EMI TEST REPORT

Test Report No. : 23BE0059-HO-1

Applicant	:	**OPTEX CO.,LTD.**
Type of Equipment	:	**Microwave Door Sensor**
Model No.	:	**EZ**
Test standard	:	**FCC Part 15 Subpart C Section 15.207 and Section 15.249**
FCC ID	:	**DC9EZ-SERIES**
Test Result	:	**Complied**

1. This test report shall not be reproduced in full or partial, without the written approval of UL Apex Co., Ltd.
2. The results in this report apply only to the sample tested.
3. This equipment is in compliance with above regulation. We hereby certify that the data contain a true representation of the EMC profile.
4. The test results in this report are traceable to the national or international standards.
5. This test report does not constitute an endorsement by NIST/NVLAP or U.S. Government.

Date of test : May 2, 2003

Tested by : T. Yamashita

Tomoyuki Yamashita
EMC Section

Approved by :

Hironobu Shimoji
Group Leader of EMC Section

UL Apex Co., Ltd.
Head Office EMC Lab.
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN
Telephone : +81 596 24 8116
Facsimile : +81 596 24 8124

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SECTION 1: Client information

Company name	:	OPTEX CO.,LTD.
Brand name	:	OPTEX
Address	:	5-265-1 Ogoto Otsu Shiga 520-0101 Japan
Telephone Number	:	+81 77 579 8111
Facsimile Number	:	+81 77 579 8137
Contact Person	:	Osamu Imanishi

SECTION 2: Equipment under test (E.U.T.)

2.1 Identification of E.U.T.

Type of Equipment	:	Microwave Door Sensor
Model No.	:	EZ
Serial No.	:	037
Rating	:	AC12-24V, DC12-30V
Country of Manufacture	:	Japan
Receipt Date of Sample	:	April 23, 2003
Condition of EUT	:	Engineering prototype

2.2 Product Description

OPTEX CO.,LTD., Model: EZ is the Microwave door sensor. Its intended use is the sensing for automatic door opener.
The switch is installed on the upper of the automatic door or on the ceiling, and it detects the person or objects such as shopping carts, which enter through the automatic doors. The automatic door controller controls the closing motion of the door, which receives the detecting signals that outputs from the switch.
The system for detecting the human body is the Doppler system. When the microwave emits from
The switch itself the switch reads the microwave frequency change that reflects from the mobile objects.
This product is the fixed station and its antenna is unchangeable, that is, permanently installed.

The specification is as following;

(Transmitter)

Equipment type	:	Transceiver
Frequency of Operation	:	24.125GHz
Type of Modulation	:	Continuous wave
Transmit power or power range	:	>-6dBm, <+3dBm
Duty cycle	:	100%
Mode of operation	:	Simplex
Antenna Type	:	wire zig-zag array antenna
Antenna connector Type	:	Coaxial
Method of frequency Generation	:	Other (resonator)
Power supply	:	2W (Microwave unit: 125mW)
Operating voltage	:	DC12 to 30V, AC12 to 24V (Microwave unit: DC+5V)
Operating temperature	:	-20 deg.C. to +55deg.C. (Microwave unit: -25 to +60 deg.C.)
Power & Signal Cable Length	:	≦ 3m

(Receiver)

Equipment type	:	Transceiver
Type of Receiver	:	Homodyne mixer
Frequency of Operation	:	24.125GHz
Local Oscillator Frequency	:	24.125GHz
Other Clock Frequency	:	4MHz
Type of Modulation	:	Continuous wave
Transmit power or power range	:	>-6dBm, <+3dBm
Duty cycle	:	100%
Mode of operation	:	Simplex
Antenna Type	:	Wire zig-zag array antenna
Antenna connector Type	:	Coaxial
Method of frequency Generation	:	Other (resonator)
Power supply	:	2W (Microwave unit: 125mW)
Operating voltage	:	DC12 to 30V, AC12 to 24V (Microwave unit: DC+5V)
Operating temperature	:	-20 deg.C. to +55deg.C. (Microwave unit: -25 to +60 deg.C.)
Power & Signal Cable Length	:	≦ 3m

SECTION 3: Test specification, procedures and results

3.1 Test Specification

Test Specification : FCC Part 15 Subpart C Section 15.207 and Section15.249

Title : FCC 47CFR Part15 Radio Frequency Device Subpart C Intentional Radiators
Section 15.207 Conducted emission limits; general requirements
Section 15.249 Operation within the bands 902-928MHz, 2400-2483.5MHz, 5725-5785MHz and 24.0-24.25GHz

