TEST REPORT

Test Report No. : UL-RPT-RP10981270JD01A V2.0

Manufacturer	:	General Dynamics Broadband UK Ltd
Model No.	:	BFZ
Product Generation	:	RN2410
FCC ID	:	PKTNODEBBFZ
Technology	:	LTE
Test Standard(s)	:	FCC Parts 2.1049, 2.1051, 74.636(a), 74.637(a)(c) & 74.661

1. This test report shall not be reproduced in full or partial, without the written approval of UL VS LTD.
2. The results in this report apply only to the sample tested.
3. The sample tested is in compliance with the above standard(s).
4. The test results in this report are traceable to the national or international standards.
5. Version 2.0 supersedes all previous versions.

Date of Issue: 12 May 2016

Checked by:

Ian Watch
Senior Engineer, Radio Laboratory

Company Signatory:

Steven White
Service Lead, Radio Laboratory
UL VS LTD

0644

This laboratory is accredited by UKAS. The tests reported herein have been performed in accordance with its terms of accreditation.

UL VS LTD

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Table of Contents

1. Customer Information

Company Name:	General Dynamics Broadband UK Ltd
Address:	Unit 7 Greenways Business Park Bellinger Close Chippenham Wiltshire SN15 1BN United Kingdom

2. Summary of Testing

2.1. General Information

Specification Reference:	47CFR74
Specification Title:	Code of Federal Regulations Volume 47 (Telecommunications): Part 74 Subpart F (Television Broadcast Auxiliary Stations)
Site Registration:	209735
Location of Testing:	UL VS LTD, Unit 3 Horizon, Wade Road, Kingsland Business Park, Basingstoke, Hampshire, RG24 8AH, United Kingdom
Test Dates:	12 February 2016 to 04 May 2016

2.2. Summary of Test Results

FCC Reference (47CFR)	Measurement	Note(s)	Result
74.636(a)	Transmitter Equivalent Isotropically Radiated Power (EIRP)	-	✓
2.1049	Transmitter Occupied Bandwidth	-	✓
74.637(a)(2)(i) / 74.637(c)(3) / 2.1051	Transmitter Conducted Emission Mask	1	✓
74.637(a)(2)(iii) / 74.637(c)(3) / 2.1051	Transmitter Conducted Emissions	-	✓
74.637(a)(2)(iii) / 74.637(c)(3) / 2.1053	Transmitter Radiated Spurious Emissions	-	✓
74.661 / 2.1055	Transmitter Frequency Stability (Temperature and Voltage Variation)	-	✓

Key to Results

✓ **= Complied** ✗ **= Did not comply**

Note(s):

1. Calculations of the emission mask specified in Part 74.637(a)(2)(i), were performed using 6 and 12 MHz as values for the authorised bandwidth, for the 5 and 10 MHz channel bandwidths respectively. The authorised bandwidth and mask parameters were established in pre-filing KDB inquiry consultation with FCC Lab.

2.3. Methods and Procedures

Reference:	FCC KDB 971168 D01 v02r02, October 17, 2014
Title:	Measurement Guidance for Certification of Licensed Digital Transmitters
Reference:	FCC KDB 662911 D01 v02r01 October 31, 2013
Title:	Emissions Testing of Transmitters with Multiple Outputs in the Same Band

2.4. Deviations from the Test Specification

For the measurements contained within this test report, there were no deviations from, additions to, or exclusions from the test specification identified above.

3. Equipment Under Test (EUT)

3.1. Identification of Equipment Under Test (EUT)

Brand Name:	General Dynamics Broadband
Model Name or Number:	BFZ
Product Generation:	RN2410
Test Sample Serial Number:	BFZBG01000210
Hardware Version:	1
Software Version:	9.2.6
FCC ID:	PKTNODEBBFZ

3.2. Description of EUT

The Equipment Under Test was an LTE base station. It is powered from a -48 VDC supply.

3.3. Modifications Incorporated in the EUT

No modifications were applied to the EUT during testing.

3.4. Additional Information Related to Testing

Tested Technology:	LTE		
Type of Equipment	eNodeB		
Channel Bandwidth:	5 MHz & 10 MHz		
Modulation Types:	QPSK, 16QAM & 64QAM		
Duty Cycle:	100% (TDD Config. 0)		
Maximum Antenna Gain:	20.0 dBi		
Power Supply Requirement:	Nominal	-48.0 VDC	
	Minimum	-40.8 VDC	
	Maximum	-55.2 VDC	
Transmit / Receive Frequency Range:	2025 MHz to 2110 MHz		
Channels Tested:	**Channel Bandwidth (MHz)**		**Frequency (MHz)**
Bottom Channel	5		2028.5
	10		2031.5
Middle Channel	All		2067.5
Top Channel	5		2106.5
	10		2103.5

3.5. Support Equipment

The following support equipment was used to exercise the EUT during testing:

Description:	Laptop PC
Brand Name:	Toshiba
Model Name or Number:	Satellite Pro A100
Serial Number:	67070971Q

Description:	GPS Antenna
Brand Name:	Trimble
Model Name or Number:	57860-00
Serial Number:	30780148

Description:	Ethernet to serial cable (2 metres length)
Brand Name:	Not marked or stated
Model Name or Number:	Not marked or stated
Serial Number:	Not marked or stated

Description:	Serial to USB cable (0.4 metres length)
Brand Name:	Not marked or stated
Model Name or Number:	UC-232A
Serial Number:	Z866011AK30483

Description:	SFP to Ethernet cable (10 metres length)
Brand Name:	Not marked or stated
Model Name or Number:	Not marked or stated
Serial Number:	Not marked or stated

Description:	SFP to Optical (terminated) (10 metres length)
Brand Name:	Not marked or stated
Model Name or Number:	NA20354-001
Serial Number:	33544510100012

4. Operation and Monitoring of the EUT during Testing

4.1. Operating Modes

The EUT was tested in the following operating mode(s):

- Transmit Mode - The EUT was set to transmit with maximum output power using 5 MHz and 10 MHz channel bandwidths. QPSK, 16QAM and 64QAM modulations were tested.
- For frequency stability tests the EUT was set to transmit an unmodulated CW test tone.

4.2. Configuration and Peripherals

The EUT was tested in the following configuration(s):

- The EUT was controlled via a laptop PC, using bespoke software supplied by the customer. The customer supplied a document with test instructions, titled *LTE eNode B Approvals Test Instructions DRAFT V01.01*. The test instructions were followed to place the unit into the correct test mode.
- It was connected to the test laptop via an Ethernet cable, connected to the EUT's Ethernet port.
- The EUT has two transceiver RF ports marked RF1 and RF2. The port not being used whilst testing was being performed was terminated with a suitable 50 Ohm load. It has two receiver ports marked Rxa and Rxb, both ports were terminated with a suitable 50 Ohm load for all tests.
- The customer supplied suitable cables with terminations to ensure all other ports were terminated for all tests.
- For 5 MHz channel bandwidth, the EUT was configured for 25 Resource Blocks as defined in 3GPP 36.141 Rel 8.
- For 10 MHz channel bandwidth, the EUT was configured for 50 Resource Blocks as defined in 3GPP 36.141 Rel 8.
- The EUT was configured using the following E-UTRA Test Models as defined in 3GPP 36.141 Rel 8:
    - E-TM1.1 for QPSK modulation
    - E-TM3.2 for 16QAM modulation
    - E-TM3.1 for 64QAM modulation
- For all operating modes, the EUT was transmitting with a burst duty cycle ≥ 98%.

5. Measurements, Examinations and Derived Results

5.1. General Comments

Measurement uncertainties are evaluated in accordance with current best practice. Our reported expanded uncertainties are based on standard uncertainties, which are multiplied by an appropriate coverage factor to provide a statistical confidence level of approximately 95%. Please refer to *Section 6* for Measurement Uncertainty details.

In accordance with UKAS requirements all the measurement equipment is on a calibration schedule. All equipment was within the calibration period on the date of testing.

5.2. Test Results

5.2.1. Transmitter Equivalent Isotropically Radiated Power (EIRP)

Test Summary:

Test Engineer:	Georgios Vrezas	**Test Date:**	15 February 2016
Test Sample Serial Number:	BFZBG01000210		

FCC Reference:	Parts 74.636(a)
Test Method Used:	FCC KDB 971168 D01 Sections 5.2.1, 5.5 & 5.6

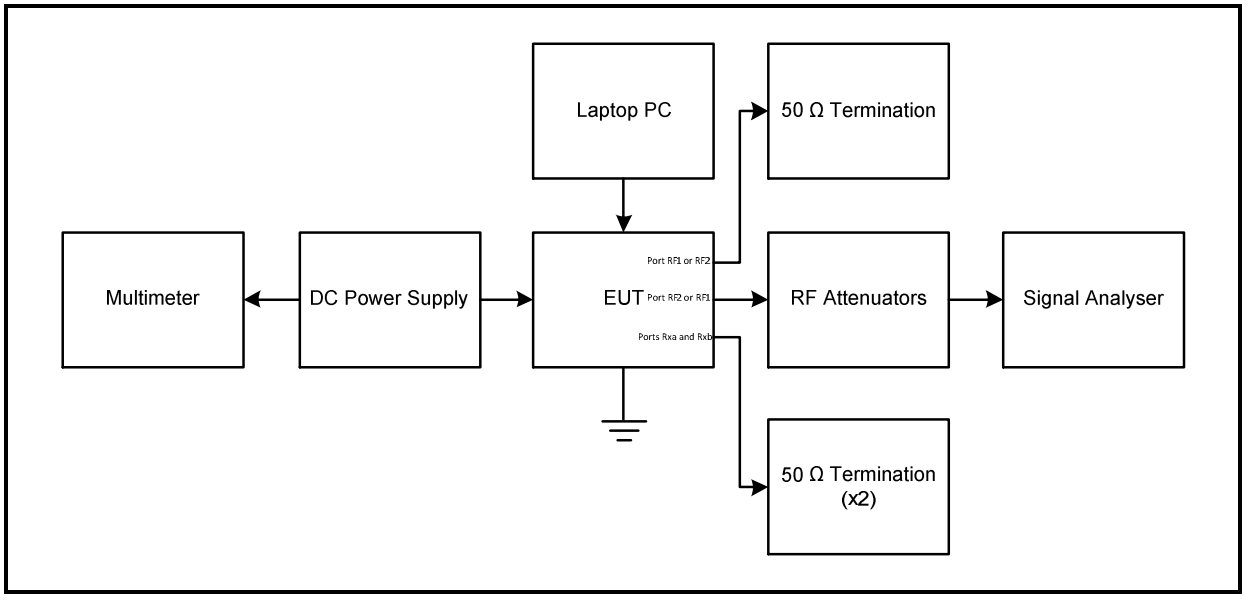
Environmental Conditions:

Temperature (°C):	28
Relative Humidity (%):	22

Note(s):

1. Measurements were performed with the EUT transmitting with QPSK, 16QAM and 64QAM modulation schemes.
2. Maximum conducted power was calculated by integrating the spectrum across the OBW of the signal, using the signal analyser's band power measurement function with band limits set equal to the OBW. Measurements of OBW can be found in section 5.2.2 of this test report.
3. Power from both antenna ports was measured and combined using the measure-and-sum method stated in FCC KDB 662911 D01.
4. The customer stated that the EUT is designed to operate with a maximum antenna gain of 20 dBi.
5. The signal analyser was connected to one RF port on the EUT, using suitable attenuation and RF cable. The second RF port was terminated into a 50 Ω load. An RF level offset was entered on the spectrum analyser to compensate for the loss of the attenuator and RF cables.
6. The signal analyser's number of sweep points was set to greater than twice the span divided by the RBW.

Test setup:



Transmitter Equivalent Isotropically Radiated Power (EIRP) (continued)

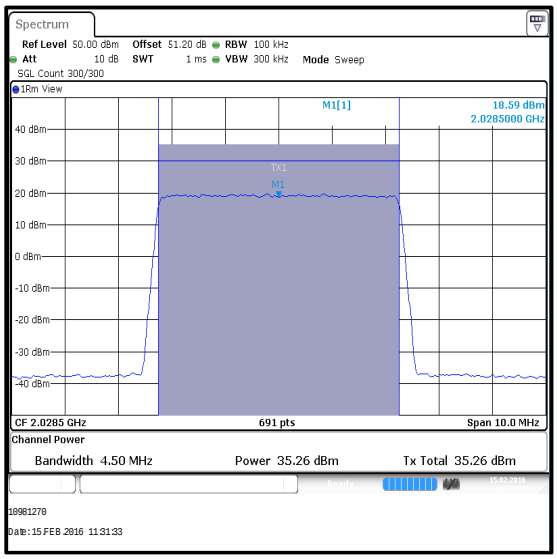
Results: 5 MHz Channel Bandwidth

Frequency (MHz)	Modulation	Conducted RF Power at Port RF1 (dBm)	Conducted RF Power at Port RF2 (dBm)	Combined Conducted RF Power (dBm)
2028.5	QPSK	35.3	35.0	38.2
2067.5	QPSK	35.1	35.5	38.3
2106.5	QPSK	35.6	35.7	38.7

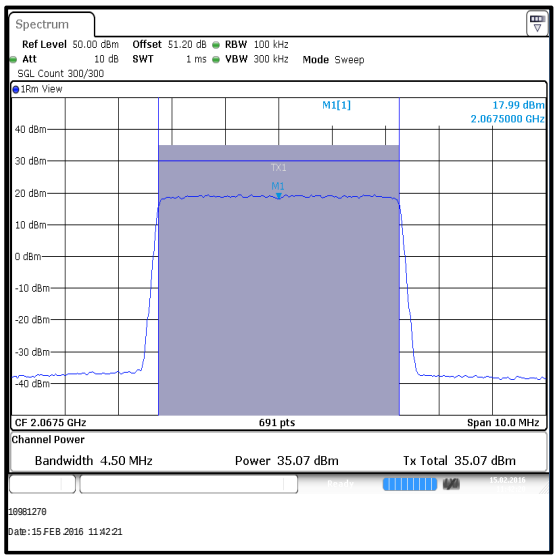
Frequency (MHz)	Combined Conducted RF Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Margin (dB)	Result
2028.5	38.2	20.0	58.2	75.0	16.8	Complied
2067.5	38.3	20.0	58.3	75.0	16.7	Complied
2106.5	38.7	20.0	58.7	75.0	16.3	Complied

Transmitter Equivalent Isotropically Radiated Power (EIRP) (continued)

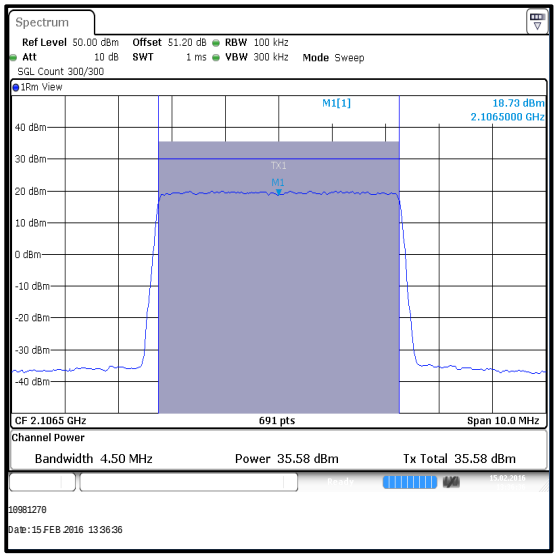
Results: Port RF1



QPSK / Bottom Channel



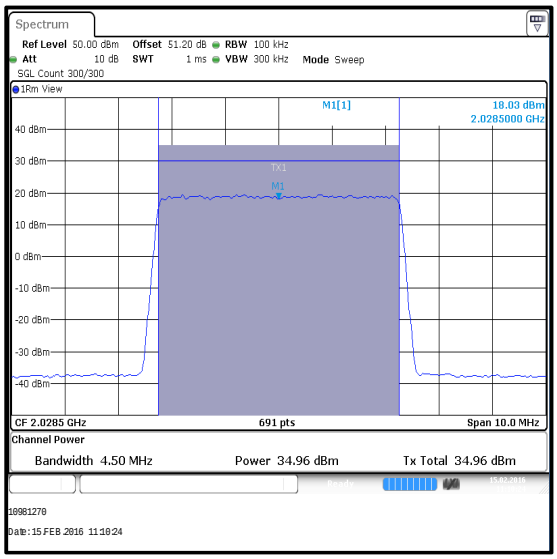
QPSK / Middle Channel



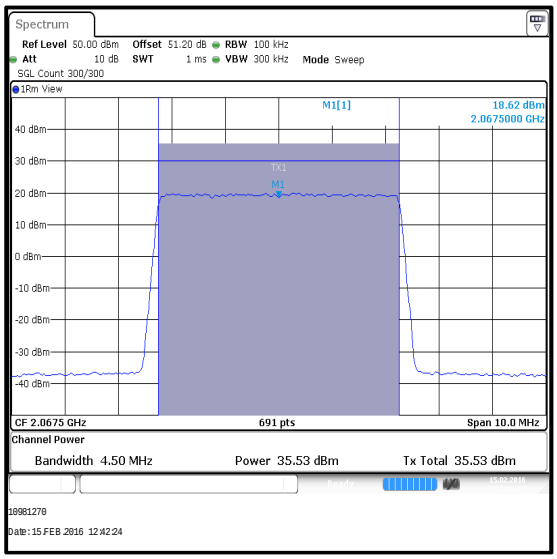
QPSK / Top Channel

Transmitter Equivalent Isotropically Radiated Power (EIRP) (continued)

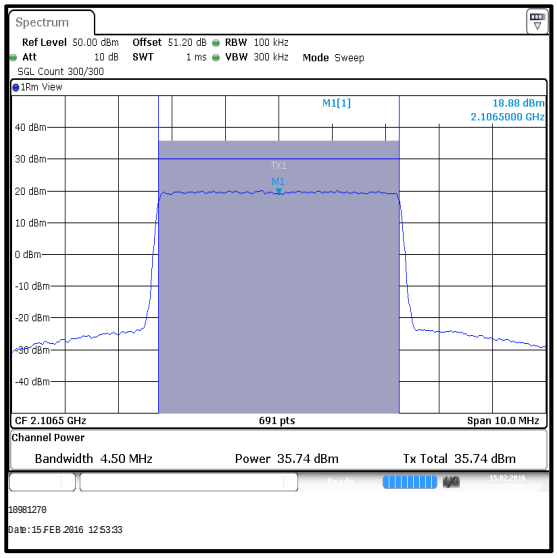
Results: Port RF2



QPSK / Bottom Channel



QPSK / Middle Channel



QPSK / Top Channel

Transmitter Equivalent Isotropically Radiated Power (EIRP) (continued)

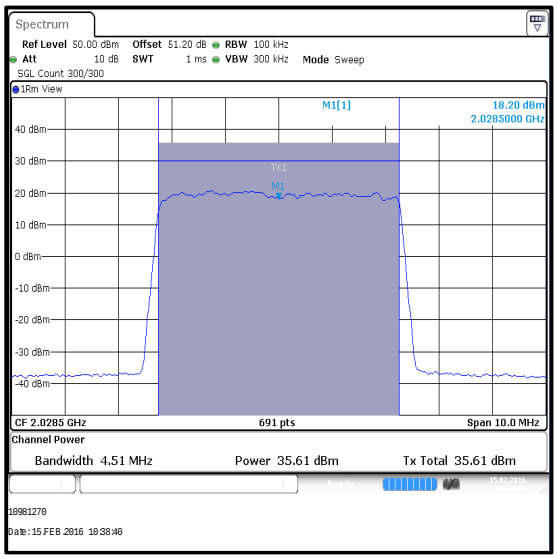
Results: 5 MHz Channel Bandwidth

Frequency (MHz)	Modulation	Conducted RF Power at Port RF1 (dBm)	Conducted RF Power at Port RF2 (dBm)	Combined Conducted RF Power (dBm)
2028.5	16QAM	35.6	35.5	38.6
2067.5	16QAM	35.5	35.8	38.7
2106.5	16QAM	36.0	35.9	39.0

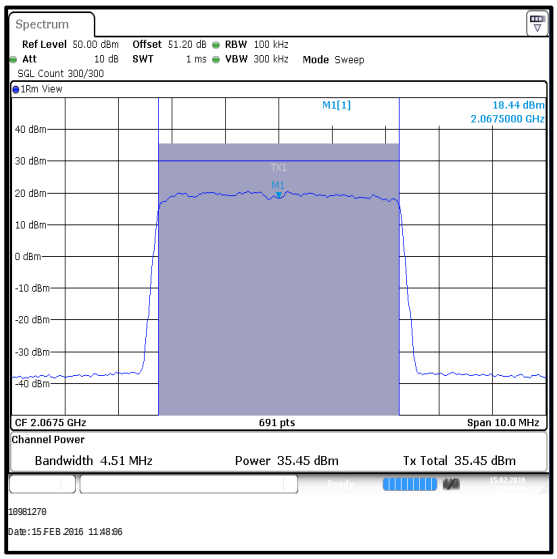
Frequency (MHz)	Combined Conducted RF Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Margin (dB)	Result
2028.5	38.6	20.0	58.6	75.0	16.4	Complied
2067.5	38.7	20.0	58.7	75.0	16.3	Complied
2106.5	39.0	20.0	59.0	75.0	16.0	Complied

Transmitter Equivalent Isotropically Radiated Power (EIRP) (continued)

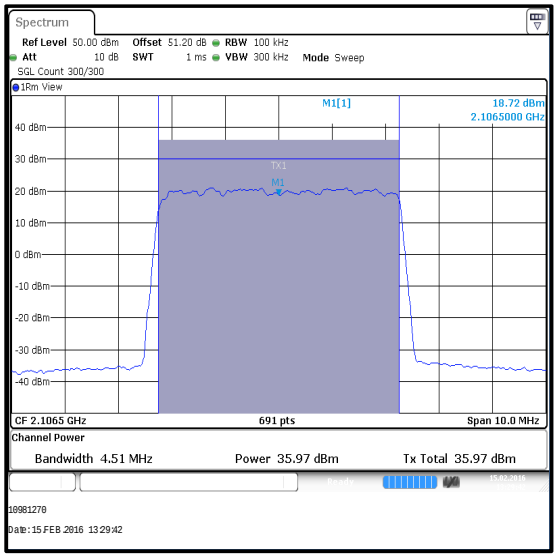
Results: Port RF1



16QAM / Bottom Channel



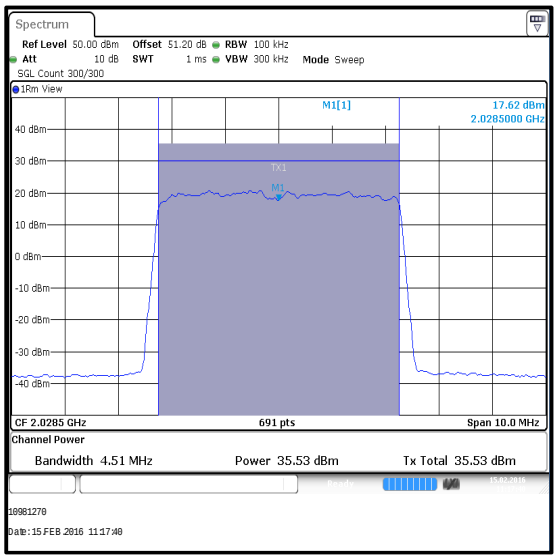
16QAM / Middle Channel



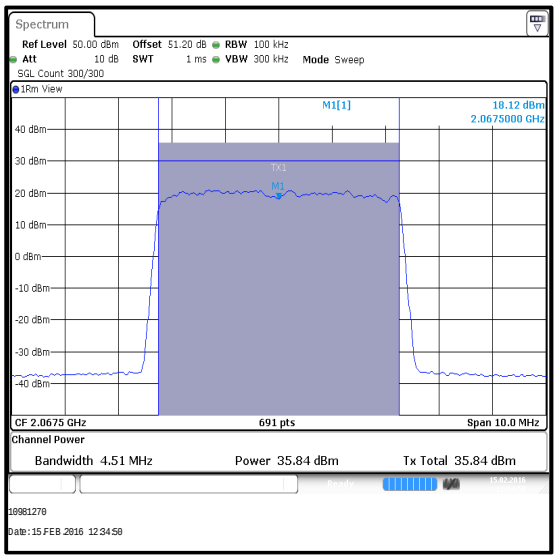
16QAM / Top Channel

Transmitter Equivalent Isotropically Radiated Power (EIRP) (continued)

