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**FCC PART 80, 90 AND IC RSS-238
 TEST REPORT
 For
 NAVICO RBUITALIA S.R.L.**

APPLICANT	NAVICO RBU ITALIA S.R.L.
	VIA ROMITA, 26 MONTAGNANA VAL di PESA – MONTESPERTOLI, FIRENZE ITALY 50025
FCC ID	2AJJ3SRTLAN12U6X
IC	21849-R3016
MODEL NUMBER	12 KW SRT X-BAND LAN TRANSCEIVER
PRODUCT DESCRIPTION	12 KW X-BAND RADAR SYSTEM
DATE SAMPLE RECEIVED	8/18/2016
FINAL TEST DATE	11/15/2016
TESTED BY	Christian Pawlak
APPROVED BY	Cory Leverett
TEST RESULTS	<input checked="" type="checkbox"/> PASS <input type="checkbox"/> FAIL

Report Number	Version Number	Description	Issue Date
1664AUT16TestReport_	Rev1	Initial Issue	11/15/2016
	Rev2	Added Noise floor for Radiated Emissions	12/21/2016

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

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GENERAL REMARKS

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Summary

The device under test does:

- Fulfill the general approval requirements as identified in this test report and was selected by the customer.
- 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 requirements.

I attest that the necessary measurements were made at:

Timco Engineering Inc.
849 NW State Road 45
Newberry, FL 32669



Tested by:

Christian Pawlak
Project Manager

Date: 11/15/2016



Reviewed and approved by:

Name and Title: Cory Leverett, Project Manager

Date: 12/21/2016

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EUT SPECIFICATION

EUT Description	12 kw X-BAND RADAR SYSTEM
FCC ID	2AJJ3SRTLAN12U6X
IC Certification	21849-SRTLAN12U6X
Model Number	12 KW SRT X-BAND LAN TRANSCEIVER
Serial Number	N/A
Operating Frequency	9.2 to 9.5 GHz (USA) 9225-9500MHz (Canada)
Type of Emission	Pulse
Modulation	PON
EUT Power Source	<input type="checkbox"/> 110–120Vac/50– 60Hz
	<input checked="" type="checkbox"/> DC Power (24V)
	<input type="checkbox"/> Battery Operated Exclusively
Test Item	<input type="checkbox"/> Prototype
	<input type="checkbox"/> Pre-Production
	<input checked="" type="checkbox"/> Production
Type of Equipment	<input type="checkbox"/> Fixed
	<input checked="" type="checkbox"/> Mobile
	<input type="checkbox"/> Portable
Antenna Gain	29 dBi

TEST SETUP INFORMATION

Test facility	Timco Engineering, Inc. 849 NW State Road 45, Newberry, FL 32669
Test Condition	Temperature: 26°C Relative humidity: 50%. Barometer: 1012.5mb
Modifications	None
Test Exercise	The EUT was placed in continuous transmit mode of operation
Applicable Standards	ANSI/TIA 603-D: 2010, FCC CFR 47, Part 80, Part 90, IC RSS-238, IC RSS-GEN

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TEST RESULTS SUMMARY

Test	Regulatory Body	Rule	Result
RF Power Output	FCC	Part 80.215(a)(3)	Pass
		Part 90.205(r)	Pass
	IC	RSS-238 Section 4.2	Pass
Modulation Characteristics	FCC	Part 90.207	Pass
	IC	RSS 238 3.2(a)	Pass
Occupied Bandwidth	FCC	Part 80.205(a)	Pass
		Part 90.209, Part 90.210(b)	Pass
	IC	RSS 238 3.2(c)	Pass
Spurious Emissions at Antenna Terminals	FCC	Part 80.211(f)	Pass
		Part 90.210, Part 90.215	Pass
	IC	RSS 238 4.3	Pass
Field Strength of Spurious Emissions	FCC	Part 80.211(f)	Pass
		Part 90.210, Part 90.215	Pass
	IC	RSS 238 4.3	Pass
Frequency Stability	FCC	Part 80.209(b)	Pass
		Part 90.213	Pass
	IC	RSS-238 4.1	Pass

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RF POWER OUTPUT

Rule Part No.: Part 2.1046(a), Part 80.215(a)(3), Part 90.205(r), RSS-238 Section 4.2

Requirements:

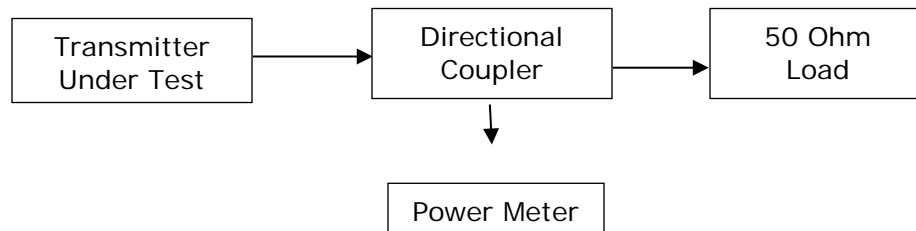
Part 90.205(r) – Power will be authorized on a case-by-case basis.

RSS-238 Section 4.2 – The output power shall not exceed 60 kW and the antenna gain shall not exceed 35 dBi.

Method of Measurement: RF power is measured by connecting a 50-ohm, Peak Power meter to the RF output connector.

Test Setup Diagram:

b) Method of Measurement



Test Data: Measurement Table

Pulse Type	Peak Power (dBm)	Peak Power (Watts)	Duty Cycle (%)	Average Power (Watts)
P0	69.11	8147.04	0.021%	1.71
P1	69.25	8413.95	0.042%	3.52
P2	69.31	8531.00	0.060%	5.13

Results Meet Requirements

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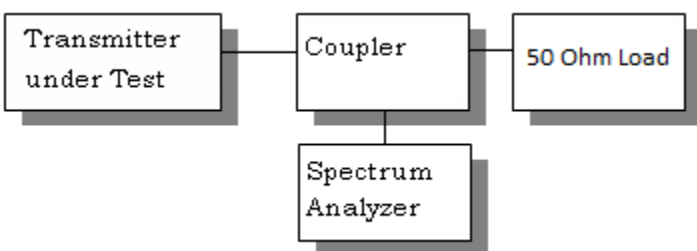
MODULATION CHARACTERISTICS

Rule Part No.: Part 90.207, RSS-238 Section 3.2(a)

Requirements: None

Method of Measurement: Modulation Characteristics are reported using a 50-ohm peak power sensor or spectrum analyzer in zero span mode. A directional coupler is used to sample output power.

Test Setup Diagram:



The device under test is capable of multiple pulse styles and durations.

Detailed specifications are contained in “product specifications” manual.

Plots of these pulse groups are shown below.

