Electromagnetic Compatibility Test Report

Tests Performed on a Utility Communications, Inc

Base Station Transmitter, Model UTR1300

Radiometrics Document RP-6795

Product Detail: FCC ID: YMN-UTR1300 Equipment type: 217-221 MHz, Base Station Transmitter
Test Standards: US CFR Title 47, Chapter I, FCC Part 2, 80, 90, and 95 FCC Part 90 CFR Title 47: 2009 This report concerns: Original Grant for Certification FCC Parts 2, 80, 90, and 95

Tests Performed For:	*Test Facility:*
Utility Communications, Inc 10740 West U.S. Hwy 30 Wanatah, IN 46390	**Radiometrics Midwest Corporation** 12 East Devonwood Romeoville, IL 60446 Phone: (815) 293-0772

Test Date(s): (Month-Day-Year)
June 15 to July 28, 2010

Document RP-6835 Revisions:

Rev.	Issue Date	Affected Pages	Revised By
0	August 4, 2010		
1	August 11, 2010	1	Joseph Strzelecki

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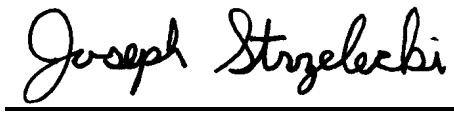
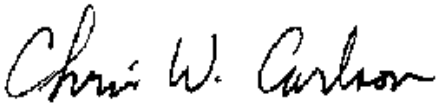
1 ADMINISTRATIVE DATA

Equipment Under Test: A Utility Communications, Inc. Base Station Transmitter Model: UTR1300 Serial Number: None This will be referred to as the EUT in this Report	
Date EUT Received at Radiometrics: (Month-Day-Year) May 21, 2010	*Test Date(s): (Month-Day-Year)* June 15 to July 28, 2010
Test Report Written By: Joseph Strzelecki Senior EMC Engineer	*Test Witnessed By:* The tests were not witnessed by personnel from Utility Communications, Inc
Radiometrics' Personnel Responsible for Test:  Joseph Strzelecki Senior EMC Engineer NARTE EMC-000877-NE	*Test Report Approved By*  Chris W. Carlson Director of Engineering NARTE EMC-000921-NE

2 TEST SUMMARY AND RESULTS

The EUT (Equipment Under Test) is a Base Station Transmitter, Model UTR1300, manufactured by Utility Communications, Inc. The detailed test results are presented in a separate section. The following is a summary of the test results.

Transmitter Requirements

Environmental Phenomena	Frequency Range	FCC Section	Test Result
RF Power Output	217 to 221 MHz	2.1046	Pass
Modulation Characteristics	217 to 221 MHz	2.1047	Pass
Occupied Bandwidth Test; Emissions Masks	217 to 221 MHz	2.1049	Pass
Spurious RF Conducted Emissions	1-4700 MHz	2.1051	Pass
Field Strength of Spurious Radiation	30-2200 MHz	2.1053	Pass
Frequency Vs. Temperature	217 to 221 MHz	2.1055	Pass
Frequency Vs. Voltage	217 to 221 MHz	2.1055	Pass
Modulation Limiting	217 to 221 MHz	2.1047	Pass
Audio Freq Response	217 to 221 MHz	2.1047	Pass

The EUT was tested and found to comply with the following Standards:

FCC Part 80 (AMTS); 217-218 MHz; 12.5 kHz Channel spacing; 100W
FCC Part 95 Subpart F 218-219 MHz; 12.5 kHz Channel spacing; 20W
FCC Part 90 Subpart T 220-221 MHz; 12.5 kHz Channel spacing; 100W

3 EQUIPMENT UNDER TEST (EUT) DETAILS

3.1 EUT Description

The EUT is a Base Station Transmitter, Model UTR1300, manufactured by Utility Communications, Inc. The EUT was in good working condition during the tests, with no known defects.

3.2 Related Submittals

Utility Communications, Inc is not submitting any other products simultaneously for equipment authorization related to the EUT.

4 TESTED SYSTEM DETAILS

4.1 Tested System Configuration

The system was configured for testing in a typical fashion. The EUT was placed in an equipment rack as in a normal installation. The testing was performed in conditions as close as possible to installed conditions. Wiring was consistent with manufacturer's recommendations. Power was supplied at 13.8 VDC. The identification for all equipment, used in the tested system, is:

Tested System Configuration List

Item	Description	Type*	Manufacturer	Model Number	Serial Number
1	Base Station Transmitter	E	Utility Communications	UTR1300	10031349
2	Data Module	E	Utility Communications	TSC03	None

* Type: E = EUT, P = Peripheral, S = Support Equipment;

4.2 Special Accessories

No special accessories were used during the tests in order to achieve compliance.

4.3 Equipment Modifications

No modifications were made to the EUT at Radiometrics' test facility in order to comply with the standards listed in this report.

5 TEST SPECIFICATIONS AND RELATED DOCUMENTS

Document	Date	Title
FCC CFR Title 47	2009	Code of Federal Regulations Title 47, Chapter 1, Federal Communications Commission, Part 15 - Radio Frequency Devices
ANSI C63.4-2003	2003	Methods of Measurement of Radio Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz
IC RSS-Gen Issue 2	2007	General Requirements and Information for the Certification of Radiocommunication Equipment (RSS-Gen)
IC RSS-119 Issue 10	2010	Land Mobile and Fixed Radio Transmitters and Receivers, 27.41 to 960.0 MHz
TIA-603-C	2004	Land Mobile FM or PM Communications Equipment – Measurement and Performance Standards

6 RADIOMETRICS' TEST FACILITIES

The results of these tests were obtained at Radiometrics Midwest Corp. in Romeoville, Illinois, USA. Radiometrics is accredited by A2LA (American Association for Laboratory Accreditation) to conform to ISO/IEC 17025: 2005 "General Requirements for the Competence of Calibration and Testing Laboratories". Radiometrics' Lab Code is 121191 and Certification Number is 1495.01. A copy of the accreditation can be accessed on our web site (www.radiomet.com). Radiometrics accreditation status can be verified at A2LA's web site (www.a2la2.org).

The following is a list of shielded enclosures located in Romeoville, Illinois used during the tests:

Chamber A: Is an anechoic chamber that measures 24' L X 12' W X 12' H. The walls and ceiling are fully lined with ferrite absorber tiles. The floor has a 10' x 10' section of ferrite absorber tiles located in the center. Panashield of Rowayton, Connecticut manufactured the chamber. The enclosure is NAMAS certified.

Chamber E: Is a custom made anechoic chamber that measures 52' L X 30' W X 18' H. The walls and ceiling are fully lined with RF absorber. Pro-shield of Collinsville, Oklahoma manufactured the chamber.

Test Station F: Is an area that measures 10' D X 12' W X 10' H. The floor and back wall are metal shielded. This area is used for conducted emissions measurements.

A separate ten-foot long, brass plated, steel ground rod attached via a 6 inch copper braid grounds each of the above chambers. Each enclosure is also equipped with low-pass power line filters.

The FCC has accepted these sites as test site number US1065. The FCC test site Registration Number is 732175. Details of the site characteristics are on file with the Industry Canada as site number IC3124A-1.

7 DEVIATIONS AND EXCLUSIONS FROM THE TEST SPECIFICATIONS

There were no deviations or exclusions from the test specifications.

8 CERTIFICATION

Radiometrics Midwest Corporation certifies that the data contained herein was taken under conditions that meet or exceed the requirements of the test specification. The results relate only to the EUT listed herein. Any modifications made to the EUT subsequent to the indicated test date will invalidate the data and void this certification.

9 TEST EQUIPMENT TABLE

RMC ID	Manufacturer	Description	Model No.	Serial No.	Frequency Range	Cal Period	Cal Date
ANT-13	EMCO	Horn Antenna	3115	2502	1.0-18GHz	24 Mo.	10/22/08
ANT-44	Impossible Machine	Super Log Antenna	SL-20M2G	1002	20-2000MHz	24 Mo.	11/25/09
ATT-01	Bird	Attenuator (20dB)	8343-200	2140	DC-1GHz	24 Mo.	01/29/10
ATT-02	KDI	Attenuator	A710N	RMC1	DC-10GHz	24 Mo.	04/19/10
ATT-22	Bird Elect.	Attenuator	8327-300	2049	DC-3GHz	12 Mo.	04/19/10
DIR-07	Werlatone	Directional Coupler	C3908	6929	80-1000MHz	24 Mo.	06/02/10
DIR-10	Narda	Directional Coupler	27443	0018-85-39	1-18 GHz	24 Mo.	04/19/10
MOD-01	HP / Agilent	Modulation Analyzer	8901B	3005A02631	0.15-1300MHz	12 Mo.	05/21/10
PRE-01	HP / Agilent	Preselector	85685A	2510A00143	20 Hz-2GHz	12 Mo.	01/11/10
PWM-01	Boonton	Power Meter	4230	22503	50kHz-18GHz	24 Mo.	10/29/09
REC-08	HP / Agilent	Spectrum Analyzer	8566B	2648A13481 2209A01436	30Hz-22GHz	12 Mo.	08/21/09
SCP-01	Tektronix	Oscilloscope	TDS724A	B010117	DC-500MHz	N/A	NCR
SIG-03	Gigatronics	RF Synthesizer	6061A	5130395	0.01-1050MHz	24 Mo.	02/01/10
THM-02	Fluke	Temp/Humid Meter	971	93490471	N/A	12 Mo.	04/01/10

Note: All calibrated equipment is subject to periodic checks.
NCR – No Calibration Required. Device monitored by calibrated equipment. N/A: Not Applicable.

10 TEST SECTIONS

In all modes, the transmitter was terminated with a 100 W load.

In analog modes, the transmitter was modulated with a 2,500 Hz sine wave at an input level 16 dB greater than that required to produce 50% of the rated system deviation at 1000 Hz. In the Digital modes, the transmitter was modulated with it's standard modulator.

10.1 Peak Output Power

An Boonton Power meter was used for this test.

2.1046	**Peak Power**				
TX freq MHz	Atten & Cable	Reading dBm	Total dBm	Watts	Power Setting
217.5	30.1	19.8	49.9	97.7	100
217.5	30.1	0	30.1	1.0	1
218.5	30.1	12.9	43	20.0	20
218.5	30.1	-0.1	30	1.0	1
220.5	30.1	19.9	50	100.0	100
220.5	30.1	-0.1	30	1.0	1

Test Date: July 12, 2010
Judgement: Pass

10.2 Occupied Bandwidth; Emissions Masks

The spectrum analyzer was set to the MAX HOLD mode to record the worst case of the modulation. The EUT was transmitting at its maximum data rate. The trace was allowed to stabilize.

All Channels are 12.5 kHz

The emissions Masks B and D are from FCC part 90.210.

Mask B and D were used in this Report:

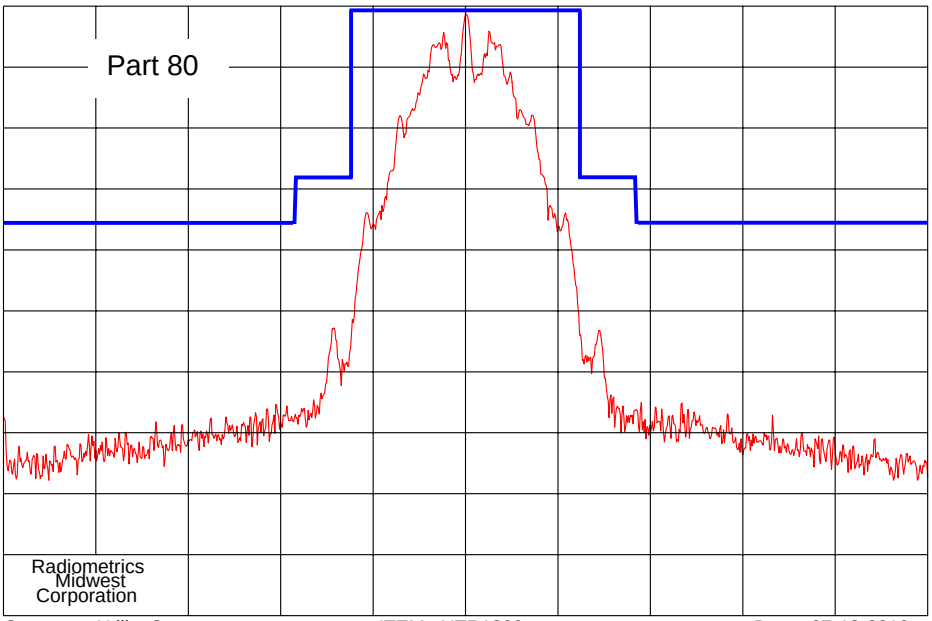
Mask B (dBm): P(dBm) – (43+10xLOG P(W))

Mask D (dBm): P(dBm) – (50+10xLOG P(W))

Part 95F Mask: P(dBm) – (43+10xLOG P(W))

Part 80 Mask: P(dBm) – (43+10xLOG P(W))

