

Electromagnetic Compatibility Test Report

Prepared in accordance with

FCC Part 15 and ANSI C63.10

On

BROADBAND ETHERNET RADIO

RF-7800W

**Harris RF Communications
221 Jefferson Ridge Parkway
Lynchburg, VA 24501**




Prepared by:

TUV Rheinland of North America, Inc.

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Report No.: 31351086.001 Harris RF-7800W.doc

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Client:	Harris RF Communications 221 Jefferson Ridge Parkway Lynchburg, VA 24501		Shane Miller 434-455-9530 smille29@harris.com		
Identification:	BROADBAND ETHERNET RADIO	Serial No.:	E00047		
Test item:	RF-7800W	Date tested:	7/9/2013		
Testing location:	TUV Rheinland of North America 336 Initiative Drive Rochester, NY 14624 U.S.A.		Tel: (585) 426-5555 Fax: 585-568-8338		
Test specification:	Emissions: FCC Part 15, Subpart C, FCC Parts 15.107(c), 15.207(c) FCC Parts 15.247(d), 15.205, 15.209, 15.215(c) FCC Part 15.247(a)(2) , FCC Part 15.247, FCC Part 15.247(b)(3) , FCC Part 15.247(d) , FCC Parts 15.209(a) FCC Parts 15.247(i) ,				
Test Result	The above product was found to be Compliant to the above test standard(s)				
tested by: Randall E Masline		reviewed by: Cecil Gittens			
8 August 2013 _____ <i>Signature</i>		8 August 2013 _____ <i>Signature</i>			
Other Aspects:	None				
Abbreviations: OK, Pass, Compliant, Complies = passed Fail, Not Compliant, Does Not Comply = failed N/A = not applicable					
			Industry Canada	VCCI	BSMI
US5253	Testing Cert.# 3331.04		3466C-1	A-0037	SL2-IN-E-050R

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Manufacturer's statement - attestation

The manufacturer; Harris RF Communications, as the responsible party for the equipment tested, hereby affirms:

- a) That Shane Miller reviewed and concurs that the test shown in this report are reflective of the operational characteristics of the device for which certification is sought;
- b) That the device in this test report will be representative of production units;
- c) That all changes (in hardware and software/firmware) to the subject device will be reviewed.
- d) That any changes impacting the attributes, functionality or operational characteristics documented in this report will be communicated to the body responsible for approving (certifying) the subject equipment.



Shane Miller

Printed name of official

Signature of official

221 Jefferson Ridge Parkway

Lynchburg, VA 24551

Address

2 Aug 13

Date

434-455-9530

Telephone number

smille29@Harris.com

Email address of official

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1 General Information

1.1 Scope

This report is intended to document the status of conformance with the requirements of the FCC Part 15 and ANSI **C63.10** based on the results of testing performed on 7/9/2013 on the BROADBAND ETHERNET RADIO, RF-7800W No. RF-7800W, manufactured by Harris RF Communications. This report only applies to the specific samples tested under the stated test conditions. It is the responsibility of the manufacturer to assure that additional production units of this RF-7800W are manufactured with identical or EMI equivalent electrical and mechanical components. This report is further intended to document changes and modifications to the EUT throughout its life cycle. All documentation will be included as a supplement.

1.2 Purpose

Testing was performed to evaluate the EMC performance of the EUT (Equipment Under Test) in accordance with the applicable requirements, procedures, and criteria defined in the application of regulations and application of standards listed in this report.

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1.3 Summary of Test Results

Applicant	Harris RF Communications 221 Jefferson Ridge Parkway Lynchburg, VA 24501	Tel	434-455-9530	Contact	Shane Miller
		Fax	434-455-6819	e-mail	smille29@harris.com
Broadband Ethernet Radio	BROADBAND ETHERNET RADIO	RF-7800W:	RF-7800W		
Serial Number	E00047	Test Voltage/Freq.	Power over Ethernet		
Test Date Completed:	7/9/2013	Test Engineer	Randall E Masline		
Standards	Broadband Ethernet Radio	Severity Level or Limit	Criteria	Test Result	
FCC Part 15, Subpart C Standard	Radio Frequency Devices-Subpart C: Intentional Radiators	See called out parts below	See Below	Complies	
FCC Part 15.247	Operation within the band 5725 to 5850 MHz	See called out parts below	Below Limit	Complies	
FCC Parts 15.247(d), 15.205, 15.209, 15.215(c)	Out-of-Band Spurious and Harmonic Emissions (EUT in Transmit Mode)	Below the applicable limits	Below Limit	Complies	
FCC Parts 15.107(c), 15.207(c)	Conducted Emissions on AC Mains	EUT is operated by POE	Below Limit	Complies	
FCC Part 15.247(d)	Band Edge Radiated Emission	Per requirements of the standard	Below Limit	Complies	
FCC Part 15.247(b)(3)	Conducted Output Power	Shall not exceed 1.0 Watts	Below Limit	Complies	
FCC Part 15.247(a)(2)	Occupied Bandwidth	6 dB \geq 500 kHz 99% BW	Within Limit	Complies	
FCC Part 15.247(e)	Peak Power Spectral Density	\leq 8 dBm in any 3 kHz	Below Limit	Complies	
FCC Part 15.31(e)	Voltage Requirements	Output at 0.85% and 1.15% of Nominal Voltage	Below Limit	Complies	
FCC Parts 15.209(a)	Radiated Emissions while EUT in Receive Mode	Below limit of section 15.209(a) Class B	Below Limit	Complies	
FCC Parts 15.247(i)	RF Exposure	SAR or MPE Requirements	Below Limit	Complies (without testing)	
FCC Parts 15.203	Antenna Requirements	Professionally Installed Device		Complies	

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2 Laboratory Information

2.1 Accreditations & Endorsements

2.1.1 US Federal Communications Commission

TUV Rheinland of North America located at, 336 Initiative Drive, Rochester, NY 14624-6217 is accredited by the commission for performing testing services for the general public on a fee basis. This laboratory test facilities have been fully described in reports submitted to and accepted by the FCC (Registration No 90575). The laboratory scope of accreditation includes: Title 47 CFR Part 15, and 18. The accreditation is updated every 3 years.

2.1.2 ILAC/A2LA

This is a program which is administered under the auspices of A2LA. The laboratory has been assessed and accredited in accordance with ISO Standard 17025:2005 (Certificate Number: 3331.04). The scope of laboratory accreditation includes emission and immunity testing. The accreditation is updated annually.

2.1.3 VCCI

VCCI Accredited test lab. Registration numbers A-0037, R-3673, C-4113, C-4114, C-4115, T-1158, T-1159 G429.

2.1.4 Industry Canada

(Registration No.: 3466C-1) The OATS has been accepted by Industry Canada to perform testing to 3 and to 10m, based on the test procedures described in ANSI C63.4-2009.

2.1.5 BSMI

Registration No.: SL2-IN-E-050R. The BSMI accreditation was obtained by NIST MRA with the BSMI.

2.1.6 Korea

Recognized by Radio Research Agency as an accredited Conformity Assessment Body (CAB) under the terms of Phase I of the APEC TEL.

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2.1.7 Sample Calculation – radiated & conducted emissions

The field strength is calculated by subtracting the Amplifier Gain and adding the Cable Loss and Antenna Correction Factor to the measured reading. The basic equation is as follows:

$$\text{Field Strength (dB}\mu\text{V/m)} = \text{RAW} - \text{AMP} + \text{CBL} + \text{ACF}$$

Where: RAW = Measured level before correction (dBμV)

AMP = Amplifier Gain (dB)

CBL = Cable Loss (dB)

ACF = Antenna Correction Factor (dB/m)

$$\mu\text{V/m} = 10^{\frac{\text{dB}\mu\text{V/m}}{20}}$$

Sample radiated emissions calculation @ 30 MHz

Measurement +Antenna Factor–Amplifier Gain+Cable loss=Radiated Emissions (dBμV/m)

$$25 \text{ dB}\mu\text{V/m} + 17.5 \text{ dB} - 20 \text{ dB} + 1.0 \text{ dB} = 23.5 \text{ dB}\mu\text{V/m}$$

2.2 Measurement Uncertainty Emissions

Per CISPR 16-4-2	Ulab	Ucisp
Radiated Disturbance @ 10m		
30 MHz – 1,000 MHz	4.57 dB	5.2 dB
Radiated Disturbance @ 3m		
1.0 GHz – 6.0 GHz	5.08 dB	5.2 dB
6.0 GHz – 18.0 GHz	5.16 dB	5.5 dB
Conducted Disturbance @ Mains Terminals		
150 kHz – 30 MHz	2.62 dB	3.6 dB
Disturbance Power		
30 MHz – 300 MHz	3.88 dB	4.5 dB

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Measurement Uncertainty Immunity

The estimated combined standard uncertainty for ESD immunity measurements is $\pm 2.98\%$.	Per EN61000-4-2
The estimated combined standard uncertainty for radiated immunity measurements is $\pm 2.0\text{dB}$.	Per EN61000-4-3
The estimated combined standard uncertainty for EFT fast transient immunity measurements is $\pm 5.0\%$.	Per EN61000-4-6
The estimated combined standard uncertainty for surge immunity measurements is $\pm 5.0\%$.	Per EN61000-4-5
The estimated combined standard uncertainty for conducted immunity measurements is $\pm 2.0\text{dB}$.	Per EN61000-4-6
The estimated combined standard uncertainty for power frequency magnetic field immunity measurements is $\pm 2.57\%$.	Per CISPR16-4-2 Method
The estimated combined standard uncertainty for voltage variation and interruption measurements is $\pm 2.48\%$.	Per CISPR16-4-2 Method
The estimated combined standard uncertainty for radiated emissions measurements is $\pm 4.57\text{ dB}$	Per CISPR16-4-2 Method
The estimated combined standard uncertainty for radiated emissions measurements from 1 GHz to 6 GHz is $\pm 4.57\text{dB}$	Per CISPR16-4-2 Method
The estimated combined standard uncertainty for radiated emissions measurements from 6 GHz to 18 GHz is $\pm 4.57\text{dB}$	Per CISPR16-4-2 Method
The estimated combined standard uncertainty for conducted emissions measurements is $\pm 2.62\text{dB}$.	Per CISPR16-4-2 Method
The estimated combined standard uncertainty for harmonic current and flicker measurements is $\pm 11.15\%$.	Per CISPR16-4-2 Method

Expanded measurement uncertainty numbers are shown in the tables above. Compliance criteria are not based on measurement uncertainty.

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2.3 Measurement Equipment Used

Equipment	Manufacturer	Model #	Ref.	Serial #	Last Cal dd/mm/yy	Next Cal dd/mm/yy	Test
Radiated Emissions							
Horn	EMCO	3115	C025	9512-4630	20-Jul-12	20-Jul-13	RE
Horn	EMCO	3115	C031	9812-5635	23-Mar 12	23-Mar 14	RE
BiLog	Chase	CBL6111	C041	1170	12-Sept-12	12-Sept-14	RE
Analyzer w RF Filter Section 85460A	HP	8546A		3325A00134	11-Sept-12	11-Sept-13	RE
Receiver (20Hz-40GHz)	Rohde & Schwarz	ESI(B) 40	C320	839283/005	13-Sept-12	13-Sept-13	RE
Multimeter	Fluke	83	C437	48162892	13-Sept-12	13-Sept-13	RE
Amplifier (1-26.5 GHz.)	Agilent	8449B	C438	3008A01842	7-Nov-11	7-Nov-13	RE
Amplifier 1 - 18GHz	Rohde & Schwarz	TS-PR18	C439	122002/001	7-Nov-11	7-Nov-13	RE
Amplifier (18-26.5GHz)	Rohde & Schwarz	TS-PR26	C443	100005	10-Aug- 12	10-Aug- 13	RE
BiLog	Chase	CBL6111B	C448	2081	22-Feb-12	22-Feb-14	RE
Receiver	Agilent	N9038A	C325	MY52130004	1-May-12	1-May 13	RE
Horn(18-26.5 GHz)	EMCO	3160-09	C447	C447	8-Mar-13	8-Mar-15	RE
Pressure/Temperature/RH	Extech	SD700	C482	Q668892	3-Oct-12	3-Oct-13	RE
Conducted Emissions							
LISN	Schwarzbeck	8126	C109	189	13-Sept-12	13-Sept-13	CE
LISN	Schwarzbeck	8121	C111	131	21-Jan-13	21-Jan-14	CE
Analyzer w RF Filter Section 85460A	HP	8546A		3325A00134	11-Sept-12	11-Sept-13	CE
Multimeter	Fluke	87	C405	49050672	13-Sept-12	13-Sept-13	CE
General Laboratory Equipment							
Multimeter	Fluke	87	C445	59890224	13-Sept-12	13-Sept-13	
Multimeter	Fluke	8062A	C452	4715199	13-Sept-12	13-Sept-13	
Pressure/Temperature/RH	Extech	SD700	C481	Q668884	3-Oct-12	3-Oct-13	

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3 Product Information

3.1 Product Broadband Ethernet Radio

Broadband Ethernet Radio uses the frequency band listed below with the associated bandwidths.

Bandwidth (MHz)	Low (MHz)	Middle (MHz)	High (MHz)
40	5745	5787.5	5830
20	5735	5787.5	5840
10	5730	5787.5	5845
5	5727.5	5787.5	5847.5

3.2 Equipment Modifications

No modifications were needed to bring product into compliance.

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4 Radiated Emissions

4.1 Spurious Emissions Outside the band - FCC 15.247(d), RSS-210 A8.5

In any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of desired power, based on either RF conducted or radiated measurements. Conducted antenna port measurements are provided below to show that the EUT meets these requirements at the band edges.

4.1.1 Over View of Test

Results	Complies (as tested per this report)				Date	5/31/2013	
Standard	FCC Parts 15.205, 15.209, 15.215(c), 15.247(d), RSS-210 A8.5, and RSS-GEN 7.2.1						
Product RF-7800W	RF-7800W			Serial#	E00047		
Test Set-up	Tested at a 10m O.A.T.S., placed on a 1.0m x 1.5m non-conductive table 80cm above the ground plane on a turn-table. See test plans for details						
EUT Powered By	Power over Ethernet	Temp	76 °F	Humidity	36%	Pressure	1007 mbar
Perf. Criteria	(Below Limit)		Perf. Verification		Readings Under Limit		
Mod. to EUT	None		Test Performed By		Randall E Masline		

4.1.2 Test Procedure

Testing was performed in accordance with 47 CFR Part 15, ANSI C63.10:2009, RSS-GEN Issue 2. These test methods are listed under the laboratory's NVLAP Scope of Accreditation. This test measures the levels emanating from the EUT, thus evaluating the potential for the EUT to cause radio frequency interference to other electronic devices.

4.1.3 Deviations

There were no deviations from the test methodology listed in the test plan for the radiated emission test.

4.1.4 Final Test

All final radiated spurious emissions measurements were below (in compliance) the limits.

The worst –case emissions are shown below. All other emissions are on file at TUV Rheinland.

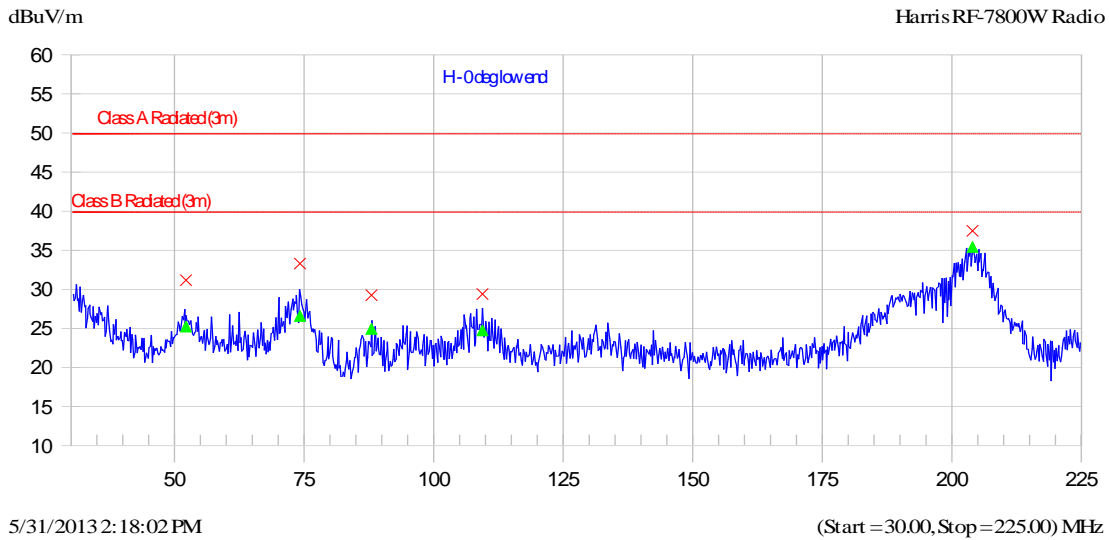
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4.1.4.1 Prescan Radiated Emissions

NOTES:

Radiated Emissions Prescan
Vertical / Horizontal

H - 0 deg low end



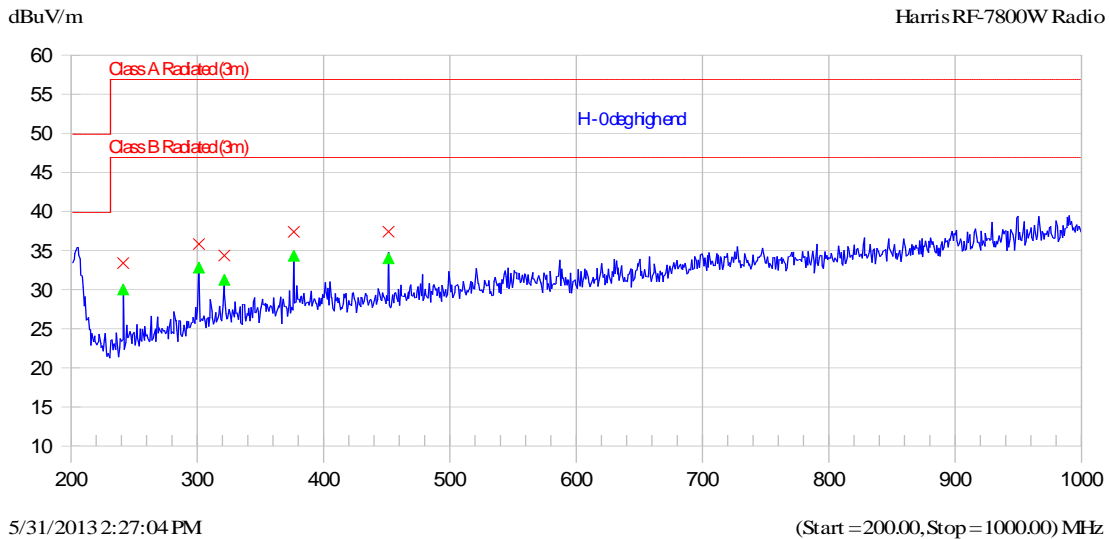
Frequency MHz	Peak dBuV/m	QP dBuV/m	Class B-QP dB	Class A-QP dB	Trace Name
51.883	31.3	25.3	-14.7	-24.7	H - 0 deg low end
73.877	33.4	26.7	-13.3	-23.3	H - 0 deg low end
87.651	29.4	25.0	-15.0	-25.0	H - 0 deg low end
109.101	29.5	24.8	-15.2	-25.2	H - 0 deg low end
203.626	37.6	35.5	-4.5	-14.5	H - 0 deg low end

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NOTES:

Radiated Emissions Prescan
Vertical / Horizontal

H - 0 deg high end



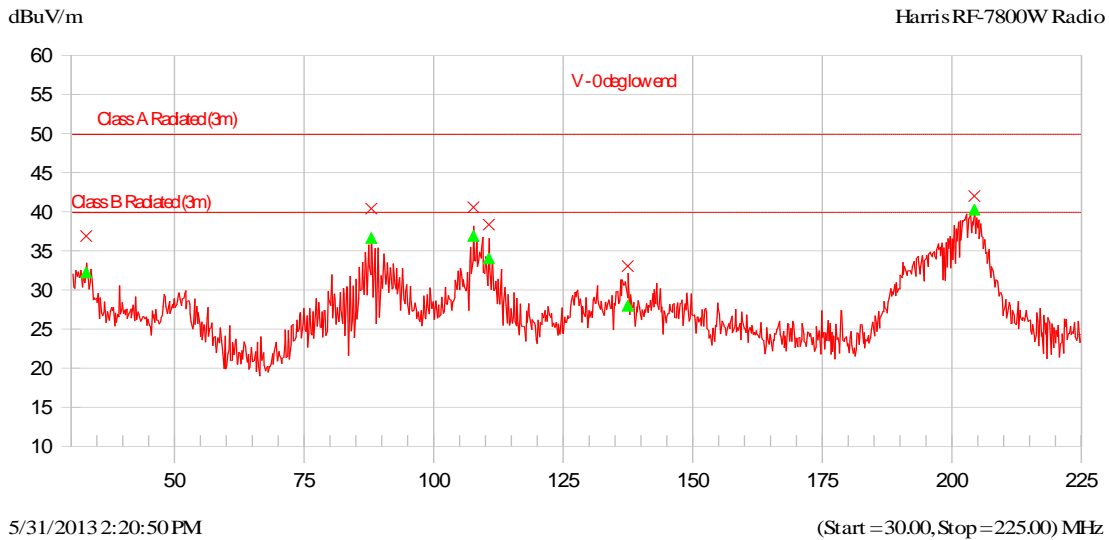
Frequency MHz	Peak dBuV/m	QP dBuV/m	Class B-QP dB	Class A-QP dB	Trace Name
240.036	33.5	30.1	-16.9	-26.9	H - 0 deg high end
299.987	35.9	32.9	-14.1	-24.1	H - 0 deg high end
320.042	34.5	31.4	-15.6	-25.6	H - 0 deg high end
375.042	37.5	34.4	-12.6	-22.6	H - 0 deg high end
450.002	37.5	34.1	-12.9	-22.9	H - 0 deg high end

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NOTES:

