



TELTEST LABORATORIES

A Division of
Tait Electronics Ltd
558 Wairakei Rd
Christchurch New Zealand

RADIO PERFORMANCE MEASUREMENTS

on the T2015-623 Mobile Transceiver

FCC ID: CAS2000-6231

Serial No 608419

in accordance with

FCC 47 Parts 22 and 90

Test Report No:

1100

Date:

27 November 1996

Copy Number:

2

of

2

PREPARED BY:

Paul Burgess



TEST TECHNICIAN

CHECKED & APPROVED BY:

S.A.Crompton

LABORATORY MANAGER

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TARF	1100	FCC ID:CAS2000-6231	
Test Technician:	Paul Burgess		
EQUIPMENT TYPE	T2015-623	Serial No	608419
SOFTWARE VERSION	V2.05	MAIN PCB VERSION	220-01250-14A
		CONTROL BOARD VERSION	220-01292-02

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**TRANSMITTER CARRIER OUTPUT POWER
HIGH POWER**

FCC 47 Part 2.985

TEST PARAMETERS	
AMBIENT TEMPERATURE (°C)	20.0
RELATIVE HUMIDITY (%)	55
RF POWER LEVEL (Watts)	25 W
STANDARD VOLTAGE (Volts)	13.8 V DC

RESULTS:

TEST CONDITIONS		TRANSMITTER POWER (W) 480.1 MHz	
T _{ambient} °C	13.8	Maximum	Minimum
		25.9	25.9
Maximum Power variation under Normal Test conditions (dBr)		+0.15	
Measurement Uncertainty (dB)		+0.63 -0.68	

The load attached to the output terminals is a 50 ohm resistive termination.

LIMIT CLAUSE: FCC 47 Part 90.205
(B)

Radio type	Frequency Band (Mhz) Max Power Limit (W)								
	25 to 100	100 to 216	216 to 470	470 to 512	806 to 824	851 to 869	896 to 901	929 to 930	935 to 940
Base	350	350	350	1000	-	2000	-	2000	2000
Mobile	300	75	75	350	-	-	-		

(C) The output power shall not exceed manufacturer's specified rated output by more than 20%.

TEST EQUIPMENT USED: 2 , 4 , 5 , 15

TEST SET-UP: RF POWER OUTPUT



**TRANSMITTER CARRIER OUTPUT POWER
LOW POWER**

FCC 47 Part 2.985

TEST PARAMETERS	
AMBIENT TEMPERATURE (°C)	20.0
RELATIVE HUMIDITY (%)	55
RF POWER LEVEL (Watts)	5 W
STANDARD VOLTAGE (Volts)	13.8 V DC

RESULTS:

TEST CONDITIONS		TRANSMITTER POWER (W) 480.1 MHz	
T _{ambient} °C	13.8	Maximum	Minimum
		5.51	5.51
Maximum Power variation under Normal Test conditions (dBr)		+0.42	
Measurement Uncertainty (dB)		+0.63 -0.68	

The load attached to the output terminals is a 50 ohm resistive termination.

**LIMIT CLAUSE:
(B)**

FCC 47 Part 90.205

Radio type	Frequency Band (Mhz) Max Power Limit (W)								
	25 to 100	100 to 216	216 to 470	470 to 512	806 to 824	851 to 869	896 to 901	929 to 930	935 to 940
Base	350	350	350	1000	-	2000	-	2000	2000
Mobile	300	75	75	350	-	-	-		

TEST EQUIPMENT USED: 2 , 4 , 5 , 15

TEST SET-UP: RF POWER OUTPUT



**TRANSMITTER MODULATION CHARACTERISTIC
LOW PASS FILTER RESPONSE**

FCC 47 Part 2.987

TEST PARAMETERS	
AMBIENT TEMPERATURE (°C)	23.5
RELATIVE HUMIDITY (%)	45
RF POWER LEVEL (Watts)	25 W
STANDARD VOLTAGE (Volts)	13.8V DC

RESULTS:

MODULATION AUDIO LEVEL RESPONSE			
480.1 MHz			
MODULATION FREQUENCY (Hz)	Audio Output (dBr)	MODULATION FREQUENCY (Hz)	Audio Output (dBr)
100	-5.09	3500	-8.13
200	-1.75	4000	-12.69
300	-0.70	4500	-16.79
400	-0.27	5000	-20.52
500	-0.09	6000	-27.20
600	-0.01	7000	-33.37
750	0.02	8000	-39.55
1000	0.00	9000	-46.35
1200	0.00	10000	-55.20
1400	0.03	11000	-60.66
1500	0.08	12500	-55.14
1700	0.21	15000	-52.40
1850	0.33	17500	-52.70
2000	0.45	20000	-53.70
2250	0.47	25000	-55.30
2500	-0.03	50000	-61.59
2750	-1.36	75000	-62.50
3000	-3.38	100000	-62.00

PLOT: See attached EXHIBIT C(1).

**TRANSMITTER MODULATION CHARACTERISTIC Cont.
LOW PASS FILTER RESPONSE**

FCC 47 Part 2.987

LIMIT CLAUSE:

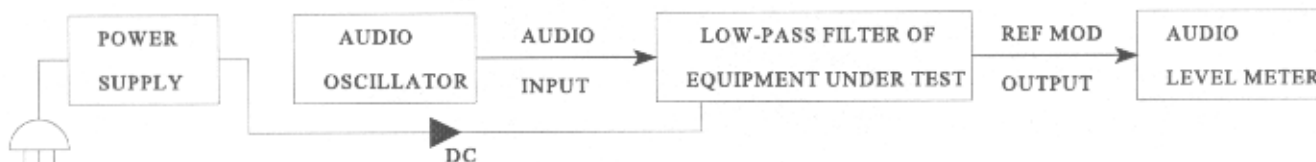
FCC 47 Part 90.211

With respect to level at 1KHz.

FCC Modulation Type	Frequency Range (MHz)	Audio Band (KHz)	Limit (dB)
VHF (D)(1)(1)	25 to 50	3 to 15	- 40 Log (fKHz/3)
	72 to 73		
	75.4 to 76	> 15	- 28
	150.8 to 174		
UHF (D)(1)(2)	450 to 512	3 to 20	- 60 Log (fKHz/3)
	806 to 824		
	851 to 869	> 20	- 50
	929 to 930		
UHF (D)(1)(3)	896 to 901	3 to 20	- 100 Log (fKHz/3)
	935 to 940		

TEST EQUIPMENT USED: 4 , 13 , 14

TEST SET-UP: LOW PASS FILTER



**TRANSMITTER MODULATION CHARACTERISTIC
AUDIO PRE-EMPHASIS RESPONSE**

FCC 47 Part 2.987

TEST PARAMETERS	
AMBIENT TEMPERATURE (°C)	23.5
RELATIVE HUMIDITY (%)	45
RF FREQUENCY (MHz)	480.1 MHz
RF POWER LEVEL (Watts)	25 W
STANDARD VOLTAGE (Volts)	13.8V DC

RESULTS:

Audio output (Pre-Emphasis)					
Audio I/P Frequency	Output (dB ref to 1kHz)		Audio I/P Frequency	Output (dB ref to 1kHz)	
	+ve Peak	-ve Peak		+ve Peak	-ve Peak
100	-25.90	-25.30	1500	3.42	3.34
150	-17.90	-17.80	2000	5.90	5.88
200	-15.00	-15.00	2500	6.90	6.87
250	-11.60	-12.50	3000	4.92	4.91
300	-9.73	-10.80	3500	1.49	1.37
350	-8.63	-9.07	4000	-2.01	-2.11
400	-7.38	-7.53	5000	-7.94	-8.35
500	-5.64	-5.40	6000	-13.10	-13.40
600	-3.98	-4.02	7000	-16.10	-17.10
700	-2.85	-2.78	8000	-19.50	-20.70
800	-1.70	-1.87	10000	-23.00	-24.40
1000.00	ref	ref			

PLOT: See attached EXHIBIT C(2a).

**TRANSMITTER MODULATION CHARACTERISTIC
MODULATOR LIMITING RESPONSE
STEADY STATE LIMITING**

FCC 47 Part 2.987

TEST PARAMETERS	
AMBIENT TEMPERATURE (°C)	23.5
RELATIVE HUMIDITY (%)	45
RF FREQUENCY	480.1 MHz
RF POWER LEVEL (Watts)	25 W
STANDARD VOLTAGE (Volts)	13.8V DC

RESULTS:

AUDIO OUTPUT DEVIATION LEVEL			Max Deviation (kHz)	2.50	
I / P Audio Frequency	Output (dB ref to max deviation)		I / P Audio Frequency	Output (kHz)	
	+ve	-ve		+ve	-ve
100	-26.70	-27.70	100	0.116	0.103
150	-16.80	-17.40	150	0.361	0.337
200	-11.80	-12.00	200	0.643	0.628
250	-9.04	-8.97	250	0.883	0.890
300	-7.11	-6.80	300	1.103	1.143
350	-5.37	-5.02	350	1.347	1.403
400	-3.94	-3.76	400	1.588	1.622
500	-3.16	-3.28	500	1.738	1.714
600	-3.15	-3.27	600	1.740	1.716
700	-2.86	-2.96	700	1.799	1.778
800	-2.43	-2.54	800	1.890	1.866
1000	-2.01	-2.21	1000	1.984	1.938
1500	-1.98	-2.10	1500	1.990	1.963
2000	-1.38	-1.48	2000	2.133	2.108
2500	-1.87	-1.89	2500	2.016	2.011
3000	-5.21	-5.24	3000	1.372	1.368
3500	-9.82	-9.78	3500	0.807	0.811
4000	-14.00	-14.00	4000	0.499	0.499
5000	-21.10	-21.20	5000	0.220	0.218
6000	-27.00	-26.80	6000	0.112	0.114
7000	-30.90	-30.70	7000	0.071	0.073
8000	-33.80	-34.30	8000	0.051	0.048
10000	-37.90	-38.40	10000	0.032	0.030
Measurement Uncertainty (Hz)			± 37.5		

PLOT: See attached EXHIBIT C(2b).

