

KTL Test Report:	8R01003
Applicant:	Allen Telecom Group 140 Vista Center Drive Forest, Virginia 24551
Equipment Under Test: (E.U.T.)	Prism Plus CTE Band Repeater
FCC ID:	BCR-ATE60-CTE
In Accordance With:	FCC Part 90, Subpart I Private Land Mobile Repeater
Tested By:	KTL Ottawa Inc. 3325 River Road, R.R. 5 Ottawa, Ontario K1V 1H2
Authorized By:	W. Waterhouse, RF Engineering Lab Manager
Date:	
Total Number of Pages:	59

EQUIPMENT: Prism Plus CTE Band Repeater
FCC ID: BCR-ATE60-CTE

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EQUIPMENT: Prism Plus CTE Band Repeater
FCC ID: BCR-ATE60-CTE

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EQUIPMENT: Prism Plus CTE Band Repeater
FCC ID: BCR-ATE60-CTE

Section 1. Summary of Test Results

Manufacturer: Allen Telecom Group

Model No.: CTE

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 90, Subpart I.



New Submission



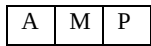
Production Unit



Class II Permissive Change



Pre-Production Unit



Equipment Code

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: 100351-0

TESTED BY: _____ DATE: _____
Russell Grant, Technologist

TECHNICAL REVIEW: _____ DATE: _____
Tom Tidwell, Wireless Group Manager

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EQUIPMENT: Prism Plus CTE Band Repeater
FCC ID: BCR-ATE60-CTE

Summary Of Test Data

NAME OF TEST	PARA. NO.	SPEC.	MEAS.	RESULT
RF Power Output	90.205	1	1	Complies
Audio Frequency Response	TIA EIA-603.3.2.6	N/A	N/A	N/A
Audio Low-Pass Filter Response	TIA EIA-603.3.2.6	N/A	N/A	N/A
Modulation Limiting	TIA EIA-603.3.2.6	N/A	N/A	N/A
Occupied Bandwidth	90.210	Plots	Plots	Complies
Spurious Emissions at Antenna Terminals	90.210	Plots	Plots	Complies
Field Strength of Spurious Emissions	90.210	75.2 dB μ V/m	28.9 dB μ V/m	Complies
Frequency Stability	90.213	N/A	N/A	N/A
Transient Frequency Behavior	90.214	N/A	N/A	N/A

Footnotes For N/A's:

- (1) Since the E.U.T. does not contain modulation circuitry modulation testing was not performed.
- (2) Since the E.U.T. is not a keyed carrier system, Transient Frequency Behavior was not performed.
- (3) Since the E.U.T. does not contain frequency generation circuitry.

Test Conditions: Temperature: 20 °C
 Humidity: 30 %

EQUIPMENT: Prism Plus CTE Band Repeater
FCC ID: BCR-ATE60-CTE

Section 2. General Equipment Specification**Transmitter**

Supply Voltage Input:	120 VAC				
Frequency Range:	806 – 824 MHz and 851 – 869 MHz				
Tunable Bands:	1				
20 dB Passband:	37.8, 39.5 MHz				
Type(s) of Modulation:	F3E (Voice) ☒	F1D ☒	F2D ☐	D7W (QAM) ☐	DXW IDEN ☒
Gain:	58 / 60 dB				
Maximum Input:	Not Applicable				
Output Impedance:	50 ohms				
RF Power Output (rated):	Single:	2 W			
	Composite:	1 W			
Channel Spacing(s):	25 kHz				
Operator Selection of Operating Frequency:	Not Applicable				
Power Output Adjustment Capability:	Not Applicable				
Frequency Translation:	F1-F1 ☐		F1-F2 ☐	N/A ☒	
Band Selection:	Software ☐		Duplexer Change ☐	Fullband Coverage ☒	

EQUIPMENT: Prism Plus CTE Band Repeater
FCC ID: BCR-ATE60-CTE

Description of Modifications For Class II Permissive Change

NOT APPLICABLE

EQUIPMENT: Prism Plus CTE Band Repeater
FCC ID: BCR-ATE60-CTE

Modifications Made During Testing

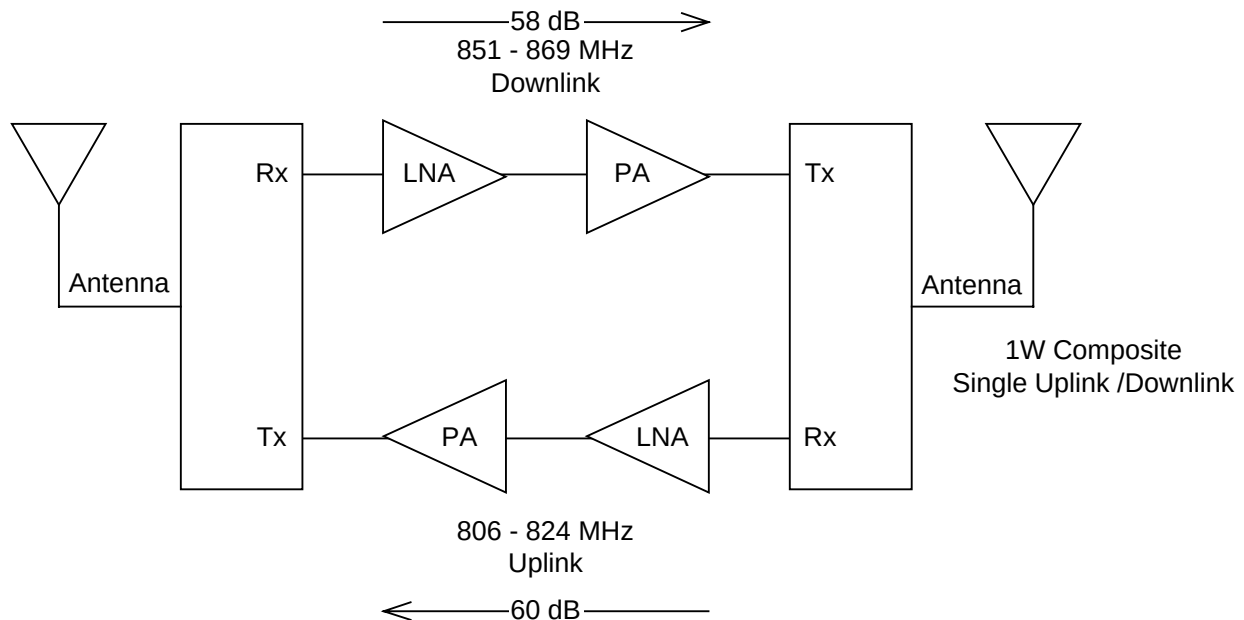
NOT APPLICABLE

EQUIPMENT: Prism Plus CTE Band Repeater
FCC ID: BCR-ATE60-CTE

Theory of Operation

The Prism Plus CTE is designed for operation in the 806 – 824 MHz / 851 – 869 MHz trunking radio band. This equipment uses duplexer, LNA and PA with 1 W composite output power. Typical applications are voice, FID paging and DXW IDEN operations.

System Diagram



EQUIPMENT: Prism Plus CTE Band Repeater
FCC ID: BCR-ATE60-CTE

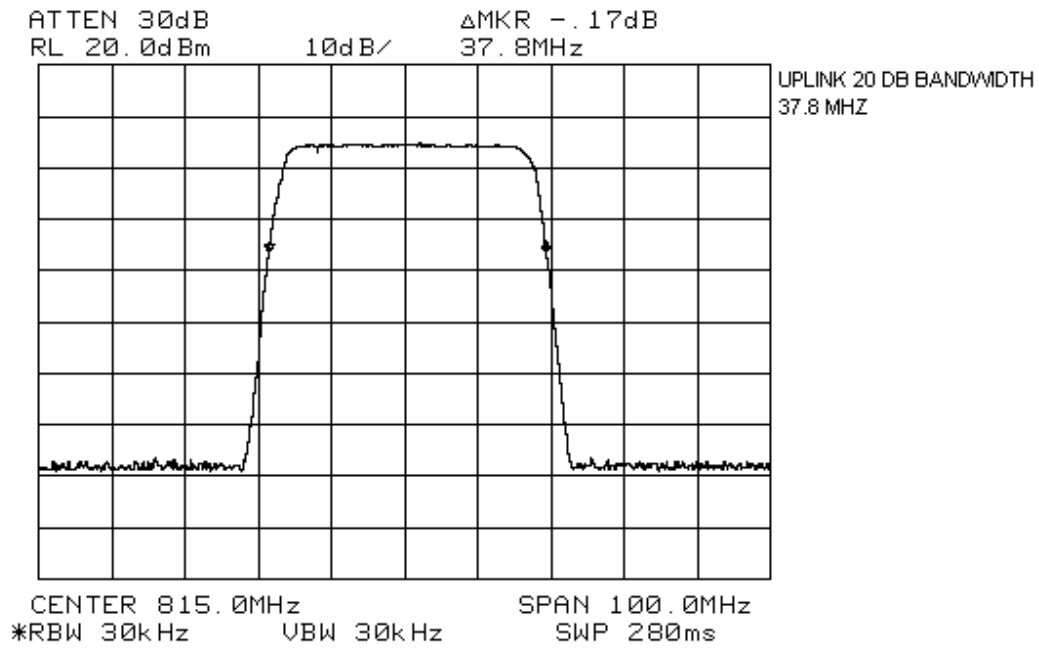
Section 3. RF Power Output

NAME OF TEST: RF Power Output	PARA. NO.: 2.985
TESTED BY: Russell Grant	DATE: November 13, 1998

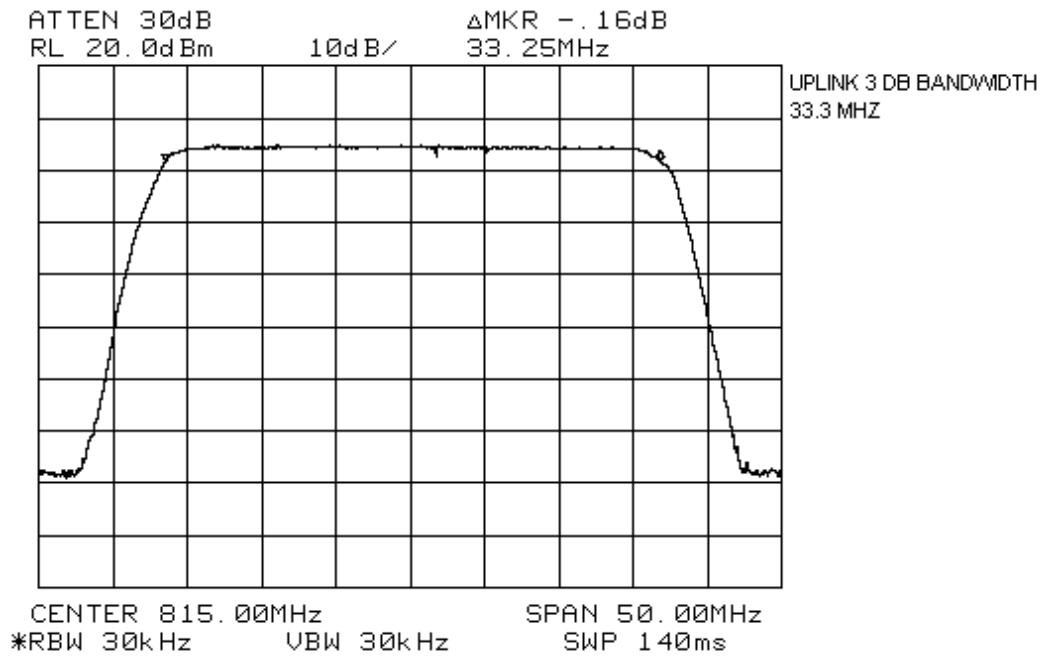
Test Results: Complies.**Measurement Data:**

Frequency (MHz)	Measured Power (dBm)	Rated Power (dBm)	Measured/Rated (dB)
815	30.0	30.0	0.0
860	30.0	30.0	0.0