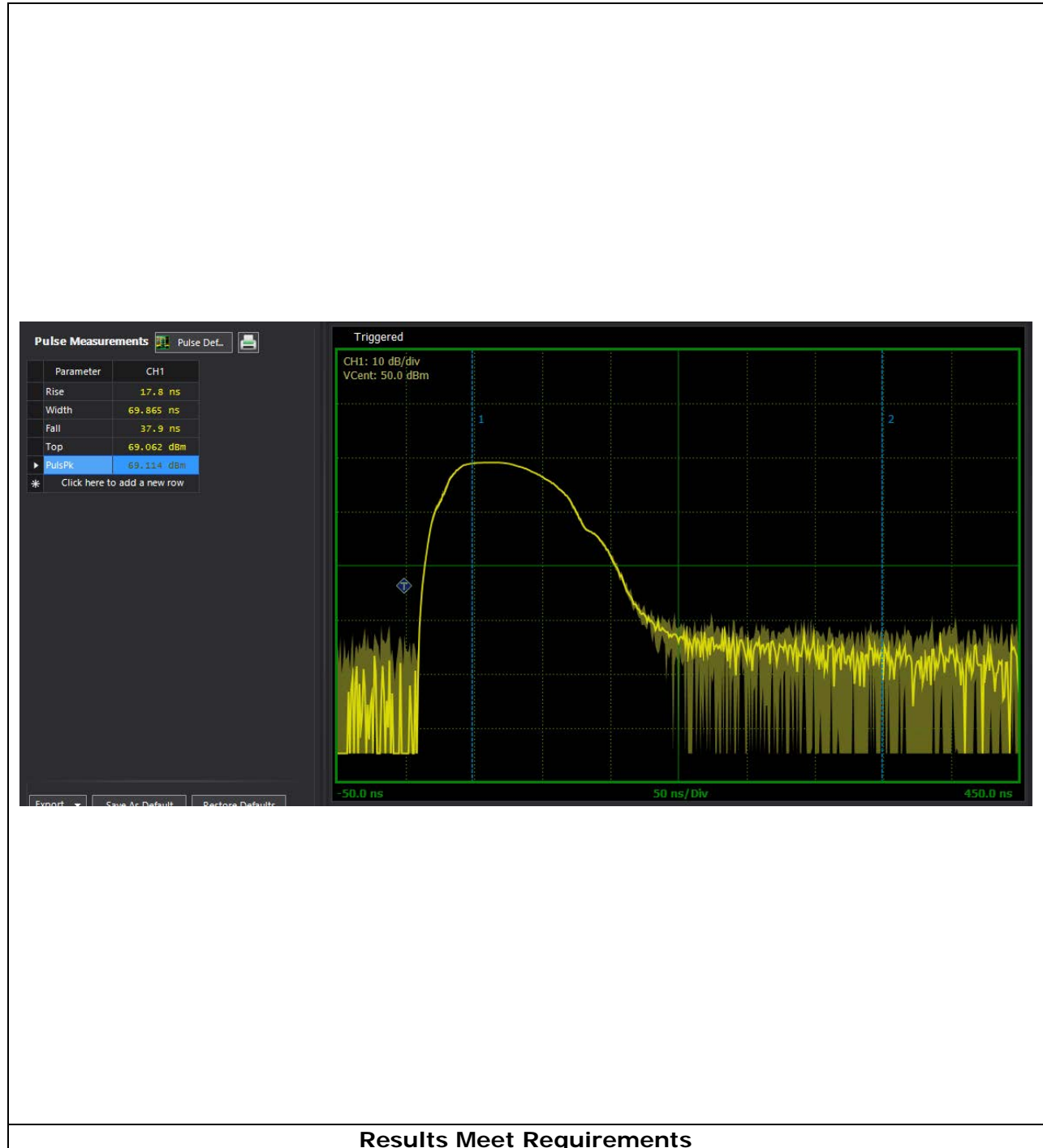
Pulse Type	Pulse Width (us)	Rise Time (us)	Period (us)	Duty Cycle (%)
P0	0.070	0.018	334	0.021%
P1	0.279	0.016	667	0.042%
P2	0.801	0.016	1333	0.060%

Results Meet Requirements

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MODULATION CHARACTERISTICS PLOTS

Test Data: PULSE PROFILE – P0

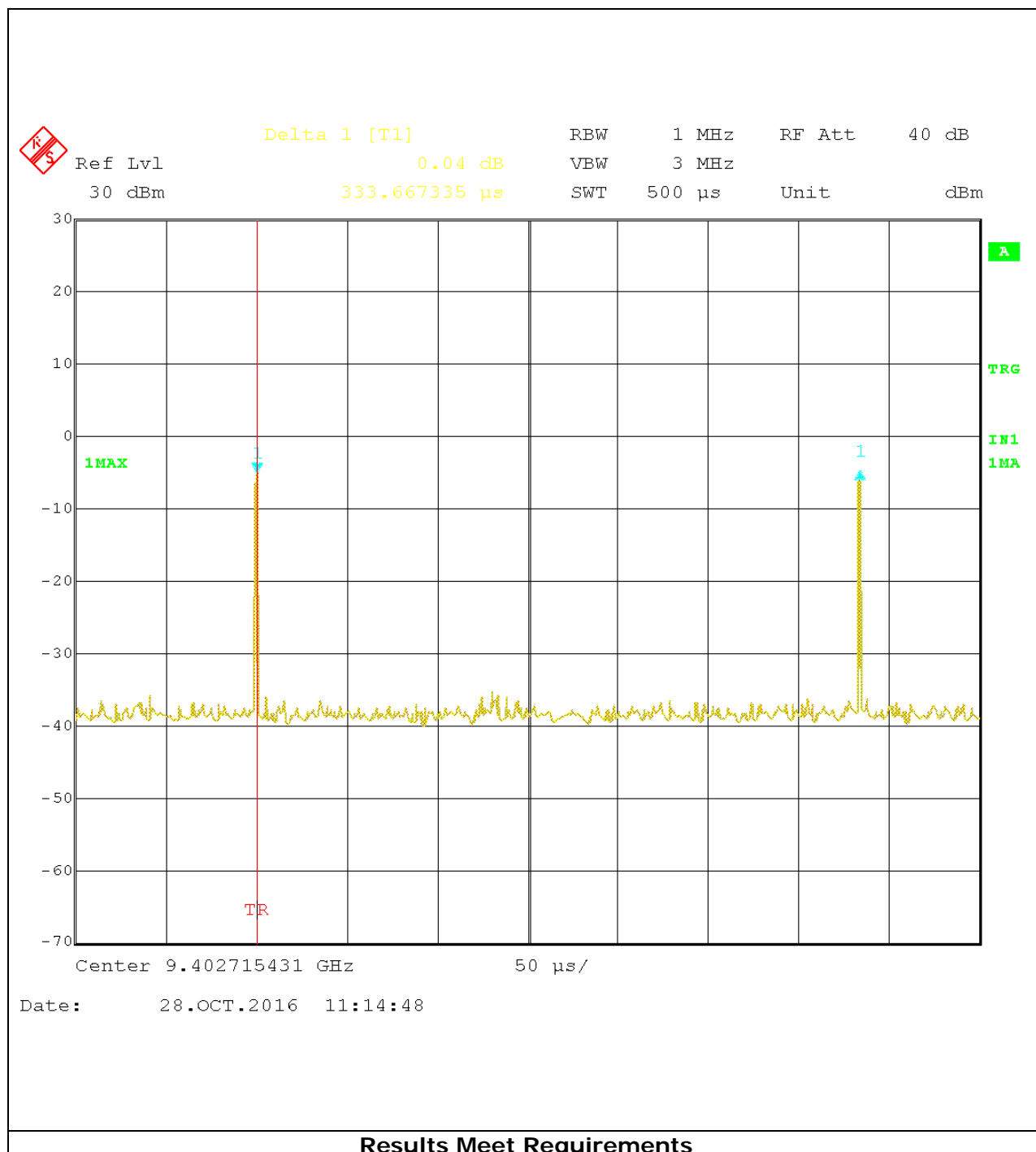


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MODULATION CHARACTERISTICS PLOTS

