

FCC ID: ESD-SA896941R9

Exhibit 2

Engineering Reports
b)Radiated Spurious Emissions (2.1053)



Assessment of Compliance

for

**Field Strength of Spurious Radiation in accordance with the
FCC Rules & Regulations Part 2.1053**

**Rugged handheld computer with
integrated wireless communications**

Sidearm ALL-Terrain Handheld PC ä

Melard Technologies, Inc.



October 2000

MELB-Mobitex Sidearm-3605

51 Spectrum Way Nepean ON K2R 1E6
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Engineering Report

Subject: Measurement of Field Strength of Spurious
Radiation in accordance with the
FCC Rules & Regulations Part 2.1053 and 90

FCC ID: ESD-SA896941R9

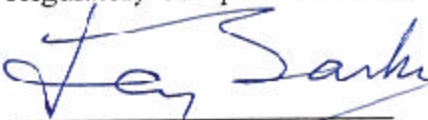
Equipment: Rugged Handheld computer with integrated wireless
communications

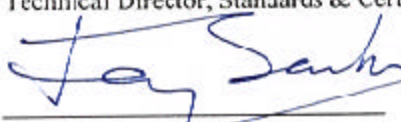
Model: Sidearm ALL Terrain Handheld PCTM

Client: Melard Technologies Inc.
28 Kaysal Court
Armonk, NY 10504
USA

Project #: MELB – Mobitex Sidearm - 3605

Prepared by: APREL Laboratories,
Regulatory Compliance Division

Approved by:  Date: Feb. 16, 2001
Jay Sarkar
Technical Director, Standards & Certification

Submitted by:  Date: Feb. 16, 2001
Jay Sarkar
Technical Director, Standards & Certification

Released by:  Date: Feb. 16/01
Dr. Jack J. Wojcik, P.Eng.

"SOLUTIONS FOR THE WIRELESS FUTURE"

FCC ID: ESD-SA896941R9
Applicant: Melard, Inc.
Equipment: Rugged handheld computer with integrated wireless communications
Model: Sidearm ALL-Terrain Handheld PC™
Standard: FCC Rules and Regulations Part 2.1053 and 90

ENGINEERING SUMMARY

This report contains the results of Field Strength of Spurious Radiation measurement performed on a MELARD Rugged handheld computer with integrated wireless communications operating with a built-in Research in Motion MOBITEK radio transmitter. The measurements were carried out in accordance with the FCC Rules and Regulations Part 2.1053 and 90. The product was evaluated for spurious when it was set at the maximum power level.

(The results presented in this report relate only to the sample tested.)

Summary of the Results

Test Description	Page No.	Test Set-up Figure No.	Results Summary
Field Strength of Spurious Radiation Ref. Paragraph 2.1053 and 90	8	1	Passed

INTRODUCTION

General

This report describes the results of the Field Strength of Spurious Radiation measurement conducted on a Melard Rugged handheld computer with integrated wireless communications model Sidearm ALL-Terrain Handheld PC™ operating with a built-in Research in Motion MOBITEK radio transmitter.

Test Facility

The tests were performed for Melard Technologies Inc. by APREL Laboratories at APREL's EMI facility located in Nepean, Ontario, Canada. The laboratory operates an (3m and 10m) Open Area Test Site (OATS). The measurement facility is calibrated in accordance with ANSI C63.4-1992.

A description of the measurement facility in accordance with the radiated and AC line conducted test site criteria per ANSI C63.4-1992 is on file with the Federal Communications Commission and is in compliance with the requirements of Section 2.948 of the Commissions rules and regulations.

APREL's registration number is 90416

APREL is accredited by Standard Council of Canada. APREL is also accredited by Industry Canada and recognised by the Federal Communications Commissions (FCC).

Standard

The evaluation and analysis were conducted in accordance with FCC Rules and Regulations Parts 2.1053 and the appropriate limits.

Test Equipment

The test equipment used during the evaluation is listed in Appendix A with calibration due dates.

Environmental Conditions

Measurements were conducted in open area test site.

