TEST DATA OF JMA-3807

Type	JMA-3807	Ser.No. LE59420
Scanner Unit	NKE-1062	Ser.No. LE39420
Display Unit	NCD-3860	Ser.No. LE29420
Ship's Main	DC24V	

Date MAR.20.1998

Section Chief M. Suzuki

Inspector K. Gyasa

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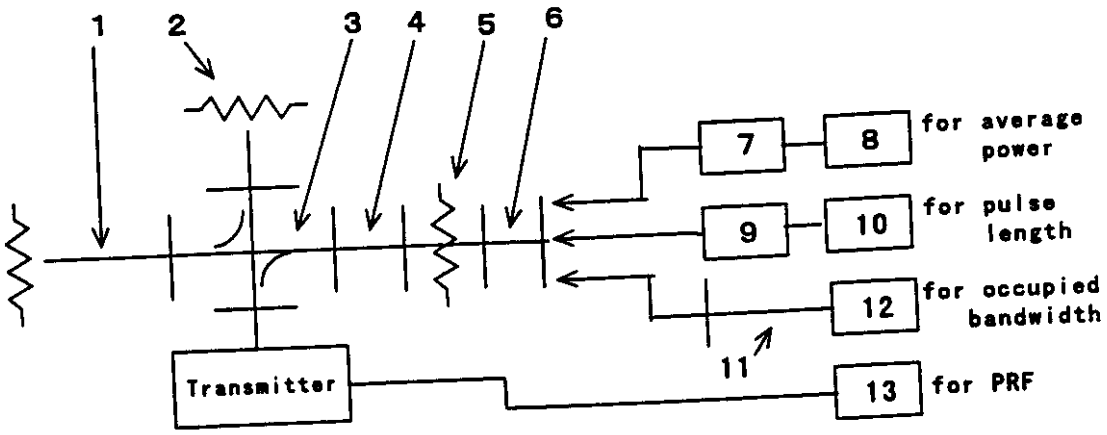
TEST INSTRUMENTATION LIST



1	Dummy Load	X910B	HP
2	high power Dummy Load	4D371A	Shimada
3	Directional Coupler	5D351	Shimada
	Coupling 30 dB		
	Directivity 30 dB		
4	Frequency Meter	X532B	HP
5	Attenuator	X382A	HP
6	Adaptor	X281A	HP
7	Power Sensor	8481A	HP
8	Power Meter	435A	HP
9	Crystal Detector	423B	HP
10	Oscilloscope	465B	SONY / Tectronix
11	Coaxial Cable	MI-04	Takeda Riken
12	Spectrum Analyzer	8592A	Hewlett Packard
13	Frequency Counter	5300A	HP

Measurement Point ; Transmitter Output

CKEJMA3807

THE APPLICANT HAS BEEN CAUTIONED AS TO THE FOLLOWING:

3807 INFORMATION TO USER.

The users manual or instruction manual for an intentional radiator shall caution the user that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

15.27(a) SPECIAL ACCESSORIES.

Equipment marketed to a consumer must be capable of complying with the necessary regulations in the configuration in which the equipment is marketed. Where special accessories, such as shielded cables and/or special connectors are required to enable an unintentional or intentional radiator to comply with the emission limits in this part, the equipment must be marketed with, i.e. shipped and sold with, those special accessories. However, in lieu of shipping or packaging the special accessories with the unintentional or intentional radiator, the responsible party may employ other methods of ensuring that the special accessories are provided to the consumer, without additional charge.

Information detailing any alternative method used to supply the special accessories for a grant of equipment authorization or retained in the verification records, as appropriate. The party responsible for the equipment, as detailed in ¤ 2.909 of this chapter, shall ensure that these special accessories are provided with the equipment. The instruction manual for such devices shall include appropriate instructions on the first page of text concerned with the installation of the device that these special accessories must be used with the device. It is the responsibility of the user to use the needed special accessories supplied with the equipment.

CKEJMA3807

Sub-part 2.983te): TEST AND MEASUREMENT DATA

All tests and measurement data shown were performed in accordance with FCC Rules and Regulations, Volume II; Part 2, Sub-part J, Sections 2.981, 2.983, 2.985, 2.987, 2.989, 2.991, 2.993, 2.995, 2.997, 2.999 and the following individual Parts:

_ 21 - Domestic Public Fixed Radio Services
_ 22 - Public Mobile Services
_ 22 Subpart H - Cellular Radiotelephone Service
_ 22.901(d) - Alternative technologies and auxiliary services
_ 23 - International Fixed Public Radio communication services
_ 24 -Personal Communications Services
74 Subpart H - Low Power Auxiliary Stations
X 80 - Stations in the Maritime Services
_ 80 Subpart E - General Technical Standards
_ 80 Subpart F - Equipment Authorization for Compulsory Ships
_ 80 Subpart K - Private Coast Stations and Marine Utility Stations
_ 80 Subpart S - Compulsory Radiotelephone Installations for Small Passenger Boats
_ 80 Subpart T - Radiotelephone Installation Required for Vessels on the Great Lakes
_ 80 Subpart U - Radiotelephone Installations Required by the Bridge-to-Bridge Act
_ 80 Subpart V - Emergency Position Indicating Radio beacons (EPIRB'S)
_ 80 Subpart W - Global Maritime Distress and Safety System (GMDSS)
_ 80 Subpart X - Voluntary Radio Installations
_ 87 - Aviation Services
_ 90 - Private Land Mobile Radio Services
_ 94 - Private Operational-Fixed Microwave Service
_ 95 Subpart A - General Mobile Radio Service (GMRS)
_ 95 Subpart C - Radio Control (R/C) Radio Service
_ 95 Subpart D - Citizens Band (CB) Radio Service
_ 95 Subpart F - Interactive Video and Data Service (IVDS)

1 Mechanical Tests

Apperrance and Structure

Scanner Unit	Good
Display Unit	Good

2 Electrical Tests

2.1 Working of each operation unit

Scanner Unit	Good
Display Unit	Good
RANGE VOL	Good
SEA VOL	Good
RAIN VOL	Good
GAIN VOL	Good
TUNE VOL	Good
RANGE Switch	Good
EBL/VRM Switch	Good
FEBL Switch	Good
ZOOM Switch	Good
OFFSET Switch	Good
RR/SHM Switch	Good
TM/RM Switch	Good
HDG/MOOD Switch	Good
BRIL Switch	Good
DESIG Switch	Good
M.O.B Switch	Good
WINDOW Switch	Good
GUARD Switch	Good
ACQ/CNL Switch	Good
MENU Switch	Good
ENTER Switch	Good
ST-BY / OFF Switch	Good
X-MIT / OFF Switch	Good
TRACK BALL	Good

2.2 Scanner unit

VSWR	frequency (MHz)	VSWR
	9415	1.35
	9445	1.15
	9475	1.40
Scanner Rotation Speed		24 rpm

2.3 Transmitter

Magnetron Ser. No.		No. SF2B/C0096B
Operating Freqency	(at 0.25 n.m.)	9403 MHz
	(at 3.0 n.m.)	9402 MHz
	(at 6.0 n.m.)	9402 MHz
	(at 48.0 n.m.)	9402 MHz
Peak Output Power	(at 0.25 n.m.)	5.69 KW
	(at 3.0 n.m.)	5.68 KW
	(at 6.0 n.m.)	5.61 KW
	(at 48.0 n.m.)	5.51 KW
Pulse Length	(at 0.25 n.m.)	0.12 μ S
	(at 3.0 n.m.)	0.43 μ S
	(at 6.0 n.m.)	0.86 μ S
	(at 48.0 n.m.)	1.2 0 μ S
Diode limiter Ser. No.		No. B0702A

2.4 Receiver

MIC Frontend Ser. No.	No .D0618A
IF Center Frequency	60 MHz
IF Band Width	20 MHz/ 6 MHz/ 3 MHz

2.5 Display

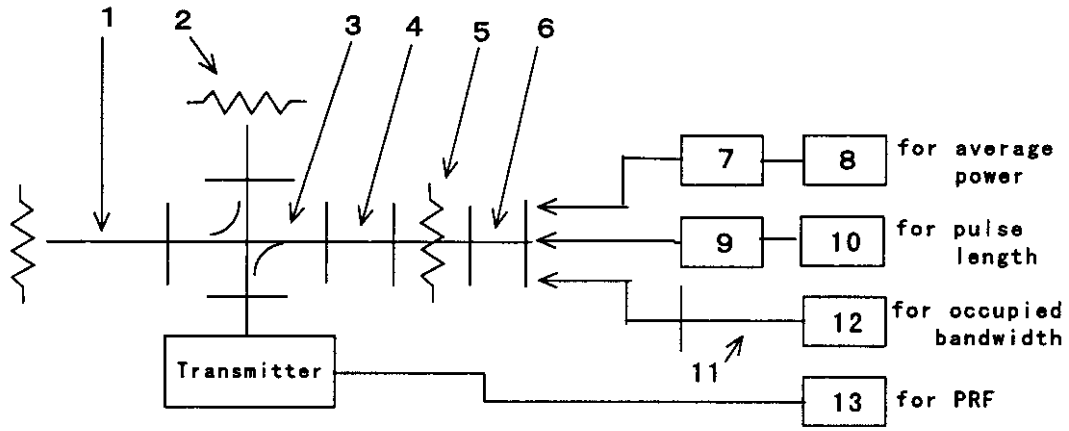
Input Voltage and Current		
	(at 0.25 n.m.)	24V 4.0A
	(at 3.0 n.m.)	24V 4.2A
	(at 6.0 n.m.)	24V 4.2A
	(at 48.0 n.m.)	24V 4.4A
Repetition Frequency		
	(at 0.25 n.m.)	1932 Hz
	(at 3.0 n.m.)	1452 Hz
	(at 6.0 n.m.)	726 Hz
	(at 48.0 n.m.)	484 Hz

3 Overall Tests

Working time of Timer	1 m 30 s
Input Variation (10.8 V dc - 48 V dc)	Good
Overall Sensitivity	Good
Minimum Range	Good
Bearing Accuracy	Good
Mechanical Noise	Good

(Sec.2.985) 1.0 RF Power Output

(Sec.2.989) 2.0 Occupied Bandwidth



1	Dummy Load	X910B	HP
2	high power Dummy Load	4D371A	Shimada
3	Directional Coupler	5D351	Shimada
	Coupling 30 dB		
	Directivity 30 dB		
4	Frequency Meter	X532B	HP
5	Attenuator	X382A	HP
6	Adaptor	X281A	HP
7	Power Sensor	8481A	HP
8	Power Meter	435A	HP
9	Crystal Detector	423B	HP
10	Oscilloscope	465B	SONY ／ Tectronix
11	Coaxial Cable	MI-04	Takeda Riken
12	Spectrum Analyzer	8592A	Hewlett Packard
13	Frequency Counter	5300A	HP

Measurement Point ; Transmitter Output

FCC Submittal Material Data

(Sec.2.985) 1.0 RF Power Output

1.1 Peak Power	(at 0.25 n.m.)	5.69 KW
	(at 3.0 n.m.)	5.68 KW
	(at 6.0 n.m.)	5.61 KW
	(at 48.0 n.m.)	5.51 KW
1.2 Average Power	(at 0.25 n.m.)	1.32 W
	(at 3.0 n.m.)	3.55 W
	(at 6.0 n.m.)	3.50 W
	(at 48.0 n.m.)	3.20 W

1.3 Load Impedance

VSWR 1.05 at 9.4 - 9.5 GHz

Type 4D371A (Shimada co.)

CKEJMA3807

NAME OF TEST: MODULATION CHARACTERISTICS - MODULATION LIMITING

PARAGRAPH: 47 CFR 2.987 (b)

GUIDE:

TEST CONDITIONS: N/A

TEST EQUIPMENT: N/A

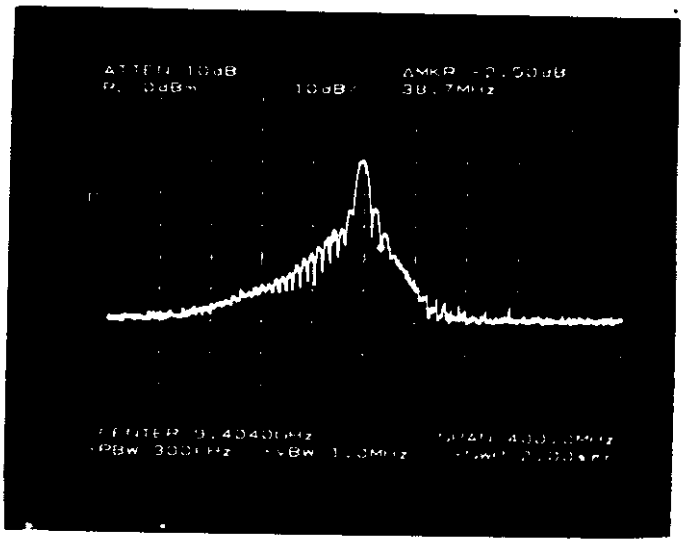
PLEASE SEE SCHMATIC, ATTACHED

(Sec. 2.989) 2.0 Occupid Bandwidth

2.1 Short Pulse PRF 1932 Hz

Short Pulse Length 0.12 μS

Scale
10dB/Div



RF Spectrum
Short Pulse

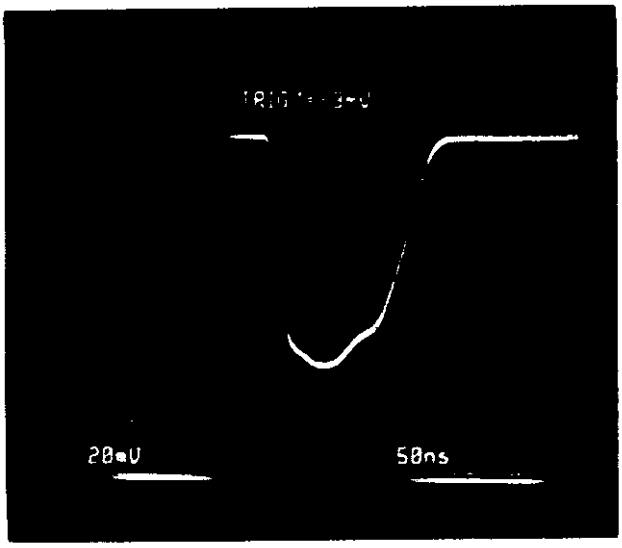
OBW=38.7 MHz

Scale 40 MHz/ Div

Center Frequency 9403 MHz

(Sec. 2.987)

Scale
20mV/Div



← 3dB

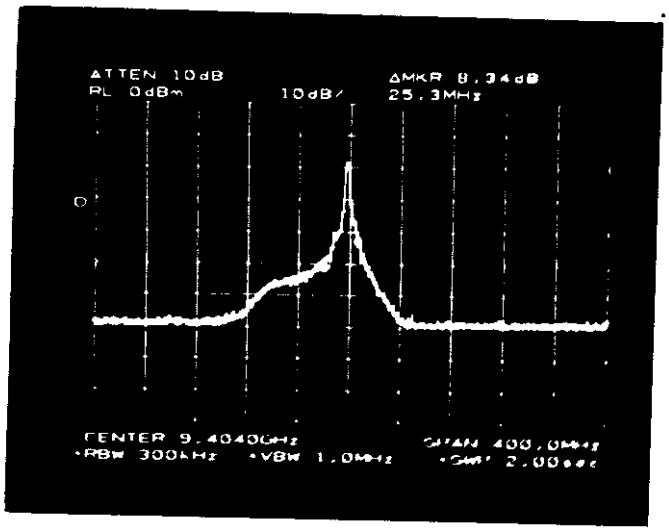
Detected RF
Pulse

Short Pulse

Scale 50nS/Div

(Sec. 2.989) 2.2 ShortMedium Pulse PRF 1452 Hz

ShortMedium Pulse Length 0.43 μS



Scale
10dB/Div

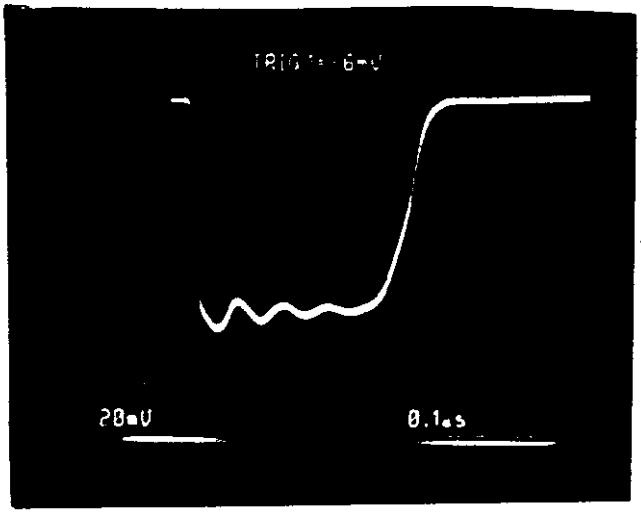
RF Spectrum
ShortMedium Pulse

OBW=25.3 MHz

Scale 40 MHz/ Div

Center Frequency 9402 MHz

(Sec. 2.987)



← 3dB

Scale
20mV/Div

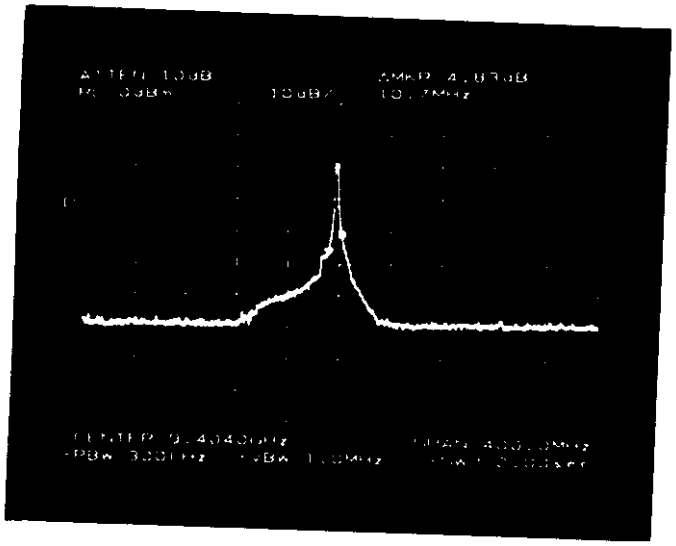
Detected RF
Pulse

ShortMedium Pulse

Scale 100nS/Div

(Sec. 2.989) 2.2 LongMedium Pulse PRF 726 Hz

LongMedium Pulse Length 0.86 μS



Scale
10dB/Div

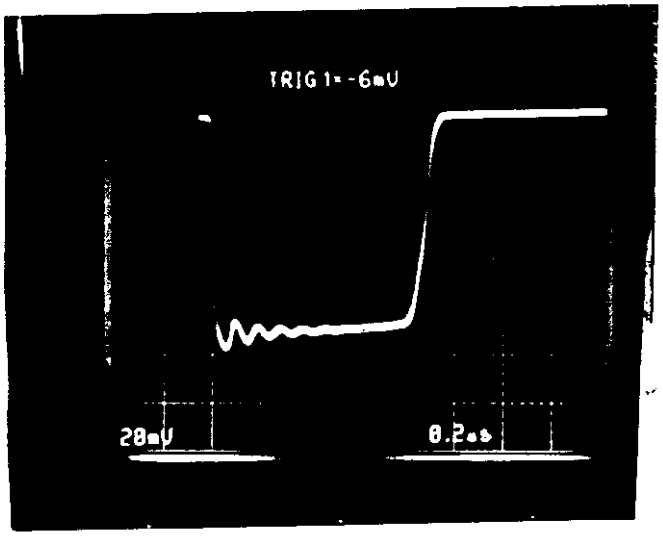
RF Spectrum
LongMedium Pulse

OBW=10.7 MHz

Scale 40 MHz/ Div

Center Frequency 9402 MHz

(Sec. 2.987)



Scale
20mV/Div

←3dB

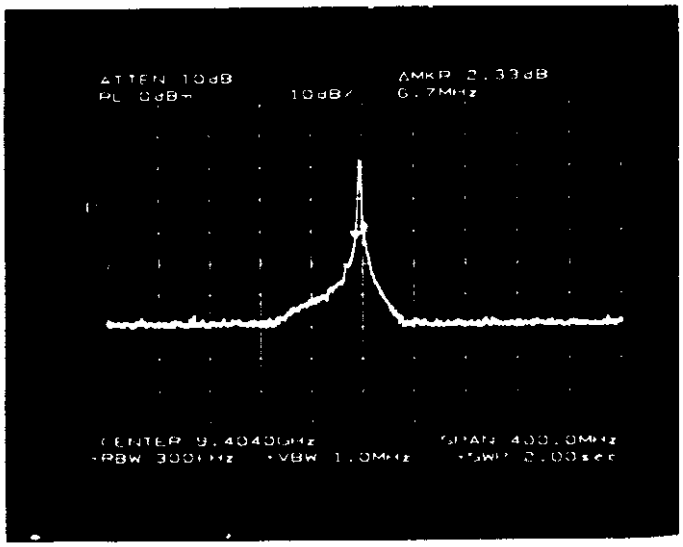
Detected RF
Pulse

LongMedium Pulse

Scale 200nS/Div

(Sec. 2.989) 2.3 Long Pulse PRF 483 Hz

Long Pulse Length 1.2 μS



Scale
10dB/Div

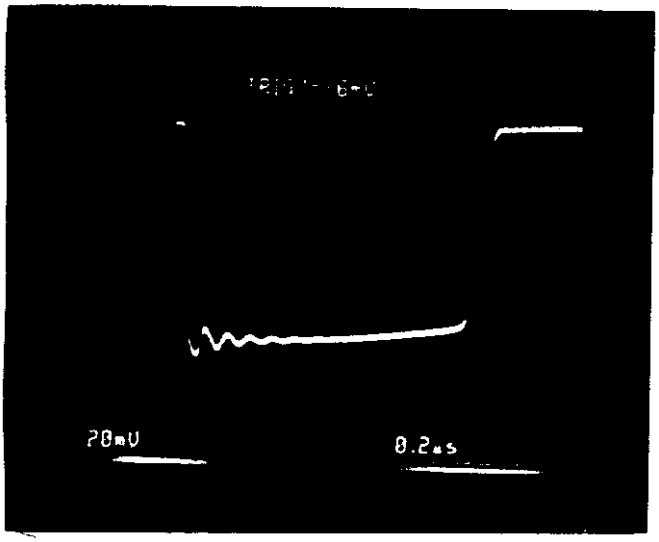
RF Spectrum
Long Pulse

OBW=6.7 MHz

Scale 40 MHz/ Div

Center Frequency 9402 MHz

(Sec. 2.987)



Scale
20mV/Div

← 3dB

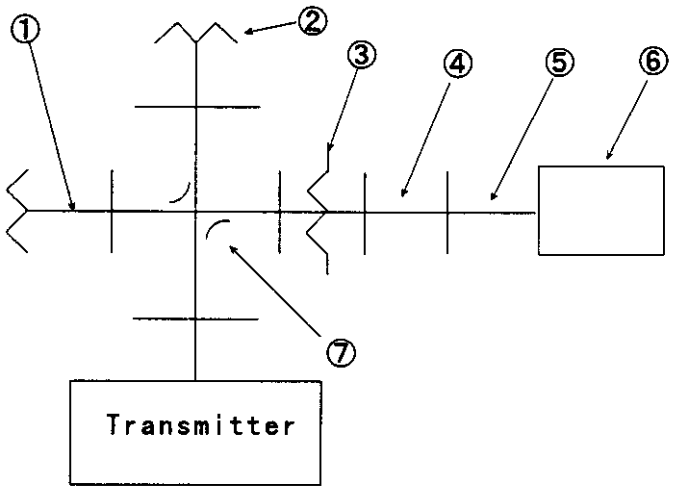
Detected RF
Pulse

Long Pulse

Scale 200 nS/Div

(Sec. 2.991)　　3.0　Sprious signals at antenna port

Condition 1;　0 to 20 GHz

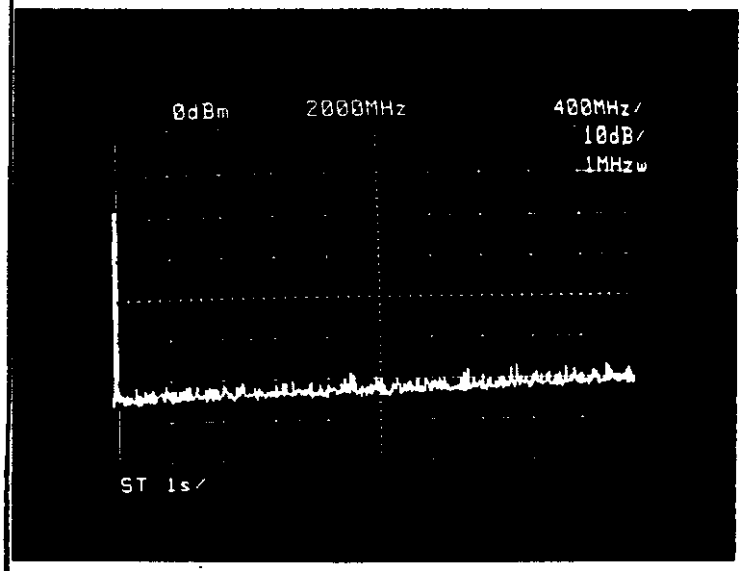


1	Dummy Load	X910B	HP
2	High power Dummy Load	4D371A	Shimada
3	Attenuator	X382A	HP
4	Adaptor	X281A	HP
5	Coaxial Cable	MI-04	Takeda Riken
6	Spectrum Analyzer	TR4133B	Takeda Riken
7	Directional Coupler	R11421	Shimada
	Coupling　30 dB		
	Directivity　30 dB		