Radiated Emissions Prescan
Vertical / Horizontal

V - 0 deg low end



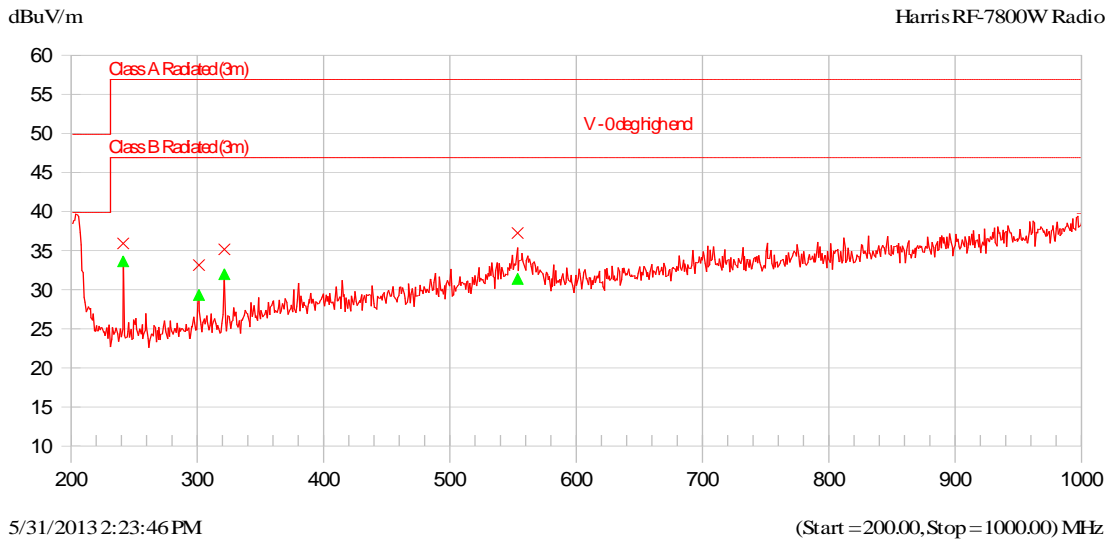
Frequency MHz	Peak dBuV/m	QP dBuV/m	Class B-QP dB	Class A-QP dB	Trace Name
32.604	37.0	32.3	-7.7	-17.7	V - 0 deg low end
87.632	40.5	36.7	-3.3	-13.3	V - 0 deg low end
107.315	40.7	37.0	-3.0	-13.0	V - 0 deg low end
110.294	38.5	34.1	-5.9	-15.9	V - 0 deg low end
137.105	33.2	28.1	-11.9	-21.9	V - 0 deg low end
204.005	42.1	40.4	0.4	-9.6	V - 0 deg low end

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NOTES:

Radiated Emissions Prescan
Vertical / Horizontal

V - 0 deg high end



Frequency MHz	Peak dBuV/m	QP dBuV/m	Class B-QP dB	Class A-QP dB	Trace Name
240.023	36.0	33.7	-13.3	-23.3	V - 0 deg high end
299.980	33.3	29.4	-17.6	-27.6	V - 0 deg high end
320.044	35.3	32.1	-14.9	-24.9	V - 0 deg high end
552.263	37.4	31.5	-15.5	-25.5	V - 0 deg high end

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4.1.5 Final Radiated Emissions

Standard:	Class B/FCC Part 15.209				final	Date:	6/25/2013		
Device Tested:	Harris				10m	File .xls:			
	Measured Level								
Meas #	Freq (MHz)	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Δ	Result	Antenna Polarization	Angle (degrees)	Antenna Height (meters)	Comment
1	203.0000	26.30	30.00	-3.70	Complied	Horizontal	0	3.00	
2	240.0360	21.40	37.00	-15.60	Complied	Horizontal	0	3.00	
3	299.9870	22.70	37.00	-14.30	Complied	Horizontal	0	1.00	
4	320.0420	22.90	37.00	-14.10	Complied	Horizontal	0	1.00	
5	375.0420	27.20	37.00	-9.80	Complied	Horizontal	0	1.00	
6	450.0020	26.20	37.00	-10.80	Complied	Horizontal	0	1.00	
7	87.6320	26.80	30.00	-3.20	Complied	Vertical	0	1.00	
8	107.3150	23.80	30.00	-6.20	Complied	Vertical	0	1.00	
9	110.2940	23.80	30.00	-6.20	Complied	Vertical	0	1.00	
10	204.0050	27.80	30.00	-2.20	Complied	Vertical	0	1.00	Maximum Emissions

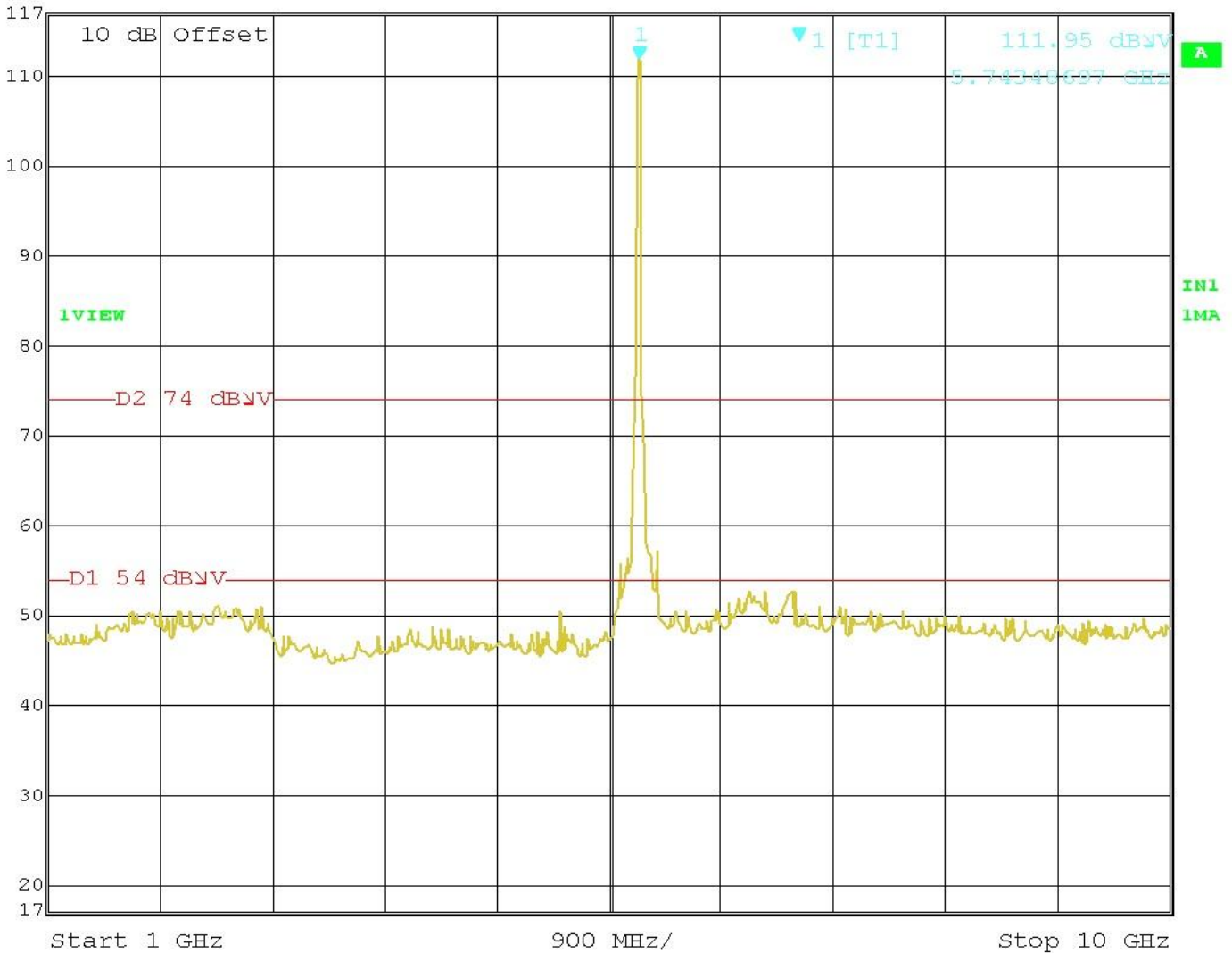
The test results contained in this report refer exclusively to the product(s) presented for testing. No liability may be assumed for models or products not referred to herein. This test report may not be published or duplicated in part without permission of the testing body. This test report by itself does not constitute authorization for the use of any TUV Rheinland test mark. The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

4.1.6 Emissions Outside the Frequency Band

In any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of desired power, based on either RF conducted or radiated measurements. Conducted antenna port measurements are provided below to show that the EUT meets these requirements at the band edges.



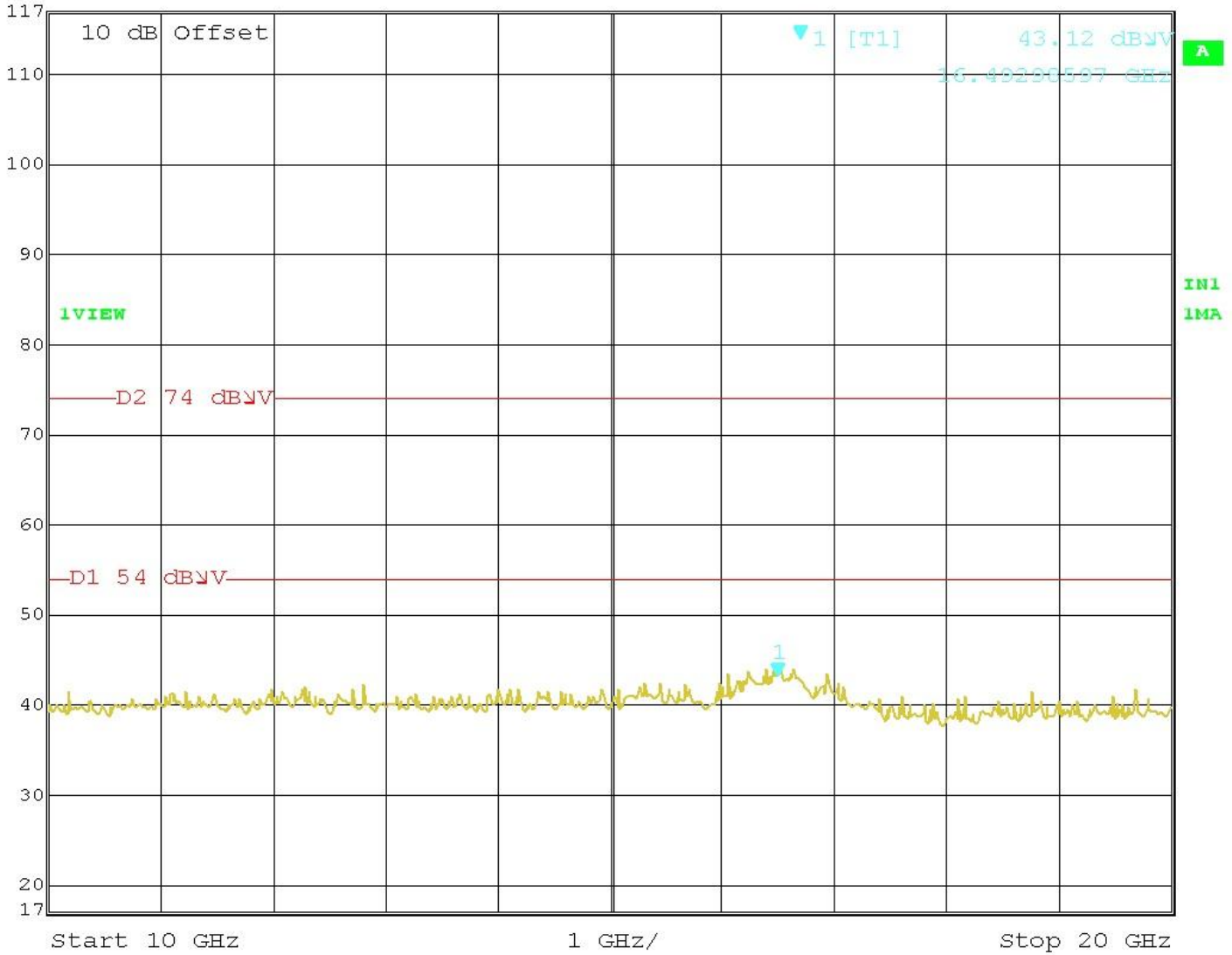
	Marker 1 [T1]	RBW	100 kHz	RF Att	20 dB
Ref Lvl	111.95 dBμV	VBW	300 kHz		
117 dBμV	5.74348697 GHz	SWT	2.25 s	Unit	dBμV



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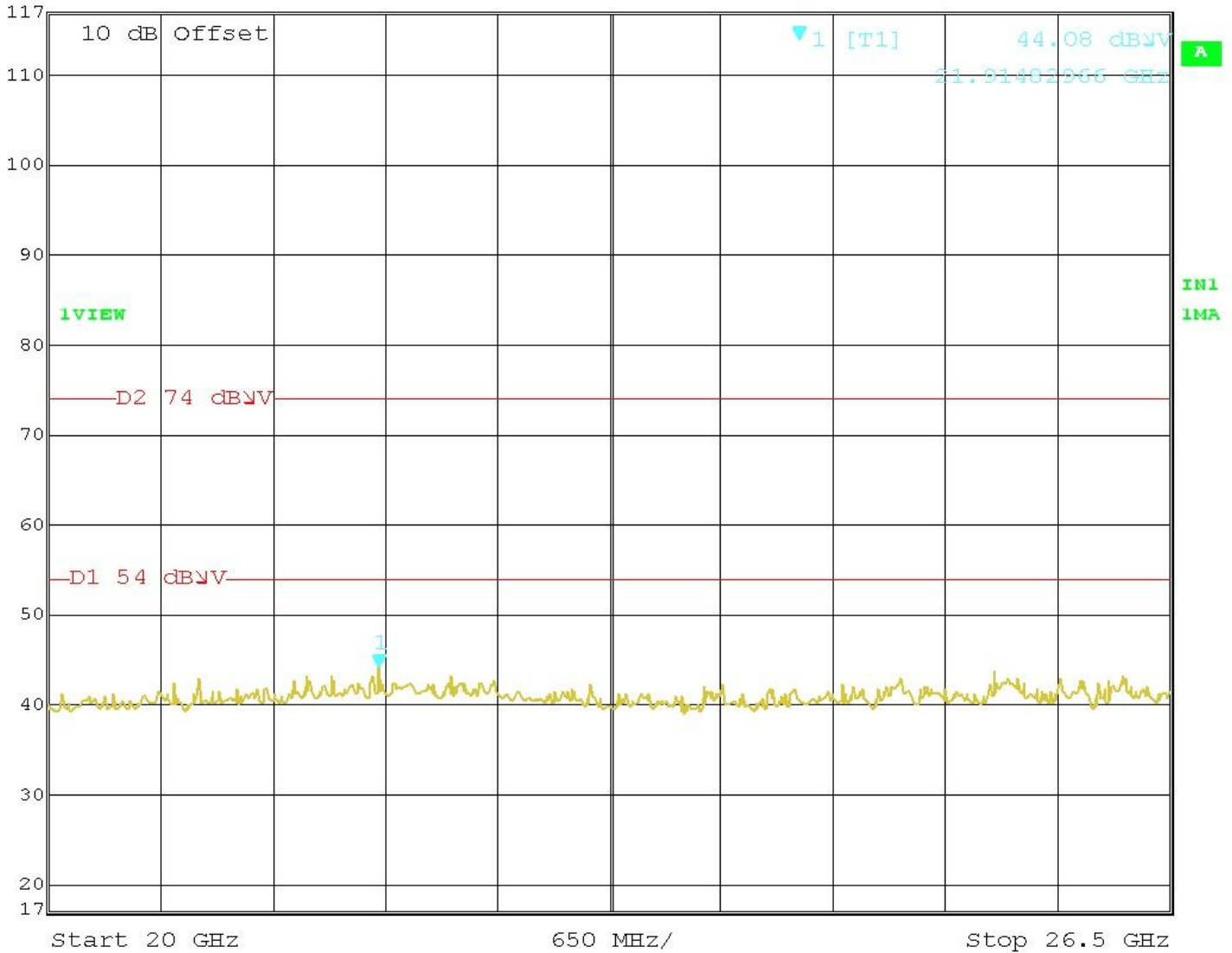
Marker 1 [T1] RBW 100 kHz RF Att 10 dB
 Ref Lvl 43.12 dBμV VBW 300 kHz
 117 dBμV 16.49298597 GHz SWT 2.5 s Unit dBμV



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Marker 1 [T1] RBW 100 kHz RF Att 10 dB
 Ref Lvl 44.08 dBμV VBW 300 kHz
 117 dBμV 21.91482966 GHz SWT 1.65 s Unit dBμV



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Marker 1 [T1]

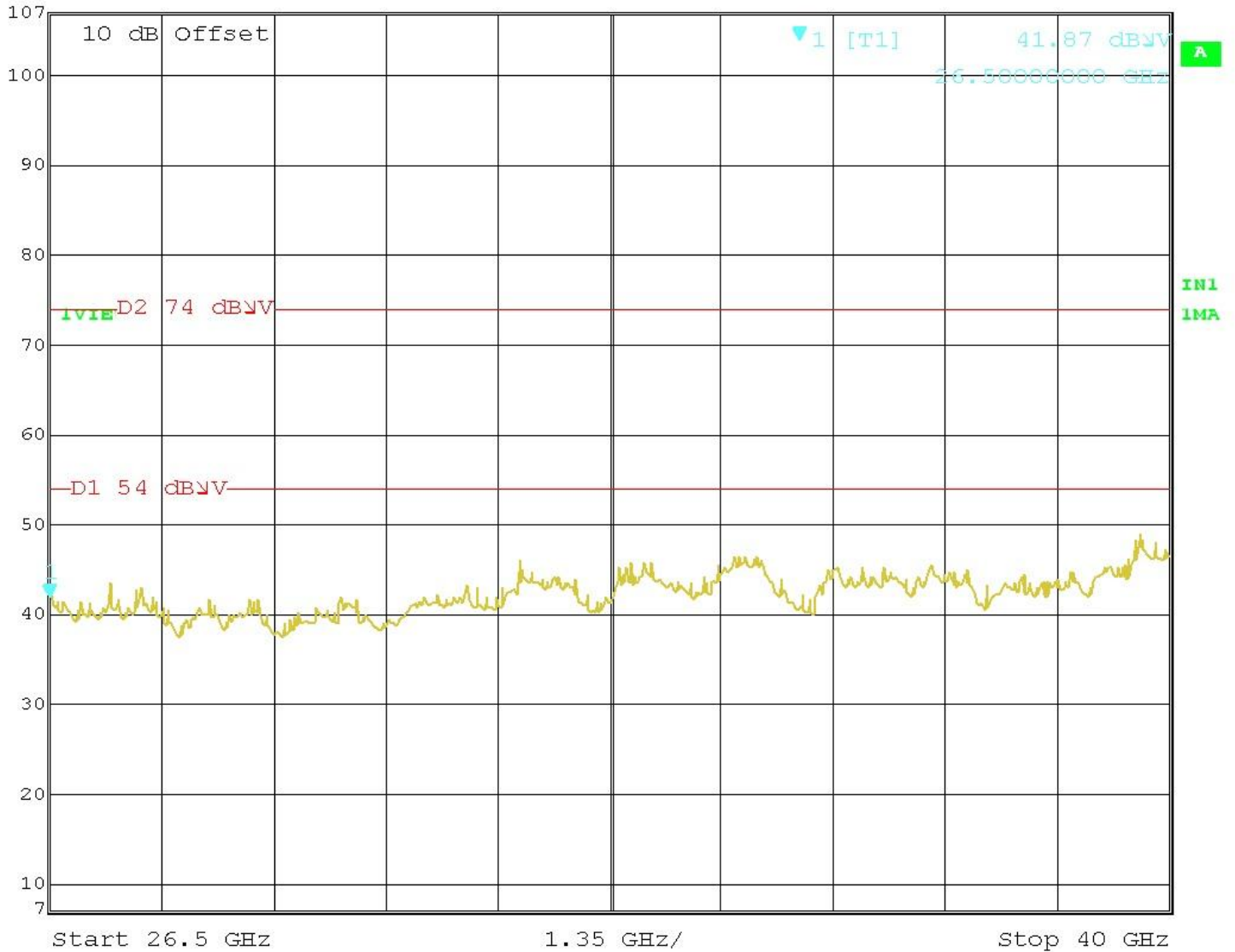
RBW 100 kHz RF Att 0 dB

Ref Lvl 41.87 dBμV

VBW 100 kHz

107 dBμV 26.50000000 GHz

SWT 3.4 s Unit dBμV



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4.2 Band Edge

4.2.1 Test Over View

Results	Complies (as tested per this report)				Date	6/27/2013	
Standard	FCC Part 15.247(d), RSS 210 2.2						
Product RF-7800W	RF-7800W			Serial#	E00047		
Test Set-up	Direct Measurement from antenna port						
EUT Powered By	Power over Ethernet	Temp	76° F	Humidity	46%	Pressure	1002 mbar
Perf. Criteria	(Below Limit)		Perf. Verification		Readings Under Limit		
Mod. to EUT	None		Test Performed By		Randall E Masline		

4.2.2 Test Procedure

Intentional radiators operating under the alternative provisions to the general emission limits must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated. The requirement to contain the designated bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage. If frequency stability is not specified in the regulations, it is recommended that the fundamental emission be kept within at least the central 80% of the permitted band in order to minimize the possibility of out-of-band operation.

4.2.3 Deviations

There were no deviations from the test methodology listed in the test plan for the Radiated Immunity test.

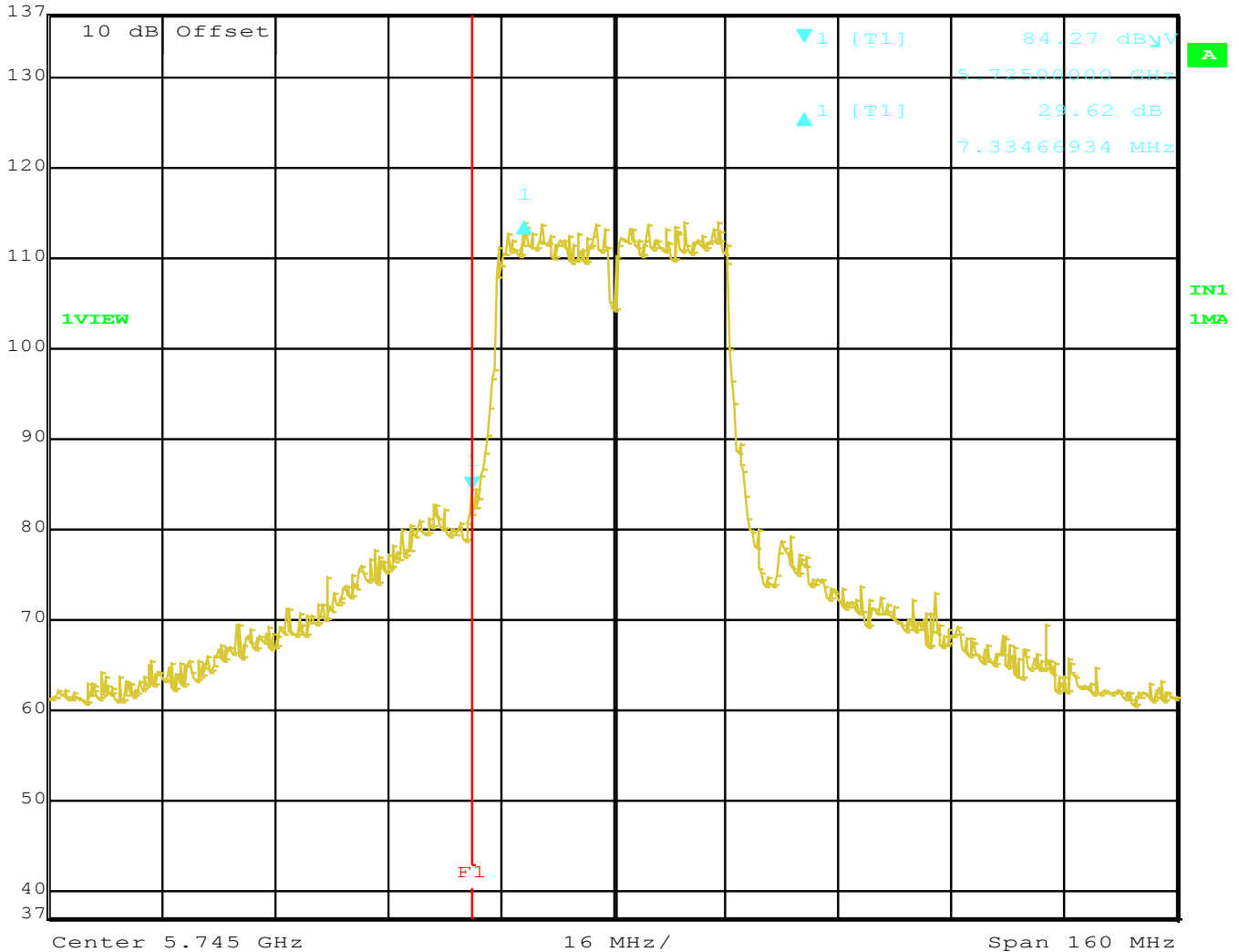
4.2.4 Final Test

The EUT met the performance criteria requirement as specified in the standards.

