



EMISSIONS TEST REPORT

(FULL COMPLIANCE)

Report Number: 102578989BOX-001

Project Number: G102578989

Report Issue Date: 03/29/2017

Report Revised Date: 12/27/2017

Model(s) Tested: CompactRAN GSM/CDMA

Model(s) Partially Tested: None

Model(s) Not Tested but declared equivalent by the client: None

Standards: CFR47 FCC Part 24 Subpart E: June 2016 and
RSS-133 Issue 6: January 2013

Tested by:
Intertek Testing Services NA, Inc.
70 Codman Hill Road
Boxborough, MA 01719
USA

Client:
Vanu, Inc.
81 Hartwell Avenue
Lexington, MA 02421
USA

Report prepared by Naga Suryadevara

Naga Suryadevara / EMC Engineer

Report reviewed by Kouma Sinn

Kouma Sinn / EMC Staff Engineer

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1 Introduction and Conclusion

The tests indicated in section 2.0 were performed on the product constructed as described in section 4.0. The remaining test sections are the verbatim text from the actual data sheets used during the investigation. These test sections include the test name, the specified test Method, a list of the actual Test Equipment Used, documentation Photos, Results and raw Data. No additions, deviations, or exclusions have been made from the standard(s) unless specifically noted.

Based on the results of our investigation, we have concluded the product tested **complies** with the requirements of the standard(s) indicated. The results obtained in this test report pertain only to the item(s) tested. Intertek does not make any claims of compliance for samples or variants which were not tested.

2 Test Summary

Section	Test full name	Result
3	Client Information	--
4	Description of Equipment Under Test and Variant Models	--
5	System Setup and Method	--
6	RF Output Power an Human RF Exposure (FCC 2.1046, 24.232:06/2016 RSS-133 Section 6.4:01/2013 RSS 102:03/2015)	Pass
7	Transmitter's Peak-to-Average Power Ratio (RSS-133 Section 6.4:01/2013)	Pass
8	Occupied Bandwidth (FCC 2.1049:06/2016 RSS-Gen Section 6.6:11/2014)	Pass
9	Band Edge Compliance (FCC 24.238(b):06/2016 RSS-133 Section 6.5.1:01/2013)	Pass
10	Spurious Conducted Emissions (FCC 2.1051, 24.238:06/2016 RSS-133 Section 6.5:01/2013 RSS Gen Section 7.0:11/2014)	Pass
11	Radiated Emissions (FCC 2.1053, 24.238:06/2016 RSS-133 Section 6.5:01/2013)	Pass
12	Frequency Stability (FCC 2.1055, 24.235:06/2016 RSS-133 Section 6.3:01/2013)	Pass
13	Line Conducted Emissions (FCC Part 15 Subpart B: 06/2016 ICES 003:01/2016)	Pass
14	Revision History	--

3 Client Information**This EUT was tested at the request of:**

Client: Vanu, Inc.
81 Hartwell Avenue
Lexington, MA 02421
USA

Contact: Mr. Dave Bither
Telephone: 617-864-1711
Fax: None
Email: dbither@vanu.com

4 Description of Equipment Under Test and Variant Models

Manufacturer: Vanu, Inc.
81 Hartwell Avenue
Lexington, MA 02421
USA

Equipment Under Test			
Description	Manufacturer	Model Number	Serial Number
Cellular Basestation	Vanu, Inc.	V2-CR-GC-19-02	130097-NTQ0108804

Receive Date:	06/06/2016
Received Condition:	Good
Type:	Production

Description of Equipment Under Test (provided by client)
Cellular Basestation

Equipment Under Test Power Configuration			
Rated Voltage	Rated Current	Rated Frequency	Number of Phases
95-140VAC	3A	60Hz	Single

Operating modes of the EUT:

No.	Descriptions of EUT Exercising
1	The EUT was set to transmit in the following configurations: "run_test_4" = transmits CDMA at channel 61 (1933.05 MHz) "run_test_5" = transmits CDMA at channel 609 (1960.45 MHz) "run_test_6" = transmits CDMA at channel 1139 (1986.95 MHz) "run_test_7" = transmits GSM at ARFCN 521(1932.0 MHz) and CDMA at channel 61(1933.05 MHz) "run_test_8" = transmits GSM at ARFCN 658 (1959.4 MHz) and CDMA at channel 609 (1960.45 MHz) "run_test_9" = transmits GSM at ARFCN 801 (1988.0 MHz) and CDMA at channel 1139 (1986.95 MHz)

Software used by the EUT:

No.	Descriptions of EUT Exercising
1	None

Radio/Receiver Characteristics	
Frequency Band(s)	1932-1988 MHz
Modulation Type(s)	GSM and CDMA
Maximum Output Power	31.51 dBm
Test Channels	"run_test_4" = transmits CDMA at channel 61 (1933.05 MHz) "run_test_5" = transmits CDMA at channel 609 (1960.45 MHz) "run_test_6" = transmits CDMA at channel 1139 (1986.95 MHz) "run_test_7" = transmits GSM at ARFCN 521(1932.0 MHz) and CDMA at channel 61(1933.05 MHz) "run_test_8" = transmits GSM at ARFCN 658 (1959.4 MHz) and CDMA at channel 609 (1960.45 MHz) "run_test_9" = transmits GSM at ARFCN 801 (1988.0 MHz) and CDMA at channel 1139 (1986.95 MHz)
Occupied Bandwidth	2.163 MHz
Frequency Hopper: Number of Hopping Channels	N/A
Frequency Hopper: Channel Dwell Time	N/A
Frequency Hopper: Max interval between two instances of use of the same channel	N/A
MIMO Information (# of Transmit and Receive antenna ports)	N/A
Equipment Type	Standalone
ETSI LBT/Adaptivity	N/A
ETSI Adaptivity Type	N/A
ETSI Temperature Category (I, II, III)	N/A
ETSI Receiver Category (1, 2, 3)	N/A
Antenna Type and Gain	8 dBi

Variant Models:

The following variant models were not tested as part of this evaluation, but have been identified by the manufacturer as being electrically identical models, depopulated models, or with reasonable similarity to the model(s) tested. Intertek does not make any claims of compliance for samples or variants which were not tested.

None

5 System Setup and Method

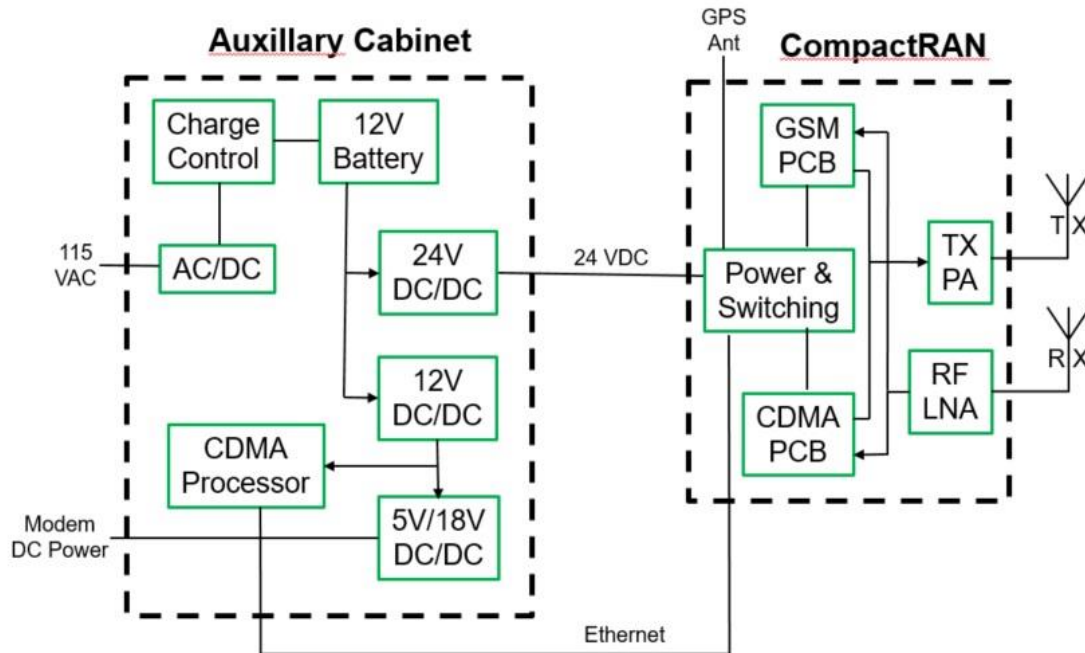
Cables					
ID	Description	Length (m)	Shielding	Ferrites	Termination
--	Ethernet	4.3	None	None	Single-board computer
--	Ethernet	4.0	None	None	Not terminated
--	SMA	1.15	None	None	GPS antenna
--	DC Cable	0.45	None	None	Power Supply
--	SMA	1.14	None	None	50 Ohm Terminator

Support Equipment			
Description	Manufacturer	Model Number	Serial Number
Single-board Computer	Intel	DCCP847DYE	G6YE42004VA
Keyboard	Dell	L100	CNORH659735716BM05HQ
Monitor	Dell	1708FPt	CN-OPM372-72872-73I-OWDI
Power Supply	Mean Well (MW)	Not Labeled	RB1A101032

5.1 Method:

Configuration as required by CFR47 FCC Part 24 Subpart E June 2016, RSS-133 Issue 6 January 2013, RSS-Gen Issue 4 November 2014, RSS 102 March 2015 and KDB 971168 October 2014.

5.2 EUT Block Diagram:



6 RF Output Power and Human RF Exposure

6.1 Method

Tests are performed in accordance with FCC 2.1046, 24.232, RSS-133 Section 6.4 and RSS 102.

TEST SITE: EMC Lab

The EMC Lab has one Semi-anechoic Chamber and one Shielded Chamber. AC Mains Power is available at 120, 230, and 277 Single Phase; 208, 400, and 480 3-Phase. Large reference ground-planes are installed in the general lab area to facilitate EMC work not requiring a shielded environment.

6.2 Test Equipment Used:

Asset	Description	Manufacturer	Model	Serial	Cal Date	Cal Due
DAV001 ¹	Weather Station	Davis Instruments	7400	PE80519A61	10/23/2015	10/23/2016
MET1 ¹	Digital Multimeter	Meterman	15XP	050407785	05/09/2016	05/09/2017
ROS002 ²	9kHz to 3GHz EMI Test Receiver	Rohde & Schwartz	ESCI 1166.5950K03	100067	06/23/2015	06/23/2016
CBLSHF203 ³	Cable, SMA - SMA, 9kHz-40GHz, Cable Kit 4	Sucoflex (Huber Suhb)	104PE	CBLSHF203	08/06/2015	08/06/2016
WEI8 ⁴	Attenuator	Weinschel Corp	47-10-34	BD8309	03/30/2016	03/30/2017
WEI18 ⁵	20 dB, 50 Watt Attenuator DC-18GHz	Weinschel Corp	47-20-34	BP0570	03/30/2016	03/30/2017

Software Utilized:

Name	Manufacturer	Version
None		

6.3 Results:

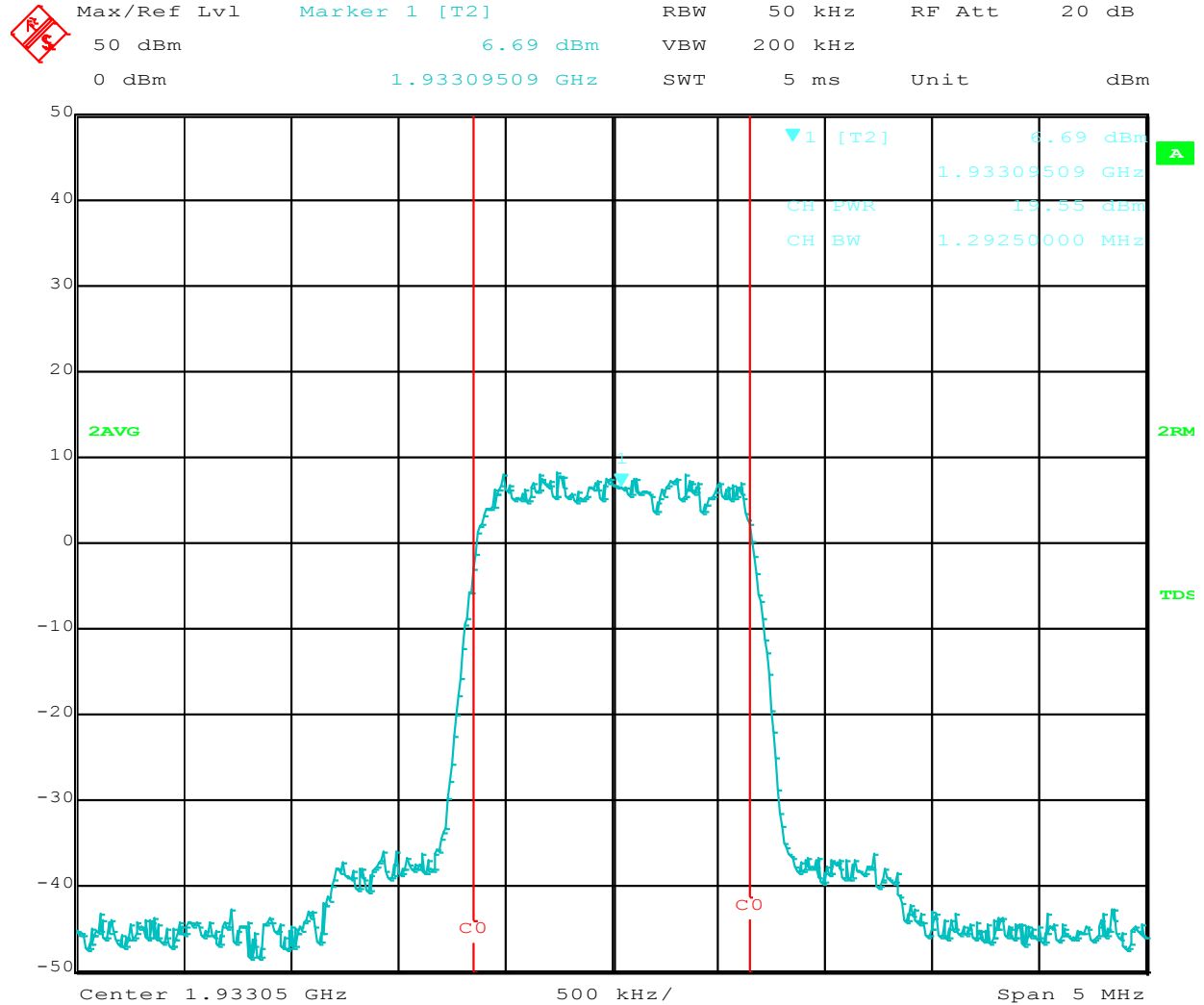
The sample tested was found to Comply.

Test	EUT Reading dBm	Antenna Gain (dBi)	EUT Net Reading (dBm)	Margin with Standard Limit RSS 133 (50 dBm)	Margin with Standard Limit FCC Part 24 (62.15 dBm)	Pass/Fail
CDMA at channel 61 (1933.05 MHz)	19.55	8	27.55	-22.45	-34.6	Pass
CDMA at channel 609 (1960.45 MHz)	19.83	8	27.83	-22.17	-34.32	Pass
CDMA at channel 1139 (1986.95 MHz)	19.88	8	27.88	-22.12	-34.27	Pass
GSM at ARFCN 521(1932.0 MHz) and CDMA at channel 61(1933.05 MHz)	23.10	8	31.10	-18.9	-31.05	Pass
GSM at ARFCN 658(1959.4 MHz) and CDMA at channel 609(1960.45 MHz)	23.17	8	31.17	-18.83	-30.98	Pass
GSM at ARFCN 801 (1988.0 MHz) and CDMA at channel 1139 (1986.95 MHz)	23.51	8	31.51	-18.49	-30.64	Pass

6.4 Plots/Data:

Notes: Transducer factors were programmed into the spectrum analyzer to compensate for cable loss and attenuators in the test setup.

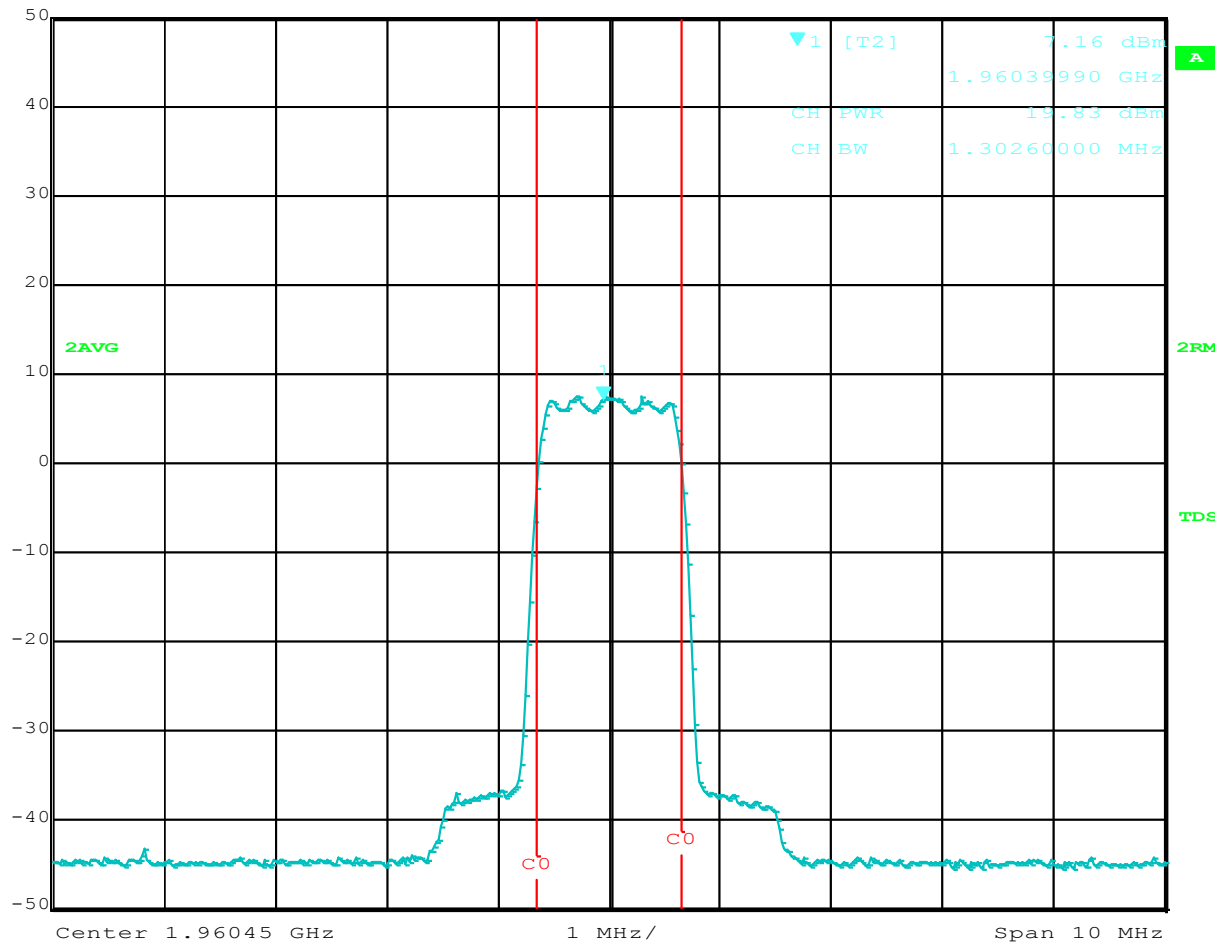
Output Power (Average) - transmits CDMA at channel 61 (1933.05 MHz), 19.55 dBm



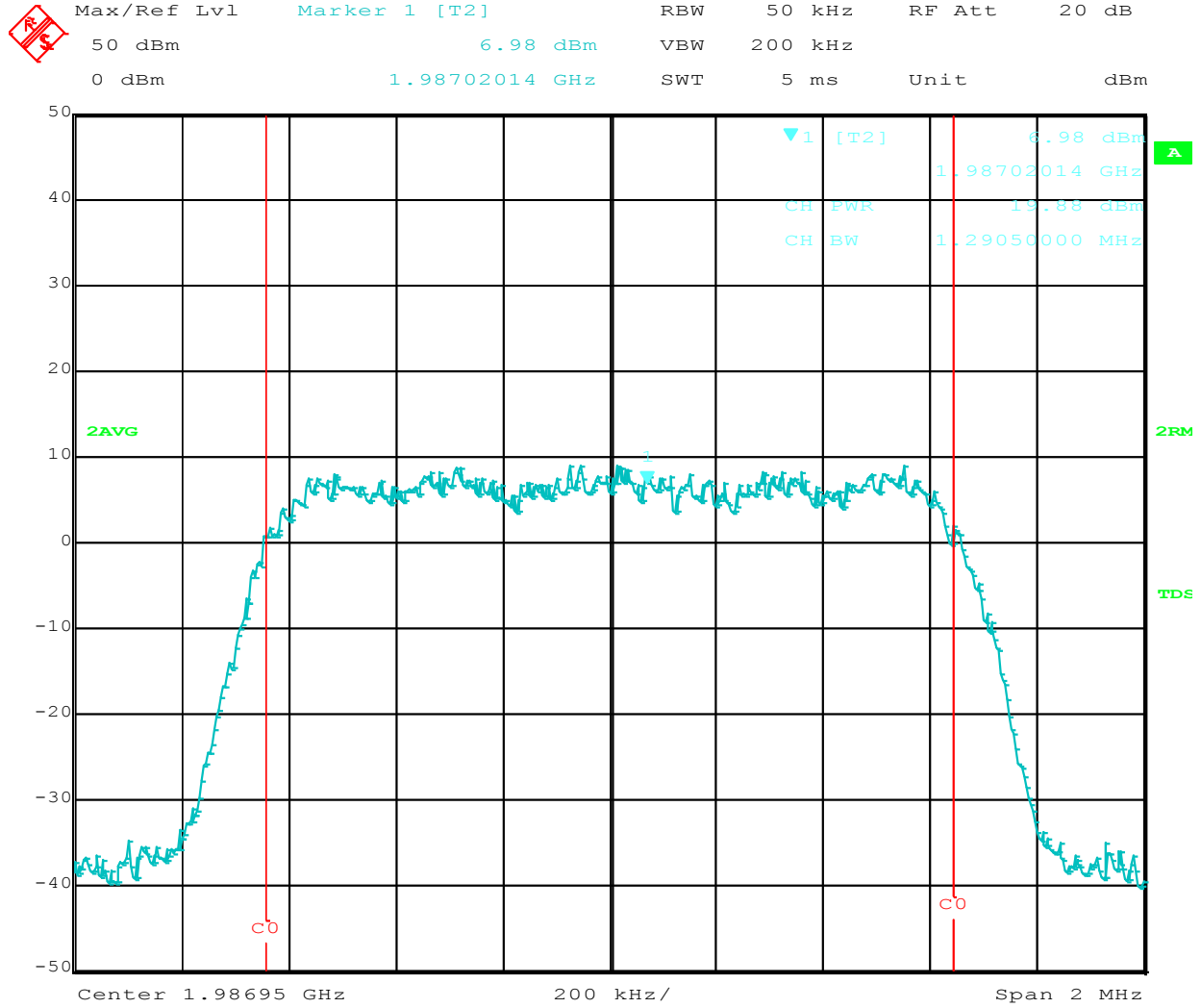
Output Power (Average) - transmits CDMA at channel 609 (1960.45 MHz), 19.83 dBm



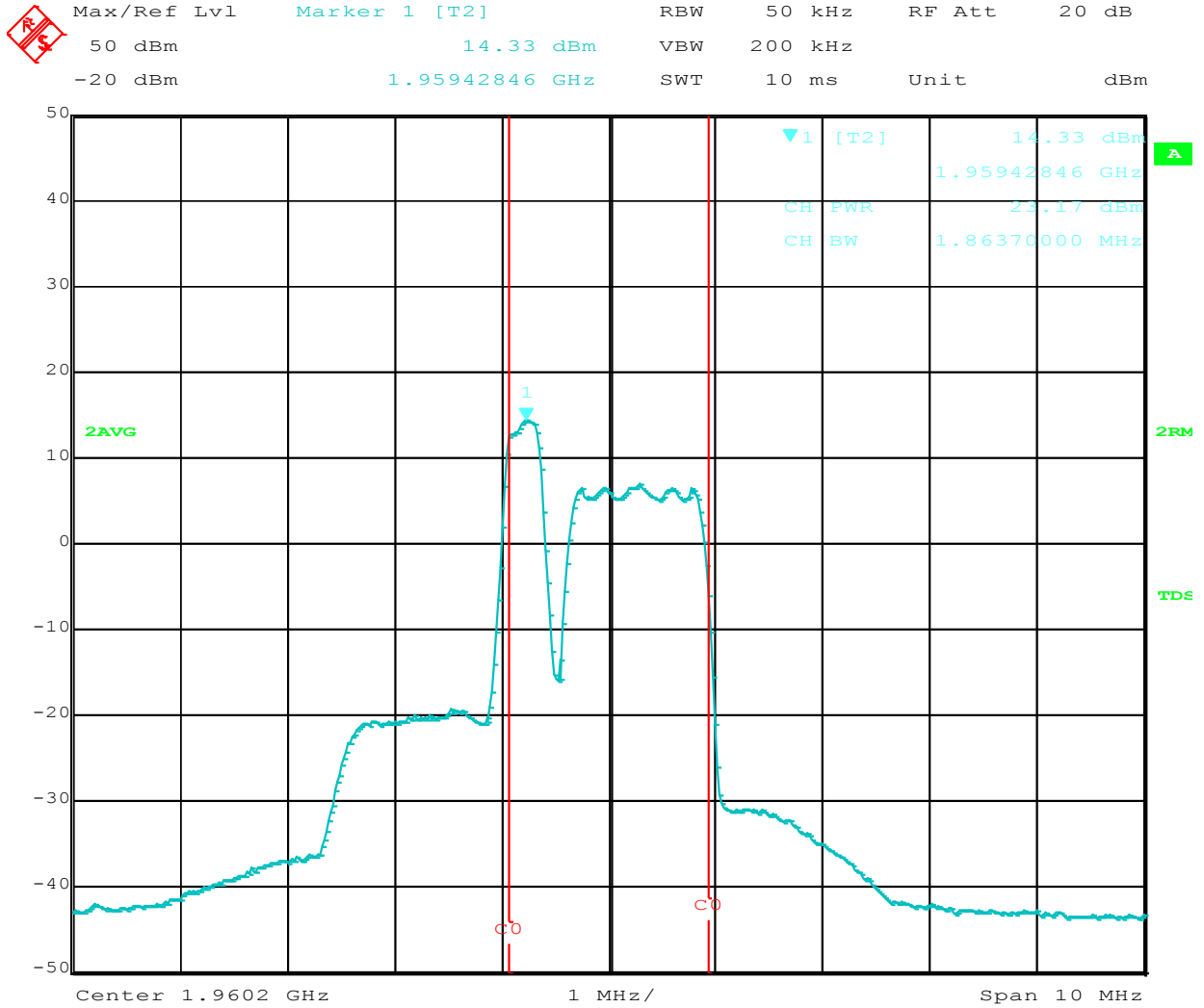
Max/Ref Lvl	Marker 1 [T2]	RBW	50 kHz	RF Att	20 dB
50 dBm	7.16 dBm	VBW	200 kHz		
0 dBm	1.96039990 GHz	SWT	10 ms	Unit	dBm



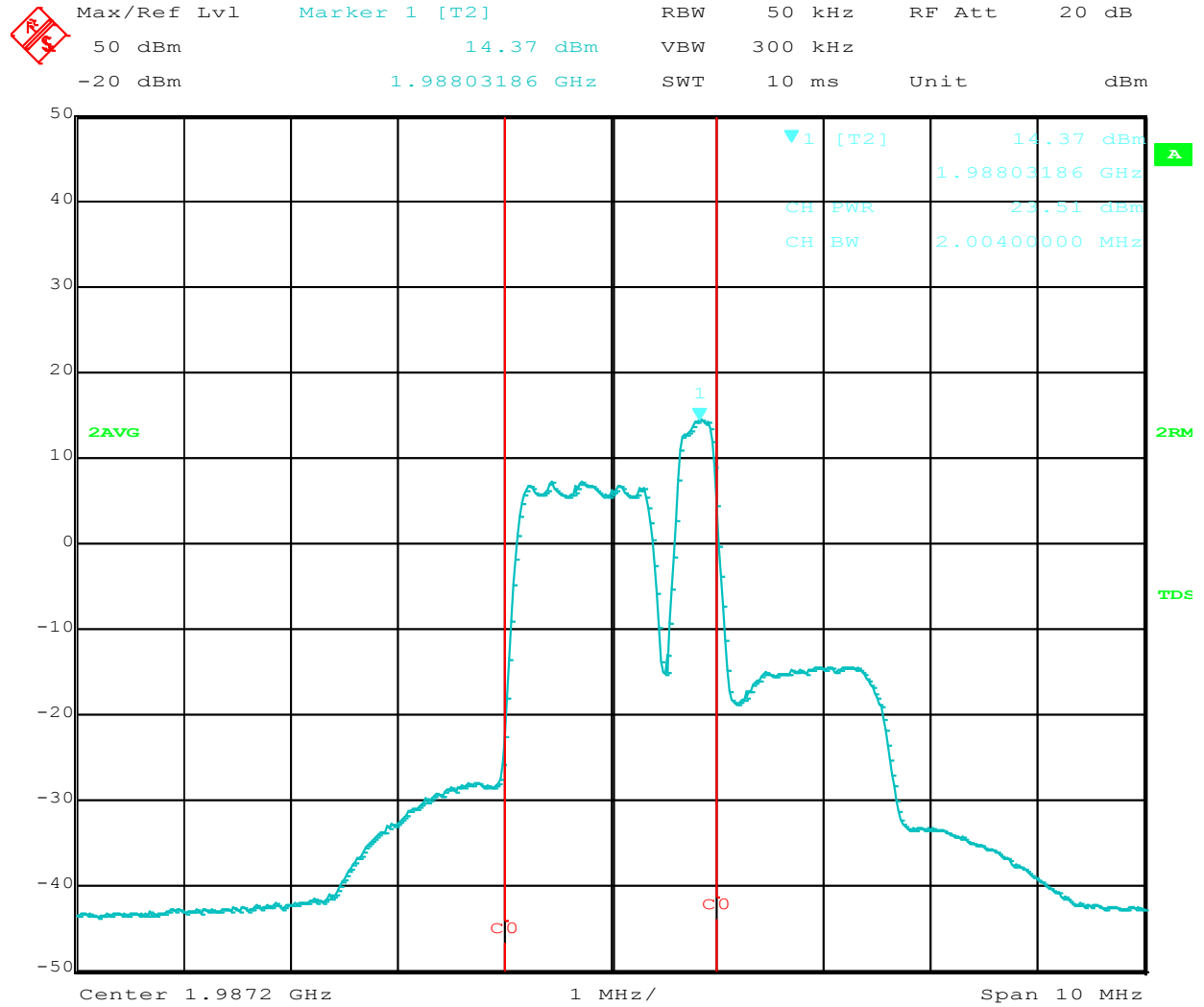
Output Power (Average) - transmits CDMA at channel 1139 (1986.95 MHz), 19.88 dBm



Output Power (Average) - transmits GSM at ARFCN 658 (1959.4 MHz) and CDMA at channel 609 (1960.45 MHz), 23.17 dBm



Output Power (Average) - transmits GSM at ARFCN 801 (1988.0 MHz) and CDMA at channel 1139 (1986.95 MHz), 23.51 dBm



Human RF Exposure

The EUT was measured in a radiated fashion. The RF output power was measured using a resolution bandwidth which encompassed the entire emission bandwidth. The data obtained was adjusted for equipment losses and converted from a field strength reading to a power reading using the provisions of FCC KDB 558074 and RSS-Gen 4.6. .

§1.1310 The criteria listed in table 1 shall be used to evaluate the environmental impact of human exposure to radiofrequency (RF) radiation as specified in §1.1307(b), except in the case of portable devices shall be evaluated according to the provisions of §2.1093 of this chapter.

Part §1.1310 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 Exposure				
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
300-1,500			f/300	6
1,500-100,000			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
300-1,500			f/1500	30
1,500-100,000			1.0	30

f = frequency in MHz * = Plane-wave equivalent power density

(1) Occupational/controlled exposure limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when a person is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure. The phrase *fully aware* in the context of applying these exposure limits means that an exposed person has received written and/or verbal information fully explaining the potential for RF exposure resulting from his or her employment. With the exception of *transient* persons, this phrase also means that an exposed person has received appropriate training regarding work practices relating to controlling or mitigating his or her exposure. Such training is not required for *transient* persons, but they must receive written and/or verbal information and notification (for example, using signs) concerning their exposure potential and appropriate means available to mitigate their exposure. The phrase *exercise control* means that an exposed person is allowed to and knows how to reduce or avoid exposure by administrative or engineering controls and work practices, such as use of personal protective equipment or time averaging of exposure.

(2) General population/uncontrolled exposure limits apply in situations in which the general public may be exposed, or in which persons who are exposed as a consequence of their employment may not be fully aware of the potential for exposure or cannot exercise control over their exposure.

RSS-102 Issue 5 Exposure Limits:**Table 4: RF Field Strength Limits for Devices Used by the General Public
(Uncontrolled Environment)**

Frequency Range (MHz)	Electric Field (V/m rms)	Magnetic Field (A/m rms)	Power Density (W/m ²)	Reference Period (minutes)
0.003-10 ²¹	83	90	-	Instantaneous*
0.1-10	-	0.73/ <i>f</i>	-	6**
1.1-10	87/ <i>f</i> ^{0.5}	-	-	6**
10-20	27.46	0.0728	2	6
20-48	58.07/ <i>f</i> ^{0.25}	0.1540/ <i>f</i> ^{0.25}	8.944/ <i>f</i> ^{0.5}	6
48-300	22.06	0.05852	1.291	6
300-6000	3.142 <i>f</i> ^{0.3417}	0.008335 <i>f</i> ^{0.3417}	0.02619 <i>f</i> ^{0.6834}	6
6000-15000	61.4	0.163	10	6
15000-150000	61.4	0.163	10	616000/ <i>f</i> ^{1.2}
150000-300000	0.158 <i>f</i> ^{0.5}	4.21 x 10 ⁻⁴ <i>f</i> ^{0.5}	6.67 x 10 ⁻⁵ <i>f</i>	616000/ <i>f</i> ^{1.2}
Note: <i>f</i> is frequency in MHz. *Based on nerve stimulation (NS). ** Based on specific absorption rate (SAR).				

1.1 Test Procedure

An MPE evaluation was performed in order to show that the device was compliant with §2.1091. The maximum power density was calculated for each transmitter at a separation distance of 20 cm.

For each transmitter the maximum power RF exposure at a 20 cm distance using the formula:

$$\text{Conducted Power}_{\text{mW}} = 10^{\text{ConductedPower(dBm)}/10}$$

$$\text{Power Density} = [\text{Conducted Power}_{\text{mW}} \times \text{Ant.Gain}] / [4\pi \times (20_{\text{cm}})^2] \text{ or } [\text{EIRP}] / [4\pi \times (20_{\text{cm}})^2]$$

1.2 Results:

Maximum Output Power (EIRP) = 31.51 dBm or 1415.79378 mW

$$\text{Power Density} = (1415.79378) / 5026.5 = 0.281 \text{ mW/cm}^2 = 2.81 \text{ W/m}^2$$

$$\text{FCC Limit} = 1 \text{ mW/cm}^2$$

$$\text{RSS-102 Issue 5 Exposure Limit} = 4.7 \text{ W/m}^2$$

The calculated maximum power density at 20 cm distance is less than the limit for general population / uncontrolled exposure.

Test Personnel:	Naga Suryadevara <i>N5</i>	Test Date:	06/14/2016
Supervising/Reviewing Engineer:			06/15/2016
(Where Applicable)	N/A		06/16/2016
Product Standard:	CFR47 FCC Part 24 Subpart E, RSS-133	Limit Applied:	See Test Report Section 2.0
Input Voltage:	120VAC 60Hz	Ambient Temperature:	22, 24, 20 °C
Pretest Verification w/ Ambient Signals or BB Source:	N/A	Relative Humidity:	54, 42, 38 %
		Atmospheric Pressure:	1008, 1003, 1002 mbars

Deviations, Additions, or Exclusions: None

7 Transmitter's Peak-to-Average Power Ratio

7.1 Method

Tests are performed in accordance with RSS-133 Section 6.4.

TEST SITE: EMC Lab

The EMC Lab has one Semi-anechoic Chamber and one Shielded Chamber. AC Mains Power is available at 120, 230, and 277 Single Phase; 208, 400, and 480 3-Phase. Large reference ground-planes are installed in the general lab area to facilitate EMC work not requiring a shielded environment.

7.2 Test Equipment Used:

Asset	Description	Manufacturer	Model	Serial	Cal Date	Cal Due
DAV001 ¹	Weather Station	Davis Instruments	7400	PE80519A61	10/23/2015	10/23/2016
MET1 ¹	Digital Multimeter	Meterman	15XP	050407785	05/09/2016	05/09/2017
ROS002 ²	9kHz to 3GHz EMI Test Receiver	Rohde & Schwartz	ESCI 1166.5950K03	100067	06/23/2015	06/23/2016
CBLSHF203 ³	Cable, SMA - SMA, 9kHz-40GHz, Cable Kit 4	Sucoflex (Huber Suhb)	104PE	CBLSHF203	08/06/2015	08/06/2016
WEI8 ⁴	Attenuator	Weinschel Corp	47-10-34	BD8309	03/30/2016	03/30/2017
WEI18 ⁵	20 dB, 50 Watt Attenuator DC-18GHz	Weinschel Corp	47-20-34	BP0570	03/30/2016	03/30/2017

Software Utilized:

Name	Manufacturer	Version
None		

7.3 Results:

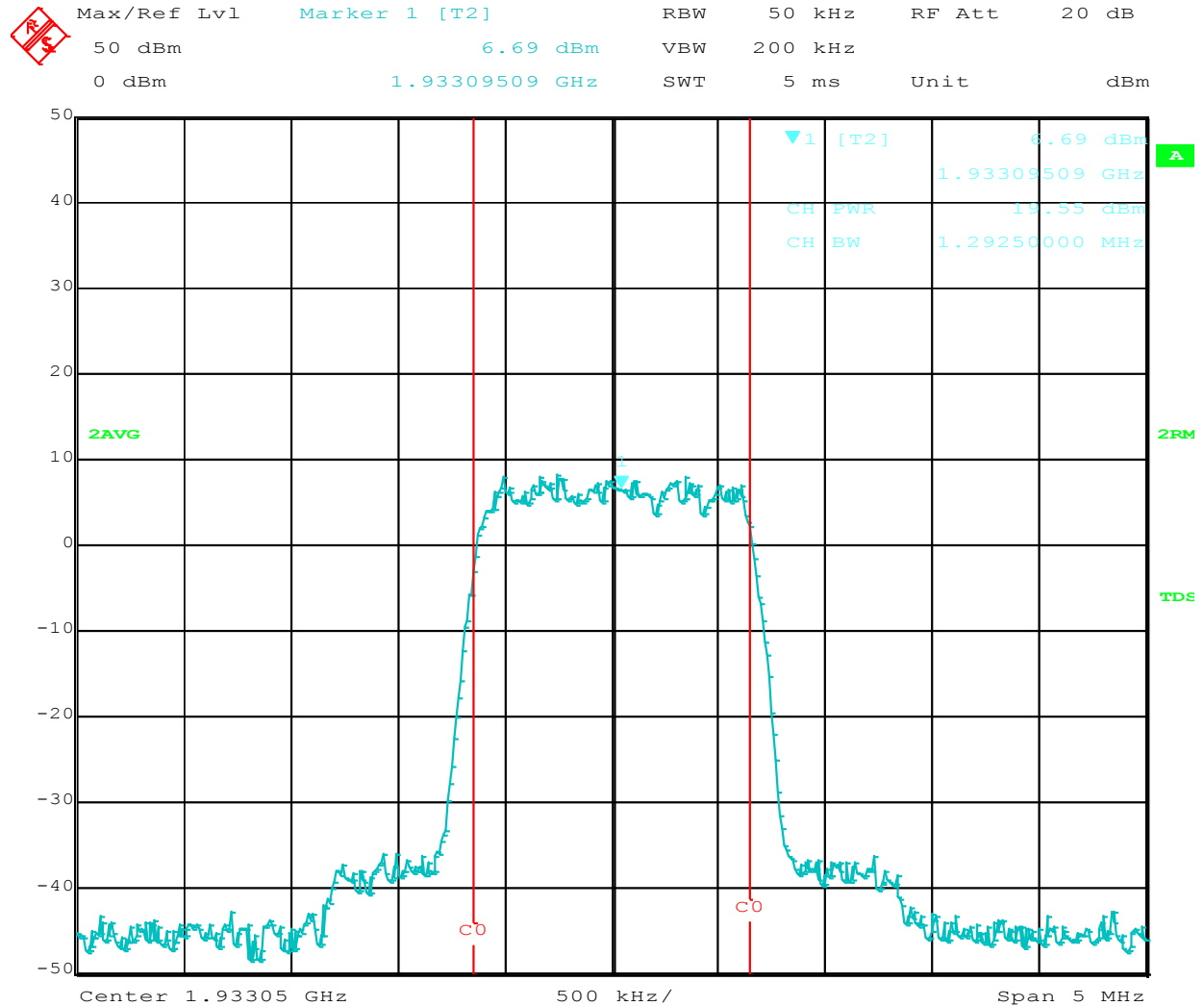
The sample tested was found to Comply. Peak to Average Power shall not exceed 13 dB.

Test	Peak (dBm)	Average (dBm)	Antenna Gain (dBi)	Net Peak Power (dBm)	Net Average Power (dBm)	PAPR	Pass/Fail
CDMA at channel 61 (1933.05 MHz)	29.60	19.55	8	37.60	27.55	11.05	Pass
CDMA at channel 609 (1960.45 MHz),	30.17	19.83	8	38.17	27.83	10.34	Pass
CDMA at channel 1139 (1986.95 MHz)	30.06	19.88	8	38.06	27.88	10.18	Pass
GSM at ARFCN 521(1932.0 MHz) and CDMA at channel 61(1933.05 MHz)	23.84	23.10	8	31.84	31.10	0.74	Pass
GSM at ARFCN 658(1959.4 MHz) and CDMA at channel 609(1960.45 MHz)	23.87	23.17	8	31.87	31.17	0.7	Pass
GSM at ARFCN 801 (1988.0 MHz) and CDMA at channel 1139 (1986.95 MHz)	24.67	23.51	8	32.67	31.51	1.16	Pass

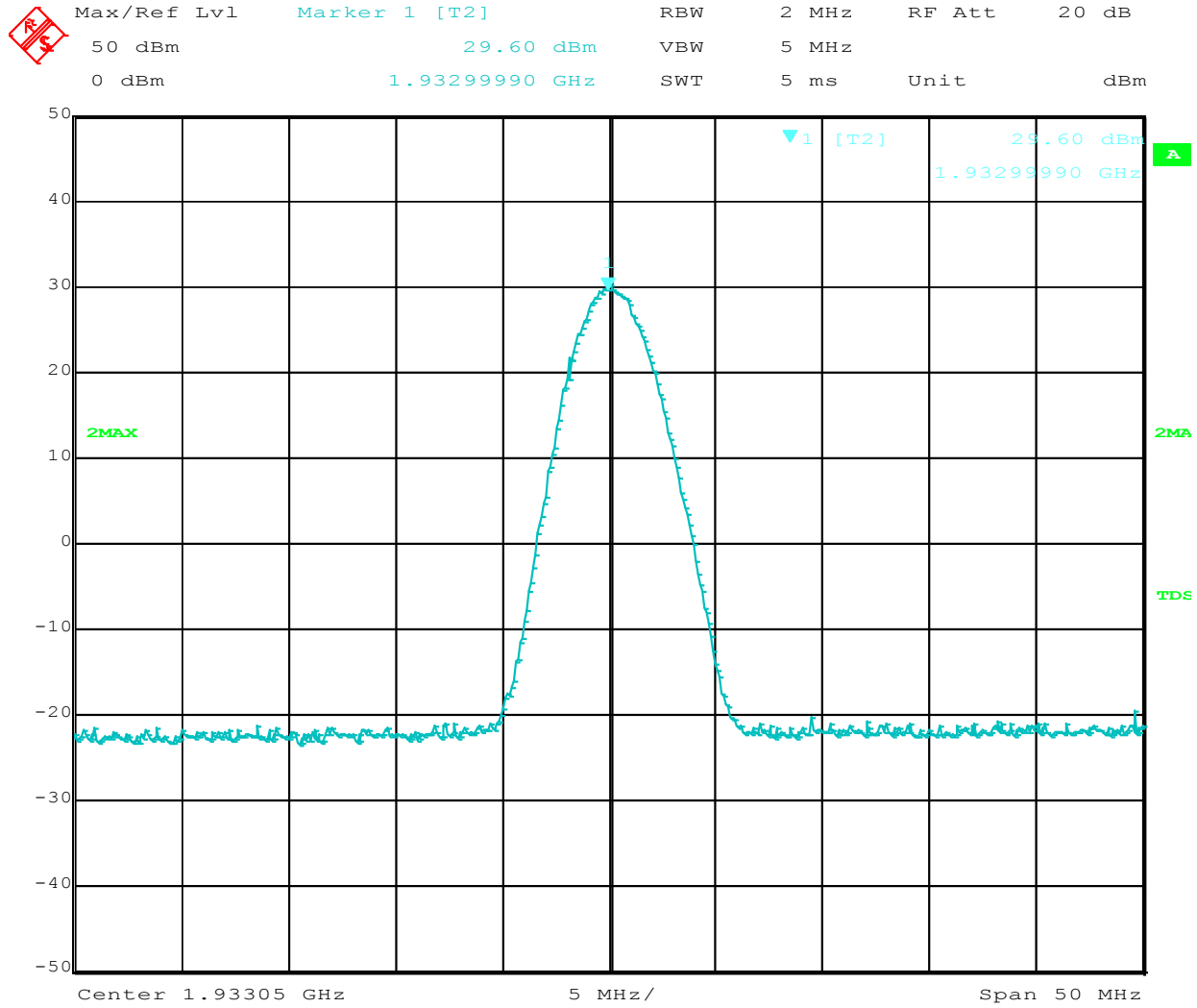
7.4 Plots/Data:

Notes: Transducer factors were programmed into the spectrum analyzer to compensate for cable loss and attenuators in the test setup.

