



FSP QUALIFICATION TEST REPORT

Customer: **RD-1**Model name: **FSP500-60EGN**Tested by: **Brian Chien**Report Rev: **02**Stage: **B-TEST**

Checked by:

Spec. Rev: **1**Date: **2010/09/27**

Approved by:

Sample Rev:

Item	Sub-Item	Results	Page	Comments
Input Characteristics	Efficiency	Pass	1-2	
	Power factor	Pass	1	
	Input current	Pass	1	
	Inrush current	Pass	3	
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	Hold up time	Pass	24	
Output Characteristics	Output Voltage Regulation	Pass	4-6	
	Ripple & Noise	Pass	7-9	
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	P.G.Delay timing	Pass	25	
	P.G fail timing	Pass	26	
	Overshoot	Pass	15-17	
Protections	Short circuit	Pass	18-19	
	Over current	Pass	20	
	Over voltage	Pass	21-22	
Safety	Leakage current	Pass	51	
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	Insulation resistance	Pass	53	
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	Current Harmonic	Pass	28-30	EN61000-3-2
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	ESD	Pass	63-64	EN61000-4-2
	EFT	Pass	65-66	EN61000-4-4
	AC Voltage Dips	Pass	78	EN61000-4-11

表單編號:A000W-00502

Efficiency

1. Specification:

AC Input	Input line current	Minimum Efficiency		
		Full load (100%)	Typical load (50%)	Light load (20%)
115V	<8Amps-rms	87%	90%	87%
230V	<4Amps-rms	87%	90%	87%

2. Test condition:

- ✧ AC Input: 115Vac/230Vac
- ✧ Frequency: 60Hz/50Hz
- ✧ Ambient Temperature: 25°C

Loading	+5V	+12V1	+12V2	-12V	+3.3V	+5Vsb
Full	13.37A	15.37A	15.37A	0.29A	13.37A	3.36A
Typical	6.69A	7.68A	7.68A	0.14A	6.69A	1.68A
Light	2.69A	3.07A	3.07A	0.06A	2.69A	0.67A

3. Test record

Vin(V)	Fin(Hz)	Load	Vinrms(V)	linrms(A)	Pin(W)	Pout(W)	PF	EFF(%)	Result
115	60	Full	115.020	4.904	560.659	490.605	0.999	87.505	Pass
		Typical	114.790	2.441	274.701	248.610	0.997	90.502	Pass
		Light	115.220	1.009	113.599	100.066	0.986	88.087	Pass
230	50	Full	230.340	2.397	549.068	489.813	0.990	89.208	Pass
		Typical	230.690	1.212	272.351	246.734	0.977	90.594	Pass
		Light	230.880	0.531	112.068	98.912	0.925	88.261	Pass

Efficiency (Erp)

1. Specification:

Load Condition	Criteria : +5Vsb Eff.	Remark
No load	---	Reference
90 mA	Efficiency \geq 50%	Recommend
100 mA	Input Power < 1W	Regulation
250 mA	Efficiency \geq 60%	Reference
\geq 1A	Efficiency \geq 70%	Reference

2. Test condition:

- ✧ AC Input: 230Vac
- ✧ Frequency: 50Hz
- ✧ Ambient Temperature: 25°C
- ✧ PS-ON Signal: High state (Standby mode)
- ✧ Warm up time: 15 minutes minimum

Loading	+5V	+12V1	+12V2	-12V	+3.3V	+5Vsb
No load	---	---	---	---	---	0A
90mA	---	---	---	---	---	0.09A
100mA	---	---	---	---	---	0.1A
250mA	---	---	---	---	---	0.25A
1A	---	---	---	---	---	1A

3. Test record

Vin(V)	Fin(Hz)	Load	Vinrms(V)	Iinrms(A)	Pin(W)	Pout(W)	EFF(%)	Vout(V)	Result
230	50	No load	231.010	0.066	0.225	0	---	5.102	Pass
		90mA	231.010	0.066	0.794	0.456	57.491	5.100	Pass
		100mA	231.010	0.067	0.840	0.511	60.864	5.100	Pass
		250mA	231.000	0.070	1.750	1.275	72.832	5.095	Pass
		1A	231.000	0.106	6.548	5.084	77.635	5.076	Pass

Inrush Current

1. Specification:

Repetitive ON/OFF cycling of the AC input voltage should not damage the power supply or cause the input fuse to blow.

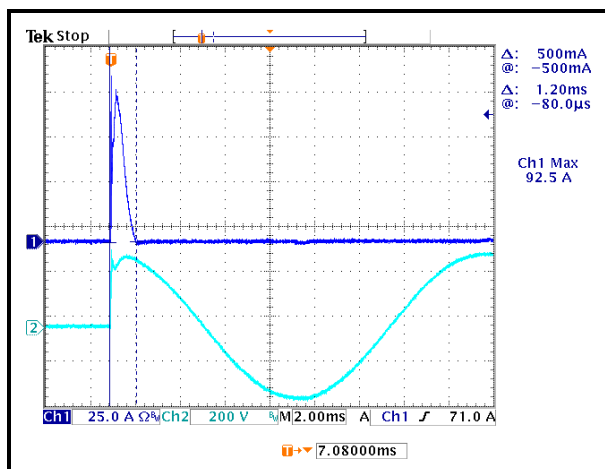
2. Test condition:

- ✧ AC Input: 220Vac
- ✧ Frequency: 60Hz
- ✧ Ambient Temperature: 25°C

Loading	+5V	+12V1	+12V2	-12V	+3.3V	+5Vsb
FL1	24A	15A	14.1A	0.3A	3A	3.5A

3. Test record

Vin	Fin	Loading	SPEC (A)	Bridge Peak Forward Surge current (A)	Fuse SPEC (A ² sec)	Ip (A)	t(mS)	Ip ² * t (A ² sec)	Result
220	60	FL1	*	200	---	92.5	1.2	10.27	PASS



CH1 : Iin=92.5A

CH2 : AC Input (220Vac/60Hz)

Load : FL1

Output voltage regulation

1. Specification:

Outputs		+5V	+12V1	+12V2	-12V	+3.3V	+5Vsb
Vout Range(V)	Min	4.75	11.40	11.40	-10.80	3.135	4.75
	Max	5.25	12.60	12.60	-13.20	3.465	5.25

2. Test condition:

- ✧ AC Input: 90Vac/115Vac/230Vac/264Vac
- ✧ Frequency: 47Hz/60Hz/50Hz/63Hz
- ✧ Ambient Temperature: 25°C

Loading	+5V	+12V1	+12V2	-12V	+3.3V	+5Vsb
COND.1	---	---	---	---	---	3.5A
COND.2	0.2A	0.1A	0A	0A	0.1A	0A
COND.3	1A	2A	2A	0A	24A	0.1A
COND.4	24A	2A	2A	0A	0.1A	0.1A
COND.5	2A	18A	18A	0A	2A	0.1A
COND.6	3.6A	2.6A	2.4A	0.1A	3.6A	0.2A
COND.7	9A	6.5A	6A	0.15A	9A	0.5A
COND.8	14A	12A	13A	0.3A	13A	1A
COND.9	13.37A	15.37A	15.37A	0.29A	13.37A	3.36A
COND.10	16A	16A	6A	0.3A	16A	2A

3. Test record

Vin (Vac)	Fin (Hz)	Loading	Regulation Output (Vdc)						Result
			+5V	+12V1	+12V2	-12V	+3.3V	+5Vsb	
90	47	COND.1	---	---	---	---	---	4.968	PASS
		COND.2	5.068	12.200	12.212	-12.725	3.247	5.045	PASS
		COND.3	5.005	12.177	12.172	-12.993	3.158	5.000	PASS
		COND.4	4.883	12.413	12.375	-13.000	3.217	5.017	PASS
		COND.5	5.170	11.485	11.475	-12.358	3.197	4.997	PASS
		COND.6	5.082	12.060	12.052	-12.243	3.225	5.028	PASS
		COND.7	5.020	12.050	12.007	-12.295	3.193	5.003	PASS
		COND.8	4.977	11.913	11.802	-12.185	3.158	4.965	PASS
		COND.9	4.995	11.810	11.705	-12.167	3.170	4.923	PASS
		COND.10	4.943	11.958	11.985	-12.233	3.152	4.943	PASS
115	60	COND.1	---	---	---	---	---	4.970	PASS
		COND.2	5.073	12.198	12.210	-12.722	3.247	5.048	PASS
		COND.3	5.005	12.182	12.182	-12.995	3.165	5.000	PASS
		COND.4	4.885	12.417	12.385	-13.003	3.223	5.017	PASS
		COND.5	5.168	11.490	11.475	-12.365	3.197	4.997	PASS
		COND.6	5.082	12.063	12.060	-12.248	3.227	5.028	PASS
		COND.7	5.023	12.052	12.028	-12.302	3.200	5.000	PASS
		COND.8	4.983	11.927	11.842	-12.195	3.165	4.965	PASS
		COND.9	4.985	11.805	11.722	-12.185	3.170	4.912	PASS
		COND.10	4.943	11.965	11.993	-12.240	3.158	4.943	PASS
230	50	COND.1	---	---	---	---	---	4.965	PASS
		COND.2	5.015	12.065	12.073	-12.520	3.318	5.057	PASS
		COND.3	4.957	12.063	12.052	-12.615	3.168	5.015	PASS
		COND.4	4.832	12.313	12.265	-12.868	3.293	5.030	PASS
		COND.5	5.140	11.487	11.468	-12.248	3.263	5.012	PASS
		COND.6	5.030	11.930	11.922	-12.123	3.287	5.040	PASS
		COND.7	4.975	11.948	11.908	-12.180	3.243	5.012	PASS
		COND.8	4.950	11.877	11.792	-12.113	3.200	4.977	PASS
		COND.9	4.970	11.788	11.715	-12.108	3.188	4.920	PASS
		COND.10	4.915	11.935	11.917	-12.158	3.190	4.950	PASS
264	63	COND.1	---	---	---	---	---	4.965	PASS
		COND.2	5.015	12.065	12.070	-12.517	3.318	5.057	PASS
		COND.3	4.955	12.065	12.057	-12.618	3.235	5.012	PASS
		COND.4	4.832	12.313	12.270	-12.870	3.293	5.030	PASS
		COND.5	5.140	11.487	11.470	-12.248	3.275	5.010	PASS
		COND.6	5.030	11.935	11.925	-12.125	3.297	5.040	PASS

	COND.7	4.977	11.948	11.913	-12.182	3.267	5.010	PASS
	COND.8	4.952	11.880	11.800	-12.115	3.237	4.975	PASS
	COND.9	4.968	11.795	11.708	-12.120	3.227	4.915	PASS
	COND.10	4.915	11.927	11.925	-12.155	3.227	4.950	PASS

Ripple & Noise

1. Specification:

Outputs	+5V	+12V1	+12V2	-12V	+3.3V	+5Vsb
Ripple-Noise(Vp-p)	0.05	0.12	0.12	0.20	0.05	0.05

2. Test condition:

- ✧ AC Input: 90Vac/115Vac/230Vac/264Vac
- ✧ Frequency: 47Hz/60Hz/50Hz/63Hz
- ✧ Ambient Temperature: 25°C

Loading	+5V	+12V1	+12V2	-12V	+3.3V	+5Vsb
COND.1	---	---	---	---	---	3.5A
COND.2	0.2A	0.1A	0A	0A	0.1A	0A
COND.3	1A	2A	2A	0A	24A	0.1A
COND.4	24A	2A	2A	0A	0.1A	0.1A
COND.5	2A	18A	18A	0A	2A	0.1A
COND.6	3.6A	2.6A	2.4A	0.1A	3.6A	0.2A
COND.7	9A	6.5A	6A	0.15A	9A	0.5A
COND.8	14A	12A	13A	0.3A	13A	1A
COND.9	13.37A	15.37A	15.37A	0.29A	13.37A	3.36A
COND.10	16A	16A	6A	0.3A	16A	2A

3. Test Record:

Vin (Vac)	Fin (Hz)	Loading	Ripple & Noise (Vp-p)						Result
			+5V	+12V1	+12V2	-12V	+3.3V	+5Vsb	
90	47	COND.1	---	---	---	---	---	0.017	PASS
		COND.2	0.043	0.030	0.026	0.024	0.023	0.014	PASS
		COND.3	0.039	0.028	0.028	0.022	0.031	0.015	PASS
		COND.4	0.041	0.033	0.031	0.028	0.033	0.017	PASS
		COND.5	0.037	0.046	0.046	0.037	0.042	0.021	PASS
		COND.6	0.023	0.031	0.029	0.035	0.033	0.015	PASS
		COND.7	0.026	0.037	0.037	0.044	0.036	0.017	PASS
		COND.8	0.036	0.056	0.055	0.071	0.041	0.022	PASS
		COND.9	0.040	0.067	0.066	0.080	0.041	0.018	PASS
		COND.10	0.038	0.057	0.055	0.069	0.040	0.041	PASS
115	60	COND.1	---	---	---	---	---	0.016	PASS
		COND.2	0.041	0.030	0.026	0.024	0.024	0.015	PASS
		COND.3	0.044	0.028	0.027	0.021	0.030	0.015	PASS
		COND.4	0.042	0.033	0.029	0.027	0.030	0.016	PASS
		COND.5	0.032	0.038	0.038	0.036	0.039	0.021	PASS
		COND.6	0.024	0.030	0.029	0.033	0.030	0.016	PASS
		COND.7	0.026	0.032	0.032	0.040	0.034	0.017	PASS
		COND.8	0.031	0.046	0.045	0.061	0.038	0.022	PASS
		COND.9	0.035	0.054	0.052	0.067	0.039	0.019	PASS
		COND.10	0.033	0.047	0.045	0.060	0.037	0.041	PASS
230	50	COND.1	---	---	---	---	---	0.022	PASS
		COND.2	0.042	0.030	0.027	0.024	0.026	0.015	PASS
		COND.3	0.040	0.027	0.027	0.023	0.031	0.015	PASS
		COND.4	0.043	0.032	0.029	0.028	0.031	0.017	PASS
		COND.5	0.030	0.035	0.034	0.036	0.038	0.021	PASS
		COND.6	0.023	0.028	0.028	0.033	0.030	0.016	PASS
		COND.7	0.025	0.032	0.033	0.039	0.033	0.017	PASS
		COND.8	0.030	0.044	0.041	0.057	0.036	0.022	PASS
		COND.9	0.032	0.049	0.047	0.062	0.037	0.019	PASS
		COND.10	0.032	0.044	0.042	0.056	0.036	0.042	PASS
264	63	COND.1	---	---	---	---	---	0.023	PASS
		COND.2	0.040	0.037	0.034	0.030	0.025	0.017	PASS
		COND.3	0.042	0.034	0.031	0.027	0.029	0.016	PASS
		COND.4	0.041	0.041	0.038	0.036	0.028	0.018	PASS
		COND.5	0.034	0.039	0.045	0.047	0.036	0.024	PASS
		COND.6	0.027	0.033	0.036	0.044	0.026	0.020	PASS

	COND.7	0.031	0.039	0.044	0.051	0.032	0.022	PASS
	COND.8	0.034	0.051	0.058	0.073	0.035	0.027	PASS
	COND.9	0.035	0.054	0.065	0.076	0.038	0.022	PASS
	COND.10	0.037	0.049	0.052	0.069	0.036	0.042	PASS

Dynamic load

1. Specification:

Outputs		+5V	+12V	-12V	+3.3V	+5Vsb
Vout Range	Min	4.75V	11.4V	-10.80V	3.135V	4.75V
	Max	5.25V	12.6V	-13.20V	3.465V	5.25V

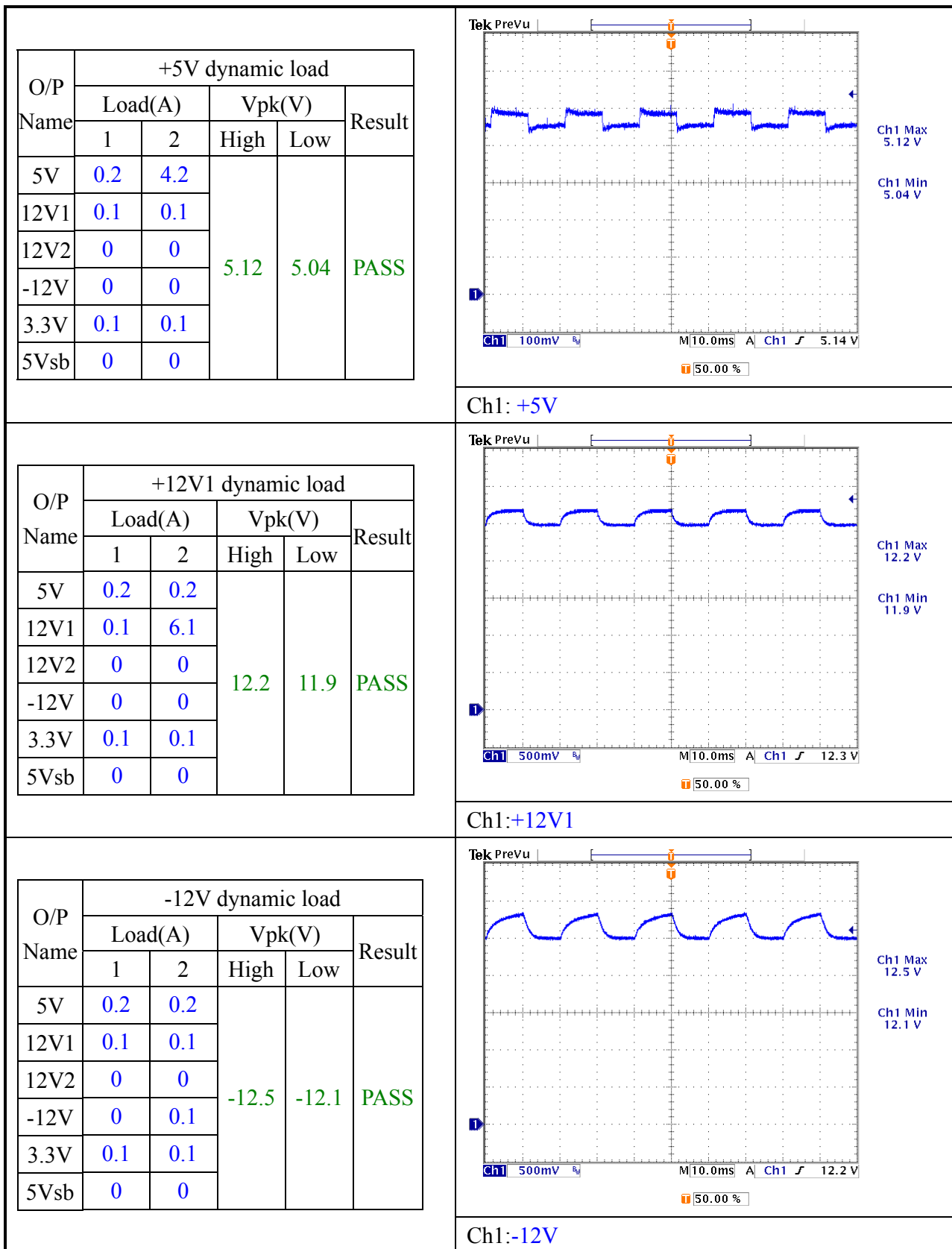
2. Test Condition:

- ✧ Input Voltage: 115Vac/60Hz & 230Vac/50Hz
- ✧ Ambient Temperature: 25°C

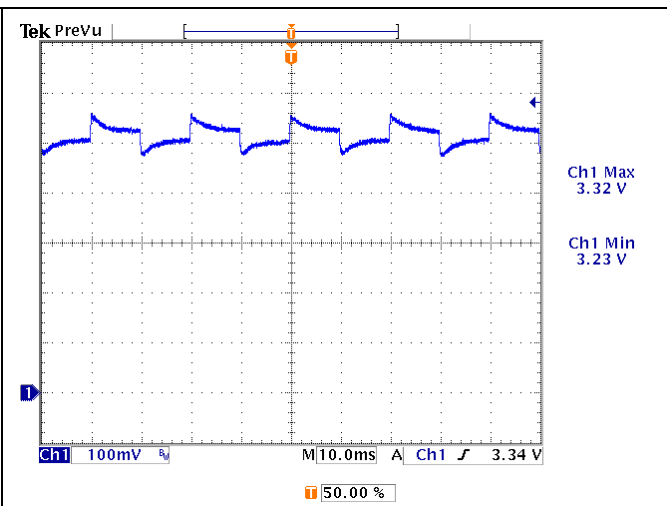
Output	+5V	+12V	-12V	+3.3V	+5Vsb
Step load size	4A	6A	0.1A	4A	0.25A
Capacitive load	6000uF	10000uF	350uF	6000uF	6000uF
Load slew rate	1A/uS				
Load-change repetition rate	50Hz				

3. Test Record:

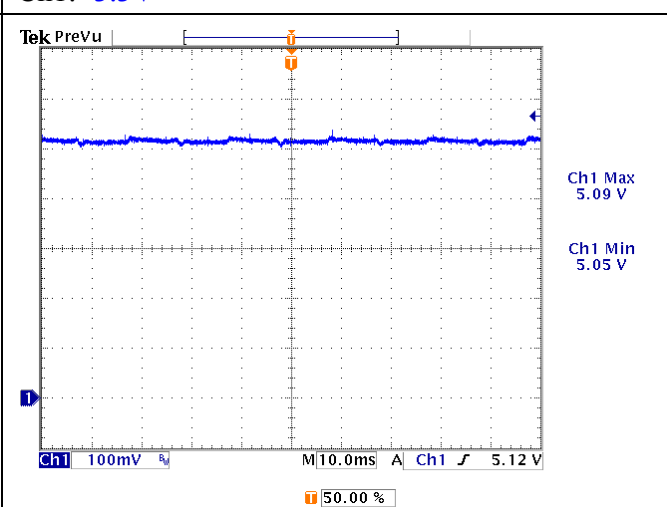
115Vac/60Hz



O/P Name	+3.3V dynamic load				Result
	Load(A)		Vpk(V)		
	1	2	High	Low	
5V	0.2	0.2	3.32	3.23	PASS
12V1	0.1	0.1			
12V2	0	0			
-12V	0	0			
3.3V	0.1	4.1			
5Vsb	0	0			

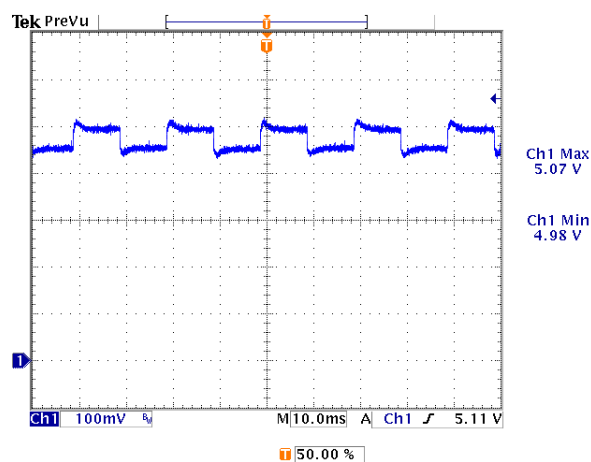


O/P Name	+5Vsb dynamic load				Result
	Load(A)		Vpk(V)		
	1	2	High	Low	
5V	0.2	0.2	5.09	5.05	PASS
12V1	0.1	0.1			
12V2	0	0			
-12V	0	0			
3.3V	0.1	0.1			
5Vsb	0	0.25			



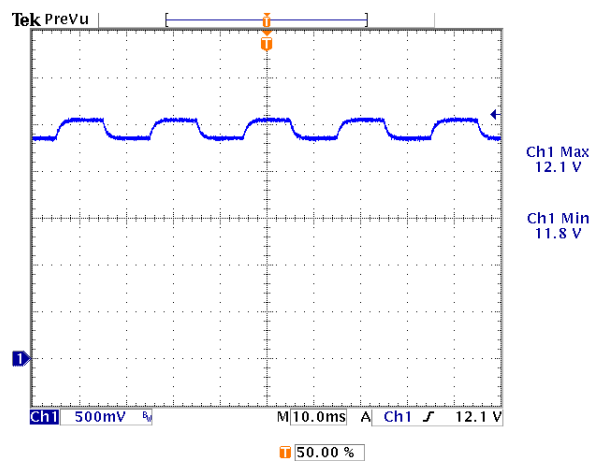
230Vac/50Hz

O/P Name	+5V dynamic load				Result
	Load(A)		Vpk(V)		
	1	2	High	Low	
5V	0.2	4.2	5.07	4.98	PASS
12V1	0.1	0.1			
12V2	0	0			
-12V	0	0			
3.3V	0.1	0.1			
5Vsb	0	0			



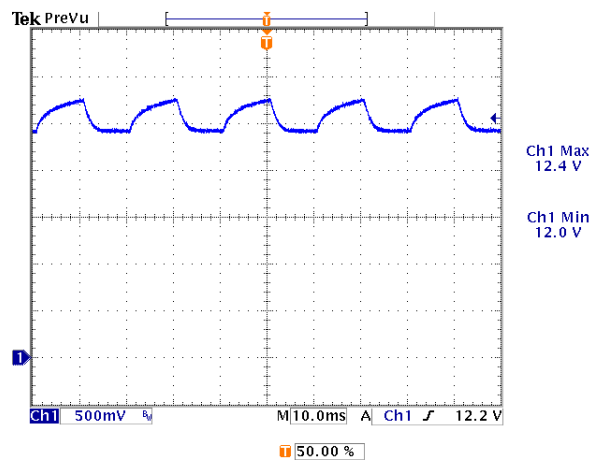
Ch1:+5V

O/P Name	+12V1 dynamic load				Result
	Load(A)		Vpk(V)		
	1	2	High	Low	
5V	0.2	0.2	12.1	11.8	PASS
12V1	0.1	6.1			
12V2	0	0			
-12V	0	0			
3.3V	0.1	0.1			
5Vsb	0	0			



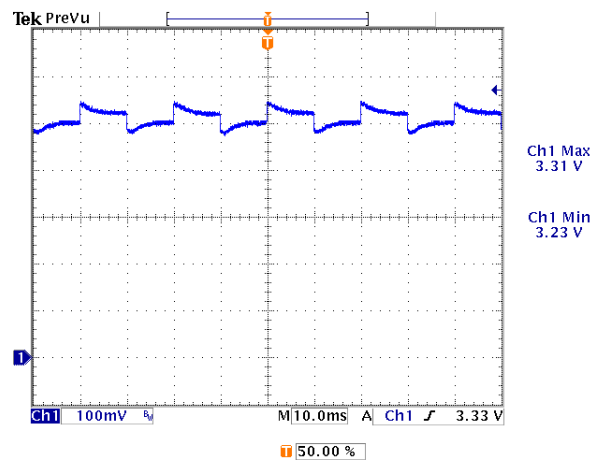
Ch1:+12V1

O/P Name	-12V dynamic load				Result
	Load(A)		Vpk(V)		
	1	2	High	Low	
5V	0.2	0.2	-12.4	-12.0	PASS
12V1	0.1	0.1			
12V2	0	0			
-12V	0	0.1			
3.3V	0.1	0.1			
5Vsb	0	0			



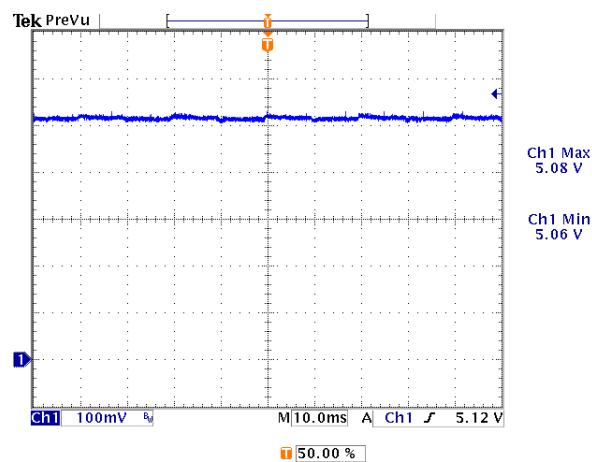
Ch1:-12V

O/P Name	+3.3V dynamic load				Result
	Load(A)		Vpk(V)		
	1	2	High	Low	
5V	0.2	0.2	3.31	3.23	PASS
12V1	0.1	0.1			
12V2	0	0			
-12V	0	0			
3.3V	0.1	4.1			
5Vsb	0	0			



Ch1:+3.3V

O/P Name	+5Vsb dynamic load				Result
	Load(A)		Vpk(V)		
	1	2	High	Low	
5V	0.2	0.2	5.08	5.06	PASS
12V1	0.1	0.1			
12V2	0	0			
-12V	0	0			
3.3V	0.1	0.1			
5Vsb	0	0.25			



Ch1:+5Vsb

Overshoot

1. Specification:

Any output overshoot during turn-on shall not exceed 10% of nominal output voltage.

