



LABORATORIES, INC.

TABLE OF CONTENTS

Administrative Information	3
Summary Of Results	4
Equipment Under Test (EUT) Description	4
Measurement Uncertainty	4
Peripheral Devices	4
Report Of Measurements	5
Table 1: Six Highest Radiated Emission Levels (Transmitter)	5
Table 2: Six Highest Radiated Emission Levels (Receiver)	6
Table 3: Six Highest Radiated Emission Levels	7
Table 4: Six Highest Power Output Emission Levels at 3 meters	8
Table 5: Three Highest Power Output Emission Levels at Antenna Terminal	9
Occupied Bandwidth Plots Fcc Part 15.247 (a)(1)(ii)	10
Occupied Bandwidth Plots Fcc Part 15.247 (a)(1)(ii)	11
Occupied Bandwidth Plots Fcc Part 15.247 (a)(1)(ii)	12
Occupied Bandwidth Plots Fcc Part 15.247 (a)(1)(ii)	13
Occupied Bandwidth Plots Fcc Part 15.247 (a)(1)(ii)	14
Occupied Bandwidth Plots Fcc Part 15.247 (a)(1)(ii)	15
Occupied Bandwidth Plots Fcc Part 15.247 (a)(1)(ii)	16
Occupied Bandwidth Plots Fcc Part 15.247 (a)(1)(ii)	17
Occupied Bandwidth Plots Fcc Part 15.247 (a)(1)(ii)	18
Table A : List Of Test Equipment	19
EUT Setup	20
Test Instrumentation And Analyzer Settings	21
Table B : Analyzer Bandwidth Settings Per Frequency Range	21
Spectrum Analyzer Detector Functions	22
Peak	22
Quasi-Peak	22
Average	22
Test Methods	23
Radiated Emissions Testing	23
Radiated Emissions Testing at Antenna Terminal	24
Power Output	24
Sample Calculations	25
Appendix A : Information About The Equipment Under Test	26
I/O Ports	27
Crystal Oscillators	27
Printed Circuit Boards	27
Required EUT Changes To Comply	27
Cable Information	28
Photograph Showing Radiated Emissions	29
Photograph Showing Radiated Emissions	30
Photograph Showing Antenna Conducted Emissions	31
Appendix B : Measurement Data Sheets	32

CKC Laboratories, Inc. has Certificates of Accreditation from the following agencies:
DATEch (Germany); A2LA (USA); FCC (USA); VCCI (Japan); BCIQ (Taiwan); HOKLAS (Hong Kong).
CKC Laboratories, Inc. has Letters of Acceptance through an MRA for the following agencies:
ACA/NATA (Australia); SABS (South Africa); SWEDAC (Sweden); TUV Rheinland-Germany; TUV Rheinland-Korea; TUV Rheinland-Russia; Radio Communication Agency (RA); NEMKO (Norway).

ADMINISTRATIVE INFORMATION

DATE OF TEST: June 11, 1998

PURPOSE OF TEST: To demonstrate the compliance of the
Vehicle Mount Terminal, T2455, with the
FCC requirements for Part 15.247 devices.

MANUFACTURER: Intermec Technologies, Inc.
6001 36th Ave W.
Everett, WA 98203

REPRESENTATIVE: Kursat Eroglu

TEST LOCATION: CKC Laboratories, Inc.
5473A Clouds Rest
Mariposa, CA 95338

TEST PERSONNEL: Dustin Oaks

TEST METHOD: ANSI C63.4 1992

FREQUENCY RANGE TESTED: 30 MHz – 24 GHz

EQUIPMENT UNDER TEST:

Vehicle Terminal

Manuf: Intermec
Model: T2455
Serial: 040001
FCC ID: HN2T2455-24

Power Regulator

Manuf: Power One
Model: P/N066777-01
Serial: X2012
FCC ID: N/A

SUMMARY OF RESULTS

The Intermec Technologies, Inc. Vehicle Mount Terminal, T2455, was tested in accordance with FCC Part 15.247 for compliance with the transmitter characteristics requirements of the FCC Rules.

As received, the above equipment was found to be fully compliant with the limits of FCC Part 15.247.

EQUIPMENT UNDER TEST (EUT) DESCRIPTION

Vehicle Mount Terminal with Data Input connections and 2.4 GHz FHSS transceiver.

MEASUREMENT UNCERTAINTY

Associated with data in this report is a ± 4 dB measurement uncertainty.

PERIPHERAL DEVICES

The EUT was not tested with peripheral devices.

REPORT OF MEASUREMENTS

The following tables report the highest emissions levels recorded during the tests performed on the Vehicle Mount Terminal, T2455. The data sheets from which these tables were compiled are contained in Appendix B.

Table 1: Six Highest Radiated Emission Levels (Transmitter)

FREQUENCY MHz	METER READING dBμV	CORRECTION FACTORS				CORRECTED READING dBμV/m	SPEC LIMIT dBμV/m	MARGIN dB	NOTES
		Ant dB	Amp dB	Cable dB	Dist dB				
300.062	37.2	22.6	-26.6	3.4		36.6	46.0	-9.4	H
4880.000	30.1	34.7	-33.6	15.0		46.2	54.0	-7.8	V
7320.000	24.1	37.0	-33.1	20.5		48.5	54.0	-5.5	V
9608.012	13.3	39.1	-31.6	24.2		45.0	54.0	-9.0	V
9760.000	14.4	39.0	-31.5	22.7		44.6	54.0	-9.4	H
14640.000	8.8	41.8	-34.1	29.9		46.4	54.0	-7.6	V

Test Method: ANSI C63.4 1992
Spec Limit : FCC Part 15.209/15.205/15.247(c)
Test Distance: 3 Meters

NOTES: H = Horizontal Polarization
V = Vertical Polarization
N = No Polarization
D = Dipole Reading
Q = Quasi Peak Reading
A = Average Reading

COMMENTS: EUT is operating in normal configuration IAW manufactures specifications. EUT normally operates inside a forklift, therefore operates on 24VDC. EUT is operating on 24VDC via 2 auto batteries in series. EUT is a frequency hopper operating from 2.402GHz to 2.480GHz.

- EUT operating on Low channel.
- EUT operating on Mid channel.
- EUT operating on High channel.

Table 2: Six Highest Radiated Emission Levels (Receiver)

FREQUENCY MHz	METER READING dBμV	CORRECTION FACTORS				CORRECTED READING dBμV/m	SPEC LIMIT dBμV/m	MARGIN dB	NOTES
		Ant dB	Amp dB	Cable dB	Dist dB				
300.062	37.2	22.6	-26.6	3.4		36.6	46.0	-9.4	H
4880.000	30.1	34.7	-33.6	15.0		46.2	54.0	-7.8	V
7320.000	24.1	37.0	-33.1	20.5		48.5	54.0	-5.5	V
9608.012	13.3	39.1	-31.6	24.2		45.0	54.0	-9.0	V
9760.000	14.4	39.0	-31.5	22.7		44.6	54.0	-9.4	H
14640.000	8.8	41.8	-34.1	29.9		46.4	54.0	-7.6	V

Test Method: ANSI C63.4 1992
Spec Limit : FCC Part 15.109
Test Distance: 3 Meters

NOTES: H = Horizontal Polarization
V = Vertical Polarization
N = No Polarization
D = Dipole Reading
Q = Quasi Peak Reading
A = Average Reading

COMMENTS: EUT is operating in normal configuration IAW manufactures specifications. EUT normally operates inside a forklift, therefore operates on 24VDC. EUT is operating on 24VDC via 2 auto batteries in series. EUT is a frequency hopper operating from 2.402GHz to 2.480GHz.

- EUT operating in receive mode on Low channel.
- EUT operating in receive mode on mid channel.
- EUT operating in receive mode on High channel.

Table 3: Six Highest Radiated Emission Levels

FREQUENCY MHz	METER READING dBμV	CORRECTION FACTORS				CORRECTED READING dBμV	SPEC LIMIT dBμV	MARGIN dB	NOTES
		Chamb							
4880.20000	31.5	1.8				33.3	54.0	-20.7	N
7206.40000	35.7	2.1				37.8	54.0	-16.2	N
7320.20000	32.0	1.6				33.6	54.0	-20.4	N
9920.20000	41.2	2.7				43.9	54.0	-10.1	N
14880.2000	28.0	4.3				32.3	54.0	-21.7	N
17080.1000	30.3	3.3				33.6	54.0	-20.4	N

Test Method: ANSI C63.4 1992
Spec Limit : FCC Part 15.247 (c)
Test Distance: No Distance

NOTES: Q = Quasi Peak Reading
A = Average Reading
B = Black Lead
W = White Lead
N = No Polarity

COMMENTS: EUT is operating in normal configuration IAW manufactures specifications. EUT normally operates inside a forklift, therefore operates on 24VDC. EUT is operating on 24VDC via 2 auto batteries in series. EUT is a frequency hopper operating from 2.402GHz to 2.480GHz.

- EUT operating on Low channel.
- EUT operating on Mid channel.
- EUT operating on Mid channel.

Table 4: Six Highest Power Output Emission Levels at 3 meters

FREQUENCY MHz	METER READING dBμV	CORRECTION FACTORS				CORRECTED READING dBμV/m	SPEC LIMIT dBμV/m	MARGIN dB	NOTES
		Ant dB	Amp dB	Cable dB	Dist dB				
2401.860	110.9	30.6	-35.5	10.5		116.5	137.0	-20.5	V
2402.104	101.2	30.6	-35.5	10.5		106.8	137.0	-30.2	H
2439.832	106.7	30.8	-35.5	10.8		112.8	137.0	-24.2	H
2440.086	113.5	30.8	-35.5	10.8		119.6	137.0	-17.4	V
2479.872	114.2	31.1	-35.4	11.1		121.0	137.0	-16.0	V
2479.882	107.8	31.1	-35.4	11.1		114.6	137.0	-22.4	H

Test Method: ANSI C63.4 1992
Spec Limit : FCC Part 15.247 (b)
Test Distance: 3 Meters

NOTES: H = Horizontal Polarization
V = Vertical Polarization
N = No Polarization
D = Dipole Reading
Q = Quasi Peak Reading
A = Average Reading

COMMENTS: EUT is operating in normal configuration IAW manufactures specifications. EUT normally operates inside a forklift, therefore operates on 24VDC. EUT is operating on 24VDC via 2 auto batteries in series. EUT is a frequency hopper operating from 2.402GHz to 2.480GHz.

Table 5: Three Highest Power Output Emission Levels at Antenna Terminal

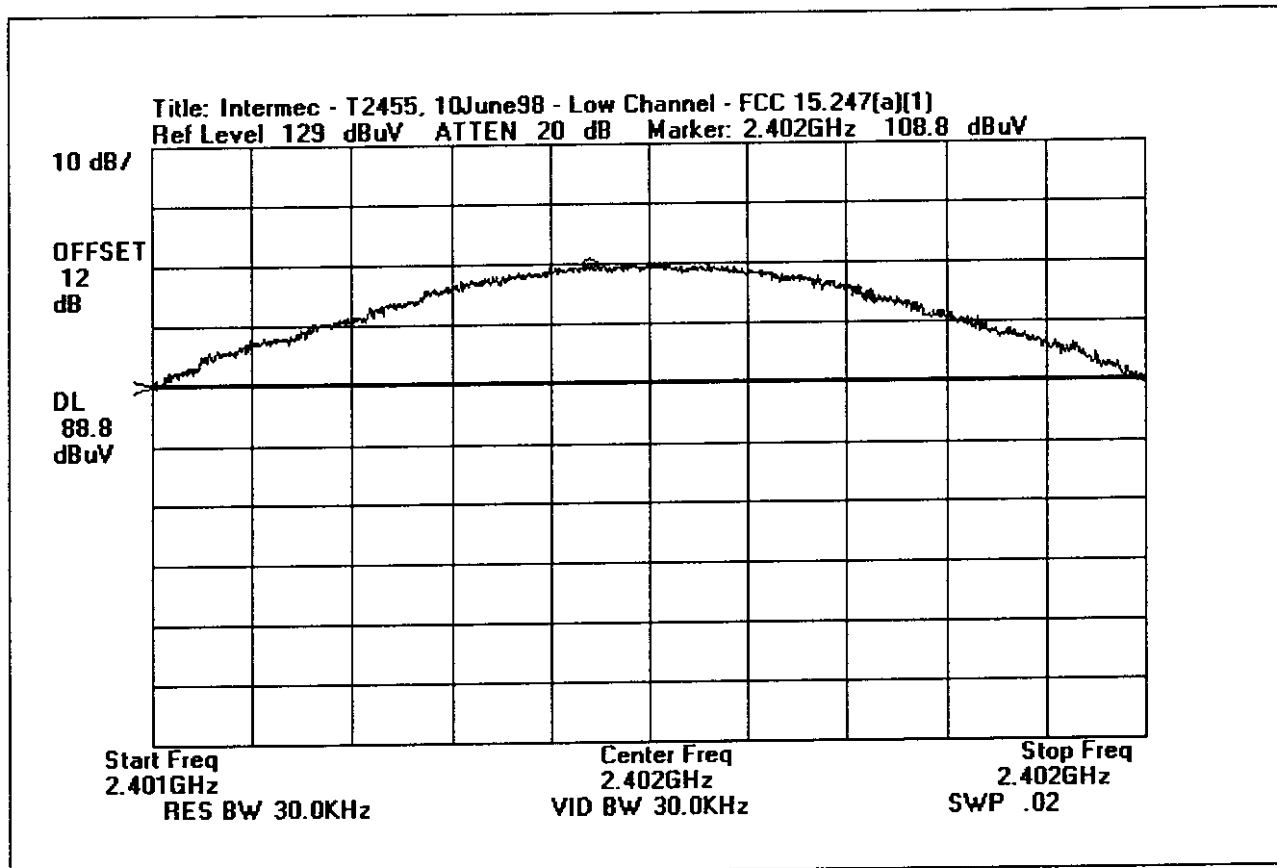
FREQUENCY MHz	METER READING dBμV	CORRECTION FACTORS				CORRECTED READING dBμV	SPEC LIMIT dBμV	MARGIN dB	NOTES
		Lisn dB							
2401.92000	114.3	0.0				114.3	137.0	-22.7	N
2440.04500	113.4	0.0				113.4	137.0	-23.6	N
2480.03000	112.5	0.0				112.5	137.0	-24.5	N

