Texas Instruments

PMP4344 Test Procedure

China Power Reference Design

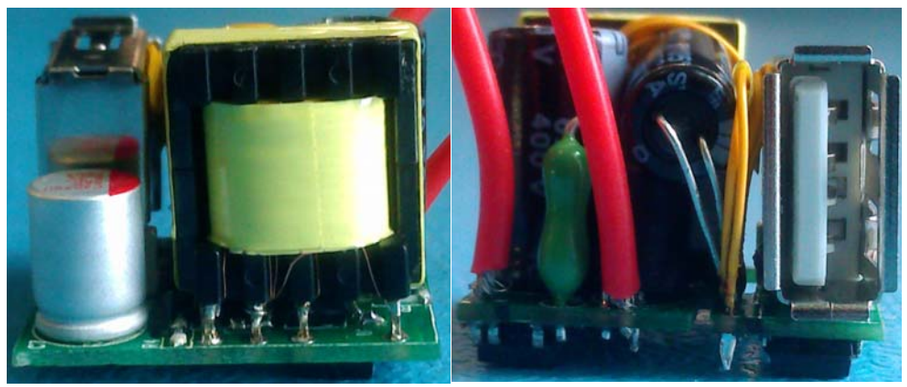
REV A

11/07/2012

1 GENERAL

1.1 PURPOSE

To provide detailed data for evaluating and verifying the PMP4344, which uses TI new Primary Side Controller UCC28710 for USB charger with 22mmx21mmx20mm. The below photo shows this demo board.



1.2 REFERENCE DOCUMENTATION

Schematic PMP4344_SCH.PDF
Assembly PMP4344_PCB.PDF
BOM
Promotion tools

1.3 TEST EQUIPMENTS

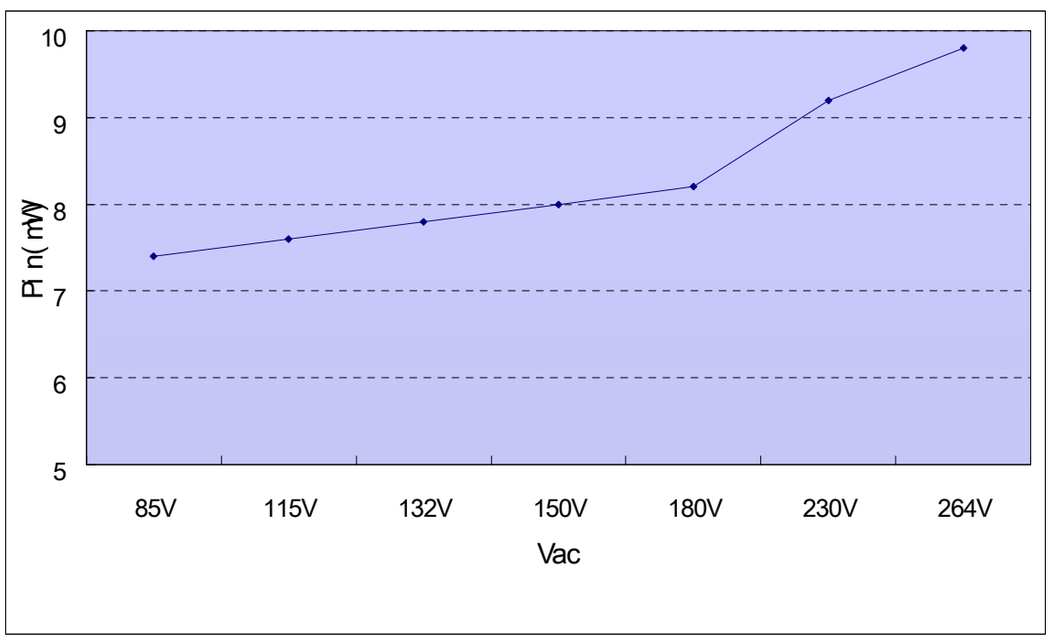
Power-meter: YOKOGAWA WT210
Multi-meter(current): Fluke 8845A
Multi-meter(voltage): Fluke 187
AC Source: Chroma 61530
LED load: Chroma 63110A module

Testing demoboard

2 INPUT CHARACTERISTICS

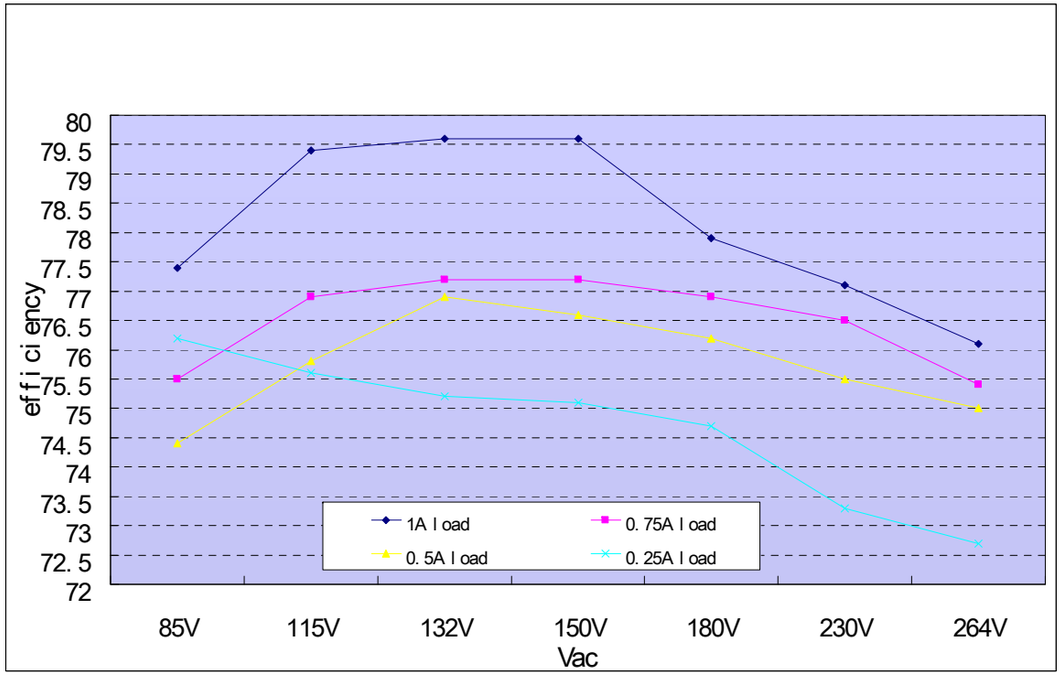
Otherwise Specified, the test is under the condition With 1m USB cable

2.1 STANDBY POWER



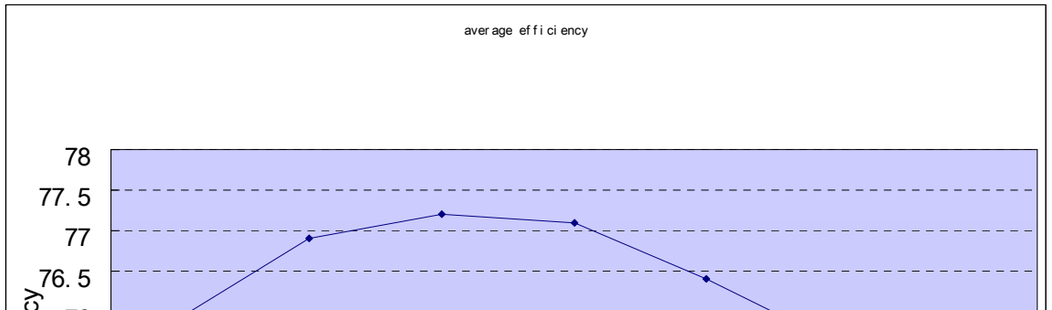
2.2 LOAD AND INPUT VOLTAGE VS EFFICIENCY

Notes: efficiency test is based USB port



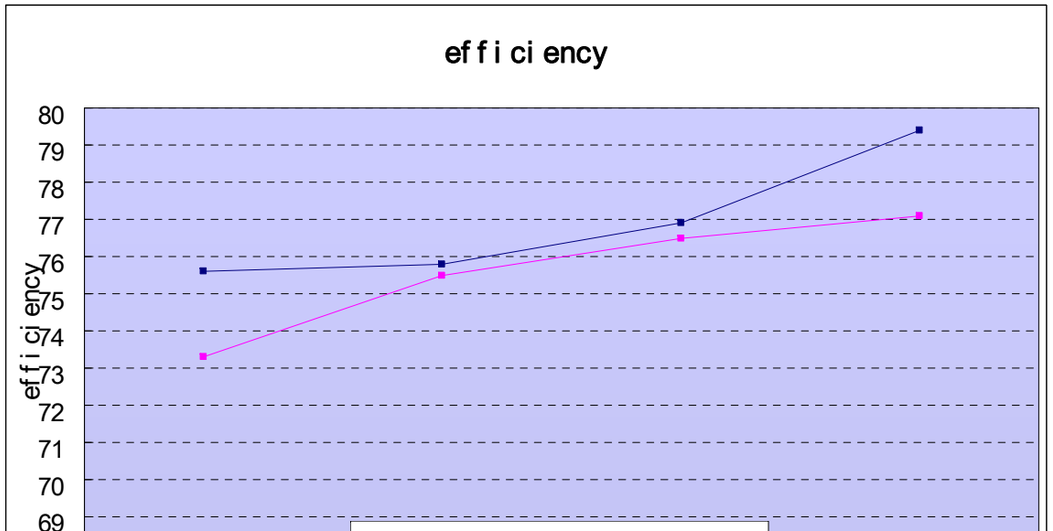
2.3 AVERAGE EFFICIENCY AT 0.25A, 0.5A, 0.75A AND 1A

