

Report on the Radio Testing
For
Cambium Networks Ltd
on
PTP 670
Report no. TRA-039285-47-00B
25 May 2018

RF930



Report Number: TRA-039285-47-00B
Issue: B

REPORT ON THE RADIO TESTING OF A
Cambium Networks Ltd
PTP 670
WITH RESPECT TO SPECIFICATION
FCC 47CFR Subpart E

TEST DATE: 2018-01-31 to 2018-03-07

Written by:

Daniel Moncayola
Radio Test Engineer

Approved by:

John Charters
Department Manager-Radio

Date: 2018-05-25

Disclaimers:

- [1] THIS DOCUMENT MAY BE REPRODUCED ONLY IN ITS ENTIRETY AND WITHOUT CHANGE
[2] THE RESULTS CONTAINED IN THIS DOCUMENT RELATE ONLY TO THE ITEM(S) TESTED

RF930

1 Revision Record

<i>Issue Number</i>	<i>Issue Date</i>	<i>Revision History</i>
A	2018-04-19	Original
B	2018-05-25	Update as TCB request

2 Summary

TEST REPORT NUMBER:	TRA-039285-47-00B
WORKS ORDER NUMBER	TRA-039285-00
PURPOSE OF TEST:	Testing of radio frequency equipment per the relevant authorization procedure of chapter 47 of CFR (code of federal regulations) Part 2, subpart J.
TEST SPECIFICATION:	47CFR15 Subpart E
EQUIPMENT UNDER TEST (EUT):	PTP 670
FCC IDENTIFIER:	QWP-50670
EUT SERIAL NUMBER:	not applicable
MANUFACTURER/AGENT:	Cambium Networks Ltd
ADDRESS:	Unit B2 Linhay Business Park Eastern Road Ashburton Devon TQ13 7UP United Kingdom
CLIENT CONTACT:	Don Reid ☎ 01364 655667 ✉ Don.Reid@Cambiumnetworks.com
ORDER NUMBER:	#NP82693726
TEST DATE:	2018-01-31 to 2018-03-07
TESTED BY:	Daniel Moncayola Steve Garwell Element

2.1 Test Summary

Test Method and Description		Requirement Clause	Applicable to this equipment	Result / Note
		47CFR15		
Radiated spurious emissions (restricted bands of operation and cabinet radiation)		15.205	☒	Pass
AC power line conducted emissions		15.207	☒	Pass
Occupied bandwidth		15.407(e)	☒	Pass
Output power	Conducted	15.407(a)	☒	Pass
	PSD		☒	
	RPE		☐	
Conducted / radiated RF power out-of-band		15.407(b)	☒	Pass
TPC and DFS		15.407(h)	☐	Note 1
U-NII detection bandwidth		15.407(h)(2)	☐	Note 1
CAC		15.407(h)(2)(ii)	☐	Note 1
In-service monitoring		15.407(h)(2)(iii) & 15.407(h)(2)(iv)	☐	Note 1

Notes:

Note 1: Not Applicable, unit transmitting only in U-NII-3.

The results contained in this report relate only to the items tested, in the condition at time of test, and were obtained in the period between the date of initial receipt of samples and the date of issue of the report.

The apparatus was set-up and exercised using the configurations, modes of operation and arrangements defined in this report only. Any modifications made are identified in Section 8 of this report.

Particular operating modes, apparatus monitoring methods and performance criteria required by the standards tested to have been performed except where identified in Section 5.2 of this test report (Deviations from Test Standards).

3 Contents

1	Revision Record	3
2	Summary	4
2.1	Test Summary	5
3	Contents	6
4	Introduction	7
5	Test Specifications	8
5.1	Normative References	8
5.2	Deviations from Test Standards	8
6	Glossary of Terms	9
7	Equipment Under Test	10
7.1	EUT Identification	10
7.2	System Equipment	10
7.3	EUT Mode of Operation	10
7.4	EUT Radio Frequency Parameters	11
7.4.1	General	11
7.4.2	Antennas	12
7.5	EUT Description	13
8	Modifications	14
9	EUT Test Setup	14
9.1	Block Diagram	14
9.2	General Set-up Photograph	15
10	General Technical Parameters	19
10.1	Normal Conditions	19
10.2	Varying Test Conditions	19
11	Radiated emissions	20
11.1	Definitions	20
11.2	Test Parameters	20
11.3	Test Method	20
11.4	Test Equipment	23
11.5	Test Results	24
12	AC power-line conducted emissions	48
12.1	Definition	48
12.2	Test Parameters	48
12.3	Test Method	48
12.4	Test Equipment	50
12.5	Test Results	50
13	Occupied Bandwidth	51
13.1	Definition	51
13.2	Test Parameters	51
13.3	Test Method	51
13.4	Test Equipment	52
13.5	Test Results	52
14	Maximum conducted output power	94
14.1	Definition	94
14.2	Test Parameters	94
14.3	Test Method	95
14.4	Test Equipment	95
14.5	Test Results	96
15	Power spectral density	103
15.1	Definition	103
15.2	Test Parameters	103
15.3	Test Method	104
15.4	Test Equipment	104
15.5	Test Results	105
16	Out-of-band emissions	114
16.1	Definition	114
16.2	Test Parameters	114
16.3	Test Method	115
16.4	Test Equipment	115
16.5	Test Results	116
17	Measurement Uncertainty	202

4 Introduction

This report TRA-039285-47-00B presents the results of the Radio testing on a Cambium Networks Ltd, PTP 670 to specification 47CFR15 Radio Frequency Devices.

The testing was carried out for Cambium Networks Ltd by Element, at the address detailed below.

☐	Element Hull Unit E South Orbital Trading Park Hedon Road Hull HU9 1NJ UK	☒	Element Skelmersdale Unit 1 Pendle Place Skelmersdale West Lancashire WN8 9PN UK
--------------------------	---	-------------------------------------	--

This report details the configuration of the equipment, the test methods used and any relevant modifications where appropriate.

FCC Site Listing:

The test laboratory is accredited for the above sites under the US-EU MRA, Designation number UK0009.

ISED Registration Number(s):

Element Skelmersdale	3930B
Element Hull	3483A

The test site requirements of ANSI C63.4-2014 are met up to 1GHz.

The test site SVSWR requirements of CISPR 16-1-4:2010 are met over the frequency range 1 GHz to 18 GHz.

5 Test Specifications

5.1 Normative References

- FCC 47 CFR Ch. I – Part 15 – Radio Frequency Devices.
- FCC KDB Publication 789033 D02 v02r01 – Guidelines For Compliance Testing Of Unlicensed National Information Infrastructure (U-NII) Devices Part 15, Subpart E
- ANSI C63.10-2013 – American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.
- ANSI C63.4-2014 – American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.

5.2 Deviations from Test Standards

There were no deviations from the test standard.

6 Glossary of Terms

§	denotes a section reference from the standard, not this document
AC	Alternating Current
ANSI	American National Standards Institute
BW	bandwidth
C	Celsius
CAC	Channel Availability Check
CFR	Code of Federal Regulations
CW	Continuous Wave
dB	decibel
dBm	dB relative to 1 milliwatt
DC	Direct Current
DFS	Dynamic Frequency Selection
DSSS	Direct Sequence Spread Spectrum
EIRP	Equivalent Isotropically Radiated Power
ERP	Effective Radiated Power
EUT	Equipment Under Test
FCC	Federal Communications Commission
FHSS	Frequency Hopping Spread Spectrum
Hz	hertz
IC	Industry Canada (now ISED)
ISED	Innovation, Science and Economic Development Canada
ITU	International Telecommunication Union
LBT	Listen Before Talk
LE-LAN	Licence-Exempt Local Area Network
m	metre
max	maximum
MIMO	Multiple Input and Multiple Output
min	minimum
MRA	Mutual Recognition Agreement
N/A	Not Applicable
PCB	Printed Circuit Board
PDF	Portable Document Format
Pt-mpt	Point-to-multipoint
Pt-pt	Point-to-point
PSD	Power Spectral Density
RF	Radio Frequency
RH	Relative Humidity
RMS	Root Mean Square
Rx	receiver
s	second
SVSWR	Site Voltage Standing Wave Ratio
TPC	Transmitter Power Control
Tx	transmitter
UKAS	United Kingdom Accreditation Service
U-NII	Unlicensed-National Information Infrastructure
V	volt
W	watt
Ω	ohm

7 Equipment Under Test

7.1 EUT Identification

- Name: PTP 670
- Serial Number: not applicable
- Model Number: 670
- Software Revision: Test software
- Build Level / Revision Number: R3

7.2 System Equipment

Equipment listed below forms part of the overall test setup and is required for equipment functionality and/or monitoring during testing. The compliance levels achieved in this report relate only to the EUT and not items given in the following list.

- Name: Cambium Networks Power Injector AC + DC
- Serial Number: 1611000125
- Model Number: E100109B G
- Build Level / Revision Number: 02
- Name: Dell Latitude Laptop PC
- Serial Number: 2CE00223BK
- Model Number: E6440

7.3 EUT Mode of Operation

The mode of operation for tests was as follows:

The equipment under test is a transceiver operating in the 5725 MHz to 5850 MHz band. The test has been performed with four different antenna configurations listed in section 7.4.2.

Maximum Power GUI settings:

GUI Power setting 5 MHz bandwidth channels						
Mod modes Freq. (MHz)	AQU	BPSK	QPSK	16 QAM	64 QAM	256 QAM
5727.5	27	27	26	25	24	23
5788	27	27	26	25	24	23
5847.5	27	27	26	25	24	23

GUI Power setting 10 MHz bandwidth channels						
Mod modes Freq. (MHz)	AQU	BPSK	QPSK	16 QAM	64 QAM	256 QAM
5730	27	27	26	25	24	23
5788	27	27	26	25	24	23
5845	27	27	26	25	24	23

GUI Power setting 15 MHz bandwidth channels						
Mod modes Freq. (MHz)	AQU	BPSK	QPSK	16 QAM	64 QAM	256 QAM
5732.5	27	27	26	25	24	23
5788	27	27	26	25	24	23
5842.5	27	27	26	25	24	23

GUI Power setting 20 MHz bandwidth channels						
Mod modes Freq. (MHz)	AQU	BPSK	QPSK	16 QAM	64 QAM	256 QAM
5735	27	27	26	25	24	23
5788	27	27	26	25	24	23
5840	27	27	26	25	24	23

GUI Power setting 30 MHz bandwidth channels						
Mod modes Freq. (MHz)	AQU	BPSK	QPSK	16 QAM	64 QAM	256 QAM
5740	27	27	26	25	24	23
5788	27	27	26	25	24	23
5835	27	27	26	25	24	23

GUI Power setting 40 MHz bandwidth channels						
Mod modes Freq. (MHz)	AQU	BPSK	QPSK	16 QAM	64 QAM	256 QAM
5745	27	27	26	25	24	23
5788	27	27	26	25	24	23
5830	27	27	26	25	24	23

GUI Power setting 45 MHz bandwidth channels						
Mod modes Freq. (MHz)	AQU	BPSK	QPSK	16 QAM	64 QAM	256 QAM
5747.5	27	27	26	25	24	23
5788	27	27	26	25	24	23
5827.5	27	27	26	25	24	23

7.4 EUT Radio Frequency Parameters

7.4.1 General

Band of operation:	5725 MHz to 5850 MHz
Modulation type(s):	AQU, BPSK, QPSK, 16 QAM, 64 QAM and 256 QAM
Occupied channel bandwidth(s):	5, 10, 15, 20, 30, 40 and 45 MHz
Channel spacing:	5, 10, 15, 20, 30, 40 and 45 MHz
Declared output power(s):	27, 26, 25, 24 and 23 dBm
Warning against use of alternative antennas in user manual (yes/no):	Not Applicable
Nominal Supply Voltage:	-48 Vdc (POE)
Location of notice for license exempt use:	User manual
Method of prevention of use on non-US frequencies:	Digitally signed software / licence key

7.4.2 Antennas

Type:	90 degree sector antenna
Frequency range:	4900 MHz to 5925 MHz
Impedance:	50 Ohm
Gain:	17 dBi $\pm$ 1 dBi integrated 90° sector or external
Polarisation:	Sector 90 °
Connector type:	50 Ohm, Standard N-Type, Female
Dimensions:	59.5 x 15.7 x 15.5 cm (23.4" x 6.2" x 6.1")
Weight:	Approx. 6.8 kg (15 lbs)
Environmental limits:	IP67, IP66

Type:	4-foot Dual-Pol Parabolic, PX4F-52
Frequency range:	5250 – 5850 MHz
Impedance:	50 Ohm
Polarisation:	Dual
Gain:	35.3 dBi
Connector type:	50 Ohm, Standard N-Type, Female
Dimensions:	Diameter 1.2 m/ 4ft
Weight:	Net Weight 54 kg 119 lb

Type:	6-foot Single-Pol Parabolic (Extrapolation only)
Frequency range:	5250 – 5850 MHz
Impedance:	50 Ohm
Polarisation:	Single
Gain:	38.4 dBi
Connector type:	50 Ohm, Standard N-Type, Female
Dimensions:	Diameter 1.8 m/ 6ft
Weight:	Net Weight 42.8 kg 95 lb

Type:	MA-WA56-DP23G7CM Flat Plate
Frequency range:	4900 – 6100 MHz
Impedance:	50 Ohm
Gain:	23 dBi
Polarisation:	Dual
Connector type:	Integrated
Dimensions:	305 x 305 x 15 mm (12" x 12" x 1.6")
Weight:	900 gr

Type:	KPPA-5.7-DPOMA Omnidirectional
Frequency range:	5150-5900 MHz
Impedance:	50 Ohm
Gain:	13 dBi
Polarisation:	Dual
Connector type:	50 Ohm, Standard N-Type, Female
Dimensions:	584 x 127 x 152 mm (23" x 5" x 6")
Weight:	1.8 kg/ 4 lb

7.5 EUT Description

The equipment under test is a transceiver operating in the 5725 MHz to 5850 MHz band. The test has been performed with four different antenna configurations listed in section 7.4.2.

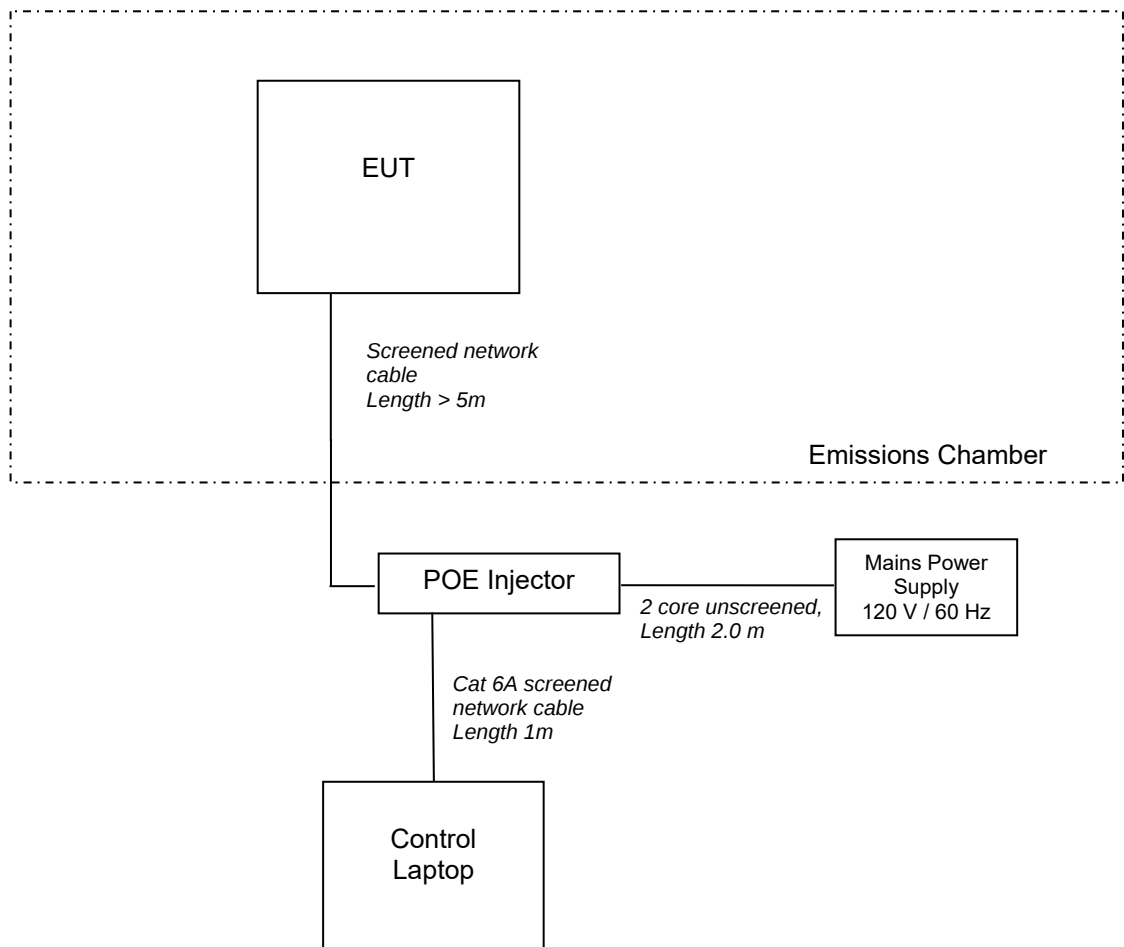
8 Modifications

No modifications were performed during this assessment.

9 EUT Test Setup

9.1 Block Diagram

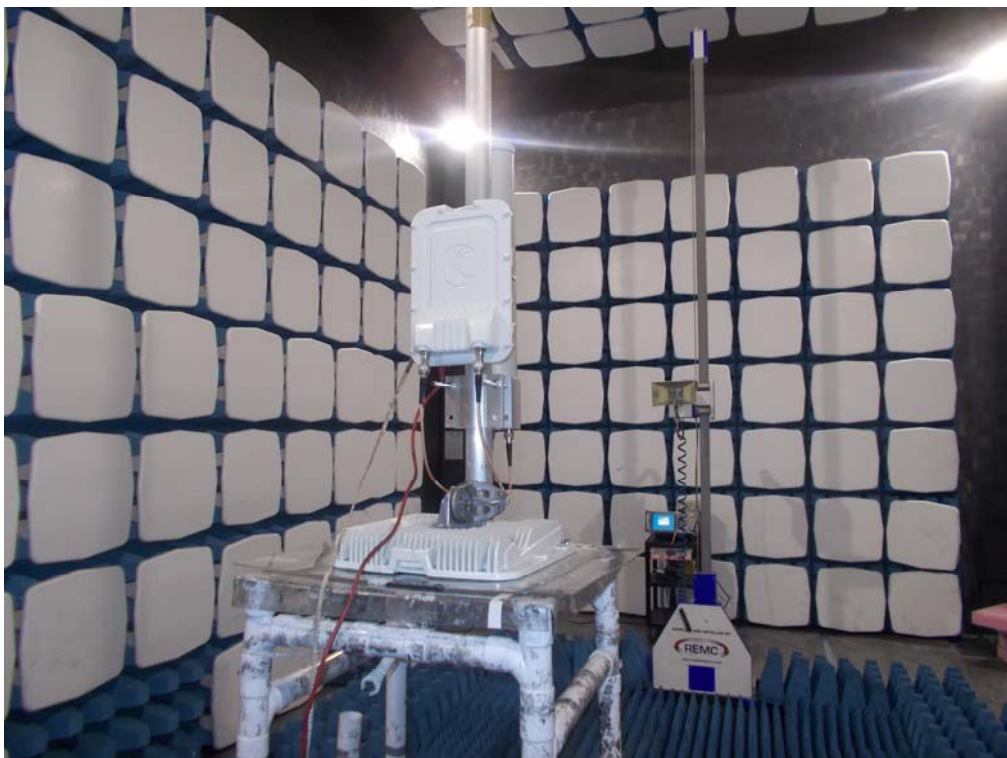
The following diagram shows basic EUT interconnections with cable type and cable lengths identified:



9.2 General Set-up Photograph

The following photograph shows basic EUT set-up:

Omnidirectional antenna



Sector antenna (connectorized)



High Gain Flat plate Antenna



4' Parabolic Antenna



10 General Technical Parameters

10.1 Normal Conditions

The E U T was tested under the normal environmental conditions of the test laboratory, except where otherwise stated. The normal power source applied was -48V dc from a power over Ethernet adaptor.

10.2 Varying Test Conditions

Variation of supply voltage is required to ensure stability of the declared output power and frequency. During carrier power testing the following variations were made:

	Category	Nominal	Variation
☐	Mains	110 V ac	85% and 115%
☒	Adaptor	-48 Vdc	N/A

11 Radiated emissions

11.1 Definitions

Spurious emissions

Emissions on a frequency or frequencies, which are outside the necessary bandwidth and the level of which may be reduced without affecting the corresponding transmission of information. Spurious emissions include harmonic emissions, parasitic emissions, intermodulation products and frequency conversion products, but exclude out-of-band emissions.

Restricted bands

A frequency band in which intentional radiators are permitted to radiate only spurious emissions but not fundamental signals.

11.2 Test Parameters

Test Location:	Element Skelmersdale
Test Chamber:	Radio Chamber
Test Standard and Clause:	ANSI C63.10-2013, Clause 6.5 and 6.6
EUT Frequencies Measured:	5727.5 MHz / 5788 MHz / 5847.5 MHz
EUT Channel Bandwidths:	5 MHz
Deviations From Standard:	None (Only worst case was reported BPSK 5 MHz)
Measurement BW:	30 MHz to 1 GHz: 120 kHz Above 1 GHz: 1 MHz
Measurement Detector:	Up to 1 GHz: quasi-peak Above 1 GHz: RMS average and Peak

Environmental Conditions (Normal Environment)

Temperature: 25 °C	+15 °C to +35 °C (as declared)
Humidity: 32 %RH	20%RH to 75%RH (as declared)
Supply: -48 Vdc	-48 Vdc (as declared)

Test Limits

Unwanted emissions that fall within the restricted frequency bands shall comply with the limits specified:

General Field Strength Limits for License-Exempt Transmitters at Frequencies Above 30 MHz

<i>Frequency (MHz)</i>	<i>Field Strength (μV/m at 3m)</i>
30-88	100
88-216	150
216-960	200
Above 960	500

11.3 Test Method

With the EUT setup as per section 9 of this report and connected as per Figure i, the emissions from the EUT were measured on a spectrum analyzer / EMI receiver.

Radiated electromagnetic emissions from the EUT are checked first by preview scans. Preview scans for all spectrum and modulation characteristics are checked, using a peak detector and where applicable worst-case determined for function, operation, orientation, etc. for both vertical and horizontal polarisations. Pre-scan plots are shown with a peak detector and 100kHz RBW.

If the EUT connects to auxiliary equipment and is table or floor standing, the configurations prescribed in ANSI C63.10 are followed. Alternatively, a layout closest to normal use (as declared by the provider) is employed, (see EUT setup photographs for more detail).

Emissions between 30 MHz and 1 GHz are measured using calibrated broadband antennas. Emissions above 1 GHz are characterized using standard gain horn antennas. Pre-amplifiers and filters are used where required. Care is taken to ensure that test receiver resolution bandwidth, video bandwidth and detector type(s) meet the regulatory requirements.

For both horizontal and vertical polarizations, the EUT is then rotated through 360 degrees in azimuth until the highest emission is detected. At the previously determined azimuth the test antenna is raised and lowered from 1 to 4 m in height until a maximum emission level is detected, this maximum value is recorded.

Power values measured on the test receiver / analyzer are converted to field strength, FS, in dB μ V/m at the regulatory distance, using:

$$FS = PR + CL + AF - PA + DC - CF$$

Where,

PR is the power recorded on the receiver / spectrum analyzer in dB μ V;

CL is the cable loss in dB;

AF is the test antenna factor in dB/m;

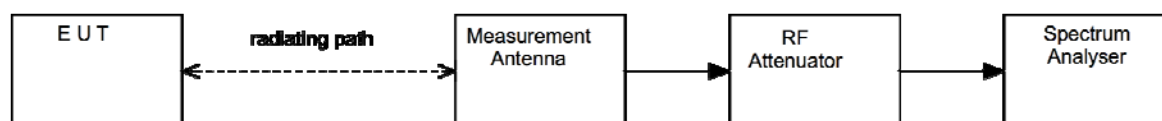
PA is the pre-amplifier gain in dB (where used);

DC is the duty correction factor in dB (where used, e.g. where average detector on pulsed harmonic understates the power);

CF is the distance factor in dB (where measurement distance different to limit distance);

This field strength value is then compared with the regulatory limit.

Figure i Test Setup



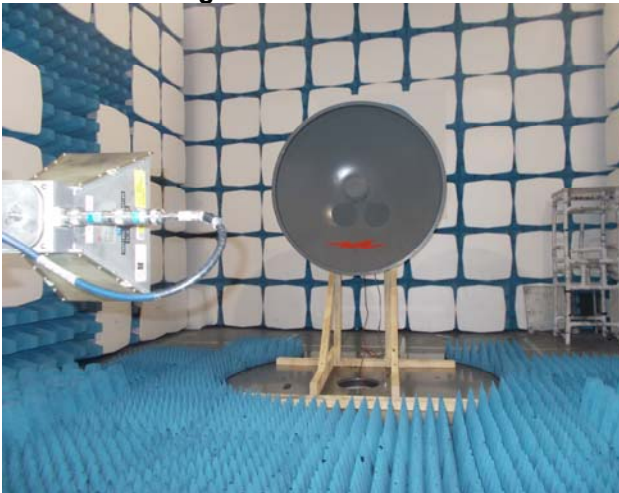
Test Setup Photograph(s)



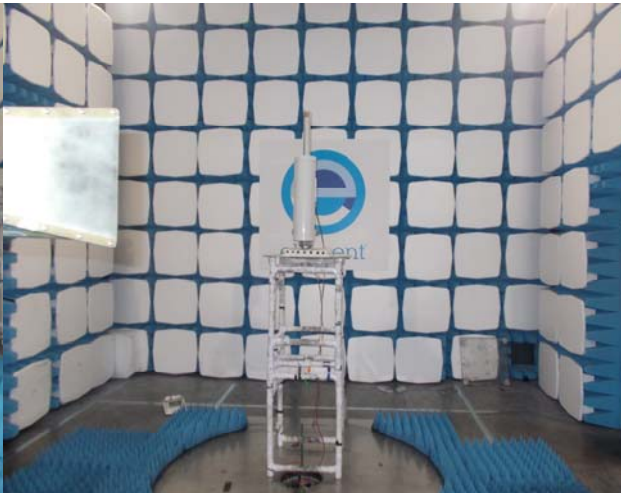
High Gain Flat Plate



Omnidirectional Antenna



4' Parabolic Antenna



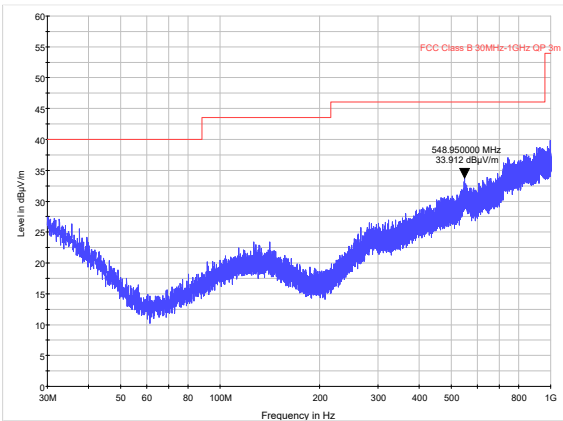
Sector Antenna Connectorized

11.4 Test Equipment

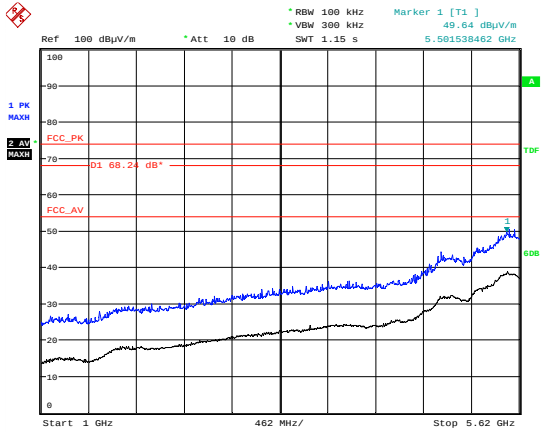
Equipment Description	Manufacturer	Equipment Type	Element No	Last Cal Calibration	Calibration Period	Due For Calibration
Bilog	Chase	CBL611/A	U191	2017-02-23	24	2019-02-23
Receiver	R&S	ESVS10	L352	2017-07-28	12	2018-07-28
Spectrum Analyser	R&S	FSU46	U281	2017-06-19	12	2018-06-19
1-18GHz Horn	EMCO	3115	L139	2017-09-25	24	2019-09-25
Pre Amp	Agilent	8449B	L572	2017-09-28	12	2018-09-28
Horn 18-26GHz (&U330)	Flann	20240-20	L300	2016-04-07	24	2018-04-07
Standard Gain Horn 26-40	Flann	22240-20	L301	2017-07-25	12	2018-07-25
6 dB Attenuator	Bird	8304-060-N	U376	Calibrate in Use		
10 dB Attenuator	Bird	8304-100-N	L222	Calibrate in Use		
High Pass Filter	Atlantic Microwave Ltd	AFH-0700	U558	Calibrate in Use		

11.5 Test Results

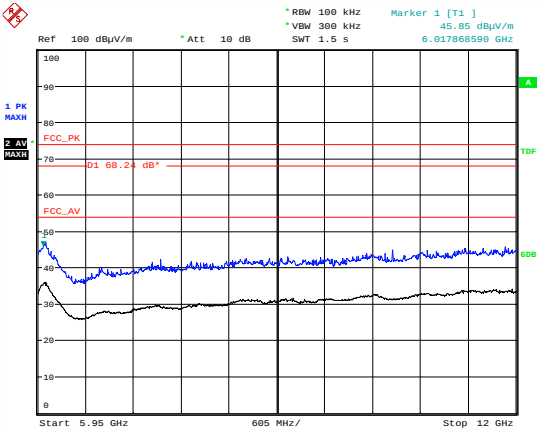
Flat plate High gain antenna



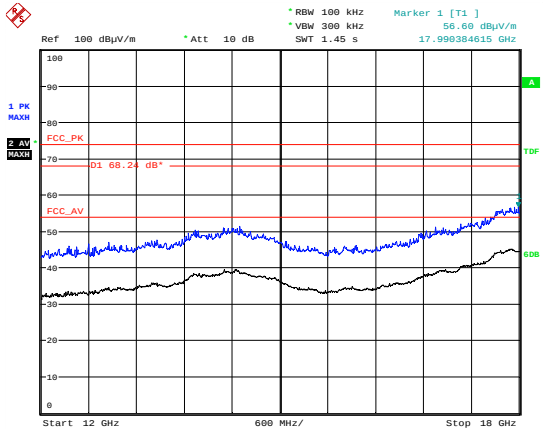
30 MHz to 1 GHz; Channel 5727.5 MHz; BPSK.



