

KTL Test Report: 9L0114R

Applicant: Conifer Corporation

**Equipment Under Test:
(E.U.T.)** TR2278 Signal Transverter

FCC ID: CI32278

In Accordance With: **FCC PART 21, Subpart K,
FCC PART 74**
Multipoint Distribution Service

Tested By: KTL Dallas Inc.
802 N. Kealy
Lewisville, Texas 75057-3136

Authorized By: 
Tom Tidwell, RF Group Manager

Date: 8/31/99

Total Number of Pages: 1

EQUIPMENT: TR2278 Transverter
FCC ID: CI32278

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EQUIPMENT: TR2278 Transverter
FCC ID: CI32278

Section 1. Summary of Test Results

Manufacturer: Conifer Corporation

Model No.: TR2278

Serial No.: NONE

General: **All measurements are traceable to national standards.**

These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with FCC Part 21, Subpart K and Part 74.



New Submission



Production Unit



Class II Permissive Change



Pre-Production Unit

THIS TEST REPORT RELATES ONLY TO THE ITEM(S) TESTED.

THE FOLLOWING DEVIATIONS FROM, ADDITIONS TO, OR EXCLUSIONS FROM THE TEST SPECIFICATIONS HAVE BEEN MADE.

See " Summary of Test Data".



NVLAP LAB CODE: 100426-0

TESTED BY: Tom Tidwell

DATE: 11 – 15 August, 1999

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This report applies only to the items tested.

EQUIPMENT: TR2278 Transverter
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Summary Of Test Data

NAME OF TEST	PARA. NO.	SPEC.	MEAS.	RESULT
RF Power Output	2.1046	33dBW EIRP	+18 dBW	Complies
Occupied Bandwidth	2.1049	21.908 (b) Mask	Plots 1 - 47	Complies
Spurious Emissions @ Antenna Terminals	2.1051	-60 dBc	Plots 48 - 65	Complies
Field Strength of Spurious Radiation	2.1053	-60 dBc	-63 dBc	Complies
Frequency Stability	2.1055	± 1 kHz	N/A	N/A

Footnotes:

Frequency stability was not measured since the EUT uses a common oscillator for frequency conversion which oscillator is synchronized to the GPS timing signal.

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Section 2. General Equipment Specification

Max. Power Input:	QPSK	+10 dBm
	16 QAM	+7 dBm
Frequency Range:	2150 – 2162 MHz MDS band	
Type(s) of Modulation:	F3E (Voice)	F1D
	☐	☐
	F2D	☐
	D7W (QAM)	☒
	G7W (QPSK)	☒
Emission Designator:	QPSK	100KG7W, 200KG7W, 400KG7W, 640KG7W, 800KG7W, 1M60G7W, 1M93G7W, 2M10G7W
	16QAM	200KD7W, 400KD7W, 800KD7W, 1M60D7W, 3M20D7W
Output Impedance:	50 ohms	
Gain:	20 dB (fixed)	
RF Power Output Rated:	Per Carrier:	+27 dBm nominal (QPSK), +24 dBm nominal(16QAM)
	Composite:	Not Applicable
Duty Cycle:	Continuous	
Channel Spacing:	N/A	
Operator Selection Of Operating Frequency:	Not selectable by user	
Power Output Adjustment Capability:	Not adjustable by user.	
Description of Modulation(s):	QPSK	Data Source: Pseudo-random bit source Symbol rate: Variable Filter: COS/0.25 Coding: None
	16QAM	Data Source: Pseudo-random bit source Symbol rate: Variable Filter: COS/0.25 Coding: None

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QPSK Modulation			
Symbol Rate (ksps)	Useable Bandwidth (kHz)	Maximum Input Level (dBm)	RF Output (dBm)
128	100	+10	+27.0
160	200	+10	+27.0
320	400	+9	+26.4
512	640	+9	+27.0
640	800	+9	+27.0
1280	1600	+9	+27.0
1544	1930	+9	+27.0
2048	2100	+8	+26.0
2560	3200	+8	+26.0

16QAM			
Symbol Rate (ksps)	Useable Bandwidth (kHz)	Maximum Input Level (dBm)	RF Output (dBm)
160	200	+7	+24.0
320	400	+6	+23.5
640	800	+6	+23.5
1280	1600	+6	+23.5
2560	3200	+6	+23.5

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Description of Modifications For Class II Permissive Change

Not Applicable

KTL Dallas

FCC PART 21, SUBPART K
MULTIPOINT DISTRIBUTION SERVICE
PROJECT NO.: 9L0114R

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Modifications Made During Testing

Not Applicable

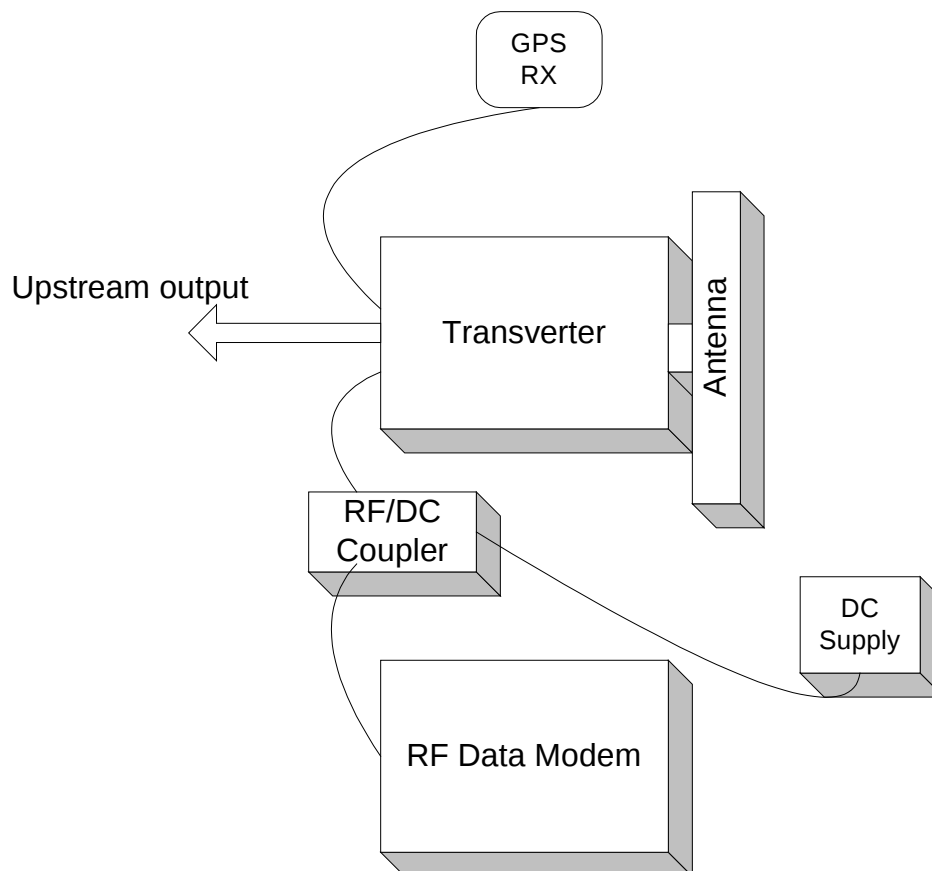
EQUIPMENT: TR2278 Transverter
FCC ID: CI32278

Theory Of Operation

The EUT is a frequency converter/amplifier that operates over the 2150 – 2162 MHz MDS band. The system uses one TR2278 for each transmitted channel. A 15 dBi gain panel antenna or a 21 dBi gain sub reflector antenna is connected to the rf output. With a maximum of +27 dBm at the antenna output terminal, the maximum EIRP with 21 dBi antenna gain is +18 dBW. The upstream is directly connected to the head end equipment via 75 ohm coaxial cable.

The system uses a common oscillator, synchronized with the GPS timing signal, to convert the downstream signal from the 27 – 39 MHz band to the 2150 – 2162 MHz band. Since a common oscillator is used, the frequency drift is dependent upon the stability of the input signal.

System Diagram



EQUIPMENT: TR2278 Transverter
FCC ID: CI32278

Section 3. RF Power Output

NAME OF TEST: RF Power Output	PARA. NO.: 2.1046
TESTED BY: Tom Tidwell	DATE: 11,12 August 1999

Test Results: Complies.**Measurement Data:**

Maximum Power Output @ Antenna (dBm)	Maximum Power Output @ Antenna (dBW)	Antenna Gain (dBi)	EIRP (dBW)
+27	-3	15	+12

Test Equipment Used: 1,4,5,7,,8,14,21,22**Environmental Conditions:** 22 °Celsius
42 % RH

EQUIPMENT: TR2278 Transverter
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Section 4. Occupied Bandwidth

NAME OF TEST: Occupied Bandwidth	PARA. NO.: 2.1049
TESTED BY: Tom Tidwell	DATE: 11, 12 August 1999

Test Results: Complies.

Measurement Data: See attached plots.

NOTE: The equipment tested is intended for single channel operation. There are two modulation types: QPSK and 16 QAM. Within an assigned 6 MHz channel the user may use multiple Transverter units to fill the 6 MHz channel assignment. The lowest and highest channels are centered at a frequency removed from the lower or upper 6 MHz channel edge by a displacement of $f_d = \text{Useable BW}/2 + 20 \text{ kHz}$. The useable BW is taken from the chart reproduced on page 6 of this report.

For Example:

Using QPSK modulation with a symbol rate of 128 ksps:

Useable BW = 100 kHz

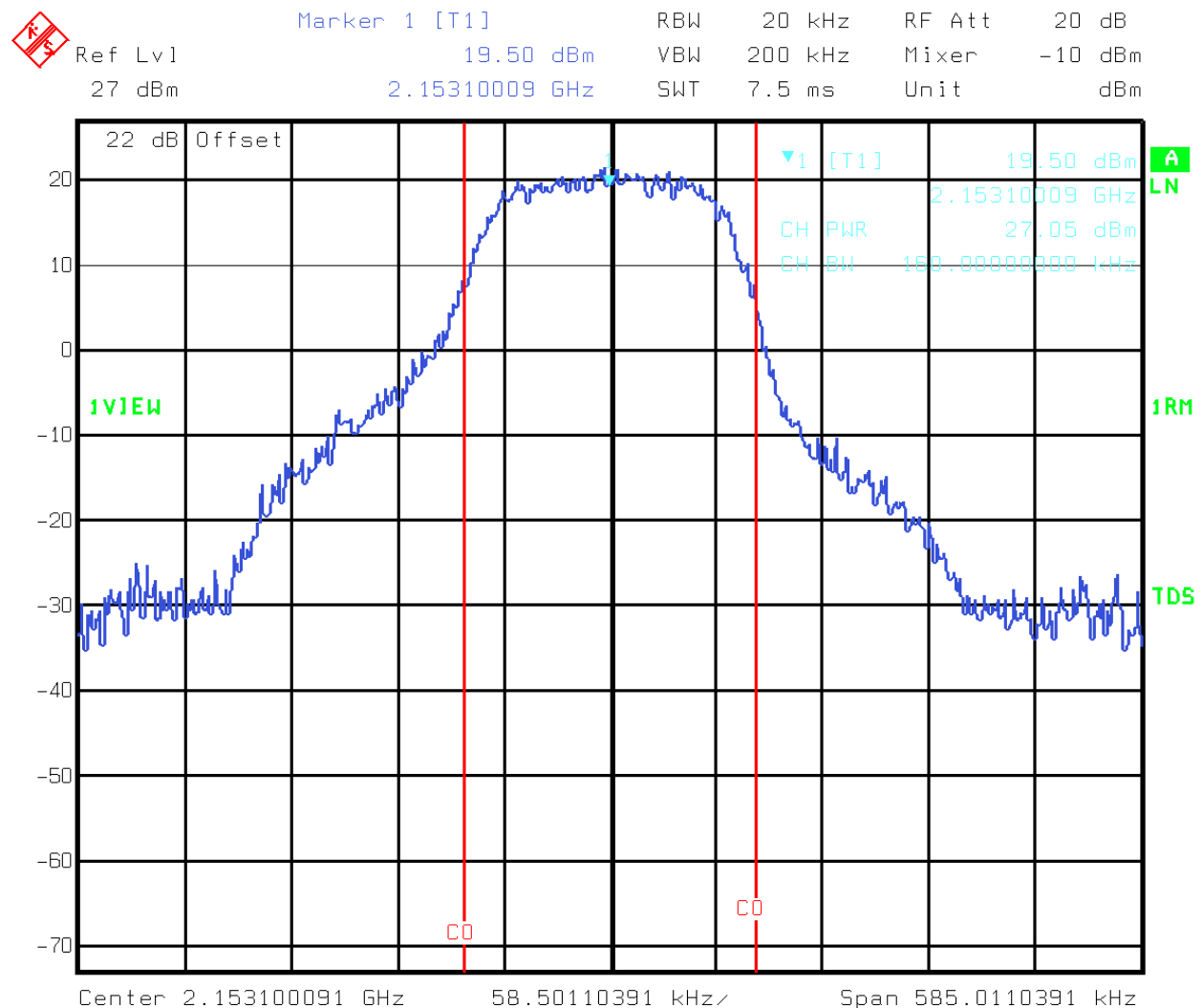
$f_d = 100\text{kHz}/2 + 20 \text{ kHz} = 70 \text{ kHz}$.

Therefore in the 6 MHz channel centered on 2156 MHz, the lowest useable channel would be centered on $2153 \text{ MHz} + 70 \text{ kHz} = 2153.07 \text{ MHz}$. The highest useable channel would be centered on $2159 \text{ MHz} - 70 \text{ kHz} = 2158.93 \text{ MHz}$.

Test Equipment Used: 1,4,5,14,21,22

Environmental Conditions: 22 °Celsius
42 % RH

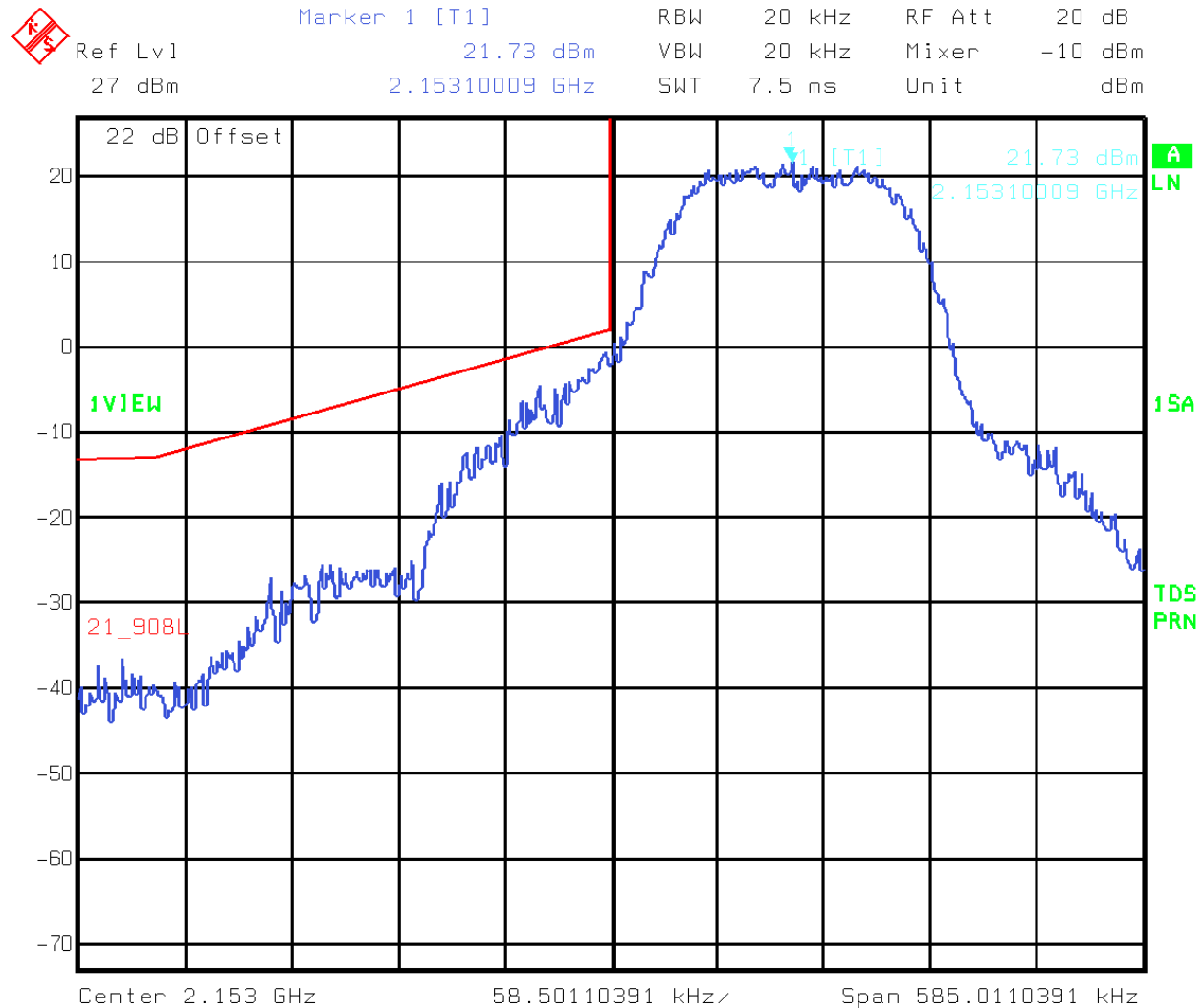
EQUIPMENT: TR2278 Transverter
FCC ID: CI32278



Title: Average Channel Power
Comment A: 35.9133 MHz Input, 2153.100 MHz Output
Date: 11.AUG.1999 13:08:50

Plot 1 – QPSK modulation, 128 ksps

EQUIPMENT: TR2278 Transverter
FCC ID: CI32278

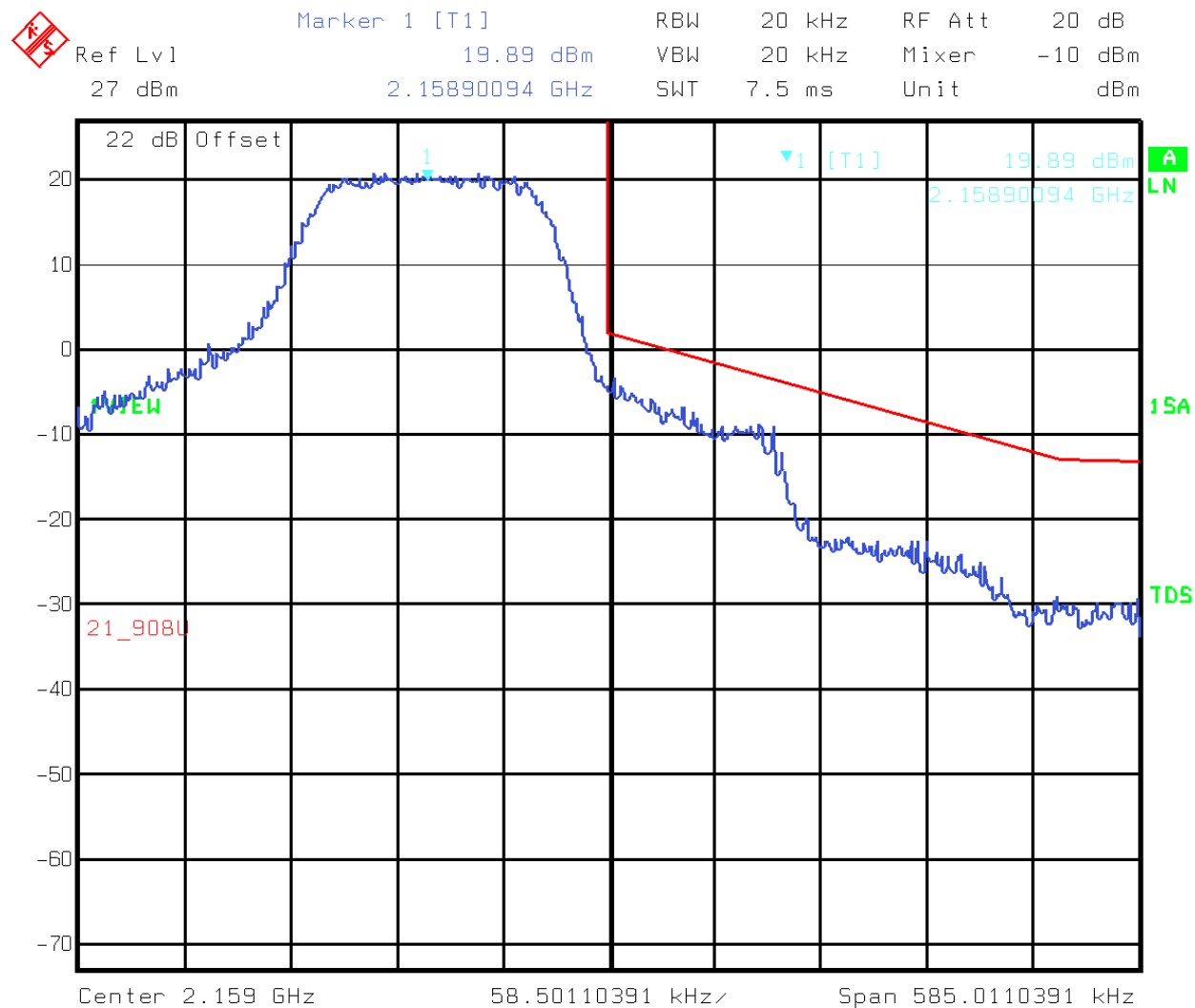


Title: Lower Edge of 6 MHz Channel

Date: 11.AUG.1999 13:13:38

Plot 2- QPSK modulation, 128 ksps

EQUIPMENT: TR2278 Transverter
FCC ID: CI32278

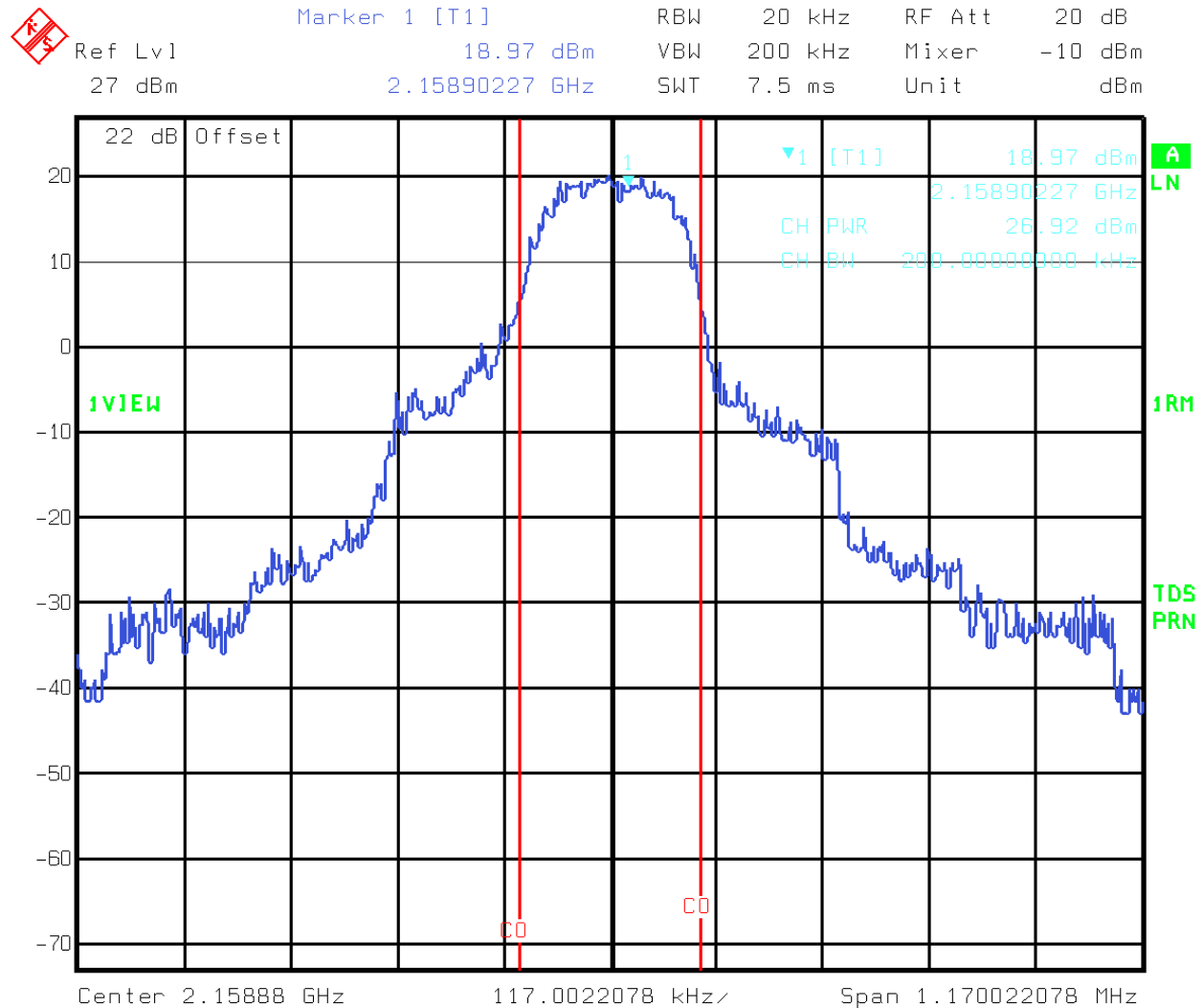


Title: Upper Edge of 6 MHz Channel

Date: 11.AUG.1999 14:42:23

Plot 3 – QPSK modulation, 128 ksps

EQUIPMENT: TR2278 Transverter
FCC ID: CI32278

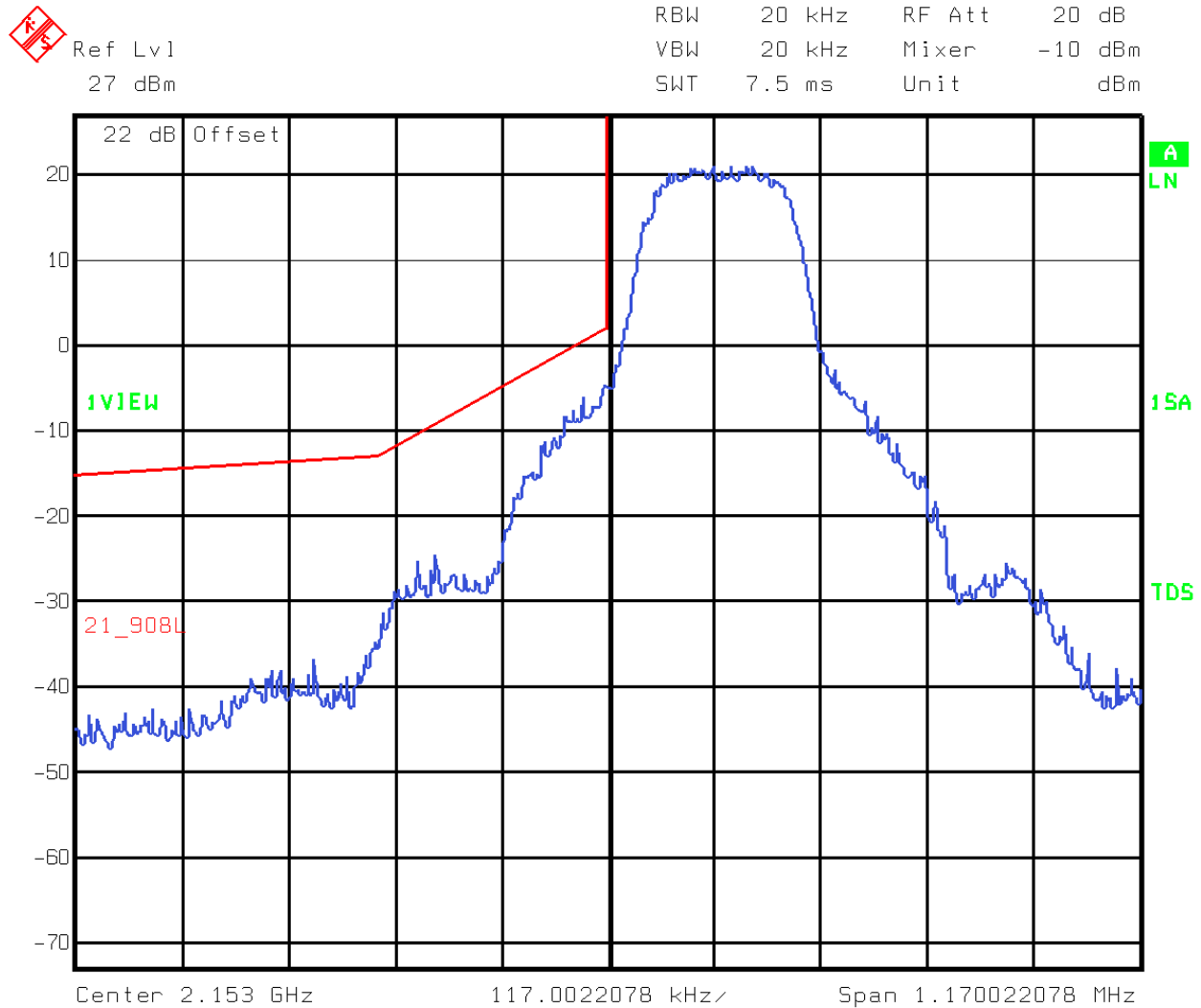


Title: Average Channel Power

Date: 11.AUG.1999 14:59:21

Plot 4 -- QPSK modulation, 160 ksps

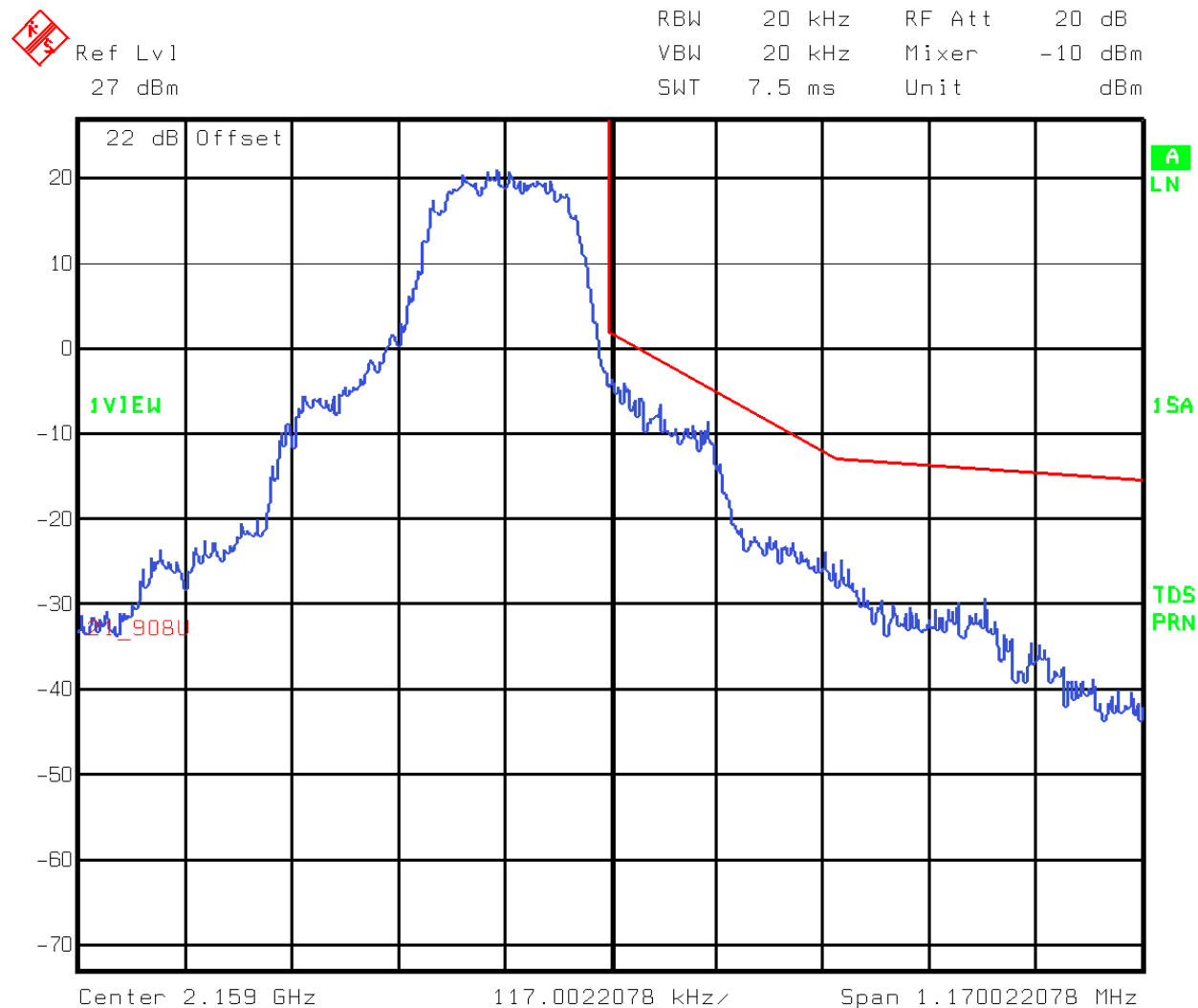
EQUIPMENT: TR2278 Transverter
FCC ID: CI32278



