


EVCM500-S-00A

5V1.1A Test Report

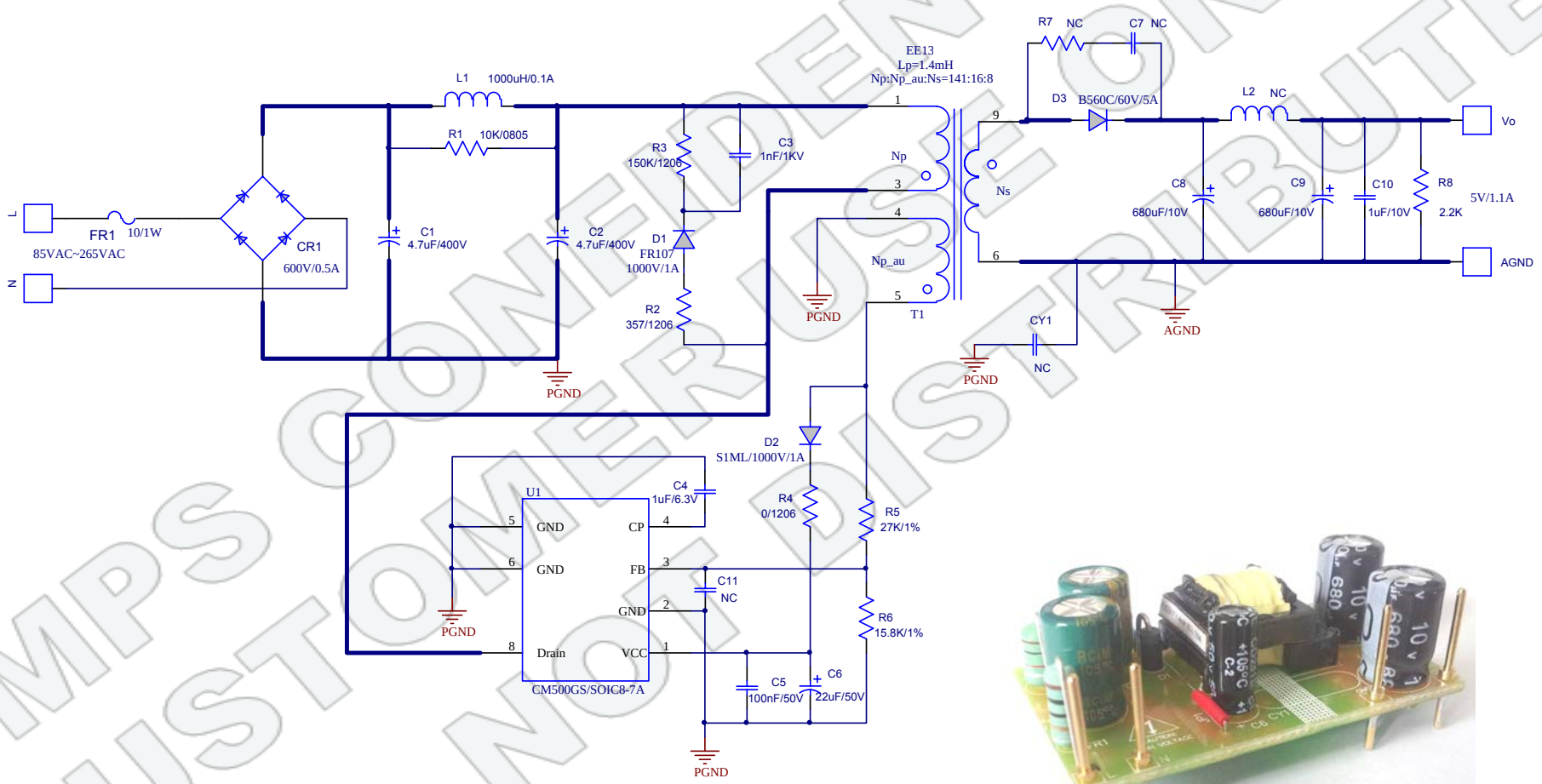
May, 2013

AC/DC, HZ

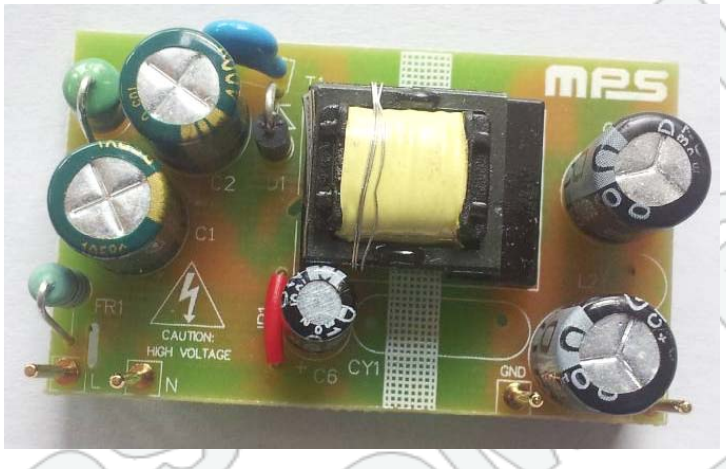
1. Specification

Description	Parameter	Units
Input voltage	85~265	V_{AC}
Input frequency	50~60	Hz
Output1 voltage	5	V
Output1 current	1.1	A
……		

