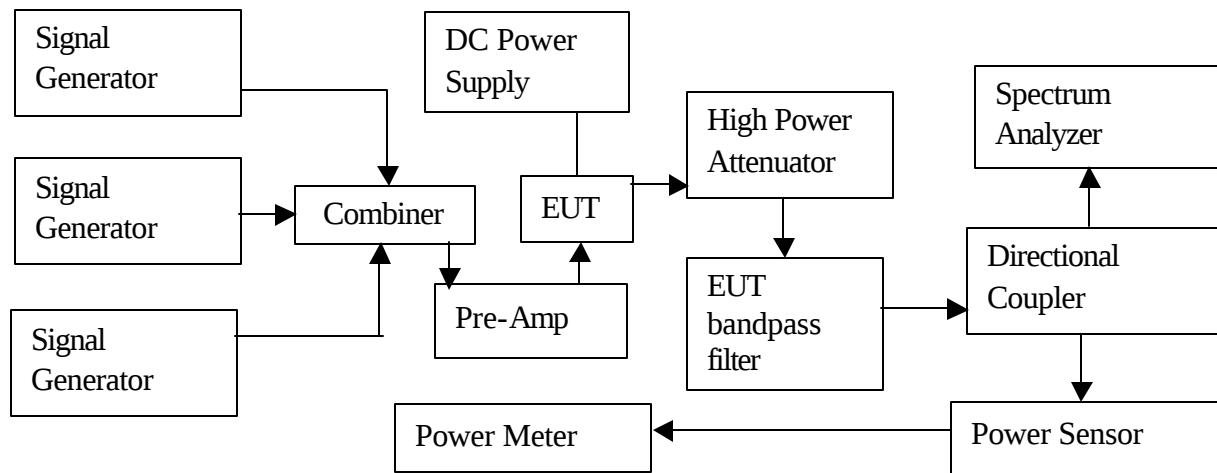


14.4 SECTION 2.1051: SPURIOUS EMISSION AT ANTENNA TERMINALS

TEST SETUP:



Minimum Requirement:

Section 22.917(e):

For Base stations transmitters the magnitude of each spurious, harmonic, and intermodulation emissions that can be detected when the equipment is operated under conditions specified in the instruction manual and/or alignment procedure, shall not be more than $43 + 10 \log (P)$ dBc below the mean power output, which is equivalent to -13 dBm.

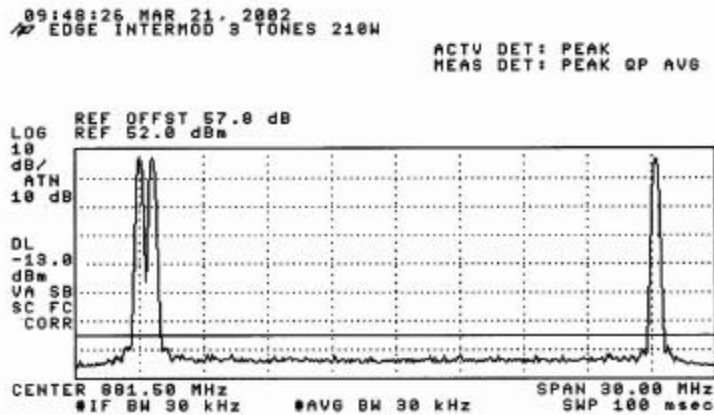
Test Procedure:

Input 3 tones modulated signals to the amp to produce 210 watts composite power. Set the RES & VID BW to 30kHz and the DISPLAY LINE to -13 dBm. Scan the EUT from 30 MHz to the 10th harmonic of carrier and check for spurious, harmonic, and intermodulation emissions.

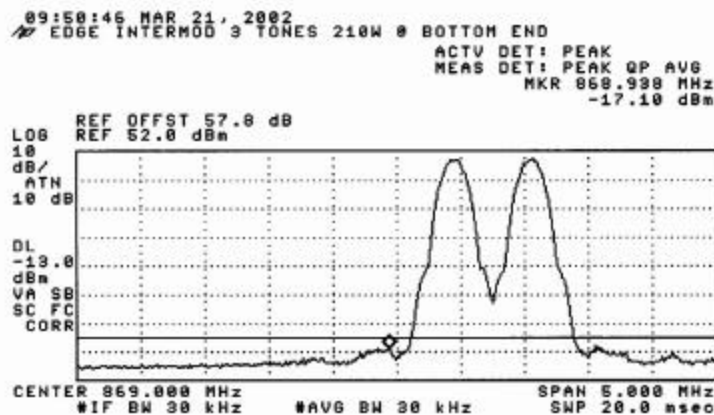
Test Result:

Plots were taken with single input at low, mid, and high of the band. Plots were taken of the out-of-band emissions from 30 MHz to 9GHz.

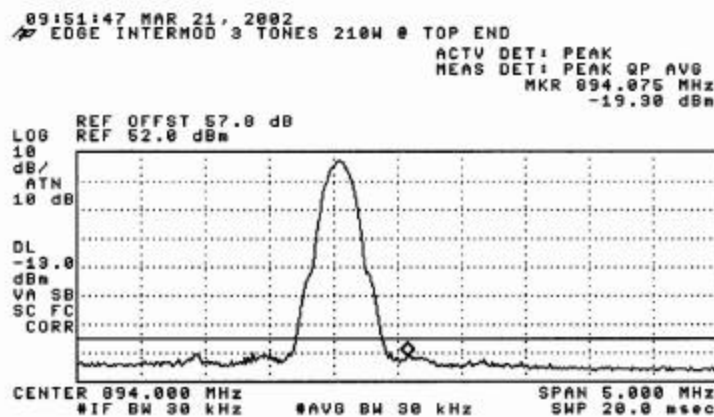
INTERMODULATION EMISSIONS		
Plot#	Description	Frequency (MHz)
37	EDGE 3 tones Intermodulation	869.45, 870.05 & 893.55
38	EDGE with Marker @ bottom end	Marker @ 869
39	EDGE with Marker @ top end	Marker @ 894
40	EDGE 3 tones Intermodulation Out-of-Band	30 - 1000
41	EDGE 3 tones Intermodulation Out-of-Band	1000 - 2900
42	EDGE 3 tones Intermodulation Out-of-Band	2750 - 9000
43	GSM 3 tones Intermodulation	869.45, 870.05 & 893.55
44	GSM with Marker @ bottom end	Marker @ 869
45	GSM with Marker @ top end	Marker @ 894
46	GSM 3 tones Intermodulation Out-of-Band	30 - 1000
47	GSM 3 tones Intermodulation Out-of-Band	1000 - 2900
48	GSM 3 tones Intermodulation Out-of-Band	2750 - 9000
49	TDMA 3 tones Intermodulation	869.2, 869.29 & 893.8
50	TDMA with Marker @ bottom end	Marker @ 869
51	TDMA with Marker @ top end	Marker @ 894
52	TDMA 3 tones Intermodulation Out-of-Band	30 - 1000
53	TDMA 3 tones Intermodulation Out-of-Band	1000 - 2900
54	TDMA 3 tones Intermodulation Out-of-Band	2750 - 9000
55	CDMA 3 tones Intermodulation	870.875, 873.375 & 892.125
56	CDMA with Marker @ bottom end	Marker @ 869
57	CDMA with Marker @ top end	Marker @ 894
58	CDMA 3 tones Intermodulation Out-of-Band	30 - 1000
59	CDMA 3 tones Intermodulation Out-of-Band	1000 - 2900
60	CDMA 3 tones Intermodulation Out-of-Band	2750 - 9000
61	AMPS/VOICE 3 tones Intermodulation	869.2, 869.35 & 893.8
62	AMPS/VOICE with Marker @ bottom end	Marker @ 869
63	AMPS/VOICE with Marker @ top end	Marker @ 894
64	AMPS/VOICE 3 tones Intermodulation Out-of-Band	30 - 1000
65	AMPS/VOICE 3 tones Intermodulation Out-of-Band	1000 - 2900
66	AMPS/VOICE 3 tones Intermodulation Out-of-Band	2750 - 9000
67	AMPS/DATA 3 tones Intermodulation	869.2, 869.35 & 893.8
68	AMPS/DATA with Marker @ bottom end	Marker @ 869
69	AMPS/DATA with Marker @ top end	Marker @ 894
70	AMPS/DATA 3 tones Intermodulation Out-of-Band	30 - 1000
71	AMPS/DATA 3 tones Intermodulation Out-of-Band	1000 - 2900
72	AMPS/DATA 3 tones Intermodulation Out-of-Band	2750 - 9000