Title: Lower Edge of 6 MHz Channel
Comment A: 160 kbps
Date: 12.AUG.1999 9:49:14

Plot 5 -- QPSK modulation, 160 kbps

EQUIPMENT: TR2278 Transverter
FCC ID: CI32278

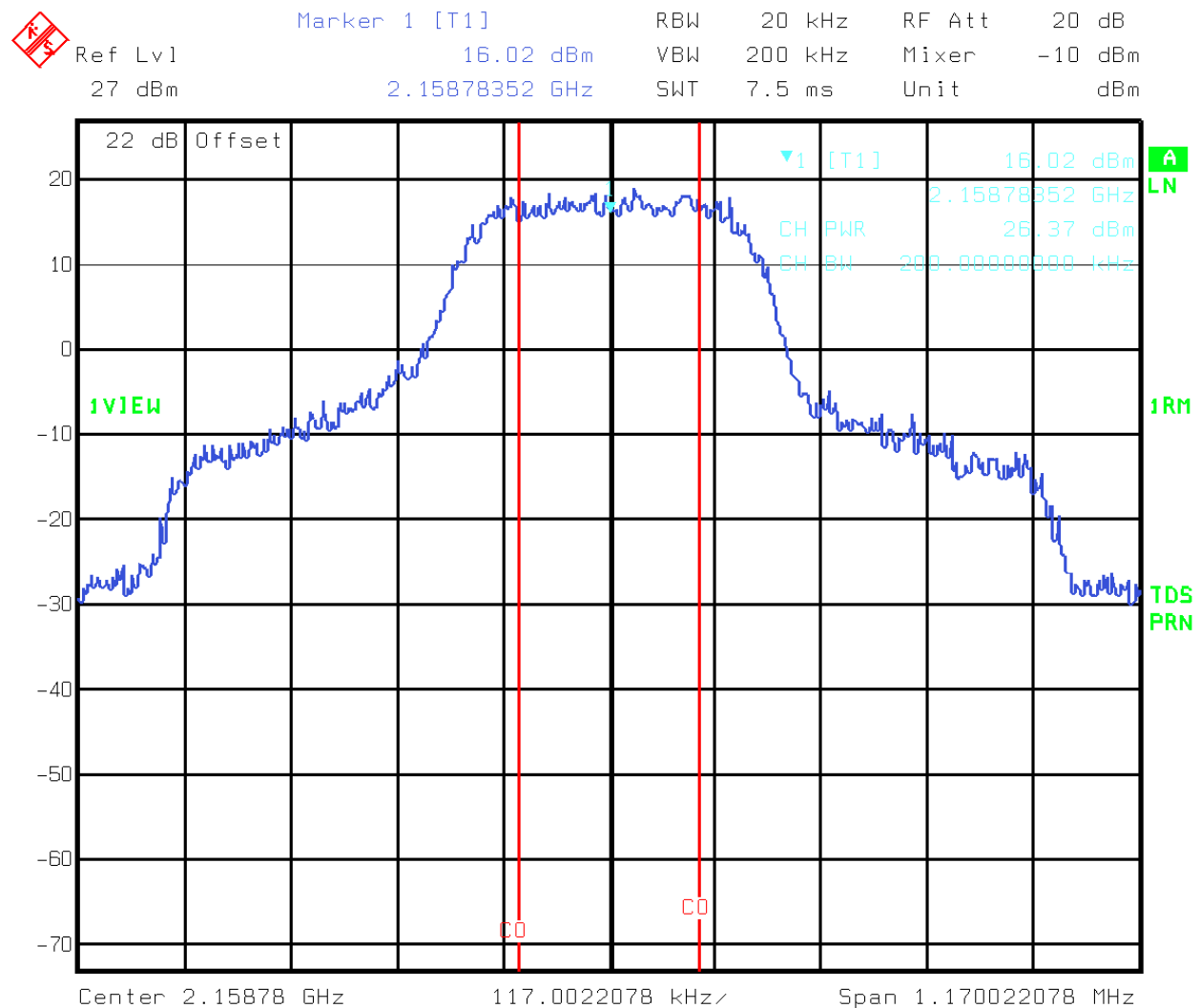


Title: Upper Edge of 6 MHz Channel

Date: 11.AUG.1999 15:00:38

Plot 6 -- QPSK modulation, 160 ksps

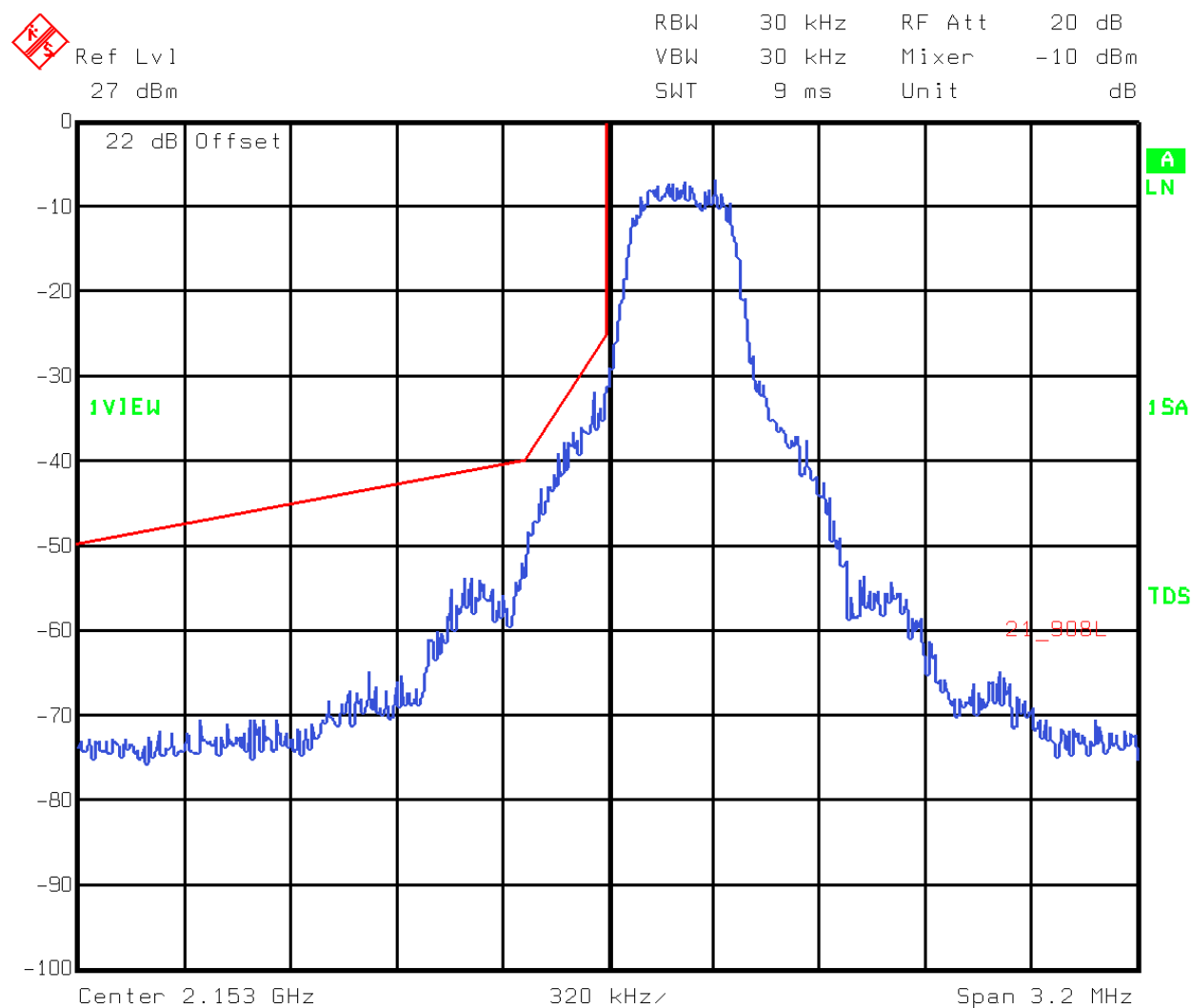
EQUIPMENT: TR2278 Transverter
FCC ID: CI32278



Title: Average Channel Power
Date: 11.AUG.1999 15:37:56

Plot 7 - QPSK modulation, 320 kbps

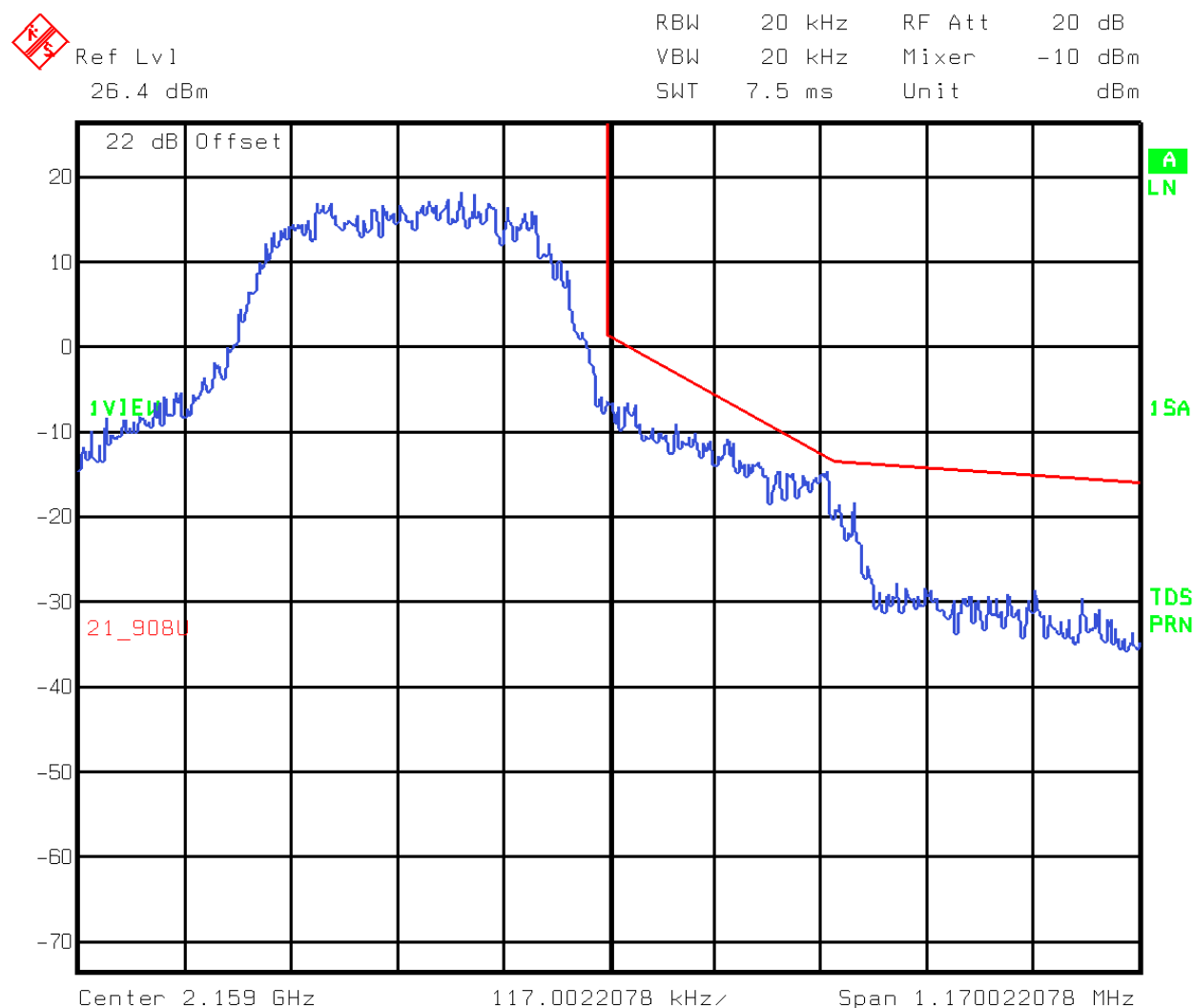
EQUIPMENT: TR2278 Transverter
FCC ID: CI32278



Title: Lower Edge of 6 MHz Channel
Comment A: 320 kbps
Date: 12.AUG.1999 9:42:17

Plot 8 – QPSK Modulation, 320 kbps

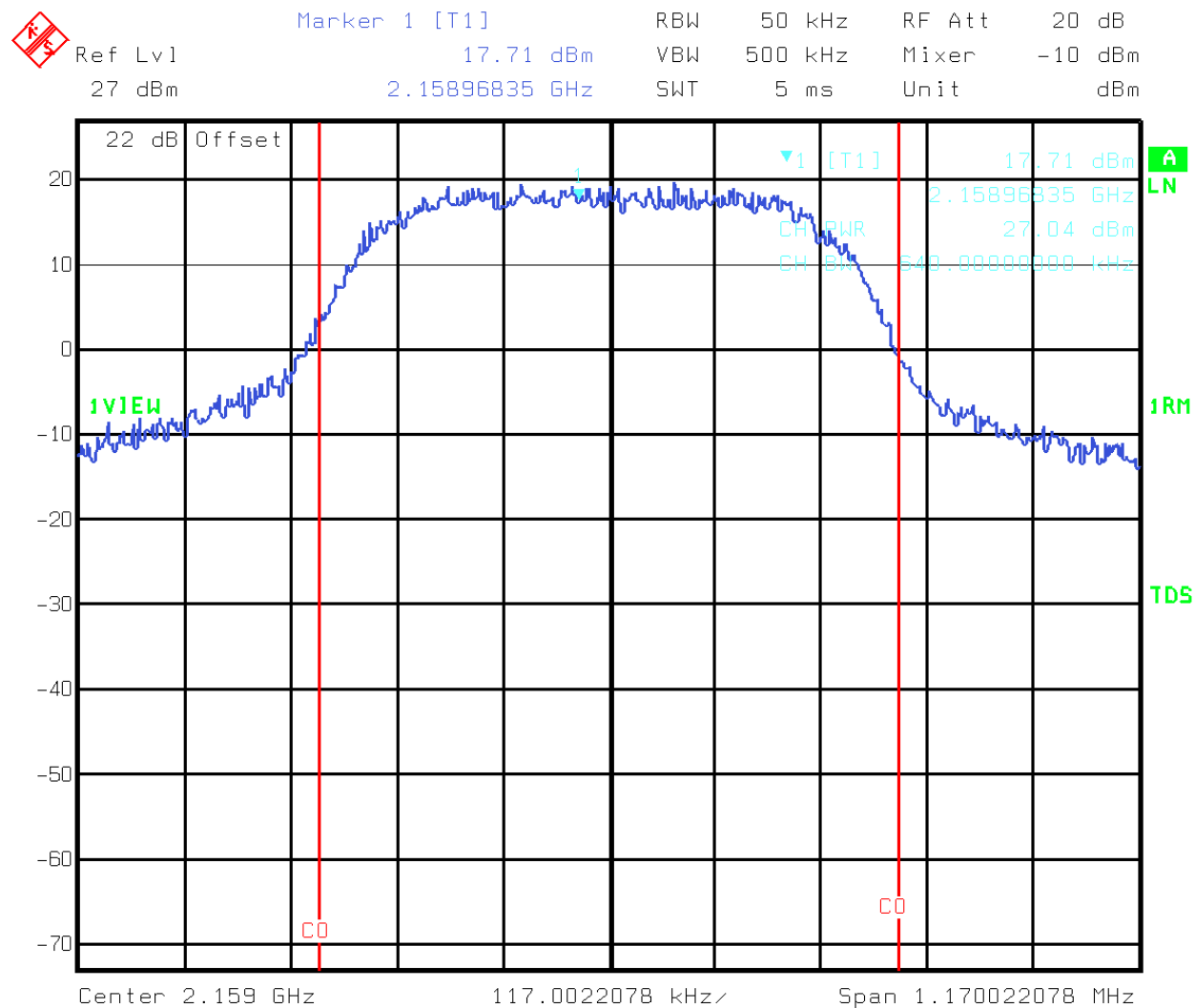
EQUIPMENT: TR2278 Transverter
FCC ID: CI32278



Title: Upper Band Edge
Comment A: 320 KSPS
Date: 11.AUG.1999 15:44:20

Plot 9 – QPSK Modulation, 320 kbps

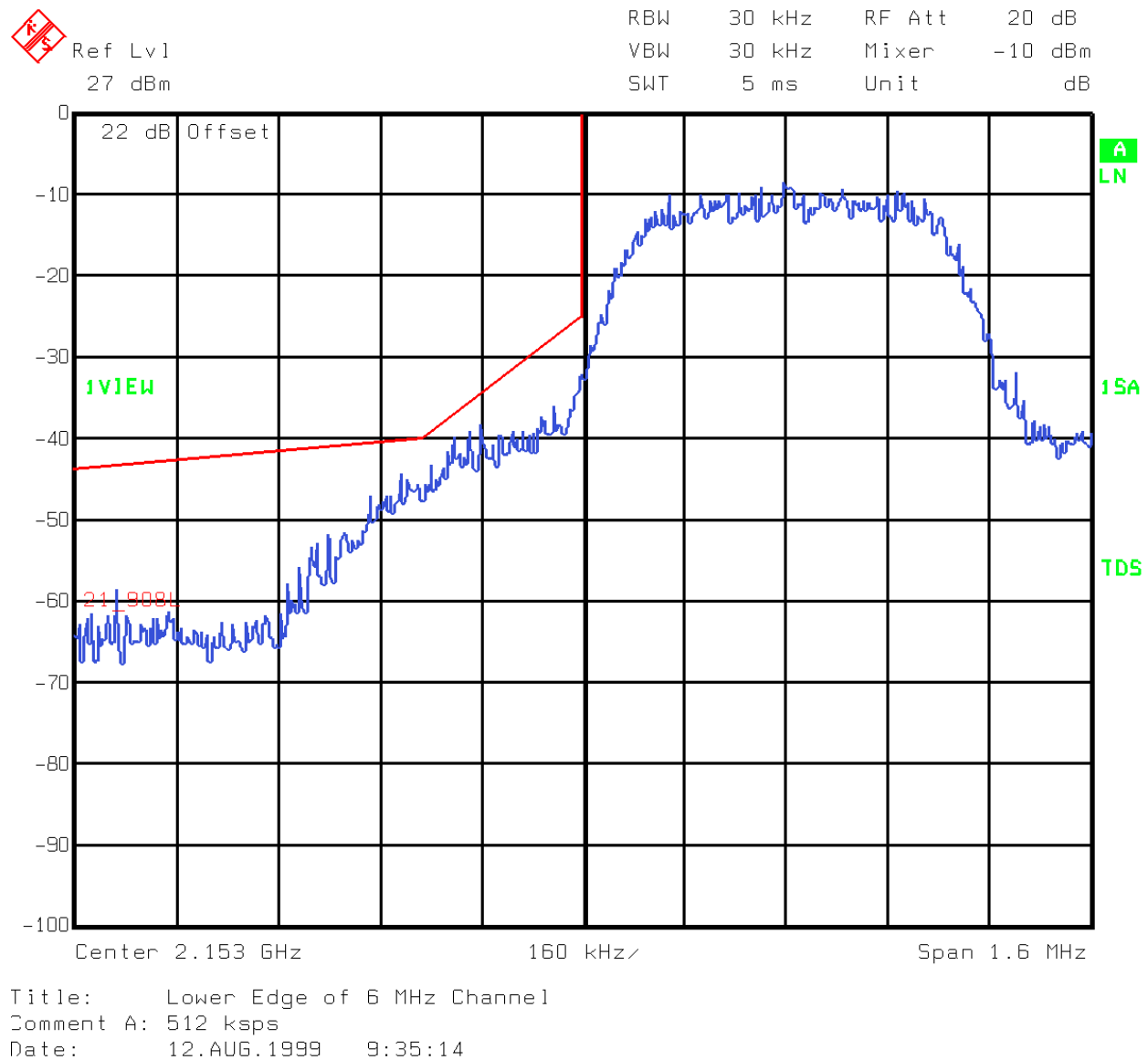
EQUIPMENT: TR2278 Transverter
FCC ID: CI32278



Title: Channel Power
Comment A: 512 KSPS
Date: 11.AUG.1999 15:57:34

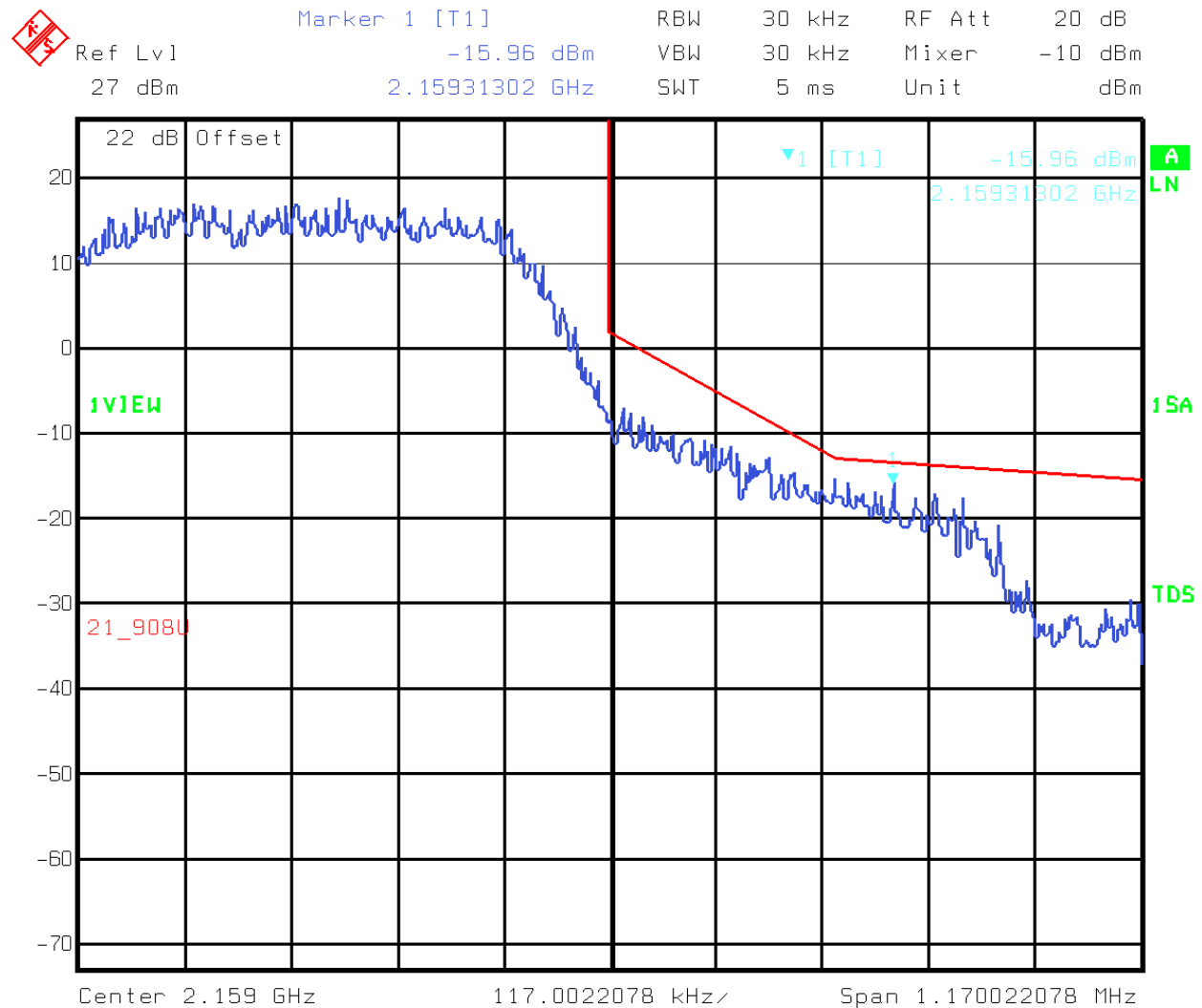
Plot 10 – QPSK Modulation, 512 kbps

EQUIPMENT: TR2278 Transverter
FCC ID: CI32278



Plot 11 – QPSK Modulation, 512 kbps

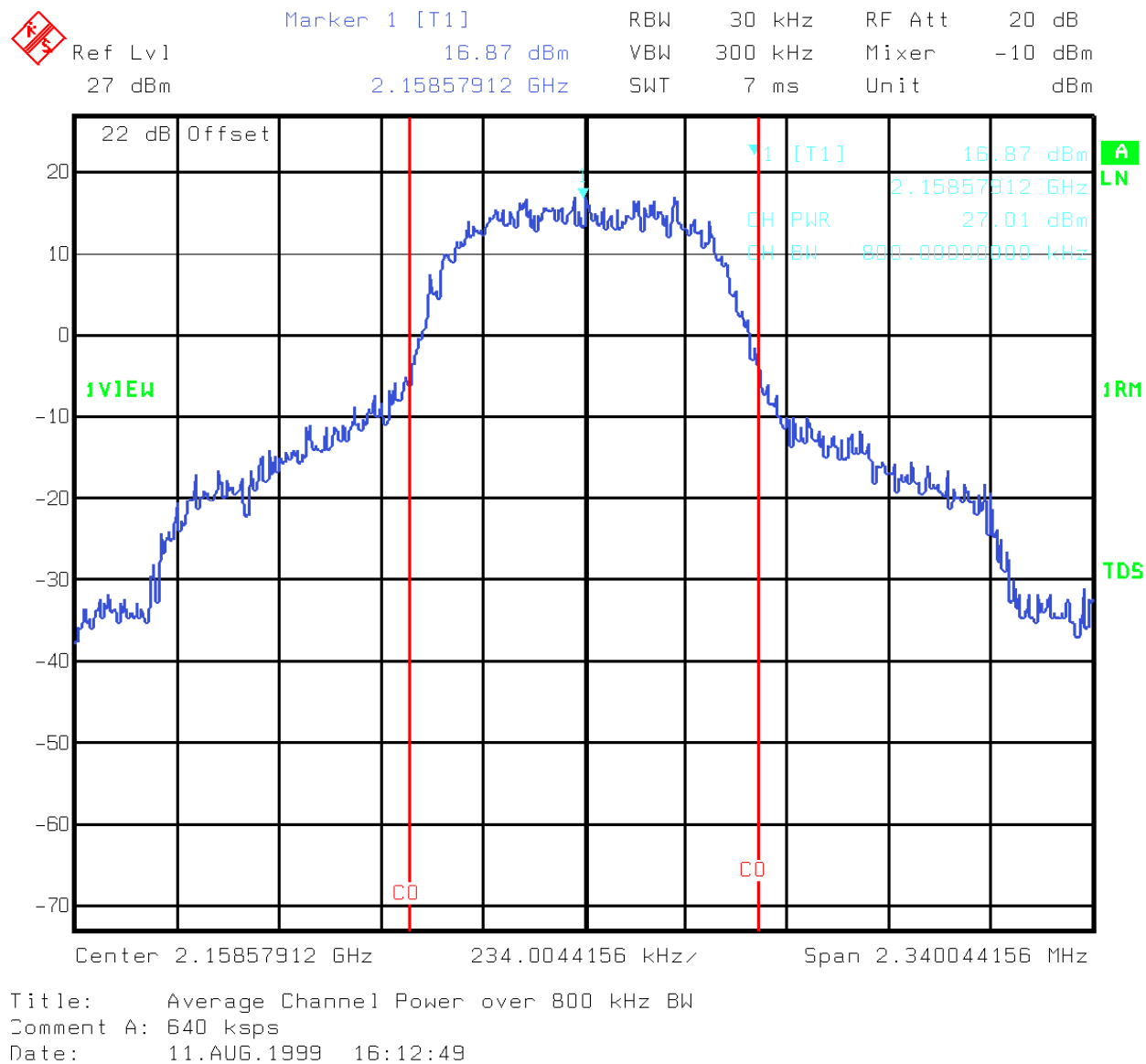
EQUIPMENT: TR2278 Transverter
FCC ID: CI32278



Title: Upper Edge of 6 MHz Channel
Comment A: 512 KSPS
Date: 11.AUG.1999 16:04:25

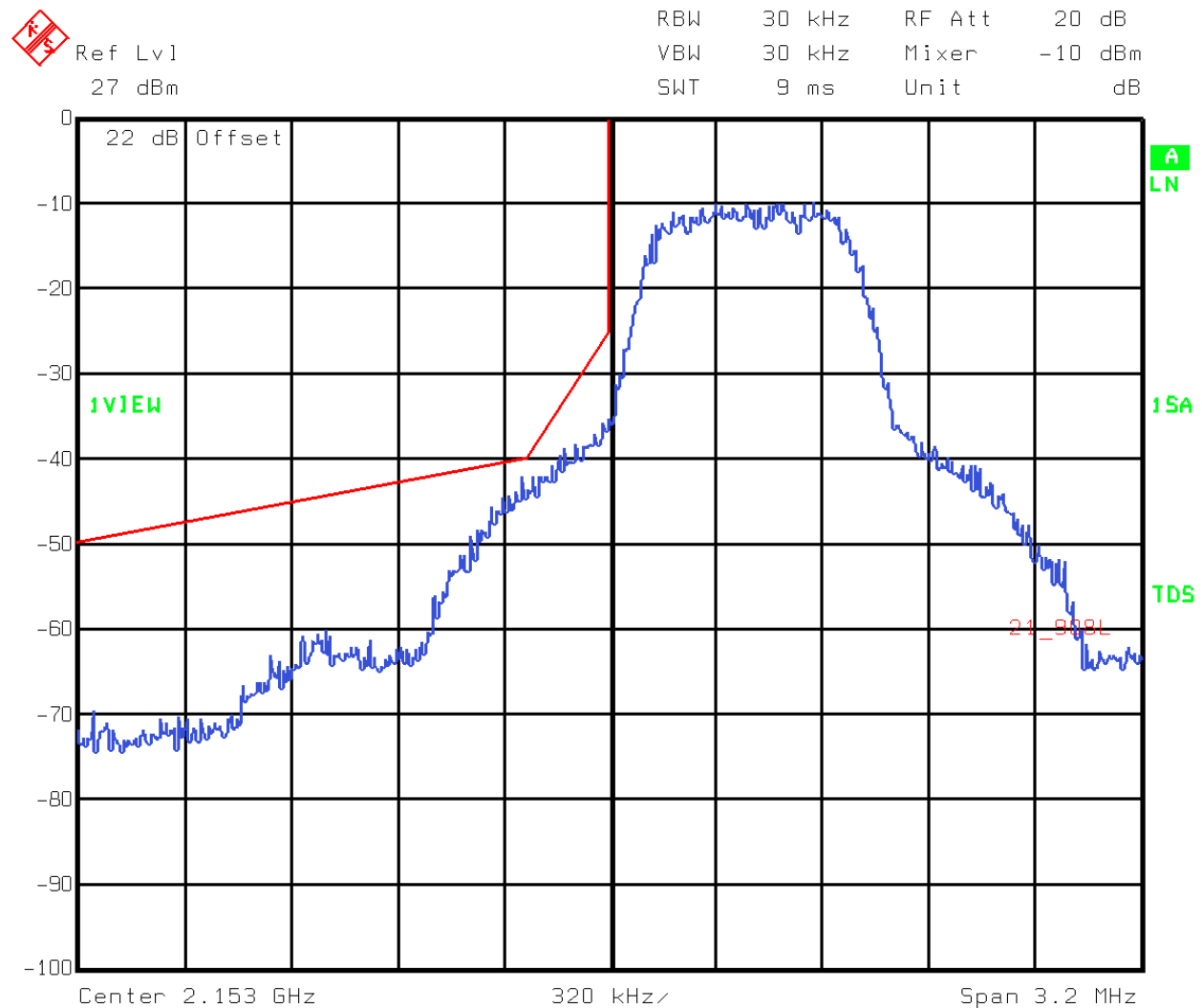
Plot 12 – QPSK Modulation, 512 kbps

EQUIPMENT: TR2278 Transverter
FCC ID: CI32278



Plot 13 – QPSK Modulation, 640 kbps

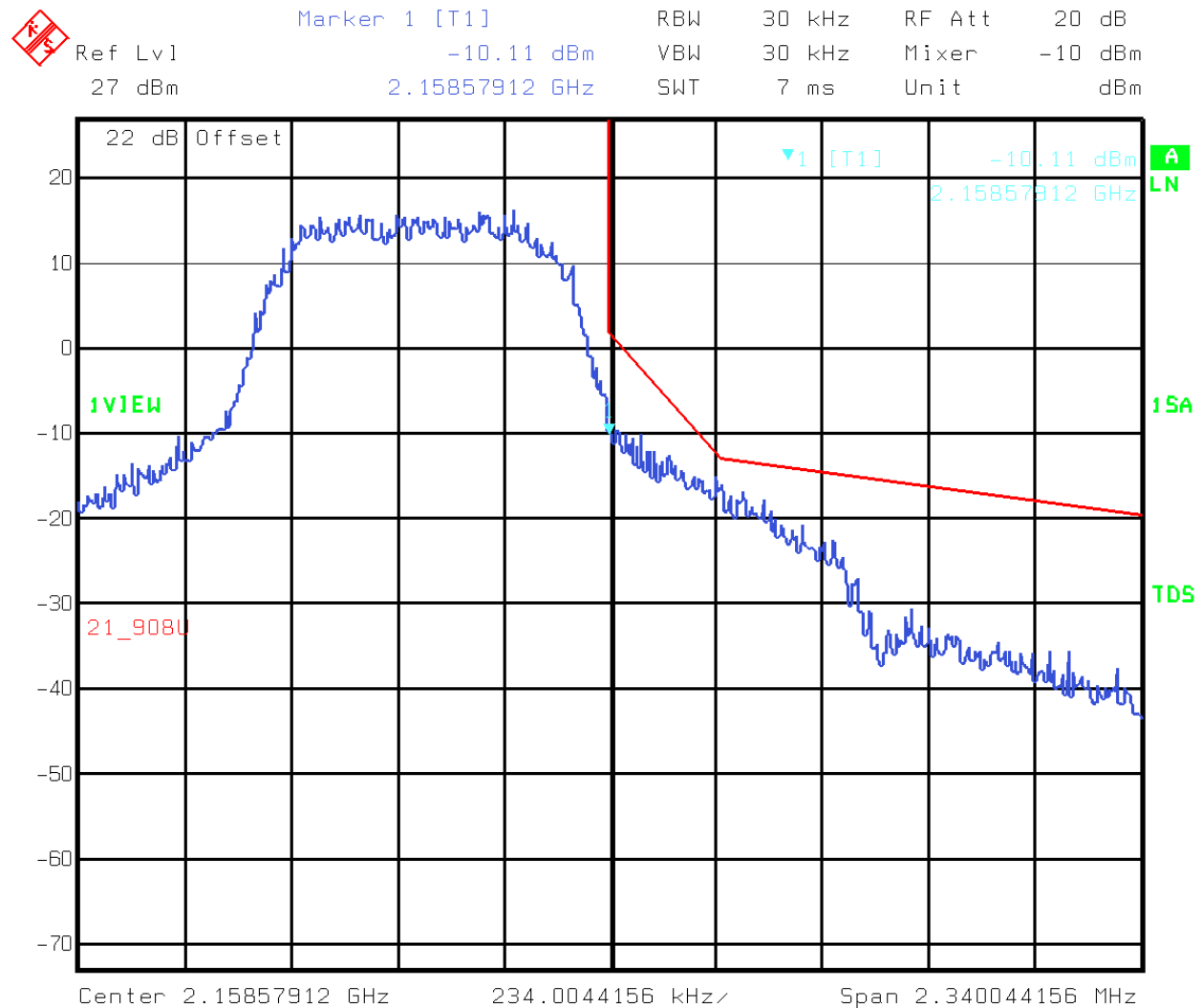
EQUIPMENT: TR2278 Transverter
FCC ID: CI32278



Title: Lower Edge of 6 MHz Channel
Comment A: 640 kbps
Date: 12.AUG.1999 9:19:42

Plot 14 – QPSK Modulation, 640 kbps

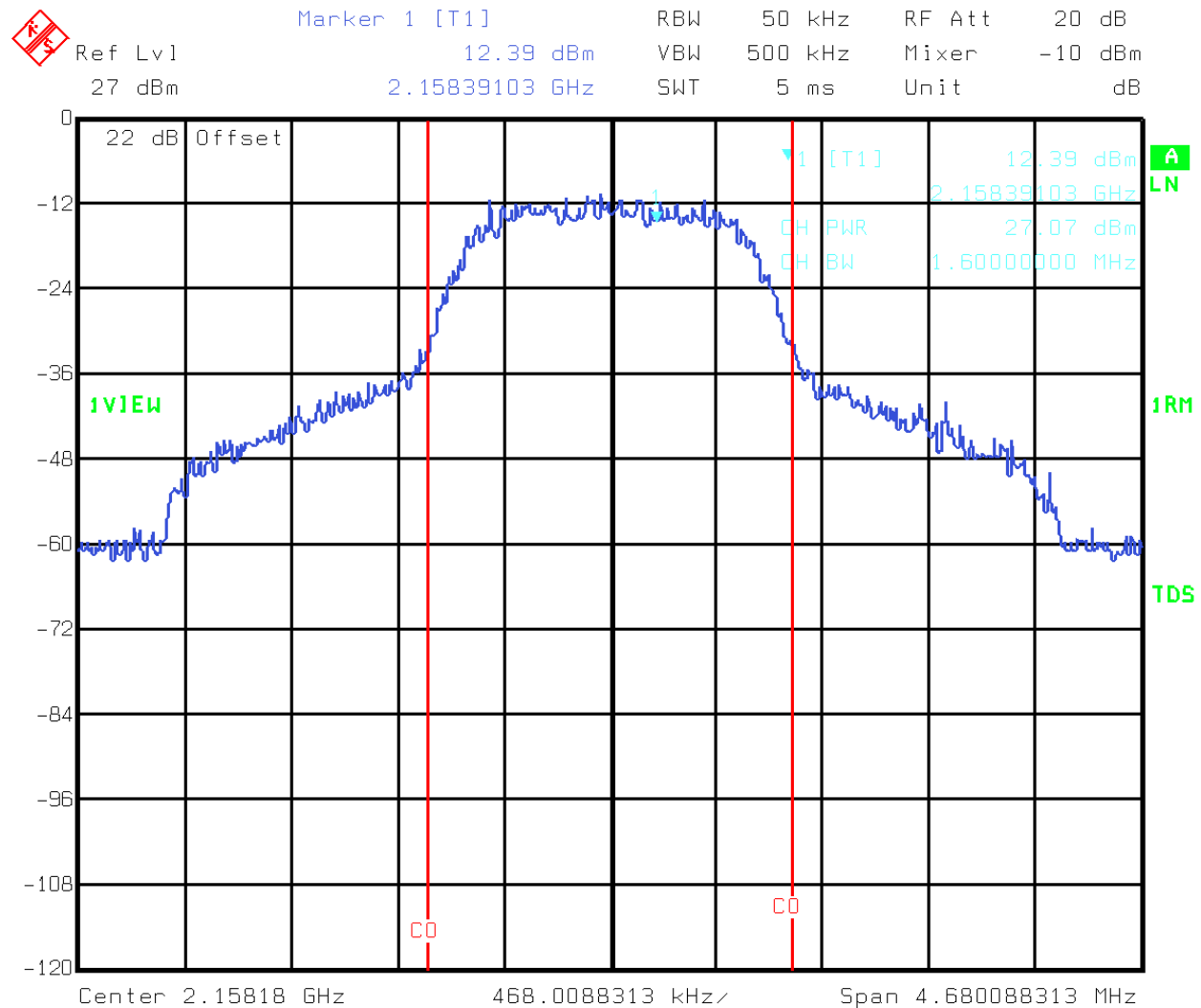
EQUIPMENT: TR2278 Transverter
FCC ID: CI32278



Title: Upper Edge of 6 MHz Channel
Comment A: 640 kbps
Date: 11.AUG.1999 16:17:47

