Compliance Testing, LLC
Previously Flom Test Lab
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toll-free: (866) 311-3268
fax: (480) 926-3598
http://www.ComplianceTesting.com
info@ComplianceTesting.com

Test Report

Prepared for: Crescend Technologies, LLC

Model: P25-XXL3-PS1-C8-001

Description: 928-942 MHz 250W Amplifier

Serial Number: 180886798

FCC ID: CWWP25XXL3

To
FCC Part 90

Date of Issue: May 14, 2019

On the behalf of the applicant:	**Crescend Technologies, LLC** **140 E. State Parkway** **Schaumburg, IL 60173**
Attention of:	**Jack Fischler, Program Manager** **Phone: 847-908-5400** **Email: jfischler@crescendtech.com**

Prepared By
Compliance Testing, LLC
1724 S. Nevada Way
Mesa, AZ 85204
(480) 926-3100 phone / (480) 926-3598 fax
www.compliancetesting.com
Project No: p1880019

Christian Pawlak
Project Test Engineer

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All results contained herein relate only to the sample tested

Test Report Revision History

Revision	Date	Revised By	Reason for Revision
1.0	12/07/2018	Christian Pawlak	Original Document
2.0	4/22/2019	Greg Corbin	Removed ISED test data
3.0	5/14/2019	Greg Corbin	Added references to rule parts in the test summary table on page 7.

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ILAC / A2LA

Compliance Testing, LLC, has been accredited in accordance with the recognized International Standard ISO/IEC 17025:2005. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer joint ISO-ILAC-IAF Communiqué dated January 2009)

The tests results contained within this test report all fall within our scope of accreditation, unless noted below.

Please refer to http://www.compliancetesting.com/labscope.html for current scope of accreditation.

Testing Certificate Number: **2152.01**

ACCREDITED
TESTING CERT
#2152.01

FCC Site Reg. #349717

IC Site Reg. #2044A-2

Non-accredited tests contained in this report:

N/A

Test and Measurement Data

All tests and measurement data shown were performed in accordance with FCC Rules and Regulations Part 90.219, KDB 935210 D05 Booster, and FCC Part 2, where appropriate.

Standard Test Conditions and Engineering Practices

Except as noted herein, the following conditions and procedures were observed during the testing.

In accordance with ANSI/TIA 603C, and unless otherwise indicated in the specific measurement results, the ambient temperature of the actual EUT was maintained within the range of 10° to 40°C (50° to 104°F) unless the particular equipment requirements specify testing over a different temperature range. Also, unless otherwise indicated, the humidity levels were in the range of 10% to 90% relative humidity.

Environmental Conditions		
Temp (ºC)	**Humidity (%)**	**Pressure (mbar)**
22.7	47.5	961.4

Measurement results, unless otherwise noted, are worst-case measurements.

Accessories: None

Modifications: None

Cables:

Qty	Description	Length (M)	Shielding Y/N	Shielded Hood Y/N	Termination
1	NEMA 5-15P to IEC 60320 C13	1	N	N	None

Test Result Summary

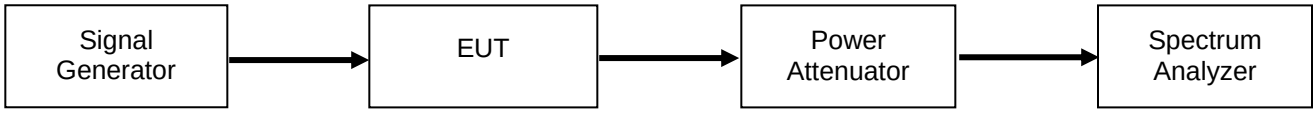
Specification	Test Name	Pass, Fail, N/A	Comments
KDB 935210 D05 4.2	AGC Threshold	Pass	
KDB 935210-D05 4.3	Out of Band Rejection	Pass	
KDB 935210-D05 4.4	Input-versus-output Signal Comparison	Pass	
KDB 935210-D05 4.5 2.1049	Input/Output Power and Amplifier/Booster Gain	Pass	
KDB 935210-D05 4.6 90.219(e)(2)	Noise Figure	N/A	Not Required per KDB 925403
KDB 935210-D05 4.7.2	Out-of-band/Out-of-block Emissions Conducted Measurements	N/A	Not Required per KDB 885618
KDB 935210-D05 4.7.3 2.1051	Spurious Emissions Conducted Measurements	Pass	
KDB 935210-D05 4.8 90.213	Frequency Stability	N/A	EUT does not alter input signal
KDB 935210-D05 4.9 2.1053	Spurious Emissions Radiated Measurements	Pass	

AGC Threshold
Engineer: Christian Pawlak
Test Date: 2018-11-14

Test Procedure

The Method of Measurement was KDB 935210 4.2 with power measurements taken per KDB 935210 4.5.2

Test Setup



Limits:
None

Test Results:

Band (MHz)	Tuned Frequency (MHz)	AGC Threshold (dBm)
928 – 929	928.5125	+21.0
929 – 930	929.5125	+21.0
935 – 940	937.5000	+21.0

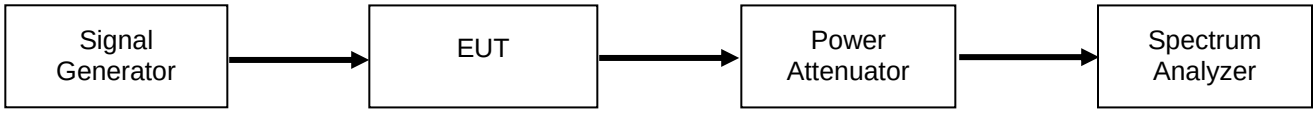
Out-of-Band Rejection
Engineer: Christian Pawlak
Test Date: 2018-11-14

Test Procedure

The Method of Measurement was KDB 935210 4.3 with the following modifications:

Spectrum Analyzer span was extended to include -20dB points
CW amplitude was 3 dB above AGC threshold
Frequency Step Size was 50 kHz
Dwell time was 50ms

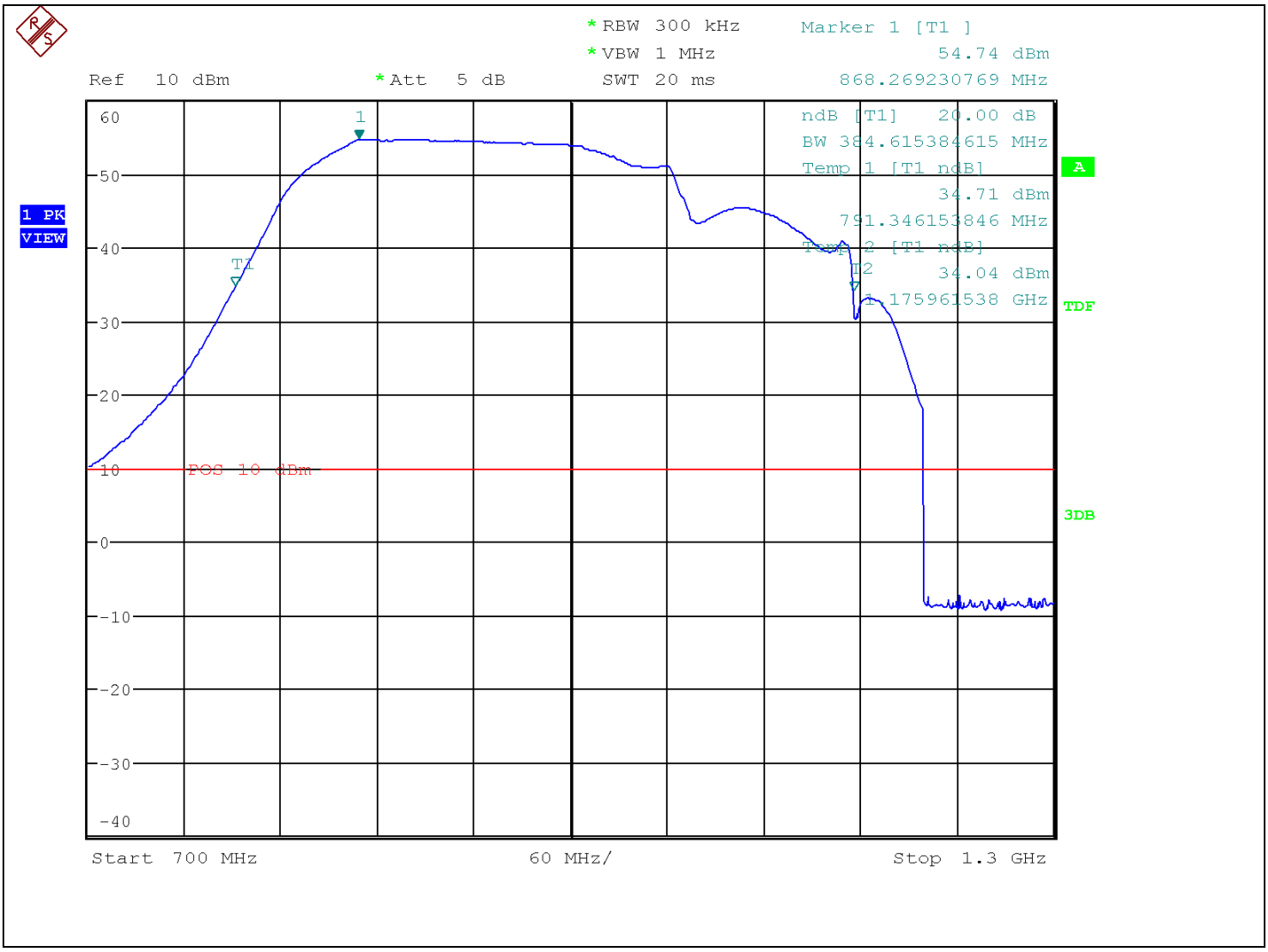
Test Setup



Limits:
None

Test Results:
See plot(s) below

Out-of-band Rejection – All Bands



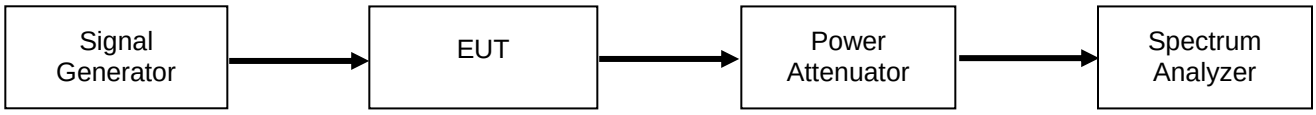
Input-Versus-Output Signal Comparison
Engineer: Christian Pawlak
Test Date: 2018-11-15

Test Procedure

The Method of Measurement was KDB 935210 4.4 with the following modifications:

Signal Generator output is highly linear with respect to Frequency, Bandwidth, and Power.
One EUT input plot is shown for each emission designator.

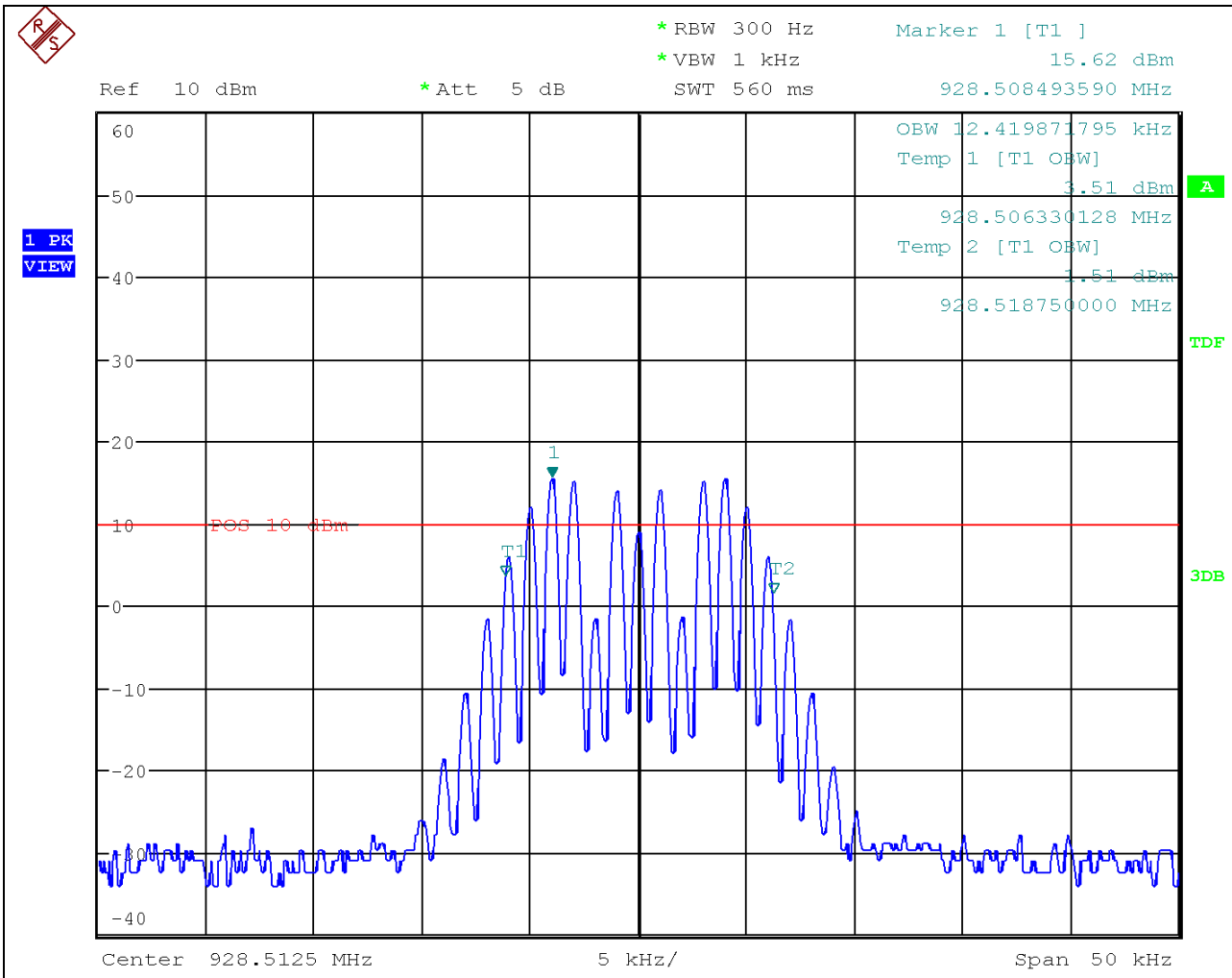
Test Setup



Limits:
None

Test Results:
No dissimilarities observed. See plots below.

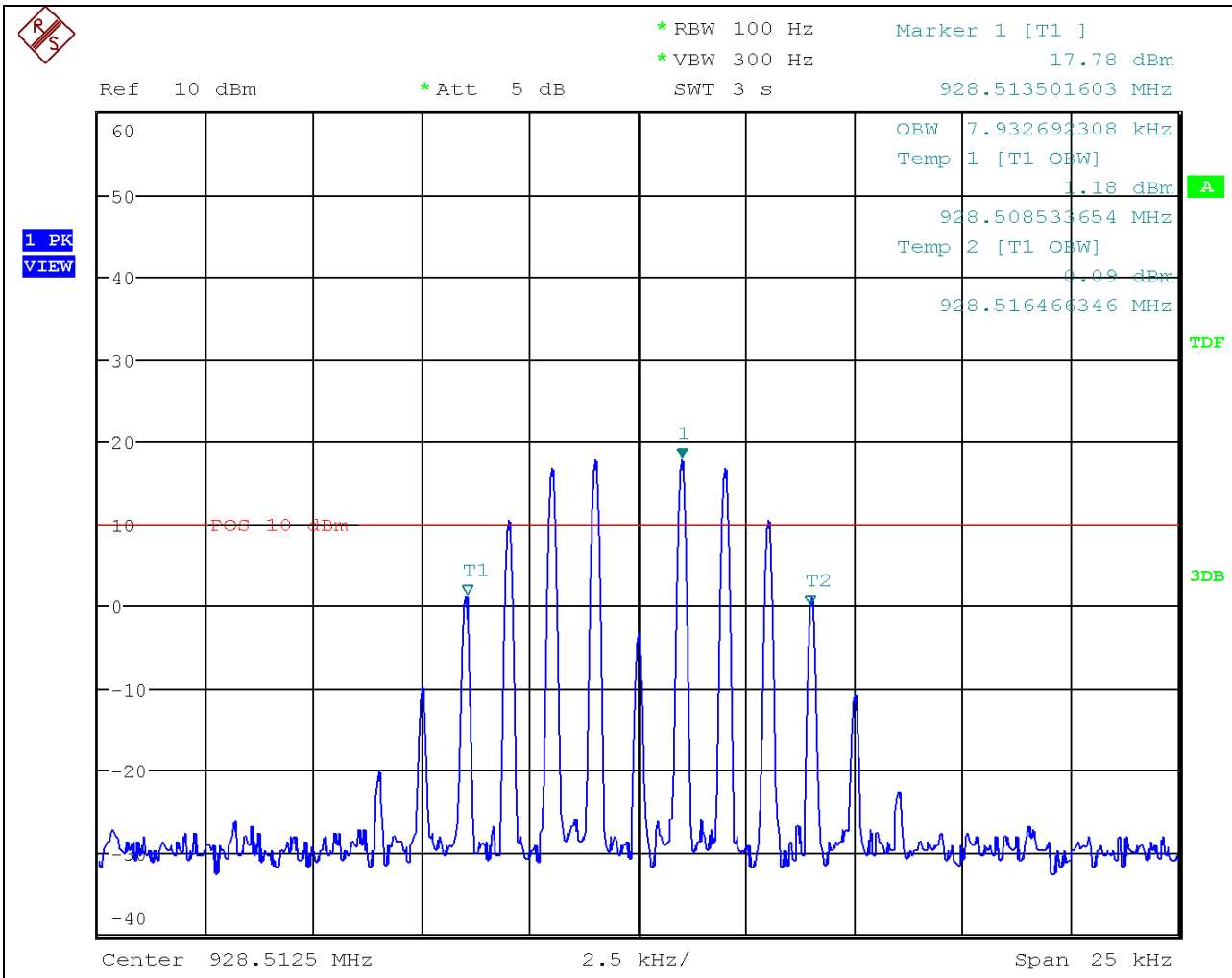
Input-versus-output Signal Comparison – Input – 16K0F3E



p1880019_iocomp_in_16k0f3e_inp24

Date: 15.NOV.2018 01:27:19

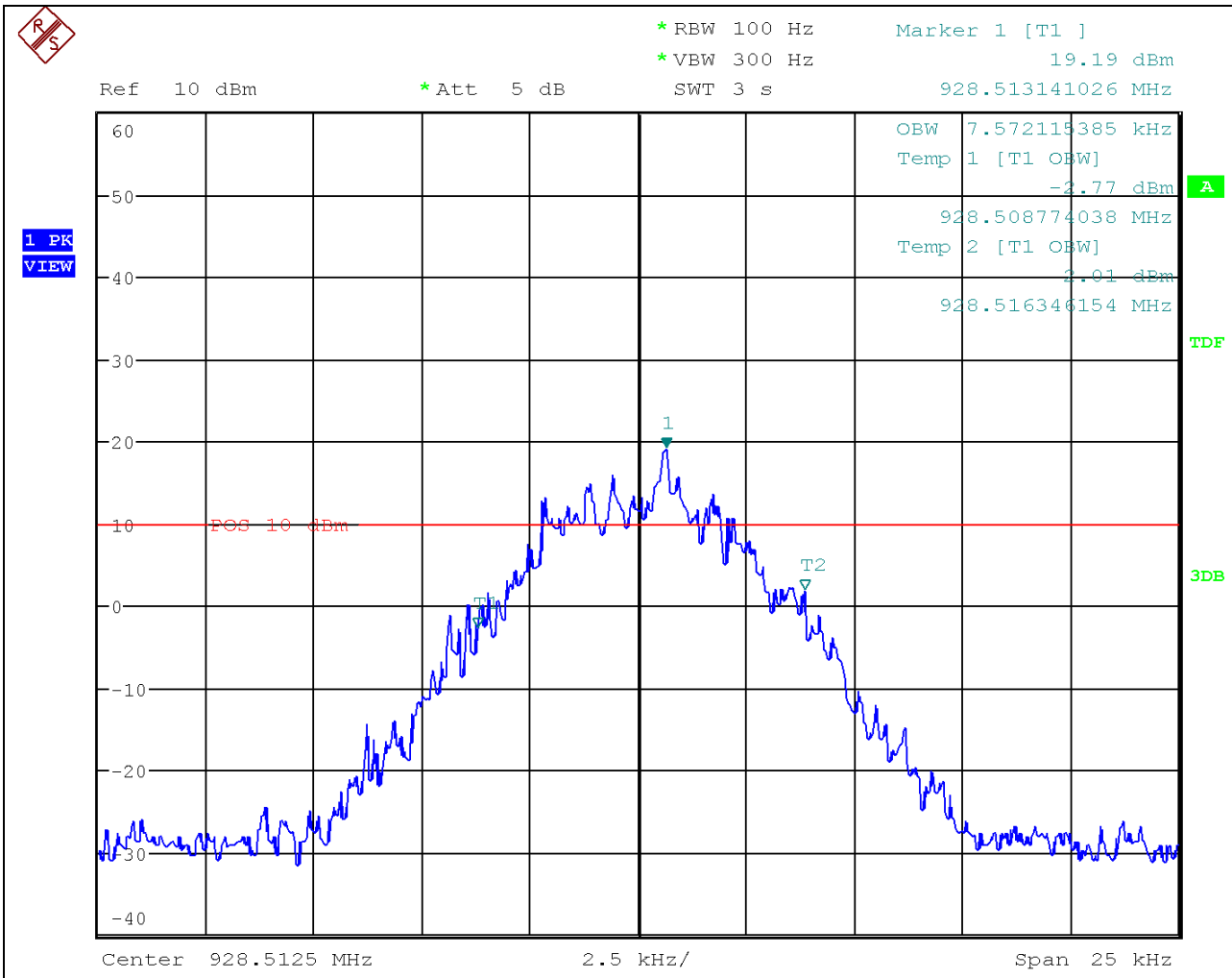
Input-versus-output Signal Comparison – Input – 11K3F3E



