Texas Instruments

PMP4335 Test Procedure

China Power Reference Design

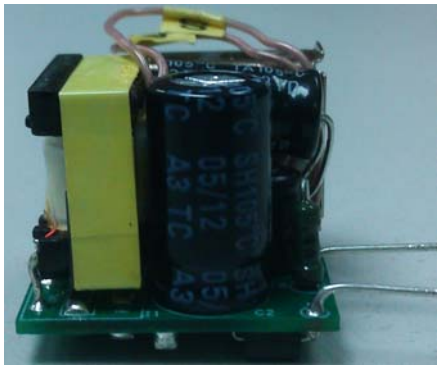
REV A

8/13/2011

1 GENERAL

1.1 PURPOSE

To provide detailed data for evaluating and verifying the PMP4335, which used TI new Primary Side CC/CV Controller UCC28700 for 5V1A mobile charger with 22mmx21mmx20mm. The below photo shows this demo board.



1.2 REFERENCE DOCUMENTATION

Schematic PMP4335_SCH.PDF
Assembly PMP4335_PCB.PDF
BOM

1.3 TEST EQUIPMENTS

Power-meter: YOKOGAWA WT210
Multi-meter(current): Fluke 8845A
Multi-meter(voltage): Fluke 187
AC Source: Chroma 61530
E-load: Chroma 63110A module
E-load: Chroma 63105 module
Testing demobaord: PMP4335B

1.4 Specifications

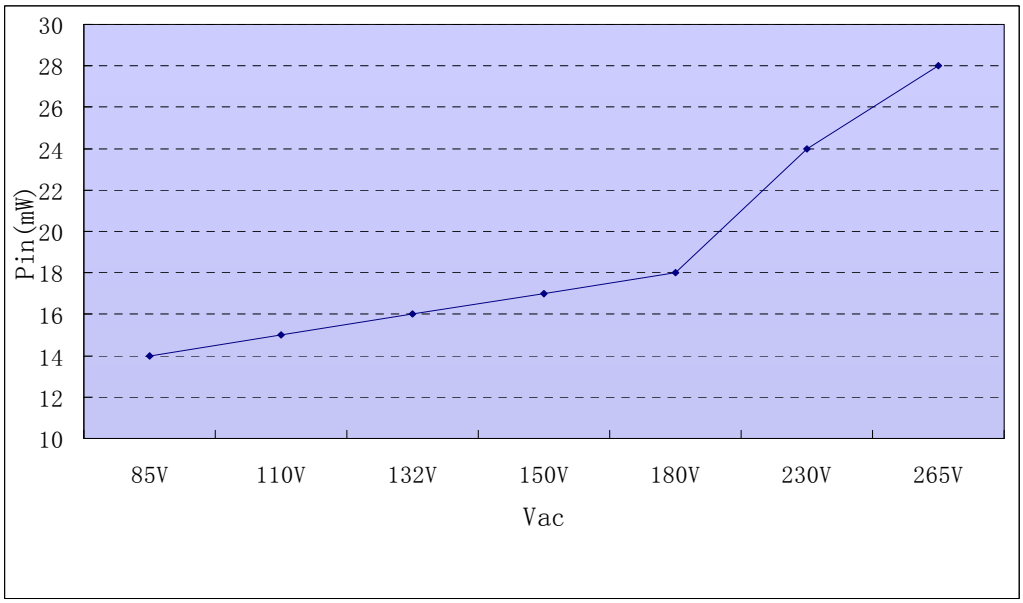
Parameter	Test condition	Min	Type	Max	units
input voltage		85		265	Vac
input frequency range		47		63	Hz
Average efficiency		75			%
Standby power	85-265Vac			30	mW
Output voltage			5		V
Output voltage ripple			80		mV
Output current			1		A
CV precision	0-1A			5	%
CC precision	2-5V			5	%
input UVP					
output OVP					
output OCP&SCP					

2 INPUT CHARACTERISTICS

2.1 STANDBY POWER

Vin(Vac)	Freq(Hz)	Pin(W)	Vo(Vrms)	Io(Arms)	Eff(%)	Pass/Fail
85	60	**0.014**	**4.98**	**0**		
110	60	**0.015**	**4.97**	**0**		
132	60	**0.016**	**4.97**	**0**		
150	60	**0.017**	**4.96**	**0**		
180	50	**0.018**	**4.95**	**0**		
230	50	**0.024**	**4.98**	**0**		
265	50	**0.028**	**4.97**	**0**		