Plot 15 – QPSK Modulation, 640 kbps

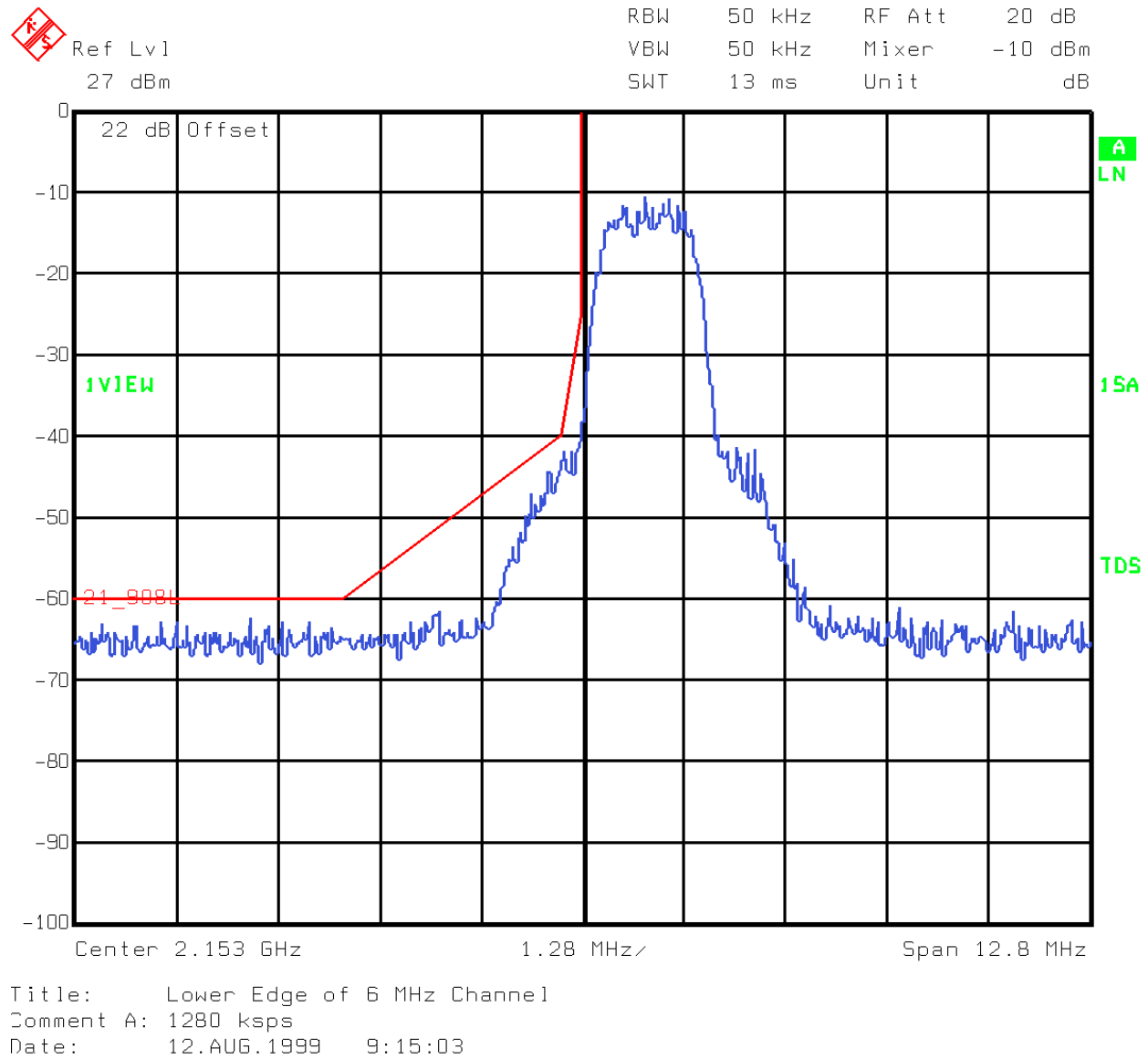
EQUIPMENT: TR2278 Transverter
FCC ID: CI32278



Title: Average Power in 1.6 MHz channel
Comment A: 1280 kbps
Date: 11.AUG.1999 16:34:16

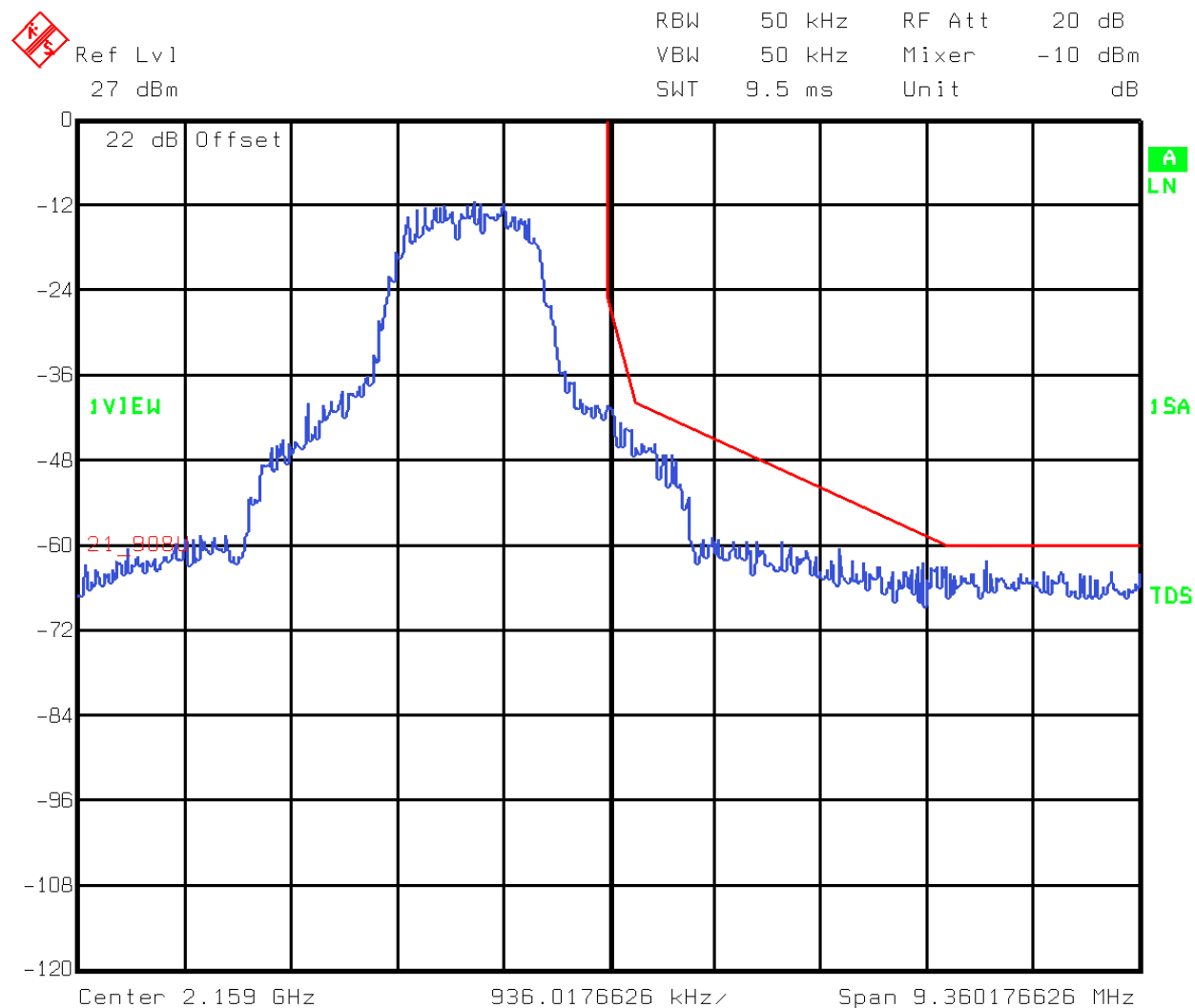
Plot 16 – QPSK Modulation, 1280 kbps

EQUIPMENT: TR2278 Transverter
FCC ID: CI32278



Plot 17 – QPSK Modulation, 1280 kbps

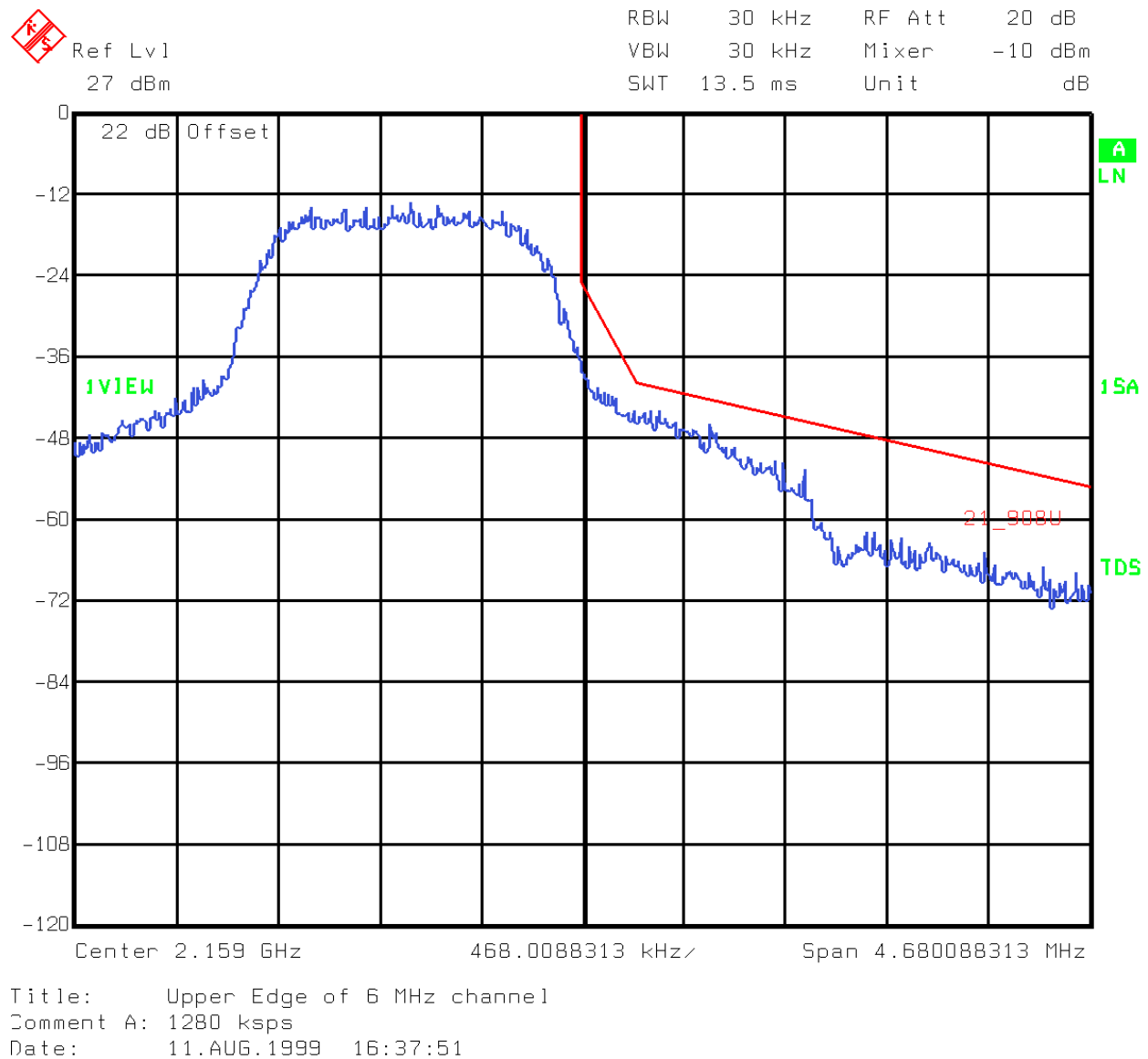
EQUIPMENT: TR2278 Transverter
FCC ID: CI32278



Title: Upper Edge of 6 MHz Channel
Comment A: 1280 kbps
Date: 11.AUG.1999 16:28:24

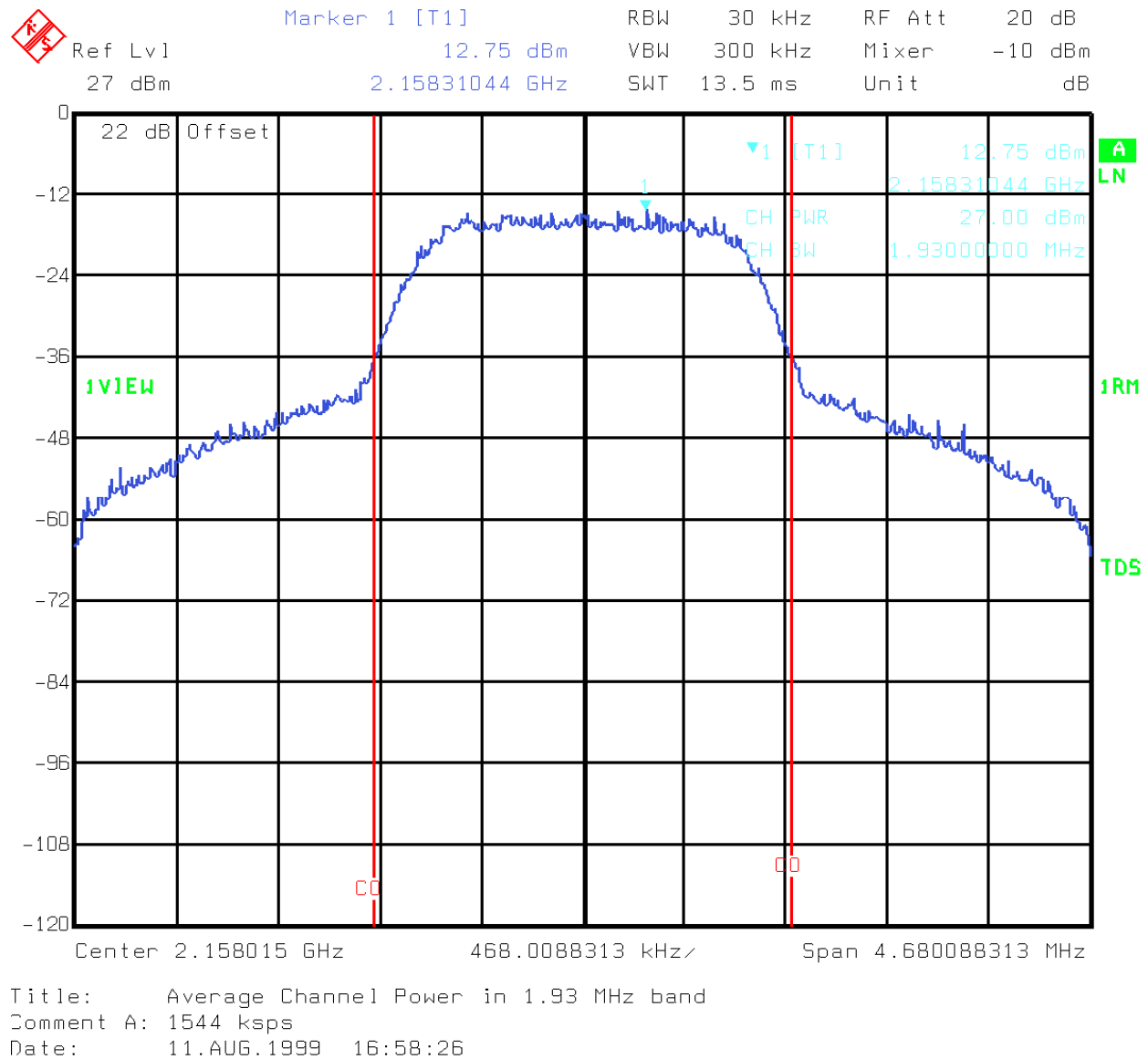
Plot 18 – QPSK Modulation, 1280 kbps

EQUIPMENT: TR2278 Transverter
FCC ID: CI32278



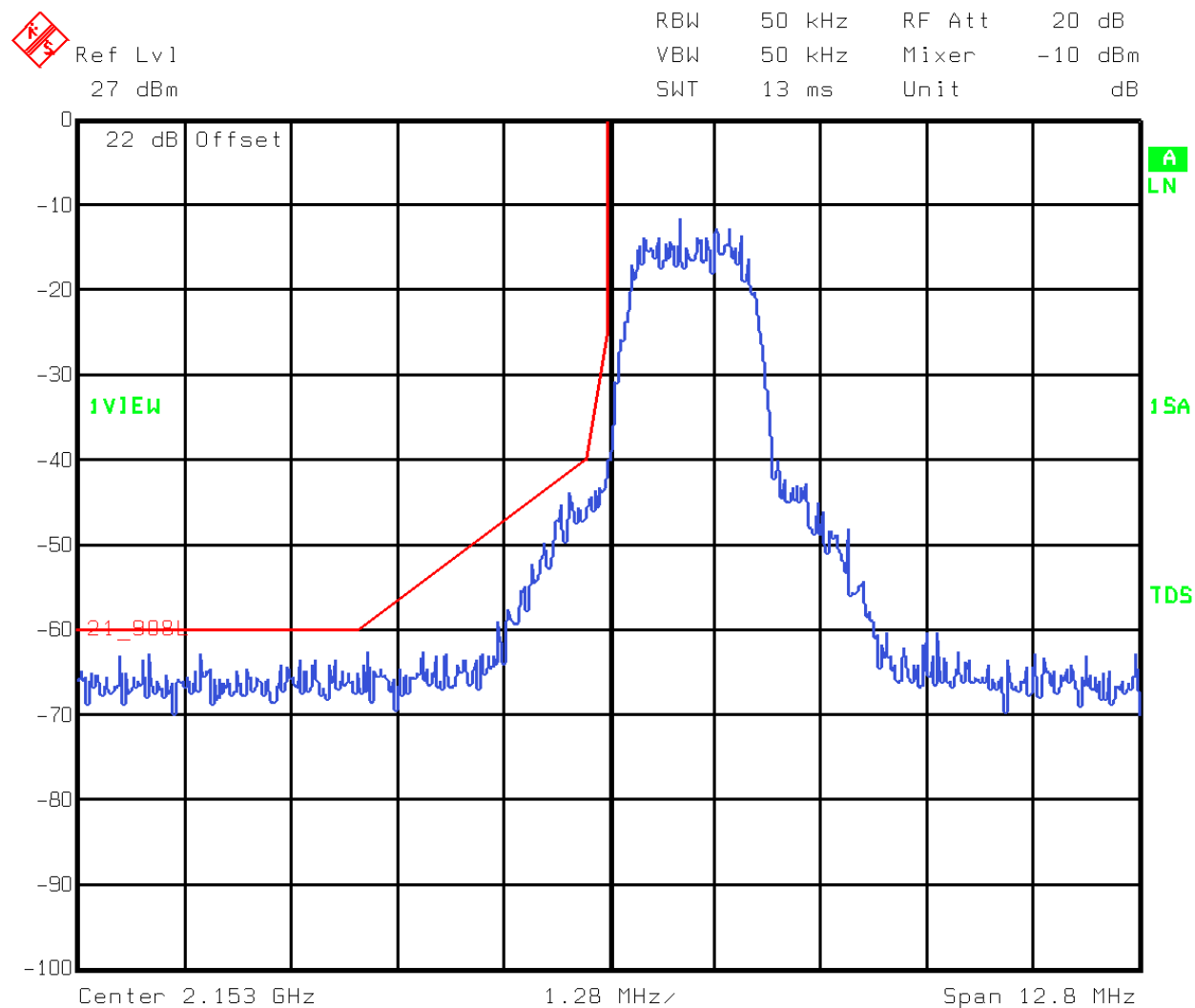
Plot 19 – QPSK Modulation, 1280 kbps

EQUIPMENT: TR2278 Transverter
FCC ID: CI32278



Plot 20 – QPSK Modulation, 1544 kbps

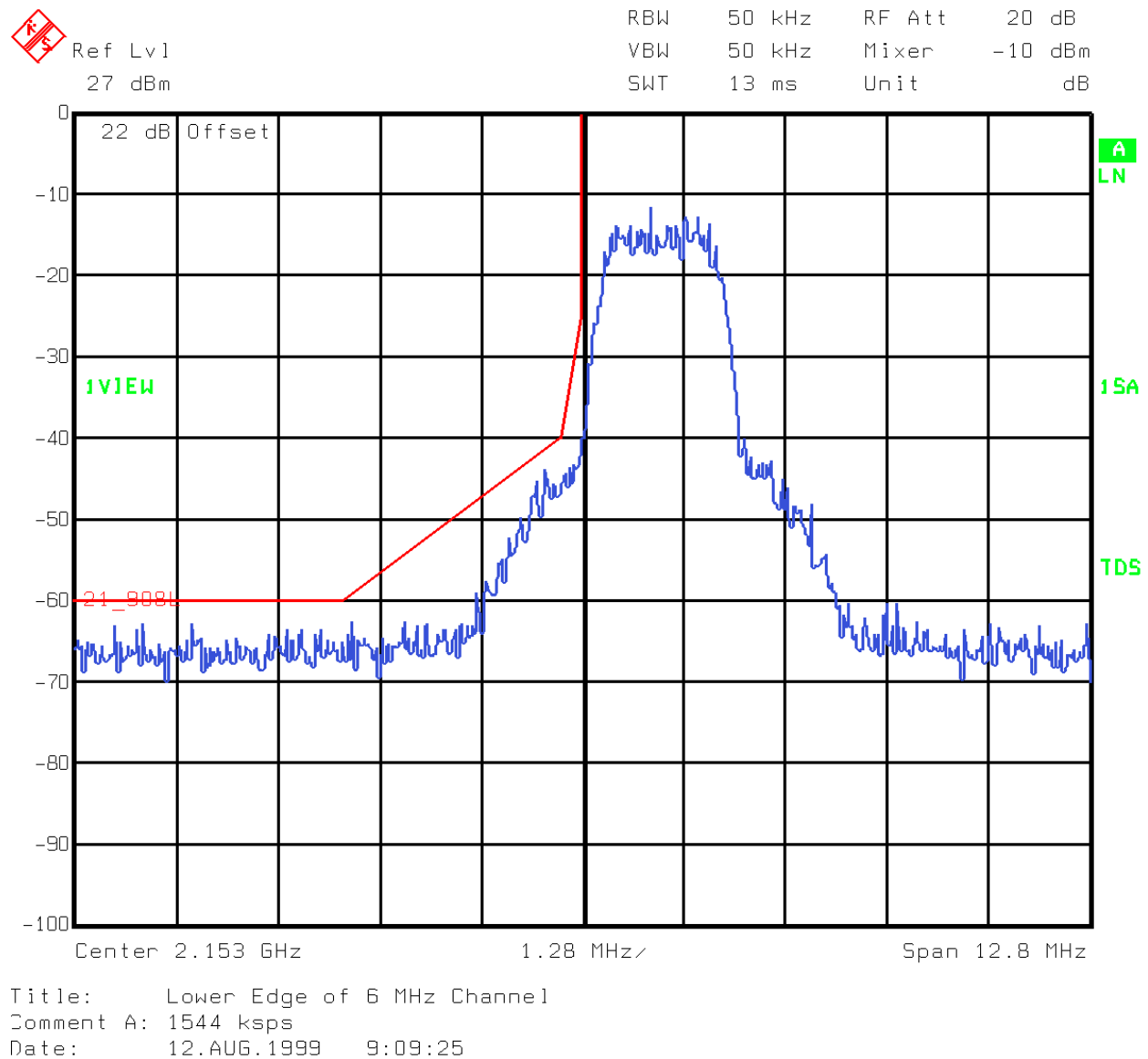
EQUIPMENT: TR2278 Transverter
FCC ID: CI32278



Title: Lower Edge of 6 MHz Channel
Comment A: 1544 kbps
Date: 12.AUG.1999 9:09:25

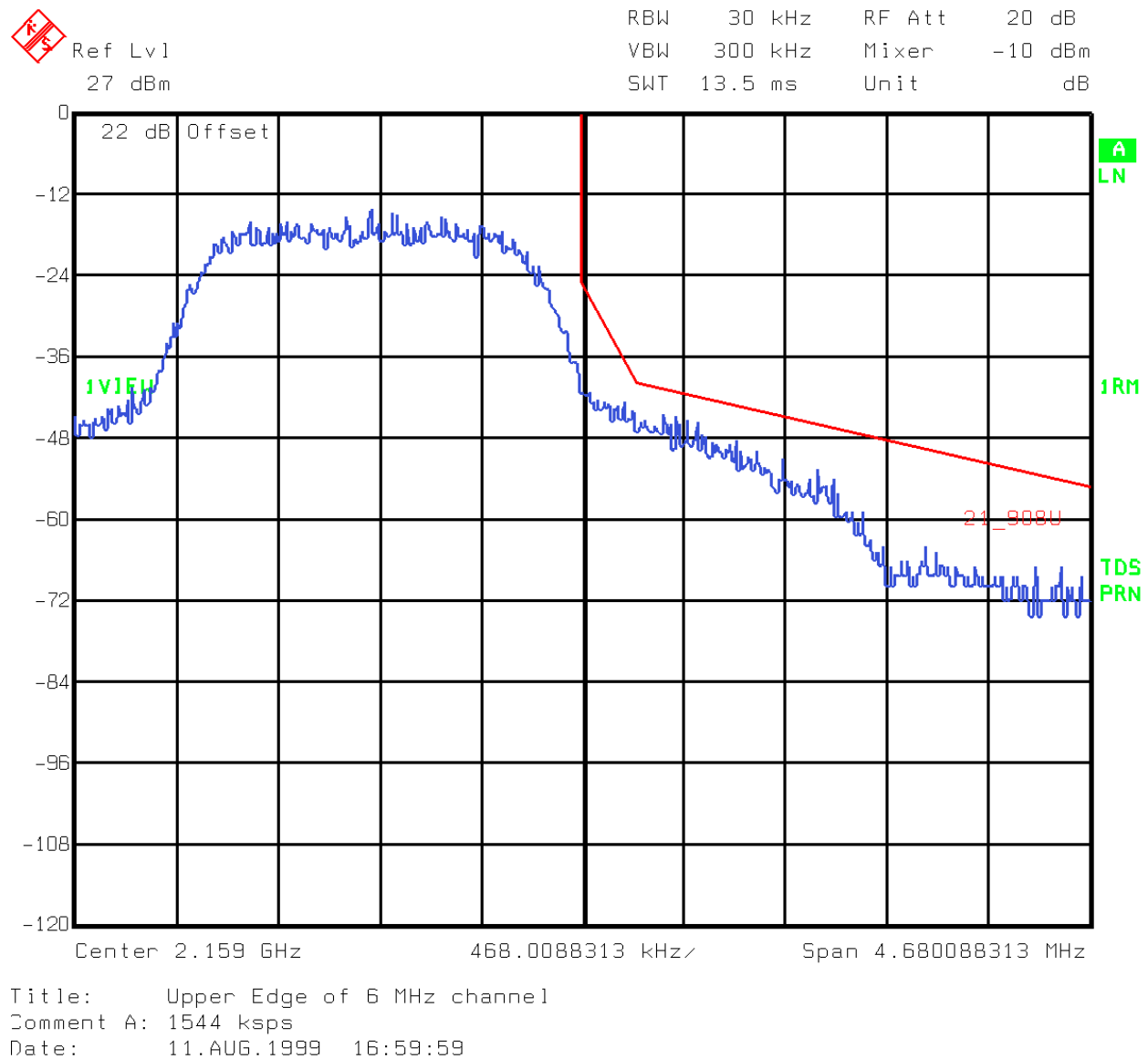
Plot 21 – QPSK Modulation, 1544 kbps

EQUIPMENT: TR2278 Transverter
FCC ID: CI32278



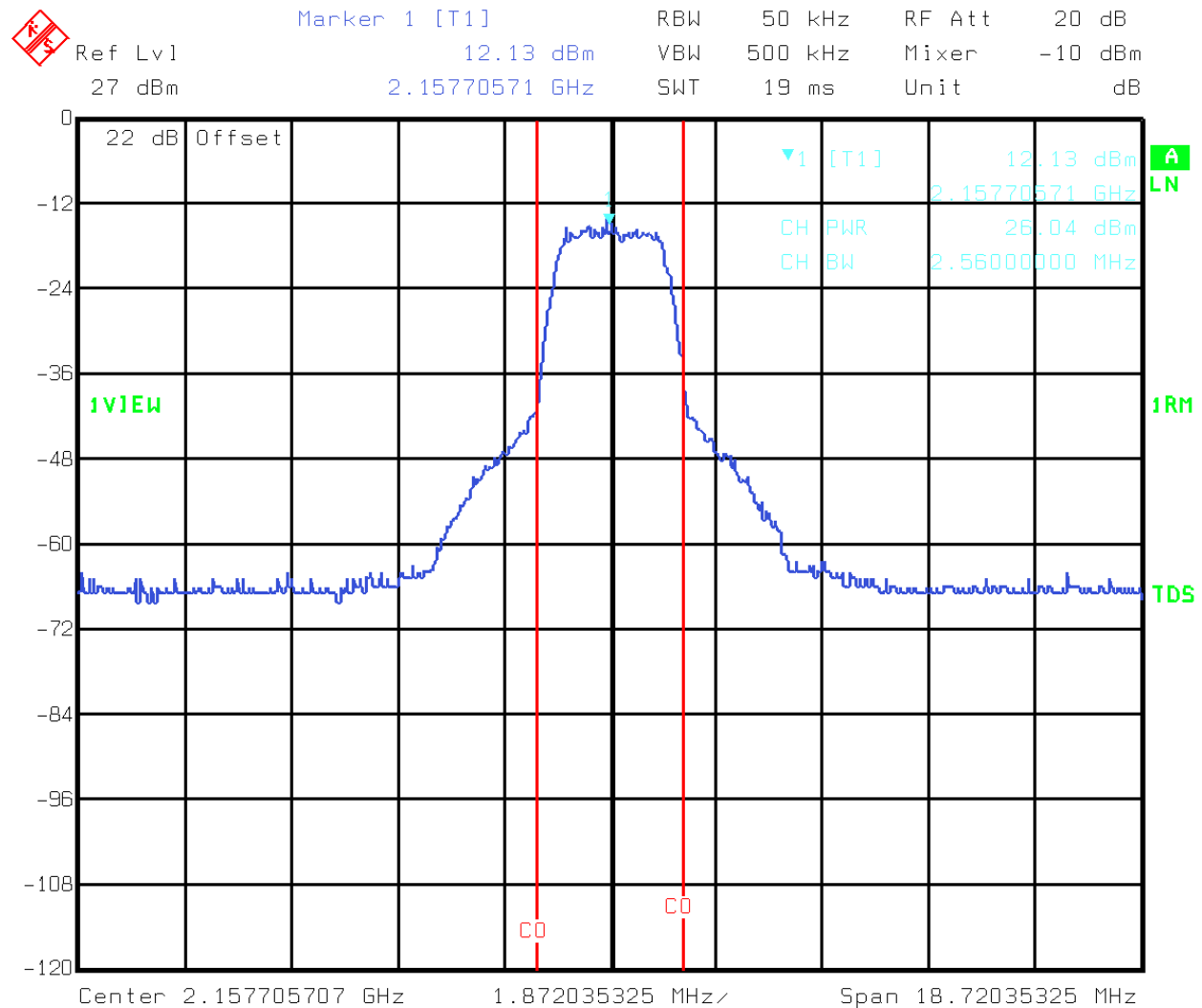
Plot 22 – QPSK Modulation, 1544 kbps

EQUIPMENT: TR2278 Transverter
FCC ID: CI32278



Plot 23 – QPSK Modulation, 1544 kbps

EQUIPMENT: TR2278 Transverter
FCC ID: CI32278

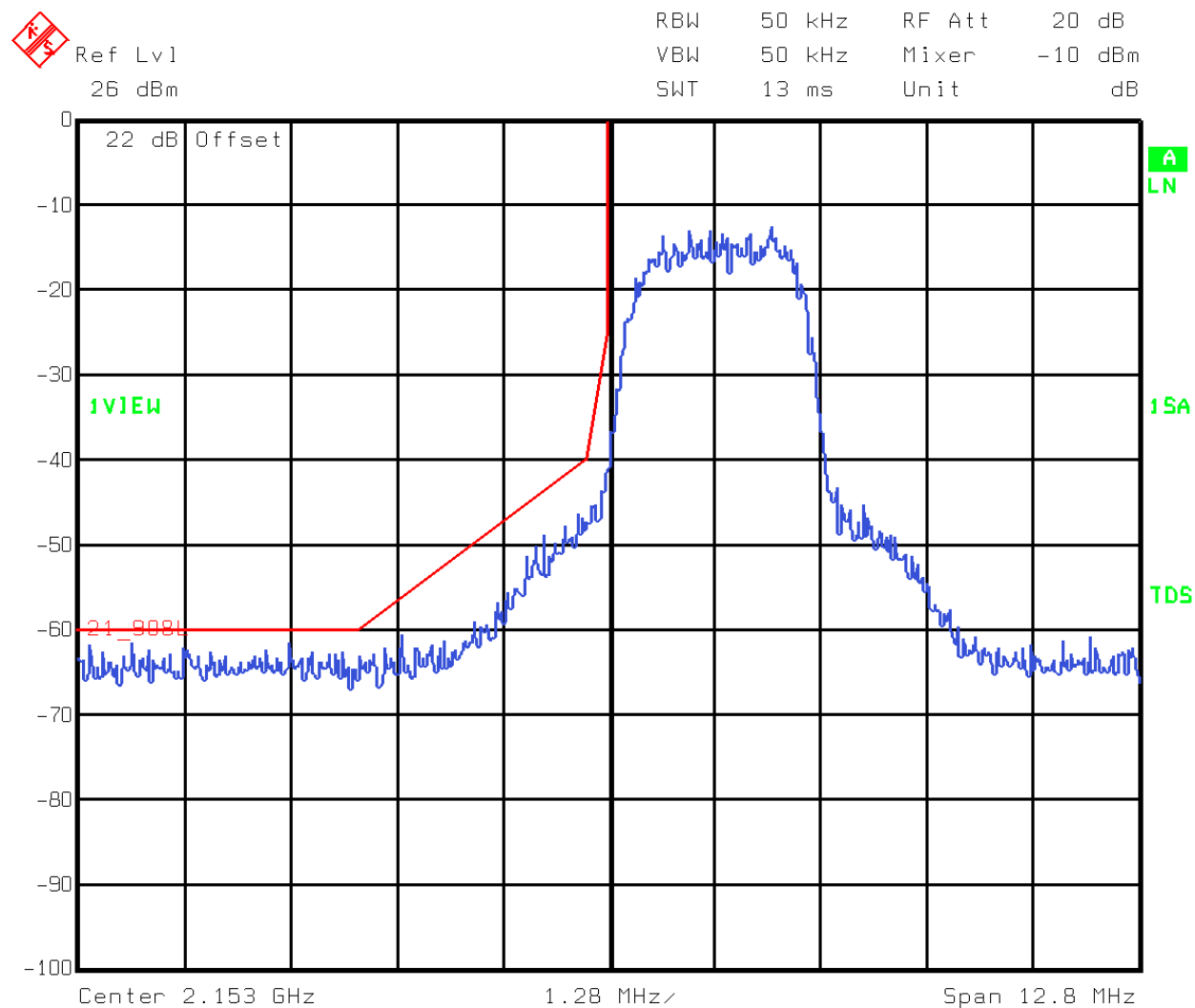


Title: Average Power over 2.56 MHz Band

Date: 12.AUG.1999 8:27:37

Plot 24 – QPSK Modulation 2048 ksps

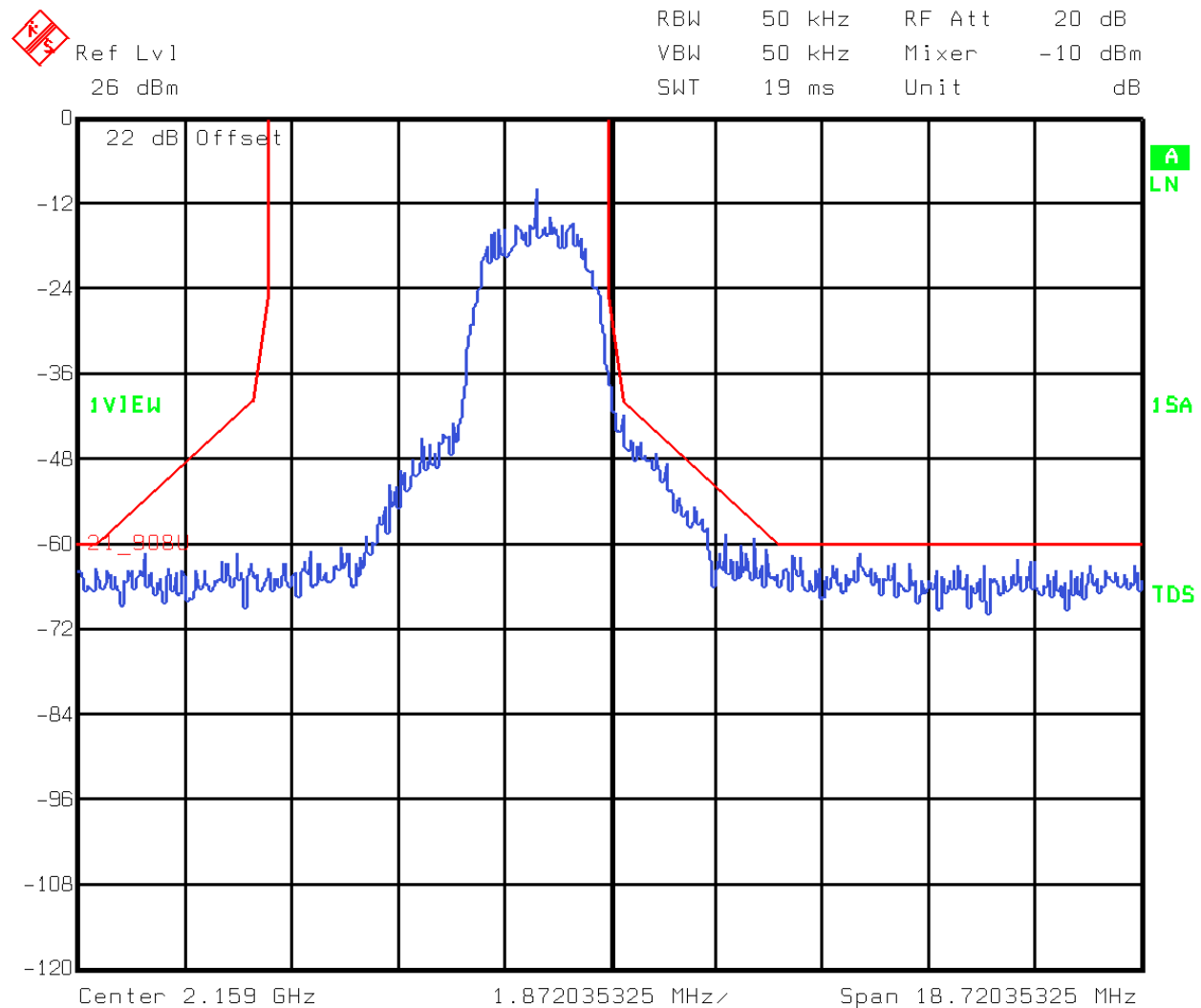
EQUIPMENT: TR2278 Transverter
FCC ID: CI32278