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	Delta 1 [T1]	RBW	100 kHz	RF Att	30 dB
Ref Lvl	29.62 dB	VBW	300 kHz		
137 dBμV	7.33466934 MHz	SWT	40 ms	Unit	dBμV



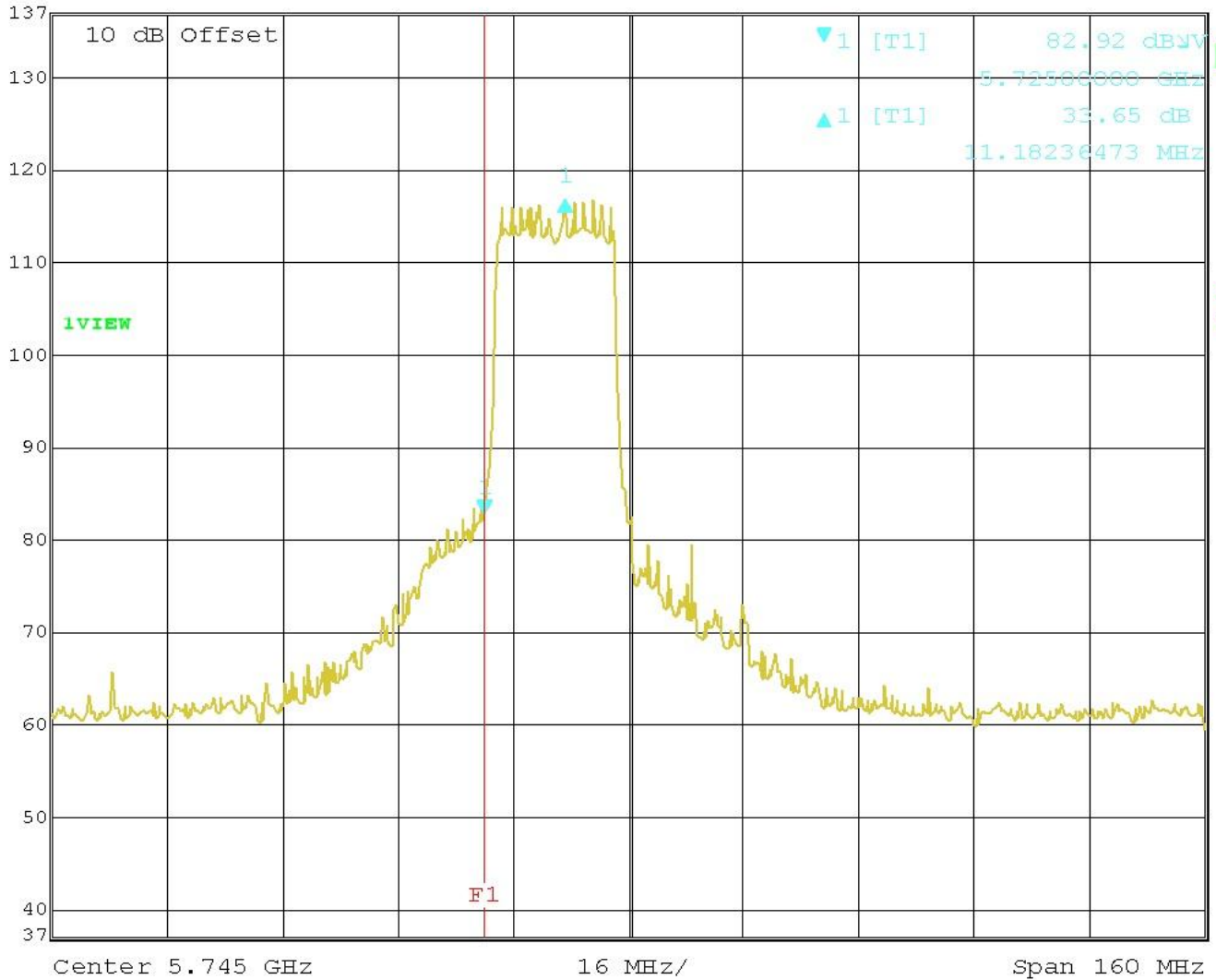
Date: 1.JAN.1997 04:21:00

Notes: Measured using the Peak detector. Band Edge is at 5725 MHz (F1)
Using 40 MHz BW

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Delta 1 [T1]	RBW	100 kHz	RF Att	30 dB
Ref Lvl	33.65 dB	VBW	300 kHz	
137 dBμV	11.18236473 MHz	SWT	40 ms	Unit dBμV

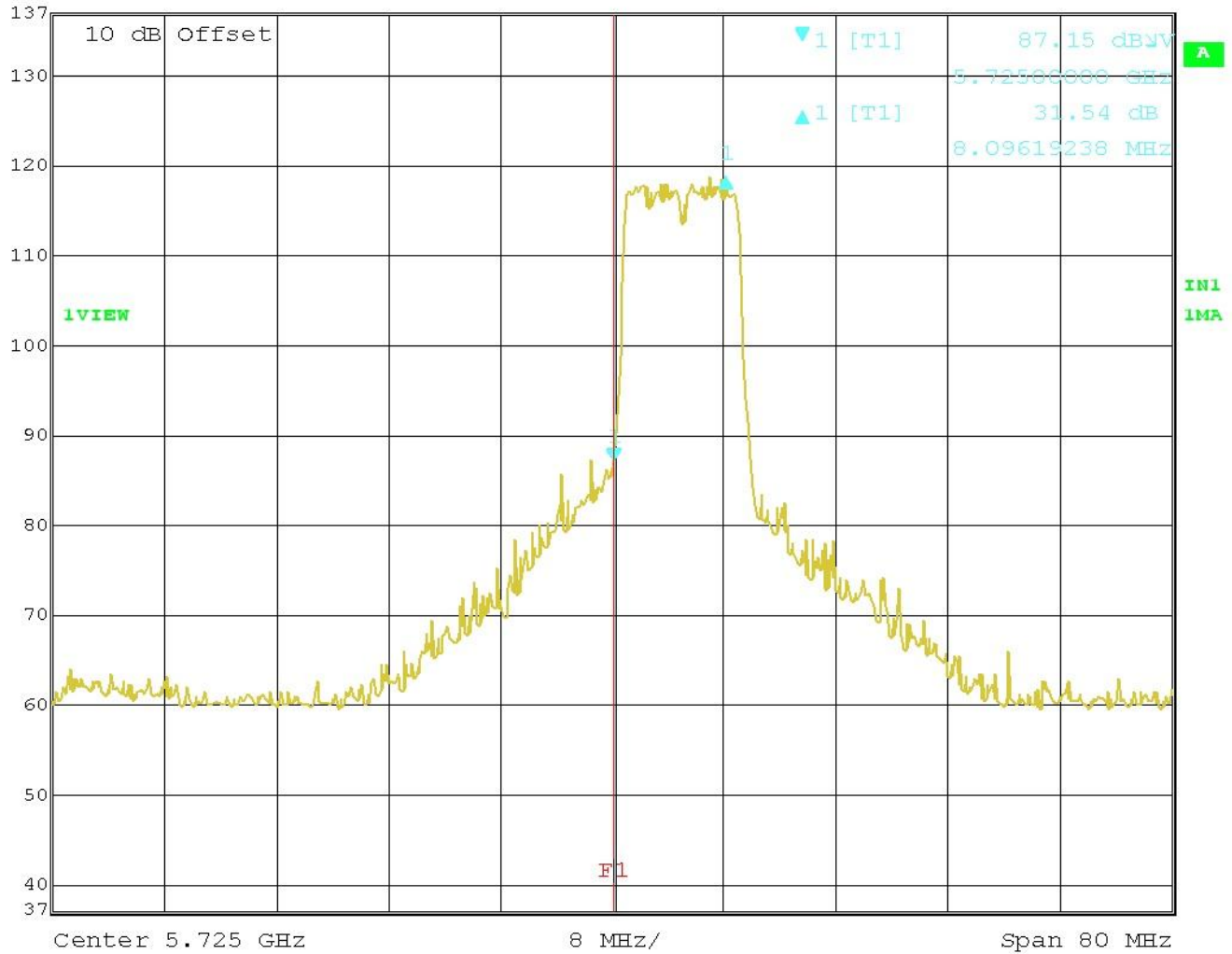


Notes: Measured using the Peak detector. Band Edge is at 5725 MHz (F1)
Using 20 MHz BW

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	Delta 1 [T1]	RBW	100 kHz	RF Att	30 dB
Ref Lvl	31.54 dB	VBW	300 kHz		
137 dBμV	8.09619238 MHz	SWT	20 ms	Unit	dBμV

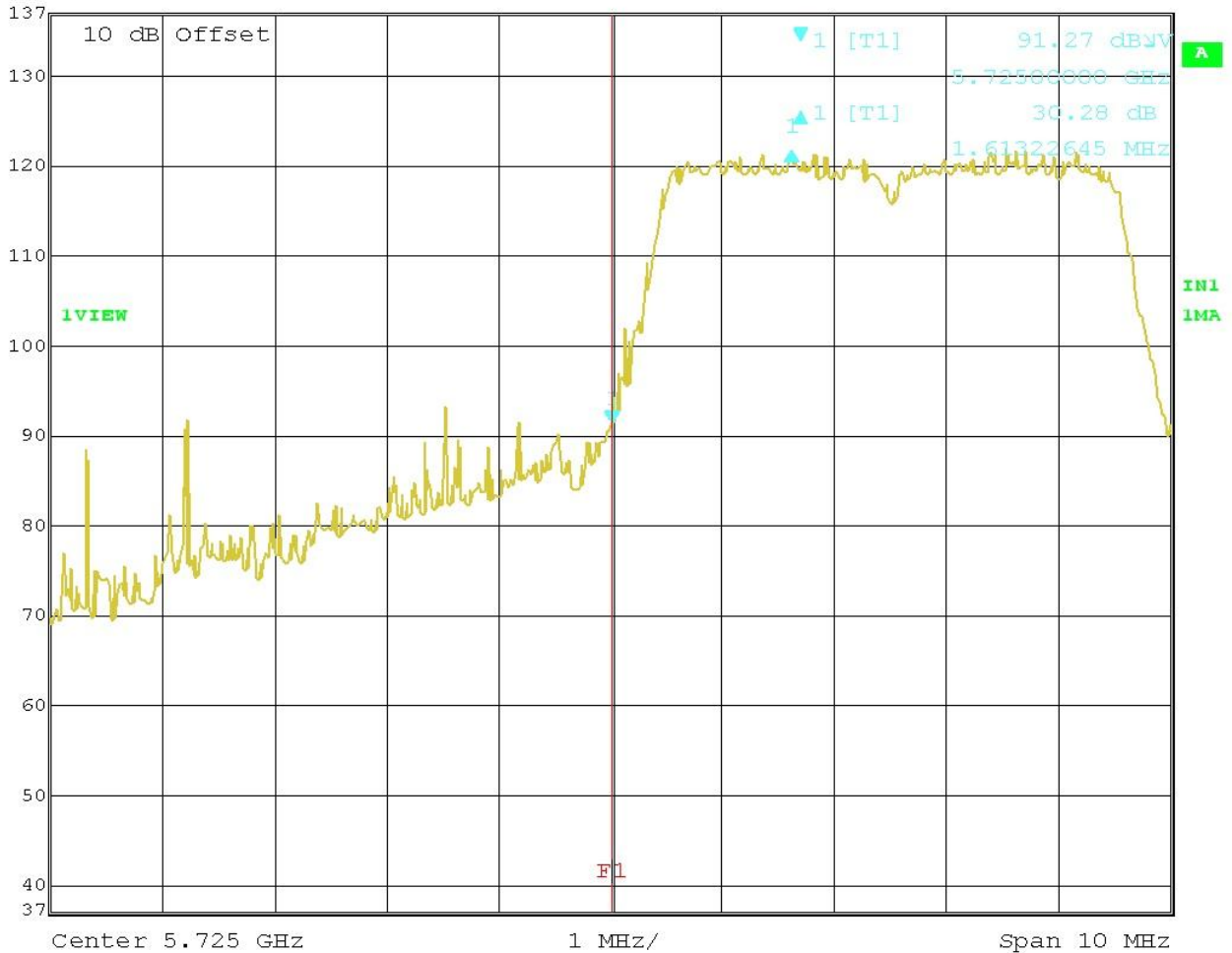


Notes: Measured using the Peak detector. Band Edge is at 5725 MHz (F1)
Using 10 MHz BW

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Ref Lvl	Delta 1 [T1]	RBW	100 kHz	RF Att	30 dB
137 dBμV	30.28 dB	VBW	300 kHz		
	1.61322645 MHz	SWT	5 ms	Unit	dBμV

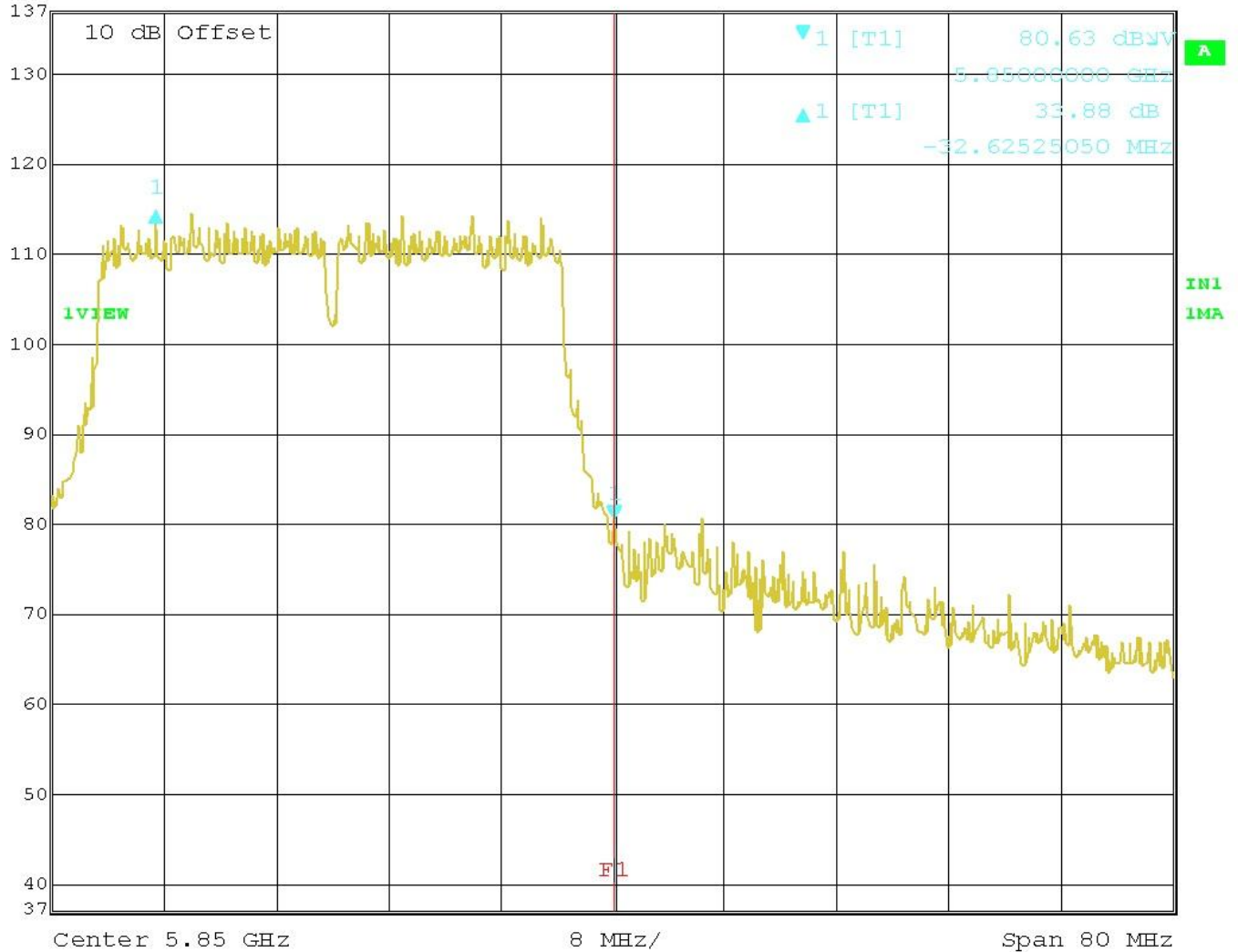


Notes: Measured using the Peak detector. Band Edge is at 5725 MHz (F1)
Using 5 MHz BW

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Ref Lvl	Delta 1 [T1]	RBW	100 kHz	RF Att	30 dB
137 dBμV	33.88 dB	VBW	300 kHz		
	-32.62525050 MHz	SWT	20 ms	Unit	dBμV

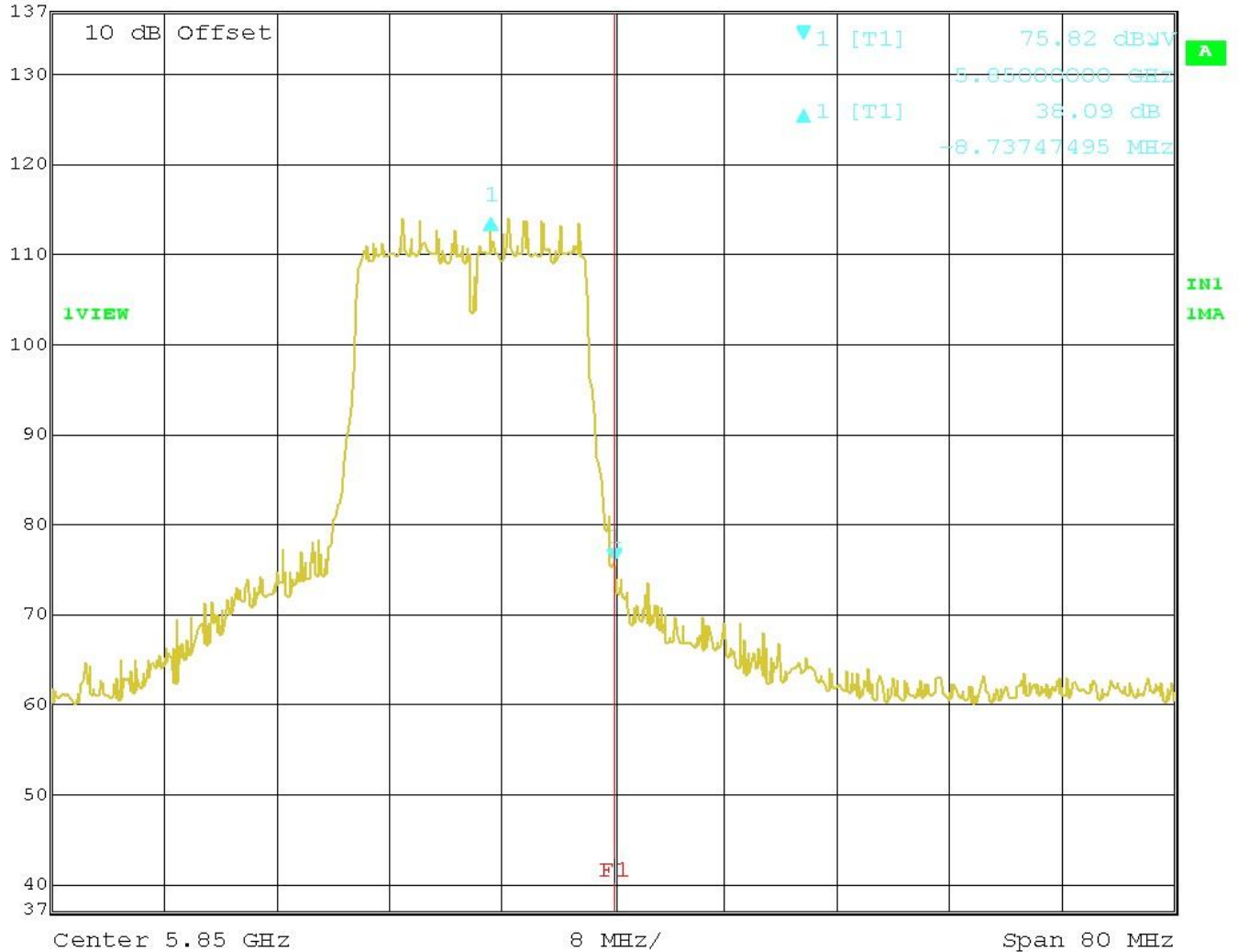


Notes: Measured using the Peak detector. Band Edge is at 5850 MHz (F1)
Using 40 MHz BW

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Ref Lvl	Delta 1 [T1]	RBW	100 kHz	RF Att	30 dB
137 dBμV	38.09 dB	VBW	300 kHz		
	-8.73747495 MHz	SWT	20 ms	Unit	dBμV