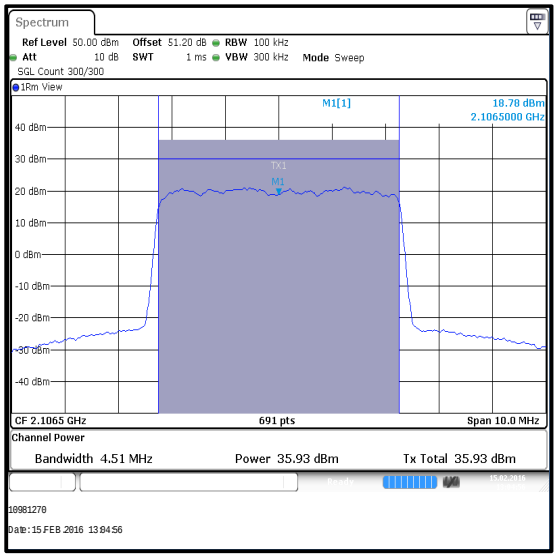
Results: Port RF2



16QAM / Bottom Channel



16QAM / Middle Channel



16QAM / Top Channel

Transmitter Equivalent Isotropically Radiated Power (EIRP) (continued)

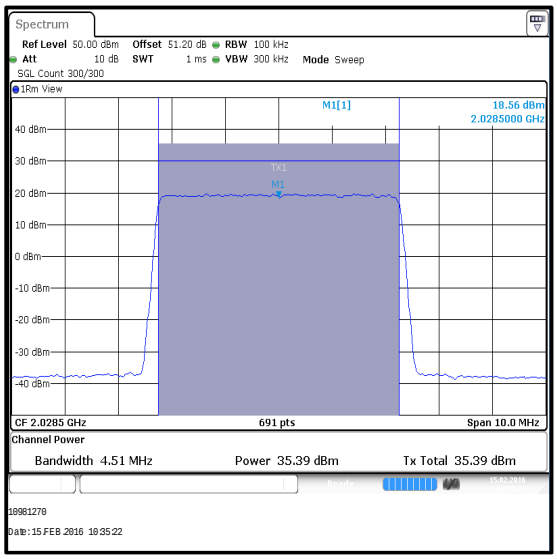
Results: 5 MHz Channel Bandwidth

Frequency (MHz)	Modulation	Conducted RF Power at Port RF1 (dBm)	Conducted RF Power at Port RF2 (dBm)	Combined Conducted RF Power (dBm)
2028.5	64QAM	35.4	35.0	38.2
2067.5	64QAM	35.1	35.2	38.2
2106.5	64QAM	35.5	35.7	38.6

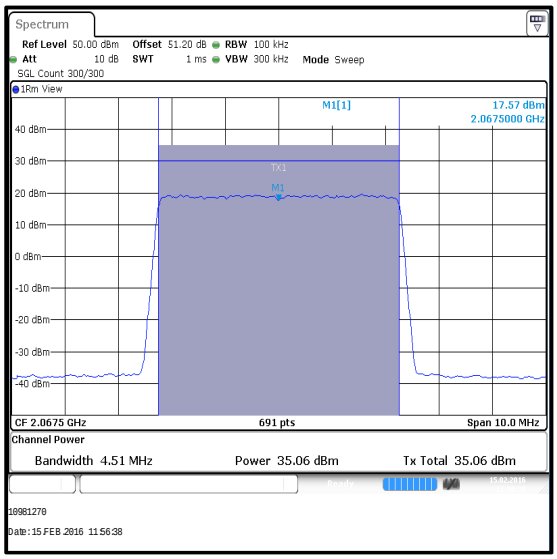
Frequency (MHz)	Combined Conducted RF Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Margin (dB)	Result
2028.5	38.2	20.0	58.2	75.0	16.8	Complied
2067.5	38.2	20.0	58.2	75.0	16.8	Complied
2106.5	38.6	20.0	58.6	75.0	16.4	Complied

Transmitter Equivalent Isotropically Radiated Power (EIRP) (continued)

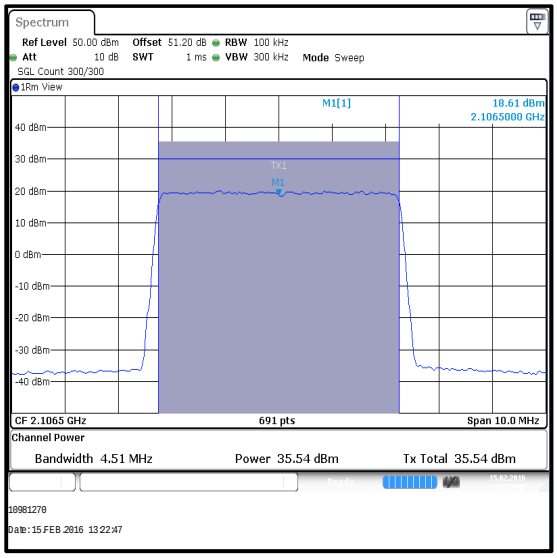
Results: Port RF1



64QAM / Bottom Channel



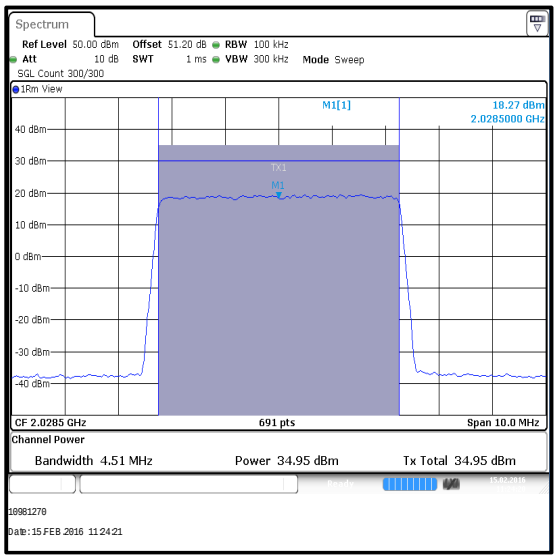
64QAM / Middle Channel



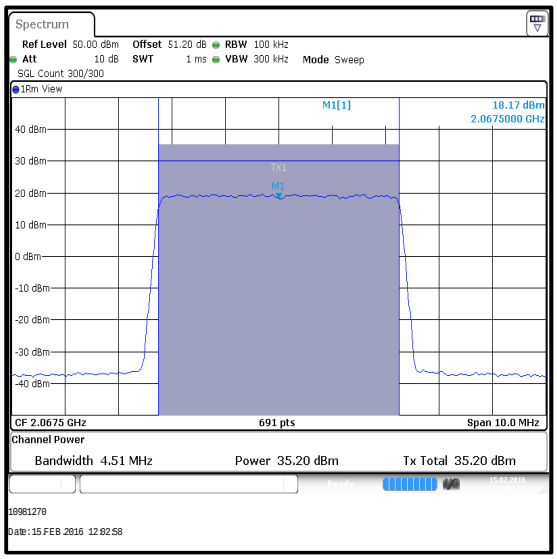
64QAM / Top Channel

Transmitter Equivalent Isotropically Radiated Power (EIRP) (continued)

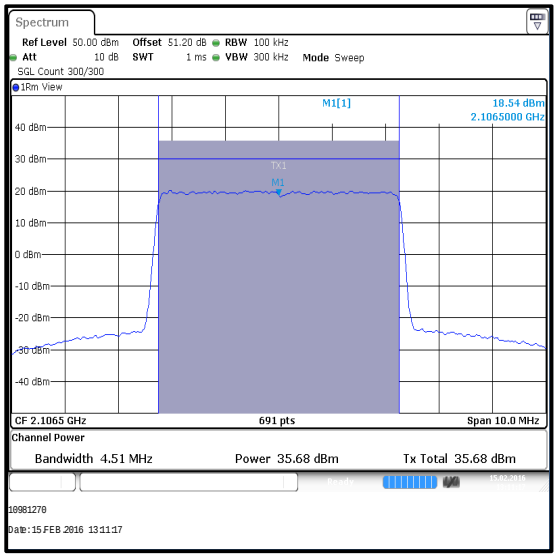
Results: Port RF2



64QAM / Bottom Channel



64QAM / Middle Channel



64QAM / Top Channel

Transmitter Equivalent Isotropically Radiated Power (EIRP) (continued)

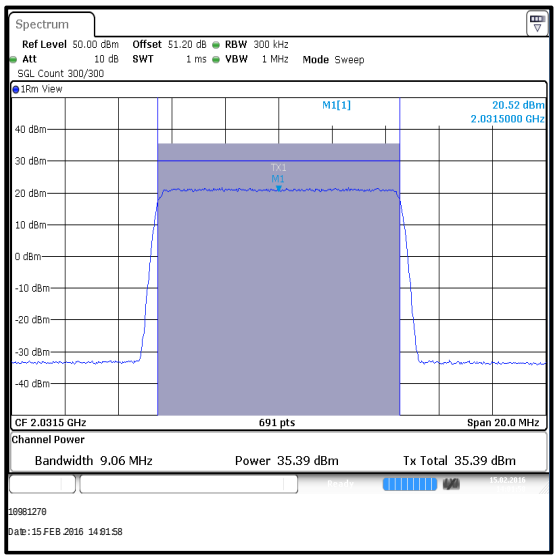
Results: 10 MHz Channel Bandwidth

Frequency (MHz)	Modulation	Conducted RF Power at Port RF1 (dBm)	Conducted RF Power at Port RF2 (dBm)	Combined Conducted RF Power (dBm)
2031.5	QPSK	35.4	35.2	38.3
2067.5	QPSK	35.2	35.8	38.5
2103.5	QPSK	35.7	35.8	38.8

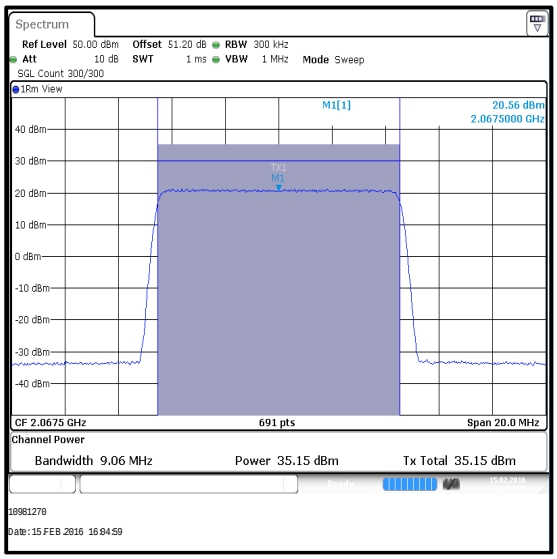
Frequency (MHz)	Combined Conducted RF Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Margin (dB)	Result
2031.5	38.3	20.0	58.3	75.0	16.7	Complied
2067.5	38.5	20.0	58.5	75.0	16.5	Complied
2103.5	38.8	20.0	58.8	75.0	16.2	Complied

Transmitter Equivalent Isotropically Radiated Power (EIRP) (continued)

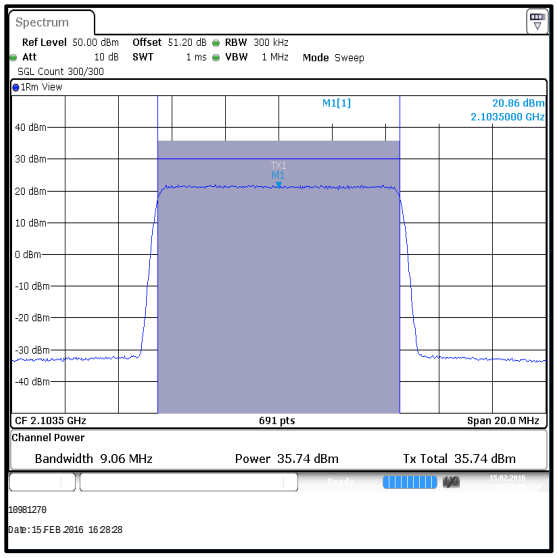
Results: Port RF1



QPSK / Bottom Channel



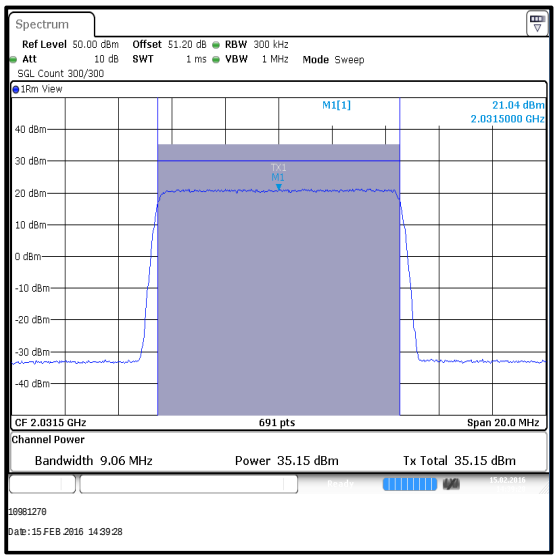
QPSK / Middle Channel



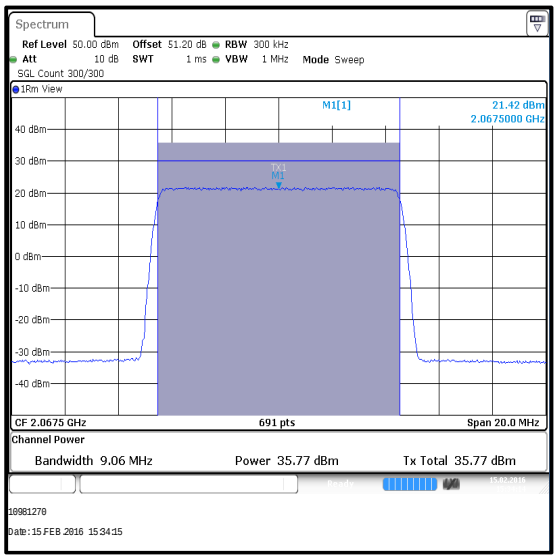
QPSK / Top Channel

Transmitter Equivalent Isotropically Radiated Power (EIRP) (continued)

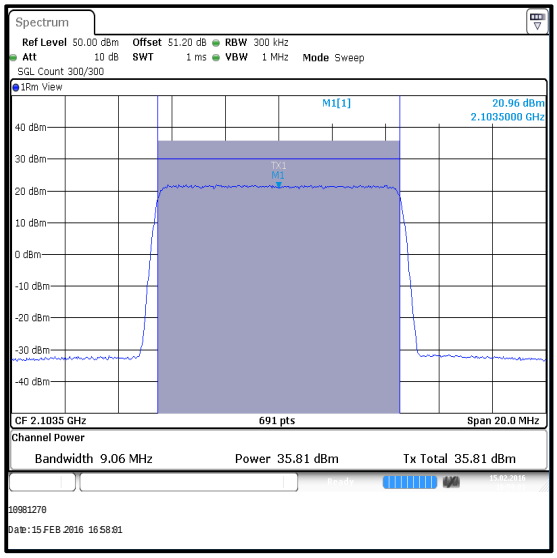
Results: Port RF2



QPSK / Bottom Channel



QPSK / Middle Channel



QPSK / Top Channel

Transmitter Equivalent Isotropically Radiated Power (EIRP) (continued)

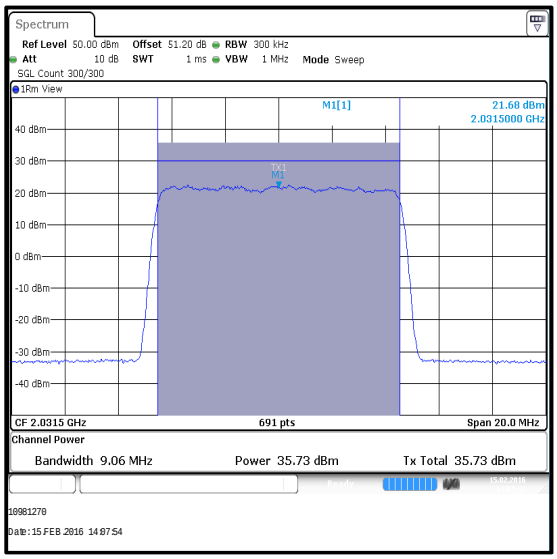
Results: 10 MHz Channel Bandwidth

Frequency (MHz)	Modulation	Conducted RF Power at Port RF1 (dBm)	Conducted RF Power at Port RF2 (dBm)	Combined Conducted RF Power (dBm)
2031.5	16QAM	35.7	35.2	38.5
2067.5	16QAM	35.3	35.6	38.5
2103.5	16QAM	35.8	35.7	38.8

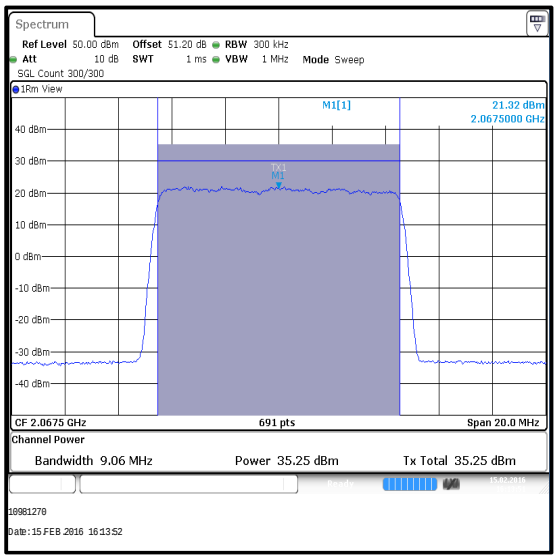
Frequency (MHz)	Combined Conducted RF Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Margin (dB)	Result
2031.5	38.5	20.0	58.5	75.0	16.5	Complied
2067.5	38.5	20.0	58.5	75.0	16.5	Complied
2103.5	38.8	20.0	58.8	75.0	16.2	Complied

Transmitter Equivalent Isotropically Radiated Power (EIRP) (continued)

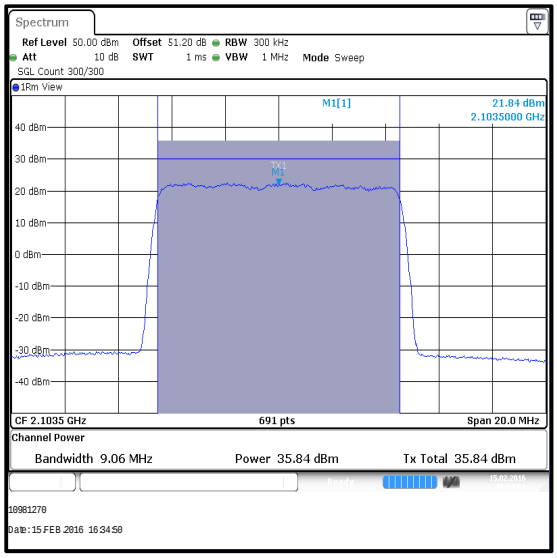
Results: Port RF1



16QAM / Bottom Channel



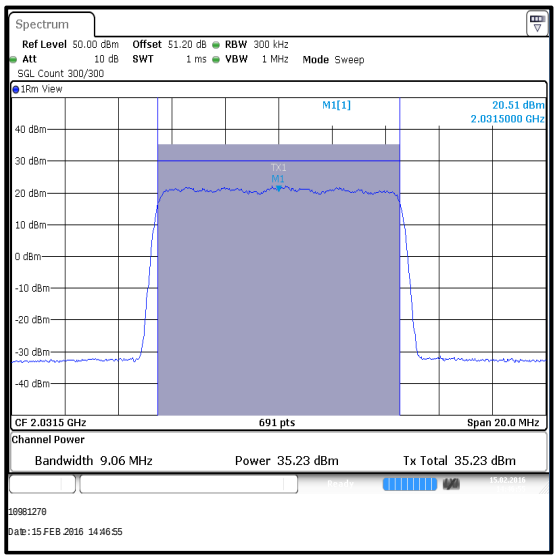
16QAM / Middle Channel



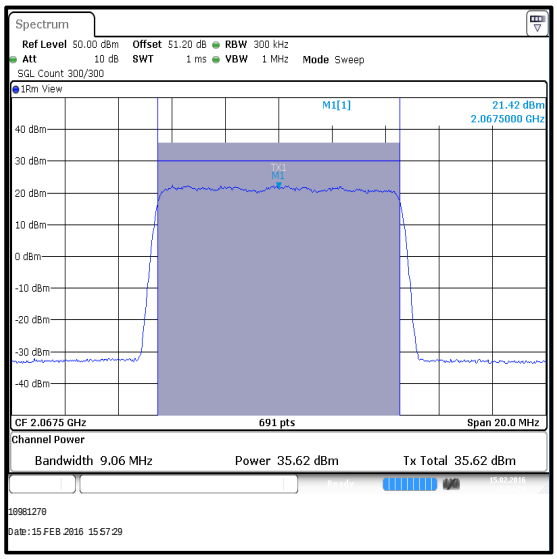
16QAM / Top Channel

Transmitter Equivalent Isotropically Radiated Power (EIRP) (continued)

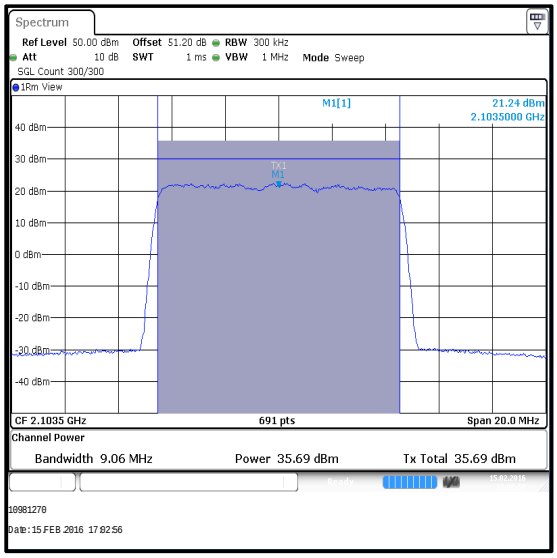
Results: Port RF2



16QAM / Bottom Channel



16QAM / Middle Channel



16QAM / Top Channel

Transmitter Equivalent Isotropically Radiated Power (EIRP) (continued)

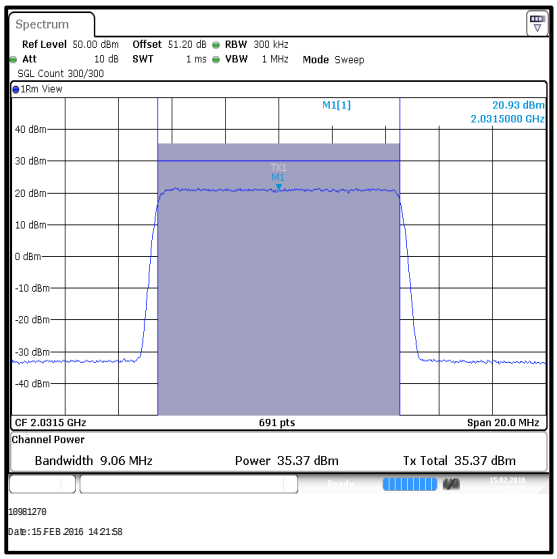
Results: 10 MHz Channel Bandwidth

Frequency (MHz)	Modulation	Conducted RF Power at Port RF1 (dBm)	Conducted RF Power at Port RF2 (dBm)	Combined Conducted RF Power (dBm)
2031.5	64QAM	35.4	35.3	38.4
2067.5	64QAM	35.3	35.4	38.4
2103.5	64QAM	35.7	35.7	38.7

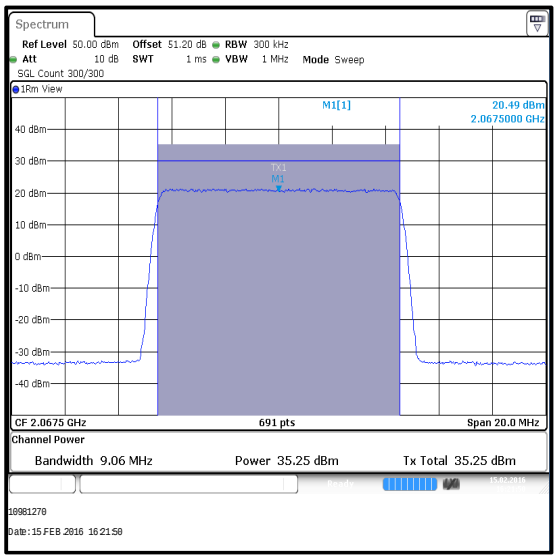
Frequency (MHz)	Combined Conducted RF Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Margin (dB)	Result
2031.5	38.4	20.0	58.4	75.0	16.6	Complied
2067.5	38.4	20.0	58.4	75.0	16.6	Complied
2103.5	38.7	20.0	58.7	75.0	16.3	Complied

