



DEMO BOARD TEST REPORT

High Performance 24V3A up to 10A Peak Power Output Adapter with Current Mode PWM Controller KP201C

FEATURES

- Peak Power Excursion with Turbo OLP
- OLP with Programmable Debounce Time
- Support CCM & DCM Operation
- Fixed 65KHz Switching Frequency, up to 130Khz in Turbo Mode
- High Precision 24V CV Regulation with Fast Dynamic Response
- High Efficiency Meet CoC V5 Tier2. Less than 150mW Standby Power
- Good EMI Performance
- Built-in Protections with Auto Recovery:
 - VDD Under Voltage Lockout (UVLO)
 - Precision Output OVP (CS OVP)
 - External Programmable OTP
 - Cycle-by-Cycle Current Limiting
 - Over Load Protection (OLP)

INTRODUCTION

KP201C is a high performance current mode PWM controller for offline flyback converter applications, especially for printer or motor driver power supply. The controller architecture is arranged to authorize a transient peak power excursion when the FB voltage is upon 3V. At this point, the switching frequency is increased from 65 kHz to 130 kHz, as well as the CS peak value until the peak current hits the limit.

The Demo Board of KP201C-D02 is typically designed for the application of 24V/3A with universal input (90-265Vac, 60/50Hz). Besides the multi-protection function, this demo also has very good efficiency, line & load regulation, low standby power loss and meets the EN55022B Conduction and Radiation requirement .

APPLICATIONS

- Printer Adapter
- Motor Driver Power Supply

DEMO BOARD SEPCIFICATION

Description	Symbol	Min	Type	Max	Unit	Note
Input Voltage	Vin	90		265	Vac	50/60Hz
Output Voltage	Vout		24		Vdc	
Output Current	Iout		3		A	
Total Output Power	Pout		72		W	
Ripple & Noise	Vripple		29.6		mVp-p	20MHz Bandwidth @115Vac, 1.5m Cable End
System Average Efficiency	η		>89.3		%	Board End @230Vac
Standby Power Consumption	Pst		148		mW	@265Vac
Startup Time	Tst		2		s	Tested at 90Vac/60Hz
Conducted EMI Margin			6		dB	EN55022 Class B
Radiated EMI Margin			4		dB	EN55022 Class B
Surge Test		2			kV	Differential Mode @ 230Vac/50Hz
ESD(Contact)			± 8		kV	
ESD(Air)			± 15		kV	
Safety		Designed to meet UL60950				
Operating Ambient		0		40	°C	
Operating Humidity		5		95	%R.H.	

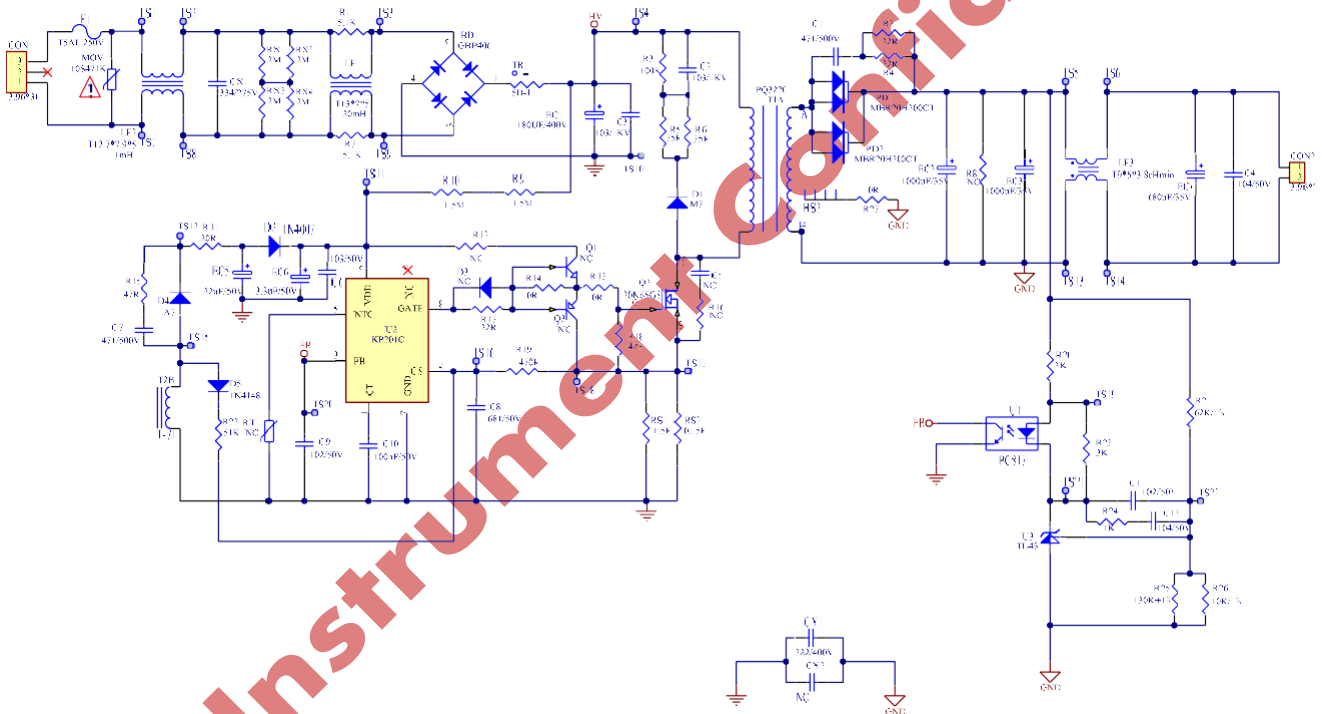
The table above shows the minimum acceptable performance of the design. Actual performance is listed in the results section.

Demo Board of KP201CSGA_D02_REV1.0

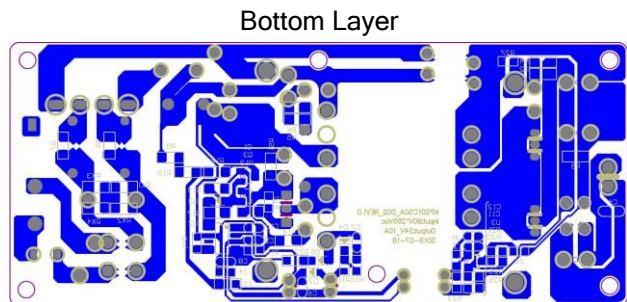
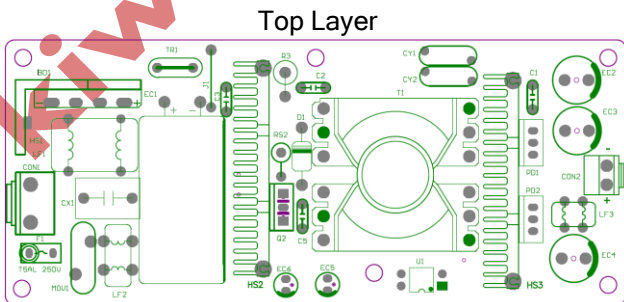


Board Size(in mm): L x W x H=130 x 55 x30

Schematic



Printed Circuit Board Layout





Demo Board Test Report of High Performance 24V3A up to 10A Peak Power Output Adapter with Current Mode PWM Controller KP201C

Circuit Description

The Demo Board of KP201C-D02 is configured in a single stage flyback topology, which combines a current mode PWM control regulator KP201CSG. KP201-D02 is typically designed for the application of 24V/3A adapter, which has 10A peak power output capability with universal input (90-265Vac, 50/60Hz). Additionally, the demo board can achieve high efficiency, low standby power loss and precise constant voltage control.

1. Input Rectification and EMI filtering

The circuit input stage is composed by the components of F1, MOV1, LF1, LF2, CX1, TR1 and BD1. F1, MOV1, LF1, LF2 and TR1 provide the inrush current limitation and surge protection in the event of component failure, surge or short circuit event. LF1, LF2 and CX1 are used to guarantee EMI to meet EN55022B Standard. RX1~RX4 are used to discharge the X-Cap CX1. The bridge diode of BD1 rectifies the AC input to DC output, which is followed by a bulk capacitor EC1.

2. Current Mode PWM Controller KP201C Operation

R9, R10, R11, D2, D4, EC5, and EC6 are used as VDD power supply for KP201C. KP201C uses opto-coupler U1 R24, C11, C12, R20 and TL431 to generate FB Pin voltage on primary side to regulate the output voltage within full load range. RS1 and RS2 are sensing resistors to set maximum output power. C2, D1, R3, R5, R6 compose snubber circuit to depress the drain-source voltage spike.

U2 is the current mode PWM controller KP201C, which is used for offline flyback converter applications. PWM switching frequency in KP201C is fixed to 65KHz and is trimmed to tight range under normal load condition. The FB voltage increases as the load get heavy. The switching frequency and CS peak value increases if the FB voltage is upon 3V. For the turbo duration, the switching frequency is increased from 65 kHz to 130 kHz, as well as the CS peak value until the peak current hits the limit.

As the load current increases, when the CS peak hits the threshold of OLP, the inner timer will be triggered. The inner timer is fixed to 120ms if CT is floating. The OLP timer can be adjusted by wiring a capacitor from CT to ground.

If over load occurs in turbo mode and the CS peak value is limited, the fault is detected when FB is over 4.8V. If this fault is present for more than 21ms (typical), the protection will be triggered.

3. Output Voltage Regulation

R24, C11, C12 and U3 TL431 compose output voltage regulation network. R21, R25 and R26 are the output voltage resistor dividers for TL431's reference compare. EC2, EC3 and EC4 are the output capacitors used to supply output current and lower output voltage ripple.