★ Attenuation　3　; 25dB

★ Measurement Point;Rotary Joint Output

(Sec. 2.991)

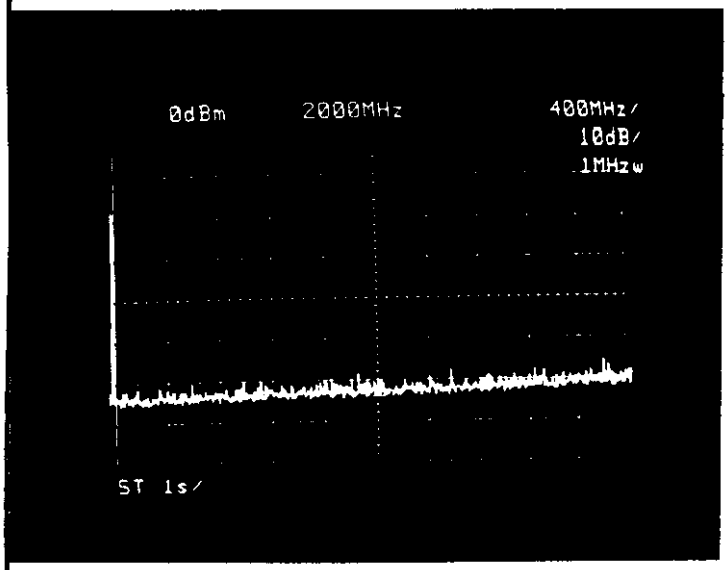


Scale
↑10dB/Div
→400 MHz
/Div

Spurious
Signals

OFF

0 to 3.6 GHz

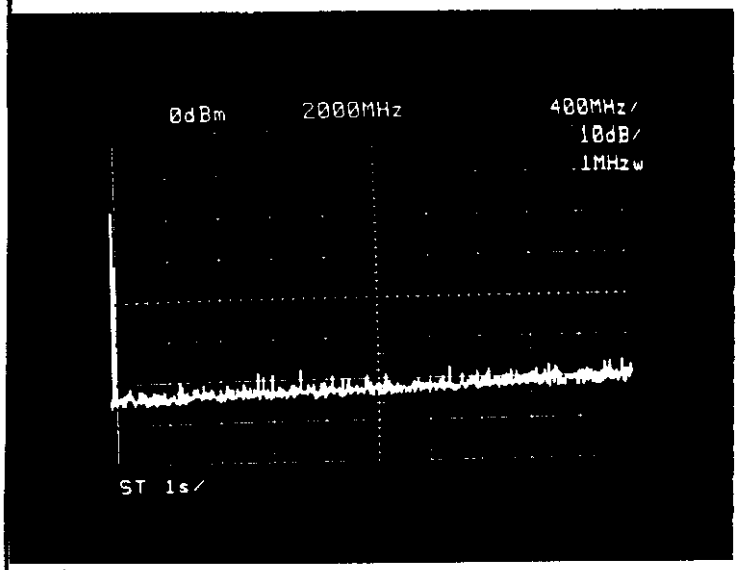


Scale
↑10dB/Div
→400 MHz
/Div

Spurious
Signals

Stand-By

0 to 3.6 GHz



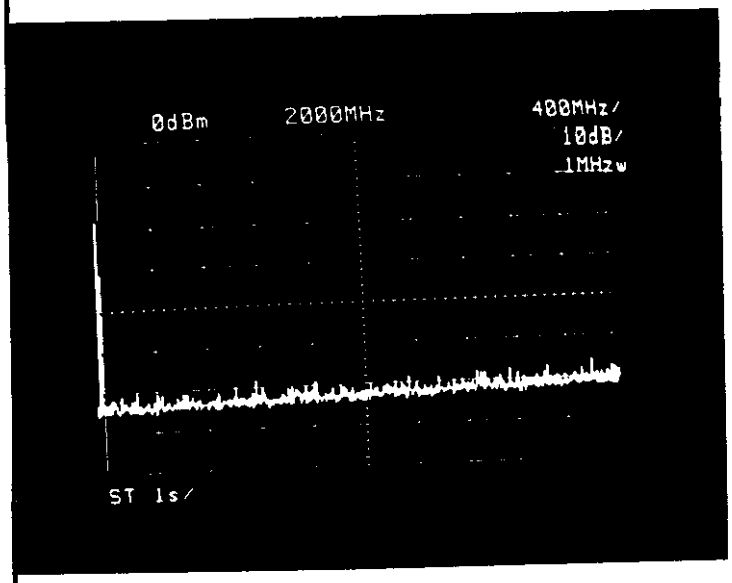
Scale
↑10dB/Div
→400 MHz
/Div

Spurious
Signals

Short Pulse

0 to 3.6 GHz

(Sec. 2.991)



Scale
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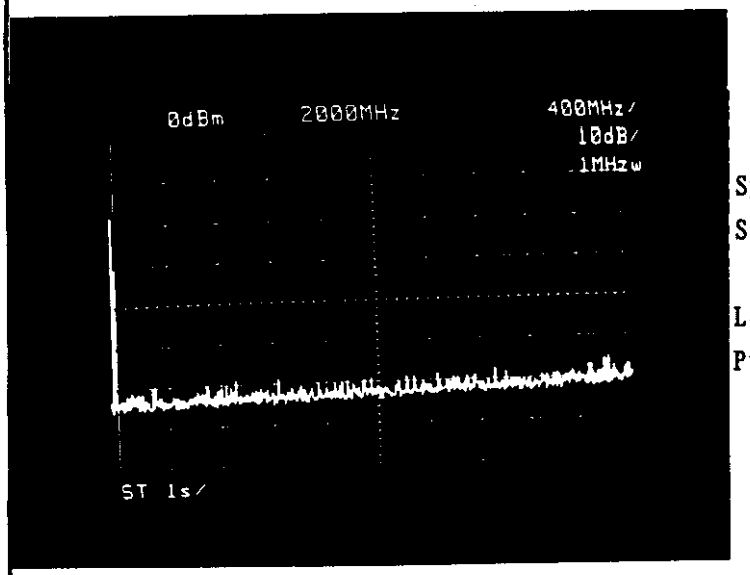
→400 MHz
/Div

Spurious
Signals

Short Medium
Pulse

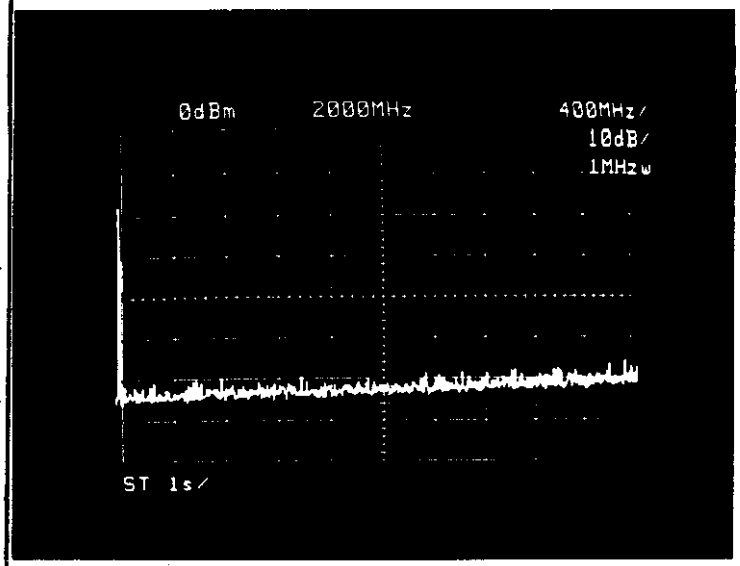
0 to 3.6 GHz



Scale
↑10dB/Div
→400 MHz
/Div

Spurious
Signals

Long Medium
Pulse



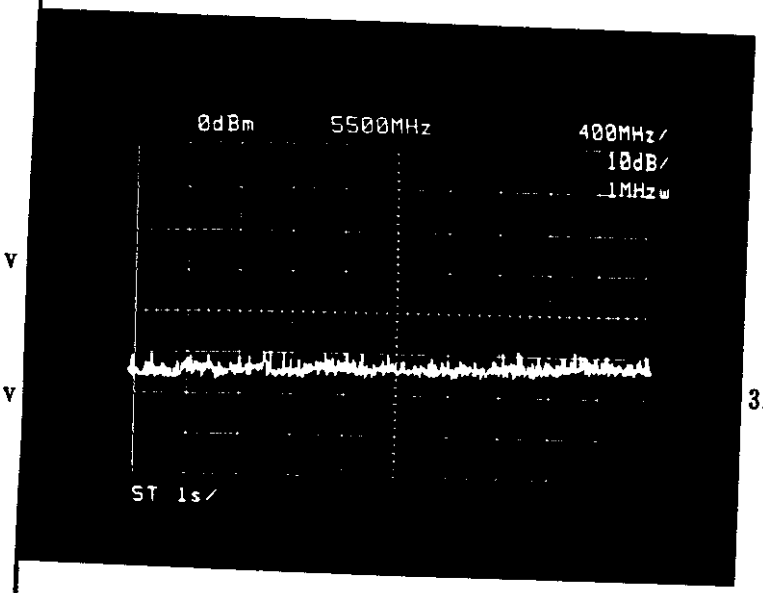
Scale
↑10dB/Div
→400 MHz
/Div

0 to 3.6 GHz
Spurious
Signals

Long Pulse

0 to 3.6 GHz

(Sec. 2.991)

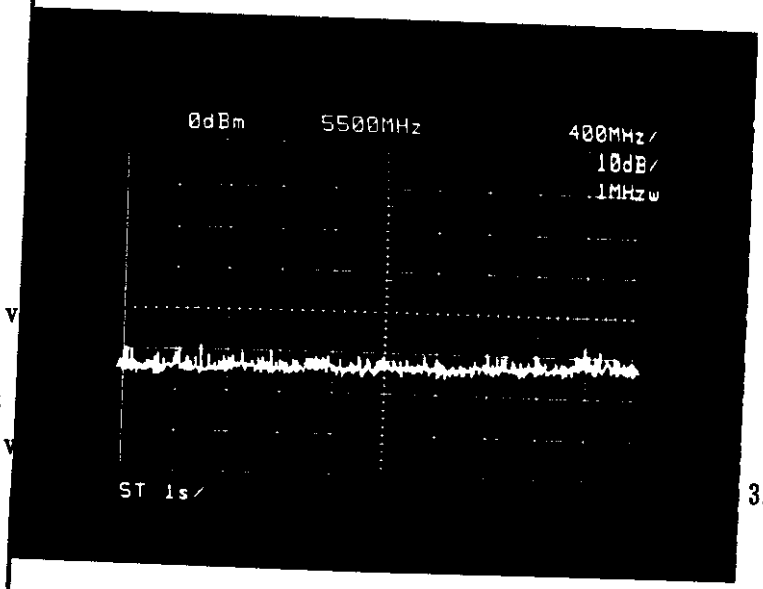


Scale
↑ 10dB/Div
→400 MHz
/Div

Spurious
Signals

OFF

3.5 to 7.5 GHz

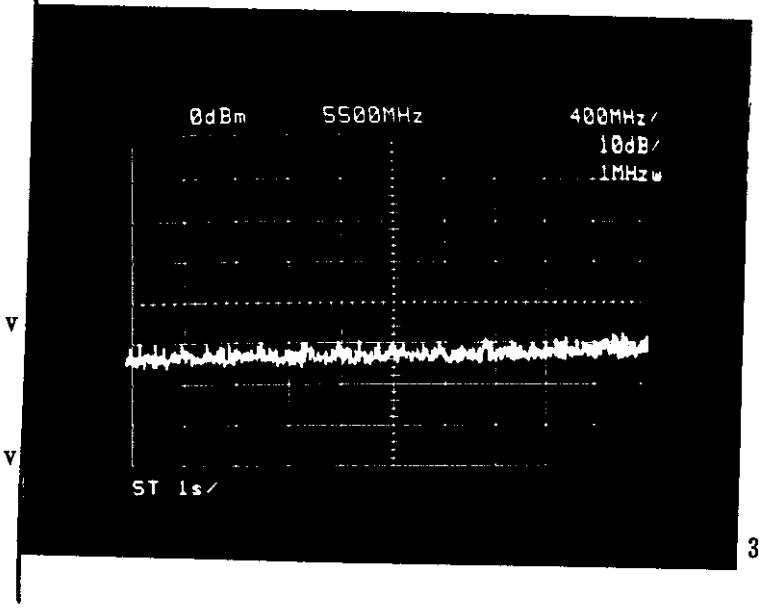


Scale
↑ 10dB/Div
→400 MHz
/Div

Spurious
Signals

Stand-By

3.5 to 7.5 GHz



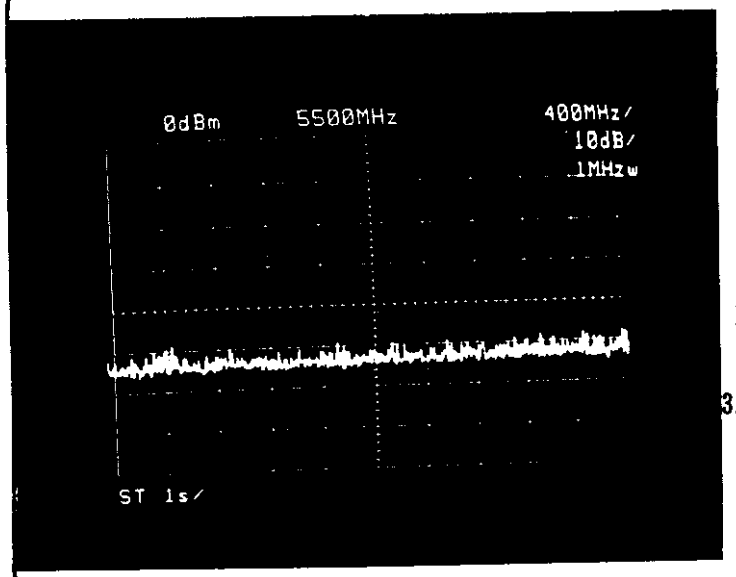
Scale
↑ 10dB/Div
→400 MHz
/Div

Spurious
Signals

Short Pulse

3.5 to 7.5 GHz

(Sec. 2.991)

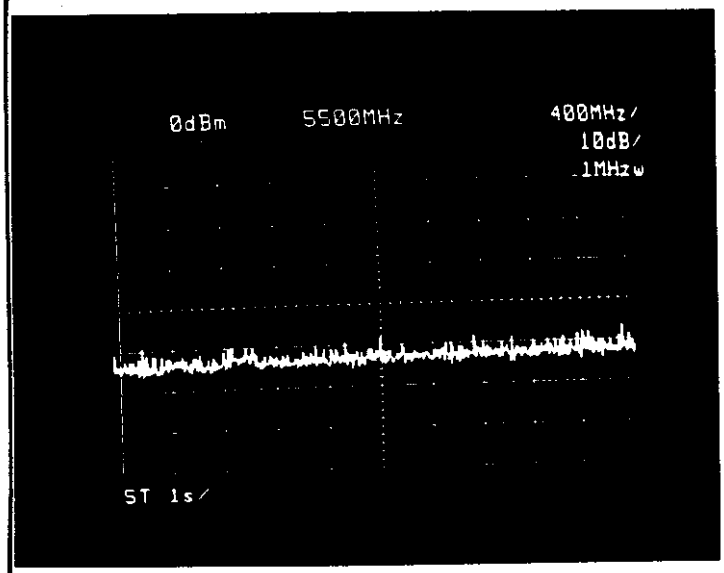


Scale
↑ 10dB/Div
→ 400 MHz
/Div

Spurious
Signals

Short Medium
Pulse

3.5 to 7.5 GHz

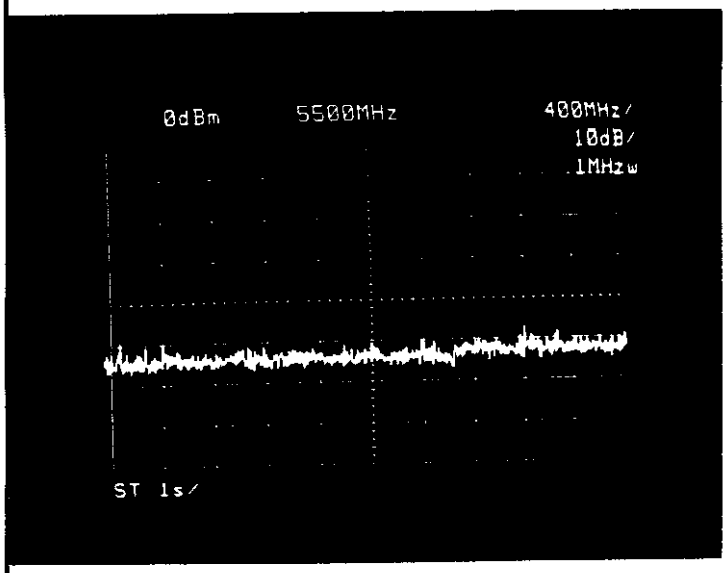


Scale
↑ 10dB/Div
→ 400 MHz
/Div

Spurious
Signals

Long Medium
Pulse

3.5 to 7.5 GHz



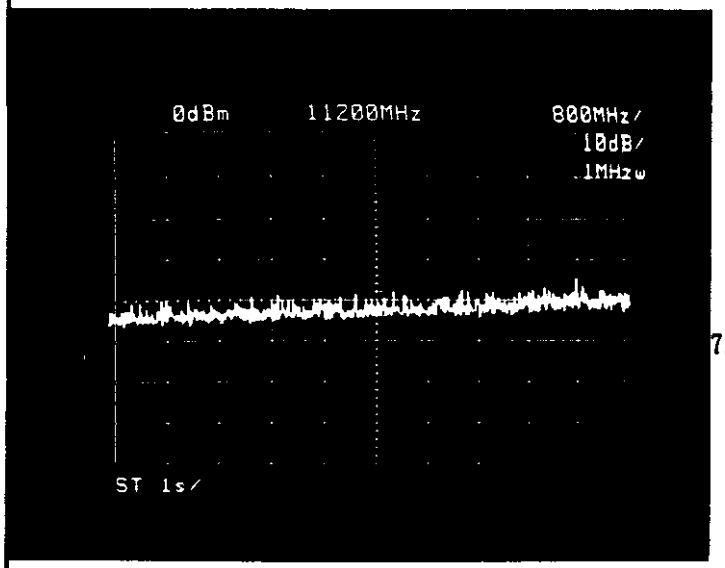
Scale
↑ 10dB/Div
→ 400 MHz
/Div

Spurious
Signals

Long Pulse

3.5 to 7.5 GHz

(Sec. 2.991)

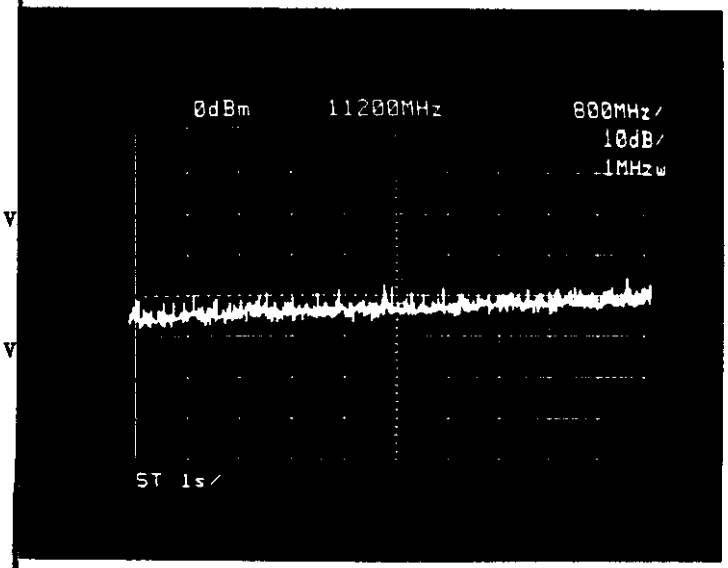


Scale
↑10dB/Div
→800 MHz
/Div

Spurious
Signals

OFF

7.2 to 15.2 GHz

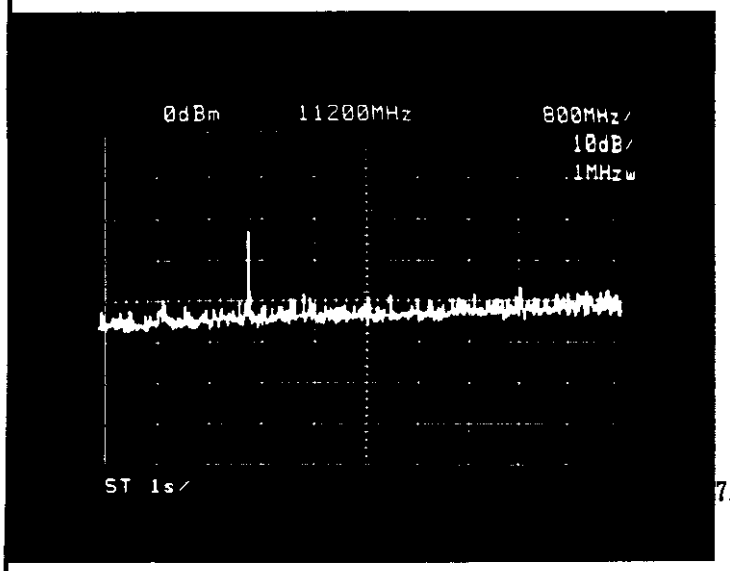


Scale
↑10dB/Div
→800 MHz
/Div

Spurious
Signals

Stand-By

7.2 to 15.2 GHz



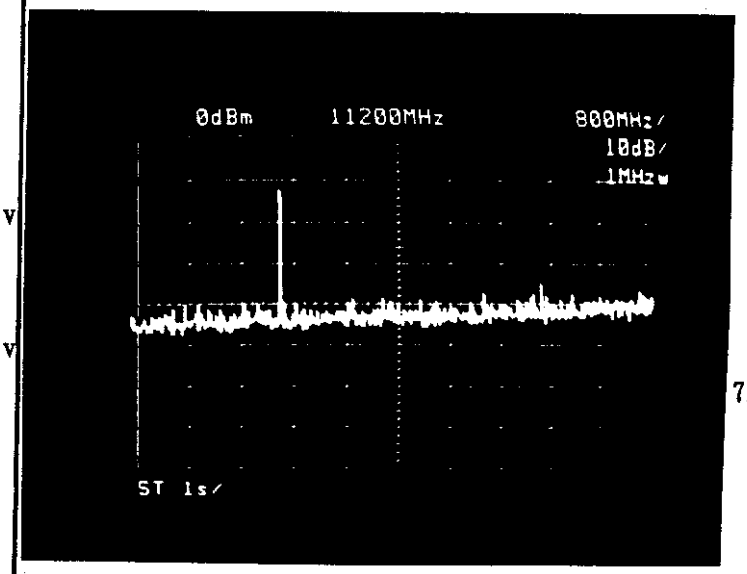
Scale
↑10dB/Div
→800 MHz
/Div

Spurious
Signals

Short Pulse

7.2 to 15.2 GHz

(Sec. 2.991)