Test Data: PULSE INTERVAL – P0

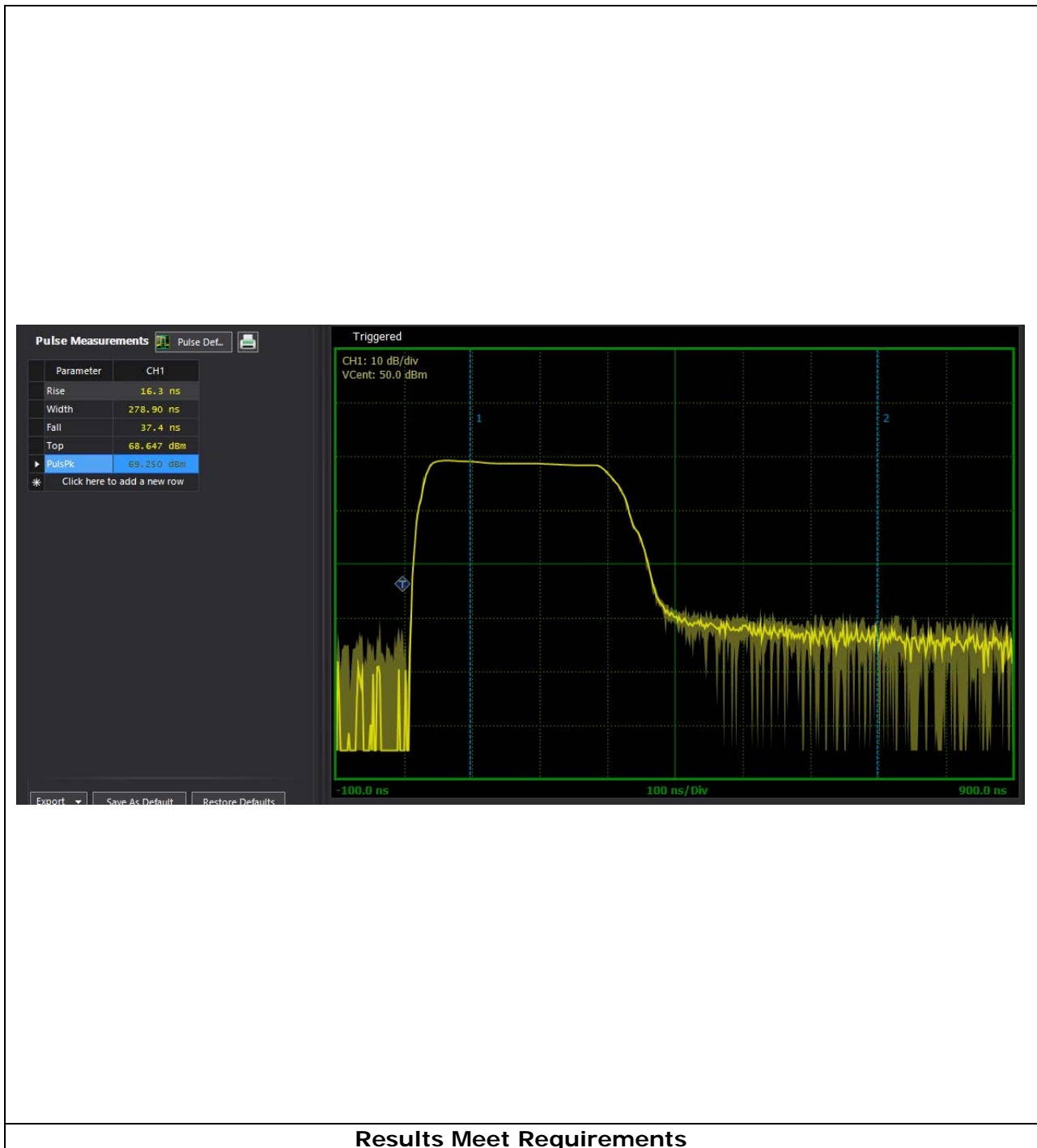


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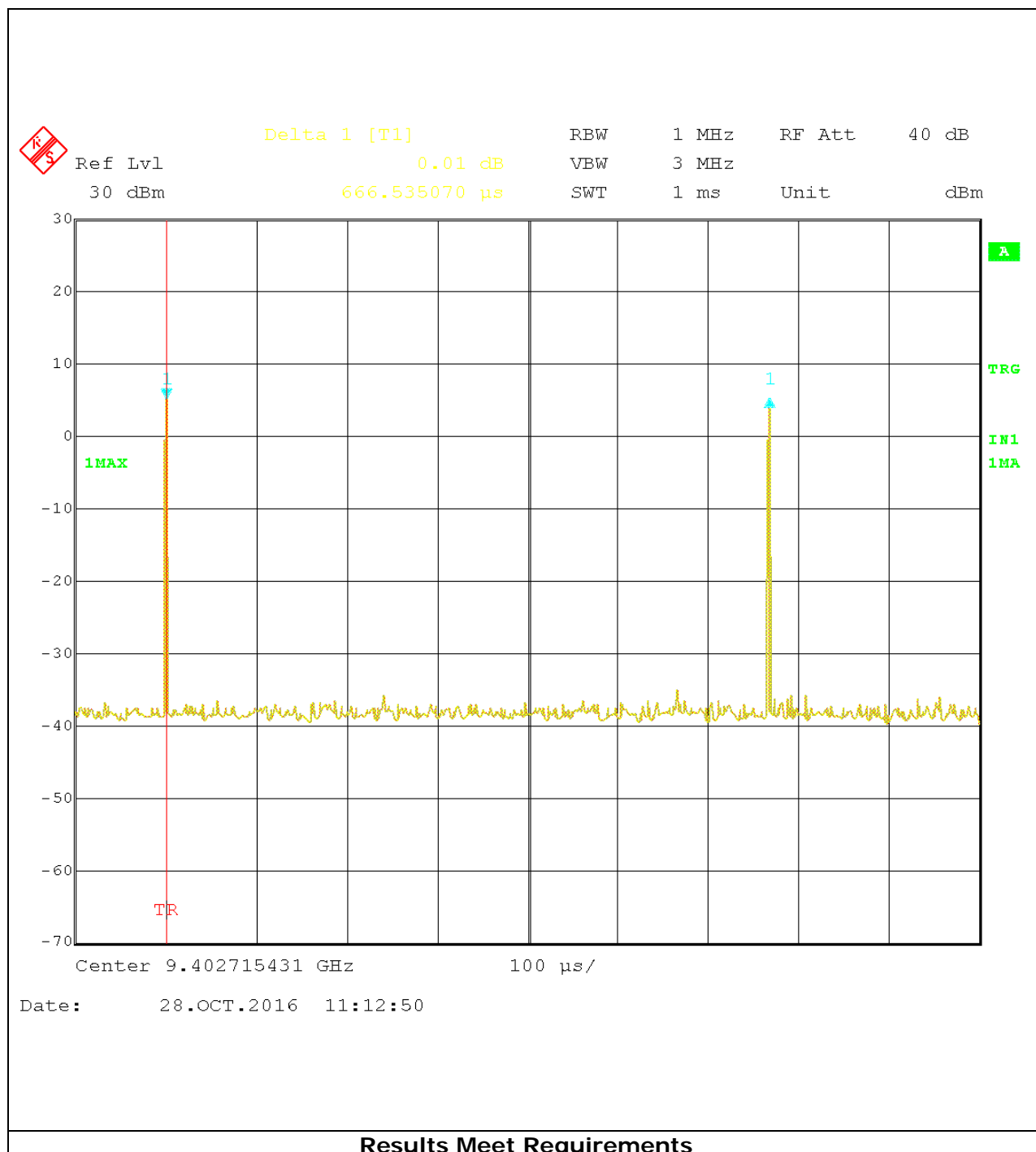
MODULATION CHARACTERISTICS PLOTS

