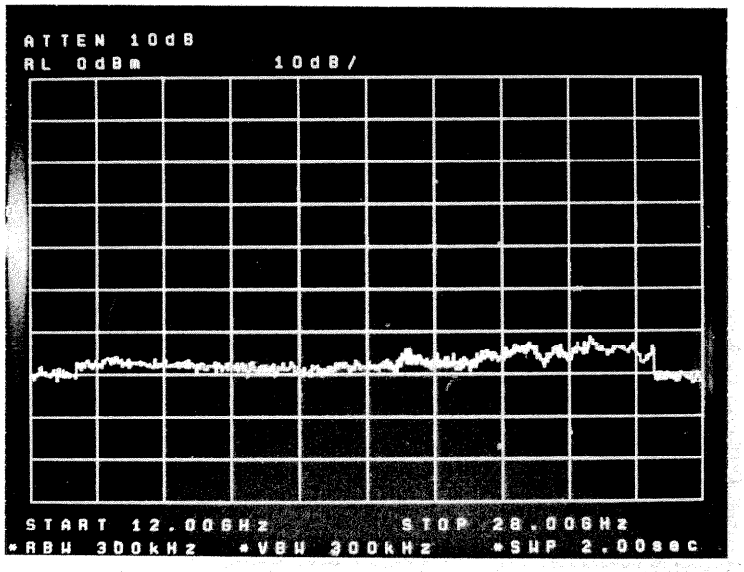
(Sec. 2.991)



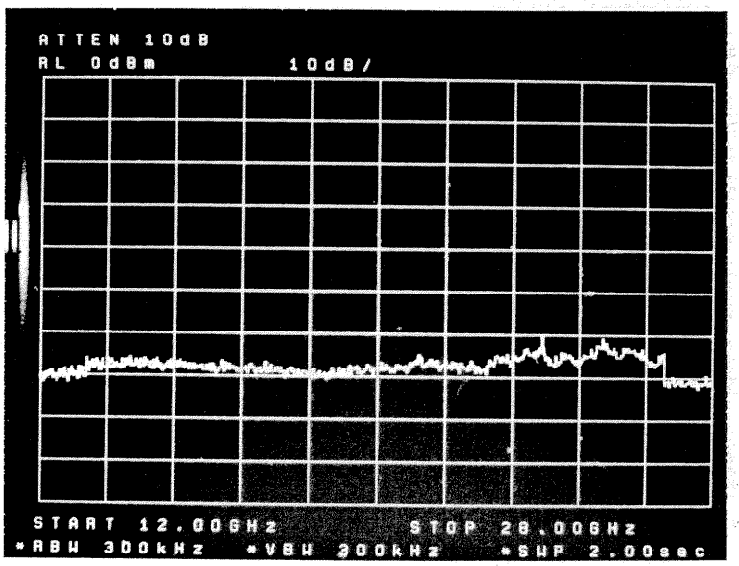
Scale
↑ 10dB/Div

→1.6GHz/Div

Spurious
Signal

0.25 μS Pulse

12 to 28 GHz



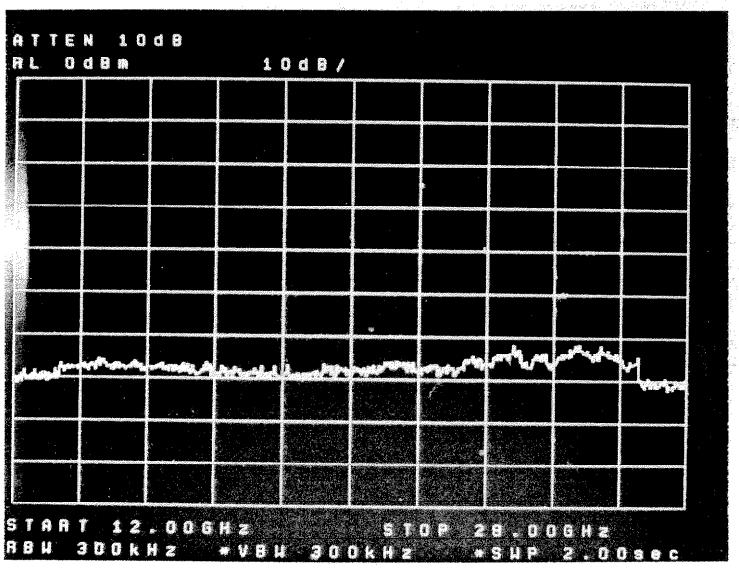
Scale
↑ 10dB/Div

→1.6GHz/Div

Spurious
Signal

0.5 μS Pulse

12 to 28 GHz



Scale
↑ 10dB/Div

→1.6GHz/Div

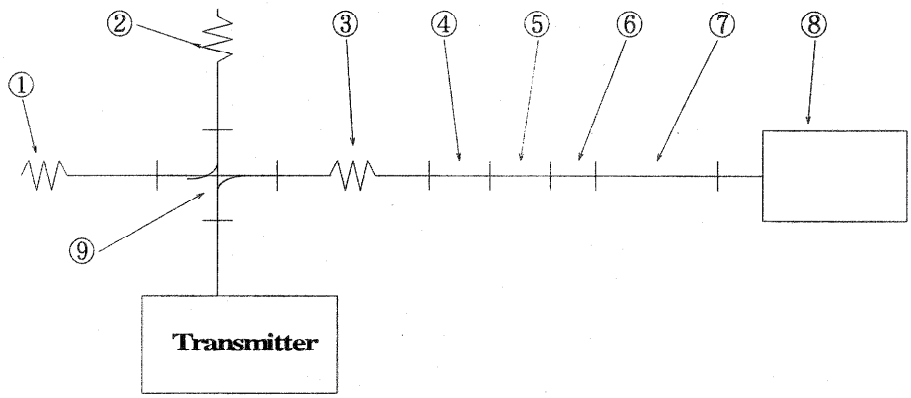
Spurious
Signal

1.0 μS Pulse

12 to 28 GHz

(Sec. 2.991)　　3.0　Sprious signals at antenna port

Condition 28.0 – 50.0 GHz

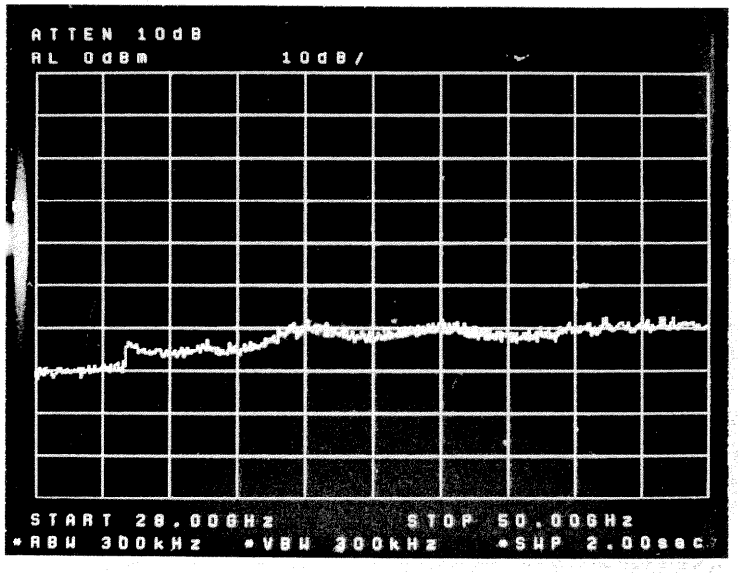


10. Dummy Load	4D104	Shimada
11. high power Dummy Load	4D371A	Shimada
12. Attenuator	S382C	HP
13. Taperd W/G	195-X KU	AIRCOM
14. Taperd W/G	11518A	HP
15. Adapter	BL00-6255-00	Oriet Microwave
16. Coaxial Cable	SF101	HUBER+SUHNER
17. Spectrum Analyzer	8565EC	HP
18. Directional Coupler	5D102A	Shimada
Coupling 30 dB		
Directivity 30 dB		

Attenuation 3　　: 30 dB

Measurement Point : Transmitter Output

(Sec. 2.991)