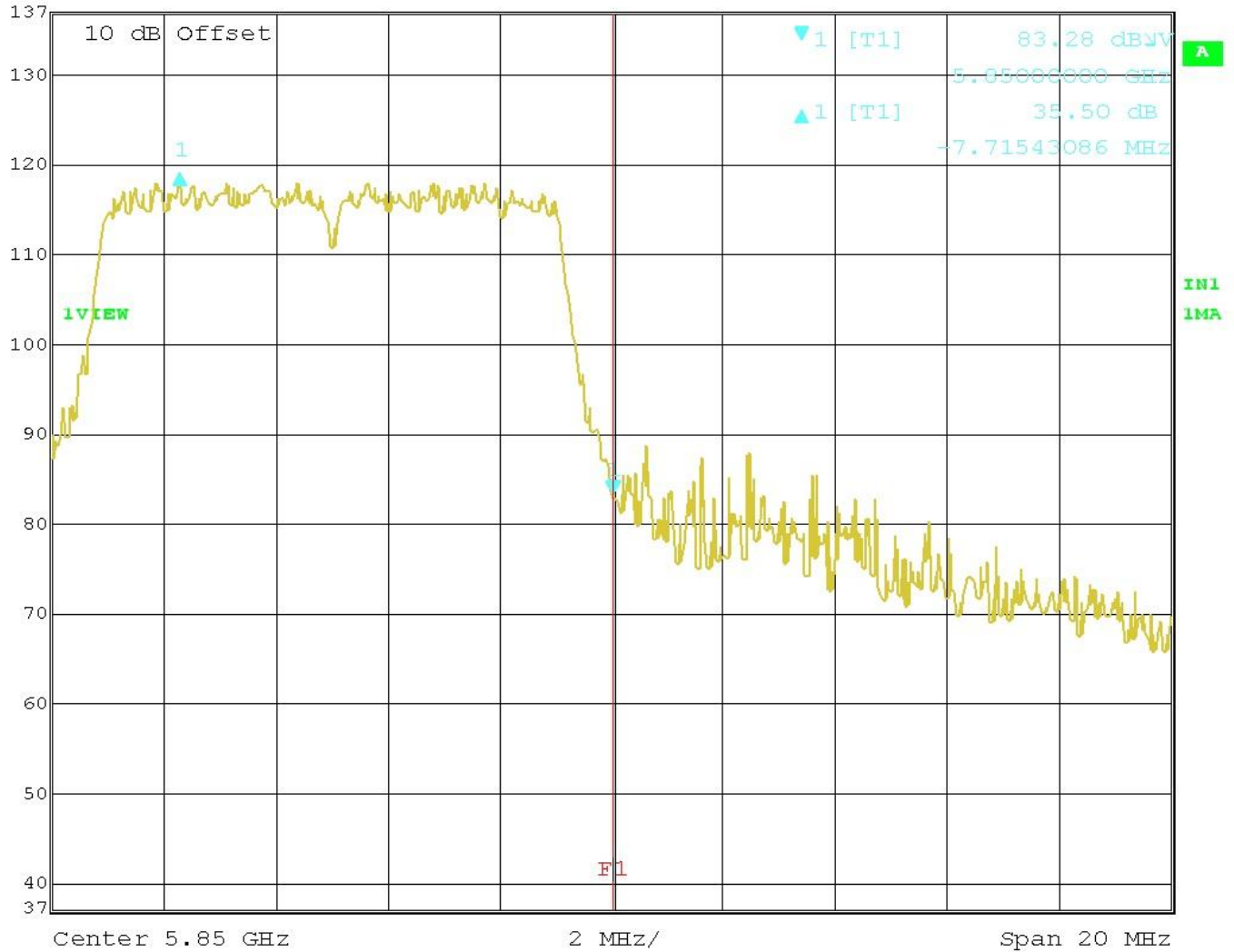


Notes: Measured using the Peak detector. Band Edge is at 5850 MHz (F1)
Using 20 MHz BW

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Ref Lvl	Delta 1 [T1]	RBW	100 kHz	RF Att	30 dB
137 dBµV	35.50 dB	VBW	300 kHz		
	-7.71543086 MHz	SWT	5 ms	Unit	dBµV



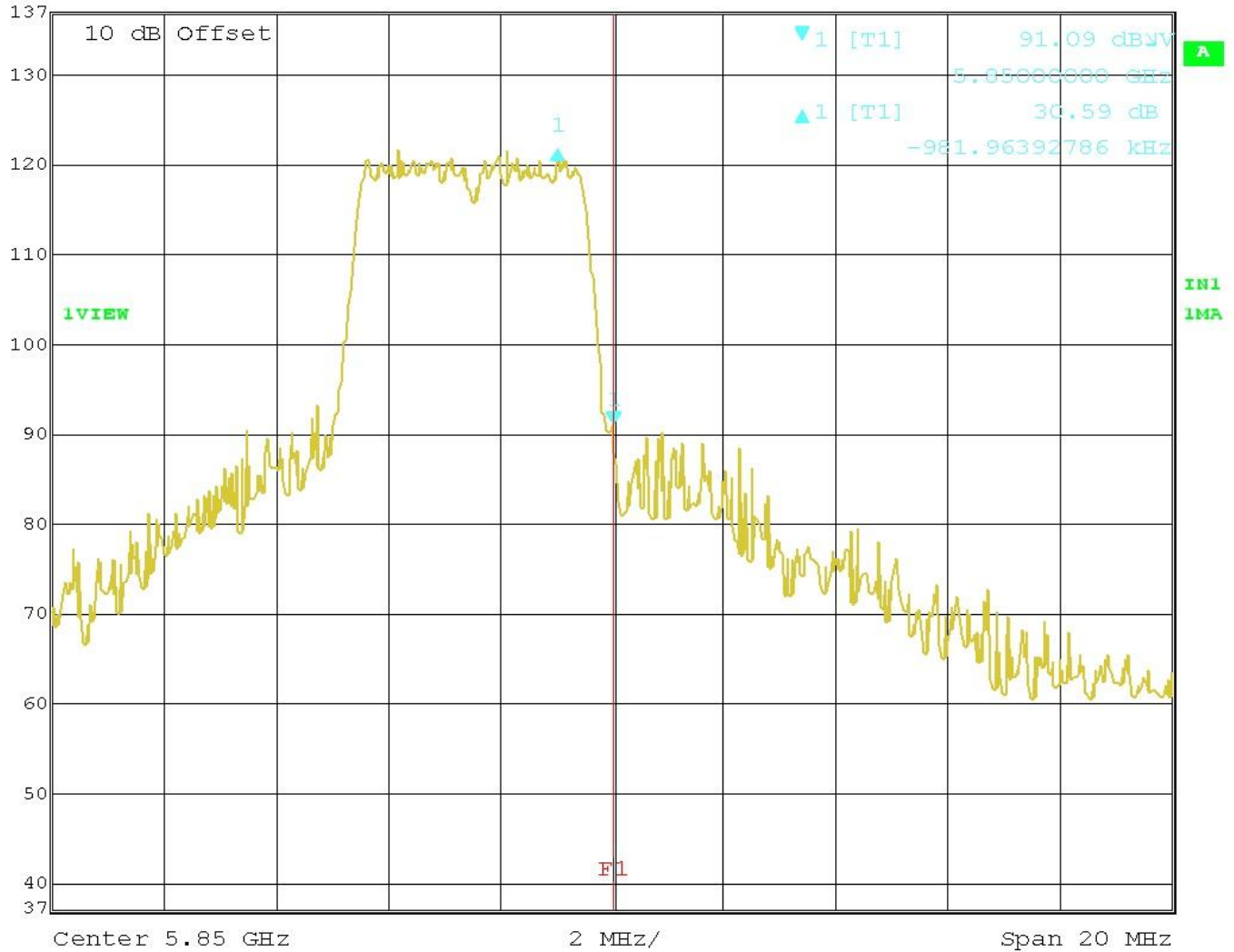
Notes: Measured using the Peak detector. Band Edge is at 5850 MHz (F1)

Using 10 MHz BW

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Ref Lvl	Delta 1 [T1]	RBW	100 kHz	RF Att	30 dB
137 dBμV	30.59 dB	VBW	300 kHz		
	-981.96392786 kHz	SWT	5 ms	Unit	dBμV



Notes: Measured using the Peak detector. Band Edge is at 5850 MHz (F1)

Using 5 MHz BW

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Conducted Emissions on AC Mains

This test measures the electromagnet levels of spurious signals generated by the EUT on the AC power line that may affect the performance of other near by electronic equipment.

4.2.5 Over View of Test

Results	Complies (as tested per this report)				Date	7/9/2013	
Standard	FCC Parts 15.107(c), 15.207(c)						
Product RF-7800W	RF-7800W			Serial#	E00047		
Test Set-up	Tested in shielded room. EUT placed on table, see test plans for details						
EUT Powered By	4.5VDC battery	Temp	23° C	Humidity	25%	Pressure	1011 mbar
Frequency Range	150 kHz – 30 MHz						
Perf. Criteria	(Below Limit)		Perf. Verification	Readings Under Limit for L1 & Neutral			
Mod. to EUT	None		Test Performed By	Randall E Masline			

4.2.6 Test Procedure

This device is powered by POE (Power over Ethernet), therefore per FCC Part 15.207(c) this test is required.

4.2.7 Final Test

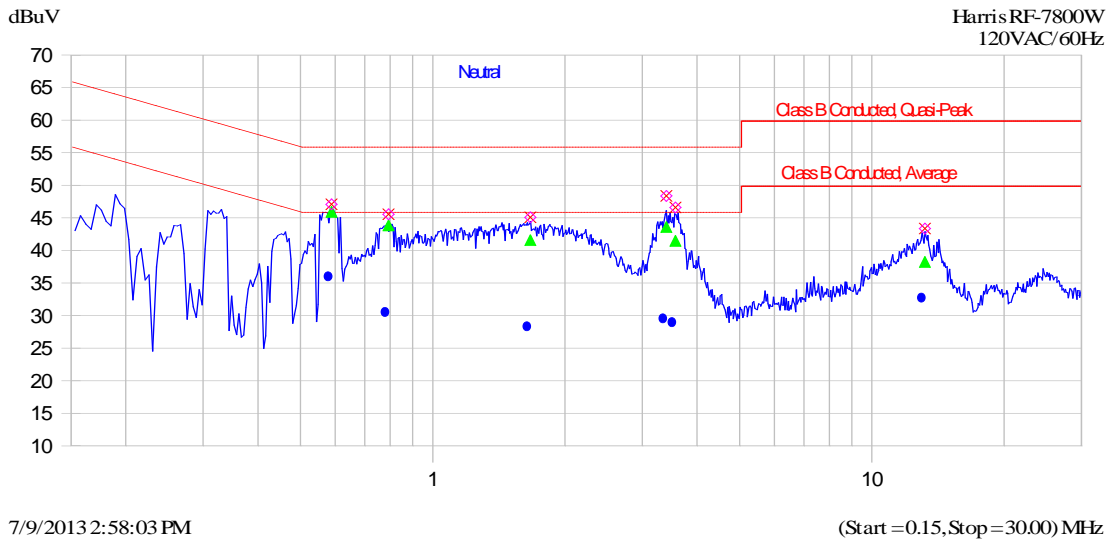
Since the EUT is a powered via POE (Power over Ethernet). Product Complies.

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NOTES:

Conducted Emissions @ 120V/60Hz
Neutral

Neutral



Frequency MHz	Peak dBuV	QP dBuV	Delta QP-QP Limit dB	Avg dBuV	Delta Avg-Avg Limit dB	Transducer Correction dB	Cable Correction dB
0.583	47.2	46.0	-10.0	35.9	-10.1	0.0	10.3
0.786	45.7	44.0	-12.0	30.4	-15.6	0.0	10.3
1.652	45.2	41.7	-14.3	28.2	-17.8	0.0	10.4
3.373	48.5	43.7	-12.3	29.4	-16.6	0.1	10.5
3.535	46.7	41.6	-14.4	28.9	-17.1	0.1	10.5
13.083	43.5	38.4	-21.6	32.6	-17.4	0.1	11.0

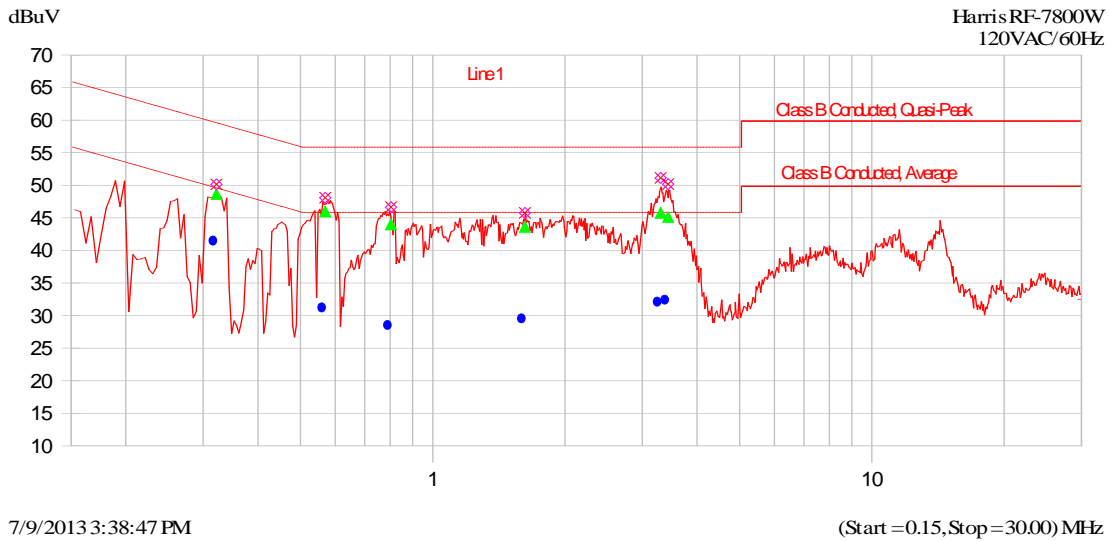
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NOTES:

Conducted Emissions @ 120V/60Hz

Line

Line 1



Frequency MHz	Peak dBuV	QP dBuV	Delta QP-QP dB	QP-QP Limit	Avg dBuV	Delta Avg-Avg dB	Avg-Avg Limit	Transducer Correction dB	Cable Correction dB
0.319	50.3	48.8	-11.0		41.4	-8.4		0.0	10.2
0.564	48.2	46.1	-9.9		31.1	-14.9		0.0	10.3
0.796	46.8	44.1	-11.9		28.4	-17.6		0.0	10.3
1.607	45.9	43.7	-12.3		29.4	-16.6		0.0	10.4
3.274	51.3	45.9	-10.1		32.0	-14.0		0.1	10.5
3.406	50.3	45.2	-10.8		32.3	-13.7		0.1	10.5

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5 Antenna Port Conducted Emissions

For conducted tests, the emissions were measured at the antenna port.

Testing was performed in accordance with 47 CFR Part 15, ANSI C63.10:2009, RSP-100 Issue 9. These test methods are listed under the laboratory's NVLAP Scope of Accreditation. This test measures the levels emanating from the EUT, thus evaluating the potential for the EUT to cause radio frequency interference to other electronic devices.

5.1 Conducted Output Power, FCC 15.247(b)(3) and RSS-210 A8.4(4)

5.1.1 For systems using digital modulation 5725–5850 in the MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the *maximum conducted output power* is the highest total transmit power occurring in any mode.

5.1.2 Test Over View

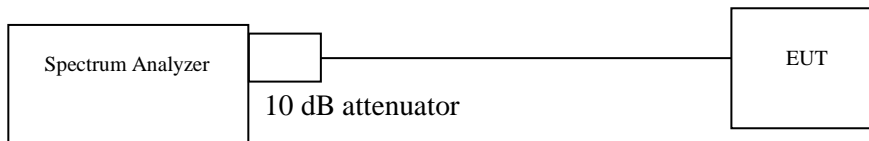
Results	Complies (as tested per this report)				Date	6/27/2013	
Standard	FCC Part 15.247(b)(3) and RSS-210 A8.4(4)						
Product RF-7800W	RF-7800W			Serial#	E00047		
Test Set-up	Direct Measurement from antenna port						
EUT Powered By	Power over Ethernet	Temp	22° C	Humidity	32%	Pressure	1010mbar
Perf. Criteria	(Below Limit)			Perf. Verification	Readings Under Limit		
Mod. to EUT	None			Test Performed By	Randall E Masline		

5.1.3 Test Procedure

The peak output power was measured at the low, mid and high band frequencies. The measurement was made using a direct connection between the RF output of the EUT and the spectrum analyzer. The cable loss and the attenuator was measured and added in the reference level offset in the spectrum analyzer. The spectrum analyzer's resolution bandwidth was greater than the 20dB bandwidth of the modulated carrier and the video bandwidth was equal to the resolution bandwidth.

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Test Setup:



5.1.4 Deviations

There were no deviations from the test methodology listed in the test plan for the Power output test.

5.1.5 Final Test

The EUT met the performance criteria requirement as specified in the test plan of this report and in the standards.

5.1.6 Peak Power Output

Emission Freq (MHz)	Power Output (dBm)	Power Output (dBuV)	Spec Limit (dBm)
5745	22.58	129.57	30
5787.5	16.68	123.69	30
5847.5	17.31	124.32	30

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Ref Lvl	Marker 1 [T1]	RBW	1 MHz	RF Att	30 dB
30 dBm	22.58 dBm	VBW	1 MHz		
	5.74203407 GHz	SWT	5 ms	Unit	dBm

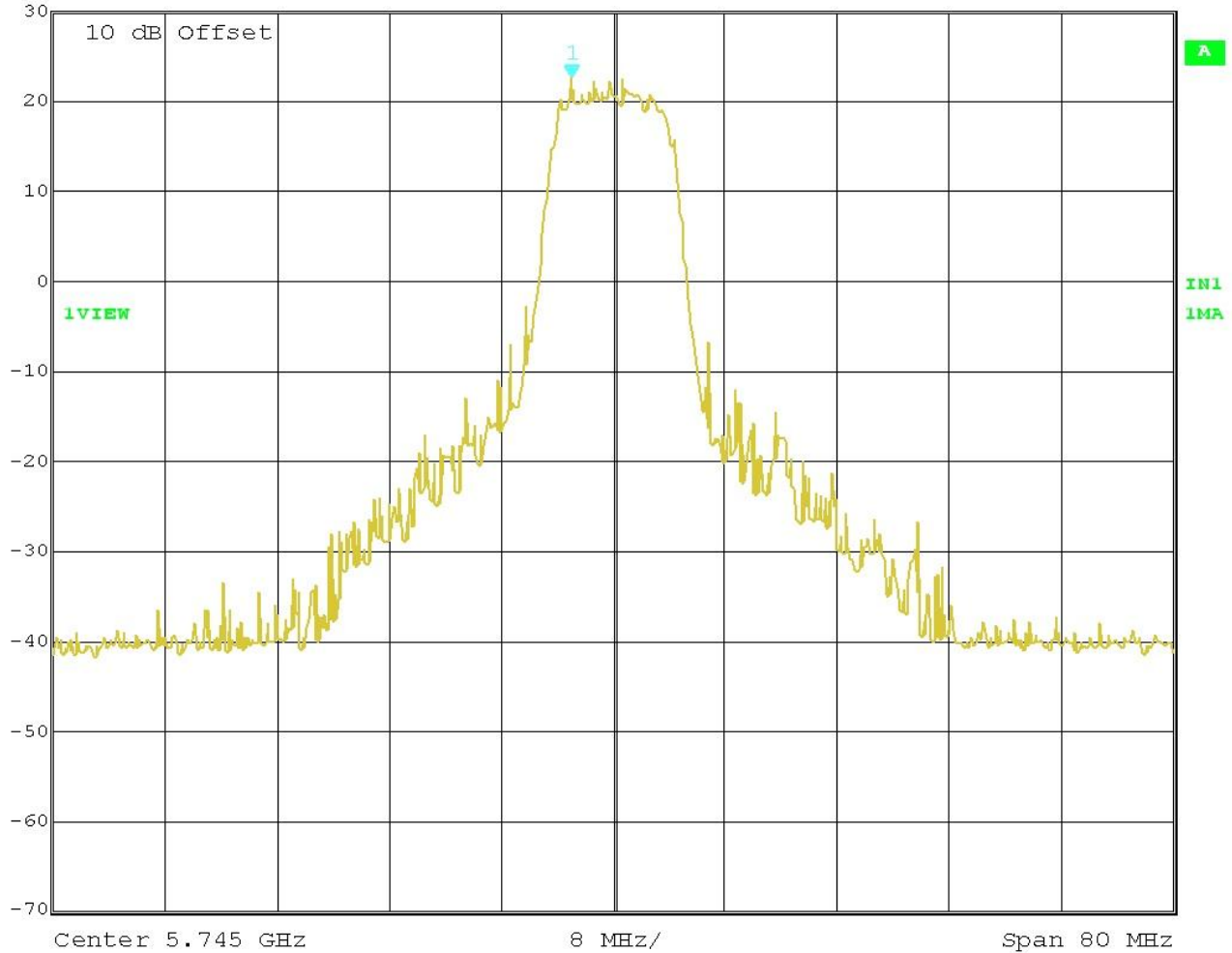


Figure 1 – Highest Peak Conducted Power Output for Lowest Channel at 5745 MHz.

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Ref Lvl	137 dBμV	Marker 1 [T1]	123.69 dBμV	RBW	1 MHz	RF Att	30 dB
			5.78056613 GHz	VBW	3 MHz		
				SWT	5 ms	Unit	dBμV

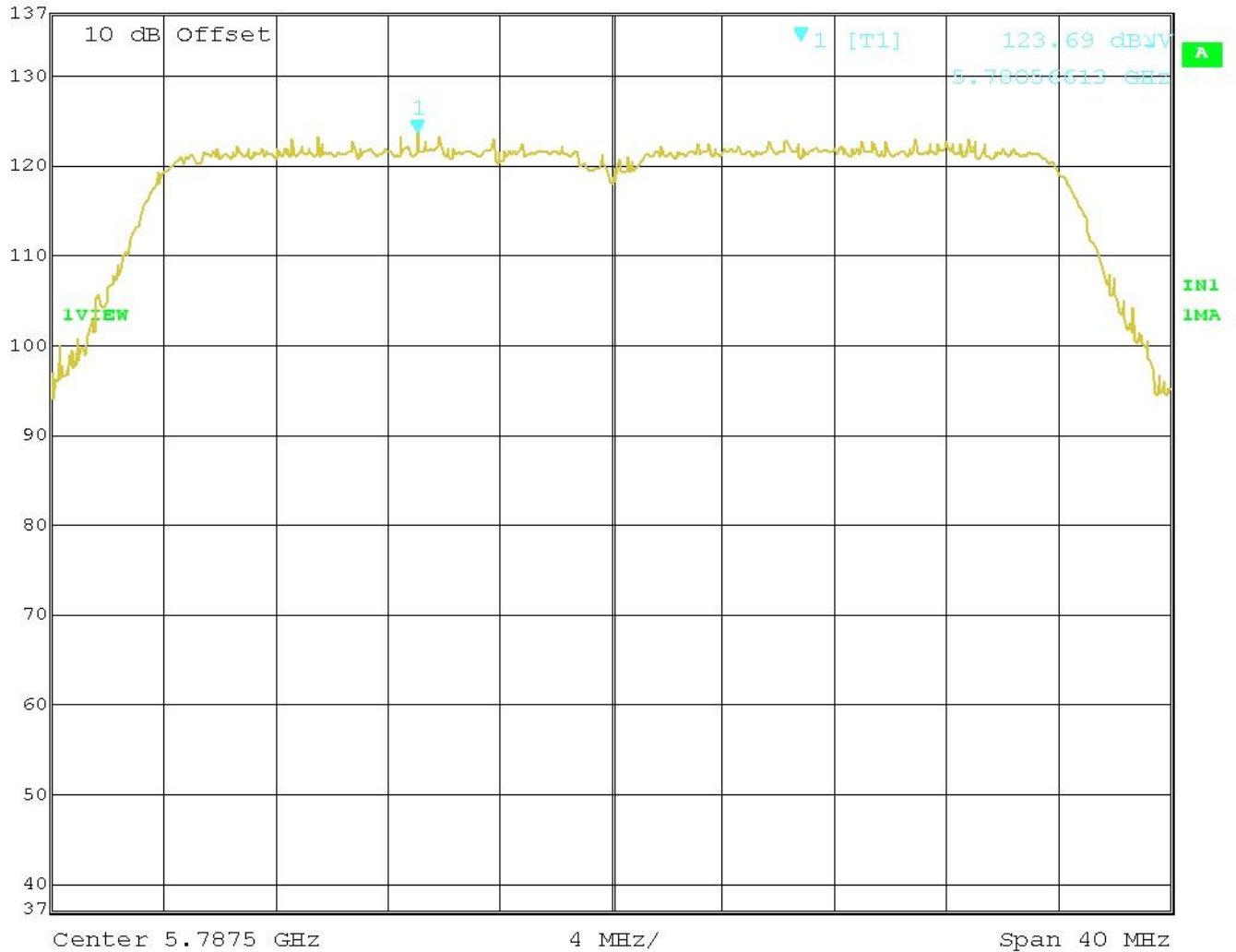


Figure 2 – Highest Peak Conducted Power Output for Mid Channel at 5787.5 MHz.

