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MFA M. Flom Associates, Inc. - Global Compliance Center

3356 North San Marcos Place, Suite 107, Chandler, Arizona 85225-7176
www.mflom.com general@mflom.com (480) 926-3100, FAX: 926-3598

TOTAL PAGES:	2
DATE:	June 2nd, 1999
VIA FAX:	1 301 344 2050
TO:	Federal Communications Commission,
ATTENTION:	George Tannahill
APPLICANT:	JAPAN RADIO CO. LTD.
EQUIPMENT:	FCC ID: CKEJMA3925 Confirm. EA92689
SUBJECT:	Your Correspondence Reference No. 7989

Covered
Letters

Hi George:

Further to your e-mail abovenoted, attached please find fax from the Applicant consenting to the measured power output of 15.2 kW on the FCC grant, as per your suggestion.

We will look forward to receiving the Grant A.S.A.P.

Any news yet on the CKEJMA3910 (EA92701)?

Regards,



MORTON FLOM, P. Eng.

mf;mgf
enc.



Japan Radio Co., Ltd.

2125 CENTER AVENUE, SUITE 208 • FORT LEE, NJ 07024 • PHONE: (201) 242-1882 • FAX: (201) 242-1885

FACSIMILE MESSAGE

From: Robert Scheel

Pages: 1
(including this one)

June 2, 1999

To: M. Flom Associates, Inc. 480 926-3598

Attn: Mr. Morton Flom

RE: FCC ID CKEJMA-3925/ Your fax of 5/27/99

We wish to confirm that it is acceptable to list the power output as 15.2 kW on the FCC grant, as was suggested by the FCC.

Thanks for your assistance in this matter.

Best regards.

cc: Mr. G. Usui, JRC New York.

FCC LABORATORY
OFF

MFA M. Flom Associates, Inc.
Global Compliance Center

3356 North San Marcos Place, Suite 107
Chandler, Arizona 85224-1571
(602) 926-3100, FAX: 926-3598

** NEW PHONE NO. = 480 926 3100 NEW FAX: 480 926 3598
www.goodnet.com/~mflom

NEW electronic addresses: www.mflom.com general@mflom.com

April 1st, 1999.

Federal Communications Commission,
Office of Eng'g & Technology,
7435 Oakland Mills Road,
Columbia, Maryland 21046.

Attention: Bill Inglis, Electronics Engineer
Applicant: JAPAN RADIO CO. LTD.
Equipment: FCC ID: CKEJMA3925 EA92689 Corresp. Ref. 6570

Hi Bill: Seems like you are back in 'harness' - they
 say 'you can't keep a good man down'! Heard
 Phil has retired. Are you looking forward to
 your turn?

This letter is in reply to your e-mail of 03/15/99 in which you
mentioned certain pages in the Report. Since JRC did not number
their pages, to avoid confusion, we thought it best to send you
a complete copy of their report which has been 'lazer jet printed'
by a professional copy service. Hope this will clarify matters
for you.

It's good to hear from you - once in a while.

Via con Dios, Adios Amigo
and Happy Easter

Morton Flom
MORTON FLOM, P. Eng.

mf;mgf

encs.
CERTIFIED MAIL, R.R.R.

TEST DATA OF JMA-3925

Type	JMA-3925	Ser. No. LS54966
Scanner Unit	NKE-1056	Ser. No. LS35365
Display Unit	NCD-3870	Ser. No. LS24966
Ship's Main	DC24V	

Date OCT. 20. 1998

Section Chief

M. Sudoh

Inspector

K. Gusa

1 Mechanical Tests

Apperance and Structure

Scanner Unit	Good
Display Unit	Good

2 Electrical Tests

2.1 Working of each operation unit

Scanner Unit	Good
Display Unit	

(1) By Knob

EBL/VRM	Good
SEA CLUTTER	Good
RAIN CLUTTER	Good
GAIN	Good
TUNE	Good
BRILL	Good
POWER SUPPLY	Good

(2) By Switches

MAIN MENU	Good
SUB MENU	Good
ENT	Good
RANGE △	Good
RANGE ▽	Good
PANEL DIM	Good
DAY/NIGHT	Good
RANGE RINGS	Good
BEARING	Good
PULSE WIDTH	Good
TM RESET	Good
TM/RM	Good
OFFCENT	Good
SHM	Good
ACK	Good
VRM/VRM OFF	Good
EBL/EBL OFF	Good
FUNC	Good
ALARM	Good
TX/ST-BY	Good
TEN KEY (0 ~ 9)	Good
CLR	Good
ReverseKey	Good
DATE READ	Good
ACQ	Good

(3) Special keys

FEBL	Good
VECT +	Good
VECT -	Good
VECT	Good
Enlarging/Reducing Key	Good
DEST	Good
MAKER Key	Good
TRACK	Good
Starting Point Key	Good
End Point Key	Good
CANCEL TARGET	Good
MARK	Good
OWN TRACK	Good

2.2 Scanner unit

VSWR	frequency (MHz)	VSWR
	9380	1.35
	9410	1.15
	9440	1.40
Scanner Rotation Speed		20 rpm

2.3 Transmitter

Magnetron Ser. No.	A3523A
Operating Frequency (at 0.5 n. m.)	9420 MHz
(at 1.5 n. m.)	9420 MHz
(at 3 n. m.)	9419 MHz
(at 6 n. m.)	9419 MHz
(at 24 n. m.)	9417 MHz
Peak Output Power (at 0.5 n. m.)	14.2 KW
(at 1.5 n. m.)	14.1 KW
(at 3 n. m.)	14.6 KW
(at 6 n. m.)	15.1 KW
(at 24 n. m.)	15.2 KW
Pulse Length (at 0.5 n. m.)	0.11 μ S
(at 1.5 n. m.)	0.24 μ S
(at 3 n. m.)	0.44 μ S
(at 6 n. m.)	0.88 μ S
(at 24 n. m.)	1.22 μ S
Diode limiter Ser. No.	B6186A

2.4 Receiver

MIC Frontend Ser. No.	B3124A
IF Center Frequency	60 MHz
IF Band Width	20 MHz/ 6 MHz/ 3 MHz

2.5 Display

Input Voltage and Current

(at 0.5 n. m.)	24V 2.3A
(at 1.5 n. m.)	24V 2.4A
(at 3 n. m.)	24V 2.5A
(at 6 n. m.)	24V 2.5A
(at 24 n. m.)	24V 2.5A

Repetition Frequency

(at 0.5 n. m.)	2082 Hz
(at 1.5 n. m.)	2082 Hz
(at 3 n. m.)	1562 Hz
(at 6 n. m.)	781 Hz
(at 24 n. m.)	521 Hz

3 Overall Tests

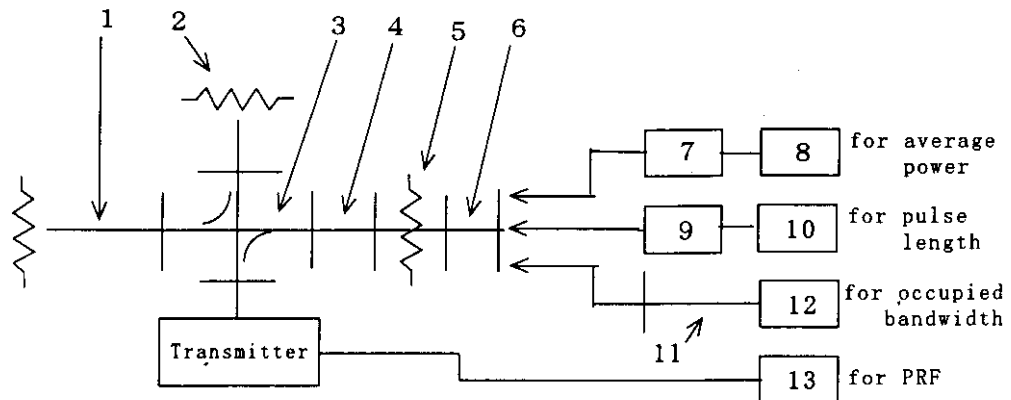
Working time of Timer	3 min
Input Variation (21.6 V dc - 26.4 V dc)	Good
Overall Sensitivity	Good
Minimum Range	Good
Bearing Accuracy	Good
Mechanical Noise	Good

TEST INSTRUMENTATION LIST

Dummy Load	X910B	HP
High power Dummy Load	4D371A	Shimada
Directional Coupler -1	R11421 Coupling 30dB Directivity 30dB	Shimada
Directional Coupler -2	5D351 Coupling 20dB Directivity 20db	Shimada
Adaptor	X281A	HP
Attenuator	X382A	HP
Tapered W/G -1	195X KU	AIRCOM
Tapered W/G -2	11818A	HP
Tapered W/G -3	11519A	HP
Tapered W/G -4	11520A	HP
External Mixer	11517A	HP
Coaxial Cable-1	10503A	HP
Coaxial Cable-2	MI 04	Takeda Riken
Spectrum Analyzer -1	TR4133B	TAKeda Riken
Spectrum Analyzer -2	8563E	Hewlett Packard
Oscilloscope	465B	SONY/Tectronix
Frequency Counter	5300A	HP
Crystal Detector	423B	HP
Frequency Meter	X532B	HP
Power Meter	435A	HP
Power Sensor	8481A	HP
Signal Generator	TR4511	ADVANTEST
Test Antenna -1	1/2 Coaxial(Untuued)	
Test Antenna -2	AILTECH 94612-1	Log Peliodic
Test Antenna -3	AILTECH 94626-1	HP-11519A
Test Antenna -4	AILTECH 94627-1	HP-11519A
Temperature Chamber	-30 °C ~ +80 °C	Onisi Netugaku
Chield Room	31040/SIT1300F2	TDK

1.3 Load Impedance

(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	8563E	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.)	14. 2 KW
	(at 1. 5 n. m.)	14. 1 KW
	(at 3. 0 n. m.)	14. 6 KW
	(at 6. 0 n. m.)	15. 1 KW
	(at 24 n. m.)	15. 2 KW

1. 2 Average Power	(at 0. 25 n. m.)	3. 25 W
	(at 1. 5 n. m.)	7. 05 W
	(at 3. 0 n. m.)	10. 0 W
	(at 6. 0 n. m.)	10. 4 W
	(at 24 n. m.)	9. 65 W

VSWR 1. 05 at 9. 4 - 9. 5 GHz

Type

4D371A (Shimada co.)

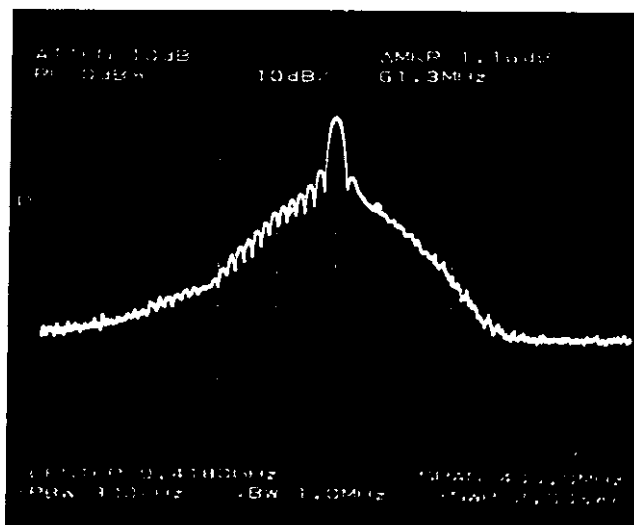
(Sec. 2.989)

2.0 Occupied Bandwidth

2.1 Short Pulse PRF 2082 Hz

Short Pulse Length 0.11 μ S

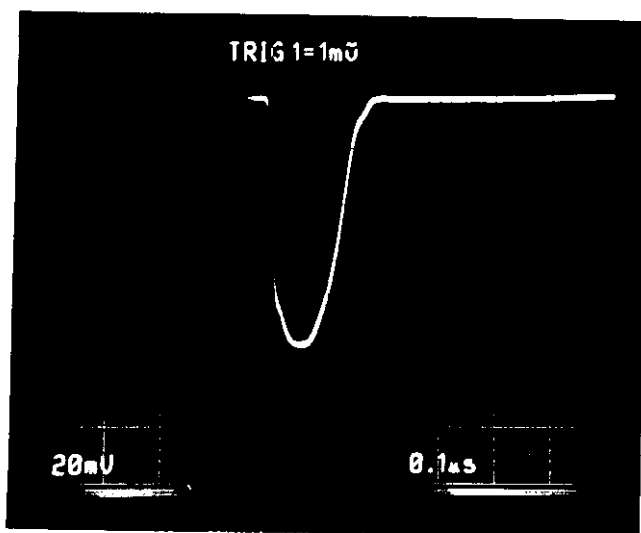
Scale
10dB/Div



Scale 40 MHz/ Div
Center Frequency 9418 MHz

(Sec. 2.987)

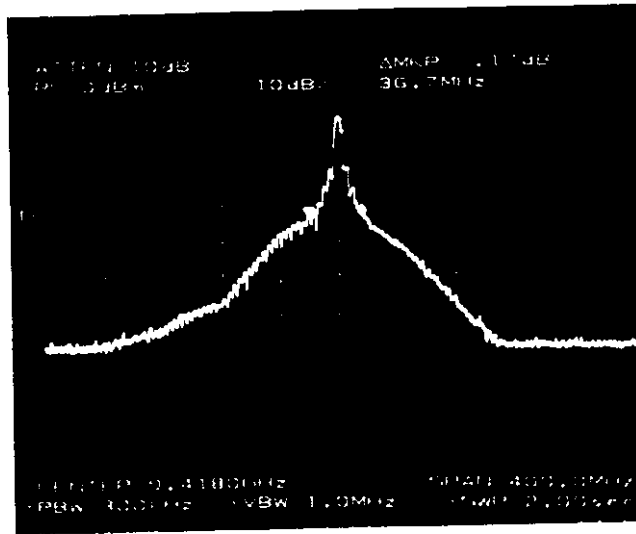
Scale
20mV/Div



Scale 100ns/Div

(Sec. 2.989) 2.2 ShortMedium Pulse PRF 2082 Hz
 ShortMedium Pulse Length 0.24 μ S

Scale
10dB/Div



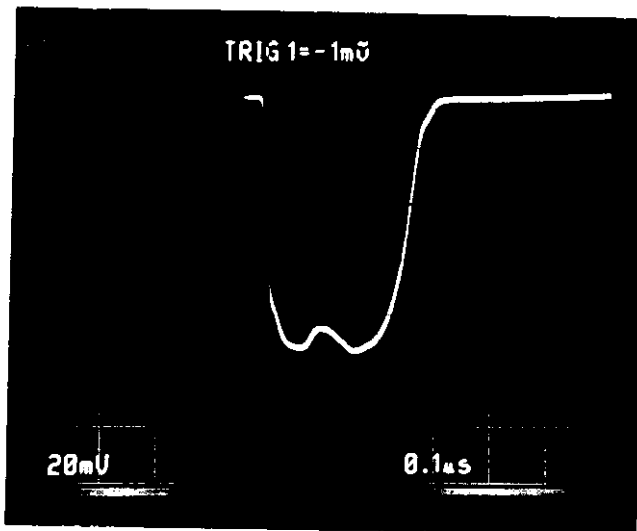
RF Spectrum
ShortMedium Pulse

OBW=36.7 MHz

Scale 40 MHz/ Div
Center Frequency 9418 MHz

(Sec. 2.987)

Scale
20mV/Div



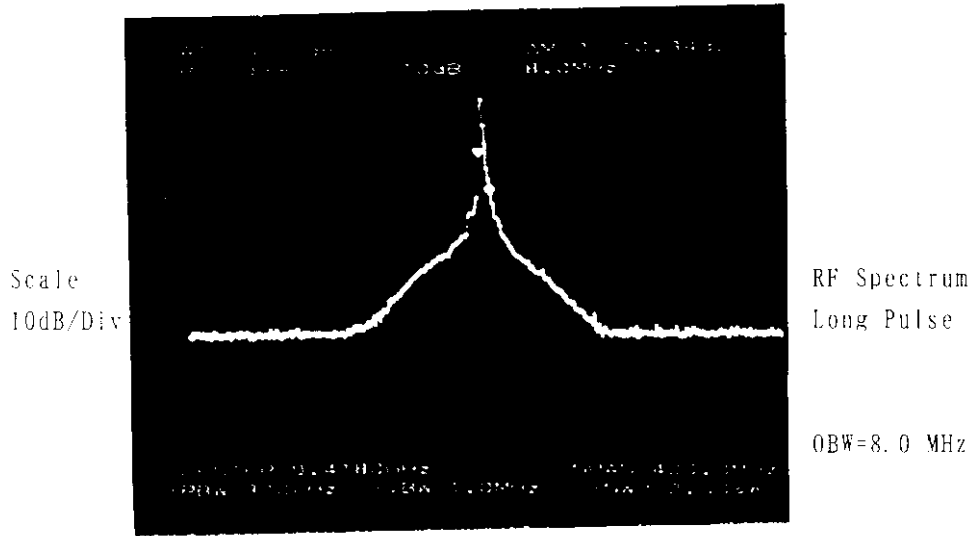
← 3dB

Detected RF
Pulse

Short Medium Pulse

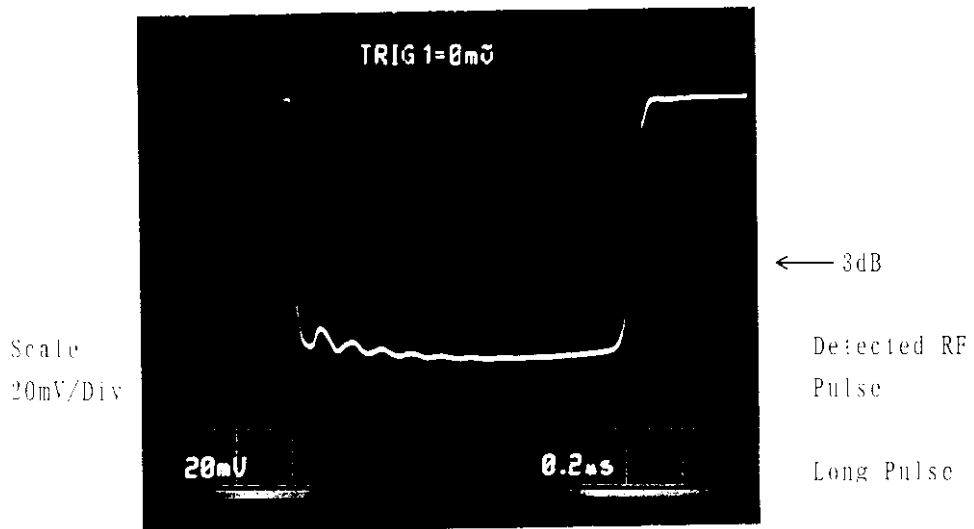
Scale 100nS/Div

(Sec. 2.989) 2.2 Long Pulse PRF 521 Hz
Long Pulse Length 1.22 μ S



Scale 40 MHz/ Div
Center Frequency 9418 MHz

(Sec. 2.987)

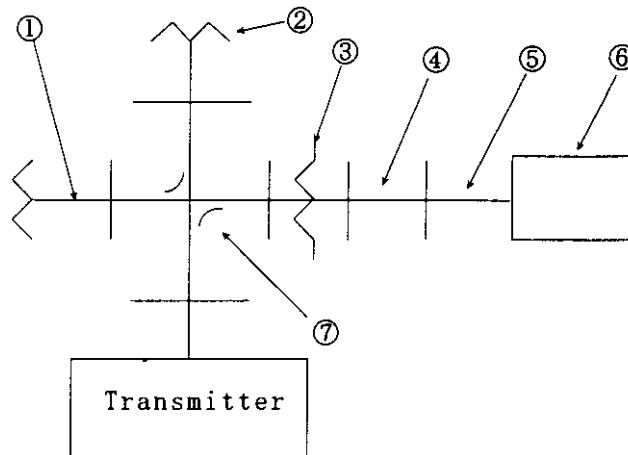


Scale 200nS/Div

(Sec. 2. 991)

3.0 Spurious signals at antenna port

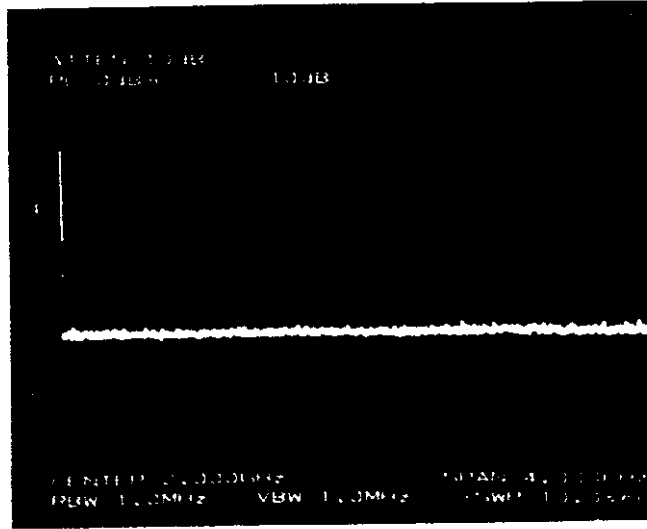
Condition 1; 0 to 20 GHz



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	8563E	HP
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

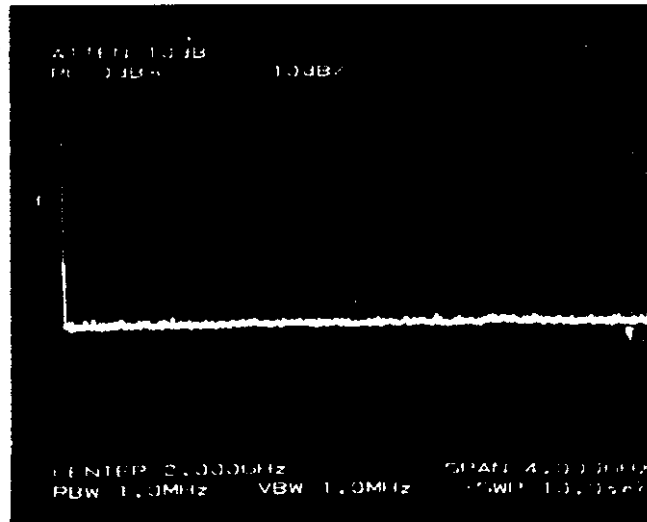


Spurious
Signals

OFF

0 to 3.6 GHz

Scale
↑ 10dB/Div
→ 400 MHz
/Div

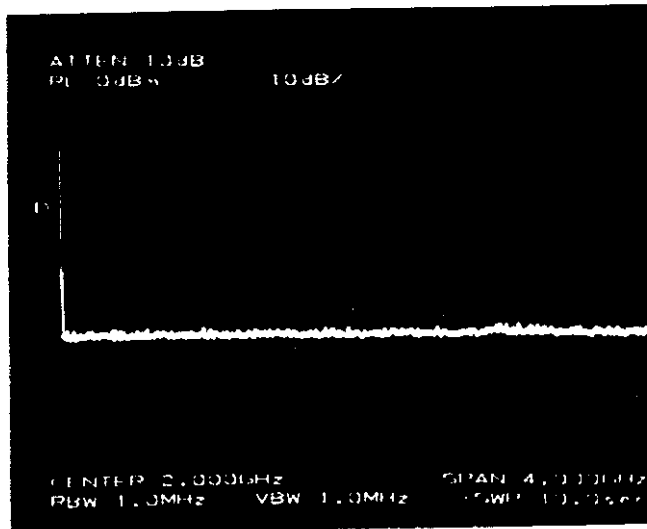


Spurious
Signals

Stand-By

0 to 3.6 GHz

Scale
↑ 10dB/Div
→ 400 MHz
/Div



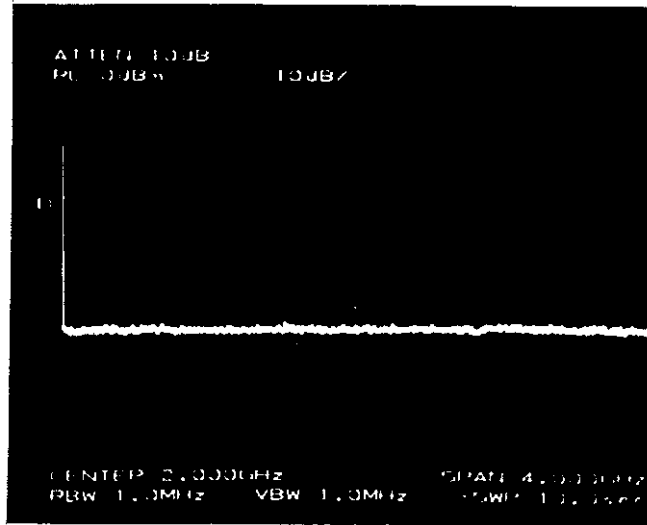
Spurious
Signals

Short Pulse

0 to 3.6 GHz

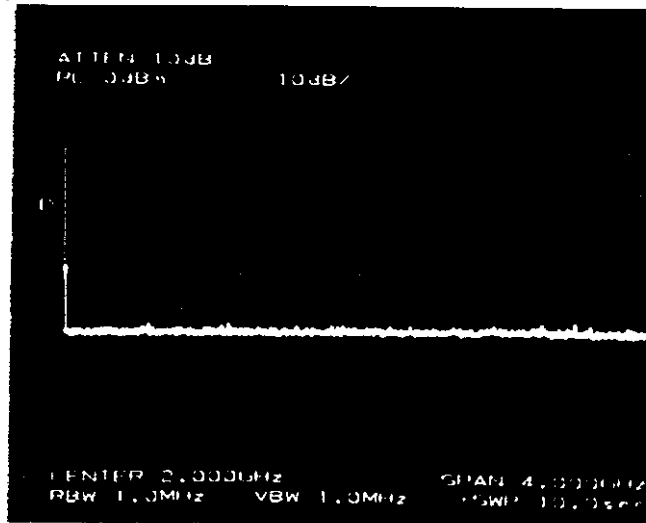
(Sec. 2.991)