Test Data: PULSE PROFILE – P1



MODULATION CHARACTERISTICS PLOTS

Test Data: PULSE INTERVAL – P1

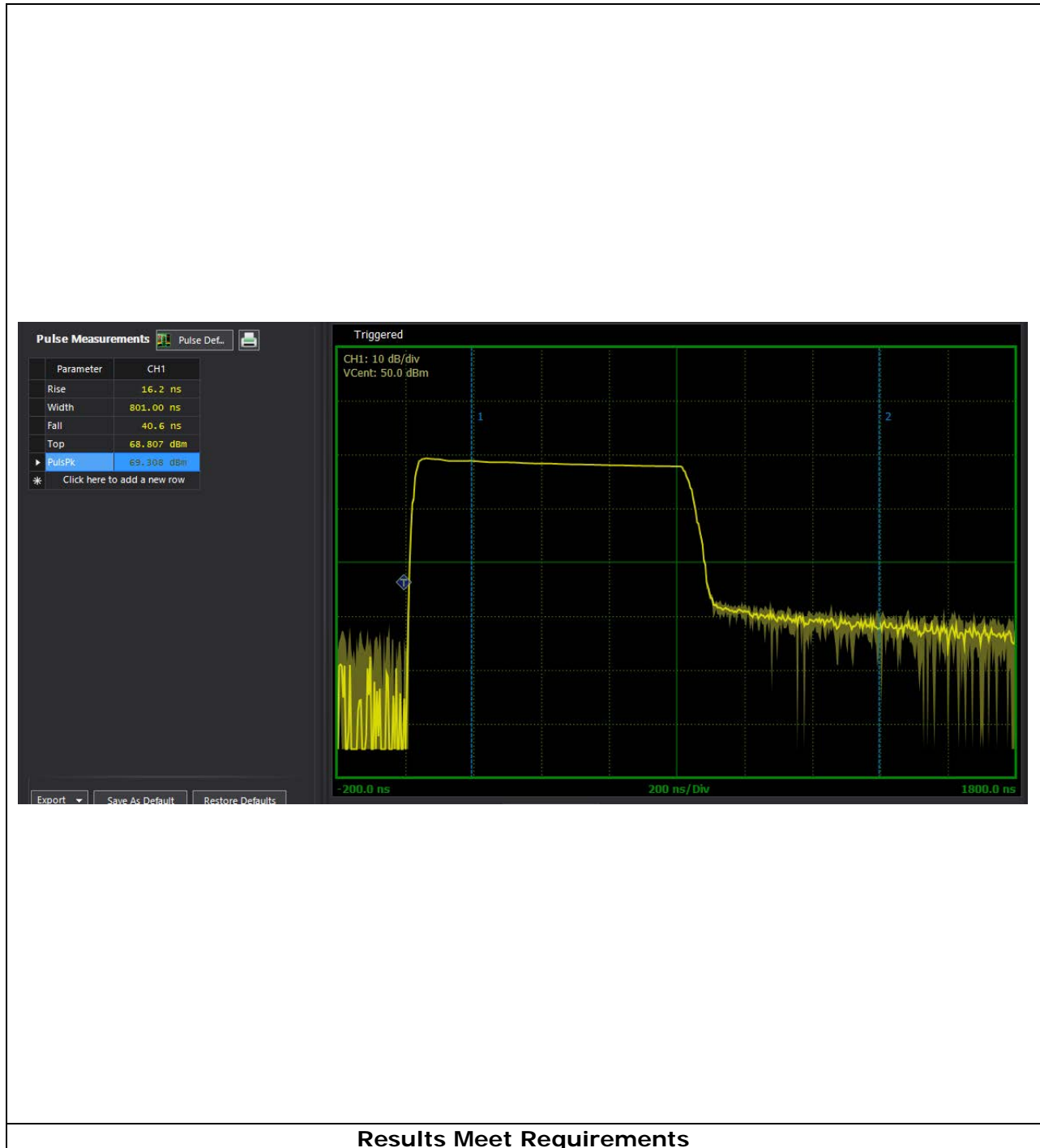


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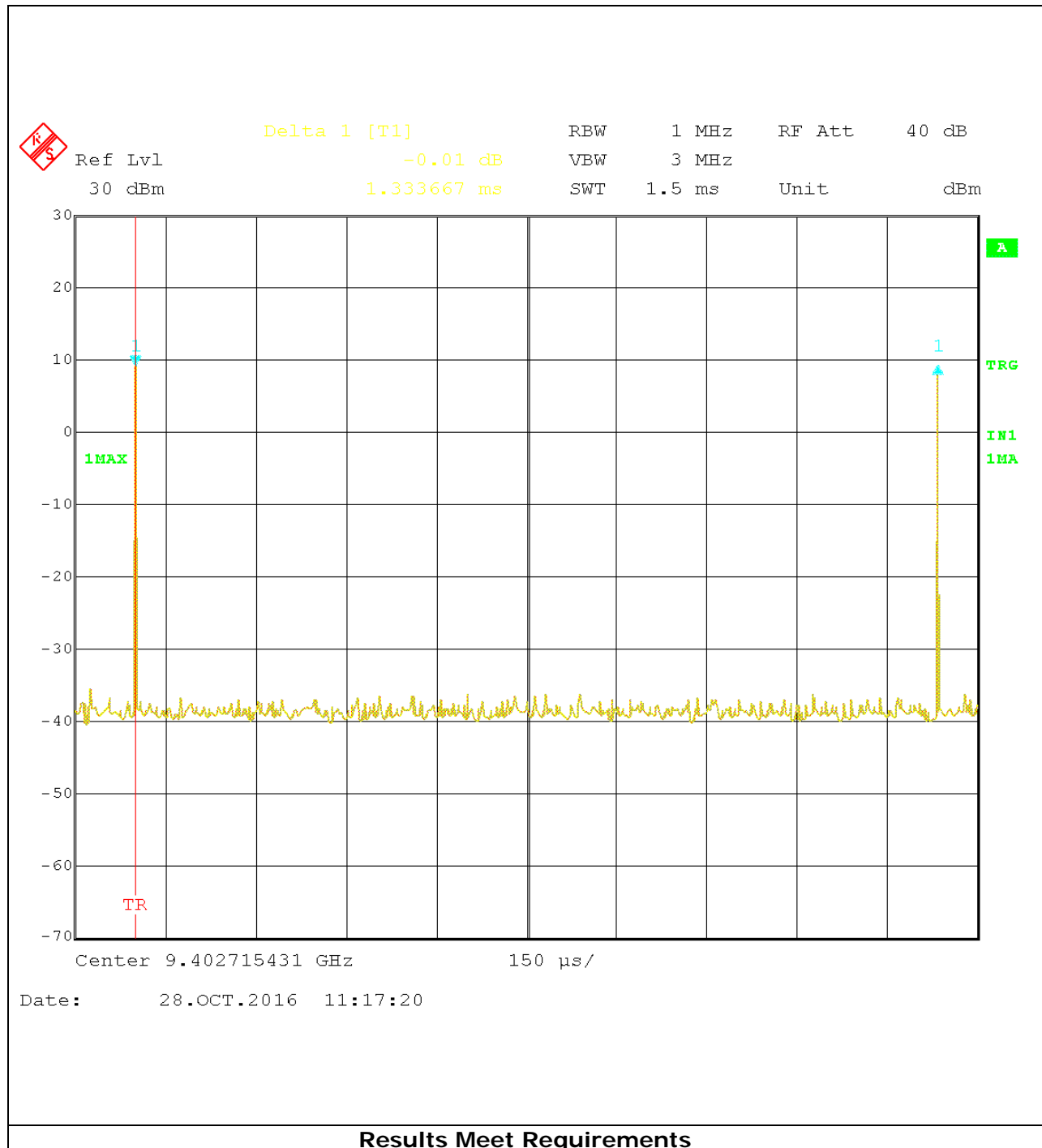
MODULATION CHARACTERISTICS PLOTS

Test Data: PULSE PROFILE – P2



MODULATION CHARACTERISTICS PLOTS

Test Data: PULSE INTERVAL – P2



OCCUPIED BANDWIDTH

Rule Part No.: Part 90.209, Part 90.210(b), Part 80.205(a), RSS 238 3.2(c)

Requirements:

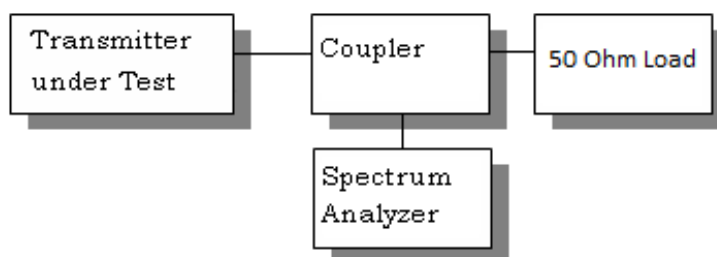
Part 80.205(a): Emissions must remain within the band

Part 90.209: Subject to case-by-case review

RSS 238 3.2(c): 40dB bandwidth measurements must be reported

Method of Measurement: Measurements were made in accordance with standard listed above.

