11.3 Drain Voltage and Current Start-up Profile

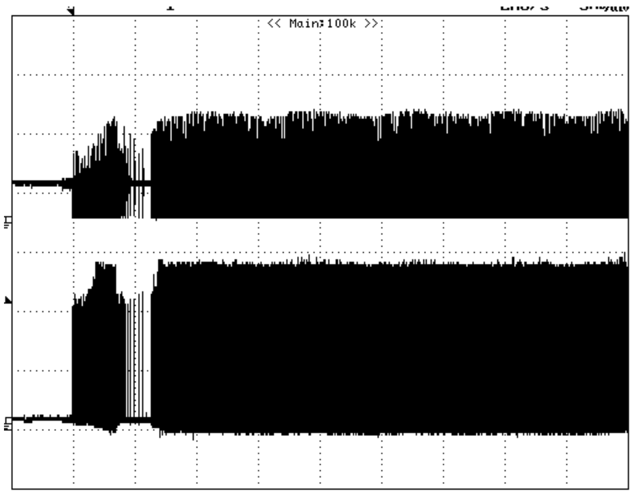

Figure 17 – 85 VAC Input and Maximum Load.
Upper: V_{DRAIN}, 200 V / div.
Lower: I_{DRAIN}, 50 mA / div, 5 ms / div.

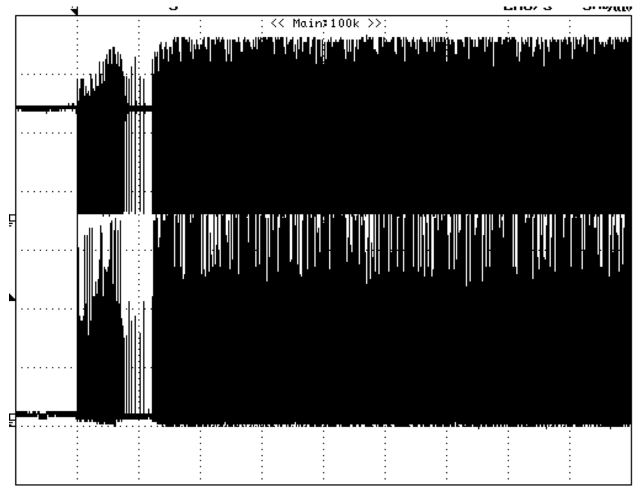

Figure 18 – 265 VAC Input and Maximum Load.
Upper: V_{DRAIN}, 200 V / div.
Lower: I_{DRAIN}, 50 mA / div, 5 ms / div.

11.4 Load Transient Response (75% to 100% Load Step)

In the figures shown below, signal averaging was used to better enable viewing the load transient response. The oscilloscope was triggered using the load current step as a trigger source. Since the output switching and line frequency occur essentially at random with respect to the load transient, contributions to the output ripple from these sources will average out, leaving the contribution only from the load step response.

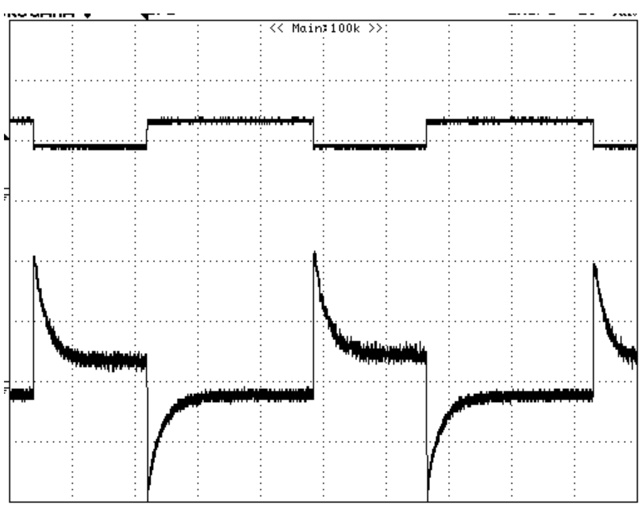

Figure 19 – Transient Response, 115 VAC, 50-100-505% Load Step.
Top: Load Current, 0.5 A/div.
Bottom: Output Voltage
200 mV, 10 ms / div.