Test Method: ANSI C63.4 1992
Spec Limit : FCC Part 15.247 (b)
Test Distance: No Distance

NOTES: Q = Quasi Peak Reading
A = Average Reading
B = Black Lead
W = White Lead

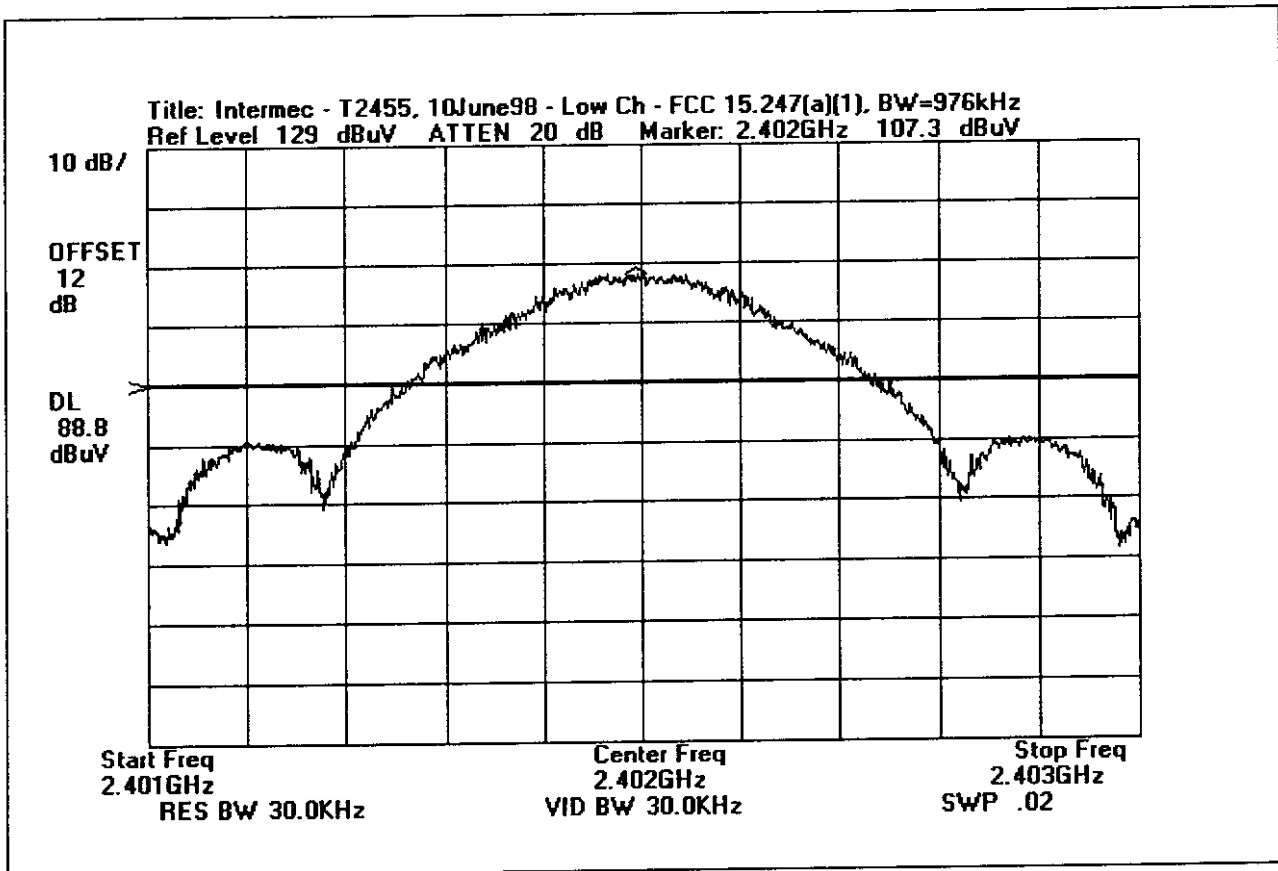
COMMENTS: EUT is operating in normal configuration IAW manufactures specifications. EUT normally operates inside a forklift, therefore operates on 24VDC. EUT is operating on 24VDC via 2 auto batteries in series. EUT is a frequency hopper operating from 2.402GHz to 2.480GHz.

OCCUPIED BANDWIDTH PLOTS FCC PART 15.247 (a)(1)(ii)



NOTES:

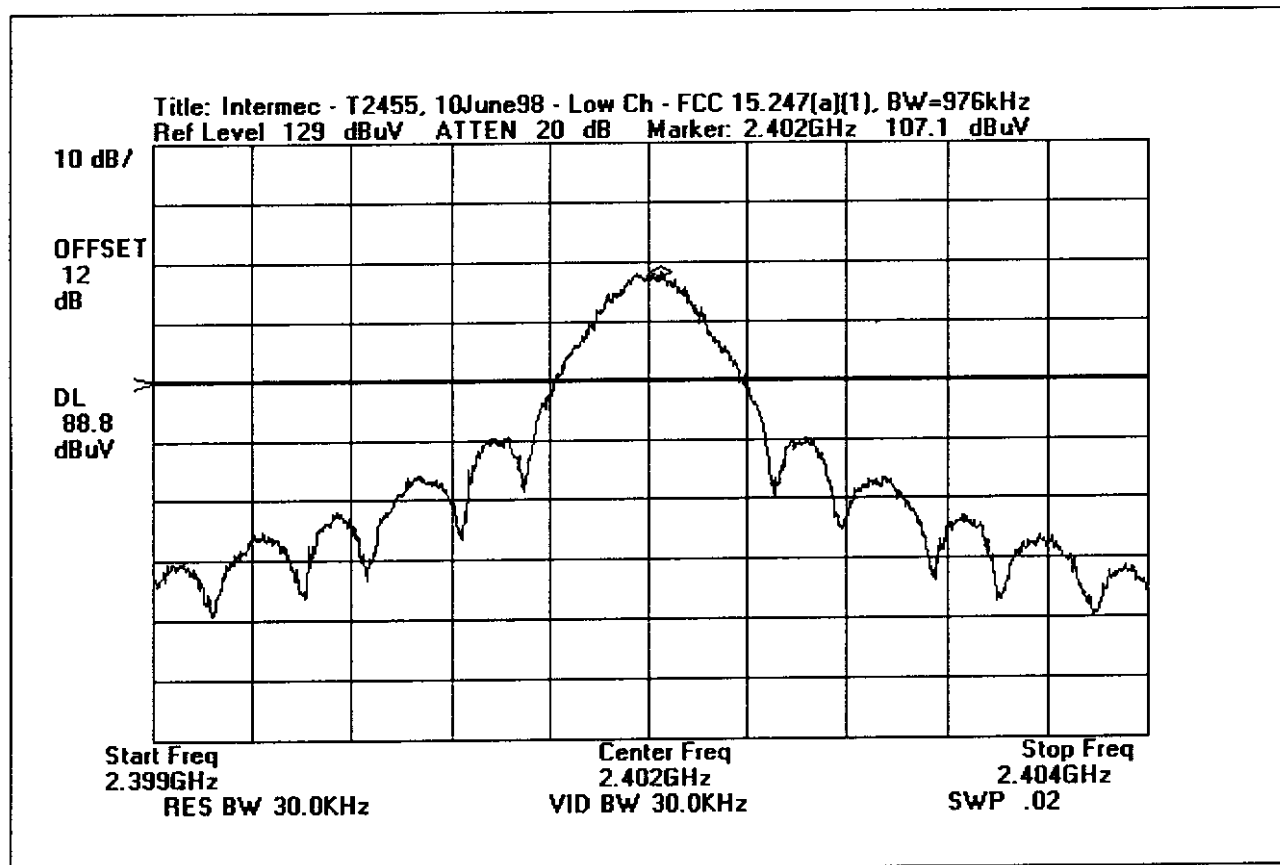
OCCUPIED BANDWIDTH PLOTS FCC PART 15.247 (a)(1)(ii)



NOTES:

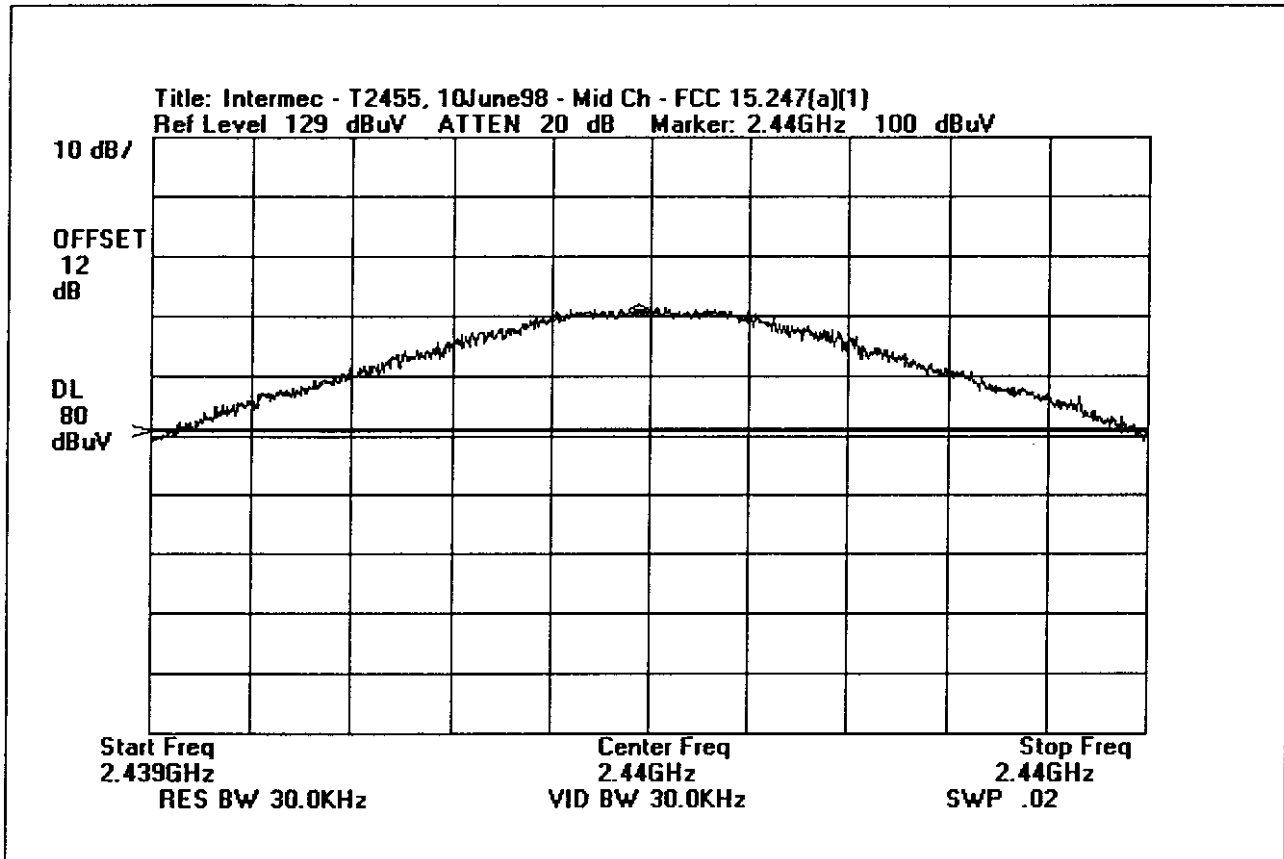


OCCUPIED BANDWIDTH PLOTS FCC PART 15.247 (a)(1)(ii)



