Company: RADWIN Ltd.

Test of: RADWIN JET DUO

To: FCC Part 15 Subpart E 15.407

Report No.: RDWN50-U3 Rev B (non-DFS Bands)

TEST REPORT

COMBINED TEST REPORT

FROM

Test of: RADWIN JET DUO

To: FCC CFR 47 Part 15 Subpart E 15.407

Test Report Serial No.: RDWN50-U3 Rev B (non-DFS Bands)

This report supersedes: NONE

Applicant:	RADWIN Ltd. 27 Habarzel Street Tel Aviv 69710 Israel
Product Function:	Dual Band 3.x and 5.x GHz Base Station Outdoor Radio with Beamforming Antenna
Issue Date:	26th February 2018

This Test Report is Issued Under the Authority of:

MiCOM Labs, Inc.
575 Boulder Court
Pleasanton California 94566
USA
Phone: +1 (925) 462-0304
Fax: +1 (925) 462-0306
www.micomlabs.com

TESTING CERT #2381.01

MiCOM Labs is an ISO 17025 Accredited Testing Laboratory

Table of Contents

1. ACCREDITATION, LISTINGS & RECOGNITION

1.1. ESTING ACCREDITATION

MiCOM Labs, Inc. is an accredited Electrical testing laboratory per the international standard ISO/IEC 17025:2005. The company is accredited by the American Association for Laboratory Accreditation (A2LA) www.a2la.org test laboratory number 2381.01. MiCOM Labs test schedule is available at the following URL; http://www.a2la.org/scopepdf/2381-01.pdf

ilac-MRA A2LA

Accredited Laboratory

A2LA has accredited

MICOM LABS

Pleasanton, CA

for technical competence in the field of

Electrical Testing

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005 *General requirements for the competence of testing and calibration laboratories*. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (*refer to joint ISO-ILAC-IAF Communiqué dated 8 January 2009*).

A2LA

Presented this 4th day of February 2016.

President and CEO
For the Accreditation Council
Certificate Number 2381.01
Valid to February 28, 2018
Revised January 26, 2018

For the tests to which this accreditation applies, please refer to the laboratory's Electrical Scope of Accreditation.

1.2. RECOGNITION

MiCOM Labs, Inc has widely recognized wireless testing capabilities. Our international recognition includes Conformity Assessment Body designation by APEC MRA countries. MiCOM Labs test reports are accepted globally.

Country	Recognition Body	Status	Phase	Identification No.
USA	Federal Communications Commission (FCC)	TCB	-	US0159 Listing #: 102167
Canada	Industry Canada (IC)	FCB	APEC MRA 2	US0159 Listing #: 4143A-2 4143A-3
Japan	MIC (Ministry of Internal Affairs and Communication)	CAB	APEC MRA 2	RCB 210
	VCCI	--	--	A-0012
Europe	European Commission	NB	EU MRA	NB 2280
Australia	Australian Communications and Media Authority (ACMA)	CAB	APEC MRA 1	US0159
Hong Kong	Office of the Telecommunication Authority (OFTA)	CAB	APEC MRA 1	
Korea	Ministry of Information and Communication Radio Research Laboratory (RRL)	CAB	APEC MRA 1	
Singapore	Infocomm Development Authority (IDA)	CAB	APEC MRA 1	
Taiwan	National Communications Commission (NCC) Bureau of Standards, Metrology and Inspection (BSMI)	CAB	APEC MRA 1	
Vietnam	Ministry of Communication (MIC)	CAB	APEC MRA 1	

EU MRA – European Union Mutual Recognition Agreement.
NB – Notified Body
APEC MRA – Asia Pacific Economic Community Mutual Recognition Agreement. Recognition agreement under which test lab is accredited to regulatory standards of the APEC member countries.

Phase I - recognition for product testing
Phase II – recognition for both product testing and certification

1.3. PRODUCT CERTIFICATION

MiCOM Labs, Inc. is an accredited Product Certification Body per the international standard ISO/IEC 17065:2012. The company is accredited by the American Association for Laboratory Accreditation (A2LA) www.a2la.org test laboratory number 2381.02. MiCOM Labs test schedule is available at the following URL; http://www.a2la.org/scopepdf/2381-02.pdf

Accredited Product Certification Body

A2LA has accredited

MICOM LABS

Pleasanton, CA

This product certification body is accredited in accordance with the recognized International Standard ISO/IEC 17065:2012 *Requirements for bodies certifying products, processes and services*. This product certification body also meets the *A2LA R322 – Specific Requirements – Notified Body Accreditation Requirements* and *A2LA R308 - Specific Requirements - ISO-IEC 17065 - Telecommunication Certification Body Accreditation Program*. This accreditation demonstrates technical competence for a defined scope and the operation of a management system.

Presented this 4th day of February 2016.

President and CEO
For the Accreditation Council
Certificate Number 2381.02
Valid to February 28, 2018
Revised January 26, 2018

For the product certification schemes to which this accreditation applies, please refer to the organization's Product Certification Scope of Accreditation.

United States of America – Telecommunication Certification Body (TCB)
Industry Canada – Certification Body, CAB Identifier – US0159
Europe – Notified Body (NB), NB Identifier - 2280
Japan – Recognized Certification Body (RCB), RCB Identifier - 210

2. DOCUMENT HISTORY

Document History		
Revision	Date	Comments
Draft	30th November 2017	Program undertaken to test the following; a).. Full testing 5150-5250 MHz b).. add additional antenna
Draft #2	22nd December 2017	
Rev A	26th December 2017	Initial Release
Rev B	26th February 2018	Included reference document to satisfy 15.407 (a) (1) (i) for Transmission Elevation Angles above 30º RDWN50-U3 Elevation Angle Consideration

In the above table the latest report revision will replace all earlier versions.

3. TEST RESULT CERTIFICATE

Manufacturer:	Radwin 27 Habarzel Street Tel Aviv 69710 Israel	**Tested By:**	MiCOM Labs, Inc. 575 Boulder Court Pleasanton California 94566 USA
Model:	RADWIN JET DUO	**Telephone:**	+1 925 462 0304
		Fax:	+1 925 462 0306
Equipment Type:	Dual Band 3.x and 5.x GHz Base Station Outdoor Radio with Beamforming Antenna		
S/N's:	Prototype		
Test Date(s):	25th October – 20th November 2017	**Website:**	www.micomlabs.com

STANDARD(S)	TEST RESULTS
FCC CFR 47 Part 15 Subpart E 15.407 (non-DFS Bands)	EQUIPMENT COMPLIES

MiCOM Labs, Inc. tested the equipment mentioned in accordance with the requirements set forth in the above standards. Test results indicate that the equipment tested is capable of demonstrating compliance with the requirements as documented within this report.

Notes:

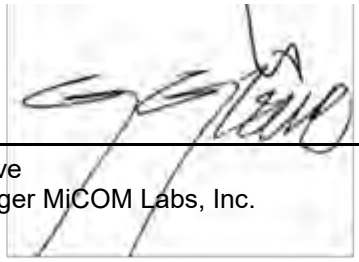
1. This document reports conditions under which testing was conducted and the results of testing performed.

2. Details of test methods used have been recorded and kept on file by the laboratory.

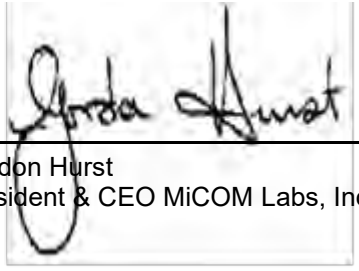
3. Test results apply only to the item(s) tested.

A2LA ACCREDITED
TESTING CERT #2381.01

Approved & Released for MiCOM Labs, Inc. by:



Graeme Grieve
Quality Manager MiCOM Labs, Inc.



Gordon Hurst
President & CEO MiCOM Labs, Inc.

4. REFERENCES AND MEASUREMENT UNCERTAINTY

4.1. Normative References

REF.	PUBLICATION	YEAR	TITLE
I	KDB 662911 D01 & D02	Oct 31 2013	Guidance for measurement of output emission of devices that employ single transmitter with multiple outputs or systems with multiple transmitters operating simultaneously in the same frequency band
II	KDB 926956 D01 v02	22nd August 2016	U-NII Device Transition Plan
III	KDB 789033 D02 v02r01	December 2017	Guidelines for compliance testing of Unlicensed National Information Infrastructure (U-NII) Devices (Part 15, Subpart E)
IV	KDB 412172	7th August 2015	Guidance Determining ERP and EIRP of an RF transmitting device
V	A2LA	August 2017	R105 - Requirement's When Making Reference to A2LA Accreditation Status
VI	ANSI C63.10	2013	American National Standard for Testing Unlicensed Wireless Devices
VII	ANSI C63.4	2014	American National Standards for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz
VIII	ETSI TR 100 028	2001-12	Parts 1 and 2 Electromagnetic compatibility and Radio Spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics
IX	FCC 47 CFR Part 15.407	2016	Radio Frequency Devices; Subpart E –Unlicensed National Information Infrastructure Devices
X	M 3003	Edition 3 Nov.2012	Expression of Uncertainty and Confidence in Measurements
XI	KDB 644545 D03 v01	August 14th 2014	Guidance for IEEE 802.11ac New Rules
XII	FCC 47 CFR Part 2.1033	2016	FCC requirements and rules regarding photographs and test setup diagrams.
XIII	KDB 662911 D01	October 31, 2013	Emissions Testing of Transmitters with Multiple Outputs in the Same Band
XV	KDB 662911 D02	October 25 2011	MIMO with Cross-Polarized Antenna

4.2. Test and Uncertainty Procedure

Conducted and radiated emission measurements were conducted in accordance with American National Standards Institute ANSI C63.4, listed in the Normative References section of this report.

Measurement uncertainty figures are calculated in accordance with ETSI TR 100 028 Parts 1 and 2.

Measurement uncertainties stated are based on a standard uncertainty multiplied by a coverage factor k = 2, providing a level of confidence of approximately 95 % in accordance with UKAS document M 3003 listed in the Normative References section of this report.

5. PRODUCT DETAILS AND TEST CONFIGURATIONS

5.1. Technical Details

Details	Description
Purpose:	Test of the RADWIN JET DUO to FCC CFR 47 Part 15 Subpart E 15.407 Compliance Measurement Procedures for Unlicensed National Information Infrastructure devices operating in the 5150 to 5250 MHz band
Applicant:	RADWIN Ltd. 27 Habarzel Street Tel Aviv .69710 Israel
Manufacturer:	As applicant
Laboratory performing the tests:	MiCOM Labs, Inc. 575 Boulder Court Pleasanton California 94566 USA
Test report reference number:	RDWN47-U4
Date EUT received:	16th October 2017
Standard(s) applied:	FCC CFR 47 Part 15 Subpart E 15.407
Dates of test (from - to):	25th October – 20th November 2017
No of Units Tested:	1
Product Family Name:	RADWIN JET
Model(s):	RADWIN JET DUO
Location for use:	Outdoors
Declared Frequency Range(s):	5150 - 5250 MHz
Type of Modulation:	BPSK, QPSK, 16QAM, 64QAM, 256QAM
EUT Modes of Operation:	Bandwidths 10 MHz, 20 MHz, 40 MHz, 80 MHz
Declared Nominal Output Power (dBm):	30
Transmit/Receive Operation:	Transceiver
Rated Input Voltage and Current:	POE: 115 Vac 60Hz / 55 Vdc 1 A
Operating Temperature Range:	-40ºC to +60ºC
ITU Emission Designator:	10 MHz 10M0W7W 20 MHz 20M0W7W 40 MHz 40M0W7W 80 MHz 80M0W7W
Equipment Dimensions:	2.6 / 14.2 / 13.9 in
Weight:	14.0 lb
Hardware Rev:	Prototype
Software Rev:	Prototype

5.2. Scope Of Test Program

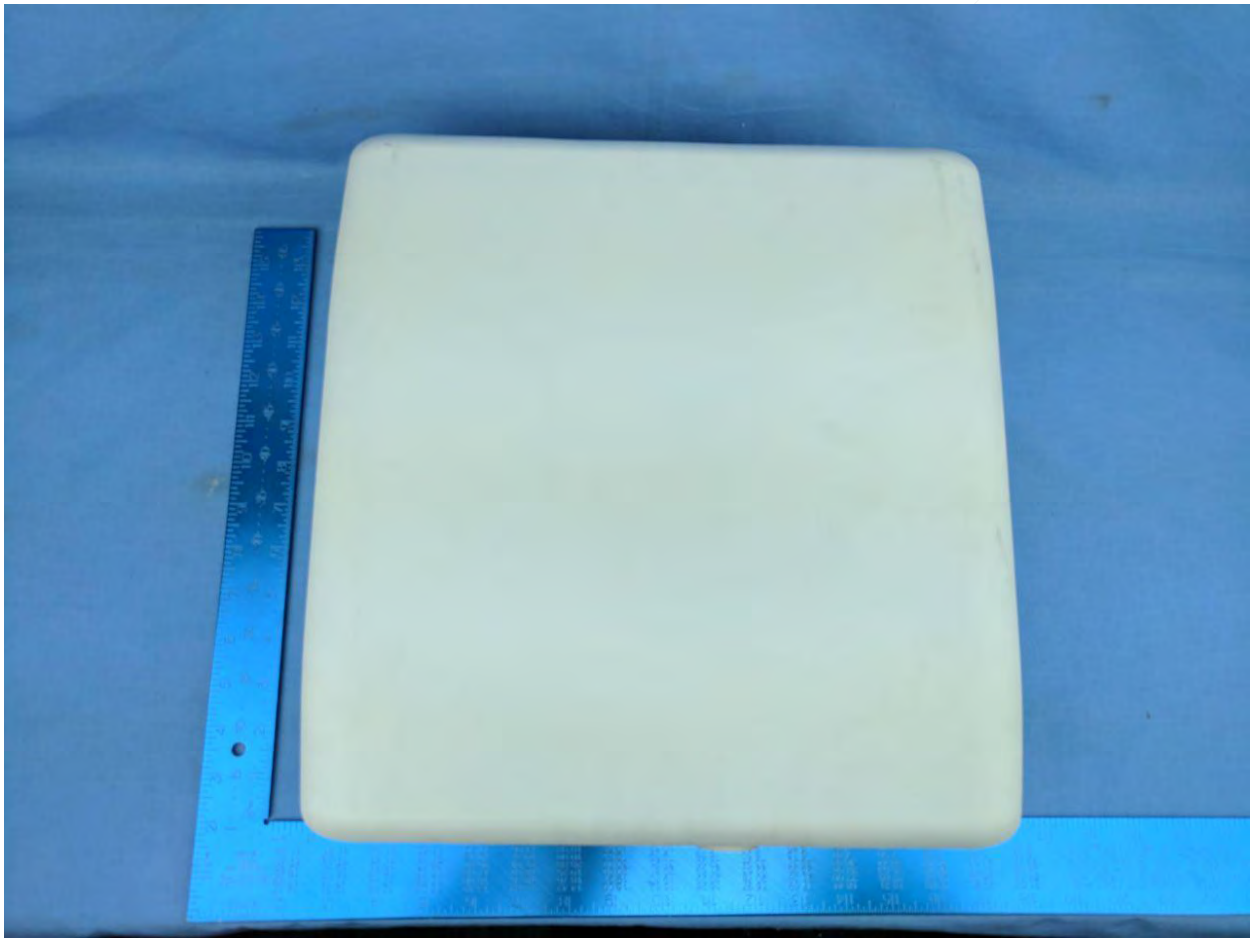
RADWIN JET DUO

The scope of the test program was to test the RADWIN JET DUO configurations in the frequency ranges 5150 - 5250 MHz for compliance against the following specification:

FCC CFR 47 Part 15 Subpart E 15.407
Compliance Measurement Procedures for Unlicensed National Information Infrastructure devices operating in the 5150 to 5250 MHz bands.

The following antennas were tested to 5150 - 5250 MHz for transmitter spurious and band edge Integral Antenna 11 dBi (non-beamforming) and Antenna 11 dBi (with 9.5 dBi Beamforming) = 20.5 dBi

RADWIN JET DUO



POE Injector

5.3. Equipment Model(s) and Serial Number(s)

Type	Description	Manufacturer	Model	Serial no.	Delivery Date
EUT	Dual Band 3.x and 5.x GHz Base Station Outdoor Radio with Beamforming Antenna	RADWIN Ltd.	RADWIN JET DUO	Prototype	16th October 2017
EUT	Power Injector for Power Over Ethernet (POE) 100-240V / 50-60Hz: 55 Vdc, 1.0 A	SINPRO	CPU55A-270-1 REV.B	--	--
Support	Laptop	Dell		--	--

5.4. Antenna Details

Type	Manufacturer	Model	Family	Gain (dBi)	BF Gain	Dir BW	X-Pol	Frequency Band (MHz)
integral	RADWIN Ltd.	SA0199500	Panel	11.0	9.5	12	Yes	5150 - 5250
integral	RADWIN Ltd.	SA0199500*	Panel	11.0	8.5	16	Yes	5150 - 5250
integral	RADWIN Ltd.	SA0199500	Panel	11.0	-	85	Yes	5150 - 5250

BF Gain - Beamforming Gain
Dir BW - Directional BeamWidth
X-Pol - Cross Polarization

*Not tested antenna configuration, covered via the 9.5 dB BF Gain

5.5. Cabling and I/O Ports

Port Type	Max Cable Length	# of Ports	Screened	Conn Type	Data Type	Bit Rate
Ethernet	>30m	1	Yes	RJ45	Packet Data	10/100/1000

5.6. Test Configurations

Results for the following configurations are provided in this report:

Channel Bandwidth(s)	Data Rate MBit/s	Channel Frequency (MHz)		
		Low	Mid	High
5150-5250 MHz				
10MHz	3.25	5162	5200	5245
20MHz	6.50	5165	5200	5240
40MHz	13.50	5173	5200	5230
80MHz	29.30	5194	--	5210

5.7. Equipment Modifications

The following modifications were required to bring the equipment into compliance:
1. NONE

5.8. Deviations from the Test Standard

The following deviations from the test standard were required in order to complete the test program:
1. NONE

6. TEST SUMMARY

List of Measurements

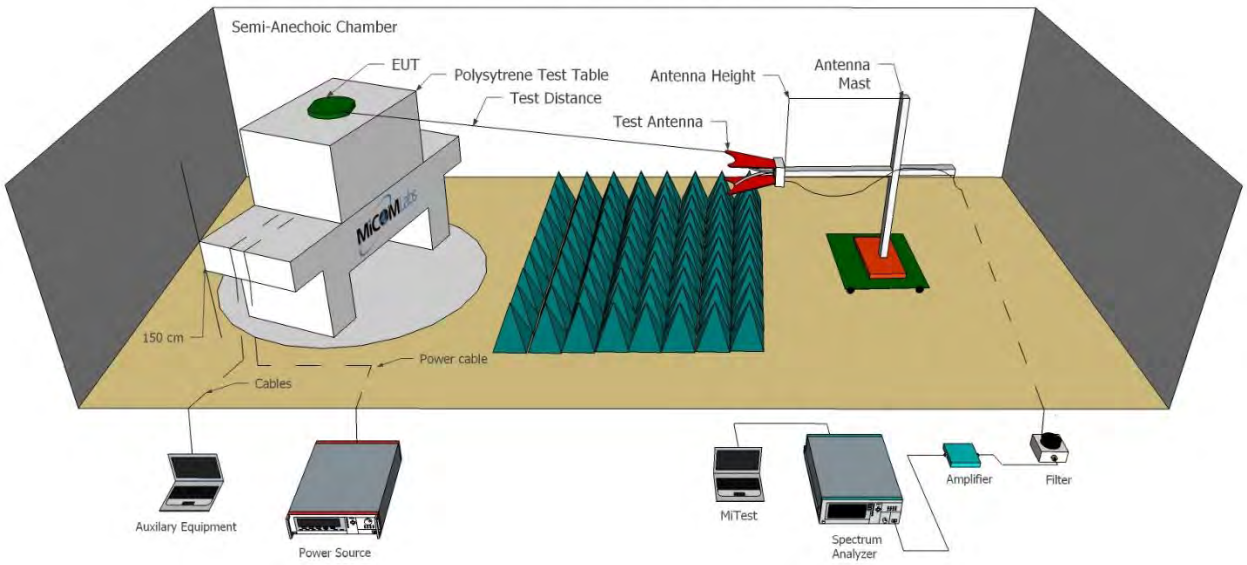
Test Header	Result	Data Link
Radiated Test Method	Complies	-
26 dB & 99% Bandwidth	Complies	View Data
Peak Transmit Power	Complies	View Data
Power Spectral Density	Complies	View Data
TX Spurious & Restricted Band Emissions	Complies	-
RADWIN Ltd. SA0199500 11 dBi	Complies	View Data
RADWIN Ltd. SA0199500 20.5 dBi	Complies	View Data
Restricted Edge & Band-Edge Emissions	Complies	-
RADWIN Ltd. SA0199500 11 dBi	Complies	View Data
RADWIN Ltd. SA0199500 20.5 dBi	Complies	View Data
Digital Emissions	Complies	View Data
Conducted Emissions AC mains	Complies	View Data
Transmission Elevation Angles above 30º	Complies	See included reference document RDWN50-U3 Elevation Angle Consideration

7. TEST EQUIPMENT CONFIGURATION(S)

7.1. Radiated Emissions - 3m Chamber

The following tests were performed using the radiated test set-up shown in the diagram below. Radiated emissions above 1GHz.

Radiated Emissions Above 1GHz Test Setup



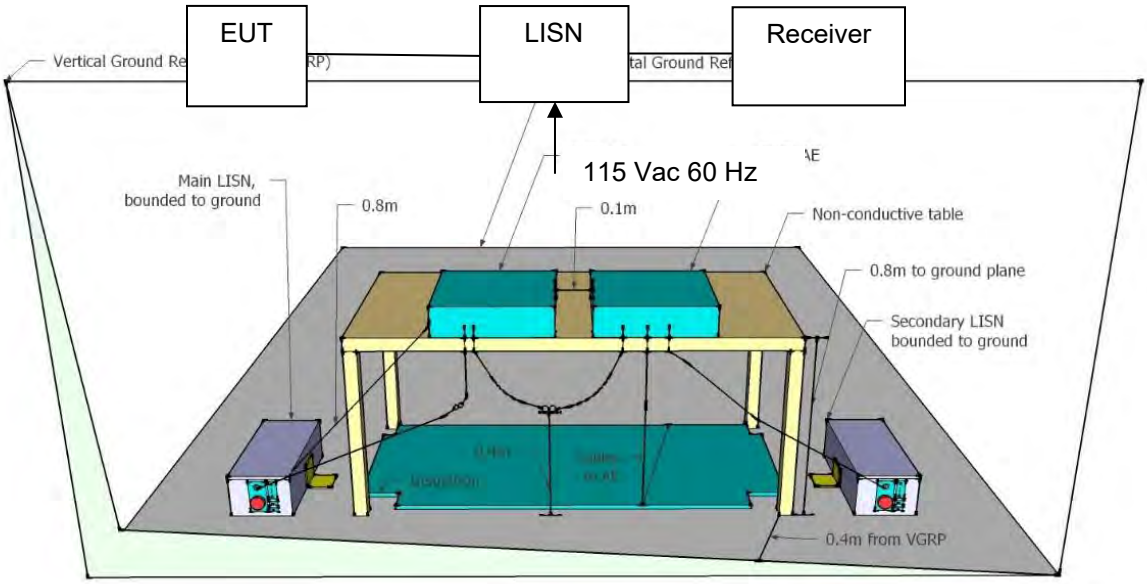
A full system calibration was performed on the test station and any resulting system losses (or gains) were taken into account in the production of all final measurement data.

Asset#	Description	Manufacturer	Model#	Serial#	Calibration Due Date
158	Barometer/Thermometer	Control Company	4196	E2846	30 Nov 2017
170	Video System Controller for Semi Anechoic Chamber	Panasonic	WV-CU101	04R08507	Not Required
287	Rohde & Schwarz 40 GHz Receiver	Rhode & Schwarz	ESIB40	100201	2 May 2018
338	Sunol 30 to 3000 MHz Antenna	Sunol	JB3	A052907	5 Oct 2018
373	26III RMS Multimeter	Fluke	Fluke 26 series III	76080720	21 Sep 2018
377	Band Rejection Filter 5150 to 5880MHz	Microtronics	BRM50716	034	6 Oct 2018
397	Amp 10 - 2500MHz	MiCOM Labs	Amp 10 - 2500 MHz	NA	12 Oct 2018
399	ETS 1-18 GHz Horn Antenna	ETS	3117	00154575	12 Oct 2018
406	Amplifier for Radiated Emissions	MiCOM Labs	40dB 1 to 18GHz Amp	0406	12 Oct 2018
410	Desktop Computer	Dell	Inspiron 620	WS38	Not Required
411	Mast/Turntable Controller	Sunol Sciences	SC98V	060199-1D	Not Required
412	USB to GPIB Interface	National Instruments	GPIB-USB HS	11B8DC2	Not Required
413	Mast Controller	Sunol Science	TWR95-4	030801-3	Not Required
415	Turntable Controller	Sunol Sciences	Turntable Controller	None	Not Required
416	Gigabit ethernet filter	ETS-Lingren	Gigafoil 260366	None	Not Required
447	MiTest Rad Emissions Test Software v1.0	MiCOM	Rad Emissions Test Software	447	Not Required
462	Schwarzbeck cable from Antenna to Amplifier.	Schwarzbeck	AK 9513	462	4 Oct 2018
463	Schwarzbeck cable from Amplifier to Bulkhead.	Schwarzbeck	AK 9513	463	4 Oct 2018
464	Schwarzbeck cable from Bulkhead to Receiver	Schwarzbeck	AK 9513	464	4 Oct 2018
480	Cable - Bulkhead to Amp	SRC Haverhill	157-3050360	480	6 Oct 2018
481	Cable - Bulkhead to Receiver	SRC Haverhill	151-3050787	481	6 Oct 2018
482	Cable - Amp to Antenna	SRC Haverhill	157-3051574	482	6 Oct 2018

7.2. ac Wireline

The ac Wireline Conducted Emissions test was performed using the conducted test set-up shown in the diagram below.

Test Measurement Set up



Assets Utilized for ac Wireline Emission Testing

Asset#	Description	Manufacturer	Model#	Serial#	Calibration Due Date
158	Barometer/Thermometer	Control Company	4196	E2846	30 Nov 2017
184	Pulse Limiter	Rhode & Schwarz	ESH3Z2	357.8810.52	6 Oct 2018
190	LISN (two-line V-network)	Rhode & Schwarz	ESH3Z5	836679/006	18 Oct 2018
287	Rohde & Schwarz 40 GHz Receiver	Rhode & Schwarz	ESIB40	100201	2 May 2018
307	BNC-CABLE	Megaphase	1689 1GVT4	15F50B002	6 Oct 2018
316	Dell desktop computer workstation	Dell	Desktop	WS04	Not Required
372	AC Variable PS	California Instruments	1251P	L06951	Cal when used
388	LISN (3 Phase) 9kHz - 30MHz	Rohde & Schwarz	ESH2-Z5	892107/022	20 Oct 2018
496	MiTest Conducted Emissions test software.	MiCOM	Conducted Emissions Test Software Version 1.0	496	Not Required
CCEMC01	Confidence Check.	MiCOM	CCEMC01	None	2 Apr 2018

8. MEASUREMENT AND PRESENTATION OF TEST DATA

The measurement and graphical data presented in this test report was generated automatically using state-of-the-art technology creating an easy to read report structure. Numerical measurement data is separated from supporting graphical data (plots) through hyperlinks. Numerical measurement data can be reviewed without scrolling through numerous graphical pages to arrive at the next data matrix.

Plots have been relegated into the Appendix 'Graphical Data'.

Test and report automation was performed by MiTest. MiTest is an automated test system developed by MiCOM Labs. MiTest is the first cloud based modular test system enabling end-to-end automation of regulatory compliance testing for conducted RF testing.

The MiCOM Labs "MiTest" Automated Test System" (Patent Pending)

9. TEST RESULTS

9.1. 26 dB & 99% Bandwidth

Conducted Test Conditions for 26 dB and 99% Bandwidth			
Standards:	FCC CFR 47:15.407	**Ambient Temp. (ºC):**	24.0 - 27.5
Test Heading:	26 dB and 99 % Bandwidth	**Rel. Humidity (%):**	32 - 45
Standard Section(s):	15.407 (a)	**Pressure (mBars):**	999 - 1001
Reference Document(s):	See Normative References		

Test Procedure for 26 dB and 99% Bandwidth Measurement
The bandwidth at 26 dB and 99 % is measured radiated, in a 3 meter chamber, while EUT is operating in transmission mode at the appropriate center frequency. The Resolution Bandwidth was set to approximately 1% of the emission bandwidth.
Testing was performed under ambient conditions at nominal voltage. Where the device operated with multiple antenna ports i.e. MIMO device, each port was measured and reported. In this case Vertical a (V) and Horizontal for port b (H).

Test configuration and setup used for the measurement was per the Radiated Test Set-up section specified in this document.

Equipment Configuration for 26 dB & 99% Occupied Bandwidth

Variant:	10 MHz Bandwidth	**Duty Cycle (%):**	100
Data Rate:	3.25 MBit/s	**Antenna Gain (dBi):**	11
Modulation:	OFDM	**Beam Forming Gain (Y)(dB):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	JMH
Engineering Test Notes:			

Test Frequency	Measured 26 dB Bandwidth (MHz)		26 dB Bandwidth (MHz)			
MHz	**H**	**V**	**Highest**	**Lowest**		
5162.0	12.63	-	12.63	12.63		
5200.0	12.06	-	12.06	12.06		
5245.0	12.54	-	12.54	12.54		

Test Frequency	Measured 99% Bandwidth (MHz)		99% Bandwidth (MHz)			
MHz	**H**	**V**	**Highest**	**Lowest**		
5162.0	9.01	-	9.01	9.01		
5200.0	9.06	-	9.06	9.06		
5245.0	9.02	-	9.02	9.02		

Traceability to Industry Recognized Test Methodologies	
Work Instruction:	WI-03 MEASURING RF SPECTRUM MASK
Measurement Uncertainty:	±2.81 dB

Note: click the links in the above matrix to view the graphical image (plot).

The above values are representative of the worst case value between polarities and based on the power measurements.

Equipment Configuration for 26 dB & 99% Occupied Bandwidth			
Variant:	20 MHz Bandwidth	**Duty Cycle (%):**	100
Data Rate:	6.50 MBit/s	**Antenna Gain (dBi):**	11
Modulation:	OFDM	**Beam Forming Gain (Y)(dB):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	OC
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Measured 26 dB Bandwidth (MHz)		26 dB Bandwidth (MHz)			
MHz	**H**	**V**	**Highest**	**Lowest**		
5165.0	24.37	-	24.37	24.37		
5200.0	23.17	-	23.17	23.17		
5240.0	22.77	-	22.77	22.77		

Test Frequency	Measured 99% Bandwidth (MHz)		99% Bandwidth (MHz)			
MHz	**H**	**V**	**Highest**	**Lowest**		
5165.0	18.04	-	18.04	18.04		
5200.0	17.96	-	17.96	17.96		
5240.0	17.88	-	17.88	17.88		

Traceability to Industry Recognized Test Methodologies	
Work Instruction:	WI-03 MEASURING RF SPECTRUM MASK
Measurement Uncertainty:	±2.81 dB

Note: click the links in the above matrix to view the graphical image (plot).

The above values are representative of the worst case value between polarities and based on the power measurements.

Equipment Configuration for 26 dB & 99% Occupied Bandwidth			
Variant:	40 MHz Bandwidth	**Duty Cycle (%):**	100
Data Rate:	13.50 MBit/s	**Antenna Gain (dBi):**	11
Modulation:	OFDM	**Beam Forming Gain (Y)(dB):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	JMH
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Measured 26 dB Bandwidth (MHz)		26 dB Bandwidth (MHz)			
MHz	**H**	**V**	**Highest**	**Lowest**		
5173.0	44.32	-	44.32	44.32		
5200.0	44.55	-	44.55	44.55		
5230.0	46.08	-	46.08	46.08		

Test Frequency	Measured 99% Bandwidth (MHz)		99% Bandwidth (MHz)			
MHz	**H**	**V**	**Highest**	**Lowest**		
5173.0	36.71	-	36.71	36.71		
5200.0	36.87	-	36.87	36.87		
5230.0	36.87	-	36.87	36.87		

Traceability to Industry Recognized Test Methodologies	
Work Instruction:	WI-03 MEASURING RF SPECTRUM MASK
Measurement Uncertainty:	±2.81 dB

Note: click the links in the above matrix to view the graphical image (plot).

The above values are representative of the worst case value between polarities and based on the power measurements.

Equipment Configuration for 26 dB & 99% Occupied Bandwidth

Variant:	80MHz	**Duty Cycle (%):**	100
Data Rate:	29.30 MBit/s	**Antenna Gain (dBi):**	11
Modulation:	OFDM	**Beam Forming Gain (Y)(dB):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	OC
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Measured 26 dB Bandwidth (MHz)		26 dB Bandwidth (MHz)			
MHz	**H**	**V**	**Highest**	**Lowest**		
5194.0	89.94	-	89.94	89.94		
5210.0	88.98	-	88.98	88.98		

Test Frequency	Measured 99% Bandwidth (MHz)		99% Bandwidth (MHz)			
MHz	**H**	**V**	**Highest**	**Lowest**		
5194.0	76.95	-	76.95	76.95		
5210.0	76.63	-	76.63	76.63		

Traceability to Industry Recognized Test Methodologies	
Work Instruction:	WI-03 MEASURING RF SPECTRUM MASK
Measurement Uncertainty:	±2.81 dB

Note: click the links in the above matrix to view the graphical image (plot).

The above values are representative of the worst case value between polarities and based on the power measurements.

9.2. Peak Transmit Power

Conducted Test Conditions for Maximum Conducted Output Power			
Standard:	FCC CFR 47:15.407	**Ambient Temp. (ºC):**	24.0 - 27.5
Test Heading:	Maximum Conducted Output Power	**Rel. Humidity (%):**	32 - 45
Standard Section(s):	15.407 (a)	**Pressure (mBars):**	999 - 1001
Reference Document(s):	KDB 789033 - D02 General UNII Test Procedures New Rules v01		

Test Procedure for Maximum Output Power Measurement

Spectrum Analyzer Method. KDB 789033 defines a methodology using spectrum analyzer. Where power shall be calculated by integrating the spectrum across a frequency span that encompasses, at a minimum, either the EBW or the 99% occupied bandwidth of the signal.1 However, the EBW must be used to determine bandwidth dependent limits on maximum conducted output power in accordance with Section 15.407(a). Testing was performed under ambient conditions at nominal voltage.

Test configuration and setup used for the measurement was per the Radiated Test Set-up section specified in this document. Supporting KDB's referenced below.

KDB 662911 D01 & KDB 662911 D02

NOTE: KDB 412172 D01 was used to determine the EIRP from the results of a power measurements performed under far-field conditions with respect to all transmit and receive (measurement) antennas.

Radiated measurements used for compliance with conducted limits, the following steps are required to ensure that the total emission power is determined for equipment driving cross polarized antennas:

(1) Measure radiated emissions with vertical and horizontal polarizations of the measurement antenna;
(2) Convert each radiated measurement to transmit power based on the antenna gain;

EIRP level to an equivalent electric field strength using the following relationship:
E = EIRP – 20*log (D) + 104.8

Where:
E = electric field strength in dBµV/m,
EIRP = equivalent isotropic radiated power in dBm
D = specified measurement distance in meters.