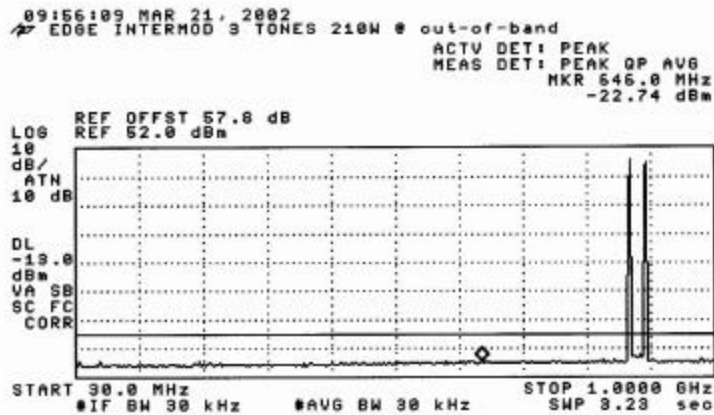
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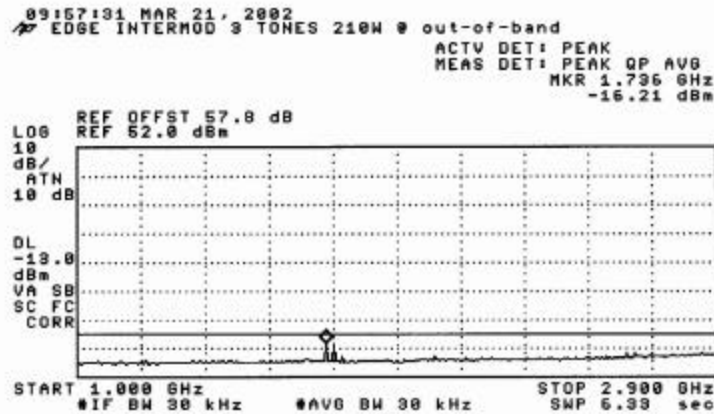
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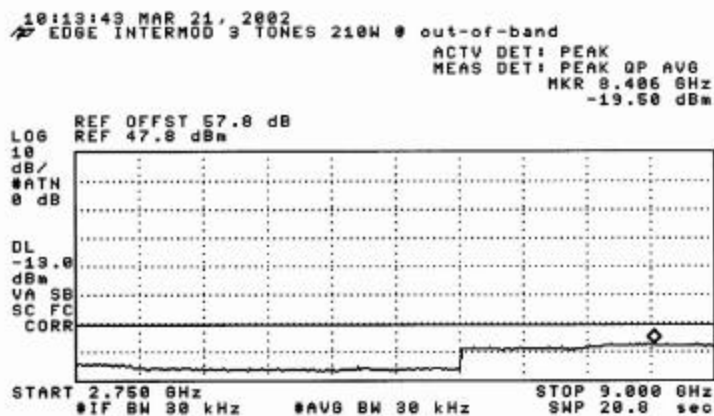
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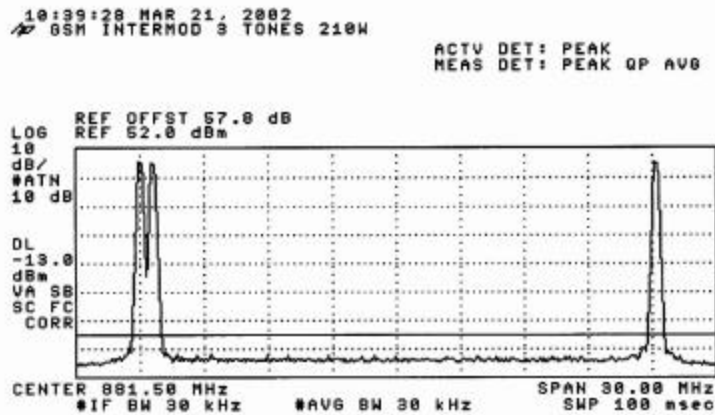
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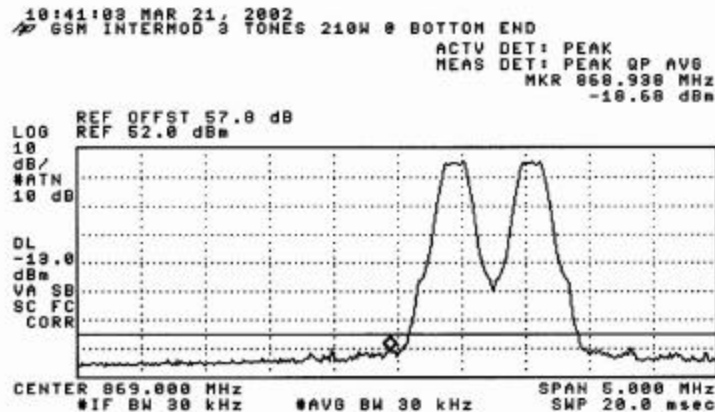
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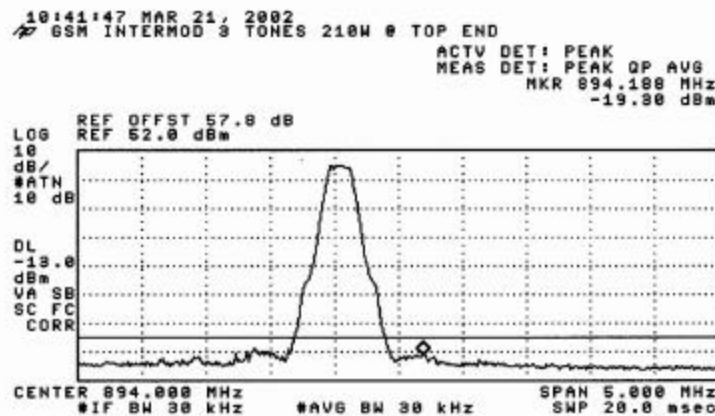
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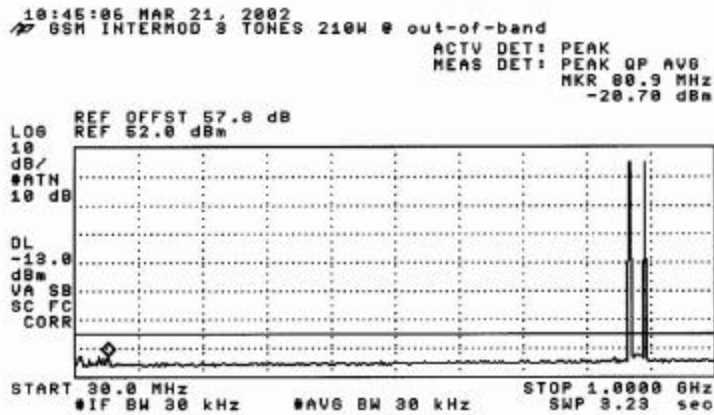