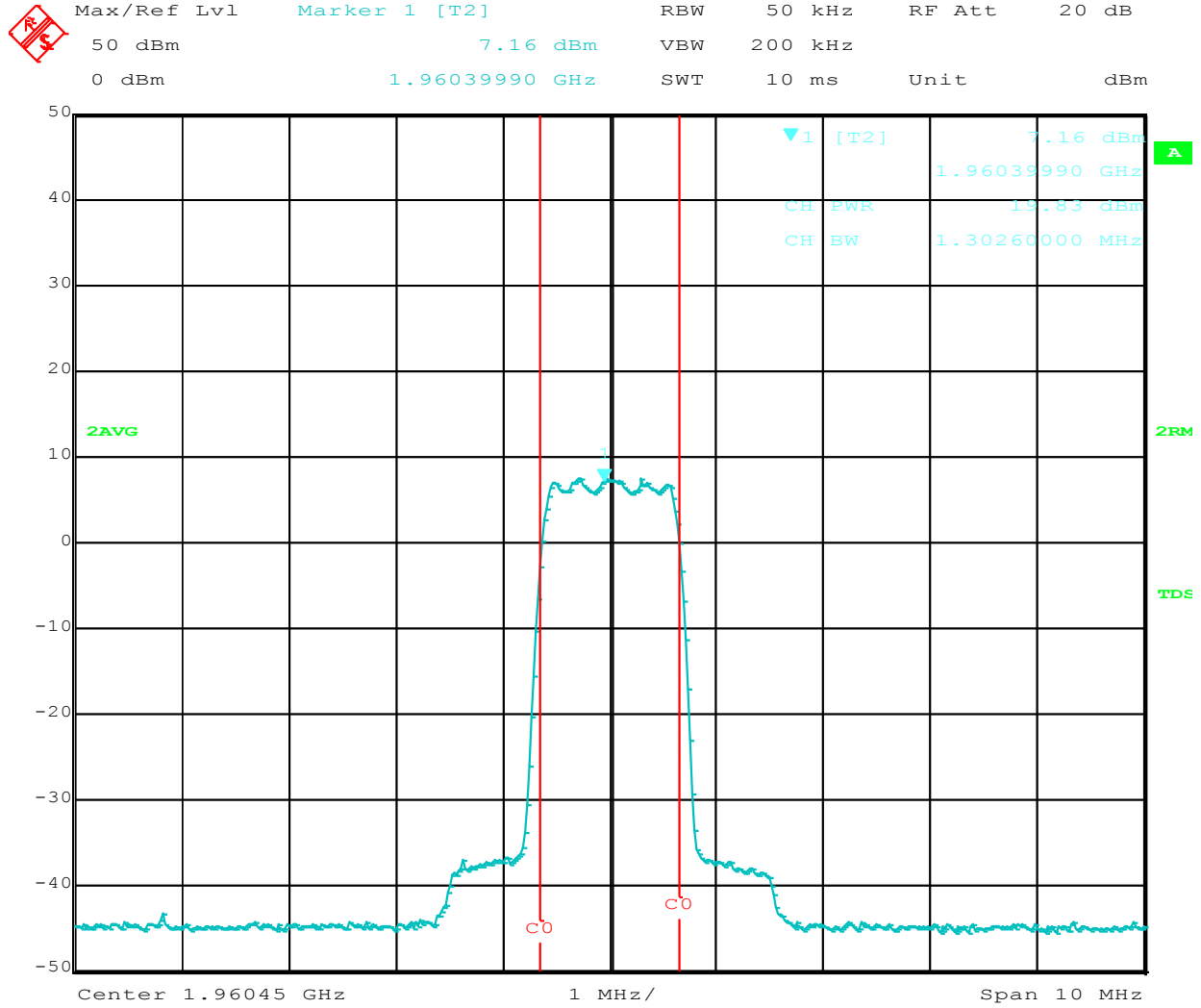
Output Power (Average) - transmits CDMA at channel 61 (1933.05 MHz), 19.55 dBm



Output Power (Peak) - transmits CDMA at channel 61 (1933.05 MHz), 29.60 dBm



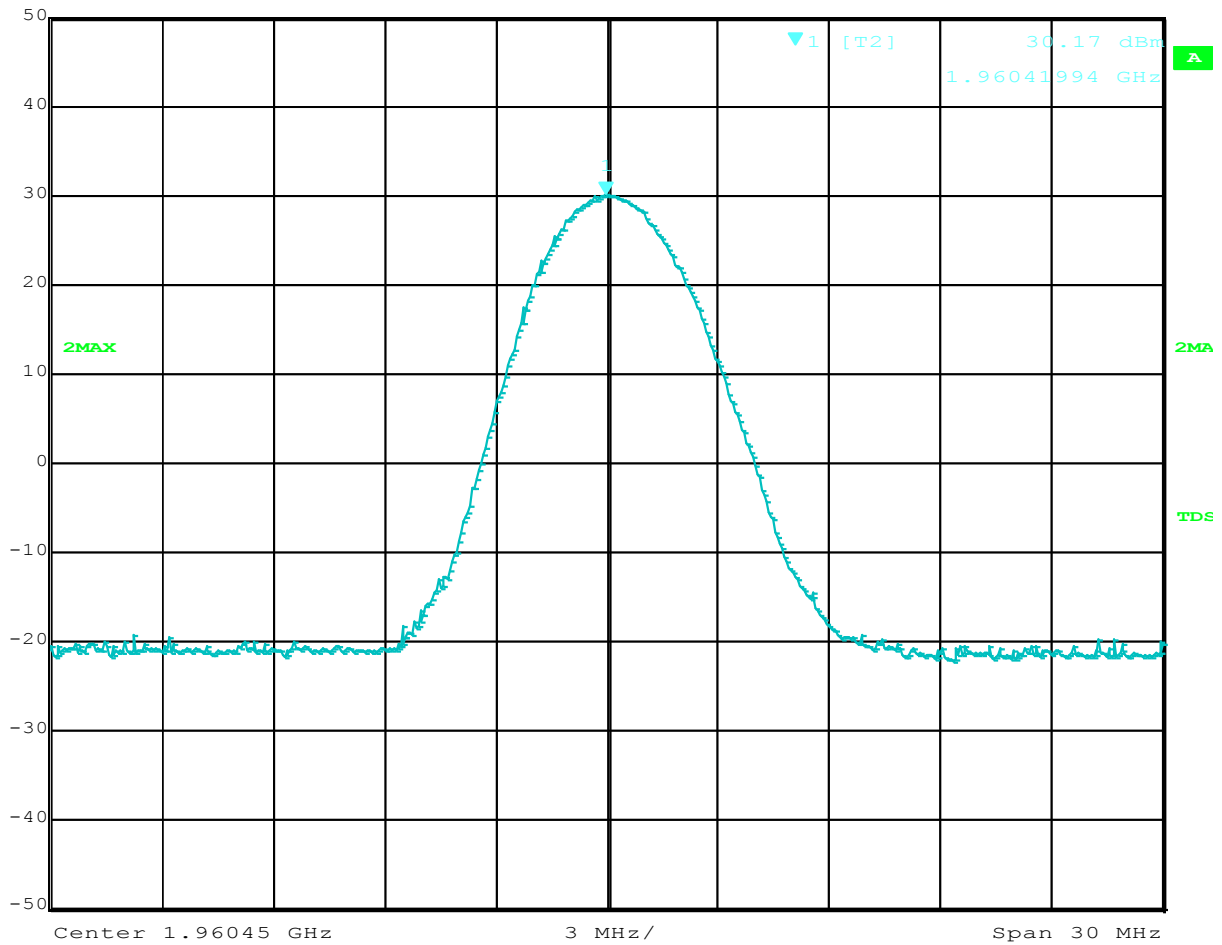
Output Power (Average) - transmits CDMA at channel 609 (1960.45 MHz), 19.83 dBm



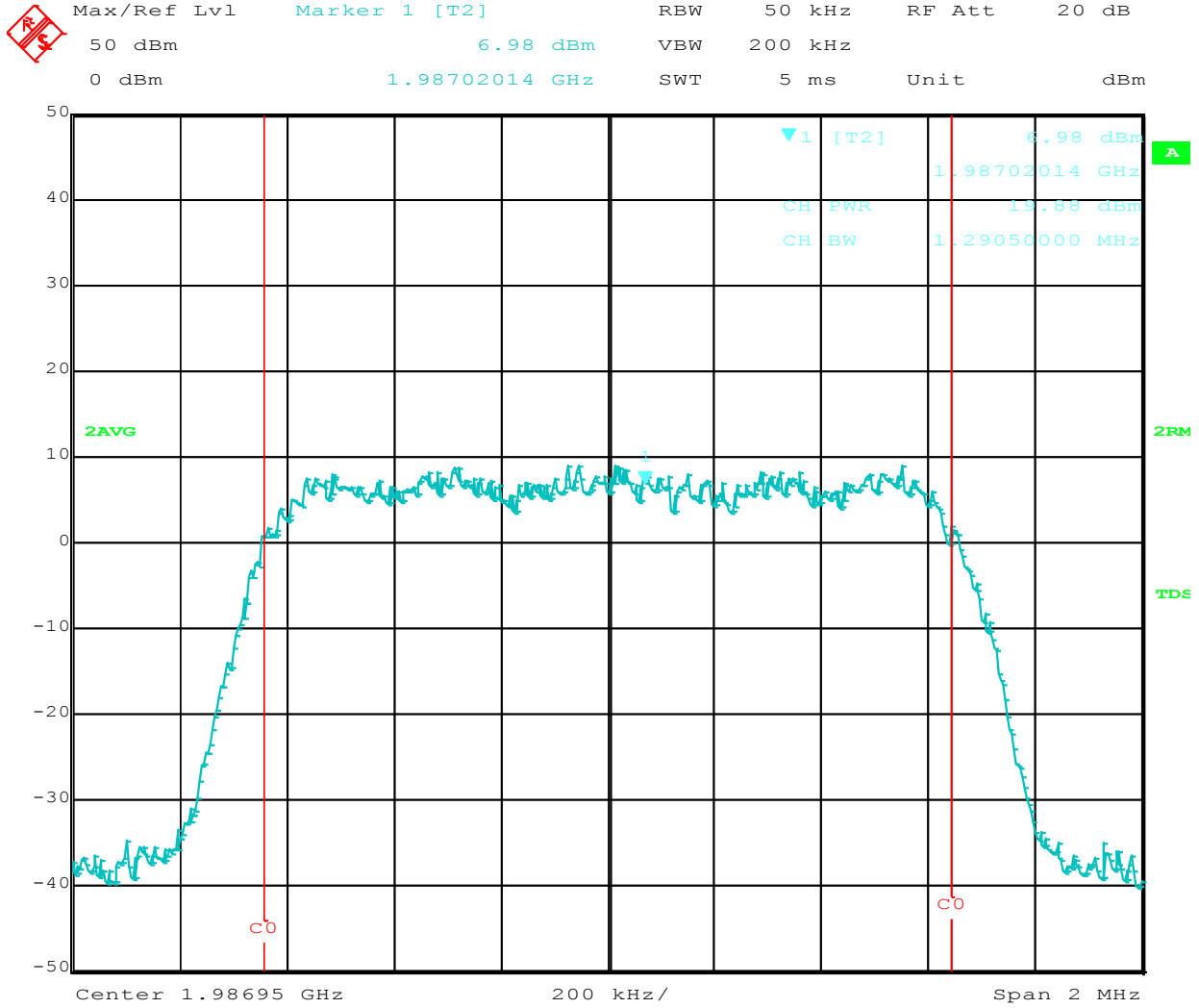
Output Power (Peak) - transmits CDMA at channel 609 (1960.45 MHz), 30.17 dBm



Max/Ref Lvl	Marker 1 [T2]	RBW	2 MHz	RF Att	20 dB
50 dBm	30.17 dBm	VBW	10 MHz		
0 dBm	1.96041994 GHz	SWT	5 ms	Unit	dBm



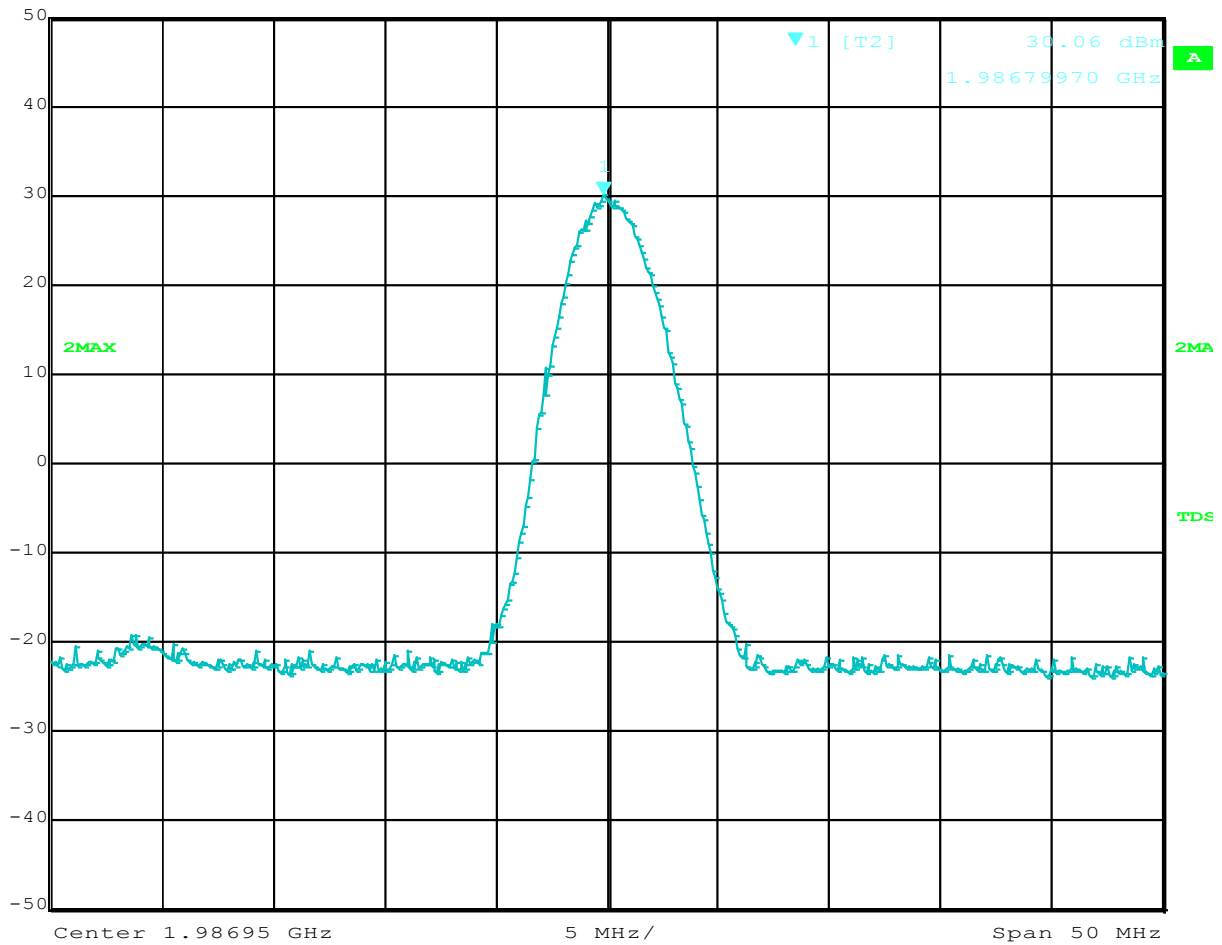
Output Power (Average) - transmits CDMA at channel 1139 (1986.95 MHz), 19.88 dBm



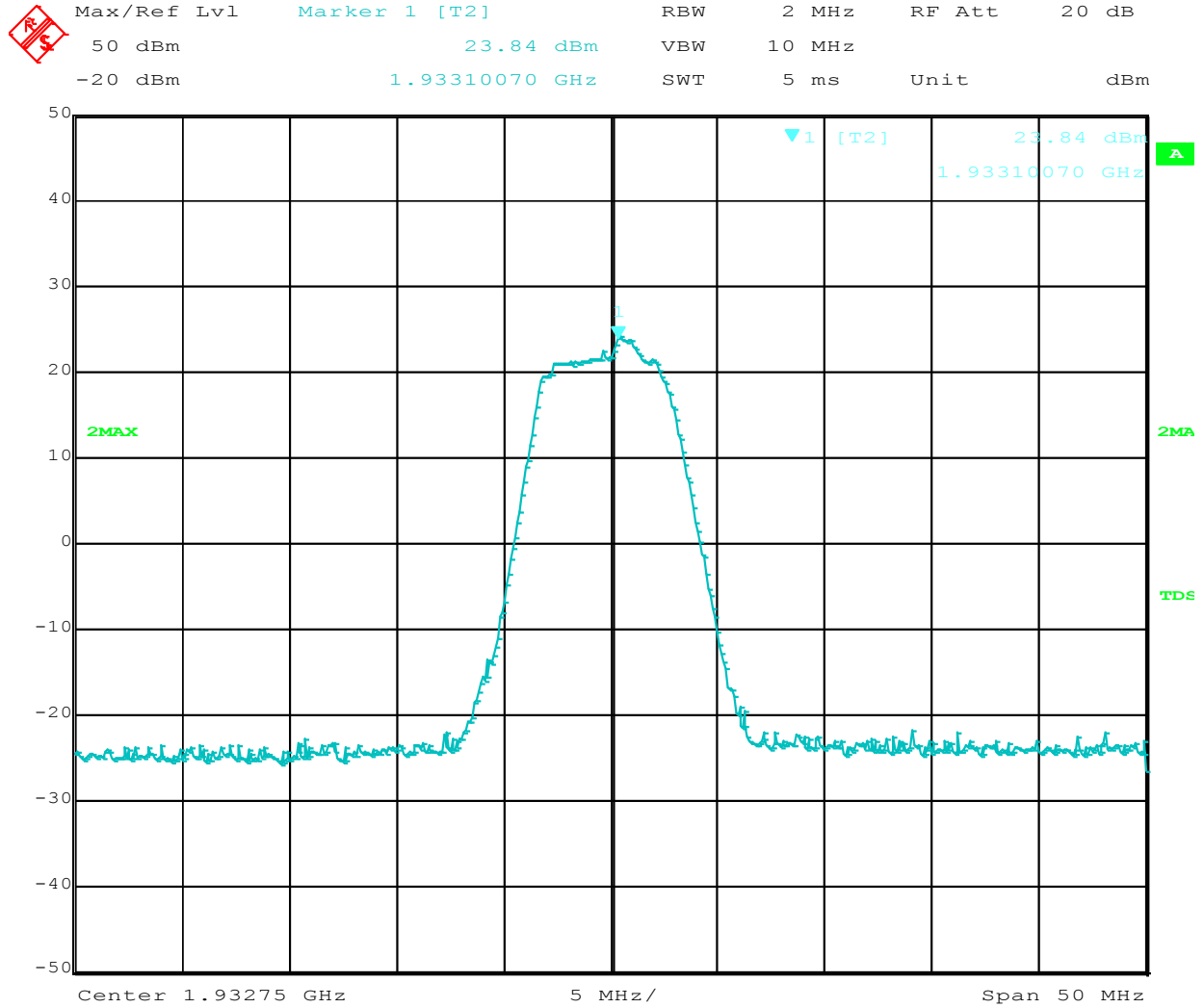
Output Power (Peak) - transmits CDMA at channel 1139 (1986.95 MHz), 30.06 dBm



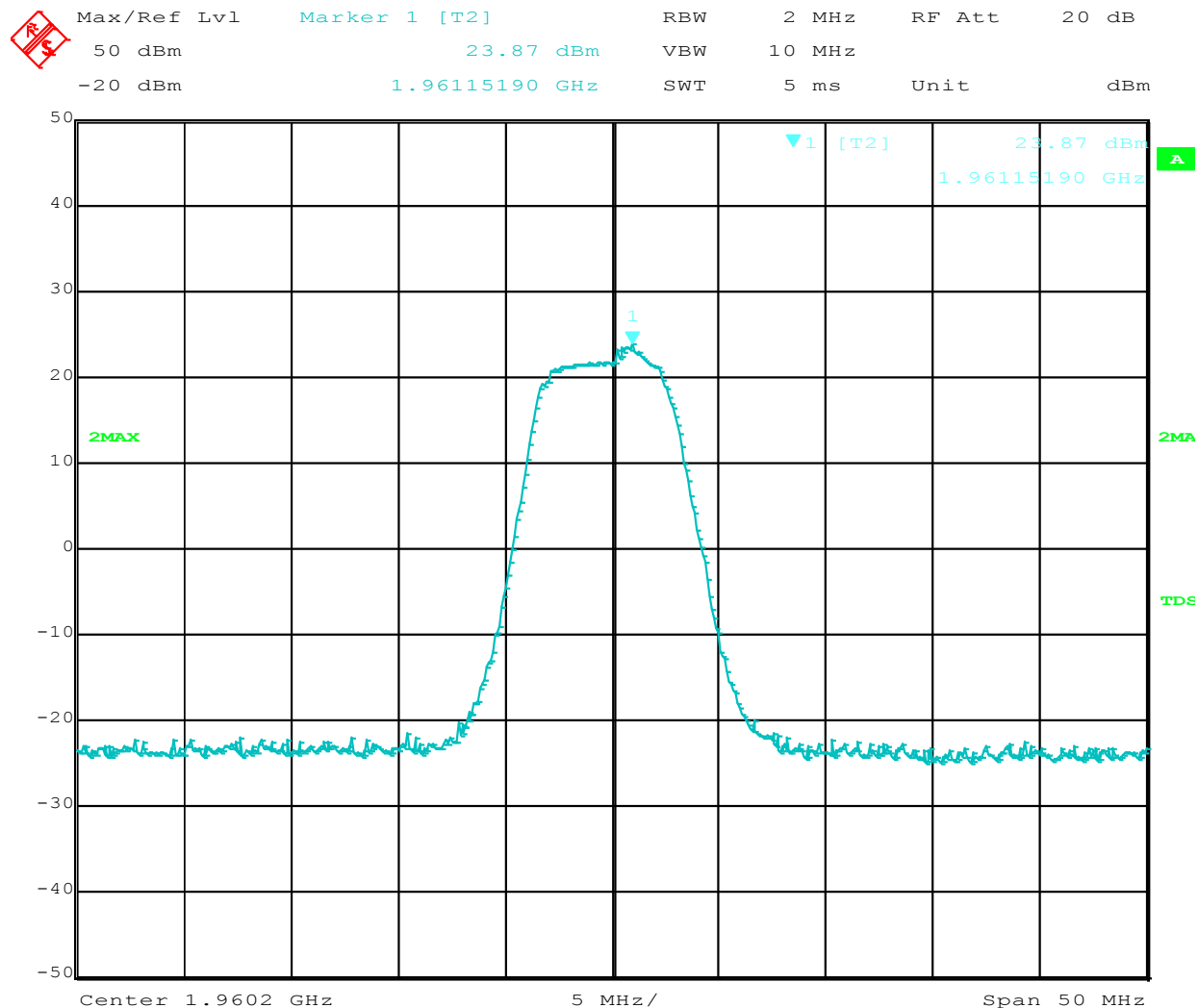
Max/Ref Lvl	Marker 1 [T2]	RBW	2 MHz	RF Att	20 dB
50 dBm	30.06 dBm	VBW	10 MHz		
0 dBm	1.98679970 GHz	SWT	5 ms	Unit	dBm



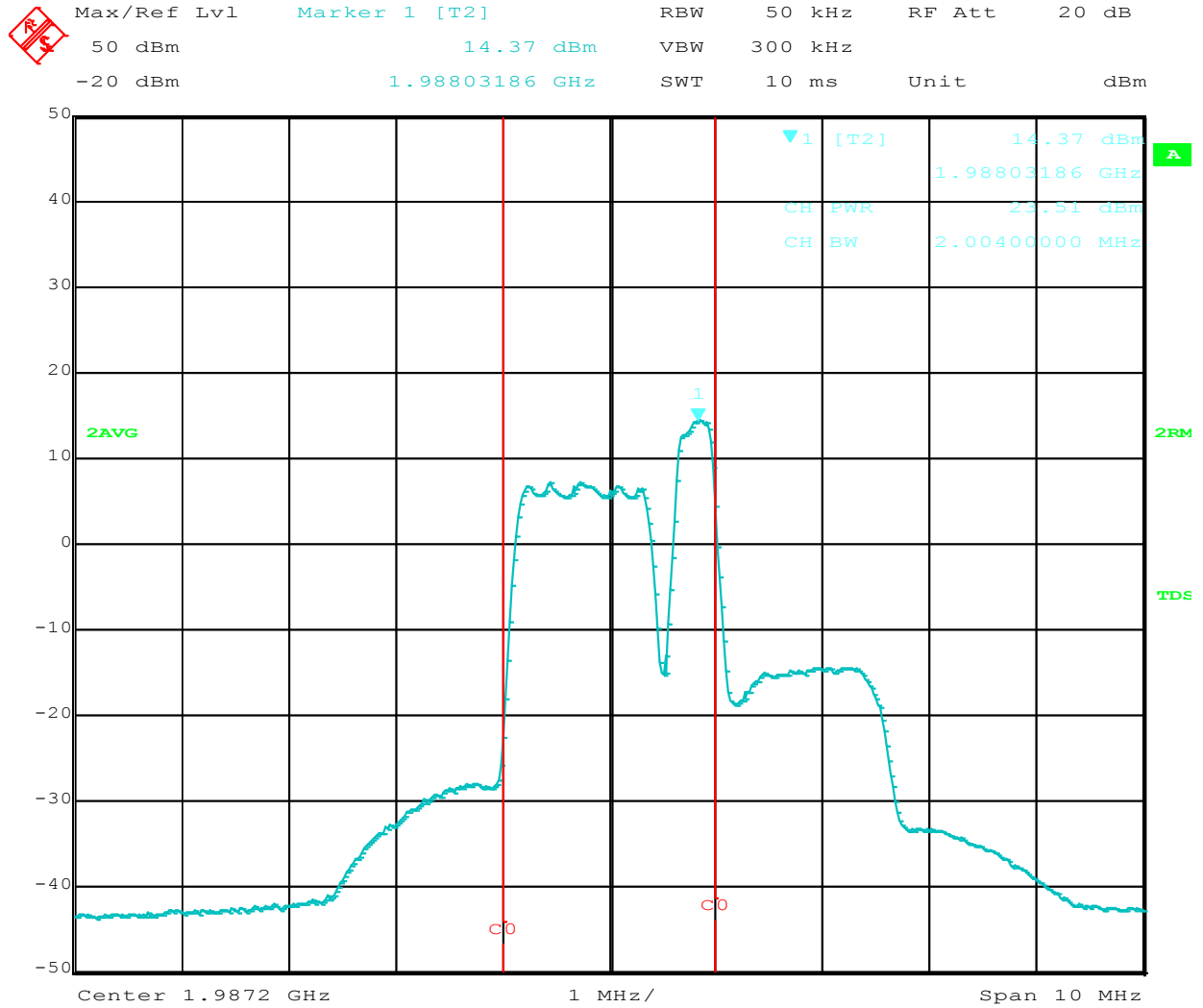
Output Power (Peak) - transmits GSM at ARFCN 521 (1932.0 MHz) and CDMA at channel 61 (1933.05 MHz), 23.84 dBm



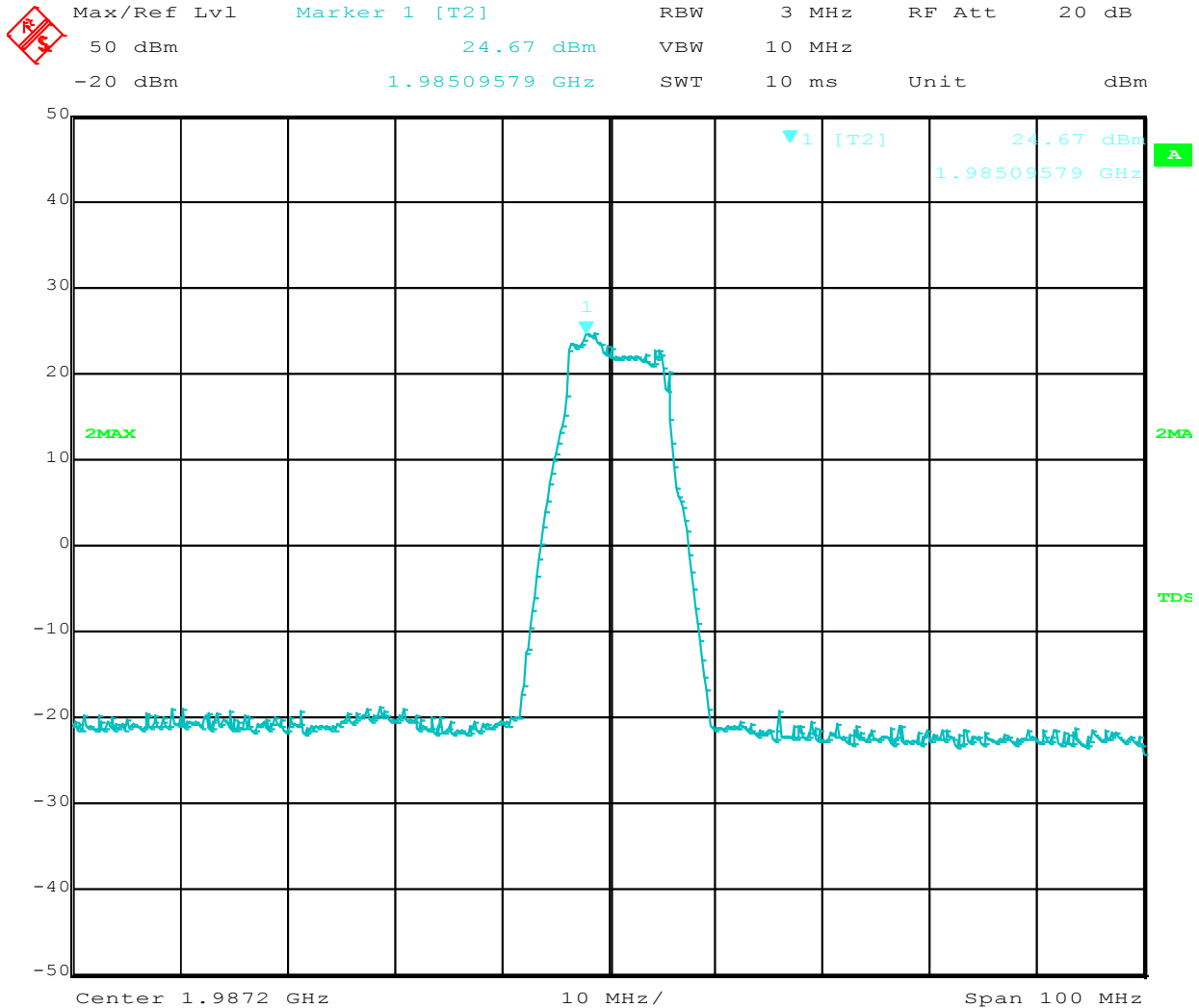
Output Power (Peak) - transmits ARFCN 658 (1959.4 MHz) and CDMA at channel 609 (1960.45 MHz), 23.87 dBm



Output Power (Average) - transmits ARFCN 801 (1988.0 MHz) and CDMA at channel 1139 (1986.95 MHz), 23.51 dBm



Output Power (Peak) - transmits ARFCN 801 (1988.0 MHz) and CDMA at channel 1139 (1986.95 MHz), 24.67 dBm



Test Personnel: Naga Suryadevara N5
Supervising/Reviewing Engineer: N/A
(Where Applicable) CFR47 FCC Part 24 Subpart E, RSS-133
Product Standard: 120VAC 60Hz
Input Voltage: N/A
Pretest Verification w/ Ambient Signals or BB Source: N/A

Test Date: 06/14/2016
06/15/2016
06/16/2016

Limit Applied: See Test Report Section 2.0
Ambient Temperature: 22, 24, 20 °C
Relative Humidity: 54, 42, 38 %
Atmospheric Pressure: 1008, 1003, 1002 mbars

Deviations, Additions, or Exclusions: None

8 Occupied Bandwidth

8.1 Method

Tests are performed in accordance with FCC 2.1049, RSS-Gen Section 6.6.

TEST SITE: EMC Lab

The EMC Lab has one Semi-anechoic Chamber and one Shielded Chamber. AC Mains Power is available at 120, 230, and 277 Single Phase; 208, 400, and 480 3-Phase. Large reference ground-planes are installed in the general lab area to facilitate EMC work not requiring a shielded environment.

8.2 Test Equipment Used:

Asset	Description	Manufacturer	Model	Serial	Cal Date	Cal Due
DAV001 ¹	Weather Station	Davis Instruments	7400	PE80519A61	10/23/2015	10/23/2016
MET1 ¹	Digital Multimeter	Meterman	15XP	050407785	05/09/2016	05/09/2017
ROS002 ¹	9kHz to 3GHz EMI Test Receiver	Rohde & Schwartz	ESCI 1166.5950K03	100067	06/23/2015	06/23/2016
CBLSHF203 ¹	Cable, SMA - SMA, 9kHz-40GHz, Cable Kit 4	Sucoflex (Huber Suhb)	104PE	CBLSHF203	08/06/2015	08/06/2016
WEI8 ¹	Attenuator	Weinschel Corp	47-10-34	BD8309	03/30/2016	03/30/2017
WEI18 ¹	20 dB, 50 Watt Attenuator DC-18GHz	Weinschel Corp	47-20-34	BP0570	03/30/2016	03/30/2017

Software Utilized:

Name	Manufacturer	Version
None		

8.3 Results:

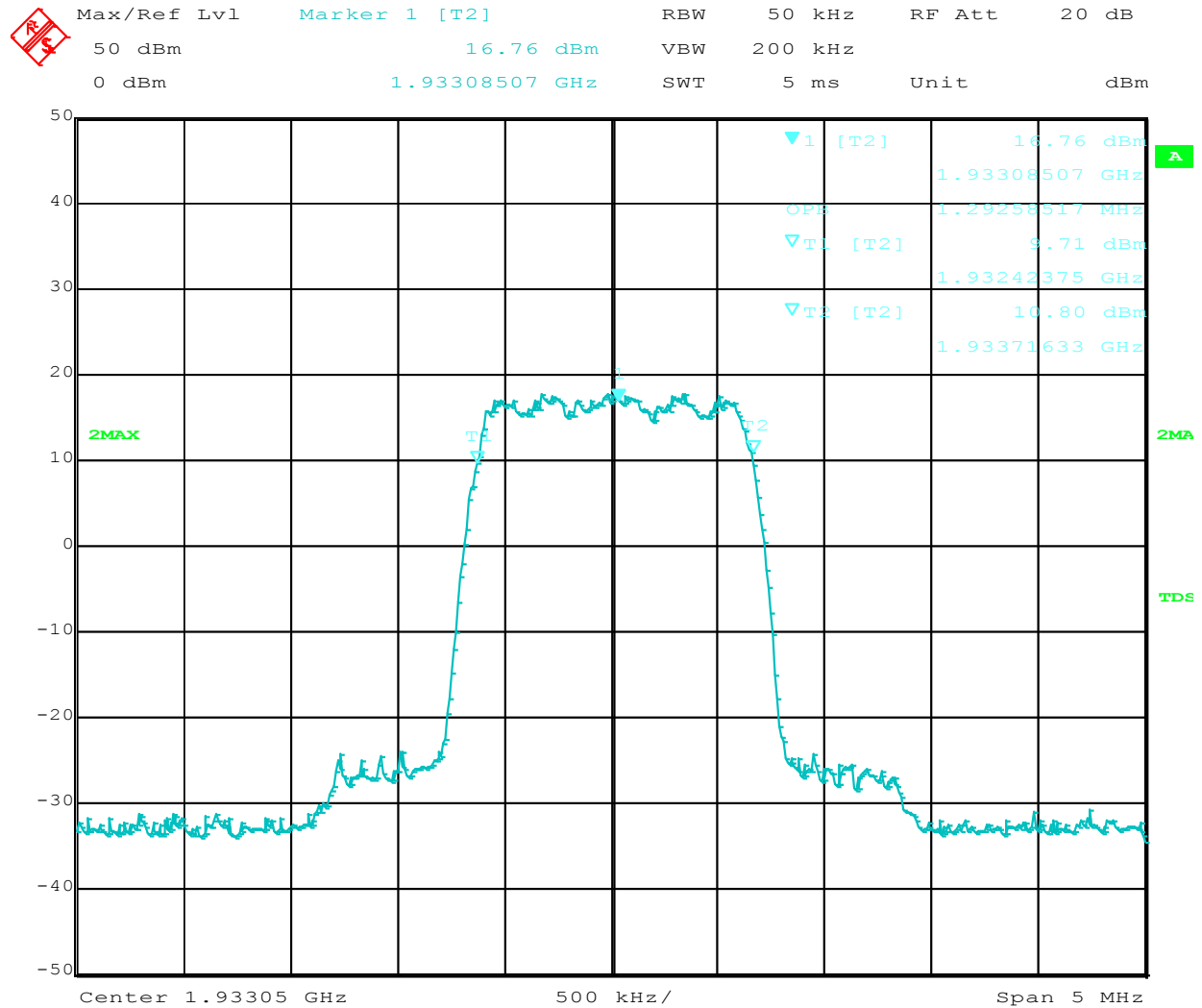
The sample tested was found to Comply.

Test	26 dB Bandwidth (kHz)	Occupied Bandwidth (kHz)	Pass/Fail	Comment
CDMA at channel 61 (1933.05 MHz)	1292.5	1482	Pass	Emission is within the assigned band
CDMA at channel 609 (1960.45 MHz)	1302	1503	Pass	Emission is within the assigned band
CDMA at channel 1139 (1986.95 MHz)	1290.5	1479.4	Pass	Emission is within the assigned band
GSM at ARFCN 521(1932.0 MHz) and CDMA at channel 61(1933.05 MHz)	1863	2084	Pass	Emission is within the assigned band
GSM at ARFCN 658(1959.4 MHz) and CDMA at channel 609(1960.45 MHz)	1860	2084	Pass	Emission is within the assigned band
GSM at ARFCN 801 (1988.0 MHz) and CDMA at channel 1139 (1986.95 MHz)	2004	2163	Pass	Emission is within the assigned band

8.4 Plots/Data:

Notes: Transducer factors were programmed into the spectrum analyzer to compensate for cable loss and attenuators in the test setup.

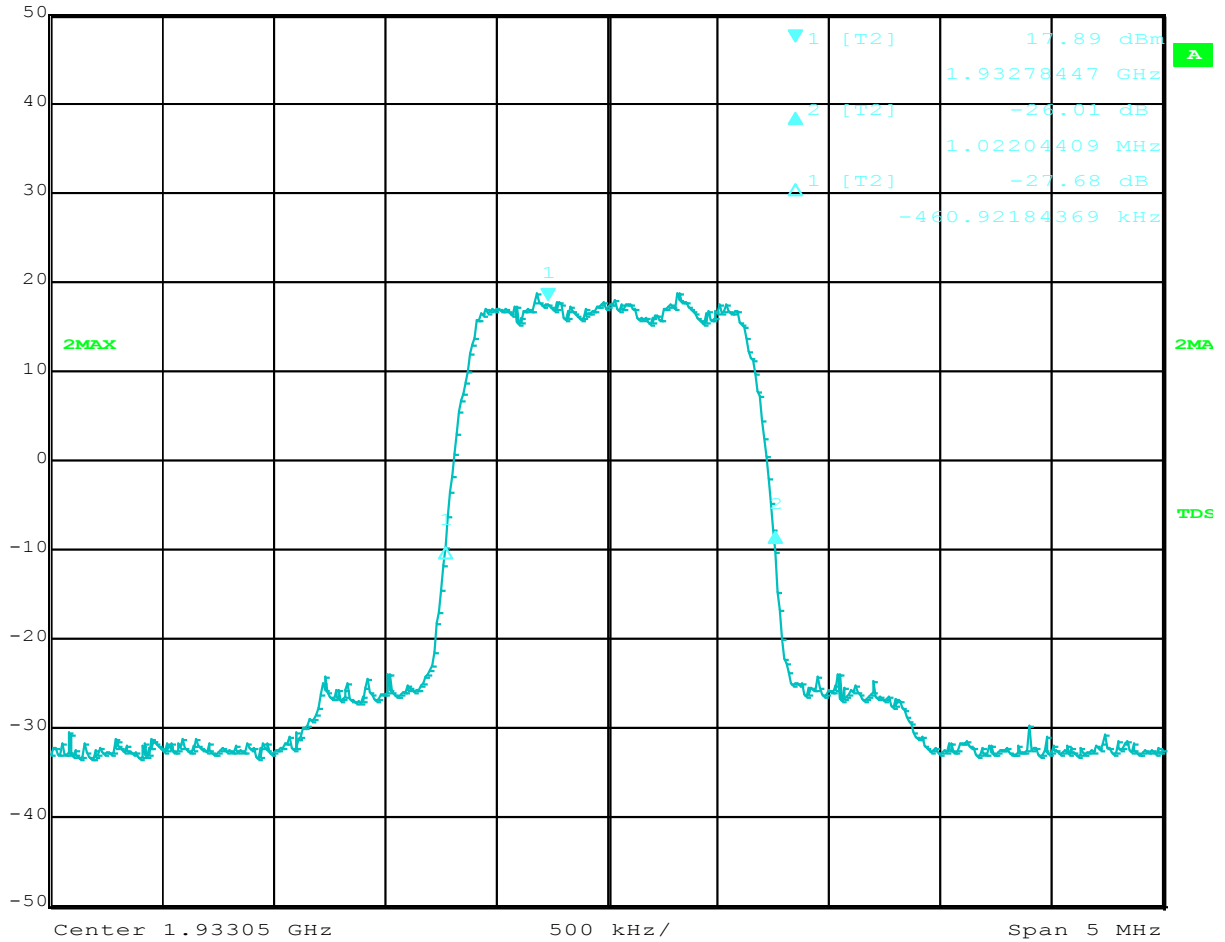
Occupied Bandwidth (99%) transmits CDMA at channel 61 (1933.05 MHz), 1.2925 MHz



Occupied Bandwidth (26 dB) transmits CDMA at channel 61 (1933.05 MHz), 1.482 MHz



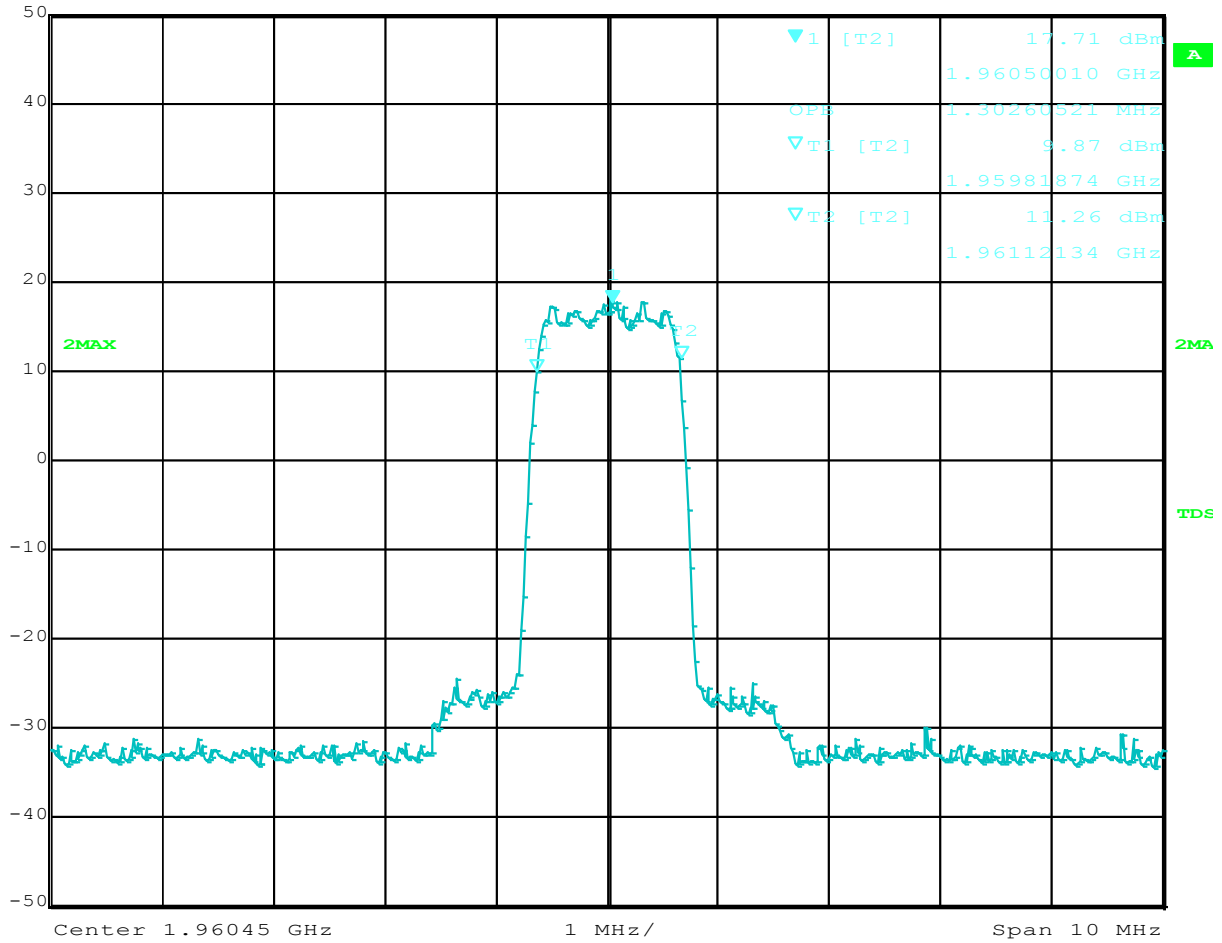
Max/Ref Lvl	Delta 2 [T2]	RBW	50 kHz	RF Att	20 dB
50 dBm	-26.01 dB	VBW	200 kHz		
0 dBm	1.02204409 MHz	SWT	5 ms	Unit	dBm



Occupied Bandwidth (99%) transmits CDMA at channel 609 (1960.45 MHz), 1.302 MHz



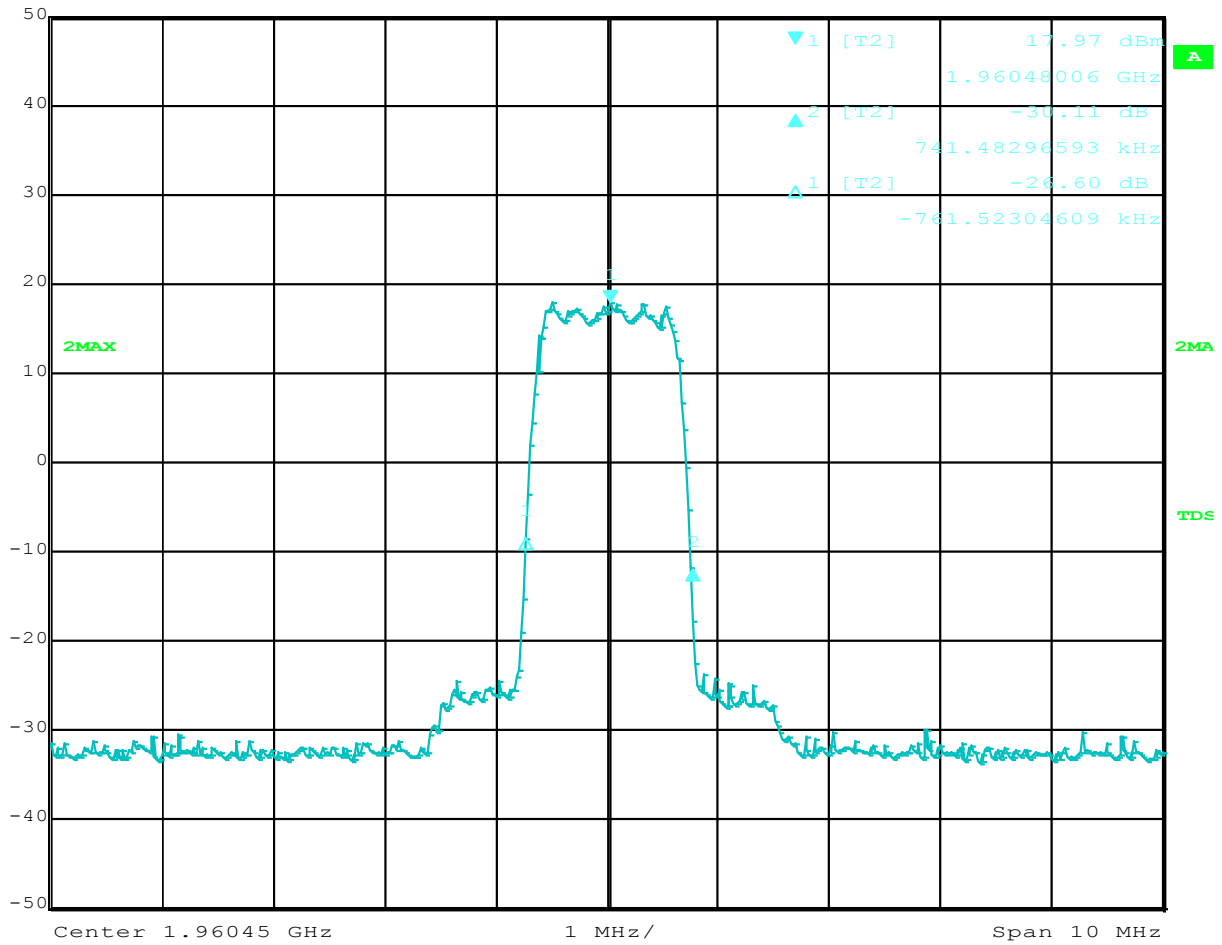
Max/Ref Lvl	Marker 1 [T2]	RBW	50 kHz	RF Att	20 dB
50 dBm	17.71 dBm	VBW	200 kHz		
0 dBm	1.96050010 GHz	SWT	10 ms	Unit	dBm



Occupied Bandwidth (26 dB) transmits CDMA at channel 609 (1960.45 MHz), 1.503 MHz



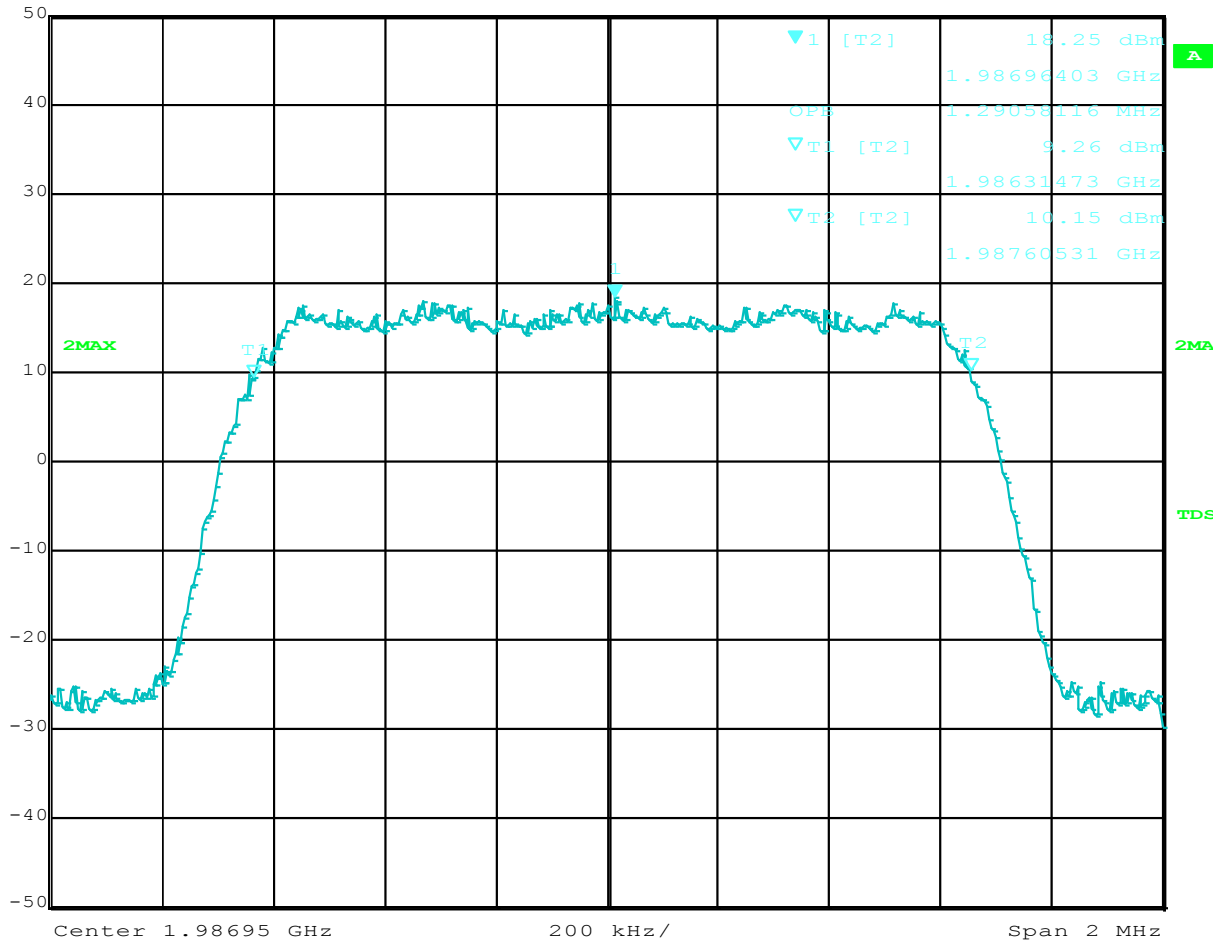
Max/Ref Lvl	Delta 2 [T2]	RBW	50 kHz	RF Att	20 dB
50 dBm	-30.11 dB	VBW	200 kHz		
0 dBm	741.48296593 kHz	SWT	10 ms	Unit	dBm



Occupied Bandwidth (99%) transmits CDMA at channel 1139 (1986.95 MHz), 1.29058 MHz