Title: Lower Edge of 6 MHz Channel
Comment A: 2048 kbps
Date: 12.AUG.1999 9:01:35

Plot 25 – QPSK Modulation, 2048 kbps

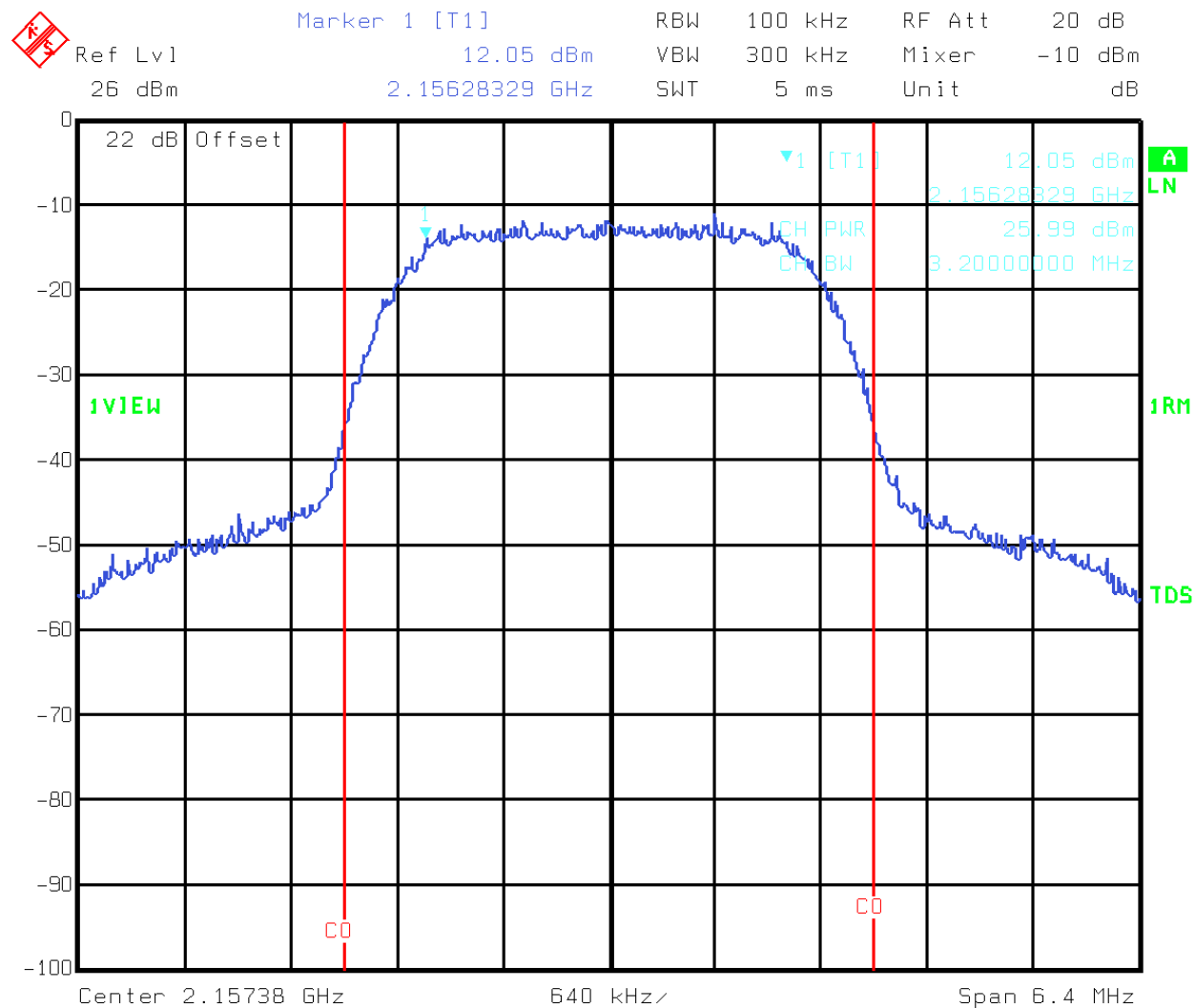
EQUIPMENT: TR2278 Transverter
FCC ID: CI32278



Title: Upper Edge of 6 MHz Channel
Comment A: 2560 kbps
Date: 12.AUG.1999 8:29:23

Plot 26 – QPSK Modulation, 2048 kbps

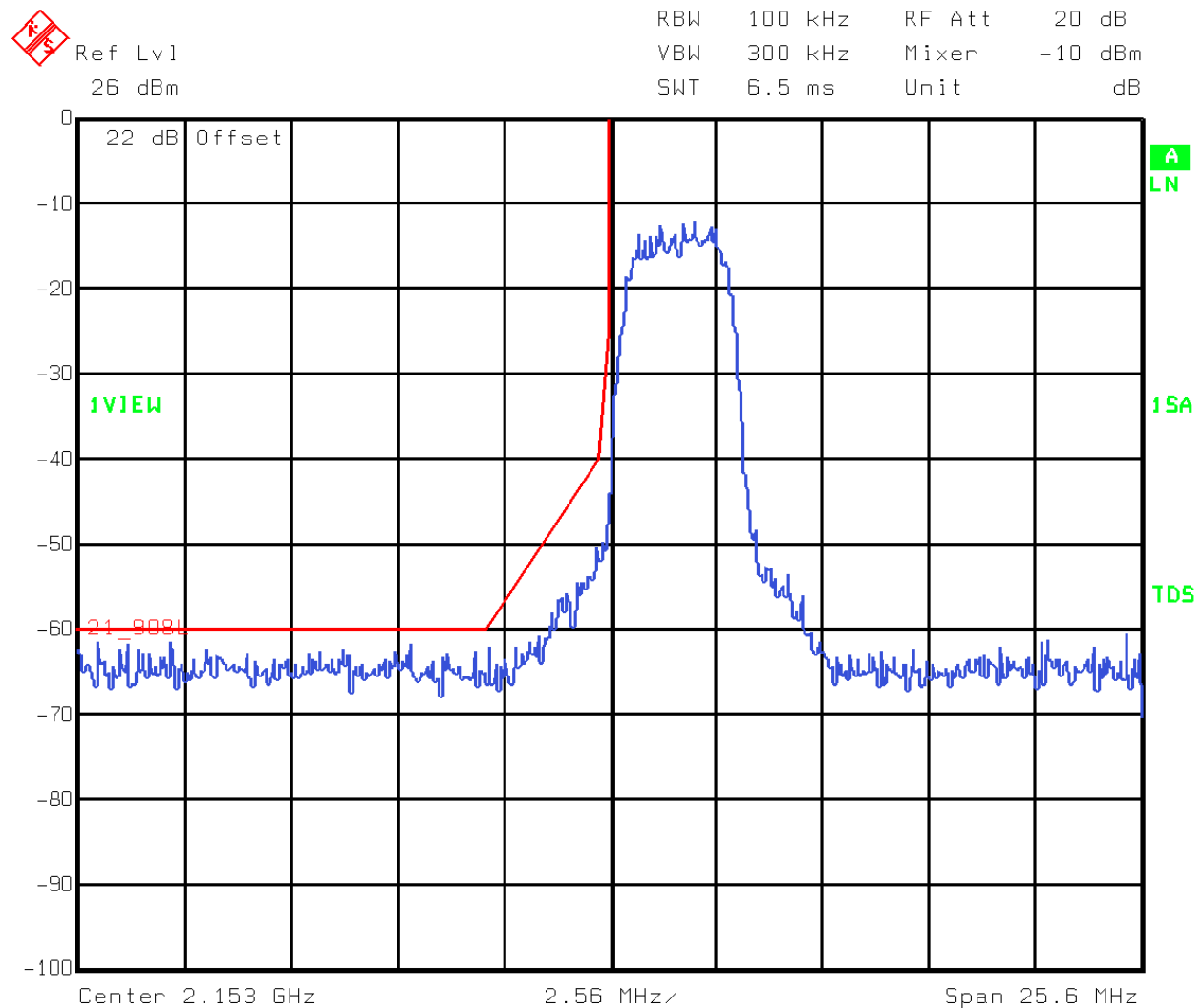
EQUIPMENT: TR2278 Transverter
FCC ID: CI32278



Title: Average Channel Power over 3.2 MHz BW
Comment A: 2560 kbps
Date: 12.AUG.1999 8:43:42

Plot 27 – QPSK Modulation, 2560 kbps

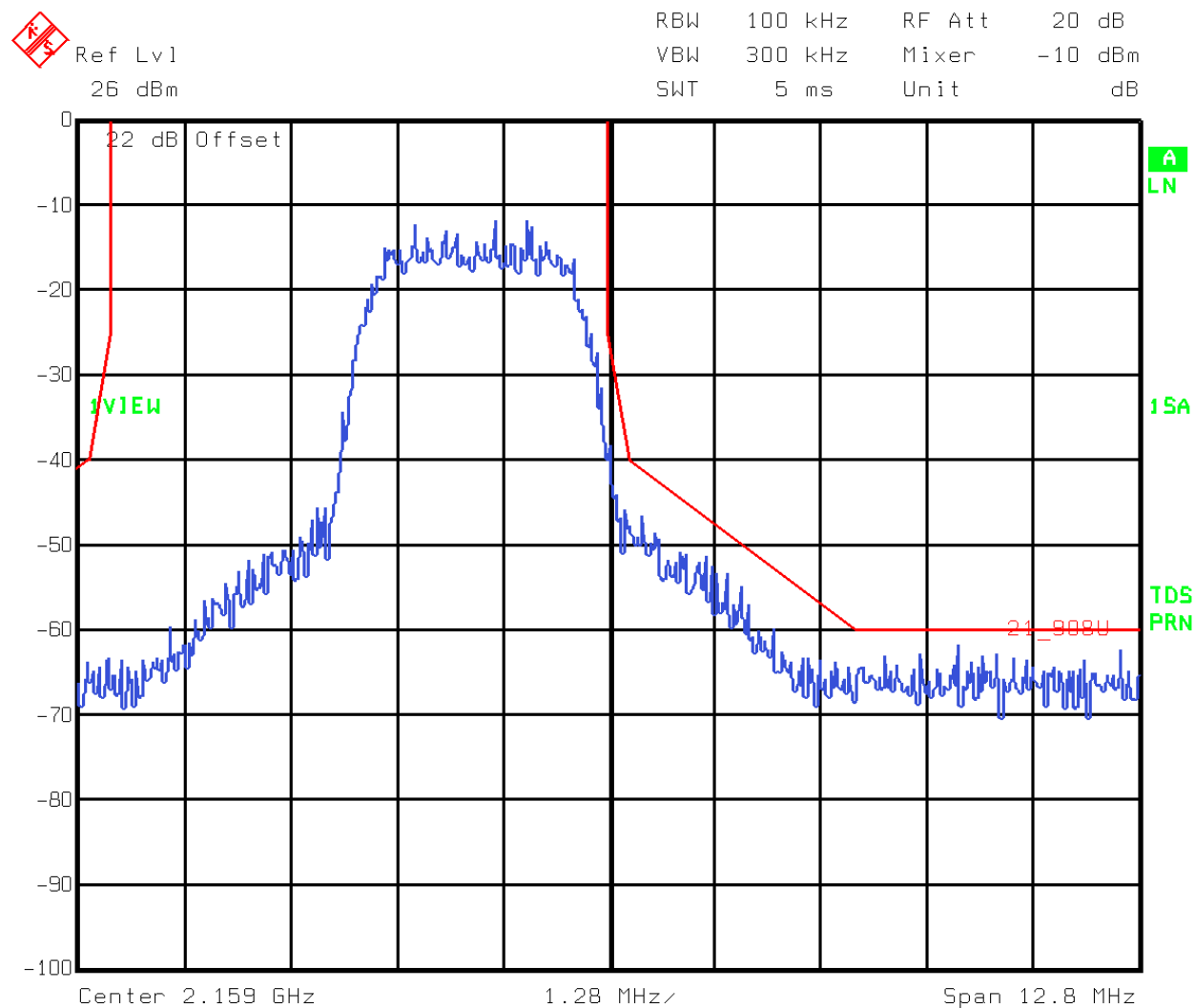
EQUIPMENT: TR2278 Transverter
FCC ID: CI32278



Title: Lower Edge of 6 MHz Channel
Comment A: 2560 kbps
Date: 12.AUG.1999 8:53:25

Plot 28 – QPSK Modulation, 2560 kbps

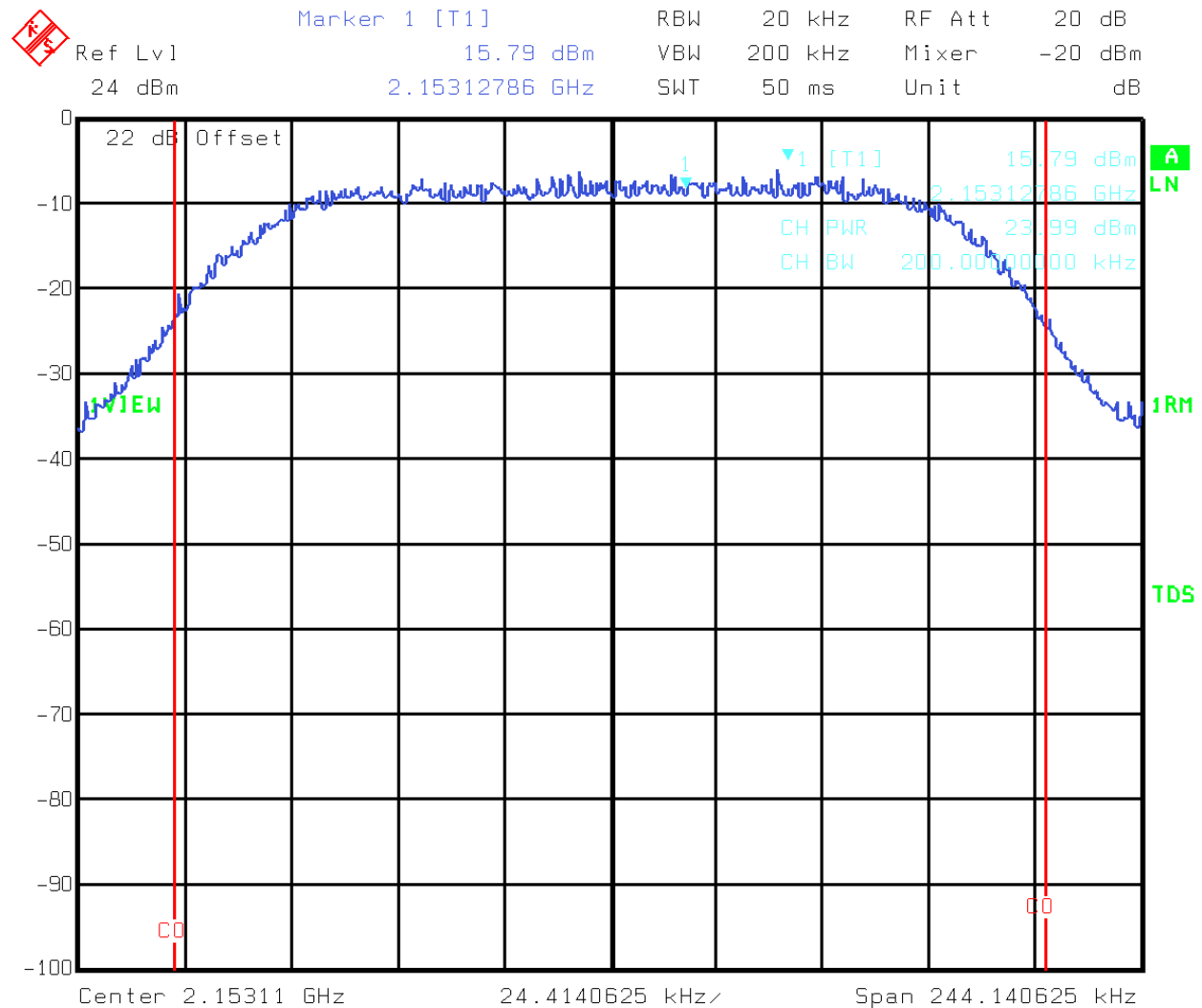
EQUIPMENT: TR2278 Transverter
FCC ID: CI32278



Title: Upper Edge of 6 MHz Channel
Comment A: 2560 kbps
Date: 12.AUG.1999 8:46:23

Plot 29 – QPSK Modulation, 2560 kbps

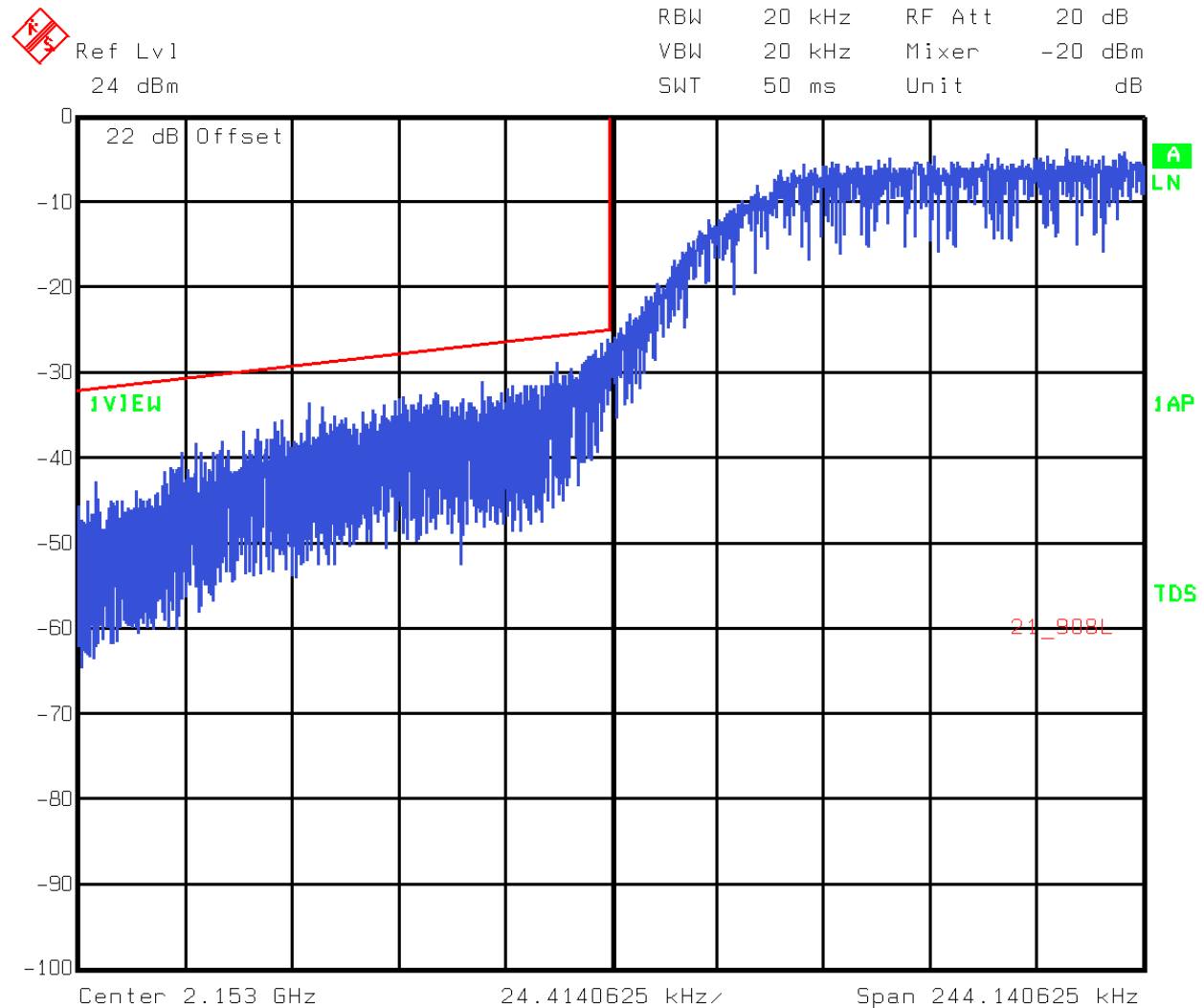
EQUIPMENT: TR2278 Transverter
FCC ID: CI32278



Title: Average Channel Power
Comment A: 16 QAM Modulation 160 ks/sec.
Date: 16.AUG.1999 10:47:57

Plot 30 – 16 QAM, 160 ksps

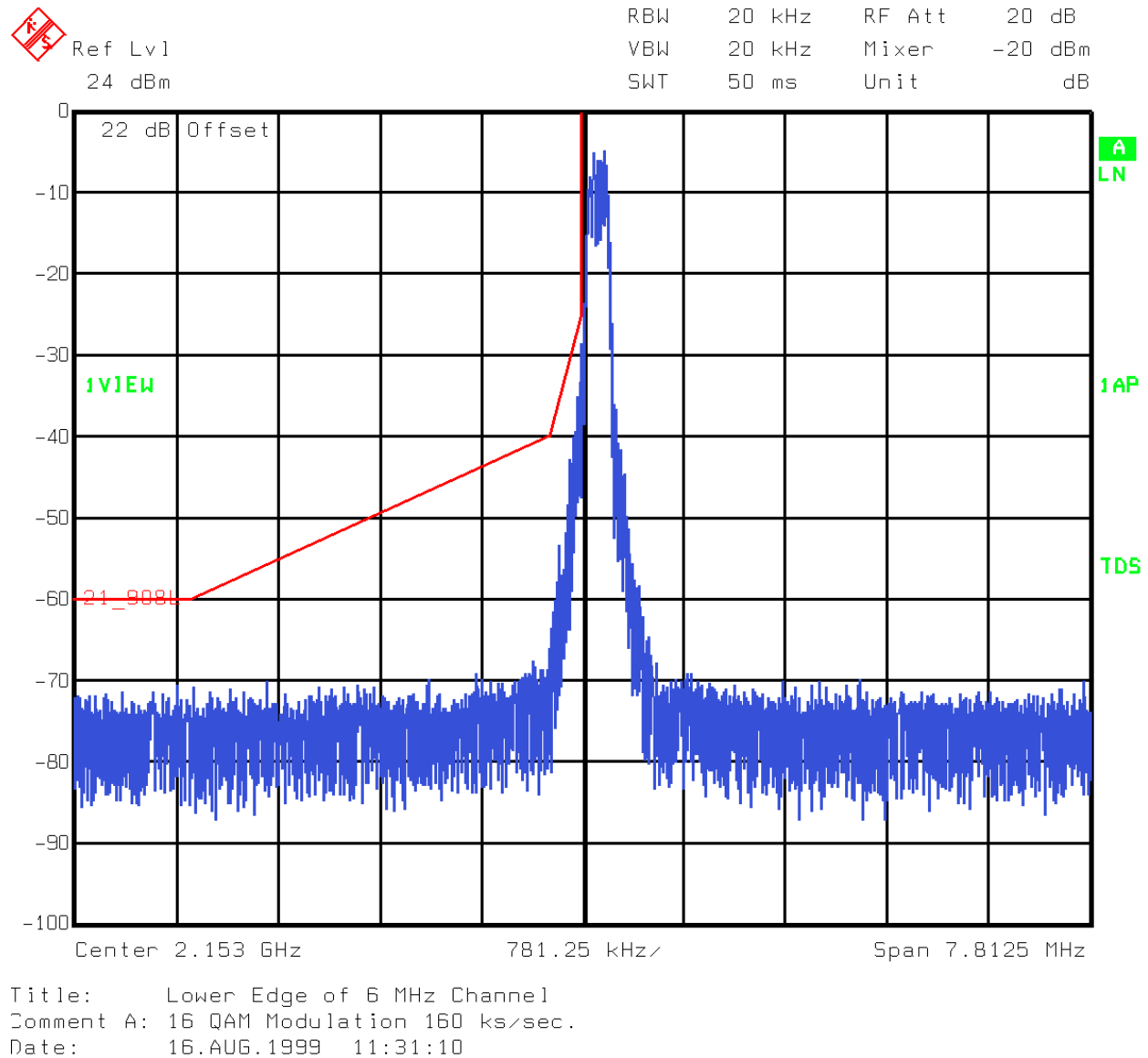
EQUIPMENT: TR2278 Transverter
FCC ID: CI32278



Title: Lower Edge of 6 MHz Channel
 Comment A: 16 QAM Modulation 160 ks/sec.
 Date: 16.AUG.1999 11:03:01

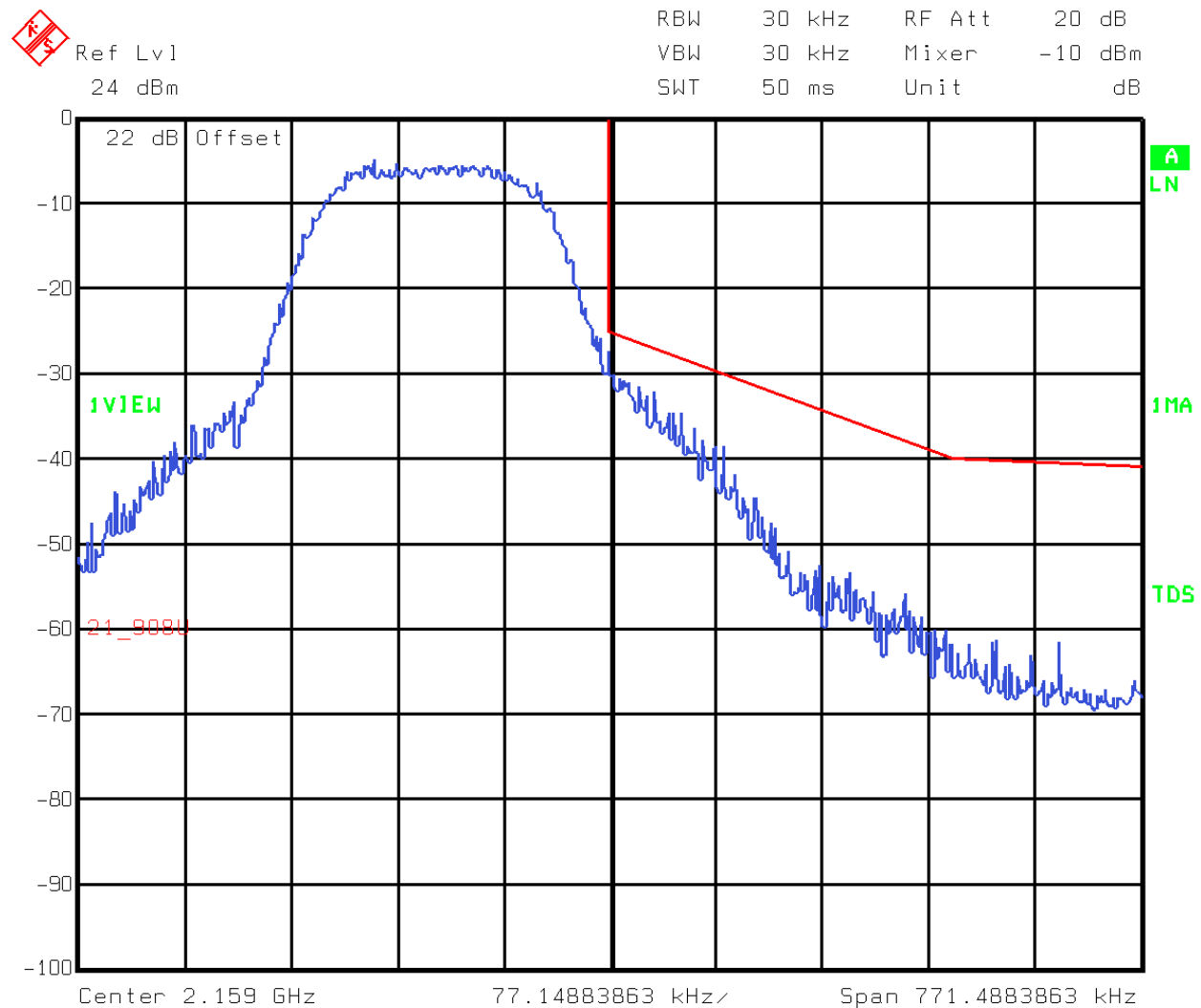
Plot 31 - 16 QAM, 160 kps

EQUIPMENT: TR2278 Transverter
FCC ID: CI32278



Plot 32 - 16 QAM, 160 kps

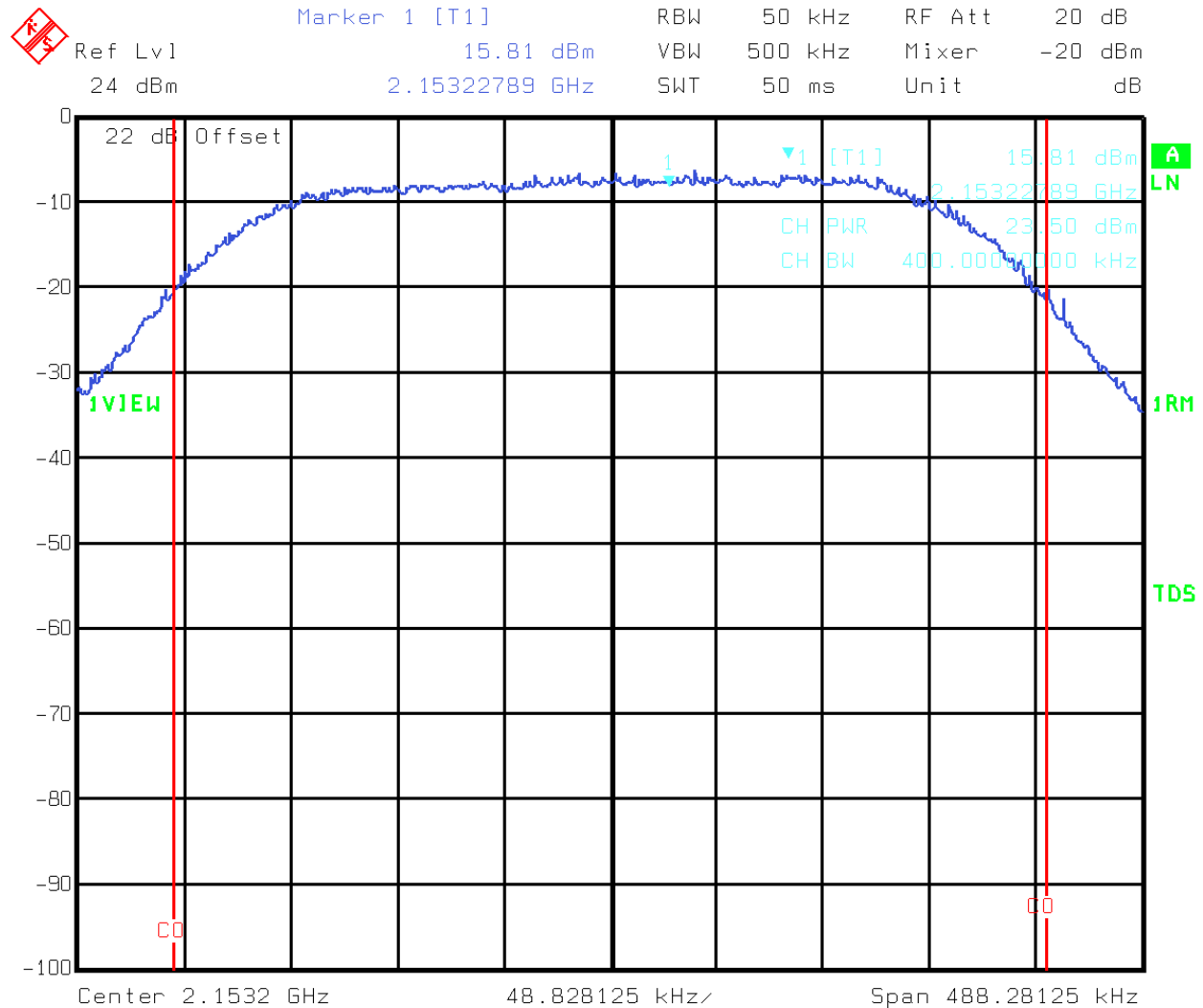
EQUIPMENT: TR2278 Transverter
FCC ID: CI32278



Title: Upper Edge of 6 MHz Channel
Comment A: 16 QAM, 160 ksps
Date: 18.AUG.1999 14:40:37

Plot 33 - 16 QAM, 160 ksps

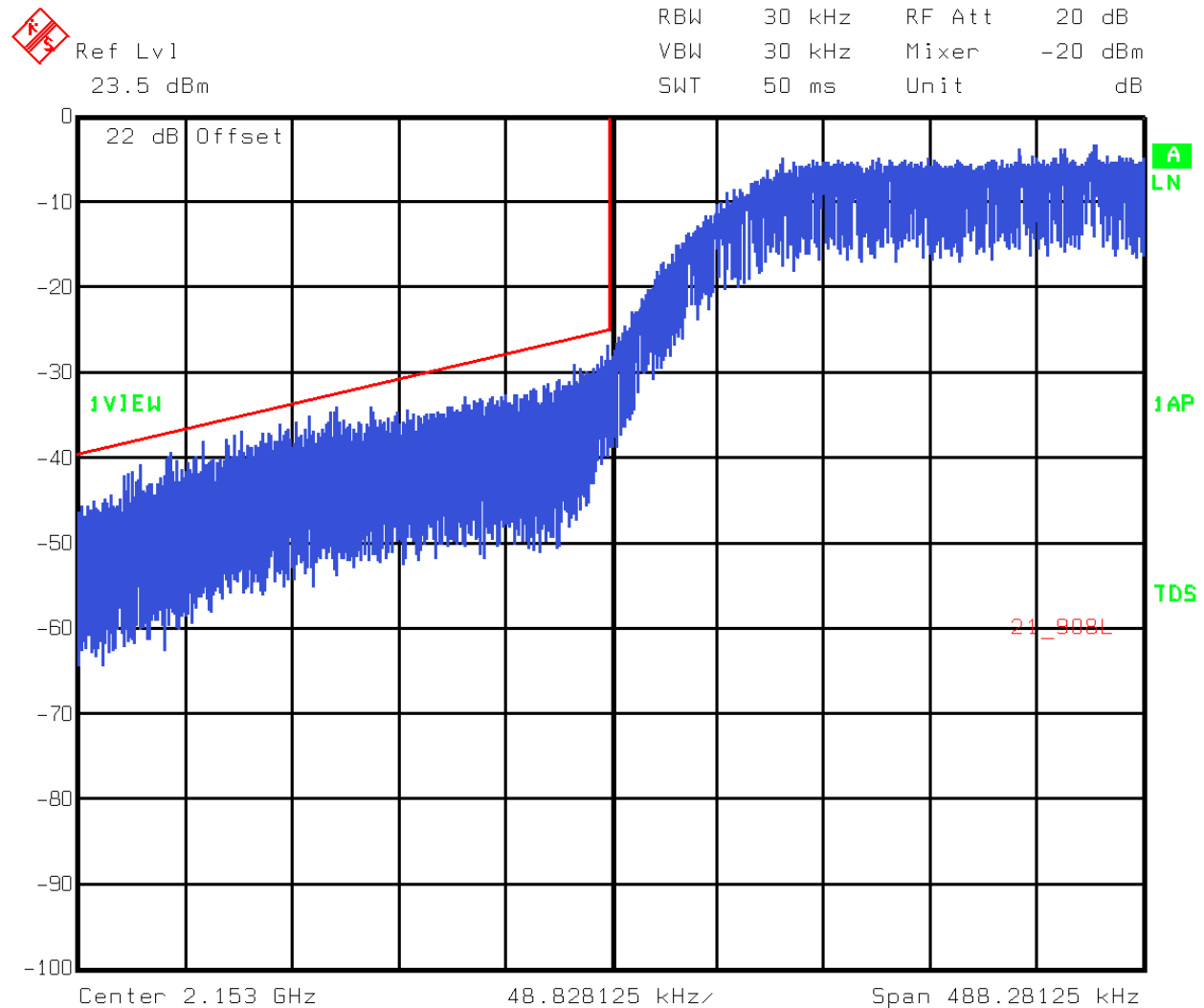
EQUIPMENT: TR2278 Transverter
FCC ID: CI32278