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Bill of Material

No.	Designator	Value	Description	Package	Manufacturer	Part Number
1	BD1	GBP406	Diode Bridge	GBL	Taiwan Semi	GBL06
2	C1	471/500V	Capacitor	0805		
3	C2	103/1KV	Capacitor	1206		
4	C3	103/1KV	Capacitor	1206		
5	C4	104/50V	Capacitor	1206		
6	C5	NC				
7	C6	103/50V	Capacitor	0805		
8	C7	471/50V	Capacitor	0805		
9	C8	681/50V	Capacitor	0805		
10	C9	102/50V	Capacitor	0805		
11	C10	100nF/50V	Capacitor	0805		
12	C11	102/50V	Capacitor	0805		
13	C12	104/50V	Capacitor	0805		
14	CON1		Connector-7.8mm*2	TH		
15	CON2		Connector 3.96mm*2	TH		
16	CX1	334/275V	Capacitor	TH		
17	CY1	2.2nF/400V	Y-Capacitor	TH		
18	CY2	NC				
19	D1	M7	Diode	SMA		M7
20	D2	1N4007	Diode	SOD123		1N4007
21	D3	1N4148	Diode	SOD-123		1N4148
22	D4	A7	Diode	SOD123		FF1MS
23	D5	1N4148	Diode	SOD-123		1N4148
24	EC1	180UF/400V	Electrolytic Capacitor	TH	Aihua	
25	EC2	35V/1000uF	Electrolytic Capacitor	TH	Aihua	
26	EC3	35V/1000uF	Electrolytic Capacitor	TH	Aihua	
27	EC4	35V/680uF	Electrolytic Capacitor	TH	Aihua	
28	EC5	22uF/50V	Electrolytic Capacitor	TH	Aihua	
29	EC6	3.3uF/50V	Electrolytic Capacitor	TH	Aihua	
30	F1	5A/250V	Fuse	TH	Any	
31	HS2		Heat Sink 55*25*7.5mm	TH		
32	LF1	20mH	Common Mode Choke	TH	Any	T16*12*8
33	LF2	300uH	Common Mode Choke	TH	Any	T9*5*3
34	LF3	14uH	Common Mode Choke	TH	Würth Electronics	744841414



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35	MOV1	10S471K	Metal oxide varistor	TH	Any	10S471K
36	PD1		Dual Common Cathode Schottky Rectifier	TO220-AB	Taiwan Semi	MBR20H200CT
37	PD2		Dual Common Cathode Schottky Rectifier	TO220-AB	Taiwan Semi	MBR20H200CT
38	Q1	NC	NPN Transistor	SOT-23-T		
39	Q2	JCS20N65	20A,650V MOSFET	TO-220F	Sino microelectronic	
40	Q3	NC	NPN Transistor	SOT-23-T		
41	R1	5.1K	Resistance	1206	Yageo	
42	R2	22R	Resistance	1206	Yageo	
43	R3	100K/2W	Resistance	TH	Yageo	
44	R4	22R	Resistance	1206	Yageo	
45	R5	75R	Resistance	1206	Yageo	
46	R6	75R	Resistance	1206	Yageo	
47	R7	5.1K	Resistance	1206	Yageo	
48	R8	NC	Resistance	1206	Yageo	
49	R9	1.5M	Resistance	1206	Yageo	
50	R10	1.5M	Resistance	1206	Yageo	
51	R11	20R	Resistance	0805	Yageo	
52	R12	NC	Resistance	1206	Yageo	
53	R13	0R	Resistance	1206	Yageo	
54	R14	0R	Resistance	1206	Yageo	
55	R15	47R	Resistance	0805	Yageo	
56	R16	NC	Resistance	1206	Yageo	
57	R17	22R	Resistance	1206	Yageo	
58	R18	47K	Resistance	0805	Yageo	
59	R19	470R	Resistance	0805	Yageo	
60	R20	2K	Resistance	0805	Yageo	
61	R21	62K1%	Resistance	0805	Yageo	
62	R22	51K	Resistance	1206	Yageo	
63	R23	3K	Resistance	0805	Yageo	
64	R24	1K	Resistance	0805	Yageo	
65	R25	130K1%	Resistance	0805	Yageo	
66	R26	10K1%	Resistance	0805	Yageo	
67	R27	0R	Resistance	0805	Yageo	
68	RS1	1.5R	Resistance	1206	Yageo	
69	RS2	0.33R/2W	Resistance	TH	Yageo	
70	RT1	NC	Resistance	0805	Yageo	
71	RX1	2M	Resistance	1206	Yageo	
72	RX2	2M	Resistance	1206	Yageo	
73	RX3	2M	Resistance	1206	Yageo	
74	RX4	2M	Resistance	1206	Yageo	



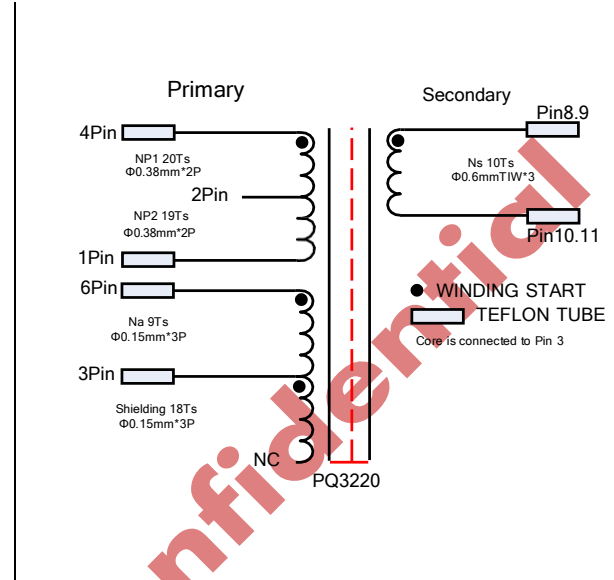
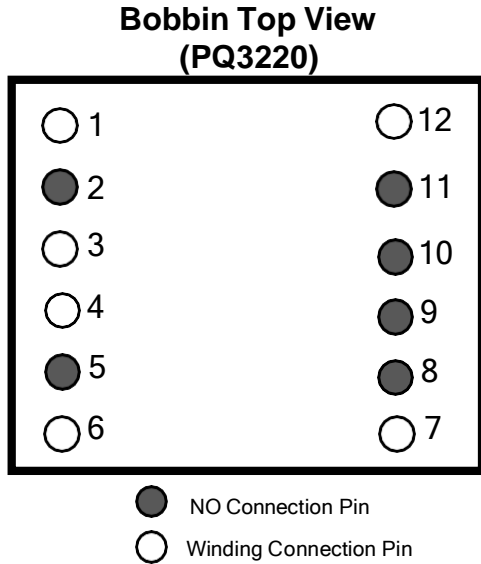
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75	T1	0.43mH,	Bobbin PQ3220 6+6 Pins	PQ3220	TDG	PQ3220-PC44
76	TR1	5D-11	Diode Bridge	TH	RUILON	
77	U1	None	Opto-Isolator	DIP4	Everlight	EL817
78	U2	KP201CSGA	Offline Current Mode PWM Controller with Multiple Output Mode	SOP-8	Kiwi Instruments	KP201CSGA
79	U3	None	Programmable Precision Reference	SOT-23		TL431

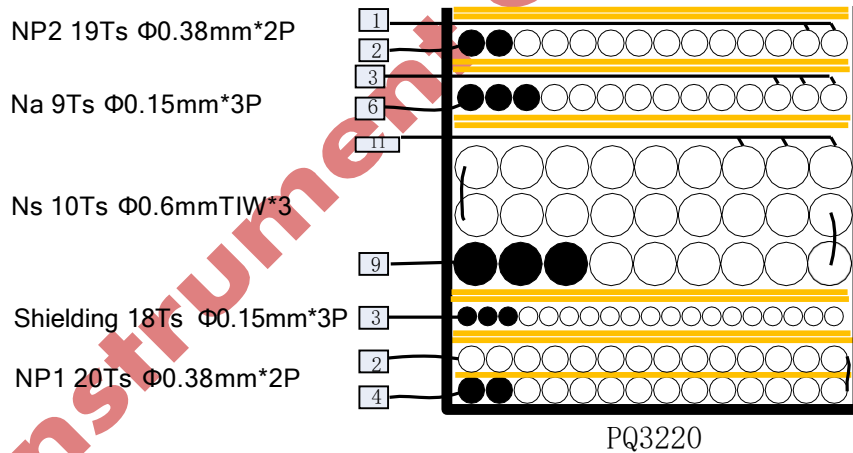
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Transformer Manufacture Guide

1. Electrical Diagram



2. Winding Diagram



3. Winding Order

Number	Winding	Layer	Start	End	Wire Size(mm)	Turns	Note
1	NP1	2	4	2	0.38*2P	20Ts	Close Wound
2	Shielding	1	3	NC	0.15*3P	18Ts	Close Wound
3	NS	3	8.9	10.11	0.6(TIW)*3P	10Ts	Close Wound
4	Na	1	6	3	0.15*3P	9Ts	Close Wound
8	NP2	1	2	1	0.38*2P	19Ts	Close Wound



**Demo Board Test Report of High Performance 24V3A up to 10A
Peak Power Output Adapter with Current Mode PWM Controller KP201C**

4. Electrical Specification

Items	Test Condition	Test Pin	Specification
Primary Inductance	Measured at 40kHz, 1.0 VRMS	Pins 4 - 6; other windings open	0.43mH±5%
Leakage Inductance	Measured at 40kHz, 1.0 VRMS	Pins 4 - 6; all other windings shorted	8uH
HI-POT HV Test	3000Vac/50Hz, One minute	Primary to Secondary	3000Vac, 5mA
	1500Vac/50Hz, One minute	Primary to Core	1500Vac, 5mA
	1500Vac/50Hz, One minute	Secondary to Core	1500Vac, 5mA
Insulation Resistance	500Vdc	All windings to core	100M Ω Min
	500Vdc	Between windings	100M Ω Min
DC Resistance	-	Pins 4 - 1	2R Max

5. BOM

Items	Spec
Core	PQ3220, PC40 or equivalent
Bobbin	PQ3220, 6+6Pin
Wire	Φ0.38mm, 2UEW, Class B; Φ0.15mm, 2UEW, Class B; Φ0.6mm TIW;
Tape	9.5mm(W)×0.06mm(TH)



**Demo Board Test Report of High Performance 24V3A up to 10A
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Test Result