NOTES:

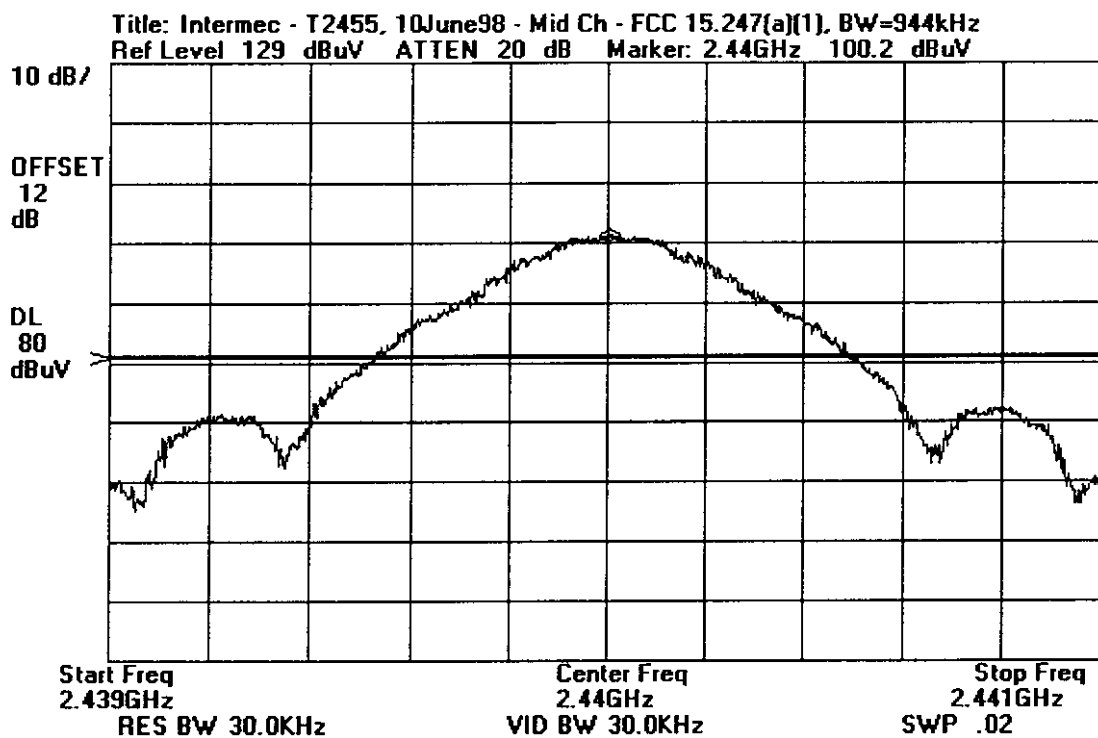
OCCUPIED BANDWIDTH PLOTS FCC PART 15.247 (a)(1)(ii)



NOTES:

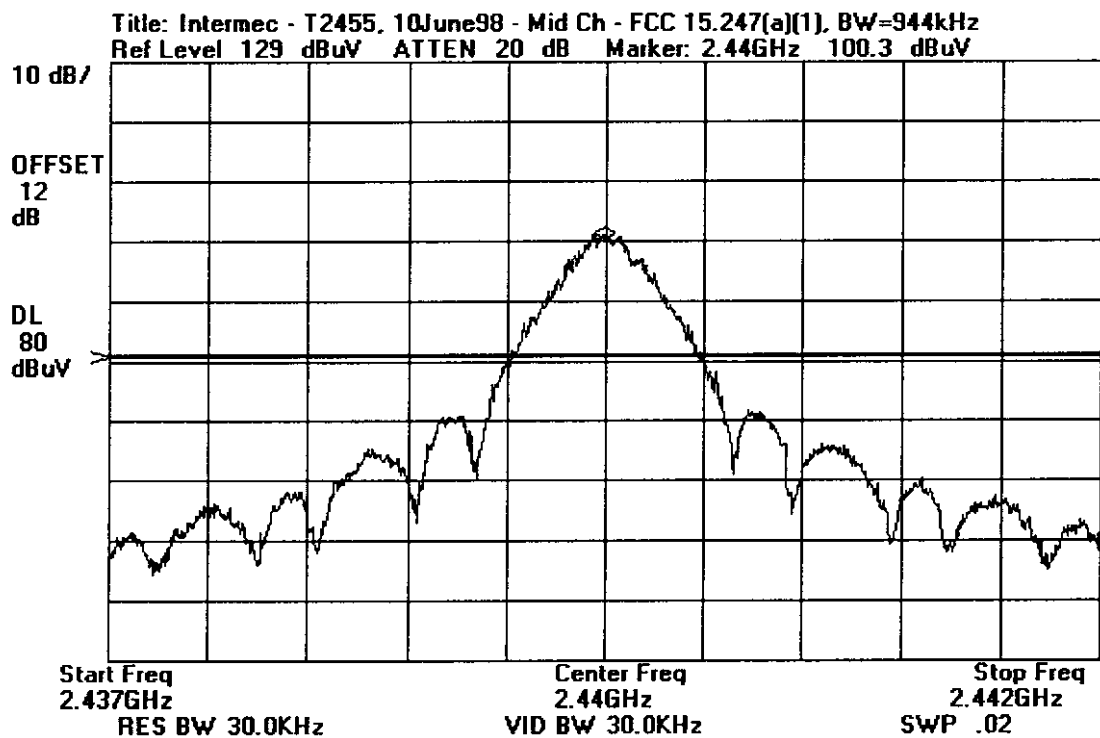


OCCUPIED BANDWIDTH PLOTS FCC PART 15.247 (a)(1)(ii)



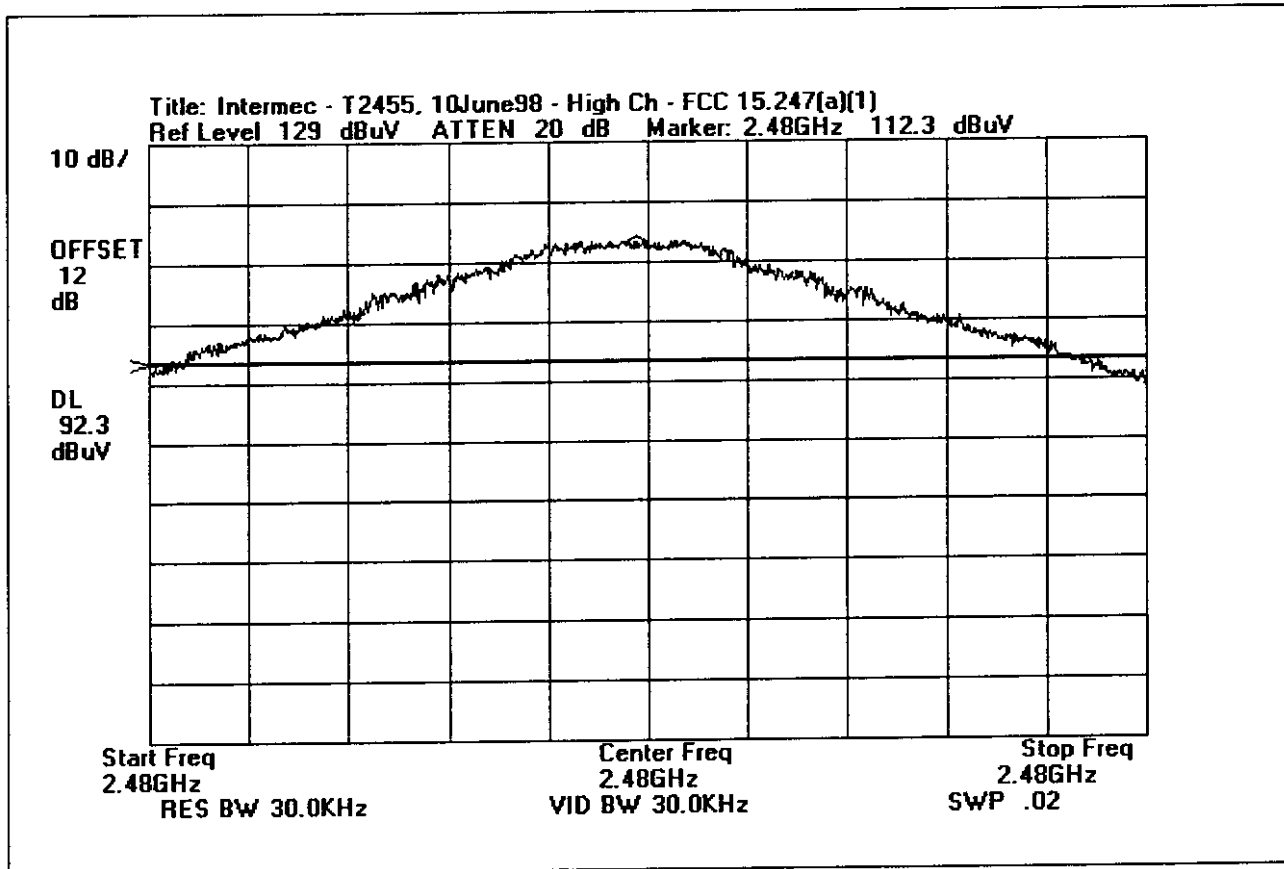
NOTES:

OCCUPIED BANDWIDTH PLOTS FCC PART 15.247 (a)(1)(ii)



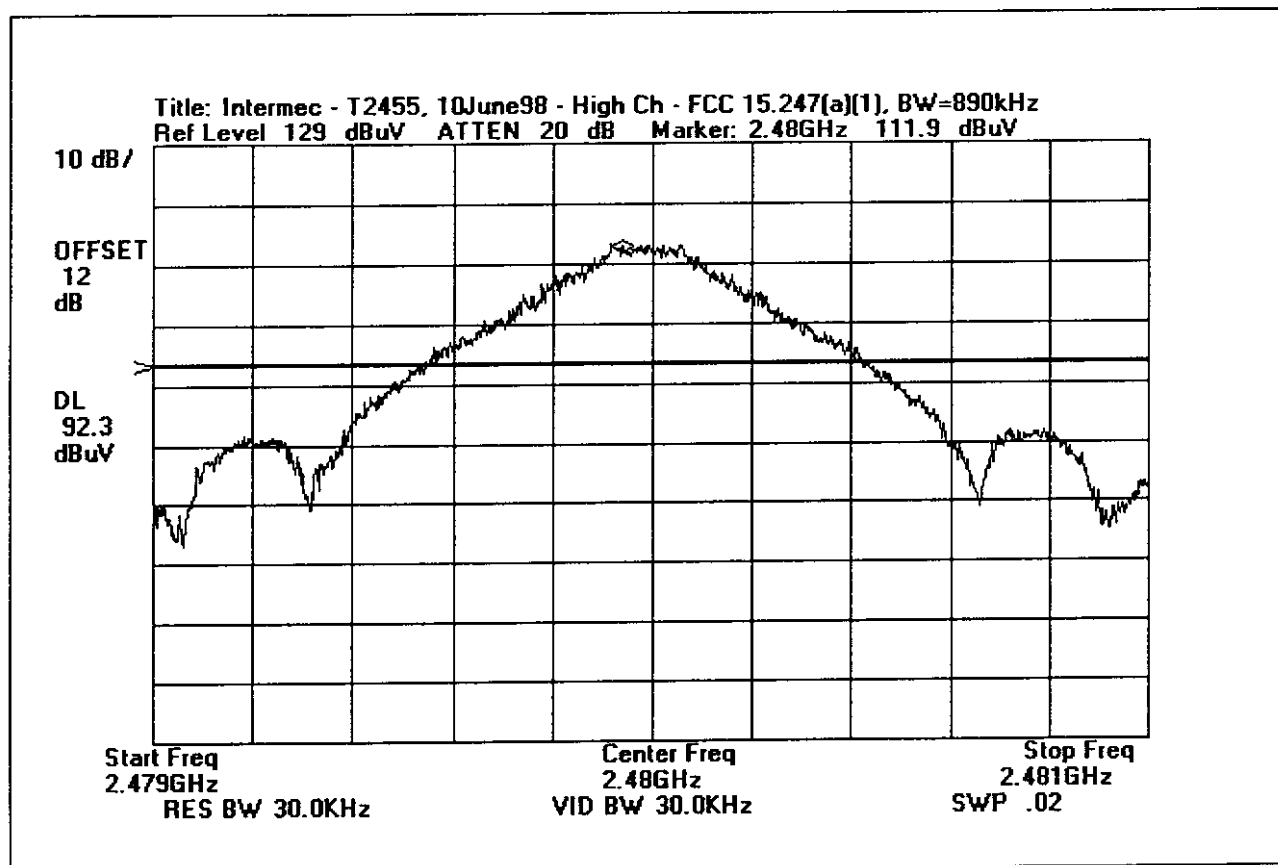
NOTES:

OCCUPIED BANDWIDTH PLOTS FCC PART 15.247 (a)(1)(ii)



NOTES:

OCCUPIED BANDWIDTH PLOTS FCC PART 15.247 (a)(1)(ii)



NOTES:

OCCUPIED BANDWIDTH PLOTS FCC PART 15.247 (a)(1)(ii)

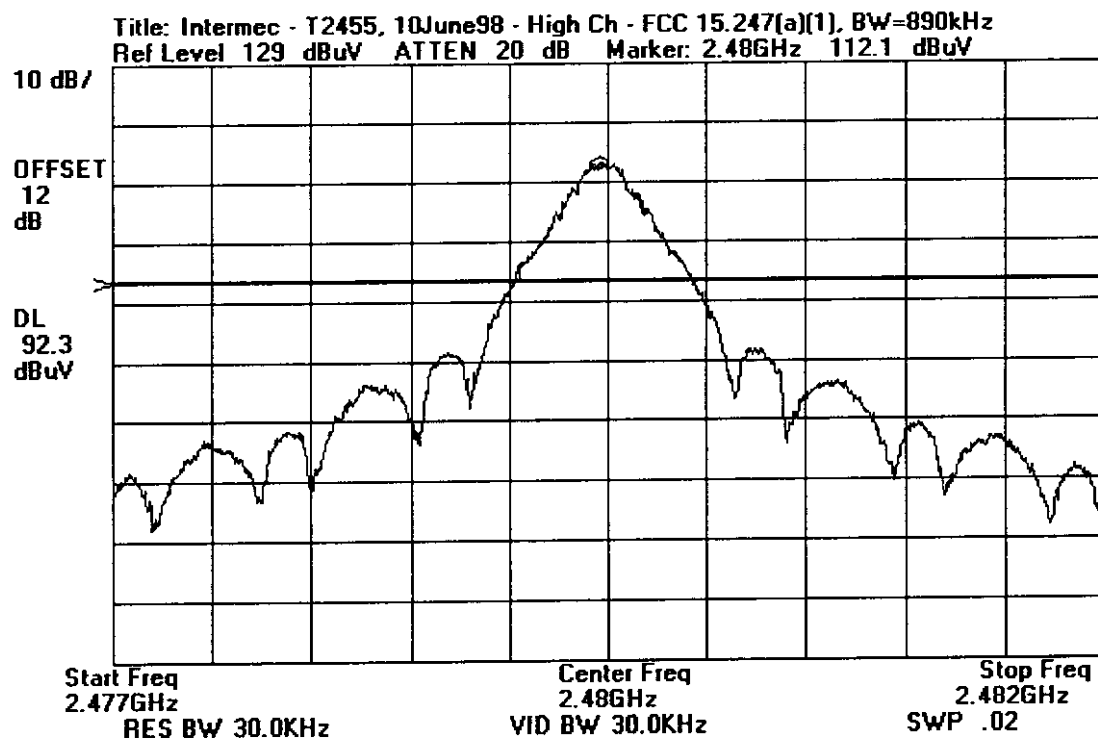


TABLE A

LIST OF TEST EQUIPMENT

1. Spectrum Analyzer, Hewlett Packard, Model No. 85662A, S/N 2403A08241.
2. Preamp, Hewlett Packard, Model No. 8447D, S/N -1937A02604.
3. Quasi-Peak Adapter, Hewlett Packard, Model No. 85650A, S/N 2811A01267.
4. Biconical Antenna, A & H Systems, Model No. SAS-200/542, S/N 156.
5. Log Periodic Antenna, A & H Systems, Model No. SAS-200/512, S/N 154
6. Magnetic Loop Antenna, EMCO, Model No. 6502, S/N 1074.
7. Horn Antenna, EMCO, Model No. 3115, S/N 4683.
8. LISN (FCC), Solar Electronics, S/N 855996, 992.
9. LISN, Solar Electronics, S/N 8144793, 474.
10. Test software, EMI Test 2.91.

EUT SETUP

The equipment under test (EUT) and the peripherals listed were setup in a manner that represented their normal use. Any special conditions required for the EUT to operate normally are identified in the comments that accompany Table 1 through 3 for radiated emissions and Table 4 & 5 for Power Output emissions. Additionally, a complete description of all the ports and I/O cables is included on the information sheets contained in Appendix A.

During radiated emissions testing, the EUT was mounted on a nonconductive, rotating approximately 80 cm above the conductive grid. The nonconductive table dimensions were 1 meter by 1.5 meters. This configuration is typical for radiated emissions testing of vehicle mounted devices.

I/O cables were connected to the EUT in the manner required for normal operation of the system. Excess cabling was bundled in the center in a serpentine fashion using 30-40 centimeter lengths.

TEST INSTRUMENTATION AND ANALYZER SETTINGS

The test instrumentation and equipment listed in Table A were used to collect the radiated emissions data for the Vehicle Mount Terminal, T2455. For radiated measurements below 300 MHz, the biconical antenna was used. For frequencies from 300 to 1000 MHz, the log periodic antenna was used. For frequencies above 1000 MHz, the horn antenna was used. All antennas were located at a distance of 3 meters from the edge of the EUT.

The HP spectrum analyzer was used for all measurements. Table B shows the analyzer bandwidth settings that were used in designated frequency bands. During radiated testing, the measurements were made with 0 dB of attenuation, a reference level of 97 dB μ V, and a vertical scale of 10 dB per division.

TABLE B : ANALYZER BANDWIDTH SETTINGS PER FREQUENCY RANGE

TEST	BEGINNING FREQUENCY	ENDING FREQUENCY	BANDWIDTH SETTING
RADIATED EMISSIONS	30 MHz	1000 MHz	120 kHz
RADIATED EMISSIONS	1000 MHz	24 GHZ	1 MHz

SPECTRUM ANALYZER DETECTOR FUNCTIONS

The notes that accompany the measurements contained in Tables 1 -5 indicate the type of detector function used to obtain the given readings. Unless otherwise noted, all readings were made in the "Peak" mode. Whenever a "Quasi-Peak" or "Average" reading is listed as one of the six highest readings, this is indicated as a "Q" or an "A" in Table 1, Table 2 or Table 3. The following paragraphs describe in more detail the detector functions and when they were used to obtain the emissions data for the Vehicle Mount Terminal, T2455.

Peak

In this mode, the Spectrum Analyzer or test engineer recorded all emissions at their peak value as the frequency band selected was scanned. By combining this function with another feature of the analyzer called "peak hold," the analyzer had the ability to measure transients or low duty cycle transient emission peak levels. In this mode the analyzer made a slow scan across the frequency band selected and measured the peak emission value found at each frequency across the band.

Quasi-Peak

When the true peak values exceeded or were within 2 dB of the specification limit, quasi-peak measurements were taken using the HP 85650A Quasi-Peak Adapter for the HP 8568B Spectrum Analyzer. The detailed procedure for making quasi peak measurements contained in the HP Quasi-Peak Adapter manual were followed.

Average

When the frequencies exceed 1 GHz, average measurements may be made using the spectrum analyzer. To make these measurements, the test engineer reduces the video bandwidth on the analyzer until the modulation of the signal is filtered out. At this point the analyzer is set into the linear mode and the scan time is reduced.

TEST METHODS

The radiated emissions data of the Vehicle Mount Terminal, T2455, was taken with the HP Spectrum Analyzer. Incorporating the applicable correction factors for distance, antenna, cable loss and amplifier gain, the data was reduced as shown in the "Sample Calculations". The corrected data was then compared to the FCC Part 15.247 emissions limits to determine compliance.

Preliminary and final measurements were taken in order to better ensure that all emissions from the EUT were found and maximized.

Radiated Emissions Testing

During the preliminary radiated scan, the EUT was powered up and operating in its defined FCC test mode with the I/O cables and line cords facing the antenna. The frequency range of 30 MHz - 88 MHz was then scanned with the biconical antenna located about 1.5 meter above the ground plane in the vertical configuration. During this scan, the turntable was rotated and all peaks which were at or near the limit were recorded. The frequency range of 100 - 300 MHz was scanned in the same manner, using the biconical antenna, and the peaks recorded. Lastly, a scan of the FM band from 88 - 110 MHz was made, using a reduced resolution bandwidth and a reduced frequency span. The biconical antenna was changed to the horizontal polarity and the above steps were repeated. After changing to the log periodic antenna in the horizontal configuration, the frequency range of 300 - 1000 MHz was scanned. The log periodic antenna was changed to the vertical polarity and the frequency range of 300 - 1000 MHz was again scanned. The horn antenna was used to scan for frequencies above 1000 MHz. Care was taken to ensure that no frequencies were missed within the FM and TV bands. An analysis was performed to determine if the signals that were at or near the limit were caused by an ambient transmission. If unable to determine by analysis, the equipment was powered down to make the final determination if the EUT was the source of the emission.

For the final radiated scan, the equipment was again positioned with its I/O and power cables facing the antenna. A thorough scan of all frequencies was manually made using a small frequency span, rotating the turntable as needed. Comparison with the previously recorded measurements was then made.

Using the peak readings from both scans as a guide, the test engineer then maximized the readings with respect to the table rotation, antenna height and configuration of the cables. Maximizing of the cables was achieved by monitoring the spectrum analyzer on a closed circuit television monitor while the EUT cables were being moved and rearranged on the EUT table for maximum emissions. Photographs showing the final worst case configuration of the EUT are contained in Appendix A.

Conducted
Radiated Emissions Testing at Antenna Terminal

For measuring the signal strength on the RF output port of the EUT, the spectrum analyzer and preamplifier were connected directly to the RF output port via a cable and a 50Ω to 75Ω adapter. For the frequency range of 30 - 1000 MHz, a 100 kHz resolution bandwidth was used. For the frequencies above 1000 MHz, a 1 MHz resolution bandwidth was used. The video bandwidth was set to a value greater than the resolution bandwidth. The sweep time of the analyzer was adjusted so that the spectrum analyzer readings were always in a calibrated range. All harmonics and spurious emissions were at least 20 dB below the peak level measured in the authorized band.

Power Output

Frequency of Transmitter: 2.4 GHz

The RF conducted test, was measured using a direct connection between the antenna port of the transmitter and the spectrum analyzer, through suitable attenuation. The resolution bandwidth was adjusted to greater than the 6 dB bandwidth of the emissions.

Frequency	Measurement in dBm	Measurement in mW
2.4 GHz	7.3	5.37

$$\text{mW} = 114.3 \text{dBuV/m} - 107 \text{dB}$$

$$\text{mW} = (7.3/10) \text{ inv log}$$

$$5.37 \text{ mW}$$

The limit used was determined by the method stated in FCC Part 15.247(b).

SAMPLE CALCULATIONS

The basic spectrum analyzer reading was converted using correction factors as shown in the six highest emissions readings in Tables 1 and 2. For radiated emissions in dB μ V/m, the spectrum analyzer reading in dB μ V was corrected by using the following formula:

$$\begin{aligned}
 &\text{Meter reading (dB}\mu\text{V)} \\
 &+ \text{Antenna Factor (dB)} \\
 &+ \text{Cable Loss (dB)} \\
 &- \text{Distance Correction (dB)} \\
 &- \text{Pre-amplifier Gain (dB)} \\
 &= \text{Corrected Reading (dB}\mu\text{V/m)}
 \end{aligned}$$

This reading was then compared to the applicable specification limit to determine compliance. For conducted emissions, no correction factors were needed when 50 μ H LISN's were used.

