

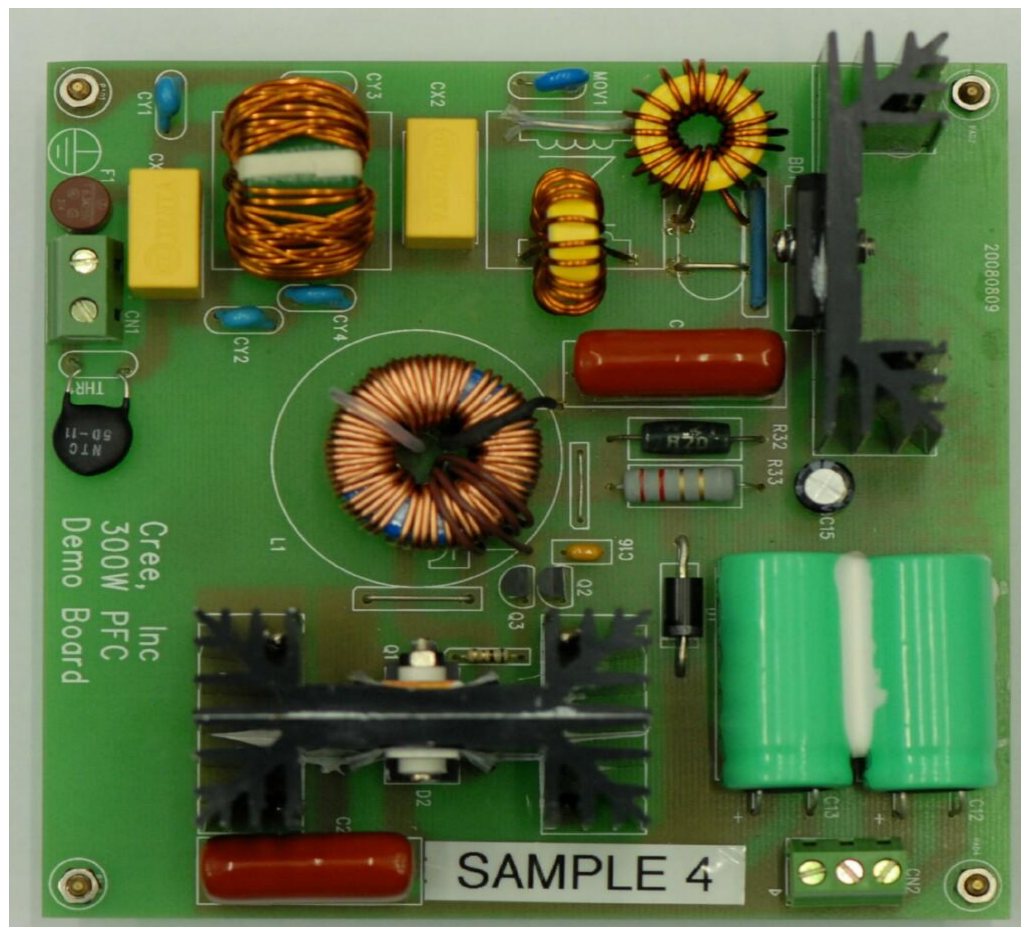
Cree® 300-W CCM PFC Demo Board

Features

- Designed to meet IEC1000-3-2
- Worldwide Line Operation 85 Vrms to 265 Vrms
- Regulated 385 Vdc, 300-W max output
- Switching frequency 130 kHz

Specifications

Input Voltage Range	90 Vac ~ 264 Vac 50 Hz/60 Hz
Output Power	300 W max
Output Voltage	385 Vdc +/-5%
Switching Frequency	130 kHz +/- 10%
Efficiency	90% min at 90 Vac Full load
	92% min at 115 Vac Full load
	95% min at 230 Vac Full load
Operating Temperature Range	0 °C to 40 °C
Mechanical Dimension	130 mm X 130 mm X 37 mm





