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### EMC COMPLIANCE REPORT

In accordance with

IEC 60601-1-2: 2001 (CISPR 11: 2004

Electromagnetic Radiation Measurements)

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MEGAPULSE PTY LTD

48V MEGAPULSE MKII BATTERY CONDITIONER

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REPORT TL4719A

MARCH 2005



NATA Accredited Laboratory  
Number: 3540

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# Certificate of Compliance

**RFI Industries Test Report: TL4719A**  
**Issue Date: March 2005**

**Test Sample:** 48V Megapulse MKII Battery Conditioner  
**Model No:** Not Specified  
**Serial No:** J4803051000

**Client Details:** Mr. Ross Naddei,  
Megapulse Pty Ltd,  
11 Fortuna Court,  
Eaton's Hill,  
Queensland, 4037

Phone: (07) 3325 4200  
Fax: (07) 3325 4199

**Test Specification:** IEC 60601-1-2: 2001  
Medical electrical equipment-  
Part 1-2: General requirements for safety-  
Collateral standard:  
Electromagnetic compatibility-  
Requirements and tests

**Summary:** CISPR 11: 2004 – Group 1, Class B  
Electromagnetic Radiation Measurements

**Complied**

**Test Date(s):** 28<sup>th</sup> and 29<sup>th</sup> of June 2004

**Test House:  
(Issued by)** R.F.I. Industries Pty. Limited,  
EMI/EMC Laboratories,  
52 Holloway Drive,  
Bayswater, Victoria  
Australia 3153.

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The 48V Megapulse MKII Battery Conditioner, complied with the Electromagnetic radiation requirements of IEC 60601-1-2: 2001 Medical electrical equipment – Part 1-2: General requirements for safety – Collateral standard: Electromagnetic compatibility – Requirements and tests



Steven Koljatic  
(Test Engineer)



Jeremy Poynter  
(Test Officer)



Andrew Burden  
(EMC Engineering Manager)

31/03/2005

Date



## EMC COMPLIANCE REPORT FOR MEGAPULSE PTY LTD

### 1. INTRODUCTION

Electromagnetic radiation emission measurements were performed on the 48V Megapulse MKII Battery Conditioner, in accordance with the requirements of IEC 60601-1-2: 2001

### 2. SUMMARY OF RESULTS

Worst-case emissions are tabled as follows:

Test	Configuration	Delta Limit
Electromagnetic Radiation	Horizontal/Vertical	Peak Emissions >10dB below limit

### 3. TEST SAMPLE, MODIFICATIONS and CONFIGURATION

#### 3.1 Test Sample

The product, as supplied by the client, is described as follows:

48V Megapulse MKII Battery Conditioner.  
Model No: Not specified  
Serial No: J4803051000

This product shall be referred to as the EUT (Equipment under test).

#### 3.2 Modifications

RFI Industries performed no modifications on the EUT.

#### 3.3 Configuration

The EUT was tested in nominal operating mode. All measurements were performed at 48VDC supply voltage via 300mm leads from four 12VDC automotive batteries in series. Battery interconnecting lead lengths were kept to a minimum.

(Refer to Appendix B for battery configuration photo)

### 4. TEST FACILITY AND EQUIPMENT

#### 4.1 Test Facility

Electromagnetic radiation pre-scan emission measurements were performed at RFI Industries EMC Laboratories, located at 52 Holloway Drive Bayswater, Victoria, Australia.

Compliance Electromagnetic radiation emission measurements were performed at an Open Area Test Site, located at 290 Majors Line Road, Tooborac, near Heathcote, 100km north of Melbourne, Victoria, Australia.

## 4.2 Test Equipment

Refer to Appendix A for the measurement instrument list.

## 5. REFERENCE STANDARDS

### IEC 60601-1-2: 2001

Medical electrical equipment – Part 1-2: General requirements for safety – Collateral standard: Electromagnetic compatibility – Requirements and tests.

### CISPR 11: 2004

Industrial, scientific and medical (ISM) radio-frequency equipment – Electromagnetic disturbance characteristics – Limits and methods of measurement.

## 6. ELECTROMAGNETIC RADIATION DISTURBANCE

### 6.1 Test Procedure

A pre-scan of electromagnetic radiation emissions was performed (prior to compliance measurements) at a test distance of 3 metres inside a semi-anechoic chamber at RFI Industries EMC Laboratories in Bayswater, in order to characterise the emission profile.

Electromagnetic radiation emissions were measured 10 metres away from the EUT at the Open Area Test Site.