Figure 20 – Transient Response, 230 VAC, 50-100-50% Load Step.
Upper: Load Current, 0.5 A/ div.
Bottom: Output Voltage
200 mV, 10 ms / div.

11.5 Short Circuit Output Current

The photos below show the output current during auto-restart with the output shorted at the end of the 28 AWG cable.

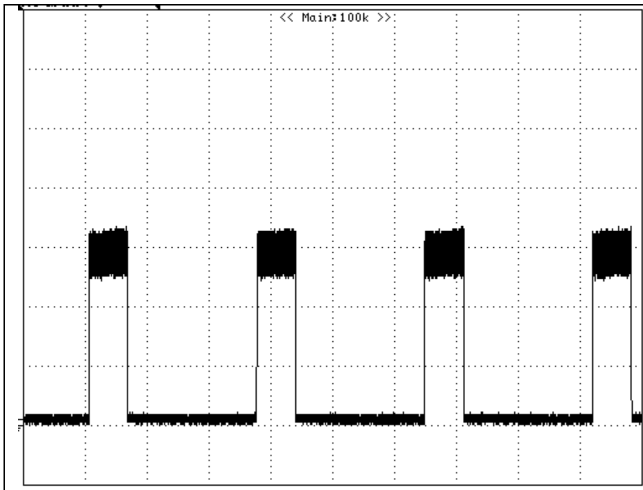

Figure 21 – Short Circuit Output Current, 115 VAC. Output Current 0.2 A/div, 500 ms / div.

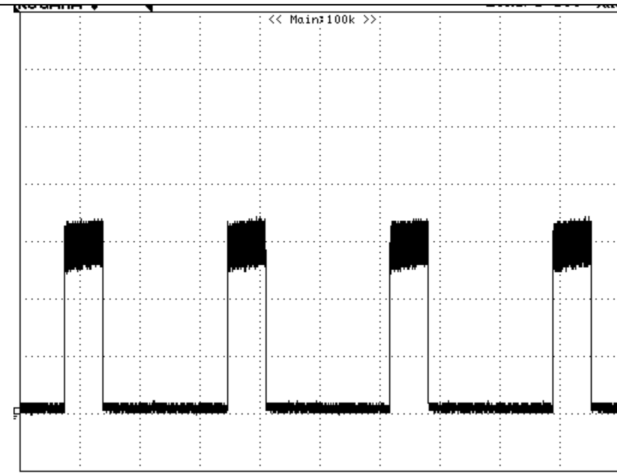

Figure 22 – Short Circuit Output Current, 230 VAC. Output Current 0.2 A/div, 500 ms / div.

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11.6 Output Ripple Measurements

11.6.1 Ripple Measurement Technique

For DC output ripple measurements, a modified oscilloscope test probe must be utilized in order to reduce spurious signals due to pickup. Details of the probe modification are provided below.

The 4987BA probe adapter is affixed with two capacitors tied in parallel across the probe tip. The capacitors include one (1) 0.1 μF/50 V ceramic type and one (1) 1.0 μF/50 V aluminum electrolytic. The aluminum electrolytic type capacitor is polarized, so proper polarity across DC outputs must be maintained (see below).

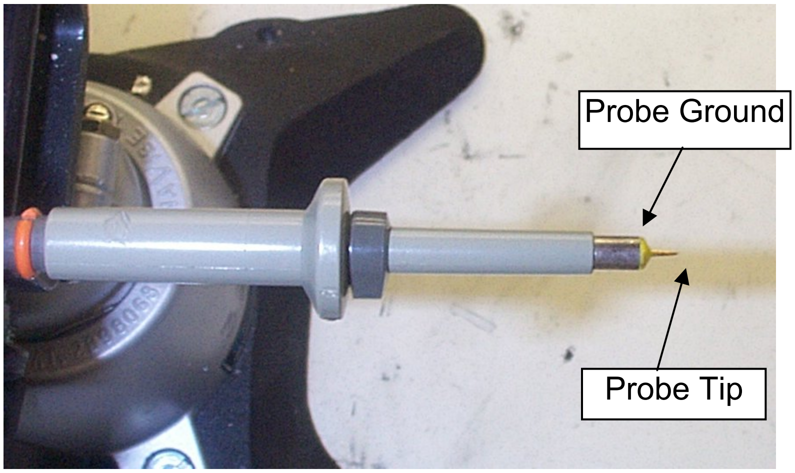

Figure 23 – Oscilloscope Probe Prepared for Ripple Measurement. (End Cap and Ground Lead Removed)