STANDBY POWER CURVE

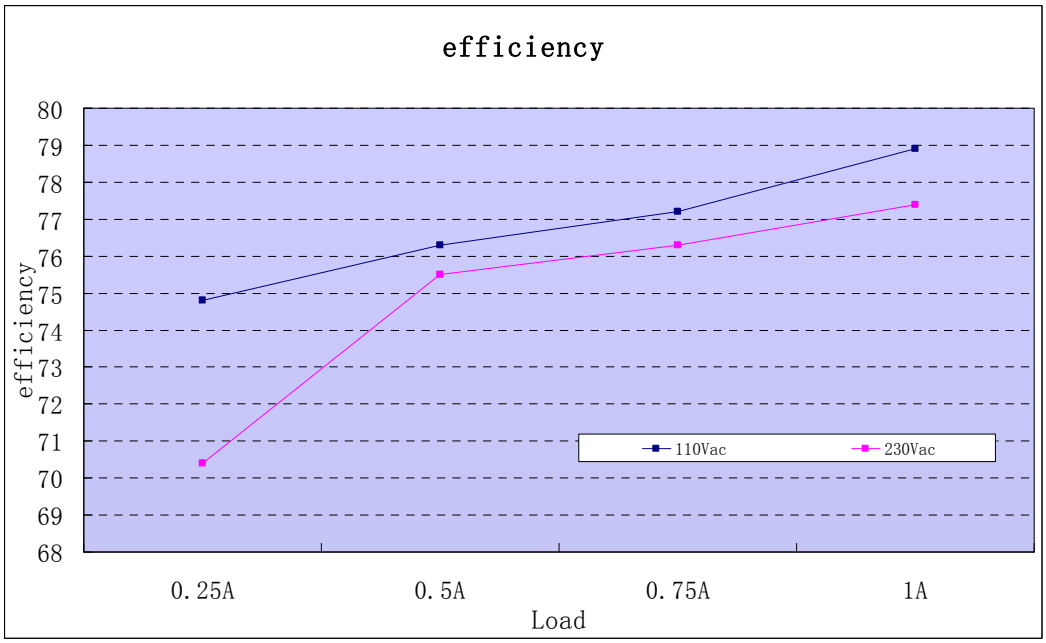


2.2 EFFICIENCY

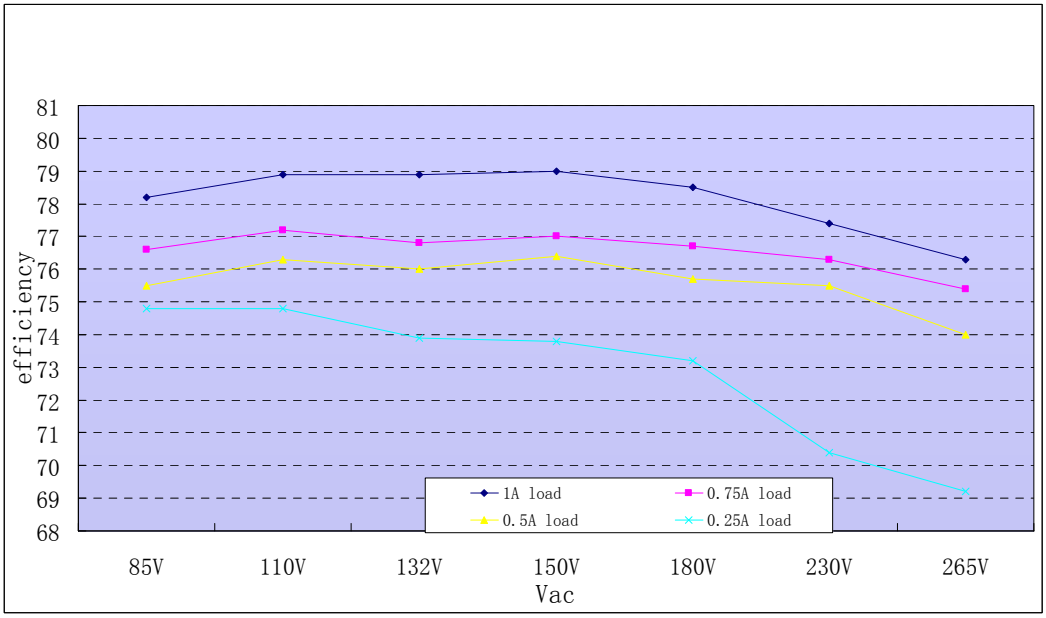
77.4% minimum with 230v input at 100% load.

Vin(Vac)	Freq(Hz)	Pin(W)	Vo(Vrms)	Io(Arms)	Eff(%)	Pass/Fail
85	60	**6.32**	**4.94**	**1**	**78.2**	
110	60	**6.26**	**4.94**	**1**	**78.9**	
132	60	**6.27**	**4.94**	**1**	**78.9**	
150	60	**6.26**	**4.95**	**1**	**79**	
180	50	**6.30**	**4.94**	**1**	**78.5**	
230	50	**6.39**	**4.94**	**1**	**77.4**	
265	50	**6.47**	**4.94**	**1**	**76.3**	

