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FCC PART 15.247 & IC RSS-247

2.4 GHz DTS

TEST REPORT

Applicant	**ADHERIUM (NZ) LTD.**
Address	**LEVEL 2, 204 QUAY STREET AUCKLAND, NEW ZEALAND 1010**
FCC ID	**PN2-STAV1**
IC	**20509-STAV1**
Model Number	NF0080
Product Description	Wireless Data Logger for Inhaled Medication
Date Sample Received	4/30/2016
Final Test Date	5/3/2016
Tested By	Cory Leverett
Approved By	Tim Royer

Report Number	Version Number	Description	Issue Date
674AUT16TestReport	Rev1	Initial Issue	5/11/2016

THE ATTACHED REPORT SHALL NOT BE REPRODUCED EXCEPT IN FULL WITHOUT THE WRITTEN APPROVAL OF TIMCO ENGINEERING, INC.

TIMCO ENGINEERING, Inc.

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GENERAL REMARKS

The attached report shall not be reproduced except in full without the written permission of Timco Engineering Inc.

Summary

The device under test does:

☒ Fulfill the general approval requirements as identified in this test report
☐ Not fulfill the general approval requirements as identified in this test report

Attestations

This equipment has been tested in accordance with the standards identified in this test report. To the best of my knowledge and belief, these tests were performed using the measurement procedures described in this report.

All instrumentation and accessories used to test products for compliance to the indicated standards are calibrated regularly in accordance with ISO 17025: 2005 requirements.

I attest that the necessary measurements were made at:

Timco Engineering Inc.
849 NW State Road 45
Newberry, FL 32669
IC Test Site Registration # : 2056A-3

Tested by:

Cory Leverett
Project Manager/Testing Technician

Date: 5/ 3/ 2016

Reviewed and approved by:

Tim Royer
Project Manager/Testing Technician
Date: 5/ 11/ 2016

GENERAL INFORMATION

EUT Specification

Regulatory Standards	FCC Title 47 CFR Part 15.247 IC RSS-247 Issue 1 IC RSS-GEN Issue 4		
FCC ID	**PN2-STAV1**		
IC	**20509-STAV1**		
Model	NF0080		
EUT Description	WIRELESS DATA LOGGER FOR INHALED MEDICATION		
Modulation Type	Bluetooth LE (GFSK 1 Mbps)		
Operating Frequency	TX: 2402 – 2480 MHz	RX: 2402 – 2480 MHz	
EUT Power Source	☐ 110–120Vac/50– 60Hz (While in charging Cradle)		
	☐ DC Power		
	☒ Battery Operated		
Test Item	☐ Prototype	☒ Pre-Production	☐ Production
Type of Equipment	☐ Fixed	☐ Mobile	☒ Portable
Antenna Connector	None (Temp Connector Provided for testing)		
Antenna	Integral PCB Chip		
Test Conditions	Temperature: 24-26ºC Relative humidity: 50-65%		
Measurement Standard	ANSI C63.10-2013 (Measurement Procedures) ANSI C63.4-2009 (Radiated Site Validation)		
Test Exercise	The EUT was tested in a continuous transmission mode		

Test Supporting Equipment

Device	Manufacturer	Model	S/N	Supplied By	Used For
NA					

RESULTS SUMMARY

FCC Rule Part No.	IC Standard Ref.	Requirement	Test Item	Result
15.207 (a)	RSS-GEN 8.8	AC Powerline Conducted Emissions	Powerline Conducted	Pass
15.215 (c)	RSS-GEN 6.6	Occupied Bandwidth	99% Bandwidth	Pass
			20 dB Bandwidth	Pass
15.247(a)(e)	RSS-247 § 5.2	Digital Transmission Systems	6 dB Bandwidth	Pass
			Power Spectral Density	Pass
15.247(b)	RSS-247 § 5.4	Transmitter Output Power and Equivalent Isotropically Radiated Power	Peak Power Output (ERP)	Pass
			Antenna Gain (EIRP)	Pass
15.247(d)	RSS-247 § 5.5	Unwanted Emissions	Bandedge	Pass
			Radiated Spurious	Pass

Notes:

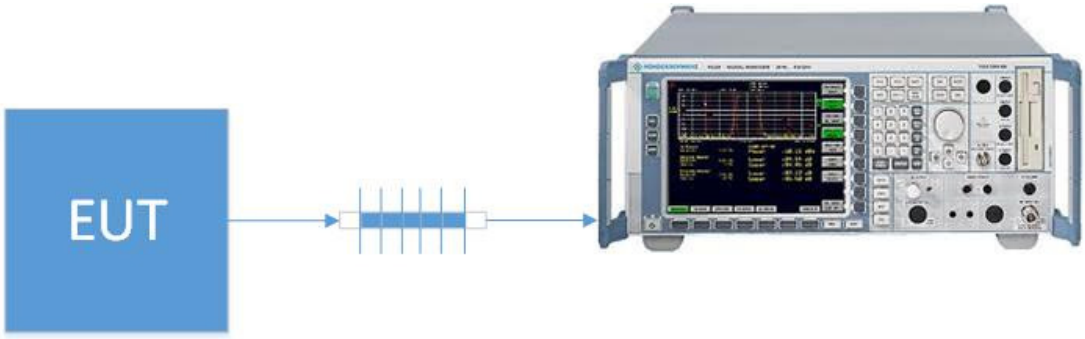
DTS BANDWIDTH

Rules Part No.: FCC 15.247 (a)(2) , IC RSS 247 § 5.2.1

Requirements: The minimum 6 dB bandwidth shall be 500 kHz.

Test Method: ANSI C63.10 § 11.8.1 DTS Bandwidth Option 1

Setup:



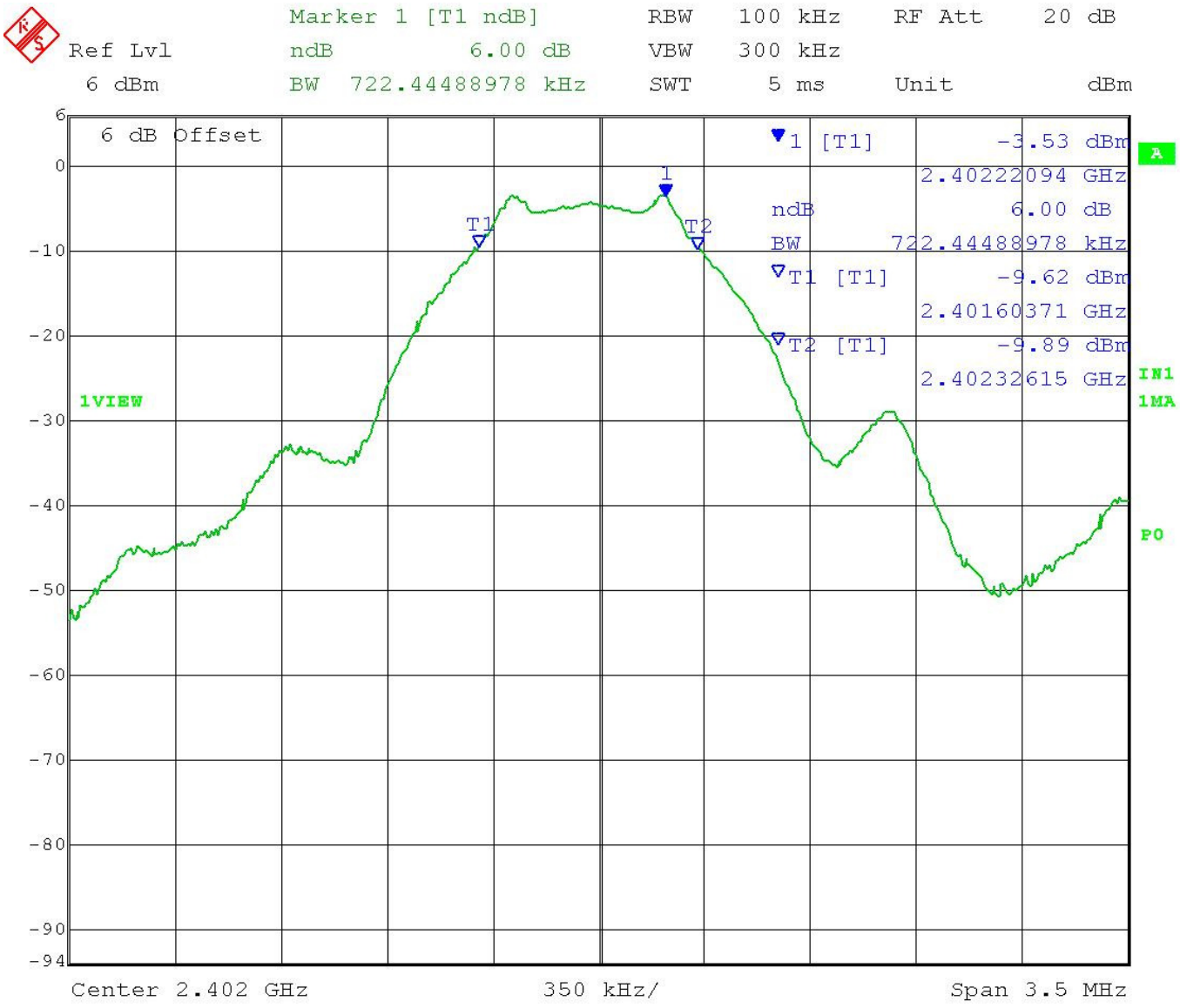
Test Data: 6 dB Occupied Bandwidth Measurement Table

Tuned Frequency (MHz)	6 dB BW (KHz)	Limit (KHz)	Margin (KHz)
2402	722.44	≥ 500	222.44
2442	736.47	≥ 500	236.47
2480	715.43	≥ 500	215.43