**TRANSMITTER MODULATION CHARACTERISTIC
MODULATOR LIMITING RESPONSE
INSTANTANEOUS LIMITING**

FCC 47 Part 2.987

TEST PARAMETERS	
AMBIENT TEMPERATURE (°C)	23.5
RELATIVE HUMIDITY (%)	45
RF FREQUENCY	480.1 MHz
RF POWER LEVEL (Watts)	25 W
STANDARD VOLTAGE (Volts)	13.8V DC

RESULTS:

AUDIO OUTPUT DEVIATION LEVEL			Max Deviation (kHz)	2.50	
I / P Audio Frequency	Output (dB ref to max deviation)		I / P Audio Frequency	Output (kHz)	
	+ve	-ve		+ve	-ve
100	-6.80	-5.40	100	1.143	1.343
150	-5.38	-6.41	150	1.346	1.195
200	-3.72	-4.06	200	1.629	1.567
250	-3.56	-3.89	250	1.659	1.598
300	-3.35	-3.61	300	1.700	1.650
350	-3.10	-3.28	350	1.750	1.714
400	-2.66	-2.89	400	1.841	1.792
500	-2.05	-2.22	500	1.974	1.936
600	-1.89	-2.04	600	2.011	1.977
700	-1.76	-1.97	700	2.041	1.993
800	-1.64	-1.90	800	2.070	2.009
1000	-1.75	-1.91	1000	2.044	2.007
1500	-1.88	-2.03	1500	2.013	1.979
2000	-1.30	-1.42	2000	2.152	2.123
2500	-1.79	-1.85	2500	2.034	2.020
3000	-5.08	-5.09	3000	1.393	1.391
3500	-9.44	-9.36	3500	0.843	0.851
4000	-13.50	-12.50	4000	0.528	0.593
5000	-18.90	-16.60	5000	0.284	0.370
6000	-23.10	-17.90	6000	0.175	0.318
7000	-26.70	-19.90	7000	0.116	0.253
8000	-27.70	-21.40	8000	0.103	0.213
10000	-36.60	-20.60	10000	0.037	0.233
Measurement Uncertainty (Hz)			± 37.5		

PLOT: See attached EXHIBIT C(2c).

**TRANSMITTER MODULATION CHARACTERISTIC
MODULATOR LIMITING RESPONSE**

FCC 47 Part 2.987

TEST PARAMETERS	
AMBIENT TEMPERATURE (°C)	23.5
RELATIVE HUMIDITY (%)	45
RF POWER LEVEL (Watts)	25 W
STANDARD VOLTAGE (Volts)	13.8V DC

RESULTS:

AUDIO OUTPUT DEVIATION LEVEL (KHz)										
480.1 MHz										
I / P dBm	300		500		1000		2000		3000	
	+ve	-ve	+ve	-ve	+ve	-ve	+ve	-ve	+ve	-ve
-85	0.031	0.045	0.028	0.036	0.044	0.029	0.029	0.048	0.069	0.034
-80	0.038	0.037	0.047	0.052	0.076	0.063	0.112	0.121	0.116	0.116
-75	0.047	0.048	0.069	0.071	0.118	0.112	0.208	0.210	0.187	0.185
-70	0.069	0.066	0.102	0.104	0.187	0.185	0.357	0.353	0.315	0.315
-65	0.098	0.101	0.169	0.169	0.308	0.311	0.607	0.607	0.534	0.534
-60	0.160	0.160	0.274	0.277	0.534	0.534	1.059	1.055	0.940	0.933
-55	0.265	0.262	0.482	0.482	0.927	0.928	1.797	1.782	1.262	1.256
-50	0.450	0.450	0.834	0.837	1.625	1.618	2.056	2.027	1.329	1.329
-45	0.798	0.797	1.498	1.505	1.903	1.858	2.111	2.087	1.352	1.347
-40	1.165	1.177	1.744	1.714	1.974	1.934	2.121	2.096	1.357	1.350
-35	1.156	1.215	1.736	1.712	1.979	1.927	2.121	2.094	1.353	1.352
-30	1.157	1.201	1.740	1.714	1.974	1.932	2.121	2.103	1.352	1.353
-25	1.168	1.203	1.734	1.712	1.974	1.934	2.118	2.101	1.355	1.350
-20	1.168	1.199	1.742	1.708	1.977	1.923	2.118	2.096	1.352	1.350
-15	1.176	1.173	1.744	1.704	1.979	1.921	2.118	2.099	1.353	1.352
-10	1.465	1.230	1.780	1.656	1.890	1.923	2.082	2.077	1.346	1.347
-5	1.822	1.740	2.051	1.979	1.805	1.736	1.979	1.932	1.276	1.276
+0	2.037	1.961	2.111	2.070	1.824	1.638	1.841	1.679	1.171	1.188
+5	2.118	2.113	2.072	2.077	1.784	1.635	1.686	1.407	1.049	1.086
+10	2.072	2.094	1.990	2.063	1.712	1.710	1.493	1.093	0.861	0.928
Measurement Uncertainty (Hz)					± 37.5					

PLOT: See attached EXHIBIT C(2d).

TRANSMITTER MODULATION CHARACTERISTICS Cont.

FCC 47 Part 2.987

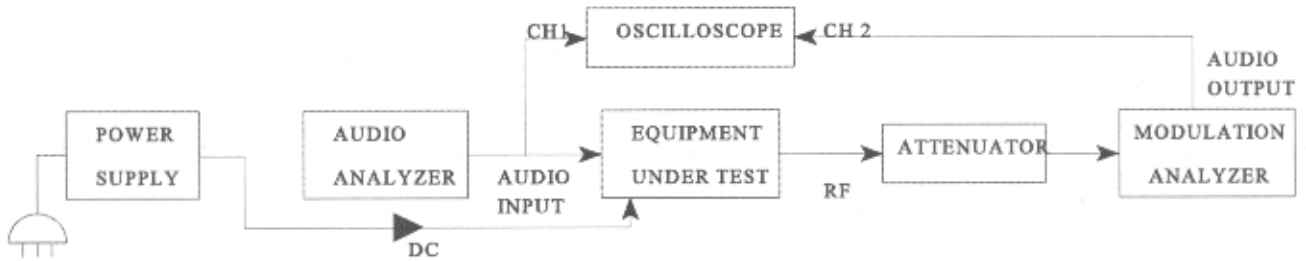
LIMIT CLAUSE:

FCC 47 Part 90.209

FCC Bandwidth Type	Frequency Range MHz	Max Deviation KHz
(B) (4)	< 947	2.5

TEST EQUIPMENT USED: 2, 3, 4, 5, 10, 11, 15

TEST SET-UP: MODULATION TESTS



TRANSMITTER OCCUPIED BANDWIDTH

FCC 47 Part 2.989

TEST PARAMETERS	
AMBIENT TEMPERATURE (°C)	21.5
RELATIVE HUMIDITY (%)	50
RF POWER LEVEL (Watts)	25 W
STANDARD VOLTAGE (Volts)	13.8V DC

(D): AUDIO MODULATION. (Type F3E)

Transmitter modulated by a 2500 Hz signal at 16 dB above the level that resulted in 50% deviation.

RESULTS:

PLOT: See attached EXHIBIT C(3).

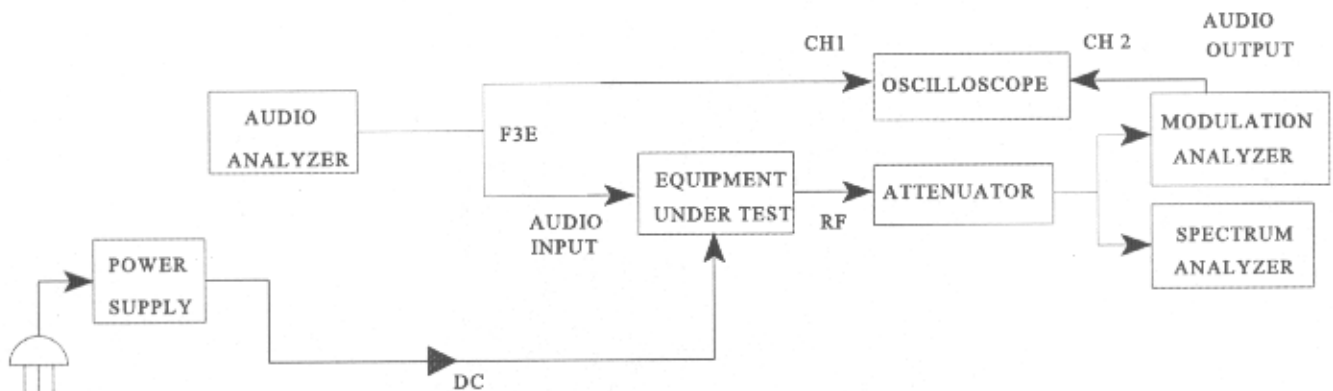
LIMIT CLAUSE:

FCC 47 Part 90.210

FCC Bandwidth Type	Frequency Range MHz	Audio Bandwidth KHz	Power verse Frequency Mask	
			Frequency Limitation	Power Level
D	150 to 174 421 to 512	11.25 (NB)	$f_c < f < f_c \pm 5.625 \text{ KHz}$	-0 dBc
			From $f > f_c \pm 5.625 \text{ KHz}$ to $f < f_c \pm 12.5 \text{ KHz}$	-20 dBc
				-64 dBc
			$f_c \pm 12.5 \text{ KHz} < f$	-64 dBc