Scale
↑ 10dB/Div
→ 400 MHz
/Div



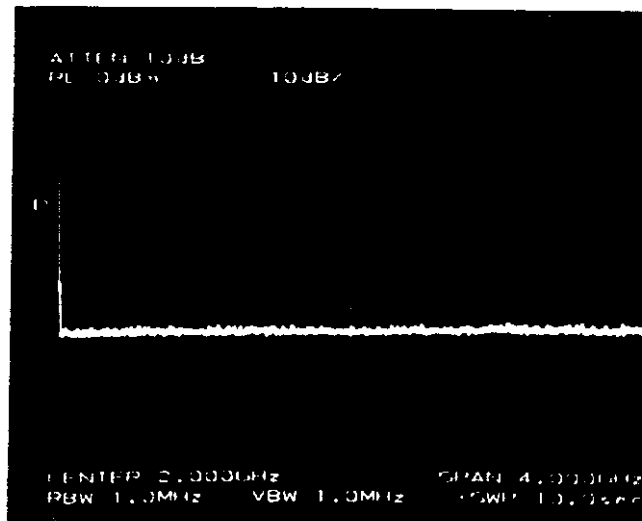
Spurious
Signals
Short Medium
Pulse
0 to 3.6 GHz

Scale
↑ 10dB/Div
→ 400 MHz
/Div



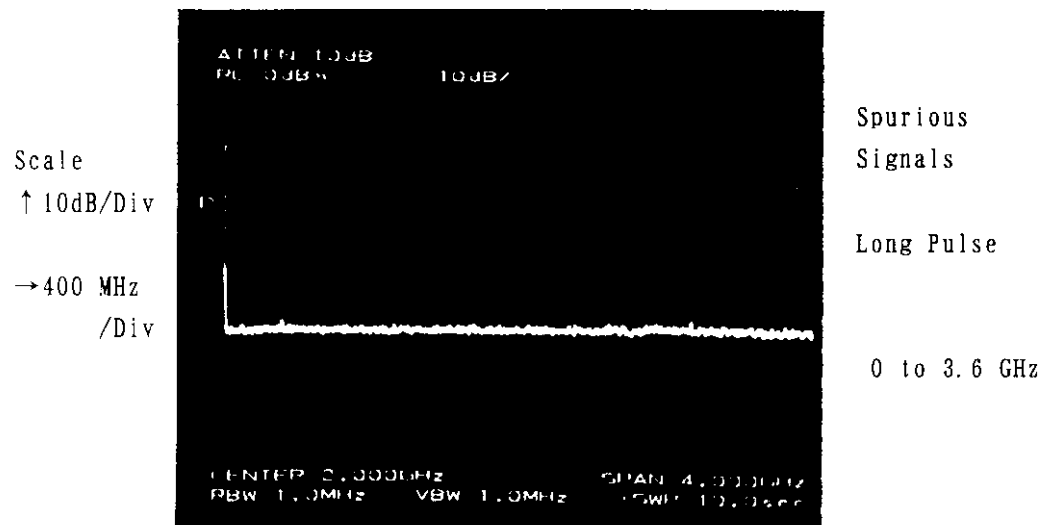
Spurious
Signals
Medium Pulse
0 to 3.6 GHz

Scale
↑ 10dB/Div
→ 400 MHz
/Div

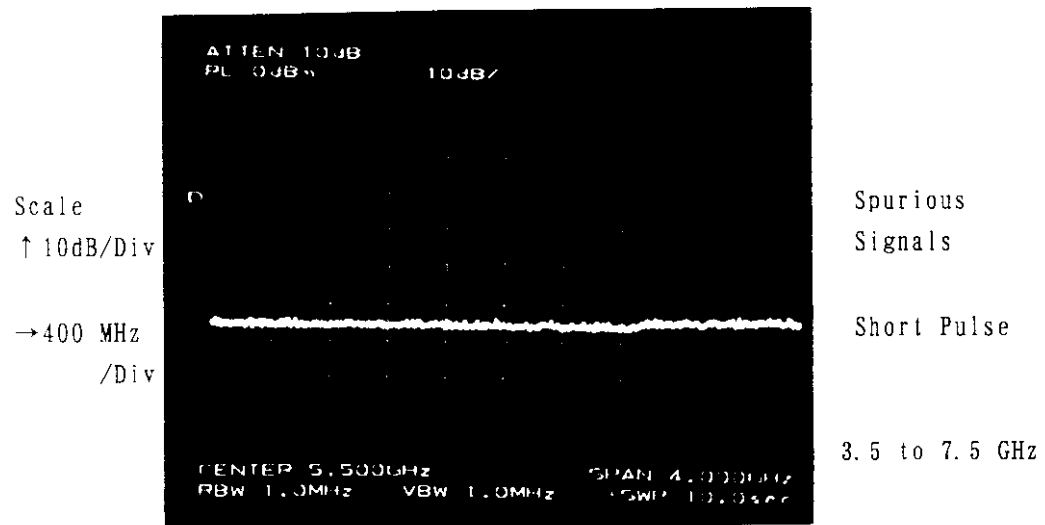
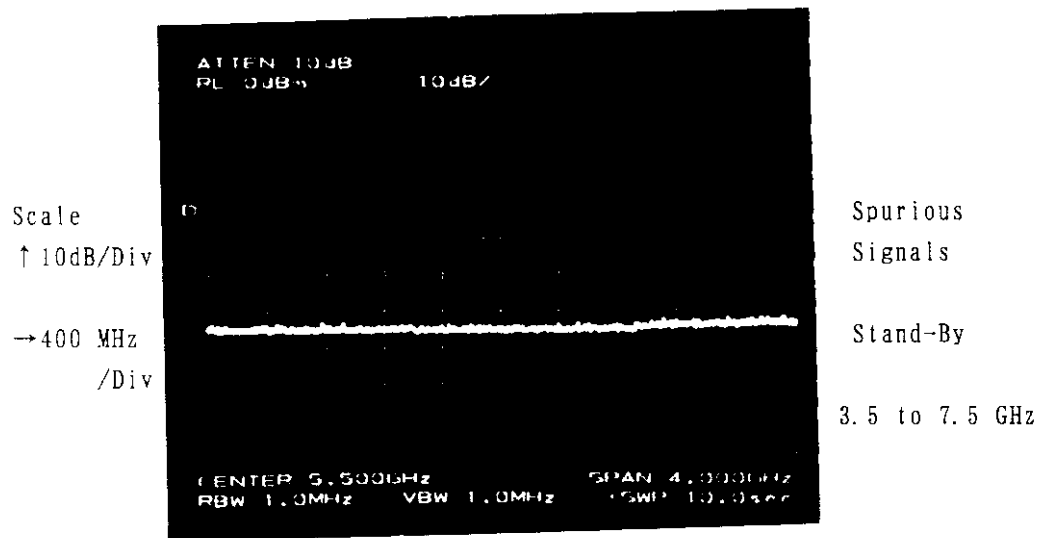
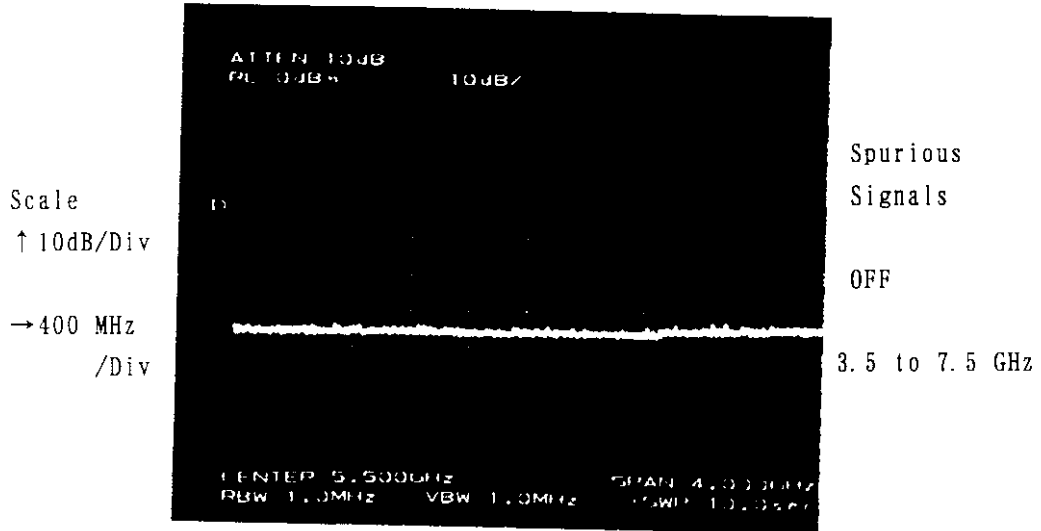


Spurious
Signals
Long Medium Pulse
0 to 3.6 GHz

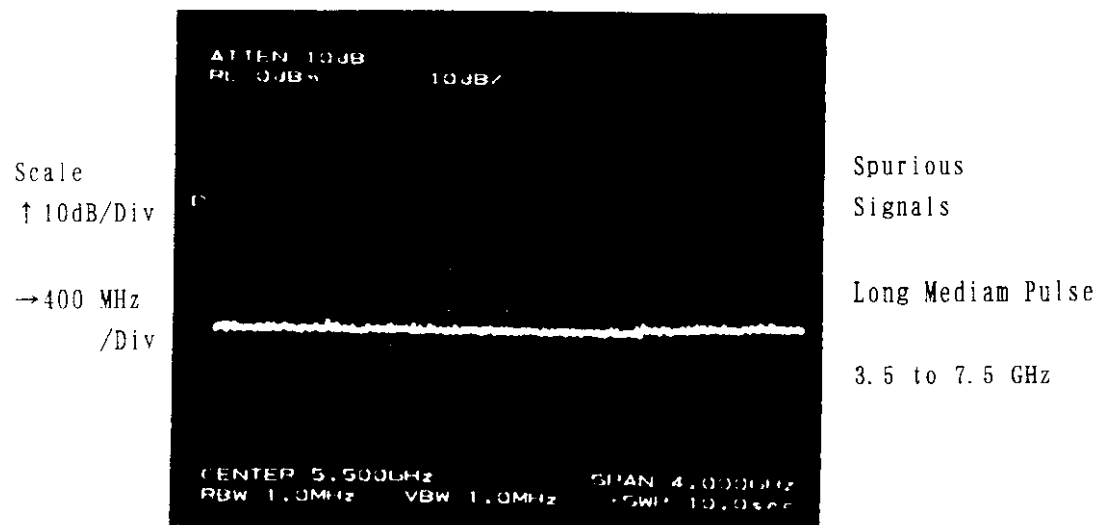
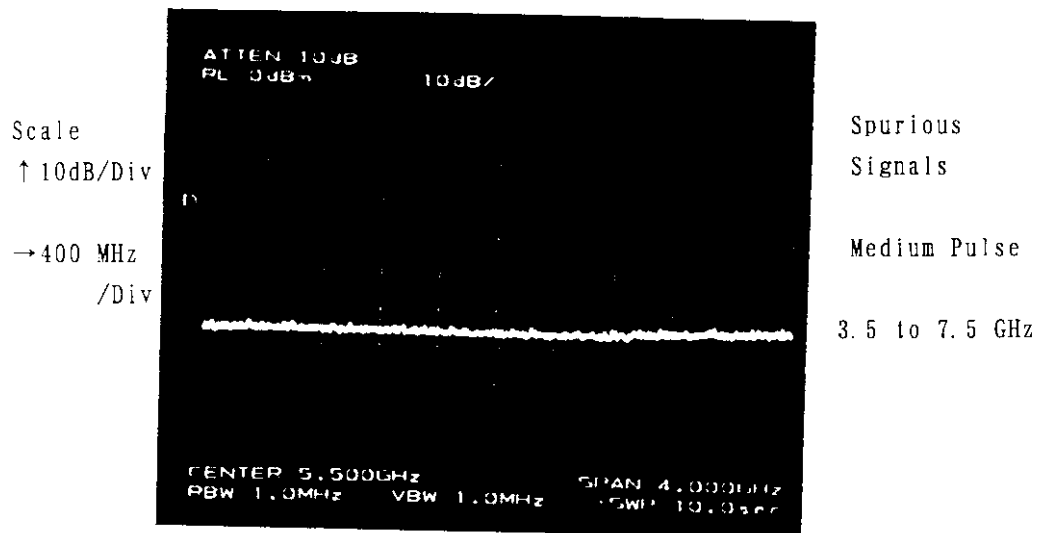
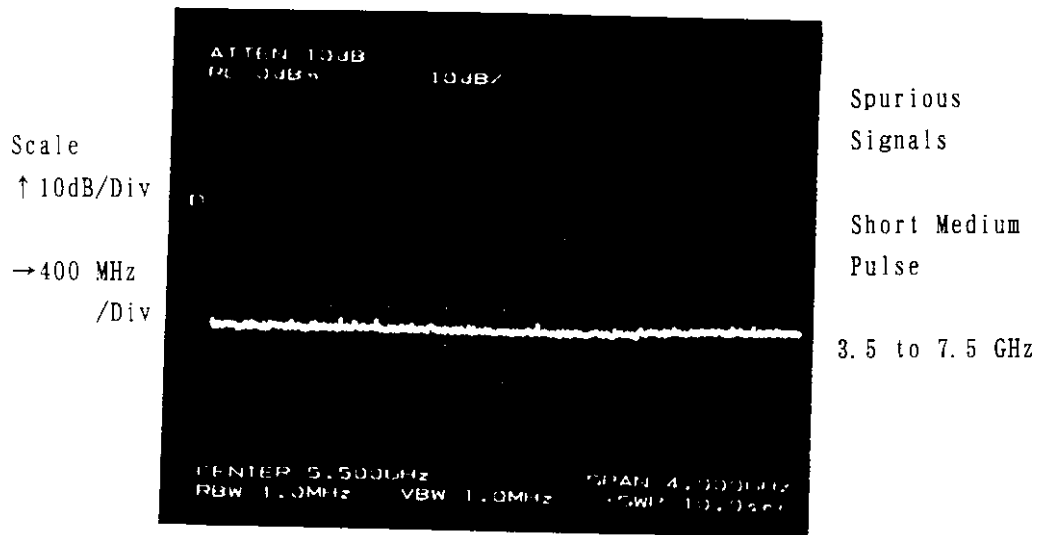
(Sec. 2.991)



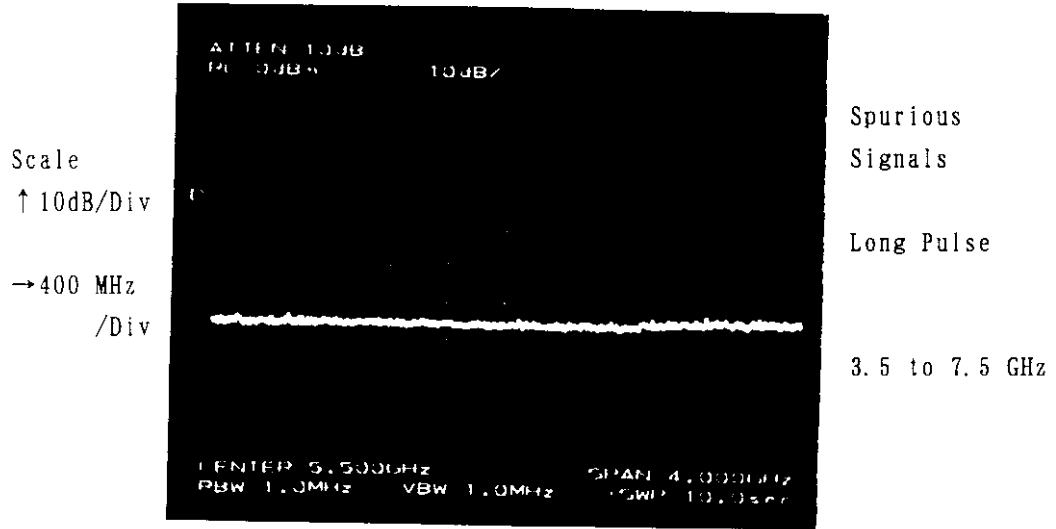
(Sec. 2.991)



(Sec. 2.991)

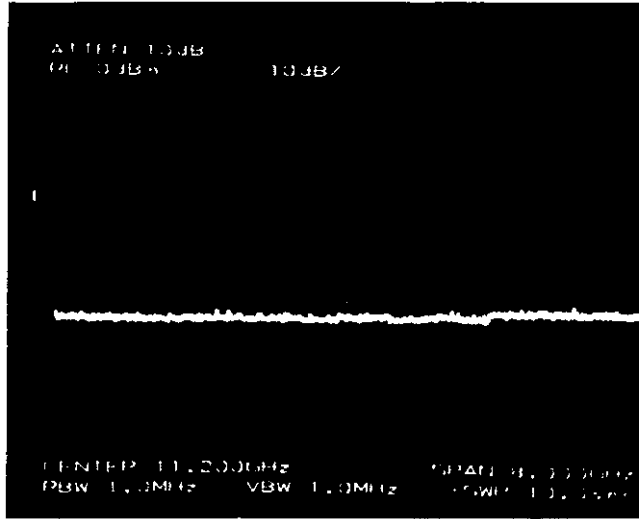


(Sec. 2.991)



(Sec. 2.991)

Scale
↑ 10dB/Div
→ 800 MHz
/Div

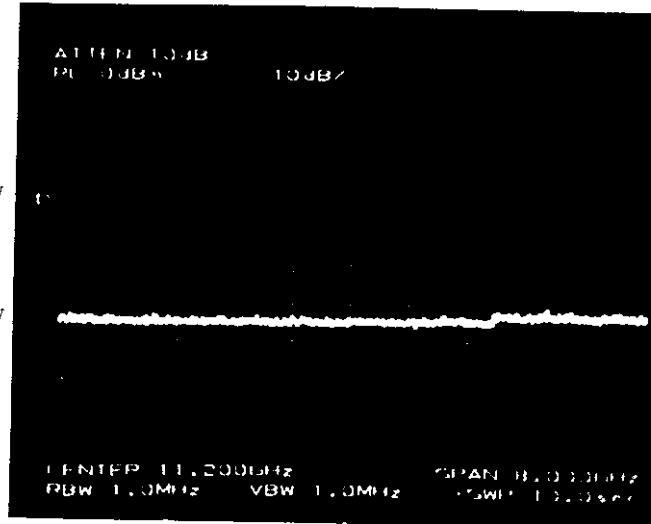


Spurious
Signals

OFF

7.2 to 15.2 GHz

Scale
↑ 10dB/Div
→ 800 MHz
/Div

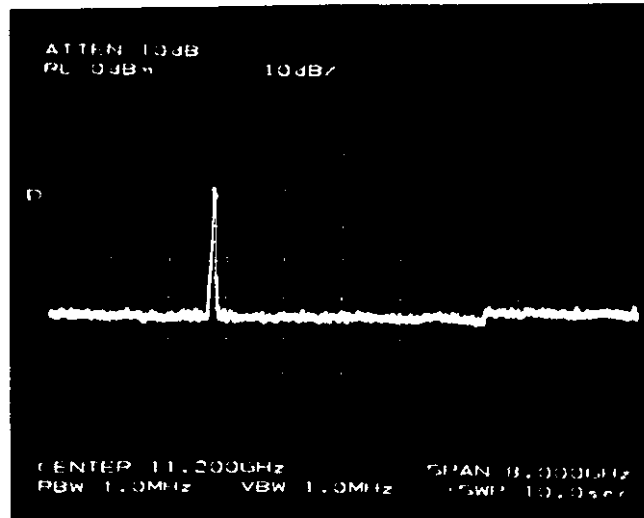


Spurious
Signals

Stand-By

7.2 to 15.2 GHz

Scale
↑ 10dB/Div
→ 800 MHz
/Div

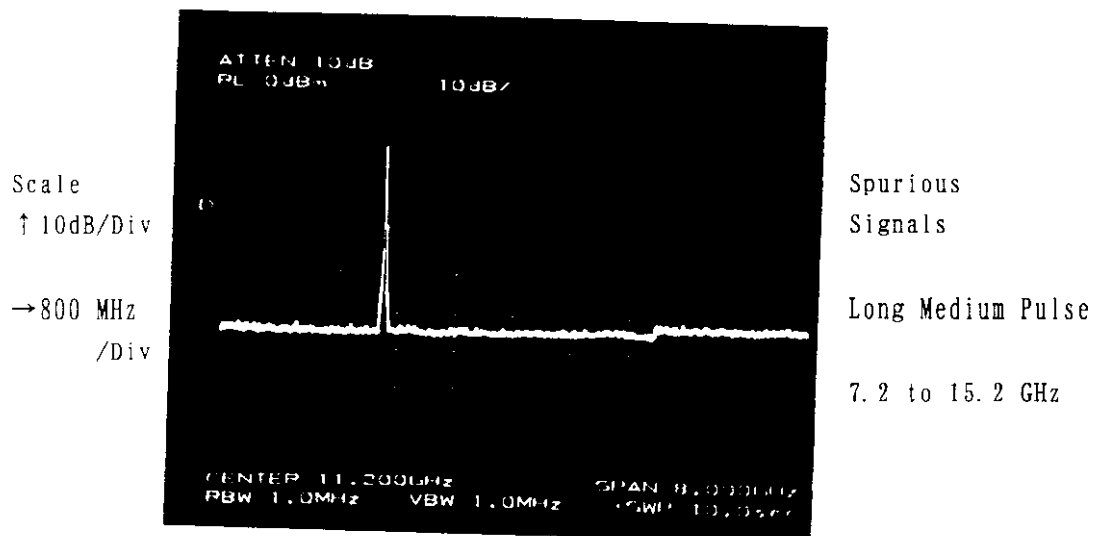
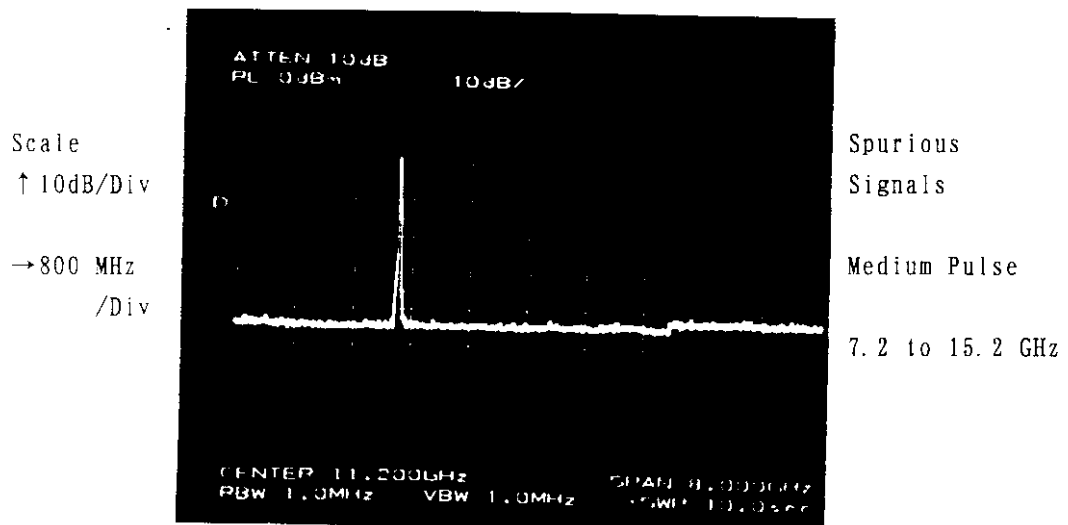
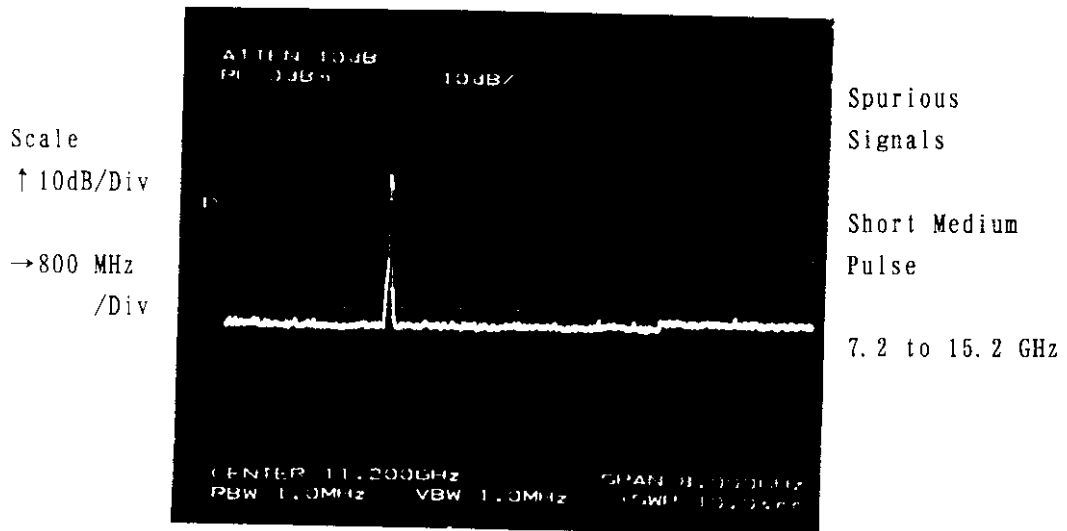