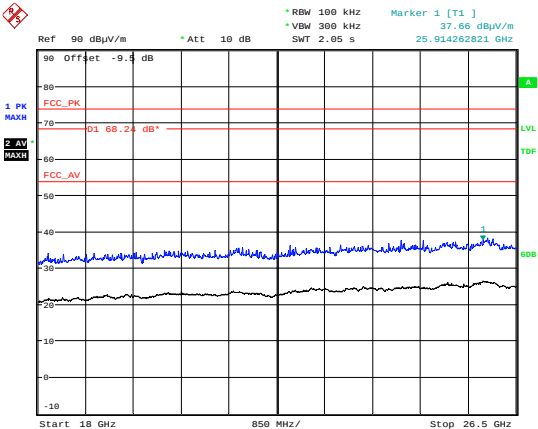
1 GHz to 5.62 GHz; Channel 5727.5 MHz; BPSK.



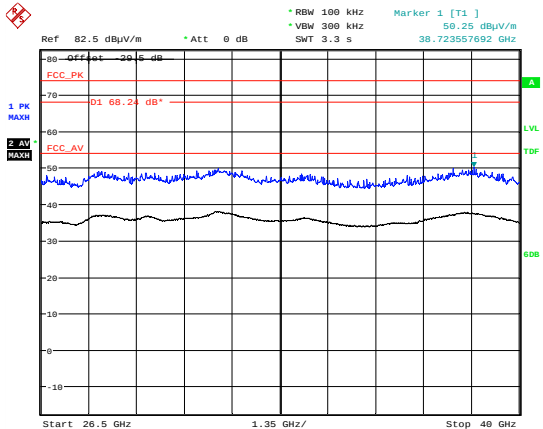
5.95 GHz to 12 GHz; Channel 5727.5 MHz; BPSK.



12 GHz to 18 GHz; Channel 5727.5 MHz; BPSK.

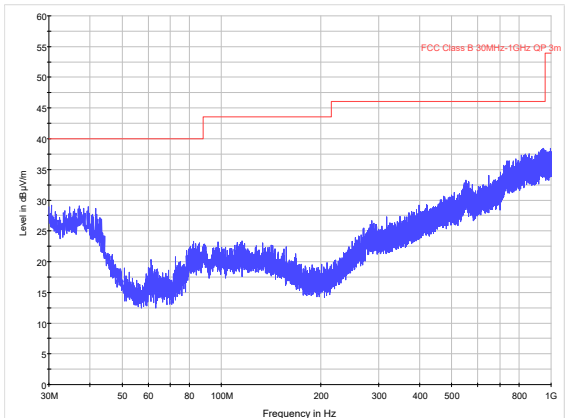


18 GHz to 26.5 GHz; Channel 5727.5 MHz; BPSK.

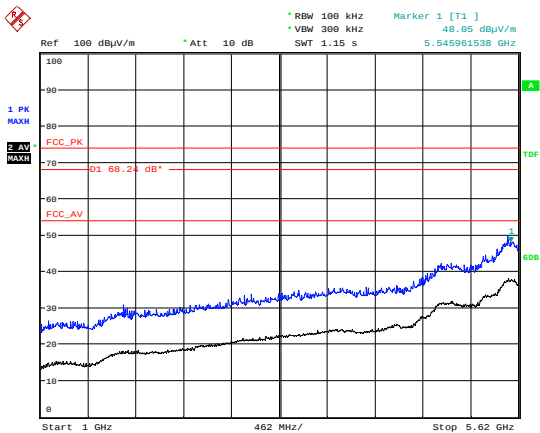


26.5 GHz to 40 GHz; Channel 5727.5 MHz; BPSK.

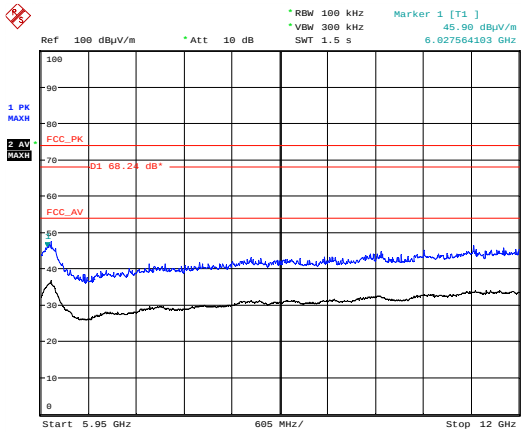
High Power: 27 dBm; Bandwidth: 5 MHz; Mod mode: BPSK; Channel: 5727.5 MHz; Flat plate High gain antenna										
Detector	Freq. (MHz)	Meas'd Emission (dBµV)	Cable Loss (dB)	Antenna Factor (dB/m)	Pre-amp Gain (dB)	Duty Cycle Corr'n (dB)	Field Strength (dBµV/m)	Distance Extrap'n Factor (dB)	Field Strength (µV/m)	Limit (µV/m)
No Emission within 20 dB to the limit										



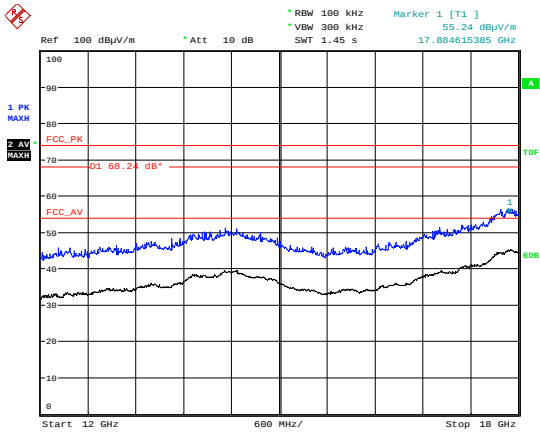
30 MHz to 1 GHz; Channel 5788 MHz;
BPSK.



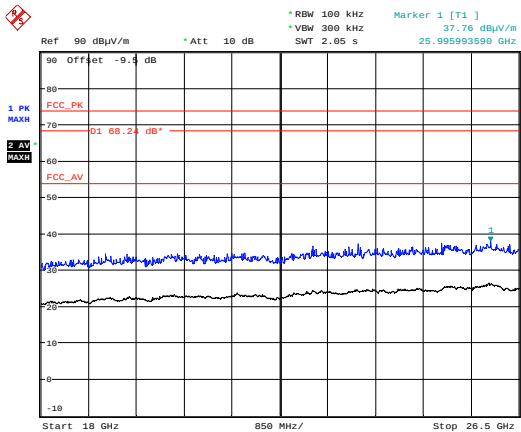
1 GHz to 5.62 GHz; Channel 5788 MHz;
BPSK.



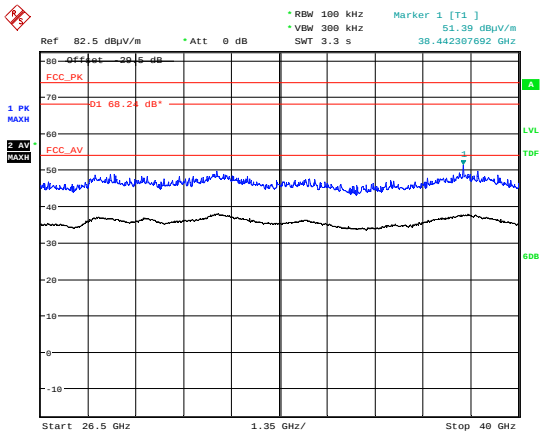
5.95 GHz to 12 GHz; Channel 5788 MHz;
BPSK.



12 GHz to 18 GHz; Channel 5788 MHz;
BPSK.

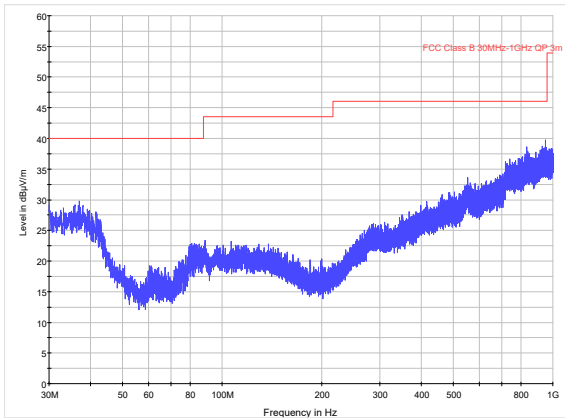


18 GHz to 26.5 GHz; Channel 5788 MHz;
BPSK.

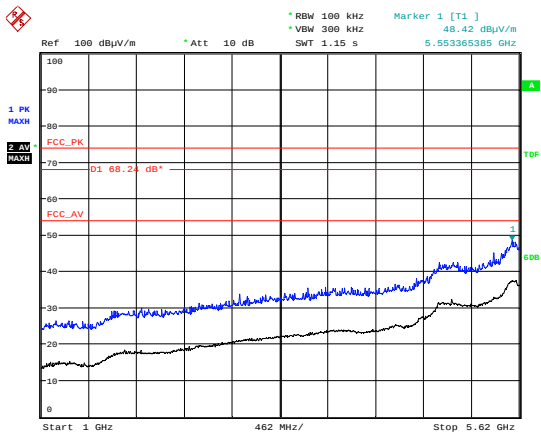


26.5 GHz to 40 GHz; Channel 5788 MHz;
BPSK.

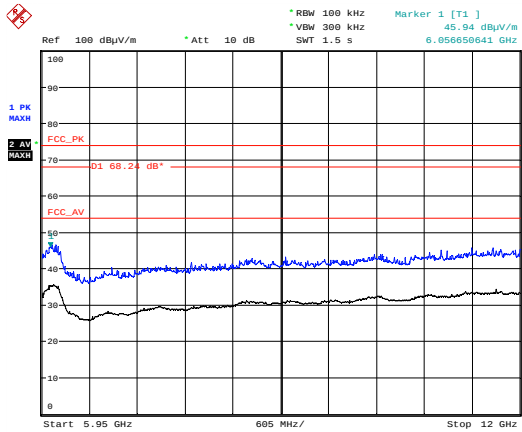
High Power: 27 dBm; Bandwidth: 5 MHz; Mod mode: BPSK; Channel: 5788 MHz; Flat plate High gain antenna										
Detector	Freq. (MHz)	Meas'd Emission (dBµV)	Cable Loss (dB)	Antenna Factor (dB/m)	Pre-amp Gain (dB)	Duty Cycle Corr'n (dB)	Field Strength (dBµV/m)	Distance Extrap'n Factor (dB)	Field Strength (µV/m)	Limit (µV/m)
No Emission within 20 dB to the limit										



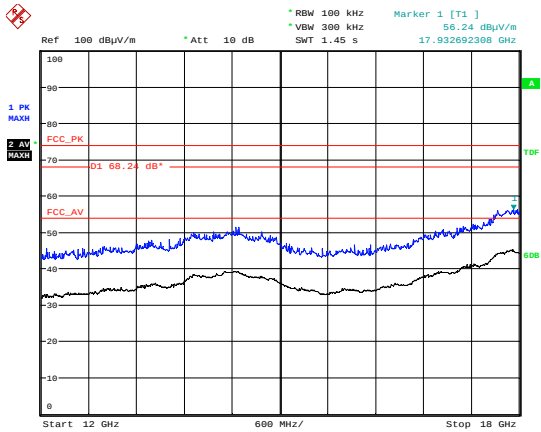
30 MHz to 1 GHz; Channel 5847.5 MHz;
BPSK.



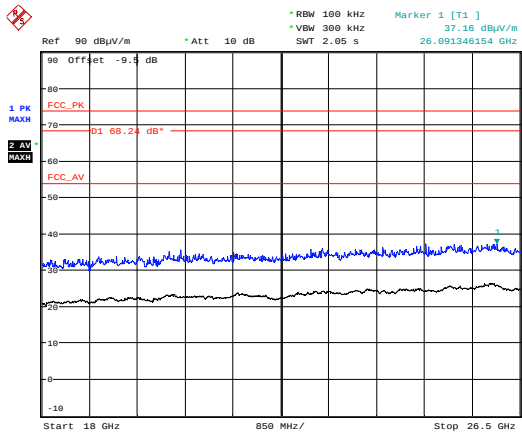
1 GHz to 5.62 GHz; Channel 5847.5 MHz;
BPSK.



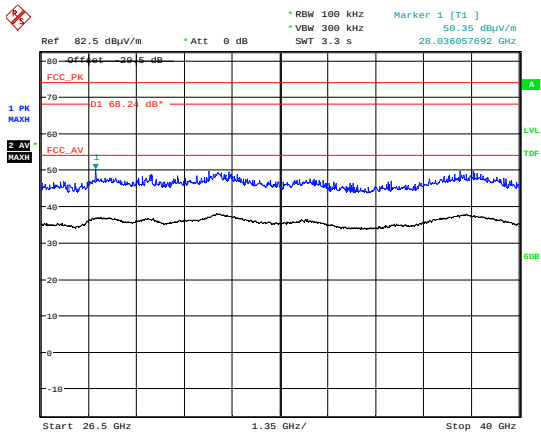
5.95 GHz to 12 GHz; Channel 5847.5 MHz;
BPSK.



12 GHz to 18 GHz; Channel 5847.5 MHz;
BPSK.



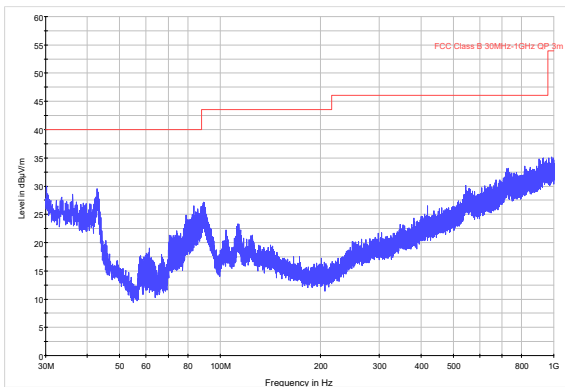
18 GHz to 26.5 GHz; Channel 5847.5 MHz;
BPSK.



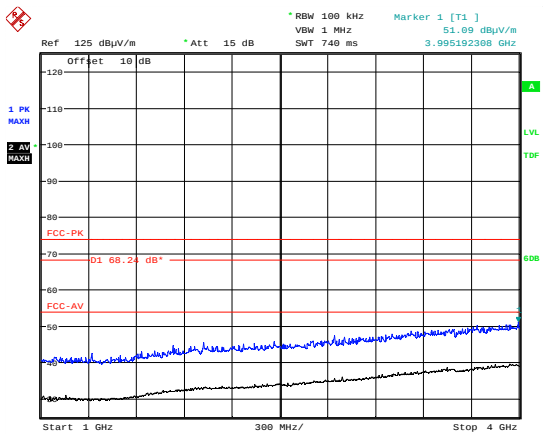
26.5 GHz to 40 GHz; Channel 5847.5 MHz;
BPSK.

High Power: 27 dBm; Bandwidth: 5 MHz; Mod mode: BPSK; Channel: 5847.5 MHz; Flat plate High gain antenna										
Detector	Freq. (MHz)	Meas'd Emission (dBµV)	Cable Loss (dB)	Antenna Factor (dB/m)	Pre-amp Gain (dB)	Duty Cycle Corr'n (dB)	Field Strength (dBµV/m)	Distance Extrap'n Factor (dB)	Field Strength (µV/m)	Limit (µV/m)
No Emission within 20 dB to the limit										

Omnidirectional antenna

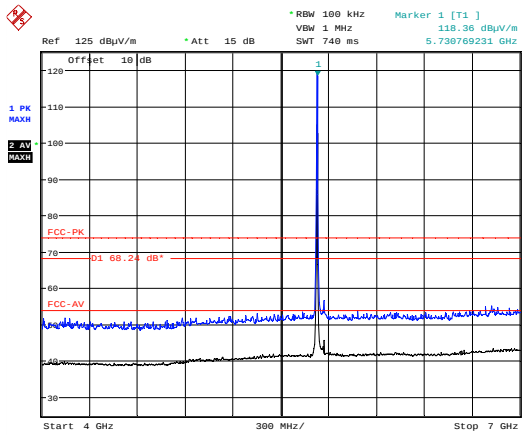


30 MHz to 1 GHz; Channel 5727.5 MHz;
BPSK.



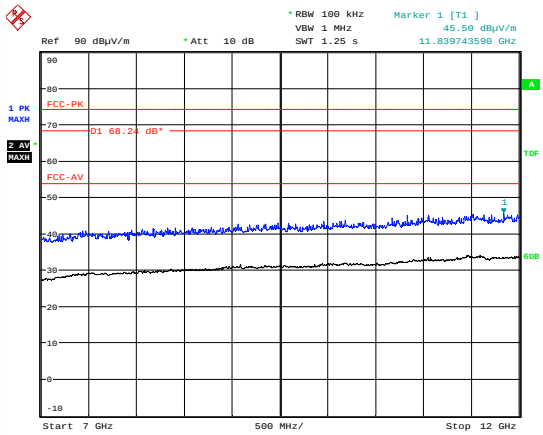
Date: 13.FEB.2018 11:19:05

1 GHz to 4 GHz; Channel 5727.5 MHz;
BPSK.



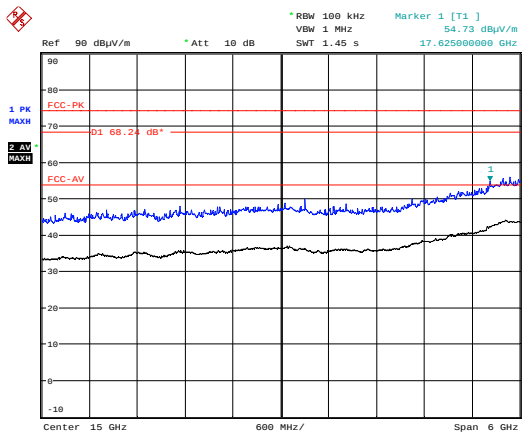
Date: 13.FEB.2018 10:32:49

4 GHz to 7 GHz; Channel 5727.5 MHz;
BPSK.



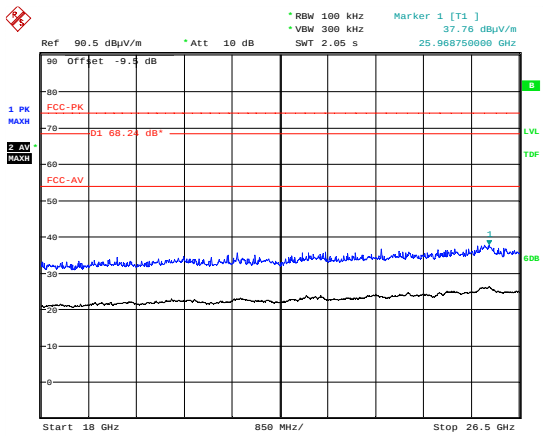
Date: 13.FEB.2018 11:24:03

7 GHz to 12 GHz; Channel 5727.5 MHz;
BPSK.



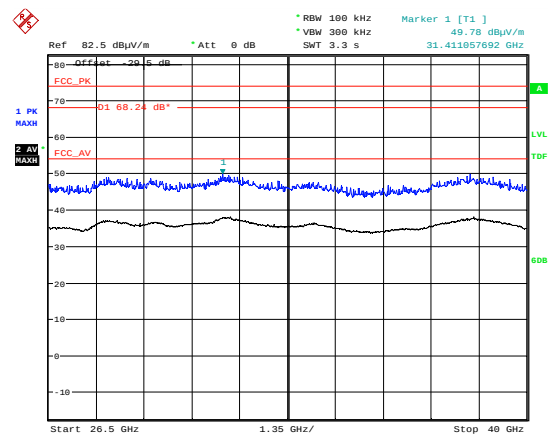
Date: 13.FEB.2018 11:25:49

12 GHz to 18 GHz; Channel 5727.5 MHz;
BPSK.



Date: 14.FEB.2018 13:02:12

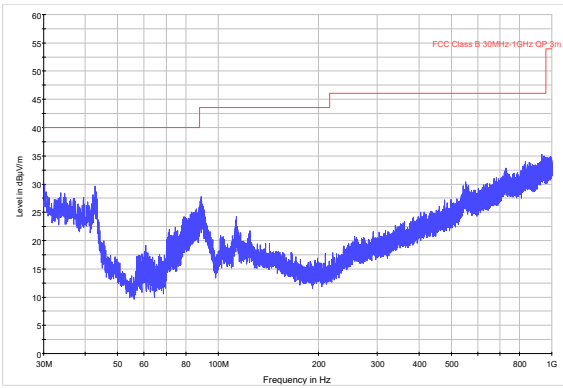
18 GHz to 26.5 GHz; Channel 5727.5 MHz;
BPSK.



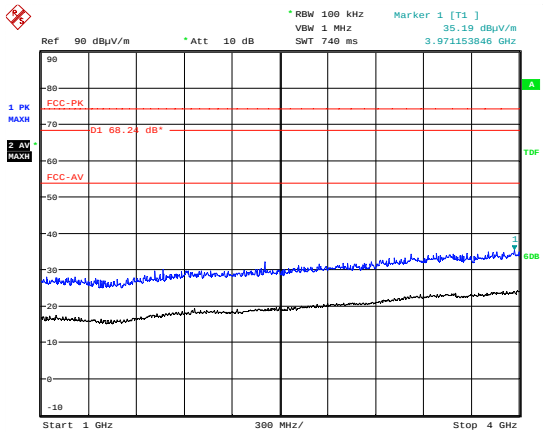
Date: 15.FEB.2018 10:43:23

26.5 GHz to 40 GHz; Channel 5727.5 MHz; BPSK.

High Power: 27 dBm; Bandwidth: 5 MHz; Mod mode: BPSK; Channel: 5727.5 MHz; Omnidirectional Antenna										
Detector	Freq. (MHz)	Meas'd Emission (dBμV)	Cable Loss (dB)	Antenna Factor (dB/m)	Pre-amp Gain (dB)	Duty Cycle Corr'n (dB)	Field Strength (dBμV/m)	Distance Extrap'n Factor (dB)	Field Strength (μV/m)	Limit (μV/m)
No Emission within 20 dB to the limit										

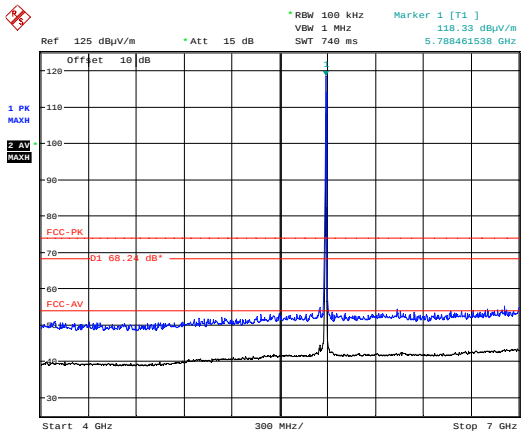


30 MHz to 1 GHz; Channel 5788 MHz;
BPSK.



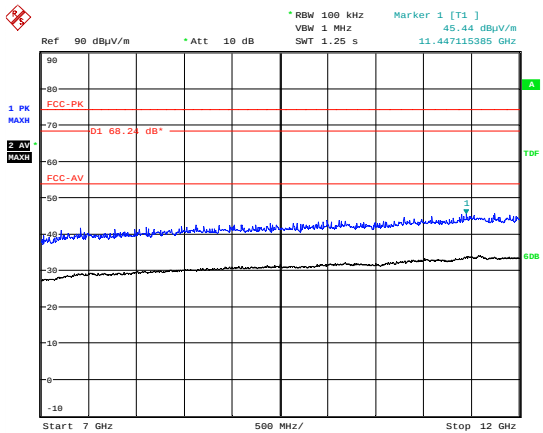
Date: 13.FEB.2018 11:36:19

1 GHz to 4 GHz; Channel 5788 MHz; BPSK.



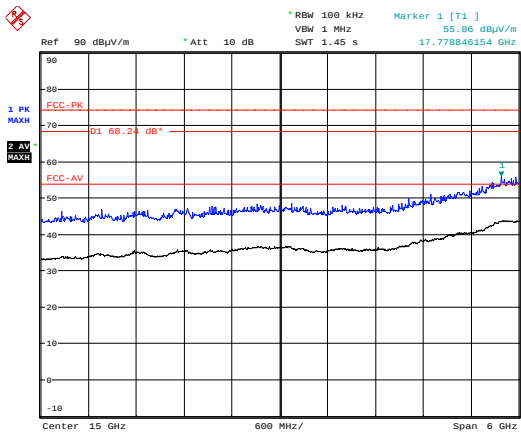
Date: 13.FEB.2018 10:39:04

4 GHz to 7 GHz; Channel 5788 MHz; BPSK.



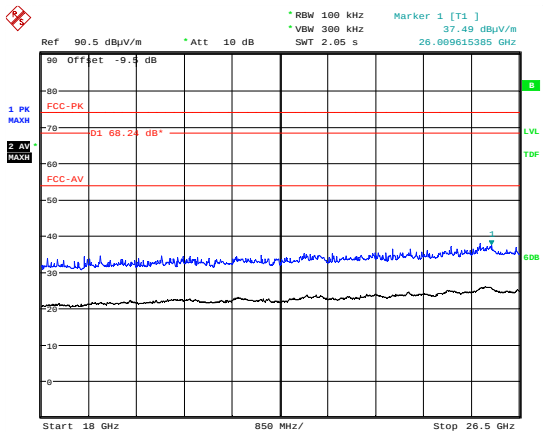
Date: 13.FEB.2018 11:32:01

7 GHz to 12 GHz; Channel 5788 MHz;
BPSK.



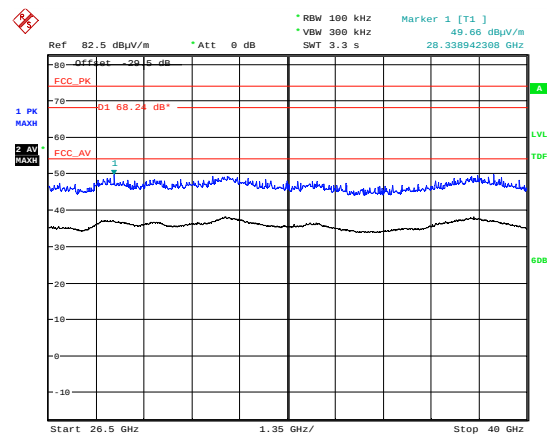
Date: 13.FEB.2018 11:30:52

12 GHz to 18 GHz; Channel 5788 MHz;
BPSK.



Date: 14.FEB.2018 13:07:02

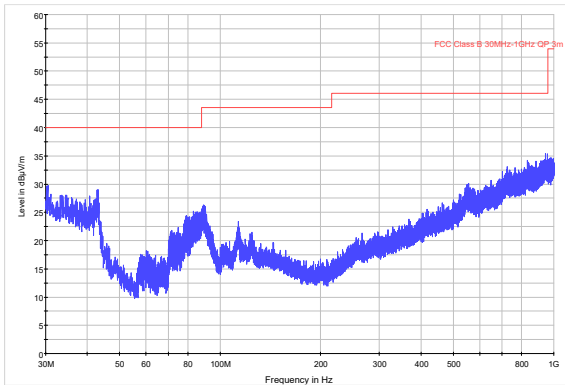
18 GHz to 26.5 GHz; Channel 5788 MHz;
BPSK.



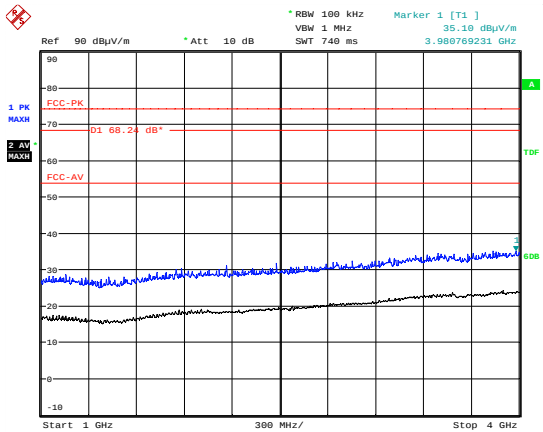
Date: 15.FEB.2018 10:44:48

26.5 GHz to 40 GHz; Channel 5788 MHz; BPSK.

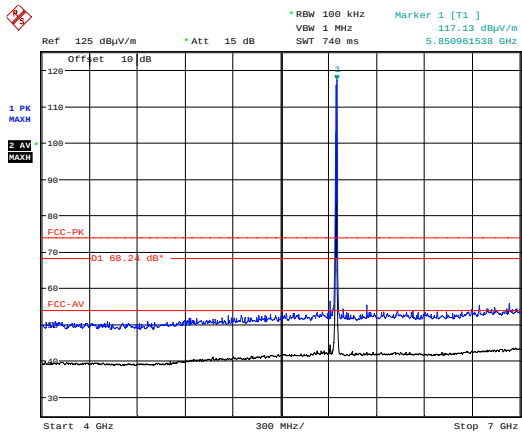
High Power: 27 dBm; Bandwidth: 5 MHz; Mod mode: BPSK; Channel: 5788 MHz; Omnidirectional Antenna										
Detector	Freq. (MHz)	Meas'd Emission (dBμV)	Cable Loss (dB)	Antenna Factor (dB/m)	Pre-amp Gain (dB)	Duty Cycle Corr'n (dB)	Field Strength (dBμV/m)	Distance Extrap'n Factor (dB)	Field Strength (μV/m)	Limit (μV/m)
No Emission within 20 dB to the limit										



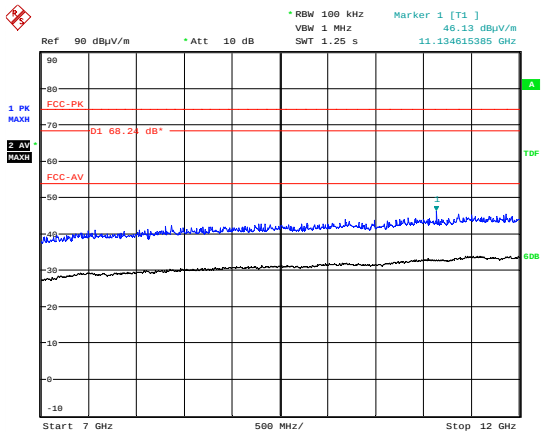
30 MHz to 1 GHz; Channel 5847.5 MHz;
BPSK.