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Ref Lvl	137 dBμV	Marker 1 [T1]	124.32 dBμV	RBW	1 MHz	RF Att	30 dB
			5.83725451 GHz	VBW	3 MHz		
				SWT	5 ms	Unit	dBμV

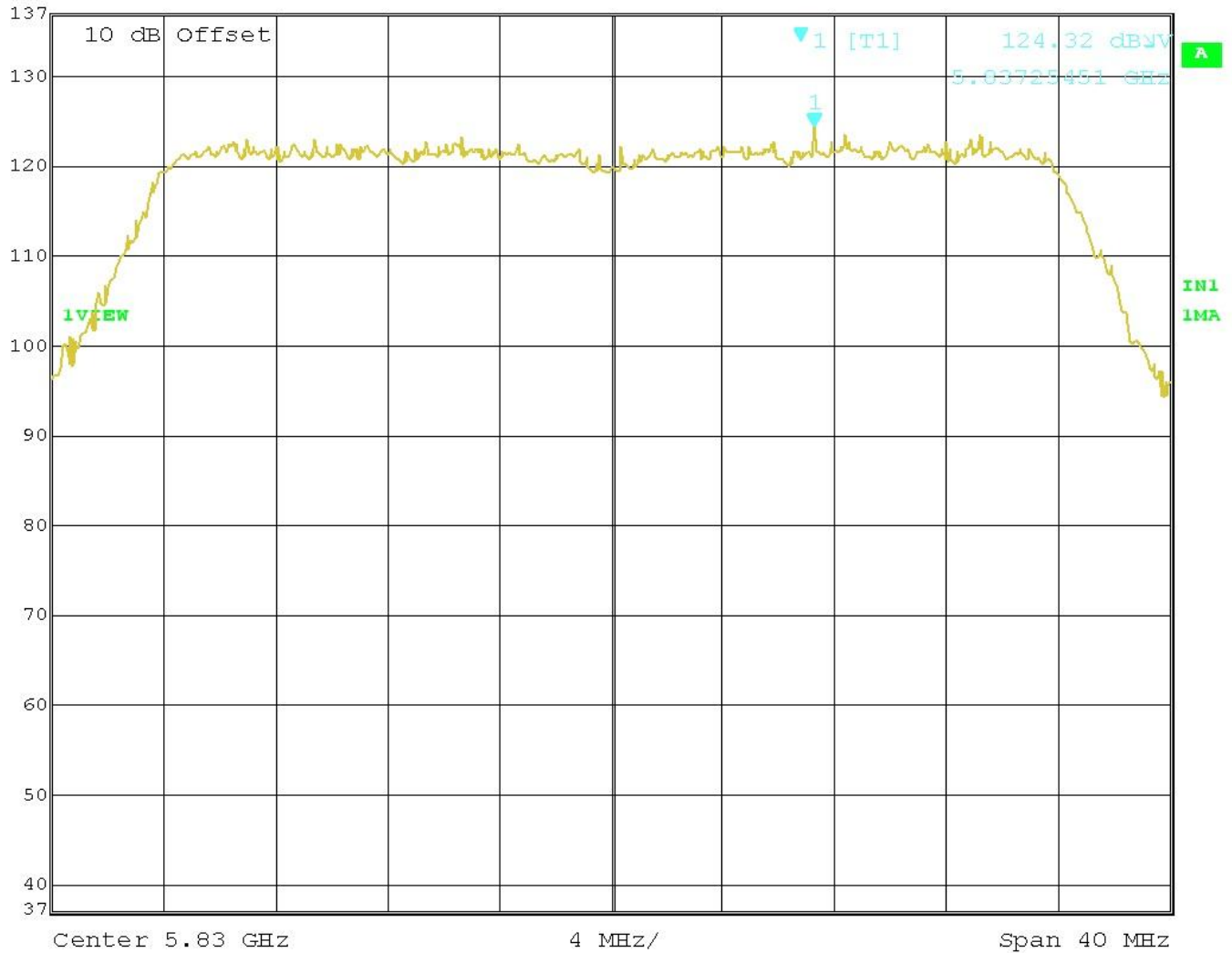


Figure 3 – Highest Peak Conducted Power Output for Highest Channel at 5830 MHz.

Results

As tested, the EUT was found to be compliant to the requirements of the test standard.

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5.2 Peak Power Spectral Density

5.2.1 Test Over View

Results	Complies (as tested per this report)				Date	6/27/2013	
Standard	FCC Part 15.247(e) and RSS 210 A8.2(b)						
Product RF-7800W	RF-7800W			Serial#	E00047		
Test Set-up	Direct Measurement from antenna port						
EUT Powered By	Power over Ethernet	Temp	22° C	Humidity	32%	Pressure	1010mbar
Perf. Criteria	Below Limit (10dBm)		Perf. Verification		≤8 dBm in any 3 kHz		
Mod. to EUT	None		Test Performed By		Randall E Masline		

5.2.2 Test Procedure

Using the methods of ANSI C63.10:2009, section 6.11.2.3 were used.

5.2.3 Deviations

There were no deviations from the test methodology listed in the test plan for the Peak Power Spectral Density test.

5.2.4 Final Test

The EUT met the performance criteria requirement as specified in the test plan of this report and in the standards.

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5.2.5 Final Data

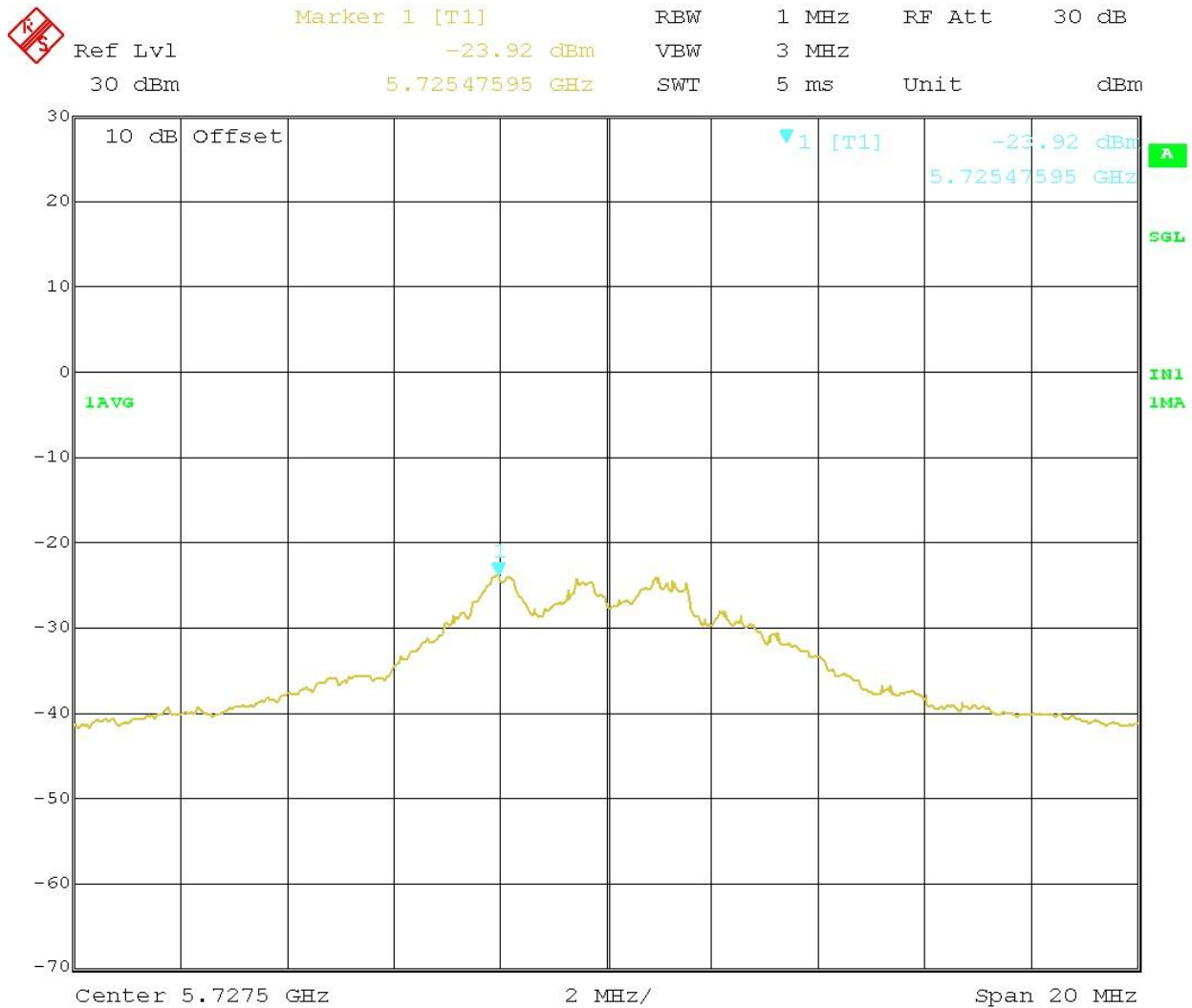


Figure 4: 5727.5 MHz at 5MHz BW

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Ref Lvl	Marker 1 [T1]	RBW	1 MHz	RF Att	30 dB
30 dBm	-30.31 dBm	VBW	3 MHz		
	5.73062124 GHz	SWT	5 ms	Unit	dBm

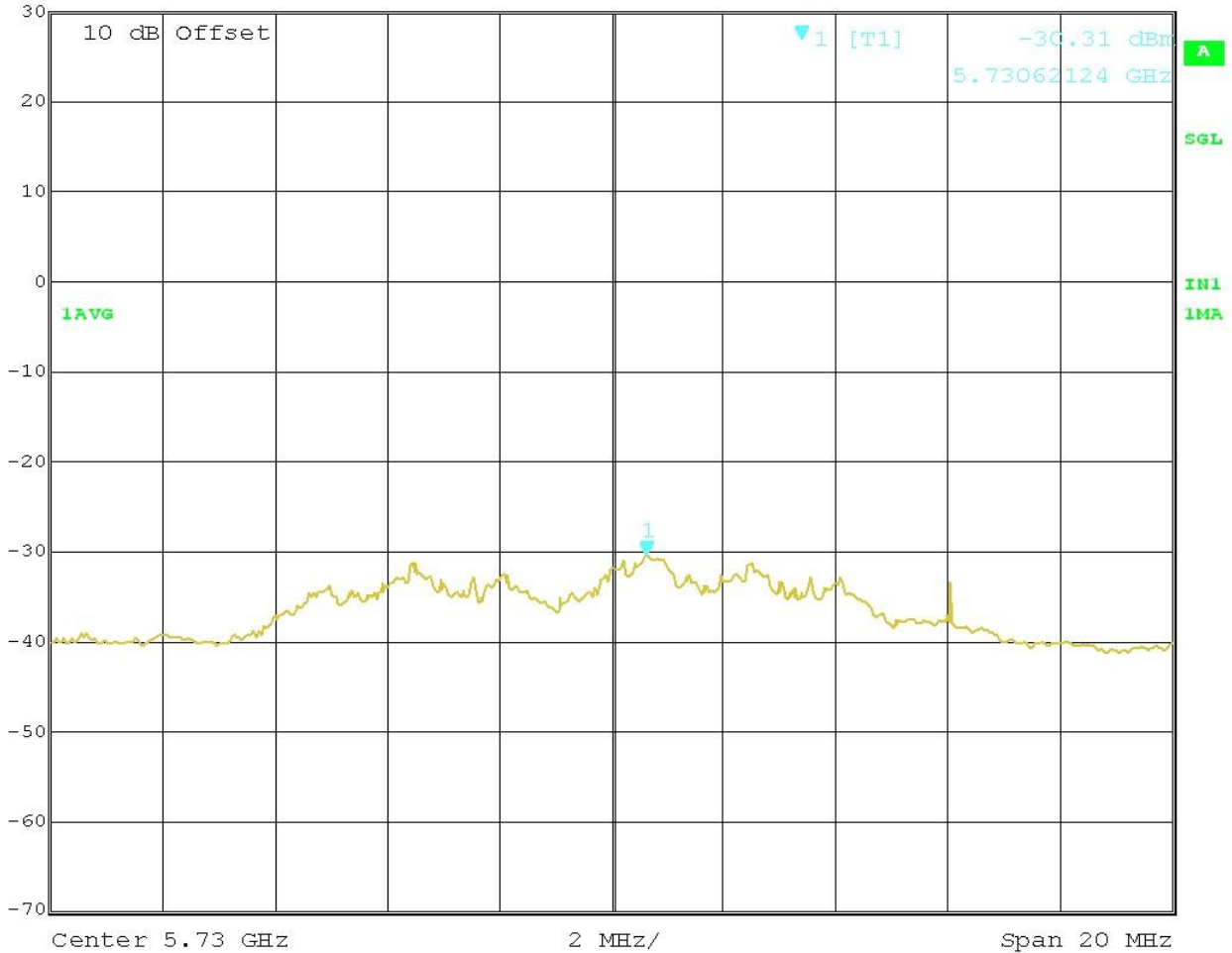


Figure 5: 5730 MHz at 10 MHz BW

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Ref Lvl	Marker 1 [T1]	RBW	1 MHz	RF Att	30 dB
30 dBm	-32.34 dBm	VBW	3 MHz		
	5.74219439 GHz	SWT	5 ms	Unit	dBm

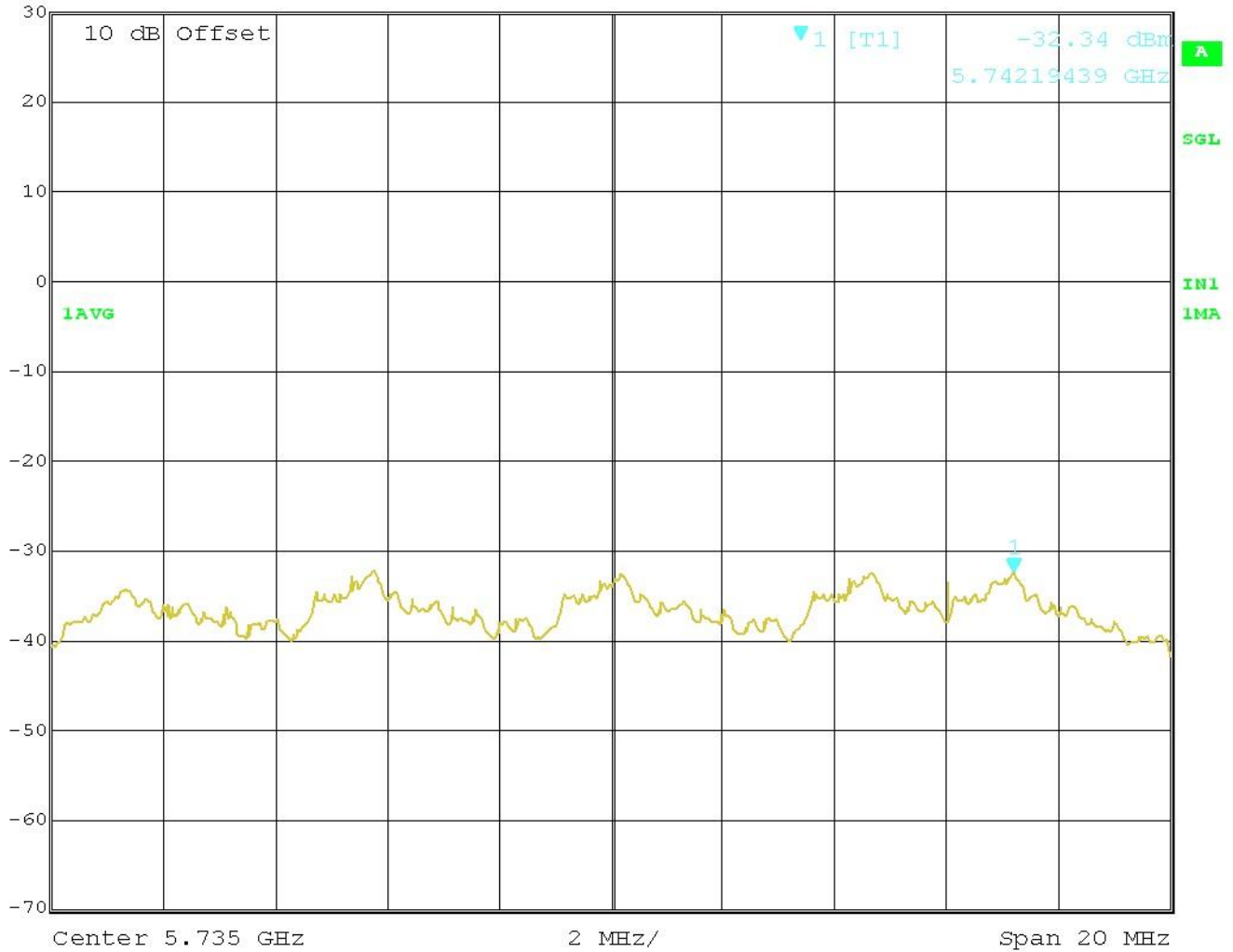


Figure 6: 5735 MHz at 20 MHz BW

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Ref Lvl	Marker 1 [T1]	RBW	1 MHz	RF Att	30 dB
30 dBm	-32.83 dBm	VBW	3 MHz		
	5.74077154 GHz	SWT	5 ms	Unit	dBm

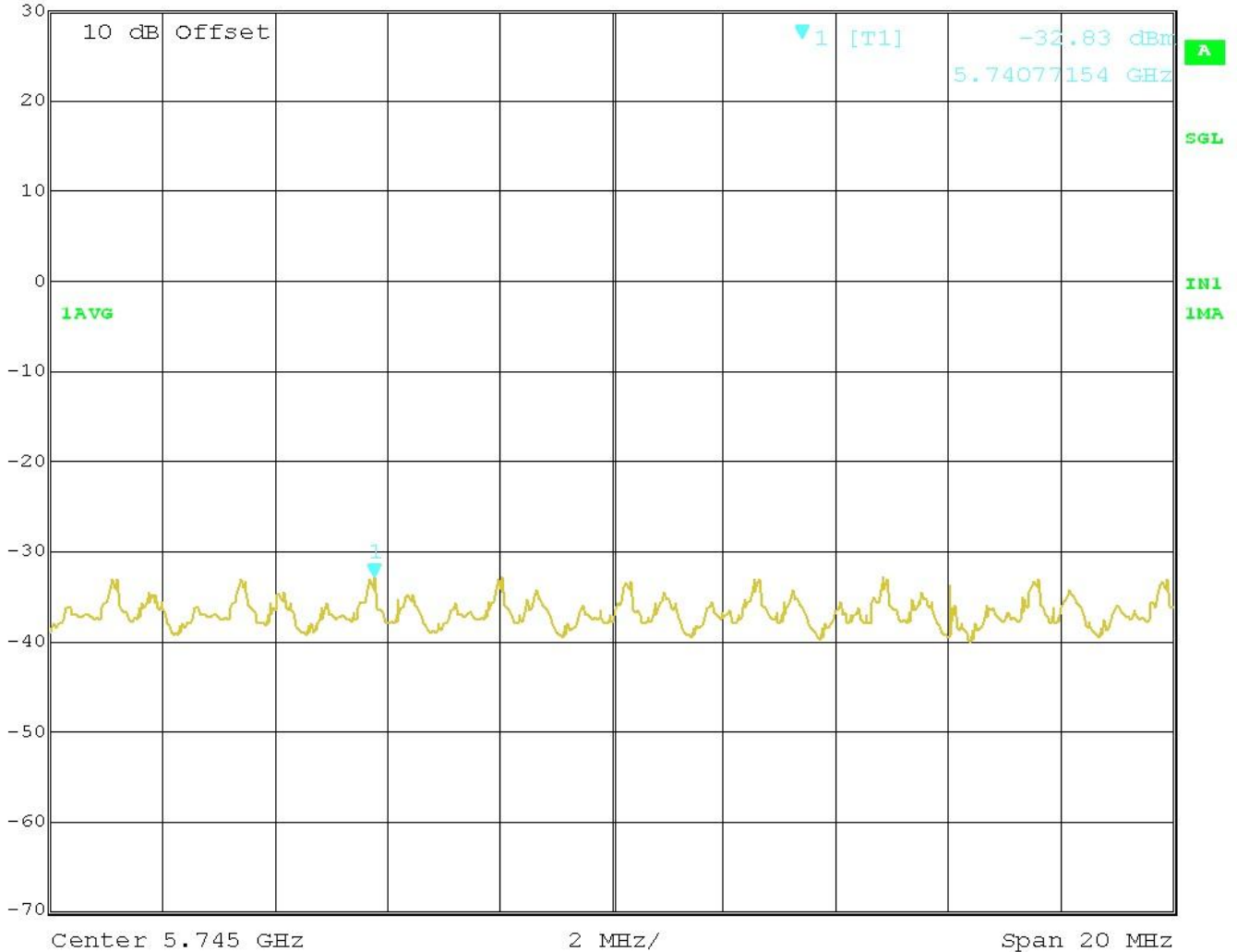


Figure 7: 5745 MHz at 40 MHz BW

The test results contained in this report refer exclusively to the product(s) presented for testing. No liability may be assumed for models or products not referred to herein. This test report may not be published or duplicated in part without permission of the testing body. This test report by itself does not constitute authorization for the use of any TUV Rheinland test mark. The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.