(3) Sum the powers across the two polarizations to compare the resultant electric field strength level to the applicable limit.

Calculated Power = A + G + Y+ 10 log (1/x) dBm

A = Total Power [10*Log10 ($10^{a/10}$ + $10^{b/10}$ + $10^{c/10}$ + $10^{d/10}$)]
G = Antenna Gain
Y = Beamforming Gain
x = Duty Cycle (average power measurements only)

Limits Maximum Conducted Output Power

Operating Frequency Band 5150-5250 MHz
15. 407 (a)(1)
(i) For an outdoor 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 provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. 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. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).

(ii) For an indoor 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 provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. 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.

(iii) For fixed point-to-point access points 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. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi 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. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

(iv) 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 provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. 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.

Equipment Configuration for RF Output Power

Variant:	10MHz	**Duty Cycle (%):**	99
Data Rate:	3.25 MBit/s	**Antenna Gain (dBi):**	11.0
Modulation:	OFDM	**Beam Forming Gain (Y)(dB):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	JMH
Engineering Test Notes:			

Test Measurement Results

Test Frequency MHz	Measured Output Power		Calculated Total Power	Limit	Margin	EUT Power Setting
	H	V	dBm	dB	Numeric	Numeric
5162	17.93	15.59	20.70	30	-9.30	12.5
5200	25.63	22.64	28.17	30	-1.83	18.5
5245	26.04	21.6	28.15	30	-1.85	18.5

Traceability to Industry Recognized Test Methodologies	
Work Instruction:	WI-01 MEASURING RF OUTPUT POWER
Uncertainty:	±1.33 dB

NOTE: KDB 412172 D01 was used to determine the EIRP from the results of a power measurements performed under far-field conditions with respect to all transmit and receive (measurement) antennas.

Equipment Configuration for RF Output Power

Variant:	20MHz	**Duty Cycle (%):**	99
Data Rate:	6.50MBit/s	**Antenna Gain (dBi):**	11.0
Modulation:	OFDM	**Beam Forming Gain (Y)(dB):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	OC
Engineering Test Notes:			

Test Measurement Results

Test Frequency MHz	Measured Output Power		Calculated Total Power	Limit	Margin	EUT Power Setting
	H	V	dBm	dB	Numeric	Numeric
5165	10.84	9.16	13.86	30	-16.14	5.5
5200	22.53	20.07	25.25	30	-4.75	18.5
5240	22.08	19.26	24.68	30	-5.32	18.5

Traceability to Industry Recognized Test Methodologies	
Work Instruction:	WI-01 MEASURING RF OUTPUT POWER
Uncertainty:	±1.33 dB

NOTE: KDB 412172 D01 was used to determine the EIRP from the results of a power measurements performed under far-field conditions with respect to all transmit and receive (measurement) antennas.

Equipment Configuration for RF Output Power

Variant:	40MHz	**Duty Cycle (%):**	99
Data Rate:	13.50 MBit/s	**Antenna Gain (dBi):**	11.0
Modulation:	OFDM	**Beam Forming Gain (Y)(dB):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	OC
Engineering Test Notes:			

Test Measurement Results

Test Frequency MHz	Measured Output Power		Calculated Total Power	Limit	Margin	EUT Power Setting
	H	V	dBm	dB	Numeric	Numeric
5173	3.1	1.43	6.13	30	-23.87	-2.5
5200	25.27	21.78	27.65	30	-2.35	18.5
5230	23.67	19.64	25.89	30	-4.11	18.5

Traceability to Industry Recognized Test Methodologies	
Work Instruction:	WI-01 MEASURING RF OUTPUT POWER
Uncertainty:	±1.33 dB

NOTE: KDB 412172 D01 was used to determine the EIRP from the results of a power measurements performed under far-field conditions with respect to all transmit and receive (measurement) antennas.

Equipment Configuration for RF Output Power

Variant:	80MHz	**Duty Cycle (%):**	99
Data Rate:	29.30 MBit/s	**Antenna Gain (dBi):**	11.0
Modulation:	OFDM	**Beam Forming Gain (Y)(dB):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	OC
Engineering Test Notes:			

Test Measurement Results

Test Frequency MHz	Measured Output Power		Calculated Total Power	Limit	Margin	EUT Power Setting
	H	V	dBm	dB	Numeric	Numeric
5194	5.4	2.26	7.89	30	-22.11	-1.0
5210	25.45	21.99	27.84	30	-2.16	18.5

Traceability to Industry Recognized Test Methodologies	
Work Instruction:	WI-01 MEASURING RF OUTPUT POWER
Uncertainty:	±1.33 dB

NOTE: KDB 412172 D01 was used to determine the EIRP from the results of a power measurements performed under far-field conditions with respect to all transmit and receive (measurement) antennas.

9.3. Power Spectral Density

Conducted Test Conditions for Power Spectral Density			
Standard:	FCC CFR 47:15.407	**Ambient Temp. (ºC):**	24.0 - 27.5
Test Heading:	Power Spectral Density	**Rel. Humidity (%):**	32 - 45
Standard Section(s):	15.407 (a)	**Pressure (mBars):**	999 - 1001
Reference Document(s):	KDB 789033 - D02 General UNII Test Procedures New Rules v01		

Test Procedure for Power Spectral Density

The In-Band power spectral density was measured using the measure and sum approach per FCC KDB 662911 (D01 Multiple Transmitter Output v02.)

Measure and sum the spectra across the outputs. With this technique, spectra are measured at each output of the device at the required resolution bandwidth. The individual spectra are then summed mathematically in linear power units. Unlike in-band power measurements, in which the sum involves a single measured value (output power) from each output, measurements for compliance with PSD limits involve summing entire spectra across corresponding frequency bins on the various outputs. Consistency is maintained for any device with N transmitter outputs to be certain the individual outputs are all aligned with the same span and same number of points. In this instance, the linear power spectrum value within the first spectral bin of output 0 is summed with that in the first spectral bin of output 1, and the first spectral bin of output 2, and so on up to the Nth output to obtain the true value for the first frequency bin of the summed spectrum. The summed spectrum value for each frequency bin is computed in this fashion. These summed spectral values were calculated on a computer, and the results read back into the spectrum analyzer as a data file to produce a representative plot of total spectral power density.

Calculated Power = A + 10 log (1/x) dBm

A = Total Power Spectral Density [10 Log10 (10a/10 + 10 b/10 + 10c/10 + 10d/10)]

x = Duty Cycle

Test configuration and setup used for the measurement was per the Radiated Test Set-up section specified in this document. Supporting KDB's referenced below.

KDB 662911 D01 & KDB 662911 D02

Radiated measurements used for compliance with conducted limits, the following steps are required to ensure that the total emission power s determined for equipment driving cross polarized antennas:

(1) Measure radiated emissions with vertical and horizontal polarizations of the measurement antenna;
(2) Convert each radiated measurement to transmit power based on the antenna gain;

EIRP level to an equivalent electric field strength using the following relationship:
E = EIRP – 20*log (D) + 104.8

Where:
E = electric field strength in dBµV/m,
EIRP = equivalent isotropic radiated power in dBm
D = specified measurement distance in meters.

(3) Sum the powers or PSDs across the two polarizations to compare the resultant electric field strength level to the applicable limit.

Calculated Power = A + G + Y+ 10 log (1/x) dBm

A = Total Power [$10*\text{Log10}\ (10^{a/10} + 10^{b/10} + 10^{c/10} + 10^{d/10})$]
G = Antenna Gain
Y = Beamforming Gain
x = Duty Cycle (average power measurements only)

Limits Maximum Power Spectral Density

Operating Frequency Band 5150-5250 MHz
15. 407 (a)(1)
(i) For an outdoor 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 provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. 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. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).

(ii) For an indoor 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 provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. 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.

(iii) For fixed point-to-point access points 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. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi 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. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

(iv) 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 provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. 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.

Equipment Configuration for Power Spectral Density

Variant:	10 MHz	**Duty Cycle (%):**	100
Data Rate:	3.25 MBit/s	**Antenna Gain (dBi):**	11.00
Modulation:	OFDM	**Beam Forming Gain (Y)(dB):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	OC
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Measured Power Spectral Density (dBm/MHz)		Summation Peak Marker + DCCF (+0.0 dB)	Limit	Margin
MHz	**H**	**V**	**dBm/MHz**	**dBm/MHz**	**dB**
5162.0	6.56	9.80	12.26	17.0	-4.74
5200.0	13.20	12.97	16.87	17.0	-0.13
5245.0	12.14	12.98	16.36	17.0	-0.64

Traceability to Industry Recognized Test Methodologies	
Work Instruction:	WI-03 MEASURING RF SPECTRUM MASK
Measurement Uncertainty:	±2.81 dB

DCCF – Duty Cycle Correction Factor

Equipment Configuration for Power Spectral Density

Variant:	20 MHz	**Duty Cycle (%):**	100
Data Rate:	6.50 MBit/s	**Antenna Gain (dBi):**	11.00
Modulation:	OFDM	**Beam Forming Gain (Y)(dB):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	OC
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Measured Power Spectral Density (dBm/MHz)		Summation Peak Marker + DCCF (+0.0 dB)	Limit	Margin
MHz	**H**	**V**	**dBm/MHz**	**dBm/MHz**	**dB**
5165.0	-5.38	-2.67	-0.03	17.0	-17.03
5200.0	11.16	11.01	14.87	17.0	-2.13
5240.0	10.16	9.39	13.57	17.0	-3.43

Traceability to Industry Recognized Test Methodologies	
Work Instruction:	WI-03 MEASURING RF SPECTRUM MASK
Measurement Uncertainty:	2.81 dB

DCCF - Duty Cycle Correction Factor

Note: click the links in the above matrix to view the graphical image (plot).

Equipment Configuration for Power Spectral Density			
Variant:	40 MHz	**Duty Cycle (%):**	100.0
Data Rate:	13.50 MBit/s	**Antenna Gain (dBi):**	11.00
Modulation:	OFDM	**Beam Forming Gain (Y)(dB):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	JMH
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Measured Power Spectral Density (dBm/MHz)		Summation Peak Marker + DCCF (+0.00 dB)	Limit	Margin
MHz	**H**	**V**	**dBm/MHz**	**dBm/MHz**	**dB**
5173.0	-13.93	-11.47	-8.75	17.0	-25.75
5200.0	8.03	7.83	11.71	17.0	-5.29
5230.0	6.16	5.90	9.81	17.0	-7.19

Traceability to Industry Recognized Test Methodologies	
Work Instruction:	WI-03 MEASURING RF SPECTRUM MASK
Measurement Uncertainty:	±2.81 dB

DCCF - Duty Cycle Correction Factor

Note: click the links in the above matrix to view the graphical image (plot).

Equipment Configuration for Power Spectral Density

Variant:	80 MHz	**Duty Cycle (%):**	100.0
Data Rate:	29.30 MBit/s	**Antenna Gain (dBi):**	11.00
Modulation:	OFDM	**Beam Forming Gain (Y)(dB):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	JMH
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Measured Power Spectral Density (dBm/MHz)		Summation Peak Marker + DCCF (+0.00 dB)	Limit	Margin
MHz	**H**	**V**	**dBm/MHz**	**dBm/MHz**	**dB**
5194.0	-15.48	-14.67	-11.27	17.0	-28.27
5210.0	5.00	5.54	9.06	17.0	-7.94

Traceability to Industry Recognized Test Methodologies	
Work Instruction:	WI-03 MEASURING RF SPECTRUM MASK
Measurement Uncertainty:	±2.81 dB

DCCF - Duty Cycle Correction Factor

Note: click the links in the above matrix to view the graphical image (plot).

9.4. Radiated

Radiated Test Conditions for Radiated Spurious and Band-Edge Emissions			
Standard:	FCC CFR 47:15.407	**Ambient Temp. (ºC):**	20.0 - 24.5
Test Heading:	Radiated Spurious and Band-Edge Emissions	**Rel. Humidity (%):**	32 - 45
Standard Section(s):	15.407 (b), 15.205, 15.209	**Pressure (mBars):**	999 - 1001
Reference Document(s):	See Normative References		

Test Procedure for Radiated Spurious and Band-Edge Emissions
Radiated emissions for restricted bands above 1 GHz are measured in the anechoic chamber at a 3-meter distance on every azimuth in both horizontal and vertical polarities. The emissions are recorded and maximized as a function of azimuth by rotation through 360° with a spectrum analyzer in peak hold mode. Depending on the frequency band spanned a notch filter was used to remove the fundamental frequency. The highest emissions relative to the limit are listed for each frequency spanned.
Measurements on any restricted band frequency or frequencies above 1 GHz are based on the use of measurement instrumentation employing peak and average detectors. All measurements were performed using a resolution bandwidth of 1 MHz.

Test configuration and setup for Undesirable Measurement were per the Radiated Test Set-up specified in this document.

15.407 (b) Undesirable emission limits. Except as shown in paragraph (b)(7) of this section, the maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

(1) For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.

(5) The emission measurements shall be performed using a minimum resolution bandwidth of 1 MHz. A lower resolution bandwidth may be employed near the band edge, when necessary, provided the measured energy is integrated to show the total power over 1 MHz.

(6) Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in §15.209. Further, any U-NII devices using an AC power line are required to comply also with the conducted limits set forth in §15.207.

(7) The provisions of §15.205 apply to intentional radiators operating under this section.

(8) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the upper and lower frequency band edges as the design of the equipment permits.

Limits for Restricted Bands (15.205, 15.209)
Peak emission: 68.23 dBuV/m
Average emission: 54 dBuV/m

Field Strength Calculation
The field strength is calculated by adding the Antenna Factor and Cable Loss, and subtracting Amplifier Gain from the measured reading. All factors are included in the reported data.
FS = R + AF + CORR - FO

where:
FS = Field Strength
R = Measured Spectrum analyzer Input Amplitude
AF = Antenna Factor
CORR = Correction Factor = CL – AG + NFL
CL = Cable Loss
AG = Amplifier Gain
FO = Distance Falloff Factor
NFL = Notch Filter Loss

Example:
The following formula is used to convert the equipment isotropic radiated power (eirp) to field strength (dBµV/m);

$$E = \frac{1000000 \times \sqrt{30P}}{3} \ \mu V/m$$

where P is the EIRP in Watts

Therefore: -27 dBm/MHz equates to 68.23 dBuV/m

Conversion between dBmV/m (or dBmV) and mV/m (or mV) are as follows:
Level (dBmV/m) = 20 * Log (level (mV/m))

40 dBmV/m = 100 mV/m
48 dBmV/m = 250 mV/m

Restricted Bands of Operation (15.205)
(a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

Frequency Band			
MHz	**MHz**	**MHz**	**GHz**
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	Above 38.6
13.36-13.41			

(b) Except as provided in paragraphs (d) and (e) of this section, the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in §15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in §15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in §15.209 shall be demonstrated based on the average value of the measured emissions. The

provisions in §15.35 apply to these measurements.

(c) Except as provided in paragraphs (d) and (e) of this section, regardless of the field strength limits specified elsewhere in this subpart, the provisions of this section apply to emissions from any intentional radiator.

(d) The following devices are exempt from the requirements of this section:

(1) Swept frequency field disturbance sensors operating between 1.705 and 37 MHz provided their emissions only sweep through the bands listed in paragraph (a) of this section, the sweep is never stopped with the fundamental emission within the bands listed in paragraph (a) of this section, and the fundamental emission is outside of the bands listed in paragraph (a) of this section more than 99% of the time the device is actively transmitting, without compensation for duty cycle.

(2) Transmitters used to detect buried electronic markers at 101.4 kHz which are employed by telephone companies.

(3) Cable locating equipment operated pursuant to §15.213.

(4) Any equipment operated under the provisions of §15.253, 15.255, and 15.256 in the frequency band 75-85 GHz, or §15.257 of this part.

(5) Biomedical telemetry devices operating under the provisions of §15.242 of this part are not subject to the restricted band 608-614 MHz but are subject to compliance within the other restricted bands.

(6) Transmitters operating under the provisions of subparts D or F of this part.

(7) Devices operated pursuant to §15.225 are exempt from complying with this section for the 13.36-13.41 MHz band only.

(8) Devices operated in the 24.075-24.175 GHz band under §15.245 are exempt from complying with the requirements of this section for the 48.15-48.35 GHz and 72.225-72.525 GHz bands only, and shall not exceed the limits specified in §15.245(b).

(9) Devices operated in the 24.0-24.25 GHz band under §15.249 are exempt from complying with the requirements of this section for the 48.0-48.5 GHz and 72.0-72.75 GHz bands only, and shall not exceed the limits specified in §15.249(a).

(e) Harmonic emissions appearing in the restricted bands above 17.7 GHz from field disturbance sensors operating under the provisions of §15.245 shall not exceed the limits specified in §15.245(b).

9.4.1. TX Spurious & Restricted Band Emissions

9.4.1.1. RADWIN Ltd. SA0199500 11 dBi

Equipment Configuration for TX Spurious & Restricted Band Emissions

Antenna:	RADWIN Ltd. SA0199500 11 dBi	**Variant:**	10MHz
Antenna Gain (dBi):	11.00	**Modulation:**	OFDM
Beam Forming Gain (Y):	Not Applicable	**Duty Cycle (%):**	99
Channel Frequency (MHz):	5162.00	**Data Rate:**	6.00 MBit/s
Power Setting:	12	**Tested By:**	SB

Test Measurement Results

1000.00 - 18000.00 MHz												
Num	**Frequency MHz**	**Raw dBµV**	**Cable Loss dB**	**AF dB**	**Level dBµV/m**	**Measurement Type**	**Pol**	**Hgt cm**	**Azt Deg**	**Limit dBµV/m**	**Margin dB**	**Pass /Fail**
#1	3434.65	66.21	2.60	-16.01	52.80	Max Peak	Vertical	192	355	68.2	-15.4	Pass
#2	3434.65	49.83	2.60	-16.01	36.42	Max Avg	Vertical	192	355	54.0	-17.6	Pass
#3	3726.17	60.65	2.71	-15.42	47.94	Max Peak	Vertical	164	333	68.2	-20.3	Pass
#4	3726.17	47.14	2.71	-15.42	34.43	Max Avg	Vertical	164	333	54.0	-19.6	Pass
#5	5165.63	61.72	3.08	-14.39	50.41	Fundamental	Vertical	150	0	--	--	
#6	6271.24	60.75	3.24	-11.80	52.19	Max Peak	Horizontal	173	3	68.2	-16.0	Pass
#7	6271.24	47.48	3.24	-11.80	38.92	Max Avg	Horizontal	173	3	54.0	-15.1	Pass
#8	6883.40	56.21	3.13	-10.44	48.90	Max Peak	Horizontal	134	47	68.2	-19.3	Pass
#9	6883.40	44.87	3.13	-10.44	37.56	Max Avg	Horizontal	134	47	54.0	-16.4	Pass
#10	16185.51	48.25	5.60	0.91	54.76	Max Peak	Horizontal	187	219	68.2	-13.5	Pass
#11	16185.51	34.31	5.60	0.91	40.82	Max Avg	Horizontal	187	219	54.0	-13.2	Pass

Equipment Configuration for TX Spurious & Restricted Band Emissions

Antenna:	RADWIN Ltd. SA0199500 11 dBi	**Variant:**	10MHz
Antenna Gain (dBi):	11.00	**Modulation:**	OFDM
Beam Forming Gain (Y):	Not Applicable	**Duty Cycle (%):**	99
Channel Frequency (MHz):	5200.00	**Data Rate:**	0.00 MBit/s
Power Setting:	18.5	**Tested By:**	SB

Test Measurement Results

1000.00 - 18000.00 MHz												
Num	**Frequency MHz**	**Raw dBµV**	**Cable Loss dB**	**AF dB**	**Level dBµV/m**	**Measurement Type**	**Pol**	**Hgt cm**	**Azt Deg**	**Limit dBµV/m**	**Margin dB**	**Pass /Fail**
#1	3432.74	62.73	2.60	-16.04	49.29	Max Peak	Vertical	163	357	68.2	-18.9	Pass
#2	3432.74	47.78	2.60	-16.04	34.34	Max Avg	Vertical	163	357	54.0	-19.7	Pass
#3	4836.94	63.96	2.98	-15.12	51.82	Max Peak	Vertical	152	338	68.2	-16.4	Pass
#4	4836.94	50.21	2.98	-15.12	38.07	Max Avg	Vertical	152	338	54.0	-15.9	Pass
#5	5203.77	88.36	3.09	-14.26	77.19	Fundamental	Horizontal	200	0	--	--	
#6	6263.26	66.12	3.22	-11.91	57.43	Max Peak	Vertical	163	5	68.2	-10.8	Pass
#7	6263.26	51.81	3.22	-11.91	43.12	Max Avg	Vertical	163	5	54.0	-10.9	Pass
#8	6934.98	53.71	3.19	-10.11	46.79	Max Peak	Vertical	162	66	68.2	-21.4	Pass
#9	6934.98	40.36	3.19	-10.11	33.44	Max Avg	Vertical	162	66	54.0	-20.6	Pass
#10	10404.96	52.76	4.42	0.02	57.20	Max Peak	Vertical	98	326	68.2	-11.0	Pass
#11	10404.96	36.58	4.42	0.02	41.02	Max Avg	Vertical	98	326	54.0	-13.0	Pass
#12	10405.07	63.58	4.42	0.05	68.05	Max Peak	Horizontal	168	74	68.2	-0.2	Pass
#13	10405.07	45.58	4.42	0.05	50.05	Max Avg	Horizontal	168	74	54.0	-4.0	Pass
#14	16271.18	48.79	5.68	-0.25	54.22	Max Peak	Vertical	131	39	68.2	-14.0	Pass
#15	16271.18	35.22	5.68	-0.25	40.65	Max Avg	Vertical	131	39	54.0	-13.4	Pass
#16	16864.33	49.38	5.54	-0.96	53.96	Max Peak	Horizontal	170	182	68.2	-14.3	Pass
#17	16864.33	36.23	5.54	-0.96	40.81	Max Avg	Horizontal	170	182	54.0	-13.2	Pass

Equipment Configuration for TX Spurious & Restricted Band Emissions

Antenna:	RADWIN Ltd. SA0199500 11 dBi	**Variant:**	10MHz
Antenna Gain (dBi):	11.00	**Modulation:**	OFDM
Beam Forming Gain (Y):	Not Applicable	**Duty Cycle (%):**	99
Channel Frequency (MHz):	5245.00	**Data Rate:**	0.00 MBit/s
Power Setting:	18.5	**Tested By:**	SB

Test Measurement Results

1000.00 - 18000.00 MHz												
Num	**Frequency MHz**	**Raw dBµV**	**Cable Loss dB**	**AF dB**	**Level dBµV/m**	**Measurement Type**	**Pol**	**Hgt cm**	**Azt Deg**	**Limit dBµV/m**	**Margin dB**	**Pass /Fail**
#1	3435.80	64.28	2.60	-16.01	50.87	Max Peak	Vertical	163	0	68.2	-17.4	Pass
#2	3435.80	48.27	2.60	-16.01	34.86	Max Avg	Vertical	163	0	54.0	-19.1	Pass
#3	5242.03	86.25	3.13	-14.41	74.97	Fundamental	Horizontal	151	0	--	--	
#4	6236.89	64.70	3.21	-11.86	56.05	Max Peak	Horizontal	140	48	68.2	-12.2	Pass
#5	6236.89	50.41	3.21	-11.86	41.76	Max Avg	Horizontal	140	48	54.0	-12.2	Pass
#6	6993.50	60.06	3.26	-9.85	53.47	Max Peak	Vertical	141	7	68.2	-14.8	Pass
#7	6993.50	55.03	3.26	-9.85	48.44	Max Avg	Vertical	141	7	54.0	-5.6	Pass
#8	10494.48	62.15	4.51	0.35	67.01	Max Peak	Horizontal	163	69	68.2	-1.2	Pass
#9	10494.48	44.80	4.51	0.35	49.66	Max Avg	Horizontal	163	69	54.0	-4.3	Pass
#10	10495.15	52.32	4.51	0.35	57.18	Max Peak	Vertical	152	325	68.2	-11.1	Pass
#11	10495.15	35.15	4.51	0.35	40.01	Max Avg	Vertical	152	325	54.0	-14.0	Pass
#12	16741.96	48.43	5.66	-0.06	54.03	Max Peak	Horizontal	184	331	68.2	-14.2	Pass
#13	16741.96	35.40	5.66	-0.06	41.00	Max Avg	Horizontal	184	331	54.0	-13.0	Pass

9.4.1.2. RADWIN Ltd. SA0199500 BF 20.5 dBi (11 dBi + 9.5 dB)

BF = Beam Forming

Equipment Configuration for TX Spurious & Restricted Band Emissions			
Antenna:	RADWIN Ltd. SA0199500 20.5 dBi	**Variant:**	10MHz
Antenna Gain (dBi):	11.00	**Modulation:**	OFDM
Beam Forming Gain (Y):	9.5	**Duty Cycle (%):**	
Channel Frequency (MHz):	5162.00	**Data Rate:**	0.00 MBit/s
Power Setting:	7.5	**Tested By:**	JMH

Test Measurement Results

1000.00 - 18000.00 MHz												
Num	**Frequency MHz**	**Raw dBµV**	**Cable Loss dB**	**AF dB**	**Level dBµV/m**	**Measurement Type**	**Pol**	**Hgt cm**	**Azt Deg**	**Limit dBµV/m**	**Margin dB**	**Pass /Fail**
#1	4799.97	65.23	2.97	-15.42	52.78	Max Peak	Vertical	145	6	68.2	-15.5	Pass
#2	4799.97	52.84	2.97	-15.42	40.39	Max Avg	Vertical	145	6	54.0	-13.6	Pass
#3	5164.97	72.12	3.08	-14.43	60.77	Fundamental	Vertical	151	0	--	--	
#4	6236.95	61.42	3.21	-11.86	52.77	Peak (NRB)	Horizontal	151	3	--	--	Pass
Test Notes: EUT powered by POE and connected to laptop outside chamber												

Equipment Configuration for TX Spurious & Restricted Band Emissions

Antenna:	RADWIN Ltd. SA0199500 20.5 dBi	**Variant:**	10MHz
Antenna Gain (dBi):	11.00	**Modulation:**	OFDM
Beam Forming Gain (Y):	9.5	**Duty Cycle (%):**	
Channel Frequency (MHz):	5200.00	**Data Rate:**	0.00 MBit/s
Power Setting:	19	**Tested By:**	JMH

Test Measurement Results

1000.00 - 18000.00 MHz												
Num	**Frequency MHz**	**Raw dBµV**	**Cable Loss dB**	**AF dB**	**Level dBµV/m**	**Measurement Type**	**Pol**	**Hgt cm**	**Azt Deg**	**Limit dBµV/m**	**Margin dB**	**Pass /Fail**
#1	4833.21	73.43	2.98	-15.14	61.27	Max Peak	Vertical	146	3	68.2	-7.0	Pass
#2	4833.21	59.18	2.98	-15.14	47.02	Max Avg	Vertical	146	3	54.0	-7.0	Pass
#3	5202.89	95.20	3.09	-14.25	84.04	Fundamental	Horizontal	151	0	--	--	
#4	6128.79	63.23	3.25	-11.90	54.58	Peak (NRB)	Horizontal	151	3	--	--	Pass
#5	6227.04	70.21	3.20	-11.86	61.55	Max Peak	Horizontal	149	1	68.2	-6.7	Pass
#6	6925.86	71.49	3.23	-10.14	64.58	Max Peak	Vertical	152	3	68.2	-3.4	Pass
#7	10400.77	63.74	4.41	0.11	68.03	Max Peak	Horizontal	165	291	68.2	-0.2	Pass
#8	15601.95	56.93	5.58	1.30	63.81	Max Peak	Horizontal	162	3	68.2	-4.4	Pass
#9	15601.95	38.06	5.58	1.30	44.94	Max Avg	Horizontal	162	3	54.0	-9.1	Pass

Test Notes: EUT powered by POE and connected to laptop outside chamber

Equipment Configuration for TX Spurious & Restricted Band Emissions

Antenna:	RADWIN Ltd. SA0199500 20.5 dBi	**Variant:**	10MHz
Antenna Gain (dBi):	11.00	**Modulation:**	OFDM
Beam Forming Gain (Y):	9.5	**Duty Cycle (%):**	
Channel Frequency (MHz):	5245.00	**Data Rate:**	0.00 MBit/s
Power Setting:	19	**Tested By:**	JMH

Test Measurement Results

1000.00 - 18000.00 MHz												
Num	**Frequency MHz**	**Raw dBµV**	**Cable Loss dB**	**AF dB**	**Level dBµV/m**	**Measurement Type**	**Pol**	**Hgt cm**	**Azt Deg**	**Limit dBµV/m**	**Margin dB**	**Pass /Fail**
#1	4863.09	69.47	3.03	-14.99	57.51	Max Peak	Horizontal	164	3	68.2	-10.7	Pass
#2	4863.09	55.48	3.03	-14.99	43.52	Max Avg	Horizontal	164	3	54.0	-10.5	Pass
#3	5241.37	90.26	3.13	-14.42	78.97	Fundamental	Horizontal	100	0	--	--	
#4	6249.52	71.84	3.23	-11.76	63.31	Max Peak	Horizontal	164	1	68.2	-4.9	Pass
#5	6249.52	58.04	3.23	-11.76	49.51	Max Avg	Horizontal	164	1	54.0	-4.5	Pass
#6	6993.29	57.28	3.26	-9.85	50.69	Peak (NRB)	Vertical	151	0	--	--	Pass
#7	10489.68	61.55	4.45	0.33	66.33	Max Peak	Horizontal	164	312	68.2	-1.9	Pass
#8	10489.68	46.22	4.45	0.33	51.00	Max Avg	Horizontal	164	312	54.0	-3.0	Pass

Test Notes: EUT powered by POE and connected to laptop outside chamber

9.4.2. Restricted Edge & Band-Edge Emissions

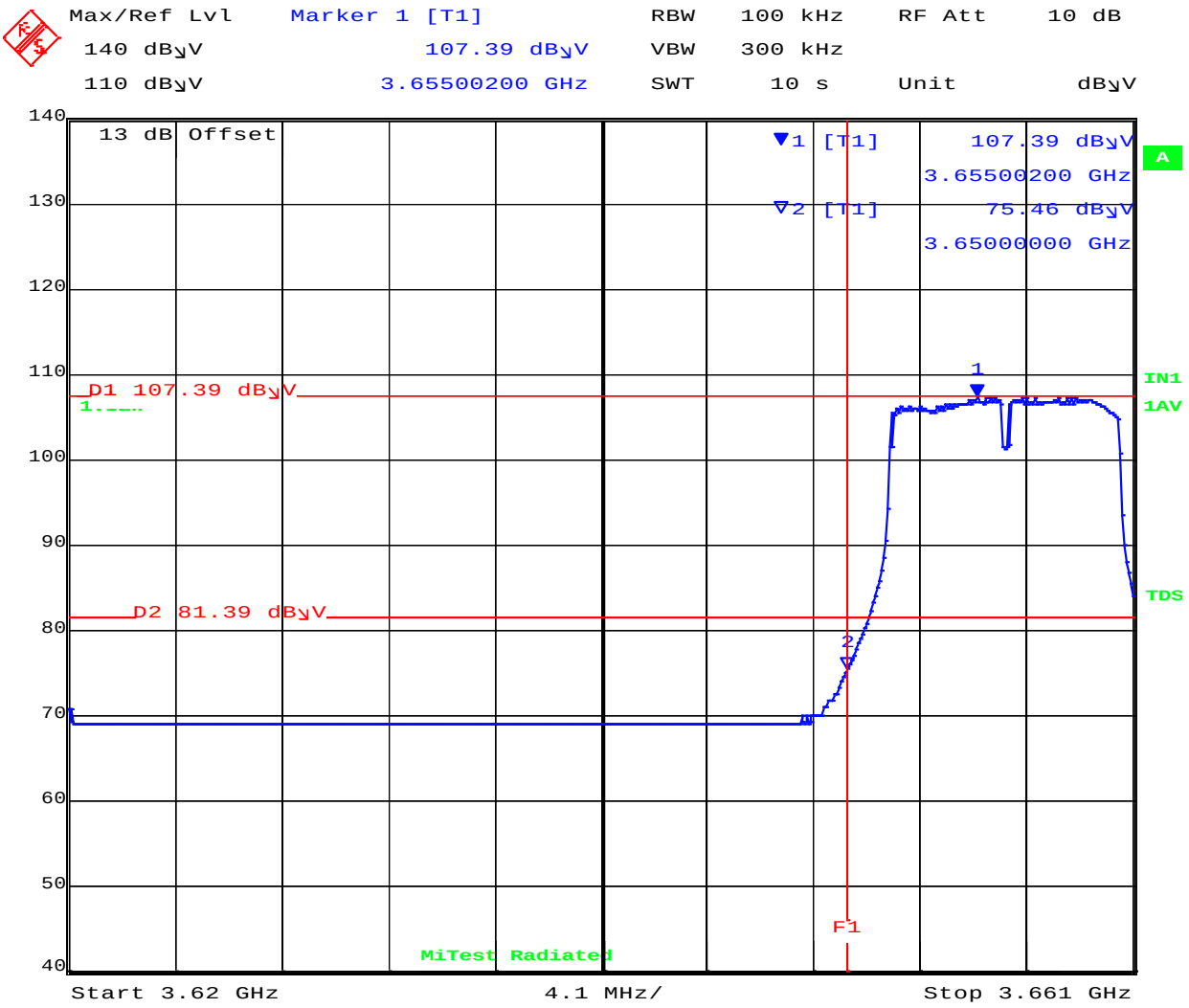
9.4.2.3. RADWIN Ltd. SA0199500 11 dBi

RESULTS SUMMARY FOR RADIATED BAND-EDGE EMISSIONS

5150 - 5250 MHz

RADWIN Ltd. SA0199500 11 dBi		Band-Edge Freq	Limit 68.2dBµV/m	Limit 54.0dBµV/m	Power Setting
Channel Bandwidth(s)	Operating Frequency (MHz)	MHz	dBµV/m	dBµV/m	
10 MHz	5162.00	5150.00	65.56	53.51	12.0
20 MHz	5165.00	5150.00	66.54	53.81	5.5
40 MHz	5172.00	5150.00	68.13	53.51	-2.5
80 MHz	5194.00	5150.00	67.61	53.21	-1.0

Click on the links to view the data.