Notes: efficiency test is based USB port



2.4 EFFICIENCY VS LOAD

Notes: efficiency test is based USB port

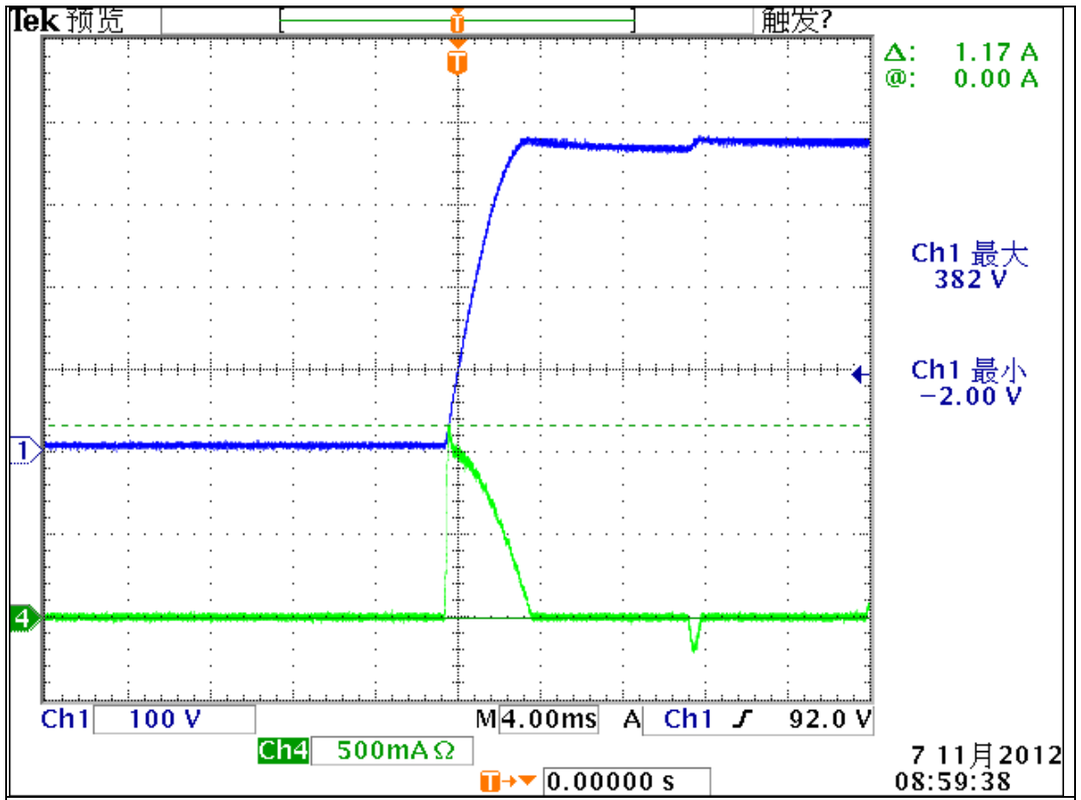


2.5 INPUT CURRENT

Vin(Vac)	Freq(Hz)	Iin(Arms)	Pass/Fail
85	60	**0.138**	

2.6 INPUT INRUSH CURRENT

Max inrush current: 1.17A @264Vac and 1.2A load

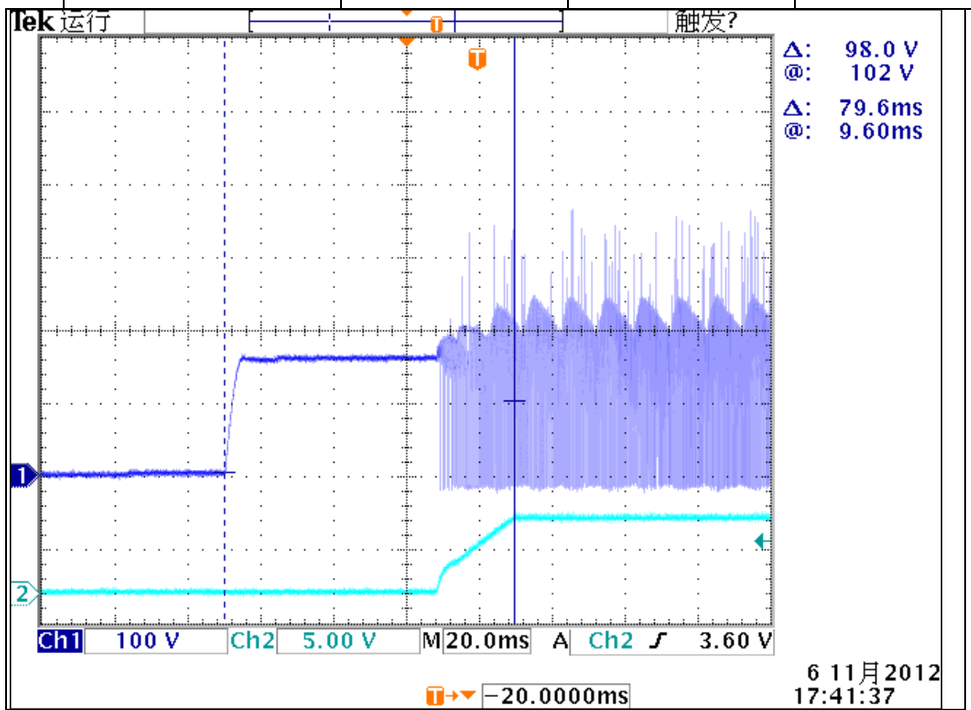


Vin:264Vac Io: 1.2A
Ch1: Input bulk CAP voltage 100V/div
Ch4: Input inrush current 500mA/div

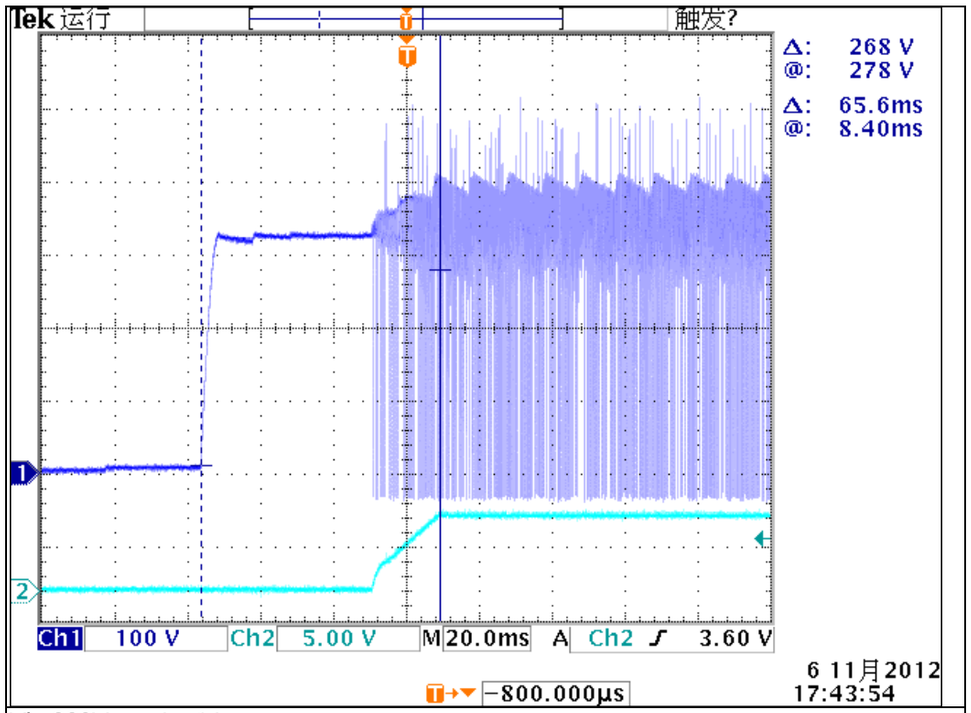
3 OUTPUT CHARACTERISTICS

3.1 STARTUP TIME

Input voltage	Output current	Startup time	Pass/Fail
115Vac	1A	**79.6mS**	
230Vac	1A	**65.6mS**	



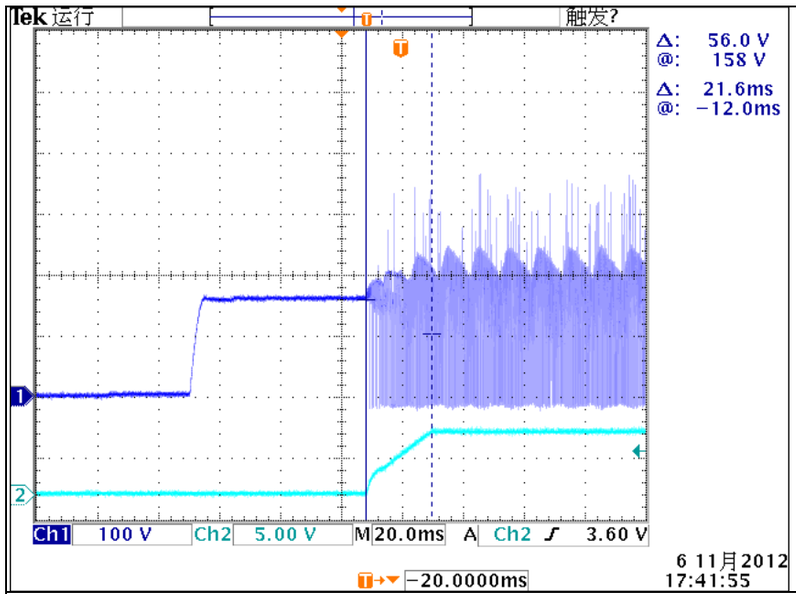
Vin:115Vac Io: 1A
Ch1: MOSFET's drain voltage, 100V/div
Ch2: output voltage, 5V/div