A typical data sheet will display the following in column format:

#	Freq MHz	Rdng dB μ V	Cable	Pream	Bicon Ant.	Log S Ant.	Horn	Dist	Corr dB μ V/m	Spec	Margin	Polar
---	-------------	--------------------	-------	-------	---------------	---------------	------	------	----------------------	------	--------	-------

means reading number

Freq MHz is the frequency in MHz of the obtained reading.

Rdng dB μ V is the reading obtained on the spectrum analyzer in dB μ V.

Pream is short for the preamplifier factor or gain in dB.

Horn is the horn antenna factor in dB.

Bicon Ant. is the biconical antenna factor in dB.

Log Ant. is the log periodic antenna factor in dB.

Cable is the cable loss in dB of the coaxial cable on the OATS.

Dist is the distance factor (in dB). It is used when testing at a different test distance than the one stated in the spec.

Corr dB μ V/m is the corrected reading which is now in dB μ V/m (field strength).

Spec is the specification limit (dB) stated in the agency's regulations.

Margin is the closeness to the specified limit in dB; + is over and - is under the limit.

Polar is the Polarity of the antenna with respect to earth.



LABORATORIES, INC. —

APPENDIX A

INFORMATION ABOUT THE EQUIPMENT UNDER TEST



LABORATORIES, INC.

INFORMATION ABOUT THE EQUIPMENT UNDER TEST

Test Software/Firmware: test software
CRT was displaying: Test SW mode
Power Supply Manufacturer: Intermec
Power Supply Part Number: NA
AC Line Filter Manufacturer: NA
AC Line Filter Part Number:

Line voltage used during testing: 12/24 V

I/O PORTS

Type	#
Barcode Input Device	2
Power	1
Antenna	1
Keyboard	1

CRYSTAL OSCILLATORS

Type	Freq In MHz
crystal	16
crystal	8

PRINTED CIRCUIT BOARDS

Function	Model & Rev	Clocks, MHz	Layers	Location

REQUIRED EUT CHANGES TO COMPLY:

CABLE INFORMATION

Cable #: 1	Cable(s) of this type: 1
Cable Type: power Construction: round Connected To End (1): EUT Connector At End (1): 4 pin Shield Grounded At (1): NA Part Number:	Shield Type: foil Length In Meters: variable Connected To End (2): Power Supply Connector At End (2): special Shield Grounded At (2): conn. Shield Number of Conductors: 4
Notes:	

Cable #: 2	Cable(s) of this type: 1
Cable Type: Keyboard Construction: round Connected To End (1): EUT Connector At End (1): special Shield Grounded At (1): conn. shield Part Number:	Shield Type: foil Length In Meters: 6m Connected To End (2): Keyboard Connector At End (2): special Shield Grounded At (2): conn. Shield Number of Conductors: 6
Notes:	

Cable #: 3	Cable(s) of this type: 1
Cable Type: Input Device Construction: round Connected To End (1): EUT Connector At End (1): special Shield Grounded At (1): conn. Shield Part Number:	Shield Type: foil Length In Meters: 1.5 Connected To End (2): Input Device Connector At End (2): special Shield Grounded At (2): gnd pin Number of Conductors: 6
Notes:	

PHOTOGRAPH SHOWING RADIATED EMISSIONS

Applicant: Intermec Technologies, Inc.
 Equipment: Vehicle Mount Terminal
 Model Number: T2455

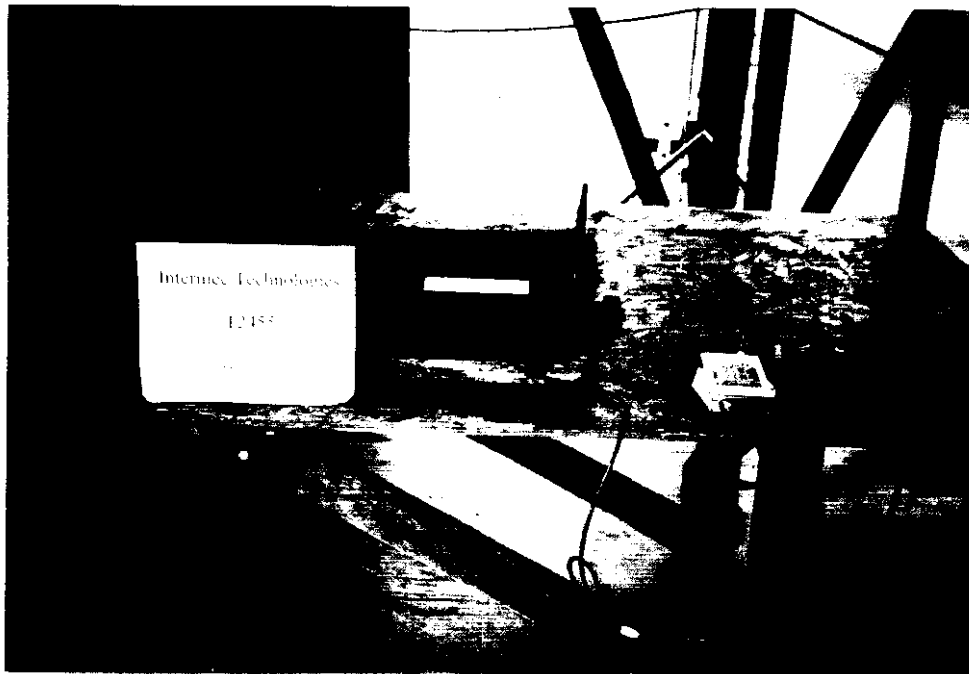


Radiated Emissions - Front View

NOTES:

PHOTOGRAPH SHOWING RADIATED EMISSIONS

Applicant: Intermec Technologies, Inc.
Equipment: Vehicle Mount Terminal
Model Number: T2455



Radiated Emissions - Back View

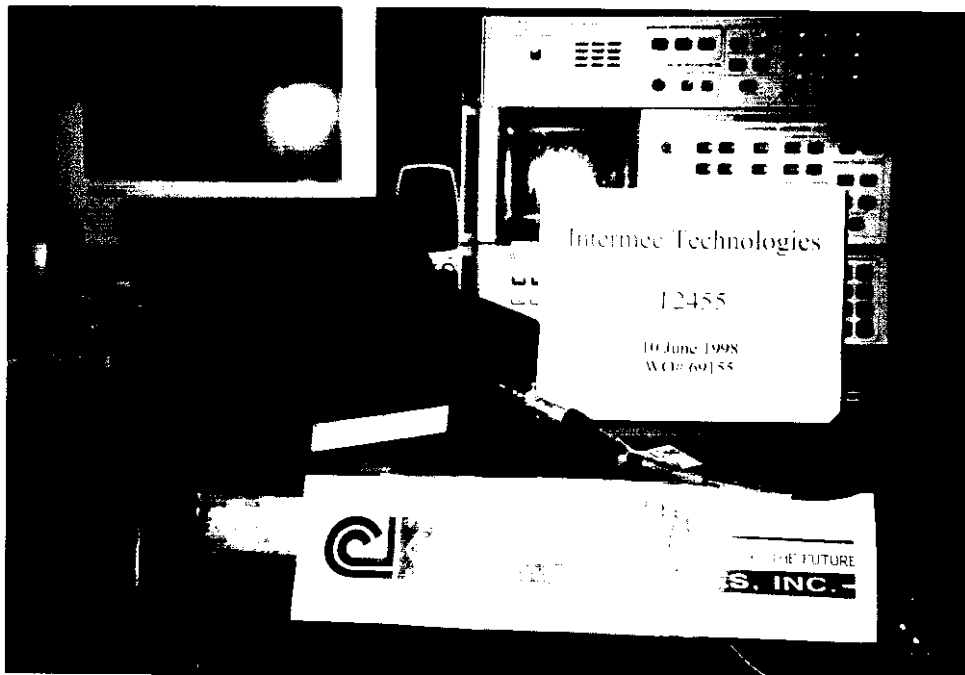
NOTES:



LABORATORIES, INC.

PHOTOGRAPH SHOWING ANTENNA CONDUCTED EMISSIONS

Applicant: Intermec Technologies, Inc.
Equipment: Vehicle Mount Terminal
Model Number: T2455



Antenna Conducted Emissions - Front View

NOTES:

Page 31 of 49
Report No: FC98-019

APPENDIX B
MEASUREMENT DATA SHEETS



LABORATORIES, INC.

Test Location: CKC Laboratories, Inc. • 5473A Clouds Rest Rd, Barn • Mariposa, CA 95338 • (800)-500-4EMC

Customer: Intermec Corporation
Specification: FCC 15.247 / 15.209 / 15.205
Test Type: Maximized Emissions
Equipment: Vehicle Terminal
Manufacturer: Intermec
Model: T2455
S/N: 040001

Date: Jun-11-98
Time: 10:17
Sequence#: 3
Tested By: Dustin Oaks

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
Vehicle Terminal*	Intermec	T2455	040001
Power Regulator	Power One	P/N066777-01	X2012

Support Devices:

Function	Manufacturer	Model #	S/N
None			

Test Conditions / Notes:

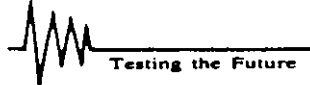
EUT is operating in normal configuration IAW manufactures specifications. EUT normally operates inside a forklift, therefore operates on 24VDC. EUT is operating on 24VDC via 2 auto batteries in series. EUT is a frequency hopper operating from 2.402GHz to 2.480GHz. EUT operating on Low channel.

Measurement Data:

Sorted by Margin

Test Distance: 3 Meters

#	Freq MHz	Rdng dBμV	Pream Horn dB	Bicon Horn dB	Log S Barn dB	Barn dB	Dist dB	Corr dBμV/m	Spec dBμV/m	Margin dB	Polar
1	9608.012	13.3	+0.0 -31.6	+0.0 +39.1	+0.0 +24.2	+0.0	+0.0	45.0	54.0	-9.0	Vert
2	4804.180	28.3	+0.0 -33.6	+0.0 +34.5	+0.0 +14.7	+0.0	+0.0	43.9	54.0	-10.1	Vert
3	300.056	36.4	-26.6 +0.0	+0.0 +0.0	+22.6 +0.0	+3.4	+0.0	35.8	46.0	-10.2	Horiz
4	7206.012	19.5	+0.0 -33.1	+0.0 +36.7	+0.0 +20.2	+0.0	+0.0	43.3	54.0	-10.7	Vert
5	9608.012	10.6	+0.0 -31.6	+0.0 +39.1	+0.0 +24.2	+0.0	+0.0	42.3	54.0	-11.7	Horiz
6	7206.012	18.4	+0.0 -33.1	+0.0 +36.7	+0.0 +20.2	+0.0	+0.0	42.2	54.0	-11.8	Horiz
7	4804.012	26.1	+0.0 -33.6	+0.0 +34.5	+0.0 +14.7	+0.0	+0.0	41.7	54.0	-12.3	Horiz
8	480.063	38.9	-27.8 +0.0	+0.0 +0.0	+17.5 +0.0	+4.5	+0.0	33.1	46.0	-12.9	Vert
9	499.446	38.5	-27.8 +0.0	+0.0 +0.0	+17.6 +0.0	+4.6	+0.0	32.9	46.0	-13.1	Vert
10	344.080	36.1	-26.9 +0.0	+0.0 +0.0	+19.8 +0.0	+3.7	+0.0	32.7	46.0	-13.3	Horiz



LABORATORIES, INC.

