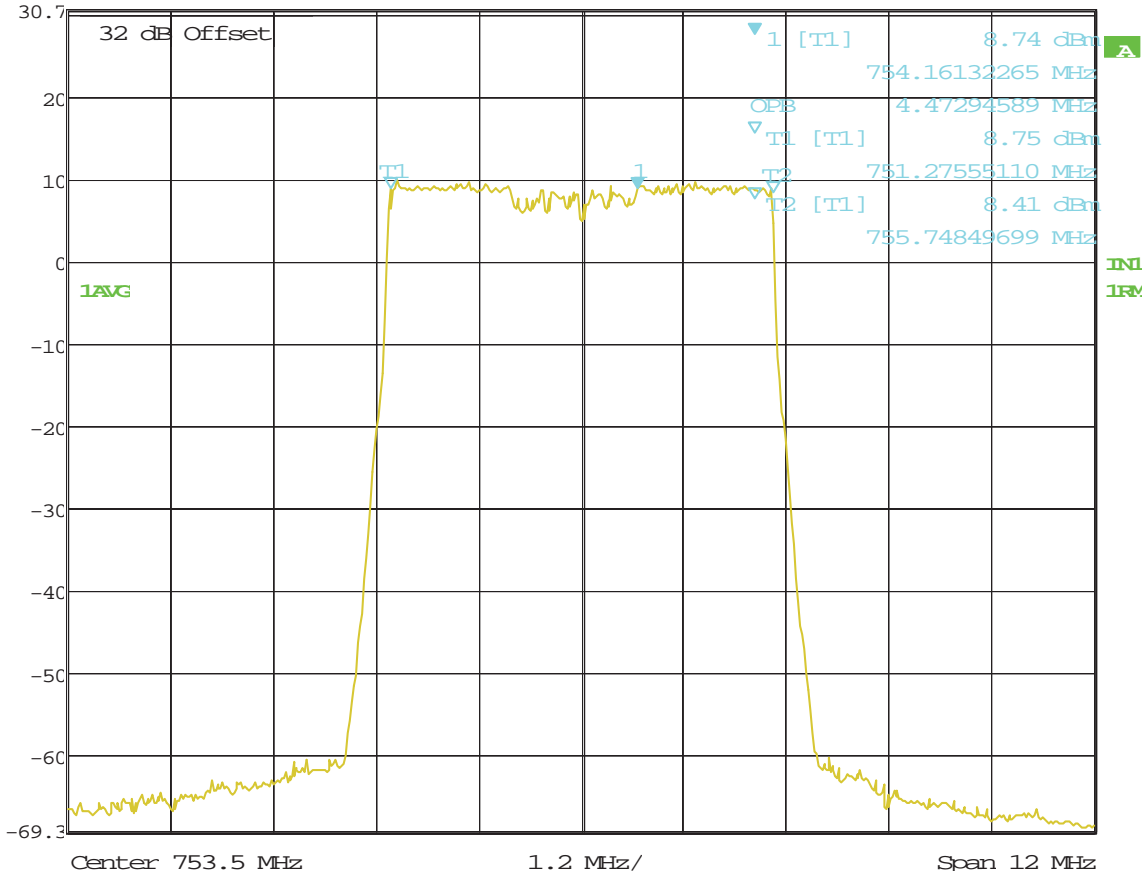
Marker 1 [T1] RBW 30 kHz RF Att 10 dB
Ref Lvl 9.02 dBm VBW 300 kHz
30.7 dBm 752.52605210 MHz SWT 34 ms Unit dBm



Title: 99% POWER BANDWIDTH; Test Engineer: SEG
Comment A: 9768 MRO V1.0 B13 700U Cubedock(FLIR M2); 753.5MHz, QPSK
PWR: 1W; 2X2 MIMO; FCC PART 27.53(C); FCCID: AS5BBTRX-07
Date: 19.SEP.2012 14:43:13



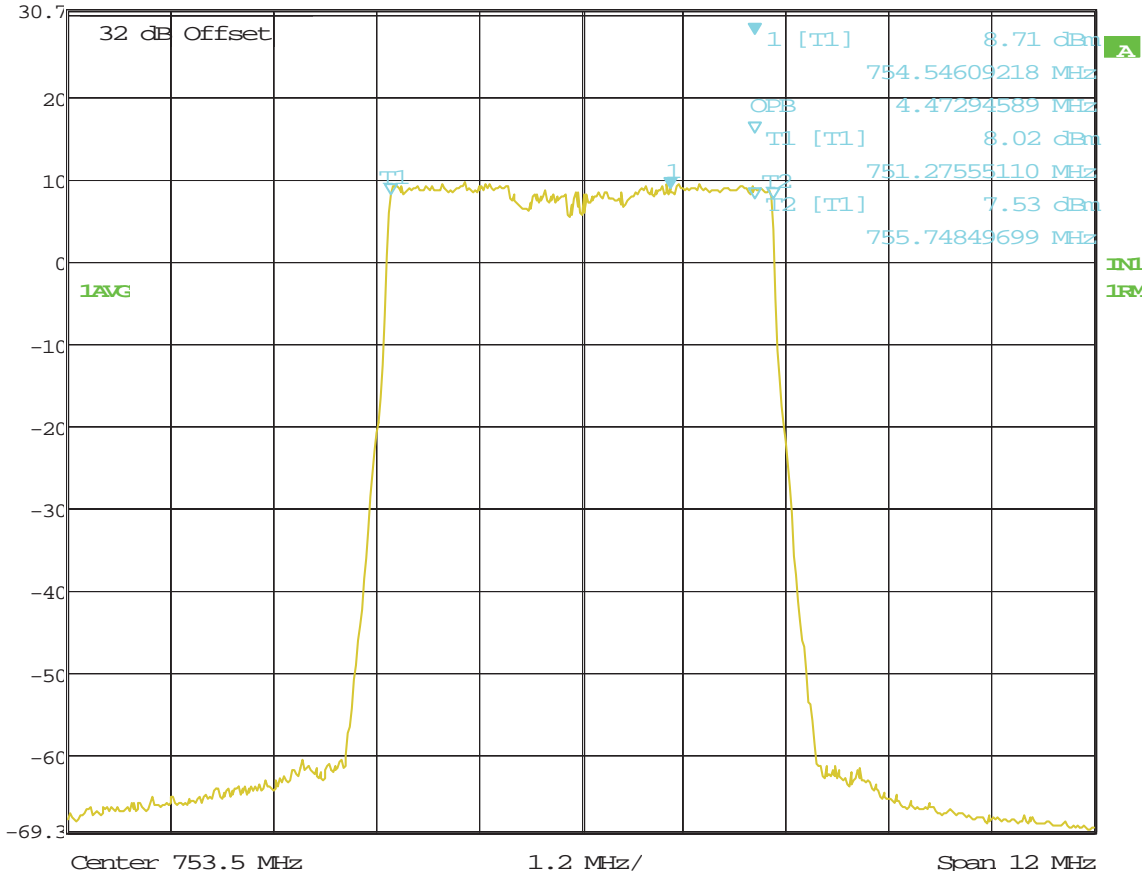
Marker 1 [T1] RBW 30 kHz RF Att 10 dB
Ref Lvl 8.74 dBm VBW 300 kHz
30.7 dBm 754.16132265 MHz SWT 34 ms Unit dBm



Title: 99% POWER BANDWIDTH; Test Engineer: SEG
Comment A: 9768 MRO V1.0 B13 700U Cubedock(FLIR M2); 753.5MHz, 16QAM
PWR: 1W; 2X2 MIMO; FCC PART 27.53(C); FCCID: AS5BBTRX-07
Date: 19.SEP.2012 15:10:54



Marker 1 [T1] RBW 30 kHz RF Att 10 dB
 Ref Lvl 8.71 dBm VBW 300 kHz
 30.7 dBm 754.54609218 MHz SWT 34 ms Unit dBm

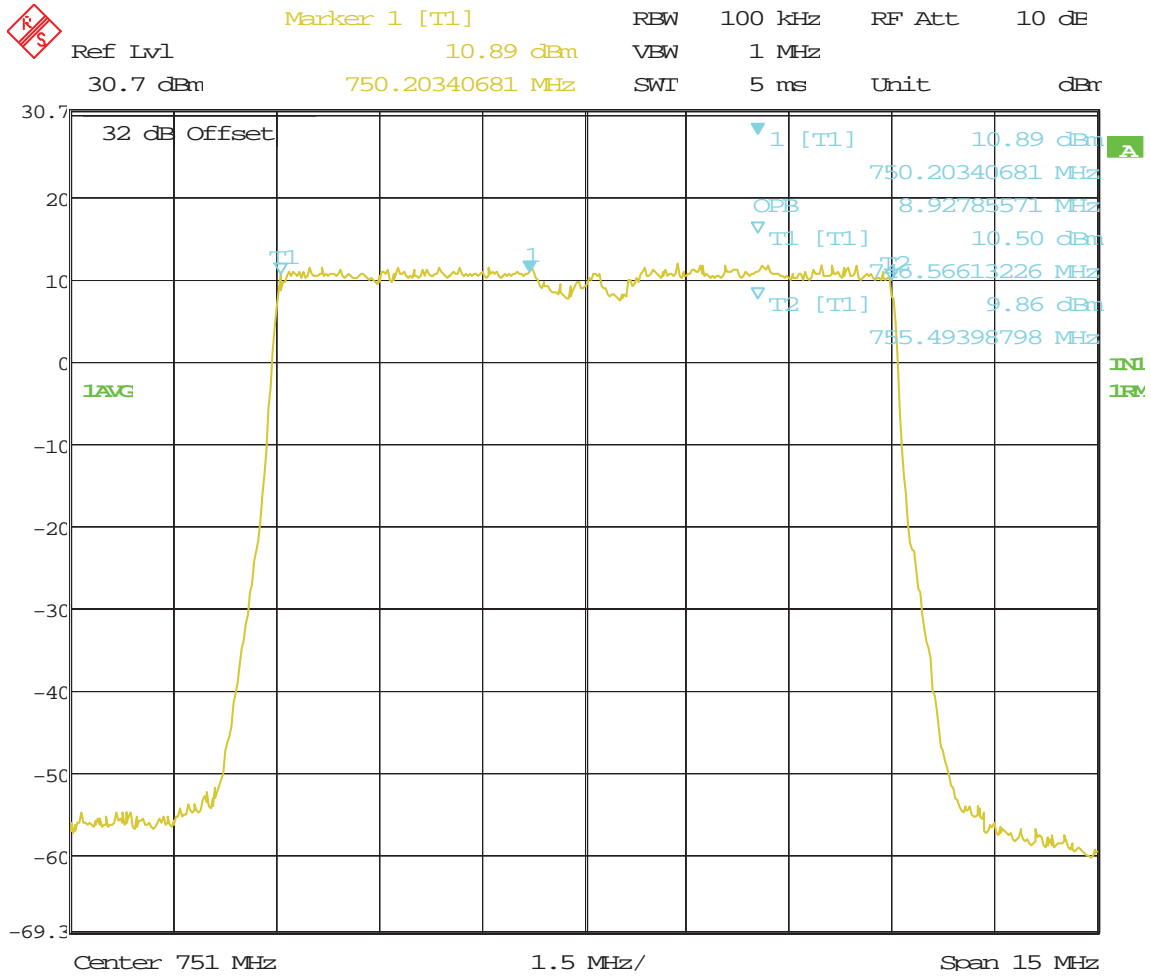


Title: 99% POWER BANDWIDTH; Test Engineer: SEG
 Comment A: 9768 MRO V1.0 B13 700U Cubedock(FLIR M2); 753.5MHz, 64QAM
 PWR: 1W; 2X2 MIMO; FCC PART 27.53(C); FCCID: AS5BBTRX-07
 Date: 20.SEP.2012 07:52:42

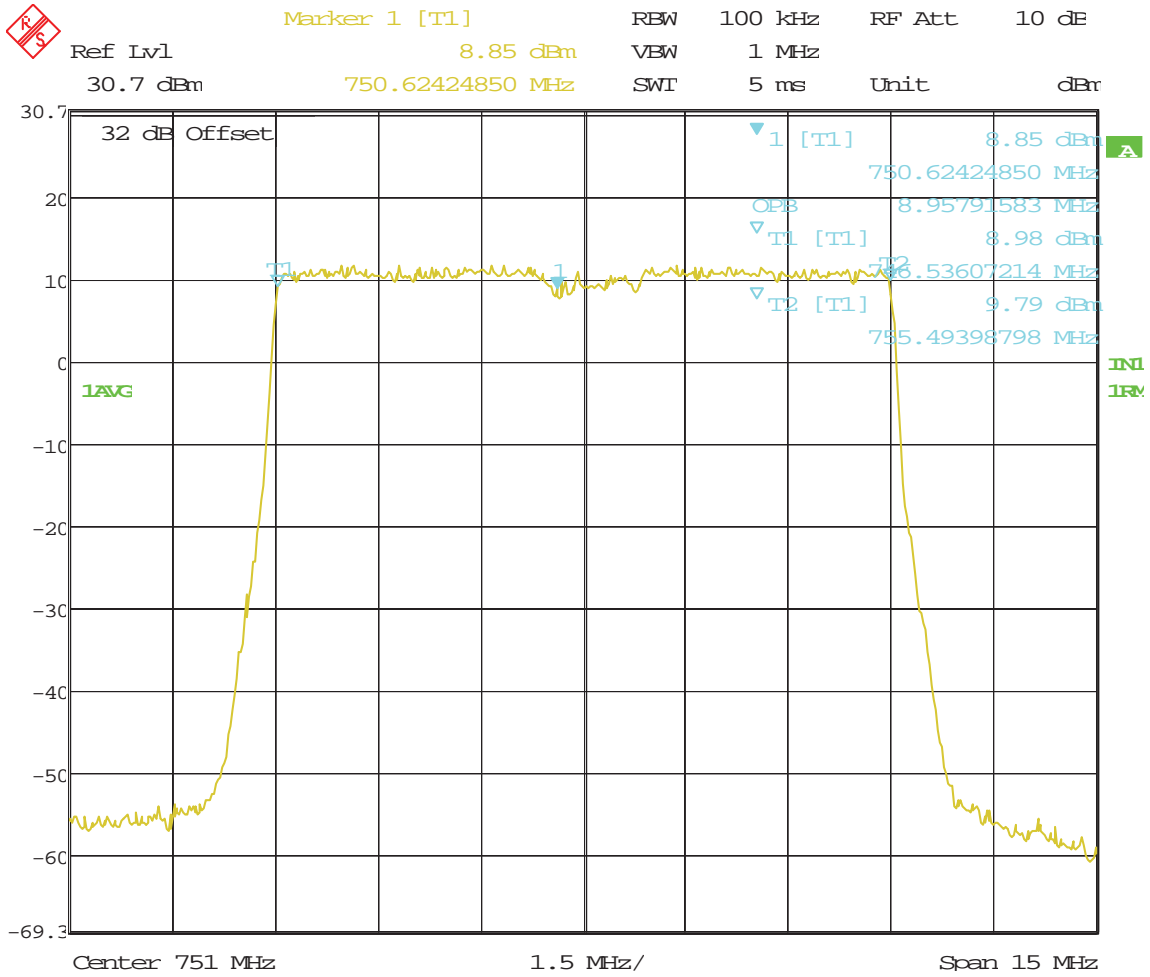
Block: C

10 MHz Bandwidth 746 – 756 MHz

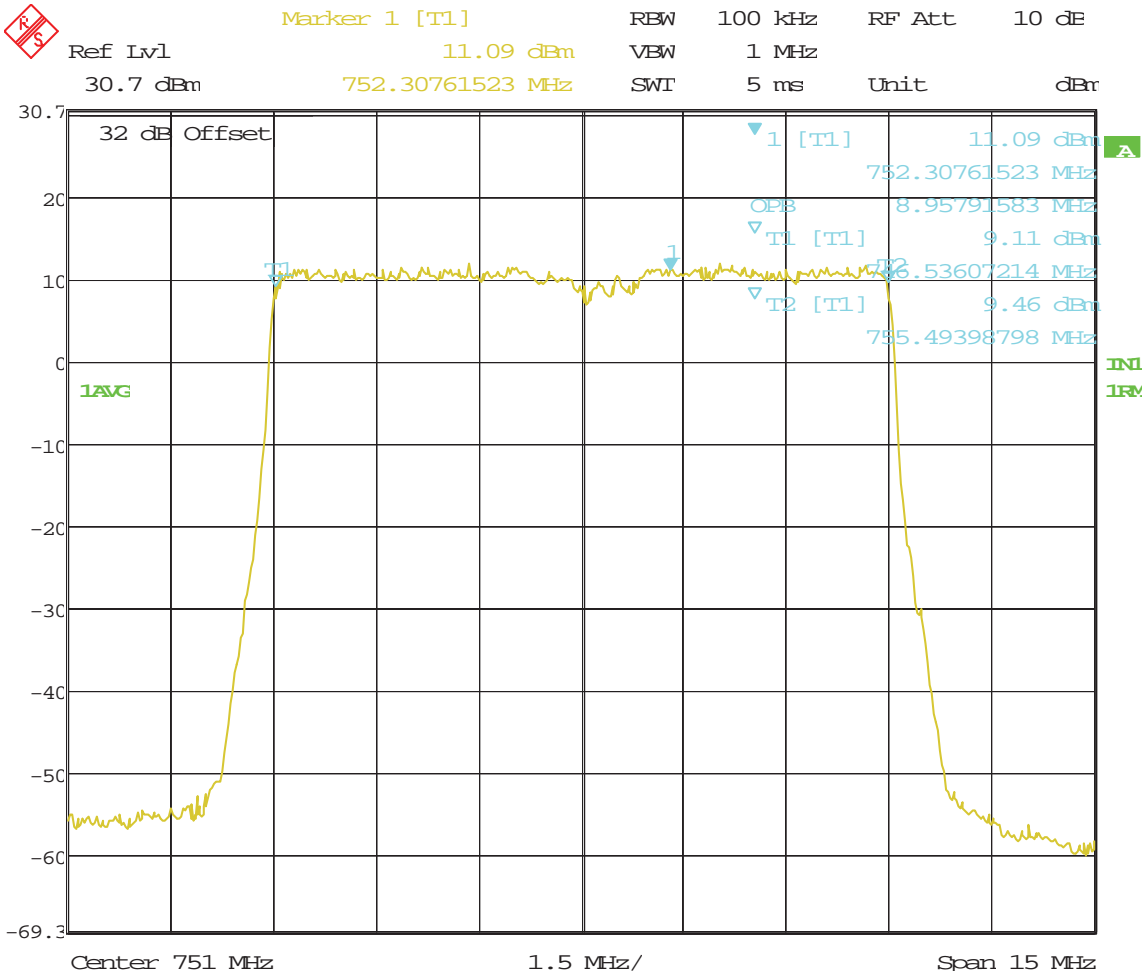
(99% Power Bandwidth)



Title: 99% POWER BANDWIDTH; Test Engineer: SEG
 Comment A: 9768 MRO V1.0 B13 700U Cubedock(FLIR M2); 751 MHz, QPSK
 PWR: 1W; 2X2 MIMO, FCC PART 27.53(C); FCCID: AS5BBTRX-07
 Date: 20.SEP.2012 08:46:06



Title: 99% POWER BANDWIDTH; Test Engineer: SEG
 Comment A: 9768 MRO V1.0 B13 700U Cubedock(FLIR M2); 751 MHz, 16QAM
 PWR: 1W; 2X2 MIMO, FCC PART 27.53(C); FCCID: AS5BBTRX-07
 Date: 20.SEP.2012 09:38:39



Title: 99% POWER BANDWIDTH; Test Engineer: SEG
 Comment A: 9768 MRO V1.0 B13 700U Cubedock(FLIR M2); 751 MHz, 64QAM
 PWR: 1W; 2X2 MIMO, FCC PART 27.53(C); FCCID: AS5BBTRX-07
 Date: 20.SEP.2012 09:49:15

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

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

The occupied bandwidth of the 9768 Metro Radio Outdoor (Filter M2) 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 “9768 Metro Radio Outdoor (Filter M2)” in the following configurations:

1. QPSK
2. 16 QAM
3. 64 QAM

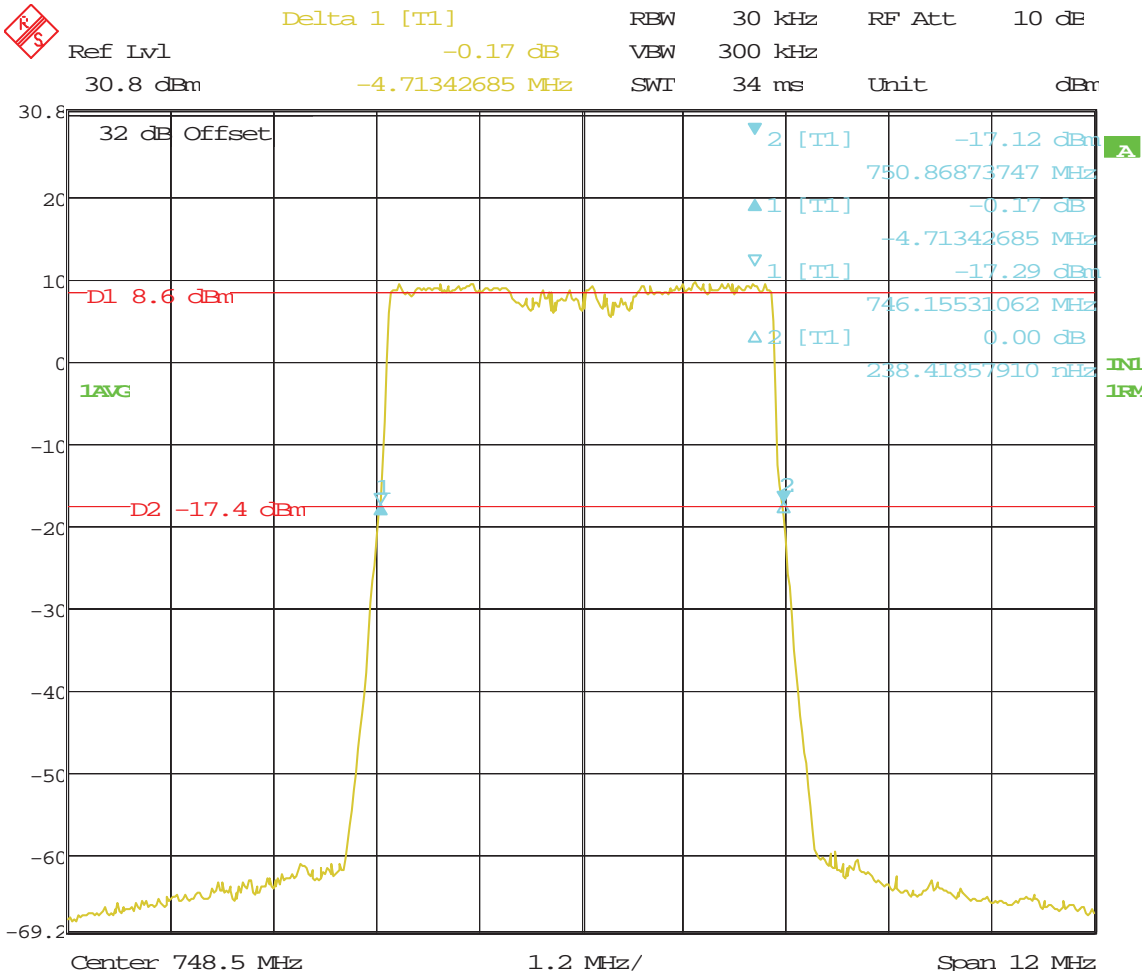
Results:

The plots are provided for QPSK, 16QAM and 64QAM modulations for 5MHz and 10 MHz bands.
The Measured 26dB emissions bandwidth is 4.73 MHz for 5 MHz band and 9.40 MHz for 10 MHz band.

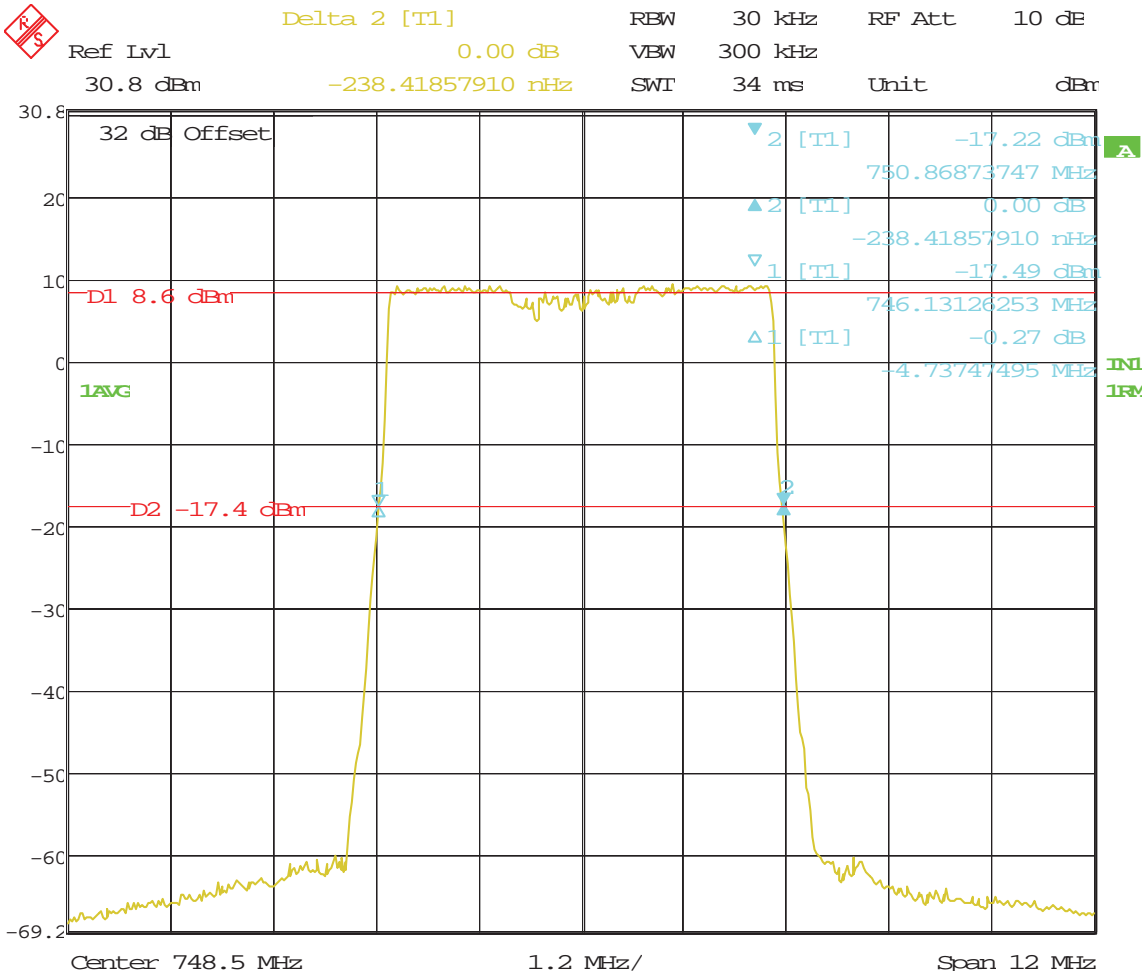
Block: C (Lower)

5 MHz Bandwidth 746 – 751 MHz

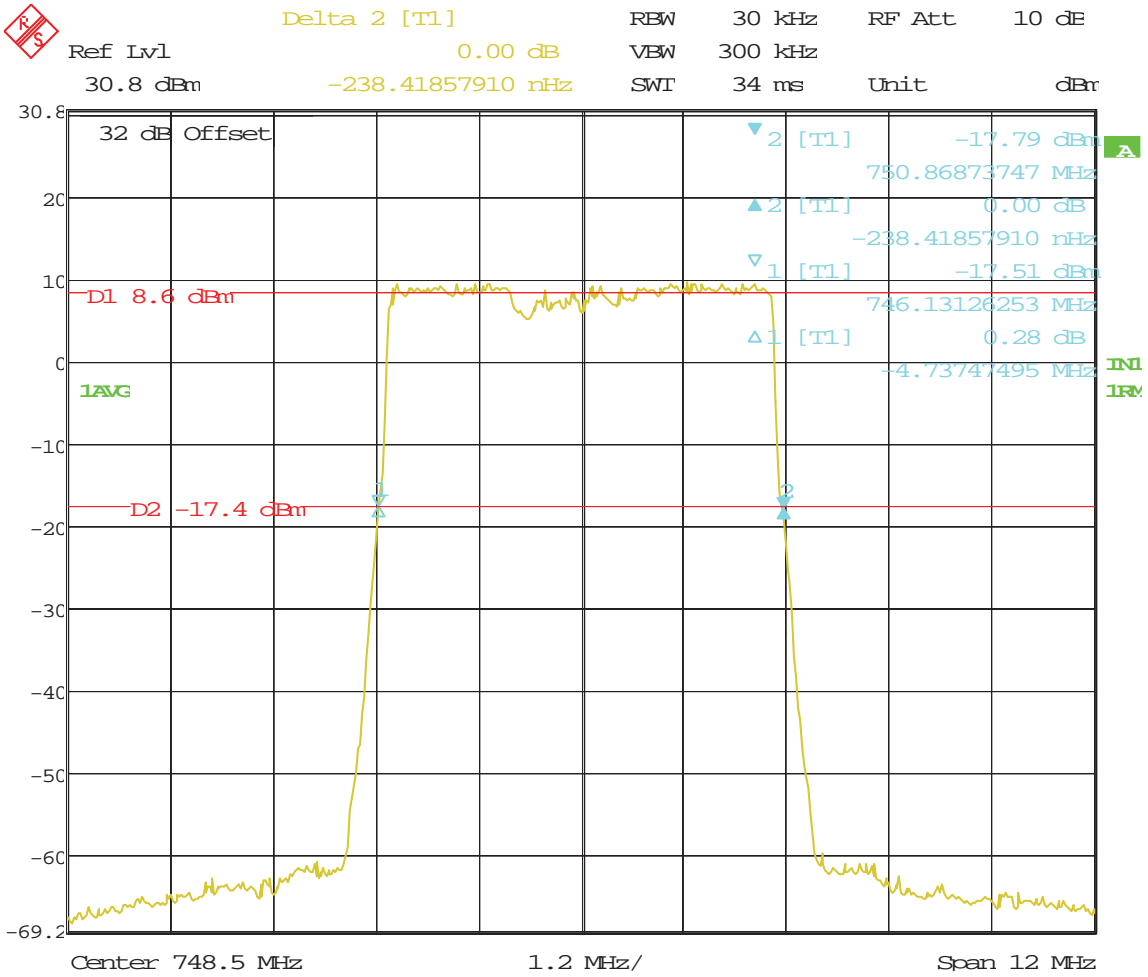
(26dB Bandwidth)