- Temperature: 24 °C ± 2
- Relative Humidity: 30 - 50 %
- Air Pressure: 101 kPa ± 3

FCC SUBMISSION INFORMATION

FCC ID: ESD-SA896941R9

Equipment: Rugged handheld computer with integrated wireless communications

Model: Sidearm ALL-Terrain Handheld PC™

For: Certification

Applicant: **Melard USA, Inc.**
28 Kaysal Court
Armonk, NY 10504
U.S.A.

Manufacturer: **Melard USA, Inc.**
28 Kaysal Court
Armonk, NY 10504
U.S.A.

Evaluated by: **APREL Laboratories**
51 Spectrum Way
Nepean, Ontario
Canada K2R 1E6

Test: Field Strength of Spurious Radiation

Ref: FCC Parts 2.1046 and 90.210

Criteria: Emission **Mask J:**

The permitted maximum level of spurious emission is $50 + 10 \log (P)$ dB below the unmodulated carrier power of the transmitter (P). This was calculated to be 77.2 dB μ V/m at 3 meters.

Set-up: See Figure 1.a

Conditions: Voltage Supply: 7.4/8.4 DC Battery

Equipment: See Appendix A.

Procedure: The final measurements were taken at APREL Laboratory's open area test site (OATS) measurement facility. This open area test site is calibrated to ANSI C63.4 document and a description of the measurement facility is on file with the Federal Communications Commission and is in compliance with the requirements of Section 2.948 of the Commissions rules and regulations. (FCC Registration No.:90416).

The Rugged handheld computer with integrated wireless communications was configured to operate at maximum power with appropriate modulation. Special software was employed in order that the transmitter was processing data in a normal manner.

Prior to final measurement in the OATS, preliminary radiated spurious emissions were scanned in a shielded enclosure at a distance of 1 m using biconical, log-periodic and horn antennas in order to determine the characteristic frequencies of the field strength of spurious emissions. Based on this information, measurements were performed in the OATS at these characteristic frequencies using calibrated antennas.

All field strength measurements were made with a spectrum analyser and the appropriate calibrated antenna for the frequency range from 9 kHz up to 10th harmonics of the transmit frequency (see equipment list for the calibrated antenna used). **The Power of the carrier frequency was also measured in the OATS.**

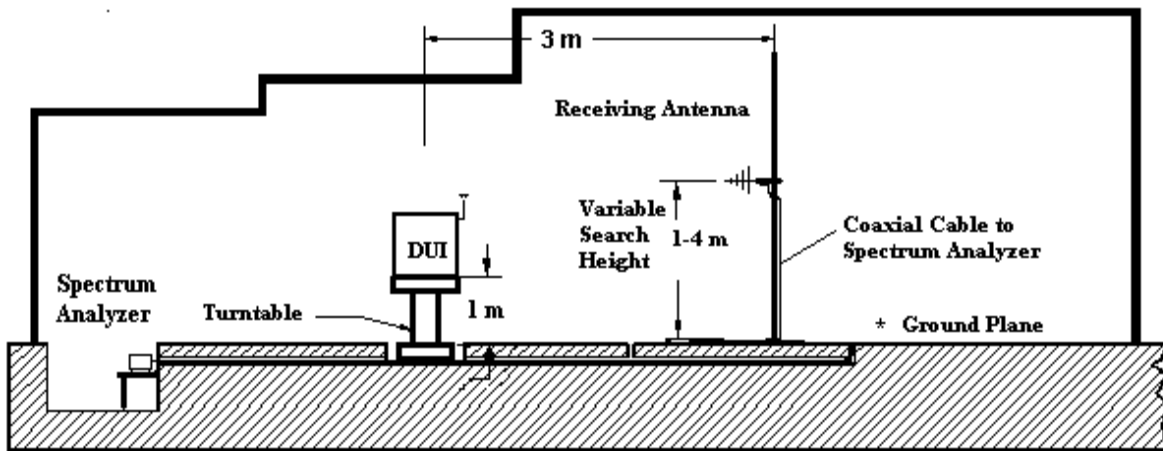


Figure 1.a Test set up for the Field Strength of Spurious Radiation Measurement in OATS
(Not to scale)



Fig. 1.b APREL's OATS (Open Area Test Site)

The equipment under test was placed on a turntable positioned 3 meters away from the calibrated receiving antenna, which in turn was connected to the spectrum analyzer. For each identified frequency, the received signal was maximized by the positioning of the turntable and the height of the antenna. The process was repeated for both horizontal and vertical polarisation.