Ref Lvl	Marker 1 [T1]	RBW	1 MHz	RF Att	30 dB
30 dBm	-28.09 dBm	VBW	3 MHz		
	5.83603206 GHz	SWT	5 ms	Unit	dBm

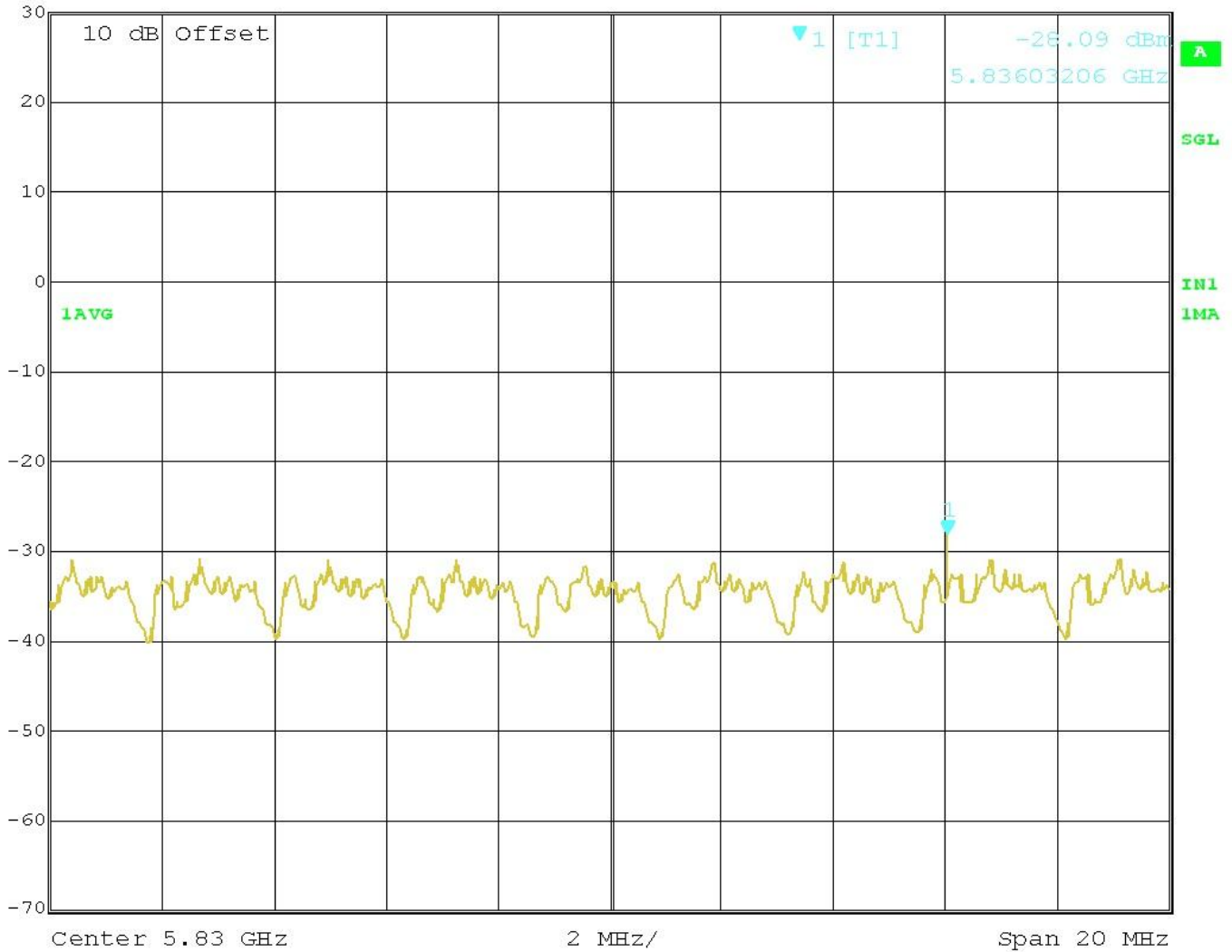


Figure 8: 5830 MHz at 40 MHz BW

The test results contained in this report refer exclusively to the product(s) presented for testing. No liability may be assumed for models or products not referred to herein. This test report may not be published or duplicated in part without permission of the testing body. This test report by itself does not constitute authorization for the use of any TUV Rheinland test mark. The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.



Ref Lvl	30 dBm	Marker 1 [T1]	5.84026052 GHz	RBW	1 MHz	RF Att	30 dB
				VBW	3 MHz		
				SWT	5 ms	Unit	dBm

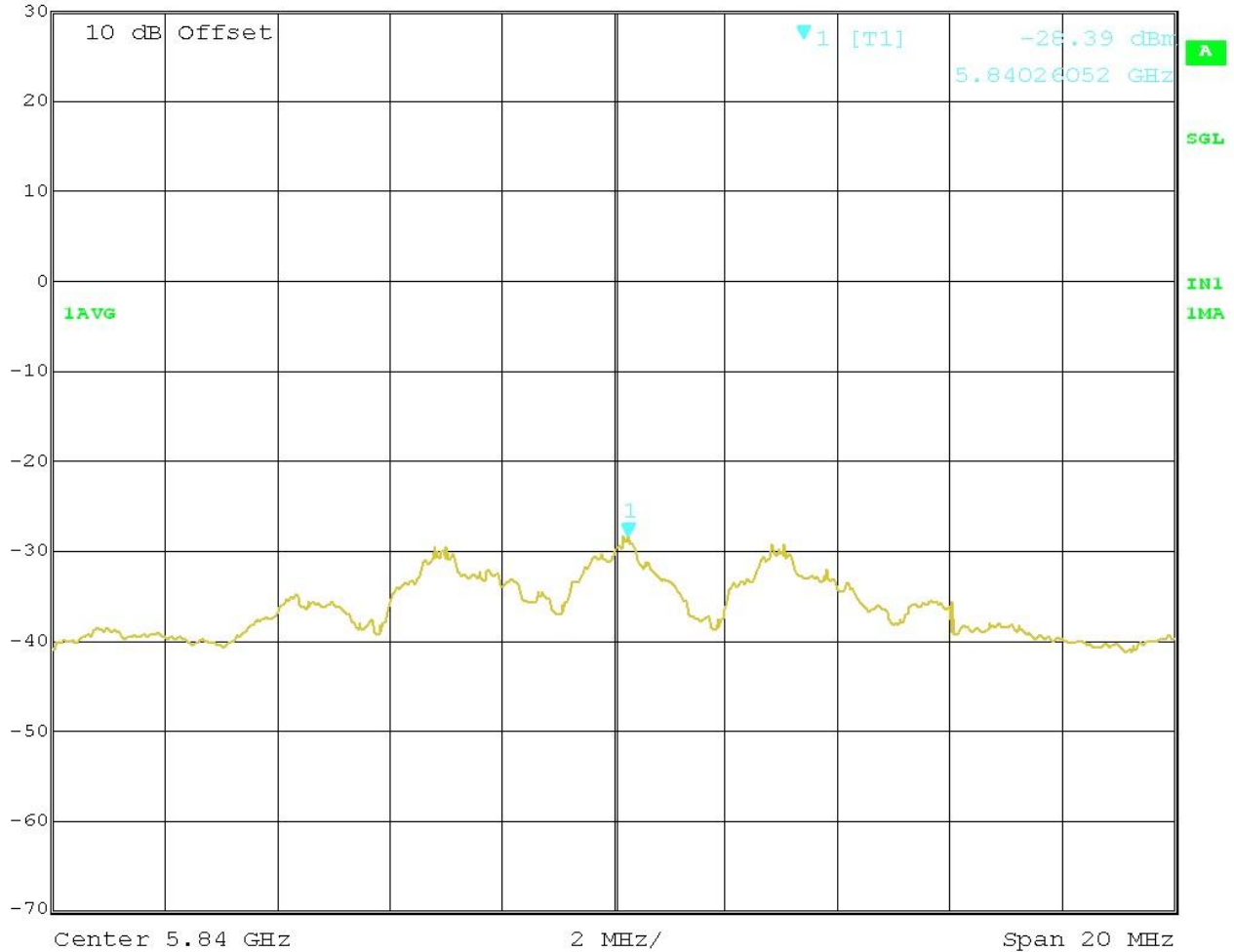


Figure 9: 5840 MHz at 20 MHz BW

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Ref Lvl	Marker 1 [T1]	RBW	1 MHz	RF Att	30 dB
30 dBm	-25.83 dBm	VBW	3 MHz		
	5.84582164 GHz	SWT	5 ms	Unit	dBm

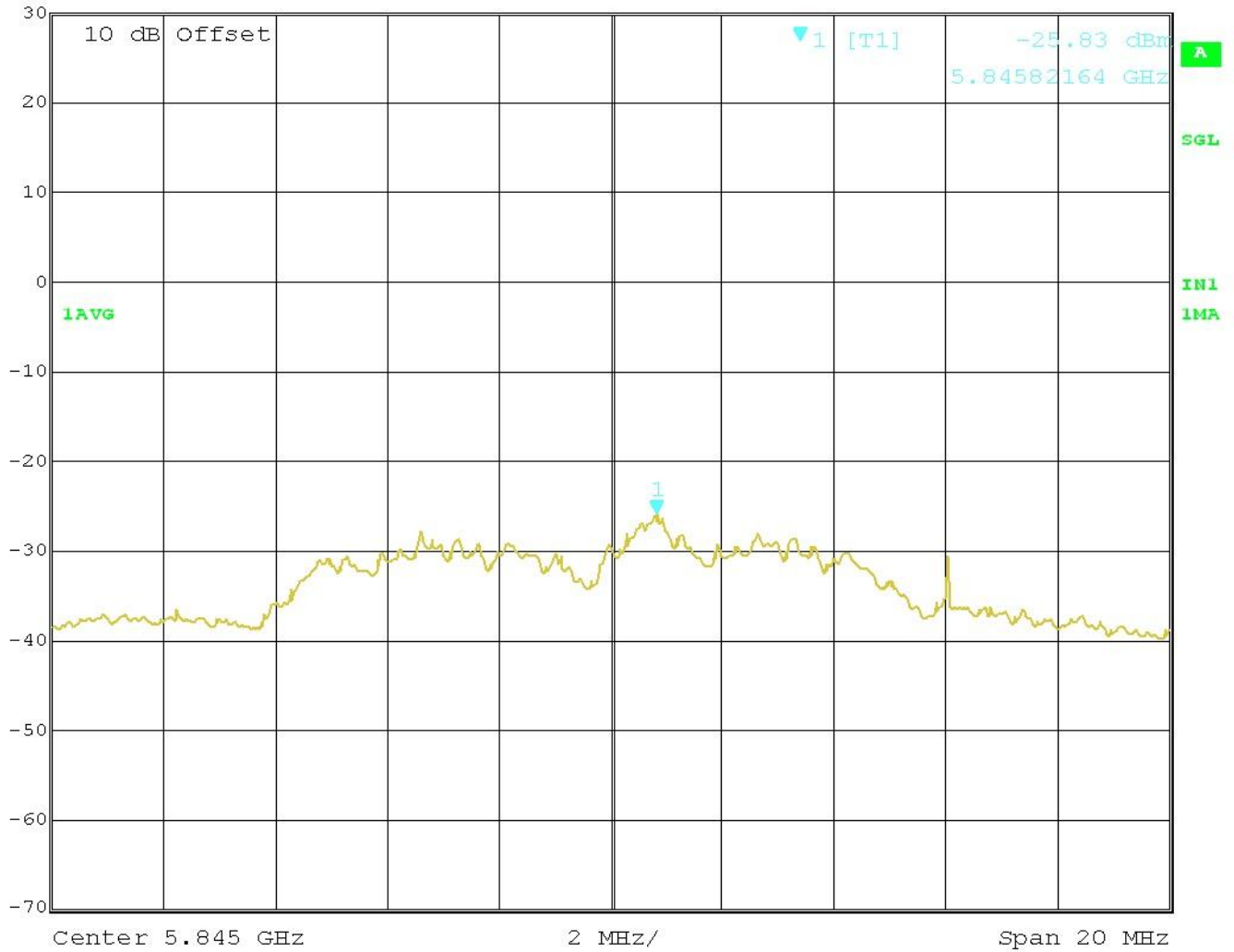


Figure 10: 5845 MHz at 10 MHz BW

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Ref Lvl	Marker 1 [T1]	RBW	1 MHz	RF Att	30 dB
30 dBm	-28.00 dBm	VBW	3 MHz		
	5.84699900 GHz	SWT	5 ms	Unit	dBm

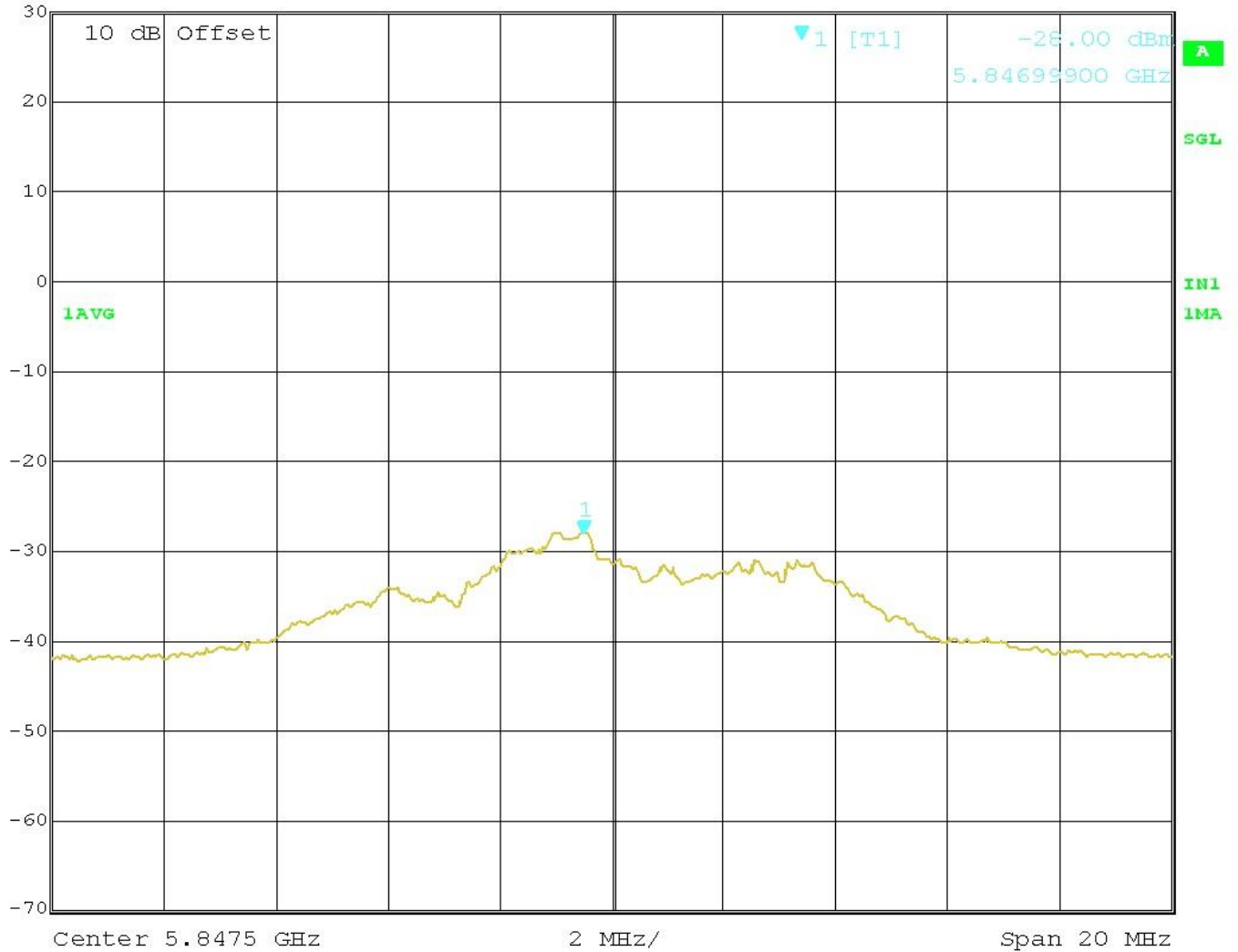


Figure 11: 5847.5 MHz at 5 MHz BW

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5.3 Occupied Bandwidth

Systems using digital modulation techniques may operate in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

5.3.1 Test Over View

Results	Complies (as tested per this report)				Date	6/27/2013	
Standard	FCC Part 15.247(a)(2)						
Product RF-7800W	RF-7800W			Serial#	E00047		
Test Set-up	Direct Measurement from antenna port						
EUT Powered By	Power over Ethernet	Temp	22° F	Humidity	32%	Pressure	1010 mbar
Perf. Criteria	(Below Limit)		Perf. Verification		Readings Under Limit		
Mod. to EUT	None		Test Performed By		Randall E Masline		

5.3.2 Test Procedure

Minimum allowed 6dB Bandwidth = 500 kHz

5.3.3 Deviations

There were no deviations from the test methodology listed in the test plan for the Occupied Bandwidth test.

5.3.4 Final Test

The EUT met the performance criteria requirement as specified in the standards.

The test results contained in this report refer exclusively to the product(s) presented for testing. No liability may be assumed for models or products not referred to herein. This test report may not be published or duplicated in part without permission of the testing body. This test report by itself does not constitute authorization for the use of any TUV Rheinland test mark. The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

5.3.5 Final Data



	Delta 1 [T1]	RBW	100 kHz	RF Att	30 dB
Ref Lvl	1.15 dB	VBW	300 kHz		
137 dBμV	33.12124248 MHz	SWT	40 ms	Unit	dBμV

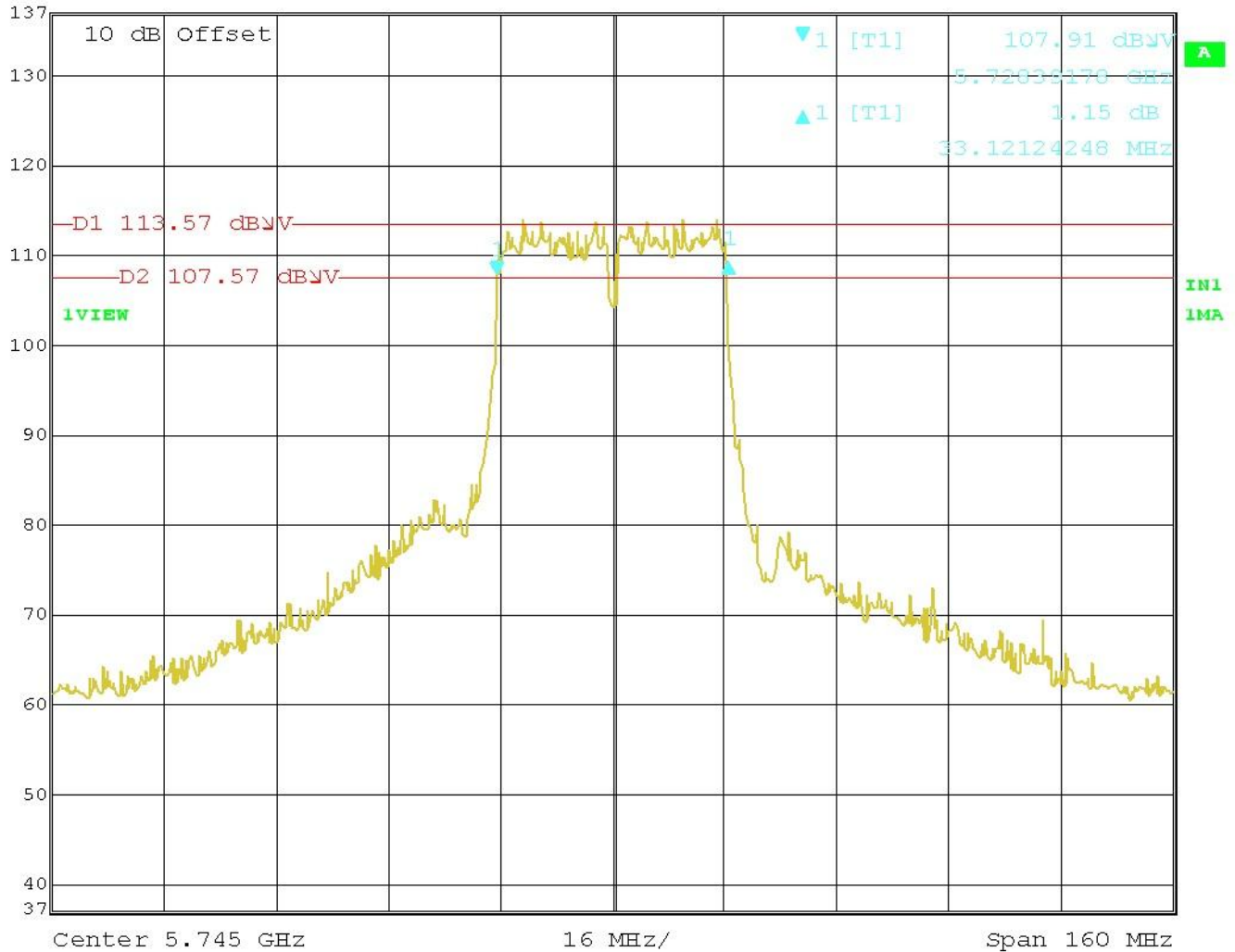


Figure 12: 6dB Occupied Bandwidth 40 MHz Channel

6dB Band width is 33.1212 MHz which is > 500 kHz

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Ref Lvl	Delta 1 [T1]	RBW	100 kHz	RF Att	30 dB
137 dBμV	-3.85 dB	VBW	300 kHz		
	16.51302605 MHz	SWT	20 ms	Unit	dBμV

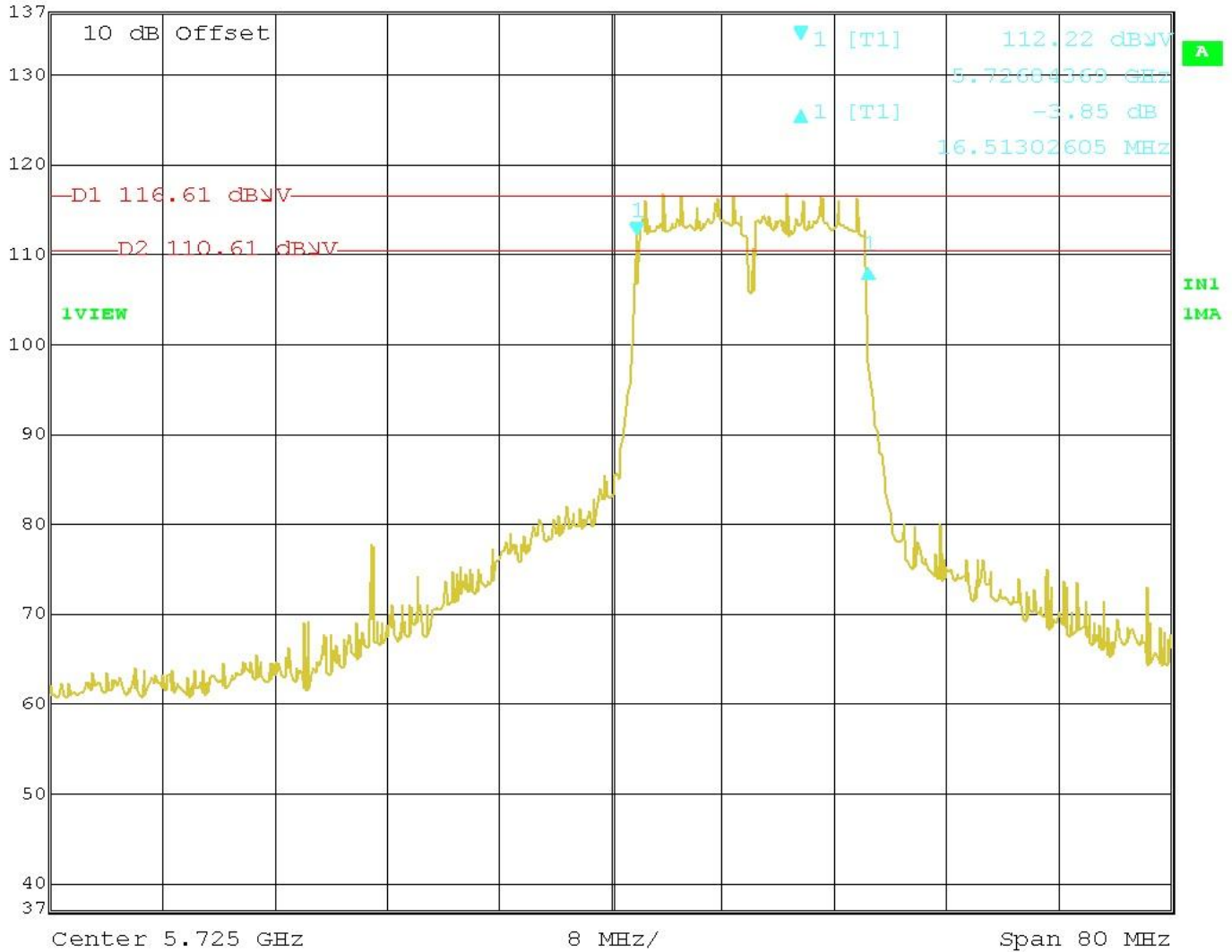


Figure 13: 6dB Occupied Bandwidth 20 MHz Channel

6dB Band width is 16.513 MHz which is > 500 kHz

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Delta 1 [T1] RBW 100 kHz RF Att 30 dB
 Ref Lvl 4.26 dB VBW 300 kHz
 137 dBμV 8.25651303 MHz SWT 10 ms Unit dBμV

