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EMC COMPLIANCE REPORT In accordance with 95/54/EC

MEGAPULSE PTY LTD

48V MEGAPULSE MKII BATTERY CONDITIONER

REPORT TL4498D

July 2004



Certificate of Compliance

RFI Industries Test Report: TL4498D
Issue Date: July 2004

Test Specification: Commission Directive 95/54/EC of November 1995

Test Sample(s): 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 Results: **95/54/EC**
Annex IX RF Immunity Free Field Immunity (20MHz – 2GHz) **PASS**

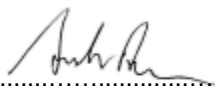
Test Date(s): 8th and 9th of July, 2004.

**Test House:
(Issued by)** R.F.I. Industries Pty. Limited,
EMI/EMC Laboratories,
52 Holloway Drive,
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The **48V Megapulse MKII Battery Conditioner**, complies with radiated free field immunity of 30V/m over the frequency range 20MHz to 1000MHz.


.....
Simon Grilj
(Team Leader)


.....
Andrew Burden
(EMC Engineering Manager)

28-07-04
.....
Date

EMC COMPLIANCE REPORT FOR MEGAPULSE PTY. LTD.

1. INTRODUCTION

Electromagnetic Compatibility (EMC) tests were performed on a 48V Megapulse MKII Battery Conditioner module in accordance with the requirements of 95/54/EC – November 1995.

2. PRODUCT SAMPLE, MODIFICATIONS and CONFIGURATION

2.1 Product Sample

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

48V Megapulse MKII Battery Conditioner module
Model No: not specified
Serial No: J4803051000

2.2 Modifications

No modifications were performed on the above sample.

2.3 Configuration

The product was tested in its normal operating mode whilst attached to four 12V automotive batteries.

3. TEST FACILITY AND EQUIPMENT

3.1 Test Facility

Tests were performed at the EMI/EMC Laboratories of RFI Industries, located at 52 Holloway Drive, Bayswater, Victoria. All RF immunity tests were carried out inside a fully shielded anechoic chamber.

3.2 Test Equipment

Refer to Appendix A for the measurement instrument list.

4. REFERENCE STANDARDS

95/54/EC : 1995

Official Journal of the European Communities.

ANNEX IX

Methods of testing for immunity of electrical/electronic sub-assemblies to electromagnetic radiation.

5. Annex IX RF Immunity of electronic sub-assemblies (20MHz to 1GHz)

5.1 Test Procedure

Prior to testing, a CW electric field was calibrated at a distance of 1.5 meters from the transmitting antenna using an orthogonal electric field probe. The drive level to the amplifier was recorded using immunity software and stored as a look up table.

The frequency range of 20MHz to 1000MHz was swept incrementally using 1% step sizes.

During actual testing, the orthogonal electric field probe was replaced by the EUT and the recorded electric fields stored as a lookup table were replayed back.

Once again the frequency range of 20MHz to 1000MHz was swept incrementally using 1% step sizes, however this time 80% AM @ 1kHz with a dwell time of 2 seconds was added to the calibrated RF field giving a total electric field of 30V/m.

Both horizontal and vertical antenna polarizations were used to radiate the EUT in turn.

The EUT was positioned on a non-conductive table, 0.8m above the reference ground plane.

Due to the nature of the device under test, the manufacturer states, “ *Megapulse is supplied with wires 300mm in length. The wires deliver the pulse. The wires must not be lengthened as doing so will result in loss of efficiency and void warranty.*”

As a result the supply lines could not be lengthened to 1.5 meters nor could they be fed through an automotive LISN. Therefore all lead leads were kept to a length of 300mm and connected directly to four 12V automotive batteries connected in series. As a result the stripline test was replaced by the free field immunity test, which extended its coverage range down to 20MHz.

See photograph in Appendix B of a typical test configuration.

5.2 Test Results

Field Level	EUT Orientation & Operating Mode	Polarization	Criteria
30V/m	Front panel – normal operating mode	Vertical	Pass, Criteria A
30V/m	Front panel – normal operating mode	Horizontal	Pass, Criteria A

Frequency Band: 20 – 1000MHz with 80% AM @ 1kHz

Comments: No degradation or malfunction was observed.

