

Nemko Test Report: 2L0435RUS1

Applicant: Navini Networks
2240 Campbell Creek Blvd. Suite 110
Richardson, TX 75082

**Equipment Under Test:
(E.U.T.)** 2.6 EFGH BTS Release 1

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

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

Authorized By:



Tom Tidwell, EMC/Wireless Group Manager

Date: 9/13/02

Total Number of Pages: 36

EQUIPMENT: 2.6 EFGH BTS Release 1

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EQUIPMENT: 2.6 EFGH BTS Release 1

Section 1. Summary of Test Results

Manufacturer: Navini Networks

Model No.: 2.6 EFGH BTS Release 1

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.



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. NONE
See “ Summary of Test Data”.

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This report applies only to the items tested.

*EQUIPMENT: 2.6 EFGH BTS Release 1***Summary Of Test Data**

NAME OF TEST	PARA. NO.	SPEC. LIMIT	RESULT
RF Power Output	2.1046	33dBW EIRP	Complies
Occupied Bandwidth	2.1049	21.908 (b) Mask	Complies
Spurious Emissions @ Antenna Terminals	2.1051	-60 dBc	Complies
Field Strength of Spurious Radiation	2.1053	-60 dBc	Complies
Frequency Stability	2.1055	Mask	Complies

Footnotes:

EQUIPMENT: 2.6 EFGH BTS Release 1

Section 2. General Equipment Specification

Supply Power: 24 Vdc

Frequency Range: 2596MHz to 2686MHz

Type(s) of Modulation:	F3E (Voice)	F1D	F2D	D7W (QAM)	DQPSK (F9W)
	☐	☐	☐	☐	☒

Emission Designator: 5M00F9W

Output Impedance: 50 ohms

RF Power Output Rated: +38 dBm rms (6.31 watts)

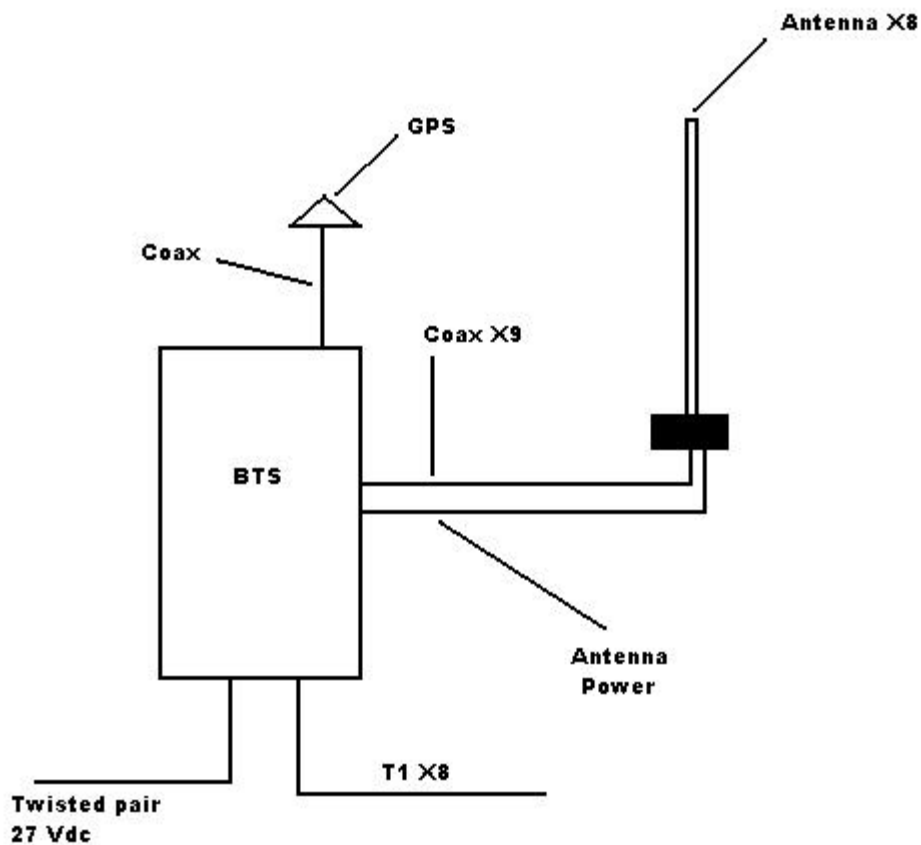
Duty Cycle: 50% TDD

**Operator Selection Of
Operating Frequency:** Software controlled

**Power Output Adjustment
Capability:** Software controlled

*EQUIPMENT: 2.6 EFGH BTS Release 1***Description Of EUT**

The EUT is a licensed, non-broadcast base station transmitter for use in the MMDS, ITFS and MDS services. The EUT is intended to deliver broadband data services to Customer Premise Equipment transceiver units.

System Diagram

*EQUIPMENT: 2.6 EFGH BTS Release 1***Section 3. RF Power Output**

NAME OF TEST: RF Power Output	PARA. NO.: 2.1046
TESTED BY: David Light	DATE: 9/3/2002

Test Results: Complies**Measurement Data:**

Test Frequency	Power Output	Power Output
(MHz)	(dBm)	(Watts)
2653	38.2	6.61

Test Equipment Used: Agilent Model E4416A s/n GB41290732
Agilent Model E9327A s/n US40440319**Measurement Uncertainty:** +/- 0.6 dB

EQUIPMENT: 2.6 EFGH BTS Release 1

Section 4. Occupied Bandwidth

NAME OF TEST: Occupied Bandwidth	PARA. NO.: 2.1049
TESTED BY: David Light	DATE: 9/3/2002

Test Results: Complies

Measurement Data: See attached data sheets.

Measurement Uncertainty: +/- 1×10^{-7} ppm

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Test data – Emission Mask



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Data Plot		Occupied Bandwidth	
Page 1 of 1			
Job No.: 2L0435R	Date: 9/3/2002	Complete: X	
Specification: PT 21	Temperature(°C): 22	Preliminary:	
Tested By: David Light	Relative Humidity(%):		
E.U.T.: 2.6 GHz BTS			
Configuration: Tx full power			
Sample Number: 1			
Location: On site	RBW: Refer to plots	Measurement	
Detector Type: Rms	VBW: Refer to plots	Distance: NA m	
Test Equipment Used			
Antenna:	Directional Coupler:		
Pre-Amp:	Cable #1:		
Filter:	Cable #2:		
Receiver: 1036	Cable #3:		
Attenuator #1:	Cable #4:		
Attenuator #2:	Mixer:		
Additional equipment used:			
Measurement Uncertainty: +/-1.7 dB			
Date: 03.SEP.2002 10:49:42			
Notes: Occupied Bandwidth Mask			

EQUIPMENT: 2.6 EFGH BTS Release 1

Section 5. Spurious Emissions at Antenna Terminals

NAME OF TEST: Spurious Emissions @ Antenna Terminals	PARA. NO.: 2.1051
TESTED BY: David Light	DATE: 3/4/2002

Test Results: Complies

Measurement Data: See attached data sheets.

Measurement Uncertainty: +/- 1.7 dB

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Test Data – Spurious Emissions at Antenna Terminals



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Data Plot		Spurious Emissions at Antenna Terminals	
Page 1 of 1		Complete ☒ Preliminary ☐	
Job No.:	Date:		
Specification: PT 21	Temperature(°C):		
Tested By: David Light	Relative Humidity(%)		
E.U.T.: 2.6 GHz BTS			
Configuration: TX TDD SIGNAL			
Sample Number: 1			
Location: On site	RBW: 5 MHz	Measurement	
Detector Type: Rms	VBW: 10 MHz	Distance: N/A m	
Test Equipment Used			
Antenna:	Directional Coupler:		
Pre-Amp:	Cable #1:		
Filter:	Cable #2:		
Receiver: 1036	Cable #3:		
Attenuator #1:	Cable #4:		
Attenuator #2:	Mixer:		
Additional equipment used:			
Measurement Uncertainty: +/-1.7 dB			
Date: 04.SEP.2002 10:45:32			
Notes: MARKER 1 = CARRIER (Filtered) DISPLAY LINE - -20.7 dBm (-60dBc FROM CARRIER POWER)			

EQUIPMENT: 2.6 EFGH BTS Release 1

Section 6. Field Strength of Spurious

NAME OF TEST: Field Strength of Spurious Emissions	PARA. NO.: 2.1053
TESTED BY: David Light	DATE:9/4/2002

Test Results: Complies**Measurement Data:** See attached table.**Measurement Uncertainty:** +/-1.7 dB**Test Data - Radiated Emissions**