Spurious
Signals

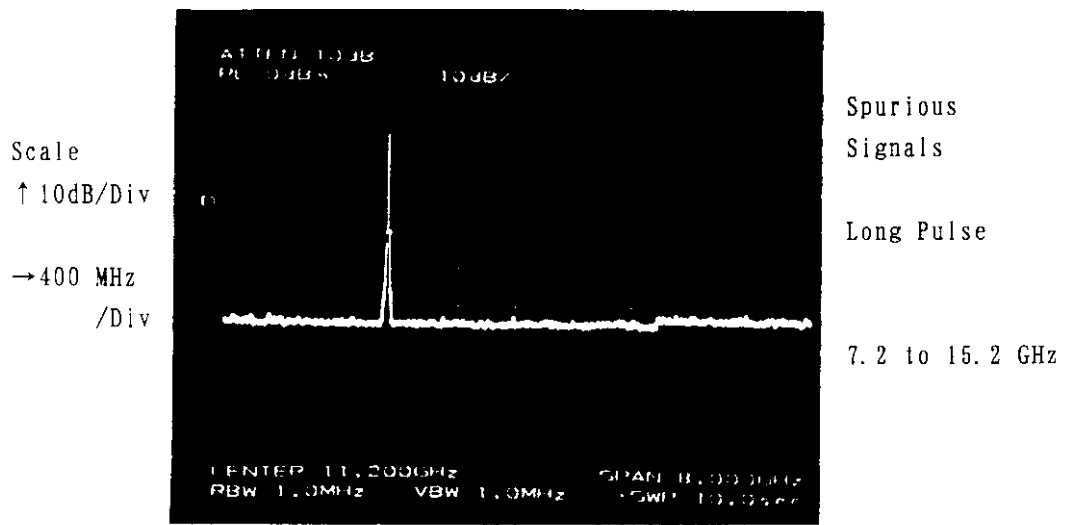
Short Pulse

7.2 to 15.2 GHz

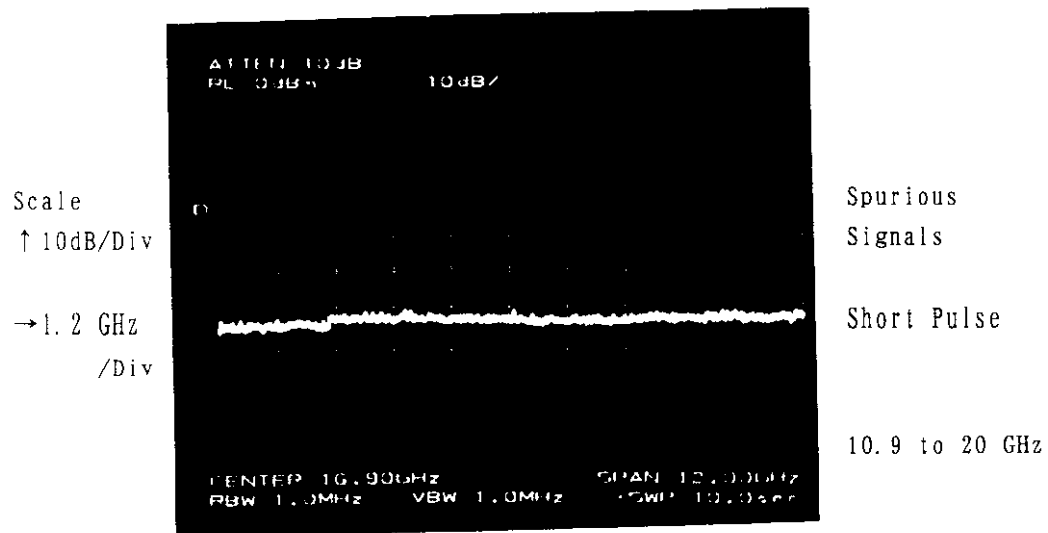
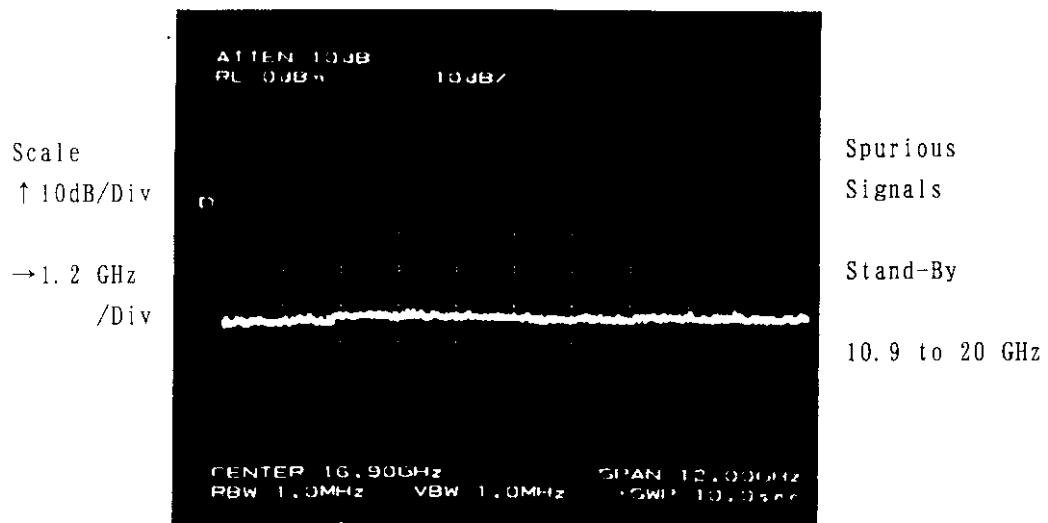
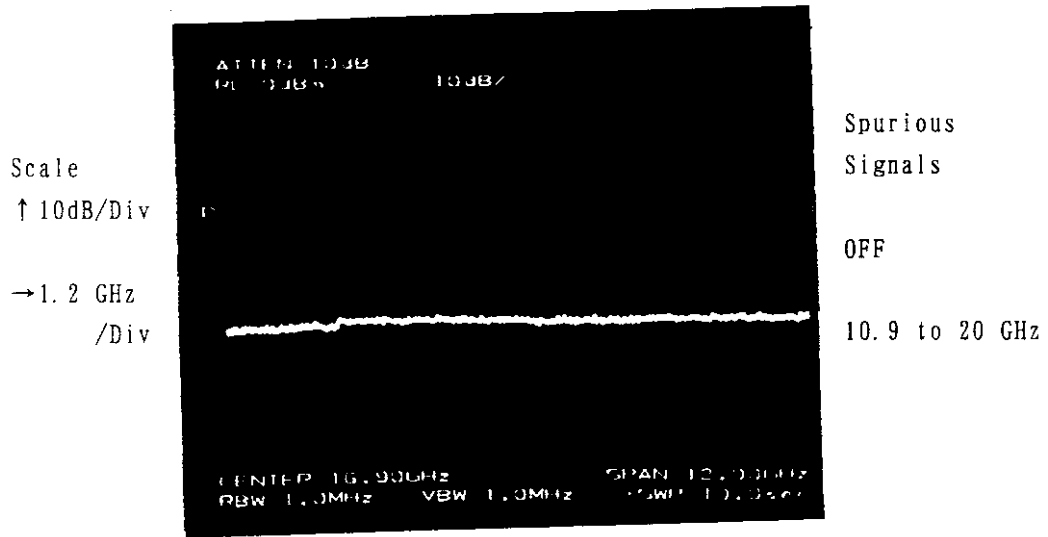
(Sec. 2.991)



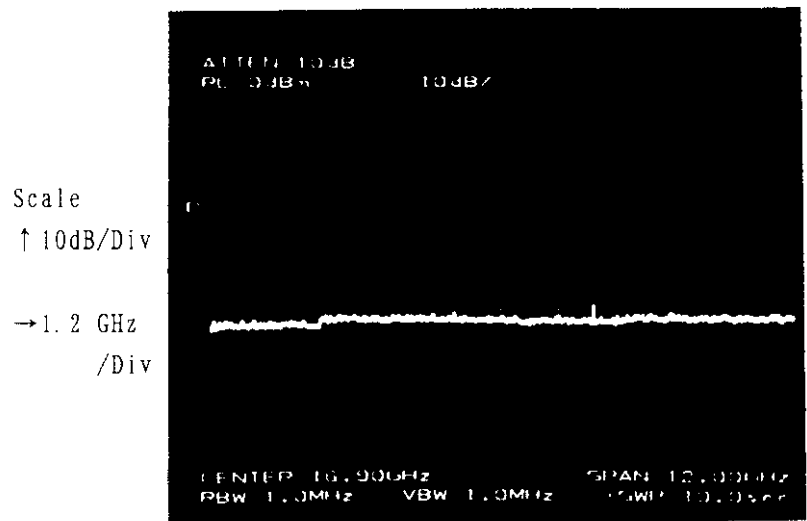
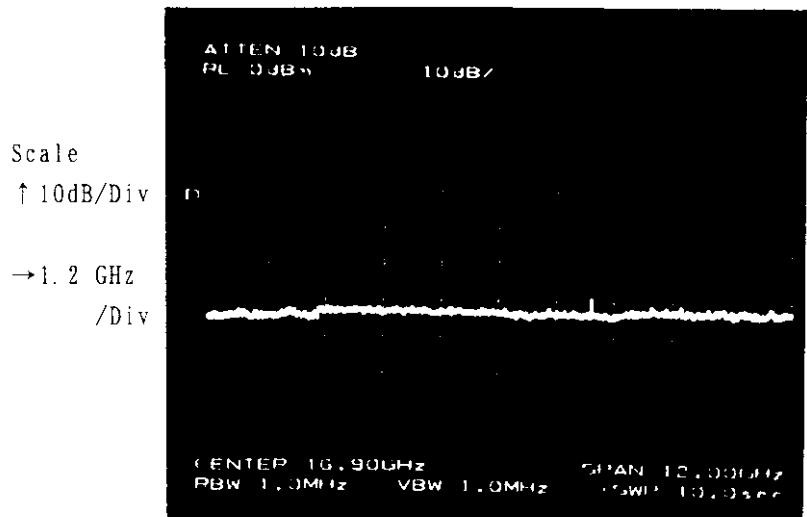
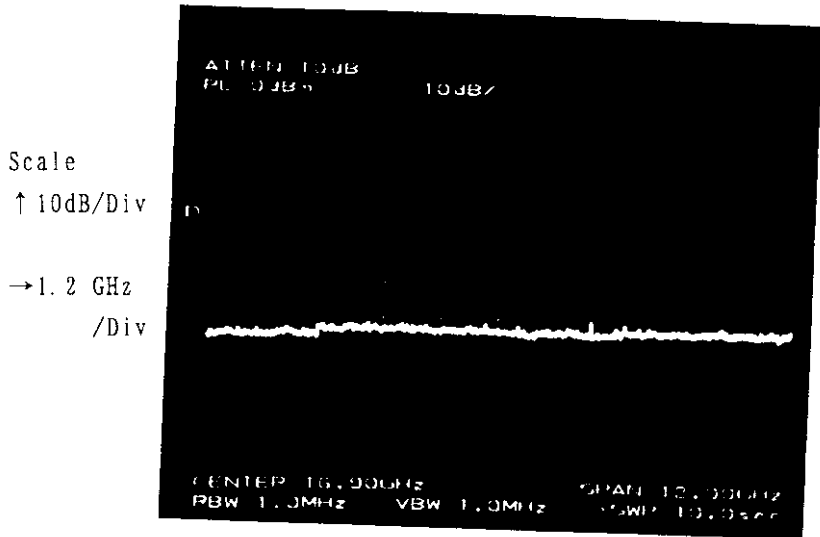
(Sec. 2.991)



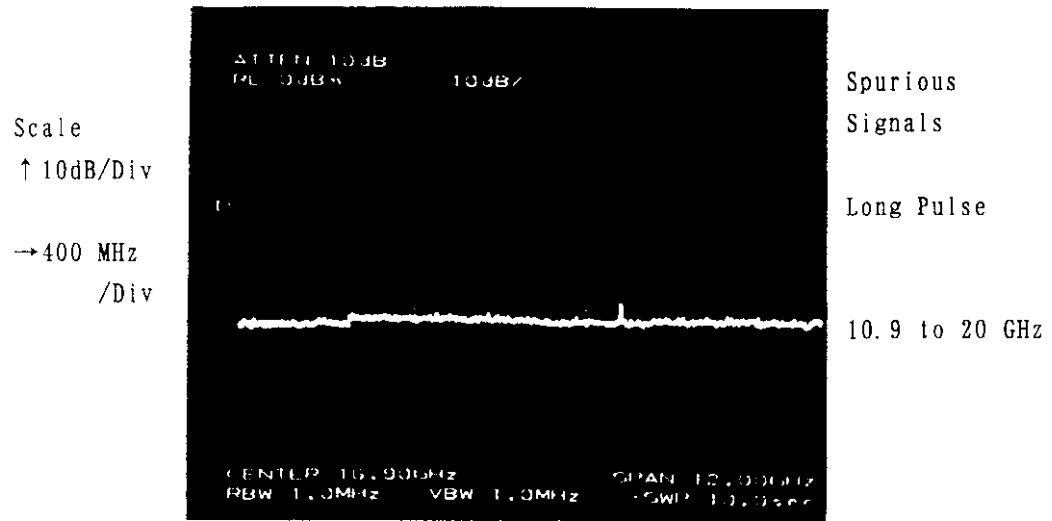
(Sec. 2.991)

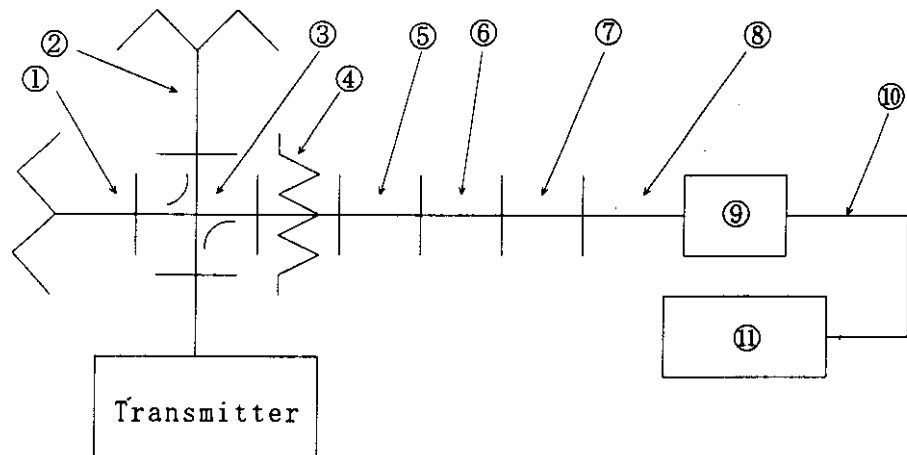


(Sec. 2.991)



(Sec. 2.991)





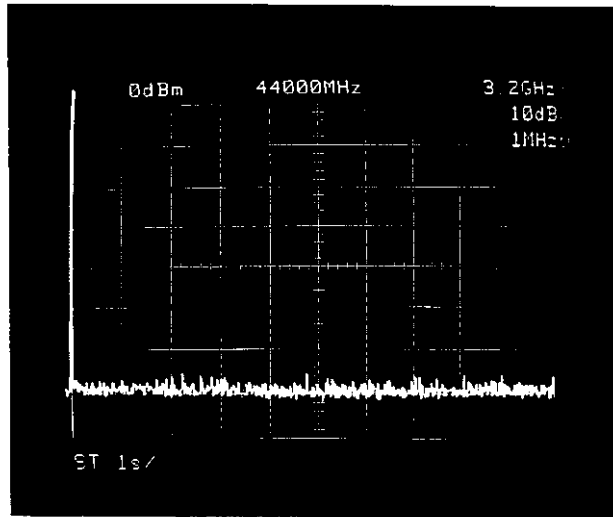
1	Dummy Load		X910B	HP
2	High power Dummy Load		4D371A	Shimada
3	Directional Coupler		R11421	Shimada
		Coupling	30 dB	
		Directivity	30 dB	
4	Attenuator		X382A	HP
5	Tapered W/G		195-X KU	AIRCOM
6	Tapered W/G		11818A	HP
7	Tapered W/G		11519A	HP
8	Tapered W/G		11520A	HP
9	External Mixer		11517A	HP
10	Coaxial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

★ Attenuation on ATT4 ; 50dB

★ Measurement Point ; Rotary Joint Output

(Sec. 2.991)

Scale
↑ 10dB/Div
→ 1.6 GHz
/Div

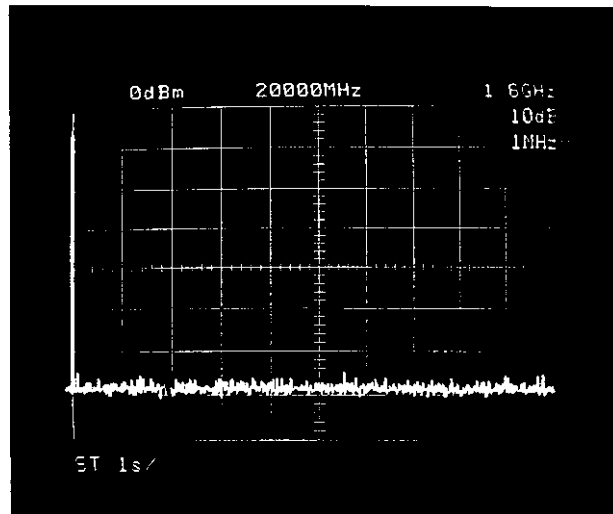


Spurious
Signals

OFF

12.4 to 28 GHz

Scale
↑ 10dB/Div
→ 1.6 GHz
/Div

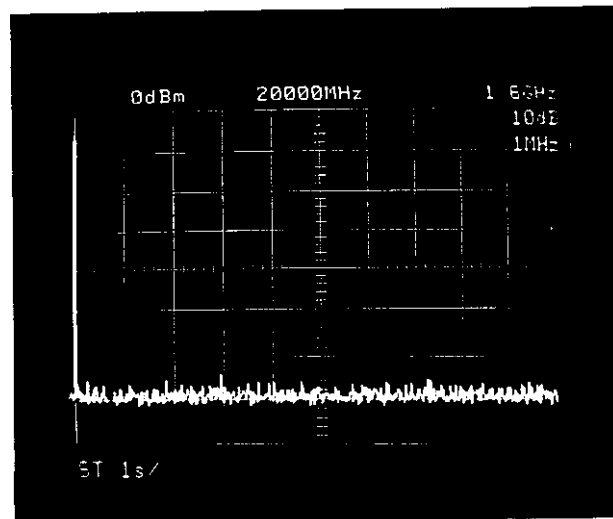


Spurious
Signals

Stand-By

12.4 to 28 GHz

Scale
↑ 10dB/Div
→ 1.6 GHz
/Div



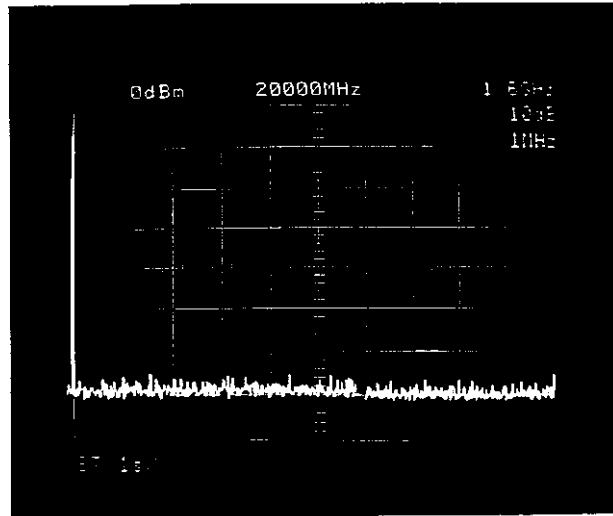
Spurious
Signals

Short Pulse

12.4 to 28 GHz

(Sec. 2.991)

Scale
↑ 10dB/Div
→ 1.6 GHz
/Div

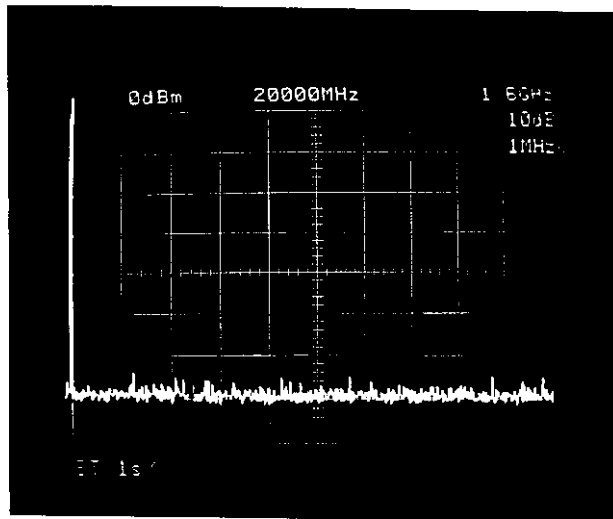


Spurious
Signals

Short Medium
Pulse

12.4 to 28 GHz

Scale
↑ 10dB/Div
→ 1.6 GHz
/Div

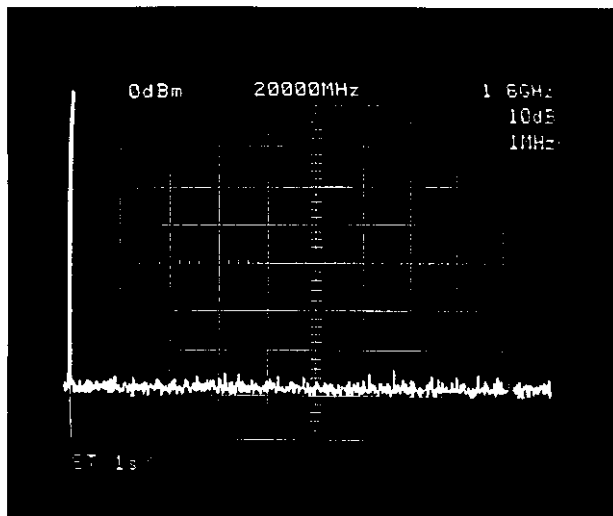


Spurious
Signals

Medium Pulse

12.4 to 28 GHz

Scale
↑ 10dB/Div
→ 1.6 GHz
/Div

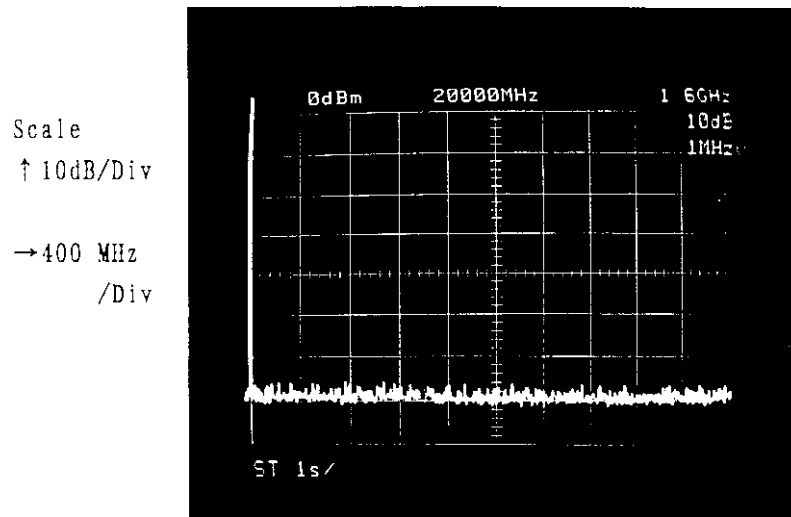


Spurious
Signals

Long Medium Pulse

12.4 to 28 GHz

(Sec. 2.991)



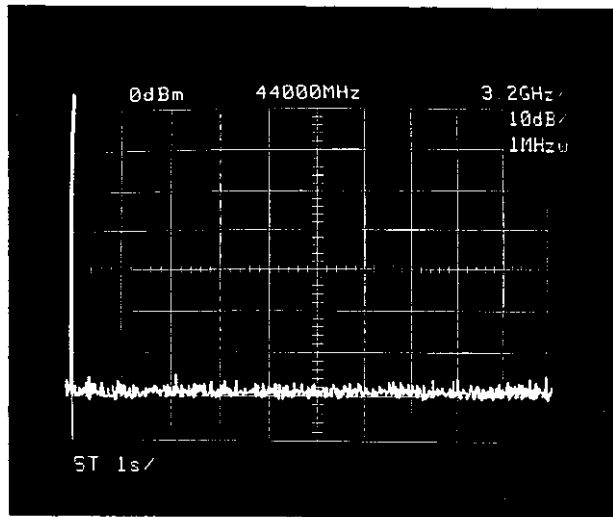
Spurious
Signals

Long Pulse

12.4 to 28 GHz

(Sec. 2.991)