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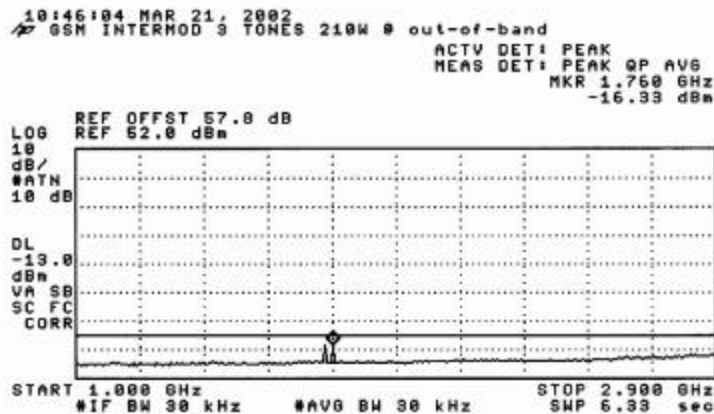
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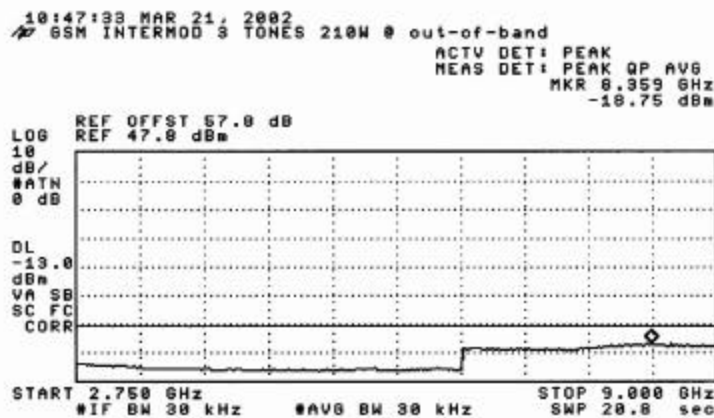
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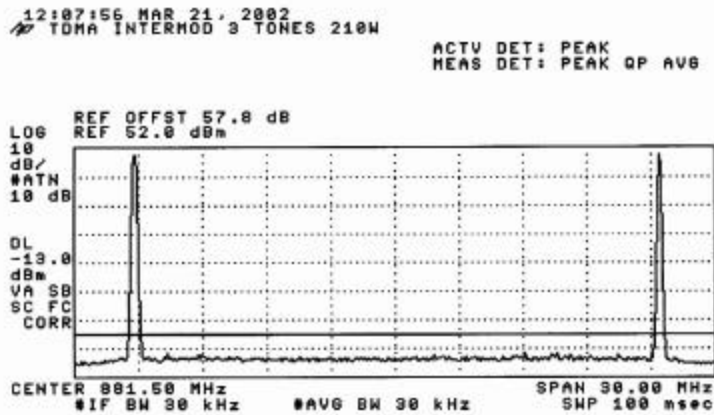
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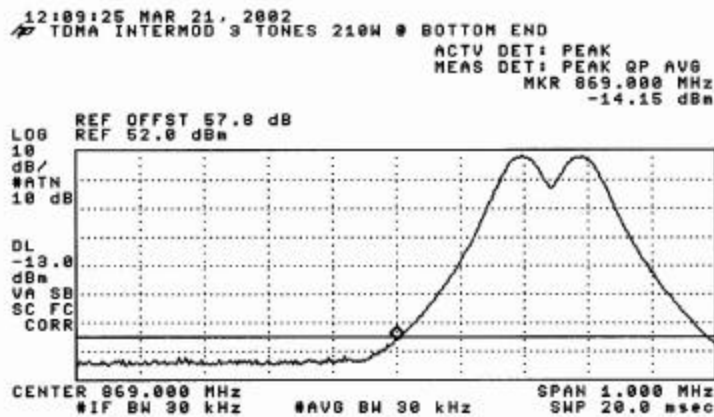
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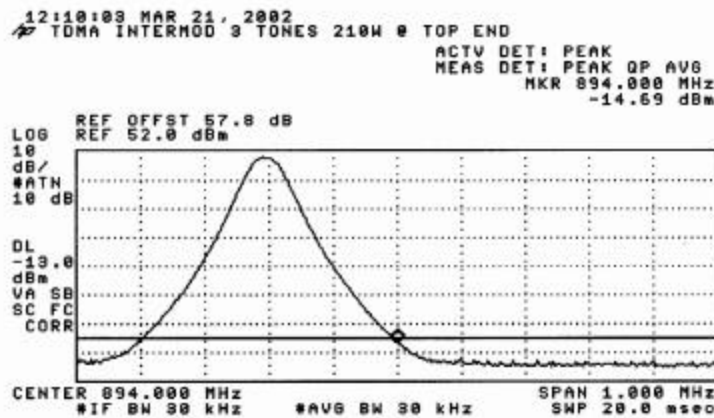
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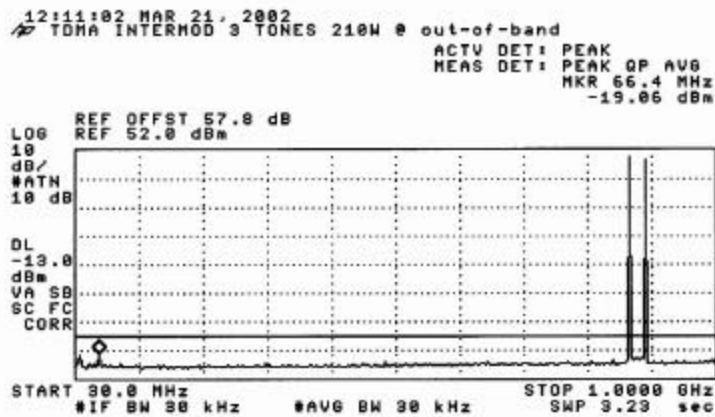
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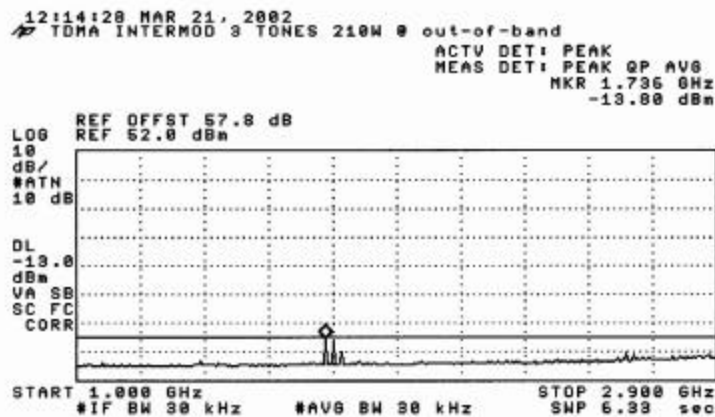