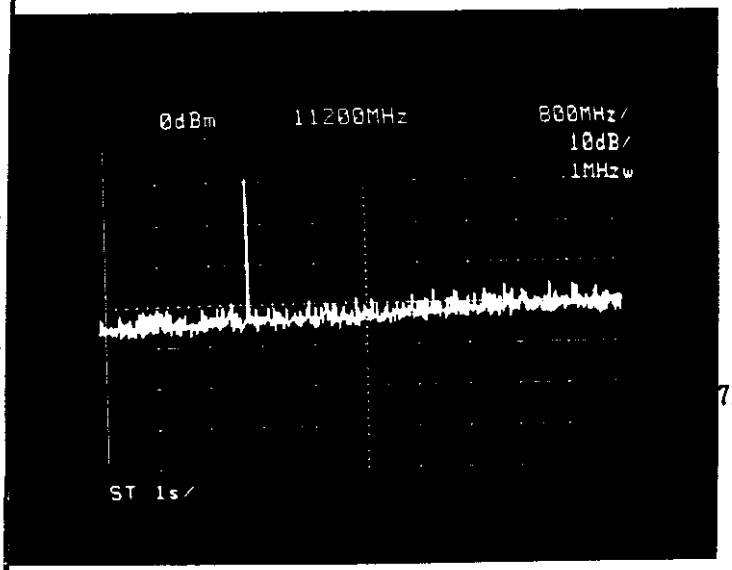


Scale
↑10dB/Div
→800 MHz
/Div

Spurious
Signals

Short Medium
Pulse

7.2 to 15.2 GHz

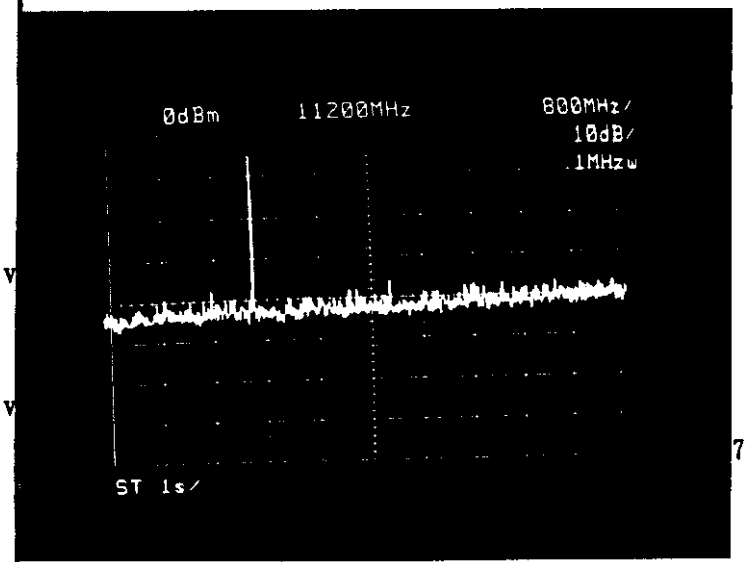


Scale
↑10dB/Div
→800 MHz
/Div

Spurious
Signals

Long Medium
Pulse

7.2 to 15.2 GHz



Scale
↑10dB/Div
→800 MHz
/Div

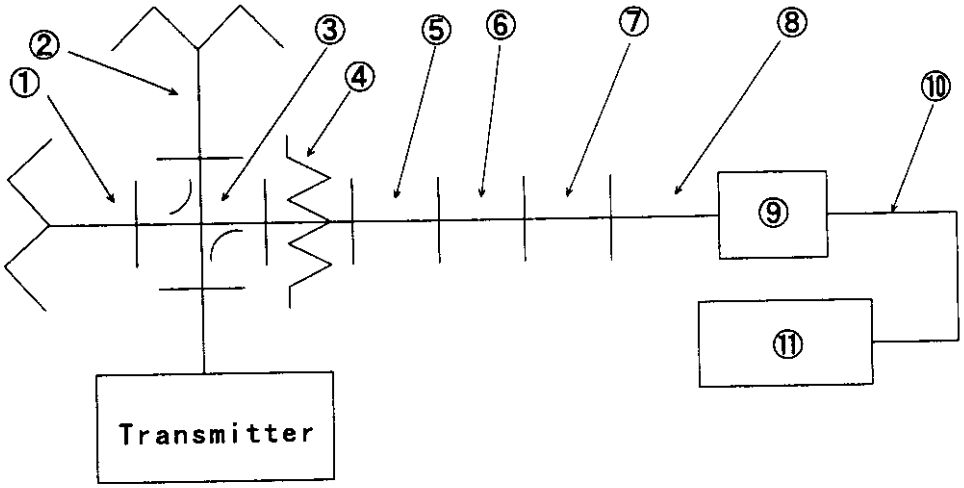
Spurious
Signals

Long Pulse

7.2 to 15.2 GHz

(Sec. 2.991) 3.0 Sprious signals at antenna port

Condition 2: 12.4 to 40 GHz

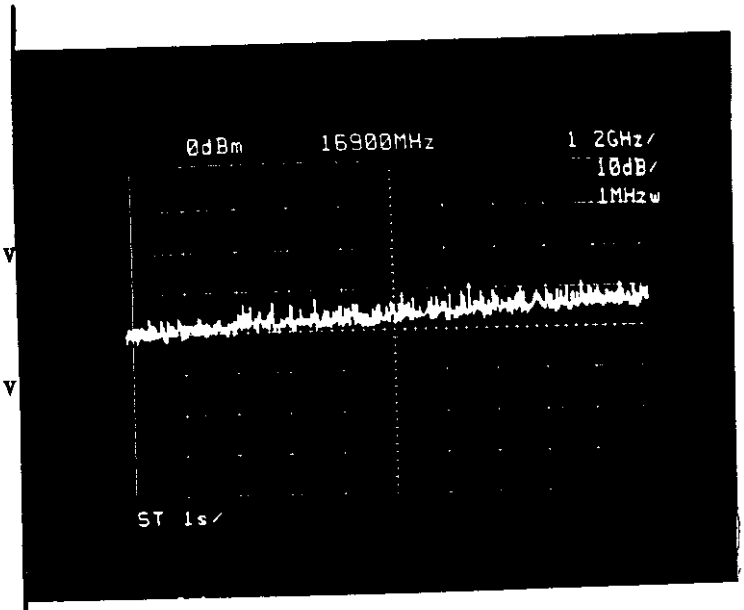


1	Dummy Load		X910B	HP
2	High power Dummy Load		4D371A	Shimada
3	Directional Coupler		R11421	Shimada
	Coupling	30 dB		
	Directivity	30 dB		
4	Attenuator		X382A	HP
5	Tapered W/G		195-X KU	AIRCOM
6	Tapered W/G		11818A	HP
7	Tapered W/G		11519A	HP
8	Tapered W/G		11520A	HP
9	External Mixer		11517A	HP
10	Coaxial Cable		10503A	HP
11	Spectrum Analyzer		TR4133B	Takeda Riken

★ Attenuation on ATT4 ; 50dB

★ Measurement Point ;Rotary Joint Output

(Sec. 2.991)

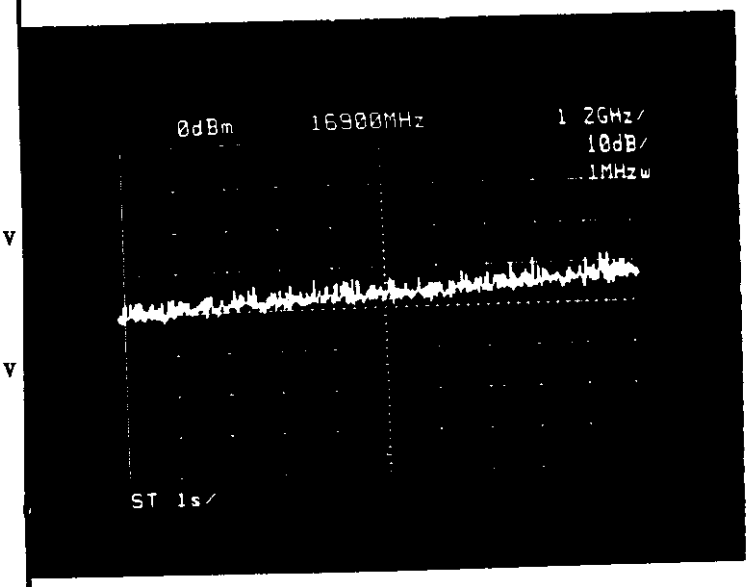


Scale
↑10dB/Div
→1.2 GHz
/Div

Spurious
Signals

OFF

10.9 to 20 GHz

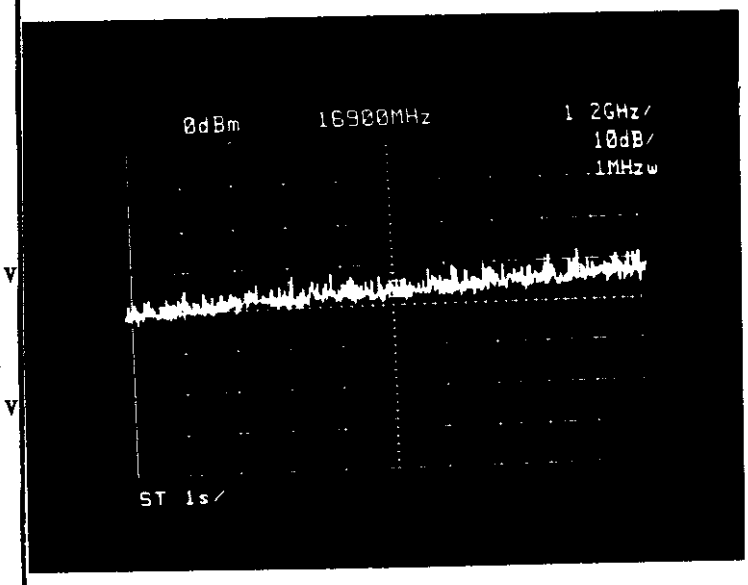


Scale
↑10dB/Div
→1.2 GHz
/Div

Spurious
Signals

Stand-By

10.9 to 20 GHz



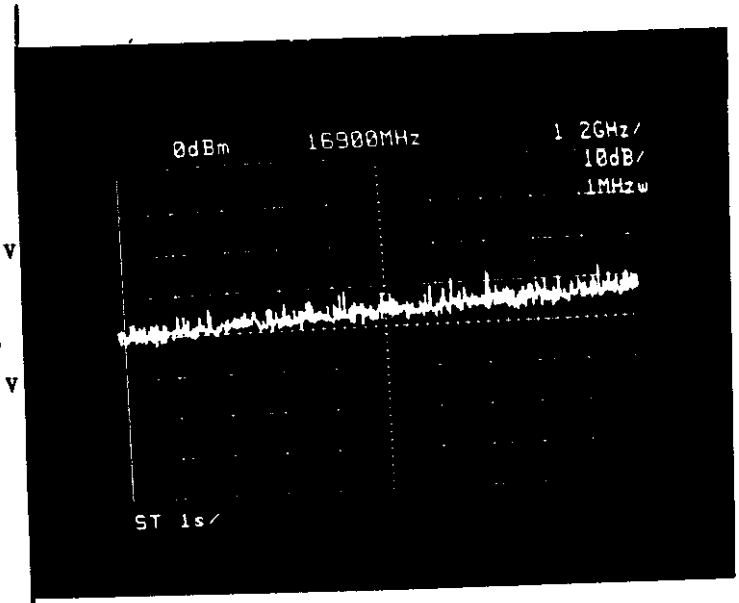
Scale
↑10dB/Div
→1.2 GHz
/Div

Spurious
Signals

Short Pulse

10.9 to 20 GHz

(Sec. 2.991)

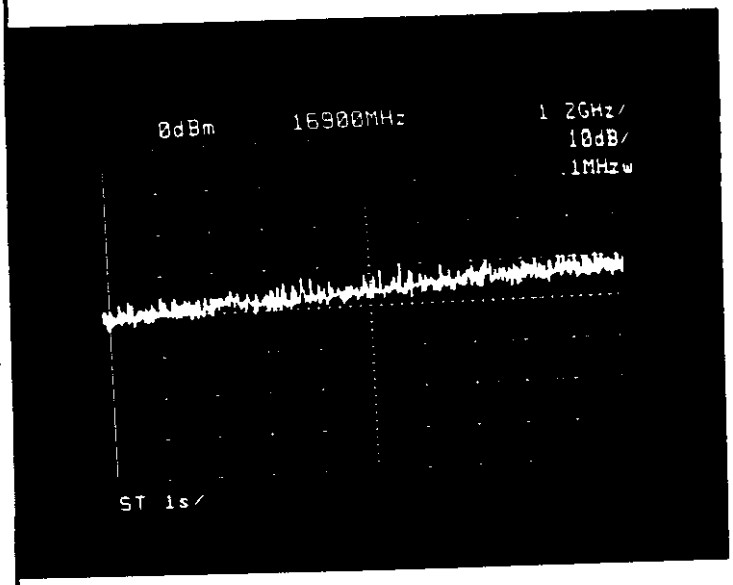


Scale
↑ 10dB/Div
→1.2 GHz
/Div

Spurious
Signals

Short Medium
Pulse

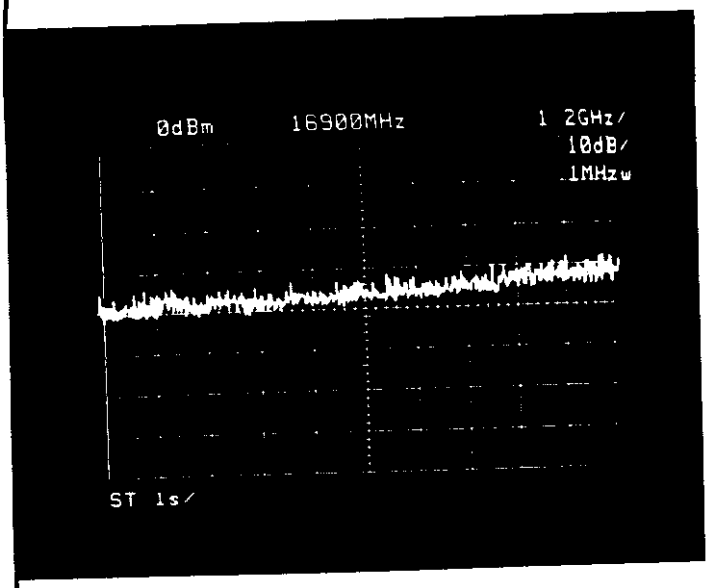
10.9 to 20 GHz



Scale
↑ 10dB/Div
→1.2 GHz
/Div

Spurious
Signals

Long Medium
Pulse
10.9 to 20 GHz



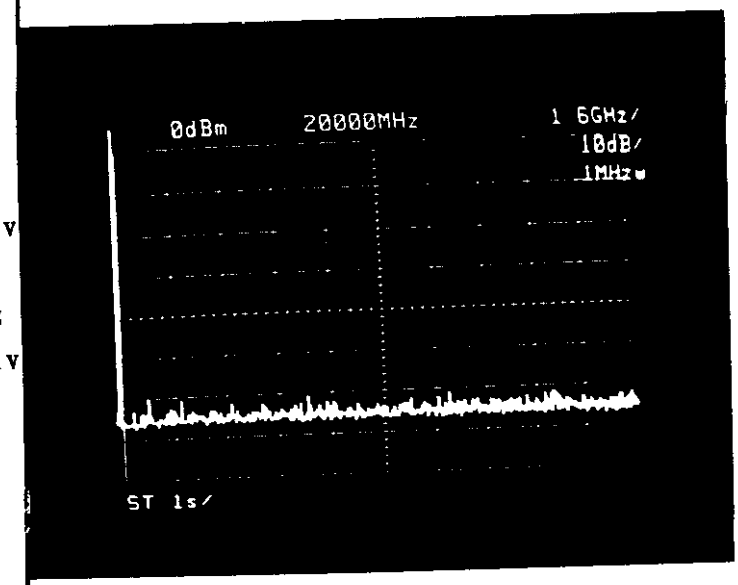
Scale
↑ 10dB/Div
→1.2 GHz
/Div

Spurious
Signals

Long Pulse

10.9 to 20 GHz

(Sec. 2.991)

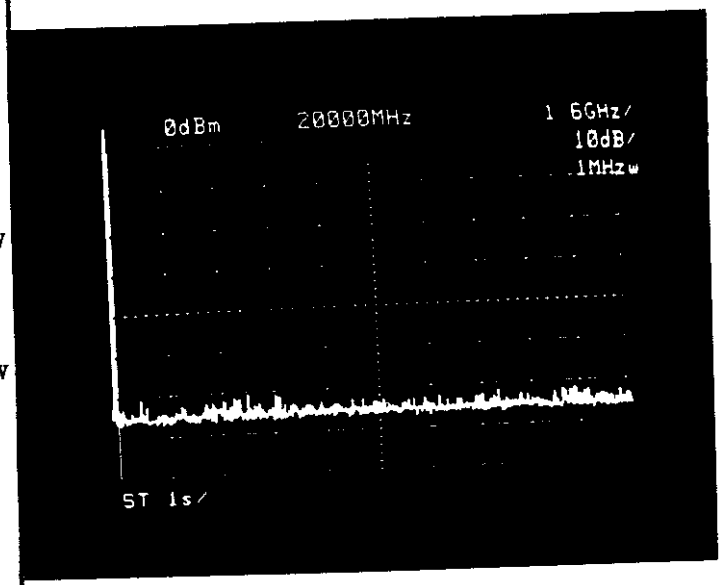


Scale
↑ 10dB/Div
→1.6 GHz
/Div

Spurious
Signals

OFF

12.4 to 28 GHz

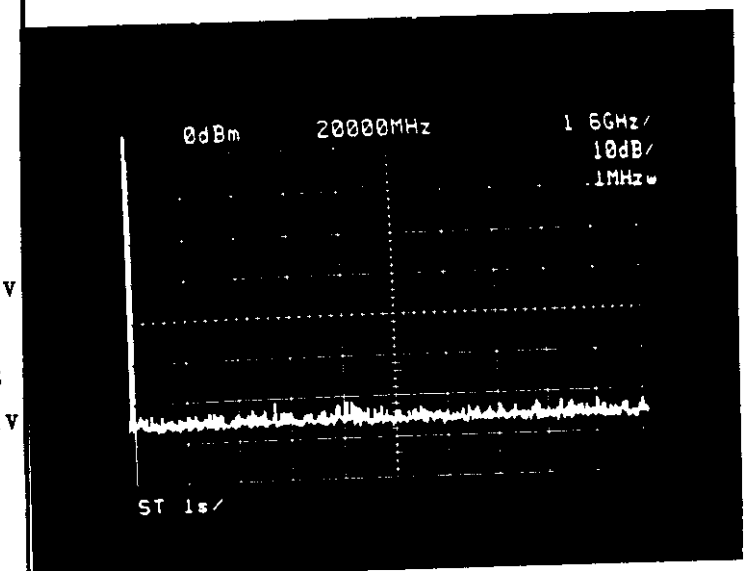


Scale
↑ 10dB/Div
→1.6 GHz
/Div

Spurious
Signals

Stand-By

12.4 to 28 GHz



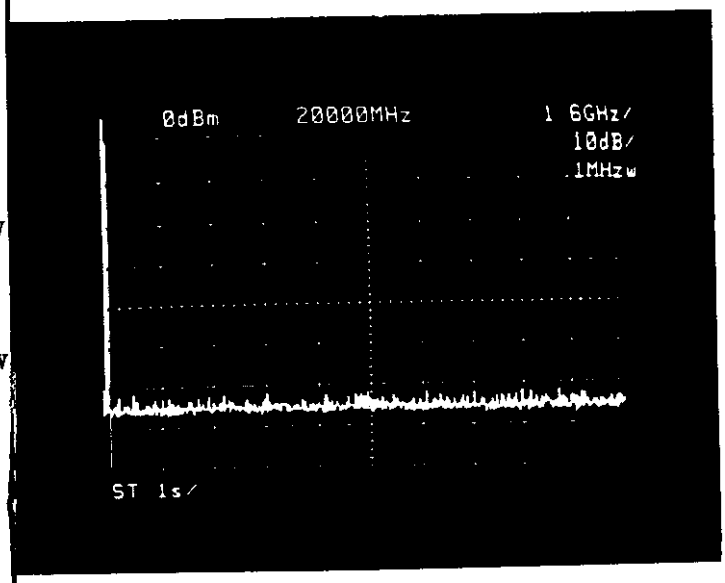
Scale
↑ 10dB/Div
→1.6 GHz
/Div

Spurious
Signals

Short Pulse

12.4 to 28 GHz

(Sec. 2.991)

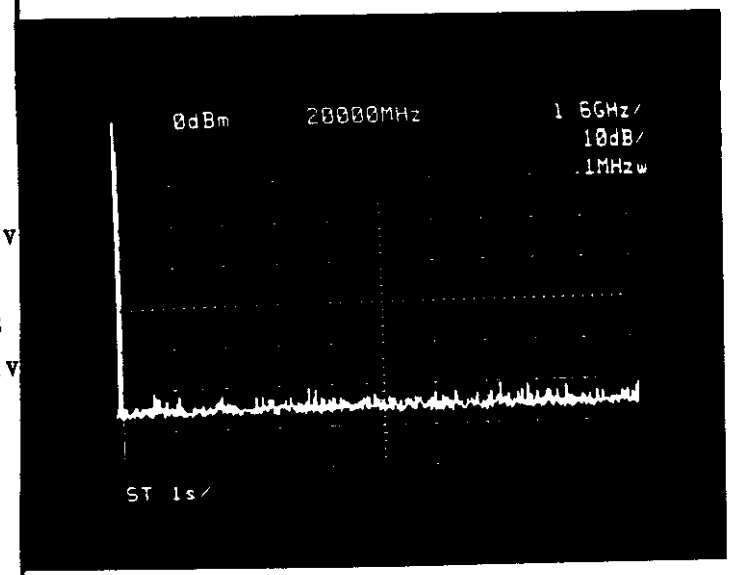


Scale
↑ 10dB/Div
→ 1.6 GHz
/Div

Spurious
Signals

Short Medium
Pulse

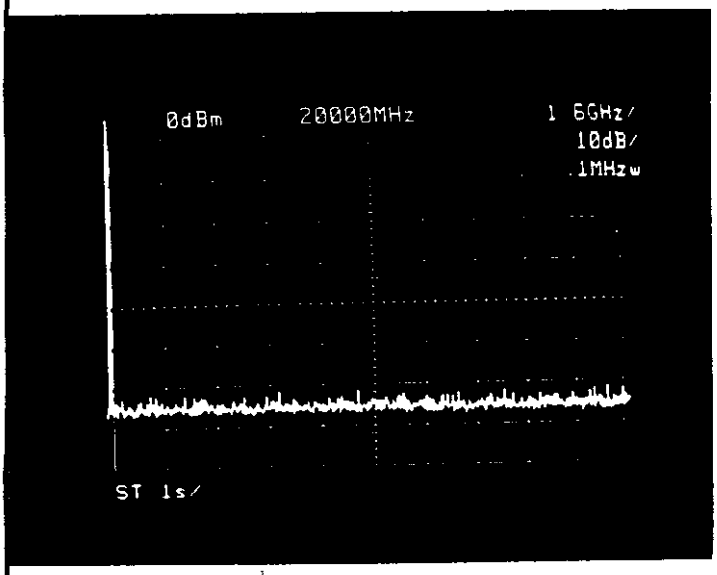
12.4 to 28 GHz



Scale
↑ 10dB/Div
→ 1.6 GHz
/Div

Spurious
Signals

Long Medium
Pulse
12.4 to 28 GHz



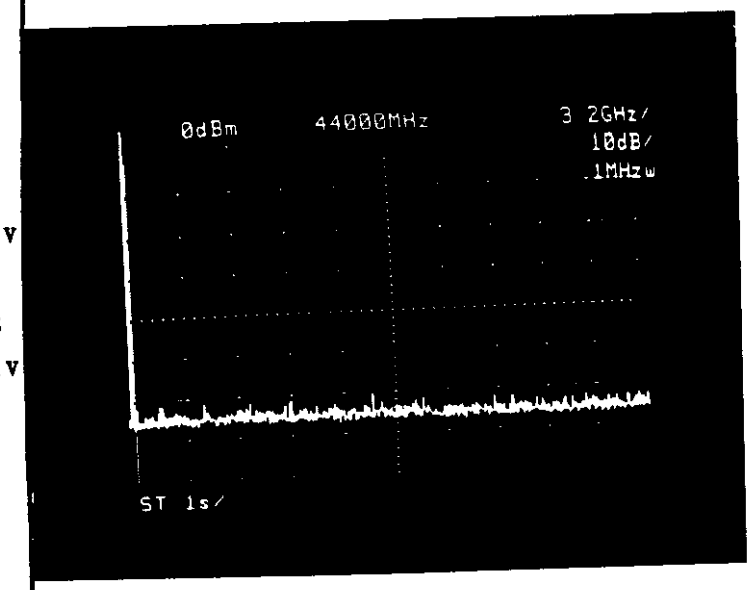
Scale
↑ 10dB/Div
→ 1.6 GHz
/Div

Spurious
Signals

Long Pulse

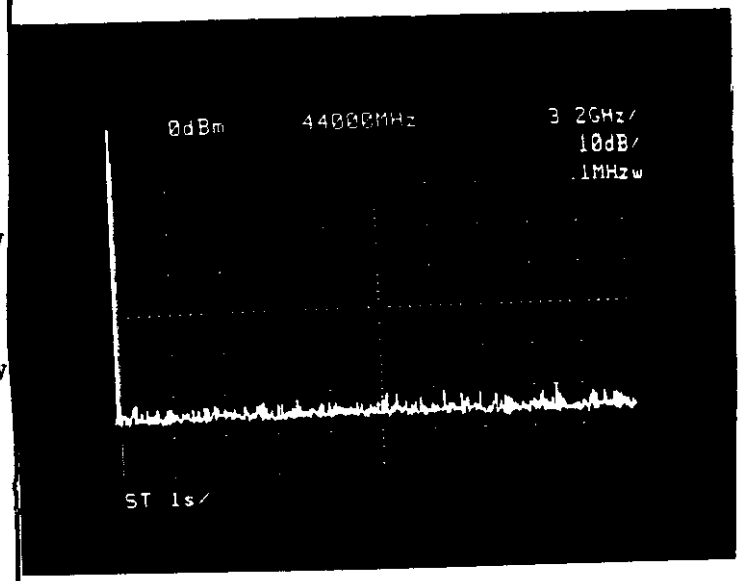
12.4 to 28 GHz

(Sec. 2.991)



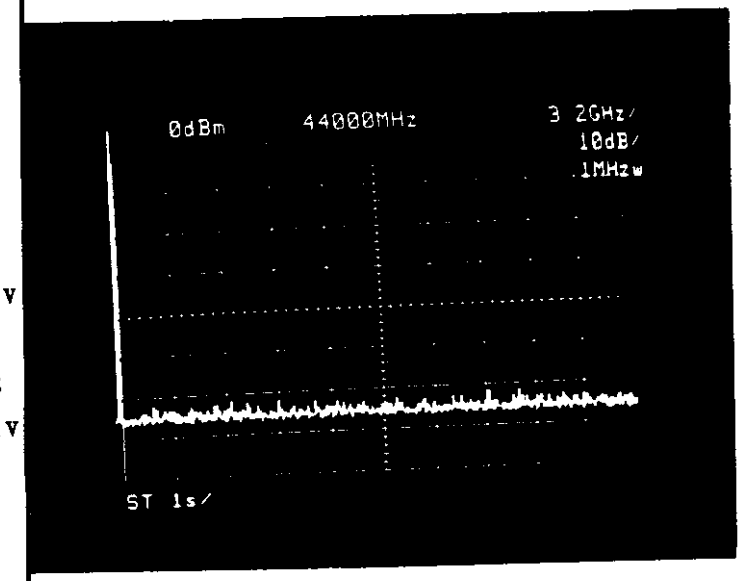
Scale
↑ 10dB/Div
→ 3.2 GHz /Div

Spurious Signals
OFF
28 to 60 GHz



Scale
↑ 10dB/Div
→ 3.2 GHz /Div

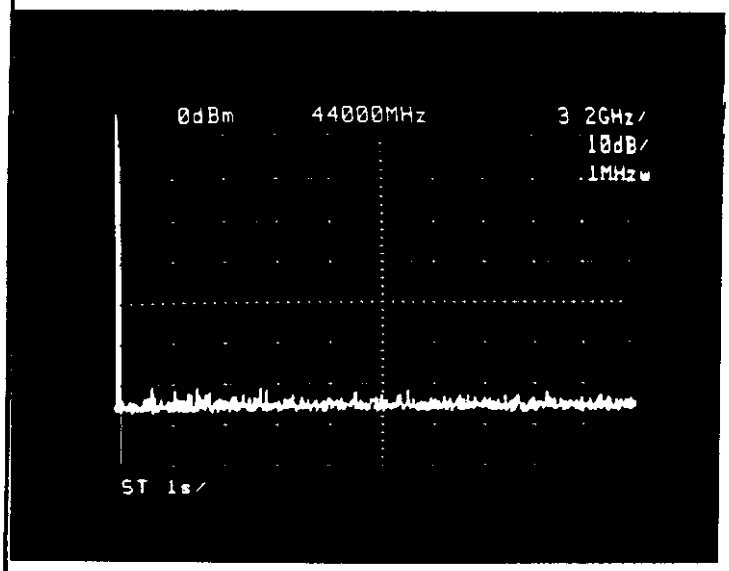
Spurious Signals
Stand-By
28 to 60 GHz



Scale
↑ 10dB/Div
→ 3.2 GHz /Div

Spurious Signals
Short Pulse
28 to 60 GHz

(Sec. 2.991)