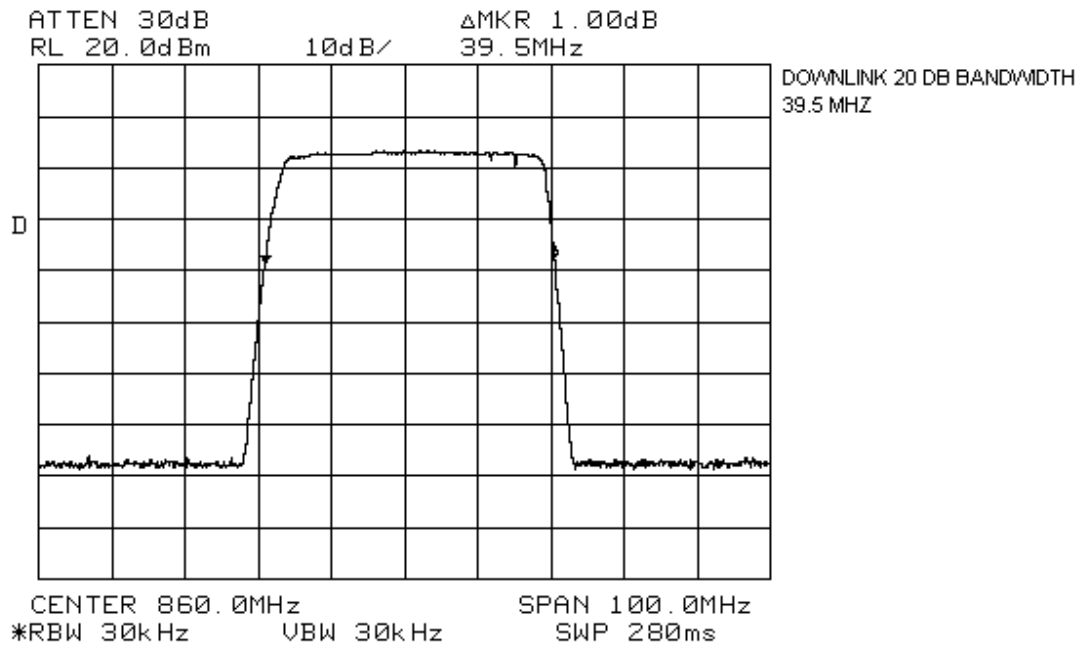
EQUIPMENT: Prism Plus CTE Band Repeater
FCC ID: BCR-ATE60-CTE



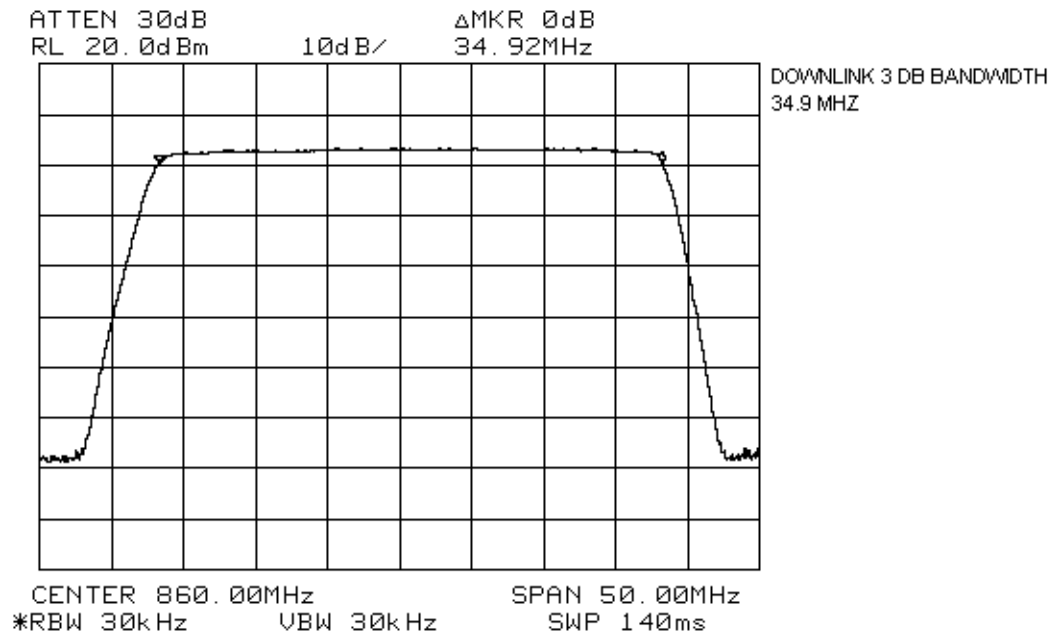
EQUIPMENT: Prism Plus CTE Band Repeater
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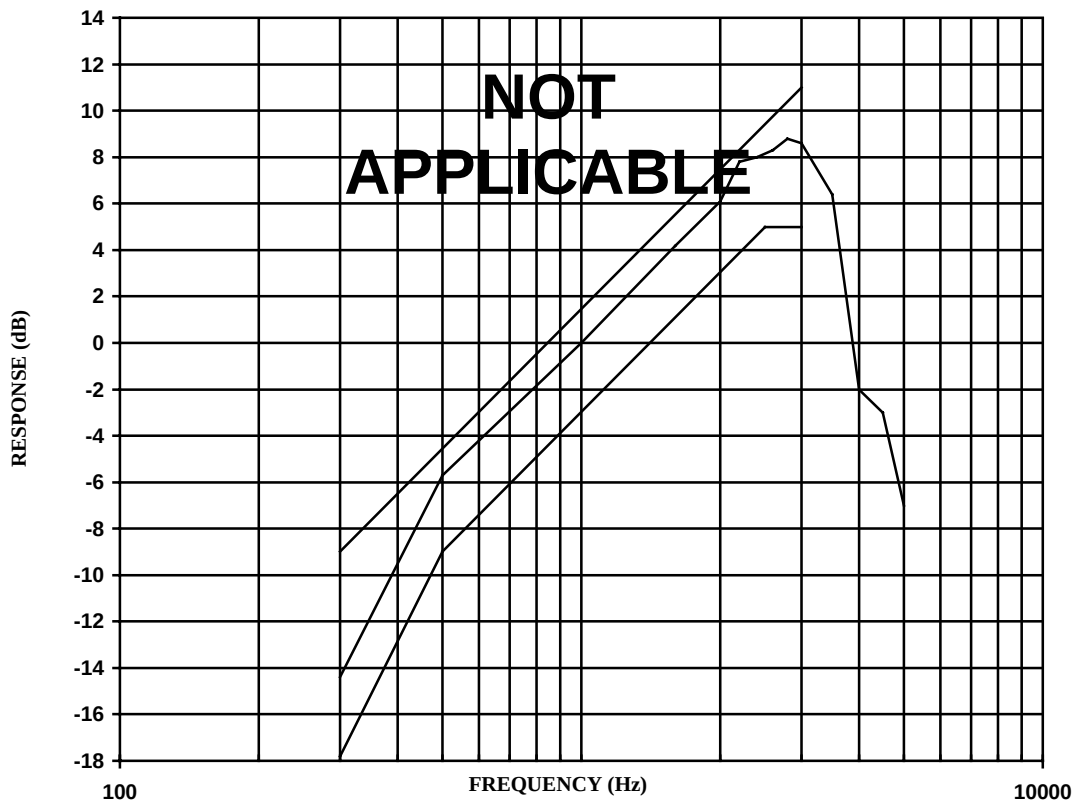
EQUIPMENT: Prism Plus CTE Band Repeater
FCC ID: BCR-ATE60-CTE**Section 4. Audio Frequency Response**

NAME OF TEST: Audio Frequency Response

PARA. NO.: 2.987(a)

TESTED BY:

DATE:

**Audio Frequency Response**

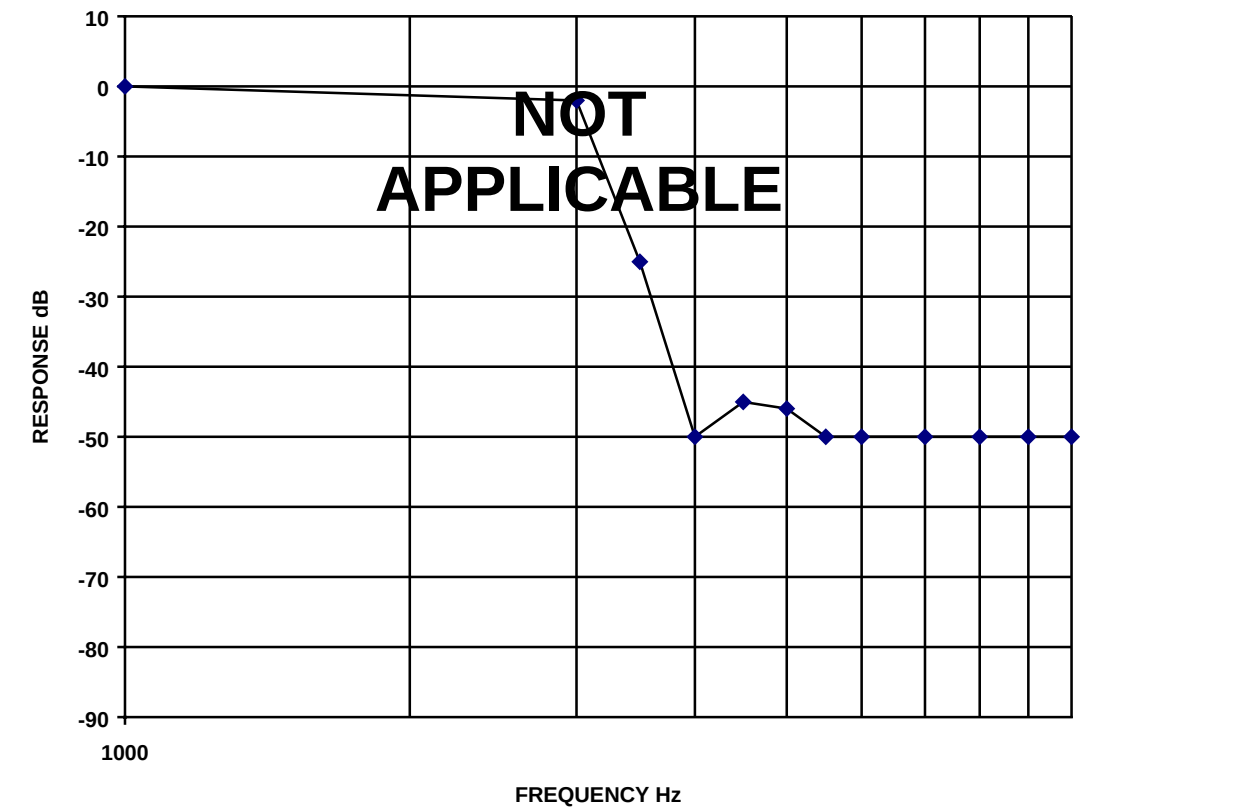
Frequency	300	600	900	1.2 k	1.5 k	1.8 k	2.1k	2.3 k	2.6 k	3.0 k	3.5 k	4 k

Frequency	4.5 k	5 k	5.5 k	6 k	6.5 k	7 k	7.5 k	8 k	8.5 k	9 k	9.5 k	10 k

EQUIPMENT: Prism Plus CTE Band Repeater
FCC ID: BCR-ATE60-CTE

Section 5. Audio Low-Pass Filter Response

NAME OF TEST: Audio Low-Pass Filter Response	PARA. NO.: 2.987(a)
TESTED BY:	DATE:



Audio Low-Pass Filter Response

Frequency	1k	3 k	3.5 k	4 k	4.5 k	5 k	5.5 k	6 k	7 k	8 k	9 k	10 k

EQUIPMENT: Prism Plus CTE Band Repeater
FCC ID: BCR-ATE60-CTE

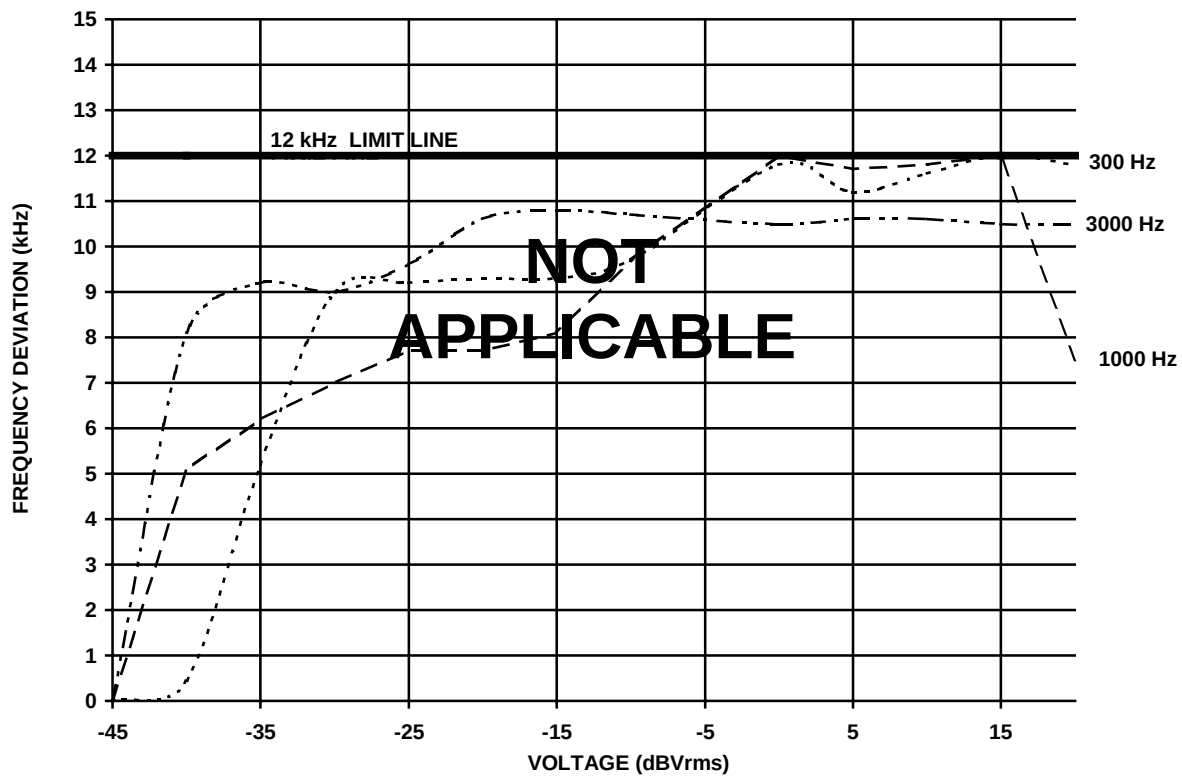
Section 6. Modulation Limiting

NAME OF TEST: Modulation Limiting

PARA. NO.: 2.987(b)

TESTED BY:

DATE:



Input	-45	-40	-35	-30	-25	-20	-15	-10	0	5	10	15	20
300 Hz	0	0.452	5.2	9	9.02	9.3	9.3	9.7	11.8	11.2	11.6	12	11.8
1 kHz	0	5.1	6.2	7	7.7	7.7	8.1	9.7	12	11.7	11.8	12	7.5
Limit	12	12	12	12	12	12	12	12	12	12	12	12	12
3 kHz	0	8.1	9.2	9	9.6	10.6	10.8	10.7	10.5	10.6	10.6	10.5	10.5

Maximum deviation for non-voice modulation _____ kHz.