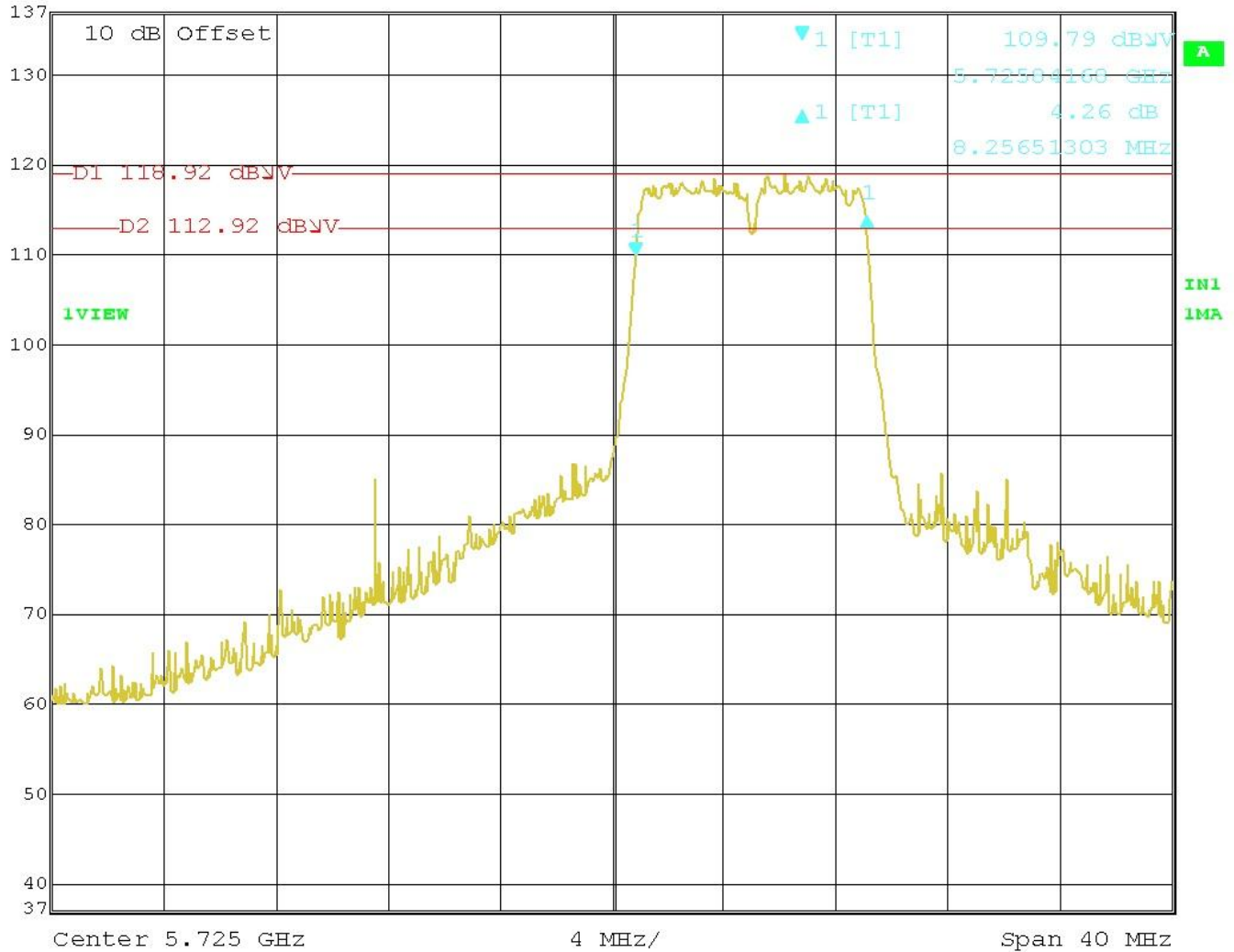


Figure 14: 6dB Occupied Bandwidth 10 MHz Channel

6dB Band width is 8.526 MHz which is > 500 kHz

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Delta 1 [T1] RBW 100 kHz RF Att 30 dB
 Ref Lvl 0.83 dB VBW 300 kHz
 137 dBμV 3.96793587 MHz SWT 5 ms Unit dBμV

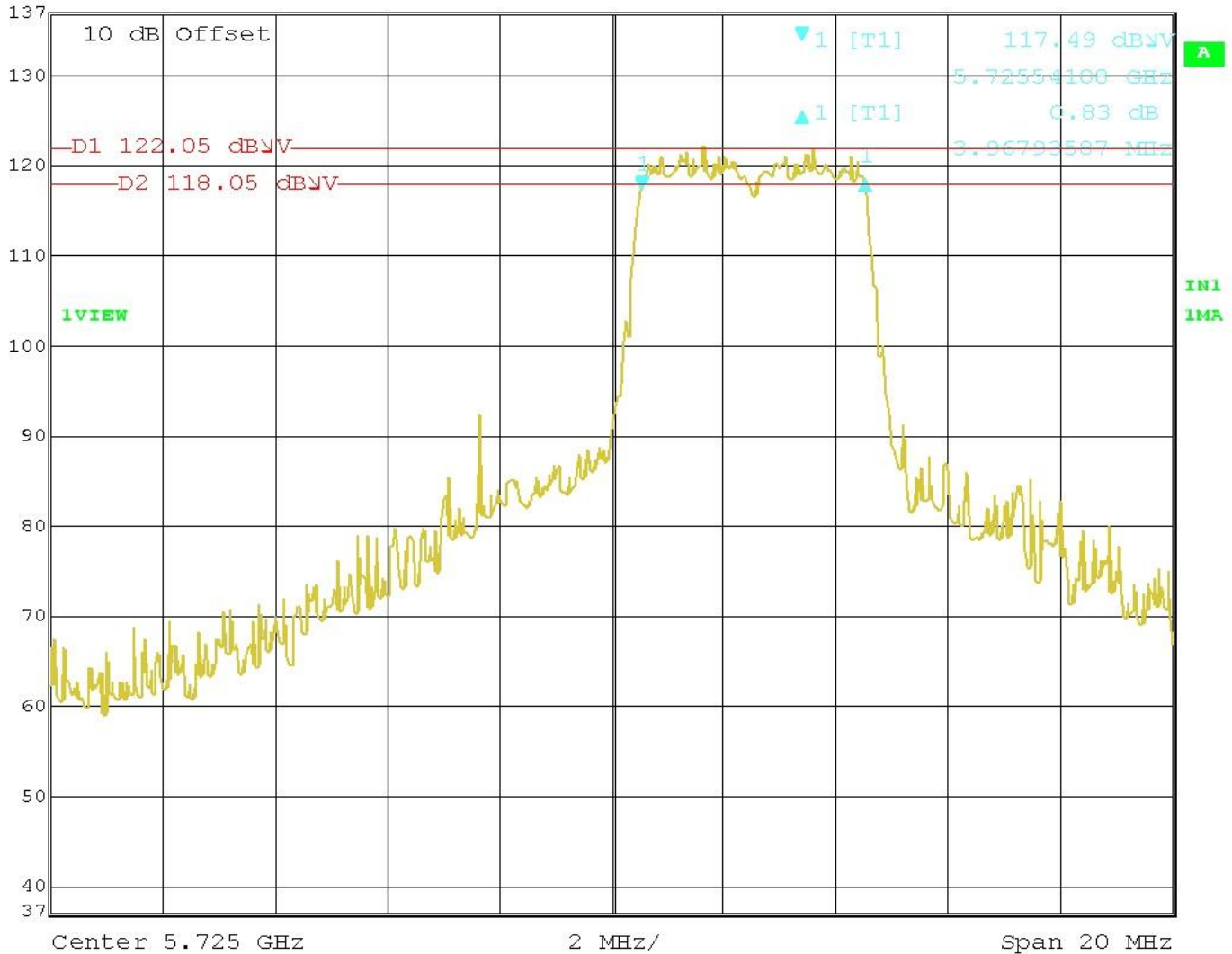


Figure 15: 6dB Occupied Bandwidth 5 MHz Channel

6dB Band width is 3.967 MHz which is > 500 kHz

The test results contained in this report refer exclusively to the product(s) presented for testing. No liability may be assumed for models or products not referred to herein. This test report may not be published or duplicated in part without permission of the testing body. This test report by itself does not constitute authorization for the use of any TUV Rheinland test mark. The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.



Ref Lvl	Delta 1 [T1]	RBW	100 kHz	RF Att	30 dB
137 dBμV	0.25 dB	VBW	300 kHz		
	35.04509018 MHz	SWT	40 ms	Unit	dBμV

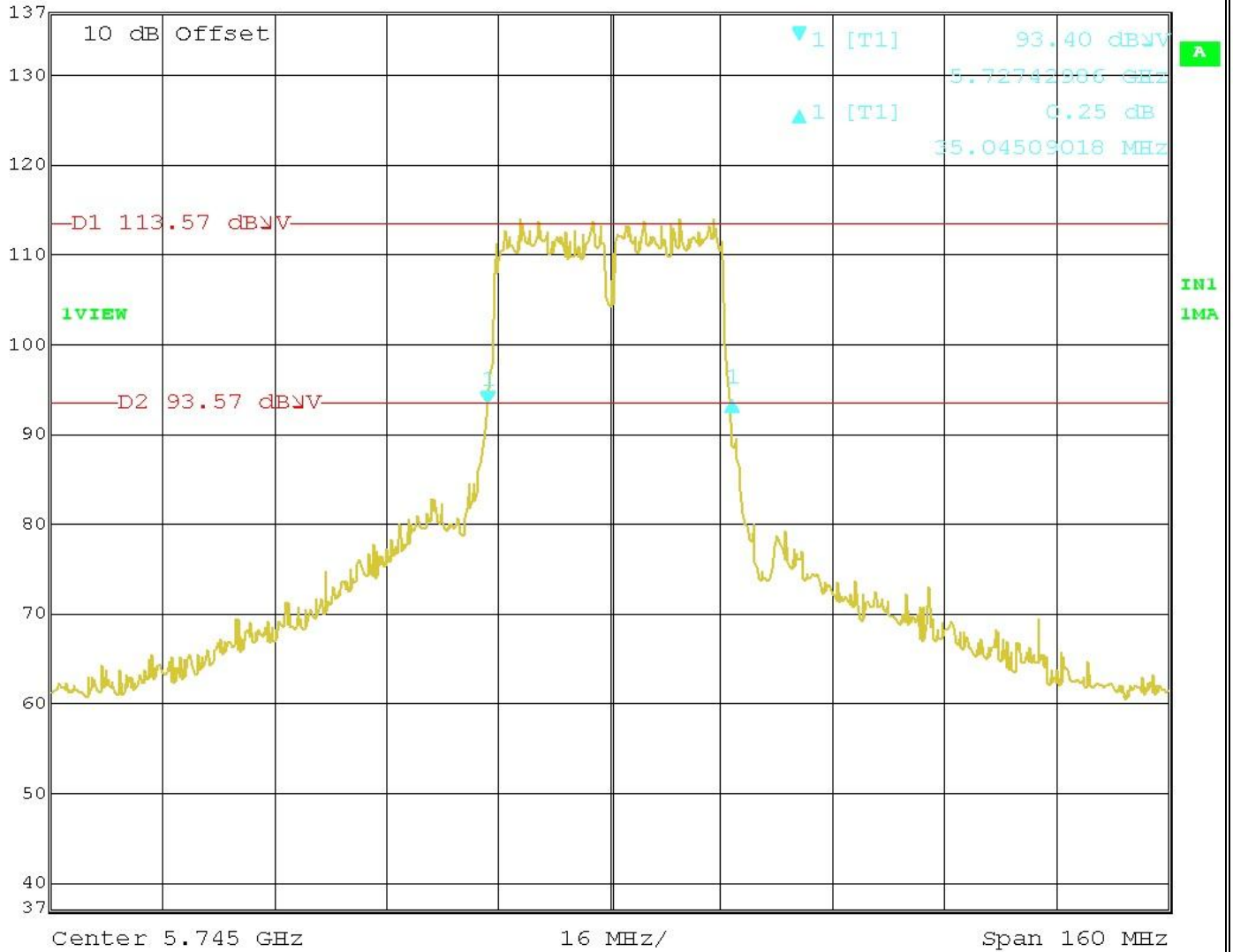


Figure 16: 20 dB Occupied Bandwidth of 40 MHz Channel
20dB Band width is 35.045 MHz which is > 500 kHz

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	Delta 1 [T1]	RBW	100 kHz	RF Att	30 dB
Ref Lvl	3.11 dB	VBW	300 kHz		
137 dBμV	17.31462926 MHz	SWT	20 ms	Unit	dBμV

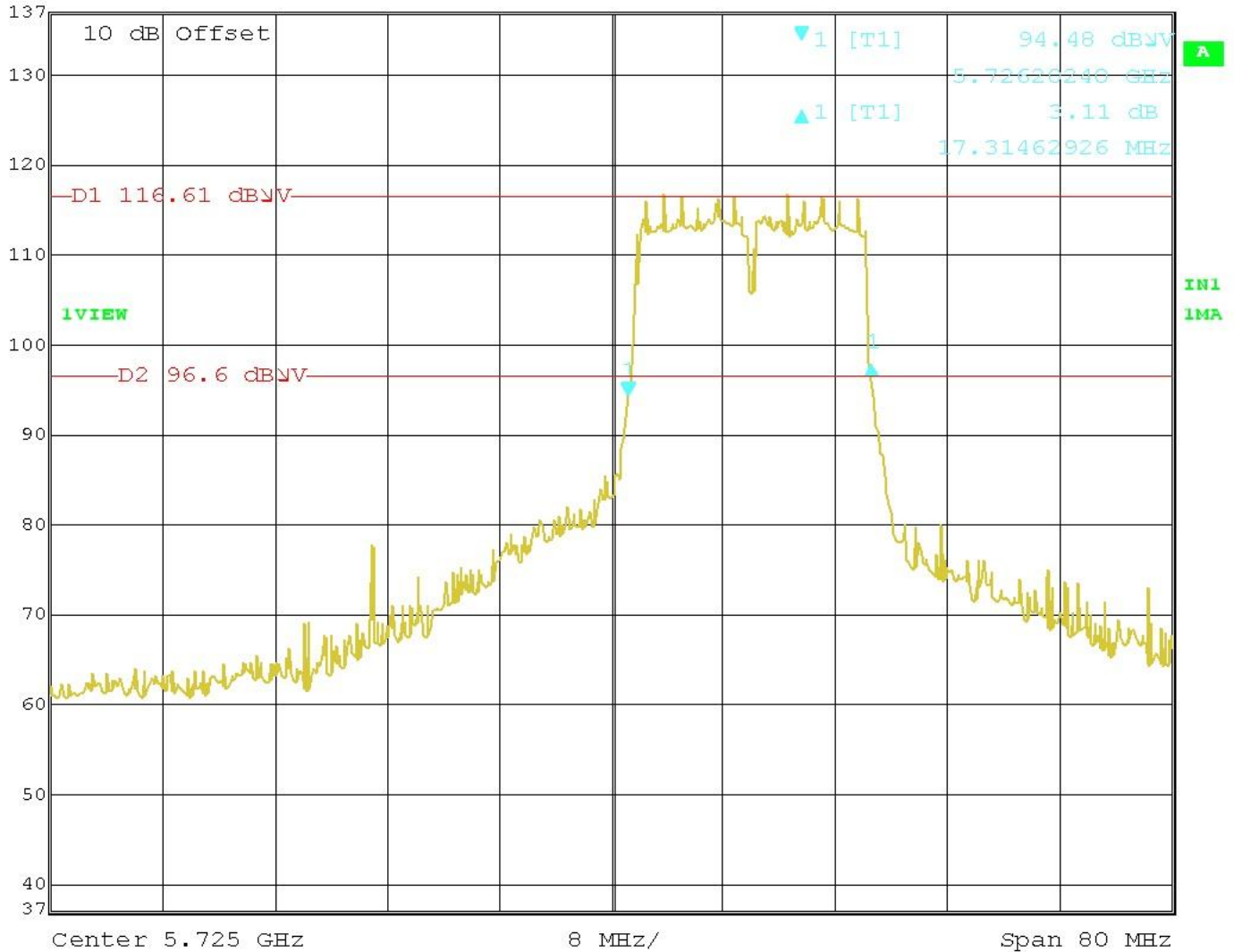


Figure 17: 20 dB Occupied Bandwidth of 20 MHz Channel
20dB Band width is 17.314 MHz which is > 500 kHz

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Ref Lvl	Delta 1 [T1]	RBW	100 kHz	RF Att	30 dB
137 dBμV	-0.52 dB	VBW	300 kHz		
	8.81763527 MHz	SWT	10 ms	Unit	dBμV

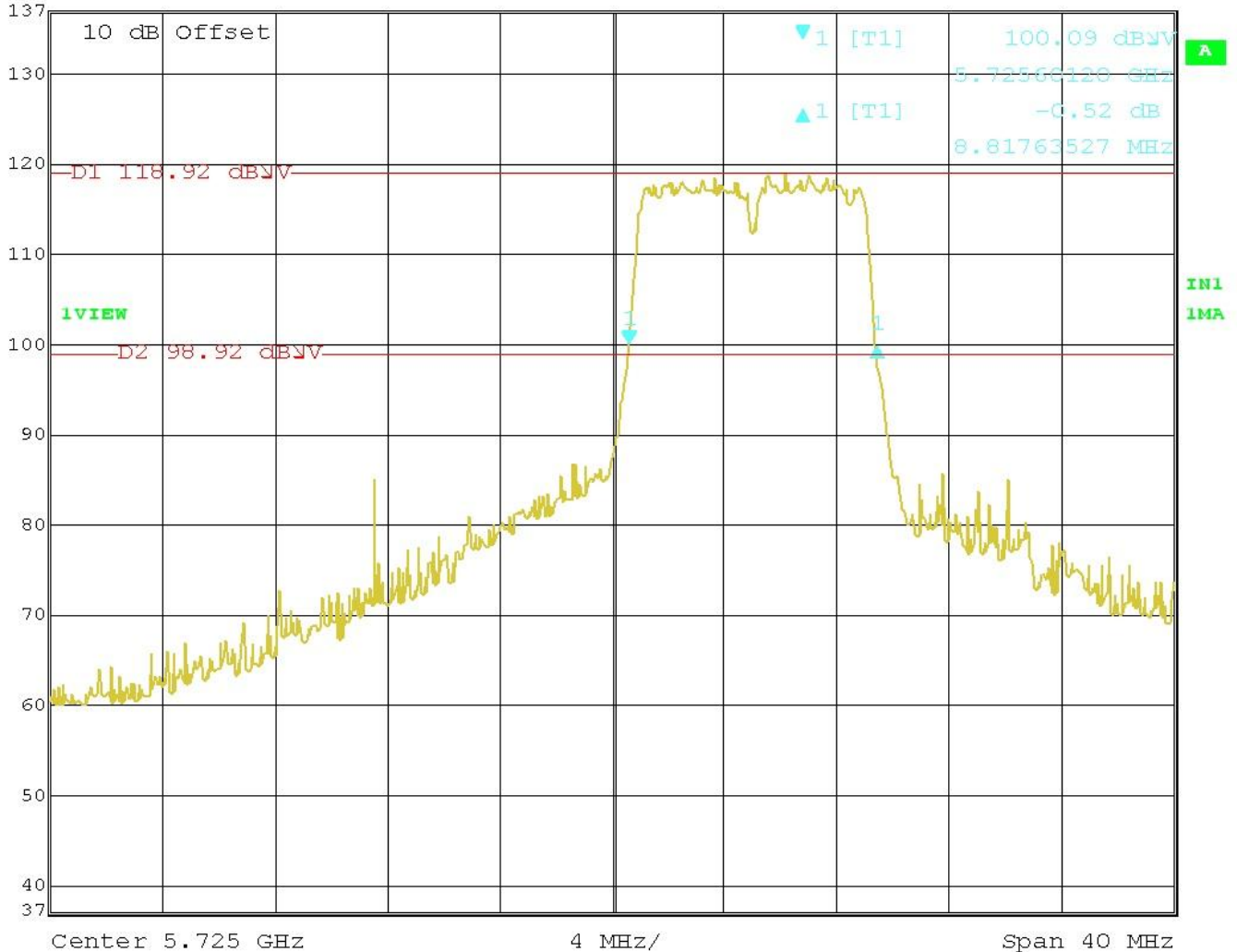


Figure 18: 20 dB Occupied Bandwidth of 10 MHz Channel

20dB Band width is 8.817 MHz which is > 500 kHz

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Delta 1 [T1]	RBW	100 kHz	RF Att	30 dB
Ref Lvl	-3.79 dB	VBW	300 kHz	
137 dBμV	4.52905812 MHz	SWT	5 ms	Unit dBμV

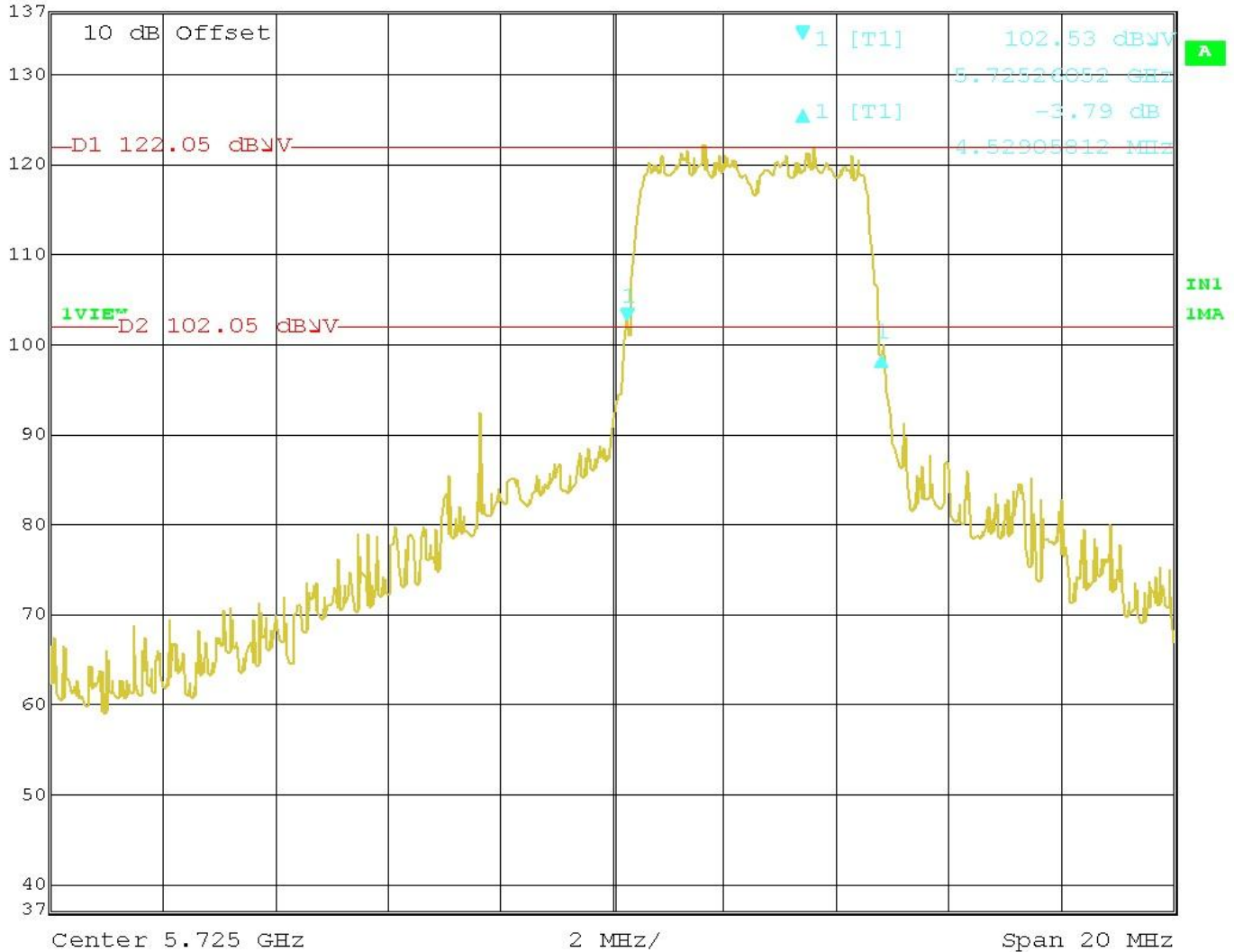


Figure 19: 20 dB Occupied Bandwidth of 5 MHz Channel
20dB Band width is 4.529 MHz which is > 500 kHz

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5.1 Voltage Requirements FCC Part 15.31(e)

FCC Part 15.31 states that for intentional radiators, measurements of the variation of the input power or the radiated signal level of the fundamental frequency component of the emission, as appropriate, shall be performed with the supply voltage varied between 85% and 115% of the nominal rated supply voltage. For battery operated equipment, the equipment tests shall be performed using a new battery.