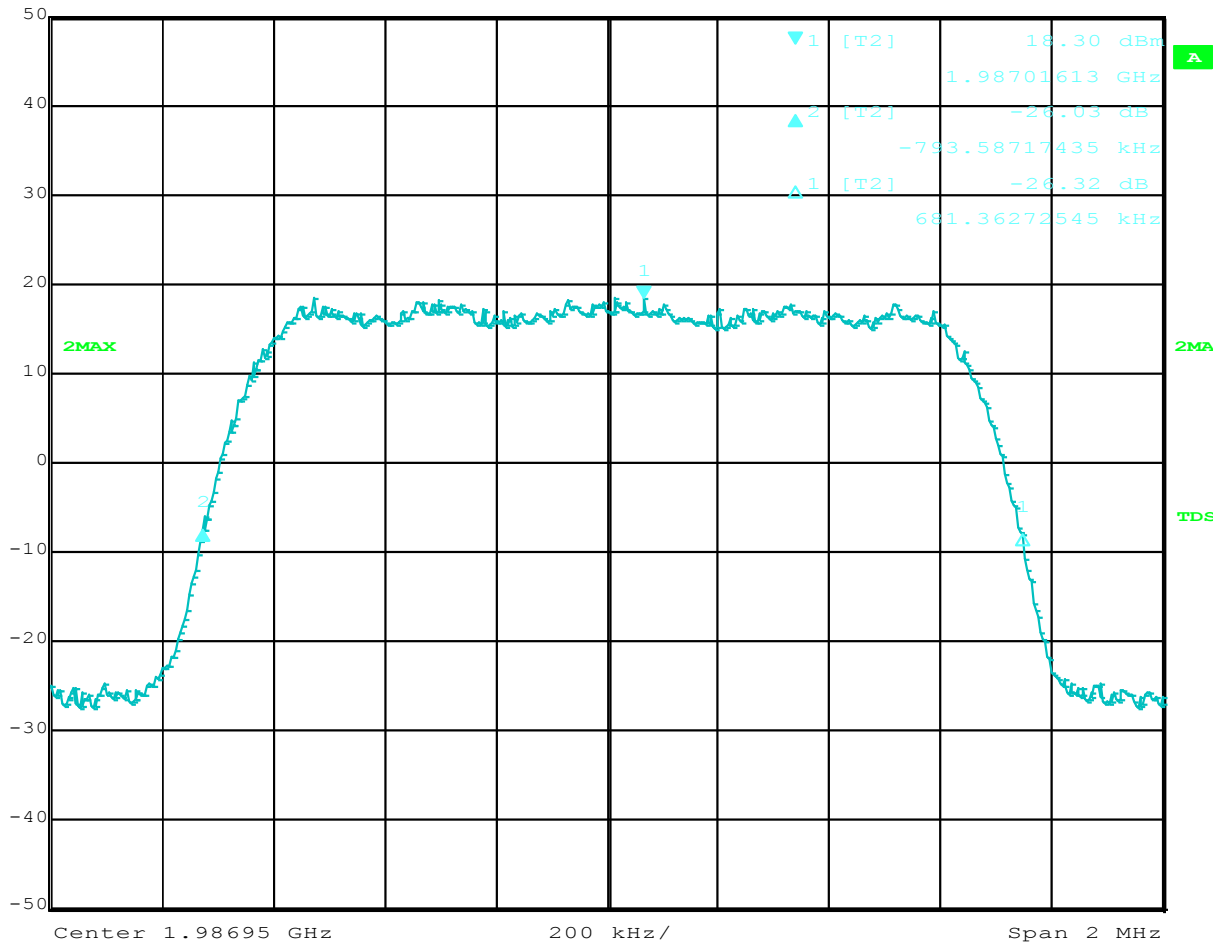
Max/Ref Lvl	Marker 1 [T2]	RBW	50 kHz	RF Att	20 dB
50 dBm	18.25 dBm	VBW	200 kHz		
0 dBm	1.98696403 GHz	SWT	5 ms	Unit	dBm



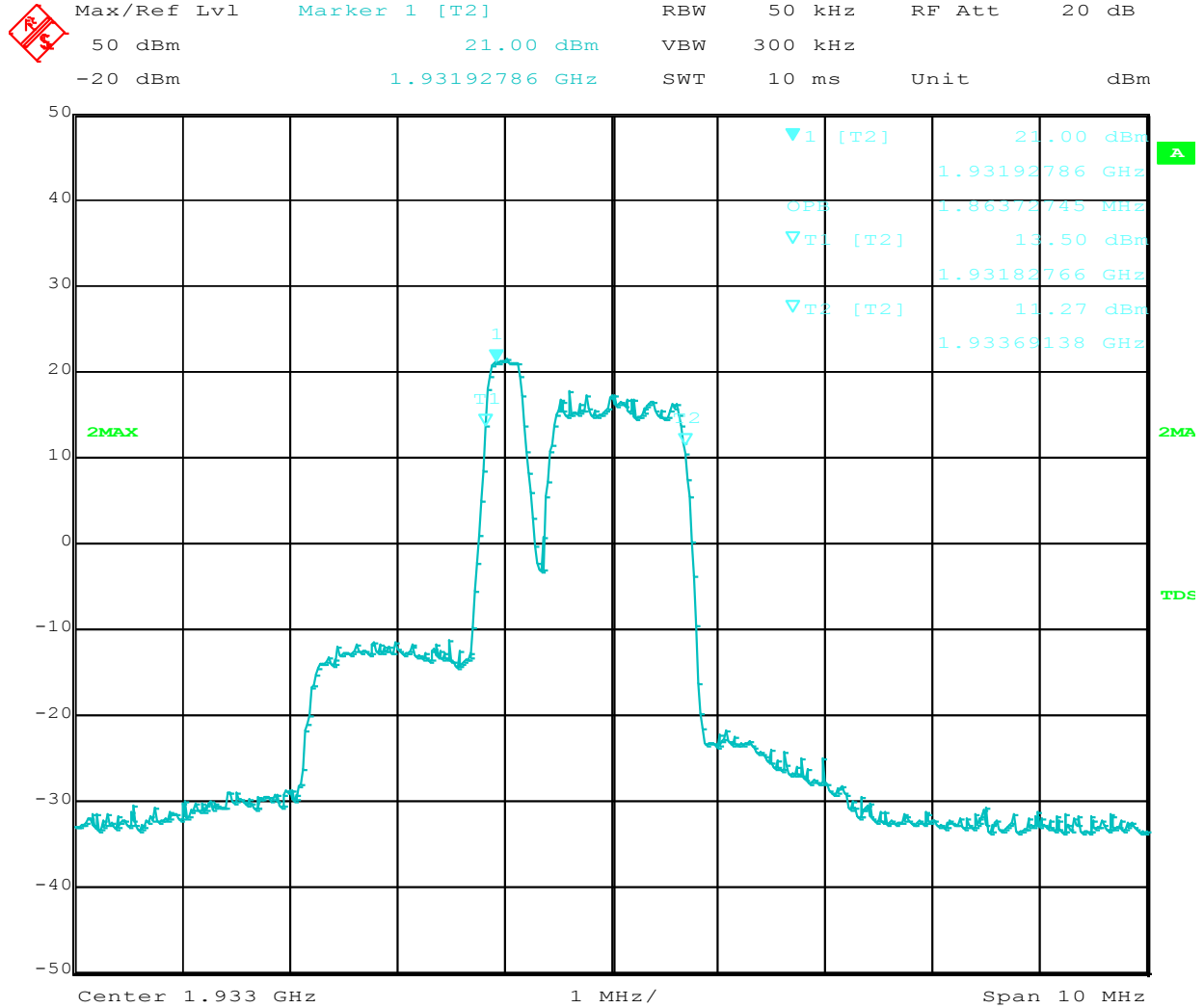
Occupied Bandwidth (26 dB) transmits CDMA at channel 1139 (1986.95 MHz), 1.4794 MHz



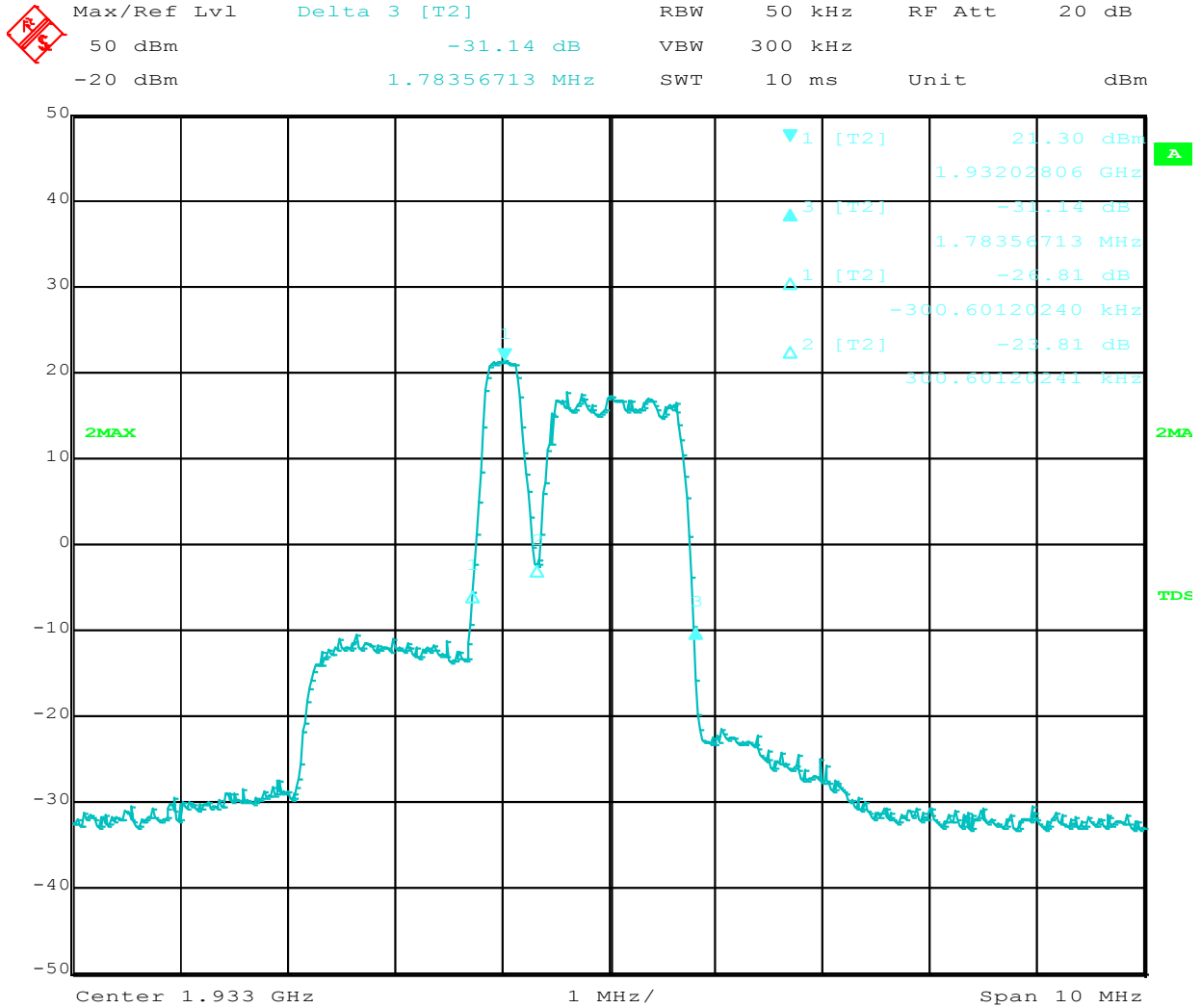
Max/Ref Lvl	Delta 2 [T2]	RBW	50 kHz	RF Att	20 dB
50 dBm	-26.03 dB	VBW	200 kHz		
0 dBm	-793.58717435 kHz	SWT	5 ms	Unit	dBm



Occupied Bandwidth (99%) transmits GSM at ARFCN 521(1932.0 MHz) and CDMA at channel 61(1933.05 MHz), 1.863 MHz

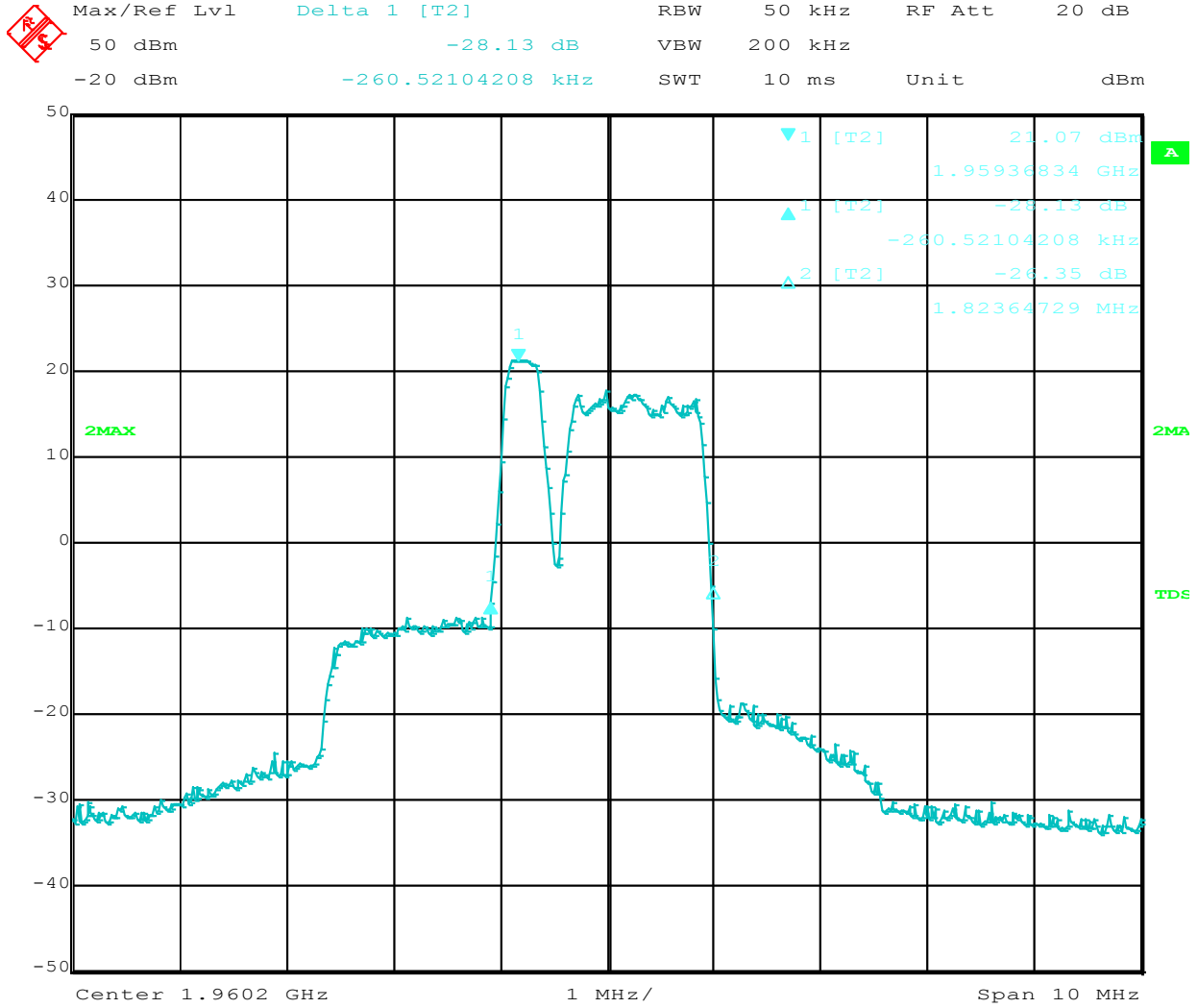


Occupied Bandwidth (26 dB) transmits GSM at ARFCN 521(1932.0 MHz) and CDMA at channel 61(1933.05 MHz), 2.084 MHz

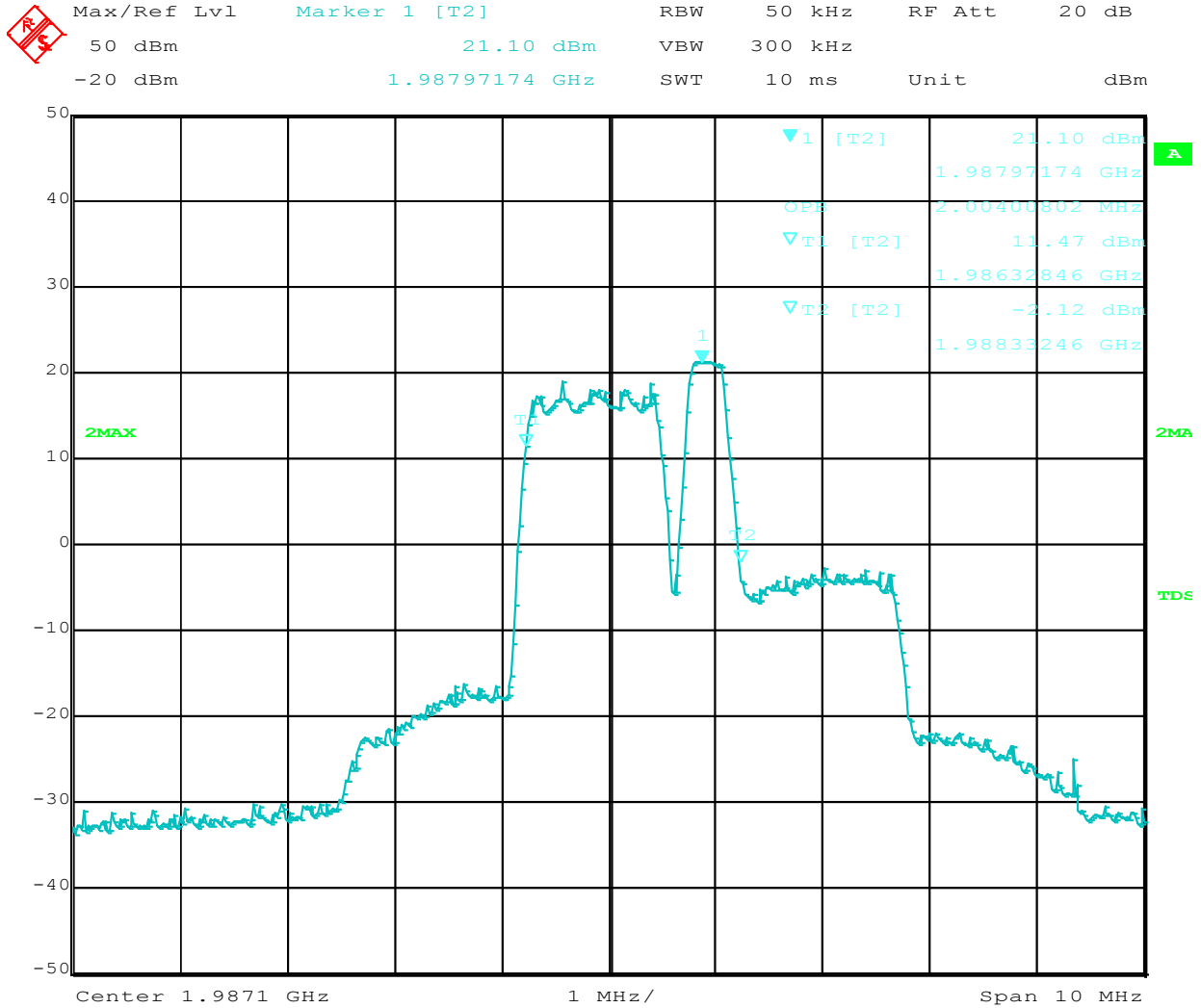


A

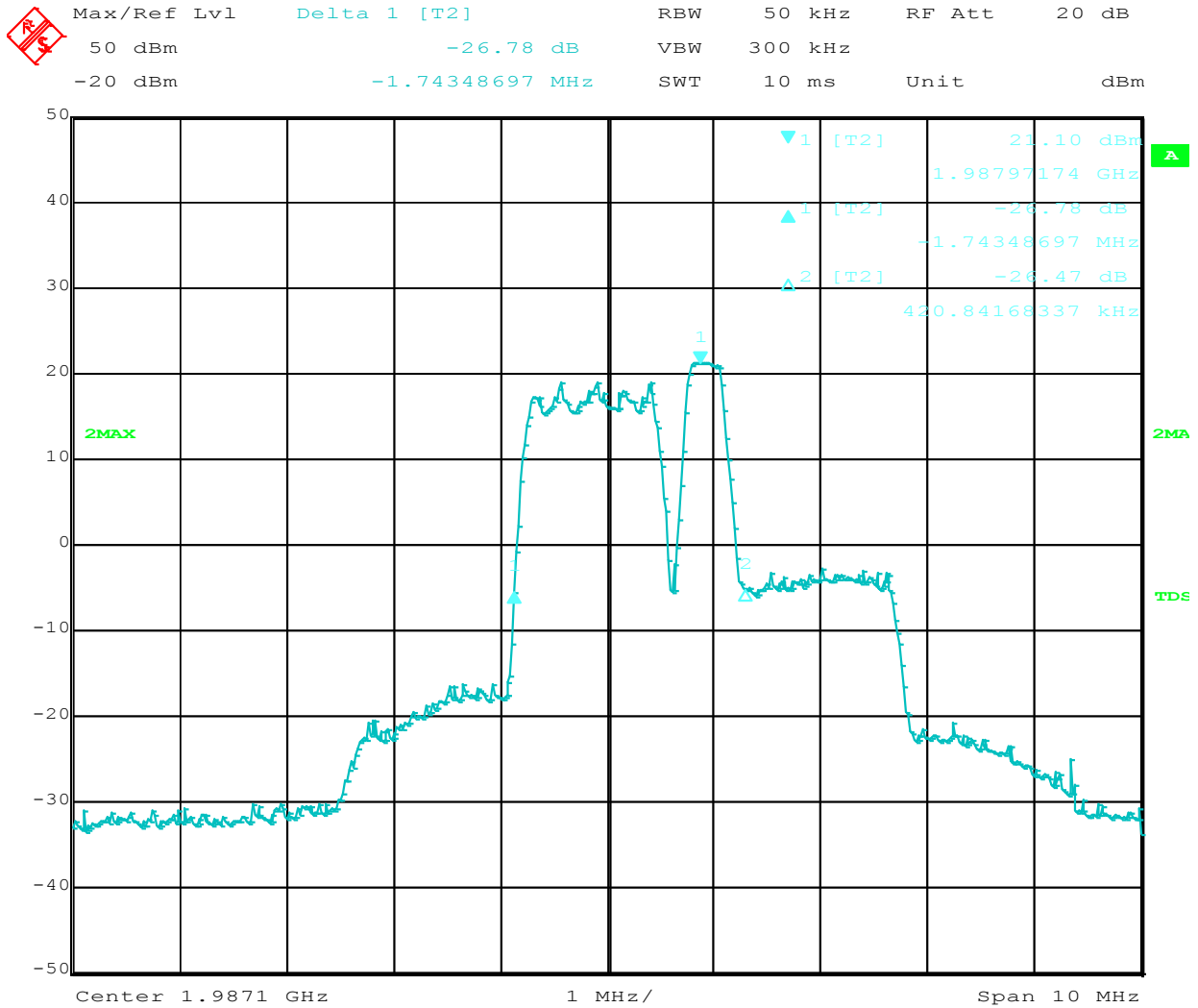
Occupied Bandwidth (26 dB) transmits GSM at ARFCN 658(1959.4 MHz) and CDMA at channel 609(1960.45 MHz), 2.084 MHz



Occupied Bandwidth (99%) transmits GSM at ARFCN 801 (1988.0 MHz) and CDMA at channel 1139 (1986.95 MHz), 2.004 MHz



Occupied Bandwidth (26 dB) transmits GSM at ARFCN 801 (1988.0 MHz) and CDMA at channel 1139 (1986.95 MHz), 2.163 MHz



Test Personnel: <u>Naga Suryadevara N-5</u>	Test Date: <u>06/14/2016</u>
Supervising/Reviewing Engineer: <u>N/A</u>	<u>06/15/2016</u>
(Where Applicable) <u>N/A</u>	<u>06/16/2016</u>
Product Standard: <u>CFR47 FCC Part 24 Subpart E, RSS-133</u>	Limit Applied: <u>See Test Report Section 2.0</u>
Input Voltage: <u>120VAC 60Hz</u>	Ambient Temperature: <u>22, 24, 20 °C</u>
Pretest Verification w/ Ambient Signals or BB Source: <u>N/A</u>	Relative Humidity: <u>54, 42, 38 %</u>
	Atmospheric Pressure: <u>1008, 1003, 1002 mbars</u>

Deviations, Additions, or Exclusions: None

9 Band Edge Compliance

9.1 Method

Tests are performed in accordance with FCC 24.238(b), RSS-133 Section 6.5.1.

TEST SITE: EMC Lab

The EMC Lab has one Semi-anechoic Chamber and one Shielded Chamber. AC Mains Power is available at 120, 230, and 277 Single Phase; 208, 400, and 480 3-Phase. Large reference ground-planes are installed in the general lab area to facilitate EMC work not requiring a shielded environment.

9.2 Test Equipment Used:

Asset	Description	Manufacturer	Model	Serial	Cal Date	Cal Due
DAV001'	Weather Station	Davis Instruments	7400	PE80519A61	10/23/2015	10/23/2016
MET1'	Digital Multimeter	Meterman	15XP	050407785	05/09/2016	05/09/2017
ROS002'	9kHz to 3GHz EMI Test Receiver	Rohde & Schwartz	ESCI 1166.5950K03	100067	06/23/2015	06/23/2016
CBLSHF203'	Cable, SMA - SMA, 9kHz-40GHz, Cable Kit 4	Sucoflex (Huber Suhm)	104PE	CBLSHF203	08/06/2015	08/06/2016
WEI8'	Attenuator	Weinschel Corp	47-10-34	BD8309	03/30/2016	03/30/2017
WEI18'	20 dB, 50 Watt Attenuator DC-18GHz	Weinschel Corp	47-20-34	BP0570	03/30/2016	03/30/2017

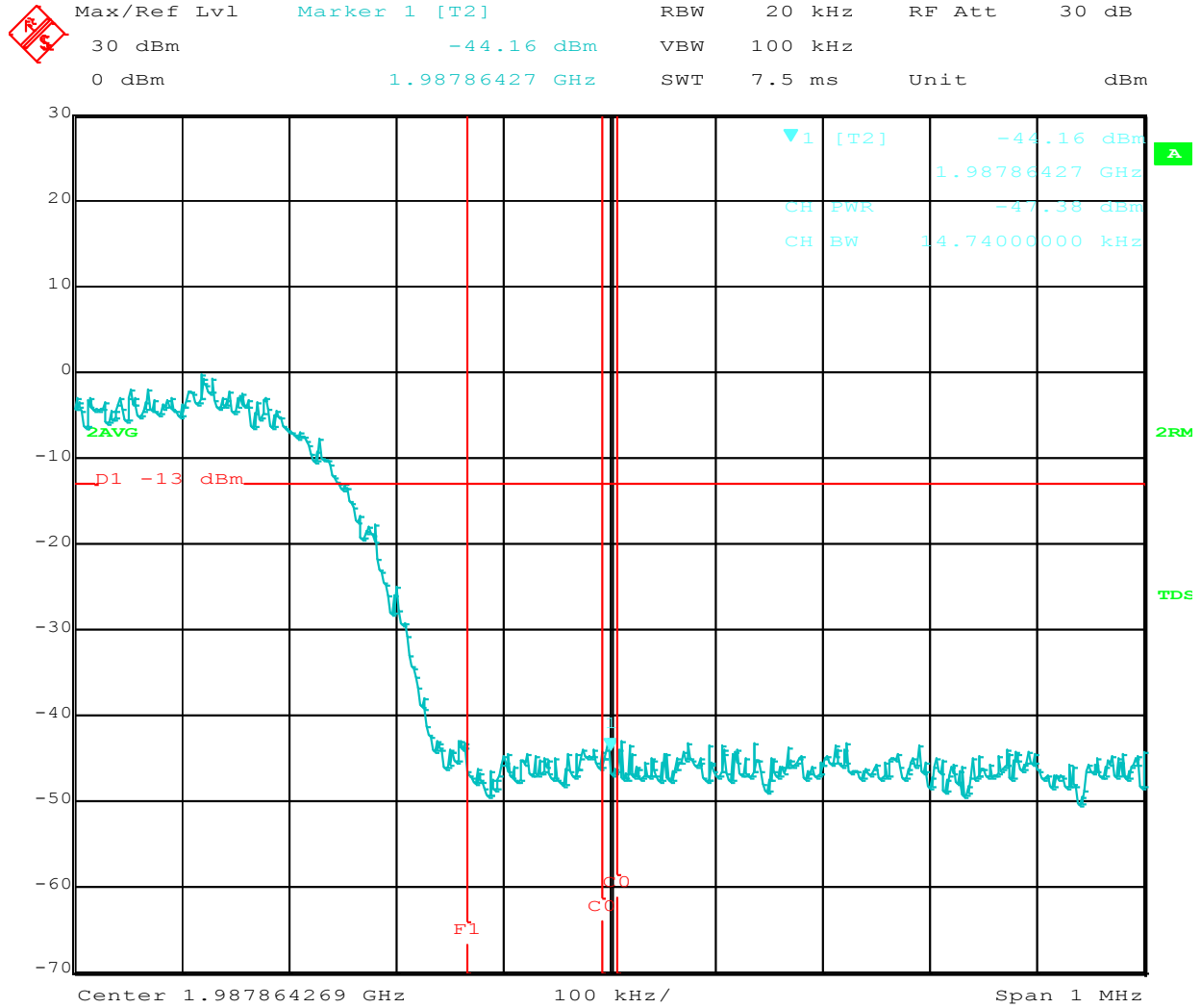
Software Utilized:

Name	Manufacturer	Version
None		

9.3 Results:

The sample tested was found to Comply. Band Edge emissions shall not exceed -13 dBm.

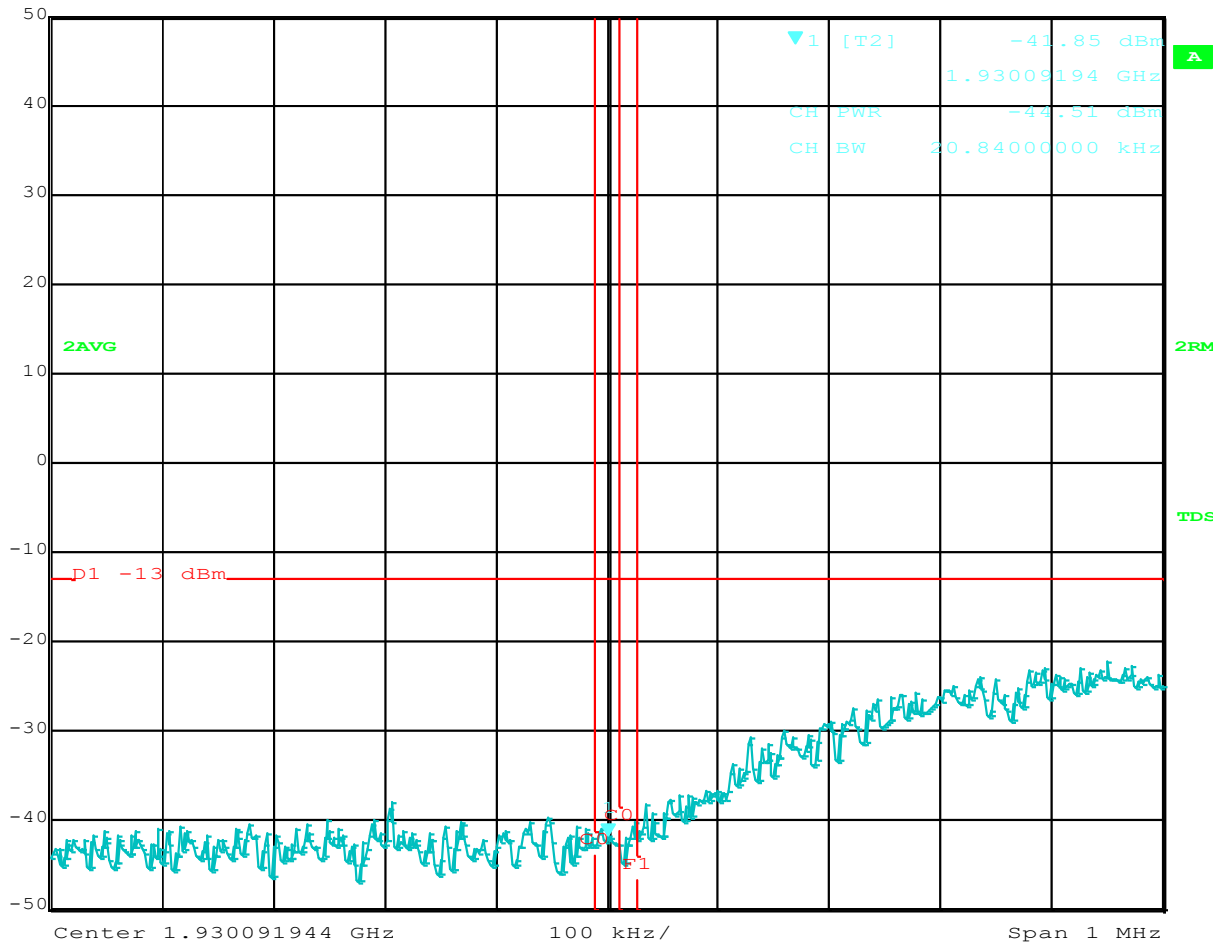
Upper Band edge Compliance - transmits CDMA at channel 1139



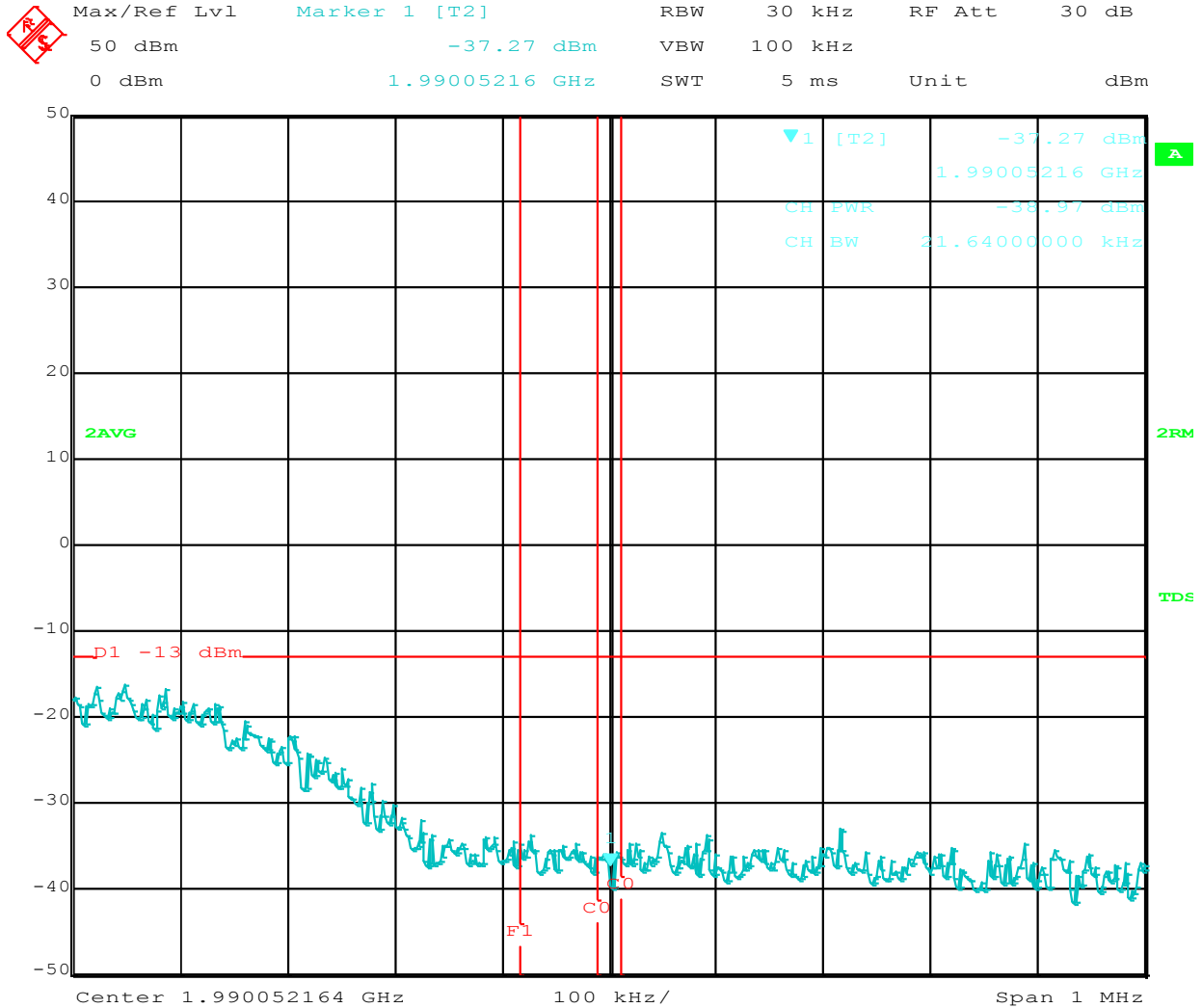
Lower Band edge Compliance - transmits GSM at ARFCN 521 and CDMA at channel 61



Max/Ref Lvl	Marker 1 [T2]	RBW	30 kHz	RF Att	30 dB
50 dBm	-41.85 dBm	VBW	100 kHz		
0 dBm	1.93009194 GHz	SWT	5 ms	Unit	dBm



Upper Band edge Compliance - transmits GSM at ARFCN 801 and CDMA at channel 1139



Test Personnel: Naga Suryadevara N-5
Supervising/Reviewing Engineer: N/A
(Where Applicable) CFR47 FCC Part 24 Subpart E, RSS-133
Product Standard: 120VAC 60Hz
Input Voltage: N/A
Pretest Verification w/ Ambient Signals or BB Source: N/A

Test Date: 06/14/2016
06/15/2016
06/16/2016

Limit Applied: See Test Report Section 2.0
Ambient Temperature: 22, 24, 20 °C
Relative Humidity: 54, 42, 38 %
Atmospheric Pressure: 1008, 1003, 1002 mbars

Deviations, Additions, or Exclusions: None

10 Spurious Conducted Emissions

10.1 Method

Tests are performed in accordance with FCC 2.1051, 24.238, RSS-133 Section 6.5, RSS Gen Section 7.0.

TEST SITE: EMC Lab

The EMC Lab has one Semi-anechoic Chamber and one Shielded Chamber. AC Mains Power is available at 120, 230, and 277 Single Phase; 208, 400, and 480 3-Phase. Large reference ground-planes are installed in the general lab area to facilitate EMC work not requiring a shielded environment.

10.2 Test Equipment Used:

Test equipment used from 06/14/2016 to 06/16/2016

Asset	Description	Manufacturer	Model	Serial	Cal Date	Cal Due
DAV001'	Weather Station	Davis Instruments	7400	PE80519A61	10/23/2015	10/23/2016
MET1'	Digital Multimeter	Meterman	15XP	050407785	05/09/2016	05/09/2017
ROS002'	9kHz to 3GHz EMI Test Receiver	Rohde & Schwartz	ESCI 1166.5950K03	100067	06/23/2015	06/23/2016
ROS001'	Spectrum Analyzer 20Hz - 40 GHz	Rohde & Schwartz	FSEK-30	100225	06/09/2016	06/09/2017
CBLSHF203'	Cable, SMA - SMA, 9kHz-40GHz, Cable Kit 4	Sucoflex (Huber Suhm)	104PE	CBLSHF203	08/06/2015	08/06/2016
WEI8'	Attenuator	Weinschel Corp	47-10-34	BD8309	03/30/2016	03/30/2017
WEI18'	20 dB, 50 Watt Attenuator DC-18GHz	Weinschel Corp	47-20-34	BP0570	03/30/2016	03/30/2017

Test equipment used on 09/17/2016

Asset	Description	Manufacturer	Model	Serial	Cal Date	Cal Due
DAV001'	Weather Station	Davis Instruments	7400	PE80519A61	11/28/2016	11/28/2017
MET1'	Digital Multimeter	Meterman	15XP	050407785	05/09/2016	05/09/2017
ROS002'	9kHz to 3GHz EMI Test Receiver	Rohde & Schwartz	ESCI 1166.5950K03	100067	07/29/2016	07/29/2017
ROS001'	Spectrum Analyzer 20Hz - 40 GHz	Rohde & Schwartz	FSEK-30	100225	06/09/2016	06/09/2017
CBLSHF203'	Cable, SMA - SMA, 9kHz-40GHz, Cable Kit 4	Sucoflex (Huber Suhm)	104PE	CBLSHF203	09/08/2016	09/08/2017
WEI8'	Attenuator	Weinschel Corp	47-10-34	BD8309	03/30/2016	03/30/2017
WEI18'	20 dB, 50 Watt Attenuator DC-18GHz	Weinschel Corp	47-20-34	BP0570	03/30/2016	03/30/2017

Software Utilized:

Name	Manufacturer	Version
None		

10.3 Results:

The sample tested was found to Comply.

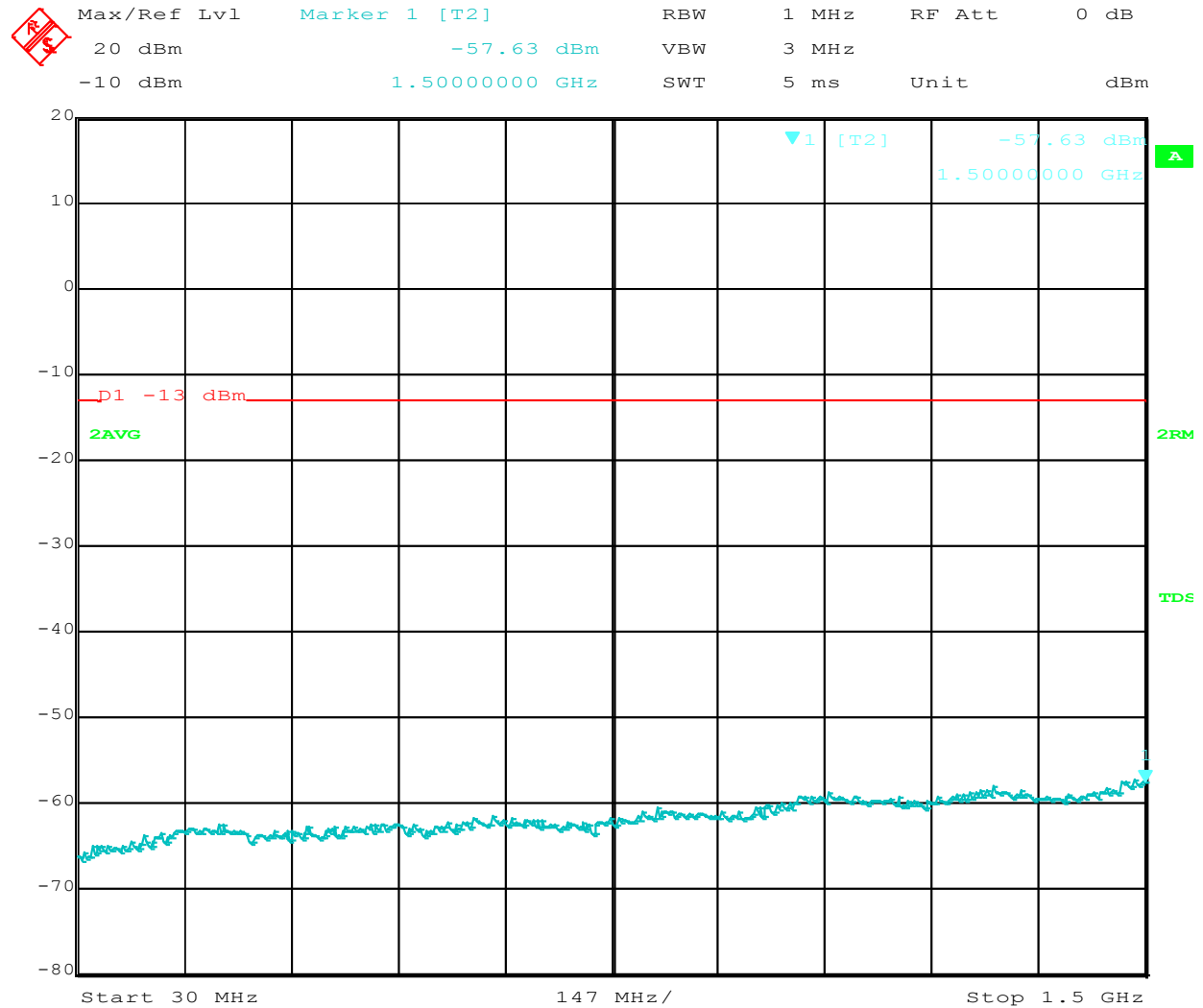
The spurious emissions shall not exceed -13 dBm in Tx mode from 30 MHz – 20 GHz.

The spurious emissions shall not exceed -57 dBm from 30 MHz – 1 GHz and -53.01 dBm from 1 – 20 GHz in Rx mode.

10.4 Plots/Data:

Notes: Transducer factors were programmed into the spectrum analyzer to compensate for cable loss and attenuators in the test setup.