Transmitter Equivalent Isotropically Radiated Power (EIRP) (continued)

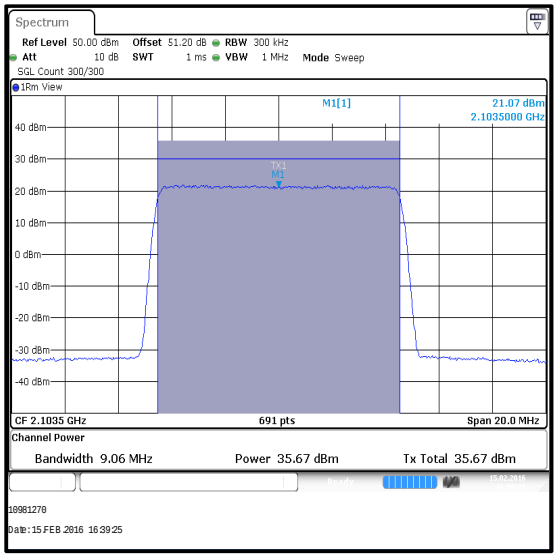
Results: Port RF1



64QAM / Bottom Channel



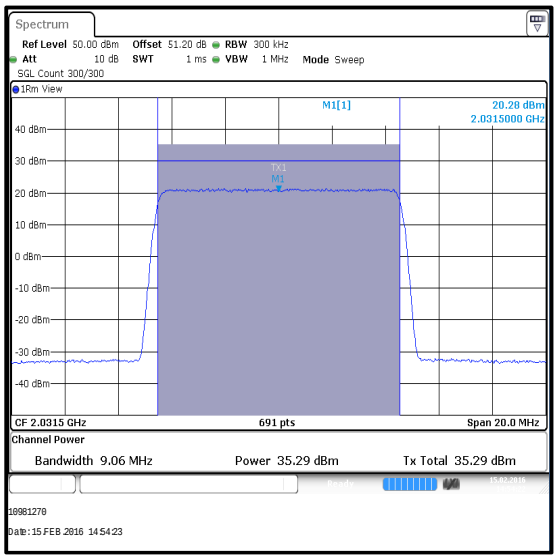
64QAM / Middle Channel



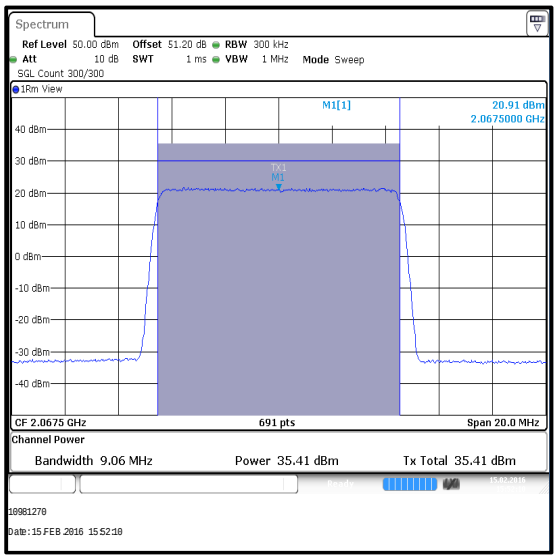
64QAM / Top Channel

Transmitter Equivalent Isotropically Radiated Power (EIRP) (continued)

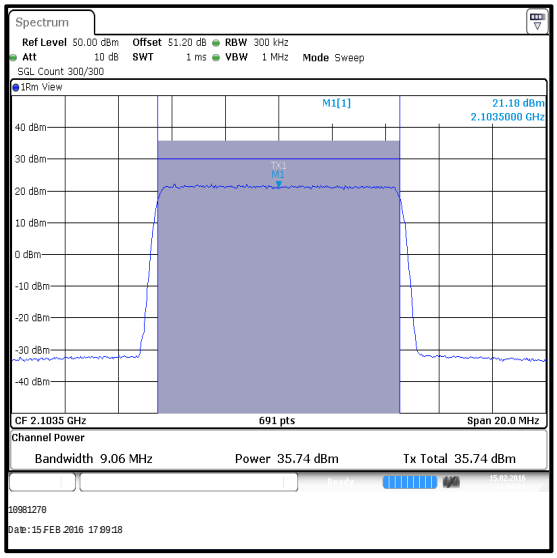
Results: Port RF2



64QAM / Bottom Channel



64QAM / Middle Channel



64QAM / Top Channel

Transmitter Equivalent Isotropically Radiated Power (EIRP) (continued)

Test Equipment Used:

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M1785	Thermohygrometer	JM Handelspunkt	30.5015.13	None stated	23 Apr 2016	12
M1835	Signal Analyser	Rohde & Schwarz	FSV30	103050	18 Feb 2016	12
A2006	Attenuator	Narda	769-30	06588	Calibrated before use	-
A2007	Attenuator	Narda	769-20	001	Calibrated before use	-
A250	50 Ω Termination	Narda	376BNM	1411	Calibrated before use	-
G0607	Signal Generator	Rohde & Schwarz	SMU200A	100943	18 Jul 2016	36
G0565	Power Supply	Hewlett Packard	E4356A	US39290102	Calibrated before use	-
M1229	Multimeter	Fluke	179	87640015	23 Apr 2016	12

5.2.2. Transmitter Occupied Bandwidth

Test Summary:

Test Engineer:	Georgios Vrezas	**Test Date:**	12 February 2016
Test Sample Serial Number:	BFZBG01000210		

FCC Reference:	Part 2.1049
Test Method Used:	KDB 971168 D01 Section 4.2

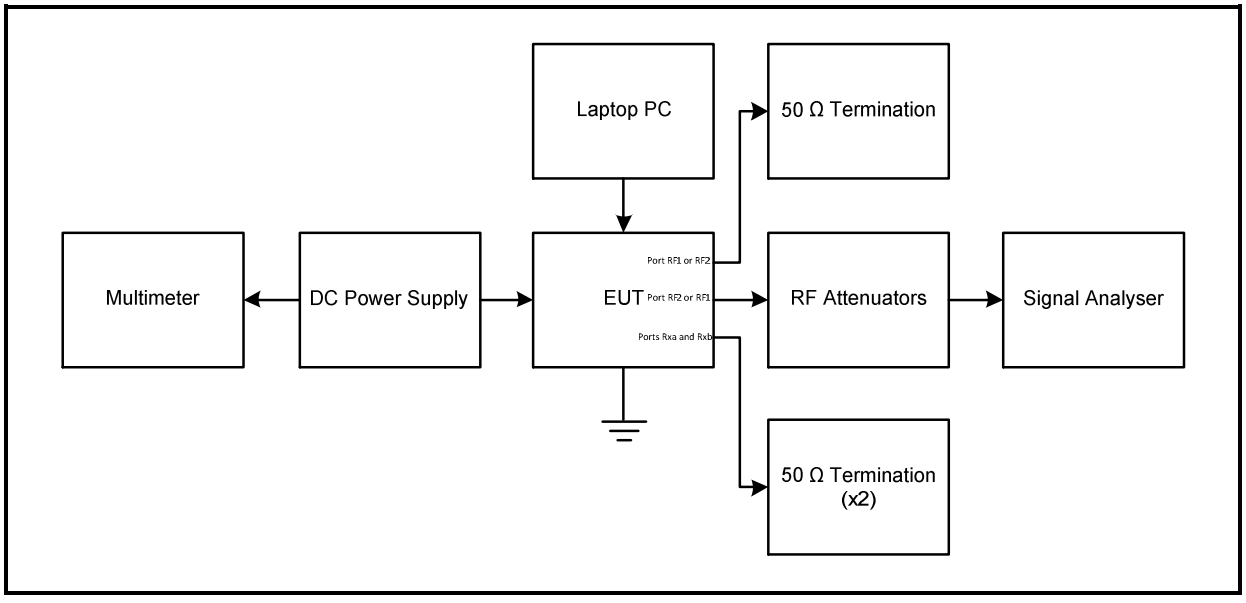
Environmental Conditions:

Temperature (°C):	25
Relative Humidity (%):	33

Note(s):

1. Measurements were performed with the EUT transmitting with QPSK, 16QAM and 64QAM modulation schemes.
2. The 99% emission bandwidth was measured using the signal analyser occupied bandwidth function. The resolution bandwidth was set in the range of 1% to 5% of the occupied bandwidth and the video bandwidth set to at least 3 times the resolution bandwidth. A peak detector was used.
3. The signal analyser was connected to one RF port on the EUT, using suitable attenuation and RF cable. The second RF port was terminated into a 50 Ω load. An RF level offset was entered on the spectrum analyser to compensate for the loss of the attenuator and RF cables.

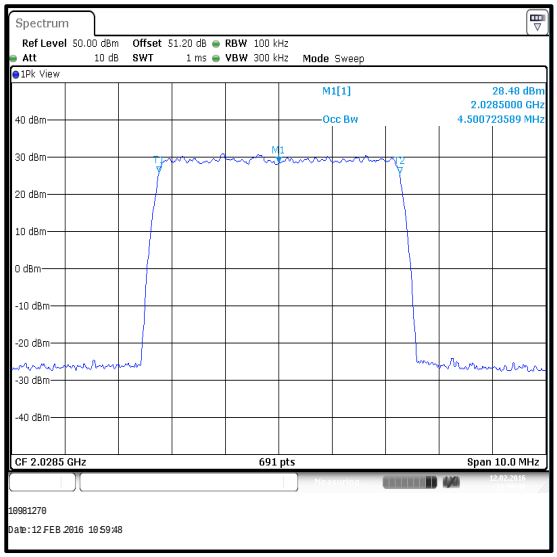
Test setup:



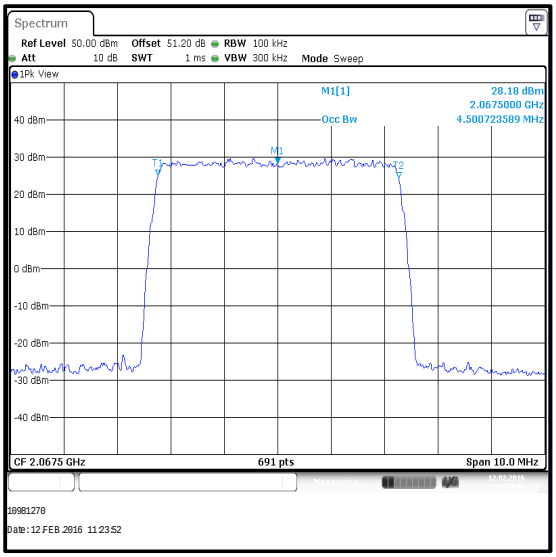
Transmitter Occupied Bandwidth (continued)

Results: 5 MHz Channel Bandwidth / Port RF1

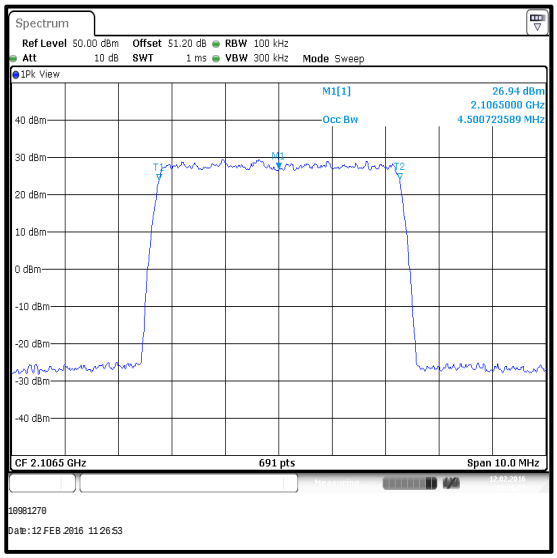
Frequency (MHz)	Modulation	Resource Blocks	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
2028.5	QPSK	25	100	300	4.501
2067.5	QPSK	25	100	300	4.501
2106.5	QPSK	25	100	300	4.501



QPSK / Bottom Channel



QPSK / Middle Channel

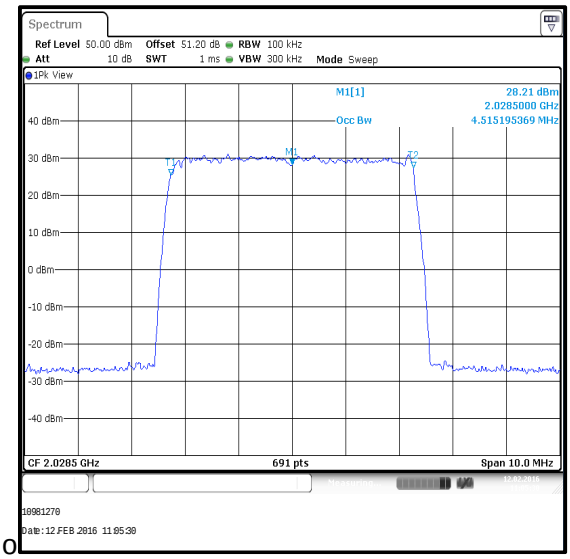


QPSK / Top Channel

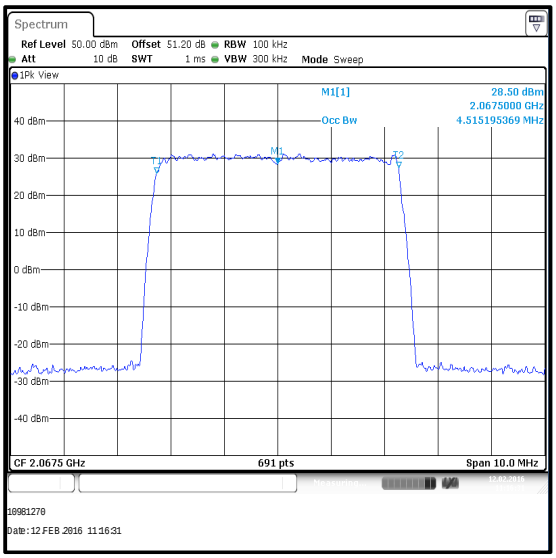
Transmitter Occupied Bandwidth (continued)

Results: 5 MHz Channel Bandwidth / Port RF1

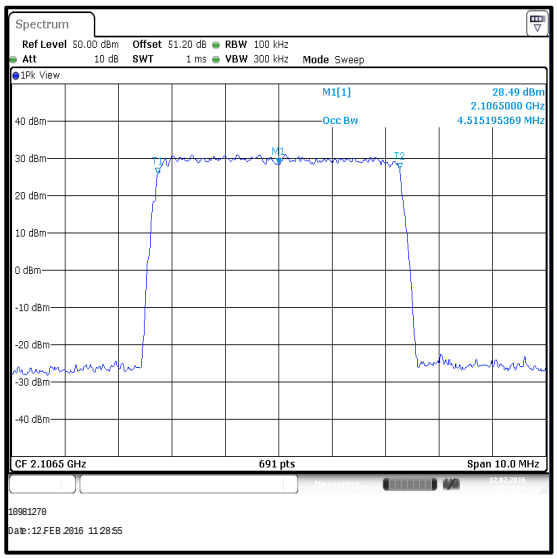
Frequency (MHz)	Modulation	Resource Blocks	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
2028.5	16QAM	25	100	300	4.515
2067.5	16QAM	25	100	300	4.515
2106.5	16QAM	25	100	300	4.515



16QAM / Bottom Channel



16QAM / Middle Channel

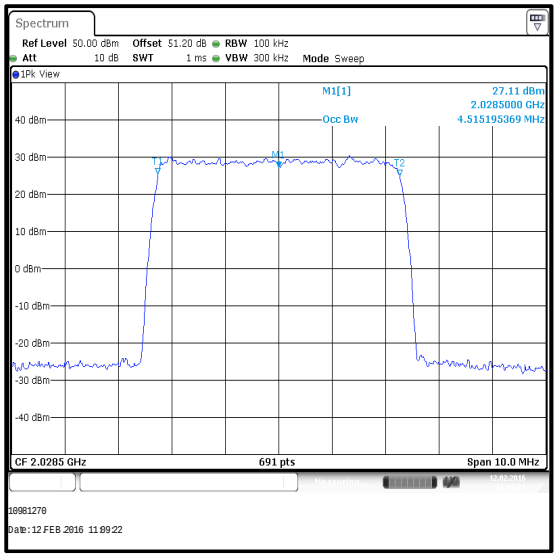


16QAM / Top Channel

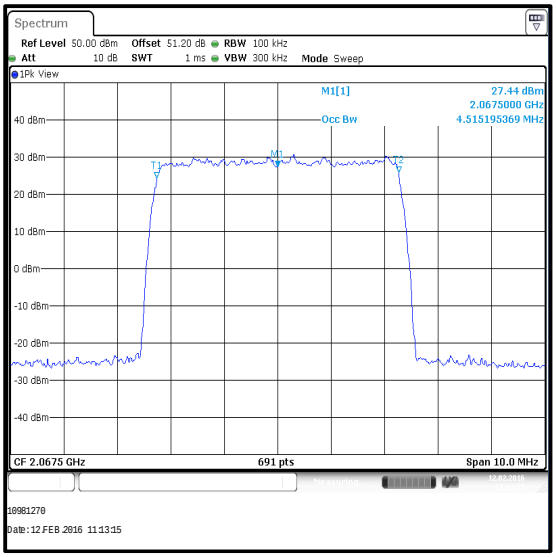
Transmitter Occupied Bandwidth (continued)

Results: 5 MHz Channel Bandwidth / Port RF1

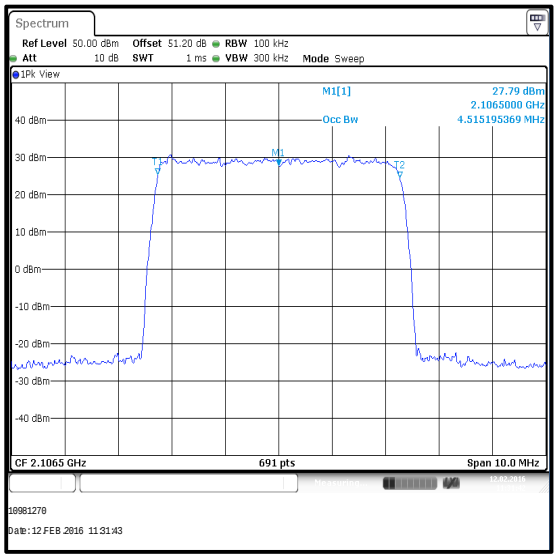
Frequency (MHz)	Modulation	Resource Blocks	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
2028.5	64QAM	25	100	300	4.515
2067.5	64QAM	25	100	300	4.515
2106.5	64QAM	25	100	300	4.515



64QAM / Bottom Channel



64QAM / Middle Channel

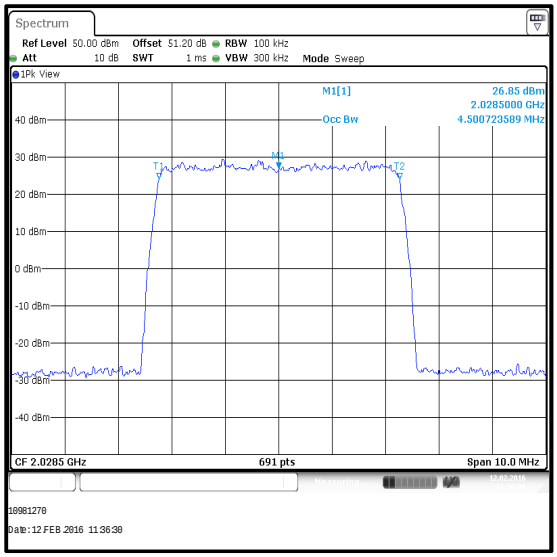


64QAM / Top Channel

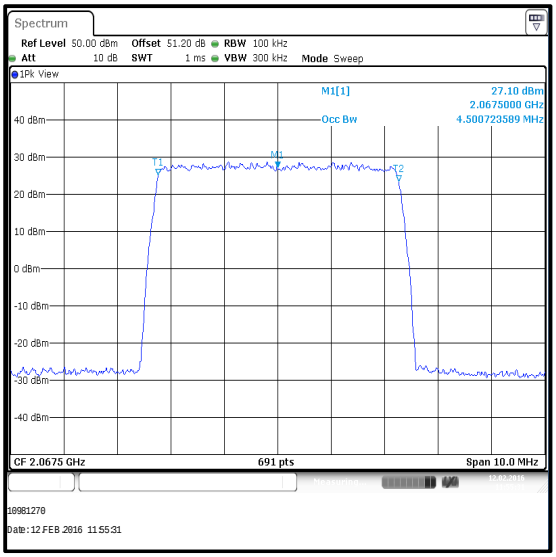
Transmitter Occupied Bandwidth (continued)

Results: 5 MHz Channel Bandwidth / Port RF2

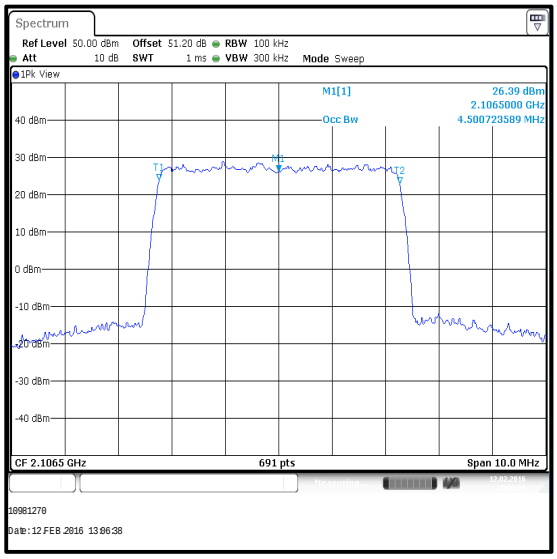
Frequency (MHz)	Modulation	Resource Blocks	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
2028.5	QPSK	25	100	300	4.501
2067.5	QPSK	25	100	300	4.501
2106.5	QPSK	25	100	300	4.501



QPSK / Bottom Channel



QPSK / Middle Channel

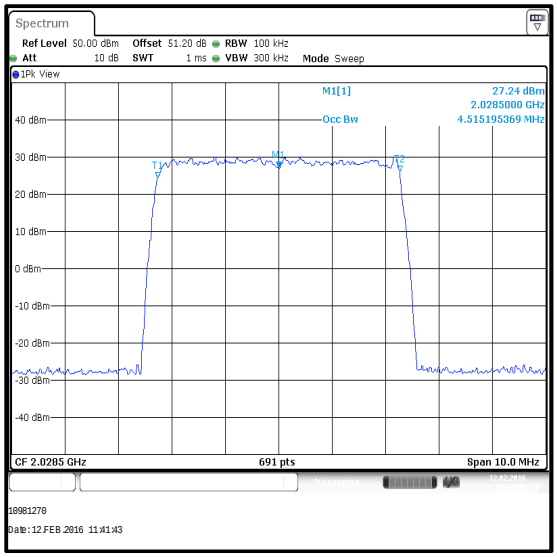


QPSK / Top Channel

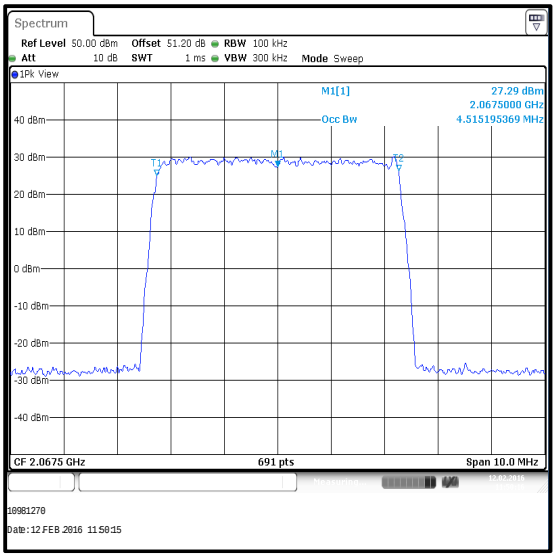
Transmitter Occupied Bandwidth (continued)