Scale
↑ 10dB/Div
→ 3.2 GHz
/Div

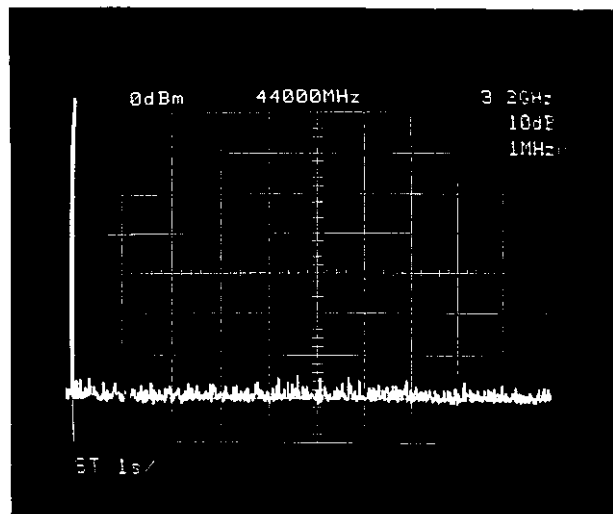


Spurious
Signals

OFF

28 to 60 GHz

Scale
↑ 10dB/Div
→ 3.2 GHz
/Div

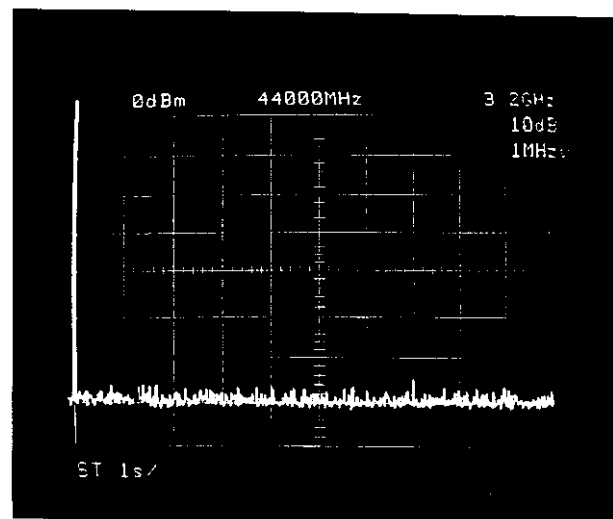


Spurious
Signals

Stand-By

28 to 60 GHz

Scale
↑ 10dB/Div
→ 3.2 GHz
/Div



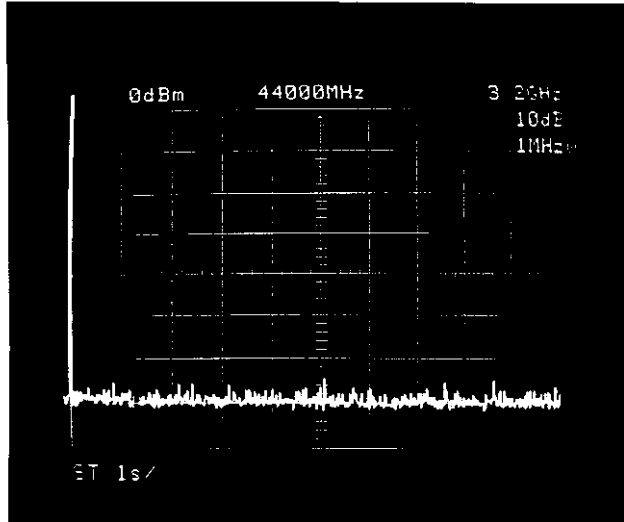
Spurious
Signals

Short Pulse

28 to 60 GHz

(Sec. 2.991)

Scale
↑ 10dB/Div
→ 3.2 GHz
/Div

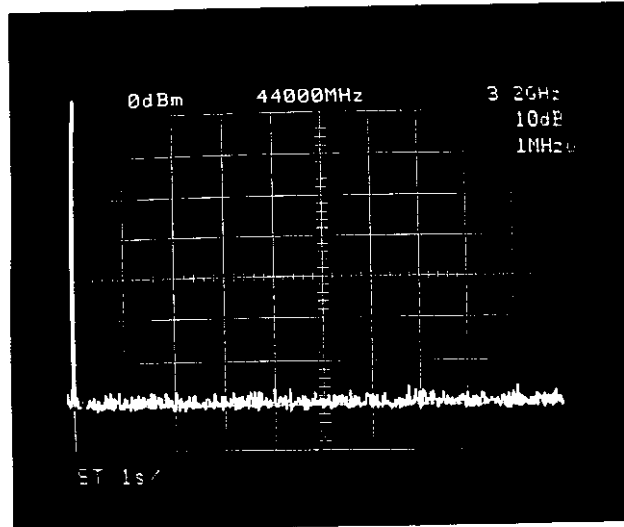


Spurious
Signals

Short Medium Pulse

28 to 60 GHz

Scale
↑ 10dB/Div
→ 3.2 GHz
/Div

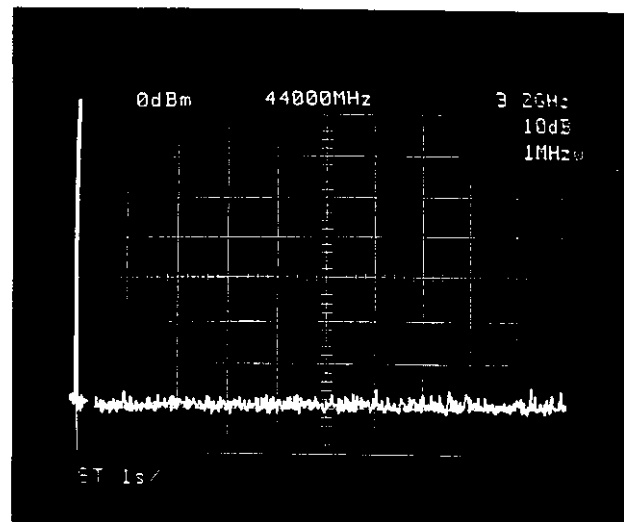


Spurious
Signals

Medium Pulse

28 to 60 GHz

Scale
↑ 10dB/Div
→ 3.2 GHz
/Div



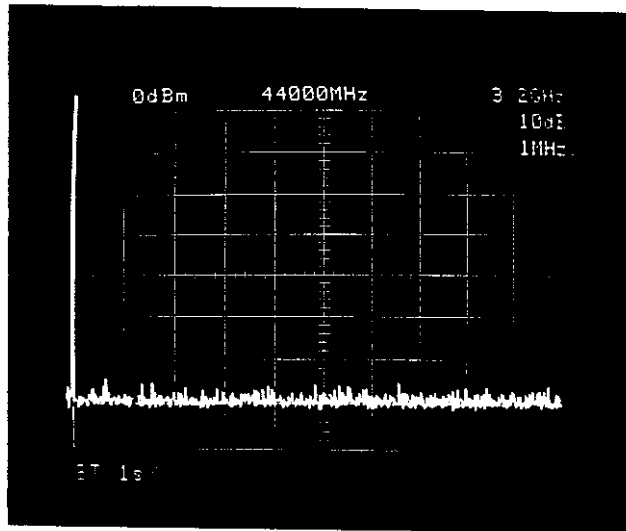
Spurious
Signals

Long Medium Pulse

28 to 60 GHz

(Sec. 2.991)

Scale
↑ 10dB/Div
→ 3.2 GHz
/Div

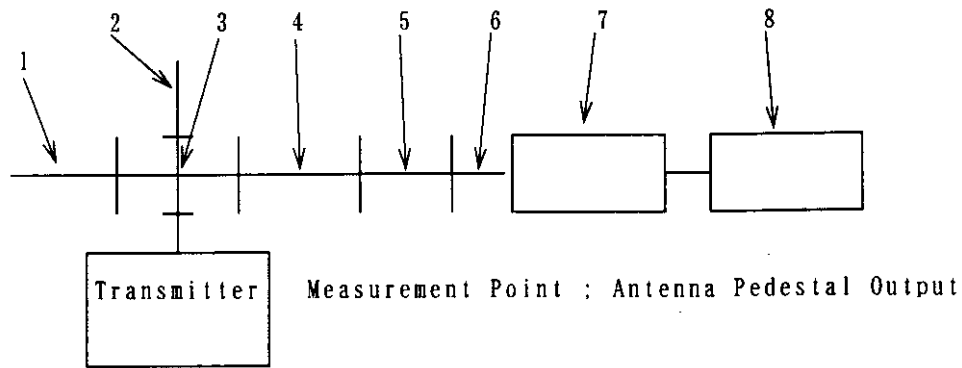


Spurious
Signals

Long Pulse

28 to 60 GHz

(Sec. 2. 995) 4.0 Frequency Stability



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 Procedure

- 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, measured frequency at 21.6V, 24V, 26.4V
- 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 21.6V, 24V, 26.4V

Temperature	Operating Frequency MHz									Warm Up Time
	Short Pulse			Medium Short Puls			Medium			
	21.6V	24.0V	26.4V	21.6V	24.0V	26.4V	21.6V	24.0V	26.4V	
-30	9423	9424	9425	9428	9428	9425	9425	9426	9425	3' 04"
-20	9423	9423	9424	9423	9424	9424	9423	9425	9424	3' 04"
-10	9421	9422	9422	9423	9422	9422	9421	9422	9422	3' 04"
0	9421	9422	9421	9422	9421	9421	9419	9422	9421	3' 04"
+10	9421	9421	9420	9421	9420	9420	9420	9420	9420	3' 04"
+20	9421	9420	9419	9421	9420	9419	9421	9419	9419	3' 05"
+30	9419	9419	9419	9419	9419	9419	9420	9418	9419	3' 05"
+40	9418	9419	9419	9418	9419	9419	9420	9418	9419	3' 05"
+50	9418	9419	9419	9418	9419	9419	9419	9418	9419	3' 05"
+55	9417	9419	9419	9417	9419	9419	9417	9417	9419	3' 05"

SECTION 5

TEST: Spurious Emissions Field Strength

EQUIPMENT: JMA-3925 S/N LS 5 4 9 6 6

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 9.14 watts maximum (long pulse) or 39.61 dBm:

$$\begin{aligned} \text{Emissions} &\leq 39.61\text{dBm} - [43 + 10 \log(9.14)] \text{ dBm} \\ &\leq -13.0 \text{ dBm} \end{aligned}$$

TEST RESULTS: No spurious emissions observed above minimum standard.

TEST CONDITIONS: Tamb = 20°C to 25°C RHamb = 40% ~ 60%
Euut input = 24 VDC
Stabilization: UUT energized for 10 minutes minimum.

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

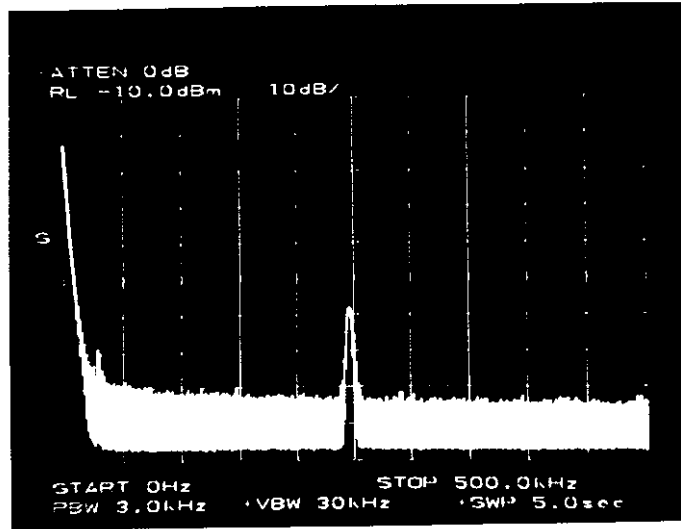
DATE: 9 - 10 OCT. 1998

TEST ENGINEER: K. YUASA.