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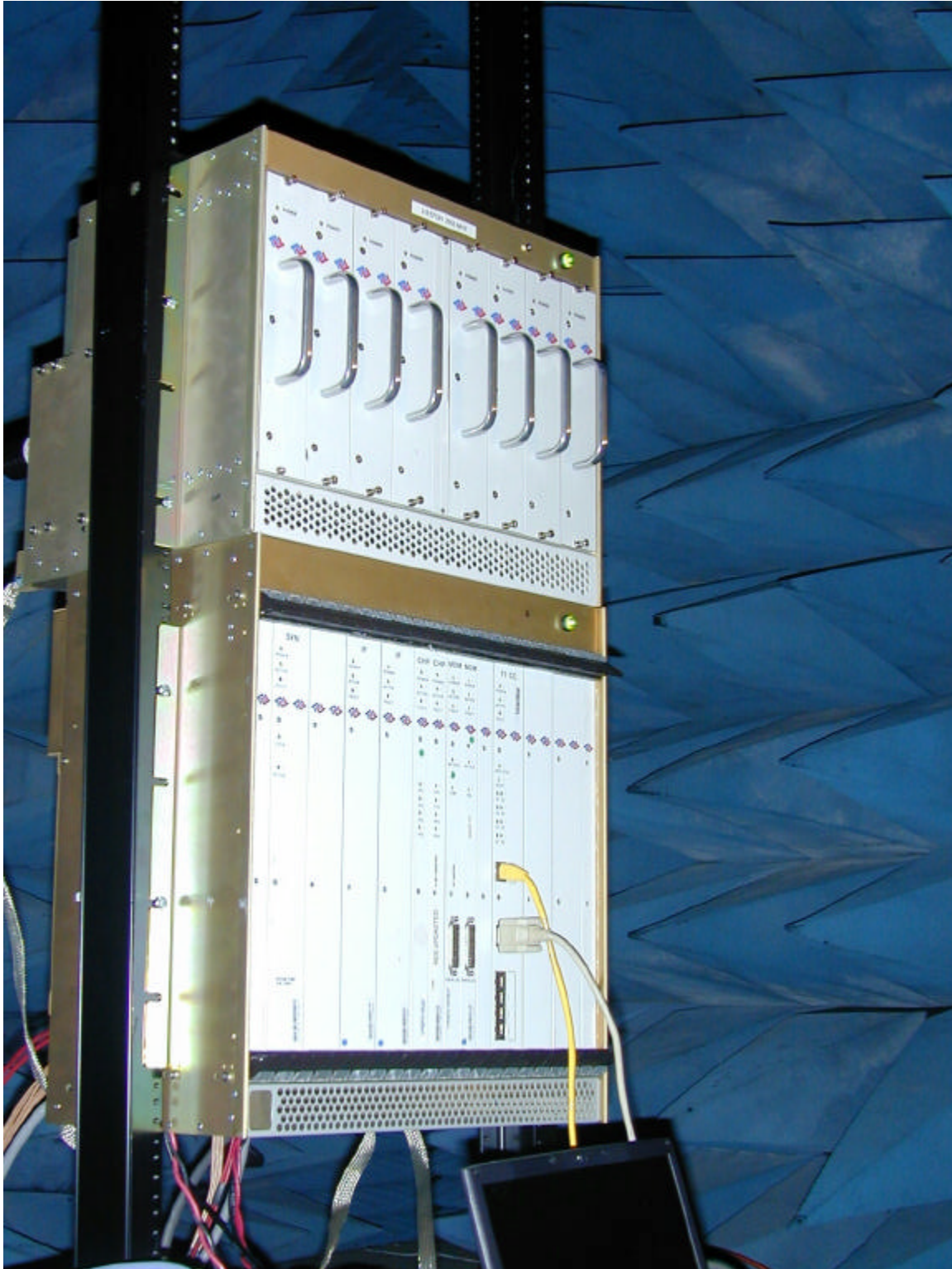
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Page 1 of 1		Field Strength of Spurious Emissions		Complete <u>X</u>
Job No.:	2L0435	Date:	9/4/2002	Preliminary _____
Specification:	Pt 21	Temperature(°C):	24	
Tested By:	David Light	Relative Humidity(%)	40	
E.U.T.:	2.6 GHz BTS			
Configuration:	Tx at 2.653 GHz into 50 ohm load			
Sample No:	1			
Location:	AC 1	RBW:	3 Mhz	Measurement
Detector Type:	Peak	VBW:	3 MHz	Distance: <u>3</u> m
Test Equipment Used				
Antenna:	1304	Directional Coupler:		
Pre-Amp:	1016	Cable #1:	1484	
Filter:		Cable #2:	1485	
Receiver:	1283	Cable #3:		
Attenuator #1:		Cable #4:		
Attenuator #2:		Mixer:		
Additional equipment used:				
Measurement Uncertainty:	+/-3.6 dB			
Notes: SEARCHED SPECTRUM TO THE TENTH HARMONIC				
NO EMISSIONS DETECTED ABOVE NOISE FLOOR WHICH WAS AT LEAST 20 dB BELOW THE SPEC LIMIT				

EQUIPMENT: 2.6 EFGH BTS Release 1

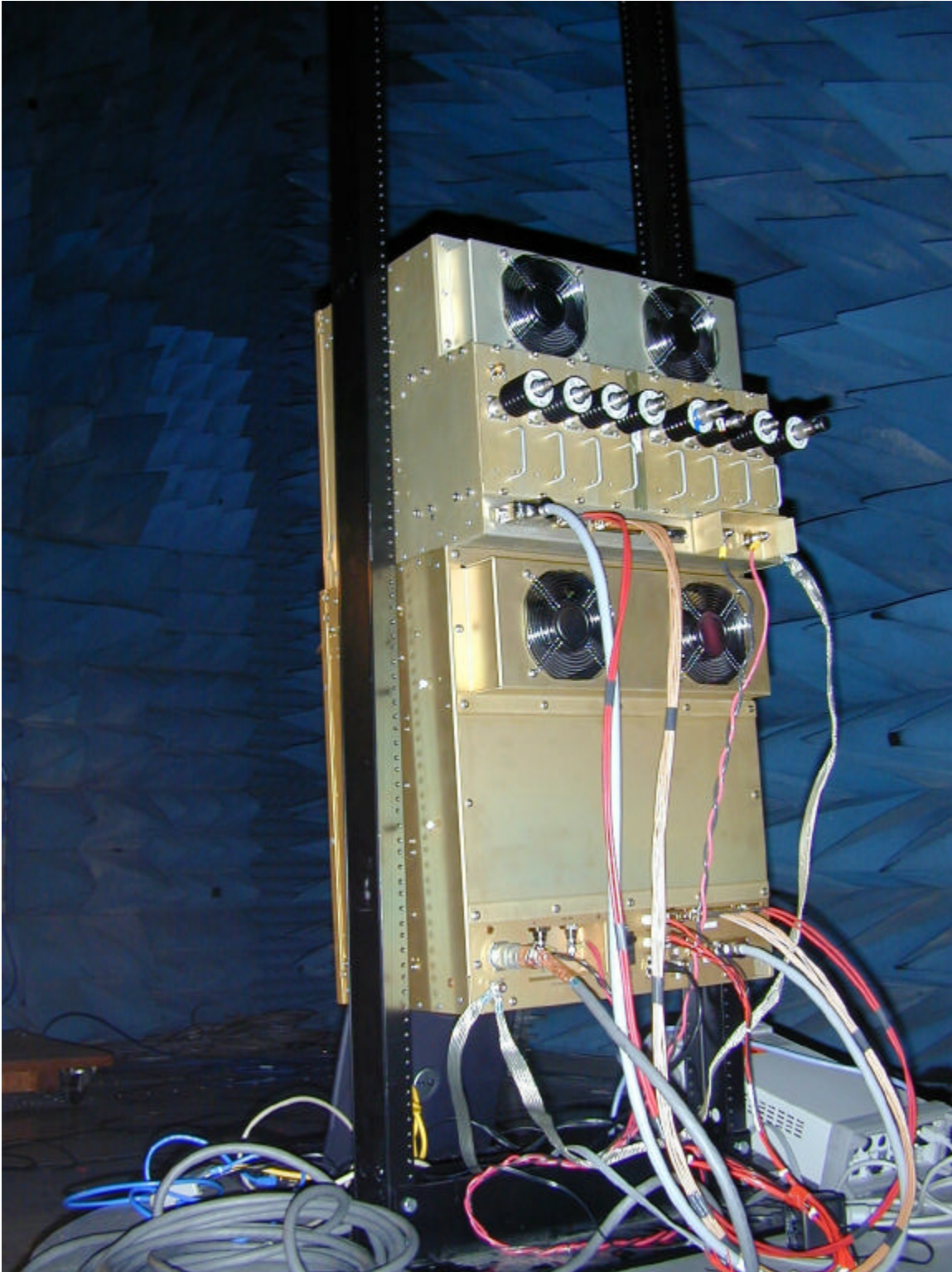
Photos – Field Strength of Spurious Emissions

Front



EQUIPMENT: 2.6 EFGH BTS Release 1

Rear



EQUIPMENT: 2.6 EFGH BTS Release 1

Section 7. Frequency Stability

NAME OF TEST: Frequency Stability	PARA. NO.: 2.1055
TESTED BY: David Light	DATE:9/3/2002

Test Results: Complies

Measurement Data: See attached data sheets.