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Equipment Configuration for Restricted Lower Band-Edge Emissions

Antenna:	RADWIN Ltd. SA0199500 11 dBi	**Variant:**	10MHz
Antenna Gain (dBi):	11.00	**Modulation:**	OFDM
Beam Forming Gain (Y):	Not Applicable	**Duty Cycle (%):**	99
Channel Frequency (MHz):	5162.00	**Data Rate:**	6.00 MBit/s
Power Setting:	12.0	**Tested By:**	SB

Test Measurement Results

4500.00 - 5250.00 MHz												
Num	**Frequency MHz**	**Raw dBµV**	**Cable Loss dB**	**AF dB**	**Level dBµV/m**	**Measurement Type**	**Pol**	**Hgt cm**	**Azt Deg**	**Limit dBµV/m**	**Margin dB**	**Pass /Fail**
#1	5113.23	27.16	3.10	35.30	65.56	Max Peak	Vertical	152	15	68.2	-2.7	Pass
#2	5149.30	15.05	3.06	35.40	53.51	Max Avg	Vertical	152	15	54.0	-0.5	Pass
#3	5150.00	--	--	--	--	Restricted-Band	--	--	--	--	--	--

Equipment Configuration for Restricted Lower Band-Edge Emissions

Antenna:	RADWIN Ltd. SA0199500 11 dBi	**Variant:**	20MHz
Antenna Gain (dBi):	11.00	**Modulation:**	OFDM
Beam Forming Gain (Y):	Not Applicable	**Duty Cycle (%):**	99
Channel Frequency (MHz):	5165.00	**Data Rate:**	6.00 MBit/s
Power Setting:	5.5	**Tested By:**	SB

Test Measurement Results

4500.00 - 5250.00 MHz												
Num	**Frequency MHz**	**Raw dBµV**	**Cable Loss dB**	**AF dB**	**Level dBµV/m**	**Measurement Type**	**Pol**	**Hgt cm**	**Azt Deg**	**Limit dBµV/m**	**Margin dB**	**Pass /Fail**
#1	5147.80	28.08	3.06	35.40	66.54	Max Peak	Vertical	152	15	68.2	-1.7	Pass
#2	5150.00	15.35	3.06	35.40	53.81	Max Avg	Vertical	152	15	54.0	-0.2	Pass
#3	5150.00	--	--	--	--	Restricted-Band	--	--	--	--	--	--

Equipment Configuration for Restricted Lower Band-Edge Emissions

Antenna:	RADWIN Ltd. SA0199500 11 dBi	**Variant:**	40MHz
Antenna Gain (dBi):	11.00	**Modulation:**	OFDM
Beam Forming Gain (Y):	Not Applicable	**Duty Cycle (%):**	99
Channel Frequency (MHz):	5172.00	**Data Rate:**	0.00 MBit/s
Power Setting:	-2.5	**Tested By:**	SB

Test Measurement Results

4500.00 - 5250.00 MHz												
Num	**Frequency MHz**	**Raw dBµV**	**Cable Loss dB**	**AF dB**	**Level dBµV/m**	**Measurement Type**	**Pol**	**Hgt cm**	**Azt Deg**	**Limit dBµV/m**	**Margin dB**	**Pass /Fail**
#1	5150.00	15.05	3.06	35.40	53.51	Max Avg	Vertical	152	15	54.0	-0.5	Pass
#2	5150.00	29.67	3.06	35.40	68.13	Max Peak	Vertical	152	15	68.2	-0.1	Pass
#3	5150.00	--	--	--	--	Restricted-Band	--	--	--	--	--	--
Test Notes: channel moved from 5172 to 5173												

Equipment Configuration for Restricted Lower Band-Edge Emissions

Antenna:	RADWIN Ltd. SA0199500 11 dBi	**Variant:**	80MHz
Antenna Gain (dBi):	11.00	**Modulation:**	OFDM
Beam Forming Gain (Y):	Not Applicable	**Duty Cycle (%):**	99
Channel Frequency (MHz):	5194.00	**Data Rate:**	6.00 MBit/s
Power Setting:	-1.0	**Tested By:**	SB

Test Measurement Results

4500.00 - 5250.00 MHz												
Num	**Frequency MHz**	**Raw dBµV**	**Cable Loss dB**	**AF dB**	**Level dBµV/m**	**Measurement Type**	**Pol**	**Hgt cm**	**Azt Deg**	**Limit dBµV/m**	**Margin dB**	**Pass /Fail**
#1	5150.00	14.75	3.06	35.40	53.21	Max Avg	Vertical	152	15	54.0	-0.8	Pass
#2	5150.00	29.15	3.06	35.40	67.61	Max Peak	Vertical	152	15	68.2	-0.6	Pass
#3	5150.00	--	--	--	--	Restricted-Band	--	--	--	--	--	--

9.4.2.4. RADWIN Ltd. SA0199500 BF 20.5 dBi (11 dBi + 9.5 dBi)

BF = Beam Forming

RESULTS SUMMARY FOR RADIATED BAND-EDGE EMISSIONS

5150 - 5250 MHz

RADWIN Ltd. SA0199500 11 dBi		Band-Edge Freq	Limit 68.2dBµV/m	Limit 54.0dBµV/m	Power Setting
Channel Bandwidth(s)	Operating Frequency (MHz)	MHz	dBµV/m	dBµV/m	
10 MHz	5162.00	5150.00	67.98	49.97	7.5
20 MHz	5165.00	5150.00	67.83	48.58	-1.0
40 MHz	5172.00	5150.00	67.39	48.75	-8.0
80 MHz	5194.00	5150.00	67.69	48.07	-6.0

Click on the links to view the data.

Equipment Configuration for Restricted Lower Band-Edge Emissions

Antenna:	RADWIN Ltd. SA0199500 20.5 dBi	**Variant:**	10MHz
Antenna Gain (dBi):	11.00	**Modulation:**	OFDM
Beam Forming Gain (Y):	9.5	**Duty Cycle (%):**	
Channel Frequency (MHz):	5162.00	**Data Rate:**	0.00 MBit/s
Power Setting:	7.5	**Tested By:**	JMH

Test Measurement Results

4500.00 - 5250.00 MHz												
Num	**Frequency MHz**	**Raw dBµV**	**Cable Loss dB**	**AF dB**	**Level dBµV/m**	**Measurement Type**	**Pol**	**Hgt cm**	**Azt Deg**	**Limit dBµV/m**	**Margin dB**	**Pass /Fail**
#1	5150.00	11.51	3.06	35.40	49.97	Max Avg	Vertical	153	2	54.0	-4.0	Pass
#2	5150.00	29.52	3.06	35.40	67.98	Max Peak	Vertical	153	2	68.2	-0.3	Pass
#3	5150.00	--	--	--	--	Restricted-Band	--	--	--	--	--	--
Test Notes: EUT powered by POE and connected to laptop outside chamber												

Equipment Configuration for Restricted Lower Band-Edge Emissions

Antenna:	RADWIN Ltd. SA0199500 20.5 dBi	**Variant:**	20MHz
Antenna Gain (dBi):	11.00	**Modulation:**	OFDM
Beam Forming Gain (Y):	9.50	**Duty Cycle (%):**	
Channel Frequency (MHz):	5165.00	**Data Rate:**	0.00 MBit/s
Power Setting:	-1.0	**Tested By:**	JMH

Test Measurement Results

4500.00 - 5250.00 MHz												
Num	**Frequency MHz**	**Raw dBµV**	**Cable Loss dB**	**AF dB**	**Level dBµV/m**	**Measurement Type**	**Pol**	**Hgt cm**	**Azt Deg**	**Limit dBµV/m**	**Margin dB**	**Pass /Fail**
#1	5150.00	10.12	3.06	35.40	48.58	Max Avg	Vertical	153	2	54.0	-5.4	Pass
#2	5150.00	29.37	3.06	35.40	67.83	Max Peak	Vertical	153	2	68.2	-0.4	Pass
#3	5150.00	--	--	--	--	Restricted-Band	--	--	--	--	--	--
Test Notes: EUT powered by POE and connected to laptop outside chamber												

Equipment Configuration for Restricted Lower Band-Edge Emissions

Antenna:	RADWIN Ltd. SA0199500 20.5 dBi	**Variant:**	40MHz
Antenna Gain (dBi):	11.00	**Modulation:**	OFDM
Beam Forming Gain (Y):	9.50	**Duty Cycle (%):**	
Channel Frequency (MHz):	5173.00	**Data Rate:**	0.00 MBit/s
Power Setting:	-8	**Tested By:**	JMH

Test Measurement Results

4500.00 - 5250.00 MHz												
Num	**Frequency MHz**	**Raw dBµV**	**Cable Loss dB**	**AF dB**	**Level dBµV/m**	**Measurement Type**	**Pol**	**Hgt cm**	**Azt Deg**	**Limit dBµV/m**	**Margin dB**	**Pass /Fail**
#1	5150.00	10.29	3.06	35.40	48.75	Max Avg	Vertical	153	2	54.0	-5.3	Pass
#2	5150.00	28.93	3.06	35.40	67.39	Max Peak	Vertical	153	2	68.2	-0.8	Pass
#3	5150.00	--	--	--	--	Restricted-Band	--	--	--	--	--	--
Test Notes: EUT powered by POE and connected to laptop outside chamber. Moved in 1 MHz to 5173 MHz												

Equipment Configuration for Restricted Lower Band-Edge Emissions

Antenna:	RADWIN Ltd. SA0199500 20.5 dBi	**Variant:**	80MHz
Antenna Gain (dBi):	11.00	**Modulation:**	OFDM
Beam Forming Gain (Y):	9.50	**Duty Cycle (%):**	
Channel Frequency (MHz):	5194.00	**Data Rate:**	0.00 MBit/s
Power Setting:	-6	**Tested By:**	JMH

Test Measurement Results

4500.00 - 5250.00 MHz												
Num	**Frequency MHz**	**Raw dBµV**	**Cable Loss dB**	**AF dB**	**Level dBµV/m**	**Measurement Type**	**Pol**	**Hgt cm**	**Azt Deg**	**Limit dBµV/m**	**Margin dB**	**Pass /Fail**
#1	5150.00	9.61	3.06	35.40	48.07	Max Avg	Vertical	153	2	54.0	-5.9	Pass
#2	5150.00	29.23	3.06	35.40	67.69	Max Peak	Vertical	153	2	68.2	-0.5	Pass
#3	5150.00	--	--	--	--	Restricted-Band	--	--	--	--	--	--
Test Notes: EUT powered by POE and connected to laptop outside chamber												

9.4.3. Digital Emissions

FCC, Part 15 Subpart C §15.205/ §15.209

Test Procedure

Testing 30M-1 GHz was performed in a 3-meter anechoic chamber using a CISPR compliant receiver. Preliminary radiated emissions were measured on every azimuth and with the receiving antenna in both horizontal and vertical polarizations. To further maximize emissions the receive antenna was varied between 1 and 4 meters. The emissions are recorded with receiver in peak hold mode. Emissions closest to the limits are measured in the quasi-peak mode with the tuned receiver using a bandwidth of 120 kHz. Only the highest emissions relative to the limit are listed. The anechoic chamber test set-up is identified in Section 6 Test Set-Up Photographs.

The EUT had two methods of powering on ac/dc converter and Power over Ethernet (POE). Both modes were tested for emissions below 1GHz.

Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Loss, and subtracting Amplifier Gain from the measured reading. In this test facility, the Antenna Factor, Cable Loss, and Amplifier Gains are loaded into the Rohde & Schwarz Receiver and the corrected field strength can be read directly on the receiver.

$$FS = R + AF + CORR$$

where:

FS = Field Strength
R = Measured Receiver Input Amplitude
AF = Antenna Factor
CORR = Correction Factor = CL – AG + NFL
CL = Cable Loss
AG = Amplifier Gain

For example:
Given a Receiver input reading of 51.5dBμV; Antenna Factor of 8.5dB; Cable Loss of 1.3dB; Falloff Factor of 0dB, an Amplifier Gain of 26dB and Notch Filter Loss of 1dB. The Field Strength of the measured emission is:

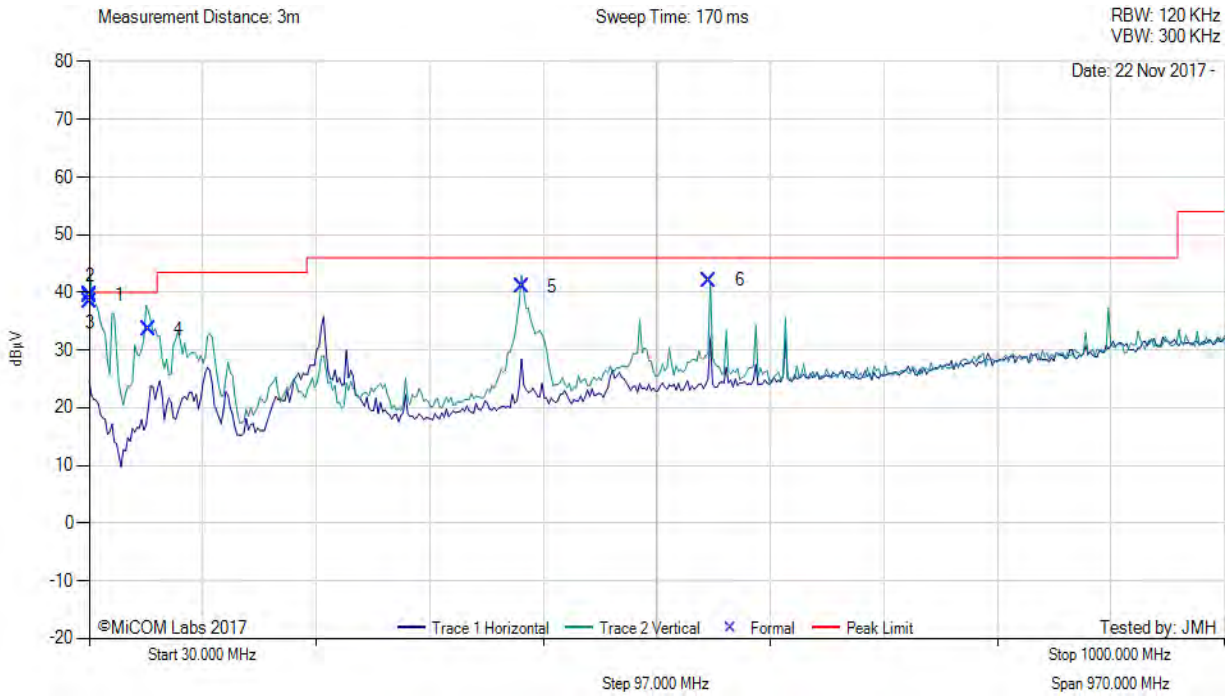
$$FS = 51.5 + 8.5 + 1.3 - 26.0 + 1 = 36.3 dB\mu V/m$$

Conversion between dBμV/m (or dBμV) and μV/m (or μV) are done as:

$$Level\ (dB\mu V/m) = 20 * Log\ (level\ (\mu V/m))$$

40 dBμV/m = 100μV/m
48 dBμV/m = 250μV/m

Variant: Digital Emissions, Test Freq: 3680.00 MHz, Power Setting: 24



30.00 - 1000.00 MHz												
Num	**Frequency MHz**	**Raw dBµV**	**Cable Loss dB**	**AF dB**	**Level dBµV/m**	**Measurement Type**	**Pol**	**Hgt cm**	**Azt Deg**	**Limit dBµV/m**	**Margin dB**	**Pass /Fail**
1	30.01	46.55	3.41	-10.38	39.58	MaxQP	Vertical	101	274	40.0	-0.4	Pass
2	30.48	46.36	3.41	-10.38	39.39	MaxQP	Vertical	100	0	40.0	-0.6	Pass
3	30.87	45.36	3.41	-10.38	38.39	MaxQP	Vertical	120	0	40.0	-1.6	Pass
4	80.40	53.31	3.72	-23.42	33.61	MaxQP	Vertical	109	327	40.0	-6.4	Pass
5	400.02	51.10	4.88	-15.05	40.93	MaxQP	Vertical	118	356	46.0	-5.1	Pass
6	560.00	48.73	5.34	-11.98	42.09	MaxQP	Vertical	169	353	46.0	-3.9	Pass

Test Notes: EUT powered by POE, connected to laptop outside chamber

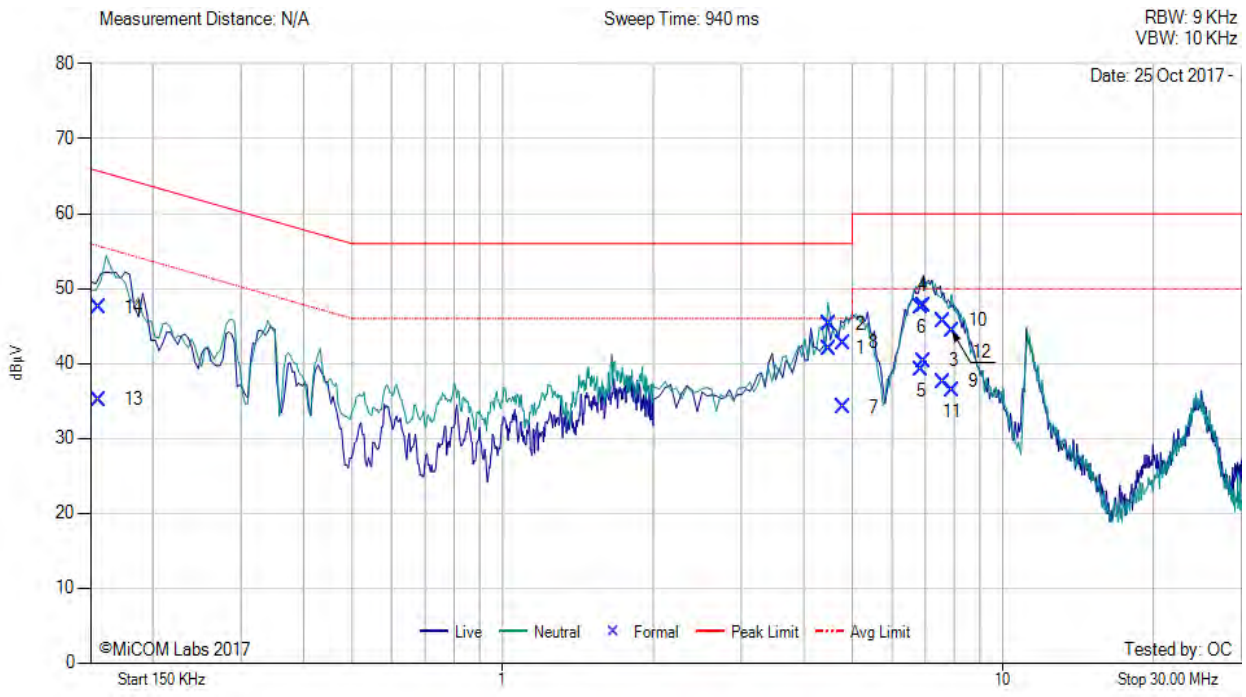
9.5. AC Wireline Conducted Emissions (150 kHz – 30 MHz)

FCC, Part 15 Subpart C §15.207

Test Procedure
The EUT is configured in accordance with ANSI C63.4. The conducted emissions are measured in a shielded room with a spectrum analyzer in peak hold in the first instance. Emissions closest to the limit are measured in the quasi-peak mode (QP) with the tuned receiver using a bandwidth of 9 kHz. The emissions are maximized further by cable manipulation. The highest emissions relative to the limit are listed.

Test Set-up is shown in Section 4.1 Test Equipment Configurations/Radiated Testing

Variant: AC Wireline, Test Freq: 0.15 - 30 MHz

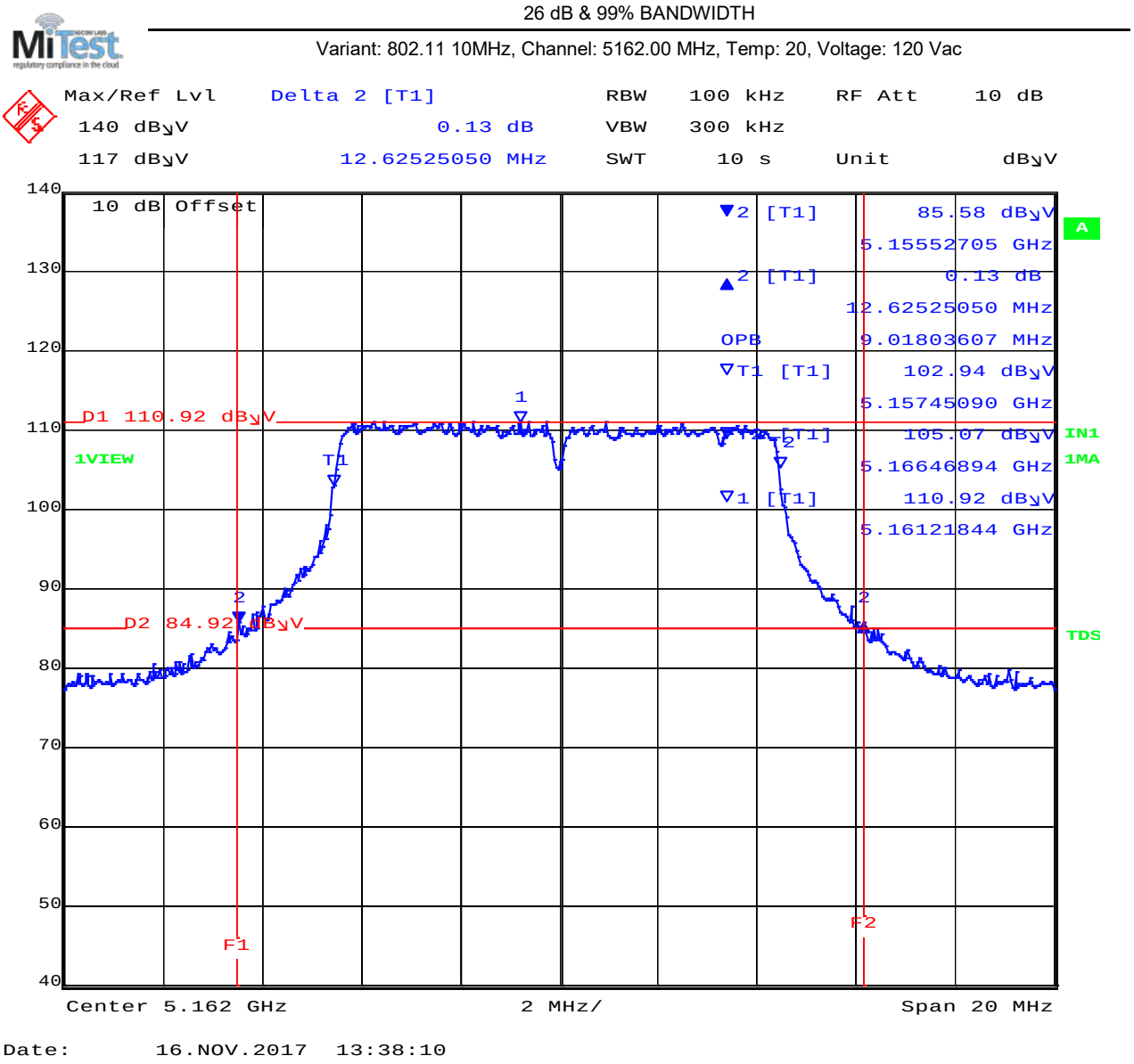


Num	Frequency MHz	Raw dBµV	Cable Loss dB	Factor dB	Total Correction dBµV	Corrected Value dBµV	Measurement Type	Line	Limit dBµV/m	Margin dB	Pass /Fail
1	4.505	31.73	0.25	10.07	10.32	42.05	Max Avg	Neutral	46.0	-4.0	Pass
2	4.505	34.98	0.25	10.07	10.32	45.30	Max Qp	Neutral	56.0	-10.7	Pass
3	6.933	29.82	0.36	10.17	10.53	40.35	Max Avg	Live	50.0	-9.7	Pass
4	6.933	37.09	0.36	10.17	10.53	47.62	Max Qp	Live	60.0	-12.4	Pass
5	6.886	28.66	0.36	10.17	10.53	39.19	Max Avg	Neutral	50.0	-10.8	Pass
6	6.886	37.05	0.36	10.17	10.53	47.58	Max Qp	Neutral	60.0	-12.4	Pass
7	4.790	23.85	0.26	10.08	10.34	34.19	Max Avg	Live	46.0	-11.8	Pass
8	4.790	32.42	0.26	10.08	10.34	42.76	Max Qp	Live	56.0	-13.2	Pass
9	7.591	27.02	0.41	10.16	10.57	37.59	Max Avg	Live	50.0	-12.4	Pass
10	7.591	35.12	0.41	10.16	10.57	45.69	Max Qp	Live	60.0	-14.3	Pass
11	7.916	25.72	0.43	10.17	10.60	36.32	Max Avg	Neutral	50.0	-13.7	Pass
12	7.916	33.72	0.43	10.17	10.60	44.32	Max Qp	Neutral	60.0	-15.7	Pass
13	0.156	25.20	0.05	9.92	9.97	35.17	Max Avg	Neutral	55.8	-20.7	Pass
14	0.156	37.50	0.05	9.92	9.97	47.47	Max Qp	Neutral	65.8	-18.4	Pass

Test Notes: Model: Jet Duo DB. PoE powered configuration. 120V, 60Hz

A. APPENDIX - GRAPHICAL IMAGES

A.1. 26 dB & 99% Bandwidth

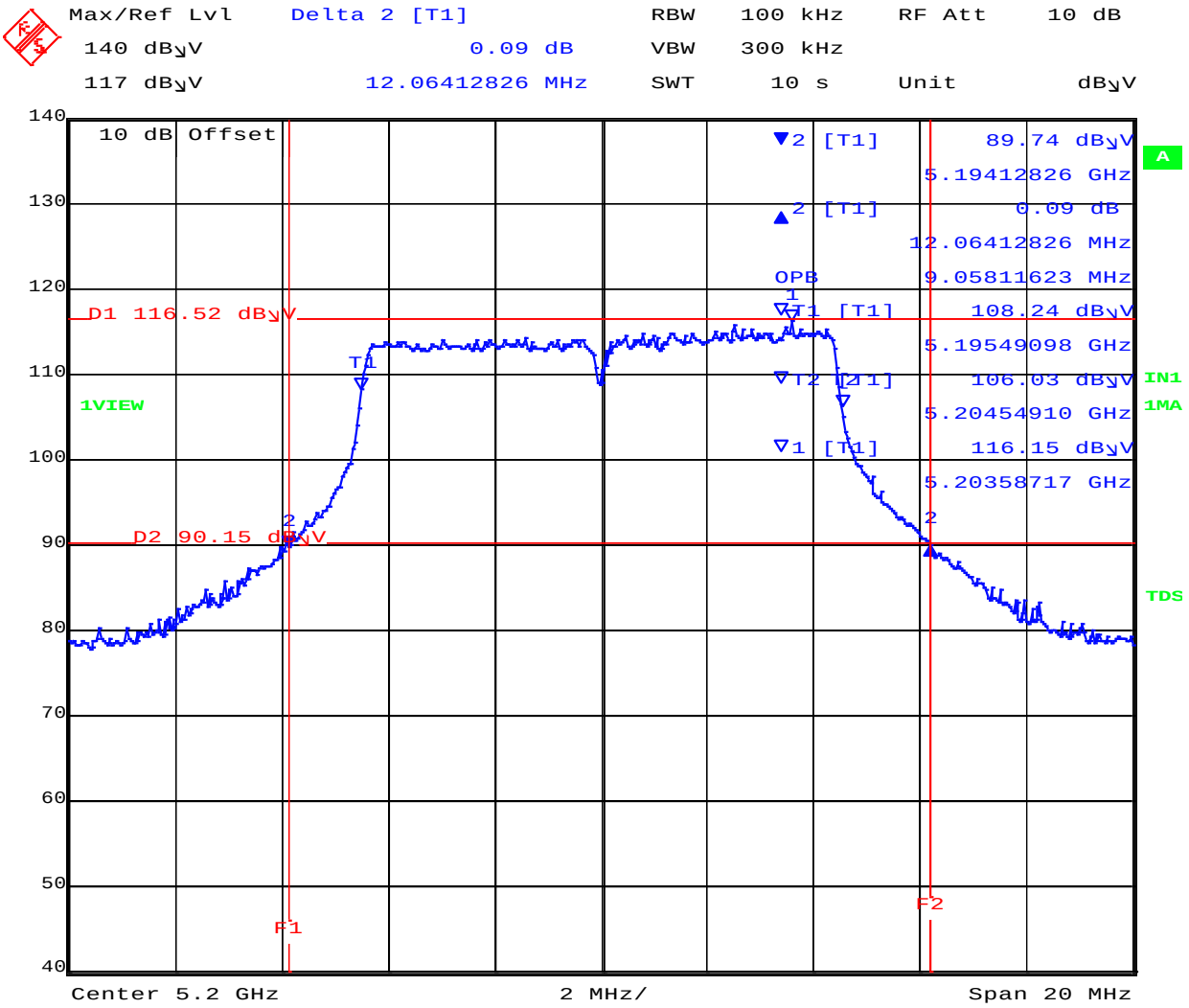


Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 0 Trace Mode = MAX HOLD	T1 : 5157.45090 MHz : 102.94 dBuV T2 : 5166.46894 MHz : 105.07 dBuV OBW : 9.01 MHz	Measured 26 dB Bandwidth: 12.63 MHz Measured 99% Bandwidth: 9.01 MHz

back to matrix

26 dB & 99% BANDWIDTH

Variant: 802.11 10MHz, Channel: 5200.00 MHz, Temp: 20, Voltage: 120 Vac

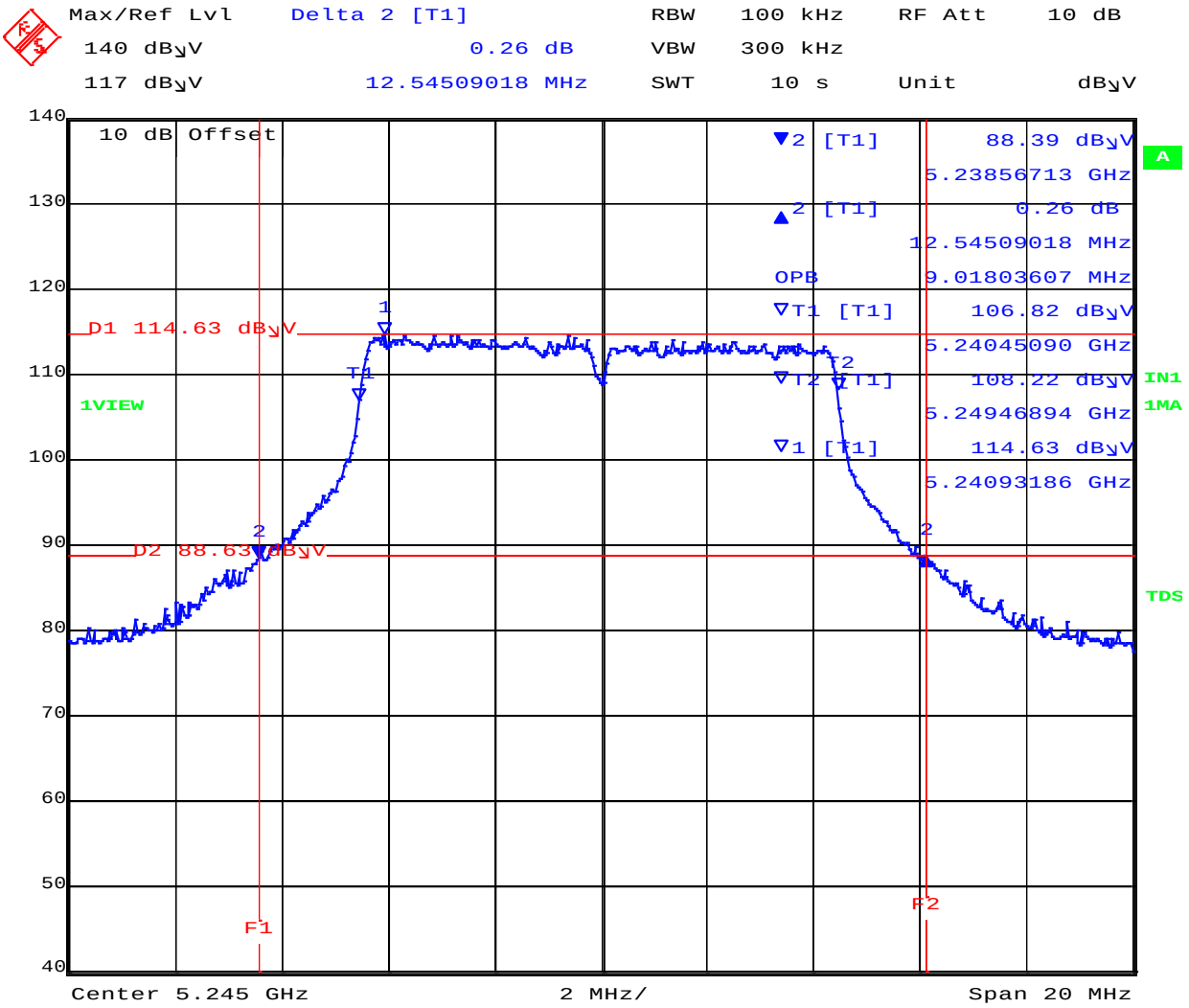


Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 0 Trace Mode = MAX HOLD	T1 : 5195.49098MHz : 108.24 dBuV T2 : 5204.54910 MHz : 106.03 dBuV OBW : 9.06 MHz	Measured 26 dB Bandwidth: 12.06 MHz Measured 99% Bandwidth: 9.06 MHz

back to matrix

26 dB & 99% BANDWIDTH

Variant: 802.11 10MHz, Channel: 5245.00 MHz, Temp: 20, Voltage: 120 Vac

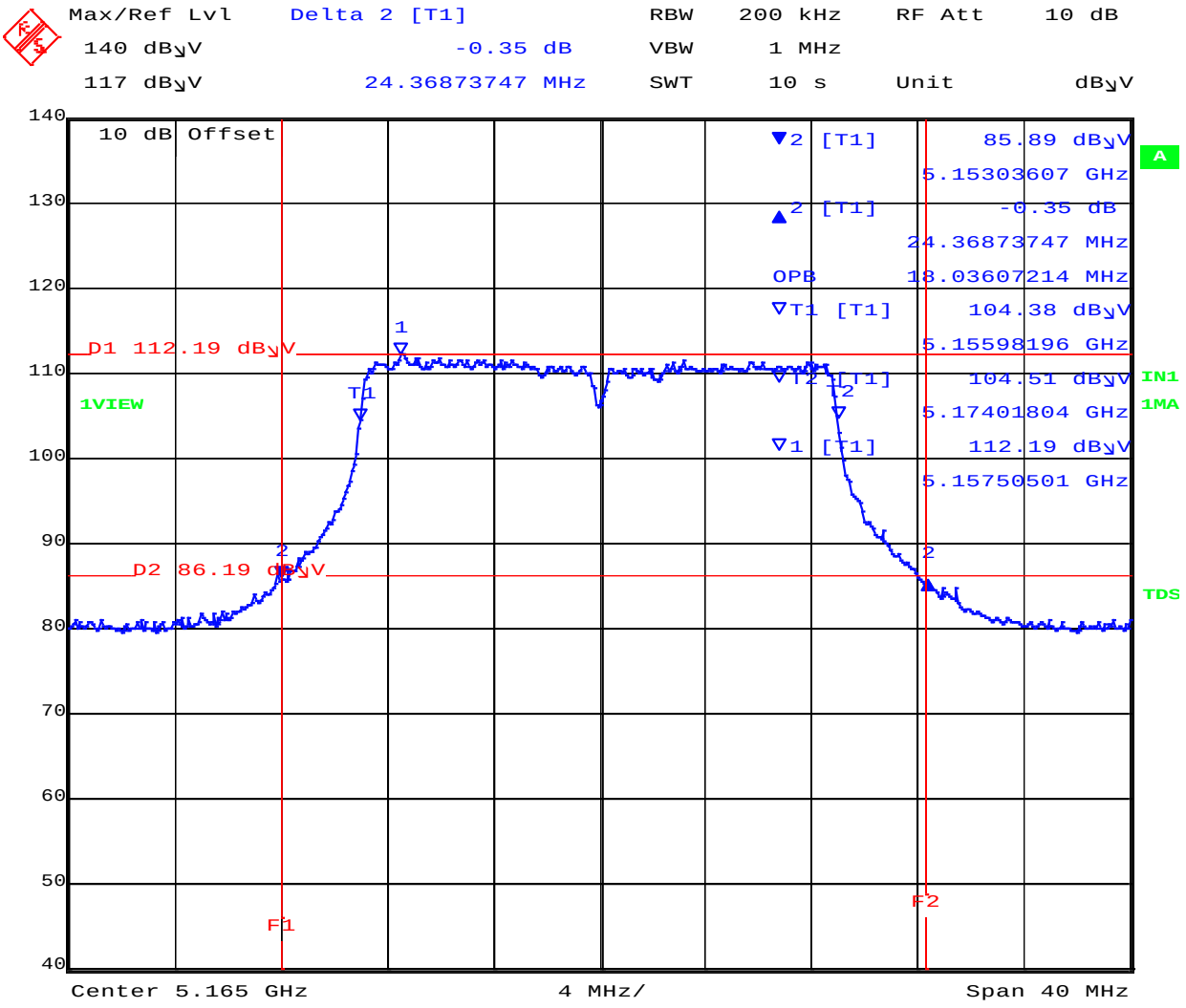


Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 0 Trace Mode = MAX HOLD	T1 : 5240.45090 MHz : 106.82 dBuV T2 : 5249.46894 MHz : 108.22 dBuV OBW : 9.02 MHz	Measured 26 dB Bandwidth: 12.54 MHz Measured 99% Bandwidth: 9.02 MHz