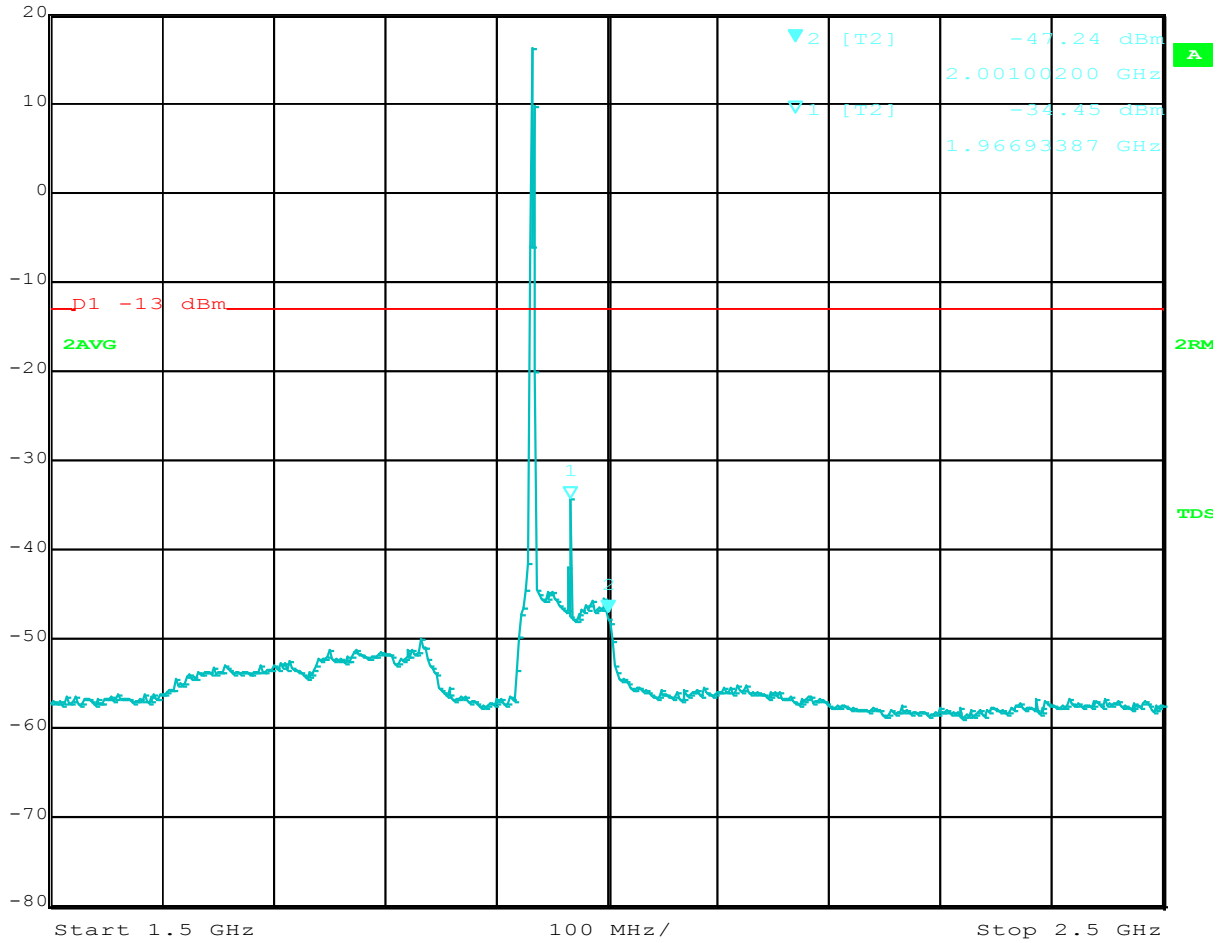
Transmits CDMA at channel 61, 30 MHz – 1.5 GHz



Transmits CDMA at channel 61, 1.5 GHz – 2.5 GHz



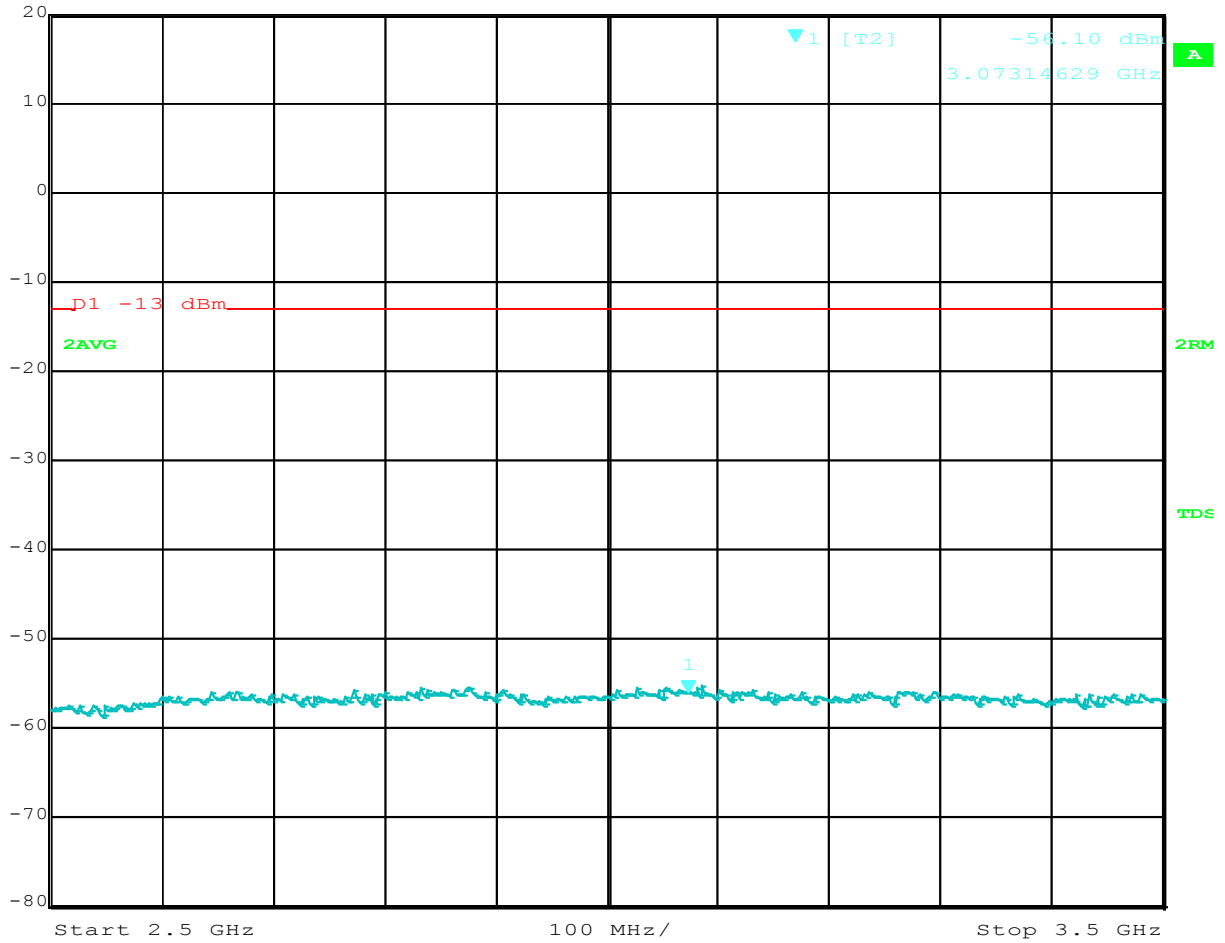
Max/Ref Lvl	Marker 2 [T2]	RBW	1 MHz	RF Att	0 dB
20 dBm	-47.24 dBm	VBW	3 MHz		
-10 dBm	2.00100200 GHz	SWT	5 ms	Unit	dBm



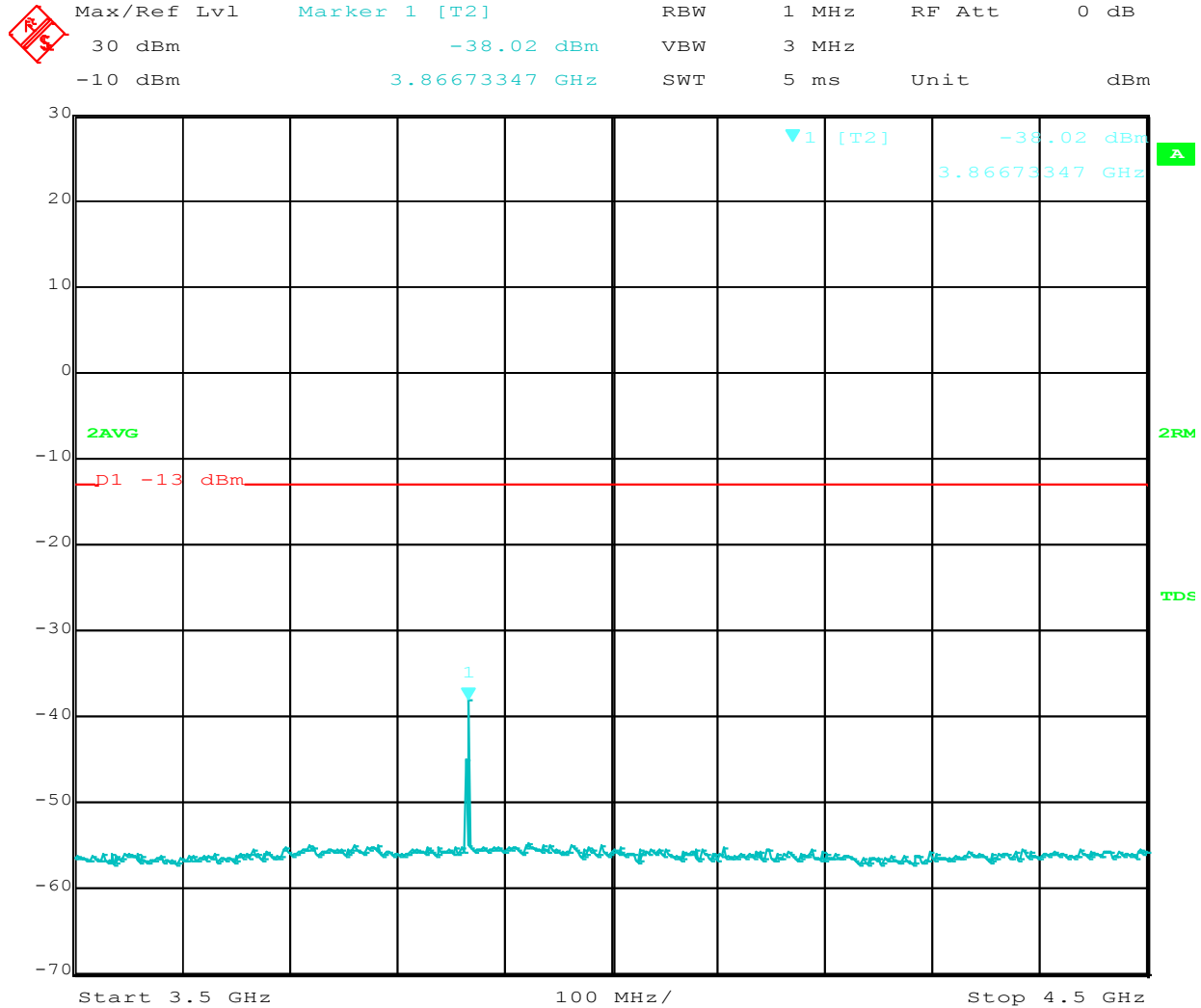
Transmits CDMA at channel 61, 2.5 GHz – 3.5 GHz



Max/Ref Lvl	Marker 1 [T2]	RBW	1 MHz	RF Att	0 dB
20 dBm	-56.10 dBm	VBW	3 MHz		
-10 dBm	3.07314629 GHz	SWT	5 ms	Unit	dBm



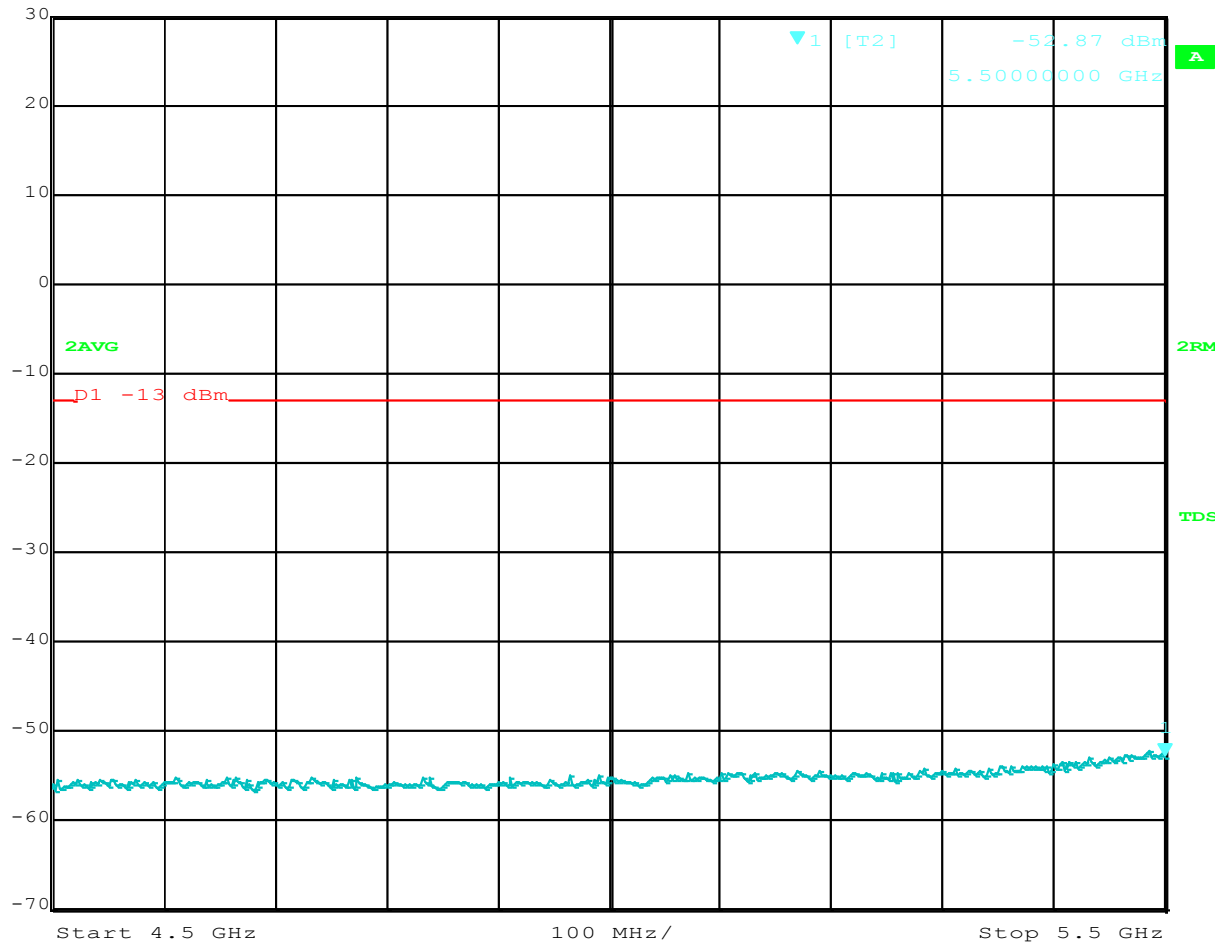
Transmits CDMA at channel 61, 3.5 GHz – 4.5 GHz



Transmits CDMA at channel 61, 4.5 GHz – 5.5 GHz



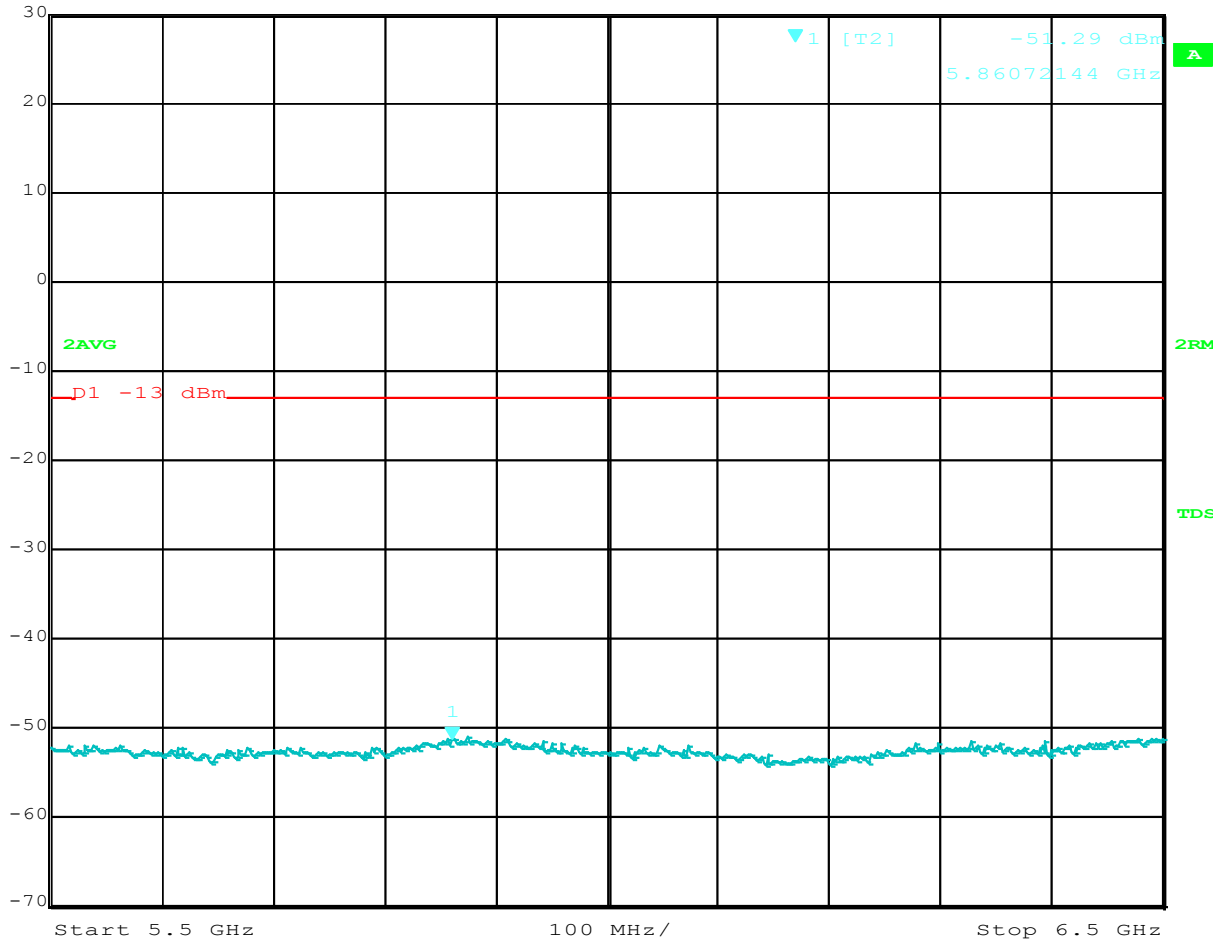
Max/Ref Lvl	Marker 1 [T2]	RBW	1 MHz	RF Att	0 dB
30 dBm	-52.87 dBm	VBW	3 MHz		
-10 dBm	5.50000000 GHz	SWT	5 ms	Unit	dBm



Transmits CDMA at channel 61, 5.5 GHz – 6.5 GHz



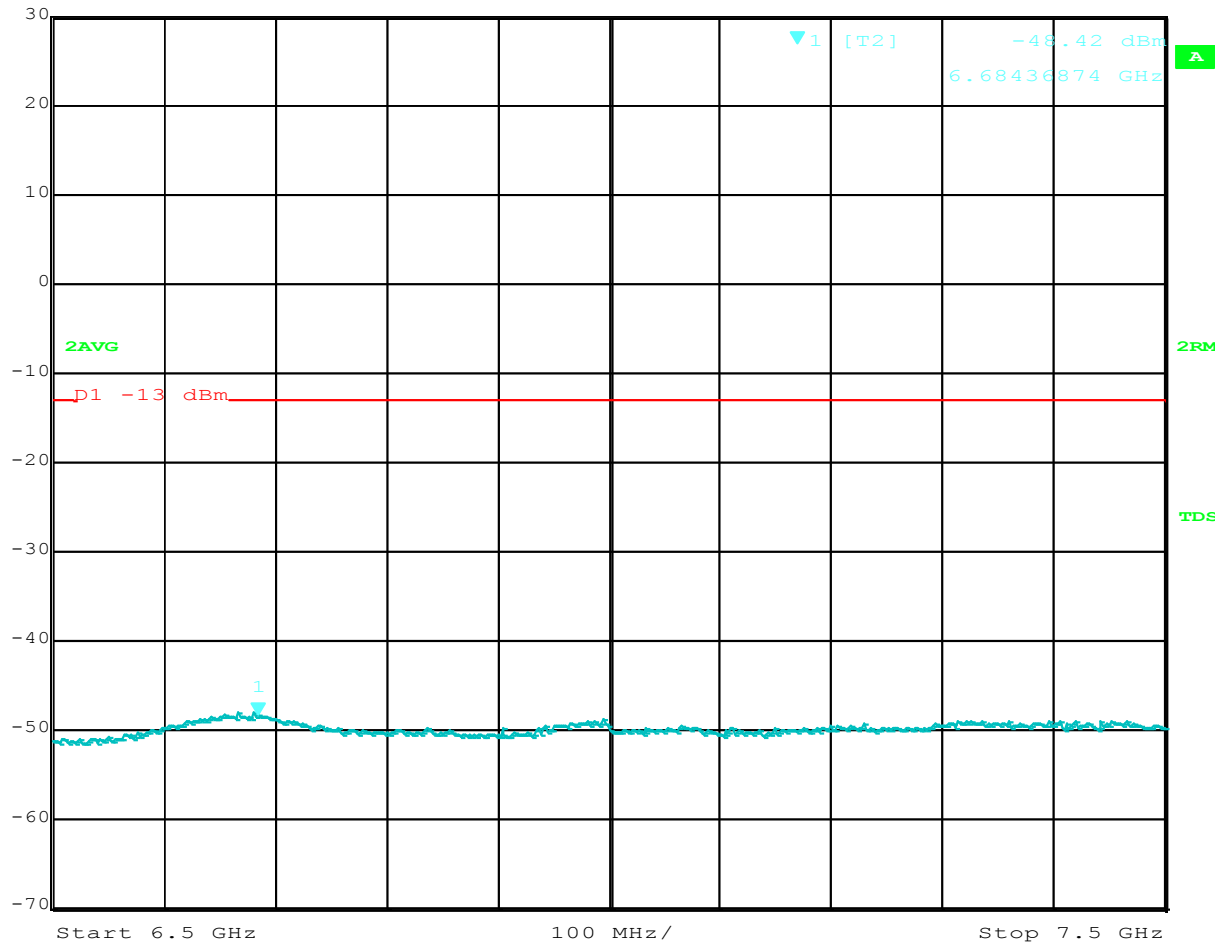
Max/Ref Lvl	Marker 1 [T2]	RBW	1 MHz	RF Att	0 dB
30 dBm	-51.29 dBm	VBW	3 MHz		
-10 dBm	5.86072144 GHz	SWT	5 ms	Unit	dBm



Transmits CDMA at channel 61, 6.5 GHz – 7.5 GHz



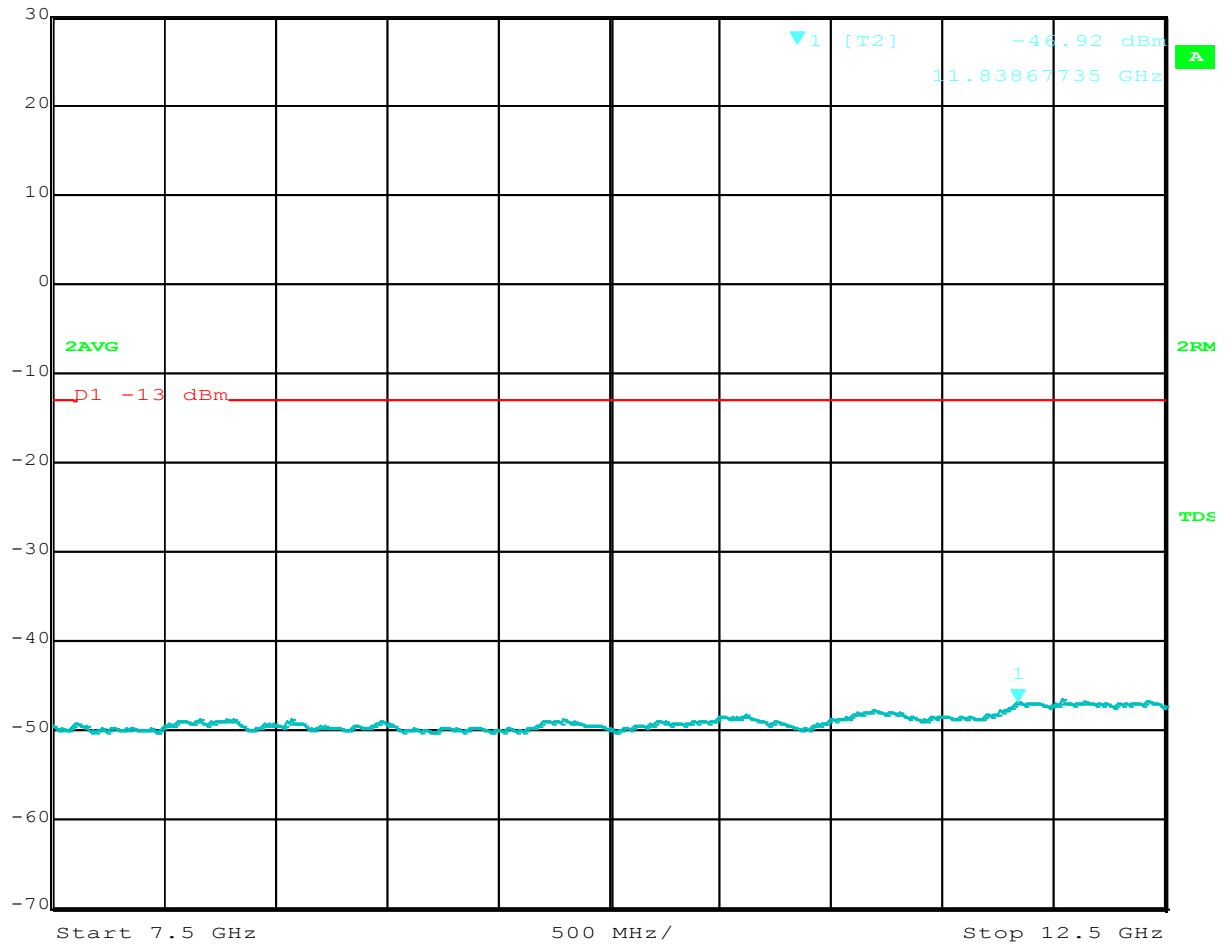
Max/Ref Lvl	Marker 1 [T2]	RBW	1 MHz	RF Att	0 dB
30 dBm	-48.42 dBm	VBW	3 MHz		
-10 dBm	6.68436874 GHz	SWT	10 ms	Unit	dBm



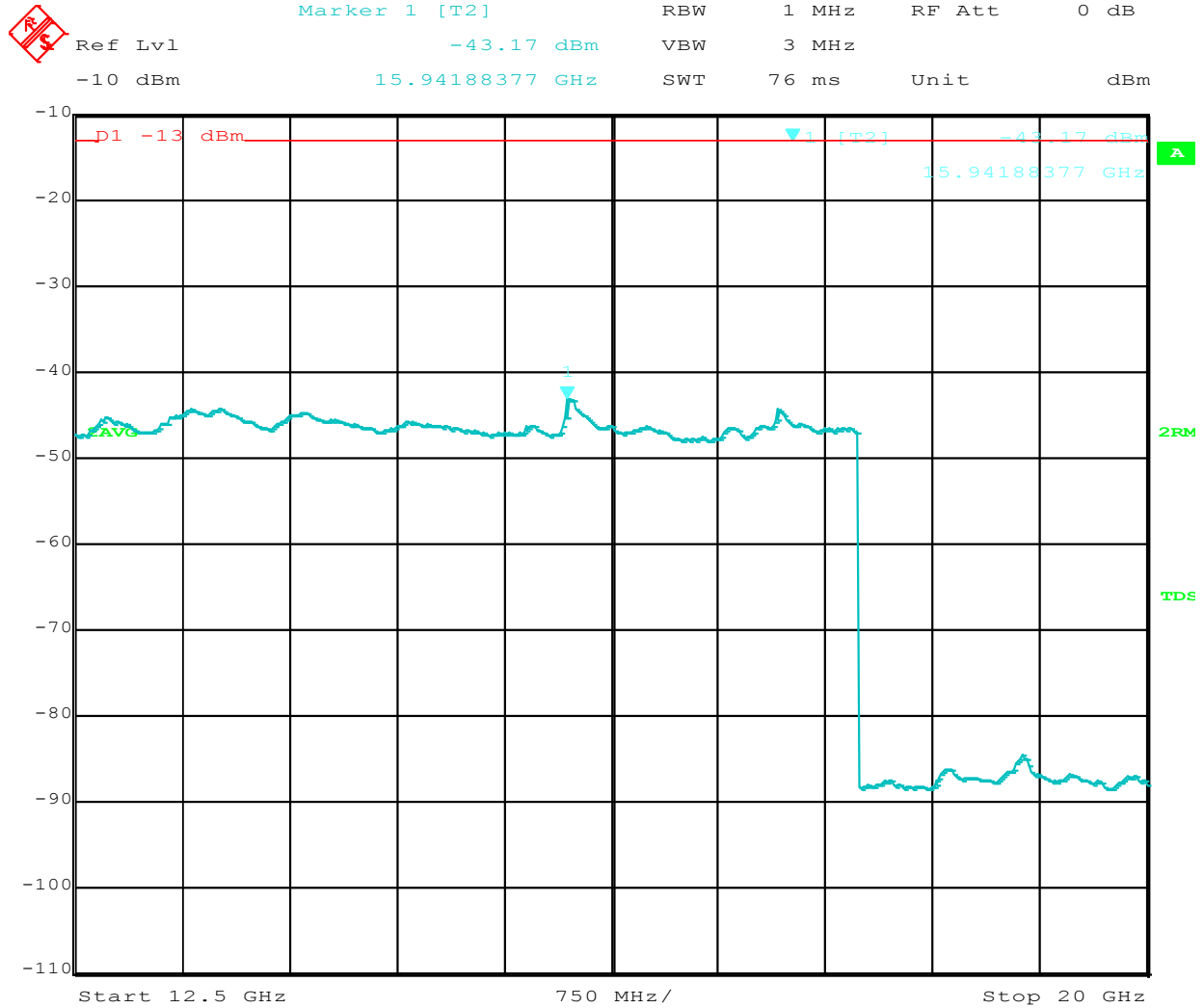
Transmits CDMA at channel 61, 7.5 GHz – 12.5 GHz



Max/Ref Lvl	Marker 1 [T2]	RBW	1 MHz	RF Att	0 dB
30 dBm	-46.92 dBm	VBW	3 MHz		
-10 dBm	11.83867735 GHz	SWT	50 ms	Unit	dBm



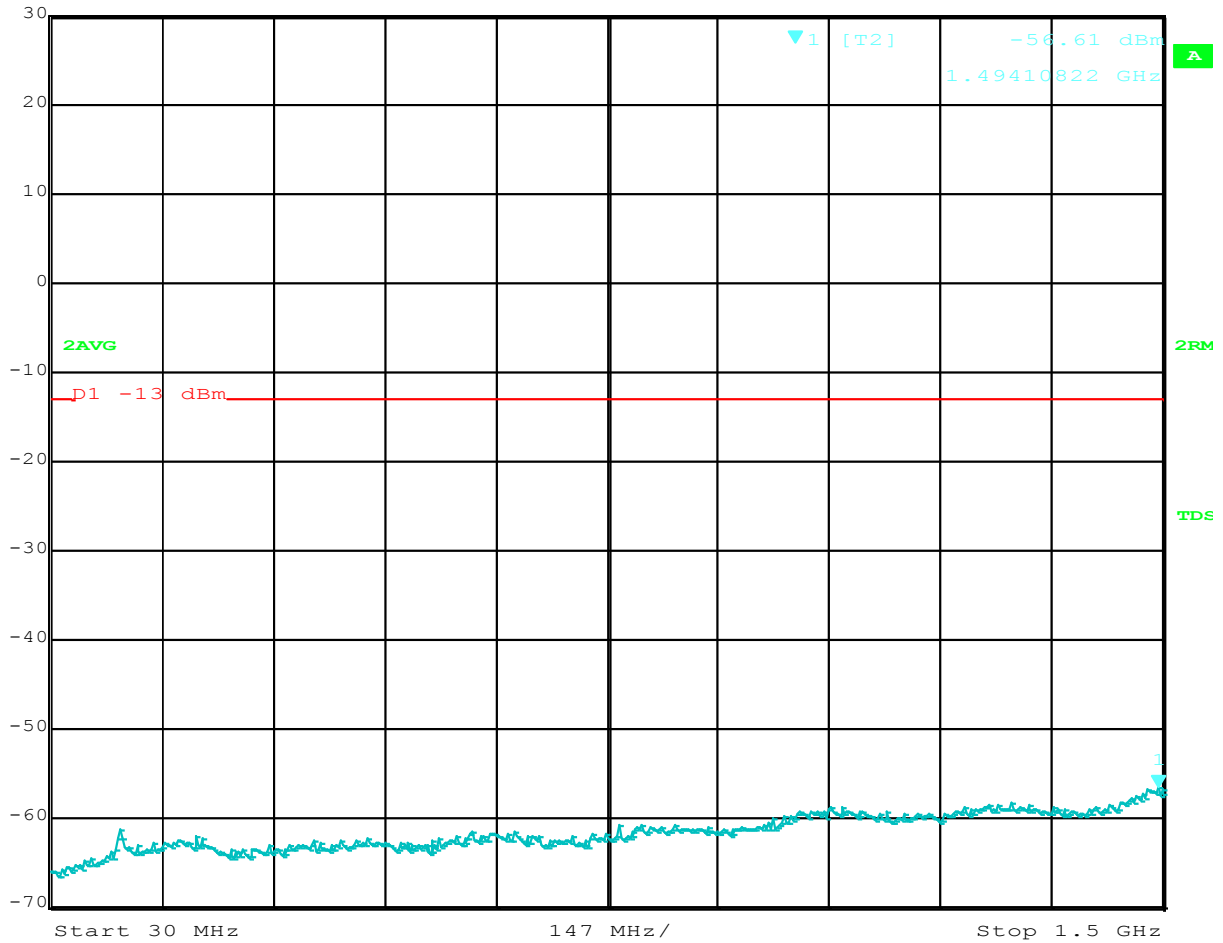
Transmits CDMA at channel 61, 12.5 GHz – 20.0 GHz



Transmits CDMA at channel 609, 30 MHz – 1.5 GHz



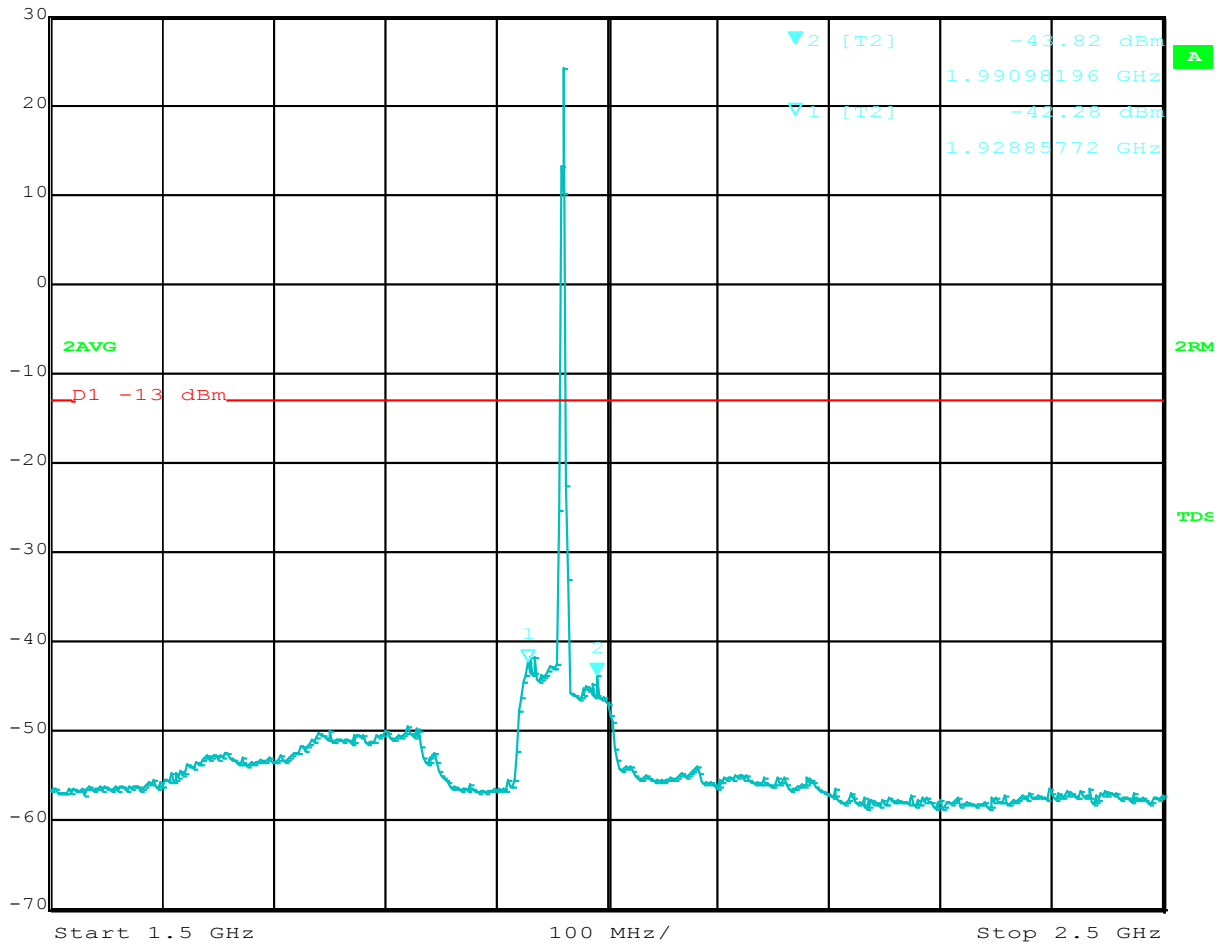
Max/Ref Lvl	Marker 1 [T2]	RBW	1 MHz	RF Att	0 dB
30 dBm	-56.61 dBm	VBW	3 MHz		
-10 dBm	1.49410822 GHz	SWT	5 ms	Unit	dBm



Transmits CDMA at channel 609, 1.5 GHz – 2.5 GHz



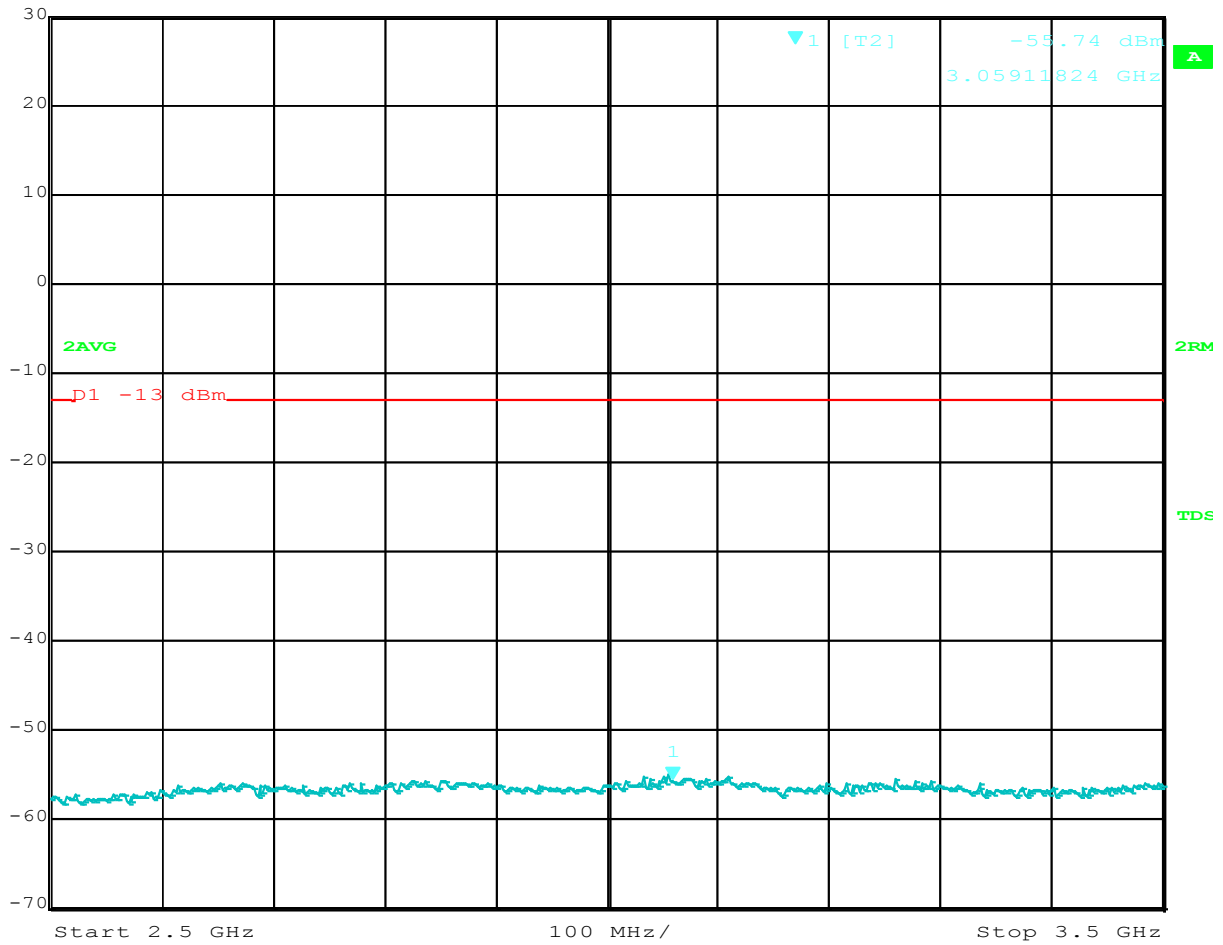
Max/Ref Lvl	Marker 2 [T2]	RBW	1 MHz	RF Att	0 dB
30 dBm	-43.82 dBm	VBW	3 MHz		
-10 dBm	1.99098196 GHz	SWT	5 ms	Unit	dBm



Transmits CDMA at channel 609, 2.5 GHz – 3.5 GHz



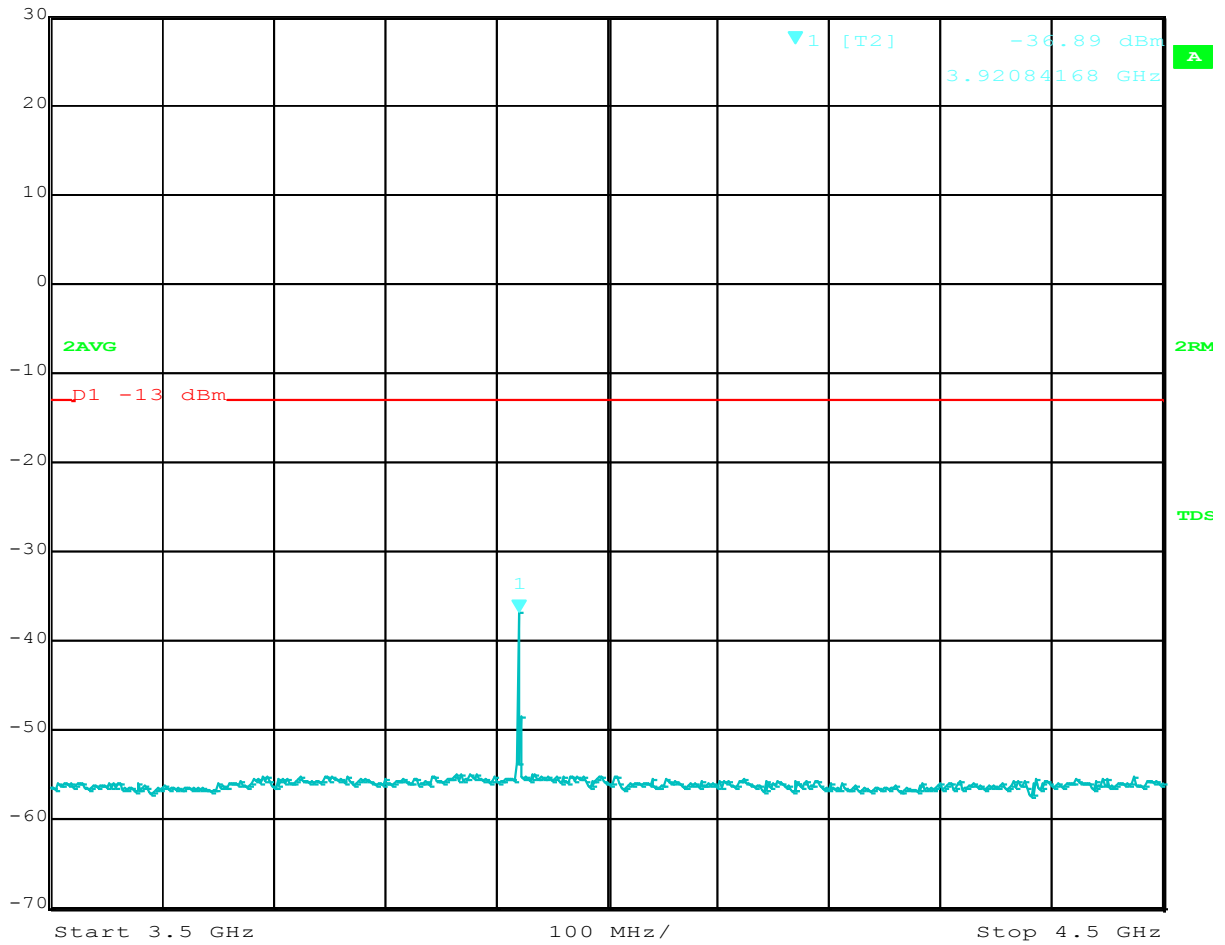
Max/Ref Lvl	Marker 1 [T2]	RBW	1 MHz	RF Att	0 dB
30 dBm	-55.74 dBm	VBW	3 MHz		
-10 dBm	3.05911824 GHz	SWT	5 ms	Unit	dBm



Transmits CDMA at channel 609, 3.5 GHz – 4.5 GHz



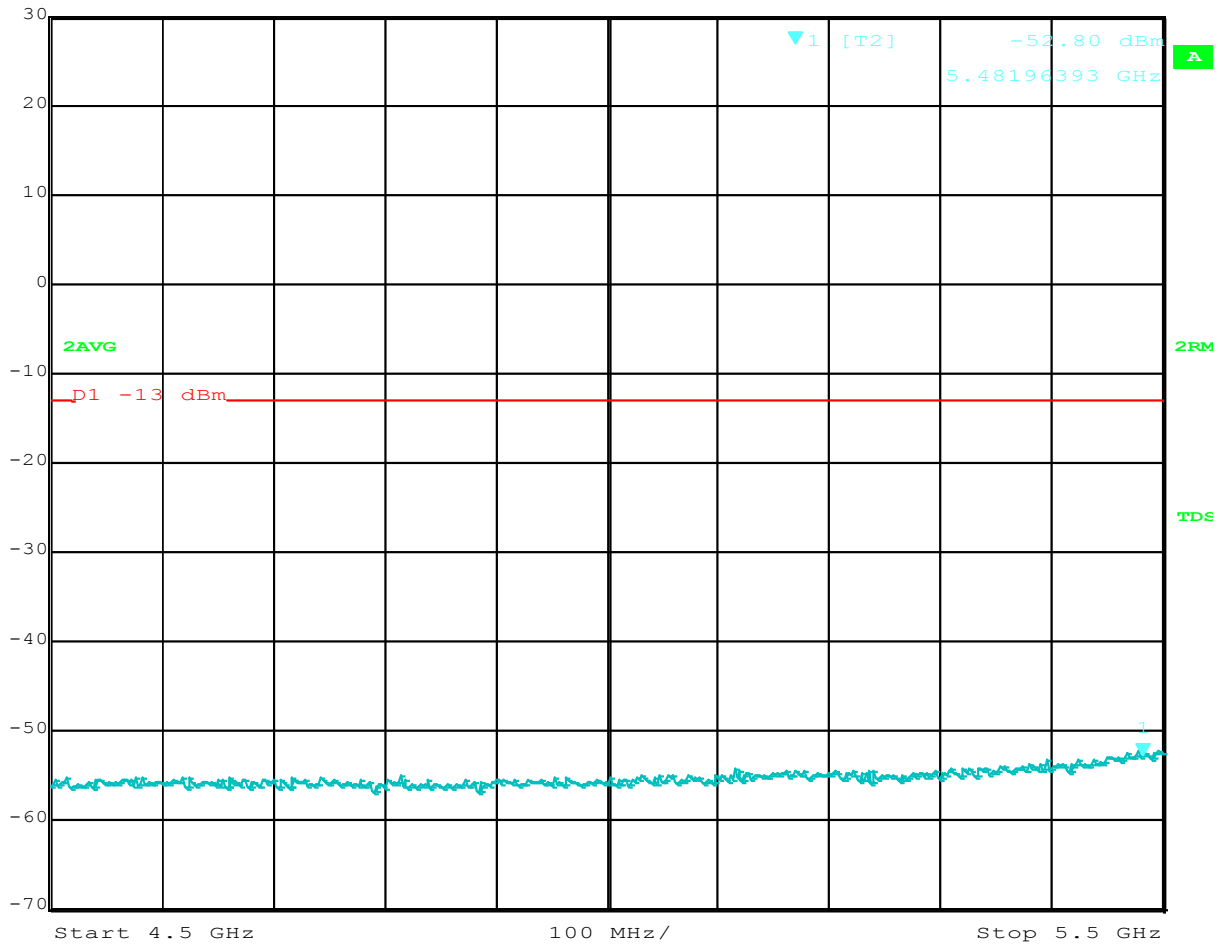
Max/Ref Lvl	Marker 1 [T2]	RBW	1 MHz	RF Att	0 dB
30 dBm	-36.89 dBm	VBW	3 MHz		
-10 dBm	3.92084168 GHz	SWT	5 ms	Unit	dBm



Transmits CDMA at channel 609, 4.5 GHz – 5.5 GHz



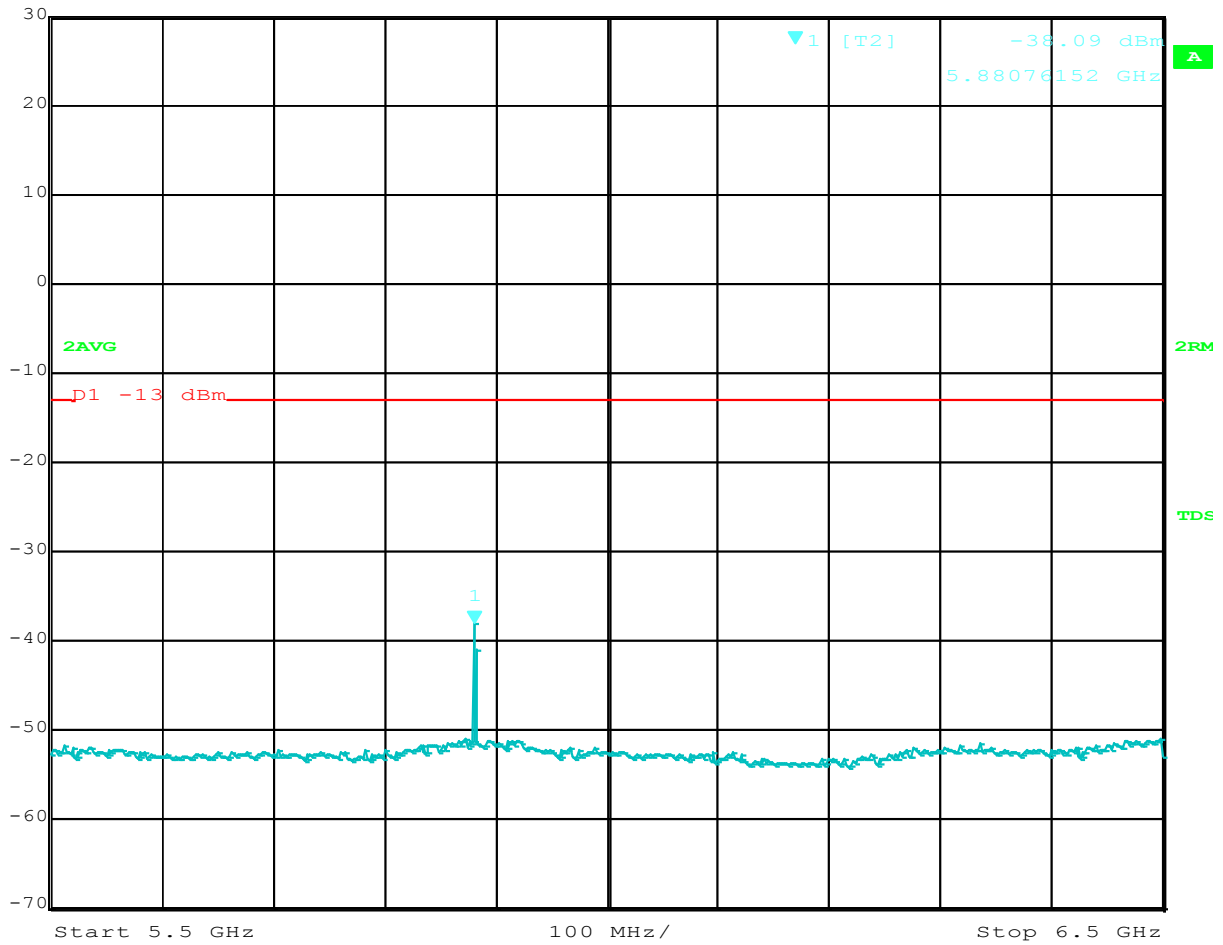
Max/Ref Lvl	Marker 1 [T2]	RBW	1 MHz	RF Att	0 dB
30 dBm	-52.80 dBm	VBW	3 MHz		
-10 dBm	5.48196393 GHz	SWT	5 ms	Unit	dBm



Transmits CDMA at channel 609, 5.5 GHz – 6.5 GHz



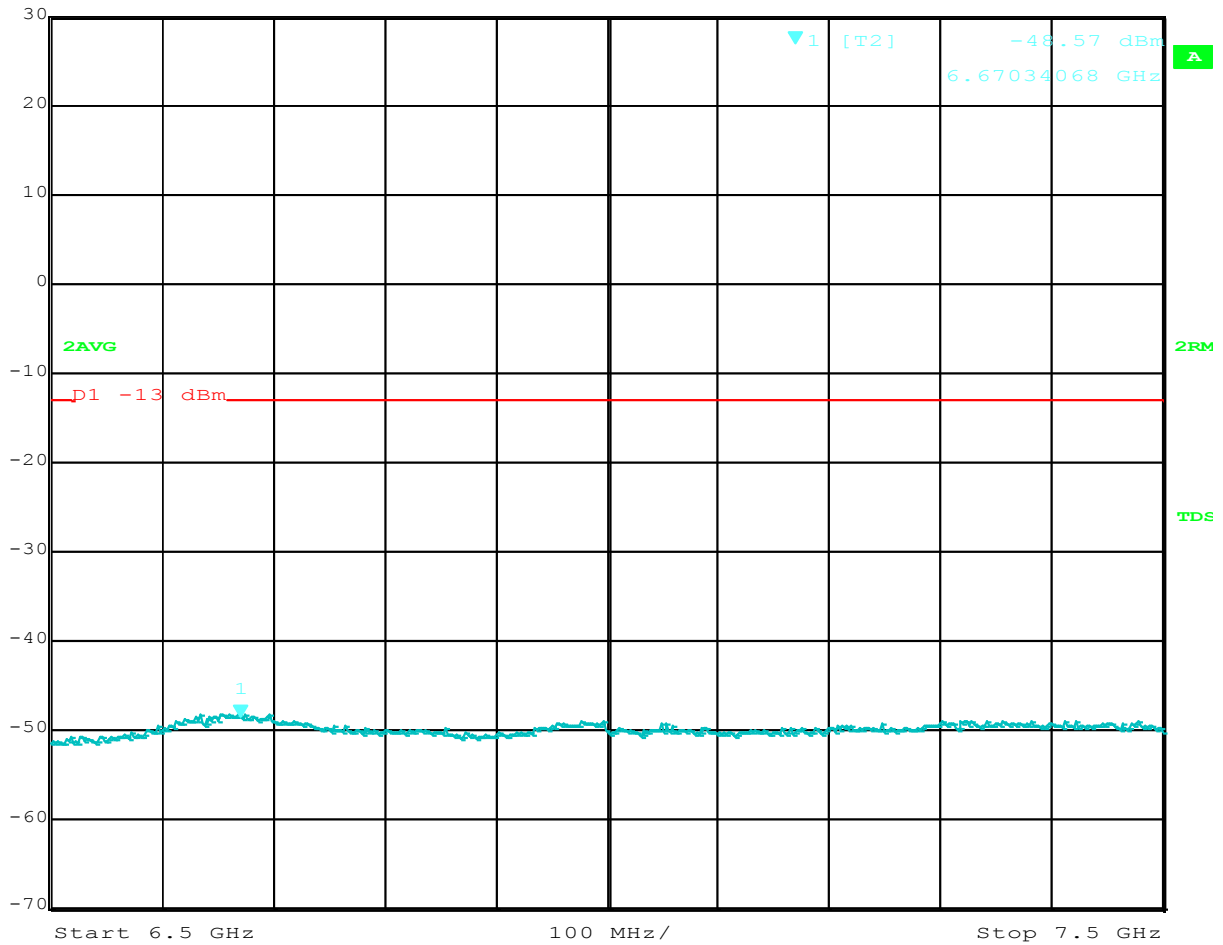
Max/Ref Lvl	Marker 1 [T2]	RBW	1 MHz	RF Att	0 dB
30 dBm	-38.09 dBm	VBW	3 MHz		
-10 dBm	5.88076152 GHz	SWT	5 ms	Unit	dBm



