TOSHIBA

TOSHIBA HOKUTO ELECTRONICS CORPORATION

MAGNETRON ENGINEERING GROUP
1975, 23-CHOME MINAMI 5-JODORI, ASAHIKAWA, HOKKAIDO 078-8335, JAPAN
PHONE : (0166) 31-4728 FACSIMILE : (0166) 31-4739

Mr. R. Kanemitsu
Deputy General Manager
Research & Development Dep't
Nissin Industry Co., Ltd.
3-2-11, Shibukawa-cho,
Higashi Osaka City
Japan

January 17, 2003
(Ref. No. : 03-008)

Re : Electromagnetic radiation from microwave oven MO-105ZZ with Toshiba magnetron 2M253H(IF)-Z1

Dear Mr. Kanemitsu

We are enclosing herewith the above mentioned test results based on FCC measuring method in our measuring facility of FCC file number 430A.

We confirmed test results are satisfied with FCC limit.

Please feel free to contact us, if you have any question or request.

Sincerely yours,

Yokoyama Ryosuke
Manager
Magnetron engineering group

RY/oh

Electromagnetic radiation test of microwave oven

The following measurements were conducted in Toshiba Hokuto Electronics Corporation measurement facility of FCC file number 430A.

1. Description of oven

Manufacturer of oven	: Nisshin industry co., ltd
Model name	: MO-105ZZ
Line voltage	: 120V/60Hz
Output RF power	: 1100W/2450MHz
Magnetron type	: Toshiba 2M253H(IF)-Z1

2. Equipment class : Part 18 Consmer Dvice

3. Test procedure : FCC/OST MP-5

4. Date of measurement : January 7, 2003

5. Measurement data

5-1. Output power (Load : 1000ml water / center)

Input power	: 1691W	
Output power	: 1015W	
Permissible FIS $_{@300m}$	: 35.6 μ V/m	$= 25\sqrt{\text{Output power} / 500}$

FIS : Field Intensity Strength

5-2. Power leak (Load : 275ml water / center)

Po leak : 2 W/m^2

5-3. FIS measurements

Band	Frequency (MHz)	FIS $_{@300m}$ (μ V/m)	Permissble FIS $_{@300m}$ (μ V/m)	Load
Side band	2399	2.0	35.6	700ml / center
Side band	2553	2.3		700ml / center
2nd harmonic	4918	7.6		300ml / side
3rd harmonic	6915	7.1		300ml / center
4th harmonic	10267	4.8		700ml / center

Note 2nd and 3rd harmonics : The maximum value with the load condition such as 300ml or 700ml water in the center or side position.

5-4. Frequency sweeping

None of higher FIS value than those shown in the above table existed in the following frequency band.

Frequency (MHz)	Load condition	Refer
2000 - 2400	700ml / center	Page 7-9
2500 - 4100		
4100 - 7700	300ml or 700ml / center or side	
7700 - 10000	700ml / center	

5-5. Frequency measurements

The variation of frequency for load variation (Load : 1000ml water / center)

Volume of water (ml)	Frequency (MHz)
1000	2470
800	2467
600	2474
400	2451
200	2458

The variation of frequency for line voltage variation (Load : 1000ml water / center)

Line voltage (V)	Frequency (MHz)
96	2469
108	2467
120	2469
132	2471
150	2471

6. Description of instrumentation and calculation

6-1. Measurement equipment (Refer Page-4)

Interference analyzer : EMC-60 MK-IV (Bandwidth : 5MHz, Detecter function : Linear average)
Antenna : CA-S, CA-M and CA-X

6-2. Test condition

Distance of antenna to oven : 3.0m
Antenna height range : 0.5m - 1.8m
Turn table height : 0.8m (360 degree movable)

6-3. Calculation formula

$FIS_{@3m}(dB\mu v/m)$ = Analyzer reading($dB\mu v$) + Antenna factor(dB/m) + Cable loss(dB)
$FIS_{@300m}(\mu v/m)$ = $K \times 10 \hat{} (FIS_{@3m} / 20)$

K : Conversion factor for 3m to 300m

Antenna factor and cable loss for our equipment are as follows :