RESULTS: Meets Requirements

DTS BANDWIDTH

Test Data: **6dB Bandwidth Plot Low End of Band**

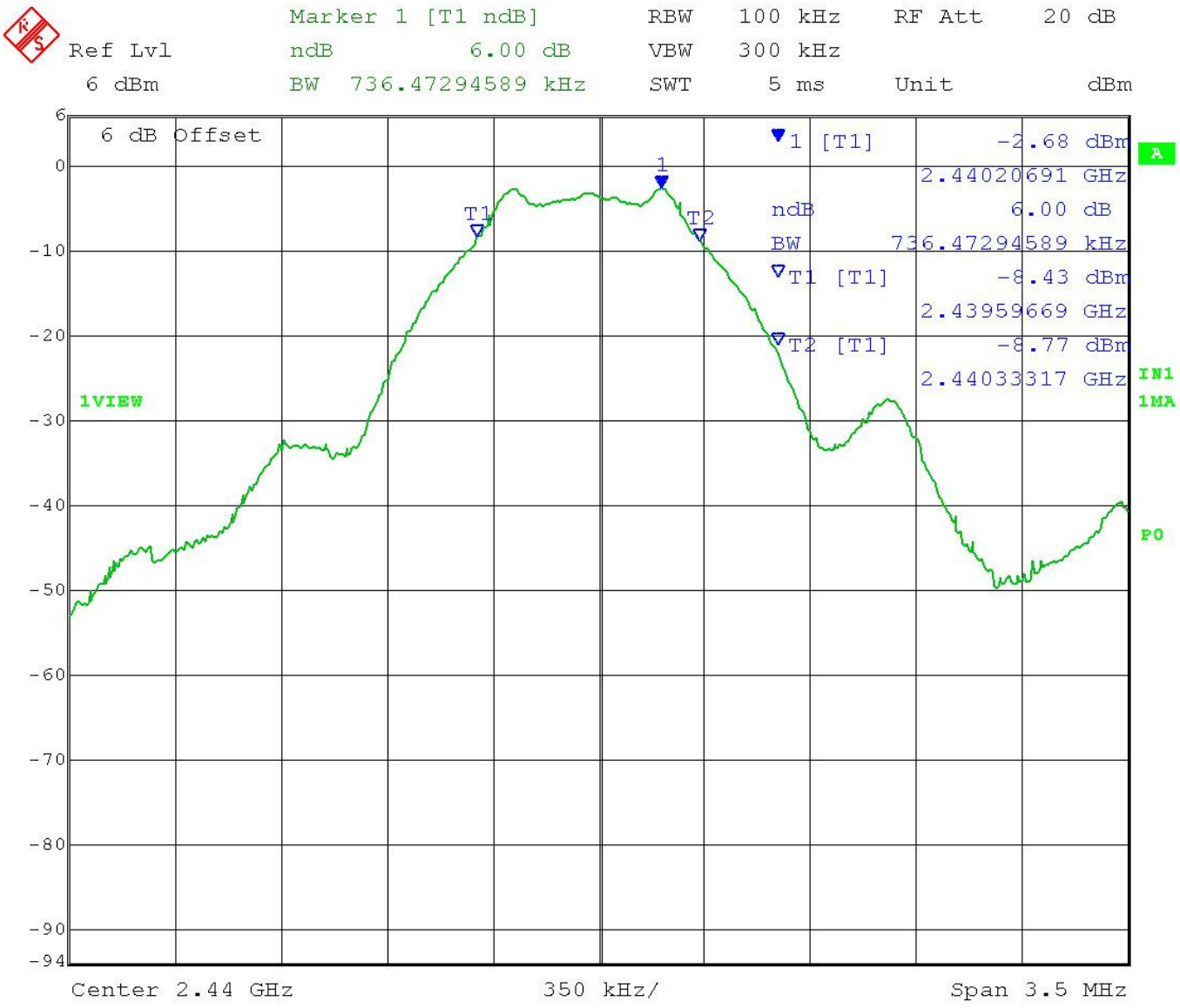


Date: 2.MAY.2016 13:23:59

RESULTS: Meets Requirements

DTS BANDWIDTH

Test Data: **6dB Bandwidth Plot Middle of Band**

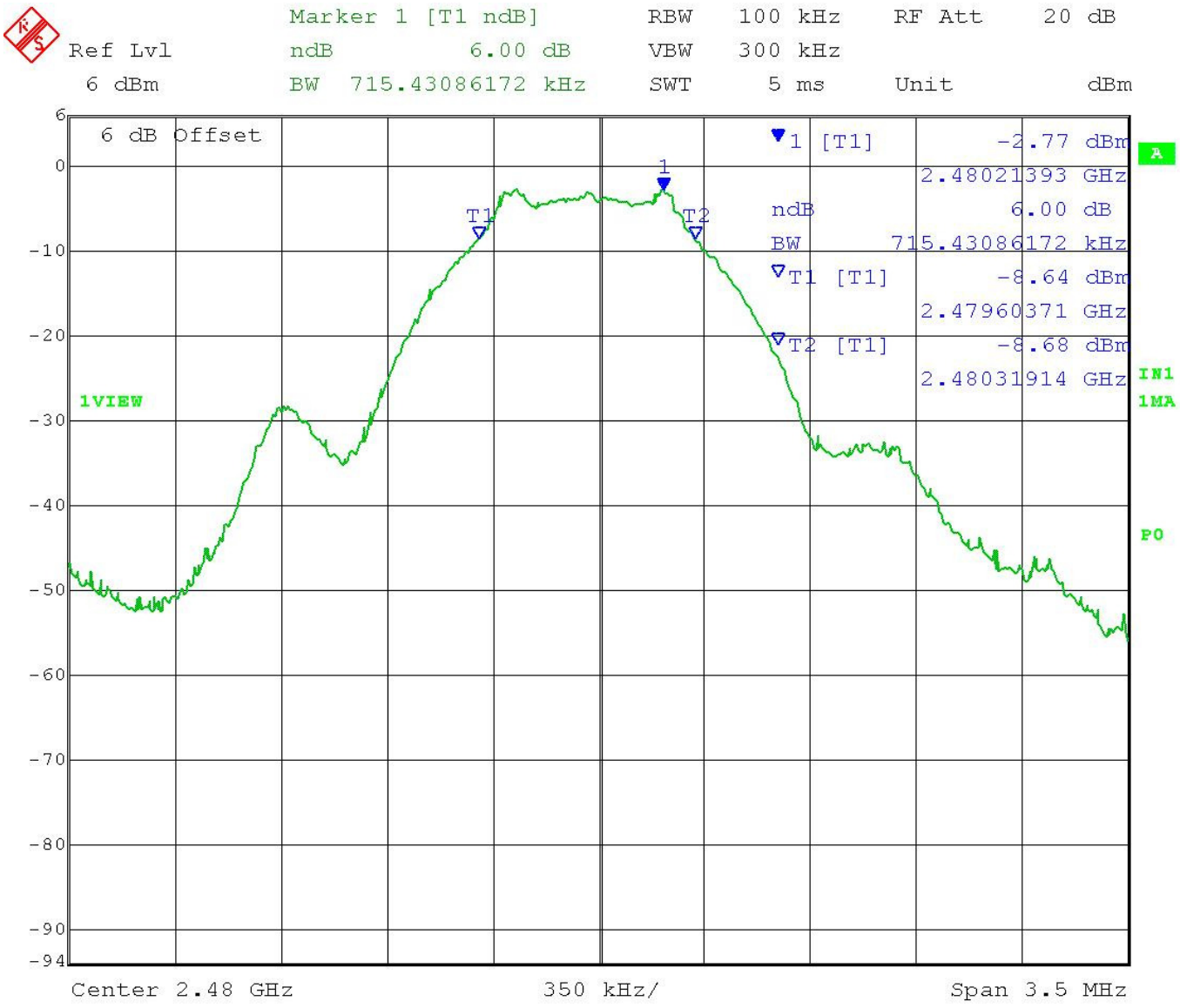


Date: 2.MAY.2016 13:25:33

RESULTS: Meets Requirements

DTS BANDWIDTH

Test Data: **6dB Bandwidth Plot High end of Band**



Date: 2.MAY.2016 13:17:31

RESULTS: Meets Requirements

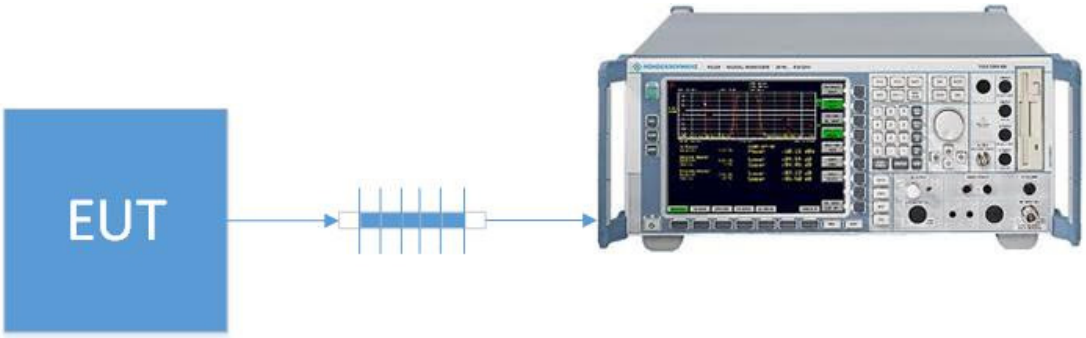
PEAK POWER OUTPUT

Rules Part No.: FCC 15.247(b) (3) (4), IC RSS 247 § 5.4.4

Requirements: Maximum Conducted Peak Power Output shall not exceed 1 Watt
Also the Peak Power Output shall not exceed 4 Watts EIRP

Test Method: ANSI C63.10 § 11.2 Power Limits, definitions, and device configuration
ANSI C63.10 § 11.9.1.1 Fundamental Output Power RBW ≥ DTS Bandwidth
ANSI C63.10 § Annex G Relationship among Field Strength and ERP/EIRP

Setup:



PEAK POWER OUTPUT

Test Data: **Peak Conducted Power Output Measurement Table**

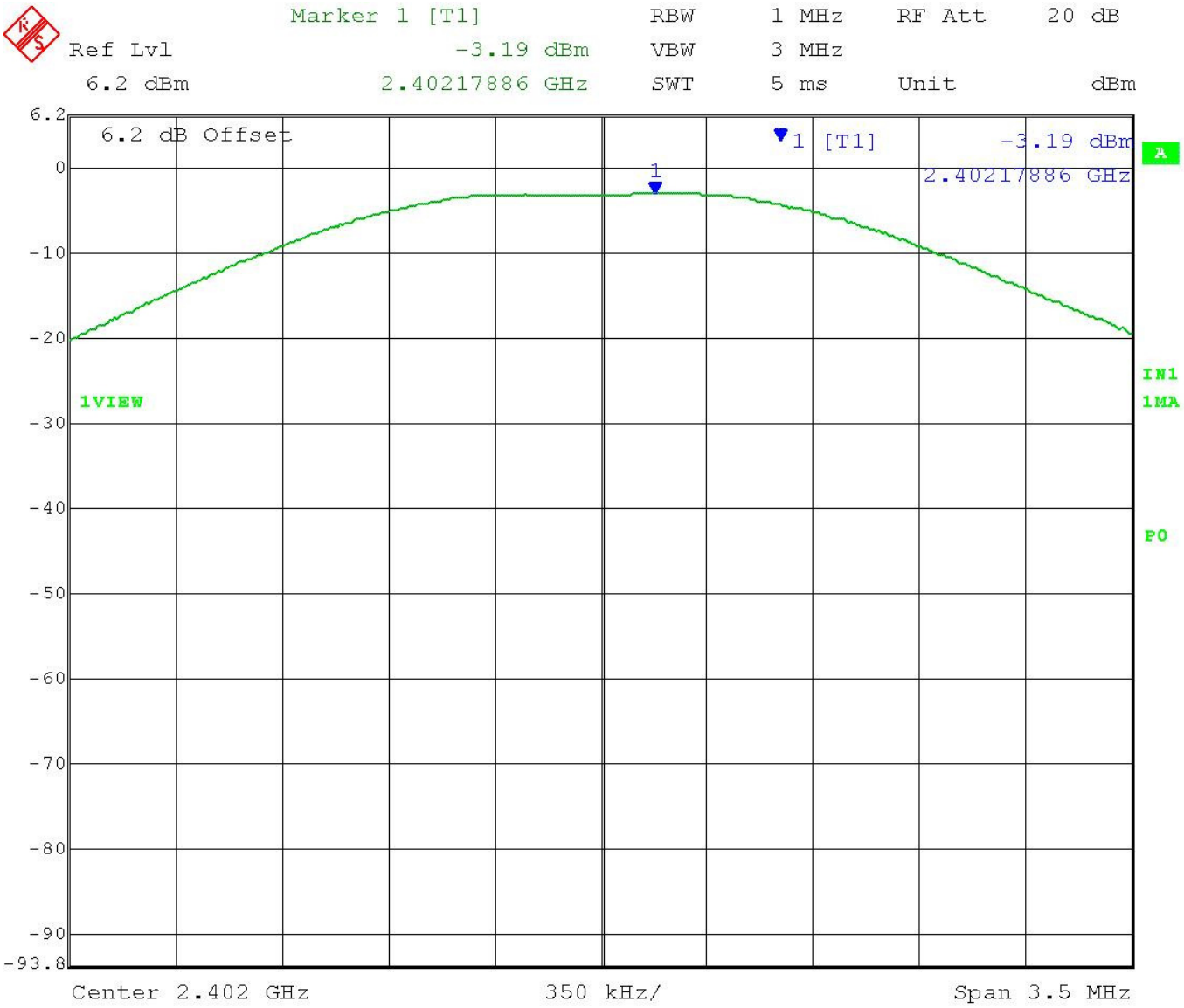
Peak Conducted Power Output Measurement				
Tuned Frequency (MHz)	Level (dBm)	ERP (W)	Limit (W)	Margin (W)
2402	-3.19	0.00048	1.00	0.99952
2442	-2.22	0.00060	1.00	0.99940
2480	-2.07	0.00062	1.00	0.99938