Transmits CDMA at channel 609, 6.5 GHz – 7.5 GHz



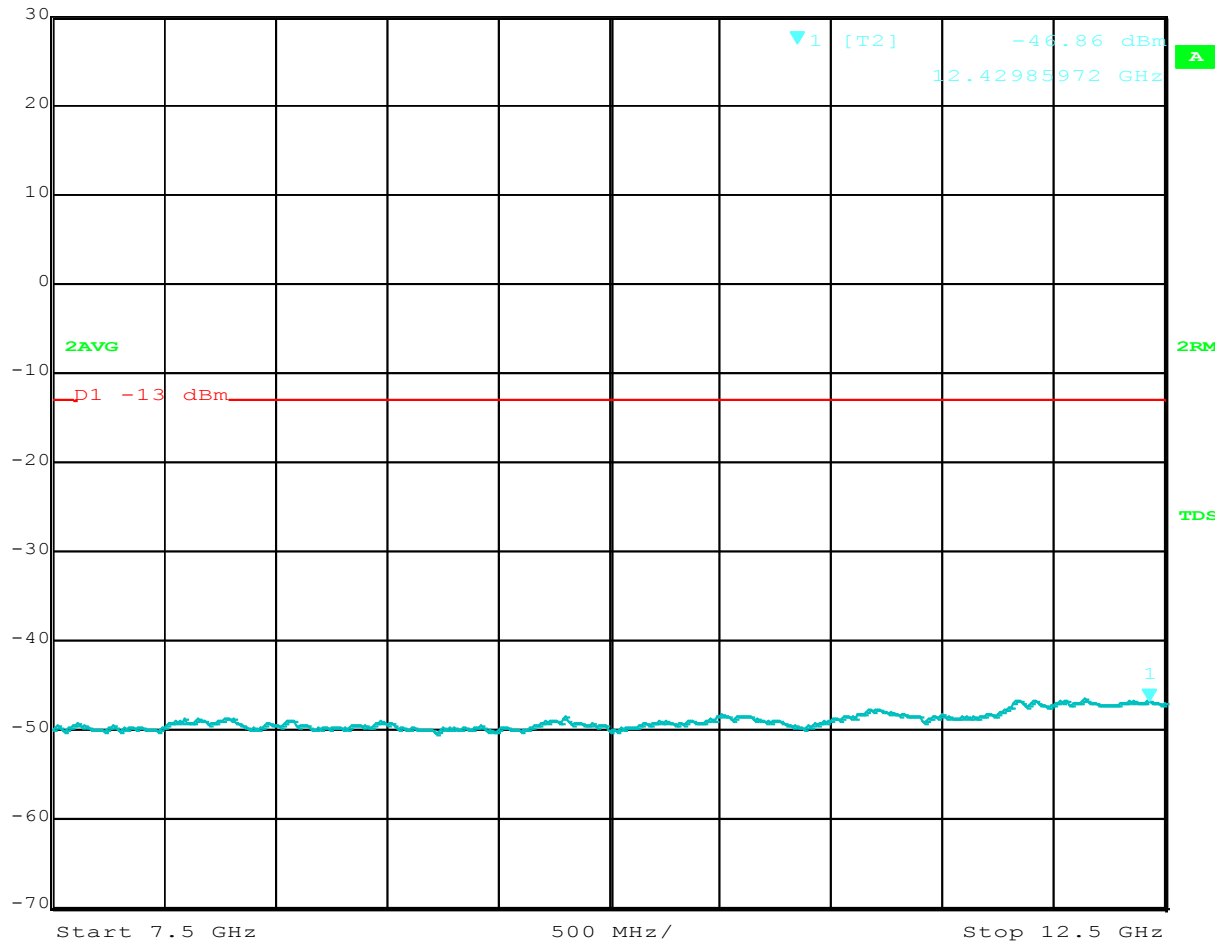
Max/Ref Lvl	Marker 1 [T2]	RBW	1 MHz	RF Att	0 dB
30 dBm	-48.57 dBm	VBW	3 MHz		
-10 dBm	6.67034068 GHz	SWT	10 ms	Unit	dBm



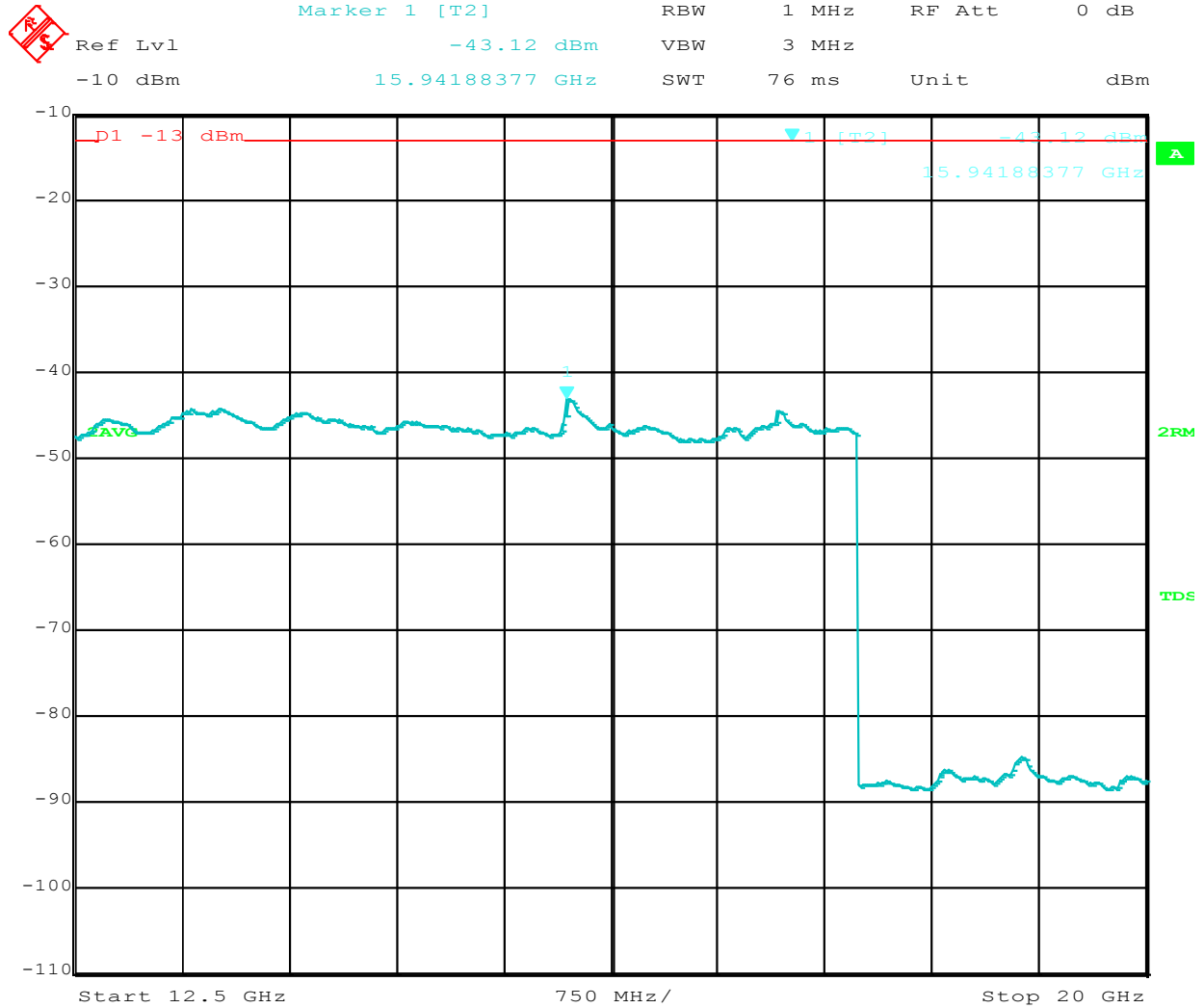
Transmits CDMA at channel 609, 7.5 GHz – 12.5 GHz



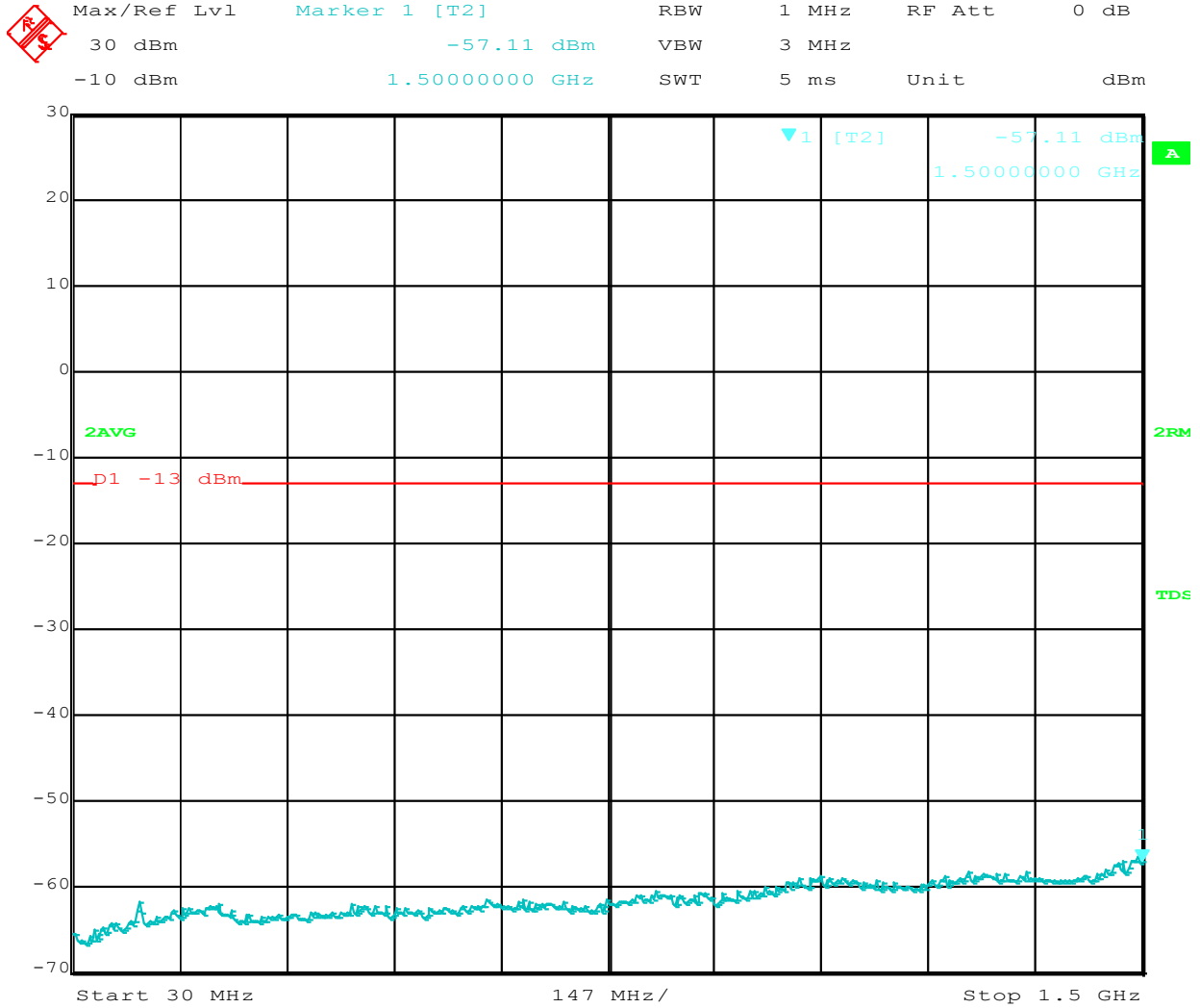
Max/Ref Lvl	Marker 1 [T2]	RBW	1 MHz	RF Att	0 dB
30 dBm	-46.86 dBm	VBW	3 MHz		
-10 dBm	12.42985972 GHz	SWT	50 ms	Unit	dBm



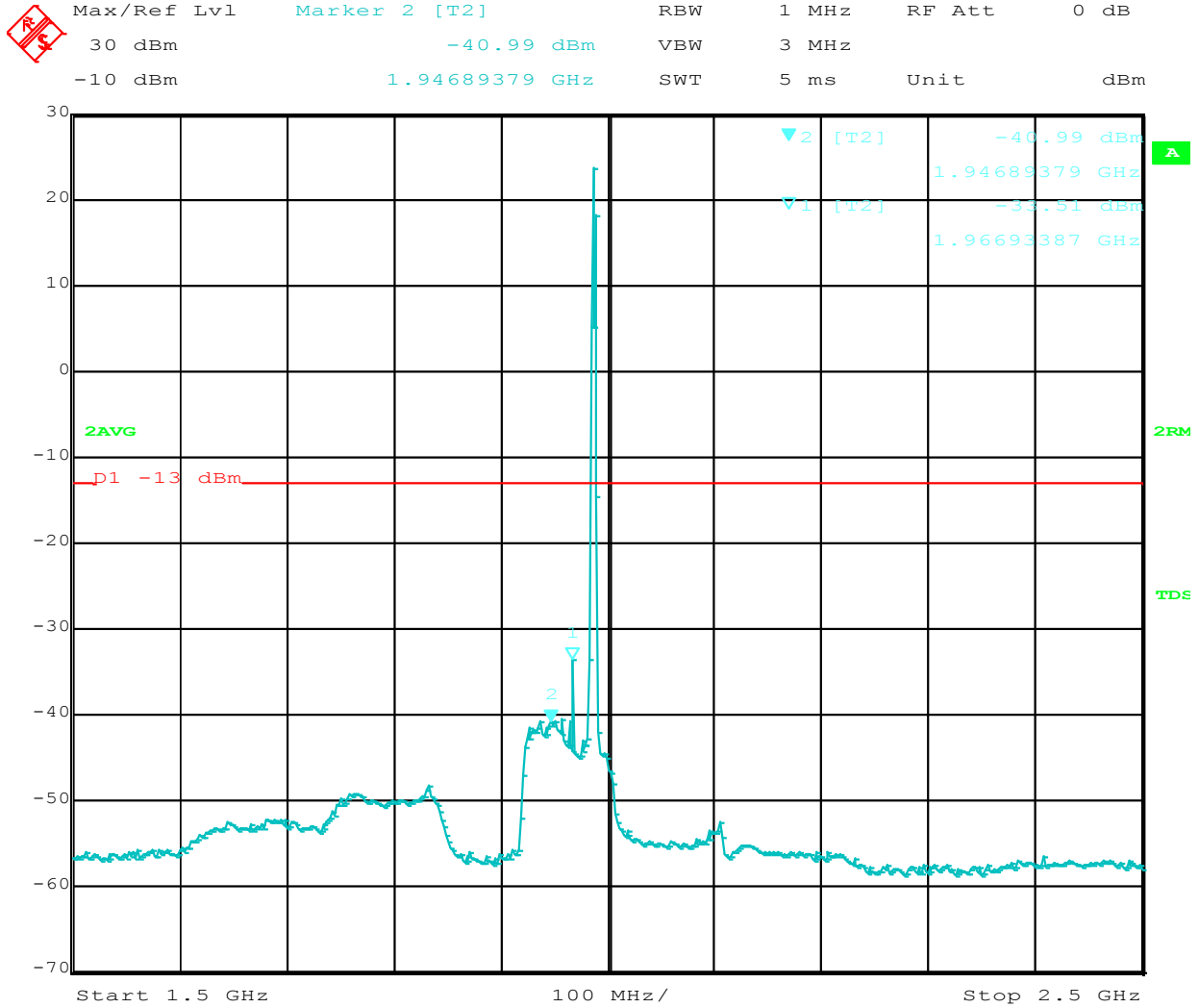
Transmits CDMA at channel 609, 12.5 GHz – 20.0 GHz



Transmits CDMA at channel 1139, 30 MHz – 1.5 GHz



Transmits CDMA at channel 1139, 1.5 GHz – 2.5 GHz

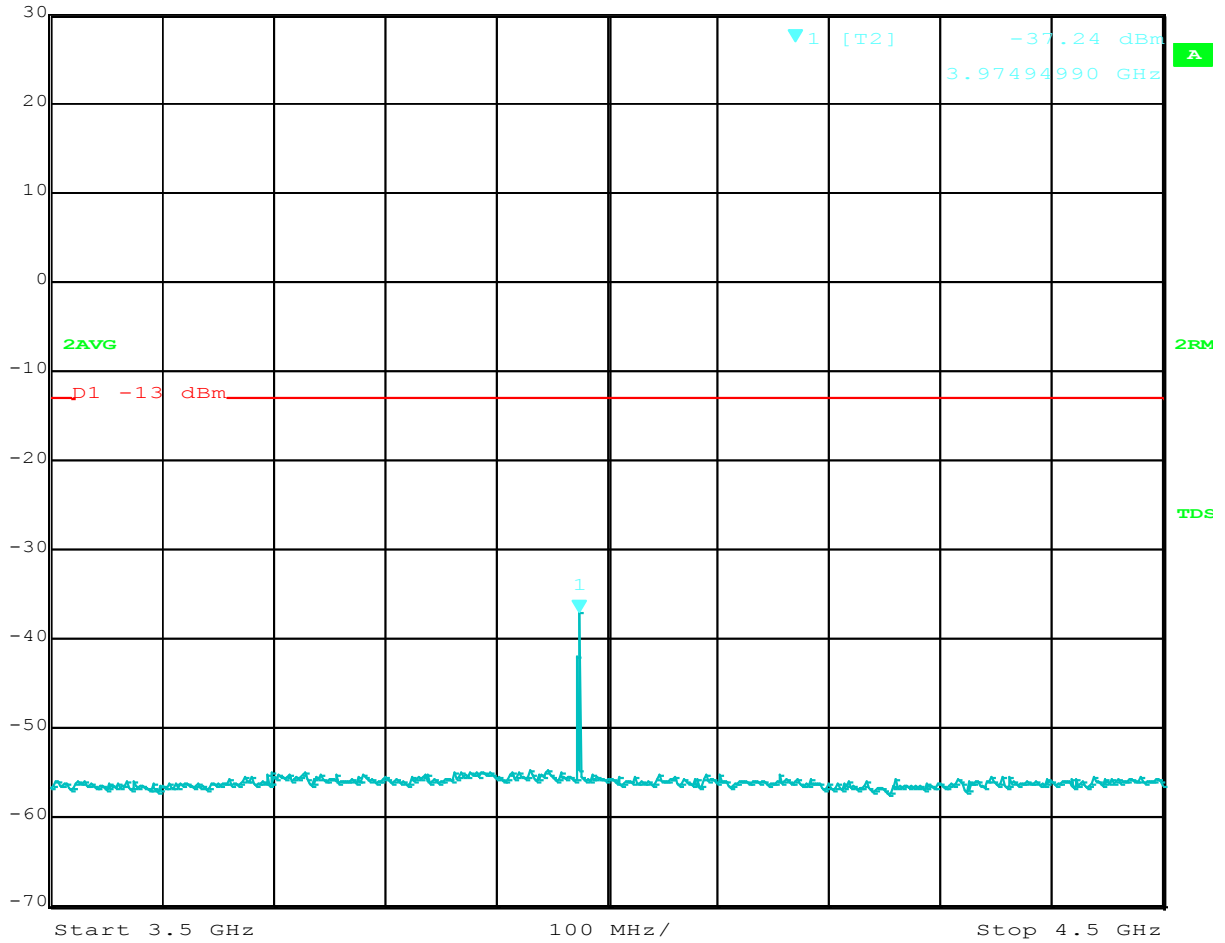


The screenshot shows a spectrum analyzer display with a frequency range from 2.5 GHz to 3.5 GHz. The vertical axis represents power in dBm, ranging from -70 to 30. A red horizontal line is drawn at -13 dBm, labeled 'D1 -13 dBm'. A green label '2AVG' is visible on the left. A cyan trace shows a noisy signal floor at approximately -58.41 dBm, with a label '1' and a cyan arrow pointing to it. On the right side, there are labels 'A' and 'TDS'. The bottom of the screen shows the frequency range 'Start 2.5 GHz', '100 MHz/' (span), and 'Stop 3.5 GHz'.

Transmits CDMA at channel 1139, 3.5 GHz – 4.5 GHz



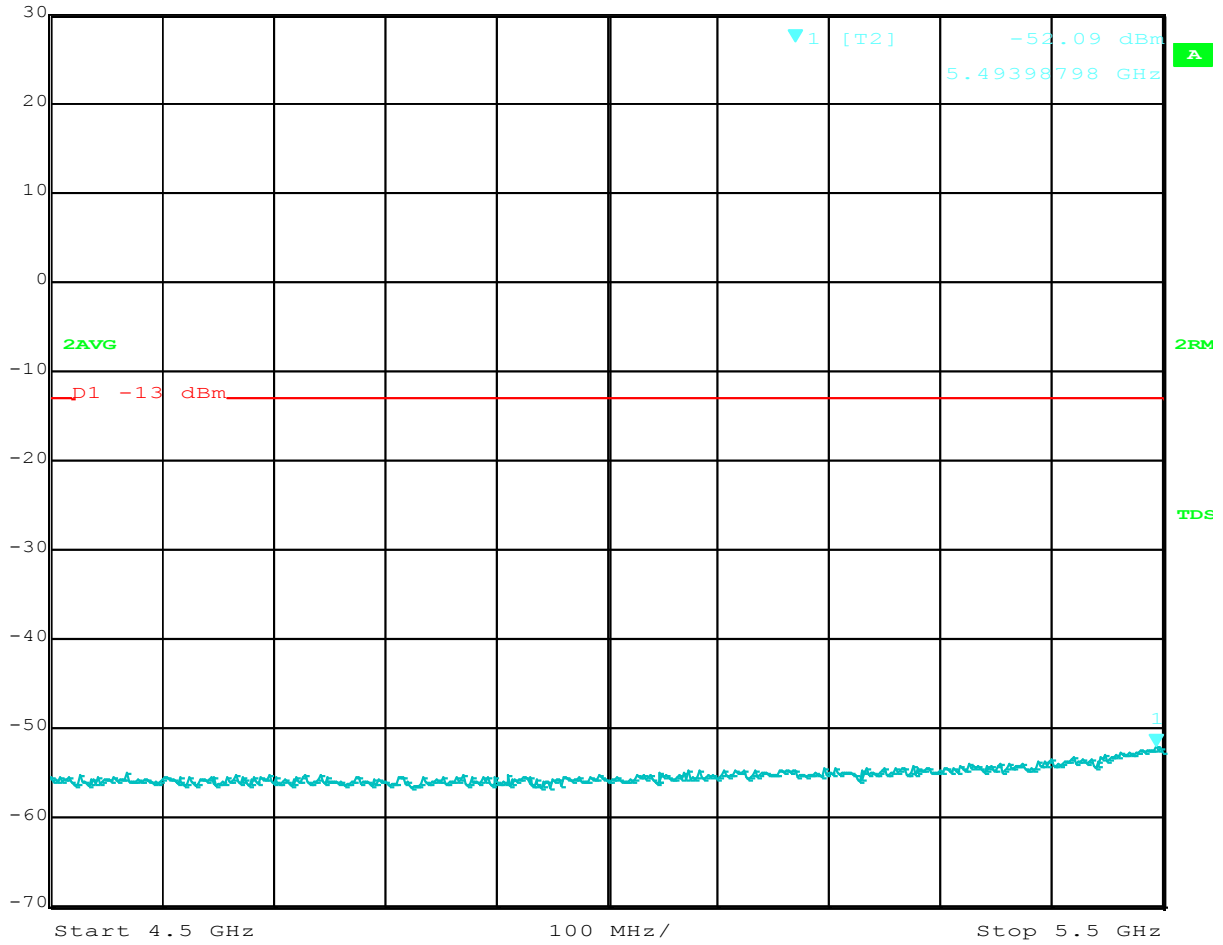
Max/Ref Lvl	Marker 1 [T2]	RBW	1 MHz	RF Att	0 dB
30 dBm	-37.24 dBm	VBW	3 MHz		
-10 dBm	3.97494990 GHz	SWT	5 ms	Unit	dBm



Transmits CDMA at channel 1139, 4.5 GHz – 5.5 GHz



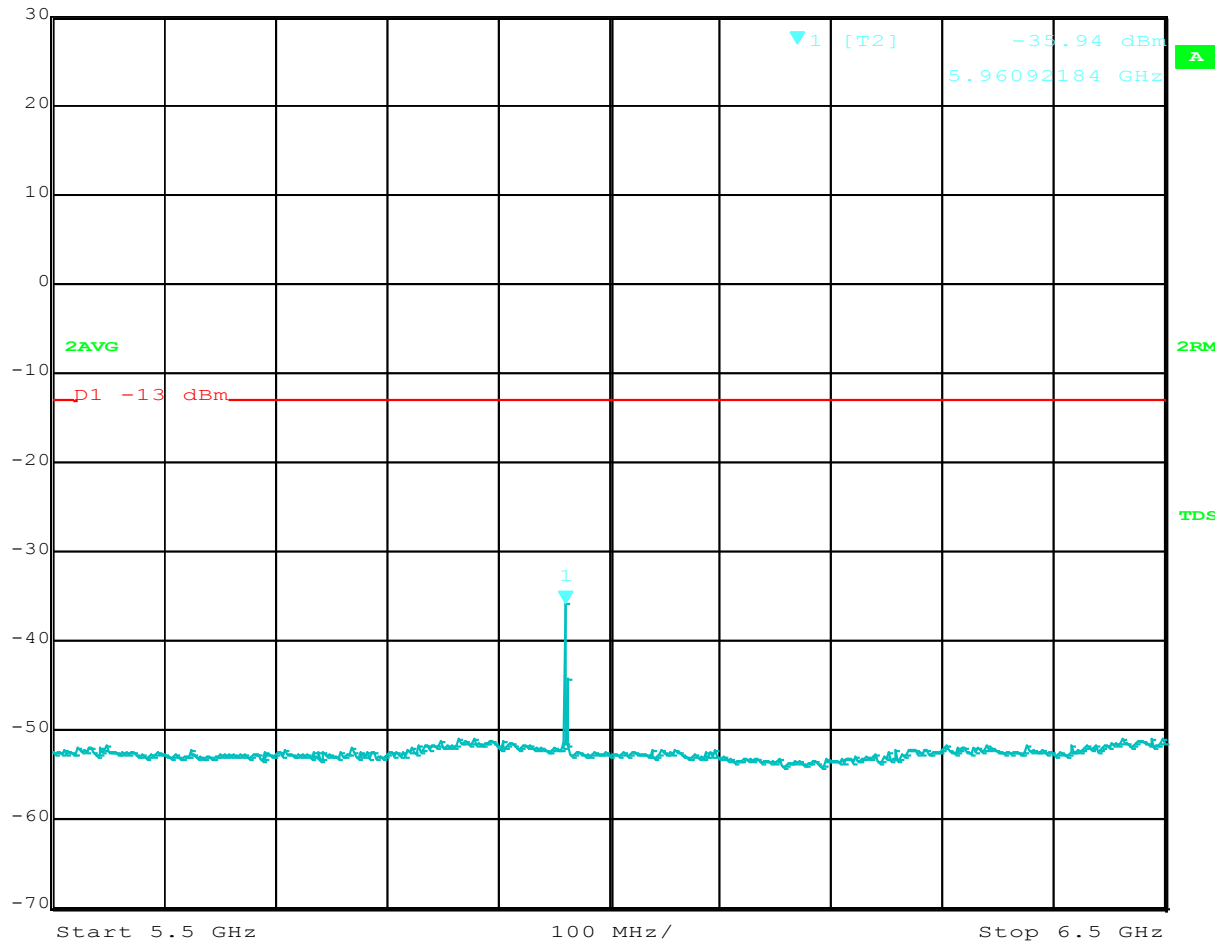
Max/Ref Lvl	Marker 1 [T2]	RBW	1 MHz	RF Att	0 dB
30 dBm	-52.09 dBm	VBW	3 MHz		
-10 dBm	5.49398798 GHz	SWT	5 ms	Unit	dBm



Transmits CDMA at channel 1139, 5.5 GHz – 6.5 GHz

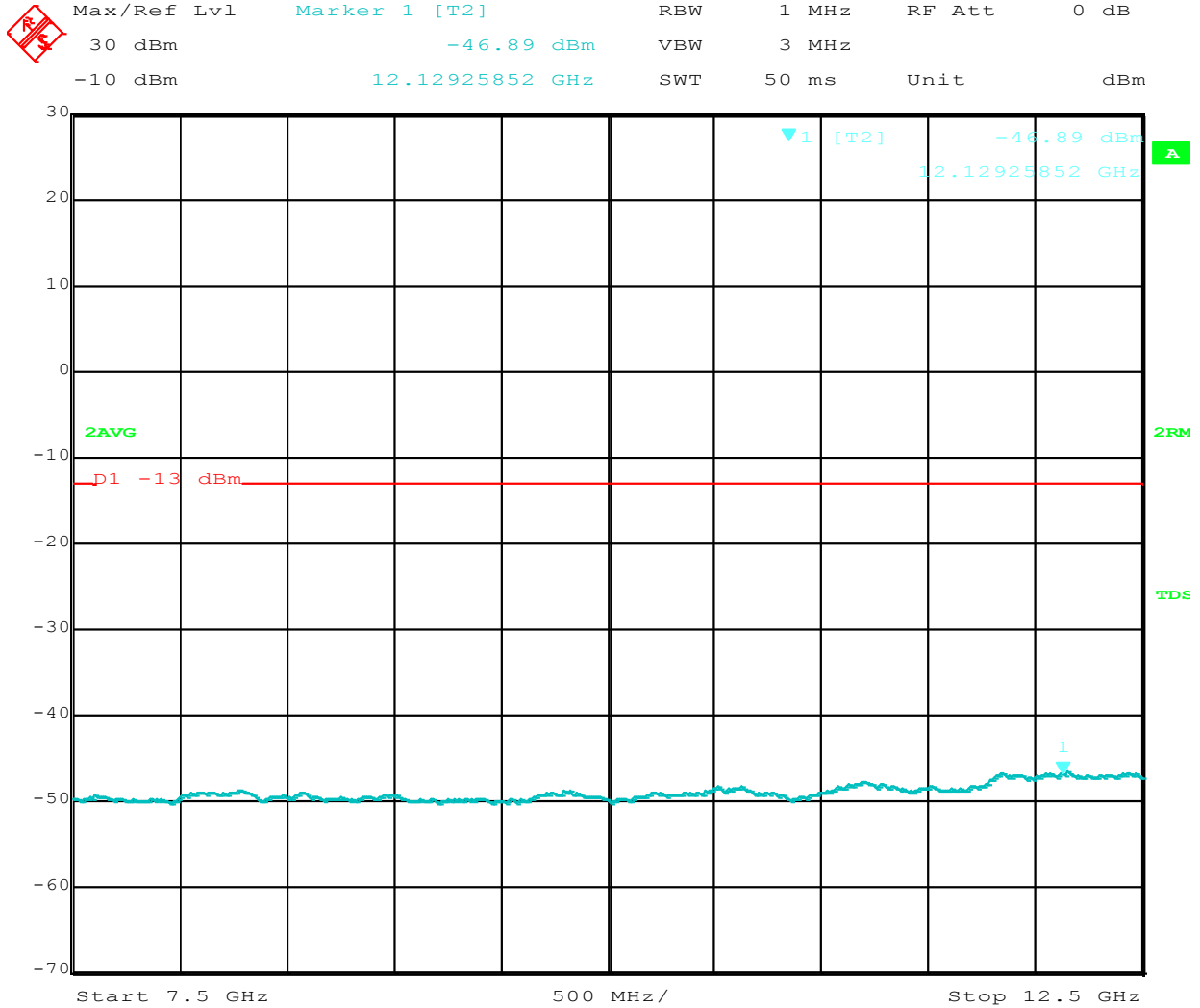


Max/Ref Lvl	Marker 1 [T2]	RBW	1 MHz	RF Att	0 dB
30 dBm	-35.94 dBm	VBW	3 MHz		
-10 dBm	5.96092184 GHz	SWT	5 ms	Unit	dBm



The spectrum plot shows a red horizontal line at -13 dBm, labeled 'D1 -13 dBm'. A cyan trace, labeled '1' with a downward arrow, shows a signal level around -50 dBm. The plot includes a grid with frequency on the x-axis (6.5 GHz to 7.5 GHz) and power on the y-axis (-70 dBm to 30 dBm). Other labels include '2AVG', '2RM', 'TDS', and 'A'.

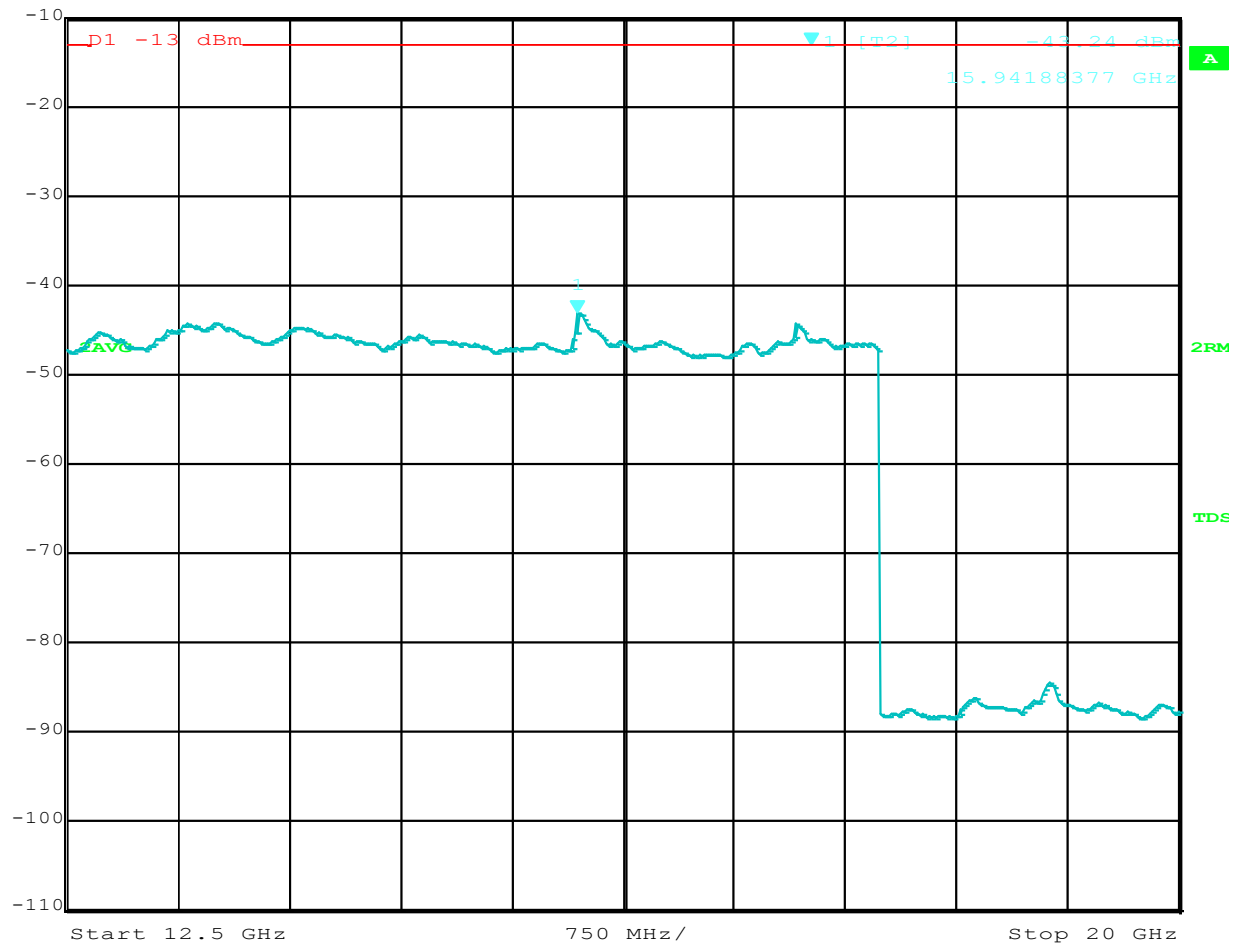
Transmits CDMA at channel 1139, 7.5 GHz – 12.5 GHz



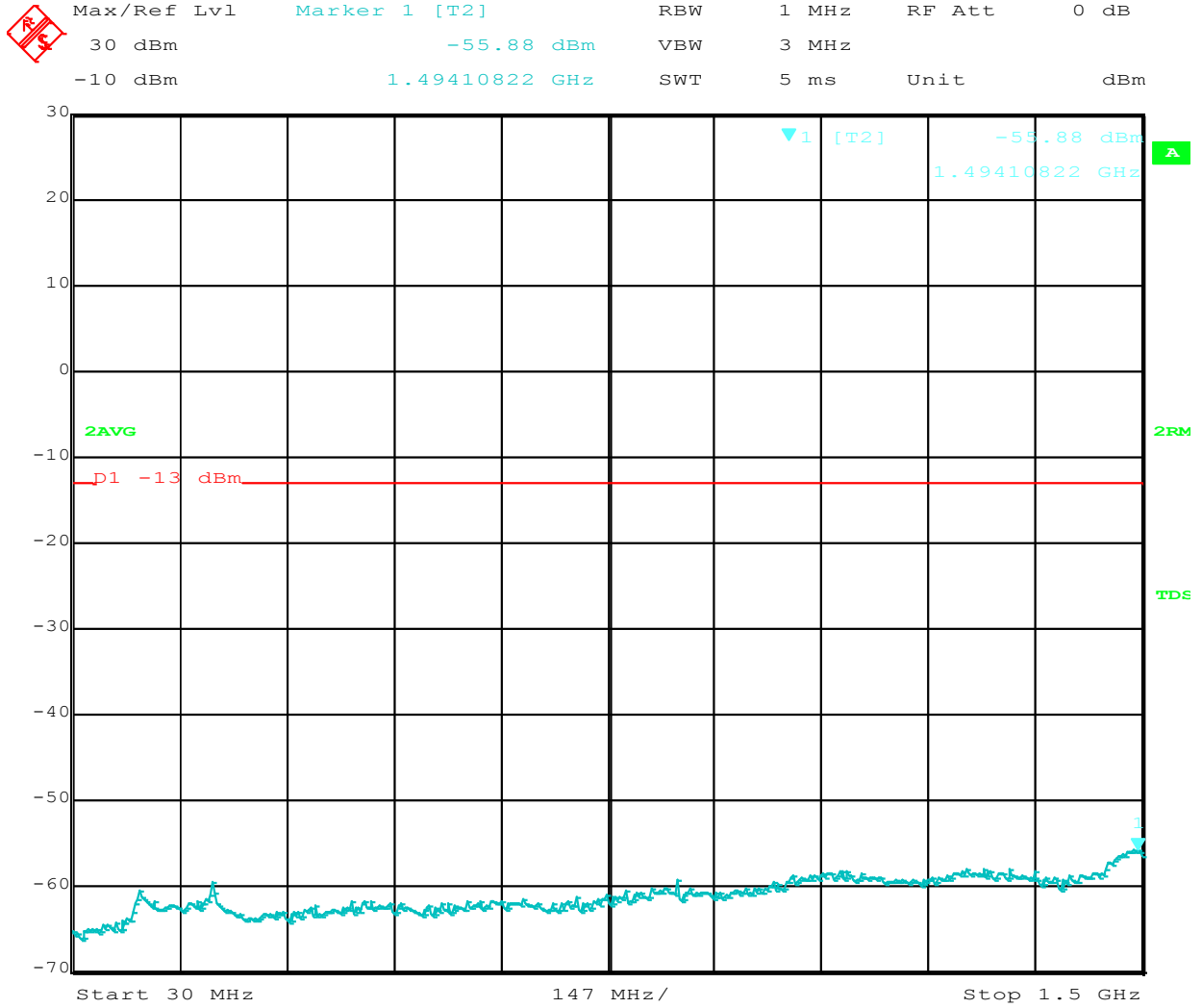
Transmits CDMA at channel 1139, 12.5 GHz – 20.0 GHz



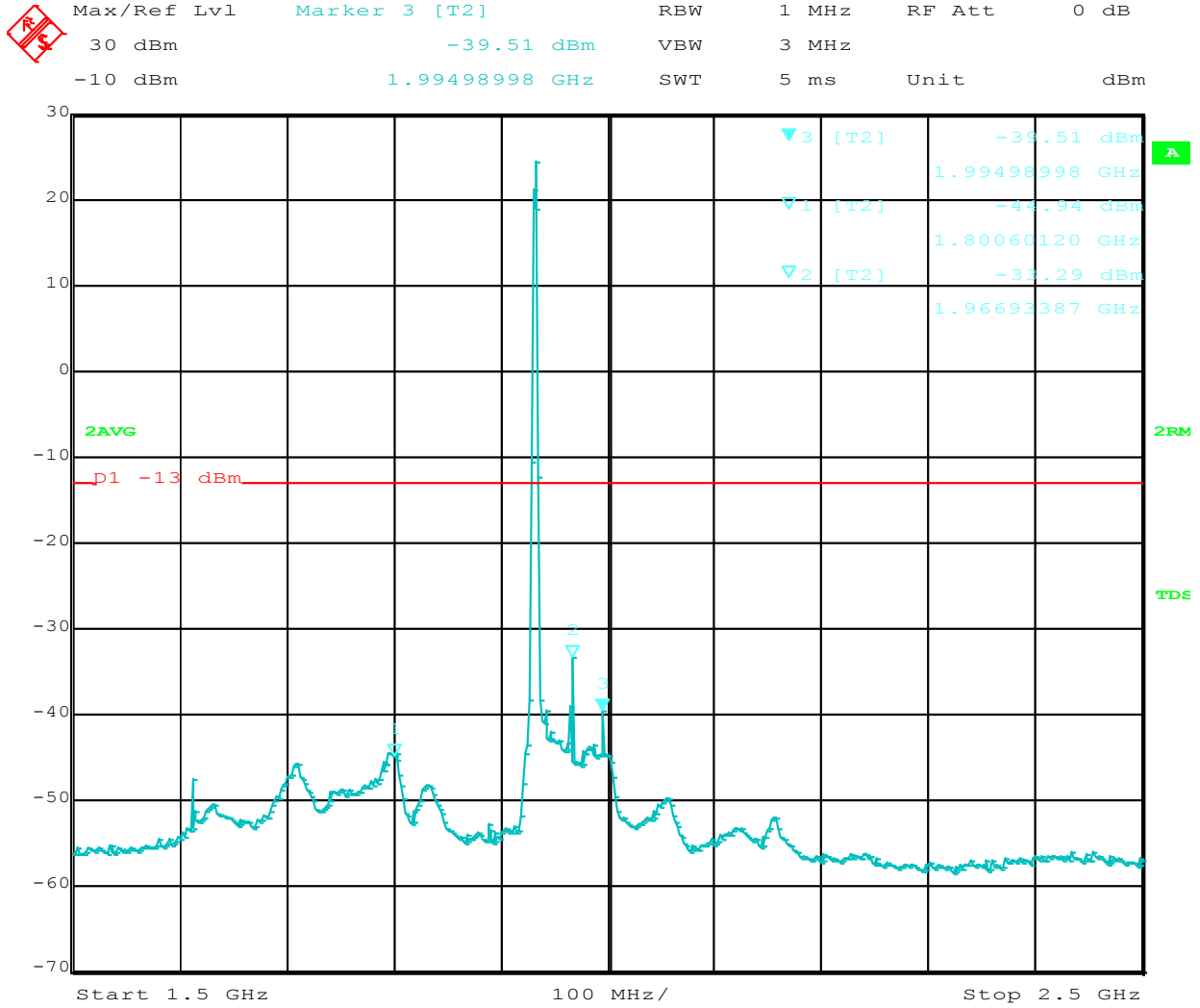
Ref Lvl -10 dBm
 Marker 1 [T2] -43.24 dBm
 15.94188377 GHz
 RBW 1 MHz
 RF Att 0 dB
 VBW 3 MHz
 SWT 76 ms
 Unit dBm



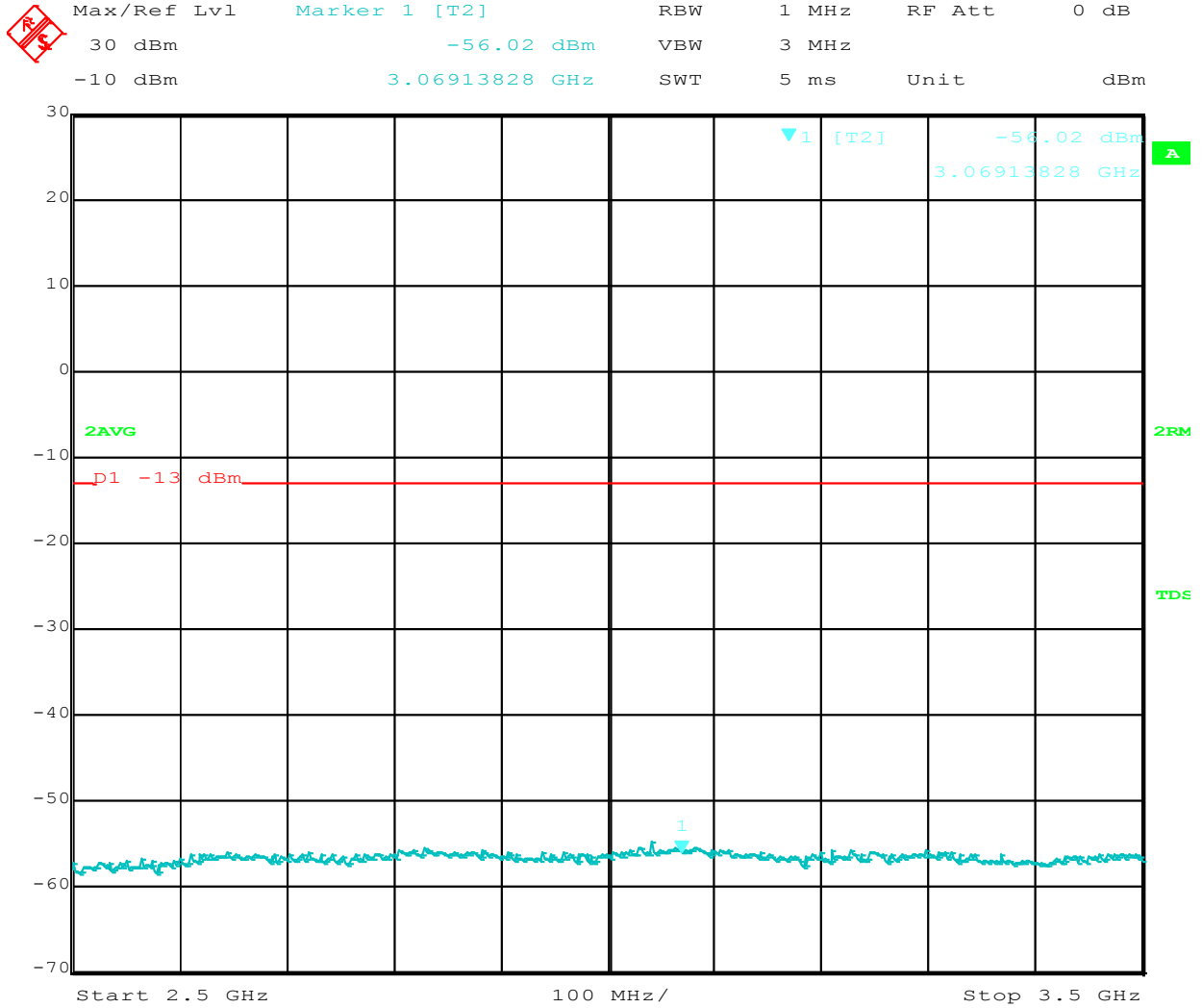
Transmits GSM at ARFCN 521 and CDMA at channel 61, 30 MHz – 1.5 GHz



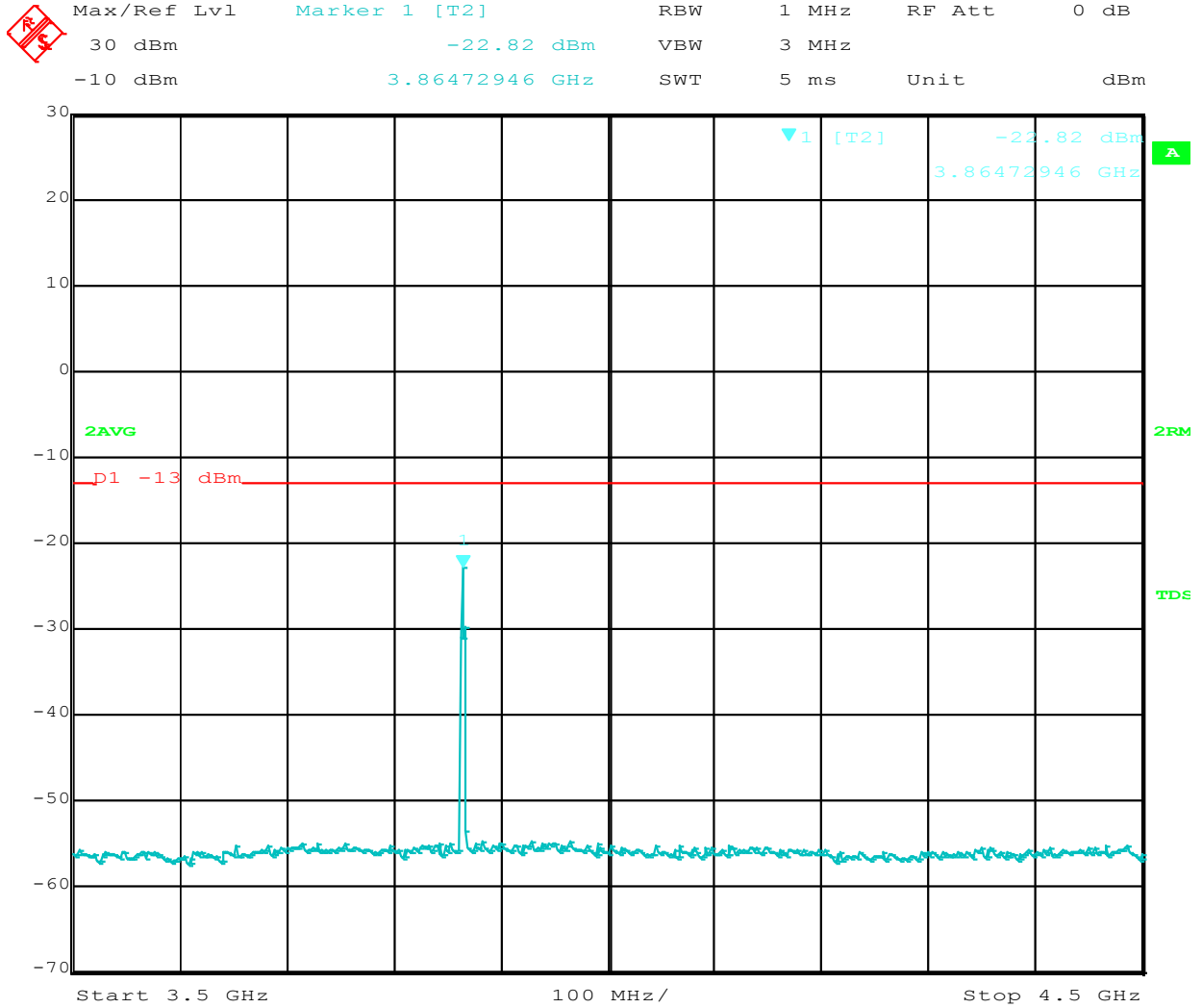
Transmits GSM at ARFCN 521 and CDMA at channel 61, 1.5 GHz – 2.5 GHz