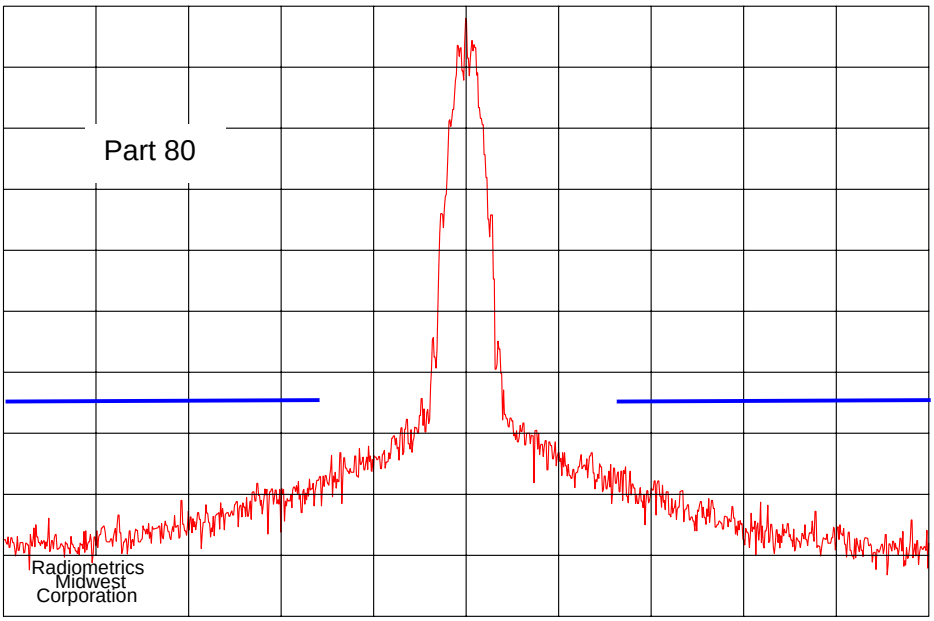
217.50 MHz; 100 Watts; 12.5 kHz Channel; Digital Modulation; Part 80



Company: Utility Comm.
CENTER 217.500 0 MHz
RES BW 300 Hz
10 dB/
Notes: Digital Mod., 100 W

ITEM : UTR1300
REF 20.0 dBm
VBW 1 kHz
Time: 09:23

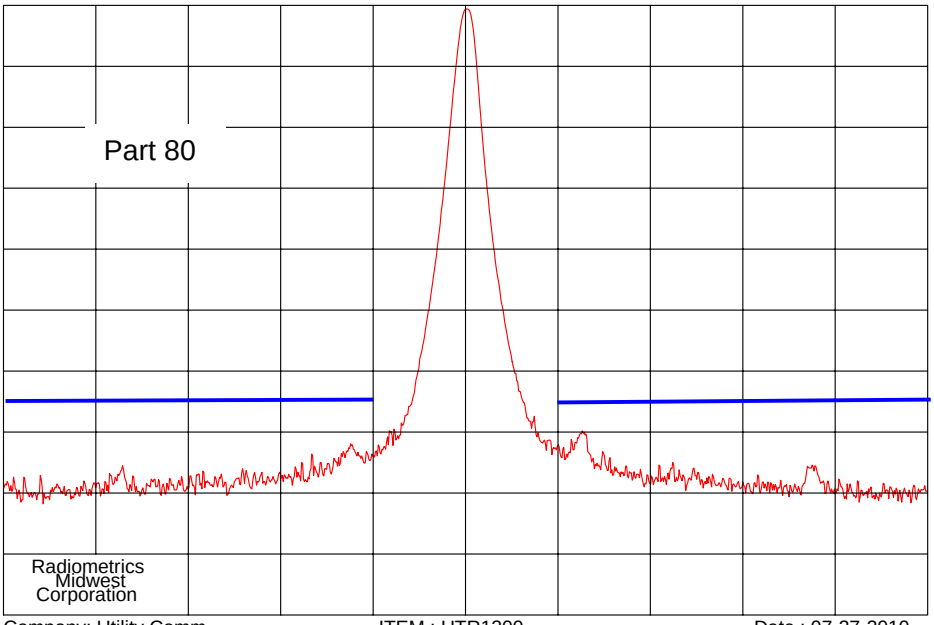
Date : 07-13-2010
SPAN 50.0 kHz
ATTEN 30 dB
SWP 1.50 sec



Company: Utility Comm.
CENTER 217.500 MHz
RES BW 300 Hz
10 dB/
Notes: Digital Mod., 100 W

ITEM : UTR1300
REF 20.0 dBm
VBW 1 kHz
Time: 09:24

Date : 07-13-2010
SPAN 200 kHz
ATTEN 30 dB
SWP 6.00 sec

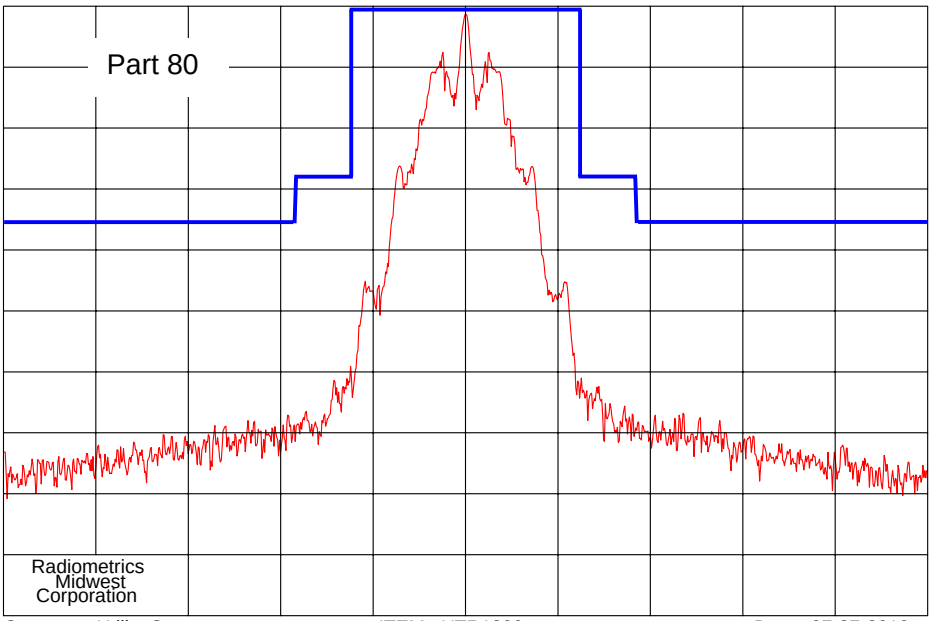


Company: Utility Comm.
CENTER 217.50 MHz
RES BW 10 kHz
10 dB/
Notes: Digital Modulation, 100 Watt

ITEM : UTR1300
REF 20.0 dBm
VBW 30 kHz
Time: 15:41

Date : 07-27-2010
SPAN 1.00 MHz
ATTEN 30 dB
SWP 30.0 msec
File: BW42

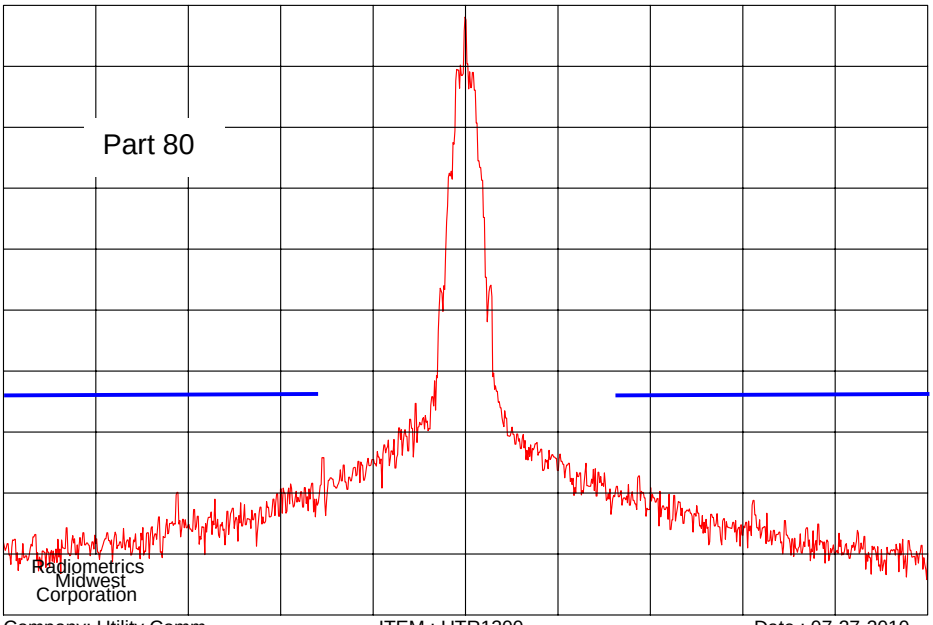
217.50 MHz; 1 Watts; 12.5 kHz Channel; Digital Modulation; Part 80



Company: Utility Comm.
CENTER 217.500 0 MHz
RES BW 300 Hz
10 dB/
Notes: Digital Modulation, 1 Watt

ITEM : UTR1300
REF 0.0 dBm
VBW 1 kHz
Time: 15:17

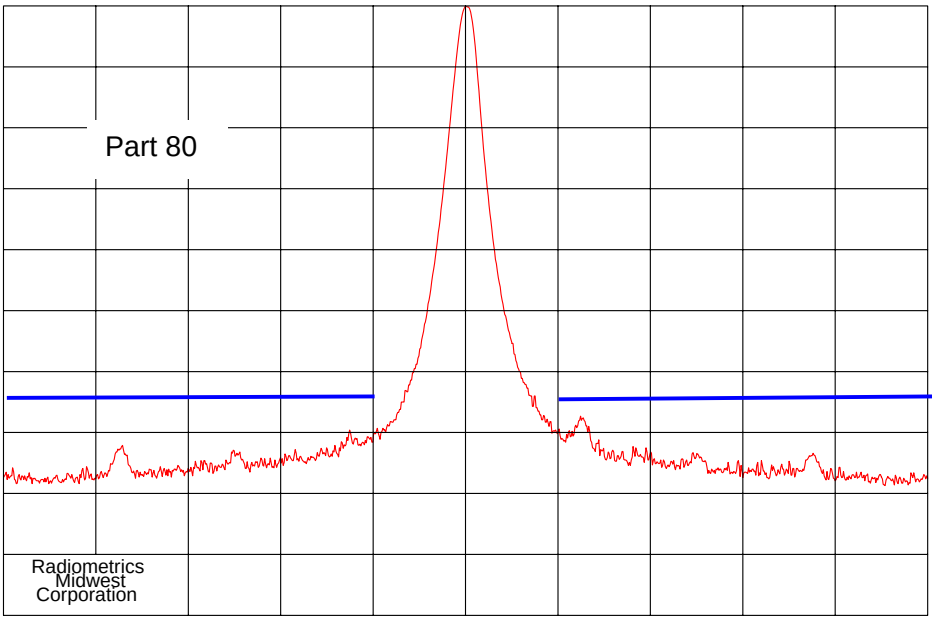
Date : 07-27-2010
SPAN 50.0 kHz
ATTEN 10 dB
SWP 1.50 sec
File: BW26



Company: Utility Comm.
CENTER 217.500 MHz
RES BW 300 Hz
10 dB/
Notes: Digital Modulation, 1 Watt

ITEM : UTR1300
REF 0.0 dBm
VBW 1 kHz
Time: 15:19

Date : 07-27-2010
SPAN 200 kHz
ATTEN 10 dB
SWP 6.00 sec
File: BW28

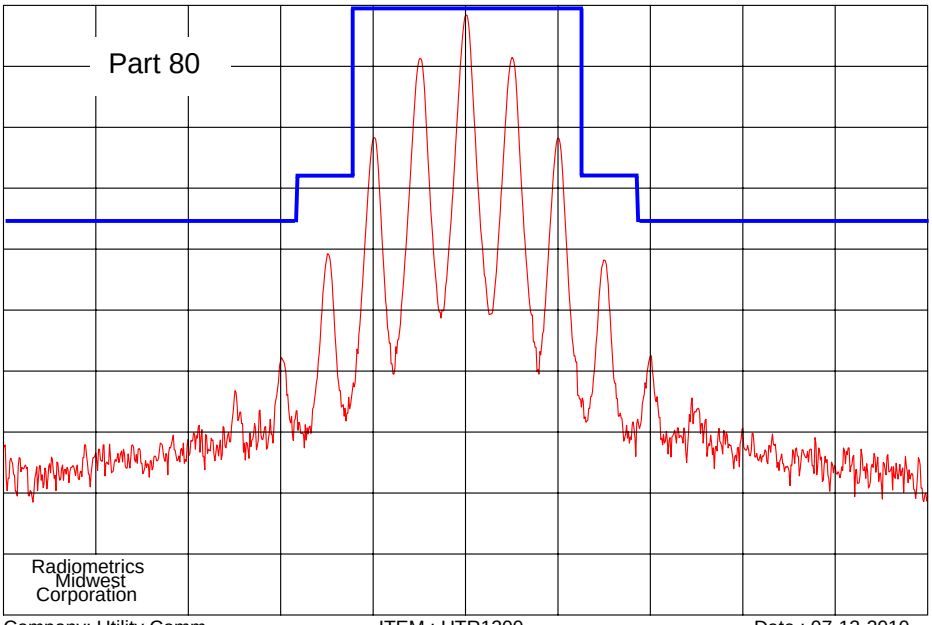


Company: Utility Comm.
CENTER 217.50 MHz
RES BW 10 kHz
10 dB/
Notes: Digital Modulation, 1 Watt