Title: 26dB BANDWIDTH; Test Engineer: SEG
 Comment A: 9768 MRO V1.0 B13 700U Cubedock(FLIR M2); 748.5MHz, QPSK
 PWR: 1W; 2X2 MIMO; FCC PART 27.53(C); FCCID: AS5BBTRX-07
 Date: 18.SEP.2012 11:39:20



Title: 26dB BANDWIDTH; Test Engineer: SEG
 Comment A: 9768 MRO V1.0 B13 700U Cubedock(FLIR M2); 748.5MHz, 16QAM
 PWR: 1W; 2X2 MIMO; FCC PART 27.53(C); FCCID: AS5BBTRX-07
 Date: 18.SEP.2012 12:45:36

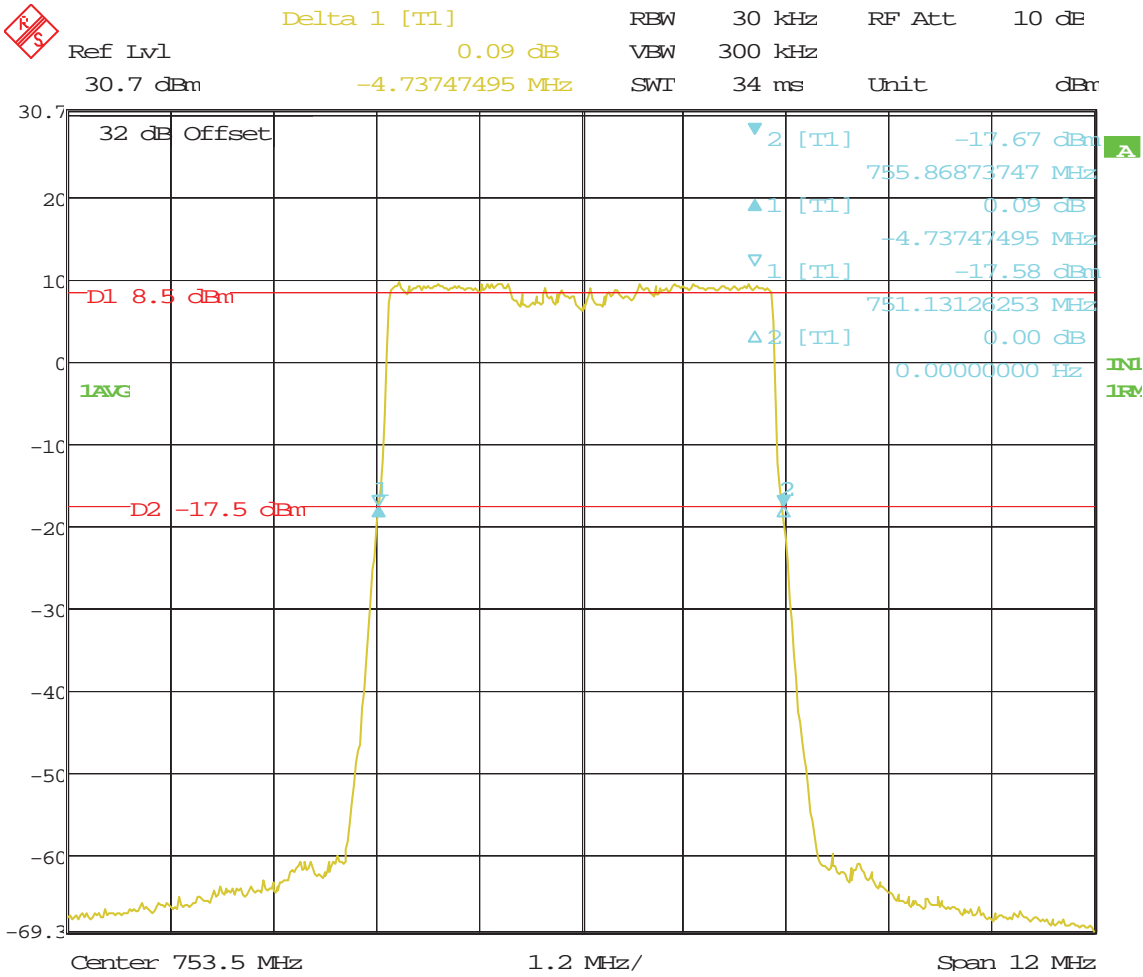


Title: 26dB BANDWIDTH; Test Engineer: SEG
 Comment A: 9768 MRO V1.0 B13 700U Cubedock(FLIR M2); 748.5MHz, 64QAM
 PWR: 1W; 2X2 MIMO; FCC PART 27.53(C); FCCID: AS5BBTRX-07
 Date: 19.SEP.2012 07:35:02

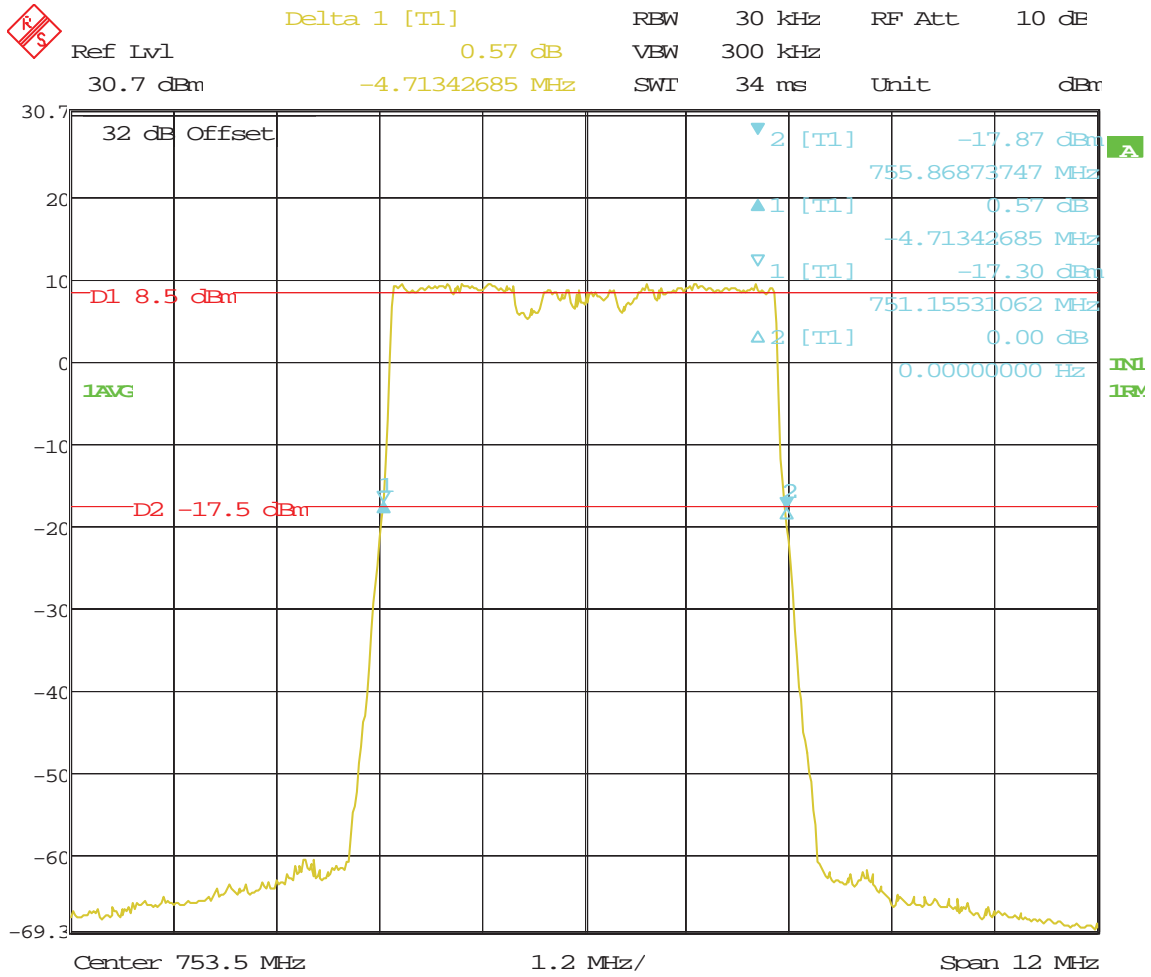
Block: C (Upper)

5 MHz Bandwidth 751 – 756 MHz

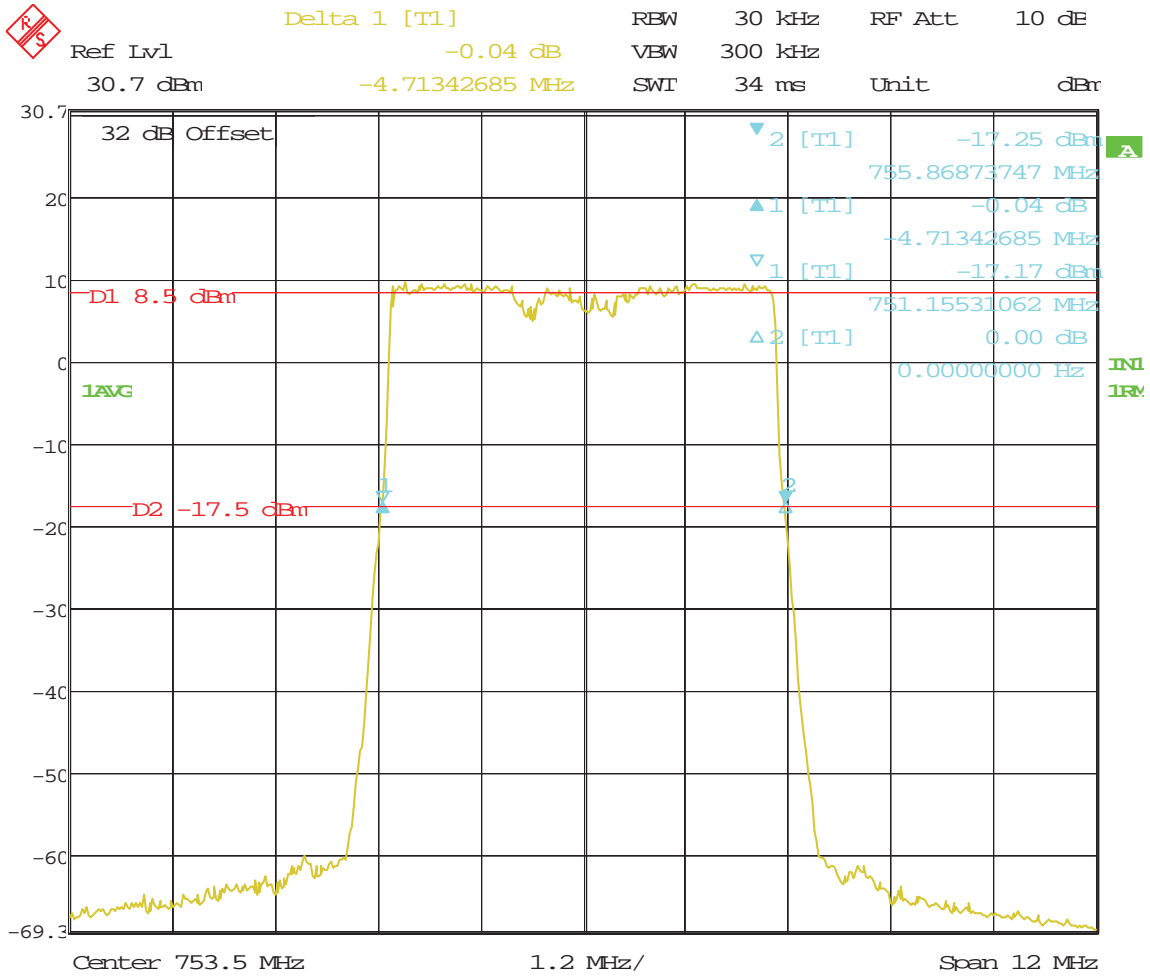
(26dB Bandwidth)



Title: 26dB BANDWIDTH; Test Engineer: SEG
 Comment A: 9768 MRO V1.0 B13 700U Cubedock(FLIR M2); 753.5MHz, QPSK
 PWR: 1W; 2X2 MIMO; FCC PART 27.53(C); FCCID: AS5BBTRX-07
 Date: 19.SEP.2012 14:39:50



Title: 26dB BANDWIDTH; Test Engineer: SEG
 Comment A: 9768 MRO V1.0 B13 700U Cubedock(FLIR M2); 753.5MHz, 16QAM
 PWR: 1W; 2X2 MIMO; FCC PART 27.53(C); FCCID: AS5BBTRX-07
 Date: 19.SEP.2012 15:15:48



Title: 26dB BANDWIDTH; Test Engineer: SEG
 Comment A: 9768 MRO V1.0 B13 700U Cubedock(FLIR M2); 753.5MHz, 64QAM
 PWR: 1W; 2X2 MIMO; FCC PART 27.53(C); FCCID: AS5BBTRX-07
 Date: 20.SEP.2012 07:48:44

Block: C

10 MHz Bandwidth 746 – 756 MHz

(26dB Bandwidth)



Delta 2 [T1]

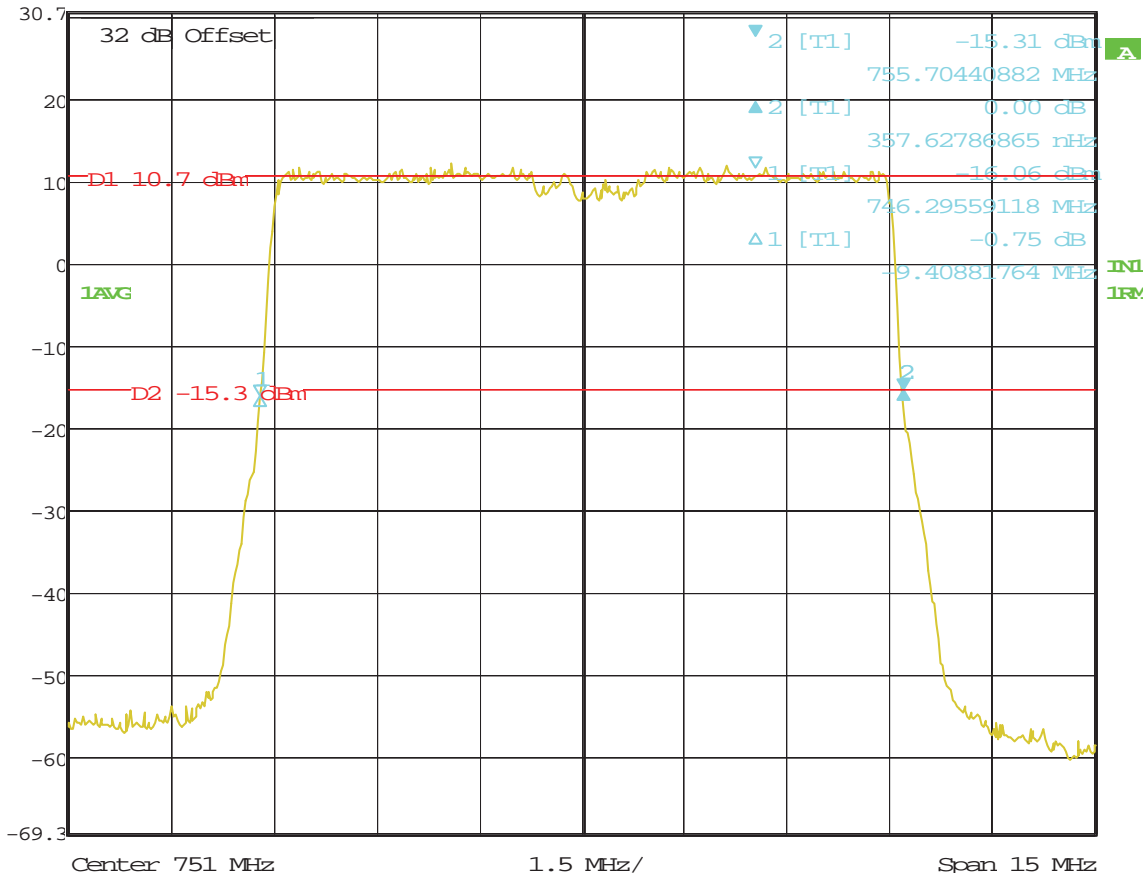
RBW 100 kHz RF Att 10 dB

Ref Lvl 0.00 dB

VBW 1 MHz

30.7 dBm 357.6278685 nHz

SWT 5 ms Unit dBm



Title: 26dB BANDWIDTH; Test Engineer: SEG
 Comment A: 9768 MRO V1.0 B13 700U Cubedock(FLIR M2); 751 MHz, QPSK
 PWR: 1W; 2X2 MIMO, FCC PART 27.53(C); FCCID: AS5BBTRX-07
 Date: 20.SEP.2012 08:42:35



Delta 1 [T1]

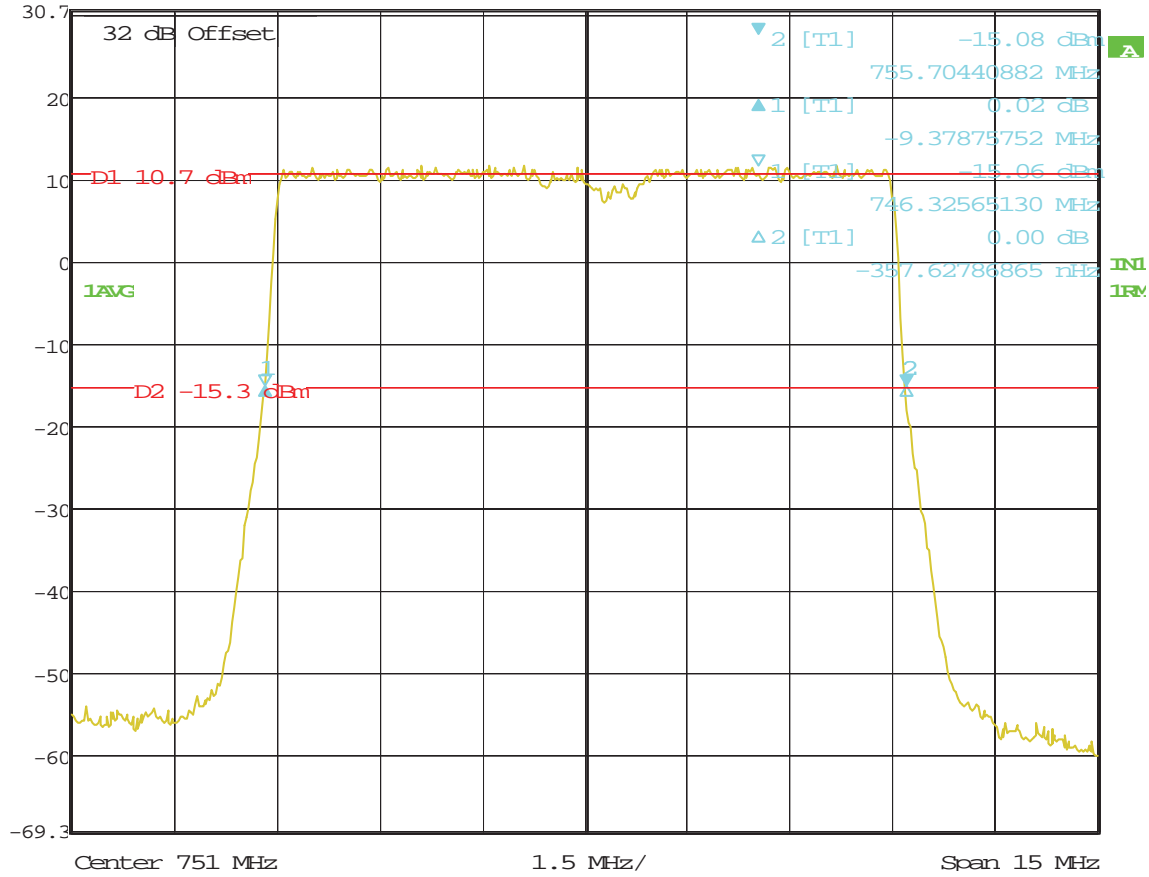
RBW 100 kHz RF Att 10 dB

Ref Lvl 0.02 dB

VBW 1 MHz

30.7 dBm -9.37875752 MHz

SWT 5 ms Unit dBm



Title: 26 BANDWIDTH; Test Engineer: SEG
 Comment A: 9768 MRO V1.0 B13 700U Cubedock(FLIR M2); 751 MHz, 16QAM
 PWR: 1W; 2X2 MIMO, FCC PART 27.53(C); FCCID: AS5BBTRX-07
 Date: 20.SEP.2012 09:37:02



Delta 2 [T1]

RBW 100 kHz RF Att 10 dB

Ref Lvl 0.00 dB

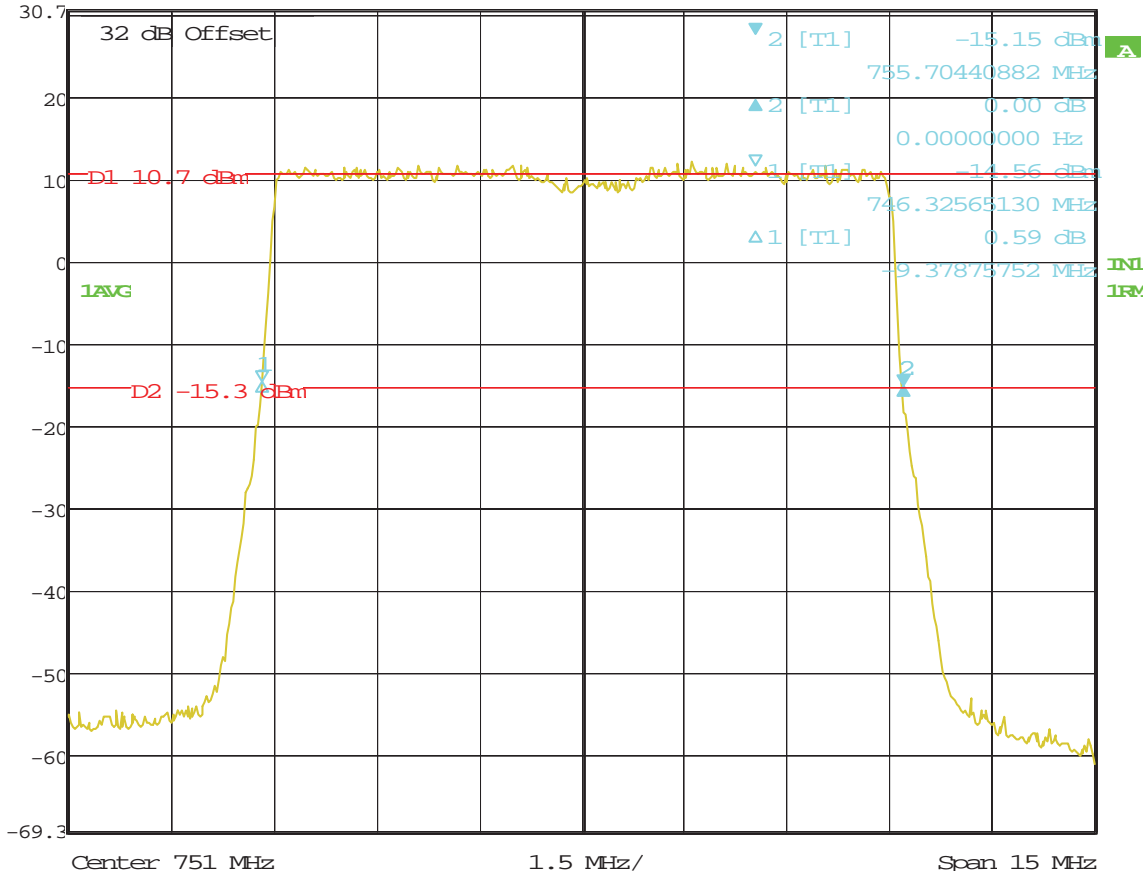
VBW 1 MHz

30.7 dBm

0.0000000 Hz

SWT 5 ms

Unit dBm



Title: 26dB BANDWIDTH; Test Engineer: SEG
 Comment A: 9768 MRO V1.0 B13 700U Cubedock(FLIR M2); 751 MHz, 64QAM
 PWR: 1W; 2X2 MIMO, FCC PART 27.53(C); FCCID: AS5BBTRX-07
 Date: 20.SEP.2012 09:59:43

**MEASUREMENT OF
SPECTRUM MASK/OCCUPIED BANDWIDTH
(100 kHz ADJACENT TO CHANNEL EDGE)
Section 27.53 (c)**

**MEASUREMENT OF SPECTRUM MASK
OCCUPIED BANDWIDTH**

The Spectrum mask close to the center of the carrier frequency (Occupied bandwidth) of the 9768 Metro Radio Outdoor (Filter M2) 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 9768 Metro Radio Outdoor (Filter M2).