EQUIPMENT: Prism Plus CTE Band Repeater
FCC ID: BCR-ATE60-CTE

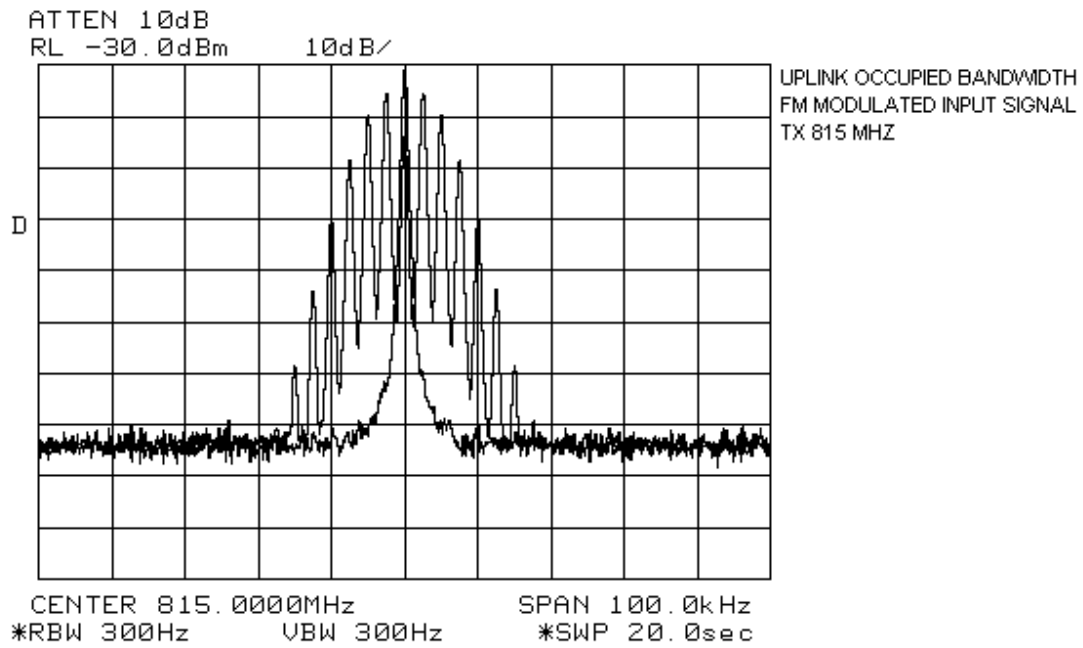
Section 7. Occupied Bandwidth

NAME OF TEST: Occupied Bandwidth	PARA. NO.: 2.989
TESTED BY: Russell Grant	DATE: November 13, 1998

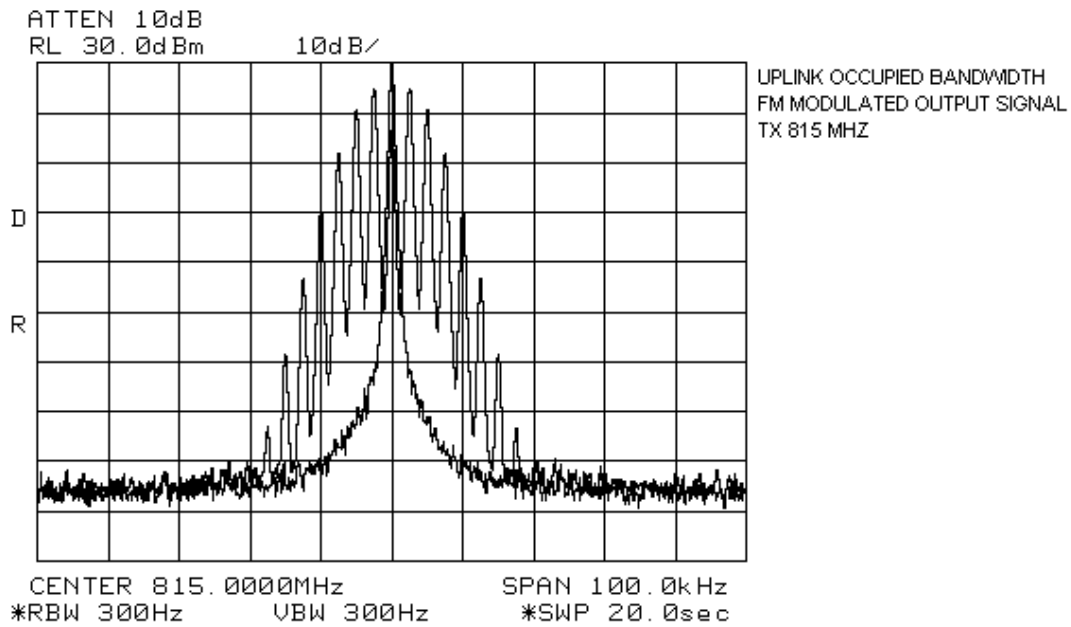
Test Results: Complies.

Test Data: See attached graph(s).

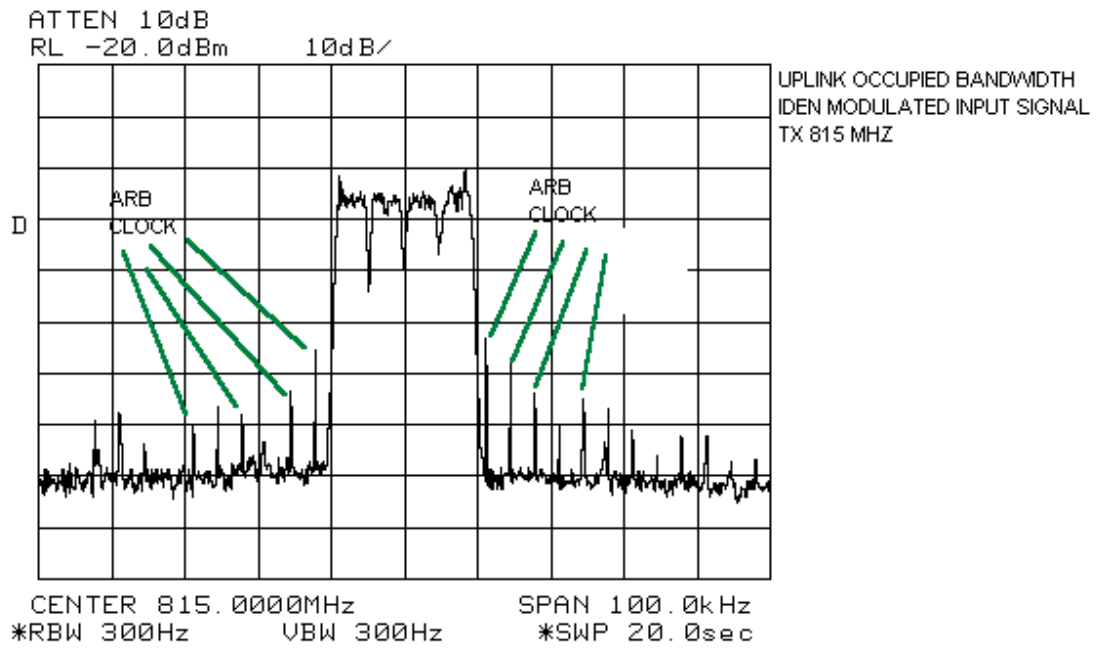
EQUIPMENT: Prism Plus CTE Band Repeater
FCC ID: BCR-ATE60-CTE



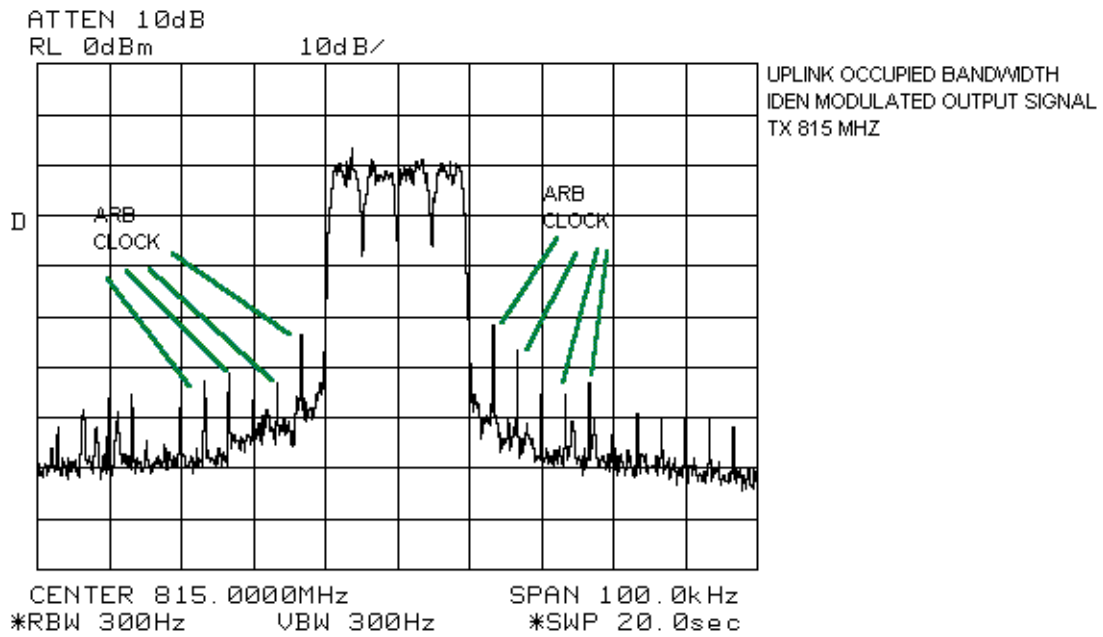
EQUIPMENT: Prism Plus CTE Band Repeater
FCC ID: BCR-ATE60-CTE