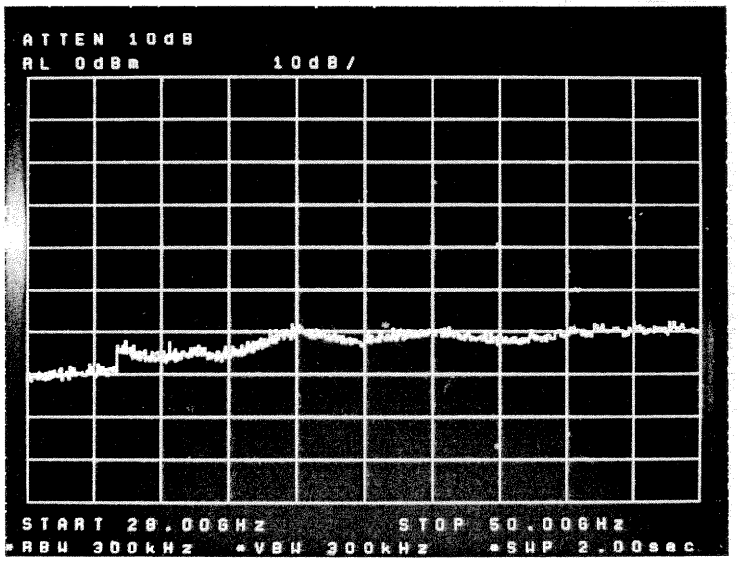
Scale
↑ 10dB/Div

→2.2GHz/Div

Spurious
Signal

OFF

28 to 50 GHz



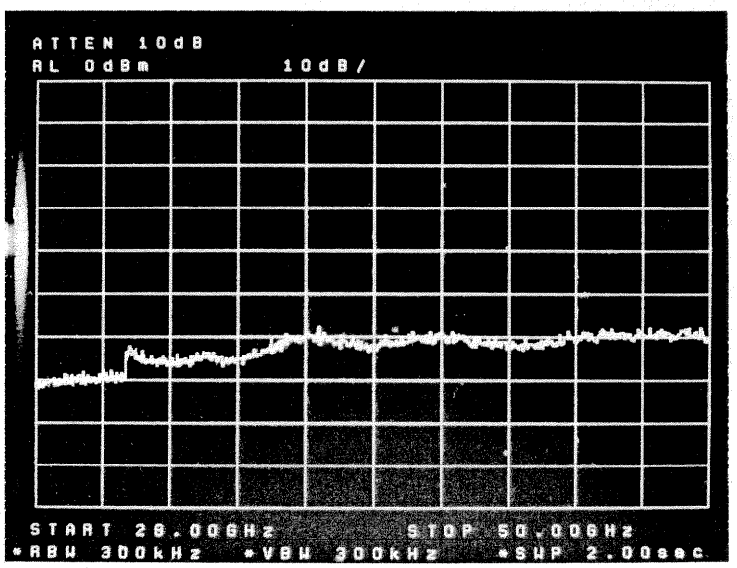
Scale
↑ 10dB/Div

→2.2GHz/Div

Spurious
Signal

Stand-By

28 to 50 GHz



Scale
↑ 10dB/Div

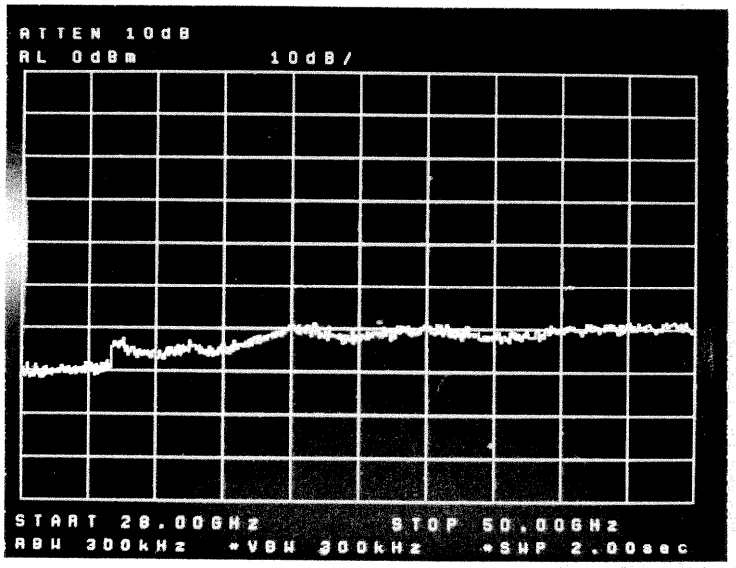
→2.2GHz/Div

Spurious
Signal

0.08 μS Pulse

28 to 50 GHz

(Sec. 2.991)



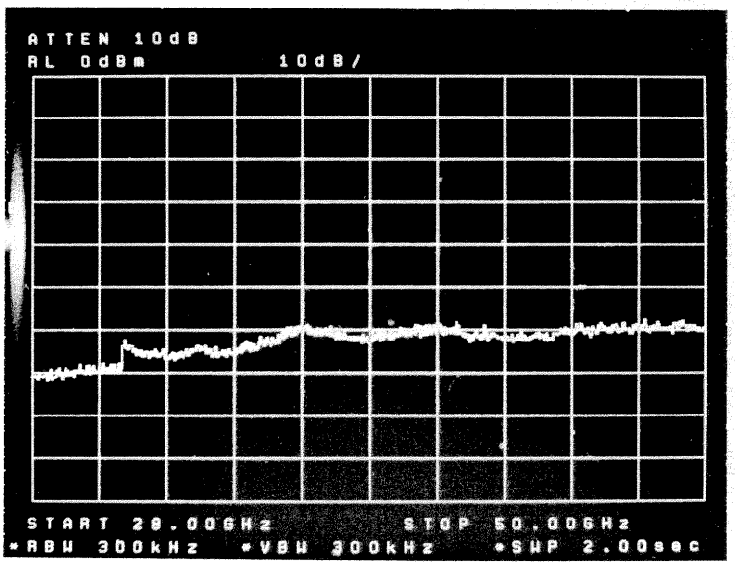
Scale
↑ 10dB/Div

→2.2GHz/Div

Spurious
Signal

0.25 μS Pulse

28 to 50 GHz



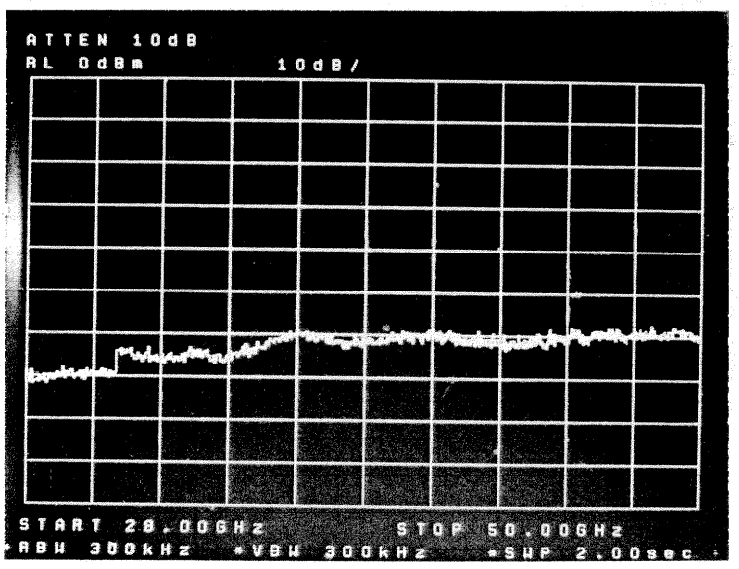
Scale
↑ 10dB/Div

→2.2GHz/Div

Spurious
Signal

0.5 μS Pulse

28 to 50 GHz



Scale
↑ 10dB/Div

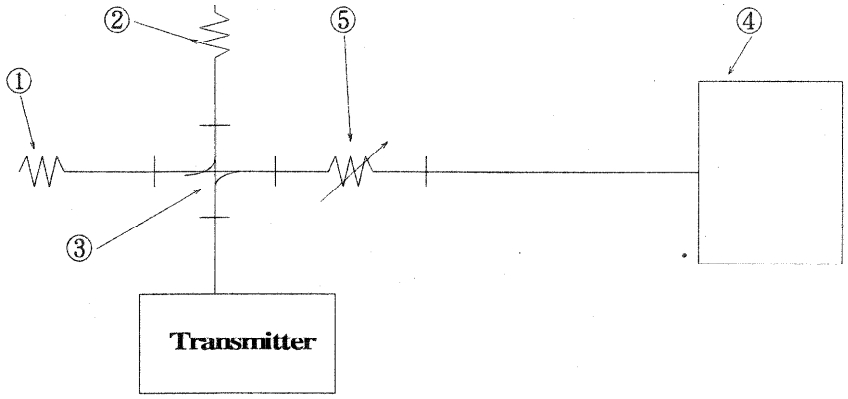
→2.2GHz/Div

Spurious
Signal

1.0 μS Pulse

28 to 50 GHz

(Sec.2.995) 4.0 Frequency Stability



4. Dummy Load 4D104 HP
5. High Power Dummy Load 4D371A Shimada
6. Directional Coupler 5D102A Shimada
   Coupling 30dB
   Directivity 30dB
4. Spectrum Analyzer 8592A HP
6. Attenuator
   Temperature Chamber Onishi Netugaku