The following plots show that the transmitted signal stays within the required emission mask when the equipment is subjected to temperature variations.

Note –.The device ceased operation at 21.5 Vdc and would not operate at –15% supply voltage. Data was taken at cutoff voltage.

Measurement Uncertainty: 1×10^{-7} ppm

EQUIPMENT: 2.6 EFGH BTS Release 1

Test Data – Frequency Stability



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Data Plot

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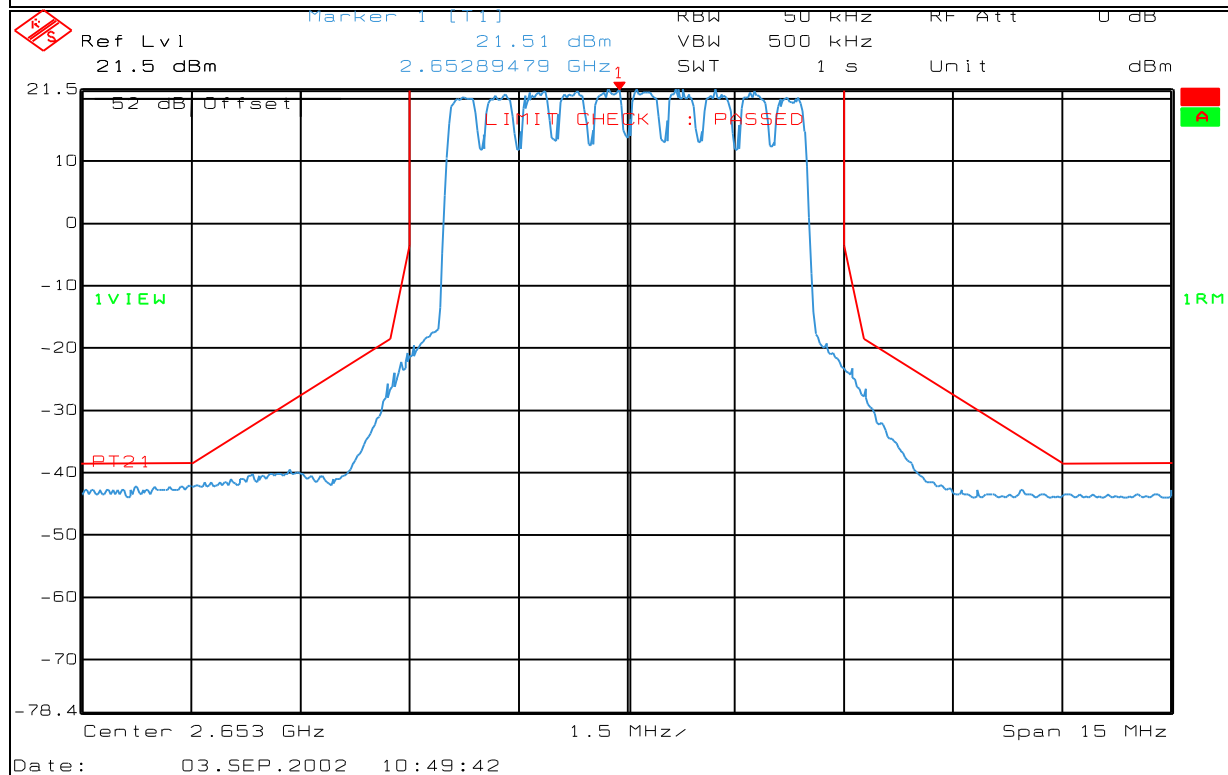
Job No.: 2L0435R Date: 9/3/2002
Specification: PT 21 Temperature(°C): 24
Tested By: David Light Relative Humidity(%): 40
E.U.T.: 2.6 GHz BTS
Configuration: TX FULL POWER
Sample Number: 1
Location: ON SITE RBW: Refer to plots
Detector Type: Rms VBW: Refer to plots

Complete X
Preliminary:

Measurement
Distance: NA m

Test Equipment Used

Antenna: Directional Coupler:
Pre-Amp: Cable #1:
Filter: Cable #2:
Receiver: 1036 Cable #3:
Attenuator #1: Cable #4:
Attenuator #2: Mixer:
Additional equipment used:
Measurement Uncertainty: +/-1.7 dB



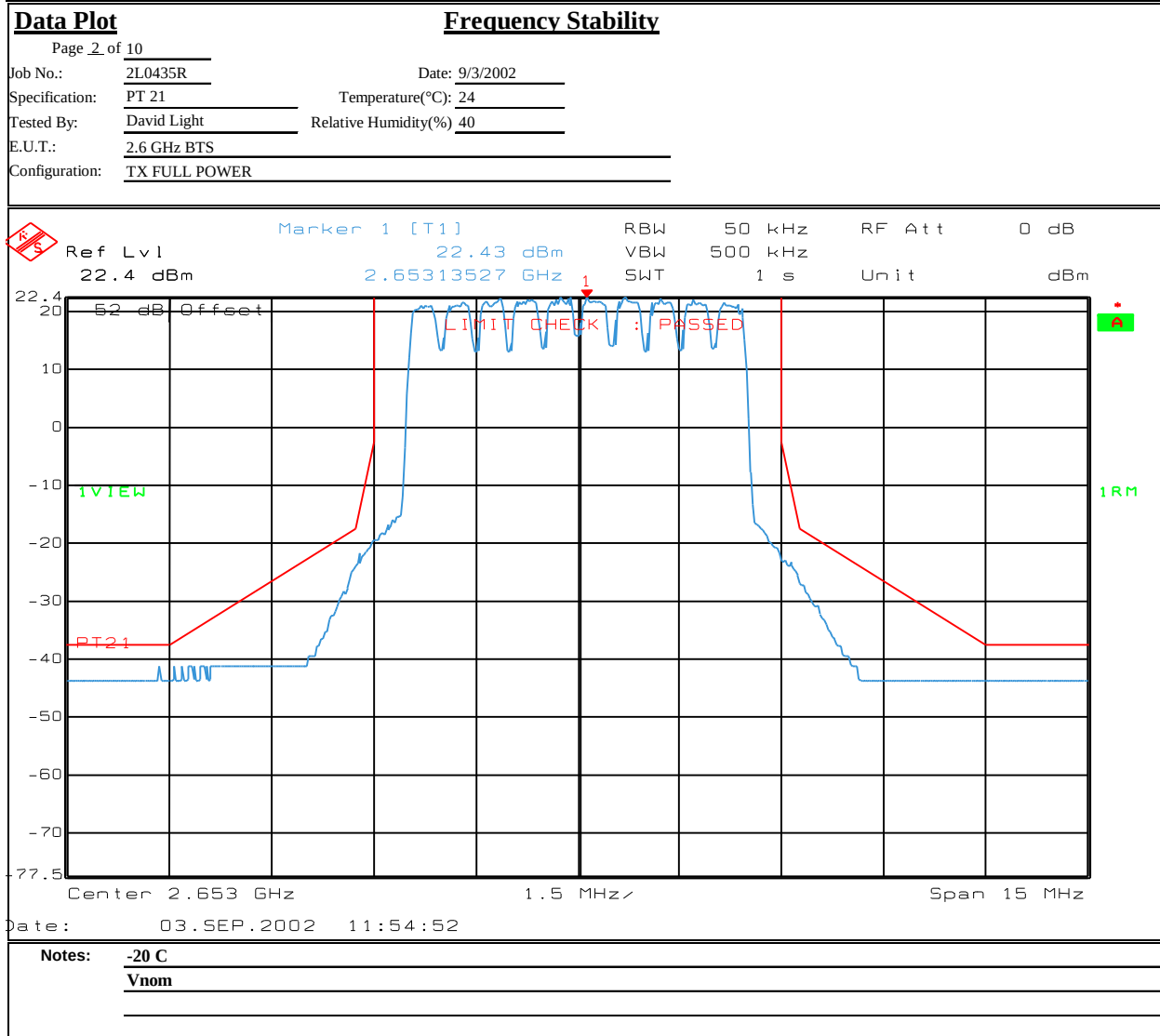
Notes: Tnom
Vnom (24 Vdc)