Information submitted includes the relative radiated power of each spurious emissions with reference to the calculated 77.2 dB μ V/m limit per 90.210 assuming all emissions are radiated from half-wave dipole antenna.

Measurements given in the spurious emissions test result tables contain: analyzer reading, correction factor, and final reading. The final field strength level are derived from the analyzer measurement and the correction factor (antenna factor and cable loss) as shown in the following example:

Sample Calculation

A. Spectrum analyzer reading

At 1798.00 MHz (2nd harmonic, see Table 1), a spurious level of 46.8 dB μ V @ 3 meters is measured.

B. Correction factor (antenna factor and cable loss)

Cable loss: 0.5 dB

Antenna Factor: 24.5 dB

Total Correction Factor: 0.5 + 24.5 = 25.0 dB/m

C. Final reading (Field Strength of spurious emission):

$$C = A + B$$

$$C = 46.8 \text{ dB}\mu\text{V} + 25.0 \text{ dB}$$

$$C = 71.8 \text{ dB}\mu\text{V/m @ 3 meters}$$

D. The criteria level.

The field intensity, which would be produced by the transmitter carrier operating into a half-wave dipole antenna (gain of 1.64), at a distance of 3 m, was calculated using the following formula:

$$\text{Field Strength of unmodulated carrier (dB}\mu\text{V/m)} = 10 \log_{10} (\text{PtG}/4\pi r^2) + 146 \text{ dB}$$

Pt is transmitter carrier power, unmodulated

G is gain, 1.64

R is distance, 3 meters

Criteria (reference) level at 3 meters from 0.676 Watt (ERP) into half-wave dipole antenna is 77.2 dB μ V/m.

E = Margin (spurious emission below the reference level)

$$E = D - C$$

$$E = 77.2 \text{ dB}\mu\text{V/m} - 71.8 \text{ dB}\mu\text{V/m}$$

$$E = 5.4 \text{ dB}\mu\text{V/m}$$

Results: **Passed.** **See Tables 1 and 2**

Table 1
Field Strength of Spurious Radiation
 Transmitter Frequency: 899.00 MHz
 Antenna Polarization: Vertical
Resolution Bandwidth:
 10 kHz (below 1 GHz)
 100 kHz (above 1 GHz)

Frequency (MHz)	Measured Level (dB μ V)	Correction Factor (dB/m)	Field Strength (dB μ V/m)	Criteria Level (dB μ V/m)	Margin (dB)
	"A"	"B"	"C"	"D"	"E"
899.00 Carrier	102.2	23.3	125.5	-	-
1798.00 2 nd harmonic	46.8	25.0	71.8	77.2	5.4
2697.00 3 rd harmonic	32.7	32.9	65.6	77.2	11.6
3596.00 4 th harmonic	24.9	39.2	64.1	77.2	13.1
4495.00 5 th harmonic	32.1	41.2	73.3	77.2	3.1
5394.00 6 th harmonic	19.8 noise floor	47.5	67.3	77.2	9.9

 Test performed by: Kulcha Pomon

 Date: October, 2000

Table 2
Field Strength of Spurious Radiation
 Transmitter Frequency: 899.00 MHz
 Antenna Polarization: Horizontal
Resolution Bandwidth:
 10 kHz (below 1 GHz)
 100 kHz (above 1 GHz)

Frequency (MHz)	Measured Level (dB μ V)	Correction Factor (dB/m)	Field Strength (dB μ V/m)	Criteria Level (dB μ V/m)	Margin (dB)
	"A"	"B"	"C"	"D"	"E"
899.00 Carrier	93.9	23.3	117.2	-	-
1798.00 2 nd harmonic	38.5	25.0	63.5	77.2	13.7
2697.00 3 rd harmonic	38.0	32.9	70.9	77.2	6.3
3596.00 4 th harmonic	20.9 noise floor	39.2	60.1	77.2	17.1
4495.00 5 th harmonic	21.7	41.2	62.9	77.2	14.3
5394.00 6 th harmonic	19.4 noise floor	47.5	66.9	77.2	10.3