Band	Frequency (MHz)	Antenna	Antenna factor (dB/m)	Cable loss (dB)	K
Fundamental	2450	CA-S	21.8	1.174	0.0062
2nd harmonic	4900	CA-M	39.1	1.288	0.01
3rd harmonic	7350	CA-M	39.2	1.397	0.01
4th harmonic	9800	CA-X	42.5	1.679	0.01

Example : 2nd harmonics

Analyzer reading = 22($dB\mu v$)
$FIS_{@300m}$ = $0.01 \times 10 \hat{} ((22 + 39.1 + 1.288) / 20)$ = 13.1 ($\mu v/m$)

7. Measurement equipment : Attached please find "Measurement equipment"(Refer Page-4).

Table 1 Measurement equipment

No.	Equipment name	Model name & manufacturer	Specification	Last calibration date	Calibration frequency
1	Interference analyzer	EMC-60 MK-IV Ser : 44116 Electro-metrics	0.5 to 18 GHz	March 2002	
2	Antenna	(1) CA-S Ser : 22-1 Polarad	2.1 to 4.34 GHz		
		(2) CA-M Ser : 20-15 Polarad	4.19 to 7.74 GHz		
		(3) CA-X Ser : 20-10 Polarad	7.36 to 10 GHz		
3	Signal generator	8671B Ser : 2545A00106 Hewlett packard	2.0 to 18 GHz	March 2002	
4	Frequency counter	85340A Ser : 134A01280 Hewlett packard		March 2002	Annually
5	Power meter	435A Ser : 1312J00144 Hewlett packard	0 to 1 mW	March 2002	Annually
6	Power sensor	8481A Ser : 1234A871 Hewlett packard		March 2002	
7	Spectrum analyzer	8562A Ser : 2923A03932 Hewlett packard	1 kHz to 22 GHz	March 2002	