3.2 Procedures and results

No.	Item	Test Procedure	Specification	Deviation	Worst margin	Results
1	Conducted Emission	ANSI C63.4:2001	Section 15.207(a)	N/A	8.7dB(0.1635MHz, L1, QP)	Complied
2	Radiated Emission	ANSI C63.4:2001	Section 15.249	N/A	*1)	N/A
*1) See the reference in test report No.2-3190-01-02/03 (CETECOM)						

3.3 Additions to standards

No addition, deviation or exclusion has been made from standards.

3.4 Confirmation

UL Apex Co., Ltd. hereby confirms that E.U.T. , in the configuration tested, complies with the specifications FCC Part15 Subpart C Section 15.209 and Section 15.249.

3.5 Uncertainty

Conducted emission test
The measurement uncertainty (with a 95% confidence level) for this test was ±1.3dB.
☐The result is within Head Office EMC lab's uncertainty.
■The data listed in this test report has enough margin.

3.6 Test Location

UL Apex Co., Ltd. EMC Head Office Division. No.2 semi anechoic chamber, 7.5 x 5.8 x 5.2m.
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN
Telephone: +81 596 24 8116 Facsimile: +81 596 24 8124
This site has been fully described in a report submitted to FCC office, and listed on June 05, 2002 (Registration number: 846015).
*NVLAP Lab. code: 200572-0

3.7 Test setup, Test instruments and Data of EMI

Refer to APPENDIX 1 to 3.

SECTION 4: Operation of E.U.T. during testing

4.1 Operating Modes

The EUT exercise program used during radiated testing was designed to exercise the various system components in a manner similar to typical use.
The operating mode/system was as follows:

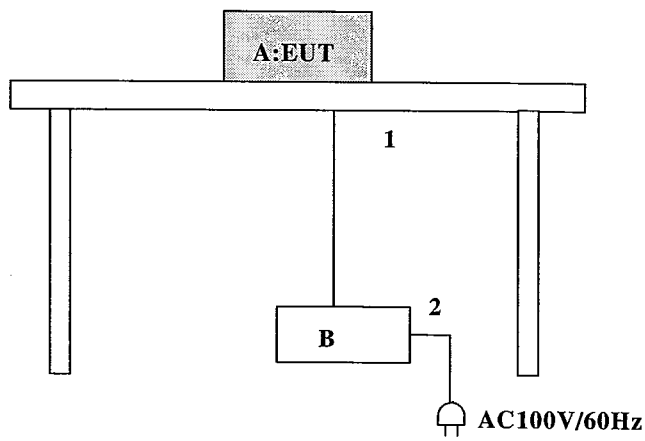
Operation mode : Running mode

*It is in the states of initializing about 5 seconds (Green light is on). After that, it becomes the detecting mode. When the person or objects enter or moves within the area, it becomes the states of detecting (Red light is on).

Justification: The system was configured in typical fashion (as a customer would normally use it) for testing.

4.2 Configuration and peripherals

Front View



* Test data was taken under worse case conditions.

Description of EUT

No.	Item	Model number	Serial number	Manufacturer	FCC ID
A	Microwave door sensor	EZ	037	OPTEX CO., LTD.	DC9EZ-SERIES
B	DC Power Supply	-	-	KIKUSUI	-

List of cables used

No.	Item	Length (m)	Shield	Backshell Material
1	Power cable & Signal Cable	3.0	N	Polyvinyl chloride
2	AC Cable	1.0	N	Polyvinyl chloride

SECTION 5: Conducted Emission

5.1 Operating environment

The test was carried out on a reference ground plane 4.0 x 4.0m in No.2 semi anechoic chamber, 7.5 x 5.8 x 5.2 m.

Temperature : See data
Humidity : See data

5.2 Test configuration

EUT was placed on a platform of nominal size, 1m by 1.5m, raised 80cm above the conducting ground plane. The rear of tabletop was located 40cm to the vertical conducting plane. The rear of EUT and its peripherals was aligned and flushed with rear of tabletop. All other surfaces of tabletop were at least 80cm from any other grounded conducting surface. EUT was located 80cm from LISN and excess AC cable was bundled in center. I/O cables that were connected to the peripherals were bundled in center. They were folded back and forth forming a bundle 30cm to 40cm long and were hanged at a 40cm height to the ground plane. Each EUT current-carrying power lead, except the ground (safety) lead, was individually connected through a LISN to the input power source.
A drawing of the set up is shown in the photos of APPENDIX 1.