2. Schematic



3. Board Photograph



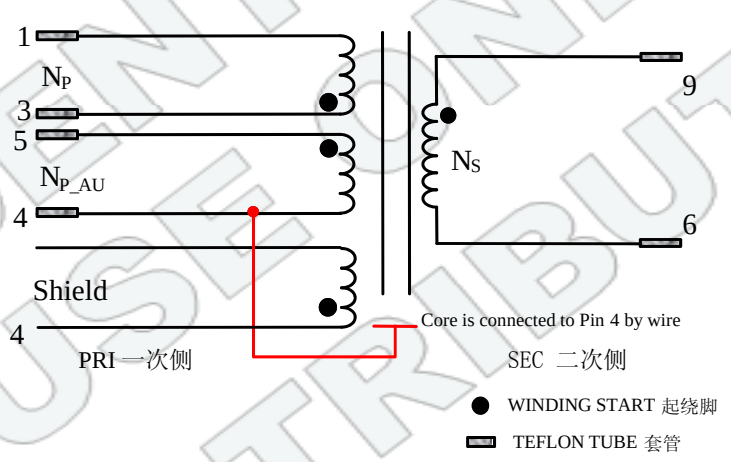
4. Bill of Materials

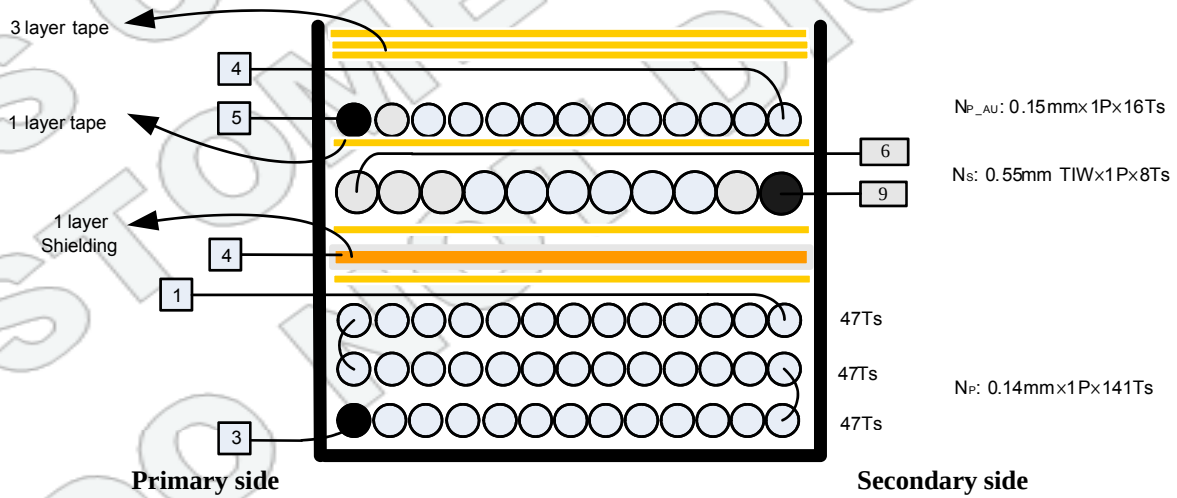
Ref	Value	Description	Package	Manufacturer	Manufactuer_P/N
C1,C2	4.7uF	Capacitor;400V	DIP	Beryl	4.7uF/400V
C3	1nF	Ceramic Capacitor,1kV	DIP	Any	1nF/1kV
C4	1uF	Ceramic Capacitor;6.3V;X7R;	0603	Murata	GRM188R70J105KA01D
C5	100nF	Ceramic Capacitor;50V;X7R;	0603	TDK	C1608X7R1H104K
C6	22uF	Electrolytic Capacitor;50V	DIP	Jianghai	CD281L-50V22
C7	NC				
C8, C9	680uF	Electrolytic Capacitor;10V	DIP	Jianghai	CD263-10V680
C10	1uF	Ceramic Capacitor;10V;X7R	0603	Murata	GRM188R71A105KA61D
C11	NC				
CY1	NC				
CR1	MB6F	Diode;600V;0.5A	SOP-4	Diodes	MB6F
D1	FR107	Diode;1000V;1A	DO-41	Diodes	FR107
D2	S1ML	Diode; 1000V;1A	SMA	Taiwan Semiconductor	S1ML
D3	B560C	Schottky Diode;60V;5A	SMC	Diodes	B560C
FR1	10Ω	Fusible Resistor, 1 W, 1%	Yageo	DIP	FKN1WSJT-52-10R
L1	1000uH	Inductor;8 Ohm;0.1A	DIP	Bangdayuan	CKL0510-102
L2	NC	Short			
R1	10kΩ	Film Resistor;1%	0805	Yageo	RC0805FR-0710KL
R2	357Ω	Film Resistor;1%;1/4W	1206	Yageo	RC1206JR-07357RL
R3	150kΩ	Film 'Resistor;1%;1/4W	1206	Yageo	RC1206FR-07150KL
R4	0Ω	Film Resistor;5%;1/4	1206	Yageo	RC1206JR-070RL
R5	27kΩ	Film Resistor;1%;	0603	Yageo	RC0603FR-0727KL
R6	15.8kΩ	Film Resistor;1%	0603	Yageo	RC0603FR-0715K8L
R7	NC				
R8	2.2kΩ	Film Resistor;1%;	0603	Yageo	RC0603FR-072K2L
U1		Primary side regulator	SOIC8-7A	MPS	CM500GS
T1		Transformer;1.4mH; Np:Np_au:Ns=141:16:8	EE13 Horizontal	Emei	FX0317

5. Transformer Information

5.1 Winding Spec

- Primary inductance: 1.4mH
- Leakage inductance: 60uH
- Core/Bobbin: EE13/EE13 Horizontal
- Core material: PC40
- N_P:N_{P_AU}:N_S=141:16:8





5.2 Winding Details

Winding Order	Pin Number		Wire Type (Φ)	Number of Wires	Number of Turns
	Start	Finish			
N_P	3	1	0.14mm	1	141
Shielding	4	nc			
N_S	9	6	0.55mm TIW	1	8
N_{P_AU}	5	4	0.15mm	1	16

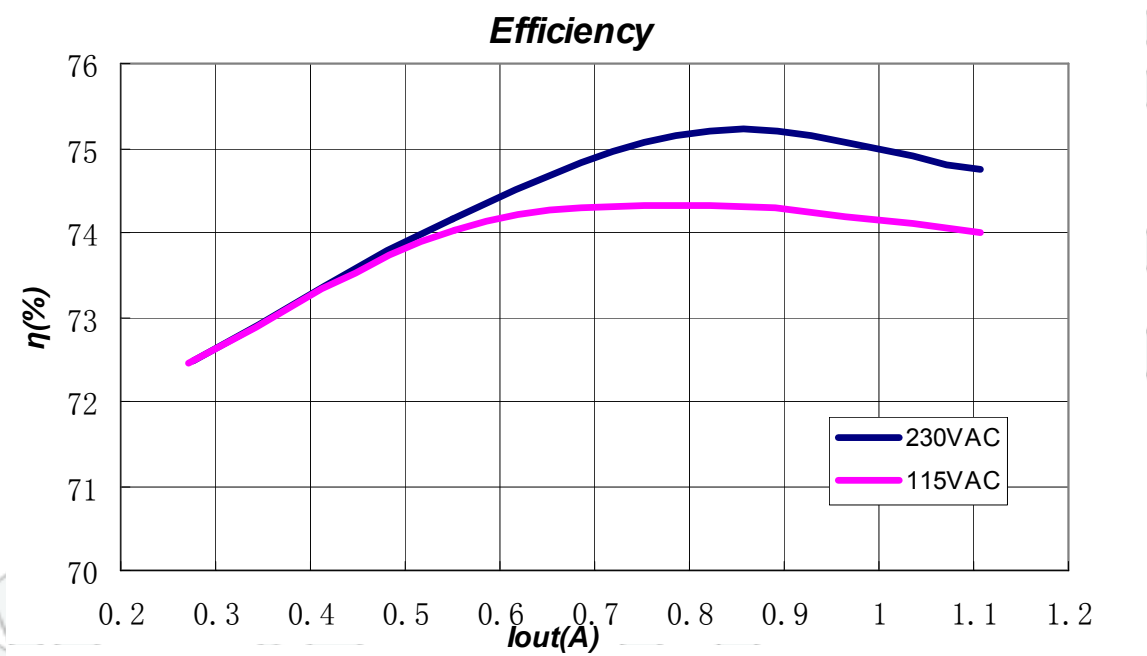
6. Test Equipment

- AC Source: Chroma, Model 61601
- Power Meter: Yokogawa, Model WT210
- E-Load: Chroma, Model 63101
- Oscilloscope: Tektronix, Model TDS3014C
- Current Probe/Amplifier: Tektronix, Model TCP202
- EMC Receiver: Rohde & Schwarz, Model ESPI3+ESPI-B2

EVCM500-S-00A 5V/1.1A Demo Board Performance

CM500 Demo Board Performance List			
1	Efficiency	9	SCP
2	No Load Consumption	10	OCkP
3	CV/CC	11	Transient
4	Steady State	12	EMI (Conducted Emission)
5	Stress	13	Thermal
6	Turn-on Delay Time	14	Surge Test
7	Output Rise Time		
8	Out Ripple		