2. Test condition:

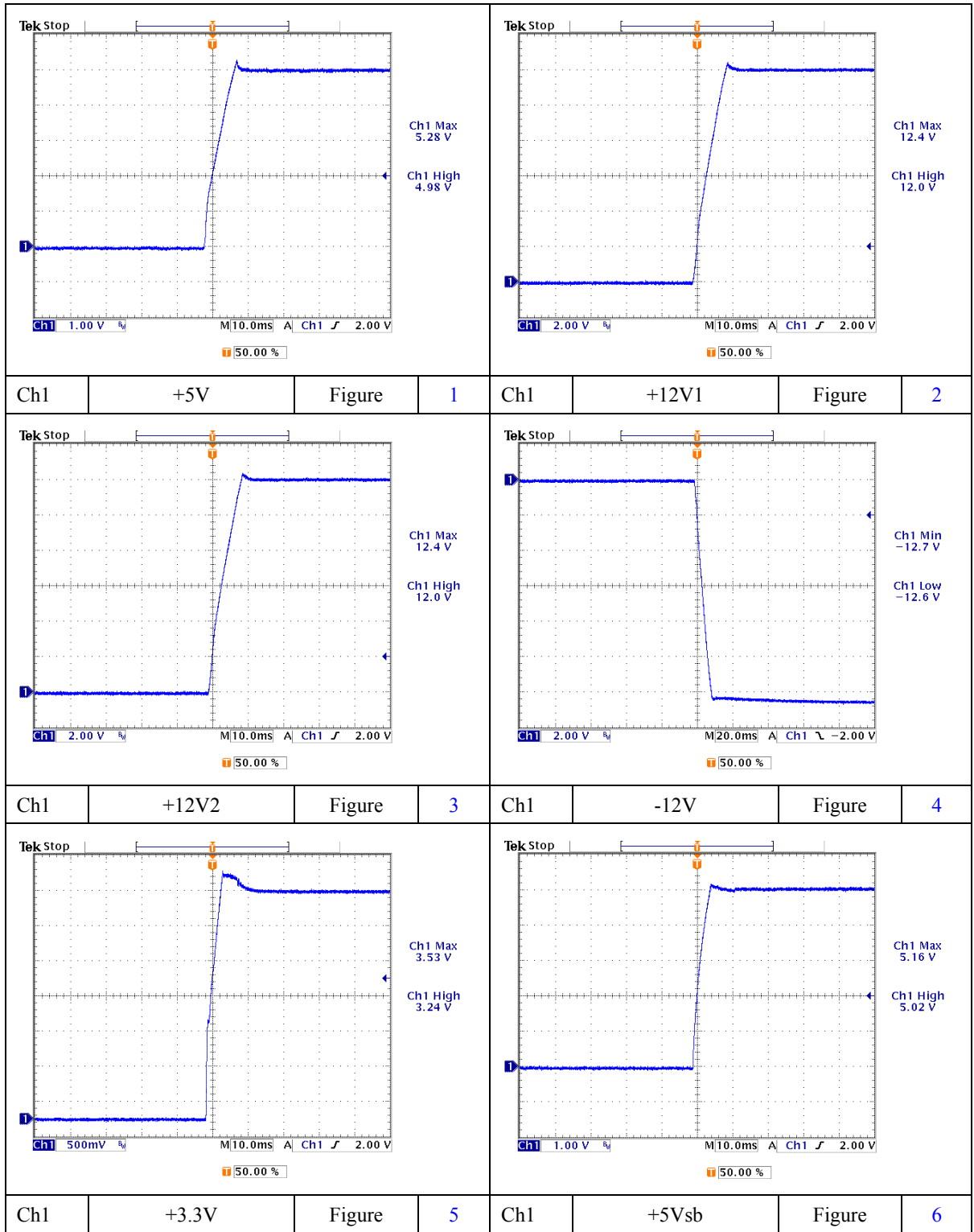
- ✧ AC Input: 115Vac/230Vac
- ✧ Frequency: 60Hz/50Hz
- ✧ Ambient Temperature: 25°C

Loading	+5V	+12V1	+12V2	-12V	+3.3V	+5Vsb
ML	0.2A	0.1A	0A	0A	0.1A	0A

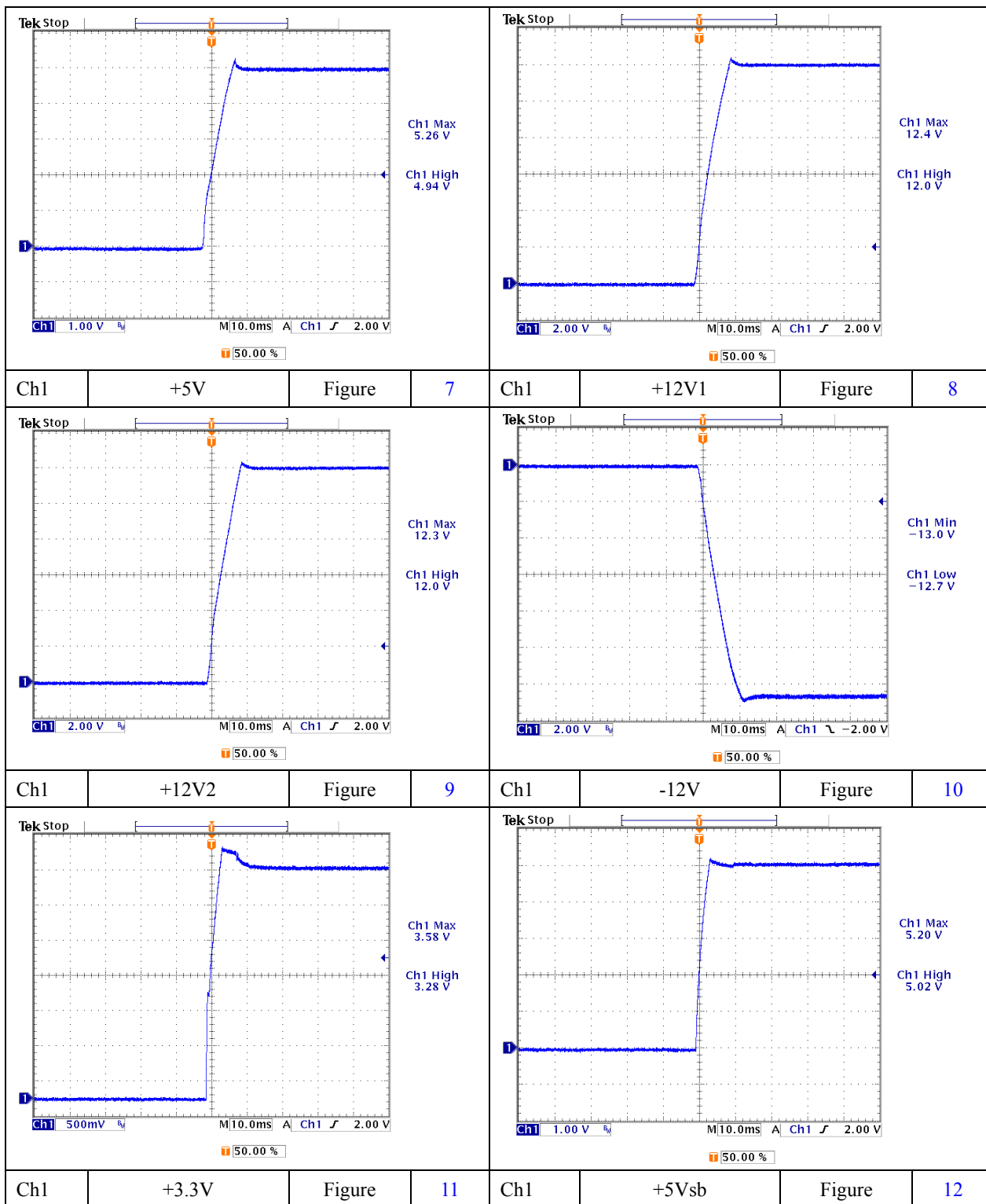
3. Test record

Vin(Vac)	Fin(Hz)	Load	Which-Load	Spec(V)	Overshoot(V)	Result	Figure
115	60	ML	+5V	5.5	5.280	Pass	1
			+12V1	13.2	12.440	Pass	2
			+12V2	13.2	12.360	Pass	3
			-12V	-13.2	-12.720	Pass	4
			+3.3V	3.63	3.530	Pass	5
			+5Vsb	5.5	5.160	Pass	6
230	50	ML	+5V	5.5	5.260	Pass	7
			+12V1	13.2	12.400	Pass	8
			+12V2	13.2	12.320	Pass	9
			-12V	-13.2	-13.000	Pass	10
			+3.3V	3.63	3.580	Pass	11
			+5Vsb	5.5	5.200	Pass	12

115Vac



230Vac



Short circuit

1. Specification:

A short circuit at any output shall cause no damage to the power supply or blow the primary fuse. The supply may shutdown in the event of a short circuit and require power-on restart. A short circuit consists of application of a test resistance of less than 0.05 ohms at each output with maximum load on all outputs

2. Test condition:

- ✧ AC Input: 115Vac/230Vac
- ✧ Frequency: 60Hz/50Hz
- ✧ Ambient Temperature: 25°C

Loading	+5V	+12V1	+12V2	-12V	+3.3V	+5Vsb
ML	0.2A	0.1A	0A	0A	0.1A	0A

3. Test record

Vin(Vac)	Fin(Hz)	Output	Loading	Which-Load	V disable(V)	Pin(W)	Iinrms(A)	Result
115V	60Hz	+5V	ML	+5V	0.000	0.033	0.061	PASS
		+12V1			0.007			
		+12V2			0.005			
		-12V			-0.002			
		+3.3V			0.002			
		+5Vsb			5.048			
		+5V	ML	+12V1	0.000	0.033	0.061	PASS
		+12V1			0.005			
		+12V2			0.002			
		-12V			-0.147			
		+3.3V			0.002			
		+5Vsb			5.048			
		+5V	ML	+12V2	0.002	0.033	0.061	PASS
		+12V1			0.002			
		+12V2			0.002			
		-12V			-0.145			
		+3.3V			0.002			
		+5Vsb			5.048			
		+5V	ML	-12V	0.002	0.033	0.061	PASS
		+12V1			0.007			
		+12V2			0.005			
		-12V			0.000			
		+3.3V			0.000			
		+5Vsb			5.048			
+5V	ML	+3.3V	0.002	0.033	0.061	PASS		
+12V1			0.005					
+12V2			0.005					
-12V			-0.145					
+3.3V			0.002					
+5Vsb			5.045					
+5V	ML	+5Vsb	0.002	0.033	0.061	PASS		
+12V1			0.005					
+12V2			0.005					
-12V			-0.147					
+3.3V			0.002					
+5Vsb			0.000					

Vin(Vac)	Fin(Hz)	Output	Loading	Which-Load	V disable(V)	Pin(W)	Iinrms(A)	Result
230V	50Hz	+5V	ML	+5V	0.000	0.161	0.101	PASS
		+12V1			0.007			
		+12V2			0.005			
		-12V			-0.047			
		+3.3V			0.002			
		+5Vsb			5.048			
		+5V	ML	+12V1	0.000	0.163	0.101	PASS
		+12V1			0.002			
		+12V2			0.002			
		-12V			-0.142			
		+3.3V			0.002			
		+5Vsb			5.048			
		+5V	ML	+12V2	0.002	0.163	0.101	PASS
		+12V1			0.005			
		+12V2			0.002			
		-12V			-0.142			
		+3.3V			0.000			
		+5Vsb			5.048			
		+5V	ML	-12V	0.000	0.162	0.101	PASS
		+12V1			0.007			
+12V2	0.005							
-12V	0.000							
+3.3V	0.002							
+5Vsb	5.050							
+5V	ML	+3.3V	0.002	0.163	0.101	PASS		
+12V1			0.005					
+12V2			0.005					
-12V			-0.142					
+3.3V			0.002					
+5Vsb			5.048					
+5V	ML	+5Vsb	0.000	0.160	0.101	PASS		
+12V1			0.005					
+12V2			0.005					
-12V			-0.147					
+3.3V			0.002					
+5Vsb			0.000					

Over current

1. Specification:

Output Voltage	+3.3V	+5V	+12V1	+12V2
Max. over current limit	60	48	20~24	20~24

2. Test condition:

- ✧ AC Input: 115Vac/230Vac
- ✧ Frequency: 60Hz/50Hz
- ✧ Ambient Temperature: 25°C

Loading	+5V	+12V1	+12V2	-12V	+3.3V	+5Vsb
ML	0.2A	0.1A	0A	0A	0.1A	0A

3. Test Record:

Vin(Vac)	Fin(Hz)	Loading	Which Load	Tstep(ms)	I-Step(V)	Spec(A)	OCP(A)	Protected mode	Result
115	60	ML	+3.3V	100.000	0.500	60	41.500	Latch	Pass
			+5V	100.000	0.500	48	46.000	Latch	Pass
			+12V1	100.000	0.100	20~24	22.200	Latch	Pass
			+12V2	100.000	0.100	20~24	21.800	Latch	Pass
230	50	ML	+3.3V	100.000	0.500	60	42.000	Latch	Pass
			+5V	100.000	0.500	48	46.000	Latch	Pass
			+12V1	100.000	0.100	20~24	22.200	Latch	Pass
			+12V2	100.000	0.100	20~24	21.800	Latch	Pass

Over voltage

1. Specification:

In the event of an over-voltage condition on +3.3V&+5Vdc&+12V the power supply shut down and require remote control or remove the AC main input to reset the system

+3.3V: 4.3Vmax,, **+5V:** 6.7Vmax ,, **+12V:** 15.6Vmax.

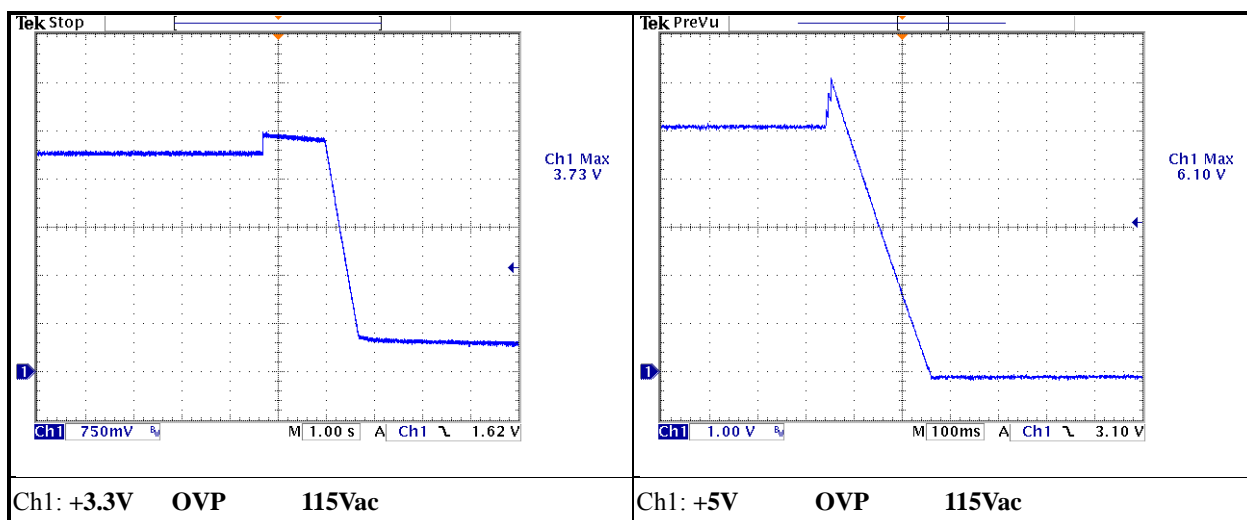
2. Test condition:

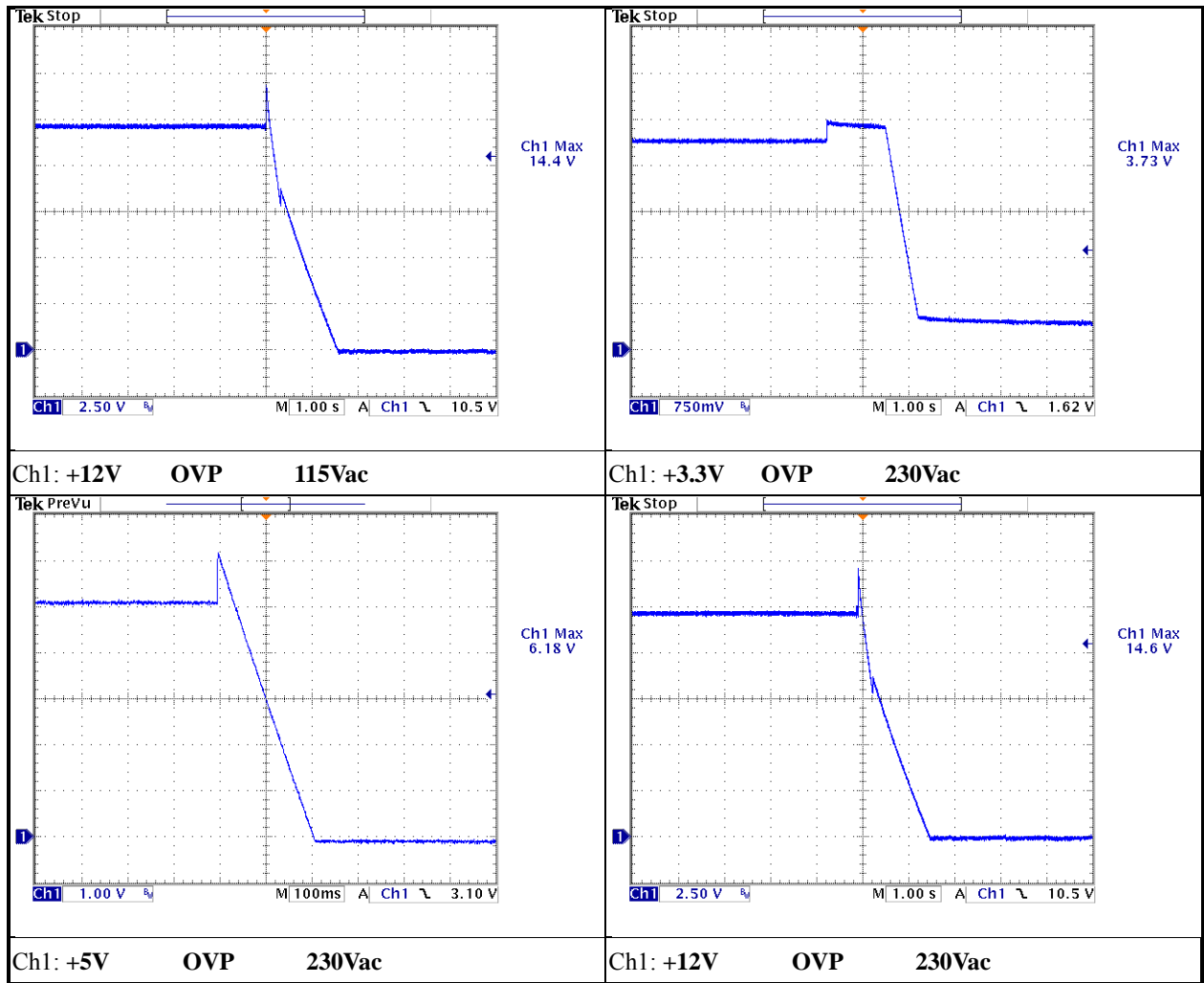
- ✧ AC Input: 115Vac/230Vac
- ✧ Frequency: 60Hz/50Hz
- ✧ Ambient Temperature: 25°C

Loading	+5V	+12V1	+12V2	-12V	+3.3V	+5Vsb
ML	0.2A	0.1A	0A	0A	0.1A	0A

3. Test Record:

Vin(Vac)	Fin(Hz)	Loading	Which Load	Tstep(ms)	V-Step(V)	Spec(V)	OVP(V)	Protected mode	Result
115	60	ML	+3.3V	---	---	4.3Vmax	3.73	Latch	Pass
			+5V	---	---	6.7Vmax	6.10	Latch	Pass
			+12V	---	---	15.6Vmax	14.4	Latch	Pass
230	50	ML	+3.3V	---	---	4.3Vmax	3.73	Latch	Pass
			+5V	---	---	6.7Vmax	6.18	Latch	Pass
			+12V	---	---	15.6Vmax	14.6	Latch	Pass





Turn on time

1. Specification:

No define.

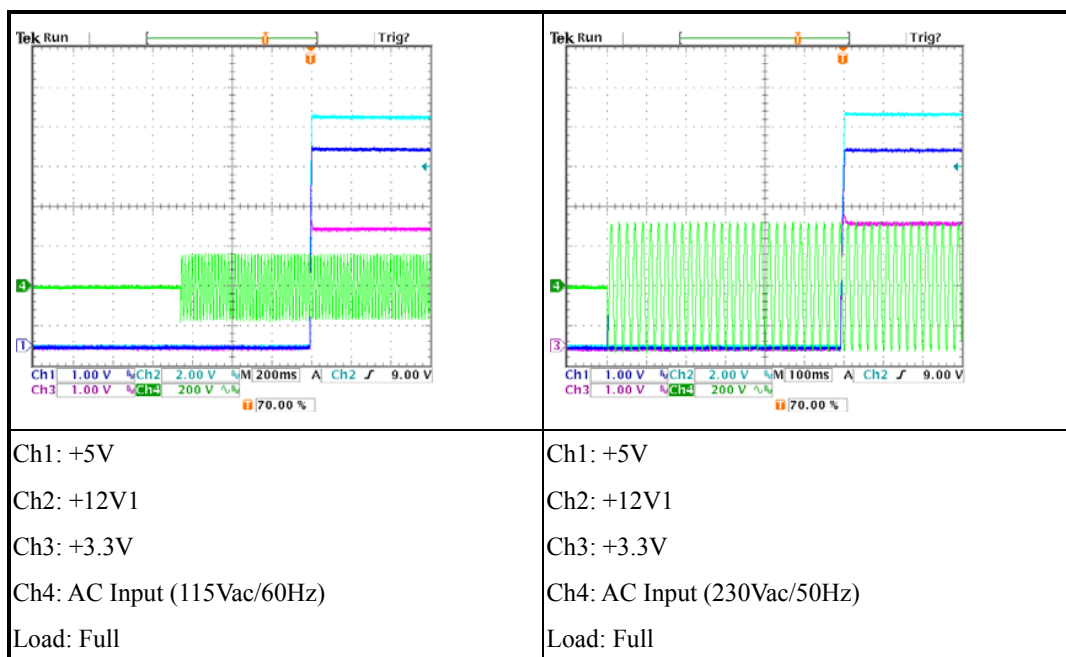
2. Test condition:

- ✧ AC Input: 115Vac/230Vac
- ✧ Frequency: 60Hz/50Hz
- ✧ Ambient Temperature: 25°C

Loading	+5V	+12V1	+12V2	-12V	+3.3V	+5Vsb
Full	13.37A	15.37A	15.37A	0.29A	13.37A	3.36A

3. Test Record:

Vin(ac)	Fin(Hz)	Load	Spec(max)	+5V	+12V1	+12V2	-12V	+3.3V	+5Vsb	Result
115	60	Full	*ms	660.577	661.345	661.690	659.682	656.522	576.571	Ref
230	50	Full	*ms	600.511	600.898	601.293	600.095	596.155	540.902	Ref



Hold up time

1. Specification:

17.0ms minimum: at 115V&230V / 60Hz&50Hz.(@ Full LOAD)

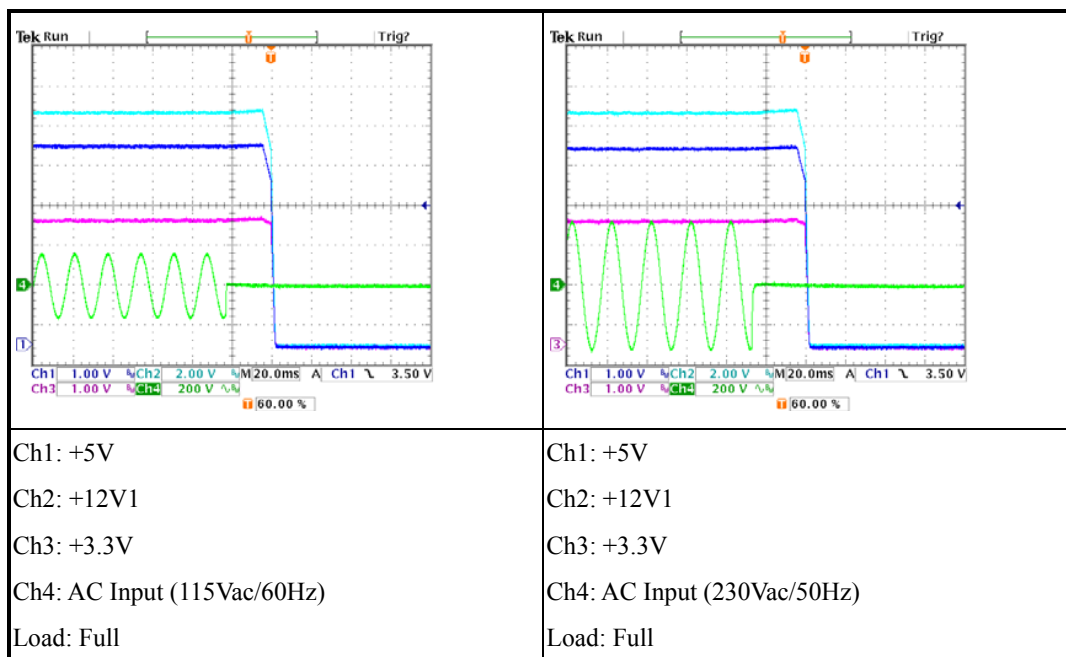
2. Test condition:

- ✧ AC Input: 115Vac/230Vac
- ✧ Frequency: 60Hz/50Hz
- ✧ Ambient Temperature: 25°C

Loading	+5V	+12V1	+12V2	-12V	+3.3V	+5Vsb
Full	13.37A	15.37A	15.37A	0.29A	13.37A	3.36A

3. Test Record:

Vin(Vac)	Fin(Hz)	Load	Spec(Min)	+5V	+12V1	+12V2	-12V	+3.3V	+5Vsb	Result
115	60	Full	17ms	19.848	19.357	18.968	23.193	22.667	74.791	Pass
230	50		17ms	20.712	20.986	20.870	23.465	23.209	75.931	Pass



P.G delay time

1. Specification:

Power good @115Vac/230Vac, full load; 100-500mSec.