Cree 300-W PFC BOM

Item No.	Circuit Code	Description	Manufacturer	Usage	Remarks
1	BD1	Bridge rectifier 6A/600V		1	
2	C1	Polyester Capacitor 1uF/400V		1	
3	C10	SMD Cap 0805 560pF/50V X7R		1	
4	C11	SMD Cap 0805 22nF/50V X7R		1	
5	C12	Electrolytic Cap 105 DegC 100uF/400V		1	
6	C13	Electrolytic Cap 105 DegC 100uF/400V		1	
7	C14	SMD Cap 0805 1uF/50V X7R		1	
8	C15	Electrolytic Cap 105 DegC 220uF/35V		1	
9	C16	Mono Cap 0.22uF/25V		1	
10	C17	SMD Cap 0805 4700pF/50V X7R		1	
11	C2	Polyester Capacitor 1uF/400V		1	
12	C3	SMD Cap 0805 1.2nF/50V X7R		1	
13	C4	SMD Cap 0805 270pF/50V X7R		1	
14	C5	SMD Cap 0805 150nF/50V X7R		1	
15	C6	SMD Cap 0805 2.2uF/50V X7R		1	
16	C7	SMD Cap 0805 2.2uF/50V X7R		1	
17	C8	SMD Cap 0805 1uF/50V X7R		1	
18	C9	SMD Cap 0805 0.01uF/50V X7R		1	
19	CN1	Green, Two Pins 7.5mm pitch		1	
20	CN2	Green, Three Pins 5.0 mm pitch		1	
21	CX1	X-Cap: X2 0.47uF/250V		1	
22	CX2	X-Cap: X2 0.47uF/250V		1	
23	Cy	Y-Cap: Y2 3300pF/250V		1	
24	CY1	Y-Cap: Y2 1000pF/250V		1	
25	CY2	Y-Cap: Y2 1000pF/250V		1	
26	CY3	Y-Cap: Y2 3300pF/250V		1	
27	CY4	Y-Cap: Y2 3300pF/250V		1	
28	D1	Diode MUR360 3A/600V	On Semi	1	
29	D2	SiC schottky diode CSD02060A 2A/600V	Cree	1	
30	D3	Silicon Schottky Diode 1N5819		1	
31	D4	Silicon Schottky Diode 1N5819		1	
32	D5	Silicon Diode 1N4148		1	
33	F1	Fuse T6A/250V		1	
34	J1	SMD Resistor 0R 1206 1/4W 5%		1	
35	J2	SMD Resistor 0R 1206 1/4W 5%		1	
36	JMP1	1mm dia copper wire L=14mm		1	
37	JMP2	0.6mm dia copper wire L=8mm		1	
38	JMP3	1mm dia copper wire L=16mm		1	
39	JMP4	0.6mm dia copper wire L=8mm		1	
40	L1	Boost Choke 320uH HF106060 65T AWG18		1	