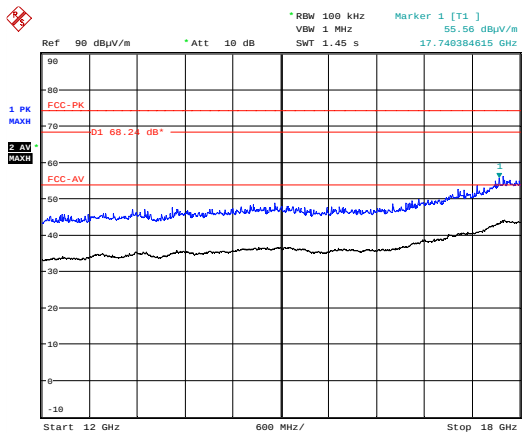
1 GHz to 4 GHz; Channel 5847.5 MHz;
BPSK.



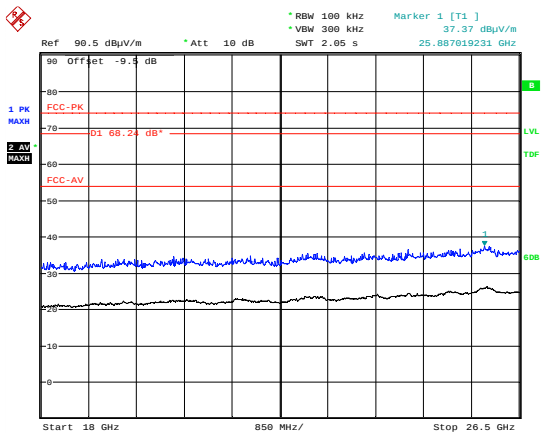
4 GHz to 7 GHz; Channel 5847.5 MHz;
BPSK.



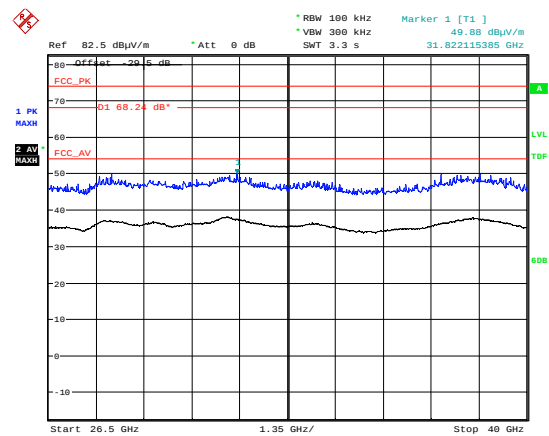
7 GHz to 12 GHz; Channel 5847.5 MHz;
BPSK.



12 GHz to 18 GHz; Channel 5847.5 MHz;
BPSK.



18 GHz to 26.5 GHz; Channel 5847.5 MHz;
BPSK.

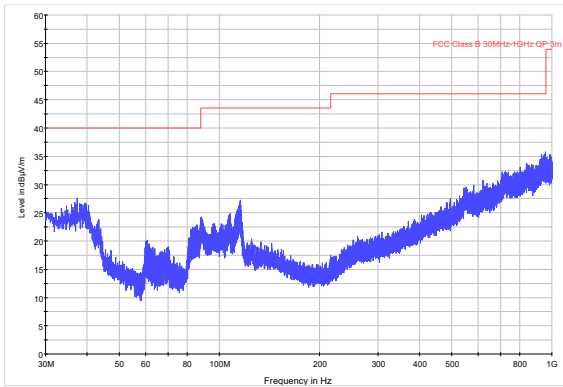


Date: 15.FEB.2018 10:45:35

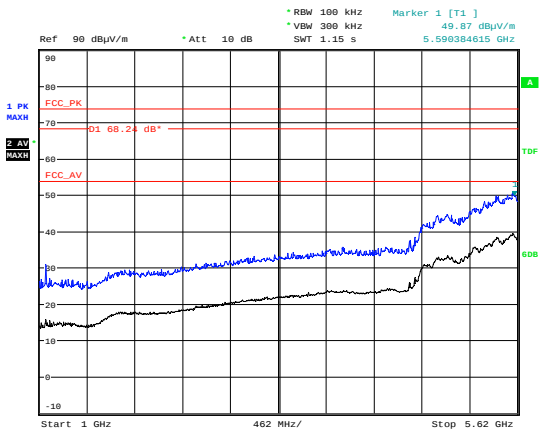
26.5 GHz to 40 GHz; Channel 5847.5 MHz; BPSK.

High Power: 27 dBm; Bandwidth: 5 MHz; Mod mode: BPSK; Channel: 5847.5 MHz; Omnidirectional Antenna										
Detector	Freq. (MHz)	Meas'd Emission (dBμV)	Cable Loss (dB)	Antenna Factor (dB/m)	Pre-amp Gain (dB)	Duty Cycle Corr'n (dB)	Field Strength (dBμV/m)	Distance Extrap'n Factor (dB)	Field Strength (μV/m)	Limit (μV/m)
No Emission within 20 dB to the limit										

4' Parabolic antenna

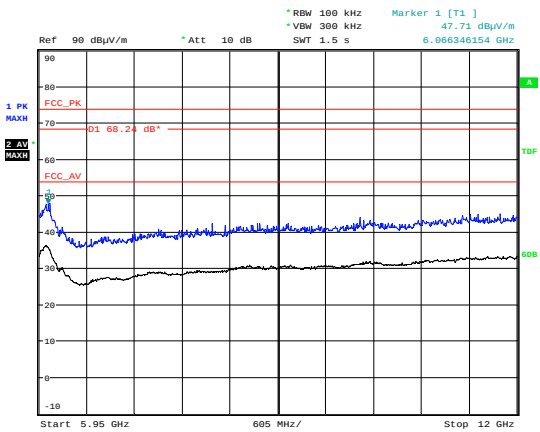


30 MHz to 1 GHz; Channel 5727.5 MHz;
BPSK.



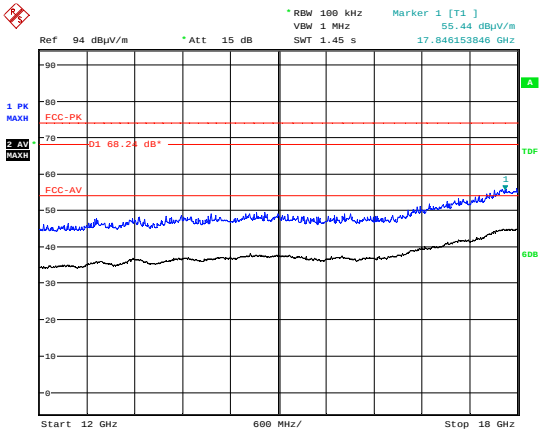
Date: 5.MAR.2018 17:02:04

1 GHz to 5.62 GHz; Channel 5727.5 MHz;
BPSK.



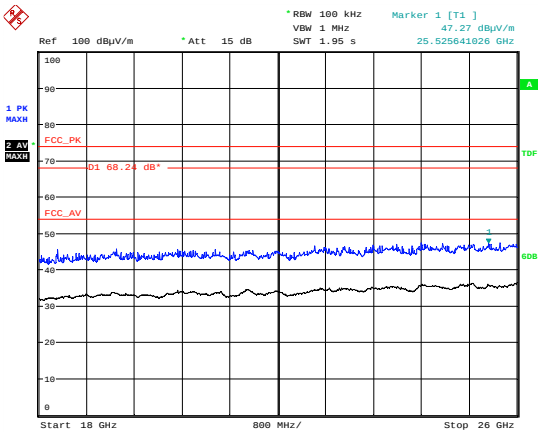
Date: 5.MAR.2018 17:03:48

5.95 GHz to 12 GHz; Channel 5727.5 MHz;
BPSK.



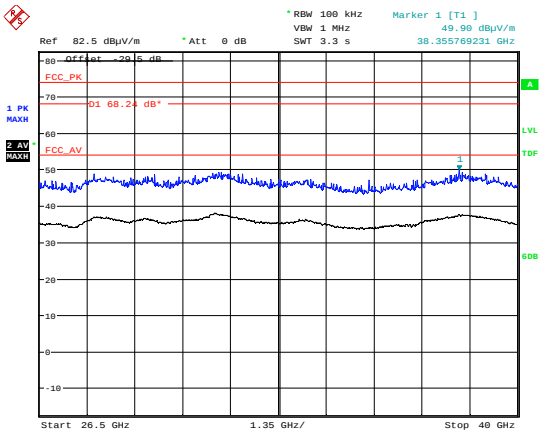
Date: 13.FEB.2018 18:26:27

12 GHz to 18 GHz; Channel 5727.5 MHz;
BPSK.



Date: 15.FEB.2018 19:31:45

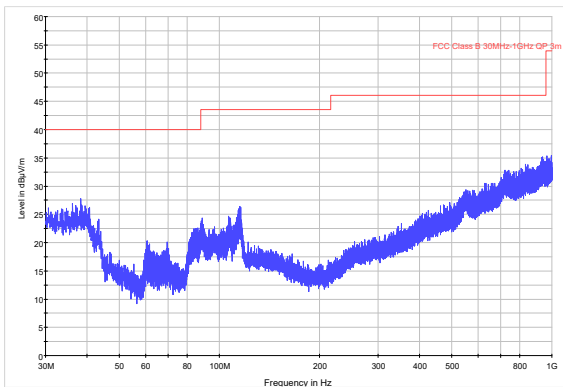
18 GHz to 26.5 GHz; Channel 5727.5 MHz;
BPSK.



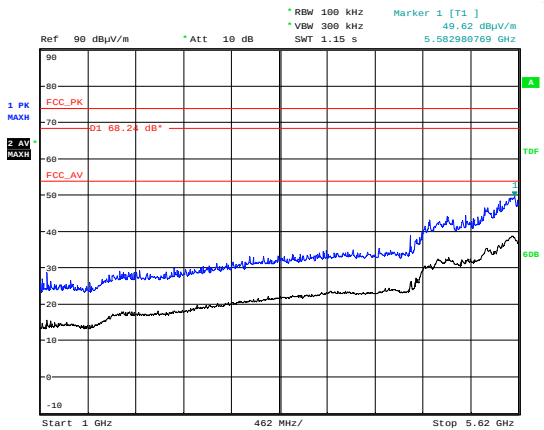
Date: 15.FEB.2018 20:35:25

26.5 GHz to 40 GHz; Channel 5727.5 MHz;
BPSK.

High Power: 27 dBm; Bandwidth: 5 MHz; Mod mode: BPSK; Channel: 5727.5 MHz; 4' Parabolic Antenna										
Detector	Freq. (MHz)	Meas'd Emission (dBµV)	Cable Loss (dB)	Antenna Factor (dB/m)	Pre-amp Gain (dB)	Duty Cycle Corr'n (dB)	Field Strength (dBµV/m)	Distance Extrap'n Factor (dB)	Field Strength (µV/m)	Limit (µV/m)
No Emission within 20 dB to the limit										

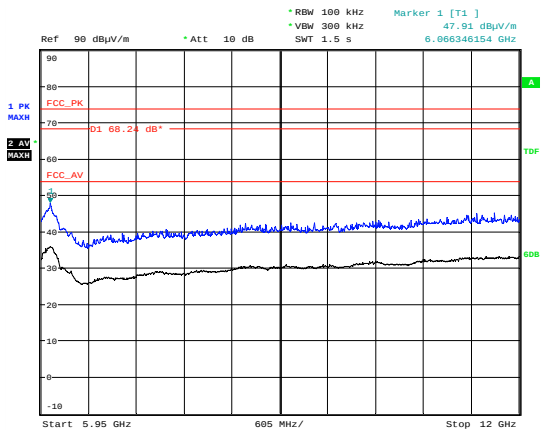


30 MHz to 1 GHz; Channel 5788 MHz;
BPSK.



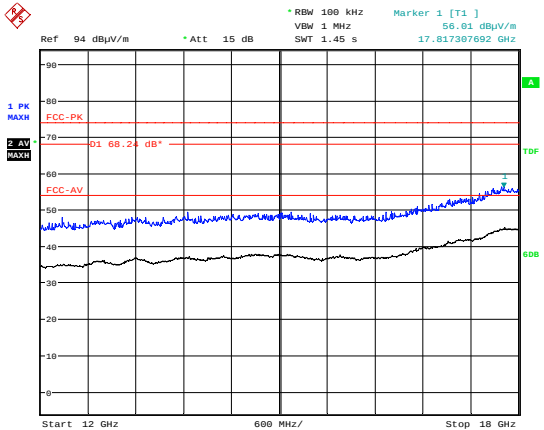
Date: 5.MAR.2018 17:07:51

1 GHz to 5.62 GHz; Channel 5788 MHz;
BPSK.



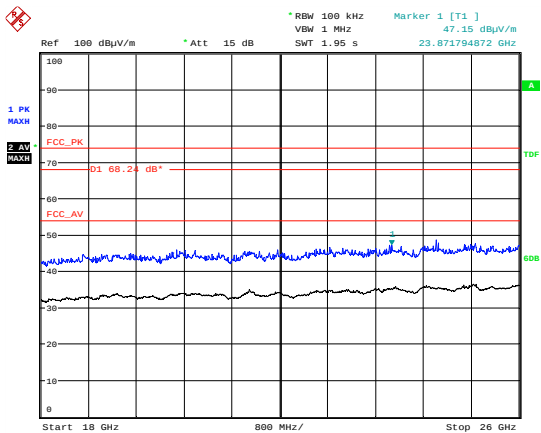
Date: 5.MAR.2018 17:08:37

5.95 GHz to 12 GHz; Channel 5788 MHz;
BPSK.



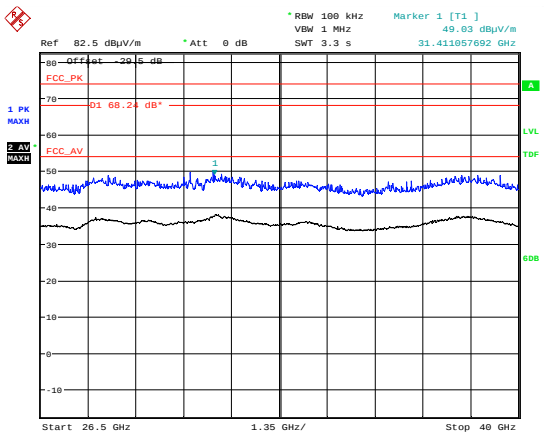
Date: 13.FEB.2018 18:25:34

12 GHz to 18 GHz; Channel 5788 MHz;
BPSK.



Date: 15.FEB.2018 19:32:29

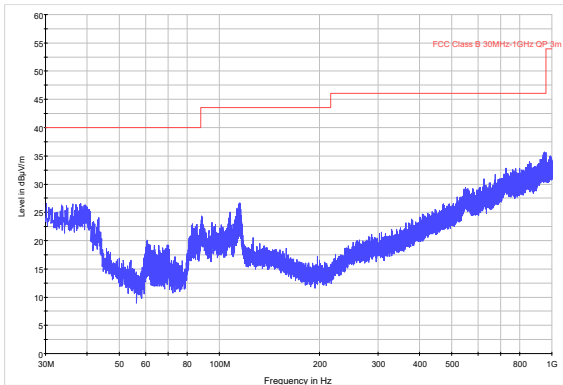
18 GHz to 26.5 GHz; Channel 5788 MHz;
BPSK.



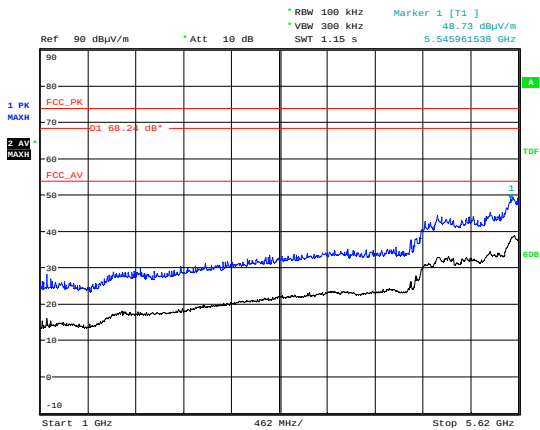
Date: 15.FEB.2018 20:36:11

26.5 GHz to 40 GHz; Channel 5788 MHz;
BPSK.

High Power: 27 dBm; Bandwidth: 5 MHz; Mod mode: BPSK; Channel: 5788 MHz; 4' Parabolic Antenna										
Detector	Freq. (MHz)	Meas'd Emission (dBµV)	Cable Loss (dB)	Antenna Factor (dB/m)	Pre-amp Gain (dB)	Duty Cycle Corr'n (dB)	Field Strength (dBµV/m)	Distance Extrap'n Factor (dB)	Field Strength (µV/m)	Limit (µV/m)
No Emission within 20 dB to the limit										

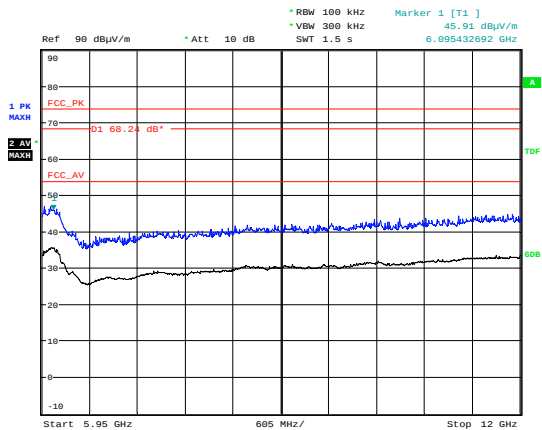


30 MHz to 1 GHz; Channel 5847.5 MHz;
BPSK.



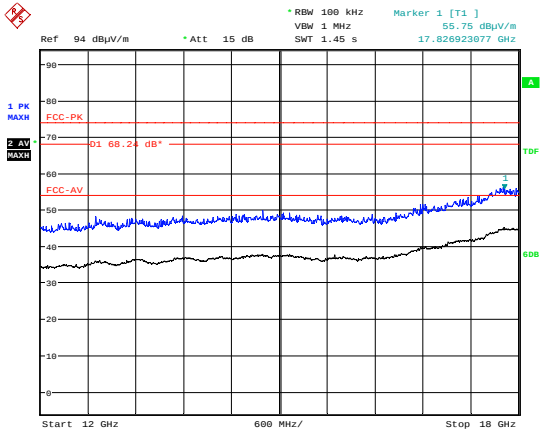
Date: 5.MAR.2018 17:12:47

1 GHz to 5.62 GHz; Channel 5847.5 MHz;
BPSK.



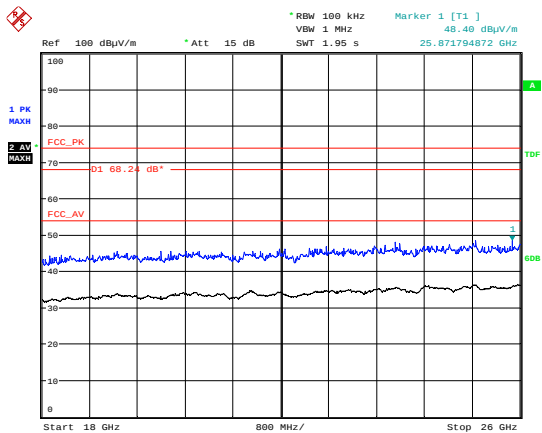
Date: 5.MAR.2018 17:10:55

5.95 GHz to 12 GHz; Channel 5847.5 MHz;
BPSK.



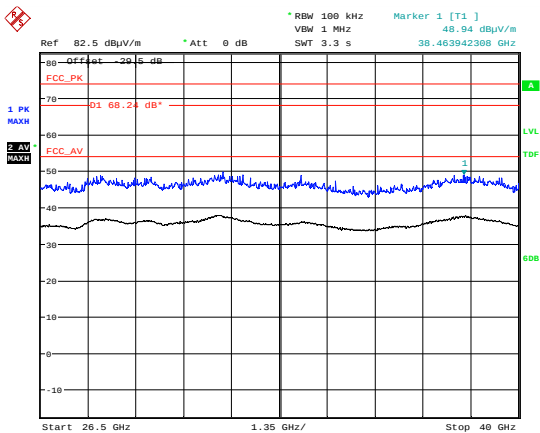
Date: 13.FEB.2018 18:38:14

12 GHz to 18 GHz; Channel 5847.5 MHz;
BPSK.



Date: 15.FEB.2018 19:33:47

18 GHz to 26.5 GHz; Channel 5847.5 MHz;
BPSK.

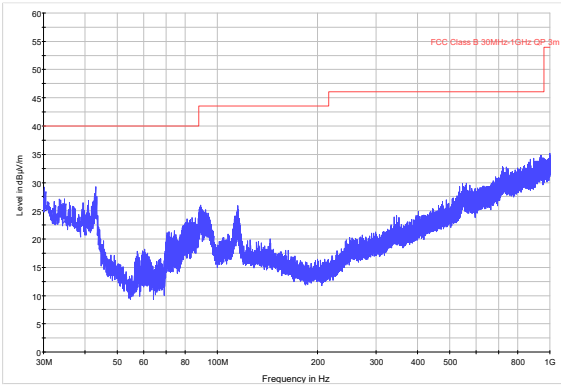


Date: 15.FEB.2018 20:37:06

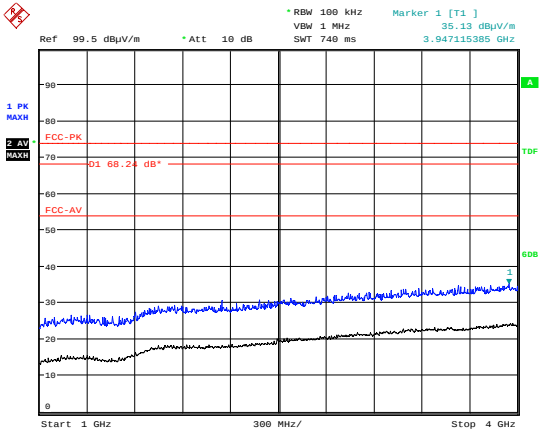
26.5 GHz to 40 GHz; Channel 5847.5 MHz;
BPSK.

High Power: 27 dBm; Bandwidth: 5 MHz; Mod mode: BPSK; Channel: 5847.5 MHz; 4' Parabolic Antenna										
Detector	Freq. (MHz)	Meas'd Emission (dBµV)	Cable Loss (dB)	Antenna Factor (dB/m)	Pre-amp Gain (dB)	Duty Cycle Corr'n (dB)	Field Strength (dBµV/m)	Distance Extrap'n Factor (dB)	Field Strength (µV/m)	Limit (µV/m)
No Emission within 20 dB to the limit										

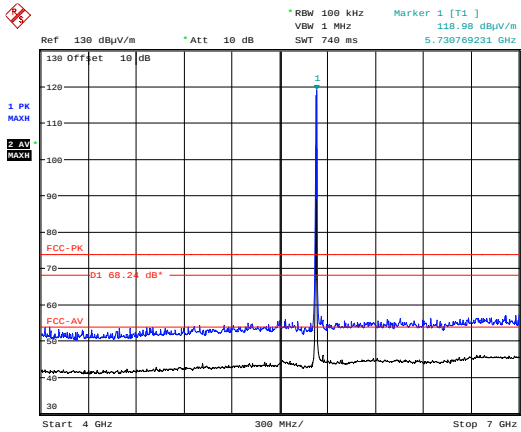
Sector antenna



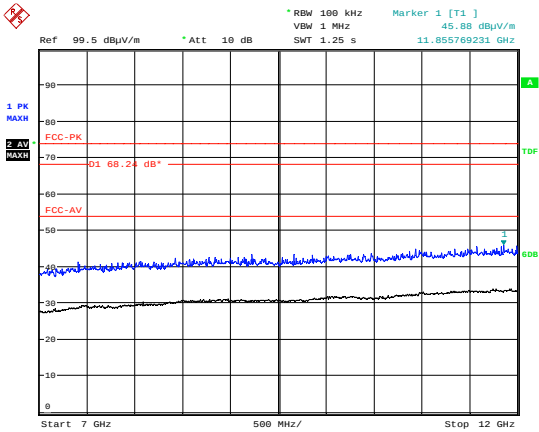
30 MHz to 1 GHz; Channel 5727.5 MHz;
BPSK.



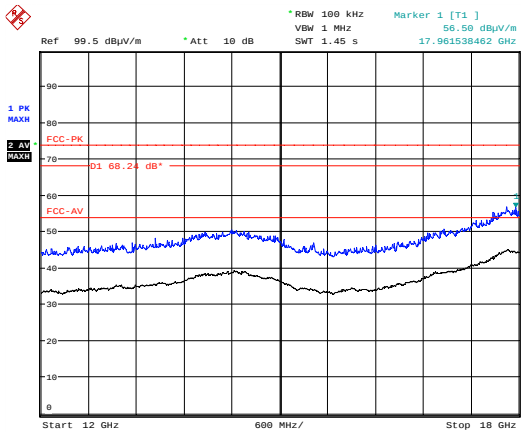
1 GHz to 4 GHz; Channel 5727.5 MHz;
BPSK.



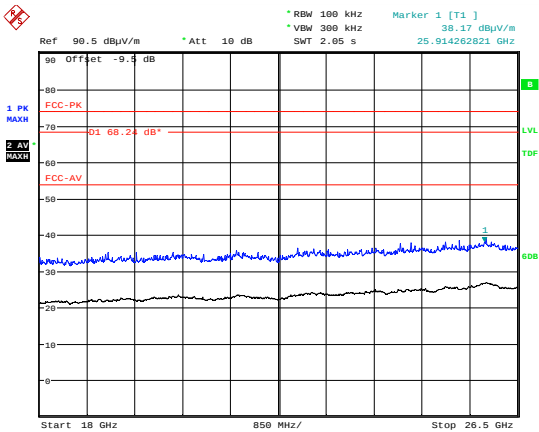
4 GHz to 7 GHz; Channel 5727.5 MHz;
BPSK.



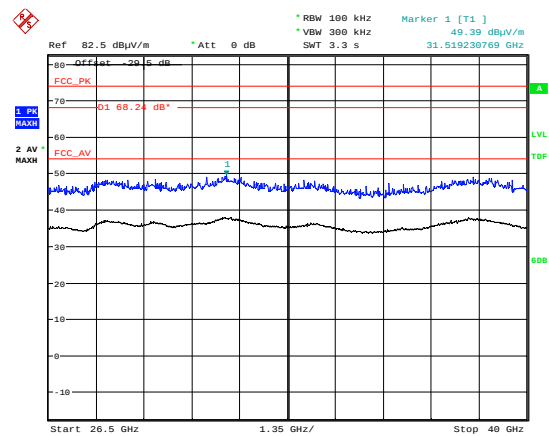
7 GHz to 12 GHz; Channel 5727.5 MHz;
BPSK.



12 GHz to 18 GHz; Channel 5727.5 MHz;
BPSK.



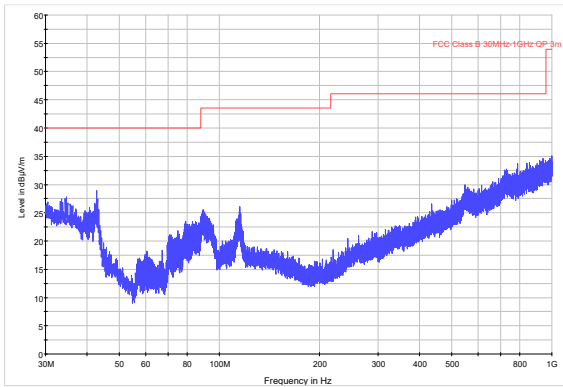
18 GHz to 26.5 GHz; Channel 5727.5 MHz;
BPSK.