TEST EQUIPMENT USED: 2 , 3 , 4 , 5 , 9 , 10 , 11 , 14 , 15

TEST SET-UP: OCCUPIED BANDWIDTH



**TRANSIENT FREQUENCY BEHAVIOUR
HIGH POWER**

FCC 47 Part 90.214

TEST PARAMETERS	
AMBIENT TEMPERATURE (°C)	24.5
RELATIVE HUMIDITY (%)	47
RF POWER LEVEL (Watts)	25 W
STANDARD VOLTAGE (Volts)	13.8V DC

RESULTS:

FREQUENCY	480.1 MHz	@	2.5 PPM
TRANSIENT RESPONSE PERIOD	CARRIER, PEAK VARIATION FROM NOMINAL		
	KEY "ON" (Hz)		KEY "OFF" (Hz)
t1	2375.0		N/A
t2	244.64		N/A
t3	N/A		2812.5
t2~t3	89.28		
ERROR LIMIT (t2~t3)	1200.25		

Confirm that during periods "t1" and "t3" the frequency difference does not exceed the value of one channel separation.	YES	NO
	✓	
Confirm that during period "t2" the frequency difference does not exceed half a channel separation.	YES	NO
	✓	
Confirm that during the period "t2" to "t3" the frequency difference does not exceed the frequency error limit.	YES	NO
	✓	

PLOT: See attached Exhibit C (4), for key "ON", and attached Exhibit C (5), for key "OFF".

LIMIT CLAUSE: FCC 47 Part 90.214

TRANSIENT PERIODS	MAXIMUM FREQUENCY DIFFERENCE (KHz)	FREQUENCY RANGES (MHz)		
		ALL EQUIPMENT		
		150 to 174	450 to 500	500 to 512
t1 (ms)	± 12.5	5.0	10.0	20.0
t2 (ms)	± 6.25	20.0	25.0	50.0
t3 (ms)	± 12.5	5.0	10.0	10.0

TEST EQUIPMENT USED: 1 , 2 , 4 , 5 , 8 , 10 , 11 , 15 , 16 , 17 , 18 , 19

TEST SET-UP: TRANSIENT FREQUENCY

For Transient Frequency Performance method and setup see EXHIBIT C Supplement 1 Pages 1 & 2

**TRANSIENT FREQUENCY BEHAVIOUR
LOW POWER**

FCC 47 Part 90.214

TEST PARAMETERS	
AMBIENT TEMPERATURE (°C)	24.5
RELATIVE HUMIDITY (%)	47
RF POWER LEVEL (Watts)	5 W
STANDARD VOLTAGE (Volts)	13.8 VDC

RESULTS:

FREQUENCY	480.1 MHz	@	2.5 PPM
TRANSIENT RESPONSE PERIOD	CARRIER, PEAK VARIATION FROM NOMINAL		
	KEY "ON" (Hz)	KEY "OFF" (Hz)	
t1	3187.5	N/A	
t2	172.32	N/A	
t3	N/A	4875.0	
t2-t3	216.07		
ERROR LIMIT (t2-t3)	1200.25		

Confirm that during periods "t1" and "t3" the frequency difference does not exceed the value of one channel separation.	YES	NO
	✓	
Confirm that during period "t2" the frequency difference does not exceed half a channel separation.	YES	NO
	✓	
Confirm that during the period "t2" to "t3" the frequency difference does not exceed the frequency error limit.	YES	NO
	✓	

PLOT: See attached Exhibit C (6), for key "ON", and attached Exhibit C (7), for key "OFF".

LIMIT CLAUSE: FCC 47 Part 90.214

TRANSIENT PERIODS	MAXIMUM FREQUENCY DIFFERENCE (KHz)	FREQUENCY RANGES (MHz)		
		ALL EQUIPMENT		
		150 to 174	450 to 500	500 to 512
t1 (ms)	± 12.5	5.0	10.0	20.0
t2 (ms)	± 6.25	20.0	25.0	50.0
t3 (ms)	± 12.5	5.0	10.0	10.0

TEST EQUIPMENT USED: 1, 2, 4, 5, 8, 10, 11, 15, 16, 17, 18, 19

TEST SET-UP: TRANSIENT FREQUENCY

For Transient Frequency Performance method and setup see EXHIBIT C Supplement 1 Pages 1 & 2

**TRANSMITTER SPURIOUS EMISSIONS (CONDUCTED)
HIGH POWER**

FCC 47 Part 2.991

TEST PARAMETERS	
AMBIENT TEMPERATURE (°C)	21.5
RELATIVE HUMIDITY (%)	50
RF POWER LEVEL (Watts)	25
STANDARD VOLTAGE (Volts)	13.8 V DC

RESULTS:

FREQUENCY OF SPURIOUS EMISSION MHz		SPURIOUS EMISSION LEVEL (dBm)	
Harmonic	$f_c = 480.1$ MHz	Max Power @ $f_c =$	43.98 dBm
-	454.5		-37.6
-	505.7003		-38.4
$2 * f_c$	960.2	No emissions were detected that had a level greater than 20dB below the limit.	
$3 * f_c$	1440.3		
$4 * f_c$	1920.4		
$5 * f_c$	2400.5		
$6 * f_c$	2880.6		
$7 * f_c$	3360.7		
$8 * f_c$	3840.8		
$9 * f_c$	4320.9		
$10 * f_c$	4801		
UNCERTAINTY (dB)			

LIMIT CLAUSE:

FCC 47 Part 90.210

FCC Bandwidth Type	Frequency Range MHz	Audio Bandwidth KHz	Power versus Frequency Mask	
			Frequency Limitation	Power Level
D(3)	< 947	11.25(NB)	$f_c \pm 12.5$ KHz < f	-20 dBm

REMARKS: No other emissions were detected that had a level greater than 20dB below the limit.

**TRANSMITTER SPURIOUS EMISSIONS (CONDUCTED)
LOW POWER**

FCC 47 Part 2.991

TEST PARAMETERS	
AMBIENT TEMPERATURE (°C)	21.5
RELATIVE HUMIDITY (%)	50
RF POWER LEVEL (Watts)	5
STANDARD VOLTAGE (Volts)	13.8 V DC

RESULTS:

FREQUENCY OF SPURIOUS EMISSION MHz		SPURIOUS EMISSION LEVEL (dBm)	
Harmonic	$f_c = 480.1$ MHz	Max Power @ $f_c =$	36.99 dBm
$2 * f_c$	960.2	No emissions were detected that had a level greater than 20dB below the limit.	
$3 * f_c$	1440.3		
$4 * f_c$	1920.4		
$5 * f_c$	2400.5		
$6 * f_c$	2880.6		
$7 * f_c$	3360.7		
$8 * f_c$	3840.8		
$9 * f_c$	4320.9		
$10 * f_c$	4801		
UNCERTAINTY (dB)			

LIMIT CLAUSE:

FCC 47 Part 90.210

FCC Bandwidth Type	Frequency Range MHz	Audio Bandwidth KHz	Power versus Frequency Mask	
			Frequency Limitation	Power Level
D(3)	< 947	11.25(NB)	$f_c \pm 12.5$ KHz < f	-20 dBm

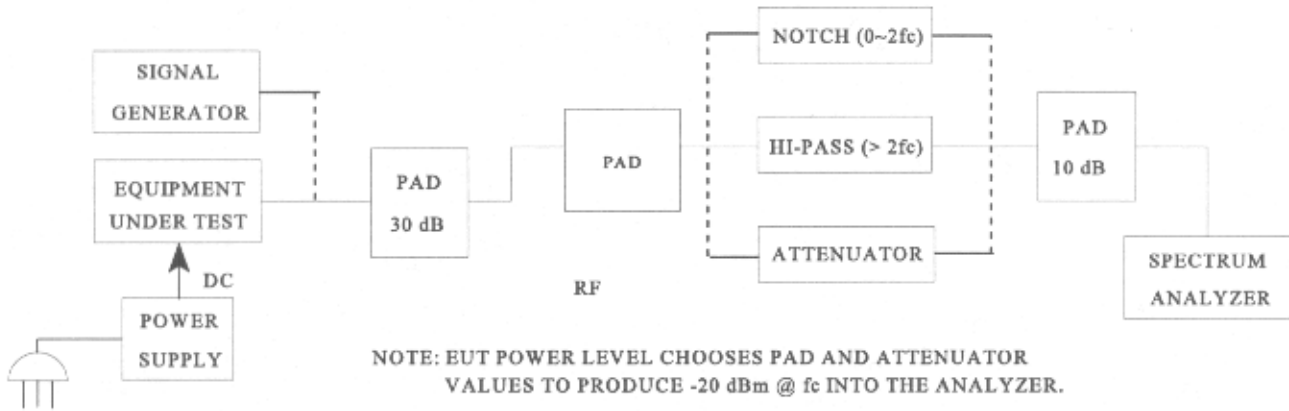
REMARKS: No emissions were detected that had a level greater than 20dB below the limit.