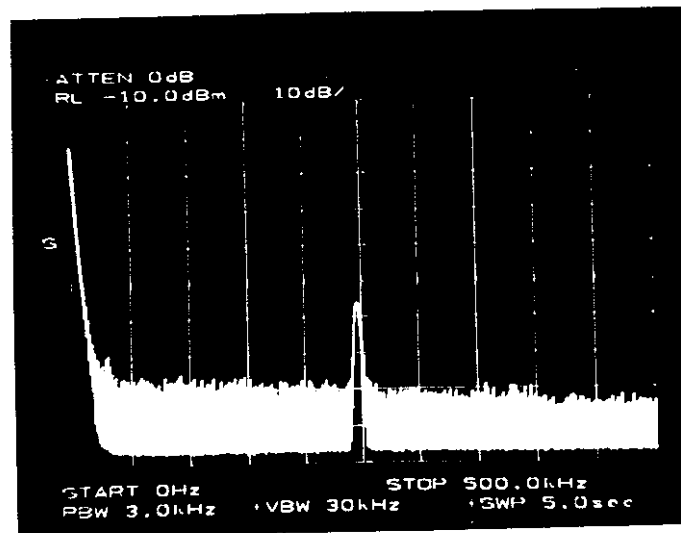
TEST #1

Frequency Band: 0~500 KHz

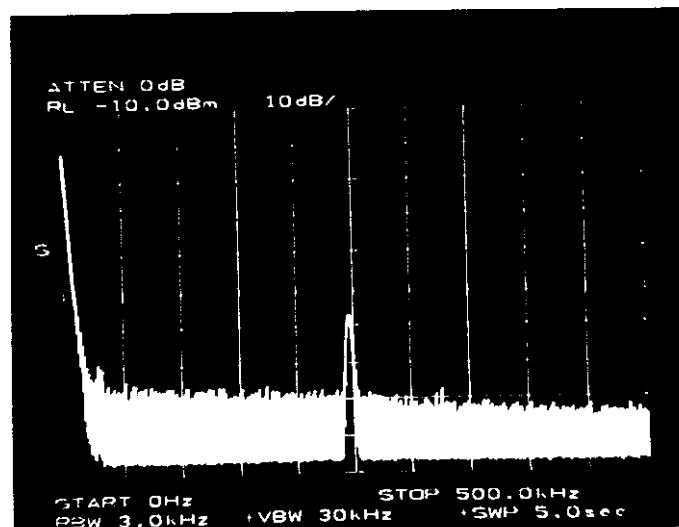
Log Ref. Level: 24.0 dBm



Amdient



Stand-By

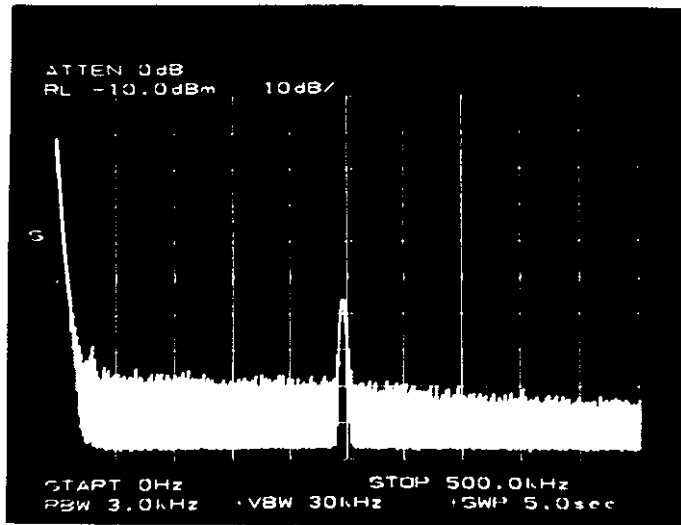


Short Pulse

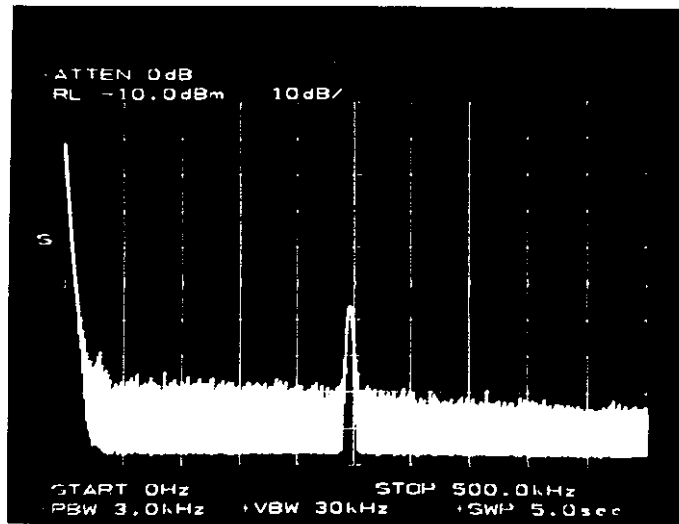
TEST #1

Frequency Band: 0~500 KHz

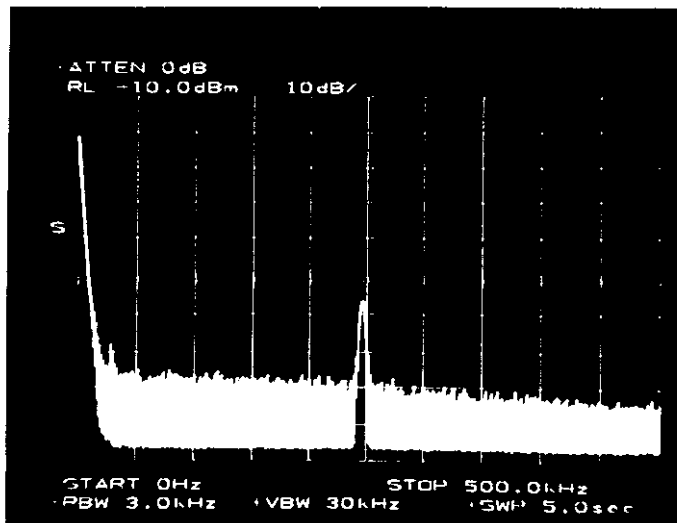
Log Ref. Level: 24.0 dBm



Medium
Short Pulse



Medium Pulse

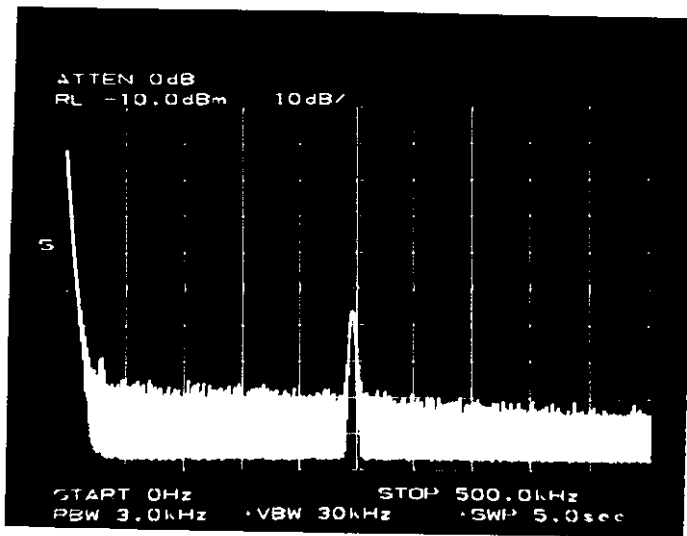


Medium
Long Pulse

TEST #1

Frequency Band: 0~500 KHz

Log Ref. Level: 24.0 dBm

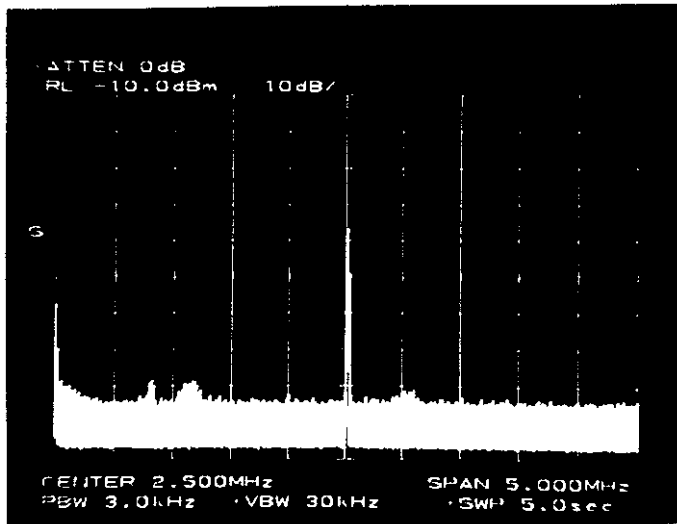


Long Pulse

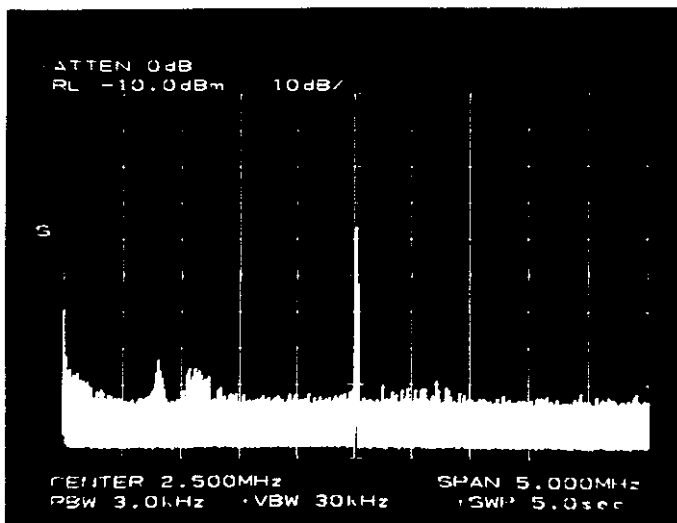
TEST #2

Frequency Band: 0~5 MHz

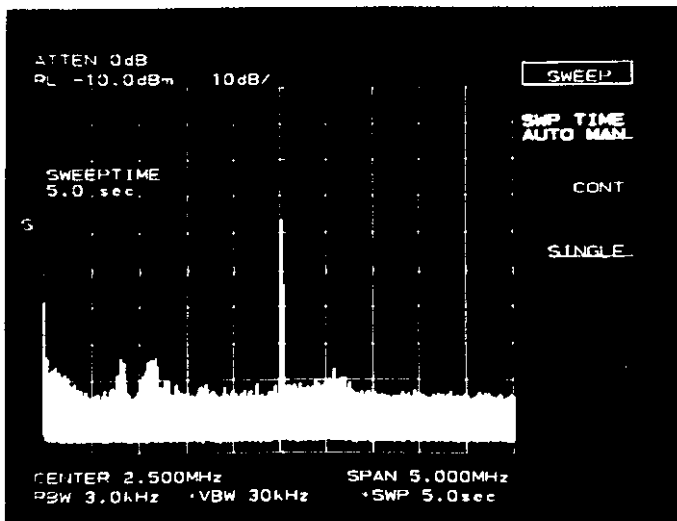
Log Ref. Level: 13.0 dBm



Ambient



Stand-By

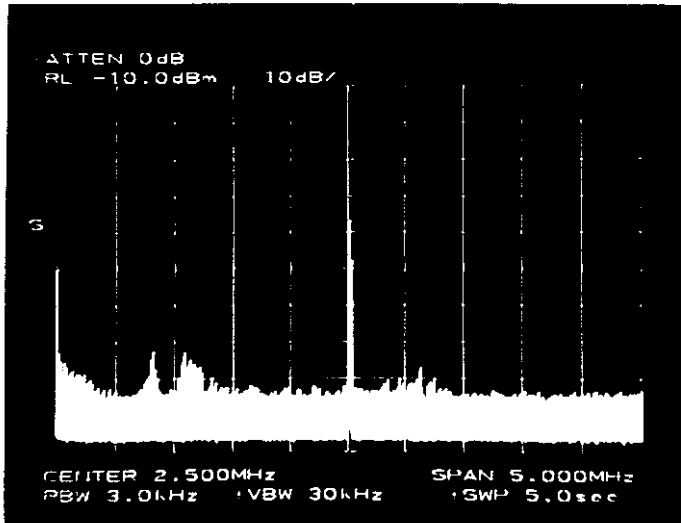


Short Pulse

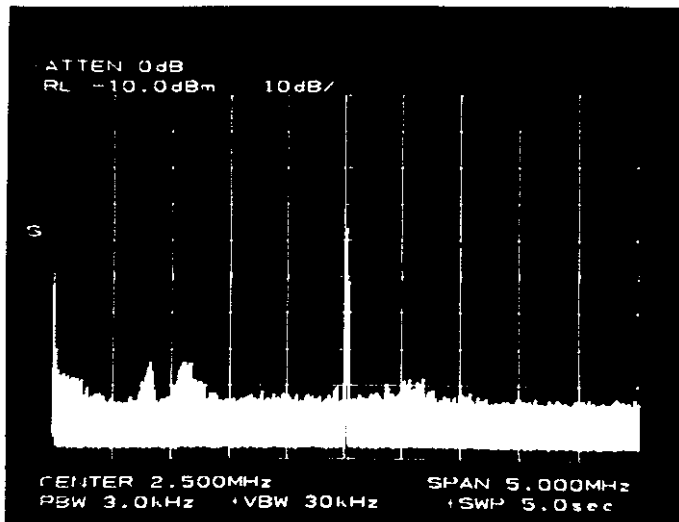
TEST #2

Frequency Band: 0~5 MHz

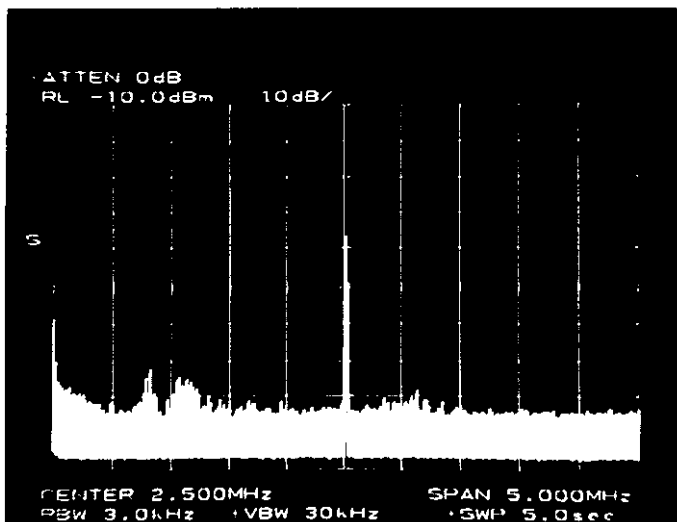
Log Ref. Level: 13.0 dBm



Medium
Short Pulse



Medium Pulse

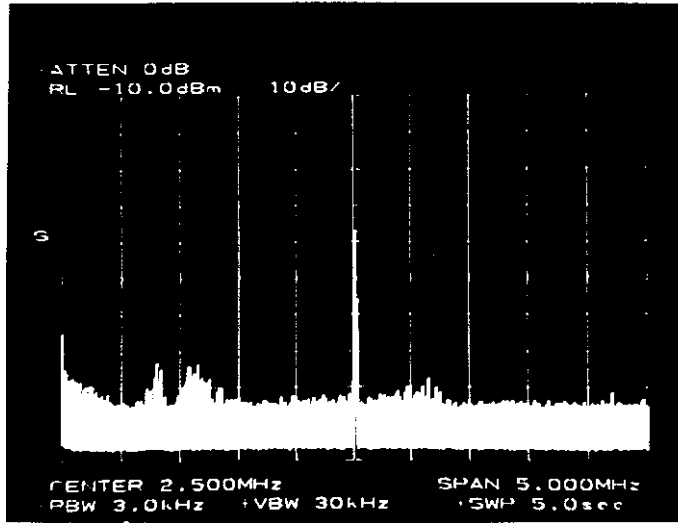


Medium
Long Pulse

TEST #2

Frequency Band: 0~5 MHz

Log Ref. Level: 13.0 dBm

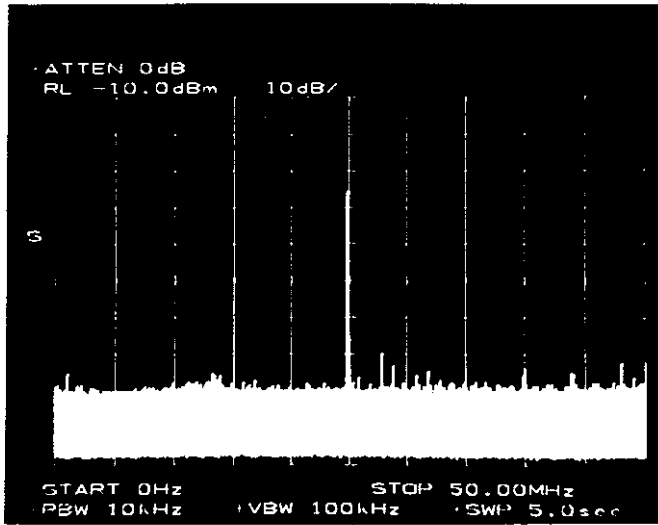


Long Pulse

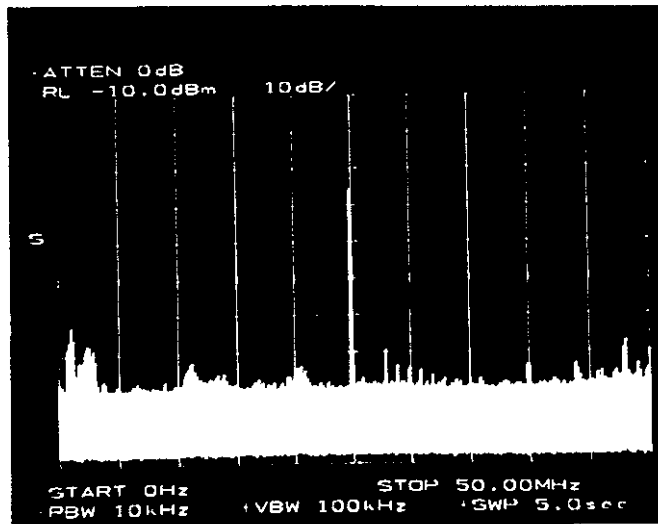
TEST #3

Frequency Band: 0~50 MHz

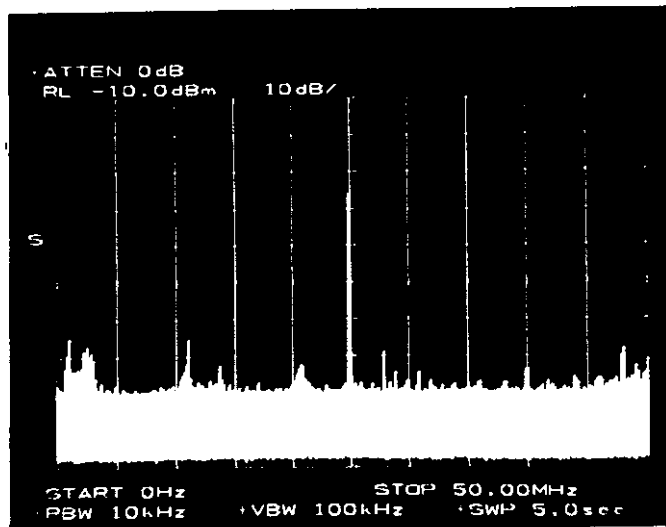
Log Ref. Level: 7.5 dBm



Ambient



Stand-By

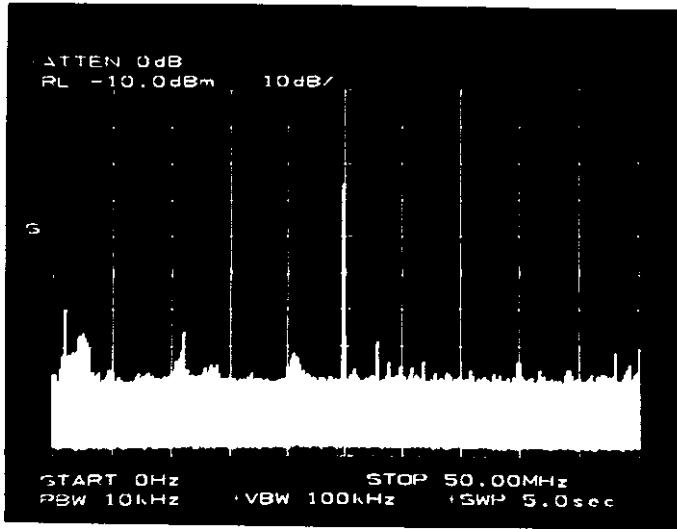


Short Pulse

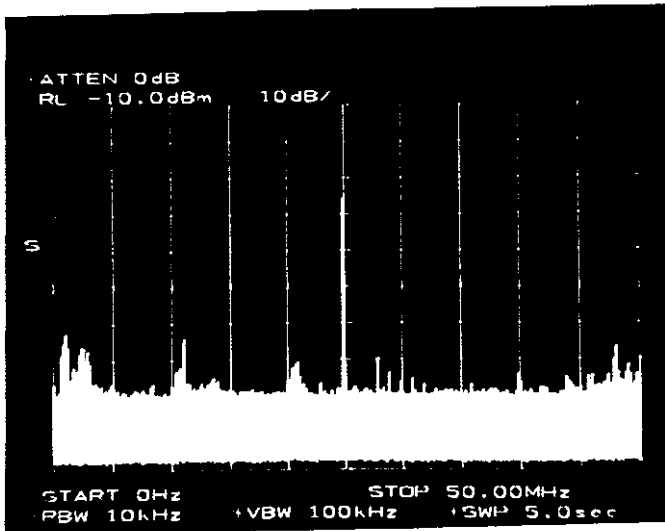
TEST #3

Frequency Band: 0~50 MHz

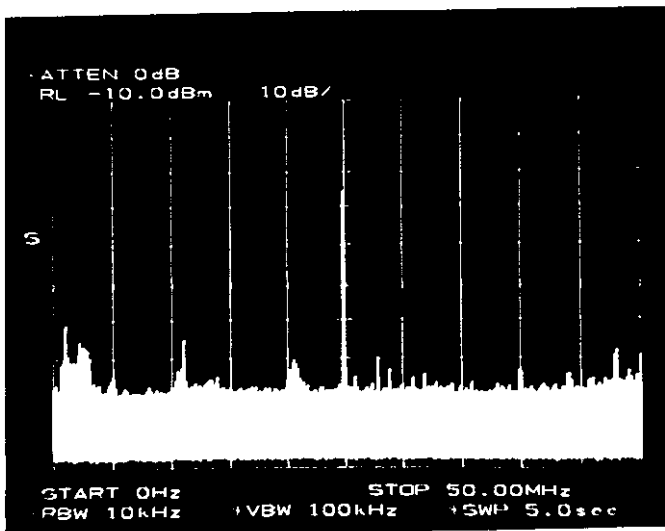
Log Ref. Level: 7.5 dBm



Medium
Short Pulse



Medium Pulse

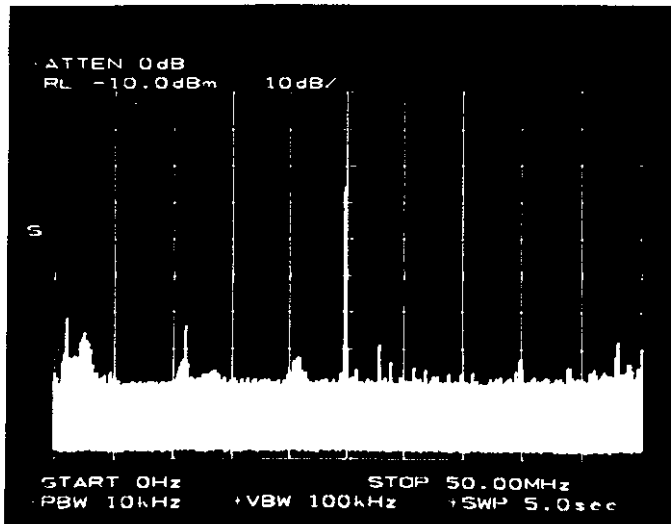


Medium
Long Pulse

TEST #3

Frequency Band: 0~50 MHz

Log Ref. Level: 7.5 dBm

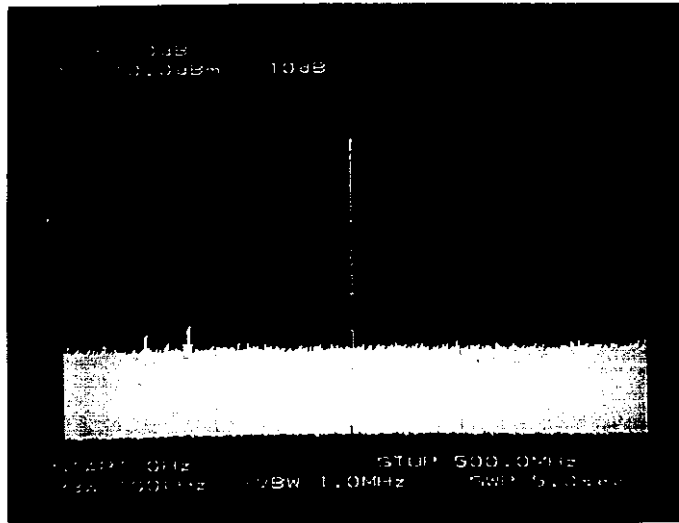


Long Pulse

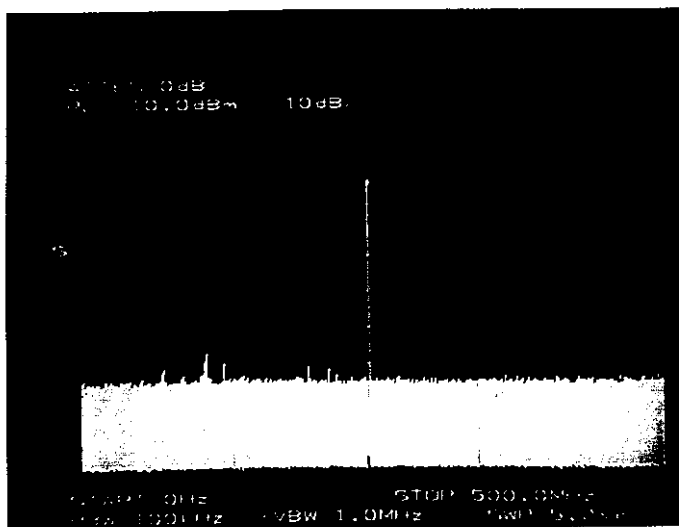
TEST #4

Frequency Band: 0~500 MHz

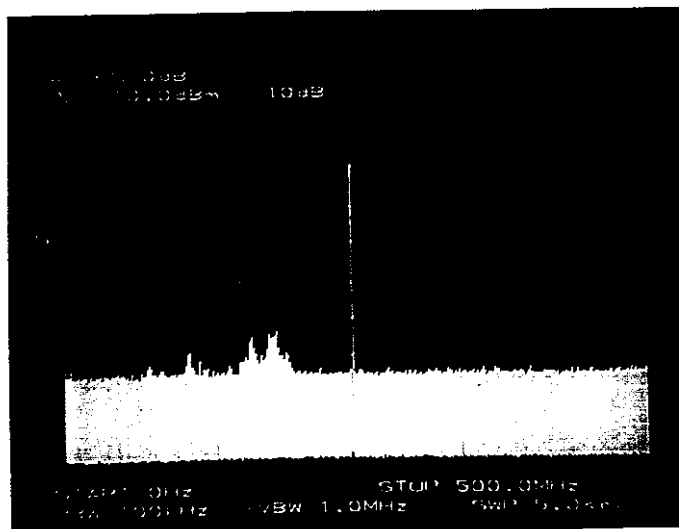
Log Ref. Level: 4.0 dBm



Ambient



Stand-By

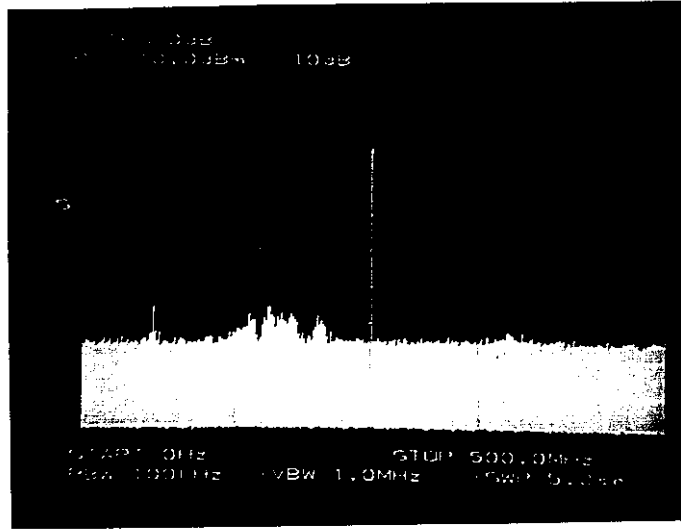


Short Pulse

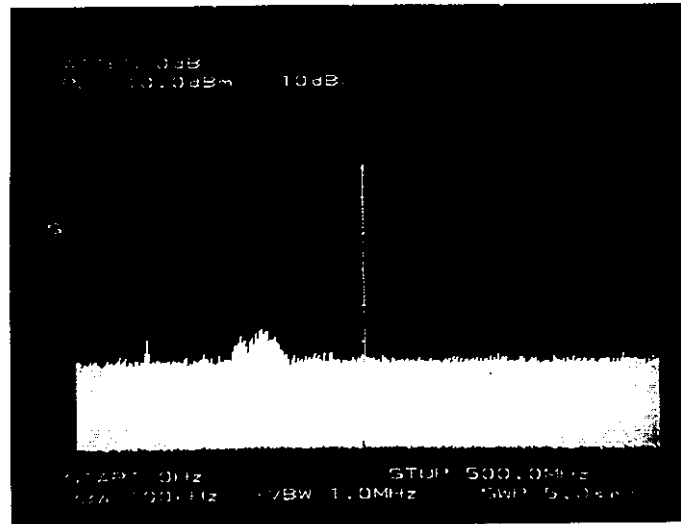
TEST #4

Frequency Band: 0~500 MHz

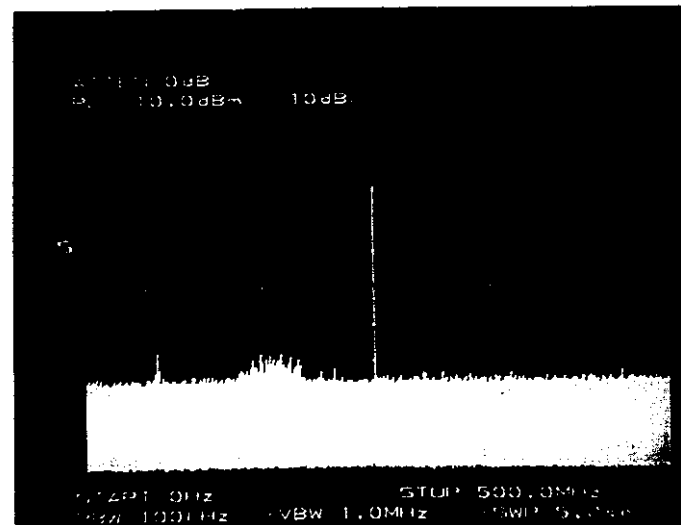
Log Ref. Level: 4.0 dBm



Medium
Short Pulse



Medium Pulse

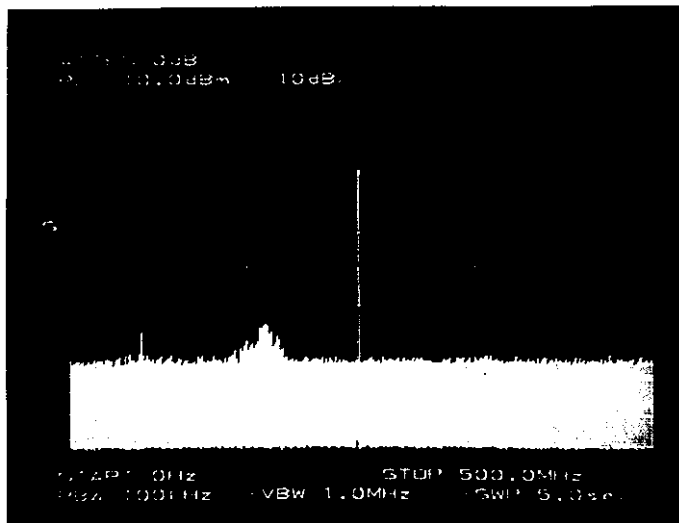


Medium
Long Pulse

TEST #4

Frequency Band: 0~500 MHz

Log Ref. Level: 4.0 dBm

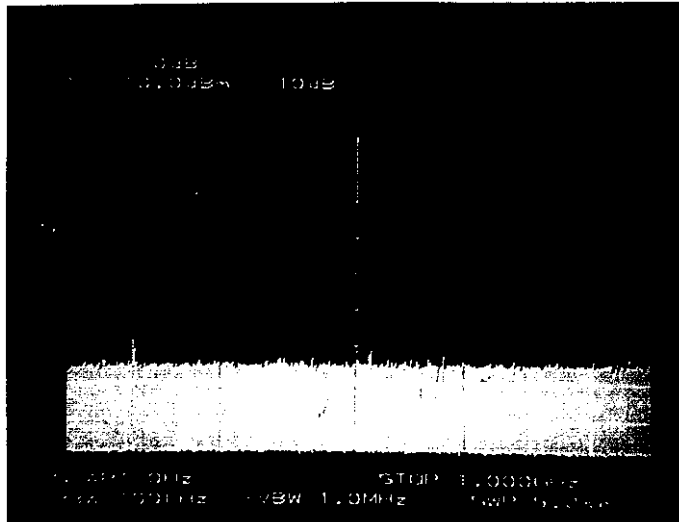


Long Pulse

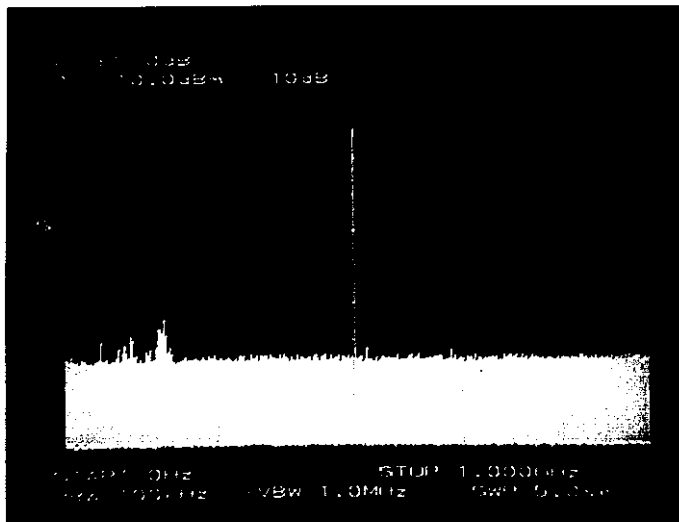
TEST #5

Frequency Band: 0~1 GHz

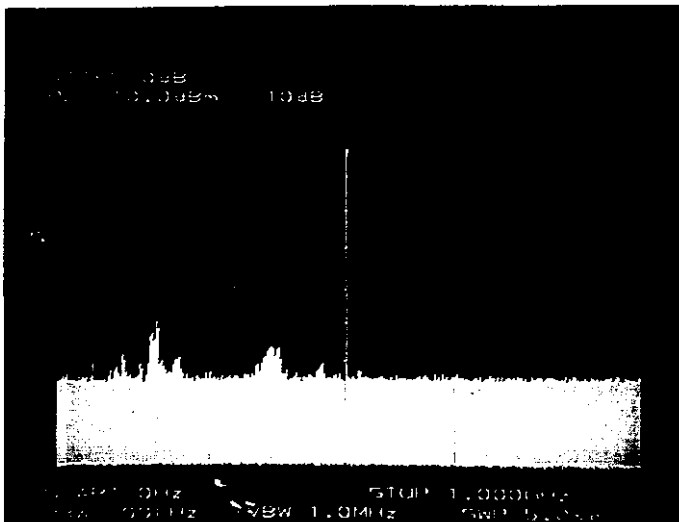
Log Ref. Level: -4.0 dBm



Ambient



Stand-By

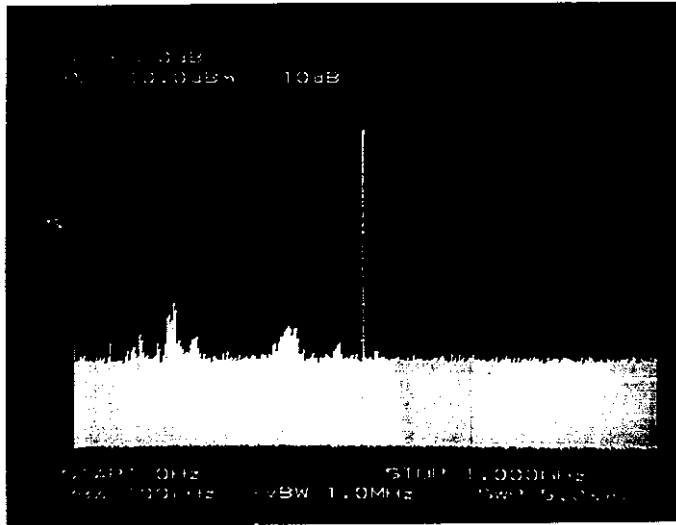


Short Pulse

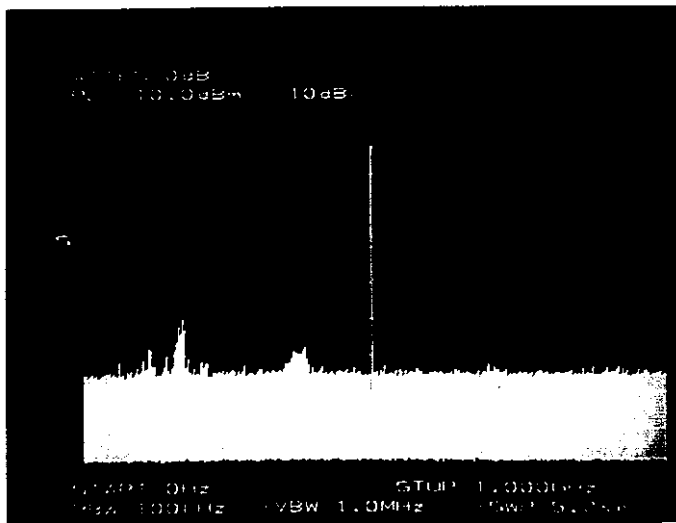
TEST #5

Frequency Band: 0~1 GHz

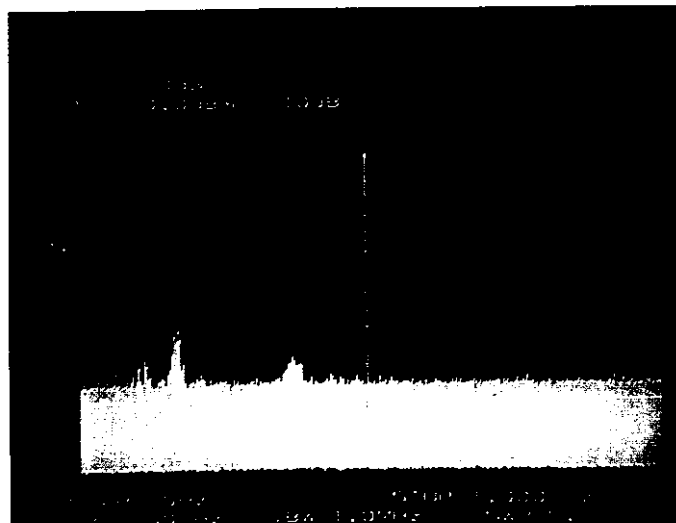
Log Ref. Level: -4.0 dBm



Medium
Short Pulse



Medium Pulse

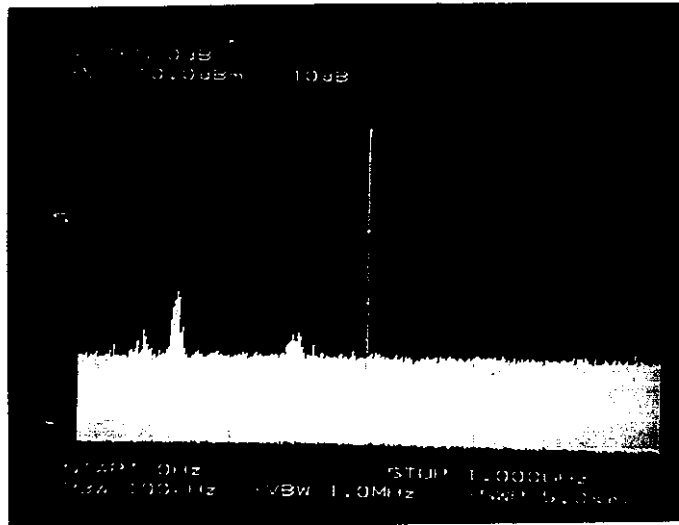


Medium
Long Pulse

TEST #5

Frequency Band: 0~1 GHz

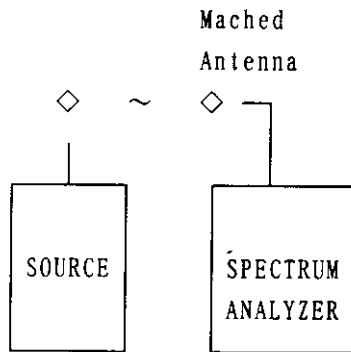
Log Ref. Level: -4.0 dBm



Long Pulse

CALIBRATION OF TESTS 6 ~ 13 (1 ~ 60 GHz)

Instead of using a signal source of known amplitude to calibrate the receiving 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:
$$P = \frac{1.64 P_t}{4 \pi R^2}$$

Where P_t is power transmitted.