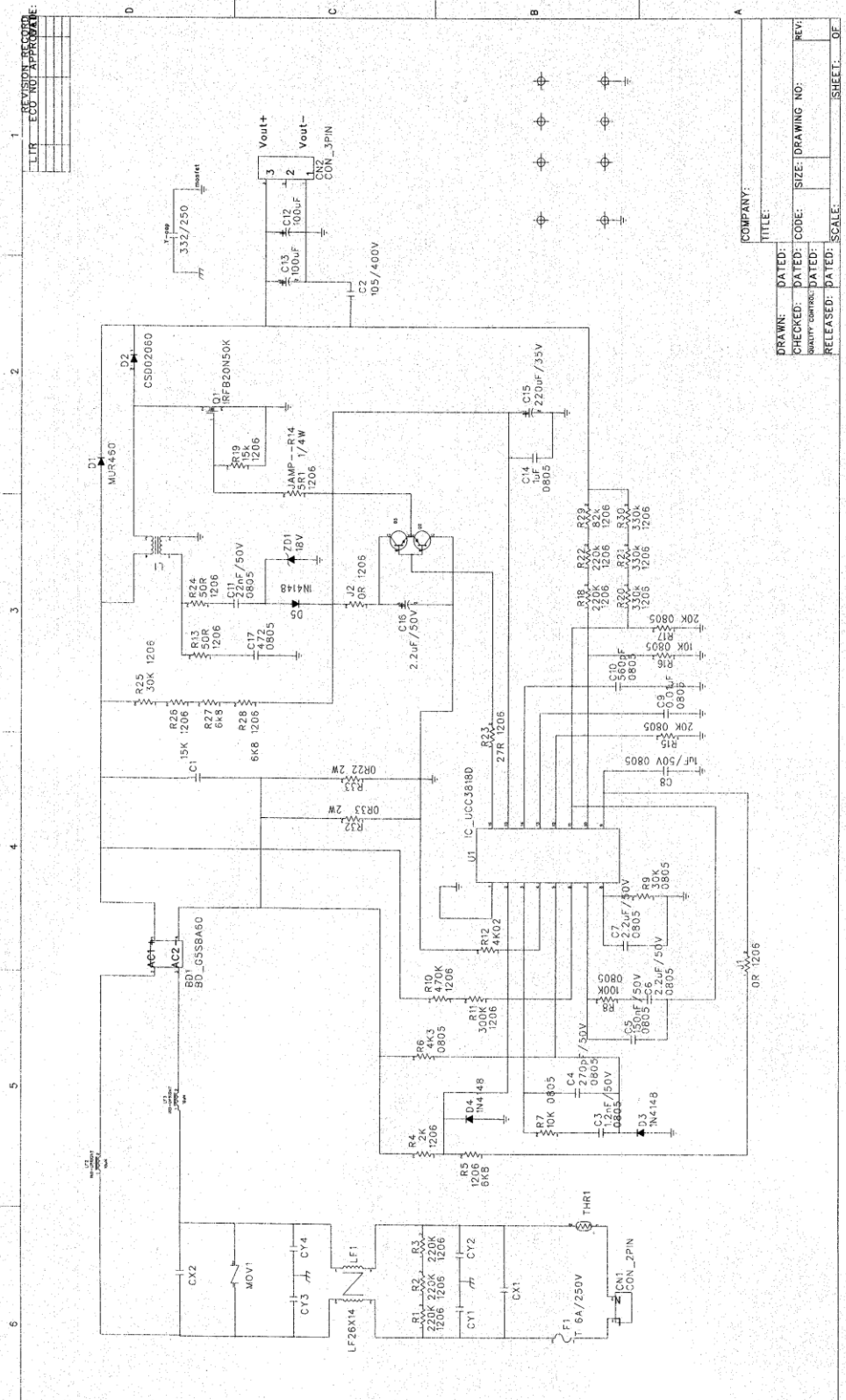
Cree 300-W PFC BOM

Item No.	Circuit Code	Description	Manufacturer	Usage	Remarks
41	LF1	Common Choke 18mH T25X15X15 35TX2 0.8mm wire		1	
42	LF2	Differential Choke 25uH T68-26A 20T 1mm wire			
43	LF3	Differential Choke 25uH T68-26A 20T 1mm wire		1	
44	MOV1	Varistor 5D471		1	
45	PCB	PCB 130mmx130mmx1.6mm Single Side FR4 2oz copper		1	
46	Q1	MosFet IRFB20N50K 20A/500V Rdson 0.21Ohm	IR	1	
47	Q2	NPN Transistor 2N3904		1	
48	Q3	PNP Transistor 2N3906		1	
49	R1	SMD Resistor 220K 1206 1/4W 5%		1	
50	R10	SMD Resistor 470K 1206 1/4W 5%		1	
51	R11	SMD Resistor 300K 1206 1/4W 5%		1	
52	R12	SMD Resistor 4K 1206 1/4W 5%		1	
53	R13	SMD Resistor 50R 1206 1/4W 5%		1	
54	R14	SMD Resistor 5R1 1206 1/4W 5%		1	
55	R15	SMD Resistor 20K 0805 1/4W 5%		1	
56	R16	SMD Resistor 10K 0805 1/4W 5%		1	
57	R17	SMD Resistor 20K 0805 1/4W 5%		1	
58	R18	SMD Resistor 220K 1206 1/4W 5%		1	
59	R19	SMD Resistor 15K 1206 1/4W 5%		1	
60	R2	SMD Resistor 220K 1206 1/4W 5%		1	
61	R20	SMD Resistor 330K 1206 1/4W 5%		1	
62	R21	SMD Resistor 330K 1206 1/4W 5%		1	
63	R22	SMD Resistor 220K 1206 1/4W 5%		1	
64	R23	SMD Resistor 27R 1206 1/4W 5%		1	
65	R24	SMD Resistor 50R 1206 1/4W 5%		1	