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 1.0 Watt (30.0 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 9768 Metro Radio Outdoor (Filter M2) is capable of operating in the band of 746 MHz to 756 MHz. The Base station presently tested was configured to operate in Block 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(c): 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:

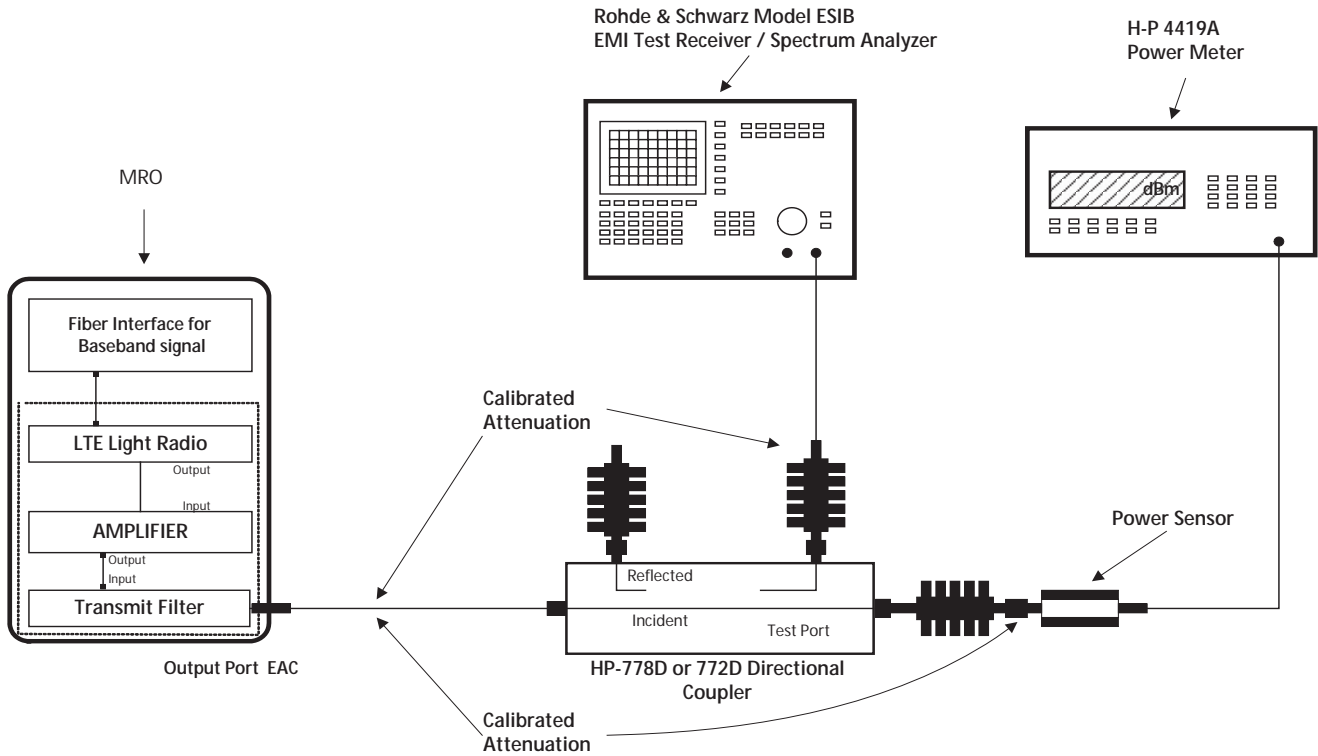
Band	Block	Center Frequency (MHz)	Carrier Bandwidth (MHz)	RF Filter	Power (Watts)
	C (Lower)	748.5	5	M1	1
	C (Upper)	753.5	5	M1	1
	C	751	10	M1	1

Measurement uncertainty:

Frequency: 100 Hz

Amplitude: 0.5 dB

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

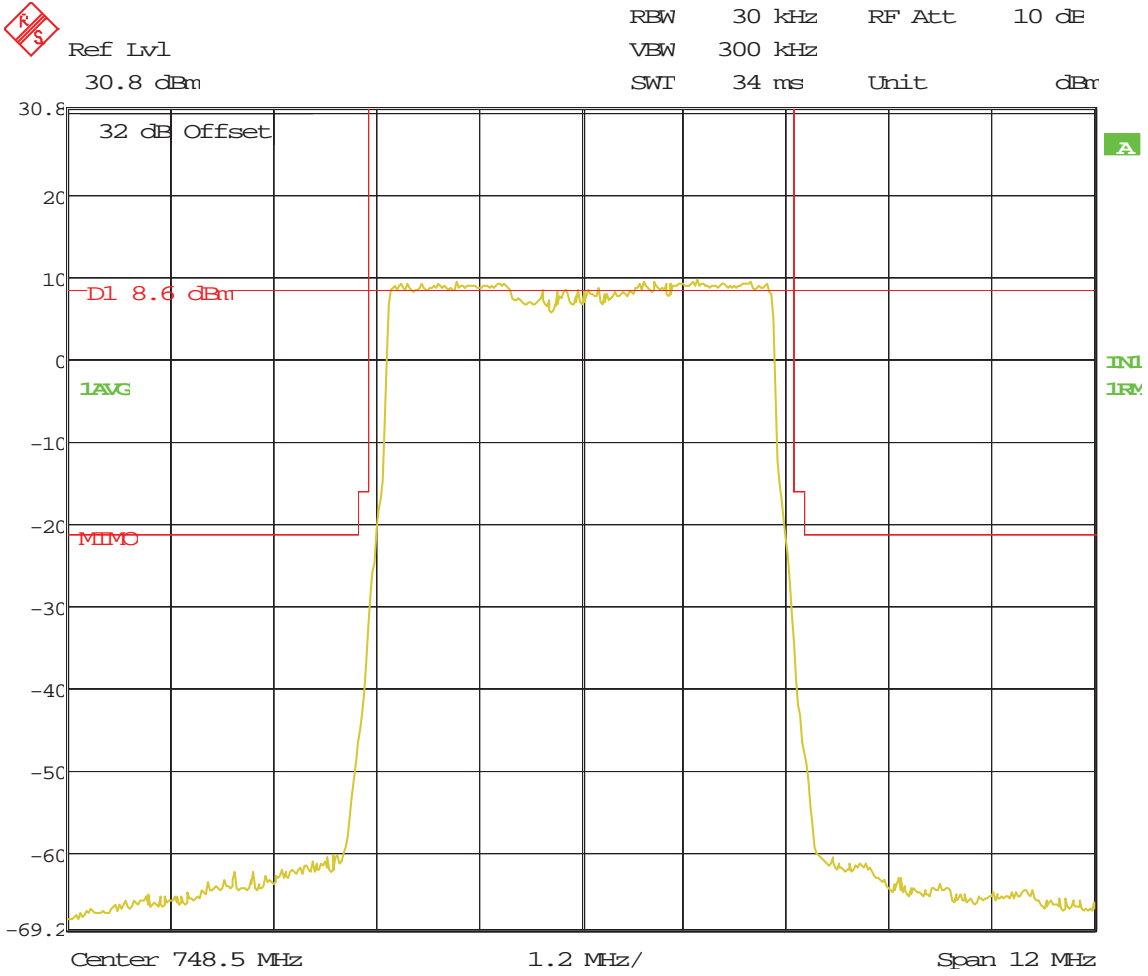


All components are calibrated over the frequency range of interest

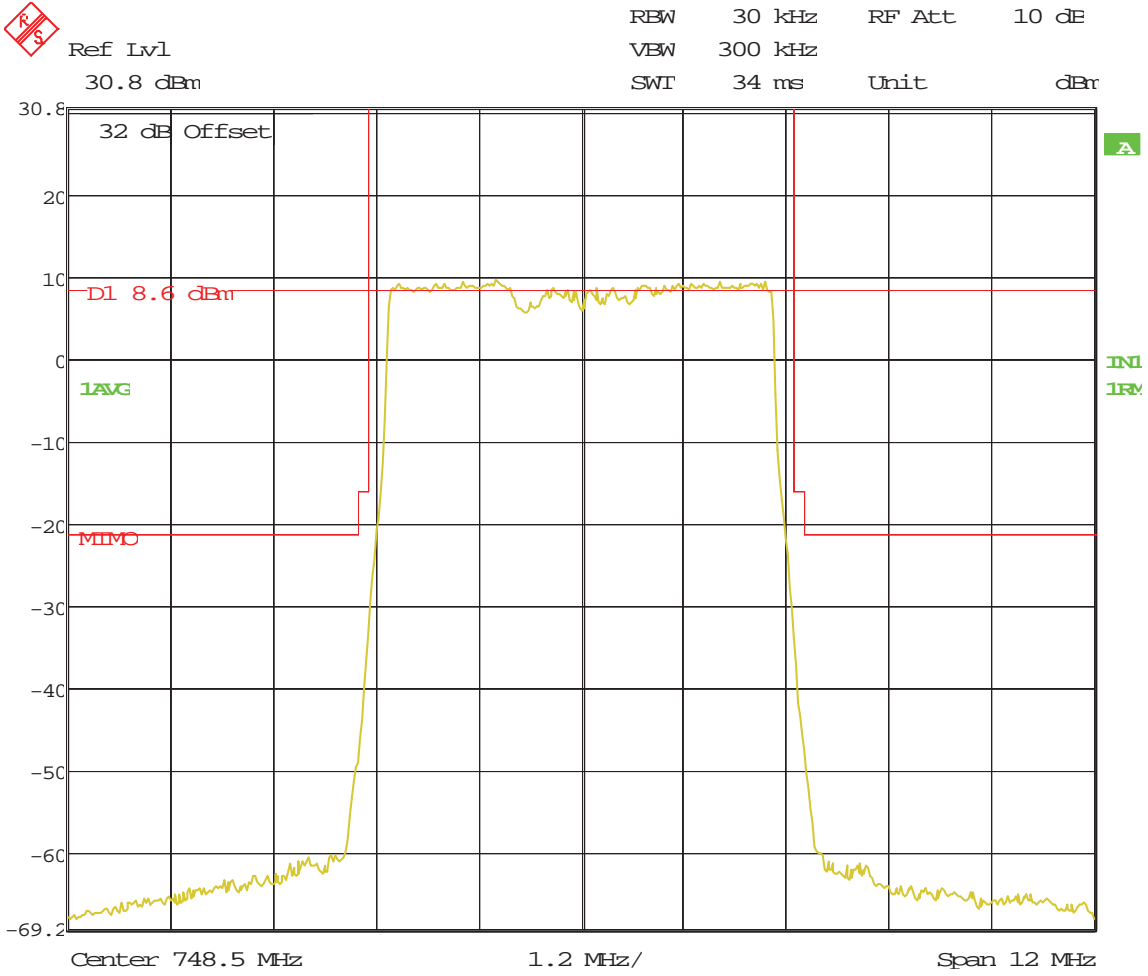
Block: C (Lower)

5 MHz Bandwidth 746 – 751 MHz

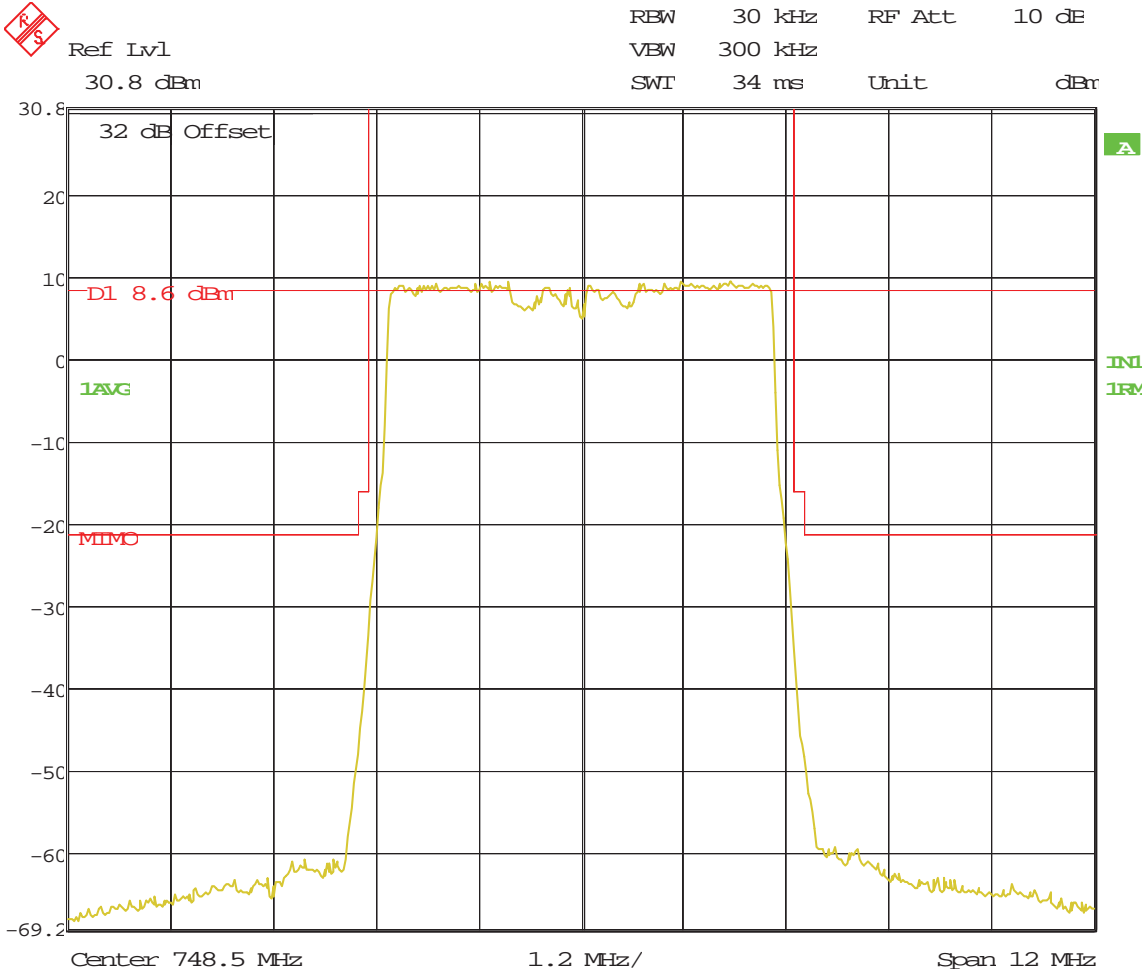
SPECTRUM MASK/OCCUPIED BANDWIDTH



Title: OCCUPIED BANDWIDTH; Test Engineer: SEG
Comment A: 9768 MRO V1.0 B13 700U Cubedock(FLIR M2); 748.5MHz, QPSK
PWR: 1W; 2X2 MIMO; FCC PART 27.53(C); FCCID: AS5BBTRX-07
Date: 18.SEP.2012 11:35:55



Title: OCCUPIED BANDWIDTH; Test Engineer: SEG
Comment A: 9768 MRO V1.0 B13 700U Cubedock(FLIR M2); 748.5MHz, 16QAM
PWR: 1W; 2X2 MIMO; FCC PART 27.53(C); FCCID: AS5BBTRX-07
Date: 18.SEP.2012 12:42:44

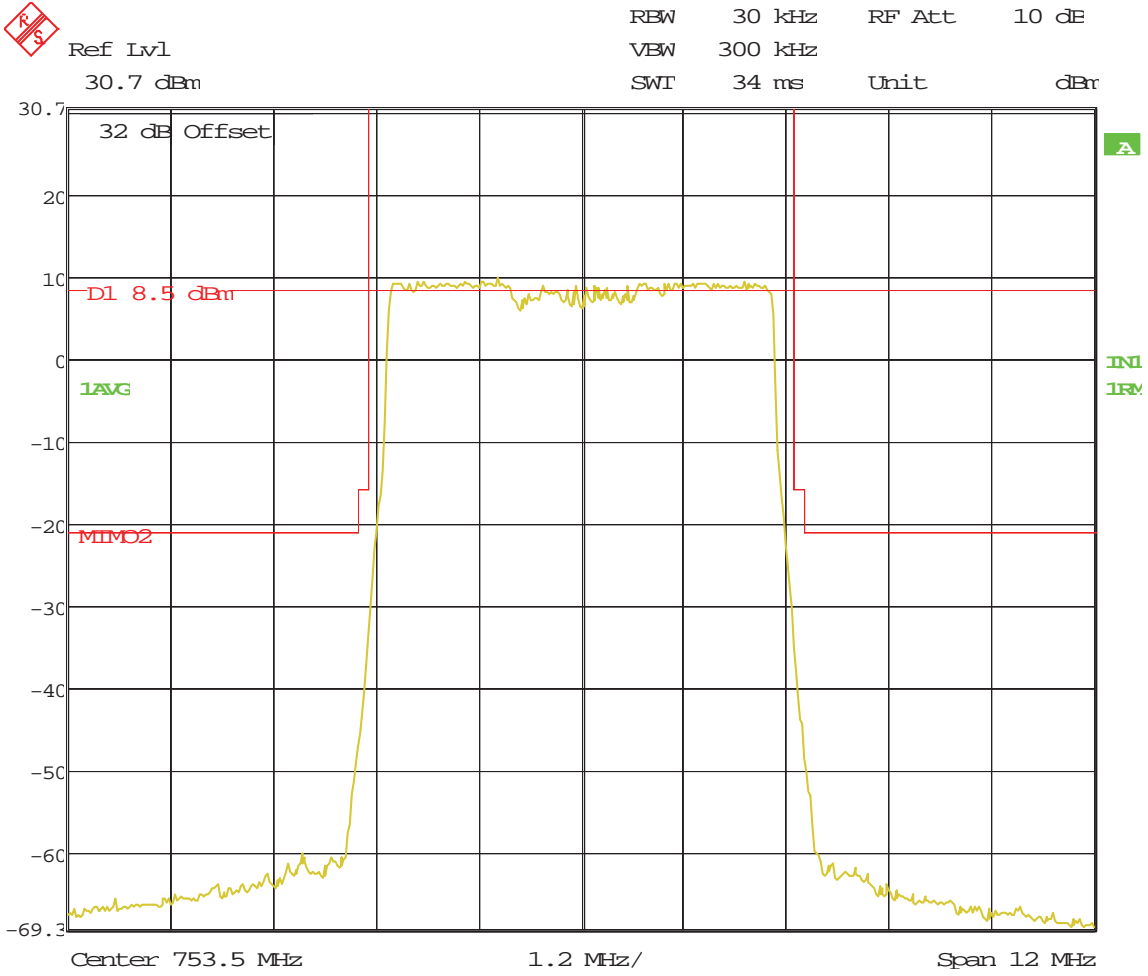


Title: OCCUPIED BANDWIDTH; Test Engineer: SEG
Comment A: 9768 MRO V1.0 B13 700U Cubedock(FLIR M2); 748.5MHz, 64QAM
PWR: 1W; 2X2 MIMO; FCC PART 27.53(C); FCCID: AS5BBTRX-07
Date: 19.SEP.2012 07:37:18

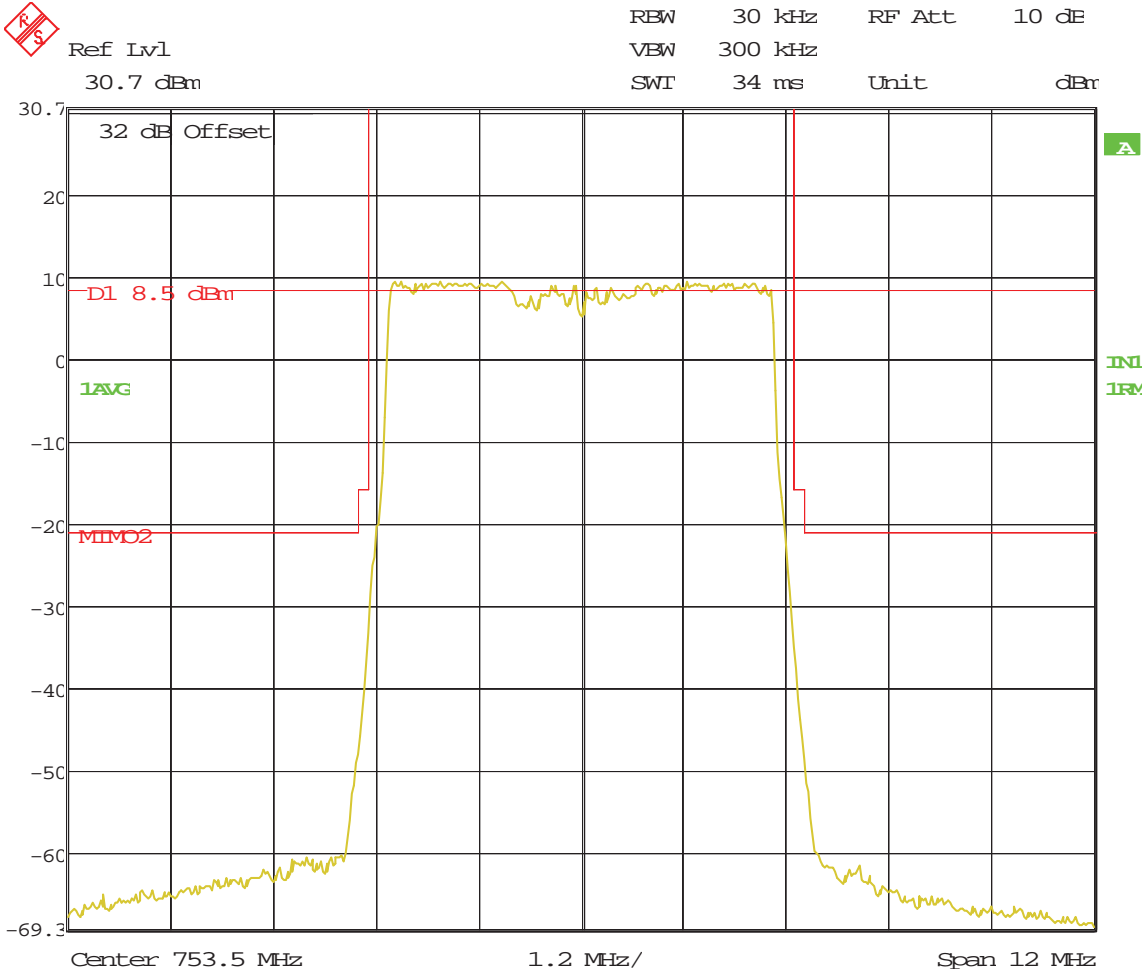
Block: C (Upper)

5 MHz Bandwidth 751 – 756 MHz

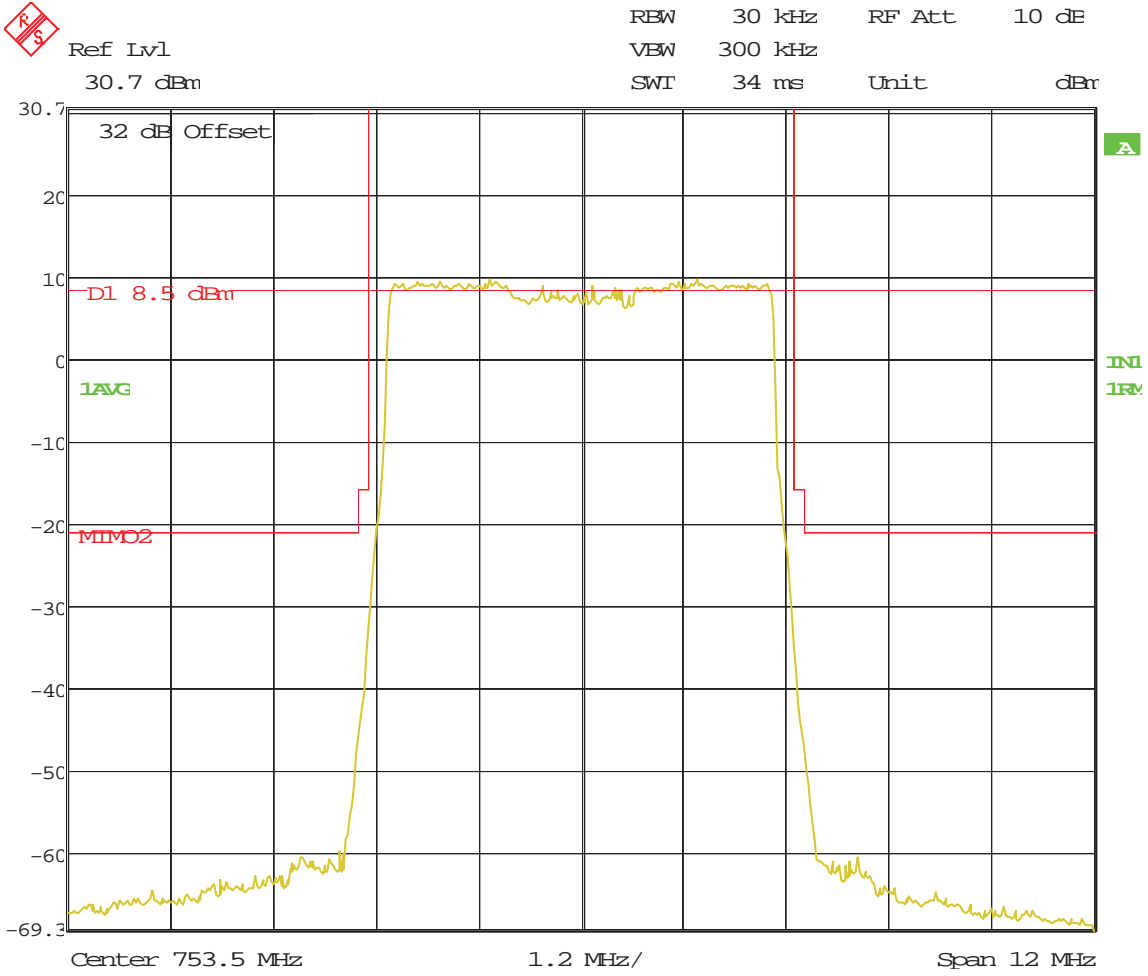
SPECTRUM MASK/OCCUPIED BANDWIDTH



Title: OCCUPIED BANDWIDTH; Test Engineer: SEG
Comment A: 9768 MRO V1.0 B13 700U Cubedock(FLIR M2); 753.5MHz, QPSK
PWR: 1W; 2X2 MIMO; FCC PART 27.53(C); FCCID: AS5BBTRX-07
Date: 19.SEP.2012 14:37:10



Title: OCCUPIED BANDWIDTH; Test Engineer: SEG
Comment A: 9768 MRO V1.0 B13 700U Cubedock(FLIR M2); 753.5MHz, 16QAM
PWR: 1W; 2X2 MIMO; FCC PART 27.53(C); FCCID: AS5BBTRX-07
Date: 19.SEP.2012 15:12:30



Title: OCCUPIED BANDWIDTH; Test Engineer: SEG
Comment A: 9768 MRO V1.0 B13 700U Cubedock(FLIR M2); 753.5MHz, 64QAM
PWR: 1W; 2X2 MIMO; FCC PART 27.53(C); FCCID: AS5BBTRX-07
Date: 20.SEP.2012 07:50:56

Block: C

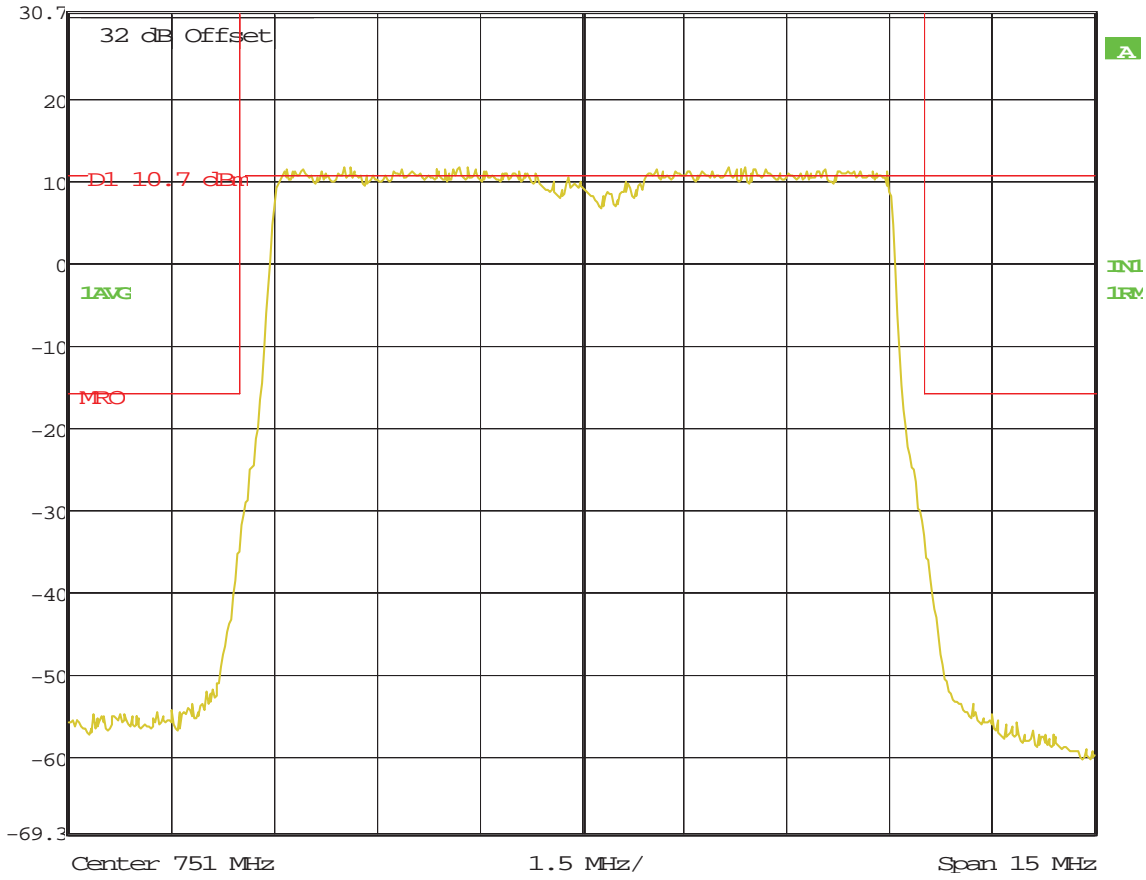
10 MHz Bandwidth 746 – 756 MHz

SPECTRUM MASK/OCCUPIED BANDWIDTH



Ref Lvl
30.7 dBm

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

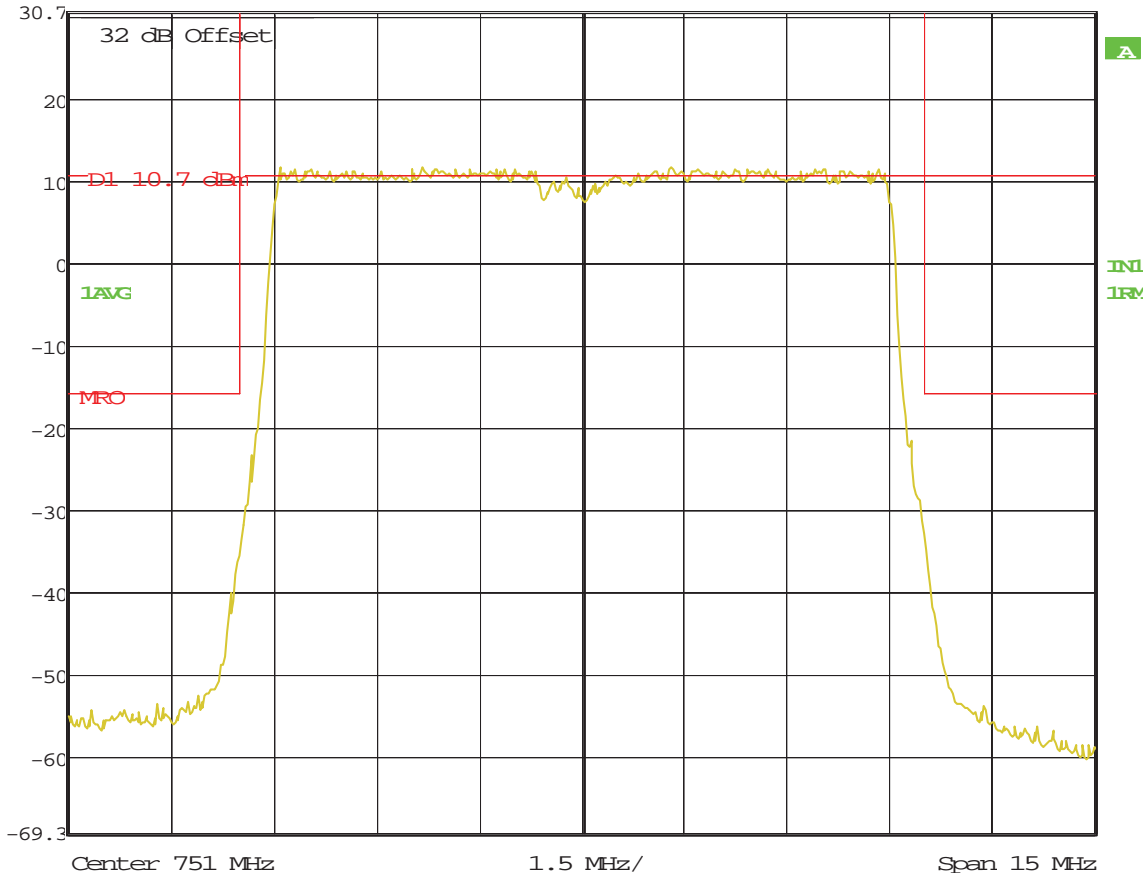


Title: OCCUPIED BANDWIDTH; Test Engineer: SEG
Comment A: 9768 MRO V1.0 B13 700U Cubedock(FLIR M2); 751 MHz, QPSK
PWR: 1W; 2X2 MIMO, FCC PART 27.53(C); FCCID: AS5BBTRX-07
Date: 20.SEP.2012 08:44:18



Ref Lvl
30.7 dBm

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

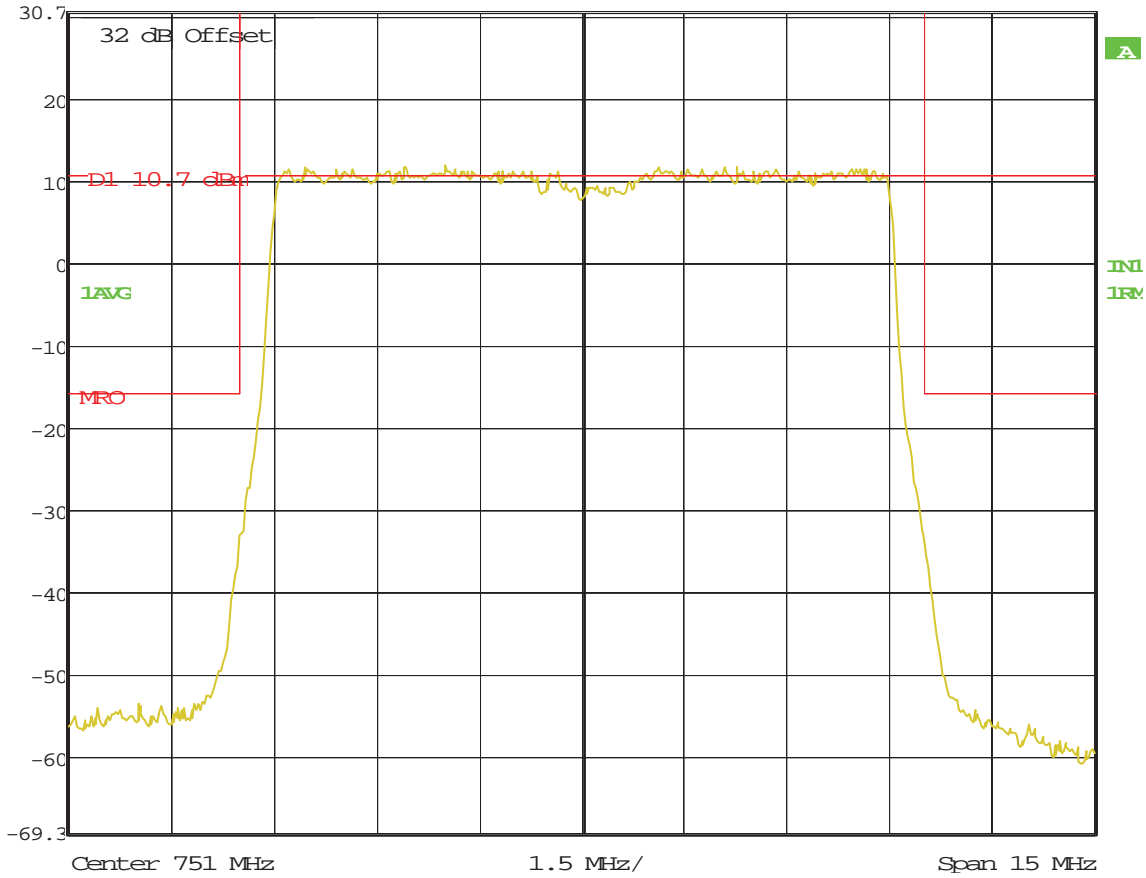


Title: OCCUPIED BANDWIDTH; Test Engineer: SEG
Comment A: 9768 MRO V1.0 B13 700U Cubedock(FLIR M2); 751 MHz, 16QAM
PWR: 1W; 2X2 MIMO, FCC PART 27.53(C); FCCID: AS5BBTRX-07
Date: 20.SEP.2012 09:24:14



Ref Lvl
30.7 dBm

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



Title: OCCUPIED BANDWIDTH; Test Engineer: SEG
Comment A: 9768 MRO V1.0 B13 700U Cubedock(FLIR M2); 751 MHz, 64QAM
PWR: 1W; 2X2 MIMO, FCC PART 27.53(C); FCCID: AS5BBTRX-07
Date: 20.SEP.2012 09:55:12

Measurement 4

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

Measurement 4

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

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 (c). Measurements were made at 1W per carrier for 10 MHz Bandwidth, and 1W 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)
	C (Lower)	748.5	5	M1	1
	C (Upper)	753.5	5	M1	1
	C	751	10	M1	1

FCC Section 27.53(c): 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. On all frequencies between 763-775 MHz and 793-805 MHz, by a factor not less than $76 + 10 \log(P)$ dB in a 6.25 kHz band segment, for base and fixed stations. 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. At frequencies where $76+10 \log(P)$ is required, the limit was made 3 dB stringent (for 10 kHz RBW, the limit will be -47dBm).