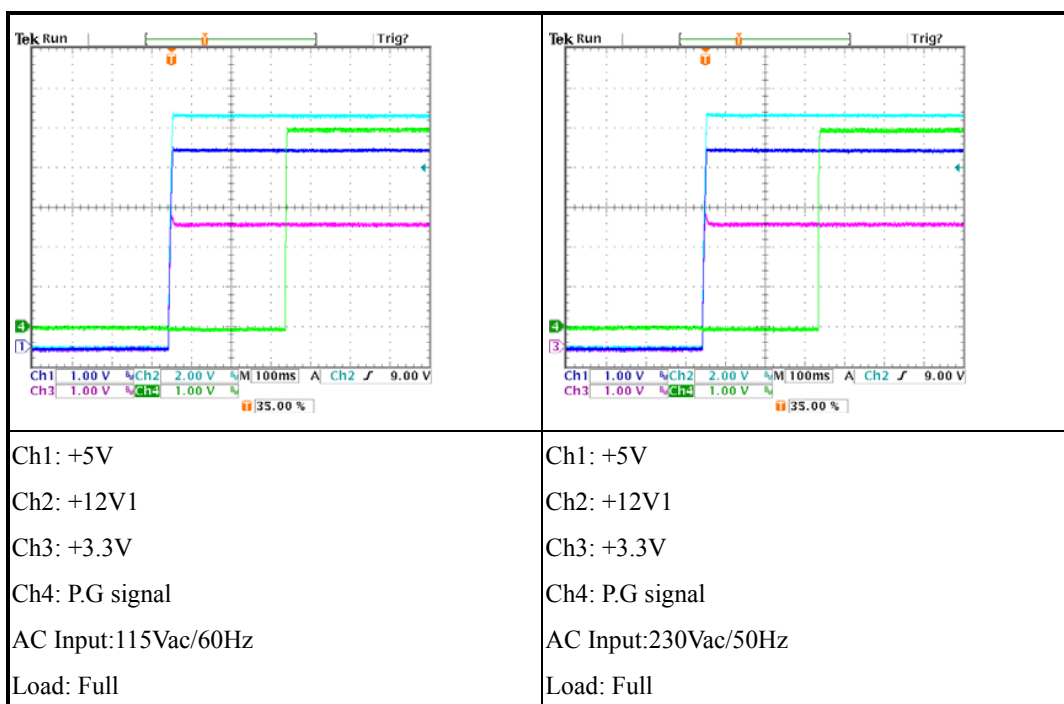
2. Test condition:

- ✧ AC Input: 115Vac/230Vac
- ✧ Frequency: 60Hz/50Hz
- ✧ Ambient Temperature: 25°C

Loading	+5V	+12V1	+12V2	-12V	+3.3V	+5Vsb
Full	13.37A	15.37A	15.37A	0.29A	13.37A	3.36A

3. Test Record:

Vin(Vac)	Fin(Hz)	Load	Spec		+5V	+12V1	+12V2	-12V	+3.3V	+5Vsb	Result
			Min.	Max.							
115	60	Full	100ms	500ms	285.036	284.339	283.852	285.743	289.442	369.741	Ref
230	50	Full	100ms	500ms	282.422	281.961	281.612	282.786	286.501	341.745	Ref



P.G fail time

1. Specification:

Power Fail @115Vac/230Vac, full load; 1mSec minimum.

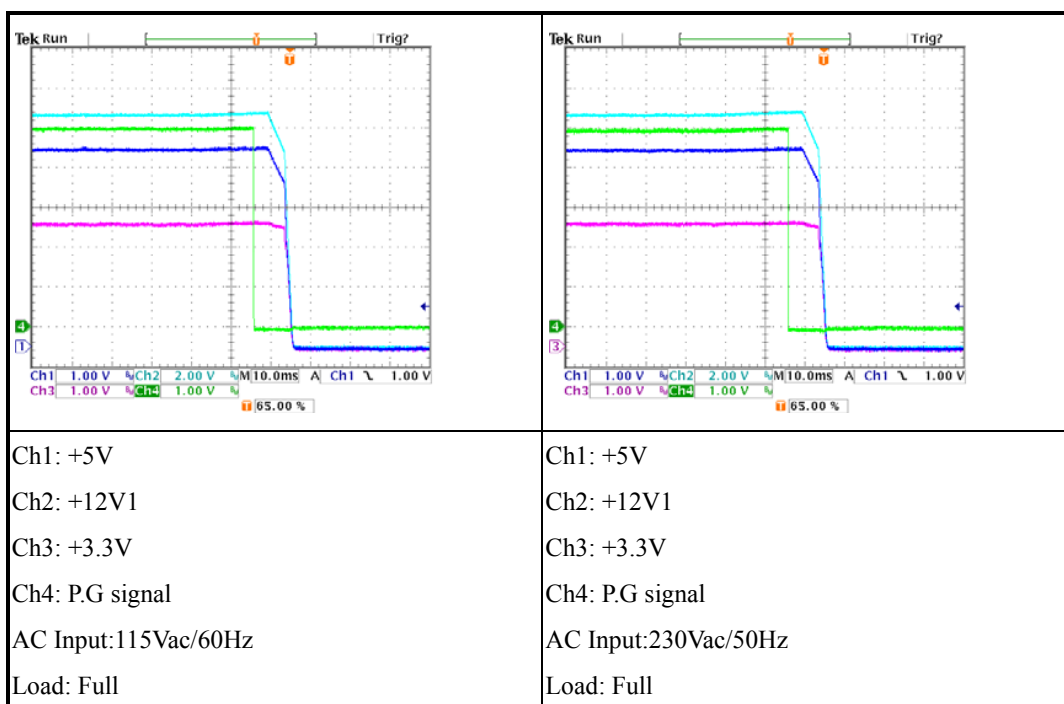
2. Test condition:

- ✧ AC Input: 115Vac/230Vac
- ✧ Frequency: 60Hz/50Hz
- ✧ Ambient Temperature: 25°C

Loading	+5V	+12V1	+12V2	-12V	+3.3V	+5Vsb
Full	13.37A	15.37A	15.37A	0.29A	13.37A	3.36A

3. Test Record:

Vin(Vac)	Fin(Hz)	Load	Spec		+5V	+12V1	+12V2	-12V	+3.3V	+5Vsb	Result
			Min.	Max.							
115	60	Full	1ms	*ms	4.802	4.407	4.036	8.355	7.750	53.890	Pass
230	50		1ms	*ms	4.624	4.199	3.998	8.267	7.115	54.147	Pass



Rise Time

1. Specification:

The cold-start enable out put voltage rise time of all outputs shall be measured with maximum load on all outputs: less than 20ms (10%~95%)

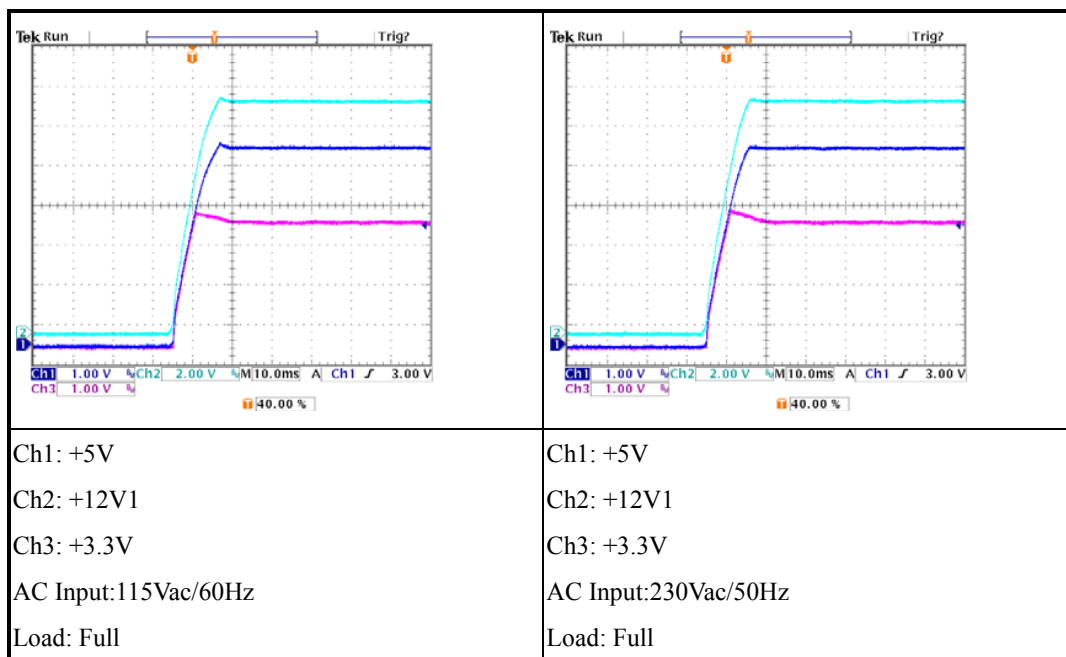
2. Test condition:

- ✧ AC Input: 115Vac/230Vac
- ✧ Frequency: 60Hz/50Hz
- ✧ Ambient Temperature: 25°C

Loading	+5V	+12V1	+12V2	-12V	+3.3V	+5Vsb
Full	13.37A	15.37A	15.37A	0.29A	13.37A	3.36A

3. Test record

Vin(Vac)	Fin(Hz)	Load	Spec		+5V	+12V1	+12V2	-12V	+3.3V	+5Vsb	Result
			Min	Max							
115	60	Full	*ms	20ms	8.633	8.979	9.313	8.165	4.707	9.162	Ref
220	50	Full	*ms	20ms	8.419	8.660	8.913	8.155	4.848	4.949	Ref



Harmonics Current

1. Specification:

Power Supply is designed to meet the *EN 61000-3-2 Power Line Harmonic Current Requirement*.

Harmonics Standard	IEC61000-3-2
Harmonics Class	Class D

2. Test Condition:

AC Input: 230Vac

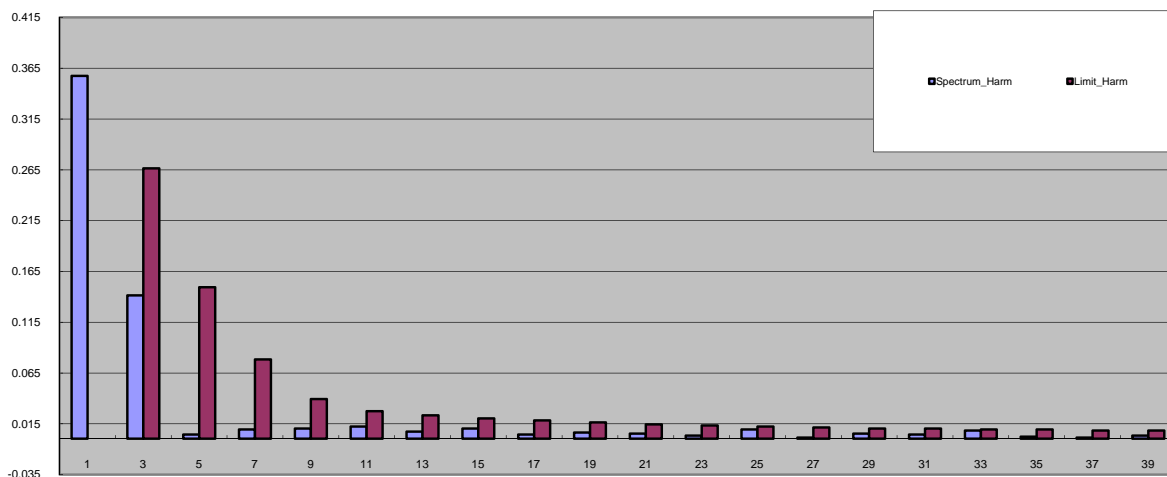
Frequency: 50Hz

Ambient Temp: 25°C

Loading	+5V	+12V1	+12V2	-12V	+3.3V	+5Vsb
75W	3A	2A	1A	0A	1.5A	1A
Full	13.37A	15.37A	15.37A	0.29A	13.37A	3.36A

3.1 Test Record:

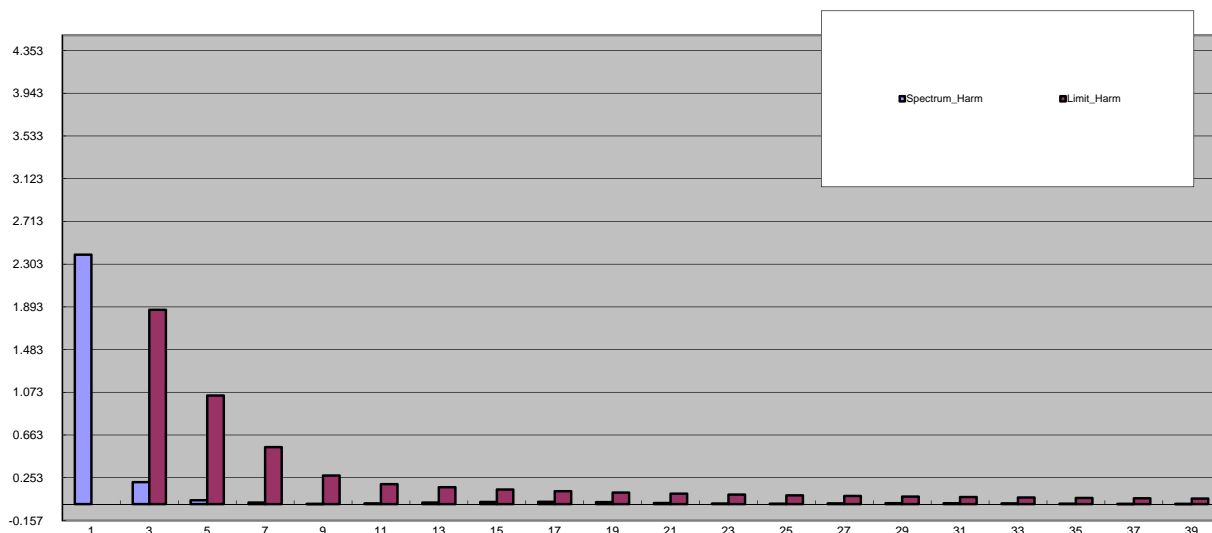
Loading	+5V	+12V1	+12V2	-12V	+3.3V	+5Vsb
75W	3A	2A	1A	0A	1.5A	1A



Vin(Vac)	Pin(W)	THD(%)	No	SPECTRUM_HARM	LIMIT_HARM	Margin(%)	Test result
230.987	78.256	40.340	1	0.357	*	*	---
			3	0.141	0.266	53.008	PASS
			5	0.004	0.149	2.685	PASS
			7	0.009	0.078	11.538	PASS
			9	0.010	0.039	25.641	PASS
			11	0.012	0.027	44.444	PASS
			13	0.007	0.023	30.435	PASS
			15	0.010	0.020	50.000	PASS
			17	0.004	0.018	22.222	PASS
			19	0.006	0.016	37.500	PASS
			21	0.005	0.014	35.714	PASS
			23	0.003	0.013	23.077	PASS
			25	0.009	0.012	75.000	PASS
			27	0.001	0.011	9.091	PASS
			29	0.005	0.010	50.000	PASS
			31	0.004	0.010	40.000	PASS
			33	0.008	0.009	88.889	PASS
			35	0.002	0.009	22.222	PASS
			37	0.001	0.008	12.500	PASS
39	0.003	0.008	37.500	PASS			

3.2 Test Record:

Loading	+5V	+12V1	+12V2	-12V	+3.3V	+5Vsb
Full	13.37A	15.37A	15.37A	0.29A	13.37A	3.36A



Vin(Vac)	Pin(W)	THD(%)	No	SPECTRUM_HARM	LIMIT_HARM	Margin(%)	Test result
230.387	548.417	9.150	1	2.394	*	*	---
			3	0.211	1.865	11.314	PASS
			5	0.037	1.042	3.551	PASS
			7	0.015	0.548	2.737	PASS
			9	0.002	0.274	0.730	PASS
			11	0.006	0.192	3.125	PASS
			13	0.015	0.162	9.259	PASS
			15	0.021	0.141	14.894	PASS
			17	0.023	0.124	18.548	PASS
			19	0.019	0.111	17.117	PASS
			21	0.011	0.101	10.891	PASS
			23	0.005	0.092	5.435	PASS
			25	0.004	0.084	4.762	PASS
			27	0.007	0.078	8.974	PASS
			29	0.009	0.073	12.329	PASS
			31	0.008	0.068	11.765	PASS
			33	0.006	0.064	9.375	PASS
			35	0.004	0.060	6.667	PASS
			37	0.002	0.057	3.509	PASS
39	0.002	0.054	3.704	PASS			

Voltage stress

1. Specification

Follow FSP specification

Device	Type	Category	Derating	Remark
			Voltage	
Capacitor	Electrolytic	Bulk	100%	
		Filter	90%	
		Others	90%	
Semiconductor	BJT/MOSFET	Main Switch	95%*	
		Small Signal	90%*	
	Diode/Schottky	Output Rectifier	95%*	
		General Purpose	90%*	

Note:

1. “*” : 100% @ Transient state

2. Test condition:

- ✧ AC Input: 90Vac/264Vac
- ✧ Frequency: 47Hz/63Hz
- ✧ Ambient Temperature: 25°C

Loading	+5V	+12V1	+12V2	-12V	+3.3V	+5Vsb
ML	0.2A	0.1A	0A	0A	0.1A	0A
Full	13.37A	15.37A	15.37A	0.29A	13.37A	3.36A

3. Test record

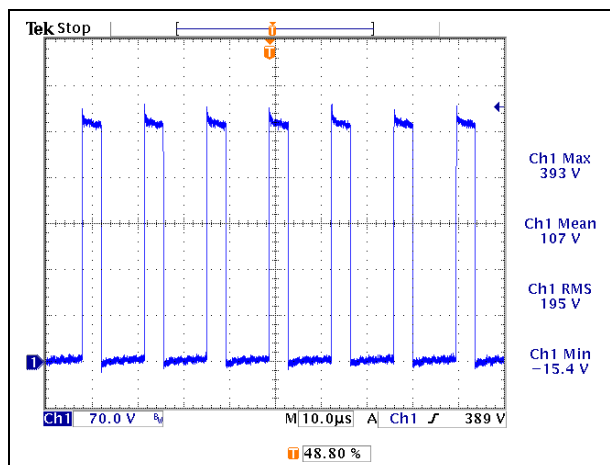
3.1 Continue stress

Location	Test Condition	Spec.(V)		Load	Continuous		PASS /FAIL	Figure
					Reading (V)	Derating (%)		
Q1	90V/47Hz	V _{DS}	600	Full	393	65.5	Pass	1
	265V/63Hz				406	67.7	Pass	2
Q2	90V/47Hz	V _{DS}	600	Full	392	65.3	Pass	3
	265V/63Hz				409	68.2	Pass	4
Q21	90V/47Hz	*	700	Full	582	83.1	Pass	5
	265V/63Hz				616	88.0	Pass	6
D2	90V/47Hz	*	600	Full	454	75.7	Pass	7
	265V/63Hz				446	74.3	Pass	8
D13	90V/47Hz	*	60	Full	33.5	55.8	Pass	9
	265V/63Hz				33.2	55.3	Pass	10
Q22	90V/47Hz	V _{DS}	60	Full	39.6	66.0	Pass	11
	265V/63Hz				41.0	68.3	Pass	12

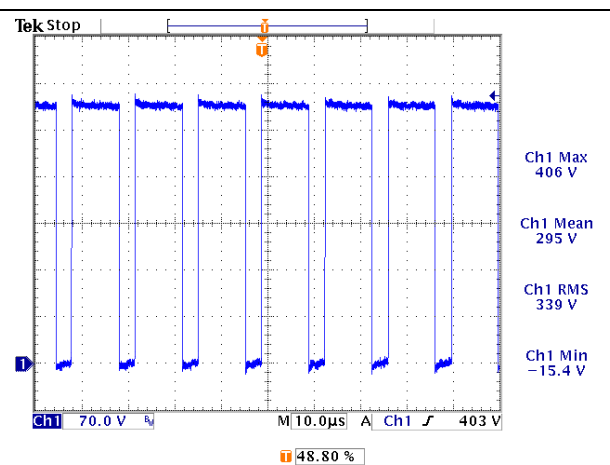
Q23	90V/47Hz	V _{DS}	60	Full	41.4	69.0	Pass	13
	265V/63Hz				44.0	73.3	Pass	14
Q26	90V/47Hz	V _{DS}	30	Full	11.5	38.3	Pass	15
	265V/63Hz				11.4	38.0	Pass	16
C1	90V/47Hz	*	420	ML	258	61.4	Pass	17
	265V/63Hz				390	92.9	Pass	18
	90V/47Hz		420	Full	360	85.7	Pass	19
	265V/63Hz				394	93.8	Pass	20
Q5	90V/47Hz	V _{DS}	800	Full	620	77.5	Pass	21
	265V/63Hz				632	79.0	Pass	22
Q15	90V/47Hz	V _{DS}	800	Full	606	75.8	Pass	23
	265V/63Hz				630	78.8	Pass	24
Q27	90V/47Hz	V _{DS}	30	Full	10.7	35.7	Pass	25
	265V/63Hz				10.6	35.3	Pass	26
Q29	90V/47Hz	V _{DS}	30	Full	15.7	52.3	Pass	27
	265V/63Hz				16.9	56.3	Pass	28

NOTE:

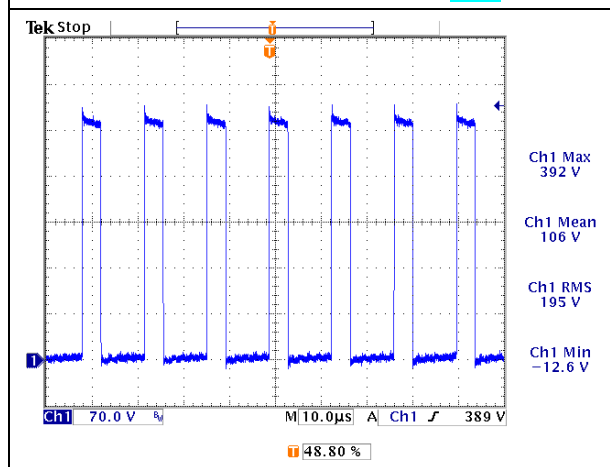
Location	Description
Q1	TR,N-MOSFET,16A,600 V,TO-220FP,0.19 ohm,STF22NM60N,S.T,
Q2	TR,N-MOSFET,16A,600 V,TO-220FP,0.19 ohm,STF22NM60N,S.T,
Q21	TR,N-MOSFET,2.5A,700V,TO-220CFM,AP03N70I-H,A.P,
D2	DIODE,ULTRAFast,8A,600V,TO-220F(2PIN),STTH8R06FP,S.T,
D13	DIODE,SCHOTTKY,20A,60V,TO-220AB,STPS20L60CT,S.T,
Q22	TR,N-MOSFET,193A,60V,TO-220,3.2m ohm,FDPO30N06,FAIRCHILD,
Q23	TR,N-MOSFET,193A,60V,TO-220,3.2m ohm,FDPO30N06,FAIRCHILD,
Q26	TR,N-MOSFET,90A,30V,PG-TO252-3-11,SMD,4m ohm,IPD040N03L G,INFINEON,
C1	CAP,AL,270uF,420V,2000Hrs,85'C,M,25*41,SNAP IN,PIN=3.8,PITCH=10,2268mA,LP271M420N410P,CAPXON,
Q5	TR,N-MOSFET,3A,800V,TO-220F,FQPF3N80C,FAIRCHILD,
Q15	TR,N-COOL MOSFET,11A,800V,P-TO220-3-31,SPA11N80C3,INFINEON,
Q27	TR,N-MOSFET,50A,30V,PG-TO252-3-11,SMD,IPD060N03L,INFINEON,
Q29	TR,N-MOSFET,90A,30V,PG-TO252-3-11,SMD,4m ohm,IPD040N03L G,INFINEON,