Efficiency Vs Load Curve



efficiency Vs Input Voltage curve



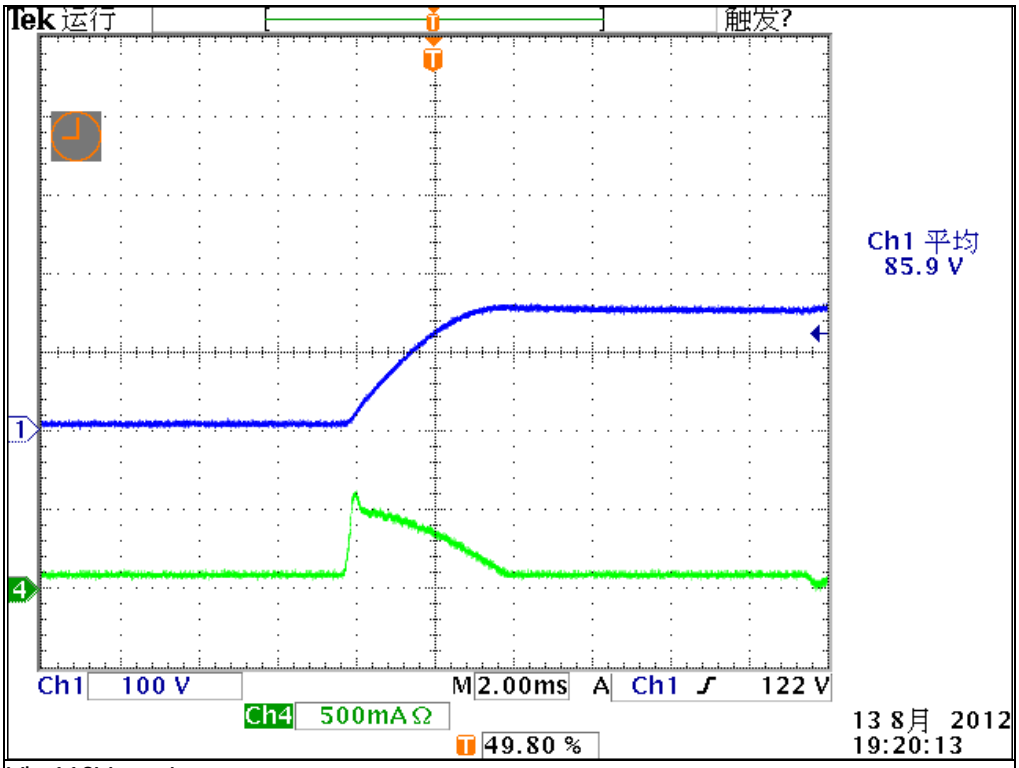
2.3 INPUT CURRENT

Vin(Vac)	Freq(Hz)	Iin(Arms)	Pass/Fail
110	60	**0.099**	
230	50	**0.066**	

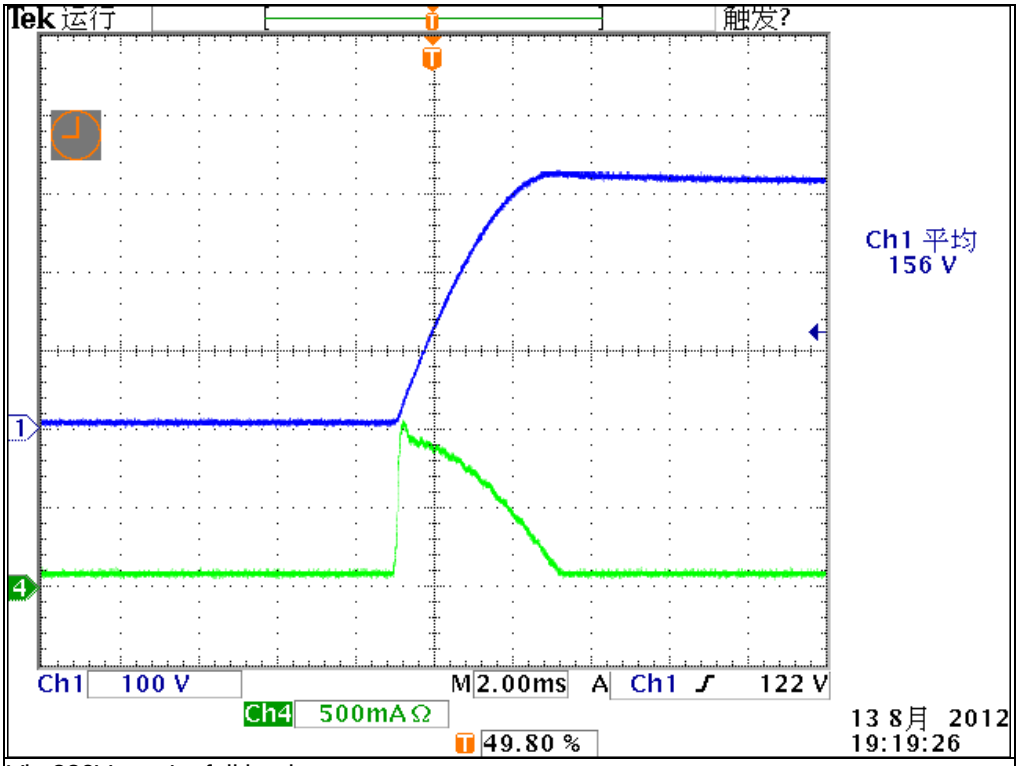
2.4 INPUT INRUSH CURRENT

Pass/Fail criteria: XX Amps RMS maximum at low line and high line, full load.

Vin(Vac)	Freq(Hz)	Iin(Arms)	Pass/Fail
110	60	**0.6**	
230	50	**1**	



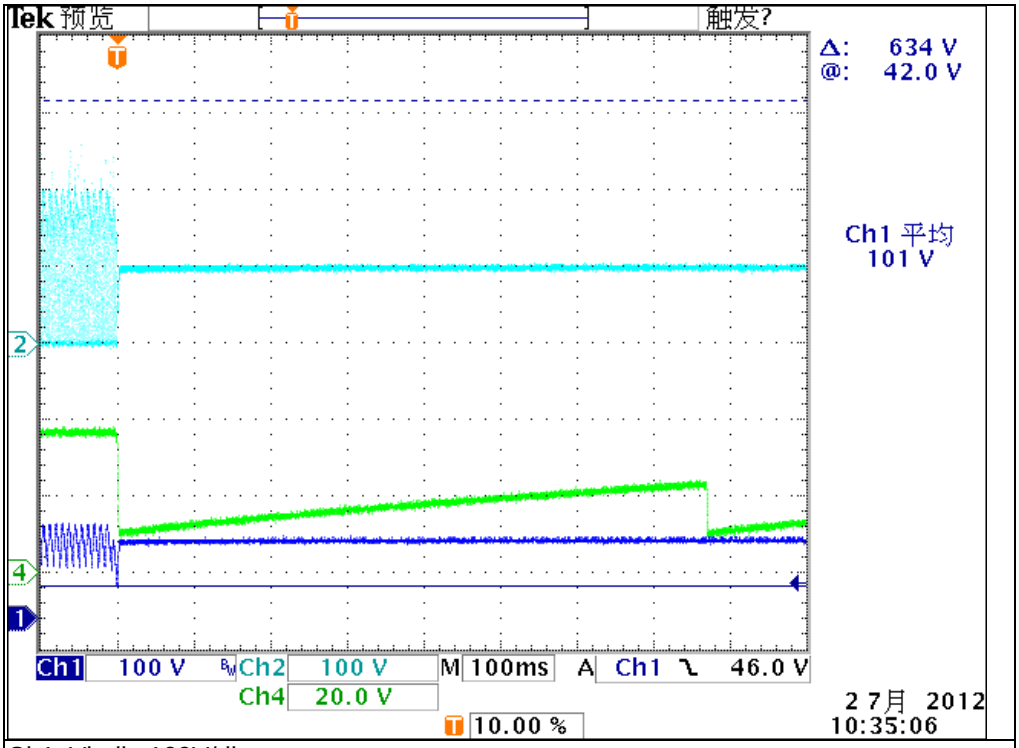
Vin:110Vac Io: full load
Ch1: Input bulk CAP voltage, 100V/div
Ch4: line current, 500mA/div