Results: 5 MHz Channel Bandwidth / Port RF2

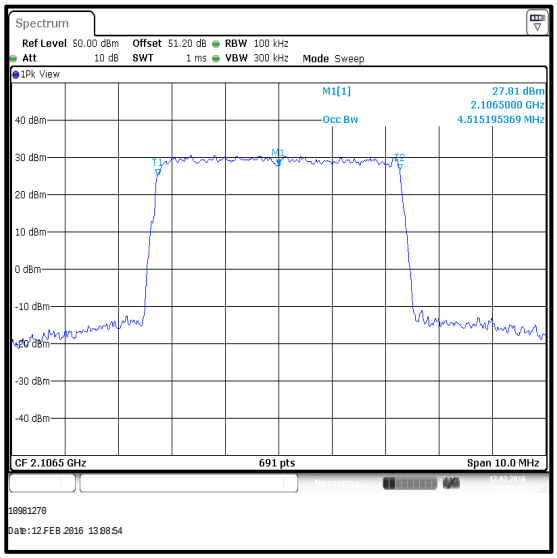
Frequency (MHz)	Modulation	Resource Blocks	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
2028.5	16QAM	25	100	300	4.515
2067.5	16QAM	25	100	300	4.515
2106.5	16QAM	25	100	300	4.515



16QAM / Bottom Channel



16QAM / Middle Channel

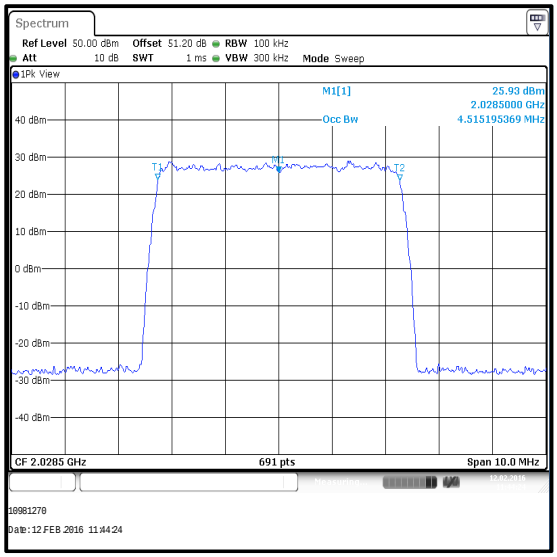


16QAM / Top Channel

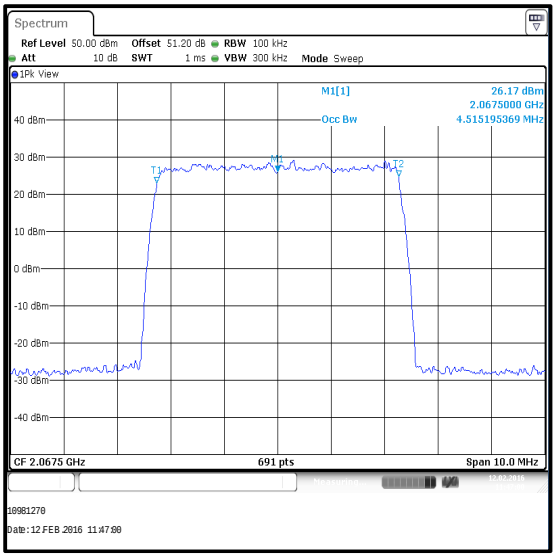
Transmitter Occupied Bandwidth (continued)

Results: 5 MHz Channel Bandwidth / Port RF2

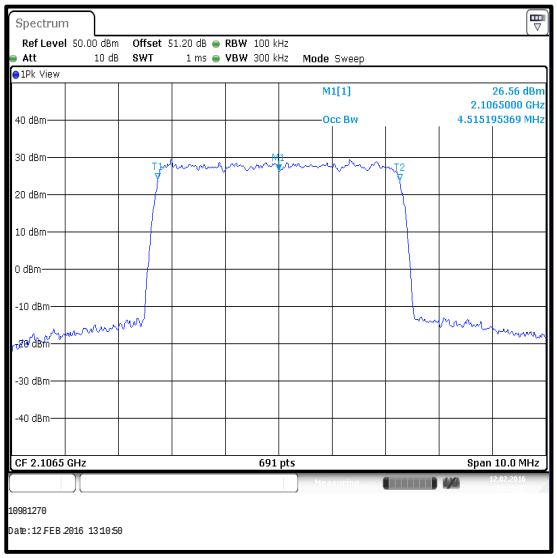
Frequency (MHz)	Modulation	Resource Blocks	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
2028.5	64QAM	25	100	300	4.515
2067.5	64QAM	25	100	300	4.515
2106.5	64QAM	25	100	300	4.515



64QAM / Bottom Channel



64QAM / Middle Channel

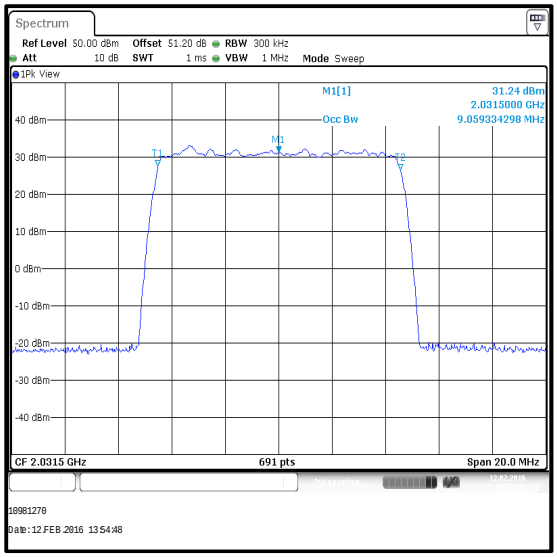


64QAM / Top Channel

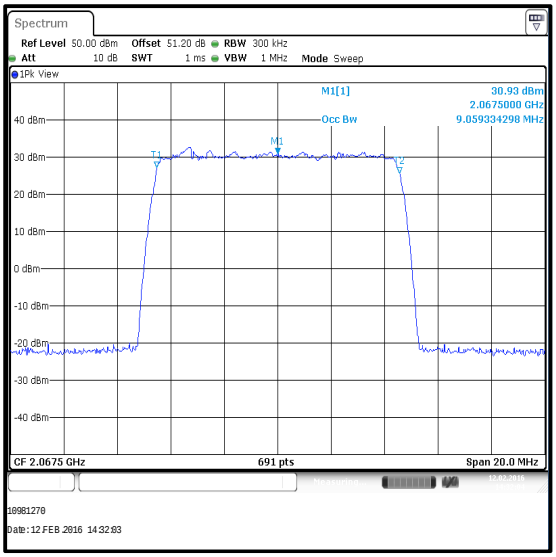
Transmitter Occupied Bandwidth (continued)

Results: 10 MHz Channel Bandwidth / Port RF1

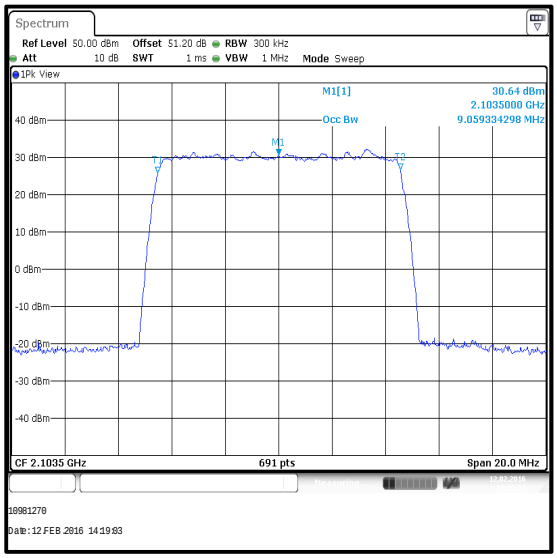
Frequency (MHz)	Modulation	Resource Blocks	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
2031.5	QPSK	50	300	1000	9.059
2067.5	QPSK	50	300	1000	9.059
2103.5	QPSK	50	300	1000	9.059



QPSK / Bottom Channel



QPSK / Middle Channel

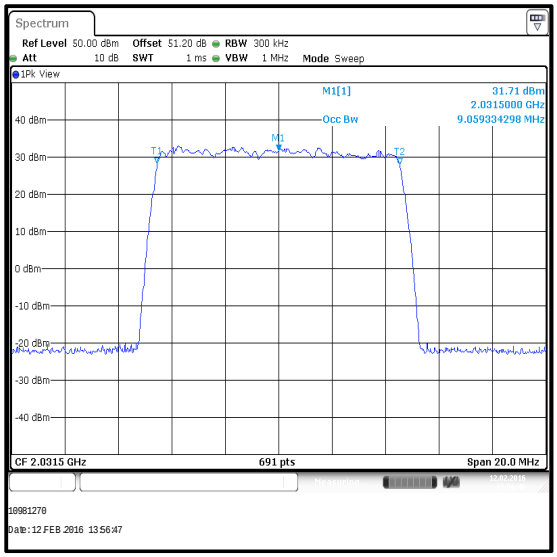


QPSK / Top Channel

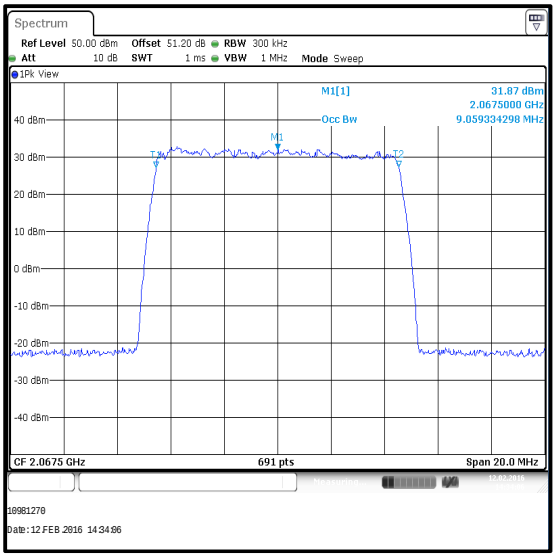
Transmitter Occupied Bandwidth (continued)

Results: 10 MHz Channel Bandwidth / Port RF1

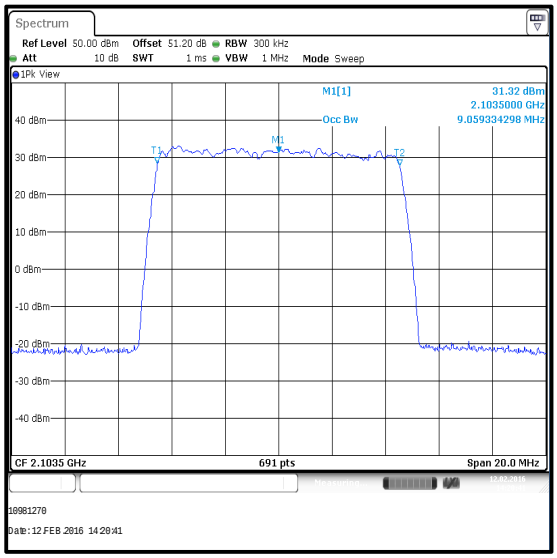
Frequency (MHz)	Modulation	Resource Blocks	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
2031.5	16QAM	50	300	1000	9.059
2067.5	16QAM	50	300	1000	9.059
2103.5	16QAM	50	300	1000	9.059



16QAM / Bottom Channel



16QAM / Middle Channel

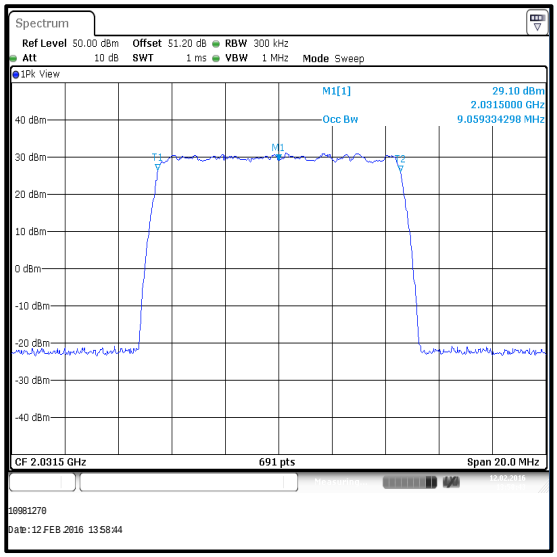


16QAM / Top Channel

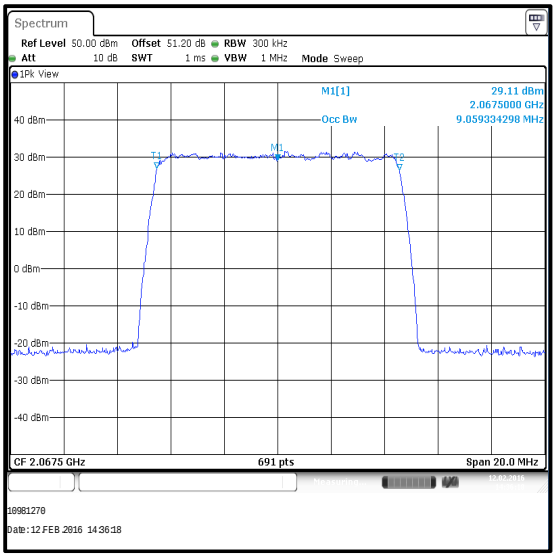
Transmitter Occupied Bandwidth (continued)

Results: 10 MHz Channel Bandwidth / Port RF1

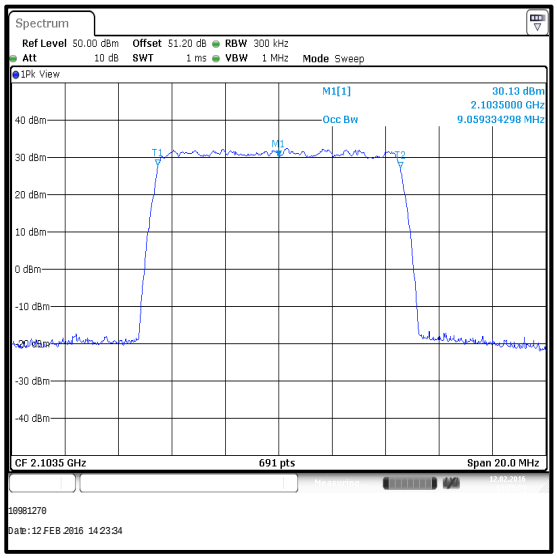
Frequency (MHz)	Modulation	Resource Blocks	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
2031.5	64QAM	50	300	1000	9.059
2067.5	64QAM	50	300	1000	9.059
2103.5	64QAM	50	300	1000	9.059



64QAM / Bottom Channel



64QAM / Middle Channel

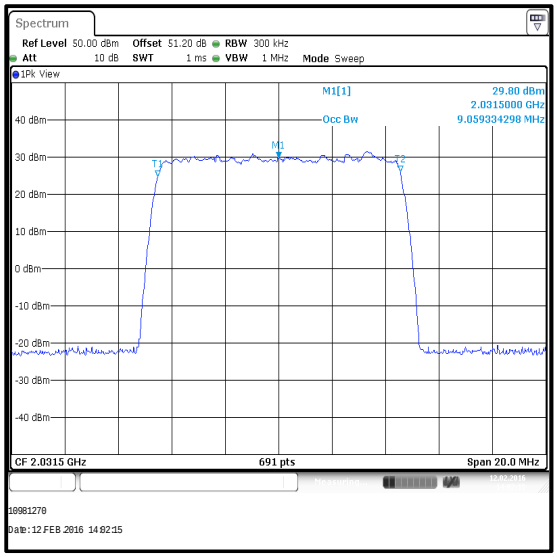


64QAM / Top Channel

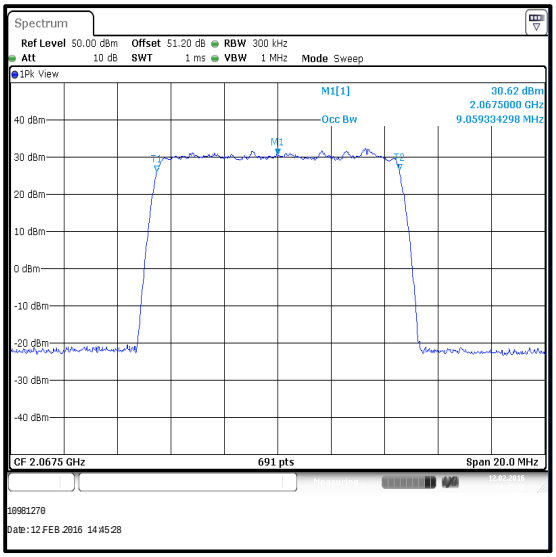
Transmitter Occupied Bandwidth (continued)

Results: 10 MHz Channel Bandwidth / Port RF2

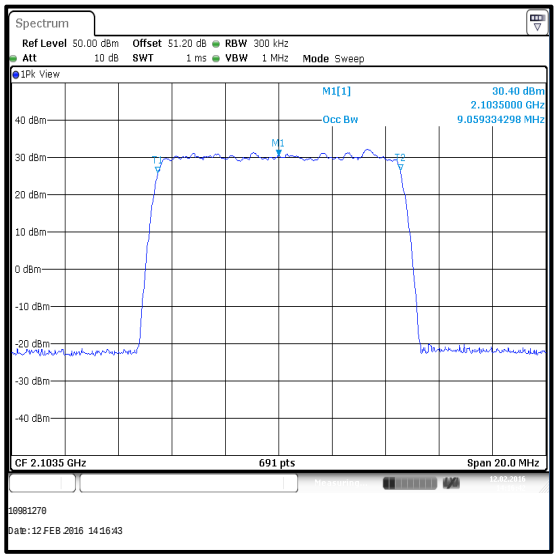
Frequency (MHz)	Modulation	Resource Blocks	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
2031.5	QPSK	50	300	1000	9.059
2067.5	QPSK	50	300	1000	9.059
2103.5	QPSK	50	300	1000	9.059



QPSK / Bottom Channel



QPSK / Middle Channel

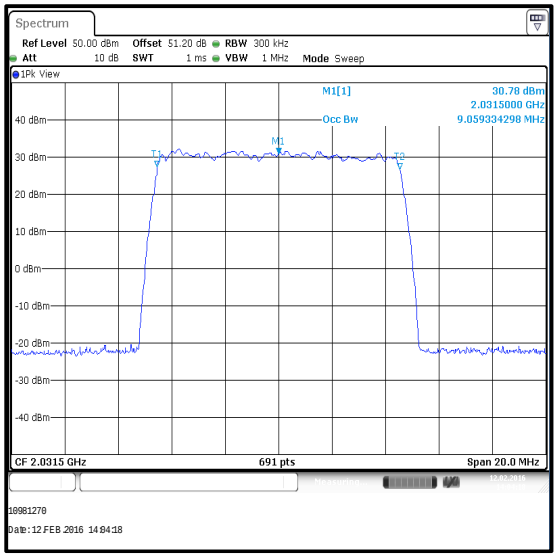


QPSK / Top Channel

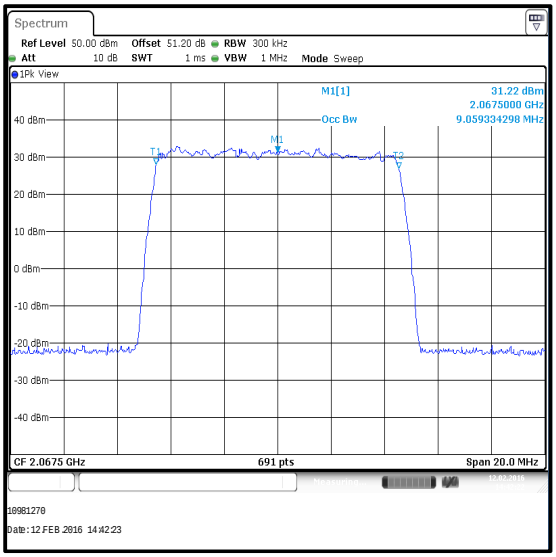
Transmitter Occupied Bandwidth (continued)

Results: 10 MHz Channel Bandwidth / Port RF2

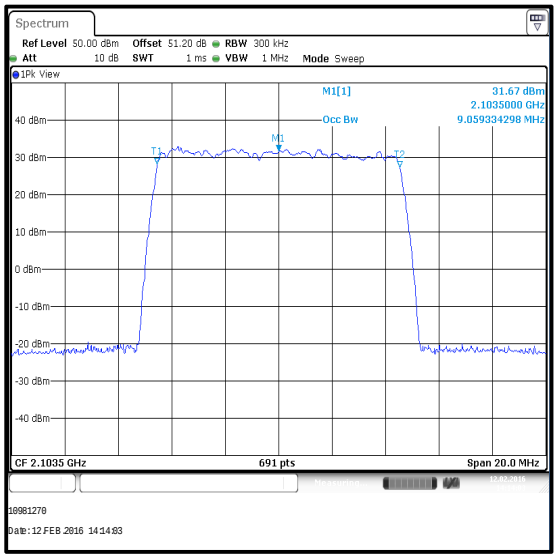
Frequency (MHz)	Modulation	Resource Blocks	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
2031.5	16QAM	50	300	1000	9.059
2067.5	16QAM	50	300	1000	9.059
2103.5	16QAM	50	300	1000	9.059



16QAM / Bottom Channel



16QAM / Middle Channel

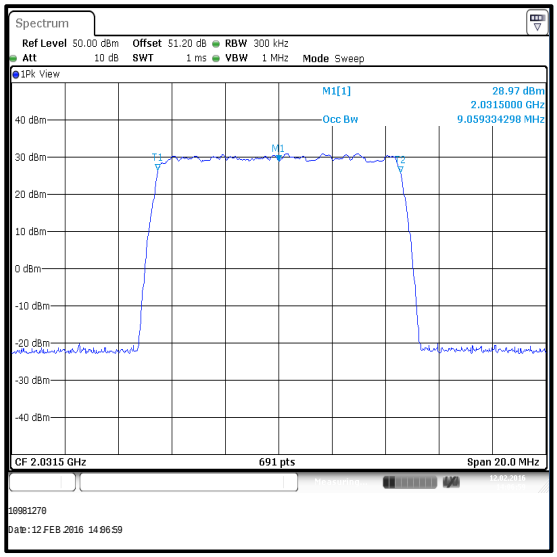


16QAM / Top Channel

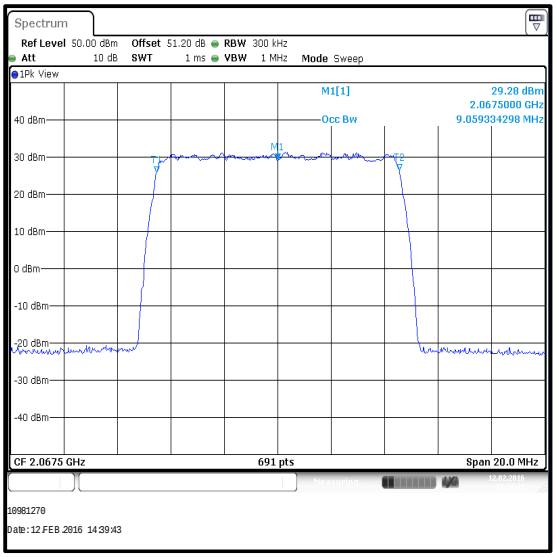
Transmitter Occupied Bandwidth (continued)

Results: 10 MHz Channel Bandwidth / Port RF2

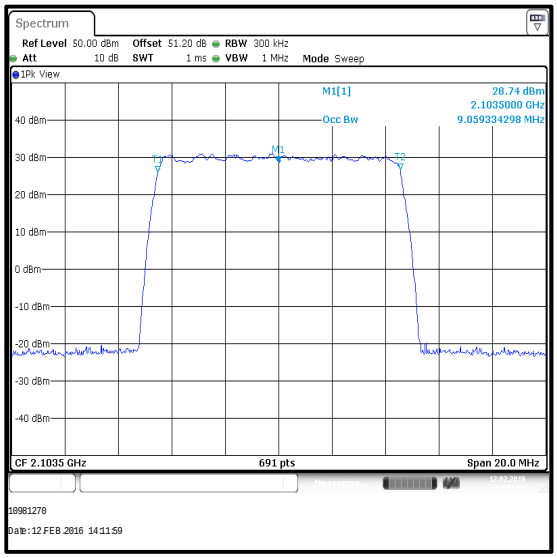
Frequency (MHz)	Modulation	Resource Blocks	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
2031.5	64QAM	50	300	1000	9.059
2067.5	64QAM	50	300	1000	9.059
2103.5	64QAM	50	300	1000	9.059