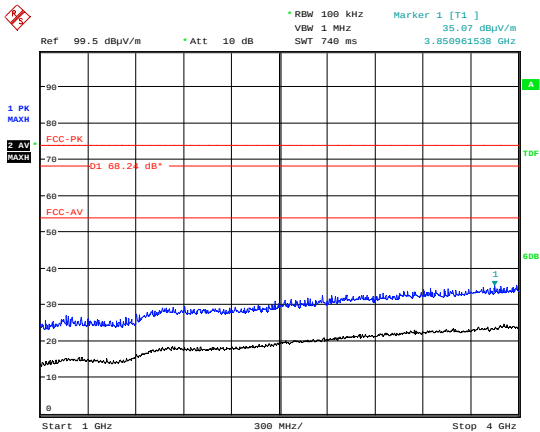
Date: 15.FEB.2018 08:59:52

26.5 GHz to 40 GHz; Channel 5727.5 MHz; BPSK.

High Power: 27 dBm; Bandwidth: 5 MHz; Mod mode: BPSK; Channel: 5727.5 MHz; Sector Antenna										
Detector	Freq. (MHz)	Meas'd Emission (dBμV)	Cable Loss (dB)	Antenna Factor (dB/m)	Pre-amp Gain (dB)	Duty Cycle Corr'n (dB)	Field Strength (dBμV/m)	Distance Extrap'n Factor (dB)	Field Strength (μV/m)	Limit (μV/m)
No Emission within 20 dB to the limit										

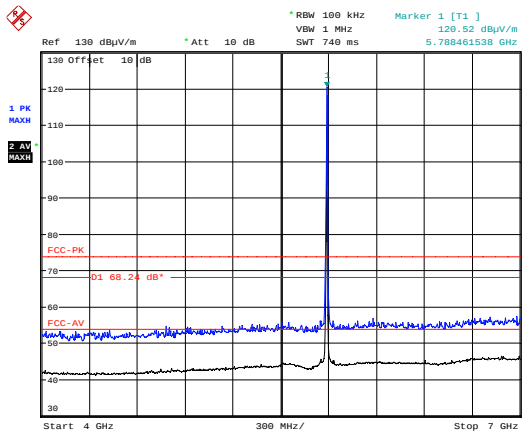


30 MHz to 1 GHz; Channel 5788 MHz; BPSK.



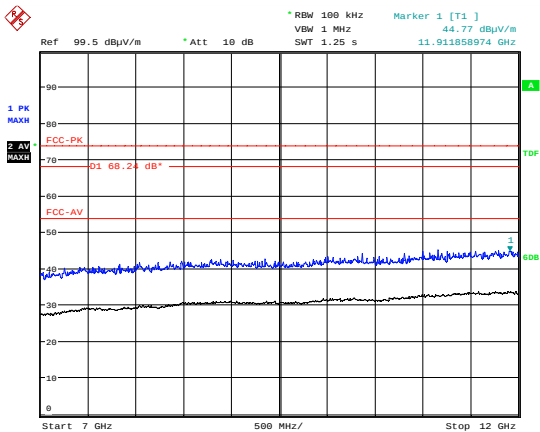
Date: 12.FEB.2018 17:37:40

1 GHz to 4 GHz; Channel 5788 MHz; BPSK.



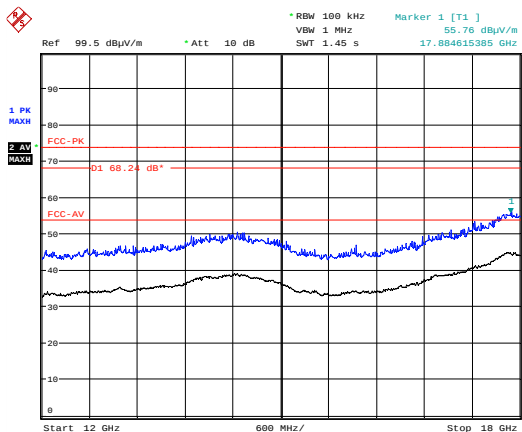
Date: 12.FEB.2018 18:37:37

4 GHz to 7 GHz; Channel 5788 MHz; BPSK.



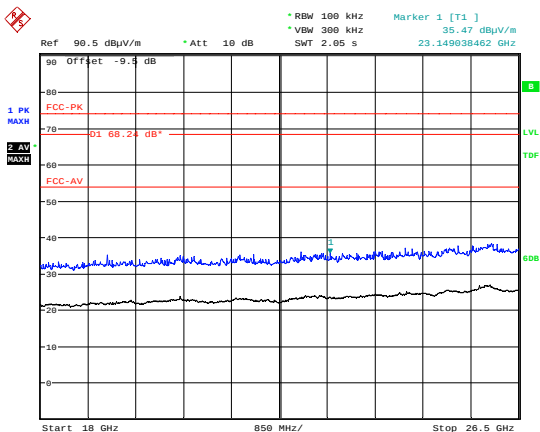
Date: 12.FEB.2018 17:38:35

7 GHz to 12 GHz; Channel 5788 MHz; BPSK.



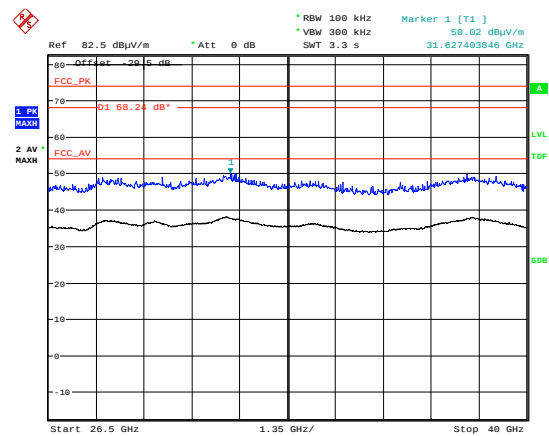
Date: 12.FEB.2018 17:39:26

12 GHz to 18 GHz; Channel 5788 MHz; BPSK.



Date: 14.FEB.2018 10:47:07

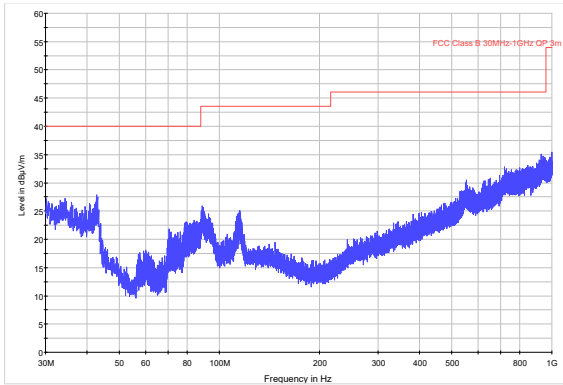
18 GHz to 26.5 GHz; Channel 5788 MHz; BPSK.



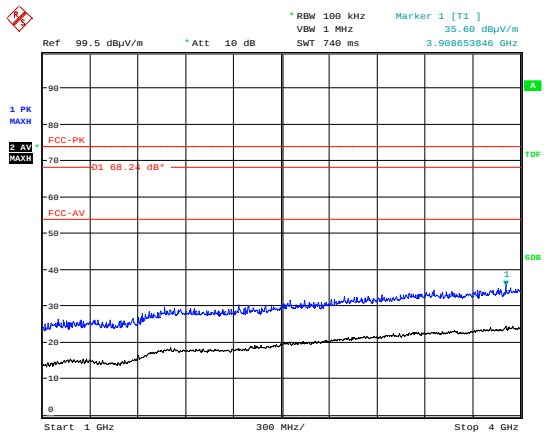
Date: 15.FEB.2018 09:03:33

26.5 GHz to 40 GHz; Channel 5788 MHz; BPSK.

High Power: 27 dBm; Bandwidth: 5 MHz; Mod mode: BPSK; Channel: 5788 MHz; Sector Antenna										
Detector	Freq. (MHz)	Meas'd Emission (dBμV)	Cable Loss (dB)	Antenna Factor (dB/m)	Pre-amp Gain (dB)	Duty Cycle Corr'n (dB)	Field Strength (dBμV/m)	Distance Extrap'n Factor (dB)	Field Strength (μV/m)	Limit (μV/m)
No Emission within 20 dB to the limit										

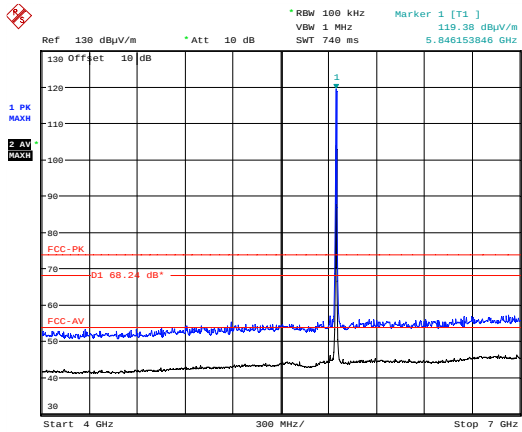


30 MHz to 1 GHz; Channel 5847.5 MHz;
BPSK.



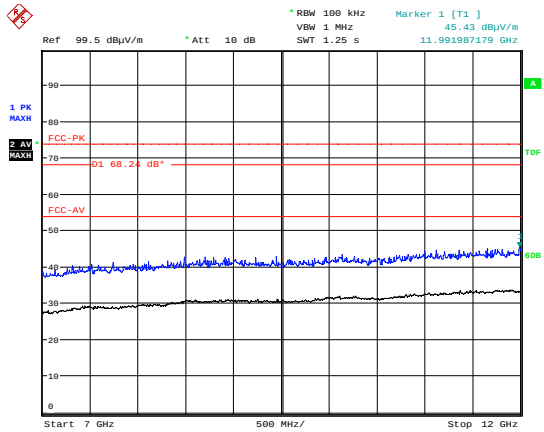
Date: 12.FEB.2018 17:48:08

1 GHz to 4 GHz; Channel 5847.5 MHz;
BPSK.



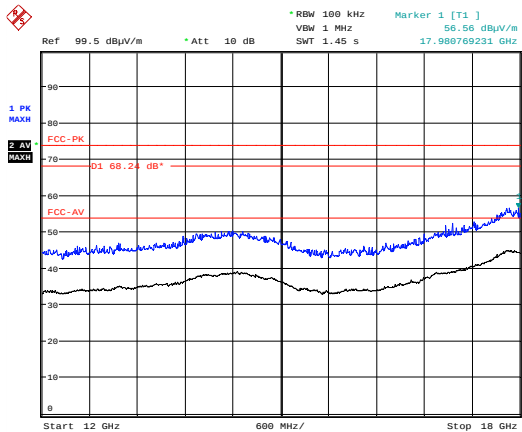
Date: 12.FEB.2018 18:36:18

4 GHz to 7 GHz; Channel 5847.5 MHz;
BPSK.



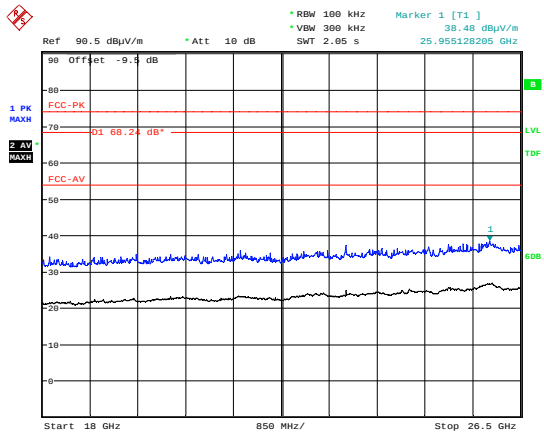
Date: 12.FEB.2018 17:47:07

7 GHz to 12 GHz; Channel 5847.5 MHz;
BPSK.



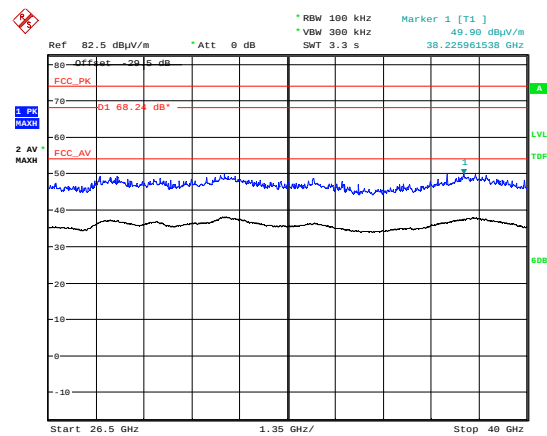
Date: 12.FEB.2018 17:46:24

12 GHz to 18 GHz; Channel 5847.5 MHz;
BPSK.



Date: 14.FEB.2018 10:48:53

18 GHz to 26.5 GHz; Channel 5847.5 MHz;
BPSK.



Date: 15.FEB.2018 09:04:39

26.5 GHz to 40 GHz; Channel 5847.5 MHz; BPSK.

High Power: 27 dBm; Bandwidth: 5 MHz; Mod mode: BPSK; Channel: 5847.5 MHz; Sector Antenna										
Detector	Freq. (MHz)	Meas'd Emission (dBμV)	Cable Loss (dB)	Antenna Factor (dB/m)	Pre-amp Gain (dB)	Duty Cycle Corr'n (dB)	Field Strength (dBμV/m)	Distance Extrap'n Factor (dB)	Field Strength (μV/m)	Limit (μV/m)
No Emission within 20 dB to the limit										

12 AC power-line conducted emissions

12.1 Definition

Line-to-ground radio-noise voltage that is conducted from all of the EUT current-carrying power input terminals that are directly (or indirectly via separate transformers or power supplies) connected to a public power network.

12.2 Test Parameters

Test Location:	Element Skelmersdale
Test Chamber:	LF Laboratory
Test Standard and Clause:	ANSI C63.10-2013, Clause 6.2
EUT Frequency of operation:	5788 MHz
EUT Channel Bandwidths:	5 MHz
EUT Modulation:	QPSK
Deviations From Standard:	None
Measurement BW:	10 kHz
Measurement Detectors:	Quasi-Peak and Average, RMS

Environmental Conditions (Normal Environment)

Temperature: 24 °C	+15 °C to +35 °C (as declared)
Humidity: 30 %RH	20%RH to 75%RH (as declared)
Supply: -48 V dc	-48 V dc (as declared)

Test Limits

A radio apparatus that is designed to be connected to the public utility (AC) power line shall ensure that the radio frequency voltage, which is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz-30 MHz, shall not exceed the limits in Table 3.

Table 3 – AC Power Line Conducted Emission Limits

Frequency (MHz)	Conducted limit (dBμV)	
	Quasi-Peak	Average**
0.15 – 0.5	66 to 56*	56 to 46*
0.5 – 5.0	56	46
5.0 – 30.0	60	50

* The level decreases linearly with the logarithm of the frequency.

** A linear average detector is required.

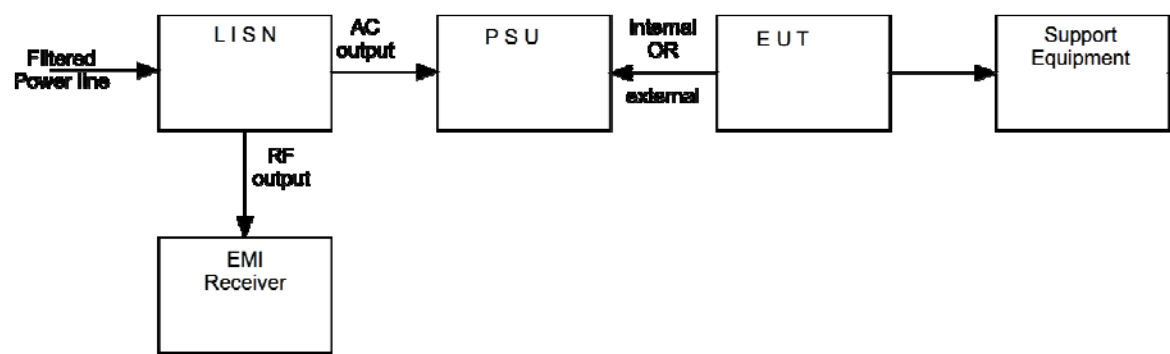
12.3 Test Method

With the EUT setup in a screened room, as per section 9 of this report and connected as per Figure ii, the power line emissions were measured on a spectrum analyzer / EMI receiver.

AC power line conducted emissions from the EUT are checked first by preview scans with peak and average detectors covering both live and neutral lines. A spectrum analyzer is used to determine if any periodic emissions are present.

Formal measurements using the correct detector(s) and bandwidth are made on frequencies identified from the preview scans. Final measurements were performed with EUT set at its maximum duty in transmit and receive modes.

Figure ii Test Setup



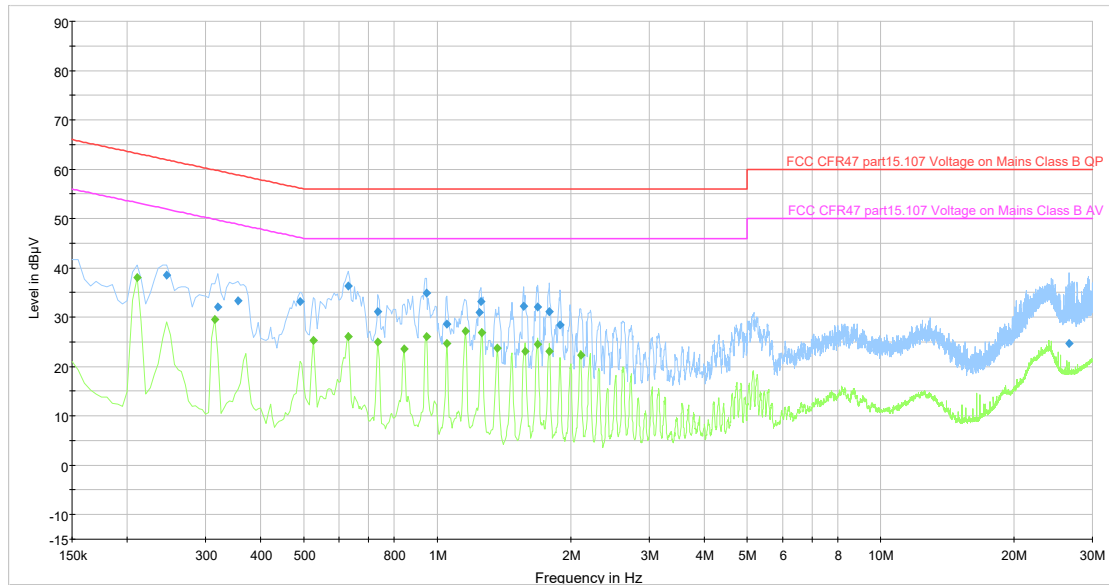
Test Setup Photograph(s)



12.4 Test Equipment

Equipment Description	Manufacturer	Equipment Type	Element No	Last Cal Calibration	Calibration Period	Due For Calibration
Lisn	R&S	ESH3-Z5.831.5	U195	2017-08-16	12	2018-08-16
Receiver	R&S	ESHS10	U187	2017-11-08	12	2018-11-08

12.5 Test Results



AC power-line conducted emissions, Transmit mode						
Results measured using the average detector						
Reference Number	Frequency (MHz)	Conductor	Result (dBuV)	Specification Limit (dBuV)	Margin (dB)	Result Summary
No Emission within 20 dB to the limit						PASS
Results measured using the quasi-peak detector						
Reference Number	Frequency (MHz)	Conductor	Result (dBuV)	Specification Limit (dBuV)	Margin (dB)	Result Summary
No Emission within 20 dB to the limit						PASS

13 Occupied Bandwidth

13.1 Definition

The emission bandwidth (x dB) is defined as the frequency range between two points, one above and one below the carrier frequency, at which the spectral density of the emission is attenuated x dB below the maximum in-band spectral density of the modulated signal.

13.2 Test Parameters

Test Location:	Element Skelmersdale
Test Chamber:	Radio Laboratory
Test Standard and Clause:	ANSI C63.10-2013, Clause 6.9
EUT Channels Measured:	Top, middle and bottom
EUT Channel Bandwidths:	5, 10, 15, 20, 30, 40 and 45 MHz
EUT Test Modulations:	AQU, BPSK, QPSK, 16 QAM, 64 QAM and 256 QAM
Deviations From Standard:	None
Measurement BW: (FCC requirement: 100 kHz)	100 kHz
Spectrum Analyzer Video BW: (requirement at least 3x RBW)	300 kHz
Measurement Span: (requirement 2 to 5 times OBW)	10, 20, 30, 40, 60, 80 and 90 MHz
Measurement Detector:	Peak

Environmental Conditions (Normal Environment)

Temperature: 24 °C	+15 °C to +35 °C (as declared)
Humidity: 32 %RH	20%RH to 75%RH (as declared)
Supply: -48 Vdc	-48 Vdc (as declared)

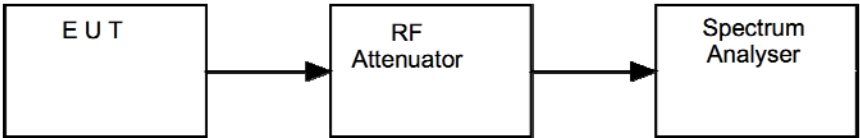
Test Limits

Within the 5.725–5.85 GHz band, the minimum 6 dB bandwidth of U–NII devices shall be at least 500 kHz.

13.3 Test Method

With the EUT setup as per section 9 of this report and connected as per Figure iii, the bandwidth of the EUT was measured on a spectrum analyser. The measurements were performed with EUT set at its maximum duty. All modulation schemes, data rates and power settings were used to observe the worst-case configuration in each bandwidth.

Figure iii Test Setup

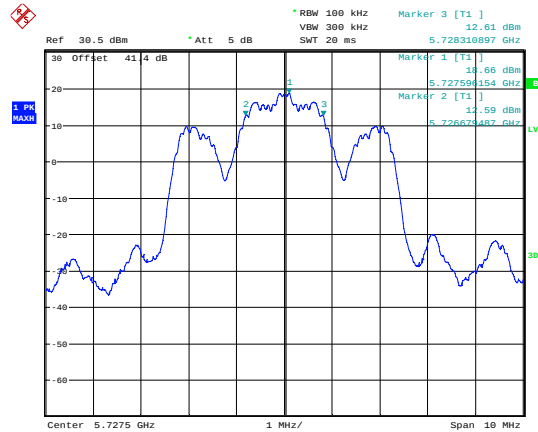


13.4 Test Equipment

Equipment Description	Manufacturer	Equipment Type	Element No	Last Cal Calibration	Calibration Period	Due For Calibration
Spectrum Analyser	R&S	FSU46	U281	2017/06/19	12	2018/06/19

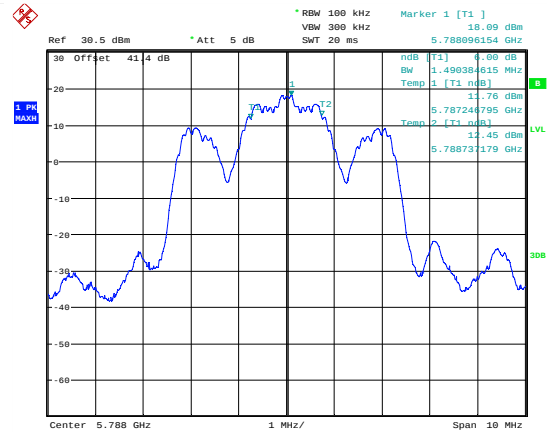
13.5 Test Results

5 MHz bandwidth



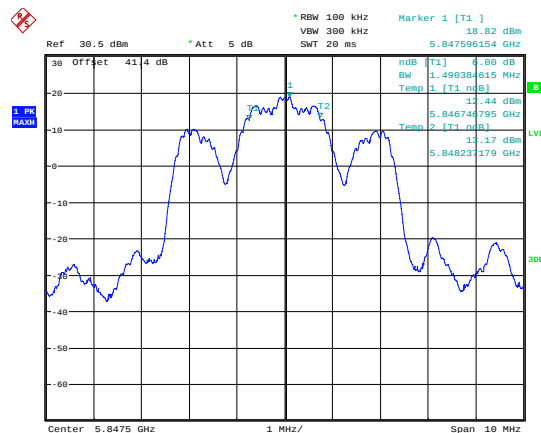
Date: 6.FEB.2018 14:02:46

6 dB Bandwidth AQU; 5727.5 MHz.



Date: 6.FEB.2018 15:32:44

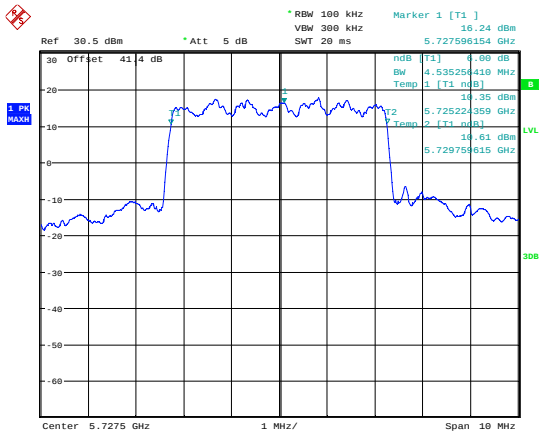
6 dB Bandwidth AQU; 5788 MHz.



Date: 6.FEB.2018 15:33:53

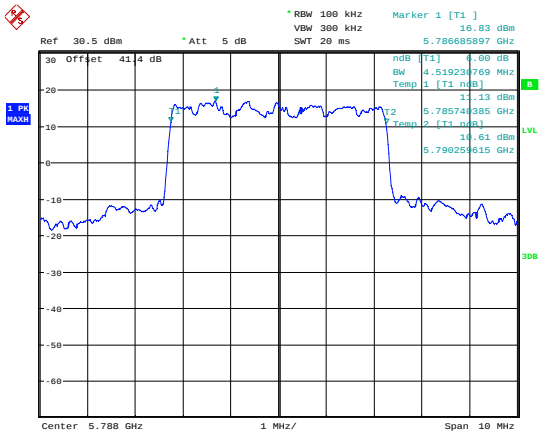
6 dB Bandwidth AQU; 5847.5 MHz.

Modulation Mode: AQU; 5 MHz				
Frequency (MHz)	FL (MHz)	FH (MHz)	6dB Bandwidth (kHz)	Result
5727.5	5726.679	5728.311	1632	PASS
5788	5787.247	5788.737	1490	PASS
5847.5	5846.747	5848.237	1490	PASS



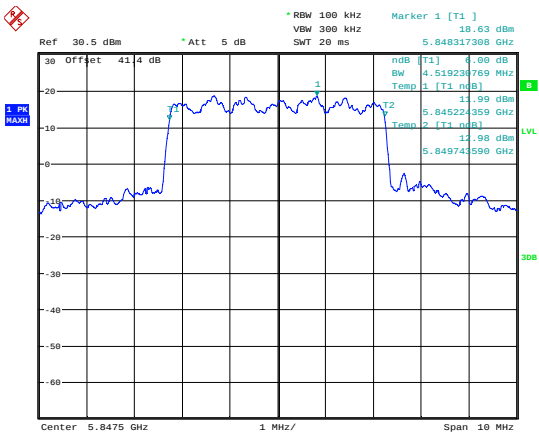
Date: 6.FEB.2018 14:13:26

6 dB Bandwidth BPSK; 5727.5 MHz.



Date: 6.FEB.2018 15:25:15

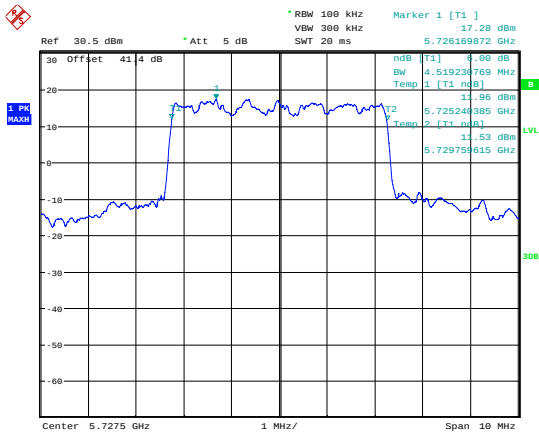
6 dB Bandwidth BPSK; 5788 MHz.



Date: 6.FEB.2018 15:38:11

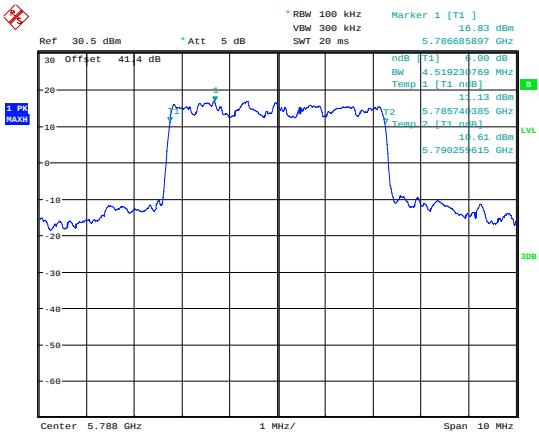
6 dB Bandwidth BPSK; 5847.5 MHz.

Modulation Mode: BPSK; 5 MHz				
Frequency (MHz)	FL (MHz)	FH (MHz)	6dB Bandwidth (kHz)	Result
5727.5	5725.224	5729.76	4536	PASS
5788	5785.74	5790.26	4520	PASS
5847.5	5845.224	5849.744	4520	PASS



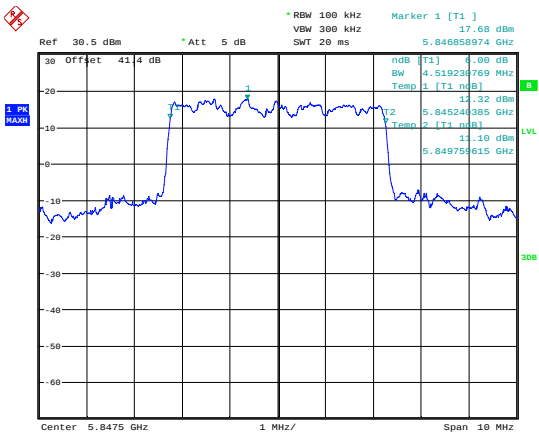
Date: 6.FEB.2018 15:13:51

6 dB Bandwidth QPSK; 5727.5 MHz.



Date: 6.FEB.2018 15:25:15

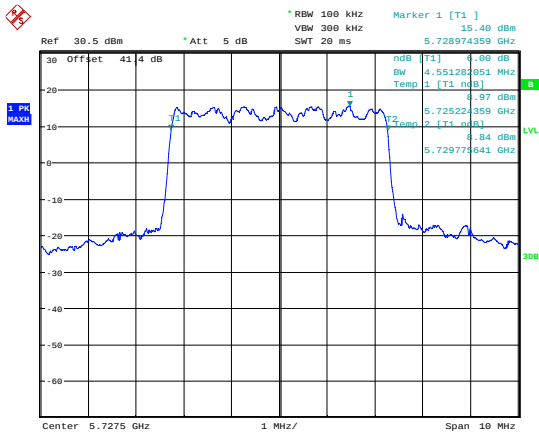
6 dB Bandwidth QPSK; 5788 MHz.