Peak EIRP Power Output Calculation				
Tuned Frequency (MHz)	ERP (dBm)	EIRP (W)	Limit (W)	Margin (W)
2402	-3.19	0.00079	4.00	3.99921
2442	-2.22	0.00098	4.00	3.99902
2480	-2.07	0.00102	4.00	3.99898

RESULTS: Meets Requirements

PEAK POWER OUTPUT

Test Data: **Peak Power Output Plot Low End of Band**

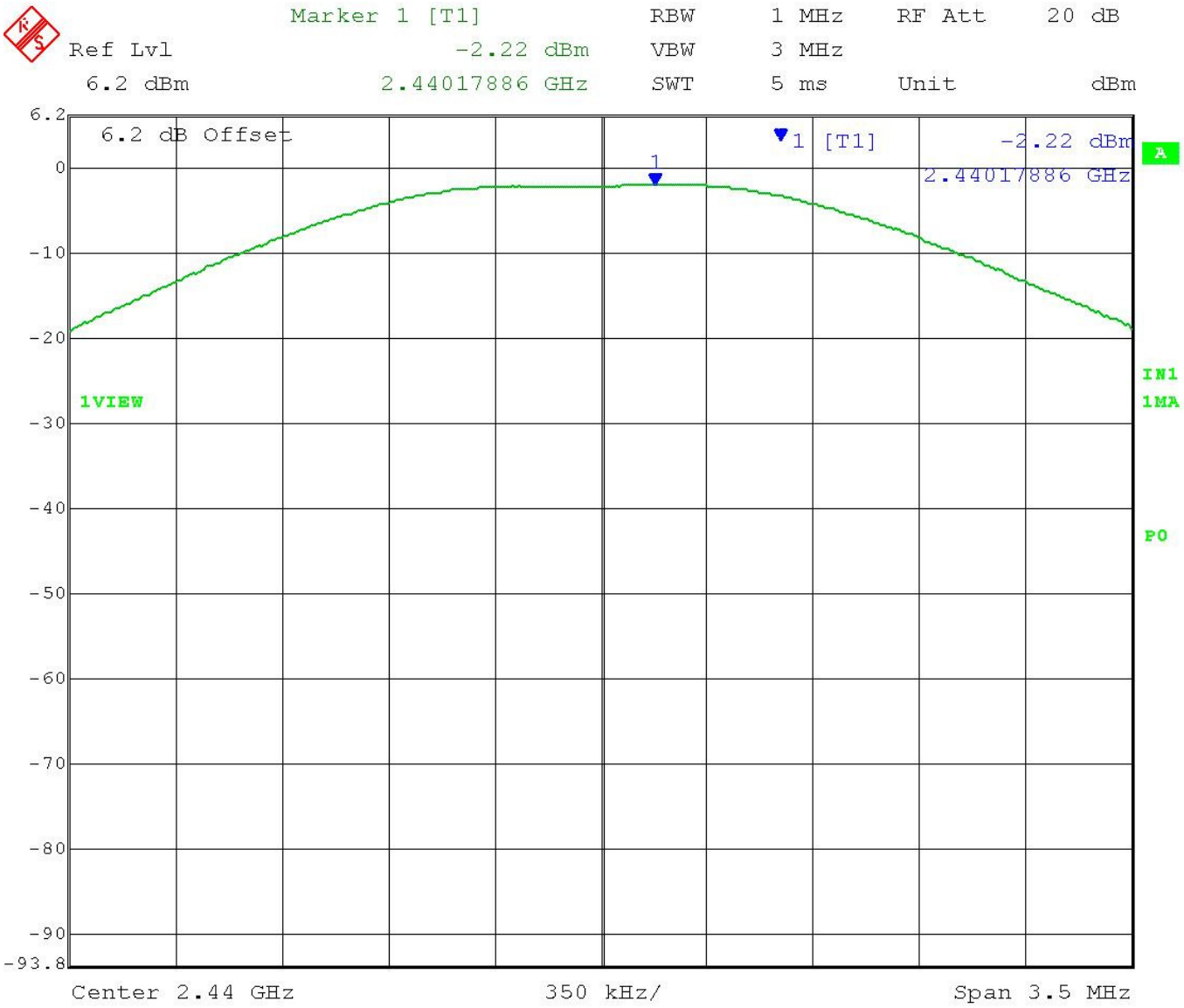


Date: 2.MAY.2016 13:30:09

RESULTS: Meets Requirements

PEAK POWER OUTPUT

Test Data: **Peak Power Output Plot Middle of Band**

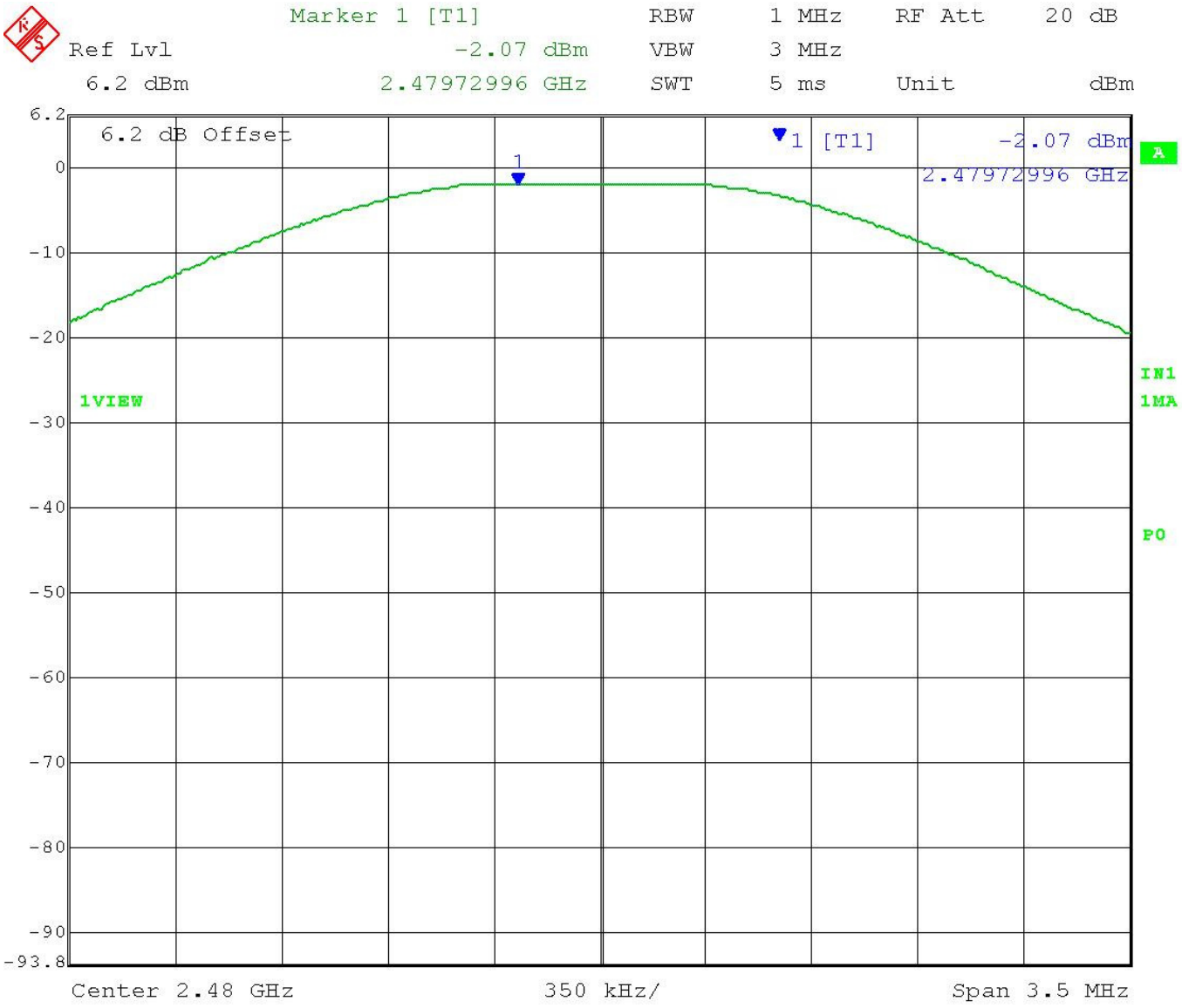


Date: 2.MAY.2016 13:29:09

RESULTS: Meets Requirements

PEAK POWER OUTPUT

Test Data: **Peak Power Output High End of Band**



Date: 2.MAY.2016 13:29:33

RESULTS: Meets Requirements

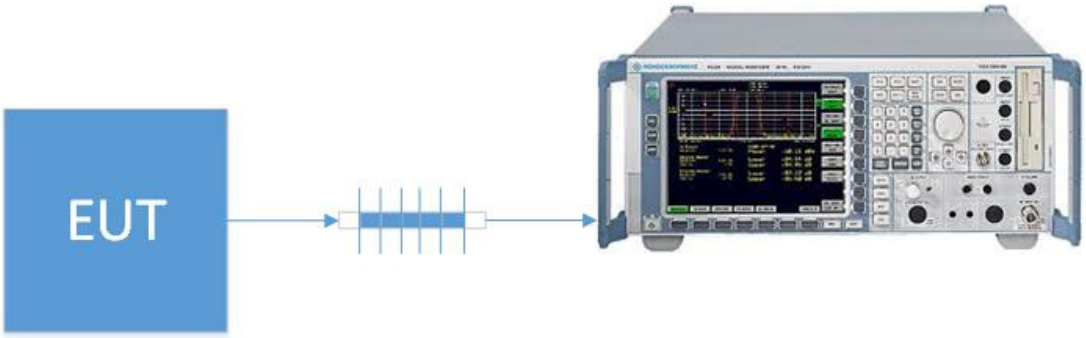
POWER SPECTRAL DENSITY

Rules Part No.: FCC 15.247(e), IC RSS 247 § 5.2.2

Requirements: The transmitter power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

Test Method: ANSI C63.10 § 11.2 Power Limits, definitions, and device configuration
ANSI C63.10 § 11.10.2 Maximum PSD in the fundamental- Method PKPSD

Setup:



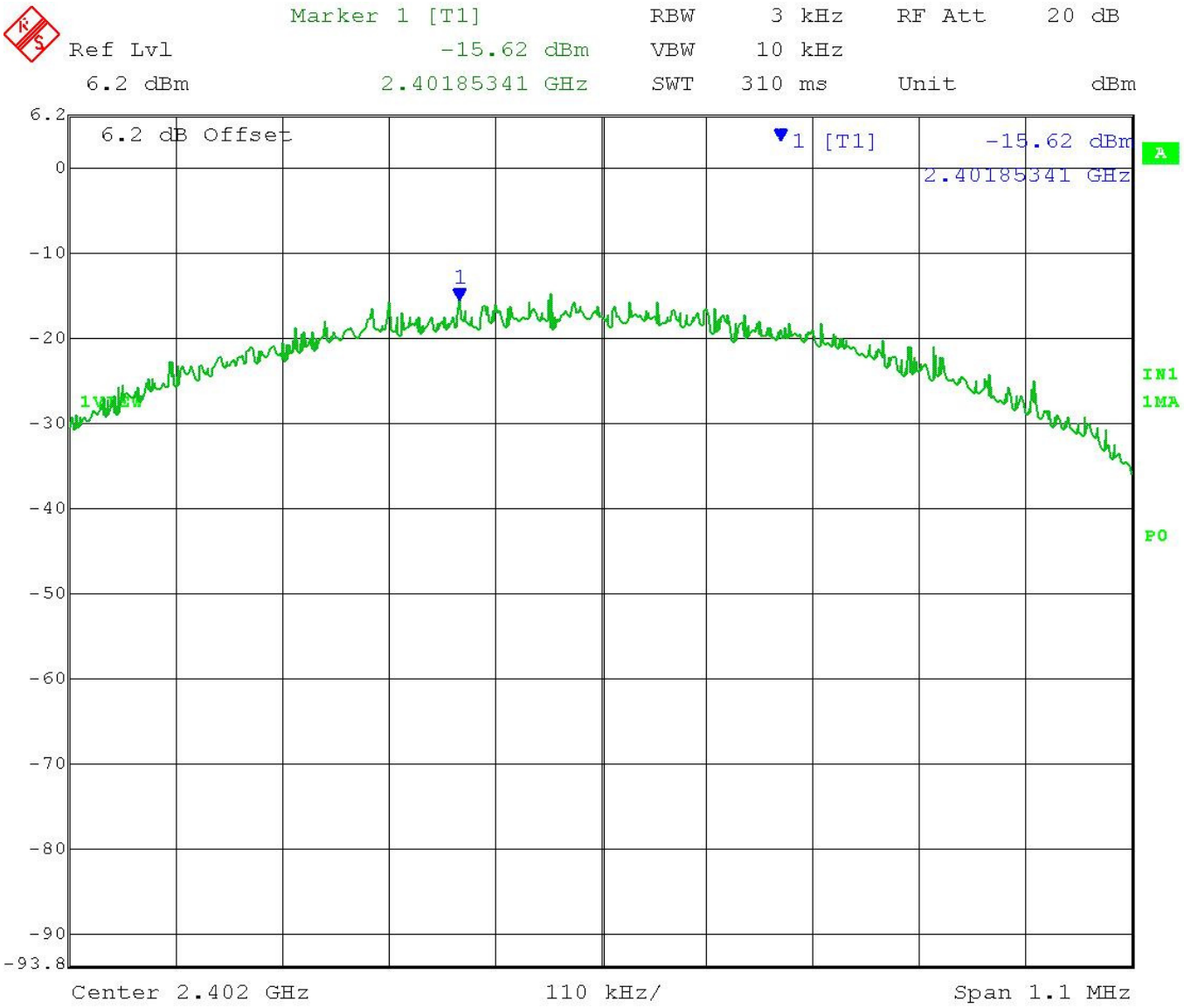
Test Data: **Power Spectral Density Measurement Table**