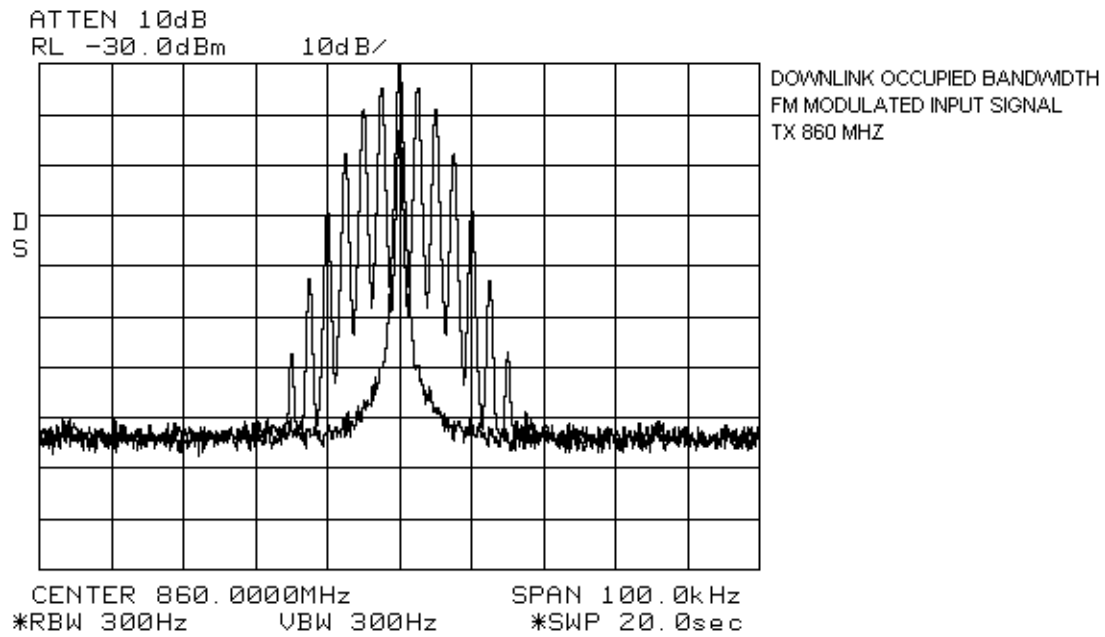
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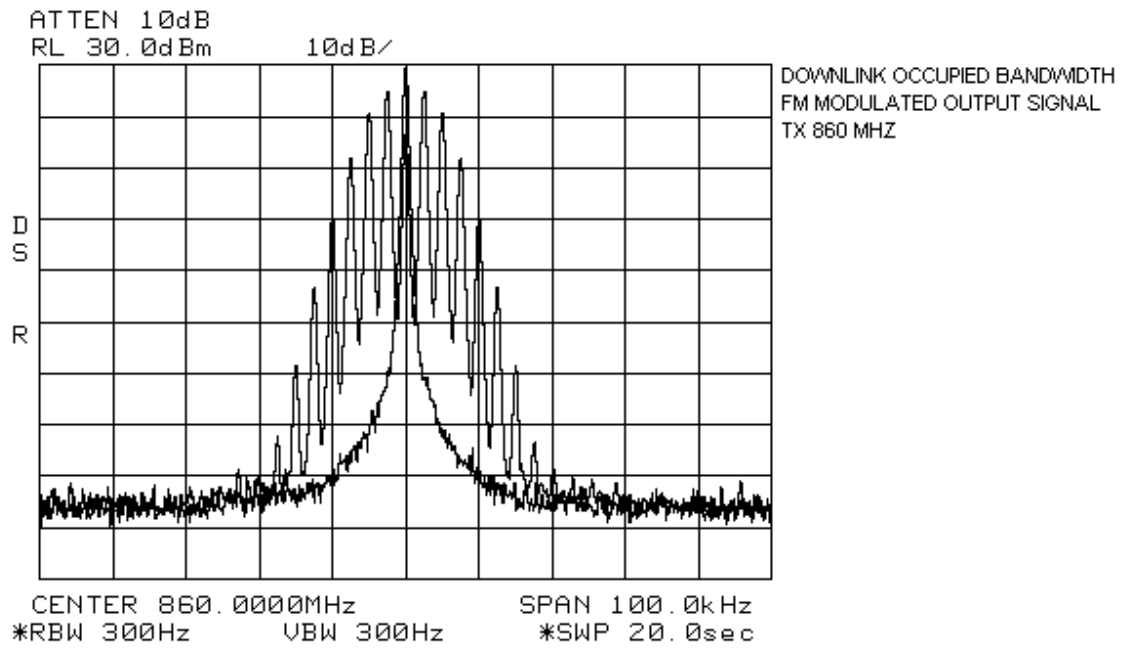
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FCC ID: BCR-ATE60-CTE



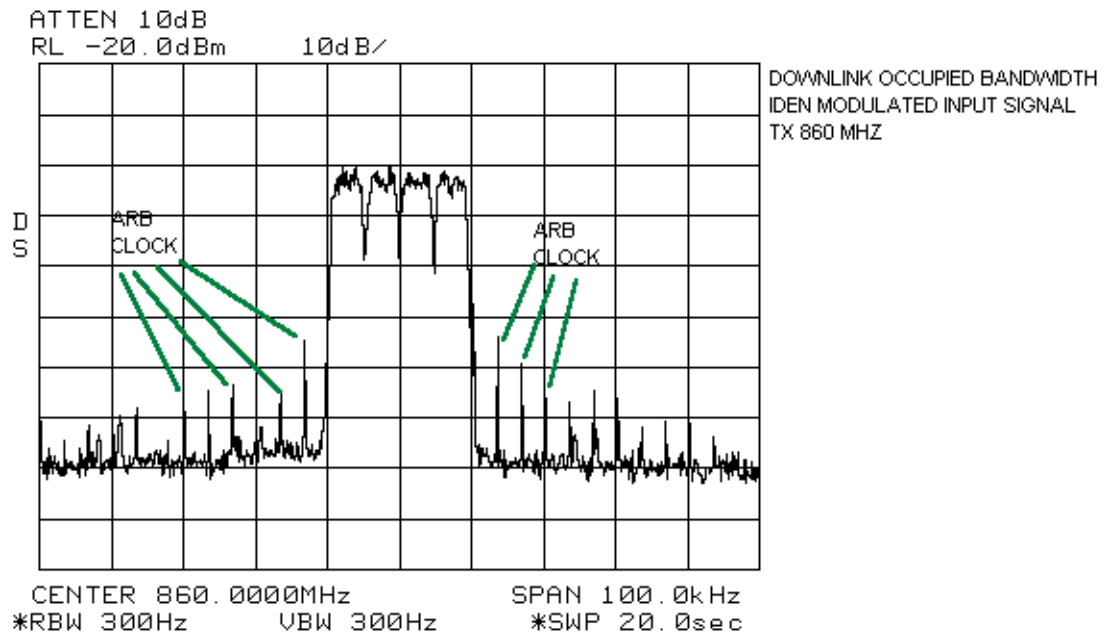
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FCC ID: BCR-ATE60-CTE



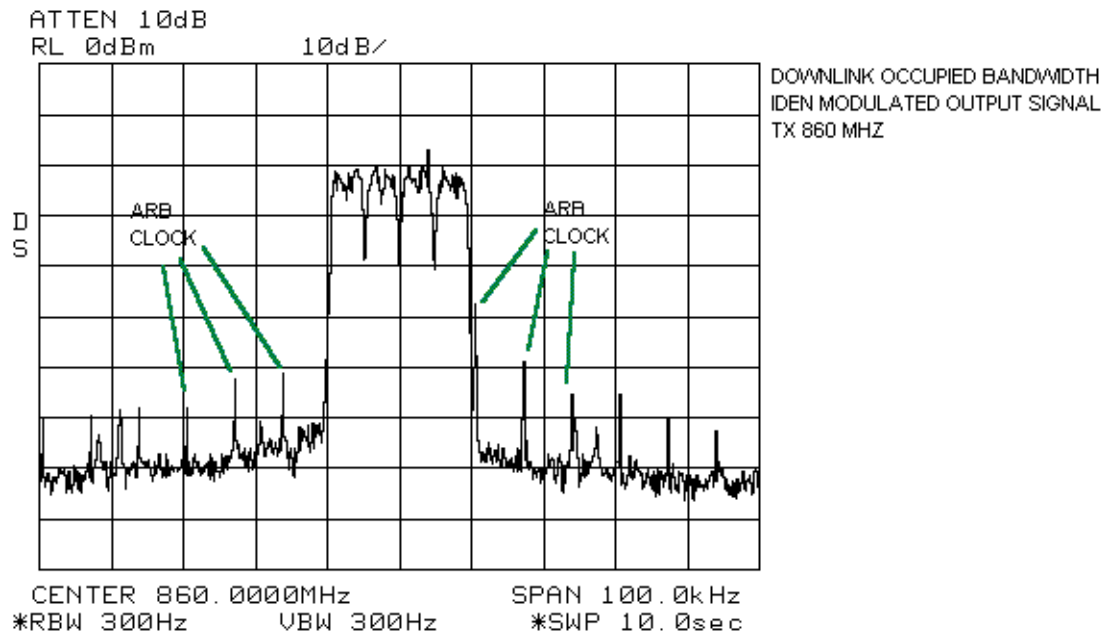
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FCC ID: BCR-ATE60-CTE



EQUIPMENT: Prism Plus CTE Band Repeater
FCC ID: BCR-ATE60-CTE

Section 8. Spurious Emissions at Antenna Terminals

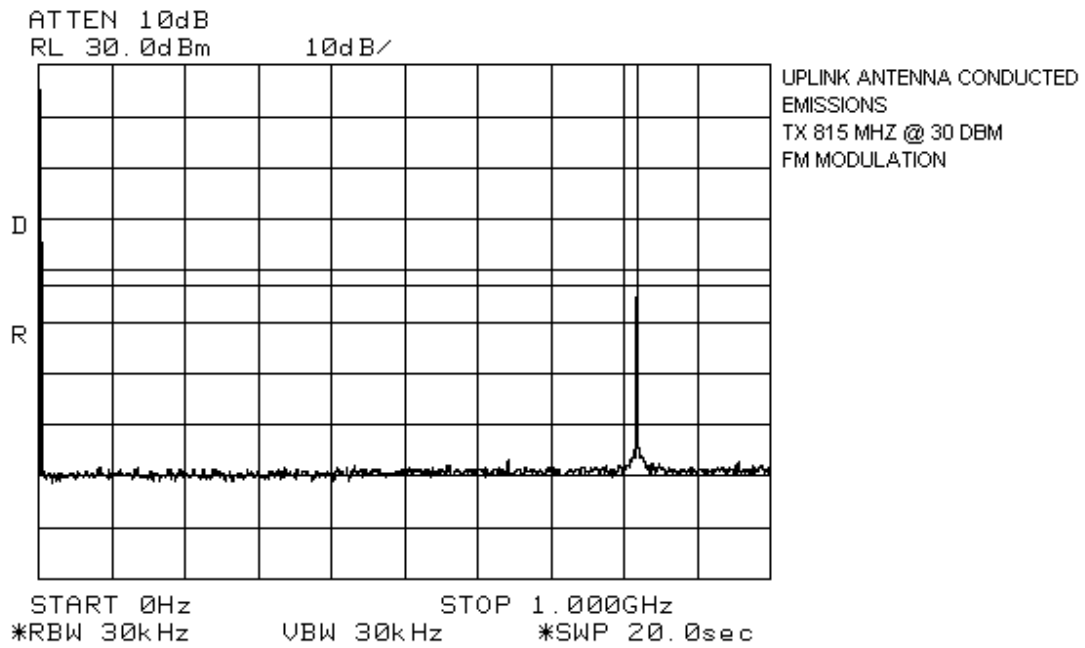
NAME OF TEST: Spurious Emissions @ Antenna Terminals	PARA. NO.: 2.991
TESTED BY: Russell Grant	DATE: November 13, 1998

Test Results: Complies.

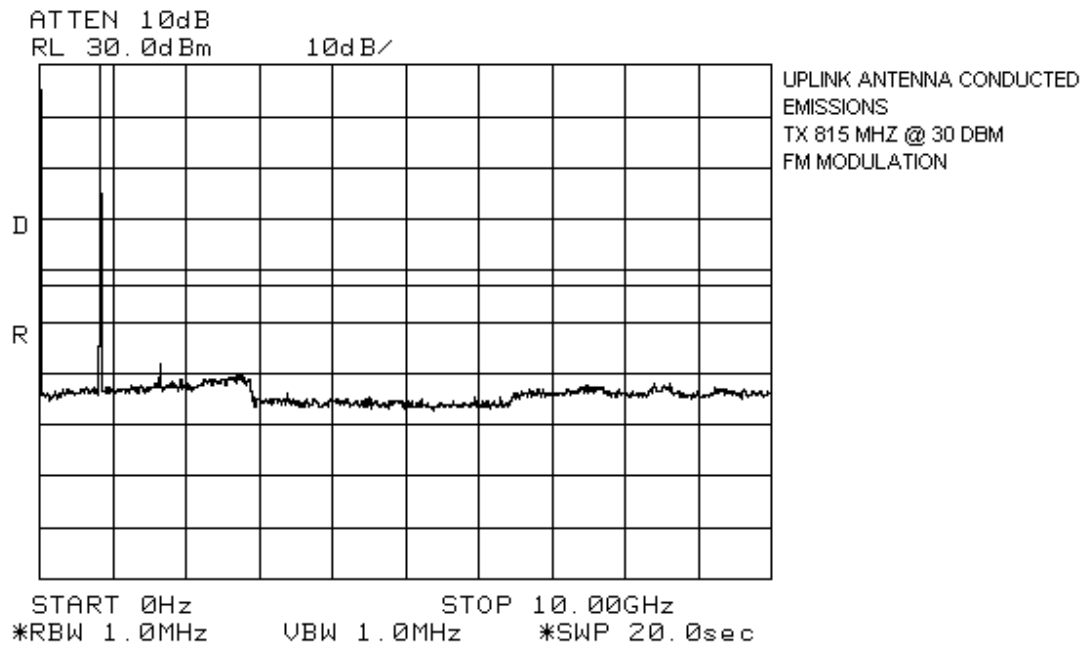
Test Data: See attached graph(s).