11	295.060	35.7	-26.6 +0.0	+20.0 +0.0	+0.0 +0.0	+3.4	+0.0	32.5	46.0	-13.5	Ho
12	800.101	31.9	-27.8 +0.0	+0.0 +0.0	+22.2 +0.0	+5.9	+0.0	32.2	46.0	-13.8	Ver
13	515.551	35.5	-27.8 +0.0	+0.0 +0.0	+18.0 +0.0	+4.6	+0.0	30.3	46.0	-15.7	Ver

Test Location: CKC Laboratories, Inc. • 5473A Clouds Rest Rd, Barn • Mariposa, CA 95338 • (800)-500-4EMC

Customer: Intermec Corporation
Specification: FCC 15.247 / 15.209 / 15.205
Test Type: Maximized Emissions
Equipment: Vehicle Terminal
Manufacturer: Intermec
Model: T2455
S/N: 040001

Date: Jun-11-98
Time: 10:01
Sequence#: 6
Tested By: Dustin Oaks

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
Vehicle Terminal*	Intermec	T2455	040001
Power Regulator	Power One	P/N066777-01	X2012

Support Devices:

Function	Manufacturer	Model #	S/N
None			

Test Conditions / Notes:

EUT is operating in normal configuration IAW manufactures specifications. EUT normally operates inside a forklift, therefore operates on 24VDC. EUT is operating on 24VDC via 2 auto batteries in series. EUT is a frequency hopper operating from 2.402GHz to 2.480GHz. EUT operating on mid channel.

Measurement Data:

Sorted by Margin

Test Distance: 3 Meters

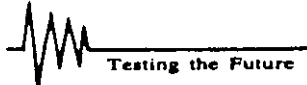
#	Freq MHz	Rdng dBμV	Pream Horn dB	Bicon Horn dB	Log S Barn dB	Barn dB	Dist dB	Corr dBμV/m	Spec dBμV/m	Margin dB	Polar
1	7320.000	24.1	+0.0 -33.1	+0.0 +37.0	+0.0 +20.5	+0.0	+0.0	48.5	54.0	-5.5	Vert
2	14640.000	8.8	+0.0 -34.1	+0.0 +41.8	+0.0 +29.9	+0.0	+0.0	46.4	54.0	-7.6	Vert
3	4880.000	30.0	+0.0 -33.6	+0.0 +34.7	+0.0 +15.0	+0.0	+0.0	46.1	54.0	-7.9	Vert
4	4880.000	28.5	+0.0 -33.6	+0.0 +34.7	+0.0 +15.0	+0.0	+0.0	44.6	54.0	-9.4	Horiz
5	300.063	36.5	-26.6 +0.0	+0.0 +0.0	+22.6 +0.0	+3.4	+0.0	35.9	46.0	-10.1	Horiz
6	12200.000	10.3	+0.0 -32.5	+0.0 +39.4	+0.0 +26.2	+0.0	+0.0	43.4	54.0	-10.6	Vert
7	7320.000	18.1	+0.0 -33.1	+0.0 +37.0	+0.0 +20.5	+0.0	+0.0	42.5	54.0	-11.5	Vert
8	7320.000	17.3	+0.0 -33.1	+0.0 +37.0	+0.0 +20.5	+0.0	+0.0	41.7	54.0	-12.3	Horiz
9	480.082	39.1	-27.8 +0.0	+0.0 +0.0	+17.5 +0.0	+4.5	+0.0	33.3	46.0	-12.7	Vert
10	9760.000	10.9	+0.0 -31.5	+0.0 +39.0	+0.0 +22.7	+0.0	+0.0	41.1	54.0	-12.9	Horiz



Testing the Future

LABORATORIES, INC.

11	344.078	36.0	-26.9 +0.0	+0.0 +0.0	+19.8 +0.0	+3.7 +0.0	+0.0	32.6	46.0	-13.4	Vert
12	800.105	32.0	-27.8 +0.0	+0.0 +0.0	+22.2 +0.0	+5.9 +0.0	+0.0	32.3	46.0	-13.7	Vert
13	9760.000	10.1	+0.0 -31.5	+0.0 +39.0	+0.0 +22.7	+0.0 +0.0	+0.0	40.3	54.0	-13.7	Vert
14	295.063	35.3	-26.6 +0.0	+20.0 +0.0	+0.0 +0.0	+3.4 +0.0	+0.0	32.1	46.0	-13.9	Horiz
15	499.431	37.4	-27.8 +0.0	+0.0 +0.0	+17.6 +0.0	+4.6 +0.0	+0.0	31.8	46.0	-14.2	Vert
16	515.546	35.3	-27.8 +0.0	+0.0 +0.0	+18.0 +0.0	+4.6 +0.0	+0.0	30.1	46.0	-15.9	Vert



LABORATORIES, INC.

Test Location: CKC Laboratories, Inc. • 5473A Clouds Rest Rd, Barn • Mariposa, CA 95338 • (800)-500-4EMC

Customer: Intermec Corporation
Specification: FCC 15.247 / 15.209 / 15.205
Test Type: Maximized Emissions
Equipment: Vehicle Terminal
Manufacturer: Intermec
Model: T2455
S/N: 040001

Date: Jun-11-98
Time: 10:18
Sequence#: 5
Tested By: Dustin Oaks

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
Vehicle Terminal*	Intermec	T2455	040001
Power Regulator	Power One	P/N066777-01	X2012

Support Devices:

Function	Manufacturer	Model #	S/N
None			

Test Conditions / Notes:

EUT is operating in normal configuration IAW manufactures specifications. EUT normally operates inside a forklift, therefore operates on 24VDC. EUT is operating on 24VDC via 2 auto batteries in series. EUT is a frequency hopper operating from 2.402GHz to 2.480GHz. EUT operating on High channel.

Measurement Data:

Sorted by Margin

Test Distance: 3 Meters

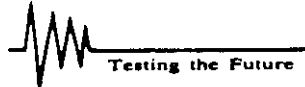
#	Freq MHz	Rdng dBμV	Pream Horn dB	Bicon Horn dB	Log S Barn dB	Barn dB	Dist dB	Corr dBμV/m	Spec dBμV/m	Margin dB	Polar
1	7320.000	22.9	+0.0 -33.1	+0.0 +37.0	+0.0 +20.5	+0.0	+0.0	47.3	54.0	-6.7	Horiz
2	4880.000	30.1	+0.0 -33.6	+0.0 +34.7	+0.0 +15.0	+0.0	+0.0	46.2	54.0	-7.8	Vert
3	4880.000	29.1	+0.0 -33.6	+0.0 +34.7	+0.0 +15.0	+0.0	+0.0	45.2	54.0	-8.8	Horiz
4	300.062	37.2	-26.6 +0.0	+0.0 +0.0	+22.6 +0.0	+3.4	+0.0	36.6	46.0	-9.4	Horiz
5	9760.000	14.4	+0.0 -31.5	+0.0 +39.0	+0.0 +22.7	+0.0	+0.0	44.6	54.0	-9.4	Horiz
6	7320.000	20.1	+0.0 -33.1	+0.0 +37.0	+0.0 +20.5	+0.0	+0.0	44.5	54.0	-9.5	Vert
7	12200.000	10.3	+0.0 -32.5	+0.0 +39.4	+0.0 +26.2	+0.0	+0.0	43.4	54.0	-10.6	Horiz
8	12200.000	9.7	+0.0 -32.5	+0.0 +39.4	+0.0 +26.2	+0.0	+0.0	42.8	54.0	-11.2	Vert
9	7320.000	16.8	+0.0 -33.1	+0.0 +37.0	+0.0 +20.5	+0.0	+0.0	41.2	54.0	-12.8	Horiz
10	9760.000	10.3	+0.0 -31.5	+0.0 +39.0	+0.0 +22.7	+0.0	+0.0	40.5	54.0	-13.5	Vert



Testing the Future

LABORATORIES, INC. —

11	800.084	32.1	-27.8 +0.0	+0.0 +0.0	+22.2 +0.0	+5.9 +0.0	32.4	46.0	-13.6	Vert
12	480.073	38.1	-27.8 +0.0	+0.0 +0.0	+17.5 +0.0	+4.5 +0.0	32.3	46.0	-13.7	Vert
13	344.089	35.1	-26.9 +0.0	+0.0 +0.0	+19.8 +0.0	+3.7 +0.0	31.7	46.0	-14.3	Horiz
14	499.431	37.0	-27.8 +0.0	+0.0 +0.0	+17.6 +0.0	+4.6 +0.0	31.4	46.0	-14.6	Vert
15	295.060	34.5	-26.6 +0.0	+20.0 +0.0	+0.0 +0.0	+3.4 +0.0	31.3	46.0	-14.7	Horiz
16	515.553	34.9	-27.8 +0.0	+0.0 +0.0	+18.0 +0.0	+4.6 +0.0	29.7	46.0	-16.3	Vert



LABORATORIES, INC. —

Test Location: CKC Laboratories, Inc. • 5473A Clouds Rest Rd, Barn • Mariposa, CA 95338 • (800)-500-4EMC

Customer: Intermec Corporation
 Specification: FCC B RADIATED (FCC Part 15.109)
 Test Type: Maximized Emissions (Receiver)
 Equipment: Vehicle Terminal
 Manufacturer: Intermec
 Model: T2455
 S/N: 040001

Date: Jun-11-98
 Time: 10:25
 Sequence#: 7
 Tested By: Dustin Oaks

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
Vehicle Terminal*	Intermec	T2455	040001
Power Regulator	Power One	P/N066777-01	X2012

Support Devices:

Function	Manufacturer	Model #	S/N
None			

Test Conditions / Notes:

EUT is operating in normal configuration IAW manufactures specifications. EUT normally operates inside a forklift, therefore operates on 24VDC. EUT is operating on 24VDC via 2 auto batteries in series. EUT is a frequency hopper operating from 2.402GHz to 2.480GHz. EUT operating in receive mode on Low channel.

Measurement Data:

Sorted by Margin

Test Distance: 3 Meters

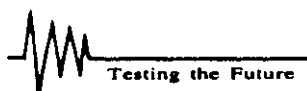
#	Freq MHz	Rdng dBμV	Pream Horn dB	Bicon Horn dB	Log S Barn dB	Barn dB	Dist dB	Corr dBμV/m	Spec dBμV/m	Margin dB	Polar
1	9608.012	13.3	+0.0 -31.6	+0.0 +39.1	+0.0 +24.2	+0.0	+0.0	45.0	54.0	-9.0	Vert
2	4804.180	28.3	+0.0 -33.6	+0.0 +34.5	+0.0 +14.7	+0.0	+0.0	43.9	54.0	-10.1	Vert
3	300.056	36.4	-26.6 +0.0	+0.0 +0.0	+22.6 +0.0	+3.4	+0.0	35.8	46.0	-10.2	Horiz
4	7206.012	19.5	+0.0 -33.1	+0.0 +36.7	+0.0 +20.2	+0.0	+0.0	43.3	54.0	-10.7	Vert
5	9608.012	10.6	+0.0 -31.6	+0.0 +39.1	+0.0 +24.2	+0.0	+0.0	42.3	54.0	-11.7	Horiz
6	7206.012	18.4	+0.0 -33.1	+0.0 +36.7	+0.0 +20.2	+0.0	+0.0	42.2	54.0	-11.8	Horiz
7	4804.012	26.1	+0.0 -33.6	+0.0 +34.5	+0.0 +14.7	+0.0	+0.0	41.7	54.0	-12.3	Horiz
8	480.063	38.9	-27.8 +0.0	+0.0 +0.0	+17.5 +0.0	+4.5	+0.0	33.1	46.0	-12.9	Vert
9	499.446	38.5	-27.8 +0.0	+0.0 +0.0	+17.6 +0.0	+4.6	+0.0	32.9	46.0	-13.1	Vert
10	344.080	36.1	-26.9 +0.0	+0.0 +0.0	+19.8 +0.0	+3.7	+0.0	32.7	46.0	-13.3	Horiz



Testing the Future

LABORATORIES, INC. —

11	295.060	35.7	-26.6 +0.0	+20.0 +0.0	+0.0 +0.0	+3.4	+0.0	32.5	46.0	-13.5	Horiz
12	800.101	31.9	-27.8 +0.0	+0.0 +0.0	+22.2 +0.0	+5.9	+0.0	32.2	46.0	-13.8	Vert
13	515.551	35.5	-27.8 +0.0	+0.0 +0.0	+18.0 +0.0	+4.6	+0.0	30.3	46.0	-15.7	Vert



LABORATORIES, INC.

Test Location: CKC Laboratories, Inc. • 5473A Clouds Rest Rd, Barn • Mariposa, CA 95338 • (800)-500-4EMC

Customer: Intermec Corporation
 Specification: FCC B RADIATED (FCC Part 15.109)
 Test Type: Maximized Emissions (Receiver)
 Equipment: Vehicle Terminal
 Manufacturer: Intermec
 Model: T2455
 S/N: 040001

Date: Jun-11-98
 Time: 10:26
 Sequence#: 8
 Tested By: Dustin Oaks

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
Vehicle Terminal*	Intermec	T2455	040001
Power Regulator	Power One	P/N066777-01	X2012

Support Devices:

Function	Manufacturer	Model #	S/N
None			

Test Conditions / Notes:

EUT is operating in normal configuration IAW manufactures specifications. EUT normally operates inside a forklift, therefore operates on 24VDC. EUT is operating on 24VDC via 2 auto batteries in series. EUT is a frequency hopper operating from 2.402GHz to 2.480GHz. EUT operating in receive mode on mid channel.