EQUIPMENT: 2.6 EFGH BTS Release 1
Test Data – Frequency Stability



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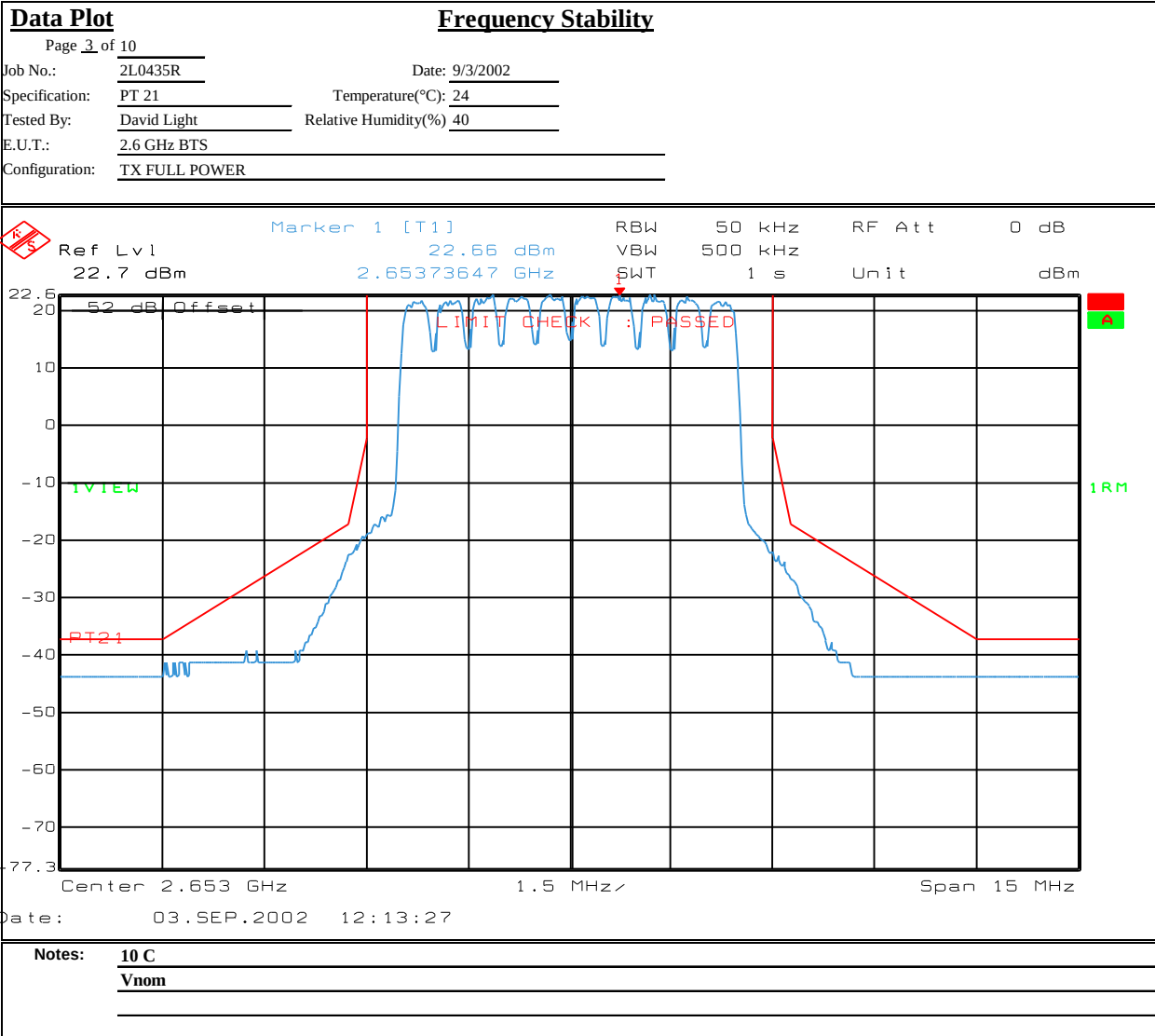
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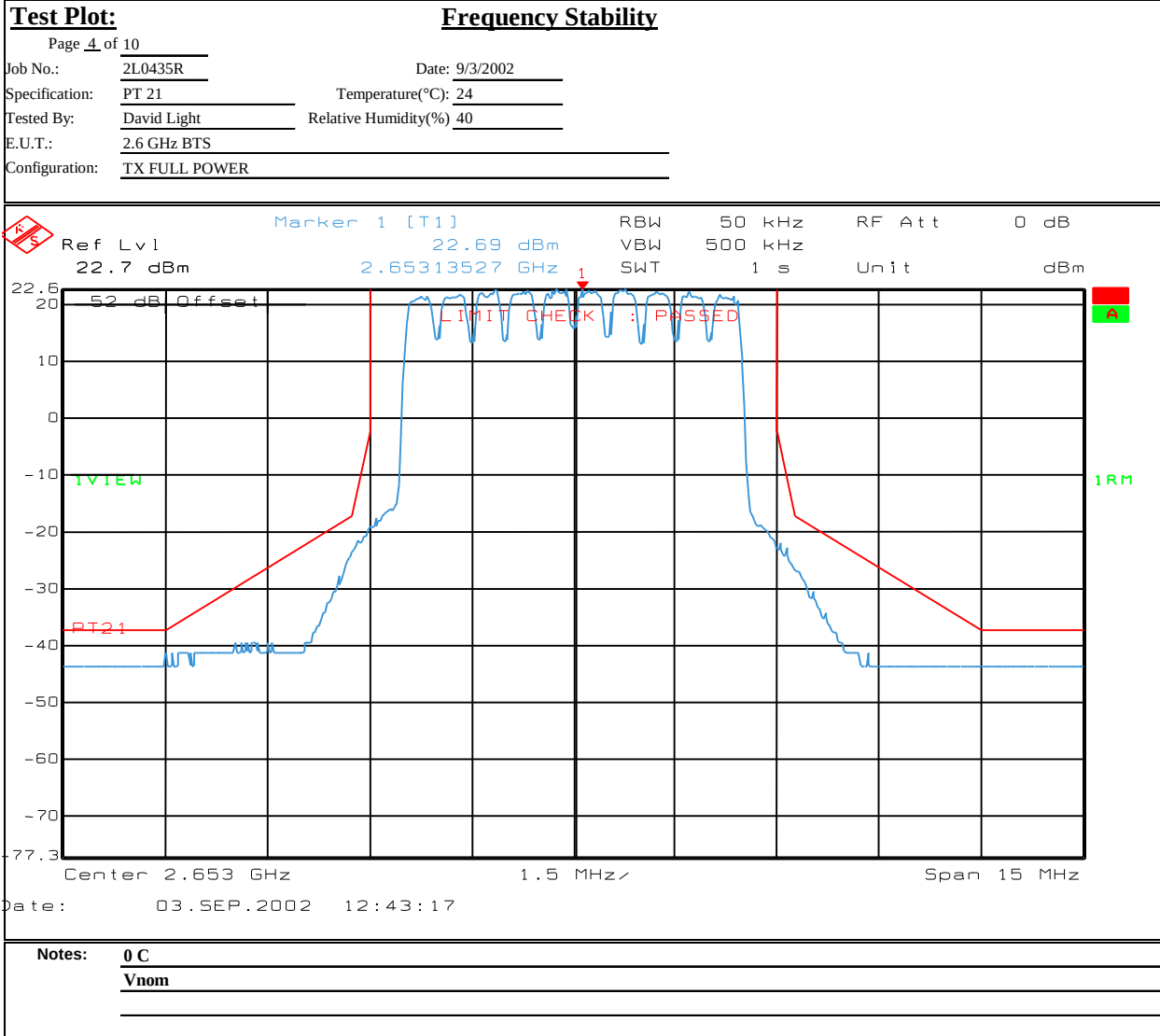