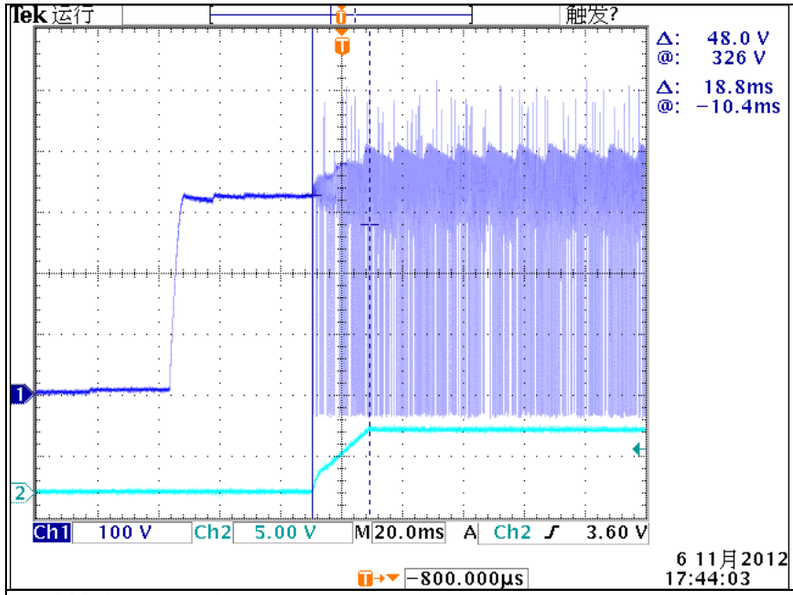
Vin:230Vac Io: 1A
Ch1: MOSFET's drain voltage, 100V/div
Ch2: output voltage, 5V/div

3.2 OUTPUT VOLTAGE RISE TIME

Input voltage	Output current	Startup time	Pass/Fail
115Vac	1A	**21.6mS**	
230Vac	1A	**18.8mS**	



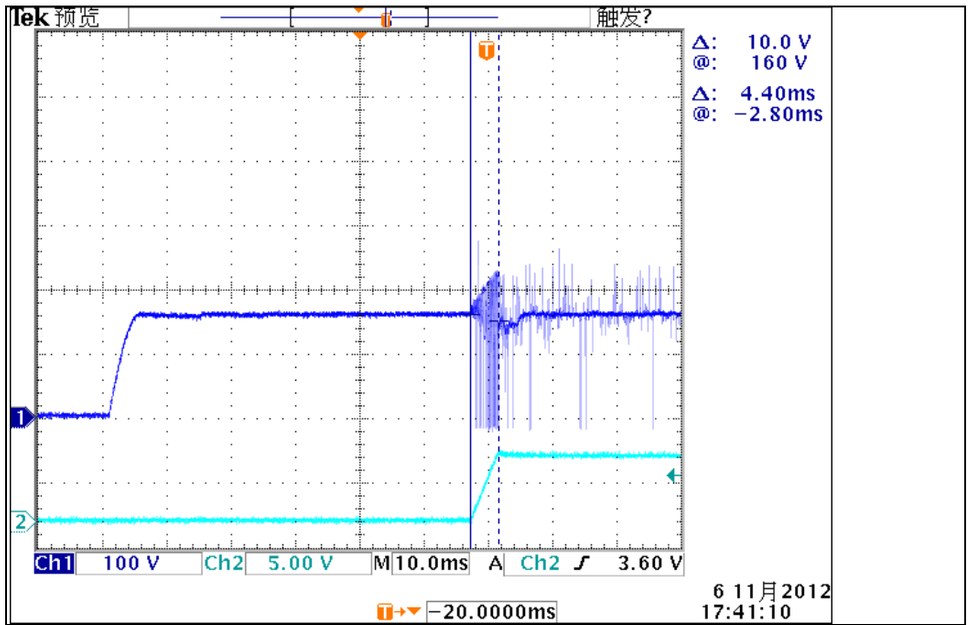
Vin:115Vac Io: 1A
Ch1: MOSFET's drain voltage, 100V/div
Ch2: output voltage, 5V/div



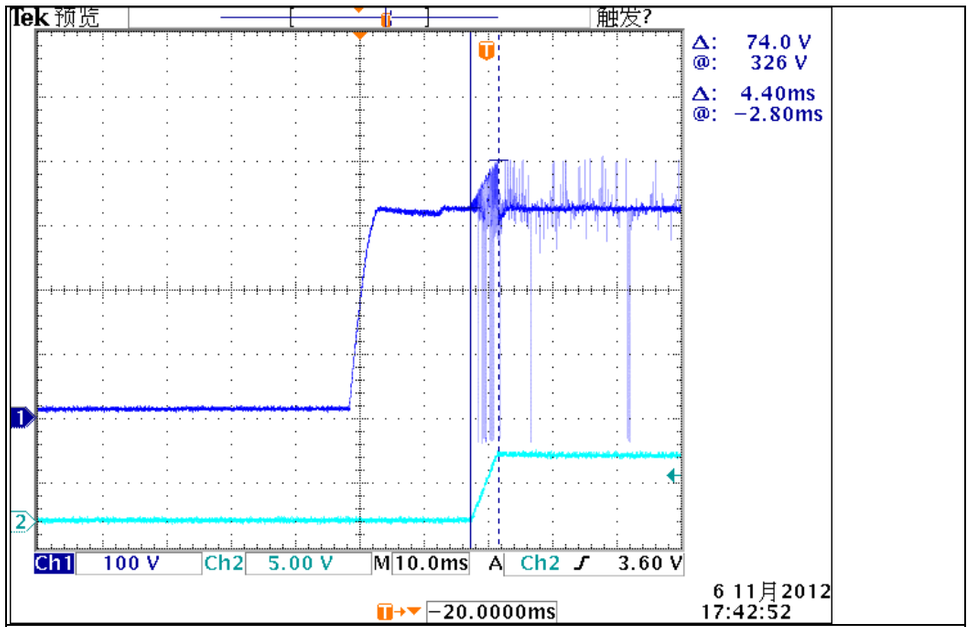
Vin:230Vac Io: 1A
Ch1: MOSFET's drain voltage, 100V/div
Ch2: output voltage, 5V/div

3.3 OUTPUT VOLTAGE OVERSHOOT

Input voltage	Output current	overshoot voltage	Pass/Fail
115Vac	0A	**<1%**	
230Vac	0A	**<1%**	