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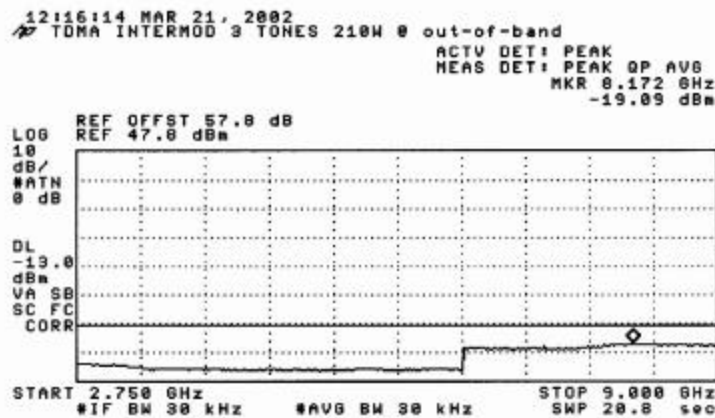
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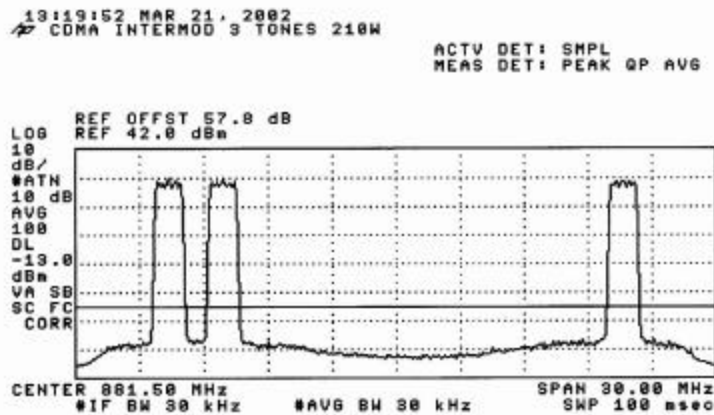
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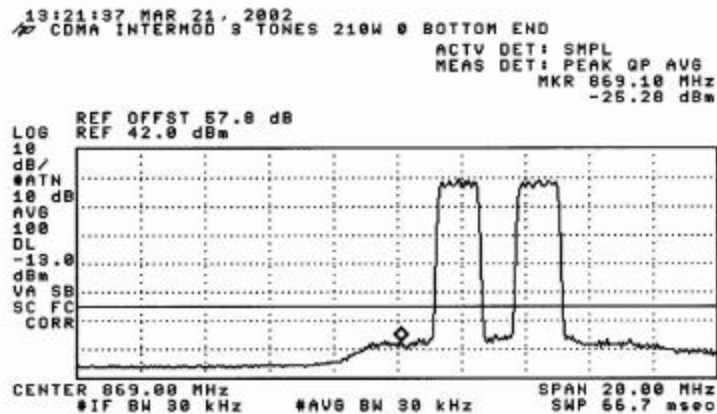
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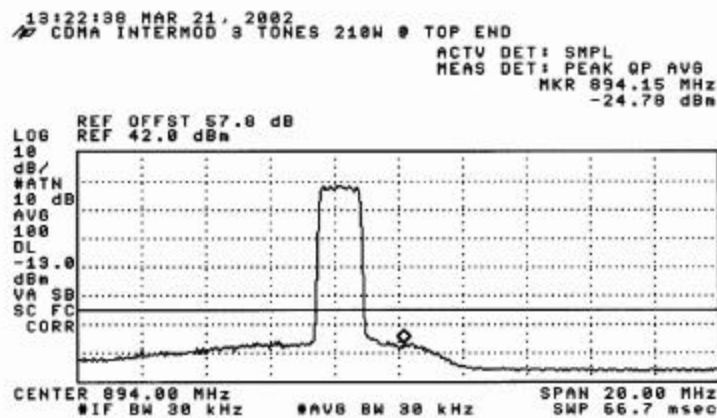
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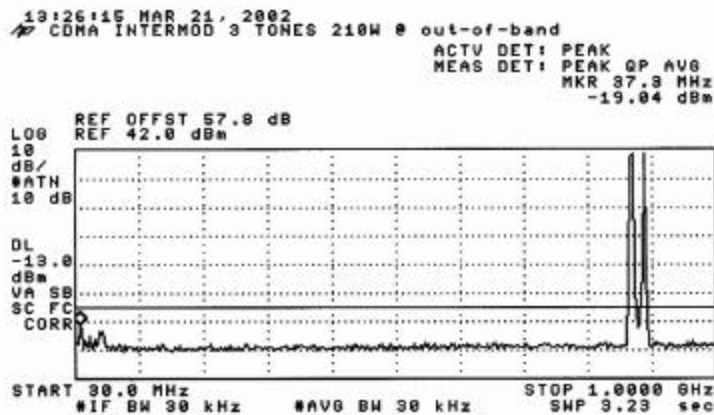
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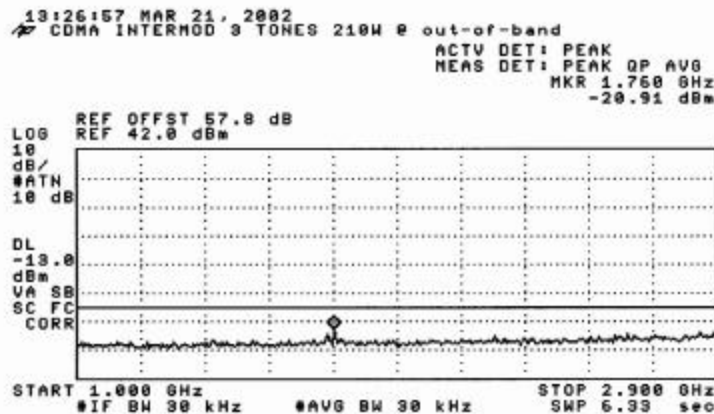