1. Active Mode Efficiency

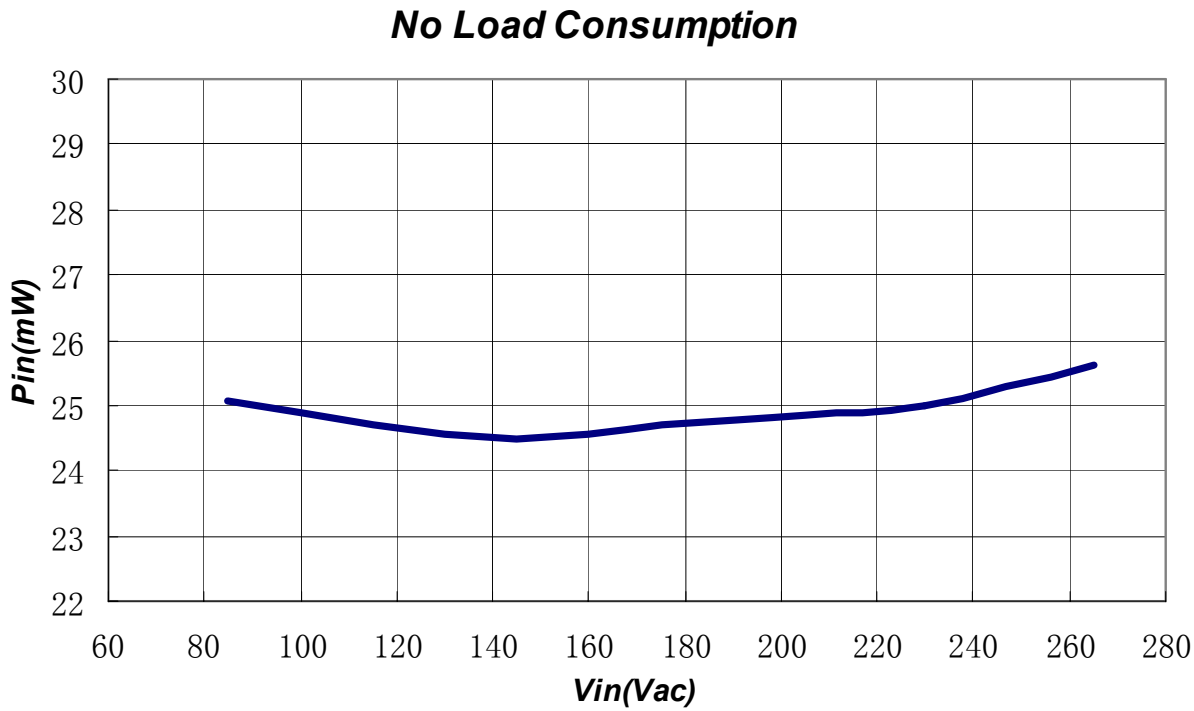


The average efficiency criterion of Energy Star:

	115Vac	230Vac
CM500	73.7%	74.15%
Energy Star V1.1	64%	64%
Energy Star V2	67%	67%

- **The efficiency can easily meet energy star requirement;**

2. No Load Power Consumption

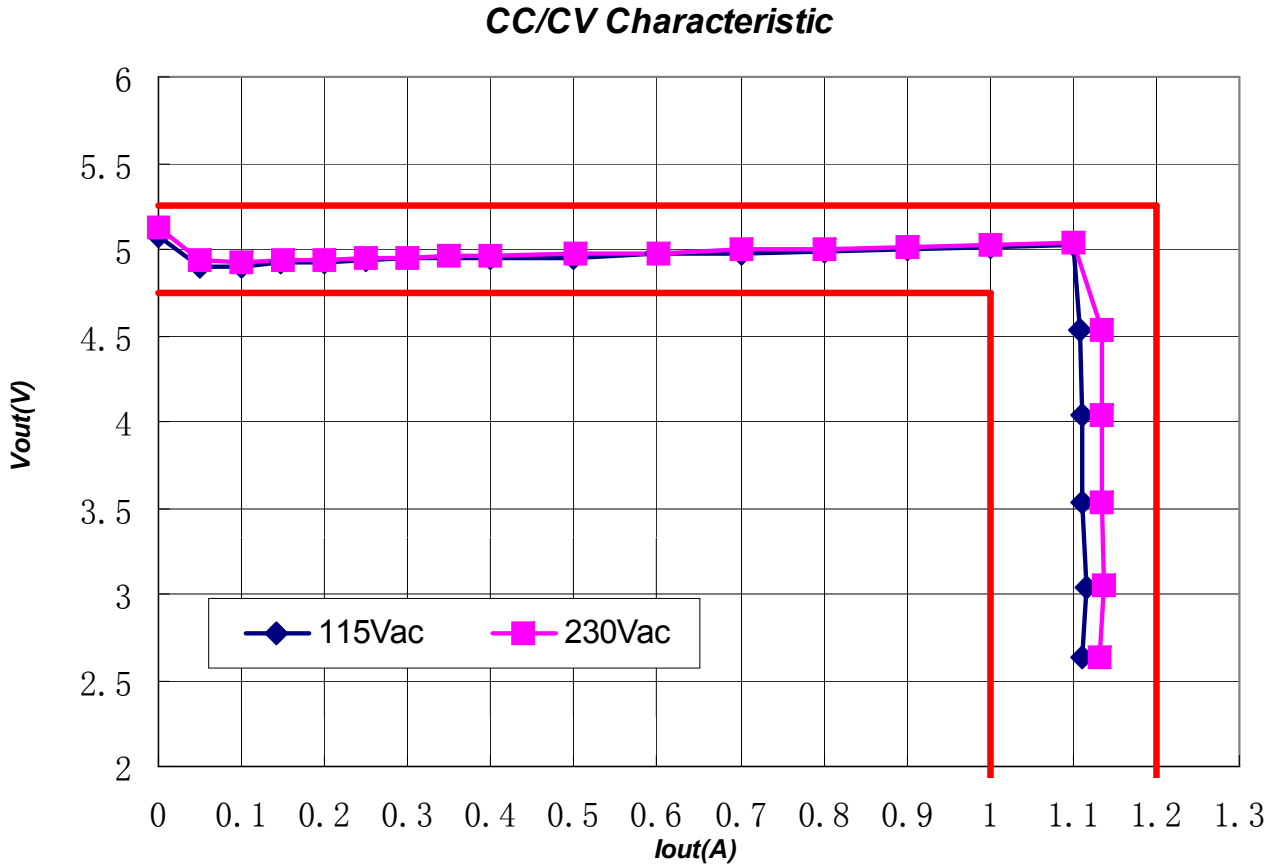


Energy Star V2

Nameplate Output (P_{NP})	Maximum No-load Input Power
0 to <50 W	≤ 0.3 W
≥50 to ≤250 W	≤ 0.5 W

3.CV/CC Characteristic

Ta=30˚C



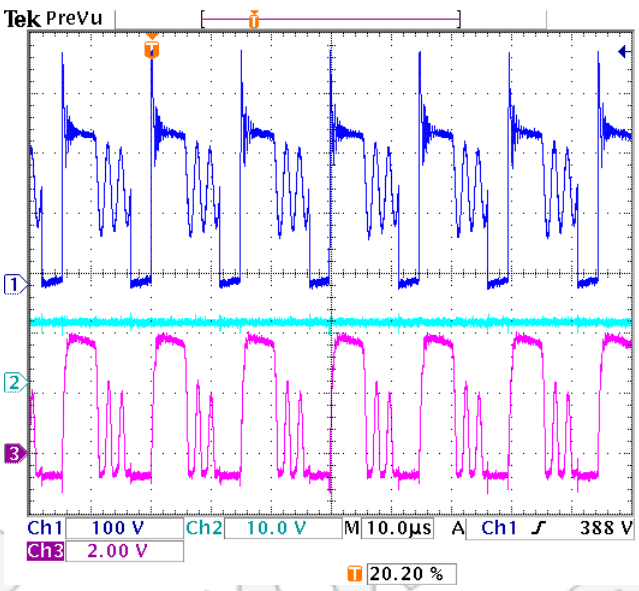
Test with 0.15V CP function and V_{OUT} test at the end of Line.