Date: 6.FEB.2018 15:38:48

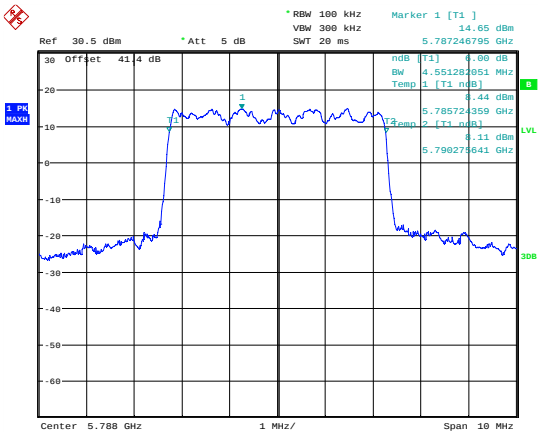
6 dB Bandwidth QPSK; 5847.5 MHz.

Modulation Mode: QPSK; 5 MHz				
Frequency (MHz)	FL (MHz)	FH (MHz)	6dB Bandwidth (kHz)	Result
5727.5	5725.24	5729.76	4520	PASS
5788	5785.74	5790.26	4520	PASS
5847.5	5845.24	5849.76	4520	PASS



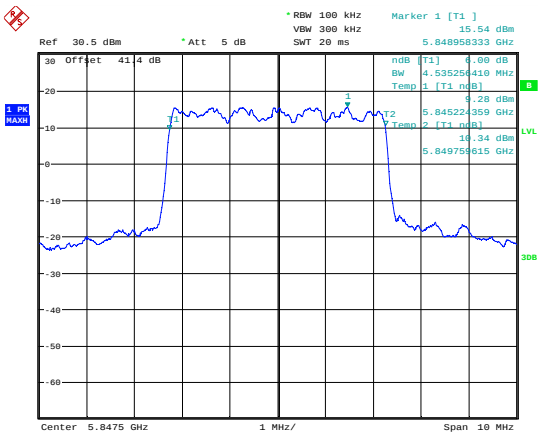
Date: 6.FEB.2018 15:17:27

6 dB Bandwidth 64 QAM; 5727.5 MHz.



Date: 6.FEB.2018 15:22:30

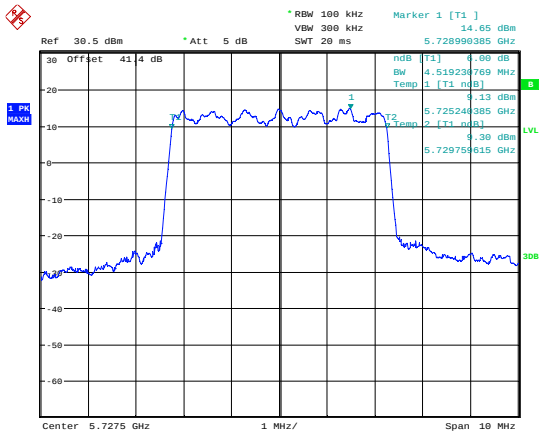
6 dB Bandwidth 64 QAM; 5788 MHz.



Date: 6.FEB.2018 15:45:06

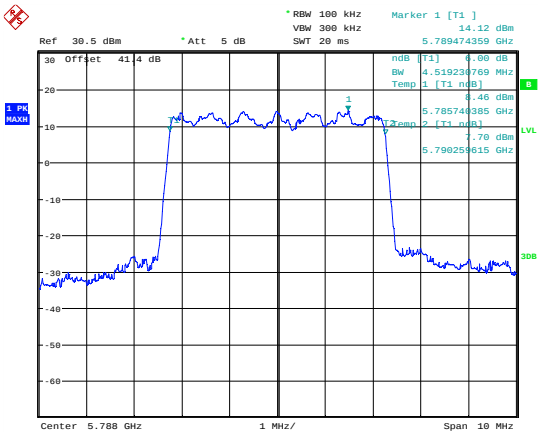
6 dB Bandwidth 64 QAM; 5847.5 MHz.

Modulation Mode: 64 QAM; 5 MHz				
Frequency (MHz)	FL (MHz)	FH (MHz)	6dB Bandwidth (kHz)	Result
5727.5	5725.224	5729.776	4552	PASS
5788	5785.724	5790.276	4552	PASS
5847.5	5845.224	5849.76	4536	PASS



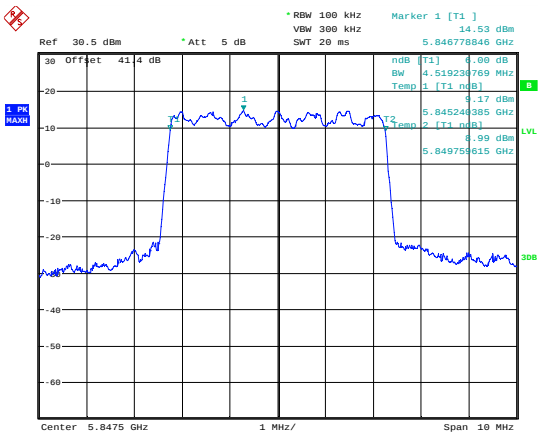
Date: 6.FEB.2018 15:18:19

6 dB Bandwidth 256 QAM; 5727.5 MHz.



Date: 6.FEB.2018 15:21:47

6 dB Bandwidth 256 QAM; 5788 MHz.

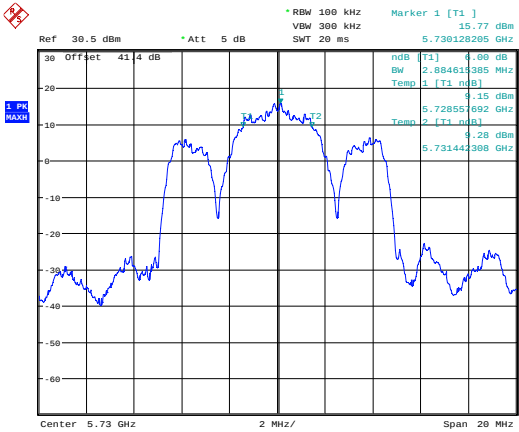


Date: 6.FEB.2018 15:48:59

6 dB Bandwidth 256 QAM; 5847.5 MHz.

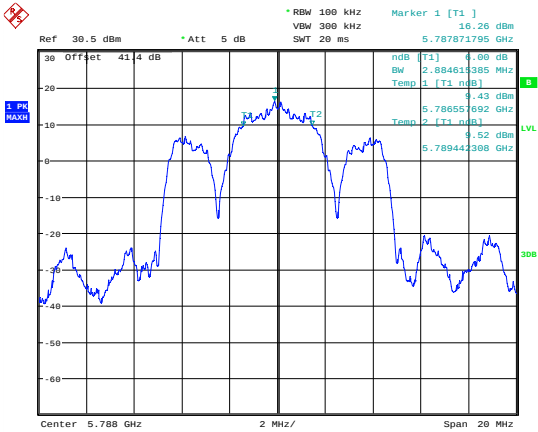
Modulation Mode: 256 QAM; 5 MHz				
Frequency (MHz)	FL (MHz)	FH (MHz)	6dB Bandwidth (kHz)	Result
5727.5	5725.24	5729.76	4520	PASS
5788	5785.74	5790.26	4520	PASS
5847.5	5845.24	5849.76	4520	PASS

10 MHz bandwidth



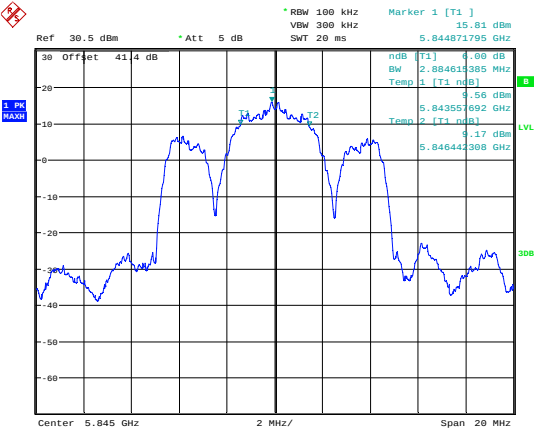
Date: 6.FEB.2018 17:26:26

6 dB Bandwidth AQU; 5730 MHz.



Date: 6.FEB.2018 17:48:22

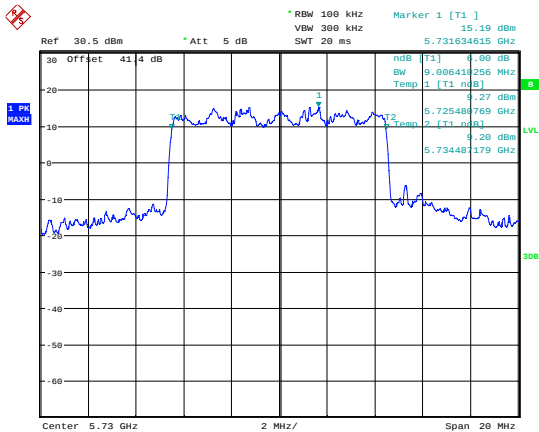
6 dB Bandwidth AQU; 5788 MHz.



Date: 6.FEB.2018 17:52:13

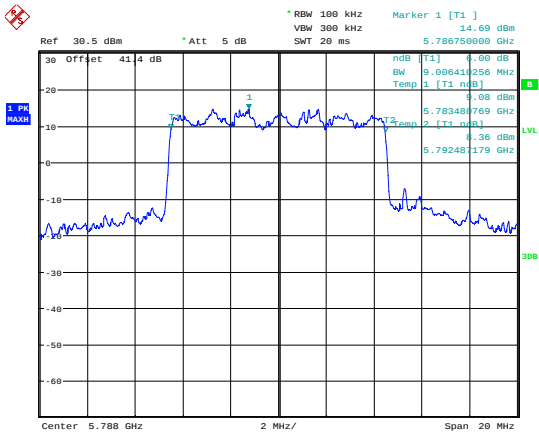
6 dB Bandwidth AQU; 5845 MHz.

Modulation Mode: AQU; 10 MHz				
Frequency (MHz)	FL (MHz)	FH (MHz)	6dB Bandwidth (kHz)	Result
5730	5728.558	5731.442	2885	PASS
5788	5786.558	5789.442	2885	PASS
5845	5843.558	5846.442	2885	PASS



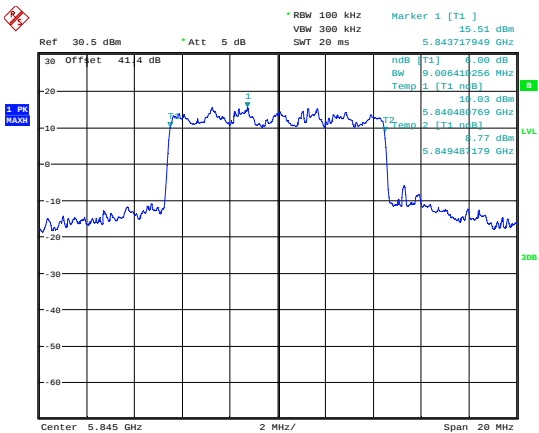
Date: 6.FEB.2018 17:27:02

6 dB Bandwidth BPSK; 5730 MHz.



Date: 6.FEB.2018 17:47:47

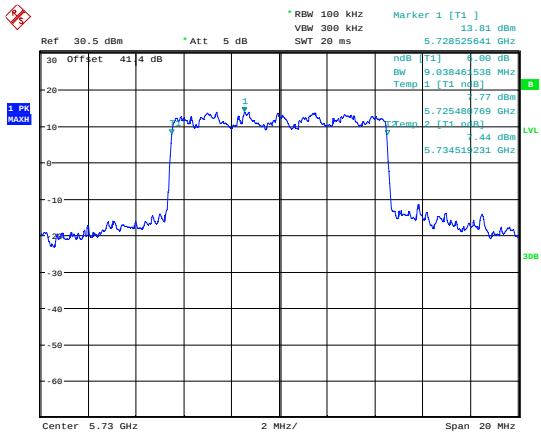
6 dB Bandwidth BPSK; 5788 MHz.



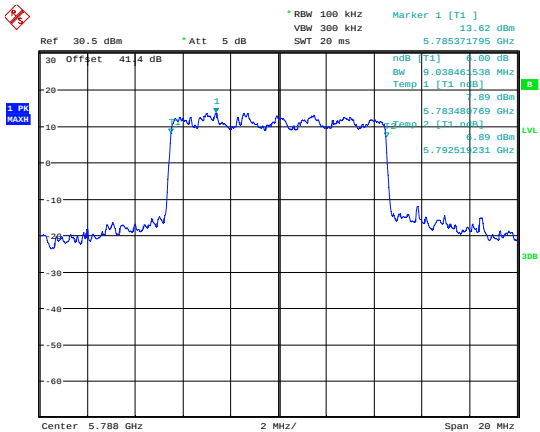
Date: 6.FEB.2018 17:52:53

6 dB Bandwidth BPSK; 5845 MHz.

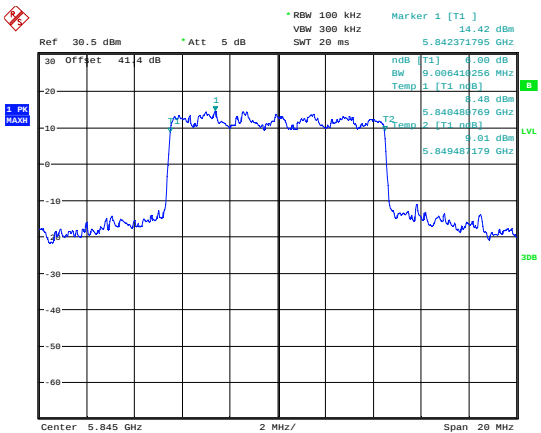
Modulation Mode: BPSK; 10 MHz				
Frequency (MHz)	FL (MHz)	FH (MHz)	6dB Bandwidth (kHz)	Result
5730	5725.481	5734.487	9006	PASS
5788	5783.481	5792.487	9006	PASS
5845	5840.481	5849.487	9006	PASS



Date: 6.FEB.2018 17:39:44
6 dB Bandwidth QPSK; 5730 MHz.

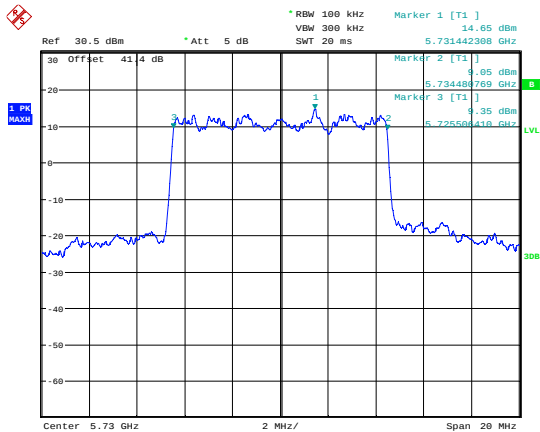


Date: 6.FEB.2018 17:44:37
6 dB Bandwidth QPSK; 5788 MHz.



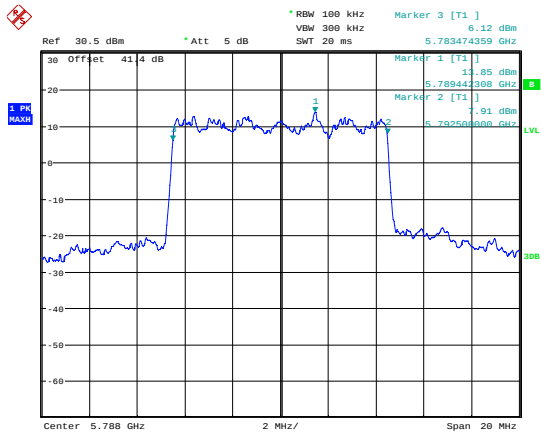
Date: 6.FEB.2018 17:56:56
6 dB Bandwidth QPSK; 5845 MHz.

Modulation Mode: QPSK; 10 MHz				
Frequency (MHz)	FL (MHz)	FH (MHz)	6dB Bandwidth (kHz)	Result
5730	5725.481	5734.519	9038	PASS
5788	5783.481	5792.519	9038	PASS
5845	5840.481	5849.487	9006	PASS



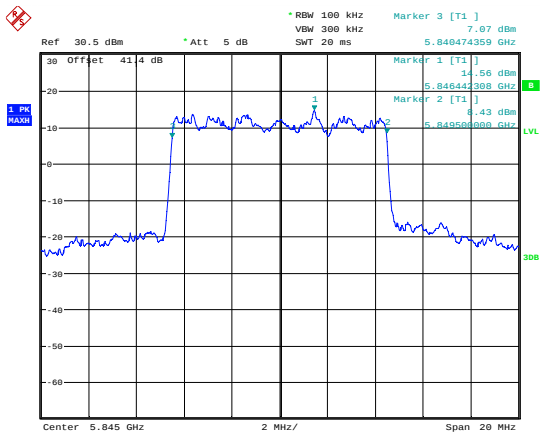
Date: 6.FEB.2018 17:33:54

6 dB Bandwidth 16 QAM; 5730 MHz.



Date: 6.FEB.2018 17:43:43

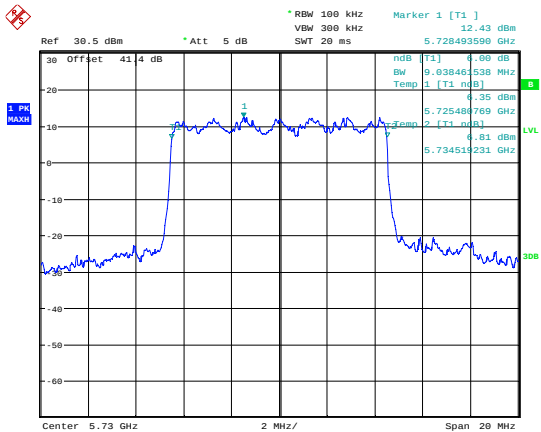
6 dB Bandwidth 16 QAM; 5788 MHz.



Date: 6.FEB.2018 17:59:02

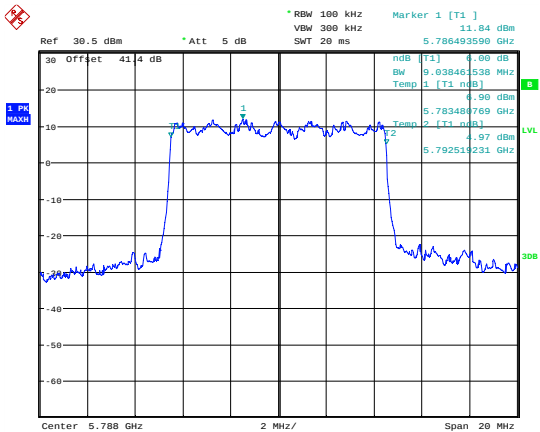
6 dB Bandwidth 16 QAM; 5845 MHz.

Modulation Mode: 16 QAM; 10 MHz				
Frequency (MHz)	FL (MHz)	FH (MHz)	6dB Bandwidth (kHz)	Result
5730	5725.506	5734.481	8975	PASS
5788	5783.474	5792.5	9026	PASS
5845	5840.474	5849.5	9026	PASS



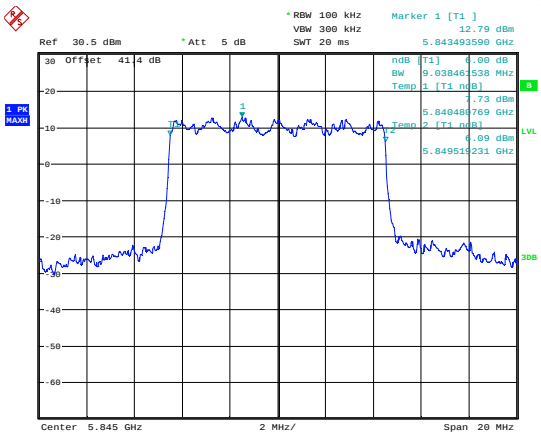
Date: 6.FEB.2018 17:37:27

6 dB Bandwidth 64 QAM; 5730 MHz.



Date: 6.FEB.2018 17:40:29

6 dB Bandwidth 64 QAM; 5788 MHz.

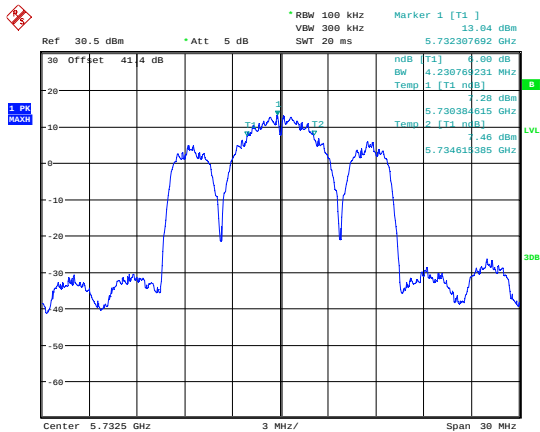


Date: 6.FEB.2018 18:01:14

6 dB Bandwidth 64 QAM; 5845 MHz.

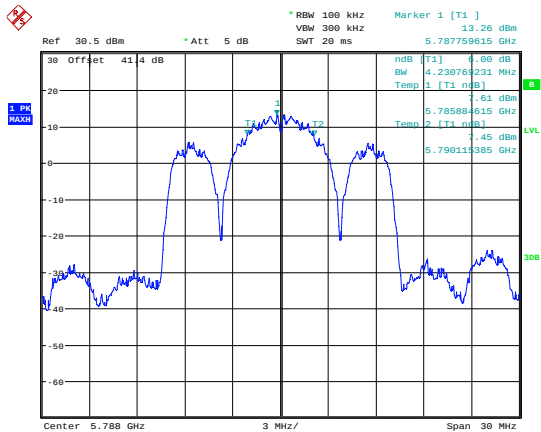
Modulation Mode: 64 QAM; 10 MHz				
Frequency (MHz)	FL (MHz)	FH (MHz)	6dB Bandwidth (kHz)	Result
5730	5725.481	5734.519	9038	PASS
5788	5783.481	5792.519	9038	PASS
5845	5840.481	5849.519	9038	PASS

15 MHz Bandwidth



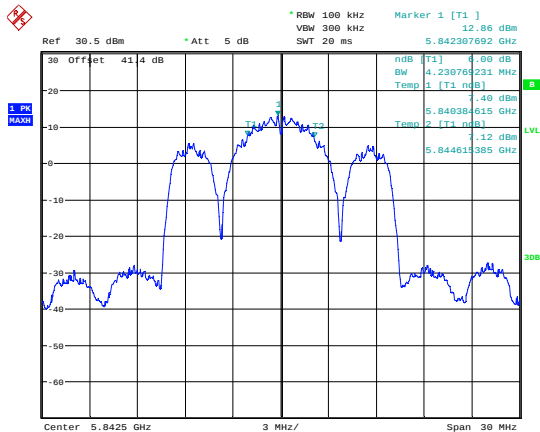
Date: 7.FEB.2018 10:08:06

6 dB Bandwidth AQU; 5732.5 MHz.



Date: 7.FEB.2018 10:29:01

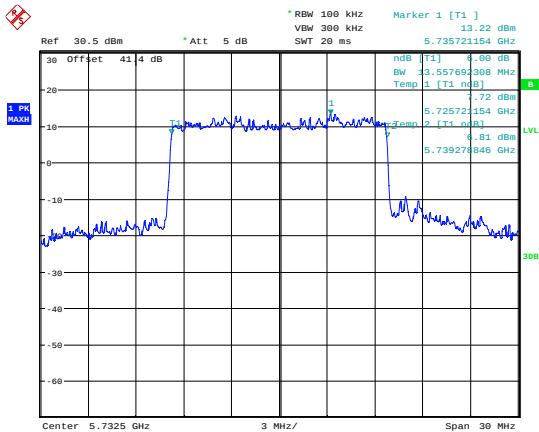
6 dB Bandwidth AQU; 5788 MHz.



Date: 7.FEB.2018 10:31:40

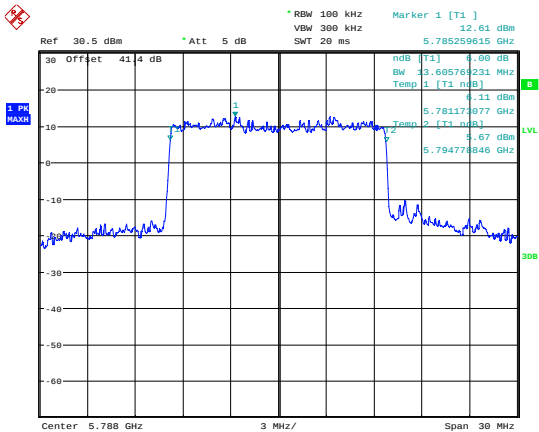
6 dB Bandwidth AQU; 5842.5 MHz.

Modulation Mode: AQU; 15 MHz				
Frequency (MHz)	FL (MHz)	FH (MHz)	6dB Bandwidth (kHz)	Result
5732.5	5730.385	5734.615	4231	PASS
5788	5785.885	5790.115	4231	PASS
5842.5	5840.385	5844.615	4231	PASS



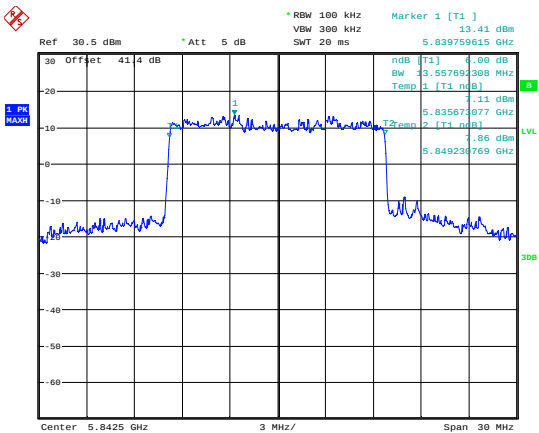
Date: 7.FEB.2018 10:09:00

6 dB Bandwidth BPSK; 5732.5 MHz.



Date: 7.FEB.2018 10:28:33

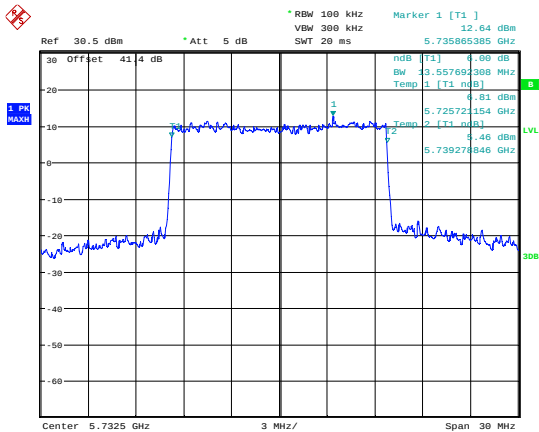
6 dB Bandwidth BPSK; 5788 MHz.



Date: 7.FEB.2018 10:32:19

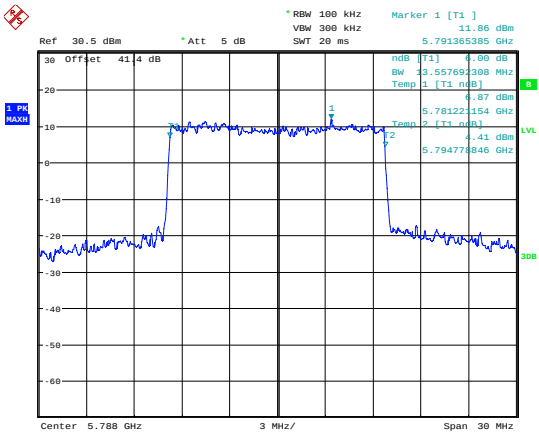
6 dB Bandwidth BPSK; 5842.5 MHz.

Modulation Mode: BPSK; 15 MHz				
Frequency (MHz)	FL (MHz)	FH (MHz)	6dB Bandwidth (kHz)	Result
5732.5	5725.721	5739.279	13558	PASS
5788	5781.173	5794.779	13606	PASS
5842.5	5835.673	5849.231	13558	PASS



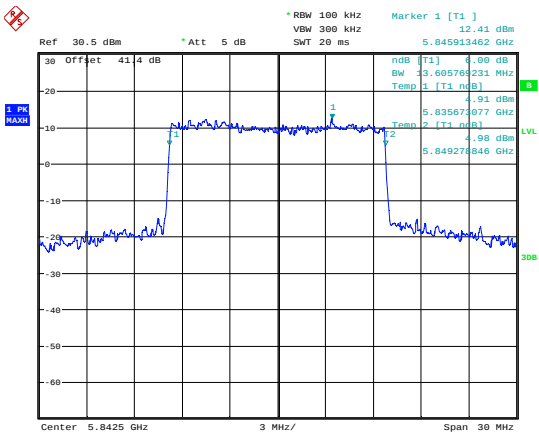
Date: 7.FEB.2018 10:10:22

6 dB Bandwidth QPSK; 5732.5 MHz.



Date: 7.FEB.2018 10:27:18

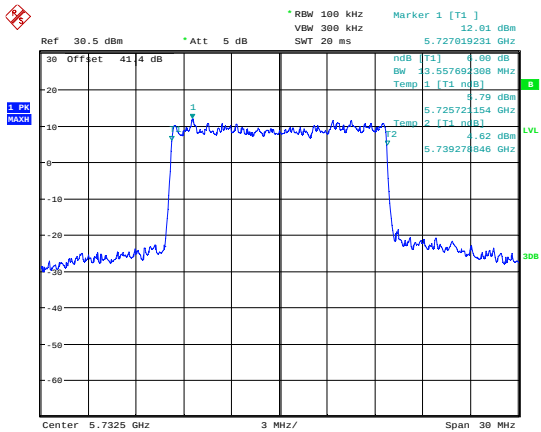
6 dB Bandwidth QPSK; 5788 MHz.