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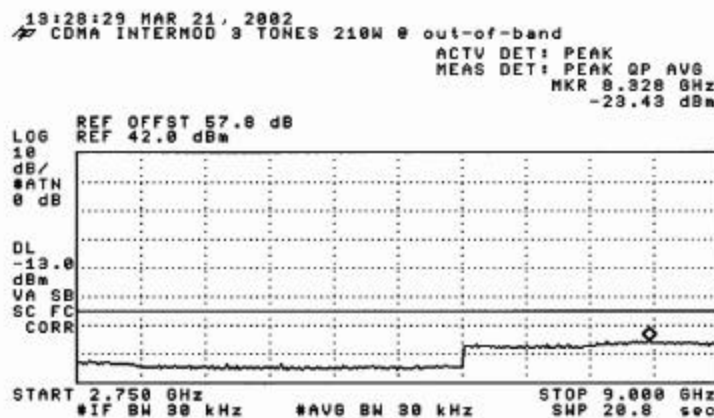
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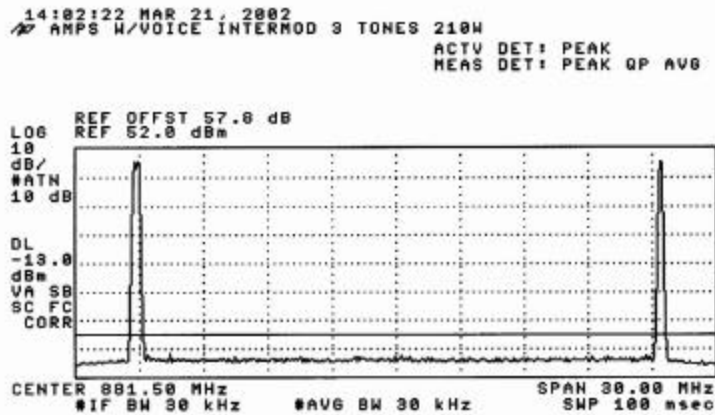
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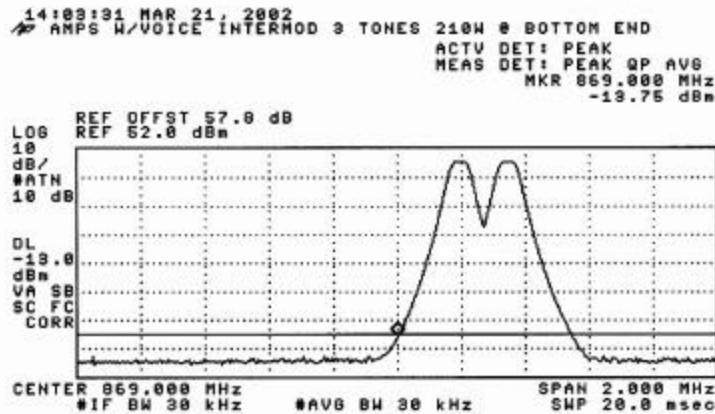
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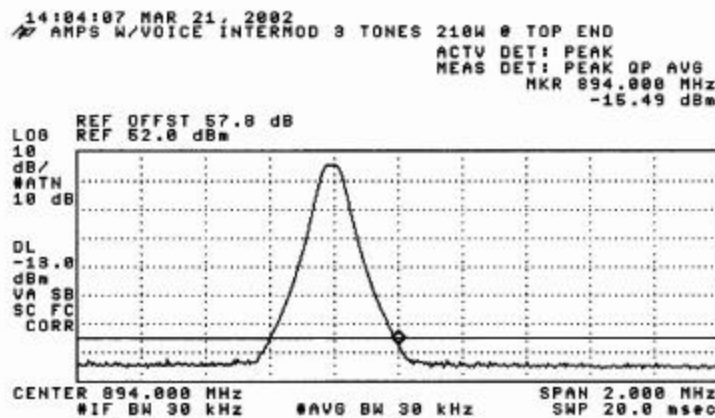
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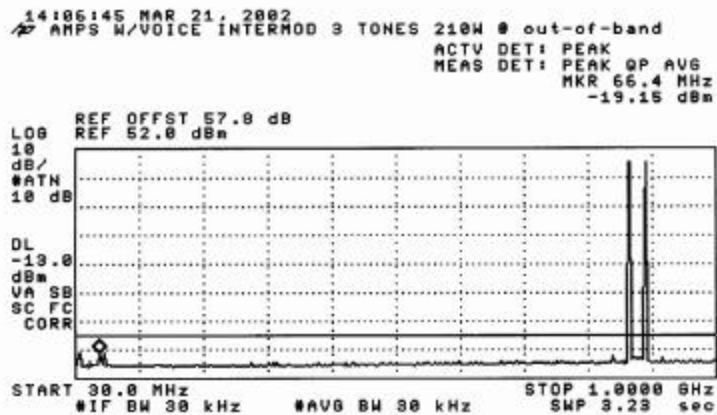
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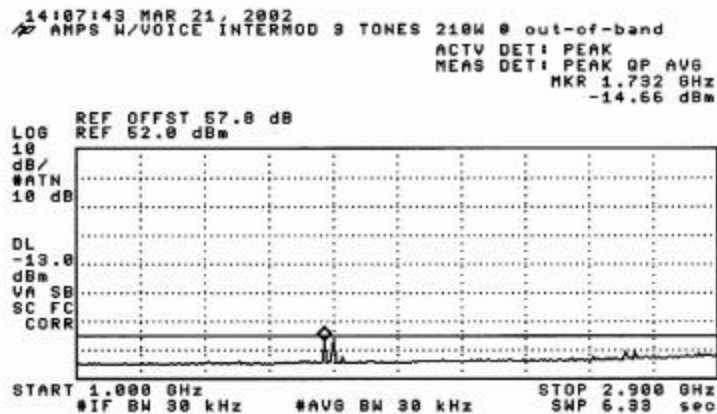
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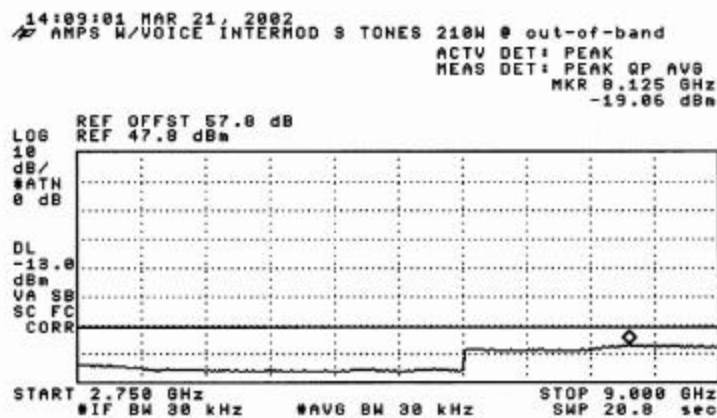
