

**DATE: 24 May 2004**

**I.T.L. (PRODUCT TESTING) LTD.**

**FCC EMC Test**

**for**

**EMTS Inc.**

**Equipment under test:**

**IntegrAlarm Door/Window Contact Sensor**

**(Transmitter Section)**

**IA-DWC1**

Written by:



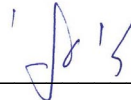
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Approved by:



E. Pitt, Test Engineer

Approved by:



I. Raz, EMC Laboratory Manager

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This report relates only to items tested.

**Measurement/Technical Report for**  
**EMTS Inc.**  
**IntegrAlarm Door/Window Contact Sensor**  
**(For Transmitter Section)**  
**IA-DWC1**

**FCC ID:RUF150704**

**24 May 2004**

This report concerns:                      Original Grant ☐                      Class II change ☒ X

Class B verification ☐                      Class A verification ☐                      Class I change ☐

Equipment type:                      Radio Telemetry Transmitter

Request Issue of Grant:

☒ x Immediately upon completion of review

Limits used:

CISPR 22 ☐

Part 15 ☒ x

Measurement procedure used is ANSI C63.4-2001.

Application for Certification

prepared by:

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Applicant for this device:

(different from "prepared by")

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# TABLE OF CONTENTS

<b>1.</b>	<b>GENERAL INFORMATION -----</b>	<b>4</b>
1.1	Administrative Information .....	4
1.2	List of Accreditations .....	5
1.3	Product Description .....	6
1.4	Test Methodology .....	6
1.5	Test Facility .....	6
1.6	Measurement Uncertainty .....	6
<b>2.</b>	<b>PRODUCT LABELING-----</b>	<b>7</b>
<b>3.</b>	<b>SYSTEM TEST CONFIGURATION-----</b>	<b>8</b>
3.1	Justification .....	8
3.2	EUT Exercise Software .....	8
3.3	Special Accessories .....	8
3.4	Equipment Modifications .....	8
3.5	Configuration of Tested System .....	8
<b>4.</b>	<b>BLOCK DIAGRAM -----</b>	<b>9</b>
4.1	Schematic Block/Connection Diagram .....	9
4.2	Theory of Operation.....	9
<b>5.</b>	<b>SPURIOUS RADIATED EMISSION, BELOW 1 GHZ -----</b>	<b>10</b>
5.1	Test Specification .....	10
5.2	Test Procedure .....	10
5.3	Test Data .....	10
5.4	Test Instrumentation Used, Radiated Measurements .....	11
5.5	Field Strength Calculation .....	12
<b>6.</b>	<b>SPURIOUS RADIATED EMISSION ABOVE 1 GHZ-----</b>	<b>13</b>
6.1	Test Specification .....	13
6.2	Radiated Emission Above 1 GHz .....	13
6.3	Test Data .....	13
6.4	Test Instrumentation Used, Radiated Measurements Above 1 GHz.....	22

# 1. General Information

## 1.1 Administrative Information

Manufacturer:	EMTS Inc.
Manufacturer's Address:	300 Alden Road Markham, Ontario L3E4C1 Canada Tel: +1-905-946-8589 Fax: +1-905-947-0138
Manufacturer's Representative:	Doron Lavee
Equipment Under Test (E.U.T):	IntegrAlarm Door/Window Contact Sensor
Equipment Model No.:	IA-DWC1
Equipment Serial No.:	Not designated
Date of Receipt of E.U.T:	02.05.04
Start of Test:	02.05.04
End of Test:	02.05.04
Test Laboratory Location:	I.T.L (Product Testing) Ltd. Kfar Bin Nun, ISRAEL 99780
Test Specifications:	FCC Part 15, Sub-part C

## **1.2 List of Accreditations**

The EMC laboratory of I.T.L. is accredited by the following bodies:

1. The American Association for Laboratory Accreditation (A2LA) (U.S.A.), Certificate No. 1152.01.
2. The Federal Communications Commission (FCC) (U.S.A.), Registration No. 90715.
3. The Israel Ministry of the Environment (Israel), Registration No. 1104/01.
4. The Voluntary Control Council for Interference by Information Technology Equipment (VCCI) (Japan), Registration Numbers: C-1350, R-1285.
5. Industry Canada (Canada), File No. IC 4025.
6. TUV Product Services, England, ASLLAS No. 97201.
7. Nemko (Norway), Authorization No. ELA 207.