back to matrix

26 dB & 99% BANDWIDTH

Variant: 802.11 20MHz, Channel: 5165.00 MHz, Temp: 20, Voltage: 120 Vac

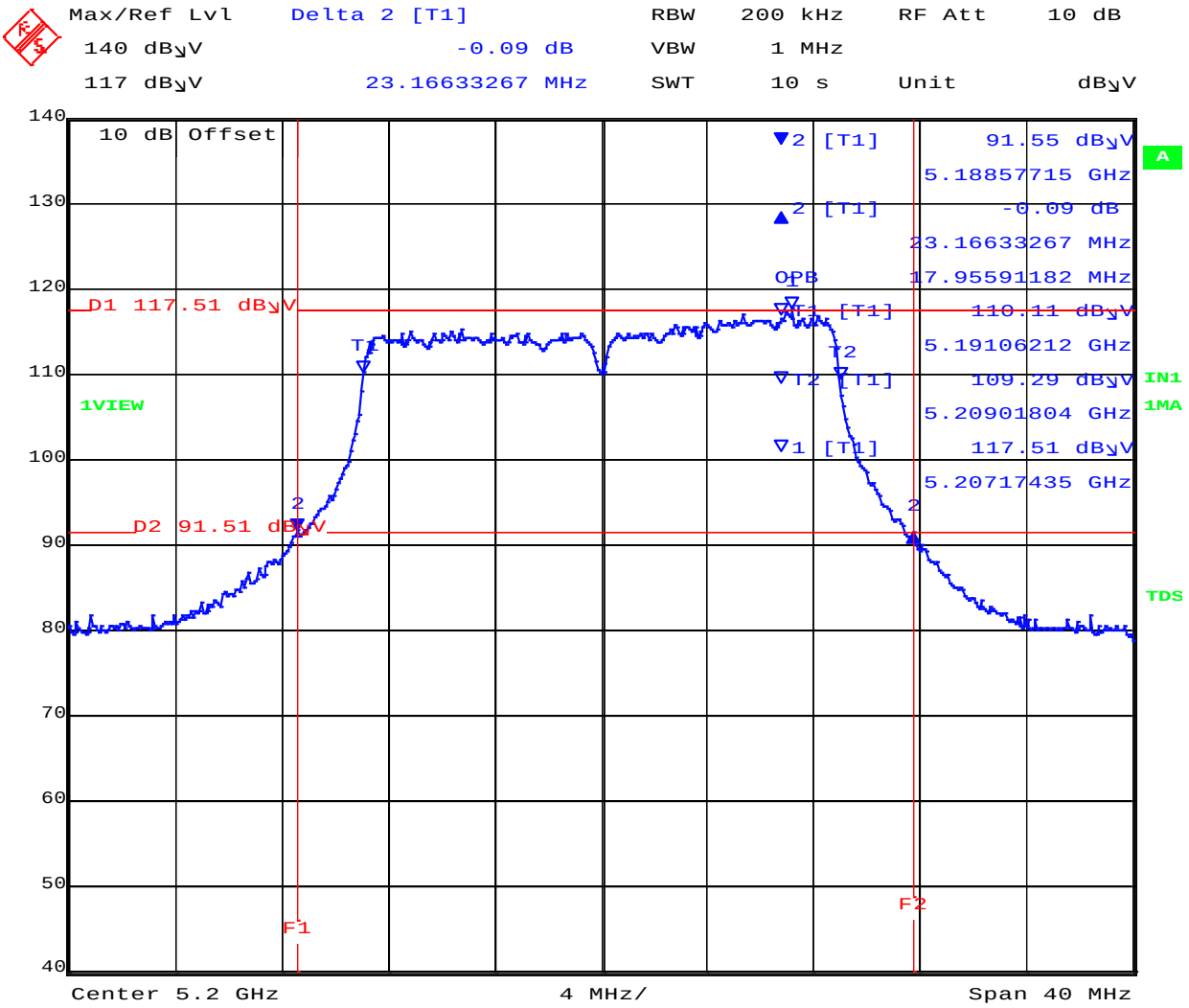


Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 0 Trace Mode = MAX HOLD	T1 : 5155.98196 MHz : 104.38 dBuV T2 : 5174.01804 MHz : 110.44 dBuV OBW : 18.04 MHz	Measured 26 dB Bandwidth: 24.37 MHz Measured 99% Bandwidth: 18.04 MHz

back to matrix

26 dB & 99% BANDWIDTH

Variant: 802.11 20MHz, Channel: 5200.00 MHz, Temp: 20, Voltage: 120 Vac

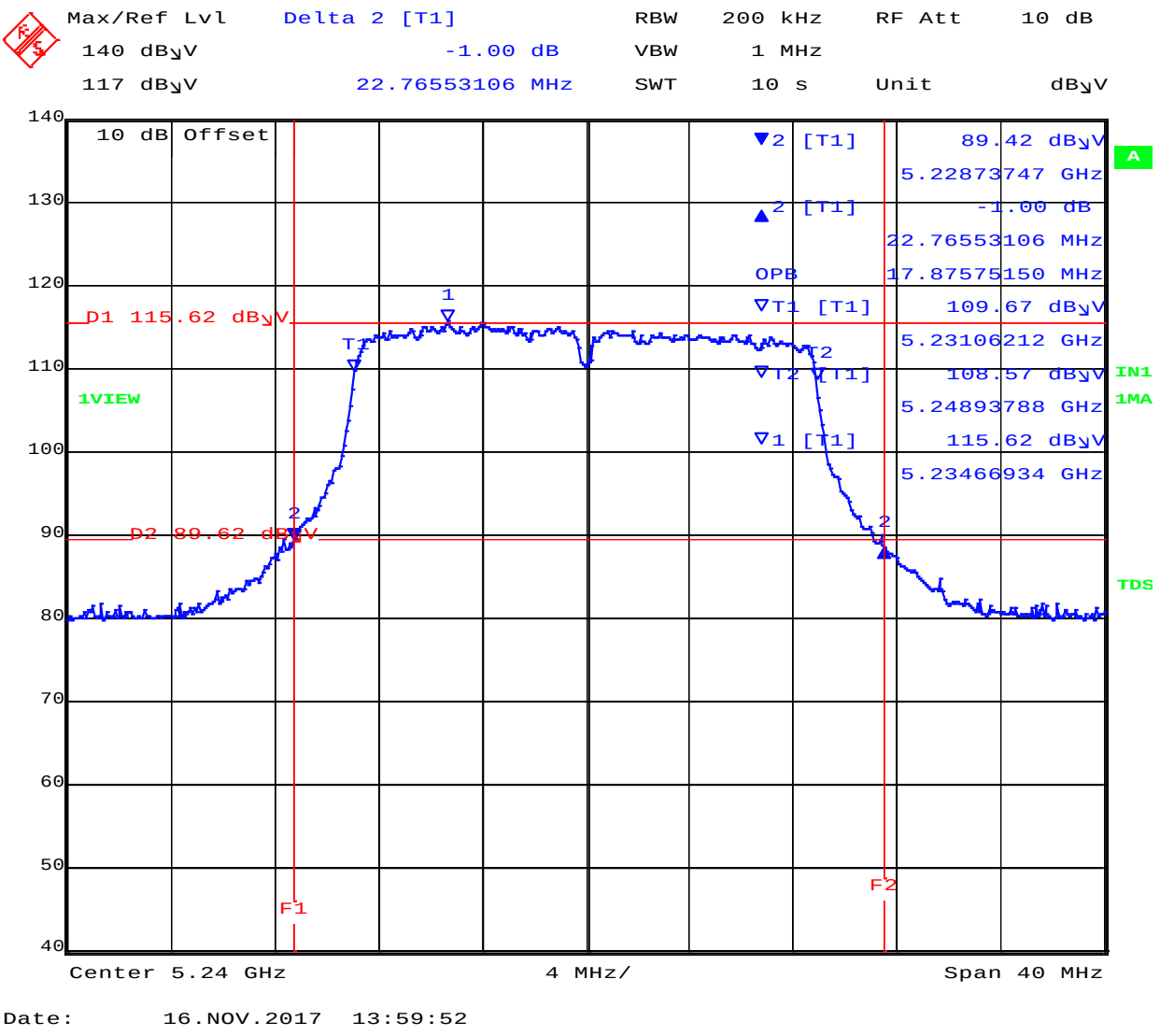


Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 0 Trace Mode = MAX HOLD	T1 : 5191.06212 MHz : 110.11 dBuV T2 : 5209.01804 MHz : 109.29 dBuV OBW : 17.96 MHz	Measured 26 dB Bandwidth: 23.17 MHz Measured 99% Bandwidth: 17.96 MHz

back to matrix

26 dB & 99% BANDWIDTH

Variant: 802.11 20MHz, Channel: 5240.00 MHz, Temp: 20, Voltage: 120 Vac

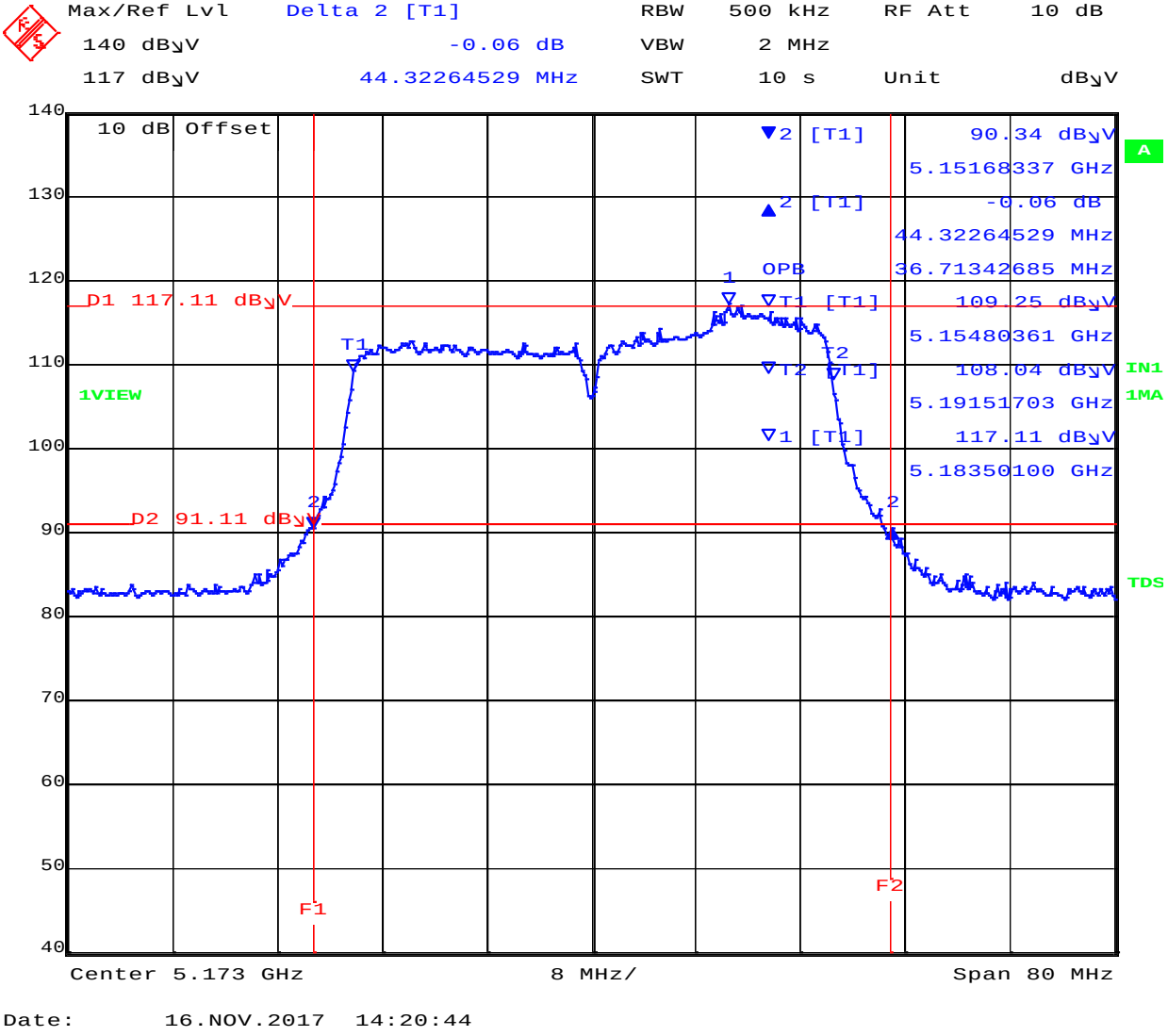


Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 0 Trace Mode = MAX HOLD	T1 : 5231.06212 MHz : 109.67 dBuV T2 : 5248.93788 MHz : 108.57 dBuV OBW : 17.88 MHz	Measured 26 dB Bandwidth: 22.77 MHz Measured 99% Bandwidth: 17.88 MHz

back to matrix

26 dB & 99% BANDWIDTH

Variant: 802.11 40MHz, Channel: 55173.00 MHz, Temp: 20, Voltage: 120 Vac

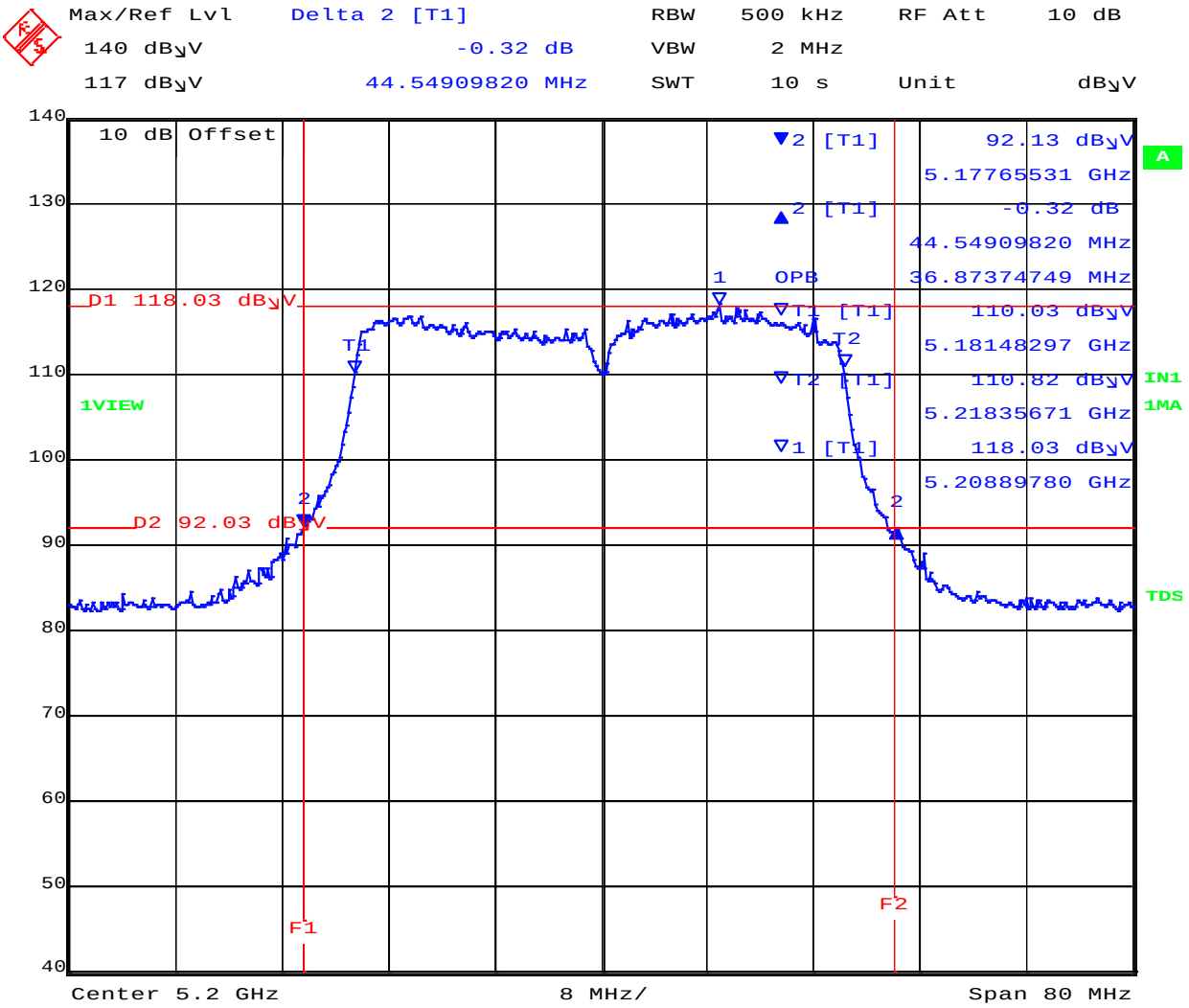


Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 0 Trace Mode = MAX HOLD	T1 : 5154.80361 MHz : 112.03 dBuV T2 : 5191.51703 MHz : 109.96 dBuV OBW : 36.71 MHz	Measured 26 dB Bandwidth: 44.32 MHz Measured 99% Bandwidth: 36.71 MHz

back to matrix

26 dB & 99% BANDWIDTH

Variant: 802.11 40MHz, Channel: 5200.00 MHz, Temp: 20, Voltage: 120 Vac

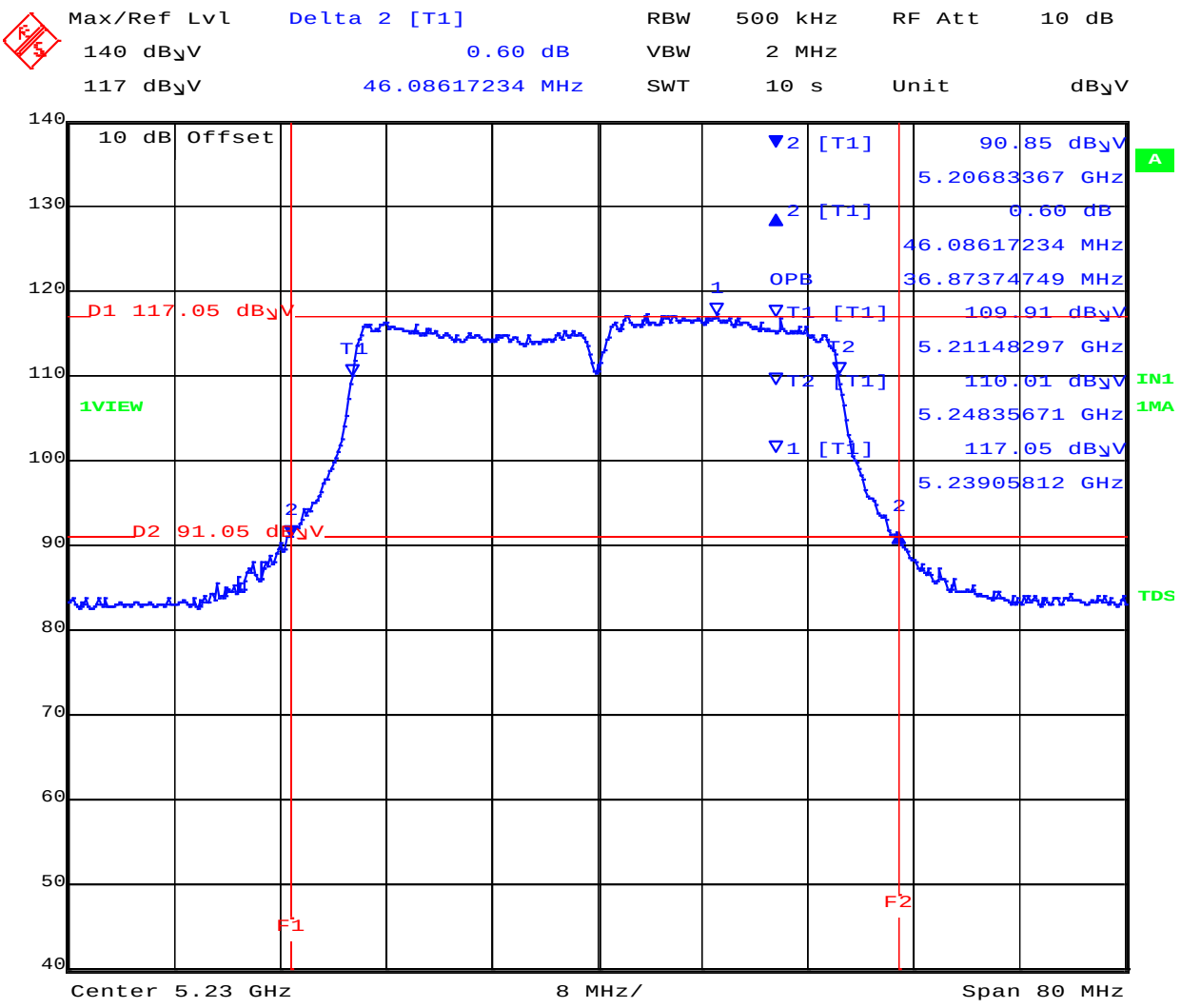


Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 0 Trace Mode = MAX HOLD	T1 : 5181.48297 MHz : 110.03 dBuV T2 : 5218.35671 MHz : 110.82 dBuV OBW : 36.87 MHz	Measured 26 dB Bandwidth: 44.55 MHz Measured 99% Bandwidth: 36.87 MHz

back to matrix

26 dB & 99% BANDWIDTH

Variant: 802.11 40MHz, Channel: 5230.00 MHz, Temp: 20, Voltage: 120 Vac

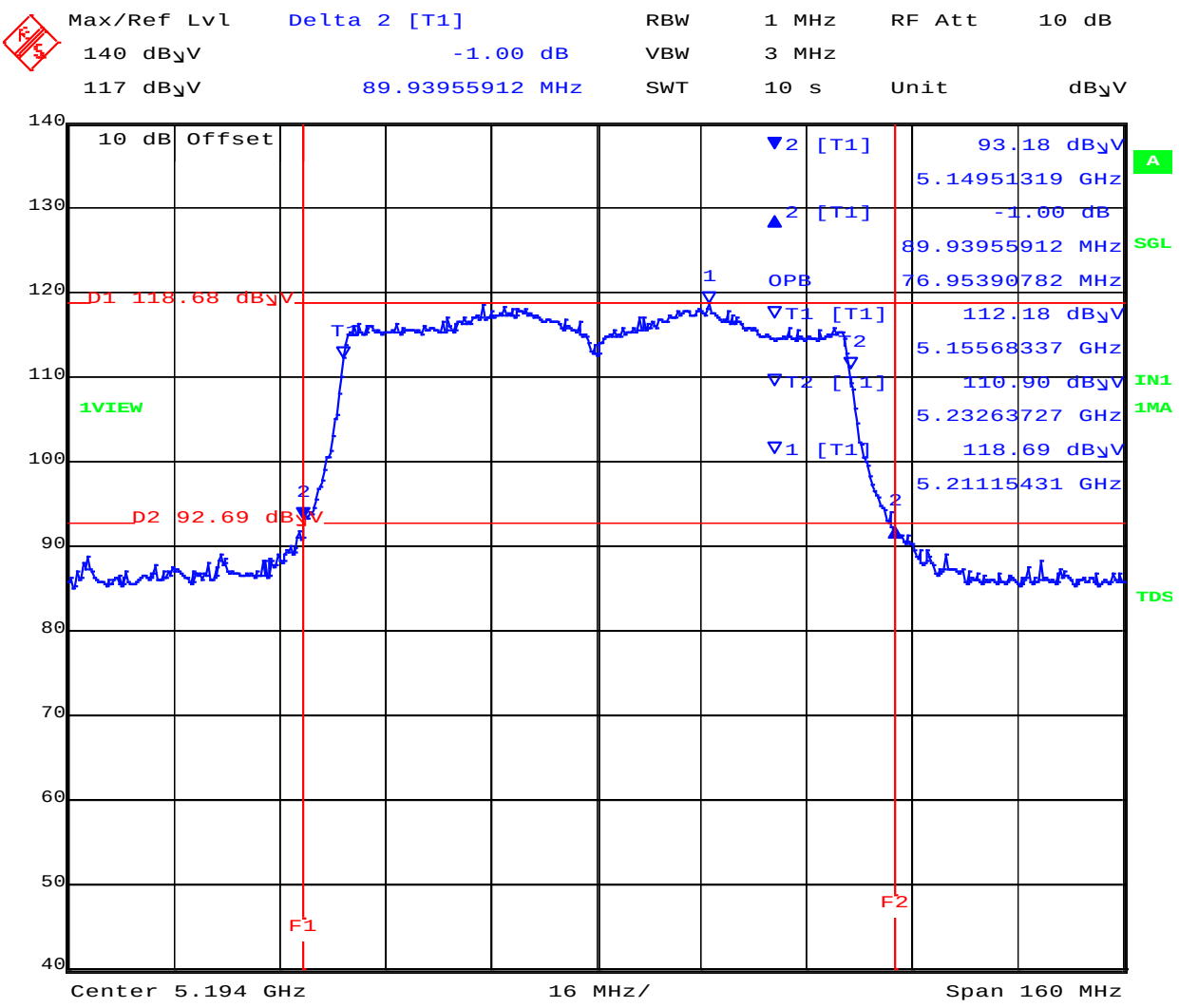


Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 0 Trace Mode = MAX HOLD	T1 : 5211.48297 MHz : 108.58 dBuV T2 : 5248.35671 MHz : 109.78 dBuV OBW : 36.87 MHz	Measured 26 dB Bandwidth: 46.08MHz Measured 99% Bandwidth: 36.87 MHz

back to matrix

26 dB & 99% BANDWIDTH

Variant: 802.11 80MHz, Channel: 5194.00 MHz, Temp: 20, Voltage: 120 Vac

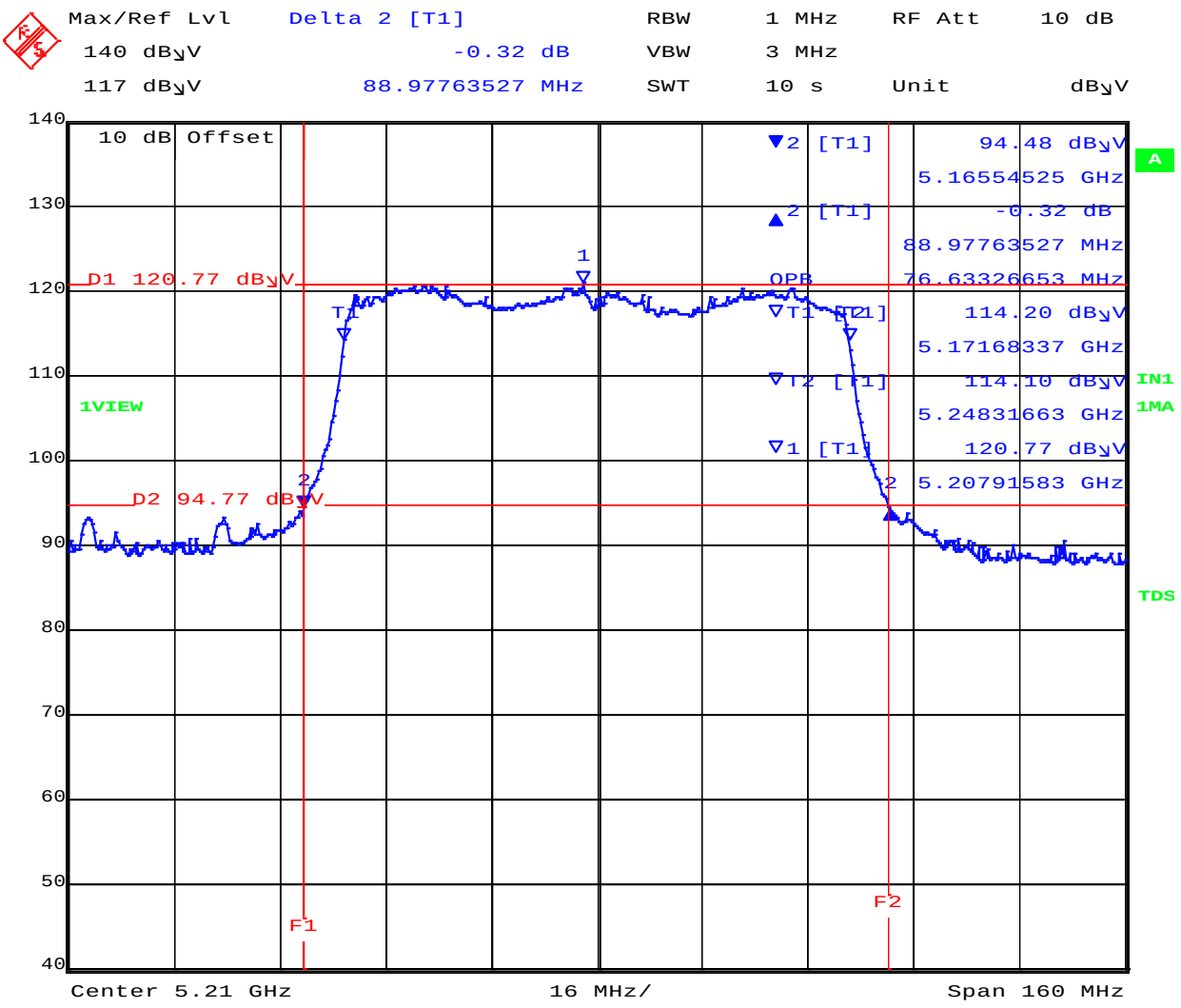


Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 0 Trace Mode = MAX HOLD	T1 : 5155.68337 MHz : 112.18 dBuV T2 : 5232.31663 MHz : 110.90 dBuV OBW : 76.95 MHz	Measured 26 dB Bandwidth: 89.94 MHz Measured 99% Bandwidth: 76.95 MHz

back to matrix

26 dB & 99% BANDWIDTH

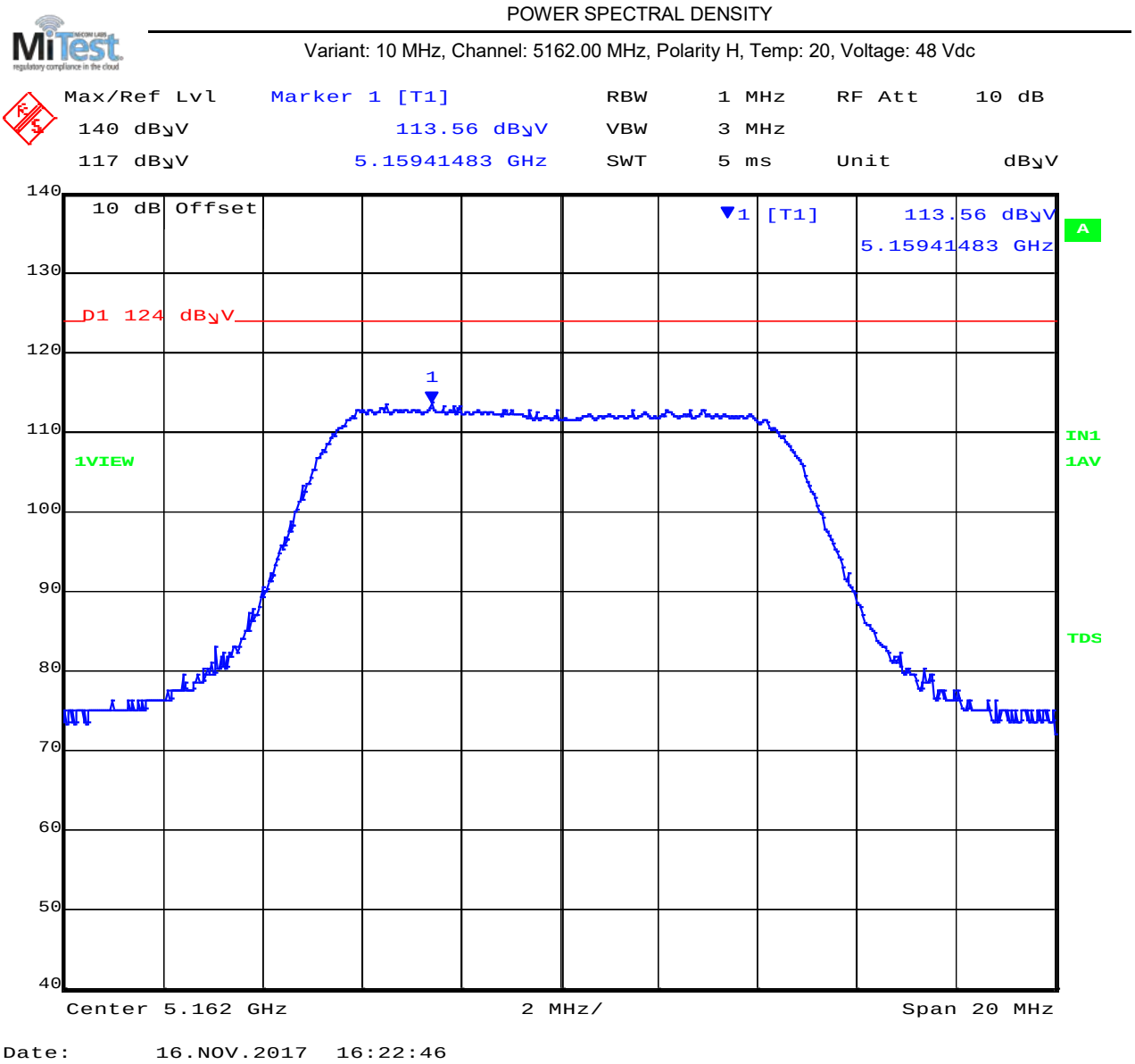
Variant: 802.11 80MHz, Channel: 5210.00 MHz, Temp: 20, Voltage: 120 Vac



Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 0 Trace Mode = MAX HOLD	T1 : 5171.68337 MHz : 114.20 dBuV T2 : 5248.31663 MHz : 114.10 dBuV OBW : 76.63 MHz	Measured 26 dB Bandwidth: 88.98 MHz Measured 99% Bandwidth: 76.63 MHz

back to matrix

A.2. Power Spectral Density

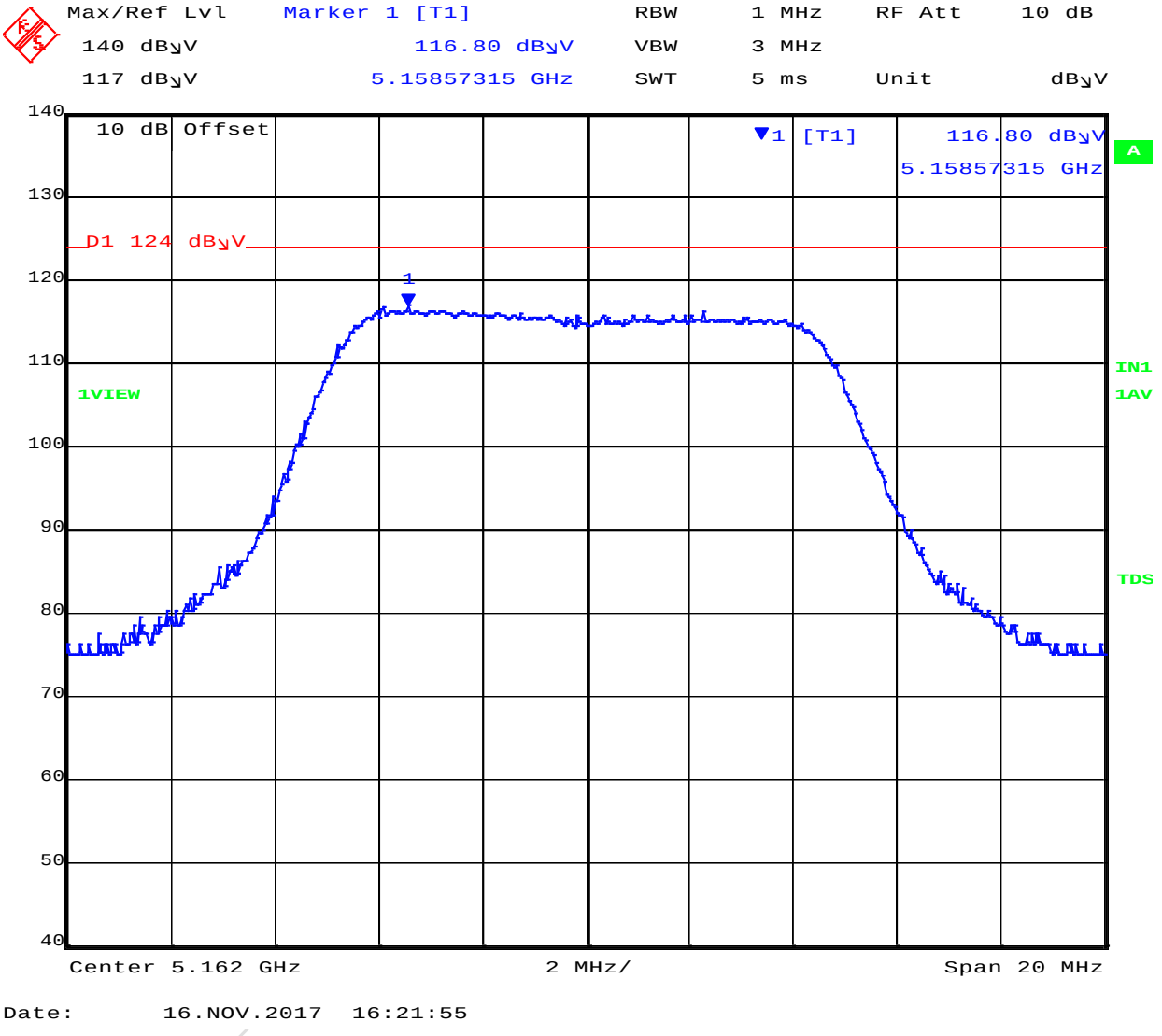


Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = Average Sweep Count = 100 RF Atten (dB) = 0 Trace Mode = VIEW	M1 : 5159.41 MHz : 113.56 dBuV/m	Limit: ≤ 17.00 dBm, 124 dBuVm

back to matrix

POWER SPECTRAL DENSITY

Variant: 10 MHz, Channel: 5162.00 MHz, Polarity V Temp: 20, Voltage: 48 Vdc

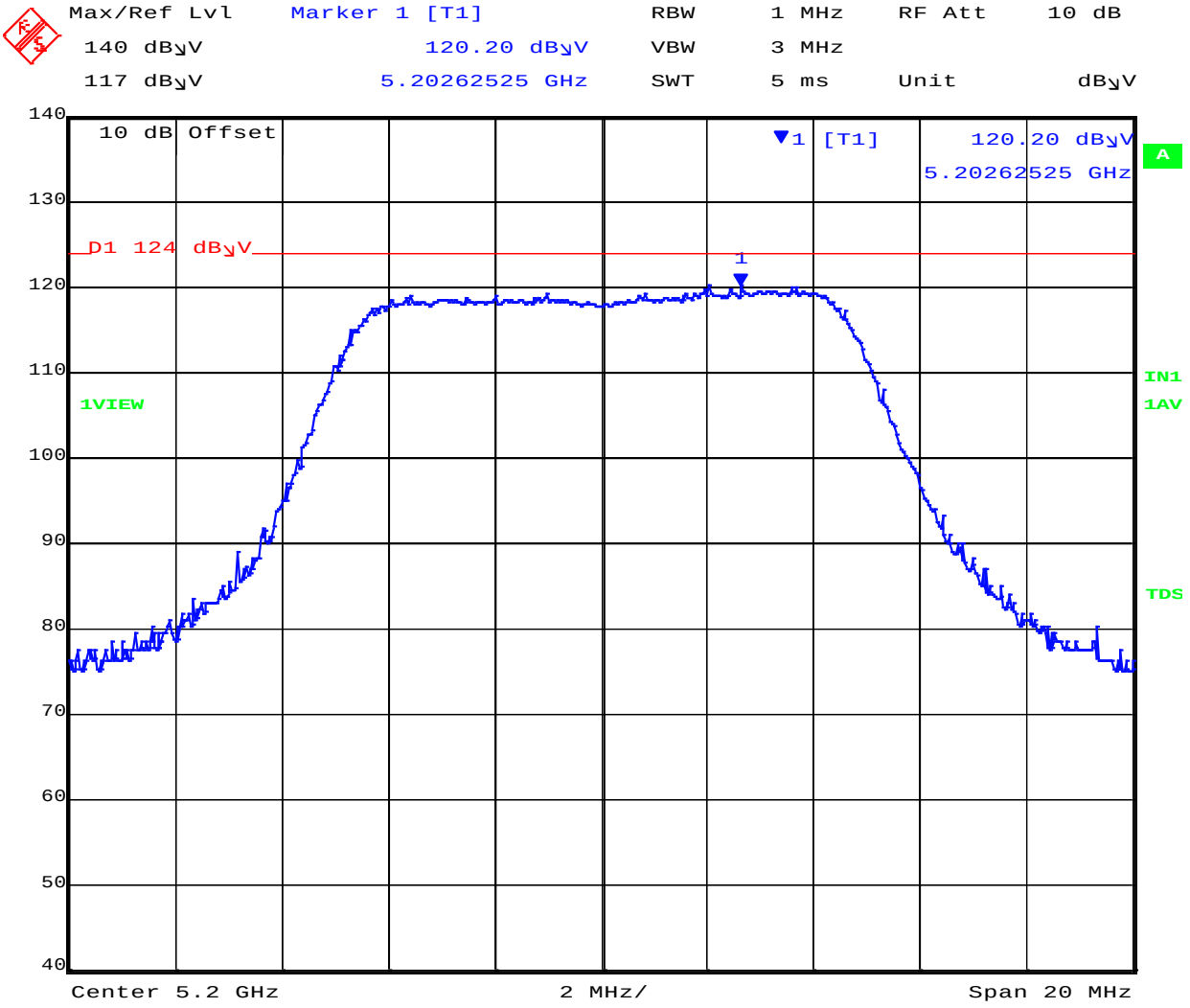


Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = Average Sweep Count = 100 RF Atten (dB) = 0 Trace Mode = VIEW	M1 : 5158.57 MHz :116.80 dBuV/m	Limit: ≤ 17.00 dBm, 124 dBuVm

back to matrix

POWER SPECTRAL DENSITY

Variant: 10 MHz, Channel: 5200.00 MHz, Polarity H, Temp: 20, Voltage: 48 Vdc

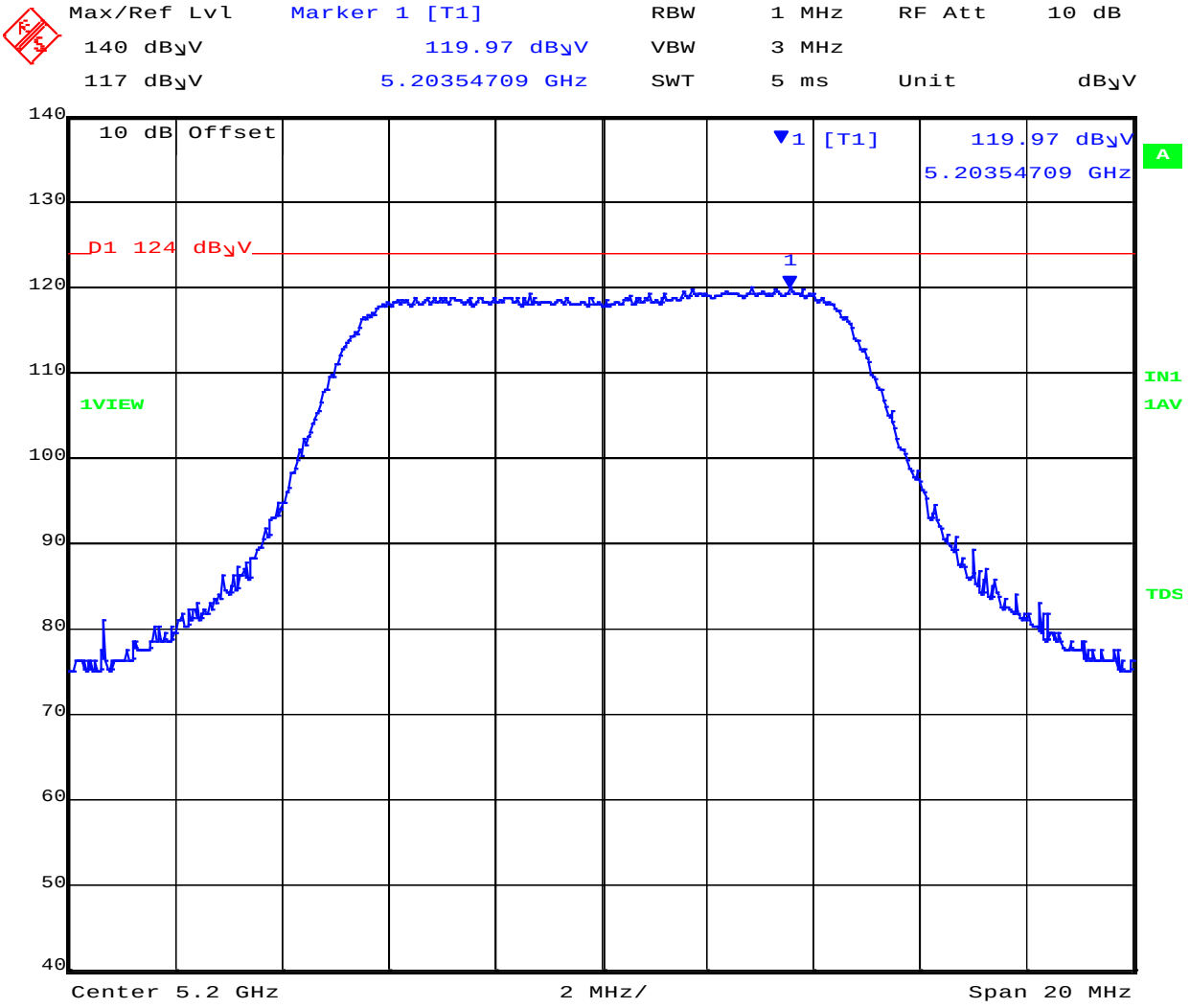


Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = Average Sweep Count = 100 RF Atten (dB) = 0 Trace Mode = VIEW	M1 : 5202.63 MHz : 120.20 dBuV/m	Limit: ≤ 17.00 dBm, 124 dBuVm

back to matrix

POWER SPECTRAL DENSITY

Variant: 10 MHz, Channel: 5200.00 MHz, Polarity V, Temp: 20, Voltage: 48 Vdc

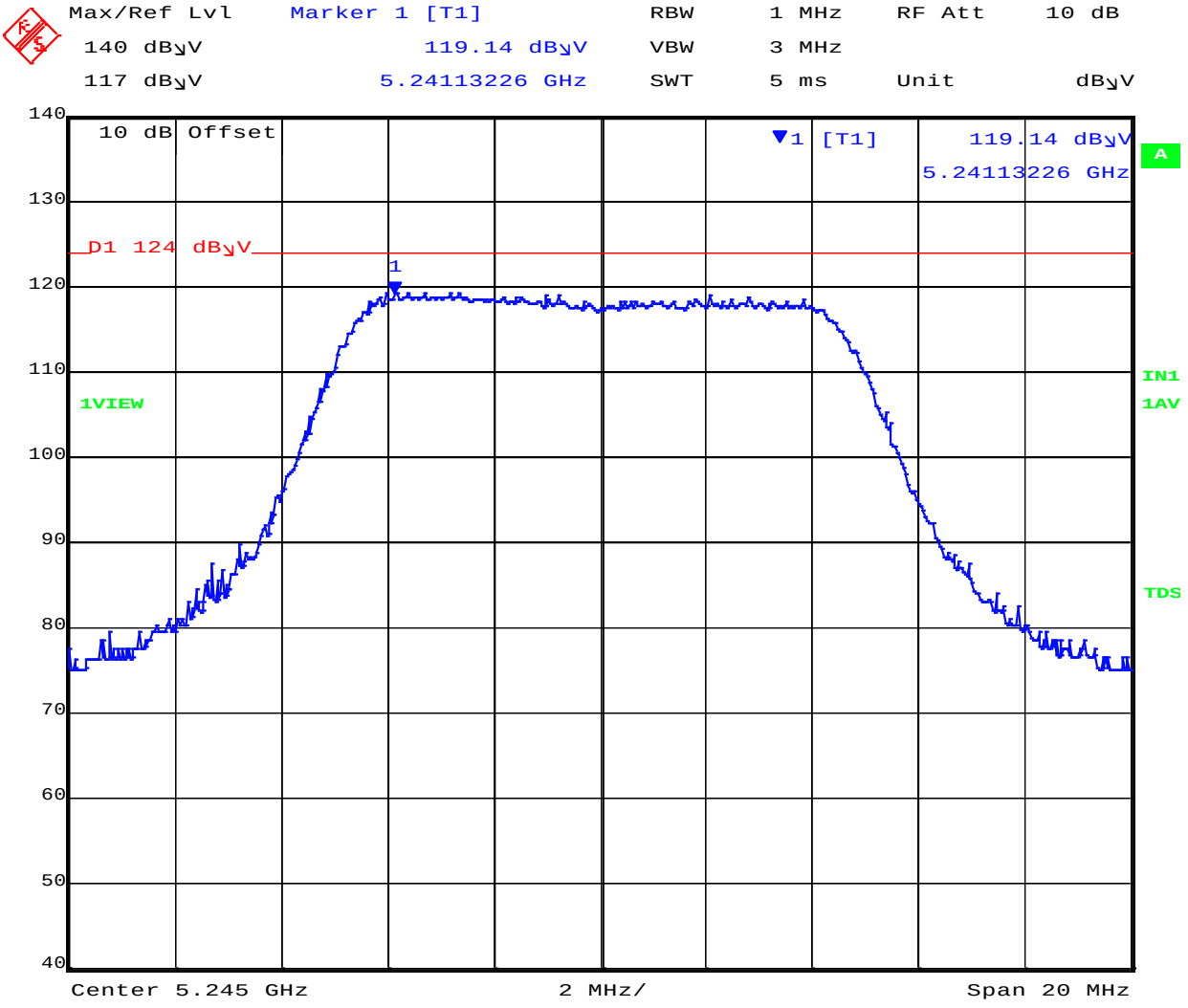


Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = Average Sweep Count = 100 RF Atten (dB) = 0 Trace Mode = VIEW	M1 : 5203.54 MHz : 119.97 dBuV/m	Limit: ≤ 17.00 dBm, 124 dBuVm

back to matrix

POWER SPECTRAL DENSITY

Variant: 10 MHz, Channel: 5245.00 MHz, Polarity H, Temp: 20, Voltage: 48 Vdc

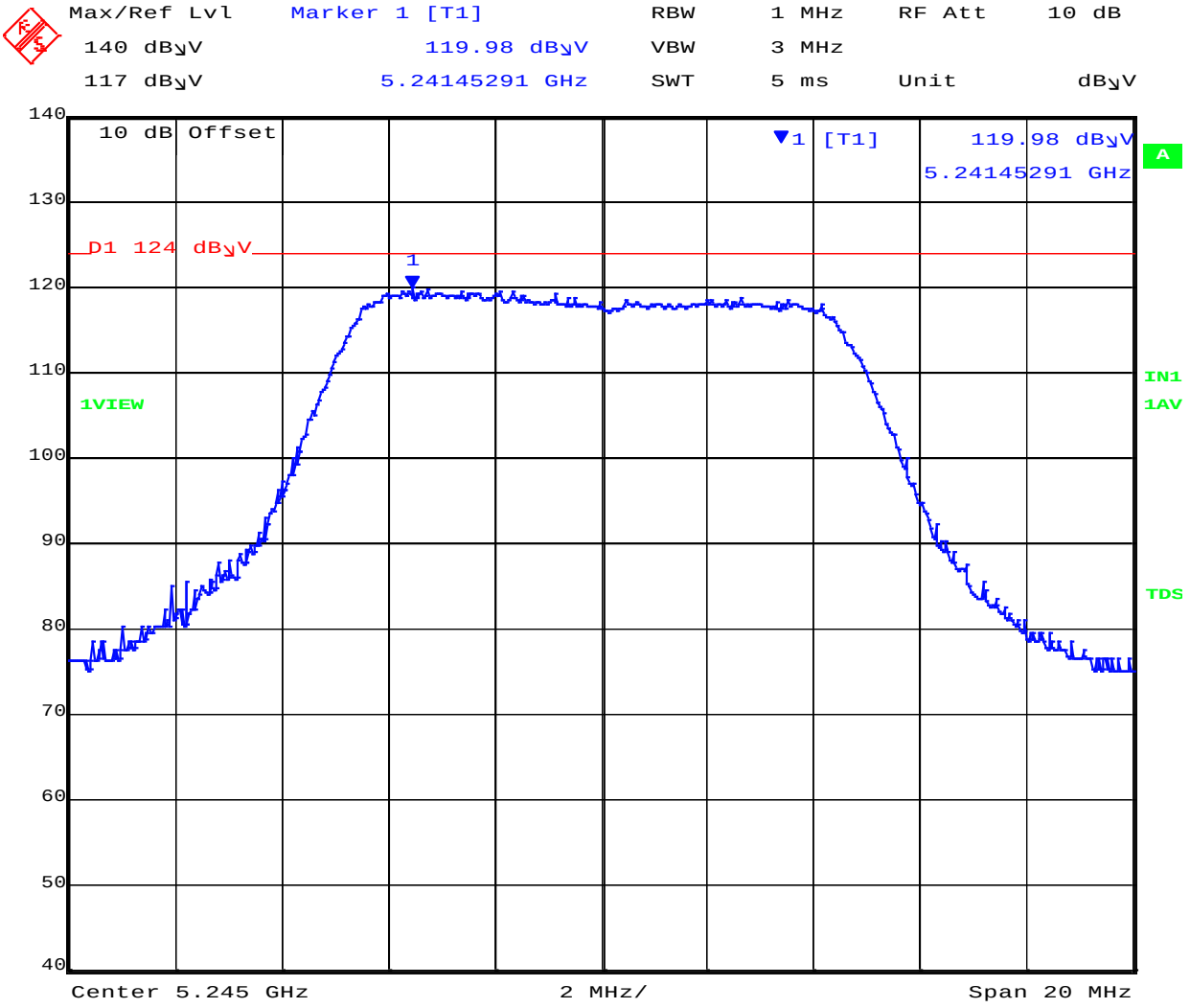


Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = Average Sweep Count = 100 RF Atten (dB) = 0 Trace Mode = VIEW	M1 : 5241.13 MHz : 119.14 dBuV/m	Limit: ≤ 17.00 dBm, 124 dBuVm

back to matrix

POWER SPECTRAL DENSITY

Variant: 10 MHz, Channel: 5245.00 MHz, Polarity V, Temp: 20, Voltage: 48 Vdc

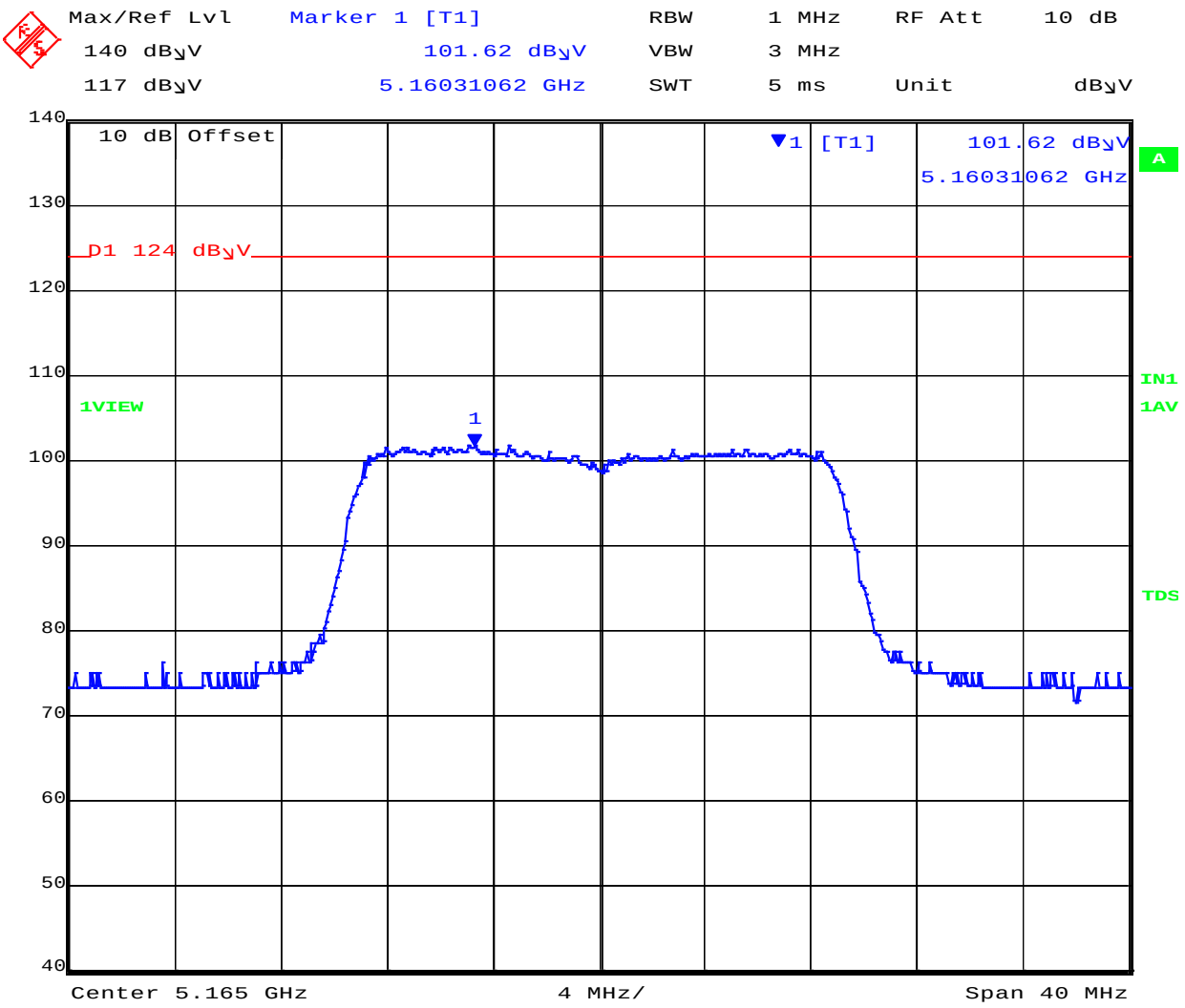


Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = Average Sweep Count = 100 RF Atten (dB) = 0 Trace Mode = VIEW	M1 : 5241.45 MHz : 119.98 dBuV/m	Limit: ≤ 17.00 dBm, 124 dBuVm

back to matrix

POWER SPECTRAL DENSITY

Variant: 20 MHz, Channel: 5165.00 MHz, Polarity H, Temp: 20, Voltage: 48 Vdc

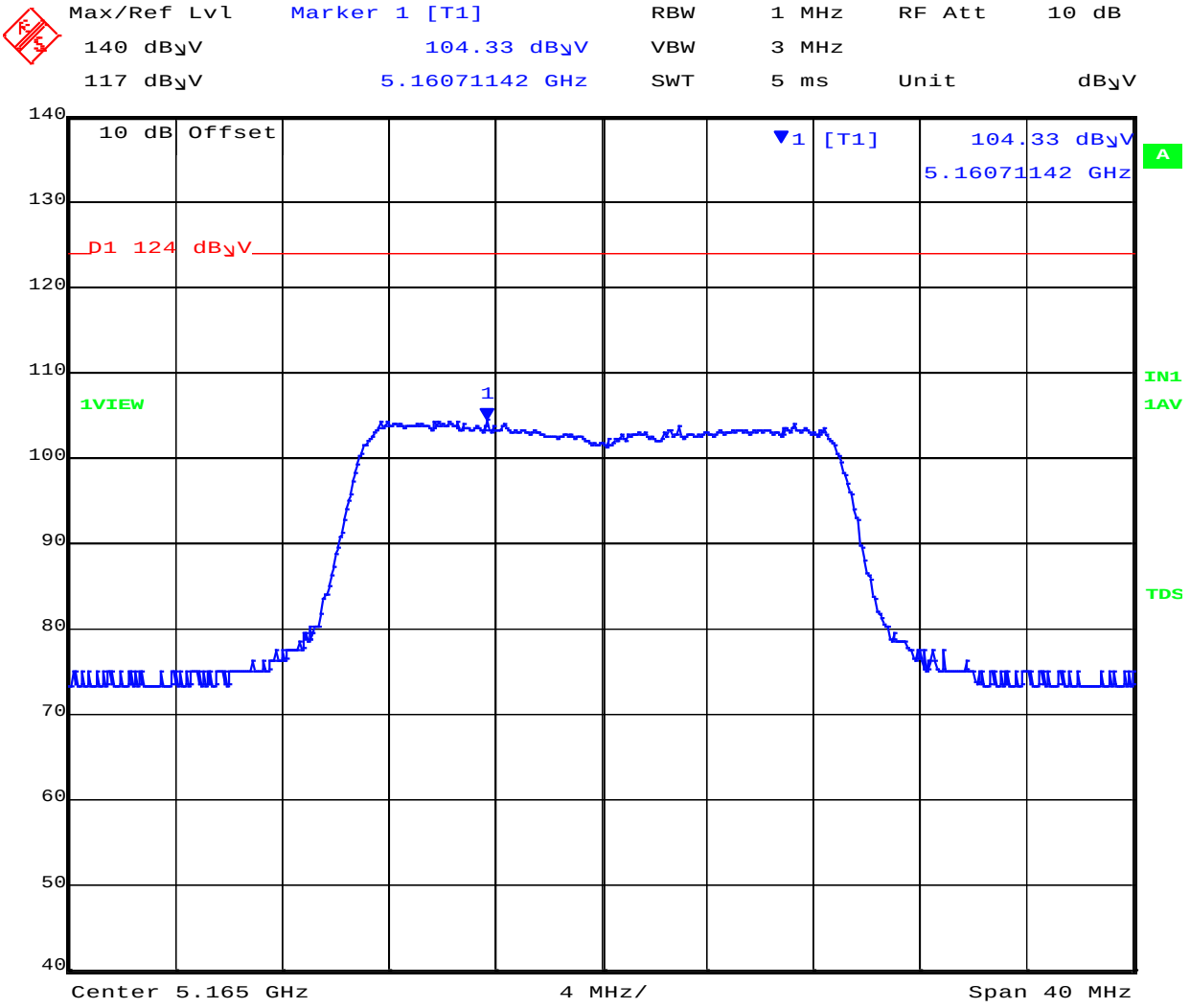


Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = Average Sweep Count = 100 RF Atten (dB) = 0 Trace Mode = VIEW	M1 : 5160.31 MHz : 101.62 dBuV/m	Limit: ≤ 17.00 dBm, 124 dBuVm

back to matrix

POWER SPECTRAL DENSITY

Variant: 20 MHz, Channel: 5165.00 MHz, Polarity V Temp: 20, Voltage: 48 Vdc

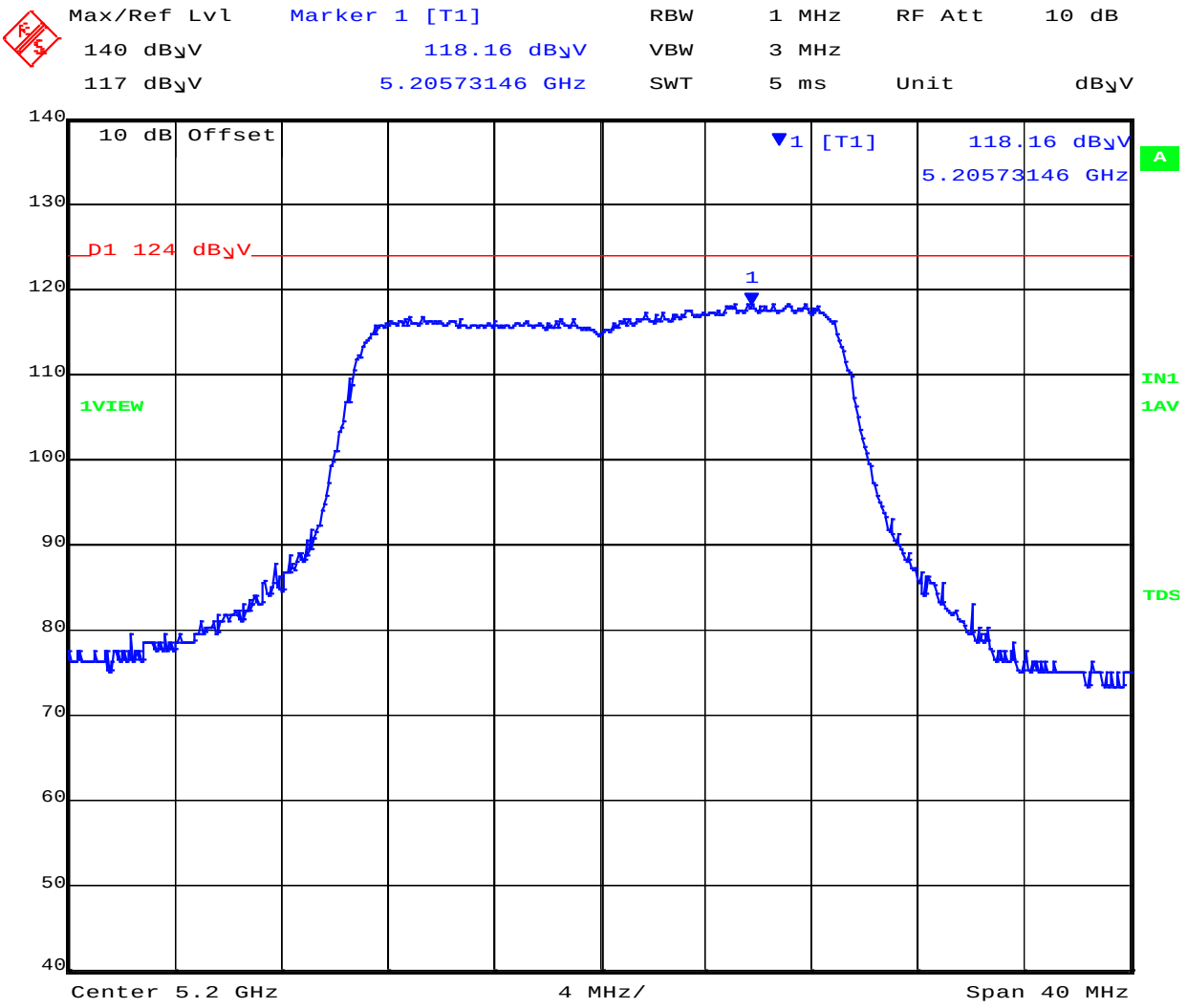


Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = Average Sweep Count = 100 RF Atten (dB) = 0 Trace Mode = VIEW	M1 : 5160.71 MHz :104.33 dBuV/m	Limit: ≤ 17.00 dBm, 124 dBuVm

back to matrix

POWER SPECTRAL DENSITY

Variant: 20 MHz, Channel: 5200.00 MHz, Polarity H, Temp: 20, Voltage: 48 Vdc

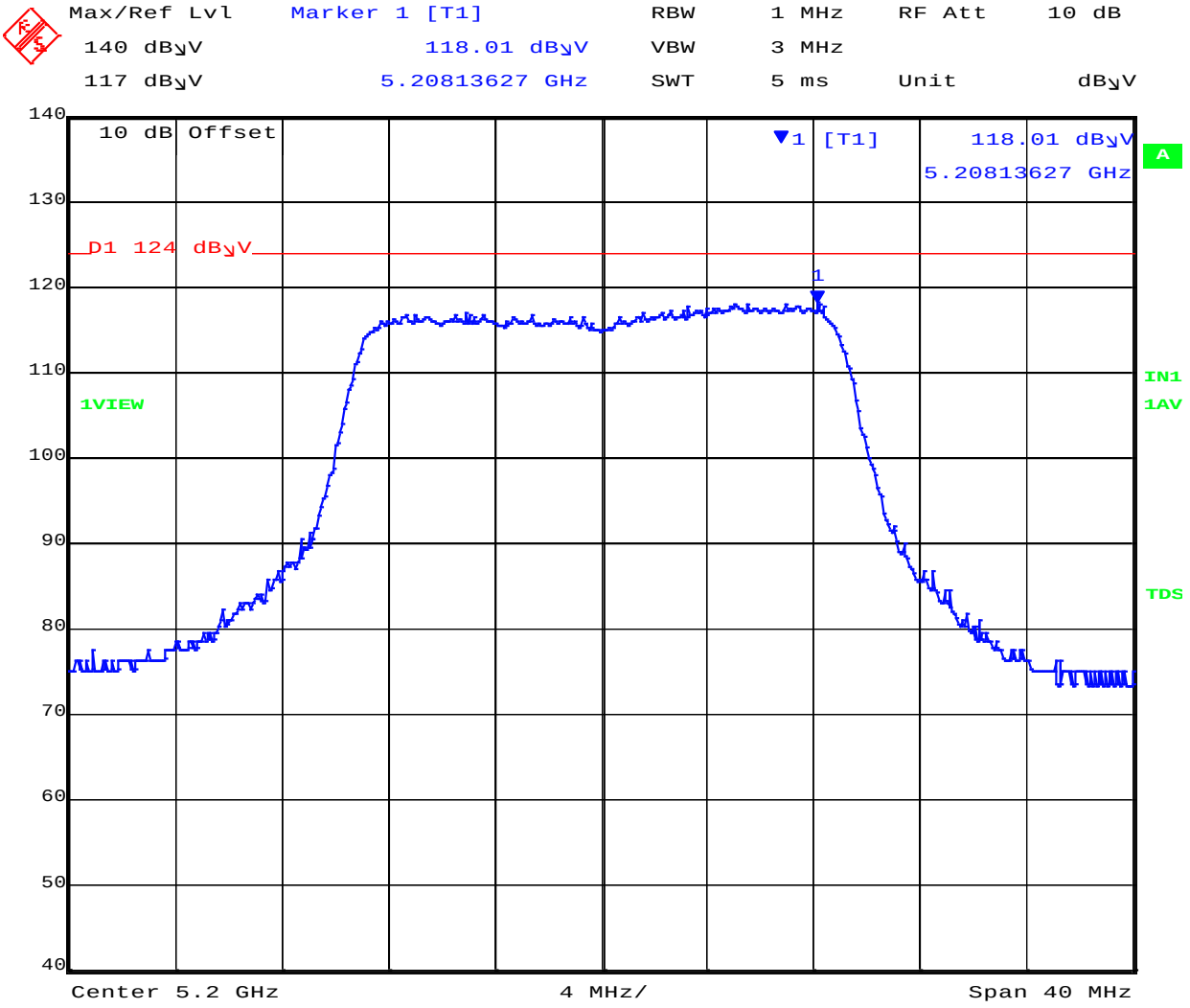


Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = Average Sweep Count = 100 RF Atten (dB) = 0 Trace Mode = VIEW	M1 : 5205.73 MHz : 118.16 dBuV/m	Limit: ≤ 17.00 dBm, 124 dBuVm