66	R25	SMD Resistor 30K 1206 1/4W 5%		1	
67	R26	SMD Resistor 15K 1206 1/4W 5%		1	
68	R27	SMD Resistor 6K8 1206 1/4W 5%		1	
69	R28	SMD Resistor 6K8 1206 1/4W 5%		1	
70	R29	SMD Resistor 82K 1206 1/4W 5%		1	
71	R3	SMD Resistor 220K 1206 1/4W 5%		1	
72	R30	SMD Resistor 330K 1206 1/4W 5%		1	
73	R32	MOF Resistor 0.33R 2W 5%		1	
74	R33	MOF Resistor 0.33R 2W 5%		1	
75	R4	SMD Resistor 2K 1206 1/4W 5%		1	
76	R5	SMD Resistor 6K8 1206 1/4W 5%		1	
77	R6	SMD Resistor 4K3 0805 1/4W 5%		1	
78	R7	SMD Resistor 10K 0805 1/4W 5%		1	
79	R8	SMD Resistor 100K 0805 1/4W 5%		1	
80	R9	SMD Resistor 30K 0805 1/4W 5%		1	



Cree 300-W PFC BOM

Item No.	Circuit Code	Description	Manufacturer	Usage	Remarks
81	THR1	NTC 5D-11		1	
82	U1	PFC IC UCC3818D SOT16	TI	1	
83	ZD1	Zener Diode 16V 0.5W		1	
84		Stand off / Nut		4	
85		Heat Sink 60mm x 32mm x 16mm		3	
86		Self Tap screw M3x8		5	
87		Silicon Rubber for TO-220		2	
88		Plastic washer for TO-220		2	
89		M3 x 13 machine screw		1	
90		M3 x 8 machine screw		1	



REV	DESCRIPTION	DATE
1	ECO NOT APPROVED	

COMPANY:	TITLE:
DRAWN:	DATED:
CHECKED:	DATED:
QUALITY CONTROL:	DATED:
RELEASED:	DATED:
SIZE:	DRAWING NO.:
SCALE:	REV.:
	SHEET: OF