Block Diagram:



Test Data: Measurement Table

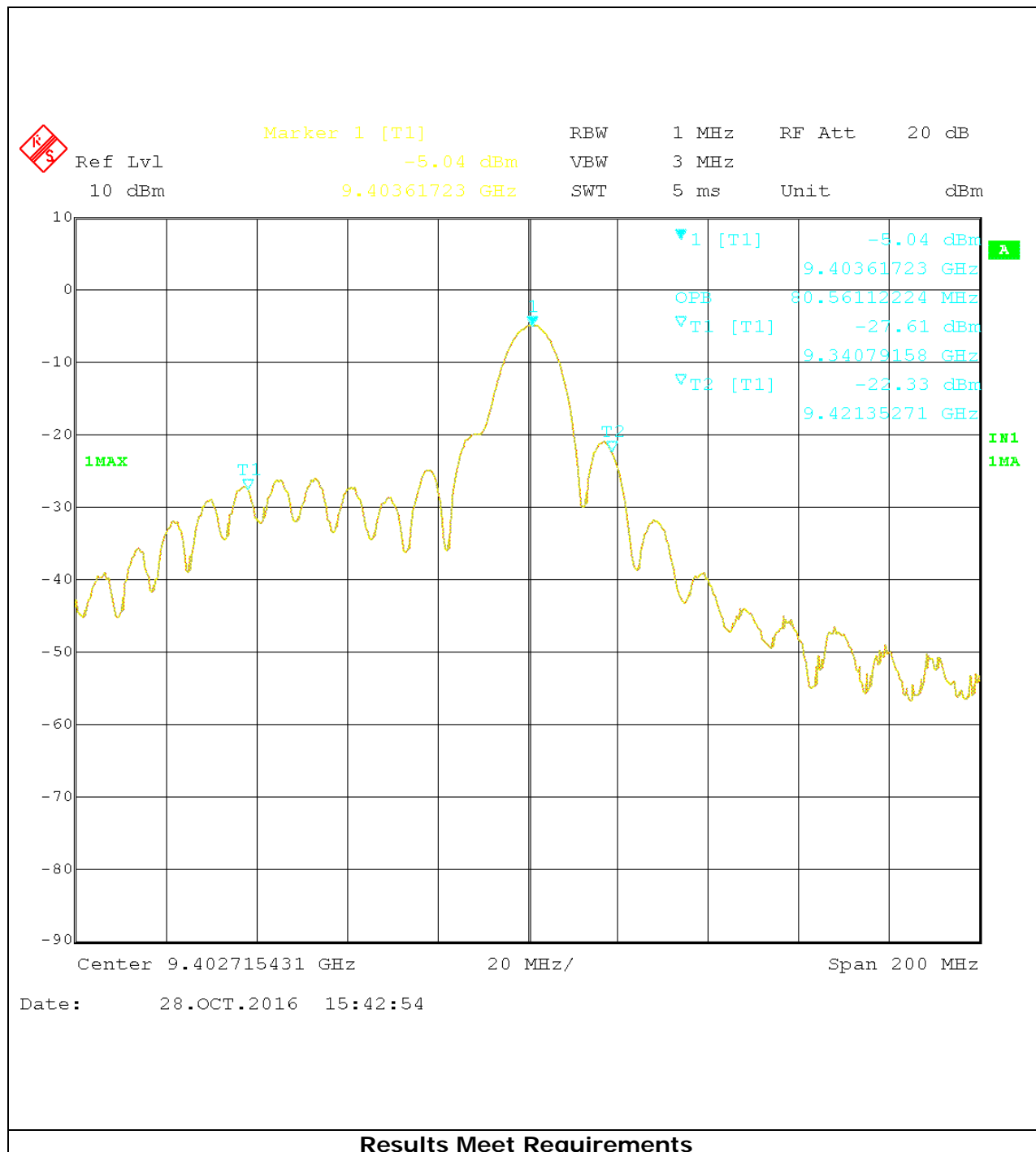
Pulse Type	Measurement Type	Occupied Bandwidth (MHz)
P0	99%	80.56
	40dB	133.47
P1	99%	21.54
	40dB	32.77
P3	99%	13.63
	40dB	33.77

Results Meet Requirements

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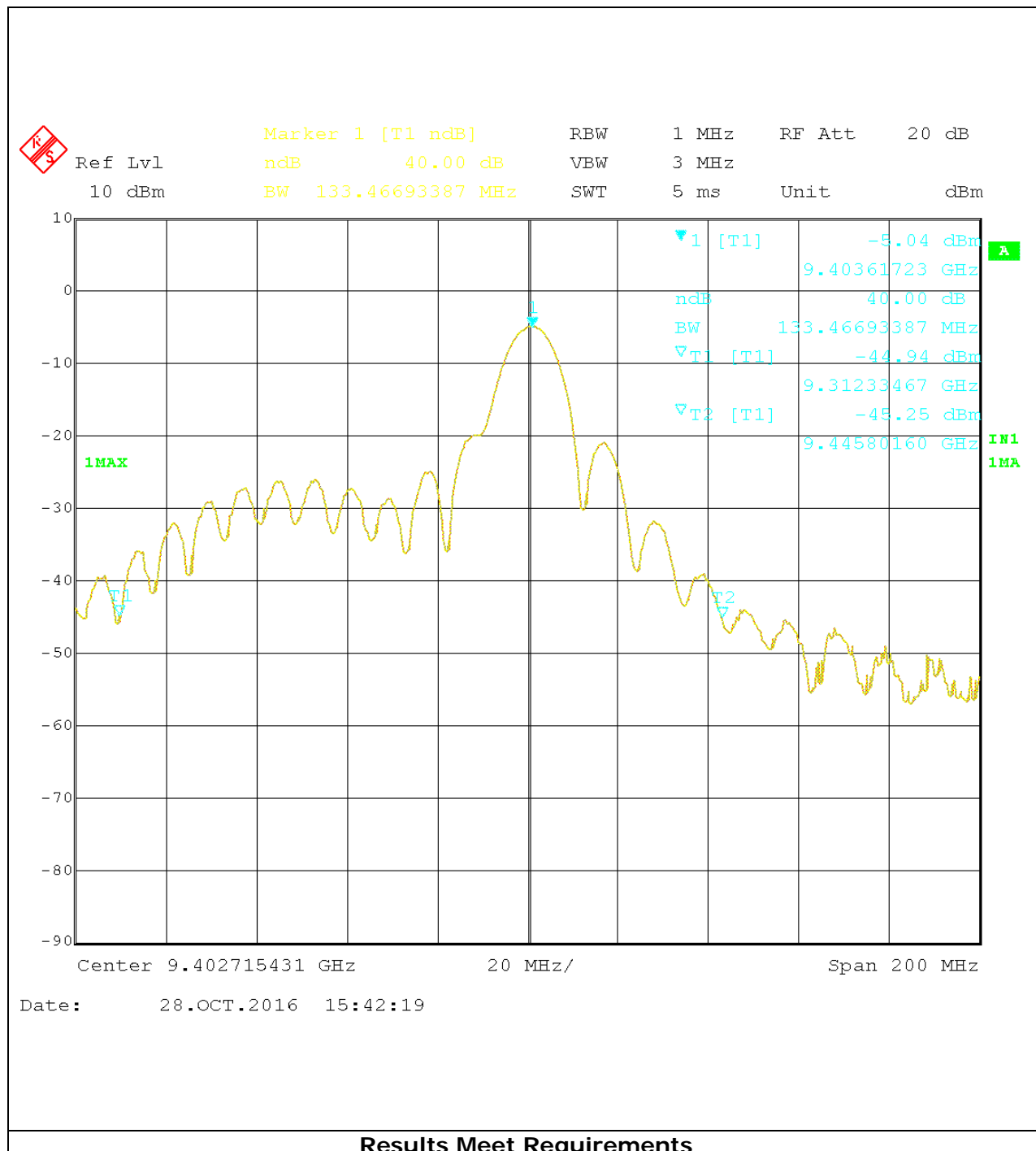
OCCUPIED BANDWIDTH