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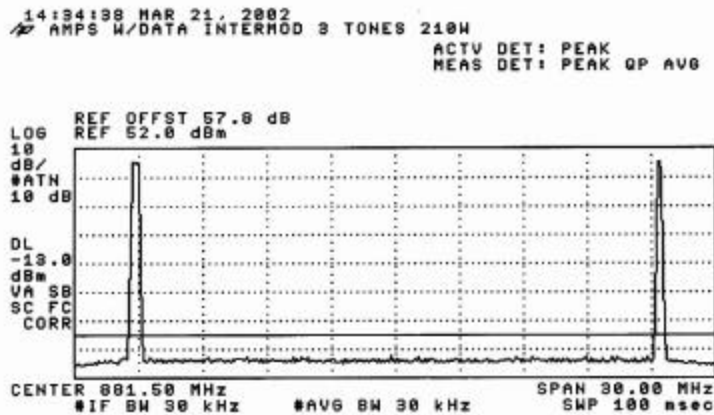
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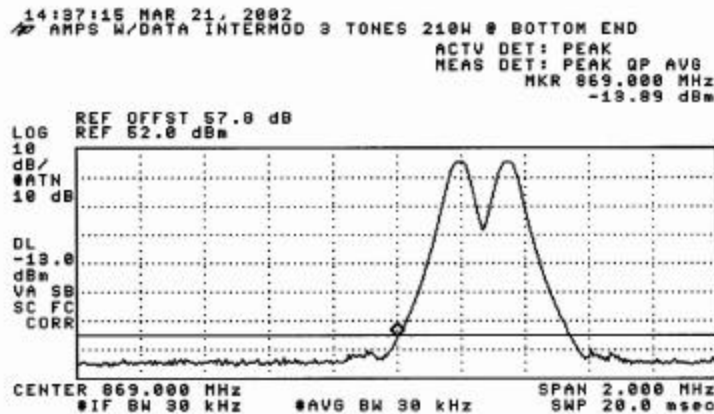
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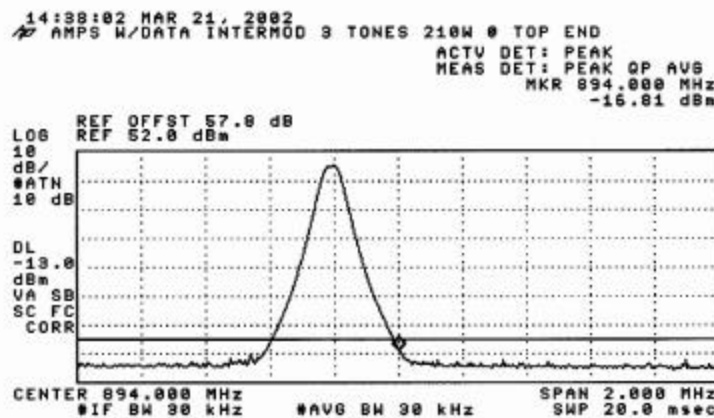
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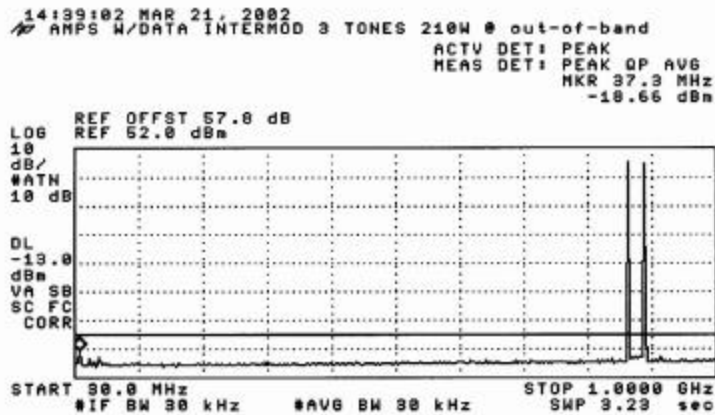
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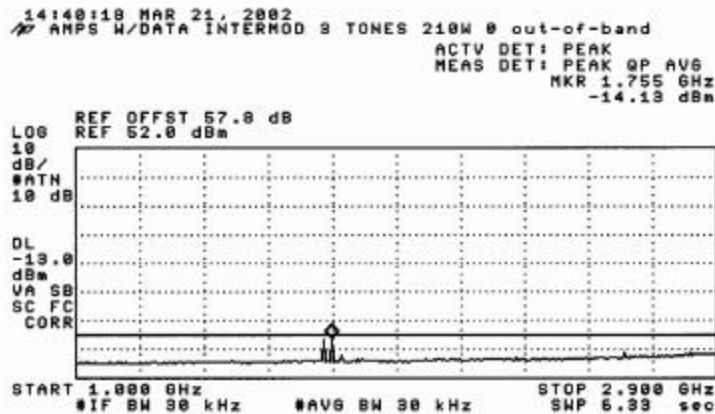
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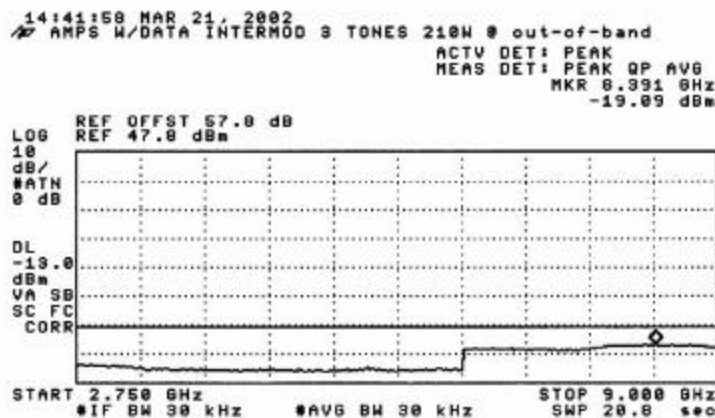
69