ITEM : UTR1300
REF 0.0 dBm
VBW 100 kHz
Time: 15:23

Date : 07-27-2010
SPAN 1.00 MHz
ATTEN 10 dB
SWP 30.0 msec
File: BW29

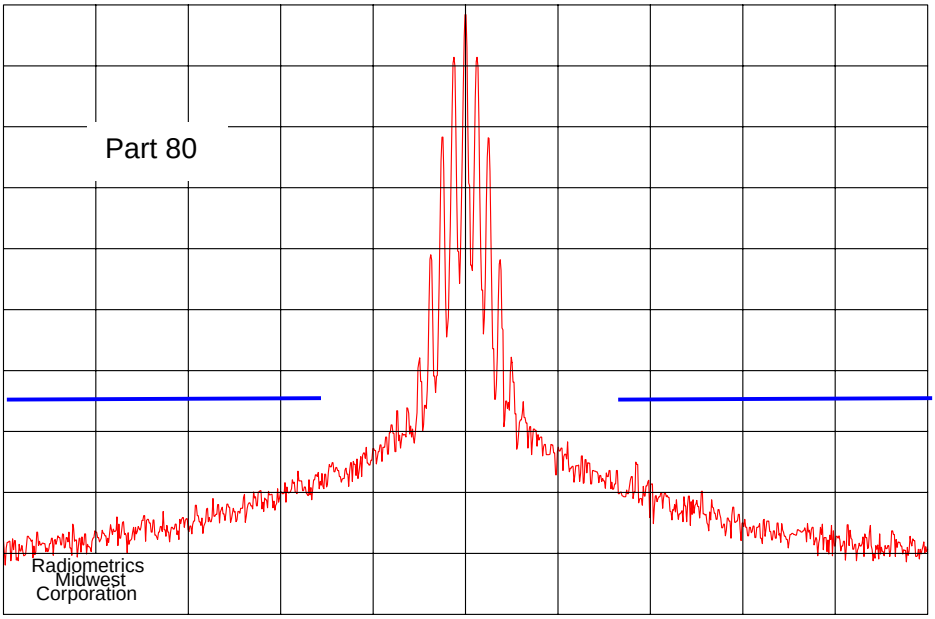
217.50 MHz; 100 Watts; 12.5 kHz Channel; Analog Modulation; Part 80



Company: Utility Comm.
CENTER 217.500 0 MHz
RES BW 300 Hz
10 dB/
Notes: Analog Mod., 100 W

ITEM : UTR1300
REF 20.0 dBm
VBW 1 kHz
Time: 11:42

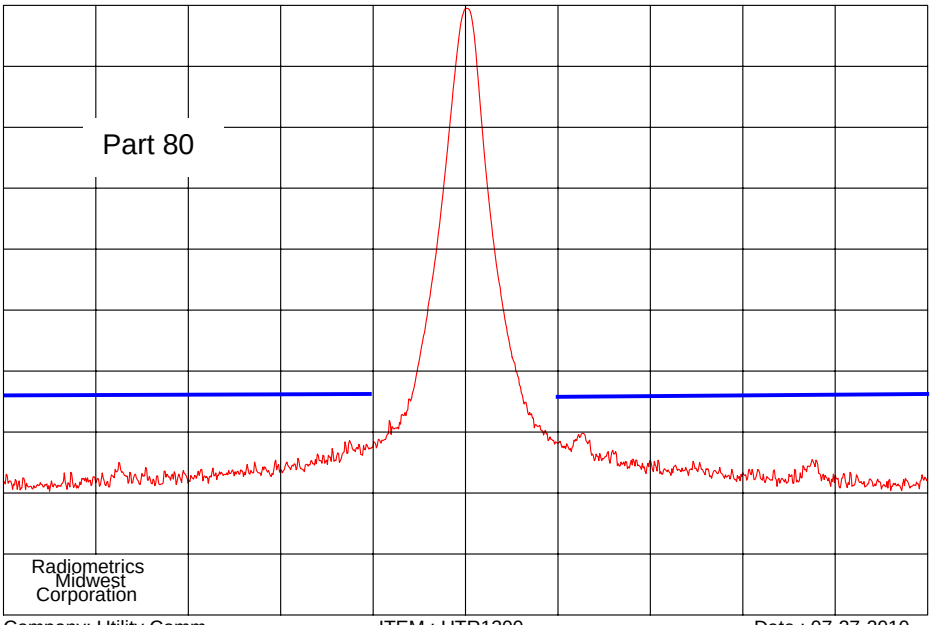
Date : 07-13-2010
SPAN 50.0 kHz
ATTEN 30 dB
SWP 1.50 sec



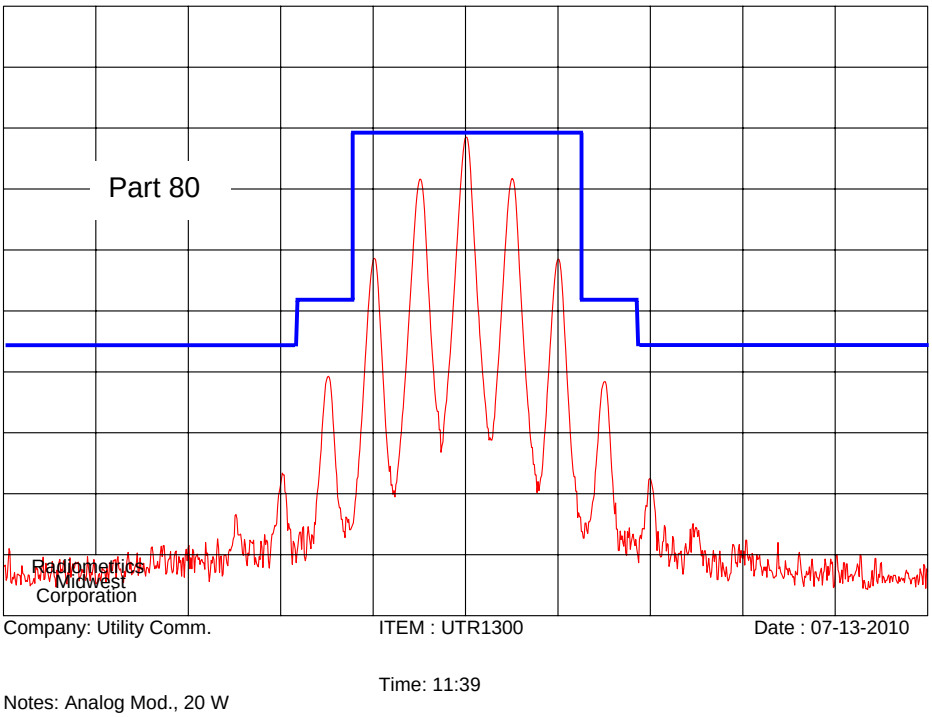
Company: Utility Comm.
CENTER 217.500 MHz
RES BW 300 Hz
10 dB/
Notes: Analog Mod., 100 W

ITEM : UTR1300
REF 20.0 dBm
VBW 1 kHz
Time: 11:41

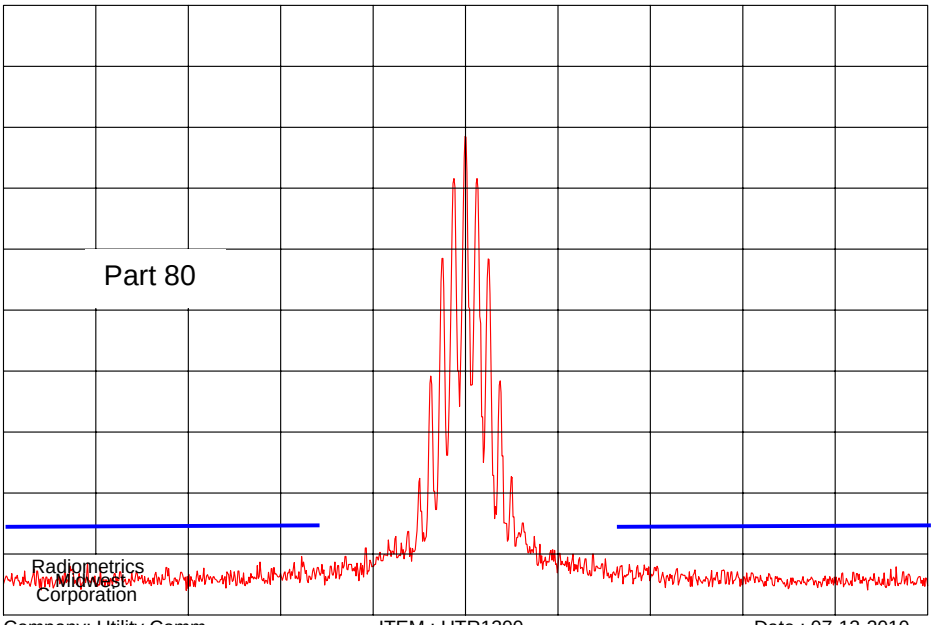
Date : 07-13-2010
SPAN 200 kHz
ATTEN 30 dB
SWP 6.00 sec



217.50 MHz; 1 Watts; 12.5 kHz Channel; Analog Modulation; Part 80



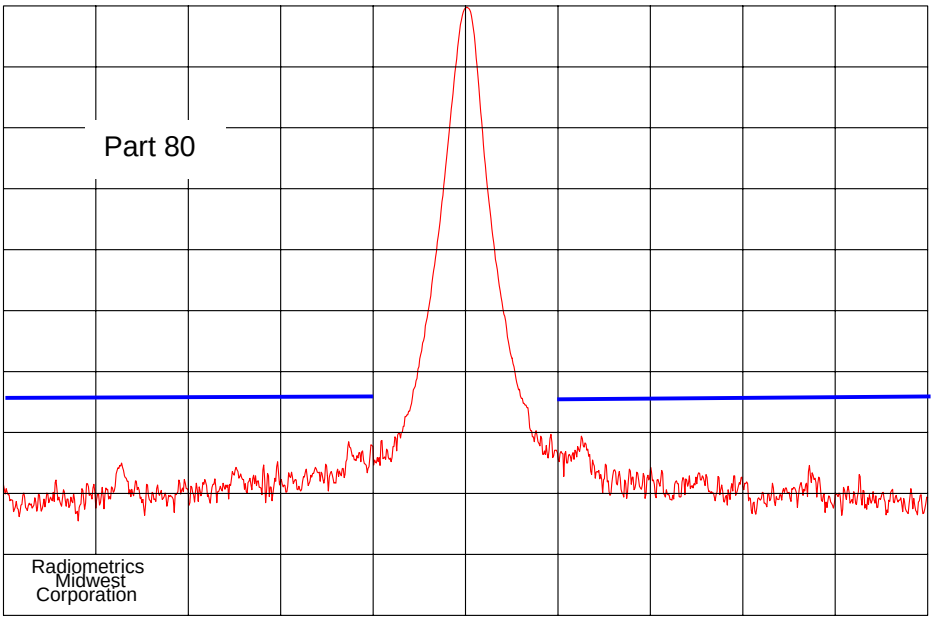
Plot above: Center 217.5 MHz; Span = 50 kHz; RBW = 300 Hz



Company: Utility Comm.
CENTER 217.500 MHz
RES BW 300 Hz
10 dB/
Notes: Analog Mod., 20 W

ITEM : UTR1300
REF 20.0 dBm
VBW 1 kHz
Time: 11:40

Date : 07-13-2010
SPAN 200 kHz
ATTEN 30 dB
SWP 6.00 sec

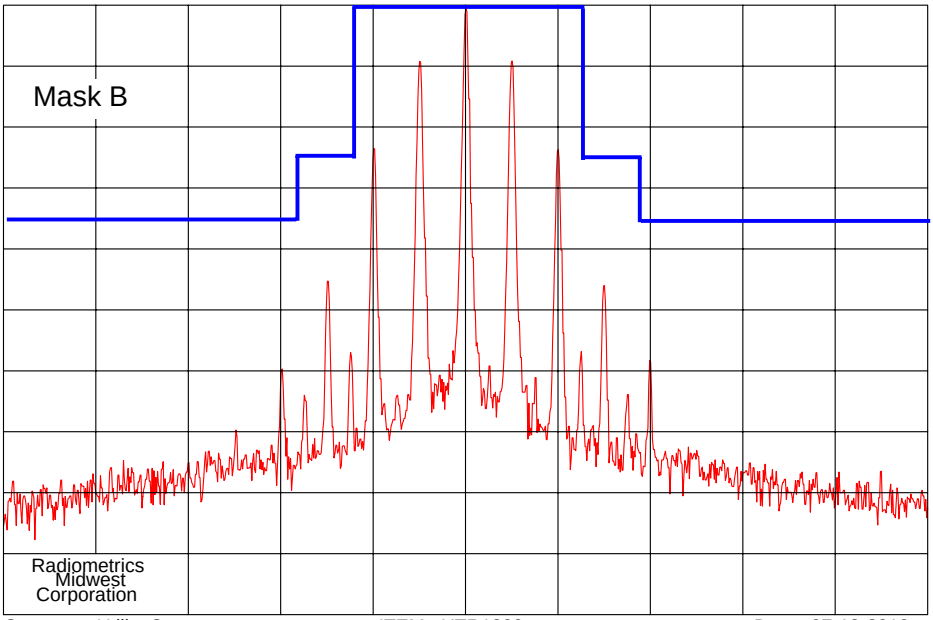


Company: Utility Comm.
CENTER 217.50 MHz
RES BW 10 kHz
10 dB/
Notes: Analog Modulation, 1 Watt