1. Input characteristics

1.1 Maximum rated input AC current

Standard: 2Amax. @ 90Vac input & full load; 4Amax. @90Vac input & Turbo OLP Load

Result: Pass

VIN(AC)	Io	Iac	Iin_max limit(A)	Result
90Vac	3A	1.56A	4A	PASS

VIN(AC)	Io	Iac	Iin_max limit(A)	Result
90Vac	6.7A	3.7A	4A	PASS

1.2 Inrush current (cold start)

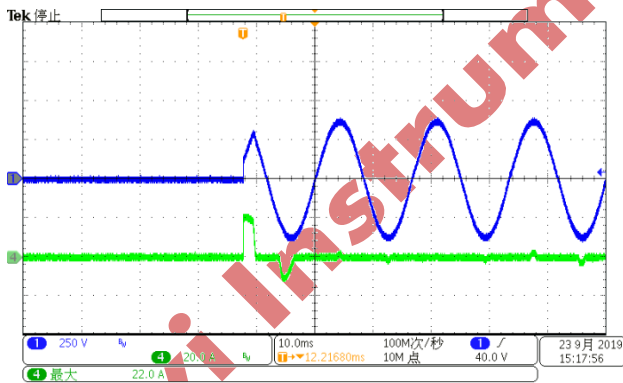
Standard: 30Amax. @ 265Vac input

Result: Pass

VIN(AC)	Iinrush	Iin_max limit(A)	Result
265Vac	22A	30A	PASS

Inrush Current waveform

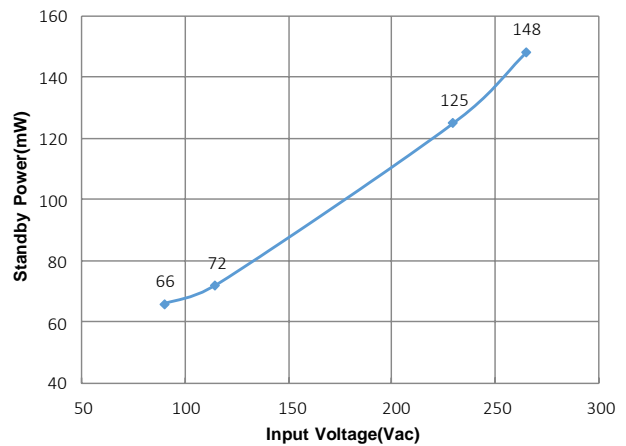
Test Condition: 24V/3A @ 265Vac, Phase=90° startup



(CH1- Vinac, CH4-Iin)

Comments: Startup Normally

Standby Power



1.3 No load input power dissipation

Standard: while input 90Vac~265Vac and the output is no load, the input power loss must be less than 150mW.

Result: Pass



**Demo Board Test Report of High Performance 24V3A up to 10A
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VIN(AC)	90	115	230	265	green mode limit(A)	Result
Pin	66	72	125	148	150mW	PASS

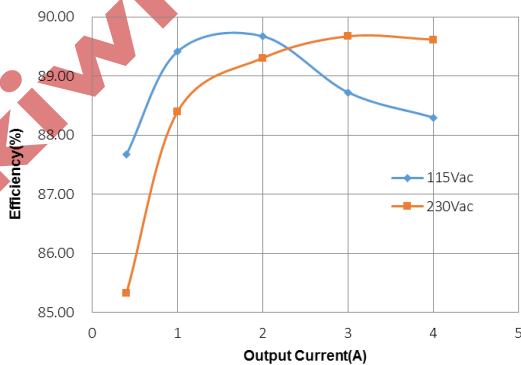
1.4 Average efficiency

Standard: The average efficiency tested on board end meets CoC V5 tier 2 with enough margin @115Vac and 230Vac, CoC V5 requirement for 24V2A system is 88.97%.

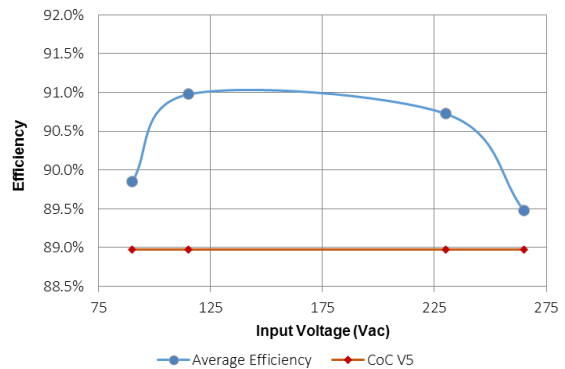
Result: Pass

Vin(Vac)	Fline(Hz)	Pin(W)	Vout(V)	Iout(A)	Pout(W)	Eff(%)	Eff_AVG(%)	CoC V5(%)
90	60	11.09	24.32	0.4	9.728	87.72	/	79
		27.31	24.32	1	24.32	89.05	88.04	89
		55	24.29	2	48.58	88.33		
		82.8	24.28	3	72.84	87.97		
		111.8	24.26	4	97.04	86.80		
115	60	11.1	24.33	0.4	9.732	87.68	/	79
		27.2	24.32	1	24.32	89.41	89.02	89
		54.2	24.3	2	48.6	89.67		
		82.1	24.28	3	72.84	88.72		
		109.9	24.26	4	97.04	88.30		
230	50	11.4	24.32	0.4	9.728	85.33	/	79
		27.5	24.31	1	24.31	88.40	89.25	89
		54.4	24.29	2	48.58	89.30		
		81.2	24.27	3	72.81	89.67		
		108.2	24.24	4	96.96	89.61		
265	50	11.64	24.31	0.4	9.724	83.54	/	79
		27.73	24.29	1	24.4	87.99	89.22	89
		54.45	24.27	2	48.54	89.15		
		80.95	24.25	3	72.75	89.87		
		107.9	24.24	4	96.96	89.86		

Efficiency & Load



Avg Efficiency & Input Voltage





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Peak Power Output Adapter with Current Mode PWM Controller KP201C**

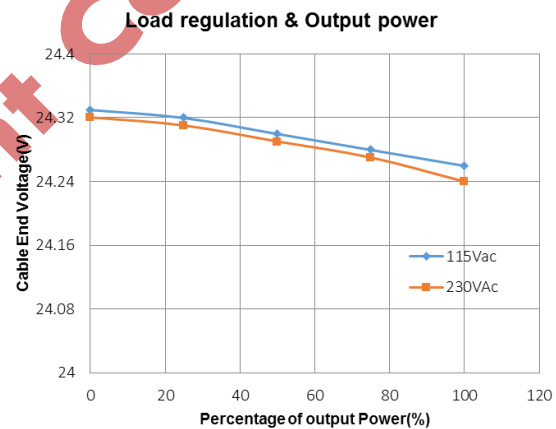
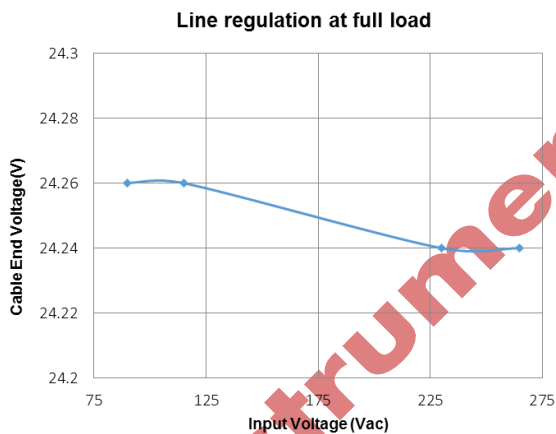
2. Output characteristics

2.1 Output line regulation and load regulation

Standard: under the input voltage 90Vac~265Vac, Line regulation <6%, Load regulation <6%. The output voltage was tested at board end.

Result: Pass

Input Voltage	Output Voltage(V)					Load Regulation
	0% Load	25% Load	50% Load	75% Load	Full Load	
90Vac/60Hz	24.32	24.32	24.29	24.29	24.26	0.25%
115Vac/60Hz	24.33	24.32	24.3	24.28	24.26	0.29%
230Vac/50Hz	24.32	24.31	24.29	24.27	24.24	0.33%
264Vac/50Hz	24.31	24.29	24.27	24.25	24.24	0.29%
Line Regulation	0.08%	0.12%	0.12%	0.16%	0.08%	



2.2 Ripple & noise

Standard: under the input voltage 115Vac and 230Vac, Vripple_max<150mVpp

Result: Pass

Note: Ripple & noise were measured at AWG 20 cable end with a 0.1uF/50V ceramic cap connected in parallel with a 10uF/50V electrolytic cap. Bandwidth was limited to 20Mhz.

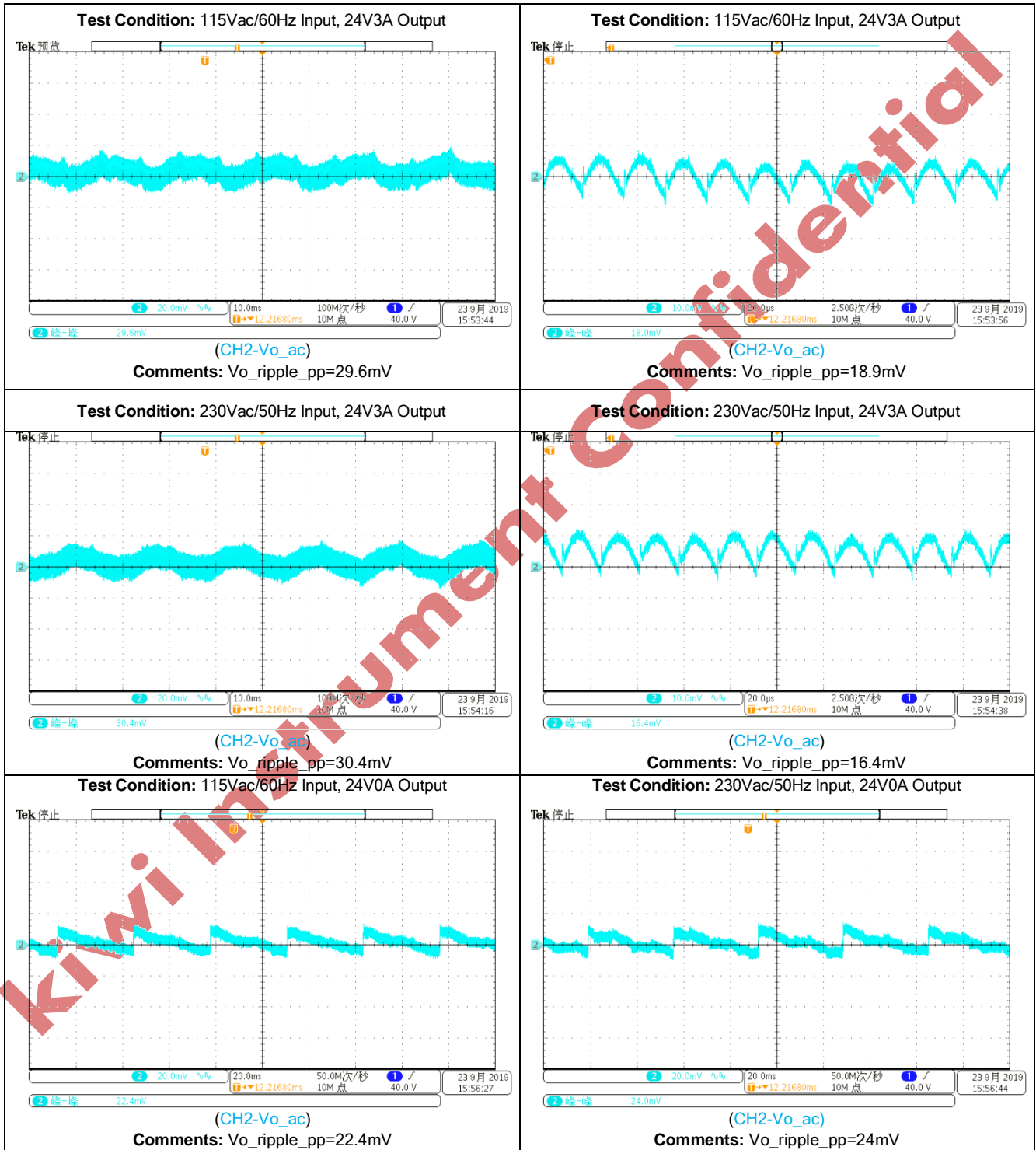
Input Voltage	Ripple & noise	
	No Load(mV)	3A Load(mV)
90Vac/60Hz	22.4	32
115Vac/60Hz	22.4	29.6



