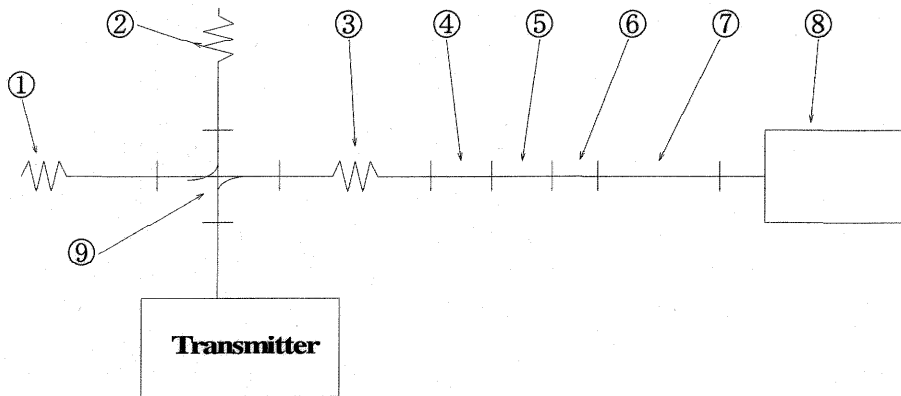


(Sec. 2.991) 3.0 Spurious signals at antenna port

Condition 12.0 – 28.0 GHz



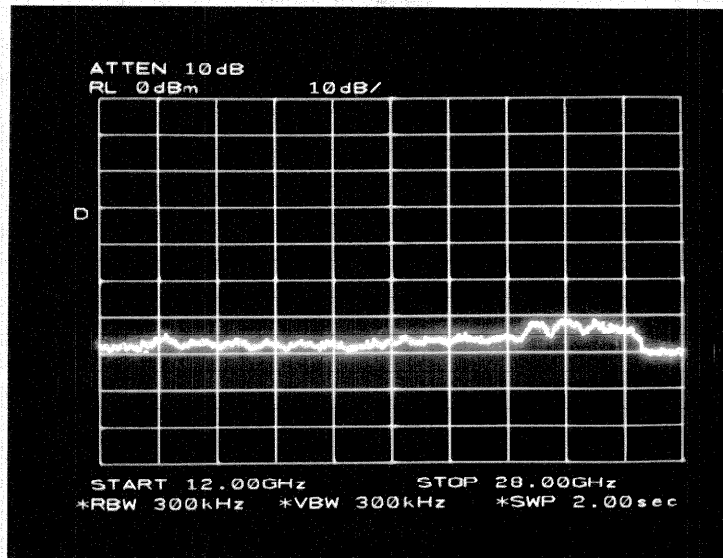
- | | | |
|--------------------------|------------|---------------------|
| 1. Dummy Load | 4D104 | Shimada |
| 2. High power Dummy Load | WTM-6910 | MANUF NIHON KOSHUHA |
| 3. Attenuator | X382A | HP |
| 4. Taperd W/G | 195-X KU | AIRCOM |
| 5. Taperd W/G | 11518A | HP |
| 6. Adapter | 22093-KF20 | FLANN |
| 7. Coaxial Cable | SF101 | HUBER+SUHNER |
| 8. Spectrum Analyzer | 8565EC | HP |
| 9. Directional Coupler | 50351 | Shimada |

Coupling 30 dB
Directivity 30 dB

Attenuation 3 : 40 dB
Measurement Point : Transmitter Output

(Sec. 2.991)