Test Data: 99% Plot- P0



OCCUPIED BANDWIDTH

Test Data: 40 dB Plot- P0

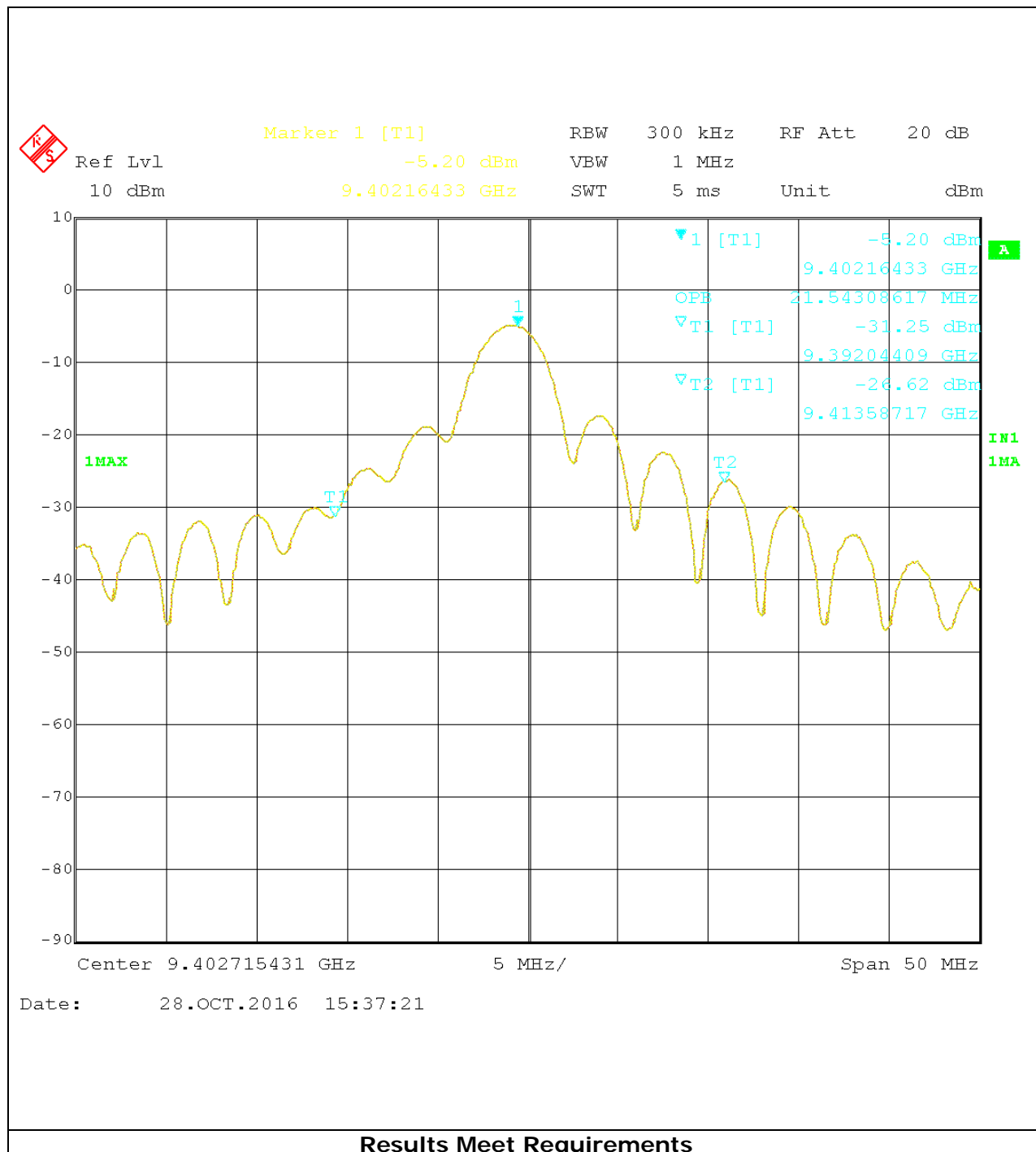


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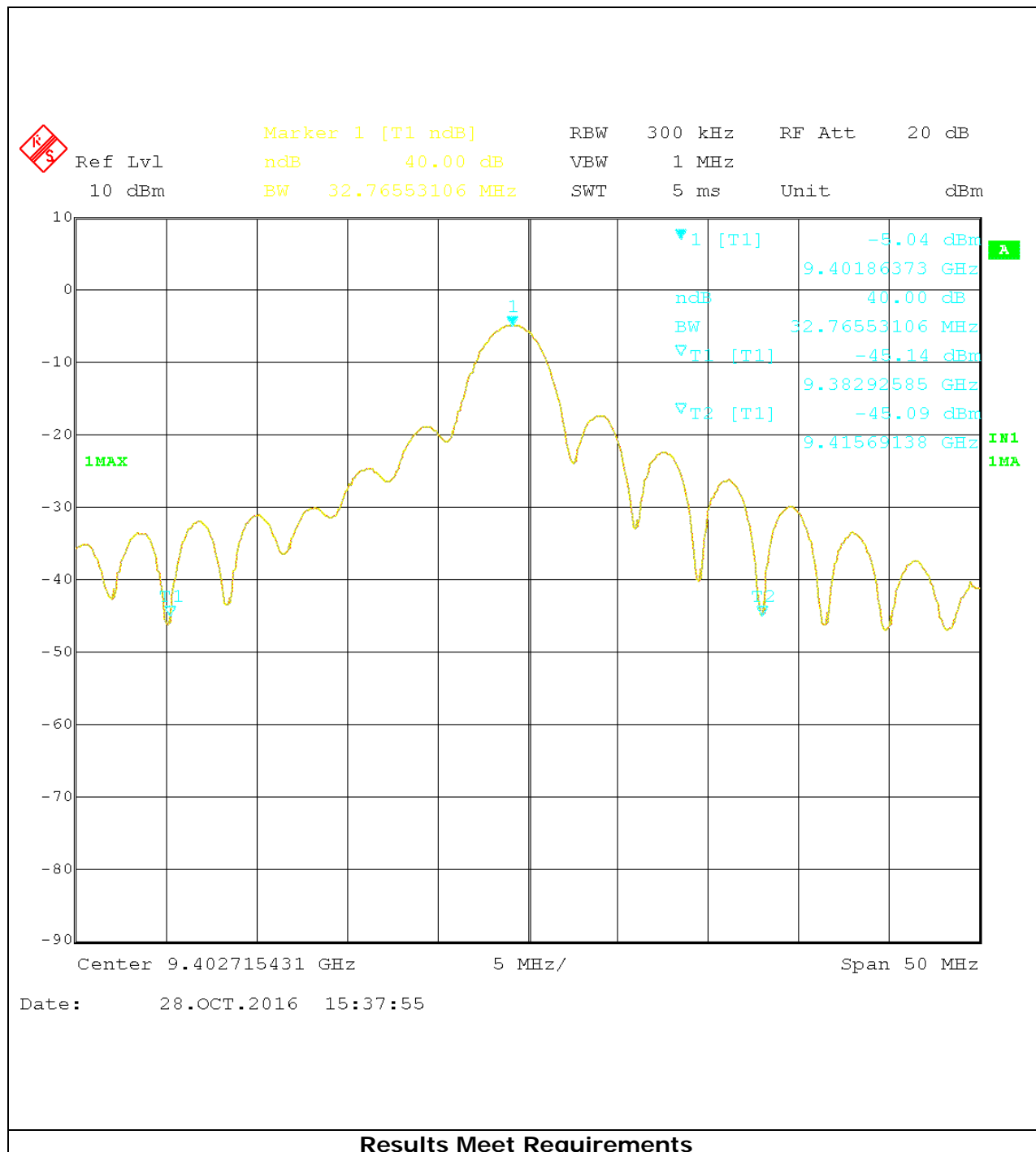
OCCUPIED BANDWIDTH