Cree 300-W Demo Board

New Layout

CSD02060A/IRFB20N50K Ambient Temperature: 24 DegC

Line Freq (Hz)	Vin (V)	Iin (A)	Pin (W)	PF	Vout (V)	Iout (A)	Pout (W)	Eff	H/S temp Deg C	Bridge H/S Temp Deg C	Ambient Temp Deg C	Remarks
50Hz	90	3.789	334.6	0.98	373.3	0.81	302.0	90.26%	88.0	82.0	24.0	Thermally stable
50Hz	115	2.893	324.5	0.98	373.6	0.81	302.2	93.13%	72.0	70.0	23.8	Thermally stable
50Hz	220	1.512	316.4	0.95	374.9	0.81	303.3	95.85%	52.0	51.0	24.0	Thermally stable
50Hz	264	1.278	315.6	0.94	375.1	0.81	303.5	96.16%	50.0	47.0	24.0	Thermally stable
50Hz	90	3.716	330.4	0.99	373.5	0.81	302.2	91.46%				Cold Start
50Hz	115	2.878	324.6	0.99	373.4	0.80	302.1	93.08%				Cold Start
50Hz	90	0.435	36.0	0.92	376.9	0.08	30.2	83.94%				
50Hz	90	0.791	68.4	0.96	376.0	0.16	60.3	88.11%				
50Hz	90	1.131	98.4	0.97	375.5	0.24	90.3	91.75%				
50Hz	90	1.496	130.8	0.97	375.3	0.32	120.3	91.99%				
50Hz	90	1.900	166.7	0.98	374.8	0.41	153.1	91.86%				
50Hz	90	2.247	197.8	0.98	374.5	0.49	183.0	92.50%				
50Hz	90	3.007	265.2	0.98	374.0	0.65	242.7	91.52%				
50Hz	90	3.752	331.7	0.98	373.5	0.81	302.3	91.14%				
50Hz	100	0.396	36.1	0.91	376.6	0.08	30.2	83.66%				
50Hz	100	0.723	68.2	0.94	375.7	0.16	60.3	88.42%				
50Hz	100	1.026	99.5	0.97	374.5	0.24	90.2	90.64%				
50Hz	100	1.361	132.5	0.97	374.1	0.32	120.3	90.79%				
50Hz	100	1.703	166.7	0.98	373.3	0.41	152.5	91.51%				
50Hz	100	1.970	193.2	0.98	373.1	0.48	179.3	92.80%				
50Hz	100	2.671	263.0	0.99	372.4	0.65	241.7	91.89%				
50Hz	100	3.303	326.1	0.99	371.9	0.81	300.9	92.27%				
50Hz	115	0.325	34.3	0.92	377.1	0.08	30.2	88.00%				
50Hz	115	0.622	67.6	0.95	376.5	0.16	60.3	89.24%				
50Hz	115	0.895	98.6	0.96	376.1	0.24	90.4	91.68%				
50Hz	115	1.167	129.7	0.97	375.5	0.32	120.3	92.75%				
50Hz	115	1.487	166.2	0.97	375.1	0.41	153.2	92.17%				
50Hz	115	1.743	195.1	0.97	374.7	0.49	183.1	93.83%				
50Hz	115	2.319	260.6	0.98	374.2	0.65	242.8	93.16%				
50Hz	115	2.879	324.2	0.98	373.8	0.81	302.4	93.29%				
50Hz	120	0.324	35.6	0.91	377.1	0.08	30.2	84.88%				
50Hz	120	0.595	67.2	0.94	376.5	0.16	60.3	89.75%				
50Hz	120	0.853	98.1	0.96	376.2	0.24	90.4	92.11%				
50Hz	120	1.118	129.2	0.96	375.5	0.32	120.3	93.09%				
50Hz	120	1.391	162.0	0.97	375.1	0.40	150.3	92.76%				
50Hz	120	1.644	192.3	0.97	374.7	0.48	180.1	93.67%				