For both horizontal and vertical antenna polarisations, the peak detector was set to MAX-HOLD and the range selected continuously scanned. The antenna height was varied from 1 to 4 metres and the turntable slowly rotated, in order to find the worst-case emission arrangement.

Plots of the accumulated measurement data for both horizontal and vertical antenna polarizations, including all transducer correction factors were produced.

*(Refer to photographs in Appendix B for views of the test configurations)*

### 6.2 Test Results

Electromagnetic radiation emissions were below the specified limit for quasi-peak measurements.

Tabled below are results of the quasi peak measurements, performed at spot frequencies where the peak emission was close to, or exceeded the applicable limit line.

Frequency (MHz)	Peak Emission (dB <sub>m</sub> V/m)	Result Quasi-peak (dB <sub>m</sub> V/m)	Limit Quasi-peak (dB <sub>m</sub> V/m)	Delta limit (dB)
Emissions > 10dB below the limit				

**Table 1: Vertical (Refer to graph 1 Appendix C)**

Frequency (MHz)	Peak Emission (dBmV/m)	Result Quasi-peak (dBmV/m)	Limit Quasi-peak (dBmV/m)	Delta limit (dB)
Emissions > 10dB below the limit				

**Table 2: Horizontal (Refer to graph 2 Appendix C)**

Notice should be taken of the measurement uncertainty of:

$\pm 5.54\text{dB}$  at 30 to 300MHz

$\pm 6.25\text{dB}$  at 300 to 1000MHz

Climatic Conditions	
Climatic Temperature:	11.6°C
Humidity:	78%

## 7. CONCLUSION

The 48V Megapulse MKII Battery Conditioner complied with the Electromagnetic Radiation Emission Requirements of IEC 60601-1-2: 2001.

## APPENDIX A

### TEST EQUIPMENT

#### (Electromagnetic Radiation Emission Measurements)

Inv.	Equipment	Make	Model No	Serial No	Calibration		Equip Used
					Date	Type	
81	Spectrum Analyser	Hewlett Packard	HP8593A	3009A00398	Sep. 04	E	◆
555	Spectrum Analyser	Hewlett Packard	HP8591E	3230A00565		E	
17	EMI Receiver	Electro Metrics	EMC-30 MKIV	350	Dec. 05	E	◆
359	Transient Limiter	Hewlett Packard	HP11947A	3107A01833		I	
312	Pre Amplifier	Amplifier Research	LN1000	16565	Jan.05	I	◆
313	Pre Amplifier	Amplifier Research	LN1000	16566		I	
355	High Pass Filter	Solar Electronics	7801-100	947214		I	
43	LISN	EMCO	3825/2R	1179		E	
47	LISN	EMCO	3850/2	9105 1005		E	
48	LISN	EMCO	3850/2	9105 1006		E	
525	Signal Generator	Hewlett Packard	HP8648A	3642U01815		I	
66	Power Splitter	Hewlett Packard	11667A	A16126	On Use	I	◆
163	Biconical Antenna	Electro Metrics	BIA-30C	3110	Jul. 04	I	◆
187	Log Periodic Antenna	EMCO	3146	2630	Sep. 04	I	◆

- V:** Verification of operation against an internal reference  
**I:** Internal calibration against a NATA traceable standard  
**E:** External calibration by a NATA endorsed facility  
**O:** External calibration by an International facility

## APPENDIX B

### PHOTOGRAPHS

Photograph No.	Photograph Description
1	Electromagnetic Radiated Emission Test Configuration.
2	Electromagnetic Radiated Emission Test Configuration Close Up.
3	Battery Configuration.
4	Interconnecting Lead Close Up.
5	EUT Close Up Front View.
6	EUT Close Up Rear View.
7	EUT Close Up Internal View.



Photo 1. Electromagnetic Radiated Emission Test Configuration.



Photo 2. Electromagnetic Radiated Emission Test Configuration Close Up.



Photo 3. Battery Configuration.