**TRANSMITTER SPURIOUS EMISSIONS (CONDUCTED) Cont.
HIGH POWER**

FCC 47 Part 2.991

TEST EQUIPMENT USED: 4, 5, 9, 11, 12, 16

TEST SET-UP: TX CONDUCTED



**TRANSMITTER SPURIOUS EMISSIONS (RADIATED)
HIGH POWER**

FCC 47 Part 2.993

TEST PARAMETERS	
AMBIENT TEMPERATURE (°C)	22.5
RELATIVE HUMIDITY (%)	44
RF POWER LEVEL (Watts)	25 W
STANDARD VOLTAGE (Volts)	13.8 V DC

RESULTS:

FREQUENCY OF SPURIOUS EMISSION (MHz)		SPURIOUS EMISSION LEVEL (dBm)	
Harmonic	$f_c = 480.1$ MHz	Max power @ $f_c =$	43.98 dBm
2 * f_c	960.2		
3 * f_c	1440.3		-35.97
4 * f_c	1920.4		-26.97
5 * f_c	2400.5	No emissions were detected that had a level greater than 20dB below the limit.	
6 * f_c	2880.6		
7 * f_c	3360.7		-37.02
8 * f_c	3840.8		-39.05
9 * f_c	4320.9	No emissions were detected that had a level greater than 20dB below the limit.	
10 * f_c	4801		
UNCERTAINTY (dB)		±	

LIMIT CLAUSE: FCC 47 Part 90.210

FCC Bandwidth Type	Frequency Range MHz	Audio Bandwidth KHz	Power versus Frequency Mask	
			Frequency Limitation	Power Level
D(3)	< 947	11.25(NB)	$f_c \pm 12.5$ KHz < f	-20 dBm

REMARKS: No other emissions were detected that had a level greater than 20dB below the limit.

**TRANSMITTER SPURIOUS EMISSIONS (RADIATED)
LOW POWER**

FCC 47 Part 2.993

TEST PARAMETERS	
AMBIENT TEMPERATURE (°C)	22.5
RELATIVE HUMIDITY (%)	44
RF POWER LEVEL (Watts)	5 W
STANDARD VOLTAGE (Volts)	13.8 V DC

RESULTS:

FREQUENCY OF SPURIOUS EMISSION (MHz)		SPURIOUS EMISSION LEVEL (dBm)
Harmonic	$f_c = 480.1$ MHz	Max power @ $f_c = 36.99$ dBm
$2 * f_c$	960.2	No emissions were detected that had a level greater than 20dB below the limit.
$3 * f_c$	1440.3	
$4 * f_c$	1920.4	-29.68
$5 * f_c$	2400.5	No emissions were detected that had a level greater than 20dB below the limit.
$6 * f_c$	2880.6	
$7 * f_c$	3360.7	-32.66
$8 * f_c$	3840.8	No emissions were detected that had a level greater than 20dB below the limit.
$9 * f_c$	4320.9	
$10 * f_c$	4801	
UNCERTAINTY (dB)		±

LIMIT CLAUSE: FCC 47 Part 90.210

FCC Bandwidth Type	Frequency Range MHz	Audio Bandwidth KHz	Power versus Frequency Mask	
			Frequency Limitation	Power Level
D(3)	< 947	11.25 (NB)	$f_c \pm 12.5$ KHz < f	-20 dBm

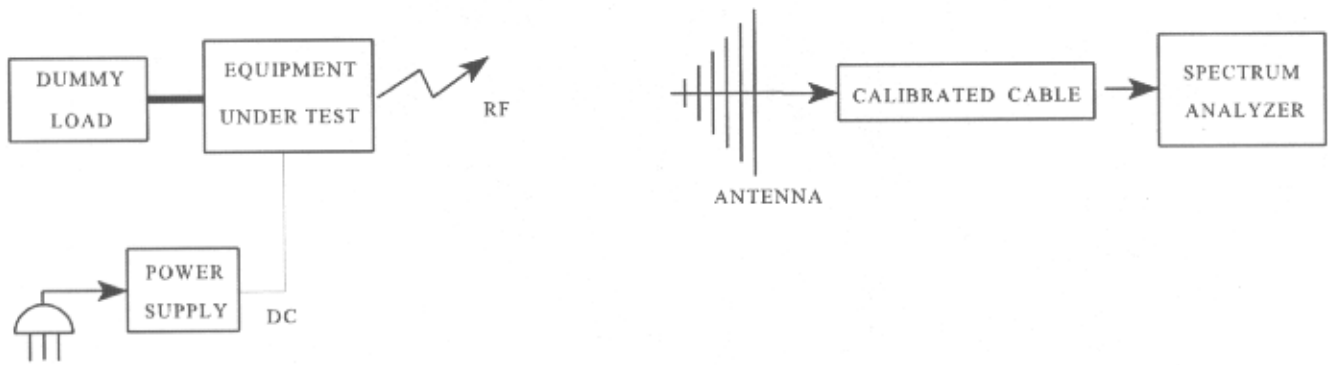
REMARKS: No other emissions were detected that had a level greater than 20dB below the limit.

TRANSMITTER SPURIOUS EMISSIONS (RADIATED)

FCC 47 Part 2.993

TEST EQUIPMENT USED: 4 , 5 , 9 , 11 , 20 , 24 , 25 , 26

TEST SET-UP: TX RADIATED



TRANSMITTER FREQUENCY STABILITY

FCC 47 Part 2.995

TEST PARAMETERS	
RF POWER LEVEL (Watts)	25
STANDARD VOLTAGE (Volts)	13.8

RESULTS:

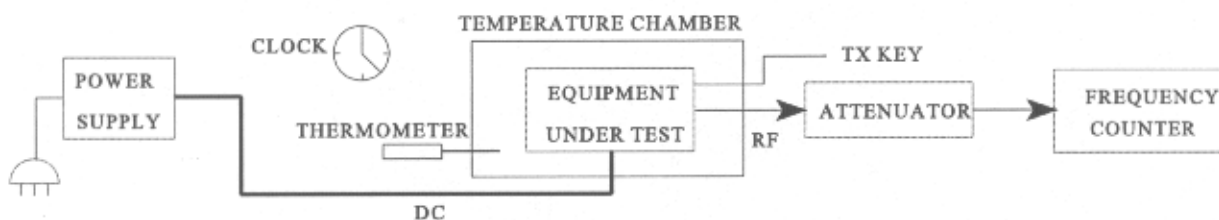
FREQUENCY 480.1	FREQUENCY ERROR (ppm)		
	10.8	13.8	15.6
CHAMBER TEMP			
-30.0 °C	0.204	0.166	0.254
-20.0 °C	1.035	1.014	1.060
-10.0 °C	1.310	1.306	1.310
+00.0 °C	1.322	1.337	1.306
+10.0 °C	1.056	1.075	1.027
+20.0 °C	0.462	0.496	0.435
+30.0 °C	-0.475	-0.442	-0.513
+40.0 °C	-1.246	-1.212	-1.273
+50.0 °C	-1.885	-1.852	-1.896
Measurement Uncertainty (Hz)	± 21.4		

LIMIT CLAUSE: FCC 47 Part 90.213

CHANNEL SPACING	Frequency Band (Mhz) Error Limit (ppm)	
	150 - 174	421 - 512
25KHz	5.0	5.0
12.5KHz	5.0	2.5

TEST EQUIPMENT USED: 2 , 4 , 5 , 6 , 15

TEST SET-UP: FREQUENCY STABILITY



TEST EQUIPMENT CALIBRATION STATUS

To facilitate inclusion on each page, the test equipment used is identified (numbered) and listed against the related test in the report.

No	Equipment Type	Model number	Serial Number	Cal Due	
1	Signal Generator	HP 8642B (Opt 001)	2512A00176	10/01/97	
2	Signal Generator	HP8648A	3430U00344	26/03/97	
3	Signal Generator	HP 8656A	2142A02103	16/01/97	
4	Modulation Analyser	HP 8901B (Opt 002)	2441A00393	10/01/97	
5	Audio Analyser	HP 8903A	2308A02597	08/01/97	
6	Power Supply	HP 6032A	2441A-0041	10/01/97	
7	Controller	HP 9836	2143A00703	N/A	
8	Environmental Chamber	Contherm	E3397	17/02/97	
9	Mixer	Minicircuits ZAD-11	77008	N/A	
10	4 Port Combiner	Rhode & Schwarz	300971/28	28/05/97	
11	Spectrum Analyser	HP8596E (Opt 140)	3346A00213	09/01/97	
12	Filter Notch	Tait	445-500	E3543	Before Use
13	Filter High Pass	Tait	800Mhz	E3384	30/11/97
14	Filter Low Pass	Tait	Mhz		30/11/97
15	Attenuator	Weinschell 45-30-34	JW663		31/01/97
16	Attenuator	Weinschell 40-20-33	CJ404		31/01/97
17	Attenuator	Weinschell 24-10-34	AM3603		31/01/97
18	Plotter	HP 7440A	2539A53151		N/A
19	Oscilloscope	Tektronics TDS 340	B013611		30/05/97
20	4 Port Combiner	Rhode & Schwarz	300729/47		28/06/97
21					
22	Mixer	Minicircuits ZAD-11	77031		N/A
23	Directional Coupler	HP778D-012	1144A07392		31/01/97
24	Filter 21.4MHz	Tait	3249		
25	RF Attenuators	JFW 50P-076			31/01/97
26	RF Attenuators	JFW 50P-077			31/01/97

27	RF Filters	NDK 21G-6DT		
28	RF Amplifier	Tait		
29	Antenna	Emco 3102	2572	
30	Antenna	Biconical	9307-1680	
31	Antenna	Singer 93490-1	523	
32	Antenna	Emco DRG 3115	2084	
33	Antenna	Ailtech DM 105A-T2	J1417-103	
34	Antenna	Ailtech DM 105A-T3	J1418-108	
35	RF Load	Weinschel F1426	AE2490	31/01/97
36	Power Supply	Tait T348/16	198120	Cal on use
37	Power Supply	Tait T348	119093	Cal on use