Date: 7.FEB.2018 10:33:36

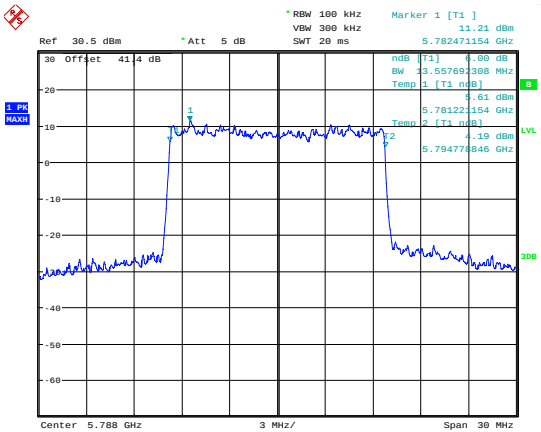
6 dB Bandwidth QPSK; 5842.5 MHz.

Modulation Mode: QPSK; 15 MHz				
Frequency (MHz)	FL (MHz)	FH (MHz)	6dB Bandwidth (kHz)	Result
5732.5	5725.721	5739.279	13558	PASS
5788	5781.221	5794.779	13558	PASS
5842.5	5835.673	5849.279	13606	PASS



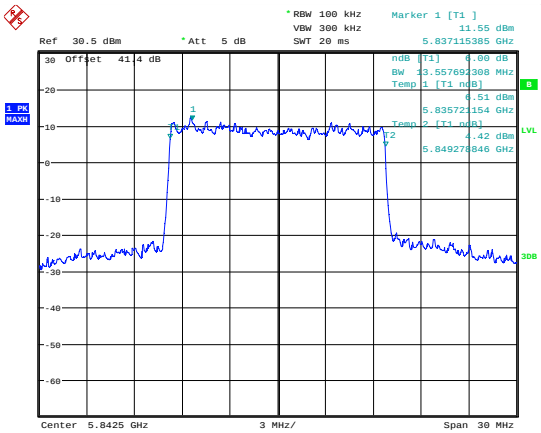
Date: 7.FEB.2018 10:10:58

6 dB Bandwidth 16 QAM; 5732.5 MHz.



Date: 7.FEB.2018 10:26:39

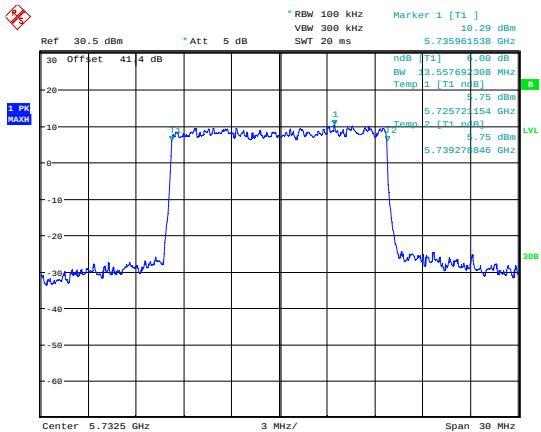
6 dB Bandwidth 16 QAM; 5788 MHz.



Date: 7.FEB.2018 11:25:27

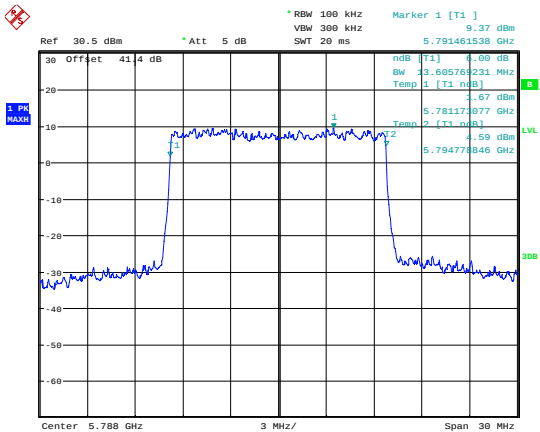
6 dB Bandwidth 16 QAM; 5842.5 MHz.

Modulation Mode: 16 QAM; 15 MHz				
Frequency (MHz)	FL (MHz)	FH (MHz)	6dB Bandwidth (kHz)	Result
5732.5	5725.721	5739.279	13558	PASS
5788	5781.221	5794.779	13558	PASS
5842.5	5835.721	5849.279	13558	PASS



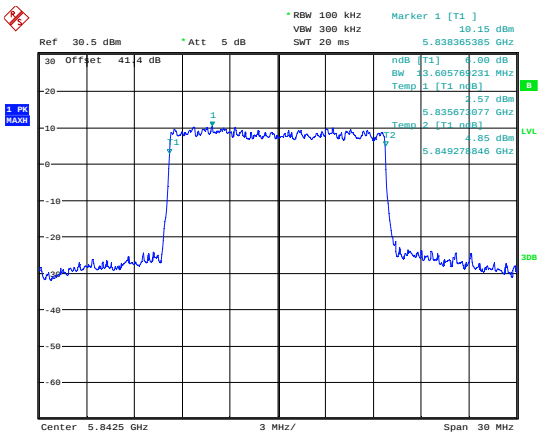
Date: 7.FEB.2018 10:12:22

6 dB Bandwidth 64 QAM; 5732.5 MHz.



Date: 7.FEB.2018 10:23:29

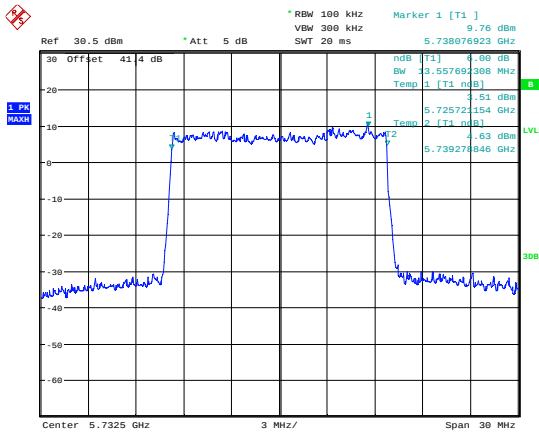
6 dB Bandwidth 64 QAM; 5788 MHz.



Date: 7.FEB.2018 11:27:00

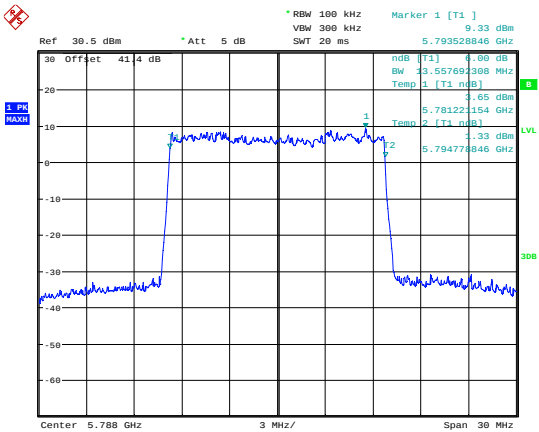
6 dB Bandwidth 64 QAM; 5842.5 MHz.

Modulation Mode: 64 QAM; 15 MHz				
Frequency (MHz)	FL (MHz)	FH (MHz)	6dB Bandwidth (kHz)	Result
5732.5	5725.721	5739.279	13558	PASS
5788	5781.173	5794.779	13606	PASS
5842.5	5835.673	5849.279	13606	PASS



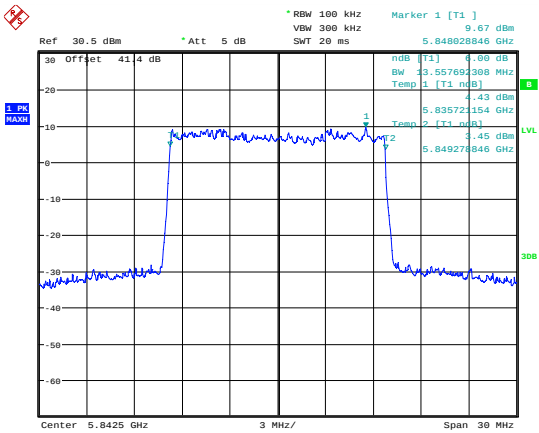
Date: 7.FEB.2018 10:12:57

6 dB Bandwidth 256 QAM; 5732.5 MHz.



Date: 7.FEB.2018 10:22:31

6 dB Bandwidth 256 QAM; 5788 MHz.

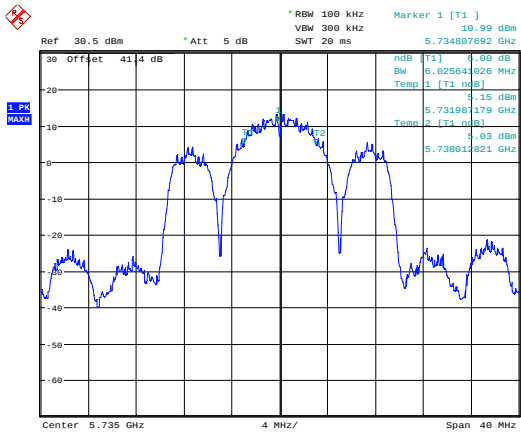


Date: 7.FEB.2018 11:28:04

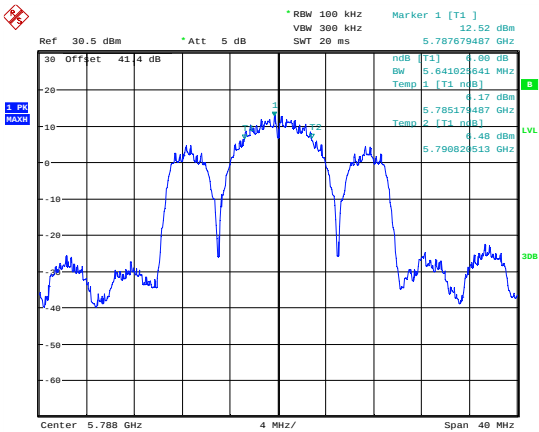
6 dB Bandwidth 256 QAM; 5842.5 MHz.

Modulation Mode: 256 QAM; 15 MHz				
Frequency (MHz)	FL (MHz)	FH (MHz)	6dB Bandwidth (kHz)	Result
5732.5	5725.721	5739.279	13558	PASS
5788	5781.221	5794.779	13558	PASS
5842.5	5835.721	5849.279	13558	PASS

20 MHz Bandwidth



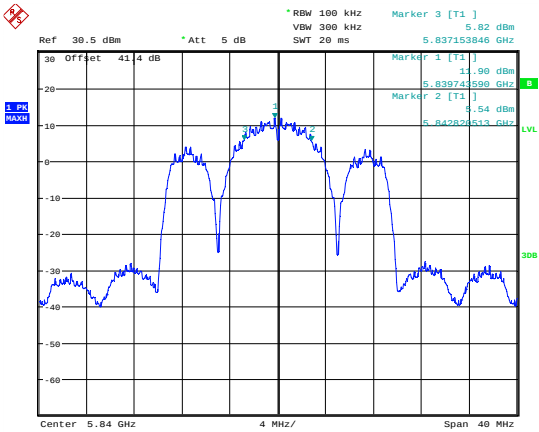
Date: 7.FEB.2018 11:38:16



Date: 7.FEB.2018 11:51:49

6 dB Bandwidth AQU; 5735 MHz.

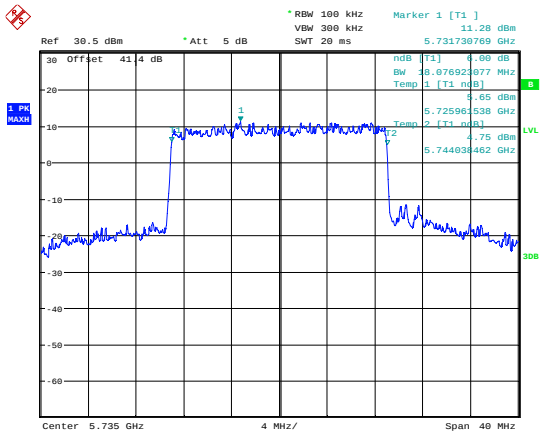
6 dB Bandwidth AQU; 5788 MHz.



Date: 7.FEB.2018 11:55:32

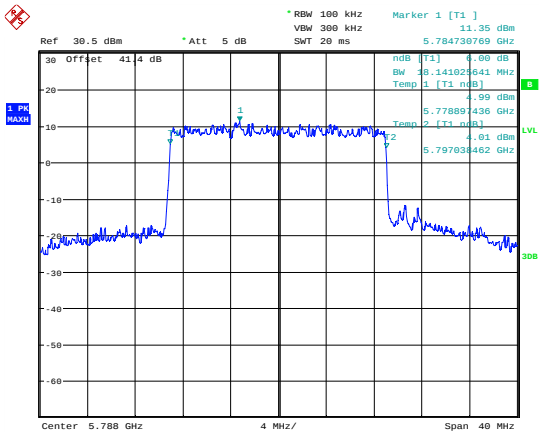
6 dB Bandwidth AQU; 5840 MHz.

Modulation Mode: AQU; 20 MHz				
Frequency (MHz)	FL (MHz)	FH (MHz)	6dB Bandwidth (kHz)	Result
5735	5731.987	5738.013	6026	PASS
5788	5785.179	5790.82	5641	PASS
5840	5837.154	5842.82	5667	PASS



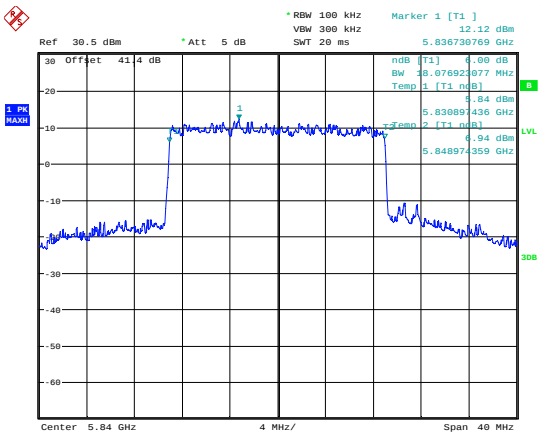
Date: 7.FEB.2018 11:37:25

6 dB Bandwidth BPSK; 5735 MHz.



Date: 7.FEB.2018 11:51:05

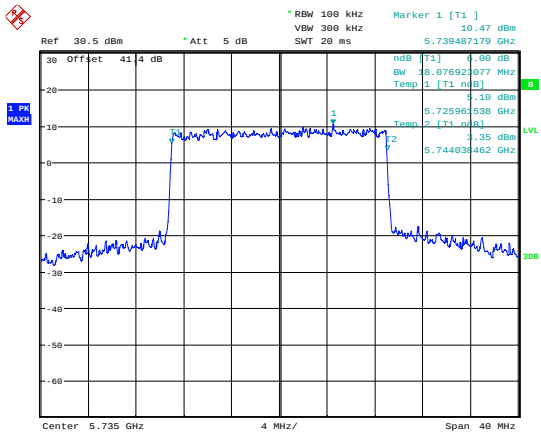
6 dB Bandwidth BPSK; 5788 MHz.



Date: 7.FEB.2018 11:56:11

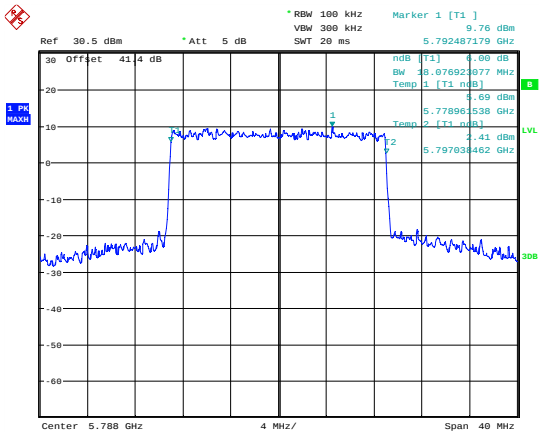
6 dB Bandwidth BPSK; 5840 MHz.

Modulation Mode: BPSK; 20 MHz				
Frequency (MHz)	FL (MHz)	FH (MHz)	6dB Bandwidth (kHz)	Result
5735	5725.961	5744.038	18077	PASS
5788	5778.897	5797.038	18141	PASS
5840	5830.897	5848.974	18077	PASS



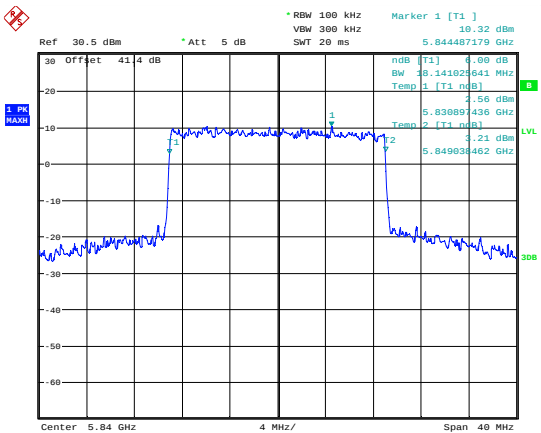
Date: 7.FEB.2018 11:40:09

6 dB Bandwidth QPSK; 5735 MHz.



Date: 7.FEB.2018 11:49:54

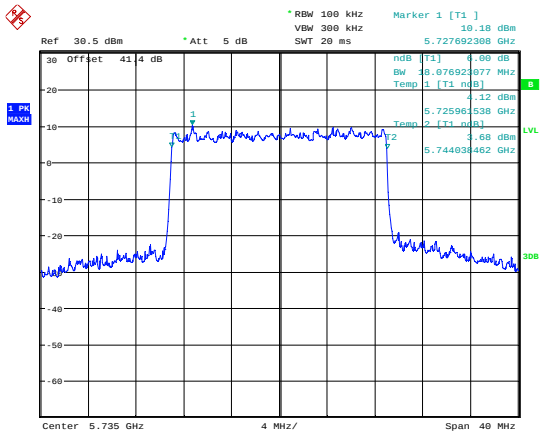
6 dB Bandwidth QPSK; 5788 MHz.



Date: 7.FEB.2018 11:57:24

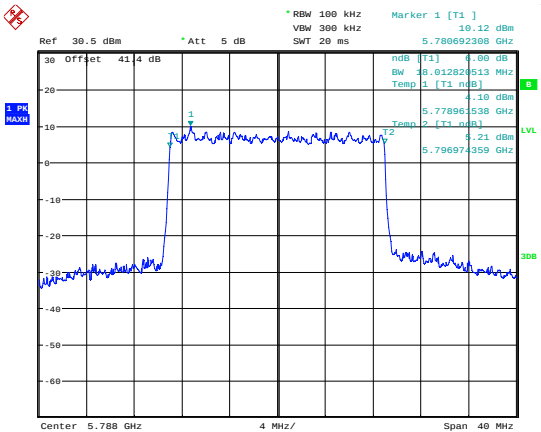
6 dB Bandwidth QPSK; 5840 MHz.

Modulation Mode: QPSK; 20 MHz				
Frequency (MHz)	FL (MHz)	FH (MHz)	6dB Bandwidth (kHz)	Result
5735	5725.961	5744.038	18077	PASS
5788	5778.961	5797.038	18077	PASS
5840	5830.897	5849.038	18141	PASS



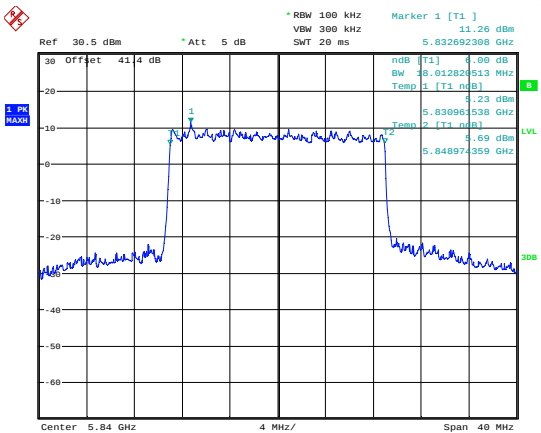
Date: 7.FEB.2018 11:49:45

6 dB Bandwidth 16 QAM; 5735 MHz.



Date: 7.FEB.2018 11:49:05

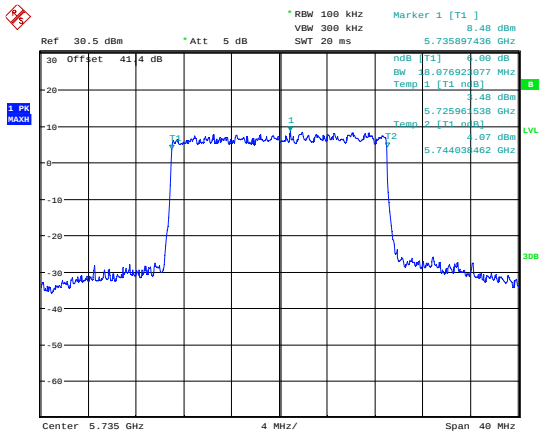
6 dB Bandwidth 16 QAM; 5788 MHz.



Date: 7.FEB.2018 11:57:55

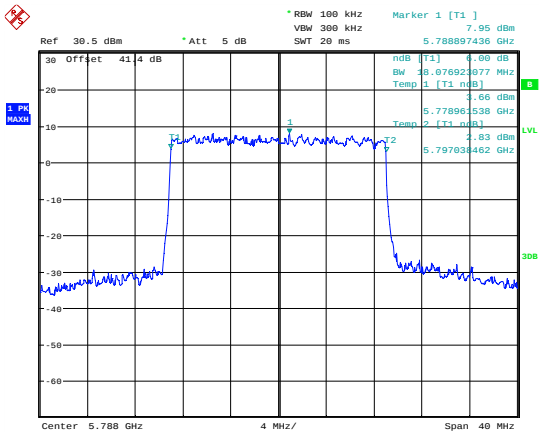
6 dB Bandwidth 16 QAM; 5840 MHz.

Modulation Mode: 16 QAM; 20 MHz				
Frequency (MHz)	FL (MHz)	FH (MHz)	6dB Bandwidth (kHz)	Result
5735	5725.962	5744.038	18077	PASS
5788	5778.961	5796.974	18013	PASS
5840	5830.961	5848.974	18013	PASS



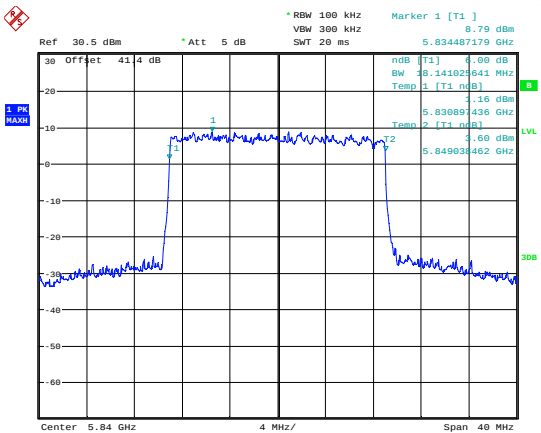
Date: 7.FEB.2018 11:42:07

6 dB Bandwidth 64 QAM; 5735 MHz.



Date: 7.FEB.2018 11:47:42

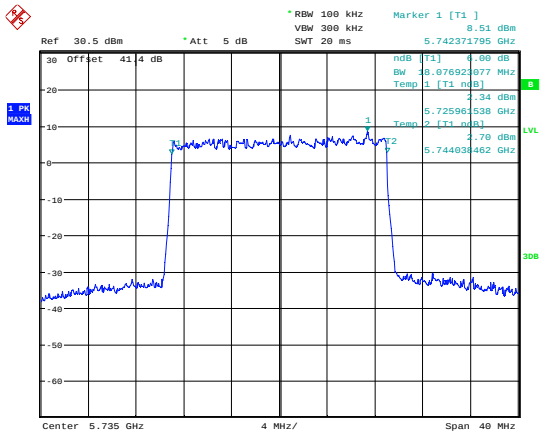
6 dB Bandwidth 64 QAM; 5788 MHz.



Date: 7.FEB.2018 11:59:00

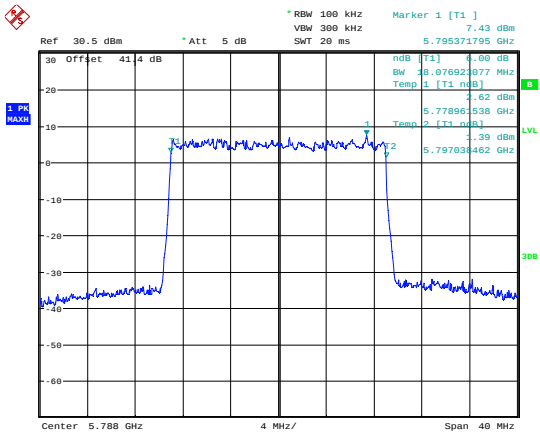
6 dB Bandwidth 64 QAM; 5840 MHz.

Modulation Mode: 64 QAM; 20 MHz				
Frequency (MHz)	FL (MHz)	FH (MHz)	6dB Bandwidth (kHz)	Result
5735	5725.961	5744.038	18077	PASS
5788	5778.961	5797.038	18077	PASS
5840	5830.897	5849.038	18141	PASS



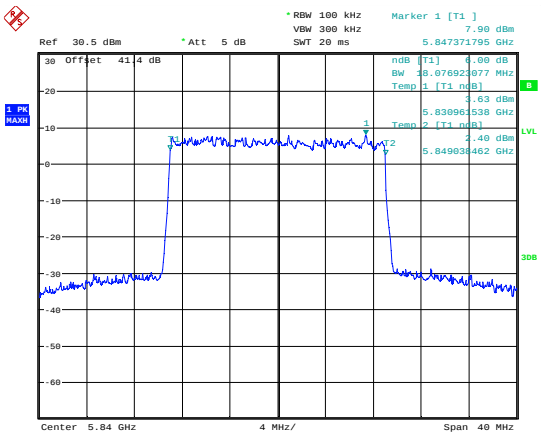
Date: 7.FEB.2018 11:44:03

6 dB Bandwidth 256 QAM; 5735 MHz.



Date: 7.FEB.2018 11:47:05

6 dB Bandwidth 256 QAM; 5788 MHz.

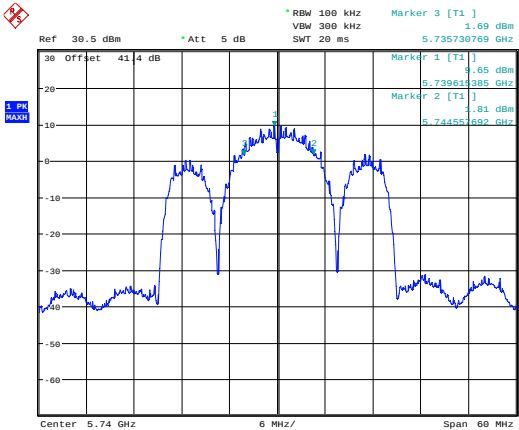


Date: 7.FEB.2018 11:59:35

6 dB Bandwidth 256 QAM; 5840 MHz.

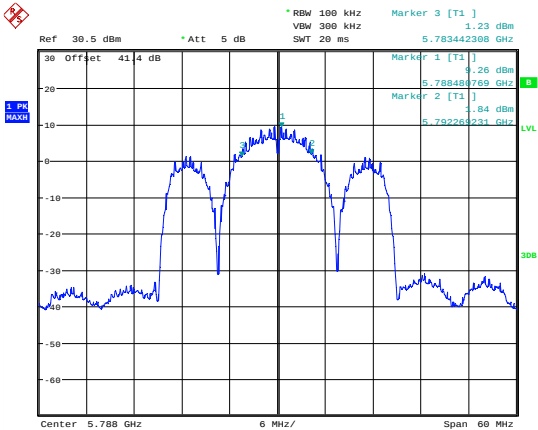
Modulation Mode: 256 QAM; 20 Mhz				
Frequency (MHz)	FL (MHz)	FH (MHz)	6dB Bandwidth (kHz)	Result
5735	5725.961	5744.038	18077	PASS
5788	5778.961	5797.038	18077	PASS
5840	5830.961	5849.038	18077	PASS

30 MHz Bandwidth



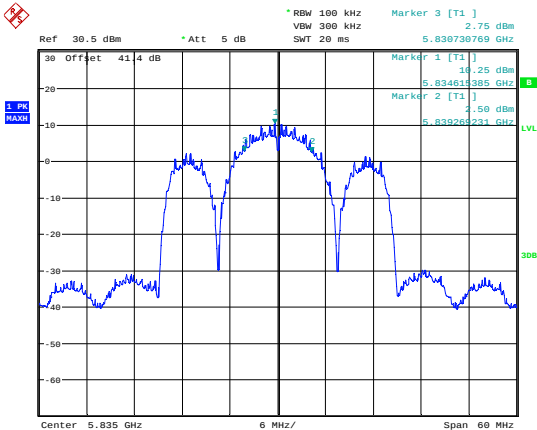
Date: 7.FEB.2018 12:05:11

6 dB Bandwidth AQU; 5740 MHz.



Date: 7.FEB.2018 12:12:06

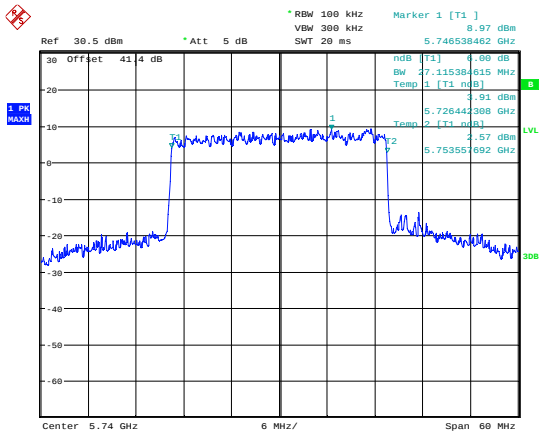
6 dB Bandwidth AQU; 5788 MHz.



Date: 7.FEB.2018 12:20:12

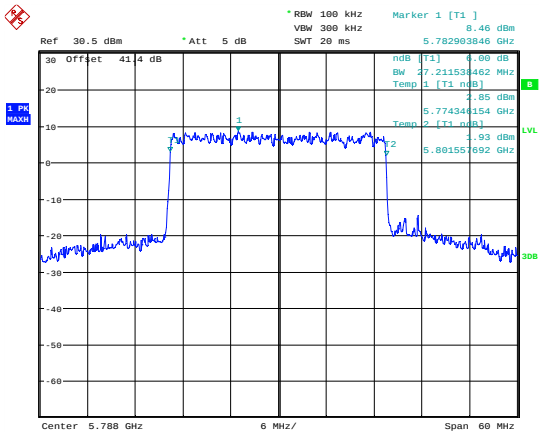
6 dB Bandwidth AQU; 5835 MHz.