p1880019_iocomp_in_11k3f3e_inp24

Date: 15.NOV.2018 01:25:21

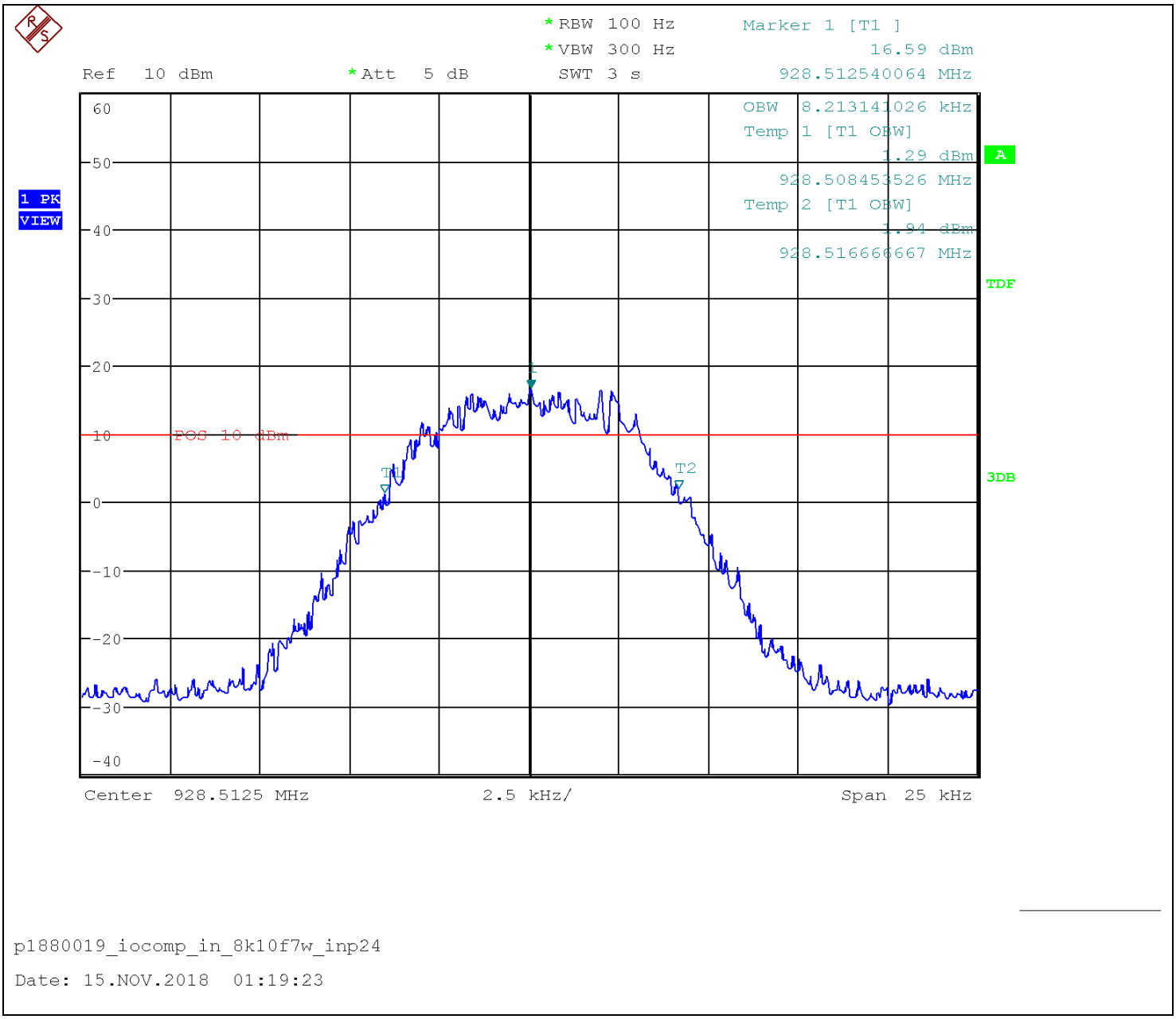
Input-versus-output Signal Comparison – Input – 8K10F1W



p1880019_iocomp_in_8k10f1w_inp24

Date: 15.NOV.2018 01:21:17

Input-versus-output Signal Comparison – Input – 8K10F7W



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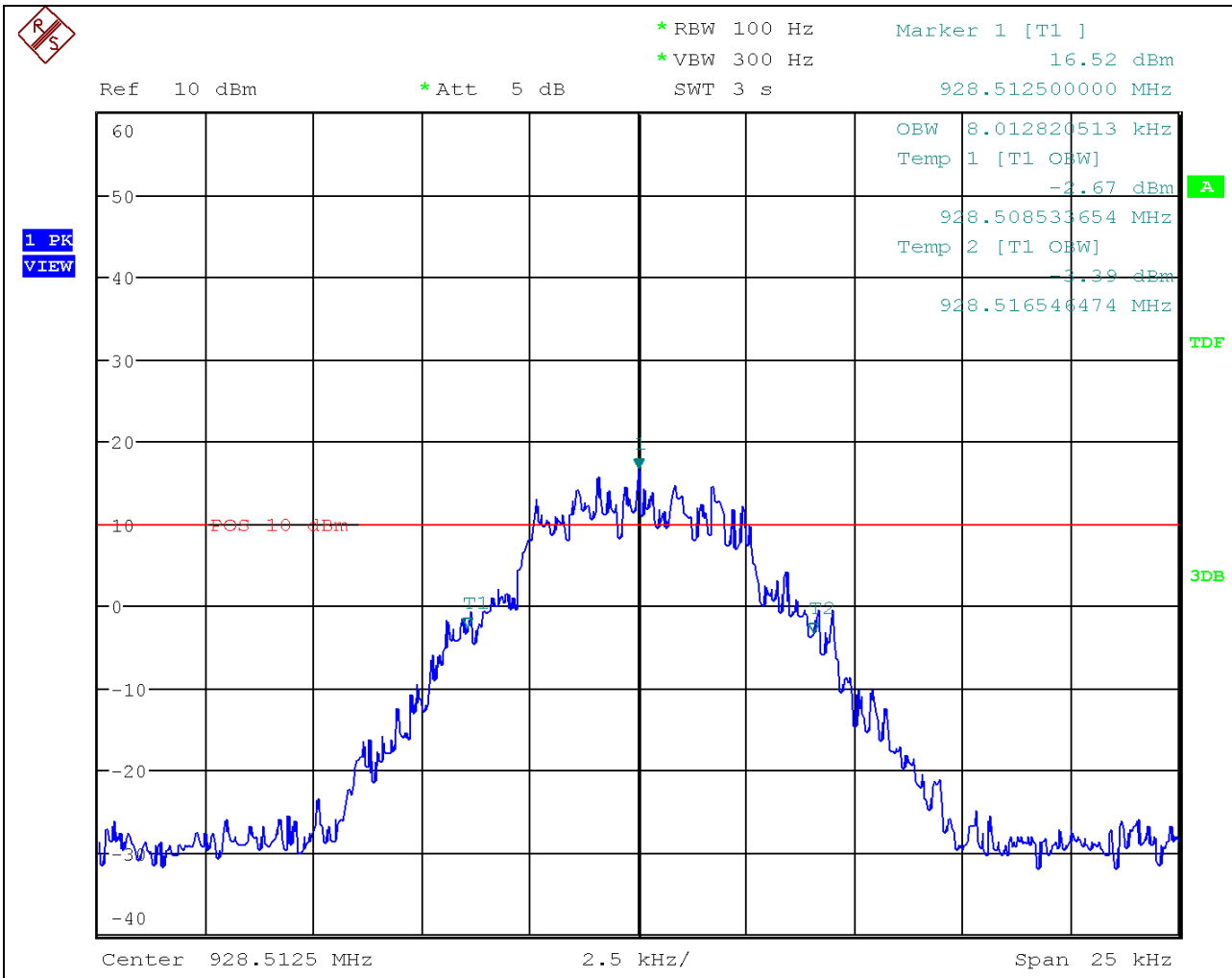
Date: 15.NOV.2018 01:19:23

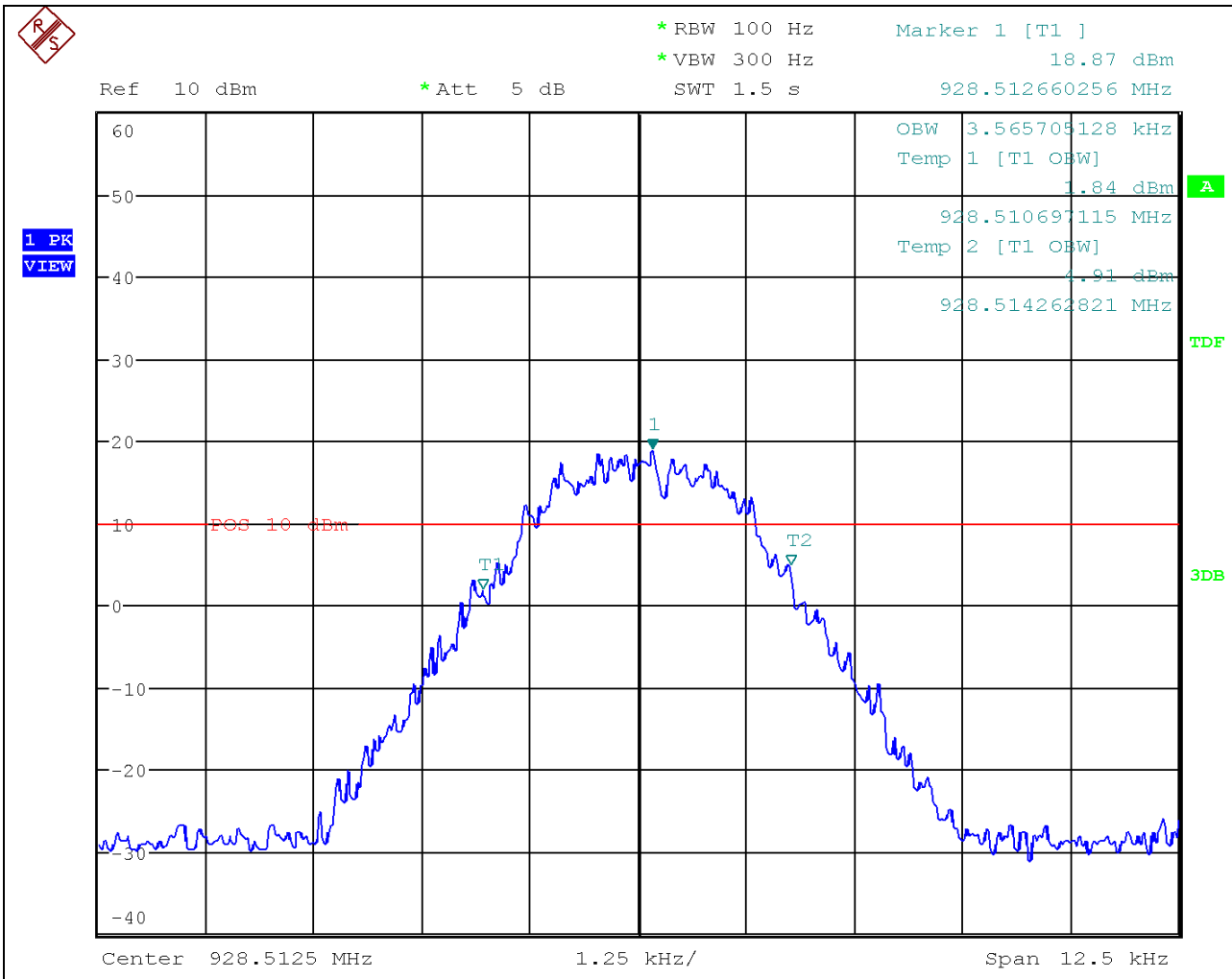
Input-versus-output Signal Comparison – Input – 7K60FXE



p1880019_iocomp_in_7k60fxe_inp24

Date: 15.NOV.2018 01:11:48

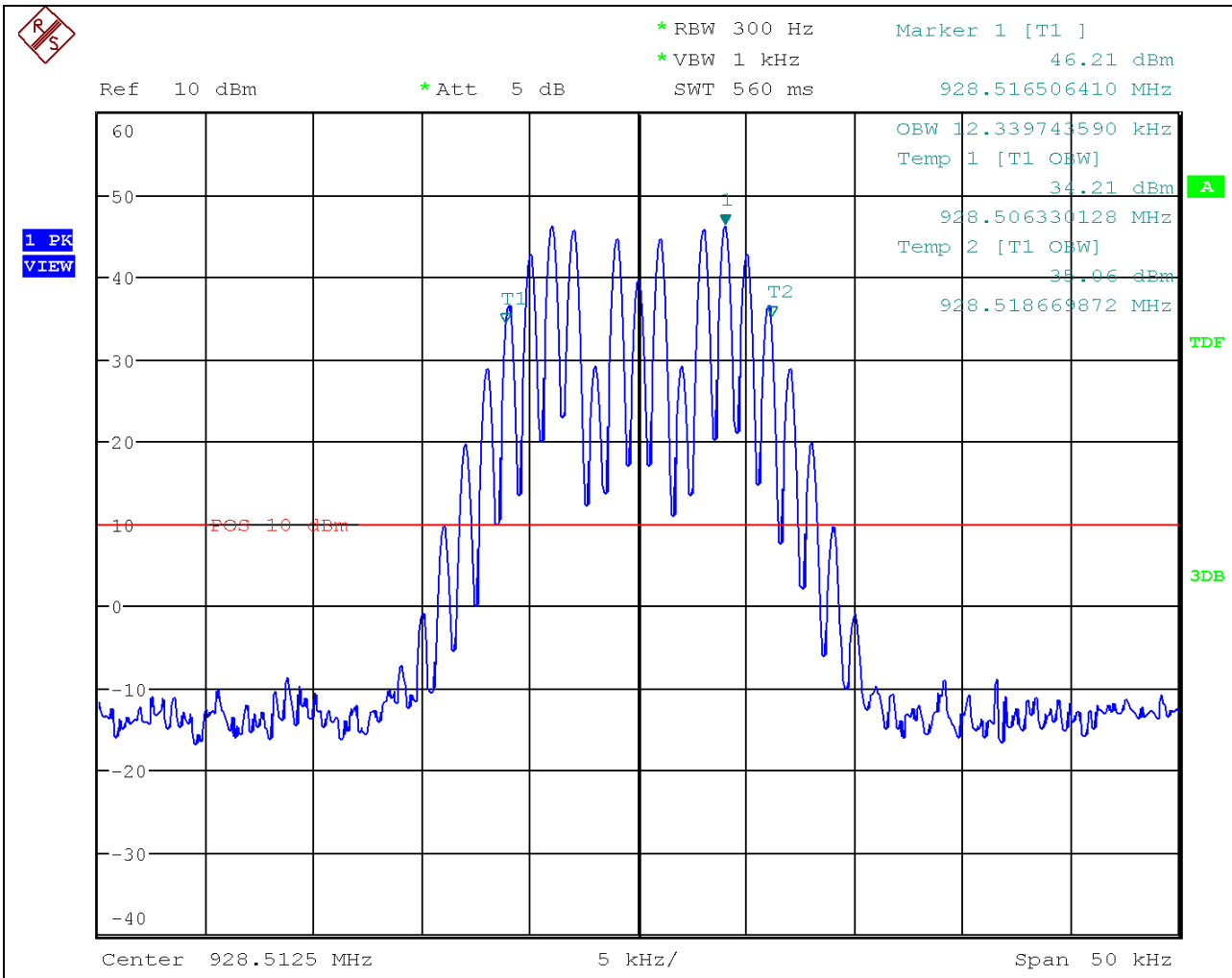
Input-versus-output Signal Comparison – Input – 4K00F2D



p1880019_iocomp_in_4k00f2d_inp24

Date: 15.NOV.2018 01:06:38

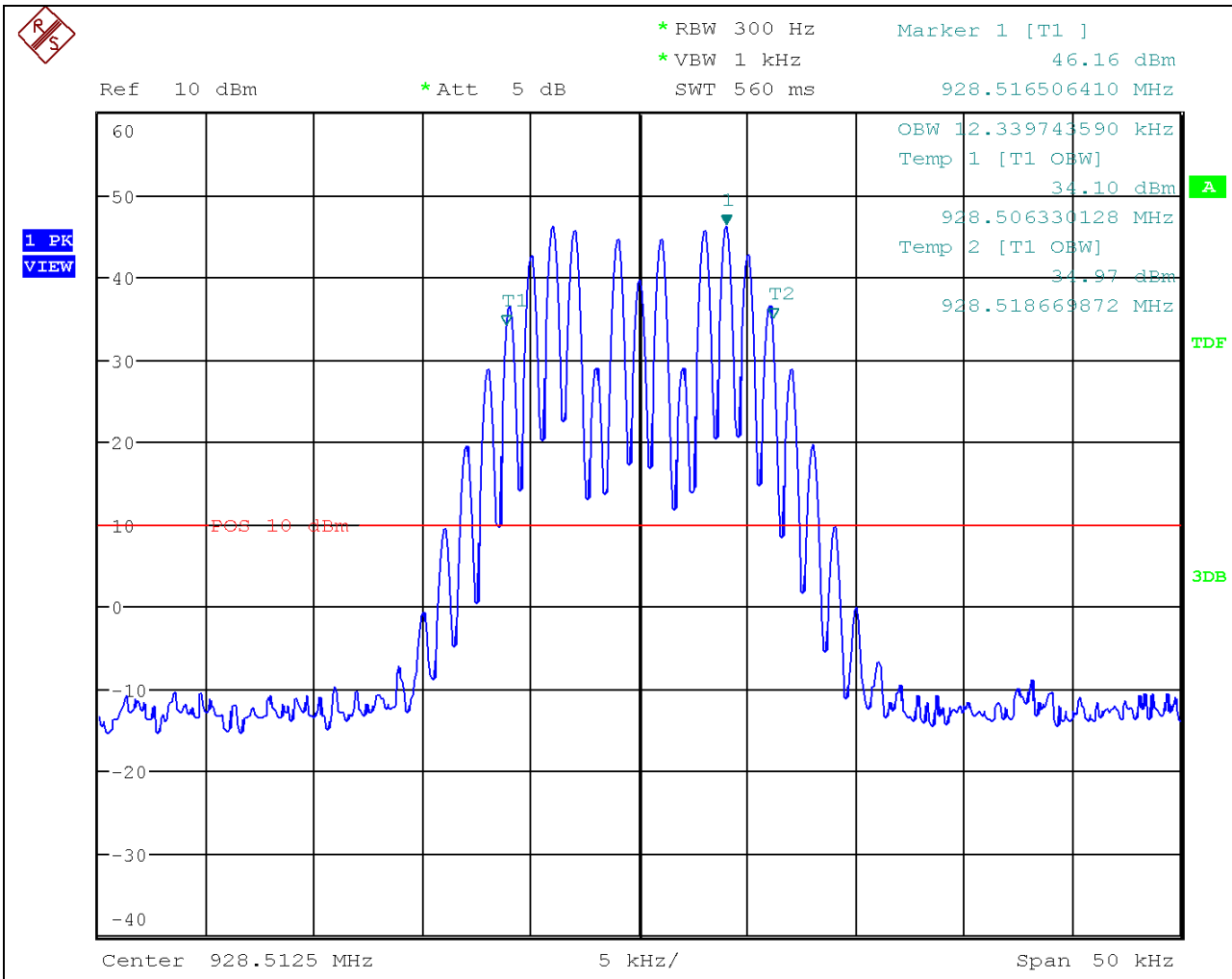
Input-versus-output Signal Comparison – 928-929 - Output Without AGC – 16K0F3E



p1880019_iocomp_b1_16k0f3e_inp21

Date: 15.NOV.2018 01:35:50

Input-versus-output Signal Comparison – 928-929 - Output With AGC – 16K0F3E



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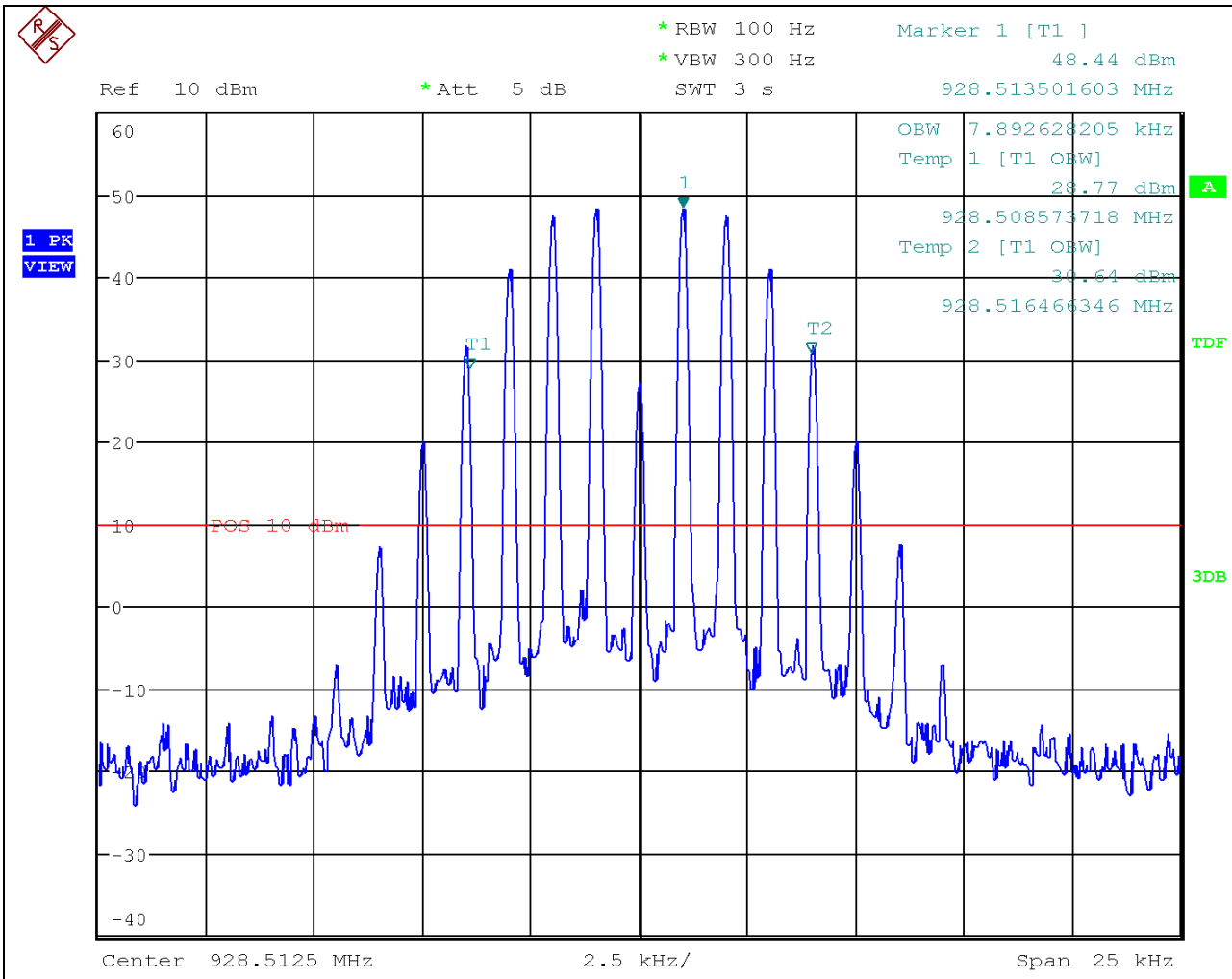
Date: 15.NOV.2018 01:34:43