The strongest emission is -14.0 dBm @ 809 MHz. This is 1 dB below the -13 dBm limit. This emission is a third order intermodulation product of 813 and 817 MHz.

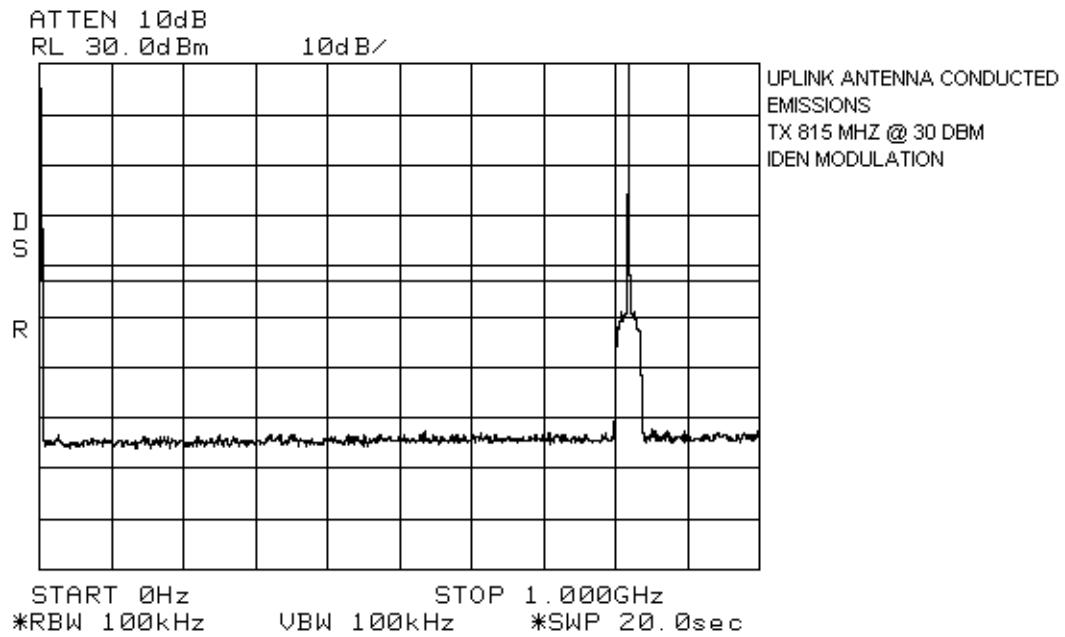
EQUIPMENT: Prism Plus CTE Band Repeater
FCC ID: BCR-ATE60-CTE



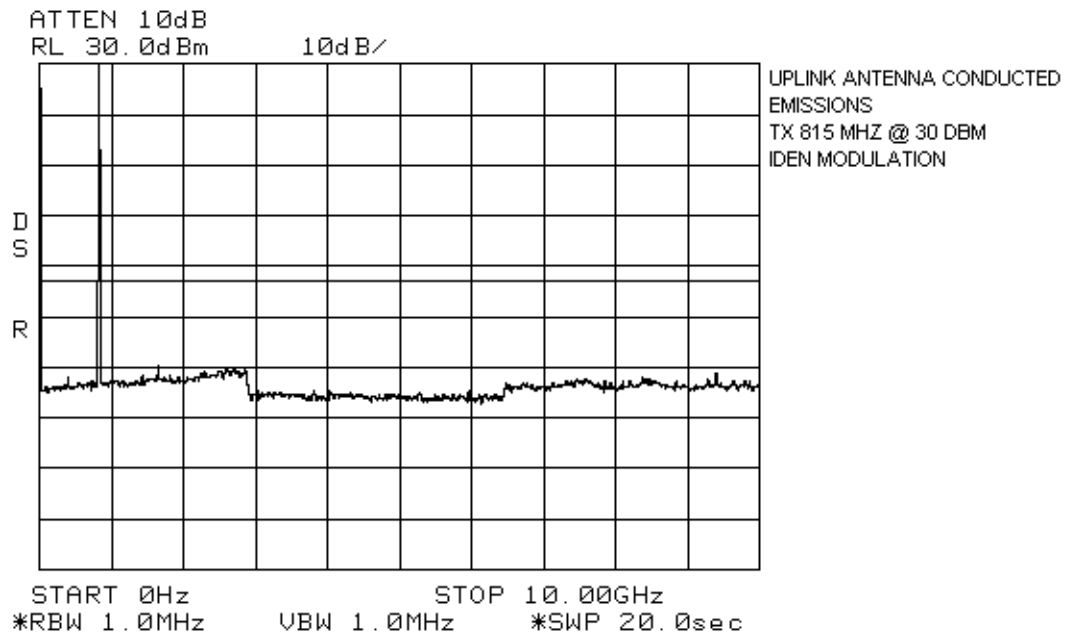
EQUIPMENT: Prism Plus CTE Band Repeater
FCC ID: BCR-ATE60-CTE



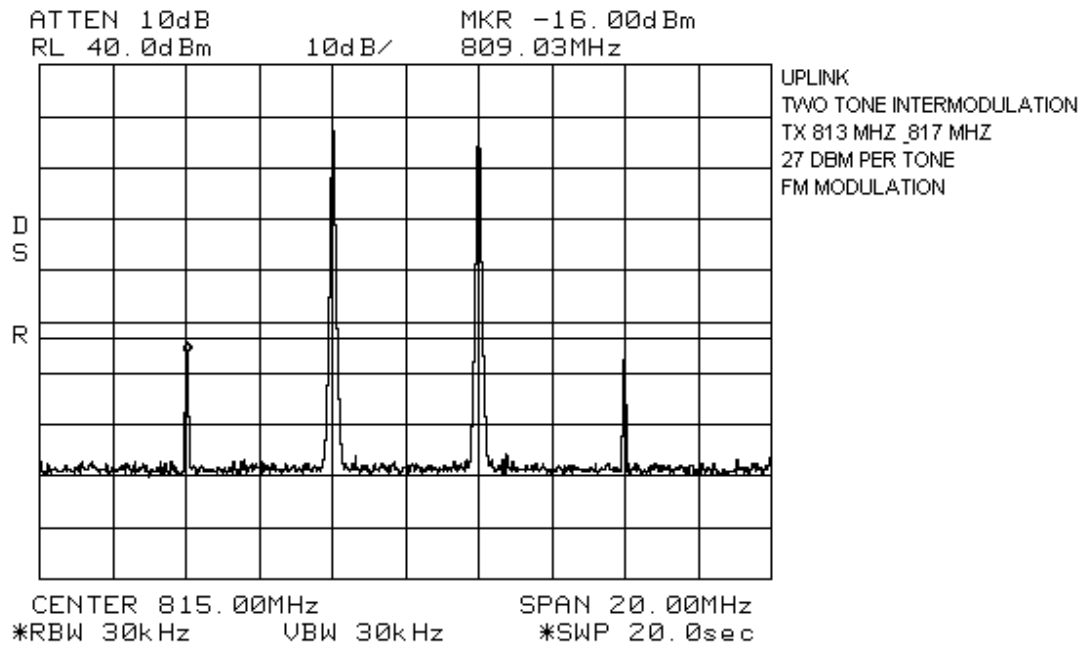
EQUIPMENT: Prism Plus CTE Band Repeater
FCC ID: BCR-ATE60-CTE



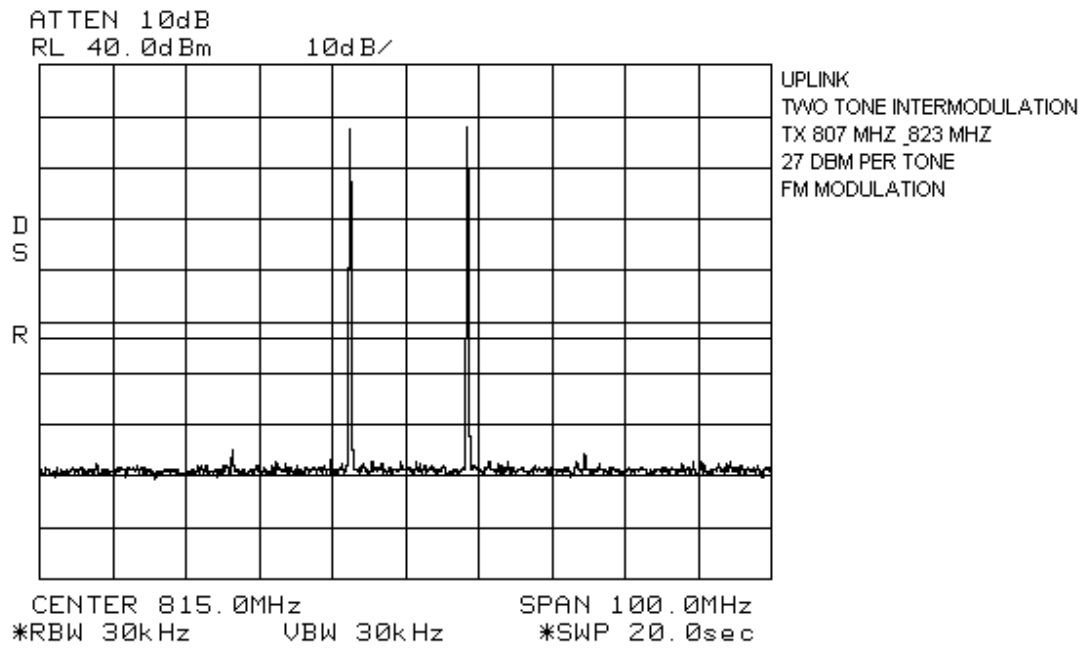
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FCC ID: BCR-ATE60-CTE



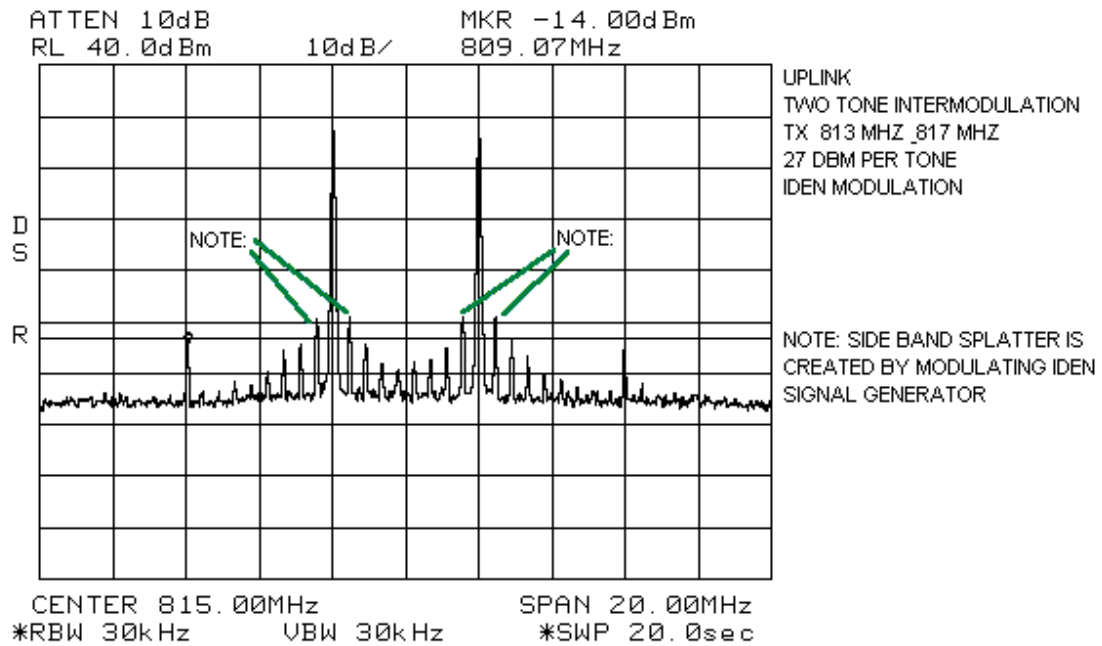
EQUIPMENT: Prism Plus CTE Band Repeater
FCC ID: BCR-ATE60-CTE