Scale
↑ 10dB/Div
→ 1.6GHz/Div

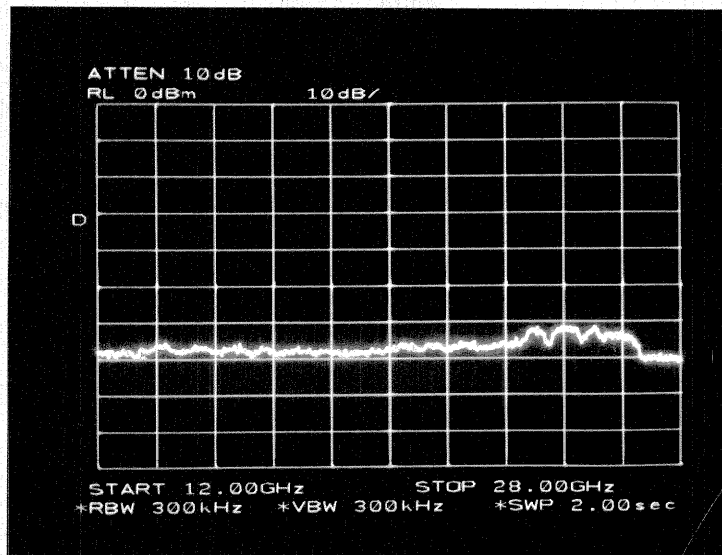


Spurious
Signal

OFF

12 to 28 GHz

Scale
↑ 10dB/Div
→ 1.6GHz/Div

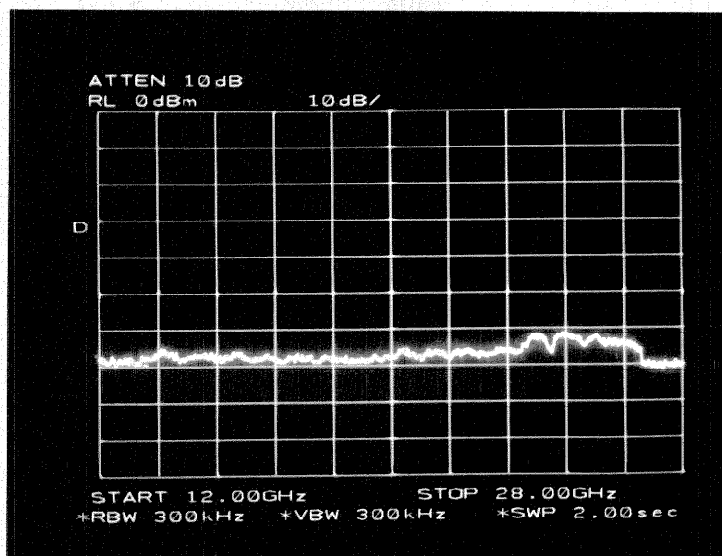


Spurious
Signal

Stand-By

12 to 28 GHz

Scale
↑ 10dB/Div
→ 1.6GHz/Div



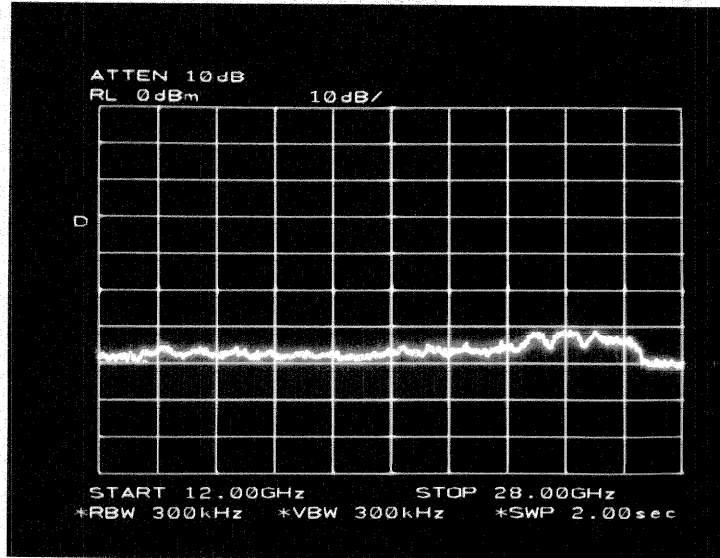
Spurious
Signal

0.08 μ S Pulse

12 to 28 GHz

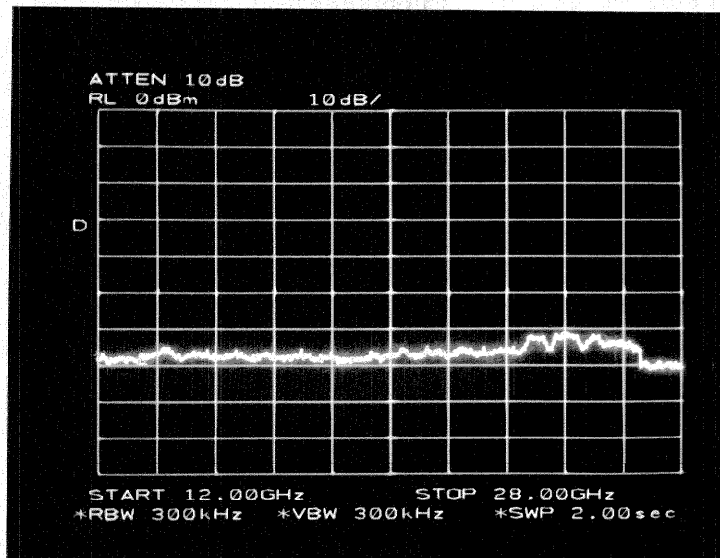
(Sec. 2.991)

Scale
↑ 10dB/Div
→ 1.6GHz/Div



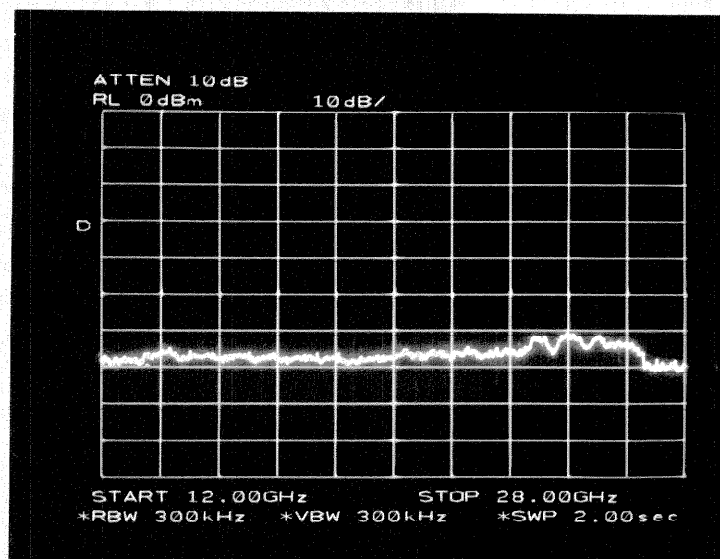
Spurious
Signal
0.25 μ S Pulse
12 to 28 GHz