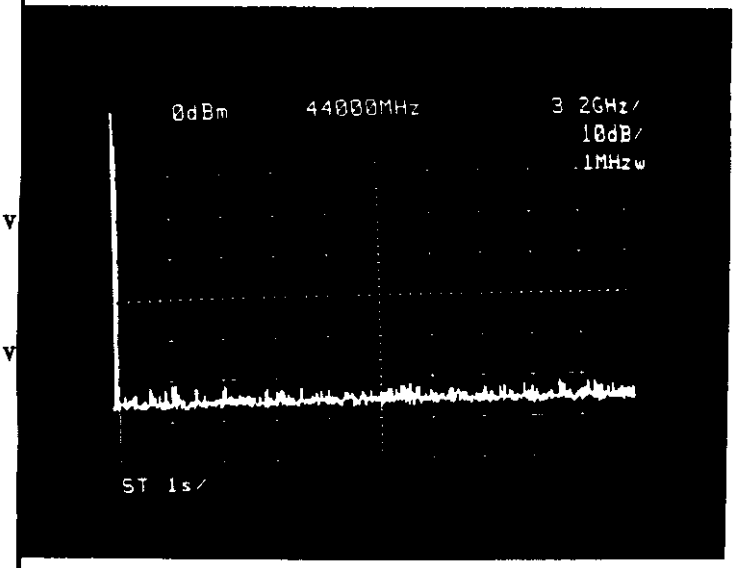


Scale
↑ 10dB/Div
→ 3.2 GHz
/Div

Spurious
Signals

Short Medium Pulse

28 to 60 GHz

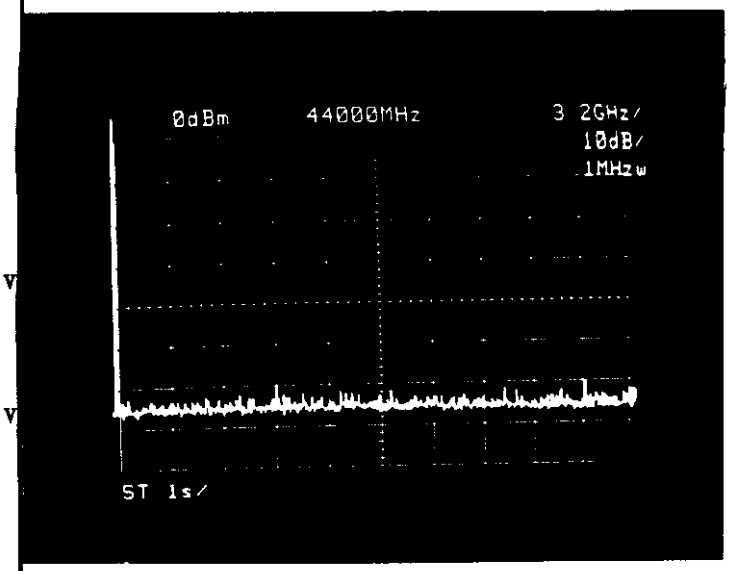


Scale
↑ 10dB/Div
→ 3.2 GHz
/Div

Spurious
Signals

Long Medium
Pulse

28 to 60 GHz



Scale
↑ 10dB/Div
→ 3.2 GHz
/Div

Spurious
Signals

Long Pulse

28 to 60 GHz

SECTION 5

TEST: Spurious Emissions Field Strength

EQUIPMENT: JMA-3807 S/N LE 59420

FCC SPECIFICATION: Sections 2.993 and 80.211.

MINIMUM STANDARD: Mean power of emissions originating in equipment lowest generated frequency to at least 40 GHz shall be attenuated below the mean power of the transmitter by at least 43 plus 10 log (mean power in watts) decibels. Since transmitter mean power is 5.51 watts maximum (long pulse) or 37.41 dBm:

$$\text{Emissions} \leqq 37.41\text{dBm} - [43 + 10\log(5.51)]\ \text{dBm}$$
$$\leqq -13.0\ \text{dBm}$$

TEST RESULTS: No spurious emissions observed above minimum standard.

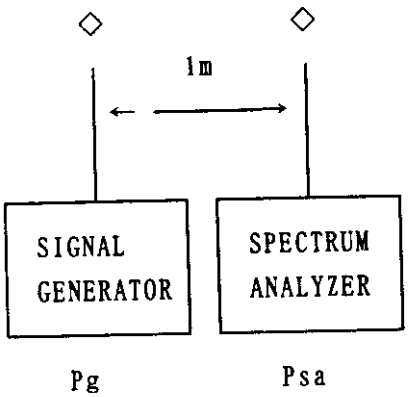
TEST CONDITIONS: Tamb = 20℃ to 25℃ RHamb = 40% ~ 60%
Euut input = 12 VDC
Stabiliazation: UUT energized for 10 minutes minimum.

TEST EQUIPMENT: JRC Original - Shielded Room
Other equipment - see test set-ups.

DATE: 9 -10 NOV. 1998

TEST ENGINEER: K. YUASA.

CALIBRATION OF TESTS 1～5 (0～1 GHz)



A signal source of known amplitude was used as a calibrating signal with identical antennas on the generator and the spectrum analyzer.
From previous testing in the shielded room, the antenna factors are considered much greater than path loss.
Hence half of the difference in signals Pg and Psa is due to each antenna.

The calibrating signal on the analyzer is therefore:

$$Pcal = Psa - (Psa - Pg) / 2 = (Psa + Pg) / 2 \text{ dBm.}$$

The log ref level on the analyzer is adjusted so as to read other signals directly:

$$LRL \text{ (adjusted)} = LRL \text{ (set)} + Pcal - Psa \text{ dBm.}$$

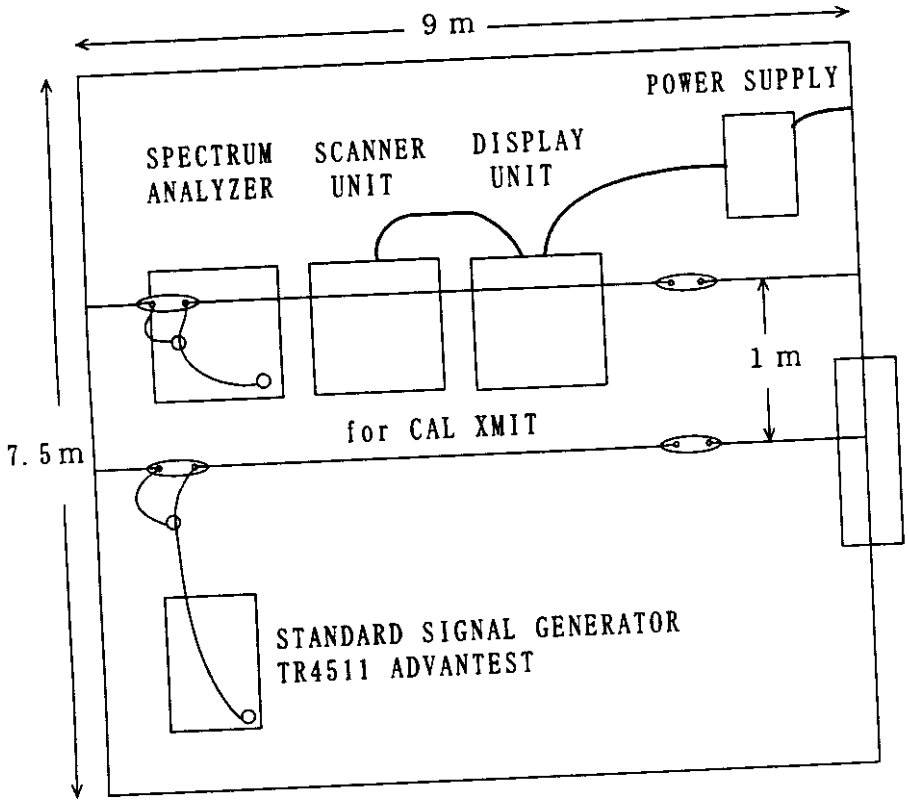
The calibrating signal used was selected on the basis of best average amplitude over the frequency range of interest.

TEST	CAL sig	Psa	Pg	Pcal	LRL(set)	LRL(adj)
1	250 KHz	-66	0	-33.0	-10	23.0
2	2.5 MHz	-47	0	-23.5	-10	13.5
3	25 MHz	-41	0	-20.5	-10	10.5
4	250 MHz	-26	0	-13.0	-10	3.0
5	500 MHz	-33	0	-16.5	-10	6.5

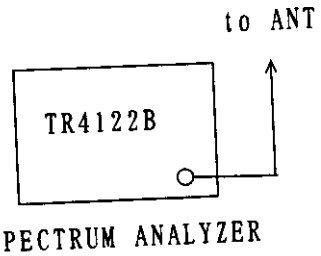
RFI TEST

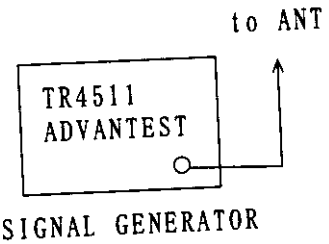
TEST SET-UP #1(0～50MHz)

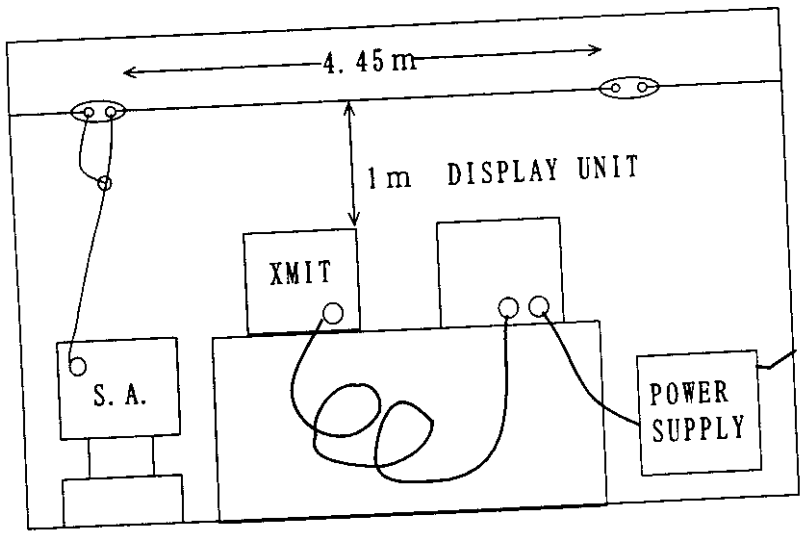
TEST #1 0～500 KHz
TEST #2 0～ 5 MHz
TEST #3 0～ 50 MHz

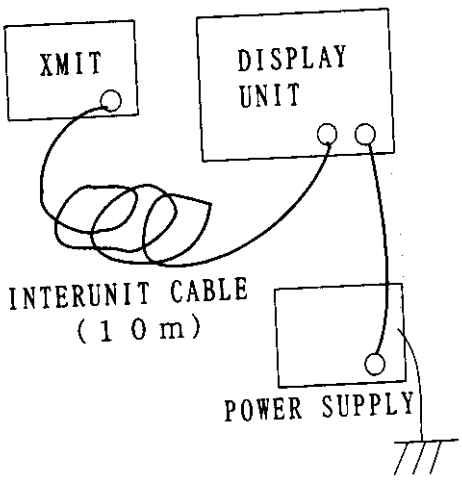


TEST EQUIPMENT









JRC ORIGINAL
RF ANECHOIC CHAMBER:SIDE VIEW

CABLE

TEST SET UP #2 (50MHz－40GHz)

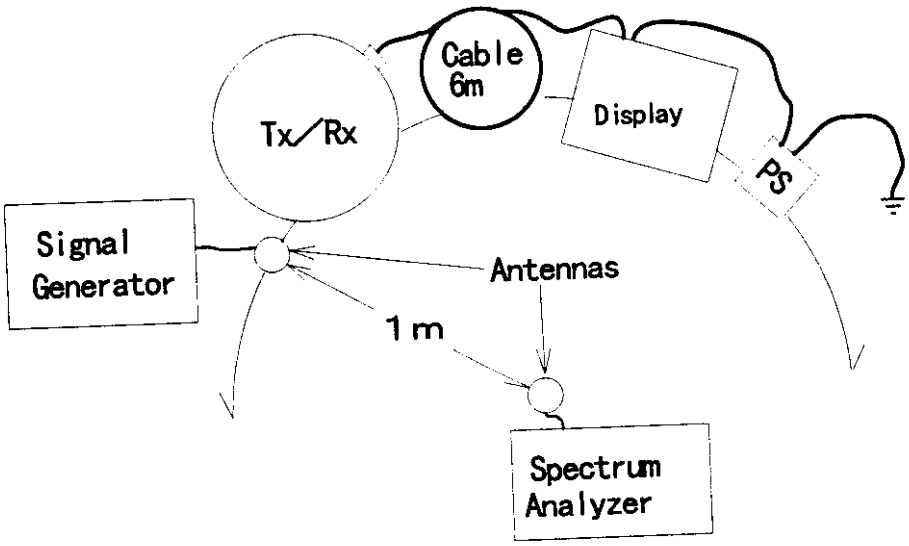


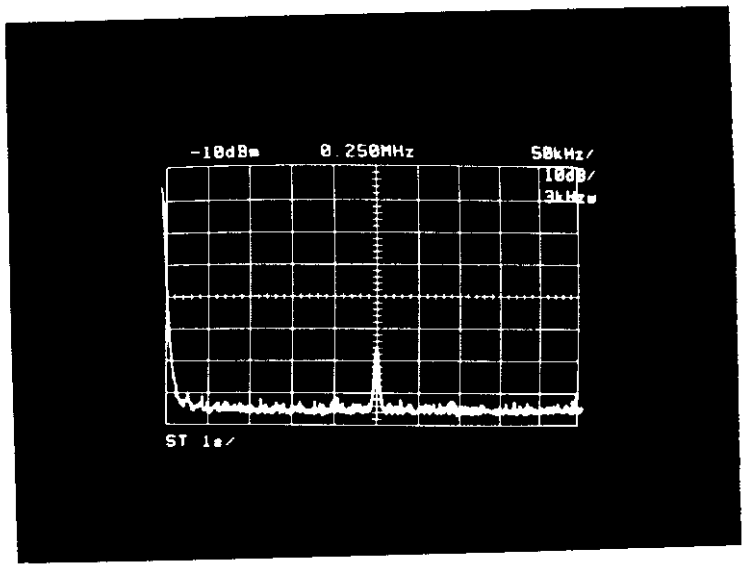
TABLE OF TEST EQUIPMENT USED

Frequency	Test Antenna	Spectrum Analyzer	Signal Generator	Misc.
0－10000MHz	1/2 Coaxial (Untuned)	TAKEDA RIKEN TR4133B	ADVANTEST TR4511	—
1－18GHz	AILTECH 94612-1 Log Peliodic	〃	NA	—
18－26GHz	AILTECH 94626-1 HP-11519A	〃	NA	—
26－40GHz	AILTECH 94627-1 HP-11519A	〃	NA	—