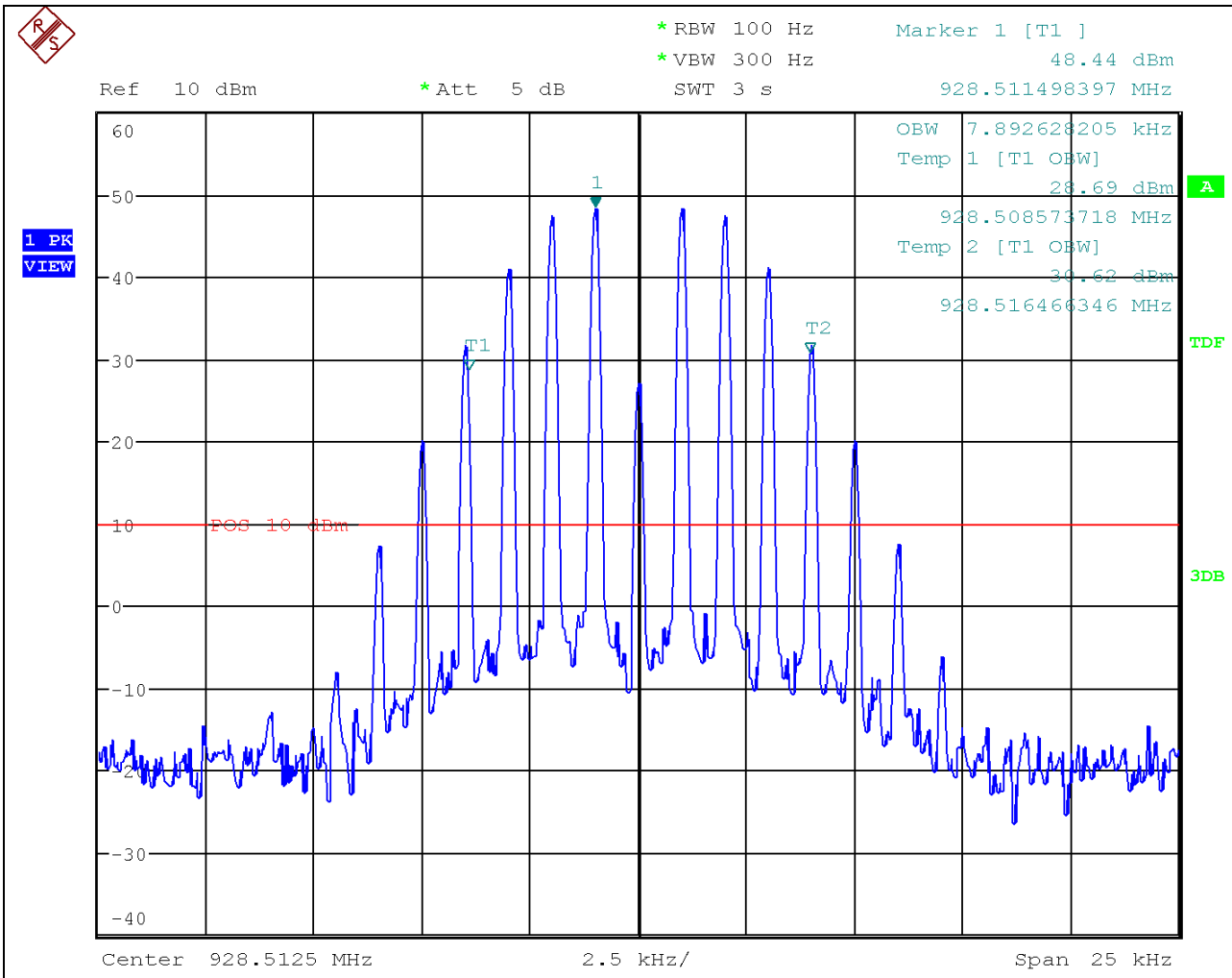
Input-versus-output Signal Comparison – 928-929 - Output Without AGC – 11K3F3E



p1880019_iocomp_b1_11k3f3e_inp21

Date: 15.NOV.2018 01:49:21

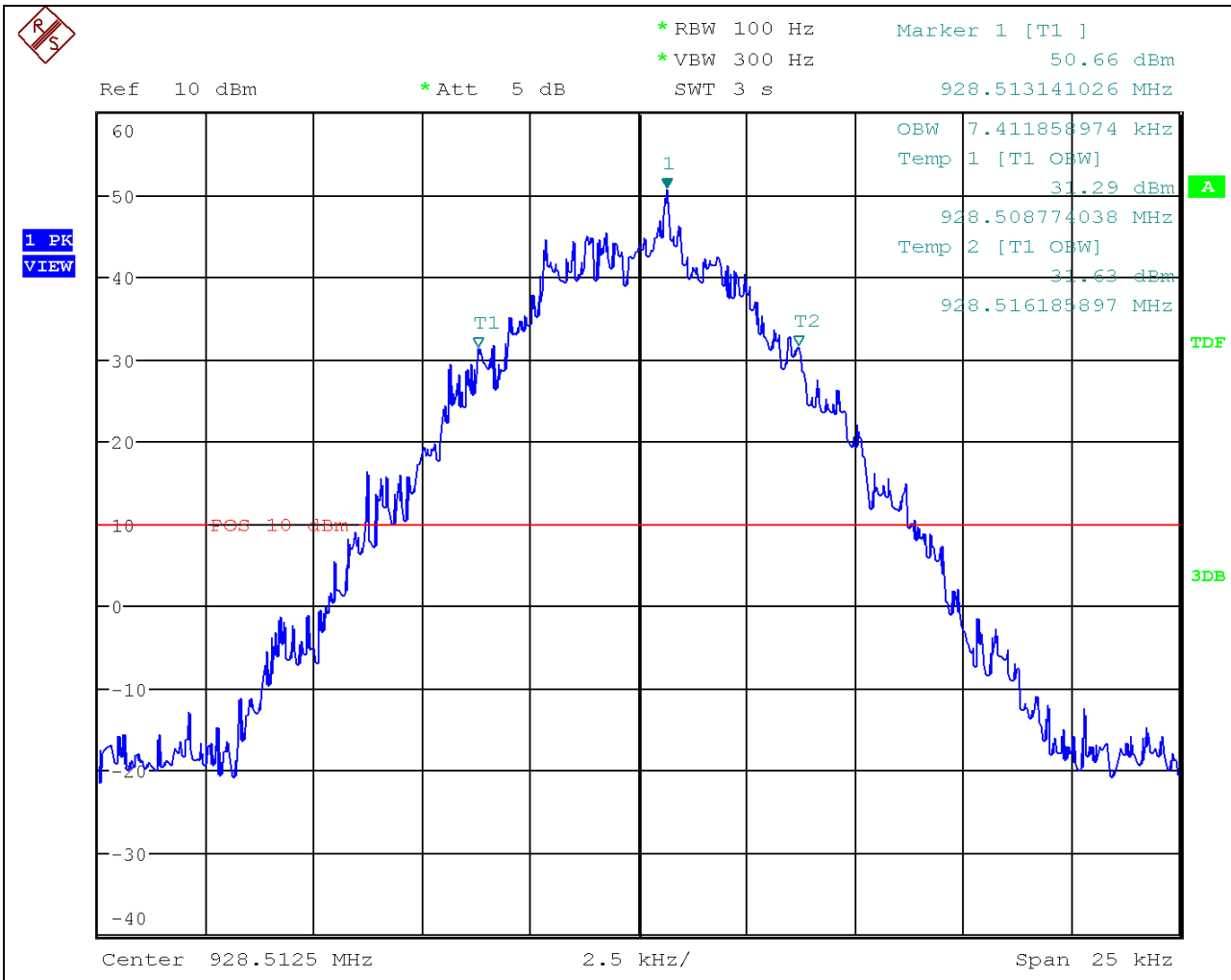
Input-versus-output Signal Comparison – 928-929 - Output With AGC – 11K3F3E



p1880019_iocomp_b1_11k3f3e_inp24

Date: 15.NOV.2018 01:50:20

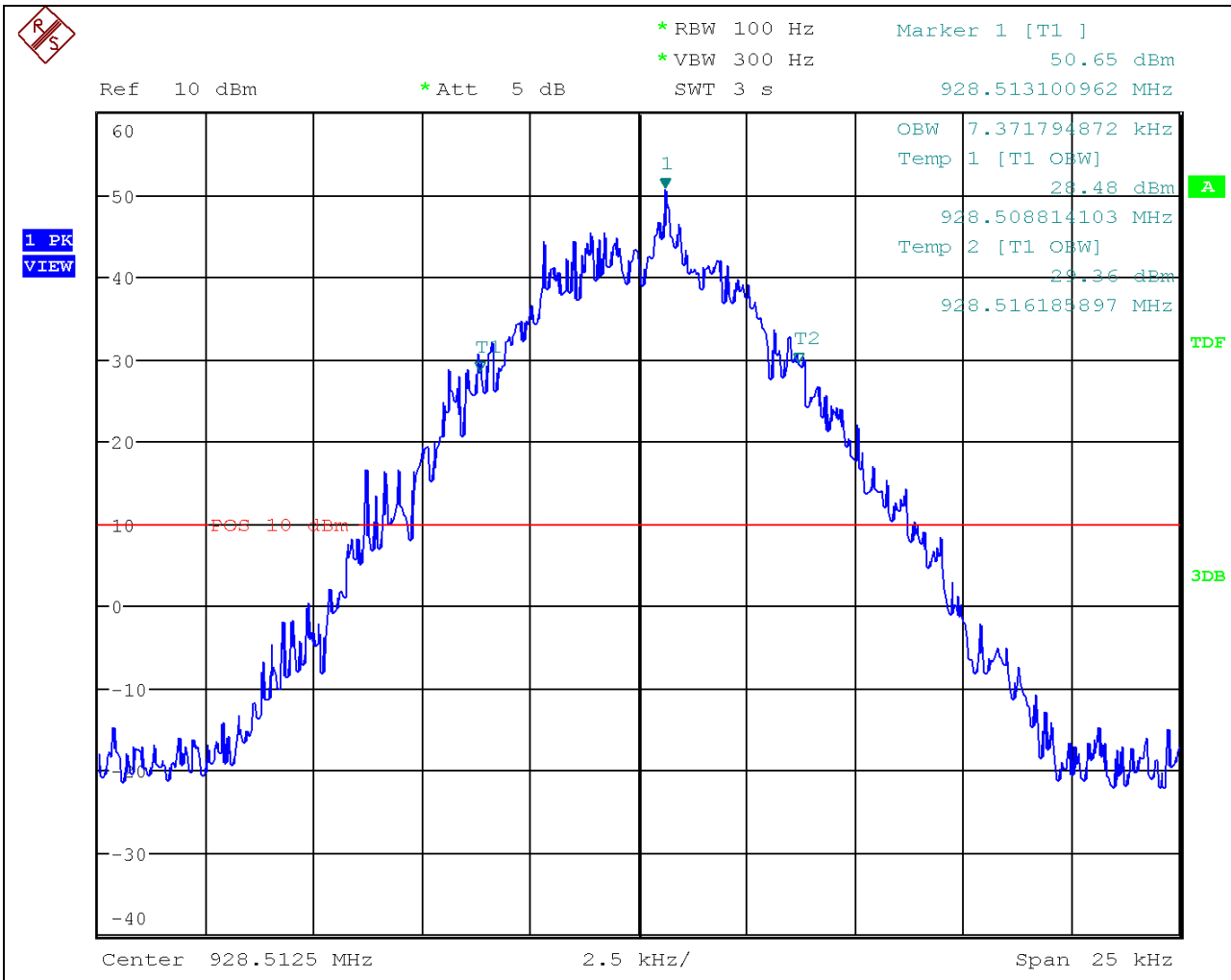
Input-versus-output Signal Comparison – 928-929 - Output Without AGC – 8K10F1W



p1880019_iocomp_b1_8k10f1w_inp21

Date: 15.NOV.2018 01:56:29

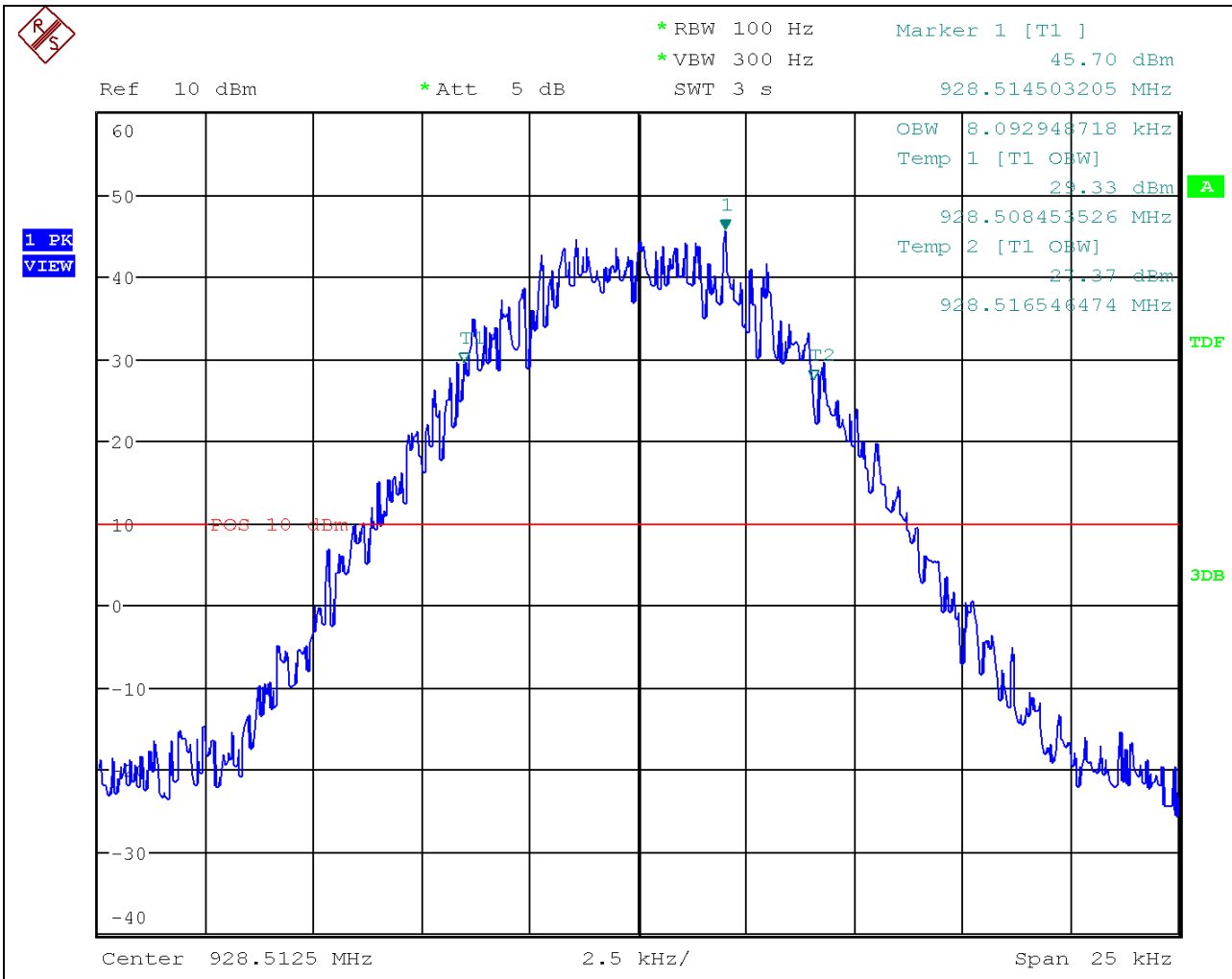
Input-versus-output Signal Comparison – 928-929 - Output With AGC – 8K10F1W



p1880019_iocomp_b1_8k10f1w_inp24

Date: 15.NOV.2018 01:55:09

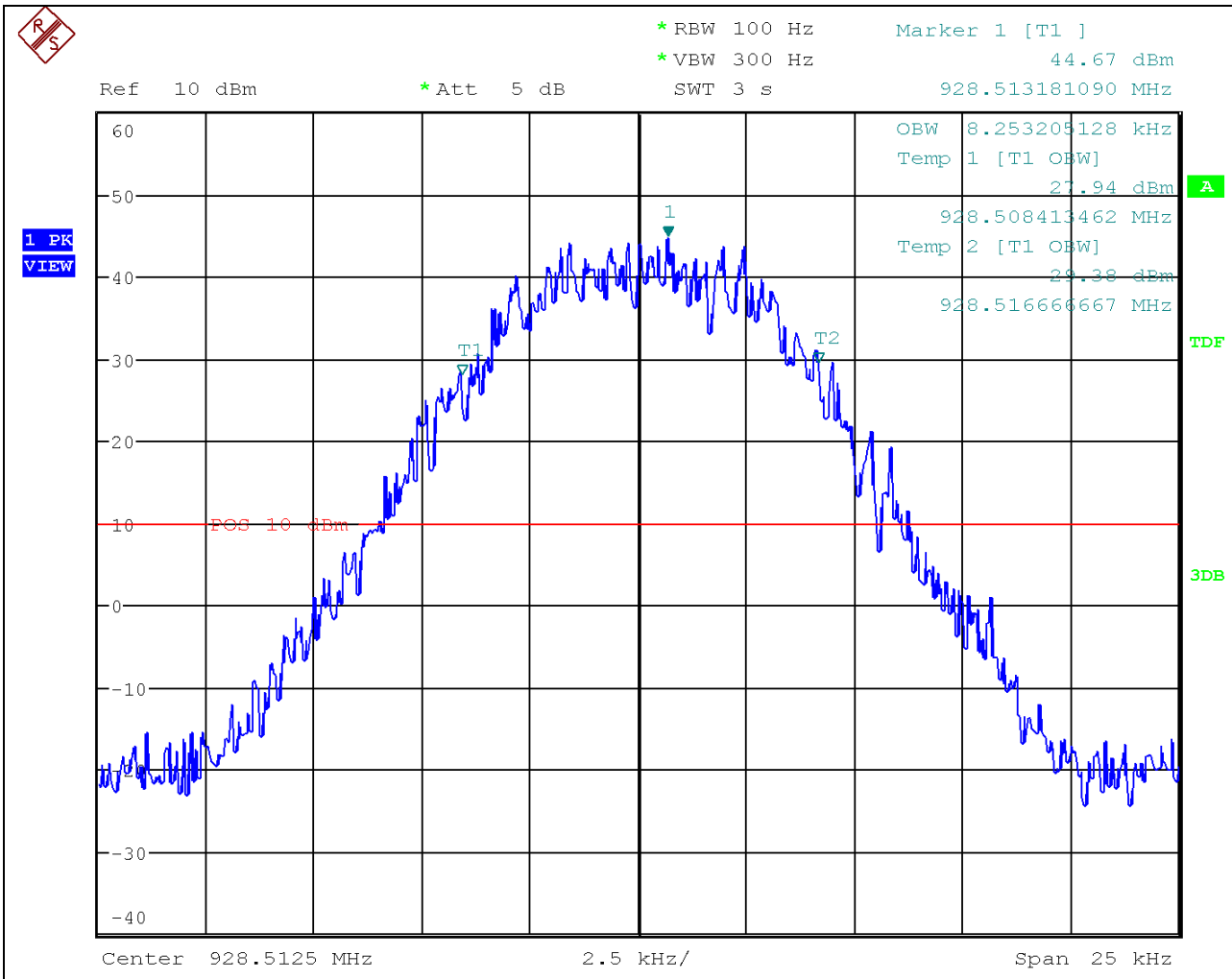
Input-versus-output Signal Comparison – 928-929 - Output Without AGC – 8K10F7W



p1880019_iocomp_b1_8k10f7w_inp21

Date: 15.NOV.2018 02:12:51

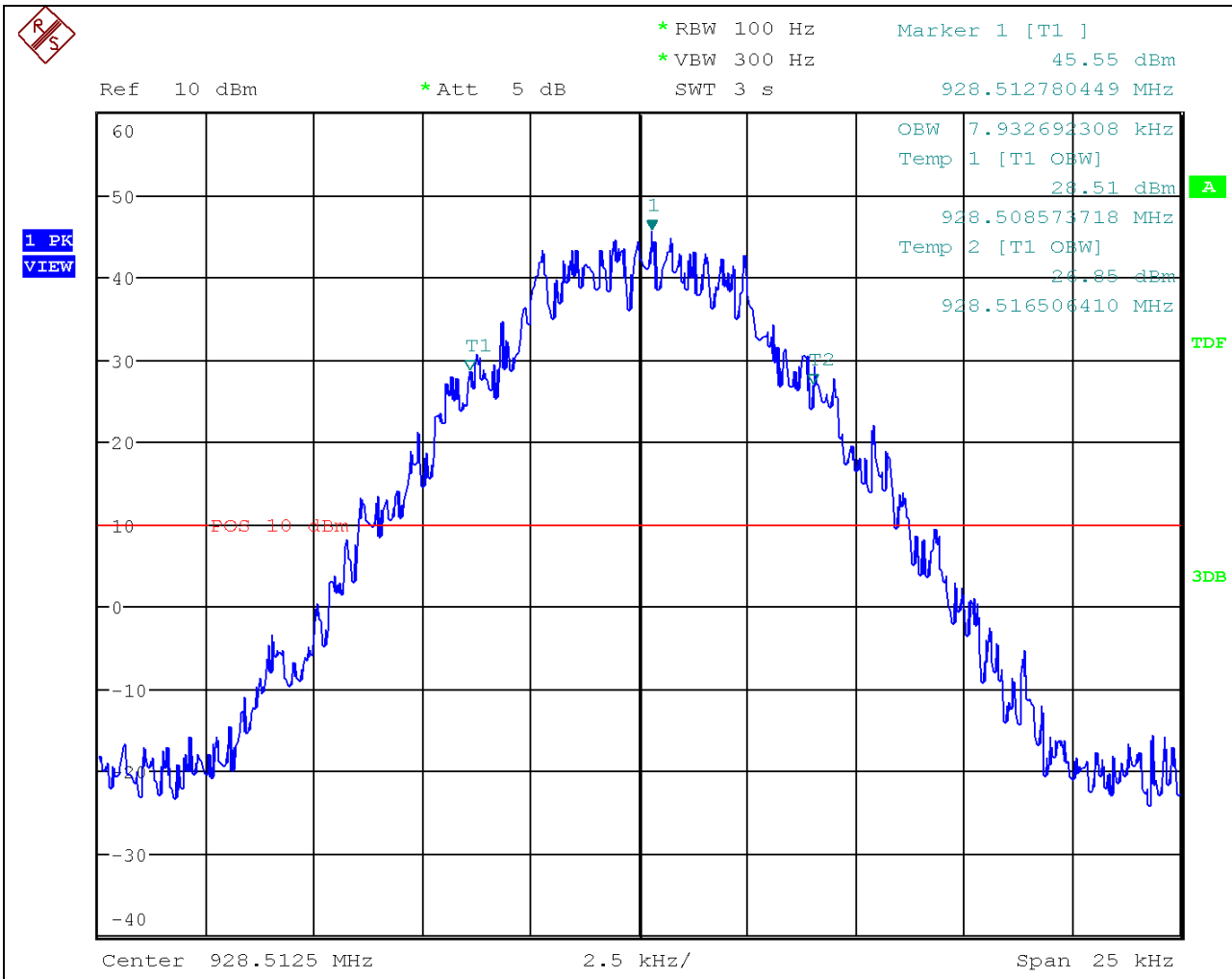
Input-versus-output Signal Comparison – 928-929 - Output With AGC – 8K10F7W