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(c).

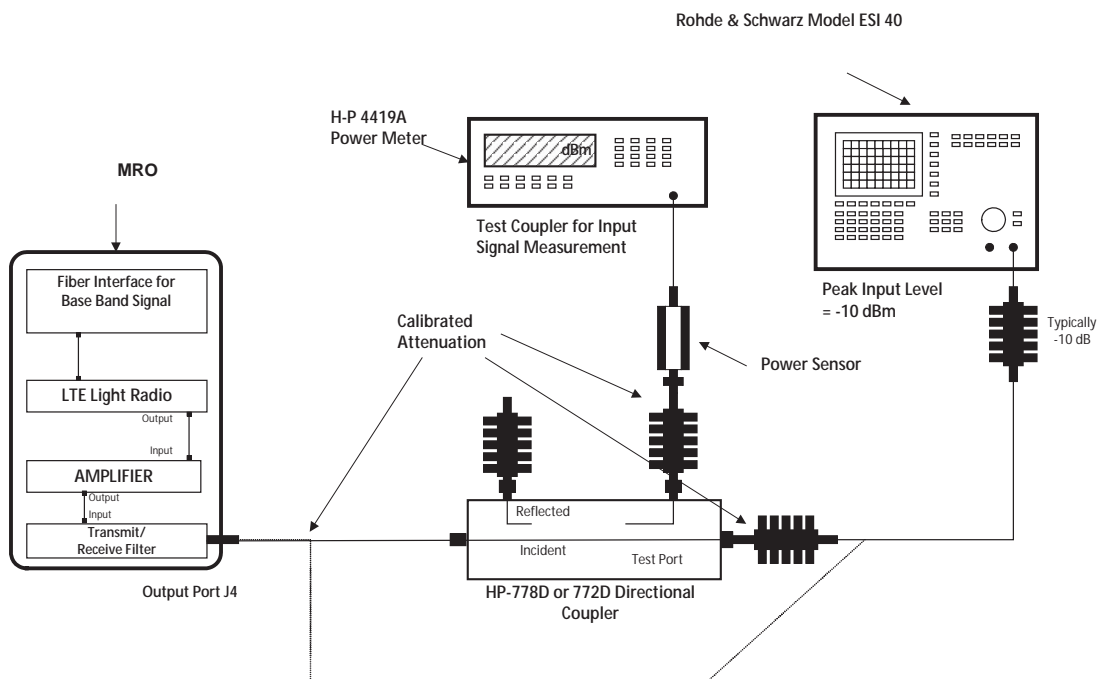
Measurement uncertainty:

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

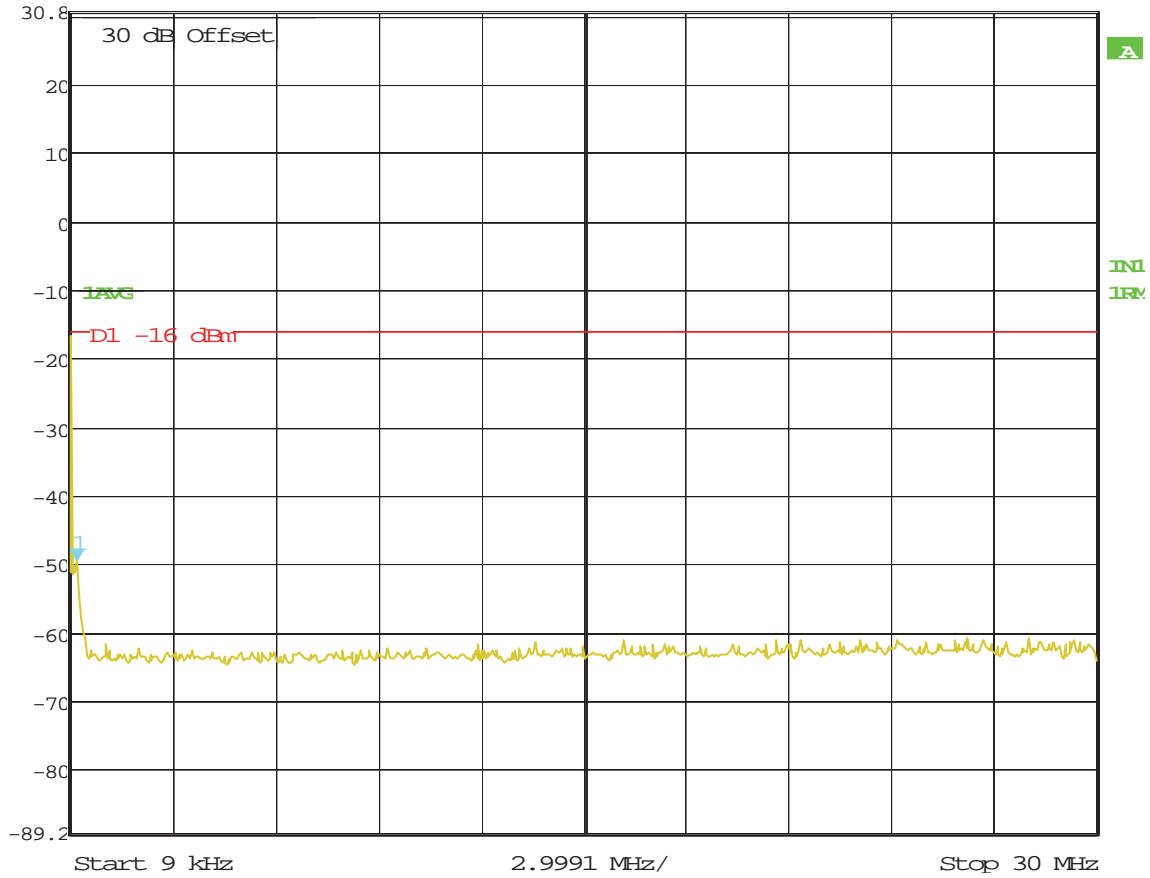


**Transmit Port
Antenna Conducted Spurious Emissions**

**Block: C (Lower)
QPSK Modulation
Bandwidth 746 – 751 MHz**



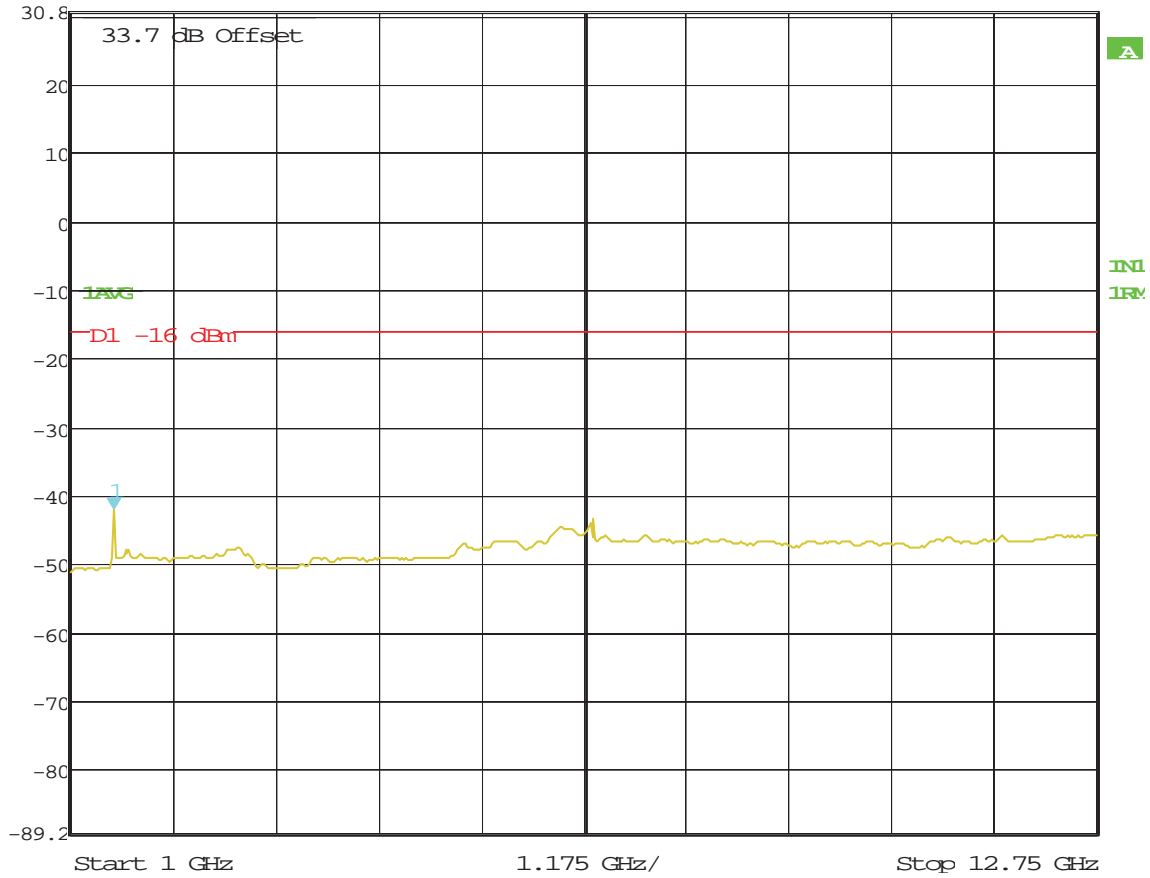
Marker 1 [T1] RBW 10 kHz RF Att 30 dB
Ref Lvl -49.45 dBm VBW 30 kHz
30.8 dBm 189.30661323 kHz SWT 760 ms Unit dBm



Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; Test Engineer: SEG
Comment A: 9768 MRO V1.0 B13 700U Cubedock (FLIR M2); 748.5MHz; QPSK
PWR: 1W; 2X2 MIMO; FCC PART 27.53(C); FCCID: AS5BBTRX-07
Date: 18.SEP.2012 11:53:52



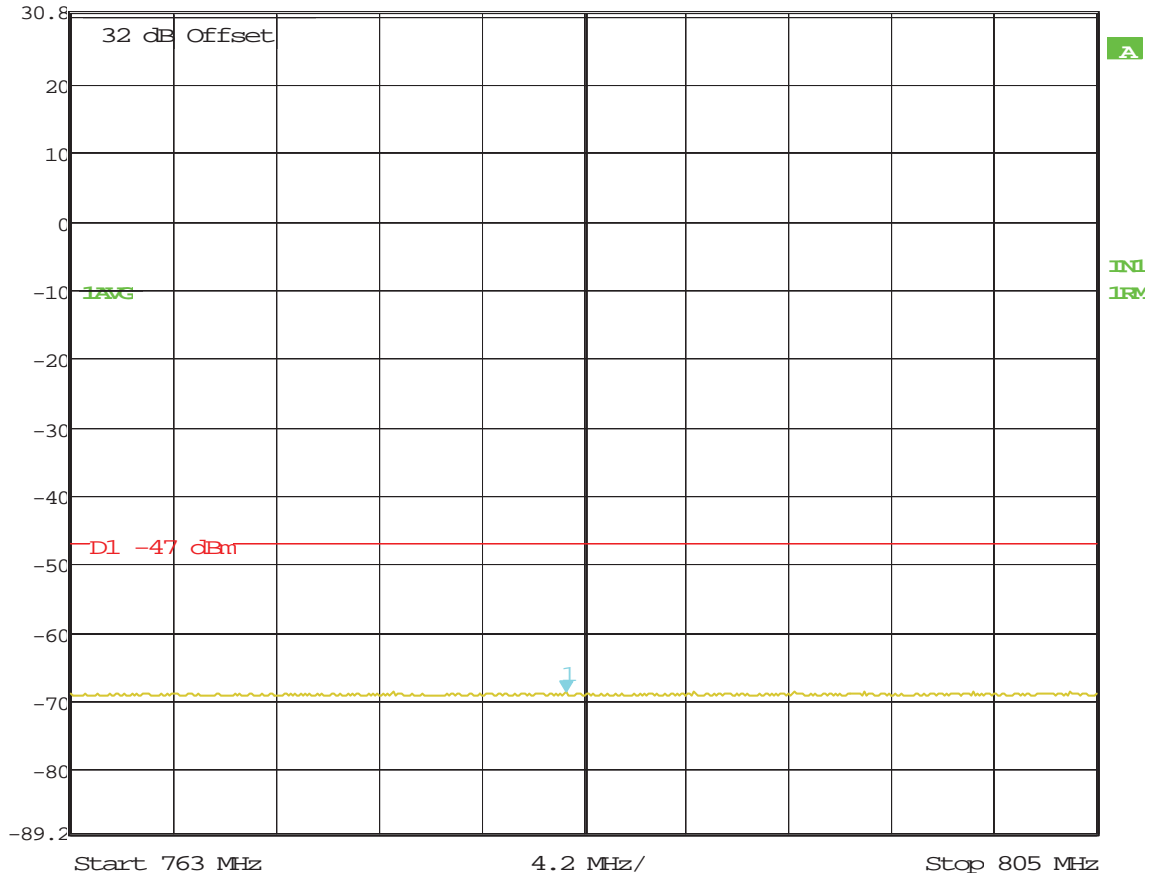
Marker 1 [T1] RBW 1 MHz RF Att 10 dB
Ref Lvl -42.05 dBm VBW 3 MHz
30.8 dBm 1.49448898 GHz SWT 120 ms Unit dBm



Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; Test Engineer: SEG
Comment A: 9768 MRO V1.0 B13 700U Cubedock (FLIR M2); 748.5MHz; QPSK
PWR: 1W; 2X2 MIMO; FCC PART 27.53(C); FCCID: AS5BBTRX-07
Date: 18.SEP.2012 11:48:10



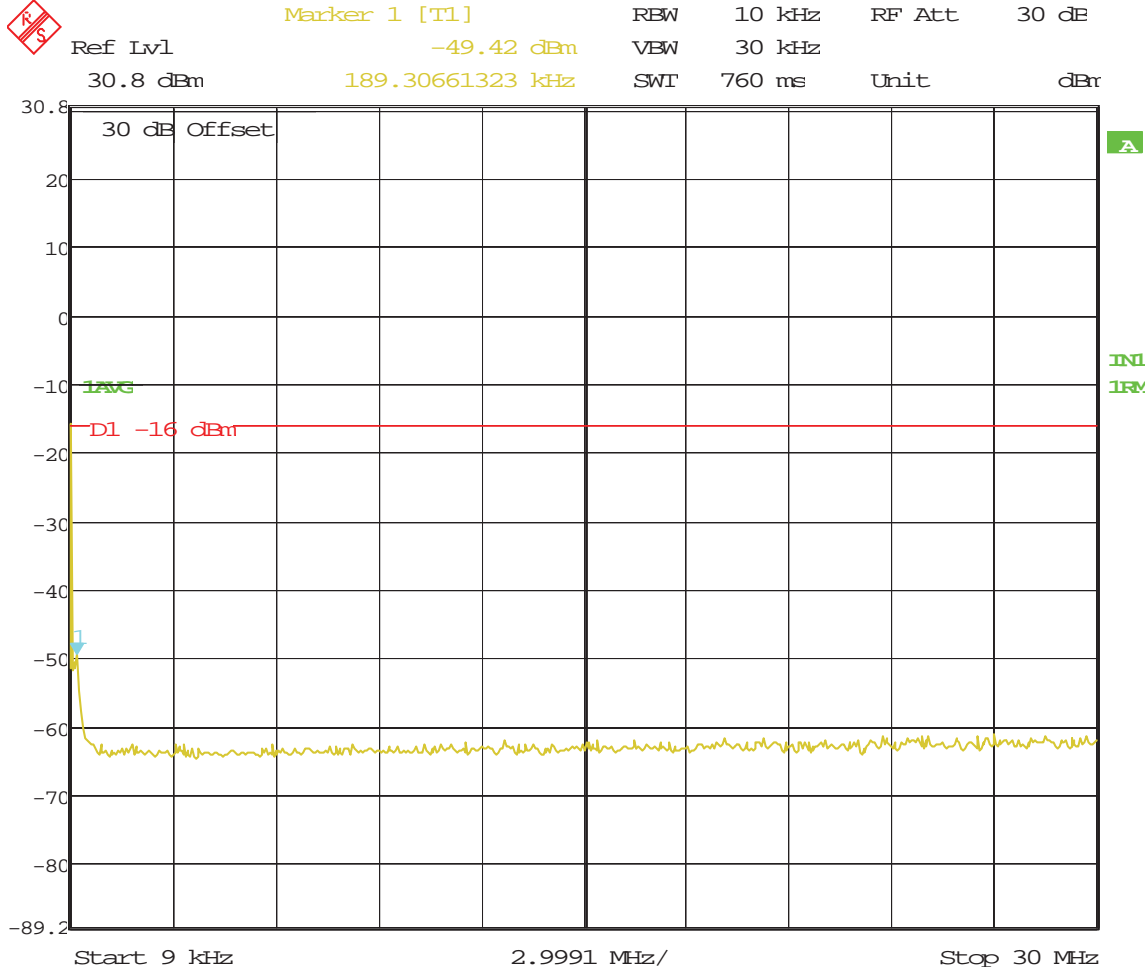
Marker 1 [T1] RBW 10 kHz RF Att 20 dB
Ref Lvl -68.70 dBm VBW 30 kHz
30.8 dBm 783.28456914 MHz SWT 1.05 s Unit dBm



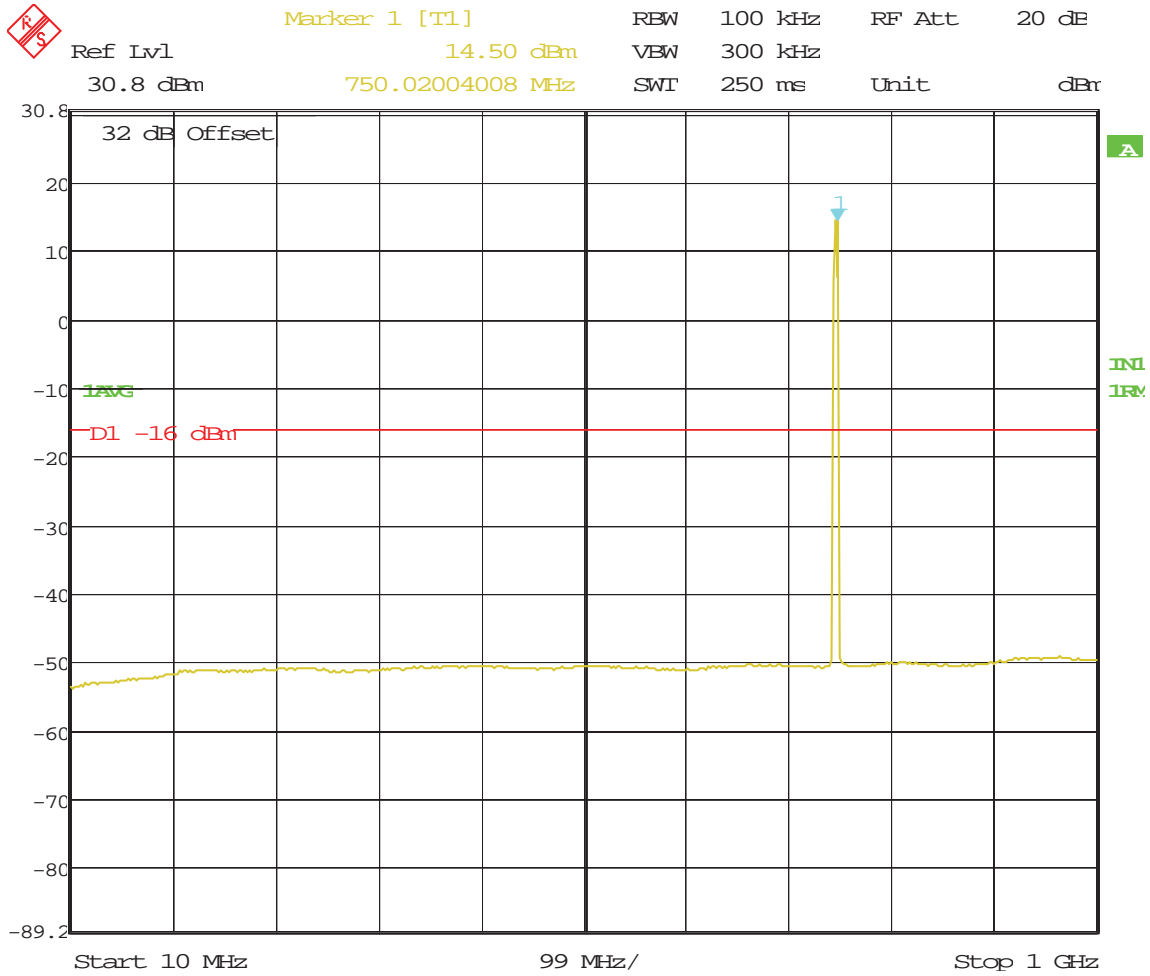
Title: SPURIOUS EMISSIONS AT TX ANTIENNA PORT; Test Engineer: SEG
Comment A: 9768 MRO V1.0 B13 700U Cubedock (FLIR M2); 748.5MHz; QPSK
PWR: 1W; 2X2 MIMO; FCC PART 27.53(C); FCCID: AS5BBTRX-07
Date: 18.SEP.2012 11:46:28

**Transmit Port
Antenna Conducted Spurious Emissions**

**Block: C (Lower)
16QAM Modulation
Bandwidth 746 – 751 MHz**



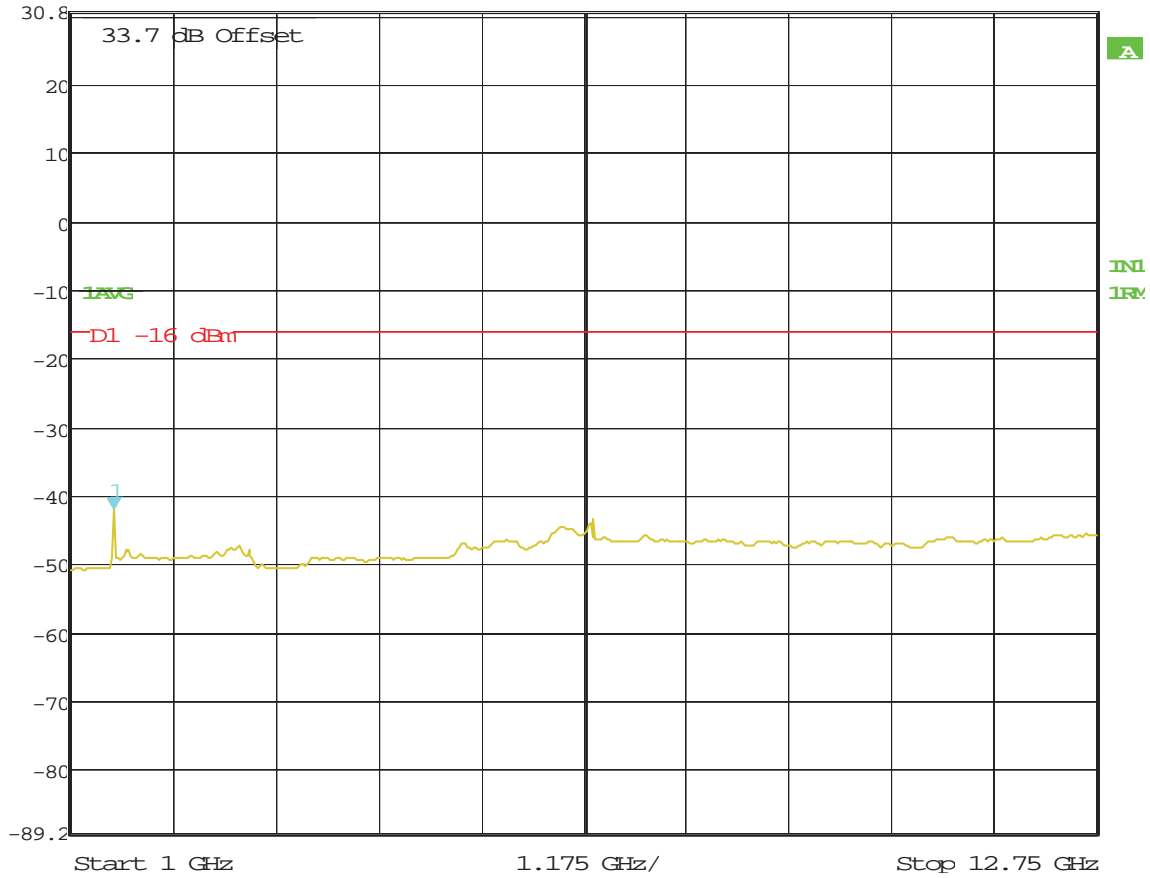
Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; Test Engineer: SEG
Comment A: 9768 MRO V1.0 B13 700U Cubedock (FLIR M2); 748.5MHz; 16QAM
PWR: 1W; 2X2 MIMO; FCC PART 27.53(C); FCCID: AS5BBTRX-07
Date: 18.SEP.2012 12:25:35



Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; Test Engineer: SEG
Comment A: 9768 MRO V1.0 B13 700U Cubedock (FLIR M2); 748.5MHz; 16QAM
PWR: 1W; 2X2 MIMO; FCC PART 27.53(C); FCCID: AS5BBTRX-07
Date: 18.SEP.2012 12:27:41