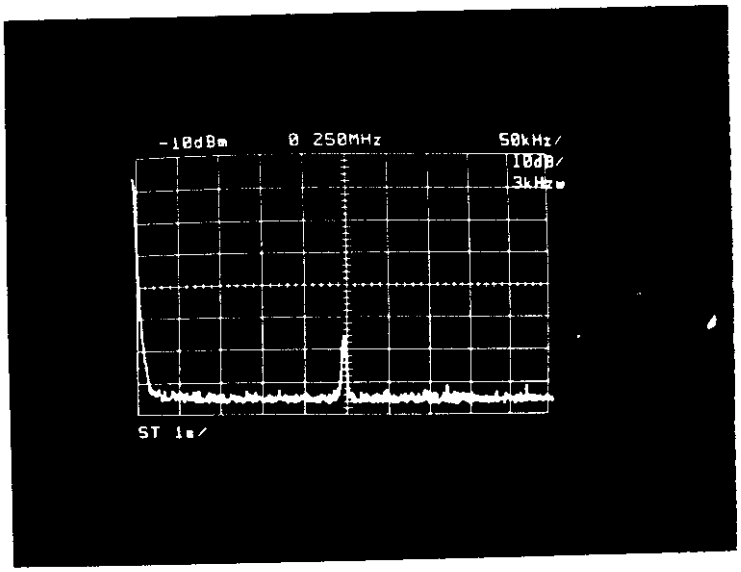
TEST #1

Frequency Band: 0～500 KHz

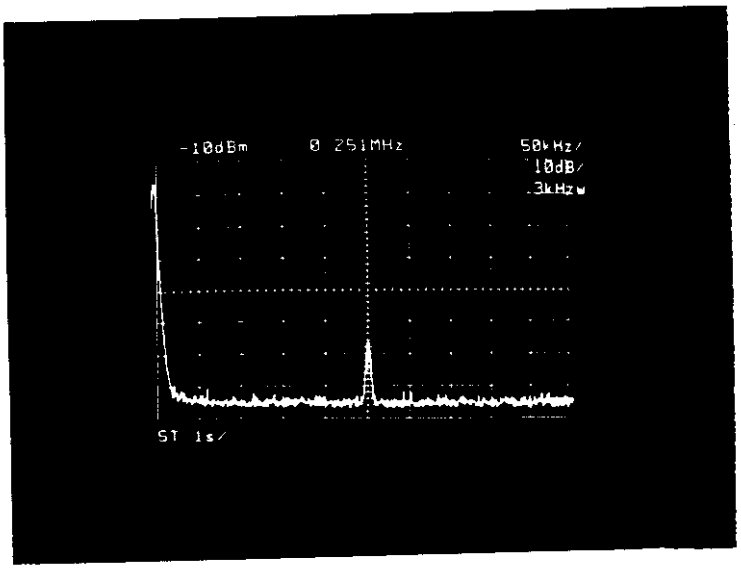
Log Ref. Level: 23.0 dBm



Amdient



Stand-By

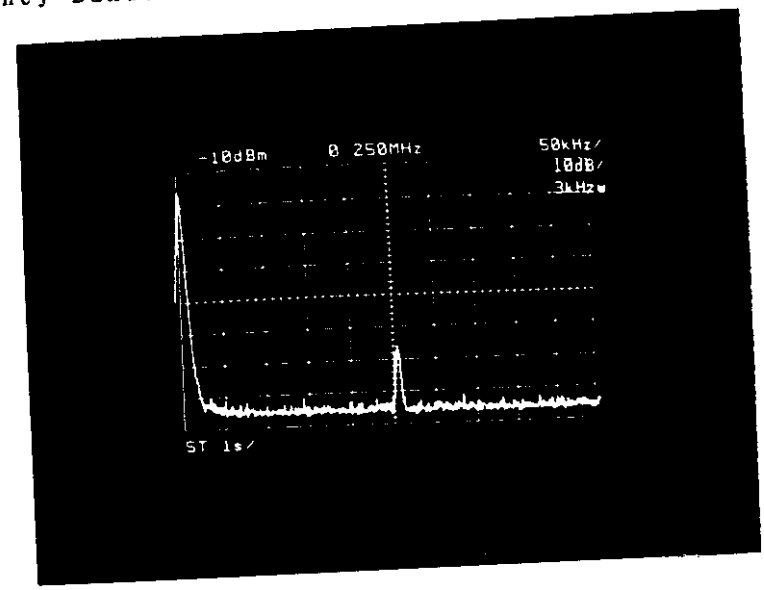


Short Pulse

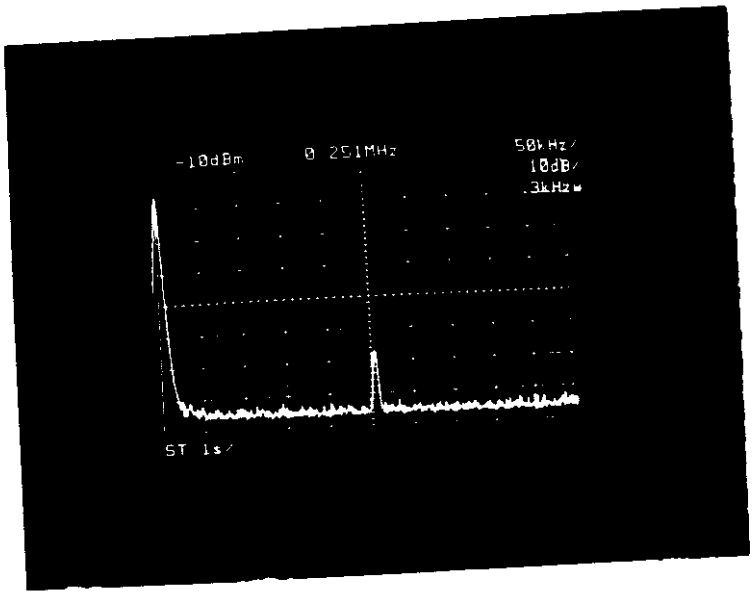
TEST #1

Frequency Band: 0～500 KHz

Log Ref. Level: 23.0 dBm



Medium
Short Pulse



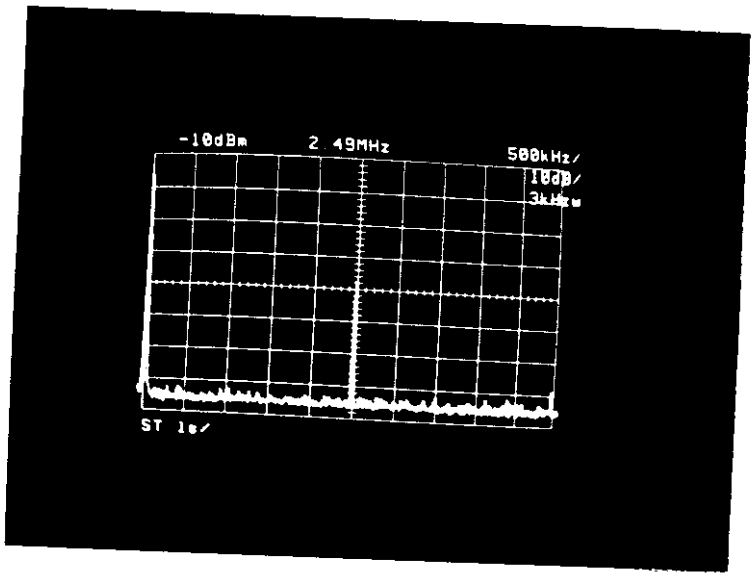
Medium
Long Pulse

Long Pulse

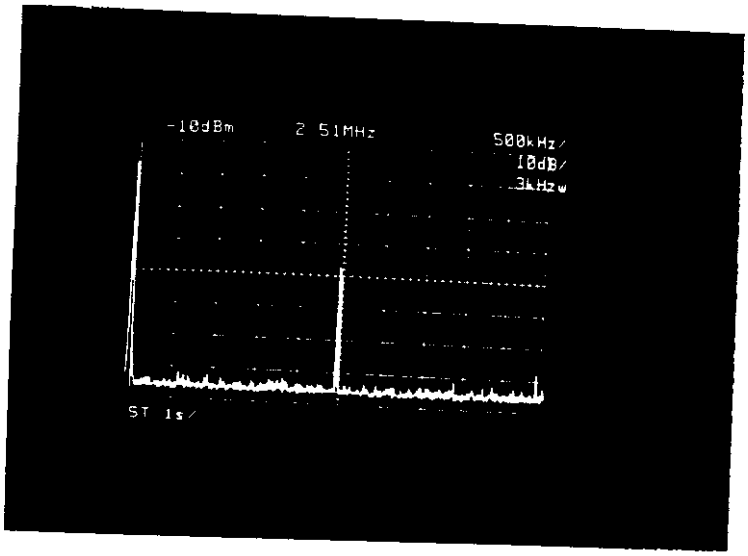
TEST #2

Frequency Band: 0～5 MHz

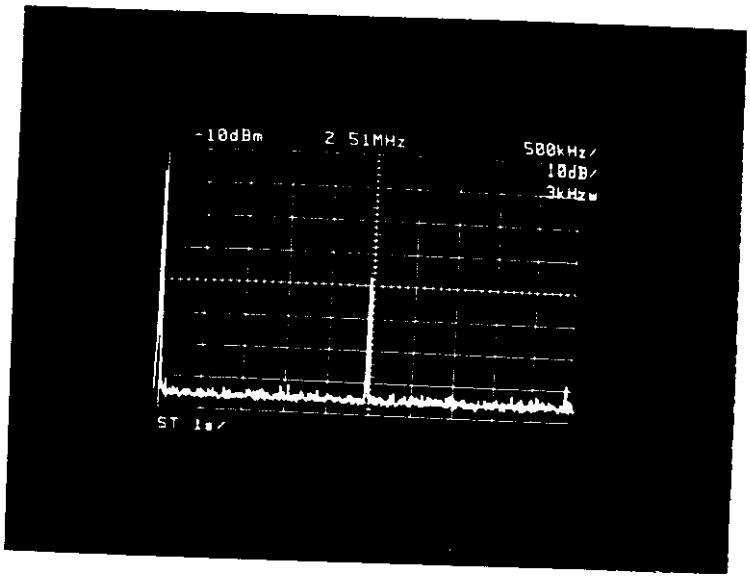
Log Ref. Level: 13.5 dBm



Ambient



Stand-By

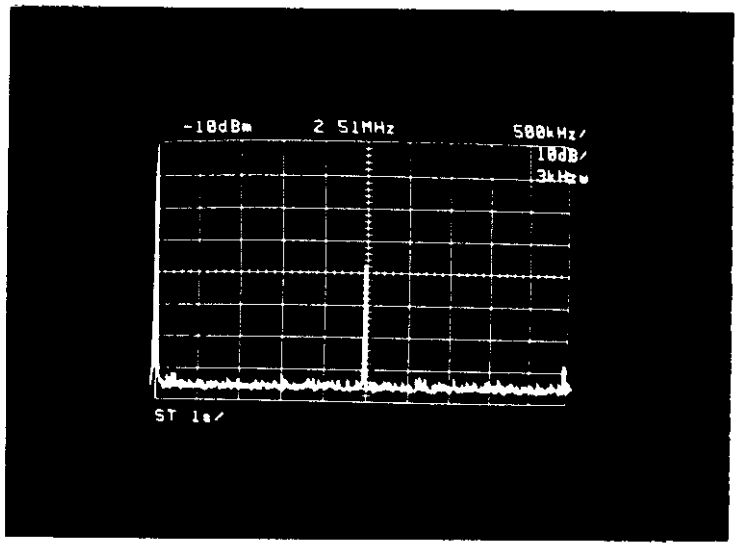


Short Pulse

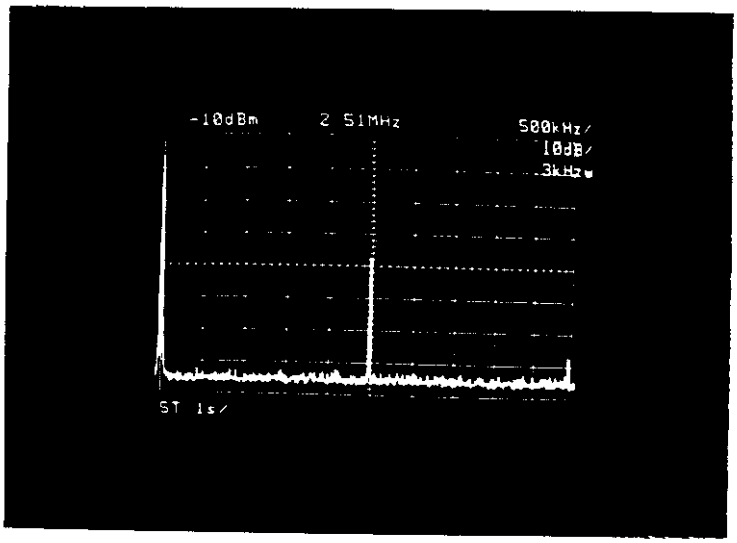
TEST #2

Frequency Band: 0～5 MHz

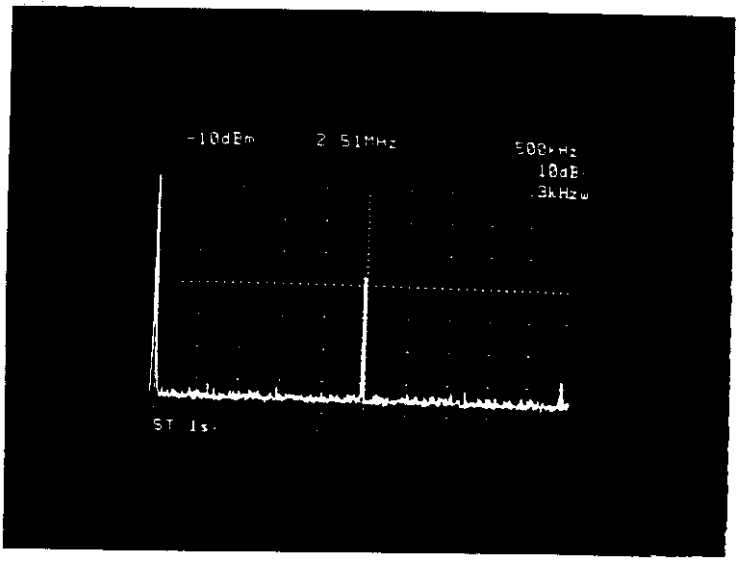
Log Ref. Level: 13.5 dBm



Medium
Short Pulse



Medium
Long Pulse



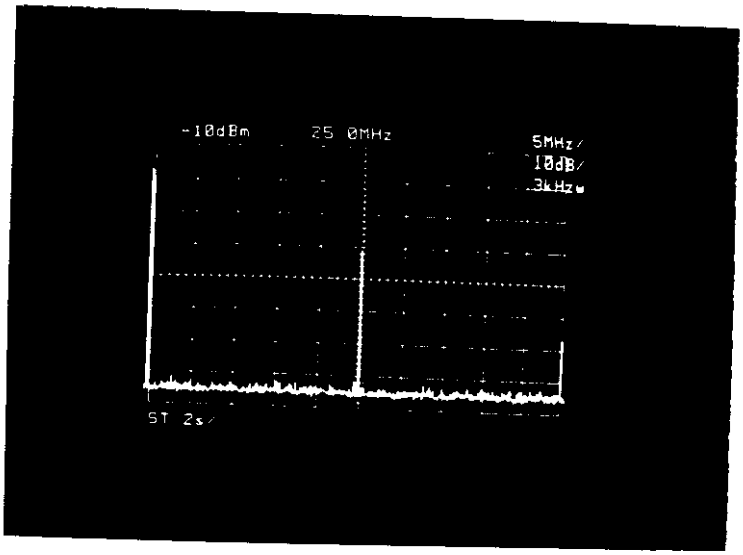
Long Pulse

TEST #3

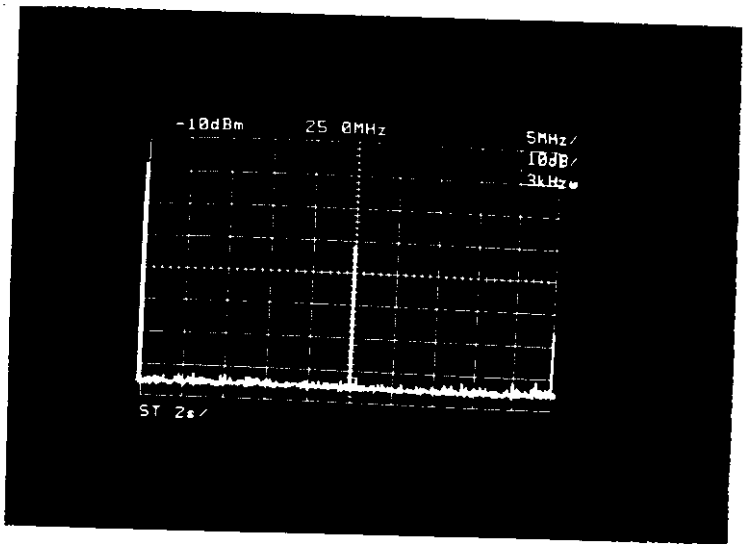
Frequency Band: 0～50 MHz

Log Ref. Level: 10.5 dBm

Ambient



Stand-By

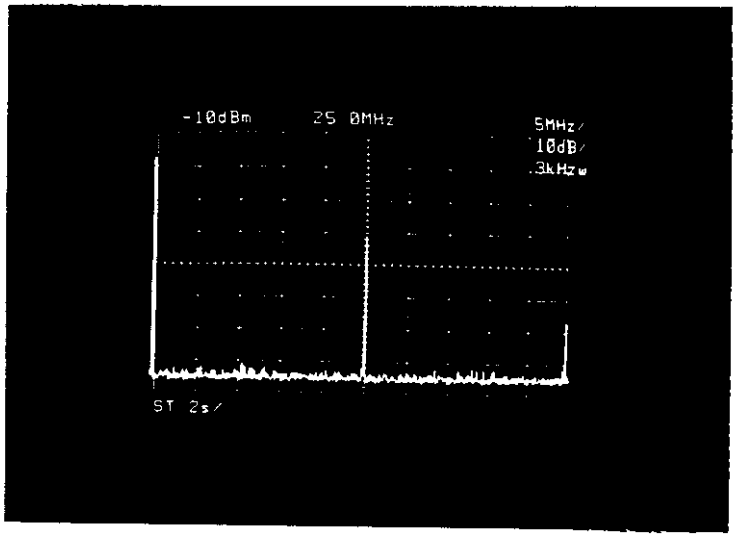


Short Pulse

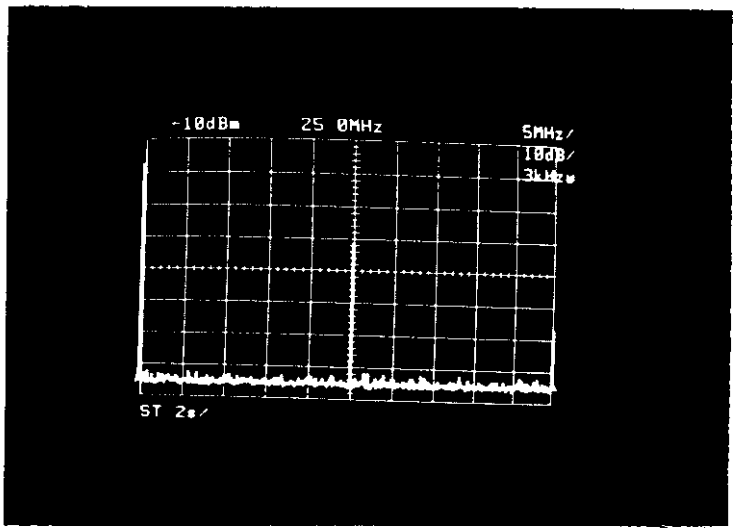
TEST #3

Frequency Band: 0～50 MHz

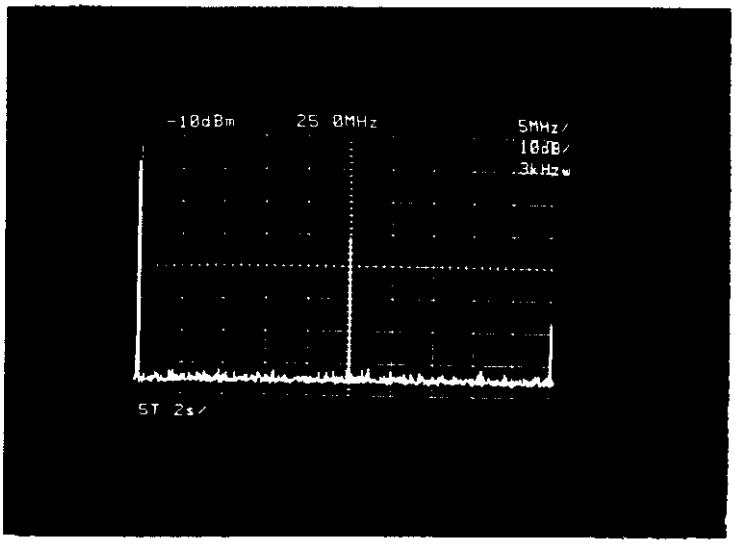
Log Ref. Level: 10.5 dBm



Medium
Short Pulse



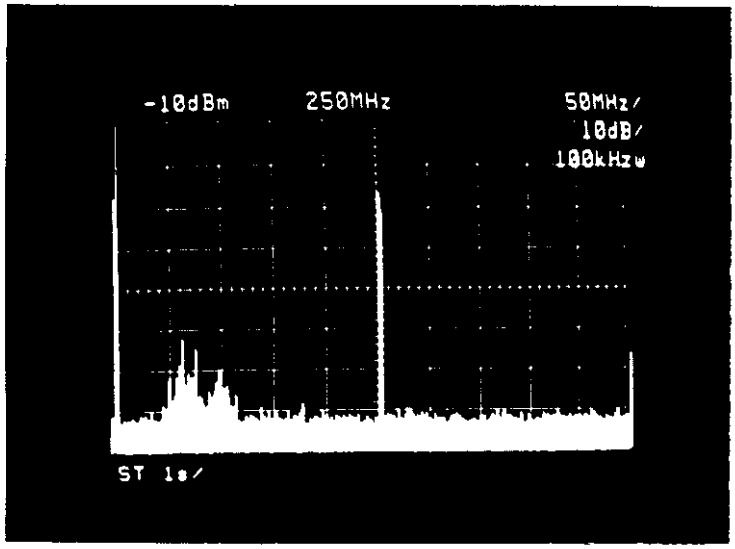
Medium
Long Pulse



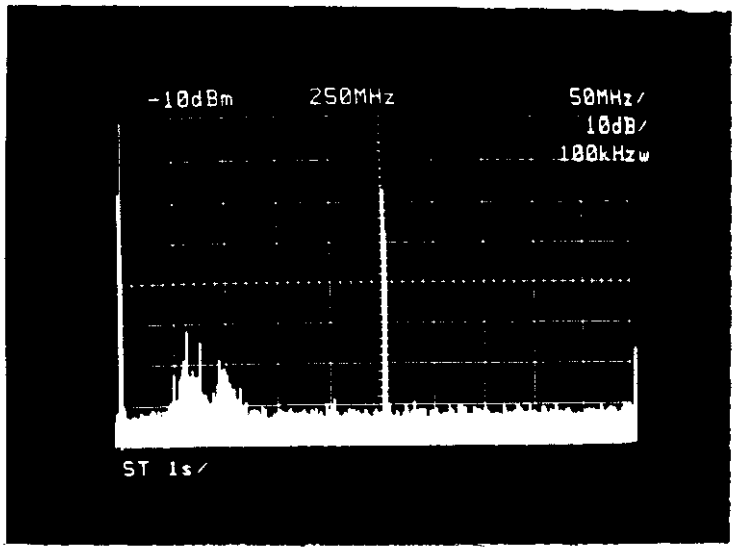
Long Pulse

TEST #4

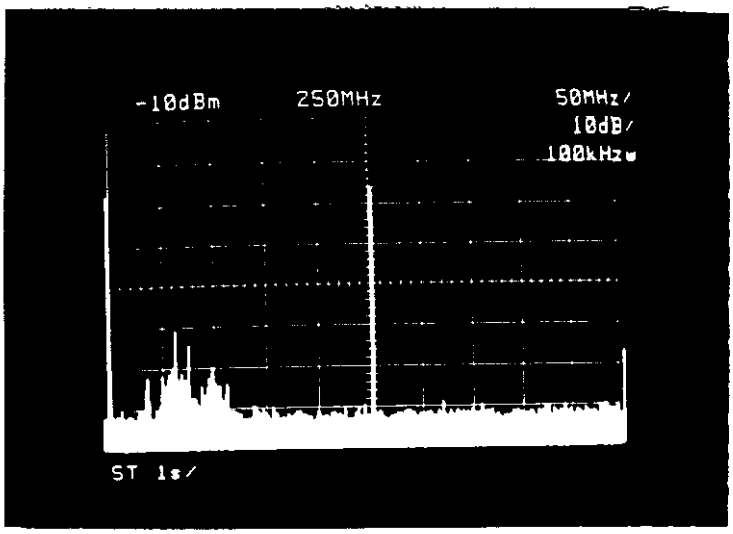
Frequency Band: 0～500 MHz Log Ref. Level: 3.0 dBm



Ambient



Stand-By

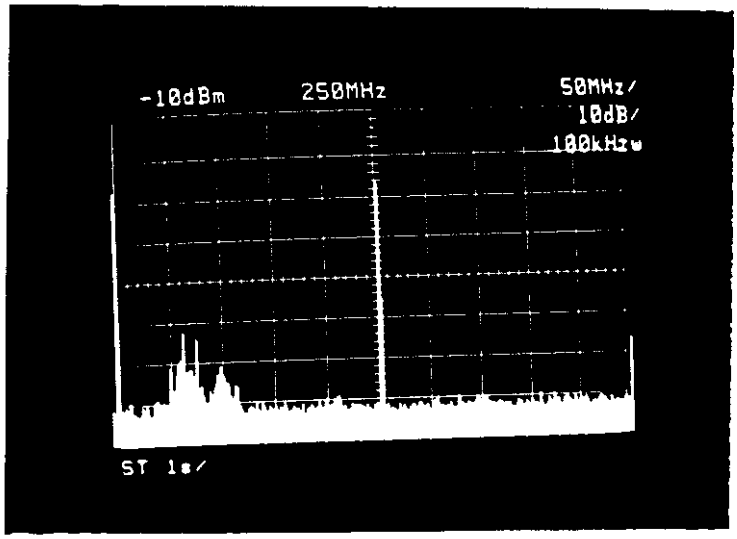


Short Pulse

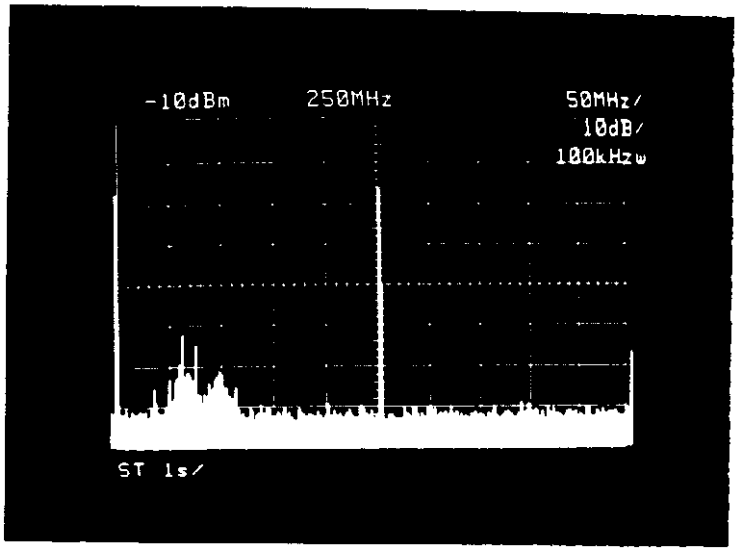
TEST #4

Frequency Band: 0～500 MHz

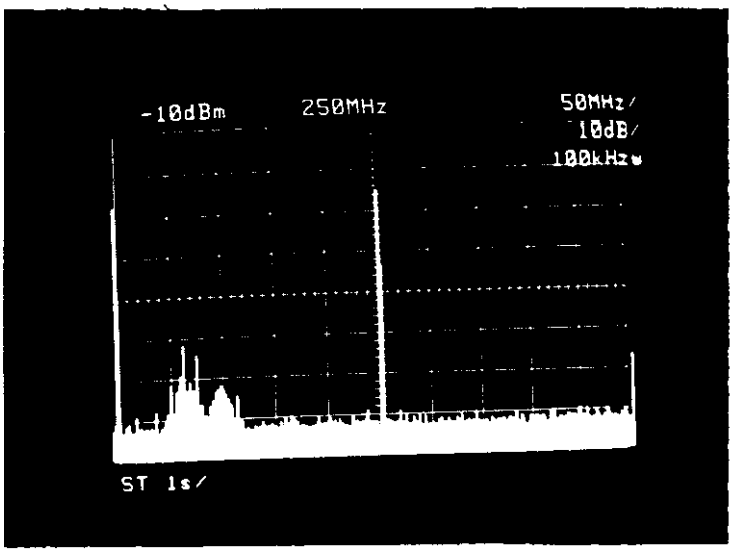
Log Ref. Level: 3.0 dBm



Medium
Short Pulse



Medium
Long Pulse

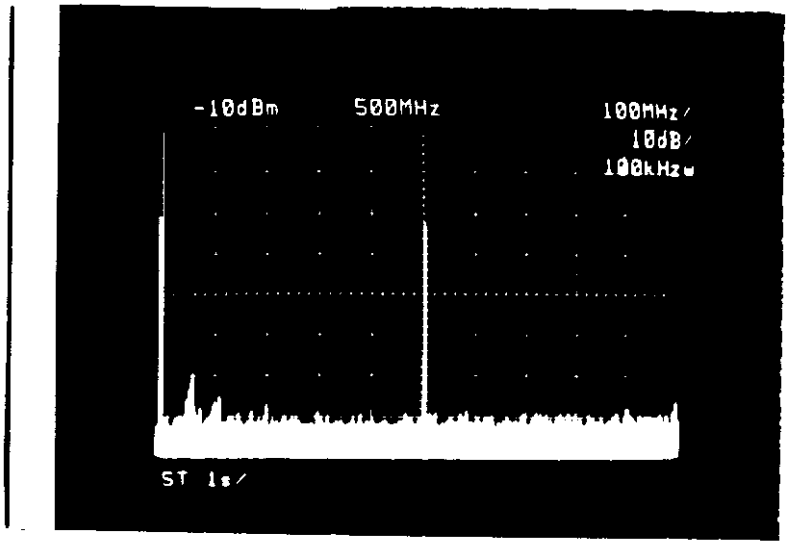


Long Pulse

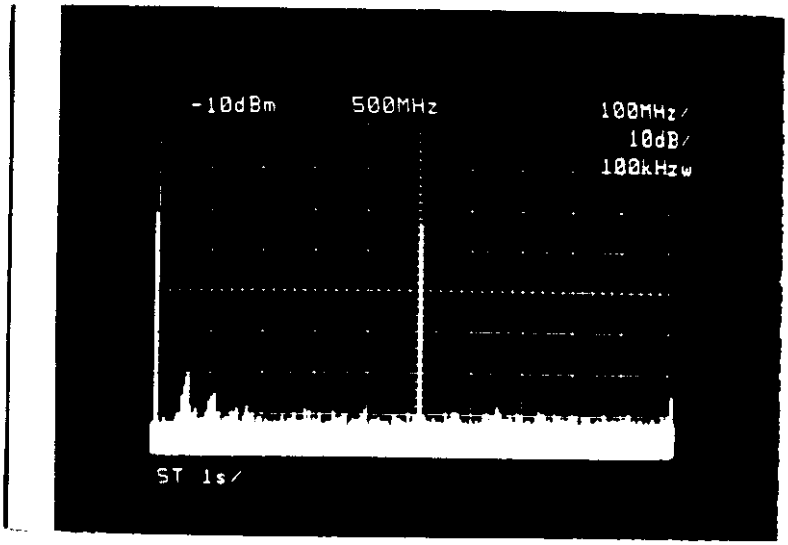
TEST #5

Frequency Band: 0～1 GHz

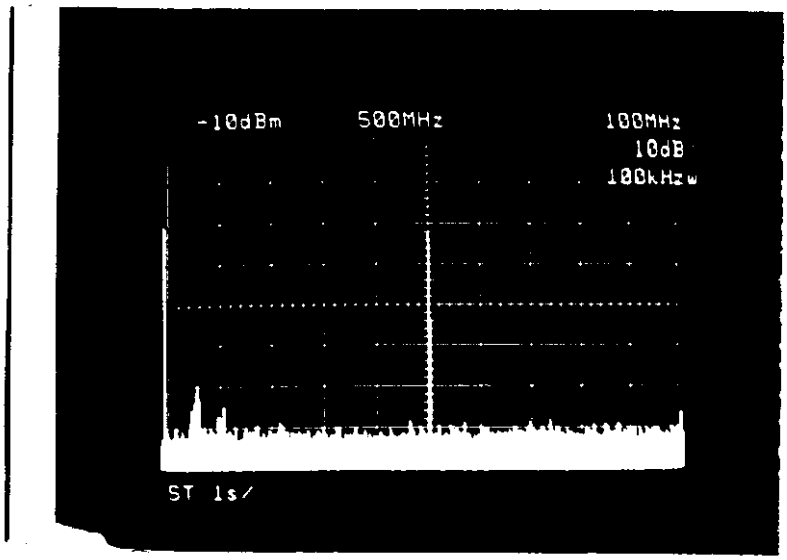
Log Ref. Level: 6.5 dBm



Ambient



Stand-By

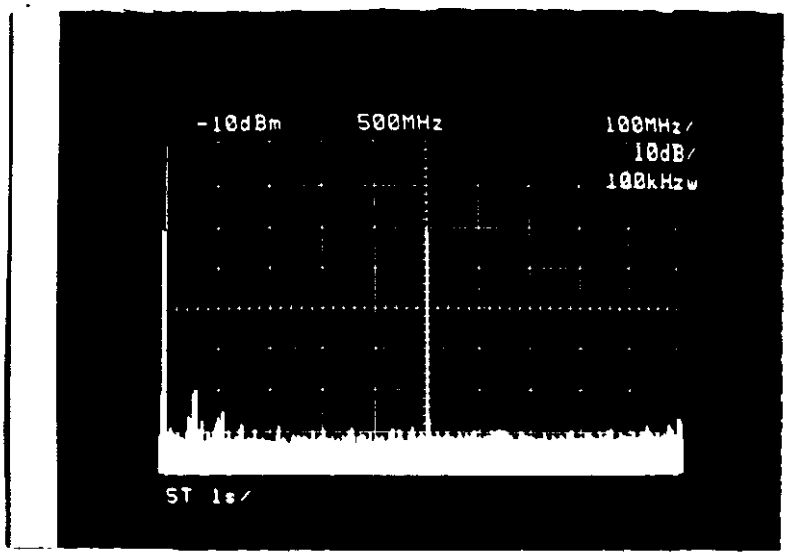


Short Pulse

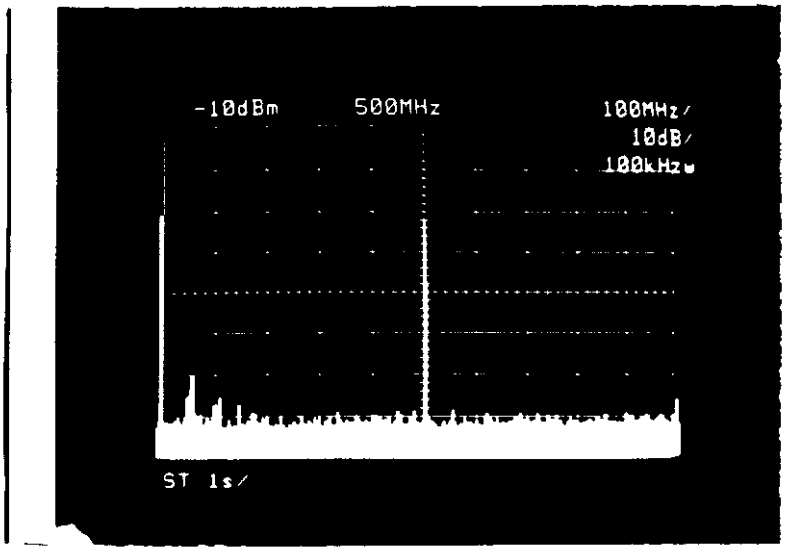
TEST #5

Frequency Band: 0～1 GHz

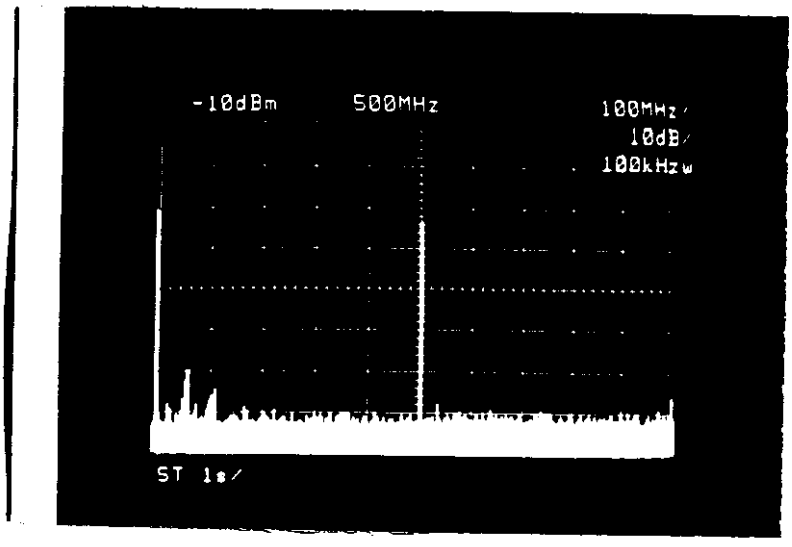
Log Ref. Level: 6.5 dBm



Medium
Short Pulse



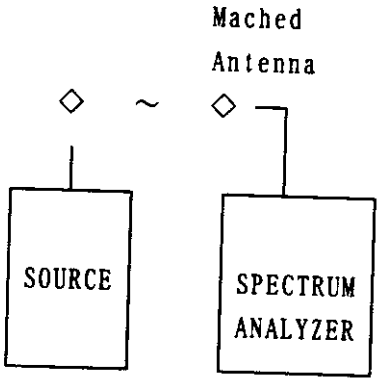
Medium
Pulse



Long Pulse

CALIBRATION OF TESTS 6 ~ 10 (1 ~ 40 GHz)

Instead of using a signal souce of known amplitude to calibrate the receiveing system, the path and antenna characteristics were computed.