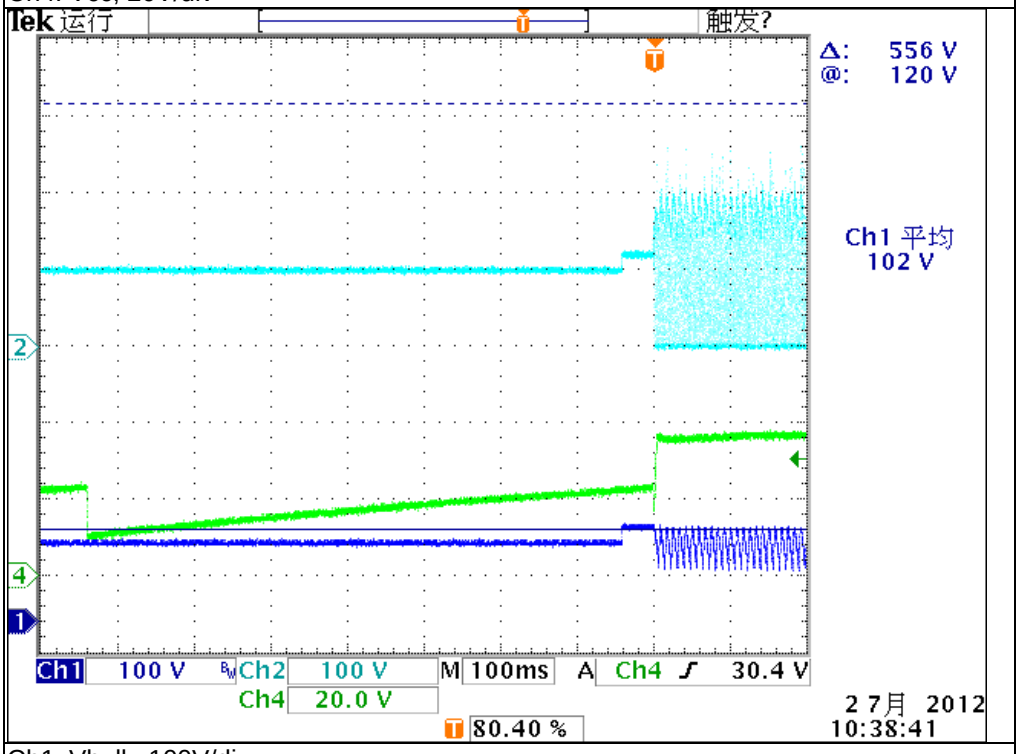
Vin:230Vac Io: full load
Ch1: Input bulk CAP voltage, 100V/div
Ch4: line current, 500mA/div

2.5 INPUT UNDER-VOLTAGE PROTECTION

Switch-off at 42v Vbulk_min(70Vac)
Switch-on at 120v Vbulk_max(85Vac)