I.T.L. Product Testing Ltd. is accredited by the American Association for Laboratory Accreditation (A2LA) and the results shown in this test report have been determined in accordance with I.T.L.'s terms of accreditation unless stated otherwise in the report.

### **1.3     *Product Description***

See details in ITL test report no. E52235.01

Description of change:

The dipole antenna of this unit was replaced by a loaded monopole antenna with -6db gain.

### **1.4     *Test Methodology***

Both conducted and radiated testing were performed according to the procedures in ANSI C63.4: 2001. Radiated testing was performed at an antenna to EUT distance of 3 meters.

### **1.5     *Test Facility***

The radiated emissions tests were performed at I.T.L.'s testing facility at Kfar Bin-Nun, Israel. This site is a FCC listed test laboratory (FCC Registration No. 90715, date of listing December 12, 2003).

I.T.L.'s EMC Laboratory is also accredited by A2LA, certificate No. 1152.01.

### **1.6     *Measurement Uncertainty***

Radiated Emission

The Open Site complies with the  $\pm 4$  dB Normalized Site Attenuation requirements of ANSI C63.4-2001. In accordance with Paragraph 5.4.6.1 of this standard, this tolerance includes instrumentation calibration errors, measurement technique errors, and errors due to site anomalies.

## **2. Product Labeling**

See ITL test report no. E52235.01.

### 3. System Test Configuration

#### 3.1 Justification

See ITL test report no. E52235.01.  
Spurious radiated emissions re-testing was performed according to correspondence with METLabs dated 05 April 2004.

#### 3.2 EUT Exercise Software

See ITL test report no. E52235.01.

#### 3.3 Special Accessories

See ITL test report no. E52235.01.

#### 3.4 Equipment Modifications

See ITL test report no. E52235.01.

#### 3.5 Configuration of Tested System

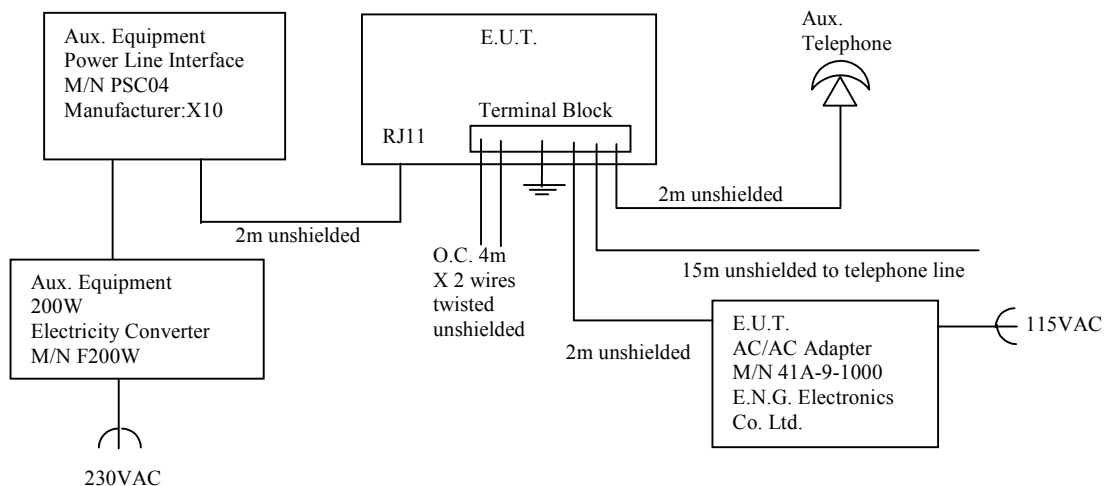


Figure 1. Configuration of Tested System



## **4. Block Diagram**

### **4.1 Schematic Block/Connection Diagram**

Intentionally Blank for Reasons of Confidentiality

### **4.2 Theory of Operation**

See ITL test report no. E52235.01.