back to matrix

POWER SPECTRAL DENSITY

Variant: 20 MHz, Channel: 5200.00 MHz, Polarity V, Temp: 20, Voltage: 48 Vdc

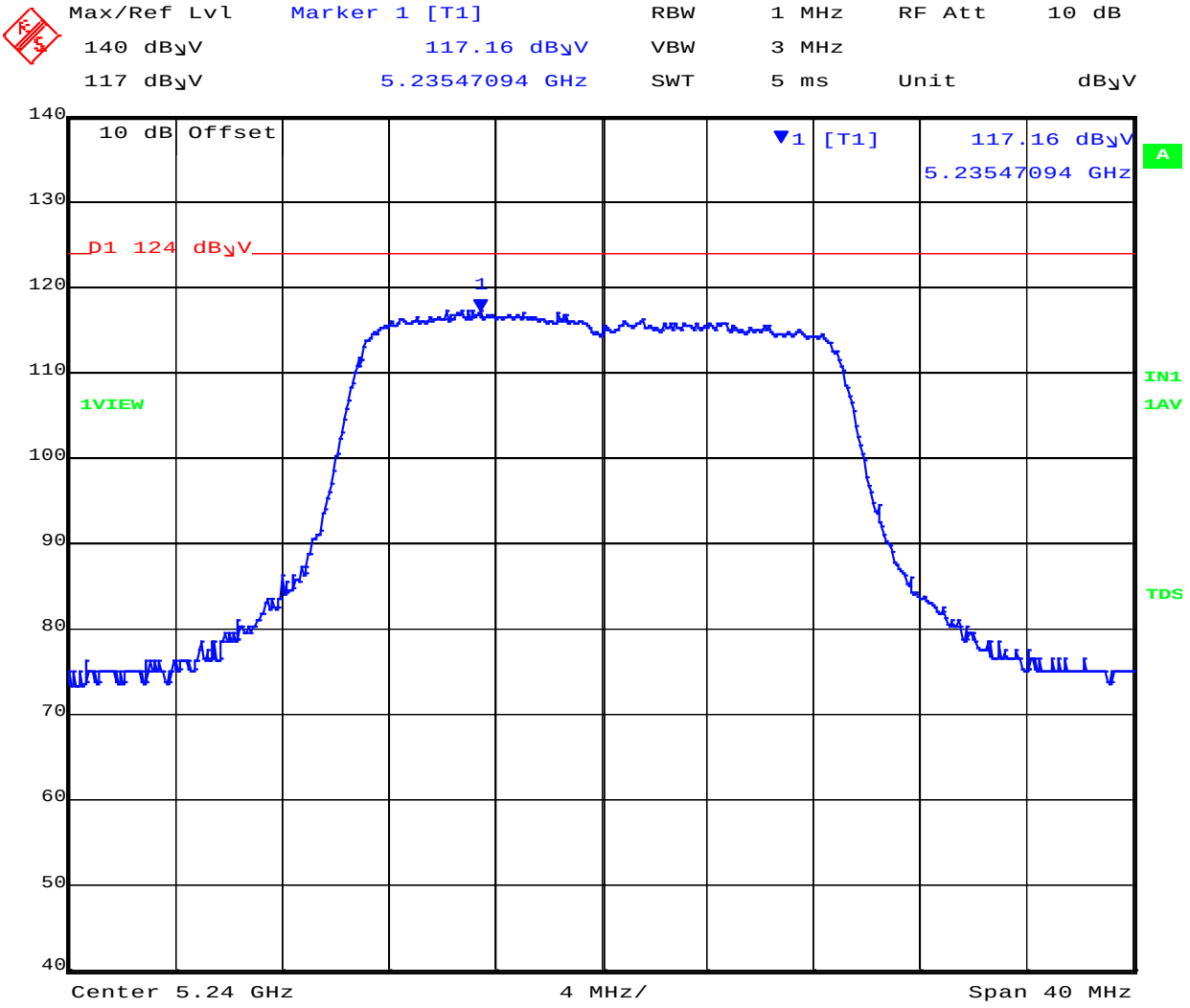


Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = Average Sweep Count = 100 RF Atten (dB) = 0 Trace Mode = VIEW	M1 : 5208.14 MHz : 118.01 dBuV/m	Limit: ≤ 17.00 dBm, 124 dBuVm

back to matrix

POWER SPECTRAL DENSITY

Variant: 20 MHz, Channel: 5240.00 MHz, Polarity H, Temp: 20, Voltage: 48 Vdc

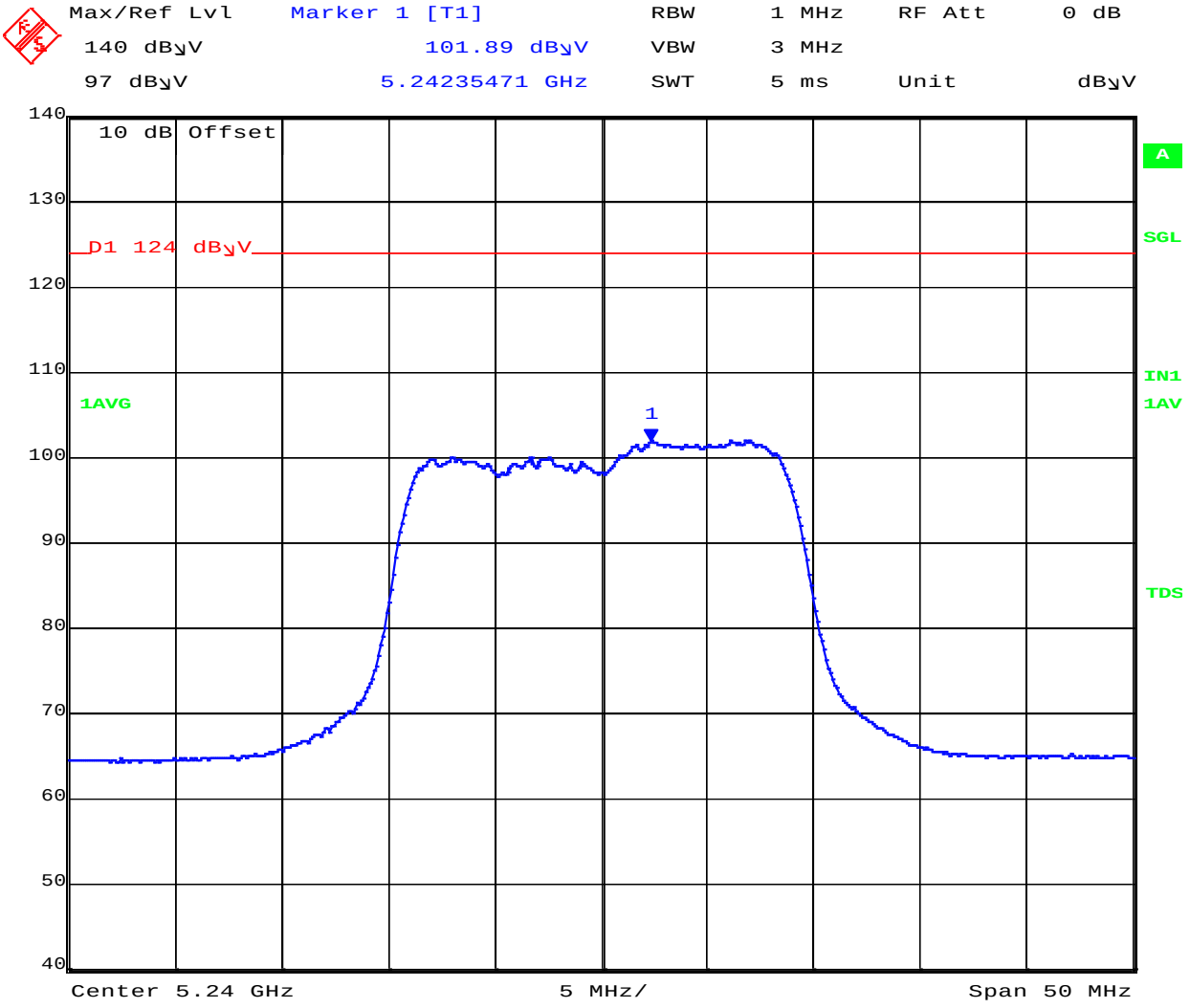


Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = Average Sweep Count = 100 RF Atten (dB) = 0 Trace Mode = VIEW	M1 : 5235.47 MHz : 117.16 dBuV/m	Limit: ≤ 17.00 dBm, 124 dBuVm

back to matrix

POWER SPECTRAL DENSITY

Variant: 20 MHz, Channel: 5240.00 MHz, Polarity V, Temp: 20, Voltage: 48 Vdc

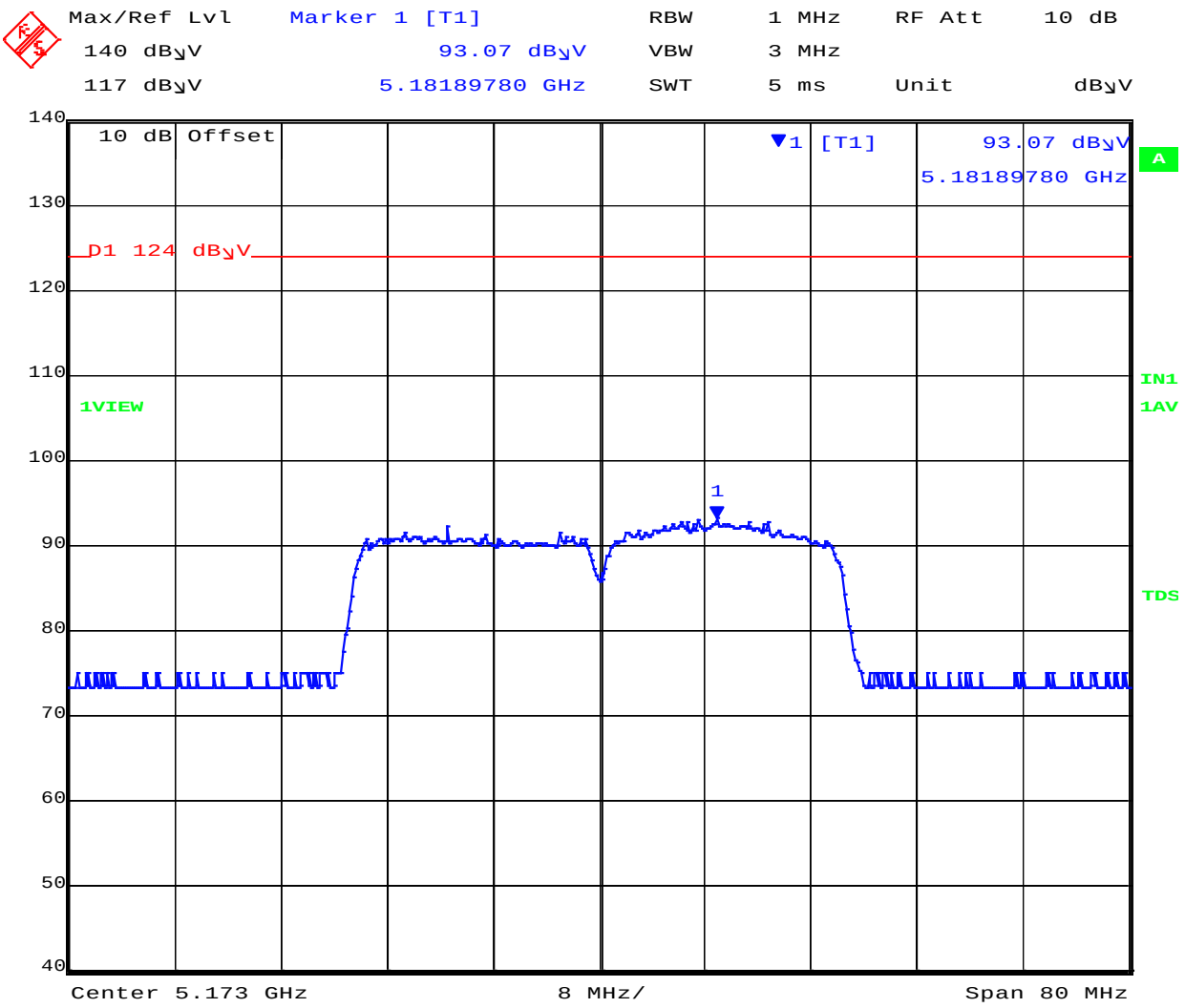


Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = Average Sweep Count = 100 RF Atten (dB) = 0 Trace Mode = VIEW	M1 : 5242.35 MHz : 101.89 dBuV/m	Limit: ≤ 17.00 dBm, 124 dBuVm

back to matrix

POWER SPECTRAL DENSITY

Variant: 40 MHz, Channel: 5173.00 MHz, Polarity H, Temp: 20, Voltage: 48 Vdc

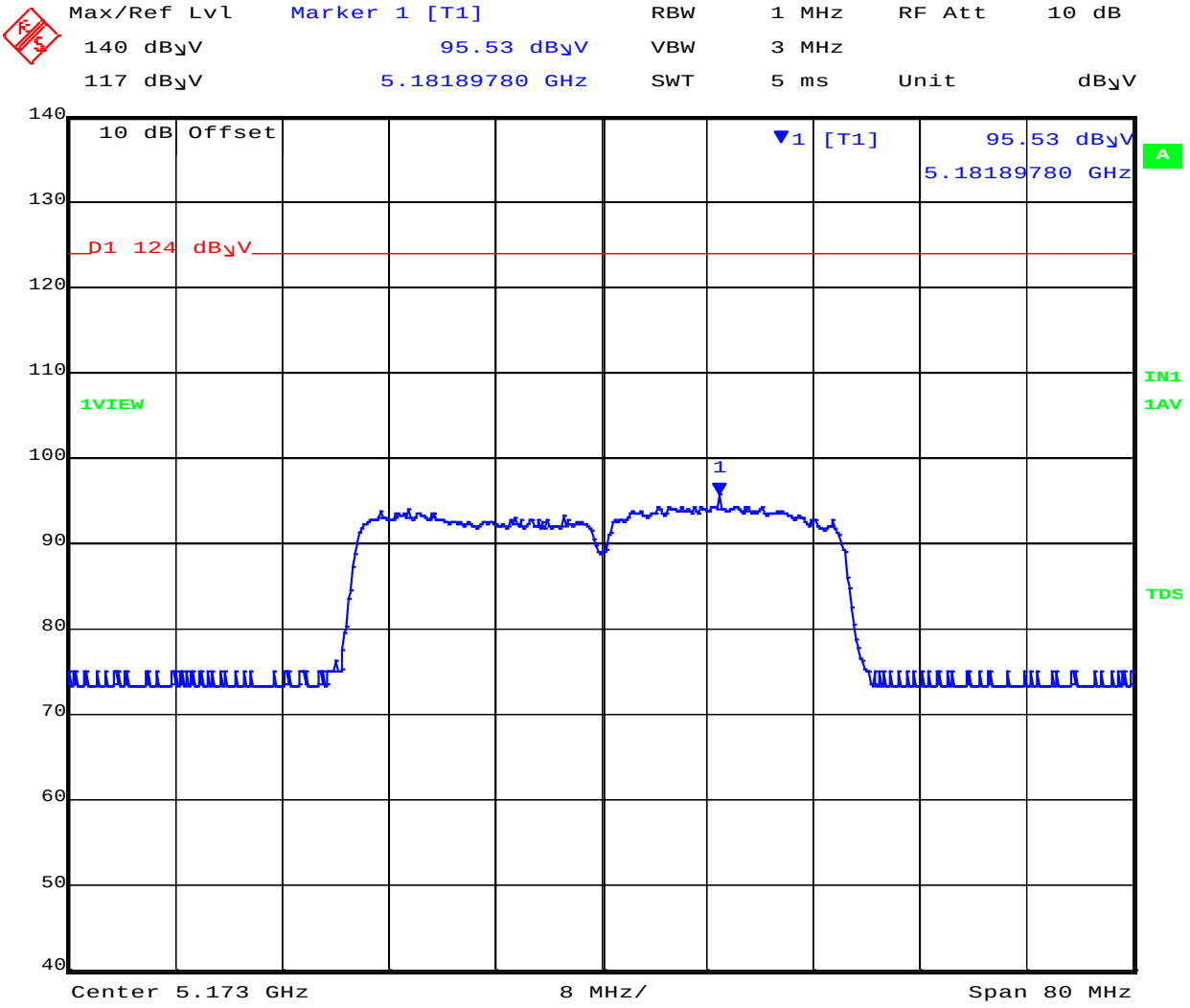


Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = Average Sweep Count = 100 RF Atten (dB) = 0 Trace Mode = VIEW	M1 : 5181.90 MHz : 93.07 dBuV/m	Limit: ≤ 17.00 dBm, 124 dBuVm

back to matrix

POWER SPECTRAL DENSITY

Variant: 40 MHz, Channel: 5173.00 MHz, Polarity V Temp: 20, Voltage: 48 Vdc

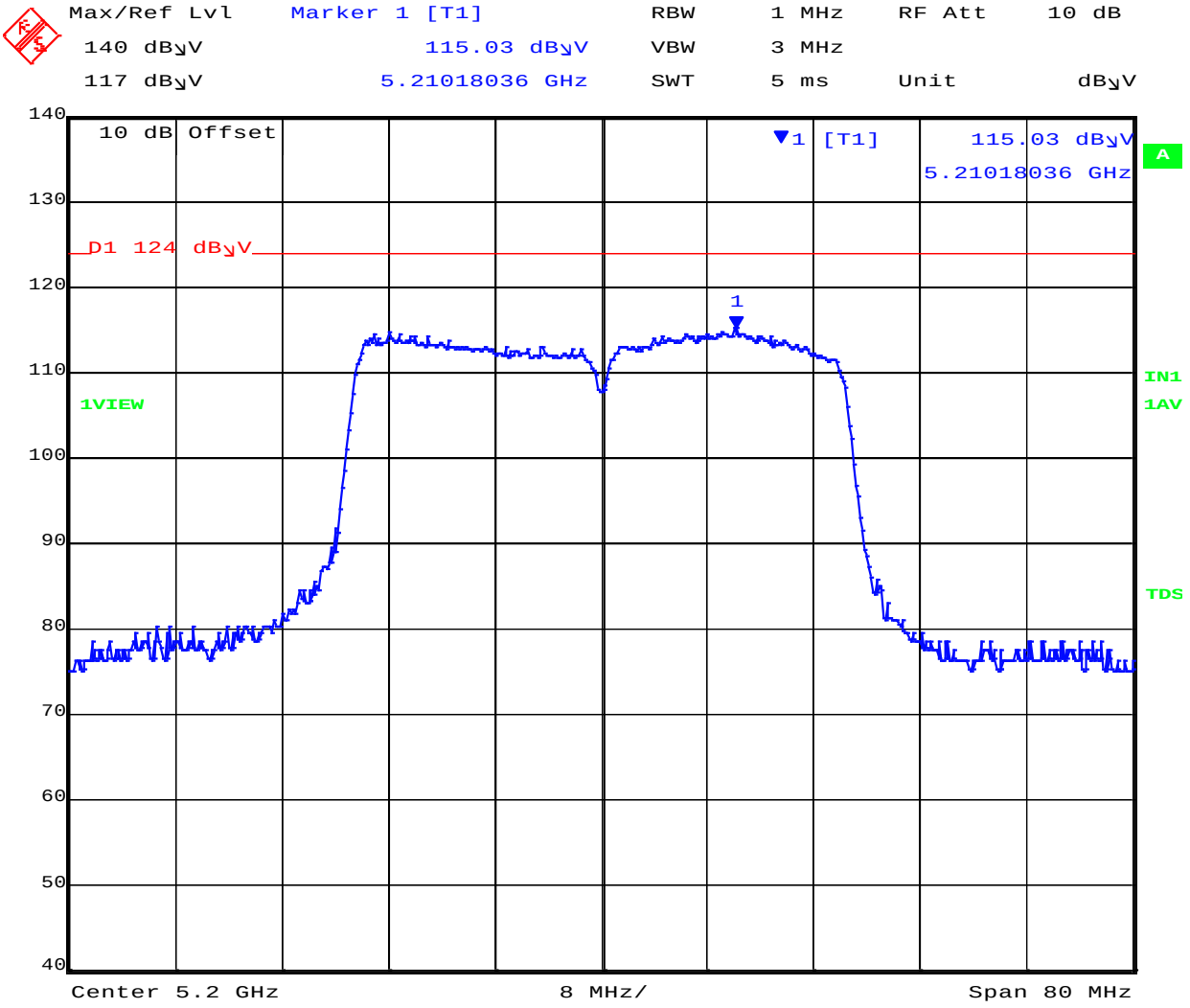


Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = Average Sweep Count = 100 RF Atten (dB) = 0 Trace Mode = VIEW	M1 : 5181.90 MHz :95.53 dBuV/m	Limit: ≤ 17.00 dBm, 124 dBuVm

back to matrix

POWER SPECTRAL DENSITY

Variant: 40 MHz, Channel: 5200.00 MHz, Polarity H, Temp: 20, Voltage: 48 Vdc

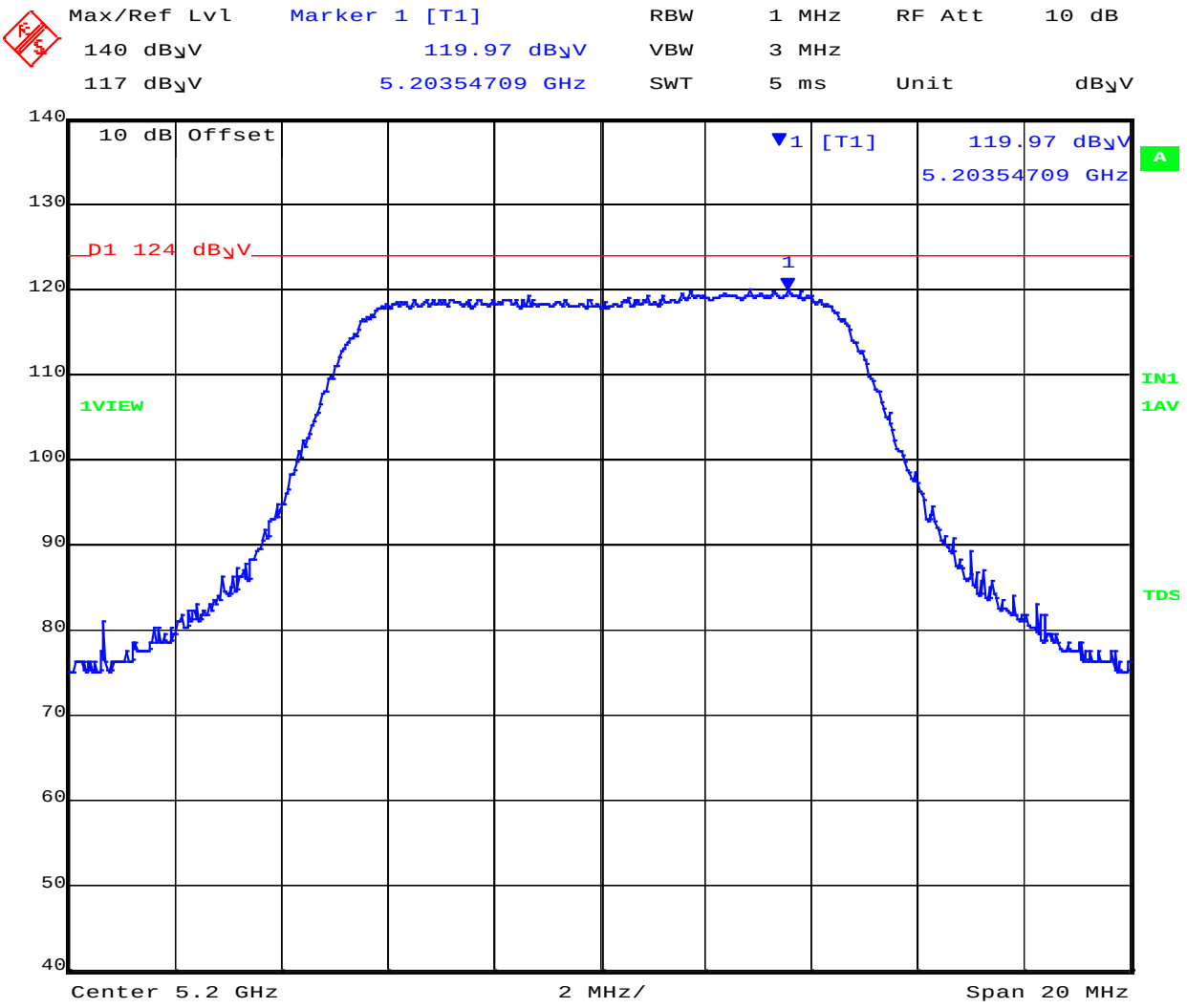


Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = Average Sweep Count = 100 RF Atten (dB) = 0 Trace Mode = VIEW	M1 : 5210.18 MHz : 115.03 dBuV/m	Limit: ≤ 17.00 dBm, 124 dBuVm

back to matrix

POWER SPECTRAL DENSITY

Variant: 40 MHz, Channel: 5200.00 MHz, Polarity V, Temp: 20, Voltage: 48 Vdc

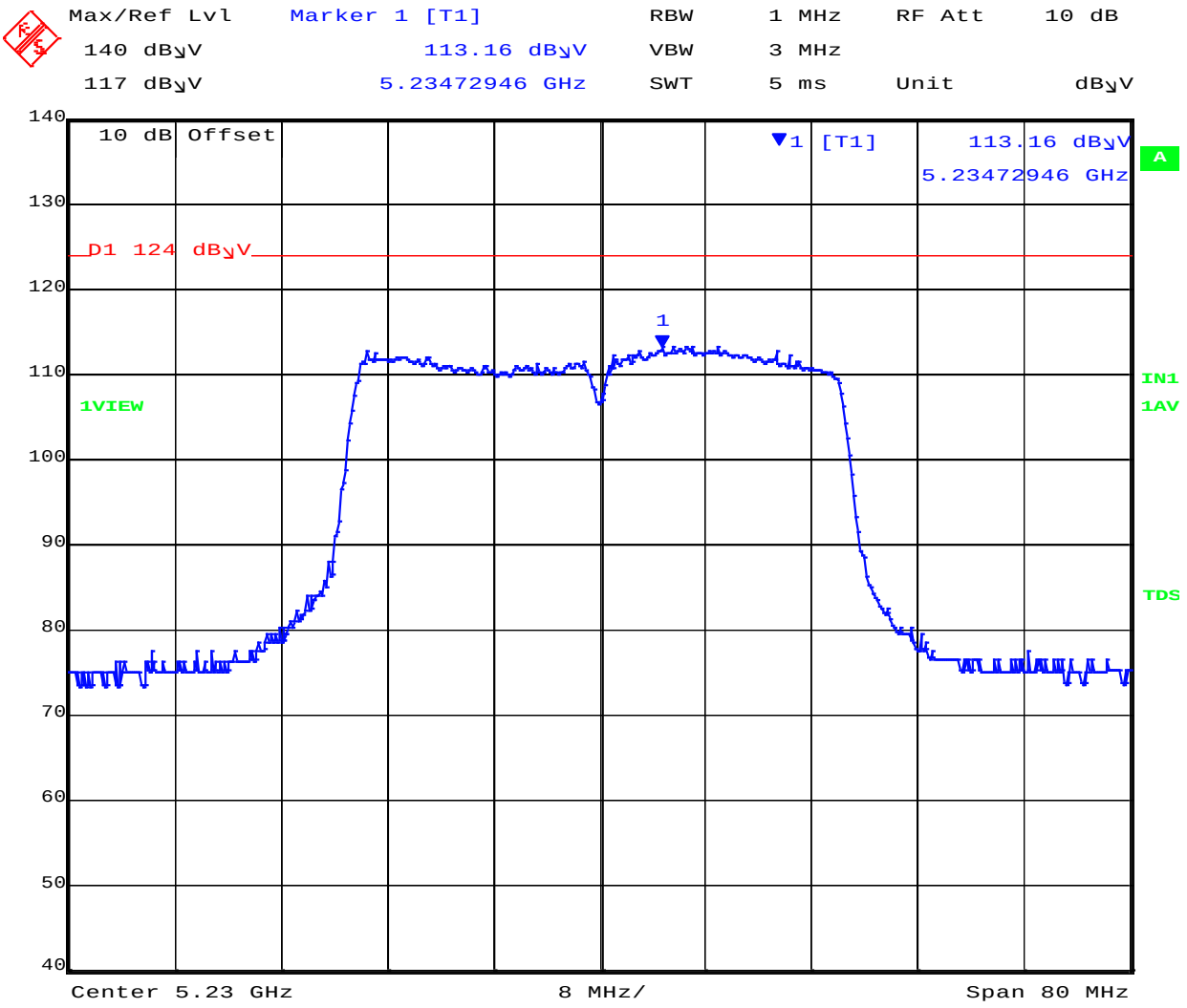


Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = Average Sweep Count = 100 RF Atten (dB) = 0 Trace Mode = VIEW	M1 : 5203.55 MHz : 119.97 dBuV/m	Limit: ≤ 17.00 dBm, 124 dBuVm

back to matrix

POWER SPECTRAL DENSITY

Variant: 40 MHz, Channel: 5230.00 MHz, Polarity H, Temp: 20, Voltage: 48 Vdc

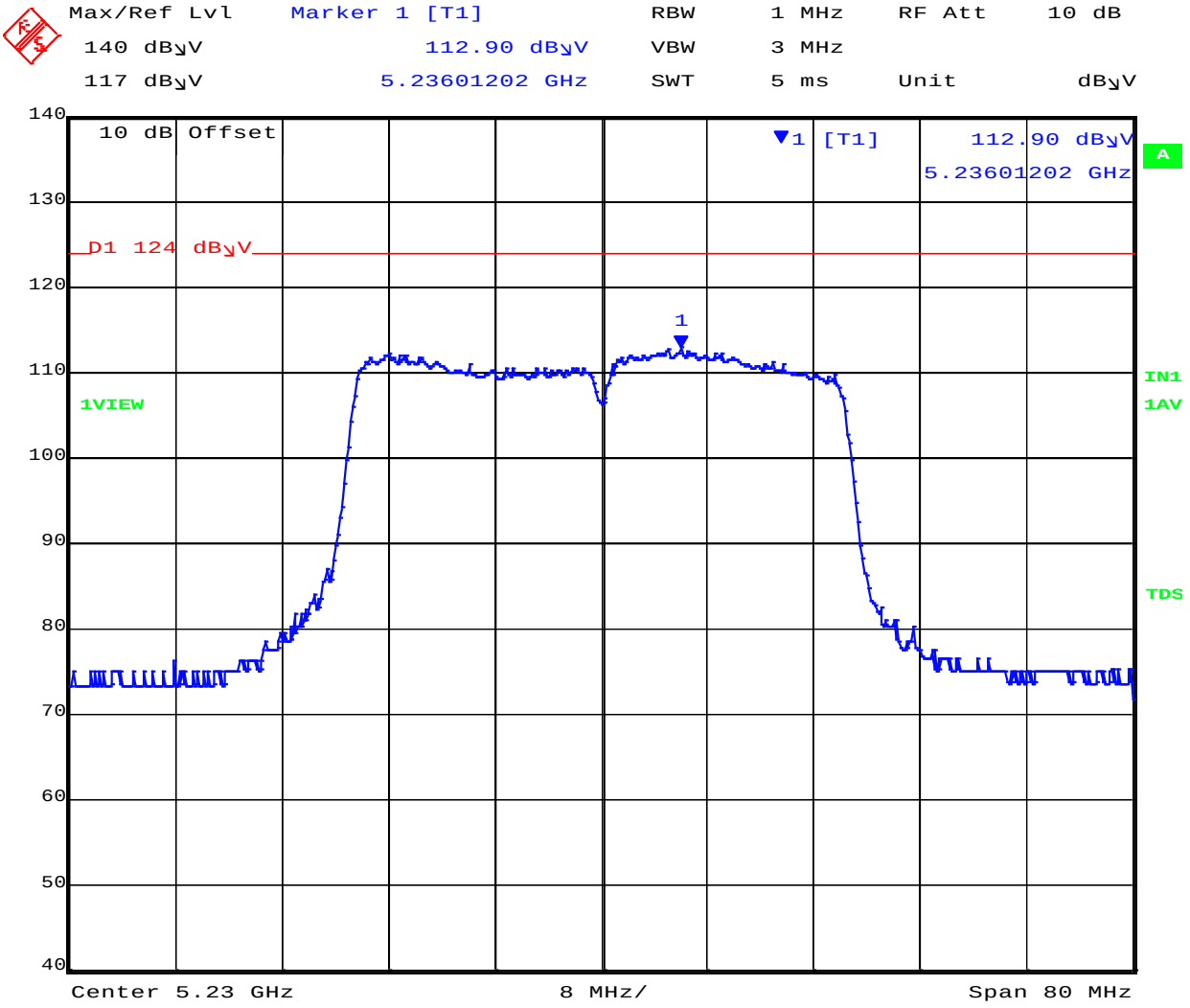


Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = Average Sweep Count = 100 RF Atten (dB) = 0 Trace Mode = VIEW	M1 : 5234.73 MHz : 113.16 dBuV/m	Limit: ≤ 17.00 dBm, 124 dBuVm