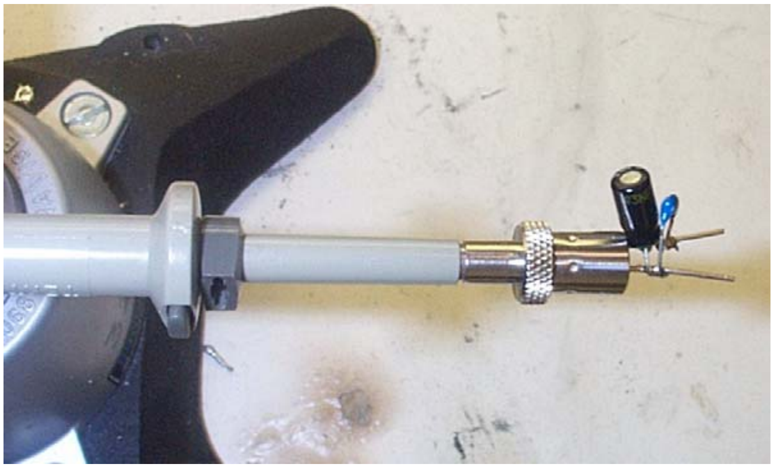

Figure 24 – Oscilloscope Probe with Probe Master (www.probemaster.com) 4987A BNC Adapter. (Modified with wires for ripple measurement, and two parallel decoupling capacitors added)

11.6.2 Measurement Results

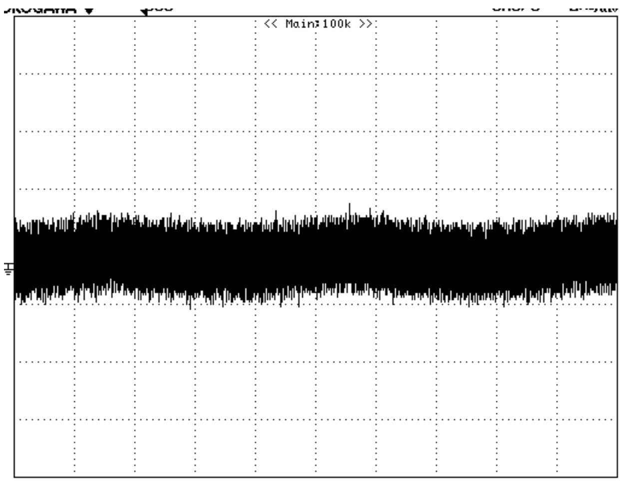

Figure 25 – Ripple, 85 VAC, Full Load.
2 ms, 50 mV / div.

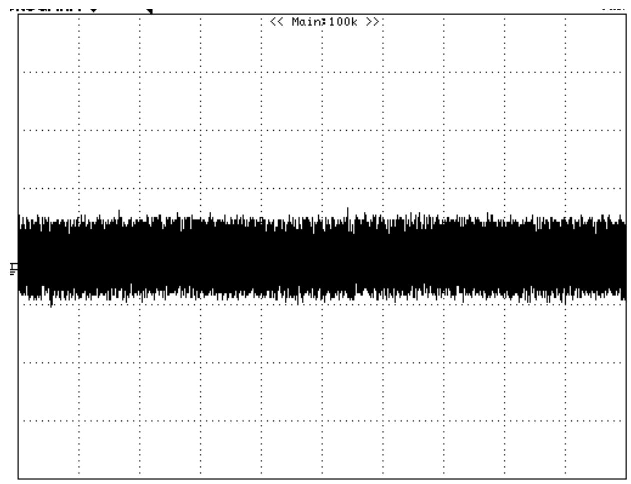

Figure 26 – 5 V Ripple, 115 VAC, Full Load.
2 ms, 50 mV / div.