Title: Average Channel Power
Comment A: 16 QAM Modulation 320 ks/sec.
Date: 16.AUG.1999 12:05:54

Plot 34 – 16 QAM Modulation, 320 kps

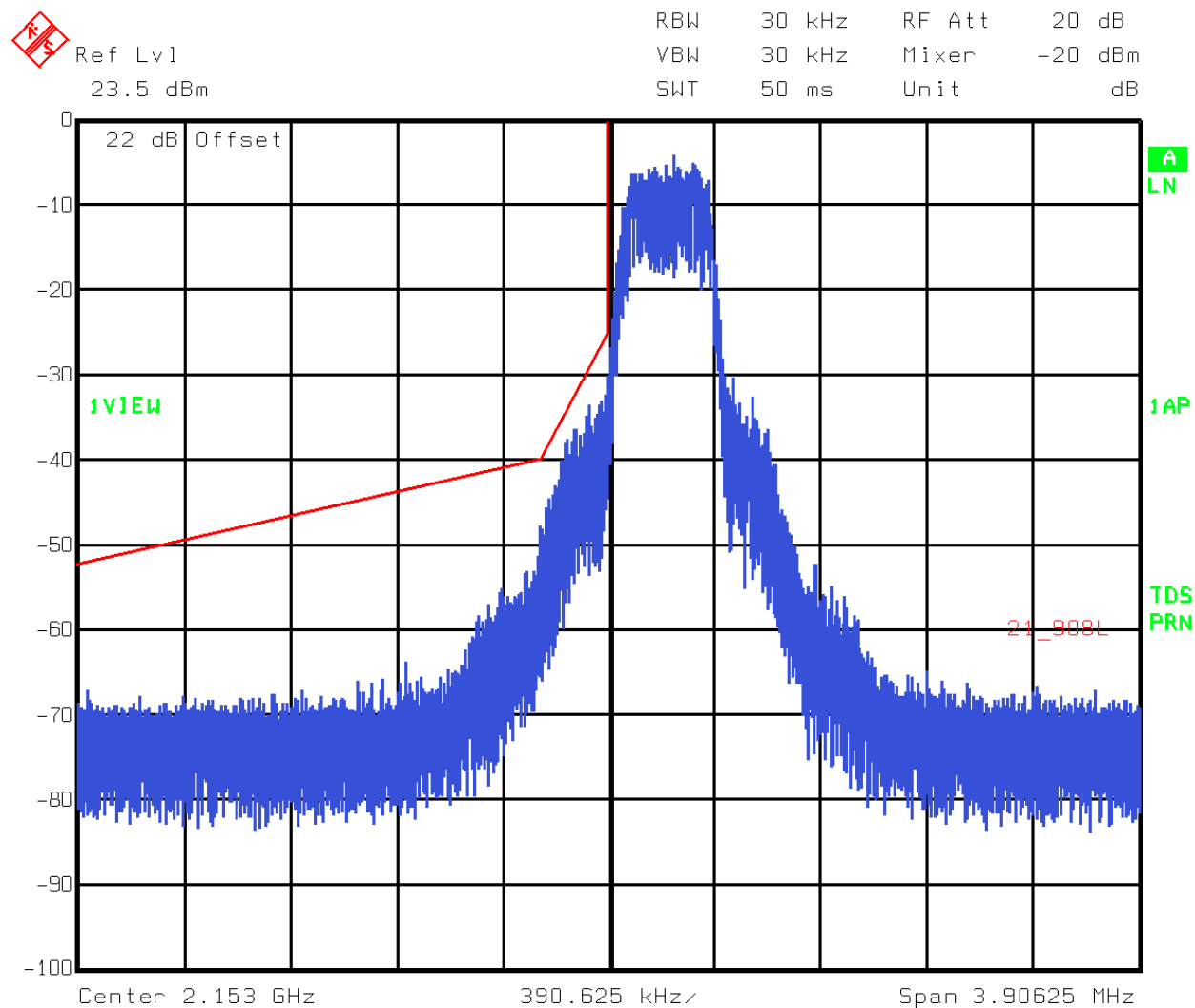
EQUIPMENT: TR2278 Transverter
FCC ID: CI32278



Title: Lower Edge of 6 MHz Channel
Comment A: 16 QAM Modulation 320 ks/sec.
Date: 16.AUG.1999 14:00:46

Plot 35 – 16 QAM Modulation, 320 kps

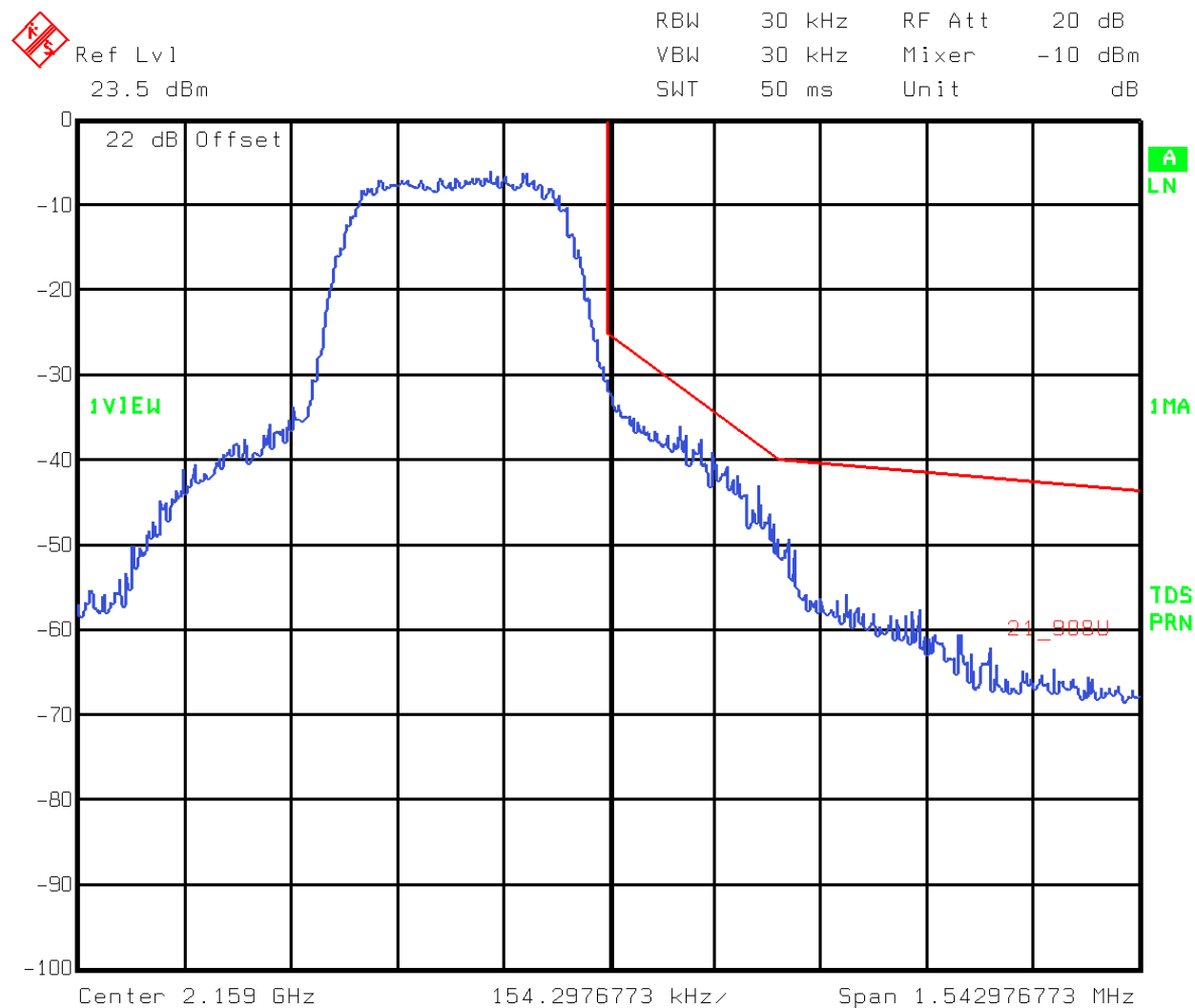
EQUIPMENT: TR2278 Transverter
FCC ID: CI32278



Title: Lower Edge of 6 MHz Channel
Comment A: 16 QAM Modulation 320 ks/sec.
Date: 16.AUG.1999 14:01:51

Plot 36 – 16 QAM Modulation, 320 kps

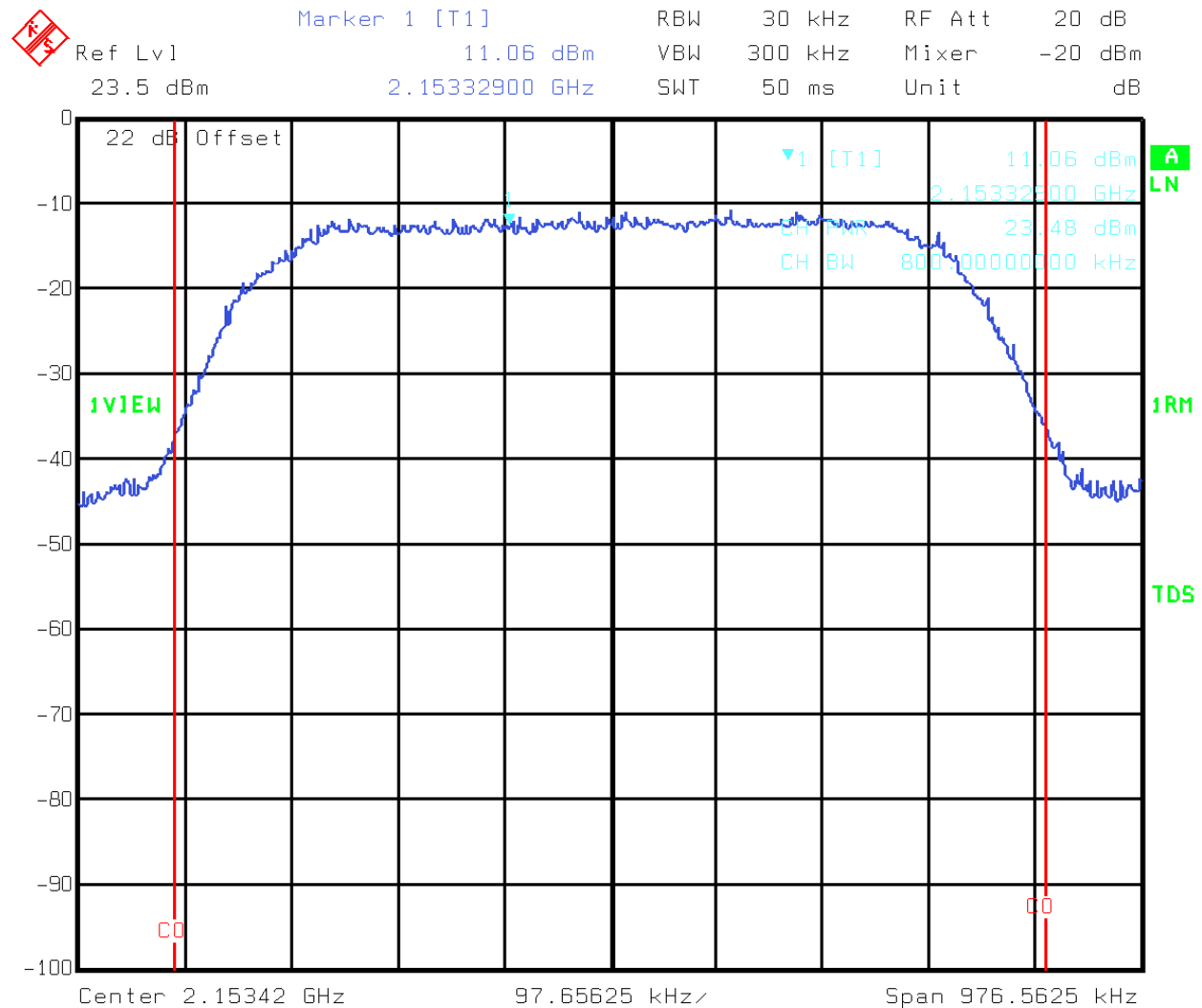
EQUIPMENT: TR2278 Transverter
FCC ID: CI32278



Title: Upper Edge of 6 MHz Channel
Comment A: 16 QAM, 320 kbps
Date: 18.AUG.1999 14:11:26

Plot 37 – 16 QAM Modulation, 320 kbps

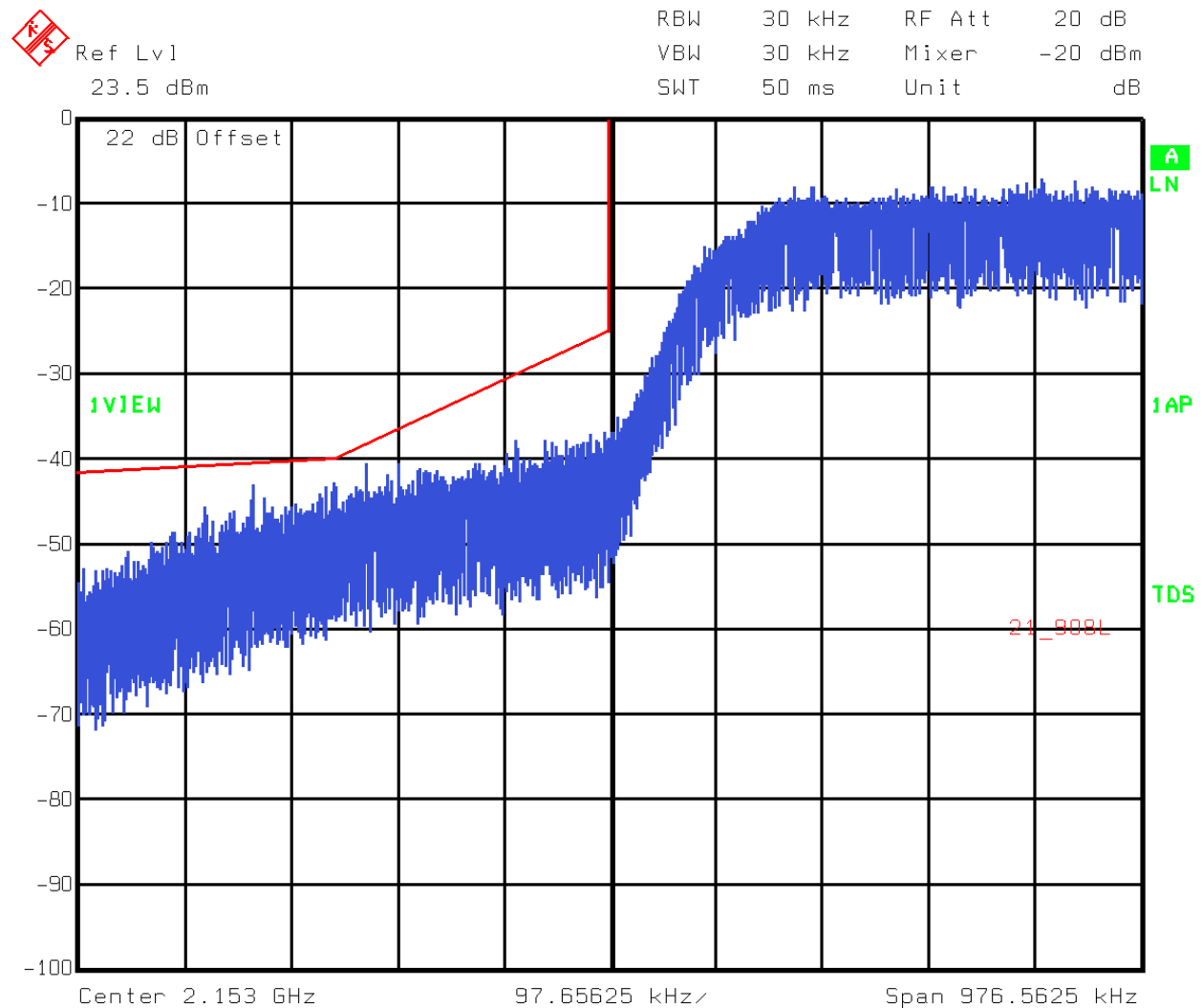
EQUIPMENT: TR2278 Transverter
FCC ID: CI32278



Title: Average Channel Bandwidth
Comment A: 16 QAM Modulation 640 ks/sec.
Date: 16.AUG.1999 15:33:49

Plot 38 – 16 QAM Modulation, 640 kps

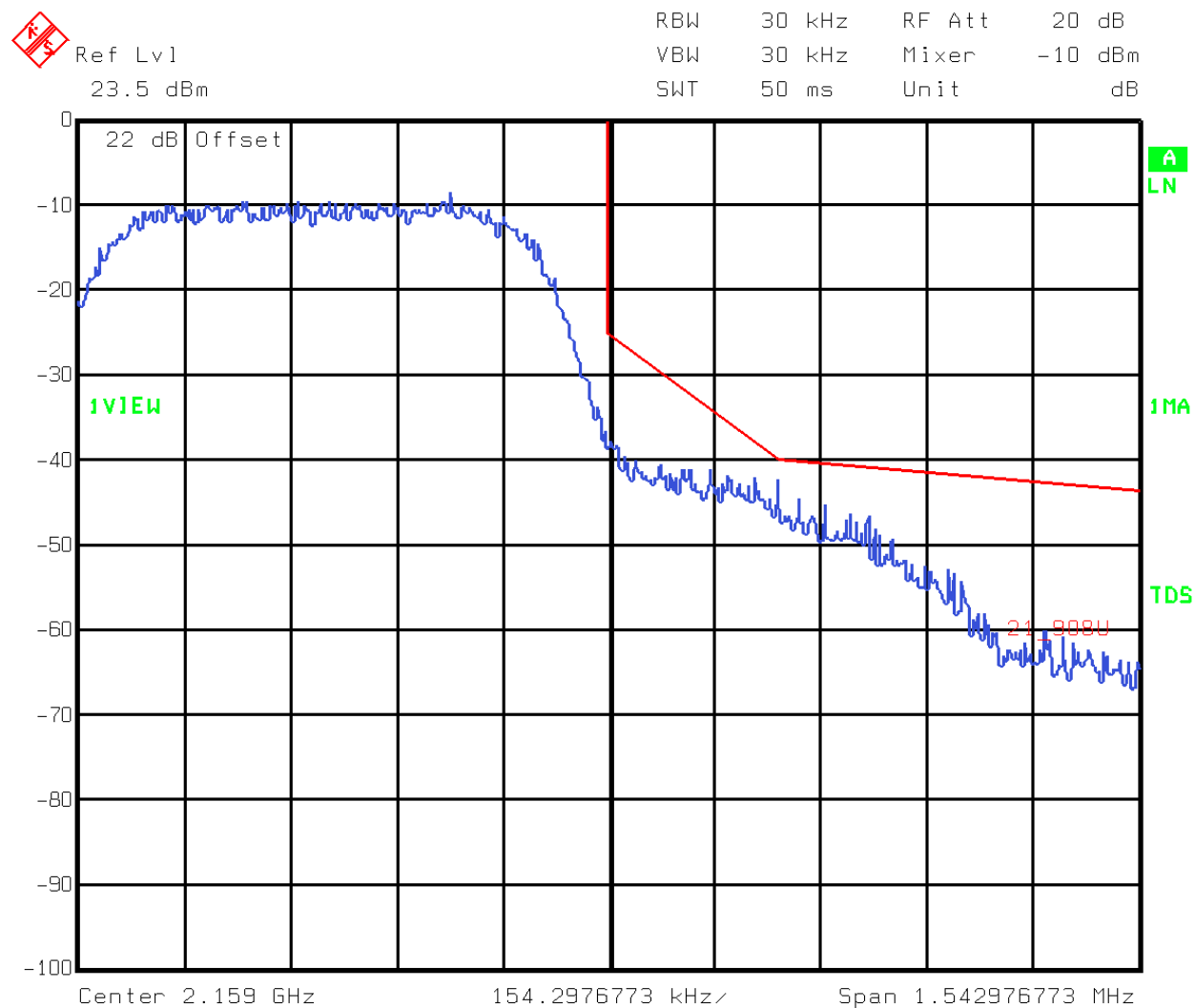
EQUIPMENT: TR2278 Transverter
FCC ID: CI32278



Title: Lower Edge of 6 MHz Channel
Comment A: 16 QAM Modulation 640 ks/sec.
Date: 16.AUG.1999 14:54:02

Plot 39 – 16 QAM Modulation, 640 kps

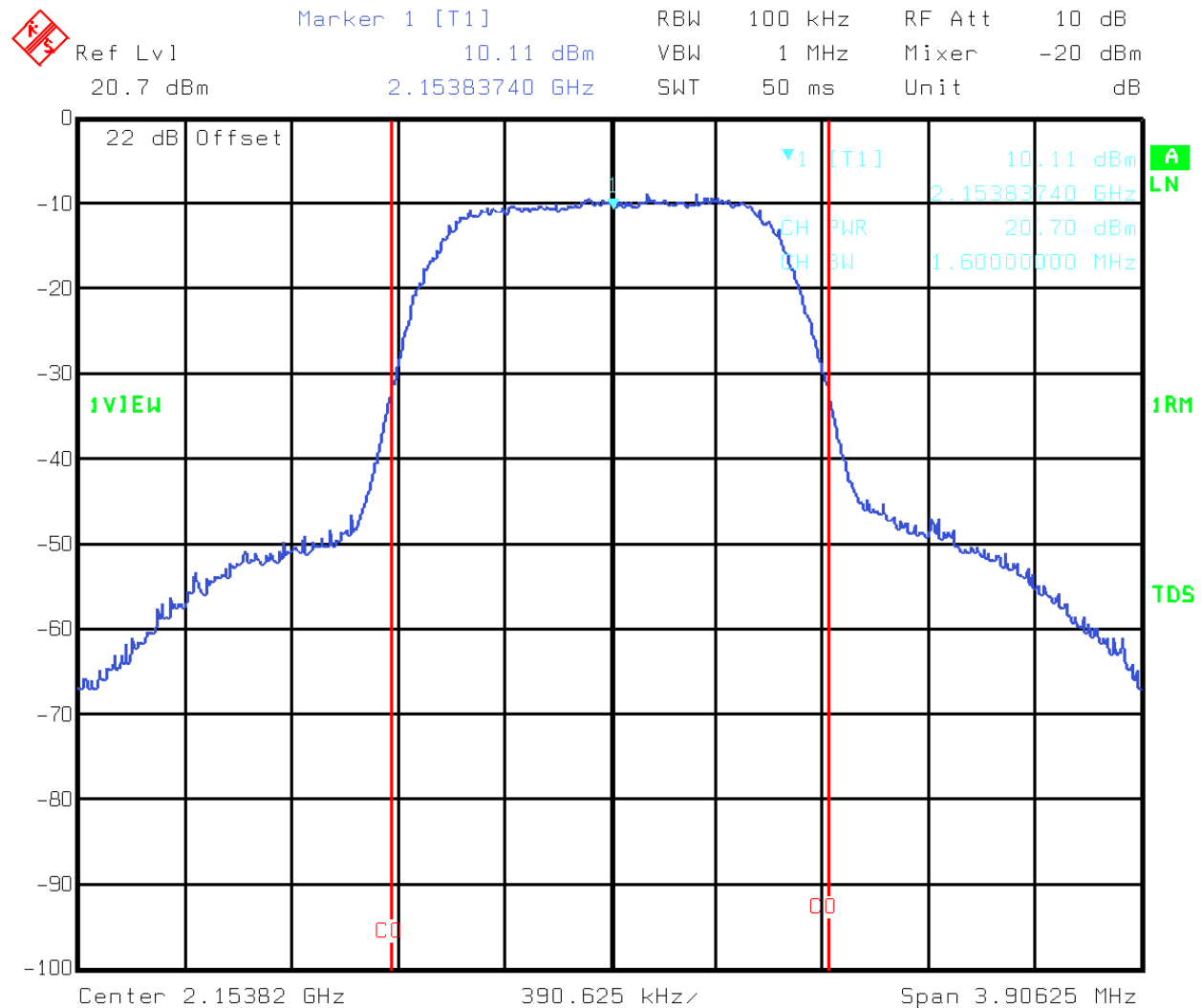
EQUIPMENT: TR2278 Transverter
FCC ID: CI32278



Title: Upper Edge of 6 MHz Channel
Comment A: 16 QAM, 640 kbps
Date: 18.AUG.1999 14:08:27

Plot 40 – 16 QAM Modulation, 640 kbps

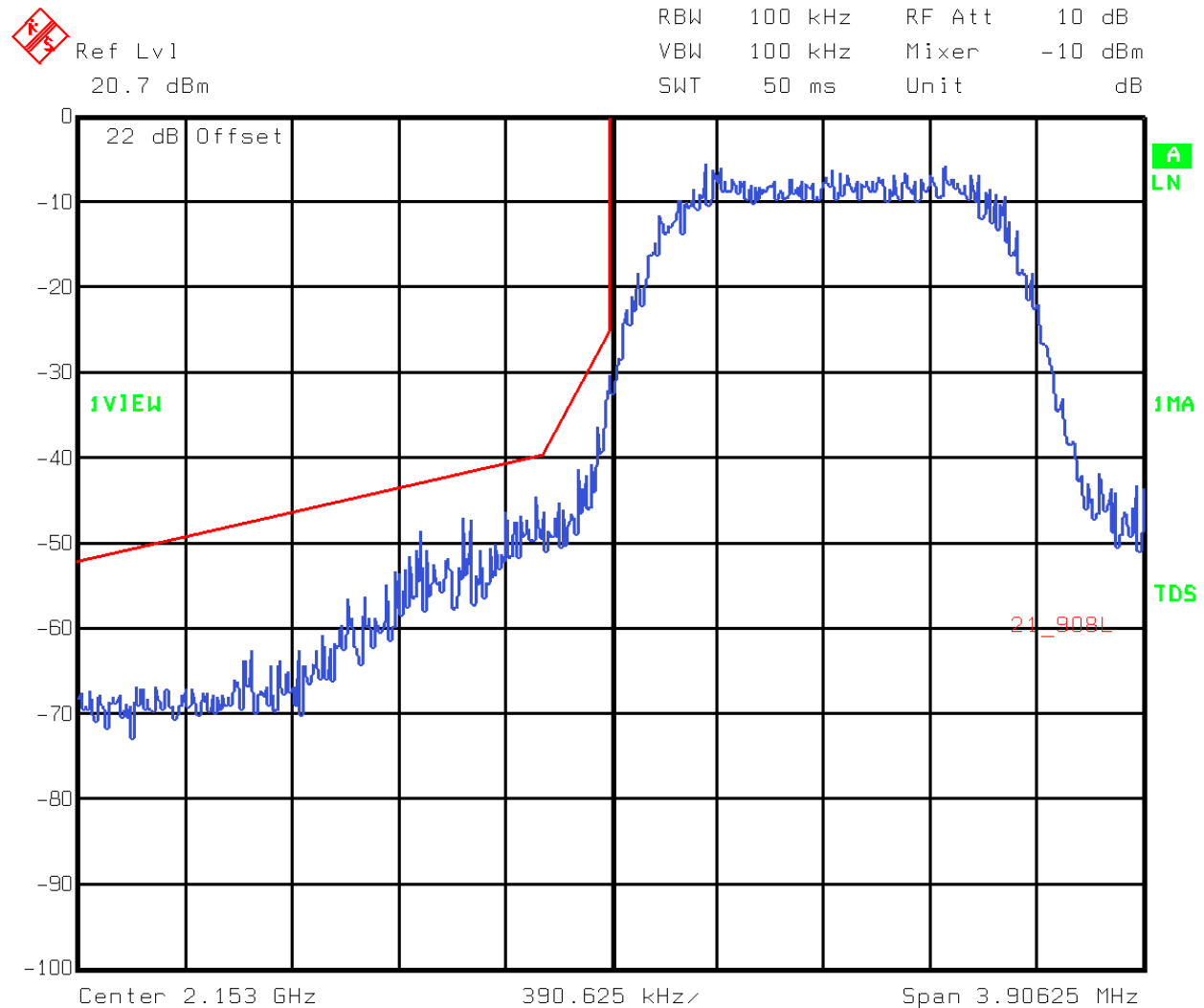
EQUIPMENT: TR2278 Transverter
FCC ID: CI32278



Title: Average Channel Power
Comment A: 16 QAM, 1280 ksps
Date: 18.AUG.1999 11:15:08

Plot 41 – 16 QAM Modulation, 1280 ksps

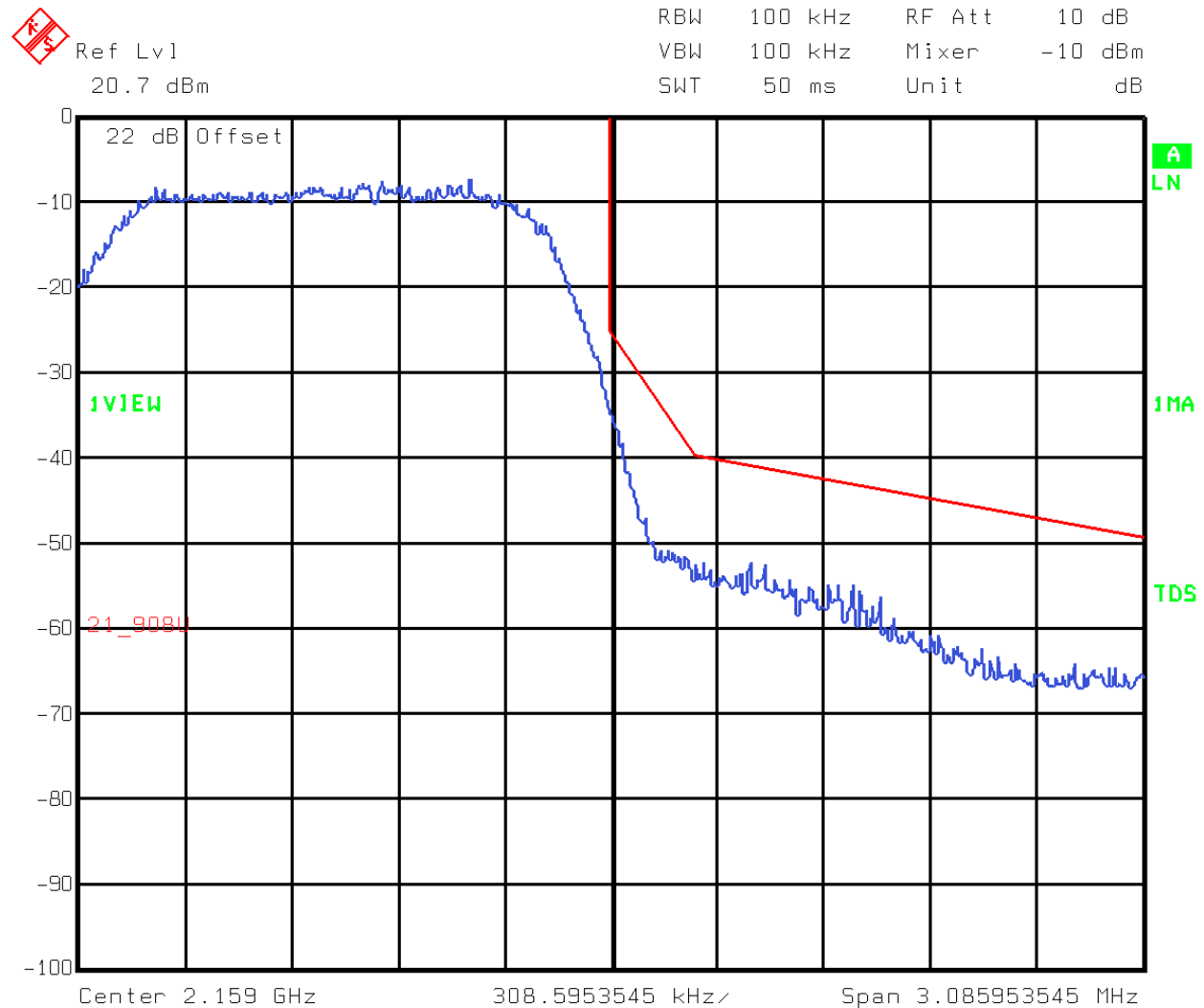
EQUIPMENT: TR2278 Transverter
FCC ID: CI32278



Title: Lower Edge of 6 MHz Band
Comment A: 16 QAM, 1280 kbps
Date: 18.AUG.1999 11:18:11

Plot 42 – 16 QAM Modulation, 1280 kbps

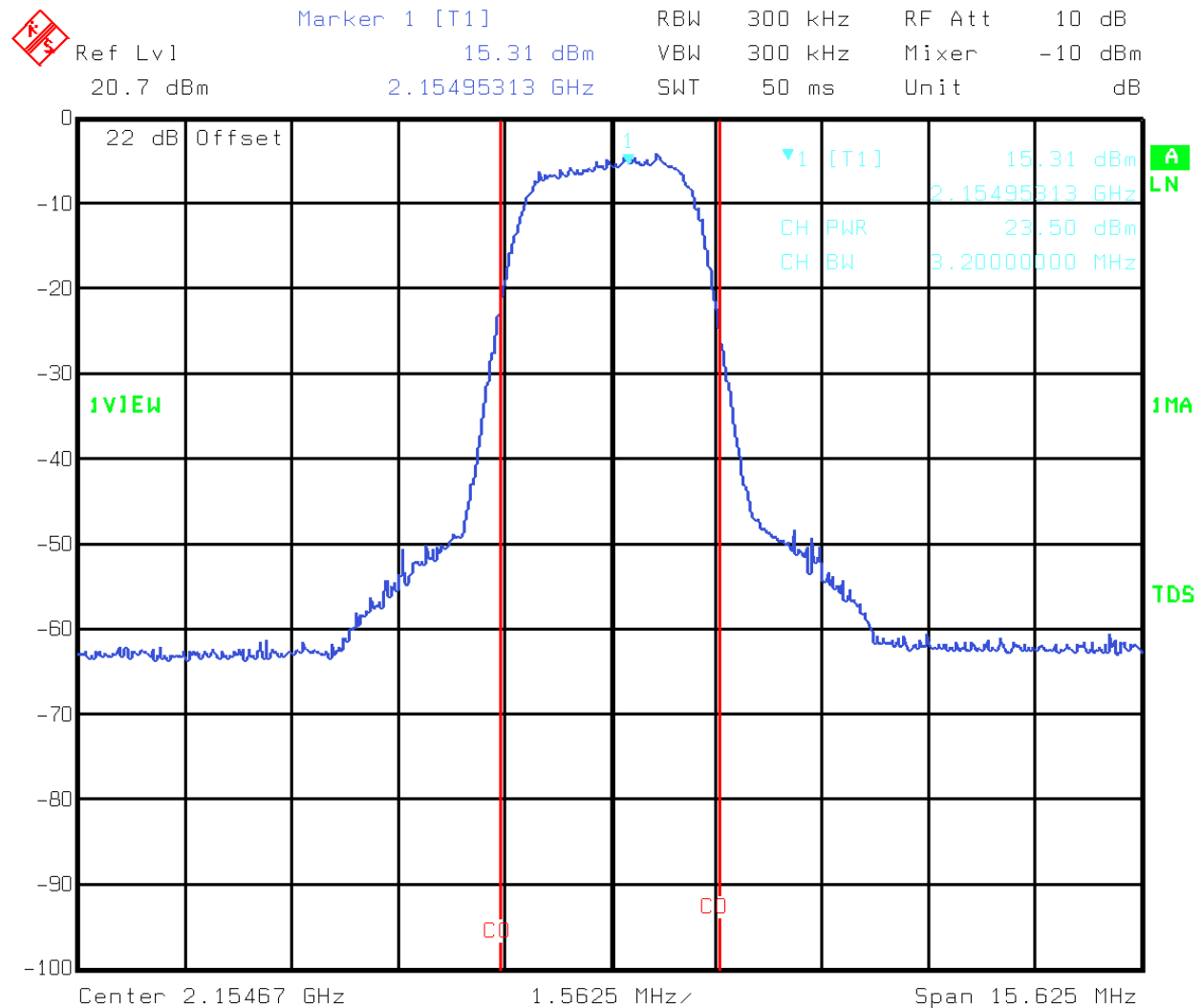
EQUIPMENT: TR2278 Transverter
FCC ID: CI32278