A half wave dipole was assumed to be the transmitting antenna.
(FCC 2.993)

The power density at distance R is: $P = \frac{1.64\ Pt}{4\pi R2}$

Where Pt is power transmitted.

The power to the analyzer is: $Psa = PAr = \frac{PG\lambda 2}{4\pi}$

Where G is the receiving antenna gain and Ar is the effective area of the receiving antenna

Hence $Psa = \frac{1.64\ Pt}{4\pi R2} \times \frac{PG\lambda 2}{4\pi} = \frac{1.6\ G\lambda 2}{16\pi 2} \times Pt$ at 1 meter

and $Pt = \frac{16\pi 2 Psa}{1.64\ G\lambda 2} = \frac{96.3\ Psa}{G\lambda 2}$

$= Psa\ (dBm) + 19.8\ (dB) - G\ (dB) - 20\ \log\lambda\ (dB)$

TEST	HORN GAIN (AVG) dB		WAVELENGTH (dB)		Pt - Psa		LOG REF LEVEL
	LOA	HI	LO	HI	LO	HI	
6	6		-10.5	-21.6	24.3	35.4	0 dBm
7	6		-21.3	-28.0	35.1	41.8	0 dBm
8	6		-27.6	-34.1	41.4	47.9	0 dBm
9	6		-31.2	-35.6	45.0	49.4	0 dBm
10	23.3	24.9	-35.6	-38.8	32.1	33.7	0 dBm
11	23.6	25.1	-39.4	-42.5	35.6	37.2	0 dBm

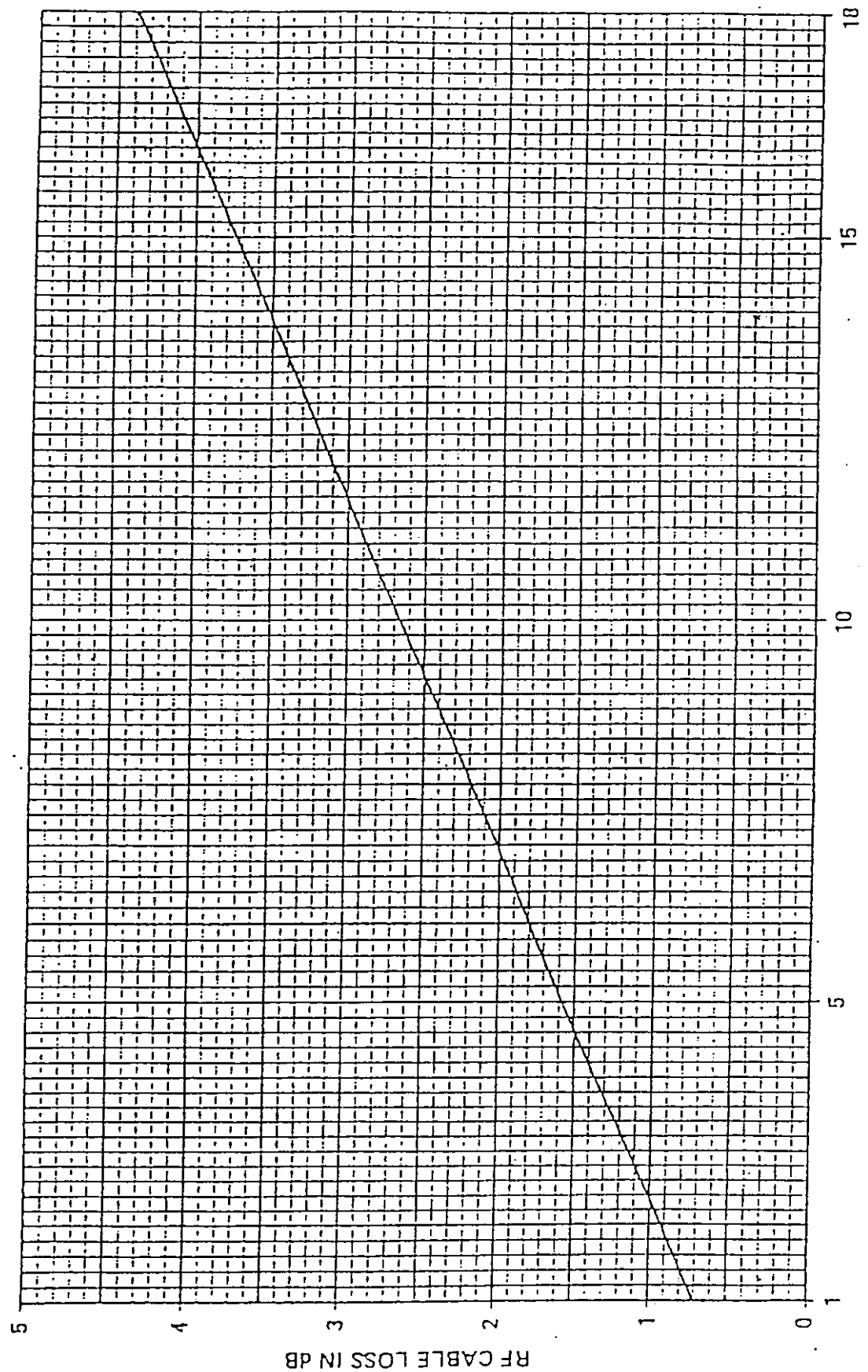


Figure 4-2. Model 94615-1 RF Cable Loss Chart

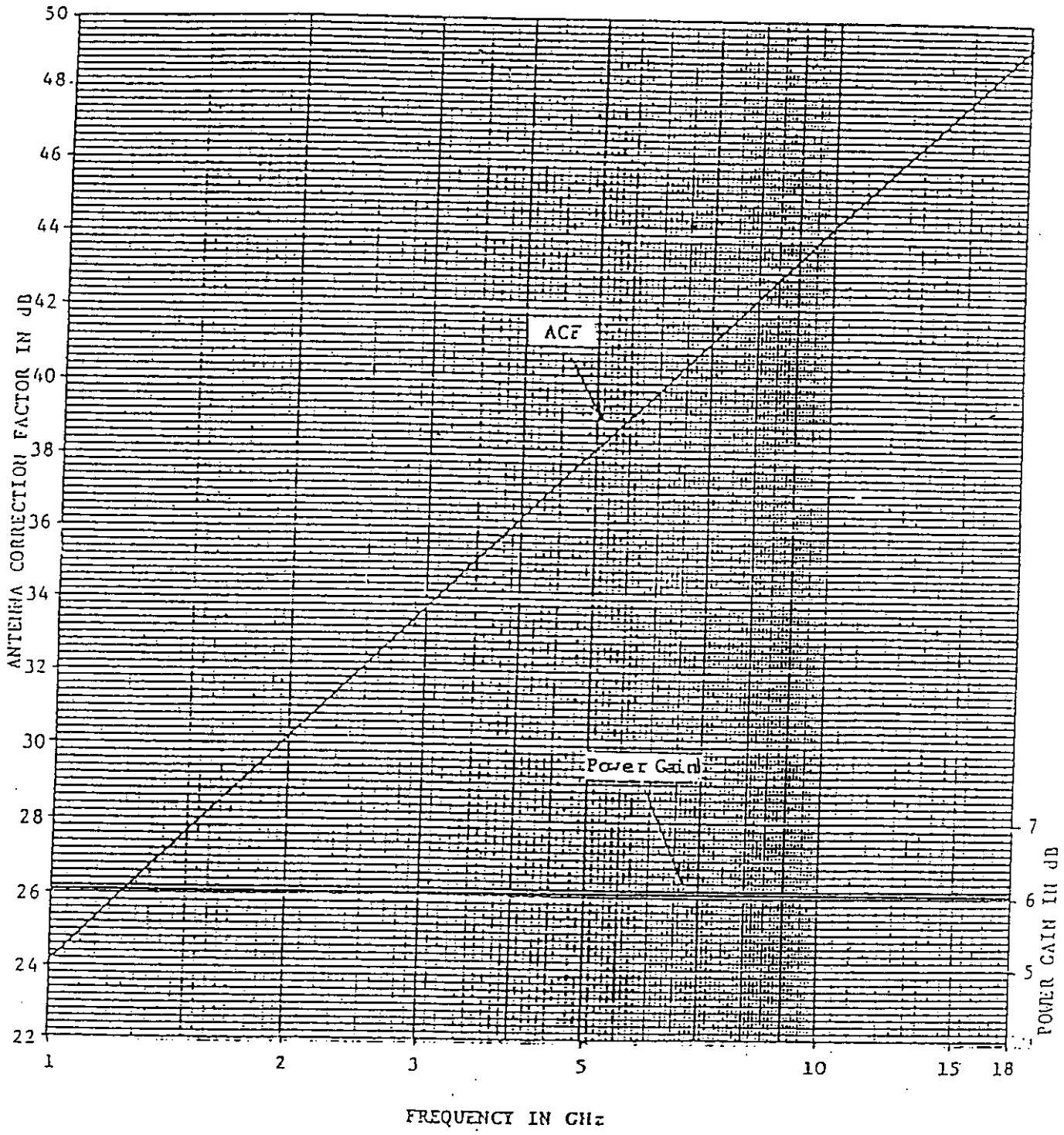


Figure 4-1. Antenna Correction Factor and Power Gain, Model 94612-1 Antenna

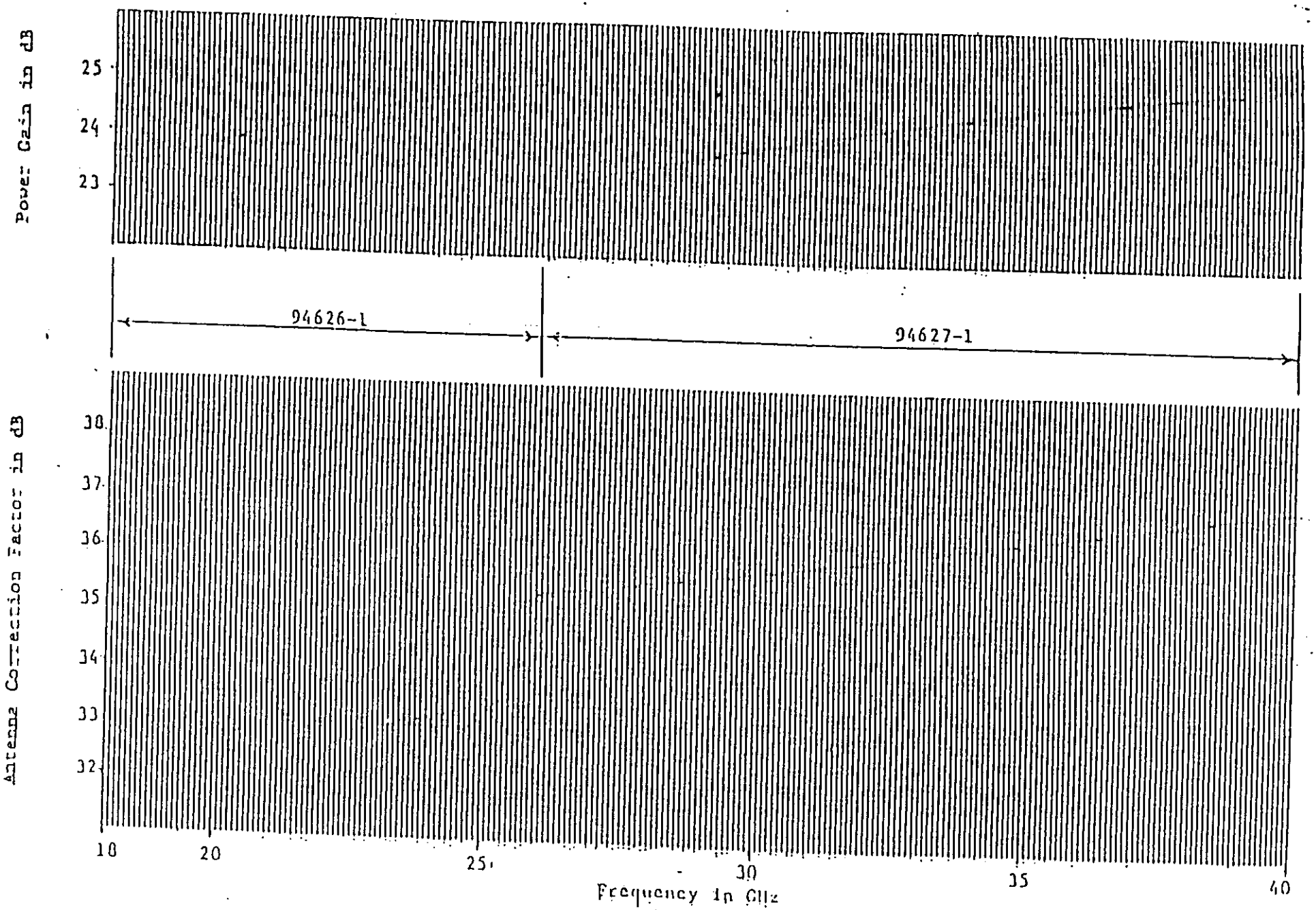
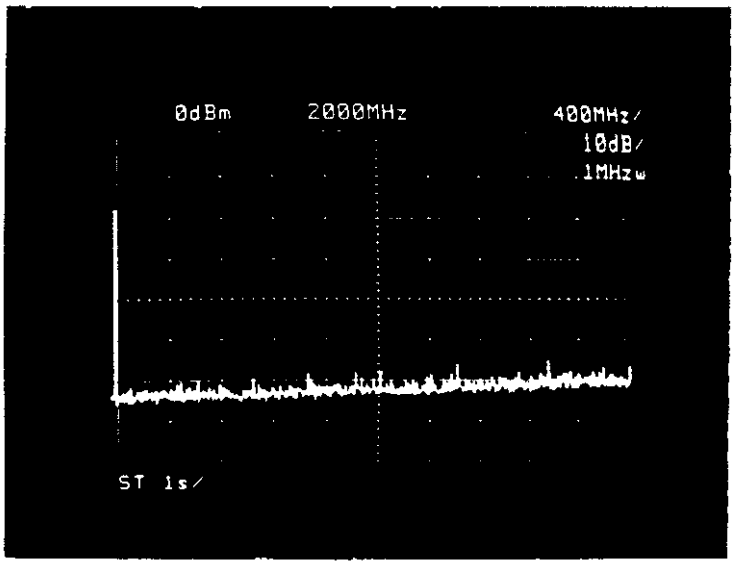


Figure 1-1. Antenna Correction Factor and Power Gain for Horn Antennas

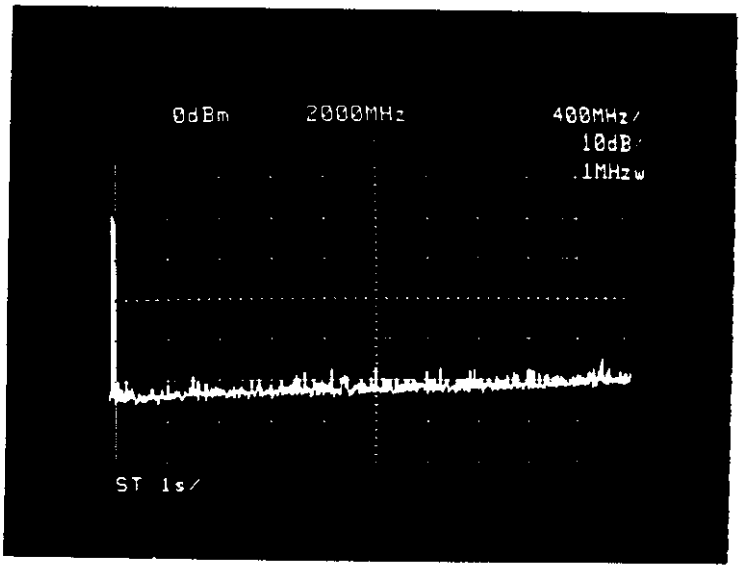
TEST #6

Frequency Band: 1～3.6 GHz Log Ref. Level: 0 dBm

Maximum Spurious Signal Observed: (See Calibration Procedure for Test 6～11)



AMBIENT

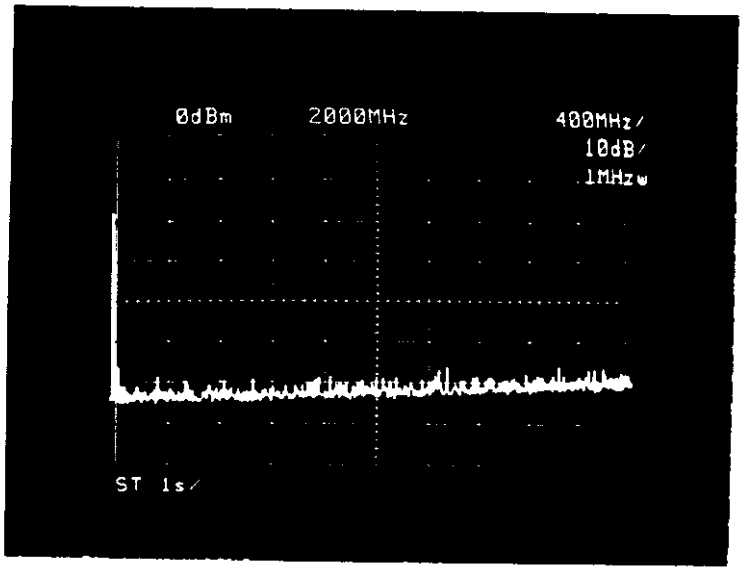


STANDBY

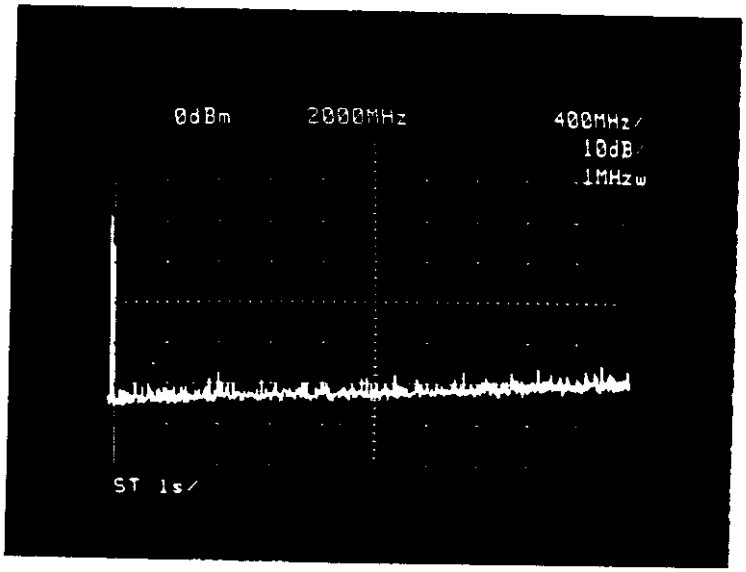
TEST #6

Frequency Band: 1～3.6 GHz Log Ref. Level: 0 dBm

Maximum Spurious Signal Observed: (See Calibration Procedure for Test 6～11)



SHORT PULSE



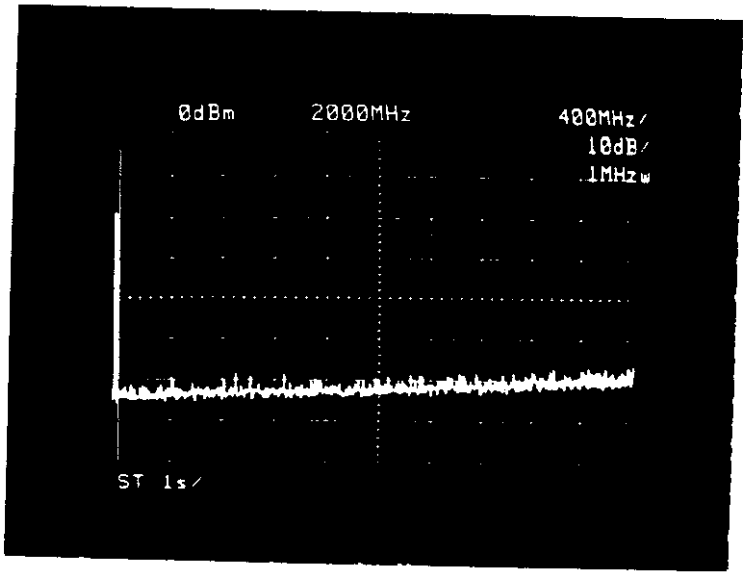
MEDIUM
SHORT PULSE

TEST #6

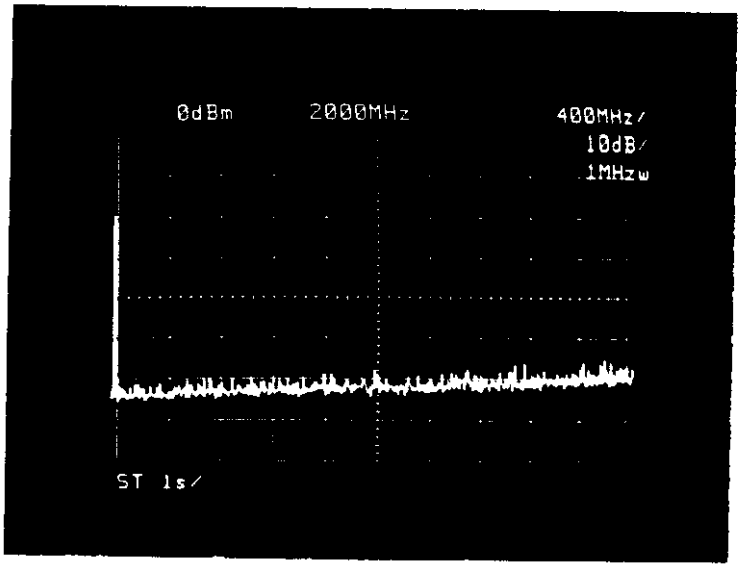
Frequency Band: 1～3.6 GHz

Log Ref. Level: 0 dBm

Maximum Spurious Signal Observed: (See Calibration Procedure for Test 6～11)