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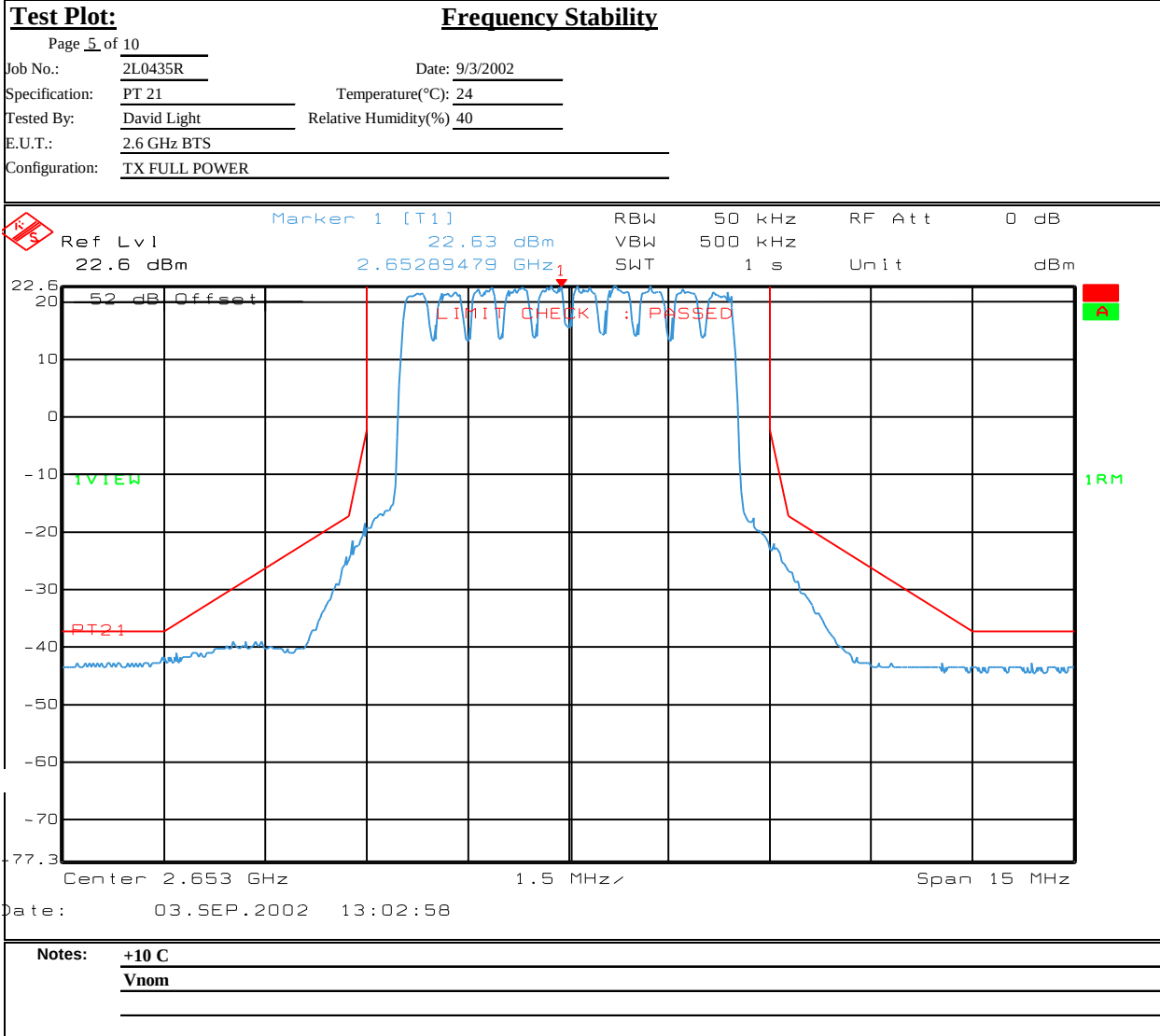
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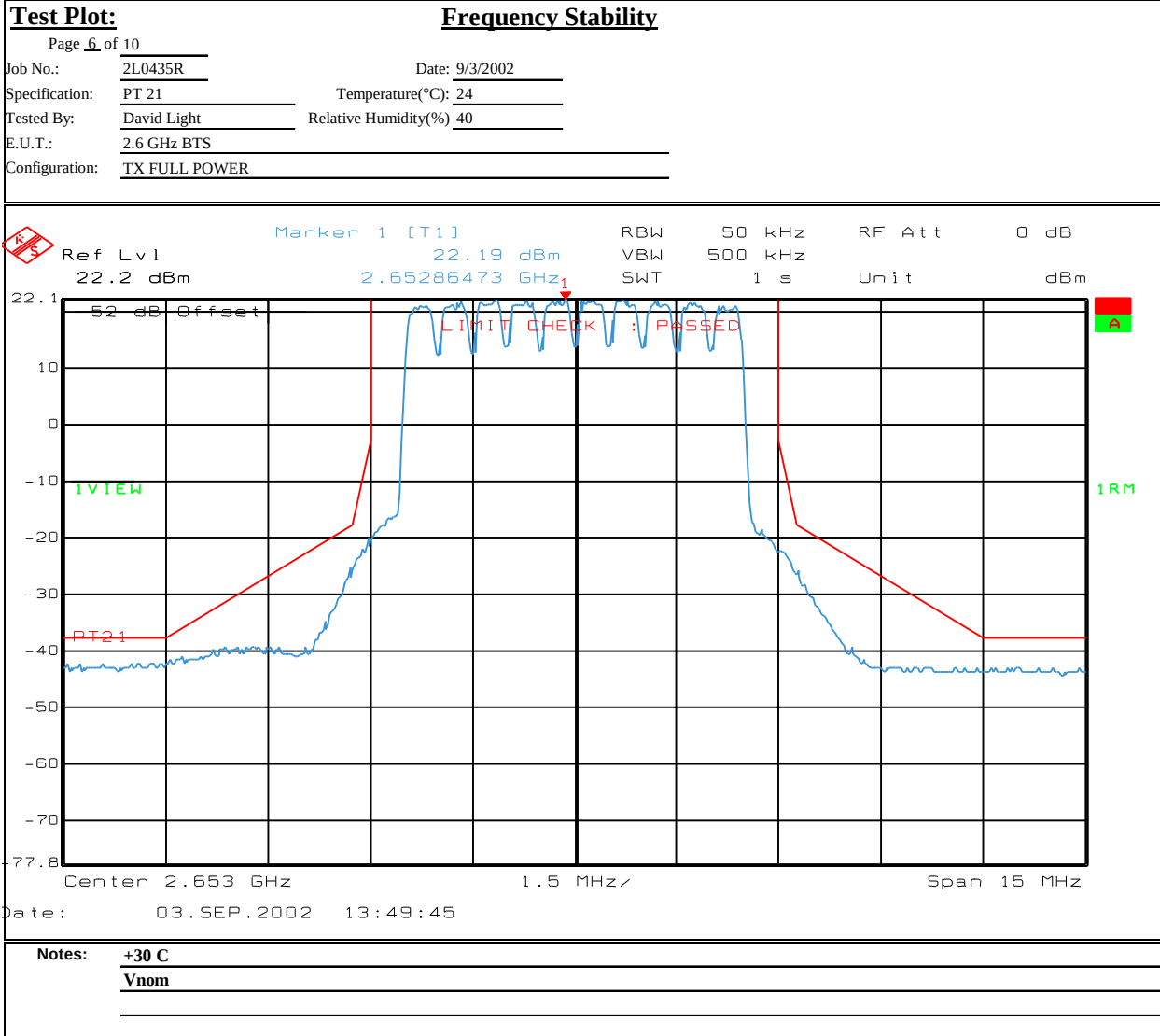
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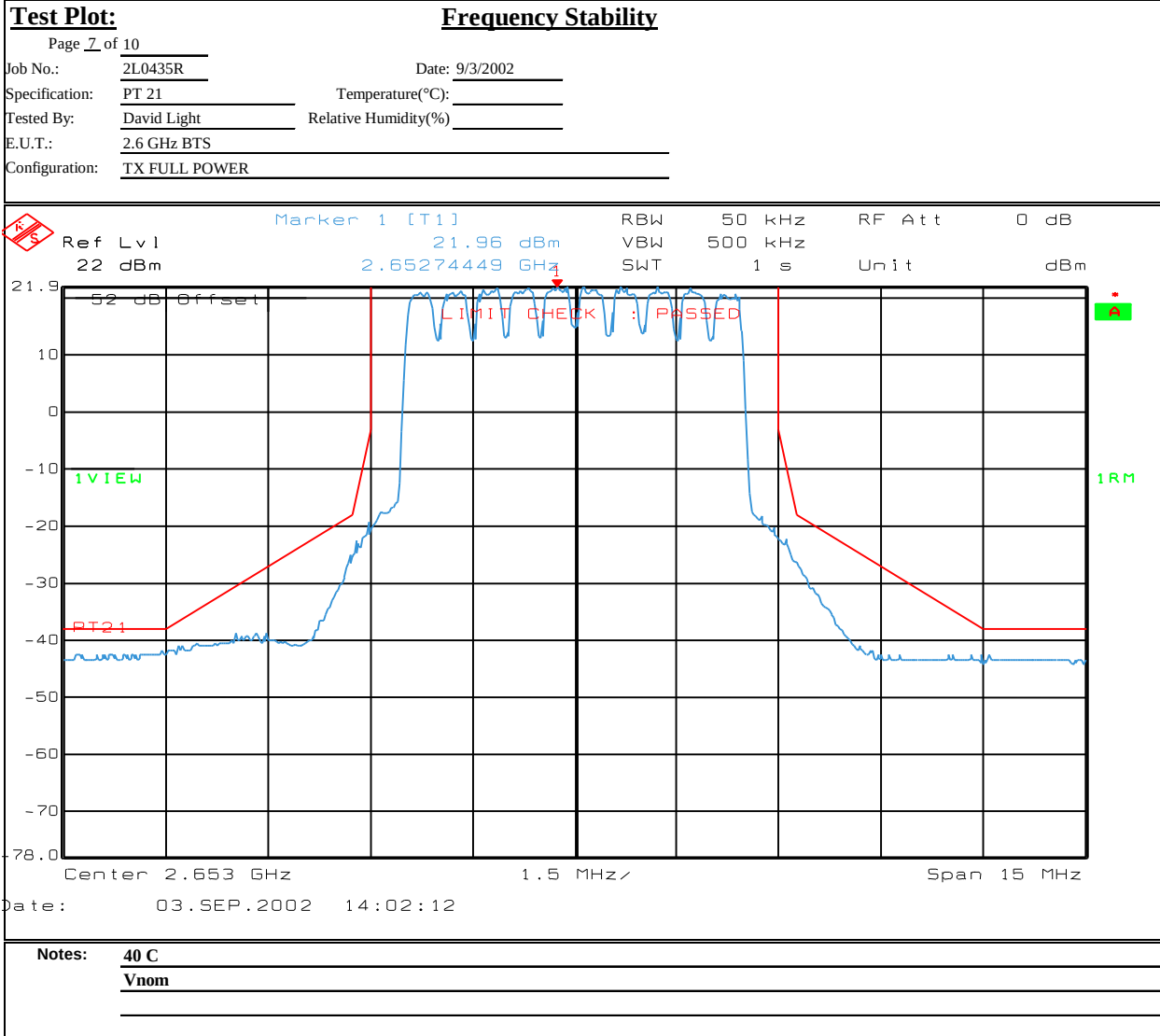