64QAM / Bottom Channel



64QAM / Middle Channel



64QAM / Top Channel

Transmitter Occupied Bandwidth (continued)

Test Equipment Used:

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M1785	Thermohygrometer	JM Handelspunkt	30.5015.13	None stated	23 Apr 2016	12
M1835	Signal Analyser	Rohde & Schwarz	FSV30	103050	18 Feb 2016	12
A2006	Attenuator	Narda	769-30	06588	Calibrated before use	-
A2007	Attenuator	Narda	769-20	001	Calibrated before use	-
A250	50 Ω Termination	Narda	376BNM	1411	Calibrated before use	-
G0607	Signal Generator	Rohde & Schwarz	SMU200A	100943	18 Jul 2016	36
G0565	Power Supply	Hewlett Packard	E4356A	US39290102	Calibrated before use	-
M1229	Multimeter	Fluke	179	87640015	23 Apr 2016	12

5.2.3. Transmitter Conducted Emission Mask

Test Summary:

Test Engineer:	Georgios Vrezas	**Test Date:**	18 February 2016
Test Sample Serial Number:	BFZBG01000210		

FCC Reference:	Parts 74.637(a)(2)(i), 74.637(c)(3), 2.1051 and notes below
Test Method Used:	KDB 971168 D01 Section 6.0

Environmental Conditions:

Temperature (°C):	25
Relative Humidity (%):	25

Note(s):

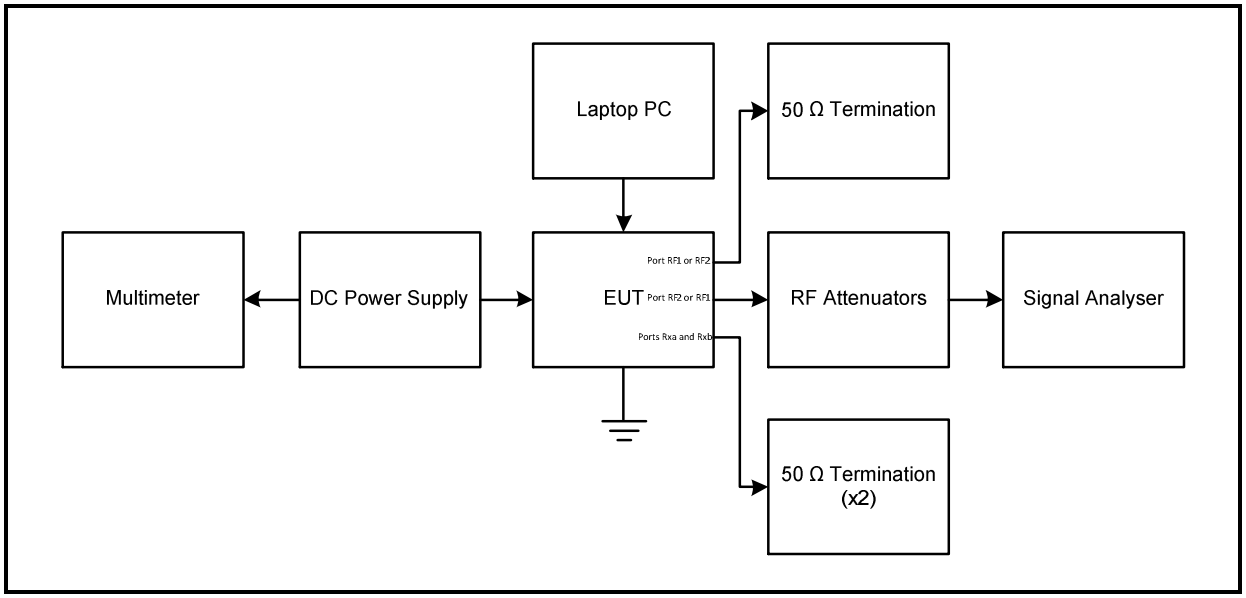
1. Measurements were performed with the EUT transmitting with 5 MHz and 10 MHz channel bandwidths, using QPSK, 16QAM and 64QAM modulation schemes, with full resource blocks.
2. Calculations of the emission mask specified in Part 74.637(a)(2)(i), were performed using 6 and 12 MHz as values for the authorised bandwidth, for the 5 and 10 MHz channel bandwidths respectively. The authorised bandwidth and mask parameters were established in pre-filing KDB inquiry consultation with FCC Lab.
3. The emission mask defined in Part 74.637(a)(2)(i), is based on the use of a 4 kHz resolution bandwidth. The nearest resolution bandwidth of the signal analyser at or above the 4 kHz reference bandwidth (B_{REF}) was 5 kHz. Measurements were performed with the signal analyser's resolution bandwidth set to 5 kHz. In accordance with Part 74.637(c)(3), limits were reduced by a factor of:

$$10*\log_{10}[(B_{REF} \text{ in megahertz})/(B_{RES} \text{ in megahertz})] = 10*\log_{10}[(4*10^{-3})/(5*10^{-3})] = -1 \text{ dB}$$

4. The mask reference level was set relative to mean carrier power (P_{MEAN}), as presented in Section 5.2.1 of this test report, using the limit line Y-Offset function of the signal analyser. It was set equal to the difference between the signal analyser reference level and the calculated mean power.
5. The signal analyser was connected to one RF port on the EUT, using suitable attenuation and RF cable. The second RF port was terminated into a 50 Ω load. An RF level offset was entered on the spectrum analyser to compensate for the loss of the attenuators and RF cables.
6. The signal analyser's number of sweep points was set to greater than twice the span divided by the RBW.
7. No mask incursions were observed. The result is compliant.

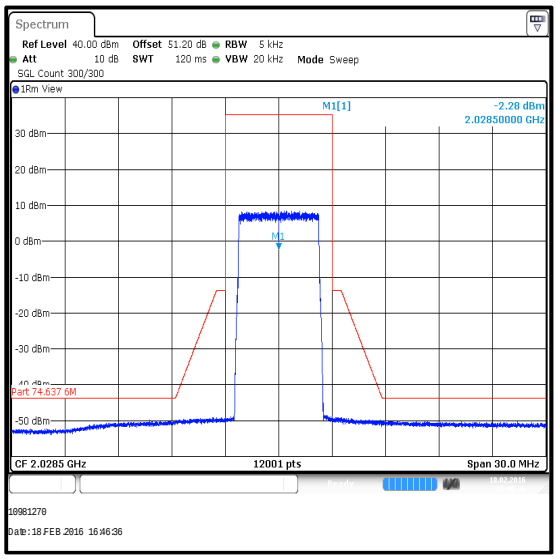
Transmitter Conducted Emission Mask (continued)

Test setup:

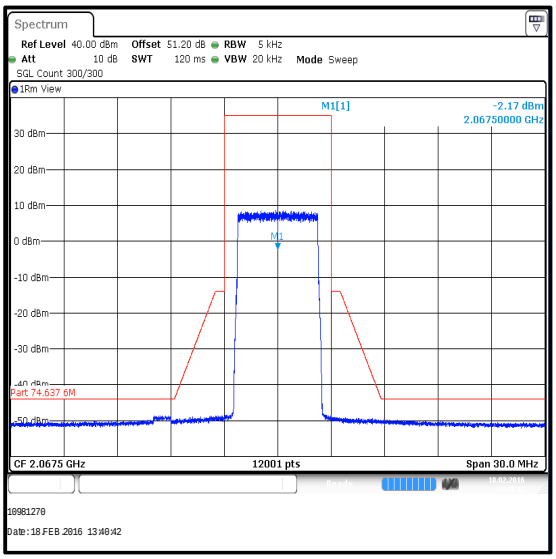


Transmitter Conducted Emission Mask (continued)

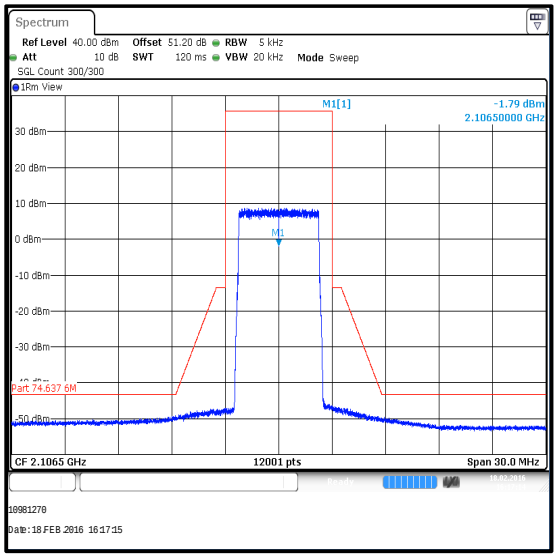
Results: 5 MHz Channel Bandwidth / QPSK / Port RF1



Bottom Channel



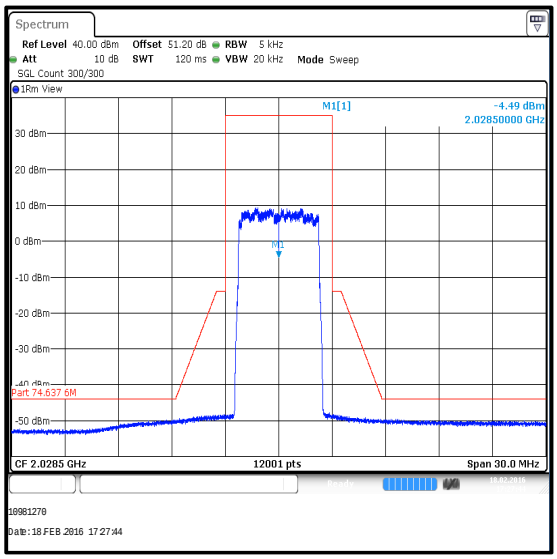
Middle Channel



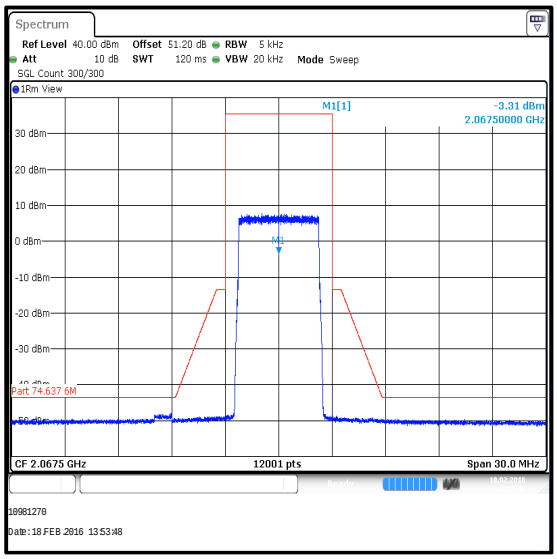
Top Channel

Transmitter Conducted Emission Mask (continued)

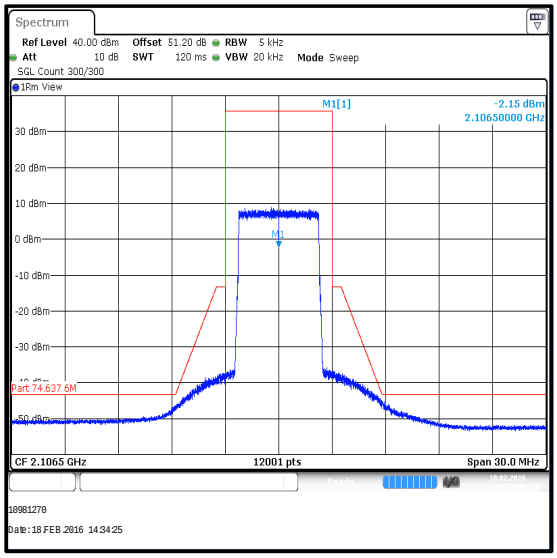
Results: 5 MHz Channel Bandwidth / QPSK / Port RF2



Bottom Channel



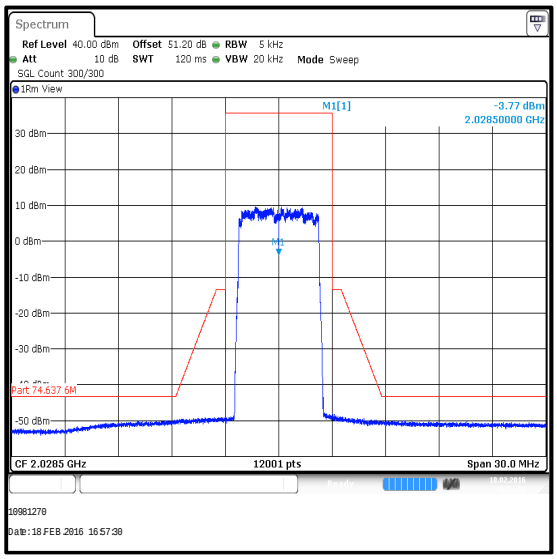
Middle Channel



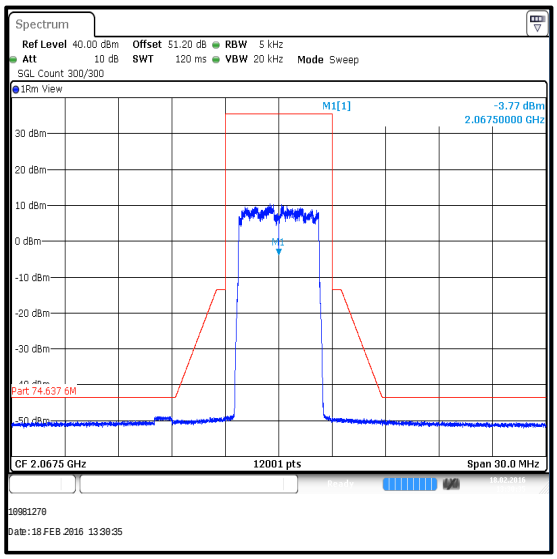
Top Channel

Transmitter Conducted Emission Mask (continued)

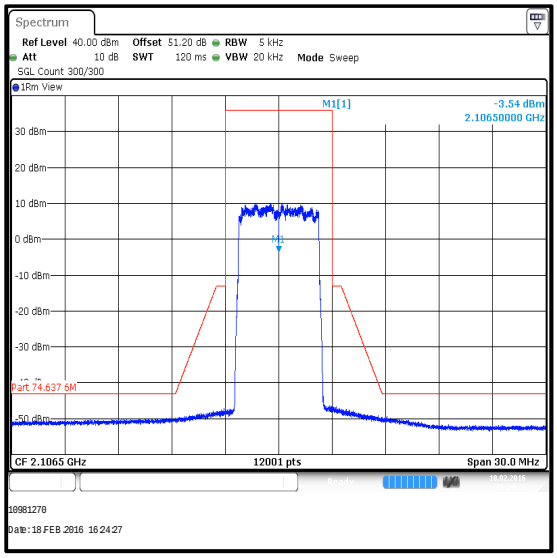
Results: 5 MHz Channel Bandwidth / 16QAM / Port RF1



Bottom Channel



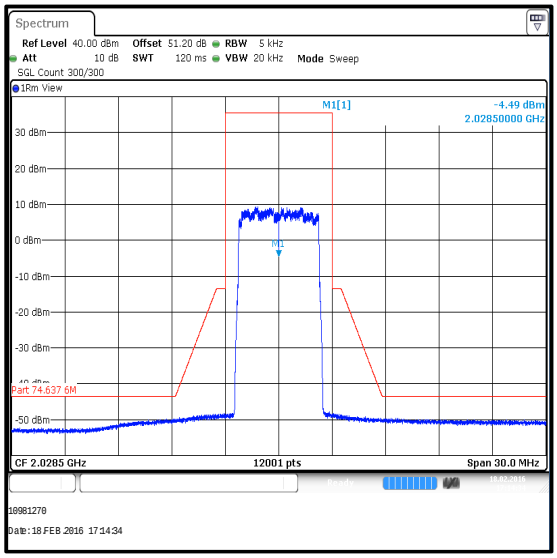
Middle Channel



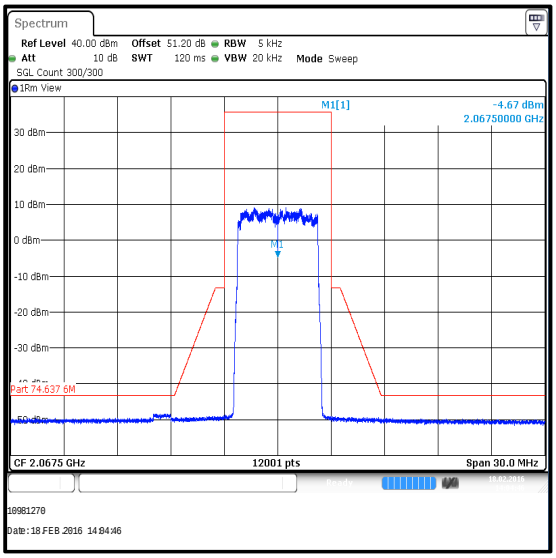
Top Channel

Transmitter Conducted Emission Mask (continued)

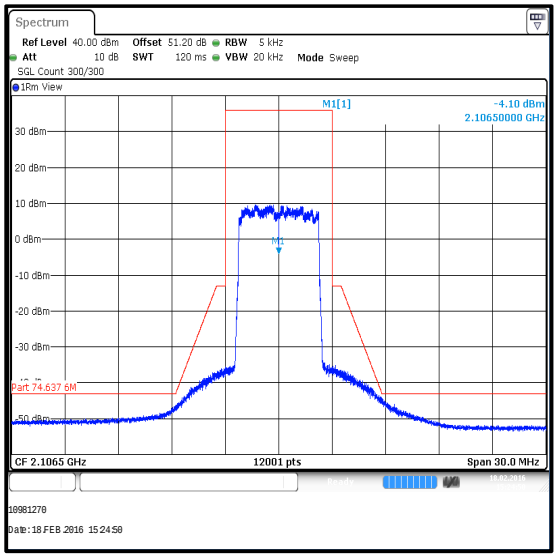
Results: 5 MHz Channel Bandwidth / 16QAM / Port RF2



Bottom Channel



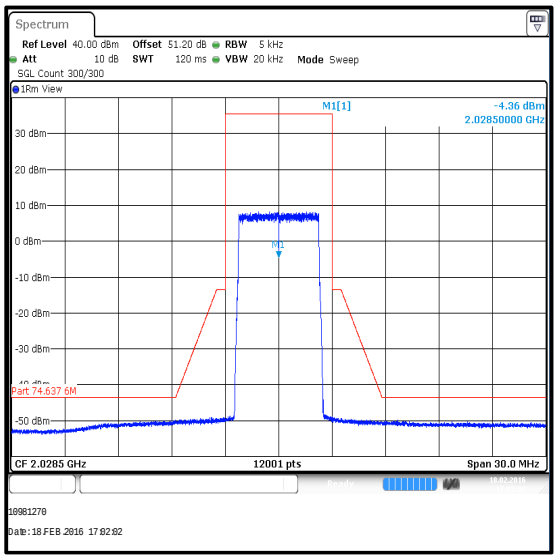
Middle Channel



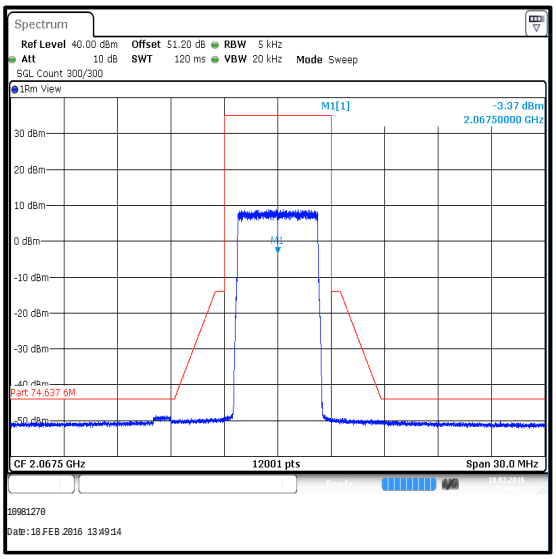
Top Channel

Transmitter Conducted Emission Mask (continued)

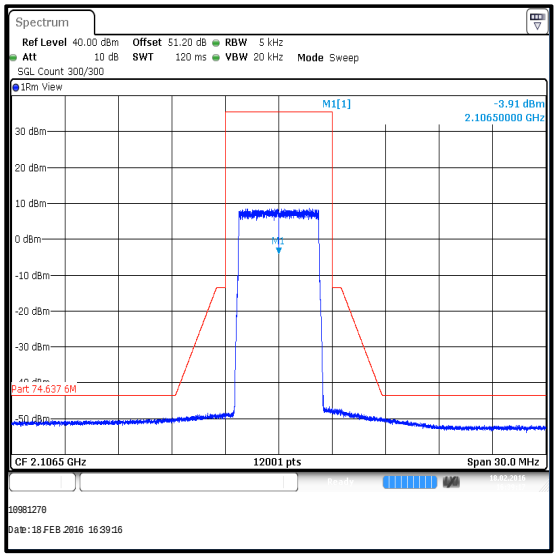
Results: 5 MHz Channel Bandwidth / 64QAM / Port RF1



Bottom Channel



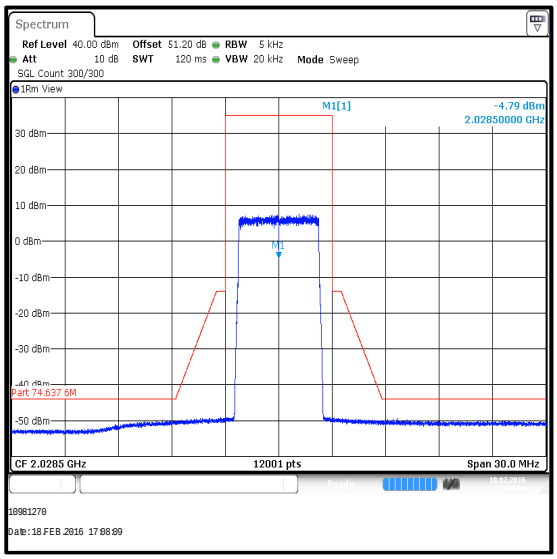
Middle Channel



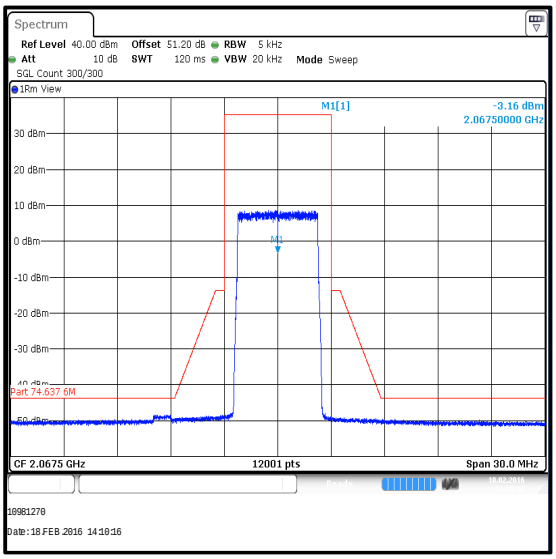
Top Channel

Transmitter Conducted Emission Mask (continued)

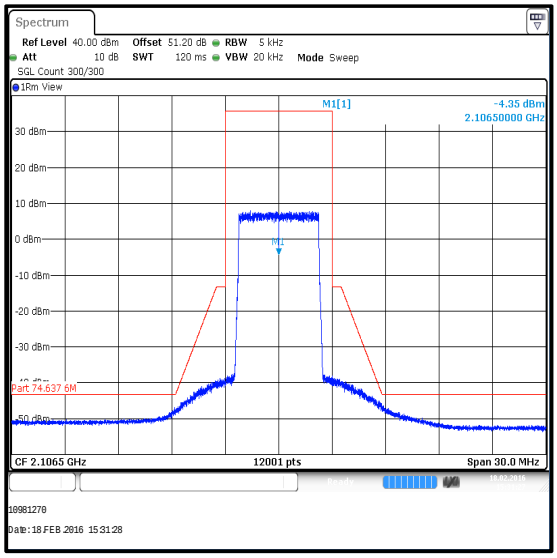
Results: 5 MHz Channel Bandwidth / 64QAM / Port RF2