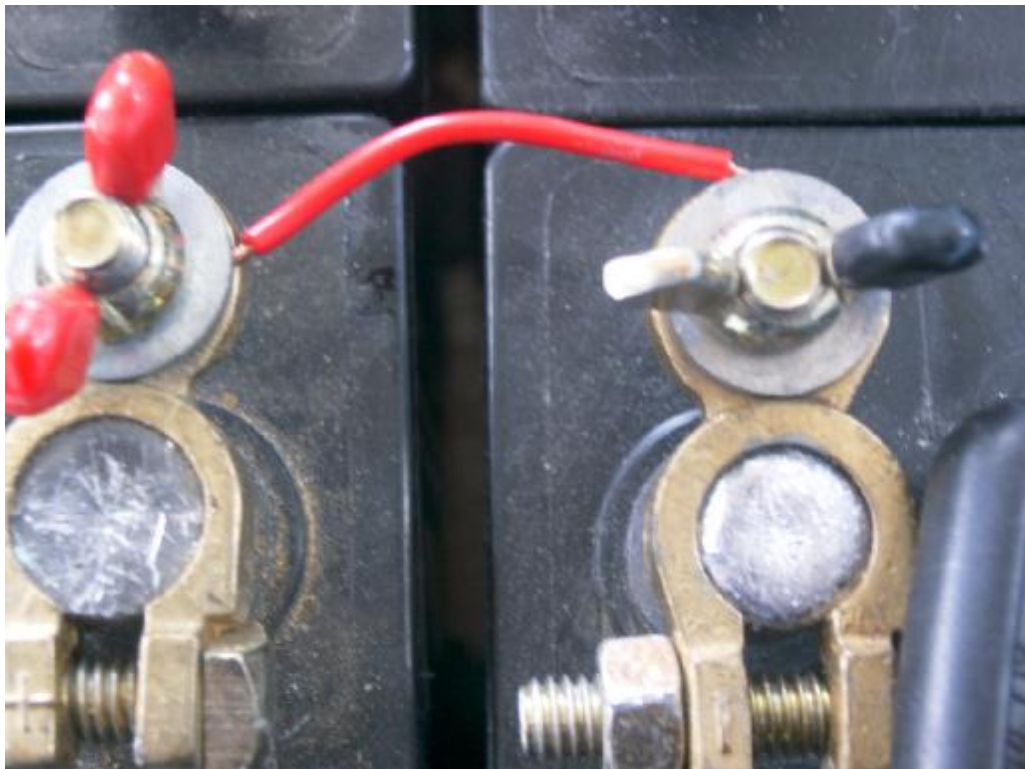


Photo 4. Interconnecting Lead Close Up.



Photo 5. EUT Close Up Front View.



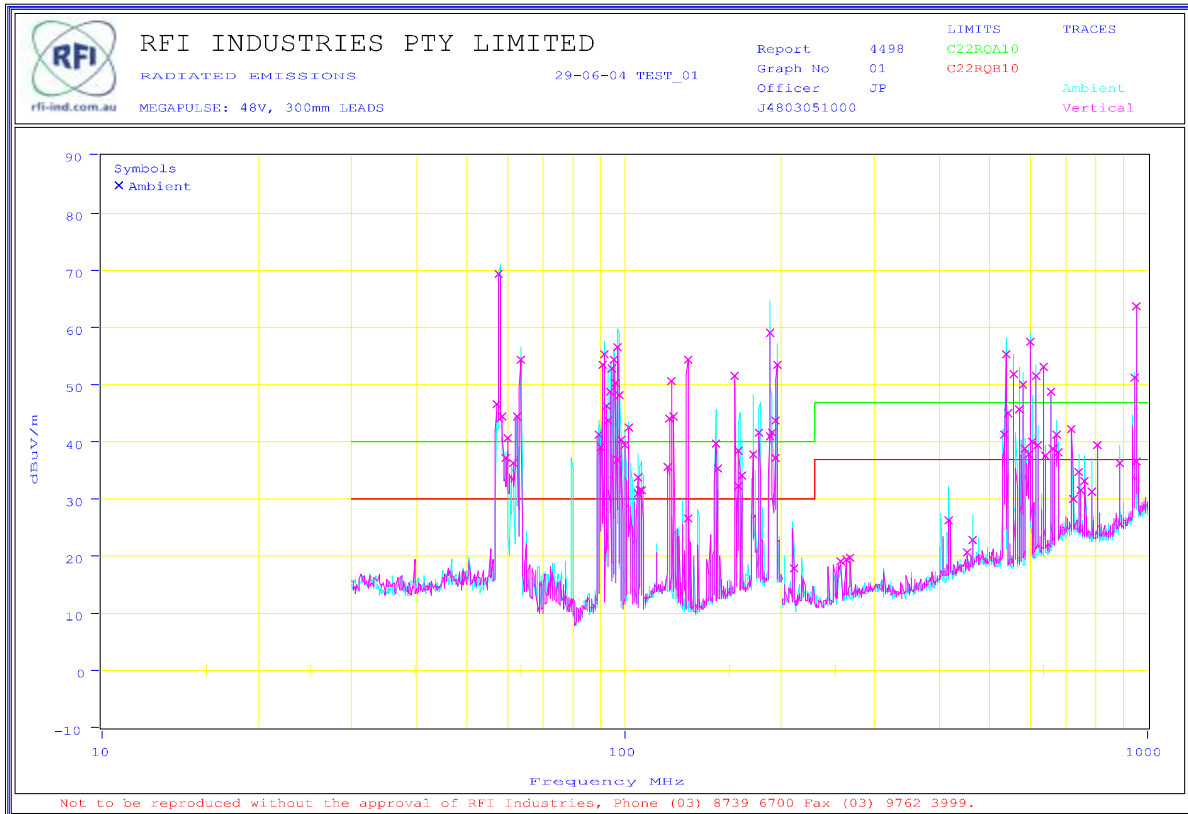
Photo 6. EUT Close Up Rear View.