Scale
↑ 10dB/Div
→ 1.6GHz/Div



Spurious
Signal
0.5 μ S Pulse
12 to 28 GHz

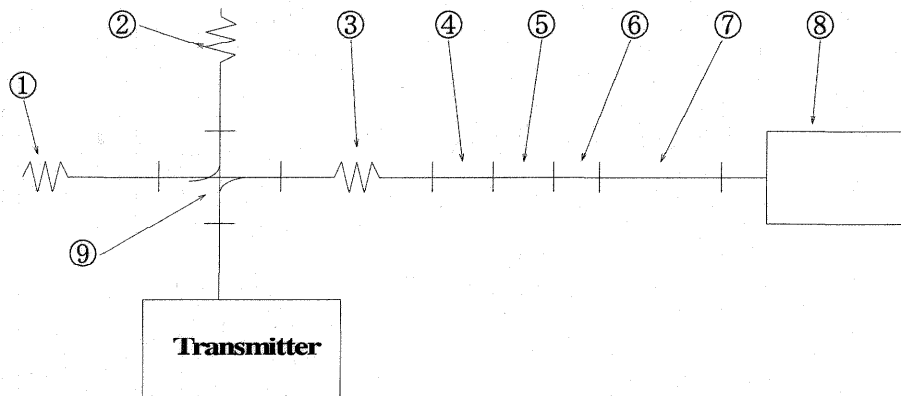
Scale
↑ 10dB/Div
→ 1.6GHz/Div



Spurious
Signal
1.0 μ S Pulse
12 to 28 GHz

(Sec. 2.991) 3.0 Spurious signals at antenna port

Condition 28.0 – 50.0 GHz



1. Dummy Load	4D104	Shimada
2. high power Dummy Load	WTM-6910	MANUF NIHON KOSHUHA
3. Attenuator	X382C	HP
4. Taperd W/G	195-X KU	AIRCOM
5. Taperd W/G	11518A	HP
	11520A	HP
6. Adapter	22093-KF20	FLANN
7. Coaxial Cable	SF101	HUBER+SUHNER
8. Spectrum Analyzer	8565EC	HP
9. Directional Coupler	50351	Shimada

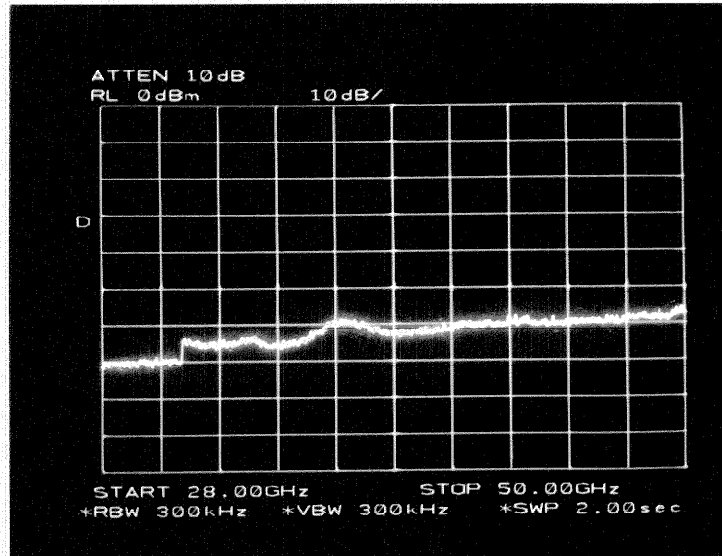
Coupling 30 dB
Directivity 30 dB

Attenuation 3 : 40 dB

Measurement Point : Transmitter Output

(Sec. 2.991)