Measurement Procesure

1 The antenna pedestal , Transceiver 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 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 Frequency [MHz]									Warm-Up Time (m) <X-MIT>
	0.08 μS Pulse			0.25 μS Pulse			0.5 μS Pulse			
	10.8	24.0	42.0	10.8	24.0	42.0	10.8	24.0	42.0	
- 15	9423	9423	9424	9423	9423	9423	9422	9422	9422	30
- 5	9421	9421	9421	9421	9421	9421	9420	9420	9421	30
+5	9418	9418	9419	9418	9418	9418	9417	9417	9417	30
+15	9416	9416	9416	9416	9416	9416	9415	9415	9415	30
+25	9415	9415	9416	9415	9415	9415	9414	9414	9415	30
+35	9413	9413	9413	9413	9413	9413	9412	9412	9412	30
+45	9412	9412	9413	9412	9412	9412	9411	9411	9412	30
+55	9412	9412	9412	9412	9412	9412	9411	9411	9411	30

Temperature [℃]	Operating Frequency [MHz]									Warm-Up Time (m) <X-MIT>
	1.0 μS Pulse									
	10.8	24.0	42.0							
- 15	9421	9421	9422							30
- 5	9419	9419	9419							30
+5	9416	9416	9416							30
+15	9413	9414	9414							30
+25	9413	9413	9413							30
+35	9411	9411	9411							30
+45	9410	9410	9410							30
+55	9410	9410	9399							30

SECTION 5

TEST: Spurious Emissions Field Strength

EQUIPMENT: JMA-2344 S/N LX54346

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 1.94 watts maximum (long pulse) or 34.3 dBm:

Emissions $\leqq$ 34.3 dBm – [43 + 10 log(2.7)] dBm
$\leqq$ -13.0 dBm

TEST RESULTS: No spurious emissions observed above minimum standard.

TEST CONDITIONS: Tamb = 20℃ to 25℃ RHamb = 40% ～ 60%
Eut input = 12 VDC

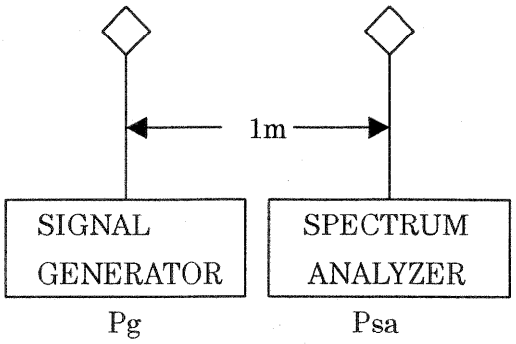
STABILLIZATION: EUT energized for 10 minutes minimum.

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

DATE: Aug,29.2002

TEST ENGINEER: H.NAKAMURA

CALIBRATION OF TESTS 1~5 (0~1GHz)



A signal source of known amplitude was used as a calibrating signal with identical antenna 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:

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

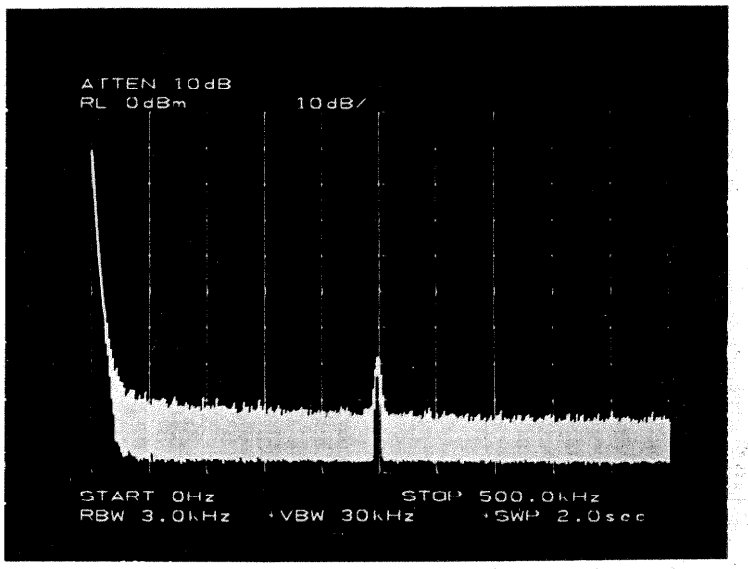
The log ref level on the analyzer is adjusted so as to read other signals diretly:

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

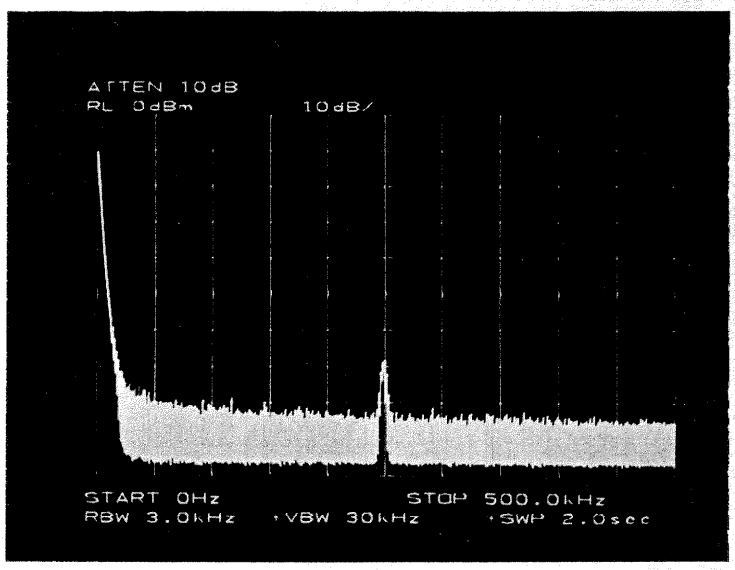
The calibrating signal used was selected on the basis of best average amplitude over the frequency range of interest.

TEST	CAL sig	Psa	Pg	Pcal	LRL(set)	LRL(adj)
1	250 kHz	-67	0	-33.5	0	33.5
2	2.5 MHz	-46	0	-23.0	0	23.0
3	25 MHz	-29	0	-14.5	0	14.5
4	250 MHz	-23	0	-11.5	0	11.5
5	500 MHz	-44	0	-22.0	0	22.0

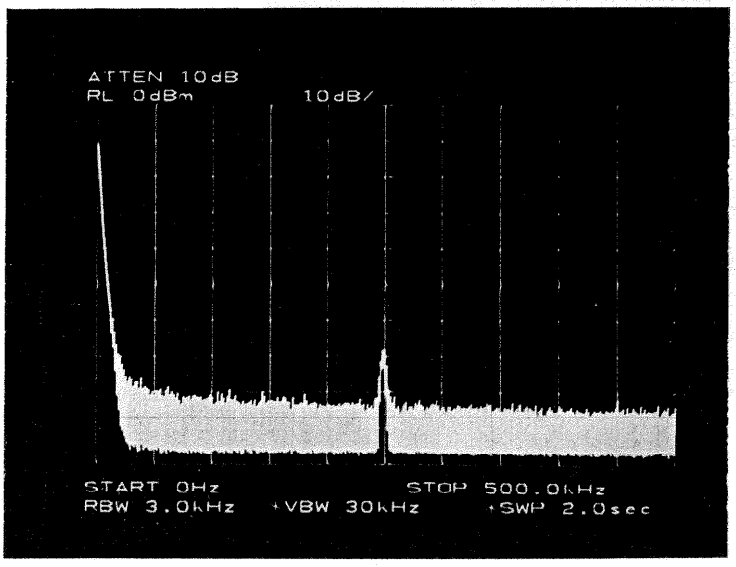
TEST #1 Frequency Band: 0～500KHz Log Ref. Level:33.5 dBm