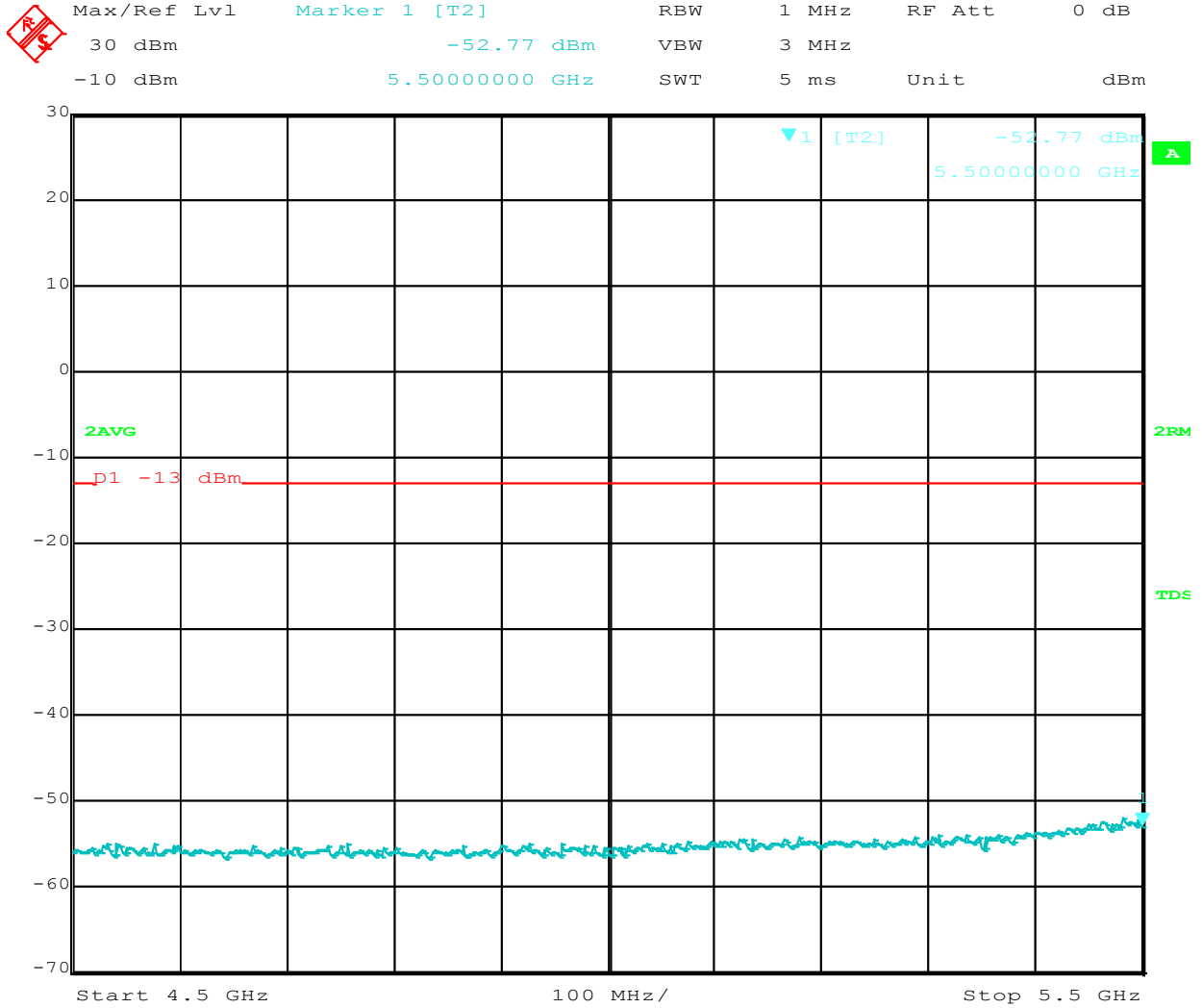
Transmits GSM at ARFCN 521 and CDMA at channel 61, 2.5 GHz – 3.5 GHz



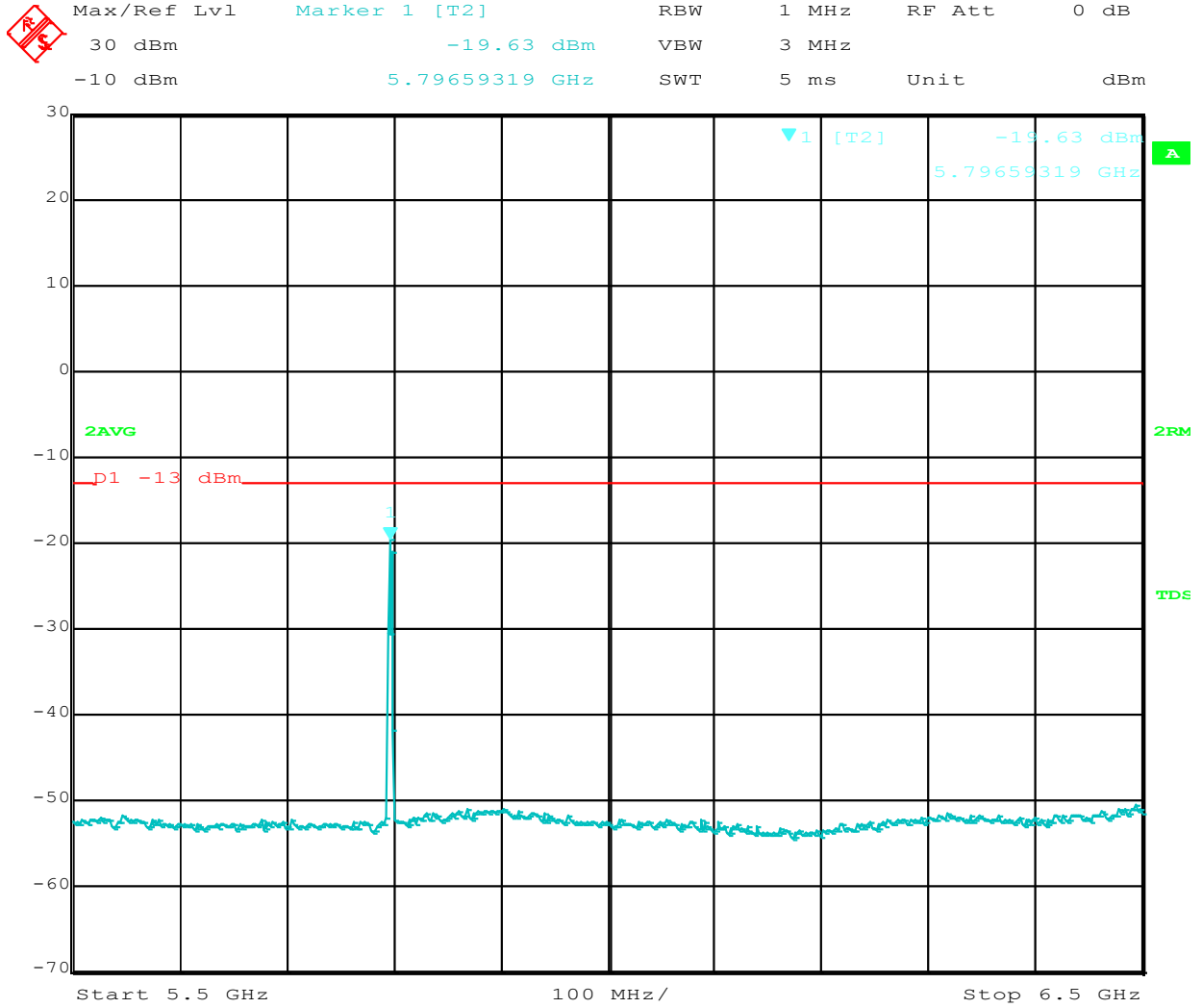
Transmits GSM at ARFCN 521 and CDMA at channel 61, 3.5 GHz – 4.5 GHz



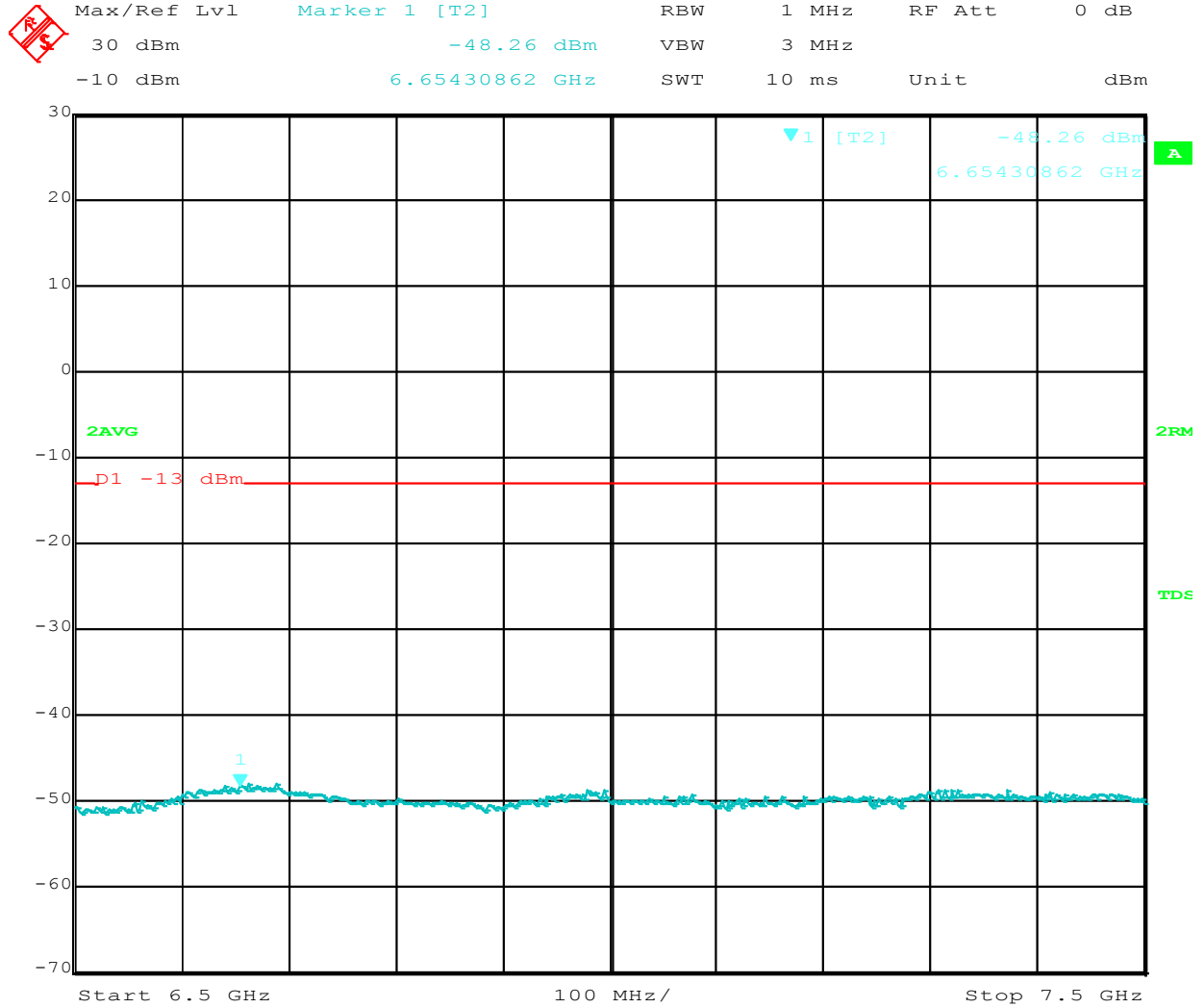
Transmits GSM at ARFCN 521 and CDMA at channel 61, 4.5 GHz – 5.5 GHz



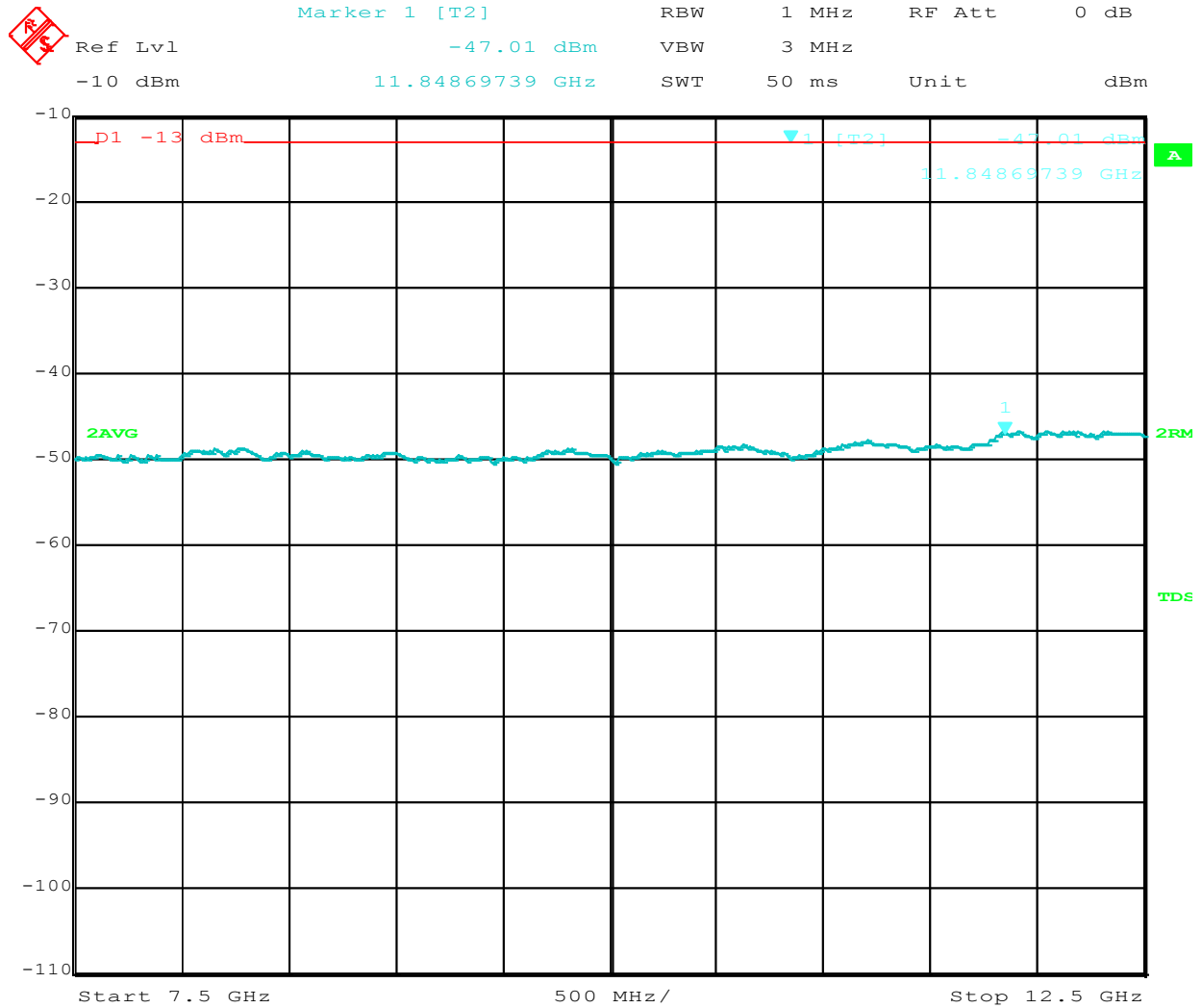
Transmits GSM at ARFCN 521 and CDMA at channel 61, 5.5 GHz – 6.5 GHz



Transmits GSM at ARFCN 521 and CDMA at channel 61, 6.5 GHz – 7.5 GHz



Transmits GSM at ARFCN 521 and CDMA at channel 61, 7.5 GHz – 12.5 GHz



Start 12.5 GHz 750 MHz/ Stop 20 GHz

Peak 1: -43.25 dBm, 15.94188377 GHz

Signal Level: -45 dBm

Marker: 1

Marker: 2

Marker: 3

Marker: 4

Marker: 5

Marker: 6

Marker: 7

Marker: 8

Marker: 9

Marker: 10

Marker: 11

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Marker: 333

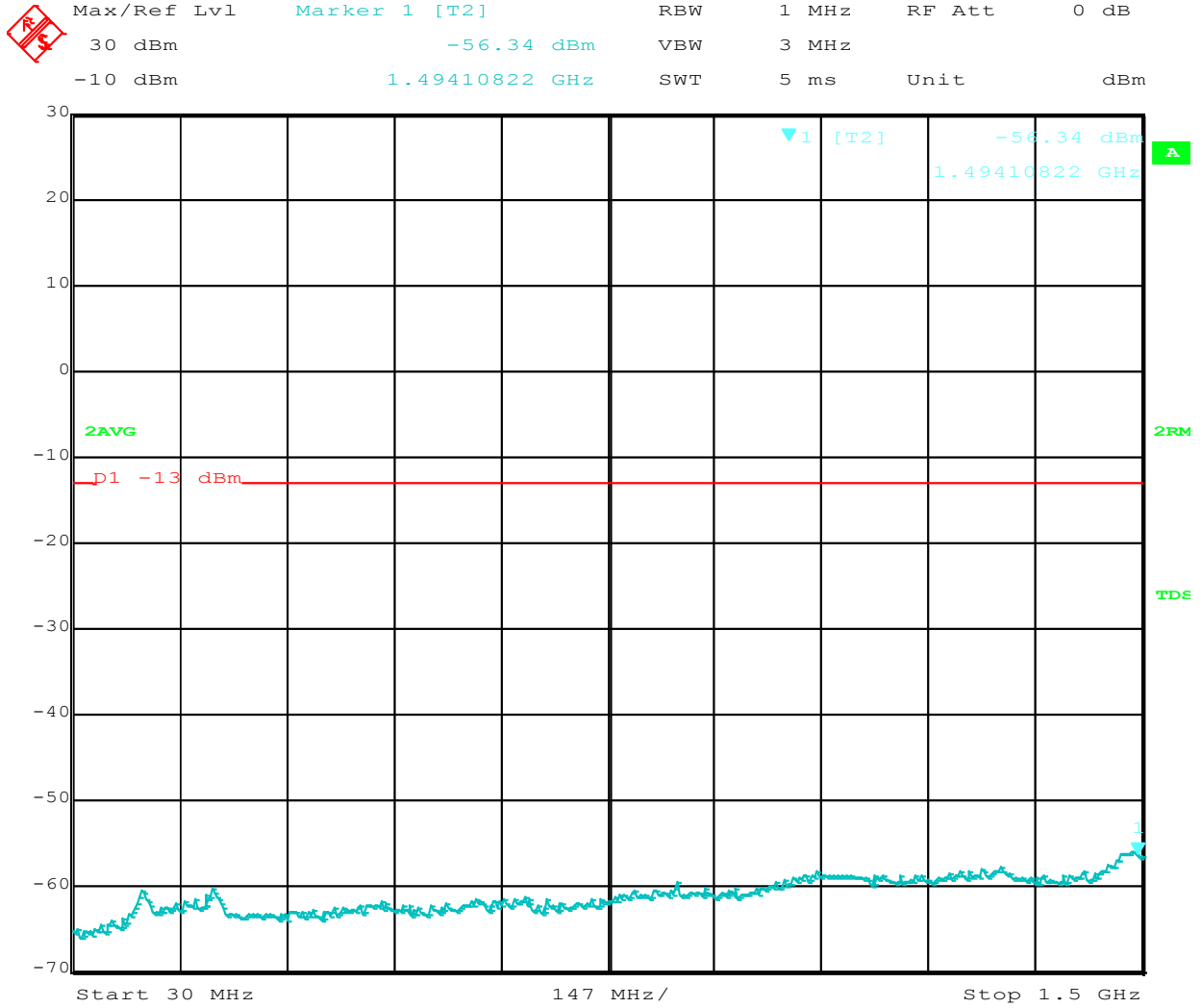
Marker: 334

Marker: 335

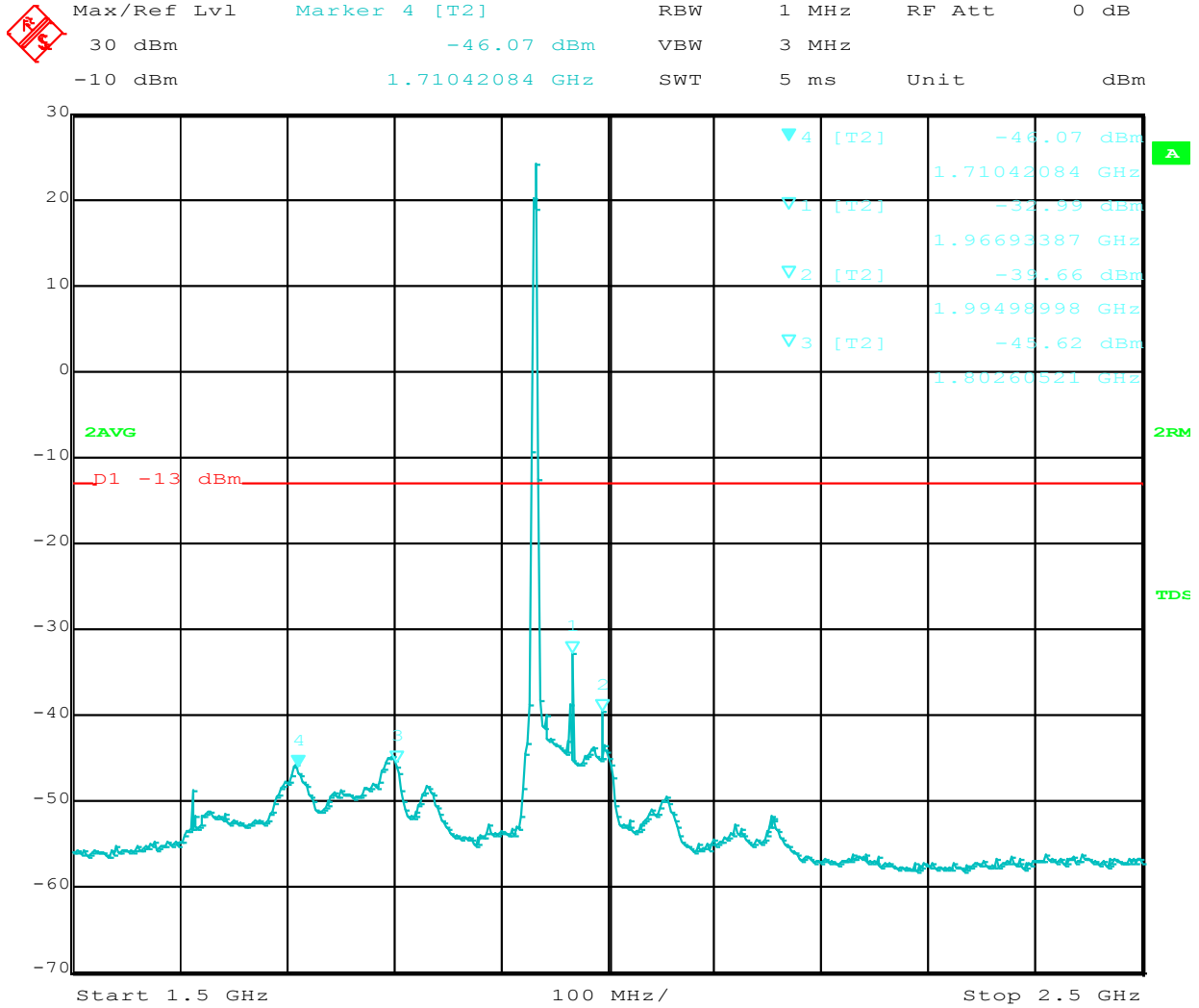
Marker: 336

Marker: 33

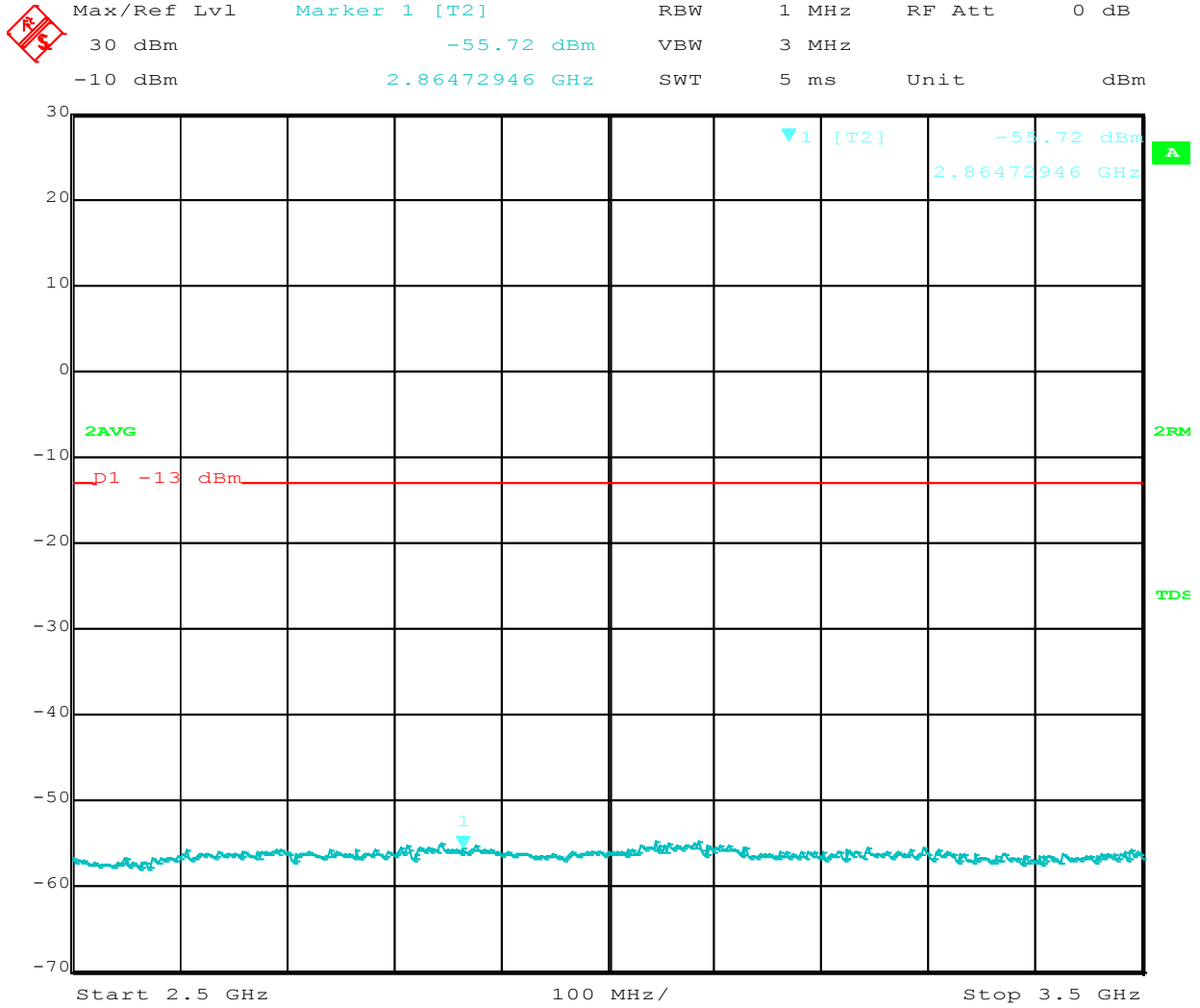
Transmits GSM at ARFCN 658 and CDMA at channel 609, 30 MHz – 1.5 GHz



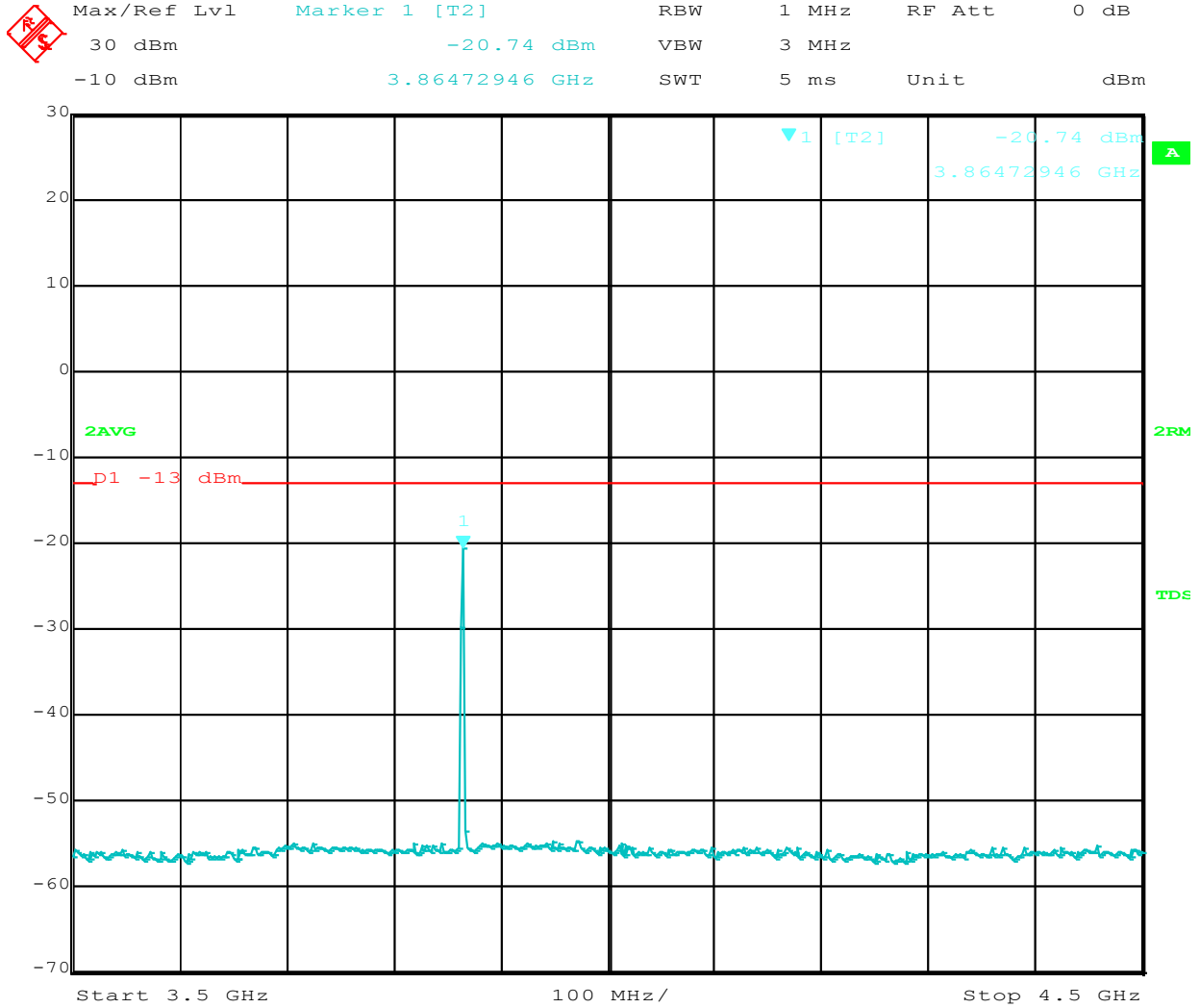
Transmits GSM at ARFCN 658 and CDMA at channel 609, 1.5 GHz – 2.5 GHz



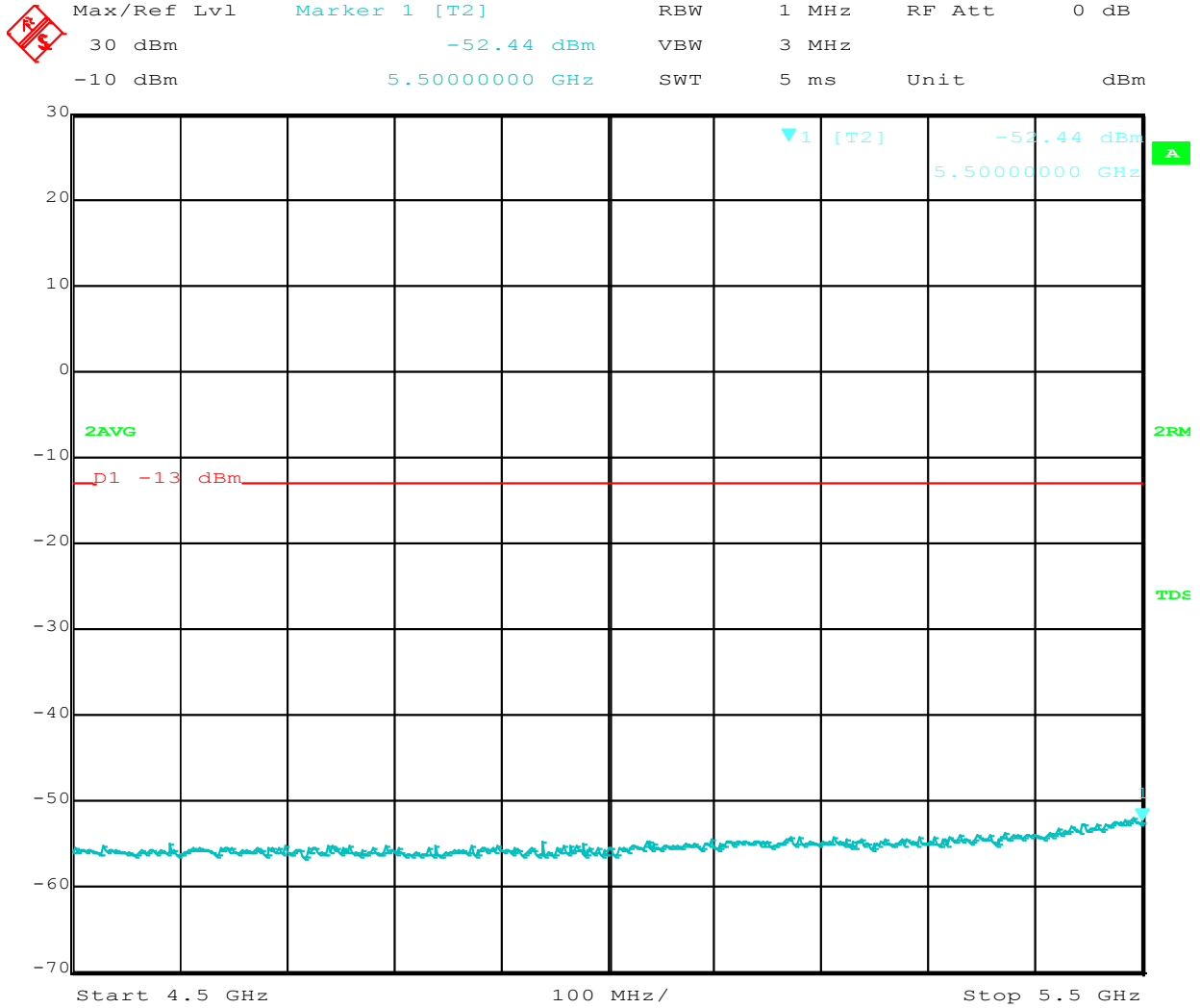
Transmits GSM at ARFCN 658 and CDMA at channel 609, 2.5 GHz – 3.5 GHz



Transmits GSM at ARFCN 658 and CDMA at channel 609, 3.5 GHz – 4.5 GHz



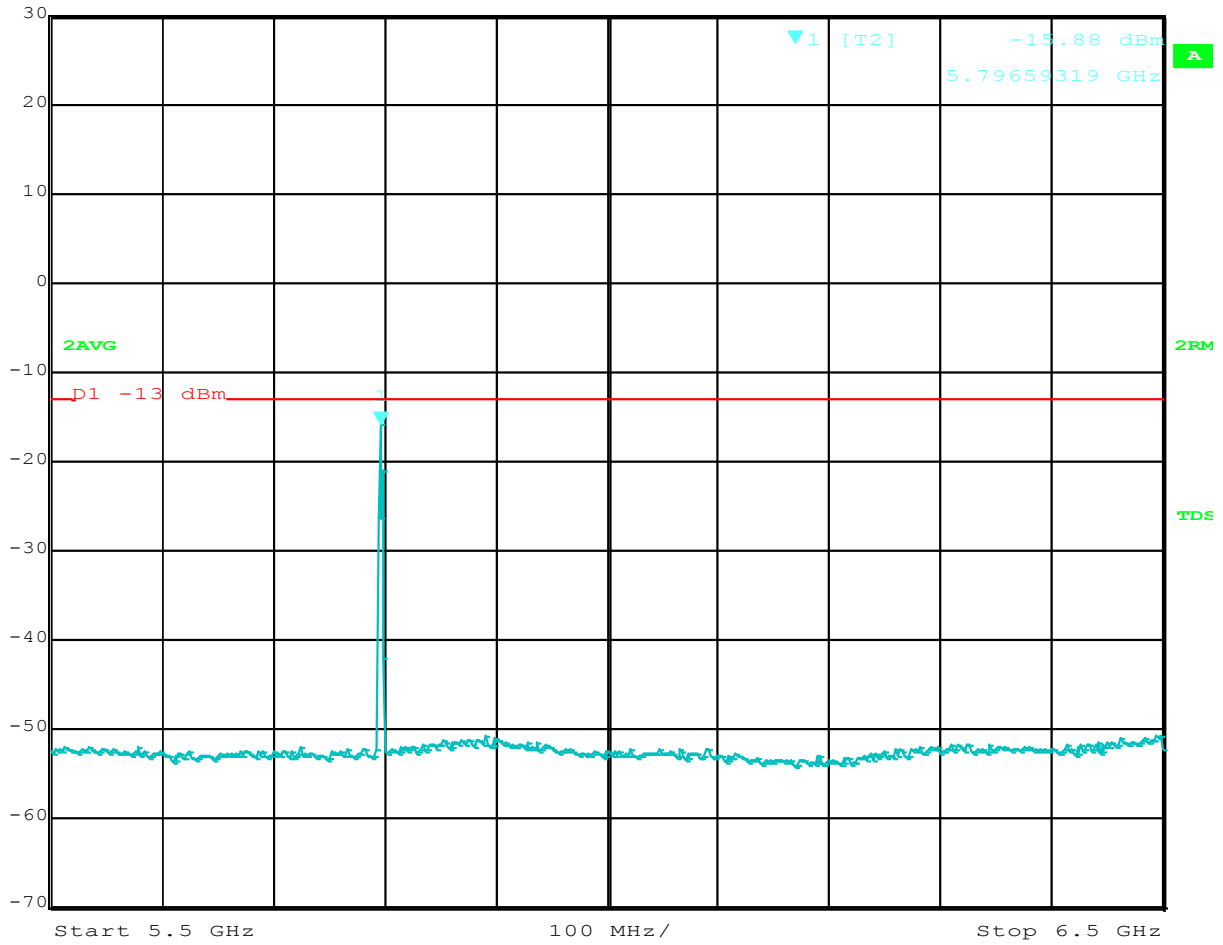
Transmits GSM at ARFCN 658 and CDMA at channel 609, 4.5 GHz – 5.5 GHz



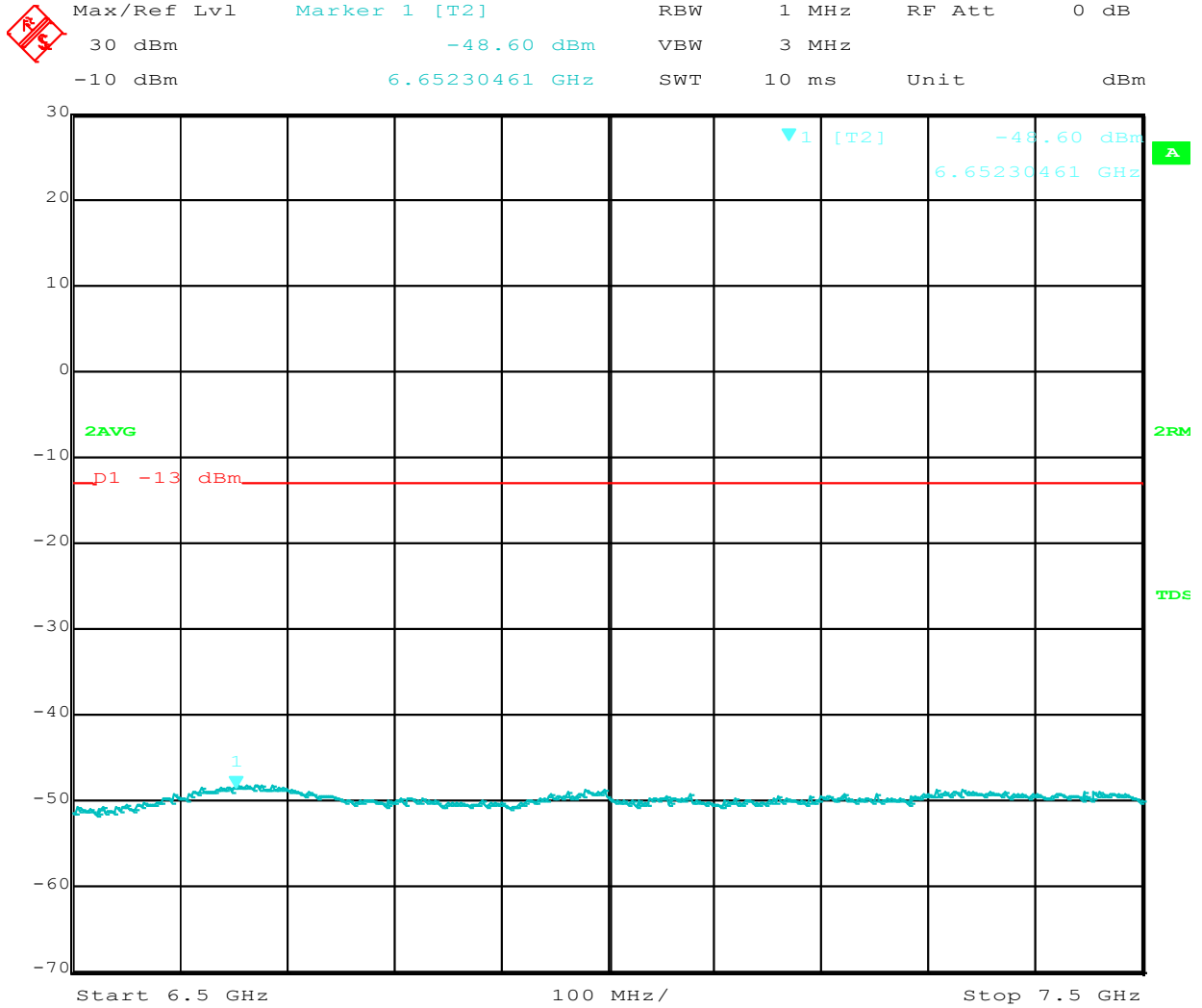
Transmits GSM at ARFCN 658 and CDMA at channel 609, 5.5 GHz – 6.5 GHz



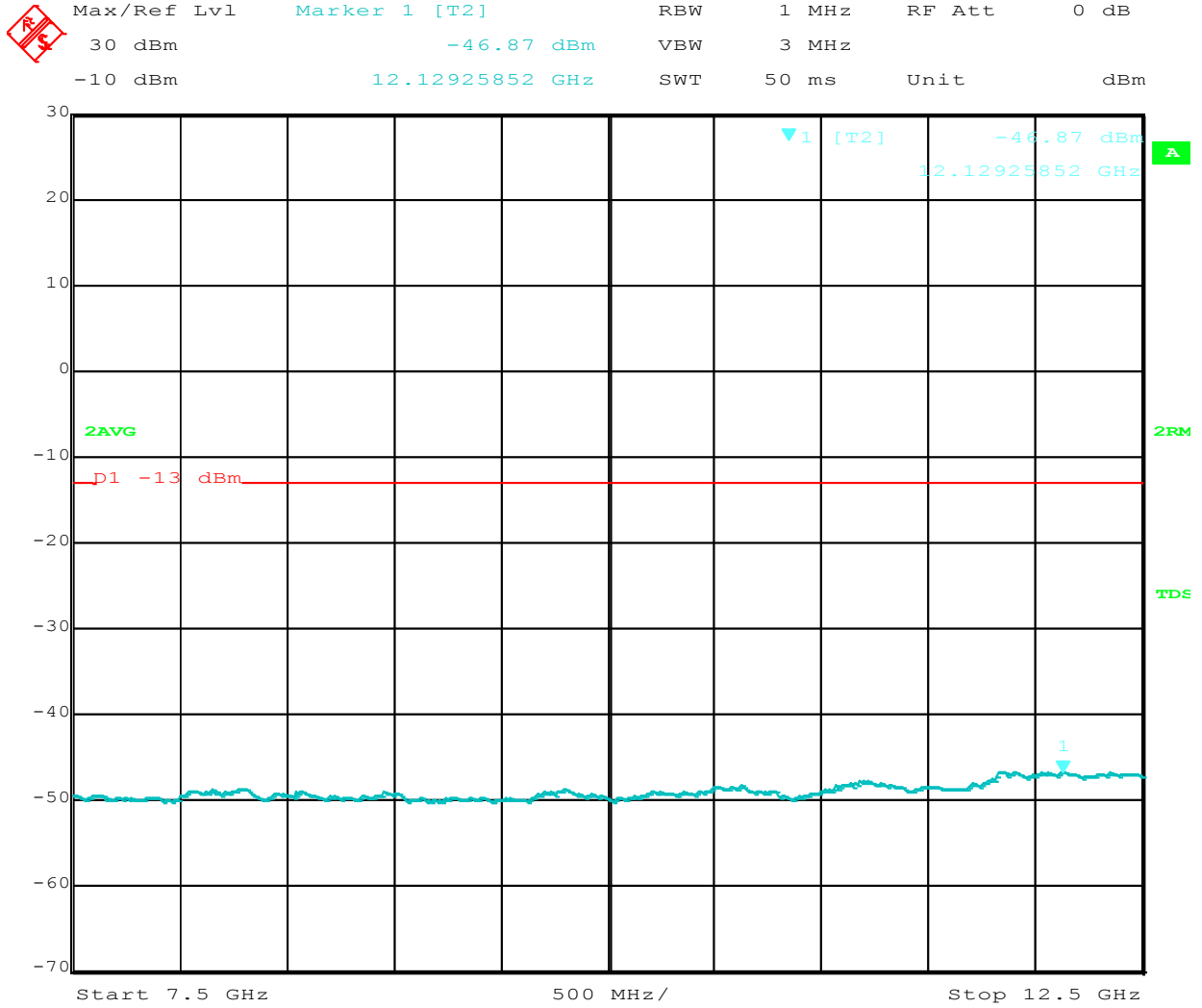
Max/Ref Lvl	Marker 1 [T2]	RBW	1 MHz	RF Att	0 dB
30 dBm	-15.88 dBm	VBW	3 MHz		
-10 dBm	5.79659319 GHz	SWT	5 ms	Unit	dBm



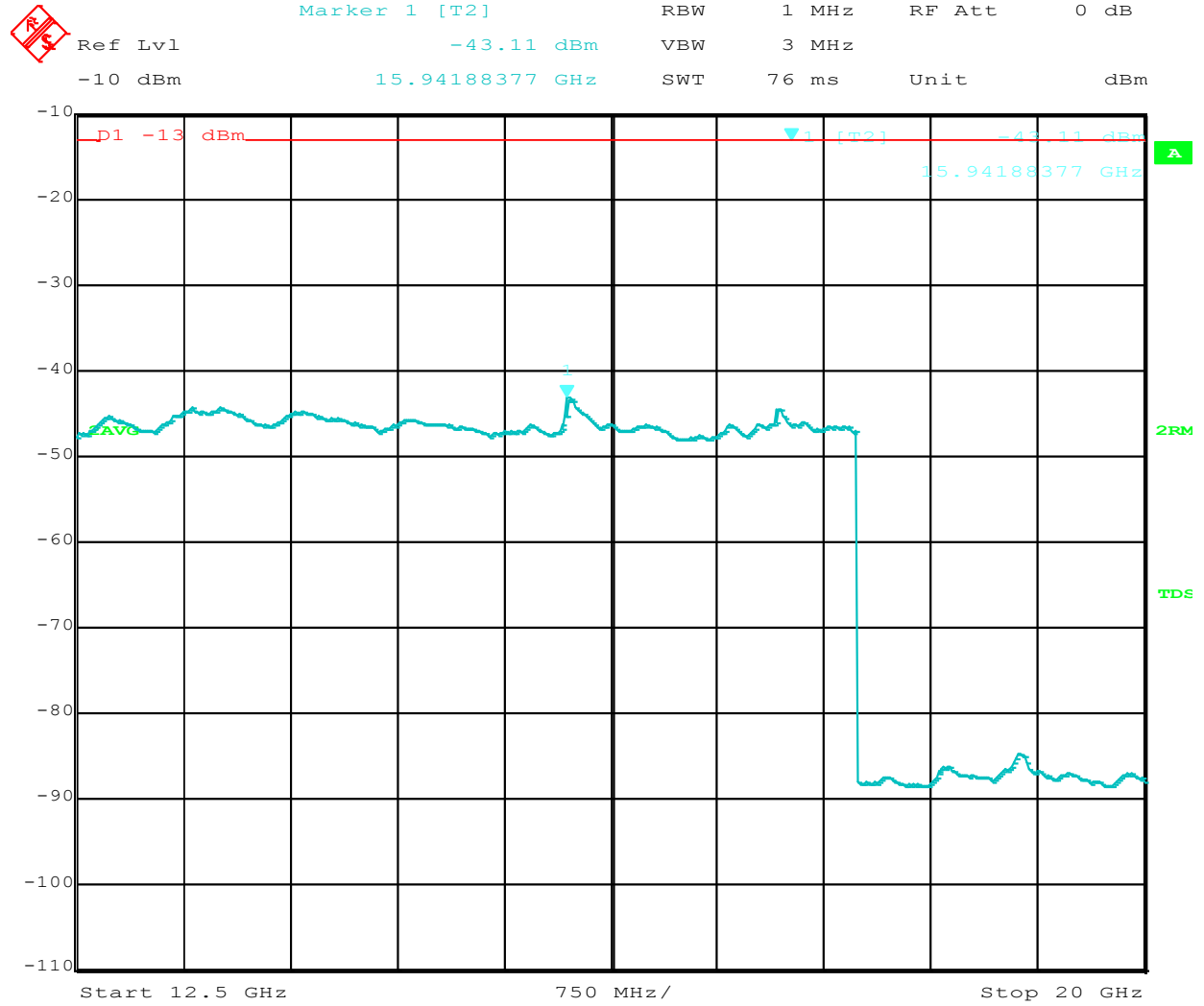
Transmits GSM at ARFCN 658 and CDMA at channel 609, 6.5 GHz – 7.5 GHz