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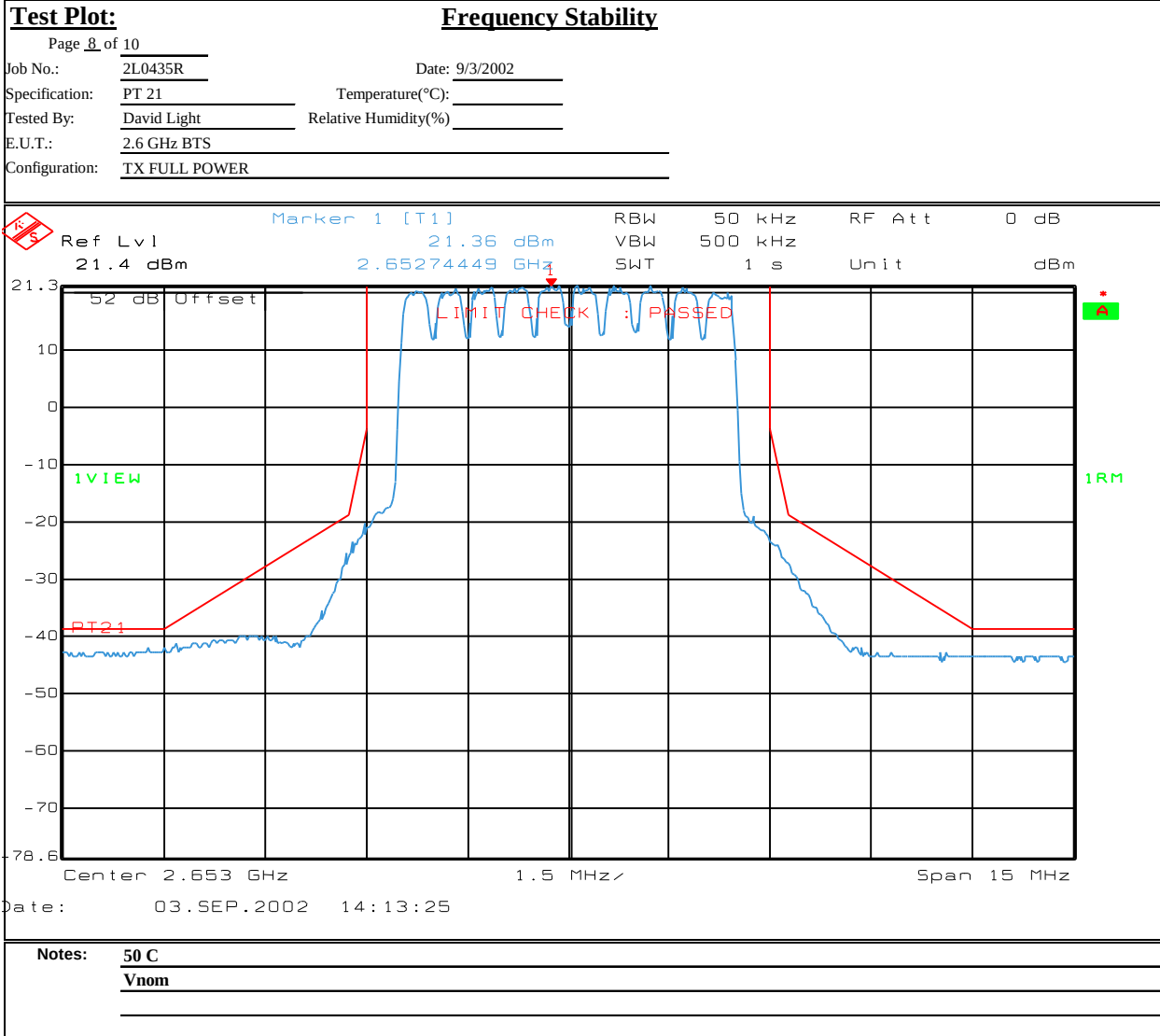
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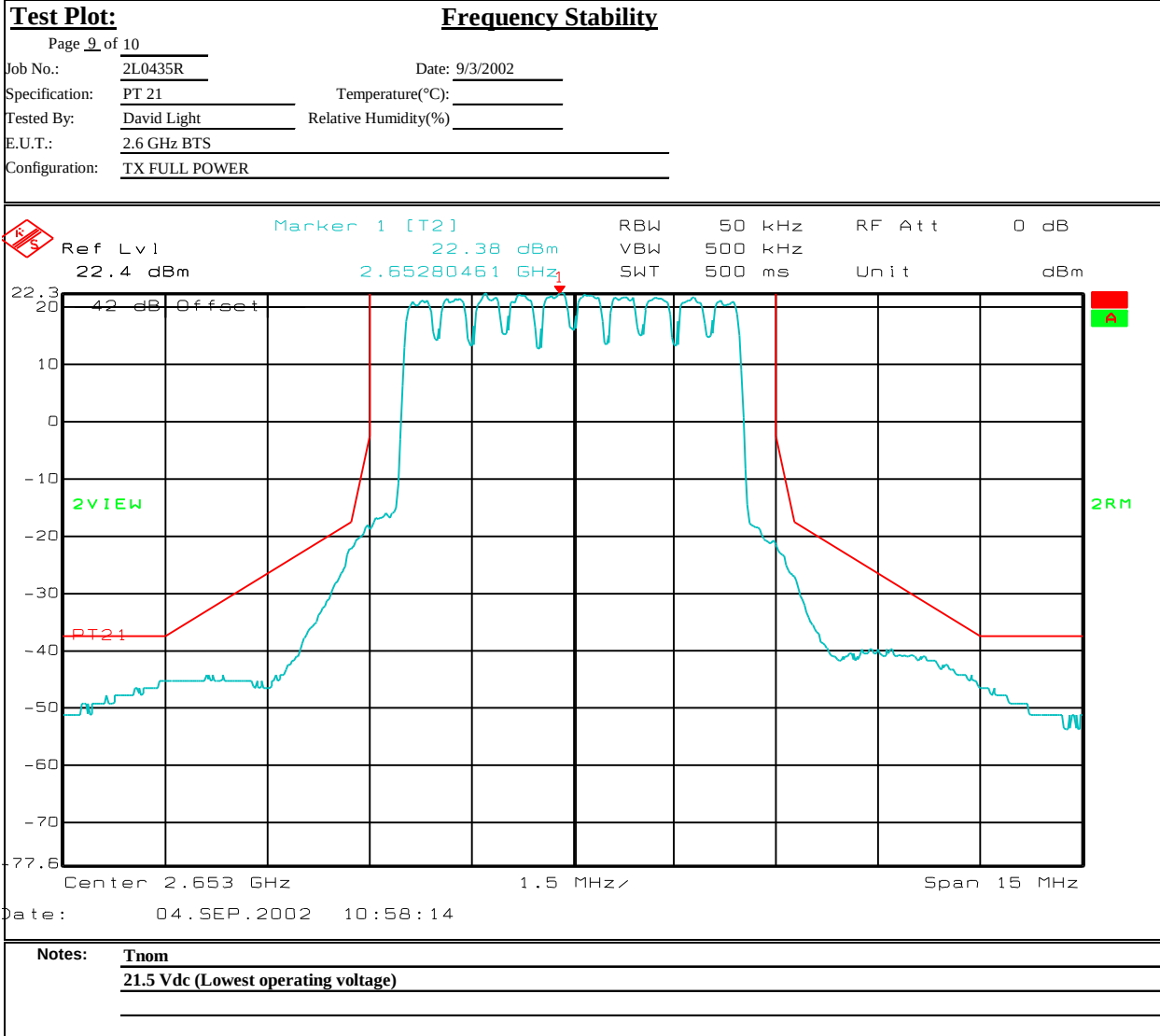
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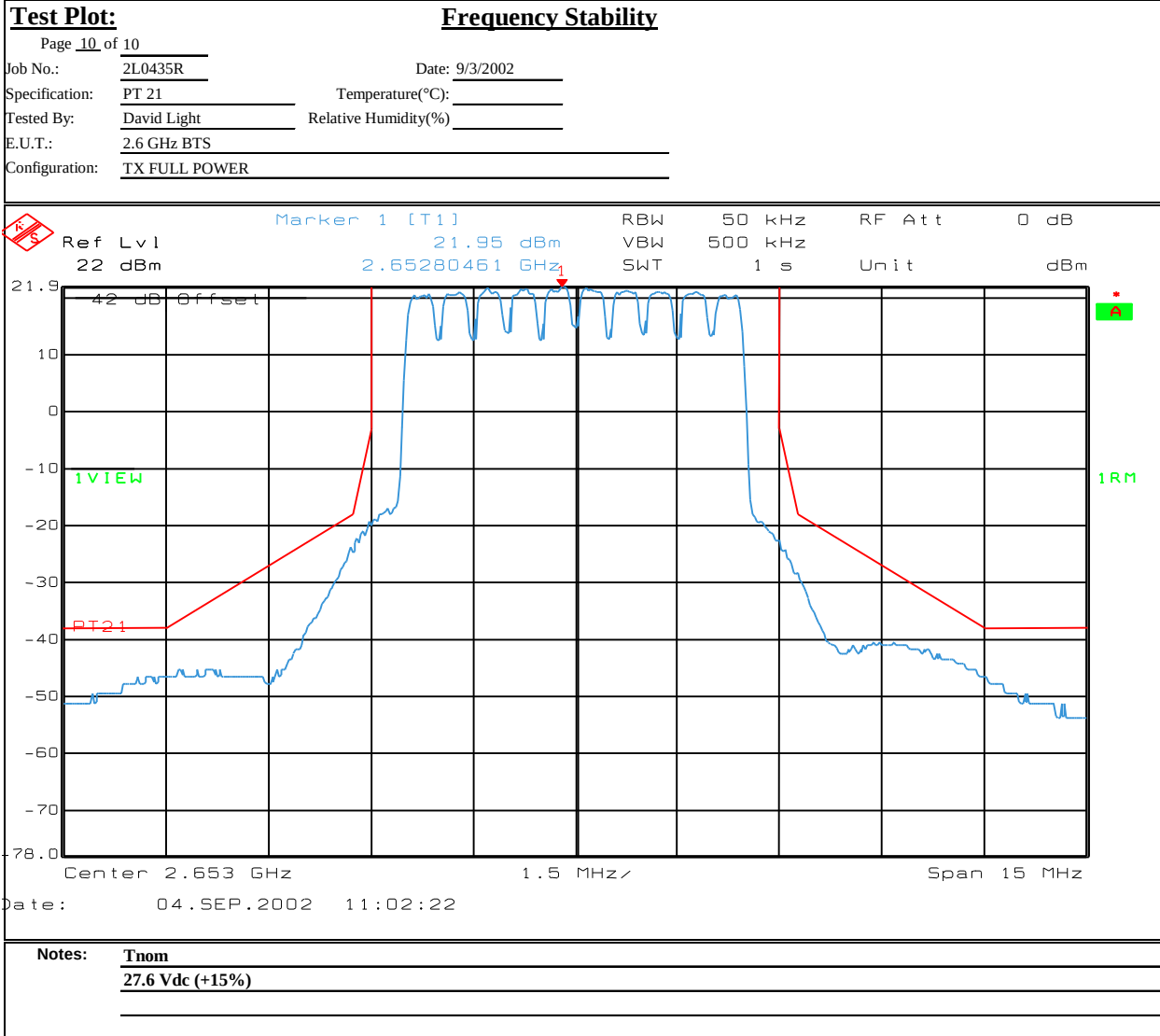