Ambient

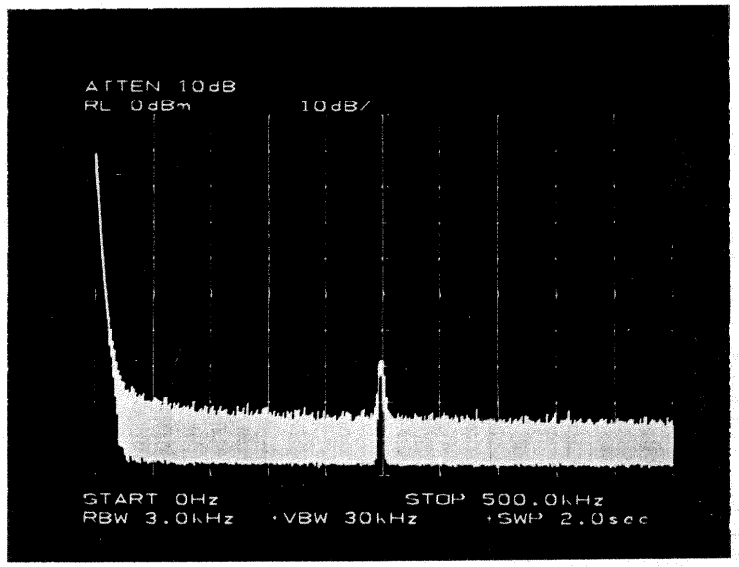


Stand-By

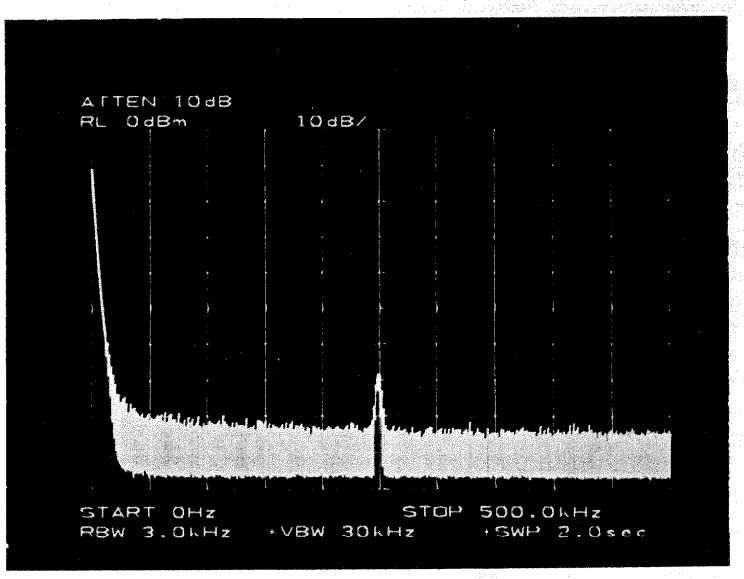


0.08 μS Pulse

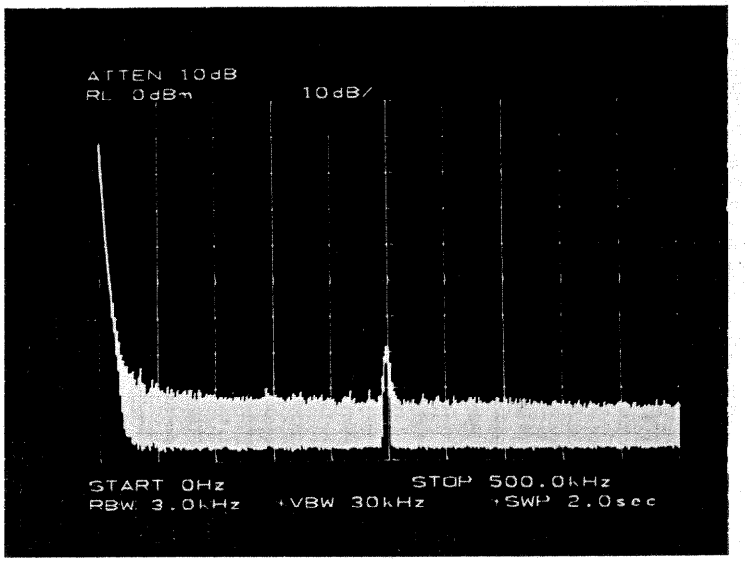
TEST #1 Frequency Band: 0~500KHz Log Ref. Level:33.5 dBm



0.25 μS Pulse

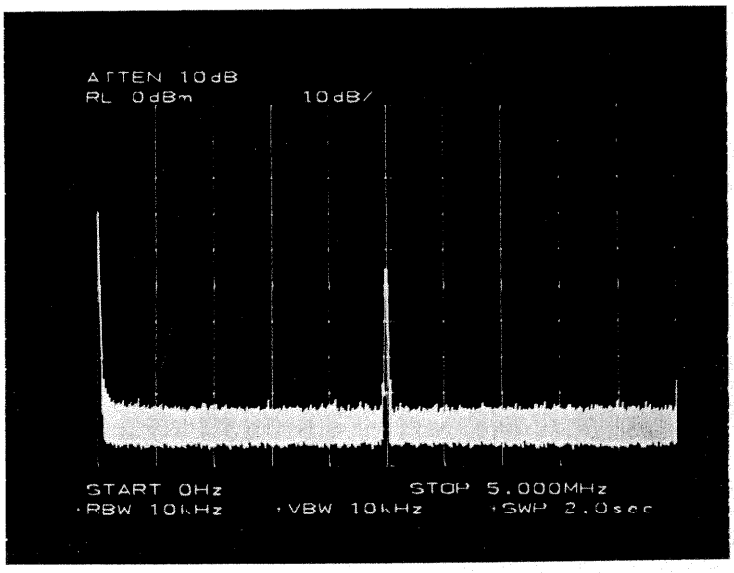


0.5 μS Pulse

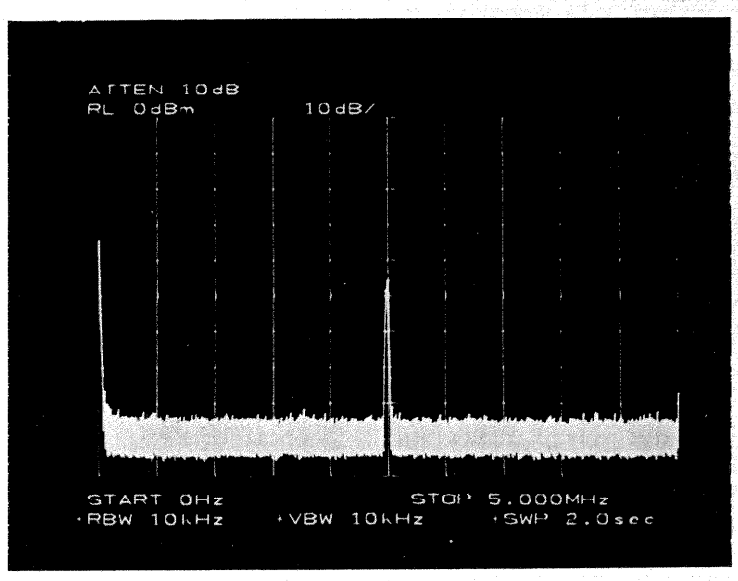


1.0 μS Pulse

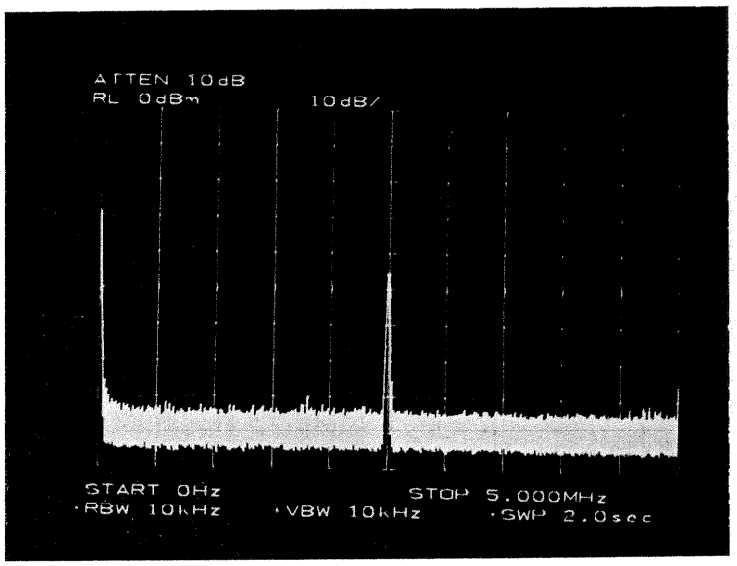
TEST #2 Frequency Band: 0~5MHz Log Ref. Level:23.0 dBm