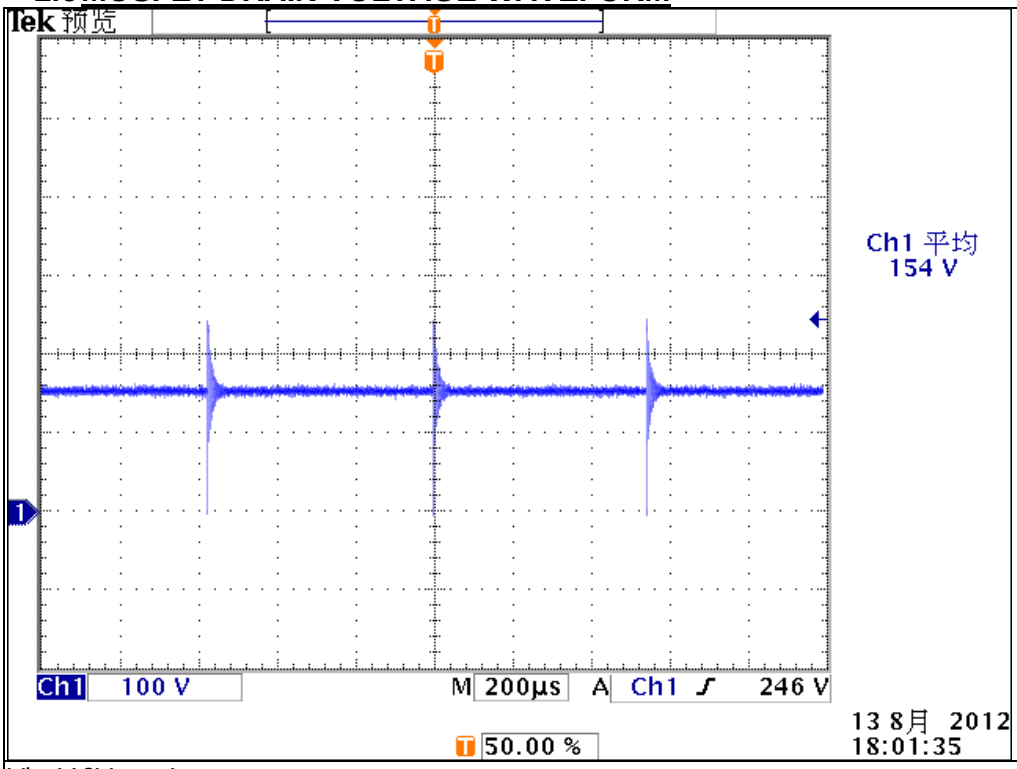


Ch1: Vbulk, 100V/div
Ch2: Vds, 100V/div
Ch4: Vcc, 20V/div

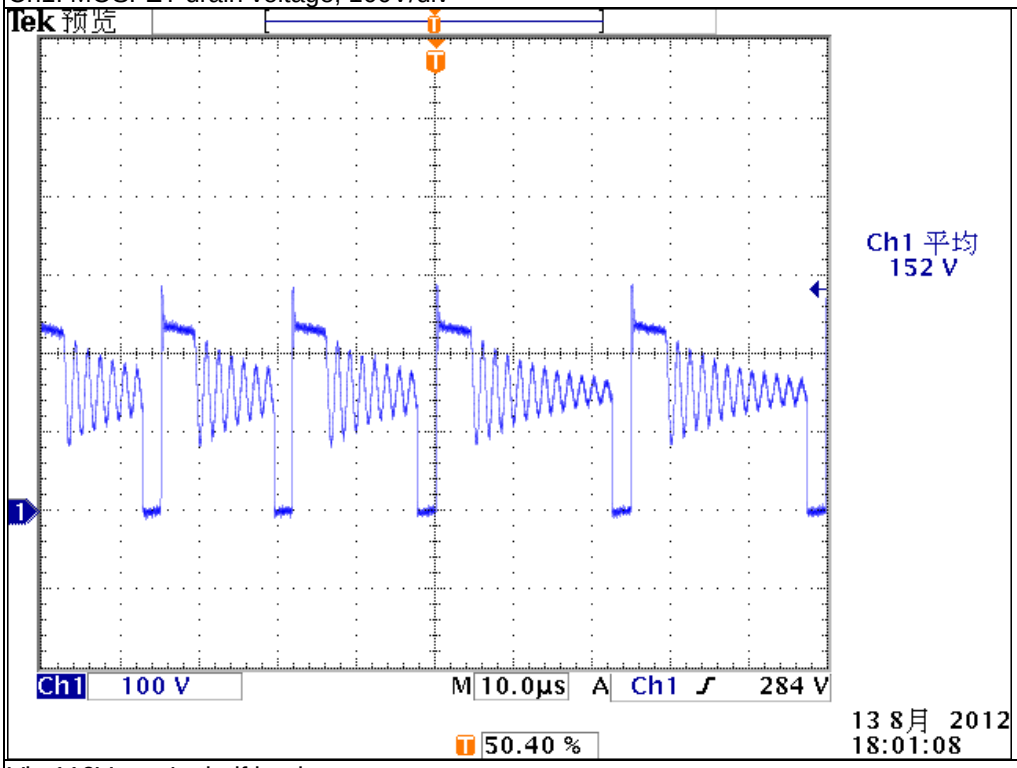


Ch1: Vbulk, 100V/div
Ch2: Vds, 100V/div
Ch4: Vcc, 20V/div

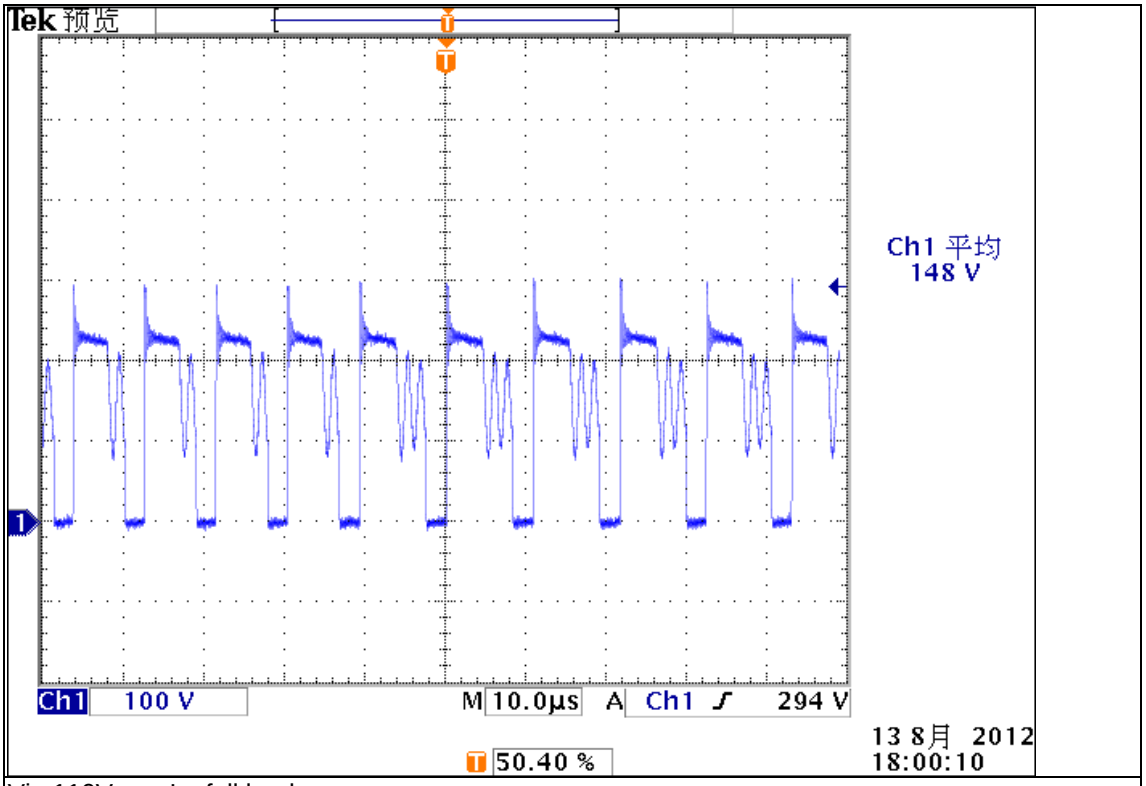