Bottom Channel



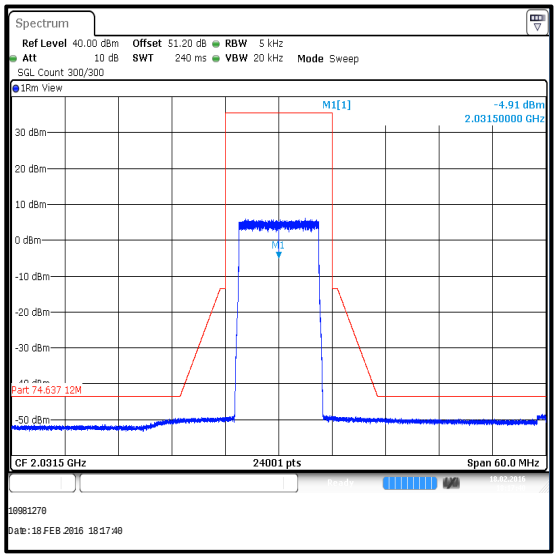
Middle Channel



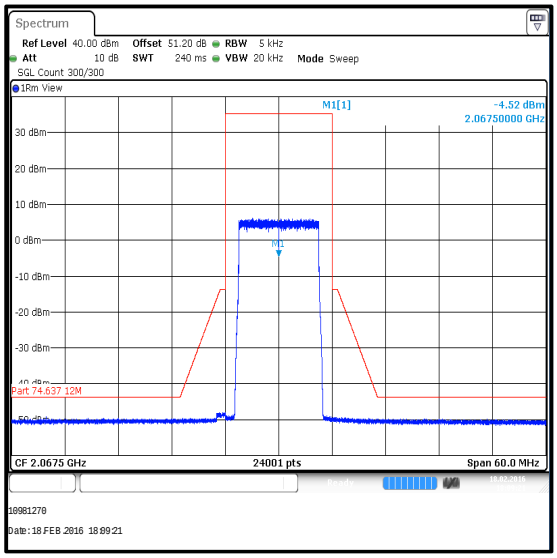
Top Channel

Transmitter Conducted Emission Mask (continued)

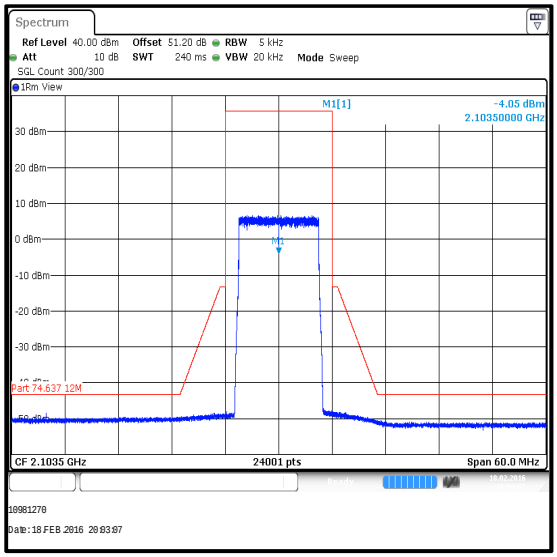
Results: 10 MHz Channel Bandwidth / QPSK / Port RF1



Bottom Channel



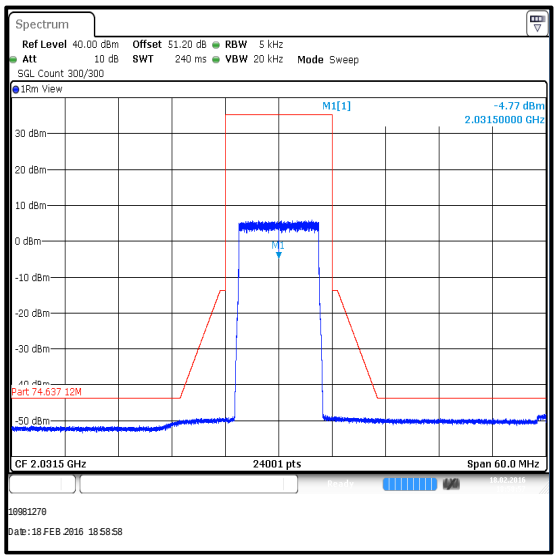
Middle Channel



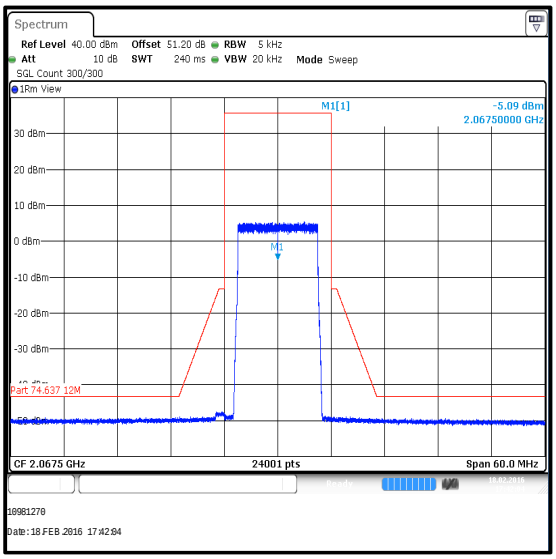
Top Channel

Transmitter Conducted Emission Mask (continued)

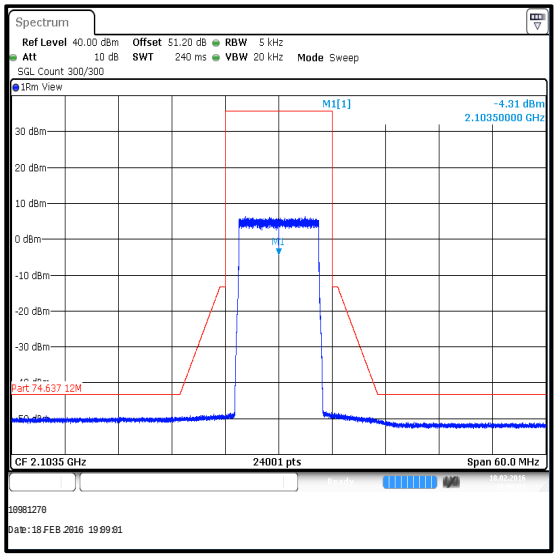
Results: 10 MHz Channel Bandwidth / QPSK / Port RF2



Bottom Channel



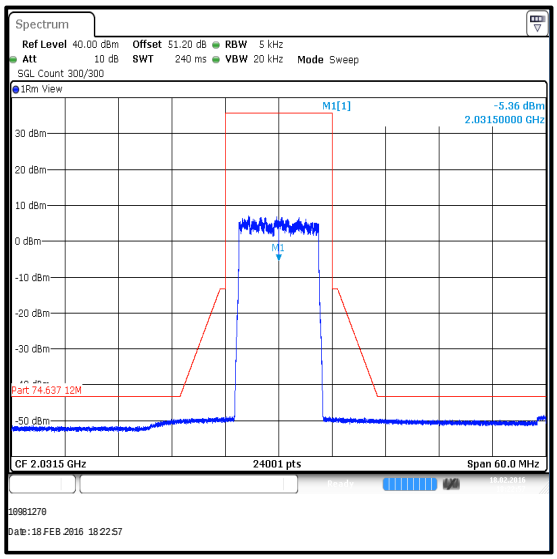
Middle Channel



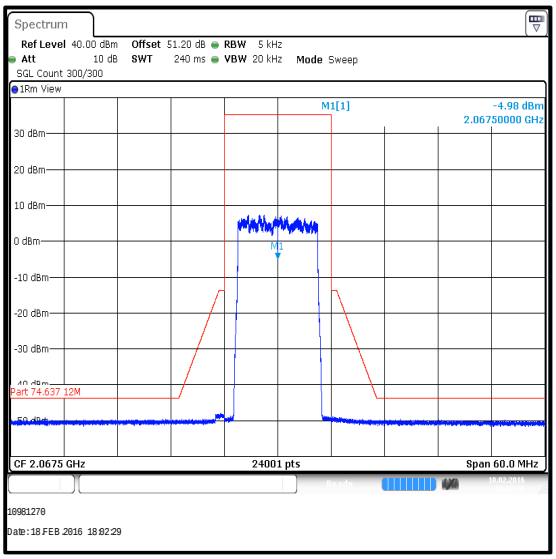
Top Channel

Transmitter Conducted Emission Mask (continued)

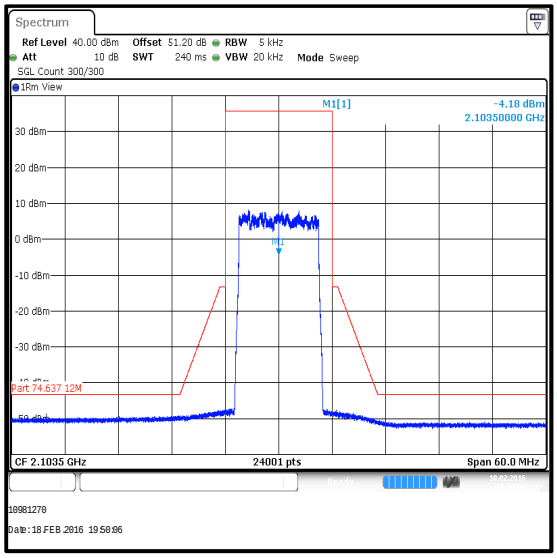
Results: 10 MHz Channel Bandwidth / 16QAM / Port RF1



Bottom Channel



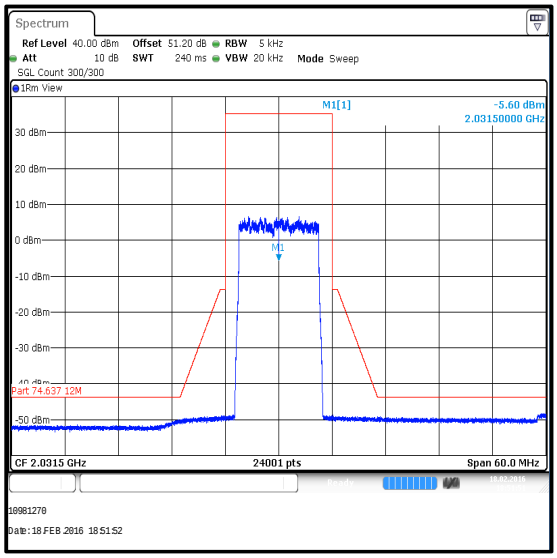
Middle Channel



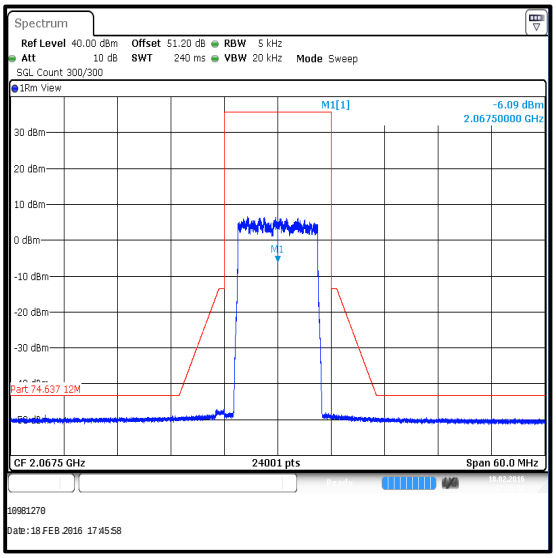
Top Channel

Transmitter Conducted Emission Mask (continued)

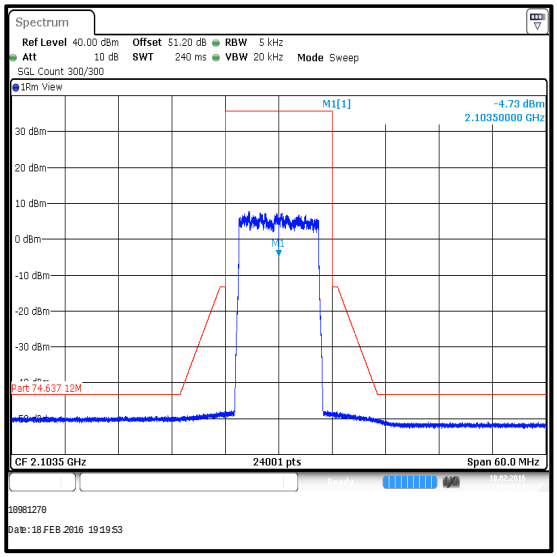
Results: 10 MHz Channel Bandwidth / 16QAM / Port RF2



Bottom Channel



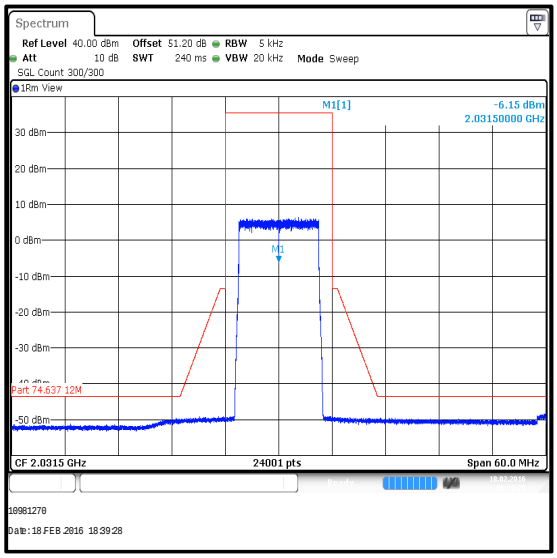
Middle Channel



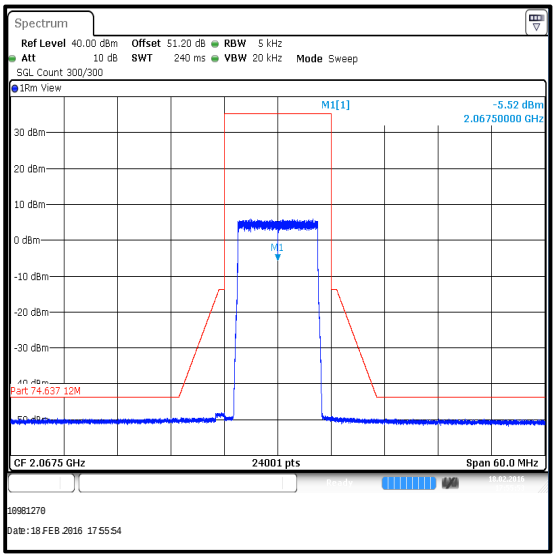
Top Channel

Transmitter Conducted Emission Mask (continued)

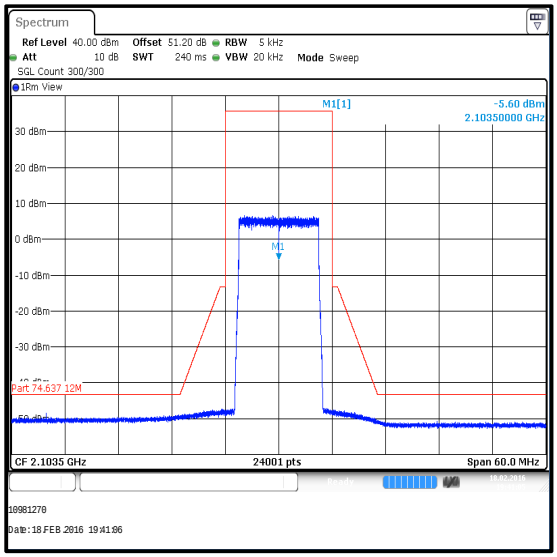
Results: 10 MHz Channel Bandwidth / 64QAM / Port RF1



Bottom Channel



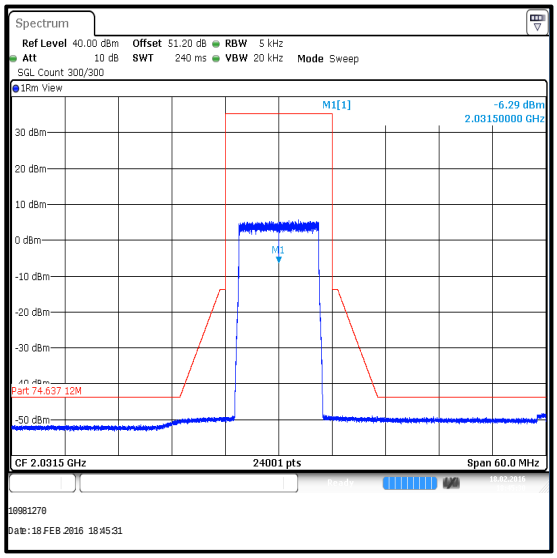
Middle Channel



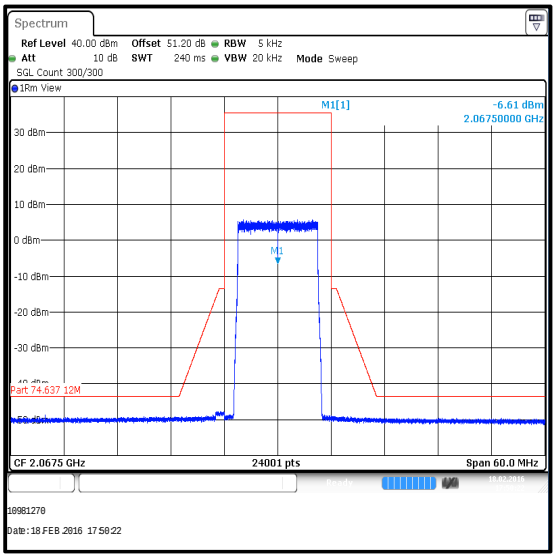
Top Channel

Transmitter Conducted Emission Mask (continued)

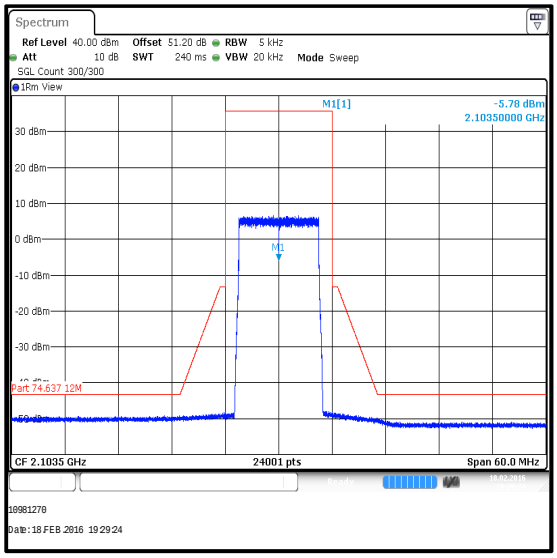
Results: 10 MHz Channel Bandwidth / 64QAM / Port RF2



Bottom Channel



Middle Channel



Top Channel

Transmitter Conducted Emission Mask (continued)

Test Equipment Used:

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M1785	Thermohygrometer	JM Handelspunkt	30.5015.13	None stated	23 Apr 2016	12
M1873	Signal Analyser	Rohde & Schwarz	FSV30	103074	03 Jul 2016	12
A2006	Attenuator	Narda	769-30	06588	Calibrated before use	-
A2007	Attenuator	Narda	769-20	001	Calibrated before use	-
A250	50 Ω Termination	Narda	376BNM	1411	Calibrated before use	-
G0607	Signal Generator	Rohde & Schwarz	SMU200A	100943	18 Jul 2016	36
G0565	Power Supply	Hewlett Packard	E4356A	US39290102	Calibrated before use	-
M1229	Multimeter	Fluke	179	87640015	23 Apr 2016	12

5.2.4. Transmitter Conducted Emissions

Test Summary:

Test Engineer:	Georgios Vrezas	**Test Date:**	04 May 2016
Test Sample Serial Number:	BBRBG010042A		

FCC Reference:	Parts 74.637(a)(2)(iii), 74.637(c)(3) and 2.1051
Test Method Used:	KDB 971168 D01 Section 6.0 & 8.0
Frequency Range:	9 kHz to 22 GHz

Environmental Conditions:

Temperature (°C):	23
Relative Humidity (%):	33

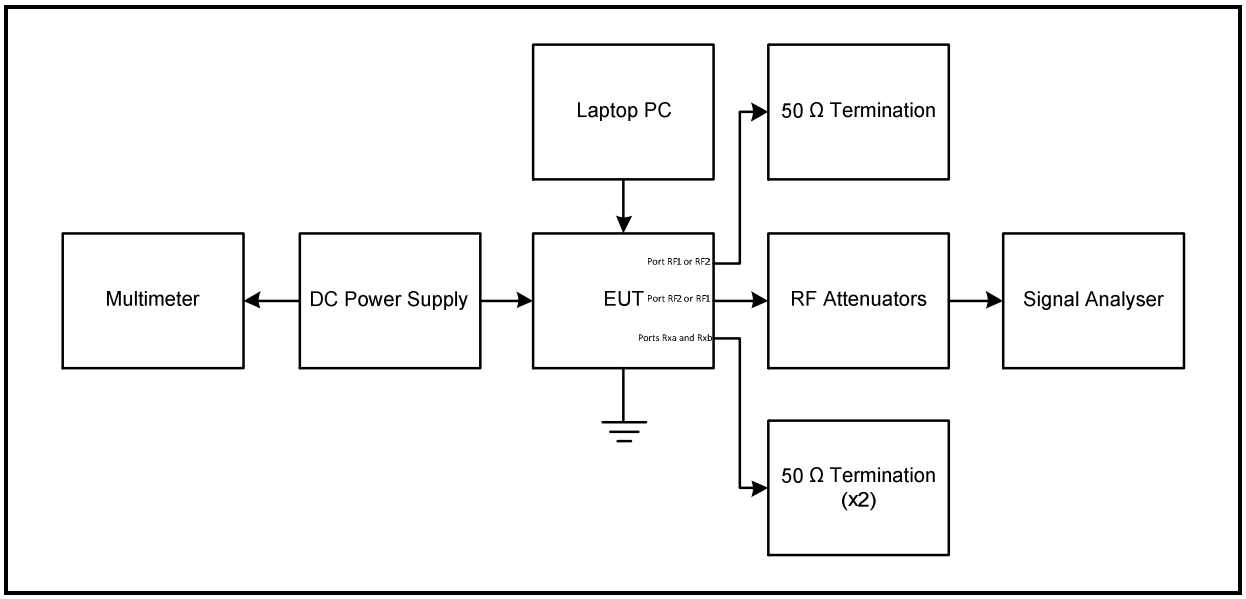
Note(s):

1. Pre-scans were performed with the EUT transmitting at maximum power with 5 MHz Channel Bandwidth using 16QAM modulation scheme, as this was found to produce the highest output level and therefore deemed worst case.
2. Testing was performed to 22 GHz, as this was equal to at least the tenth harmonic of the highest fundamental frequency (2106.5 MHz).
3. Frequencies covered in this section of the test report, are those that are removed by more than 250 percent of the authorized bandwidth.
4. For the middle channel of operation using a 5 MHz channel bandwidth, frequency band 2052.5 to 2082.5 MHz contains frequencies that removed less or equal to ±250% of the authorised bandwidth The emission requirement of 74.637(c)(3) for this band was tested separately and the results reported in Section 5.2.3 of this test report.
5. For the frequency ranges 9 kHz to 150 kHz, 150 kHz to 30 MHz, 30 MHz to 1 GHz and 1 GHz to 22 GHz, resolution bandwidths B_{RES} of 1 kHz, 10 kHz, 100 kHz and 1 MHz were used respectively.
6. Part 74.637(a)(2)(iii) defines the required emission attenuation level when measured in a 4 kHz reference bandwidth B_{REF}. In accordance with Part 74.637(c)(3), where B_{RES} and B_{REF} are not equal, a correction of $10*log_{10}[(B_{REF}$ *in megahertz)/(*B_{RES} *in megahertz)]* shall be applied
7. The correction factor was calculated as follows:

   For the frequency range 9 kHz to 150 kHz: $10*log_{10}[(4*10^{-3})/(1*10^{-3})] = 6.0$ *dB*
   For the frequency range 150 kHz to 30 MHz: $10*log_{10}[(4*10^{-3})/(10*10^{-3})] = -4.0$ *dB*
   For the frequency range 30 MHz to 1 GHz: $10*log_{10}[(4*10^{-3})/(100*10^{-3})] = -14.0$ *dB*
   For the frequency range 1 GHz to 22 GHz: $10*log_{10}[(4*10^{-3})/(1)] = -24.0$ *dB*
8. On each of the frequency ranges, emissions from both antenna ports were measured and combined using the *measure and sum spectral maxima across the outputs* method stated in FCC KDB 662911 D01.
9. Compliance on each of the frequency ranges mentioned above, is shown using the highest combined emission level of each measured frequency range
10. The signal analyser was connected to one RF port on the EUT, using suitable attenuation and RF cable. The second RF port was terminated into a 50 Ω load. An RF level offset was entered on the spectrum analyser to compensate for the loss of the attenuator and RF cables.
11. The signal analyser's number of sweep points was set to greater than twice the span divided by the RBW.
12. All emissions were ≥20 dB below the applicable limit or below the level of the noise floor of the measuring receiver.