Measurement Data:

Sorted by Margin

Test Distance: 3 Meters

#	Freq MHz	Rdng dBμV	Pream Horn dB	Bicon Horn dB	Log S Barn dB	Barn dB	Dist dB	Corr dBμV/m	Spec dBμV/m	Margin dB	Polar
1	7320.000	24.1	+0.0 -33.1	+0.0 +37.0	+0.0 +20.5	+0.0	+0.0	48.5	54.0	-5.5	Vert
2	14640.000	8.8	+0.0 -34.1	+0.0 +41.8	+0.0 +29.9	+0.0	+0.0	46.4	54.0	-7.6	Vert
3	4880.000	30.0	+0.0 -33.6	+0.0 +34.7	+0.0 +15.0	+0.0	+0.0	46.1	54.0	-7.9	Vert
4	4880.000	28.5	+0.0 -33.6	+0.0 +34.7	+0.0 +15.0	+0.0	+0.0	44.6	54.0	-9.4	Horiz
5	300.063	36.5	-26.6 +0.0	+0.0 +0.0	+22.6 +0.0	+3.4	+0.0	35.9	46.0	-10.1	Horiz
6	12200.000	10.3	+0.0 -32.5	+0.0 +39.4	+0.0 +26.2	+0.0	+0.0	43.4	54.0	-10.6	Vert
7	7320.000	18.1	+0.0 -33.1	+0.0 +37.0	+0.0 +20.5	+0.0	+0.0	42.5	54.0	-11.5	Vert
8	7320.000	17.3	+0.0 -33.1	+0.0 +37.0	+0.0 +20.5	+0.0	+0.0	41.7	54.0	-12.3	Horiz
9	480.082	39.1	-27.8 +0.0	+0.0 +0.0	+17.5 +0.0	+4.5	+0.0	33.3	46.0	-12.7	Vert
10	9760.000	10.9	+0.0 -31.5	+0.0 +39.0	+0.0 +22.7	+0.0	+0.0	41.1	54.0	-12.9	Horiz



Testing the Future

LABORATORIES, INC.

11	344.078	36.0	-26.9 +0.0	+0.0 +0.0	+19.8 +0.0	+3.7 +0.0	+0.0	32.6	46.0	-13.4	Horiz
12	800.105	32.0	-27.8 +0.0	+0.0 +0.0	+22.2 +0.0	+5.9 +0.0	+0.0	32.3	46.0	-13.7	Horiz
13	9760.000	10.1	+0.0 -31.5	+0.0 +39.0	+0.0 +22.7	+0.0 +0.0	+0.0	40.3	54.0	-13.7	Vert
14	295.063	35.3	-26.6 +0.0	+20.0 +0.0	+0.0 +0.0	+3.4 +0.0	+0.0	32.1	46.0	-13.9	Horiz
15	499.431	37.4	-27.8 +0.0	+0.0 +0.0	+17.6 +0.0	+4.6 +0.0	+0.0	31.8	46.0	-14.2	Vert
16	515.546	35.3	-27.8 +0.0	+0.0 +0.0	+18.0 +0.0	+4.6 +0.0	+0.0	30.1	46.0	-15.9	Vert



LABORATORIES, INC.

Test Location: CKC Laboratories, Inc. • 5473A Clouds Rest Rd, Barn • Mariposa, CA 95338 • (800)-500-4EMC

Customer: Intermec Corporation
 Specification: FCC B RADIATED (FCC Part 15.109)
 Test Type: Maximized Emissions (Receiver)
 Equipment: Vehicle Terminal
 Manufacturer: Intermec
 Model: T2455
 S/N: 040001

Date: Jun-11-98
 Time: 10:27
 Sequence#: 9
 Tested By: Dustin Oaks

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
Vehicle Terminal*	Intermec	T2455	040001
Power Regulator	Power One	P/N066777-01	X2012

Support Devices:

Function	Manufacturer	Model #	S/N
None			

Test Conditions / Notes:

EUT is operating in normal configuration IAW manufactures specifications. EUT normally operates inside a forklift, therefore operates on 24VDC. EUT is operating on 24VDC via 2 auto batteries in series. EUT is a frequency hopper operating from 2.402GHz to 2.480GHz. EUT operating in receive mode on High channel.

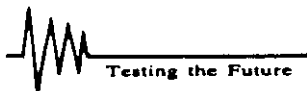
Measurement Data:

Sorted by Margin

Test Distance: 3 Meters

#	Freq MHz	Rdng dBμV	Pream Horn dB	Bicon Horn dB	Log S Barn dB	Barn dB	Dist dB	Corr dBμV/m	Spec dBμV/m	Margin dB	Polar
1	7320.000	22.9	+0.0 -33.1	+0.0 +37.0	+0.0 +20.5	+0.0	+0.0	47.3	54.0	-6.7	Horiz
2	4880.000	30.1	+0.0 -33.6	+0.0 +34.7	+0.0 +15.0	+0.0	+0.0	46.2	54.0	-7.8	Vert
3	4880.000	29.1	+0.0 -33.6	+0.0 +34.7	+0.0 +15.0	+0.0	+0.0	45.2	54.0	-8.8	Horiz
4	300.062	37.2	-26.6 +0.0	+0.0 +0.0	+22.6 +0.0	76	+0.0	36.6	46.0	-9.4	Horiz
5	9760.000	14.4	+0.0 -31.5	+0.0 +39.0	+0.0 +22.7	+0.0	+0.0	44.6	54.0	-9.4	Horiz
6	7320.000	20.1	+0.0 -33.1	+0.0 +37.0	+0.0 +20.5	+0.0	+0.0	44.5	54.0	-9.5	Vert
7	12200.000	10.3	+0.0 -32.5	+0.0 +39.4	+0.0 +26.2	+0.0	+0.0	43.4	54.0	-10.6	Horiz
8	12200.000	9.7	+0.0 -32.5	+0.0 +39.4	+0.0 +26.2	+0.0	+0.0	42.8	54.0	-11.2	Vert
9	7320.000	16.8	+0.0 -33.1	+0.0 +37.0	+0.0 +20.5	+0.0	+0.0	41.2	54.0	-12.8	Horiz
10	9760.000	10.3	+0.0 -31.5	+0.0 +39.0	+0.0 +22.7	+0.0	+0.0	40.5	54.0	-13.5	Vert

11	800.084	32.1	-27.8 +0.0	+0.0 +0.0	+22.2 +0.0	+5.9 +0.0	+0.0	32.4	46.0	-13.6	Vert
12	480.073	38.1	-27.8 +0.0	+0.0 +0.0	+17.5 +0.0	+4.5 +0.0	+0.0	32.3	46.0	-13.7	Vert
13	344.089	35.1	-26.9 +0.0	+0.0 +0.0	+19.8 +0.0	+3.7 +0.0	+0.0	31.7	46.0	-14.3	Horiz
14	499.431	37.0	-27.8 +0.0	+0.0 +0.0	+17.6 +0.0	+4.6 +0.0	+0.0	31.4	46.0	-14.6	Vert
15	295.060	34.5	-26.6 +0.0	+20.0 +0.0	+0.0 +0.0	+3.4 +0.0	+0.0	31.3	46.0	-14.7	Horiz
16	515.553	34.9	-27.8 +0.0	+0.0 +0.0	+18.0 +0.0	+4.6 +0.0	+0.0	29.7	46.0	-16.3	Vert



LABORATORIES, INC.

Test Location: CKC Laboratories, Inc. • 5473A Clouds Rest Rd, Barn • Mariposa, CA 95338 • (800)-550-4EMC

Customer: Intermec Corporation
Specification: FCC 15.247 Antenna Conducted
Test Type: Maximized Emissions
Equipment: Vehicle Terminal
Manufacturer: Intermec
Model: T2455
S/N: 040001

Date: Jun-11-98
Time: 11:36
Sequence#: 10
Tested By: Dustin Oaks

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
Vehicle Terminal*	Intermec	T2455	040001
Power Regulator	Power One	P/N066777-01	X2012

Support Devices:

Function	Manufacturer	Model #	S/N
None			

Test Conditions / Notes:

EUT is operating in normal configuration IAW manufactures specifications. EUT normally operates inside a forklift, therefore operates on 24VDC. EUT is operating on 24VDC via 2 auto batteries in series. EUT is a frequency hopper operating from 2.402GHz to 2.480GHz. EUT operating on Low channel.

Measurement Data:

Sorted by Margin

Test Distance: None

#	Freq MHz	Rdng dBμV	Chamb				Dist dB	Corr dBμV/m	Spec dBμV/m	Margin dB	Polar
			dB	dB	dB	dB					
1	7206.400	35.7	+2.1				+0.0	37.8	54.0	-16.2	None
2	12009.000	28.6	+3.4				+0.0	32.0	54.0	-22.0	None
3	16814.000	27.4	+3.6				+0.0	31.0	54.0	-23.0	None
4	14412.000	26.3	+2.1				+0.0	28.4	54.0	-25.6	None
5	4804.200	26.2	+1.8				+0.0	28.0	54.0	-26.0	None
6	9607.900	25.1	+1.4				+0.0	26.5	54.0	-27.5	None



LABORATORIES, INC.

Test Location: CKC Laboratories, Inc. • 5473A Clouds Rest Rd, Barn • Mariposa, CA 95338 • (800)-500-4EMC

Customer: **Intermec Corporation**
 Specification: **FCC 15.247 Antenna Conducted**
 Test Type: **Maximized Emissions**
 Equipment: **Vehicle Terminal**
 Manufacturer: **Intermec**
 Model: **T2455**
 S/N: **040001**

Date: Jun-11-98
 Time: 11:38
 Sequence#: 11
 Tested By: Dustin Oaks

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
Vehicle Terminal*	Intermec	T2455	040001
Power Regulator	Power One	P/N066777-01	X2012

Support Devices:

Function	Manufacturer	Model #	S/N
None			

Test Conditions / Notes:

EUT is operating in normal configuration IAW manufactures specifications. EUT normally operates inside a forklift, therefore operates on 24VDC. EUT is operating on 24VDC via 2 auto batteries in series. EUT is a frequency hopper operating from 2.402GHz to 2.480GHz. EUT operating on Mid channel.

Measurement Data:

Sorted by Margin

Test Distance: None

#	Freq MHz	Rdng dBμV	Chamb				Dist dB	Corr dBμV/m	Spec dBμV/m	Margin dB	Polar
			dB	dB	dB	dB					
1	17080.100	30.3	+3.3				+0.0	33.6	54.0	-20.4	None
2	7320.200	32.0	+1.6				+0.0	33.6	54.0	-20.4	None
3	4880.200	31.5	+1.8				+0.0	33.3	54.0	-20.7	None
4	14639.200	27.3	+2.9				+0.0	30.2	54.0	-23.8	None
5	12199.200	26.8	+3.4				+0.0	30.2	54.0	-23.8	None
6	9760.400	26.9	+2.0				+0.0	28.9	54.0	-25.1	None

Test Location: CKC Laboratories, Inc. • 5473A Clouds Rest Rd, Barn • Mariposa, CA 95338 • (800)-500-4EMC

Customer: Intermec Corporation
Specification: FCC 15.247 Antenna Conducted
Test Type: Maximized Emissions
Equipment: Vehicle Terminal
Manufacturer: Intermec
Model: T2455
S/N: 040001

Date: Jun-11-98
Time: 11:40
Sequence#: 12
Tested By: Dustin Oaks

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
Vehicle Terminal*	Intermec	T2455	040001
Power Regulator	Power One	P/N066777-01	X2012

Support Devices:

Function	Manufacturer	Model #	S/N
None			

Test Conditions / Notes:

EUT is operating in normal configuration IAW manufactures specifications. EUT normally operates inside a forklift, therefore operates on 24VDC. EUT is operating on 24VDC via 2 auto batteries in series. EUT is a frequency hopper operating from 2.402GHz to 2.480GHz. EUT operating on Mid channel.