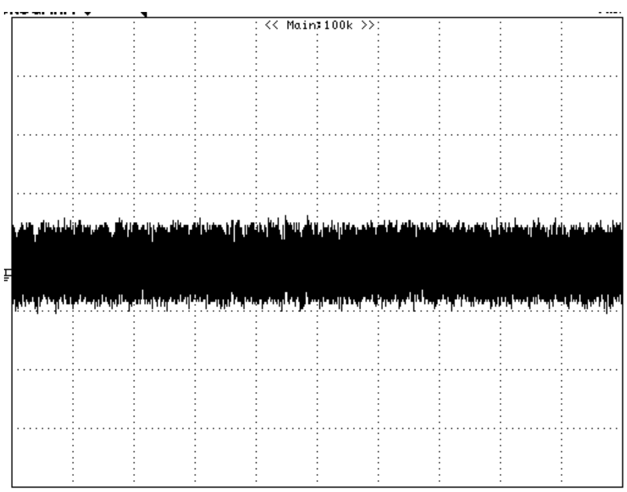

Figure 27 – Ripple, 230 VAC, Full Load.
2 ms, 50 mV /div.

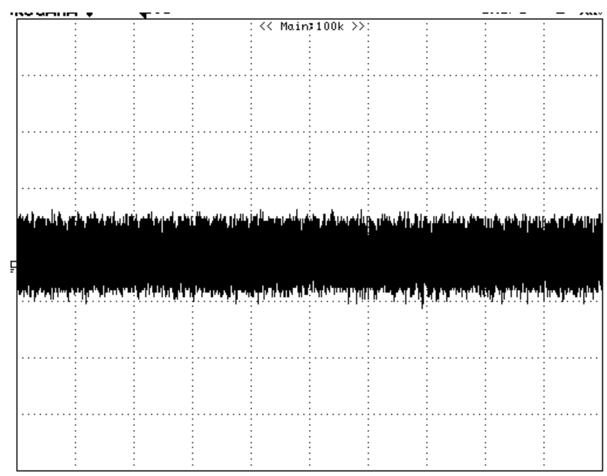

Figure 28 – Ripple, 265 VAC, Full Load.
2 ms, 50 mV /div.

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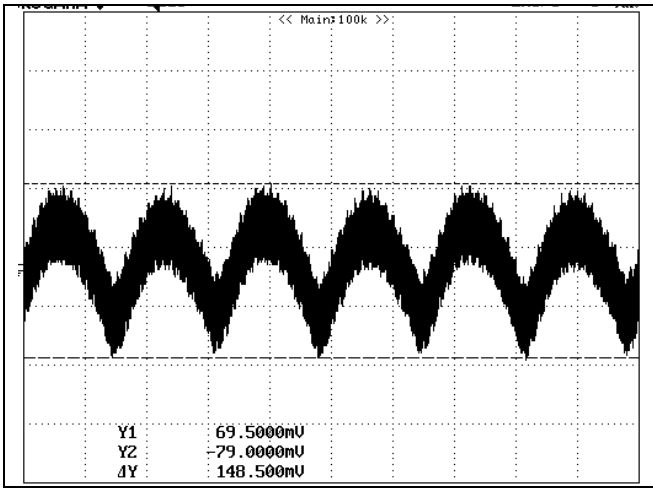

Figure 29 – Worst Case Ripple, 85 VAC, 0.66 A Load (entering CC operation).
Peak to Peak Ripple Voltage = 140 mV
5 ms, 50 mV /div.

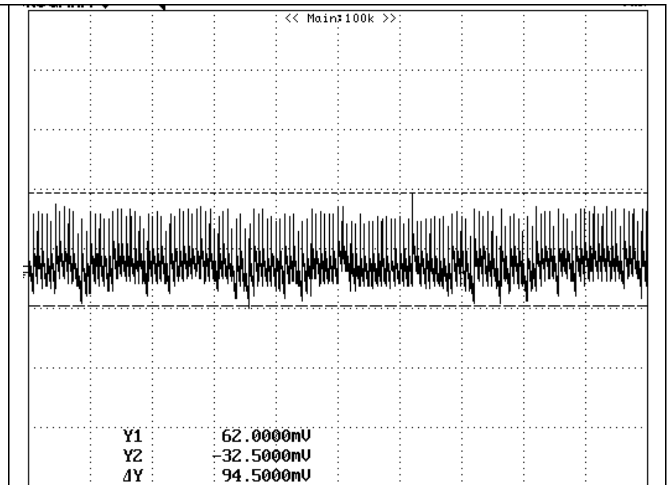

Figure 30 – Worst Case Ripple, 115 VAC, 30 mA Load.
Peak to Peak Ripple Voltage = 94 mV
5 ms, 50 mV /div.