5.1.1 Over View of Test

Results	Complies (as tested per this report)		Date	7/8/2013
Standard	FCC Part 15.31(e)			
Product RF-7800W	RF-7800W	Serial#	E00047	
Test Set-up	Tested in shielded room. EUT placed on table, see test plans for details			
Mod. to EUT	None	Test Performed By	Randall E Masline	

5.1.2 Test Procedure

A variac will be placed in front of the POE (Power over Ethernet) box in order to vary the input AC. The power source test was performed using the $\pm 15\%$ of rated voltage

Manufacturer Rated voltage: VAC, the test will be performed at $\pm 15\%$ of rated voltage.

Nominal Rated Voltage (V_{Nom}):	120	VAC
115% Max Voltage (V_{max}):	138	VAC
85% Minimum Voltage (V_{min}):	102	VAC

5.1.3 Final Test

As tested, the EUT was found to be compliant to the requirements of the test standard.

The output power and frequency did not change or waiver by varying the input voltage to the POE black box.

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6 Emissions in Receive Mode.

6.1 Radiated Emissions

This test measures the electromagnetic levels of spurious signals generated by the EUT that radiated from the EUT and may affect the performance of other nearby electronic equipment.

6.1.1 Over View of Test

Results	Complies (as tested per this report)				Date	5/31/2013	
Standard	FCC Parts 15.209(a)						
Product RF-7800W	RF-7800W			Serial#	E00047		
Configuration	See test plan for details						
Test Set-up	Tested at a 10m O.A.T.S. placed on a 1.0m x 1.5m non-conductive table 80cm above the ground plane on a turn-table. See test plans for details						
EUT Powered By	Power over Ethernet	Temp	23° C	Humidity	32%	Pressure	1010mbar
Frequency Range	30 MHz to 40 GHz @ 3m						
Perf. Criteria	(Below Limit)			Perf. Verification	Readings Under Limit		
Mod. to EUT	None			Test Performed By	Randall E Masline		

6.1.2 Test Procedure

Radiated and FCC emissions tests were performed using the procedures of ANSI C63.4:2003 including methods for signal maximizations and EUT configuration. The photos included with the report show the EUT in its maximized configuration.

The frequency range from 30 MHz to 13 GHz was investigated for radiated emissions.

Radiated emission testing was performed at a distance of 3 meters in 10m O.A.T.S.

6.1.3 Deviations

There were no deviations from the test methodology listed in the test plan for the radiated emission test.

6.1.4 Final Test

All final radiated emissions measurements were below (in compliance) the limits.

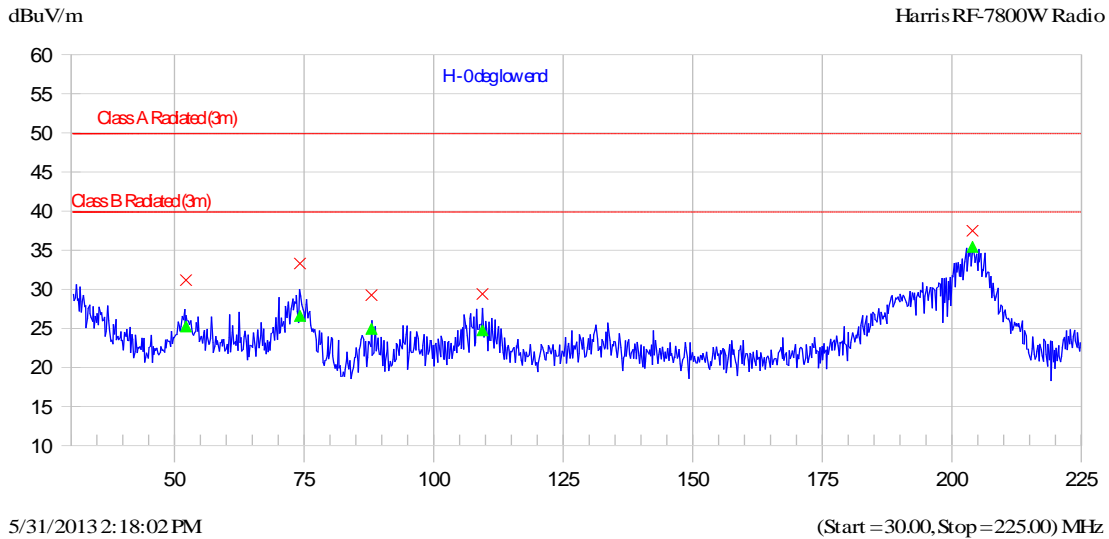
The test results contained in this report refer exclusively to the product(s) presented for testing. No liability may be assumed for models or products not referred to herein. This test report may not be published or duplicated in part without permission of the testing body. This test report by itself does not constitute authorization for the use of any TUV Rheinland test mark. The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

6.1.5 Final Graphs and Tabulated Data

NOTES:

Radiated Emissions Prescan
Vertical / Horizontal

H - 0 deg low end



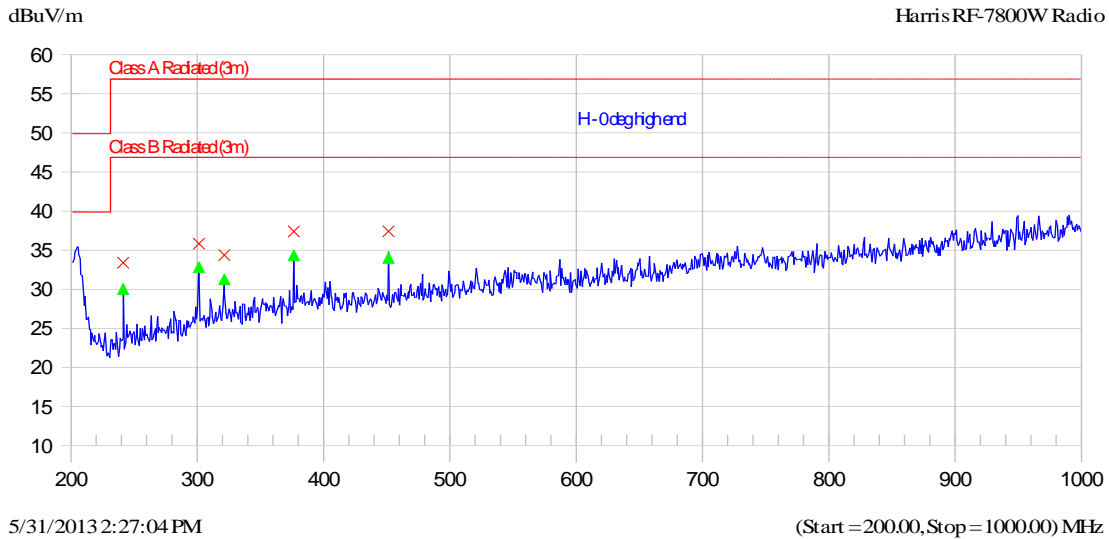
Frequency MHz	Peak dBuV/m	QP dBuV/m	Class B-QP dB	Class A-QP dB	Trace Name
51.883	31.3	25.3	-14.7	-24.7	H - 0 deg low end
73.877	33.4	26.7	-13.3	-23.3	H - 0 deg low end
87.651	29.4	25.0	-15.0	-25.0	H - 0 deg low end
109.101	29.5	24.8	-15.2	-25.2	H - 0 deg low end
203.626	37.6	35.5	-4.5	-14.5	H - 0 deg low end

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NOTES:

Radiated Emissions Prescan
Vertical / Horizontal

H - 0 deg high end



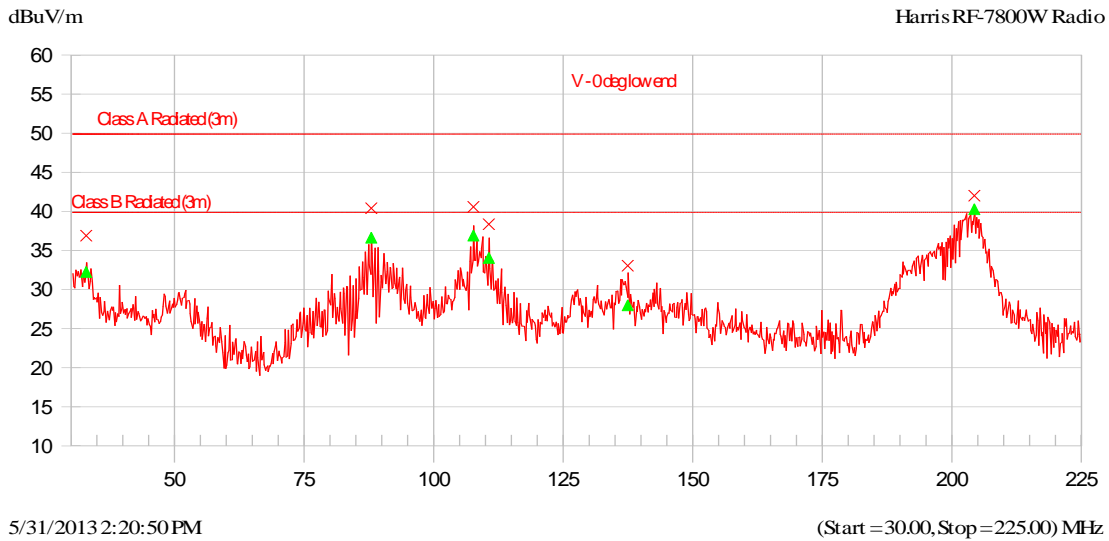
Frequency MHz	Peak dBuV/m	QP dBuV/m	Class B-QP dB	Class A-QP dB	Trace Name
240.036	33.5	30.1	-16.9	-26.9	H - 0 deg high end
299.987	35.9	32.9	-14.1	-24.1	H - 0 deg high end
320.042	34.5	31.4	-15.6	-25.6	H - 0 deg high end
375.042	37.5	34.4	-12.6	-22.6	H - 0 deg high end
450.002	37.5	34.1	-12.9	-22.9	H - 0 deg high end

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NOTES:

Radiated Emissions Prescan
Vertical / Horizontal

V - 0 deg low end



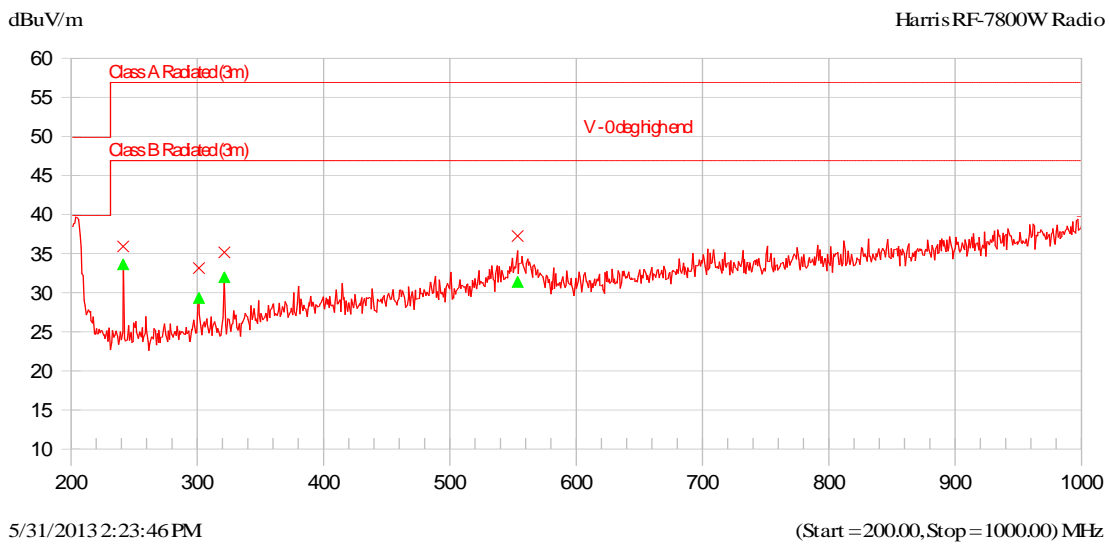
Frequency MHz	Peak dBuV/m	QP dBuV/m	Class B-QP dB	Class A-QP dB	Trace Name
32.604	37.0	32.3	-7.7	-17.7	V - 0 deg low end
87.632	40.5	36.7	-3.3	-13.3	V - 0 deg low end
107.315	40.7	37.0	-3.0	-13.0	V - 0 deg low end
110.294	38.5	34.1	-5.9	-15.9	V - 0 deg low end
137.105	33.2	28.1	-11.9	-21.9	V - 0 deg low end
204.005	42.1	40.4	0.4	-9.6	V - 0 deg low end

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NOTES:

Radiated Emissions Prescan
Vertical / Horizontal

V - 0 deg high end



Frequency MHz	Peak dBuV/m	QP dBuV/m	Class B-QP dB	Class A-QP dB	Trace Name
240.023	36.0	33.7	-13.3	-23.3	V - 0 deg high end
299.980	33.3	29.4	-17.6	-27.6	V - 0 deg high end
320.044	35.3	32.1	-14.9	-24.9	V - 0 deg high end
552.263	37.4	31.5	-15.5	-25.5	V - 0 deg high end

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6.1.1 Final Radiated Emissions

Standard:	Class B/FCC Part 15.209				final	Date:	6/25/2013		
Device Tested:	Harris				10m	File .xls:			
	Measured Level								
Meas #	Freq (MHz)	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Δ	Result	Antenna Polarization	Angle (degrees)	Antenna Height (meters)	Comment
1	203.0000	26.30	30.00	-3.70	Complied	Horizontal	0	3.00	
2	240.0360	21.40	37.00	-15.60	Complied	Horizontal	0	3.00	
3	299.9870	22.70	37.00	-14.30	Complied	Horizontal	0	1.00	
4	320.0420	22.90	37.00	-14.10	Complied	Horizontal	0	1.00	
5	375.0420	27.20	37.00	-9.80	Complied	Horizontal	0	1.00	
6	450.0020	26.20	37.00	-10.80	Complied	Horizontal	0	1.00	
7	87.6320	26.80	30.00	-3.20	Complied	Vertical	0	1.00	
8	107.3150	23.80	30.00	-6.20	Complied	Vertical	0	1.00	
9	110.2940	23.80	30.00	-6.20	Complied	Vertical	0	1.00	
10	204.0050	27.80	30.00	-2.20	Complied	Vertical	0	1.00	Maximum Emissions

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7 RF Exposure

7.1 Exposure Requirements – FCC Parts 2.1091, 15.247(d)

FCC Part 15.247(d) states that SAR evaluation is not required if “Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the Commission's guidelines. See §1.1307(b)(1) of CFR 47.”

7.1.1 RF Exposure Limit

According to FCC 1.1310 table 1: The criteria listed in the following table shall be used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation as specified in 1.1307(b)

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
0.3–3.0	614	1.63	*(100)	6
3.0–30	1842/f	4.89/f	*(900/f ²)	6
30–300	61.4	0.163	1.0	6
300–1500	f/300	6
1500–100,000	5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3–1.34	614	1.63	*(100)	30
1.34–30	824/f	2.19/f	*(180/f ²)	30
30–300	27.5	0.073	0.2	30
300–1500	f/1500	30

F = Frequency in MHz

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7.1.1.1 Antenna Gain

The maximum Gain measured in Semi-Anechoic Chamber is 8.5 dBi or 7.08 (numeric).

14 dBi or 25.12 (numeric)

21 dBi or 125.89 (numeric)

27.5 dBi or 562.34 (numeric)

30 dBi or 1000 (numeric)

7.1.1.2 Output Power into Antenna & RF Exposure value at distance >20cm: Mobile

Calculations for this report are based on highest power measurement and all the various antenna gains. Limit for MPE (from FCC part 1.1310 table 1) is 5 mW/cm² for professionally installed devices.

8.5 dBi gain Antenna	Frequency (MHz):	5725
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Conversions:

Power (dBm):	22.58
Power (mW):	181.134
Power (W):	0.181134

Antenna gain in dBi:	8.50
Linear antenna gain:	7.079

R = distance in cm:	20
R = distance in m:	0.20

FCC:

Controlled Exposures - Limit (mW/cm ²) =	5
Uncontrolled Exposures - Limit (mW/cm ²) =	1
Pd =	0.2551116 mW/cm ²
Controlled Margin to Limit =	4.7449 mW/cm ²
Uncontrolled Margin to Limit =	0.7449 mW/cm ²

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14 dBi gain Antenna	Frequency (MHz):	5725
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Conversions:

Power (dBm):	22.58
Power (mW):	181.134
Power (W):	0.181134

Antenna gain in dBi:	14.00
Linear antenna gain:	25.119

R = distance in cm:	20
R = distance in m:	0.20

FCC:

Controlled Exposures - Limit (mW/cm ²) =	5	
Uncontrolled Exposures - Limit (mW/cm ²) =	1	
Pd =	0.9051700	mW/cm ²
Controlled Margin to Limit =	4.0948	mW/cm ²
Uncontrolled Margin to Limit =	0.0948	mW/cm ²

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21 dBi gain Antenna		
	Frequency (MHz):	5725

Conversions:

Power (dBm):	22.58
Power (mW):	181.134
Power (W):	0.181134

Antenna gain in dBi:	21.00
Linear antenna gain:	125.893

R = distance in cm:	20
R = distance in m:	0.20

FCC:

Controlled Exposures - Limit (mW/cm ²) =	5	
Uncontrolled Exposures - Limit (mW/cm ²) =	1	
Pd =	4.5365964	mW/cm ²
Controlled Margin to Limit =	0.4634	mW/cm ²
Uncontrolled Margin to Limit =	-3.5366	mW/cm ²

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While using the following antenna a minimum separation distance must be at least 60 cm

27.5 dBi gain antenna		
	Frequency (MHz):	5725

Conversions:

Power (dBm):	22.58
Power (mW):	181.134
Power (W):	0.181134

Antenna gain in dBi:	27.50
Linear antenna gain:	562.341

R = distance in cm:	50
R = distance in m:	0.50

FCC:

Controlled Exposures - Limit (mW/cm ²) =	5	
Uncontrolled Exposures - Limit (mW/cm ²) =	1	
Pd =	3.2422771	mW/cm ²
Controlled Margin to Limit =	1.7577	mW/cm ²
Uncontrolled Margin to Limit =	-2.2423	mW/cm ²

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While using the following antenna a minimum separation distance must be at least 60 cm

30 dBi gain antenna		
	Frequency (MHz):	5725

Conversions:

Power (dBm):	22.58
Power (mW):	181.134
Power (W):	0.181134

Antenna gain in dBi:	30.00
Linear antenna gain:	1000.000

R = distance in cm:	60
R = distance in m:	0.60

FCC:

Controlled Exposures - Limit (mW/cm ²) =	5
Uncontrolled Exposures - Limit (mW/cm ²) =	1
Pd =	4.0039407 mW/cm ²
Controlled Margin to Limit =	0.9961 mW/cm ²
Uncontrolled Margin to Limit =	-3.0039 mW/cm ²

As originally tested, the EUT was found to be compliant to the requirements of the test standard(s).

7.1.2 Sample Calculation

The Friis transmission formula: $P_d = (P_{out} * G) / (4 * \pi * R^2)$

Where;

Pd = power density in mW/cm²

Pout = output power to antenna in mW

G = gain of antenna in linear scale

$\pi \approx 3.1416$

R = distance between observation point and center of the radiator in cm

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Appendix A

Test Plan

This test report is intended to follow this test plan outlined here in unless other wise stated in this here report. The following test plan will give details on product information, standards to be used, test set ups and refer to TUV test procedures. The test procedures will give the steps to be taken when performing the stated test. The product information below came via client, product manual, product itself and or the internet.

Test Plan Summary

Table 1: EMC Test Plan Summary FCC& IC

Test	Test Method ANSI C63.10	Test Parameters (from Standard)
Spurious Emission in Received Mode	CFR47 15.109	Class B
Spurious Emission in Transmitted Mode	CFR47 15.209	Class B
Restricted Bands of Operation	CFR47 15.205	Class B
AC Power Conducted Emission	CFR47 15.207	Class B
Occupied Bandwidth	CFR47 15.247 (a2)	500kHz minimum
Maximum Transmitted Power	CFR47 15.247 (b3)	30dBm w/ 6dBi antenna
Peak Power Spectral Density	CFR47 15.247 (e)	8dBm/ 3kHz.
Band edge Measurement	CFR47 15.247 (d)	20dBr
RF Exposure	CFR47 15.247 (i), 2.1091	General Population

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