Transmits GSM at ARFCN 658 and CDMA at channel 609, 7.5 GHz – 12.5 GHz



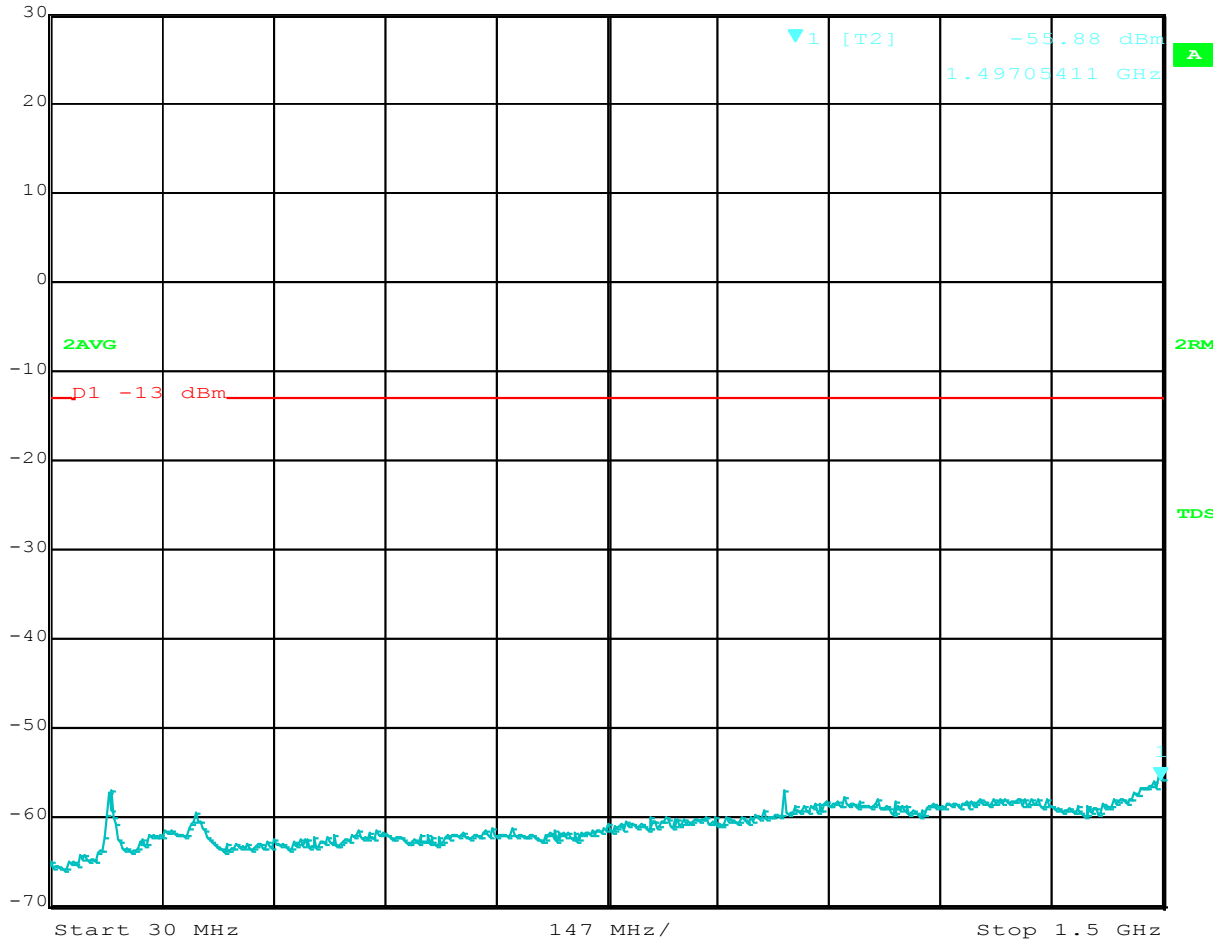
Transmits GSM at ARFCN 658 and CDMA at channel 609, 12.5 GHz – 20.0 GHz



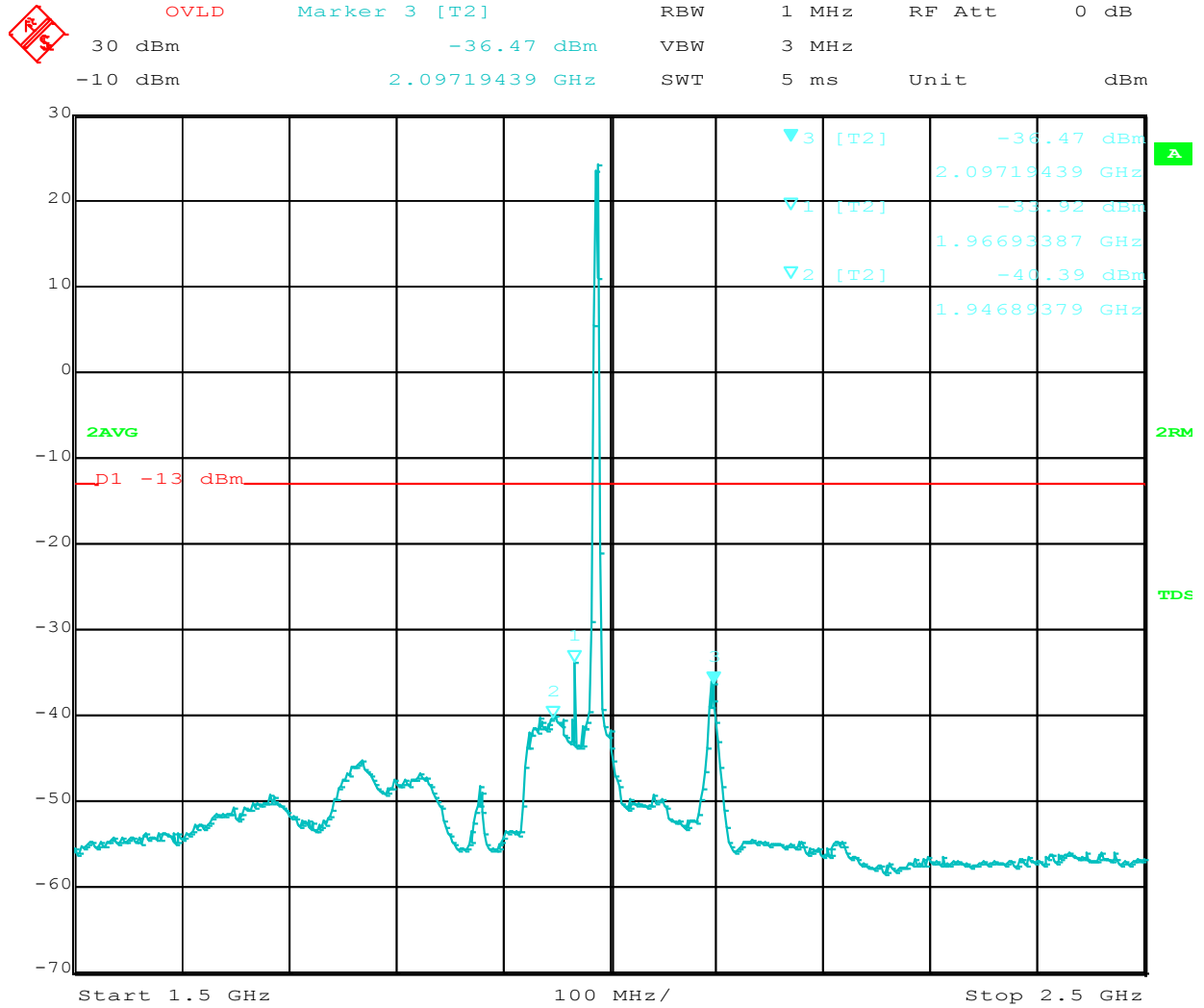
Transmits GSM at ARFCN 801 and CDMA at channel 1139, 30.0 MHz – 1.5 GHz



Max/Ref Lvl	Marker 1 [T2]	RBW	1 MHz	RF Att	0 dB
30 dBm	-55.88 dBm	VBW	3 MHz		
-10 dBm	1.49705411 GHz	SWT	5 ms	Unit	dBm



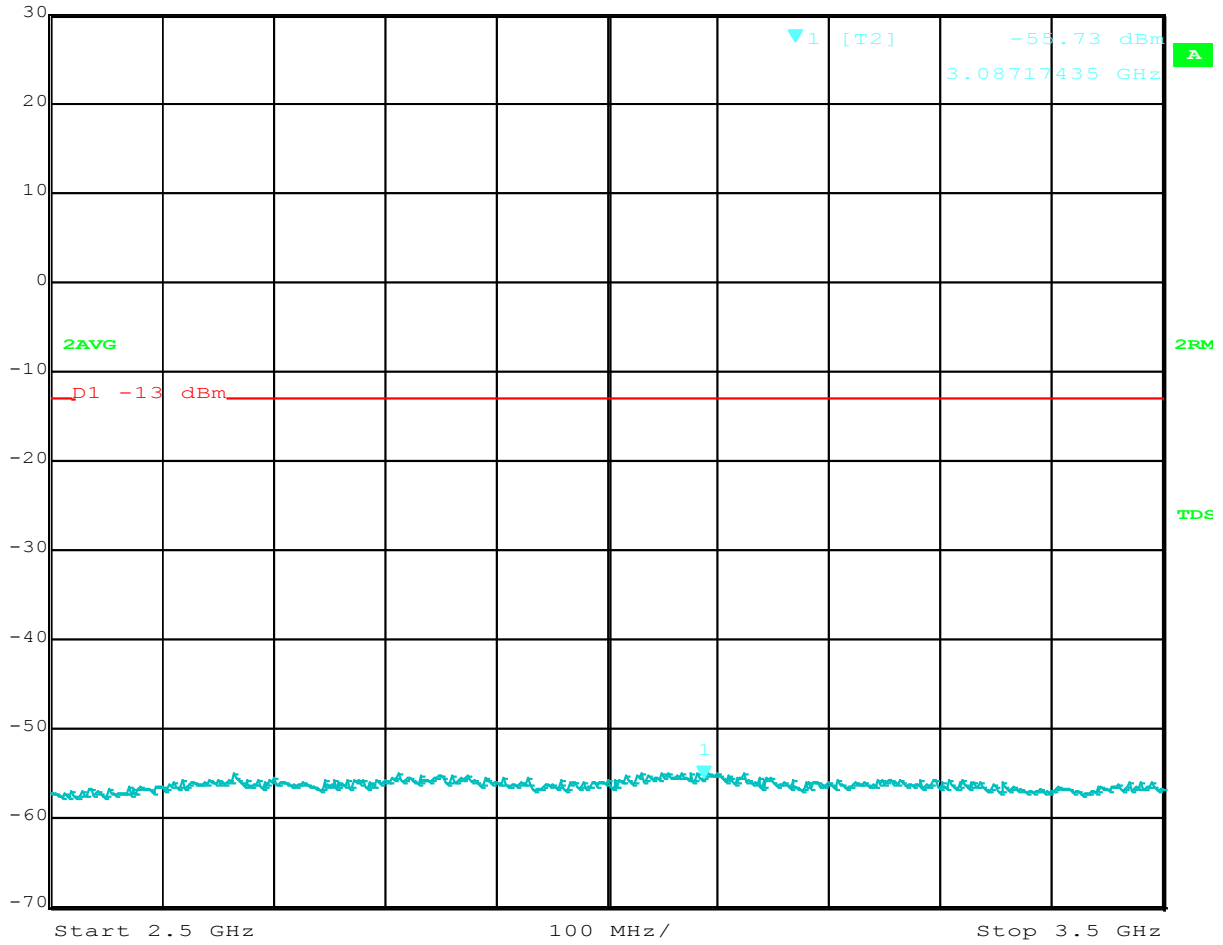
Transmits GSM at ARFCN 801 and CDMA at channel 1139, 1.5 – 2.5 GHz



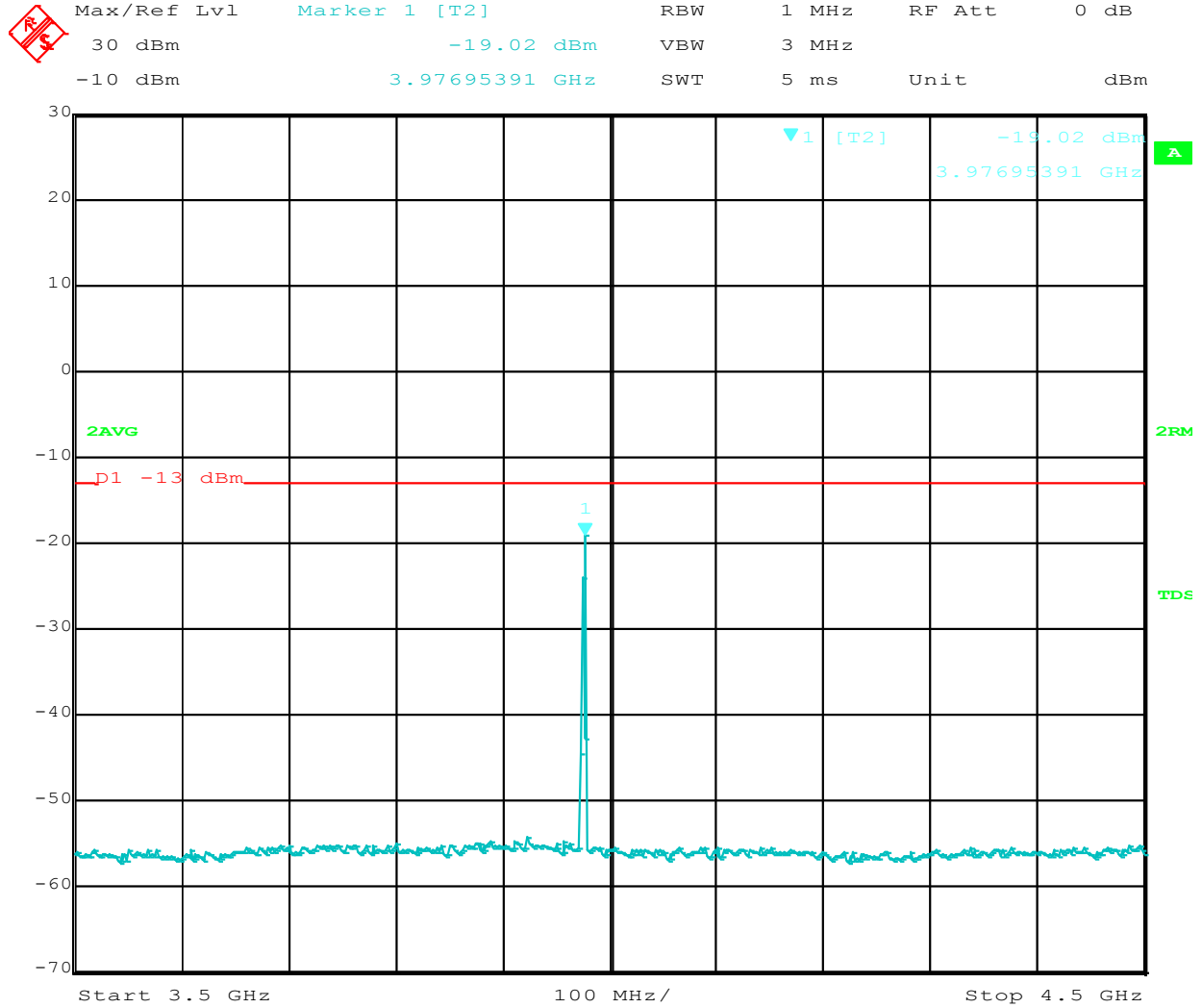
Transmits GSM at ARFCN 801 and CDMA at channel 1139, 2.5 – 3.5 GHz



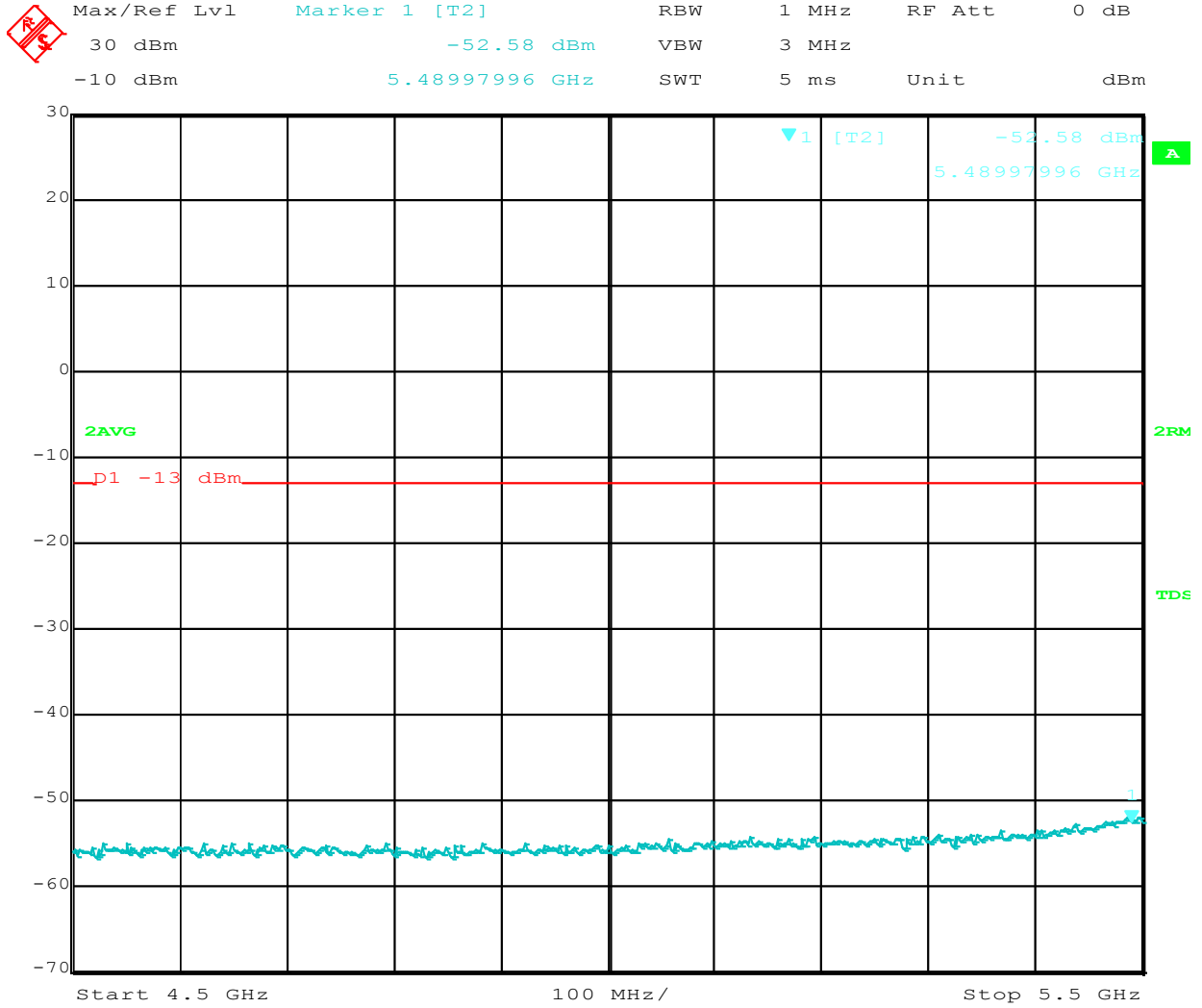
Max/Ref Lvl	Marker 1 [T2]	RBW	1 MHz	RF Att	0 dB
30 dBm	-55.73 dBm	VBW	3 MHz		
-10 dBm	3.08717435 GHz	SWT	5 ms	Unit	dBm



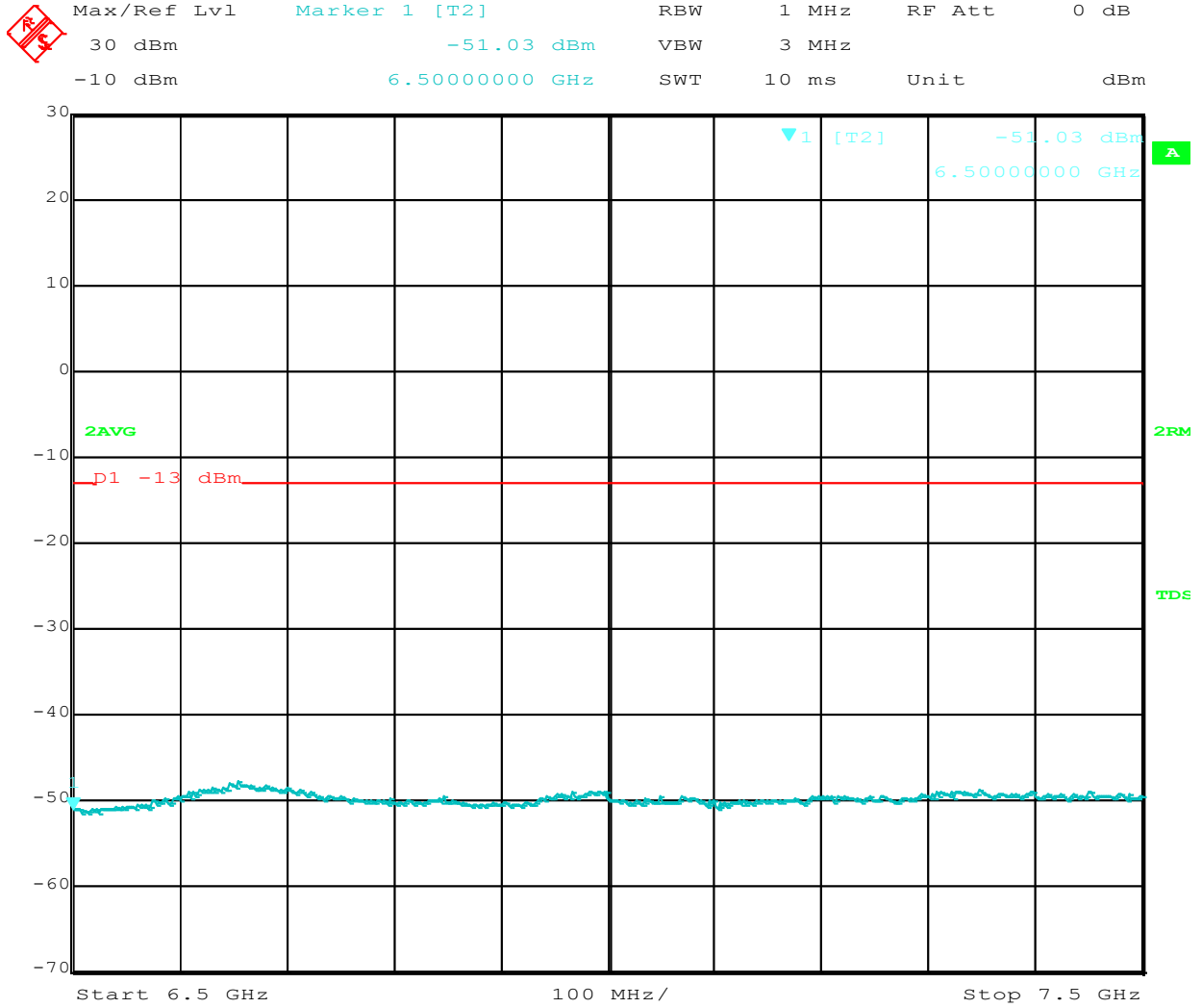
Transmits GSM at ARFCN 801 and CDMA at channel 1139, 3.5 – 4.5 GHz



Transmits GSM at ARFCN 801 and CDMA at channel 1139, 4.5 – 5.5 GHz

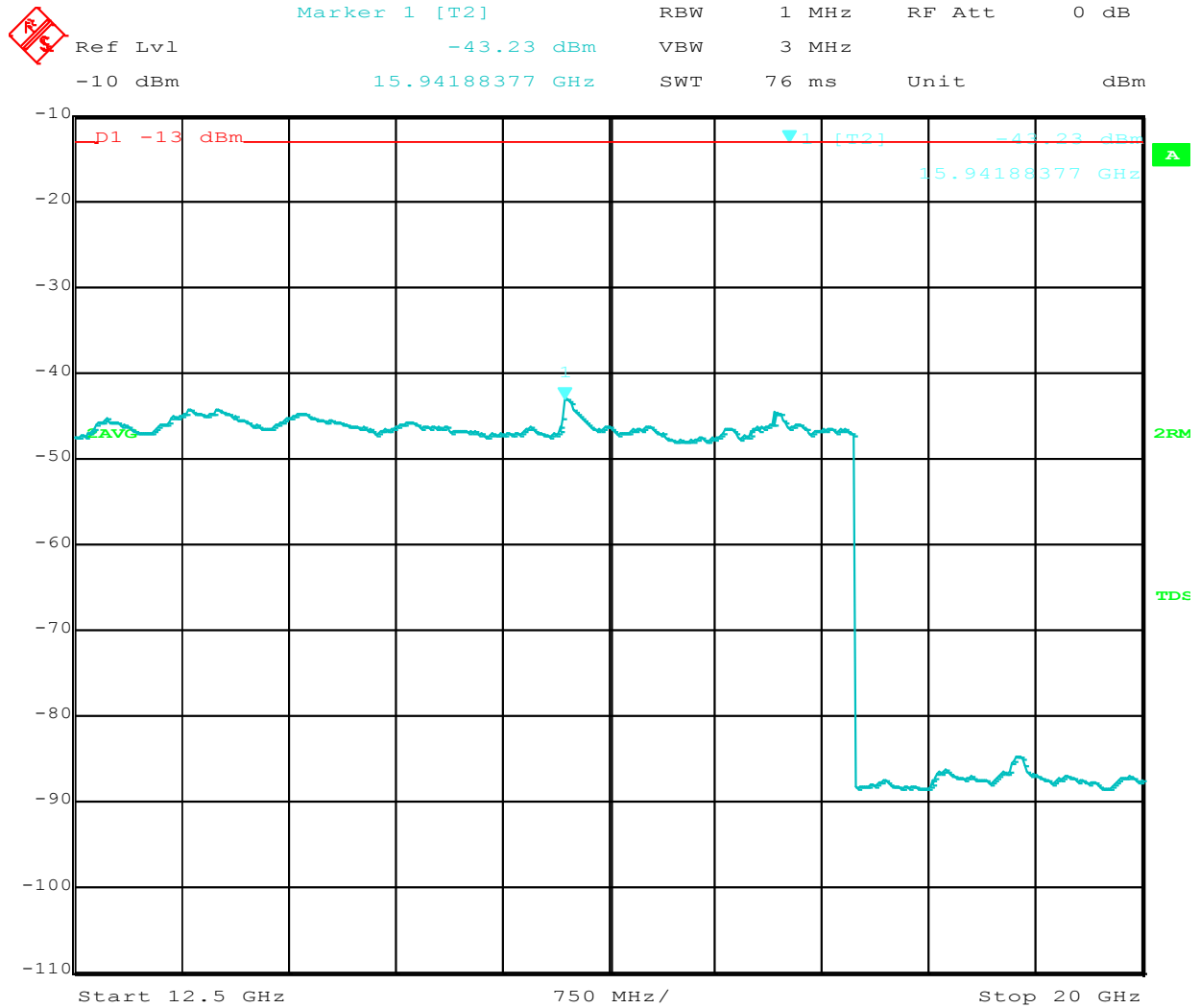


Transmits GSM at ARFCN 801 and CDMA at channel 1139, 6.5 – 7.5 GHz

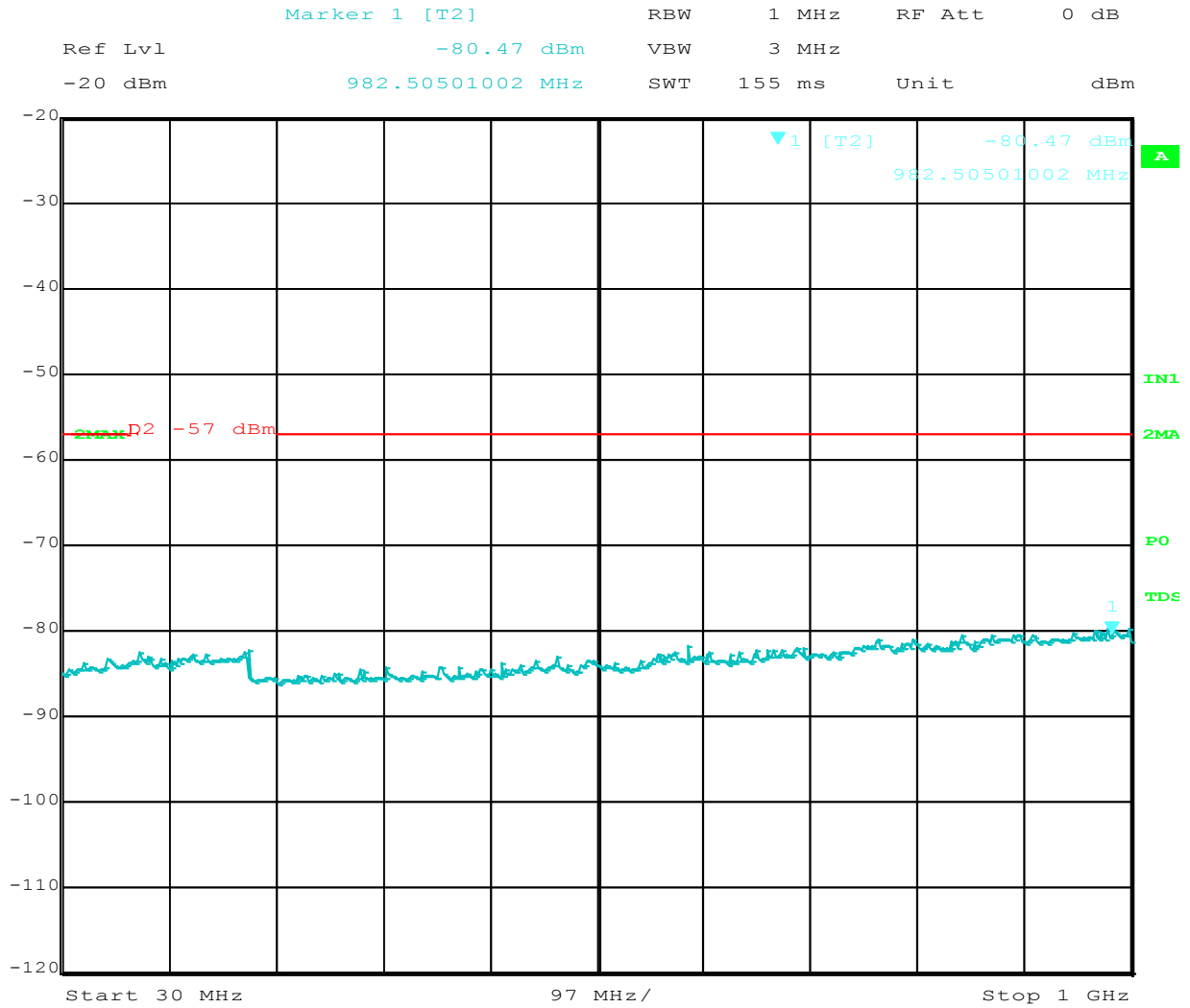


The spectrum plot displays the power spectral density across a frequency range from 7.5 GHz to 12.5 GHz. The vertical axis represents power in dBm, ranging from -70 to 30. A prominent red horizontal line at -13 dBm is labeled 'P1'. The main signal trace is shown in cyan, fluctuating around -50 dBm. A specific peak is identified at 11.84869739 GHz with a power level of -47.02 dBm, marked by a cyan triangle and the label '1'. Other labels include '2AVG' in green, '2RM' on the right edge, and 'TDS' at the bottom right.

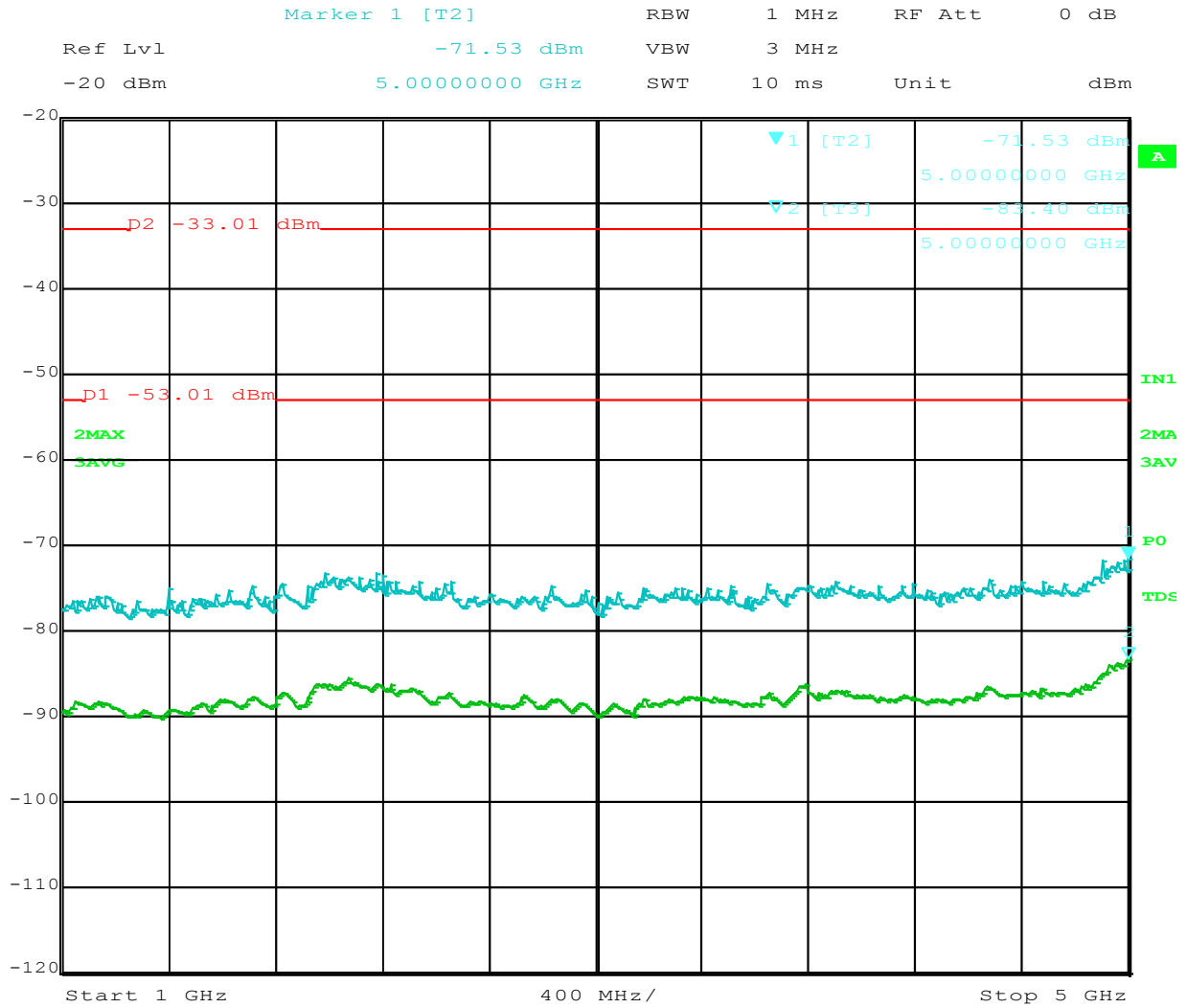
Transmits GSM at ARFCN 801 and CDMA at channel 1139, 12.5 – 20.0 GHz



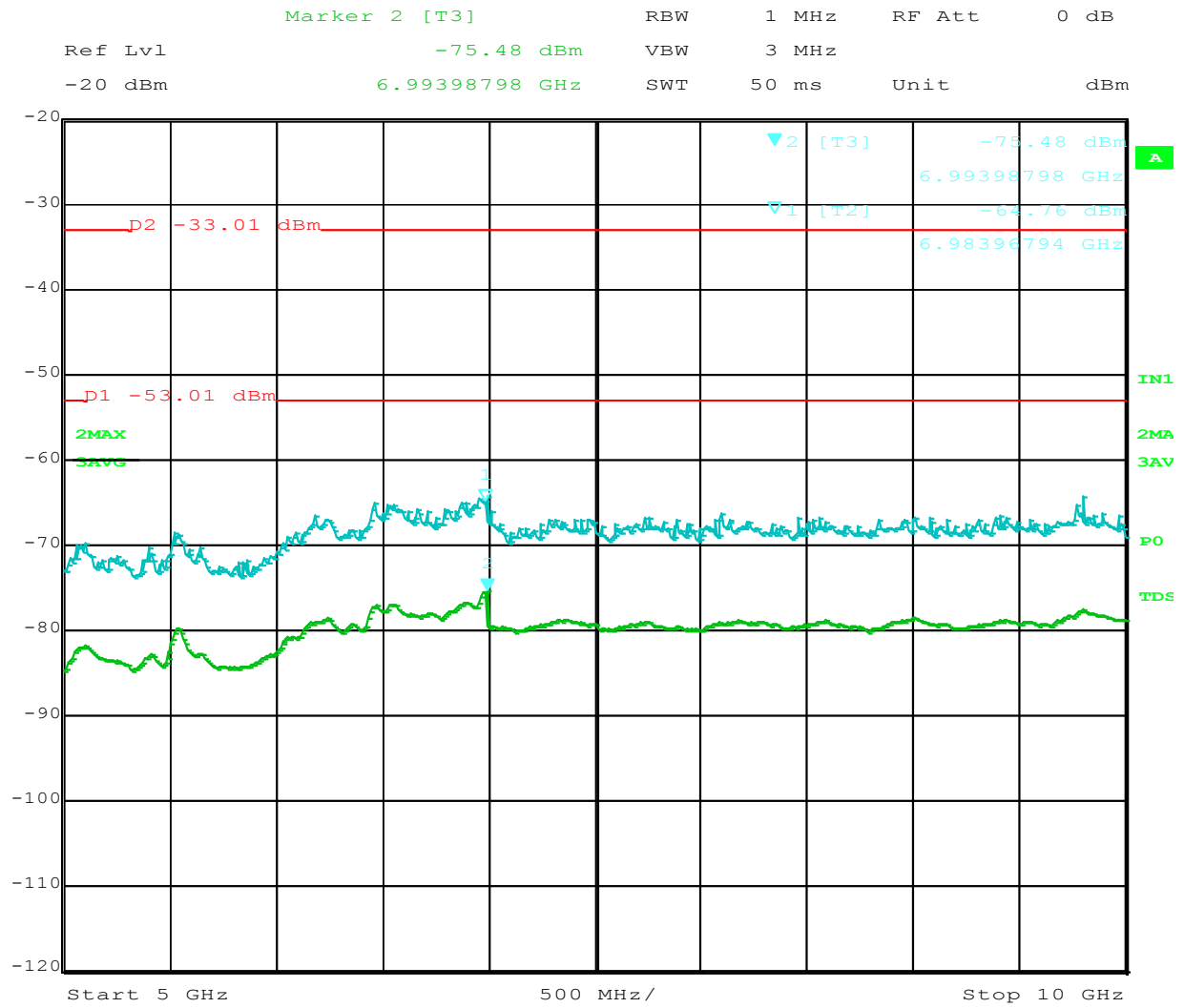
Rx mode 30 MHz – 1 GHz



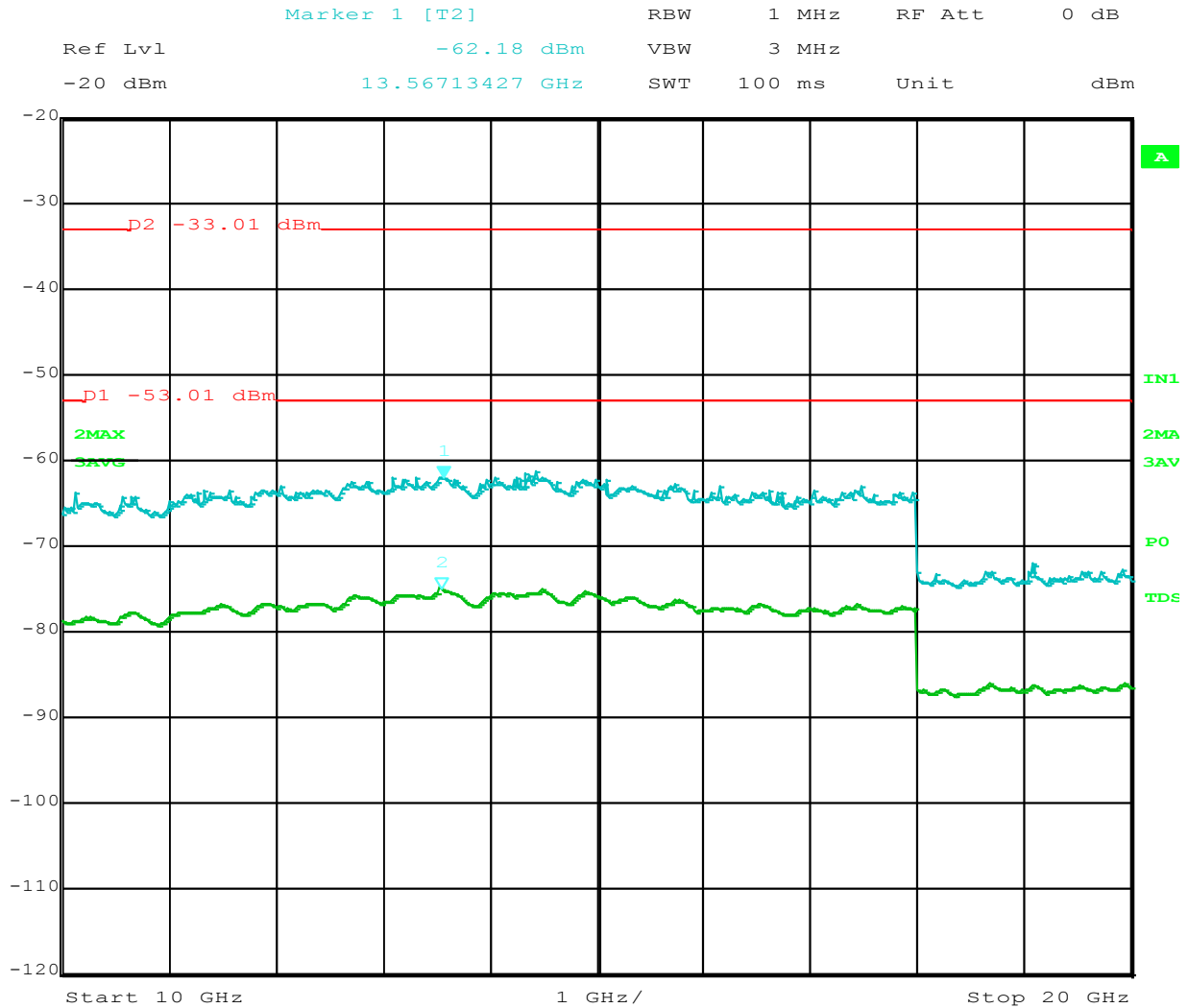
Rx mode 1 GHz – 5 GHz



Rx mode 5 GHz – 10 GHz



Rx mode 10 GHz – 20 GHz



Test Date: 06/14/2016
 06/15/2016
 06/16/2016
 09/17/2016

Test Personnel: Naga Suryadevara N5
 Supervising/Reviewing
 Engineer:
 (Where Applicable) N/A
 Product Standard: CFR47 FCC Part 24 Subpart E,
RSS-133
 Input Voltage: 120VAC 60Hz
 Pretest Verification w/
 Ambient Signals or
 BB Source: N/A

Limit Applied: See Test Report Section 2.0
 Ambient Temperature: 22, 24, 20, 20 °C
 Relative Humidity: 54, 42, 38, 16 %
 Atmospheric Pressure: 1008, 1003, 1002, 1001 mbars

Deviations, Additions, or Exclusions: None

11 Radiated Emissions

11.1 Method

Tests are performed in accordance with FCC 2.1053, 24.238, RSS-133 Section 6.5.

TEST SITE: 10m ALSE

The 10m ALSE is 13m (Length) x 21m (Depth) x 10m (Height) with the effective size in terms of space from the tips of the absorber is 12m (Length) x 20m (Depth) x 8.5m (Height). This chamber achieves broadband performance using a unique arrangement of hybrid and ferrite tile absorber. This chamber has a built in 3m diameter turntable (Embedded type). The metal structure of the table makes electrical connection around the entire circumference of the turntable to the ground plane with a metal brush type connection. The turntable is located on one end of the chamber and the antennas are mounted 3 and 10 meters away at the other end of the chamber on the adjustable an Antenna Mast. The antenna mast is a non-conductive bore sighted type with remote control of antenna height and polarization. The Antenna Mast and the turntable can be remotely controlled through the controller located in the adjacent Control room. A Styrofoam table 80 cm high is used for table-top equipment.

Measurement Uncertainty

Measurement	Frequency Range	Expanded Uncertainty (k=2)	Ucisp
Radiated Emissions, 10m	30-1000 MHz	4.6dB	6.3 dB
Radiated Emissions, 3m	30-1000 MHz	5.3 dB	6.3 dB
Radiated Emissions, 3m	1-6 GHz	4.5 dB	5.2 dB
Radiated Emissions, 3m	6-15 GHz	5.2 dB	5.5 dB
Radiated Emissions, 3m	15-18 GHz	5.0 dB	5.5 dB
Radiated Emissions, 3m	18-40 GHz	5.0 dB	5.5 dB

As shown in the table above our radiated emissions U_{lab} is less than the corresponding U_{CISPR} reference value in CISPR 16-4-2 Table 1, hence the compliance of the product is only based on the measured value, and no measurement uncertainty correction is required, based on CISPR 22 and CISPR 11 (for 2006 and later revisions) Clause 11.

Sample Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CF - AG$$

Where

FS = Field Strength in dB μ V/m

RA = Receiver Amplitude (including preamplifier) in dB μ V

CF = Cable Attenuation Factor in dB

AF = Antenna Factor in dB

AG = Amplifier Gain in dB

In the following table(s), the reading shown on the data table reflects the preamplifier gain. An example for the calculations in the following table is as follows.

Assume a receiver reading of 52.0 dB μ V is obtained. The antenna factor of 7.4 dB and cable factor of 1.6 dB is added. The amplifier gain of 29 dB is subtracted, giving a field strength of 32 dB μ V/m. This value in dB μ V/m was converted to its corresponding level in μ V/m.

$$RA = 52.0 \text{ dB}\mu\text{V}$$

$$AF = 7.4 \text{ dB/m}$$

$$CF = 1.6 \text{ dB}$$

$$AG = 29.0 \text{ dB}$$

$$FS = 32 \text{ dB}\mu\text{V/m}$$

To convert from dB μ V to μ V or mV the following was used:

$$UF = 10^{(NF / 20)} \text{ where } UF = \text{Net Reading in } \mu\text{V}$$

$$NF = \text{Net Reading in dB}\mu\text{V}$$

Example:

$$FS = RA + AF + CF - AG = 52.0 + 7.4 + 1.6 - 29.0 = 32.0$$

$$UF = 10^{(32 \text{ dB}\mu\text{V} / 20)} = 39.8 \mu\text{V/m}$$

Alternately, when C5 Software is used, the "Level" includes all losses and gains and is compared directly in the "Margin" column to the "Limit". "AF" is the Antenna Factor; "PA+CL" are Preamp and Cable Loss. These are already accounted for in the "Level" column.

11.2 Test Equipment Used:

Asset	Description	Manufacturer	Model	Serial	Cal Date	Cal Due
DAV004'	Weather Station	Davis Instruments	7400	PE80529A61 A	05/02/2016	05/02/2017
145128'	EMI Receiver (20 Hz - 40 GHz)	Rohde & Schwarz	ESIB 40	839283/001	03/10/2016	03/10/2017
145-416'	Cables 145-400 145-402 145-404 145-408	Huber + Suhner	3m Track B cables	multiple	10/08/2015	10/08/2016
145013'	Preamplifier (150 KHz to 1.3 GHz)	Hewlett Packard	8447D	2944A07027	05/02/2016	05/02/2017
145106'	Bilog Antenna (30MHz - 5GHz)	Sunol Sciences	JB5	A111003	11/10/2015	11/10/2016
145-410'	Cables 145-400 145-403 145-405 145-406 145-407	Huber + Suhner	10m Track A Cables	multiple	09/01/2015	09/01/2016
ETS001'	1-18GHz DRG Horn Antenna	ETS-Lindgren	3117	00143259	02/10/2016	02/10/2017
EMC04'	ANTENNA, RIDGED GUIDE, 18-40 GHZ	EMCO	3116	2090	05/13/2016	05/13/2017
REA004'	3GHz High Pass Filter	Reactel, Inc	7HSX-3G/18G-S11	06-1	01/25/2016	01/25/2017
PRE8'	PREAMPLIFIER 1- 40 GHz	MITEQ	NSP4000-NF	507145	08/28/2015	08/28/2016
CBLHF201 2-2M-2'	2m 9kHz-40GHz Coaxial Cable - SET2	Huber & Suhner	SF102	252675002	02/09/2016	02/09/2017
CBLHF201 2-5M-2'	5m 9kHz-40GHz Coaxial Cable - SET2	Huber & Suhner	SF102	252676002	02/19/2016	02/19/2017
ANT1A'	BROADBAND ANTENNA	Compliance Design	B100	1649	12/08/2015	12/08/2016
ANT1B'	BROADBAND ANTENNA	Compliance Design	B200	1650	12/08/2015	12/08/2016
ANT1C'	BROADBAND ANTENNA	Compliance Design	B300	00668	12/08/2015	12/08/2016
145154'	Double Ridge Waveguide Horn (750 MHz-18 GHz)	ETS Lindgren	3115	00156425	12/21/2015	12/21/2016
147058'	Signal Generator 10 MHz to 20 GHz	Hewlett Packard	83620B	3722A00552	04/19/2016	04/19/2017

Software Utilized:

Name	Manufacturer	Version
EMI Boxborough.xls	Intertek	08/27/2010

11.3 Results:

The sample tested was found to Comply.