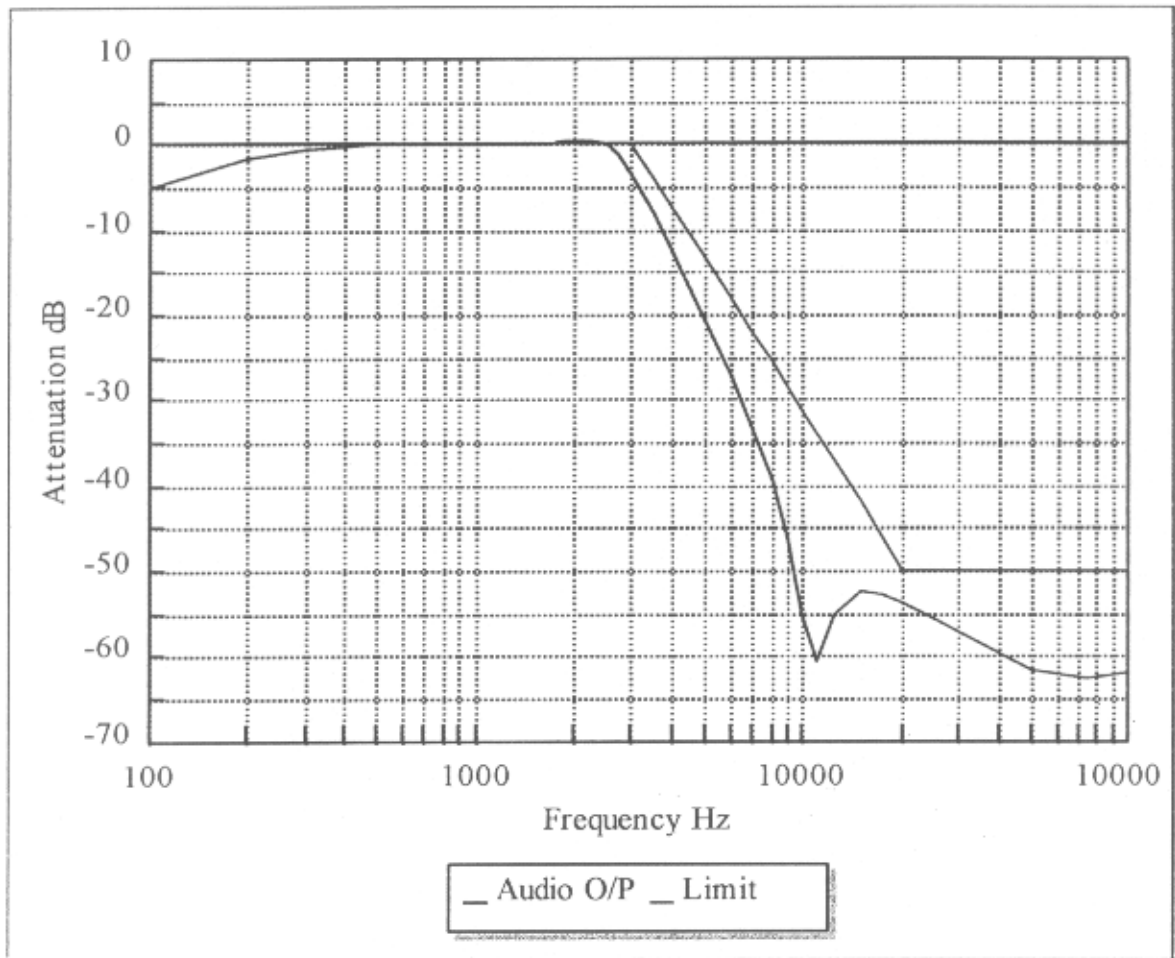
PLOTS FOR
TELTEST REPORT

1100

LOW PASS FILTER RESPONSE

FCC 47 Parts 22 & 90 Part 2.987

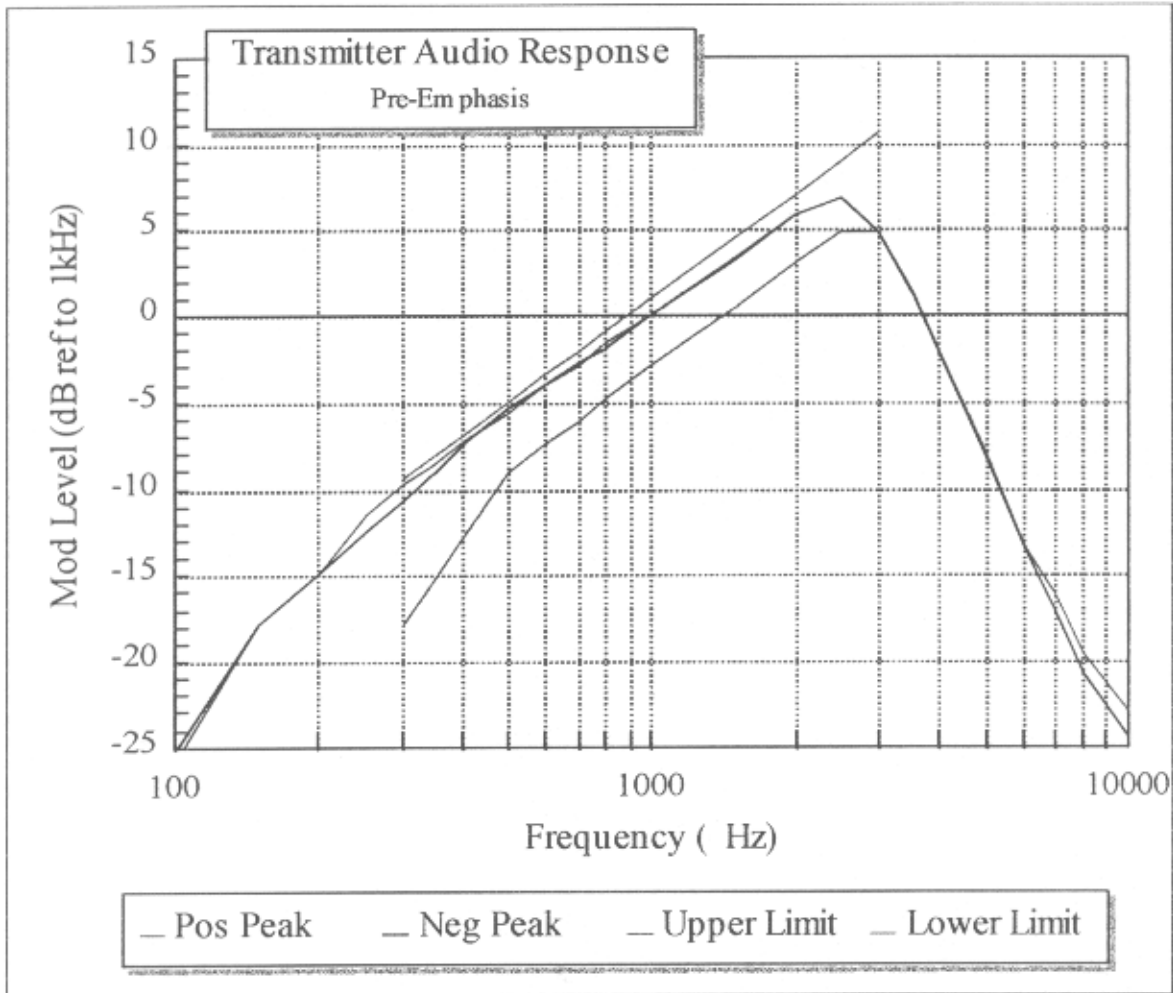
CHANNEL 480.1	25 WATTS
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**AUDIO RESPONSE
PRE-EMPHASIS**