Fig. 1 Environmental condition

Unit : mm

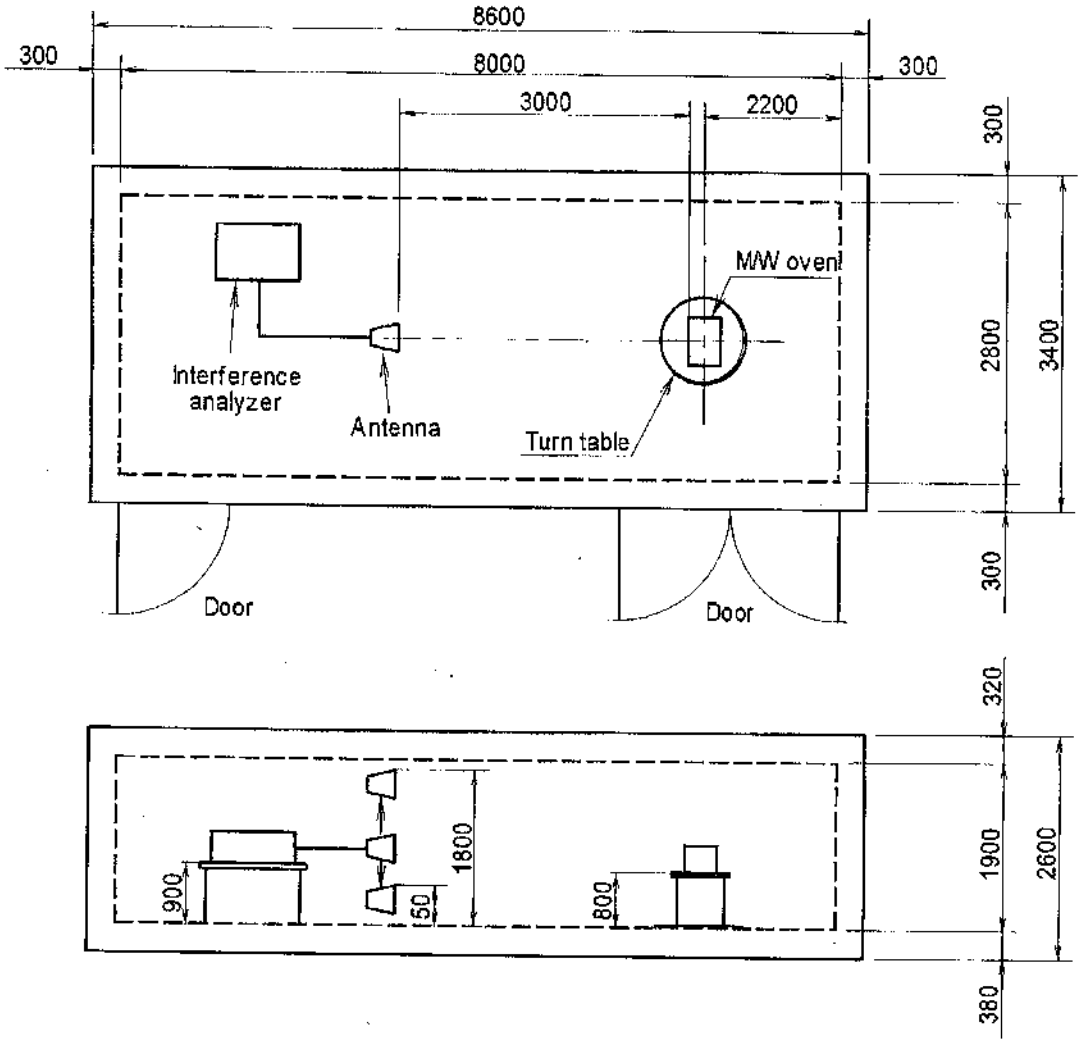