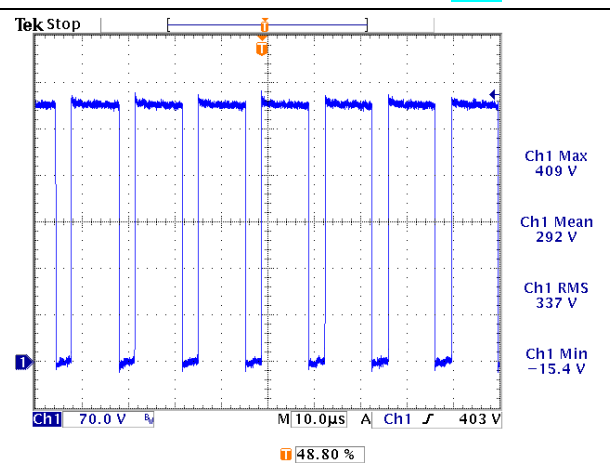
Q1(VDS) Vin=90V(FULL) FIG1



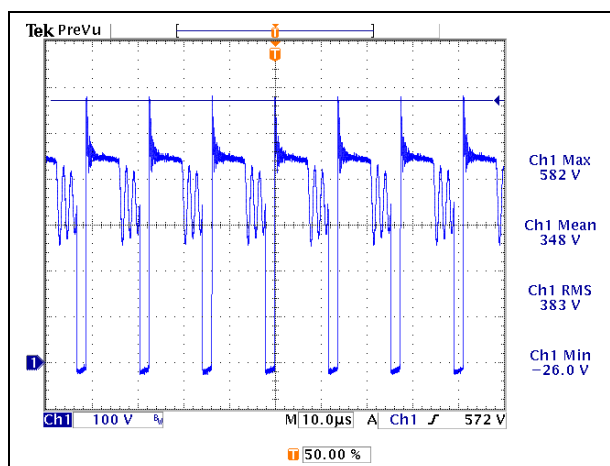
Q1(VDS) Vin=265V(FULL) FIG2



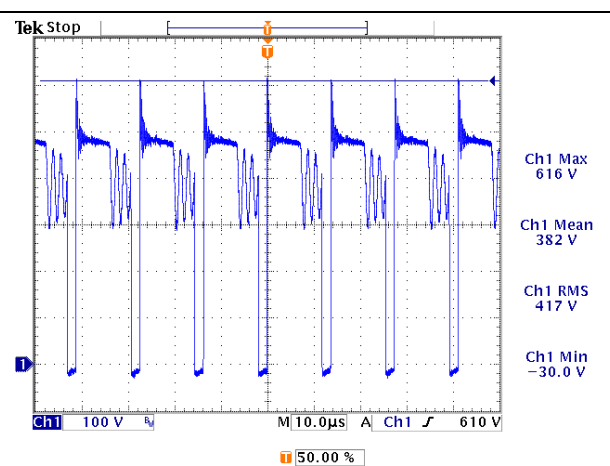
Q2(VDS) Vin=90V(FULL) FIG3



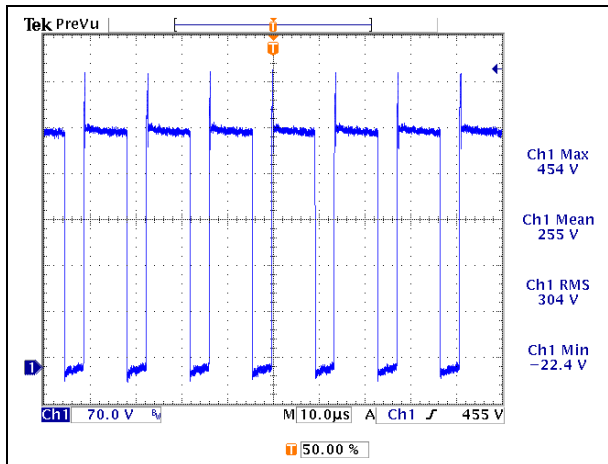
Q2(VDS) Vin=265V(FULL) FIG4



Q21 Vin=90V(FULL) FIG5

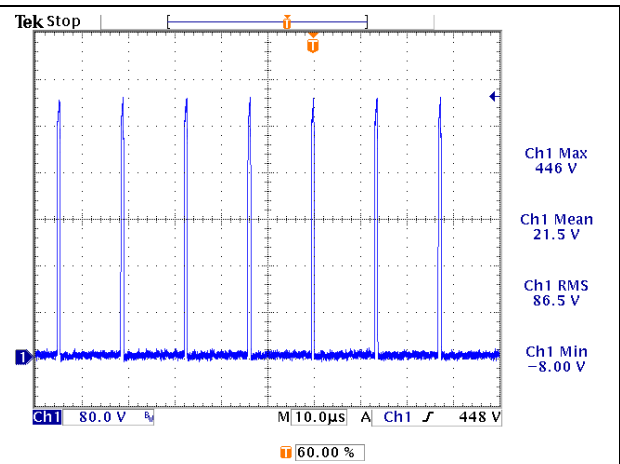


Q21 Vin=265V(FULL) FIG6



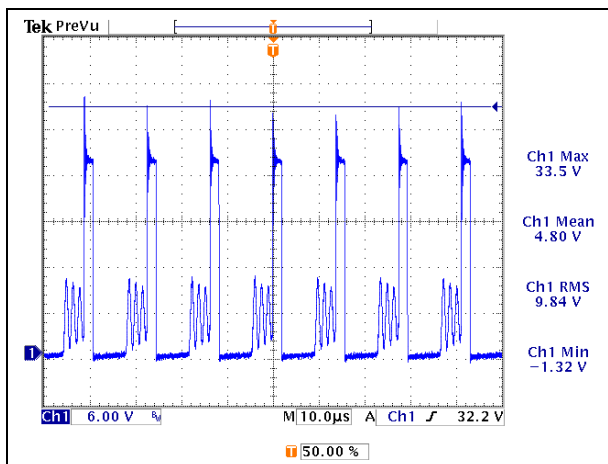
D2 Vin=90V(FULL)

FIG7



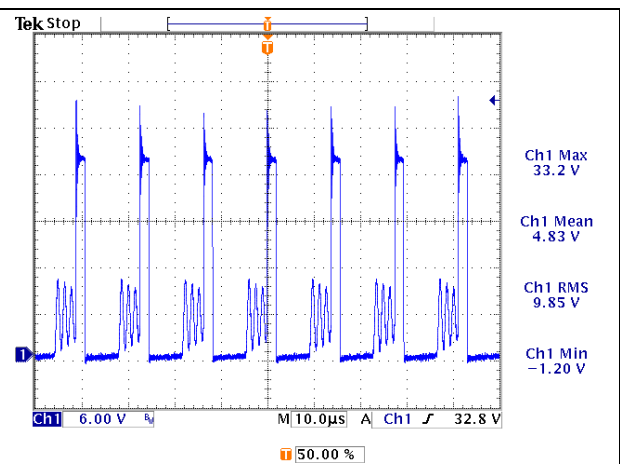
D2 Vin=265V(FULL)

FIG8



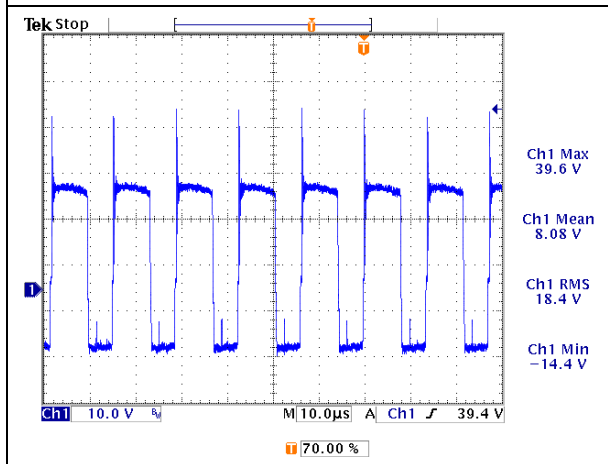
D13 Vin=90V(FULL)

FIG9



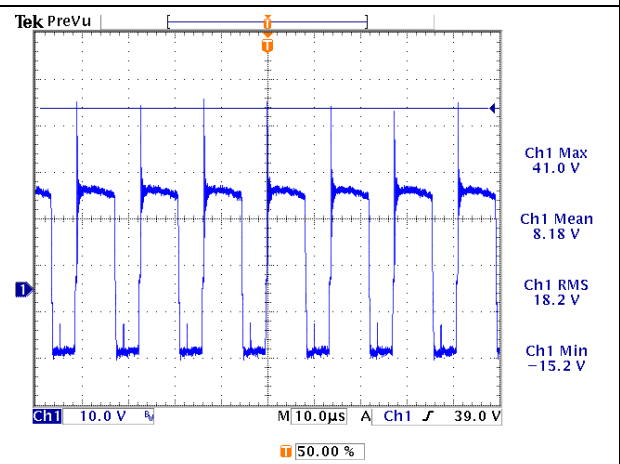
D13 Vin=265V(FULL)

FIG10



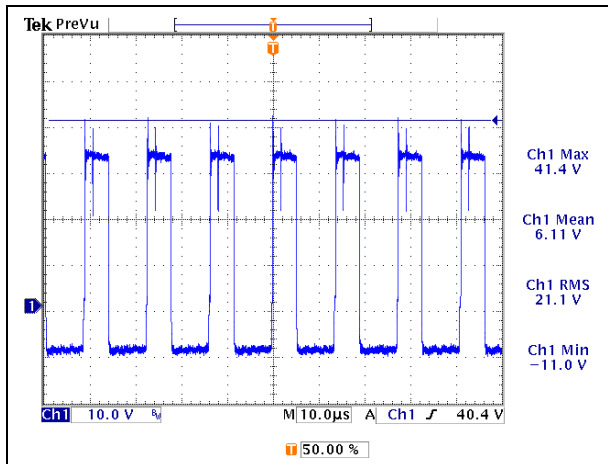
Q22(VDS) Vin=90V(FULL)

FIG11

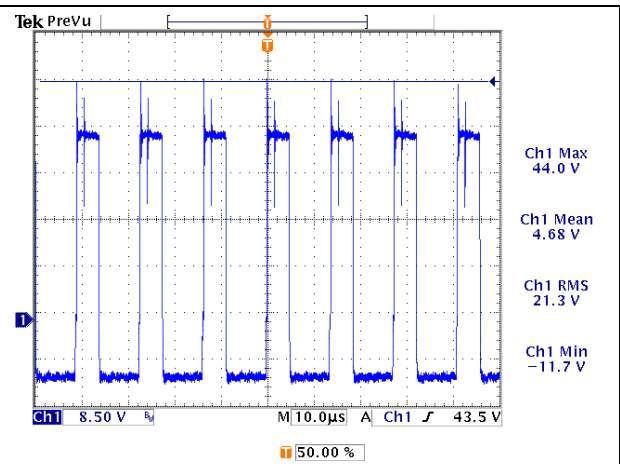


Q22(VDS) Vin=265V(FULL)

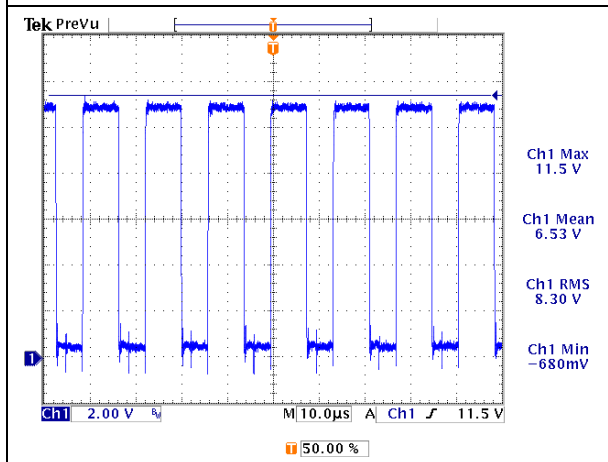
FIG12



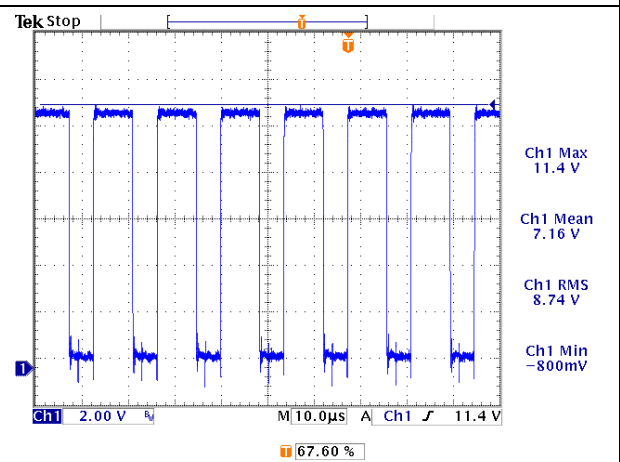
Q23(VDS) Vin=90V(FULL) FIG13



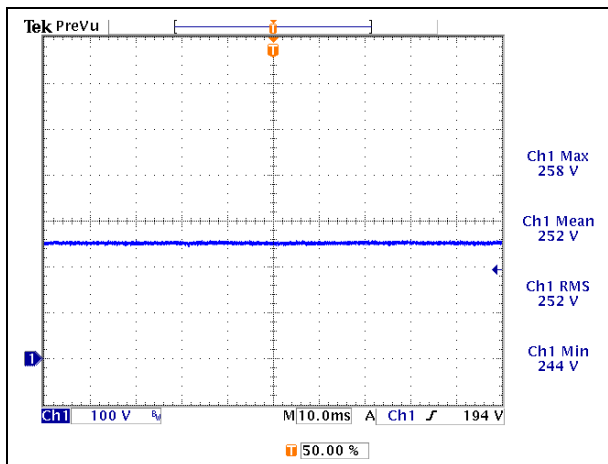
Q23(VDS) Vin=265V(FULL) FIG14



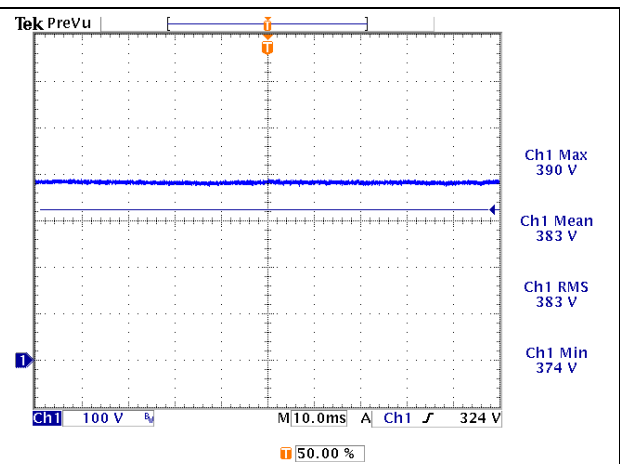
Q26(VDS) Vin=90V(FULL) FIG15



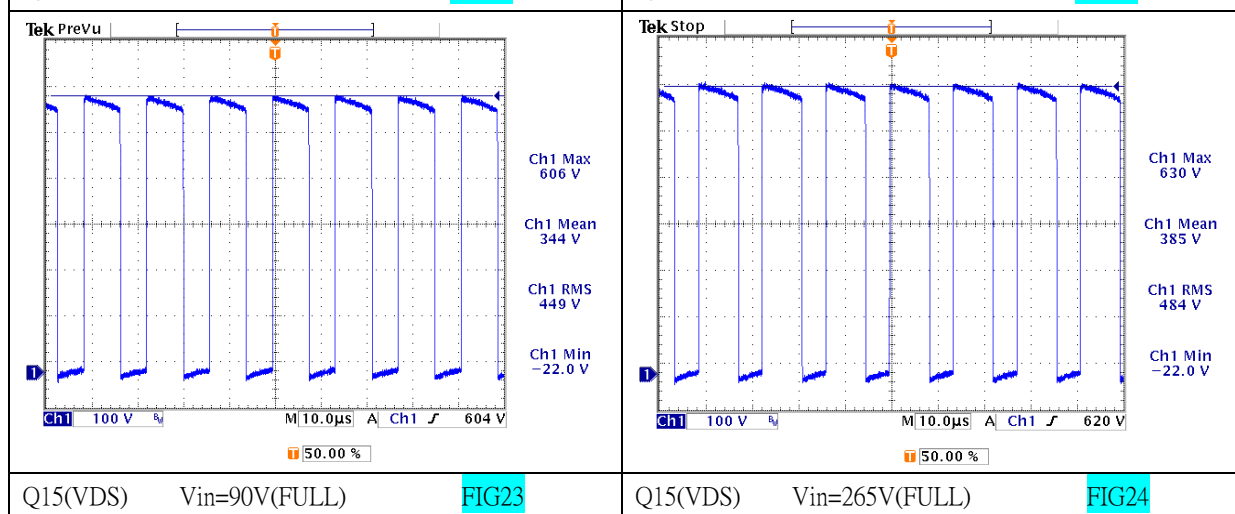
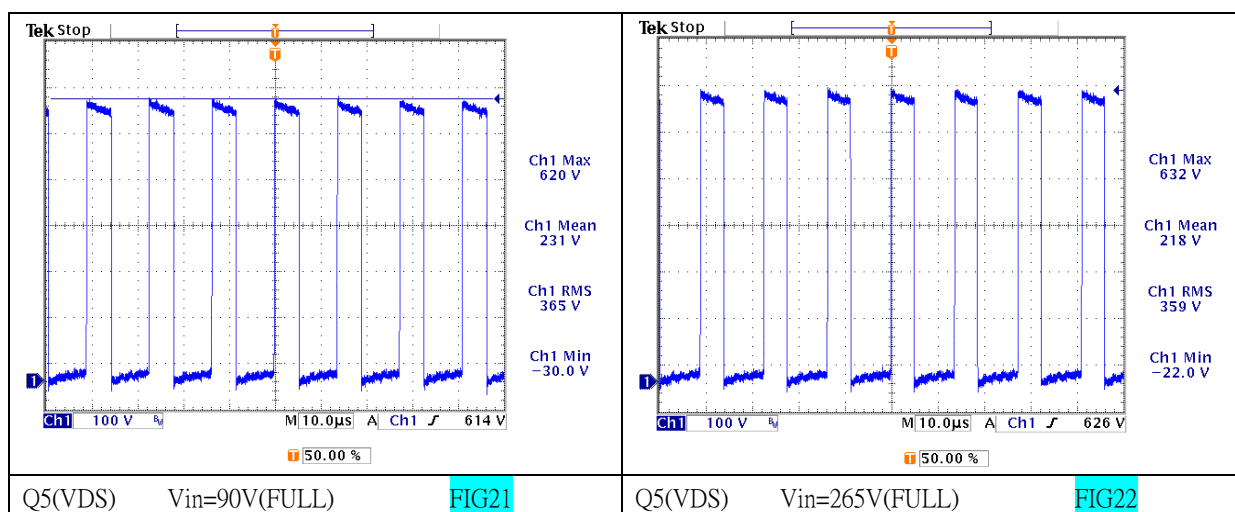
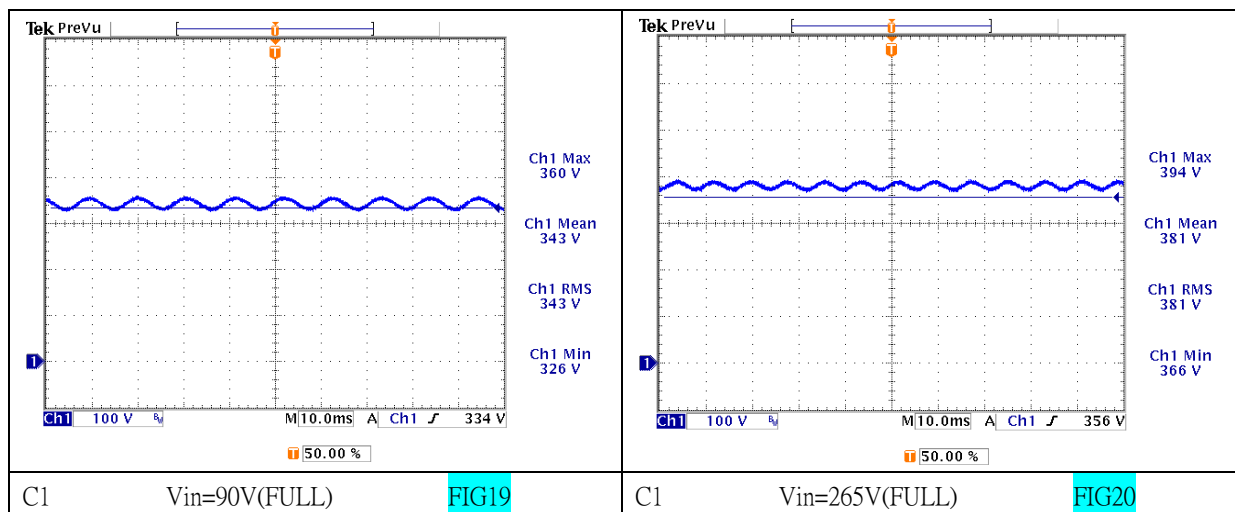
Q26(VDS) Vin=265V(FULL) FIG16

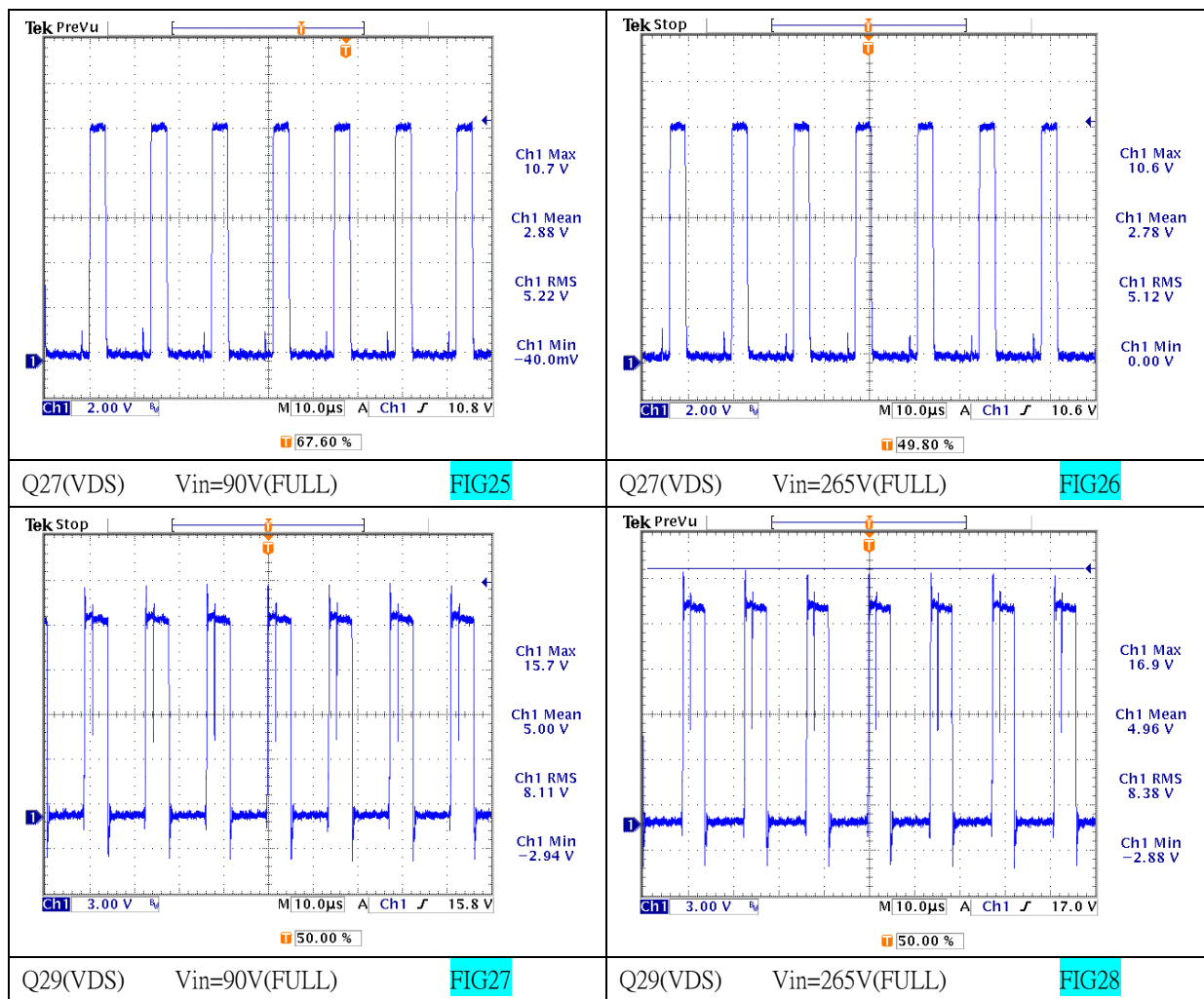


C1 Vin=90V(ML) FIG17



C1 Vin=265V(ML) FIG18

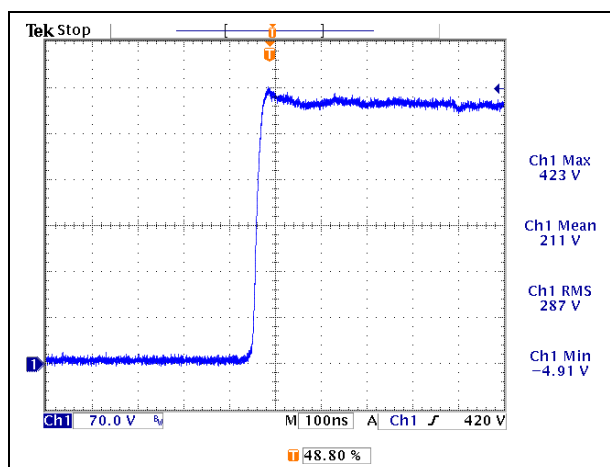




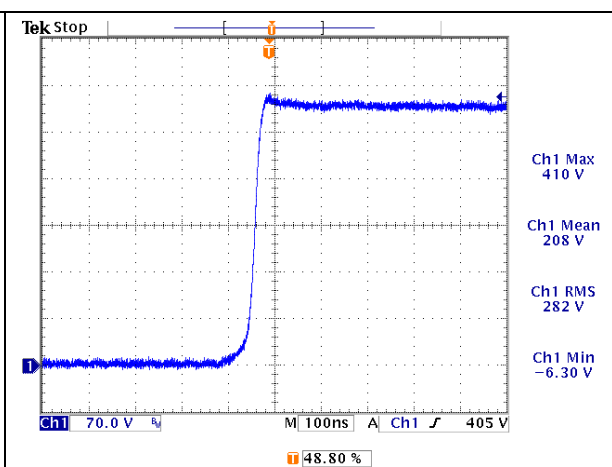
3.2 Transient stress

Location	Test Condition	Spec.(V)		Load	Transient		PASS /FAIL	Figure
					Reading (V)	Derating (%)		
Q1	90V/47Hz	V _{DS}	600	Full	423	70.5	Pass	1
	265V/63Hz				410	68.3	Pass	2
Q2	90V/47Hz	V _{DS}	600	Full	424	70.7	Pass	3
	265V/63Hz				412	68.7	Pass	4
Q21	90V/47Hz	*	700	Full	621	88.7	Pass	5
	265V/63Hz				615	87.9	Pass	6
D2	90V/47Hz	*	600	Full	480	80.0	Pass	7
	265V/63Hz				450	75.0	Pass	8
D13	90V/47Hz	*	60	Full	35.2	58.7	Pass	9
	265V/63Hz				39.8	66.3	Pass	10
Q22	90V/47Hz	V _{DS}	60	Full	59.6	99.3	Pass	11
	265V/63Hz				59.3	98.8	Pass	12