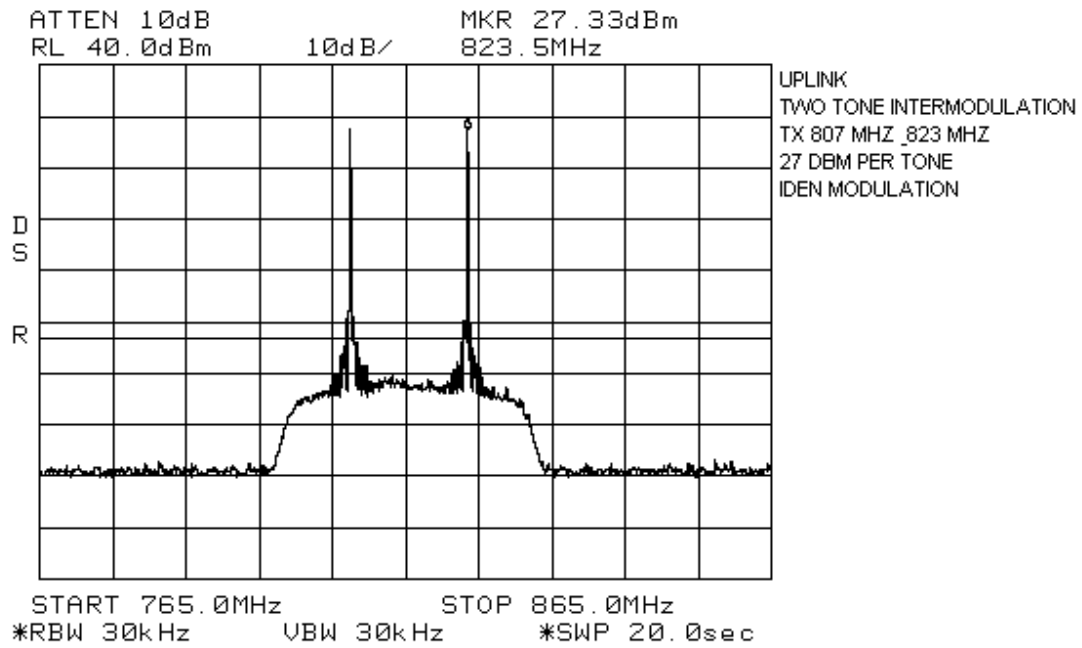
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FCC ID: BCR-ATE60-CTE



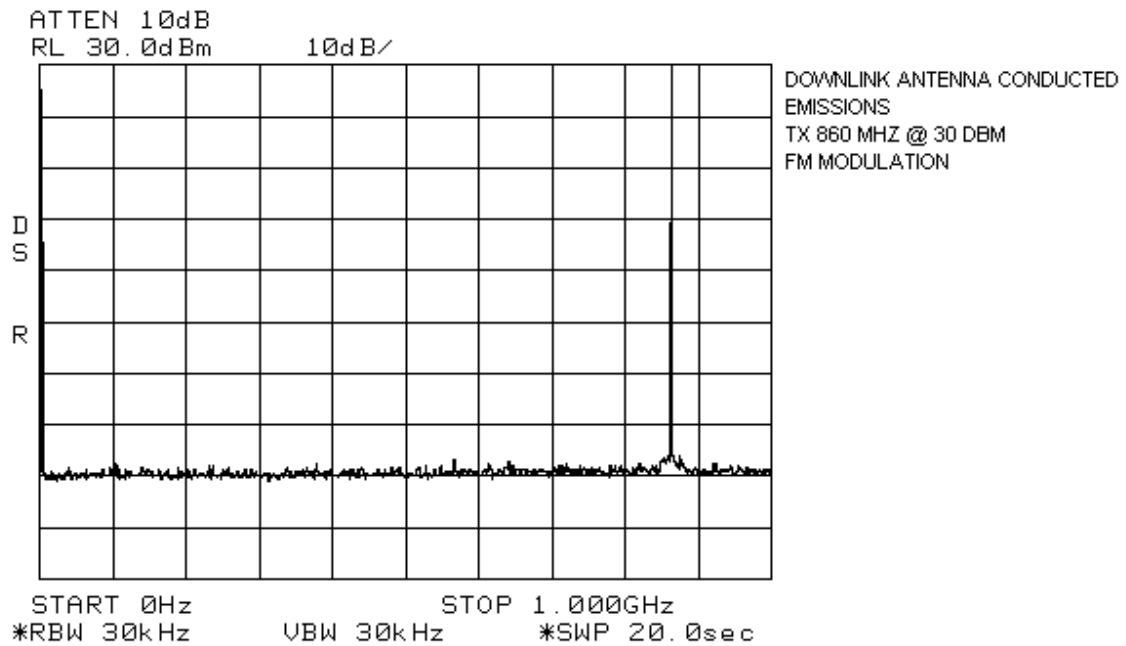
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FCC ID: BCR-ATE60-CTE



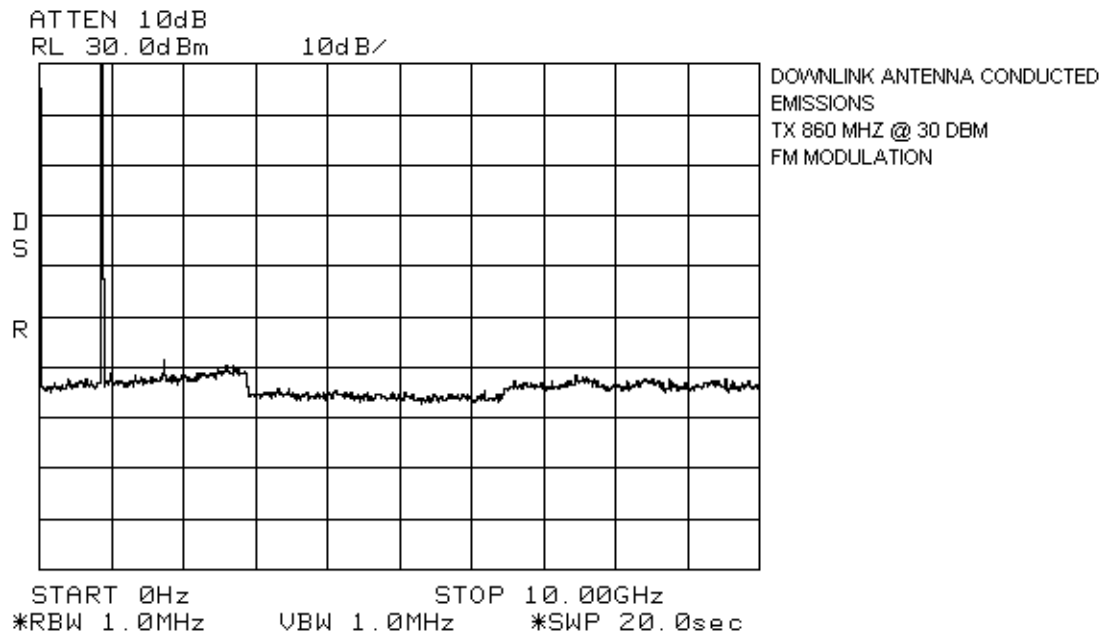
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FCC ID: BCR-ATE60-CTE



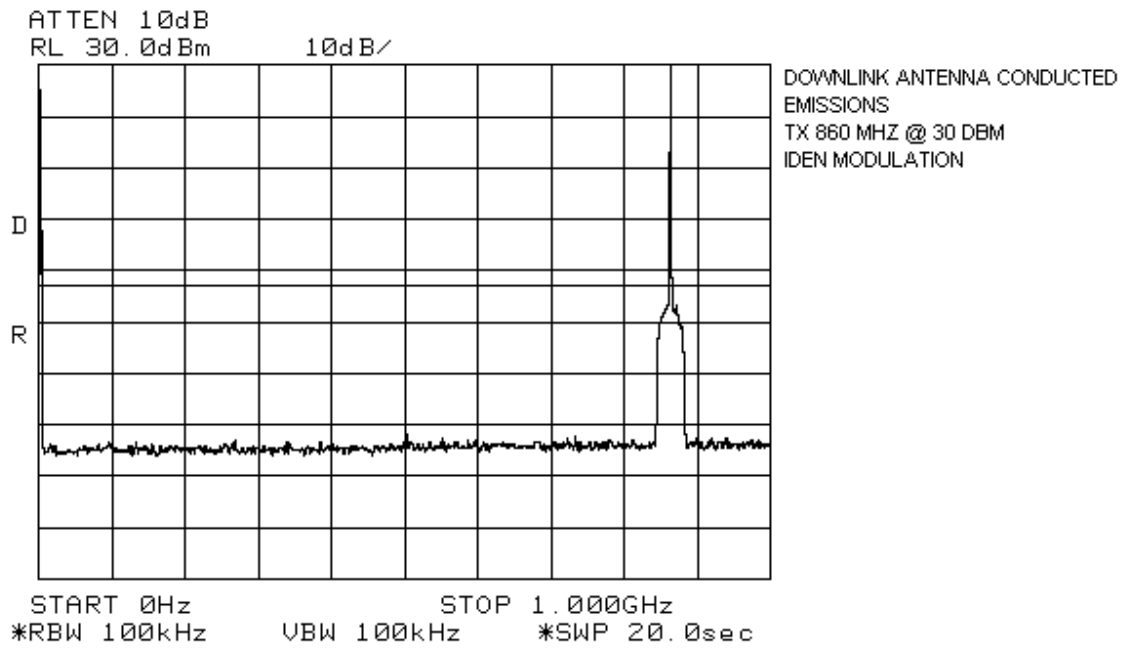
EQUIPMENT: Prism Plus CTE Band Repeater
FCC ID: BCR-ATE60-CTE



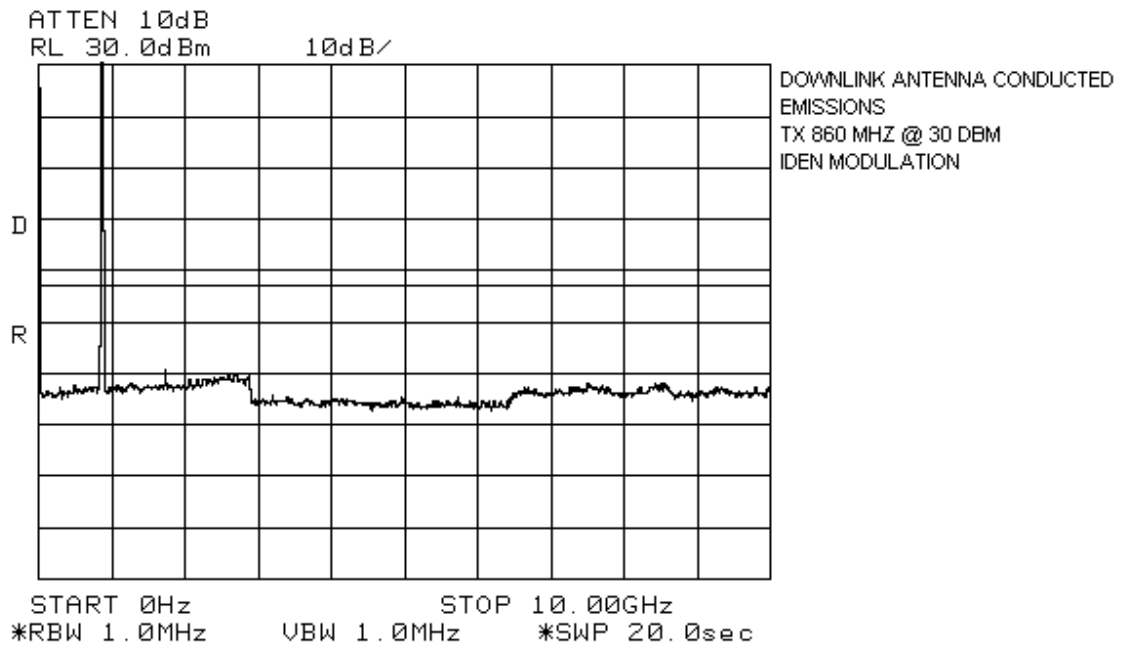
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FCC ID: BCR-ATE60-CTE



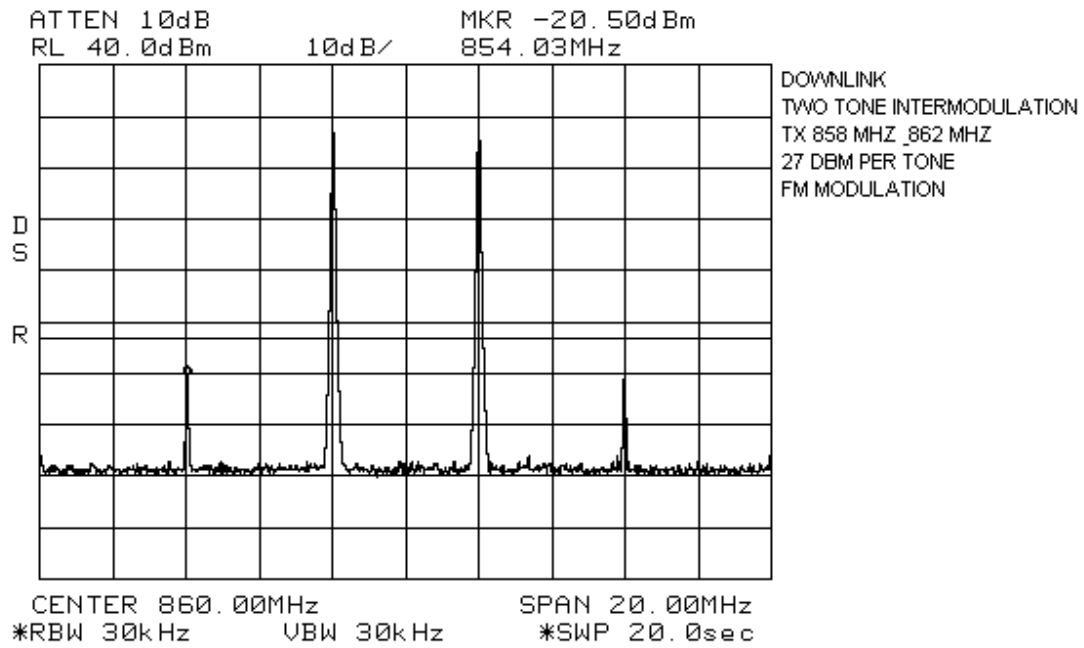
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FCC ID: BCR-ATE60-CTE