4.Steady State

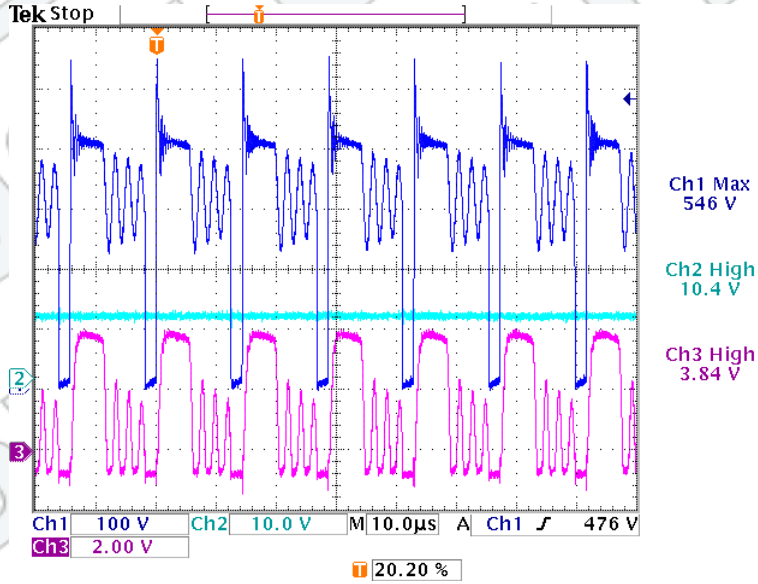
CH1: V_{DS}

CH2: V_{CC}

CH3: V_{FB}



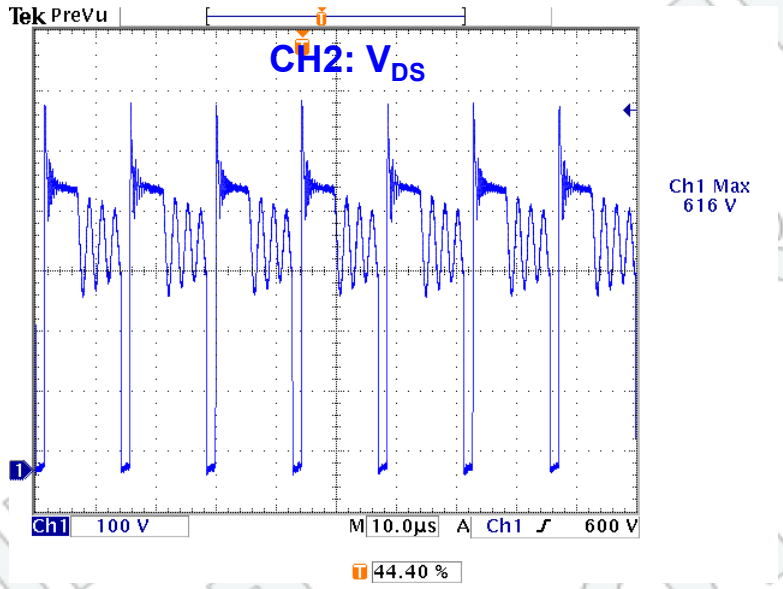
115VAC Input



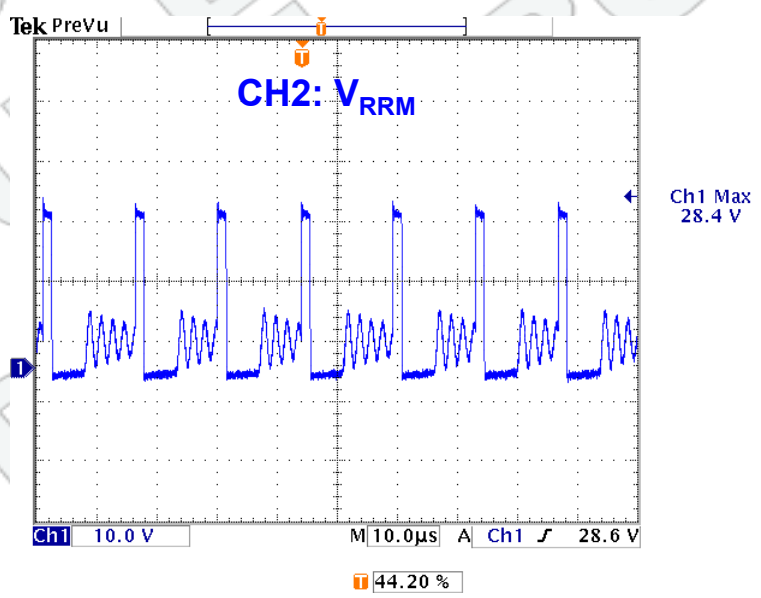
230VAC Input

5.Stress

Steady state when 265 VAC input

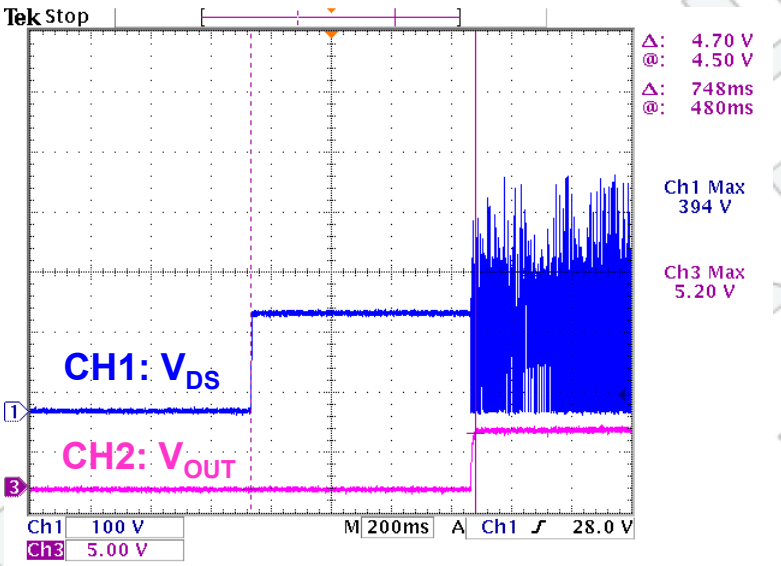


MOSFET

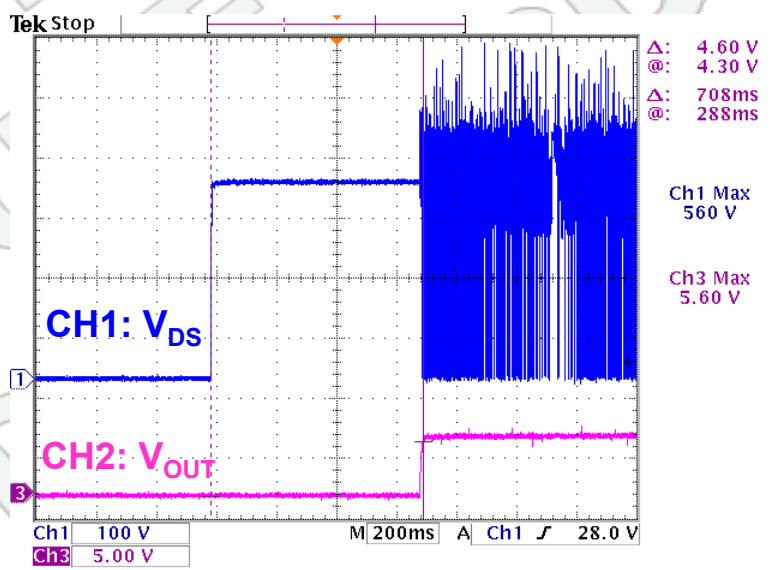


Secondary side Diode

6.Turn-on Delay time



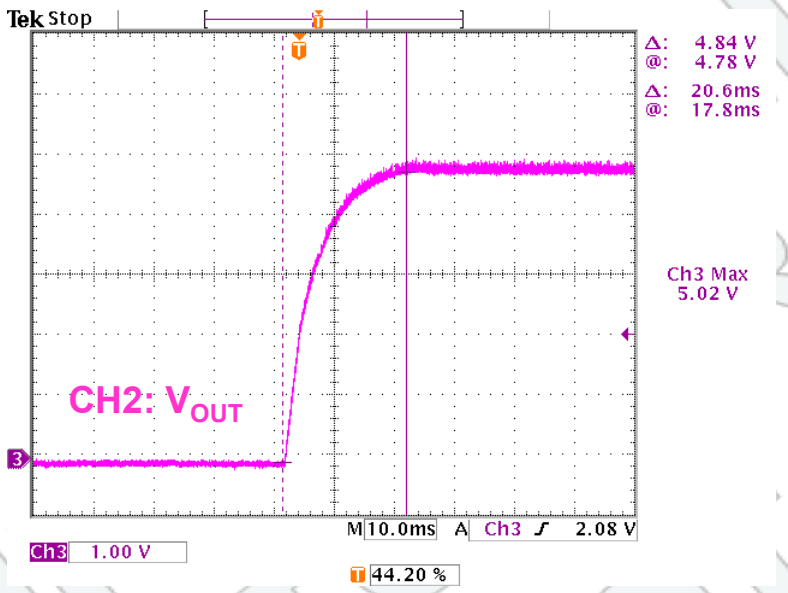
115VAC Input



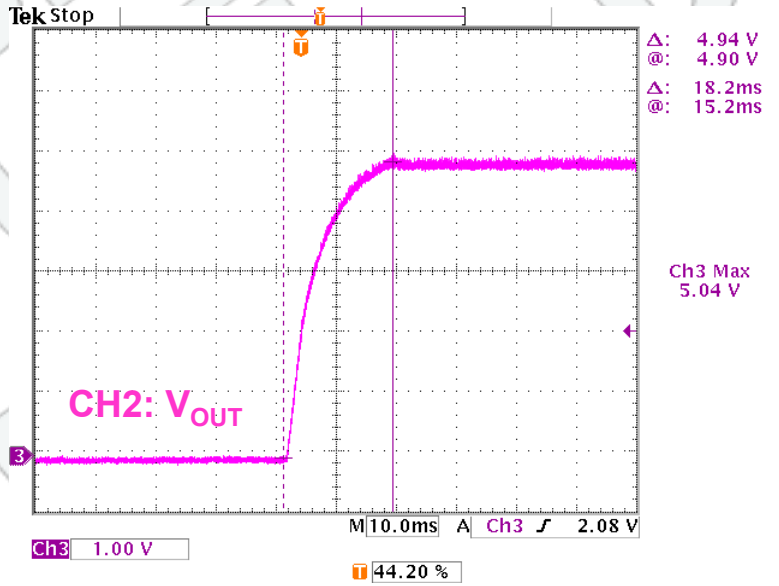
230VAC Input

7.Output Rise time

Electronic Load with CR mode.