Cree 300-W Demo Board

New Layout

CSD02060A/IRFB20N50K Ambient Temperature: 24 DegC

Line Freq (Hz)	Vin (V)	Iin (A)	Pin (W)	PF	Vout (V)	Iout (A)	Pout (W)	Eff	H/S temp Deg C	Bridge H/S Temp Deg C	Ambi-ent Temp Deg C	Remarks
50Hz	120	2.215	259.8	0.98	374.1	0.65	242.8	93.47%				
50Hz	120	2.753	323.2	0.98	373.8	0.81	302.4	93.57%				
50Hz	150	0.275	35.4	0.86	377.1	0.08	30.2	85.36%				
50Hz	150	0.479	66.7	0.93	376.8	0.16	60.4	90.60%				
50Hz	150	0.685	96.4	0.94	376.4	0.24	90.5	93.89%				
50Hz	150	0.907	128.5	0.95	376.1	0.32	120.5	93.76%				
50Hz	150	1.130	161.3	0.95	375.9	0.40	150.6	93.37%				
50Hz	150	1.345	193.8	0.96	375.1	0.49	183.3	94.61%				
50Hz	150	1.779	257.6	0.97	374.5	0.65	243.0	94.34%				
50Hz	150	2.194	318.5	0.97	374.1	0.81	302.7	95.04%				
50Hz	180	0.246	35.3	0.80	377.0	0.08	30.2	85.58%				
50Hz	180	0.406	66.5	0.91	376.8	0.16	60.4	90.83%				
50Hz	180	0.574	95.8	0.93	376.6	0.24	90.5	94.52%				
50Hz	180	0.751	127.9	0.95	376.4	0.32	120.6	94.28%				
50Hz	180	0.943	160.7	0.95	375.8	0.40	150.5	93.66%				
50Hz	180	1.111	190.3	0.95	375.6	0.48	180.6	94.92%				
50Hz	180	1.482	256.5	0.96	374.7	0.65	243.2	94.83%				
50Hz	180	1.822	317.9	0.97	374.3	0.81	302.9	95.28%				
50Hz	200	0.229	35.3	0.77	377.1	0.08	30.2	85.46%				
50Hz	200	0.376	66.5	0.88	376.7	0.16	60.4	90.87%				
50Hz	200	0.526	95.9	0.91	376.4	0.24	90.5	94.40%				
50Hz	200	0.684	127.4	0.93	376.6	0.32	120.7	94.71%				
50Hz	200	0.850	160.3	0.94	376.1	0.40	150.7	94.04%				
50Hz	200	1.019	192.4	0.94	375.8	0.49	183.6	95.44%				
50Hz	200	1.345	256.0	0.95	375.3	0.65	243.5	95.11%				
50Hz	200	1.652	317.3	0.96	374.6	0.81	303.1	95.52%				
50Hz	220	0.204	35.6	0.79	376.9	0.08	30.2	84.93%				
50Hz	220	0.361	66.4	0.84	376.7	0.16	60.4	90.95%				
50Hz	220	0.486	95.6	0.89	376.9	0.24	90.4	94.58%				
50Hz	220	0.631	127.3	0.92	376.2	0.32	120.6	94.74%				
50Hz	220	0.779	159.6	0.93	376.2	0.40	150.7	94.43%				
50Hz	220	0.935	193.1	0.94	375.7	0.49	183.6	95.10%				
50Hz	220	1.226	255.3	0.95	375.2	0.65	243.5	95.39%				
50Hz	220	1.512	316.4	0.95	374.9	0.81	303.3	95.85%				
50Hz	240	0.213	35.6	0.69	377.0	0.08	30.2	89.12%				
50Hz	240	0.348	67.7	0.81	376.6	0.16	60.3	89.12%				