Test performed by: Kathleen Korman Date: October, 2000

APPENDIX A

List of Test Equipment

List of Equipment

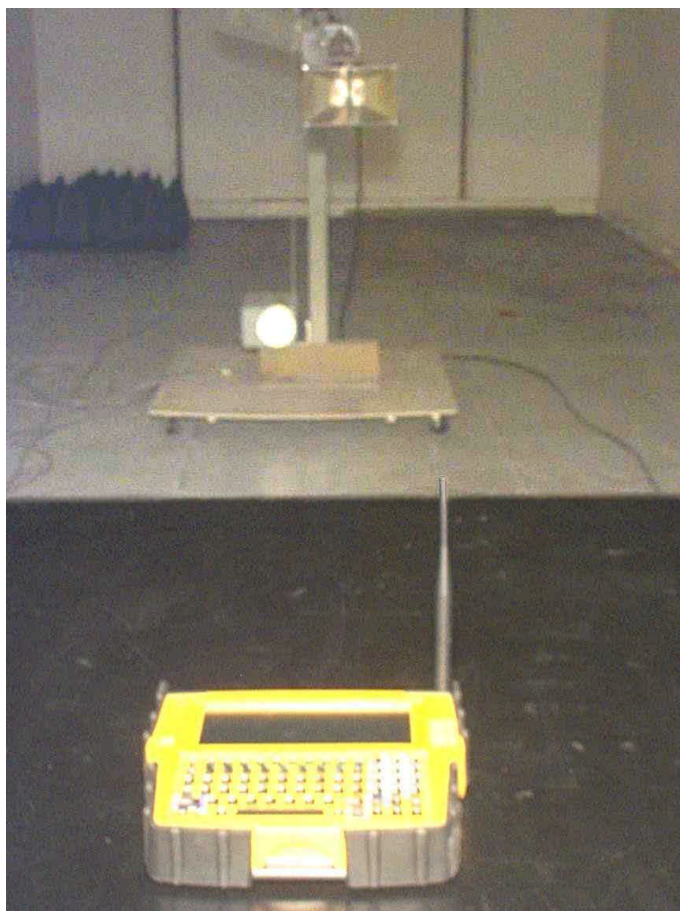
Description	Range	Manufacturer	Model #	APREL Asset #	Cal. Due Date
Spectrum Analyzer	9 kHz - 3 GHz	Anritsu	MS2661C	301330	Dec 10, 2000
Spectrum Analyzer	9 kHz - 30 GHz	Anritsu	MS2667C	301436	Nov 3, 2000
Biconical Antenna	20 MHz - 200 MHz	Eaton	94455-1	100890	July 21, 2001
Log - Periodic Antenna	200 MHz -1.0 GHz	Eaton	ALP-1	100761	July 21, 2001
Horn Antenna	1 – 18 GHz	APREL Inc.	AA – 118	100553	March 12, 2001
Anechoic Shielded Room	10 kHz - 10 GHz	APREL Inc.	–	301329	N/A
OATS	30 MHz – 1 GHz	APREL Inc.	3 m & 10 m	N/A	N/A
Mast with the Controller	1 m – 4 m	EMCO	1051 – 12	100507	N/A
Turntable with the Controller	0° - 360°	EMCO	1060 – 1.241	100506	N/A
Notch Filter	DC - 6 GHz	APREL Inc.	NFLT-835	301470	CBT
Attenuator	20 dB	Pasternack	PE 7002-20	301370	May 18, 2001
Amplifier (LNA)	30-1000 MHz	APREL Inc.	APRLNA-001	301415	June 20, 2001

APPENDIX B

PHOTOGRAPHS



**Melard Sidearm ALL-Terrain Handheld PC™
With Mobitex R902**



Sidearm ALL-Terrain Handheld PC™ Tested for Spurious Emissions at the OATS