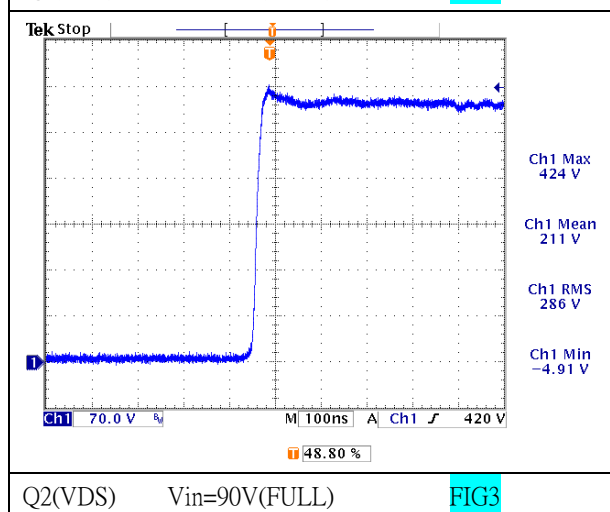
Q23	90V/47Hz	V _{DS}	60	Full	59.4	99.0	Pass	13
	265V/63Hz				58.0	96.7	Pass	14
Q26	90V/47Hz	V _{DS}	30	Full	12.6	42.0	Pass	15
	265V/63Hz				12.4	41.3	Pass	16
C1	90V/47Hz	*	420	ML	412	98.1	Pass	17
	265V/63Hz				394	93.8	Pass	18
	90V/47Hz		420	Full	396	94.3	Pass	19
	265V/63Hz				392	93.3	Pass	20
Q5	90V/47Hz	V _{DS}	800	Full	644	80.5	Pass	21
	265V/63Hz				640	80.0	Pass	22
Q15	90V/47Hz	V _{DS}	800	Full	620	77.5	Pass	23
	265V/63Hz				638	79.8	Pass	24
Q27	90V/47Hz	V _{DS}	30	Full	10.8	36.0	Pass	25
	265V/63Hz				10.7	35.7	Pass	26
Q29	90V/47Hz	V _{DS}	30	Full	25.4	84.7	Pass	27
	265V/63Hz				25.3	84.3	Pass	28



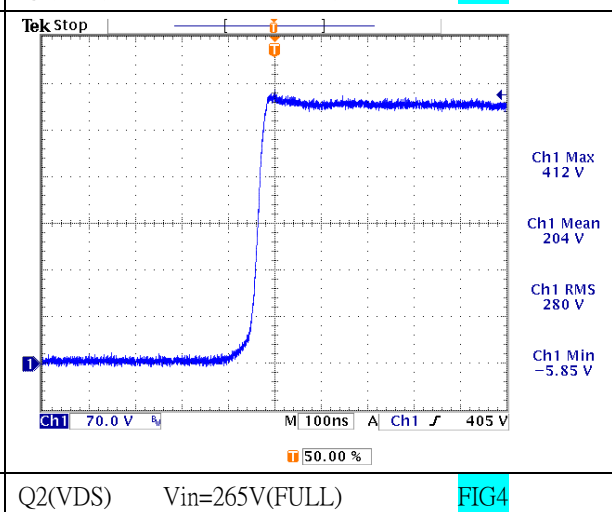
Q1(VDS) Vin=90V(FULL) FIG1



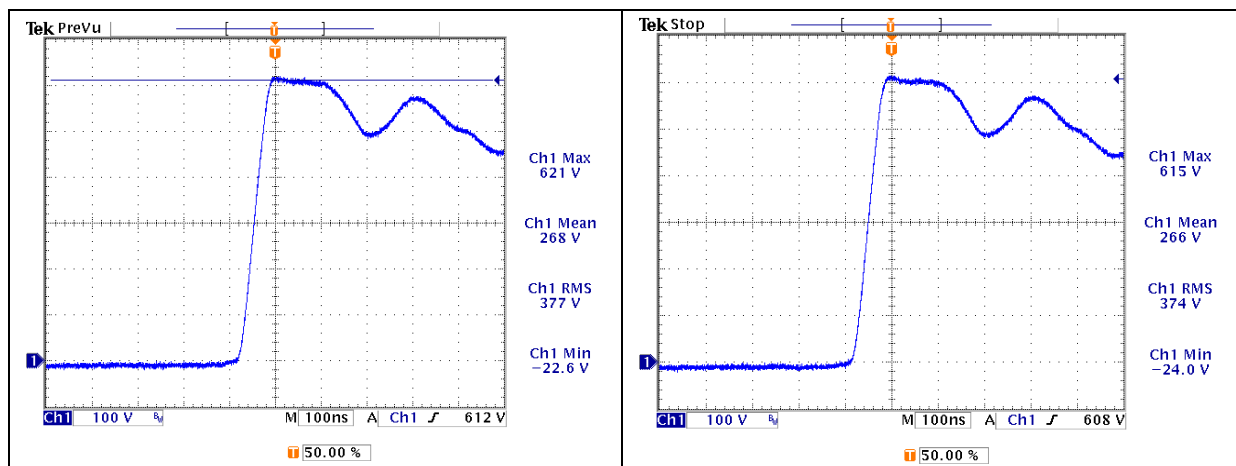
Q1(VDS) Vin=265V(FULL) FIG2



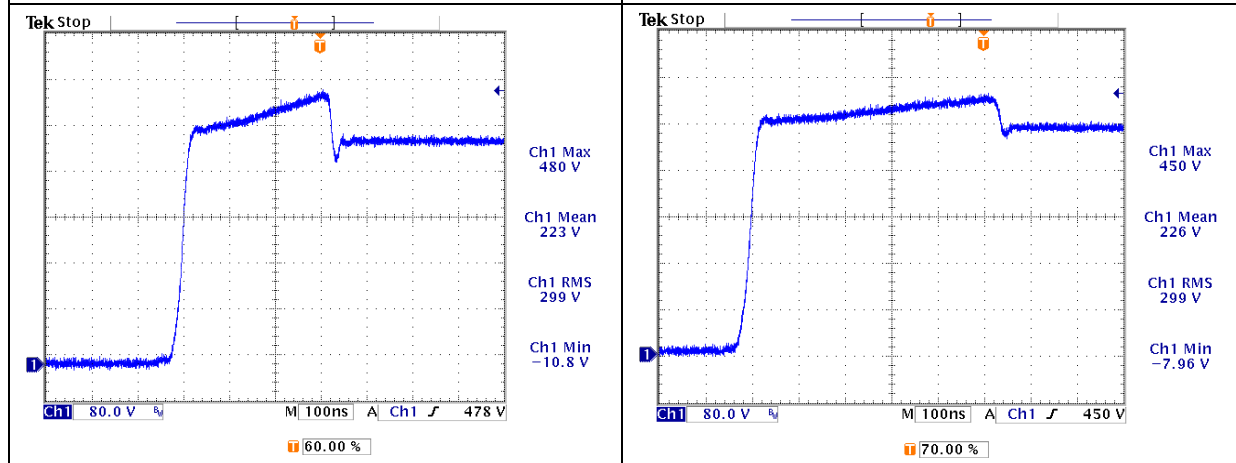
Q2(VDS) Vin=90V(FULL) FIG3



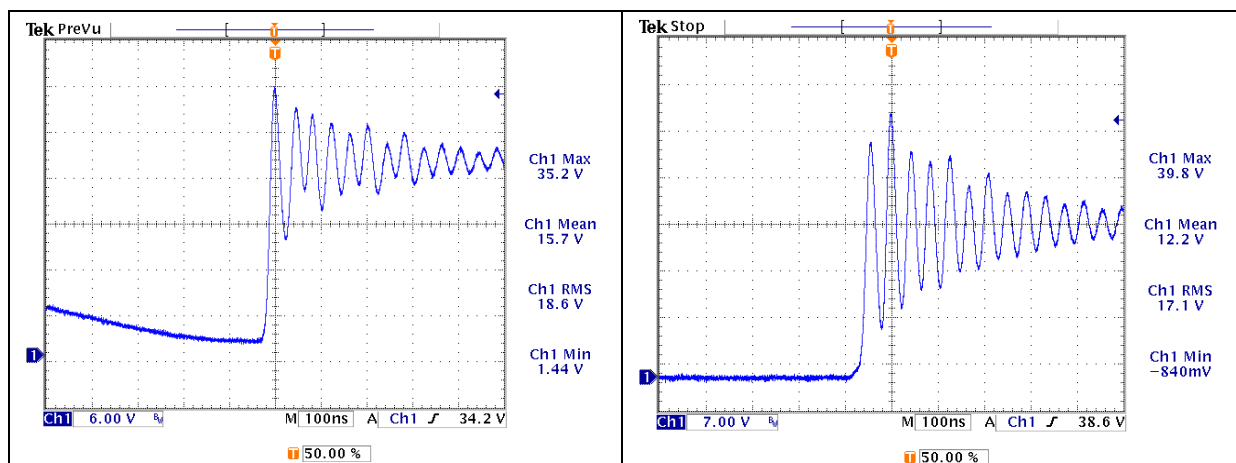
Q2(VDS) Vin=265V(FULL) FIG4



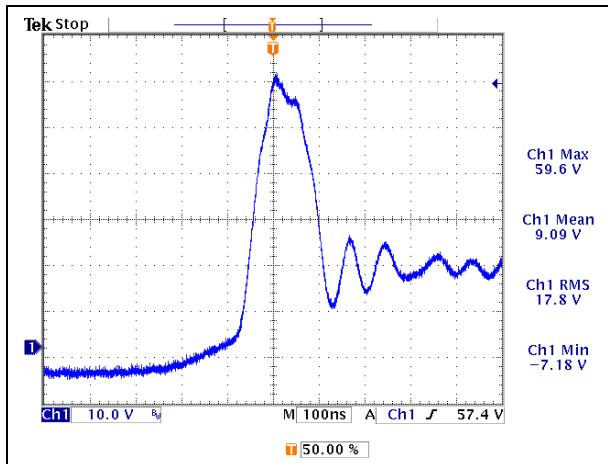
Q21 Vin=90V(FULL) FIG5 Q21 Vin=265V(FULL) FIG6



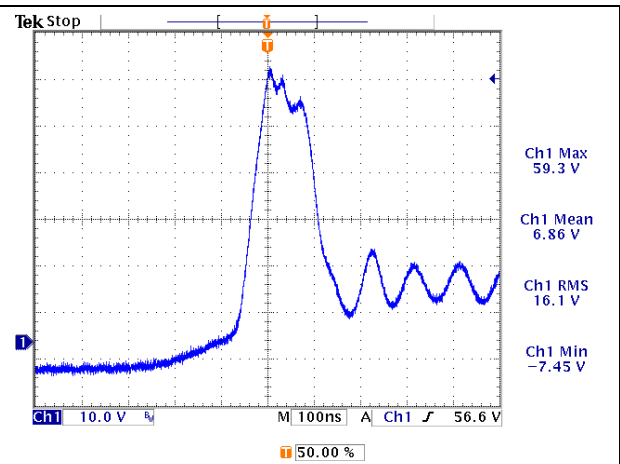
D2 Vin=90V(FULL) FIG7 D2 Vin=265V(FULL) FIG8



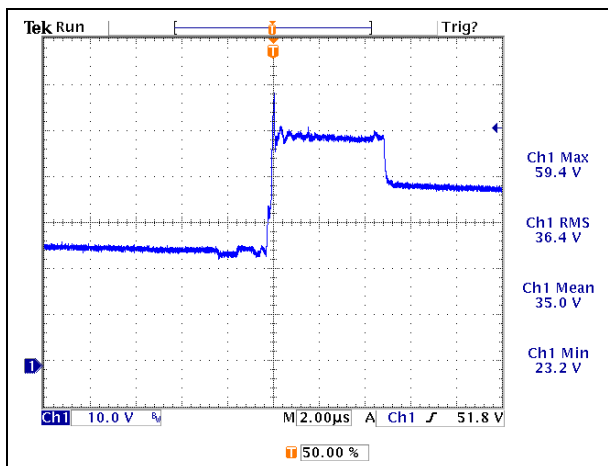
D13 Vin=90V(FULL) FIG9 D13 Vin=265V(FULL) FIG10



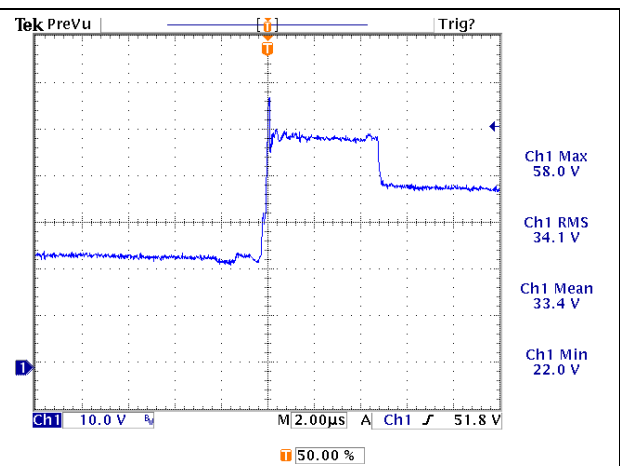
Q22(VDS) Vin=90V(FULL) FIG11



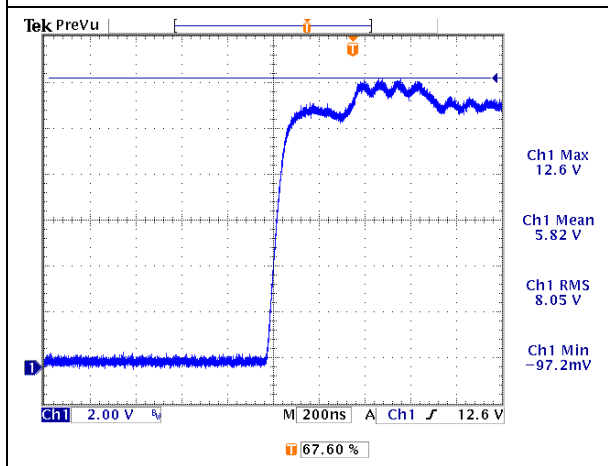
Q22(VDS) Vin=265V(FULL) FIG12



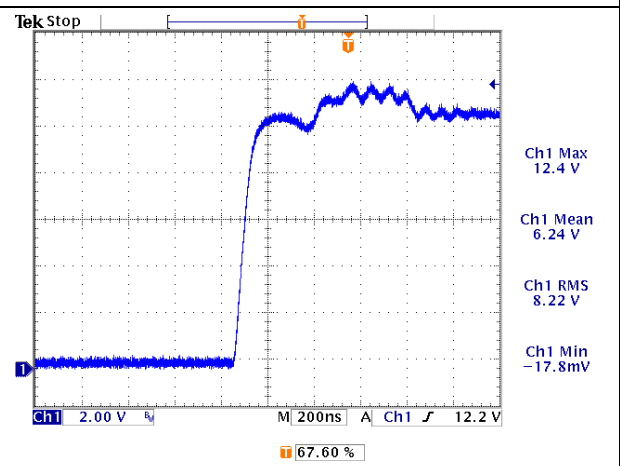
Q23(VDS) Vin=90V(FULL) FIG13



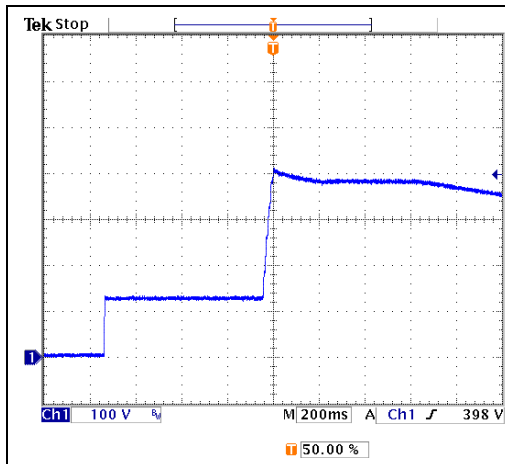
Q23(VDS) Vin=265V(FULL) FIG14



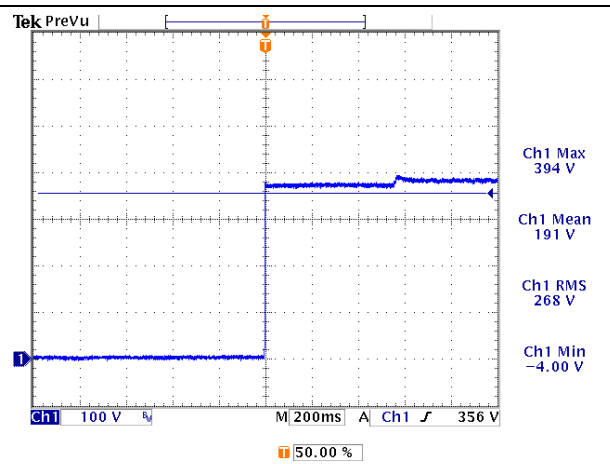
Q26(VDS) Vin=90V(FULL) FIG15



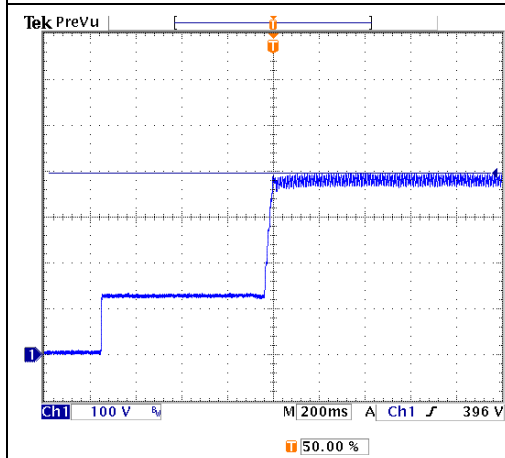
Q26(VDS) Vin=265V(FULL) FIG16



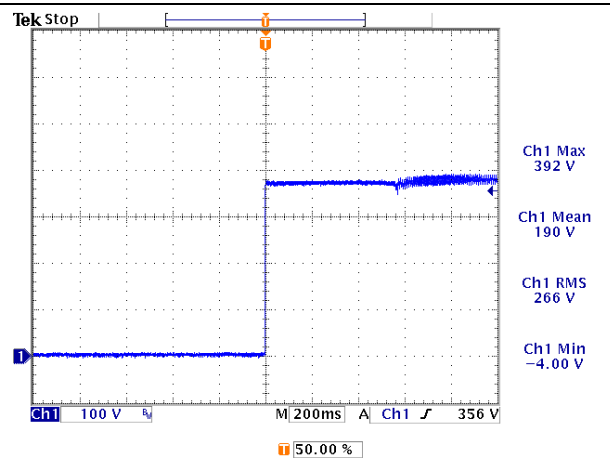
C1 Vin=90V(ML) FIG17



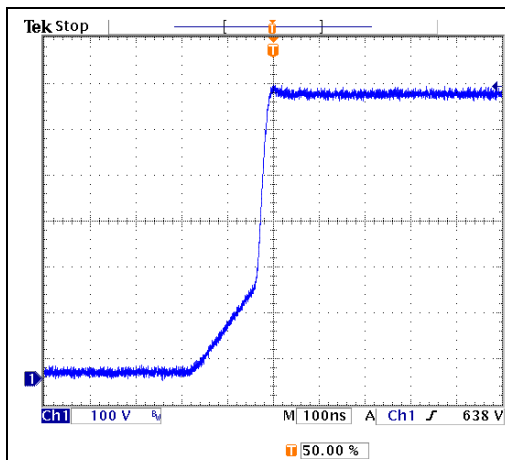
C1 Vin=265V(ML) FIG18



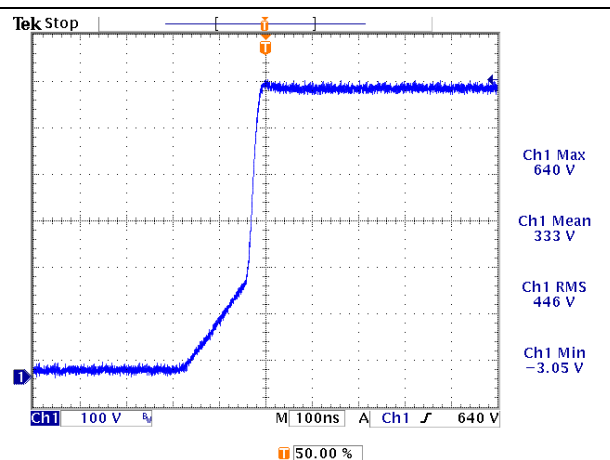
C1 Vin=90V(FULL) FIG19



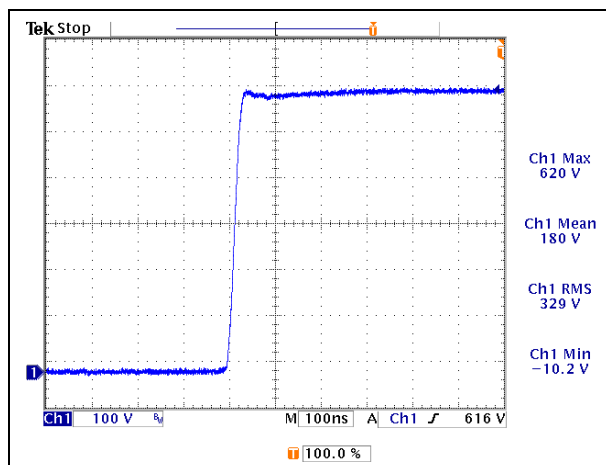
C1 Vin=265V(FULL) FIG20



Q5(VDS) Vin=90V(FULL) FIG21

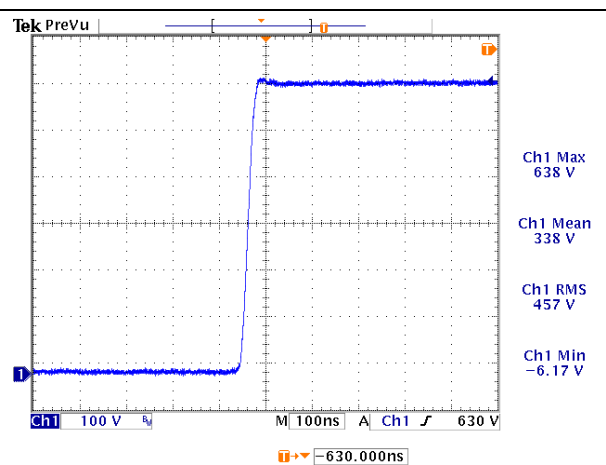


Q5(VDS) Vin=265V(FULL) FIG22



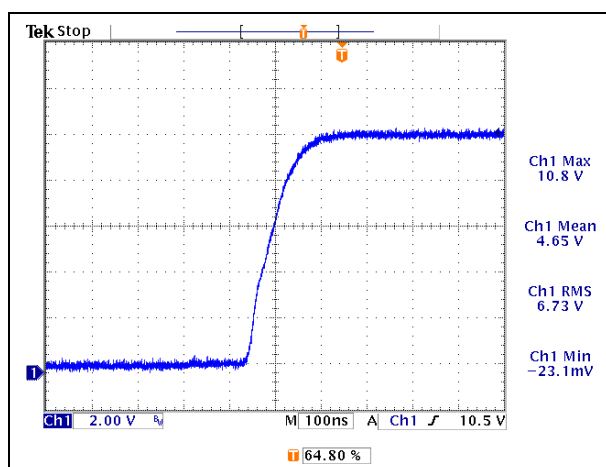
Q15(VDS) Vin=90V(FULL)

FIG23



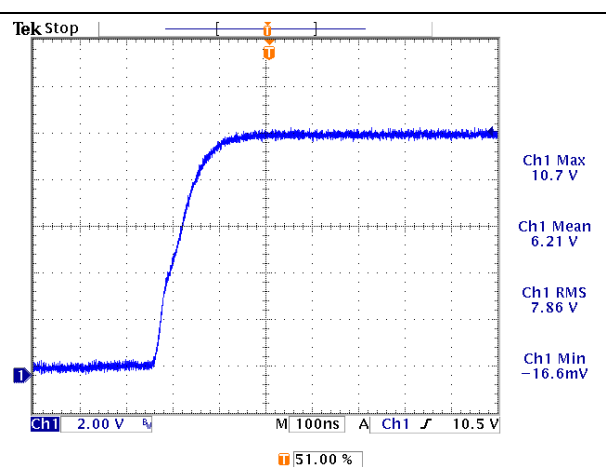
Q15(VDS) Vin=265V(FULL)

FIG24



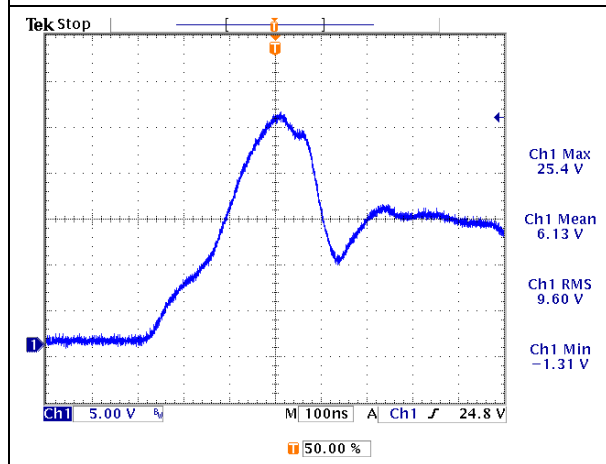
Q27(VDS) Vin=90V(FULL)

FIG25



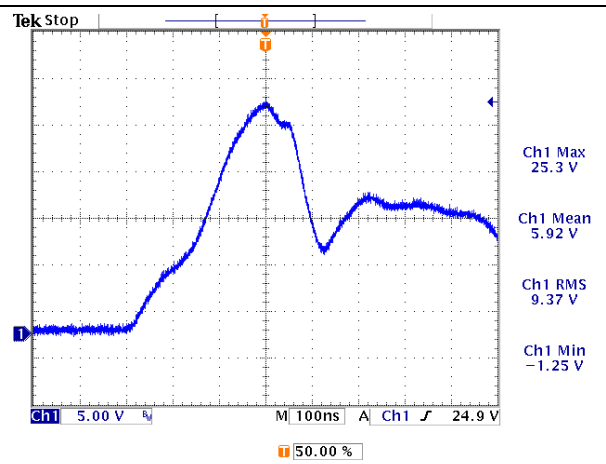
Q27(VDS) Vin=265V(FULL)