2.6 MOSFET DRAIN VOLTAGE WAVEFORM



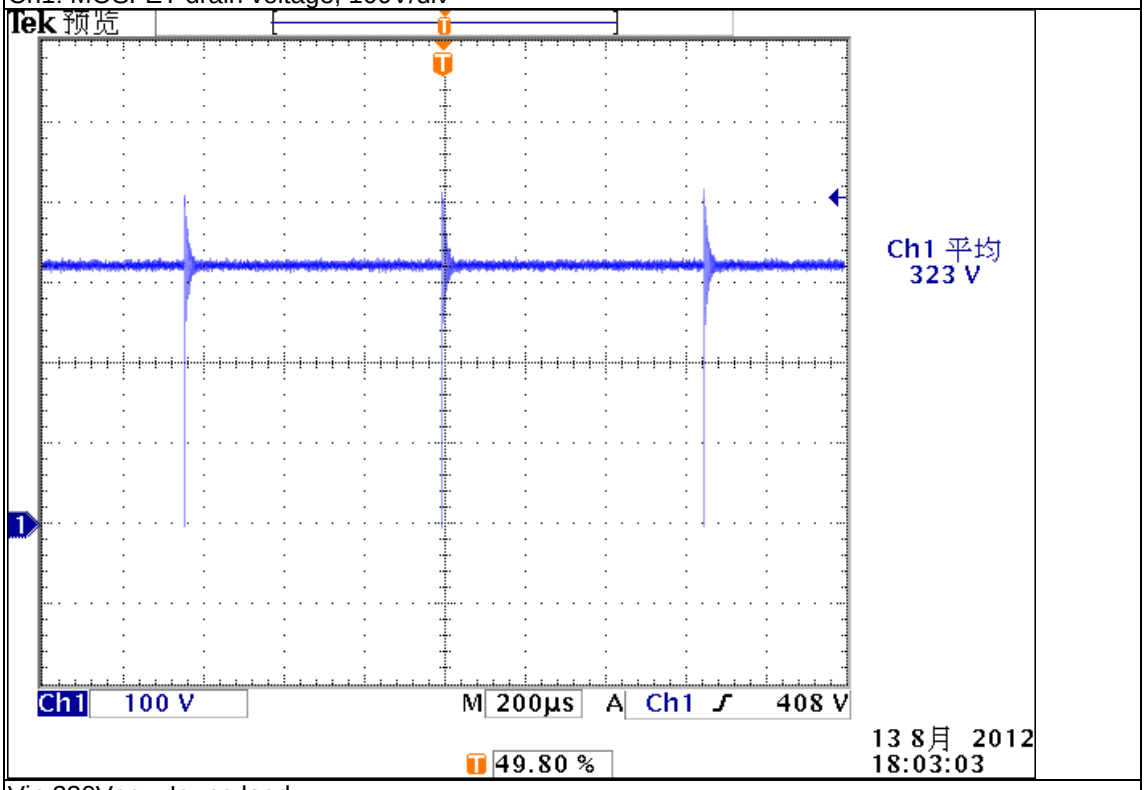
Vin:110Vac Io: no load
Ch1: MOSFET drain voltage, 100V/div



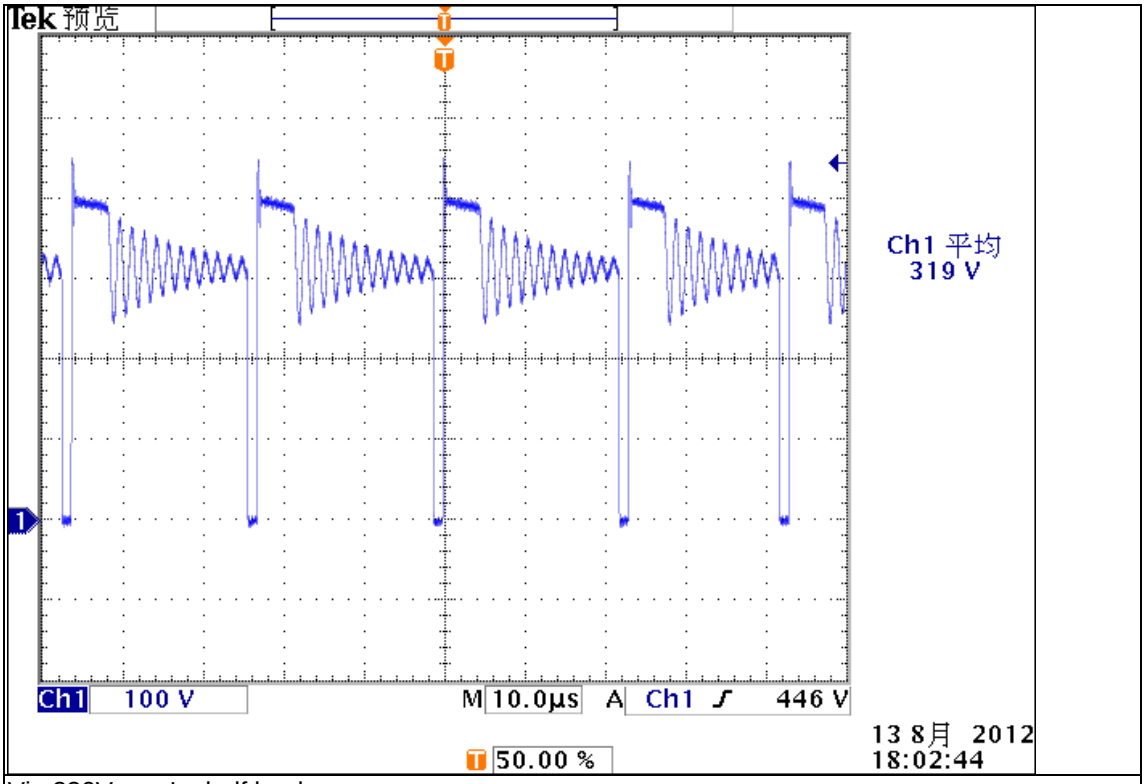
Vin:110Vac Io: half load
Ch1: MOSFET drain voltage, 100V/div