p1880019_iocomp_b1_8k10f7w_inp24

Date: 15.NOV.2018 02:11:37

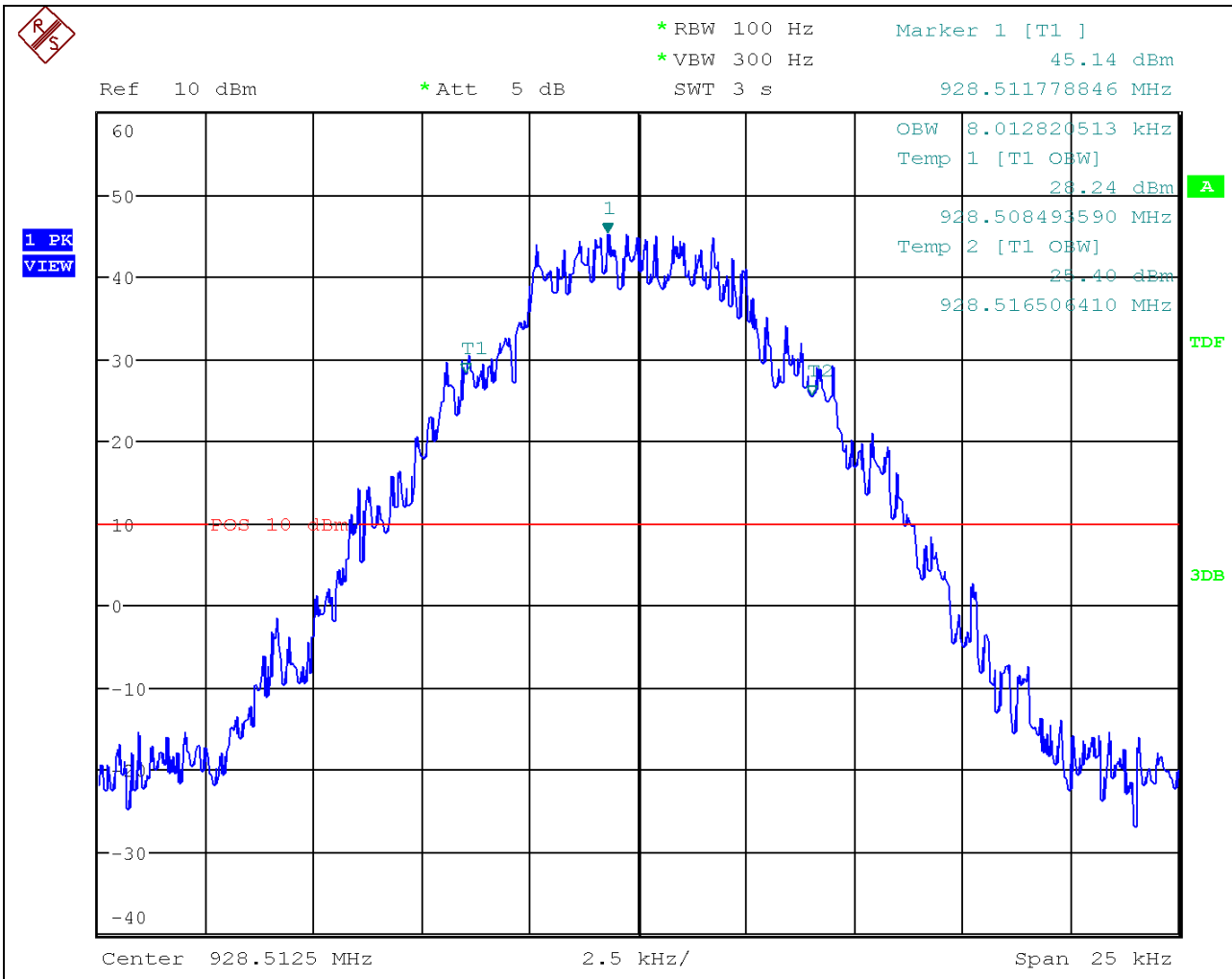
Input-versus-output Signal Comparison – 928-929 - Output Without AGC – 7K60FXE



p1880019_iocomp_b1_7k60fxe_inp21

Date: 15.NOV.2018 02:17:49

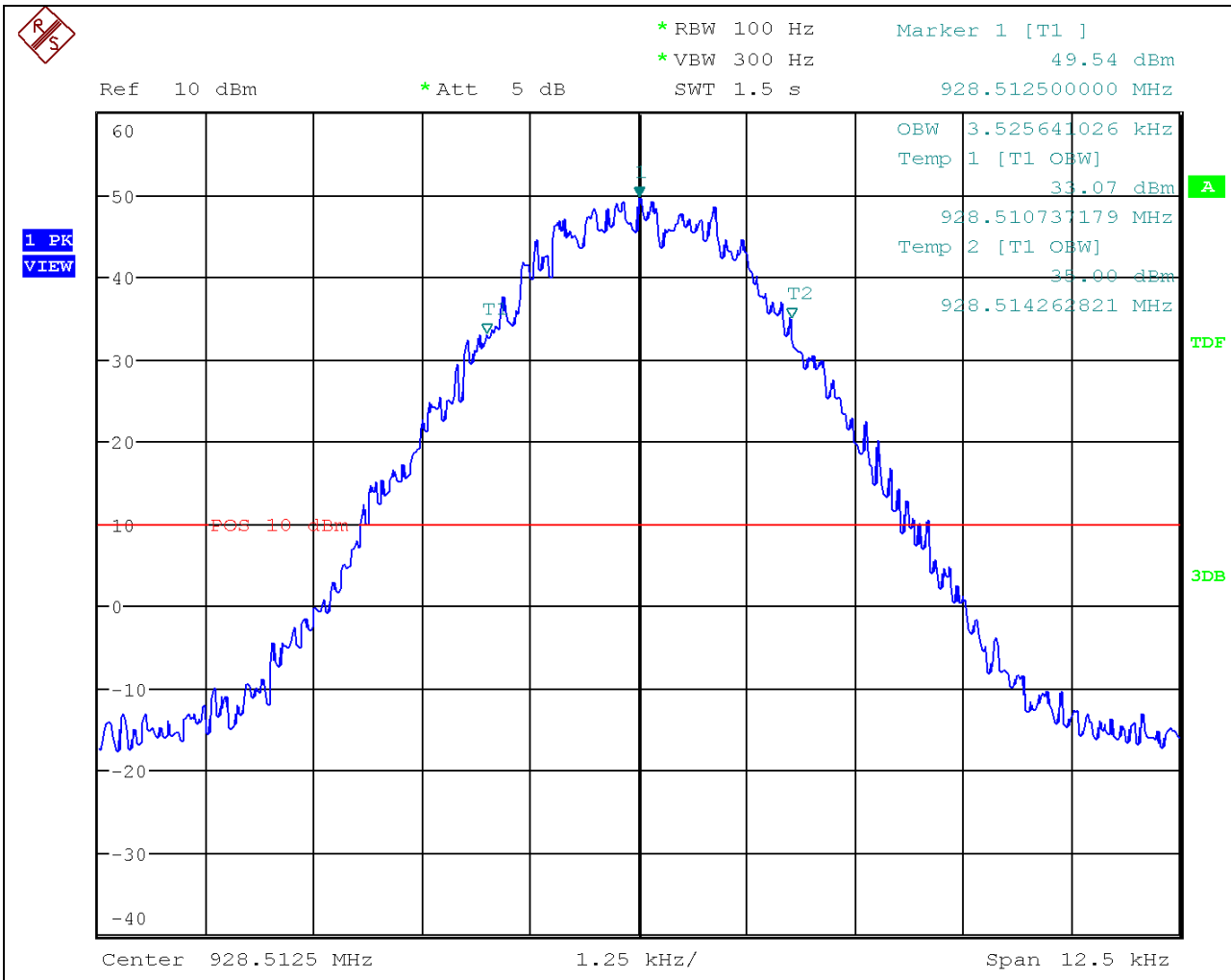
Input-versus-output Signal Comparison – 928-929 - Output With AGC – 7K60FXE



p1880019_iocomp_b1_7k60fxe_inp24

Date: 15.NOV.2018 02:16:52

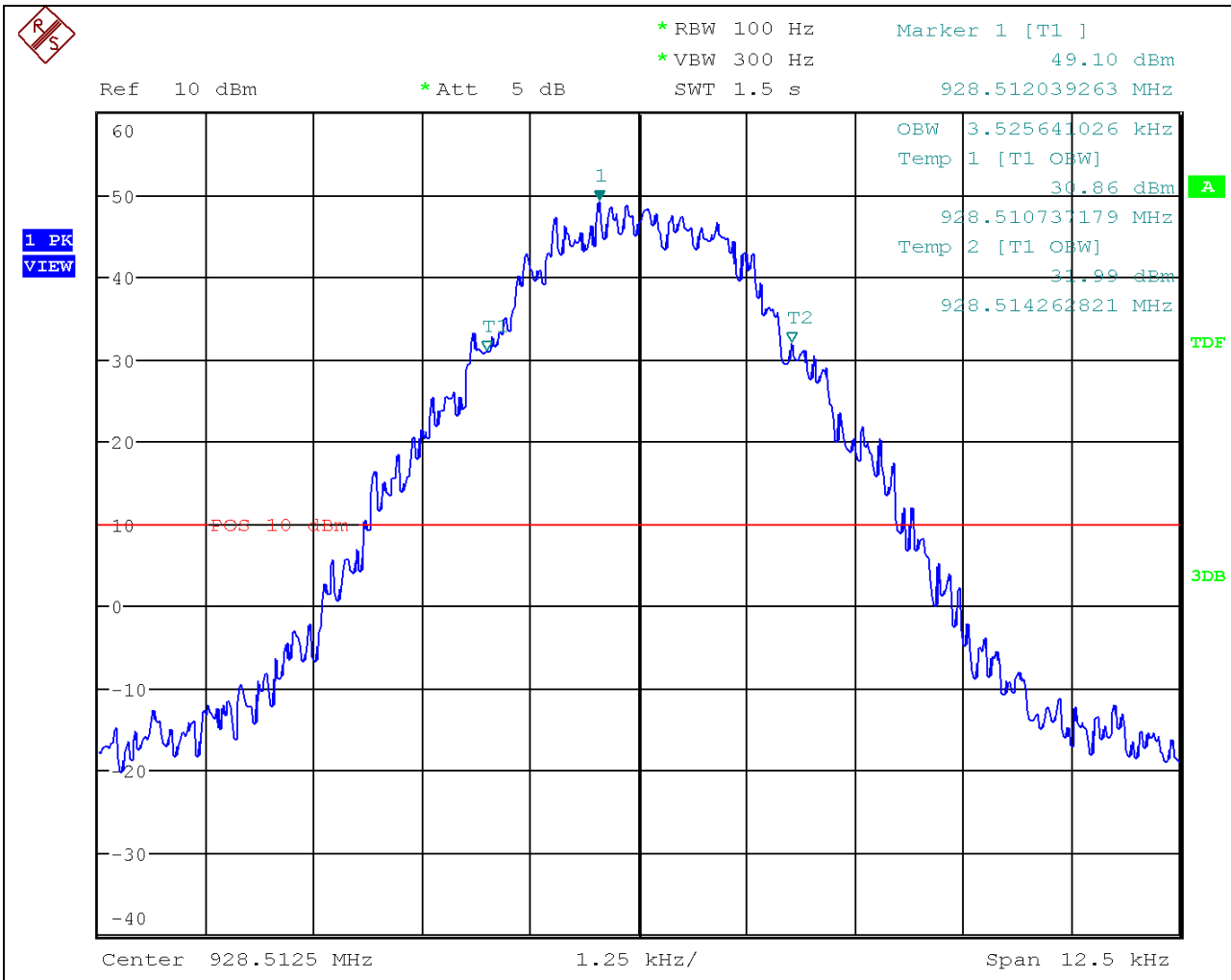
Input-versus-output Signal Comparison – 928-929 - Output Without AGC – 4K00F2D



p1880019_iocomp_b1_4k00f2d_inp21

Date: 15.NOV.2018 02:34:37

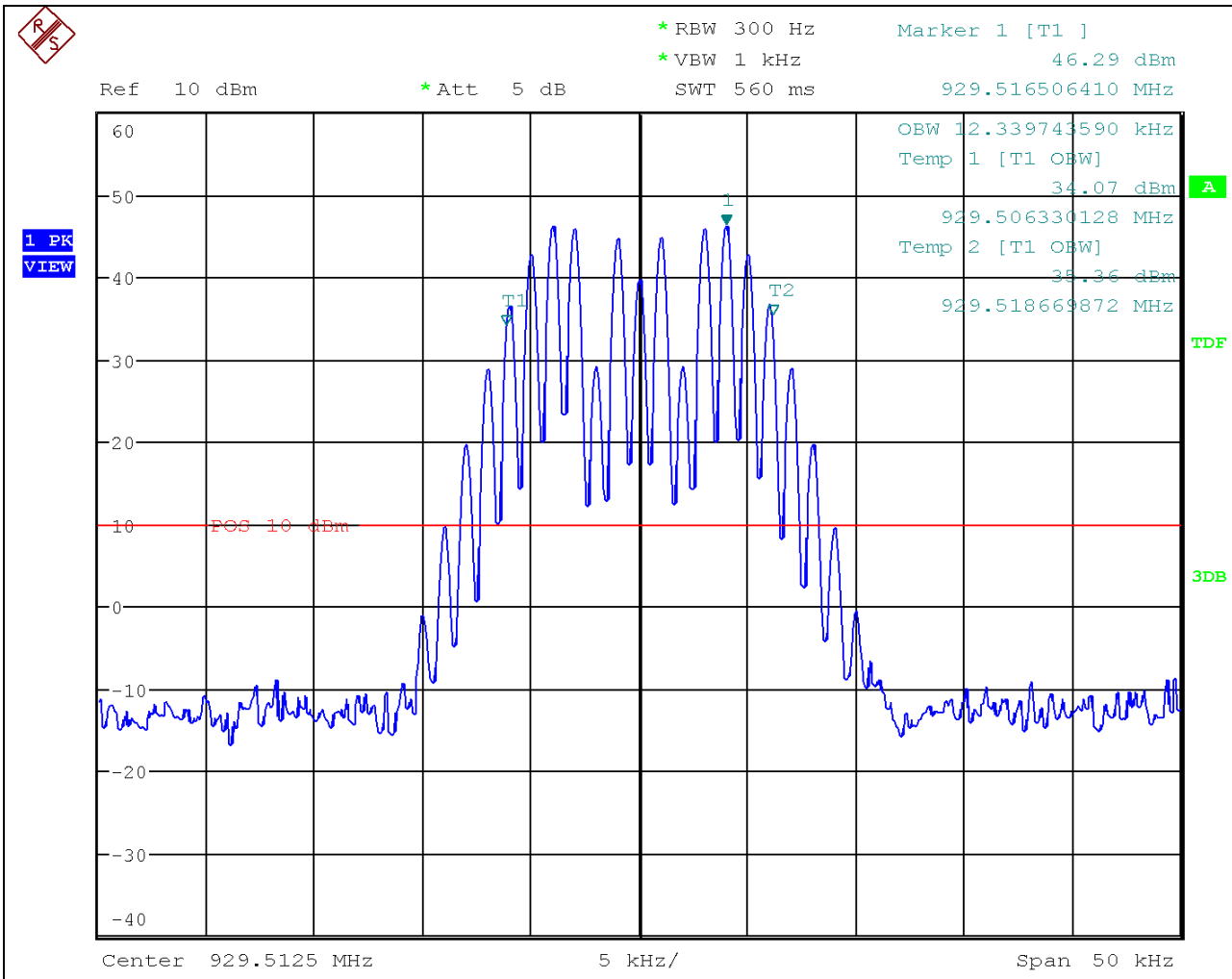
Input-versus-output Signal Comparison – 928-929 - Output With AGC – 4K00F2D



p1880019_iocomp_b1_4k00f2d_inp24

Date: 15.NOV.2018 02:33:19

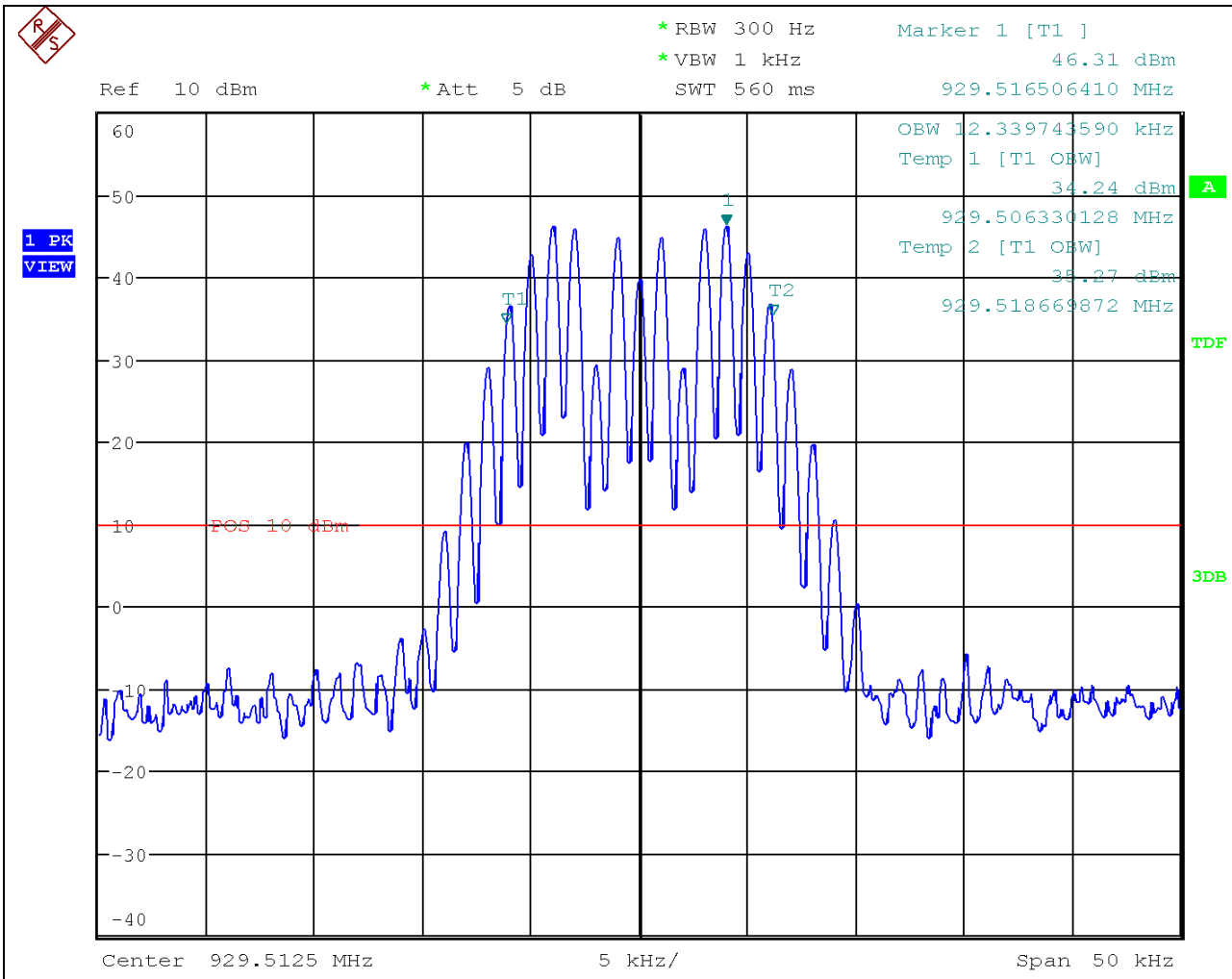
Input-versus-output Signal Comparison – 929-930 - Output Without AGC – 16K0F3E