**Demo Board Test Report of High Performance 24V3A up to 10A
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230Vac/50Hz	24	30.4
264Vac/50Hz	28	30.4

Waveforms (115Vac & 230Vac):



2.3 Load Transient Test



**Demo Board Test Report of High Performance 24V3A up to 10A
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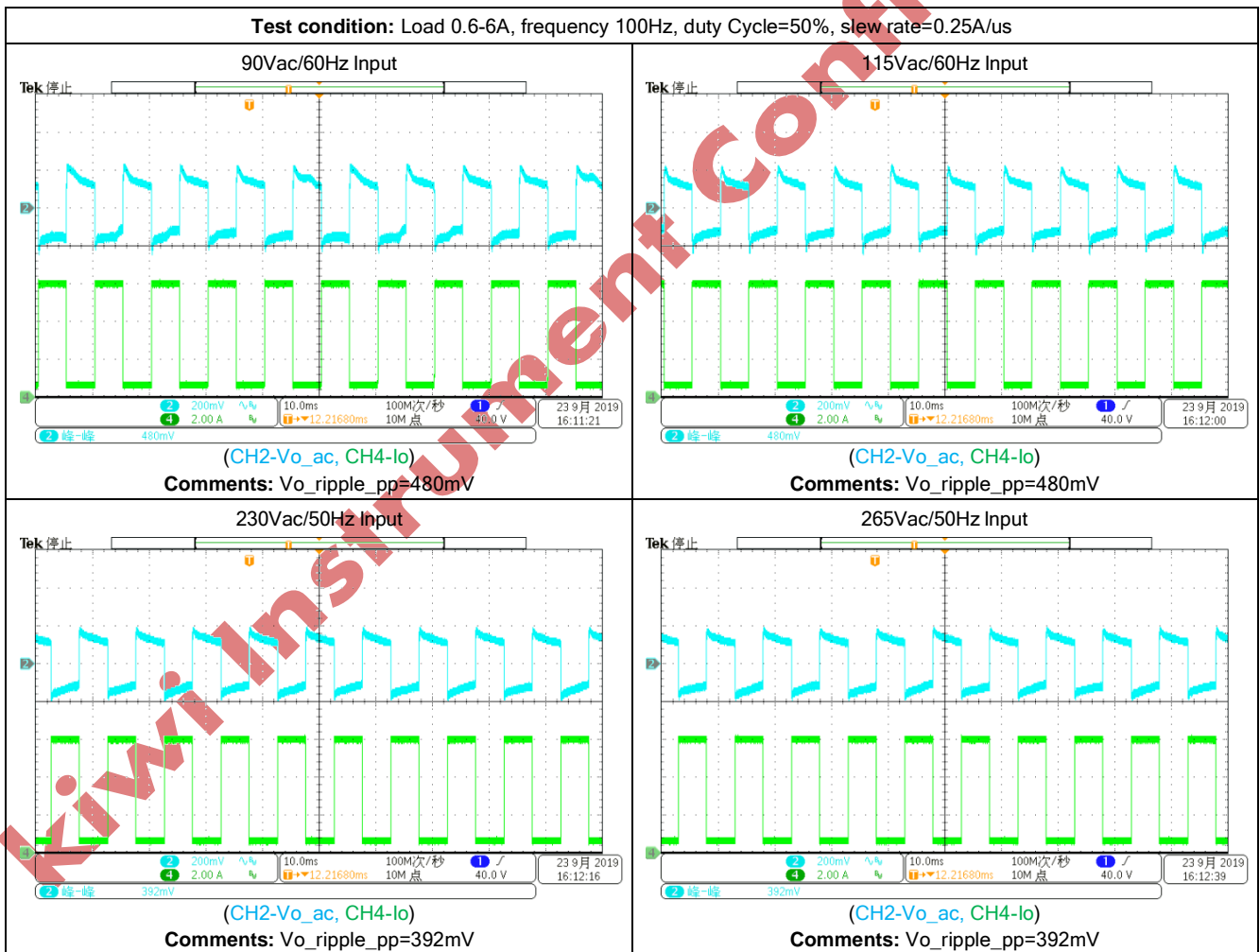
Standard: under the input voltage 90Vac~265Vac, the output Voltage transient response should be within $\pm 10\%$ normal voltage.

Result: Pass

Note: 0.6A load shift to 6A load with 0.25A/us changing ramp and 100Hz changing frequency.

Input Voltage	Output Voltage(~ac)	Remark
90Vac/60Hz	480mV	Pass
115Vac/60Hz	480mV	Pass
230Vac/50Hz	392mV	Pass
264Vac/50Hz	392mV	Pass

Waveforms:



2.4 Capacitive Load Startup Test

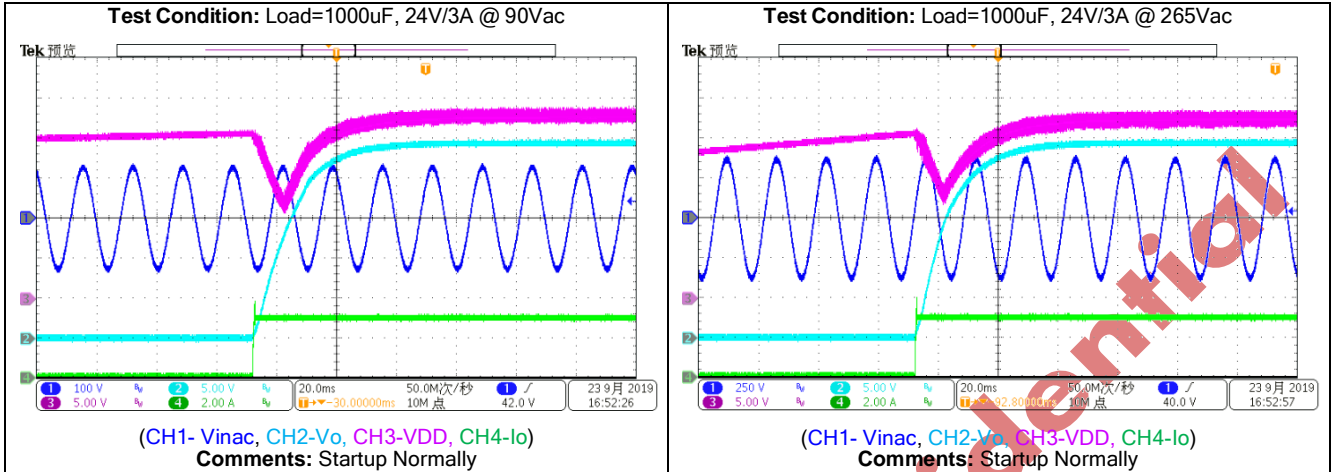
Standard: while capacitance load is 1000uF, the power supply can turn on normally and the output is in the rated range.



**Demo Board Test Report of High Performance 24V3A up to 10A
Peak Power Output Adapter with Current Mode PWM Controller KP201C**

Result: Pass

Waveforms:



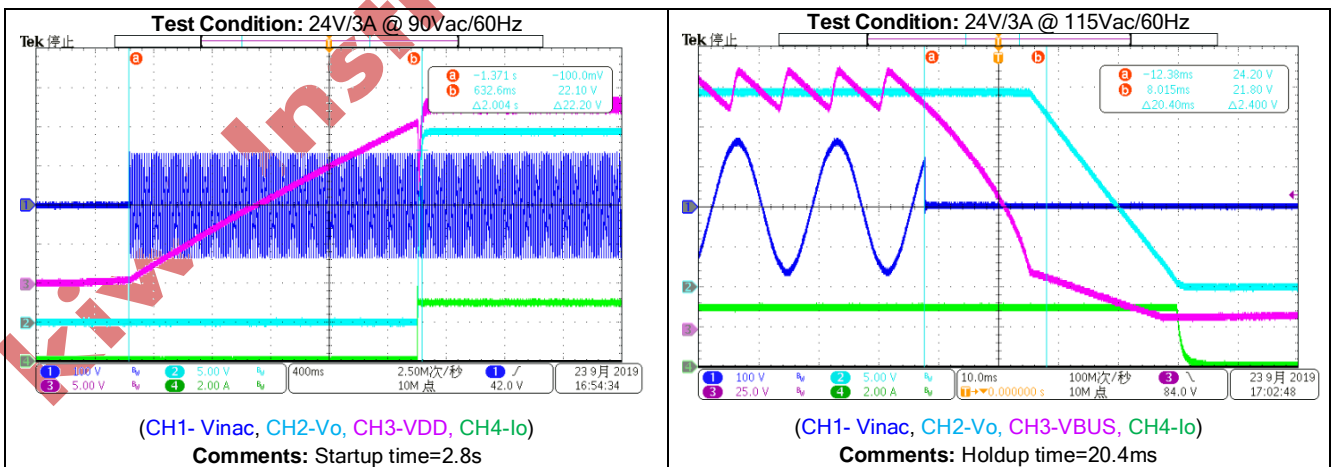
2.5 Startup Time and Holdup Time

Standard: 1.the startup time should be less than 3s @90Vac. 2. The holdup time should be larger than 10ms @115Vac;

Result: Pass

Item	Input Voltage	Test Data	Remark	Note
Startup Time	90Vac	2s	Pass	Full Load
Holdup Time	115Vac	19.720.4ms	Pass	Cut off the Vac while Vbus voltage reached the lowest voltage

Waveforms:



2.6 Output Voltage Rise Time and Fall Time

Standard: Under full load test, the output voltage rise time should be less than 50ms

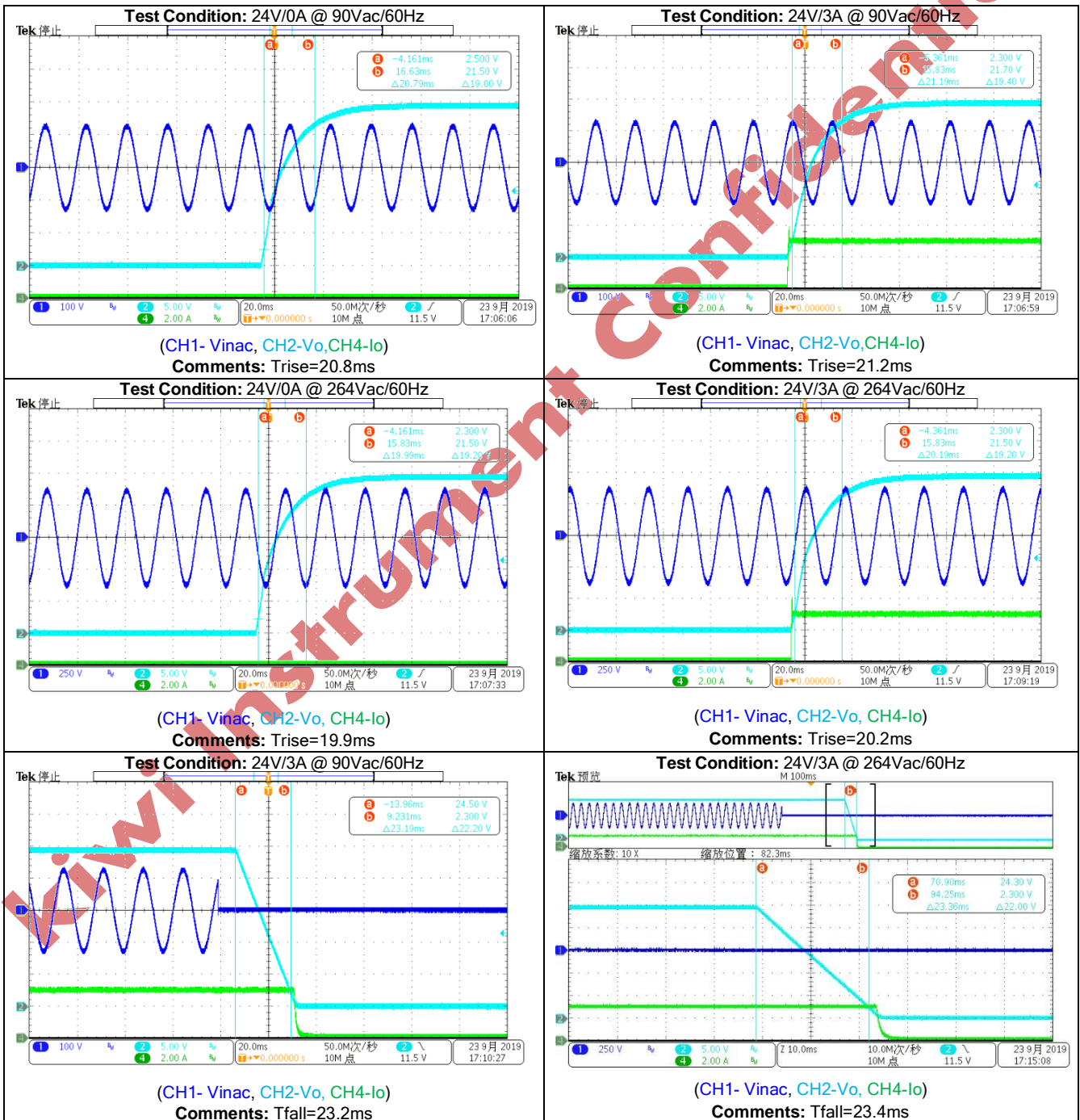


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Result: Pass

Input Voltage	Load	Item	Test Result(ms)	Note
90Vac/60Hz	Full Load	Trise	21.2ms	No overshoot
		Tfall	23.2ms	No undershoot
	No Load	Trise	20.8ms	No overshoot
264Vac/50Hz	Full Load	Trise	20.2ms	No overshoot
		Tfall	23.4ms	No undershoot
	No Load	Trise	19.9ms	No overshoot

Waveforms:





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3. Protection Test

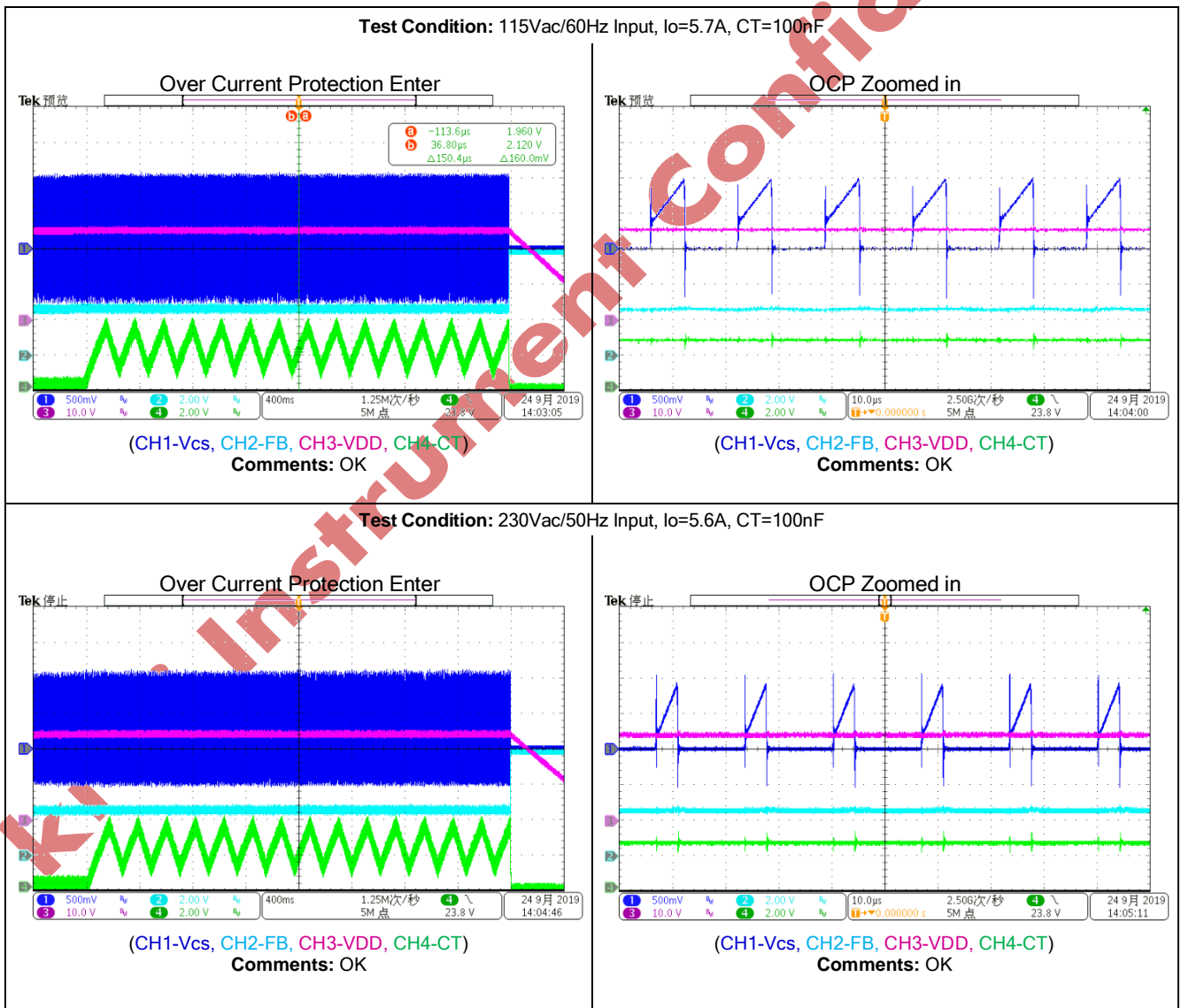
3.1 Over current protection

Standard:

Result: Pass

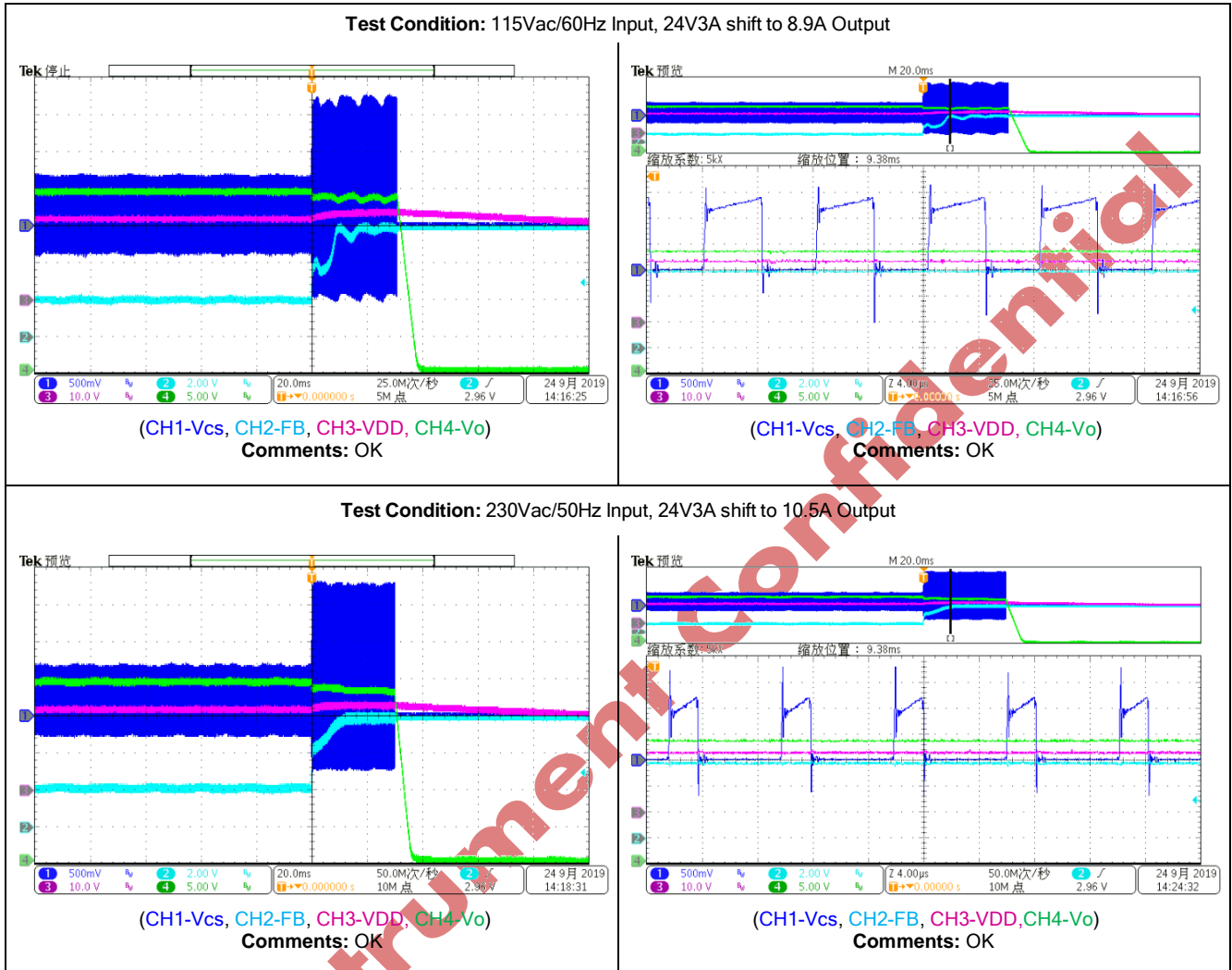
Input Voltage(Vac)	90	115	180	230	264	Remark
OCP Current(A)	5.6	5.7	5.6	5.6	5.6	Pass
Turbo OLP Current(A)	7.8	8.9	10.1	10.5	10.9	