Modulation Mode: AQU; 30 MHz				
Frequency (MHz)	FL (MHz)	FH (MHz)	6dB Bandwidth (kHz)	Result
5740	5735.731	5744.558	8827	PASS
5788	5783.442	5792.269	8827	PASS
5835	5830.731	5839.269	8538	PASS



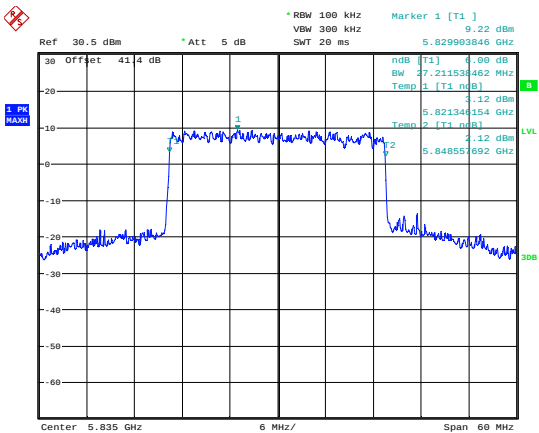
Date: 7.FEB.2018 12:05:39

6 dB Bandwidth BPSK; 5740 MHz.



Date: 7.FEB.2018 12:12:44

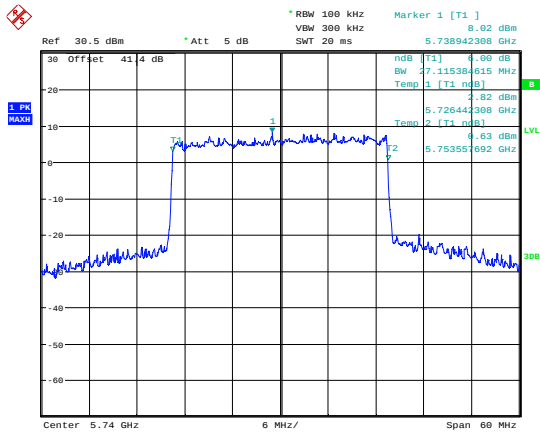
6 dB Bandwidth BPSK; 5788 MHz.



Date: 7.FEB.2018 12:20:43

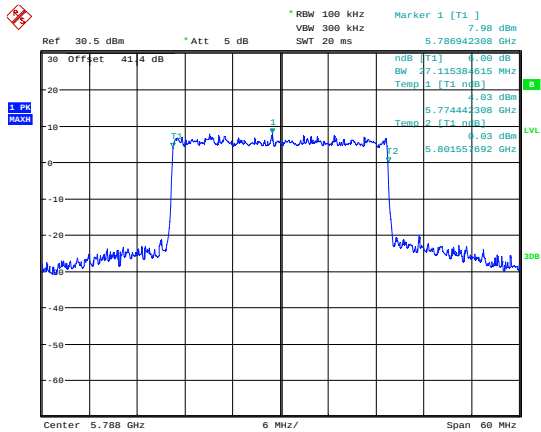
6 dB Bandwidth BPSK; 5835 MHz.

Modulation Mode: BPSK; 30 MHz				
Frequency (MHz)	FL (MHz)	FH (MHz)	6dB Bandwidth (kHz)	Result
5740	5726.442	5753.558	27116	PASS
5788	5774.346	5801.558	27212	PASS
5835	5821.346	5848.558	27212	PASS



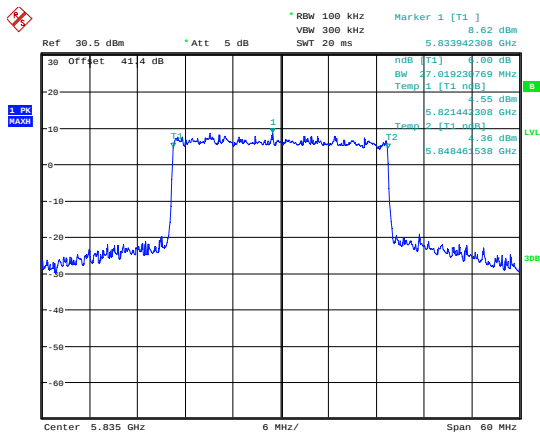
Date: 7.FEB.2018 12:06:40

6 dB Bandwidth QPSK; 5740 MHz.



Date: 7.FEB.2018 12:13:50

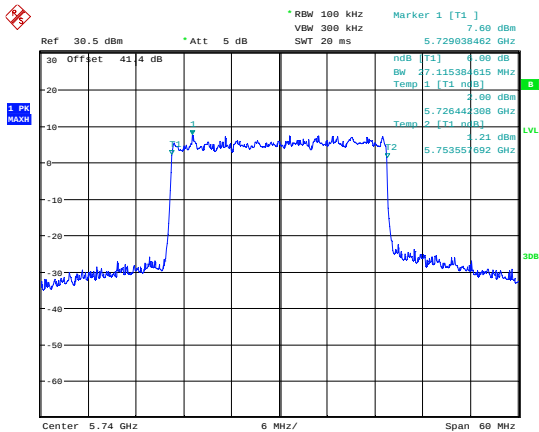
6 dB Bandwidth QPSK; 5788 MHz.



Date: 7.FEB.2018 12:21:43

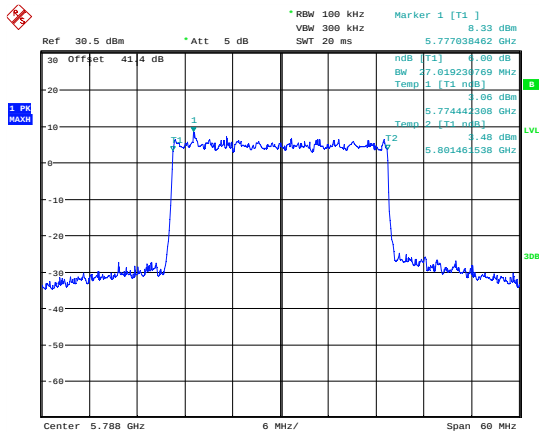
6 dB Bandwidth QPSK; 5835 MHz.

Modulation Mode: QPSK; 30 MHz				
Frequency (MHz)	FL (MHz)	FH (MHz)	6dB Bandwidth (kHz)	Result
5740	5726.442	5753.558	27116	PASS
5788	5774.442	5801.558	27116	PASS
5835	5821.442	5848.461	27019	PASS



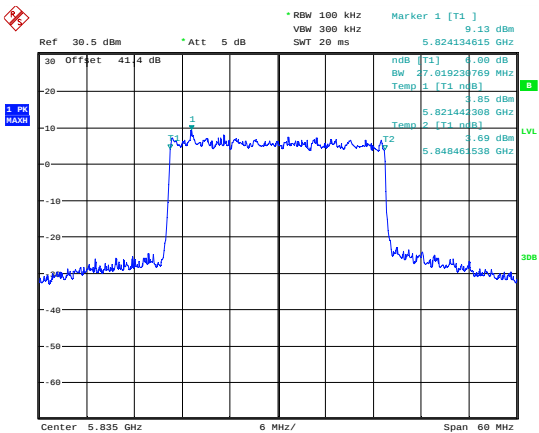
Date: 7.FEB.2018 12:07:18

6 dB Bandwidth 16 QAM; 5740 MHz.



Date: 7.FEB.2018 12:14:28

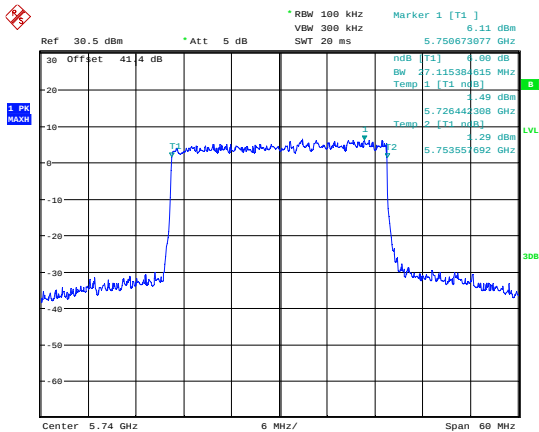
6 dB Bandwidth 16 QAM; 5788 MHz.



Date: 7.FEB.2018 12:22:22

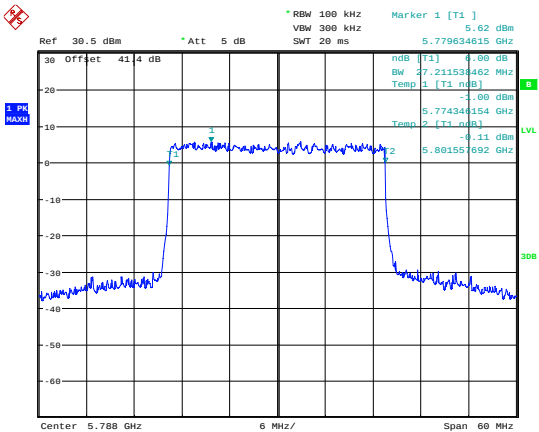
6 dB Bandwidth 16 QAM; 5835 MHz.

Modulation Mode: 16 QAM; 30 MHz				
Frequency (MHz)	FL (MHz)	FH (MHz)	6dB Bandwidth (kHz)	Result
5740	5726.442	5753.558	27116	PASS
5788	5774.442	5801.461	27019	PASS
5835	5821.442	5848.461	27019	PASS



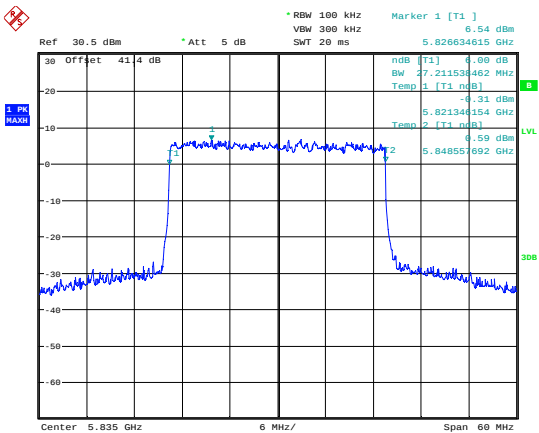
Date: 7.FEB.2018 12:08:22

6 dB Bandwidth 64 QAM; 5740 MHz.



Date: 7.FEB.2018 12:15:35

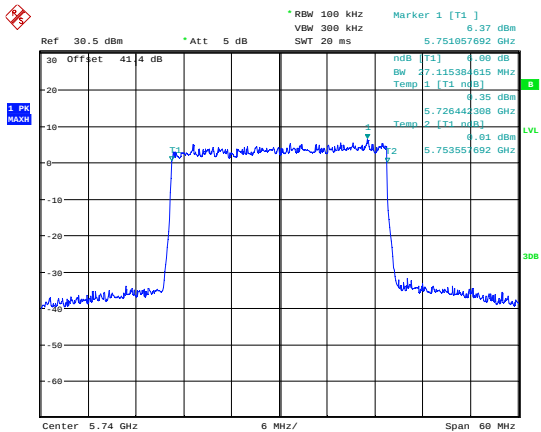
6 dB Bandwidth 64 QAM; 5788 MHz.



Date: 7.FEB.2018 12:23:26

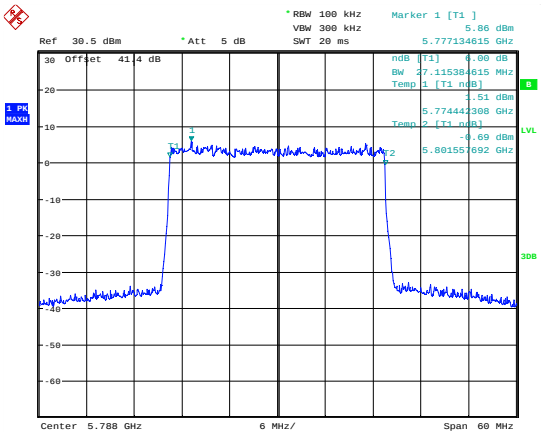
6 dB Bandwidth 64 QAM; 5835 MHz.

Modulation Mode: 64 QAM; 30 MHz				
Frequency (MHz)	FL (MHz)	FH (MHz)	6dB Bandwidth (kHz)	Result
5740	5726.442	5753.558	27116	PASS
5788	5774.346	5801.557	27212	PASS
5835	5821.346	5848.558	27212	PASS



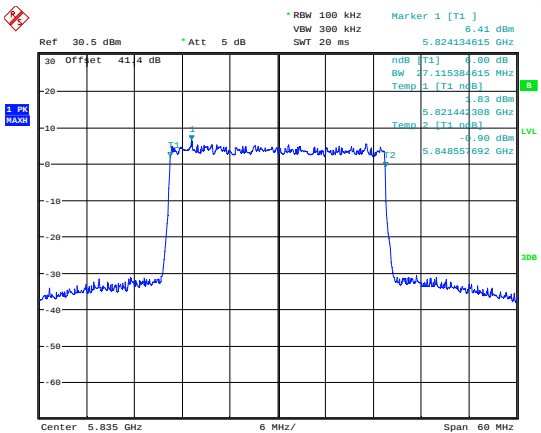
Date: 7.FEB.2018 12:08:53

6 dB Bandwidth 256 QAM; 5740 MHz.



Date: 7.FEB.2018 12:16:11

6 dB Bandwidth 256 QAM; 5788 MHz.

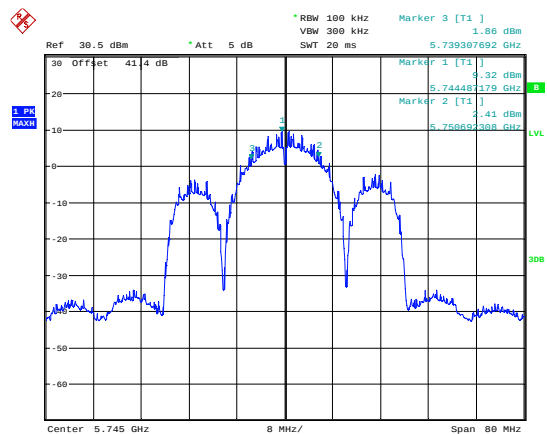


Date: 7.FEB.2018 12:23:59

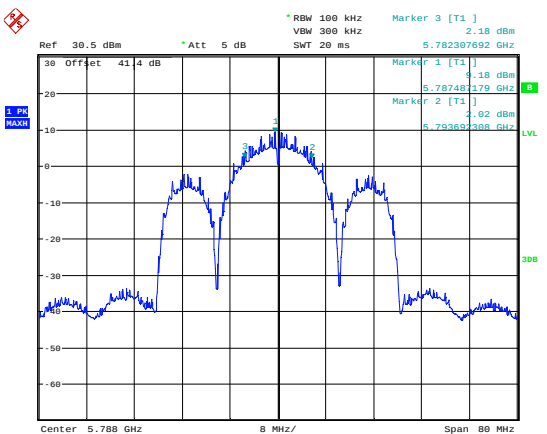
6 dB Bandwidth 256 QAM; 5835 MHz.

Modulation Mode: 256 QAM; 30 MHz				
Frequency (MHz)	FL (MHz)	FH (MHz)	6dB Bandwidth (kHz)	Result
5740	5726.442	5753.558	27116	PASS
5788	5774.442	5801.558	27116	PASS
5835	5821.442	5848.558	27116	PASS

40 MHz Bandwidth



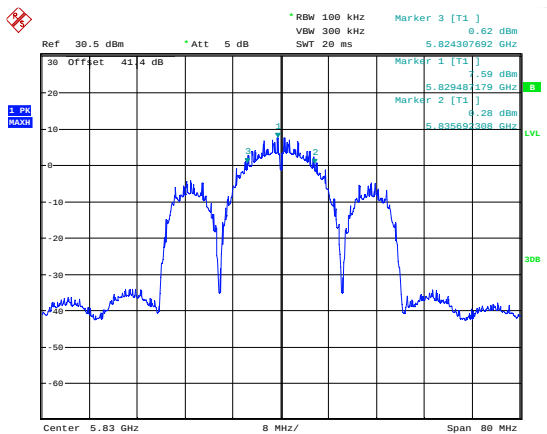
Date: 7.FEB.2018 12:37:48



Date: 7.FEB.2018 12:54:19

6 dB Bandwidth AQU; 5745 MHz.

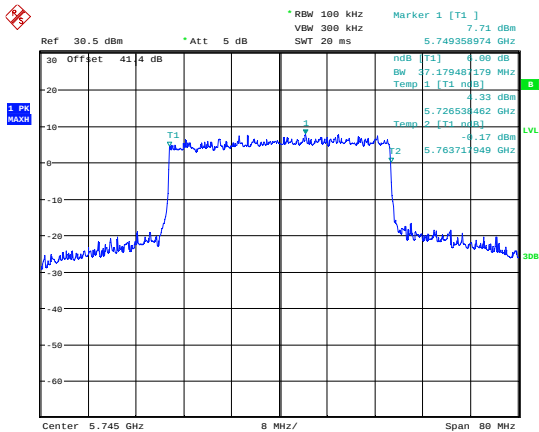
6 dB Bandwidth AQU; 5788 MHz.



Date: 7.FEB.2018 13:06:38

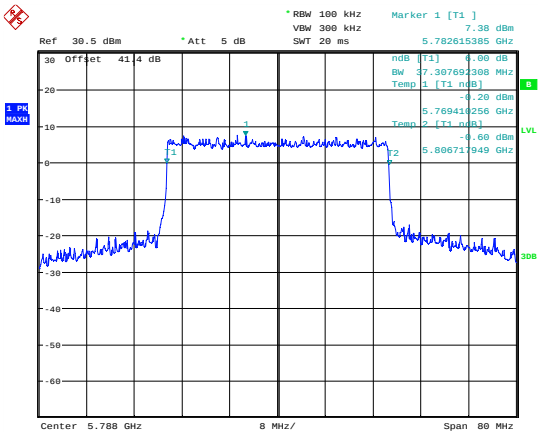
6 dB Bandwidth AQU; 5830 MHz.

Modulation Mode: AQU; 40 MHz				
Frequency (MHz)	FL (MHz)	FH (MHz)	6dB Bandwidth (kHz)	Result
5745	5739.308	5750.692	11384	PASS
5788	5782.308	5793.692	11384	PASS
5830	5824.308	5835.692	11384	PASS



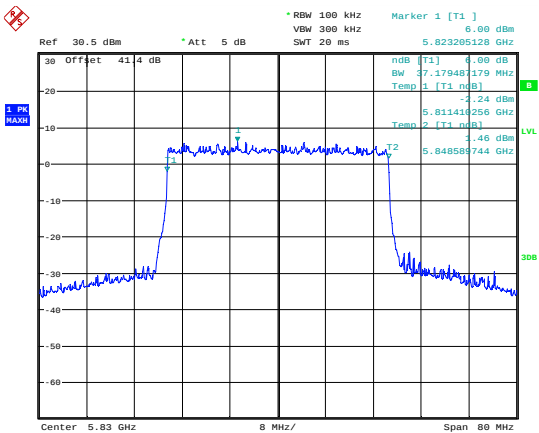
Date: 7.FEB.2018 12:46:38

6 dB Bandwidth BPSK; 5745 MHz.



Date: 7.FEB.2018 12:54:59

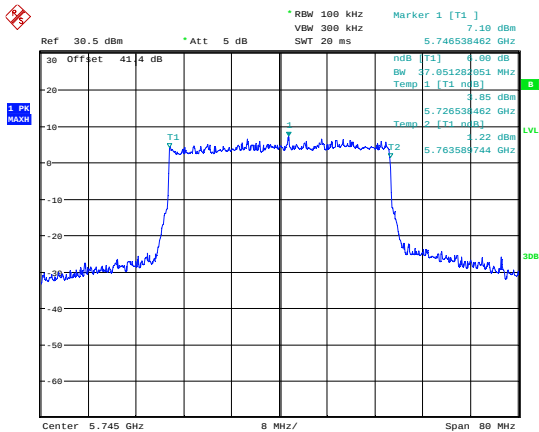
6 dB Bandwidth BPSK; 5788 MHz.



Date: 7.FEB.2018 13:07:12

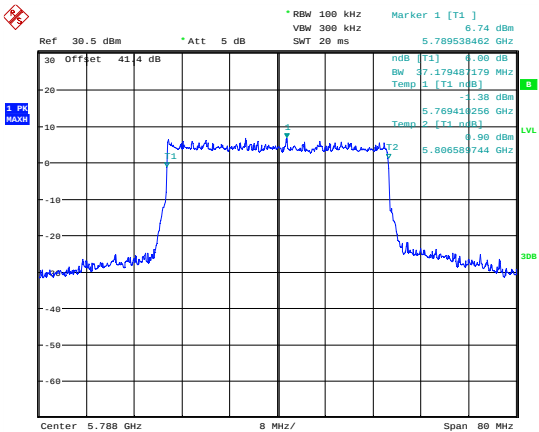
6 dB Bandwidth BPSK; 5830 MHz.

Modulation Mode: BPSK; 40 MHz				
Frequency (MHz)	FL (MHz)	FH (MHz)	6dB Bandwidth (kHz)	Result
5745	5726.538	5763.718	37180	PASS
5788	5769.41	5806.718	37308	PASS
5830	5811.41	5848.589	37179	PASS



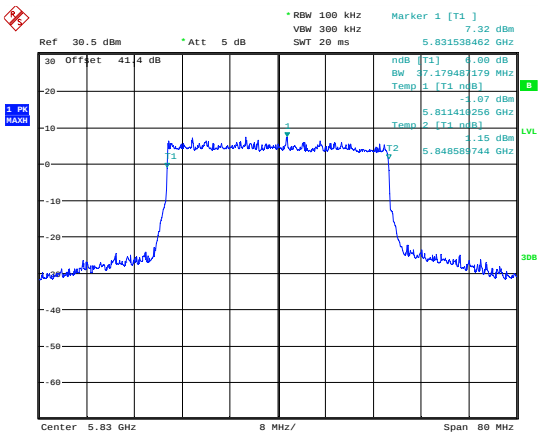
Date: 7.FEB.2018 12:48:49

6 dB Bandwidth QPSK; 5745 MHz.



Date: 7.FEB.2018 12:58:14

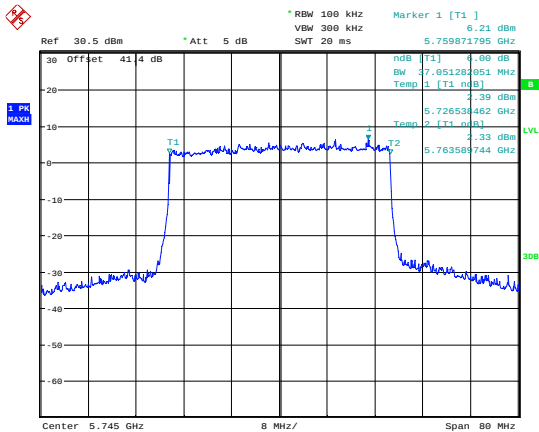
6 dB Bandwidth QPSK; 5788 MHz.



Date: 7.FEB.2018 13:08:35

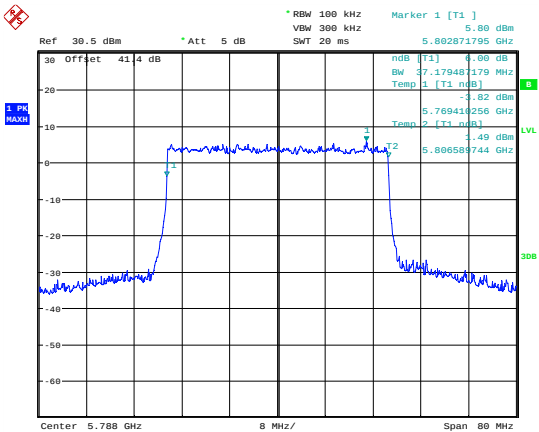
6 dB Bandwidth QPSK; 5830 MHz.

Modulation Mode: QPSK; 40 MHz				
Frequency (MHz)	FL (MHz)	FH (MHz)	6dB Bandwidth (kHz)	Result
5745	5726.538	5763.589	37051	PASS
5788	5769.41	5806.59	37180	PASS
5830	5811.41	5848.59	37180	PASS



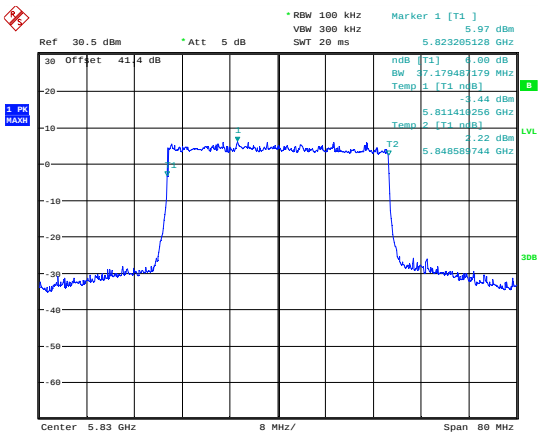
Date: 7.FEB.2018 12:49:54

6 dB Bandwidth 16 QAM; 5745 MHz.



Date: 7.FEB.2018 12:58:46

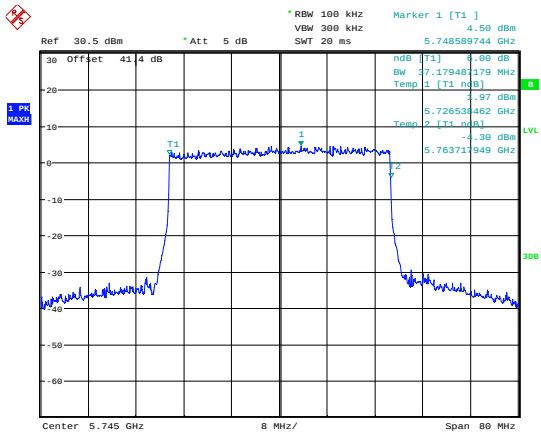
6 dB Bandwidth 16 QAM; 5788 MHz.



Date: 7.FEB.2018 13:09:26

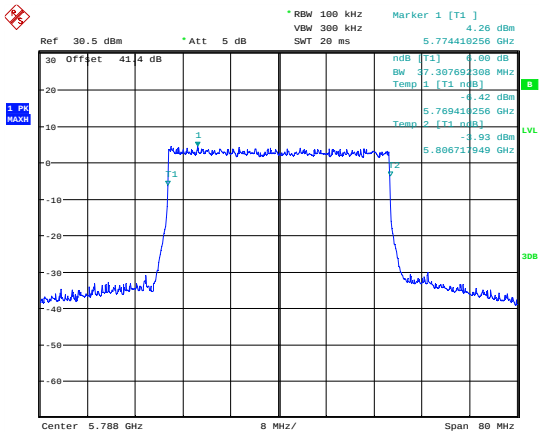
6 dB Bandwidth 16 QAM; 5830 MHz.

Modulation Mode: 16 QAM; 40 MHz				
Frequency (MHz)	FL (MHz)	FH (MHz)	6dB Bandwidth (kHz)	Result
5745	5726.538	5763.59	37052	PASS
5788	5769.41	5806.59	37180	PASS
5830	5811.41	5848.59	37180	PASS



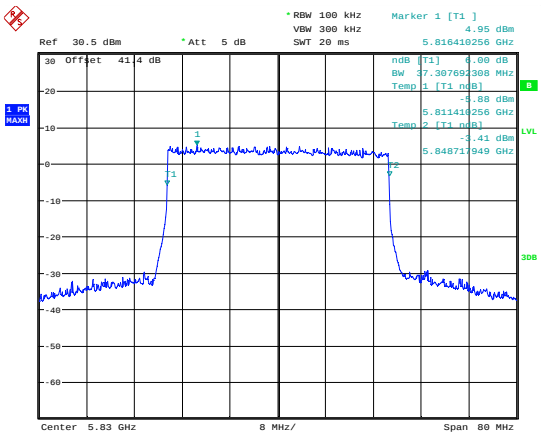
Date: 7.FEB.2018 12:51:18

6 dB Bandwidth 64 QAM; 5745 MHz.



Date: 7.FEB.2018 13:01:48

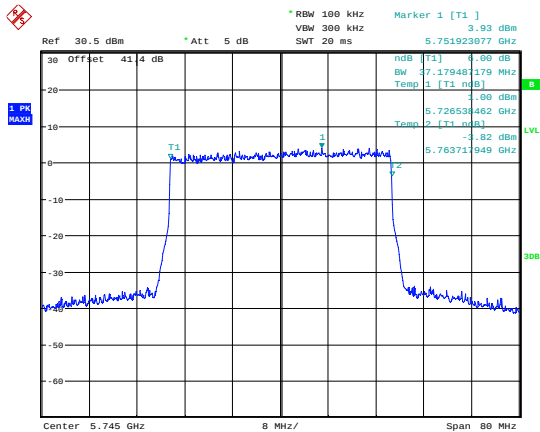
6 dB Bandwidth 64 QAM; 5788 MHz.



Date: 7.FEB.2018 13:11:43

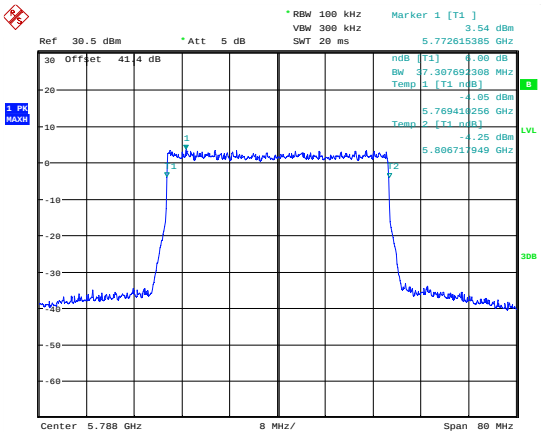
6 dB Bandwidth 64 QAM; 5830 MHz.