Transmitter Conducted Emissions (continued)

Test setup:



Transmitter Conducted Emissions (continued)

Results: Frequency Range 9 kHz – 150 kHz / B_{REF} = 4 kHz, B_{RES} = 1 kHz

Emission Frequency (kHz)	Port RF1			Port RF2		
	Conducted Emission Level (dBm)	Correction Factor (dB)	Corrected Conducted Emission Level (dBm)	Conducted Emission Level (dBm)	Correction Factor (dB)	Corrected Conducted Emission Level (dBm)
9.000 (Port RF1) 9.904 (Port RF2)	-69.7	6.0	-63.7	-69.1	6.0	-63.1

Emission Frequency (kHz)	RF Port 1 Corrected Conducted Emission Level (dBm)	RF Port 2 Corrected Conducted Emission Level (dBm)	Combined Conducted Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
9.000 (Port RF1) 9.904 (Port RF2)	-63.7	-63.1	-60.4	-13.0	47.4	Complied

Results: Frequency Range 150 kHz – 30 MHz / B_{REF} = 4 kHz, B_{RES} = 10 kHz

Emission Frequency (kHz)	Port RF1			Port RF2		
	Conducted Emission Level (dBm)	Correction Factor (dB)	Corrected Conducted Emission Level (dBm)	Conducted Emission Level (dBm)	Correction Factor (dB)	Corrected Conducted Emission Level (dBm)
174.875 (Port RF1) 174.875 (Port RF2)	-63.0	-4.0	-67.0	-63.1	-4.0	-67.1

Emission Frequency (kHz)	RF Port 1 Corrected Conducted Emission Level (dBm)	RF Port 2 Corrected Conducted Emission Level (dBm)	Combined Conducted Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
174.875 (Port RF1) 174.875 (Port RF2)	-67.0	-67.1	-64.0	-13.0	51.0	Complied

Transmitter Conducted Emissions (continued)

Results: Frequency Range 30 MHz – 1 GHz / B_{REF} = 4 kHz, B_{RES} = 100 kHz

Emission Frequency (MHz)	Port RF1			Port RF2		
	Conducted Emission Level (dBm)	Correction Factor (dB)	Corrected Conducted Emission Level (dBm)	Conducted Emission Level (dBm)	Correction Factor (dB)	Corrected Conducted Emission Level (dBm)
990.300 (Port RF1) 955.865 (Port RF2)	-58.8	-14.0	-72.8	-58.8	-14.0	-72.8

Emission Frequency (MHz)	RF Port 1 Corrected Conducted Emission Level (dBm)	RF Port 2 Corrected Conducted Emission Level (dBm)	Combined Conducted Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
990.300 (Port RF1) 955.865 (Port RF2)	-72.8	-72.8	-69.8	-13.0	56.8	Complied

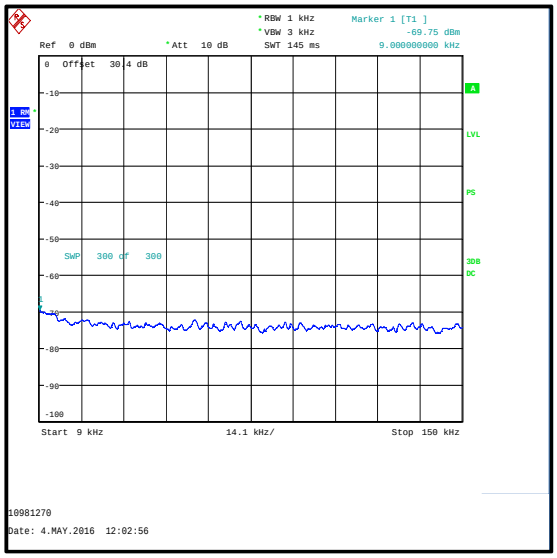
Results: Frequency Range 1 GHz – 22 GHz / B_{REF} = 4 kHz, B_{RES} = 1 MHz

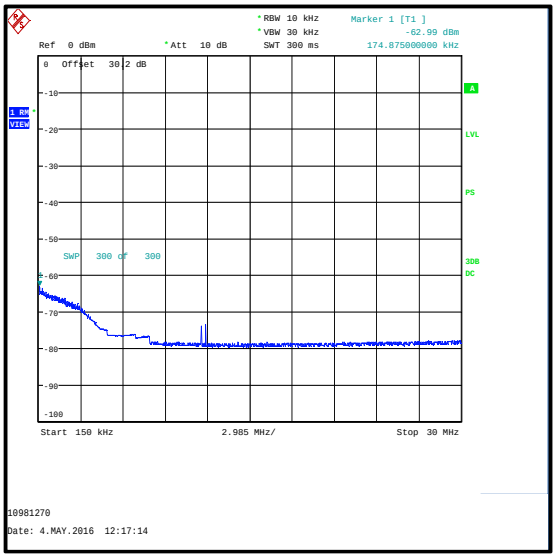
Emission Frequency (MHz)	Port RF1			Port RF2		
	Conducted Emission Level (dBm)	Correction Factor (dB)	Corrected Conducted Emission Level (dBm)	Conducted Emission Level (dBm)	Correction Factor (dB)	Corrected Conducted Emission Level (dBm)
2025.135 (Port RF1) 2046.185 (Port RF2)	-32.7	-24.0	-56.7	-31.4	-24.0	-55.4

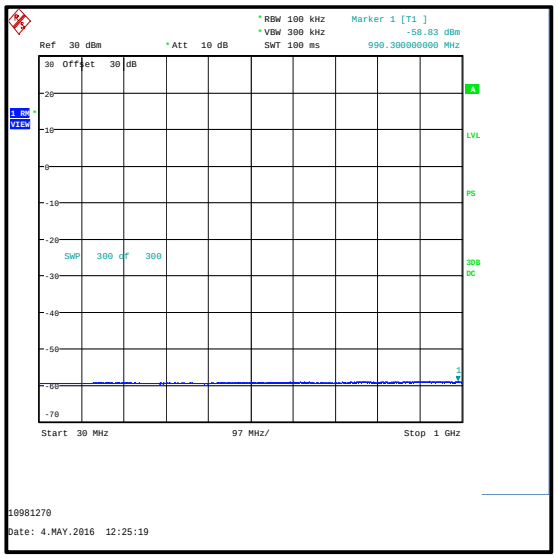
Emission Frequency (MHz)	RF Port 1 Corrected Conducted Emission Level (dBm)	RF Port 2 Corrected Conducted Emission Level (dBm)	Combined Conducted Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
2025.135 (Port RF1) 2046.185 (Port RF2)	-56.7	-55.4	-53.0	-13.0	40.0	Complied

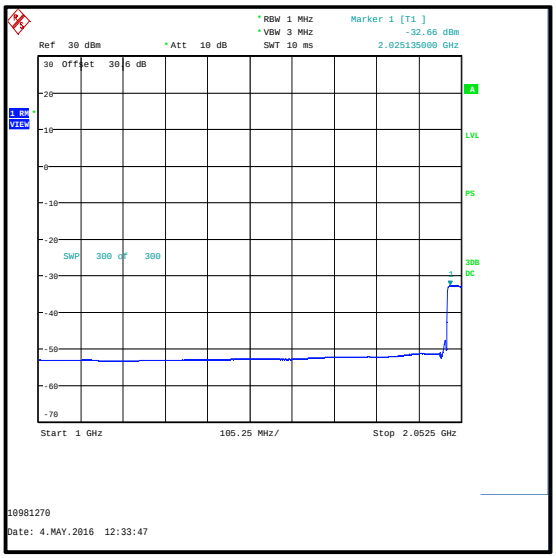
Transmitter Conducted Emissions (continued)

Results: Port RF1





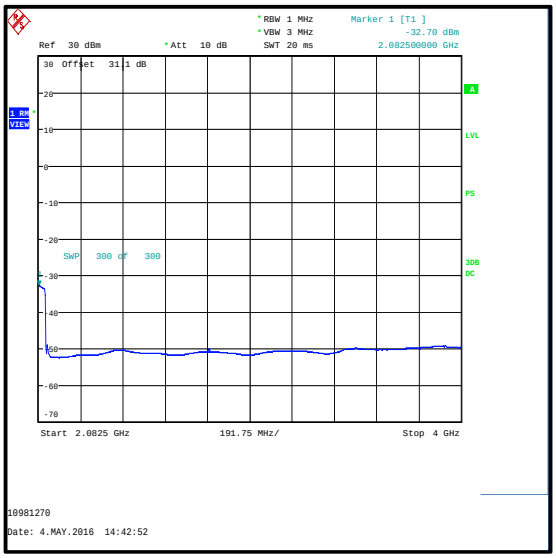


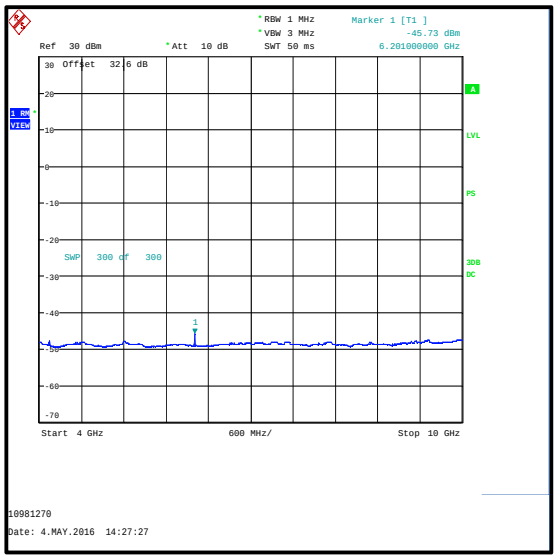


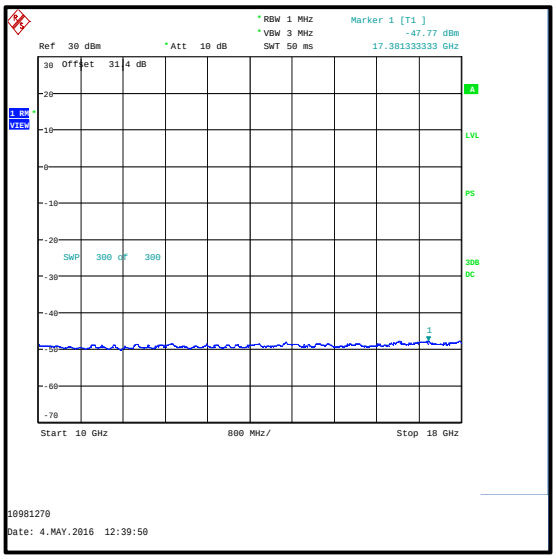
Transmitter Conducted Emissions (continued)

2052.5 MHz to 2082.5 MHz

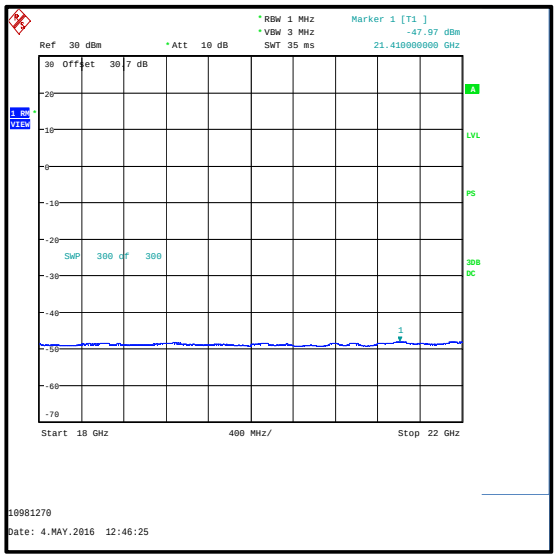
Refer to Transmitter Conducted Emission Mask section of this test report





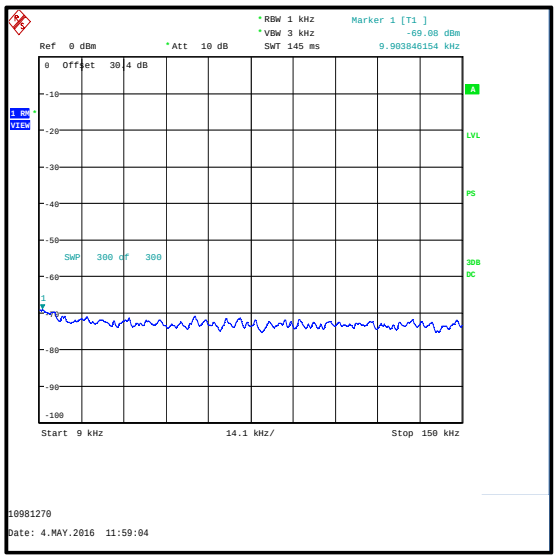


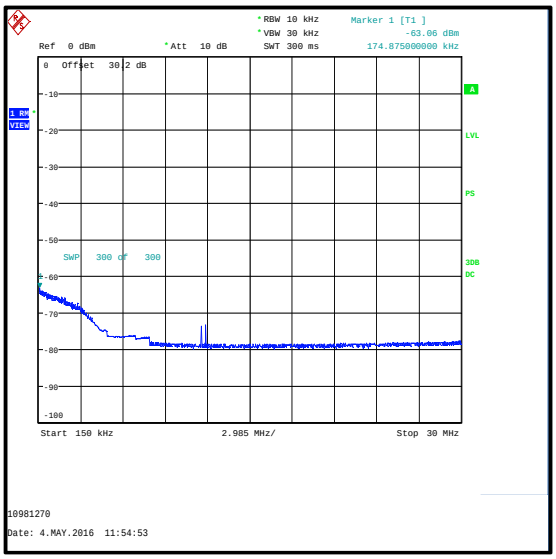
Transmitter Conducted Emissions (continued)

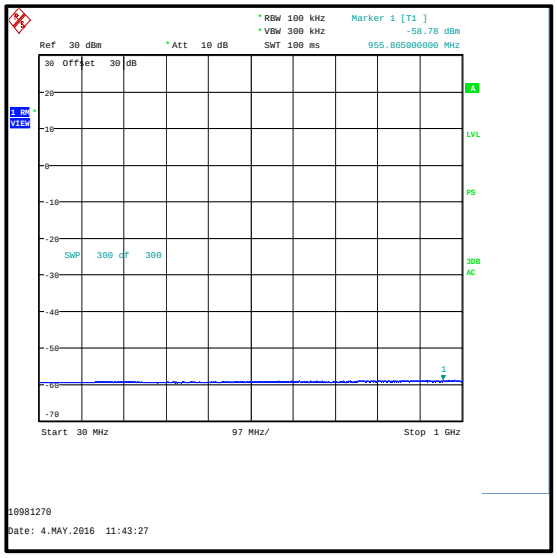


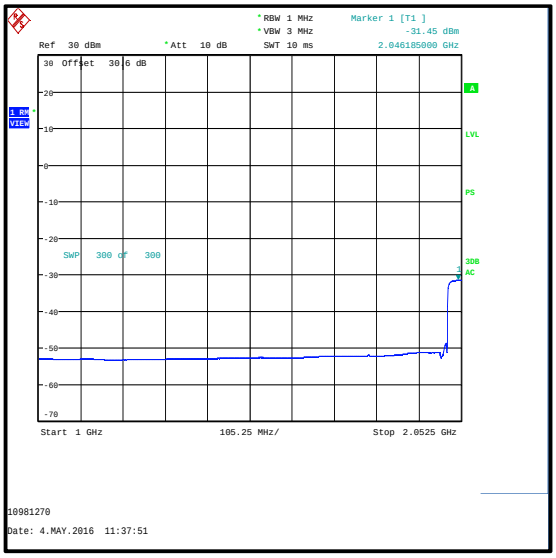
Transmitter Conducted Emissions (continued)

Results: Port RF2





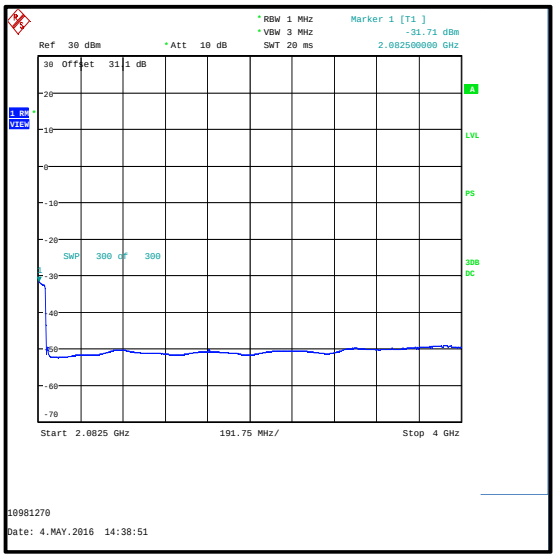


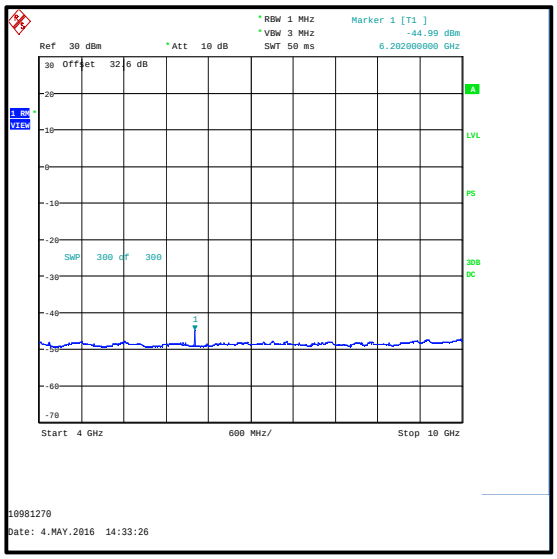


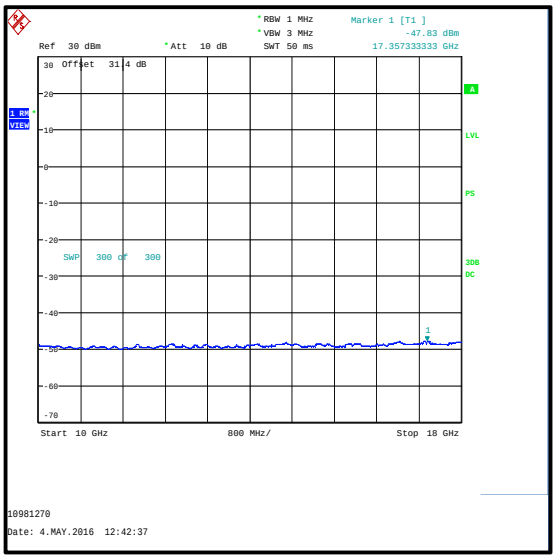
Transmitter Conducted Emissions (continued)

2052.5 MHz to 2082.5 MHz

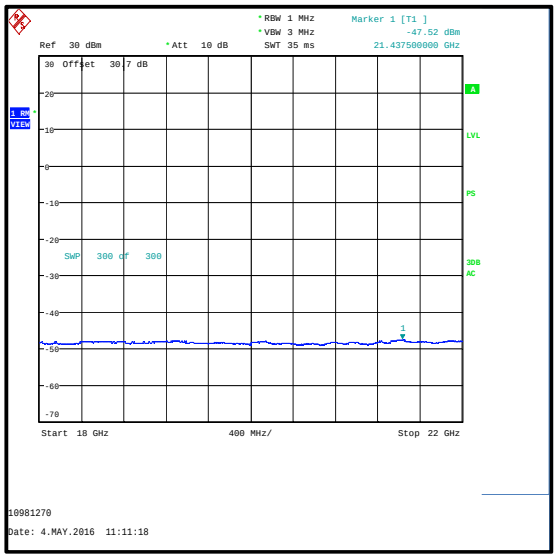
Refer to Transmitter Conducted Emission Mask section of this test report







Transmitter Conducted Emissions (continued)



Test Equipment Used:

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M2002	Thermohygrometer	Testo	608-H1	45041825	02 Apr 2017	12
M1874	Test Receiver	Rohde & Schwarz	ESU26	100553	11 Apr 2017	12
A2525	Attenuator	AtlanTecRF	AN18W5-10	832827#3	Calibrated before use	-
A1397	Attenuator	Weinschel Associates	WA46-20	A128	Calibrated before use	-
A1975	High Pass Filter	AtlanTecRF	AFH-03000	83640A	26 Apr 2017	12
A250	50 Ω Termination	Narda	376BNM	1411	Calibrated before use	-
M1252	Signal Generator	Hewlett Packard	83640A	3119A00489	26 Oct 2017	36
G0628	Signal Generator	Rohde & Schwarz	SMBV100A	261847	25 Jan 2017	12
G0565	Power Supply	Hewlett Packard	E4356A	US39290102	Calibrated before use	-
M1269	Multimeter	Fluke	179	90250210	26 May 2016	12

5.2.5. Transmitter Radiated Spurious Emissions

Test Summary:

Test Engineer:	Nick Steele	**Test Dates:**	18 February 2016, 19 February 2016 & 24 February 2016
Test Sample Serial Number:	BFZBG01000210		

FCC Reference:	Parts 74.637(a)(2)(iii), 74.637(c)(3), 2.1053 and notes below
Test Method Used:	KDB 971168 D01 Section 6.1
Frequency Range:	30 MHz to 22 GHz

Environmental Conditions:

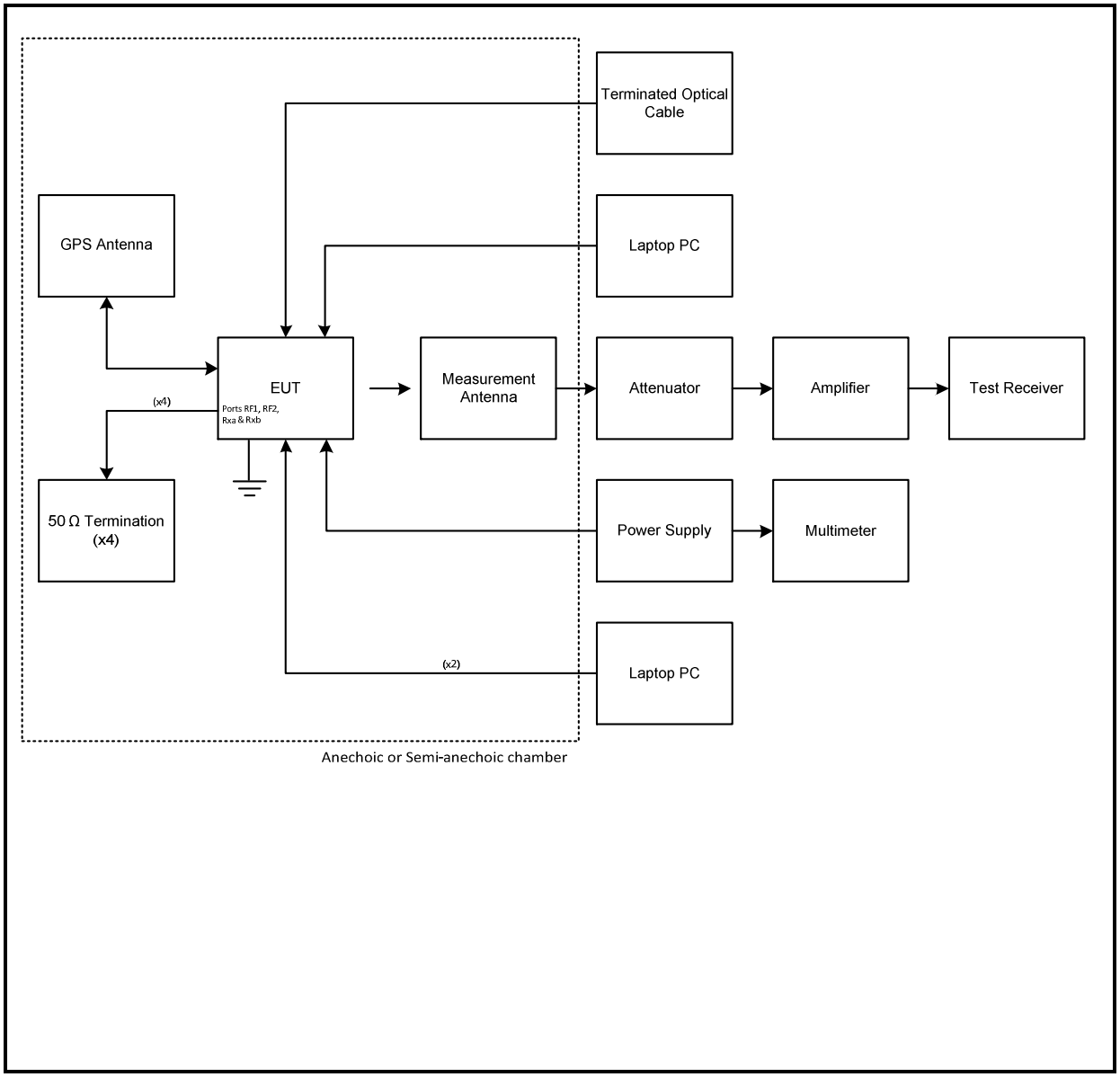
Temperature (°C):	19 to 23
Relative Humidity (%):	30 to 31

Note(s):

1. Pre scans were performed with the EUT was set to transmit with a 5 MHz channel bandwidth with 16QAM modulation and full Resource Blocks, as this was found to have the highest output power.
2. The emission seen on the 1 GHz to 4 GHz plot at approximately 2067.5 MHz is the EUT carrier.
3. All emissions shown on the pre-scan plots were investigated and found to be ambient or >20 dB below the applicable limit or below the measurement system noise floor. Therefore the highest peak noise floor reading of the measuring receiver was recorded in the table below.
4. Measurements below 1 GHz were performed in a semi-anechoic chamber (Asset Number K0001) at a distance of 3 metres. The EUT was placed at a height of 80 cm above the reference ground plane in the centre of the chamber turntable. Maximum emission levels were determined by height searching the measurement antenna over the range 1 metre to 4 metres.
5. Pre-scans above 1 GHz were performed in a fully anechoic chamber (Asset Number K0002) at a distance of 3 metres. The EUT was placed at a height of 1.5 metres above the test chamber floor in the centre of the chamber turntable. All measurement antennas were placed at a fixed height of 1.5 metres above the test chamber floor, in line with the EUT. Final measurements above 1 GHz were performed in a semi-anechoic chamber (Asset Number K0001) at a distance of 3 metres. The EUT was placed at a height of 80 cm above the reference ground plane in the centre of the chamber turntable. Maximum emission levels were determined by height searching the measurement antenna over the range 1 metre to 4 metres.