Scale
↑ 10dB/Div
→ 2.2GHz/Div

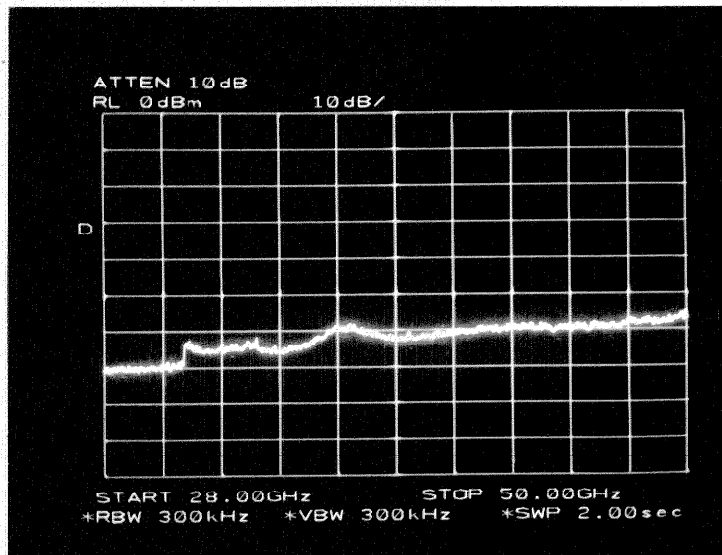


Spurious
Signal

OFF

28 to 50 GHz

Scale
↑ 10dB/Div
→ 2.2GHz/Div

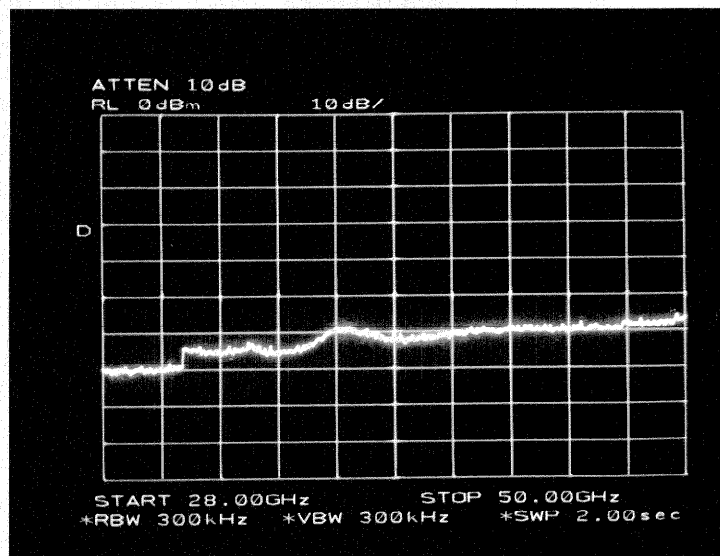


Spurious
Signal

Stand-By

28 to 50 GHz

Scale
↑ 10dB/Div
→ 2.2GHz/Div



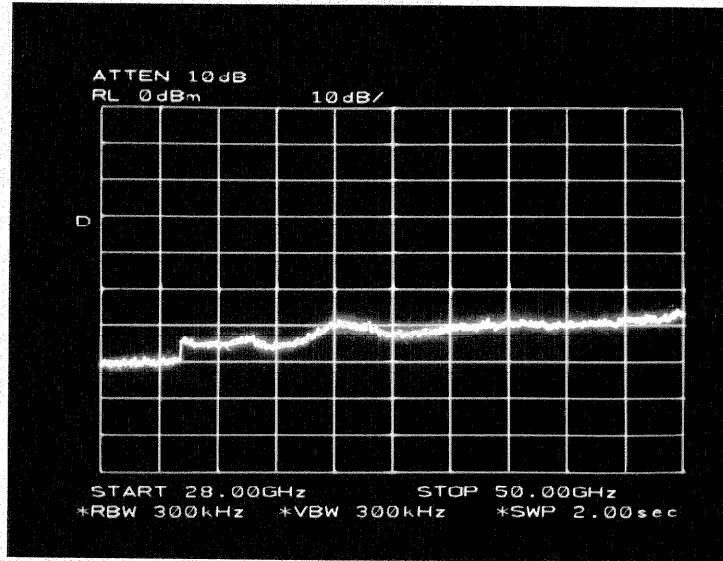
Spurious
Signal

0.08 μ S Pulse

28 to 50 GHz

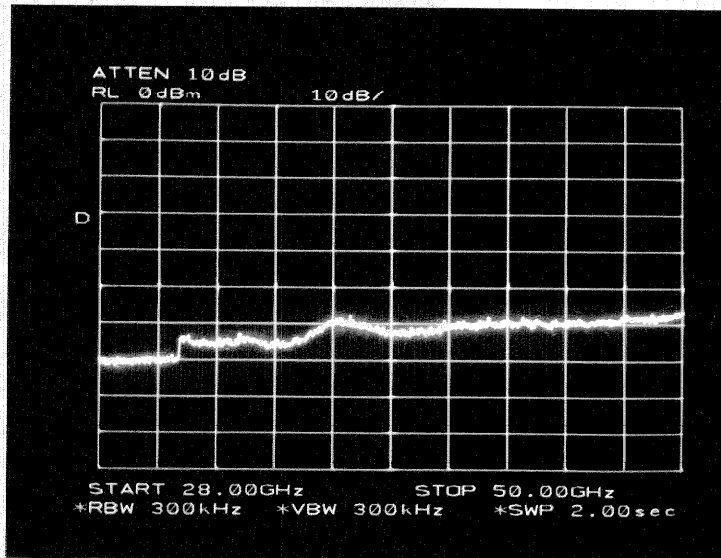
(Sec. 2.991)

Scale
↑ 10dB/Div
→ 2.2GHz/Div



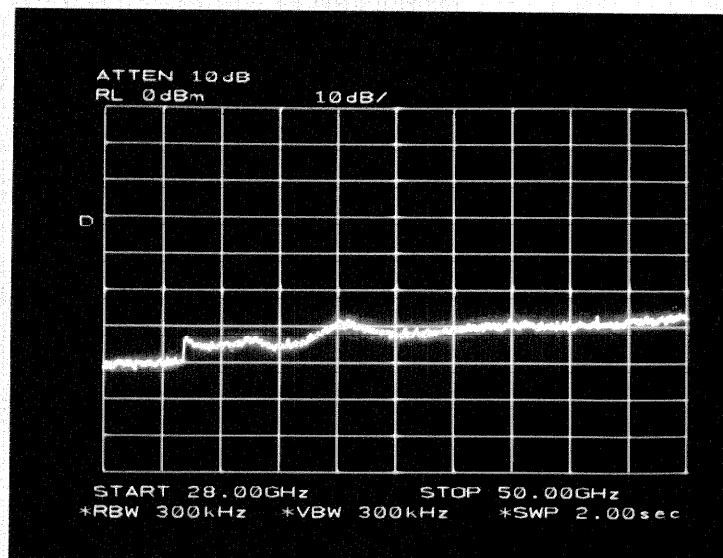
Spurious
Signal
0.25 μ S Pulse
28 to 50 GHz