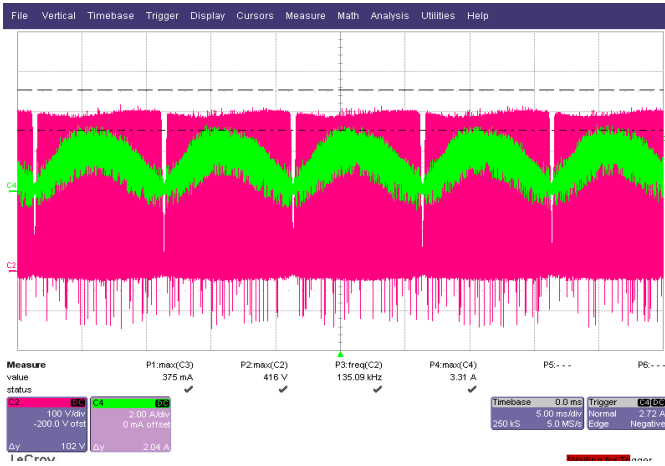
Cree 300-W Demo Board

New Layout

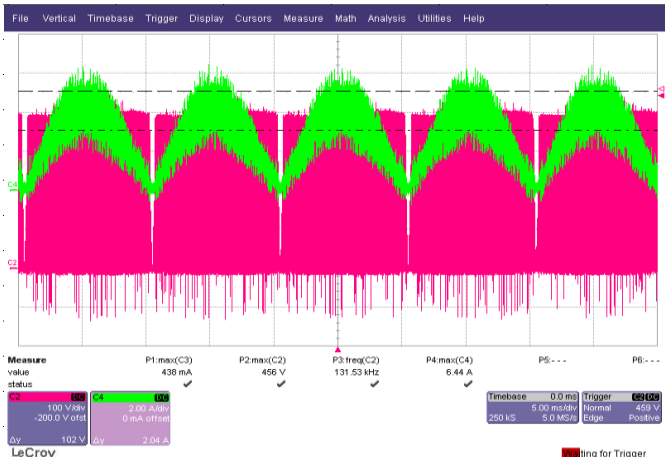
CSD02060A/IRFB20N50K Ambient Temperature: 24 DegC

Line Freq (Hz)	Vin (V)	Iin (A)	Pin (W)	PF	Vout (V)	Iout (A)	Pout (W)	Eff	H/S temp Deg C	Bridge H/S Temp Deg C	Ambi-ent Temp Deg C	Remarks
50Hz	240	0.451	95.5	0.88	376.3	0.24	90.4	94.69%				
50Hz	240	0.593	128.2	0.90	376.1	0.32	120.5	94.01%				
50Hz	240	0.728	160.6	0.92	376.1	0.40	150.6	93.79%				
50Hz	240	0.862	192.5	0.93	376.1	0.49	183.8	95.50%				
50Hz	240	1.131	255.0	0.94	375.3	0.65	243.5	95.51%				
50Hz	240	1.394	316.1	0.95	375.0	0.81	303.4	95.99%				
50Hz	264	0.216	35.7	0.63	377.1	0.08	30.2	84.71%				
50Hz	264	0.325	66.5	0.77	376.6	0.16	60.3	90.70%				
50Hz	264	0.428	94.1	0.83	376.4	0.24	90.4	96.07%				
50Hz	264	0.550	128.2	0.88	376.1	0.32	120.5	93.99%				
50Hz	264	0.672	159.2	0.90	375.9	0.40	150.6	94.61%				
50Hz	264	0.799	192.1	0.91	375.9	0.49	183.6	95.57%				
50Hz	264	1.034	254.3	0.93	375.5	0.65	243.2	95.64%				
50Hz	264	1.278	315.6	0.94	375.1	0.81	303.5	96.16%				