5.3 Test conditions

Frequency range : 0.15MHz-30MHz
EUT position : Table top
EUT operation mode: Running mode

5.4 Test procedure

The AC Mains Terminal Continuous disturbance Voltage has been measured with the EUT within a screened room. The EUT was connected to a Line Impedance Stabilization Network (LISN). An overview sweep with peak detection has been performed. The measurements have been performed with a quasi-peak detector and if required, with an average detector.
The conducted emission measurements were made with the following detector function of the test receiver.

Detector Type : Quasi-Peak
IF Bandwidth : 9 kHz

5.5 Results

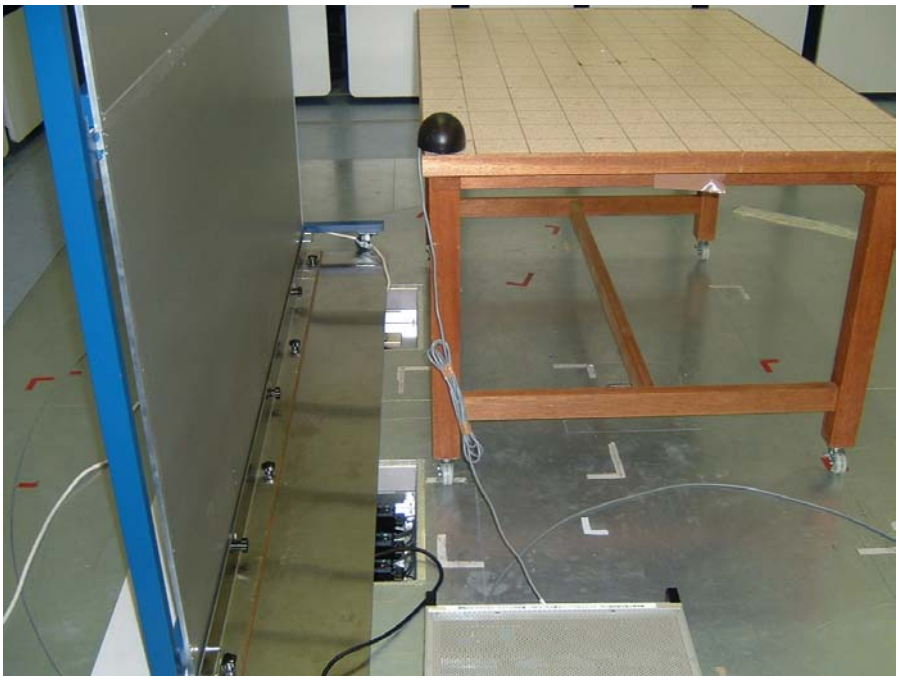
Summary of the test results: Pass

Date: May 6, 2003 Test engineer: Yoshiaki Iwasa

Contents of Appendixes

APPENDIX 1: Photographs of test setup

Conducted emission



Test Instruments

Test Report No :23BE0059-HO-1

APPENDIX 2
Test Instruments

EMI test equipment

Control No.	Instrument	Manufacturer	Model No	Test Item	Calibration Date * Interval(month)
MAEC-02	Anechoic Chamber	TDK	Semi Anechoic Chamber 3m	RE / CE	2003/04/11 * 12
MCC-13	Coaxial Cable	Fujikura/Agilent	-	CE	2003/05/08 * 12
MLS-06	LISN(AMN)	Schwarzbeck	NSLK8127	CE	2003/03/18 * 12
SA-07	Spectrum Analyzer	Advantest	R3273	CE	2002/12/10 * 12
MTR-02	Test Receiver	Rohde & Schwarz	ESCS30	CE	2003/01/31 * 12
MCC-12	Coaxial Cable	Fujikura/Agilent	MCC-12-01(8D-2W15m),MCC-12-02(5D-2W-0.7),MCC-12-03(5D-2W-0.8),MCC-12-04(5D-2W-1m),MCC-12-05(RF SW),MCC-12-06(RF SW), ※ MCC-12-07(5D-2W-0.4m)5/8追加	RE	2003/05/08 * 12
MTR-01	Test Receiver	Rohde & Schwarz	ESI40	RE	2002/11/01 * 12
MHA-02	Horn Antenna	EMCO	3160-09	RE(MW)	2003/01/11 * 12
MPA-01	Pre Amplifier	Agilent	8449B	RE	2003/02/08 * 12
MCC-11	Microwave coaxial cable	Suhner	SUCOFLEX 104	RE	2003/03/27 * 12
MCC-06	Microwave Cable	Storm	421-011	RE	2003/01/14 * 12