FIG26



Q29(VDS) Vin=90V(FULL)

FIG27



Q29(VDS) Vin=265V(FULL)

FIG28

Thermal

1. Specification:

Follow FSP specification

Device	Type	Category	Derating	Remark
			Thermal	
Capacitor	Electrolytic	Bulk	Rated-10°C	
		Filter	Rated-10°C	
		Others	Rated-10°C	
Semiconductor	BJT/MOSFET	Main Switch	85%	
		Small Signal	85%	
	Diode/Schottky	Output Rectifier	85%	
		General Purpose	85%	
Inductor	Transformer	-	85%	
	Choke	-	90%	

2. Test condition:

- ✧ AC Input: 90Vac/115Vac/230Vac/264Vac
- ✧ Frequency: 47Hz/60Hz/50Hz/63Hz
- ✧ Ambient Temperature: 40°C

Loading	+5V	+12V1	+12V2	-12V	+3.3V	+5Vsb
FL1	24A	15A	14.1A	0.3A	3A	3.5A
FL2	10.16A	15A	15.5A	0.3A	24A	0A
FL3	2A	18A	18A	0.3A	11.2A	3.5A
Sb Mode	X	X	X	X	X	3.5A

3. Test Record:**3.1 Fan Voltage Record:**

Fan Type	Input Voltage	Load	Fan Voltage (Vdc)
FAN, MIDDLE, 0.3A, 12V, 120*25, 30dB, 60cfm, 1650rpm, SLEEVE, 2PIN, 230mm, D12SM-12(M-GP1), YATE LOON / NICE FULL,	90Vac/47Hz	FL1	11.39
		FL2	11.28
		FL3	10.98
	115Vac/60Hz	FL1	11.39
		FL2	11.28
		FL3	10.98
	230Vac/50Hz	FL1	11.38
		FL2	11.26
		FL3	10.96
	264Vac/63Hz	FL1	11.38
		FL2	11.26
		FL3	10.96

3.2 Thermal Record:

(UNIT:°C)

Location	SPEC	FL1								Result
		90V	Derating (%)	115V	Derating (%)	230V	Derating (%)	264V	Derating (%)	
Q15	150	66.8	44.5	63.8	42.6	60.6	40.4	59.4	39.6	Pass
Q5	150	60.5	40.3	56.5	37.7	53.5	35.7	53.2	35.5	Pass
D2	175	69.0	39.4	63.4	36.2	58.1	33.2	57.7	33.0	Pass
Q1	150	68.2	45.4	60.3	40.2	53.0	35.4	53.8	35.9	Pass
Q2	150	69.5	46.3	61.3	40.9	53.6	35.7	52.9	35.3	Pass
Q21	150	67.3	44.9	63.1	42.1	58.5	39.0	58.1	38.8	Pass
BD1	150	94.9	63.3	81.1	54.0	61.3	40.8	58.5	39.0	Pass
T1	130	86.3	66.4	84.7	65.2	85.1	65.4	83.2	64.0	Pass
T2	130	60.2	46.3	58.6	45.0	58.6	45.1	59.1	45.5	Pass
L1	130	98.4	75.7	78.1	60.1	60.2	46.3	55.9	43.0	Pass
L2	130	66.0	50.8	58.8	45.2	52.5	40.4	52.3	40.2	Pass
FL3	130	67.5	51.9	58.5	45.0	51.8	39.9	51.1	39.3	Pass
FL2	90	59.8	66.5	54.8	60.9	50.4	56.0	50.8	56.5	Pass
FL1	130	69.2	53.2	57.2	44.0	48.0	36.9	47.0	36.2	Pass
L4	130	54.5	41.9	53.8	41.4	53.8	41.4	53.7	41.3	Pass
L8	130	50.9	39.1	50.1	38.5	50.3	38.7	50.1	38.6	Pass
L5	130	75.9	58.4	75.1	57.7	76.0	58.5	76.6	58.9	Pass
Q22	175	77.2	44.1	77.5	44.3	76.1	43.5	76.3	43.6	Pass
Q23	175	79.6	45.5	78.8	45.0	79.3	45.3	78.8	45.1	Pass
L6	90	67.8	75.4	67.0	74.5	67.5	75.0	66.8	74.2	Pass
L7	130	55.3	42.5	55.6	42.8	54.7	42.0	54.1	41.6	Pass
C42	105	52.3	49.8	51.0	48.6	51.3	48.8	51.7	49.2	Pass
C45	105	60.6	57.7	62.2	59.2	60.7	57.8	60.5	57.6	Pass
C47	105	48.6	46.2	48.9	46.6	48.2	45.9	47.7	45.4	Pass
C49	105	53.5	51.0	53.0	50.5	53.5	51.0	53.1	50.6	Pass
C38	105	46.3	44.1	45.8	43.6	44.9	42.7	44.6	42.5	Pass
C1	85	53.9	63.4	50.7	59.6	48.8	57.4	49.2	57.9	Pass
L9	130	49.9	38.4	49.7	38.2	49.1	37.8	49.4	38.0	Pass
R8	150	81.9	54.6	65.2	43.4	49.9	33.2	48.4	32.2	Pass
C3	105	50.4	48.0	47.3	45.0	45.1	43.0	44.4	42.2	Pass
D1	150	63.7	42.5	56.7	37.8	50.8	33.9	48.7	32.5	Pass
IC5	125	48.3	38.6	47.4	37.9	47.5	38.0	48.9	39.1	Pass
L3	130	60.5	46.5	59.7	45.9	58.7	45.2	60.3	46.4	Pass
IC1	125	57.9	46.3	55.8	44.7	53.8	43.1	54.0	43.2	Pass
Q29	175	86.7	49.5	87.3	49.9	87.1	49.8	87.2	49.8	Pass
Q26	175	75.9	43.4	75.1	42.9	75.7	43.3	73.9	42.2	Pass

Q27	175	80.7	46.1	80.8	46.2	80.3	45.9	79.7	45.5	Pass
Q28	175	65.0	37.1	64.7	36.9	65.0	37.2	65.2	37.3	Pass
D5	150	68.7	45.8	60.7	40.5	52.7	35.1	52.3	34.9	Pass
AMB	40	40.1	---	40.2	---	40.1	---	40.2	---	Ref

Location	SPEC	FL2								Result
		90V	Derating (%)	115V	Derating (%)	230V	Derating (%)	264V	Derating (%)	
Q15	150	67.8	45.2	64.5	43.0	62.1	41.4	60.6	40.4	Pass
Q5	150	61.2	40.8	57.4	38.2	53.8	35.8	52.8	35.2	Pass
D2	175	67.8	38.7	62.5	35.7	58.4	33.4	56.5	32.3	Pass
Q1	150	67.6	45.1	59.9	39.9	53.0	35.3	52.8	35.2	Pass
Q2	150	69.0	46.0	60.5	40.3	53.5	35.7	53.0	35.3	Pass
Q21	150	66.8	44.5	61.6	41.1	56.7	37.8	56.4	37.6	Pass
BD1	150	95.2	63.5	81.1	54.1	60.9	40.6	58.0	38.7	Pass
T1	130	90.1	69.3	90.5	69.6	89.1	68.5	89.2	68.6	Pass
T2	130	52.7	40.5	52.3	40.3	51.1	39.3	52.1	40.0	Pass
L1	130	99.7	76.7	78.8	60.6	59.7	45.9	56.0	43.1	Pass
L2	130	65.2	50.2	58.8	45.2	52.4	40.3	51.0	39.3	Pass
FL3	130	67.1	51.6	58.9	45.3	51.5	39.6	51.2	39.4	Pass
FL2	90	60.0	66.6	56.1	62.3	51.0	56.7	50.7	56.3	Pass
FL1	130	69.6	53.6	57.7	44.4	48.1	37.0	48.1	37.0	Pass
L4	130	57.8	44.4	56.5	43.5	57.1	43.9	57.3	44.1	Pass
L8	130	65.0	50.0	64.6	49.7	64.7	49.8	64.6	49.7	Pass
L5	130	72.3	55.6	72.2	55.5	72.1	55.4	73.0	56.2	Pass
Q22	175	81.9	46.8	81.8	46.7	81.4	46.5	80.9	46.2	Pass
Q23	175	84.4	48.2	84.1	48.0	83.9	47.9	83.3	47.6	Pass
L6	90	68.7	76.3	67.0	74.4	67.5	75.0	67.3	74.7	Pass
L7	130	53.5	41.2	53.5	41.1	53.2	40.9	54.2	41.7	Pass
C42	105	52.0	49.5	51.2	48.7	51.3	48.9	52.3	49.8	Pass
C45	105	61.3	58.4	61.1	58.2	61.2	58.2	61.2	58.3	Pass
C47	105	55.5	52.8	54.1	51.5	54.6	52.0	54.2	51.6	Pass
C49	105	54.1	51.5	52.9	50.4	54.1	51.5	52.9	50.4	Pass
C38	105	47.1	44.9	47.0	44.8	46.7	44.4	46.9	44.7	Pass
C1	85	53.6	63.1	50.9	59.9	49.6	58.3	49.1	57.8	Pass
L9	130	60.6	46.6	60.6	46.6	60.6	46.6	60.1	46.2	Pass
R8	150	81.9	54.6	65.8	43.8	49.7	33.1	47.9	31.9	Pass
C3	105	50.6	48.2	47.5	45.2	45.8	43.6	44.7	42.6	Pass
D1	150	64.4	42.9	56.3	37.5	50.8	33.8	48.5	32.3	Pass

IC5	125	50.3	40.2	49.1	39.3	49.8	39.9	49.3	39.5	Pass
L3	130	62.4	48.0	61.1	47.0	59.8	46.0	59.6	45.8	Pass
IC1	125	57.7	46.2	54.9	43.9	52.8	42.2	52.6	42.1	Pass
Q29	175	91.9	52.5	91.9	52.5	90.9	52.0	91.0	52.0	Pass
Q26	175	80.5	46.0	80.2	45.8	78.6	44.9	78.7	44.9	Pass
Q27	175	90.8	51.9	89.7	51.3	89.3	51.0	89.1	50.9	Pass
Q28	175	89.4	51.1	88.5	50.6	88.5	50.6	89.2	51.0	Pass
D5	150	69.0	46.0	60.0	40.0	52.4	35.0	52.2	34.8	Pass
AMB	40	40.1	---	40.2	---	40.1	---	40.2	---	Ref

Location	SPEC	FL3								Result
		90V	Derating (%)	115V	Derating (%)	230V	Derating (%)	264V	Derating (%)	
Q15	150	67.9	45.3	63.9	42.6	61.3	40.9	60.2	40.1	Pass
Q5	150	60.0	40.0	57.1	38.1	54.7	36.5	53.5	35.7	Pass
D2	175	70.1	40.1	63.8	36.5	58.8	33.6	58.2	33.3	Pass
Q1	150	68.4	45.6	60.1	40.1	54.8	36.5	54.6	36.4	Pass
Q2	150	70.8	47.2	63.1	42.1	56.3	37.5	54.4	36.3	Pass
Q21	150	67.9	45.3	63.1	42.1	58.8	39.2	59.6	39.7	Pass
BD1	150	94.5	63.0	80.2	53.5	61.1	40.7	59.7	39.8	Pass
T1	130	84.7	65.2	84.7	65.2	84.5	65.0	84.3	64.8	Pass
T2	130	58.7	45.2	58.4	44.9	58.7	45.2	57.6	44.3	Pass
L1	130	81.3	62.5	68.0	52.3	56.4	43.4	52.6	40.5	Pass
L2	130	66.5	51.2	60.8	46.8	52.8	40.6	51.9	39.9	Pass
FL3	130	67.3	51.8	60.0	46.2	53.2	40.9	52.4	40.3	Pass
FL2	90	59.4	66.0	55.1	61.2	50.7	56.3	49.5	55.0	Pass
FL1	130	66.3	51.0	57.2	44.0	48.5	37.3	47.8	36.8	Pass
L4	130	55.6	42.8	55.7	42.8	55.6	42.8	54.7	42.1	Pass
L8	130	54.8	42.2	53.1	40.8	53.2	40.9	53.4	41.1	Pass
L5	130	76.8	59.1	78.7	60.5	77.9	59.9	78.2	60.2	Pass
Q22	175	75.4	43.1	75.1	42.9	74.6	42.6	74.3	42.5	Pass
Q23	175	80.0	45.7	79.4	45.4	79.4	45.4	79.5	45.4	Pass
L6	90	69.5	77.2	70.6	78.4	70.6	78.4	70.0	77.8	Pass
L7	130	53.7	41.3	55.1	42.4	54.3	41.8	54.1	41.6	Pass
C42	105	53.7	51.1	54.3	51.7	54.4	51.8	54.8	52.2	Pass
C45	105	64.0	61.0	63.9	60.9	63.1	60.1	64.8	61.7	Pass
C47	105	48.9	46.6	49.6	47.2	50.5	48.1	49.3	47.0	Pass
C49	105	54.8	52.2	55.3	52.7	54.5	51.9	55.8	53.1	Pass
C38	105	46.6	44.4	45.0	42.9	45.1	43.0	45.7	43.5	Pass

C1	85	53.6	63.1	50.4	59.3	48.6	57.2	48.7	57.3	Pass
L9	130	51.3	39.5	51.1	39.3	50.5	38.8	51.5	39.6	Pass
R8	150	80.6	53.7	65.4	43.6	50.2	33.5	49.3	32.9	Pass
C3	105	48.6	46.3	47.4	45.1	45.2	43.0	43.9	41.8	Pass
D1	150	60.4	40.3	54.5	36.3	50.2	33.5	49.0	32.7	Pass
IC5	125	45.2	36.2	45.6	36.5	46.2	37.0	46.3	37.0	Pass
L3	130	57.5	44.2	57.0	43.8	56.1	43.2	56.7	43.6	Pass
IC1	125	58.4	46.7	57.1	45.7	55.3	44.2	54.0	43.2	Pass
Q29	175	79.9	45.7	80.0	45.7	79.8	45.6	79.7	45.5	Pass
Q26	175	68.0	38.9	67.9	38.8	68.6	39.2	68.8	39.3	Pass
Q27	175	74.7	42.7	74.7	42.7	74.4	42.5	73.9	42.2	Pass
Q28	175	67.7	38.7	67.2	38.4	66.8	38.2	66.7	38.1	Pass
D5	150	71.0	47.3	63.2	42.1	55.0	36.7	54.6	36.4	Pass
AMB	40	40.1	---	40.2	---	40.1	---	40.2	---	Ref

Location	SPEC	SB mode				Result
		90V	Derating (%)	264V	Derating (%)	
Q15	150	45.8	30.6	46.2	30.8	Pass
Q5	150	46.0	30.7	46.3	30.9	Pass
D2	175	45.4	25.9	45.5	26.0	Pass
Q1	150	45.0	30.0	45.1	30.1	Pass
Q2	150	45.5	30.3	45.7	30.5	Pass
Q21	150	49.3	32.8	50.0	33.4	Pass
BD1	150	44.7	29.8	43.3	28.8	Pass
T1	130	45.4	34.9	46.3	35.6	Pass
T2	130	66.1	50.9	69.5	53.4	Pass
L1	130	42.6	32.7	42.8	32.9	Pass
L2	130	43.7	33.6	43.7	33.6	Pass
FL3	130	43.3	33.3	43.0	33.1	Pass
FL2	90	42.9	47.7	42.9	47.6	Pass
FL1	130	43.1	33.1	43.1	33.2	Pass
L4	130	60.2	46.3	61.1	47.0	Pass
L8	130	53.2	40.9	53.6	41.2	Pass
L5	130	46.6	35.9	47.6	36.6	Pass
Q22	175	45.8	26.2	46.6	26.6	Pass
Q23	175	47.0	26.9	48.0	27.5	Pass
L6	90	45.0	50.0	45.8	50.9	Pass
L7	130	46.8	36.0	47.7	36.7	Pass

C42	105	46.3	44.1	47.3	45.0	Pass
C45	105	45.4	43.2	46.1	43.9	Pass
C47	105	49.1	46.7	49.2	46.9	Pass
C49	105	46.5	44.3	47.4	45.1	Pass
C38	105	46.2	44.0	46.5	44.3	Pass
C1	85	45.1	53.1	45.3	53.3	Pass
L9	130	47.8	36.8	48.2	37.1	Pass
R8	150	44.9	30.0	44.6	29.7	Pass
C3	105	44.0	41.9	43.9	41.8	Pass
D1	150	47.3	31.5	45.8	30.5	Pass
IC5	90	45.0	50.0	45.3	50.3	Pass
L3	130	54.1	41.6	56.1	43.1	Pass
IC1	125	48.0	38.4	48.3	38.6	Pass
Q29	175	46.1	26.4	46.8	26.8	Pass
Q26	175	47.2	27.0	47.9	27.4	Pass
Q27	175	47.6	27.2	48.4	27.7	Pass
Q28	175	49.5	28.3	50.3	28.7	Pass
D5	150	45.9	30.6	45.8	30.5	Pass
AMB	40	40.2	---	40.1	---	Ref

NOTE:

Q15	TR,N-COOL MOSFET,11A,800V,P-TO220-3-31,SPA11N80C3,INFINEON,
Q5	TR,N-MOSFET,3A,800V,TO-220F,FQPF3N80C,FAIRCHILD,
D2	DIODE,ULTRAFAST,8A,600V,TO-220F(2PIN),STTH8R06FP,S.T,
Q1	TR,N-MOSFET,16A,600 V,TO-220FP,0.19 ohm,STF22NM60N,S.T,
Q2	TR,N-MOSFET,16A,600 V,TO-220FP,0.19 ohm,STF22NM60N,S.T,
Q21	TR,N-MOSFET,2.5A,700V,TO-220CFM,AP03N70I-H,A.P,
BD1	DIODE,BRIDGE,15A,600V,GLASS,GBU1506,LITEON,
T1	X'FMR,ERXL-35V(14P),D=0.45*2,78Ts,FSP500-80EGN,3.5mH+-10%,
T2	X'FMR,EEL-19V(10P),D=0.2*2,110Ts,FSP750-80EGN,900uH+-5%,
L1	CHOKE,SENDUST,T27.7*14.1*11.99(CS270060),D=1,81.5Ts,500uH+-5%,BASE(PCB),W/TAPE,W/COPPER,
L2	CHOKE,AMO,T14.7*7.8*4.6(AMSN-13B-L),D=0.25*16C,12.5Ts,595uH,BASE(PCB),
FL3	CHOKE,FER,T25*15*10+C(A10),D=1.2,27.5Ts,5.4mH,PIN=5,PITCH=14,W/TUBE,
FL2	CHOKE,IRON,T17.5*9.4*4.83(T68-26),D=1.1,21.5Ts,21uH+-20%,PIN=3.8,PITCH=8,
FL1	CHOKE,FER,T22*14*10+C(A10),D=1,27.5Ts,4.7mH MIN,PIN=5,PITCH=15,W/TUBE,
L4	CHOKE,FER,R4*20(GL6),D=1.4,7.5Ts,1uH REF,PIN=4,PITCH=13.5,

L8	CHOKE,SENDUST,T21.1*12.7*7.11(CS203060),D=1.3*2,11.5Ts,4.6uH+-25%,PIN=5,PITCH=8.5,
L5	CHOKE,SENDUST,T27.7*14.1*11.99(CS270060),D=1.4*2,13.5Ts,14.7uH+-25%,PIN=5,PITCH=18,
Q22	TR,N-MOSFET,193A,60V,TO-220,3.2m ohm,FDP030N06,FAIRCHLD,
Q23	TR,N-MOSFET,193A,60V,TO-220,3.2m ohm,FDP030N06,FAIRCHLD,
L6	CHOKE,IRON,T6.73*2.67*4.83(T26-52)*2,D=1.8,0.5Ts,0.3uH+-25%,PIN=3.8,PITCH=5.2,
L7	CHOKE,FER,R5*20(GL6),D=1.8,3.5Ts,0.2uH,PIN=3.8,PITCH=10.5,
C42	CAP,AL,LOW ESR,3300uF,16V,3000Hrs,105'C,M,10*35,PIN=15,SC016M33003TT,TEAPO,
C45	CAP,AL,LOW ESR,1000uF,16V,4000Hrs,105'C,M,8*20,TAPING,SY016M1000,TEAPO,
C47	CAP,AL,LOW ESR,3300uF,10V,3000Hrs,105'C,M,10*25,PIN=3.8,SC010M3300,TEAPO,
C49	CAP,AL,LOW ESR,3300uF,10V,3000Hrs,105'C,M,10*25,PIN=3.8,SC010M3300,TEAPO,
C38	CAP,AL,LOW ESR,3300uF,10V,3000Hrs,105'C,M,10*25,PIN=3.8,SC010M3300,TEAPO,
C1	CAP,AL,270uF,420V,2000Hrs,85'C,M,30*30,SNAP IN,PIN=4,SPS277420M3030H3,OST,
L9	CHOKE,FER,R5*20(GL6),D=1.8,3.5Ts,0.2uH,PIN=3.8,PITCH=10.5,
R8	RES,WIRE WOUND(NO-INDUCTIVE),0.04 ohm,5W,J,S-SIZE,本體 6*17,0.04S/J/5W,
C3	CAP,POLYESTER,225,K,450V,25.5L*8.8T*18.8H*22.5F,MMX,NISSEI,
D1	DIODE,FAST,3A,1000V,DO-201AD,GLASS,1N5408G,T.S,
IC5	IC,P.G,DIP-16,WO/SCP,WT7527B N161,WELTREND,
L3	CHOKE,FER,T10*5*3+C(A07),D=0.3(TRWB),8.5Ts,226uH+-25%,BASE(PCB),
IC1	IC,COMBO(PFC,PWM,STBY),DIP-20,FSP6600B,
Q29	TR,N-MOSFET,90A,30V,PG-TO252-3-11,SMD,4m ohm,IPD040N03L G,INFINEON,
Q26	TR,N-MOSFET,90A,30V,PG-TO252-3-11,SMD,4m ohm,IPD040N03L G,INFINEON,
Q27	TR,N-MOSFET,50A,30V,PG-TO252-3-11,SMD,IPD060N03L,INFINEON,
Q28	TR,N-MOSFET,50A,30V,PG-TO252-3-11,SMD,IPD060N03L,INFINEON,
D5	DIODE,SUPER FAST,2A,600V,SMB/DO-214AA,SMD,35ns,ES2J,T.S,

Leakage current

1 Specification:

The power supply ground leakage current shall be less than 3.5mA.

2 Test condition:

- ✧ Input: 254Vac
- ✧ Frequency: 50Hz
- ✧ Ambient Temperature: 25°C

3 Test record

EQUIPMENT:

A. AC SOURCE : CHROMA 6530
B. LEAKAGE CURRENT METER : YOKOGAWA Type 3226

RESULTS:

READING : 0.74mA(L): 0.75mA(N)

PASS: FAIL:

Hi-pot

1 Specification:

- ✧ Primary to frame ground: shall be less than 10mA.
- ✧ Primary to secondary: shall be less than 10mA

2 Test condition:

- ✧ Primary to frame ground: 1800Vac.
- ✧ Primary to secondary: 1800Vac.
- ✧ Duration time: 60Second
- ✧ Ambient Temperature: 25°C

3 Test Record:

EQUIPMENT:

ZENTECH 9052 PROGRAMMABLE AUTO SAFETY TESTER

<input checked="" type="checkbox"/>	CUT OFF CURRENT	SPEC :	10	mA (max)	PASS:	<input checked="" type="checkbox"/>	FAIL:	<input type="checkbox"/>
	PRIMARY TO FRAME	:	<u>5.48</u>	mA				
	GROUND READING							
	PRIMARY TO	:	<u>5.46</u>	mA				
	SECONDARY READING							

Insulation resistance

1 Specification:

- ✧ Primary to frame ground: shall be great than 20 MΩ.
- ✧ Primary to secondary: shall be great than 20 MΩ.

2 Test condition:

- ✧ Primary to frame ground: 500Vdc.
- ✧ Primary to secondary: 500Vdc.
- ✧ Duration time: 60Second
- ✧ Ambient Temperature: 25°C

3 Test Record:

EQUIPMENT:

ZENTECH 9052 PROGRAMMABLE AUTO SAFETY TESTER

<input checked="" type="checkbox"/>	INSULATION RESISTANCE	SPEC :	20 MΩ (min)	PASS:	<input checked="" type="checkbox"/>	FAIL:	<input type="checkbox"/>
	PRIMARY TO FRAME	:	<u>194</u> MΩ				
	GROUND READING						
	PRIMARY TO	:	<u>185</u> MΩ				
	SECONDARY READING						

Ground bond

1 Specification:

The power supply ground bond shall be less than 0.1 ohm

2 Test condition:

- ✧ Output Current: 40A
- ✧ Dwell Time: 120 second
- ✧ Ambient Temperature: 25°C

3 Test Record:

EQUIPMENT:

EXTECH 7306 GROUND BOND TESTER

TEST RESULT:

READING : 0.009 Ω

PASS: FAIL:

Burn-in

1. Specification:

After burn-in test all outputs should within the spec.

2. Test Condition:

- ✧ AC Input: 230Vac
- ✧ Frequency: 50Hz.
- ✧ Ambient Temperature: 40°C

Loading	+5V	+12V1	+12V2	-12V	+3.3V	+5Vsb
Full	13.37A	15.37A	15.37A	0.29A	13.37A	3.36A

3. Test Record:

The measurement of DC output voltage

V out	Ambient: 40°C							Spec (V)	Result
	Power ON	After 8hr	After 24hr	After 32hr	After 48hr	After 56hr	After 72hr		
+5V	4.97	4.97	4.97	4.97	4.97	4.97	4.97	4.75~5.25	Pass
+12V1	12.10	12.09	12.09	12.09	12.09	12.09	12.09	11.4~12.6	Pass
+12V2	12.06	12.06	12.06	12.06	12.06	12.06	12.06	11.4~12.6	Pass
-12V	-12.48	-12.47	-12.47	-12.47	-12.47	-12.47	-12.47	-10.8~-13.2	Pass
+3.3V	3.19	3.19	3.19	3.19	3.19	3.19	3.19	3.135~3.465	Pass
+5Vsb	4.90	4.89	4.89	4.89	4.89	4.89	4.89	4.75~5.25	Pass

+5Vsb (Stand by) mode:

V out	Ambient: 40°C							Spec (V)	Result
	Power ON	After 8hr	After 24hr	After 32hr	After 48hr	After 56hr	After 72hr		
+5Vsb	4.96	4.96	4.96	4.96	4.96	4.96	4.96	4.75~5.25	Pass

On/off cycling

1. Specification:

After test the PSU should no damage and all outputs should within the spec.