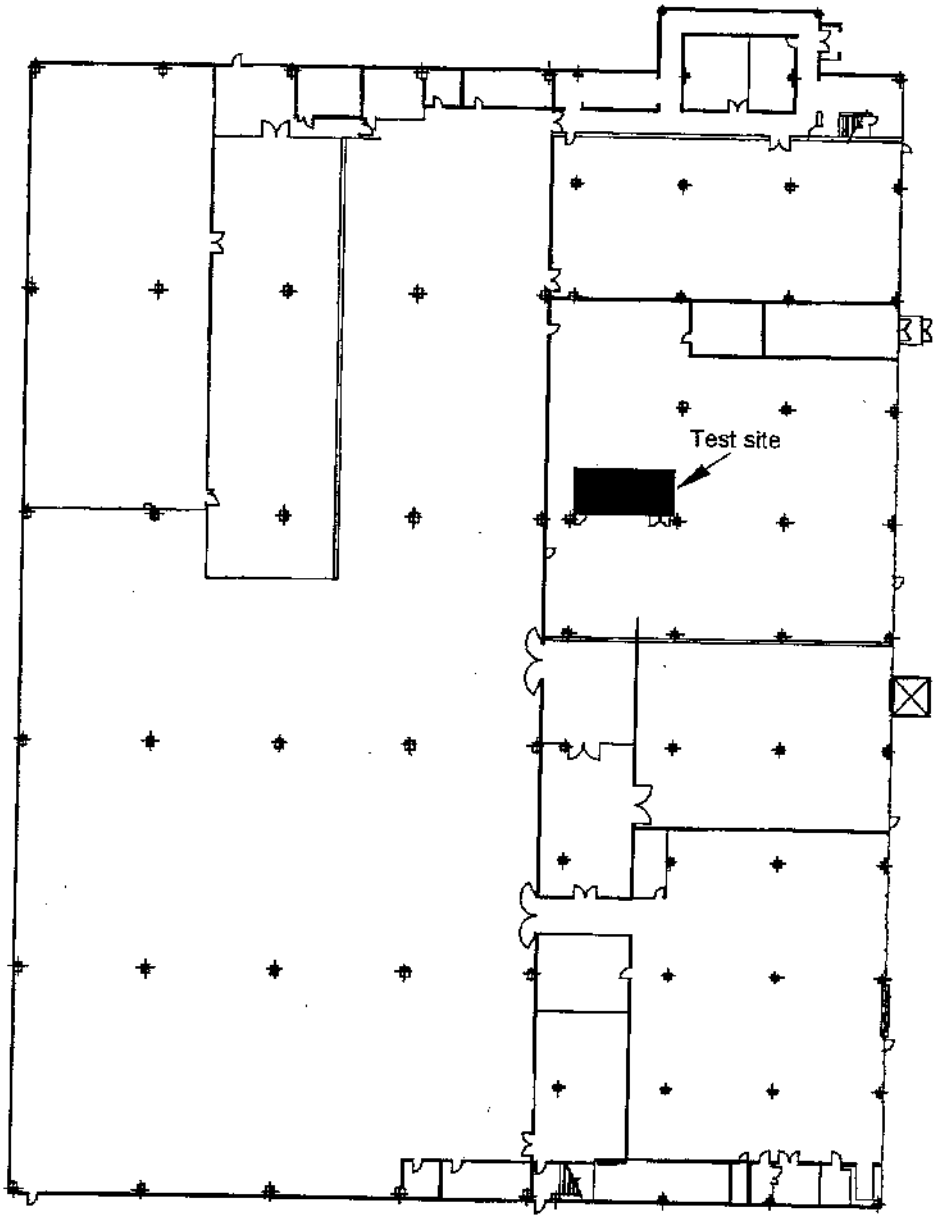
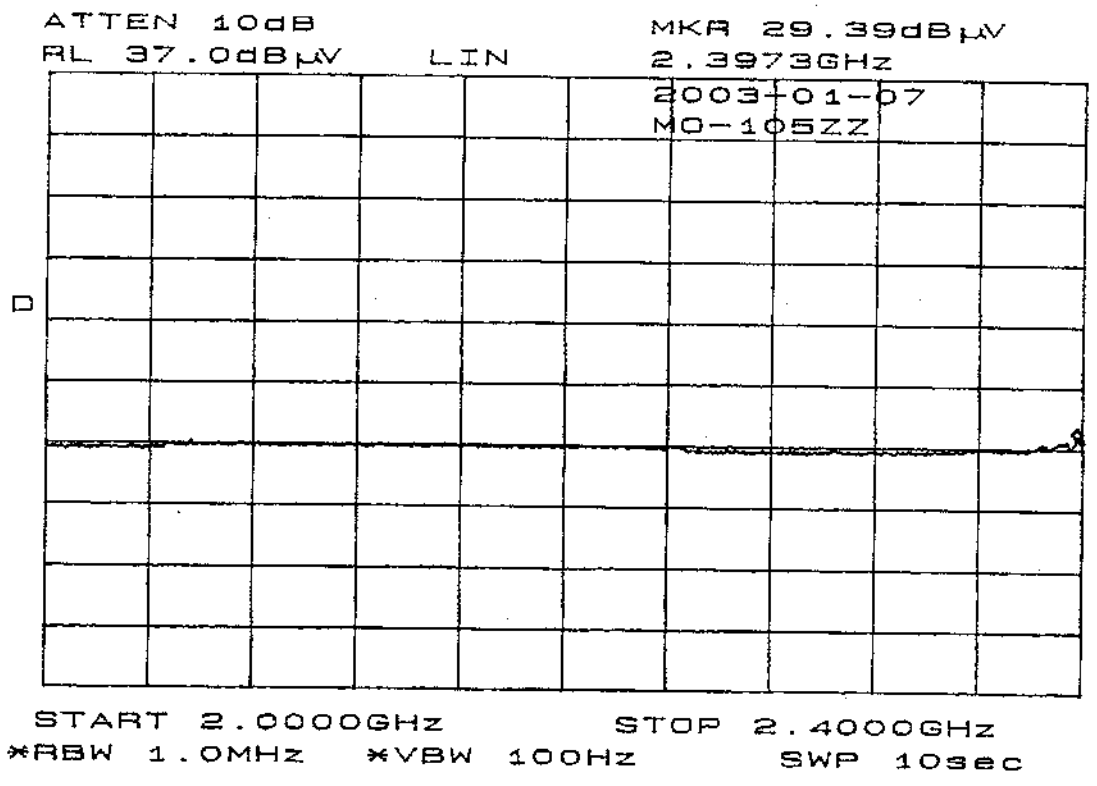