Scale
↑ 10dB/Div
→ 2.2GHz/Div



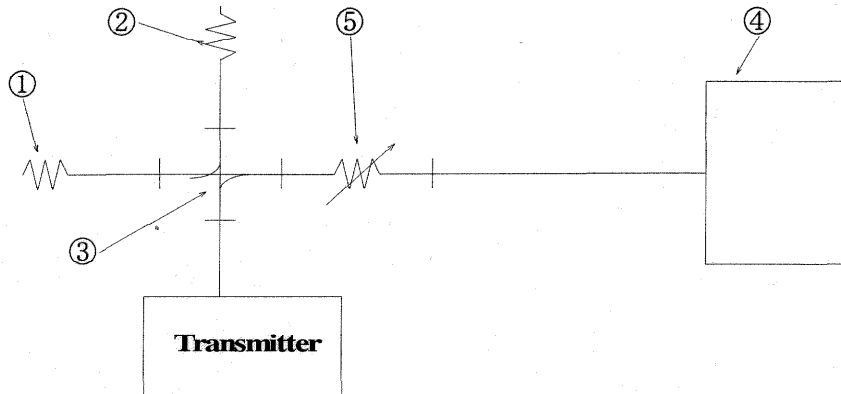
Spurious
Signal
0.5 μ S Pulse
28 to 50 GHz

Scale
↑ 10dB/Div
→ 2.2GHz/Div



Spurious
Signal
1.0 μ S Pulse
28 to 50 GHz

(Sec.2.995) 4.0 Frequency Stability



- | | | | |
|--------------------------|-------------|--------|-----------------|
| 1. Dummy Load | | 4D104 | HP |
| 2. High Power Dummy Load | | 4D371A | Shimada |
| 3. Directional Coupler | | 5D102A | Shimada |
| | Coupling | 30dB | |
| | Directivity | 30dB | |
| 4. Spectrum Analyzer | | 8592A | HP |
| 5. Attenuator | | | |
| Temperature Chamber | | | Onishi Netugaku |

Measurement Procedure

- 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 $-30\text{ }^{\circ}\text{C}$ 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 24V, 32V.
- 3 With power off, the temperature was raised in $10\text{ }^{\circ}\text{C}$ 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 24V, 32V.

Temperature [$^{\circ}\text{C}$]	Operating Frequency [MHz]						Warm-Up Time (m) <X-MIT>
	0.08 μS Pulse		0.25 μS Pulse		0.5 μS Pulse		
	24.0	32.0	24.0	32.0	24.0	32.0	
-15	9418	9419	9415	9415	9413	9413	30
-5	9416	9416	9414	9414	9412	9413	30
+5	9413	9414	9411	9411	9409	9410	30
+15	9411	9411	9409	9410	9407	9407	30
+25	9410	9410	9408	9408	9406	9406	30
+35	9408	9408	9406	9406	9404	9404	30
+45	9407	9407	9405	9405	9404	9404	30
+55	9407	9407	9405	9405	9404	9404	30

Temperature [°C]	Operating Frequency [MHz]						Warm-Up Time (m) <X-MIT>
	1.0 μ S Pulse						
	24.0	32.0					
- 15	9413	9412					30
- 5	9412	9412					30
+5	9409	9409					30
+15	9407	9407					30
+25	9406	9406					30
+35	9403	9403					30
+45	9402	9402					30
+55	9402	9401					30

SECTION 5

TEST: Spurious Emissions Field Strength

EQUIPMENT: JMA-5110 S/N LS59972

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 32.9 dBm:

$$\begin{aligned} \text{Emissions} &\leq 32.9 \text{ dBm} - [43 + 10 \log(1.94)] \text{ dBm} \\ &\leq -13.0 \text{ dBm} \end{aligned}$$

TEST RESULTS: No spurious emissions observed above minimum standard.

TEST CONDITIONS: $T_{amb} = 20^{\circ}\text{C}$ to 25°C $RH_{amb} = 40\% \sim 60\%$
Eut input = 24 VDC

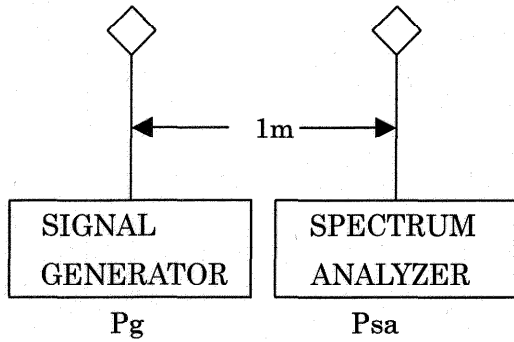
STABILIZATION: EUT energized for 10 minutes minimum.