back to matrix

POWER SPECTRAL DENSITY

Variant: 40 MHz, Channel: 5230.00 MHz, Polarity V, Temp: 20, Voltage: 48 Vdc

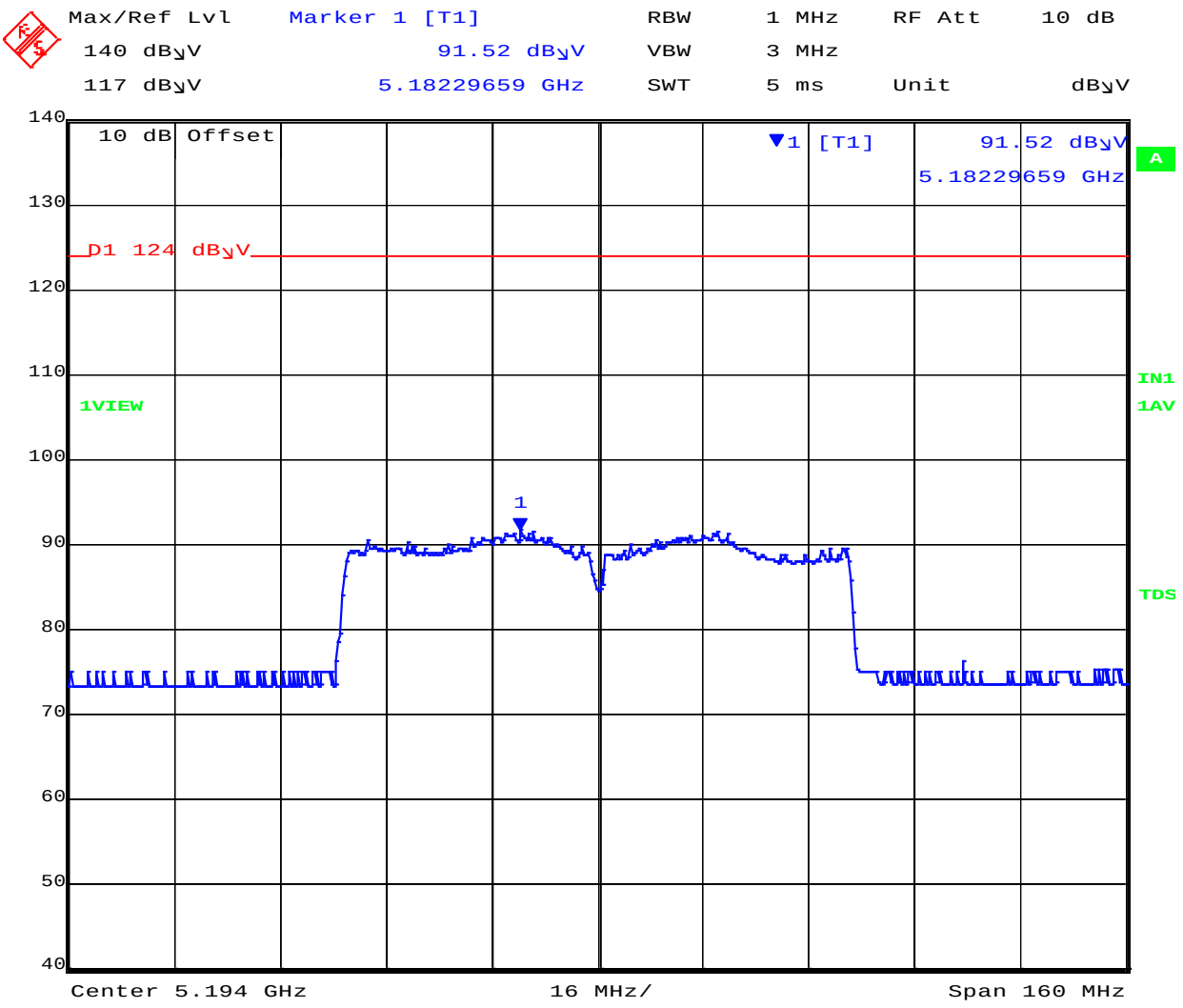


Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = Average Sweep Count = 100 RF Atten (dB) = 0 Trace Mode = VIEW	M1 : 5236.01 MHz : 112.90 dBuV/m	Limit: ≤ 17.00 dBm, 124 dBuVm

back to matrix

POWER SPECTRAL DENSITY

Variant: 80 MHz, Channel: 5194.00 MHz, Polarity H, Temp: 20, Voltage: 48 Vdc



Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = Average Sweep Count = 100 RF Atten (dB) = 0 Trace Mode = VIEW	M1 : 5182.30 MHz : 91.52 dBuV/m	Limit: ≤ 17.00 dBm, 124 dBuVm

back to matrix

POWER SPECTRAL DENSITY

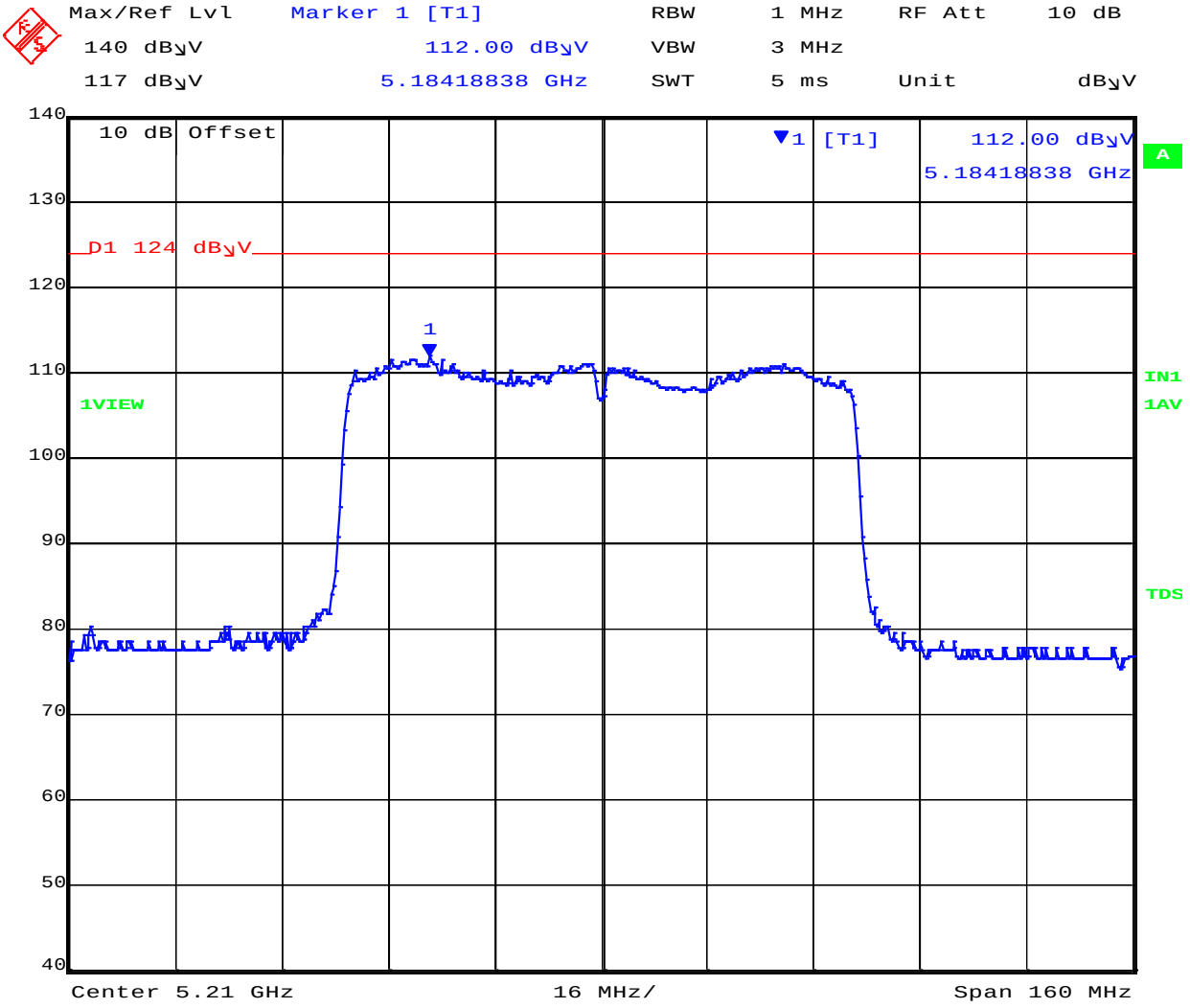
Variant: 80 MHz, Channel: 5194.00 MHz, Polarity V Temp: 20, Voltage: 48 Vdc

Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = Average Sweep Count = 100 RF Atten (dB) = 0 Trace Mode = VIEW	M1 : 5182.94 MHz : 92.33 dBuV/m	Limit: ≤ 17.00 dBm, 124 dBuVm

back to matrix

POWER SPECTRAL DENSITY

Variant: 80 MHz, Channel: 5210.00 MHz, Polarity H, Temp: 20, Voltage: 48 Vdc

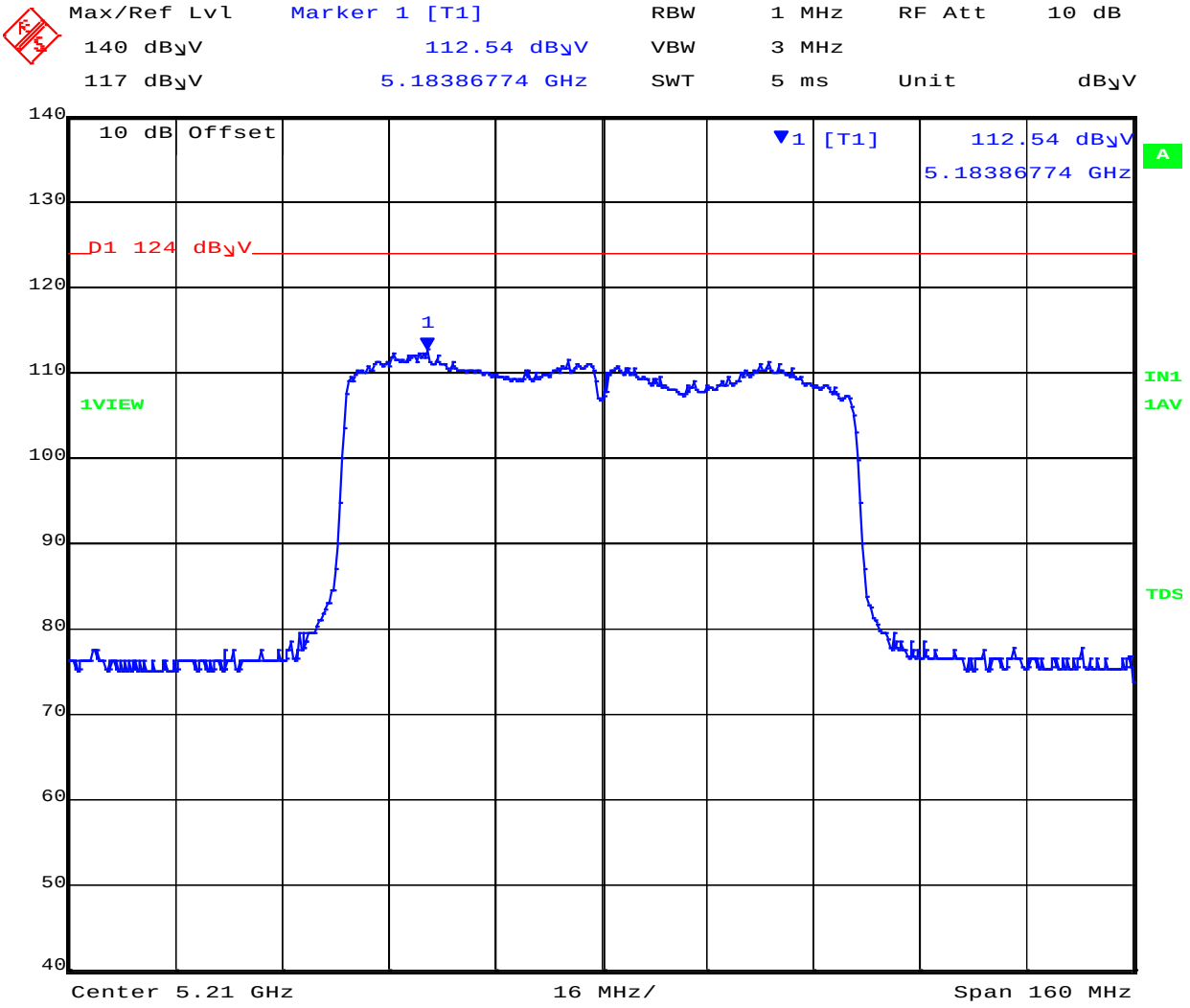


Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = Average Sweep Count = 100 RF Atten (dB) = 0 Trace Mode = VIEW	M1 : 5184.19 MHz : 112.00 dBuV/m	Limit: ≤ 17.00 dBm, 124 dBuVm

back to matrix

POWER SPECTRAL DENSITY

Variant: 80 MHz, Channel: 5210.00 MHz, Polarity V, Temp: 20, Voltage: 48 Vdc



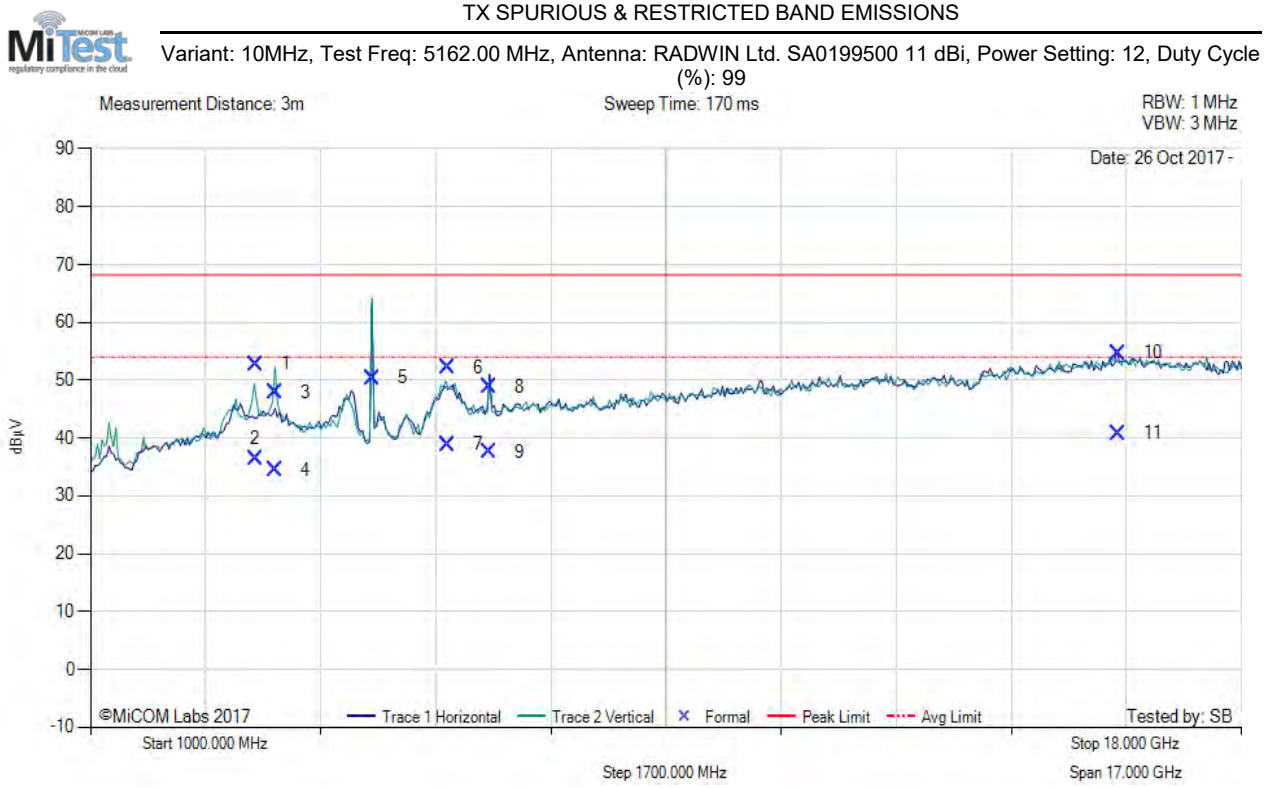
Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = Average Sweep Count = 100 RF Atten (dB) = 0 Trace Mode = VIEW	M1 : 5183.58 MHz : 112.54 dBuV/m	Limit: ≤ 17.00 dBm, 124 dBuVm

back to matrix

A.3. Radiated

A.3.1. TX Spurious & Restricted Band Emissions

A.3.1.1. RADWIN Ltd. SA0199500 11 dBi



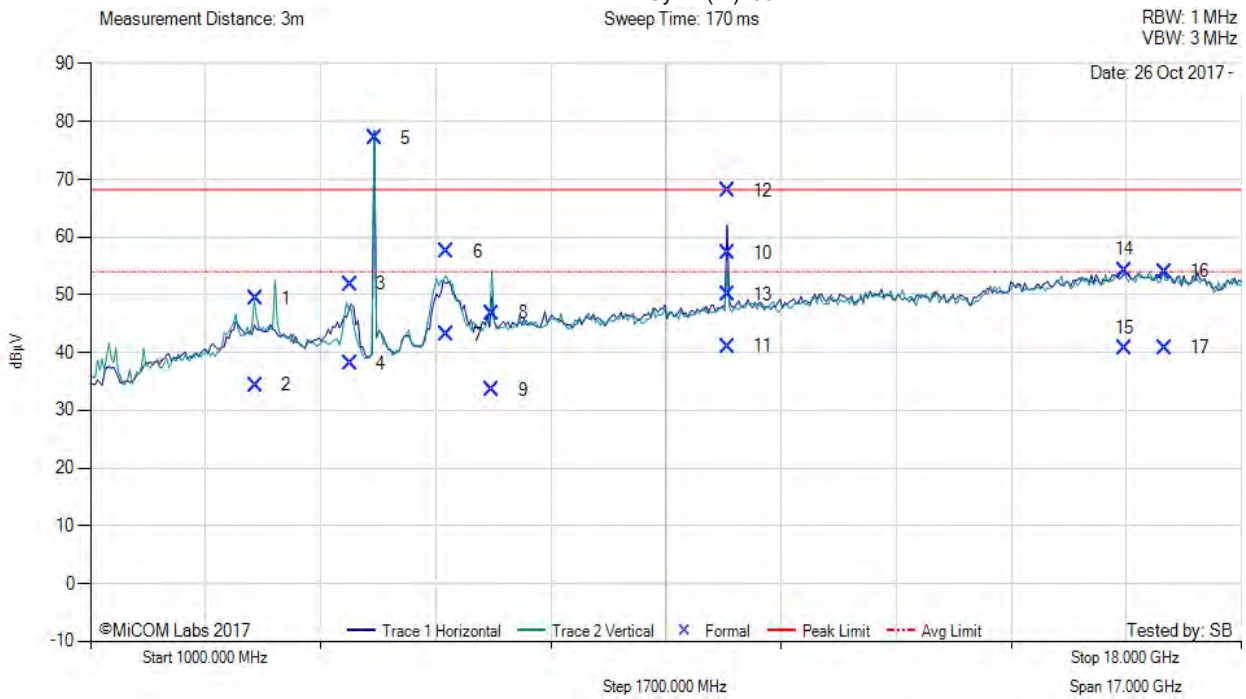
1000.00 - 18000.00 MHz												
Num	**Frequency MHz**	**Raw dBµV**	**Cable Loss dB**	**AF dB**	**Level dBµV/m**	**Measurement Type**	**Pol**	**Hgt cm**	**Azt Deg**	**Limit dBµV/m**	**Margin dB**	**Pass /Fail**
1	3434.65	66.21	2.60	-16.01	52.80	Max Peak	Vertical	192	355	68.2	-15.4	Pass
2	3434.65	49.83	2.60	-16.01	36.42	Max Avg	Vertical	192	355	54.0	-17.6	Pass
3	3726.17	60.65	2.71	-15.42	47.94	Max Peak	Vertical	164	333	68.2	-20.3	Pass
4	3726.17	47.14	2.71	-15.42	34.43	Max Avg	Vertical	164	333	54.0	-19.6	Pass
5	5165.63	61.72	3.08	-14.39	50.41	Fundamental	Vertical	150	0	--	--	
6	6271.24	60.75	3.24	-11.80	52.19	Max Peak	Horizontal	173	3	68.2	-16.0	Pass
7	6271.24	47.48	3.24	-11.80	38.92	Max Avg	Horizontal	173	3	54.0	-15.1	Pass
8	6883.40	56.21	3.13	-10.44	48.90	Max Peak	Horizontal	134	47	68.2	-19.3	Pass
9	6883.40	44.87	3.13	-10.44	37.56	Max Avg	Horizontal	134	47	54.0	-16.4	Pass
10	16185.51	48.25	5.60	0.91	54.76	Max Peak	Horizontal	187	219	68.2	-13.5	Pass

11	16185.51	34.31	5.60	0.91	40.82	Max Avg	Horizontal	187	219	54.0	-13.2	Pass

back to matrix

TX SPURIOUS & RESTRICTED BAND EMISSIONS

Variant: 10MHz, Test Freq: 5200.00 MHz, Antenna: RADWIN Ltd. SA0199500 11 dBi, Power Setting: 18.5, Duty Cycle (%): 99

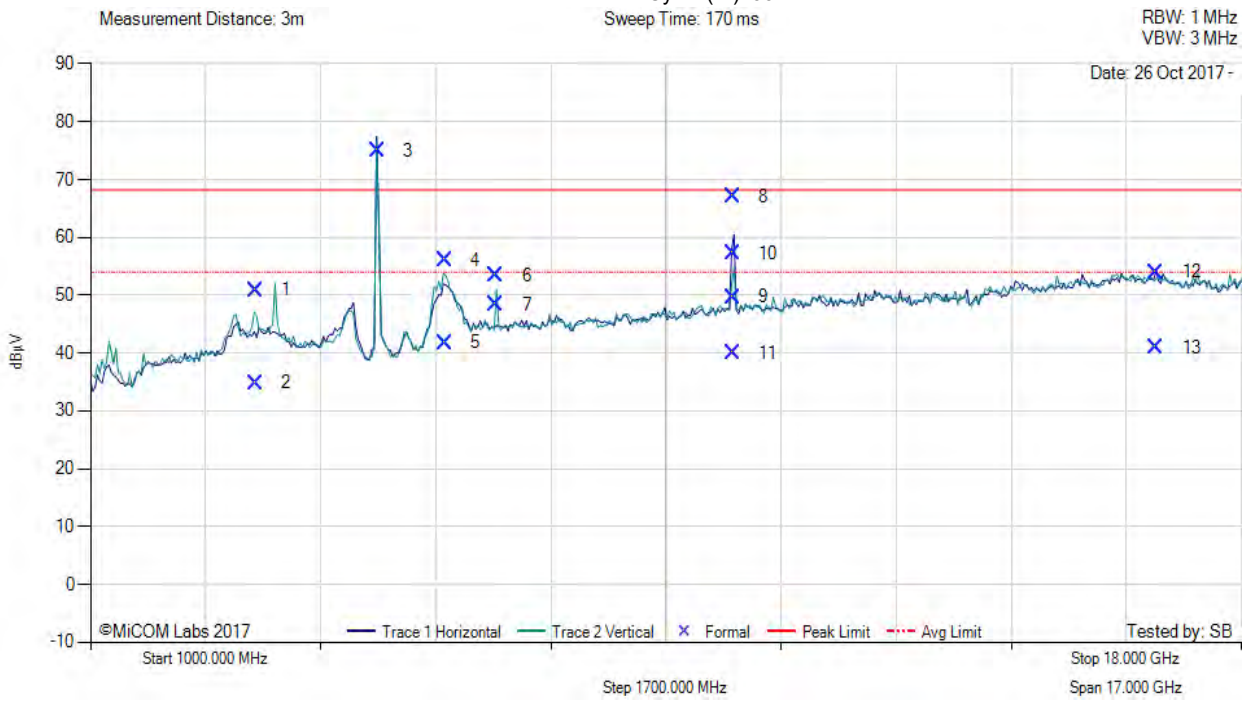


1000.00 - 18000.00 MHz												
Num	**Frequency MHz**	**Raw dBµV**	**Cable Loss dB**	**AF dB**	**Level dBµV/m**	**Measurement Type**	**Pol**	**Hgt cm**	**Azt Deg**	**Limit dBµV/m**	**Margin dB**	**Pass /Fail**
1	3432.74	62.73	2.60	-16.04	49.29	Max Peak	Vertical	163	357	68.2	-18.9	Pass
2	3432.74	47.78	2.60	-16.04	34.34	Max Avg	Vertical	163	357	54.0	-19.7	Pass
3	4836.94	63.96	2.98	-15.12	51.82	Max Peak	Vertical	152	338	68.2	-16.4	Pass
4	4836.94	50.21	2.98	-15.12	38.07	Max Avg	Vertical	152	338	54.0	-15.9	Pass
5	5203.77	88.36	3.09	-14.26	77.19	Fundamental	Horizontal	200	0	--	--	
6	6263.26	66.12	3.22	-11.91	57.43	Max Peak	Vertical	163	5	68.2	-10.8	Pass
7	6263.26	51.81	3.22	-11.91	43.12	Max Avg	Vertical	163	5	54.0	-10.9	Pass
8	6934.98	53.71	3.19	-10.11	46.79	Max Peak	Vertical	162	66	68.2	-21.4	Pass
9	6934.98	40.36	3.19	-10.11	33.44	Max Avg	Vertical	162	66	54.0	-20.6	Pass
10	10404.96	52.76	4.42	0.02	57.20	Max Peak	Vertical	98	326	68.2	-11.0	Pass
11	10404.96	36.58	4.42	0.02	41.02	Max Avg	Vertical	98	326	54.0	-13.0	Pass
12	10405.07	63.58	4.42	0.05	68.05	Max Peak	Horizontal	168	74	68.2	-0.2	Pass
13	10405.07	45.58	4.42	0.05	50.05	Max Avg	Horizontal	168	74	54.0	-4.0	Pass
14	16271.18	48.79	5.68	-0.25	54.22	Max Peak	Vertical	131	39	68.2	-14.0	Pass
15	16271.18	35.22	5.68	-0.25	40.65	Max Avg	Vertical	131	39	54.0	-13.4	Pass
16	16864.33	49.38	5.54	-0.96	53.96	Max Peak	Horizontal	170	182	68.2	-14.3	Pass
17	16864.33	36.23	5.54	-0.96	40.81	Max Avg	Horizontal	170	182	54.0	-13.2	Pass

back to matrix

TX SPURIOUS & RESTRICTED BAND EMISSIONS

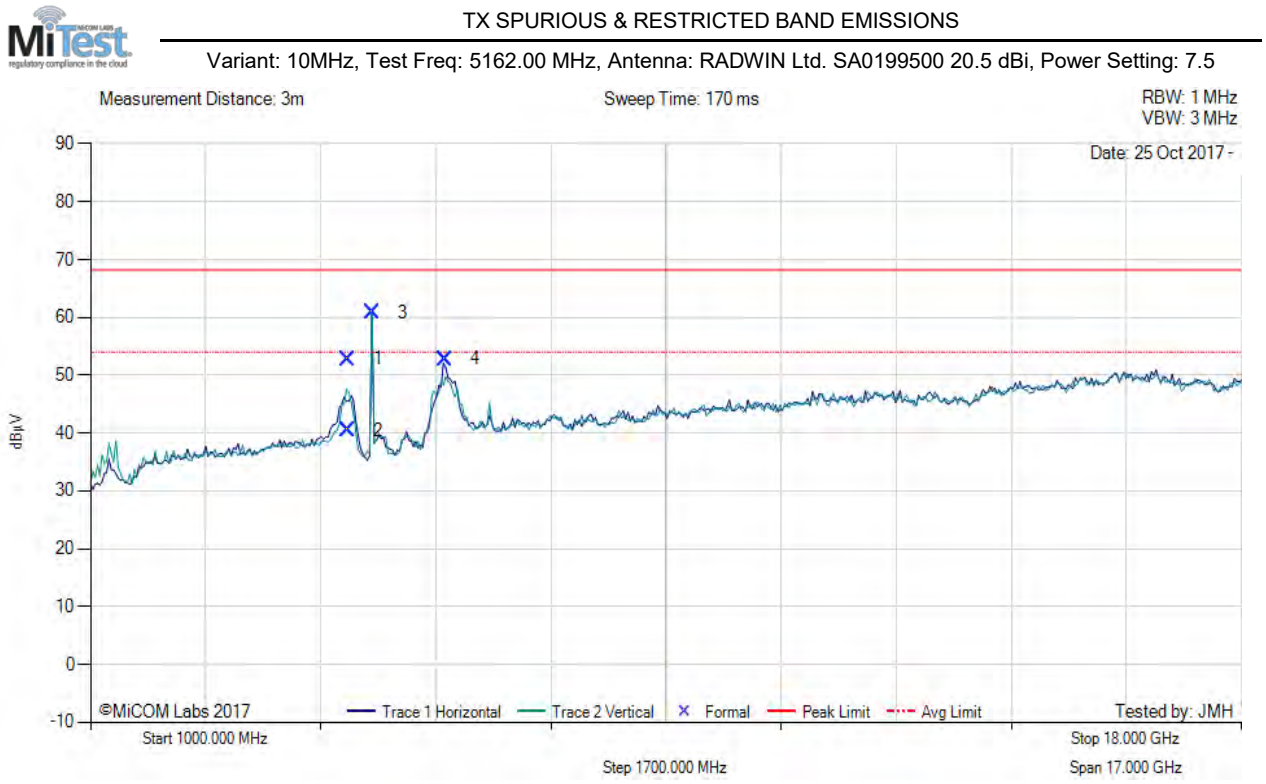
Variant: 10MHz, Test Freq: 5245.00 MHz, Antenna: RADWIN Ltd. SA0199500 11 dBi, Power Setting: 18.5, Duty Cycle (%): 99



1000.00 - 18000.00 MHz												
Num	**Frequency MHz**	**Raw dBµV**	**Cable Loss dB**	**AF dB**	**Level dBµV/m**	**Measurement Type**	**Pol**	**Hgt cm**	**Azt Deg**	**Limit dBµV/m**	**Margin dB**	**Pass /Fail**
1	3435.80	64.28	2.60	-16.01	50.87	Max Peak	Vertical	163	0	68.2	-17.4	Pass
2	3435.80	48.27	2.60	-16.01	34.86	Max Avg	Vertical	163	0	54.0	-19.1	Pass
3	5242.03	86.25	3.13	-14.41	74.97	Fundamental	Horizontal	151	0	--	--	
4	6236.89	64.70	3.21	-11.86	56.05	Max Peak	Horizontal	140	48	68.2	-12.2	Pass
5	6236.89	50.41	3.21	-11.86	41.76	Max Avg	Horizontal	140	48	54.0	-12.2	Pass
6	6993.50	60.06	3.26	-9.85	53.47	Max Peak	Vertical	141	7	68.2	-14.8	Pass
7	6993.50	55.03	3.26	-9.85	48.44	Max Avg	Vertical	141	7	54.0	-5.6	Pass
8	10494.48	62.15	4.51	0.35	67.01	Max Peak	Horizontal	163	69	68.2	-1.2	Pass
9	10494.48	44.80	4.51	0.35	49.66	Max Avg	Horizontal	163	69	54.0	-4.3	Pass
10	10495.15	52.32	4.51	0.35	57.18	Max Peak	Vertical	152	325	68.2	-11.1	Pass
11	10495.15	35.15	4.51	0.35	40.01	Max Avg	Vertical	152	325	54.0	-14.0	Pass
12	16741.96	48.43	5.66	-0.06	54.03	Max Peak	Horizontal	184	331	68.2	-14.2	Pass
13	16741.96	35.40	5.66	-0.06	41.00	Max Avg	Horizontal	184	331	54.0	-13.0	Pass

back to matrix

A.3.1.2. RADWIN Ltd. SA0199500 20.5 dBi (11dBi Gain + 9.5 dB Beamforming)



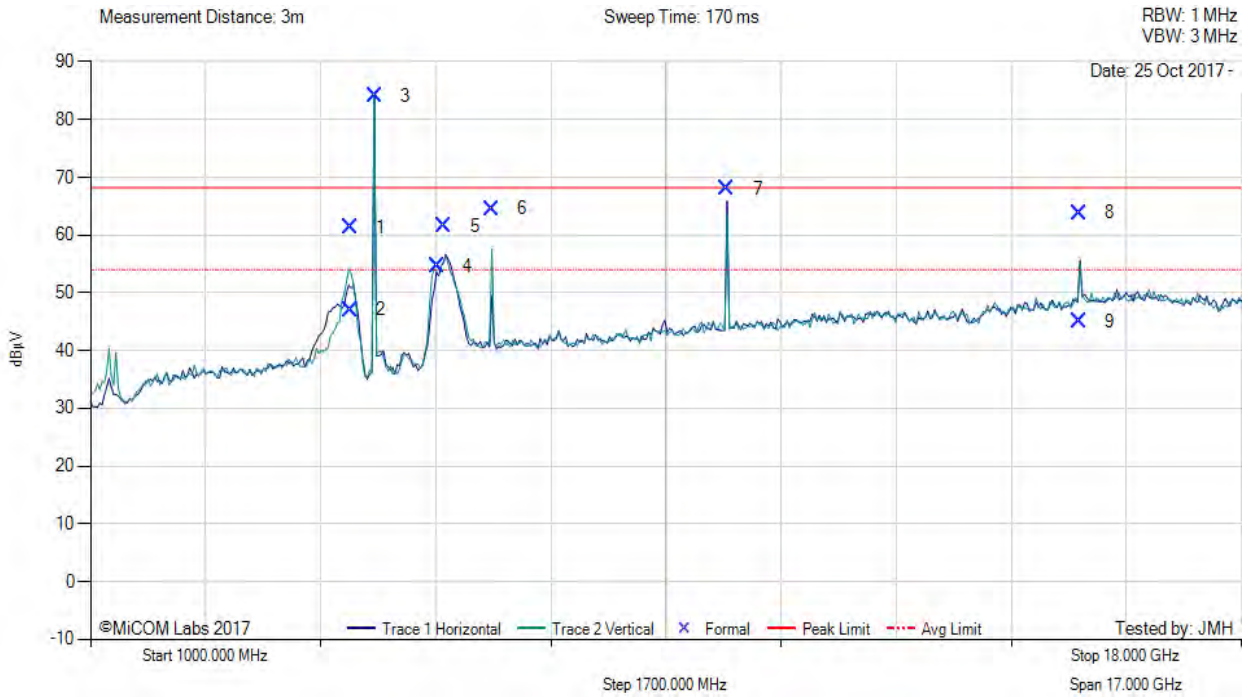
1000.00 - 18000.00 MHz												
Num	**Frequency MHz**	**Raw dBµV**	**Cable Loss dB**	**AF dB**	**Level dBµV/m**	**Measurement Type**	**Pol**	**Hgt cm**	**Azt Deg**	**Limit dBµV/m**	**Margin dB**	**Pass /Fail**
1	4799.97	65.23	2.97	-15.42	52.78	Max Peak	Vertical	145	6	68.2	-15.5	Pass
2	4799.97	52.84	2.97	-15.42	40.39	Max Avg	Vertical	145	6	54.0	-13.6	Pass
3	5164.97	72.12	3.08	-14.43	60.77	Fundamental	Vertical	151	0	--	--	
4	6236.95	61.42	3.21	-11.86	52.77	Peak (NRB)	Horizontal	151	3	--	--	Pass

Test Notes: EUT powered by POE and connected to laptop outside chamber

back to matrix

TX SPURIOUS & RESTRICTED BAND EMISSIONS

Variant: 10MHz, Test Freq: 5200.00 MHz, Antenna: RADWIN Ltd. SA0199500 20.5 dBi, Power Setting: 19