12 Line Surge

Differential and common mode input line 1.2/50 µs surge testing was completed on a single test unit to IEC61000-4-5. Input voltage was set at 230 VAC / 60 Hz. Output was loaded at full load and operation was verified following each surge event.

Surge Level (V)	Input Voltage (VAC)	Injection Location	Injection Phase (°)	Test Result (Pass/Fail)
+1000	230	L to N	90	Pass
-1000	230	L to N	90	Pass
+2000	230	L,N to Output	90	Pass
-2000	230	L,N to Output	90	Pass

100 kHz ring wave, 500 A short circuit current, differential and common mode.

Surge Level (V)	Input Voltage (VAC)	Injection Location	Injection Phase (°)	Test Result (Pass/Fail)
1000	230	L to N	90	Pass
1000	230	L,N to Output	90	Pass

Unit passes under all test conditions.

13 ESD

ESD Level (kV)	Discharge type	Input Voltage (VAC)	Test Result (Pass/Fail)
±15	Air	230	Pass
±15	Contact	230	Pass

Unit passes under all test conditions.

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14 Conducted EMI

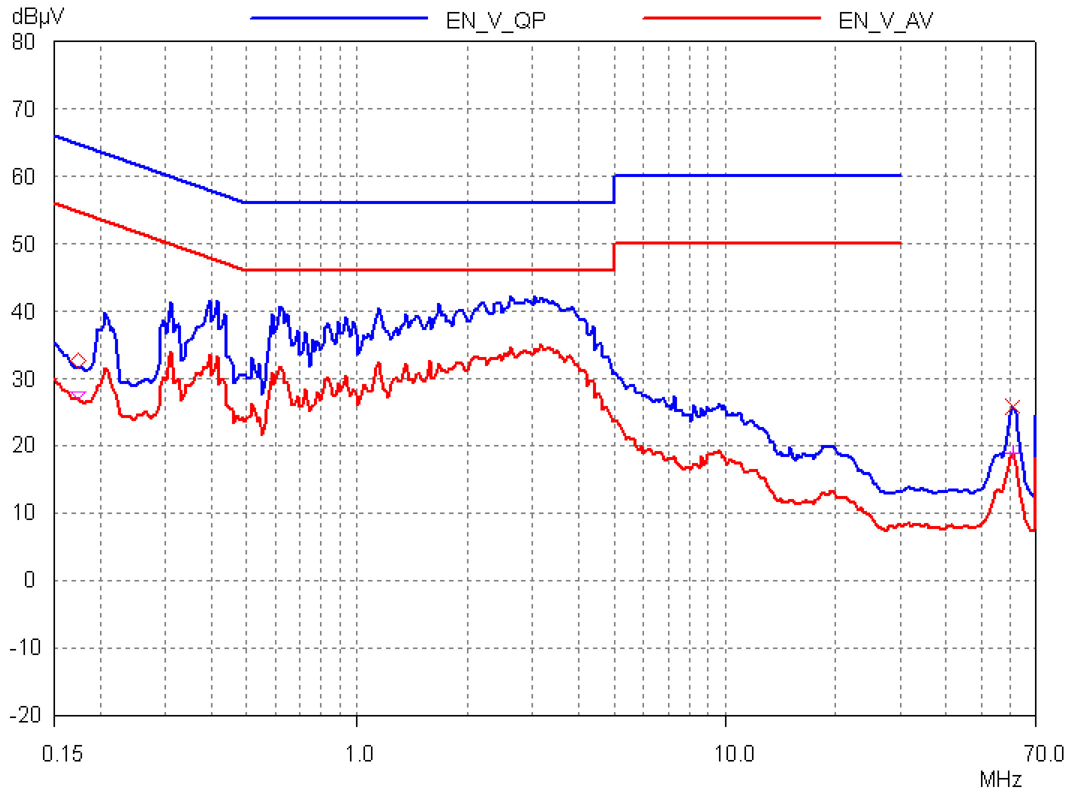

Figure 31 – Conducted EMI, Maximum Steady State Load Without Artificial Hand, 115 VAC, 60 Hz, and EN55022 B Limits.