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

DATE: May, 14, 2003 and May, 15, 2003

TEST ENGINEER: G. KOIKE

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:

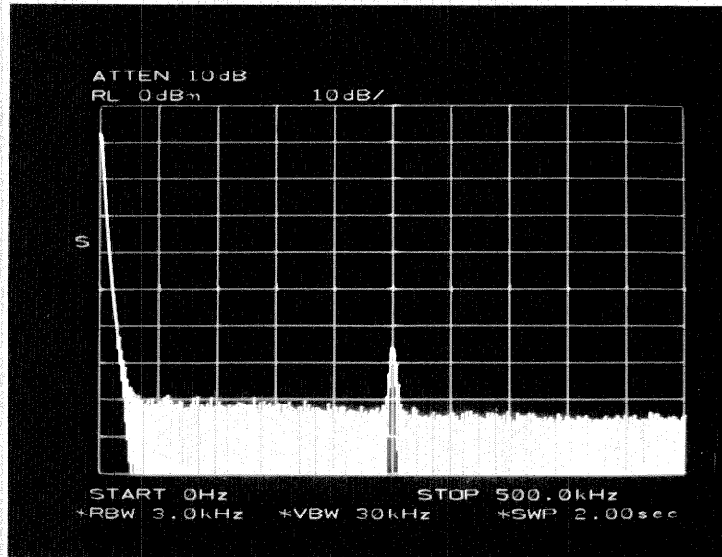
$$P_{cal} = P_{sa} - (P_{sa} - P_g) / 2 = (P_{sa} + P_g) / 2 \text{ dBm.}$$

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

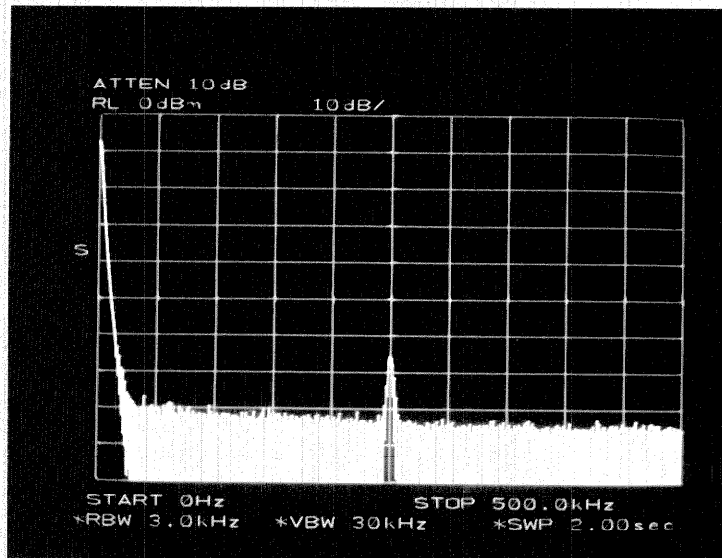
$$\text{LRL (adjusted)} = \text{LRL(set)} + P_{cal} - P_{sa} \text{ dBm.}$$

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

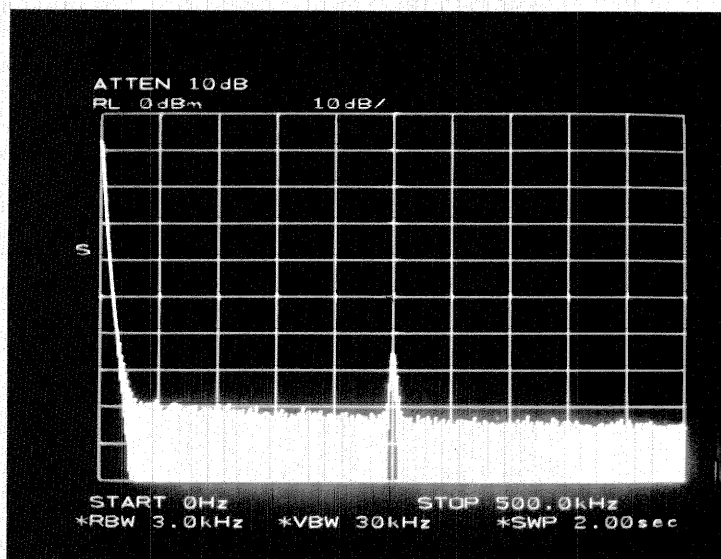
TEST	CAL sig	Psa	Pg	Pcal	LRL(set)	LRL(adj)
1	250 kHz	-67	0	-33.5	0	33.5
2	2.5 MHz	-51	0	-25.5	0	25.5
3	25 MHz	-29	0	-14.5	0	14.5
4	250 MHz	-22	0	-11.0	0	11.0
5	500 MHz	-41	0	-20.5	0	20.5