## 5. Spurious Radiated Emission, Below 1 GHz

### 5.1 Test Specification

9kHz-1000 MHz, FCC, Part 15, Subpart C

### 5.2 Test Procedure

The E.U.T. operation mode and test set-up are as described in Section 3.

A preliminary measurement to characterize the E.U.T was performed inside the shielded room at a distance of 3 meters, using peak detection mode and broadband antennas. The preliminary measurements produced a list of the highest emissions. The E.U.T was then transferred to the open site, and placed on a remote-controlled turntable. The E.U.T was placed on a non-metallic table, 0.8 meters above the ground. The configuration tested is shown in Figure 3.1. The frequency range 9kHz-1000 MHz was scanned, and the list of the highest emissions was verified and updated accordingly.

The levels of the emissions within the frequency ranges of the restricted bands (Section 15.205 of FCC Part 15) were compared to the limits of the table in Section 15.209 (a), General Requirements.

The emissions were measured using a computerized EMI receiver complying to CISPR 16 requirements. The specification limits and applicable correction factors are loaded to the receiver via a 3.5" floppy disk.

In the frequency range 9 kHz-30MHz, the loop antenna was rotated on its vertical axis. The antenna height (center of loop) was 1 meter.

In the frequency range 30-1000MHz, the readings were maximized by adjusting the antenna height between 1-4 meters. The turntable azimuth between 0-360°, and the antenna polarization.

Verification of the E.U.T emissions was based on the following methods:

- Turning the E.U.T on and off.

- Using a frequency span less than 10 MHz.

- Observation of the signal level during turntable rotation. Background noise is not affected by the rotation of the E.U.T.

The E.U.T was tested in the operating frequencies of 916.5 and 926.5 MHz.

### 5.3 Test Data

No changes were observed in the test results.

TEST PERSONNEL:

Tester Signature: 

Date: 24.05.04

Typed/Printed Name: E. Pitt

#### 5.4 Test Instrumentation Used, Radiated Measurements

Instrument	Manufacturer	Model	Serial Number	Calibration	Period
EMI Receiver	HP	85422E	3411A00102	February 28, 2004	1 year
RF Section	HP	85420E	3427A00103	February 28, 2004	1 year
Antenna Bioconical	ARA	BCD 235/B	1041	April 11, 2004	1 year
Antenna Log Periodic	ARA	LPD-2010/A	1038	March 21, 2004	1 year
Active Loop Antenna	EMCO	6502	9506-2950	October 17, 2003	1 year
Antenna Mast	ARA	AAM-4A	1001	N/A	N/A
Turntable	ARA	ART-1001/4	1001	N/A	N/A
Mast & Table Controller	ARA	ACU-2/5	1001	N/A	N/A
Printer	HP	ThinkJet 2225	2738508357.0	N/A	N/A

## **5.5 Field Strength Calculation**

The field strength is calculated directly by the EMI Receiver software, and a "Correction Factors" data disk, using the following equation:

$$[\text{dB}\mu\text{V}/\text{m}] \text{ FS} = \text{RA} + \text{AF} + \text{CF}$$

FS: Field Strength  $[\text{dB}\mu\text{V}/\text{m}]$   
RA: Receiver Amplitude  $[\text{dB}\mu\text{V}]$   
AF: Receiving Antenna Correction Factor  $[\text{dB}/\text{m}]$   
CF: Cable Attenuation Factor  $[\text{dB}]$

No external pre-amplifiers are used.

## 6. Spurious Radiated Emission Above 1 GHz

### 6.1 Test Specification

1000-9500 MHz, FCC, Part 15, Subpart C

### 6.2 Radiated Emission Above 1 GHz

The E.U.T operation mode and test set-up are as described in Section 3.

A preliminary measurement to characterize the E.U.T was performed inside the shielded room, using peak detection mode and broadband antennas. The preliminary measurements produced a list of the highest emissions. The E.U.T was then transferred to the open site, and placed on a remote-controlled turntable. The E.U.T was placed on a non-metallic table, 0.8 meters above the ground. The configuration tested is shown in Figure 3.1.

The levels of the emissions within the frequency ranges of the restricted bands (Section 15.205 of FCC Part 15) were compared to the limits of the table in Section 15.209 (a), General Requirements.