Title: Upper Edge of 6 MHz Channel
Comment A: 16 QAM, 1280 kps
Date: 18.AUG.1999 13:07:58

Plot 43 – 16 QAM Modulation, 1280 kps

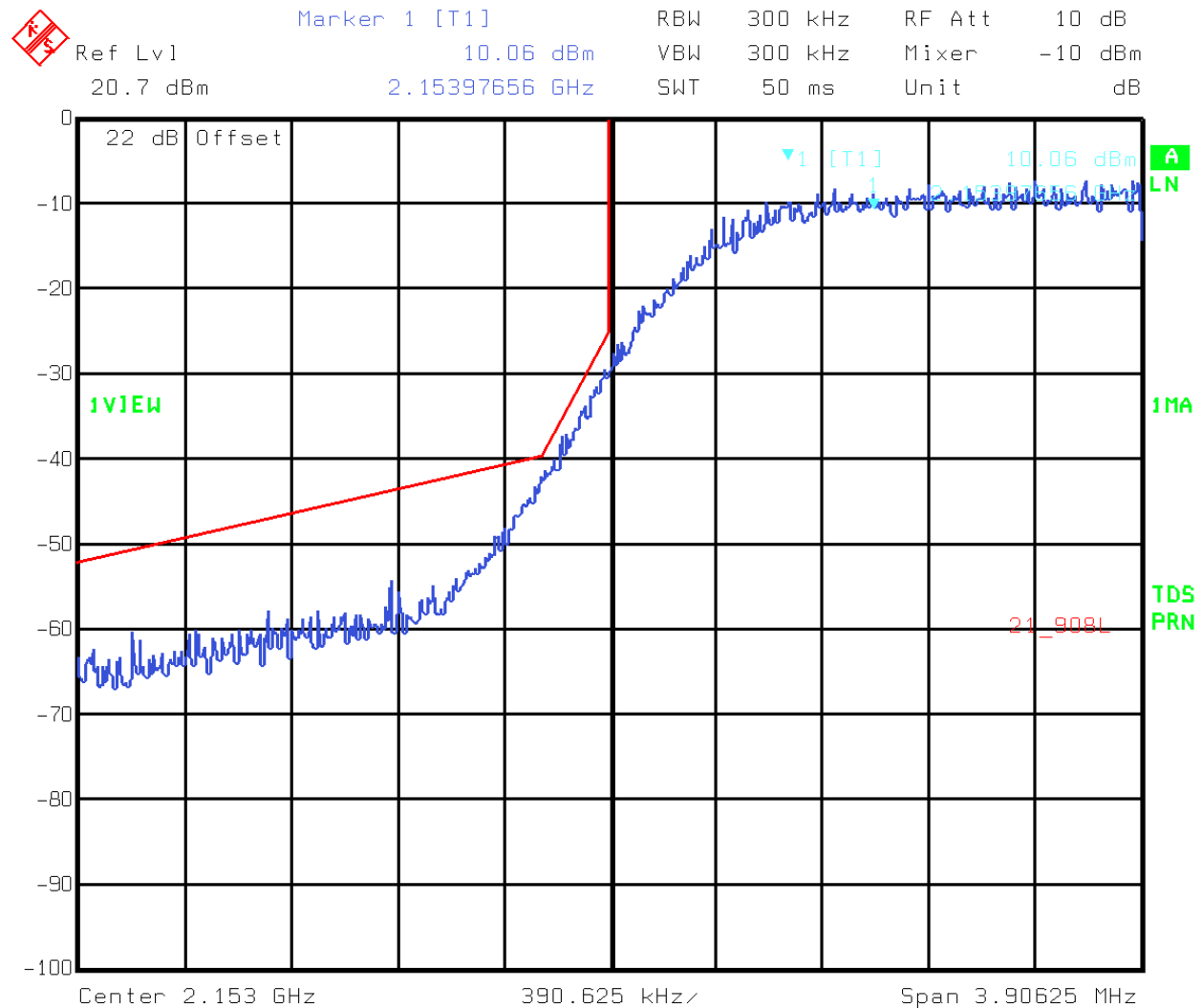
EQUIPMENT: TR2278 Transverter
FCC ID: CI32278



Title: Average Channel Power
Comment A: 16 QAM, 2560 ksps
Date: 18.AUG.1999 11:34:56

Plot 44 – 16 QAM Modulation, 2560 ksps

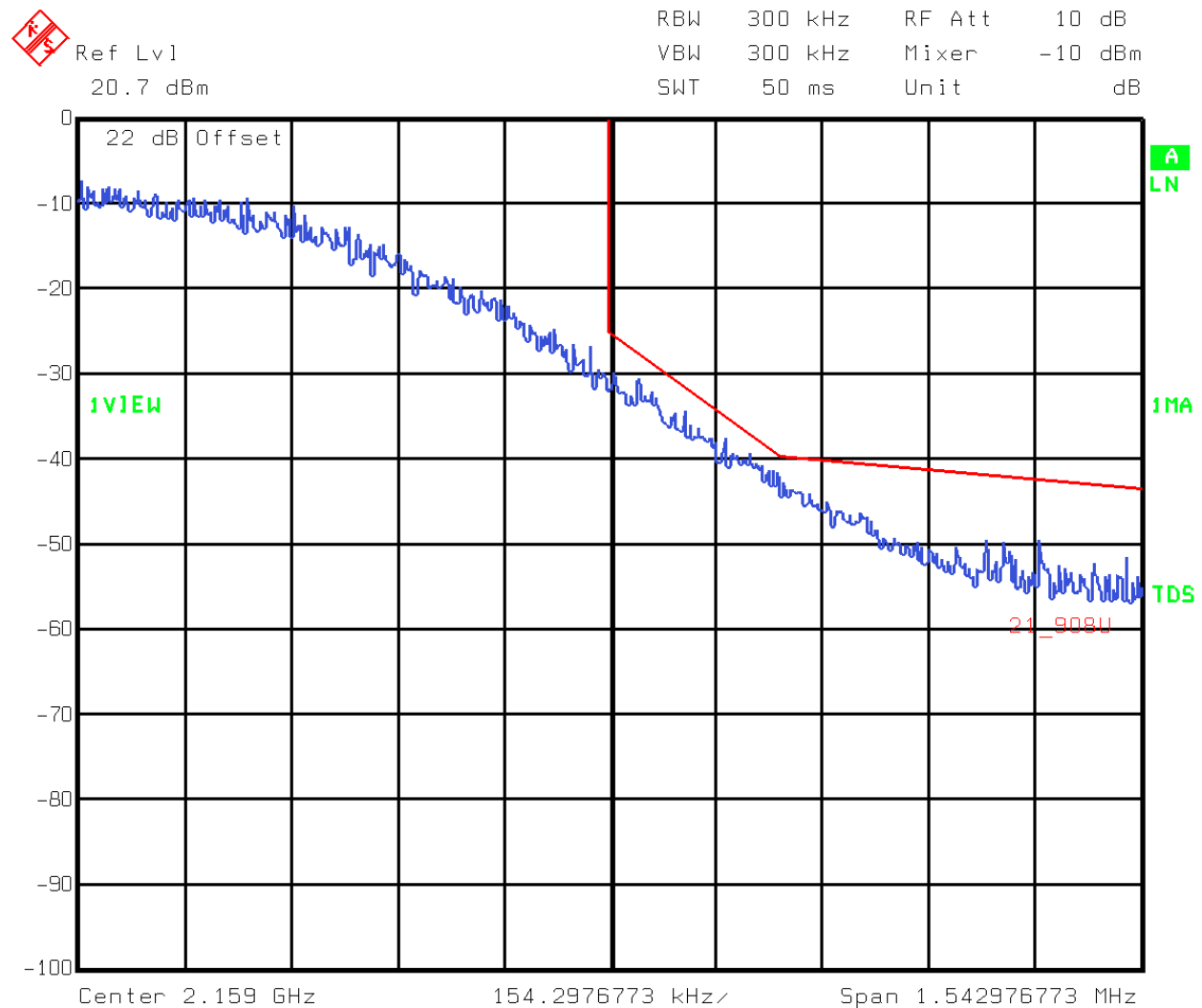
EQUIPMENT: TR2278 Transverter
FCC ID: CI32278



Title: Lower Edge of 6 MHz Channel
Comment A: 16 QAM, 2560 ksps
Date: 18.AUG.1999 11:37:37

Plot 45 – 16 QAM Modulation, 2560 ksps

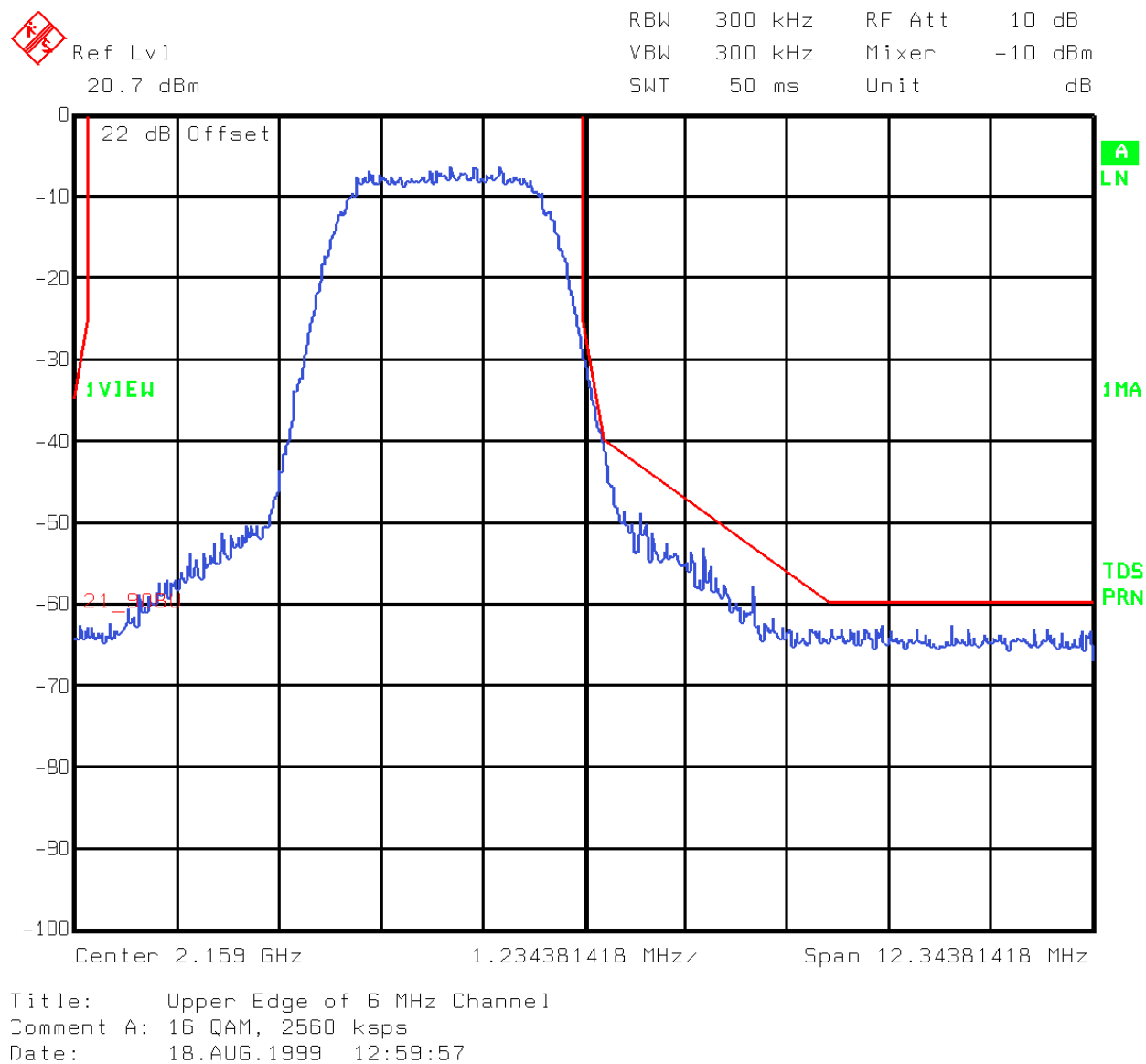
EQUIPMENT: TR2278 Transverter
FCC ID: CI32278



Title: Upper Edge of 6 MHz Channel
Comment A: 16 QAM, 2560 ksps
Date: 18.AUG.1999 12:58:43

Plot 46 – 16 QAM Modulation, 2560 ksps

EQUIPMENT: TR2278 Transverter
FCC ID: CI32278



Plot 47 – 16 QAM Modulation, 2560 kbps

EQUIPMENT: TR2278 Transverter
FCC ID: CI32278

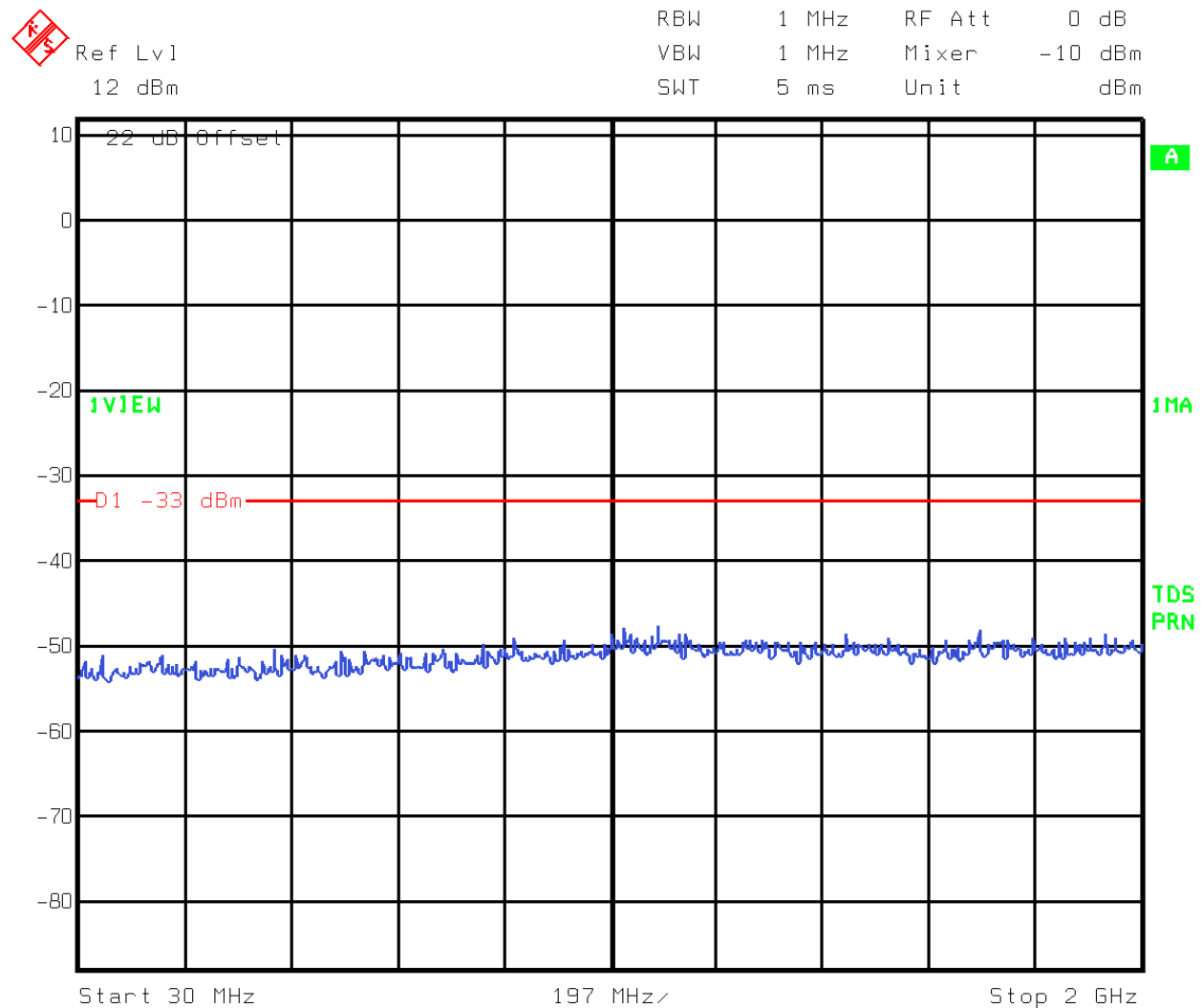
Section 5. Spurious Emissions at Antenna Terminals

NAME OF TEST: Spurious Emissions @ Antenna Terminals	PARA. NO.: 2.1051
TESTED BY: Tom Tidwell	DATE: 12 August, 1999

Test Results: Complies.**Measurement Data:** See attached plots.**Test Equipment Used:** 1,2,3,4,5,14,21,22**Environmental Conditions:** 22 °Celsius
 42 % RH

Worst-Case In-Band Spurious Emissions:	-35.97 dBm @ 6805.61 MHz
---	---

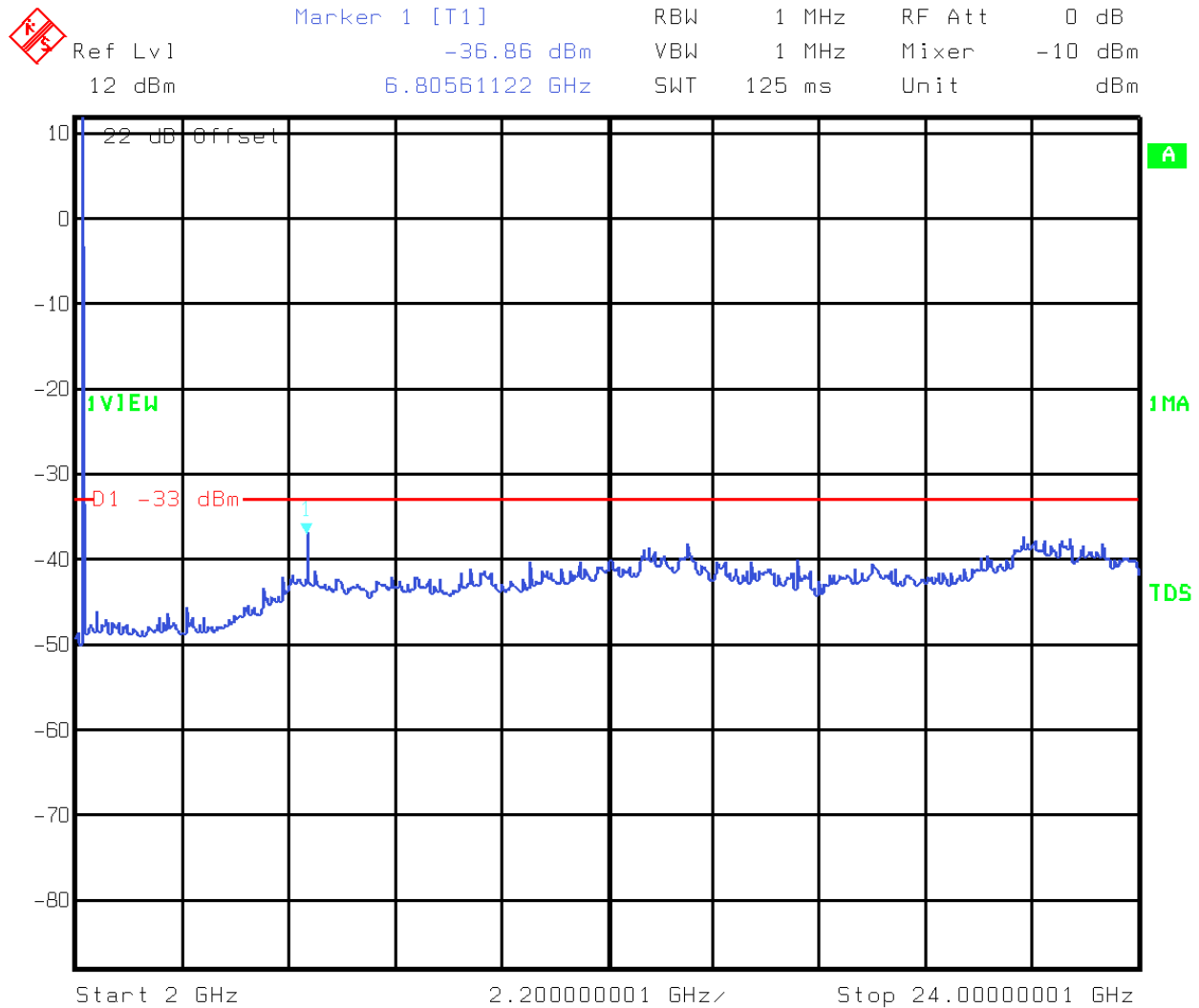
EQUIPMENT: TR2278 Transverter
FCC ID: CI32278



Title: Spurious Emissions
Comment A: 128 kps
Date: 12.AUG.1999 11:53:05

Plot 48 – 128 kps

EQUIPMENT: TR2278 Transverter
FCC ID: CI32278



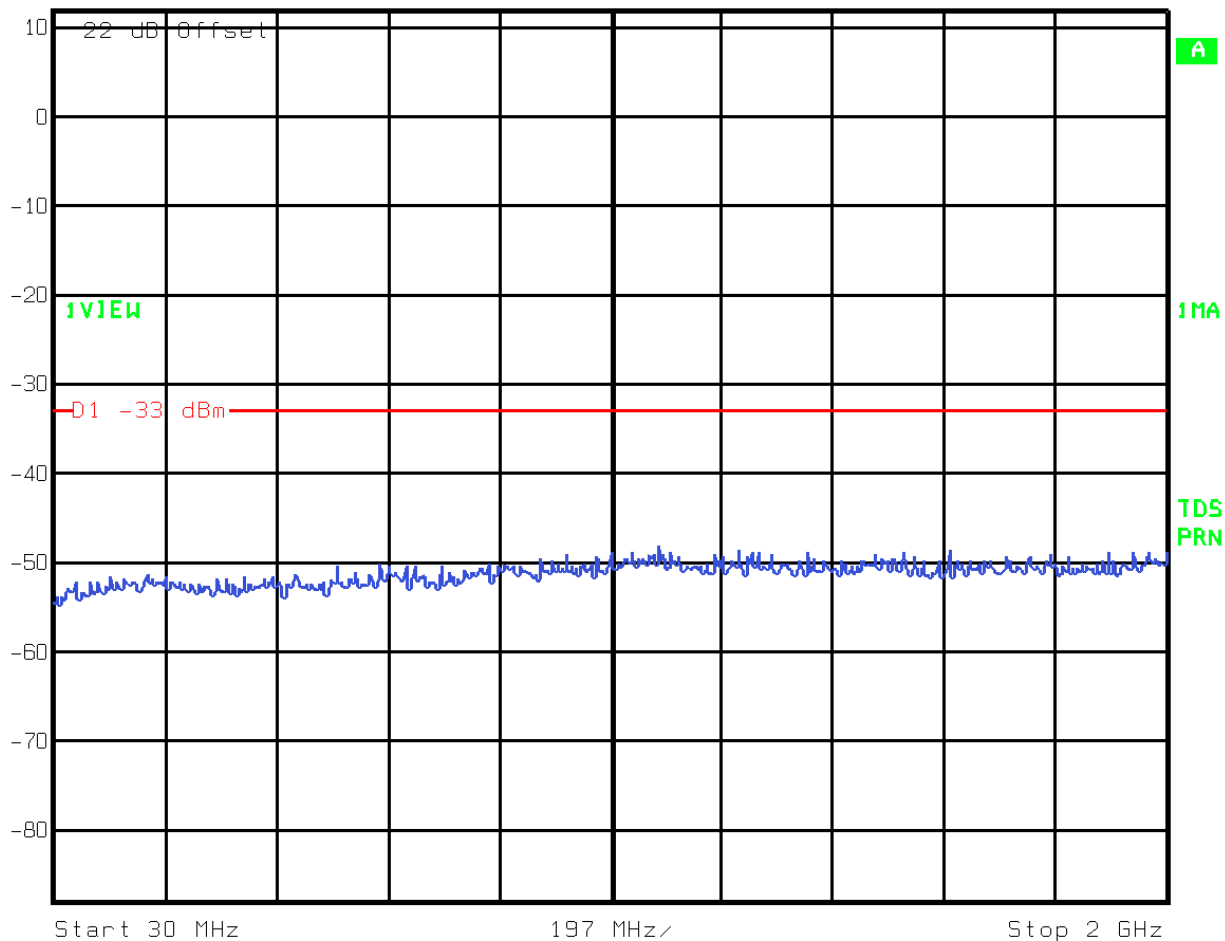
Title: Spurious Emissions
Comment A: 120 kps
Date: 12.AUG.1999 10:39:03

Plot 49 – 128 kps

EQUIPMENT: TR2278 Transverter
FCC ID: CI32278



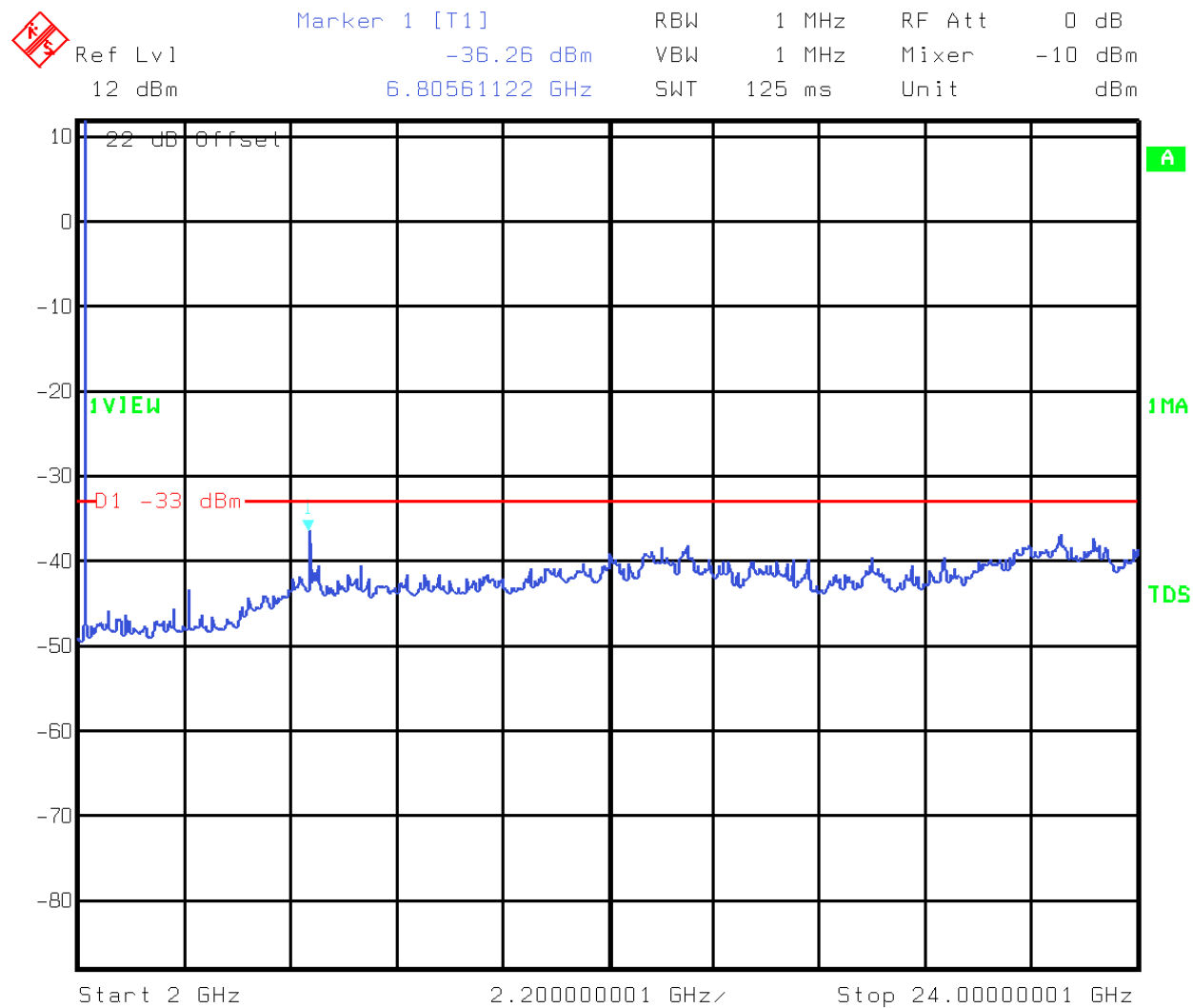
Ref Lvl	RBW	1 MHz	RF Att	0 dB
12 dBm	VBW	1 MHz	Mixer	-10 dBm
	SWT	5 ms	Unit	dBm



Title: Spurious Emissions
Comment A: 160 kps
Date: 12.AUG.1999 11:50:55

Plot 50 – 160 kps

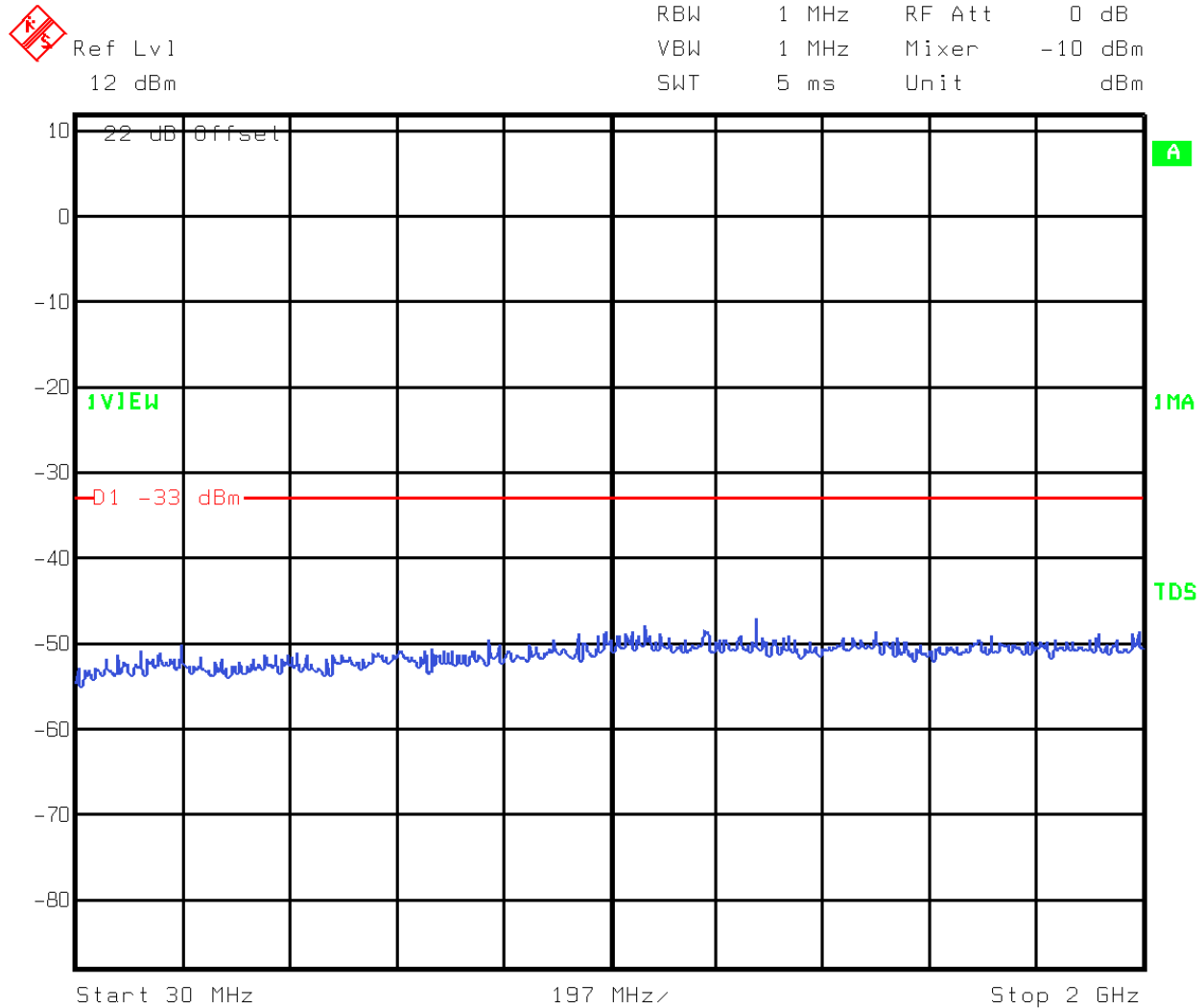
EQUIPMENT: TR2278 Transverter
FCC ID: CI32278



Title: Spurious Emissions
Comment A: 160 kps
Date: 12.AUG.1999 10:26:43

Plot 51 – 160 kps

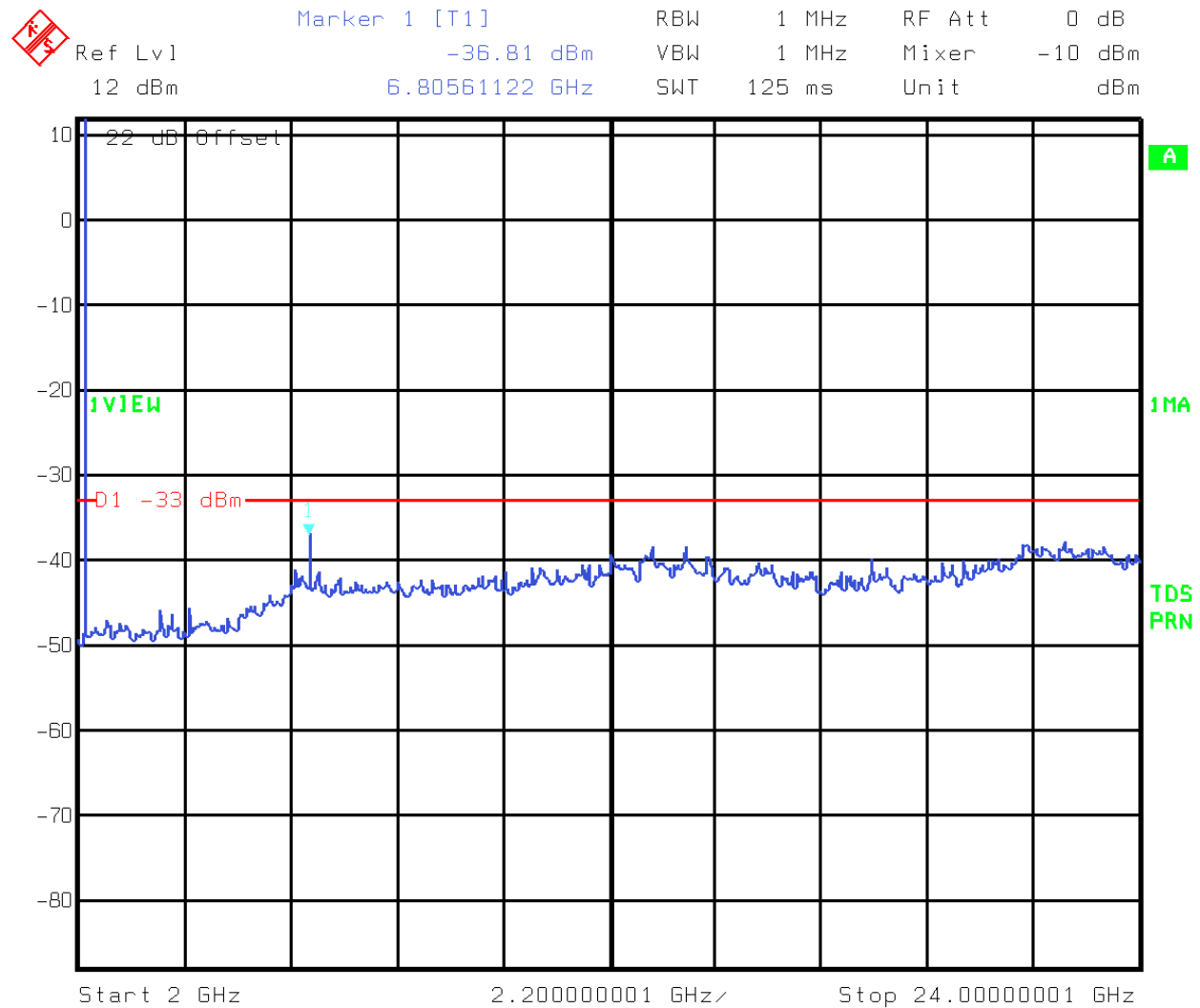
EQUIPMENT: TR2278 Transverter
FCC ID: CI32278