MEDIUM
LONG PULSE



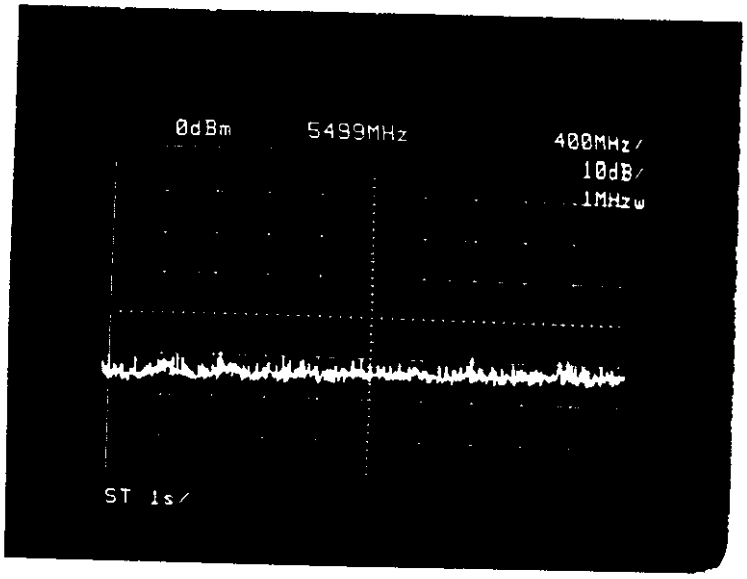
LONG PULSE

TEST #7

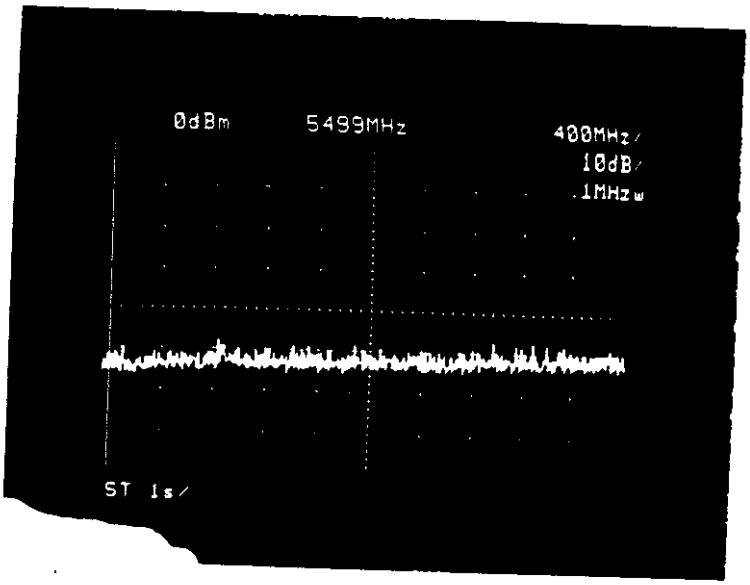
Frequency Band: 3.5～7.5 GHz

Log Ref. Level: 0 dBm

Maximum Spurious Signal Observed: (See Calibration Procedure for Test 6～11)



AMBIENT

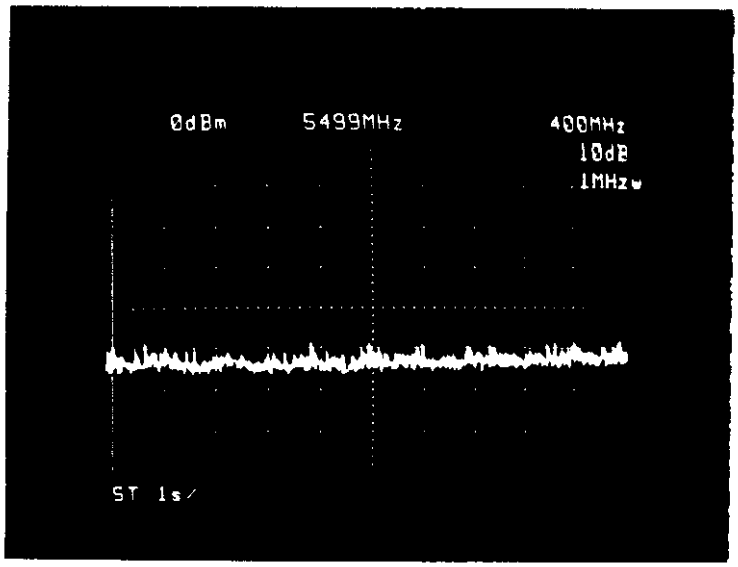


STANDBY

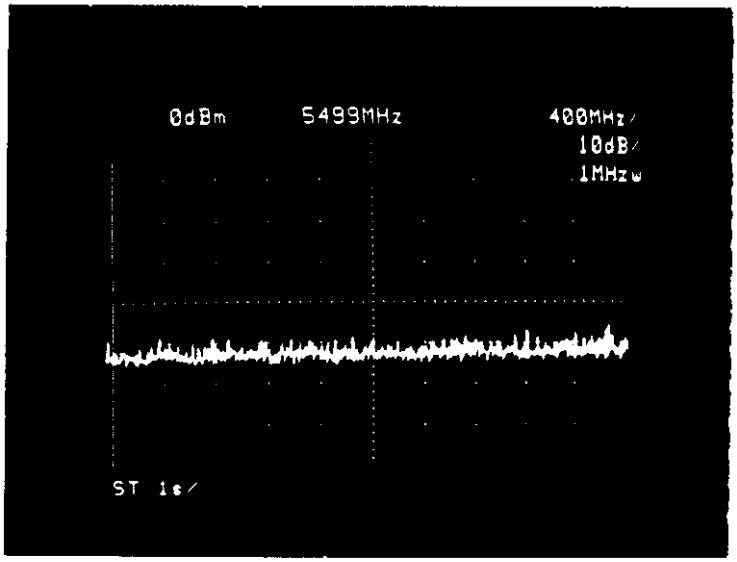
TEST #7

Frequency Band: 3.5～7.5 GHz Log Ref. Level: 0 dBm

Maximum Spurious Signal Observed: (See Calibration Procedure for Test 6～11)



SHORT PULSE

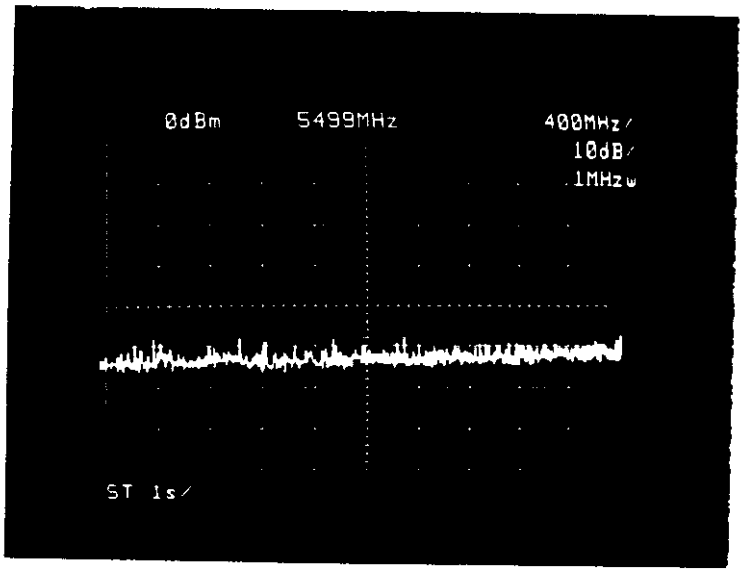


MEDIUM
SHORT PULSE

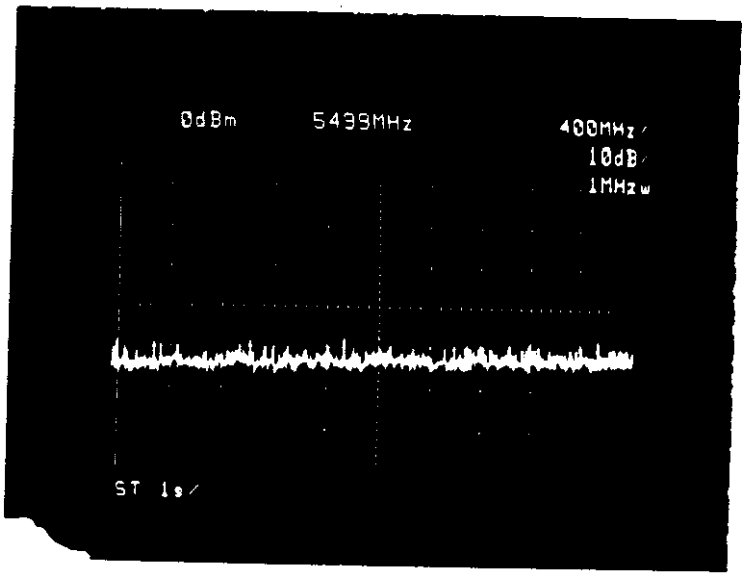
TEST #7

Frequency Band: 3.5～7.5 GHz Log Ref. Level: 0 dBm

Maximum Spurious Signal Observed: (See Calibration Procedure for Test 6～11)



MEDIUM
LONG PULSE

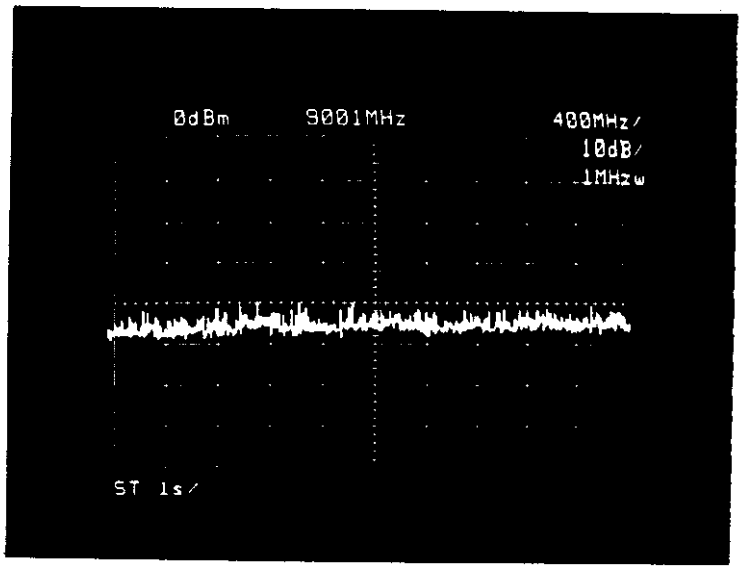


LONG PULSE

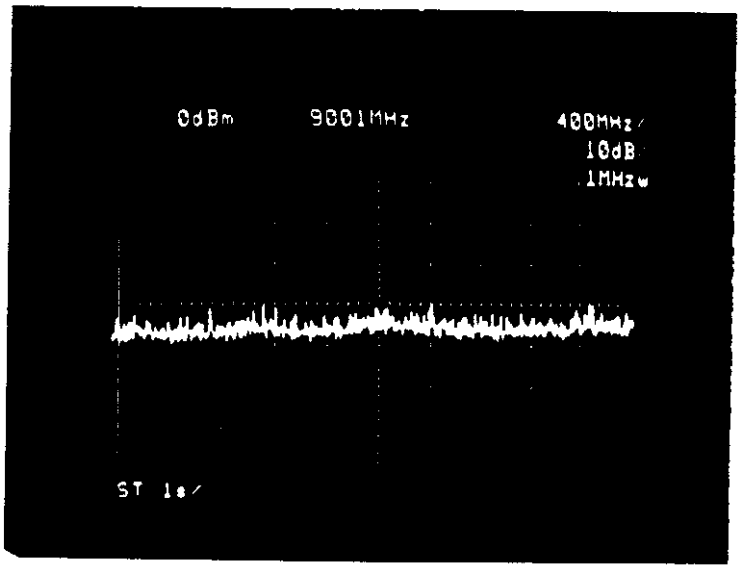
TEST #8

Frequency Band: 7～11 GHz Log Ref. Level: 0 dBm

Maximum Spurious Signal Observed: (See Calibration Procedure for Test 6～11)



AMBIENT



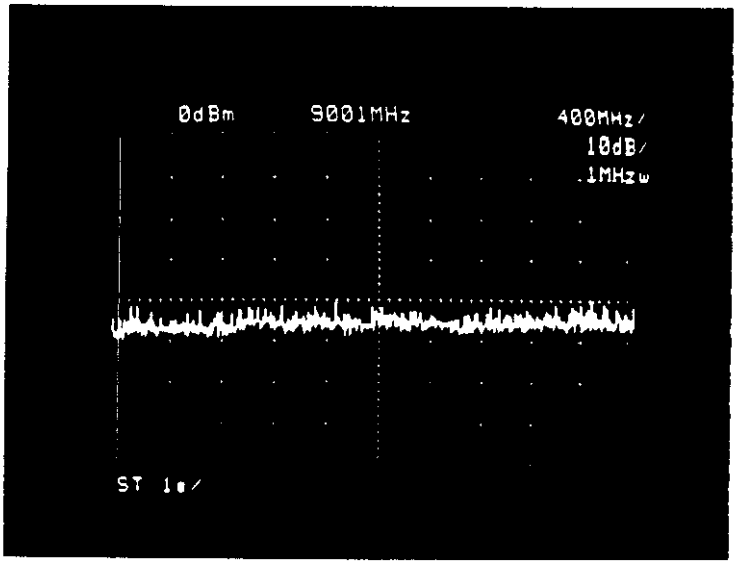
STANDBY

TEST #8

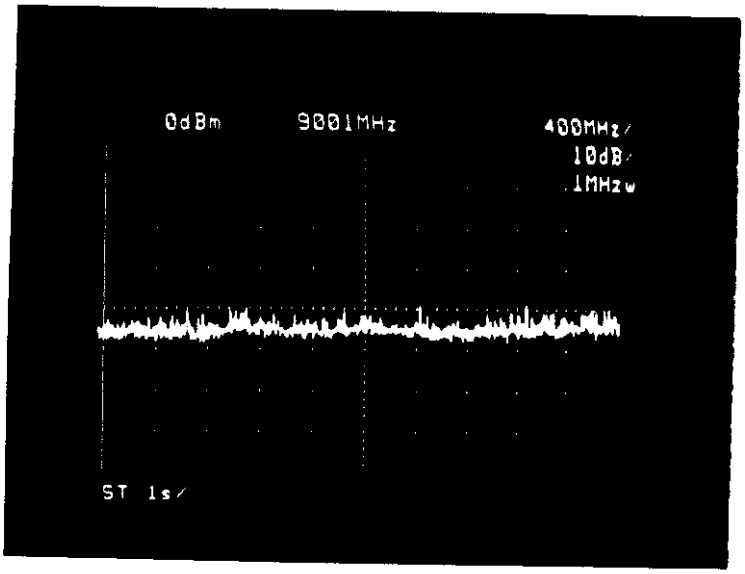
Frequency Band: 7～11 GHz

Log Ref. Level: 0 dBm

Maximum Spurious Signal Observed: (See Calibration Procedure for Test 6～11)



SHORT PULSE



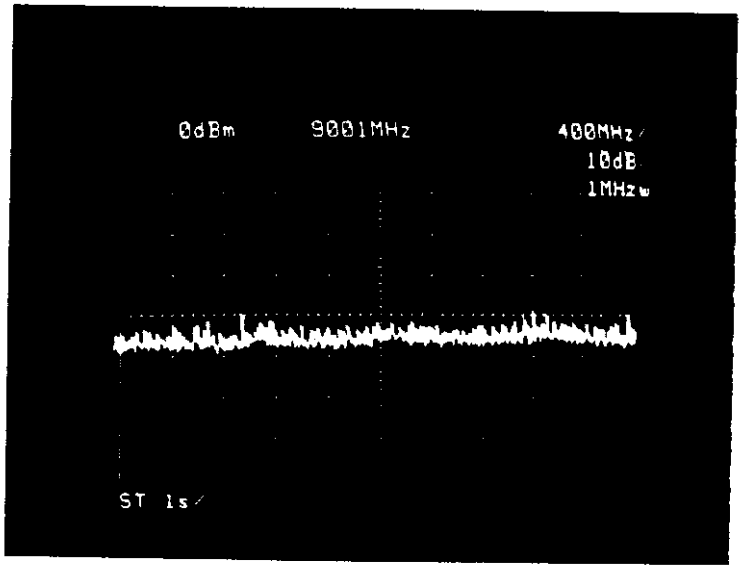
MEDIUM
SHORT PULSE

TEST #8

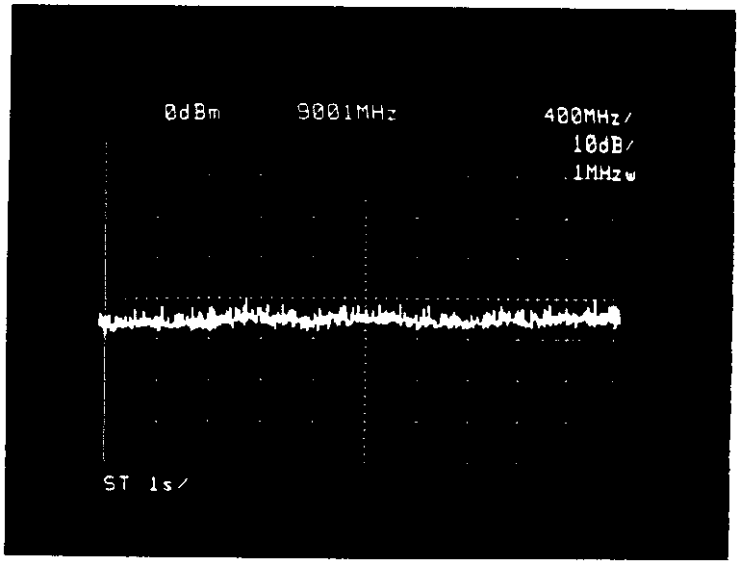
Frequency Band: 7～11 GHz

Log Ref. Level: 0 dBm

Maximum Spurious Signal Observed: (See Calibration Procedure for Test 6～11)



MEDIUM
LONG PULSE



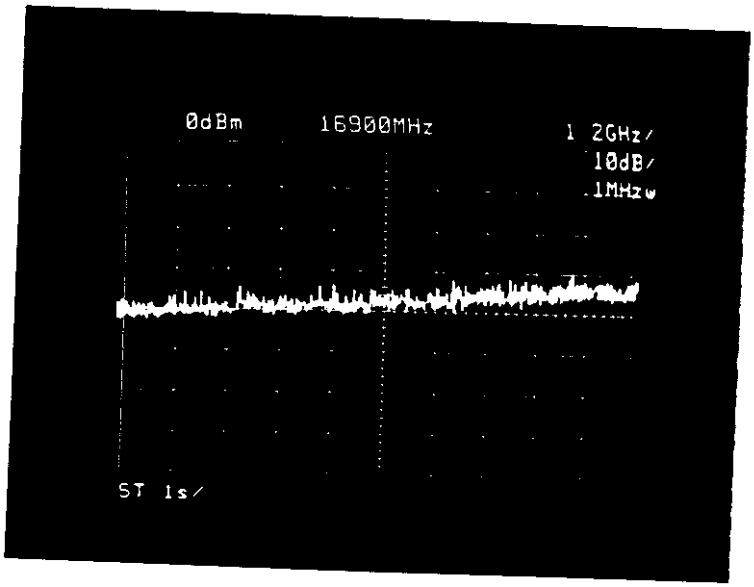
LONG PULSE

TEST #9

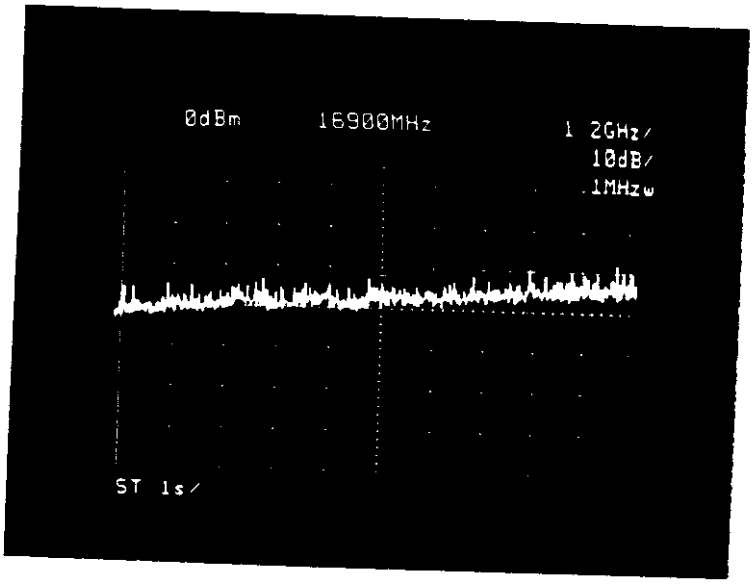
Frequency Band: 10.9～20 GHz

Log Ref. Level: 0 dBm

Maximum Spurious Signal Observed: (See Calibration Procedure for Test 6～11)



AMBIENT

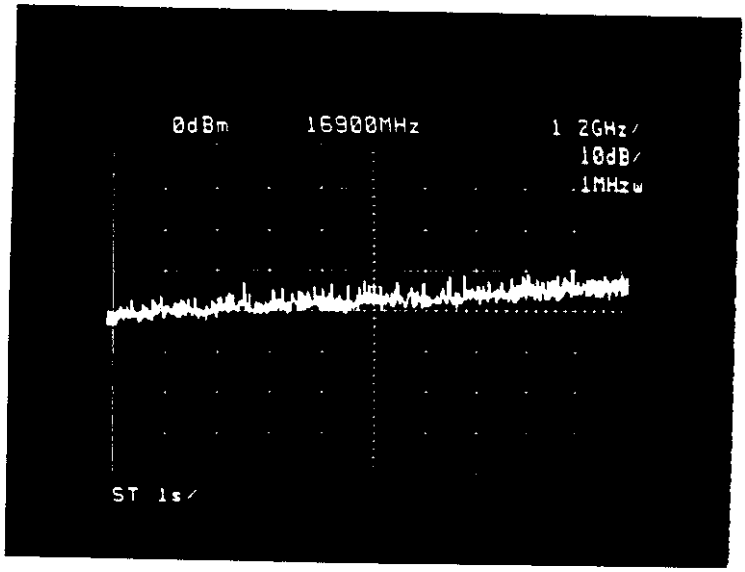


STANDBY

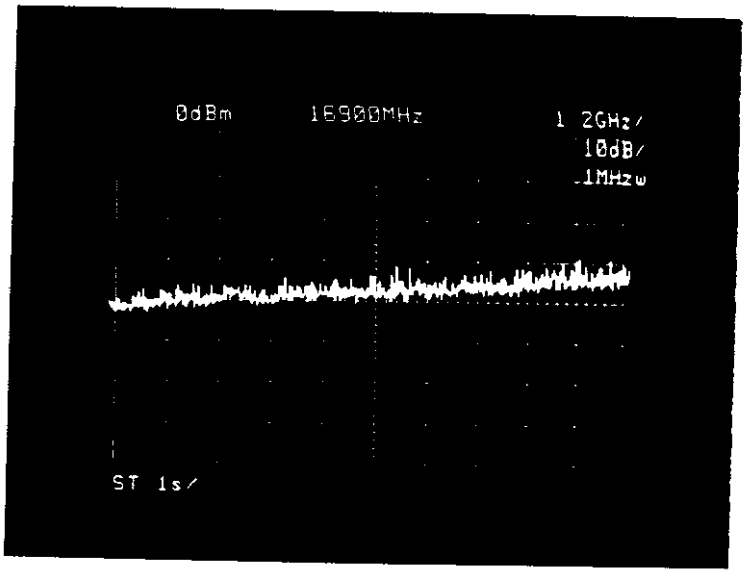
TEST #9

Frequency Band: 10.9～20 GHz Log Ref. Level: 0 dBm

Maximum Spurious Signal Observed: (See Calibration Procedure for Test 6～11)



SHORT PULSE



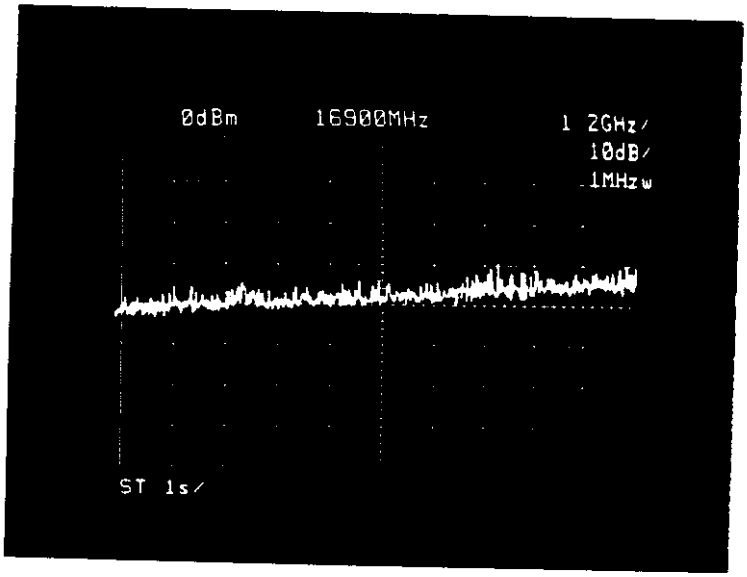
MEDIUM
SHORT PULSE

TEST #9

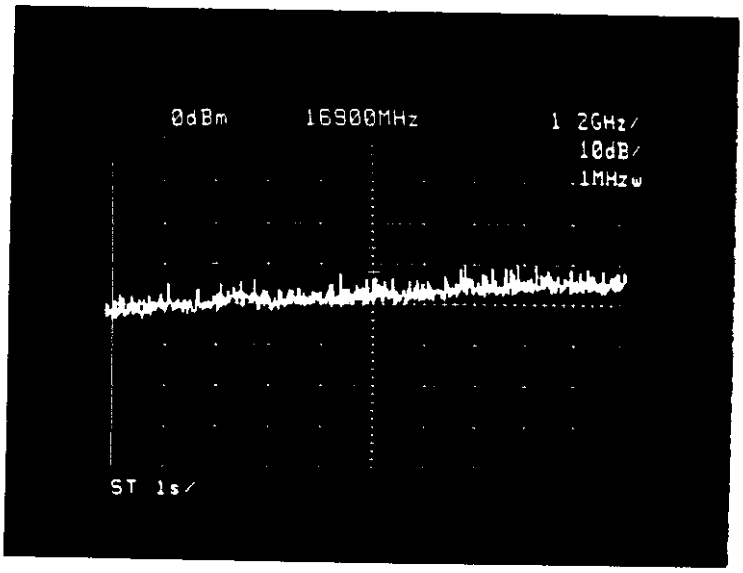
Frequency Band: 10.9～20 GHz

Log Ref. Level: 0 dBm

Maximum Spurious Signal Observed: (See Calibration Procedure for Test 6～11)