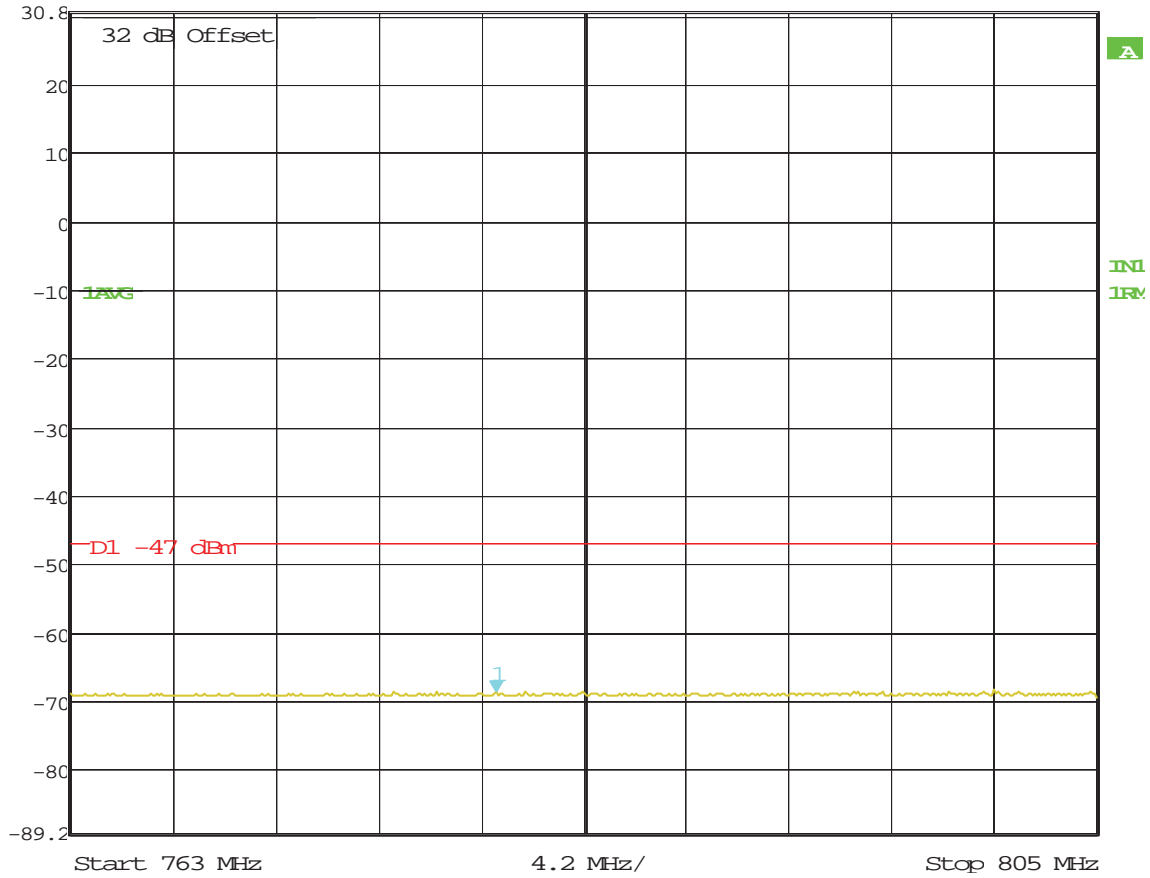
Marker 1 [T1] RBW 1 MHz RF Att 10 dB
Ref Lvl -41.93 dBm VBW 3 MHz
30.8 dBm 1.49448898 GHz SWT 120 ms Unit dBm



Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; Test Engineer: SEG
Comment A: 9768 MRO V1.0 B13 700U Cubedock (FLIR M2); 748.5MHz; 16QAM
PWR: 1W; 2X2 MIMO; FCC PART 27.53(C); FCCID: AS5BBTRX-07
Date: 18.SEP.2012 12:29:22



Marker 1 [T1] RBW 10 kHz RF Att 20 dB
Ref Lvl -68.71 dBm VBW 30 kHz
30.8 dBm 780.42284569 MHz SWT 1.05 s Unit dBm



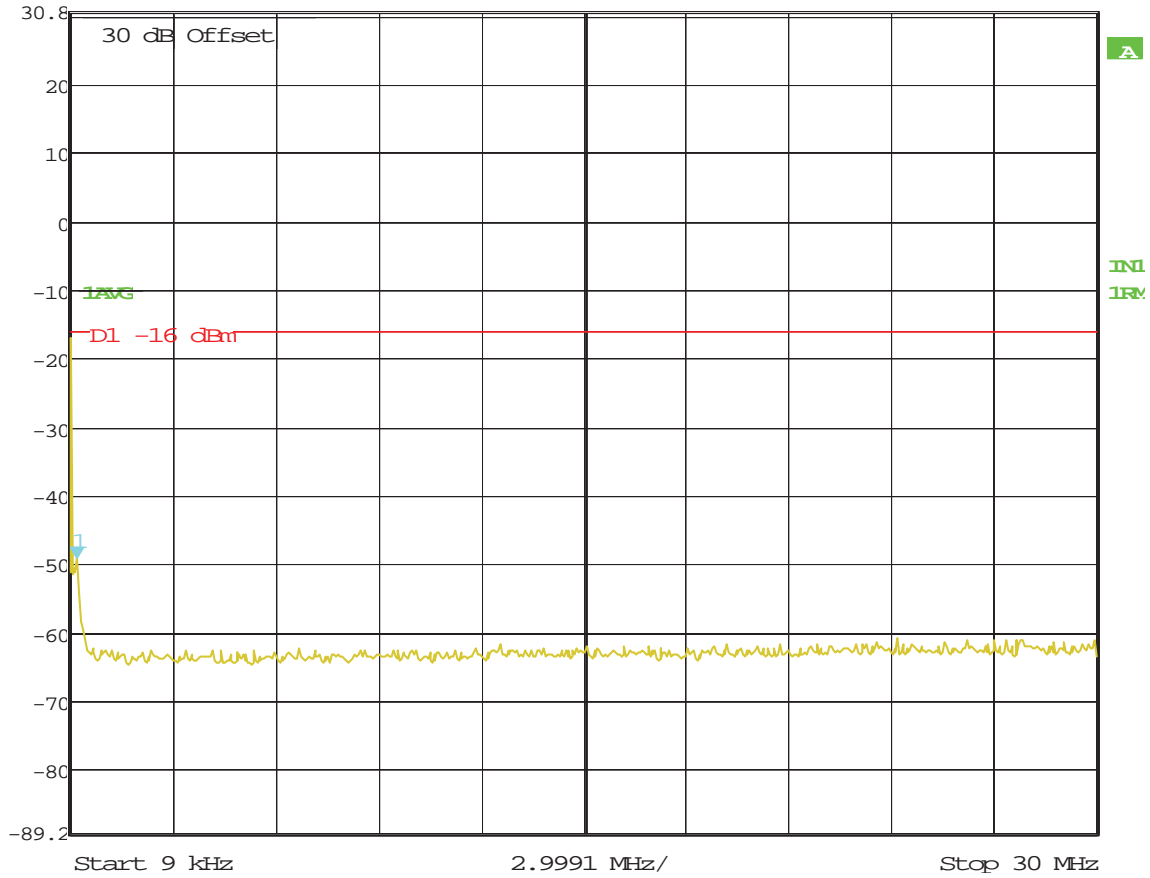
Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; Test Engineer: SEG
Comment A: 9768 MRO V1.0 B13 700U Cubedock (FLIR M2); 748.5MHz; 16QAM
PWR: 1W; 2X2 MIMO; FCC PART 27.53(C); FCCID: AS5BBTRX-07
Date: 18.SEP.2012 12:31:30

**Transmit Port
Antenna Conducted Spurious Emissions**

**Block: C (Lower)
64QAM Modulation
Bandwidth 746 – 751 MHz**



Marker 1 [T1] RBW 10 kHz RF Att 30 dB
Ref Lvl -49.23 dBm VBW 30 kHz
30.8 dBm 189.30661323 kHz SWT 760 ms Unit dBm



Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; Test Engineer: SEG
Comment A: 9768 MRO V1.0 B13 700U Cubedock (FLIR M2); 748.5MHz; 64QAM
PWR: 1W; 2X2 MIMO; FCC PART 27.53(C); FCCID: AS5BBTRX-07
Date: 19.SEP.2012 07:46:07



Marker 1 [T1]

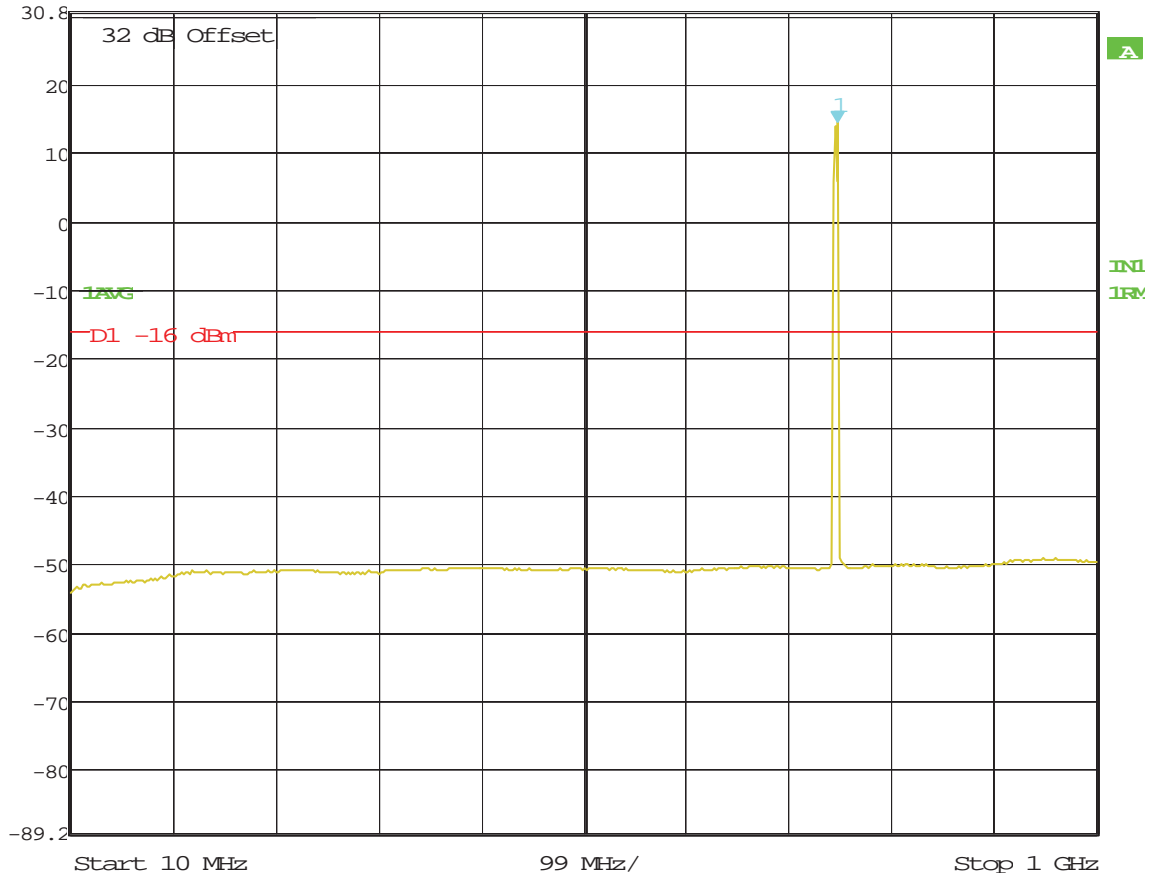
RBW 100 kHz RF Att 20 dB

Ref Lvl 30.8 dBm 14.37 dBm

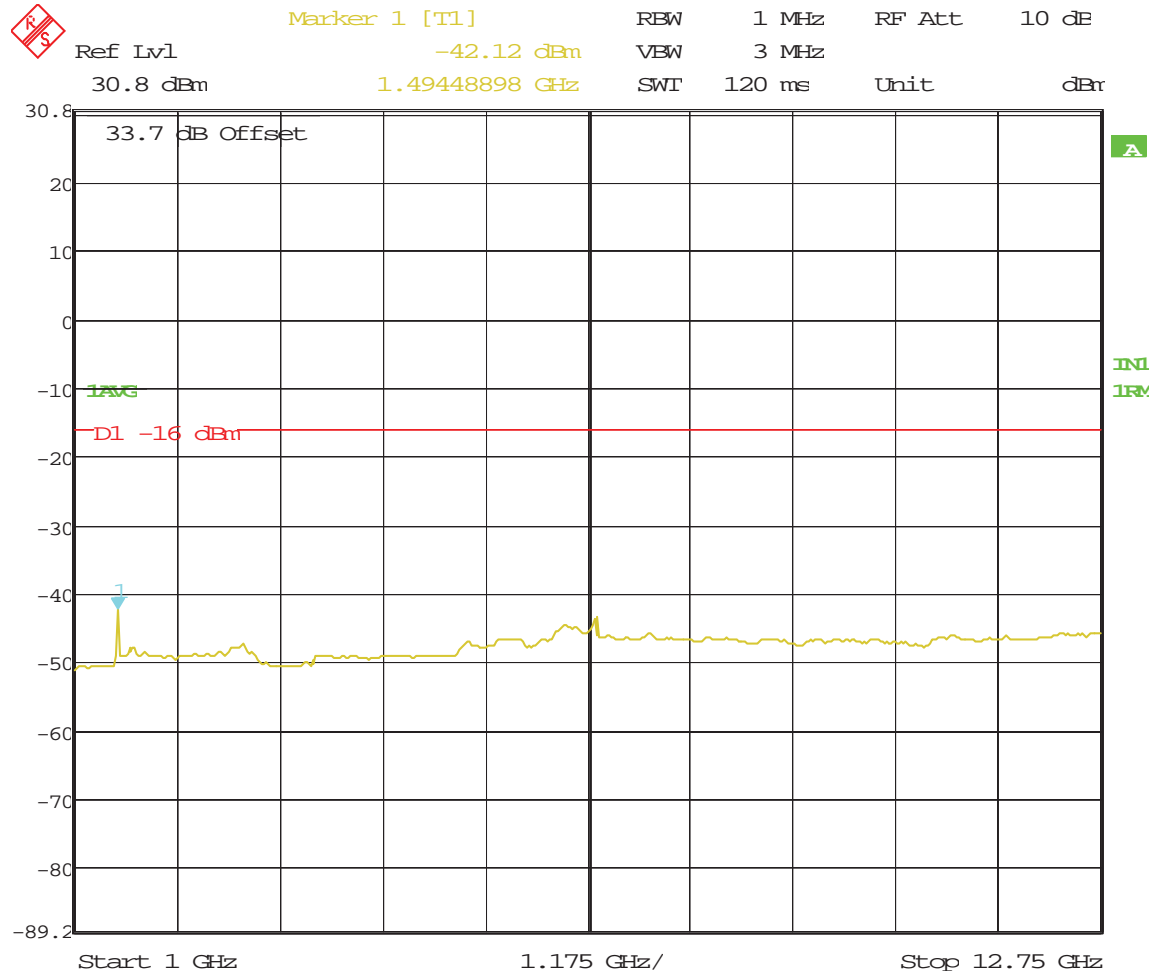
VBW 300 kHz

750.02004008 MHz

SWT 250 ms Unit dBm



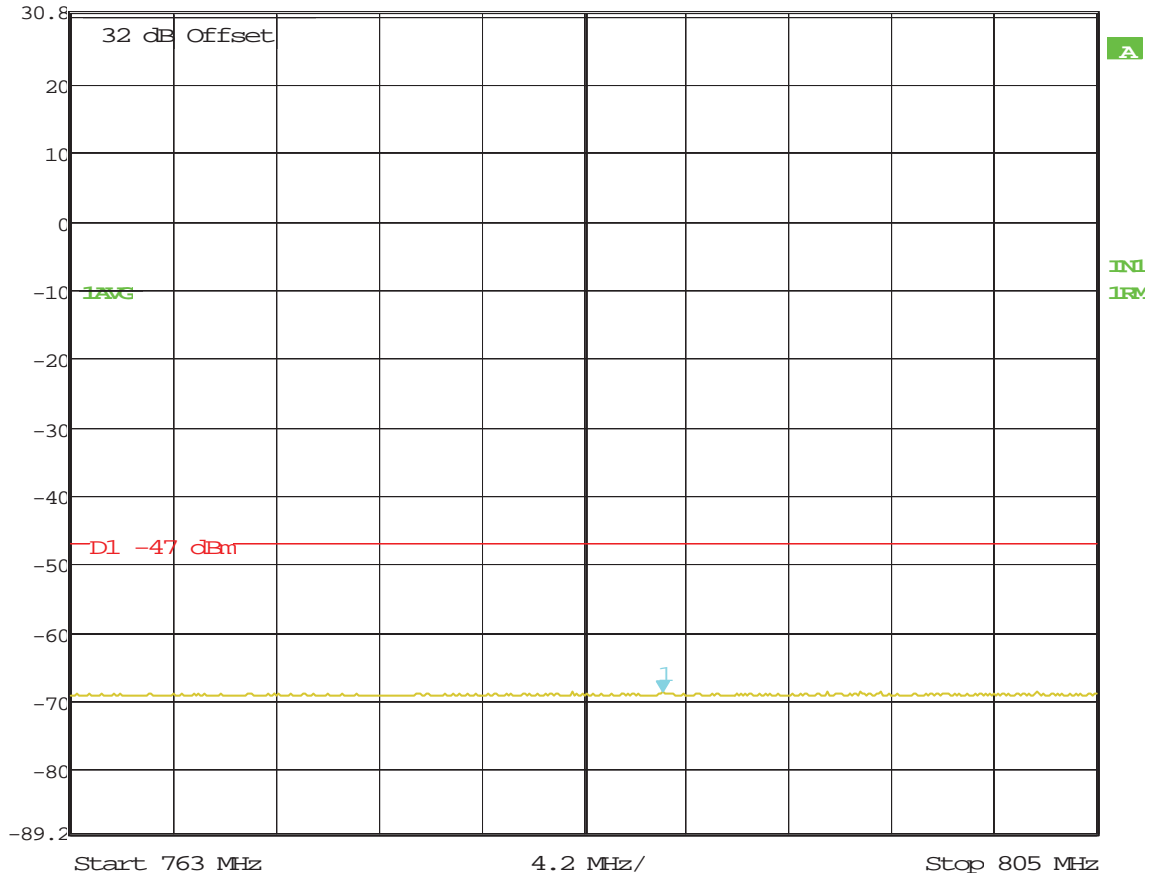
Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; Test Engineer: SEG
Comment A: 9768 MRO V1.0 B13 700U Cubedock (FLIR M2); 748.5MHz; 64QAM
PWR: 1W; 2X2 MIMO; FCC PART 27.53(C); FCCID: AS5BBTRX-07
Date: 19.SEP.2012 07:44:39



Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; Test Engineer: SEG
Comment A: 9768 MRO V1.0 B13 700U Cubedock (FLIR M2); 748.5MHz; 64QAM
PWR: 1W; 2X2 MIMO; FCC PART 27.53(C); FCCID: AS5BBTRX-07
Date: 19.SEP.2012 07:42:41



Marker 1 [T1] RBW 10 kHz RF Att 20 dB
Ref Lvl -68.65 dBm VBW 30 kHz
30.8 dBm 787.24048096 MHz SWT 1.05 s Unit dBm



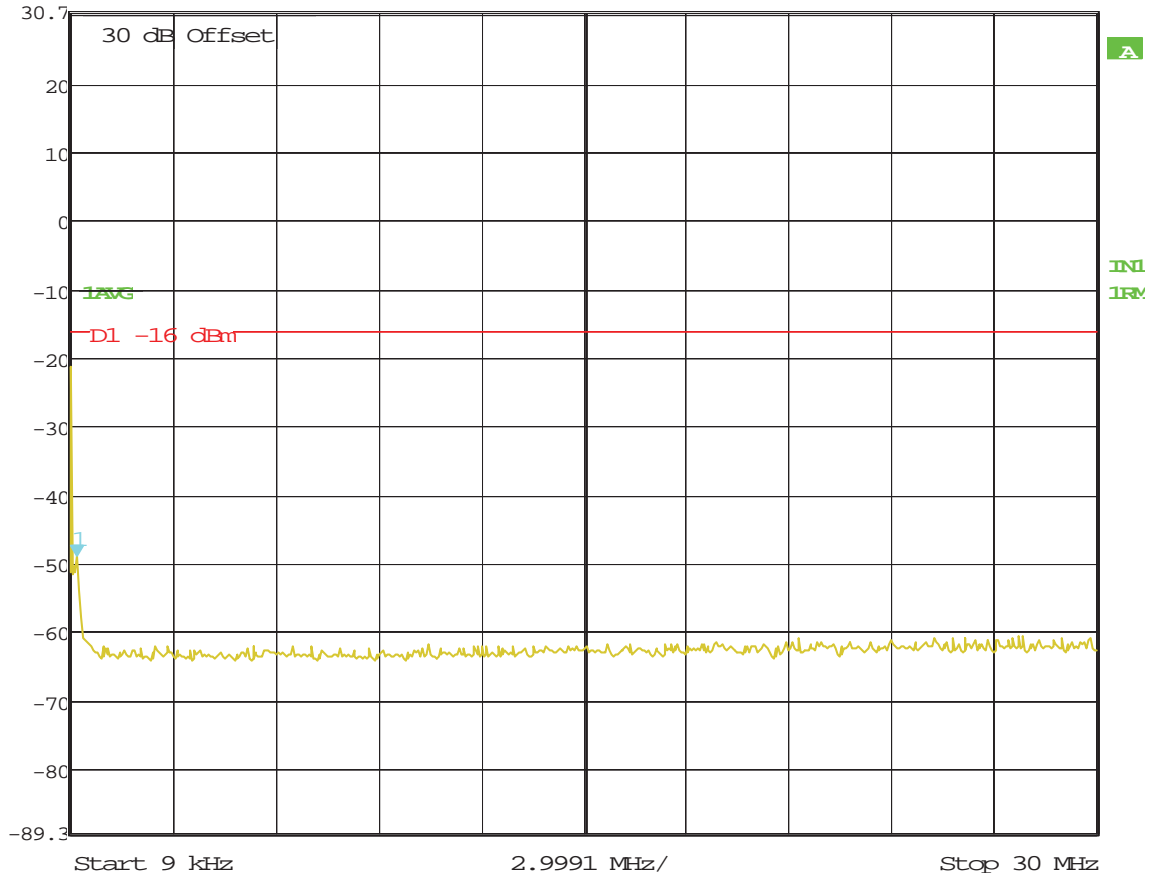
Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; Test Engineer: SEG
Comment A: 9768 MRO V1.0 B13 700U Cubedock (FLIR M2); 748.5MHz; 64QAM
PWR: 1W; 2X2 MIMO; FCC PART 27.53(C); FCCID: AS5BBTRX-07
Date: 19.SEP.2012 07:41:18

**Transmit Port
Antenna Conducted Spurious Emissions**

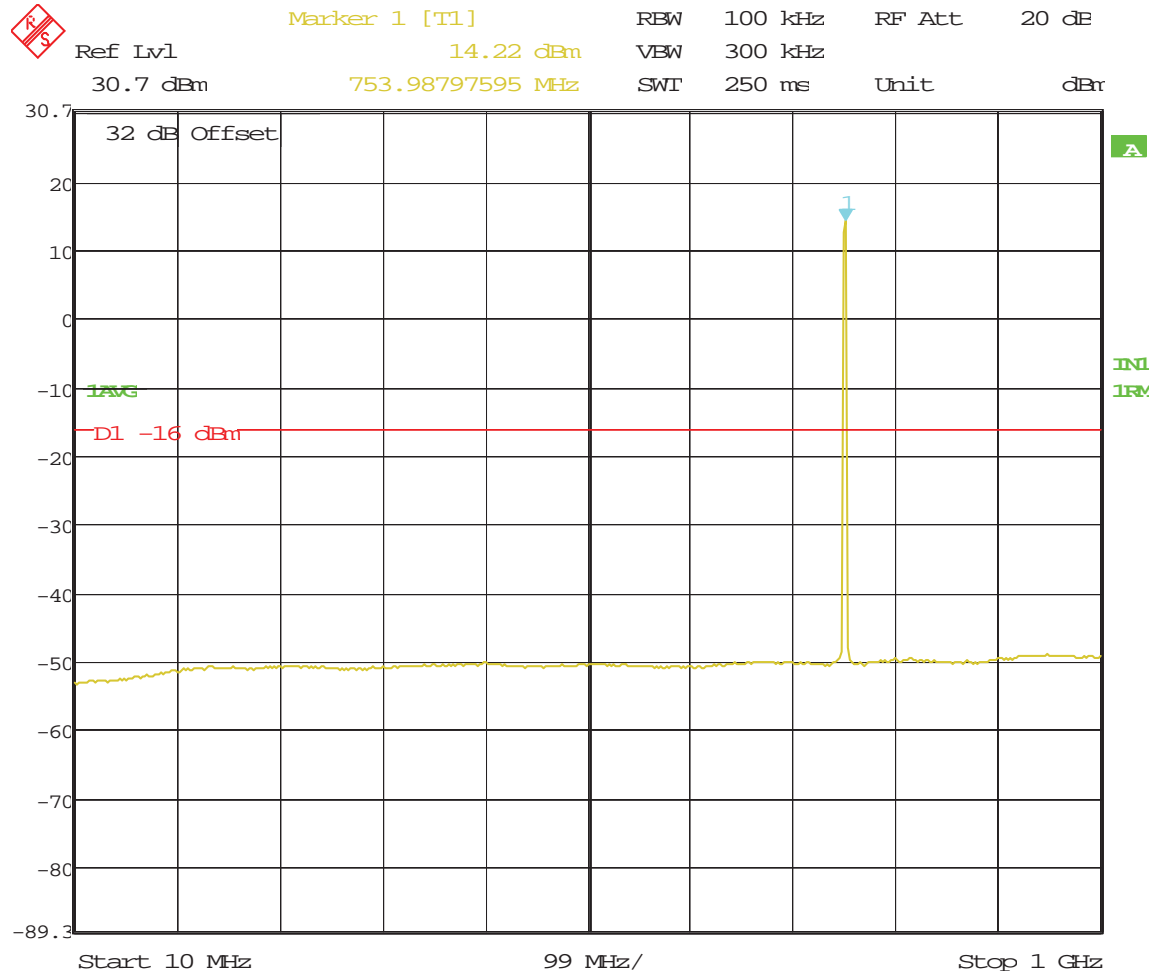
**Block: C (Upper)
QPSK Modulation
Bandwidth 751 – 756 MHz**



Marker 1 [T1] RBW 10 kHz RF Att 30 dB
Ref Lvl -49.08 dBm VBW 30 kHz
30.7 dBm 189.30661323 kHz SWT 760 ms Unit dBm



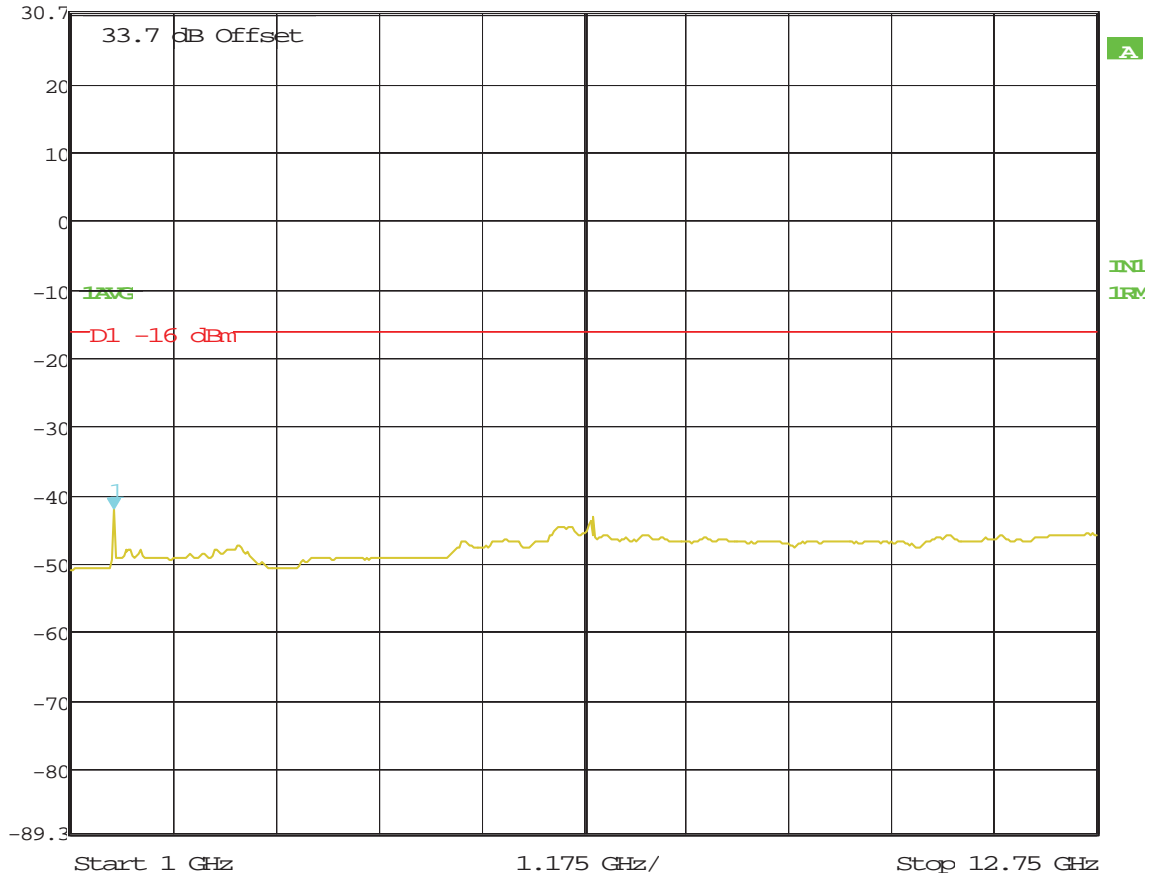
Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; Test Engineer: SEG
Comment A: 9768 MRO V1.0 B13 700U Cubedock (FLIR M2); 753.5MHz; QPSK
PWR: 1W; 2X2 MIMO; FCC PART 27.53(C); FCCID: AS5BBTRX-07
Date: 19.SEP.2012 14:50:27