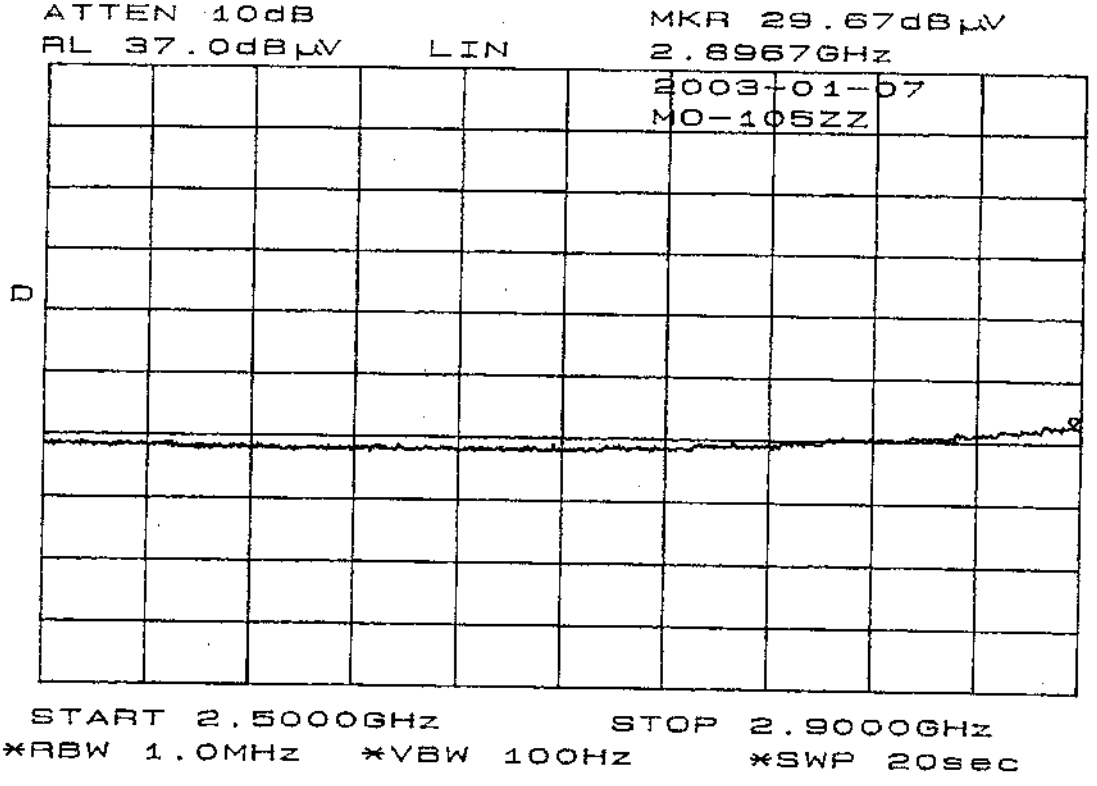
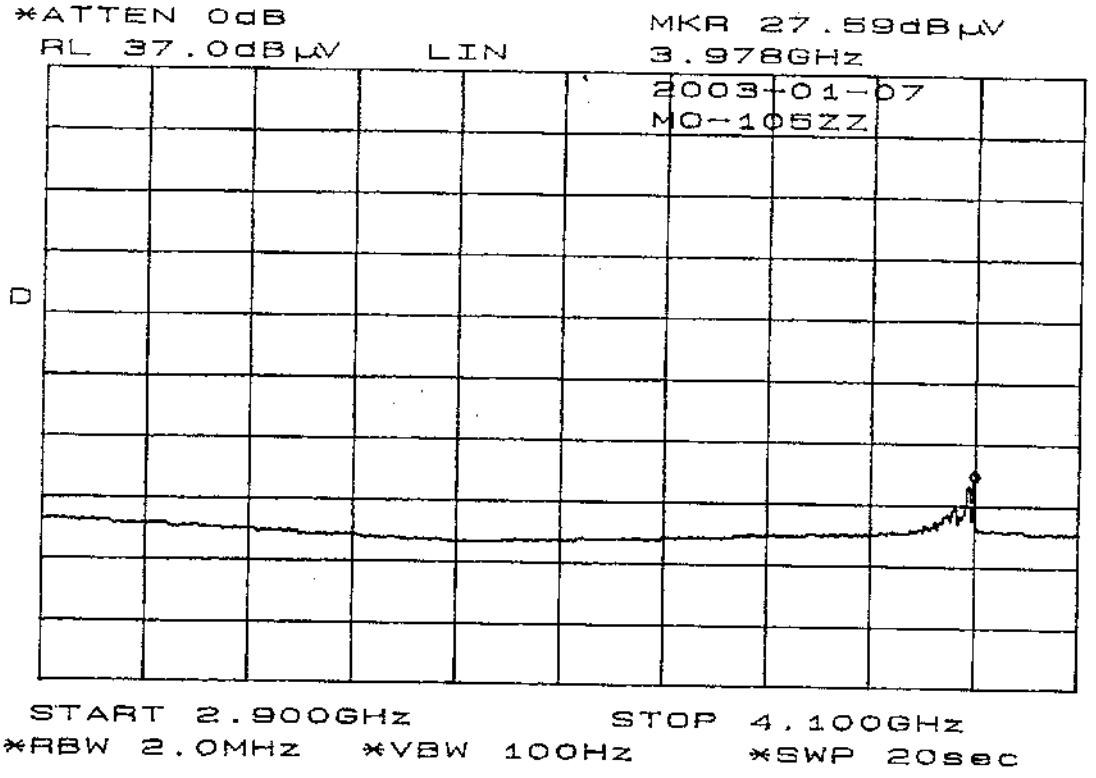