2. Test condition:

- ✧ AC Input: 230Vac/50Hz
- ✧ Ambient Temperature: 40°C
- ✧ Cycling times: 1000 times, (2sec ON 2sec OFF) 、 1000 times, (30sec ON 30sec OFF)

Loading	+5V	+12V1	+12V2	-12V	+3.3V	+5Vsb
Full	13.37A	15.37A	15.37A	0.29A	13.37A	3.36A

3. Test Record:

Status: AC input 2 Sec ON, 2 Sec OFF.

Vin (Vac)	O/P Name	DC Output (V)					Spec (V)	Results
		After 200cycles	After 400cycles	After 600cycles	After 800cycles	After 1000cycles		
230	+5V	4.97	4.97	4.97	4.97	4.97	4.75~5.25	Pass
	+12V1	12.10	12.10	12.10	12.10	12.10	11.4~12.6	Pass
	+12V2	12.06	12.06	12.06	12.06	12.06	11.4~12.6	Pass
	-12V	-12.48	-12.48	-12.48	-12.48	-12.48	-10.8~-13.2	Pass
	+3.3V	3.18	3.18	3.18	3.18	3.18	3.135~3.465	Pass
	+5Vsb	4.90	4.90	4.90	4.90	4.90	4.75~5.25	Pass

Status: AC input 30 Sec ON, 30 Sec OFF.

Vin (Vac)	O/P Name	DC Output (V)					Spec (V)	Results
		After 200cycles	After 400cycles	After 600cycles	After 800cycles	After 1000cycles		
230	+5V	4.98	4.98	4.98	4.98	4.98	4.75~5.25	Pass
	+12V1	12.11	12.11	12.11	12.11	12.11	11.4~12.6	Pass
	+12V2	12.06	12.06	12.06	12.06	12.06	11.4~12.6	Pass
	-12V	-12.49	-12.49	-12.49	-12.49	-12.49	-10.8~-13.2	Pass
	+3.3V	3.18	3.18	3.18	3.18	3.18	3.135~3.465	Pass
	+5Vsb	4.89	4.89	4.89	4.89	4.89	4.75~5.25	Pass

Temperature & Humidity

1. Specification:

After test the PSU should no damage and all outputs should within the spec.

2. Test Condition:

- ✧ AC Input: 90Vac/264Vac
- ✧ Frequency: 47Hz/63Hz
- ✧ Ambient (Operating): 0°C~40°C
- ✧ Ambient (Storage): -40°C~70°C
- ✧ Ambient Humi: 5%~95%RH

Loading	+5V	+12V1	+12V2	-12V	+3.3V	+5Vsb
Full	13.37A	15.37A	15.37A	0.29A	13.37A	3.36A

Step	Vin/Fin	Outputs Load	Ambient Temp(°C)	Ambient Humidity (%)	Power on/off	Duration (Hr)	Type
1	90Vac/47Hz	Full	25	50	OFF	0.5	Humi & temp ramp
2	90Vac/47Hz	Full	25	50	OFF	2	Room temp operating
3	90Vac/47Hz	Full	0	-----	OFF	0.5	Low Humi.&temp ramp
4	90Vac/47Hz	Full	0	-----	OFF	2	Low Humi.&temp ramp
5	90Vac/47Hz	Full	0	-----	ON	6	Low Humi.&temp operating
6	90Vac/47Hz	Full	-40	-----	OFF	0.5	Low Humi.&temp ramp
7	90Vac/47Hz	Full	-40	-----	OFF	8	Low Humi.&temp Storage
8	90Vac/47Hz	Full	0	-----	OFF	0.5	Low Humi.&temp ramp
9	90Vac/47Hz	Full	0	-----	OFF	2	Low Humi.&temp ramp
10	90Vac/47Hz	Full	0	-----	ON	6	Low Humi.&temp operating
11	90Vac/47Hz	Full	40	85	OFF	1	High Humi & temp ramp
12	90Vac/47Hz	Full	40	85	OFF	2	High Humi & temp ramp
13	90Vac/47Hz	Full	40	85	ON	8	High Humi& temp operating
14	90Vac/47Hz	Full	70	95	OFF	0.5	High Hum& temp ramp
15	90Vac/47Hz	Full	70	95	OFF	8	High Humi& temp Storage
16	90Vac/47Hz	Full	40	85	OFF	0.5	High Humi & temp ramp
17	90Vac/47Hz	Full	40	85	ON	8	High Humi& temp operating
18	90Vac/47Hz	Full	25	50	ON	0.5	Humi & temp ramp
19	90Vac/47Hz	Full	25	50	ON	2	Room temp operating

* **PS1:** After run 1cycles of step1 to step 19 then continue below step.

Step	Vin/Fin	Outputs Load	Ambient Temp(°C)	Ambient Humidity (%)	Power on/off	Duration (Hr)	Type
20	264V/63Hz	Full	25	50	OFF	0.5	Humi &temp ramp
21	264V/63Hz	Full	25	50	OFF	2	Room temp operating
22	264V/63Hz	Full	0	-----	OFF	0.5	Low Humi.&temp ramp
23	264V/63Hz	Full	0	-----	OFF	2	Low Humi.&temp ramp
24	264V/63Hz	Full	0	-----	ON	6	Low Humi.&temp operating
25	264V/63Hz	Full	-40	-----	OFF	0.5	Low Humi.&temp ramp
26	264V/63Hz	Full	-40	-----	OFF	8	Low Humi.&temp Storage
27	264V/63Hz	Full	0	-----	OFF	0.5	Low Humi.&temp ramp
28	264V/63Hz	Full	0	-----	OFF	2	Low Humi.&temp ramp
29	264V/63Hz	Full	0	-----	ON	6	Low Humi.&temp operating
30	264V/63Hz	Full	40	85	OFF	1	High Humi & temp ramp
31	264V/63Hz	Full	40	85	OFF	2	High Humi & temp ramp
32	264V/63Hz	Full	40	85	ON	8	High Humi& temp operating
33	264V/63Hz	Full	70	95	OFF	0.5	High Hum& temp ramp
34	264V/63Hz	Full	70	95	OFF	8	High Humi& temp Storage
35	264V/63Hz	Full	40	85	OFF	0.5	High Humi & temp ramp
36	264V/63Hz	Full	40	85	ON	8	High Humi& temp operating
37	264V/63Hz	Full	25	50	ON	0.5	Humi &temp ramp
38	264V/63Hz	Full	25	50	ON	2	Room temp operating

* **PS2:** After run 1cycles of step20 to step38 then checked outputs function.

3. Test Record: **Pass**

Cold start

1. Specification:

At non-operating of power supply to put down 0°C chamber 24hr , then turn on the PSU. The outputs shall remain within the regulation limits and no any damage occurs to the power supply.

2. Test Condition:

- ✧ AC Input: 90Vac/264Vac
- ✧ Frequency: 47Hz/63Hz
- ✧ Ambient Temperature:0°C

Loading	+5V	+12V1	+12V2	-12V	+3.3V	+5Vsb
Full	13.37A	15.37A	15.37A	0.29A	13.37A	3.36A

3. Test Record:

After put down 0°C chamber 24hr.

Ambient Temperature	Vin (Vac)	Fin (Hz)	Load Status	DC Output Voltage (Vdc)						Output Function
				+5V	+12V1	+12V2	-12V	+3.3V	+5Vsb	
0°C	90	47	Full	4.99	12.11	12.09	-12.49	3.20	4.93	Pass
	264	63		5.00	12.10	12.10	-12.48	3.21	4.94	

Lightning surge

1. Specification:

No damage and without any function loss

2. Test Condition:

2.1 ±1KV applied between line and Neutral, pulse rise time 1.2us and duty time 50us, 5 times each one.

2.2 ±2KV applied between line and Neutral to ground (signal ground), pulse rise time 1.2μs and duty time 50μs, 5 times test each one.

For IEC-61000-4-5:

Output polarity	Both positive and negative
Output (source) impedance	For power supply (AC or DC), line to line surges: 2ohm.
	For power supply (AC or DC), line to earth surges: 12ohm.

Voltage Test Levels vs. Class, Combination wave:

Class	Test levels(kV)	
	Power supply Coupling Mode(Combination)	
	Line to line	Line to earth
0	NA	NA
1	NA	0.5
2	0.5	1.0
3	1.0	2.0
4	2.0	4.0 ²⁾
5	1)	1)

1) Depends on the class of the local power supply system.
2) Normally tested with primary protection.

- ✧ AC Input: 230Vac
- ✧ Frequency: 50Hz
- ✧ Ambient Temperature: 25°C

Loading	+5V	+12V1	+12V2	-12V	+3.3V	+5Vsb
Full	13.37A	15.37A	15.37A	0.29A	13.37A	3.36A

3. Test Record:

Location	Polarity	Phase Angle	No of Pulse	Pulse Volt.(KV)	Result
L-N	+	0	5	1.0	PASS
	+	45	5	1.0	PASS
	+	90	5	1.0	PASS
	+	135	5	1.0	PASS
	+	180	5	1.0	PASS
	+	225	5	1.0	PASS
	+	270	5	1.0	PASS
	+	315	5	1.0	PASS
	-	0	5	1.0	PASS
	-	45	5	1.0	PASS
	-	90	5	1.0	PASS
	-	135	5	1.0	PASS
	-	180	5	1.0	PASS
	-	225	5	1.0	PASS
	-	270	5	1.0	PASS
	-	315	5	1.0	PASS
L-Earth	+	0	5	2.0	PASS
	+	45	5	2.0	PASS
	+	90	5	2.0	PASS
	+	135	5	2.0	PASS
	+	180	5	2.0	PASS
	+	225	5	2.0	PASS
	+	270	5	2.0	PASS
	+	315	5	2.0	PASS
	-	0	5	2.0	PASS
	-	45	5	2.0	PASS
	-	90	5	2.0	PASS
	-	135	5	2.0	PASS
	-	180	5	2.0	PASS
	-	225	5	2.0	PASS
	-	270	5	2.0	PASS
	-	315	5	2.0	PASS
N-Earth	+	0	5	2.0	PASS
	+	45	5	2.0	PASS
	+	90	5	2.0	PASS
	+	135	5	2.0	PASS

	+	180	5	2.0	PASS
	+	225	5	2.0	PASS
	+	270	5	2.0	PASS
	+	315	5	2.0	PASS
	-	0	5	2.0	PASS
	-	45	5	2.0	PASS
	-	90	5	2.0	PASS
	-	135	5	2.0	PASS
	-	180	5	2.0	PASS
	-	225	5	2.0	PASS
	-	270	5	2.0	PASS
	-	315	5	2.0	PASS
L.N- Earth	+	0	5	2.0	PASS
	+	45	5	2.0	PASS
	+	90	5	2.0	PASS
	+	135	5	2.0	PASS
	+	180	5	2.0	PASS
	+	225	5	2.0	PASS
	+	270	5	2.0	PASS
	+	315	5	2.0	PASS
	-	0	5	2.0	PASS
	-	45	5	2.0	PASS
	-	90	5	2.0	PASS
	-	135	5	2.0	PASS
	-	180	5	2.0	PASS
	-	225	5	2.0	PASS
	-	270	5	2.0	PASS
	-	315	5	2.0	PASS

E.S.D

1. Specification:

No damage and without any function loss.

2. Test Condition:

The objective of the ESD test is to determine the susceptibility of products to exposed, when operating under all potential environmental conditions. The test conditions and setup shall conform to that outlined in

IEC61000-4-2

Energy storage capacitance (Cs+Cd): 150pF+10%

Discharge resistance (RD): 330ohm±10%

Charging resistance (Rc): between 50Mohm and 100Mohm

Tolerance of the output voltage indication: ±5%

Polarity of the output voltage: positive and negative

Holding time: at least 5 sec

Discharge mode of operation: single discharge (time between successive discharge at least 1S)

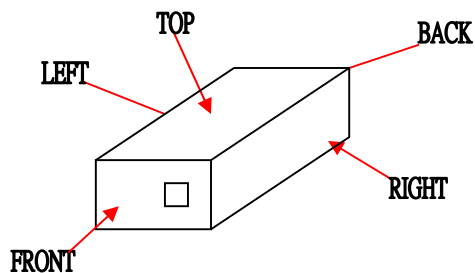
Contact discharge		Air discharge	
Level	Test voltage (KV)	Level	Test voltage (KV)
1	2	1	2
2	4	2	4
3	6	3	8
4	8	4	15
X	Special	x	Special
“X” is an open level.			

- ✧ AC input: 220Vac/50Hz
- ✧ Ambient Temperature: 25°C
- ✧ Full Load: +5V/13.37A; +12V1/15.37A; +12V2/15.37A; -12V/0.29A; +3.3V/13.37A; +5Vsb/3.36A

Contact: Level 2 and Air Discharge: Level 3.

3. Test Record:

Please refer to next page.



FSP500-60EGN Electrical Static Discharge Test Record

Vin	Discharge Voltage	Discharge location	Every point discharge 10 times				
			1	2	3	4	5
230Vac 50Hz	Contact Discharge 4KV	Front	PASS	PASS	PASS	PASS	PASS
		Back	PASS	PASS	PASS	PASS	PASS
		Left	PASS	PASS	PASS	PASS	PASS
		Right	PASS	PASS	PASS	PASS	PASS
		Top	PASS	PASS	PASS	PASS	PASS
	Contact Discharge -4KV	Front	PASS	PASS	PASS	PASS	PASS
		Back	PASS	PASS	PASS	PASS	PASS
		Left	PASS	PASS	PASS	PASS	PASS
		Right	PASS	PASS	PASS	PASS	PASS
		Top	PASS	PASS	PASS	PASS	PASS
	Air Discharge 8KV	Front	PASS	PASS	PASS	PASS	PASS
		Back	PASS	PASS	PASS	PASS	PASS
		Left	PASS	PASS	PASS	PASS	PASS
		Right	PASS	PASS	PASS	PASS	PASS
		Top	PASS	PASS	PASS	PASS	PASS
	Air Discharge -8KV	Front	PASS	PASS	PASS	PASS	PASS
		Back	PASS	PASS	PASS	PASS	PASS
		Left	PASS	PASS	PASS	PASS	PASS
		Right	PASS	PASS	PASS	PASS	PASS
		Top	PASS	PASS	PASS	PASS	PASS

E.F.T

1. Specification:

No damage and without any function loss.

1.1 The open frame must not have a component failure when subjected to any fast electrical transient up to and including 1.0KV.

1.2 Component failure is defined as any malfunction of the open frame caused by component degradation or failure requiring component replacement to current the problem.

2. Test Condition:

The unit will pass an electrical fast transient susceptibility test according to the requirements of EN-61000-4-4. Burst will be applied to each line in the following table **Class 2**.

Test Sequence	Peak Voltage	Frequency	Port	Coupling Mode Mains only	Number of Bursts
Class 1	500V	5kHz	Mains or Clamp	PE to ground plane.	200 (1 minute) per polarity
Class 2	1.0kV	5kHz	Mains or Clamp	L1, L2, and PE in sequence	200 (1 minute) per polarity and coupling mode
Class 3	2.0kV	5kHz	Mains or Clamp	L1, L2, and PE in sequence	200 (1 minute) per polarity and coupling mode
Class 4	4.0kV	2.5kHz	Mains or Clamp	L1, L2, and PE in sequence	200 (1 minute) per polarity and coupling mode

✧ AC input: 230Vac.

✧ Frequency: 50Hz

✧ Ambient Temperature: 25°C

Loading	+5V	+12V1	+12V2	-12V	+3.3V	+5Vsb
Full	13.37A	15.37A	15.37A	0.29A	13.37A	3.36A

3. Test Record:

*Place the UUT on the EMS table.

Voltage	Frequency	Output: Line Coupling	Duration	Result
-1000V	5.0KHz	Mains: L1	60 sec	PASS
1000V	5.0KHz	Mains: L1	60 sec	PASS
-1000V	5.0KHz	Mains: L2	60 sec	PASS
1000V	5.0KHz	Mains: L2	60 sec	PASS
-1000V	5.0KHz	Mains: PE	60 sec	PASS
1000V	5.0KHz	Mains: PE	60 sec	PASS

E.M.I conduction

1. Specification:

Follow **EN55022 CLASSB**

- 1-1. Unless other specified, the UUT shall comply with external specification.
- 1-2. Due to component variability and manufacturing, a 6dB margin is required.

2. Test Condition:

- ✧ AC Input: 115Vac/230Vac
- ✧ Frequency: 60Hz/50Hz.
- ✧ Ambient Temperature: 25°C

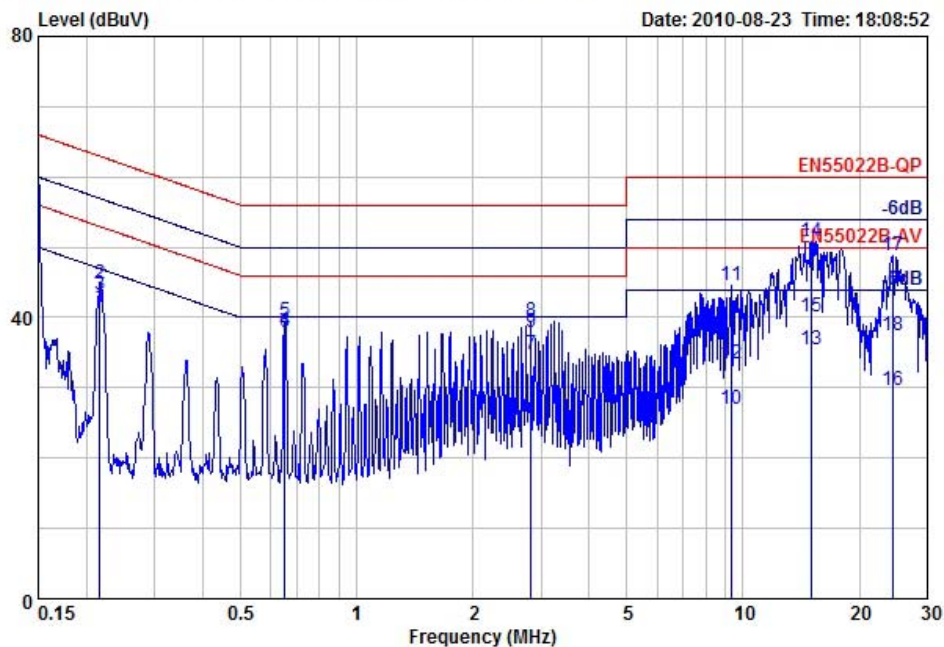
Loading	+5V	+12V1	+12V2	-12V	+3.3V	+5Vsb
Full	13.37A	15.37A	15.37A	0.29A	13.37A	3.36A

3. Test Record:

EMI conduction: **PASS** (Please refer to next page.)



Data: 174 File: D:\EMIDATA\IPQDIAMD\test.EMI.EM6 (183) Date: 2010-08-23 Time: 18:08:52

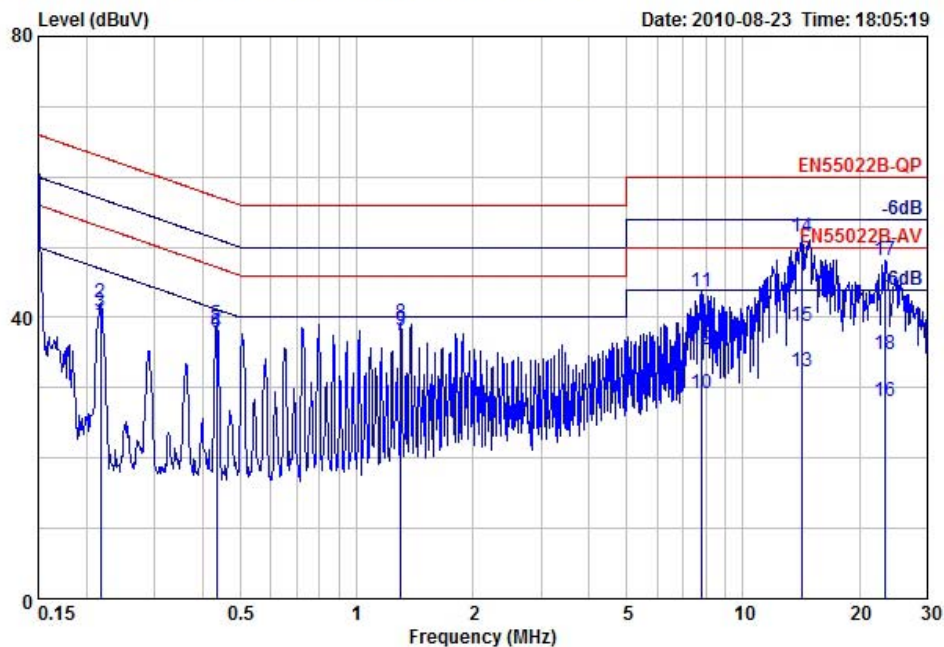


Site : FSP Conducted Test Site 3
 Condition : EN55022B-QP ESH2-Z5 2009-12 LINE
 : RBW:9.000KHz VBW:100.000KHz SWT:0.010sec
 MODEL NAME : FSP500-60EGN
 INPUT : 115V/60Hz
 LOAD : FULL LOAD

	Freq	Level	Over	Limit	Remark	Pol/Phase
	MHz	dBuV	Limit	Line		
			dB	dBuV		
1	0.22	41.35	-11.61	52.96	Average	LINE
2	0.22	44.88	-18.08	62.96	Peak	LINE
3	0.22	43.25	-19.71	62.96	QP	LINE
4 max	0.65	38.04	-7.96	46.00	Average	LINE
5	0.65	39.44	-16.56	56.00	Peak	LINE
6	0.65	37.99	-18.01	56.00	QP	LINE
7	2.82	34.72	-11.28	46.00	Average	LINE
8	2.82	39.53	-16.47	56.00	Peak	LINE
9	2.82	37.81	-18.19	56.00	QP	LINE
10	9.35	26.97	-23.03	50.00	Average	LINE
11	9.35	44.48	-15.52	60.00	Peak	LINE
12	9.35	33.36	-26.64	60.00	QP	LINE
13	14.99	35.33	-14.67	50.00	Average	LINE
14	14.99	50.88	-9.12	60.00	Peak	LINE
15	14.99	40.19	-19.81	60.00	QP	LINE
16	24.40	29.58	-20.42	50.00	Average	LINE
17	24.40	48.70	-11.30	60.00	Peak	LINE
18	24.40	37.47	-22.53	60.00	QP	LINE



Data: 171 File: D:\EMIDATA\IPQDIAMD\test.EMI.EM6 (183) Date: 2010-08-23 Time: 18:05:19

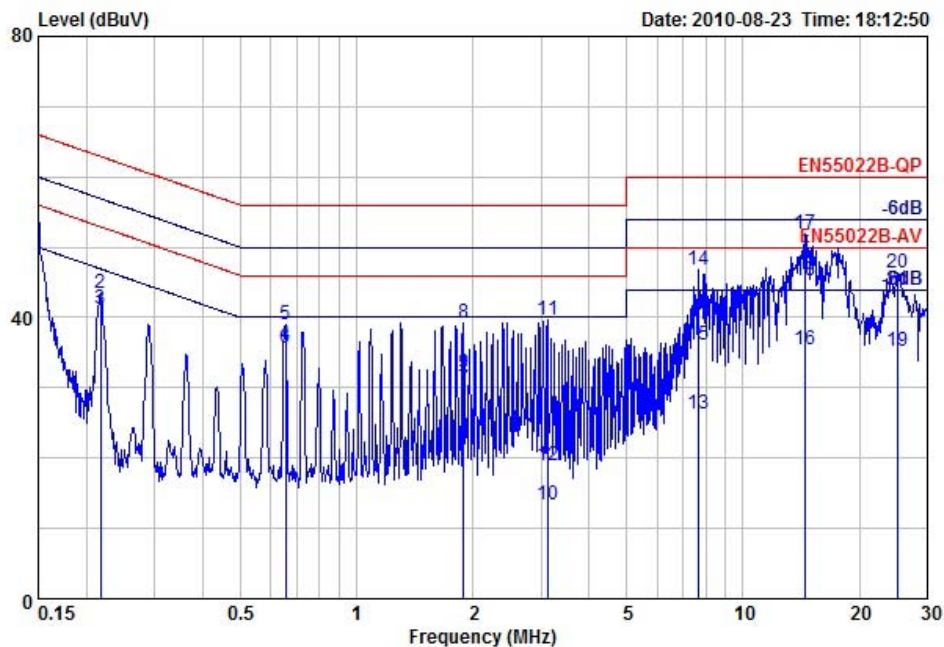


Site : FSP Conducted Test Site 3
 Condition : EN55022B-QP ESH2-Z5 2009-12 NEUTRAL
 : RBW:9.000KHz VBW:100.000KHz SWT:0.010sec
 MODEL NAME : FSP500-60EGN
 INPUT : 115V/60Hz
 LOAD : FULL LOAD

	Freq	Level	Over	Limit	Remark	Pol/Phase
	MHz	dBuV	Limit	Line		
			dB	dBuV		
1	0.22	38.91	-14.01	52.92	Average	NEUTRAL
2	0.22	42.21	-20.71	62.92	Peak	NEUTRAL
3	0.22	40.75	-22.17	62.92	QP	NEUTRAL
4	0.44	37.88	-9.27	47.15	Average	NEUTRAL
5	0.44	38.96	-18.19	57.15	Peak	NEUTRAL
6	0.44	37.84	-19.31	57.15	QP	NEUTRAL
7	1.30	37.33	-8.67	46.00	Average	NEUTRAL
8	1.30	39.13	-16.87	56.00	Peak	NEUTRAL
9	1.30	38.16	-17.84	56.00	QP	NEUTRAL
10	7.81	29.08	-20.92	50.00	Average	NEUTRAL
11	7.81	43.76	-16.24	60.00	Peak	NEUTRAL
12	7.81	35.53	-24.47	60.00	QP	NEUTRAL
13	14.21	32.25	-17.75	50.00	Average	NEUTRAL
14 max	14.21	51.47	-8.53	60.00	Peak	NEUTRAL
15	14.21	38.77	-21.23	60.00	QP	NEUTRAL
16	23.26	28.04	-21.96	50.00	Average	NEUTRAL
17	23.26	48.21	-11.79	60.00	Peak	NEUTRAL
18	23.26	34.71	-25.29	60.00	QP	NEUTRAL



Data: 177 File: D:\EMIDATA\IPQDIAMD\test.EMI.EM6 (183) Date: 2010-08-23 Time: 18:12:50