Title: Spurious Emissions
Comment A: 320 kps
Date: 12.AUG.1999 11:49:38

Plot 52 – 320 kps

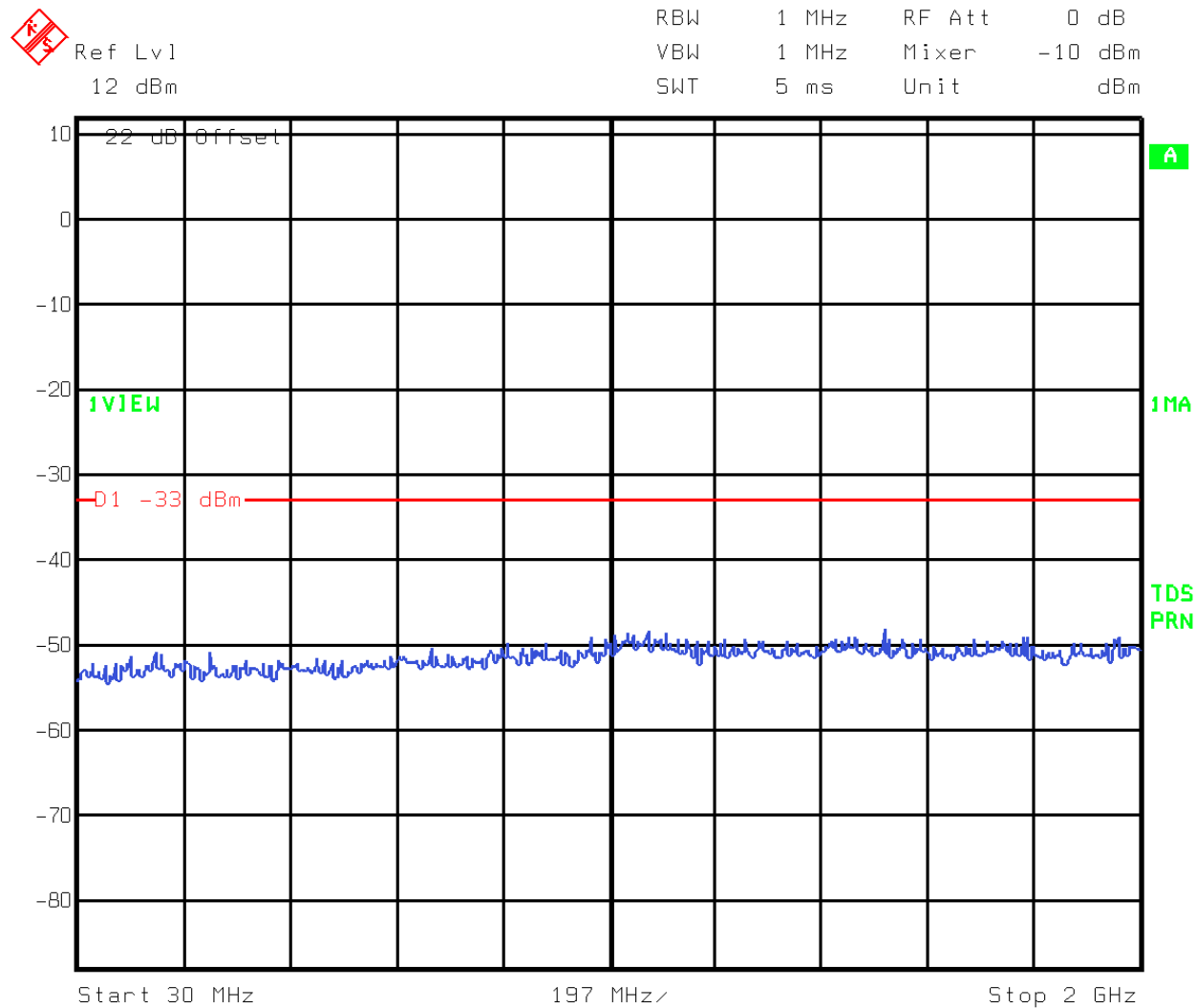
EQUIPMENT: TR2278 Transverter
FCC ID: CI32278



Title: Spurious Emissions
Comment A: 320 kps
Date: 12.AUG.1999 10:40:08

Plot 53 – 320 kps

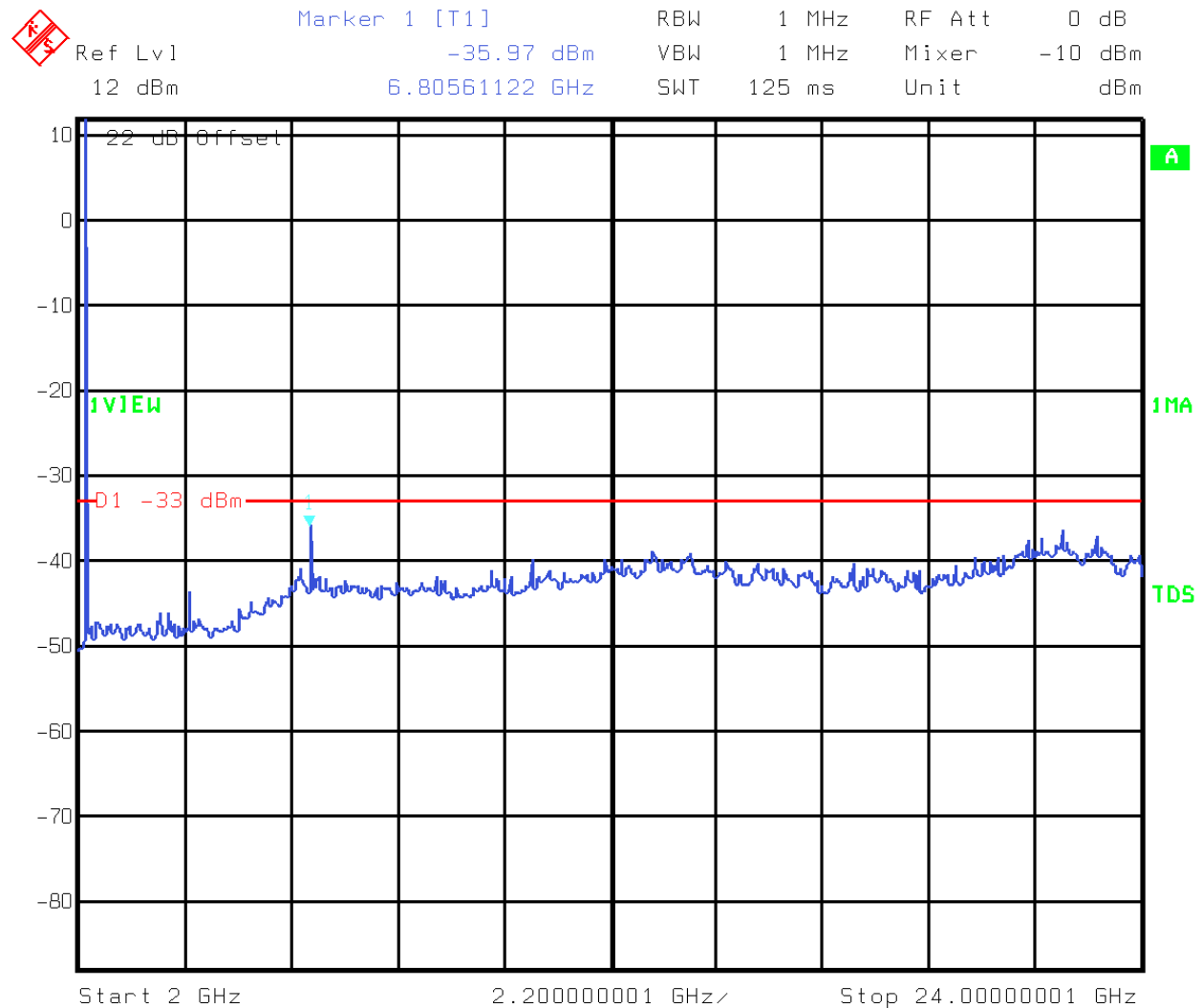
EQUIPMENT: TR2278 Transverter
FCC ID: CI32278



Title: Spurious Emissions
Comment A: 512 kps
Date: 12.AUG.1999 11:45:48

Plot 54 – 512 kps

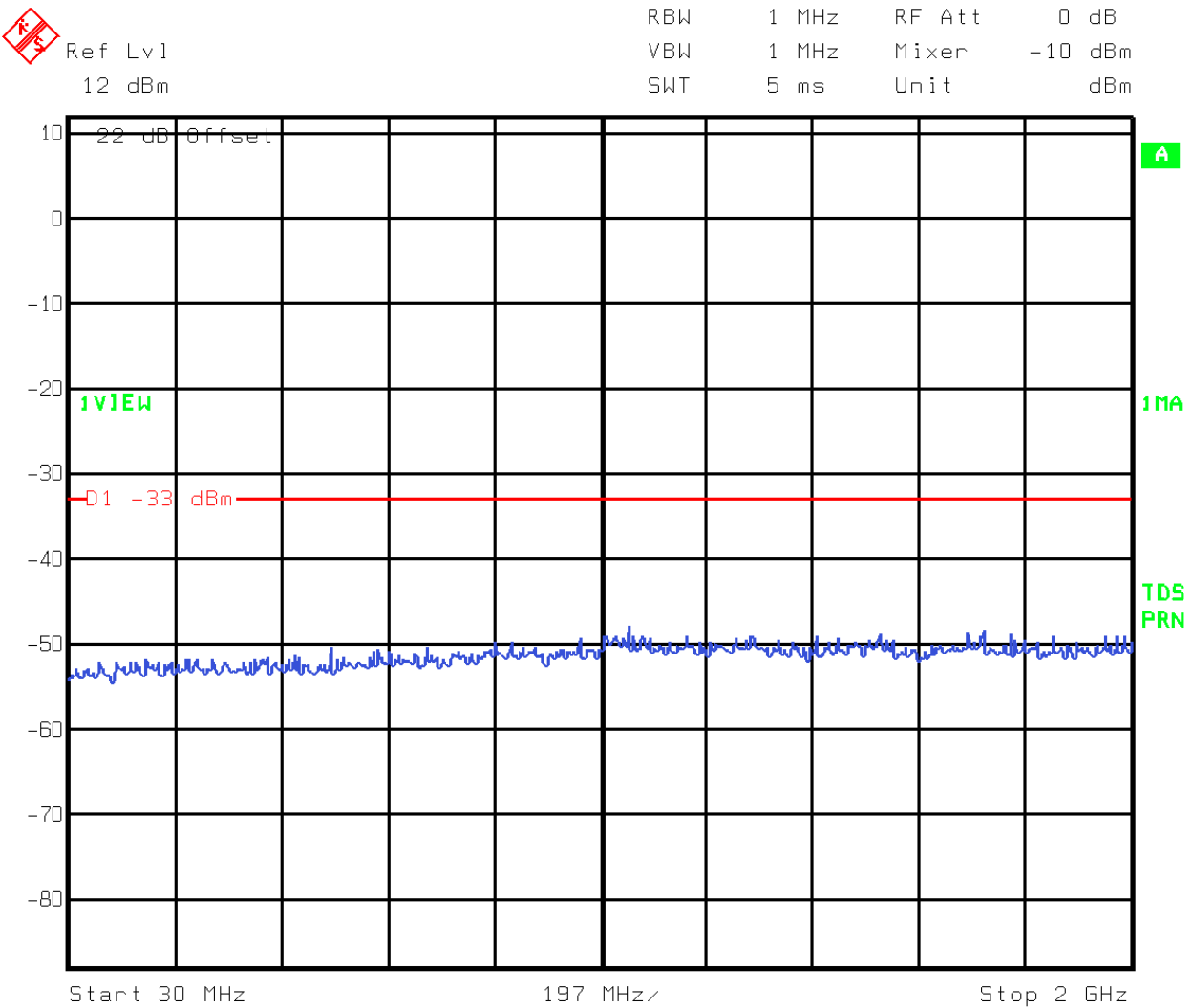
EQUIPMENT: TR2278 Transverter
FCC ID: CI32278



Title: Spurious Emissions
Comment A: 512 kbps
Date: 12.AUG.1999 10:45:36

Plot 55 – 512 kbps

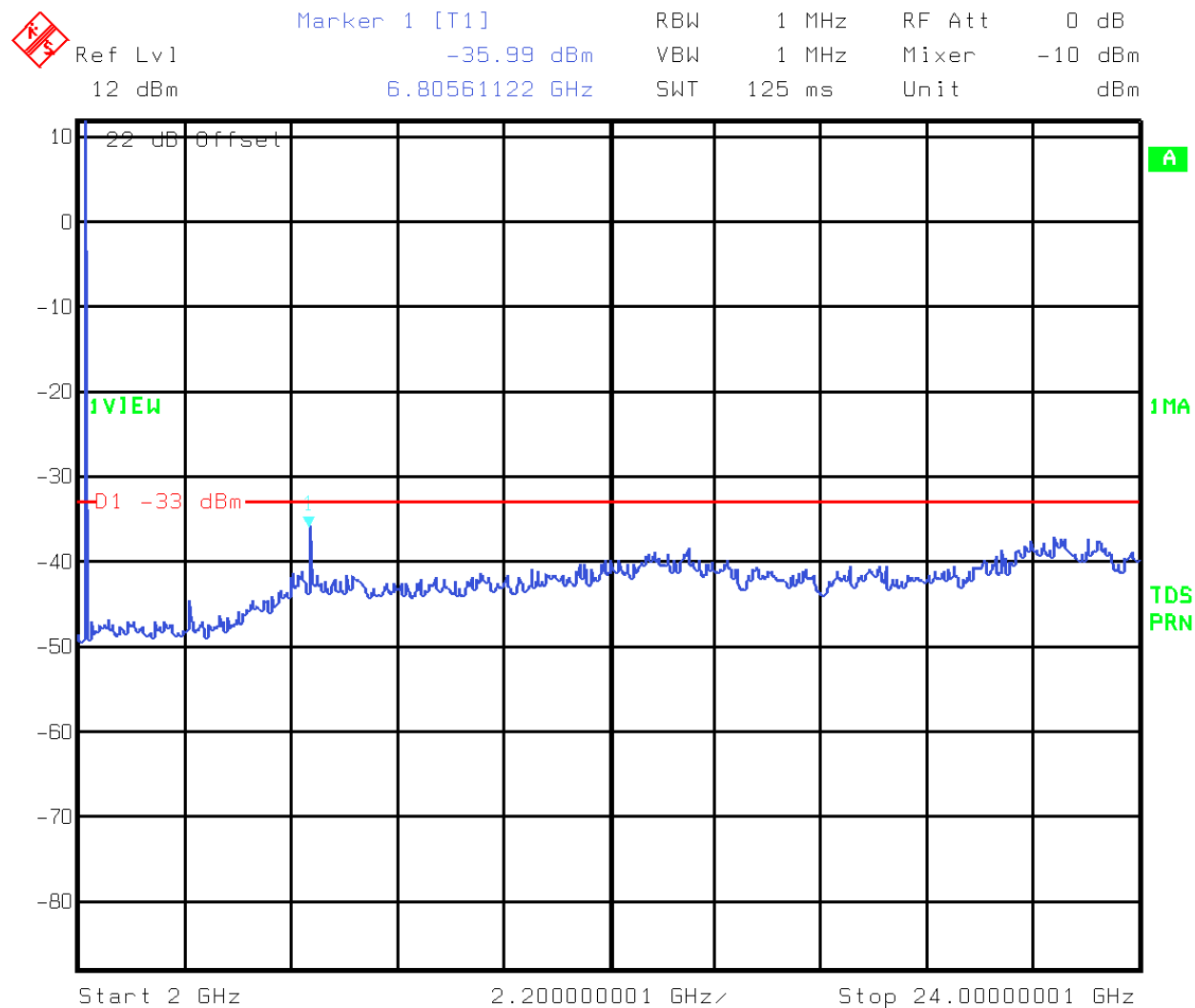
EQUIPMENT: TR2278 Transverter
FCC ID: CI32278



Title: Spurious Emissions
Date: 12.AUG.1999 11:43:20

Plot 56 – 640 kps

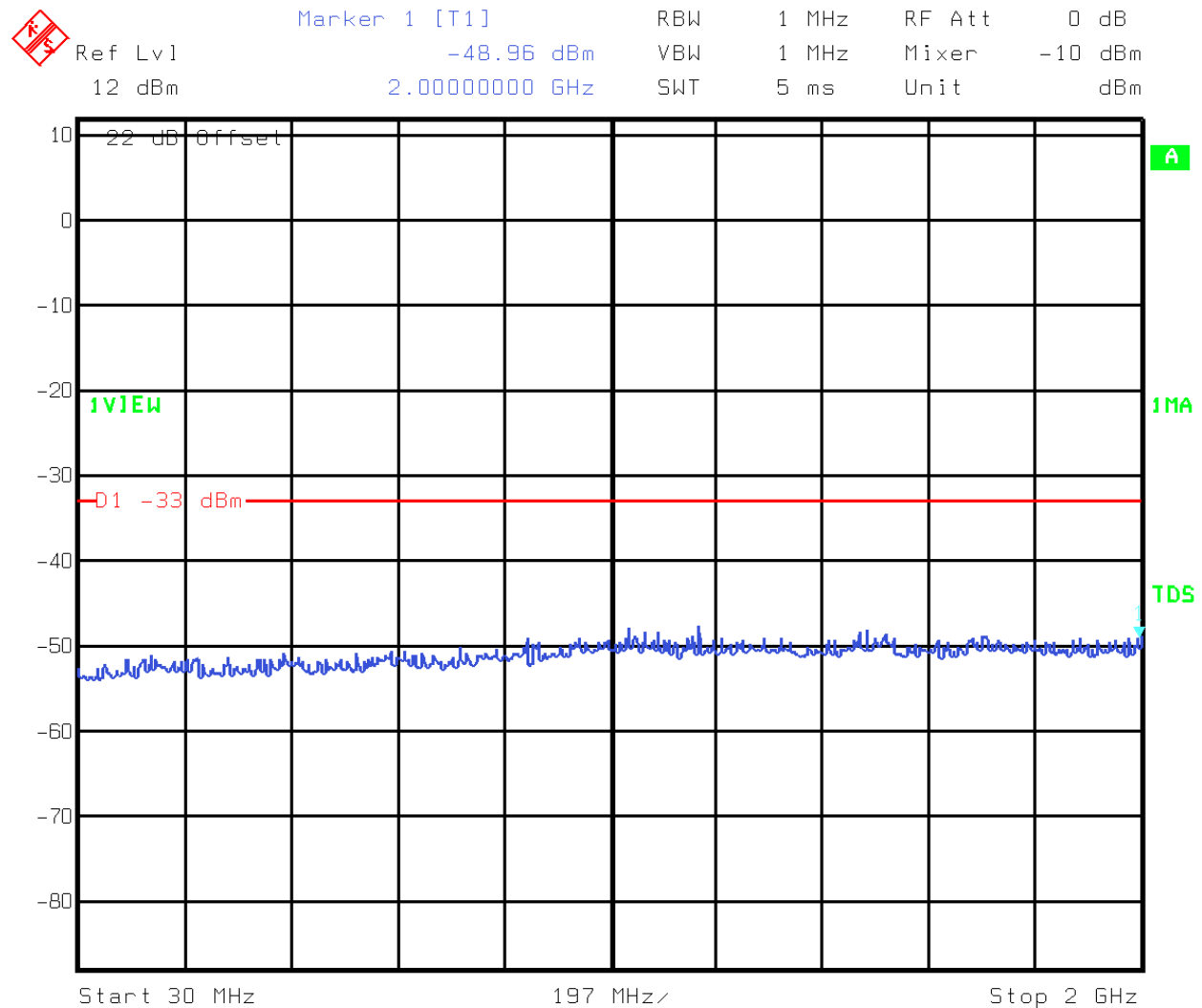
EQUIPMENT: TR2278 Transverter
FCC ID: CI32278



Title: Spurious Emissions
Comment A: 640 kps
Date: 12.AUG.1999 10:46:32

Plot 57 – 640 kps

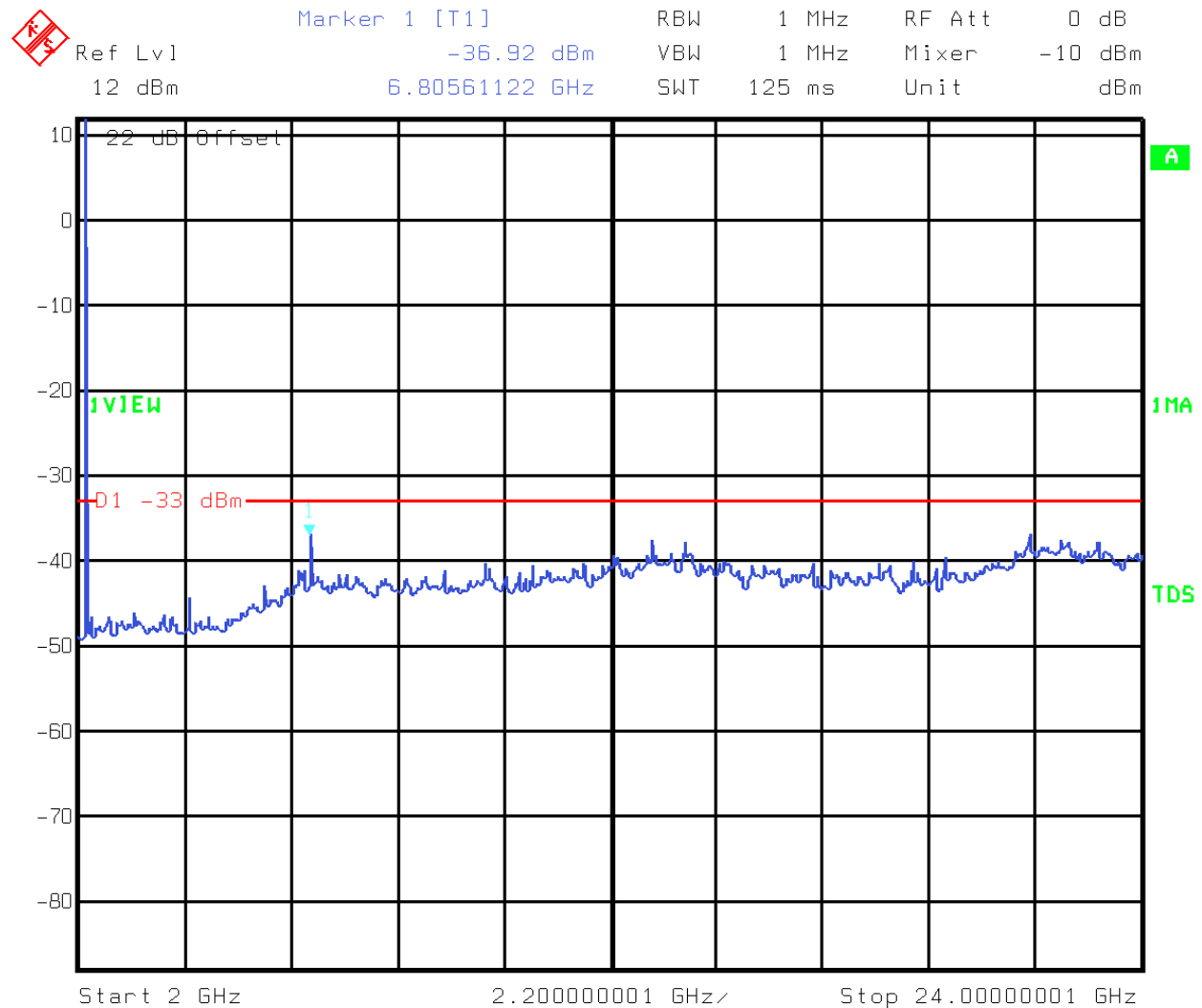
EQUIPMENT: TR2278 Transverter
FCC ID: CI32278



Title: Spurious Emissions
Comment A: 1280 ksp
Date: 12.AUG.1999 11:41:38

Plot 58 – 1280 ksp

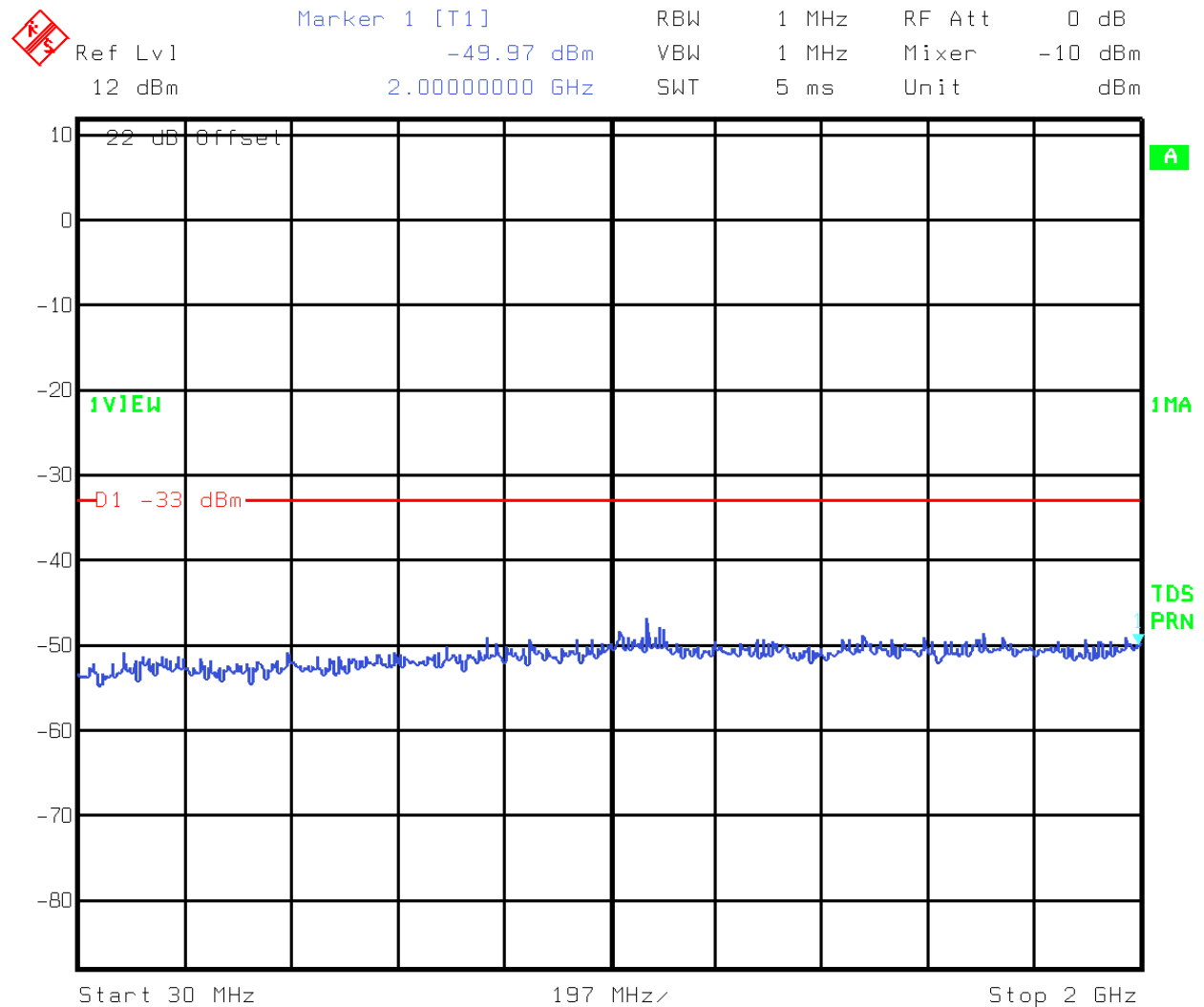
EQUIPMENT: TR2278 Transverter
FCC ID: CI32278



Title: Spurious Emissions
Comment A: 1280 ksp/s
Date: 12.AUG.1999 11:13:58

Plot 59 – 1280 ksp/s

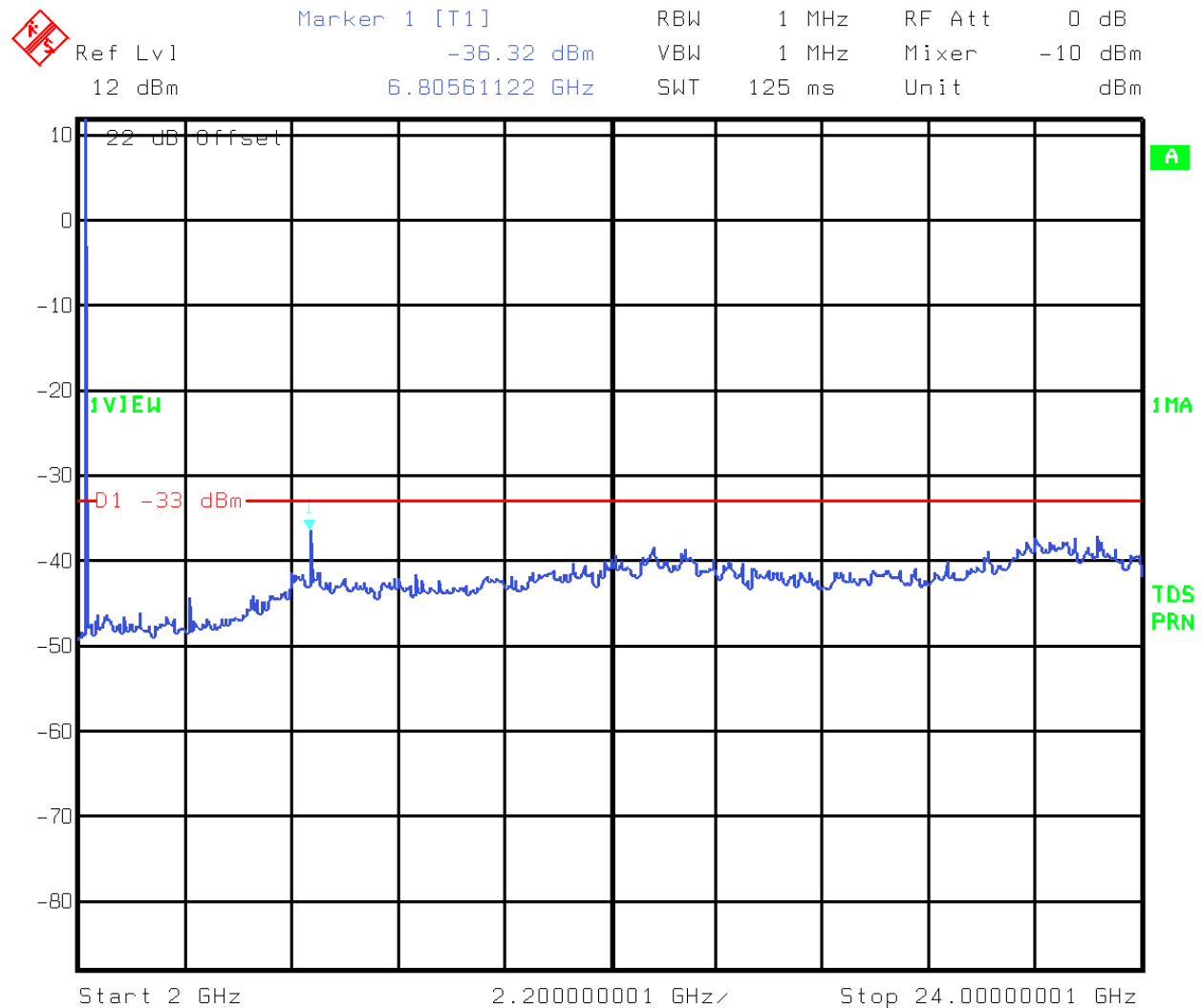
EQUIPMENT: TR2278 Transverter
FCC ID: CI32278



Title: Spurious Emissions
Comment A: 1544 kbps
Date: 12.AUG.1999 11:39:10

Plot 60 – 1544 kbps

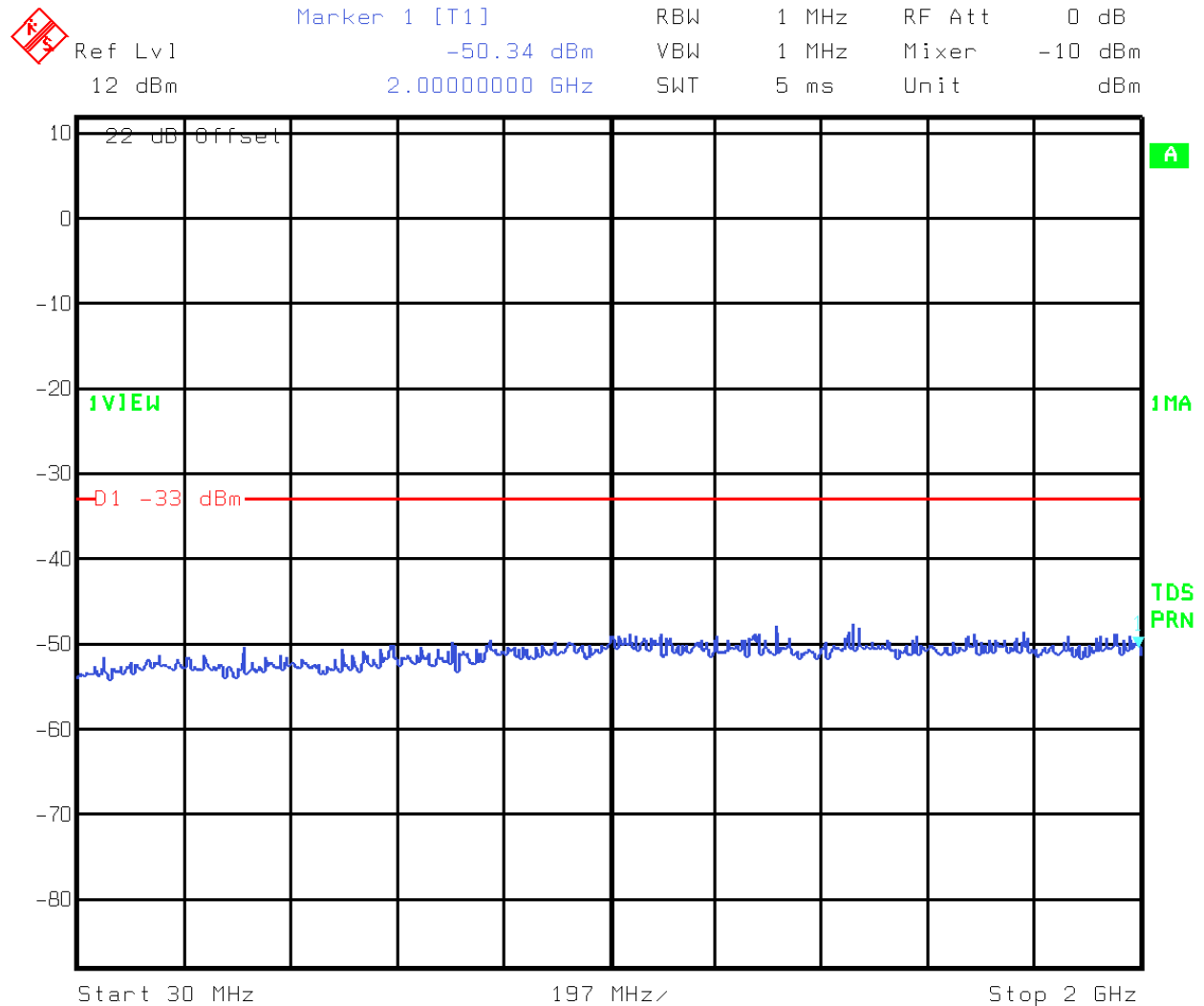
EQUIPMENT: TR2278 Transverter
FCC ID: CI32278