Waveforms:



3.2 Turbo OLP Protection

Waveforms:



3.3 Short circuit protection

Standard: the power supply must shut-down in the event of a short circuit and automatically return to normal operating condition once the fault condition has been removed. And the peak input power should be less than 5W.

Result: Pass

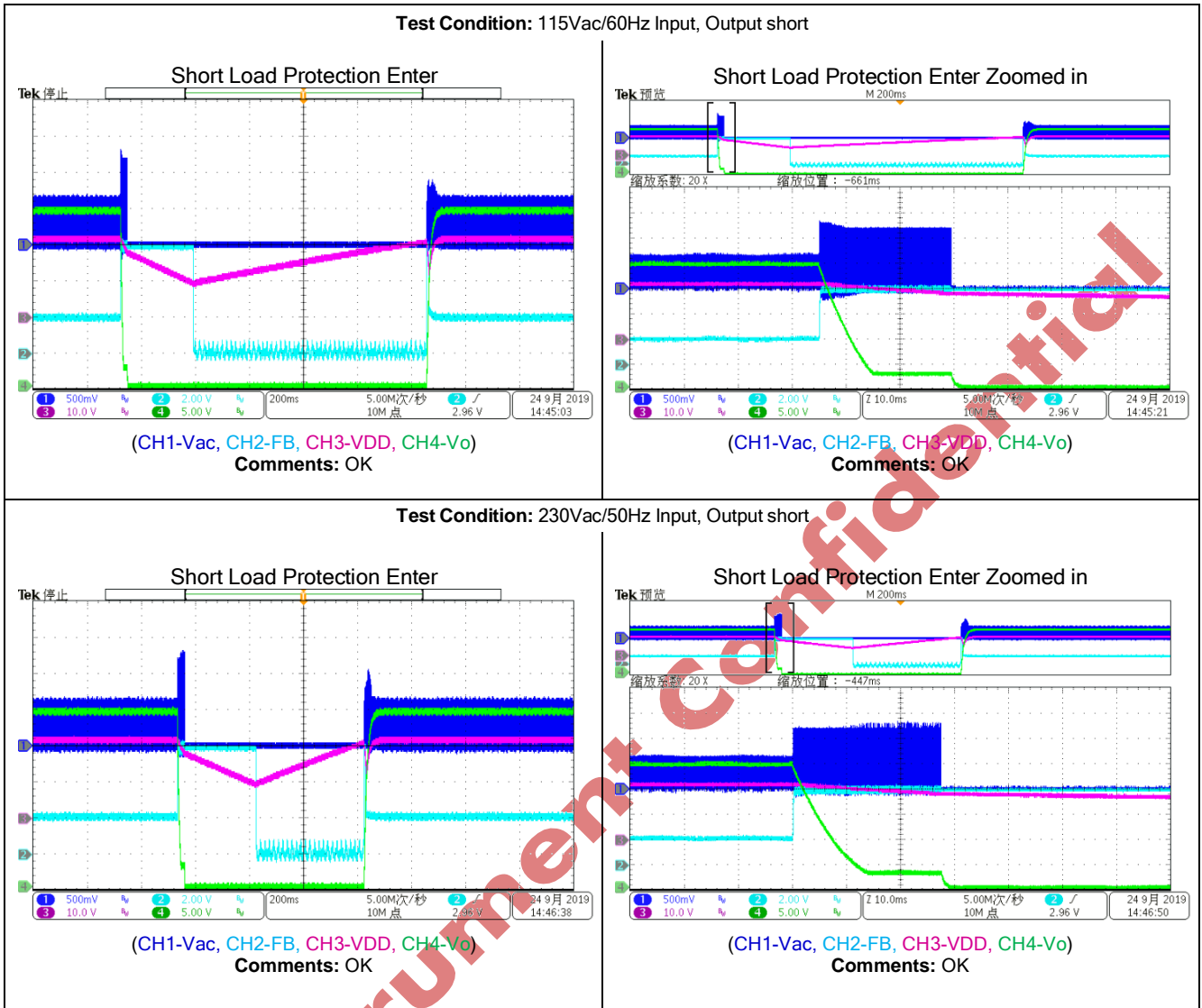
Test Data:

Input Voltage(Vac)	90	115	150	230	265	result
Pin(W)	2.2	2.42	2.77	3.12	3.5	PASS

Waveforms:



**Demo Board Test Report of High Performance 24V3A up to 10A
Peak Power Output Adapter with Current Mode PWM Controller KP201C**

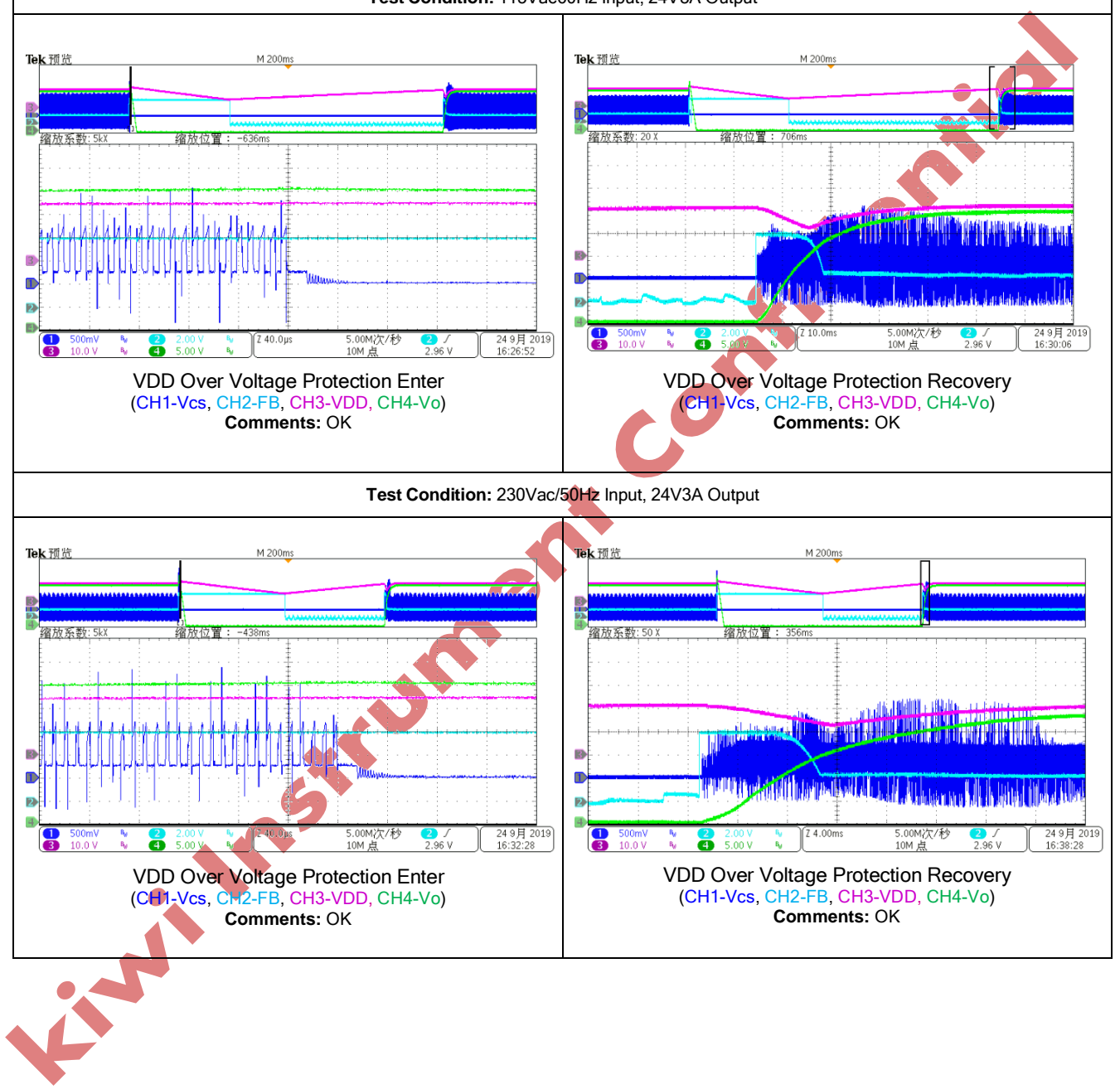


3.4 Over Voltage Protection

Standard: OVP point limit: <math><150\%V_o</math>.