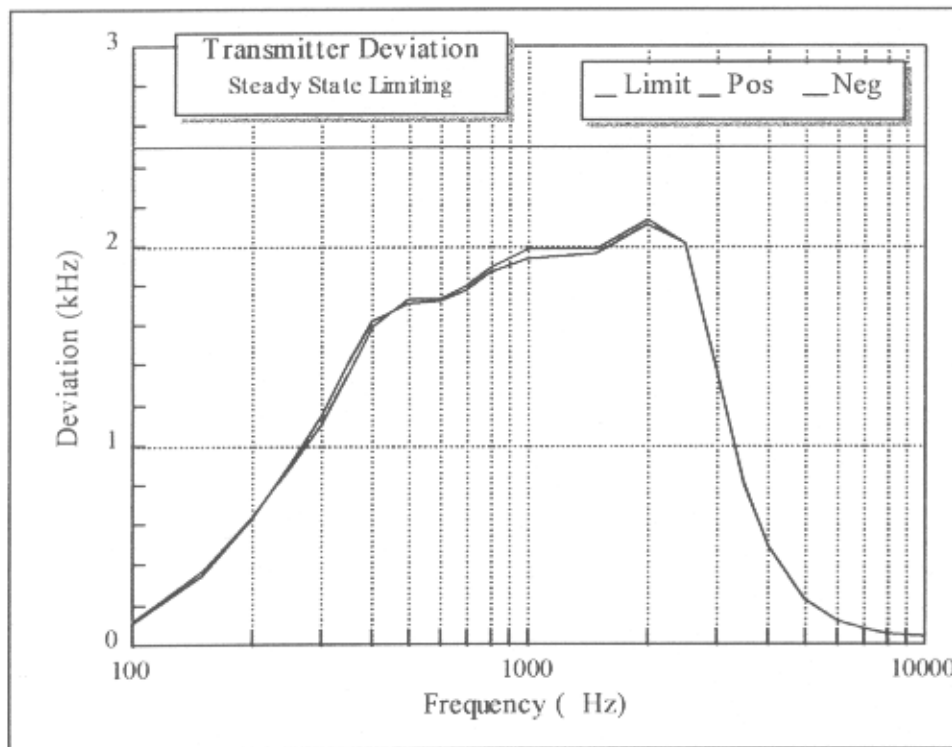
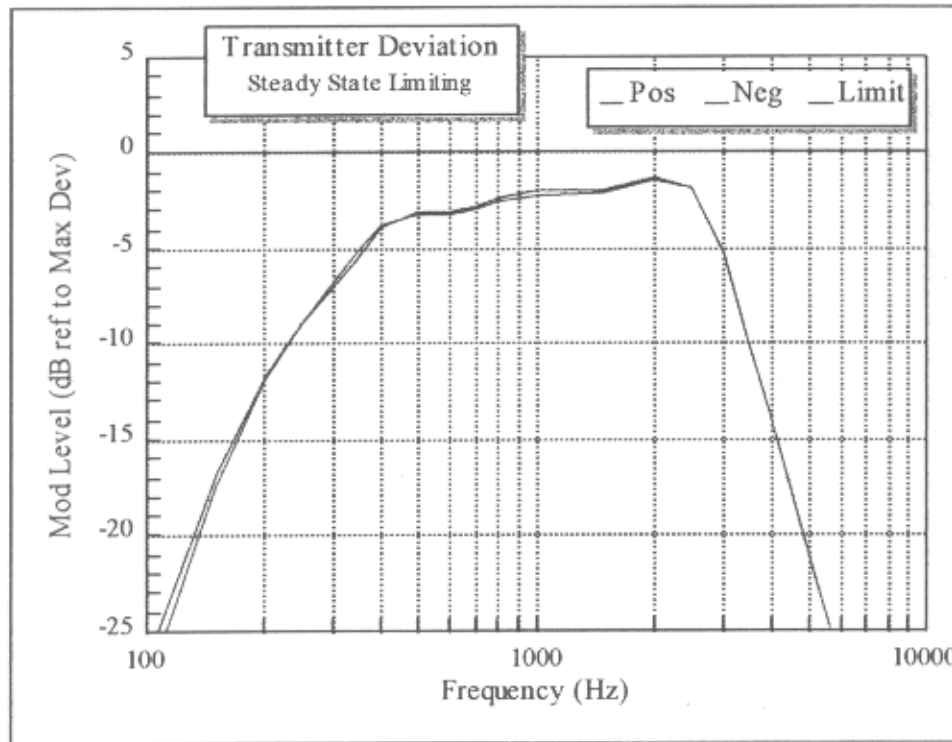
FCC 47 Parts 22 & 90 Part 2.987

CHANNEL 480.1	25 WATTS
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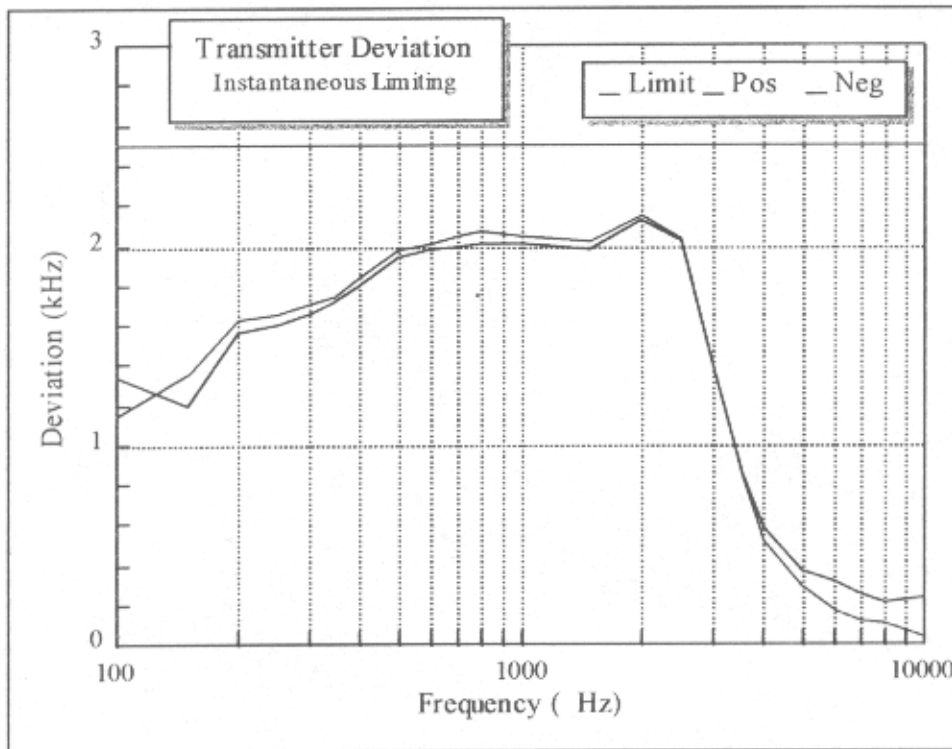
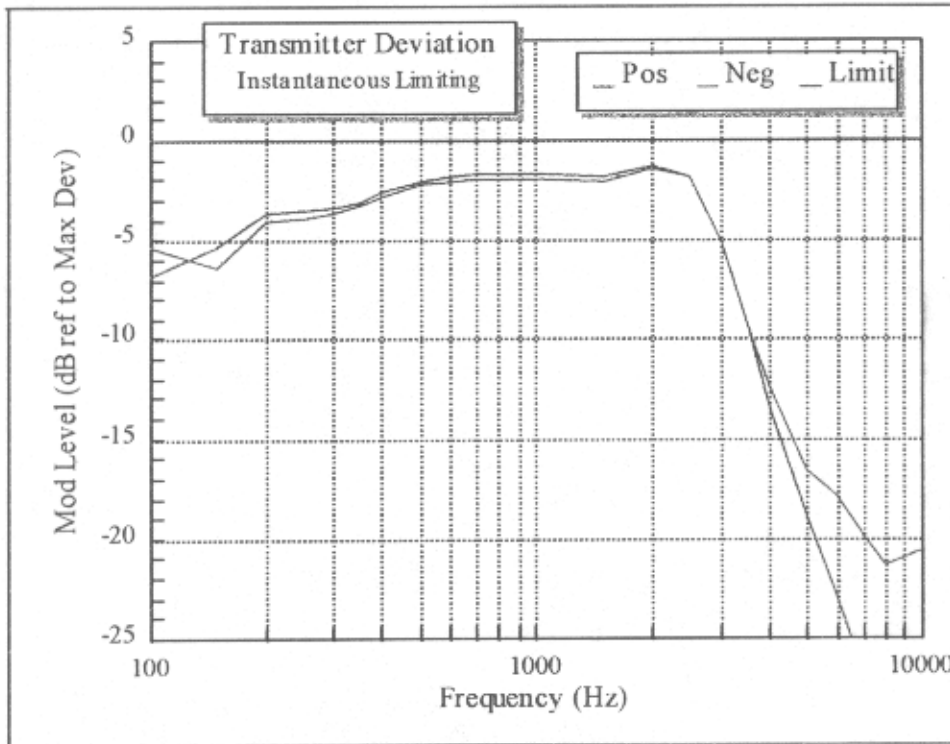
AUDIO RESPONSE
STEADY STATE LIMITING

CHANNEL 480.1	25 WATTS
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**AUDIO RESPONSE
INSTANTANEOUS LIMITING**

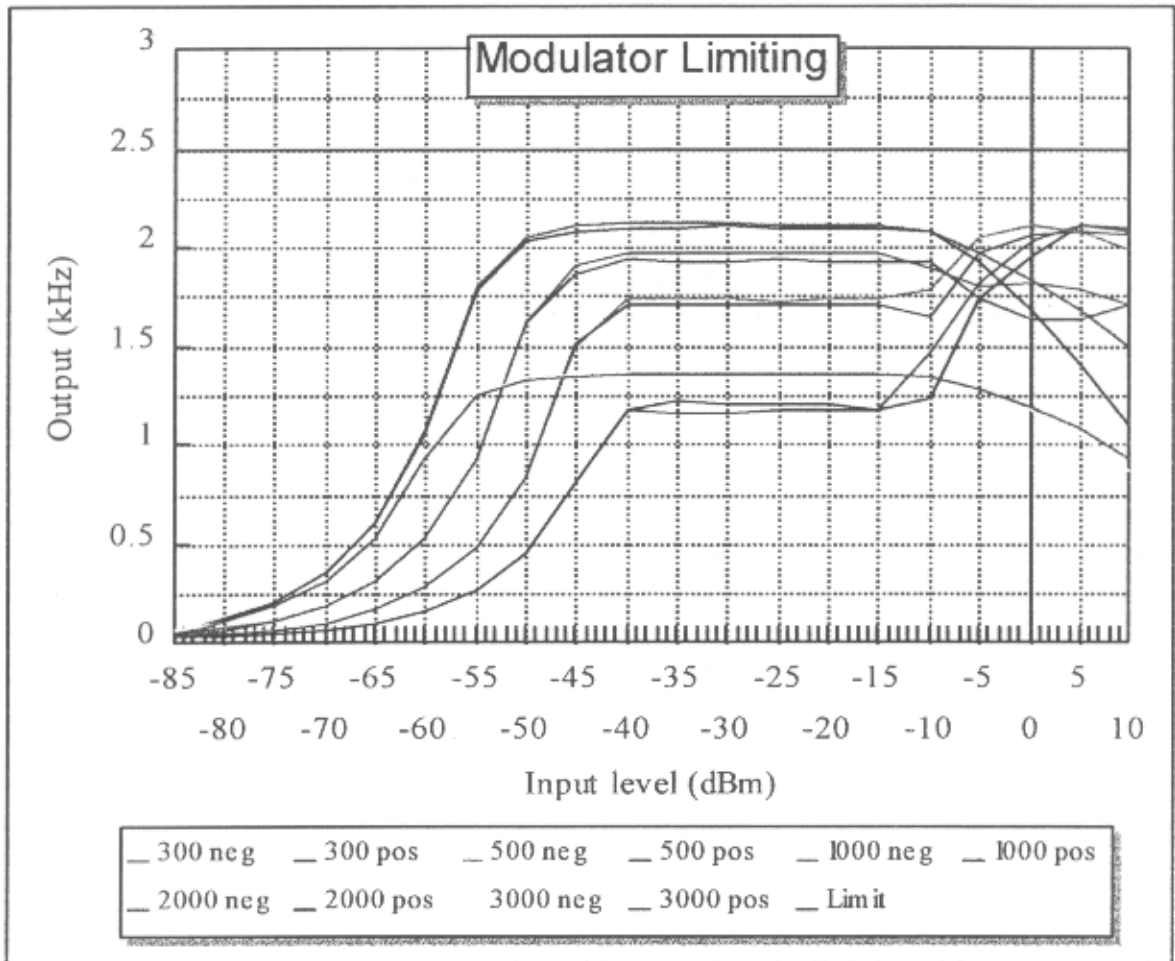
CHANNEL 480.1	25 WATTS
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MODULATOR LIMITING RESPONSE