ITEM : UTR1300
REF 0.0 dBm
VBW 30 kHz
Time: 16:29

Date : 07-27-2010
SPAN 1.00 MHz
ATTEN 10 dB
SWP 30.0 msec
File: BW53

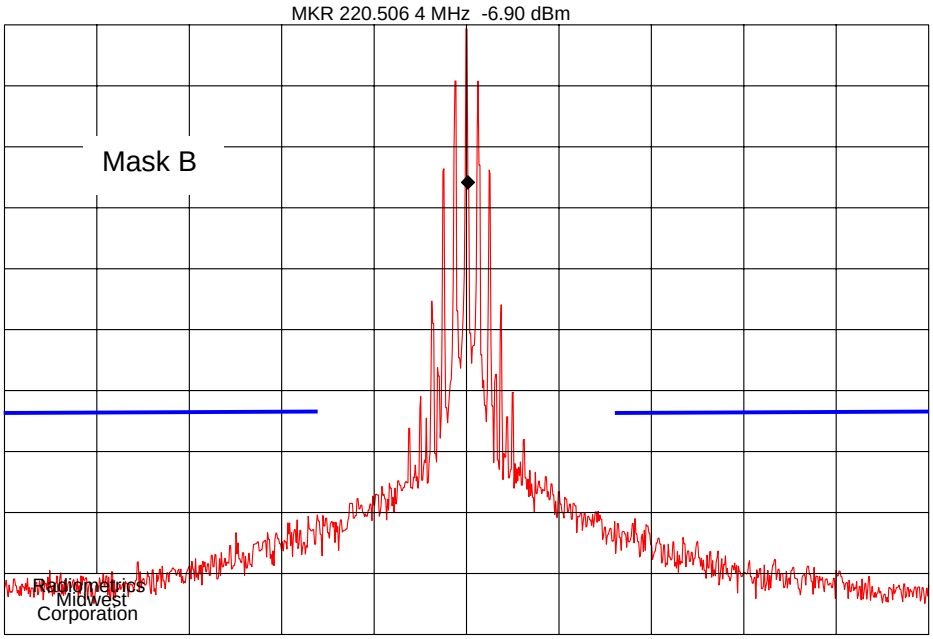
220.50 MHz; 100 Watts; 12.5 kHz Channel; Analog Modulation; Part 90T



Company: Utility Comm.
CENTER 220.506 2 MHz
RES BW 100 Hz
10 dB/
Notes: Analog Mod., 100 W

ITEM : UTR1300
REF 20.0 dBm
VBW 300 Hz
Time: 16:13

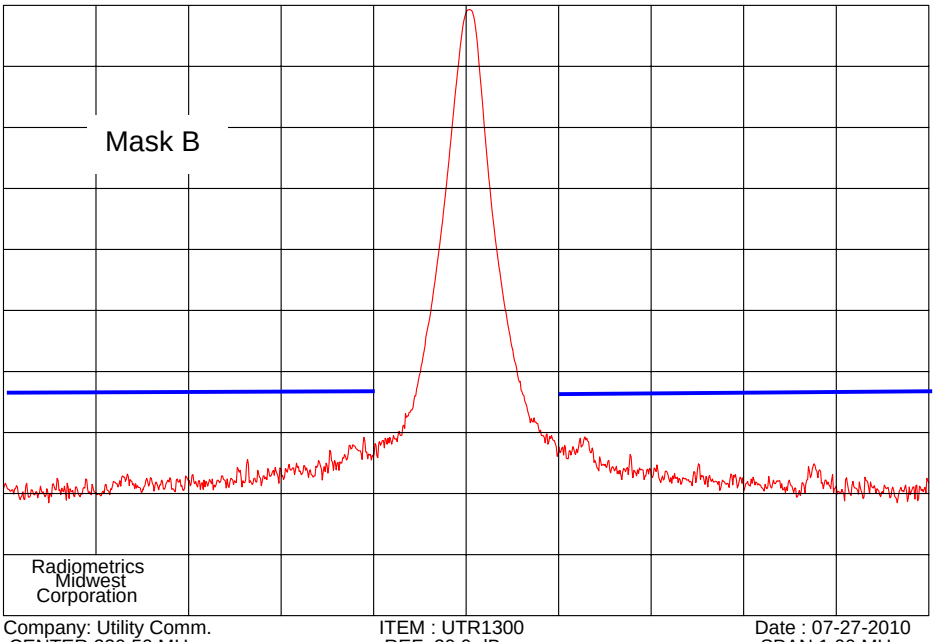
Date : 07-13-2010
SPAN 50.0 kHz
ATTEN 30 dB
SWP 15.0 sec



Company: Utility Comm.
CENTER 220.506 MHz
RES BW 100 Hz
10 dB/
Notes: Analog Mod., 100 W

ITEM : UTR1300
REF 20.0 dBm
VBW 300 Hz
Time: 16:13

Date : 07-13-2010
SPAN 201 kHz
ATTEN 30 dB
SWP 60.0 sec

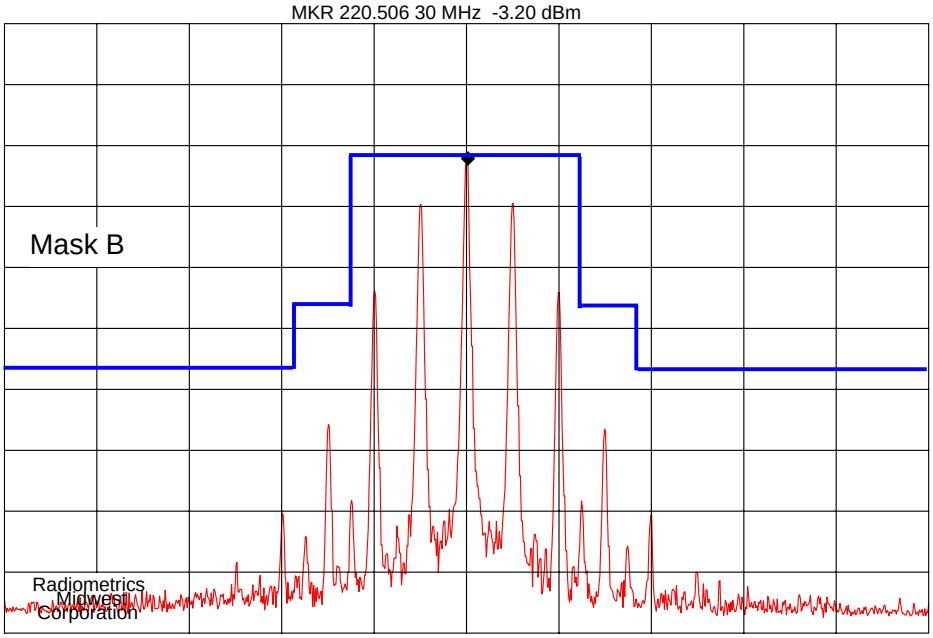


Company: Utility Comm.
CENTER 220.50 MHz
RES BW 10 kHz
10 dB/
Notes: Analog Modulation, 100 Watt

ITEM : UTR1300
REF 20.0 dBm
VBW 30 kHz
Time: 16:30

Date : 07-27-2010
SPAN 1.00 MHz
ATTEN 30 dB
SWP 30.0 msec
File: BW54

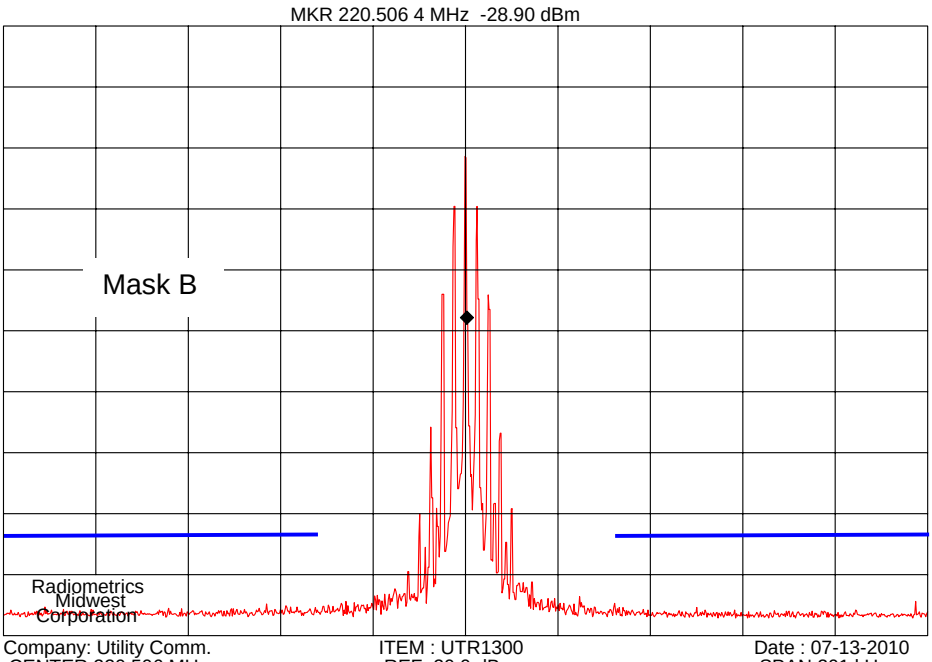
220.50 MHz; 1 Watts; 12.5 kHz Channel; Analog Modulation; Part 90T



Company: Utility Comm.
CENTER 220.506 2 MHz
RES BW 100 Hz
10 dB/
Notes: Analog Mod., 1 W

ITEM : UTR1300
REF 20.0 dBm
VBW 300 Hz
Time: 16:08

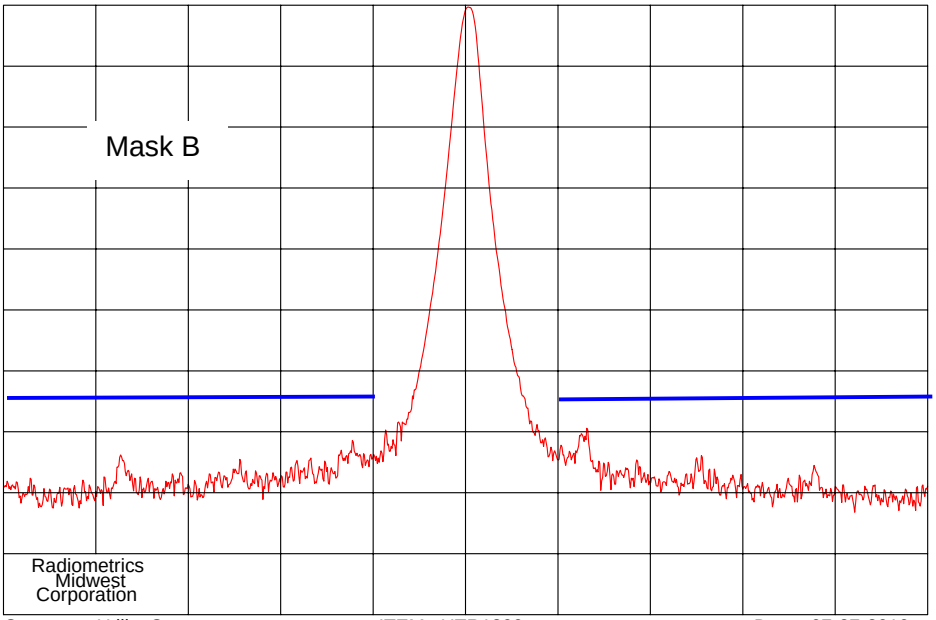
Date : 07-13-2010
SPAN 50.0 kHz
ATTEN 30 dB
SWP 15.0 sec



Company: Utility Comm.
CENTER 220.506 MHz
RES BW 100 Hz
10 dB/
Notes: Analog Mod., 1 W