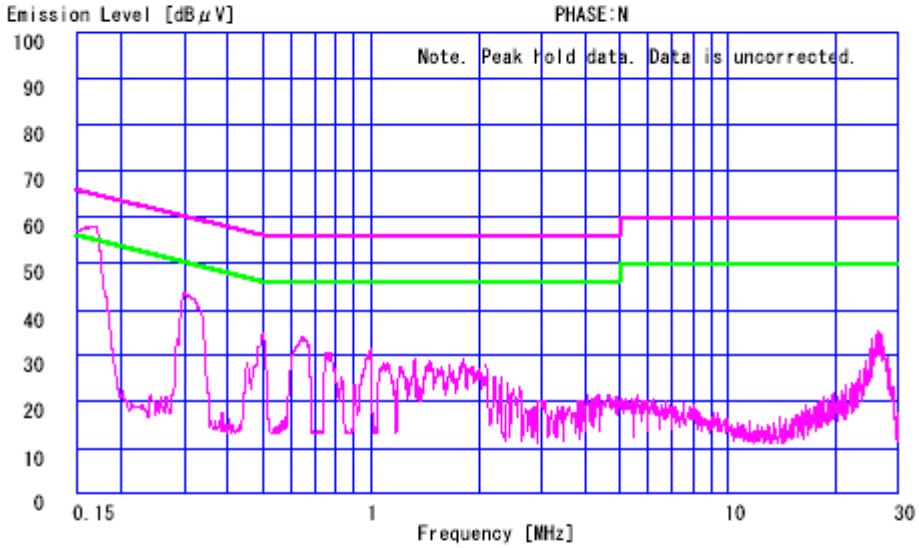
All equipment is calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.
Test Item:
CE: Conducted emission,
RE: Radiated emission,

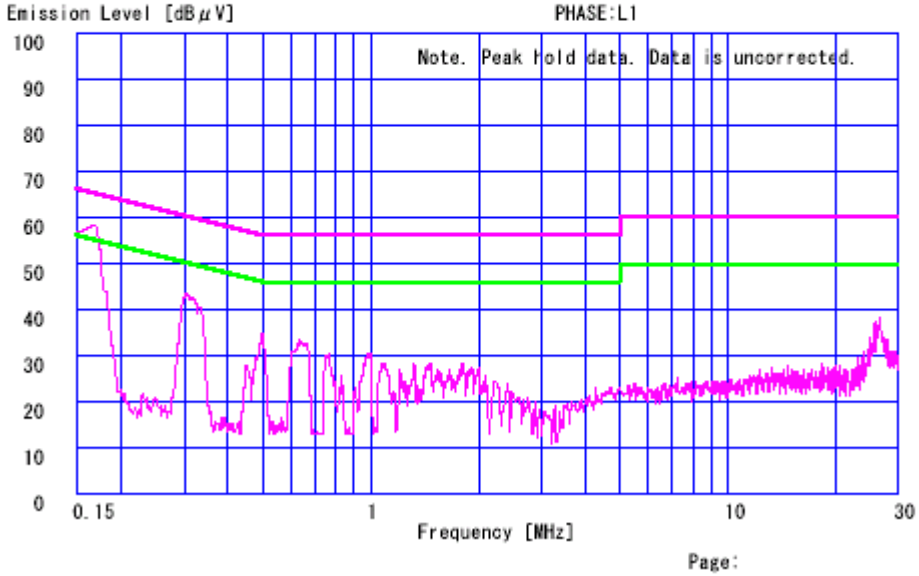
DATA OF CONDUCTION TEST CHART

UL Apex Co., Ltd. Head Office EMC Lab.
No.2 Semi Anechoic Chamber
Report No.: 23BE0059-HO