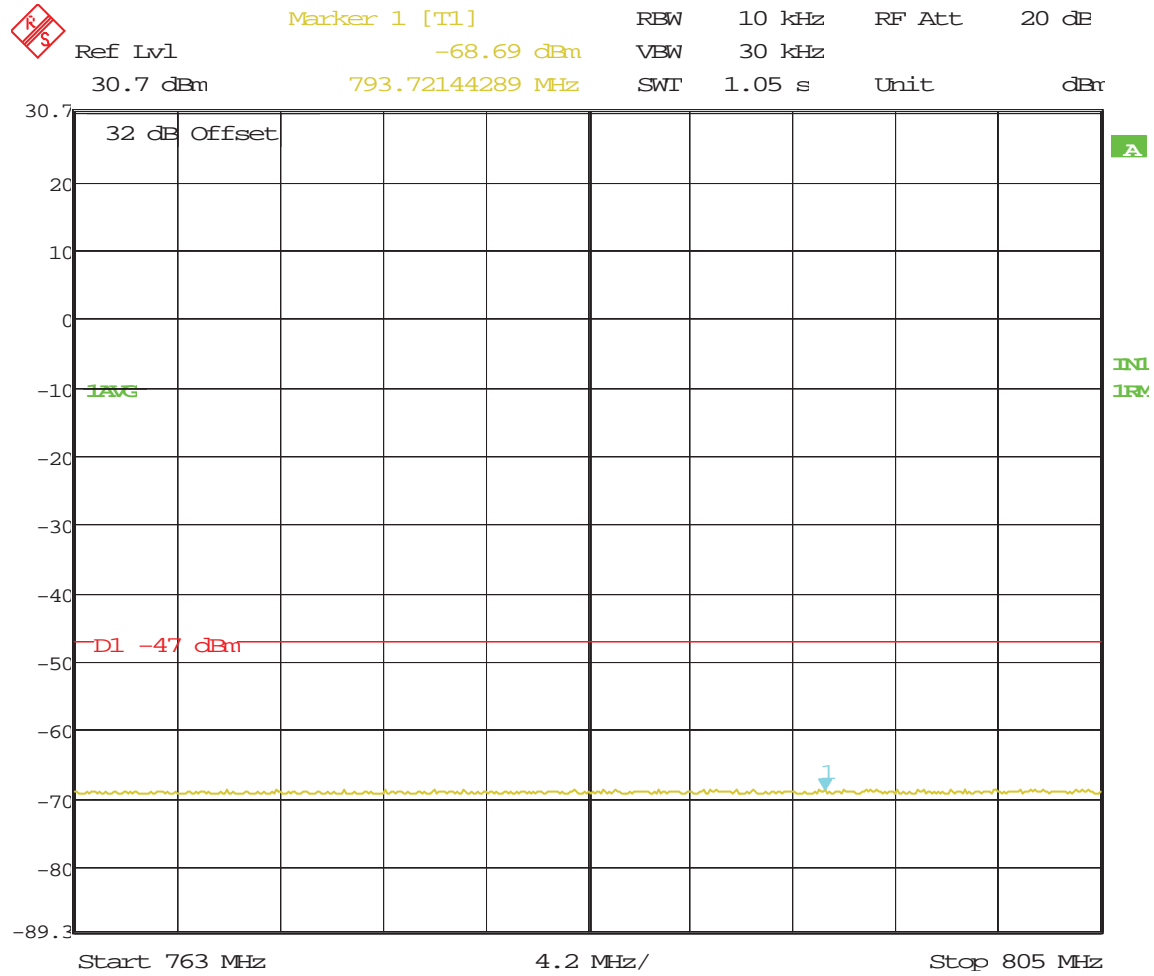
Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; Test Engineer: SEG
Comment A: 9768 MRO V1.0 B13 700U Cubedock (FLIR M2); 753.5MHz; QPSK
PWR: 1W; 2X2 MIMO; FCC PART 27.53(C); FCCID: AS5BBTRX-07
Date: 19.SEP.2012 14:49:06



Marker 1 [T1] RBW 1 MHz RF Att 10 dB
Ref Lvl -42.17 dBm VBW 3 MHz
30.7 dBm 1.49448898 GHz SWT 120 ms Unit dBm



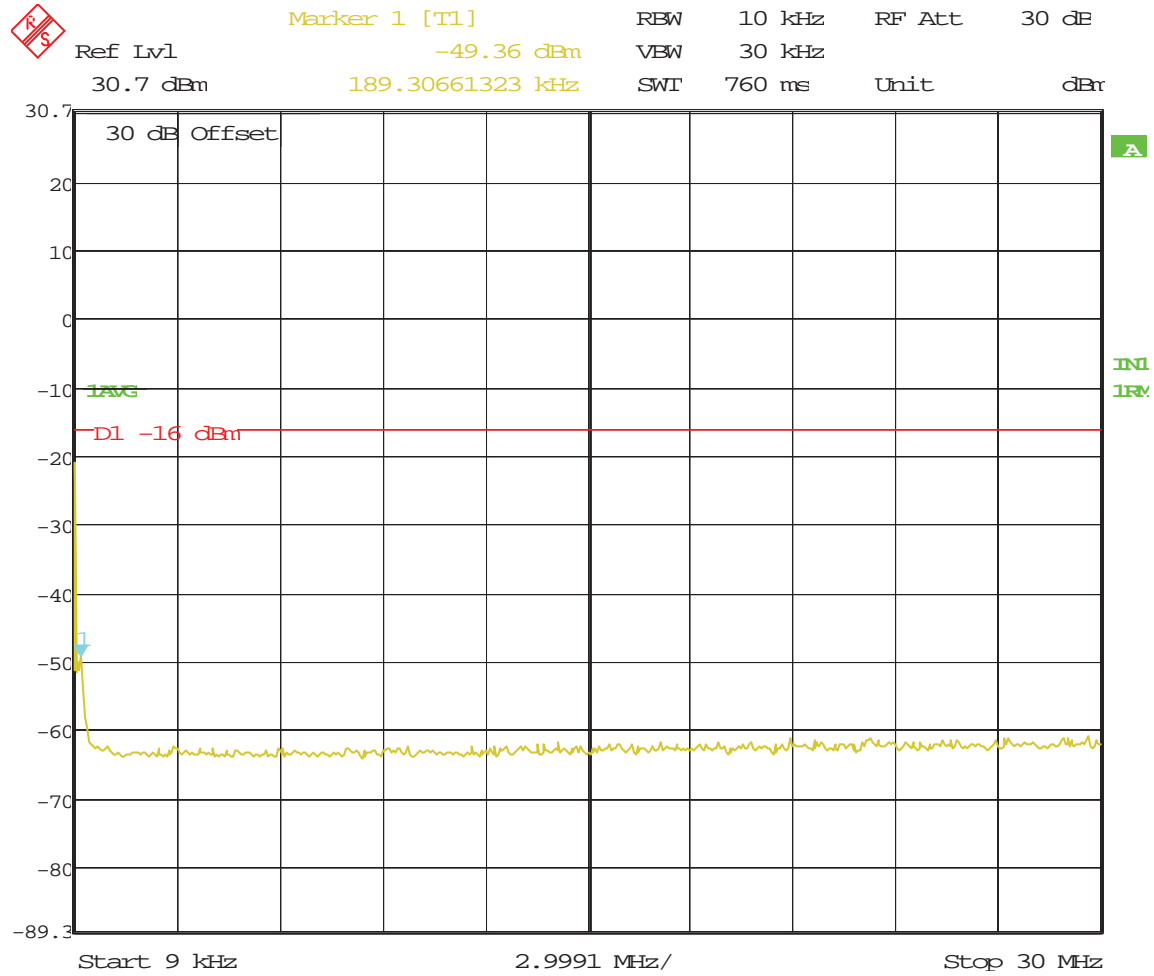
Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; Test Engineer: SEG
Comment A: 9768 MRO V1.0 B13 700U Cubedock (FLIR M2); 753.5MHz; QPSK
PWR: 1W; 2X2 MIMO; FCC PART 27.53(C); FCCID: AS5BBTRX-07
Date: 19.SEP.2012 14:47:14



Title: SPURIOUS EMISSIONS AT TX ANTIENNA PORT; Test Engineer: SEG
Comment A: 9768 MRO V1.0 B13 700U Cubedock (FLIR M2); 753.5MHz; QPSK
PWR: 1W; 2X2 MIMO; FCC PART 27.53(C); FCCID: AS5BBTRX-07
Date: 19.SEP.2012 14:45:47

**Transmit Port
Antenna Conducted Spurious Emissions**

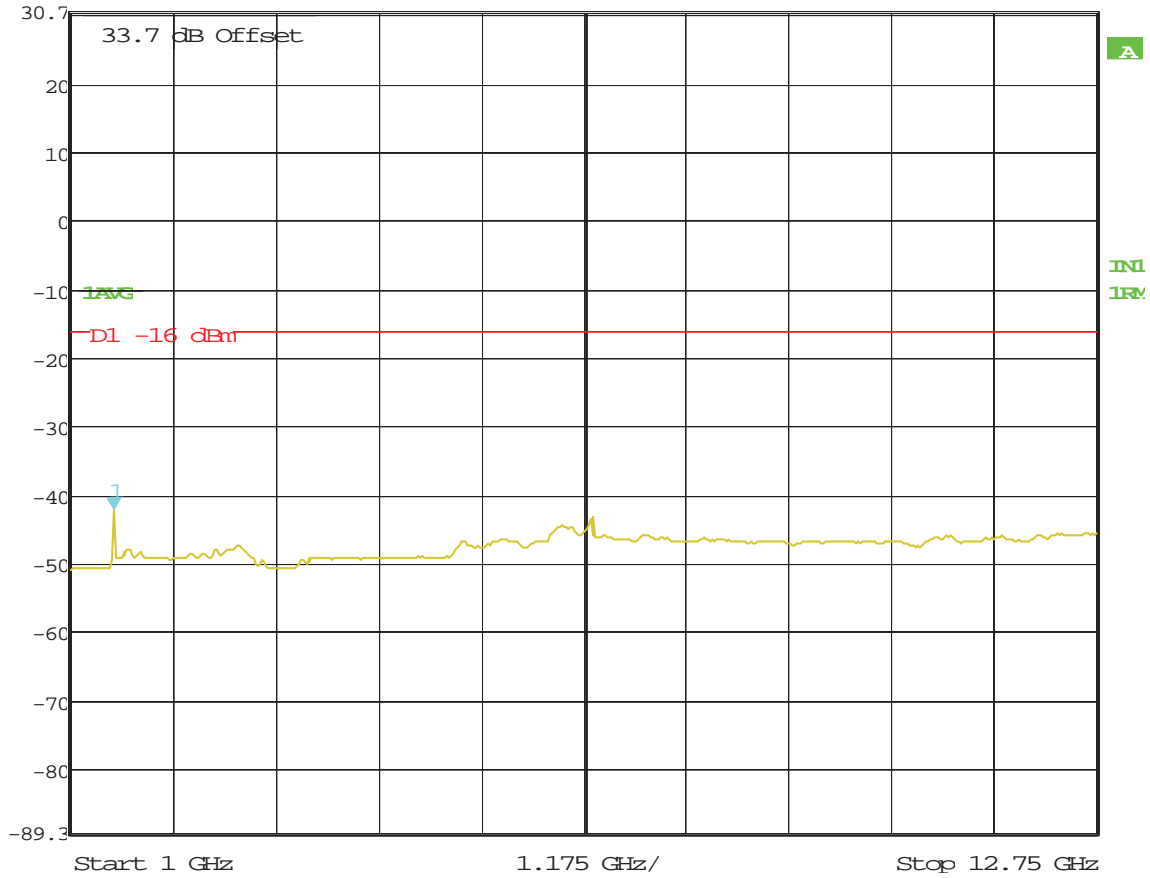
**Block: C (Upper)
16QAM Modulation
Bandwidth 751 – 756 MHz**



Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; Test Engineer: SEG
Comment A: 9768 MRO V1.0 B13 700U Cubedock (FLIR M2); 753.5MHz; 16QAM
PWR: 1W; 2X2 MIMO; FCC PART 27.53(C); FCCID: AS5BBTRX-07
Date: 19.SEP.2012 15:03:29



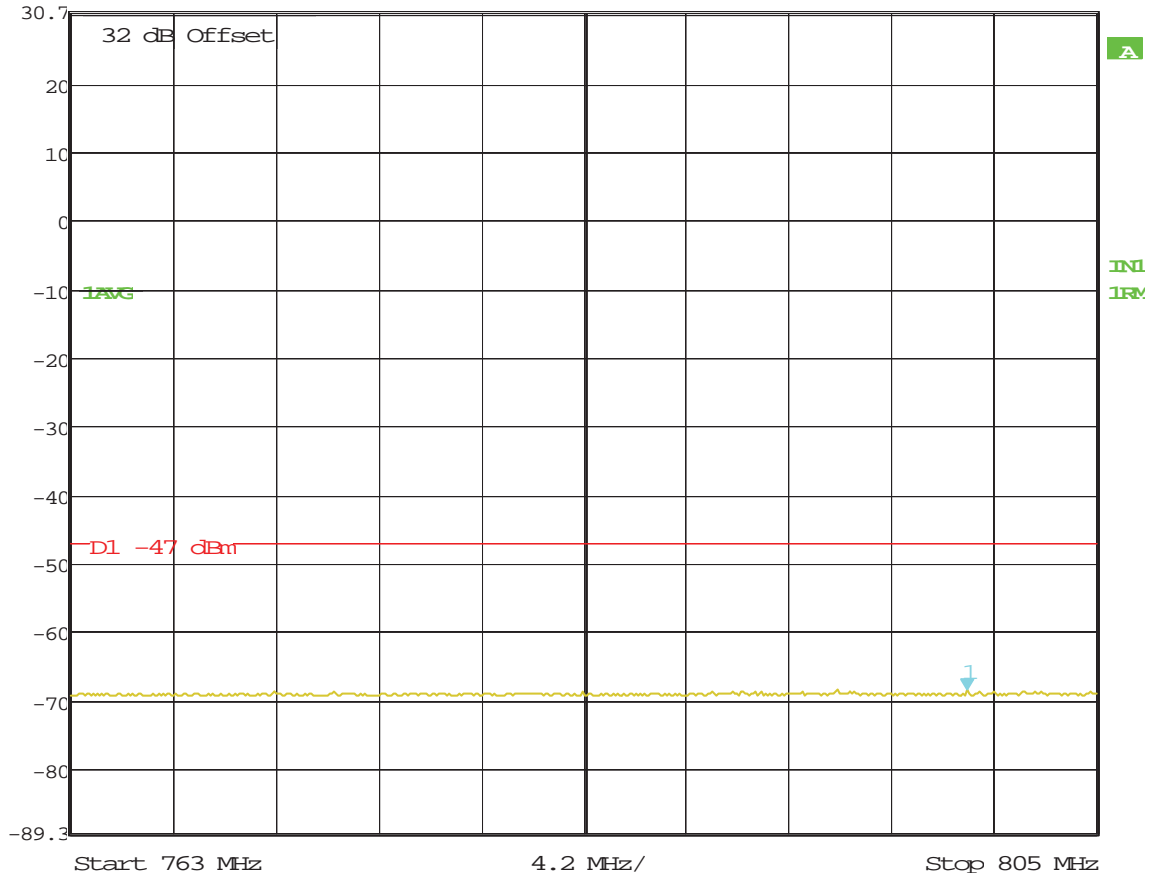
Marker 1 [T1] RBW 1 MHz RF Att 10 dB
Ref Lvl -42.19 dBm VBW 3 MHz
30.7 dBm 1.49448898 GHz SWT 120 ms Unit dBm



Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; Test Engineer: SEG
Comment A: 9768 MRO V1.0 B13 700U Cubedock (FLIR M2); 753.5MHz; 16QAM
PWR: 1W; 2X2 MIMO; FCC PART 27.53(C); FCCID: AS5BBTRX-07
Date: 19.SEP.2012 15:06:23



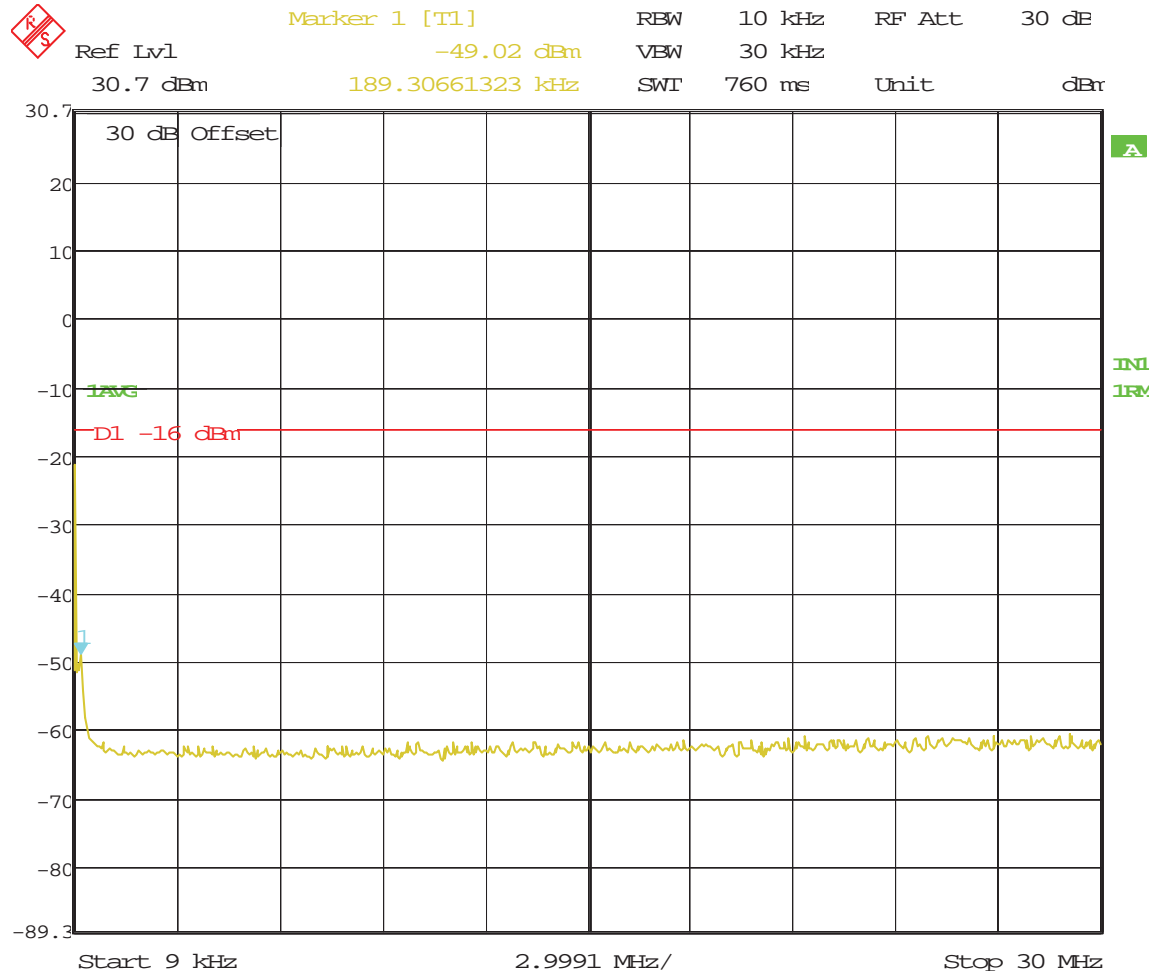
Marker 1 [T1] RBW 10 kHz RF Att 20 dB
Ref Lvl -68.40 dBm VBW 30 kHz
30.7 dBm 799.69739479 MHz SWT 1.05 s Unit dBm



Title: SPURIOUS EMISSIONS AT TX ANTIENNA PORT; Test Engineer: SEG
Comment A: 9768 MRO V1.0 B13 700U Cubedock (FLIR M2); 753.5MHz; 16QAM
PWR: 1W; 2X2 MIMO; FCC PART 27.53(C); FCCID: AS5BBTRX-07
Date: 19.SEP.2012 15:08:43

**Transmit Port
Antenna Conducted Spurious Emissions**

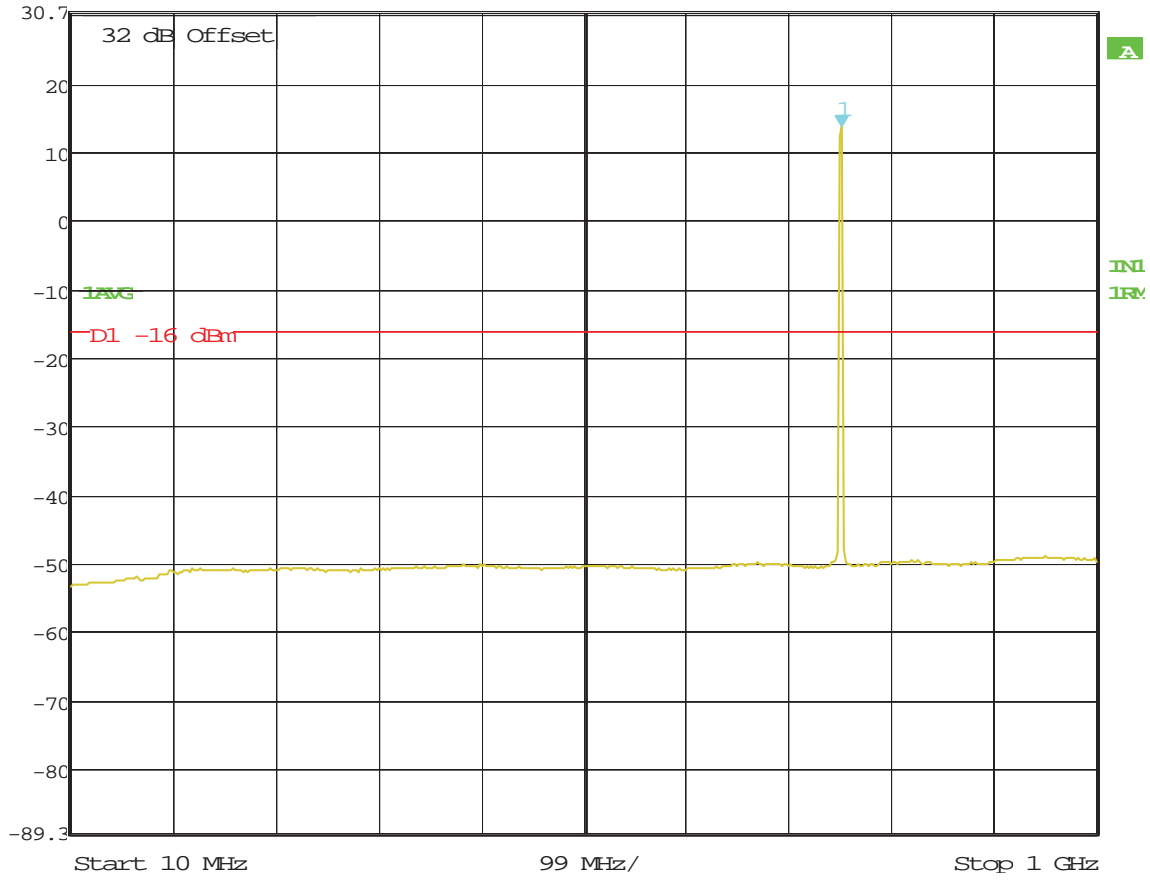
**Block: C (Upper)
64QAM Modulation
Bandwidth 751 – 756 MHz**



Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; Test Engineer: SEG
Comment A: 9768 MRO V1.0 B13 700U Cubedock (FLIR M2); 753.5MHz; 64QAM
PWR: 1W; 2X2 MIMO; FCC PART 27.53(C); FCCID: AS5BBTRX-07
Date: 20.SEP.2012 08:00:47



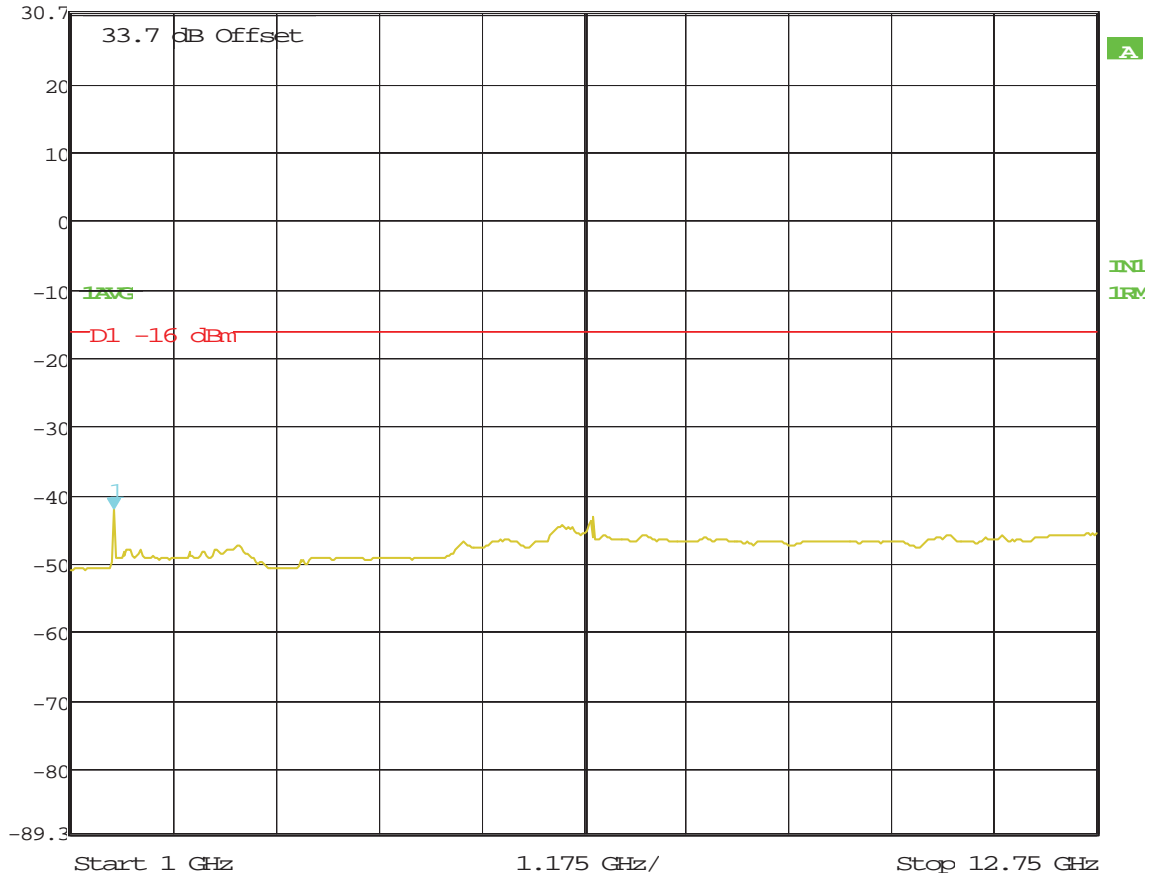
Marker 1 [T1] RBW 100 kHz RF Att 20 dB
Ref Lvl 30.7 dBm 13.73 dBm VBW 300 kHz
30.7 dBm 753.98797595 MHz SWT 250 ms Unit dBm



Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; Test Engineer: SEG
Comment A: 9768 MRO V1.0 B13 700U Cubedock (FLIR M2); 753.5MHz; 64QAM
PWR: 1W; 2X2 MIMO; FCC PART 27.53(C); FCCID: AS5BBTRX-07
Date: 20.SEP.2012 07:59:20



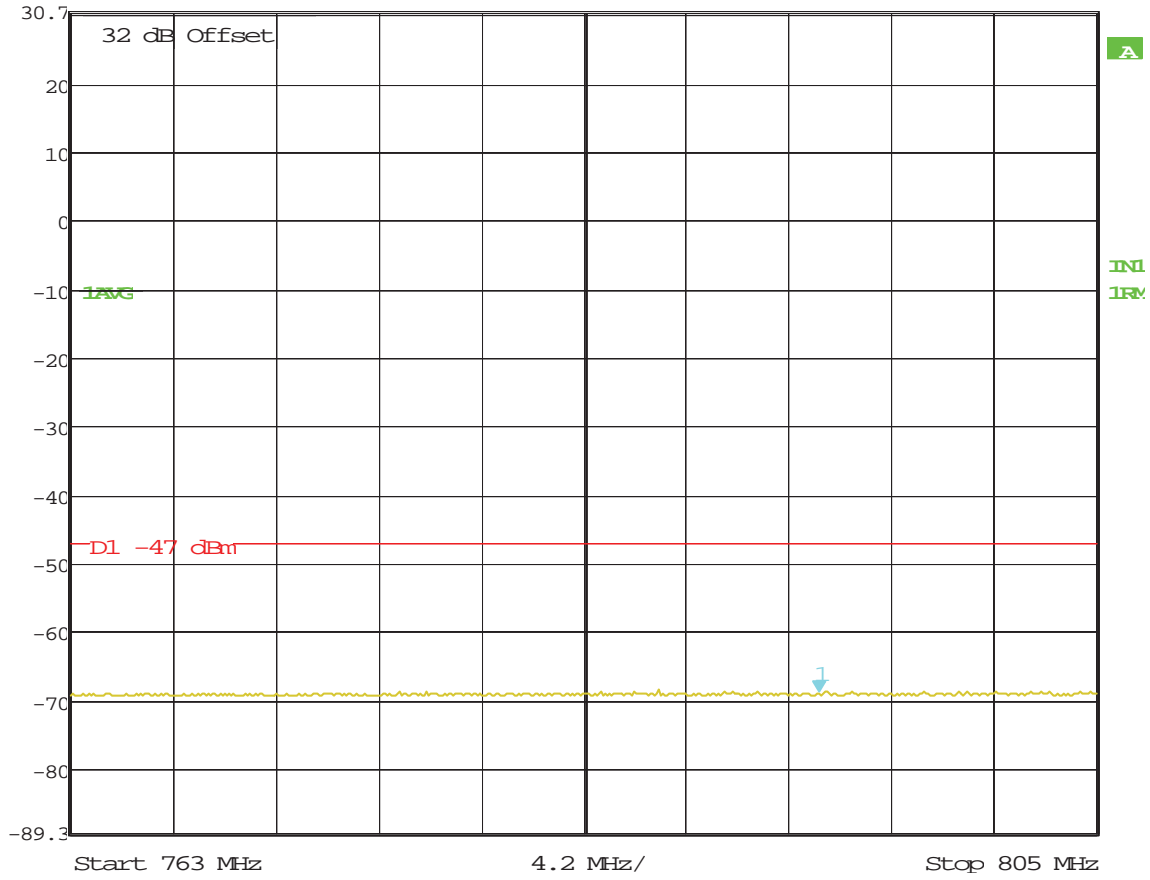
Marker 1 [T1] RBW 1 MHz RF Att 10 dB
Ref Lvl -42.05 dBm VBW 3 MHz
30.7 dBm 1.49448898 GHz SWT 120 ms Unit dBm



Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; Test Engineer: SEG
Comment A: 9768 MRO V1.0 B13 700U Cubedock (FLIR M2); 753.5MHz; 64QAM
PWR: 1W; 2X2 MIMO; FCC PART 27.53(C); FCCID: AS5BBTRX-07
Date: 20.SEP.2012 07:56:43



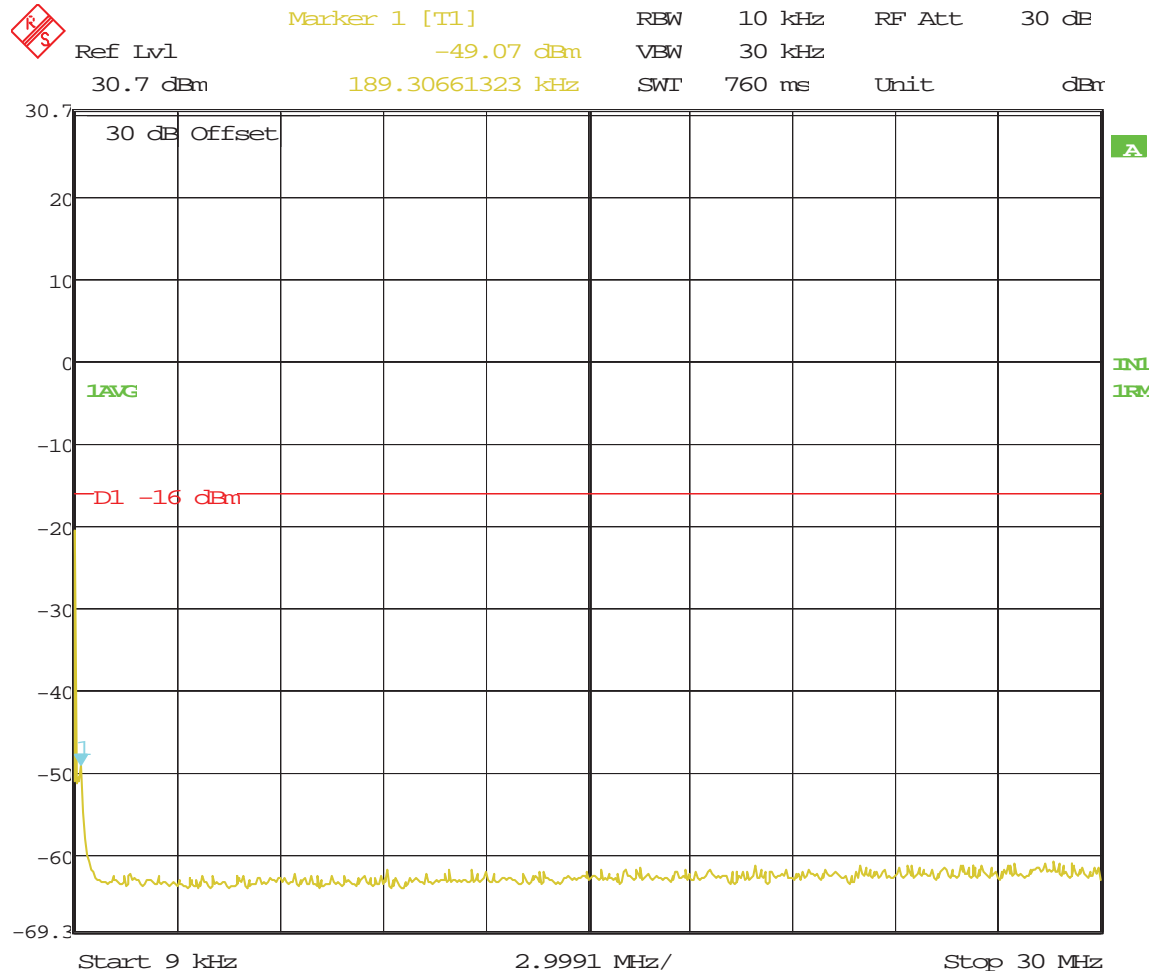
Marker 1 [T1] RBW 10 kHz RF Att 20 dB
Ref Lvl -68.74 dBm VBW 30 kHz
30.7 dBm 793.63727455 MHz SWT 1.05 s Unit dBm



Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; Test Engineer: SEG
Comment A: 9768 MRO V1.0 B13 700U Cubedock (FLIR M2); 753.5MHz; 64QAM
PWR: 1W; 2X2 MIMO; FCC PART 27.53(C); FCCID: AS5BBTRX-07
Date: 20.SEP.2012 07:55:21

**Transmit Port
Antenna Conducted Spurious Emissions**

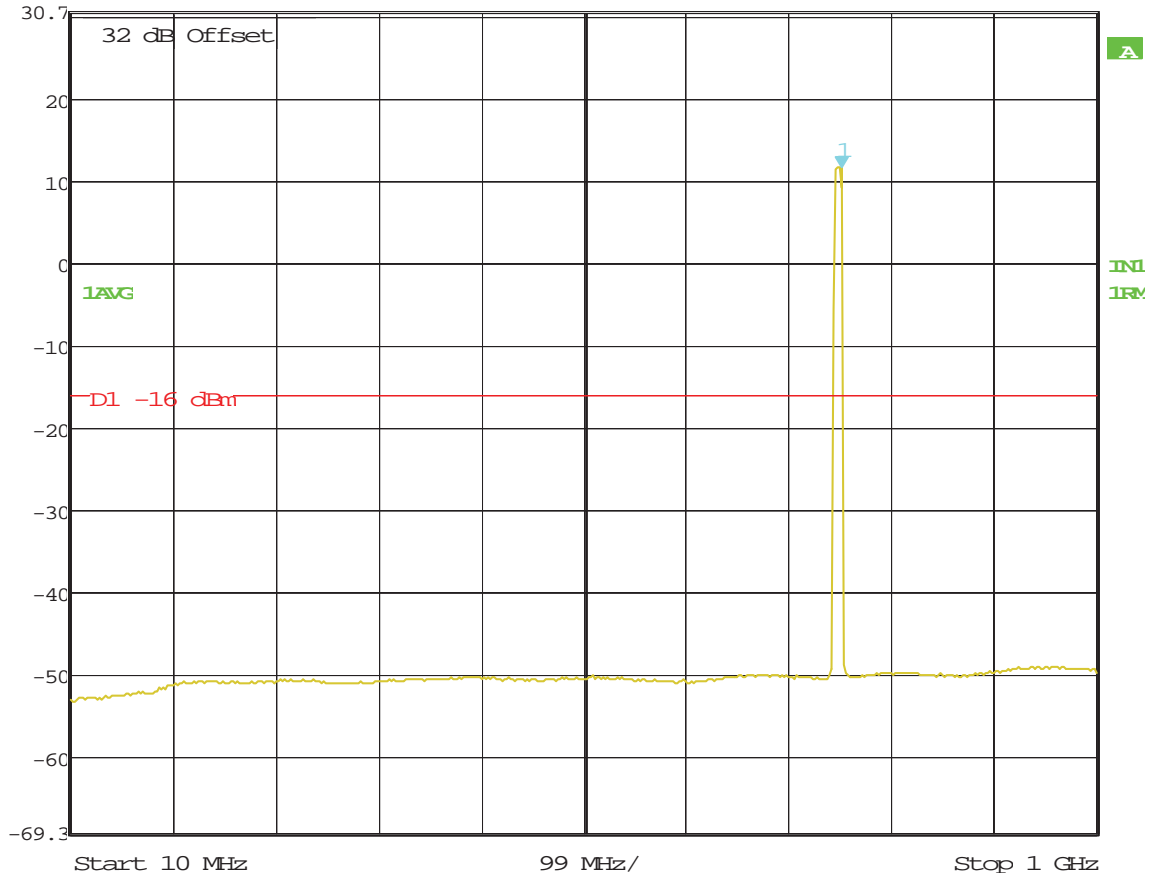
**Block: C
QPSK Modulation
Bandwidth 746 – 756 MHz**



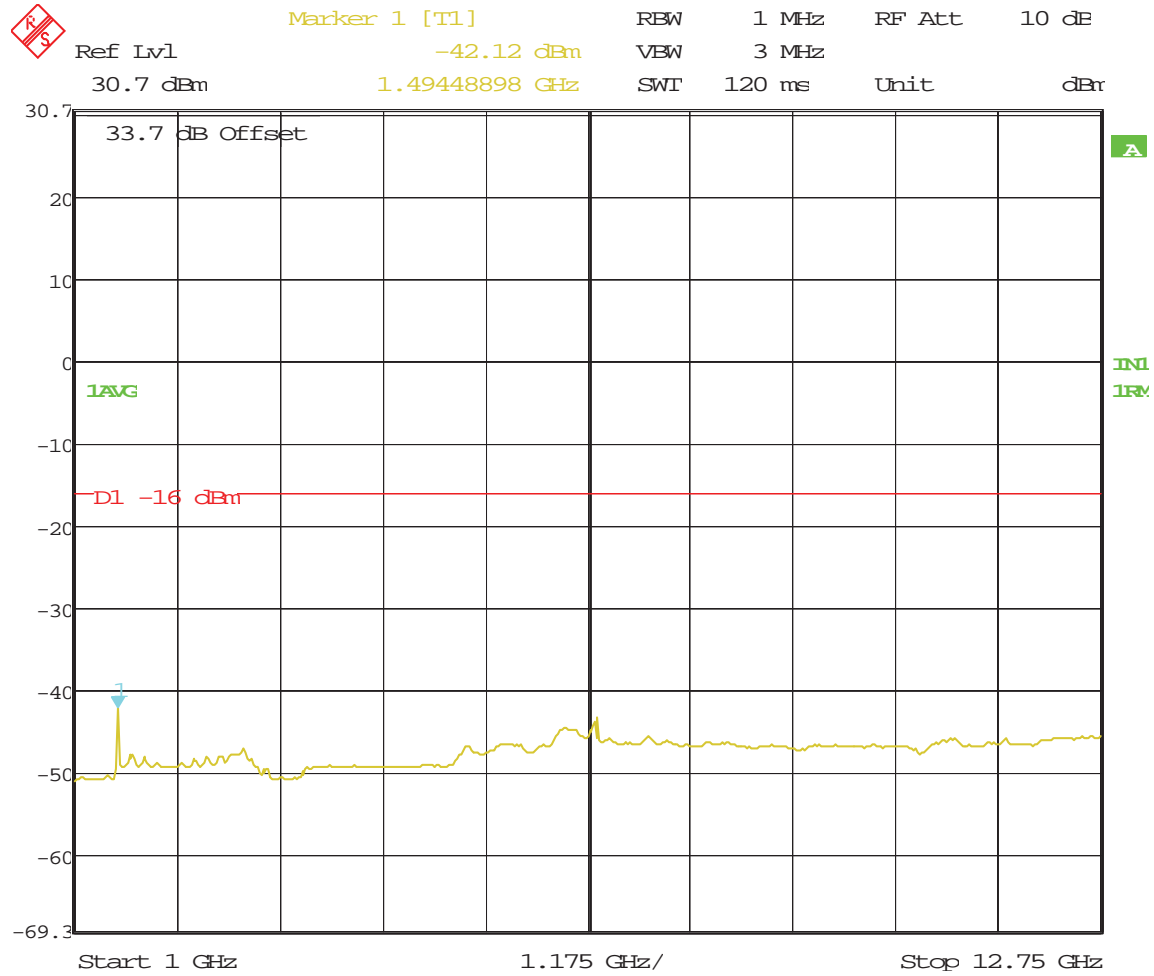
Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; Test Engineer: SEG
Comment A: 9768 MRO V1.0 B13 700U Cubedock(FLIR M2); 751 MHz, QPSK
PWR: 1W; 2X2 MIMO, FCC PART 27.53(C); FCCID: AS5BBTRX-07
Date: 20.SEP.2012 08:49:49



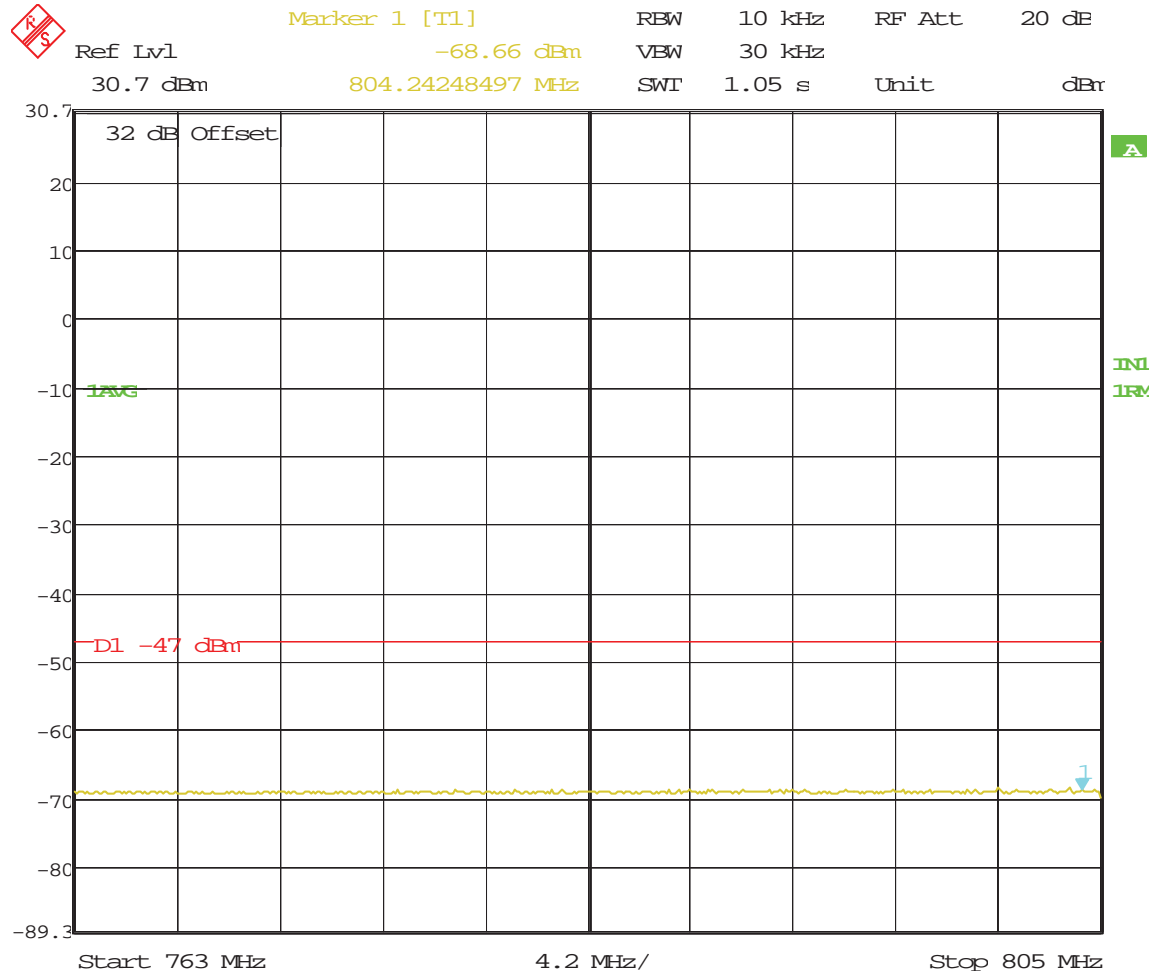
Marker 1 [T1] RBW 100 kHz RF Att 20 dB
Ref Lvl 30.7 dBm 11.57 dBm VBW 300 kHz
30.7 dBm 753.98797595 MHz SWT 250 ms Unit dBm



Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; Test Engineer: SEG
Comment A: 9768 MRO V1.0 B13 700U Cubedock(FLIR M2); 751 MHz, QPSK
PWR: 1W; 2X2 MIMO, FCC PART 27.53(C); FCCID: AS5BBTRX-07
Date: 20.SEP.2012 08:51:26



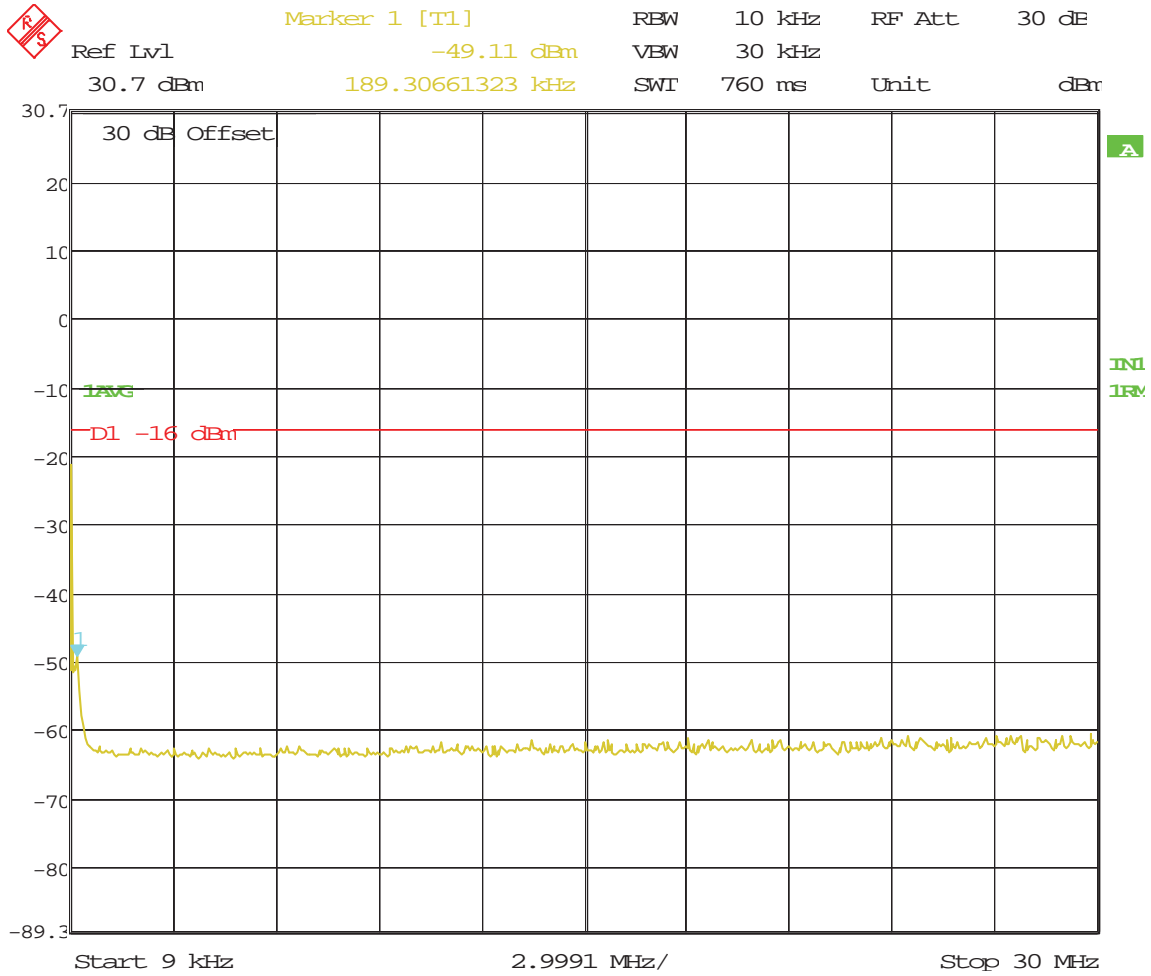
Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; Test Engineer: SEG
Comment A: 9768 MRO V1.0 B13 700U Cubedock(FLIR M2); 751 MHz, QPSK
PWR: 1W; 2X2 MIMO, FCC PART 27.53(C); FCCID: AS5BBTRX-07
Date: 20.SEP.2012 08:52:19



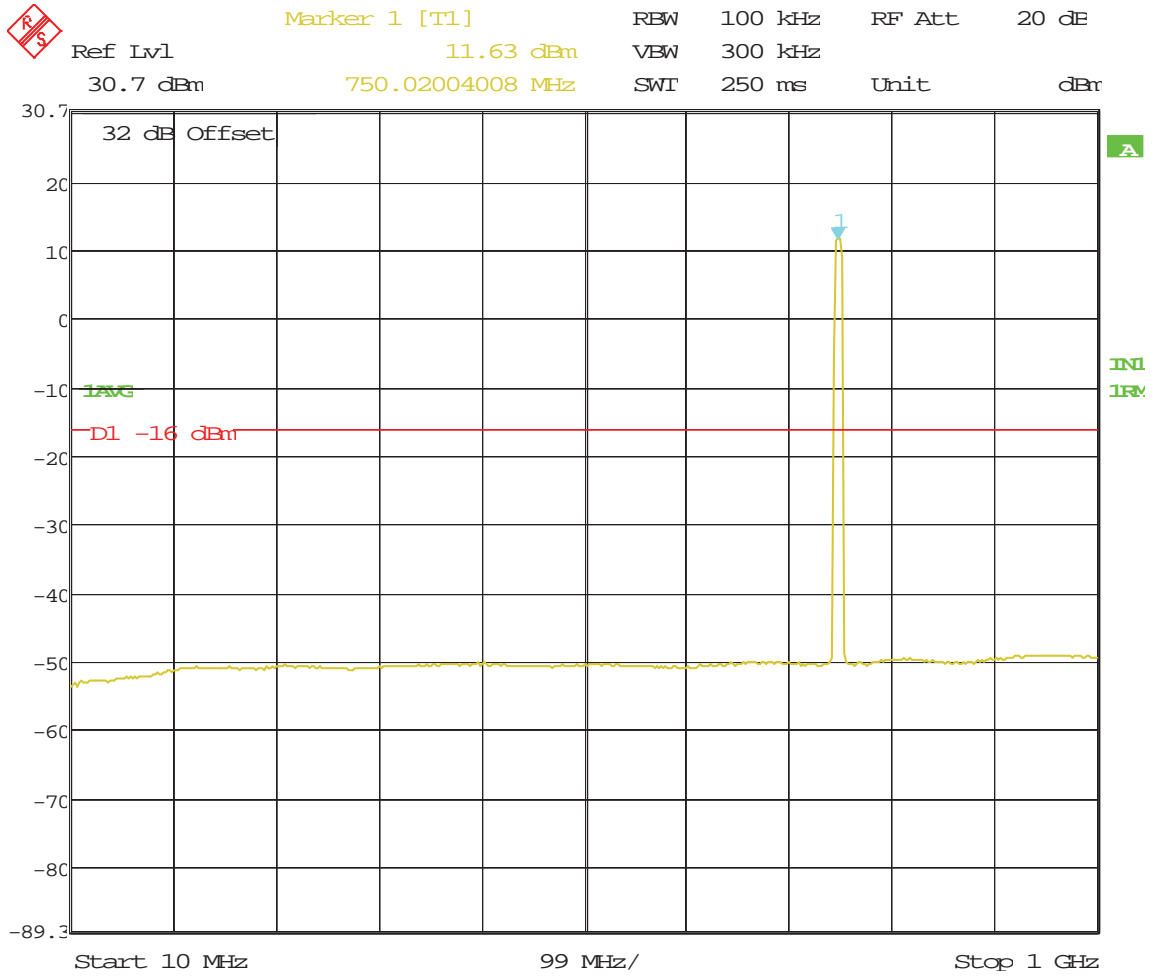
Title: SPURIOUS EMISSIONS AT TX ANTIENNA PORT; Test Engineer: SEG
Comment A: 9768 MRO V1.0 B13 700U Cubedock(FLIR M2); 751 MHz, QPSK
PWR: 1W; 2X2 MIMO, FCC PART 27.53(C); FCCID: AS5BBTRX-07
Date: 20.SEP.2012 08:54:30

**Transmit Port
Antenna Conducted Spurious Emissions**

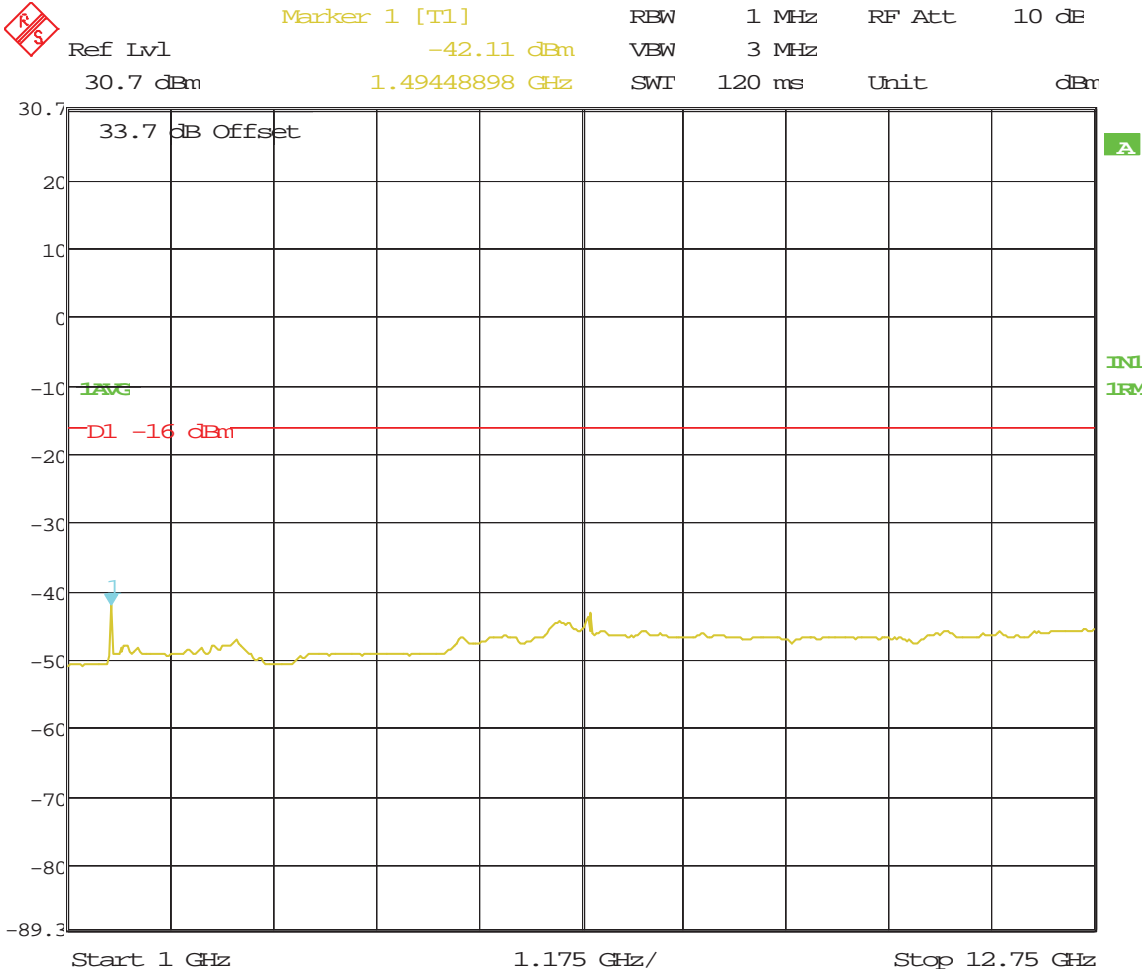
**Block: C
16QAM Modulation
Bandwidth 746 – 756 MHz**