ITEM : UTR1300
REF 20.0 dBm
VBW 300 Hz
Time: 16:10

Date : 07-13-2010
SPAN 201 kHz
ATTEN 30 dB
SWP 60.0 sec

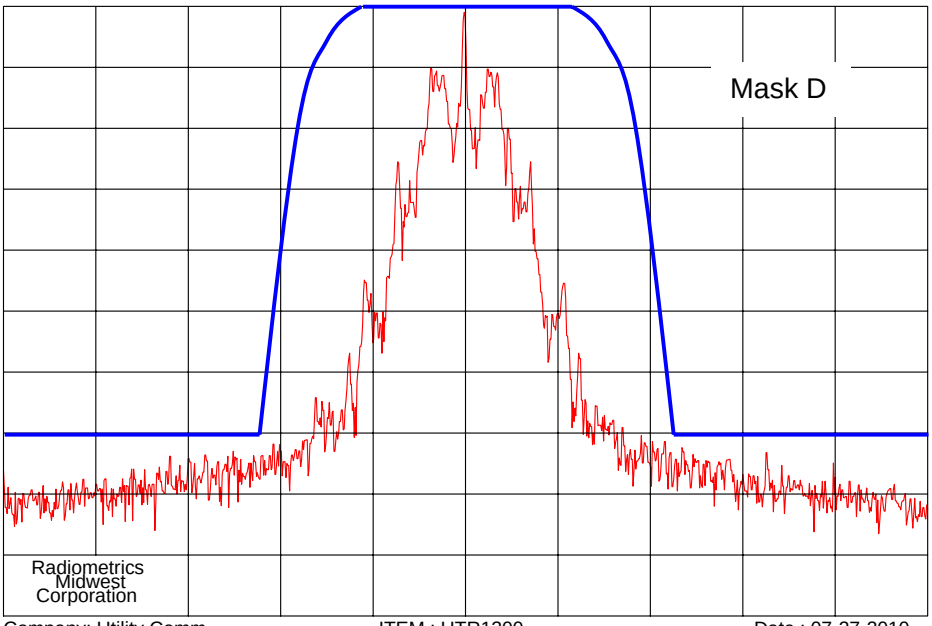


Company: Utility Comm.
CENTER 220.50 MHz
RES BW 10 kHz
10 dB/
Notes: Analog Modulation, 1 Watt

ITEM : UTR1300
REF 0.0 dBm
VBW 30 kHz
Time: 16:30

Date : 07-27-2010
SPAN 1.00 MHz
ATTEN 10 dB
SWP 30.0 msec
File: BW55

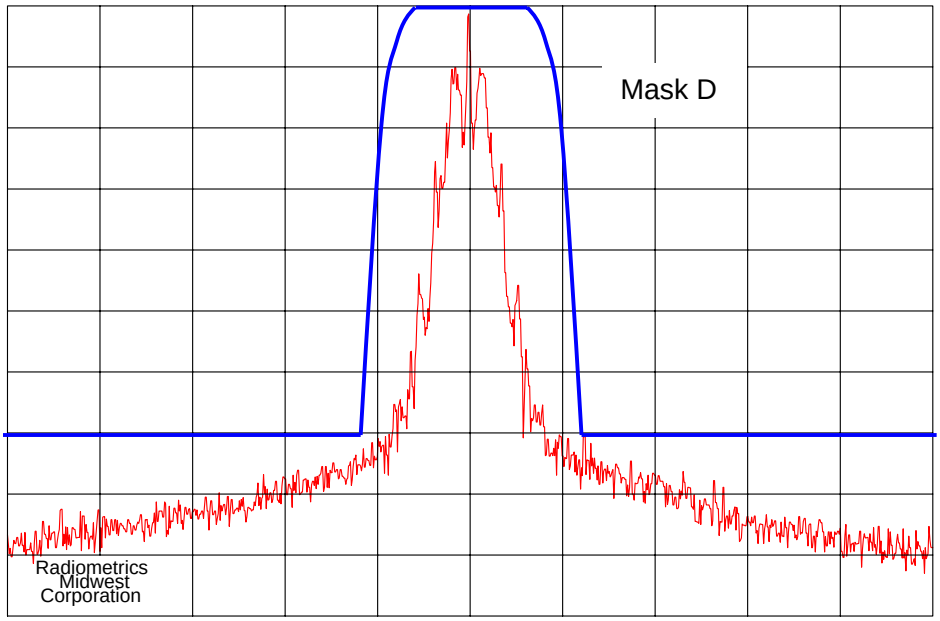
220.50 MHz; 100 Watts; 12.5 kHz Channel; Digital Modulation; Part 90T



Company: Utility Comm.
CENTER 220.506 2 MHz
RES BW 100 Hz
10 dB/
Notes: Digital Modulation, 100 Watt

ITEM : UTR1300
REF 20.0 dBm
VBW 300 Hz
Time: 15:48

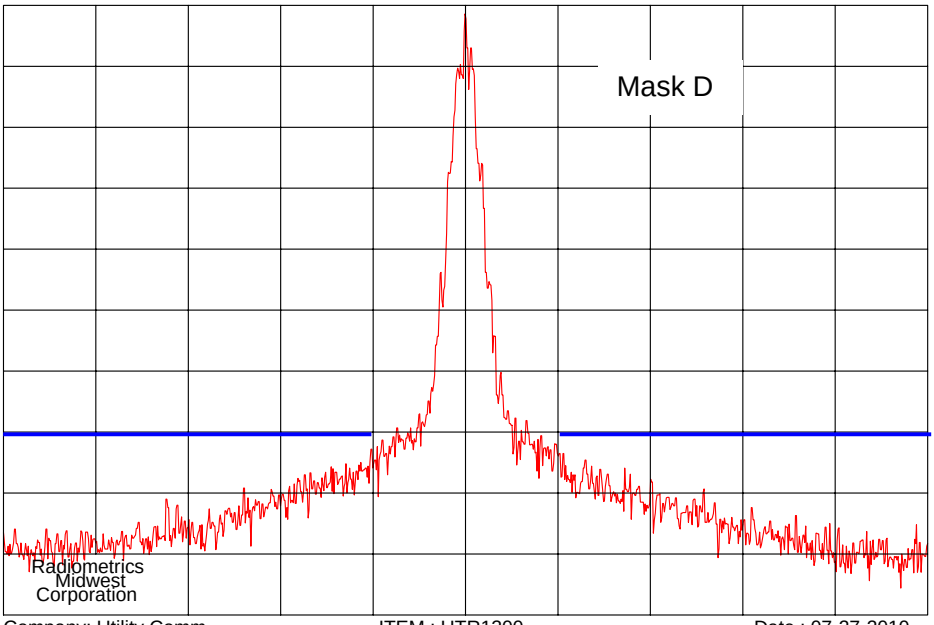
Date : 07-27-2010
SPAN 50.0 kHz
ATTEN 30 dB
SWP 15.0 sec
File: BW43



Company: Utility Comm.
CENTER 220.506 MHz
RES BW 100 Hz
10 dB/
Notes: Digital Modulation, 100 Watt

ITEM : UTR1300
REF 20.0 dBm
VBW 300 Hz
Time: 15:35

Date : 07-27-2010
SPAN 100 kHz
ATTEN 30 dB
SWP 30.0 sec
File: BW37

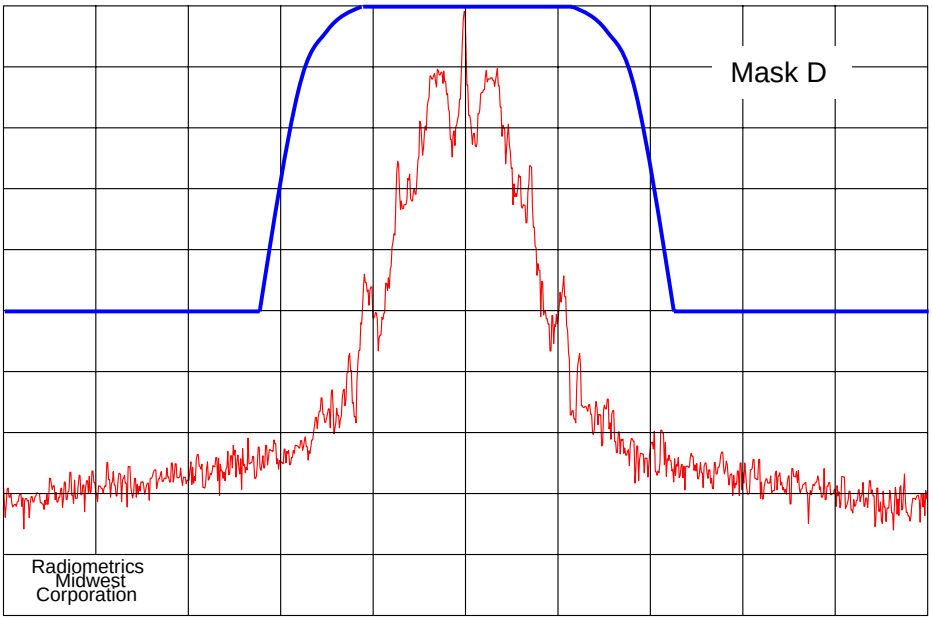


Company: Utility Comm.
CENTER 220.506 MHz
RES BW 300 Hz
10 dB/
Notes: Digital Modulation, 100 Watt

ITEM : UTR1300
REF 20.0 dBm
VBW 1 kHz
Time: 15:38

Date : 07-27-2010
SPAN 201 kHz
ATTEN 30 dB
SWP 6.00 sec
File: BW40

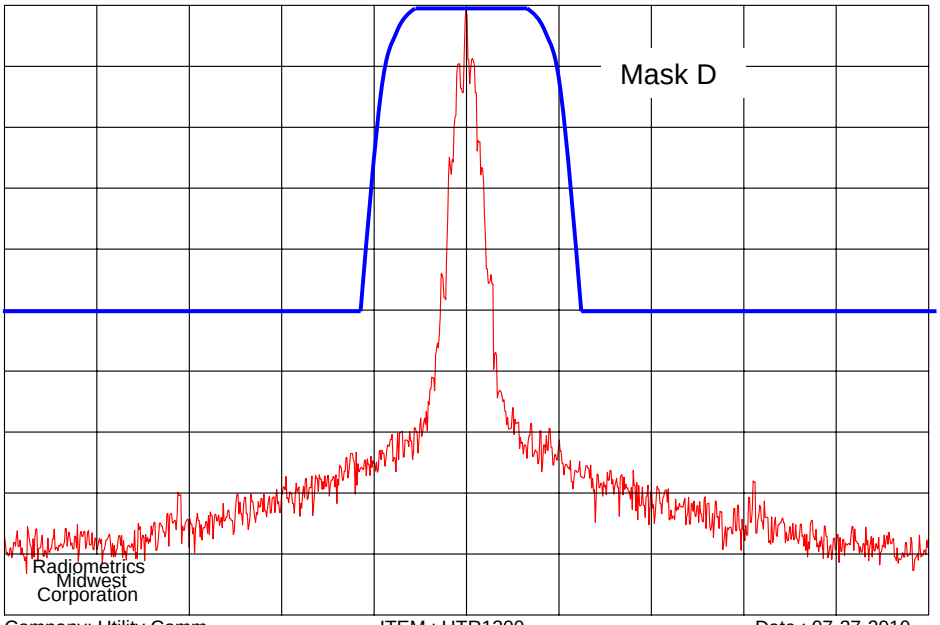
220.50 MHz; 1 Watts; 12.5 kHz Channel; Digital Modulation; Part 90T



Company: Utility Comm.
CENTER 220.506 2 MHz
RES BW 100 Hz
10 dB/
Notes: Digital Modulation, 1 Watt

ITEM : UTR1300
REF 0.0 dBm
VBW 300 Hz
Time: 15:27

Date : 07-27-2010
SPAN 50.0 kHz
ATTEN 10 dB
SWP 15.0 sec
File: BW31

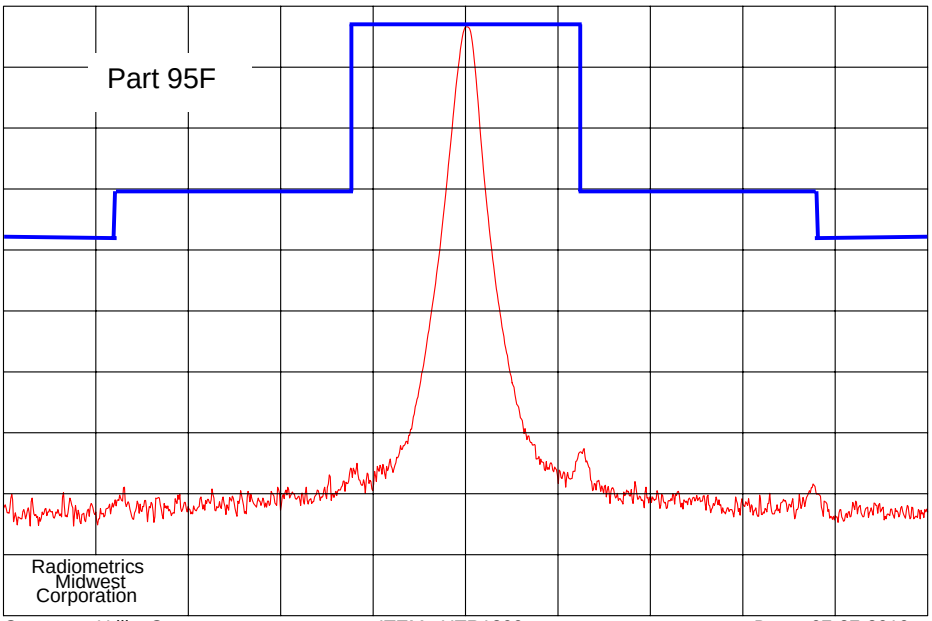


Company: Utility Comm.
CENTER 220.506 MHz
RES BW 300 Hz
10 dB/
Notes: Digital Modulation, 1 Watt