In the frequency range 1-2.9 GHz, a computerized EMI receiver complying to CISPR 16 requirements was used. The test distance was 3 meters.

In the frequency range 2.9-9.5 GHz, a spectrum analyzer including a low noise amplifier was used. The test distance was 3 meters. During peak measurements, the I.F. bandwidth was 1 MHz, and video bandwidth 3 MHz. During average measurements, the I.F. bandwidth was 1 MHz and video bandwidth was 100 Hz. The readings were maximized by adjusting the antenna height between 1-4 meters, the turntable azimuth between 0-360°, and the antenna polarization.

Verification of the E.U.T emissions was based on the following methods: turning the E.U.T on and off; using a frequency span less than 10 MHz; observation of the signal level during turntable rotation. (Background noise is not affected by the rotation of the E.U.T.)

### 6.3 Test Data

JUDGEMENT: Passed by dB

The EUT met the requirements of the F.C.C. Part 15, Subpart C, specification.

The worst cases were:

for 903.5 MHz, 9.0dB margin at 4517.00 MHz frequency, horizontal polarization.

for 913.5 MHz, 14.3dB margin at 4567.00 MHz frequency, horizontal polarization

The details of the highest emissions are given in Figure 2 to Figure 9.

TEST PERSONNEL:

Tester Signature: 

Date: 24.05.04

Typed/Printed Name: E. Pitt

## Radiated Emission Above 1 GHz

E.U.T Description    IntegrAlarm Door/Window  
Contact Sensor  
Type                    IA-DWC1  
Serial Number:        Not designated

Specification: FCC, Part 15, Subpart C

Antenna Polarization: Horizontal                    Frequency range: 1.0 GHz to 9.5 GHz  
Test Distance: 3 meters                                Detector: Peak  
Operating Frequency: 903.5 MHz

<b>Freq.</b>	<b>Peak Result</b>	<b>Peak. Specification</b>	<b>Peak. Margin</b>
(MHz)	(dBμV/m)	(dB μV/m)	(dB)
2710.00	48.2**	74.0	-25.8
3614.00	50.5*	74.0	-23.5
4517.00	65.0*	74.0	-9.0

**Figure 2. Radiated Emission. Antenna Polarization: HORIZONTAL.  
Detector: Peak**

### Notes:

Margin refers to the test results obtained minus specified requirement; thus a positive number indicates failure, and a negative result indicates that the product passes the test.

“Peak Result” includes correction factor.

\* “Correction Factor” = Antenna Factor + Cable Loss- Preamplifier Gain

\*\* “Correction Factor” = Antenna Factor + Cable Loss

## Radiated Emission Above 1 GHz

E.U.T Description    IntegrAlarm Door/Window  
Contact Sensor  
Type    IA-DWC1  
Serial Number:    Not designated

Specification: FCC, Part 15, Subpart C

Antenna Polarization: Horizontal    Frequency range: 1.0 GHz to 9.5 GHz  
Test Distance: 3 meters    Detector: Average  
Operating Frequency: 903.5 MHz

<b>Freq.</b>	<b>Average Result</b>	<b>Average Specification</b>	<b>Avg. Margin</b>
(MHz)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)
2710.00	28.2**	54.0	-25.8
3614.00	30.5*	54.0	-23.5
4517.00	45.0*	54.0	-9.0

**Figure 3. Radiated Emission. Antenna Polarization: HORIZONTAL.  
Detector: Average**

### Notes:

Margin refers to the test results obtained minus specified requirement; thus a positive number indicates failure, and a negative result indicates that the product passes the test.

“Average Result” includes correction factor.