FCC 47 Parts 22 & 90 Part 2.987

CHANNEL 480.1	25 WATTS
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OCCUPIED BANDWIDTH: AUDIO MODULATION (F3E)

FCC 47 Parts 22 & 90 Part 2.989

CHANNEL 480.1	25 WATTS
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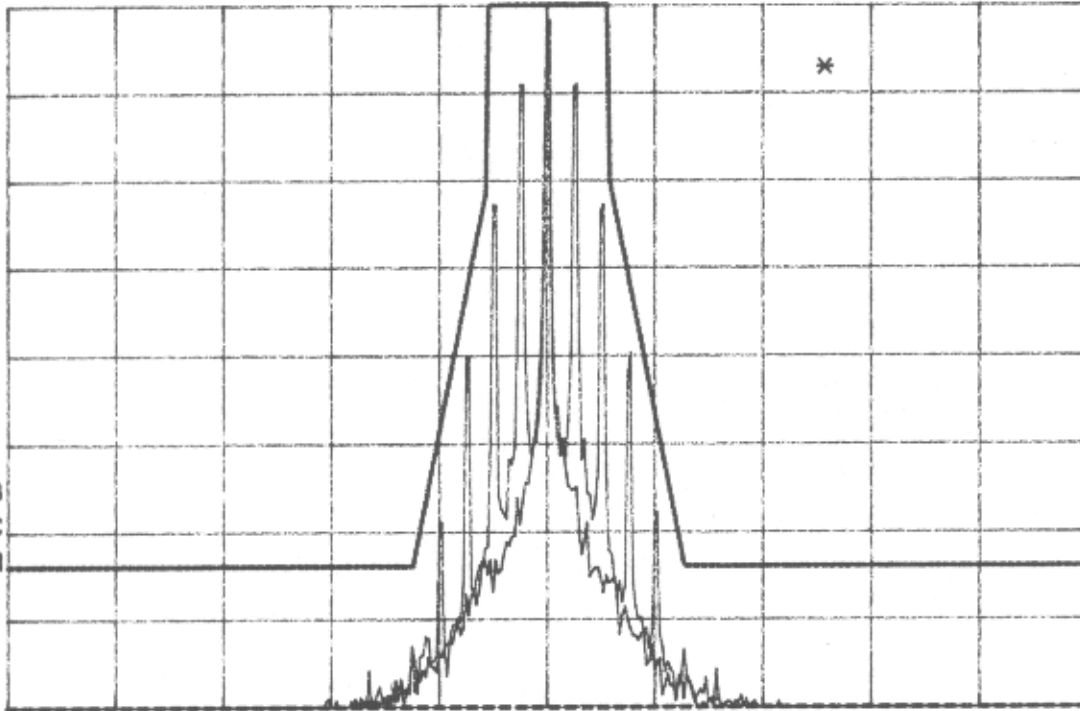
13:32:33 NOV 22, 1996

REF -16.0 dBm #AT 0 dB

PEAK
LOG
10
dB/

SPECTRUM
ANALYZER

VA VB
SC FC
CORR



More
1 of 3

CENTER 480.0993 MHz
#RES BW 100 Hz

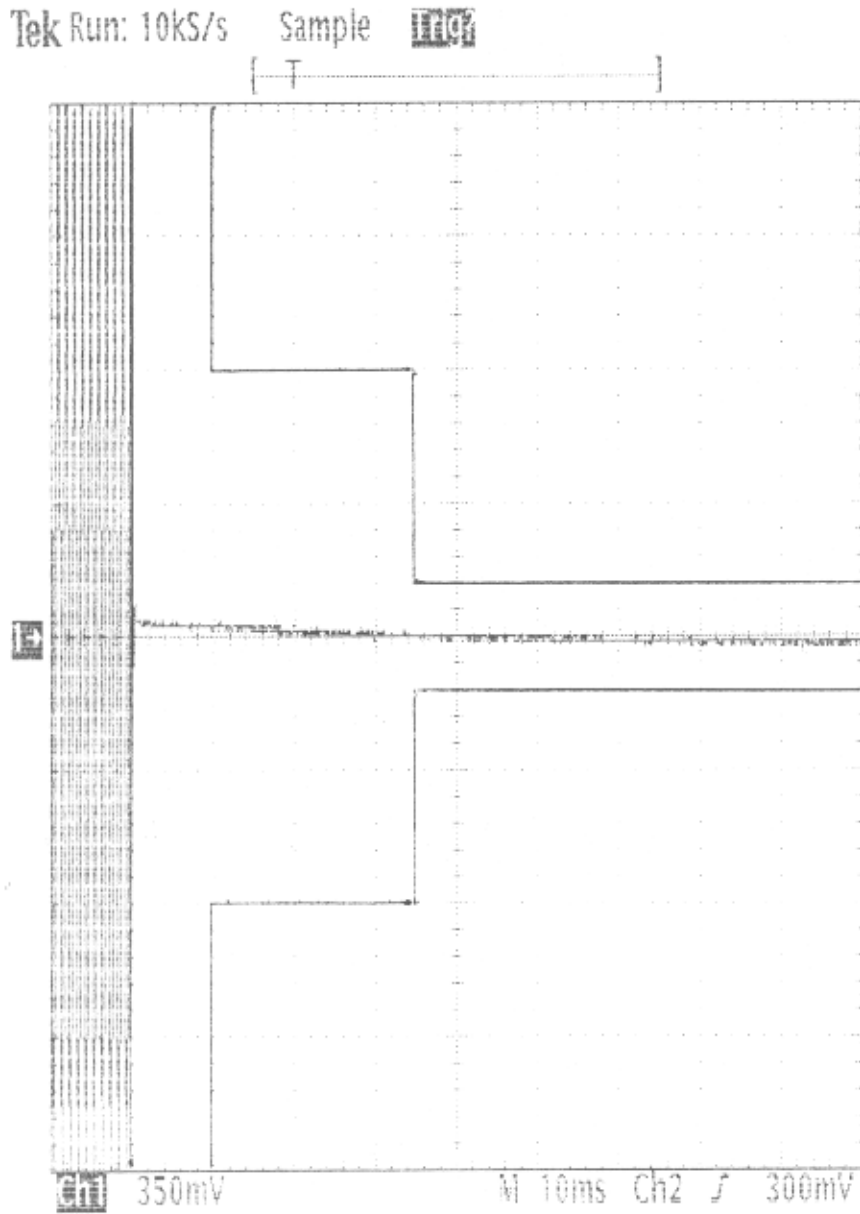
VBW 100 Hz

SPAN 100.0 kHz
SWP 30.0 sec

TRANSIENT FREQUENCY PERFORMANCE

FCC 47 Part 90 Para 214

FREQUENCY: 480.1MHz		POWER: 25 Watts		KEY:	ON
Deviation	12.5	Vertical Scale	3.125 kHz per div		