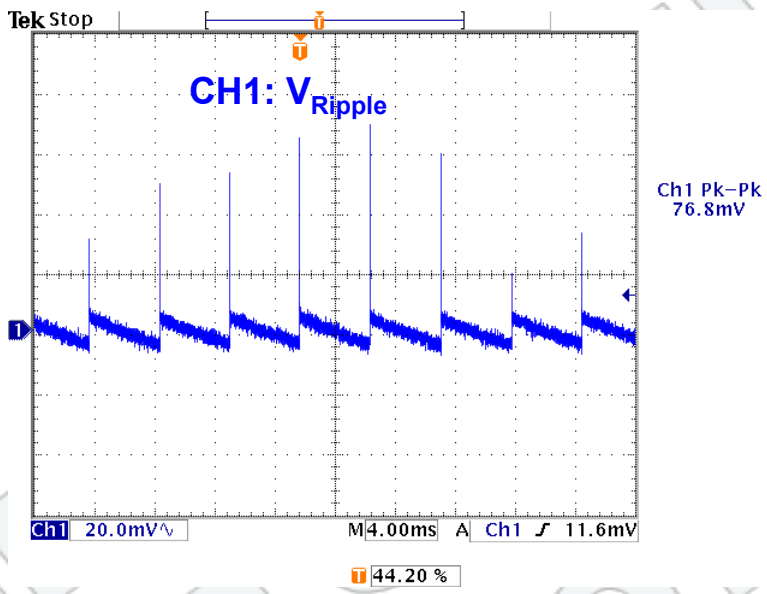
115VAC Input



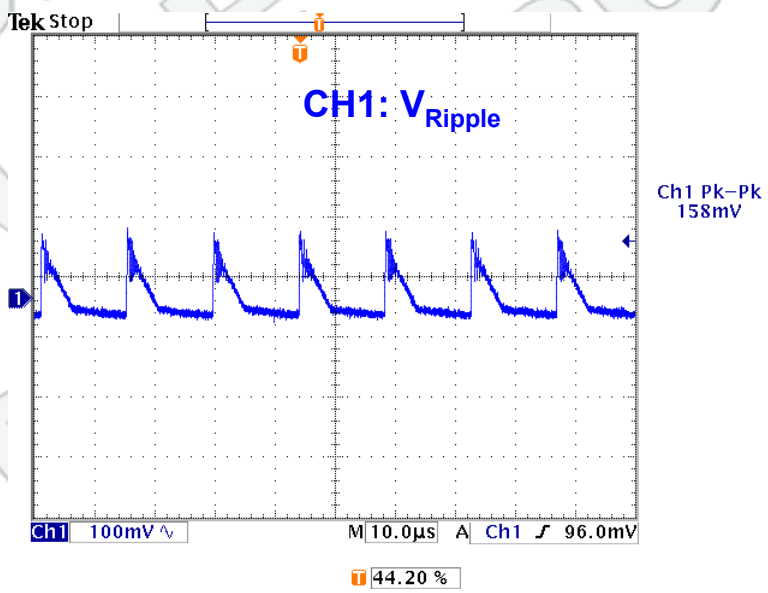
230VAC Input

8. Output Ripple

Vin=115Vac



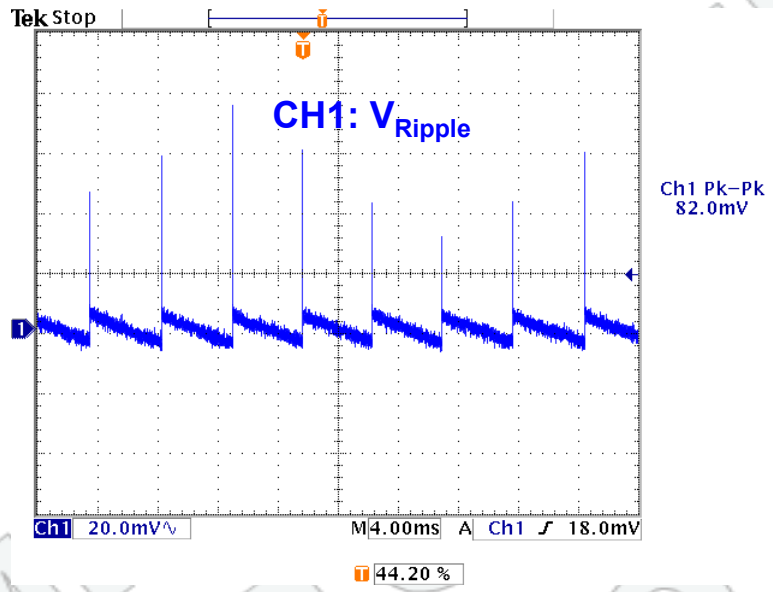
No Load



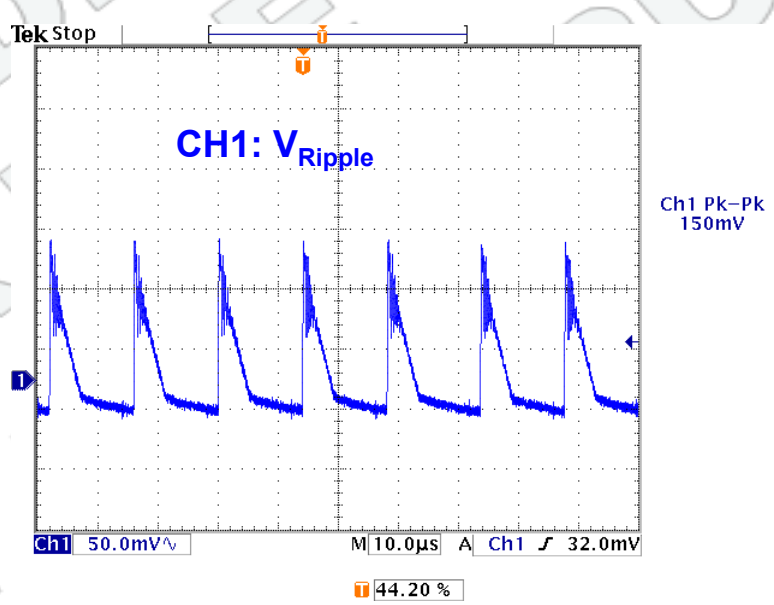
Full Load

Continue…

Vin=230Vac



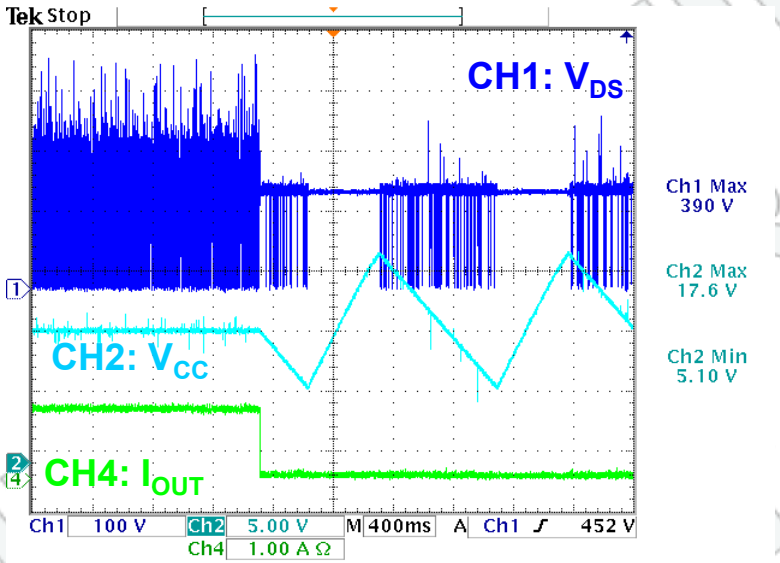
No Load



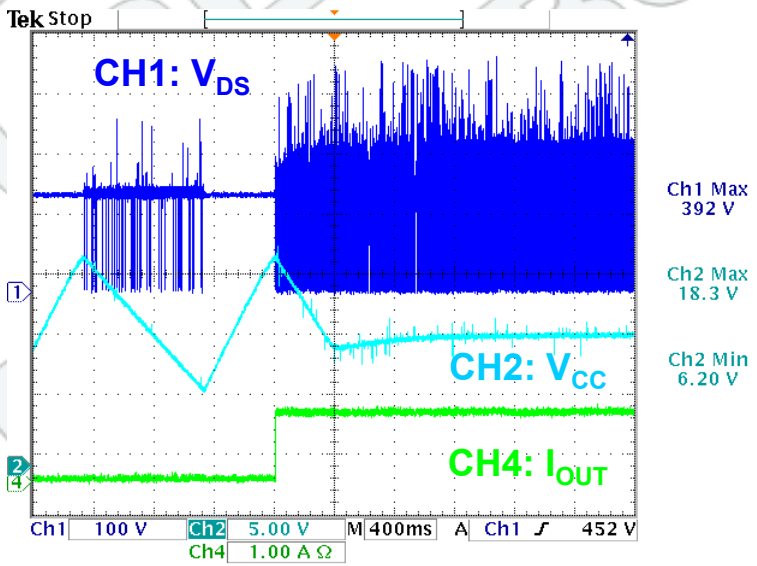
Full Load

9. SCP

Vin=115Vac



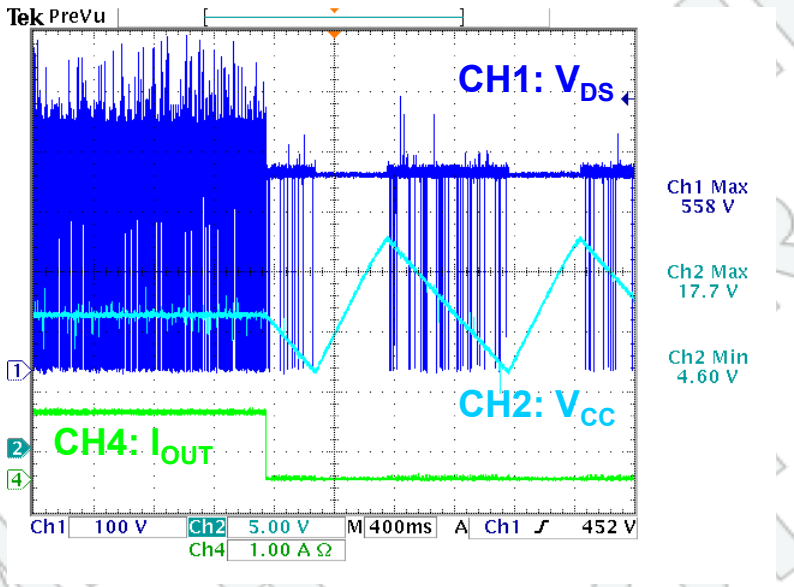
SCP Entry