p1880019_iocomp_b2_16k0f3e_inp21

Date: 15.NOV.2018 01:39:05

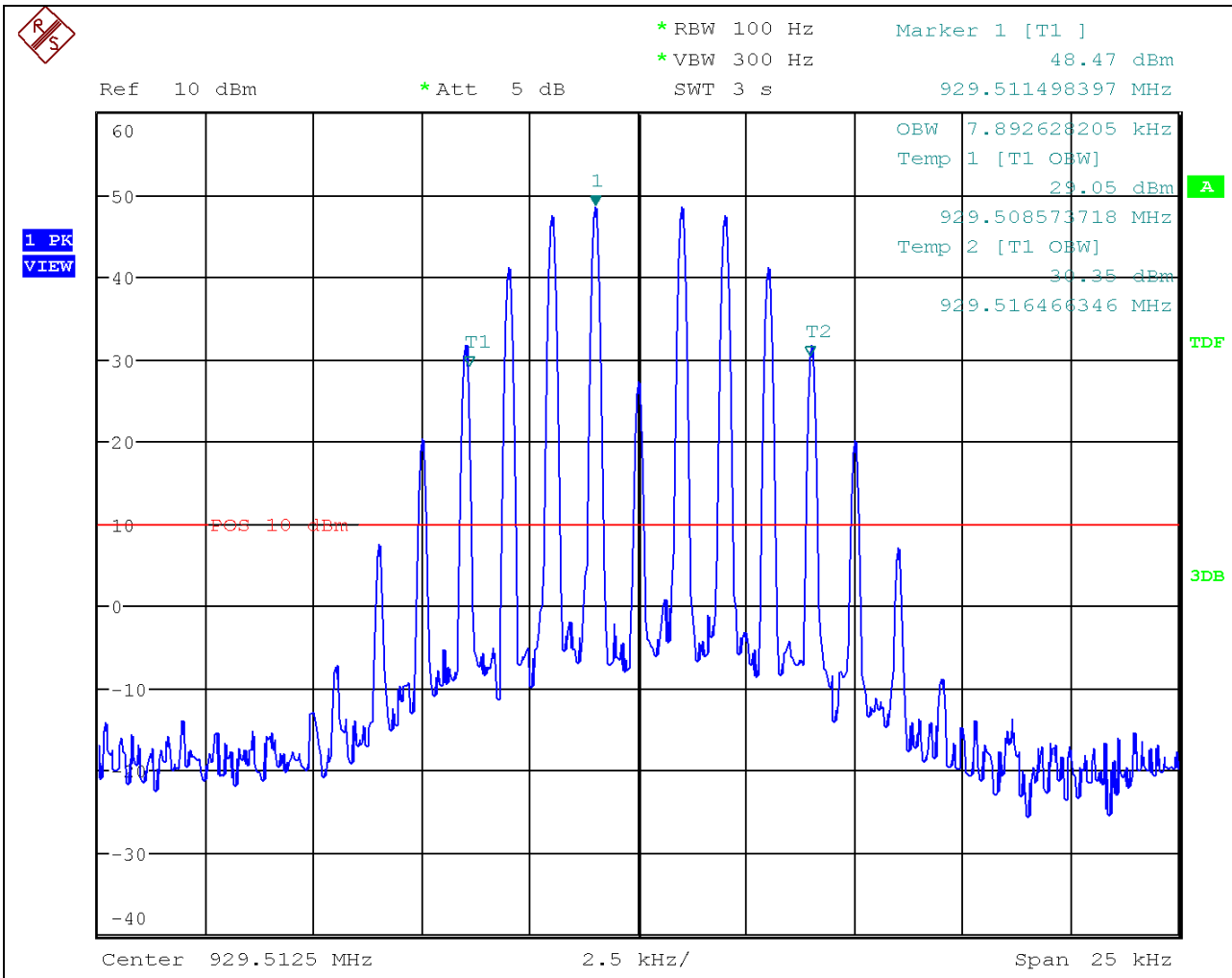
Input-versus-output Signal Comparison – 929-930 - Output With AGC – 16K0F3E



p1880019_iocomp_b2_16k0f3e_inp24

Date: 15.NOV.2018 01:40:01

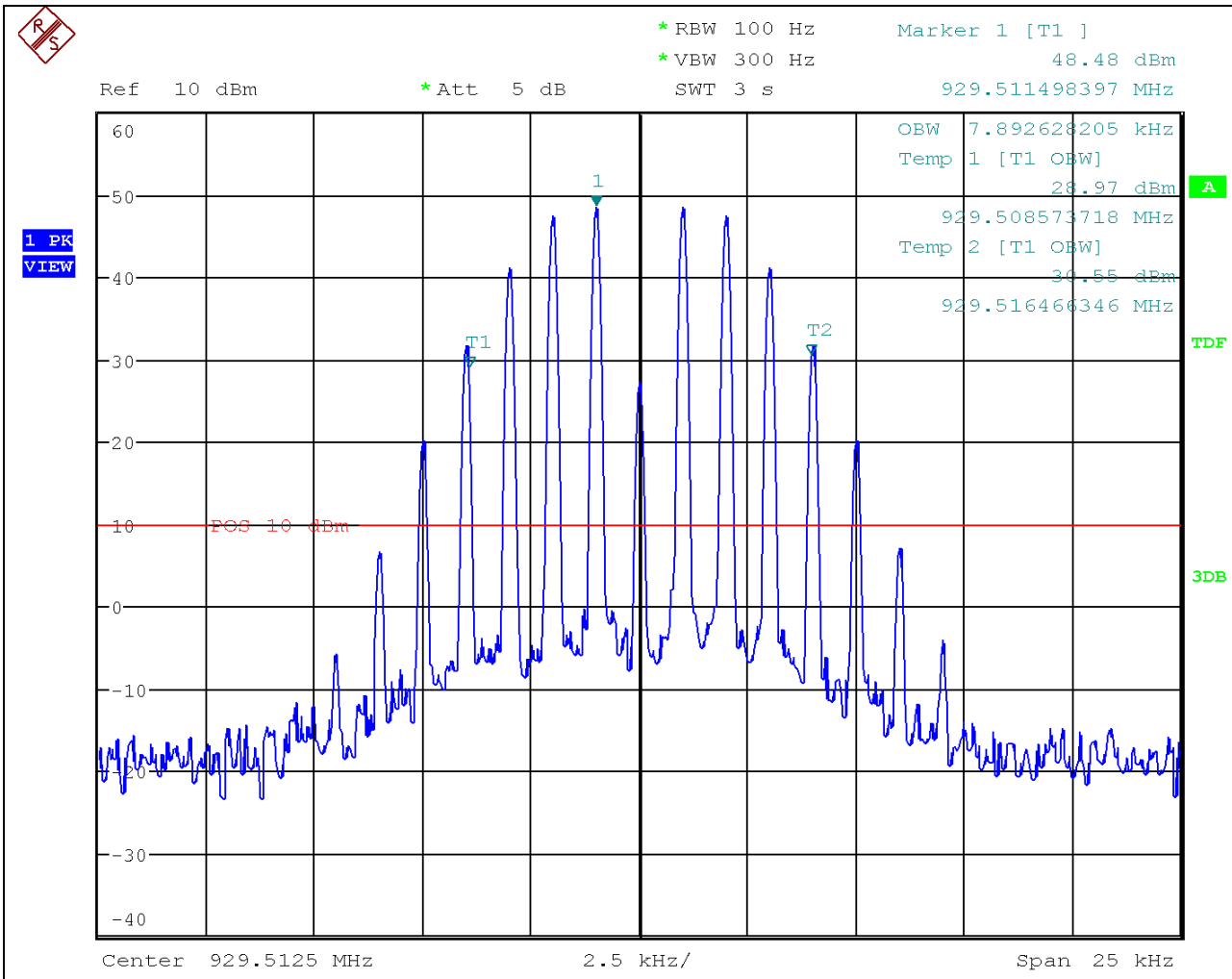
Input-versus-output Signal Comparison – 929-930 - Output Without AGC – 11K3F3E



p1880019_iocomp_b2_11k3f3e_inp21

Date: 15.NOV.2018 01:48:00

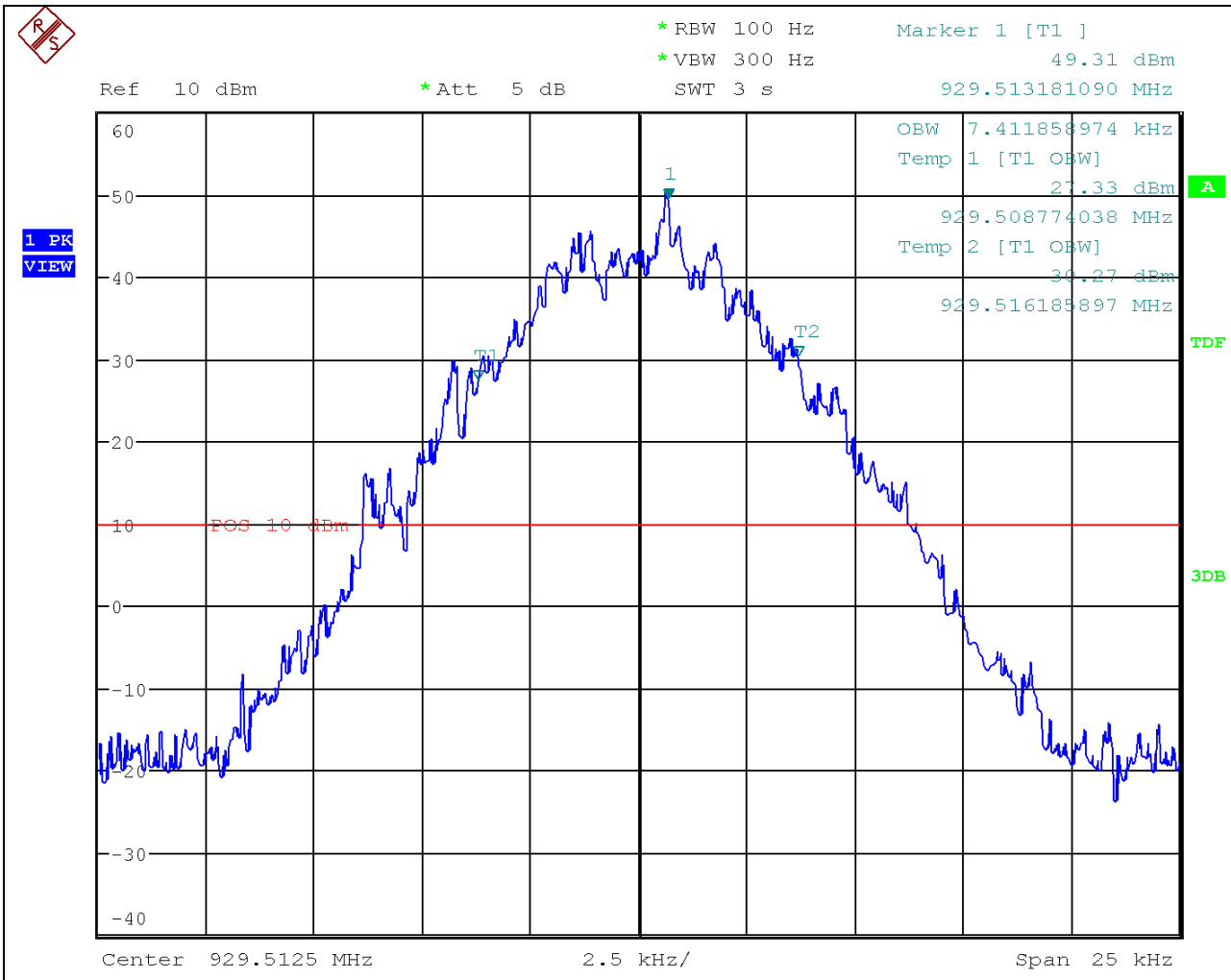
Input-versus-output Signal Comparison – 929-930 - Output With AGC – 11K3F3E



p1880019_iocomp_b2_11k3f3e_inp24

Date: 15.NOV.2018 01:46:57

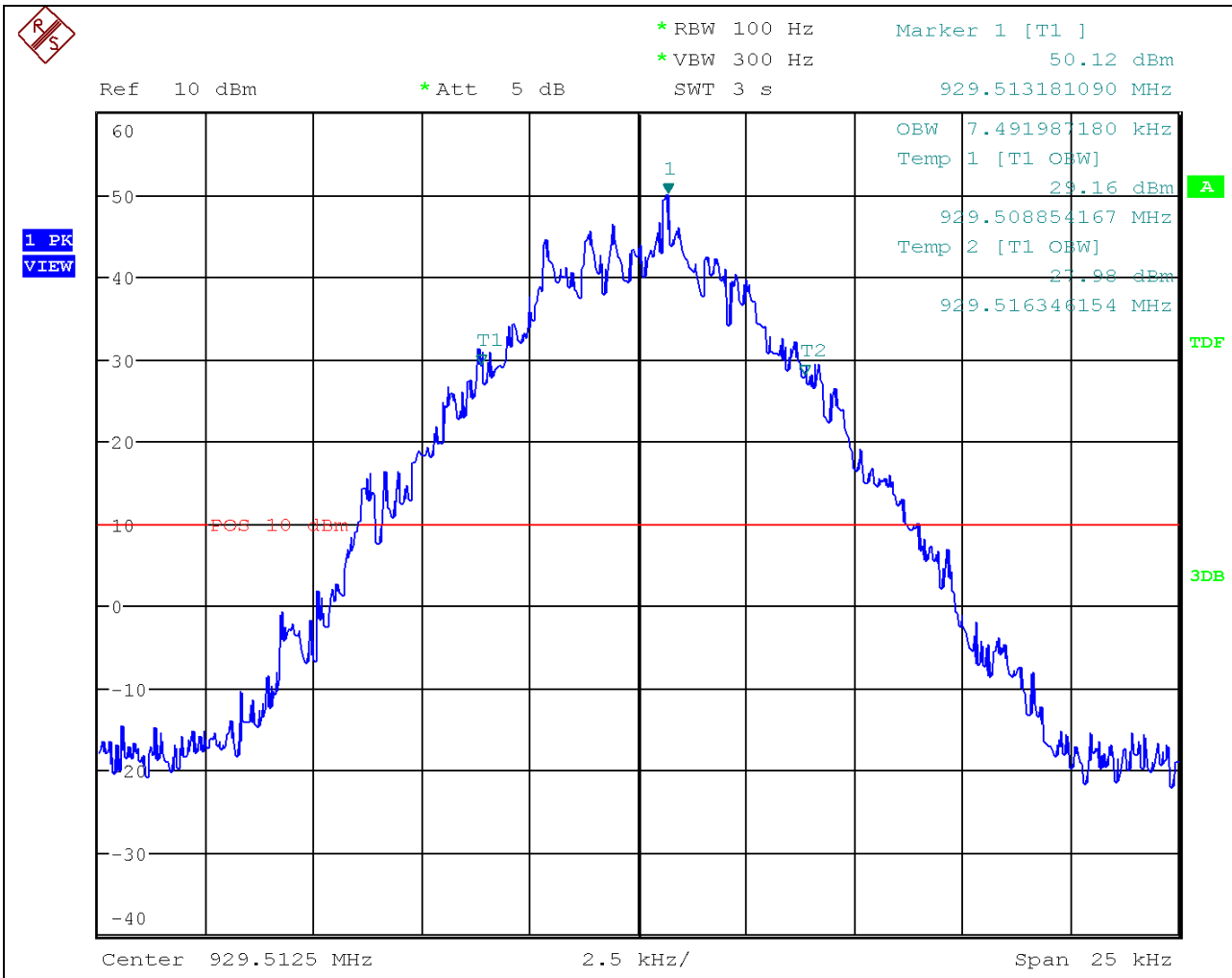
Input-versus-output Signal Comparison – 929-930 - Output Without AGC – 8K10F1W



p1880019_iocomp_b2_8k10f1w_inp21

Date: 15.NOV.2018 02:01:02

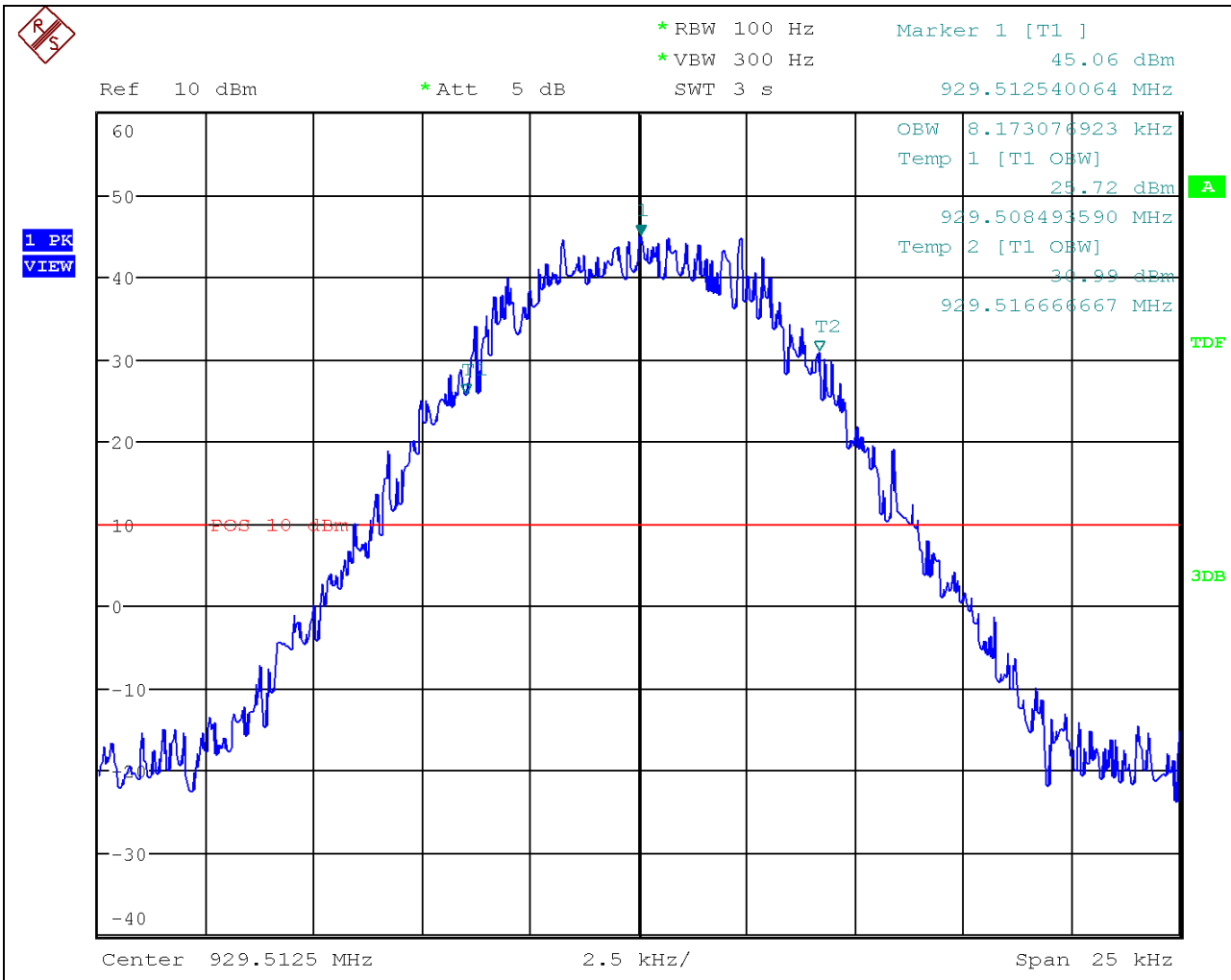
Input-versus-output Signal Comparison – 929-930 - Output With AGC – 8K10F1W



p1880019_iocomp_b2_8k10f1w_inp24

Date: 15.NOV.2018 02:00:02

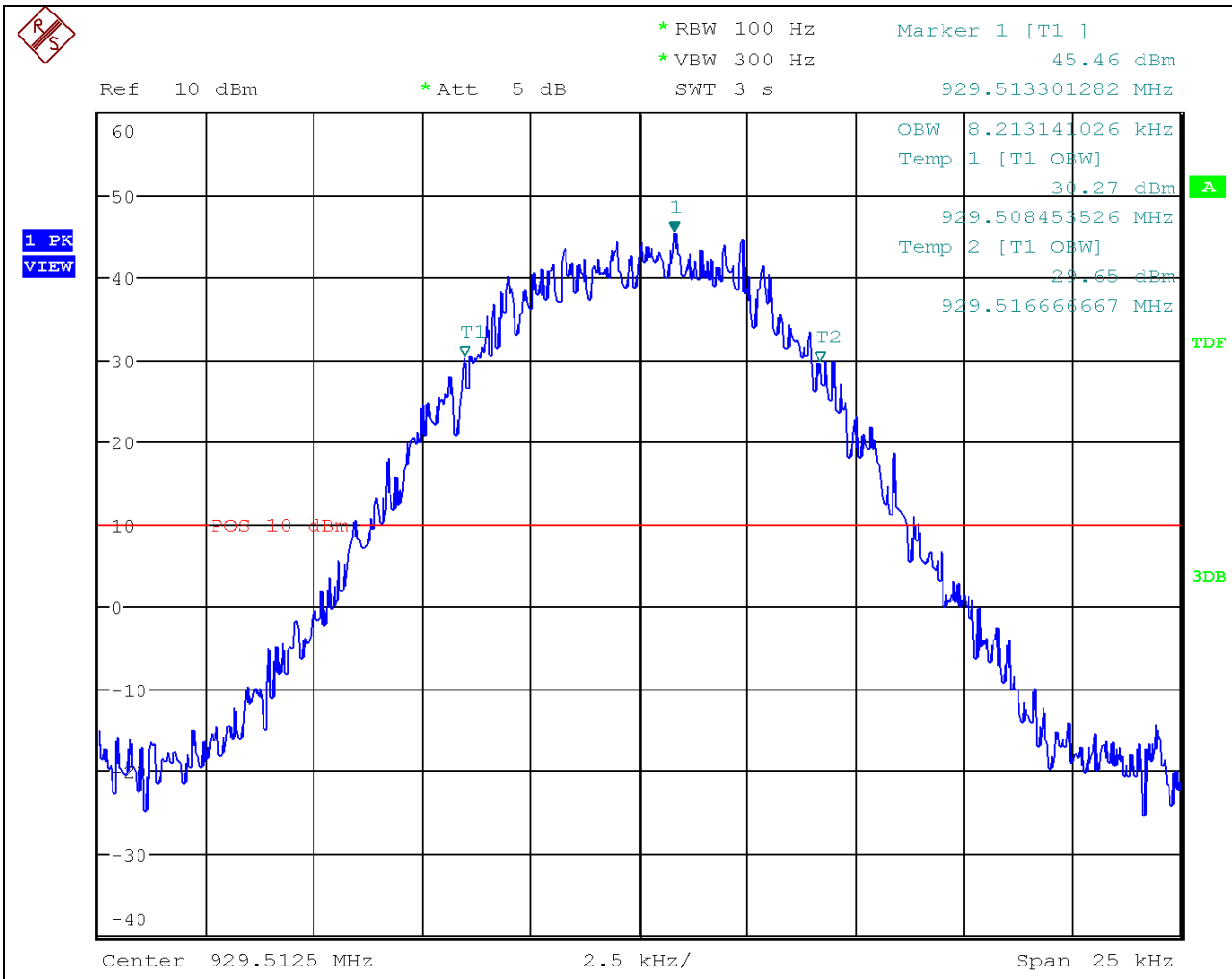
Input-versus-output Signal Comparison – 929-930 - Output Without AGC – 8K10F7W