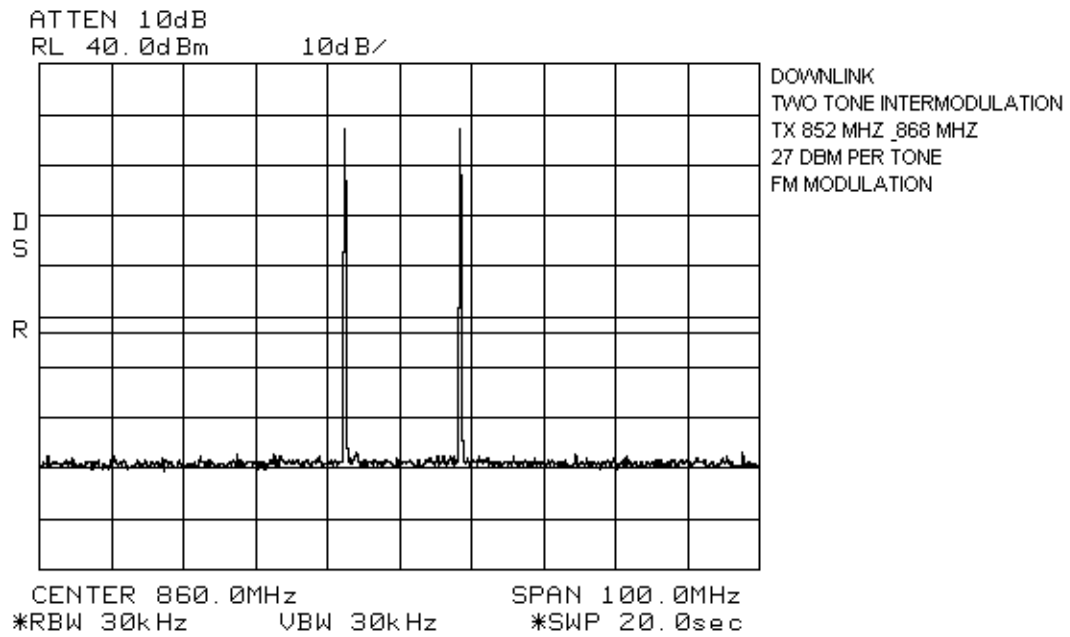
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FCC ID: BCR-ATE60-CTE



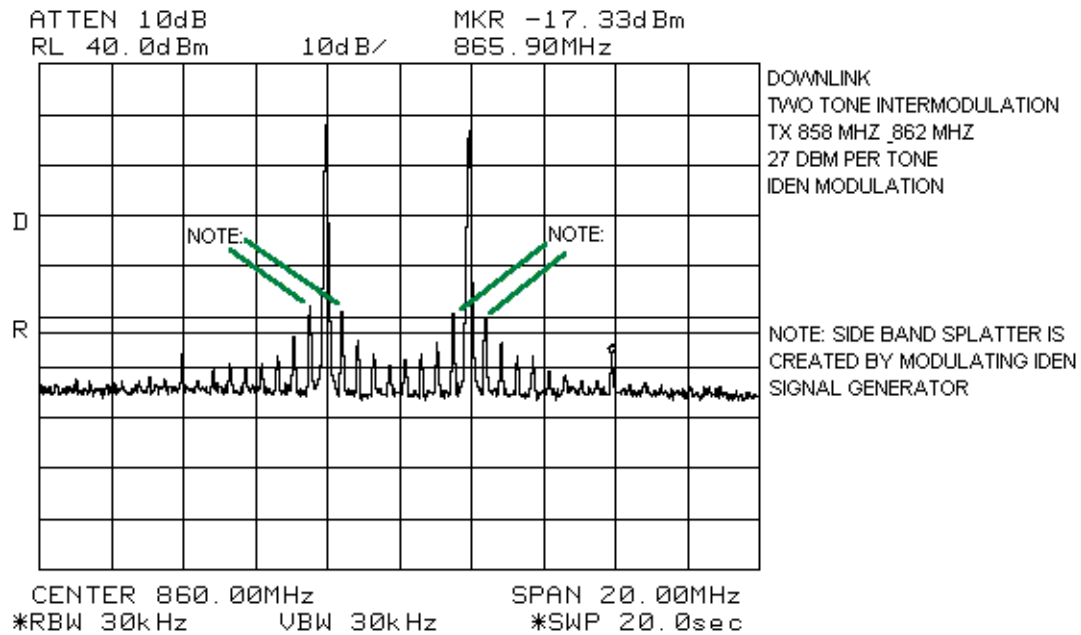
EQUIPMENT: Prism Plus CTE Band Repeater
FCC ID: BCR-ATE60-CTE



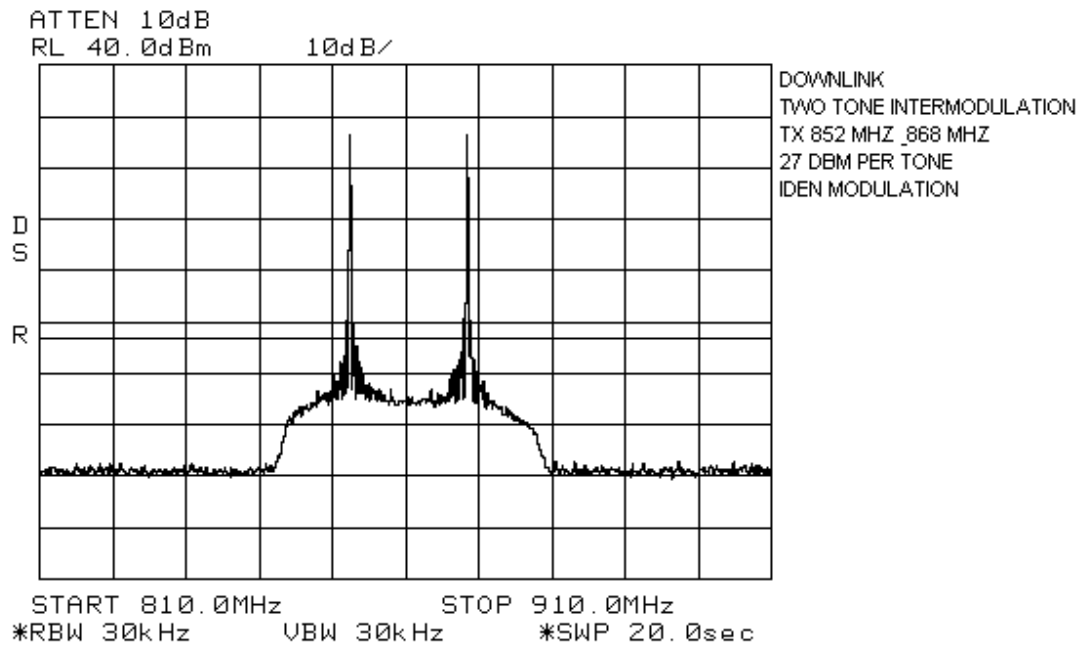
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EQUIPMENT: Prism Plus CTE Band Repeater
FCC ID: BCR-ATE60-CTE

Section 9. Field Strength of Spurious Emissions

NAME OF TEST: Field Strength of Spurious Emissions	PARA. NO.: 2.993
TESTED BY: Russell Grant	DATE: November 13, 1998

Test Results: Complies.

Test Data: See attached table.

Note: See page A5 for applicable limit.

Test Data – Radiated Emissions

Page 45 of 49

EQUIPMENT: Prism Plus CTE Band Repeater
FCC ID: BCR-ATE60-CTE

Photographs of Test Setup

FRONT VIEW

REAR VIEW

EQUIPMENT: Prism Plus CTE Band Repeater
FCC ID: BCR-ATE60-CTE

Section 10. Frequency Stability

NAME OF TEST: Frequency Stability	PARA. NO.: 2.995
TESTED BY:	DATE:

Test Results: Complies/Does Not Comply.

Measurement Data: See attached tables.

NOT APPLICABLE

EQUIPMENT: Prism Plus CTE Band Repeater
FCC ID: BCR-ATE60-CTE

Section 11. Transient Frequency Behaviour

NAME OF TEST: Transient Frequency Behaviour	PARA. NO.: 90.214
TESTED BY:	DATE:

Test Results: Complies/Does Not Comply.

Measurement Data: See attached graphs.

NOT APPLICABLE

EQUIPMENT: Prism Plus CTE Band Repeater
FCC ID: BCR-ATE60-CTE

Section 12. Test Equipment List

CAL CYCLE	EQUIPMENT	MANUFACTURER	MODEL	SERIAL	LAST CAL.	NEXT CAL.	
1 Year	Spectrum Analyzer	Hewlett Packard	8565E	FA000981	May 20/98	May 20/99	
1 Year	Attenuator	Narda	768-20	9507	July 24/98	July 24/99	
1 Year	Attenuator	Narda	765-20	9510	July 24/98	July 24/99	
1 Year	Attenuator	Narda	768-10	9704	July 24/98	July 24/99	
1 Year	Attenuator	Narda	768-10	9709	July 24/98	July 24/99	
1 Year	RF Millivoltmeter	Rohde & Schwarz	URV5	FA000420	July 23/98	July 23/99	
1 Year	Insertion Unit	Rohde & Schwarz	URV5-Z4	FA000905	July 23/98	July 23/99	
1 Year	Signal Generator	Rohde & Schwarz	SM1Q03	1084-8004-03	July 23/98	July 23/99	
	Power Supply	Hewlett Packard	6274B	2552A-08243	NCR	NCR	

NA: Not Applicable
NCR: No Cal Required

EQUIPMENT: Prism Plus CTE Band Repeater
FCC ID: BCR-ATE60-CTE

ANNEX A
TEST METHODOLOGIES

EQUIPMENT: Prism Plus CTE Band Repeater
FCC ID: BCR-ATE60-CTE

NAME OF TEST: RF Power Output	PARA. NO.: 2.985
--------------------------------------	-------------------------

Minimum Standard: Para. No. 90.205(a). The maximum allowable station ERP is dependent upon the stations HAAT and required service area and will be authorized in accordance with Table 1 of 90.205(d).

Method Of Measurement:

Detachable Antenna:

The peak power at antenna terminals is measured using an in-line peak power meter. Power output is measured with the maximum rated input level.

Integral Antenna:

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: Prism Plus CTE Band Repeater
FCC ID: BCR-ATE60-CTE

NAME OF TEST: Spurious Emissions at Antenna Terminals	PARA. NO.: 2.991
--	-------------------------

Test Method: RBW: 1% of emission bandwidth in the 0 - 1 GHz range.
1 MHz at frequencies above 1 GHz.

VBW: RBW

The spectrum is searched up to 10 times the fundamental frequency.

EQUIPMENT: Prism Plus CTE Band Repeater
FCC ID: BCR-ATE60-CTE

NAME OF TEST: Occupied Bandwidth

PARA. NO.: 2.989

Minimum Standard: Para. No. 90.210, see table 1 below for applicable mask.

Table 1

Frequency Band (MHz)	Mask for equipment with Low Pass Filter	Mask for equipment without Low Pass Filter
Below 25	A or B	A or C
25 - 50	B	C
72 - 76	B	C
150 - 174	B, D or E	C, D or E
150 Paging only	B	C
220 - 222	F	F
421 - 512	B, D or E	C, D or E
450 paging only	B	H
806 - 821/ 851 - 866	B	G
821 - 824/ 866 - 869	B	H
896 - 901/ 935 - 940	I	J
902 - 928	K	K
929 - 930	B	G
Above 940	B	C
All other bands	B	C

EQUIPMENT: Prism Plus CTE Band Repeater
FCC ID: BCR-ATE60-CTE

NAME OF TEST: Field Strength of Spurious

PARA. NO.: 2.993

Minimum Standard: Para. No. 90.210, see table 1 for applicable mask.