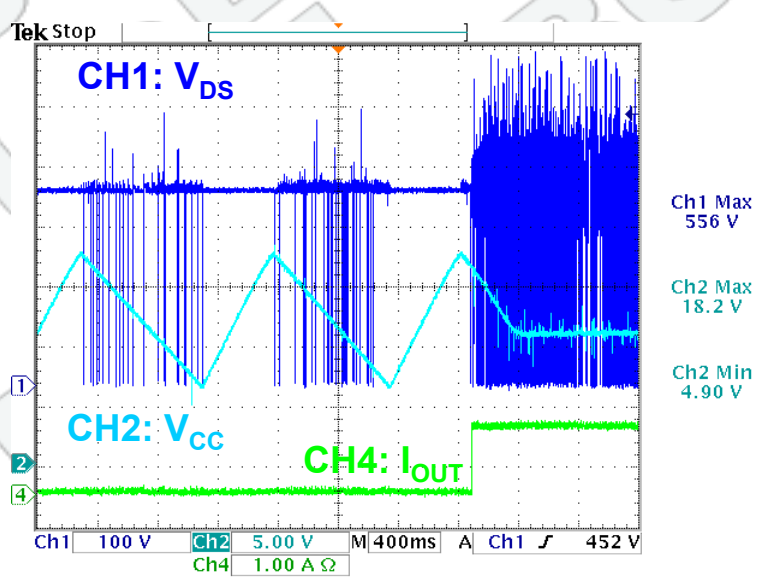
SCP Recovery

Continue…

Vin=230Vac



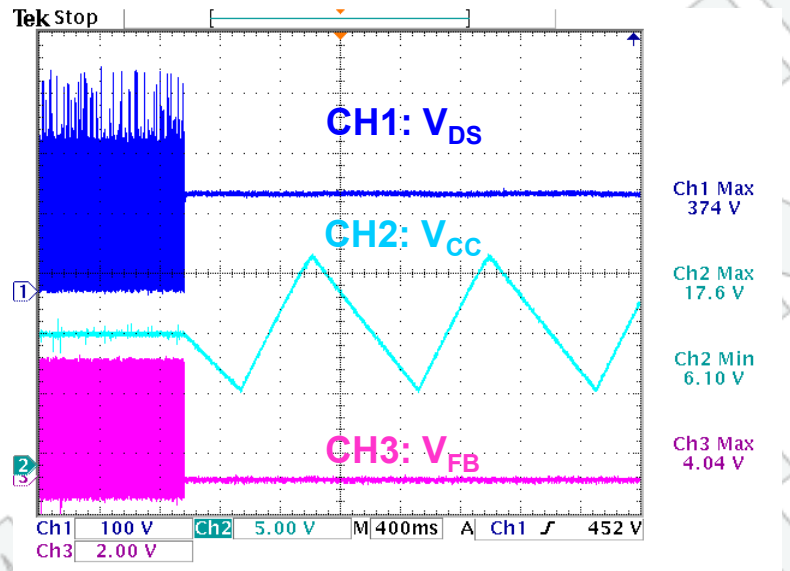
SCP Entry



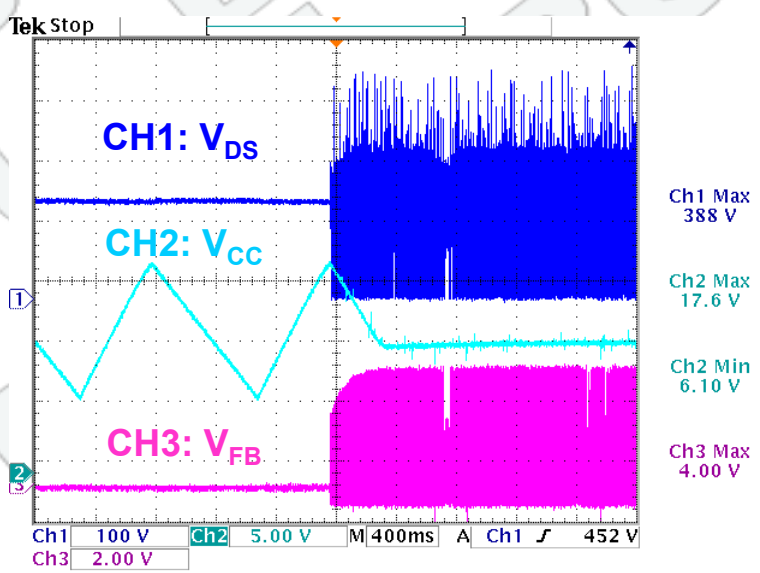
SCP Recovery

10. OCkP

Vin=115Vac



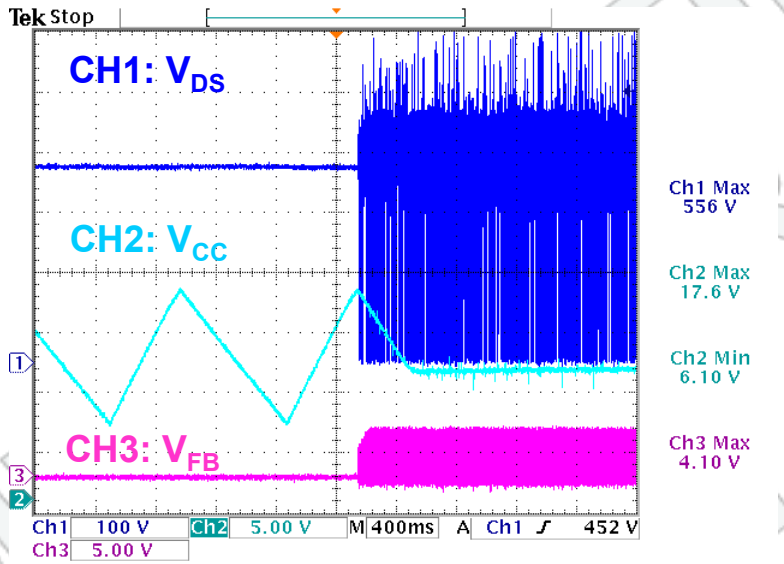
OCkP Entry



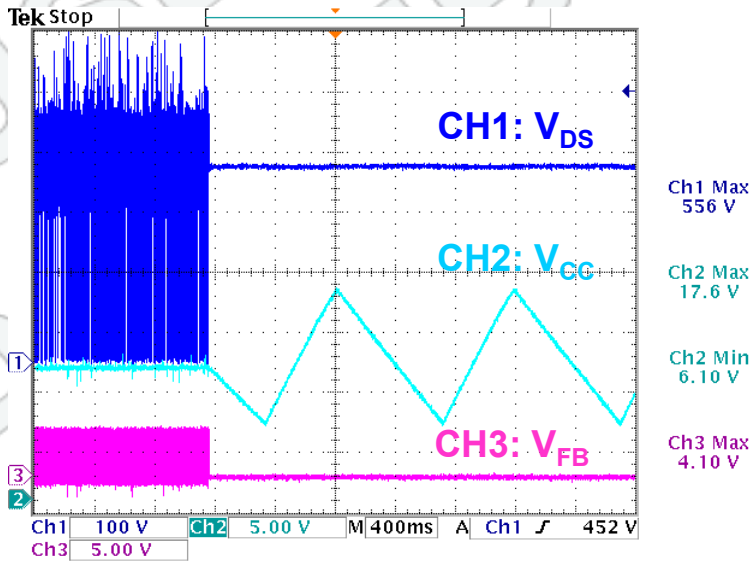
OCkP Recovery

Continue…

Vin=230Vac



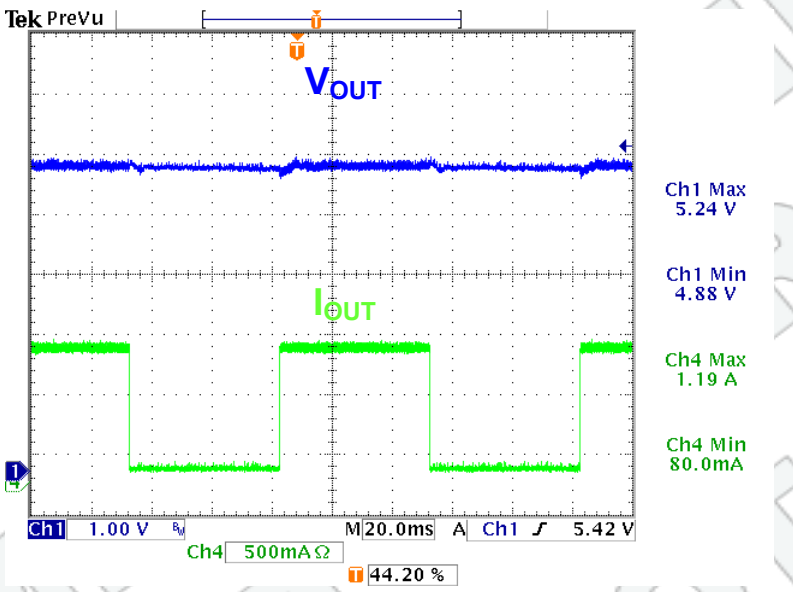
OCkP Entry



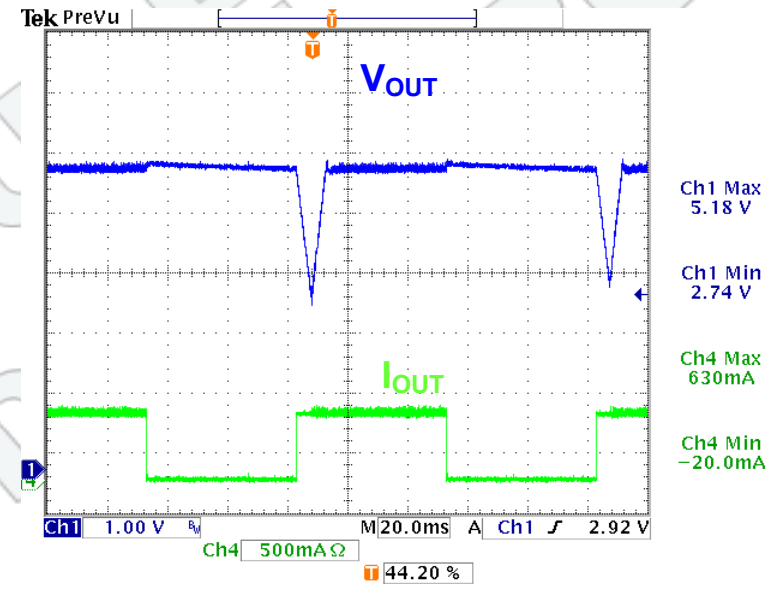