\* “Correction Factor” = Antenna Factor + Cable Loss- Preamplifier Gain

\*\* “Correction Factor” = Antenna Factor + Cable Loss

$$\text{Duty Cycle Factor} = 20 \log \frac{10}{100} = -20 \text{ dB}$$

## Radiated Emission Above 1 GHz

E.U.T Description    IntegrAlarm Door/Window  
Contact Sensor  
Type    IA-DWC1  
Serial Number:    Not designated

Specification: FCC, Part 15, Subpart C

Antenna Polarization: Vertical

Frequency range: 1.0 GHz to 9.5 GHz

Test Distance: 3 meters

Detector: Peak

Operating Frequency: 903.5 MHz

<b>Freq.</b>	<b>Peak Result</b>	<b>Peak. Specification</b>	<b>Peak. Margin</b>
(MHz)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)
2710.00	50.0**	74.0	-24.0
3614.00	49.8*	74.0	-24.2
4517.00	63.4*	74.0	-10.6

**Figure 4. Radiated Emission. Antenna Polarization: VERTICAL.  
Detector: Peak**

### Notes:

Margin refers to the test results obtained minus specified requirement; thus a positive number indicates failure, and a negative result indicates that the product passes the test.

“Peak Result” includes correction factor.

\* “Correction Factor” = Antenna Factor + Cable Loss- Preamplifier Gain

\*\* “Correction Factor” = Antenna Factor + Cable Loss



## Radiated Emission Above 1 GHz

E.U.T Description    IntegrAlarm Door/Window  
Contact Sensor  
Type    IA-DWC1  
Serial Number:    Not designated

Specification: FCC, Part 15, Subpart C

Antenna Polarization: Vertical    Frequency range: 1.0 GHz to 9.5 GHz  
Test Distance: 3 meters    Detector: Average  
Operating Frequency: 903.5 MHz

<b>Freq.</b>	<b>Average Result</b>	<b>Average Specification</b>	<b>Avg. Margin</b>
(MHz)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)
2710.00	30.0**	54.0	-24.0
3614.00	29.8*	54.0	-24.2
4517.00	43.4*	54.0	-10.6

**Figure 5. Radiated Emission. Antenna Polarization: VERTICAL.  
Detector: Average**

### Notes:

Margin refers to the test results obtained minus specified requirement; thus a positive number indicates failure, and a negative result indicates that the product passes the test.

“Average Result” includes correction factor.

\* “Correction Factor” = Antenna Factor + Cable Loss- Preamplifier Gain

\*\* “Correction Factor” = Antenna Factor + Cable Loss

$$\text{Duty Cycle Factor} = 20 \log \frac{10}{100} = -20 \text{ dB}$$

## Radiated Emission Above 1 GHz

E.U.T Description    IntegrAlarm Door/Window  
Contact Sensor  
Type                    IA-DWC1  
Serial Number:        Not designated

Specification: FCC, Part 15, Subpart C

Antenna Polarization: Horizontal                    Frequency range: 1.0 GHz to 9.5 GHz  
Test Distance: 3 meters                                Detector: Peak  
Operating Frequency: 913.5 MHz

<b>Freq.</b>	<b>Peak Result</b>	<b>Peak. Specification</b>	<b>Peak. Margin</b>
(MHz)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)
2740.00	43.8**	74.0	-30.2
3654.00	41.4*	74.0	-32.6
4567.00	59.7*	74.0	-14.3

**Figure 6. Radiated Emission. Antenna Polarization: HORIZONTAL.  
Detector: Peak**

### Notes:

Margin refers to the test results obtained minus specified requirement; thus a positive number indicates failure, and a negative result indicates that the product passes the test.

“Peak Result” includes correction factor.

\* “Correction Factor” = Antenna Factor + Cable Loss- Preamplifier Gain

\*\* “Correction Factor” = Antenna Factor + Cable Loss

## Radiated Emission Above 1 GHz

E.U.T Description    IntegrAlarm Door/Window  
Contact Sensor  
Type    IA-DWC1  
Serial Number:    Not designated

Specification: FCC, Part 15, Subpart C

Antenna Polarization: Horizontal    Frequency range: 1.0 GHz to 9.5 GHz  
Test Distance: 3 meters    Detector: Average  
Operating Frequency: 913.5 MHz

Freq.	Average Result	Average Specification	Avg. Margin
(MHz)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)
2740.00	23.8**	54.0	-30.2
3654.00	21.4*	54.0	-32.6
4567.00	39.7*	54.0	-14.3

**Figure 7. Radiated Emission. Antenna Polarization: HORIZONTAL.  
Detector: Average**

### Notes:

Margin refers to the test results obtained minus specified requirement; thus a positive number indicates failure, and a negative result indicates that the product passes the test.