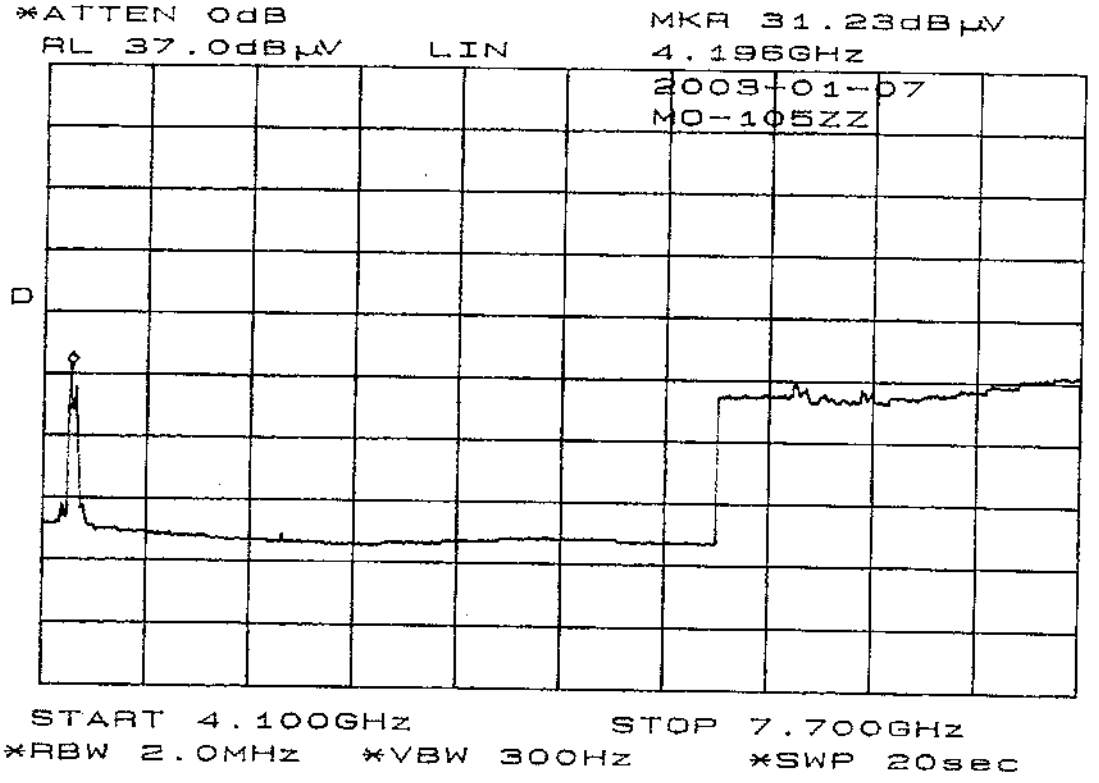
Fig. 2 Physical description of test site