Ambient

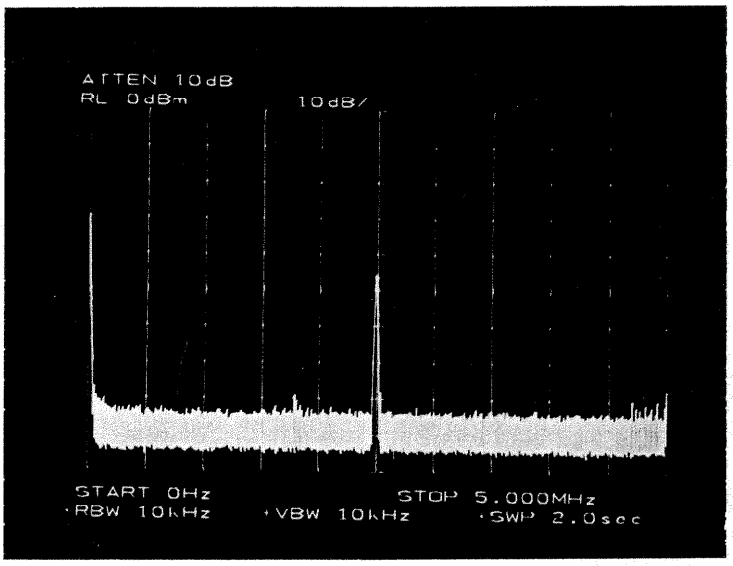


Stand-By

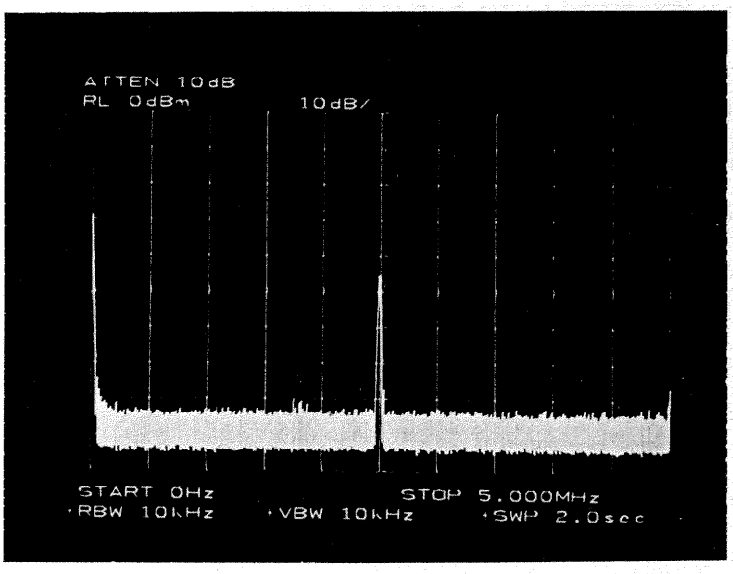


0.08 μS Pulse

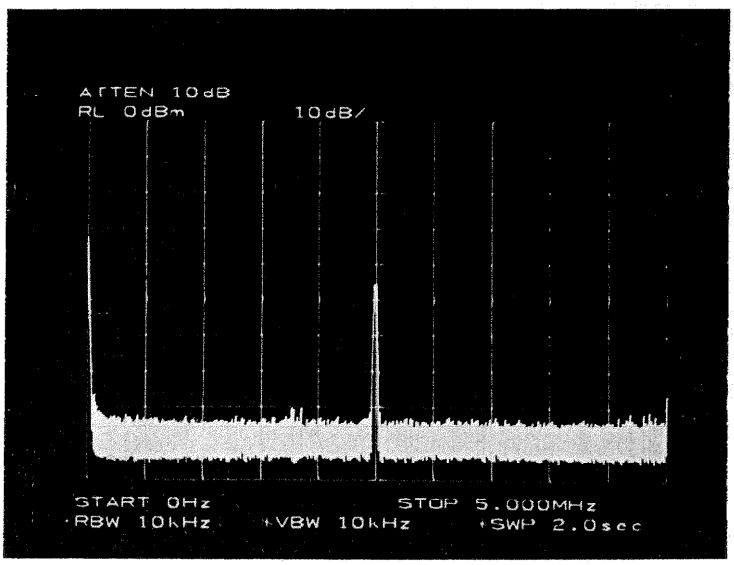
TEST #2 Frequency Band: 0~5MHz Log Ref. Level:23.0 dBm