MEDIUM
LONG PULSE



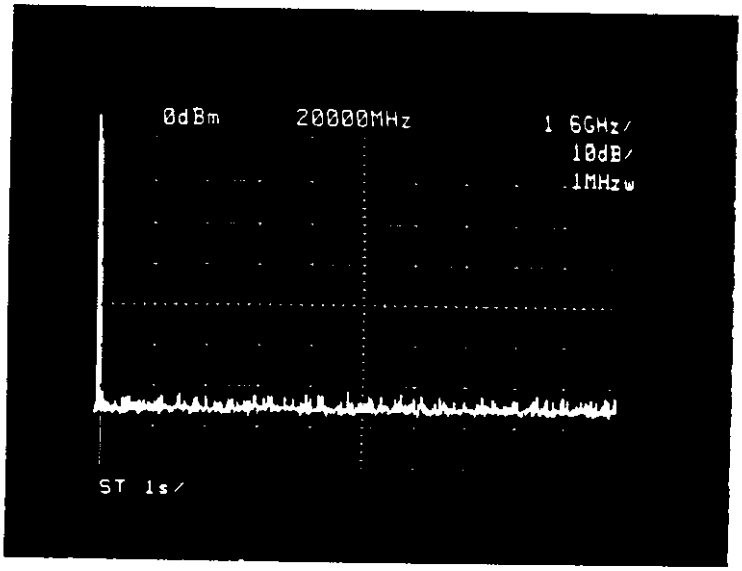
LONG PULSE

TEST #10

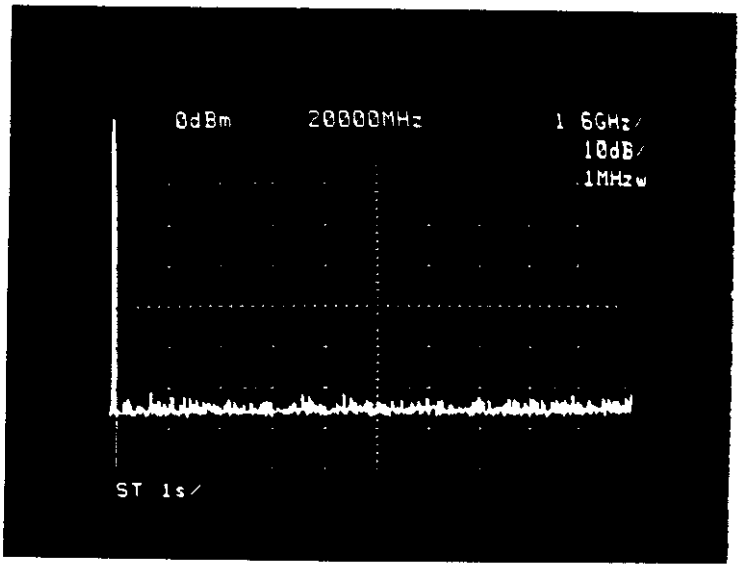
Frequency Band: 12.4～28 GHz

Log Ref. Level: 0 dBm

Maximum Spurious Signal Observed: (See Calibration Procedure for Test 6～11)



AMBIENT



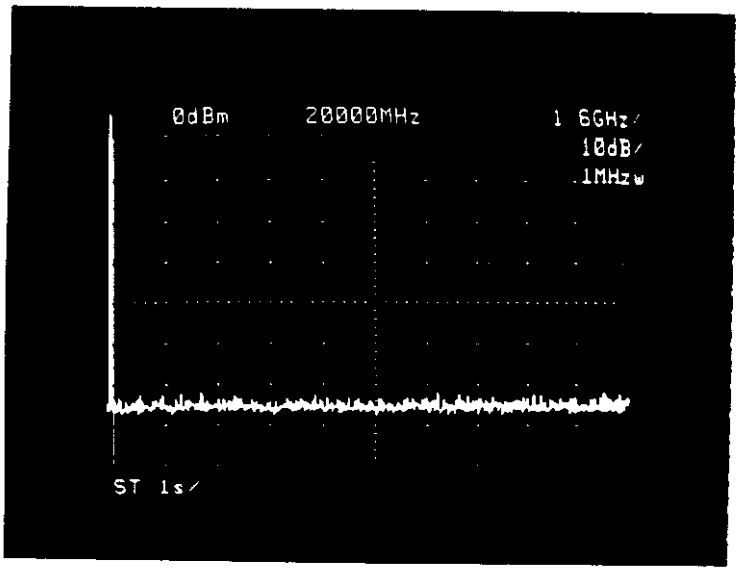
STANDBY

TEST #10

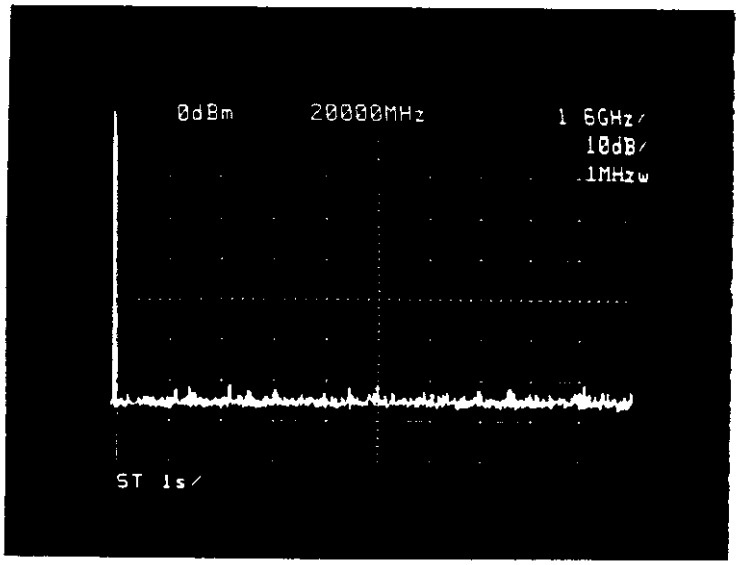
Frequency Band: 12.4～28 GHz

Log Ref. Level: 0 dBm

Maximum Spurious Signal Observed: (See Calibration Procedure for Test 6～11)



SHORT PULSE



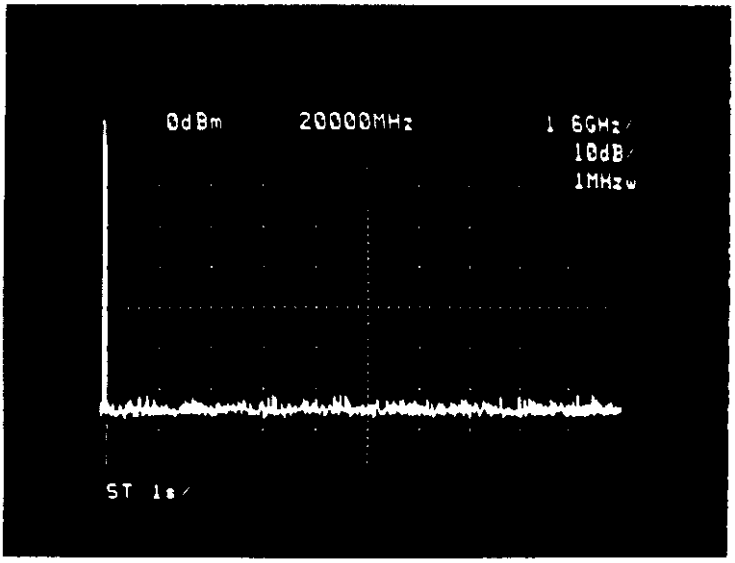
MEDIUM
SHORT PULSE

TEST #10

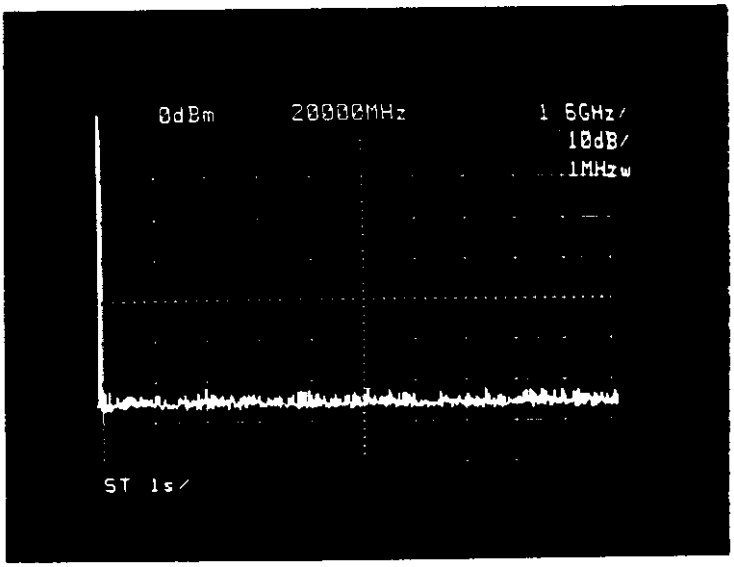
Frequency Band: 12.4～28 GHz

Log Ref. Level: 0 dBm

Maximum Spurious Signal Observed: (See Calibration Procedure for Test 6～11)



MEDIUM
LONG PULSE

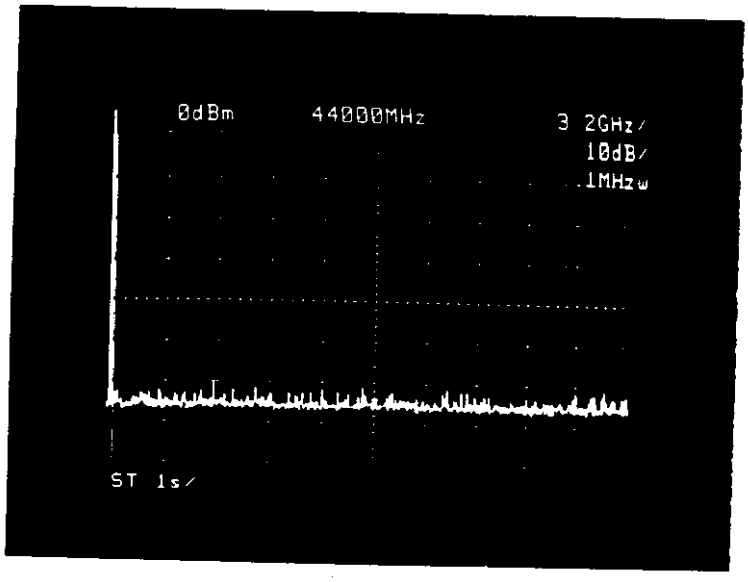


LONG PULSE

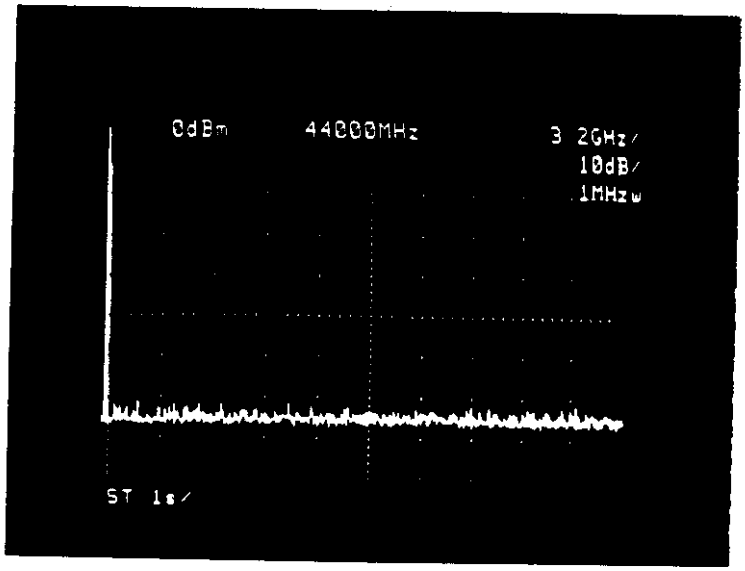
TEST #11

Frequency Band: 28～60 GHz Log Ref. Level: 0 dBm

Maximum Spurious Signal Observed: (See Calibration Procedure for Test 6～11)



AMBIENT



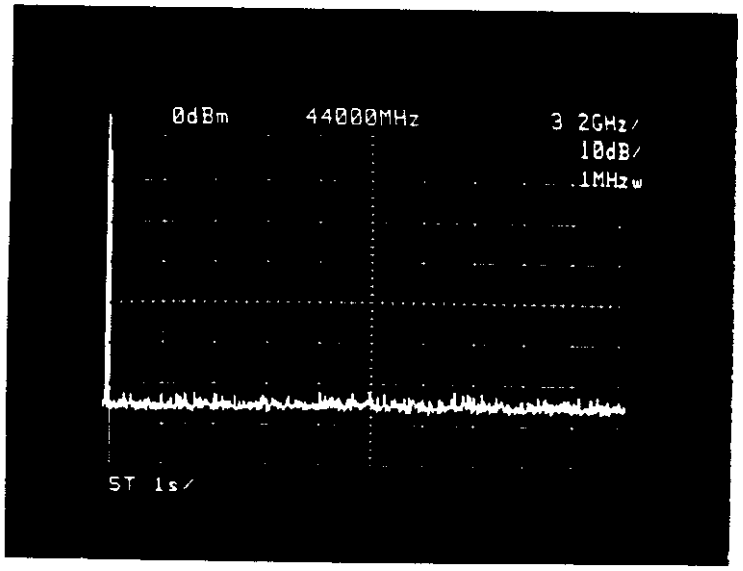
STANDBY

TEST #11

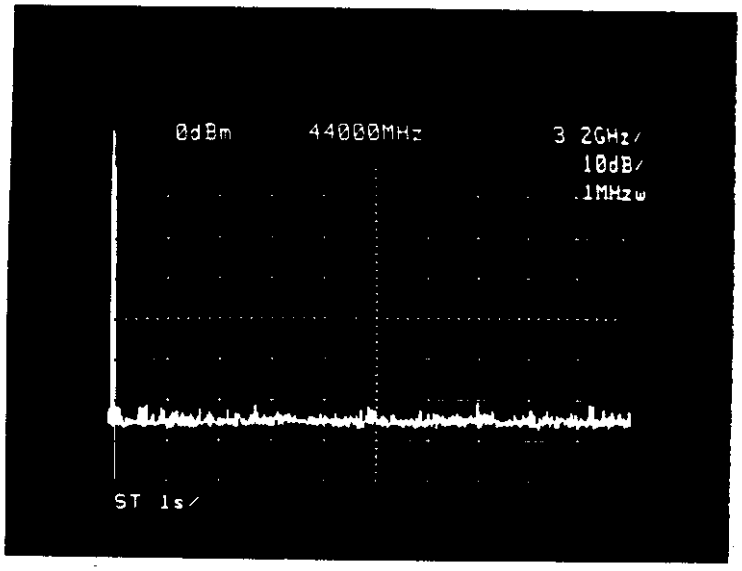
Frequency Band: 28～60 GHz

Log Ref. Level: 0 dBm

Maximum Spurious Signal Observed: (See Calibration Procedure for Test 6～11)



SHORT PULSE

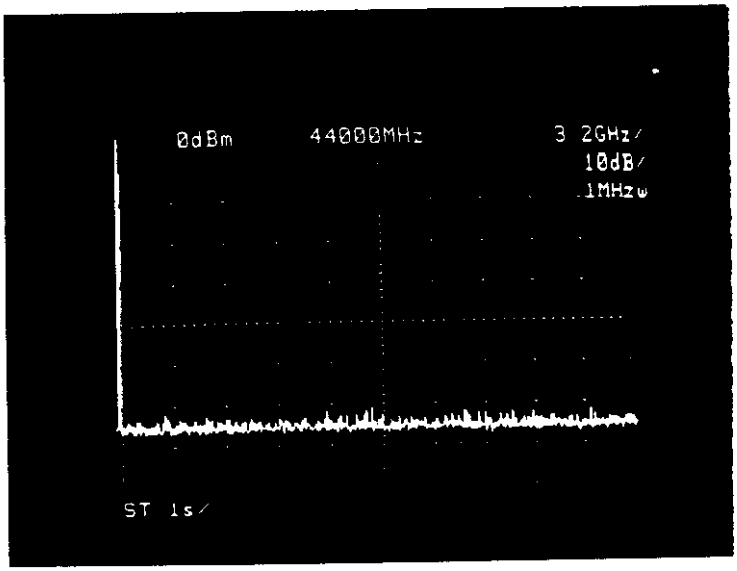


MEDIUM
SHORT PULSE

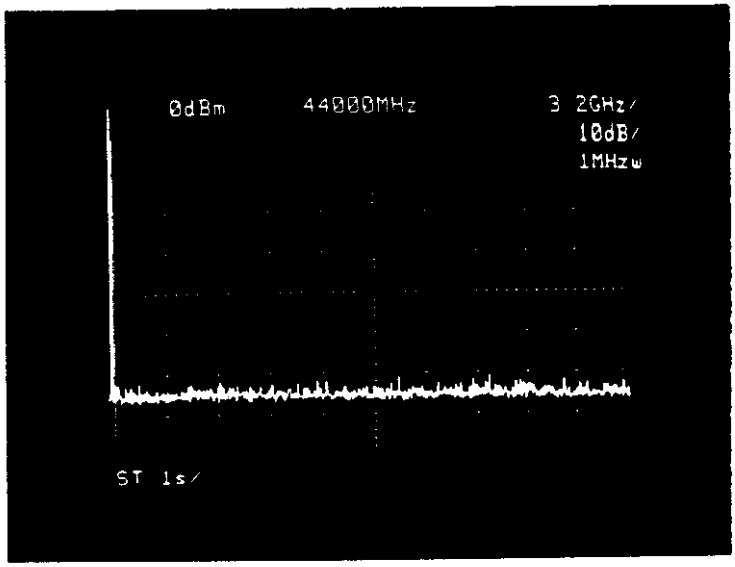
TEST #11

Frequency Band: 28～60 GHz Log Ref. Level: 0 dBm

Maximum Spurious Signal Observed: (See Calibration Procedure for Test 6～11)

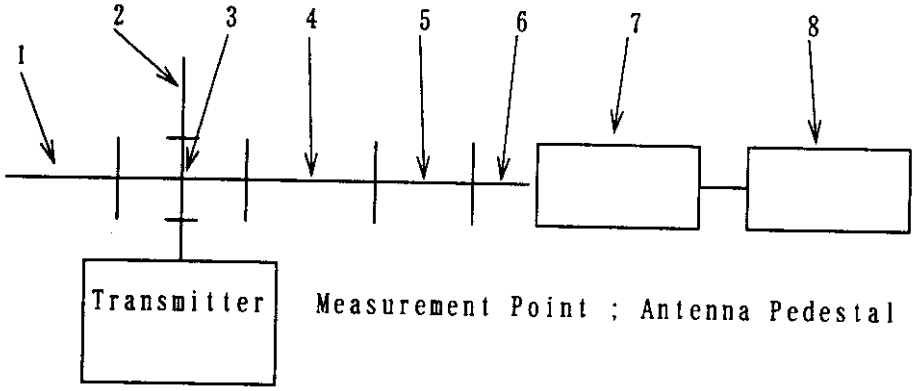


MEDIUM
LONG PULSE



LONG PULSE

(Sec. 2. 995) 4. 0 Frequency Stability



Measurement Point ; Antenna Pedestal Output

1	Dummy Load	X910B	HP
2	High Power Dummy Load	4D371A	Shimada
3	Directional Coupler	5D351	Shimada
	Coupling 20 dB		
	Directivity 20 dB		
4	Frequency Meter	X532B	HP
5	Attenuator	X382A	HP
6	Adapter	X281A	HP
7	Power Sensor	8481A	HP
8	Power Meter	435A	HP
	Temperature Chamber		Onisi Netugaku

Measurement Procesure

1 The antenna pedestal and display unit were set up in the temperature chamber and the measurement equipment were set outside the temperature chamber.

2 With power removed, the temperature was decreased to 30 and permitted to stabilize for three hours. Power was applied and measured warm up time. After 30 minutes place the radar in X MIT, mesured frequency at 10. 8V, 24V, 42V.

3 With power off, the temperature was raised in 10 steps. The sample was permitted to stabilize at each step for at least three hours. Power was applied and measured warm up time. After 30 minutes place the radar in X MIT, measured frequency at 10. 8V, 24V, 42V.

Temperature	Operating Frequeny MHz												Warm Up Time
	Short Pulse			Medium Short Puls			Medium Long Puls			Long Pulse			
	10. 8V	24. 0V	42. 0V	10. 8V	24. 0V	42. 0V	10. 8V	24. 0V	42. 0V	10. 8V	24. 0V	42. 0	
-30	9410	9410	9410	9410	9410	9410	9410	9409	9409	9409	9409	9409	1' 30"
-20	9409	9409	9409	9409	9408	9408	9408	9408	9408	9408	9408	9408	1' 30"
-10	9408	9408	9408	9407	9407	9407	9407	9407	9407	9407	9407	9407	1' 30"
0	9407	9406	9406	9406	9406	9406	9406	9406	9406	9406	9406	9406	1' 30"
+10	9405	9405	9405	9405	9405	9405	9405	9405	9405	9405	9405	9405	1' 30"
+20	9404	9403	9403	9403	9403	9403	9403	9403	9403	9403	9403	9403	1' 30"
+30	9402	9402	9402	9402	9402	9402	9402	9402	9402	9402	9402	9402	1' 30"
+40	9401	9401	9401	9401	9401	9401	9401	9401	9401	9400	9400	9400	1' 30"
+50	9400	9399	9399	9399	9399	9399	9399	9398	9398	9398	9398	9398	1' 30"
+55	9398	9398	9398	9398	9398	9398	9397	9397	9397	9397	9397	9397	1' 30"

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NAME OF TEST: RECEIVER RADIATED EMISSIONS

PARAGRAPHS:

15.109: RADIATION INTERFERENCE LIMITS
15.231(b): FIELD STRENGTH OF EMISSIONS FROM INTENTIONAL RADIATORS
15.33: FREQUENCY RANGE OF RADIATED MEASUREMENTS
80.217: SUPPRESSION OF INTERFERENCE ABOARD SHIPS

GUIDE: SEE MEASUREMENT PROCEDURE BELOW

TEST CONDITIONS: STANDARD TEMPERATURE & HUMIDITY

TEST EQUIPMENT: AS PER ATTACHED PAGE

SEARCH ANTENNAS:

1GHz - 18 GHz: LOGPERIODIC ANTENNA 94612-1
18GHz - 26.5 GHz: HORN ANTENNA 94626-1
26.5GHz - 40 GHz: HORN ANTENNA 94627-1

MEASUREMENT PROCEDURE

1. At first, bench tests were performed to locate the spurious emissions at the antenna terminals.

2. In the field, tests were conducted over the range shown. The test sample was set up on a wooden turntable above ground, and at a distance of three meters from the antenna connected to the Spectrum Analyzer.

3. In order to obtain the maximum response at each frequency, the turntable was rotated, and the search antennas were raised and lowered. The E.U.T. was also adjusted for maximum response. Tests conducted in Horizontal & Vertical polarization modes.

4. The field strength was calculated from:

$$E\ V/m\ @\ 3\ m = \mathrm{LOG10}^{-1}\frac{(dBm + 107 + A.F. + C.L.)}{20}$$

5. MEASUREMENT RESULTS: ATTACHED FOR WORST CASE CONDITIONS.

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MEASUREMENT RESULTS: RECEIVER RADIATED EMISSIONS

SPECTRUM SEARCHED	= 0 to 10 x Fc
WORST CASE	= V
LIMITS	= 15.109(a)
RESTRICTED BAND MEASUREMENTS	= 15.205
ALL OTHER EMISSIONS	= ≥ 20 dB BELOW LIMIT

TESTS WERE CONDUCTED WITH:

a. All controls and switches operated.
b. Half-wave dipole antenna or manufacturer/applicant supplied antenn a.

SAMPLE CALCULATION:

EMISSION FREQUENCY, MHz =Less then noise level

$$\text{LEVEL} = \text{LOG10-1}\ \frac{(-46.5 + 107 + 45)}{20}$$

LEVEL, ·V/m @ 3 m = 188364.9
LEVEL, ·V/m @ 1 N.M. = 304.8

RESULTS

RADIATED RECEIVER SPURIUS EMISSIONS

All other emissions in the range specified by rule 15.33 (b) were that 20dB below the limits of 15.109(a).

TUNED, MHz	EMISSION, MHz	PEAK	RBW, kHz	VBW, kHz	A.F, C.L dB	μV/m @3m	μV/m @1N.M.
9404	9384	P	30.0	30.0	45	188364.9	304.8