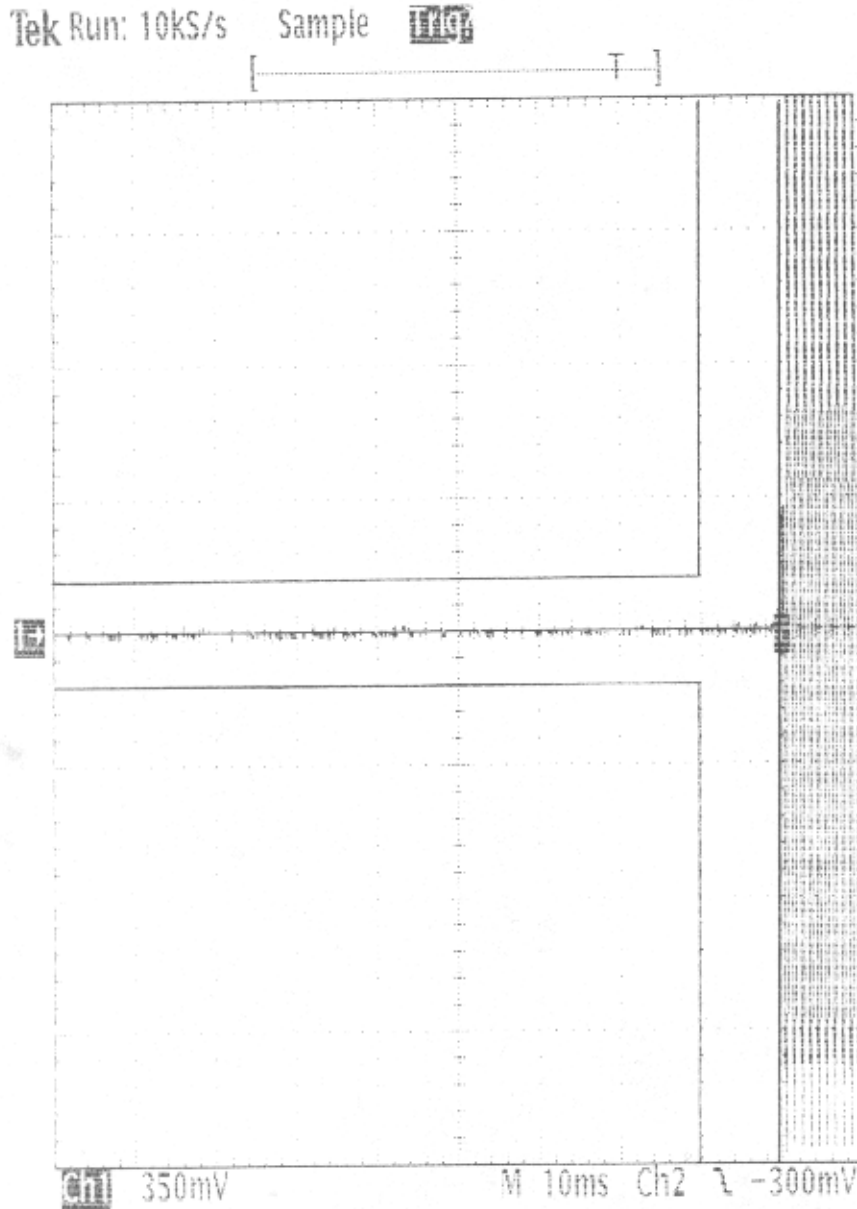


25 Nov 1996
09:12:32

TRANSIENT FREQUENCY PERFORMANCE

FCC 47 Part 90 Para 214

FREQUENCY: 480.1MHz		POWER: 25 Watts		KEY:	OFF
Deviation	12.5	Vertical Scale	3.125 kHz per div		

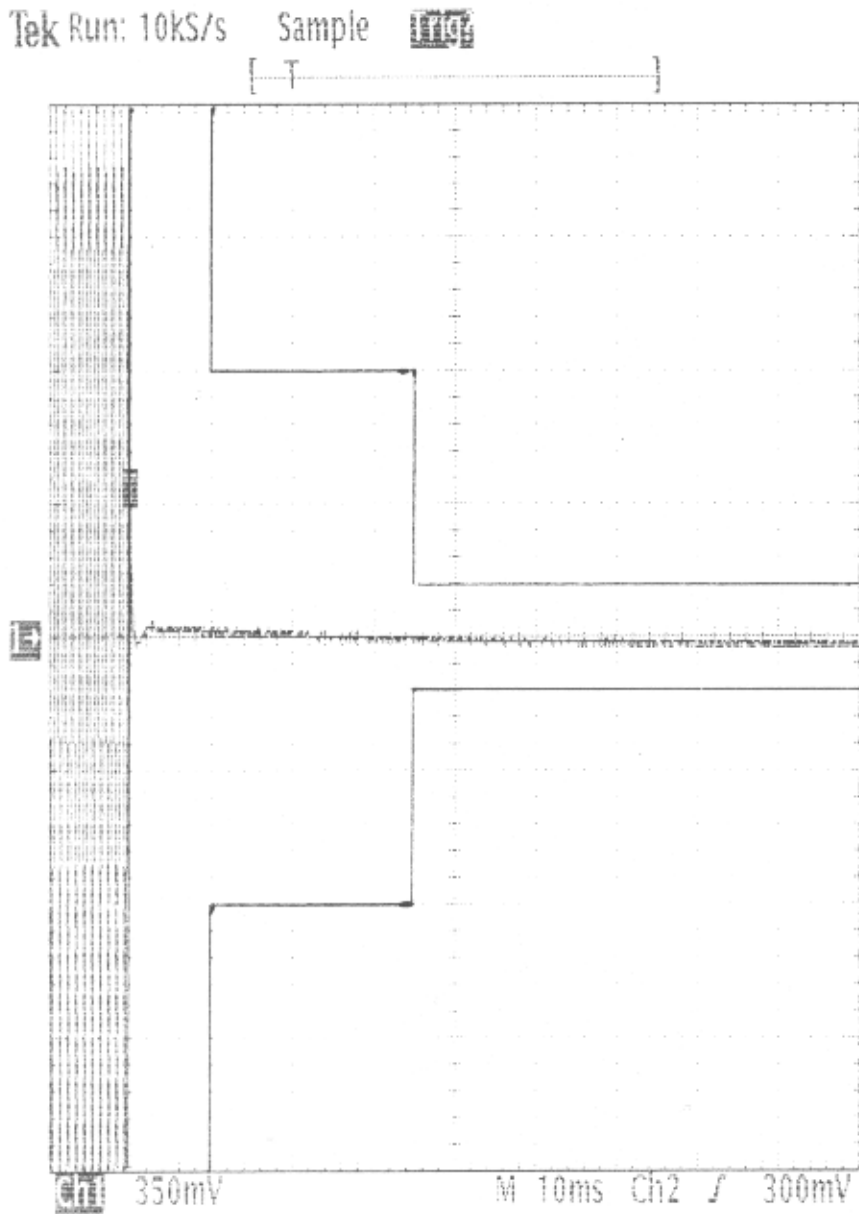


25 Nov 1996
09:51:26

TRANSIENT FREQUENCY PERFORMANCE

FCC 47 Part 90 Para 214

FREQUENCY: 480.1MHz		POWER: 5 Watts		KEY:	ON
Deviation	12.5	Vertical Scale	3.125 kHz per div		

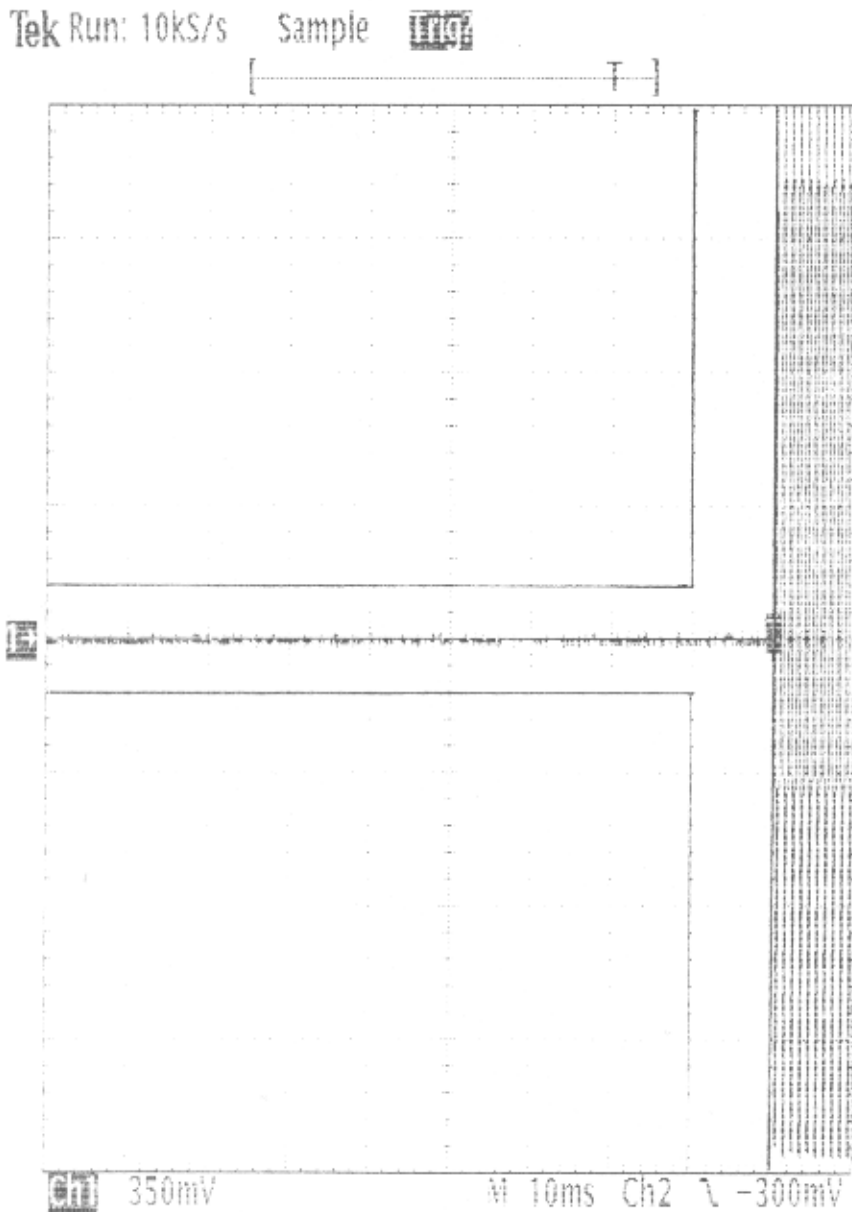


25 Nov 1996
09:57:53

TRANSIENT FREQUENCY PERFORMANCE

FCC 47 Part 90 Para 214

FREQUENCY: 480.1MHz		POWER: 5 Watts		KEY:	OFF
Deviation	12.5	Vertical Scale	3.125 kHz per div		



25 Nov 1996
10:01:35