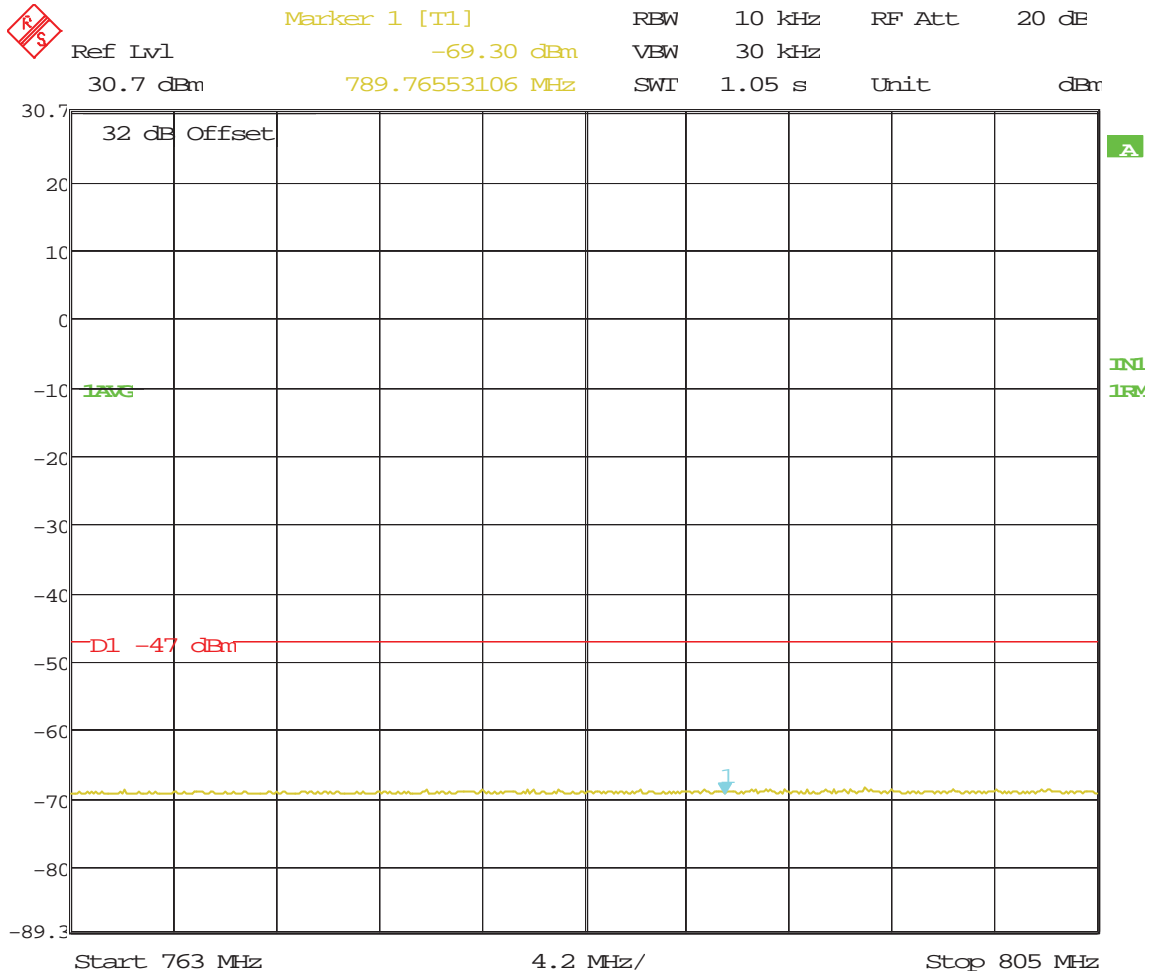
Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; Test Engineer: SEG
Comment A: 9768 MRO V1.0 B13 700U Cubedock(FLIR M2); 751 MHz, 16QAM
PWR: 1W; 2X2 MIMO, FCC PART 27.53(C); FCCID: AS5BBTRX-07
Date: 20.SEP.2012 09:18:25



Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; Test Engineer: SEG
Comment A: 9768 MRO V1.0 B13 700U Cubedock(FLIR M2); 751 MHz, 16QAM
PWR: 1W; 2X2 MIMO, FCC PART 27.53(C); FCCID: AS5BBTRX-07
Date: 20.SEP.2012 09:16:28



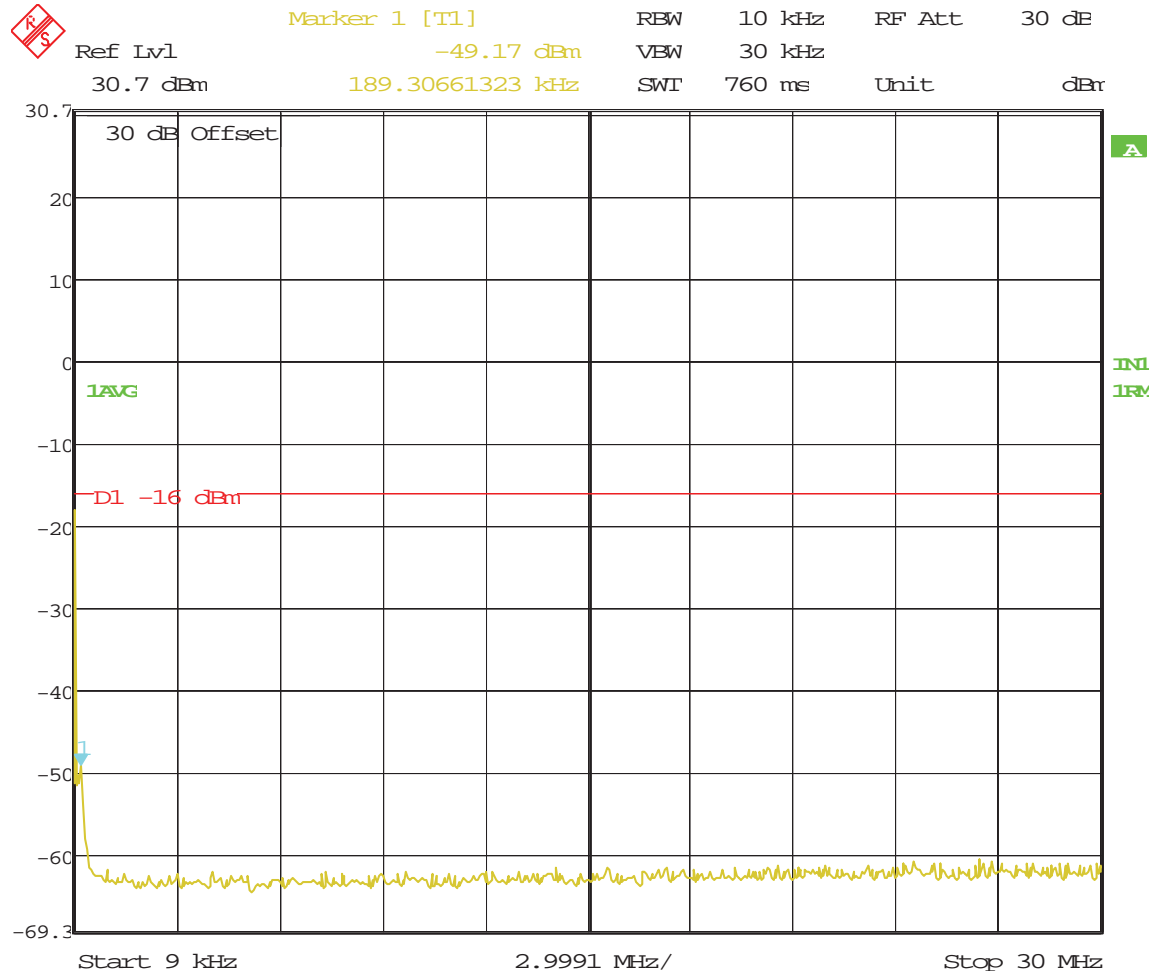
Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; Test Engineer: SEG
Comment A: 9768 MRO V1.0 B13 700U Cubedock(FLIR M2); 751 MHz, 16QAM
PWR: 1W; 2X2 MIMO, FCC PART 27.53(C); FCCID: AS5BBTRX-07
Date: 20.SEP.2012 09:15:09



Title: SPURIOUS EMISSIONS AT TX ANTIENNA PORT; Test Engineer: SEG
Comment A: 9768 MRO V1.0 B13 700U Cubedock(FLIR M2); 751 MHz, 16QAM
PWR: 1W; 2X2 MIMO, FCC PART 27.53(C); FCCID: AS5BBTRX-07
Date: 20.SEP.2012 09:12:52

**Transmit Port
Antenna Conducted Spurious Emissions**

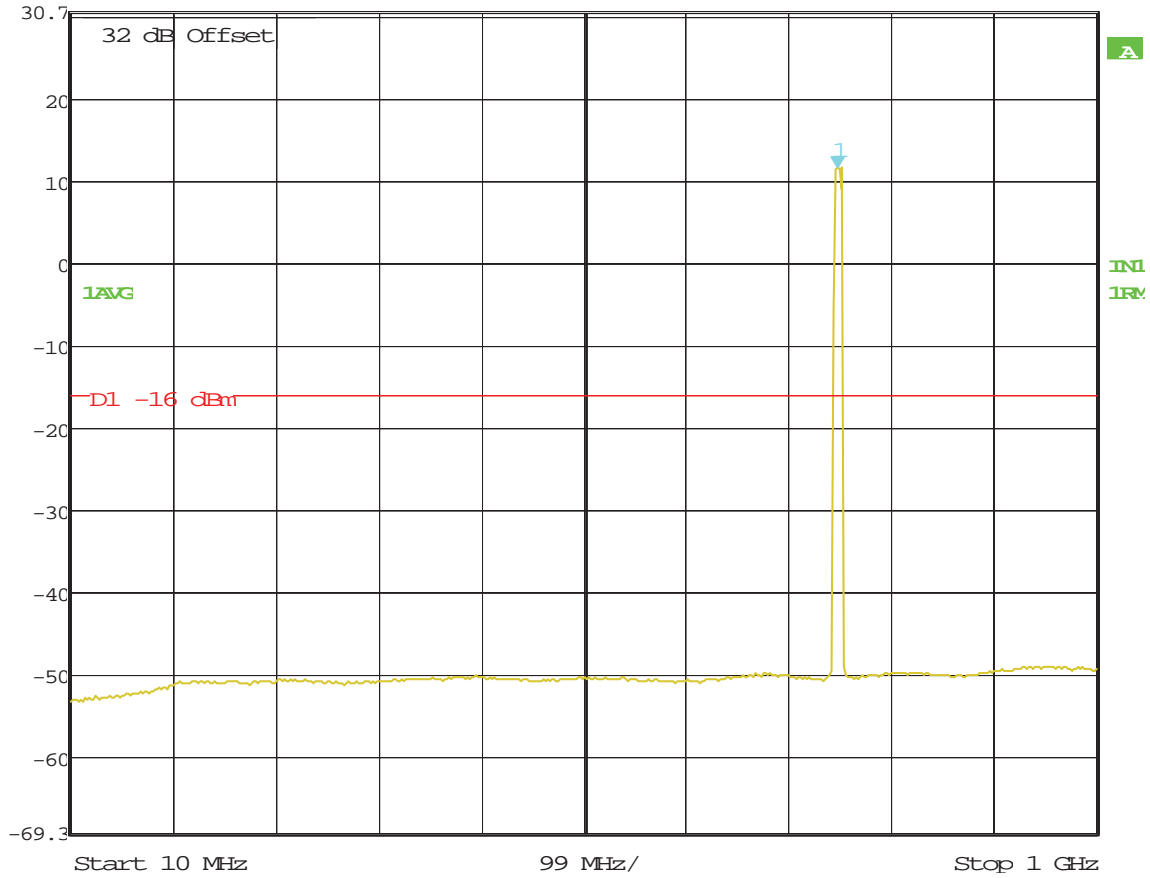
**Block: C
64QAM Modulation
Bandwidth 746 – 756 MHz**



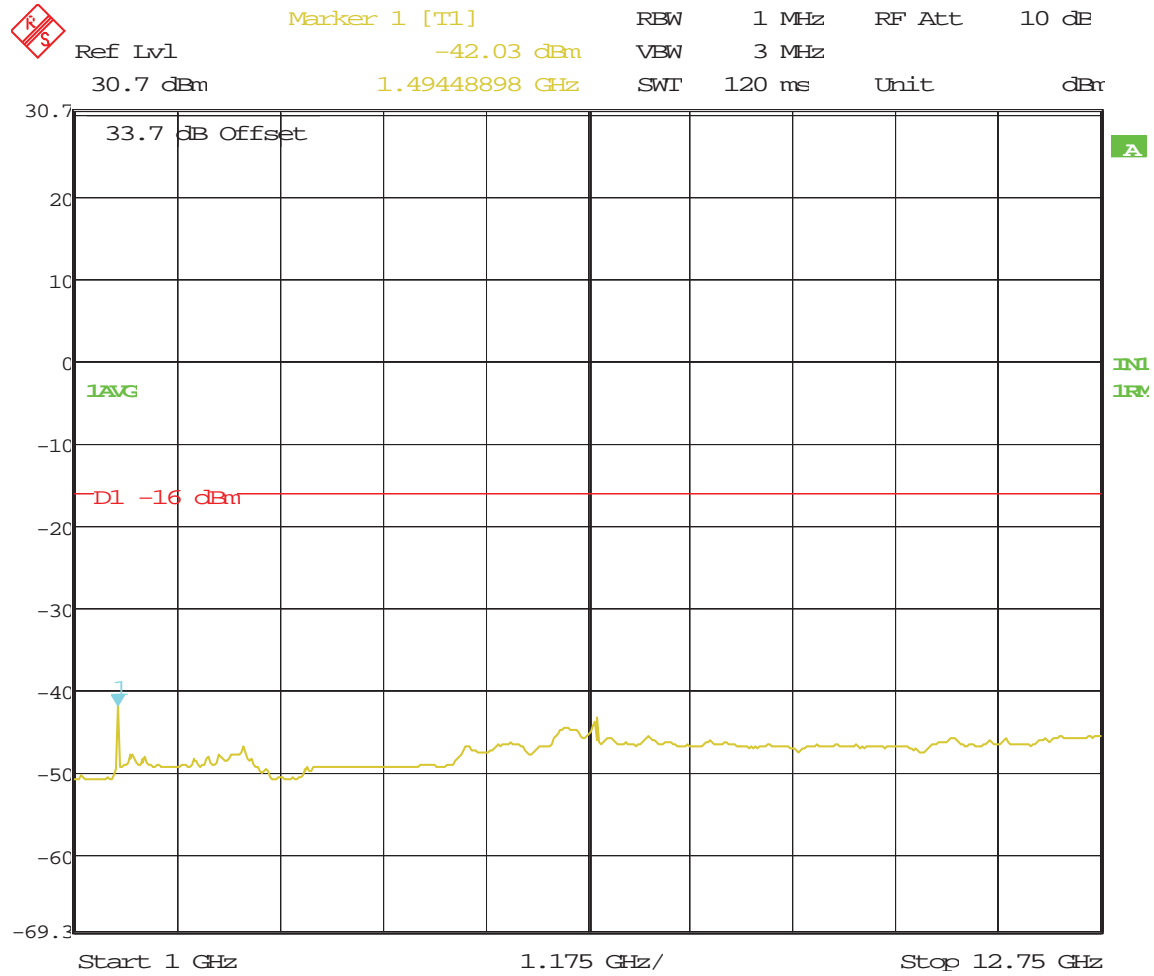
Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; Test Engineer: SEG
Comment A: 9768 MRO V1.0 B13 700U Cubedock(FLIR M2); 751 MHz, 64QAM
PWR: 1W; 2X2 MIMO, FCC PART 27.53(C); FCCID: AS5BBTRX-07
Date: 20.SEP.2012 10:02:27



Marker 1 [T1] RBW 100 kHz RF Att 20 dB
Ref Lvl 11.53 dBm VBW 300 kHz
30.7 dBm 750.02004008 MHz SWT 250 ms Unit dBm



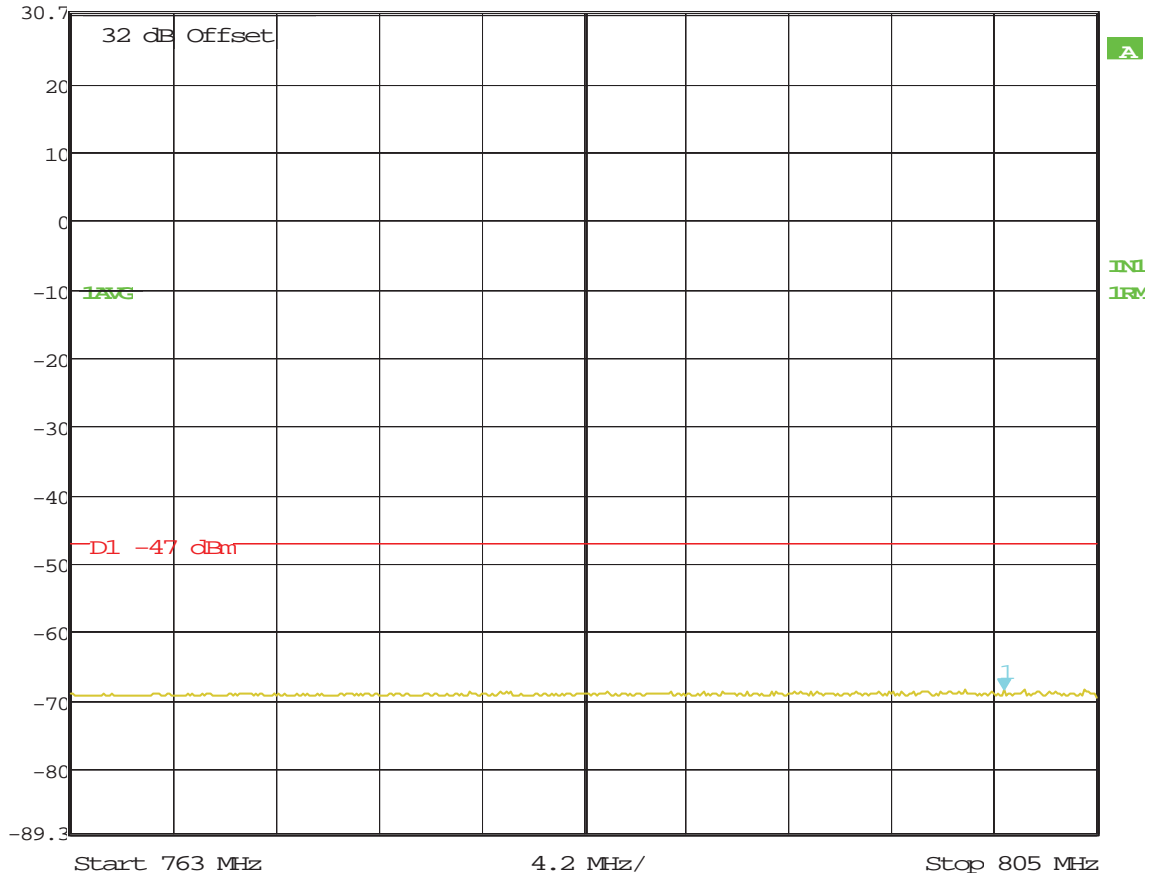
Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; Test Engineer: SEG
Comment A: 9768 MRO V1.0 B13 700U Cubedock(FLIR M2); 751 MHz, 64QAM
PWR: 1W; 2X2 MIMO, FCC PART 27.53(C); FCCID: AS5BBTRX-07
Date: 20.SEP.2012 10:03:35



Title: SPURIOUS EMISSIONS AT TX ANTENNA PORT; Test Engineer: SEG
Comment A: 9768 MRO V1.0 B13 700U Cubedock(FLIR M2); 751 MHz, 64QAM
PWR: 1W; 2X2 MIMO, FCC PART 27.53(C); FCCID: AS5BBTRX-07
Date: 20.SEP.2012 10:04:57



Marker 1 [T1] RBW 10 kHz RF Att 20 dB
Ref Lvl -68.48 dBm VBW 30 kHz
30.7 dBm 801.21242485 MHz SWT 1.05 s Unit dBm



Title: SPURIOUS EMISSIONS AT TX ANTIENNA PORT; Test Engineer: SEG
Comment A: 9768 MRO V1.0 B13 700U Cubedock(FLIR M2); 751 MHz, 64QAM
PWR: 1W; 2X2 MIMO, FCC PART 27.53(C); FCCID: AS5BBTRX-07
Date: 20.SEP.2012 10:07:26

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	3125U06345	RF Power Meter	E782	3/6/2012	12
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

Measurement -5

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

FILTER- M1**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 353147).

The “9768 Metro Radio Outdoor (Filter M2) with FCCID: AS5BBTRX-07” was tested at a RF output of **1W at Antenna Interface Connector (AIC)**. The operation of MRO was simulated using Base Band Unit (BBU)/(D2U placed outside the chamber. The interconnection between MRO and D2U was through optical fiber. The radiated emissions tests were performed serially with MRO operating with 5 MHz and 10 MHz bandwidths in the frequency block C. All tests were performed with the MRO operating in QPSK, 16QAM and 64QAM modulations. During testing, the MRO 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 the level of the un-modulated carrier.

FCC Section 27.53(c): 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 measurements at frequencies 763-775 MHz and 793-805 MHz, emissions limit shall be -37dBm for measurement resolution bandwidth of 100 kHz.

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 38.2 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 “9768 Metro Radio Outdoor (Filter M1)” the subject of this application, complies with Sections 2.1053, 27.53 (c) and 2.1057 of the Rules.

TEST INSTRUMENTATION

Manufacturer	Model	Serial #	Description	Manual #	Last Cal Date	Cal Cycle Month
Hewlett Packard	8593E	3911A04003	Spectrum Analyzer 9kHz-22GHz	E374	4/4/2012	12
Sonoma Instrument Co.	310N	186747	Amplifier 9kHz-1GHz	E814	8/18/2012	12
Weinschel	2-6	BX3430	6 dB Attenuator DC-18GHz 5 Watt	E887	1/23/2012	12
A.H.Systems	SAS-521-2	408	Biological Antenna 25-2000MHz	E601	2/7/2012	12
Rohde & Schwarz	ESIB40	100100	EMI Test Receiver (20Hz to 40 GHz) -150 +30dBm	E908	3/28/2012	12
Hewlett Packard	8449B	3008A00426	Preamplifier 1-26.5GHz	E123	7/23/2012	12
ETS Lindgren	3117	00135198	Double-Ridged Waveguide Horn 1-18GHz	E1073	9/9/2012	24

Measurement -6

MEASUREMENT OF FREQUENCY STABILITY

Measurement -6

MEASUREMENT OF FREQUENCY STABILITY

MEASUREMENT OF FREQUENCY STABILITY

The frequency stabilization and accuracy of the LTE signals modulated and amplified by the 700 MHz 9768 Metro Radio Outdoor (MRO) is a function of the input signal which is derived from the CPRI link coming from the Baseband Unit (d2uV5).

The MRO and the Baseband Unit were subjected to the FCC specified environments while operating at full rated power of 2x1W at External Antenna Connector (EAC) port. The carrier Frequency deviations were measured. The nominal Voltage input to this device is -115V or 208V AC. The MRO is designed to operate in the in the temperature range of -40C to +55C and voltage range 100 to 240V.

9768 Metro Radio Outdoor

MRO Transmit Frequency Deviation at 120VAC Over Temperature Range

Temperature in C	TX Frequency Deviation in (Hz)
25	.531
30	.396
40	.419
50	.439
40	.597
30	.373
20	.734
10	.681
0	.679
-10	.474
-20	.535
-30	.640
-40	.665
-30	.623
-20	.374
-10	.652
0	.410
10	.521
20	.544
25	.588

**Transmit Frequency Deviation at 25C Over Voltage Range
NOMINAL 115VAC**

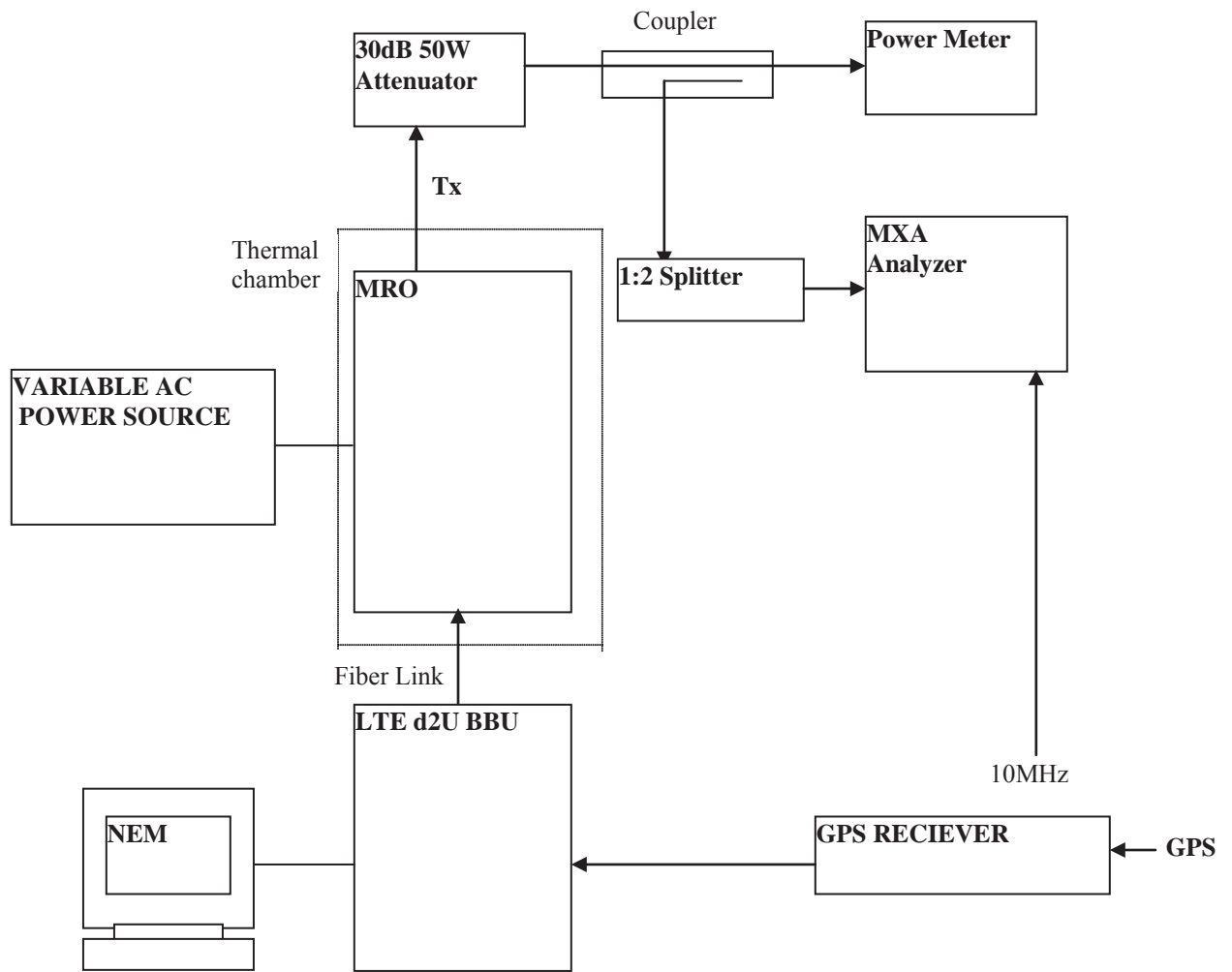
Voltage AC	TX Frequency Deviation in (Hz)
115	.755
113	.512
111	.609
109	.854
107	.631
105	.592
103	.667
101	.533
99	.483
97	.755
99	.586
101	.723
103	.603
105	.287
107	.574
109	.549
111	.515
113	.630
115	.626
117	.526
119	.610
121	.361
123	.645
125	.381
127	.671
129	.516
131	.713
133	.578

Transmit Frequency Deviation at 25C Over Voltage Range
 NOMINAL 208VAC

208	.613
206	.544
204	.533
202	.629
200	.607
198	.593
196	.756
194	.590
192	.564
190	.512
188	.593
186	.553
184	.534
182	.579
180	.653
178	.531
176	.672
175	.598
176	.762
178	.772
180	.749
182	.399
184	.404
186	.435
188	.488
190	.409
192	.535
194	.689
196	.672
198	.670
200	.784
202	.632
204	.590
206	.479
208	.718
210	.608
212	.621
214	.752
216	.522
218	.635

220	.532
222	.582
224	.619
226	.673
228	.505
230	.554
232	.474
234	.637
236	.459
238	.663
240	.527

Block Diagram of Test Setup



TEST INSTRUMENTATION

Instrument Type	Serial Number	Vendor	Expiration Date
MXA Signal Analyzer	MY49060086	Agilent	12/29/12
AC Source/Meter		BEHLMAN MODEL BL1350	N/A

Measurement -7

HUMAN EXPOSURE

Measurement -7

**FCC Section 27.52 and 1.1310, Table 1(B)
Maximum Permissible Radiofrequency radiation exposure limits**

Pursuant to FCC criteria listed in table 1(B) of FCC Part 1.1310, RF product shall be evaluated to the environmental impact of human exposure to radiofrequency (RF) radiation. The FCC limits for General Public/uncontrolled exposure is reproduced in Table below. The MRO will be typically installed in fixed locations on walls or poles. It weighs approximately 22lbs and therefore it is neither a portable or body worn wireless device.

FCC Part 1.1310 Table 1 (B) Limits for General Population/Uncontrolled Exposure				
Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm²)	Averaging time (minutes)
0.3–1.34	614	1.63	*(100)	30
1.34–30	824/f	2.19/f	*(180/f ²)	30
30–300	27.5	0.073	0.2	30
300–1500			f/1500	30
1500–100,000			1.0	30
0.3–1.34	614	1.63	*(100)	30
1.34–30	824/f	2.19/f	*(180/f ²)	30

Notes:

f = frequency in MHz;

* = Plane-wave equivalent power density

RF Exposure Calculations:

The appropriate EIRP (equivalent or effective isotropic radiated power) limits can be calculated based on the relationship between power density and EIRP, i.e.,

$$S = \frac{EIRP}{4\pi R^2}$$

Where,

S is the power density in mW/cm²,

R is the distance to the center of radiation of the antenna in cm

and EIRP is in mW

EIRP in mW = (Power input to the Antenna in mW) x (Numerical Gain of the antenna)

MRO frequency of operation is 746 to 756 MHz

From Table maximum power density allowed is = 756/1500 = 0.504 mW/cm²

Therefore,

RF Safe distance for 1W power with 5dBi antenna = 22.34 cm

RF Safe distance for 500 mW power with 5dBi antenna = 15.8 cm

Calculated RF Exposure Safe distance:

RF Safe Distance From Different Power Levels				
Power Input to Antenna mW	RF Safe Distance from Antenna SISO mode cm	RF Safe Distance from Cabinet RADOM SISO Mode cm	RF Safe Distance from Antenna 2x2 MIMO mode cm	RF Safe Distance from Cabinet RADOM 2x2 MIMO Mode cm
1000	22.34	21	31.6	30.3
500	15.8	14.5	22.34	21

**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