0.25 μS Pulse

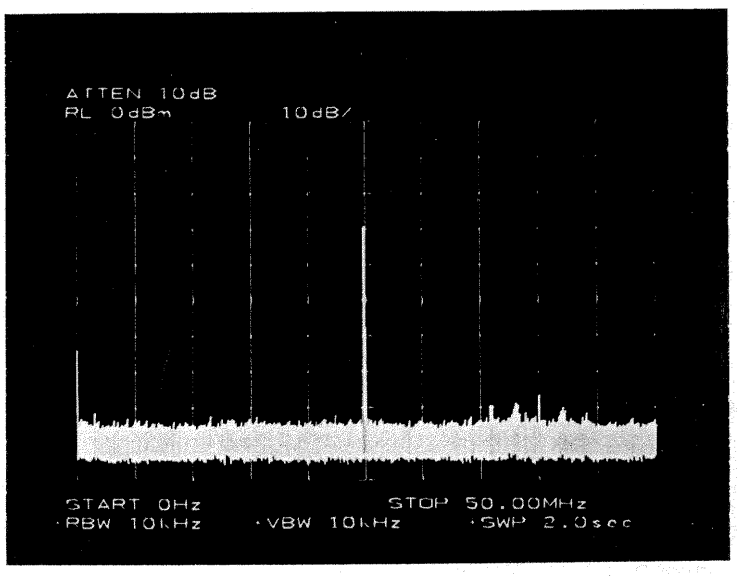


0.5 μS Pulse

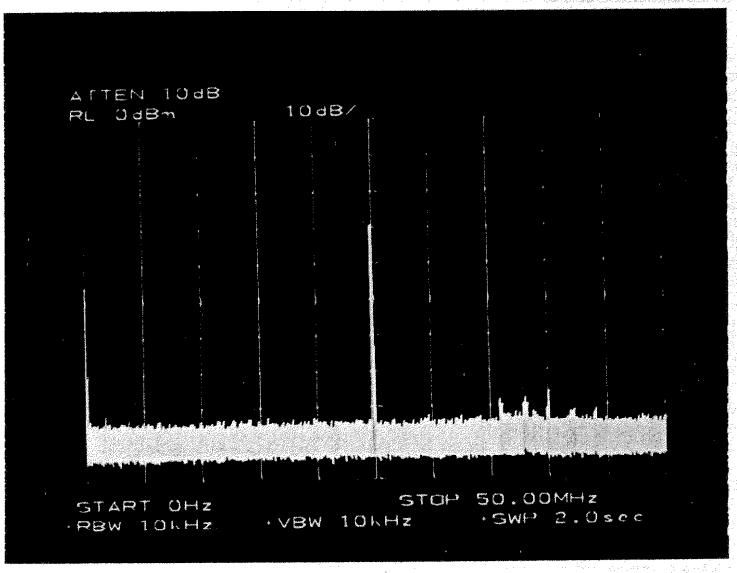


1.0 μS Pulse

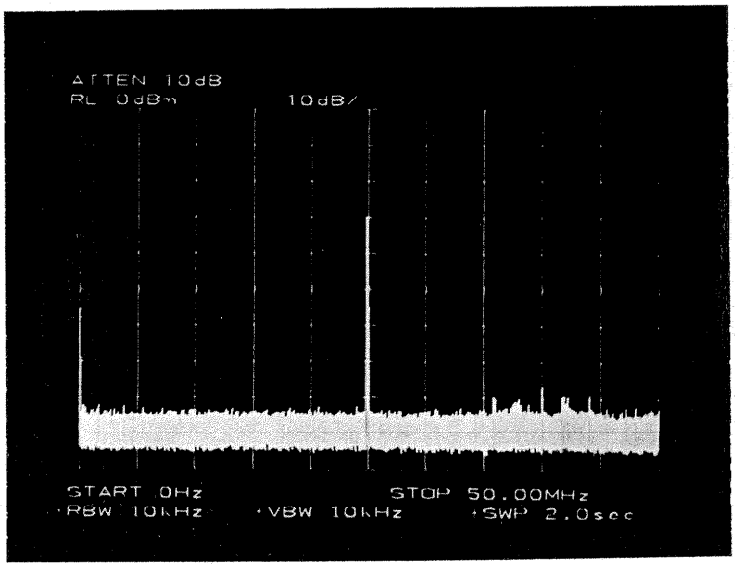
TEST #3 Frequency Band: 0～50MHz Log Ref. Level:14.5 dBm



Ambient

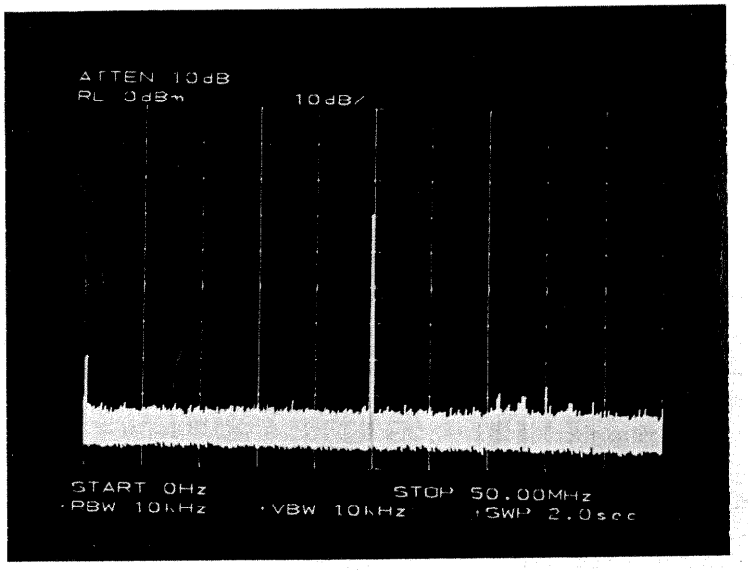


Stand-By

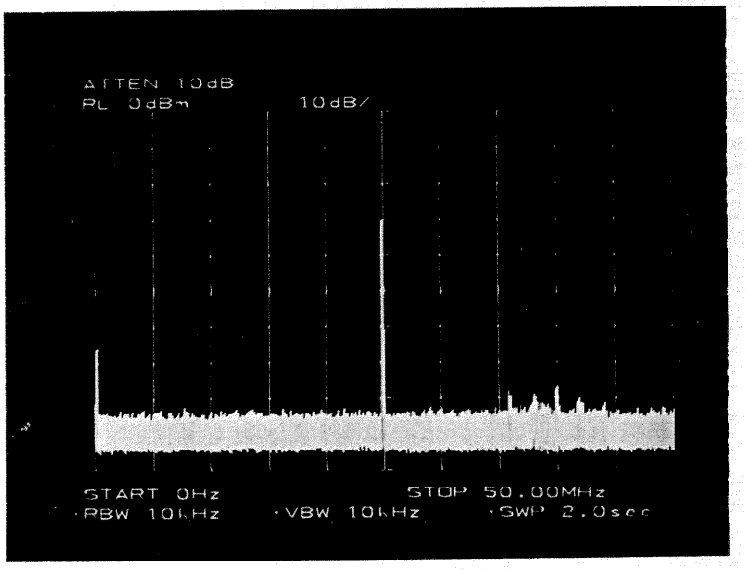


0.08 μS Pulse

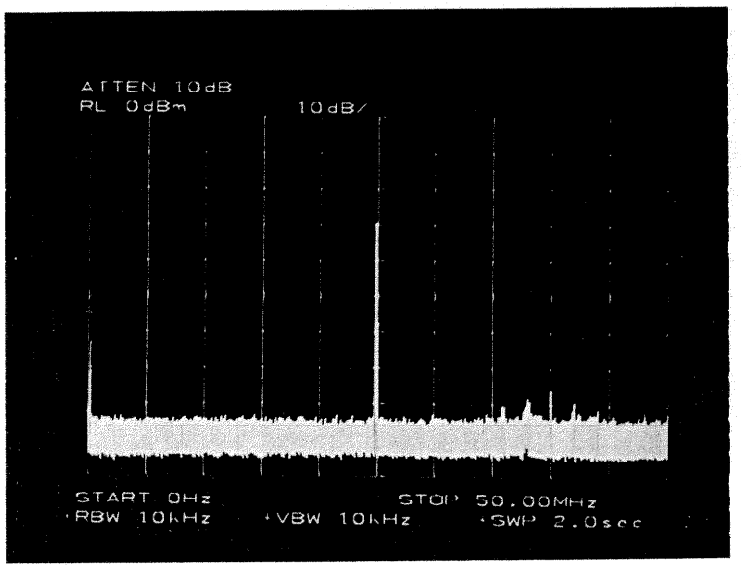
TEST #3 Frequency Band: 0~50MHz Log Ref. Level:14.5 dBm