ITEM : UTR1300
REF 0.0 dBm
VBW 1 kHz
Time: 15:31

Date : 07-27-2010
SPAN 201 kHz
ATTEN 10 dB
SWP 6.00 sec
File: BW35

218.50 MHz; 20 Watts; 12.5 kHz Channel; Digital Modulation; Part 95F

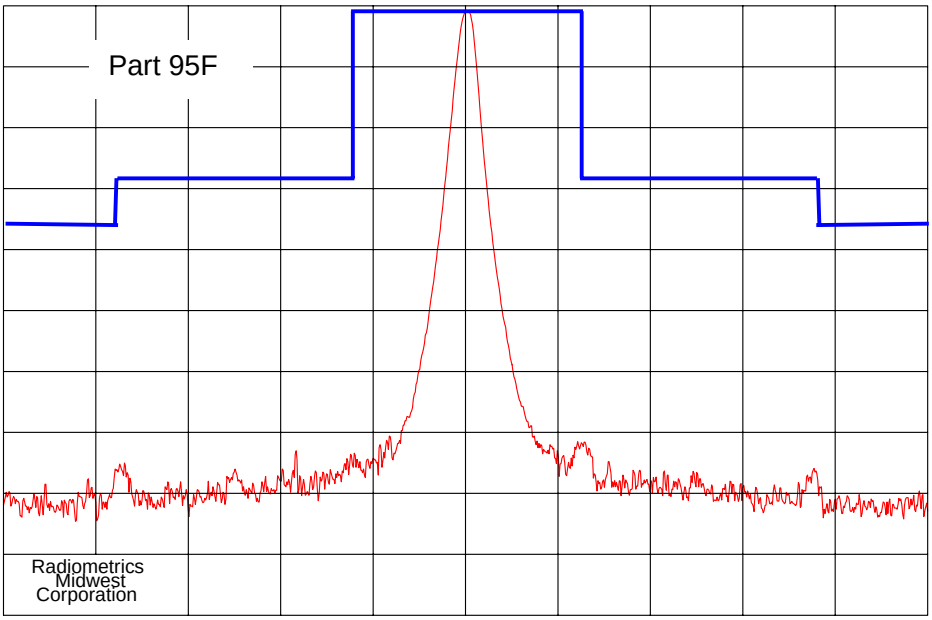


Company: Utility Comm.
CENTER 218.50 MHz
RES BW 10 kHz
10 dB/
Notes: Digital Modulation, 20 Watt

ITEM : UTR1300
REF 20.0 dBm
VBW 30 kHz
Time: 16:02

Date : 07-27-2010
SPAN 1.00 MHz
ATTEN 30 dB
SWP 30.0 msec
File: BW47

218.50 MHz; 1 Watt; 12.5 kHz Channel; Digital Modulation; Part 95F

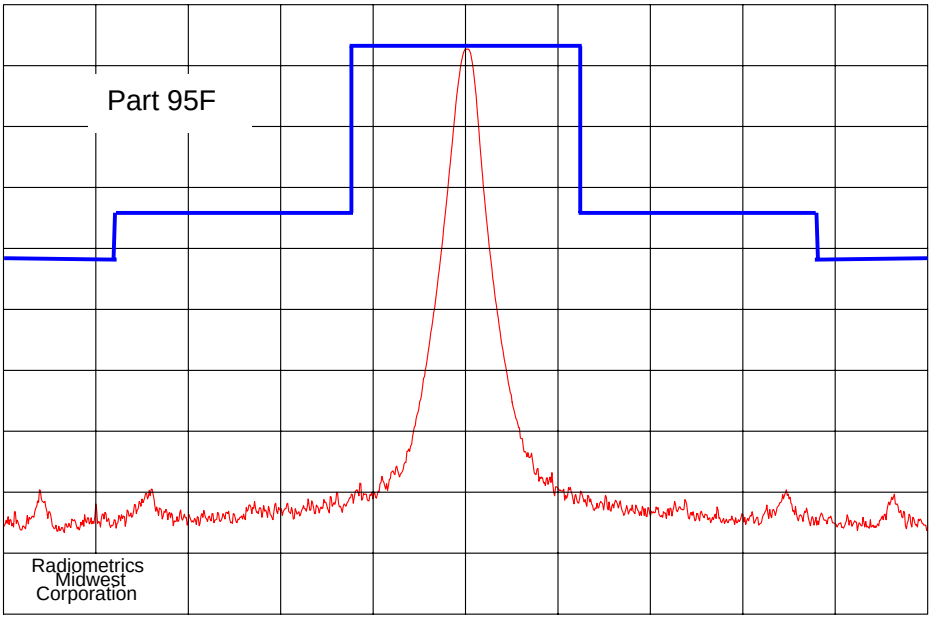


Company: Utility Comm.
CENTER 218.50 MHz
RES BW 10 kHz
10 dB/
Notes: Digital Modulation, 1 Watt

ITEM : UTR1300
REF 0.0 dBm
VBW 30 kHz
Time: 16:13

Date : 07-27-2010
SPAN 1.00 MHz
ATTEN 10 dB
SWP 30.0 msec
File: BW51

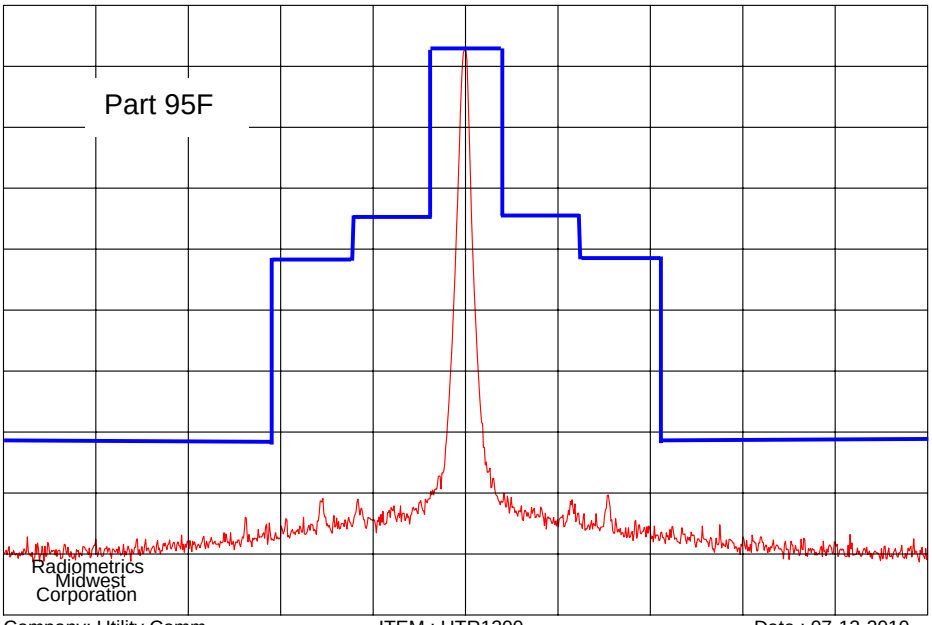
218.50 MHz; 20 Watts; 12.5 kHz Channel; Analog Modulation; Part 95F



Company: Utility Comm.
CENTER 218.50 MHz
RES BW 10 kHz
10 dB/
Notes: Analog Mod., 20 W

ITEM : UTR1300
REF 20.0 dBm
VBW 30 kHz
Time: 16:25

Date : 07-13-2010
SPAN 1.00 MHz
ATTEN 30 dB
SWP 30.0 msec

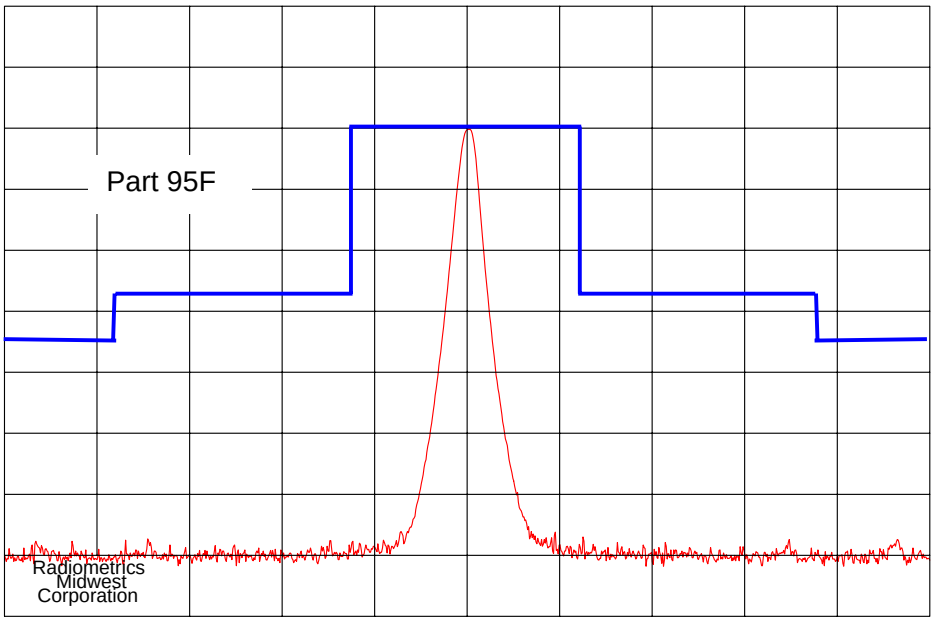


Company: Utility Comm.
CENTER 218.50 MHz
RES BW 10 kHz
10 dB/
Notes: Analog Mod., 20 W

ITEM : UTR1300
REF 20.0 dBm
VBW 30 kHz
Time: 16:26

Date : 07-13-2010
SPAN 3.00 MHz
ATTEN 30 dB
SWP 90.0 msec

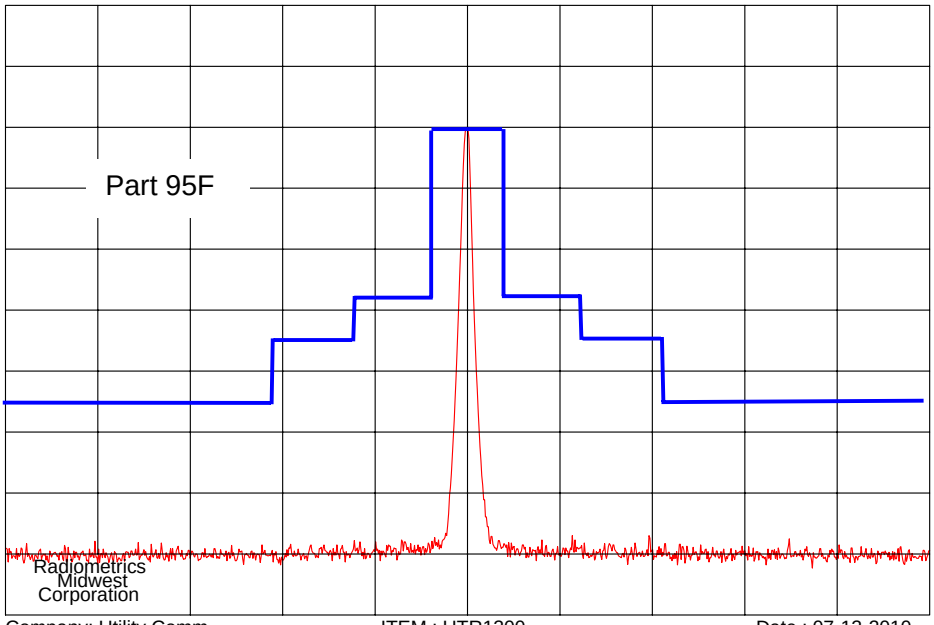
218.50 MHz; 2 Watt; 12.5 kHz Channel; Analog Modulation; Part 95F



Company: Utility Comm.
CENTER 218.50 MHz
RES BW 10 kHz
10 dB/
Notes: Analog Mod., 1 W

ITEM : UTR1300
REF 20.0 dBm
VBW 30 kHz
Time: 16:28

Date : 07-13-2010
SPAN 1.00 MHz
ATTEN 30 dB
SWP 30.0 msec



Company: Utility Comm.
CENTER 218.50 MHz
RES BW 10 kHz
10 dB/
Notes: Analog Mod., 1 W

ITEM : UTR1300
REF 20.0 dBm
VBW 30 kHz
Time: 16:27

Date : 07-13-2010
SPAN 3.00 MHz
ATTEN 30 dB
SWP 90.0 msec

Judgement: Pass
Tested by: Joseph Strzelecki

10.2.1 Spurious RF Conducted Emissions

The spectrum analyzer was set to the MAX HOLD mode to record all spurious emissions from the lowest frequency generated in the EUT up through the 10th harmonic. The transmitter is terminated with a 100 W Attenuator.