Vin:115Vac Io: 0A
Ch2: voltage, 2V/div

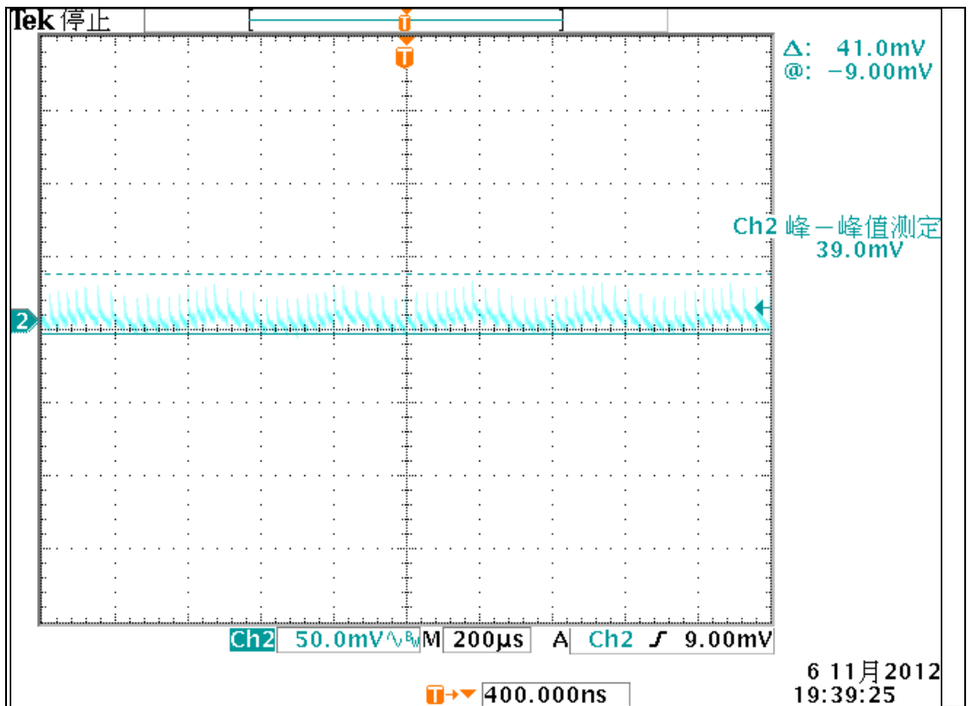


Vin:230Vac Io: 0A
Ch2: output voltage, 2V/div

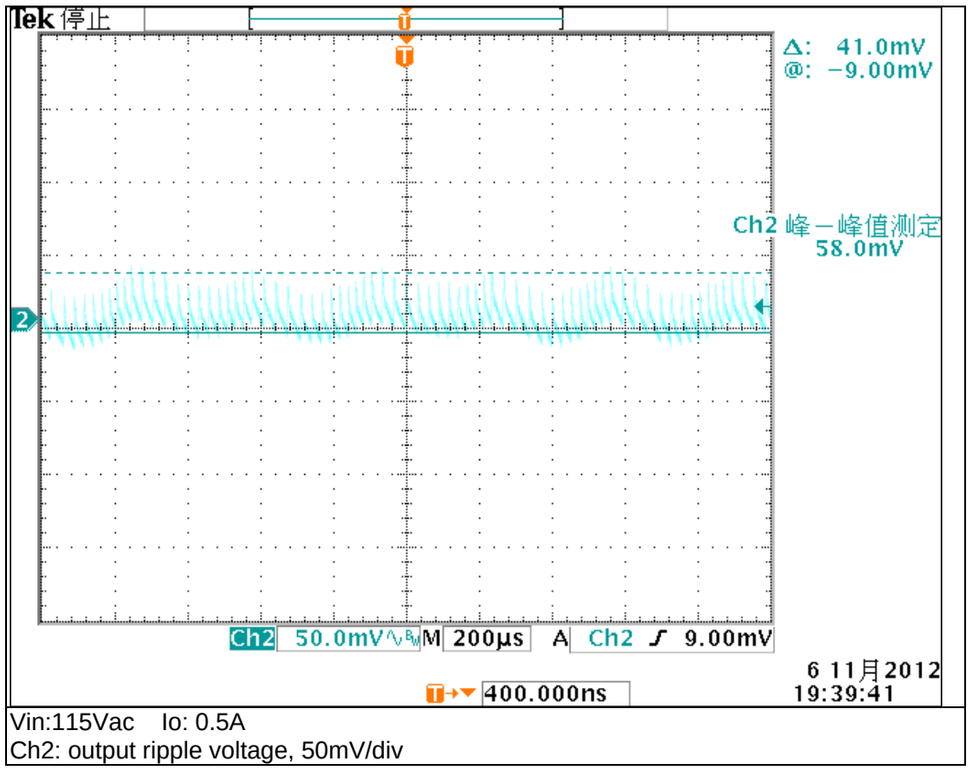
3.4 RIPPLE VOLTAGE

Input voltage	Output current	Ripple voltage	Pass/Fail
115Vac	0.25A	**39mV**	
115Vac	0.5A	**58mV**	
115Vac	0.75A	**52mV**	
115Vac	1A	**48mV**	

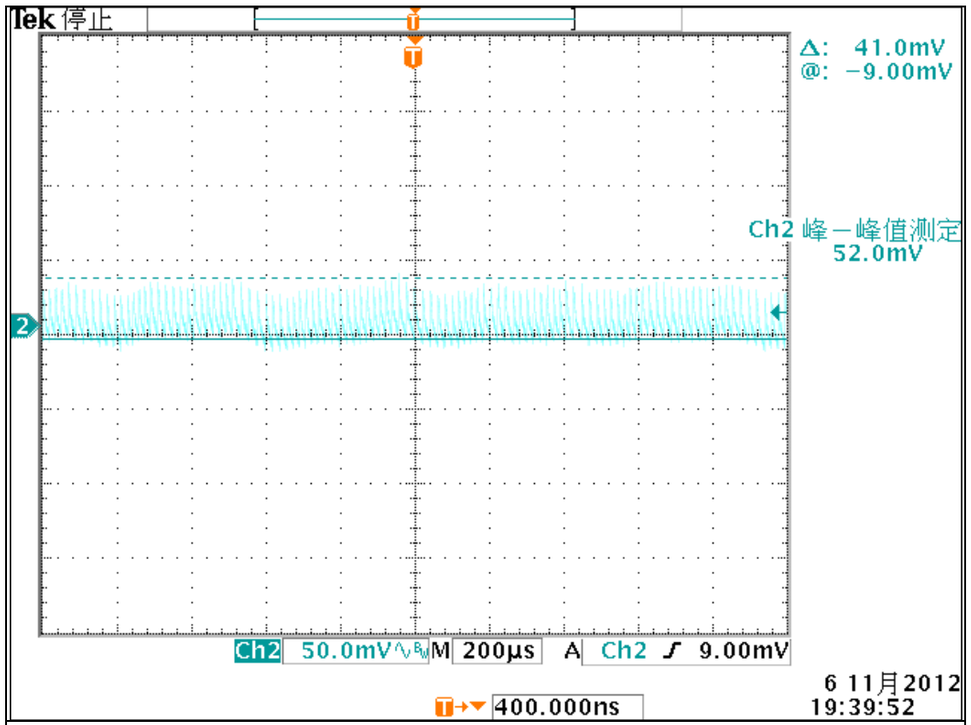
230Vac	0.25A	**38mV**	
230Vac	0.5A	**59mV**	
230Vac	0.75A	**49mV**	
230Vac	1A	**50mV**	



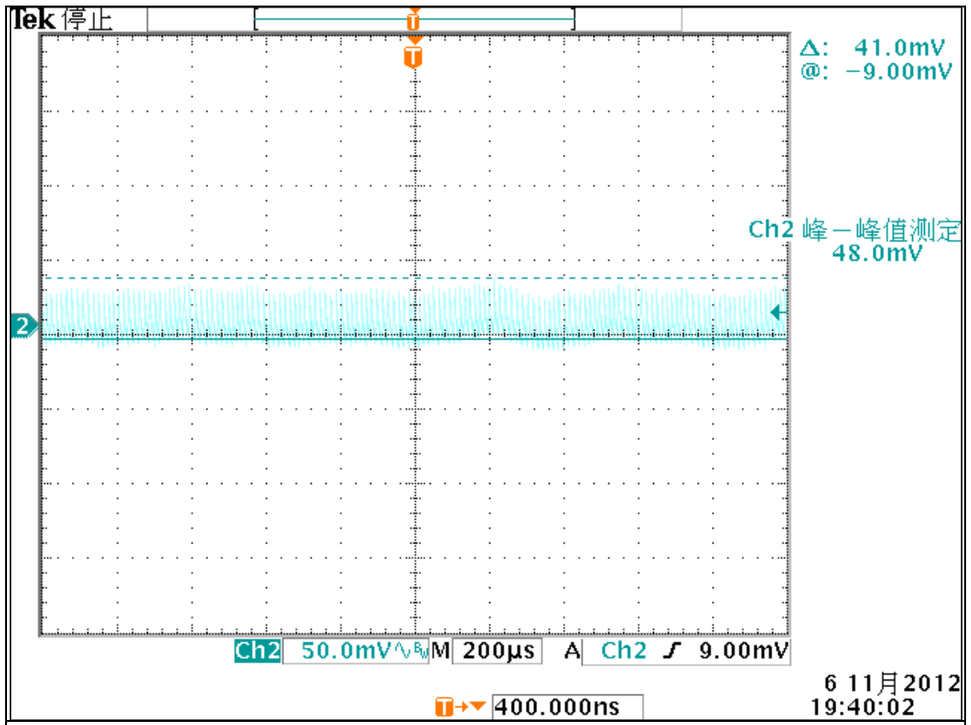
Vin:115Vac Io: 0.25A
Ch2: output ripple voltage, 50mV/div



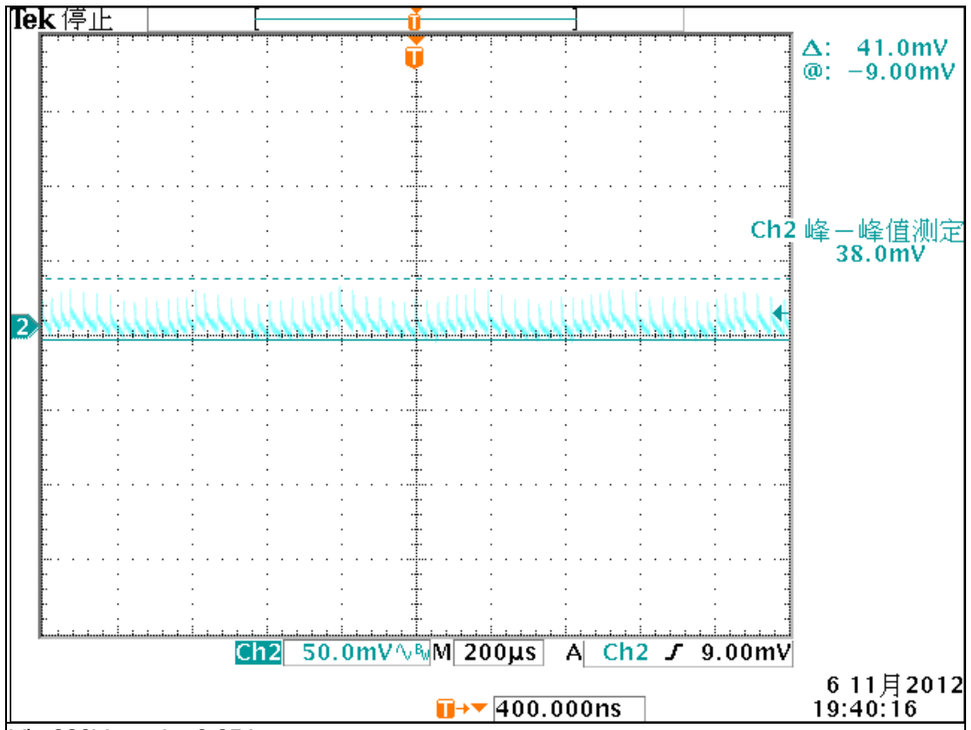
Vin:115Vac Io: 0.5A
Ch2: output ripple voltage, 50mV/div