p1880019_iocomp_b2_8k10f7w_inp21

Date: 15.NOV.2018 02:08:46

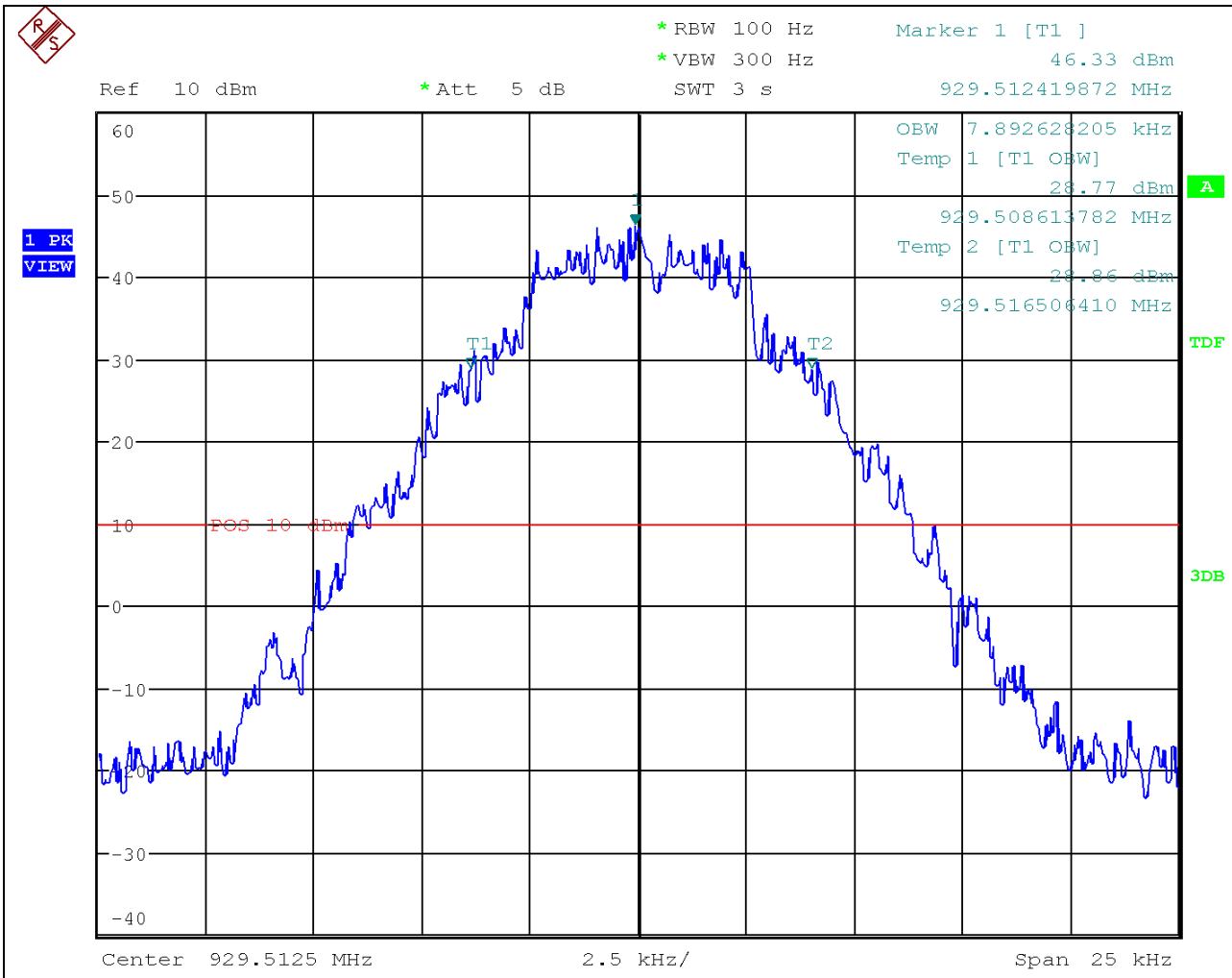
Input-versus-output Signal Comparison – 929-930 - Output With AGC – 8K10F7W



p1880019_iocomp_b2_8k10f7w_inp24

Date: 15.NOV.2018 02:10:38

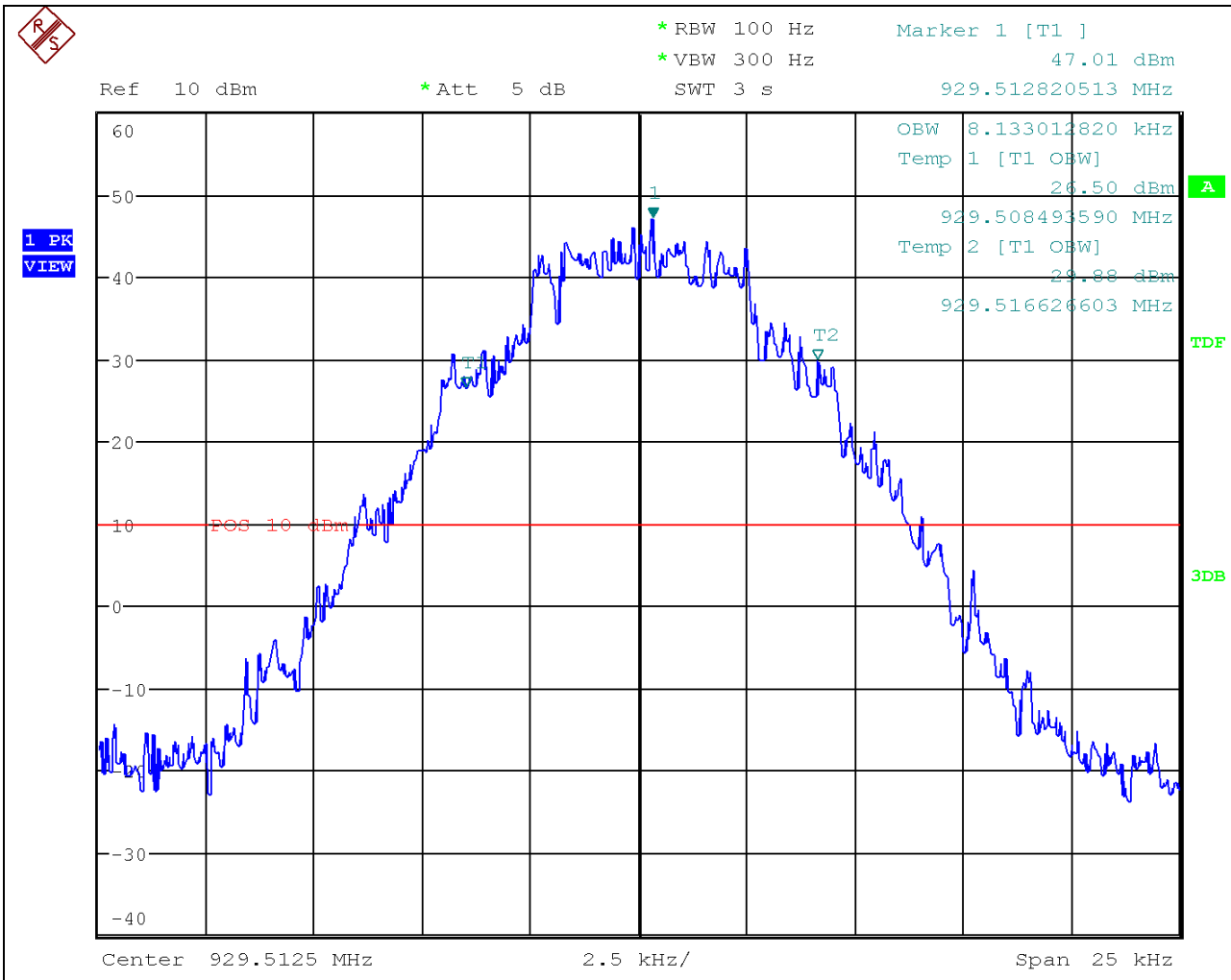
Input-versus-output Signal Comparison – 929-930 - Output Without AGC – 7K60FXE



p1880019_iocomp_b2_7k60fxe_inp21

Date: 15.NOV.2018 02:19:08

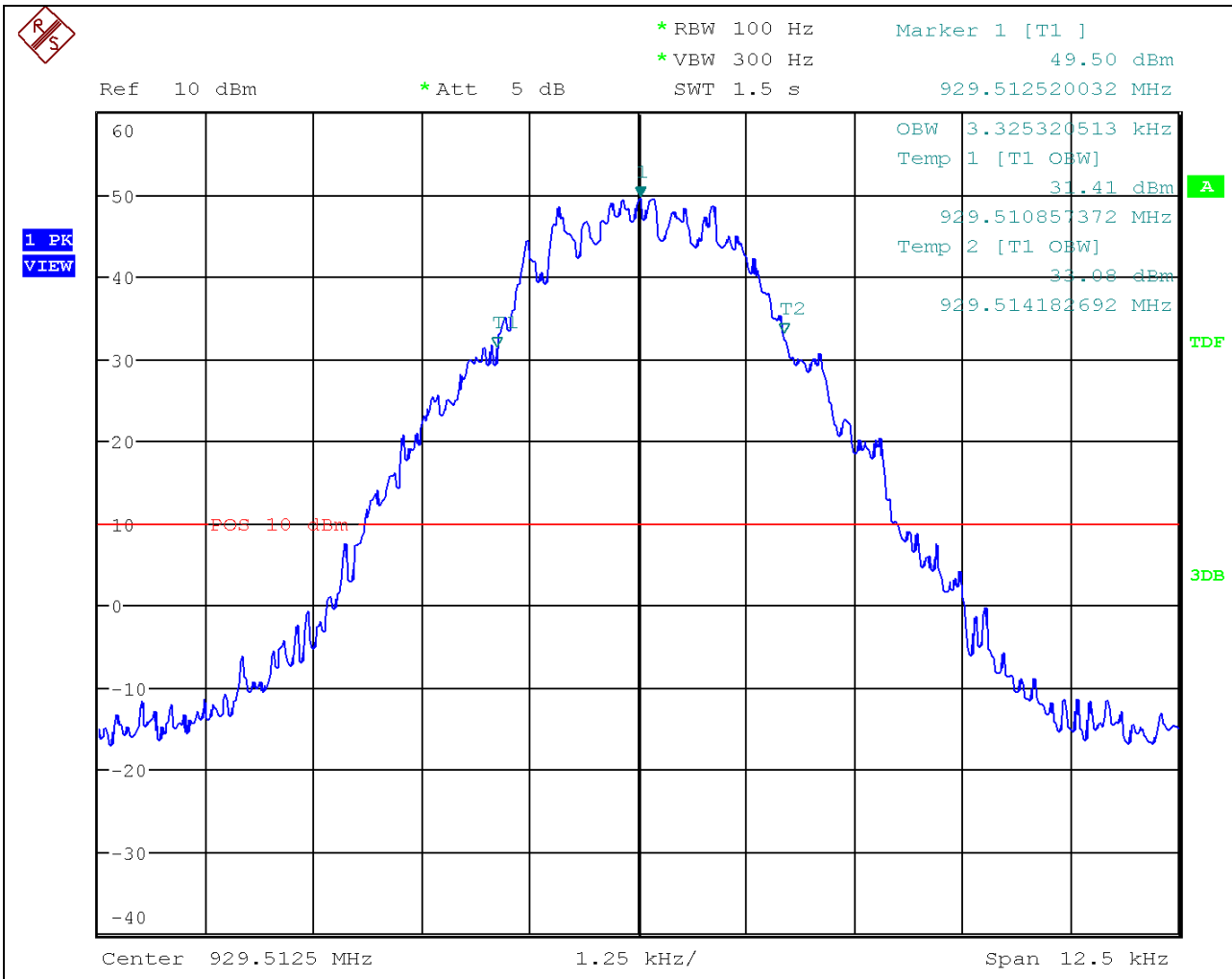
Input-versus-output Signal Comparison – 929-930 - Output With AGC – 7K60FXE



p1880019_iocomp_b2_7k60fxe_inp24

Date: 15.NOV.2018 02:20:16

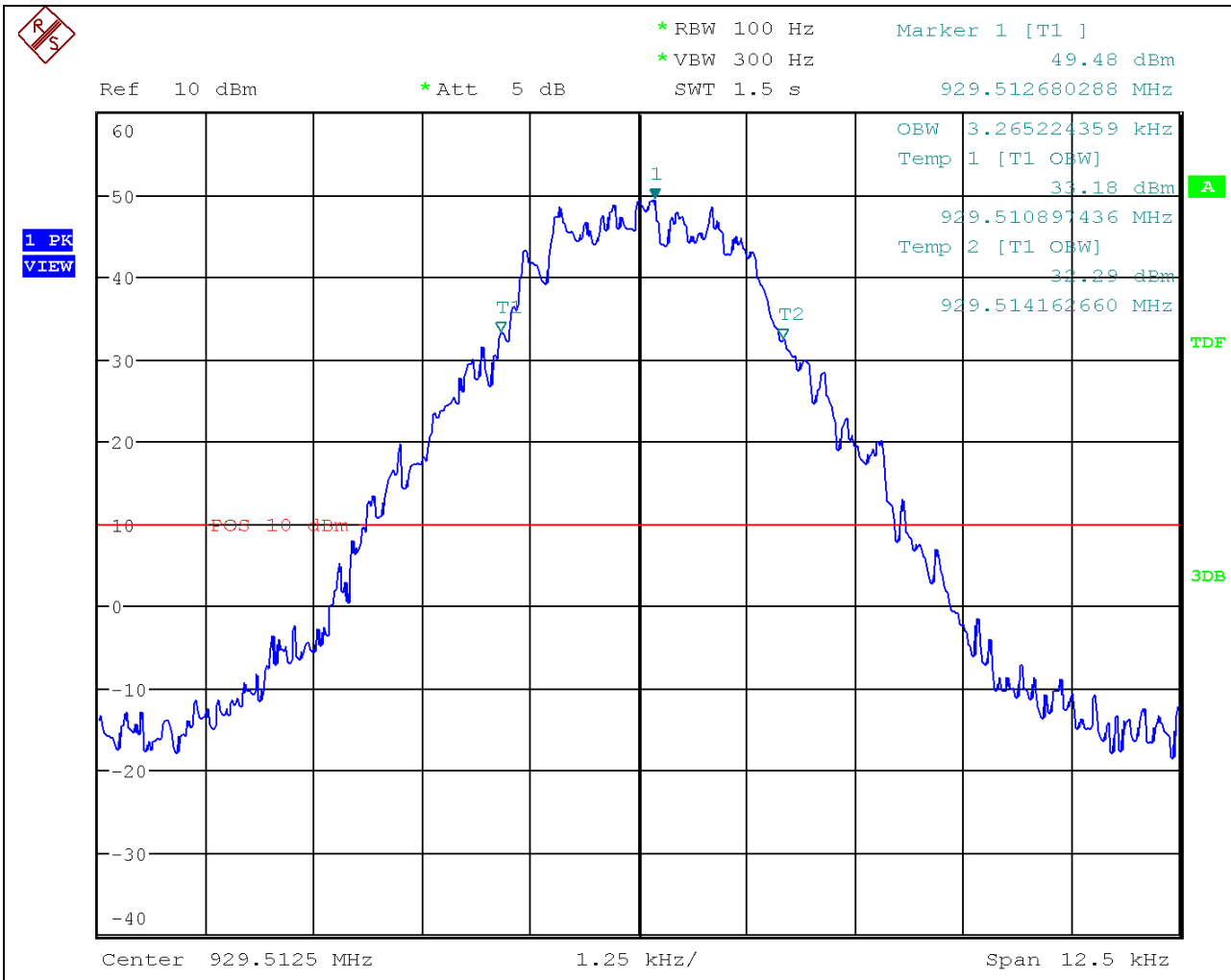
Input-versus-output Signal Comparison – 929-930 - Output Without AGC – 4K00F2D



p1880019_iocomp_b2_4k00f2d_inp21

Date: 15.NOV.2018 02:31:43

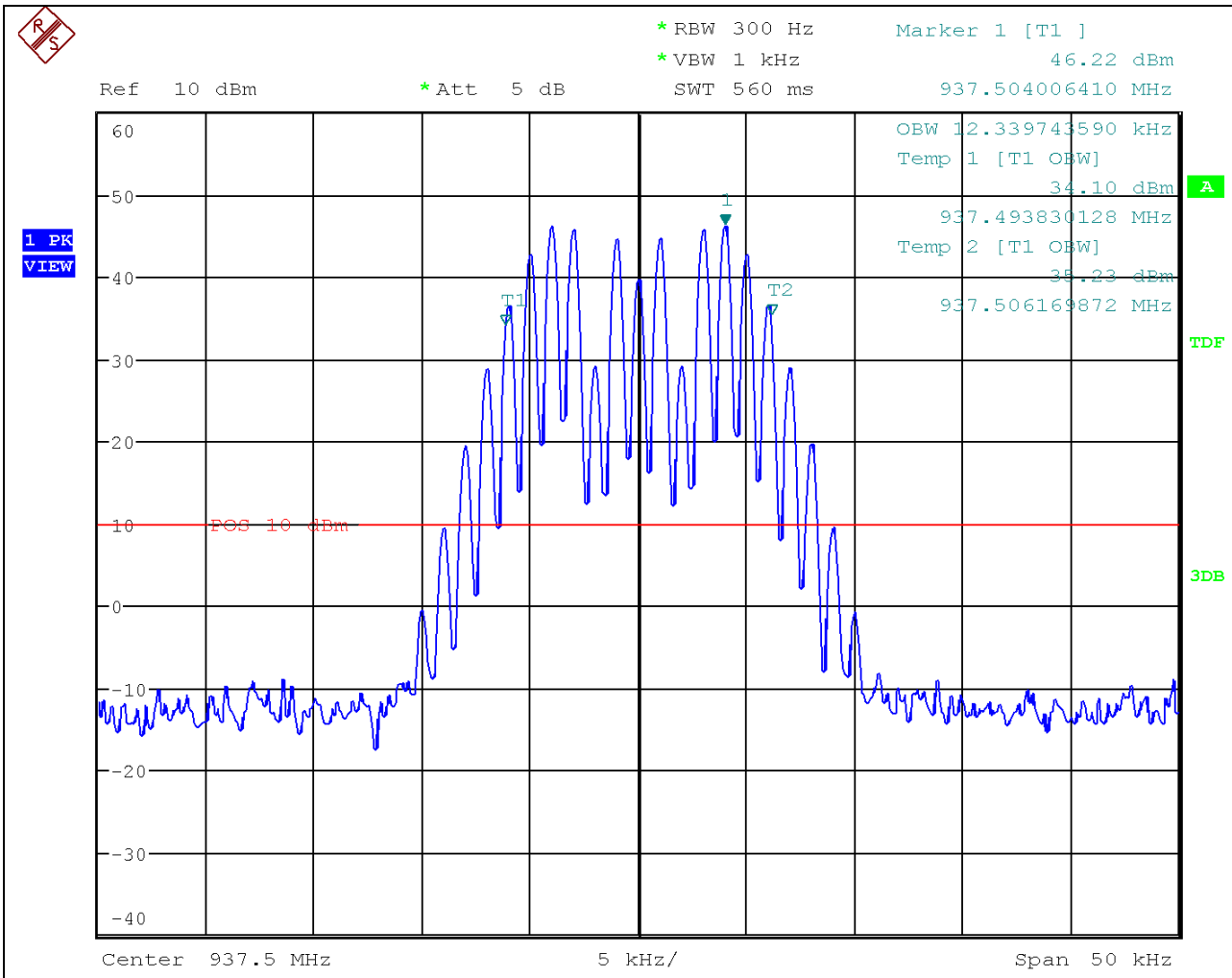
Input-versus-output Signal Comparison – 929-930 - Output With AGC – 4K00F2D



p1880019_iocomp_b2_4k00f2d_inp24

Date: 15.NOV.2018 02:32:36

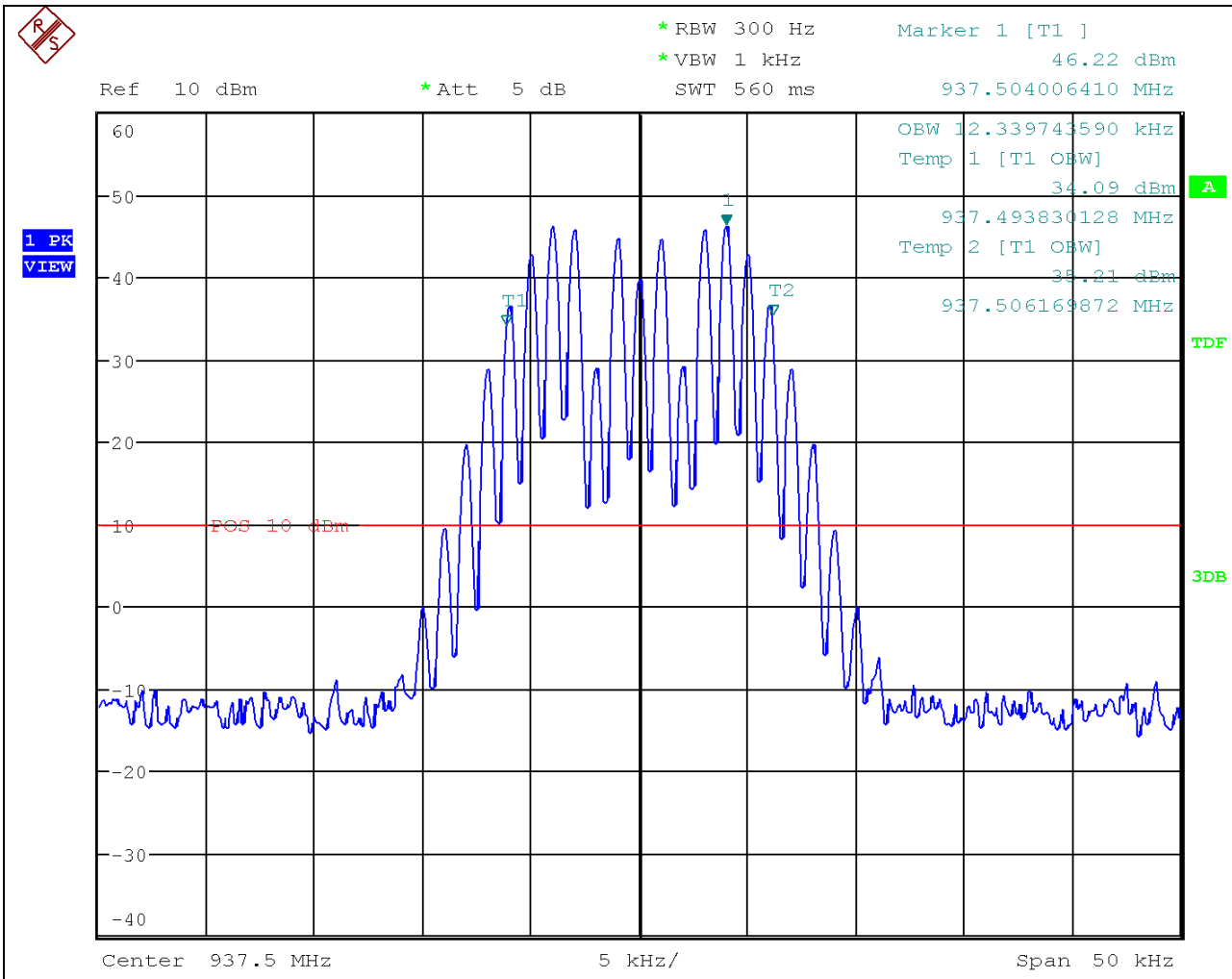
Input-versus-output Signal Comparison – 935-940 - Output Without AGC – 16K0F3E