70



71



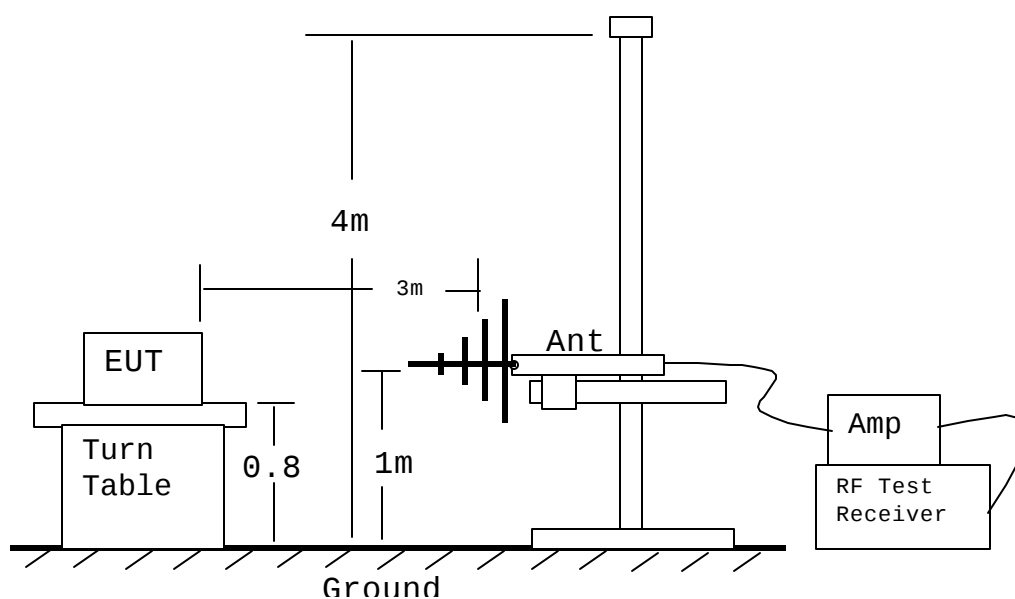
72

14.5 SECTION 2.1055: FREQUENCY STABILITY

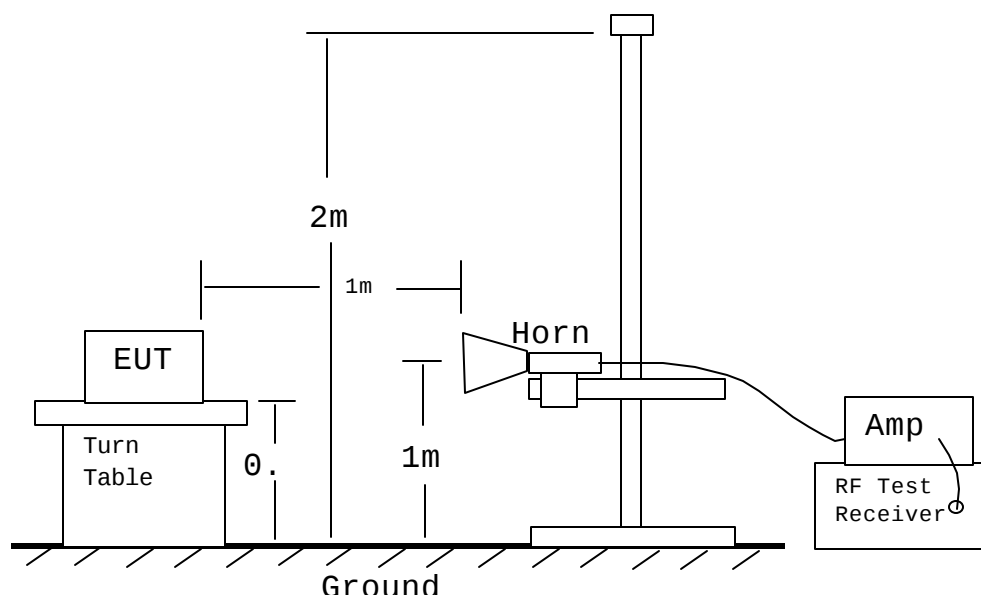
Not Applicable. Eut is a power amplifier.

15. RADIATED EMISSIONS PART 22

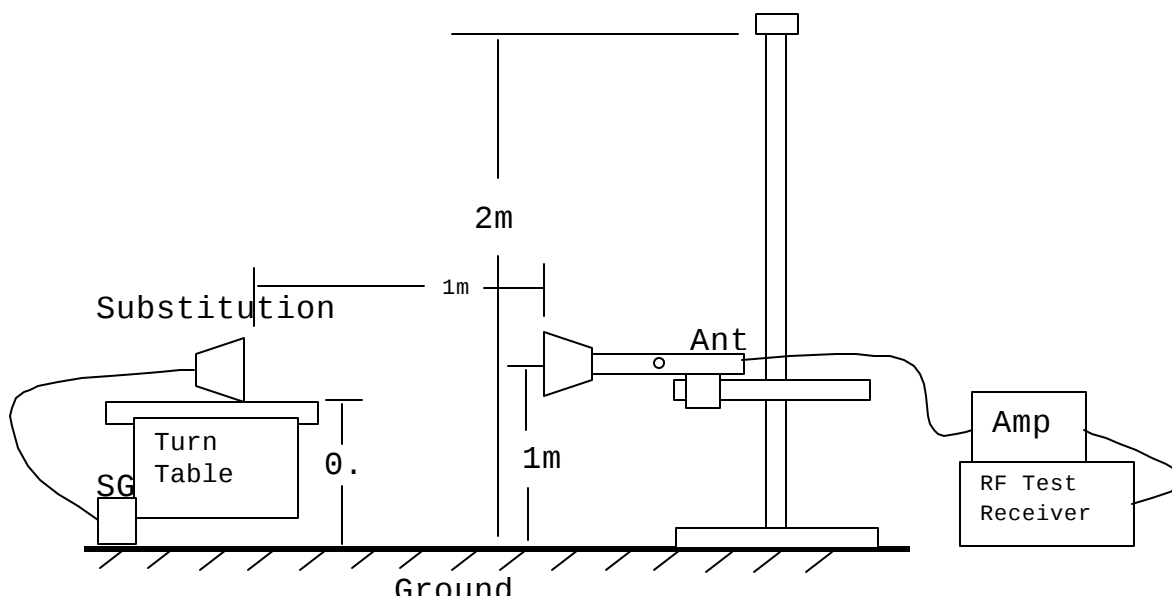
Test Set-up:



Radiated Emission Test 30 – 1000 MHz (Bilog)



Radiated Emission Test 1 – 9 GHz (Horn)



Substitution Method above 1 GHz

RADIATED EMISSION TEST PROCEDURE

The actual signal generated by the measured equipment may be determined by means of a substitution measurement in which a known signal source replaces the device to be measured.

- A. The substitution antenna will replace the Eut antenna in the same position and in vertical polarization. The frequency of the signal generator shall be set to the frequencies that were measured on the Eut. The test antenna shall be raised and lowered, if necessary, to ensure that the maximum signal is still being received. The signal generator, output level, shall be adjusted until an equal or a known related level to what was measured from the Eut is obtained in the spectrum analyzer.

The radiated power is equal to the power supplied by the signal generator
The formula, to calculate the true reading, is: $\text{True reading} = \text{dBm} + \text{GdBd} - \text{CL}$

dBm = signal generator output level

GdBd = the gain in dBd of the substitution antenna

CL = the cable loss

The calculated True reading is then compared to the limit and should not exceed the limit. This method must be performed for every emission measured from the Eut. This shall also be repeated for horizontal polarization.

Test Result:

See radiated emission data attached below.

Compliance Certification Services

Radiated Emissions
22.917(e)

3/20/02
A-Site (1 meter)
Kerwin Corpuz

POWERWAVE
869-894 MHz Multi-Channel Amplifier (M/N: G3S-800-185); 210 WATTS

fo = 869 MHz (LOW)

frequency (MHz)	SA reading (dBUV)	SG reading (dBm)	CL (dB)	Gain (dBi)	Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)
1738V	72.3	-42	1.1	8.2	6.05	-37.05	-13	-24.05
1738H	75.9	-38.2	1.1	8.2	6.05	-33.25	-13	-20.25
2607V	56.9	-55.4	1.3	9	6.85	-49.85	-13	-36.85
2607H	60.8	-51.4	1.3	9	6.85	-45.85	-13	-32.85
3476V	61.6	-48.9	1.5	8.9	6.75	-43.65	-13	-30.65
3476H	63.2	-47.4	1.5	8.9	6.75	-42.15	-13	-29.15
4345V	66.4	-44.8	1.7	10.1	7.95	-38.55	-13	-25.55
4345H	68.3	-43	1.7	10.1	7.95	-36.75	-13	-23.75
5214*	43.4	-75	1.9	9.9	7.75	-69.15	-13	-56.15
6083V	51.2	-58	2.1	10.6	8.45	-51.65	-13	-38.65
6083H	51.1	-58	2.1	10.6	8.45	-51.65	-13	-38.65
6952*	46.1	-75	2.3	10.5	8.35	-68.95	-13	-55.95
7821*	46.4	-75	2.4	10.4	8.25	-69.15	-13	-56.15
8690*	46.3	-75	2.6	10.5	8.35	-69.25	-13	-56.25