Test Data: 99% Plot- P1



OCCUPIED BANDWIDTH

Test Data: 40 dB Plot- P1

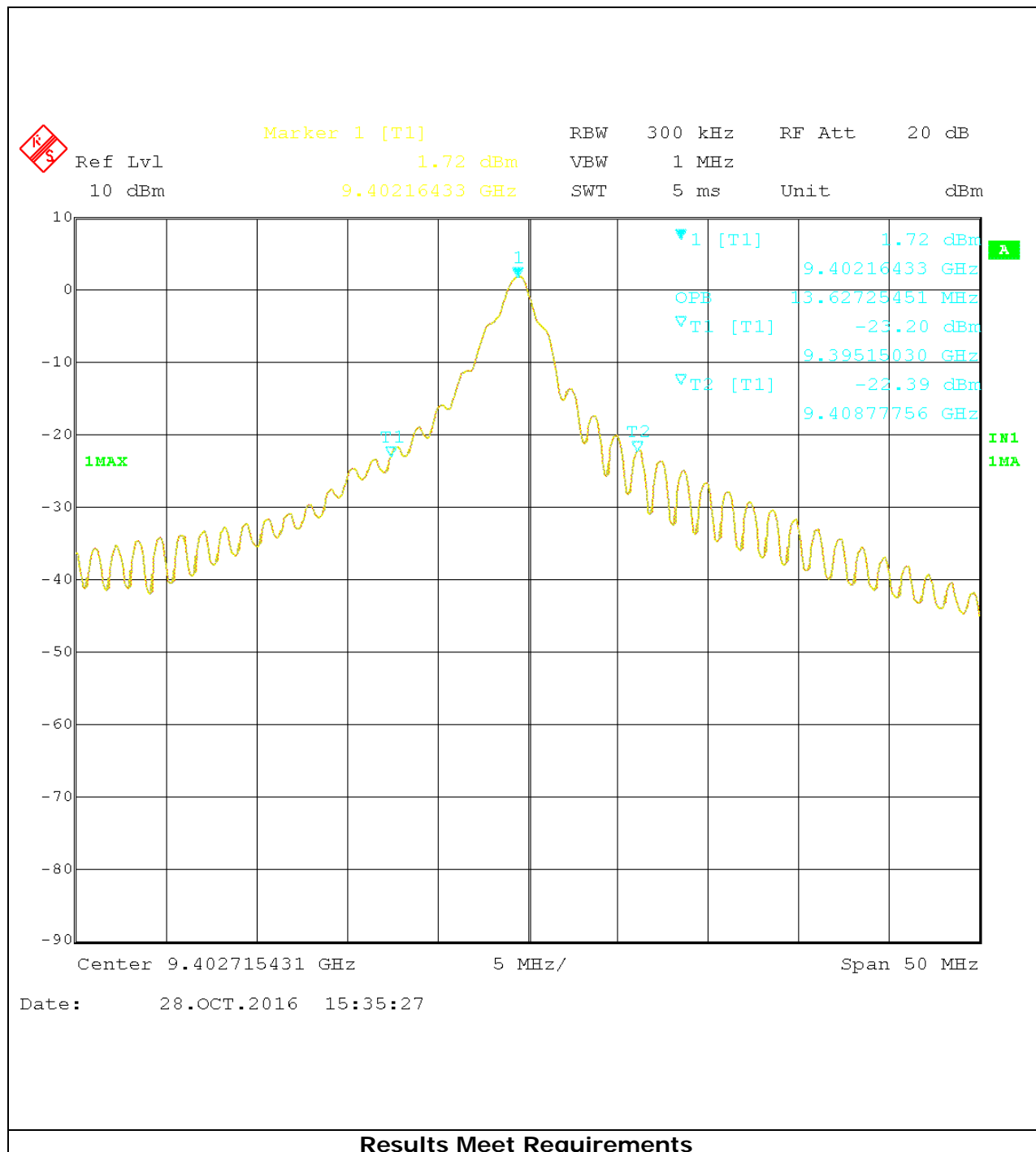


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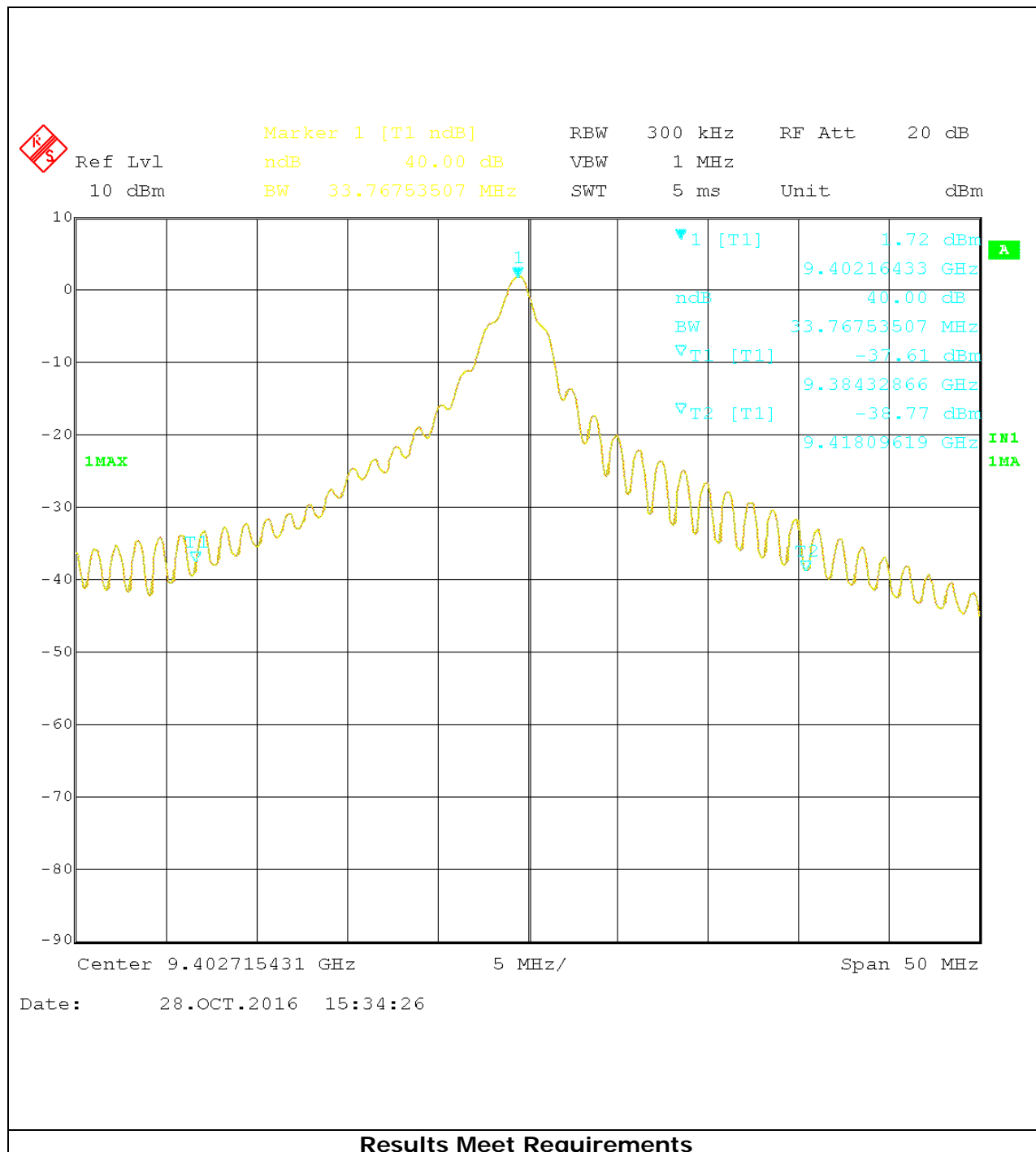
OCCUPIED BANDWIDTH