“Average Result” includes correction factor.

\* “Correction Factor” = Antenna Factor + Cable Loss- Preamplifier Gain

\*\* “Correction Factor” = Antenna Factor + Cable Loss

$$\text{Duty Cycle Factor} = 20 \log \frac{10}{100} = -20 \text{ dB}$$

## Radiated Emission Above 1 GHz

E.U.T Description    IntegrAlarm Door/Window  
Contact Sensor  
Type                    IA-DWC1  
Serial Number:        Not designated

Specification: FCC, Part 15, Subpart C

Antenna Polarization: Vertical                    Frequency range: 1.0 GHz to 9.5 GHz  
Test Distance: 3 meters                            Detector: Peak  
Operating Frequency: 913.5 MHz

<b>Freq.</b>	<b>Peak Result*</b>	<b>Peak. Specification</b>	<b>Peak. Margin</b>
(MHz)	(dB)	(dB $\mu$ V/m)	(dB)
2740.00	46.2**	74.0	-27.8
3654.00	42.0*	74.0	-32.0
4567.00	54.2*	74.0	-19.8

**Figure 8. Radiated Emission. Antenna Polarization: VERTICAL.  
Detector: Peak**

### Notes:

Margin refers to the test results obtained minus specified requirement; thus a positive number indicates failure, and a negative result indicates that the product passes the test.

“Peak Result” includes correction factor.

\* “Correction Factor” = Antenna Factor + Cable Loss- Preamplifier Gain

\*\* “Correction Factor” = Antenna Factor + Cable Loss

## Radiated Emission Above 1 GHz

E.U.T Description    IntegrAlarm Door/Window  
Contact Sensor  
Type    IA-DWC1  
Serial Number:    Not designated

Specification: FCC, Part 15, Subpart C

Antenna Polarization: Vertical    Frequency range: 1.0 GHz to 9.5 GHz  
Test Distance: 3 meters    Detector: Average  
Operating Frequency: 913.5 MHz

<b>Freq.</b>	<b>Average Result</b>	<b>Average Specification</b>	<b>Avg. Margin</b>
(MHz)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)
2740.00	26.2**	54.0	-27.8
3654.00	22.0*	54.0	-32.0
4567.00	34.2*	54.0	-19.8

**Figure 9. Radiated Emission. Antenna Polarization: VERTICAL.  
Detector: Average**

### Notes:

Margin refers to the test results obtained minus specified requirement; thus a positive number indicates failure, and a negative result indicates that the product passes the test.

“Average Result” includes correction factor.

\* “Correction Factor” = Antenna Factor + Cable Loss- Preamplifier Gain

\*\* “Correction Factor” = Antenna Factor + Cable Loss

$$\text{Duty Cycle Factor} = 20 \log \frac{10}{100} = -20 \text{ dB}$$

#### 6.4 Test Instrumentation Used, Radiated Measurements Above 1 GHz

Instrument	Manufacturer	Model	Serial Number	Calibration	Period
Receiver	HP	85422E	3411A00102	February 28, 2004	1 year
RF Section	HP	85420E	3427A00103	February 28, 2004	1 year
Antenna Mast	ARA	AAM-4A	1001	N/A	N/A
Turntable	ARA	ART-1001/4	1001	N/A	N/A
Mast & Table Controller	ARA	ACU-2/5	1001	N/A	N/A
Printer	HP	ThinkJet2225	2738508357	N/A	N/A
Antenna-Log Periodic	A.H.System	SAS-200/511	253	January 31,2003	2 year
Double Ridged Waveguide Horn Antenna	EMCO	3115	29845	March 17, 2004	1 year
Horn Antenna	ARA	SWH-28	1007	October 28, 2003	1 year
Band Pass Filter	SERNO	22102-0001	322	August 15, 2003	1 year
Low Noise Amplifier	DBS MICROWAVE	LNA-DBS-0411N313	013	October 14, 2003	1 year
Spectrum Analyzer	HP	8592L	3926A01204	February 28, 2004	1 year
Attenuator	MACOM	ATT-10	N/A	July 27, 2003	1 year
Attenuator	MACOM	ATT-20	N/A	July 27, 2003	1 year