Peak Conducted Power Spectral Density			
Tuned Frequency (MHz)	Level (dBm/3KHz)	Limit (dBm/3KHz)	Margin (dB)
2402	-15.62	8.00	23.62
2442	-13.95	8.00	21.95
2480	-14.31	8.00	22.31

RESULTS: Meets Requirements

POWER SPECTRAL DENSITY

Test Data: **Power Spectral Density Plot Low End of Band**

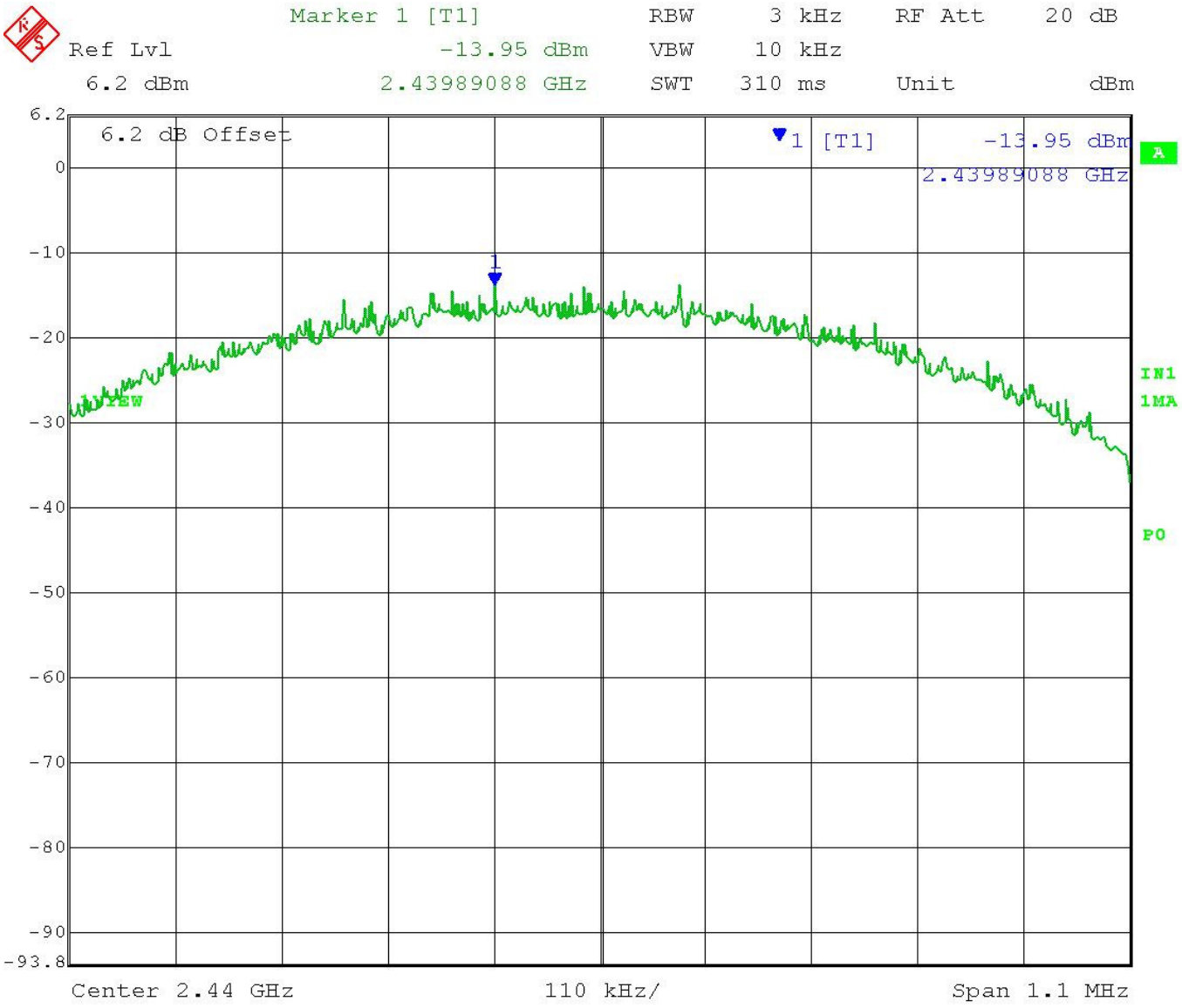


Date: 2.MAY.2016 13:33:26

RESULTS: Meets Requirements

POWER SPECTRAL DENSITY

Test Data: **Power Spectral Density Plot Middle of Band**

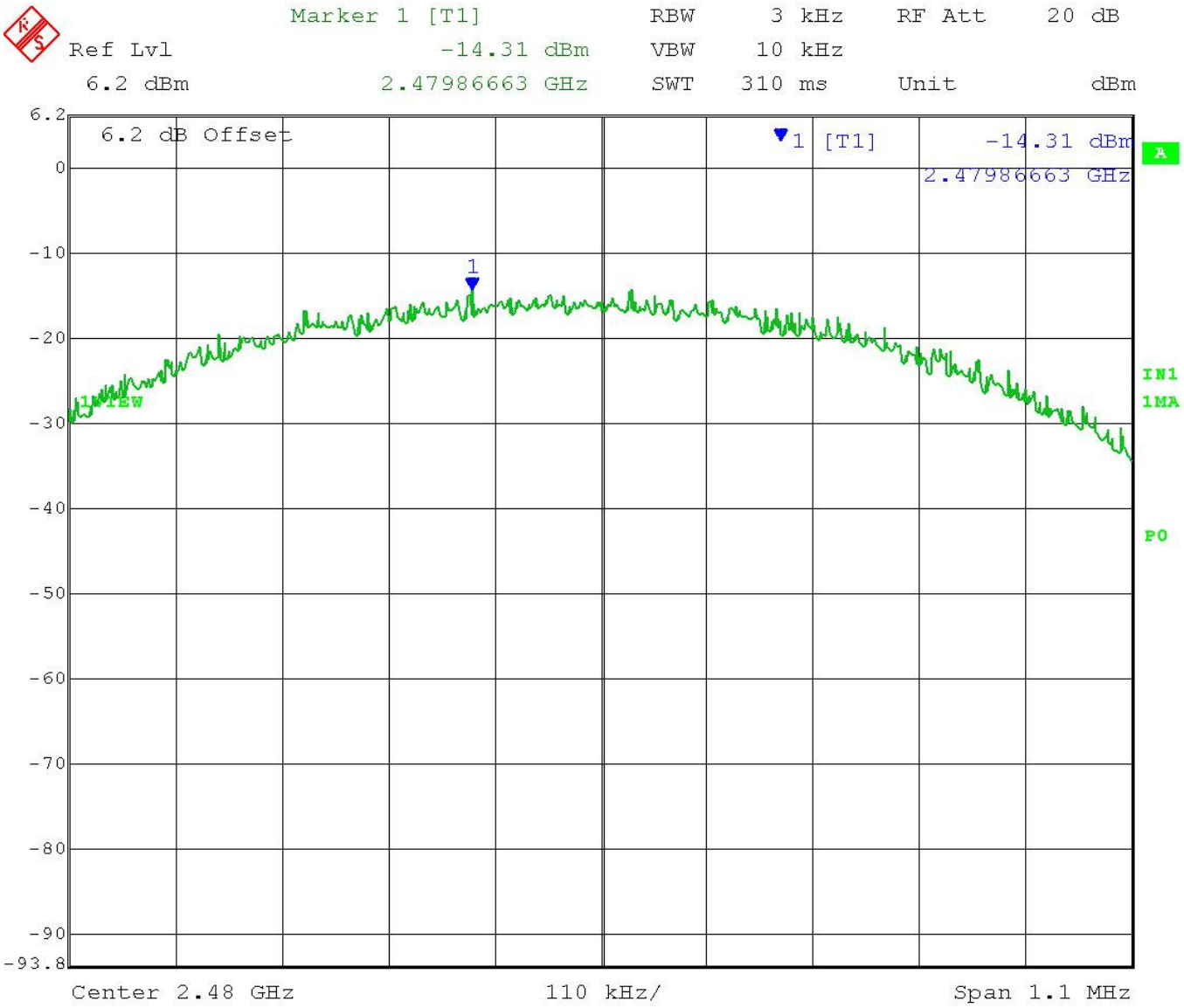


Date: 2.MAY.2016 13:34:18

RESULTS: Meets Requirements

POWER SPECTRAL DENSITY

Test Data: **Power Spectral Density Plot High End of Band**



Date: 2.MAY.2016 13:35:03

RESULTS: Meets Requirements

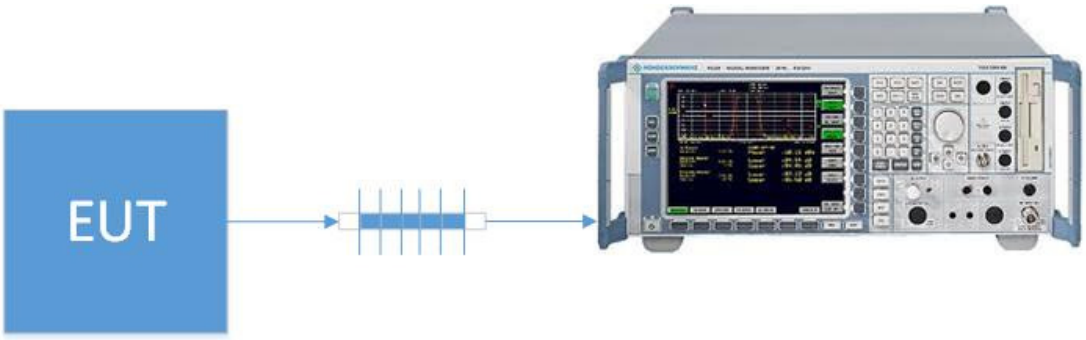
OCCUPIED BANDWIDTH

Rules Part No.: FCC 15.215 (c), IC RSS GEN § 6.6

Requirements: The 99% Bandwidth is for reporting only.