0.25 μS Pulse

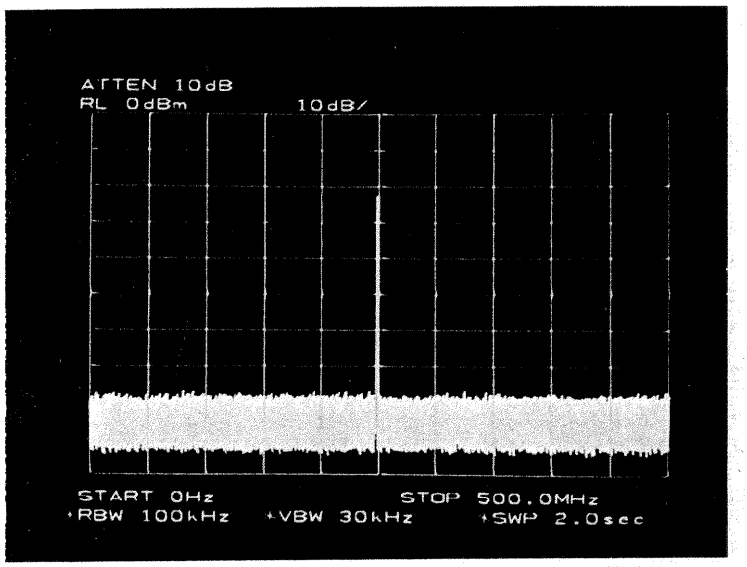


0.5 μS Pulse

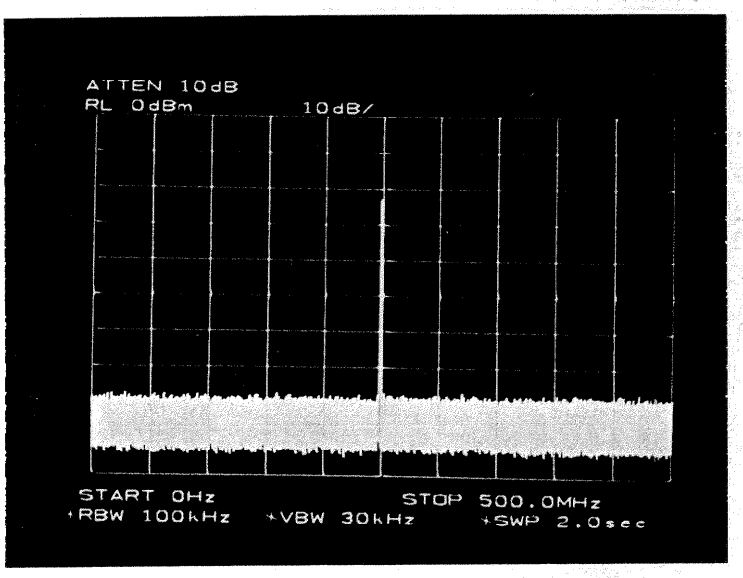


1.0 μS Pulse

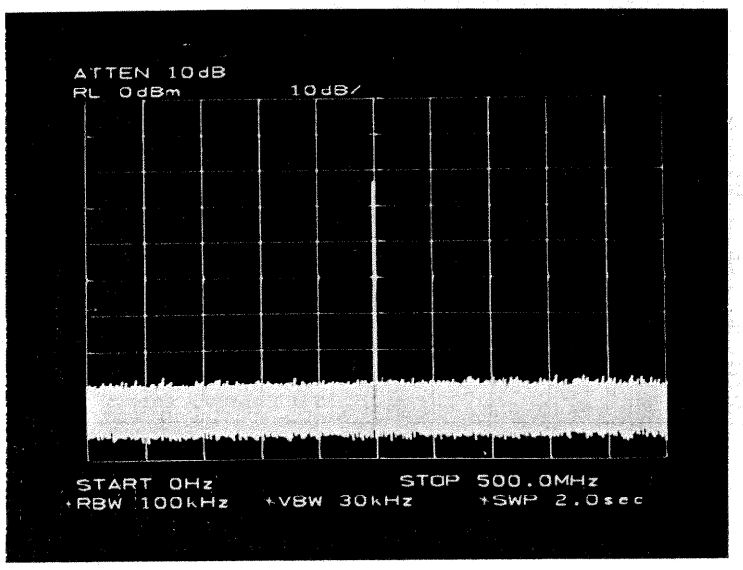
TEST #4 Frequency Band: 0～500MHz Log Ref. Level:11.5 dBm



Ambient

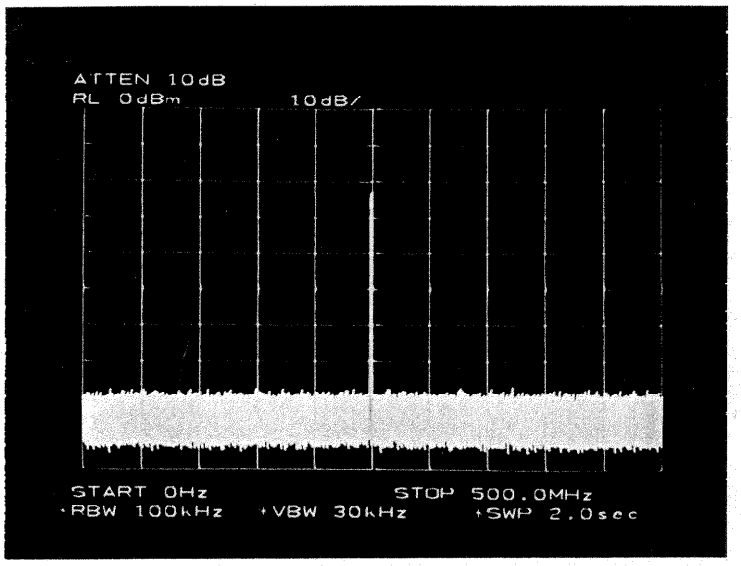


Stand-By

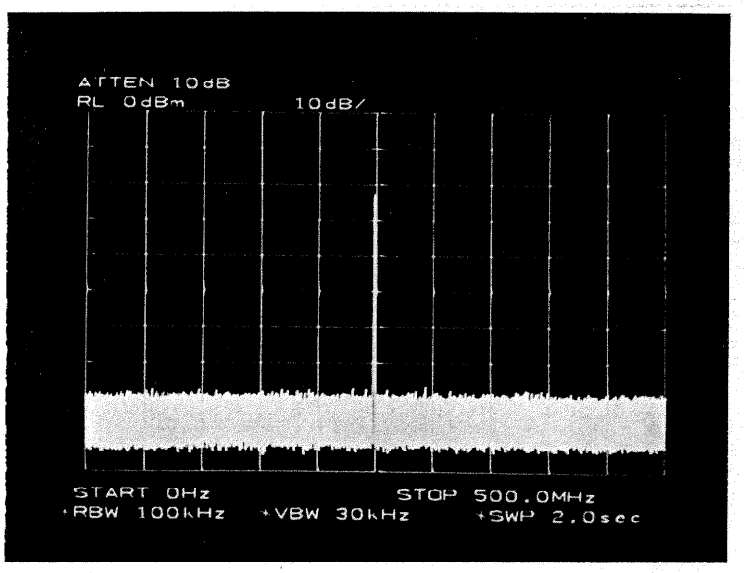


0.08 μS Pulse

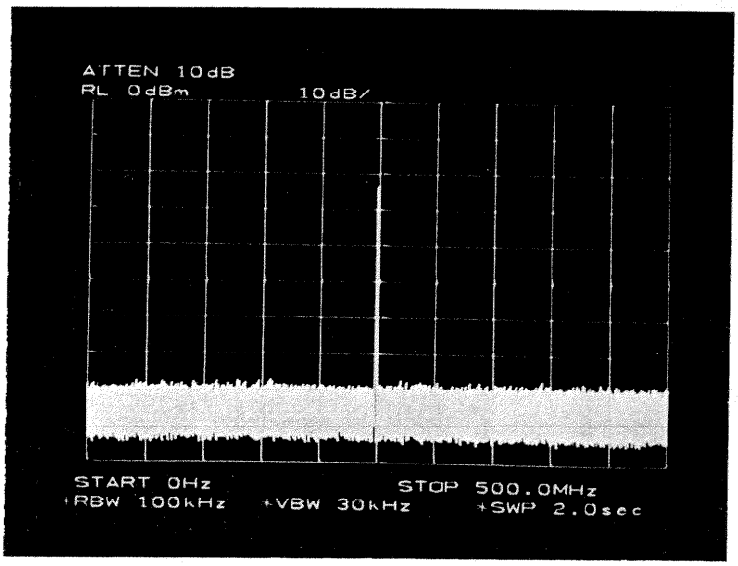
TEST #4 Frequency Band: 0～500MHz Log Ref. Level:11.5 dBm