The power to the analyzer is:
$$P_{sa} = P_{Ar} = \frac{P G \lambda^2}{4 \pi}$$

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

Hence
$$P_{sa} = \frac{1.64 P_t}{4 \pi R^2} \times \frac{P G \lambda^2}{4 \pi} = \frac{1.6 G \lambda^2}{16 \pi^2} \times P_t \text{ at 1 meter}$$

and
$$P_t = \frac{16 \pi^2 P_{sa}}{1.64 G \lambda^2} = \frac{96.3 P_{sa}}{G \lambda^2}$$

$$= P_{sa} \text{ (dBm)} + 19.8 \text{ (dB)} - G \text{ (dB)} - 20 \log \lambda \text{ (dB)}$$

TEST	HORN GAIN (AVG) dB		WAVELENGTH (dB)		Pt - Psa		LOG REF LEVEL
	LOA	HI	LO	HI	LO	HI	
6	6		-10.5	-24.4	24.3	38.2	0 dBm
7	6		-23.5	-29.0	37.3	42.8	0 dBm
8	6		-29.0	-32.4	42.8	46.5	0 dBm
9	6		-32.0	-34.5	46.2	48.3	0 dBm
10	6		-34.0	-36.0	45.8	49.7	0 dBm
11	23.3	24.9	-35.6	-38.8	32.1	33.7	0 dBm
12	24.7	23.7	-38.4	-39.7	33.5	35.8	0 dBm
13	23.6	25.1	-39.4	-46.0	35.6	37.2	0 dBm

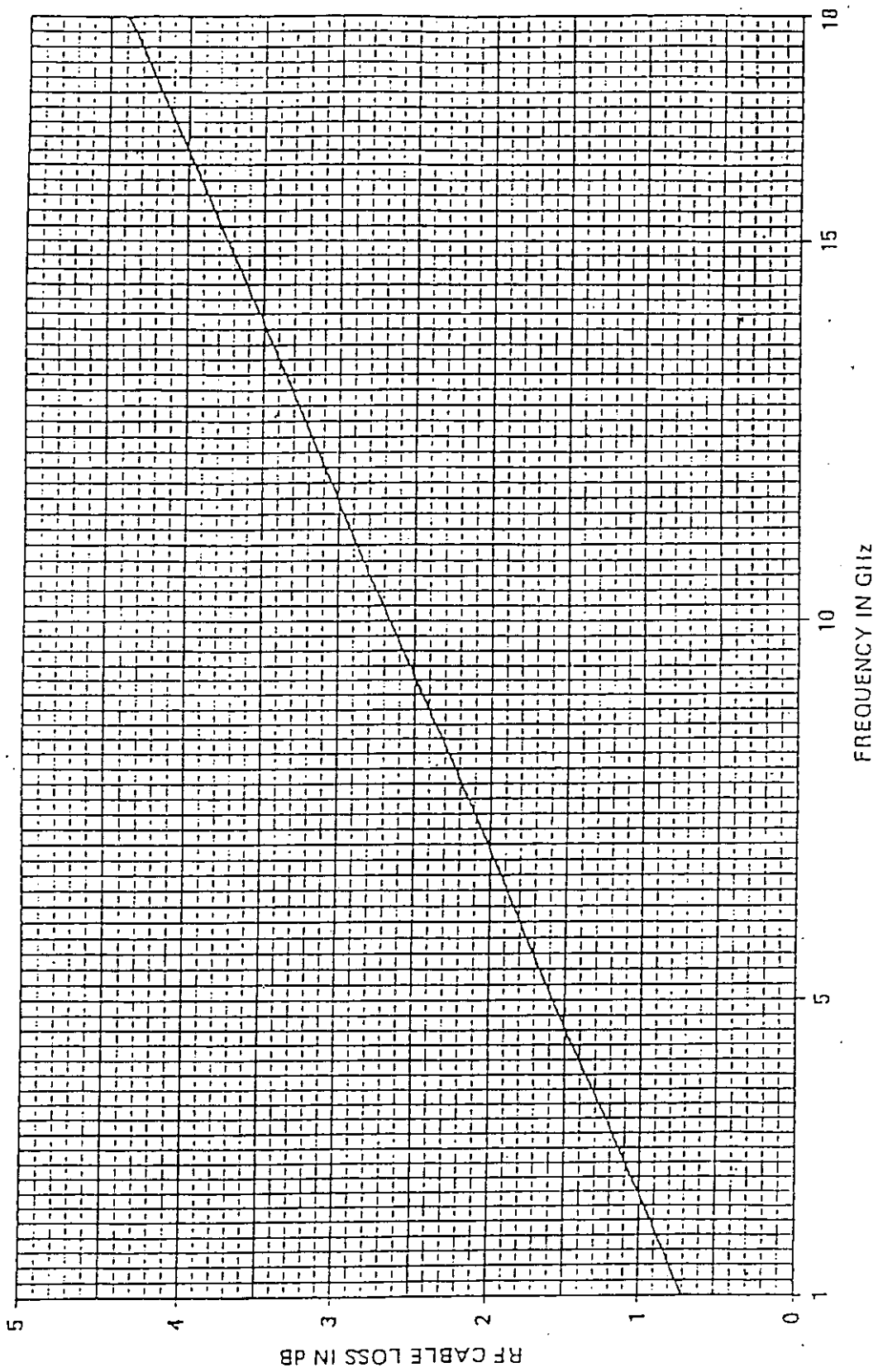


Figure 4-2. Model 94615-1 RF Cable Loss Chart

EATON

TITLE Model 94612-1 Log Periodic Antenna Instructions

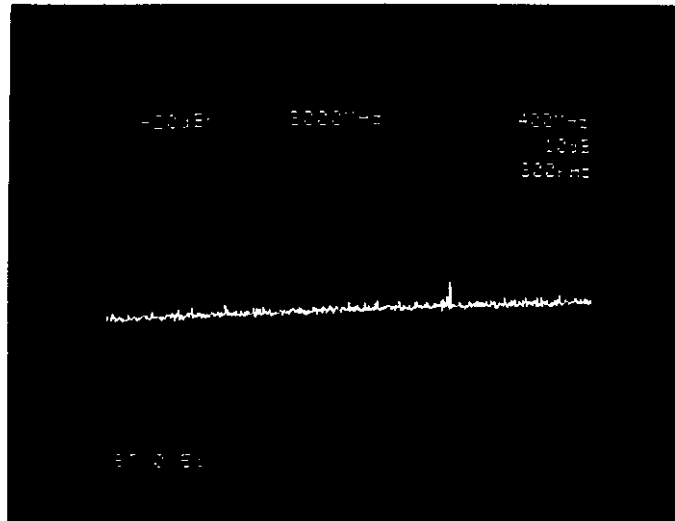
DWG NO. 1-500783-344
SHEET 4 OF 6

TEST #6

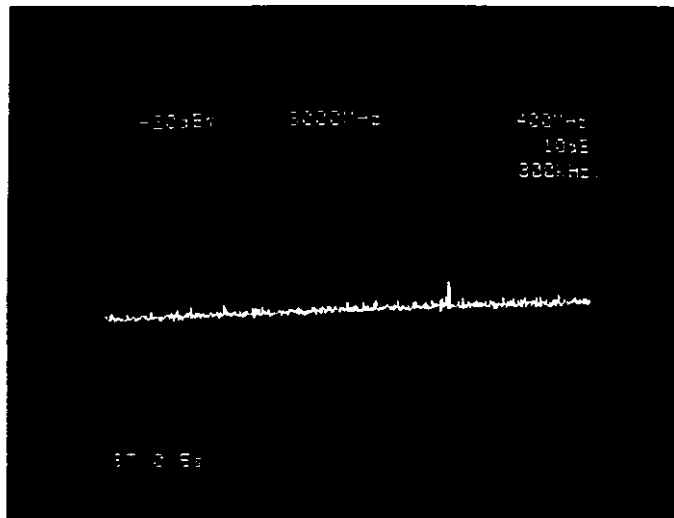
Frequency Band: 1~5GHz

Log Ref. Level: 0 dBm

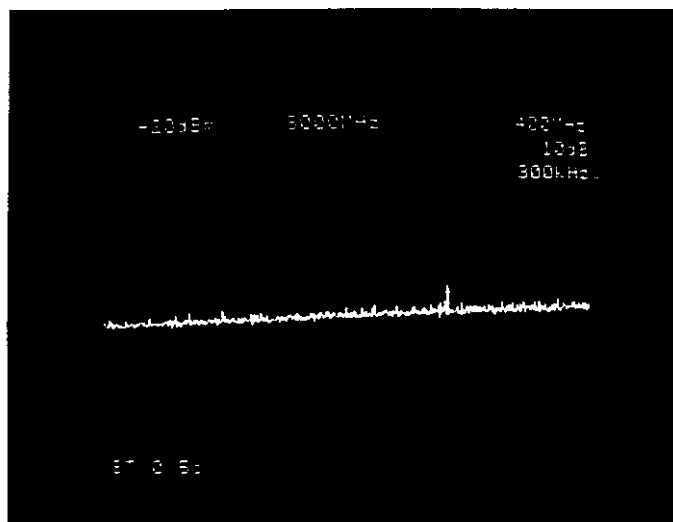
Maximum Spurious Signal Observed: (See Calibration Procedure
for Test 6~13)



Ambient



Stand-By



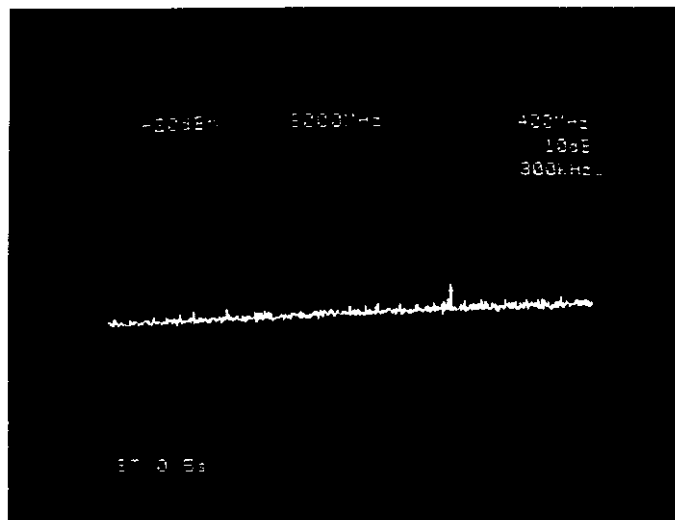
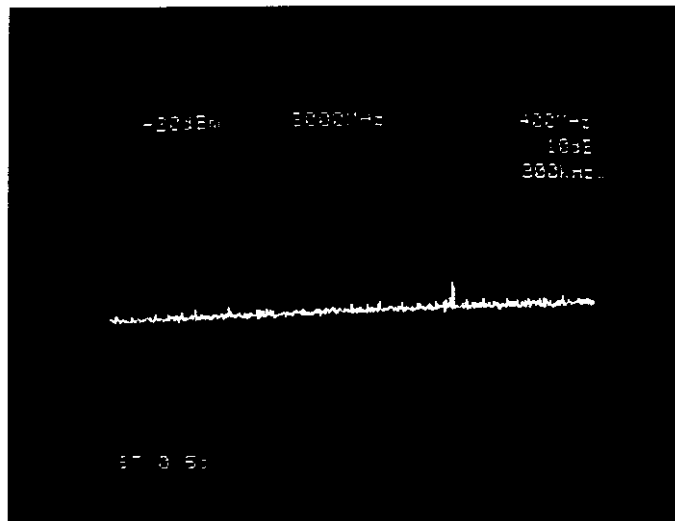
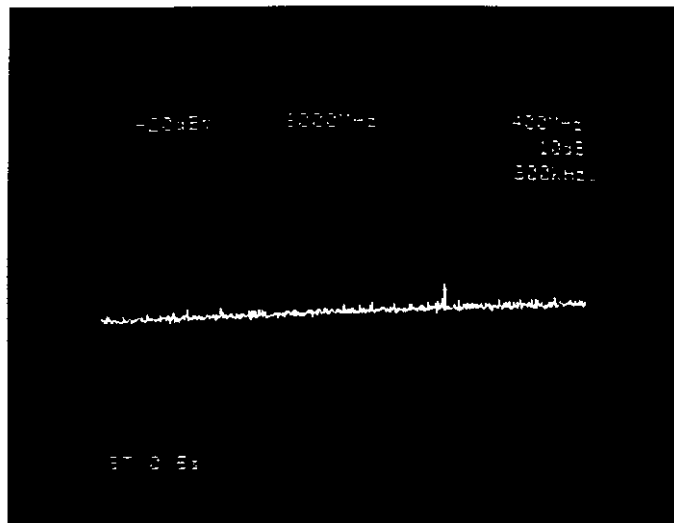
Short Pulse

TEST #6

Frequency Band: 1~5 GHz

Log Ref. Level: 0 dBm

Maximum Spurious Signal Observed: (See Calibration Procedure
for Test 6~13)

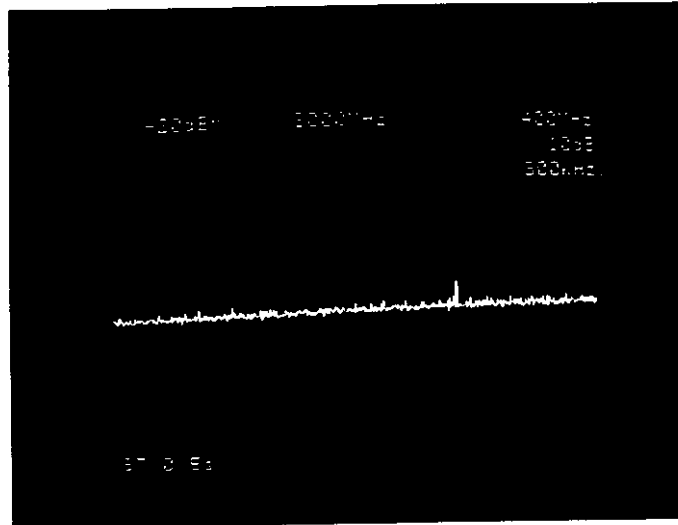


TEST #6

Frequency Band: 1~5 GHz

Log Ref. Level: 0 dBm

Maximum Spurious Signal Observed: (See Calibration Procedure
for Test 6~13)



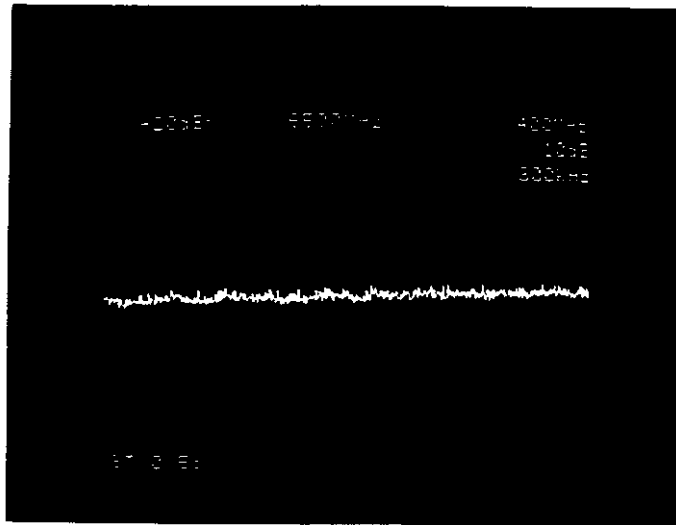
Long Pulse

TEST #7

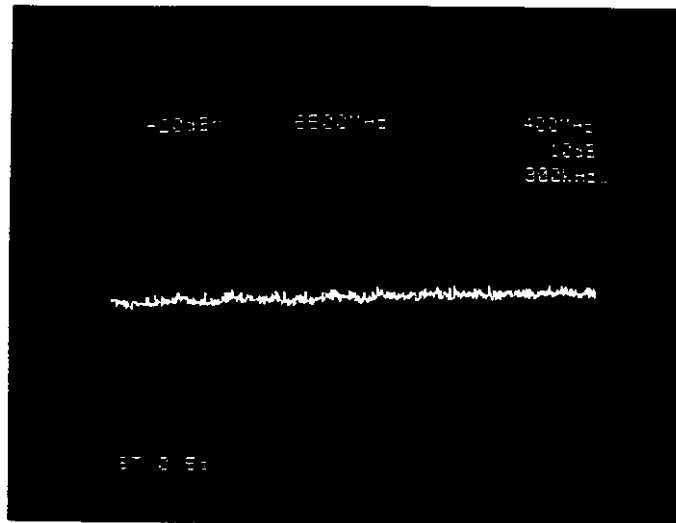
Frequency Band: 4.5~8.5 GHz

Log Ref. Level: 0 dBm

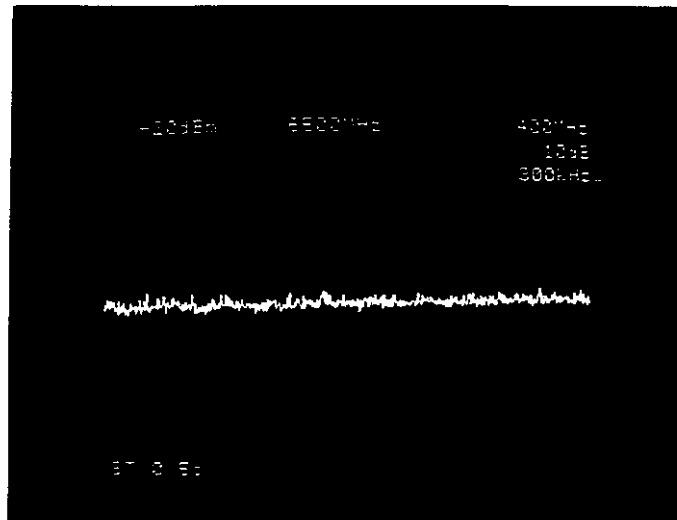
Maximum Spurious Signal Observed: (See Calibration Procedure
for Test 6~13)



Ambient



Stand-By



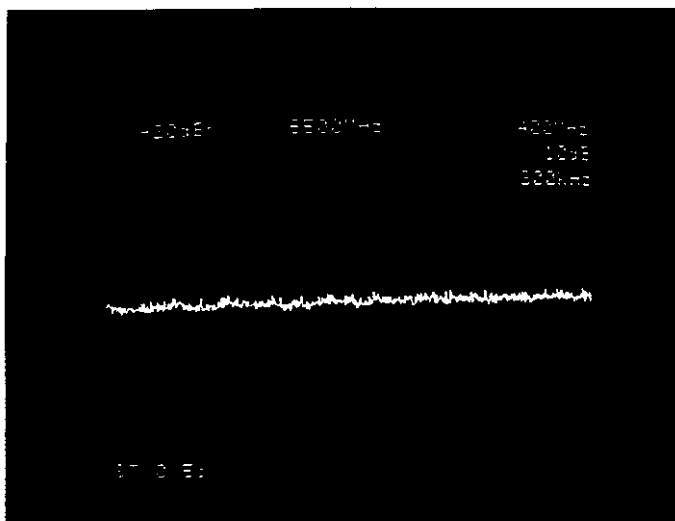
Short Pulse

TEST #7

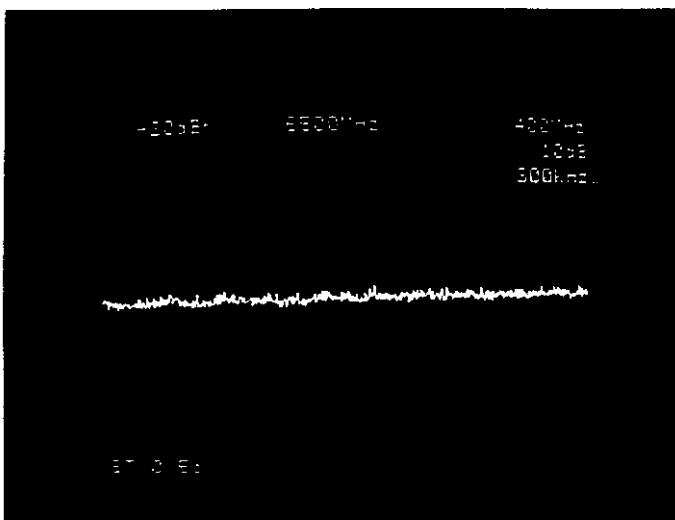
Frequency Band: 4.5~8.5 GHz

Log Ref. Level: 0 dBm

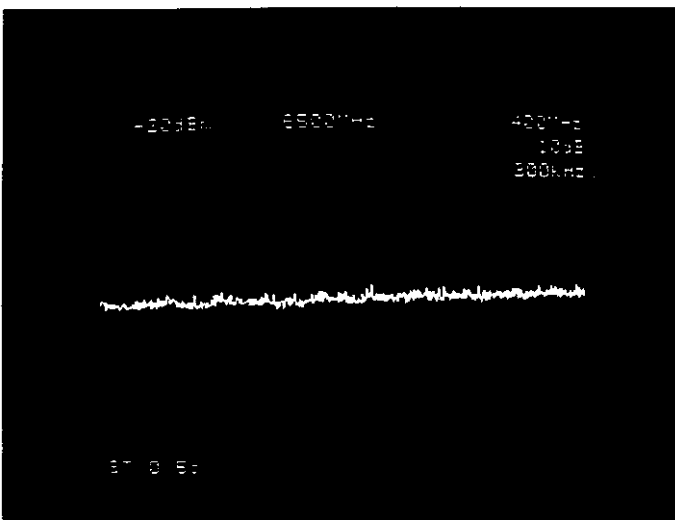
Maximum Spurious Signal Observed: (See Calibration Procedure
for Test 6~13)



Short-
Medium Pulse



Medium Pulse



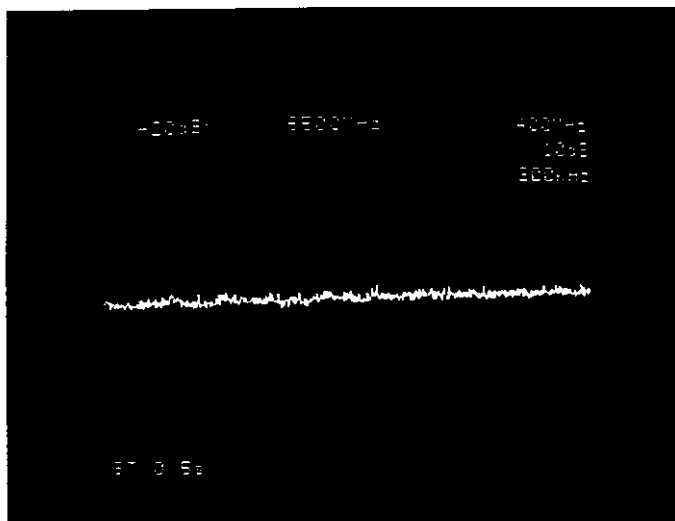
Medium-
Long Pulse

TEST #7

Frequency Band: 4.5~8.5 GHz

Log Ref. Level: 0 dBm

Maximum Spurious Signal Observed: (See Calibration Procedure
for Test 6~13)



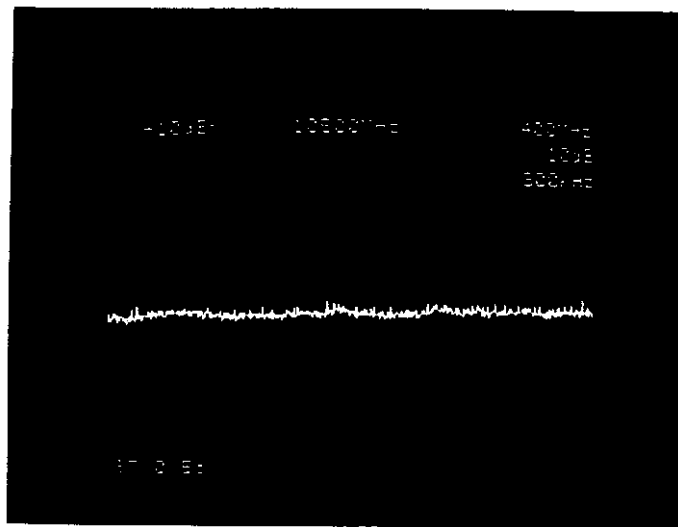
Long Pulse

TEST #8

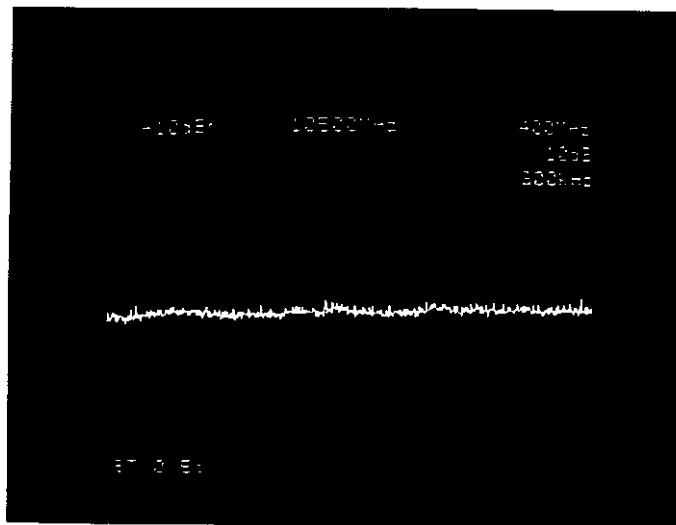
Frequency Band: 8.5~12.5 GHz

Log Ref. Level: 0 dBm

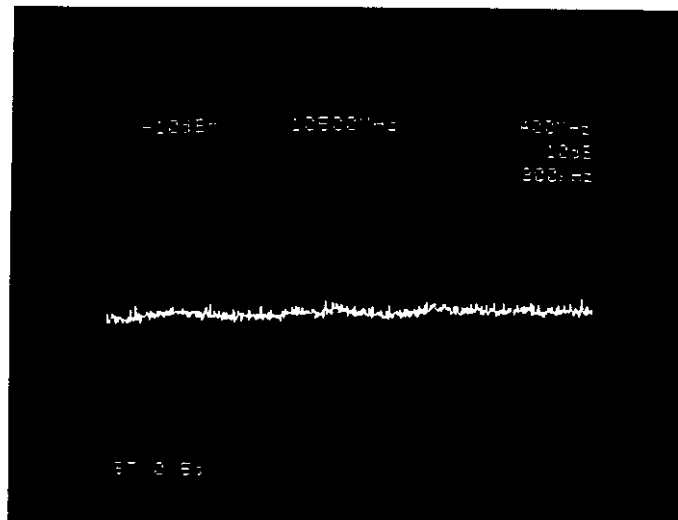
Maximum Spurious Signal Observed: (See Calibration Procedure
for Test 6~13)