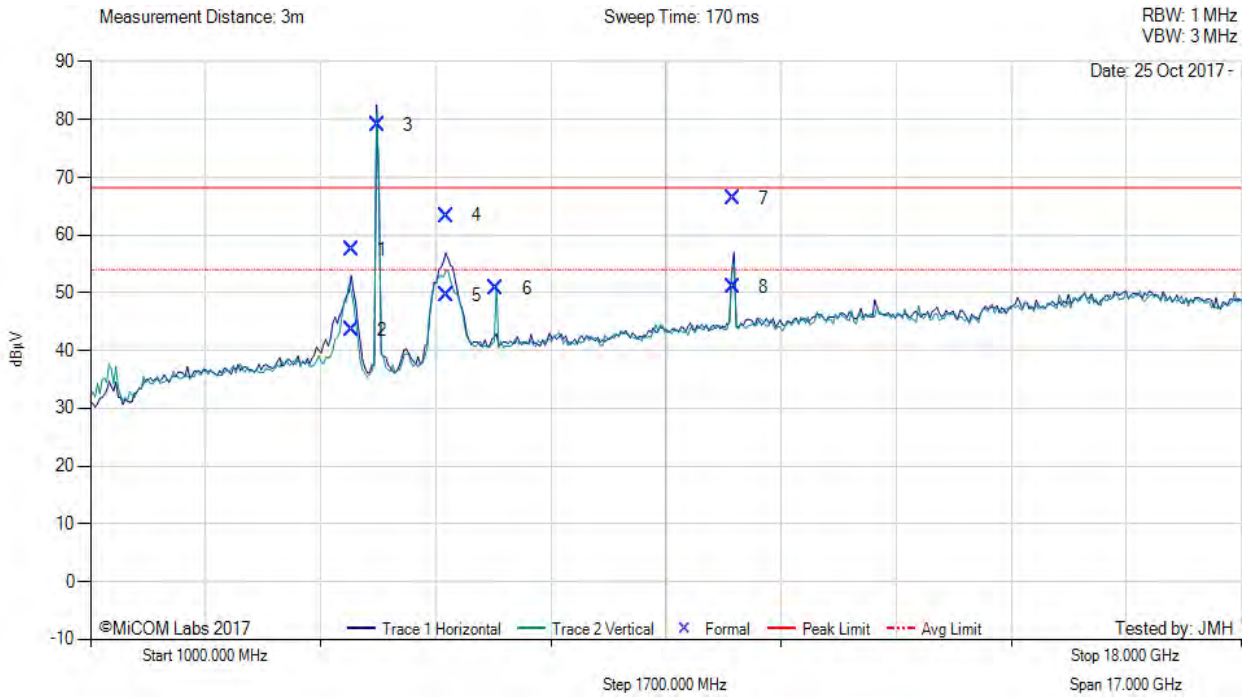
1000.00 - 18000.00 MHz												
Num	**Frequency MHz**	**Raw dBµV**	**Cable Loss dB**	**AF dB**	**Level dBµV/m**	**Measurement Type**	**Pol**	**Hgt cm**	**Azt Deg**	**Limit dBµV/m**	**Margin dB**	**Pass /Fail**
1	4833.21	73.43	2.98	-15.14	61.27	Max Peak	Vertical	146	3	68.2	-7.0	Pass
2	4833.21	59.18	2.98	-15.14	47.02	Max Avg	Vertical	146	3	54.0	-7.0	Pass
3	5202.89	95.20	3.09	-14.25	84.04	Fundamental	Horizontal	151	0	--	--	
4	6128.79	63.23	3.25	-11.90	54.58	Peak (NRB)	Horizontal	151	3	--	--	Pass
5	6227.04	70.21	3.20	-11.86	61.55	Max Peak	Horizontal	149	1	68.2	-6.7	Pass
6	6925.86	71.49	3.23	-10.14	64.58	Max Peak	Vertical	152	3	68.2	-3.4	Pass
7	10400.77	63.74	4.41	0.11	68.03	Max Peak	Horizontal	165	291	68.2	-0.2	Pass
8	15601.95	56.93	5.58	1.30	63.81	Max Peak	Horizontal	162	3	68.2	-4.4	Pass
9	15601.95	38.06	5.58	1.30	44.94	Max Avg	Horizontal	162	3	54.0	-9.1	Pass

Test Notes: EUT powered by POE and connected to laptop outside chamber

back to matrix

TX SPURIOUS & RESTRICTED BAND EMISSIONS

Variant: 10MHz, Test Freq: 5245.00 MHz, Antenna: RADWIN Ltd. SA0199500 20.5 dBi, Power Setting: 19



1000.00 - 18000.00 MHz												
Num	**Frequency MHz**	**Raw dBµV**	**Cable Loss dB**	**AF dB**	**Level dBµV/m**	**Measurement Type**	**Pol**	**Hgt cm**	**Azt Deg**	**Limit dBµV/m**	**Margin dB**	**Pass /Fail**
1	4863.09	69.47	3.03	-14.99	57.51	Max Peak	Horizontal	164	3	68.2	-10.7	Pass
2	4863.09	55.48	3.03	-14.99	43.52	Max Avg	Horizontal	164	3	54.0	-10.5	Pass
3	5241.37	90.26	3.13	-14.42	78.97	Fundamental	Horizontal	100	0	--	--	
4	6249.52	71.84	3.23	-11.76	63.31	Max Peak	Horizontal	164	1	68.2	-4.9	Pass
5	6249.52	58.04	3.23	-11.76	49.51	Max Avg	Horizontal	164	1	54.0	-4.5	Pass
6	6993.29	57.28	3.26	-9.85	50.69	Peak (NRB)	Vertical	151	0	--	--	Pass
7	10489.68	61.55	4.45	0.33	66.33	Max Peak	Horizontal	164	312	68.2	-1.9	Pass
8	10489.68	46.22	4.45	0.33	51.00	Max Avg	Horizontal	164	312	54.0	-3.0	Pass

Test Notes: EUT powered by POE and connected to laptop outside chamber

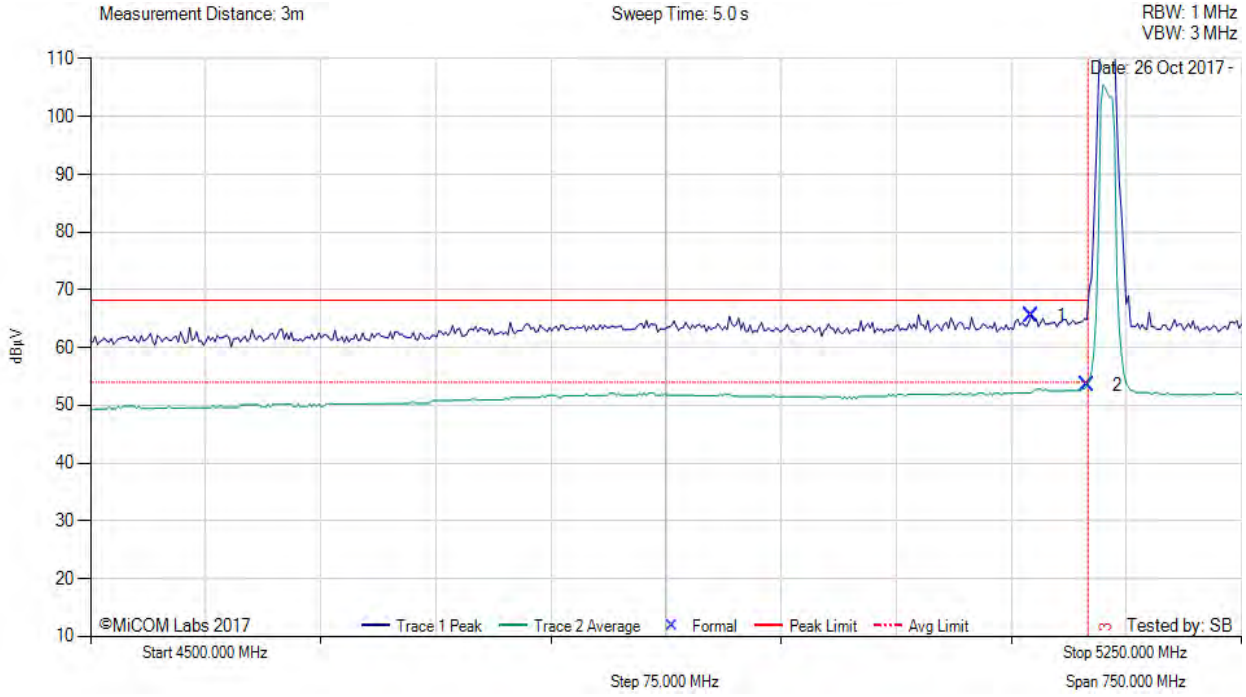
back to matrix

A.3.2. Restricted Edge & Band-Edge Emissions

A.3.2.3. RADWIN Ltd. SA0199500 11 dBi

RESTRICTED LOWER BAND-EDGE EMISSIONS

Variant: 10MHz, Test Freq: 5162.00 MHz, Antenna: RADWIN Ltd. SA0199500 11 dBi, Power Setting: 12.0, Duty Cycle (%): 99

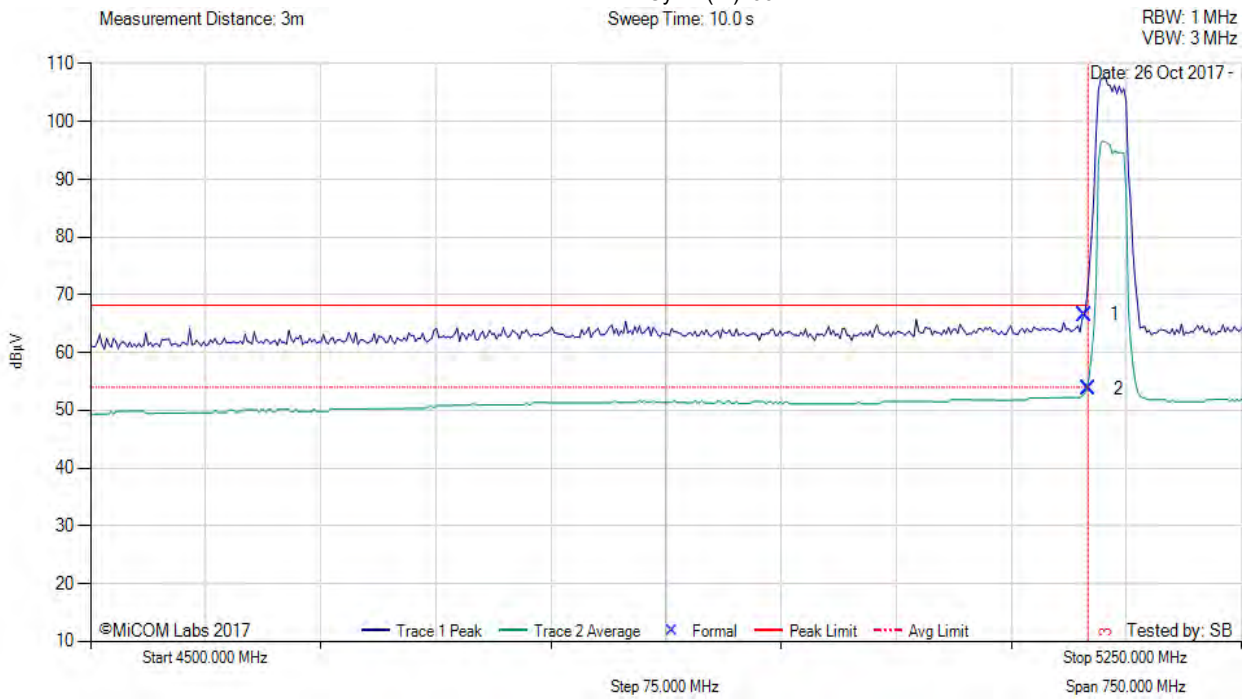


4500.00 - 5250.00 MHz												
Num	**Frequency MHz**	**Raw dBµV**	**Cable Loss dB**	**AF dB**	**Level dBµV/m**	**Measurement Type**	**Pol**	**Hgt cm**	**Azt Deg**	**Limit dBµV/m**	**Margin dB**	**Pass /Fail**
1	5113.23	27.16	3.10	35.30	65.56	Max Peak	Vertical	152	15	68.2	-2.7	Pass
2	5149.30	15.05	3.06	35.40	53.51	Max Avg	Vertical	152	15	54.0	-0.5	Pass
3	5150.00	--	--	--	--	Restricted-Band	--	--	--	--	--	--

back to matrix

RESTRICTED LOWER BAND-EDGE EMISSIONS

Variant: 20MHz, Test Freq: 5165.00 MHz, Antenna: RADWIN Ltd. SA0199500 11 dBi, Power Setting: 5.5, Duty Cycle (%): 99

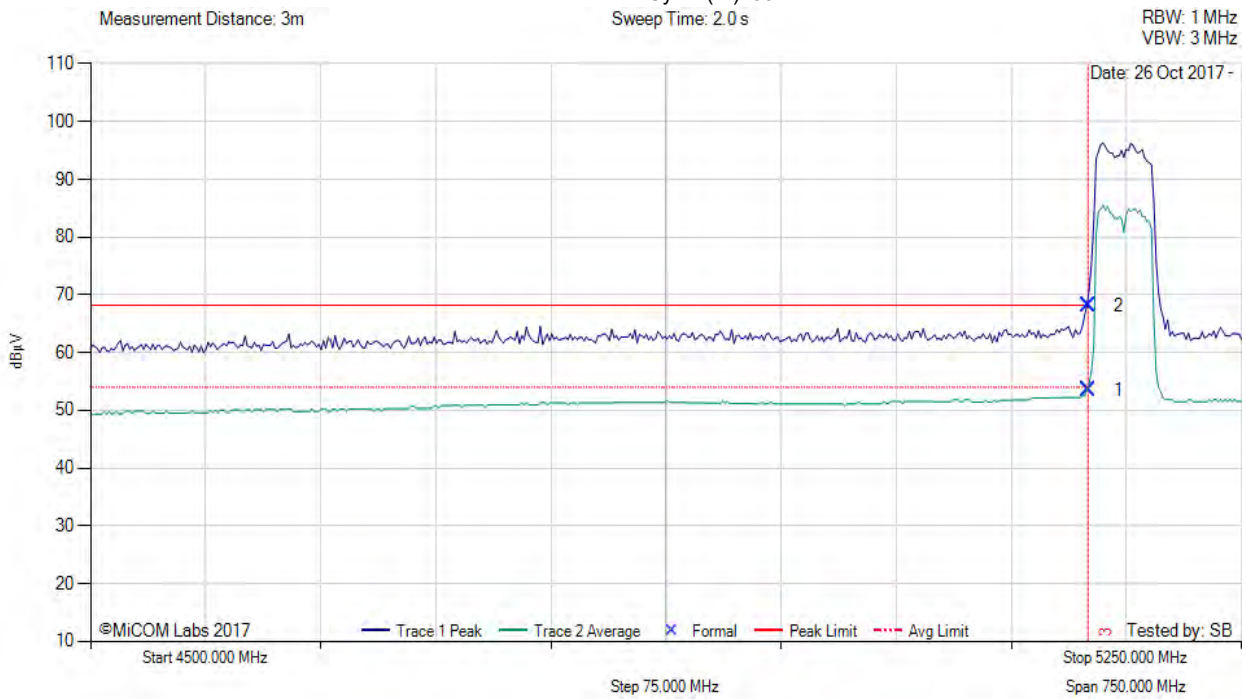


4500.00 - 5250.00 MHz												
Num	**Frequency MHz**	**Raw dBµV**	**Cable Loss dB**	**AF dB**	**Level dBµV/m**	**Measurement Type**	**Pol**	**Hgt cm**	**Azt Deg**	**Limit dBµV/m**	**Margin dB**	**Pass /Fail**
1	5147.80	28.08	3.06	35.40	66.54	Max Peak	Vertical	152	15	68.2	-1.7	Pass
2	5150.00	15.35	3.06	35.40	53.81	Max Avg	Vertical	152	15	54.0	-0.2	Pass
3	5150.00	--	--	--	--	Restricted-Band	--	--	--	--	--	--

back to matrix

RESTRICTED LOWER BAND-EDGE EMISSIONS

Variant: 40MHz, Test Freq: 5172.00 MHz, Antenna: RADWIN Ltd. SA0199500 11 dBi, Power Setting: -2.5, Duty Cycle (%): 99



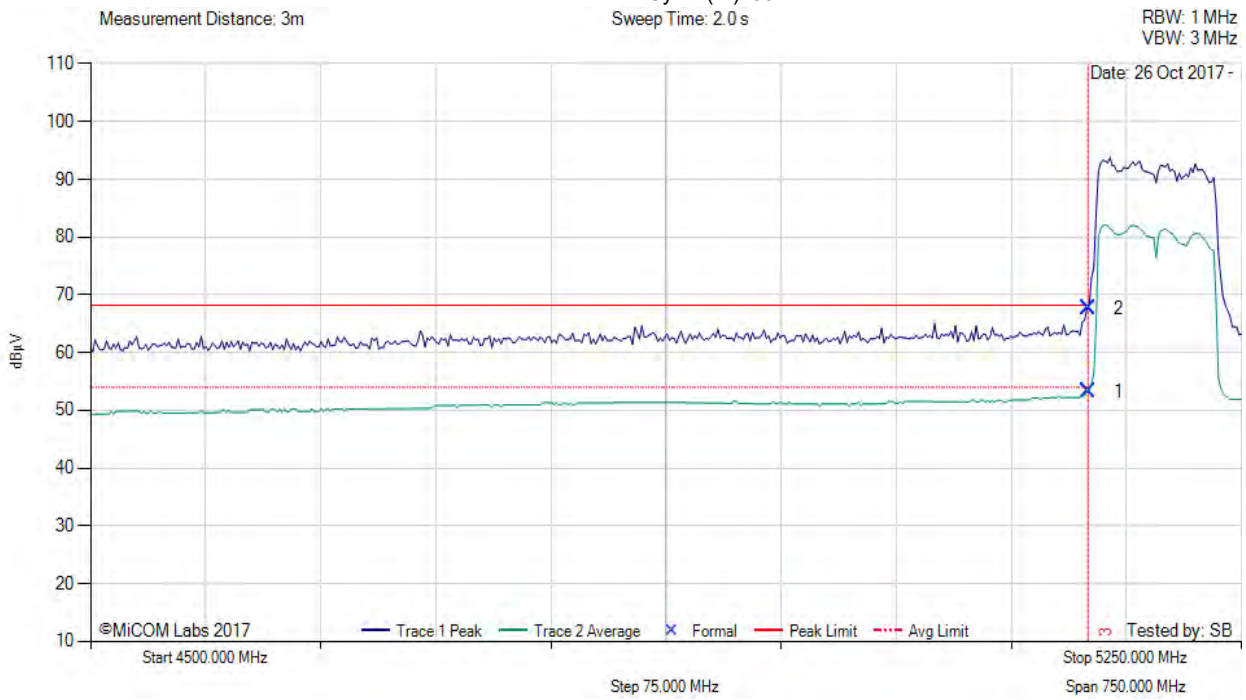
4500.00 - 5250.00 MHz												
Num	**Frequency MHz**	**Raw dBµV**	**Cable Loss dB**	**AF dB**	**Level dBµV/m**	**Measurement Type**	**Pol**	**Hgt cm**	**Azt Deg**	**Limit dBµV/m**	**Margin dB**	**Pass /Fail**
1	5150.00	15.05	3.06	35.40	53.51	Max Avg	Vertical	152	15	54.0	-0.5	Pass
2	5150.00	29.67	3.06	35.40	68.13	Max Peak	Vertical	152	15	68.2	-0.1	Pass
3	5150.00	--	--	--	--	Restricted-Band	--	--	--	--	--	--

Test Notes: channel moved from 5172 to 5173

back to matrix

RESTRICTED LOWER BAND-EDGE EMISSIONS

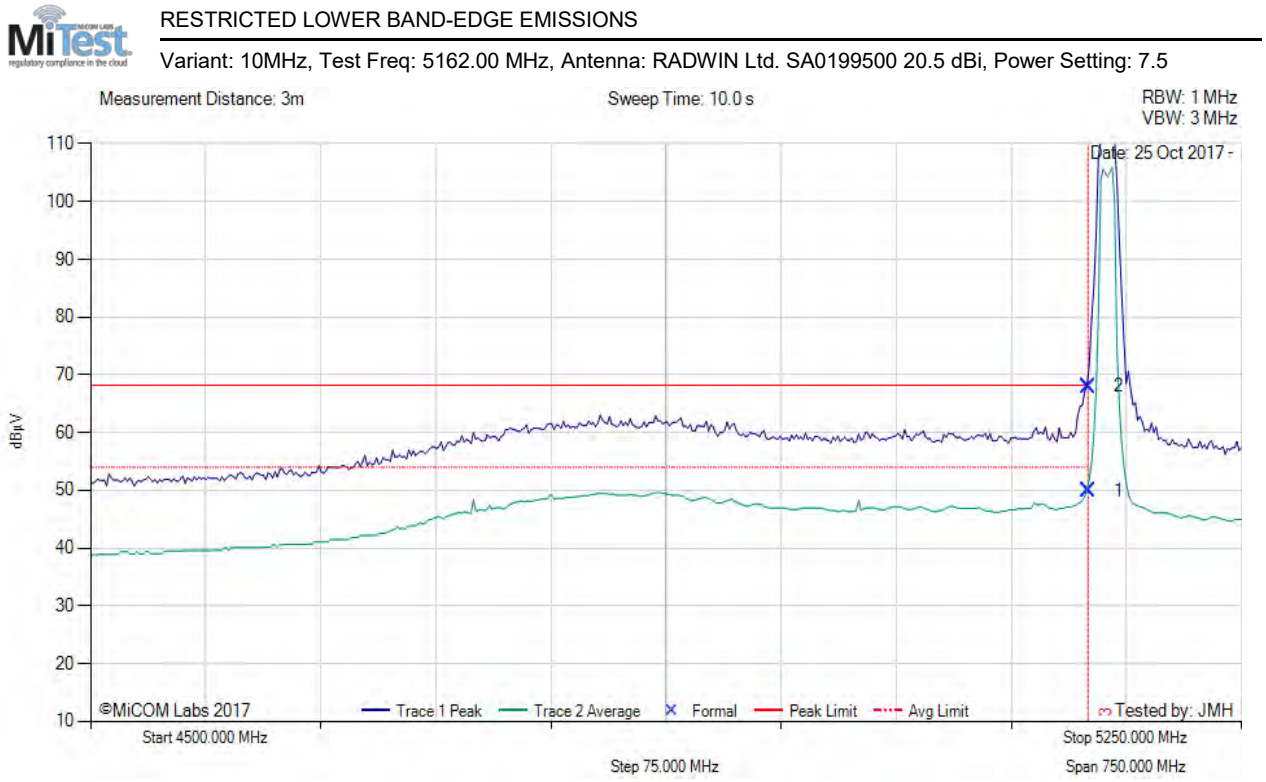
Variant: 80MHz, Test Freq: 5190.00 MHz, Antenna: RADWIN Ltd. SA0199500 11 dBi, Power Setting: -1.0, Duty Cycle (%): 99



4500.00 - 5250.00 MHz												
Num	**Frequency MHz**	**Raw dBµV**	**Cable Loss dB**	**AF dB**	**Level dBµV/m**	**Measurement Type**	**Pol**	**Hgt cm**	**Azt Deg**	**Limit dBµV/m**	**Margin dB**	**Pass /Fail**
1	5150.00	14.75	3.06	35.40	53.21	Max Avg	Vertical	152	15	54.0	-0.8	Pass
2	5150.00	29.15	3.06	35.40	67.61	Max Peak	Vertical	152	15	68.2	-0.6	Pass
3	5150.00	--	--	--	--	Restricted-Band	--	--	--	--	--	--

back to matrix

A.3.2.4. RADWIN Ltd. SA0199500 20.5 dBi (11dBi Gain + 9.5 dB Beamforming)



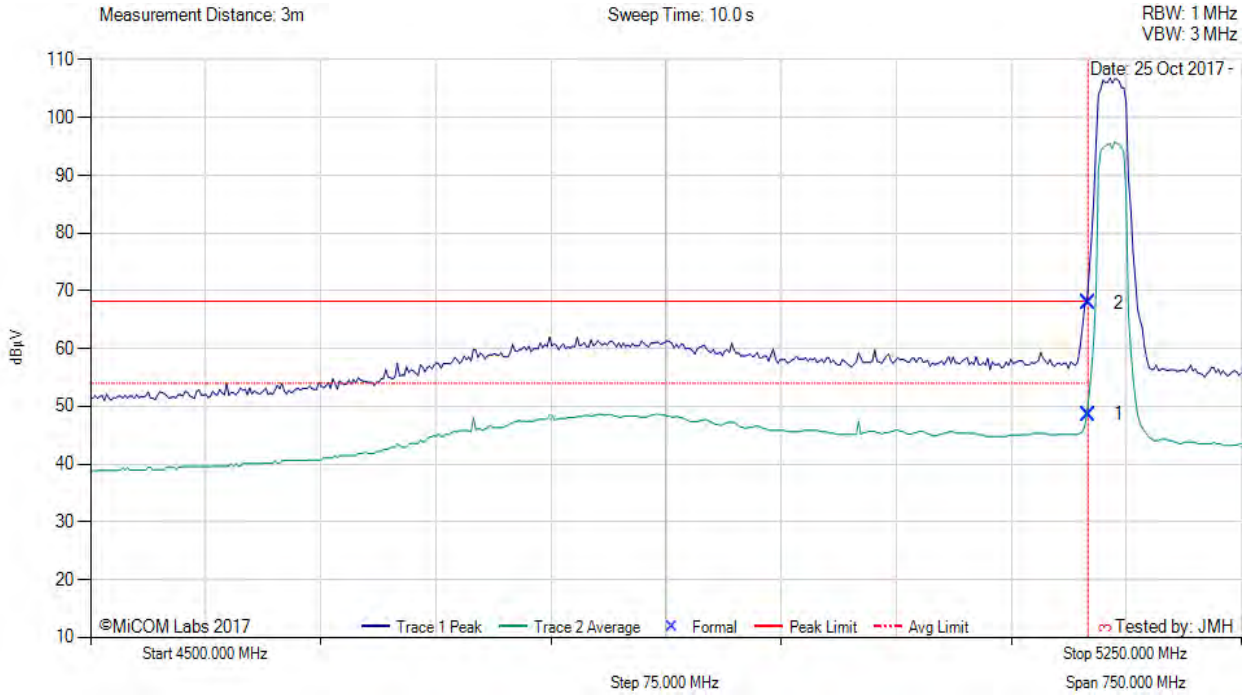
4500.00 - 5250.00 MHz												
Num	**Frequency MHz**	**Raw dBµV**	**Cable Loss dB**	**AF dB**	**Level dBµV/m**	**Measurement Type**	**Pol**	**Hgt cm**	**Azt Deg**	**Limit dBµV/m**	**Margin dB**	**Pass /Fail**
1	5150.00	11.51	3.06	35.40	49.97	Max Avg	Vertical	153	2	54.0	-4.0	Pass
2	5150.00	29.52	3.06	35.40	67.98	Max Peak	Vertical	153	2	68.2	-0.3	Pass
3	5150.00	--	--	--	--	Restricted-Band	--	--	--	--	--	--

Test Notes: EUT powered by POE and connected to laptop outside chamber

back to matrix

RESTRICTED LOWER BAND-EDGE EMISSIONS

Variant: 20MHz, Test Freq: 5165.00 MHz, Antenna: RADWIN Ltd. SA0199500 20.5 dBi, Power Setting: -1.0



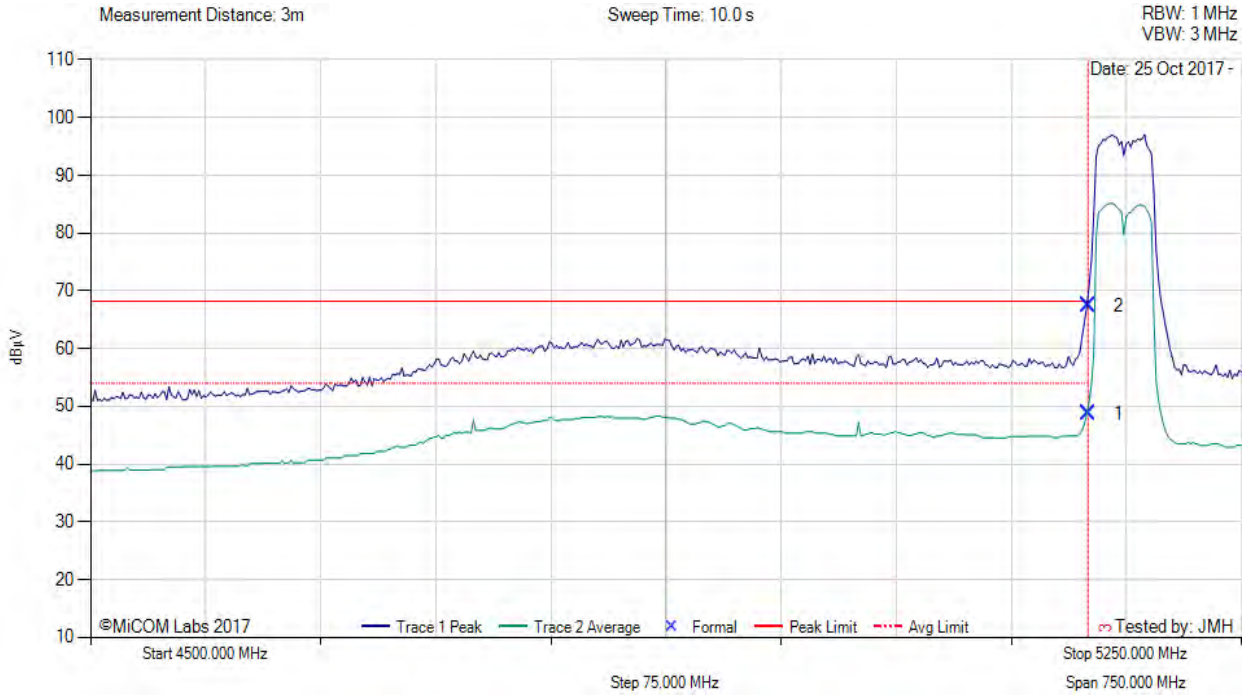
4500.00 - 5250.00 MHz												
Num	**Frequency MHz**	**Raw dBµV**	**Cable Loss dB**	**AF dB**	**Level dBµV/m**	**Measurement Type**	**Pol**	**Hgt cm**	**Azt Deg**	**Limit dBµV/m**	**Margin dB**	**Pass /Fail**
1	5150.00	10.12	3.06	35.40	48.58	Max Avg	Vertical	153	2	54.0	-5.4	Pass
2	5150.00	29.37	3.06	35.40	67.83	Max Peak	Vertical	153	2	68.2	-0.4	Pass
3	5150.00	--	--	--	--	Restricted-Band	--	--	--	--	--	--

Test Notes: EUT powered by POE and connected to laptop outside chamber

back to matrix

RESTRICTED LOWER BAND-EDGE EMISSIONS

Variant: 40MHz, Test Freq: 5173.00 MHz, Antenna: RADWIN Ltd. SA0199500 20.5 dBi, Power Setting: -8



4500.00 - 5250.00 MHz												
Num	**Frequency MHz**	**Raw dBµV**	**Cable Loss dB**	**AF dB**	**Level dBµV/m**	**Measurement Type**	**Pol**	**Hgt cm**	**Azt Deg**	**Limit dBµV/m**	**Margin dB**	**Pass /Fail**
1	5150.00	10.29	3.06	35.40	48.75	Max Avg	Vertical	153	2	54.0	-5.3	Pass
2	5150.00	28.93	3.06	35.40	67.39	Max Peak	Vertical	153	2	68.2	-0.8	Pass
3	5150.00	--	--	--	--	Restricted-Band	--	--	--	--	--	--

Test Notes: EUT powered by POE and connected to laptop outside chamber. Moved in 1 MHz to 5173 MHz

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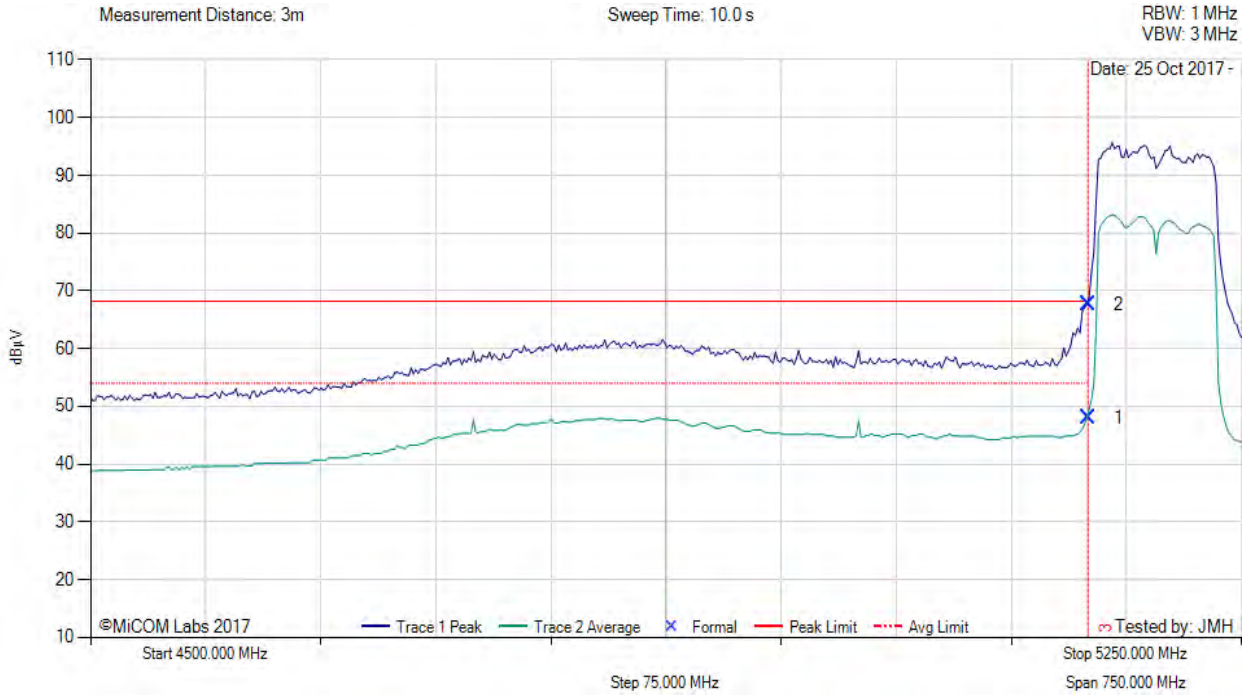
RESTRICTED LOWER BAND-EDGE EMISSIONS

Variant: 80MHz, Test Freq: 5194.00 MHz, Antenna: RADWIN Ltd. SA0199500 20.5 dBi, Power Setting: -6



4500.00 - 5250.00 MHz												
Num	**Frequency MHz**	**Raw dBµV**	**Cable Loss dB**	**AF dB**	**Level dBµV/m**	**Measurement Type**	**Pol**	**Hgt cm**	**Azt Deg**	**Limit dBµV/m**	**Margin dB**	**Pass /Fail**
1	5150.00	9.61	3.06	35.40	48.07	Max Avg	Vertical	153	2	54.0	-5.9	Pass
2	5150.00	29.23	3.06	35.40	67.69	Max Peak	Vertical	153	2	68.2	-0.5	Pass
3	5150.00	--	--	--	--	Restricted-Band	--	--	--	--	--	--

Test Notes: EUT powered by POE and connected to laptop outside chamber

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