Limits: Mask B (dBm): P(dBm) – (43+10xLOG P(W)) = -13 dBm
Mask D (dBm): P(dBm) – (50+10xLOG P(W)) or 70 dB which ever is lessor attenuation
Mask D = -20 dBm

Tx MHz	Watts	Channel kHz	Modulation Type	Freq. Tested MHz	Spurious Emissions		Noise floor dBm
					Limit dBm	EUT dBm	
217.5	100	12.5	Digital	1-2300	-20	-30	-30
217.5	1	12.5	Digital	1-2300	-20	-37	-37
217.5	100	12.5	Analog	1-2300	-20	-30	-30
217.5	1	12.5	Analog	1-2300	-20	-37	-37
218.5	20	12.5	Digital	1-2300	-20	-30	-30
218.5	1	12.5	Digital	1-2300	-20	-37	-37
218.5	20	12.5	Analog	1-2300	-20	-30	-30
218.5	1	12.5	Analog	1-2300	-20	-37	-37
220.5	100	12.5	Digital	1-2300	-20	-30	-30
220.5	1	12.5	Digital	1-2300	-20	-37	-37
220.5	100	12.5	Analog	1-2300	-20	-30	-30
220.5	1	12.5	Analog	1-2300	-20	-37	-37

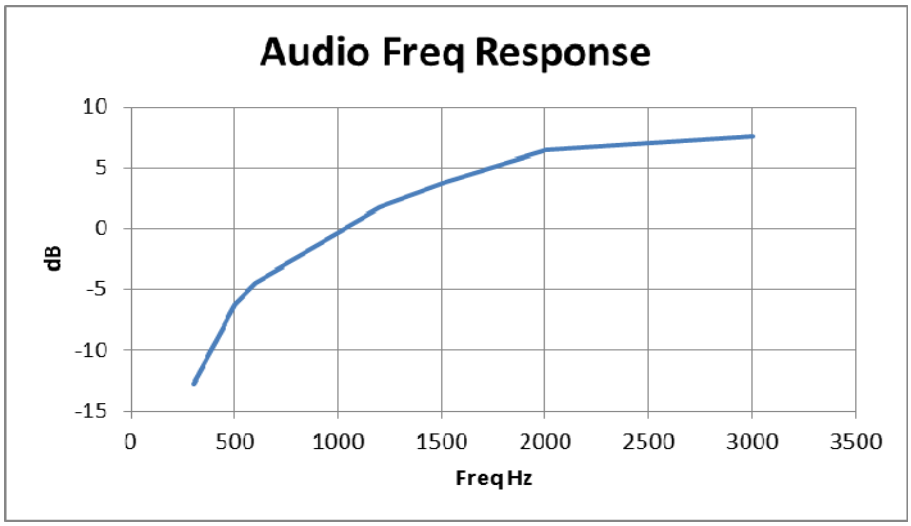
Judgement: Pass
Date 7-27-2010

10.3 Modulation Characteristics 2.1047

10.3.1 Audio Frequency Response

Procedures

1. The transmitter was set for 1.5 kHz deviation using a 1 kHz test tone. A measurement was then taken and set as the 0 dB reference.
2. The test signal amplitude was then held constant and the frequency varied over the range shown in the following chart and measurements taken.

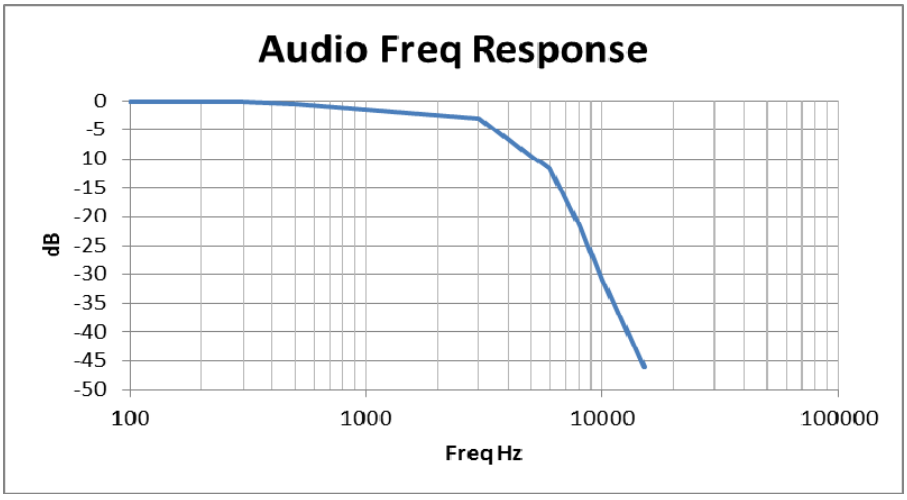


Judgment: Pass

10.3.2 Audio Low pass Filter

Procedure:

1. A 1 kHz test tone producing 50% modulation (2.5 kHz) was applied to the EUT.
2. The audio generator amplitude was then changed to the values shown in the following charts and plus and minus peak deviations observed. The peak absolute value for each measurement point is recorded in the following chart.

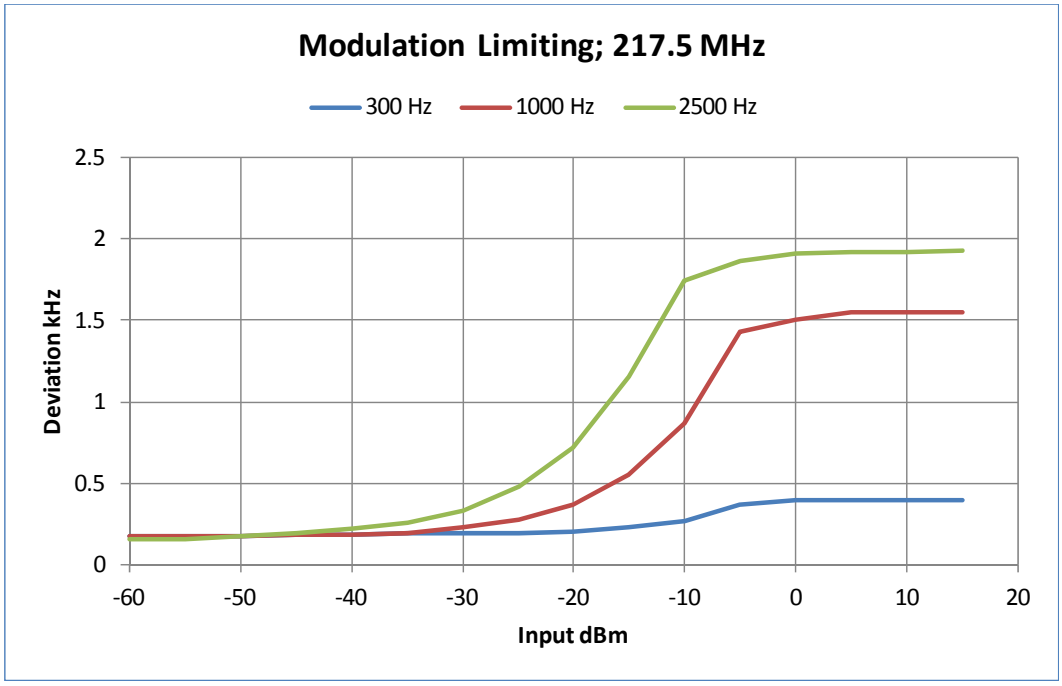


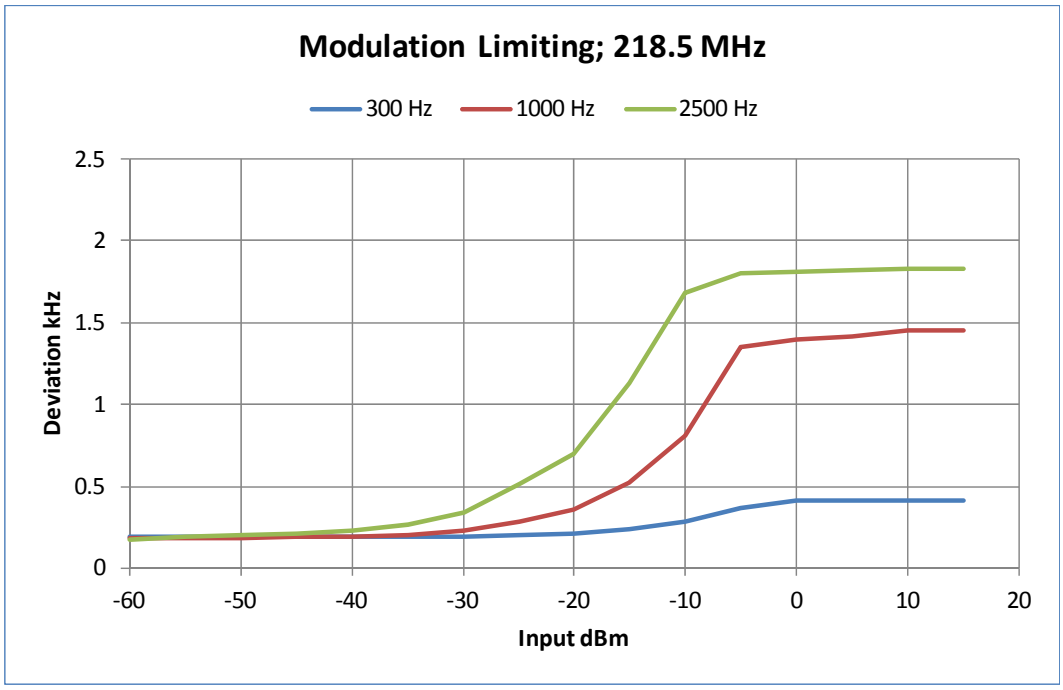
Judgment: Pass

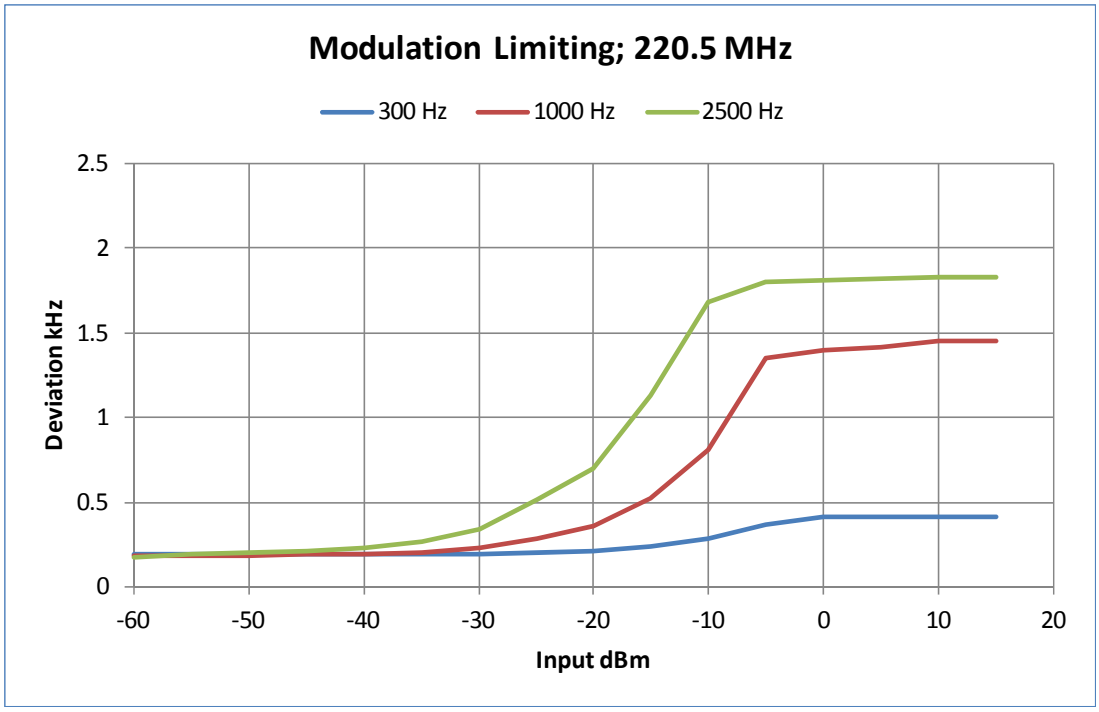
10.3.3 Modulation Limiting (2.1047)

Procedure:

1. A 300 Hz, -60 dBm test tones was applied to the EUT. The deviation was recorded.
2. The Input level was increased to 15 dBm in 5 dBm steps. The deviation was recorded at each step.
3. This procedure was repeated for 1000 and 2500 Hz.
4. The Results were plotted and shown herein.