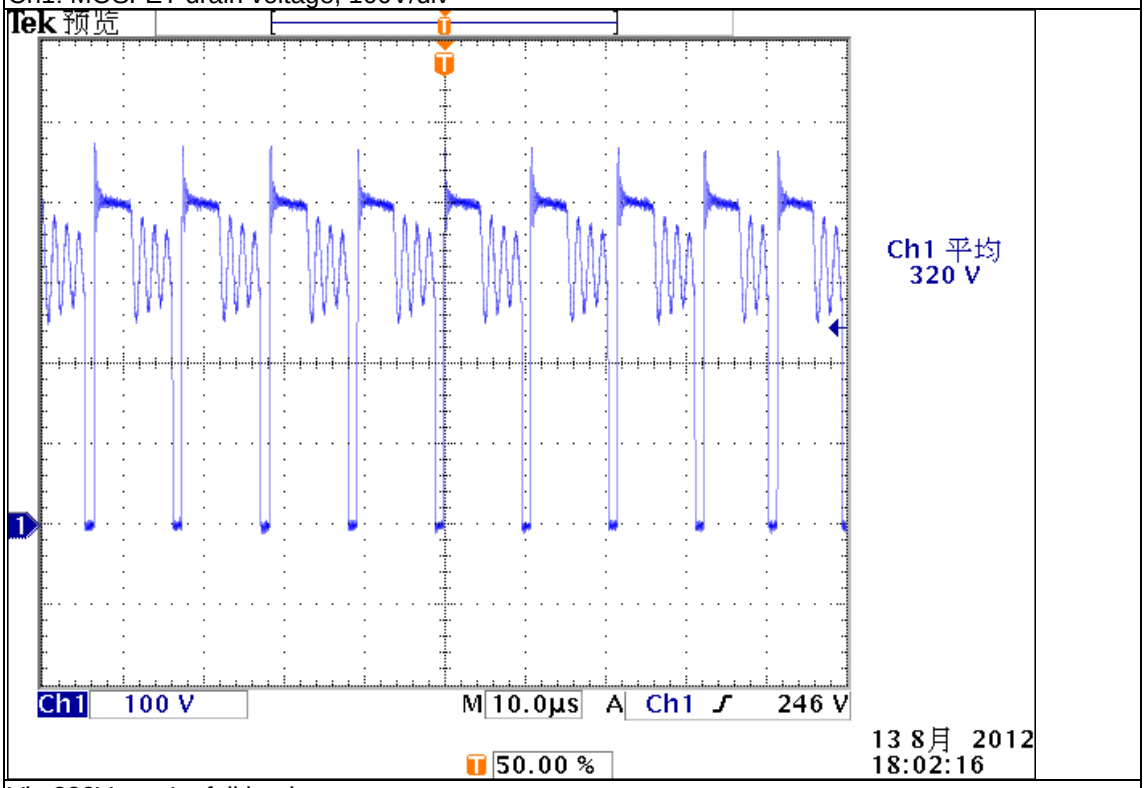
Vin:110Vac Io: full load
Ch1: MOSFET drain voltage, 100V/div