Test Method: ANSI C63.10 § 6.9.2 Occupied Bandwidth- Relative procedure
ANSI C63.10 § 6.9.3 Occupied Bandwidth- 99% Power Bandwidth procedure

Setup:



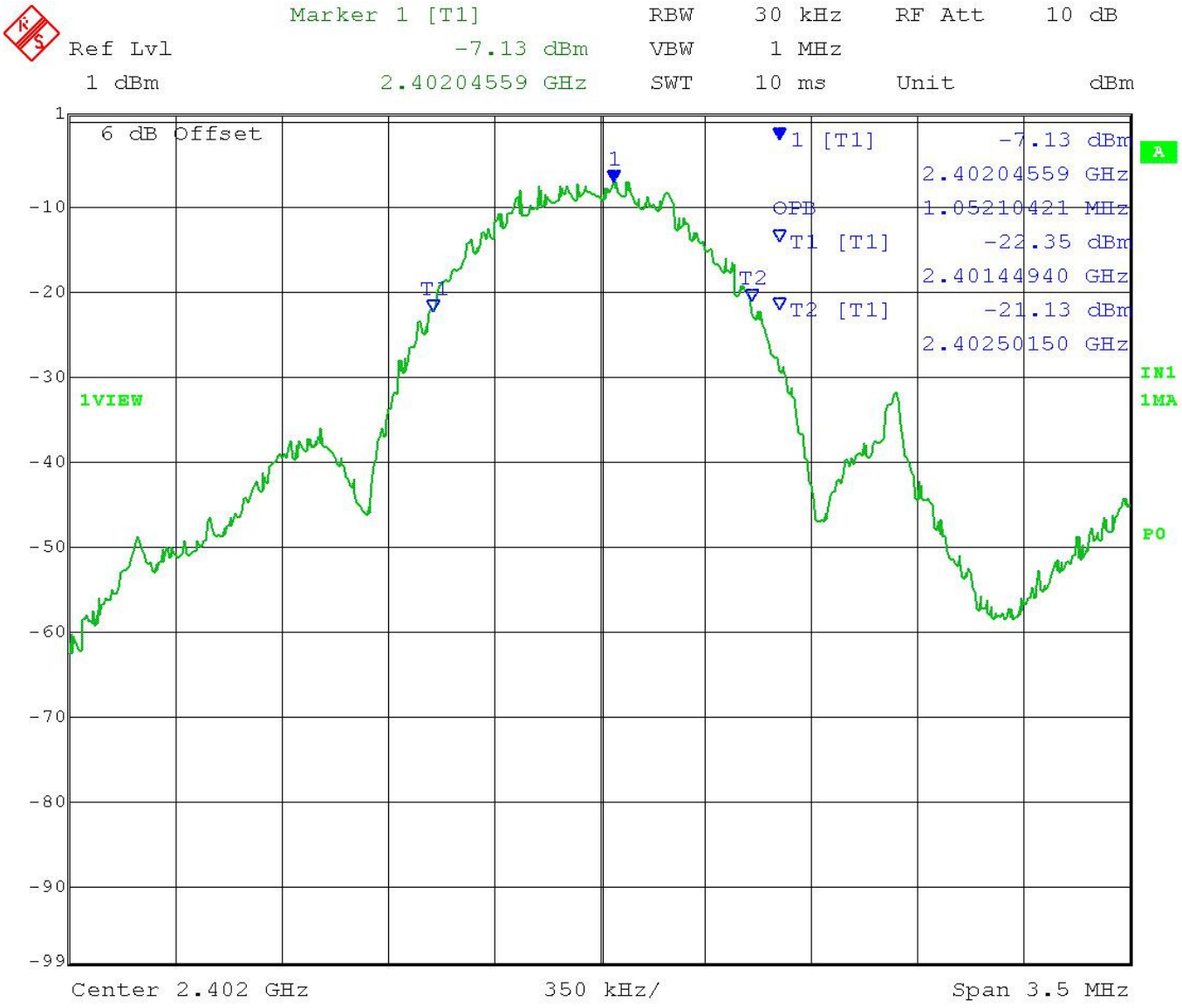
Test Data: **Occupied Bandwidth Measurement Table**

Tuned Frequency (MHz)	99% BW (MHz)
2402	1.05
2442	1.05
2480	1.05

RESULTS: Meets Requirements

OCCUPIED BANDWIDTH

Test Data: **99% Bandwidth Low End of Band**

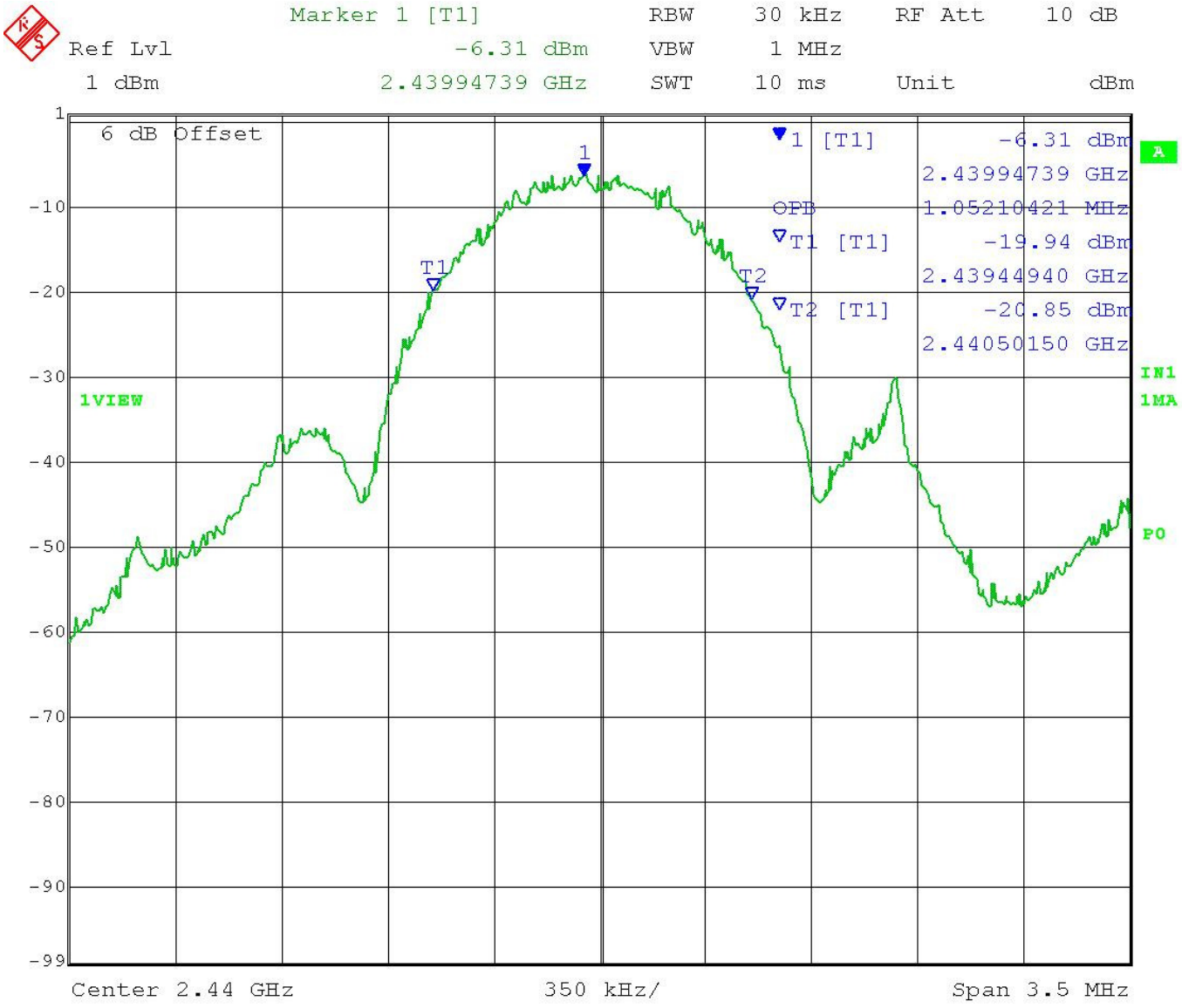


Date: 2.MAY.2016 13:13:37

RESULTS: Meets Requirements

OCCUPIED BANDWIDTH

Test Data: **99% Bandwidth Middle of Band**

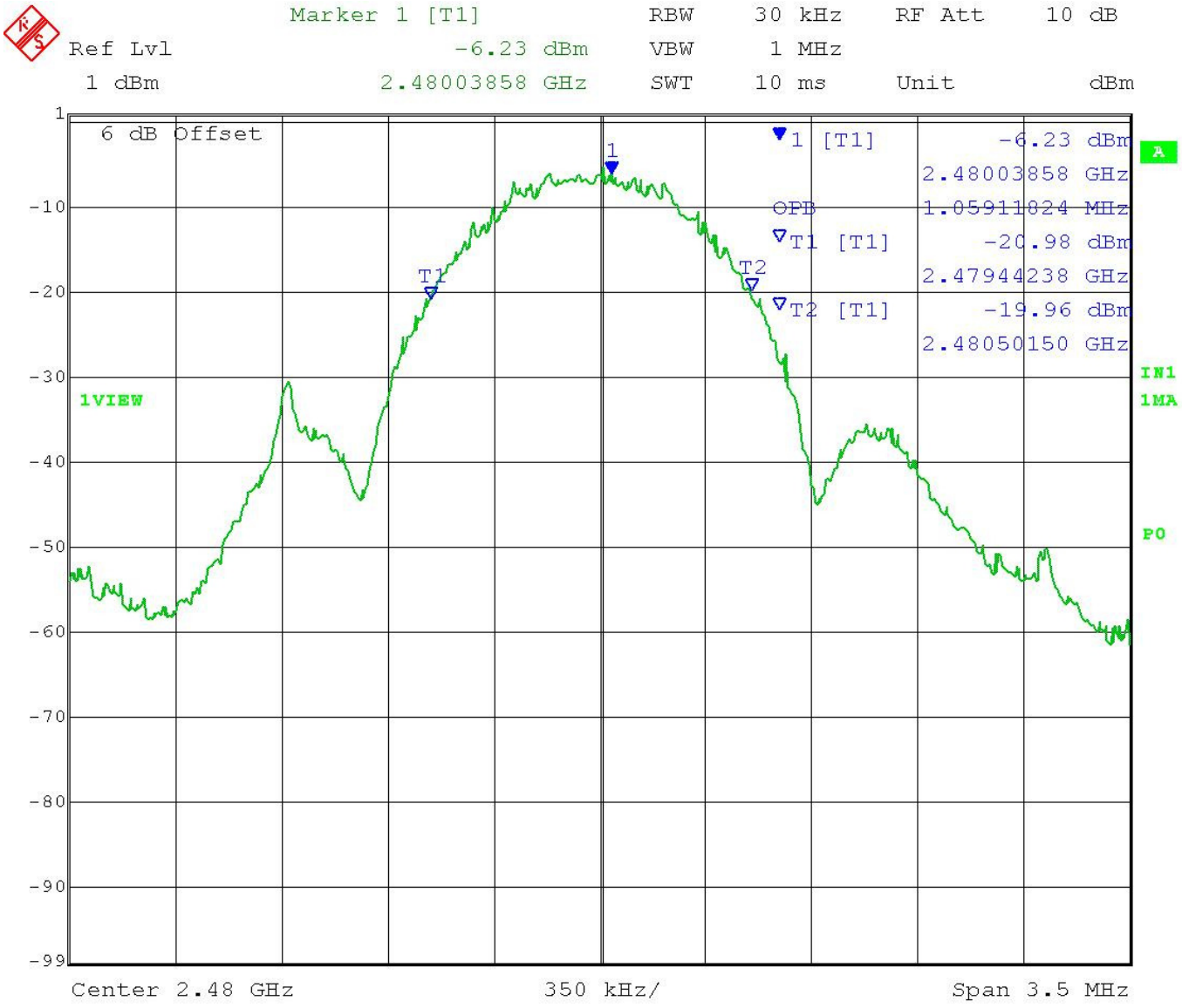


Date: 2.MAY.2016 13:14:40

RESULTS: Meets Requirements

OCCUPIED BANDWIDTH

Test Data: **99% Bandwidth High end of Band**



Date: 2.MAY.2016 13:15:29

RESULTS: Meets Requirements

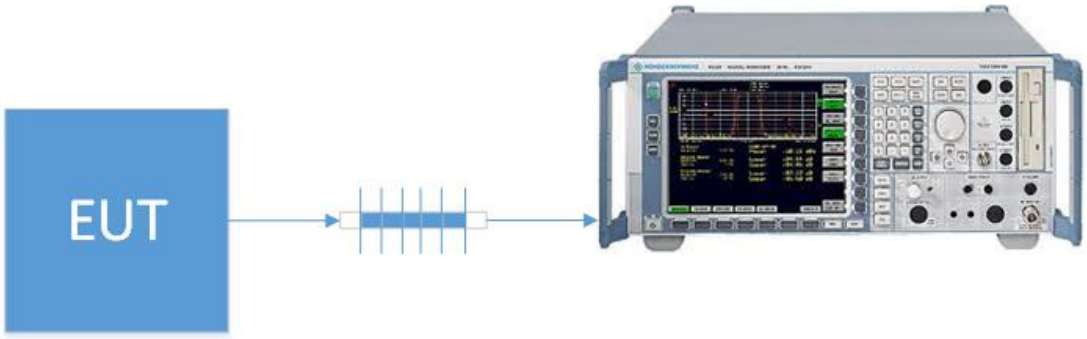
BANDEDGE

Rule Part No.: FCC 15.247(d), IC RSS 247 § 5.5

Requirements: Emissions must be at least 20dB down from the highest emission level Within the authorized band as measured with a 100 kHz RBW, in addition emissions found within the bands listed in FCC part 15.205 shall comply with limits of 15.209.