fo = 881.5 MHz (MID)

frequency (MHz)	SA reading (dBUV)	SG reading (dBm)	CL (dB)	Gain (dBi)	Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)
1763V	69.8	-44.5	1.1	8.2	6.05	-39.55	-13	-26.55
1763H	69.7	-44.5	1.1	8.2	6.05	-39.55	-13	-26.55
2644.5V	55.6	-56.6	1.3	9	6.85	-51.05	-13	-38.05
2644.5H	56.7	-55.6	1.3	9	6.85	-50.05	-13	-37.05
3526V	56.5	-54	1.5	8.9	6.75	-48.75	-13	-35.75
3526H	60.4	-50	1.5	8.9	6.75	-44.75	-13	-31.75
4407.5V	59.5	-51.5	1.7	10.1	7.95	-45.25	-13	-32.25
4407.5H	61.9	-49	1.7	10.1	7.95	-42.75	-13	-29.75
5289*	45.7	-75	1.9	9.9	7.75	-69.15	-13	-56.15
6170.5*	45.3	-75	2.1	10.6	8.45	-68.65	-13	-55.65
7052*	46.1	-75	2.3	10.5	8.35	-68.95	-13	-55.95
7933.5*	46.4	-75	2.4	10.4	8.25	-69.15	-13	-56.15
8815*	46.3	-75	2.6	10.5	8.35	-69.25	-13	-56.25

fo = 894 MHz (HIGH)

frequency (MHz)	SA reading (dBuV)	SG reading (dBm)	CL (dB)	Gain (dBi)	Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)
1788V	73.2	-41	1.1	8.2	6.05	-36.05	-13	-23.05
1788H	71.1	-43	1.1	8.2	6.05	-38.05	-13	-25.05
2682V	51.8	-60.5	1.3	9	6.85	-54.95	-13	-41.95
2682H	52.3	-60	1.3	9	6.85	-54.45	-13	-41.45
3576V	54.3	-56	1.5	8.9	6.75	-50.75	-13	-37.75
3576H	59.6	-51	1.5	8.9	6.75	-45.75	-13	-32.75
4470V	58.3	-53	1.7	10.1	7.95	-46.75	-13	-33.75
4470H	57.3	-54.1	1.7	10.1	7.95	-47.85	-13	-34.85
5364*	45.7	-75	1.9	9.9	7.75	-69.15	-13	-56.15
6258*	45.3	-75	2.1	10.6	8.45	-68.65	-13	-55.65
7152*	46.1	-75	2.3	10.5	8.35	-68.95	-13	-55.95
8046*	46.4	-75	2.4	10.4	8.25	-69.15	-13	-56.15
8940*	46.3	-75	2.6	10.5	8.35	-69.25	-13	-56.25

NOTE: * Measured noise floor (worse case vertical); H=horizontal and V=vertical

SA: Spectrum Analyzer

SG: Signal Generator

CL: SMA cable loss (5ft)

SPECTRUM ANALYZER SETTING

RES BW

VBW

Peak: 1 MHz
Average: 1 MHz

1 MHz
10 Hz

Gain (dBd) = TX Antenna - 2.15

ERP = SG reading - CL + Gain (dBd)

Margin = ERP - Limit

16. RADIATED EMISSION PART 15

RADIATED EMISSION TEST PROCEDURE

The EUT was placed on a wooden table 80 cm above the ground screen and all other support equipment were placed on the flush mounted turntable. Antenna to EUT distance was at 3 meter, measured E-Field with the range of 30M – 1GHz and a distance of 1 meter, measured 1GHz and above frequency. During the test, the table is rotated 360 degrees to maximize emissions and the antenna is positioned from 1 to 4 meters above the ground screen to further maximize emissions. The antenna is polarized in both vertical and horizontal positions.

EUT test configuration is according to Section 8 of ANSI C63.4/1992.

Monitor the frequency range of interest at a fixed antenna height and EUT azimuth. Frequency span should be small enough to easily differentiate between broadcast stations and intermittent ambient. Rotate EUT 360 degrees to maximize emissions received from EUT. If emission increases by more than 1 dB, or if another emission appears that is greater by 1 dB, return to azimuth where maximum occurred and perform additional cable manipulation to further maximize received emission.

Move antenna up and down to further maximize suspected highest amplitude signal. If emission increased by 1 dB or more, or if another emission appears that is greater by 1dB or more, return to antenna height where maximum signal was observed and manipulate cables to produce highest emissions, noting frequency and amplitude.

Test Result:

See attached file below.

		Project #: 02U1219-1 Report #: 020319A1 Date & Time: 03/19/02 3:11 PM Test Engr: KERWIN CORPUZ	
FCC, VCCI, CISPR, CE, AUSTEL, NZ UL, CSA, TUV, BSMI, DHHS, NVLAP 561F MONTEREY ROAD, SAN JOSE, CA 95037-9001 PHONE: (408) 463-0885 FAX: (408) 463-0888			
Company: POWERWAVE EUT Description: 869-894 MHz MULTI-CHANNEL AMPLIFIER(G3S-800-185) Test Configuration : EUT/POWER SUPPLY Type of Test: FCC CLASS B Mode of Operation: STANDBY			
☒ A-Site		☐ B-Site	
☐ C-Site		☐ F-Site	
☐ 6 Worst Data		☐ Descending	

Freq. (MHz)	Reading (dBuV)	AF (dB)	Class (dB)	Pre-amp (dB)	Level (dBuV/m)	Limit FCC B	Margin (dB)	Pol (H/V)	Az (Deg)	Height (Meter)	Mark (P/Q/A)
16.0 MHz STEP SIZE:											
144.00	43.80	13.15	1.60	27.44	31.12	43.50	-12.38	3mV	180.00	1.00	P
224.00	46.80	12.46	2.00	27.14	34.12	46.00	-11.88	3mV	180.00	1.00	P
256.00	42.90	14.55	2.14	27.04	32.54	46.00	-13.46	3mV	135.00	1.00	P
112.00	43.50	12.22	1.41	27.52	29.61	43.50	-13.89	3mH	225.00	2.00	P
144.00	44.10	11.70	1.60	27.44	29.97	43.50	-13.53	3mH	225.00	2.00	P
224.00	47.90	12.71	2.00	27.14	35.47	46.00	-10.53	3mH	225.00	2.00	P
256.00	45.40	14.03	2.14	27.04	34.52	46.00	-11.48	3mH	225.00	2.00	P
COMPLETED SCAN 30 - 1000 MHz, VERTICAL AND HORIZONTAL POLARIZATION											
Total data #: 7											
V.2a											

END OF REPORT