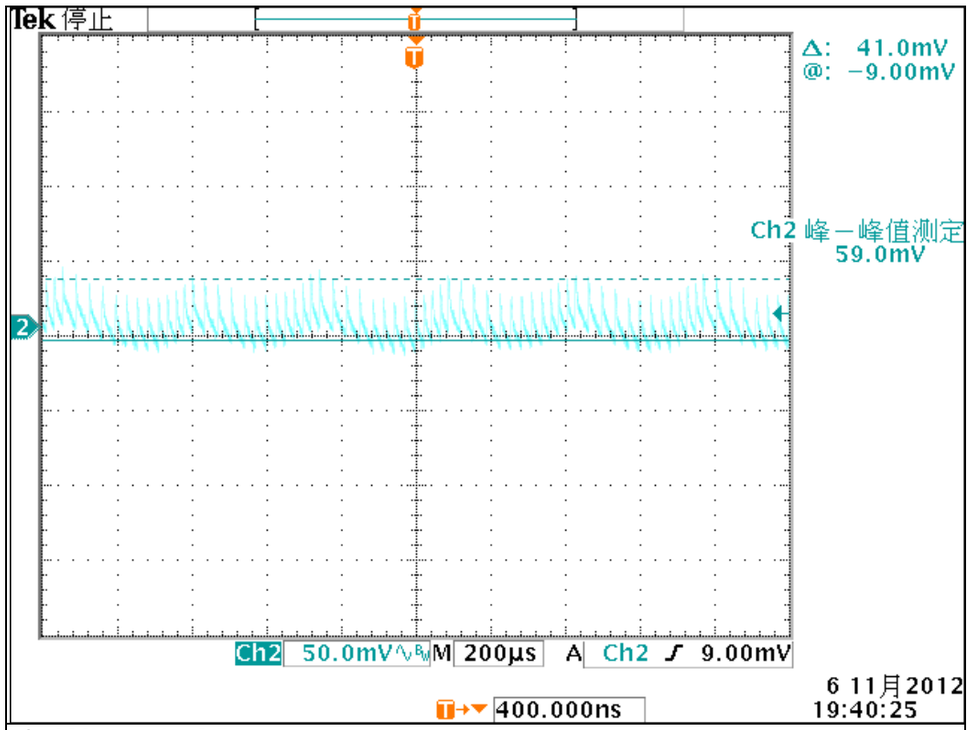
Vin:115Vac Io: 0.75A
Ch2: output ripple voltage, 50mV/div



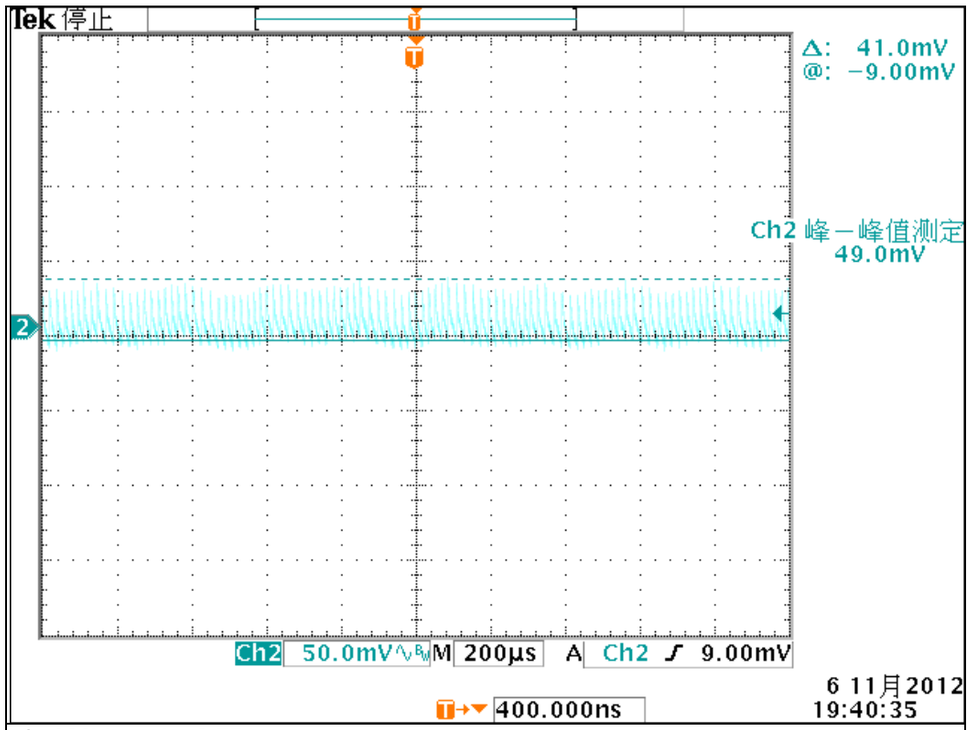
Vin:115Vac Io: 1A
Ch2: output ripple voltage, 50mV/div



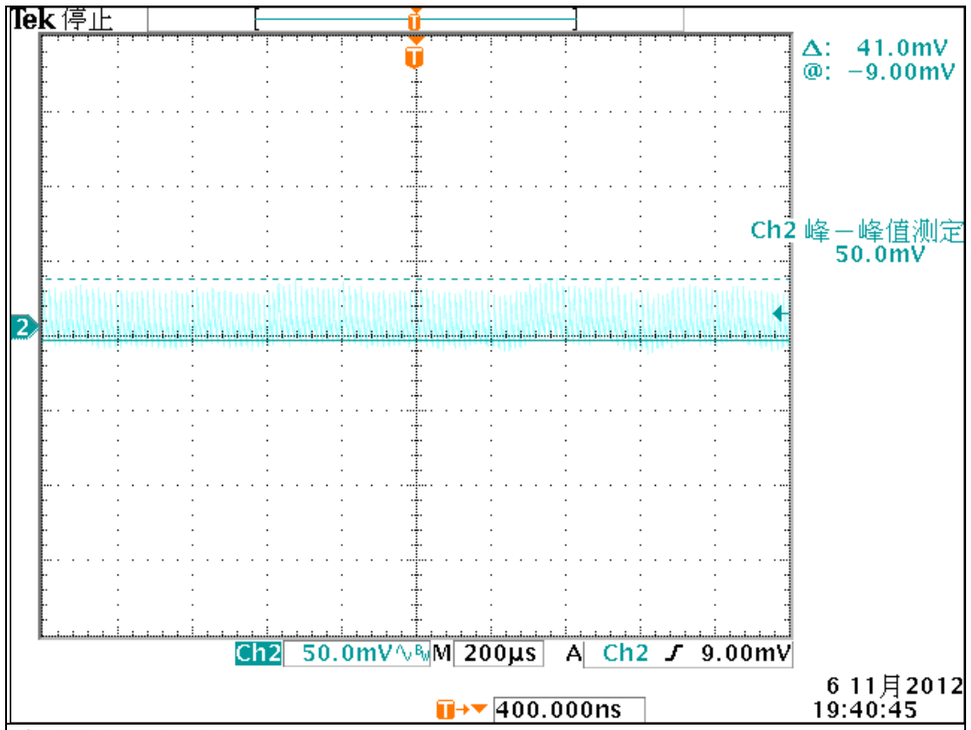
Vin:230Vac Io: 0.25A
Ch2: output ripple voltage, 50mV/div



Vin:230Vac Io: 0.5A
Ch2: output ripple voltage, 50mV/div



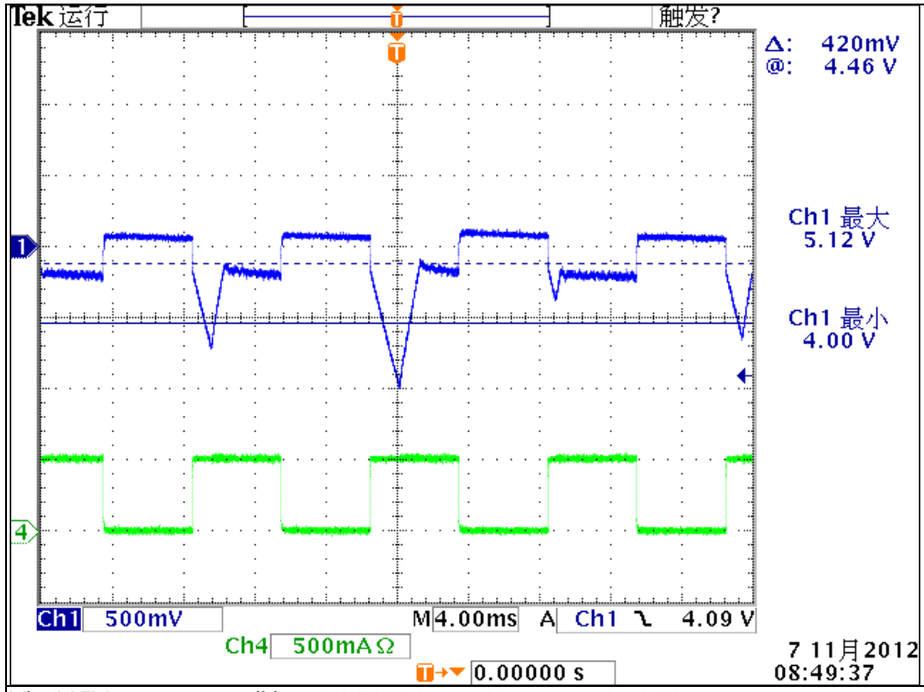
Vin:230Vac Io: 0.75A
Ch2: output ripple voltage, 50mV/div