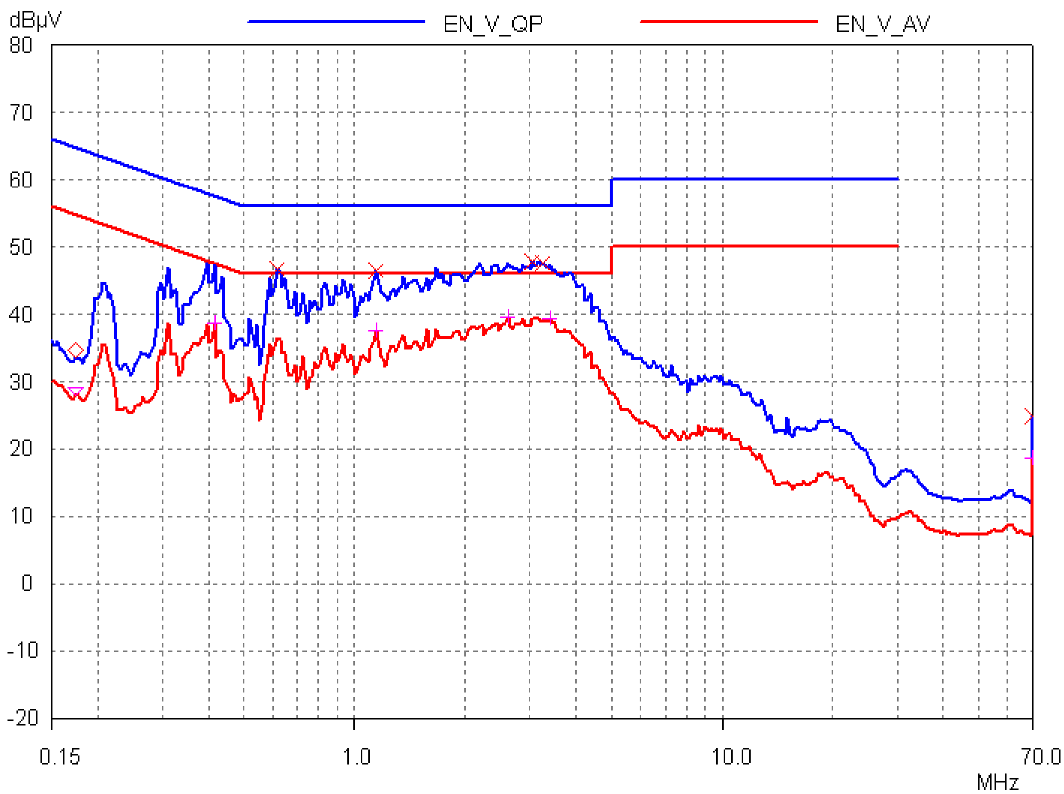

Figure 32 – Conducted EMI, Maximum Steady State Load with Artificial Hand 115 VAC, 60 Hz, and EN55022 B Limits.