Photo 7. EUT Close Up Internal View (removed for patent protection purposes).

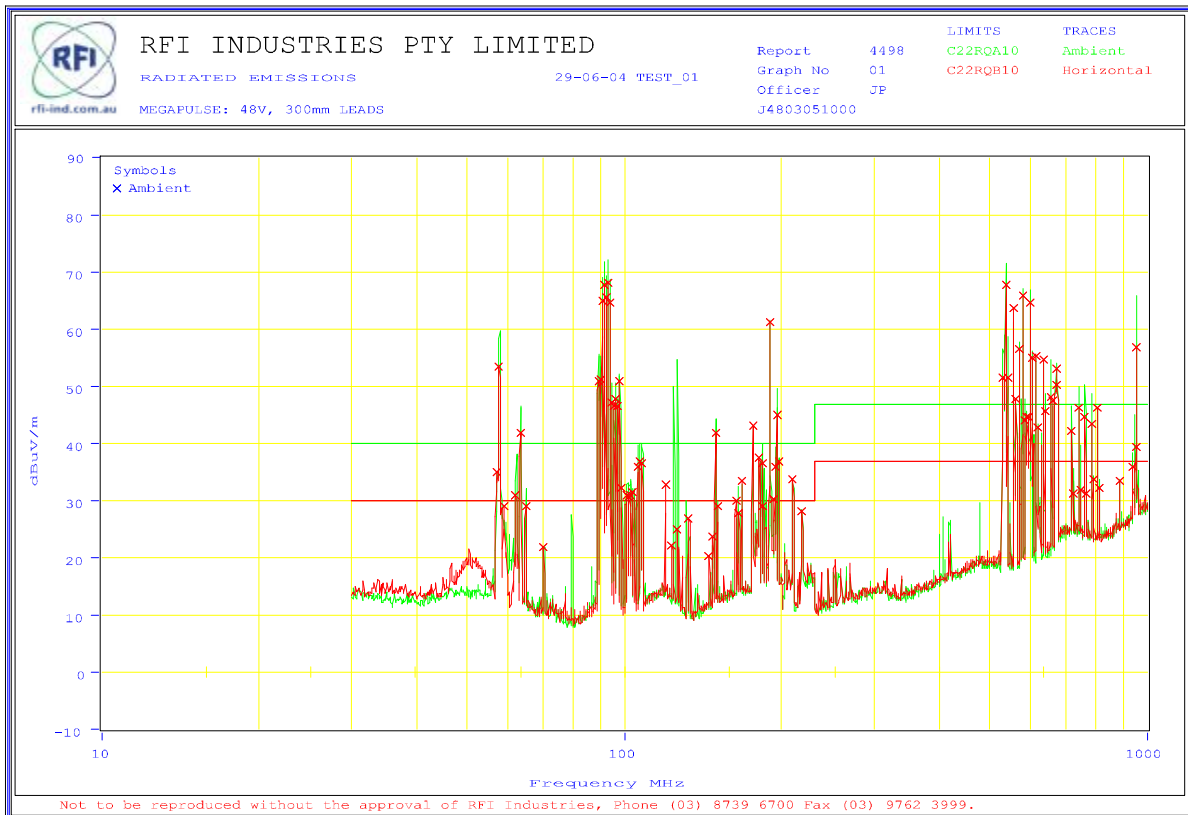
## APPENDIX C

### ELECTROMAGNETIC RADIATION EMISSION MEASUREMENTS GRAPHS

Graph No.	Graph Description
1	Vertical Antenna Polarization
2	Horizontal Antenna Polarization



Graph 1 – Vertical Antenna Polarization



Graph 2 – Horizontal Antenna Polarization