Test Method: ANSI C63.10 § 6.10.4 Authorized band-edge relative method (non-restricted)
ANSI C63.10 § 6.10.6 Marker Delta Method (restricted band edge)

Setup:



Test Data: **Upper Bandedge Measurement Table**

Peak/ Average	Field Strength of Carrier (dBuV/m)	Emission Level Below Carrier (dB)	Field Strength of Emission (dBuV/m)	Emission Limit (dBuV/m)	Margin (dB)
Peak	90.15	-55.22	34.93	74	39.07
Average	88.12	-55.22	32.90	54	21.1

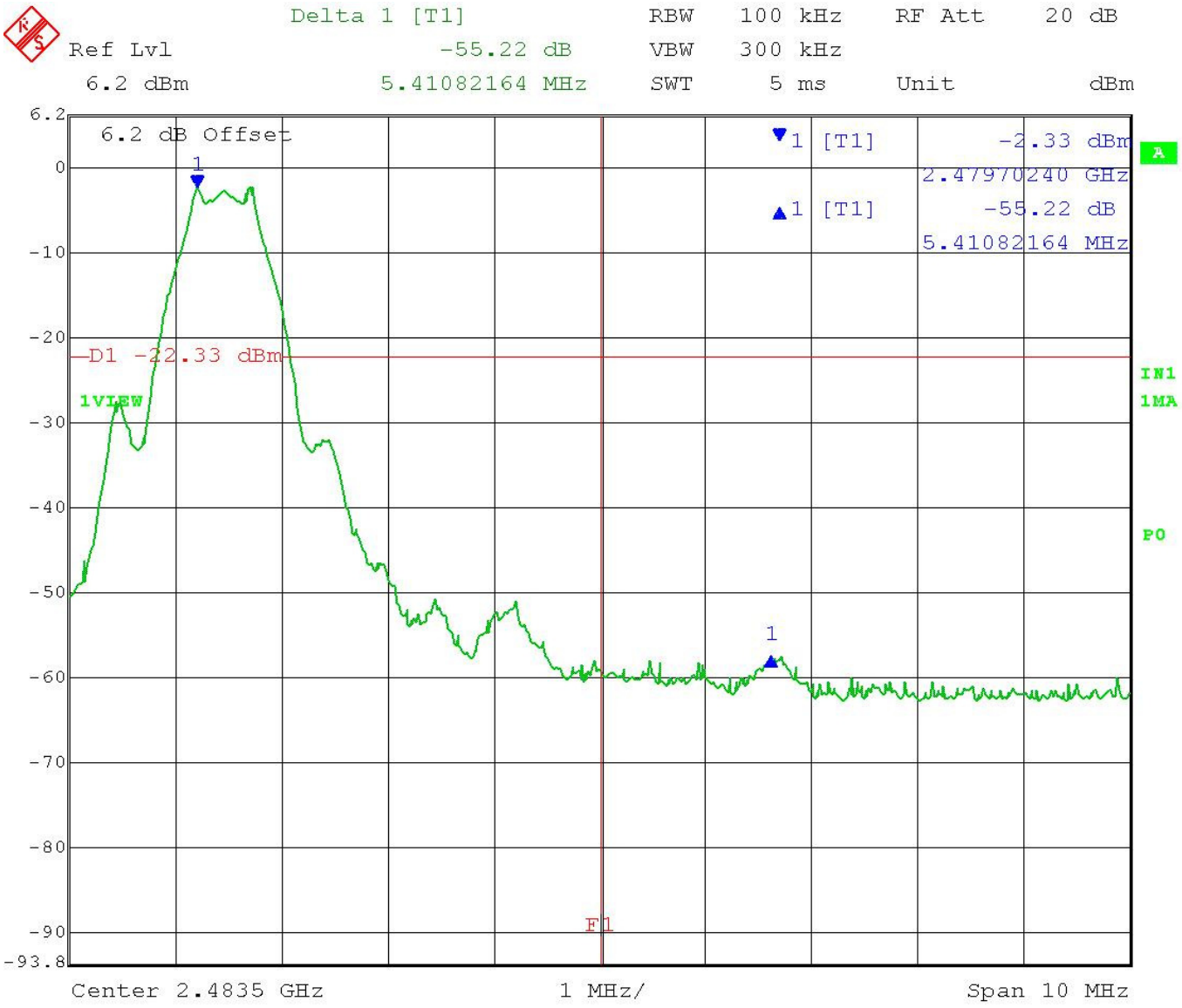
Test Data: **Lower Bandedge Measurement Table**

Measured Level (dBc)	Limit (dBc)	Margin (dB)
-43.6	-20	23.6

RESULTS: Meets Requirements

BANDEDGE

Test Data: **Upper Band Edge Plot Marker Delta Method**

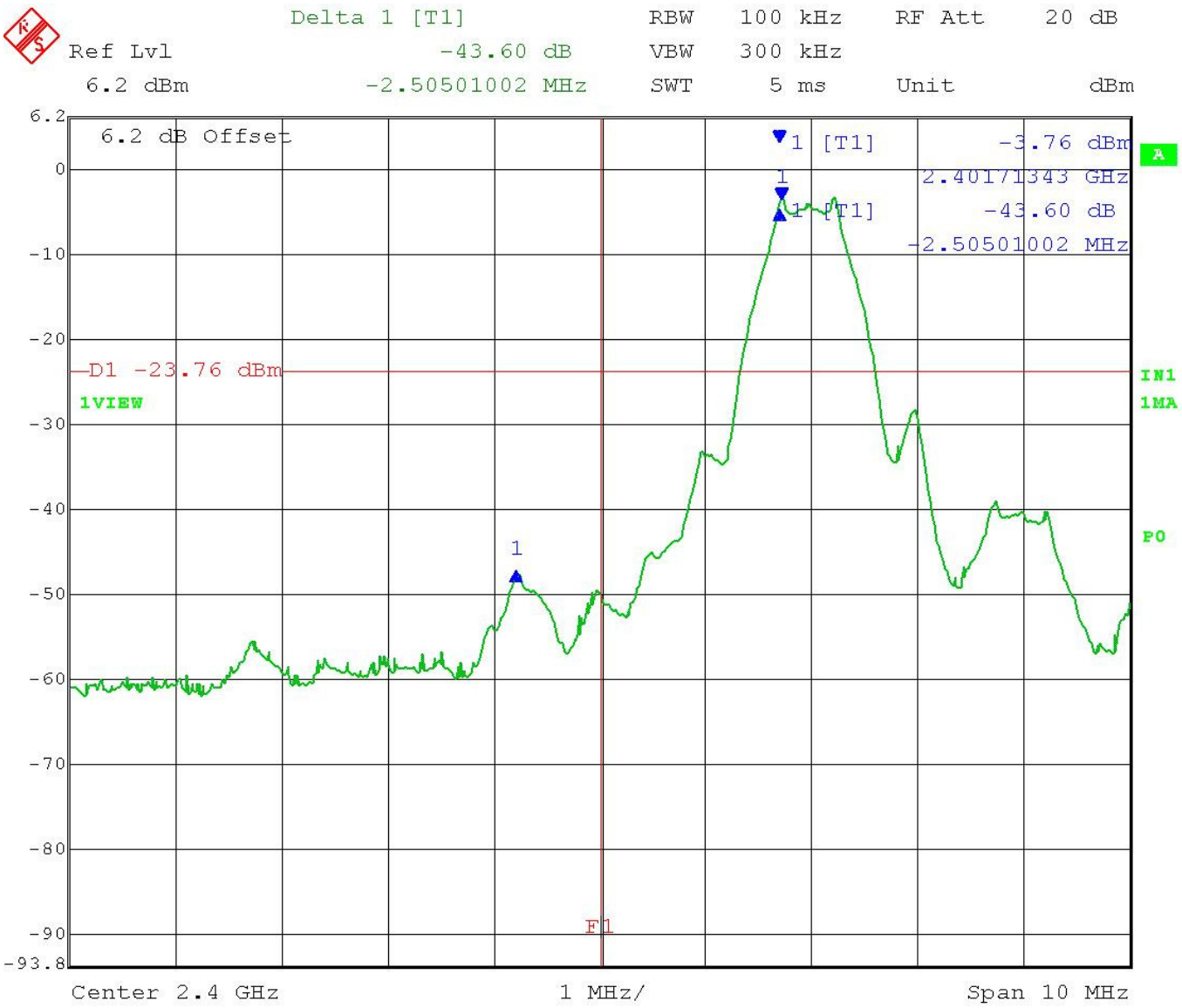


Date: 2.MAY.2016 13:39:59

RESULTS: Meets Requirements

BANDEDGE

Test Data: **Lower Band Edge Plot**



Date: 2.MAY.2016 13:38:22

RESULTS: Meets Requirements

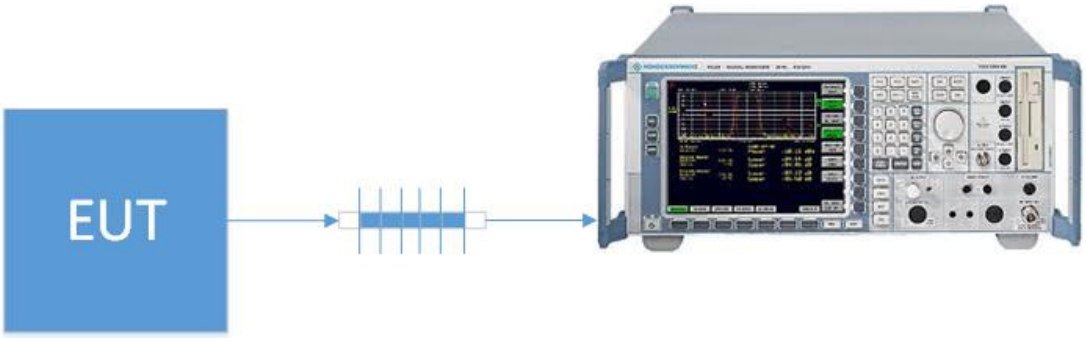
ANTENNA CONDUCTED SPURIOUS EMISSIONS

Rules Part No.: FCC part 15.247 (d) & 15.209, IC RSS 247 § 5.5 & RSS GEN § 8.9

Requirements: In any 100 kHz 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