Ambient



Stand-By



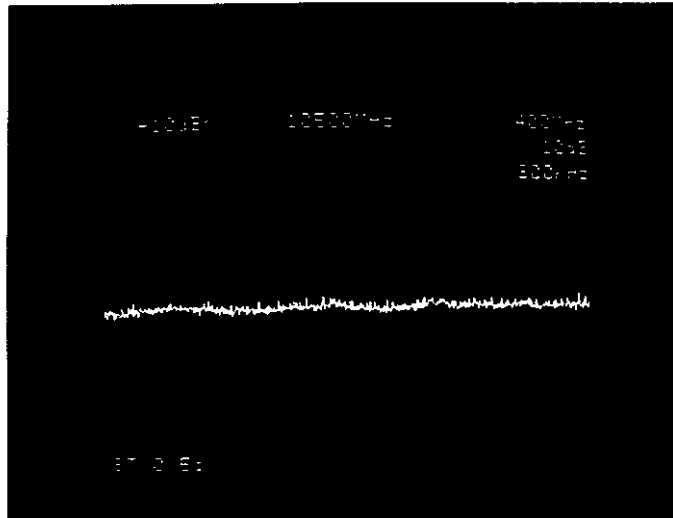
Short Pulse

TEST #8

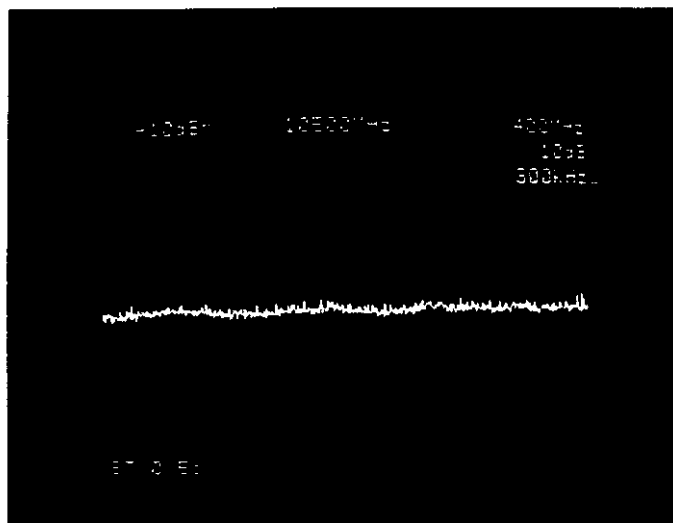
Frequency Band: 8.5~12.5 GHz

Log Ref. Level: 0 dBm

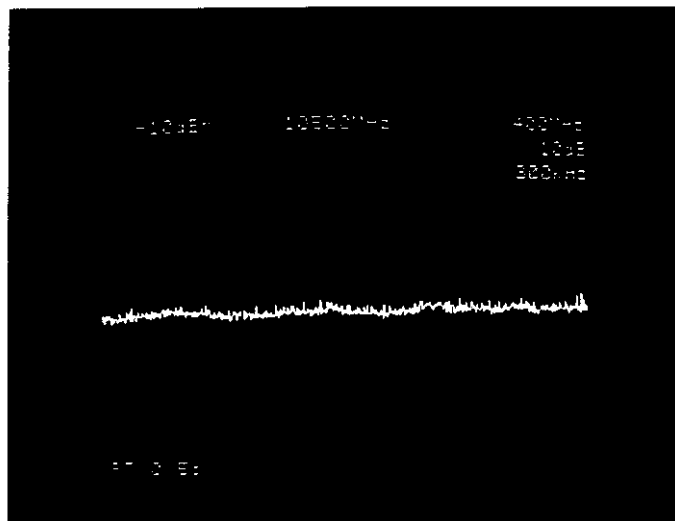
Maximum Spurious Signal Observed: (See Calibration Procedure
for Test 6~13)



Short-
Medium Pulse



Medium Pulse



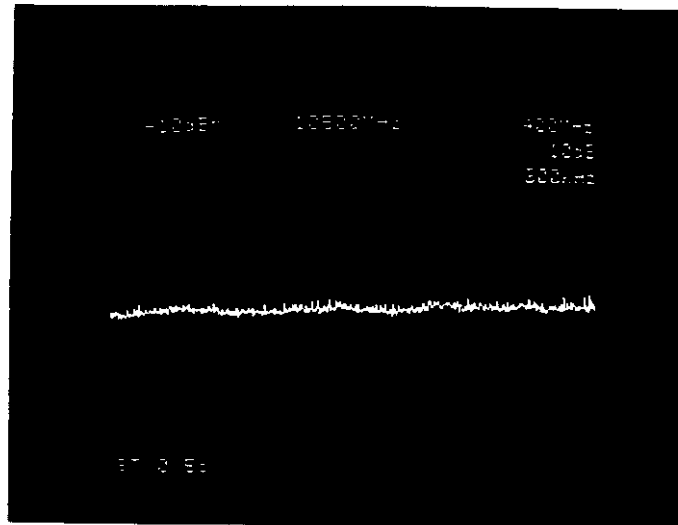
Medium-
Long Pulse

TEST #8

Frequency Band: 8.5~12.5 GHz

Log Ref. Level: 0 dBm

Maximum Spurious Signal Observed: (See Calibration Procedure
for Test 6~13)



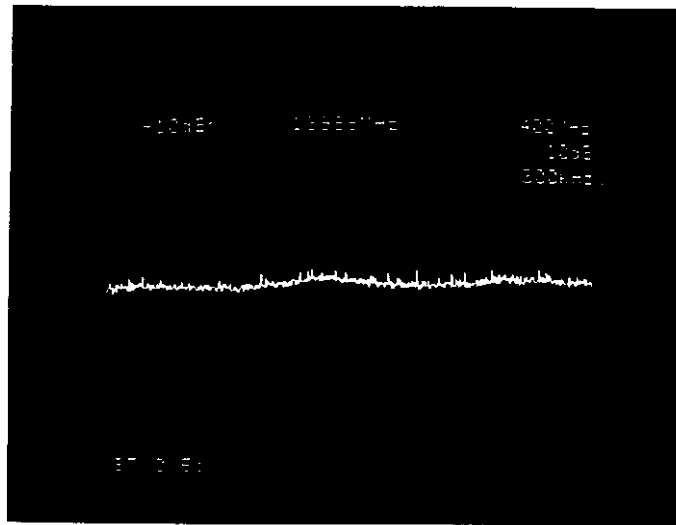
Long Pulse

TEST #9

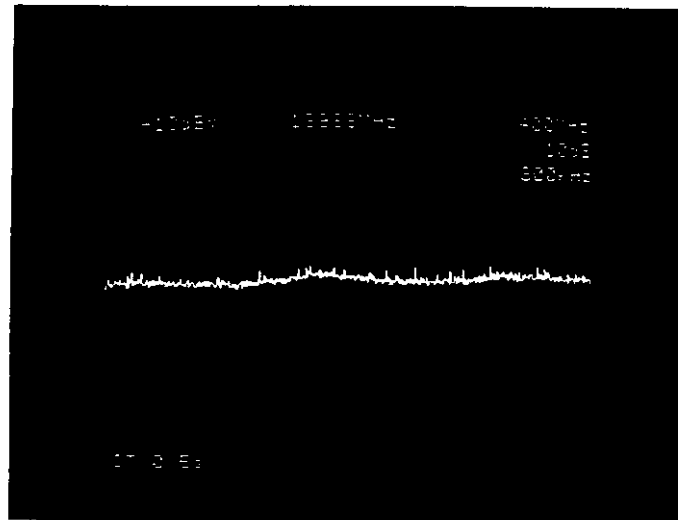
Frequency Band: 12~16 GHz

Log Ref. Level: 0 dBm

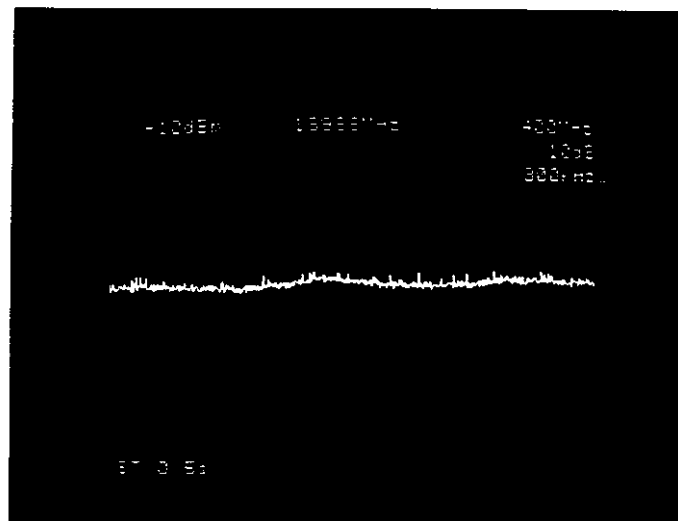
Maximum Spurious Signal Observed: (See Calibration Procedure
for Test 6~13)



Ambient



Stand-By



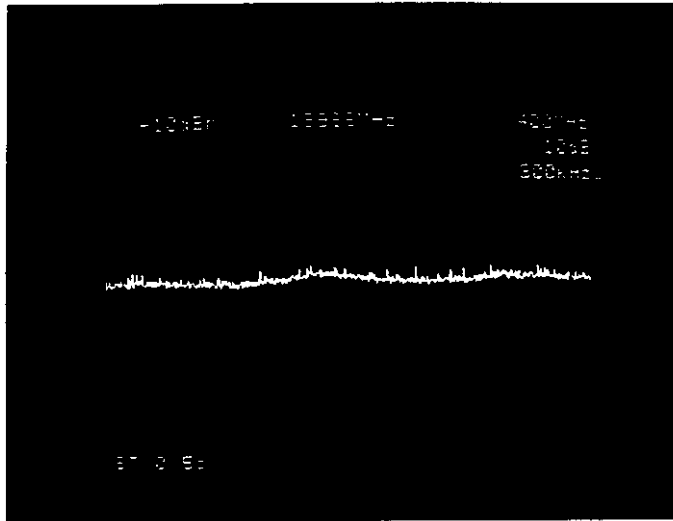
Short Pulse

TEST #9

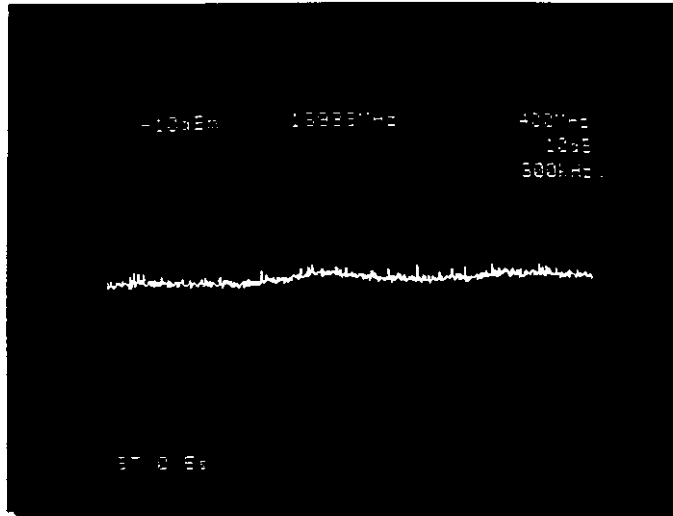
Frequency Band: 12~16 GHz

Log Ref. Level: 0 dBm

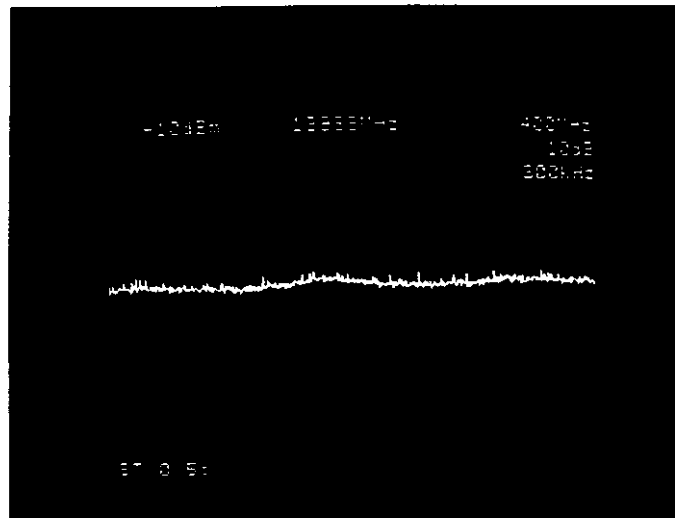
Maximum Spurious Signal Observed: (See Calibration Procedure
for Test 6~13)



Short-
Medium Pulse



Medium Pulse



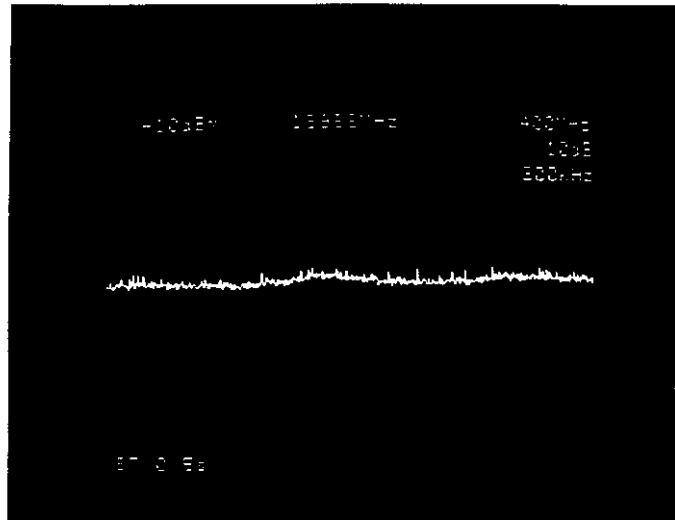
Medium-
Long Pulse

TEST #9

Frequency Band: 12~16 GHz

Log Ref. Level: 0 dBm

Maximum Spurious Signal Observed: (See Calibration Procedure
for Test 6~13)



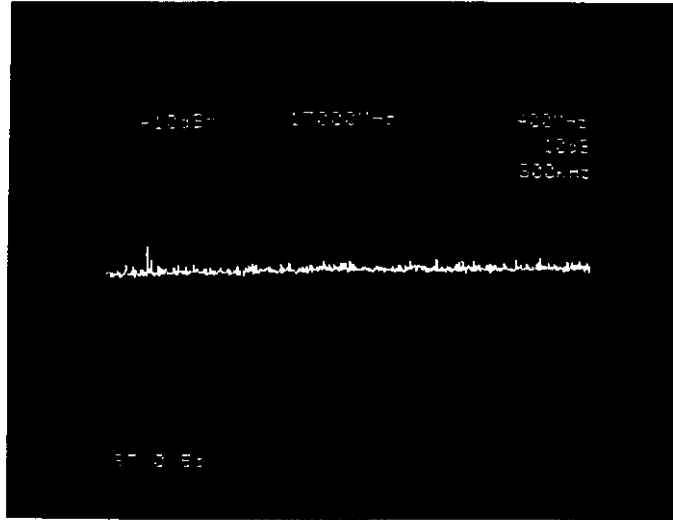
Long Pulse

TEST #10

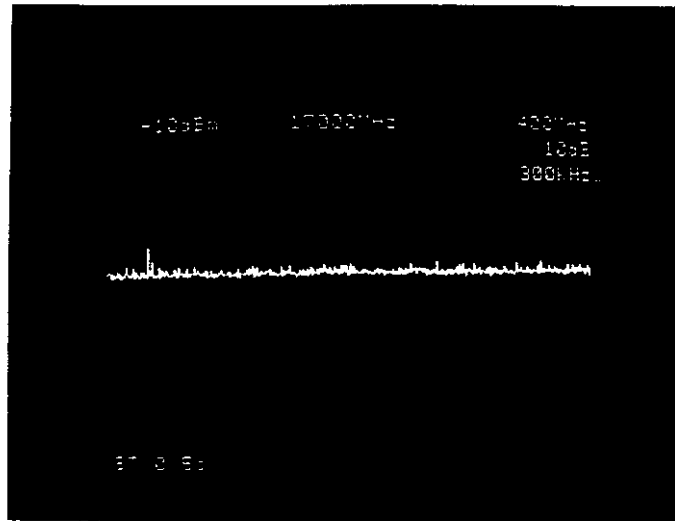
Frequency Band: 15~19 GHz

Log Ref. Level: 0 dBm

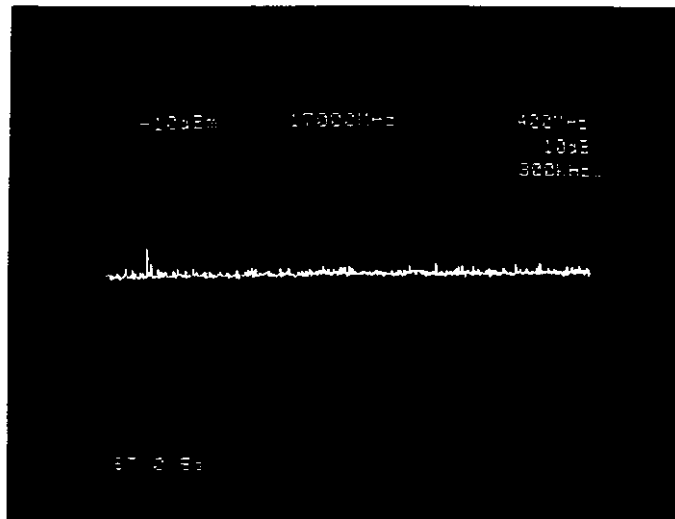
Maximum Spurious Signal Observed: (See Calibration Procedure
for Test 6~13)



Ambient



Stand-By



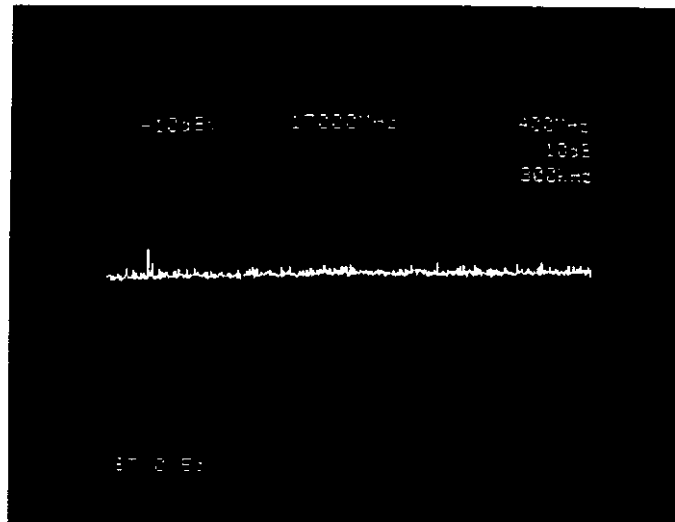
Short Pulse

TEST #10

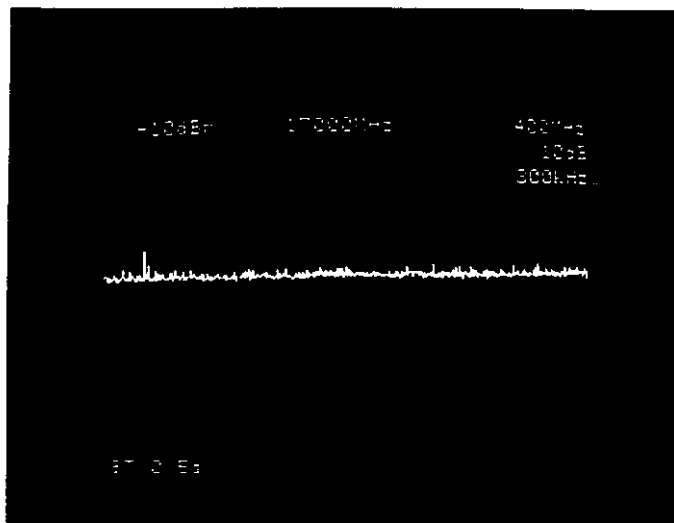
Frequency Band: 15~19 GHz

Log Ref. Level: 0 dBm

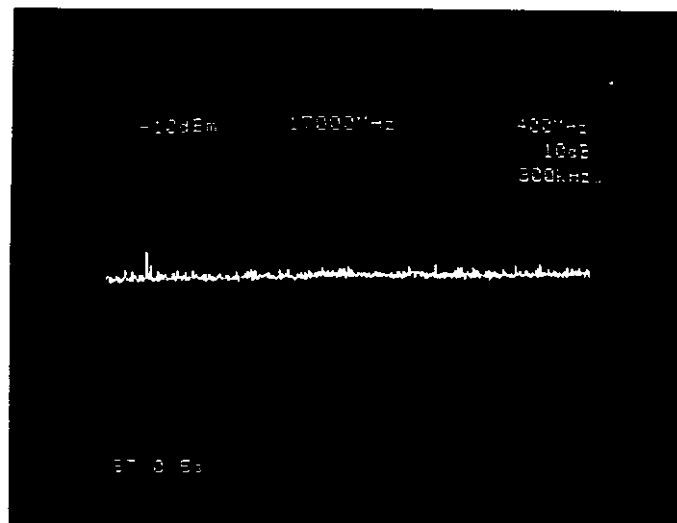
Maximum Spurious Signal Observed: (See Calibration Procedure
for Test 6~13)



Short-
Medium Pulse



Medium Pulse



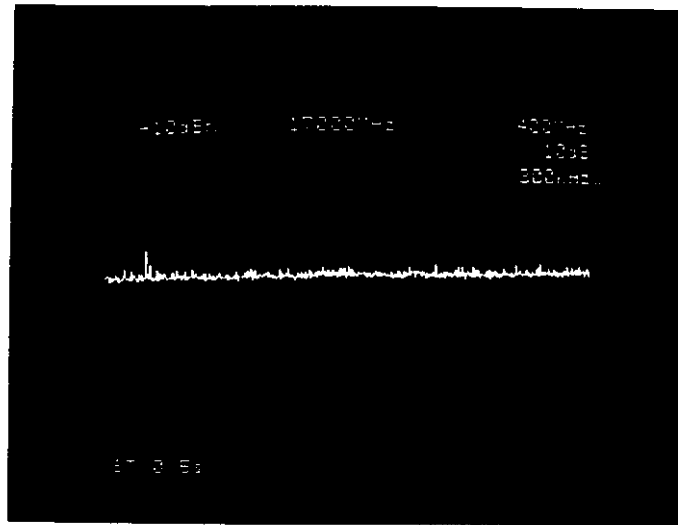
Medium-
Long Pulse

TEST #10

Frequency Band: 15~19 GHz

Log Ref. Level: 0 dBm

Maximum Spurious Signal Observed: (See Calibration Procedure
for Test 6~13)