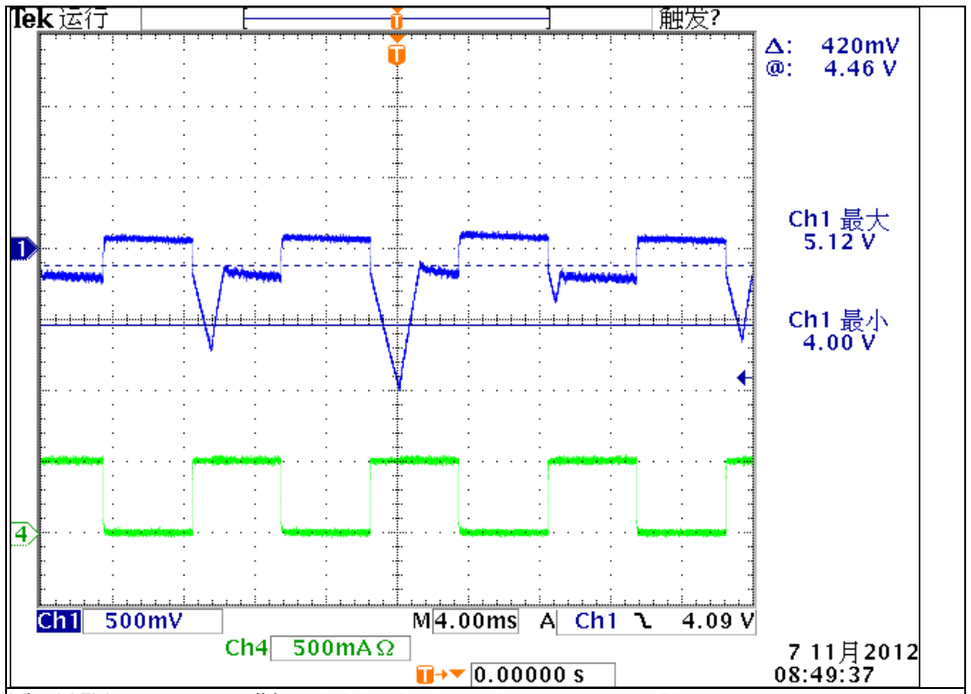
Vin:230Vac Io: 1A
Ch2: output ripple voltage, 50mV/div

3.5 DYNAMIC RESPONSE

Input voltage	Output current	Max voltage	Min voltage
115Vac	0-0.5A	**5.12V**	**4V**
230Vac	0-0.5A	**5.12V**	**4V**



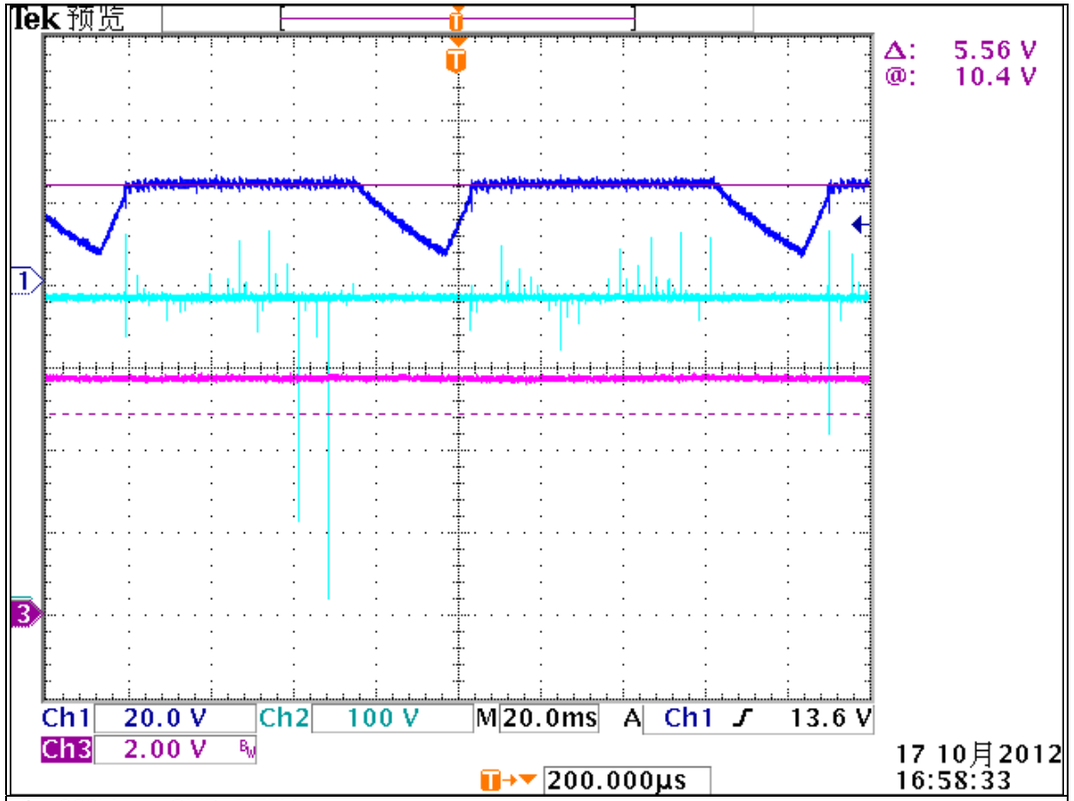
Vin:115Vac test condition: 0-0.5A, 0.1A/us, 10ms cycle, 1m USB cable
Ch1: output voltage, 500mV/div
Ch4: output current, 500mA/div



Vin:115Vac test condition: 0-0.5A, 0.1A/us, 10ms cycle, 1m USB cable
Ch1: output voltage, 500mV/div
Ch4: output current, 500mA/div

3.6 OUTPUT VOLTAGE PROTECTION

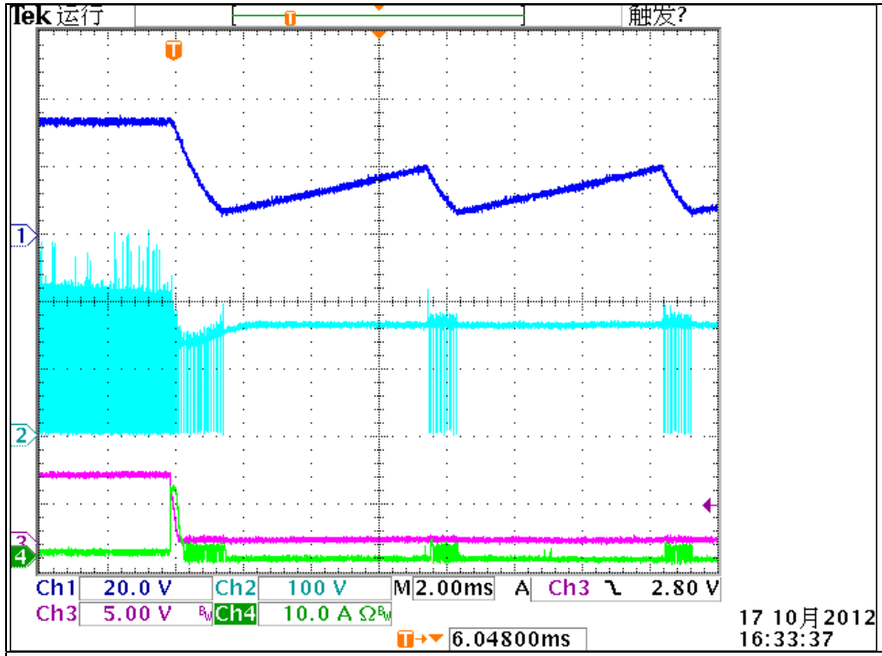
CONDITIONS	Protection voltage (V)	Pass/Fail
Vin (Vac)		
115&230	5.75	



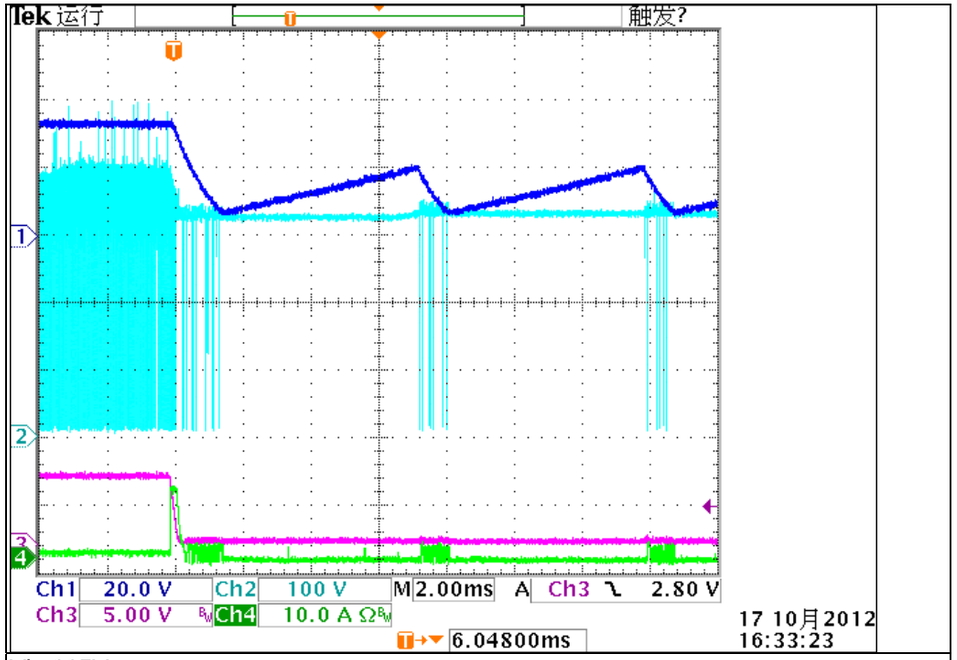
Vin: 230Vac OVP: 5.75V
Ch1: Vcc, 20V/div
Ch2: MOSFET's drain voltage, 100V/div
Ch3: output voltage, 2V/div