Applicant	: OPTEX CO..LTD.
Kind of Equipment	: Microwave Door Sensor
Model No.	: EZ
Serial No.	: 037
Power	: AC12V
Mode	: Running(Normal)
Remarks	: FCC ID:DC9EZ-SERIES, IC No:4012A-EZ
Date	: 5/9/2003
Phase	: Single Phase
Temperature	: 22 ℃
Humidity	: 35 %
Regulation 1	: FCC Part15C§15.207 (0.15-30MHz)
Regulation 2	: None

Engineer : Tomoyuki Yamashita





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Regulation : FCC Part15C§15.207 (0.15-30MHz)

T. Yamashita

Engineer : Tomoyuki Yamashita

No.	FREQ.	READING(N) QP	READING(N) AV	READING(L1) QP	READING(L1) AV	LISN FACTOR	CABLE LOSS	ATTEN.	RESULT QP	RESULT AV	LIMITS QP	LIMITS AV	MARGIN QP	MARGIN AV
	[MHz]	[dBuV]		[dBuV]		[dB]	[dB]	[dB]	[dBuV]		[dBuV]		[dB]	
1.	0.1635	56.5	45.8	56.5	45.1	0.0	0.1	0.0	56.6	45.9	65.3	55.3	8.7	9.4
2.	0.2972	40.5	-	40.9	-	0.0	0.1	0.0	41.0	-	60.3	50.3	19.3	-
3.	0.4930	33.6	-	33.6	-	0.1	0.1	0.0	33.8	-	56.1	46.1	22.3	-
4.	0.6501	30.3	-	29.7	-	0.1	0.1	0.0	30.5	-	56.0	46.0	25.5	-
5.	0.9759	28.7	-	28.3	-	0.1	0.2	0.0	29.0	-	56.0	46.0	27.0	-
6.	26.2325	27.4	-	29.2	-	0.9	1.7	0.0	31.8	-	60.0	50.0	28.2	-

CALCULATION: READING[dBμV] + LISN FACTOR[dB] + CABLE LOSS[dB] + ATTEN[dB].

Except for the above table: adequate margin data below the limits.

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Date	: 5/9/2003
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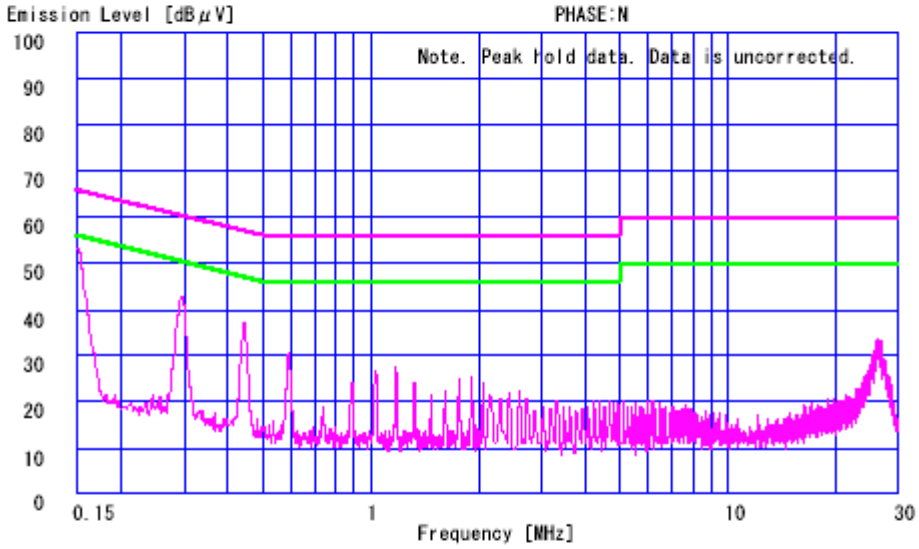
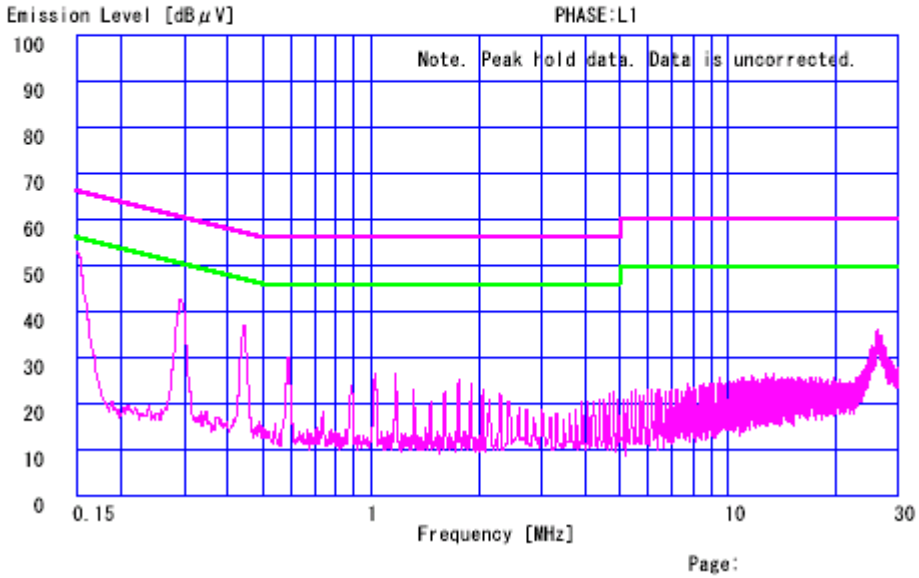
Temperature	: 22 ℃
Humidity	: 35 %
Regulation 1	: FCC Part15C§15.207 (0.15-30MHz)
Regulation 2	: None