10.4 Frequency Tolerance

10.4.1 Frequency Stability Vs. Temperature

Test Procedure:

1. The EUT was operated at 20°C and allowed to stabilize for 20 minutes and a reference measurement taken. The chamber was then set to 20° and allowed to stabilize for 20 minutes before the measurement was recorded.
2. The chamber was then decremented in 10°C steps with a 20 minute stabilization period prior to each measurement.
3. After the -30° C measurement was taken the chamber was set to 30° C and allowed to stabilize for one hour prior to recording the measurement.
4. The temperature was then incremented in 10° C steps with a 20 minute stabilization period for each measurement.

10.4.2 Frequency Stability Vs. Supply Voltage

Procedure:

1. The EUT was allowed to stabilize in a 25° C ambient with the nominal primary power supply voltage of 13.8 VDC applied.
2. The primary power supply was then set to 85% of the nominal value and the frequency measurement recorded.
3. The primary power was then set to 115% of the nominal value and the frequency measurement recorded.

Nominal Freq	219.000						
Volts	Freq.			Temp	Freq.		
DC	(MHz)	% Error	PPM	Deg C	(MHz)	% Error	PPM
15.9	218.99996	-1.83E-05	-0.18	50	218.99991	-3.93E-05	-0.39
13.8	218.99997	-1.37E-05	-0.14	40	218.99992	-3.56E-05	-0.36
11.7	218.99998	-9.13E-06	-0.09	30	218.99993	-3.38E-05	-0.34
				20	218.99997	-1.37E-05	-0.14
				20	218.99998	-9.13E-06	-0.09
				10	219.00003	1.37E-05	0.14
				0	218.99998	-9.13E-06	-0.09
				-10	218.99993	-3.20E-05	-0.32
				-20	218.99992	-3.65E-05	-0.37

Nominal Freq	217.000						
Volts	Freq.			Temp	Freq.		
DC	(MHz)	% Error	PPM	Deg C	(MHz)	% Error	PPM
15.9	217.00003	1.32E-05	0.13	50	216.99999	-5.19E-06	-0.05
13.8	217.00004	1.74E-05	0.17	40	216.99998	-1.04E-05	-0.10
11.7	217.00012	5.51E-05	0.55	30	216.99993	-3.03E-05	-0.30
				20	217.00007	3.20E-05	0.32
				20	217.00001	5.71E-06	0.06
				10	217.00022	1.00E-04	1.00
				0	217.00001	4.71E-06	0.05
				-10	216.99998	-1.07E-05	-0.11
				-20	217.00004	1.74E-05	0.17

Nominal Freq	220.000						
Volts	Freq.			Temp	Freq.		
DC	(MHz)	% Error	PPM	Deg C	(MHz)	% Error	PPM
15.9	220.0001122	5.10E-05	0.51	50	220.00003	1.47E-05	0.15
13.8	220.0001388	1.38E+00	0.63	40	220.00010	4.53E-05	0.45
11.7	220.0001696	1.38E+00	0.77	30	219.99999	-5.86E-06	-0.06
				20	220.00009	4.00E-05	0.40
				20	220.00014	6.20E-05	0.62
				10	220.00026	1.20E-04	1.20
				0	220.00013	5.96E-05	0.60
				-10	220.00005	2.11E-05	0.21
				-20	220.00020	8.92E-05	0.89

Test Requirements: Limit is 2.5 ppm

Judgement: Pass

10.5 Field Strength of Unwanted Spurious Radiation

10.5.1 Test Procedures

Radiated emission measurements in the Restricted bands were performed with linearly polarized broadband antennas. The results obtained with these antennas can be correlated with results obtained with a tuned dipole antenna. A 10 dB linearity check is performed prior to start of testing in order to determine if an overload condition exists. From 30 to 2300 MHz, an HP8566B spectrum analyzer with a preselector was used for measurement.

Final radiated emissions measurements were performed at the anechoic chamber at a test distance of 3 meters. The entire frequency range from 30 to 2300 MHz was slowly scanned and the emissions in the restricted frequency bands were recorded. Measurements were performed using the peak detector function. For each frequency, the test antenna was raised and lowered from 1 to 4 meters in order to obtain maximum reading on the spectrum analyzer. The turntable was then rotated 360 degrees to determine the maximum reading. The procedure was repeated in order to obtain the highest possible reading, which was recorded.

Radiated emission measurements are performed with linearly polarized broadband antennas. Measurements were performed using two antenna polarizations, (vertical and horizontal). The worst case emissions were recorded.

The EUT was placed on the turntable at the test site. The EUT was transmitting to a non-radiating load that was placed on the turntable. The RF cable to the load was 1 meter in length. The transmitter was keyed during the tests.

Since –20 dBm is the lowest limit, it was used for all tests.

10.5.2 Radiated Field Strength Sample Calculation

The following was used for reference only. The final determination of compliance was the substitution method as described in the previous section

The field strength is calculated by adding the Antenna Factor and Cable Loss, to the measured reading. The basic equation is as follows:

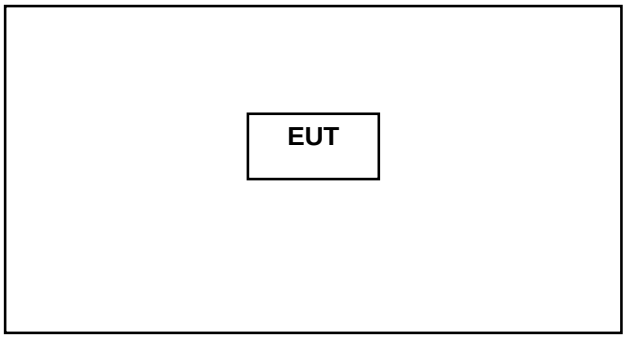
FS = RA + AF + CF

Where: FS = Field Strength
RA = Receiver Amplitude
AF = Antenna Factor
CF = Cable Attenuation Factor

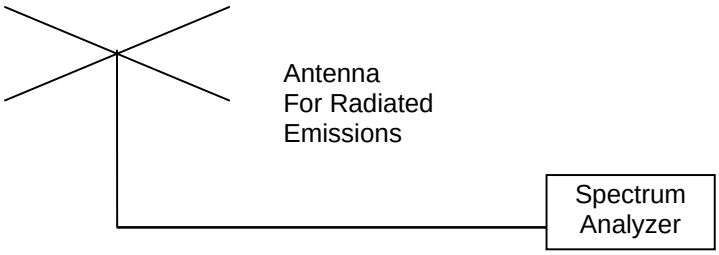
The limit was calculated using the following formula:
Power (Watts) $P = (VxD)^2/30$
Where: V=Volts/meter & D = Antenna Distance in meters

For P= -20 dBm, V = 75.2 dBuV/m

Figure 1. Drawing of Radiated Emissions Setup



Notes:
- AC outlet with low-pass filter at the base of the turntable
- Antenna height varied from 1 to 4 meters
- Distance from antenna to tested system is 3 meters
- Not to Scale



10.5.3 Spurious Radiated Emissions Test Results

The following spectrum analyzer settings were used.

Span = wide enough to fully capture the emission being measured
RBW = 1 MHz for f ≥ 1 GHz, 100 kHz for f < 1 GHz
VBW > RBW; Sweep = auto; Detector function = peak; Trace = max hold
The Tests were performed with the 100 Watt power setting. This was found to be the worst case.

Manufacturer	Utility Communications, Inc	Specification	FCC Part 2 &
Model	UTR1300	Test Date	6-15-2010
Serial Number	None	Test Distance	3 Meters
Abbreviations	Pol = Antenna Polarization; V = Vertical; H = Horizontal;		

Notes	Tx set to 217 MHz

Freq. MHz	Meter Reading dBuV	Dect. Type	Antenna		Corr. Factors dB	Field Strength dBuV/m		Margin Under Limit dB
			Factor dB	Pol/ ID#		EUT	Limit	
67.2	22.8	P	8.3	H/44	1.4	32.5	75.2	42.7
108.4	21.7	P	12.0	H/44	1.8	35.5	75.2	39.7
153.6	22.1	P	10.1	H/44	2.2	34.4	75.2	40.8
270.4	24.4	P	12.9	H/44	3.1	40.4	75.2	34.8
443.4	32.8	P	16.0	H/44	4.0	52.8	75.2	22.4
666.0	24.4	P	19.9	H/44	5.1	49.4	75.2	25.8
888.0	22.0	P	21.5	H/44	6.1	49.6	75.2	25.6
1110.0	21.8	P	23.8	H/44	7.1	52.7	75.2	22.5
1169.0	20.2	P	24.4	H/44	7.3	51.9	75.2	23.3
1273.0	20.6	P	25.1	H/44	7.8	53.5	75.2	21.7
1308.0	20.7	P	25.3	H/44	7.9	53.9	75.2	21.3
1457.0	21.0	P	25.9	H/44	8.5	55.4	75.2	19.8
1572.0	21.2	P	26.9	H/44	8.9	57.0	75.2	18.2
1894.0	20.4	P	28.8	H/44	10.2	59.4	75.2	15.8
47.2	25.2	P	14.4	V/44	1.2	40.8	75.2	34.4
61.6	25.7	P	10.1	V/44	1.4	37.2	75.2	38.0
66.4	26.5	P	8.5	V/44	1.4	36.4	75.2	38.8
147.2	23.5	P	10.1	V/44	2.2	35.8	75.2	39.4
270.4	24.3	P	12.9	V/44	3.1	40.3	75.2	34.9
315.2	22.0	P	13.6	V/44	3.3	38.9	75.2	36.3
443.4	29.5	P	16.0	V/44	4.0	49.5	75.2	25.7
666.0	24.1	P	19.9	V/44	5.1	49.1	75.2	26.1
923.0	19.5	P	22.1	V/44	6.3	47.9	75.2	27.3
1106.0	21.1	P	23.8	V/44	7.1	52.0	75.2	23.2
1422.0	21.5	P	25.6	V/44	8.3	55.4	75.2	19.8
1580.0	21.4	P	27.0	V/44	8.9	57.3	75.2	17.9
1948.0	21.5	P	28.9	V/44	10.4	60.8	75.2	14.4
Notes	Tx set to Ch 1 220.5 MHz; 100 Watts							
68.0	23.4	P	8.1	H/44	1.4	32.9	75.2	42.3
96.0	20.8	P	8.7	H/44	1.7	31.2	75.2	44.0
270.4	25.2	P	12.9	H/44	3.1	41.2	75.2	34.0

Freq. MHz	Meter Reading dBuV	Dect. Type	Antenna		Corr. Factors dB	Field Strength dBuV/m		Margin Under Limit dB
			Factor dB	Pol/ ID#		EUT	Limit	
285.5	25.0	P	12.7	H/44	3.1	40.8	75.2	34.4
300.1	22.1	P	13.1	H/44	3.2	38.4	75.2	36.8
367.3	21.7	P	14.9	H/44	3.6	40.2	75.2	35.0
437.3	29.2	P	16.4	H/44	4.0	49.6	75.2	25.6
657.0	22.7	P	19.4	H/44	5.0	47.1	75.2	28.1
876.0	21.4	P	21.3	H/44	6.1	48.8	75.2	26.4
1156.0	21.3	P	24.3	H/44	7.2	52.8	75.2	22.4
1206.0	21.7	P	24.5	H/44	7.4	53.6	75.2	21.6
1375.0	21.6	P	25.4	H/44	8.1	55.1	75.2	20.1
1537.0	21.9	P	26.5	H/44	8.8	57.2	75.2	18.0
1724.0	20.7	P	27.9	H/44	9.6	58.2	75.2	17.0
1924.0	20.2	P	28.9	H/44	10.3	59.4	75.2	15.8
49.2	26.6	P	14.0	V/44	1.2	41.8	75.2	33.4
68.0	26.1	P	8.1	V/44	1.4	35.6	75.2	39.6
160.4	22.9	P	10.4	V/44	2.3	35.6	75.2	39.6
225.0	24.9	P	11.6	V/44	2.7	39.2	75.2	36.0
240.2	23.5	P	12.2	V/44	2.9	38.6	75.2	36.6
270.4	25.5	P	12.9	V/44	3.1	41.5	75.2	33.7
300.1	23.1	P	13.1	V/44	3.2	39.4	75.2	35.8
315.2	23.4	P	13.6	V/44	3.3	40.3	75.2	34.9
437.3	28.6	P	16.4	V/44	4.0	49.0	75.2	26.2
657.0	22.4	P	19.4	V/44	5.0	46.8	75.2	28.4
876.0	21.2	P	21.3	V/44	6.1	48.6	75.2	26.6
1095.0	20.9	P	23.7	V/44	7.1	51.7	75.2	23.5
1220.0	20.5	P	24.6	V/44	7.5	52.6	75.2	22.6
1337.0	21.0	P	25.4	V/44	8.0	54.4	75.2	20.8
1579.0	20.8	P	27.0	V/44	8.9	56.7	75.2	18.5
1710.0	20.5	P	27.9	V/44	9.5	57.9	75.2	17.3
1934.0	20.2	P	28.9	V/44	10.4	59.5	75.2	15.7

Judgment: Passed by 14.4 dB
Tested by: Joseph Strzelecki