3.7 OUTPUT SHORT PROTECTION

Input voltage	Output short protection
115&230Vac	**Hiccup up mode**

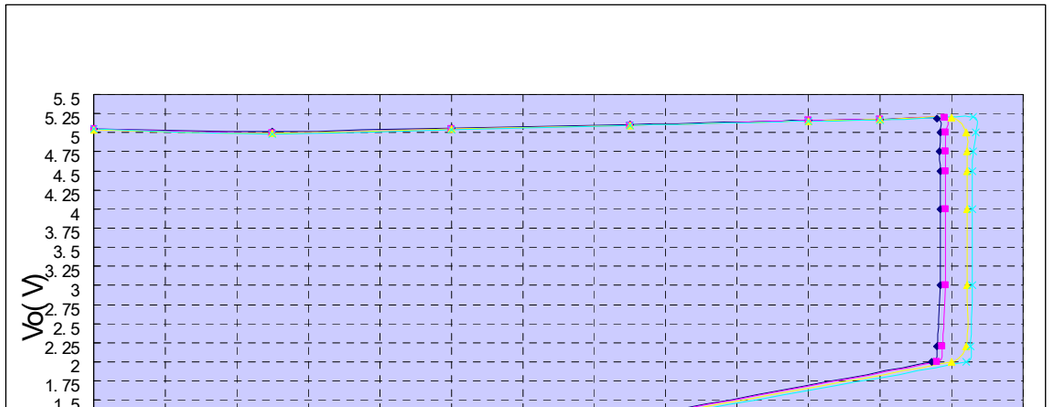


Vin:115Vac
Ch1: Vcc, 20V/div
Ch2: MOSFET's drain voltage, 100V/div
Ch3: output voltage, 5V/div
Ch4: output current, 10A/div

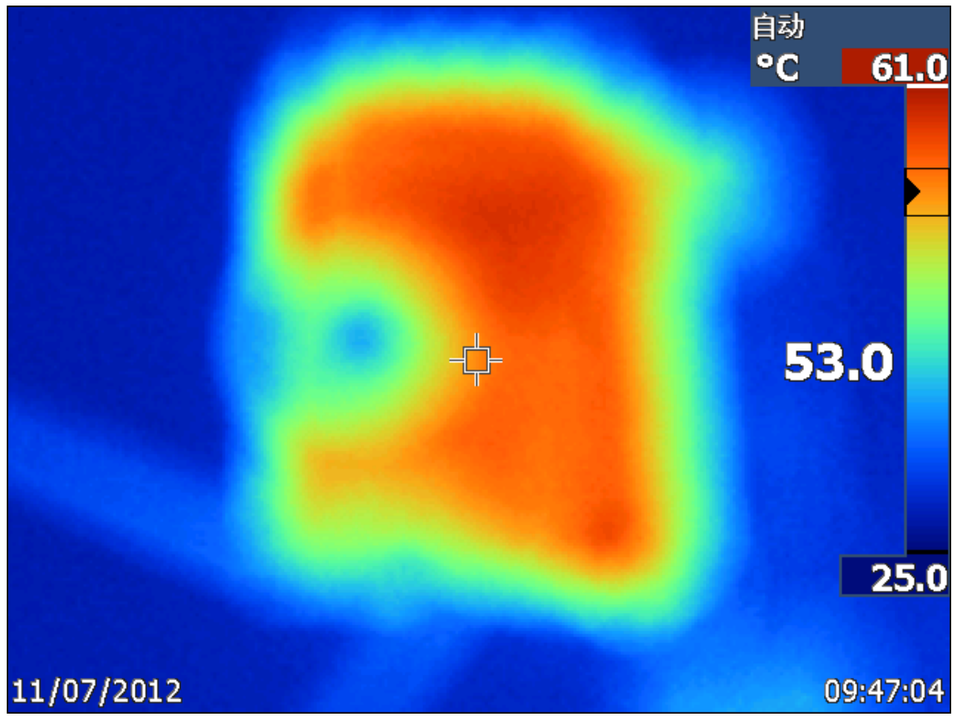


Vin:115Vac
Ch1: Vcc, 20V/div
Ch2: MOSFET's drain voltage, 100V/div
Ch3: output voltage, 5V/div
Ch4: output current, 10A/div