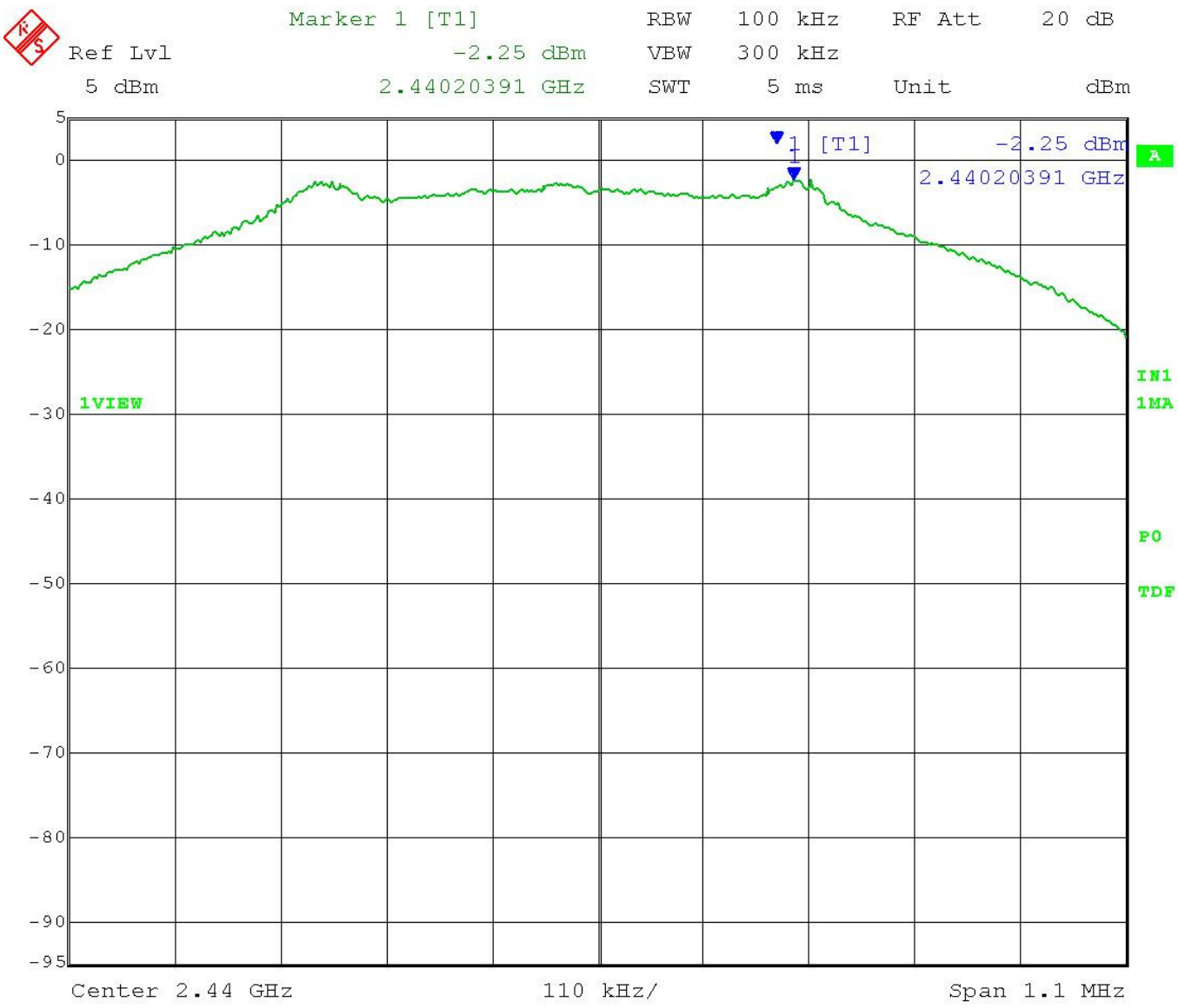
Test Method: ANSI C63.10 § 11.11.1 General Information
ANSI C63.10 § 11.11.2 Reference level measurement
ANSI C63.10 § 11.11.3 Emission level measurement

Setup:



ANTENNA CONDUCTED SPURIOUS EMISSIONS

Test Data: **100 KHz Reference Level Plot**

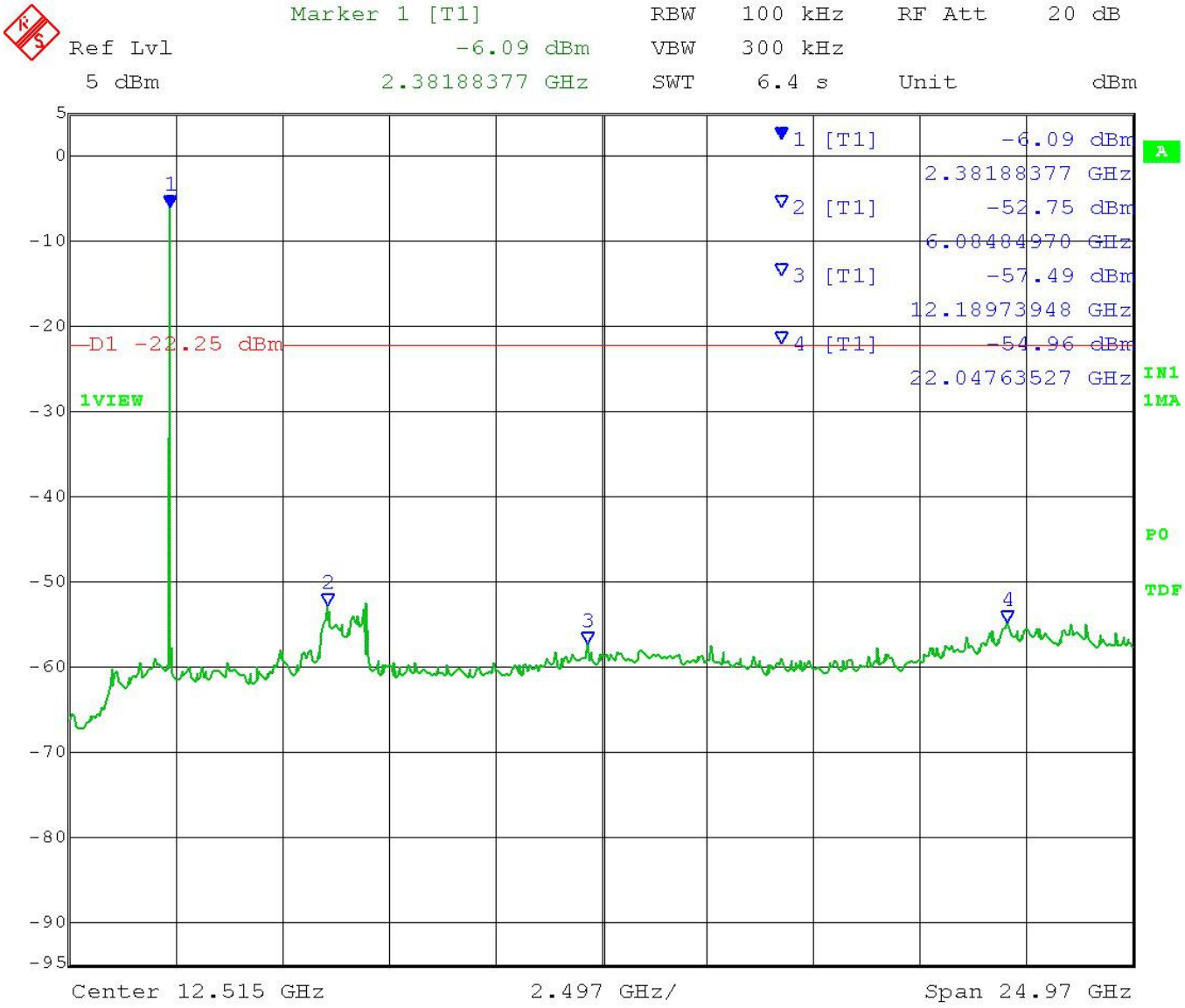


Date: 2.MAY.2016 13:54:30

RESULTS: Meets Requirements

ANTENNA CONDUCTED SPURIOUS EMISSIONS

Test Data: **Low End of Band 30 MHz – 25 GHz Plot**

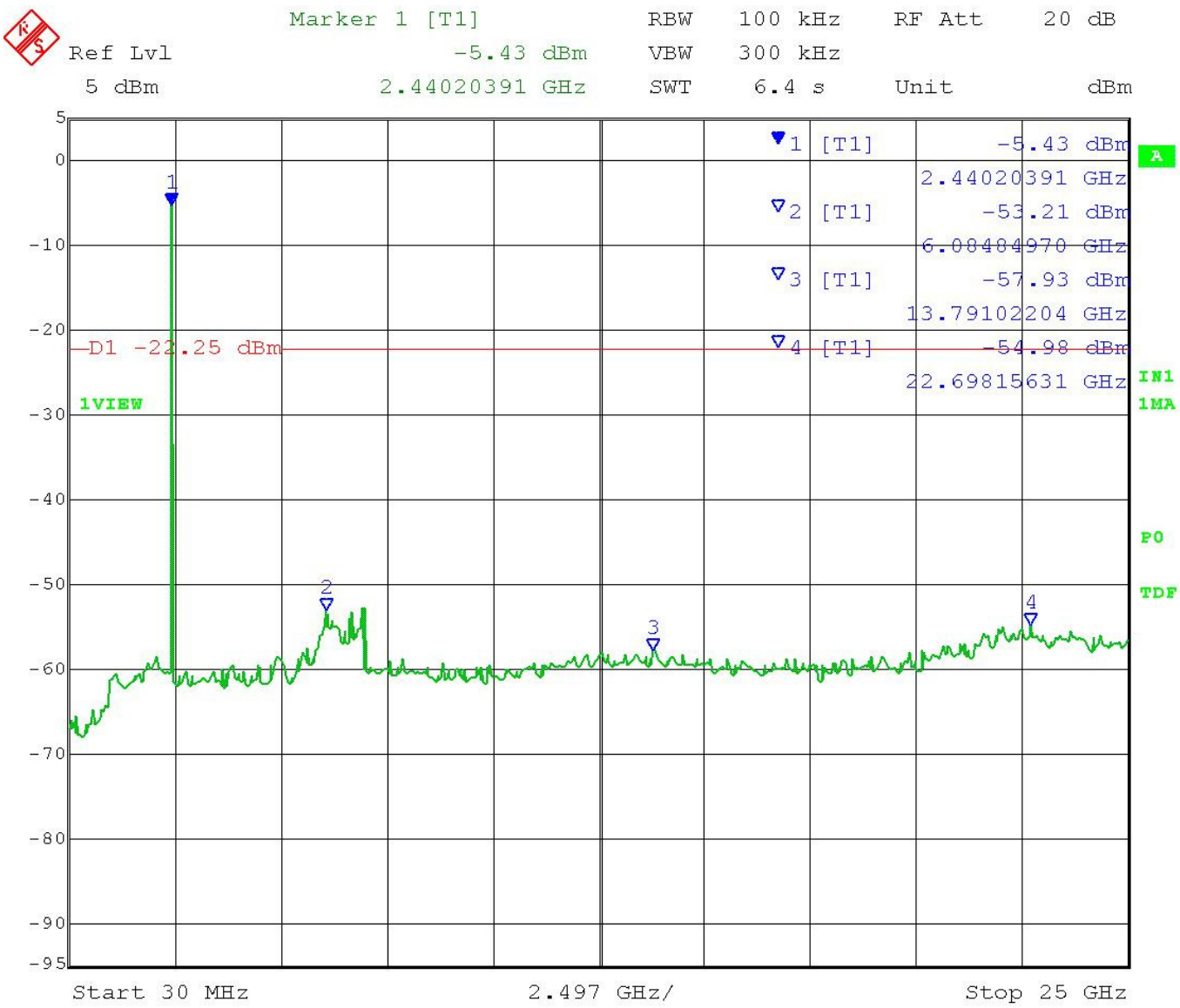


Date: 2.MAY.2016 13:57:27

RESULTS: Meets Requirements

ANTENNA CONDUCTED SPURIOUS EMISSIONS

Test Data: **Middle of Band 30 MHz – 25 GHz Plot**

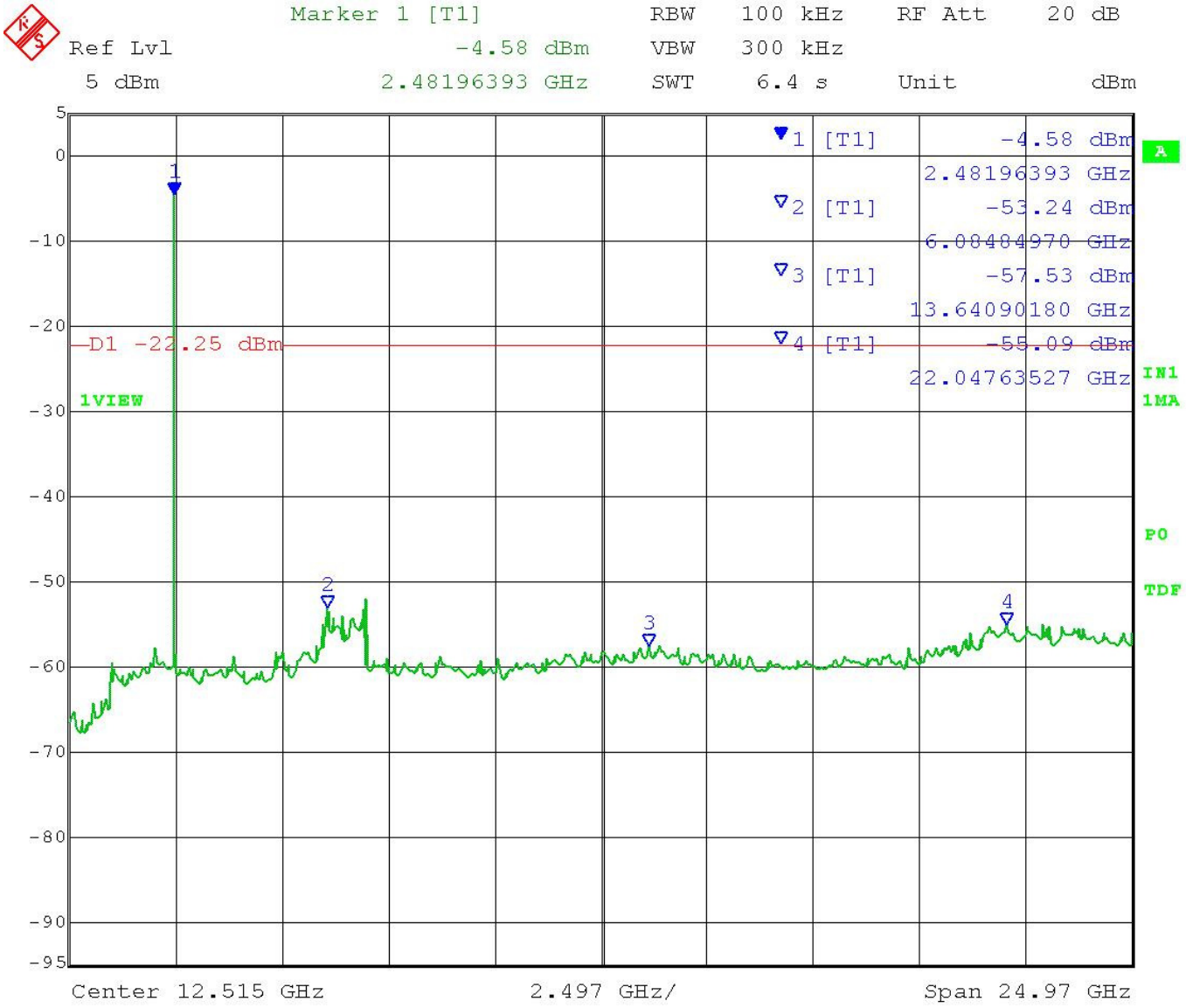


Date: 2.MAY.2016 13:56:00

RESULTS: Meets Requirements

ANTENNA CONDUCTED SPURIOUS EMISSIONS

Test Data: **High End of Band 30 MHz – 25 GHz Plot**



Date: 2.MAY.2016 13:58:53

RESULTS: Meets Requirements

RADIATED SPURIOUS EMISSIONS

Rules Part No.: FCC part 15.247 (d) & 15.209, IC RSS 247 § 5.5 & RSS GEN § 8.9

Requirements: Emissions found in restricted bands the levels must comply with the general limits found in FCC part 15.209

Frequency	Limits
FCC Part 15.209, IC RSS-GEN 8.9	
9 to 490 kHz	2400/F (kHz) µV/m @ 300 meters
490 to 1705 kHz	24000/F (kHz) µV/m @ 30 meters
1705 kHz to 30 MHz	29.54 dBµV/m @ 30 meters
30 – 88	40.0 dBµV/m @ 3 meters
80 – 216	43.5 dBµV/m @ 3 meters
216 – 960	46.0 dBµV/m @ 3 meters
Above 960	54.0 dBµV/m @ 3 meters

Test Method: ANSI C63.4 § Annex D Validation of radiated emissions standard test sites
ANSI C63.10 § 6.3 Common requirements radiated emissions
ANSI C63.10 § 6.4 Emissions below 30 MHz
ANSI C63.10 § 6.5 Emissions between 30 & 1000 MHz
ANSI C63.10 § 6.6 Emissions above 1 GHz

Field Strength Calculation:

The field strength at 3m was established by adding the meter reading of the spectrum analyzer (which is set to read in units of dBµV) to the antenna correction factor supplied by the antenna manufacturer plus the coax loss. The antenna correction factors are stated in terms of dB. The gain of the preselector was accounted for in the spectrum analyzer meter reading.

Example:

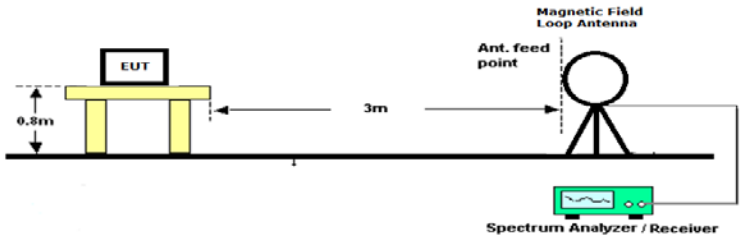
Freq (MHz)	Meter Reading	+ ACF	+ CL = FS
33	20 dBµV	+ 10.36 dB	+ 0.5 = 30.86 dBµV/m @ 3m

Notes: Only emissions within 20dB of the limit are reported from 9 KHz to 25 GHz

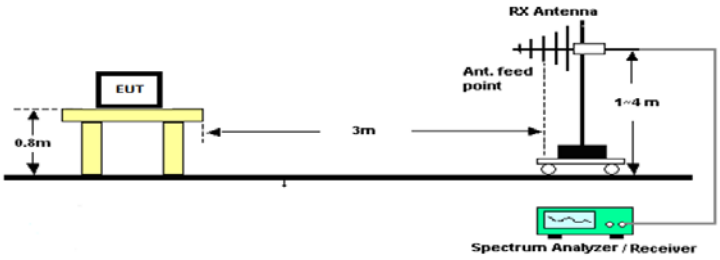
RADIATED SPURIOUS EMISSIONS

Setup:

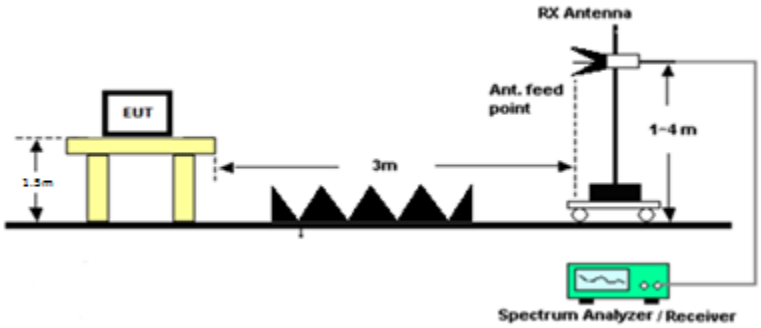
Emissions below 30 MHz



Emissions 30 – 1000 MHz



Emissions above 1 GHz



RADIATED SPURIOUS EMISSIONS

Notes: The EUT was checked in three orthogonal planes as required, a setup photo is provided to show the orientation of the worst case position.

The spectrum was measured from 9 KHz to 25 GHz, Only emissions within 20dB of the limit are reported.

* Indicates noise floor only

Test Data: Restricted Band Emissions Field Strength table

Tuned Freq (MHz)	Emission Freq (MHz)	Detector Type (QP/PK/AV)	Meter Reading (dBuV)	Antenna Polarity (H/V)	Coax Loss (dB)	Correction Factor (dB)	Field Strength (dBuV/m)	Margin (dB)
2402	4804	PK *	-0.81	H	8.07	34.00	41.26	32.74
2402	4804	AV *	-10.97	H	8.07	34.00	31.10	22.90
2402	7206	PK *	-0.93	H	9.92	35.41	44.40	29.60
2402	7206	AV *	-11.87	H	9.92	35.41	33.46	20.54
2402	9608	PK *	-0.46	H	11.42	36.82	47.78	26.22
2402	9608	AV *	-10.91	H	11.42	36.82	37.33	16.67
2440	4880	PK *	-0.71	V	8.13	33.92	41.34	32.66
2440	4880	AV *	-11.56	V	8.13	33.92	30.49	23.51
2440	7320	PK *	-0.12	V	10.00	35.60	45.48	28.52
2440	7320	AV *	-11.41	V	10.00	35.60	34.19	19.81
2440	9760	PK *	-0.53	V	11.52	37.06	48.05	25.95
2440	9760	AV *	-11.56	V	11.52	37.06	37.02	16.98
2480	5208	PK *	-0.31	H	8.42	34.11	42.22	31.78
2480	5208	AV *	-12.16	H	8.42	34.11	30.37	23.63
2480	7440	PK *	-0.63	H	10.25	35.60	45.22	28.78
2480	7440	AV *	-10.98	H	10.25	35.60	34.87	19.13
2480	9920	PK *	-0.73	H	11.78	37.24	48.29	25.71
2480	9920	AV *	-12.61	H	11.78	37.24	36.41	17.59

Results Meet Requirements

EMC EQUIPMENT LIST

Device	Manufacturer	Model	Serial Number	Cal/Char Date	Due Date
Antenna: Biconnical 1096	Eaton	94455-1	1096	07/14/15	07/14/17
Antenna: Log-Periodic 1122	Electro-Metrics	LPA-25	1122	07/14/15	07/14/17
CHAMBER	Panashield	3M	N/A	03/31/16	12/31/2017
Antenna: Double-Ridged Horn/ETS Horn 2	ETS-Lindgren Chamber	3117	00041534	02/25/15	02/25/17
EMI Test Receiver R & S ESIB 40 Screen Room	Rohde & Schwarz	ESIB 40	100274	08/12/14	08/12/16
Software: Field Strength Program	Timco	N/A	Version 4.0	N/A	N/A
Antenna: Active Loop	ETS-Lindgren	6502	00062529	11/18/15	11/18/17
Coaxial Cable #103 - K MS MS 180cm Aqua	Micro-Coax	UFB142A-0-0720-200200	225363-002 (#103)	08/05/15	08/05/17
Attenuator #27 - K 6dB 2W DC-40	Narda	4768-6	1044-3 (#27)	06/25/15	06/25/17
EMI Test Receiver R & S ESU 40 Chamber	Rohde & Schwarz	ESU 40	100320	04/01/16	04/01/18
Coaxial Cable - Chamber 3 cable set (Primary)	Micro-Coax		Chamber 3 cable set (Primary)	12/05/15	12/05/17
Pre-amp	RF-LAMBDA	RLNA00M45GA	NA	01/04/16	01/04/18

*** EMI RECEIVER SOFTWARE VERSION**

The receiver firmware used was version 4.43 Service Pack 3

END OF TEST REPORT