Transmitter Radiated Spurious Emissions (continued)

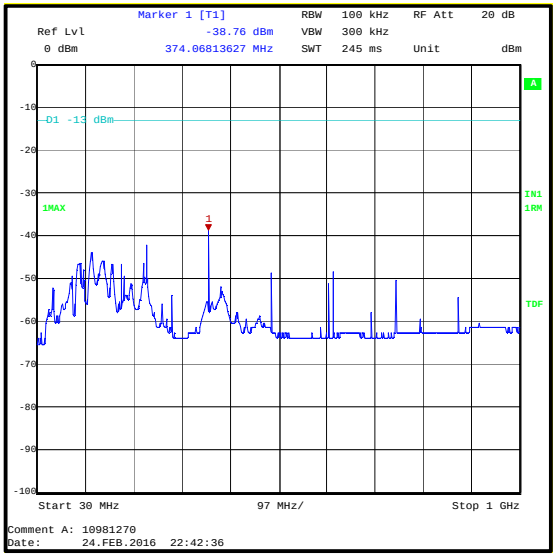
Test setup:

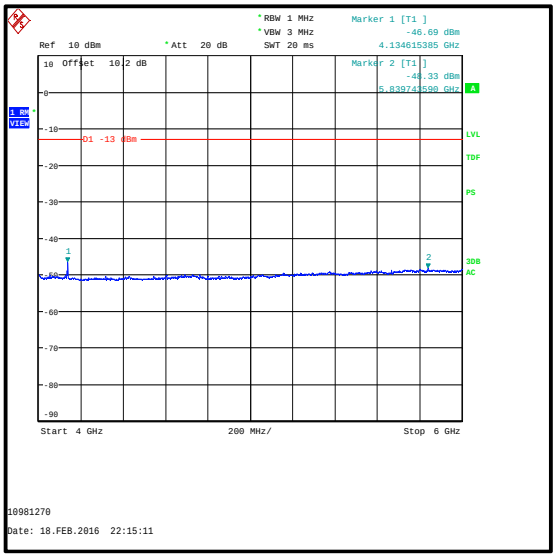


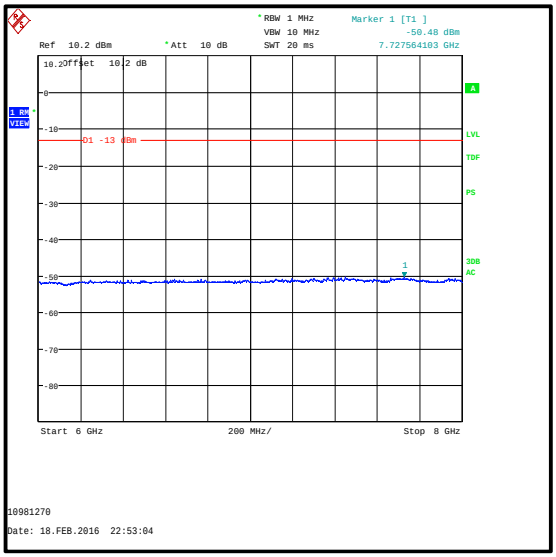
Transmitter Radiated Spurious Emissions (continued)

Results:

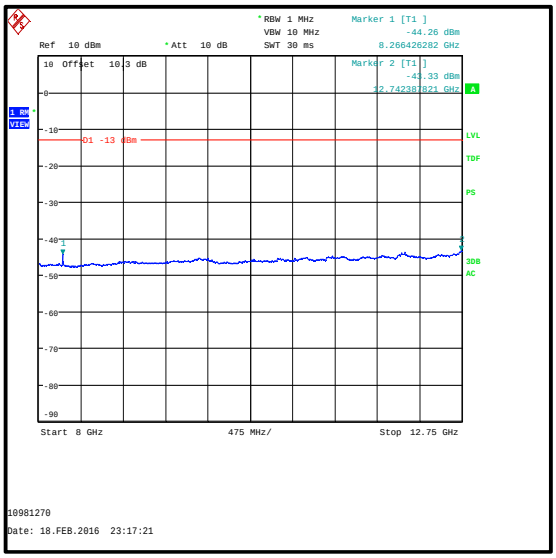
Frequency (MHz)	Antenna Polarity	Level (dBm)	Limit (dBm)	Margin (dB)	Result
18000.000	Vertical	-38.6	-13.0	25.6	Complied

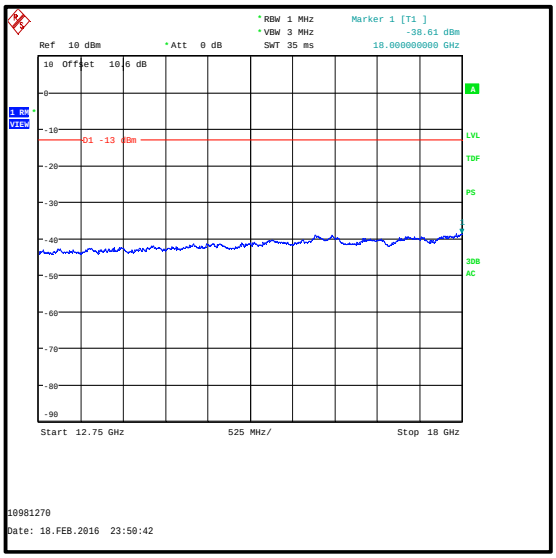


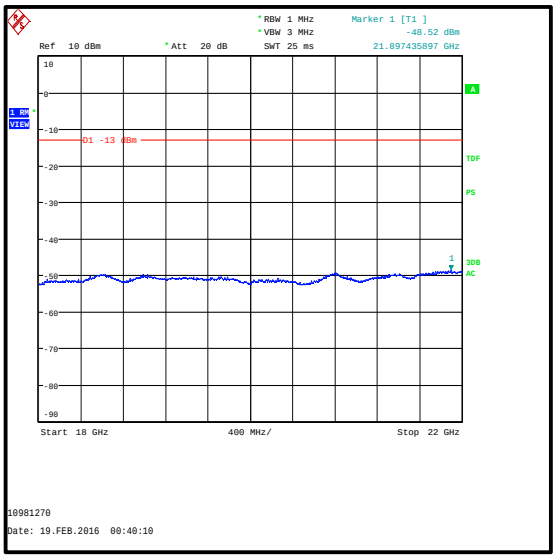




Transmitter Radiated Spurious Emissions (continued)







Transmitter Radiated Spurious Emissions (continued)

Test Equipment Used:

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M1623	Thermohygrometer	JM Handelspunkt	30.5015.13	None stated	11 Jan 2017	12
K0001	5m RSE Chamber	Rainford EMC	N/A	N/A	12 Jan 2017	12
A259	Antenna	Chase	CBL6111A	1513	09 Apr 2016	12
M1273	Test Receiver	Rohde & Schwarz	ESIB 26	100275	19 Mar 2016	12
G0543	Amplifier	Sonoma	310N	230801	29 May 2016	3
A1834	Attenuator	Hewlett Packard	8491B	10444	05 Mar 2016	12
M1656	Thermohygrometer	JM Handelspunkt	30.5015.13	None stated	23 Apr 2016	12
K0002	3m RSE Chamber	Rainford EMC	N/A	N/A	01 May 2016	12
M1886	Test Receiver	Rohde & Schwarz	ESU26	100554	21 May 2016	12
A1534	Pre Amplifier	Hewlett Packard	8449B	3008A00405	19 Dec 2016	12
A1396	Attenuator	Huber & Suhner	6810.17.B	757987	05 May 2016	12
A1818	Antenna	EMCO	3115	00075692	17 Dec 2016	12
A253	Antenna	Flann Microwave	12240-20	128	17 Dec 2016	12
A254	Antenna	Flann Microwave	14240-20	139	17 Dec 2016	12
A255	Antenna	Flann Microwave	16240-20	519	17 Dec 2016	12
A256	Antenna	Flann Microwave	18240-20	400	17 Dec 2016	12
A436	Antenna	Flann Microwave	20240-20	330	19 Dec 2016	12

5.2.6. Transmitter Frequency Stability (Temperature Variation)

Test Summary:

Test Engineer:	Georgios Vrezas	**Test Date:**	17 February 2016
Test Sample Serial Number:	BFZBG01000210		

FCC Reference:	Parts 74.661 and 2.1055
Test Method Used:	KDB 971168 D01 Section 9.0 referencing FCC CFR Part 2.1055

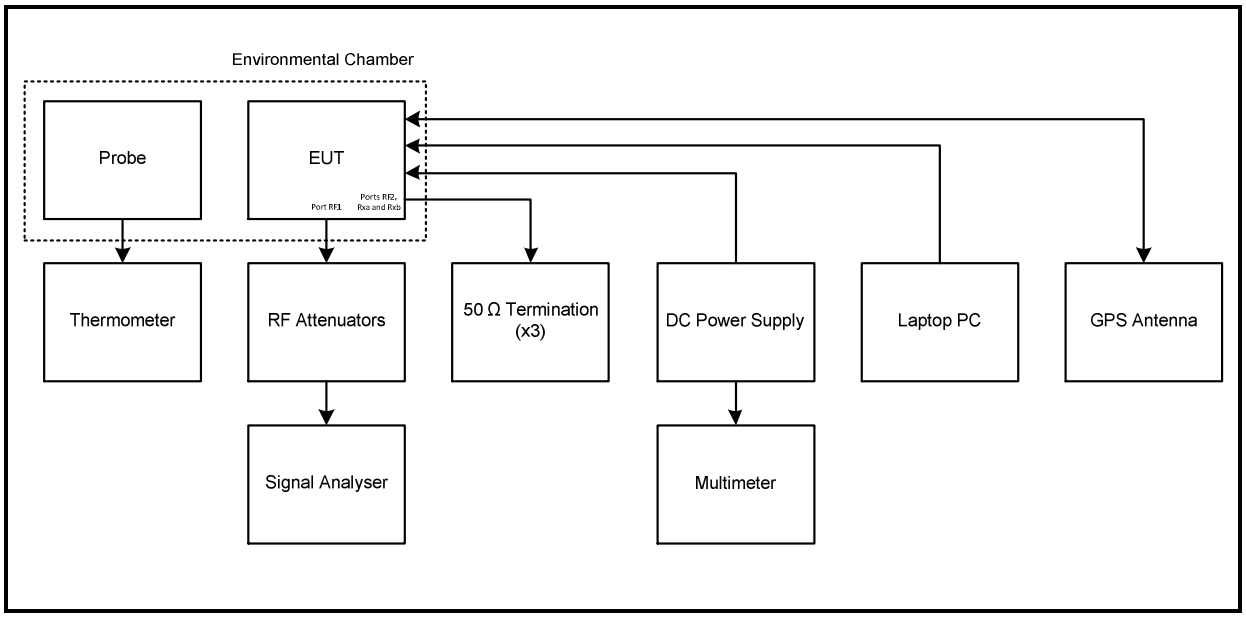
Environmental Conditions:

Ambient Temperature (°C):	24
Ambient Relative Humidity (%):	32

Note(s):

1. Temperature was monitored throughout the test with a calibrated digital thermometer.
2. An external GPS antenna was connected to the GPS antenna port of the EUT. Using the communications software Teraterm, it was seen that the EUT was frequency locked to 10 satellites.
3. The EUT was configured to transmit an unmodulated CW test tone in order to measure the frequency stability.
4. Measurements were made using the frequency count function of the test receiver.

Test setup:



Transmitter Frequency Stability (Temperature Variation) (continued)

Results: Bottom Channel (2028.5 MHz)

Temperature (°C)	Assigned Frequency (MHz)	Measured Frequency (MHz)	Frequency Error (%)	Limit (%)	Margin (%)	Result
-30	2028.500000	2028.499973	0.000001	0.005	0.004999	Complied
-20	2028.500000	2028.499975	0.000001	0.005	0.004999	Complied
-10	2028.500000	2028.499974	0.000001	0.005	0.004999	Complied
0	2028.500000	2028.499974	0.000001	0.005	0.004999	Complied
10	2028.500000	2028.499975	0.000001	0.005	0.004999	Complied
20	2028.500000	2028.499975	0.000001	0.005	0.004999	Complied
30	2028.500000	2028.499975	0.000001	0.005	0.004999	Complied
40	2028.500000	2028.499975	0.000001	0.005	0.004999	Complied
50	2028.500000	2028.499975	0.000001	0.005	0.004999	Complied

Results: Top Channel (2106.5 MHz)

Temperature (°C)	Assigned Frequency (MHz)	Measured Frequency (MHz)	Frequency Error (%)	Limit (%)	Margin (%)	Result
-30	2106.500000	2106.499972	0.000001	0.005	0.004999	Complied
-20	2106.500000	2106.499972	0.000001	0.005	0.004999	Complied
-10	2106.500000	2106.499975	0.000001	0.005	0.004999	Complied
0	2106.500000	2106.499974	0.000001	0.005	0.004999	Complied
10	2106.500000	2106.499976	0.000001	0.005	0.004999	Complied
20	2106.500000	2106.499976	0.000001	0.005	0.004999	Complied
30	2106.500000	2106.499976	0.000001	0.005	0.004999	Complied
40	2106.500000	2106.499975	0.000001	0.005	0.004999	Complied
50	2106.500000	2106.499976	0.000001	0.005	0.004999	Complied

Transmitter Frequency Stability (Temperature Variation) (continued)

Test Equipment Used:

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M1659	Thermohygrometer	JM Handelspunkt	30.5015.13	None stated	23 Apr 2016	12
M1873	Signal Analyser	Rohde & Schwarz	FSV30	103074	03 Jul 2016	12
A2006	Attenuator	Narda	769-30	06588	Calibrated before use	-
A2007	Attenuator	Narda	769-20	001	Calibrated before use	-
A250	50 Ω Termination	Narda	376BNM	1411	Calibrated before use	-
G0607	Signal Generator	Rohde & Schwarz	SMU200A	100943	18 Jul 2016	36
G0565	Power Supply	Hewlett Packard	E4356A	US39290102	Calibrated before use	-
M1229	Multimeter	Fluke	179	87640015	23 Apr 2016	12
E0513	Environmental Chamber	TAS	LT600 Series 3	23900506	Calibrated before use	-
M1643	Thermometer	Fluke	52II	18890136	23 Apr 2016	12

5.2.7. Transmitter Frequency Stability (Voltage Variation)

Test Summary:

Test Engineer:	Georgios Vrezas	**Test Date:**	17 February 2016
Test Sample Serial Number:	BFZBG01000210		

FCC Reference:	Parts 74.661 and 2.1055
Test Method Used:	KDB 971168 D01 Section 9.0 referencing FCC CFR Part 2.1055

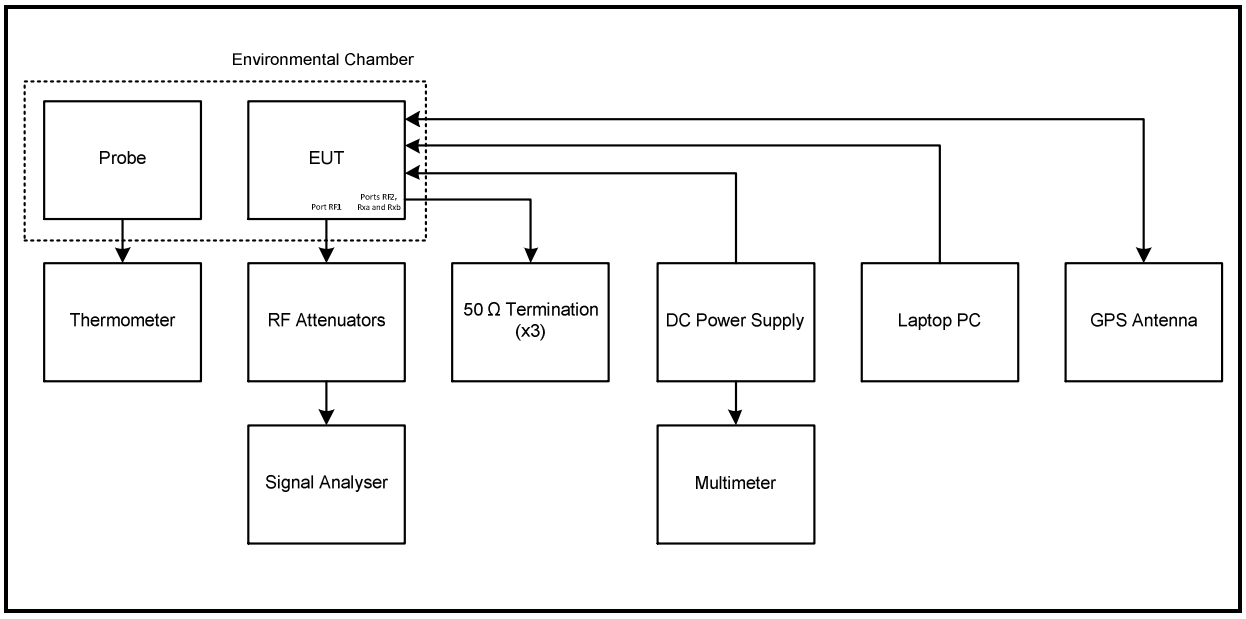
Environmental Conditions:

Temperature (°C):	24
Relative Humidity (%):	32

Note(s):

1. Voltage was monitored throughout the test with a calibrated digital voltmeter.
2. An external GPS antenna was connected to the GPS antenna port of the EUT. Using the communications software Teraterm, it was seen that the EUT was frequency locked to 10 satellites.
3. The EUT was configured to transmit an unmodulated CW test tone in order to measure the frequency stability.
4. Measurements were made using the frequency count function of the test receiver.

Test setup:



Transmitter Frequency Stability (Voltage Variation) (continued)

Results: Bottom Channel (2028.5 MHz)

Supply Voltage (VDC)	Assigned Frequency (MHz)	Measured Frequency (MHz)	Frequency Error (%)	Limit (%)	Margin (%)	Result
-40.8	2028.500000	2028.499975	0.000001	0.005	0.004999	Complied
-55.2	2028.500000	2028.499976	0.000001	0.005	0.004999	Complied

Results: Top Channel (2106.5 MHz)

Supply Voltage (VDC)	Assigned Frequency (MHz)	Measured Frequency (MHz)	Frequency Error (%)	Limit (%)	Margin (%)	Result
-40.8	2106.500000	2106.499976	0.000001	0.005	0.004999	Complied
-55.2	2106.500000	2106.499976	0.000001	0.005	0.004999	Complied

Test Equipment Used:

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M1659	Thermohygrometer	JM Handelspunkt	30.5015.13	None stated	23 Apr 2016	12
M1873	Signal Analyser	Rohde & Schwarz	FSV30	103074	03 Jul 2016	12
A2006	Attenuator	Narda	769-30	06588	Calibrated before use	-
A2007	Attenuator	Narda	769-20	001	Calibrated before use	-
A250	50 Ω Termination	Narda	376BNM	1411	Calibrated before use	-
G0607	Signal Generator	Rohde & Schwarz	SMU200A	100943	18 Jul 2016	36
G0565	Power Supply	Hewlett Packard	E4356A	US39290102	Calibrated before use	-
M1229	Multimeter	Fluke	179	87640015	23 Apr 2016	12
E0513	Environmental Chamber	TAS	LT600 Series 3	23900506	Calibrated before use	-
M1643	Thermometer	Fluke	52II	18890136	23 Apr 2016	12

6. Measurement Uncertainty

No measurement or test can ever be perfect and the imperfections give rise to error of measurement in the results. Consequently the result of a measurement is only an approximation to the value of the measurand (the specific quantity subject to measurement) and is only complete when accompanied by a statement of the uncertainty of the approximation.

The expression of uncertainty of a measurement result allows realistic comparison of results with reference values and limits given in specifications and standards.

The uncertainty of the result may need to be taken into account when interpreting the measurement results.

The reported expanded uncertainties below are based on a standard uncertainty multiplied by an appropriate coverage factor such that a confidence level of approximately 95% is maintained. For the purposes of this document “approximately” is interpreted as meaning “effectively” or “for most practical purposes”.

Measurement Type	Range	Confidence Level (%)	Calculated Uncertainty
99% Occupied Bandwidth	2025 MHz to 2110 MHz	95%	±3.92 %
Conducted Carrier Output Power	2025 MHz to 2110 MHz	95%	±1.13 dB
Conducted Emissions	9 kHz to 22 GHz	95%	±2.62 dB
Conducted Emission Mask	2001.5 MHz to 2133.5 MHz	95%	±2.62 dB
Radiated Spurious Emissions	30 MHz to 1 GHz	95%	±5.65 dB
Radiated Spurious Emissions	1 GHz to 22 GHz	95%	±2.94 dB
Frequency Stability	2025 MHz to 2110 MHz	95%	±0.92 ppm

The methods used to calculate the above uncertainties are in line with those recommended within the various measurement specifications. Where measurement specifications do not include guidelines for the evaluation of measurement uncertainty the published guidance of the appropriate accreditation body is followed.

7. Report Revision History

Version Number	Revision Details		
	Page No(s)	**Clause**	**Details**
1.0	-	-	Initial Version
2.0	45 5, 45, 60 & 70 62 & 63 All	-	Modified Note 2 and corrected Note 3 Changed FCC references Removed antenna gain from results tables and recalculated result margins Removed band edge sections

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