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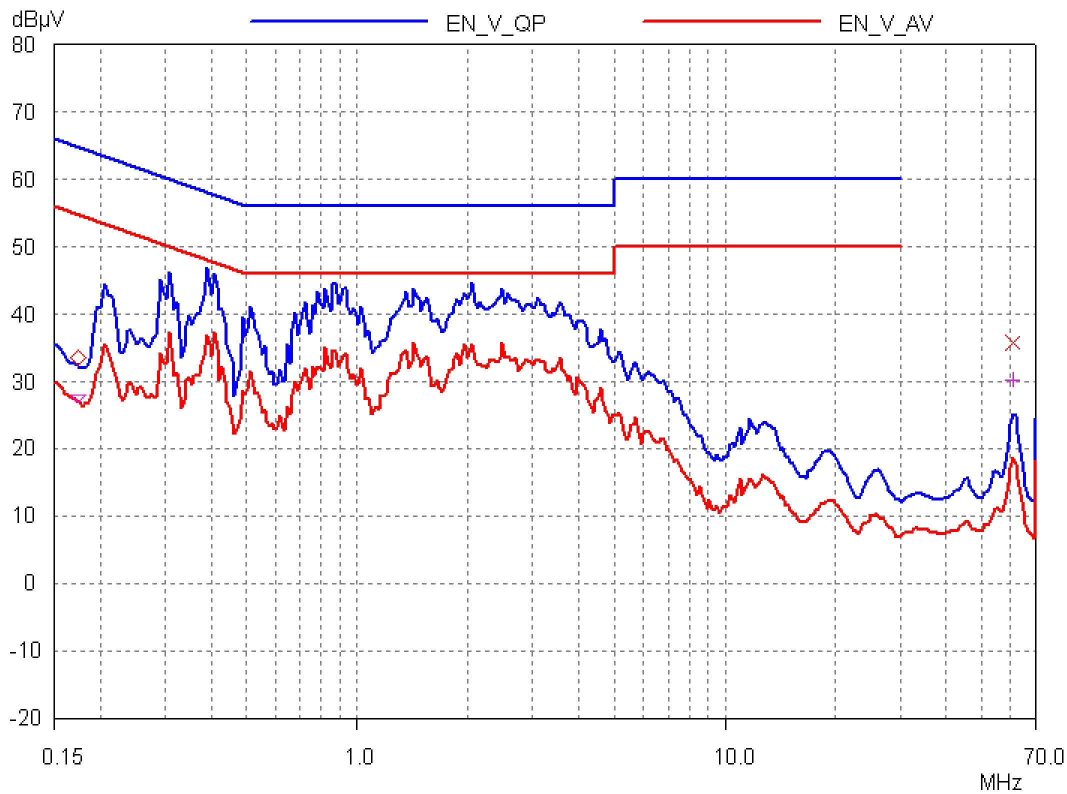

Figure 33 – Conducted EMI, Maximum Steady State Load Without Artificial Hand, 230 VAC, 60 Hz, and EN55022 B Limits.