p1880019_iocomp_b3_16k0f3e_inp21

Date: 15.NOV.2018 01:41:57

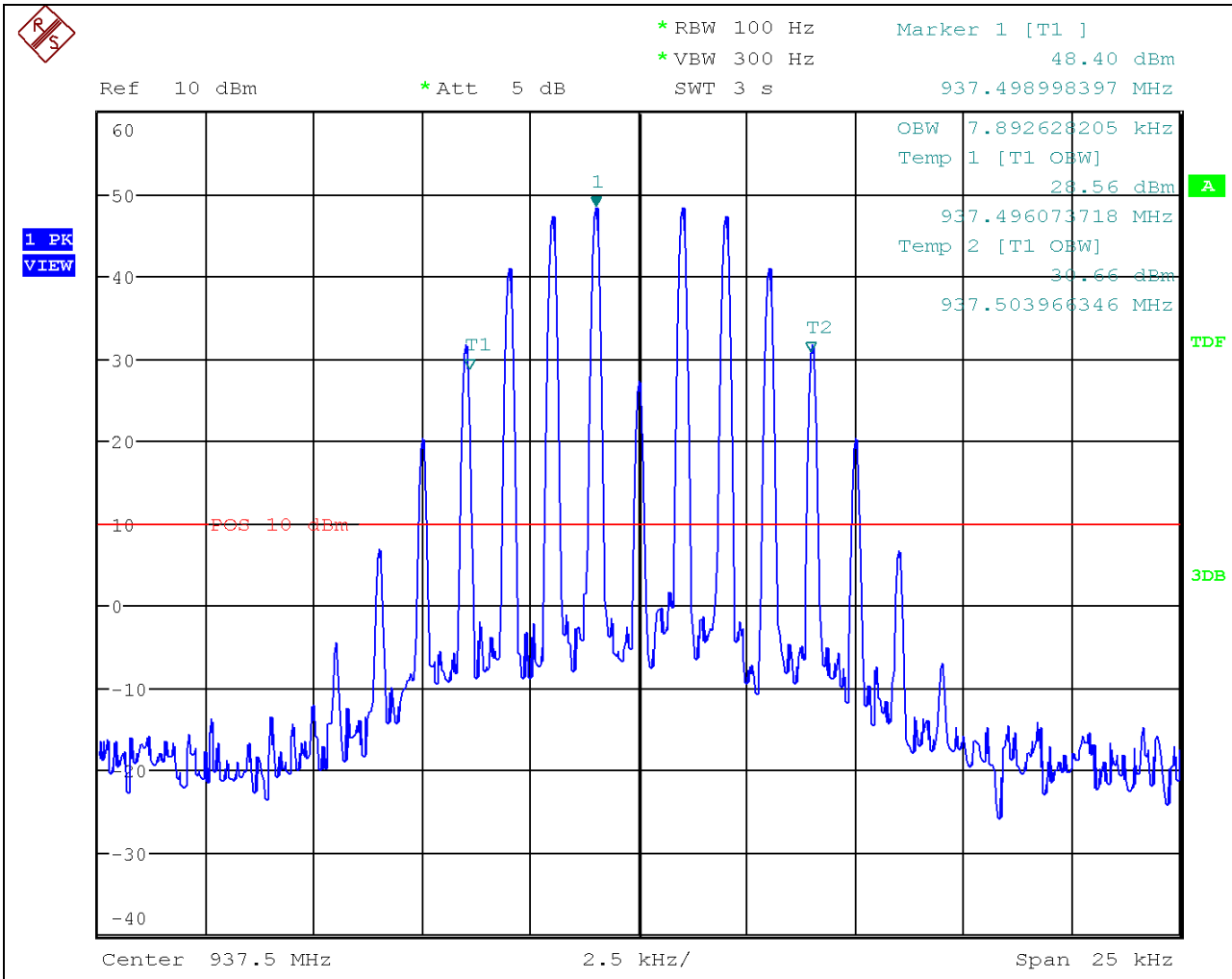
Input-versus-output Signal Comparison – 935-940 - Output With AGC – 16K0F3E



p1880019_iocomp_b3_16k0f3e_inp24

Date: 15.NOV.2018 01:41:04

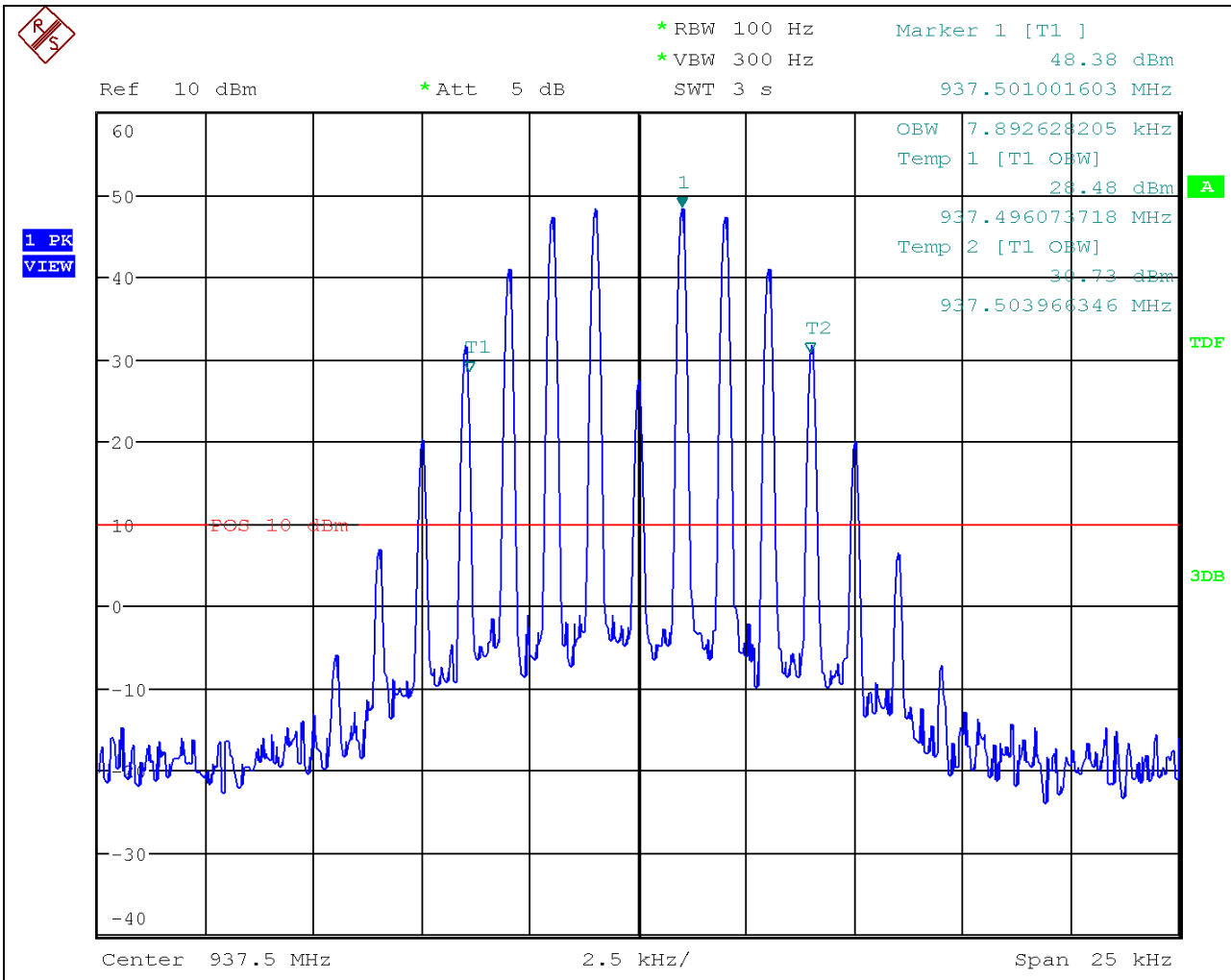
Input-versus-output Signal Comparison – 935-940 - Output Without AGC – 11K3F3E



p1880019_iocomp_b3_11k3f3e_inp21

Date: 15.NOV.2018 01:44:14

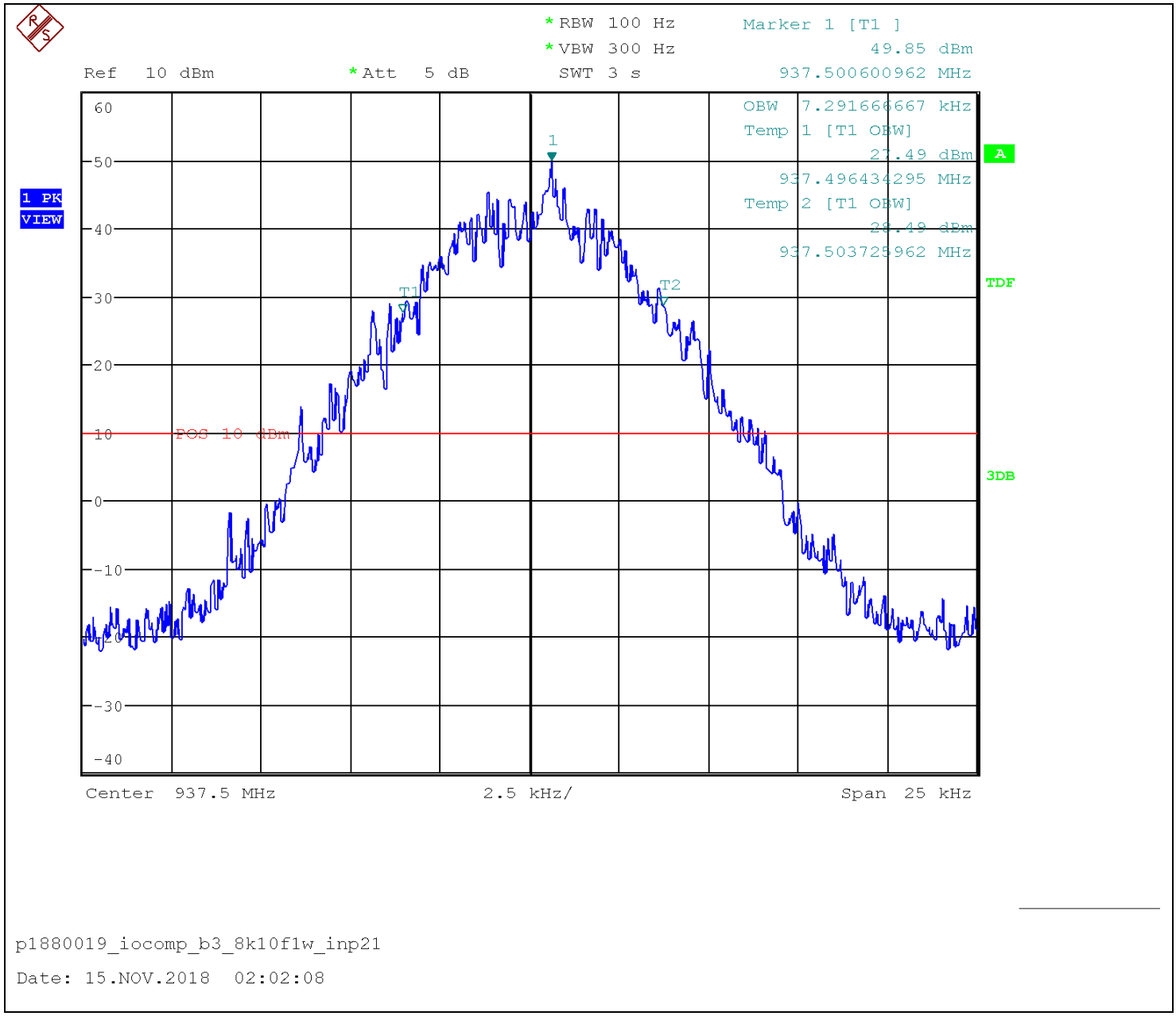
Input-versus-output Signal Comparison – 935-940 - Output With AGC – 11K3F3E



p1880019_iocomp_b3_11k3f3e_inp24

Date: 15.NOV.2018 01:45:22

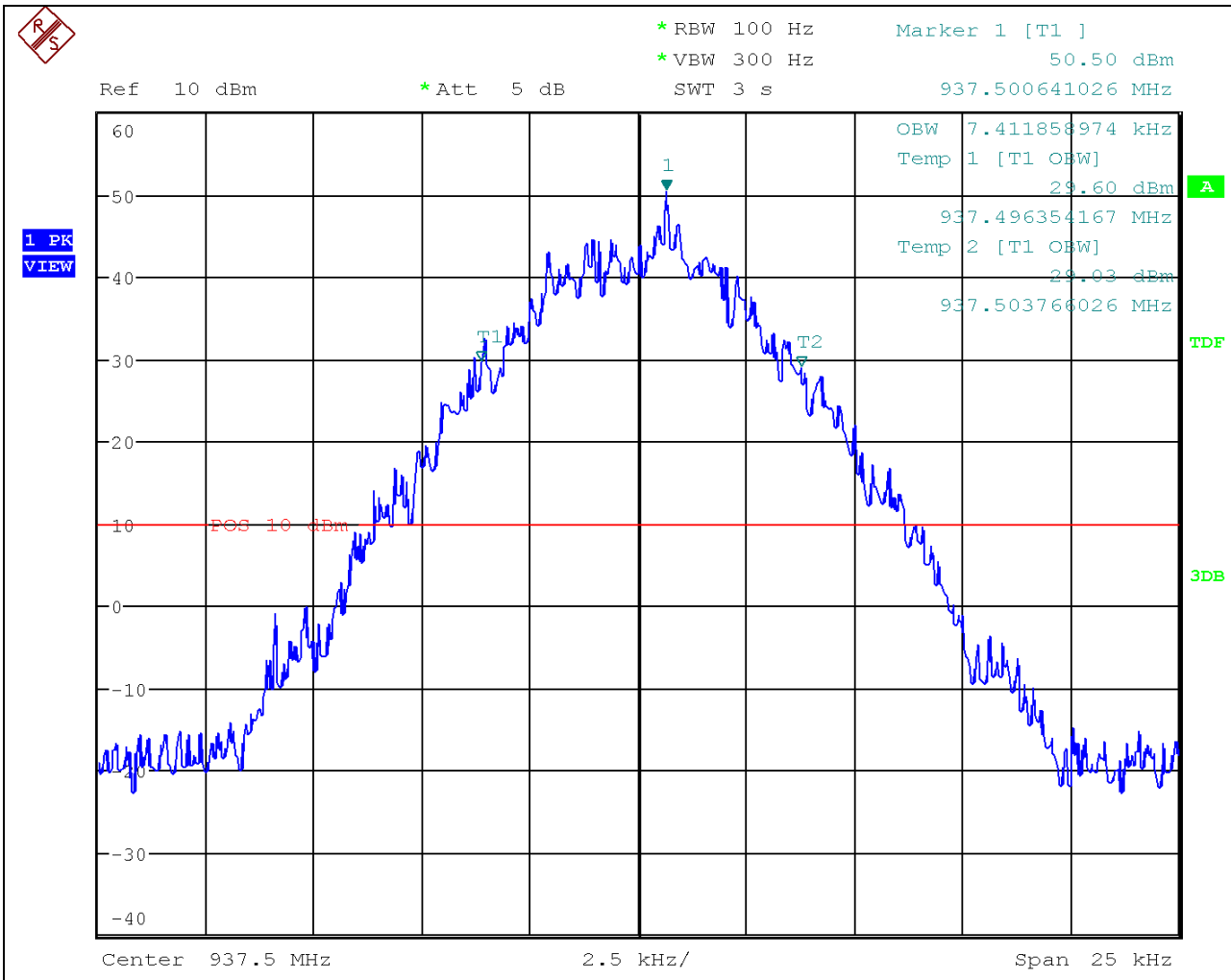
Input-versus-output Signal Comparison – 935-940 - Output Without AGC – 8K10F1W



p1880019_iocomp_b3_8k10f1w_inp21

Date: 15.NOV.2018 02:02:08

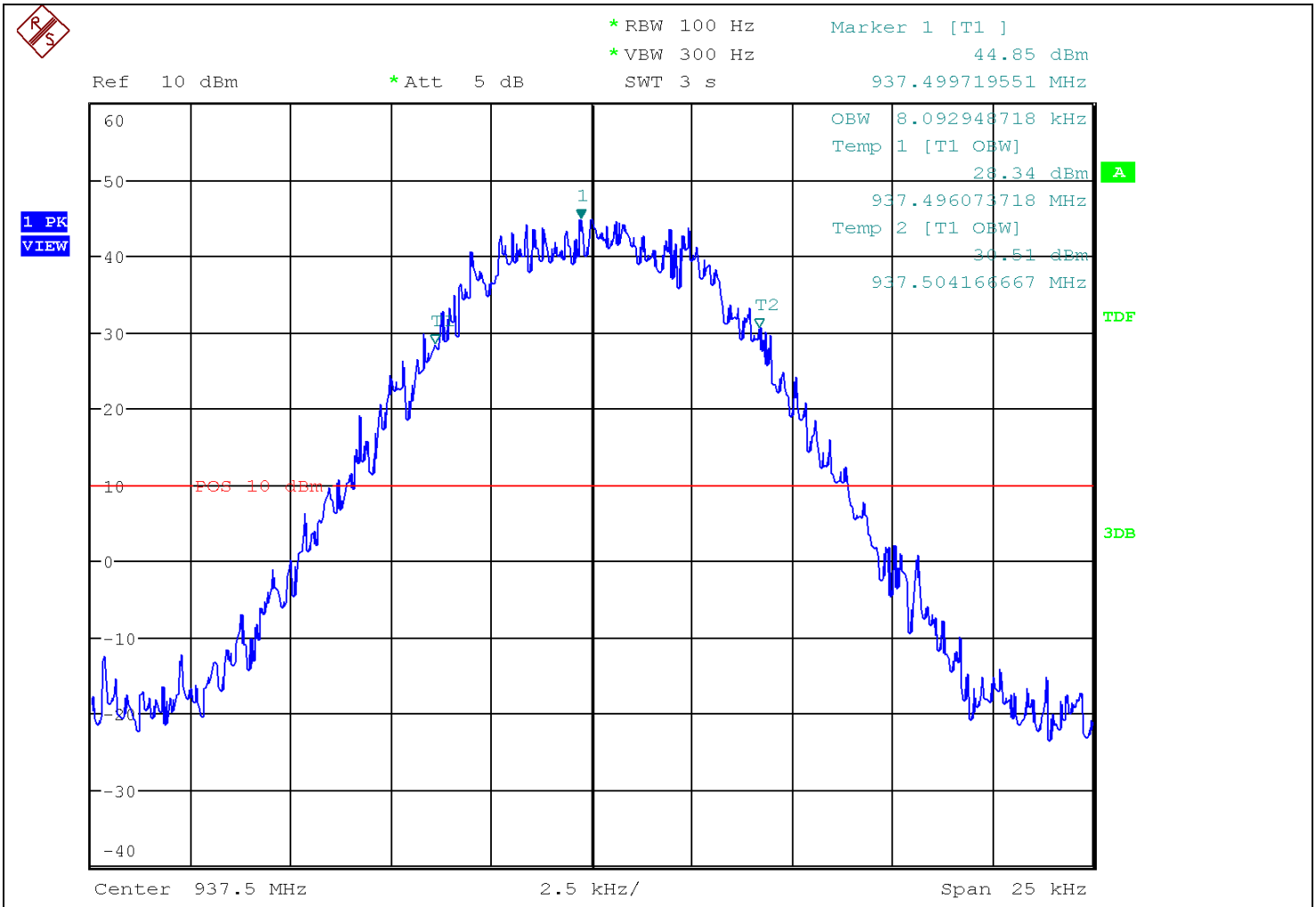
Input-versus-output Signal Comparison – 935-940 - Output With AGC – 8K10F1W



p1880019_iocomp_b3_8k10f1w_inp24

Date: 15.NOV.2018 02:03:11

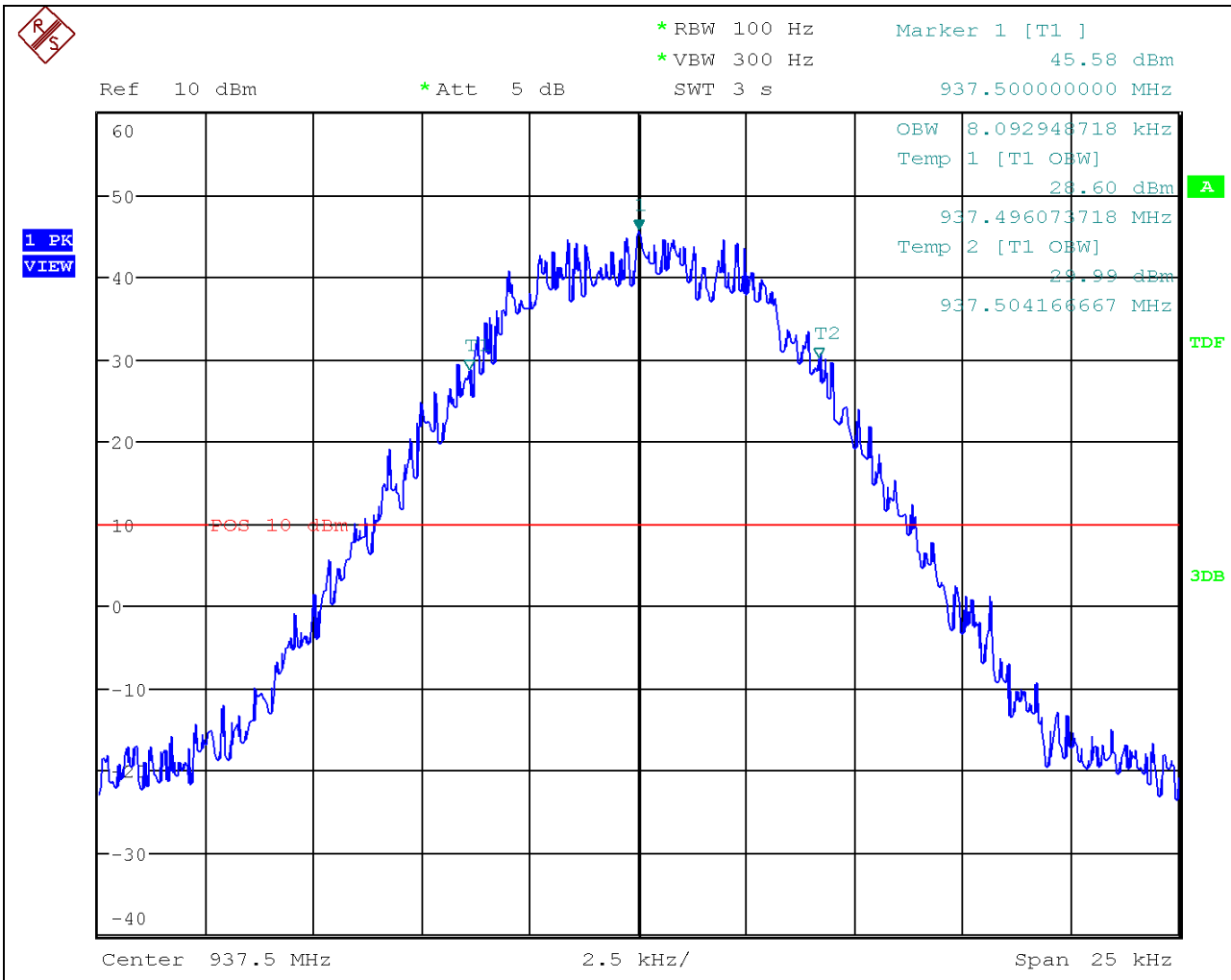
Input-versus-output Signal Comparison – 935-940 - Output Without AGC – 8K10F7W