Modulation Mode: 64 QAM; 40 MHz				
Frequency (MHz)	FL (MHz)	FH (MHz)	6dB Bandwidth (kHz)	Result
5745	5726.538	5763.718	37180	PASS
5788	5769.41	5806.718	37308	PASS
5830	5811.41	5848.718	37308	PASS



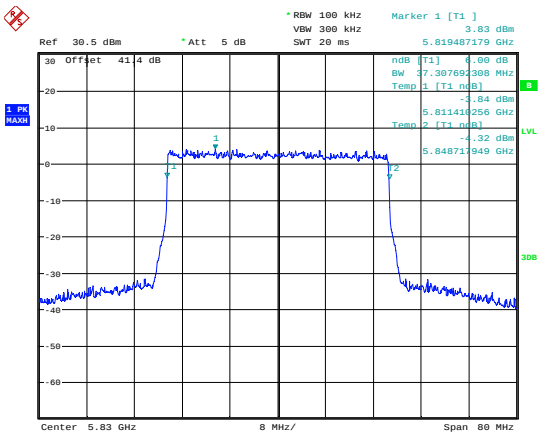
Date: 7.FEB.2018 12:51:49

6 dB Bandwidth 256 QAM; 5745 MHz.



Date: 7.FEB.2018 13:02:32

6 dB Bandwidth 256 QAM; 5788 MHz.

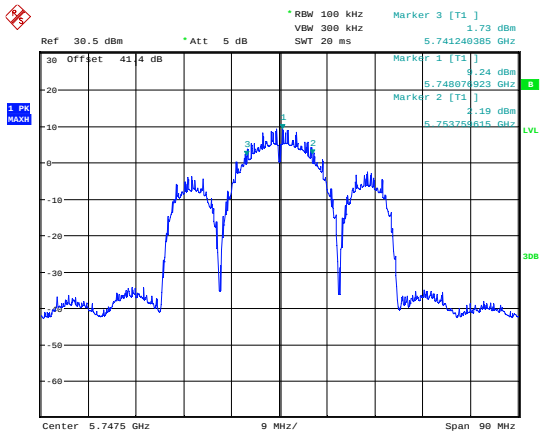


Date: 7.FEB.2018 13:12:14

6 dB Bandwidth 256 QAM; 5830 MHz.

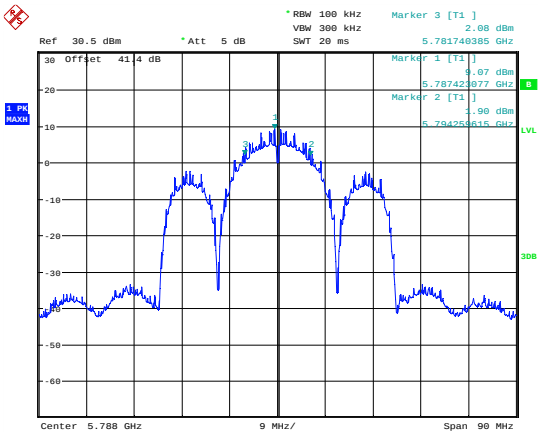
Modulation Mode: 256 QAM; 40 MHz				
Frequency (MHz)	FL (MHz)	FH (MHz)	6dB Bandwidth (kHz)	Result
5745	5726.538	5763.718	37180	PASS
5788	5769.41	5806.718	37308	PASS
5830	5811.41	5848.718	37308	PASS

45 MHz Bandwidth



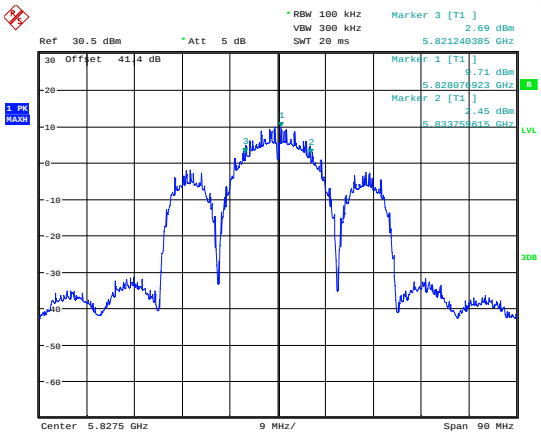
Date: 7.FEB.2018 13:16:20

6 dB Bandwidth AQU; 5747.5 MHz.



Date: 7.FEB.2018 13:22:46

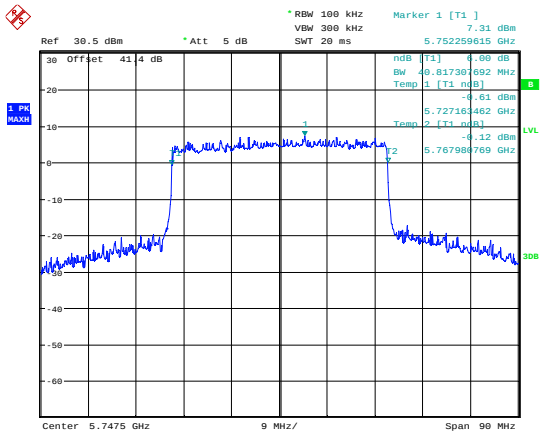
6 dB Bandwidth AQU; 5788 MHz.



Date: 7.FEB.2018 13:31:22

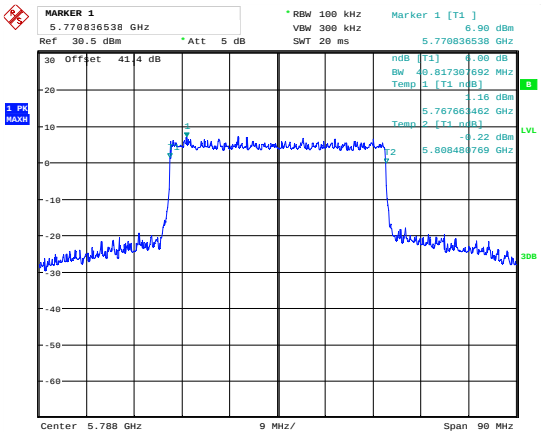
6 dB Bandwidth AQU; 5827.5 MHz.

Modulation Mode: AQU; 45 MHz				
Frequency (MHz)	FL (MHz)	FH (MHz)	6dB Bandwidth (kHz)	Result
5747.5	5741.24	5753.76	12520	PASS
5788	5781.74	5794.26	12520	PASS
5827.5	5821.24	5833.76	12520	PASS



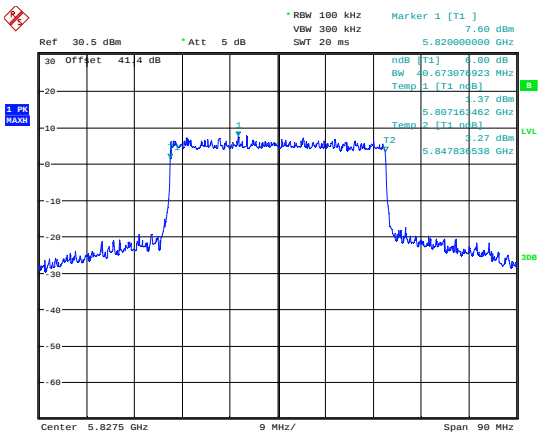
Date: 7.FEB.2018 13:16:50

6 dB Bandwidth BPSK; 5747.5 MHz.



Date: 7.FEB.2018 13:23:14

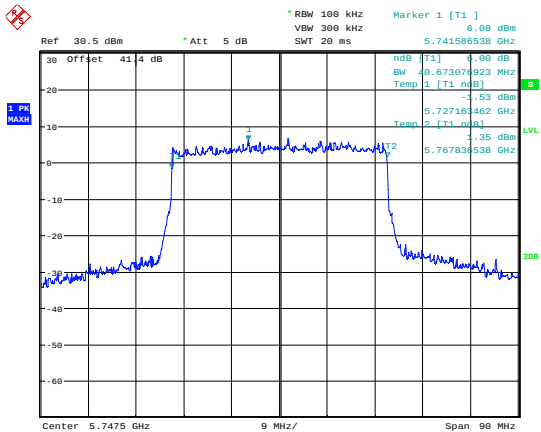
6 dB Bandwidth BPSK; 5788 MHz.



Date: 7.FEB.2018 13:32:00

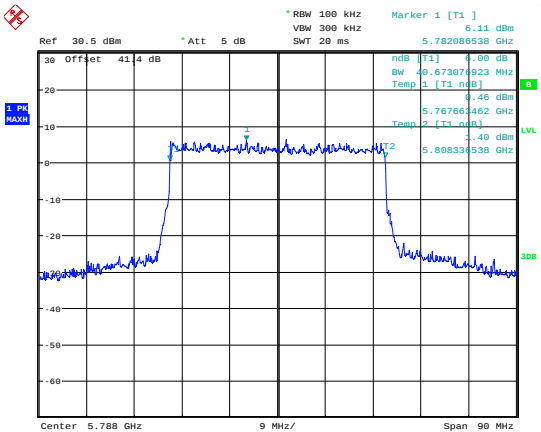
6 dB Bandwidth BPSK; 5827.5 MHz.

Modulation Mode: BPSK; 45 MHz				
Frequency (MHz)	FL (MHz)	FH (MHz)	6dB Bandwidth (kHz)	Result
5747.5	5727.163	5767.981	40818	PASS
5788	5767.663	5808.481	40818	PASS
5827.5	5807.163	5847.836	40673	PASS



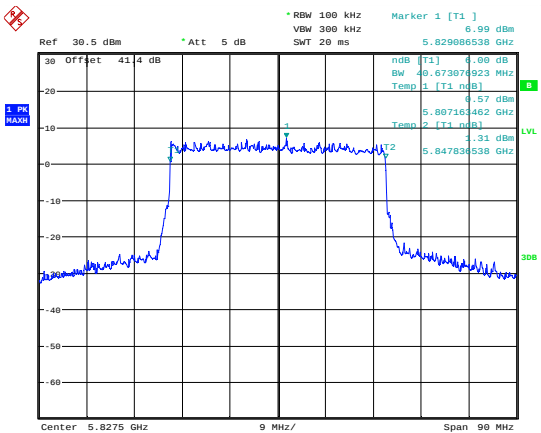
Date: 7.FEB.2018 13:18:46

6 dB Bandwidth QPSK; 5747.5 MHz.



Date: 7.FEB.2018 13:24:31

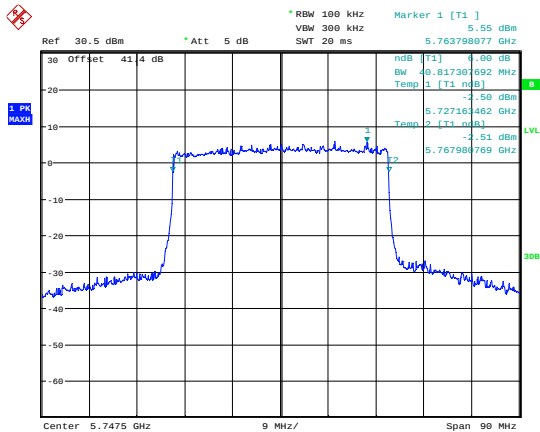
6 dB Bandwidth QPSK; 5788 MHz.



Date: 7.FEB.2018 13:33:17

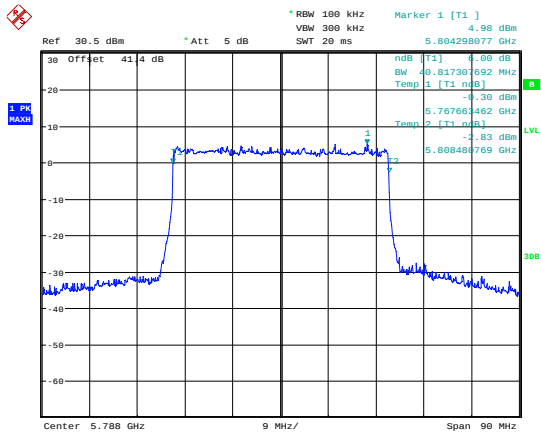
6 dB Bandwidth QPSK; 5827.5 MHz.

Modulation Mode: QPSK; 45 MHz				
Frequency (MHz)	FL (MHz)	FH (MHz)	6dB Bandwidth (kHz)	Result
5747.5	5727.163	5767.836	40673	PASS
5788	5767.663	5808.336	40673	PASS
5827.5	5807.163	5847.836	40673	PASS



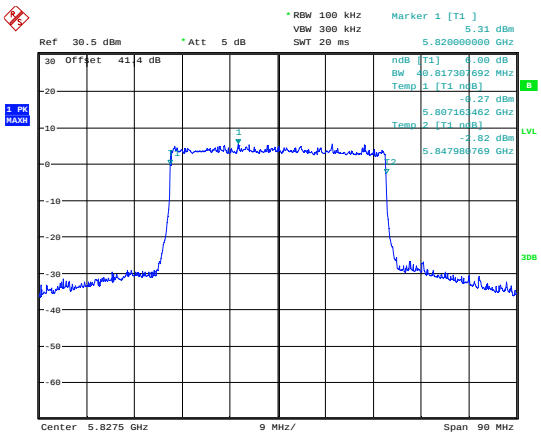
Date: 7.FEB.2018 13:19:17

6 dB Bandwidth 16 QAM; 5747.5 MHz.



Date: 7.FEB.2018 13:26:19

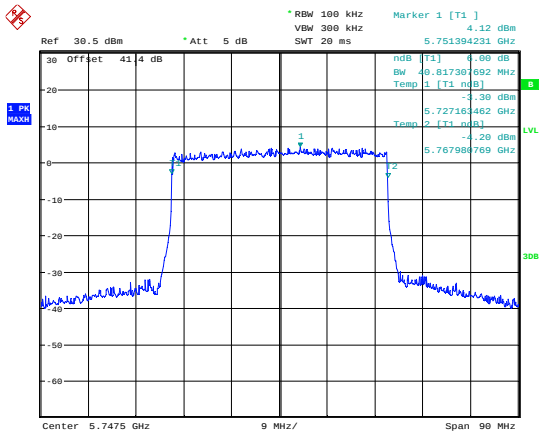
6 dB Bandwidth 16 QAM; 5788 MHz.



Date: 7.FEB.2018 13:34:01

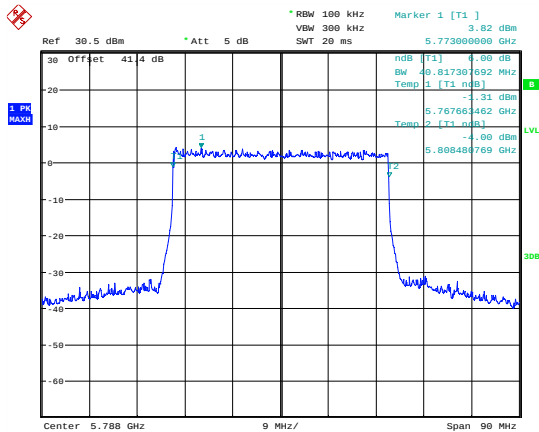
6 dB Bandwidth 16 QAM; 5827.5 MHz.

Modulation Mode: 16 QAM; 45 MHz				
Frequency (MHz)	FL (MHz)	FH (MHz)	6dB Bandwidth (kHz)	Result
5747.5	5727.163	5767.981	40818	PASS
5788	5767.663	5808.481	40818	PASS
5827.5	5807.163	5847.981	40818	PASS



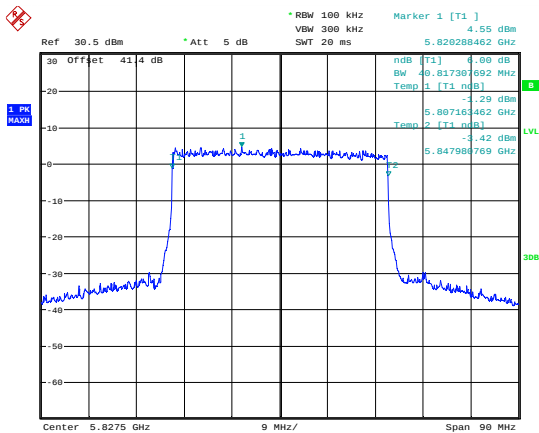
Date: 7.FEB.2018 13:20:16

6 dB Bandwidth 64 QAM; 5747.5 MHz.



Date: 7.FEB.2018 13:27:46

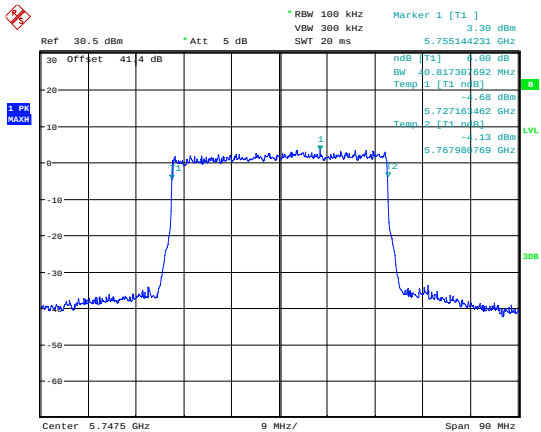
6 dB Bandwidth 64 QAM; 5788 MHz.



Date: 7.FEB.2018 13:35:10

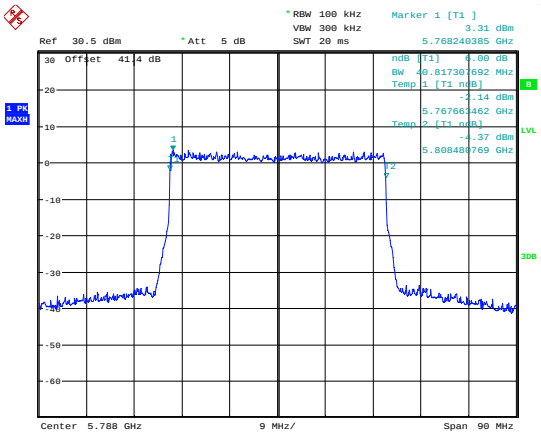
6 dB Bandwidth 64 QAM; 5827.5 MHz.

Modulation Mode: 64 QAM; 45 MHz				
Frequency (MHz)	FL (MHz)	FH (MHz)	6dB Bandwidth (kHz)	Result
5747.5	5727.163	5767.981	40818	PASS
5788	5767.663	5808.481	40818	PASS
5827.5	5807.163	5847.981	40818	PASS



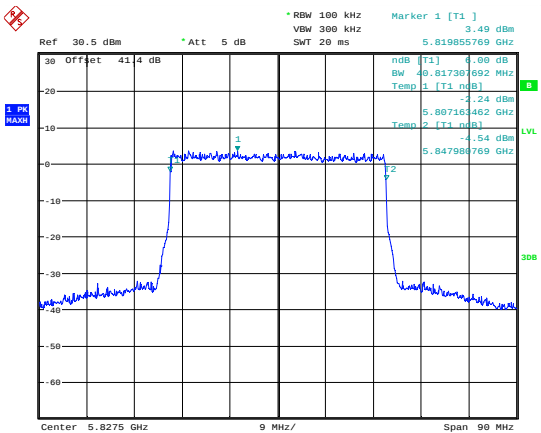
Date: 7.FEB.2018 13:20:42

6 dB Bandwidth 256 QAM; 5747.5 MHz.



Date: 7.FEB.2018 13:28:17

6 dB Bandwidth 256 QAM; 5788 MHz.



Date: 7.FEB.2018 13:35:46

6 dB Bandwidth 256 QAM; 5827.5 MHz.

Modulation Mode: 256 QAM; 45 MHz				
Frequency (MHz)	FL (MHz)	FH (MHz)	6dB Bandwidth (kHz)	Result
5747.5	5727.163	5767.981	40818	PASS
5788	5767.663	5808.481	40818	PASS
5827.5	5807.163	5847.981	40818	PASS

14 Maximum conducted output power

14.1 Definition

The maximum conducted output power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level.

14.2 Test Parameters

Test Location:	Element Skelmersdale
Test Chamber:	Radio Laboratory
Test Standard and Clause:	ANSI C63.10-2013, Clause 12.3
EUT Channels Measured:	Bottom, Middle and Top
EUT Occupied Bandwidths:	5, 10, 15, 20, 30, 40 and 45 MHz
EUT Duty Cycle:	100 %
Deviations From Standard:	None
Measurement Detector:	RMS
Voltage Extreme Environment Test Range:	-48 Vdc (as declared)

Environmental Conditions (Normal Environment)

Temperature: 24 °C	+15 °C to +35 °C (as declared)
Humidity: 32 %RH	20%RH to 75%RH (as declared)

Test Limits

For an access point operating in the band 5.15–5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W.

For mobile and portable client devices in the 5.15–5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW.

For the 5.25–5.35 GHz and 5.47–5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in megahertz.

For the band 5.725–5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W.

If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Fixed point-to-point U-NII devices operating in the band 5.725-5.85 GHz may employ antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power.

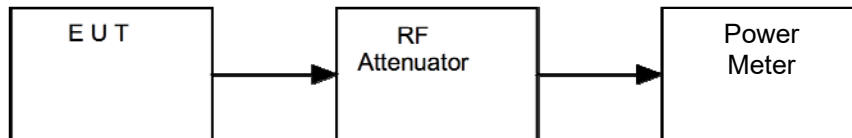
Fixed point-to-point U-NII devices operating in other bands may employ antennas with directional gain up to 23dBi without any corresponding reduction in the maximum conducted output power or maximum power spectral density. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power and maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi.

14.3 Test Method

The EUT was setup as per section 9 of this report and, as per Figure iv, the analyser was used to measure each antenna output in turn, having taken account of all path losses. The resolution bandwidth of the spectrum analyser was set between 1 and 5 % of the EUT occupied bandwidth and the analyser band power function used to calculate the average power. The results were summed as in the tables below.

The measurements were performed with EUT set at its maximum duty. All modulation schemes, data rates and power settings were used to observe the worst case configuration in each bandwidth.

Figure iv Test Setup



Note: The test was performed with two wide band power meter working simultaneously giving the end result of the as combined output power.

14.4 Test Equipment

<i>Equipment Description</i>	<i>Manufacturer</i>	<i>Equipment Type</i>	<i>Element No</i>	<i>Last Cal Calibration</i>	<i>Calibration Period</i>	<i>Due For Calibration</i>
Power Meter	Dare	RPR3006W	REF2223	2017-09-24	12	2018-09-24
Power Meter	Dare	RPR3006W	REF2083	2017-11-17	12	2018-11-17

14.5 Test Results

Maximum allowed output power into the antenna connector (dBm)						
Mod modes Antennas	AQU	BPSK	QPSK	16 QAM	64 QAM	256 QAM
sector antenna	19	19	19	19	19	19
4-foot Parabolic	27	27	26	25	24	23
6-foot Parabolic (Extrapolation only)	23.9	23.9	22.9	21.9	20.9	19.9
Flat Plate	27	27	26	25	24	23
Omnidirectional	23	23	23	23	23	23

Note 1: This device is professionally installed.

Note 2: Only the highest output power was measured.

Note 3: Different antenna systems can be installed therefore the output power must be adjusted accordingly in order to meet requirement of the different operation modes (i.e. point to point, point to multipoint...) also the power may be reduce in order to comply with other requirements on this report.

5 MHz Bandwidth; Highest output power settings					
Power Setting	Frequency (MHz)	Modulation	Total Combined Power (dBm)	Limit (dBm)	Result
27	5727.5	AQU	26.6	30	PASS
27	5727.5	BPSK	27.1	30	PASS
26	5727.5	QPSK	26.3	30	PASS
25	5727.5	16 QAM	25.3	30	PASS
24	5727.5	64 QAM	24.4	30	PASS
23	5727.5	256 QAM	23.3	30	PASS

5 MHz Bandwidth; Highest output power settings					
Power Setting	Frequency (MHz)	Modulation	Total Combined Power (dBm)	Limit (dBm)	Result
27	5788	AQU	25.9	30	PASS
27	5788	BPSK	26.3	30	PASS
26	5788	QPSK	25.3	30	PASS
25	5788	16 QAM	24.3	30	PASS
24	5788	64 QAM	23.4	30	PASS
23	5788	256 QAM	22.6	30	PASS

5 MHz Bandwidth; Highest output power settings					
Power Setting(dBm)	Frequency (MHz)	Modulation	Total Combined Power (dBm)	Limit (dBm)	Result
27	5847.5	AQU	26.6	30	PASS
27	5847.5	BPSK	27.0	30	PASS
26	5847.5	QPSK	26.3	30	PASS
25	5847.5	16 QAM	25.3	30	PASS
24	5847.5	64 QAM	24.2	30	PASS
23	5847.5	256 QAM	23.2	30	PASS

10 MHz Bandwidth; Highest output power settings					
Power Setting	Frequency (MHz)	Modulation	Total Combined Power (dBm)	Limit (dBm)	Result
27	5730	AQU	26.5	30	PASS
27	5730	BPSK	26.9	30	PASS
26	5730	QPSK	26.0	30	PASS
25	5730	16 QAM	25.0	30	PASS
24	5730	64 QAM	24.1	30	PASS
23	5730	256 QAM	23.1	30	PASS

10 MHz Bandwidth; Highest output power settings					
Power Setting	Frequency (MHz)	Modulation	Total Combined Power (dBm)	Limit (dBm)	Result
27	5788	AQU	25.8	30	PASS
27	5788	BPSK	26.4	30	PASS
26	5788	QPSK	25.4	30	PASS
25	5788	16 QAM	24.3	30	PASS
24	5788	64 QAM	23.4	30	PASS
23	5788	256 QAM	22.4	30	PASS

10 MHz Bandwidth; Highest output power settings					
Power Setting(dBm)	Frequency (MHz)	Modulation	Total Combined Power (dBm)	Limit (dBm)	Result
27	5845	AQU	26.4	30	PASS
27	5845	BPSK	27.1	30	PASS
26	5845	QPSK	26.3	30	PASS
25	5845	16 QAM	25.3	30	PASS
24	5845	64 QAM	24.4	30	PASS
23	5845	256 QAM	23.2	30	PASS

15 MHz Bandwidth; Highest output power settings					
Power Setting	Frequency (MHz)	Modulation	Total Combined Power (dBm)	Limit (dBm)	Result
27	5732.5	AQU	26.5	30	PASS
27	5732.5	BPSK	26.9	30	PASS
26	5732.5	QPSK	26.0	30	PASS
25	5732.5	16 QAM	25.1	30	PASS
24	5732.5	64 QAM	24.0	30	PASS
23	5732.5	256 QAM	23.1	30	PASS

15 MHz Bandwidth; Highest output power settings					
Power Setting	Frequency (MHz)	Modulation	Total Combined Power (dBm)	Limit (dBm)	Result
27	5788	AQU	25.9	30	PASS
27	5788	BPSK	26.4	30	PASS
26	5788	QPSK	25.5	30	PASS
25	5788	16 QAM	24.3	30	PASS
24	5788	64 QAM	23.4	30	PASS
23	5788	256 QAM	22.4	30	PASS

15 MHz Bandwidth; Highest output power settings					
Power Setting(dBm)	Frequency (MHz)	Modulation	Total Combined Power (dBm)	Limit (dBm)	Result
27	5842.5	AQU	26.6	30	PASS
27	5842.5	BPSK	27.2	30	PASS
26	5842.5	QPSK	26.4	30	PASS
25	5842.5	16 QAM	25.4	30	PASS
24	5842.5	64 QAM	24.4	30	PASS
23	5842.5	256 QAM	23.3	30	PASS

20 MHz Bandwidth; Highest output power settings					
Power Setting	Frequency (MHz)	Modulation	Total Combined Power (dBm)	Limit (dBm)	Result
27	5735	AQU	26.1	30	PASS
27	5735	BPSK	26.9	30	PASS
26	5735	QPSK	26.0	30	PASS
25	5735	16 QAM	24.8	30	PASS
24	5735	64 QAM	23.9	30	PASS
23	5735	256 QAM	22.9	30	PASS

20 MHz Bandwidth; Highest output power settings					
Power Setting	Frequency (MHz)	Modulation	Total Combined Power (dBm)	Limit (dBm)	Result
27	5788	AQU	25.6	30	PASS
27	5788	BPSK	26.2	30	PASS
26	5788	QPSK	25.4	30	PASS
25	5788	16 QAM	24.3	30	PASS
24	5788	64 QAM	23.4	30	PASS
23	5788	256 QAM	22.5	30	PASS

20 MHz Bandwidth; Highest output power settings					
Power Setting(dBm)	Frequency (MHz)	Modulation	Total Combined Power (dBm)	Limit (dBm)	Result
27	5840	AQU	26.5	30	PASS
27	5840	BPSK	27.5	30	PASS
26	5840	QPSK	26.6	30	PASS
25	5840	16 QAM	25.2	30	PASS
24	5840	64 QAM	24.3	30	PASS
23	5840	256 QAM	23.2	30	PASS

30 MHz Bandwidth; Highest output power settings					
Power Setting	Frequency (MHz)	Modulation	Total Combined Power (dBm)	Limit (dBm)	Result
27	5740	AQU	26.0	30	PASS
27	5740	BPSK	26.7	30	PASS
26	5740	QPSK	25.5	30	PASS
25	5740	16 QAM	24.7	30	PASS
24	5740	64 QAM	23.7	30	PASS
23	5740	256 QAM	22.7	30	PASS

30 MHz Bandwidth; Highest output power settings					
Power Setting	Frequency (MHz)	Modulation	Total Combined Power (dBm)	Limit (dBm)	Result
27	5788	AQU	25.7	30	PASS
27	5788	BPSK	26.3	30	PASS
26	5788	QPSK	25.4	30	PASS
25	5788	16 QAM	24.4	30	PASS
24	5788	64 QAM	23.3	30	PASS
23	5788	256 QAM	22.3	30	PASS

30 MHz Bandwidth; Highest output power settings					
Power Setting(dBm)	Frequency (MHz)	Modulation	Total Combined Power (dBm)	Limit (dBm)	Result
27	5835	AQU	26.4	30	PASS
27	5835	BPSK	27.5	30	PASS
26	5835	QPSK	26.7	30	PASS
25	5835	16 QAM	25.1	30	PASS
24	5835	64 QAM	24.3	30	PASS
23	5835	256 QAM	23.2	30	PASS