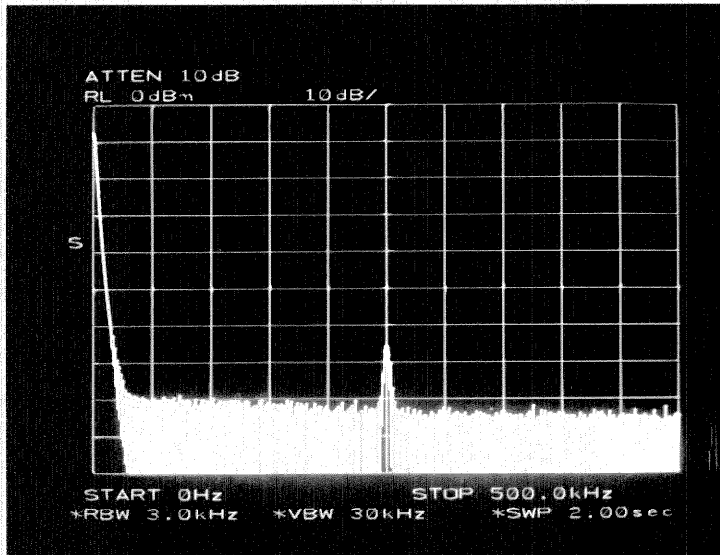
Ambient



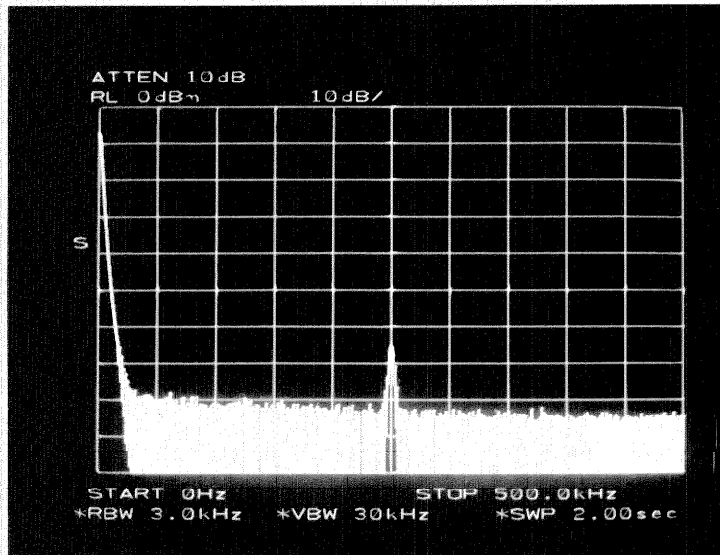
Stand-By



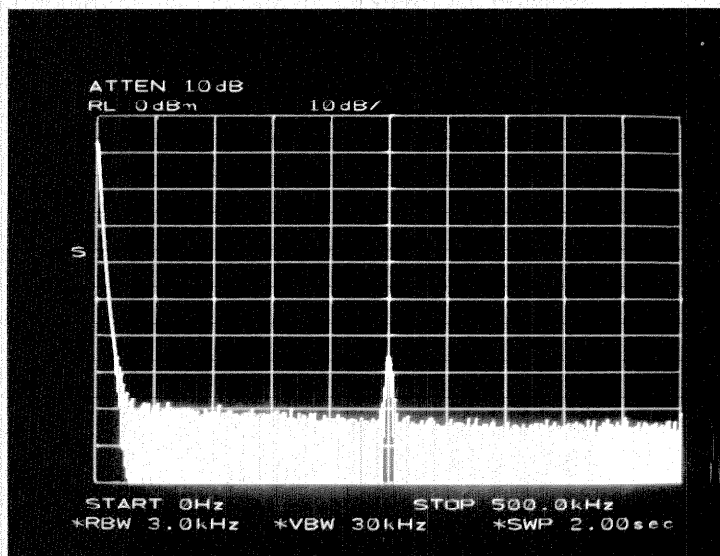
0.08 μS Pulse



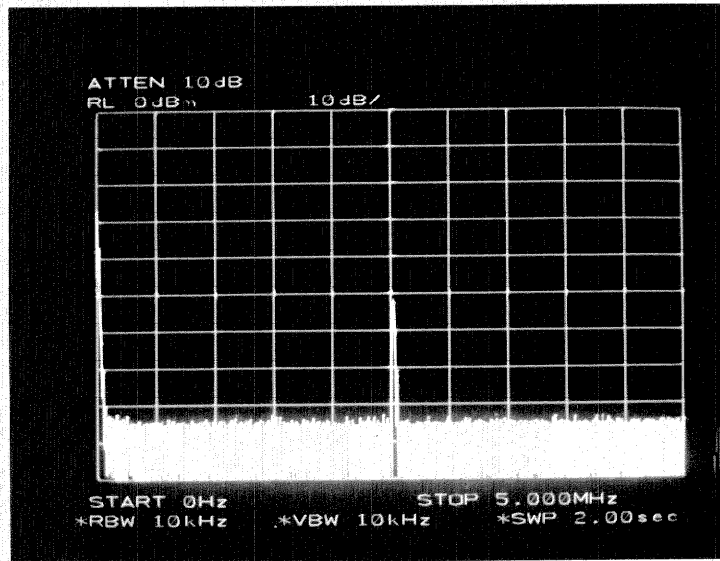
0.25 μ S Pulse



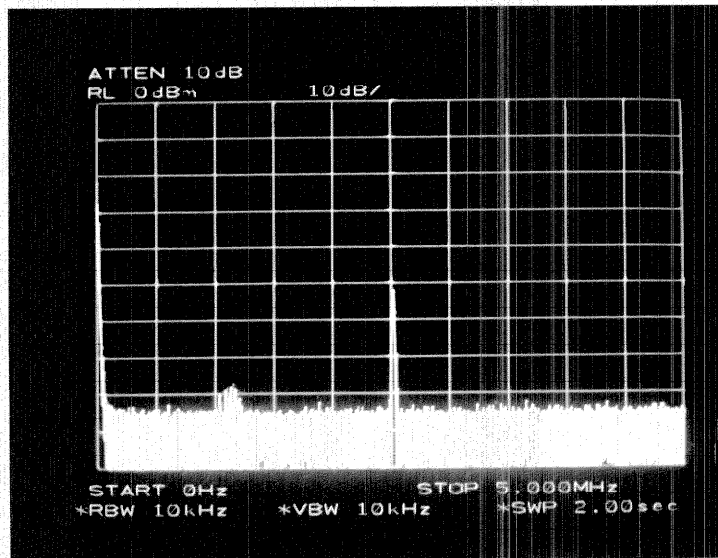
0.5 μ S Pulse