Engineer : Tomoyuki Yamashita

T. Yamashita





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	[MHz]	[dBuV]		[dBuV]		[dB]	[dB]	[dB]	[dBuV]		[dBuV]		[dB]	
1.	0.1500	38.8	-	48.0	-	0.0	0.1	0.0	48.1	-	66.0	56.0	17.9	-
2.	0.2886	40.8	-	41.4	-	0.0	0.1	0.0	41.5	-	60.6	50.6	19.1	-
3.	0.4350	34.9	-	35.0	-	0.1	0.1	0.0	35.2	-	57.2	47.2	22.0	-
4.	0.5768	27.5	-	28.0	-	0.1	0.1	0.0	28.2	-	56.0	46.0	27.8	-
5.	1.0089	25.1	-	24.1	-	0.1	0.2	0.0	25.4	-	56.0	46.0	30.6	-
6.	1.1495	24.8	-	24.1	-	0.1	0.2	0.0	25.1	-	56.0	46.0	30.9	-
7.	26.3213	29.8	-	30.3	-	0.9	1.7	0.0	32.9	-	60.0	50.0	27.1	-

CALCULATION: READING[dBμV] + LISN FACTOR[dB] + CABLE LOSS[dB] + ATTEN[dB].

Except for the above table: adequate margin data below the limits.

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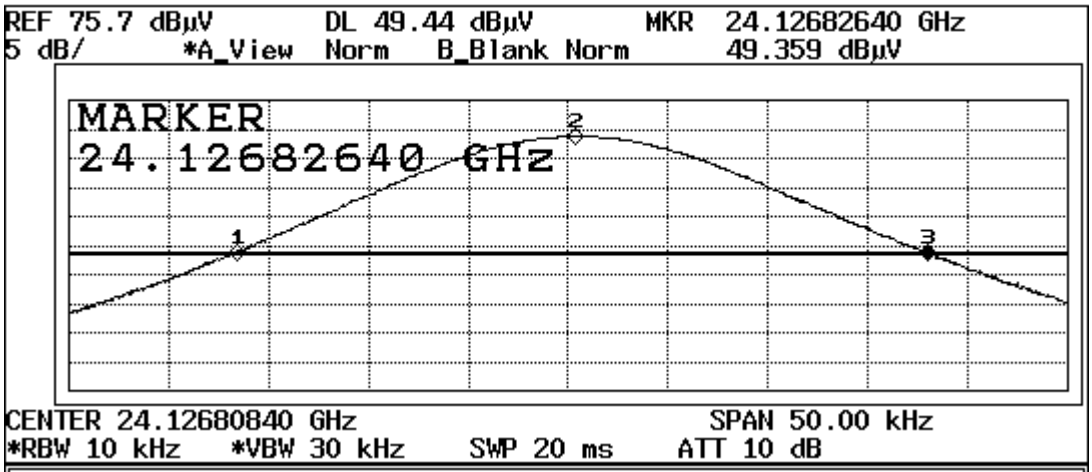
20dB Bandwidth



Multi Marker List

1:	24.12679180 GHz	49.445 dBµV
2:	24.12680875 GHz	69.438 dBµV
3:	24.12682640 GHz	49.359 dBµV
4:		
5:		
6:		
7:		
8:		
9:		
10:		
Δ:		