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*EQUIPMENT: 2.6 EFGH BTS Release 1***Section 8. Test Equipment List**

Nemko ID	Description	Manufacturer Model Number	Serial Number	Calibration Date	Calibration Due
1036	SPECTRUM ANALYZER	ROHDE & SCHWARZ FSEK30	830844/006	12/18/01	12/19/03
1042	CABLE, 4M	STORM PR90-010-144	N/A	06/14/02	06/14/03
1304	HORN ANTENNA	ELECTRO METRICS RGA-60	6151	07/30/01	07/31/03
1283	Spectrum analyzer display	Hewlett Packard 85662A	1811A00223	10/17/01	10/17/02
1016	Pre-Amp	HEWLETT PACKARD 8449A	2749A00159	07/15/02	07/15/03
1484	Cable 2.0-18.0 Ghz	Storm PR90-010-072	N/A	07/15/02	07/15/03
1485	Cable 2.0-18.0 Ghz	Storm PR90-010-216	N/A	07/15/02	07/15/03
	Power meter	Agilent E4416A	GB41290732	10/05/01	10/05/02
	Power sensor	Agilent E9327A	US40440319	08/16/02	08/16/03
	Directional coupler	Anaren 1C087-20	136	CBU	N/A

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FCC PART 21, SUBPART K
MULTIPOINT DISTRIBUTION SERVICE
PROJECT NO.:2L0435RUS1

EQUIPMENT: 2.6 EFGH BTS Release 1

Section 9. Test Details

*EQUIPMENT: 2.6 EFGH BTS Release 1***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 EIRP is measured using the substitution antenna method of measurement as described in EIA/TIA 630. The field strength of the fundamental emission is measured using a RBW setting on the spectrum analyzer greater than the 20 dB bandwidth of the transmitted waveform. The EUT is then replaced with an antenna with known gain relative to either a dipole or an isotropic radiator. A signal generator is used to feed the substitution antenna until the previously measured field strength level is obtained. The level of signal needed to drive the substitution antenna to obtain the previously measured field strength is the erp or eirp after correction for substitution antenna gain.

EQUIPMENT: 2.6 EFGH BTS Release 1

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: 2.6 EFGH BTS Release 1

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: 2.6 EFGH BTS Release 1***NAME OF TEST: Field Strength of Spurious Radiation****PARA. NO.: 2.1053**

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.

E.R.P.:

If the antenna is detachable from the circuit then the antenna is replaced with a 50 ohm load for this test.. The ERP is measured using the substitution antenna method of measurement as described in EIA/TIA 630. The field strength of the emission is measured using a RBW setting on the spectrum analyzer greater than the 20 dB bandwidth of the transmitted waveform. The EUT is then replaced with an antenna with known gain relative to either a dipole or an isotropic radiator. A signal generator is used to feed the substitution antenna until the previously measured field strength level is obtained. The level of signal needed to drive the substitution antenna to obtain the previously measured field strength is the erp or eirp after correction for substitution antenna gain.

*EQUIPMENT: 2.6 EFGH BTS Release 1***NAME OF TEST: Frequency Stability****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.

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ANNEX B

EQUIPMENT:

FCC ID:

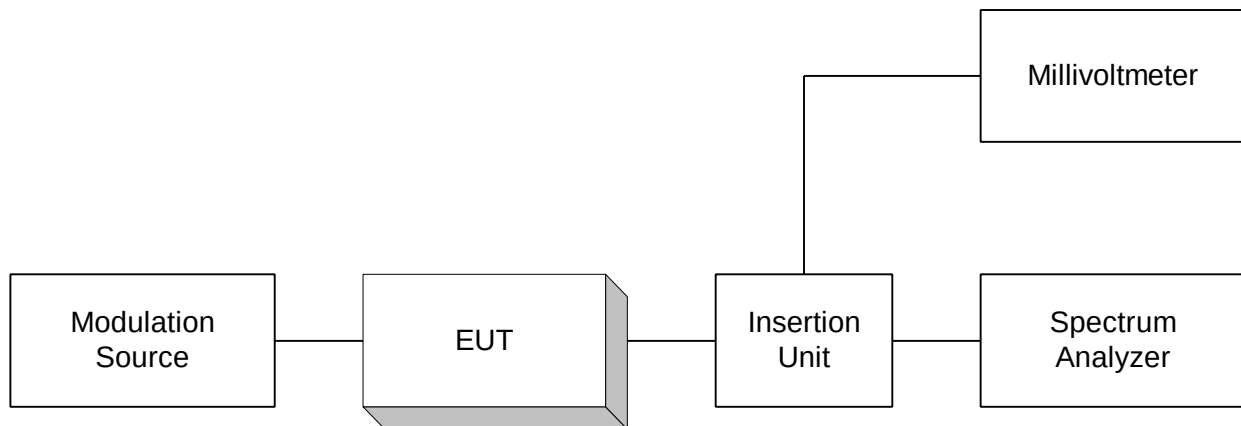
Section 10.