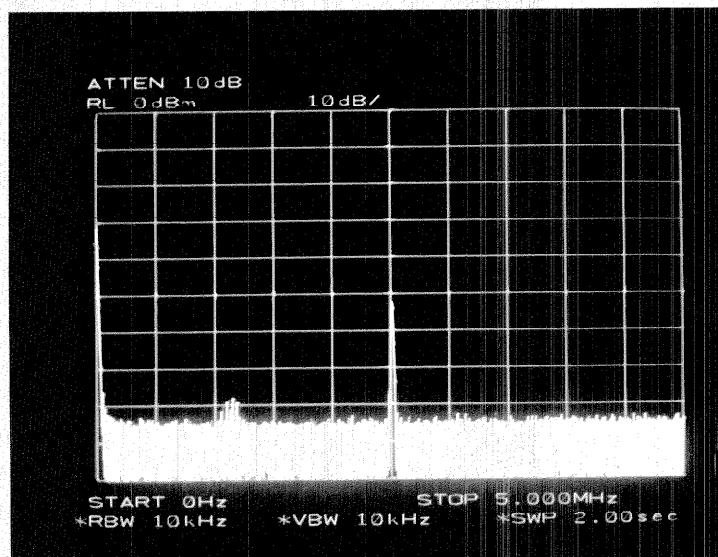
1.0 μ S Pulse



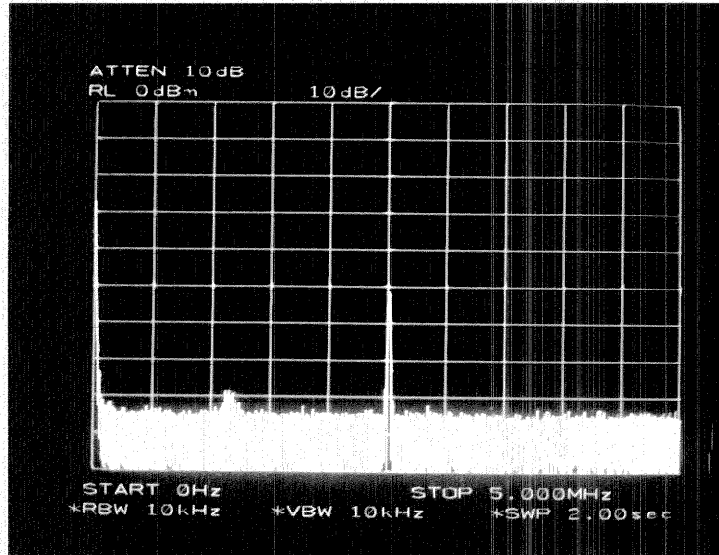
Ambient



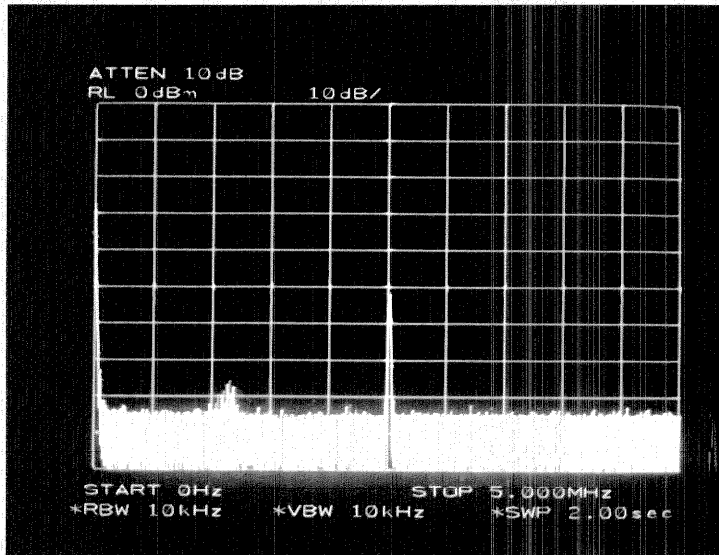
Stand-By



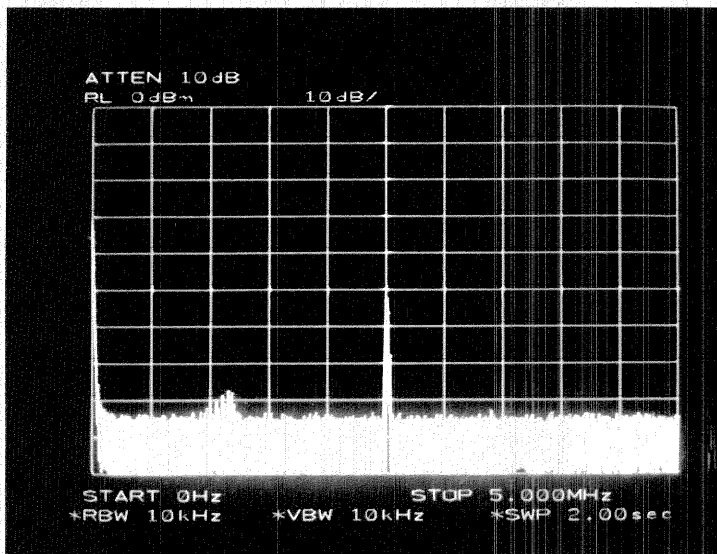
0.08 μ S Pulse



0.25 μ S Pulse



0.5 μ S Pulse



1.0 μ S Pulse