Test Data: 99% Plot- P2



OCCUPIED BANDWIDTH

Test Data: 40 dB Plot- P2



SPURIOUS EMISSIONS AT ANTENNA TERMINALS

Rule Part No.: Part 2.1051(a), Part 90.210, Part 90.215, Part 80.211(f),
RSS 238 4.3

Requirements:

For emissions more than 250% removed from operating frequency:

Part 80.211(f): $43 + 10\log(\text{mean power in watts})$

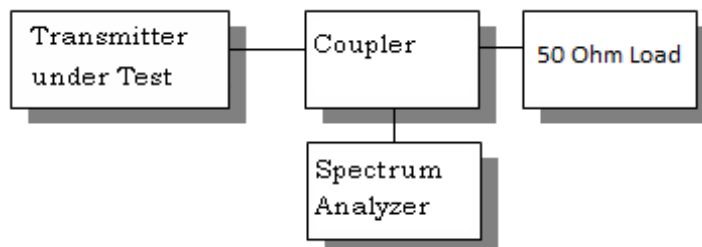
Part 90.210(c): $43 + 10\log(\text{mean power in watts})$

RSS 238 4.3: 20dB per decade from 40 dB bandwidth, not more than 60 dB

Method of Measurement: Measurements were made from 9 kHz to 40 GHz in accordance with standards listed.

The mean power was calculated based on the standard formula for radar systems:
 $P_a = P_m * T_d * f_r$. Where T_d is pulse duration, P_m is peak power, and f_r is pulse rep rate.

Block Diagram:



Test Data: Measurement Table

Pulse Type	Mean Power (Watts)	Emission Frequency (MHz)	Emission Level (dBc)	FCC Limit (dBc)	FCC Margin (dB)	IC Limit (dBc)	IC Margin (dB)
P0	1.71	18800.60	-79.91	-45.32	34.59	-46.04	33.87
P1	3.52	18800.60	-69.47	-48.46	21.01	-46.04	23.43
P2	5.13	18800.60	-66.38	-50.10	16.28	-46.04	20.34

Results Meet Requirements

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FIELD STRENGTH OF SPURIOUS EMISSIONS

Rule Parts. No.: FCC Part 2.1053, Part 90.210, Part 90.215, Part 80.211(f),
RSS-238 4.3

Requirements:

For emissions more than 250% removed from operating frequency:

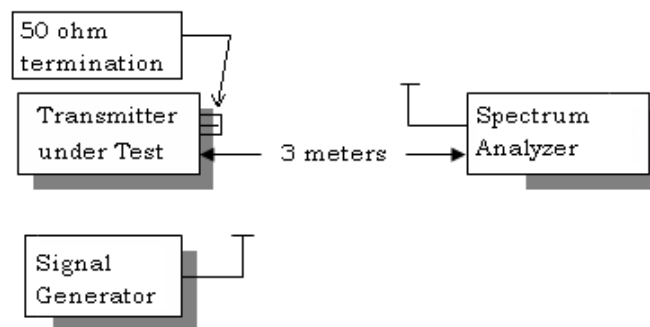
Part 80.211(f): $43 + 10\log(\text{mean power in watts})$

Part 90.210(c): $43 + 10\log(\text{mean power in watts})$

RSS 238 4.3: 20dB per decade from 40 dB bandwidth, not more than 60 dB

METHOD OF MEASUREMENT: The tabulated data shows the results of the radiated field strength emissions test. The spectrum was scanned from 9 kHz to at least the tenth harmonic of the fundamental or 40 GHz. This test was conducted per the standard listed above using the substitution method.

Test Setup Diagram:



Test Data: Measurement Table

Pulse Type	Emission Frequency (MHz)	3m Field Strength (dBuV/m)	ERP (dBm)	ERP (dBc)	FCC Limit (dBc)	FCC Margin (dB)	ICES Limit (dBc)	ICES Margin (dB)
P2	43.968	51.07	-46.31	-114.95	-50.10	64.85	-46.04	68.91
P2	86.212	48.86	-48.52	-117.16	-50.10	67.06	-46.04	71.12
P2	187.385	51.87	-45.51	-114.15	-50.10	64.05	-46.04	68.11
P2	276.954	50.53	-46.85	-115.49	-50.10	65.39	-46.04	69.45
P2	520.641	43.07	-54.31	-122.95	-50.10	72.85	-46.04	76.91
P2	32769.539	57.78	-39.60	-108.24	-50.10	58.14	-46.04	62.20

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FREQUENCY STABILITY

Rule Parts. No.: FCC Part 2.1055, Part 90.213, Part 80.209(b), RSS-238 4.1

Requirements

Part 80.209(b): Emissions must not be closer than $1.5/T$ MHz from the band edges, where T is the pulse duration in microseconds

Part 90.213(a) Specified in station authorization

RSS 238 4.1: The carrier frequency shall not depart from the reference frequency in excess of 800 ppm for equipment which operates in the band 2900-3100 MHz nor in excess of 1250 ppm for equipment which operates in the band 9225-9500 MHz.

Method of Measurements: The test procedure was modified to measure spurious emissions radiated from a terminating load.

Test Data: Measurement Table

Temperature (°C)	Frequency (MHz)	Error (ppm)	Margin (ppm)
25 (ref)	9464.1		
-20	9475.9	1247	3
-10	9475.5	1198	52
0	9470.9	714	536
10	9465.6	152	1098
20	9460.2	-416	834
30	9457.3	-723	527
40	9456.9	-769	481
50	9460.9	-346	904

Results Meet Requirements

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EQUIPMENT LIST

Device	Manufacturer	Model	Serial Number	Cal/Char Date	Due Date
CHAMBER	Panashield	3M	N/A	04/25/16	12/31/17
Antenna: Biconical 1096 Chamber	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
Antenna: Double- Ridged Horn/ETS Horn 2	ETS-Lindgren Chamber	3117	00041534	02/25/15	02/25/17
Antenna: Double-Ridged Horn	Emco	3116	9011-2145	11/18/2015	11/18/2017
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)	KMKM-0244- 00; KMKM- 0670-00; KFKF-0198- 00	12/05/15	12/05/17
Bore-sight Antenna Positioning Tower	Sunol Sciences	TLT2	N/A	NA	NA
Pre-amp	RF-LAMBDA	RLNA00M45GA	NA	01/04/16	01/04/18
Temperature Chamber LARGE	Tenney Engineering	TTRC	11717-7	08/19/14	08/19/18
USB Peak Power Sensor 50 MHz to 18 GHz	Boonton	55318	9224	06/01/16	06/01/18
Directional Coupler	HP	X752D	1829A24209	02/12/2016	02/12/2017
Adapter Waveguide WR-62 to Waveguide WR-90	ATM	62/90-6-6-6	S539608-01	N/A	N/A
Adapter Waveguide WR-62 to Coax SMA	ATM	62-251A-6	S539808-01	N/A	N/A
Adapter Waveguide WR-42 to Waveguide WR-90	ATM	42/90-8-6-6	S539408-01	N/A	N/A
Adapter Waveguide WR-42 to Coax K	ATM	42-25KA-6	S539508-01	N/A	N/A
Adapter Waveguide WR-28 to Waveguide WR-90	ATM	28/90-8-6-6	S539708-01	N/A	N/A
Adapter Waveguide WR-28 to Coax K	ATM	28-25KZA-6	S539908-01	N/A	N/A
WR90-Load	Pasternack	PE6824	N/A	N/A	N/A
Coaxial Cable	Micro-Coax	UFB142A-0- 0720-200200	225363-002	08/05/2015	08/05/2017

*EMI RECEIVER SOFTWARE VERSION

The receiver firmware used was version 4.43 Service Pack 3

END OF REPORT

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