Test Diagrams

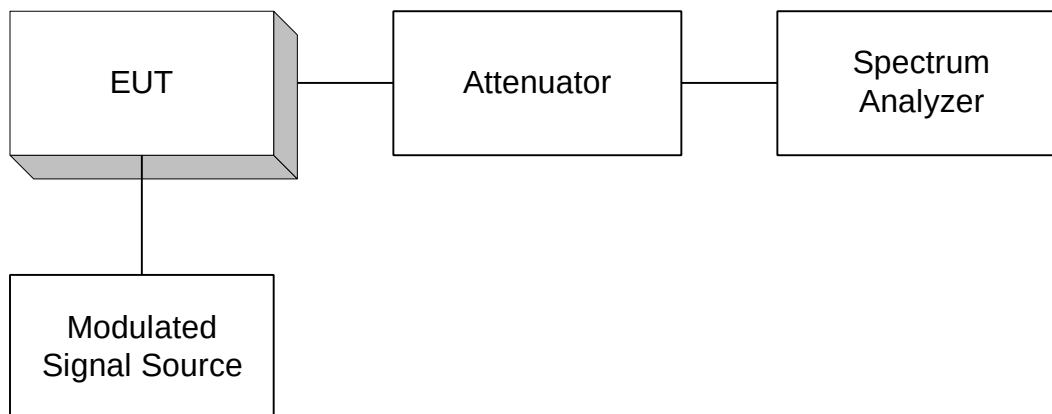
EQUIPMENT:

FCC ID:

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



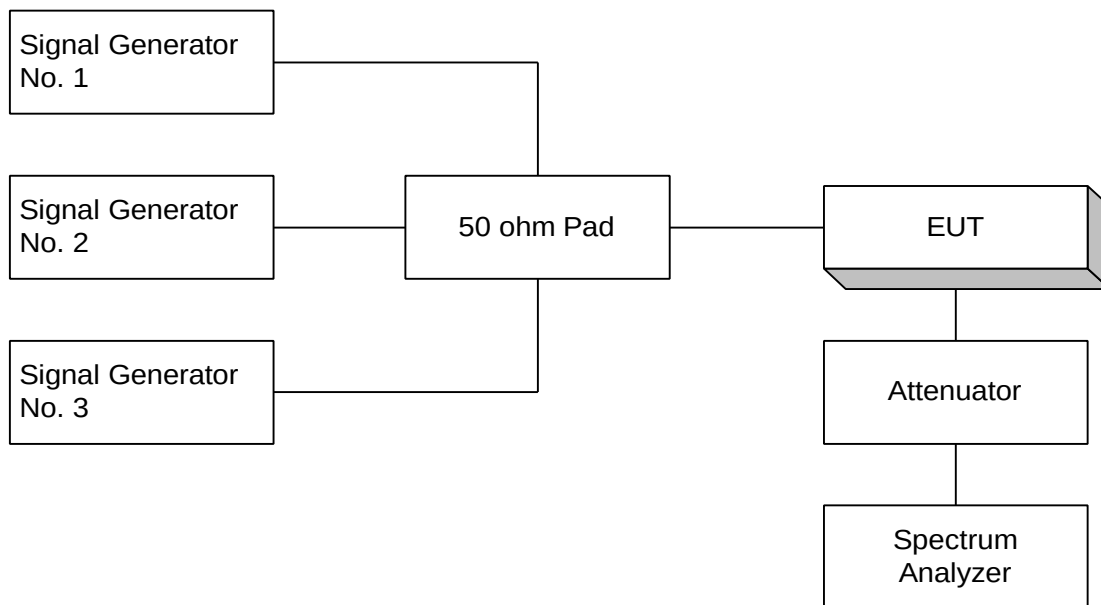
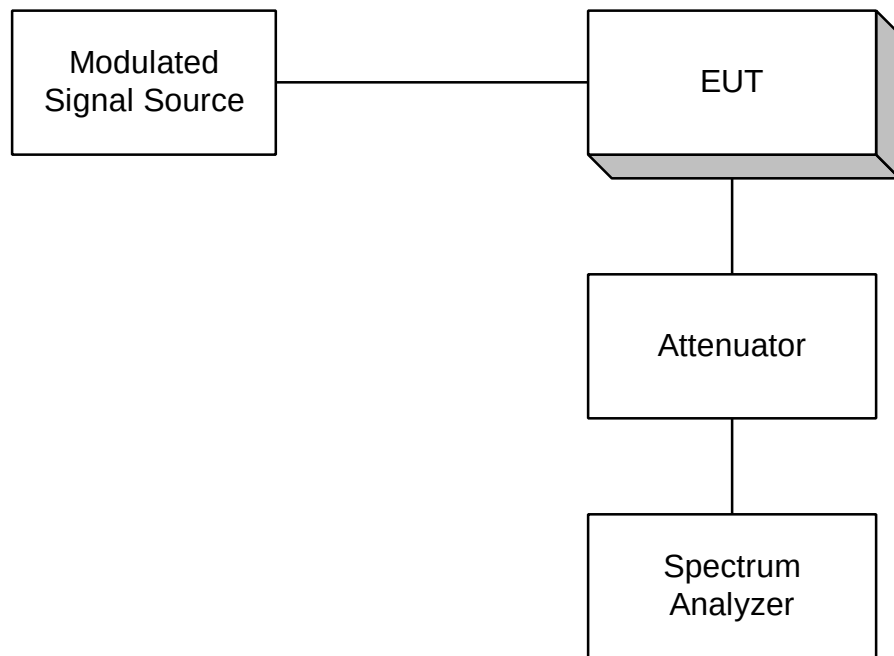
Para. No. 2.1049 - Occupied Bandwidth



EQUIPMENT:

FCC ID:

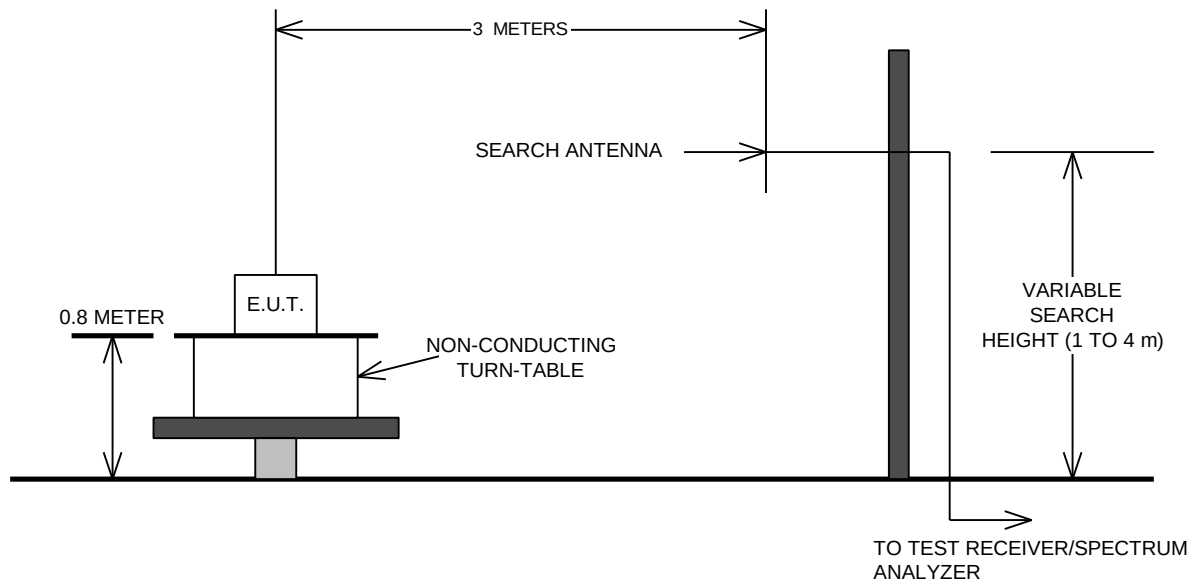
Para. No. 2.1051 - Spurious Emissions at Antenna Terminals



EQUIPMENT:

FCC ID:

Para. No. 2.1053 - Field Strength of Radiation



Para. No. 2.1055 - Frequency Stability