Calculation of Field Strength Limit

An example of attenuation requirement of $50 + 10 \log P$ is equivalent to -20 dBm (1×10^{-5} Watts) at the antenna terminal. We determine the field strength limit by using the plane wave relation.

$$GP/4\pi R^2 = E^2/120\pi$$

For emissions ≤ 1 GHz:

$G = 1.64$ (Dipole Gain)

$P = 10^{-5}$ Watts (Maximum spurious output power)

$R = 3\text{m}$ (Measurement Distance)

$$E = \frac{\sqrt{30GP}}{R} = E = \frac{\sqrt{30 \times 1.64 \times 10^{-5}}}{3} = 0.00739 \text{ V / m} = 77.4 \text{ dB}\mu\text{V / m}$$

For emissions > 1 GHz:

$G = 1$ (Isotropic Gain)

$P = 1 \times 10^{-5}$ Watts (Maximum spurious output power)

$R = 3\text{m}$ (Measurement Distance)

$$E = 77.4 - 20 \log \sqrt{1.64} = 75.2 \text{ dB}\mu\text{V / m@3m}$$

MASK	Spurious Limit	FS Limit Below 1 GHz	FS Limit Above 1 GHz
A,B,C,G,H,I	-13dBm	84.4 dB μ V/m@3m	82.2 dB μ V/m@3m
D,J	-20dBm	77.4 dB μ V/m@3m	75.2 dB μ V/m@3m
E,F,K	-25dBm	72.4 dB μ V/m@3m	70.2 dB μ V/m@3m

EQUIPMENT: Prism Plus CTE Band Repeater
FCC ID: BCR-ATE60-CTE

NAME OF TEST: Frequency Stability

PARA. NO.: 2.995

Minimum Standard: Para. No. 990.213. The transmitter carrier frequency shall remain within the assigned frequency below in ppm.

Table 2

Frequency Band (MHz)	Fixed And Base Stations	Mobile Stations	
		> 2 Watts o/p pwr	< 2 Watts o/p pwr
Below 25	100	100	200
25 - 50	20	20	50
72 - 76	5	-	50
150 - 174	5	5	5
220 - 222	0.1	1.5	1.5
421 - 512	2.5	5	5
806 - 821	1.5	2.5	2.5
821 - 824	1.0	1.5	15
851 - 866	1.5	2.5	2.5
866 - 869	1.0	1.5	1.5
869 - 901	0.1	1.5	1.5
902 - 928	2.5	2.5	2.5
929 - 930	1.5	-	-
935 - 940	0.1	1.5	1.5
1427 - 1435	300	300	300
Above 2450	-	-	-

KTL Ottawa

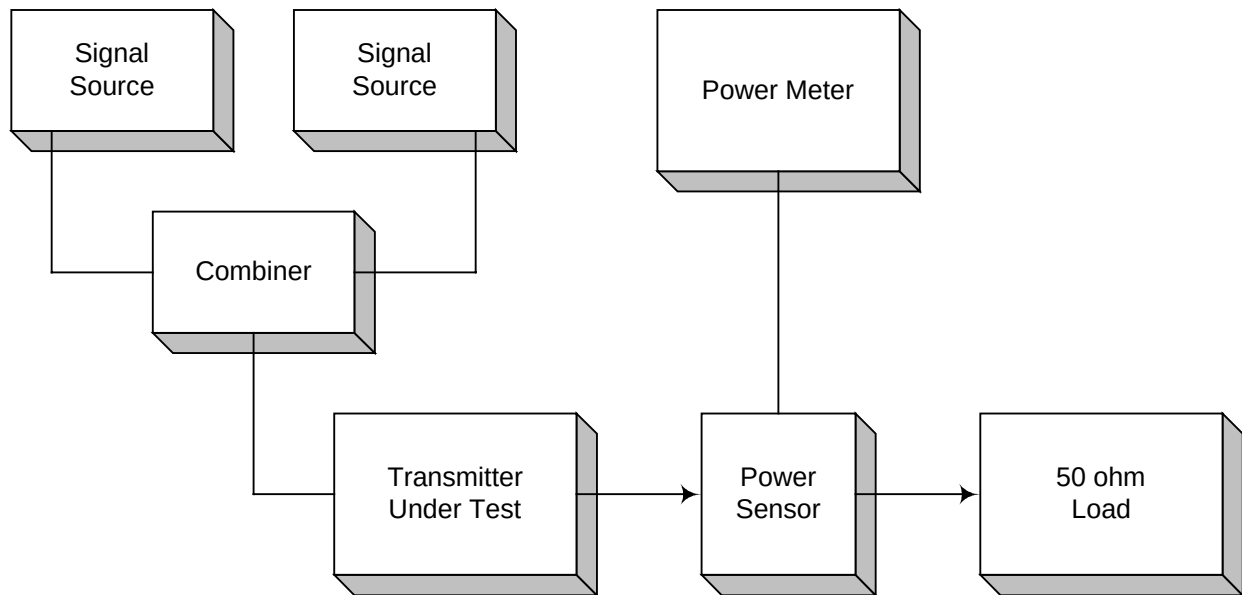
FCC PART 90, SUBPART I
PRIVATE LAND MOBILE REPEATER
PROJECT NO.: 8R01003
ANNEX B

EQUIPMENT: Prism Plus CTE Band Repeater
FCC ID: BCR-ATE60-CTE

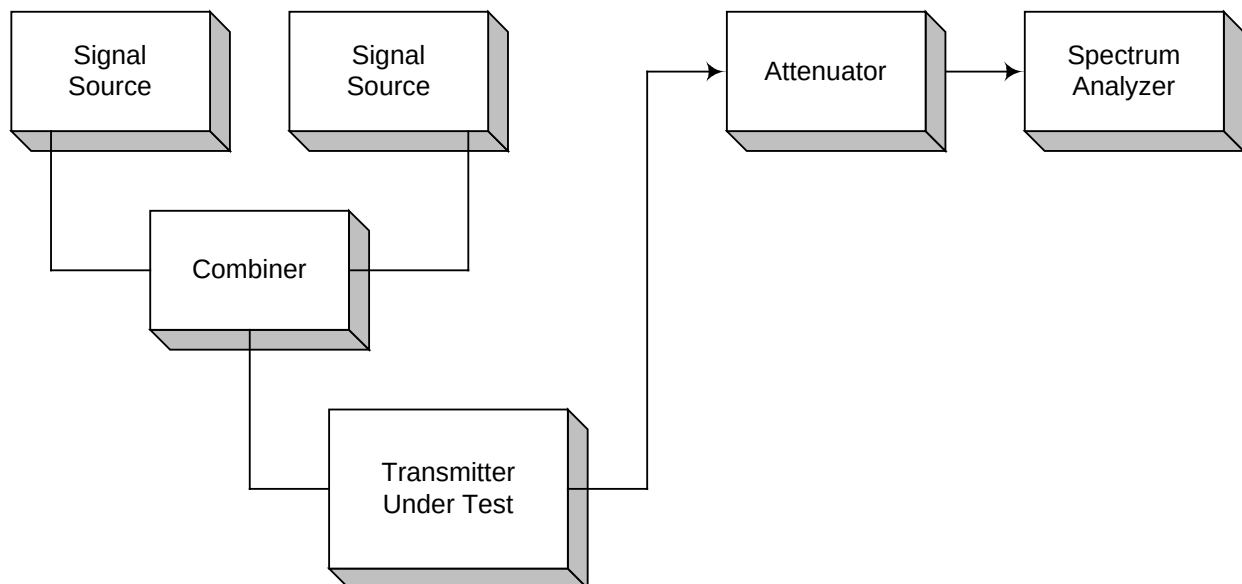
ANNEX B
TEST DIAGRAMS

EQUIPMENT: Prism Plus CTE Band Repeater
FCC ID: BCR-ATE60-CTE

Para. No. 2.985 - R.F. Power Output

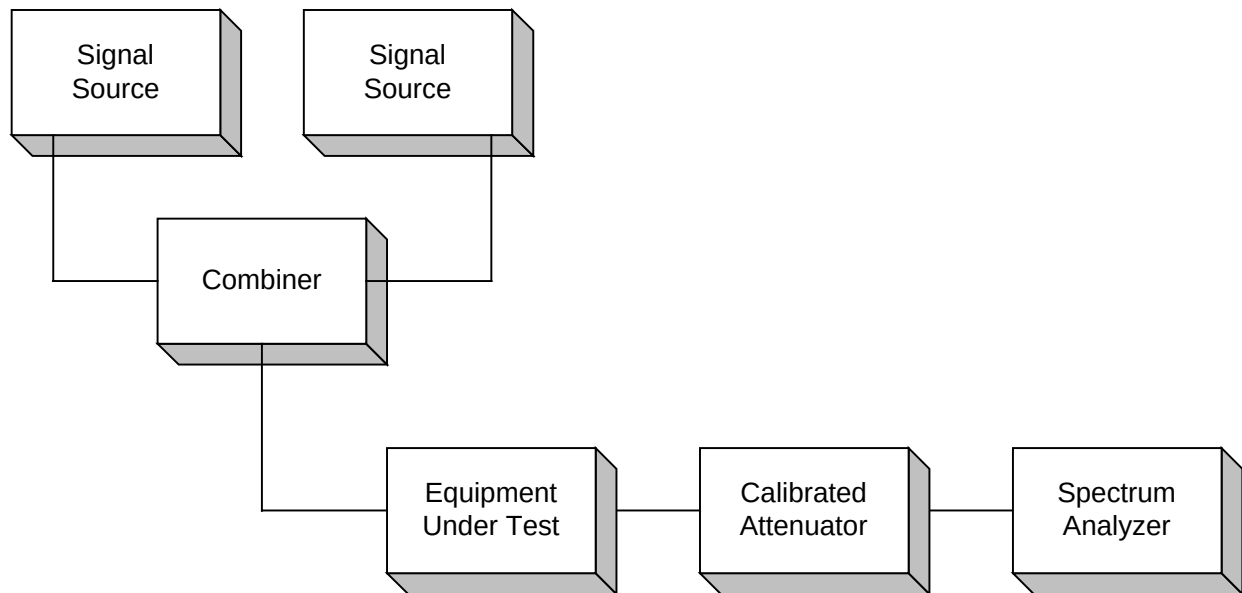


Para. No. 2.989 - Occupied Bandwidth

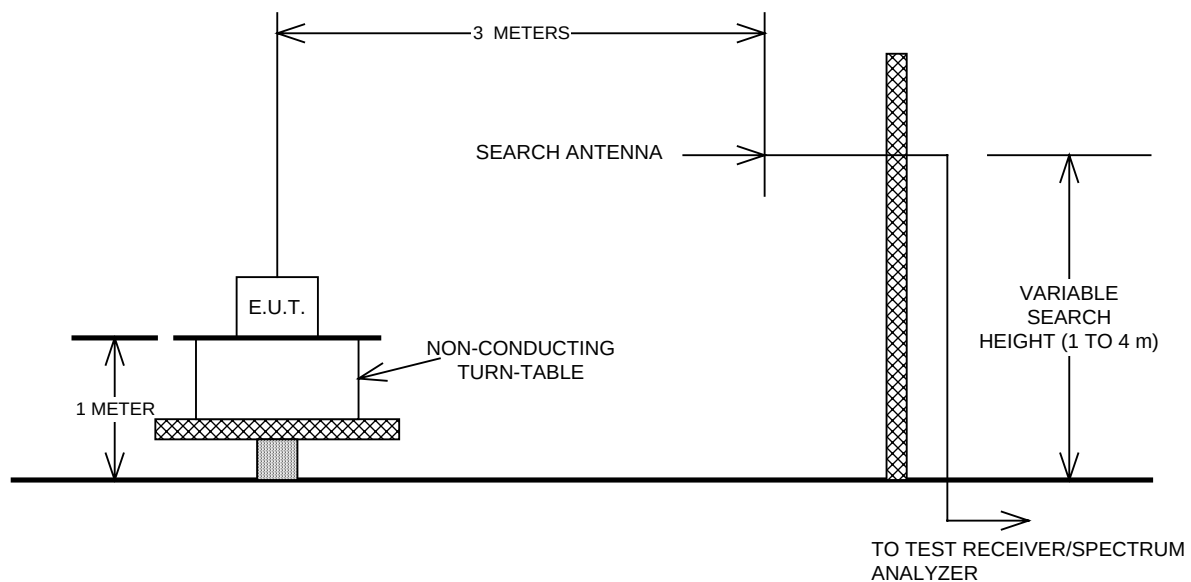


EQUIPMENT: Prism Plus CTE Band Repeater
FCC ID: BCR-ATE60-CTE

Para. No. 2.991 - Spurious Emissions at Antenna Terminals



Para. No. 2.993 - Field Strength of Spurious Radiation



EQUIPMENT: Prism Plus CTE Band Repeater
FCC ID: BCR-ATE60-CTE

Para. No. 2.995 - Frequency Stability