Result: Pass

Waveforms:





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4. Reliability requirements

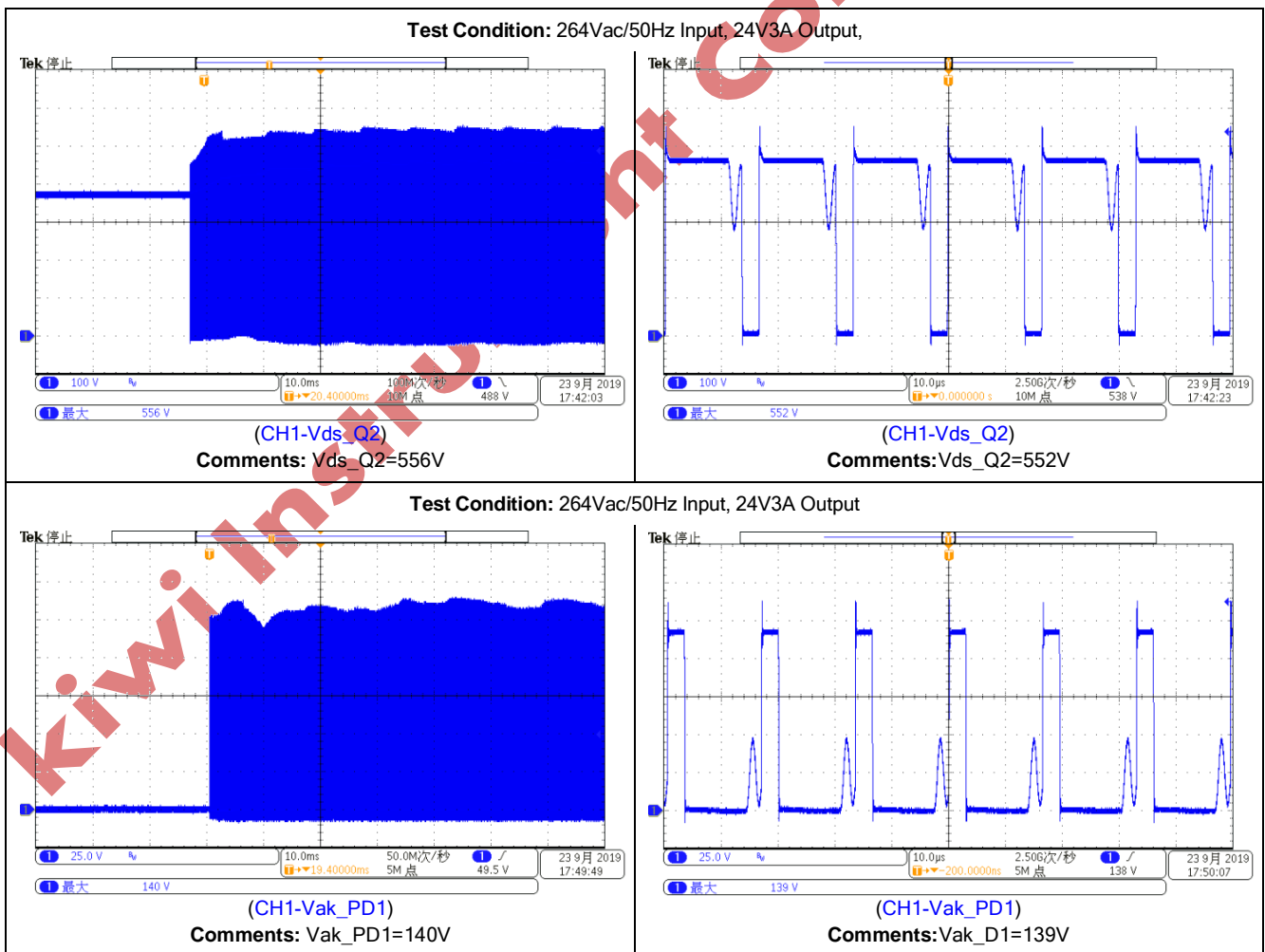
4.1 Device Maximum Rating Test

Standard: MOSFET and Diode<95% Vrrm; Bmax<0.3T.

Result: Pass

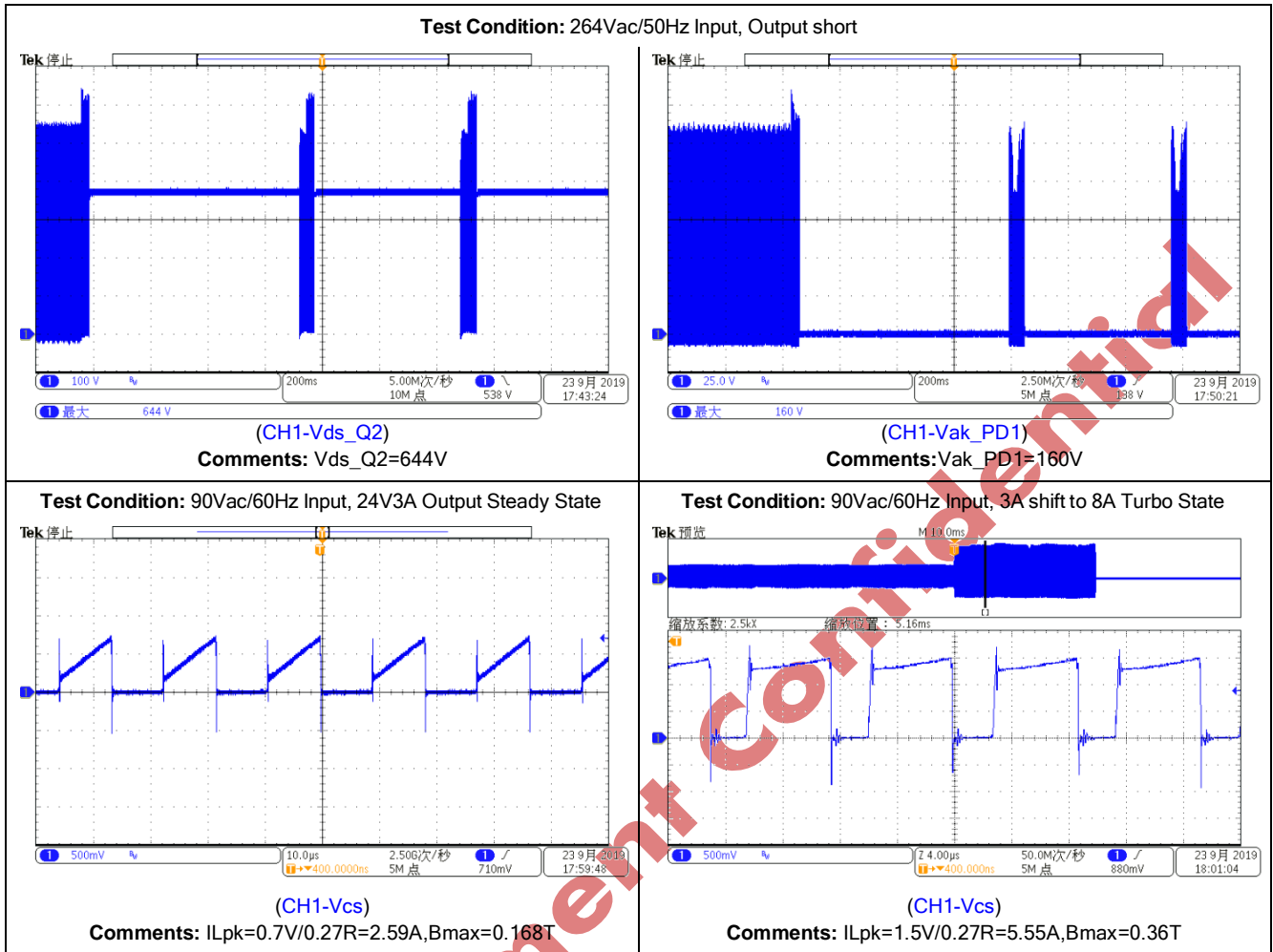
Input Voltage	Component	Test Condition	Test Result	Note
264Vac/50Hz	Q2 JCS20N65F	Startup	556V	Pass
		Steady State	552V	Pass
		Output Short	644V	Pass
	PD1 MBR20H200CT	Startup	140V	Pass
		Steady State	139V	Pass
		Output Short	160V	Pass
90Vac/60Hz	Transformer Core	Startup	0.243T	Pass
		Turbo State	0.34T	Last for 25ms

Waveforms:





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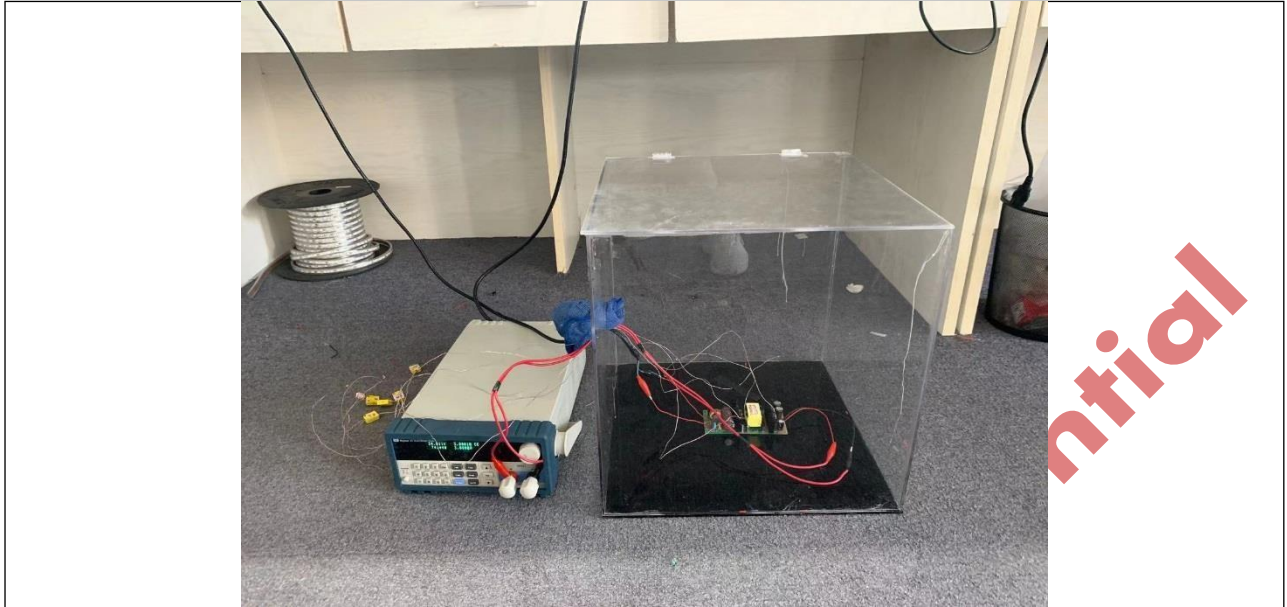
4.2 Thermal Test

Standard: MOS, IC and Diode: $T_a=40^{\circ}\text{C}$, $\Delta T<75^{\circ}\text{C}$. Transformer: $T_a=40^{\circ}\text{C}$, $\Delta T<70^{\circ}\text{C}$.