Measurement Data:

Sorted by Margin

Test Distance: None

#	Freq MHz	Rdng dBμV	Chamb				Dist dB	Corr dBμV/m	Spec dBμV/m	Margin dB	Polar
			dB	dB	dB	dB					
1	9920.200	41.2	+2.7				+0.0	43.9	54.0	-10.1	None
2	14880.200	28.0	+4.3				+0.0	32.3	54.0	-21.7	None
3	17360.199	27.7	+3.5				+0.0	31.2	54.0	-22.8	None
4	7439.600	28.8	+1.1				+0.0	29.9	54.0	-24.1	None
5	12400.200	24.7	+3.5				+0.0	28.2	54.0	-25.8	None
6	4959.800	22.9	+1.8				+0.0	24.7	54.0	-29.3	None



LABORATORIES, INC.

Test Location: CKC Laboratories, Inc. • 5473A Clouds Rest Rd, Barn • Mariposa, CA 95338 • (800)-500-4EMC

Customer: Intermec Corporation
Specification: 15.247(b)(1)
Test Type: Power Output
Equipment: Vehicle Terminal
Manufacturer: Intermec
Model: T2455
S/N: 040001

Date: Jun-10-98
Time: 16:50
Sequence#: 4
Tested By: Dustin Oaks

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
Vehicle Terminal*	Intermec	T2455	040001
Power Regulator	Power One	P/N066777-01	X2012

Support Devices:

Function	Manufacturer	Model #	S/N
None			

Test Conditions / Notes:

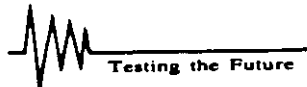
EUT is operating in normal configuration IAW manufactures specifications. EUT normally operates inside a forklift, therefore operates on 24VDC. EUT is operating on 24VDC via 2 auto batteries in series. EUT is a frequency hopper operating from 2.402GHz to 2.480GHz.

Measurement Data:

Sorted by Margin

Test Distance: 3 Meters

#	Freq MHz	Rdng dBμV	Horn dB	Horn dB	Barn dB		Dist dB	Corr dBμV/m	Spec dBμV/m	Margin dB	Polar
1	2479.872	114.2					+0.0	121.0	137.0	-16.0	Vert
			-35.4	+31.1	+11.1						
2	2440.086	113.5					+0.0	119.6	137.0	-17.4	Vert
			-35.5	+30.8	+10.8						
3	2401.860	110.9					+0.0	116.5	137.0	-20.5	Vert
			-35.5	+30.6	+10.5						
4	2479.882	107.8					+0.0	114.6	137.0	-22.4	Horiz
			-35.4	+31.1	+11.1						
5	2439.832	106.7					+0.0	112.8	137.0	-24.2	Horiz
			-35.5	+30.8	+10.8						
6	2402.104	101.2					+0.0	106.8	137.0	-30.2	Horiz
			-35.5	+30.6	+10.5						



LABORATORIES, INC.

Test Location: CKC Laboratories, Inc. • 5473A Clouds Rest Rd, Barn • Mariposa, CA 95338 • (800)-560-4EMC

Customer: Intermec Corporation
Specification: 15.247(b)(1)
Test Type: Power Output
Equipment: Vehicle Terminal
Manufacturer: Intermec
Model: T2455
S/N: 040001

Date: Jun-10-98
Time: 14:12
Sequence#: 2
Tested By: Dustin Oaks

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
Vehicle Terminal*	Intermec	T2455	040001
Power Regulator	Power One	P/N066777-01	X2012

Support Devices:

Function	Manufacturer	Model #	S/N
None			

Test Conditions / Notes:

EUT is operating in normal configuration IAW manufactures specifications. EUT normally operates inside a forklift, therefore operates on 24VDC. EUT is operating on 24VDC via 2 auto batteries in series. EUT is a frequency hopper operating from 2.402GHz to 2.480GHz.

Measurement Data:

Sorted by Margin

Test Distance: None

#	Freq MHz	Rdng dBμV	dB	dB	dB	dB	Dist dB	Corr dBμV/m	Spec dBμV/m	Margin dB	Polar
1	2401.920	114.3					+0.0	114.3	137.0	-22.7	None
2	2440.045	113.4					+0.0	113.4	137.0	-23.6	None
3	2480.030	112.5					+0.0	112.5	137.0	-24.5	None

EXHIBIT D

CKC TEST REPORT

Radiated Emissions Testing at Antenna Terminal

For measuring the signal strength on the RF output port of the EUT, the spectrum analyzer was connected directly to the RF output port via a cable. The sweep time of the analyzer was adjusted so that the spectrum analyzer readings were always in a calibrated range. All readings within 20 dB of the limit were recorded.

Power Output

Frequency of Transmitter: 2.4 GHz

The RF conducted test, was measured using a direct connection between the antenna port of the transmitter and the spectrum analyzer, through suitable attenuation. The resolution bandwidth was adjusted to greater than the 6 dB bandwidth of the emissions.

Frequency	Measurement in dBm	Measurement in mW
2.4 GHz	18	63

$$\text{mW} = 125\text{dBuV/m} - 107\text{dB}$$

$$\text{mW} = (18/10) \text{ inv log}$$

$$63 \text{ mW}$$

The limit used was determined by the method stated in FCC Part 15.247(b).

Test Location: CKC Laboratories, Inc. • 5473A Clouds Rest Rd, Barn • Mariposa, CA 95338 • (800)-500-4EMC

Customer: Intermec Corporation
Specification: 15.247(b)(1)
Test Type: Power Output
Equipment: Vehical Terminal
Manufacturer: Intermec
Model: T2455
S/N: 040001

Date: Sep-03-98
Time: 16:44
Sequence#: 3

Tested By: Skip Doyle

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
Vehical Terminal*	Intermec	T2455	040001
Power Regulator	Power One	P/N066777-01	X2012

Support Devices:

Function	Manufacturer	Model #	S/N
None			

Test Conditions / Notes:

EUT is operating in normal configuration IAW manufacturers specifications. EUT normally operates inside a forklift, therefore operates on 24VDC. EUT is operating on 24VDC via DC power supply. EUT is a frequency hopper operating from 2.402GHz to 2.480GHz. Two 6dB pads were used inline and calibrated to 12.1dB and this offset was input into the spectrum analyzer.

Measurement Data:

Sorted by Margin

Test Distance: None

#	Freq MHz	Rdng dBμV	Barn				Dist dB	Corr dBμV/m	Spec dBμV/m	Margin dB	Polar
			dB	dB	dB	dB					
1	2402.151	124.4	+0.6				+0.0	125.0	137.0	-12.0	None
2	2479.879	123.7	+0.7				+0.0	124.4	137.0	-12.6	None
3	2440.850	122.5	+0.6				+0.0	123.1	137.0	-13.9	None

Table 5: Power Output Emission Levels at Antenna Terminal

FREQUENCY MHz	METER READING dBμV	CORRECTION FACTORS				CORRECTED READING dBμV	SPEC LIMIT dBμV	MARGIN dB	NOTES
		Lisn dB							
2402.151	124.4	0.0		0.6		125.0	137.0	-12.0	N
2440.850	122.5	0.0		0.6		123.1	137.0	-13.9	N
2479.879	123.7	0.0		0.7		124.4	137.0	-12.6	N

Test Method: ANSI C63.4 1992
Spec Limit : FCC Part 15.247 (b)
Test Distance: No Distance

NOTES: Q = Quasi Peak Reading
A = Average Reading
B = Black Lead
W = White Lead

COMMENTS: EUT is operating in normal configuration IAW manufactures specifications. EUT normally operates inside a forklift, therefore operates on 24VDC. EUT is operating on 24VDC via 2 auto batteries in series. EUT is a frequency hopper operating from 2.402GHz to 2.480GHz.

T2455 Radio Information

T2455 Antenna Drawing

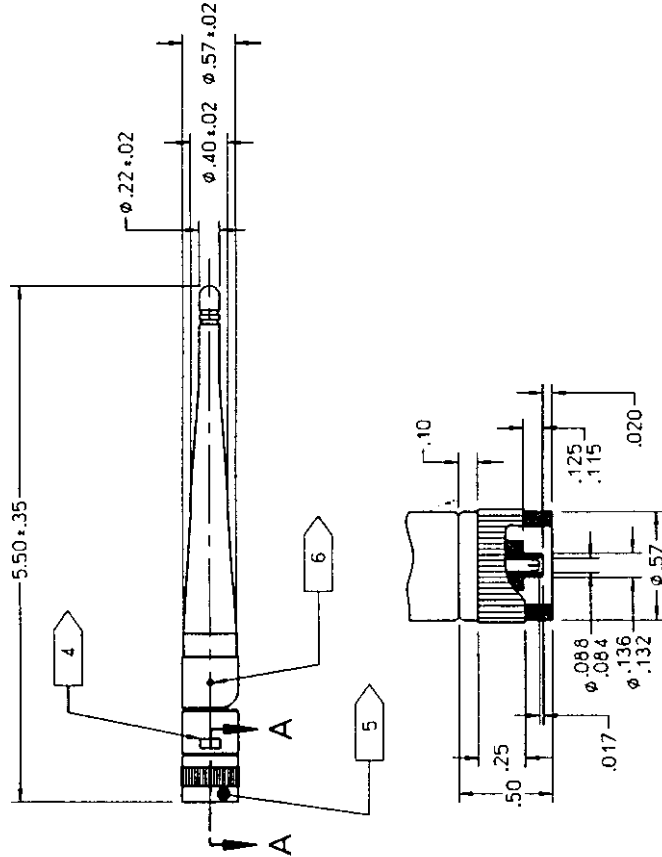
4 3 2 1

APPROVED SOURCE(S) OF SUPPLY	
SUPPLIER	PART NUMBER
1. CENTURION	066147-001
2.	
3.	
4.	
5.	
6.	

REVISIONS		
REV	DESCRIPTION	DATE
B	-001 RELEASED AT REV B	
C	-001 PER ECN 027276	03-07-98 JLEE RCH

NOTES: UNLESS OTHERWISE SPECIFIED

- BAG PARTS (25 MAX PER BAG) AND MARK BAG WITH 066147 AND DASH NUMBER TO WHICH MANUFACTURED PER SPECIFICATION 606427.
- SPECIFICATIONS: FREQUENCY RANGE 2.4-2.5 GHZ
GAIN: 1.0 dBi
OPERATING TEMPERATURE: -40°C TO +85°C
FLEX TEST: PER GEAO014
PULL TEST: 20 LB LINEAR PULL
TORQUE TEST: 20 IN-LB
POWER RATING: 50 WATTS
VSWR 1.5:1 MAX AT RESONANCE
- CHANGES REQUIRE SAC APPROVAL.
PART MARKED WITH AØ1.
THIS PIECE IS FREE TO ROTATE 360°.
FREE TO ROTATE 90° (DOWNWARD) ABOUT THIS PIVOT.
LOCKS IN 0° AND 90° POSITION.
ALL PARTS OF ASSEMBLY ARE TO BE MOLDED BLACK OR BLACK CHROME.



SECTION A-A
SCALE 2/1

SOURCE CONTROL DRAWING

CAD DBREF- 066147.1.c
SYSTEM - HP/ME30
UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES.
.XX ± .03
.XXX ± .010
ANGLES ±

THIS DRAWING SHALL NOT BE DUPLICATED OR USED FOR ANY PURPOSE OTHER THAN THAT FOR WHICH PROVIDED. THE INFORMATION DISCLOSED HEREIN ORIGINATED BY AND IS THE PROPERTY OF INTERMEC CORPORATION AND EXCEPT FOR RIGHTS EXPRESSLY GRANTED BY WRITTEN CONSENT, SUCH INFORMATION SHALL NOT BE DISCLOSED OR DISSEMINATED WHOLE OR IN PART. INTERMEC CORPORATION RESERVES ALL PATENT, PROPRIETARY, DESIGN, USE, SALE, MANUFACTURING AND REPRODUCTION RIGHTS THERE TO.

-001

APPROVALS		DATE
DRAWN	G. RAVEN	7-11-97
CHECKED	RHOAGUND	10-29-97
RESP ENG	T. BENSON	10-30-97
QA	T. ANDERSON	11-10-97
MFG ENG	V. LORD	11-6-97
SAC	O. DREW	10-30-97
CMPT ENGR	KELLY	11-4-97

Intermec		6001 36TH AVENUE WEST EVERETT, WA 98203-9280
TITLE		ANTENNA, SMB, 2.4 GHZ, DIPOLE, 248X
SIZE	CAGE CODE	DRAWING NUMBER
C 33825		066147
SCALE	1/1	SHEET 1 OF 1