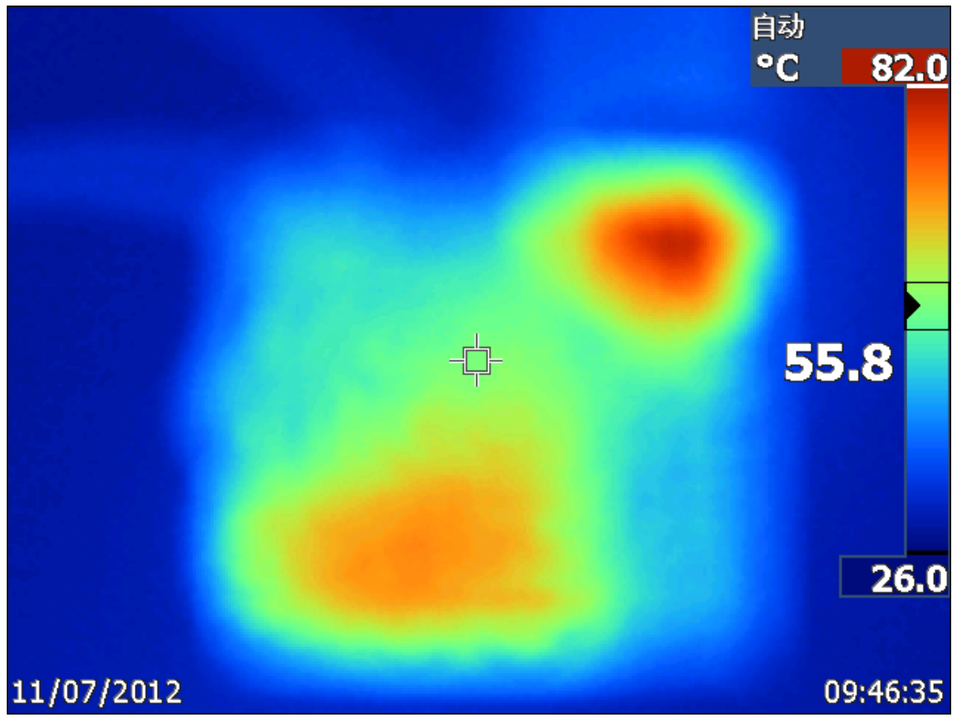
4 IV CURVE



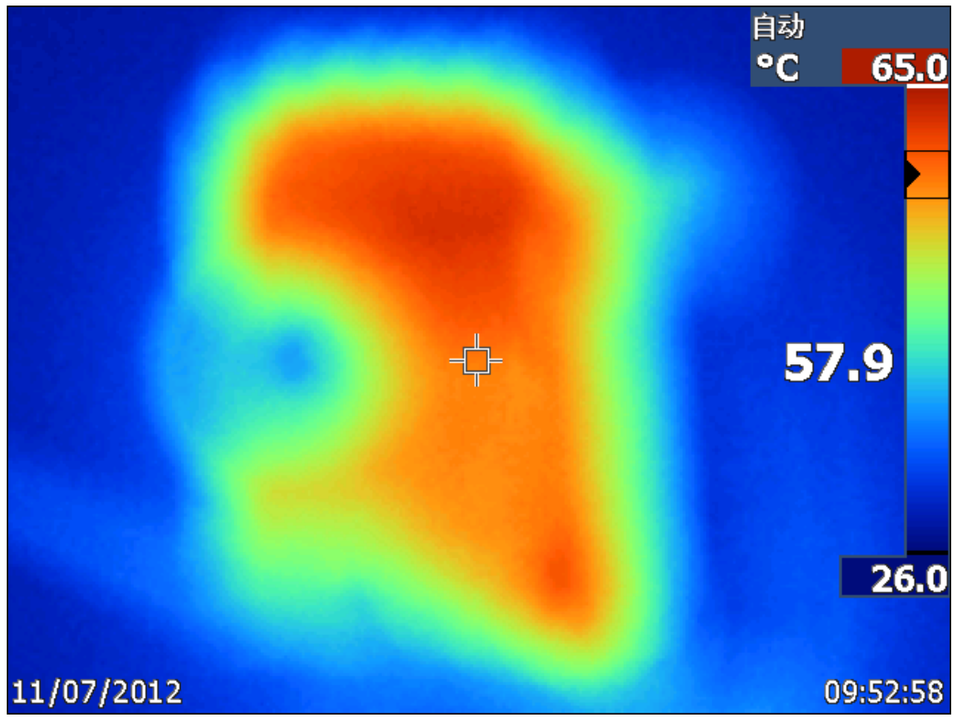
5 THERMAL IMAGE



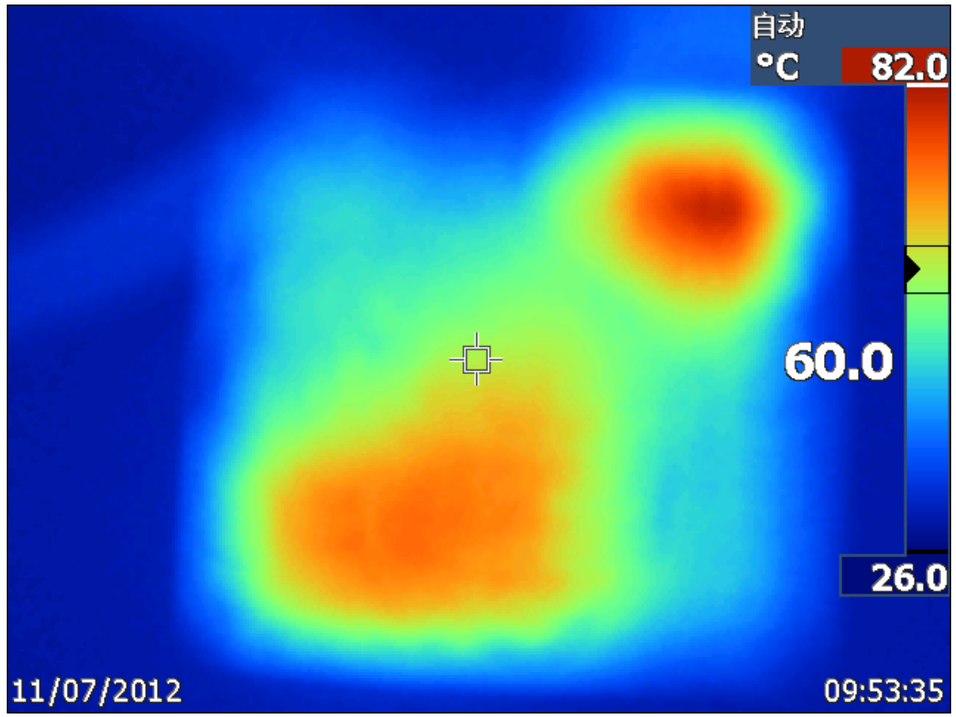
Component side, 115Vac and 1A load



Soldering side, 115Vac and 1A load

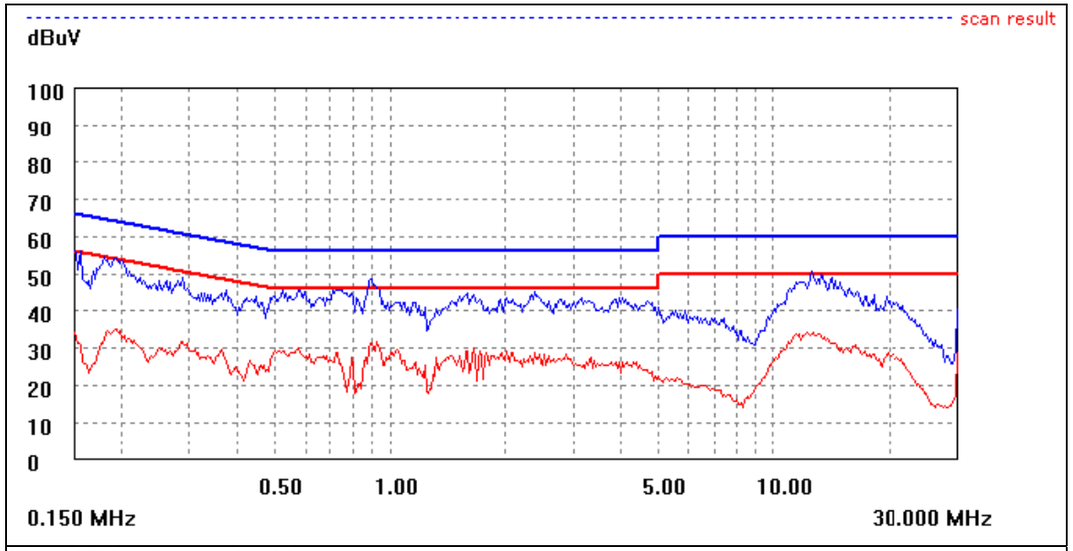


Component side, 230Vac and 1A load

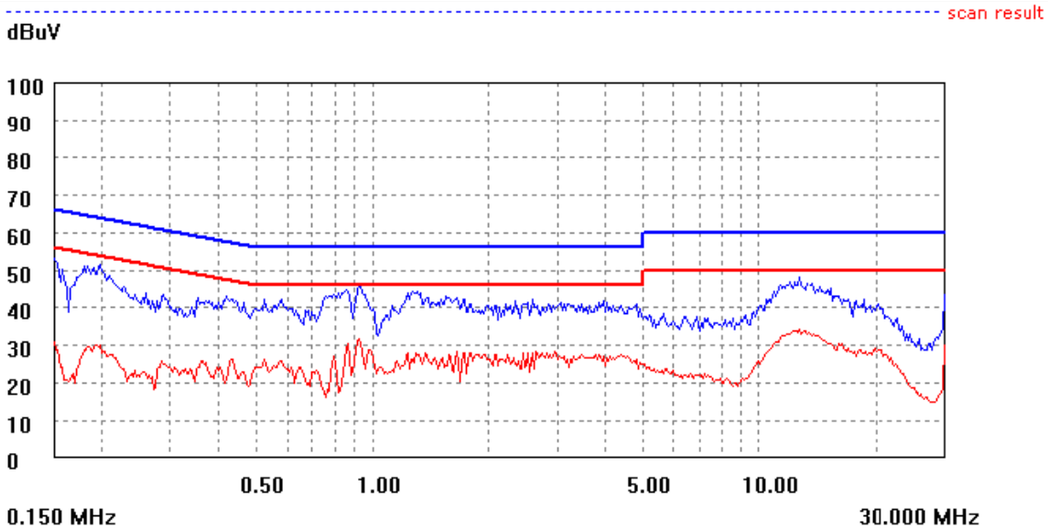


Soldering side, 230Vac and 1A load

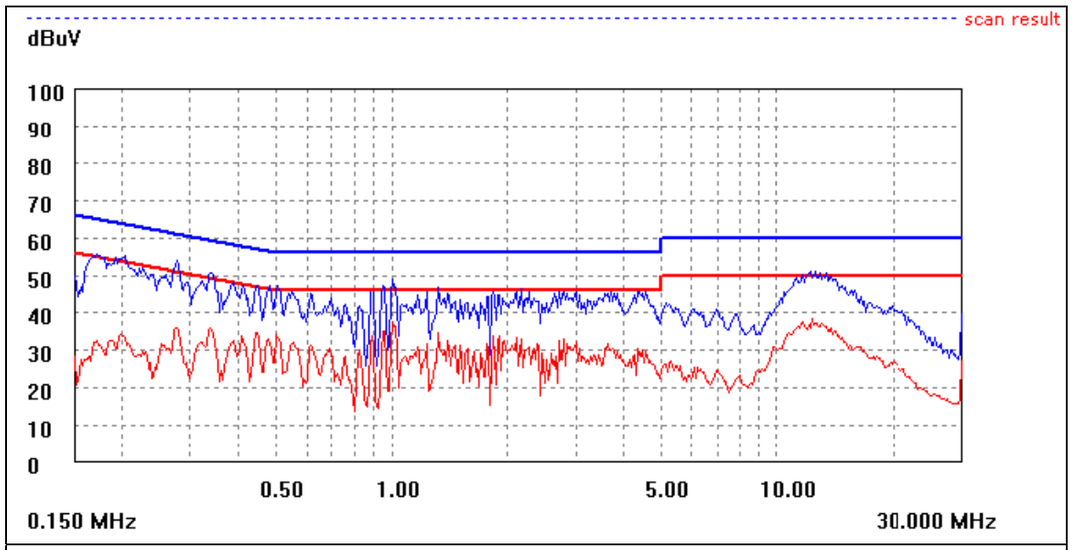
6 EMI Test



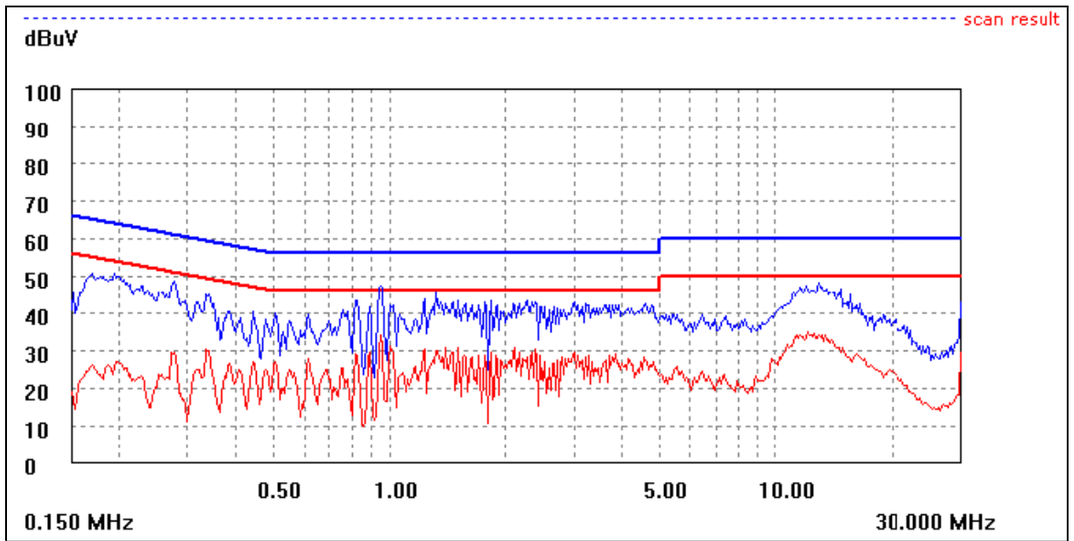
Vin: 115Vac, Line, Io: 1A
Test condition: 1m USB cable with 5R load resistor



Vin:115Vac, Neutral, Io: 1A
Test condition: 1m USB cable with 5R load resistor



Vin: 230Vac, Line, Io: 1A
Test condition: 1m USB cable with 5R load resistor



Vin:230Vac, Neutral, Io: 1A
Test condition: 1m USB cable with 5R load resistor

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