ATTEN 10dB
RL 37.0dBμV
LIN
MKR 29.39dBμV
2.3973GHz
2003-01-07
MO-105ZZ
D
START 2.0000GHz
STOP 2.4000GHz
*RBW 1.0MHz
*VBW 100Hz
SWP 10sec


ATTEN 10dB
RL 37.0dBμV
LIN
MKR 29.67dBμV
2.8967GHz
2003-01-07
MO-105ZZ
D
START 2.5000GHz
STOP 2.9000GHz
*RBW 1.0MHz
*VBW 100Hz
*SWP 20sec


*ATTEN 0dB
RL 37.0dBμV
LIN
MKR 27.59dBμV
3.978GHz
2003-01-07
MO-105ZZ
D
START 2.900GHz
STOP 4.100GHz
*RBW 2.0MHz
*VBW 100Hz
*SWP 20sec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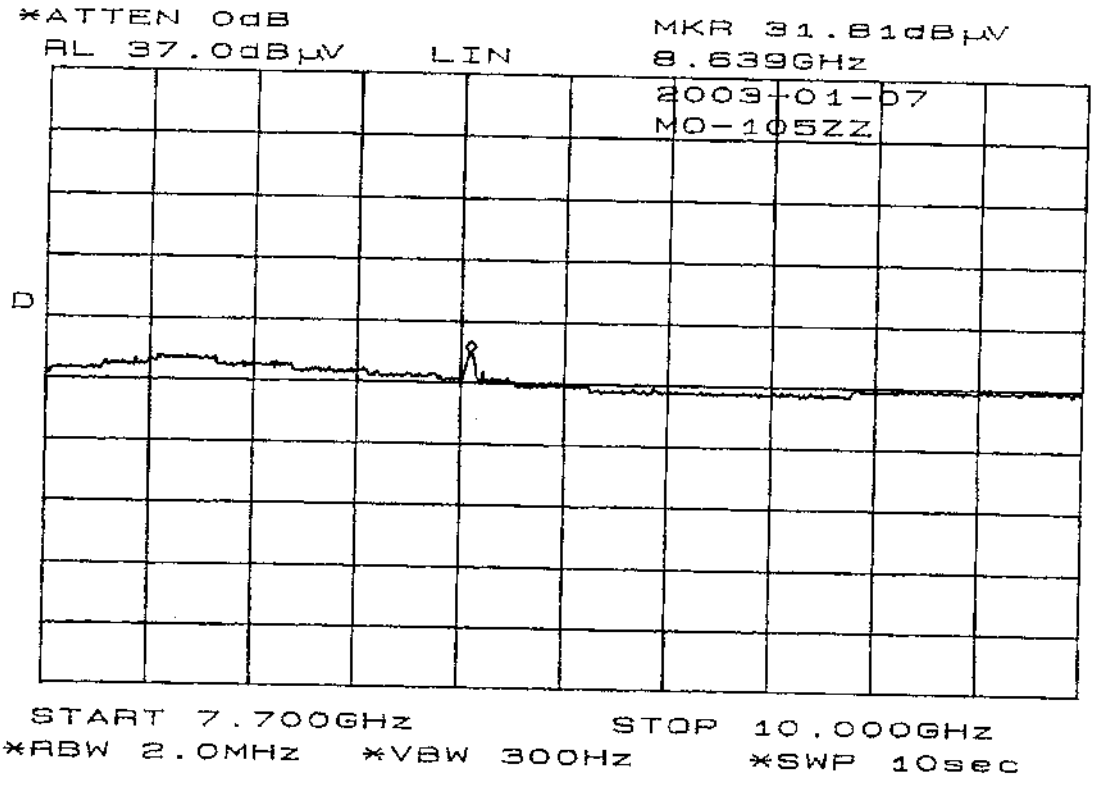
RL 37.0dBμV
LIN
MKR 31.23dBμV
4.196GHz
2003-01-07
MO-105ZZ
D
START 4.100GHz
STOP 7.700GHz
*RBW 2.0MHz
*VBW 300Hz
*SWP 20sec


*ATTEN 0dB
RL 37.0dBµV
LIN
MKR 31.81dBµV
8.639GHz
2003-01-07
MO-105ZZ
D
START 7.700GHz
STOP 10.000GHz
*RBW 2.0MHz
*VBW 300Hz
*SWP 10sec