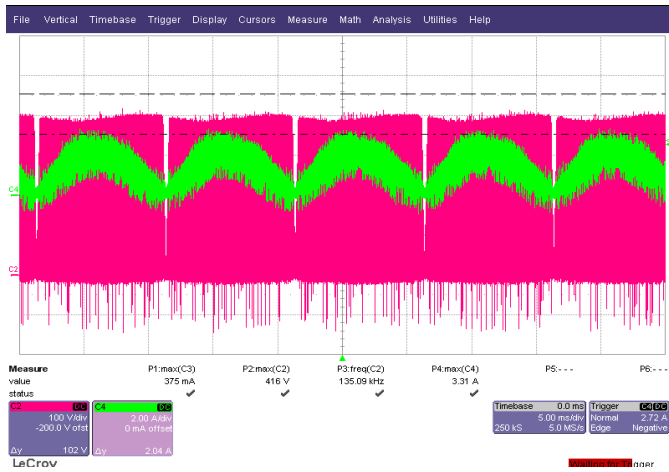
Waveform at 90 Vac input 300 W output



Waveform at 115 Vac input 300 W output

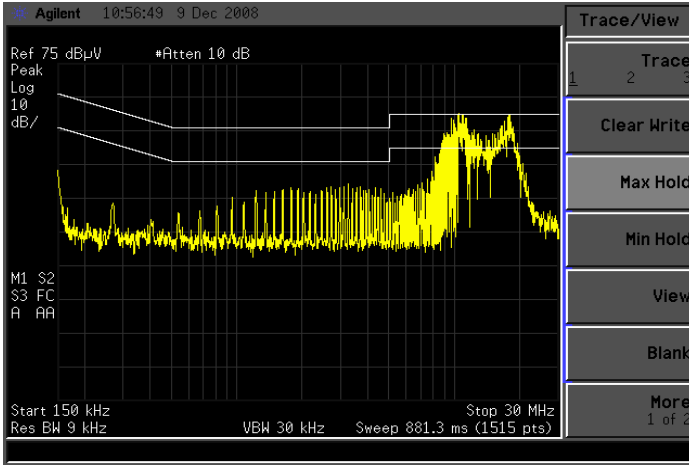


Waveform at 220 Vac input 300 W output

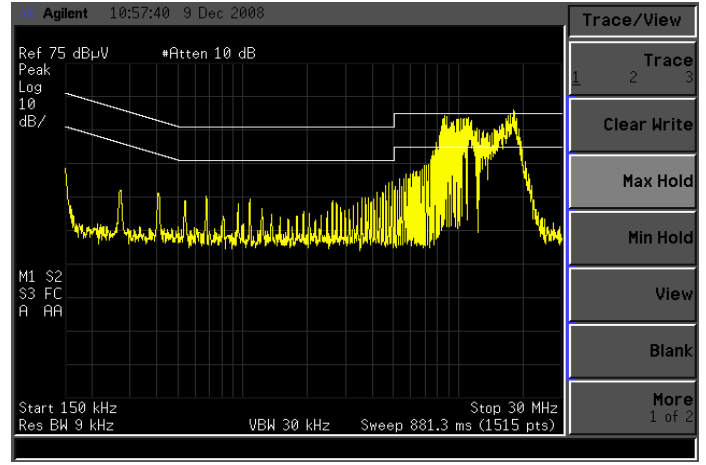


Waveform at 264 Vac input 300 W output

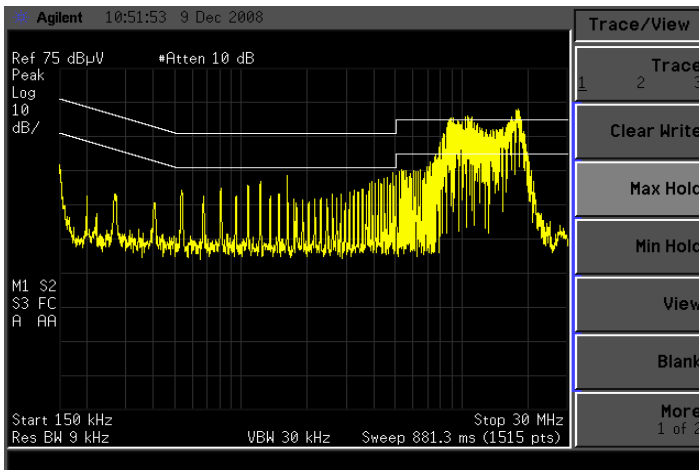




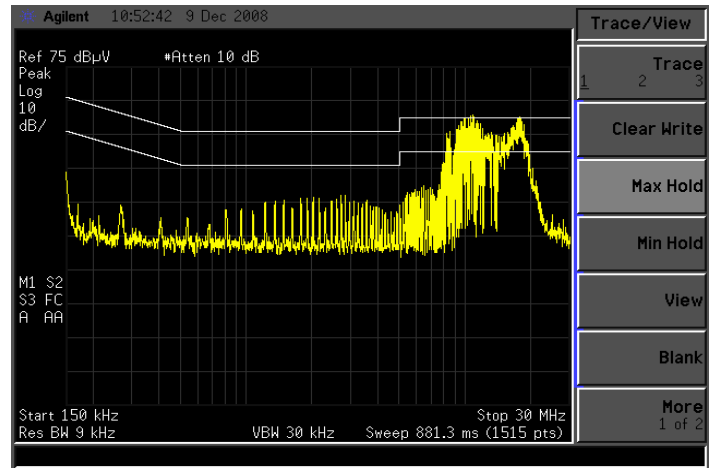
Conducted EMI plot 115 V L1 300 W resistive load



Conducted EMI plot 115 V L2 300 W resistive load



Conducted EMI plot 230 V L1 300 W resistive load



Conducted EMI plot 230 V L2 300 W resistive load