Result: Pass

Test Condition: 90Vac/60Hz, 265Vac/50Hz; 24V3A output; Burn-in 1Hour @ confined container and steady environment with no airflow, T_a is the temperature inside the cardboard box.

Component	90Vac		265Vac	
	$T_a=28.1^{\circ}\text{C}$		$T_a=28.7^{\circ}\text{C}$	
	T($^{\circ}\text{C}$)	Trise($^{\circ}\text{C}$)	T($^{\circ}\text{C}$)	Trise($^{\circ}\text{C}$)
Q2 JCS20N65F	71.8	43.7	69.6	40.9
PD1 MBR20H200CT	69.1	41	69.8	41.1
T1 Core	58.9	30.8	62.1	33.4
T1 Wire	78.3	50.2	83.8	55.1



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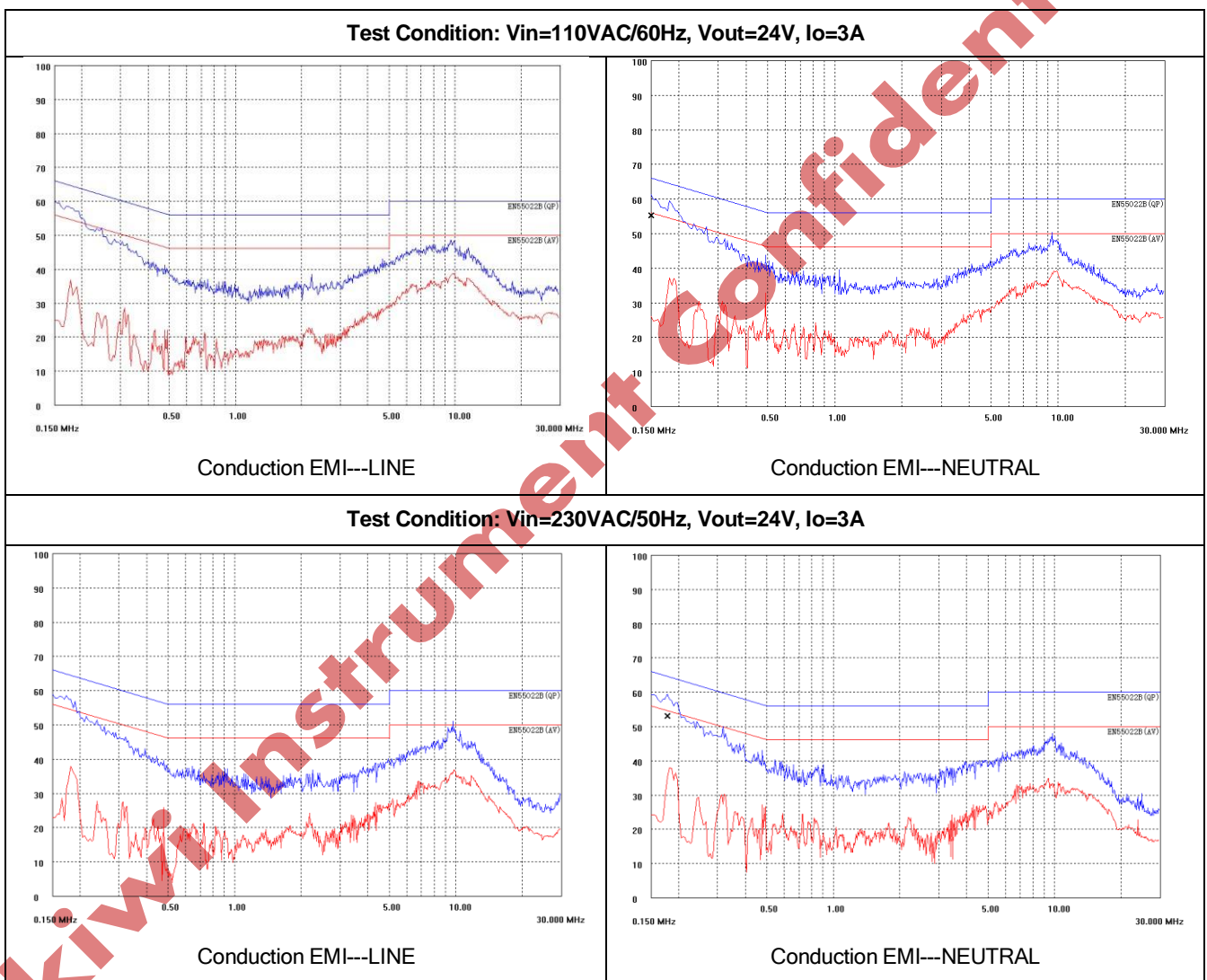
5. EMC/EMS Test Result

Standard:

standard	EN55022B/55032B
content	CE & RE
requirement	6dB margin

5.1 Conducted Emissions

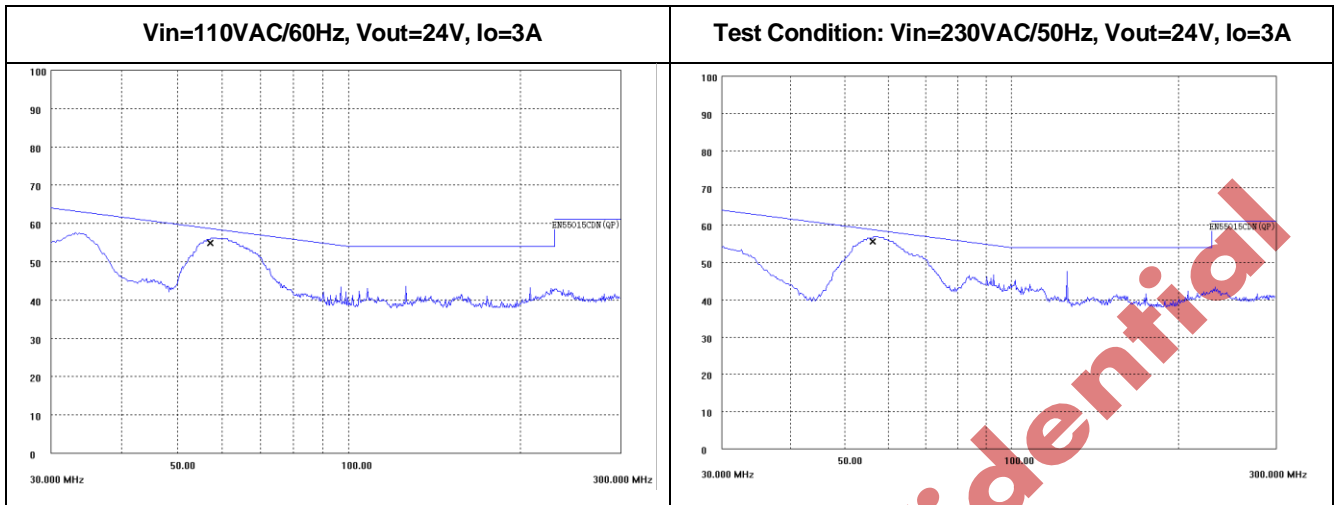
Result: Pass





**Demo Board Test Report of High Performance 24V3A up to 10A
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5.2 CDN Test



5.3 Surge Test

Line to Line 2kV surge testing was completed according to IEC61000-4-5. Input voltage was set at 230VAC/50Hz. Output was loaded at full load and operation was verified following each surge event. Each injection phase below is tested with 5 times and hold for 60 seconds before next one.

Input Voltage (VAC)	Surge Level (V)	Injection Location	Injection Phase (°)	Test Result (Pass/Fail)
230Vac/50Hz	+2000	L to N	0	Pass
	+2000	L to N	90	Pass
	+2000	L to N	180	Pass
	+2000	L to N	270	Pass
	-2000	L to N	0	Pass
	-2000	L to N	90	Pass
	-2000	L to N	180	Pass
	-2000	L to N	270	Pass

5.4 ESD Test

Input 220Vac/50Hz, Output 24V-3A. Discharge 10 times on each output terminals of cable end at each test voltage according to IEC61000-4-2

Air Discharge		Contact Discharge	
Test Voltage(kV)	Air Discharge	Test Voltage(kV)	Contact Discharge



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14	Pass	4	Pass
-14	Pass	-4	Pass
15	Pass	6	Pass
-15	Pass	-6	Pass
16	Pass	8	Pass
-16	Pass	-8	Pass

5.5 EFT Test

Input 220Vac/50Hz, Output 24V-2A. According to IEC61000-4-4, set EFT pulse as 15ms operation time with every 300ms cycle, Trise=50ns, Thold=50ns, Operation frequency Fsw=5kHz.

Input Voltage (VAC)	EFT Peak Voltage (V)	Injection Location	Frequency(kHz)	Test Result (Pass/Fail)
230Vac/50Hz	+1000	L to N	5	
	+1000	L to N	5	
	-1000	N to L	5	
	-1000	N to L	5	

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5.6 Voltage Dip Test

Input 220Vac/50Hz, Output 24V-3A. Set voltage dips test according to IEC61000-4-11:2017 as below.

CLASS	Test Level and duration for voltage dips(50 Hz/60 Hz)				
CALSS 3	0% during 1/2 cycle	0% during 1 cycle	40% during 10/12 cycle	70% during 25/30 cycle	80% during 250/300 cycle
25/30 means 25 cycles for 50Hz Test, 30 cycles for 60Hz Test.					

Test Result is classified as below:

A: Normal performance within limits specified by the manufacturer, requestor or purchaser;

B: Temporary loss of function or degradation of performance, which ceases after the disturbance ceases, and from which the equipment under test recovers its normal performance, without operation intervention;

C: Temporary loss of function or degradation of performance, the correction of which requires operator intervention;

D: Loss of function or degradation of performance which is not recoverable, owing to damage to hardware or software, or loss of data.

Test Result: A (A/B/C/D)



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Test Setup Guide

1. Connect the “V+” and “V-” terminal to the positive and negative end of the load.
2. Set the AC Power Source between 90VAC and 265VAC.
3. Connect the AC Power Source terminal to the “L” and “N” terminals on the Demo Board
4. Turn on the AC Power Source to make system startup; and Turn off the AC Power Source to make system shutdown.

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Revision History

DATE	REV	DESCRIPTION
2019-09-27	1.0	First Release

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