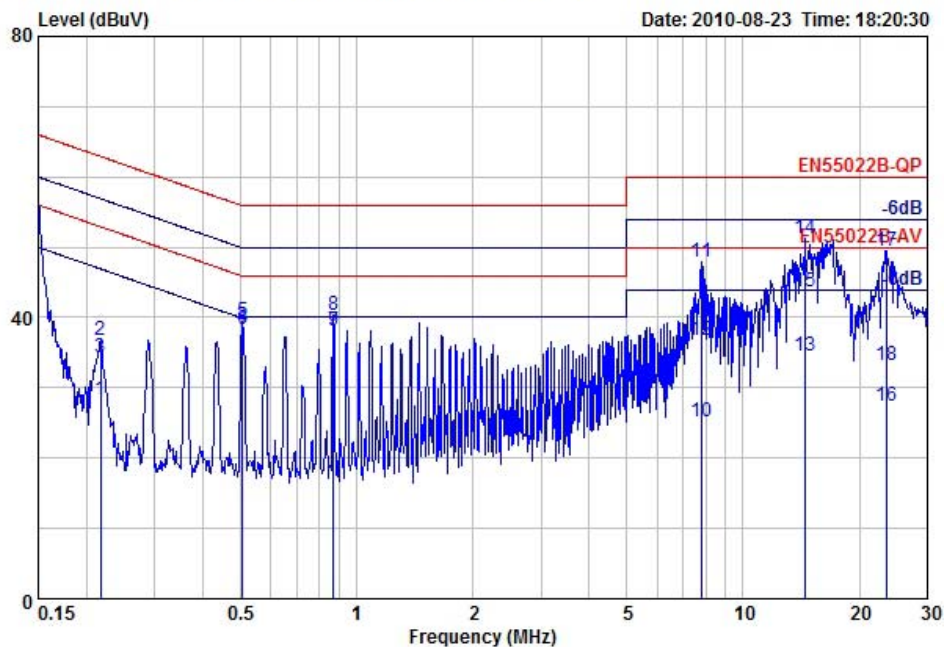


Site : FSP Conducted Test Site 3
 Condition : EN55022B-QP ESH2-Z5 2009-12 LINE
 : RBW:9.000KHz VBW:100.000KHz SWT:0.010sec
 MODEL NAME : FSP500-60EGN
 INPUT : 230V/50Hz
 LOAD : FULL LOAD

	Freq	Level	Over	Limit	Remark	Pol/Phase
	MHz	dBuV	Limit	Line		
			dB	dBuV		
1	0.22	40.69	-12.23	52.92	Average	LINE
2	0.22	43.40	-19.52	62.92	Peak	LINE
3	0.22	41.29	-21.63	62.92	QP	LINE
4	0.65	36.01	-9.99	46.00	Average	LINE
5	0.65	39.10	-16.90	56.00	Peak	LINE
6	0.65	35.74	-20.26	56.00	QP	LINE
7	1.89	29.78	-16.22	46.00	Average	LINE
8	1.89	39.28	-16.72	56.00	Peak	LINE
9	1.89	32.17	-23.83	56.00	QP	LINE
10	3.12	13.45	-32.55	46.00	Average	LINE
11	3.12	39.77	-16.23	56.00	Peak	LINE
12	3.12	18.85	-37.15	56.00	QP	LINE
13	7.69	26.21	-23.79	50.00	Average	LINE
14	7.69	46.73	-13.27	60.00	Peak	LINE
15	7.69	36.04	-23.96	60.00	QP	LINE
16	14.52	35.51	-14.49	50.00	Average	LINE
17 max	14.52	51.84	-8.16	60.00	Peak	LINE
18	14.52	45.17	-14.83	60.00	QP	LINE
19	25.05	35.10	-14.90	50.00	Average	LINE
20	25.05	46.28	-13.72	60.00	Peak	LINE



Data: 183 File: D:\EMIDATA\IPQDIAMD\test.EMI.EM6 (183) Date: 2010-08-23 Time: 18:20:30



Site : FSP Conducted Test Site 3
 Condition : EN55022B-QP ESH2-Z5 2009-12 NEUTRAL
 : RBW:9.000KHz VBW:100.000KHz SWT:0.010sec
 MODEL NAME : FSP500-60EGN
 INPUT : 230V/50Hz
 LOAD : FULL LOAD

	Freq	Level	Over	Limit	Remark	Pol/Phase
	MHz	dBuV	Limit	Line		
			dB	dBuV		
1	0.22	28.27	-24.65	52.92	Average	NEUTRAL
2	0.22	36.73	-26.19	62.92	Peak	NEUTRAL
3	0.22	34.27	-28.65	62.92	QP	NEUTRAL
4 max	0.51	38.45	-7.55	46.00	Average	NEUTRAL
5	0.51	39.41	-16.59	56.00	Peak	NEUTRAL
6	0.51	38.26	-17.74	56.00	QP	NEUTRAL
7	0.87	38.12	-7.88	46.00	Average	NEUTRAL
8	0.87	40.38	-15.62	56.00	Peak	NEUTRAL
9	0.87	38.11	-17.89	56.00	QP	NEUTRAL
10	7.81	25.13	-24.87	50.00	Average	NEUTRAL
11	7.81	47.95	-12.05	60.00	Peak	NEUTRAL
12	7.81	36.85	-23.15	60.00	QP	NEUTRAL
13	14.44	34.61	-15.39	50.00	Average	NEUTRAL
14	14.44	51.20	-8.80	60.00	Peak	NEUTRAL
15	14.44	43.67	-16.33	60.00	QP	NEUTRAL
16	23.51	27.52	-22.48	50.00	Average	NEUTRAL
17	23.51	49.52	-10.48	60.00	Peak	NEUTRAL
18	23.51	33.22	-26.78	60.00	QP	NEUTRAL

Acoustic emissions

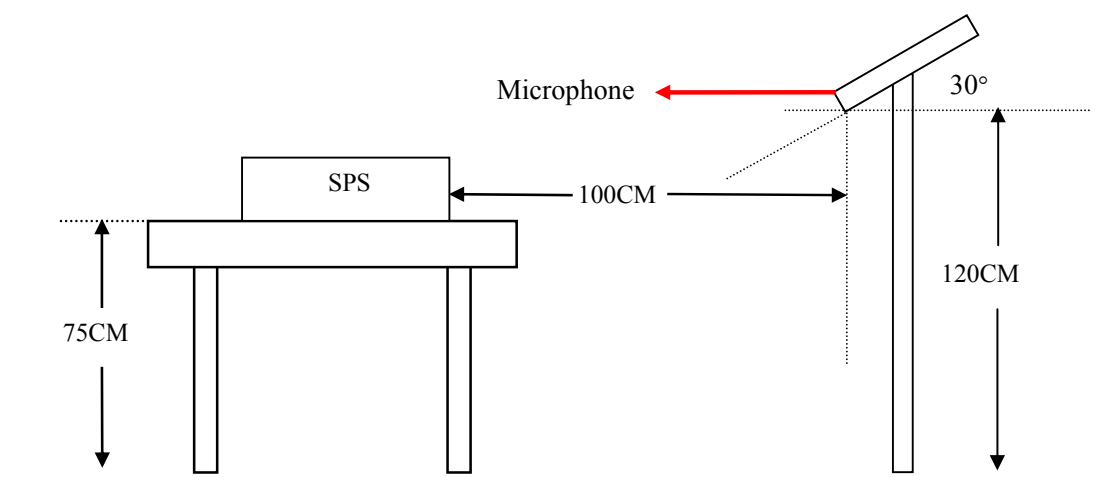
1. Specification:

None.

2. Test Condition:

- ✧ Ambient Temperature: 25.1°C. Ambient Humidity: 54%RH.
- ✧ Input voltage/frequency: 220Vac/50Hz
- ✧ Background Noise: 15.8 dB.
- ✧ Load Condition:

Loading	+5V	+12V1	+12V2	-12V	+3.3V	+5Vsb
Min.	0.2A	0.1A	0A	0A	0.1A	0A
20%	2.67A	3.07A	3.07A	0.05A	2.67A	0.67A
40%	5.34A	6.14A	6.14A	0.11A	5.34A	1.34A
60%	8.02A	9.22A	9.22A	0.17A	8.02A	2.01A
80%	10.69A	12.29A	12.29A	0.23A	10.69A	2.68A
100%	13.37A	15.37A	15.37A	0.29A	13.37A	3.36A

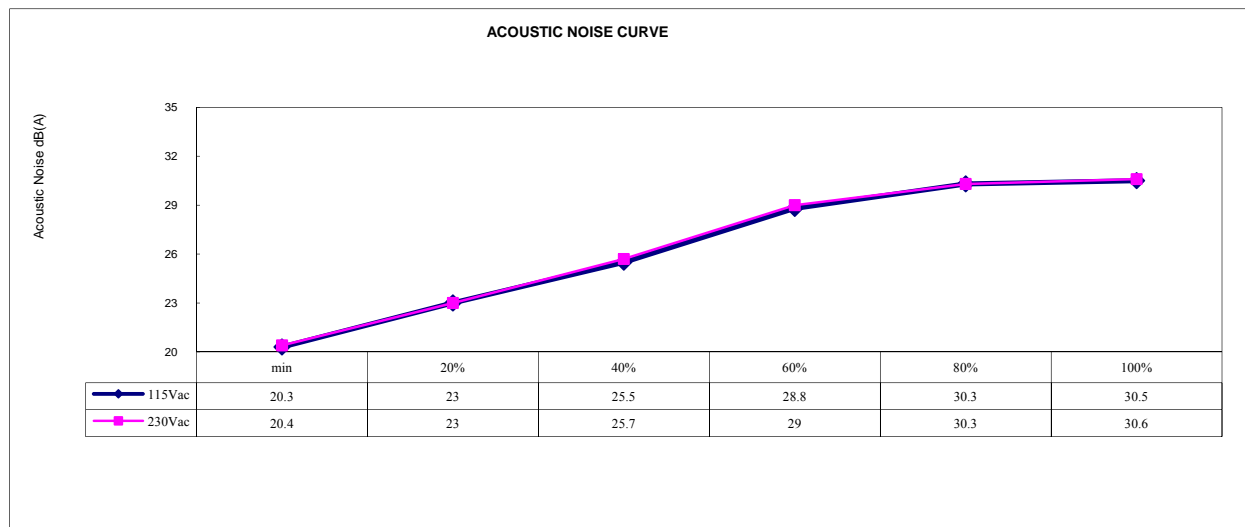


*Warm Up Time: 15 ~ 20 Minutes / Load Condition

3-1. Test Record:

Vin / Fin	Loading						Result
	Min.	20%	40%	60%	80%	100%	
115Vac / 60Hz	20.3 dB	23.0 dB	25.5 dB	28.8 dB	30.3 dB	30.5 dB	Ref.
230Vac / 50Hz	20.4 dB	23.0 dB	25.7 dB	29.0 dB	30.3 dB	30.6 dB	Ref.

3-2. Test Graph:



4. Test Result:

Ref.

Vibration

1. Test Specification:

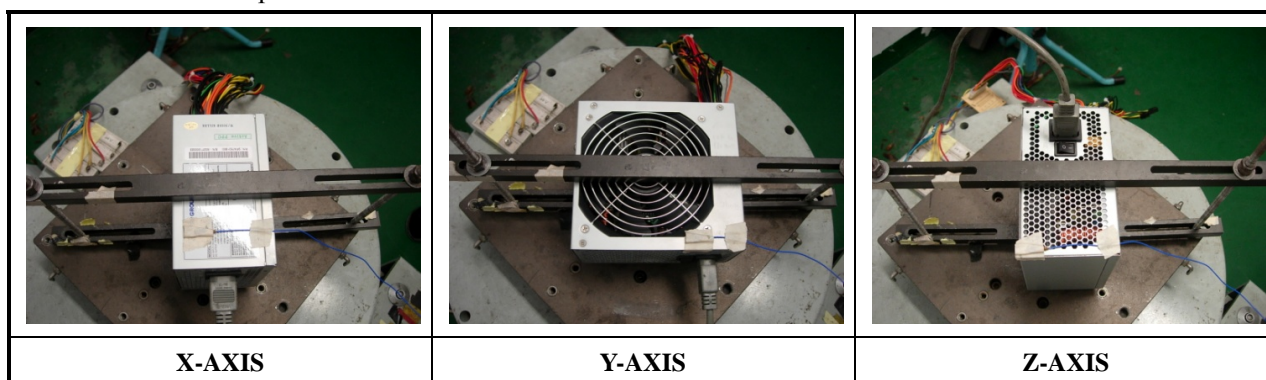
Non-recoverable failure or deviation form specified output characteristics.

2. Test Condition:

- ✧ Ac Input: 230Vac/50Hz
- ✧ Ambient Temperature: 25°C

Loading	+5V	+12V1	+12V2	-12V	+3.3V	+5Vsb
Typical	6.69A	7.68A	7.68A	0.14A	6.69A	1.68A

Vibration Operation, 0.01g²/Hz at 5 Hz sloping to 0.02g²/Hz at 20 Hz, and maintaining 0.02g²/Hz from 20 Hz to 500 Hz. The area under the PSD curve is 3.13gRMS. The duration shall be 15 minutes per axis for all three axes on all samples.



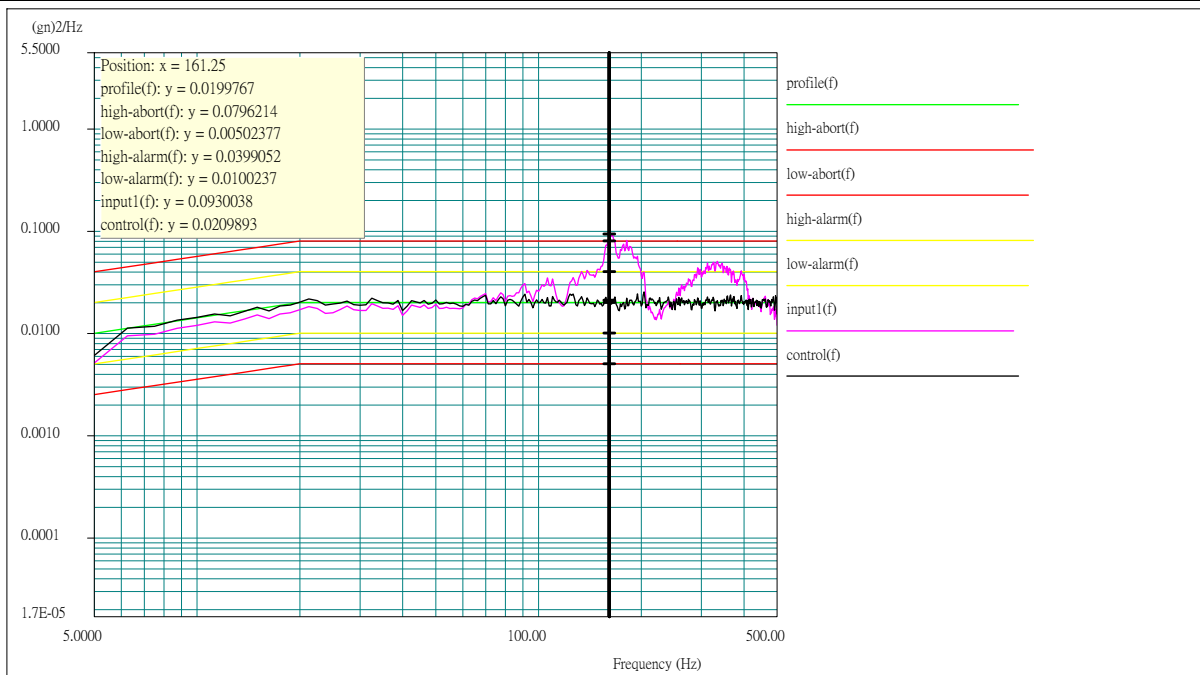
3. Result and judgment:

The PSU was without loss any functionally and no found any abnormal parts.

- ✧ Appearance check Result: PASS
- ✧ Function Check Result: PASS

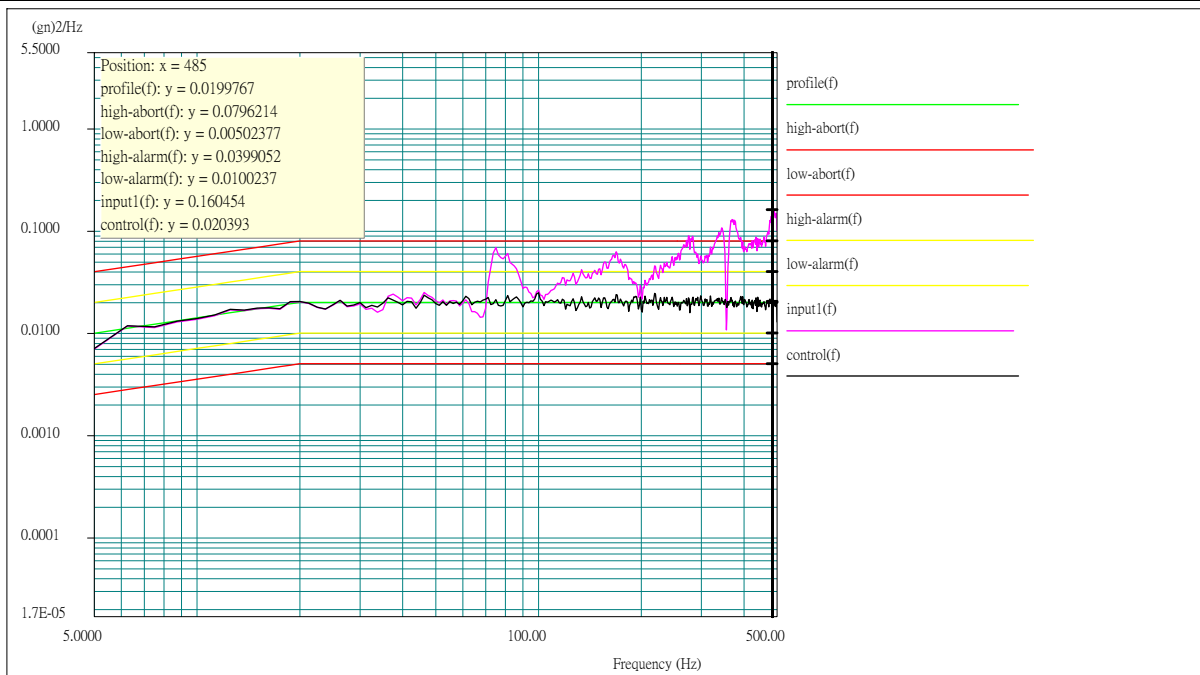
FSP500-60EGN VIBRATION TEST PROFILE FOR X-AXIS

Power supply state: Operating.	Test Type: Random	Full Level Elapsed Time: 00:15:00
Control RMS: 3.149081 gn	Demand RMS: 3.136960 gn	Frequency: 5-500Hz



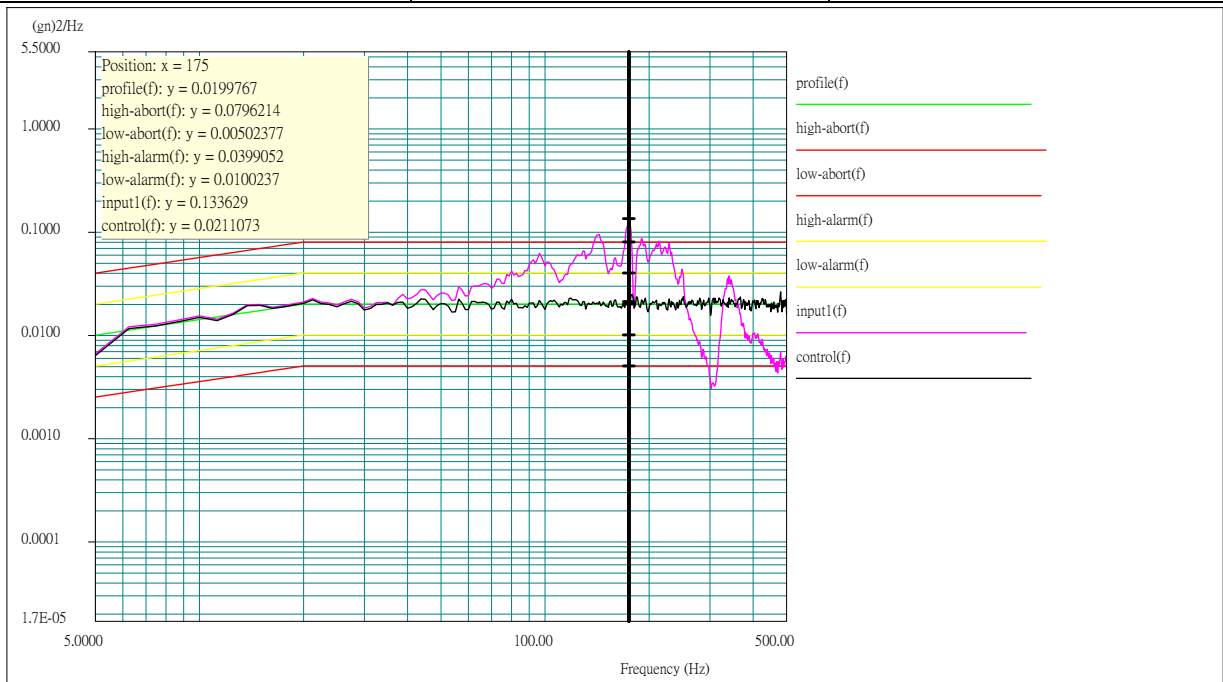
FSP500-60EGN VIBRATION TEST PROFILE FOR Y-AXIS

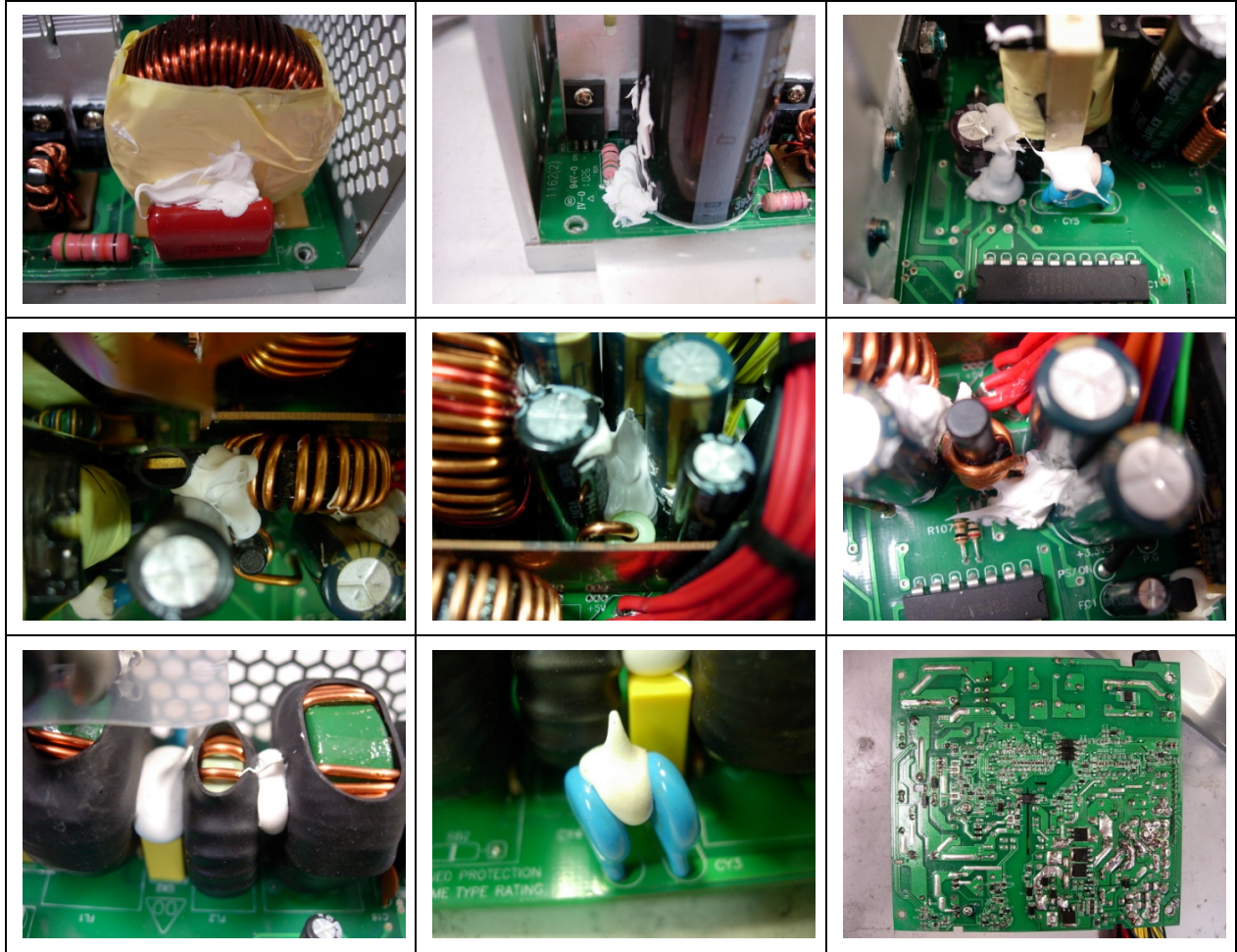
Power supply state: Operating.	Test Type: Random	Full Level Elapsed Time: 00:15:00
Control RMS: 3.141503 gn	Demand RMS: 3.136960 gn	Frequency: 5-500Hz



FSP500-60EGN VIBRATION TEST PROFILE FOR Z-AXIS

Power supply state: Operating.	Test Type: Random	Full Level Elapsed Time: 00:15:00
Control RMS: 3.152749 gn	Demand RMS: 3.136960 gn	Frequency: 5-500Hz





AC voltage dips

1. Specification:

IEC 61000-4-11 : 2004

Note:

1. "A" means the EUT function was correct during the test.
2. "B" means the EUT function was not correct during the test, which was recovered by itself after test.
3. "C" means the EUT function was not correct during the test, which was recovered by operator after test

2. Test Condition:

✧ AC Input voltage: 230Vac / 50Hz

✧ Ambient Temperature: 25°C

Loading	+5V	+12V1	+12V2	-12V	+3.3V	+5Vsb
Full	13.37A	15.37A	15.37A	0.29A	13.37A	3.36A

3. Test Record:

Test mode	Voltage dips	Durations(ms)	Interval(sec)	Times	Phase	Result
<i>Voltage interruptions</i>	100%	5000	10	12	0°/180°	B
<i>Voltage dips in %U_T</i>	60%	100	10	12	0°/180°	B
	30%	10	10	12	0°/180°	A