p1880019_iocomp_b3_8k10f7w_inp21

Date: 15.NOV.2018 02:07:14

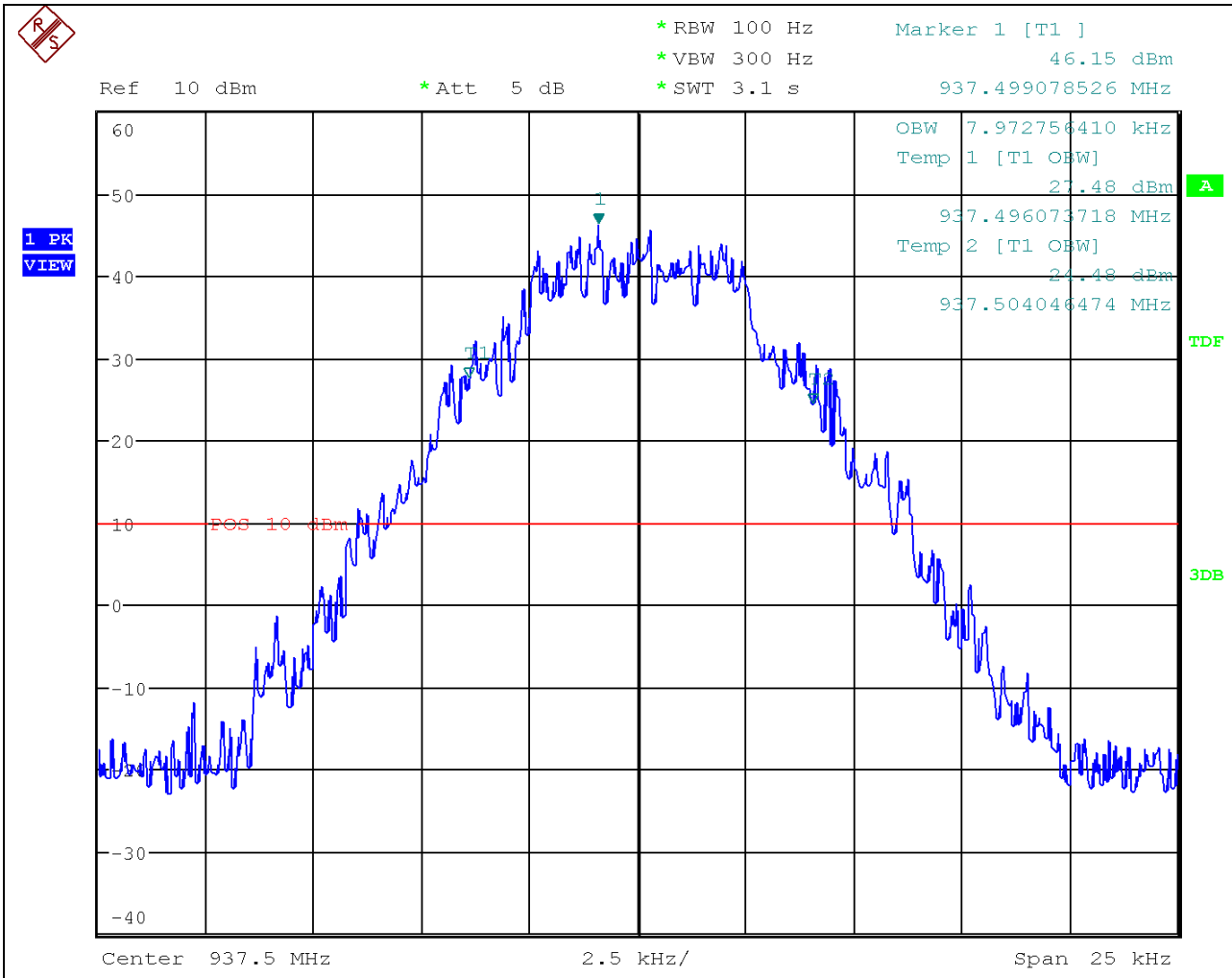
Input-versus-output Signal Comparison – 935-940 - Output With AGC – 8K10F7W



p1880019_iocomp_b3_8k10f7w_inp24

Date: 15.NOV.2018 02:05:55

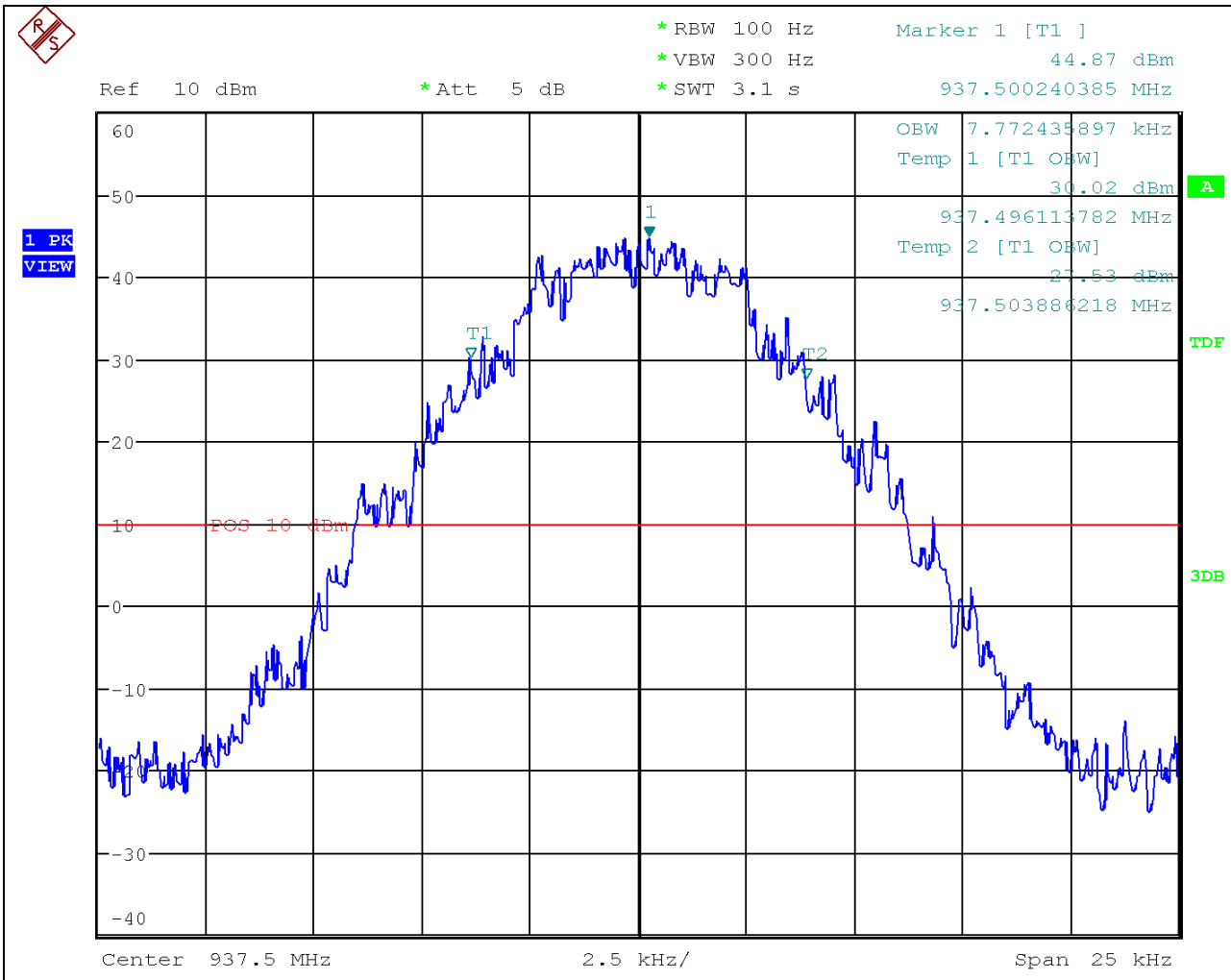
Input-versus-output Signal Comparison – 935-940 - Output Without AGC – 7K60FXE



p1880019_iocomp_b3_7k60fxe_inp21

Date: 15.NOV.2018 02:26:06

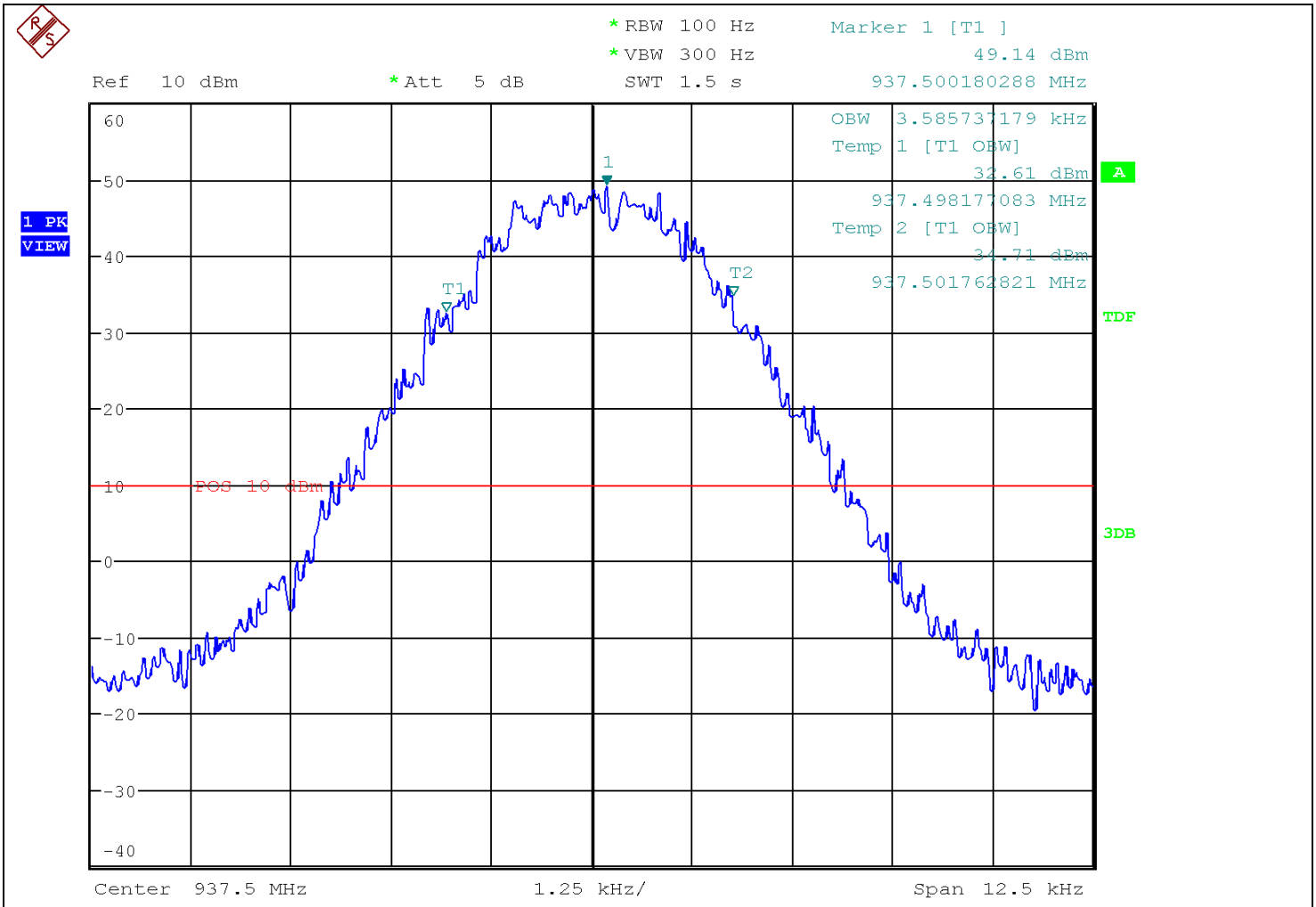
Input-versus-output Signal Comparison – 935-940 - Output With AGC – 7K60FXE



p1880019_iocomp_b3_7k60fxe_inp24

Date: 15.NOV.2018 02:25:11

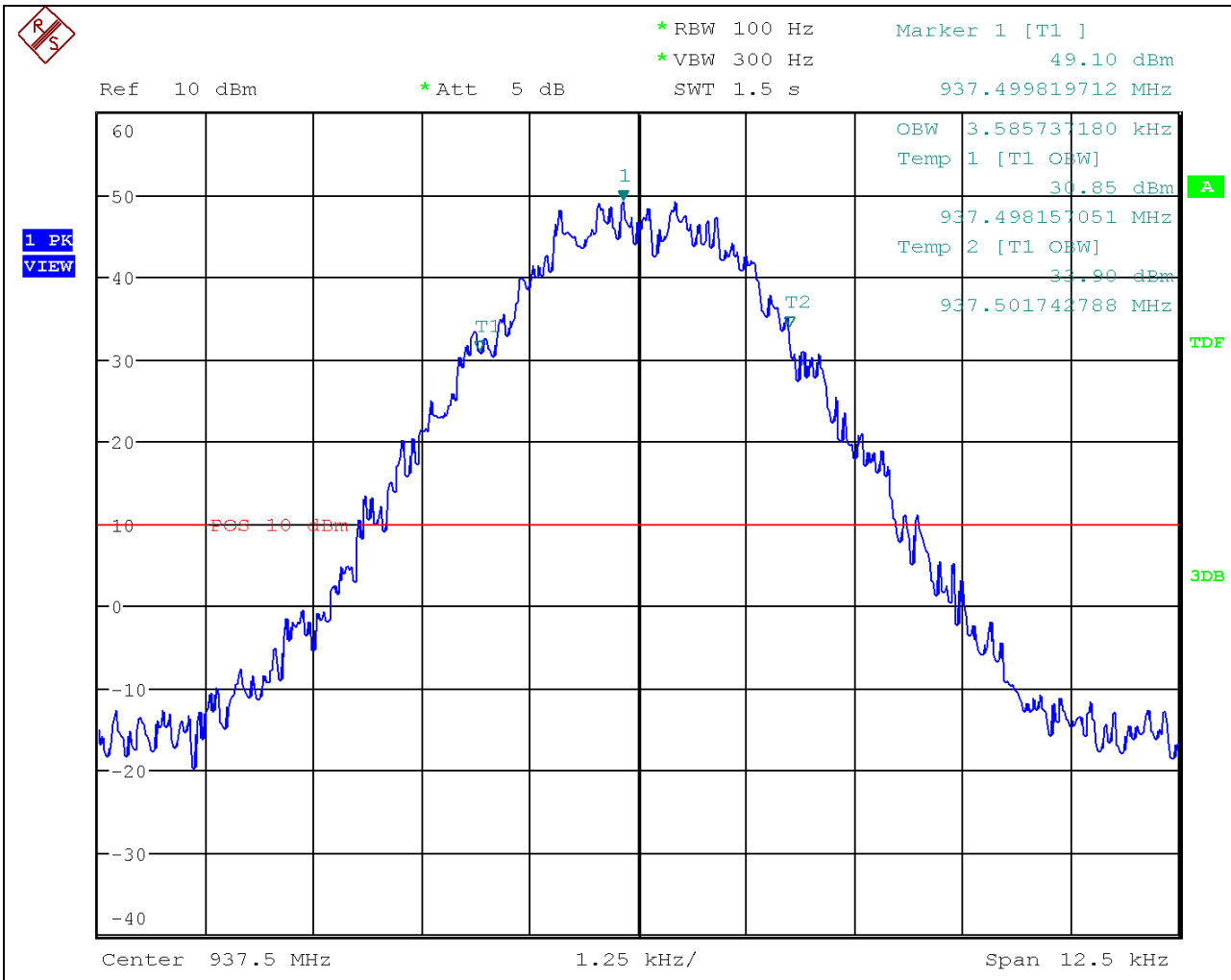
Input-versus-output Signal Comparison – 935-940 - Output Without AGC – 4K00F2D



p1880019_iocomp_b3_4k00f2d_inp21

Date: 15.NOV.2018 02:30:20

Input-versus-output Signal Comparison – 935-940 - Output With AGC – 4K00F2D



p1880019_iocomp_b3_4k00f2d_inp24

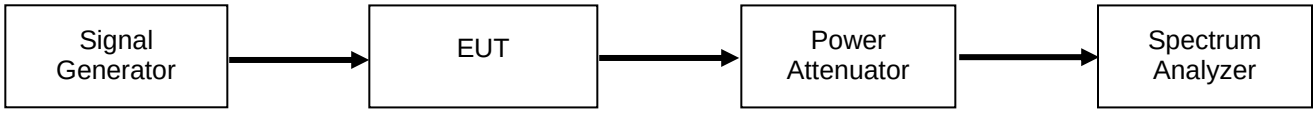
Date: 15.NOV.2018 02:29:07

Input/Output Power and Amplifier/Booster Gain
Engineer: Christian Pawlak
Test Date: 2018-11-14

Test Procedure

The Method of Measurement was KDB 935210 4.5

Test Setup



Limits:
None

Test Results:

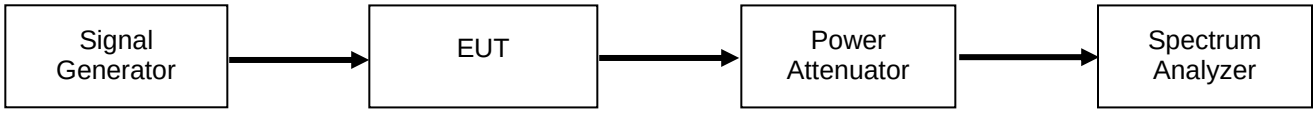
Band (MHz)	Tuned Frequency (MHz)	Input Power (dBm)	Output Power (dBm)	Gain (dB)
928 – 929	928.5125	+20.85	+54.53	33.68
		+23.84	+54.48	30.64
929 – 930	929.5125	+21.19	+54.53	33.34
		+23.95	+54.53	30.58
935 – 940	937.5000	+20.94	+54.43	33.49
		+24.00	+54.43	30.43

Spurious Emissions Conducted Measurements
Engineer: Christian Pawlak
Test Date: 2018-11-14

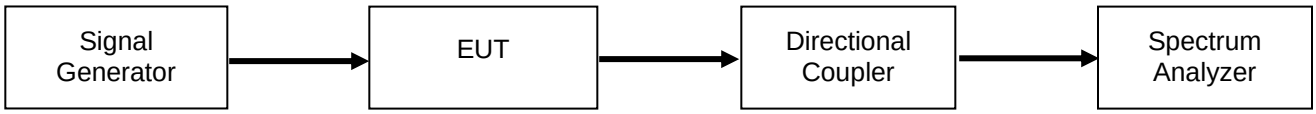
Test Procedure

The Method of Measurement was KDB 935210 4.7.3

Test Setup < 2 GHz



Test Setup > 2 GHz



Limits:
43 + 10*log(P)
Where P is the mean transmitter output power in Watts

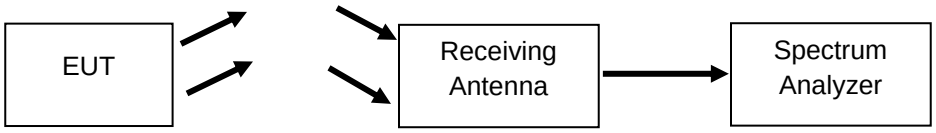
Test Results:
No emissions within 20 dB of the limit.

Unwanted Emissions – Out of Band Spurious
Engineer: Christian Pawlak
Test Date: 2018-11-15

Test Procedure

The Method of Measurement was KDB 935210 4.9

Test Setup



Limits
47 CFR 90.219(e)(3):
Spurious emissions from a signal booster must not exceed −13 dBm within any 100 kHz measurement bandwidth.
The transmitting antenna is assumed to be a ½ wave dipole.

Test Results
No emissions within 20 dB of the limit.

Test Equipment Utilized

Description	Manufacturer	Model #	CT Asset #	Last Cal Date	Cal Due Date
Digital Radio Test Set	Aeroflex	3920B	i00524	10/10/18	10/10/19
Signal Generator	Rohde & Schwarz	SMU200A	i00405	5/10/18	5/10/19
RF Amplifier	Ophir	5038AFE	I00519	NCR	NCR
Spectrum Analyzer	Agilent	E4407B	i00331	11/21/17	11/21/18
3 Meter Semi-Anechoic Chamber	Panashield	3 Meter Semi-Anechoic Chamber	i00428	8/15/16	8/15/19
Bi-Log antenna	Chase	CBL6111C	i00267	3/8/18	3/8/20
Preamplifier	HP	8447D	i00055	NCR	NCR
Horn Antenna	ARA	DRG-118/A	i00271	6/16/18	6/16/20
Preamplifier for 1-18GHz horn antenna	Miteq	AFS44 00101 400 23-10P-44	i00509	NCR	NCR

In addition to the above listed equipment standard RF connectors, cables, couplers, and attenuators were utilized in the testing of the described equipment. Prior to testing these components were tested to verify proper operation. Insertion loss was corrected mathematically wherever possible.

END OF TEST REPORT