11.4 Test Data:

30 – 1000 MHz

Radiated Emissions, Substitution

Company: Vanu
 Model #: CompactRAN GSM/CDMA
 Serial #: As listed in section 4
 Engineer(s): Vathana Ven
 Project #: G102578989
 Standard: FCC Part 24 Subpart E/RSS-113
 Barometer: DAV004
 Temp/Humidity/Pressure: 24 deg C 42% 985 mB
 Test Distance (m): 10
 Voltage/Frequency: 120VAC/60Hz
 Frequency Range: 30-1000 MHz
 Net = Generator Level (0.00 dBm) + (EUT reading - Generator reading) - Cable Loss + Antenna Gain (dBi or dBd)
 Peak: PK Quasi-Peak: QP Average: AVG RMS: RMS; NF = Noise Floor RB = Restricted Band; Bandwidth denoted as RBW/VBW

Rx Antenna: 145-145
 Rx Cable(s): 145-410
 Rx Preamp: 145-013
 Receiver: 145-128
 Tx Antenna: ANT1
 Tx Cable(s): CBLHF2012-2M-2
 Tx Signal Generator: 147058
 ERP or EIRP?: ERP

Detector Type	Ant. Pol. (V/H)	Frequency MHz	EUT Reading dB(uV)	Generator Reading dB(uV)	Transmit Cable Loss dB	Transmit Antenna dBi	Generator Level dBm	Net dBm	Limit dBm	Margin dB	Bandwidth
30-1000 MHz: run_test_4.sh_CDMA at ARFCN 61											
PK	V	102.184	35.29	76.22	0.03	-0.40	-20.00	-63.51	-13.00	-50.51	120/300 kHz
PK	V	118.700	36.86	76.25	0.03	-0.50	-20.00	-62.07	-13.00	-49.07	120/300 kHz
PK	V	199.976	46.02	77.23	0.03	0.40	-20.00	-52.99	-13.00	-39.99	120/300 kHz
PK	V	223.445	43.34	78.60	0.03	1.00	-20.00	-56.44	-13.00	-43.44	120/300 kHz
PK	H	316.235	50.66	73.73	0.03	-0.90	-20.00	-46.15	-13.00	-33.15	120/300 kHz
PK	H	550.000	38.66	70.00	0.03	1.60	-20.00	-51.92	-13.00	-38.92	120/300 kHz
30-1000 MHz: run_test_5.sh_CDMA at ARFCN 609											
PK	V	101.884	36.26	76.22	0.03	-0.40	-20.00	-62.54	-13.00	-49.54	120/300 kHz
PK	V	131.219	36.12	77.07	0.03	1.40	-20.00	-61.73	-13.00	-48.73	120/300 kHz
PK	V	199.984	46.91	77.23	0.03	0.40	-20.00	-52.10	-13.00	-39.10	120/300 kHz
PK	V	224.624	41.24	78.60	0.03	1.00	-20.00	-58.54	-13.00	-45.54	120/300 kHz
PK	H	315.438	50.01	73.73	0.03	-0.90	-20.00	-46.80	-13.00	-33.80	120/300 kHz
PK	H	550.000	38.77	70.00	0.03	1.60	-20.00	-51.81	-13.00	-38.81	120/300 kHz
30-1000 MHz: run_test_6.sh_CDMA at ARFCN 1139											
PK	V	101.422	35.99	76.22	0.03	-0.40	-20.00	-62.81	-13.00	-49.81	120/300 kHz
PK	V	131.211	36.64	77.07	0.03	1.40	-20.00	-61.21	-13.00	-48.21	120/300 kHz
PK	V	199.974	46.04	77.23	0.03	0.40	-20.00	-52.97	-13.00	-39.97	120/300 kHz
PK	V	225.005	41.48	78.60	0.03	1.00	-20.00	-58.30	-13.00	-45.30	120/300 kHz
PK	H	318.059	50.09	73.74	0.03	-0.80	-20.00	-46.63	-13.00	-33.63	120/300 kHz
30-1000 MHz: run_test_7.sh_GSM at 521 and CDMA at channel 61											
PK	V	106.042	37.09	76.22	0.03	-1.00	-20.00	-62.31	-13.00	-49.31	120/300 kHz
PK	V	119.060	35.60	76.25	0.03	-0.60	-20.00	-63.43	-13.00	-50.43	120/300 kHz
PK	V	199.975	46.30	77.23	0.03	0.40	-20.00	-52.71	-13.00	-39.71	120/300 kHz
PK	V	224.005	40.77	78.60	0.03	1.00	-20.00	-59.01	-13.00	-46.01	120/300 kHz
PK	H	312.180	50.45	73.70	0.03	-0.70	-20.00	-46.13	-13.00	-33.13	120/300 kHz
PK	H	549.980	38.15	70.00	0.03	1.60	-20.00	-52.43	-13.00	-39.43	120/300 kHz
30-1000 MHz: run_test_8.sh_GSM at 658 and CDMA at channel 609											
PK	V	106.248	39.09	76.22	0.03	-1.50	-20.00	-60.81	-13.00	-47.81	120/300 kHz
PK	V	131.218	37.44	77.07	0.03	1.40	-20.00	-60.41	-13.00	-47.41	120/300 kHz
PK	V	200.004	47.87	77.23	0.03	0.40	-20.00	-51.14	-13.00	-38.14	120/300 kHz
PK	V	223.366	42.87	78.60	0.03	1.00	-20.00	-56.91	-13.00	-43.91	120/300 kHz
PK	H	315.746	49.05	73.73	0.03	-0.90	-20.00	-47.76	-13.00	-34.76	120/300 kHz
PK	H	549.954	34.37	70.00	0.03	1.60	-20.00	-56.21	-13.00	-43.21	120/300 kHz
30-1000 MHz: run_test_8.sh_GSM at 801 and CDMA at channel 1139											
PK	V	106.263	43.45	76.22	0.03	-1.50	-20.00	-56.45	-13.00	-43.45	120/300 kHz
PK	V	131.332	37.16	77.07	0.03	1.40	-20.00	-60.69	-13.00	-47.69	120/300 kHz
PK	V	199.989	47.38	77.23	0.03	0.40	-20.00	-51.63	-13.00	-38.63	120/300 kHz
PK	V	222.775	41.09	78.00	0.03	0.90	-20.00	-58.19	-13.00	-45.19	120/300 kHz
PK	H	311.959	51.14	73.00	0.03	-0.70	-20.00	-44.74	-13.00	-31.74	120/300 kHz
PK	H	550.012	38.29	70.00	0.03	1.60	-20.00	-52.29	-13.00	-39.29	120/300 kHz

1-20 GHz

Radiated Emissions, Substitution											
Company: Vanu							Rx Antenna: ETS002				
Model #: CompactRAN GSM/CDMA							Rx Cable(s): 145-416				
Serial #: As listed in section 4.0							Rx Preamp: 145-014		Receiver: 145128		
Engineer(s): Naga Suryadevara				Location: 10M			Tx Antenna: 145154				
Project #: G102578989				Date(s): 06/17/16			Tx Cable(s): CBLHF2012-2Mx1				
Standard: FCC Part 24 Subpart E							Tx Signal Generator: 147058				
Barometer: DAV004		Temp/Humidity/Pressure: 24C		54%		1008 mbars		ERP or EIRP?: ERP			
Test Distance (m): 3				Voltage/Frequency: 120 VAC 60 Hz				Frequency Range:		Spurious (tx)	
Net = Generator Level (0.00 dBm) + (EUT reading - Generator reading) - Cable Loss + Antenna Gain (dBi or dBd)											
Peak: PK Quasi-Peak: QP Average: AVG RMS: RMS; NF = Noise Floor RB = Restricted Band; Bandwidth denoted as RBW/BW											
Detector	Ant.	Frequency	EUT Reading	Generator Reading	Transmit Cable	Transmit Antenna	Generator Level	Net	Limit	Margin	Bandwidth
Type	(V/H)	MHz	dB(uV)	dB(uV)	Loss dB	dBi	dBm	dBm	dBm	dB	
run_test_4.sh transmits CDMA at Channel 61 @ 0.8 M EUT height											
PK	H	3866.100	62.12	68.32	1.57	10.51	-20.00	-19.41	-13.00	-6.41	1/3 MHz
AVG	H	3866.100	56.76	65.41	1.57	10.51	-20.00	-21.86	-13.00	-8.86	1/3 MHz
PK	V	3866.100	59.87	67.18	1.57	10.58	-20.00	-20.45	-13.00	-7.45	1/3 MHz
AVG	V	3866.100	55.34	65.56	1.57	10.58	-20.00	-23.36	-13.00	-10.36	1/3 MHz
PK	H	5799.150	59.19	63.60	1.92	10.80	-20.00	-17.68	-13.00	-4.68	1/3 MHz
AVG	H	5799.150	54.34	62.11	1.92	10.80	-20.00	-21.04	-13.00	-8.04	1/3 MHz
PK	V	5799.150	60.27	64.11	1.92	10.91	-20.00	-17.00	-13.00	-4.00	1/3 MHz
AVG	V	5799.150	56.65	61.30	1.92	10.91	-20.00	-17.81	-13.00	-4.81	1/3 MHz
PK	H	7732.200	56.34	61.58	2.26	10.45	-20.00	-19.20	-13.00	-6.20	1/3 MHz
AVG	H	7732.200	48.78	60.69	2.26	10.45	-20.00	-25.87	-13.00	-12.87	1/3 MHz
PK	V	7732.200	58.73	62.26	2.26	10.45	-20.00	-17.49	-13.00	-4.49	1/3 MHz
AVG	V	7732.200	50.17	60.50	2.26	10.45	-20.00	-24.29	-13.00	-11.29	1/3 MHz
run_test_4.sh transmits CDMA at Channel 61 @ 1.5 M EUT height											
PK	H	3866.100	59.79	68.32	1.57	10.51	-20.00	-21.74	-13.00	-8.74	1/3 MHz
AVG	H	3866.100	55.67	65.41	1.57	10.51	-20.00	-22.95	-13.00	-9.95	1/3 MHz
PK	V	3866.100	54.12	67.18	1.57	10.58	-20.00	-26.20	-13.00	-13.20	1/3 MHz
AVG	V	3866.100	50.27	65.56	1.57	10.58	-20.00	-28.43	-13.00	-15.43	1/3 MHz
PK	H	5799.150	50.19	63.60	1.92	10.80	-20.00	-26.68	-13.00	-13.68	1/3 MHz
AVG	H	5799.150	46.63	62.11	1.92	10.80	-20.00	-28.75	-13.00	-15.75	1/3 MHz
PK	V	5799.150	52.34	64.11	1.92	10.91	-20.00	-24.93	-13.00	-11.93	1/3 MHz
AVG	V	5799.150	49.19	61.30	1.92	10.91	-20.00	-25.27	-13.00	-12.27	1/3 MHz
PK	H	7732.200	50.39	61.58	2.26	10.45	-20.00	-25.15	-13.00	-12.15	1/3 MHz
AVG	H	7732.200	48.84	60.69	2.26	10.45	-20.00	-25.81	-13.00	-12.81	1/3 MHz
PK	V	7732.200	52.77	62.26	2.26	10.45	-20.00	-23.45	-13.00	-10.45	1/3 MHz
AVG	V	7732.200	49.89	60.50	2.26	10.45	-20.00	-24.57	-13.00	-11.57	1/3 MHz
run_test_5.sh transmits CDMA at Channel 609 @ 0.8 M EUT height											
PK	H	3920.900	58.86	68.32	1.57	10.51	-20.00	-22.67	-13.00	-9.67	1/3 MHz
AVG	H	3920.900	54.12	65.41	1.57	10.51	-20.00	-24.50	-13.00	-11.50	1/3 MHz
PK	V	3920.900	60.39	67.18	1.57	10.58	-20.00	-19.93	-13.00	-6.93	1/3 MHz
AVG	V	3920.900	57.68	65.56	1.57	10.58	-20.00	-21.02	-13.00	-8.02	1/3 MHz
PK	H	5881.350	57.27	63.60	1.92	10.80	-20.00	-19.60	-13.00	-6.60	1/3 MHz
AVG	H	5881.350	56.19	62.11	1.92	10.80	-20.00	-19.19	-13.00	-6.19	1/3 MHz
PK	V	5881.350	58.87	64.11	1.92	10.91	-20.00	-18.40	-13.00	-5.40	1/3 MHz
AVG	V	5881.350	56.69	61.30	1.92	10.91	-20.00	-17.77	-13.00	-4.77	1/3 MHz
PK	H	7841.000	55.29	61.58	2.26	10.45	-20.00	-20.25	-13.00	-7.25	1/3 MHz
AVG	H	7841.000	53.32	60.69	2.26	10.45	-20.00	-21.33	-13.00	-8.33	1/3 MHz
PK	V	7841.000	56.68	62.26	2.26	10.45	-20.00	-19.54	-13.00	-6.54	1/3 MHz
AVG	V	7841.000	52.12	60.50	2.26	10.45	-20.00	-22.34	-13.00	-9.34	1/3 MHz
run_test_5.sh transmits CDMA at Channel 609 @ 1.5 M EUT height											
PK	H	3920.900	59.19	68.32	1.57	10.51	-20.00	-22.34	-13.00	-9.34	1/3 MHz
AVG	H	3920.900	55.38	65.41	1.57	10.51	-20.00	-23.24	-13.00	-10.24	1/3 MHz
PK	V	3920.900	61.17	67.18	1.57	10.58	-20.00	-19.15	-13.00	-6.15	1/3 MHz
AVG	V	3920.900	57.67	65.56	1.57	10.58	-20.00	-21.03	-13.00	-8.03	1/3 MHz
PK	H	5881.350	58.67	63.60	1.92	10.80	-20.00	-18.20	-13.00	-5.20	1/3 MHz
AVG	H	5881.350	55.19	62.11	1.92	10.80	-20.00	-20.19	-13.00	-7.19	1/3 MHz
PK	V	5881.350	59.12	64.11	1.92	10.91	-20.00	-18.15	-13.00	-5.15	1/3 MHz
AVG	V	5881.350	56.34	61.30	1.92	10.91	-20.00	-18.12	-13.00	-5.12	1/3 MHz
PK	H	7841.000	54.32	61.58	2.26	10.45	-20.00	-21.22	-13.00	-8.22	1/3 MHz
AVG	H	7841.000	48.78	60.69	2.26	10.45	-20.00	-25.87	-13.00	-12.87	1/3 MHz
PK	V	7841.000	55.24	62.26	2.26	10.45	-20.00	-20.98	-13.00	-7.98	1/3 MHz
AVG	V	7841.000	49.89	60.50	2.26	10.45	-20.00	-24.57	-13.00	-11.57	1/3 MHz

run_test 6.sh transmits CDMA at Channel 1139 @ 0.8 M EUT height										
PK	H	3973.900	61.12	68.32	1.57	10.51	-20.00	-20.41	-13.00	-7.41 1/3 MHz
AVG	H	3973.900	59.65	65.41	1.57	10.51	-20.00	-18.97	-13.00	-5.97 1/3 MHz
PK	V	3973.900	63.21	67.18	1.57	10.58	-20.00	-17.11	-13.00	-4.11 1/3 MHz
AVG	V	3973.900	60.12	65.56	1.57	10.58	-20.00	-18.58	-13.00	-5.58 1/3 MHz
PK	H	5960.850	59.17	63.60	1.92	10.80	-20.00	-17.70	-13.00	-4.70 1/3 MHz
AVG	H	5960.850	55.43	62.11	1.92	10.80	-20.00	-19.95	-13.00	-6.95 1/3 MHz
PK	V	5960.850	57.76	64.11	1.92	10.91	-20.00	-19.51	-13.00	-6.51 1/3 MHz
AVG	V	5960.850	53.12	61.30	1.92	10.91	-20.00	-21.34	-13.00	-8.34 1/3 MHz
PK	H	7947.800	51.12	61.58	2.26	10.45	-20.00	-24.42	-13.00	-11.42 1/3 MHz
AVG	H	7947.800	46.76	60.69	2.26	10.45	-20.00	-27.89	-13.00	-14.89 1/3 MHz
PK	V	7947.800	53.12	62.26	2.26	10.45	-20.00	-23.10	-13.00	-10.10 1/3 MHz
AVG	V	7947.800	45.12	60.50	2.26	10.45	-20.00	-29.34	-13.00	-16.34 1/3 MHz
run_test 6.sh transmits CDMA at Channel 1139 @ 1.5 M EUT height										
PK	H	3973.900	60.26	68.32	1.57	10.51	-20.00	-21.27	-13.00	-8.27 1/3 MHz
AVG	H	3973.900	57.72	65.41	1.57	10.51	-20.00	-20.90	-13.00	-7.90 1/3 MHz
PK	V	3973.900	61.12	67.18	1.57	10.58	-20.00	-19.20	-13.00	-6.20 1/3 MHz
AVG	V	3973.900	58.76	65.56	1.57	10.58	-20.00	-19.94	-13.00	-6.94 1/3 MHz
PK	H	5960.850	58.74	63.60	1.92	10.80	-20.00	-18.13	-13.00	-5.13 1/3 MHz
AVG	H	5960.850	54.12	62.11	1.92	10.80	-20.00	-21.26	-13.00	-8.26 1/3 MHz
PK	V	5960.850	59.65	64.11	1.92	10.91	-20.00	-17.62	-13.00	-4.62 1/3 MHz
AVG	V	5960.850	53.17	61.30	1.92	10.91	-20.00	-21.29	-13.00	-8.29 1/3 MHz
PK	H	7947.800	53.12	61.58	2.26	10.45	-20.00	-22.42	-13.00	-9.42 1/3 MHz
AVG	H	7947.800	47.79	60.69	2.26	10.45	-20.00	-26.86	-13.00	-13.86 1/3 MHz
PK	V	7947.800	50.34	62.26	2.26	10.45	-20.00	-25.88	-13.00	-12.88 1/3 MHz
AVG	V	7947.800	42.12	60.50	2.26	10.45	-20.00	-32.34	-13.00	-19.34 1/3 MHz
run_test 7.sh transmits GSM at ARFCN 521 and CDMA at Channel 61 @ 0.8M EUT height										
PK	H	3864.000	65.89	67.57	1.57	10.51	-20.00	-14.89	-13.00	-1.89 1/3 MHz
AVG	H	3864.000	63.28	66.41	1.57	10.51	-20.00	-16.34	-13.00	-3.34 1/3 MHz
PK	V	3864.000	66.68	69.18	1.57	10.58	-20.00	-15.64	-13.00	-2.64 1/3 MHz
AVG	V	3864.000	67.12	68.56	1.57	10.58	-20.00	-14.58	-13.00	-1.58 1/3 MHz
PK	H	5796.000	60.89	63.60	1.92	10.80	-20.00	-15.98	-13.00	-2.98 1/3 MHz
AVG	H	5796.000	60.12	62.11	1.92	10.80	-20.00	-15.26	-13.00	-2.26 1/3 MHz
PK	V	5796.000	61.19	64.11	1.92	10.91	-20.00	-16.08	-13.00	-3.08 1/3 MHz
AVG	V	5796.000	60.87	61.30	1.92	10.91	-20.00	-13.59	-13.00	-0.59 1/3 MHz
PK	H	7728.000	55.49	61.58	2.26	10.45	-20.00	-20.05	-13.00	-7.05 1/3 MHz
AVG	H	7728.000	53.12	60.69	2.26	10.45	-20.00	-21.53	-13.00	-8.53 1/3 MHz
PK	V	7728.000	57.87	62.26	2.26	10.45	-20.00	-18.35	-13.00	-5.35 1/3 MHz
AVG	V	7728.000	51.27	60.50	2.26	10.45	-20.00	-23.19	-13.00	-10.19 1/3 MHz
run_test 7.sh transmits GSM at ARFCN 521 and CDMA at Channel 61 @ 1.5M EUT height										
PK	H	3864.000	63.12	67.38	1.57	10.51	-20.00	-17.47	-13.00	-4.47 1/3 MHz
AVG	H	3864.000	61.12	66.07	1.57	10.51	-20.00	-18.16	-13.00	-5.16 1/3 MHz
PK	V	3864.000	64.19	65.15	1.57	10.58	-20.00	-14.10	-13.00	-1.10 1/3 MHz
AVG	V	3864.000	58.73	64.35	1.57	10.58	-20.00	-18.76	-13.00	-5.76 1/3 MHz
PK	H	5796.000	61.17	62.51	1.92	10.80	-20.00	-14.61	-13.00	-1.61 1/3 MHz
AVG	H	5796.000	58.34	61.11	1.92	10.80	-20.00	-16.04	-13.00	-3.04 1/3 MHz
PK	V	5796.000	61.12	63.41	1.92	10.91	-20.00	-15.45	-13.00	-2.45 1/3 MHz
AVG	V	5796.000	56.76	62.35	1.92	10.91	-20.00	-18.75	-13.00	-5.75 1/3 MHz
PK	H	7728.000	58.38	60.34	2.26	10.45	-20.00	-15.92	-13.00	-2.92 1/3 MHz
AVG	H	7728.000	51.84	59.58	2.26	10.45	-20.00	-21.70	-13.00	-8.70 1/3 MHz
PK	V	7728.000	57.37	61.26	2.26	10.45	-20.00	-17.85	-13.00	-4.85 1/3 MHz
AVG	V	7728.000	49.12	60.32	2.26	10.45	-20.00	-25.16	-13.00	-12.16 1/3 MHz
run_test 8.sh transmits GSM ARFCN 658 and CDMA at Channel 609 @ 0.8M EUT height										
PK	H	3918.800	62.37	66.56	1.57	10.51	-20.00	-17.40	-13.00	-4.40 1/3 MHz
AVG	H	3918.800	58.19	63.19	1.57	10.51	-20.00	-18.21	-13.00	-5.21 1/3 MHz
PK	V	3918.800	61.37	64.12	1.57	10.58	-20.00	-15.89	-13.00	-2.89 1/3 MHz
AVG	V	3918.800	56.52	61.30	1.57	10.58	-20.00	-17.92	-13.00	-4.92 1/3 MHz
PK	H	5878.200	55.87	64.51	1.92	10.80	-20.00	-21.91	-13.00	-8.91 1/3 MHz
AVG	H	5878.200	51.37	59.11	1.92	10.80	-20.00	-21.01	-13.00	-8.01 1/3 MHz
PK	V	5878.200	56.78	65.72	1.92	10.91	-20.00	-22.10	-13.00	-9.10 1/3 MHz
AVG	V	5878.200	50.24	60.57	1.92	10.91	-20.00	-23.49	-13.00	-10.49 1/3 MHz
PK	H	7837.600	52.19	60.79	2.26	10.45	-20.00	-22.56	-13.00	-9.56 1/3 MHz
AVG	H	7837.600	44.46	57.76	2.26	10.45	-20.00	-27.26	-13.00	-14.26 1/3 MHz
PK	V	7837.600	53.65	61.26	2.26	10.45	-20.00	-21.57	-13.00	-8.57 1/3 MHz
AVG	V	7837.600	57.27	60.32	2.26	10.45	-20.00	-17.01	-13.00	-4.01 1/3 MHz
run_test 8.sh transmits GSM ARFCN 658 and CDMA at Channel 609 @ 1.5M EUT height										
PK	H	3918.800	61.67	66.56	1.57	10.51	-20.00	-18.10	-13.00	-5.10 1/3 MHz
AVG	H	3918.800	59.87	63.19	1.57	10.51	-20.00	-16.53	-13.00	-3.53 1/3 MHz
PK	V	3918.800	63.12	64.12	1.57	10.58	-20.00	-14.14	-13.00	-1.14 1/3 MHz
AVG	V	3918.800	59.98	61.30	1.57	10.58	-20.00	-14.46	-13.00	-1.46 1/3 MHz
PK	H	5878.200	58.18	64.51	1.92	10.80	-20.00	-19.60	-13.00	-6.60 1/3 MHz
AVG	H	5878.200	53.43	59.11	1.92	10.80	-20.00	-18.95	-13.00	-5.95 1/3 MHz
PK	V	5878.200	59.67	65.72	1.92	10.91	-20.00	-19.21	-13.00	-6.21 1/3 MHz
AVG	V	5878.200	53.48	60.57	1.92	10.91	-20.00	-20.25	-13.00	-7.25 1/3 MHz
PK	H	7837.600	52.56	60.79	2.26	10.45	-20.00	-22.19	-13.00	-9.19 1/3 MHz
AVG	H	7837.600	47.65	57.76	2.26	10.45	-20.00	-24.07	-13.00	-11.07 1/3 MHz
PK	V	7837.600	50.12	61.26	2.26	10.45	-20.00	-25.10	-13.00	-12.10 1/3 MHz
AVG	V	7837.600	44.38	60.32	2.26	10.45	-20.00	-29.90	-13.00	-16.90 1/3 MHz

run_test_9.sh transmits GSM ARFCN 801 and CDMA at Channel 1139 @ 0.8 M EUT height										
PK	H	3976.000	66.72	67.57	1.57	10.51	-20.00	-14.06	-13.00	-1.06 1/3 MHz
AVG	H	3976.000	59.34	66.41	1.57	10.51	-20.00	-20.28	-13.00	-7.28 1/3 MHz
PK	V	3976.000	67.16	68.18	1.57	10.58	-20.00	-14.16	-13.00	-1.16 1/3 MHz
AVG	V	3976.000	60.69	65.22	1.57	10.58	-20.00	-17.67	-13.00	-4.67 1/3 MHz
PK	H	5964.000	61.23	64.63	1.92	10.80	-20.00	-16.67	-13.00	-3.67 1/3 MHz
AVG	H	5964.000	56.76	61.11	1.92	10.80	-20.00	-17.62	-13.00	-4.62 1/3 MHz
PK	V	5964.000	62.45	63.65	1.92	10.91	-20.00	-14.36	-13.00	-1.36 1/3 MHz
AVG	V	5964.000	57.17	60.33	1.92	10.91	-20.00	-16.32	-13.00	-3.32 1/3 MHz
PK	H	7952.000	56.62	60.99	2.26	10.45	-20.00	-18.33	-13.00	-5.33 1/3 MHz
AVG	H	7952.000	51.34	58.57	2.26	10.45	-20.00	-21.19	-13.00	-8.19 1/3 MHz
PK	V	7952.000	53.12	61.33	2.26	10.45	-20.00	-22.17	-13.00	-9.17 1/3 MHz
AVG	V	7952.000	50.27	59.56	2.26	10.45	-20.00	-23.25	-13.00	-10.25 1/3 MHz
run_test_9.sh transmits GSM ARFCN 801 and CDMA at Channel 1139 @ 1.5 M EUT height										
PK	H	3976.000	63.56	68.32	1.57	10.51	-20.00	-17.97	-13.00	-4.97 1/3 MHz
AVG	H	3976.000	58.76	65.41	1.57	10.51	-20.00	-19.86	-13.00	-6.86 1/3 MHz
PK	V	3976.000	65.73	67.18	1.57	10.58	-20.00	-14.59	-13.00	-1.59 1/3 MHz
AVG	V	3976.000	59.72	65.56	1.57	10.58	-20.00	-18.98	-13.00	-5.98 1/3 MHz
PK	H	5964.000	61.65	63.60	1.92	10.80	-20.00	-15.22	-13.00	-2.22 1/3 MHz
AVG	H	5964.000	55.43	62.11	1.92	10.80	-20.00	-19.95	-13.00	-6.95 1/3 MHz
PK	V	5964.000	60.32	64.11	1.92	10.91	-20.00	-16.95	-13.00	-3.95 1/3 MHz
AVG	V	5964.000	55.87	61.30	1.92	10.91	-20.00	-18.59	-13.00	-5.59 1/3 MHz
PK	H	7952.000	55.23	61.58	2.26	10.45	-20.00	-20.31	-13.00	-7.31 1/3 MHz
AVG	H	7952.000	47.76	60.69	2.26	10.45	-20.00	-26.89	-13.00	-13.89 1/3 MHz
PK	V	7952.000	53.46	62.26	2.26	10.45	-20.00	-22.76	-13.00	-9.76 1/3 MHz
AVG	V	7952.000	45.34	60.50	2.26	10.45	-20.00	-29.12	-13.00	-16.12 1/3 MHz

Test Personnel: Vathana Ven
 Supervising/Reviewing: Naga Suryadevara
 Engineer: N/A
 (Where Applicable)
 Product Standard: CFR47 FCC Part 24 Subpart E, RSS-133
 Input Voltage: 120VAC 60Hz
 Pretest Verification w/
 Ambient Signals or
 BB Source: 30-1000 MHz (BB Source)
1-20 GHz (Ambient Signals)

Test Date: 06/07/2016
06/17/2016

Limit Applied: See Test Report Section 2.0
 Ambient Temperature: 23, 24 C
 Relative Humidity: 48, 54%
 Atmospheric Pressure: 998, 1008 mbars

Deviations, Additions, or Exclusions: None

12 Frequency Stability

12.1 Method

Tests are performed in accordance with FCC 2.1055, 24.235, RSS-133 Section 6.3.

TEST SITE: Safety Lab

12.2 Test Equipment Used:

Asset	Description	Manufacturer	Model	Serial	Cal Date	Cal Due
DAV001'	Weather Station	Davis Instruments	7400	PE80519A61	10/23/2015	10/23/2016
MET1'	Digital Multimeter	Meterman	15XP	050407785	05/09/2016	05/09/2017
ROS002'	9kHz to 3GHz EMI Test Receiver	Rohde & Schwartz	ESCI 1166.5950K0 3	100067	07/29/2016	07/29/2017
CBLSHF203'	Cable, SMA - SMA, 9kHz-40GHz, Cable Kit 4	Sucoflex (Huber Suhb)	104PE	CBLSHF203	09/08/2016	09/08/2017
WEI8'	Attenuator	Weinschel Corp	47-10-34	BD8309	03/30/2016	03/30/2017
WEI18'	20 dB, 50 Watt Attenuator DC-18GHz	Weinschel Corp	47-20-34	BP0570	03/30/2016	03/30/2017

Software Utilized:

Name	Manufacturer	Version
EMI Boxborough.xls	Intertek	08/27/2010

12.3 Results:

The sample tested was found to Comply. The carrier frequency shall not depart from the reference frequency, in excess of ± 2.5 ppm for mobile stations and ± 1.0 ppm for base stations. The device was evaluated to the 1 ppm limit.

12.4 Test Data:

Transmits CDMA at channel 61 (1933.05 MHz)

%	Voltage Volts	Frequency MHz	Deviation kHz	Limit kHz	Temp Celsius	Frequency MHz	Deviation kHz	Limit kHz
-15%	102	1933.1533	-0.9	1.93	-30	1933.153300	-0.3	1.93
-10%	108	1933.155300000	1.1	1.93	-20	1933.153400	-0.2	1.93
-5%	114	1933.153900000	-0.3	1.93	-10	1933.153100	-0.5	1.93
+0%	120	1933.154200000	0	1.93	0	1933.154200	0.6	1.93
+5%	126	1933.154600000	0.4	1.93	10	1933.152800	-0.8	1.93
+10%	132	1933.154900000	0.7	1.93	20	1933.153600	0	1.93
+15%	138	1933.153100000	-1.1	1.93	30	1933.153300	-0.3	1.93
					40	1933.153000	-0.6	1.93
					50	1933.154200	0.6	1.93

Transmits CDMA at channel 609 (1960.45 MHz)

%	Voltage Volts	Frequency MHz	Deviation kHz	Limit kHz	Temp Celsius	Frequency MHz	Deviation kHz	Limit kHz
-15%	102	1960.5032	0.2	1.96	-30	1960.502800	-0.3	1.96
-10%	108	1960.502600000	-0.4	1.96	-20	1960.503300	0.2	1.96
-5%	114	1960.503300000	0.3	1.96	-10	1960.502700	-0.4	1.96
+0%	120	1960.503000000	0	1.96	0	1960.502900	-0.2	1.96
+5%	126	1960.503900000	0.9	1.96	10	1960.502800	-0.3	1.96
+10%	132	1960.502700000	-0.3	1.96	20	1960.503100	0	1.96
+15%	138	1960.503000000	0	1.96	30	1960.503500	0.4	1.96
					40	1960.502900	-0.2	1.96
					50	1960.502700	-0.4	1.96

Transmits CDMA at channel 1139 (1986.95 MHz)

%	Voltage Volts	Frequency MHz	Deviation kHz	Limit kHz	Temp Celsius	Frequency MHz	Deviation kHz	Limit kHz
-15%	102	1986.0611	0.9	1.99	-30	1986.060900	-0.2	1.99
-10%	108	1986.061300000	1.1	1.99	-20	1986.060800	-0.3	1.99
-5%	114	1986.061700000	1.5	1.99	-10	1986.061500	0.4	1.99
+0%	120	1986.060200000	0	1.99	0	1986.061200	0.1	1.99
+5%	126	1986.060500000	0.3	1.99	10	1986.061300	0.2	1.99
+10%	132	1986.061000000	0.8	1.99	20	1986.061100	0	1.99
+15%	138	1986.061100000	0.9	1.99	30	1986.060900	-0.2	1.99
					40	1986.060700	-0.4	1.99
					50	1986.061000	-0.1	1.99

Transmits GSM at ARFCN 521 (1932.0) and CDMA at channel 61 (1933.05)

%	Voltage Volts	Frequency MHz	Deviation kHz	Limit kHz	Temp Celsius	Frequency MHz	Deviation kHz	Limit kHz
-15%	102	1933.0522	0.1	1.99	-30	1933.052200	0.5	1.99
-10%	108	1933.051700000	-0.4	1.99	-20	1933.051900	0.2	1.99
-5%	114	1933.052300000	0.2	1.99	-10	1933.051800	0.1	1.99
+0%	120	1933.052100000	0	1.99	0	1933.051900	0.2	1.99
+5%	126	1933.052400000	0.3	1.99	10	1933.051700	0	1.99
+10%	132	1933.051900000	-0.2	1.99	20	1933.051700	0	1.99
+15%	138	1933.052000000	-0.1	1.99	30	1933.051900	0.2	1.99
					40	1933.052000	0.3	1.99
					50	1933.052100	0.4	1.99

Transmits GSM at ARFCN 658(1959.4 MHz) and CDMA at channel 609(1960.45 MHz)

%	Voltage Volts	Frequency MHz	Deviation kHz	Limit kHz		Temp Celsius	Frequency MHz	Deviation kHz	Limit kHz
-15%	102	1959.792	0.1	1.99		-30	1959.791800	-0.4	1.99
-10%	108	1959.792100000	0.2	1.99		-20	1959.792000	-0.2	1.99
-5%	114	1959.792300000	0.4	1.99		-10	1959.792300	0.1	1.99
+0%	120	1959.791900000	0	1.99		0	1959.792200	0	1.99
+5%	126	1959.792000000	0.1	1.99		10	1959.792400	0.2	1.99
+10%	132	1959.792100000	0.2	1.99		20	1959.792200	0	1.99
+15%	138	1959.792100000	0.2	1.99		30	1959.791900	-0.3	1.99
						40	1959.791700	-0.5	1.99
						50	1959.792100	-0.1	1.99

Transmits GSM at ARFCN 801 (1988.0 MHz) and CDMA at channel 1139 (1986.95 MHz)

%	Voltage Volts	Frequency MHz	Deviation kHz	Limit kHz		Temp Celsius	Frequency MHz	Deviation kHz	Limit kHz
-15%	102	1987.9661	0.3	1.99		-30	1987.966300	-0.7	1.99
-10%	108	1987.966900000	1.1	1.99		-20	1987.966600	-0.4	1.99
-5%	114	1987.966500000	0.7	1.99		-10	1987.967200	0.2	1.99
+0%	120	1987.965800000	0	1.99		0	1987.967000	0	1.99
+5%	126	1987.966400000	0.6	1.99		10	1987.966100	-0.9	1.99
+10%	132	1987.966200000	0.4	1.99		20	1987.967000	0	1.99
+15%	138	1987.966500000	0.7	1.99		30	1987.967300	0.3	1.99
						40	1987.967700	0.7	1.99
						50	1987.967200	0.2	1.99

Test Personnel: Naga Suryadevara N5
Supervising/Reviewing Engineer:
(Where Applicable) N/A
Product Standard: CFR47 FCC Part 24 Subpart E, RSS-133
Input Voltage: 120VAC 60Hz
Pretest Verification w/ Ambient Signals or BB Source: N/A

Test Date: 06/21/2016

Limit Applied: See Test Report Section 2.0

Ambient Temperature: 22 C

Relative Humidity: 54%

Atmospheric Pressure: 1008 mbars

Deviations, Additions, or Exclusions: None

13 AC Mains Conducted Emissions

13.1 Method

Tests are performed in accordance with Configuration as required CFR Part 15 Subpart B, ICES 003 and ANSI C 63.40.

TEST SITE: EMC Lab

The EMC Lab has one Semi-anechoic Chamber and one Shielded Chamber. AC Mains Power is available at 120, 230, and 277 Single Phase; 208, 400, and 480 3-Phase. Large reference ground-planes are installed in the general lab area to facilitate EMC work not requiring a shielded environment.

The 10m ALSE is 13m (Length) x 21m (Depth) x 10m (Height) with the effective size in terms of space from the tips of the absorber is 12m (Length) x 20m (Depth) x 8.5m (Height). This chamber achieves broadband performance using a unique arrangement of hybrid and ferrite tile absorber. This chamber has a built in 3m diameter turntable (Embedded type). The metal structure of the table makes electrical connection around the entire circumference of the turntable to the ground plane with a metal brush type connection. A Styrofoam table 80 cm high is used for table-top equipment.

Measurement Uncertainty

Measurement	Frequency Range	Expanded Uncertainty (k=2)	Ucisp
AC Line Conducted Emissions	150 kHz - 30 MHz	2.8dB	3.4dB
Telco Port Emissions	150 kHz - 30 MHz	3.2dB	5.0dB

As shown in the table above our conducted emissions U_{lab} is less than the corresponding U_{CISPR} reference value in CISPR 16-4-2 Table 1, hence the compliance of the product is only based on the measured value, and no measurement uncertainty correction is required, based on CISPR 22 and CISPR 11 (for 2006 and later revisions) Clause 11.

Sample Calculations

The following is how net line-conducted readings were determined:

$$NF = RF + LF + CF + AF$$

Where NF = Net Reading in dB μ V

RF = Reading from receiver in dB μ V

LF = LISN or ISN Correction Factor in dB

CF = Cable Correction Factor in dB

AF = Attenuator Loss Factor in dB

To convert from dB μ V to μ V or mV the following was used:

$$UF = 10^{(NF / 20)} \text{ where } UF = \text{Net Reading in } \mu\text{V}$$

NF = Net Reading in dB μ V

Example:

$$NF = RF + LF + CF + AF = 28.5 + 0.2 + 0.4 + 20.0 = 49.1 \text{ dB}\mu\text{V}$$

$$UF = 10^{(49.1 \text{ dB}\mu\text{V} / 20)} = 285.1 \mu\text{V/m}$$

Alternately, when C5 Software is used, the "Level" includes all losses and gains and is compared directly in the "Margin" column to the "Limit". "TF" is the Transducer Factor; in this case LISN or ISN loss.

13.2 Test Equipment Used:

Asset	Description	Manufacturer	Model	Serial	Cal Date	Cal Due
DAV001'	Weather Station	Davis Instruments	7400	PE80519A61	10/23/2015	10/23/2016
ROS002'	9kHz to 3GHz EMI Test Receiver	Rohde & Schwartz	ESCI 1166.5950K0 3	100067	07/23/2015	07/23/2016
MET1'	Digital Multimeter	Meterman	15XP	050407785	05/09/2016	05/09/2017
LISN31'	LISN - CISPR16 Compliant 9kHz-30MHz	Com-Power	LI-215A	191957	03/14/2016	03/14/2017
LISN33'	LISN - CISPR16 Compliant 9kHz-30MHz	Com-Power	LI-215A	191953	03/14/2016	03/14/2017
DS23A'	Attenuator, 20Db	Mini Circuits	20dB, 50 ohm	DS23A	10/15/2015	10/15/2016
CBLBNC2 012-3'	50 Ohm Coaxial Cable	Pomona	RG58C/U	CBLBNC2012 -3	02/26/2016	02/26/2017
DS23A'	Attenuator, 20dB	Mini Circuits	20dB, 50 ohm	DS23A	10/15/2015	10/15/2016

Software Utilized:

Name	Manufacturer	Version
Compliance5	Teseq	5.26.46.46

13.3 Results:

The sample tested was found to Comply.

13.4 Plots/Data:

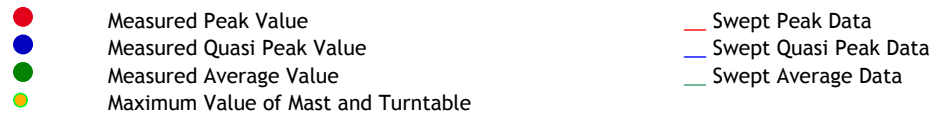
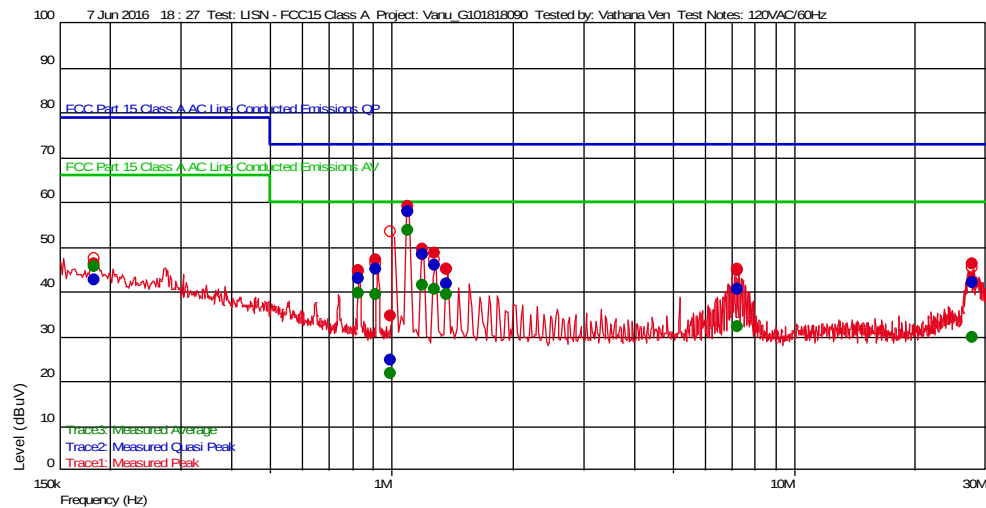
Operating @ 120 VAC 60 Hz – Rx Mode

Test Information

Test Details
 Test: User Entry
 Project: LISN - FCC15 Class A
 Test Notes: Vanu_G101818090
 Temperature: 120VAC/60Hz, Rx mode
 Humidity: 24 deg C
 Tested by: 42%, 985 mB
 Test Started: Vathana Ven
 7 Jun 2016 18 : 27

Additional Information

Prescan Emission Graph



Emissions Test Data

Trace2: Measured Quasi Peak

Frequency(Hz)	Level(dBuV)	TF	PA+CL	Limit(dBuV)	Margin(dBuV)	RBW(Hz)	Comment	LINE
1.0 M	24.54	0.010	20.264	73.000	-48.46	9 k		N
184.068136273 k	42.46	0.036	20.210	79.000	-36.54	9 k		L1
7.276553106 M	40.54	0.020	20.020	73.000	-32.46	9 k		N
1.378757515 M	41.74	0.014	20.249	73.000	-31.26	9 k		N
27.835671343 M	41.97	0.054	20.638	73.000	-31.03	9 k		L1
829.659318637 k	42.86	0.010	20.254	73.000	-30.14	9 k		N
919.93987976 k	44.92	0.010	20.260	73.000	-28.08	9 k		N
1.288577154 M	45.90	0.013	20.252	73.000	-27.10	9 k		N
1.198396794 M	48.07	0.012	20.256	73.000	-24.93	9 k		N
1.108216433 M	57.74	0.011	20.259	73.000	-15.26	9 k		N

Trace3: Measured Average

Frequency(Hz)	Level(dBuV)	TF	PA+CL	Limit(dBuV)	Margin(dBuV)	RBW(Hz)	Comment	LINE
1.0 M	21.56	0.010	20.264	60.000	-38.44	9 k		N
27.835671343 M	29.77	0.054	20.638	60.000	-30.23	9 k		L1
7.276553106 M	31.98	0.020	20.020	60.000	-28.02	9 k		N
919.93987976 k	39.21	0.010	20.260	60.000	-20.79	9 k		N
1.378757515 M	39.26	0.014	20.249	60.000	-20.74	9 k		N
184.068136273 k	45.39	0.036	20.210	66.000	-20.61	9 k		L1
829.659318637 k	39.56	0.010	20.254	60.000	-20.44	9 k		N
1.288577154 M	40.32	0.013	20.252	60.000	-19.68	9 k		N
1.198396794 M	41.47	0.012	20.256	60.000	-18.53	9 k		N
1.108216433 M	53.67	0.011	20.259	60.000	-6.33	9 k		N

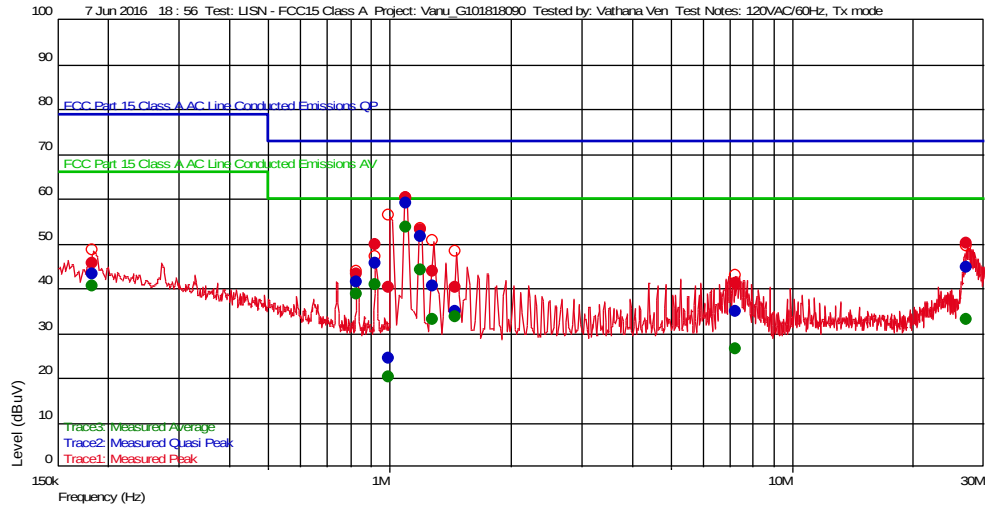
Operating @ 120 VAC 60 Hz –Tx Mode

Test Information

Test Details
 Test: LISN - FCC15 Class A
 Project: Vanu_G101818090
 Test Notes: 120VAC/60Hz, Tx mode
 Temperature: 24 deg C
 Humidity: 42%, 985 mB
 Tested by: Vathana Ven
 Test Started: 7 Jun 2016 18 : 56

Additional Information

Prescan Emission Graph



- Measured Peak Value
- Measured Quasi Peak Value
- Measured Average Value
- Maximum Value of Mast and Turntable
- Swept Peak Data
- Swept Quasi Peak Data
- Swept Average Data

Emissions Test Data

Trace2: Measured Quasi Peak

Frequency(Hz)	Level(dBuV)	TF	PA+CL	Limit(dBuV)	Margin(dBuV)	RBW(Hz)	Comment	LINE
1.0 M	24.25	0.010	20.264	73.000	-48.75	9 k		N
1.468937876 M	34.69	0.015	20.245	73.000	-38.31	9 k		N
7.294589178 M	34.90	0.020	20.019	73.000	-38.10	9 k		N
184.068136273 k	43.18	0.036	20.210	79.000	-35.82	9 k		L1
1.288577154 M	40.41	0.013	20.252	73.000	-32.59	9 k		N
831.362725451 k	41.31	0.010	20.255	73.000	-31.69	9 k		N
27.354709419 M	44.59	0.052	20.619	73.000	-28.41	9 k		L1
923.346693387 k	45.46	0.010	20.260	73.000	-27.54	9 k		N
1.198396794 M	51.45	0.012	20.256	73.000	-21.55	9 k		N
1.108216433 M	58.84	0.011	20.259	73.000	-14.16	9 k		N

Trace3: Measured Average

Frequency(Hz)	Level(dBuV)	TF	PA+CL	Limit(dBuV)	Margin(dBuV)	RBW(Hz)	Comment	LINE
1.0 M	20.28	0.010	20.264	60.000	-39.72	9 k		N
7.294589178 M	26.30	0.020	20.019	60.000	-33.70	9 k		N
27.354709419 M	32.95	0.052	20.619	60.000	-27.05	9 k		L1
1.288577154 M	33.08	0.013	20.252	60.000	-26.92	9 k		N
1.468937876 M	33.49	0.015	20.245	60.000	-26.51	9 k		N
184.068136273 k	40.39	0.036	20.210	66.000	-25.61	9 k		L1
831.362725451 k	38.78	0.010	20.255	60.000	-21.22	9 k		N
923.346693387 k	40.81	0.010	20.260	60.000	-19.19	9 k		N
1.198396794 M	43.95	0.012	20.256	60.000	-16.05	9 k		N
1.108216433 M	53.53	0.011	20.259	60.000	-6.47	9 k		N

Test Personnel: Vathana Ven *VSV*
Supervising/Reviewing
Engineer:
(Where Applicable) N/A

Test Date: 06/07/2016

Product Standard: FCC Part15 Subpart B
ICES 003

Limit Applied: All Class A

Input Voltage: 120VAC 60Hz
Pretest Verification w/
Ambient Signals or
BB Source: Yes

Ambient Temperature: 24 °C

Relative Humidity: 42 %

Atmospheric Pressure: 985 mbars

Deviations, Additions, or Exclusions: None

14 Revision History

Revision Level	Date	Report Number	Prepared By	Reviewed By	Notes
0	03/29/2016	102578989BOX-001	N.S	KPS <i>KPS</i>	Original Issue
1	12/27/2017	102578989BOX-001	N.S	KPS <i>KPS</i>	Corrected Output power in section 4.0 Radio receiver characteristics and updated test equipment table in section 10.2.