Climatic Conditions	
Room Temperature:	18°C (15°C to 35°C)
Humidity:	52% (30% to 60%)

Conclusion: The EUT complies with the requirements of Annex IX free field immunity.

APPENDIX A

EMC LABORATORY TEST EQUIPMENT (Immunity Testing)

INV	Equipment	Make	Model No	Serial No	Calibration		Equip Used
					Date	Type	
467	1-1000MHz RF Amplifier	Amplifier Research	100W1000	20724		V	*
26	10kHz-220MHz RF Amplifier	Amplifier Research	250L	3710024		V	*
535	TWT RF Amplifier	HUGHES	1177H04R021	145A		V	
561	TWT RF Amplifier	HUGHES	1177H-02F00	006		V	
597	TWT RF Amplifier	HUGHES	1177H10F000	112		V	
608	TWT RF Amplifier	HUGHES	1177H01F000	-		V	
310	Digital Remote Readout	Holaday	HI-4416	89709		V	
310	E-Field Probe	Holaday	HI-4422	89862	Aug. 04	E	*
501	E-Field Probe	Holaday	HI-4450	96627	Aug. 04	E	
560	Mainframe Field Monitor	Amplifier Research	FM 5004	21422		V	*
214	Bi-Directional Coupler	Amplifier Research	DC2000	12090		I	
526	Bi-Directional Coupler	RLC Electronics	12598-M-2565	445094		I	
600	Bi-Directional Coupler	Narda Microline	3022	10096		I	
581	Power Meter	Hewlett Packard	HP 437B	2935U00273		V	
582	Power Sensor	Hewlett Packard	HP 8482A	3318A29658		V	
629	Power Meter	Hewlett Packard	EPM-441A	GB37481752		V	
630	Power Sensor	Hewlett Packard	8482A	US37290856		V	
631	Power Sensor and Cable	Hewlett Packard	ECP-E18A	US37181651		V	
209	Double Ridged Guide Antenna	EMCO	3115	3945		I	
269	Biconical Antenna	EMCO	3143	1026		V	*
558	Double Ridge Horn	EMCO	3106	9811-2728		I	
633	Double Ridged Horn Antenna	EMCO	3115	9712-5369			
70	Injection Probe	FCC	F-120	8		V	
37	Function Generator	Hewlett Packard	3325A	1748A12031		I	
38	RF Signal Generator	FLUKE	6060A	3710024		I	
464	Arbitrary Waveform Generator	Hewlett Packard	33120A	US34015450		I	
466	Signal Generator	Hewlett Packard	8648B	3642U01071		V	
507	Signal Generator	Rohde & Schwarz	SMY 02	847510/038	Oct 06	I	*
525	Signal Generator	Hewlett Packard	8648A	3642U01815		V	
612	Signal Generator	Gigatronics	900/0.5-26	316705		V	
636	Signal Generator	Gigatronics	6080A	5465602		V	
638	Synthesized Signal Generator	Hewlett Packard	8673B	2938A01504		V	
471	Transient 1000 System	EMC Partner	TRA1H01B	TRA1000-215		V	
615	Harmonics-1000	EMC Partner	HAR1000-IP	HAR1000-64		V	
476	Powerline CDN	FCC	FCC-801-M1-16	9713		V	
477	Powerline CDN	FCC	FCC-801-M2-16	9727		V	
478	Powerline CDN	FCC	FCC-801-M3-25	9712		V	
479	Powerline CDN	FCC	FCC-801-M4-16	9702		V	
275	Capacitive Coupling Clamp	RFI Industries	CCC-IEC4	4694		V	

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

APPENDIX B PHOTOGRAPHS

Photograph	Description
1	Radiated RF Immunity Setup
2	Radiated RF Immunity Setup
3	Megapulse terminated to 4 automotive batteries
4	Megapulse exposed lead lengths
5	Verification check before and after RF immunity
6	Front view of the EUT
7	Rear view showing the serial number of the EUT
8	Internal circuit board layout (Image can not be shown due to patent protection)



Photograph 1.



Photograph 2.



Photograph 3.



Photograph 4.



Photograph 5.



Photograph 6.



Photograph 7.

Photograph 8. (Image can not be shown due to patent protection)