0.25 μS Pulse

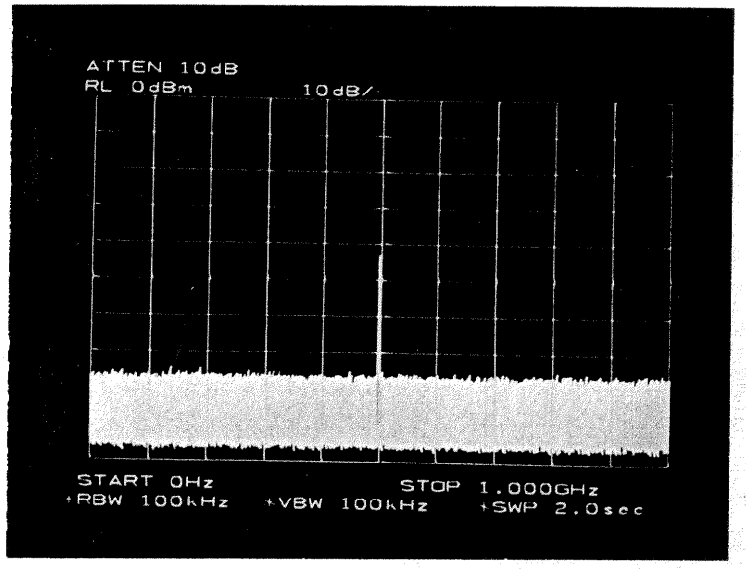


0.5 μS Pulse

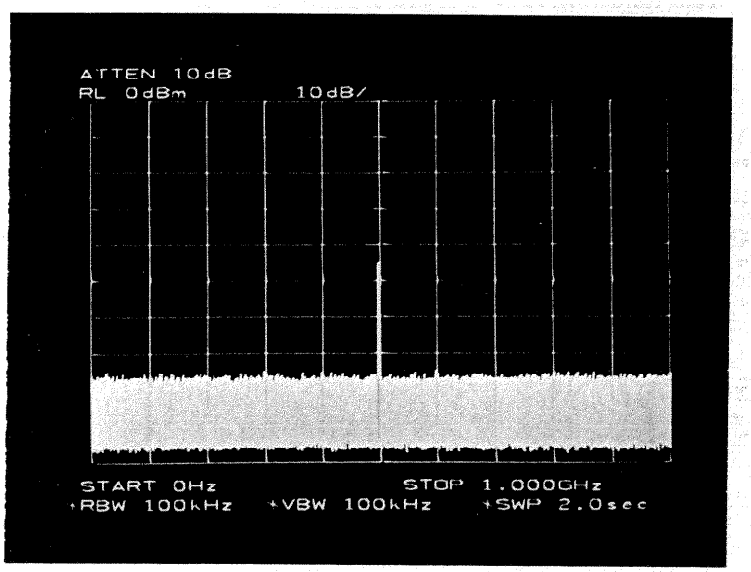


1.0 μS Pulse

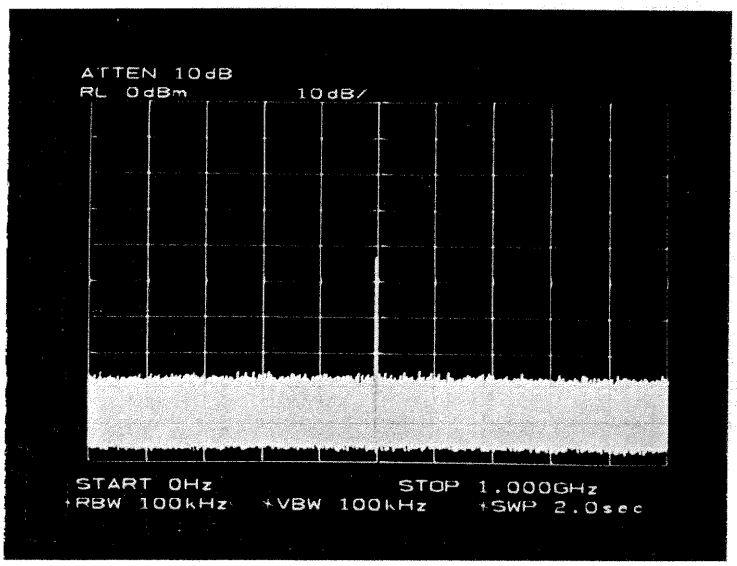
TEST #5 Frequency Band: 0~1GHz Log Ref. Level:22.0 dBm



Ambient

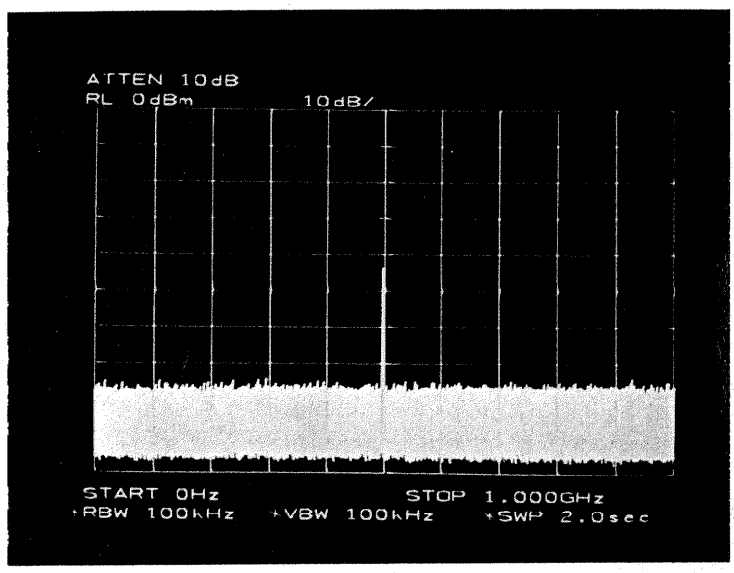


Stand-By

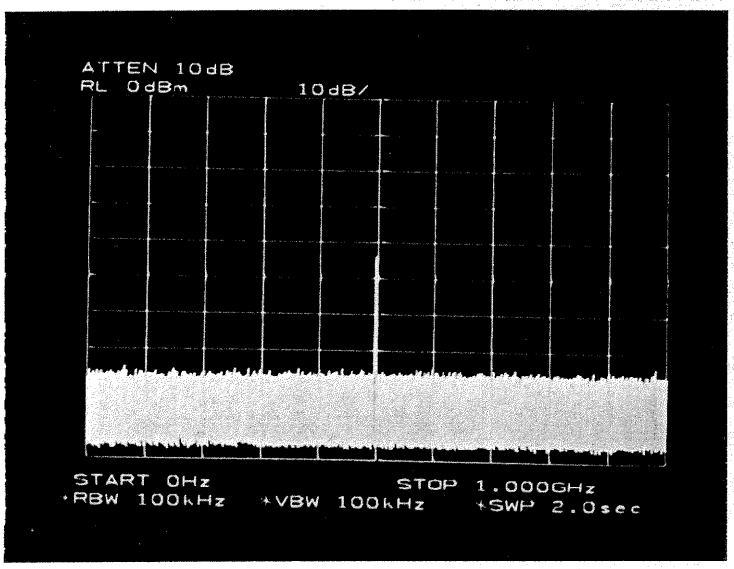


0.08 μS Pulse

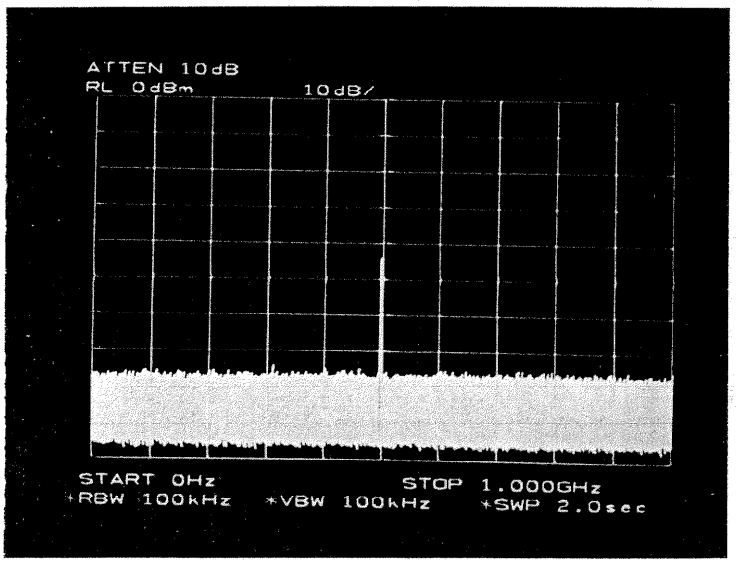
TEST #5 Frequency Band: 0~1GHz Log Ref. Level:22.0 dBm



0.25 μS Pulse



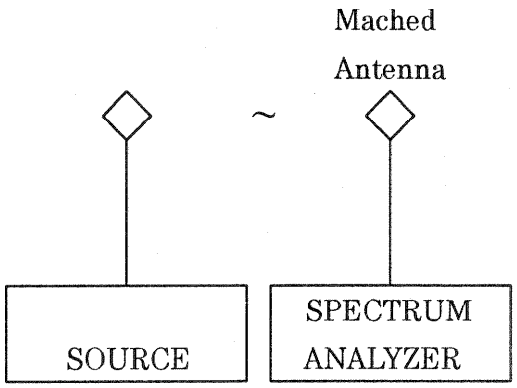
0.5 μS Pulse



1.0 μS Pulse

CALIBRATION OF TESTS 6~11 (1~50 GHz)

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



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

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

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

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

TEST	HORN GAIN (AVG) dB		WAVELENGTH (dB)		Pt - Psa		LOG REF LEVEL	
	LO	HI	LO	HI	LO	HI		
6	6		-10.5	-21.6	24.3	35.4	0 dBm	0 – 2.9 G
7	6		-21.3	-28.0	35.1	41.8	0 dBm	2.9 – 6.4 G
8	6		-27.6	-34.1	41.4	47.9	0 dBm	6.4 – 12.5G
9	6		-31.2	-35.6	45.0	49.4	0 dBm	12.5 – 20 G
10	23.3	24.9	-35.6	-38.8	32.1	33.7	0 dBm	12.4 – 28 G
11	23.6	25.1	-39.4	-42.5	35.6	37.2	0 dBm	28 – 50 G