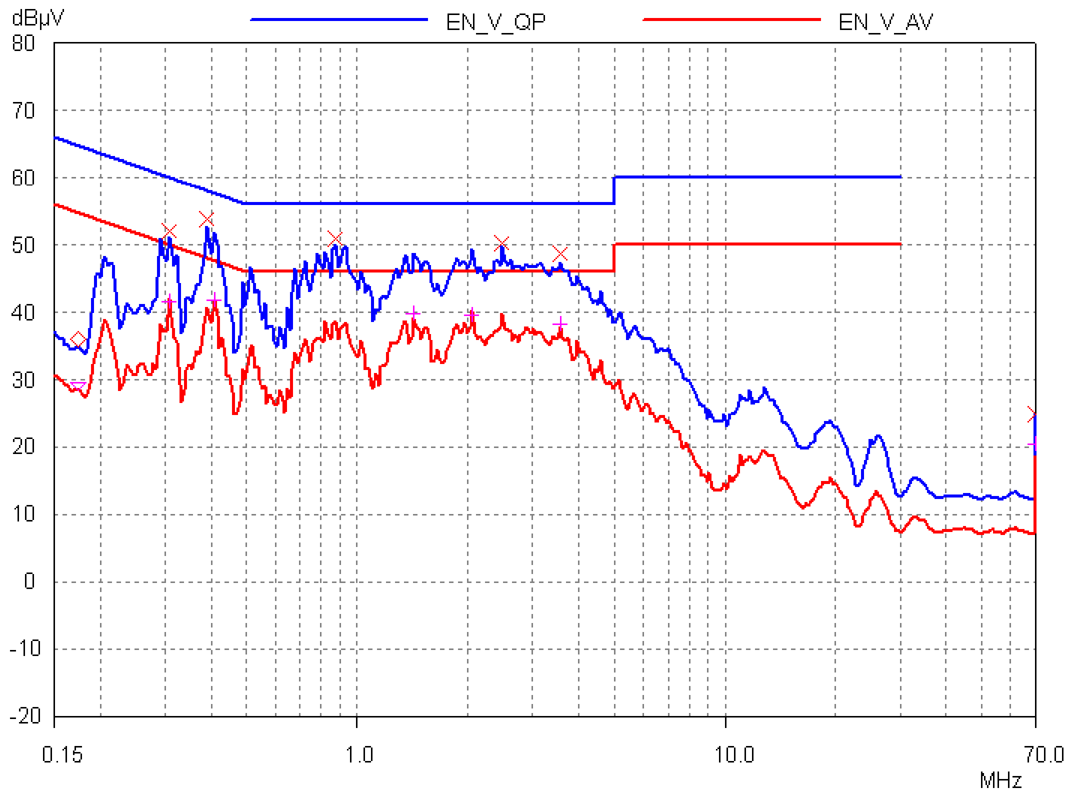

Figure 34 – Conducted EMI, Maximum Steady State Load with Artificial Hand, 230 VAC,60 Hz, and EN55022 B Limits.

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15 Revision History

Date	Author	Revision	Description & changes	Reviewed
25-Feb-09	JAC	1.0	Initial Release	PV

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Power Integrations Worldwide Sales Support Locations

WORLD HEADQUARTERS
5245 Hellyer Avenue
San Jose, CA 95138, USA.
Main: +1-408-414-9200
Customer Service:
Phone: +1-408-414-9665
Fax: +1-408-414-9765
e-mail: usasales@powerint.com

GERMANY
Rueckertstrasse 3
D-80336, Munich
Germany
Phone: +49-89-5527-3911
Fax: +49-89-5527-3920
e-mail: eurosales@powerint.com

JAPAN
Kosei Dai-3 Building
2-12-11, Shin-Yokohama,
Kohoku-ku, Yokohama-shi,
Kanagawa 222-0033
Japan
Phone: +81-45-471-1021
Fax: +81-45-471-3717
e-mail: japansales@powerint.com

TAIWAN
5F, No. 318, Nei Hu Rd., Sec. 1
Nei Hu District
Taipei 114, Taiwan R.O.C.
Phone: +886-2-2659-4570
Fax: +886-2-2659-4550
e-mail: taiwansales@powerint.com

CHINA (SHANGHAI)
Rm 1601/1610, Tower 1
Kerry Everbright City
No. 218 Tianmu Road West
Shanghai, P.R.C. 200070
Phone: +86-021-6354-6323
Fax: +86-021-6354-6325
e-mail: chinasales@powerint.com

INDIA
#1, 14th Main Road
Vasanthanagar
Bangalore-560052
India
Phone: +91-80-4113-8020
Fax: +91-80-4113-8023
e-mail: indiasales@powerint.com

KOREA
RM 602, 6FL
Korea City Air Terminal B/D, 159-6
Samsung-Dong, Kangnam-Gu,
Seoul, 135-728
Korea
Phone: +82-2-2016-6610
Fax: +82-2-2016-6630
e-mail: koreasales@powerint.com

UNITED KINGDOM
1st Floor, St. James's House
East Street,
Farnham Surrey, GU9 7TJ
United Kingdom
Phone: +44 (0) 1252-730-141
Fax: +44 (0) 1252-727-689
e-mail: eurosales@powerint.com

CHINA (SHENZHEN)
Rm A, B & C 4th Floor, Block C,
Electronics Science and
Technology Building
2070 Shennan Zhong Road
Shenzhen, Guangdong,
P.R.C. 518031
Phone: +86-755-8379-3243
Fax: +86-755-8379-5828
e-mail: chinasales@powerint.com

ITALY
Via De Amicis 2
20091 Bresso MI
Italy
Phone: +39-028-928-6000
Fax: +39-028-928-6009
e-mail: eurosales@powerint.com

SINGAPORE
51 Newton Road,
#15-08/10 Goldhill Plaza
Singapore, 308900
Phone: +65-6358-2160
Fax: +65-6358-2015
e-mail: singaporesales@powerint.com

APPLICATIONS HOTLINE
World Wide +1-408-414-9660

APPLICATIONS FAX
World Wide +1-408-414-9760