Title: Spurious Emissions
Comment A: 1544 ksps
Date: 12.AUG.1999 11:15:02

Plot 61 – 1544 ksps

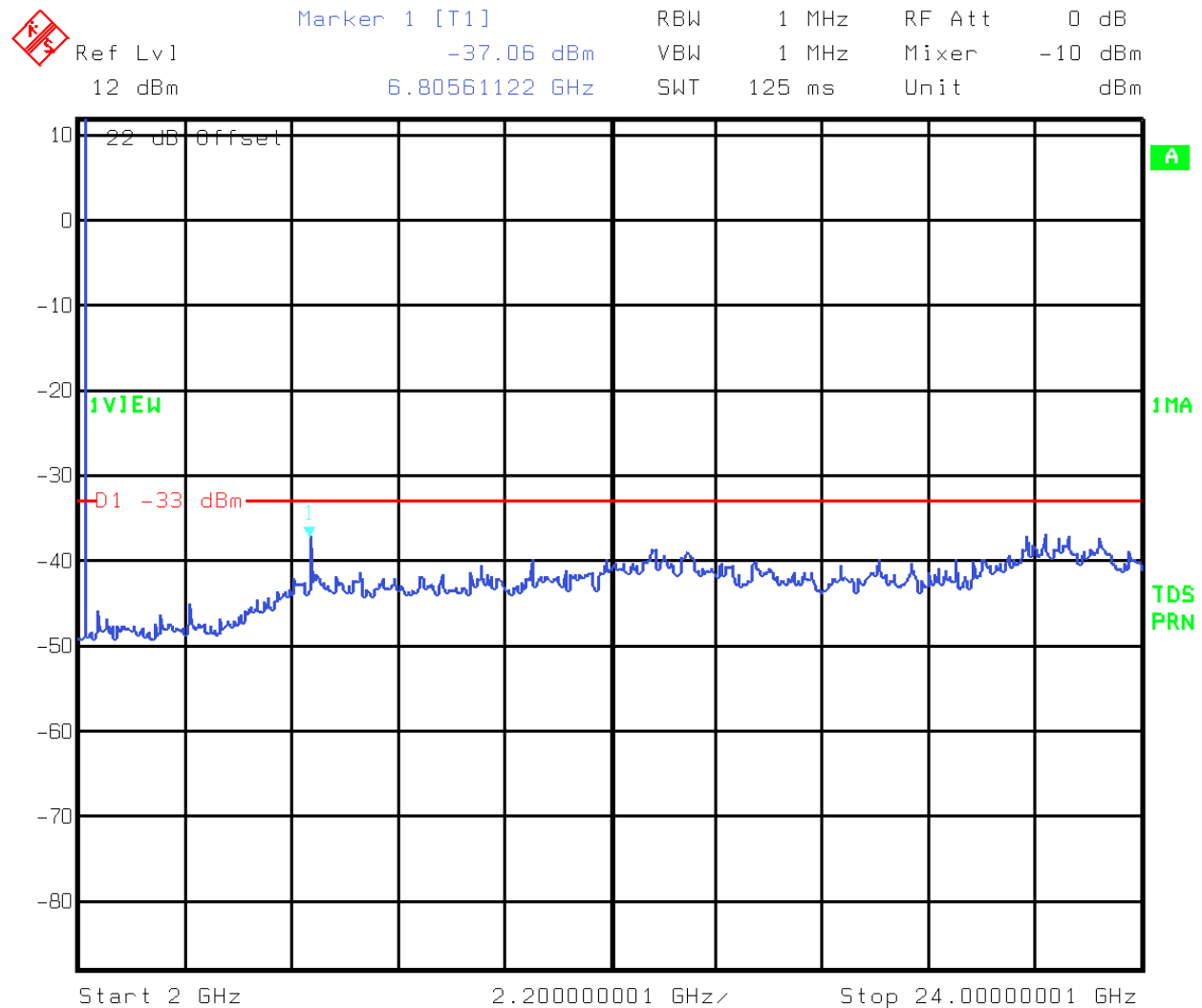
EQUIPMENT: TR2278 Transverter
FCC ID: CI32278



Title: Spurious Emissions
Comment A: 2048 ksp
Date: 12.AUG.1999 11:36:44

Plot 62 – 2048 ksp

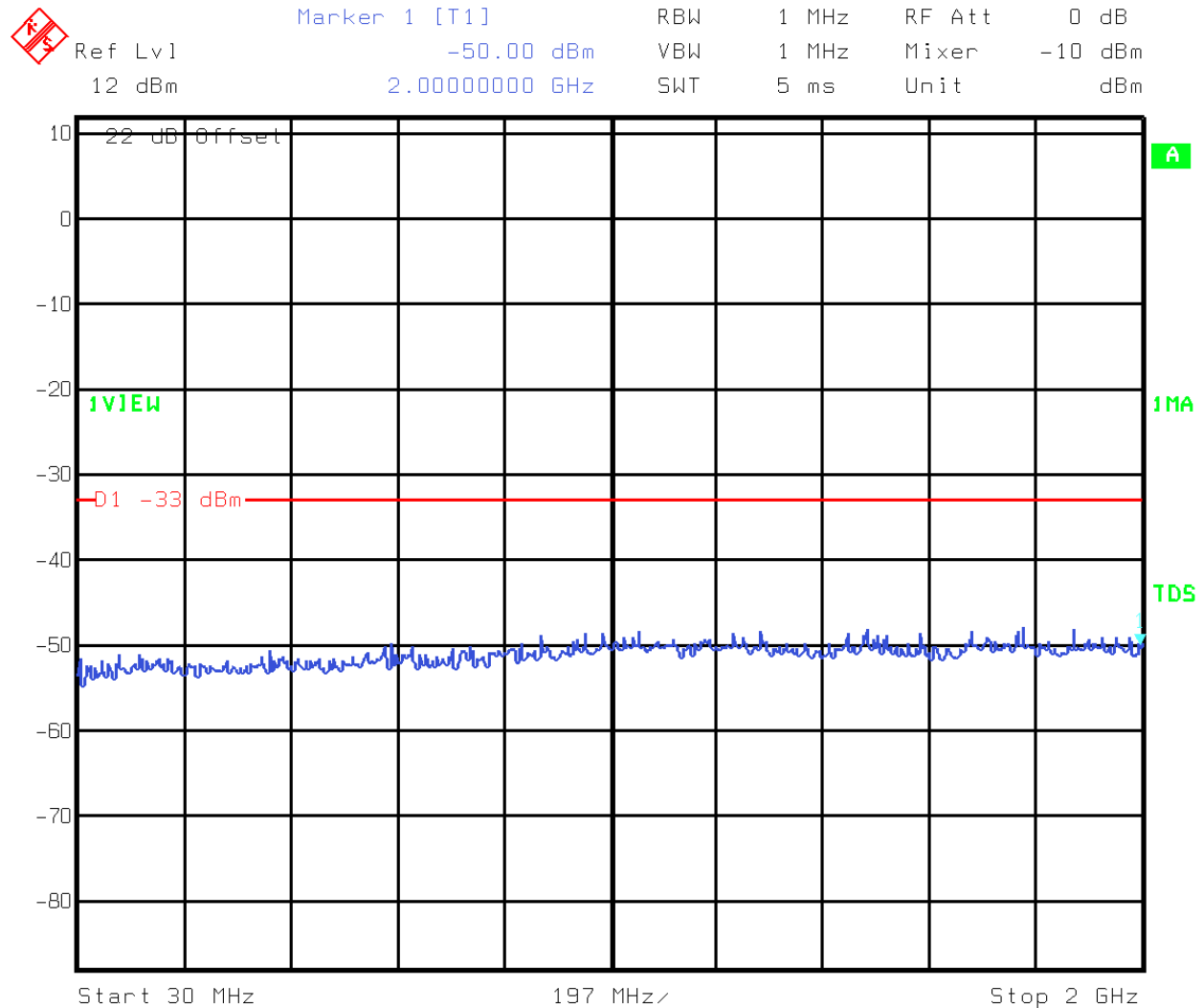
EQUIPMENT: TR2278 Transverter
FCC ID: CI32278



Title: Spurious Emissions
Comment A: 2048 ksps
Date: 12.AUG.1999 11:18:51

Plot 63 – 2048 ksps

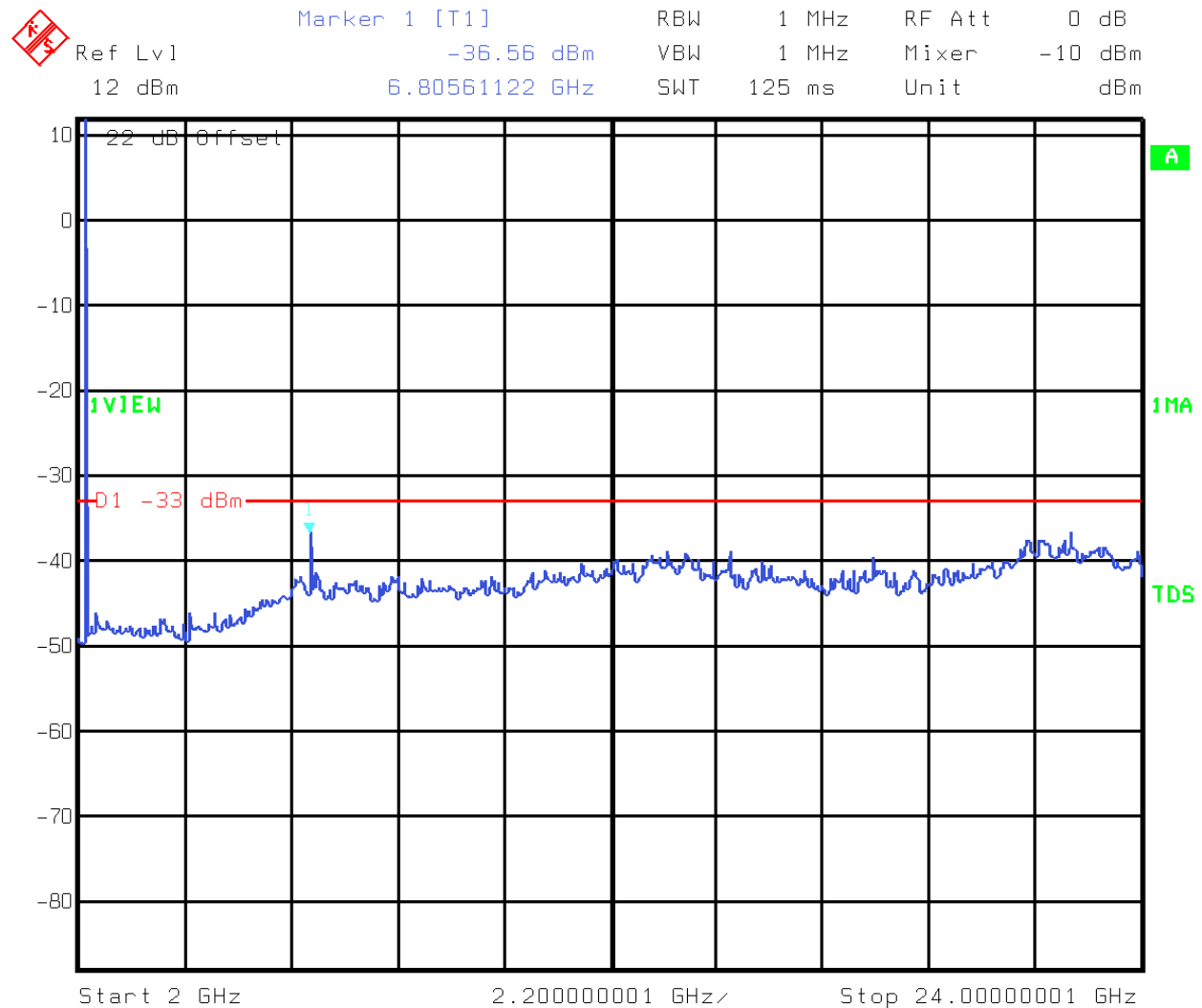
EQUIPMENT: TR2278 Transverter
FCC ID: CI32278



Title: Spurious Emissions
Comment A: 2560 ksp
Date: 12.AUG.1999 11:35:33

Plot 64 – 2560 ksp

EQUIPMENT: TR2278 Transverter
FCC ID: CI32278



Title: Spurious Emissions
Comment A: 2560 ksp
Date: 12.AUG.1999 11:30:54

Plot 65 – 2560 ksp

EQUIPMENT: TR2278 Transverter
FCC ID: CI32278

Section 6. Field Strength of Spurious

NAME OF TEST: Field Strength of Spurious Emissions	PARA. NO.: 2.1053
TESTED BY: Tom Tidwell	DATE: 12 August, 1999

Test Results: Complies

Measurement Data: See attached table(s).

Test Equipment Used: 14, 33, 34, 35

Environmental Conditions: 22 °Celsius
 42 % RH

EQUIPMENT: TR2278 Transverter
FCC ID: CI32278

Test Data - Radiated Emissions



KTL Dallas, Inc.

Dallas Headquarters:

802 N. Kealy
Lewisville, TX 75057
Tel: (972) 436-9600
Fax: (972) 436-2667

Microwave Radiated Emissions Data

Complete X Preliminary Page 1 of 1Client: Conifer Test #: MW-2 W.O.#: 9L0114EEUT: TR2278 S/N: NONE Photo ID: 9L0069 RE-1Technician: Tom Tidwell Specification: CFR 47, Part 21 Lab: 1 Date: 8/12/99Equipment Used: CF31, G2034, G2200, G2626Configuration: TX MAX POWER, ANTENNA REPLACED WITH 50 OHM LOADBandwidth: 1 MHz Video Bandwidth: 1 MHz Antenna Distance 3 m Detector:Climatic Conditions: EUT Power: X 115 V.A.C. X 60 Hz X Peak
Temperature: 23 C 208 V.A.C. 50 Hz Average
Relative Humidity: 48 % 230 V.A.C.
Atmospheric Pressure: 985 mbar Other 1 Phase 3 Phase

Freq. (MHz)	Meter Reading (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	RF Gain (dB)	Conver. Factor	Corrected Reading (dBuV/m)	EIRP (mW)	EIRP (dBm)	Pol.	Comments:
2159	102.6	28.3	3	0	0	133.9	7364.13	38.67	V	Measured w/
2159	81.1	28.3	3	0	0	112.4	52.134	17.17	H	TX antenna
										installed.
2278	59.9	28.3	3.1	32.0	0	59.3	0.00026	-35.93	V	Measured w/
2278	59.5	28.3	3.1	32.0	0	58.9	0.00023	-36.33	H	50 ohm load
4318	35	32.1	4.4	31.6	0	39.9	2.9E-06	-55.33	V	Noise Floor
4318	35	32.1	4.4	31.6	0	39.9	2.9E-06	-55.33	H	Noise Floor
6477	35	34.5	5.5	32.0	0	43	6E-06	-52.23	V	Noise Floor
6477	35	34.5	5.5	32.0	0	43	6E-06	-52.23	H	Noise Floor
8636	40	37	6.3	33.0	0	50.3	3.2E-05	-44.93	V	Noise Floor
8636	40	37	6.3	33.0	0	50.3	3.2E-05	-44.93	H	Noise Floor
10795	40	38.6	7.3	33.3	0	52.6	5.5E-05	-42.63	V	Noise Floor
10795	40	38.6	7.3	33.3	0	52.6	5.5E-05	-42.63	H	Noise Floor
12952	40	39.9	8.2	32.2	0	55.9	0.00012	-39.33	V	Noise Floor
12952	40	39.9	8.2	32.2	0	55.9	0.00012	-39.33	H	Noise Floor

DATA\COMMON\FORMS\TEST DATA SHEETS\MICRORE REV 030597

EQUIPMENT: TR2278 Transverter
FCC ID: CI32278

KTL Dallas, Inc.

Dallas Headquarters:

802 N. Kealy
Lewisville, TX 75057
Tel: (972) 436-9600
Fax: (972) 436-2667

Microwave Radiated Emissions Data

Complete X Preliminary Page 1 of 1Client: Conifer Test #: MW-3 W.O.#: 9L0114EEUT: TR2278 with Subreflector Antenna S/N: NONE Photo ID: 9L0069 RE-2Technician: Tom Tidwell Specification: CFR 47, Part 21 Lab: 1 Date: 8/18/99Equipment Used: CF31, G2034, G2200, G2626Configuration: TX MAX POWERBandwidth: 1 MHz Video Bandwidth: 1 MHz Antenna Distance 3 m Detector:

Climatic Conditions: EUT Power: X 115 V.A.C. X 60 Hz X Peak
 Temperature: 23 C 208 V.A.C. 50 Hz Average
 Relative Humidity: 48 % 230 V.A.C.
 Atmospheric Pressure: 985 mbar Other 1 Phase 3 Phase

Freq. (MHz)	Meter Reading (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	RF Gain (dB)	Conver. Factor	Corrected Reading (dBuV/m)	EIRP (mW)	EIRP (dBm)	Pol.	Comments:
2159	111	28.3	3	0	0	142.3	50947.3	47.07	V	Measured w/
2159	110.9	28.3	3	0	0	142.2	49787.6	46.97	H	TX antenna
										installed.
2278	59.9	28.3	3.1	30	0	61.3	0.0004	-33.93	V	Measured w/
2278	59.5	28.3	3.1	30	0	60.9	0.00037	-34.33	H	50 ohm load
4318	35	32.1	4.4	30	0	41.5	4.2E-06	-53.73	V	Noise Floor
4318	35	32.1	4.4	30	0	41.5	4.2E-06	-53.73	H	Noise Floor
6477	35	34.5	5.5	30	0	45	9.5E-06	-50.23	V	Noise Floor
6477	35	34.5	5.5	30	0	45	9.5E-06	-50.23	H	Noise Floor
8636	40	37	6.3	30	0	53.3	6.4E-05	-41.93	V	Noise Floor
8636	40	37	6.3	30	0	53.3	6.4E-05	-41.93	H	Noise Floor
10795	40	38.6	7.3	30	0	55.9	0.00012	-39.33	V	Noise Floor
10795	40	38.6	7.3	30	0	55.9	0.00012	-39.33	H	Noise Floor
12952	40	39.9	8.2	30	0	58.1	0.00019	-37.13	V	Noise Floor
12952	40	39.9	8.2	30	0	58.1	0.00019	-37.13	H	Noise Floor

DATA\COMMON\FORMS\TEST\DATASHEETS\MICRORE REV 030597

EQUIPMENT: TR2278 Transverter
FCC ID: CI32278

Section 7. Frequency Stability

NAME OF TEST: Frequency Stability	PARA. NO.: 2.1055
TESTED BY:	DATE:

Test Results:

Measurement Data: See attached table.

Test Equipment Used:

Standard Test Frequency:

Standard Supply Voltage:

Environmental Conditions: °Celsius
 % RH

Not Applicable

EQUIPMENT: TR2278 Transverter
FCC ID: CI32278

Test Data – Frequency Stability

Not Applicable

EQUIPMENT: TR2278 Transverter
FCC ID: CI32278**Section 8. Test Equipment List**

REF. NO.	EQUIPMENT	MANUFACTURE	MODEL	ASSET	LAST CAL.
1	50 ohm load(500W)	Narda	27470	G1366	2/25/99
2	Directional coupler(50 MHz – 1 GHz)	Narda	3020A	G3725	5/19/99
3	Directional coupler(1 GHz – 4 GHz)	Narda	3022	G3726	5/19/99
4	Directional coupler(2 GHz – 18 GHz)	Hewlett Packard	11692D	G3727	5/7/99
5	Spectrum analyzer	Rohde & Schwarz	FSEK 30	G2632	6/14/99
6	Spectrum analyzer	Hewlett Packard	8563E	G2624	5/29/99
7	Power Meter	Wavetek	8531	G3893	6/17/99
8	Power Sensor	Wavetek	85310	G3893	6/17/99
9	Tunable Notch Filter (200-400 MHz)	K & L	3TNF-200/400	G1713	COU
10	Tunable Notch Filter (250-500 MHz)	K & L	3TNF-250/500	G1714	COU
11	Tunable Notch Filter (500-1000 MHz)	K & L	3TNF-500/1000	G1712	COU
12	Tunable Notch Filter (1000-2000 MHz)	K & L	3TNF-1000/2000	G1711	COU
13	Blocking Capacitor	Hewlett Packard	11742		NCR
14	Coaxial Cable	Storm		CF31	4/29/99
15	Coaxial Cable	Suhner		C111	6/15/99
16	Coaxial Cable	AstroLab		CF38	9/1/99
17	Coaxial Cable	AstroLab		CF39	9/1/99
18	Coaxial Cable	AstroLab		CF40	9/1/99
19	Coaxial Cable	AstroLab		CF41	9/1/99
20	I/Q Modulation Generator	Rohde & Schwarz	AMIQ	G2735	5/26/99
21	RF signal generator	Rohde & Schwarz	SMIQ 03	G2736	5/3/99
22	SMA Attenuator (10 dB)	Mini-Circuits	BW-S10W2		8/14/99
23	SMA Attenuator (10 dB)	Mini-Circuits	BW-S10W3		8/15/99
24	SMA Attenuator (10 dB)	Mini-Circuits	BW-S10W4		8/16/99
25	SMA Attenuator (10 dB)	Mini-Circuits	BW-S10W5		8/17/99
26	SMA Attenuator (20 dB)	Mini-Circuits	BW-S20W2		8/14/99
27	SMA Attenuator (20 dB)	Mini-Circuits	BW-S20W3		8/15/99
28	SMA Attenuator (20 dB)	Mini-Circuits	BW-S20W4		8/16/99
29	SMA Attenuator (20 dB)	Mini-Circuits	BW-S20W5		8/17/99
30	Attenuator (10 dB)	Narda	776B-10	G1018	10/26/98
31	Attenuator (20 dB)	Narda	776B-20	G1017B	8/14/99
32	Radio test set	Rohde & Schwarz	CMTA 54	G2631	3/1/99
33	Horn Antenna	Electrometrics	RGA-60	G2034	6/28/99
34	Amplifier	Hewlett Packard	8449A	G2200	6/11/99
35	Spectrum analyzer	Hewlett Packard	8566B	G2626	4/21/99

EQUIPMENT: TR2278 Transverter
FCC ID: CI32278

Section 9. Test Setup Photos



Photo 1 – Test #MW-2

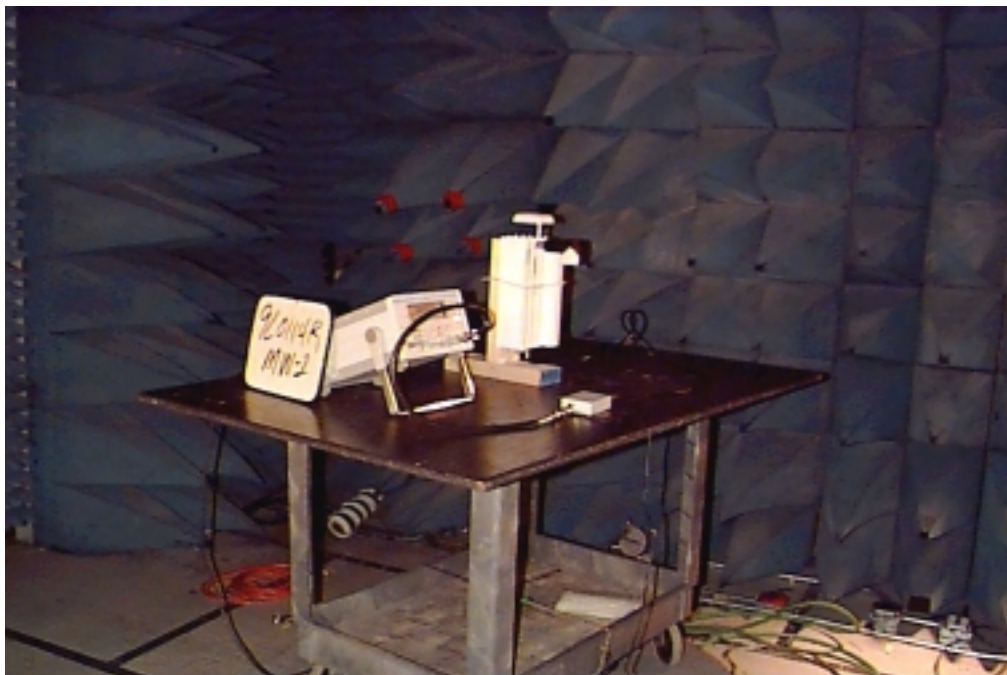


Photo 2 – Test #MW-2

EQUIPMENT: TR2278 Transverter
FCC ID: CI32278



Photo 3 – Test # MW-3

EQUIPMENT: TR2278 Transverter
FCC ID: CI32278



Photo 4 – Test #MW-3

KTL Dallas

FCC PART 21, SUBPART K
MULTIPOINT DISTRIBUTION SERVICE
PROJECT NO.: 9L0114R
ANNEX A

EQUIPMENT: TR2278 Transverter
FCC ID: CI32278

ANNEX A - TEST DETAILS

EQUIPMENT: TR2278 Transverter
FCC ID: CI32278

NAME OF TEST: RF Power Output	PARA. NO.: 2.1046
--------------------------------------	--------------------------

Method Of Measurement:**Antenna Conducted:**

The peak power at antenna terminals is measured using a Spectrum Analyzer or Power Meter. Power output is measured with the maximum rated input level.

E.I.R.P.:

If the antenna is not detachable from the circuit then the Peak Power Output is derived from the peak radiated field strength of the fundamental emission by using the plane wave relation $GP/4\pi R^2 = E^2/120\pi$ and proceeding as follows:

$$P = \frac{E^2 R^2}{30G} = \frac{E^2 3^2}{30G}$$

where,

P = the equivalent isotropic radiated power in watts

E = the maximum measured field strength in V/m

R = the measurement range (3 meters)

G = the numeric gain of the transmit antenna in relation to an isotropic radiator

EQUIPMENT: TR2278 Transverter
FCC ID: CI32278

NAME OF TEST: Occupied Bandwidth	PARA. NO.: 2.1049
---	--------------------------

Method Of Measurement:

A portion of the transmitted signal is coupled to a Spectrum Analyzer with a resolution bandwidth of at least 1% of the bandwidth of the transmitted signal. The resolution bandwidth is chosen so as not to reduce the peak level of the measured waveform.

The appropriate bandwidth mask is applied to the output waveform to verify compliance.

EQUIPMENT: TR2278 Transverter
FCC ID: CI32278

NAME OF TEST: Spurious Emission at Antenna Terminals	PARA. NO.: 2.1051
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Antenna Conducted:

A portion of the transmitted signal is coupled to a Spectrum Analyzer with a resolution bandwidth of 1 MHz for emissions above 1 GHz. Below 1 GHz the resolution bandwidth is chosen so as not to reduce the peak level of the measured waveform.

The appropriate limit line is applied to the output waveform to verify compliance.

EQUIPMENT: TR2278 Transverter
FCC ID: CI32278

NAME OF TEST: Field Strength of Spurious Radiation	PARA. NO.: 2.1053
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If the antenna is detachable from the transmitter, it is removed and replaced with a 50 ohm load. Emissions are measured up to the 10th harmonic of the highest transmit frequency that the transmitter is capable of producing.

If the antenna is not detachable from the transmitter, emissions are measured radiated only at a distance of 3 meters.

Calculation of E.I.R.P.:

Equivalent Isotropic Radiated Power is derived from the peak radiated field strength of the fundamental emission by using the plane wave relation $GP/4\pi R^2 = E^2/120\pi$ and proceeding as follows:

$$P = \frac{E^2 R^2}{30G} = \frac{E^2 3^2}{30G}$$

where,

P = the equivalent isotropic radiated power in watts

E = the maximum measured field strength in V/m

R = the measurement range (3 meters)

G = the numeric gain of the transmit antenna in relation to an isotropic radiator

EQUIPMENT: TR2278 Transverter
FCC ID: CI32278

NAME OF TEST: Frequency Stability
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2.1055

Method Of Measurement:**Frequency Stability With Voltage Variation:**

The E.U.T. is placed in an environmental chamber and allowed to stabilize at +20 degrees Celsius for at least 15 minutes. The frequency counter and signal generator are phase locked with the same 10 MHz reference frequency by connecting the 10 MHz ref. out of the counter to the 10 MHz ref, in of the signal generator. With the voltage input to the E.U.T. set to 85% S.T.V., the frequency is measured in 30 second intervals for a period of 5 minutes. This procedure is repeated at 100% S.T.V. and 115% S.T.V.

Frequency Stability With Temperature Variation:

The input voltage to the E.U.T. is set to S.T.V. and the temperature of the environmental chamber is varied in 10 degree steps from -30 degrees C to +50 degrees C. The E.U.T. is allowed to stabilize at each temperature and the frequency is measured in 30 second intervals for a period of 5 minutes.

KTL Dallas

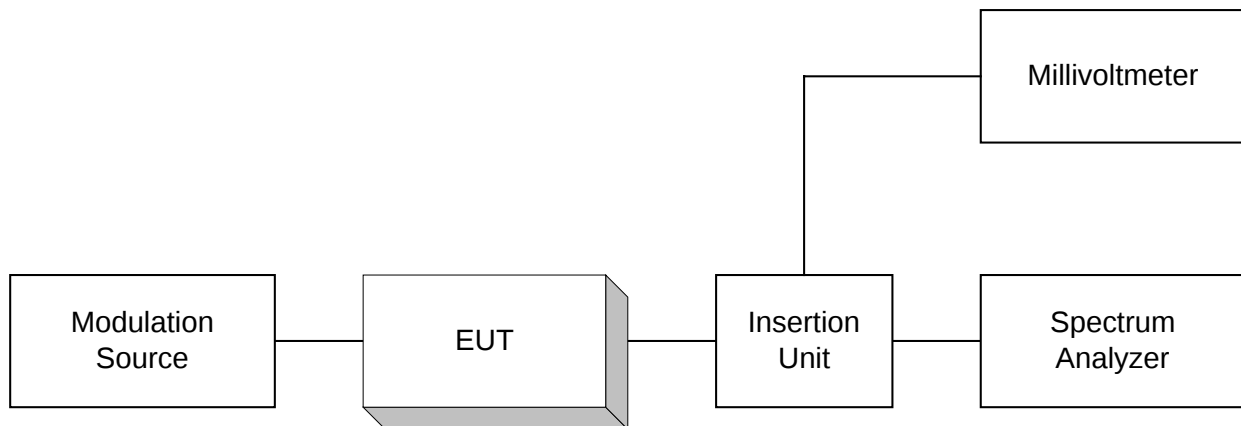
FCC PART 21, SUBPART K
MULTIPOINT DISTRIBUTION SERVICE
PROJECT NO.: 9L0114R
ANNEX B

EQUIPMENT: TR2278 Transverter
FCC ID: CI32278

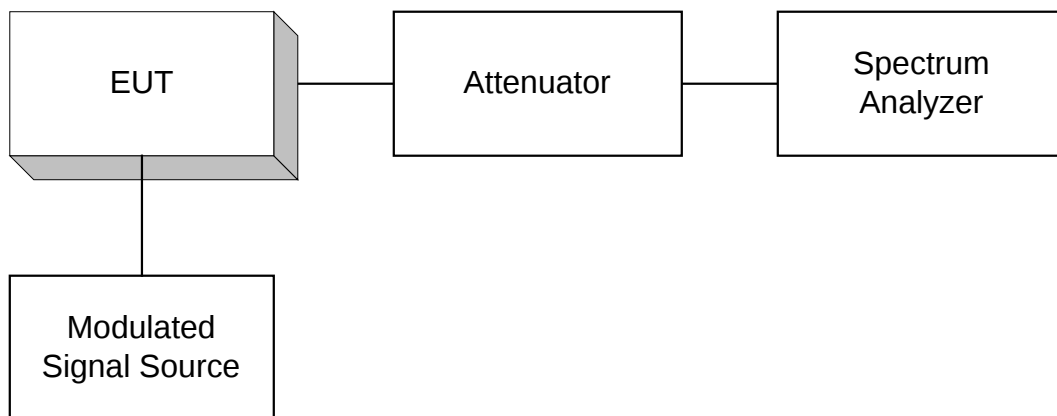
ANNEX B - TEST DIAGRAMS

EQUIPMENT: TR2278 Transverter
FCC ID: CI32278

Para. No. 2.1046 - R.F. Power Output

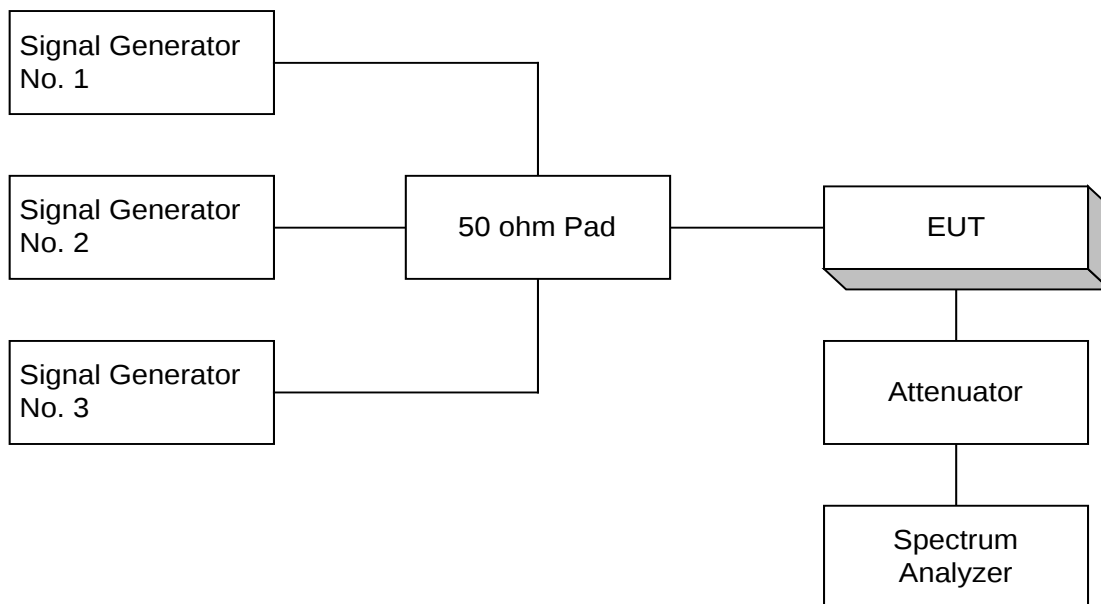
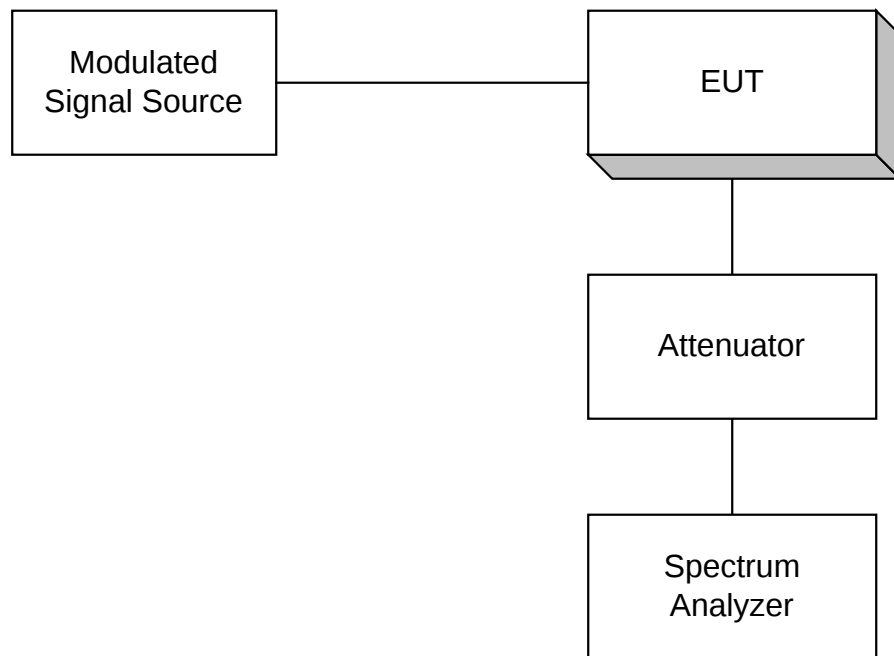


Para. No. 2.1049 - Occupied Bandwidth



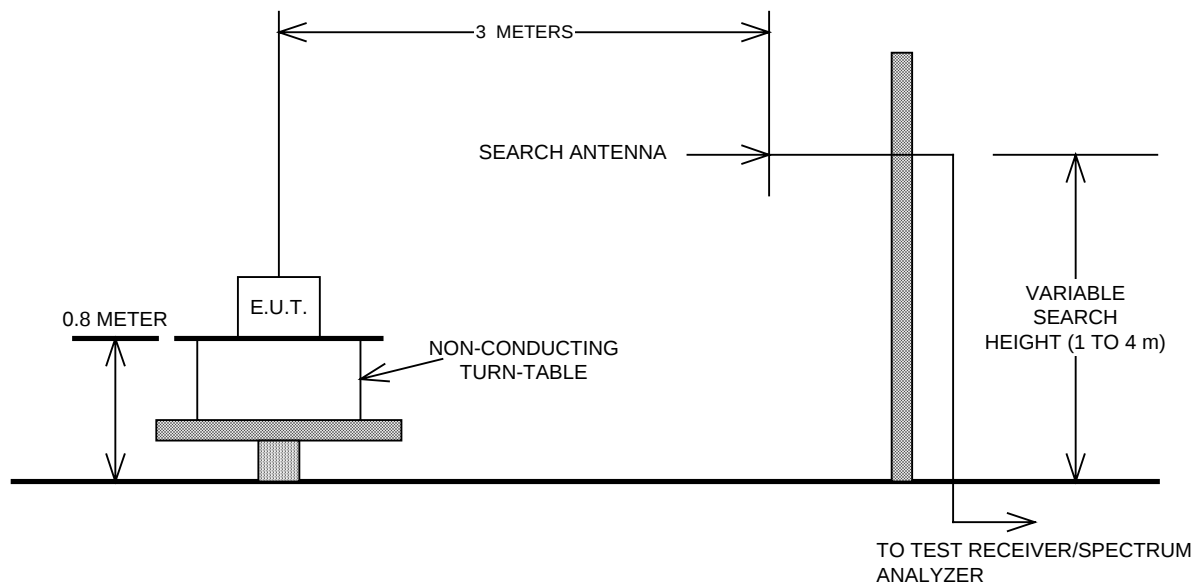
EQUIPMENT: TR2278 Transverter
FCC ID: CI32278

Para. No. 2.1051 - Spurious Emissions at Antenna Terminals



EQUIPMENT: TR2278 Transverter
FCC ID: CI32278

Para. No. 2.1053 - Field Strength of Radiation



Para. No. 2.1055 - Frequency Stability