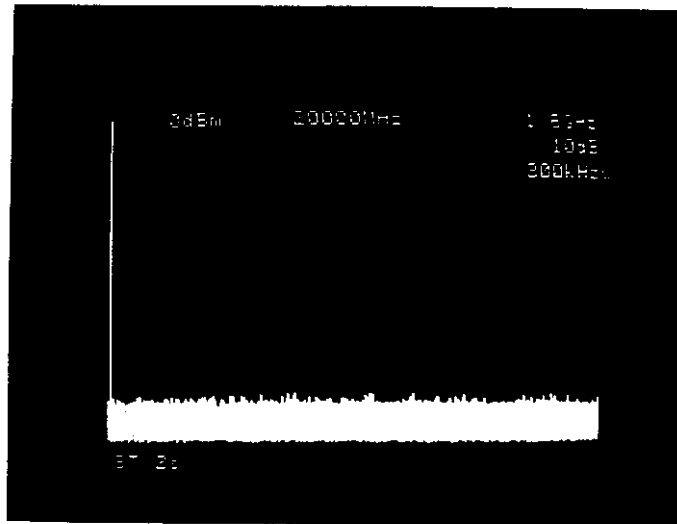
Long Pulse

TEST #11

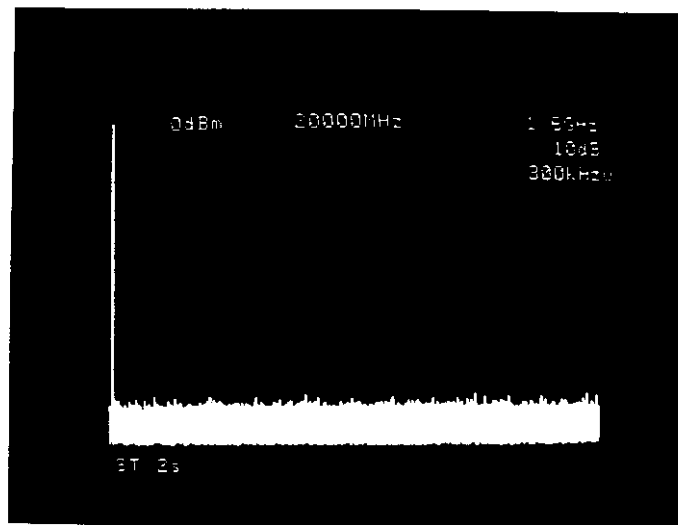
Frequency Band: 12.4~28 GHz

Log Ref. Level: 0 dBm

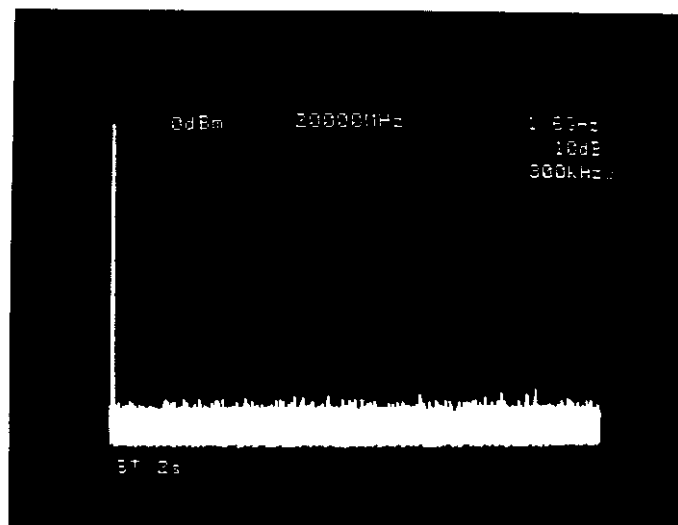
Maximum Spurious Signal Observed: (See Calibration Procedure
for Test 6~13)



Ambient



Stand-By



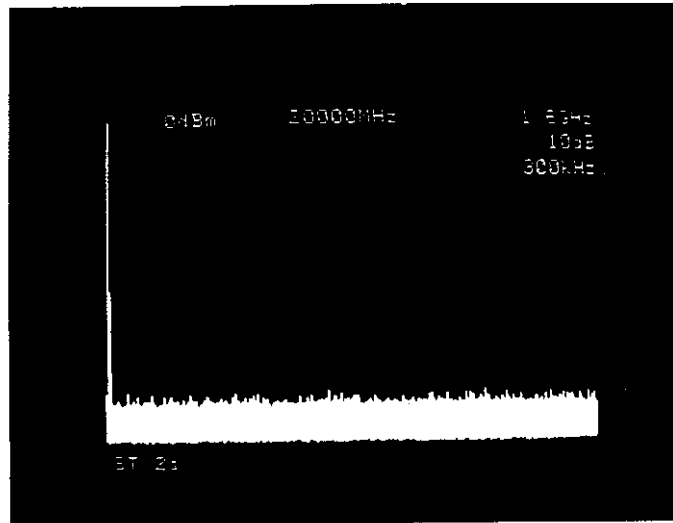
Short Pulse

TEST #11

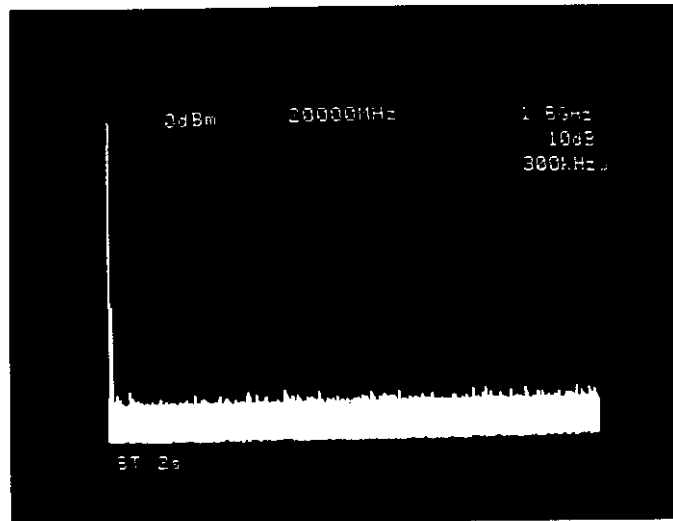
Frequency Band: 12.4~28 GHz

Log Ref. Level: 0 dBm

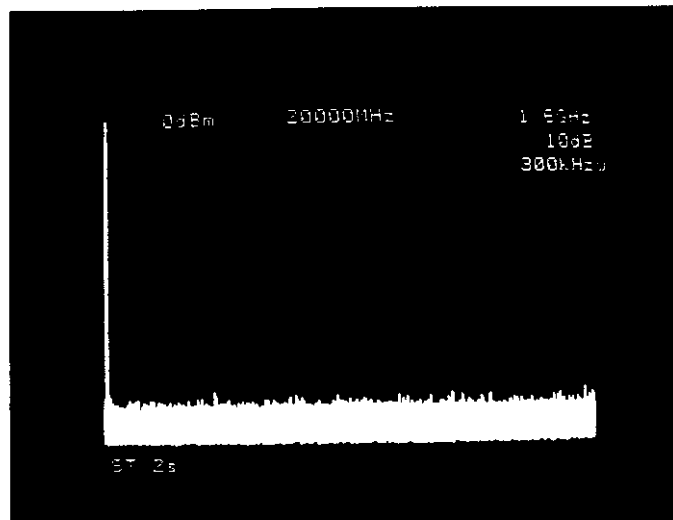
Maximum Spurious Signal Observed: (See Calibration Procedure for Test 6~13)



Short-Medium Pulse



Medium Pulse



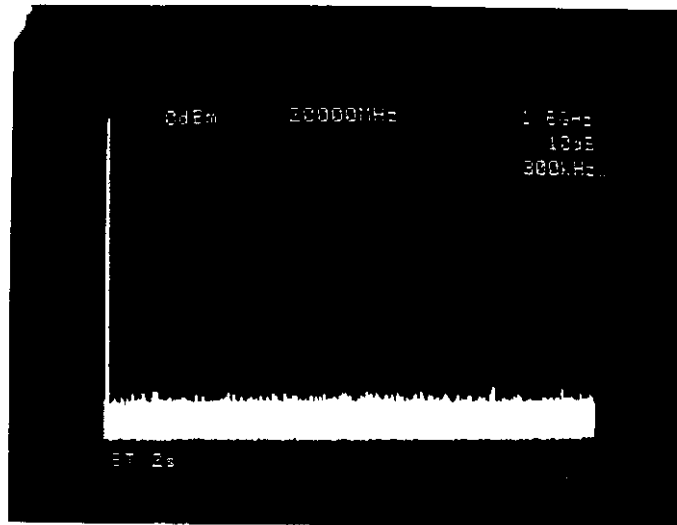
Medium-Long Pulse

TEST #11

Frequency Band: 12.4~28 GHz

Log Ref. Level: 0 dBm

Maximum Spurious Signal Observed: (See Calibration Procedure
for Test 6~13)



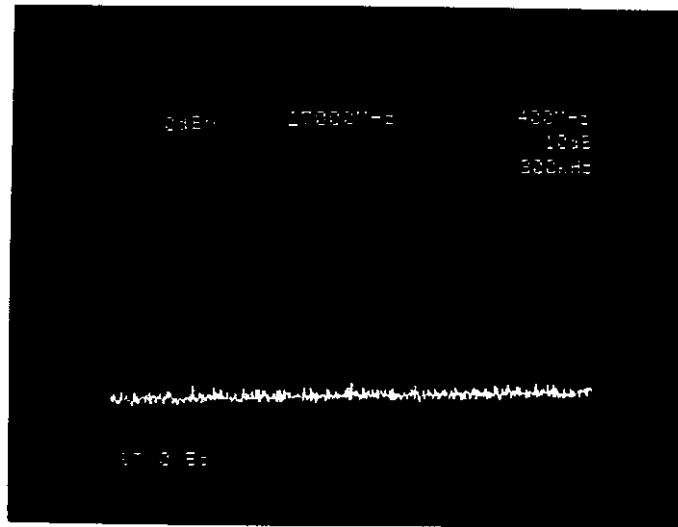
Long Pulse

TEST #12

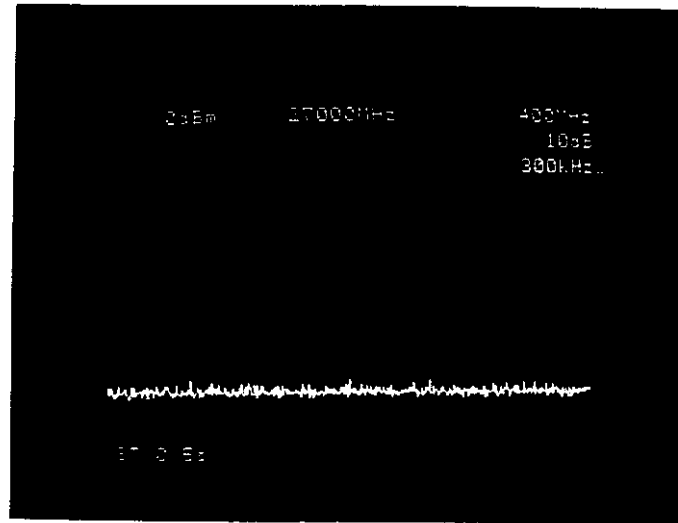
Frequency Band: 25~29 GHz

Log Ref. Level: 0 dBm

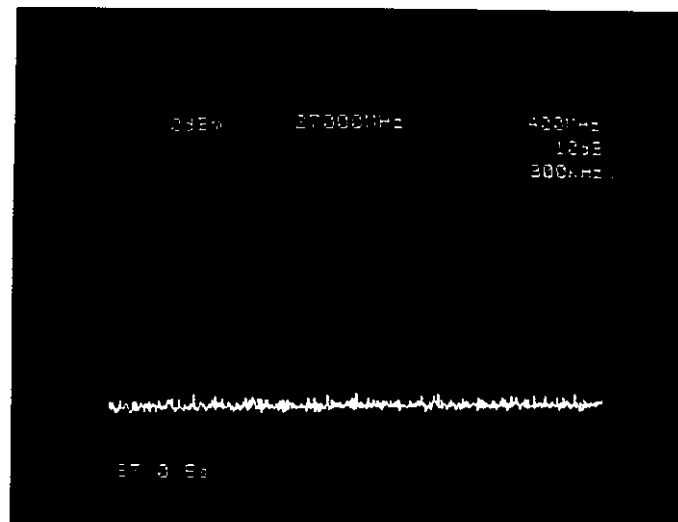
Maximum Spurious Signal Observed: (See Calibration Procedure for Test 6~13)



Ambient



Stand-By



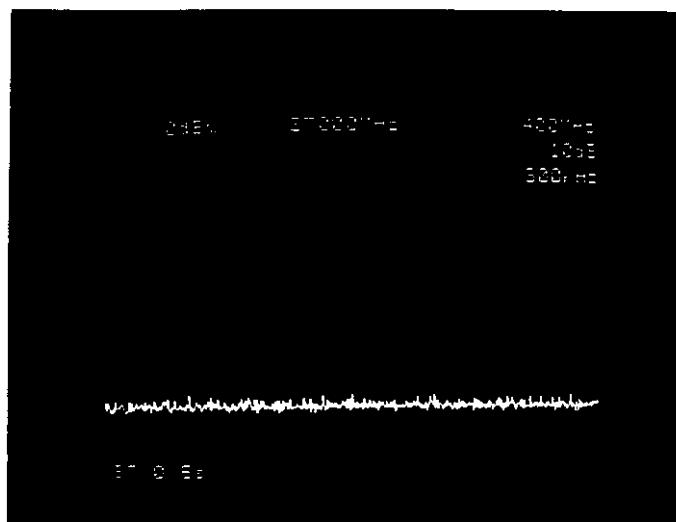
Short Pulse

TEST #12

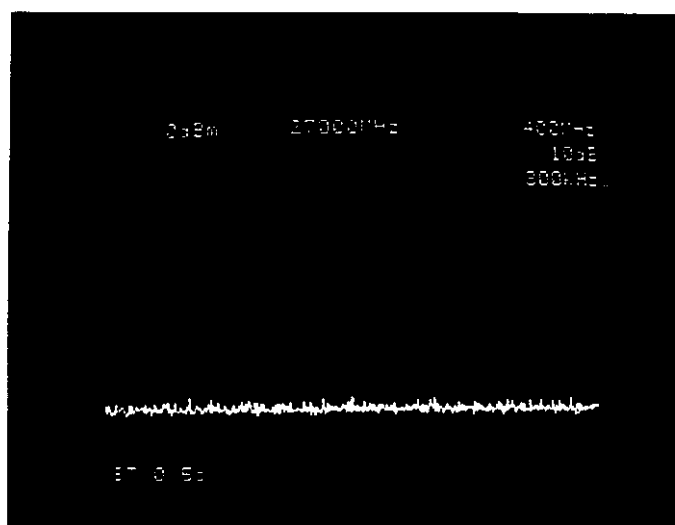
Frequency Band: 25~29 GHz

Log Ref. Level: 0 dBm

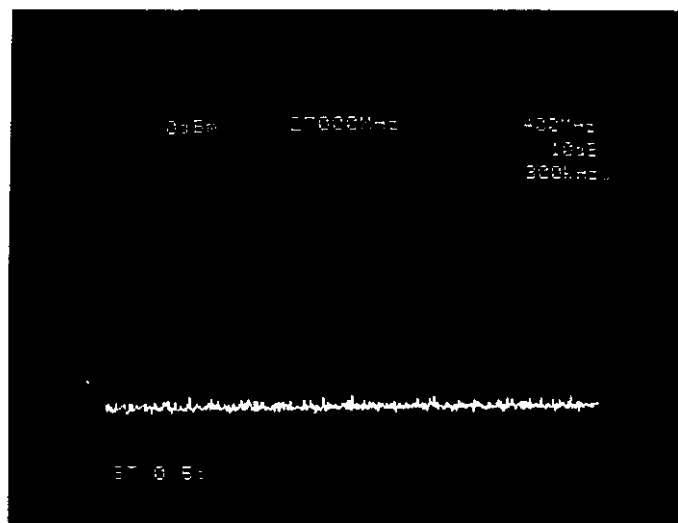
Maximum Spurious Signal Observed: (See Calibration Procedure
for Test 6~13)



Short-
Medium Pulse



Medium Pulse



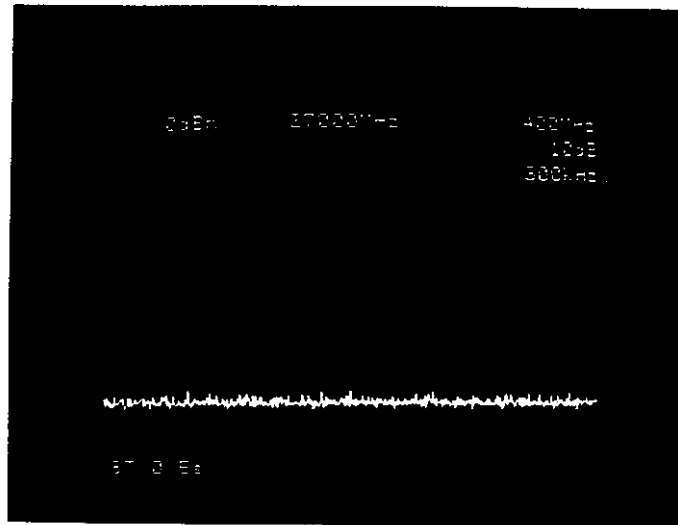
Medium-
Long Pulse

TEST #12

Frequency Band: 25~29 GHz

Log Ref. Level: 0 dB_m

Maximum Spurious Signal Observed: (See Calibration Procedure
for Test 6~13)



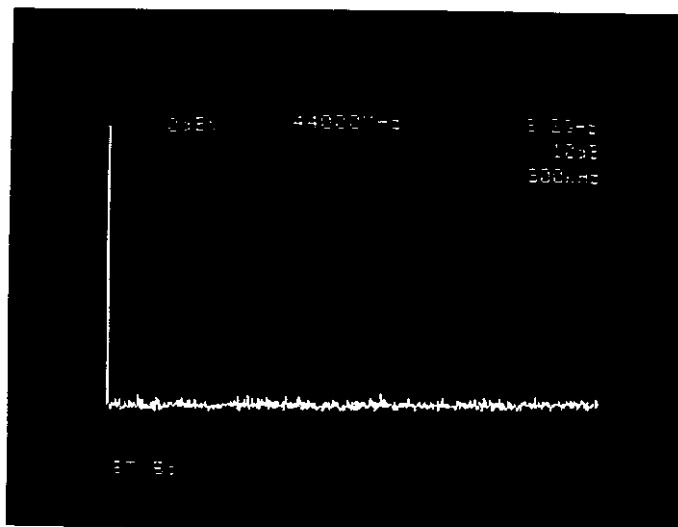
Long Pulse

TEST #13

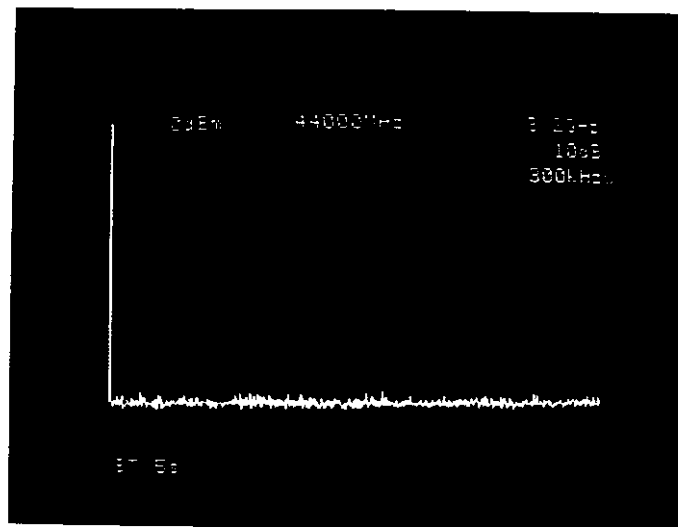
Frequency Band: 28~60 GHz

Log Ref. Level: 0 dBm

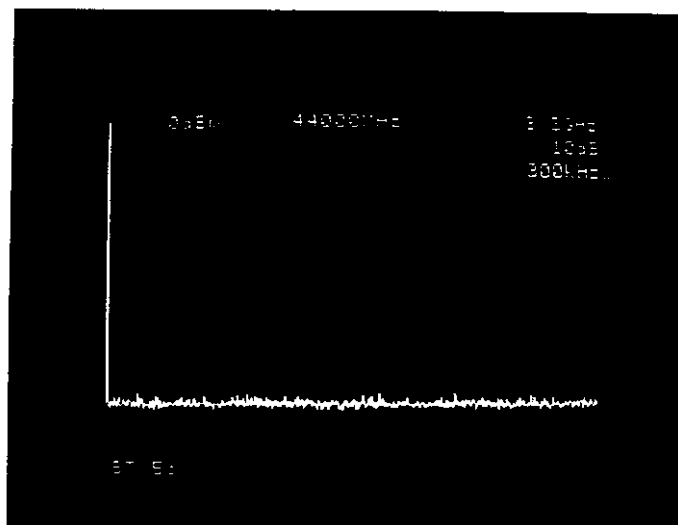
Maximum Spurious Signal Observed: (See Calibration Procedure
for Test 6~13)



Ambient



Stand-By



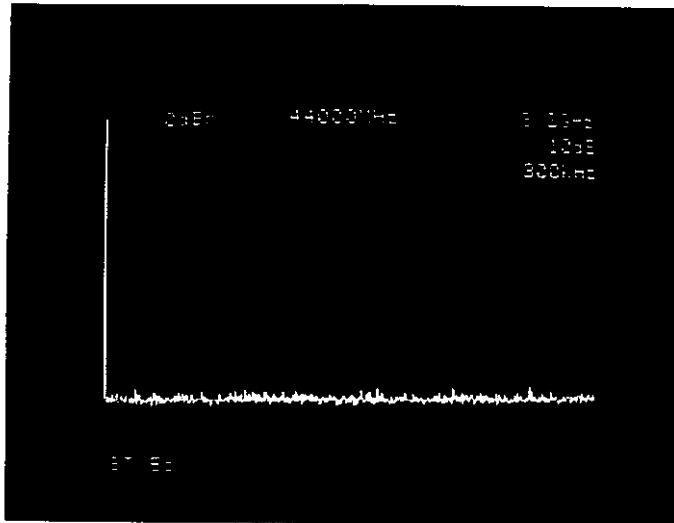
Short Pulse

TEST #13

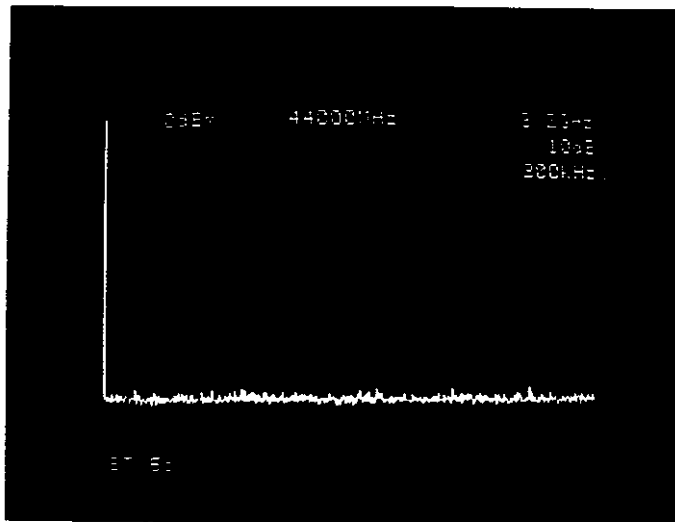
Frequency Band: 28~60 GHz

Log Ref. Level: 0 dBm

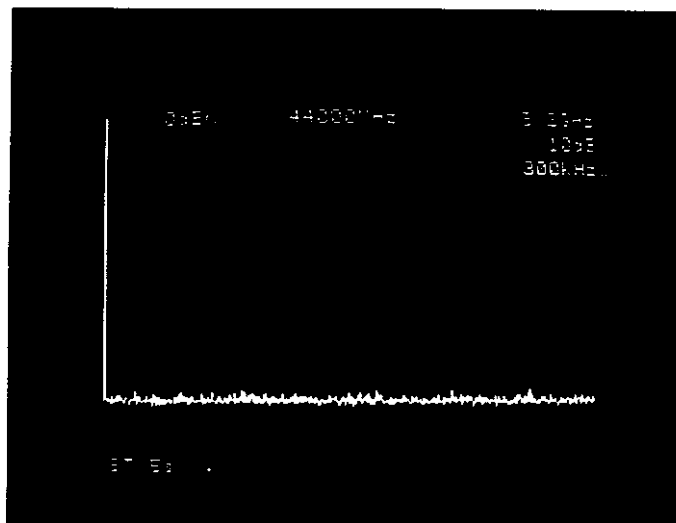
Maximum Spurious Signal Observed: (See Calibration Procedure for Test 6~13)



Short-
Medium Pulse



Medium Pulse



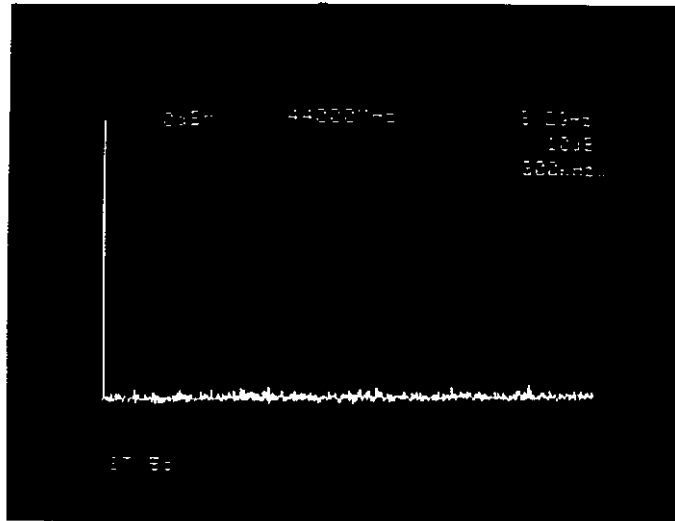
Medium-
Long Pulse

TEST #13

Frequency Band: 28~60 GHz

Log Ref. Level: 0 dBm

Maximum Spurious Signal Observed: (See Calibration Procedure
for Test 6~13)



Long Pulse

·CKEJMA3925

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:
$$E \cdot V/m @ 3 m = \text{LOG}_{10}^{-1}(\text{dBm} + 107 + \text{A.F.} + \text{C.L.})$$

20

5. MEASUREMENT RESULTS: ATTACHED FOR WORST CASE CONDITIONS.

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 = \geq 20 dB BELOW LIMIT

TESTS WERE CONDUCTED WITH:

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

SAMPLE CALCULATION:

EMISSION FREQUENCY, MHz = Less than noise level
 LEVEL = $\text{LOG}_{10}^{-1} \left(\frac{-66 + 107 + 45}{20} \right)$
 LEVEL, $\mu\text{V/m}$ @ 3 m = 19952.6
 LEVEL, $\mu\text{V/m}$ @ 1 N.M. = 32.3

RESULTS

RADIATED RECEIVER SPURIOUS 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	METER, dB μ V	A. F. C. L. dB	μ V/m @3m	μ V/m @1N.M.
9405	9384	P	30.0	30.0	36.1	45	19952.6	32.3