OCkP Recovery

11. Transient

Vin=230Vac



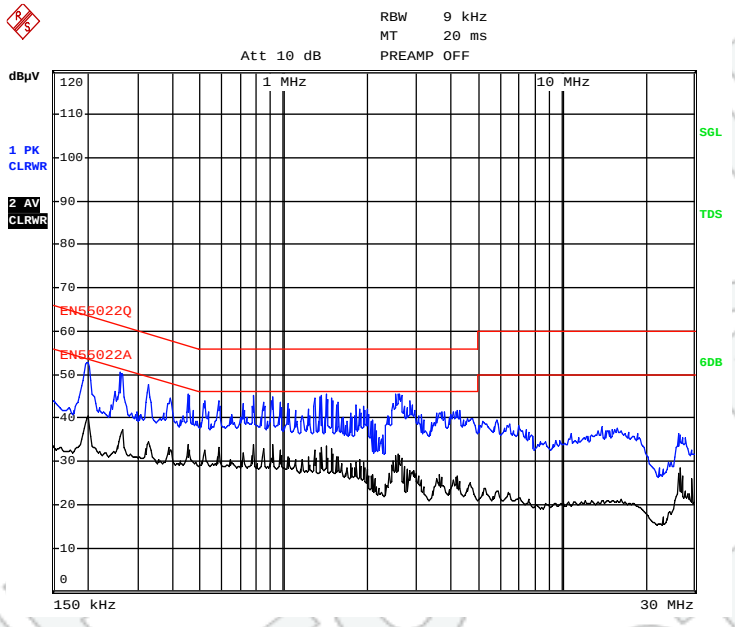
0.1A~1A
0.1A/us
T_h=50ms,T_l=50ms



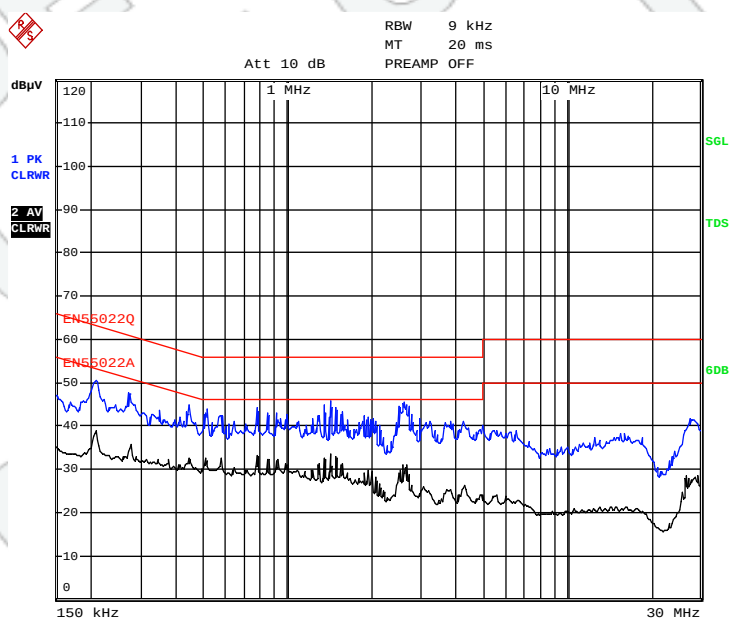
0A~0.5A
0.1A/us
T_h=50ms,T_l=50ms

12. EMI (Conducted Emission)

Vin=220Vac with full load



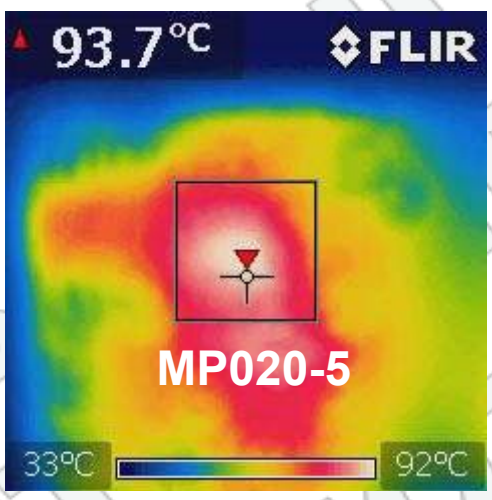
L Line, Output GND float



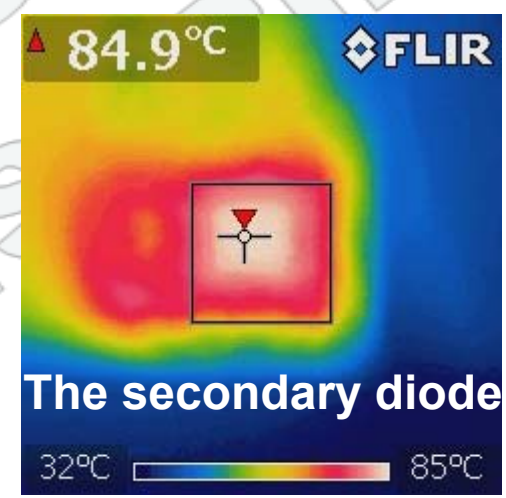
N Line, Output GND float

13. Thermal

Test condition:
Vin=85Vac, 5V/1.1A
Ambient temperature 30℃



Top layer



Bottom layer

Copper Thickness: 1 Oz

14 Surge Test

Test Conditions:

- DM Surge Test with 1.2/50us Waveform;
- 220Vac input and full load.

Surge Level (V)	Input Voltage (Vac)	Injection Location	Injection Phase (°)	Number of Surges	Test Result
1000	220	L-N	0	5	PASS
1000	220	L-N	90	5	PASS
1000	220	L-N	180	5	PASS
1000	220	L-N	270	5	PASS
1000	220	L-N	0	5	PASS
1000	220	L-N	90	5	PASS
1000	220	L-N	180	5	PASS
1000	220	L-N	270	5	PASS