Vin:230Vac Io: no load
Ch1: MOSFET drain voltage, 100V/div



Vin:230Vac Io: half load
Ch1: MOSFET drain voltage, 100V/div



Vin:230Vac Io: full load
Ch1: MOSFET drain voltage, 100V/div

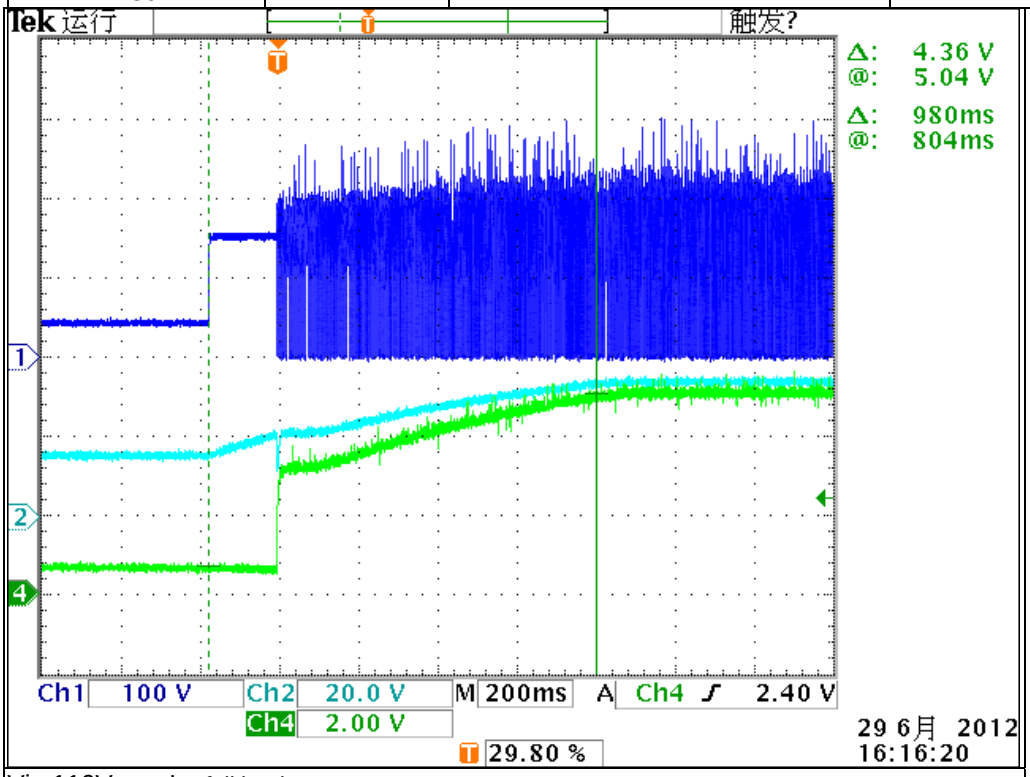
3. OUTPUT CHARACTERISTICS

2.7 OUTPUT VOLTAGE RANGE

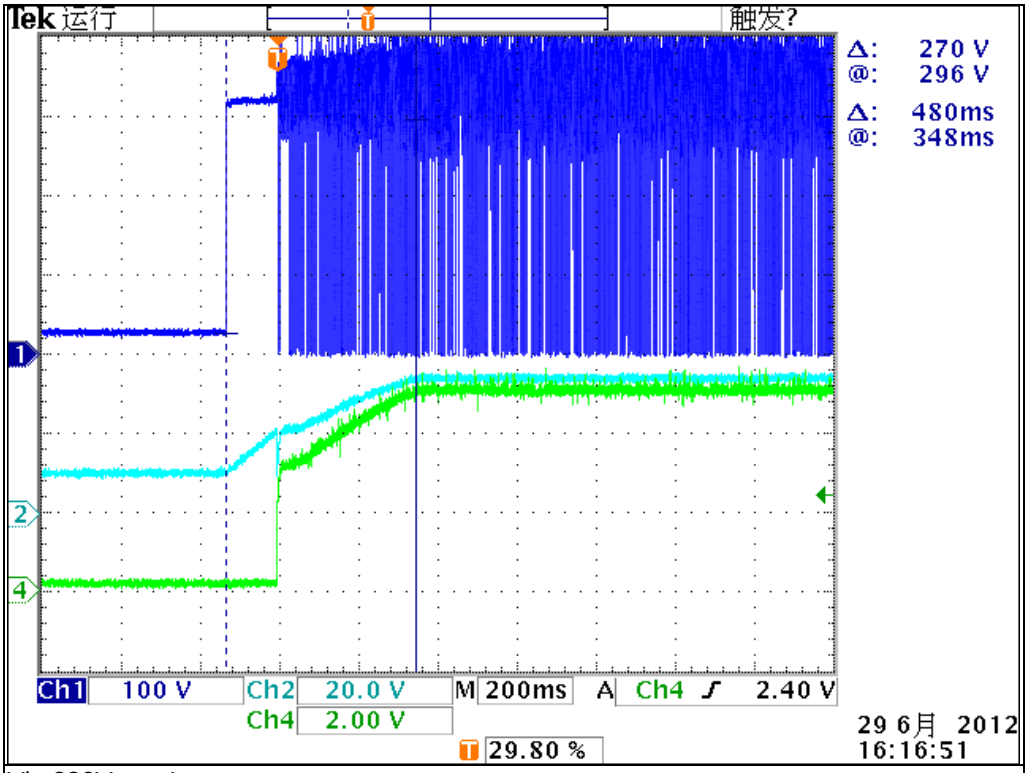
ITEM	Vout (V)	Iout(A)	Pass/Fail
Vin=110Vac	4.88	0.25	
	4.90	0.5	
	4.92	0.75	
	4.94	1	
Vin=230Vac	4.87	0.25	
	4.90	0.5	
	4.92	0.75	
	4.94	1	

2.8 TURN ON DELAY AND Vcs VOLTAGE

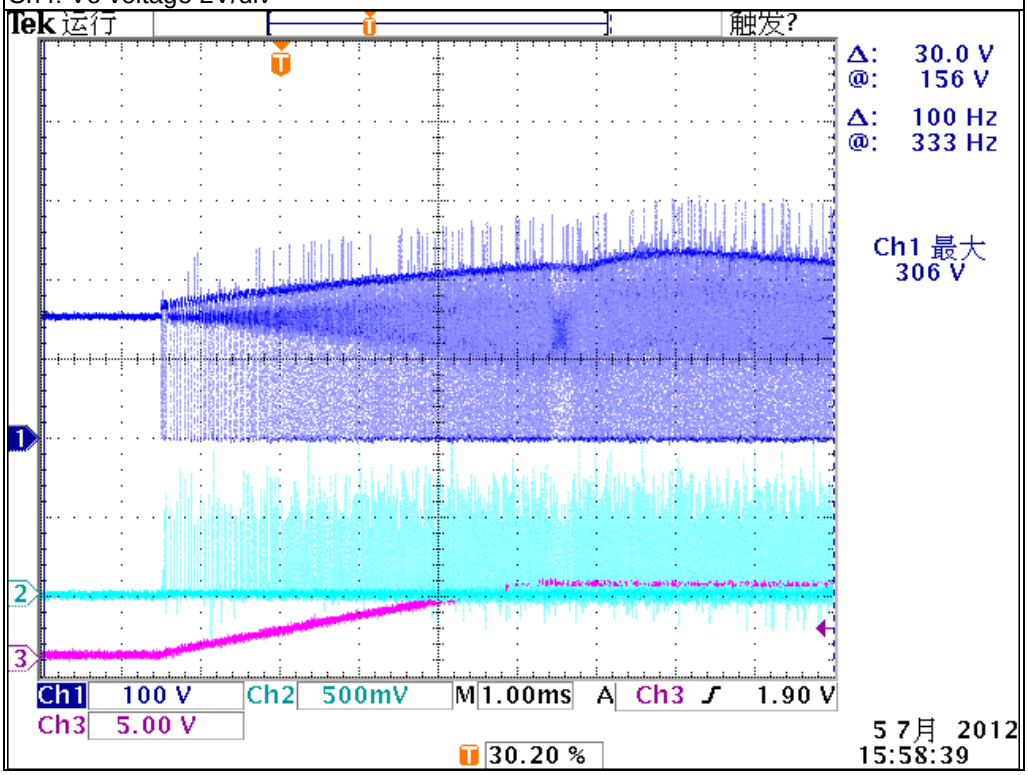
CONDITIONS		Delay time (S)	Pass/Fail
Vin (Vac)	Load		
110	Full load	0.98	
230	Full load	0.48	



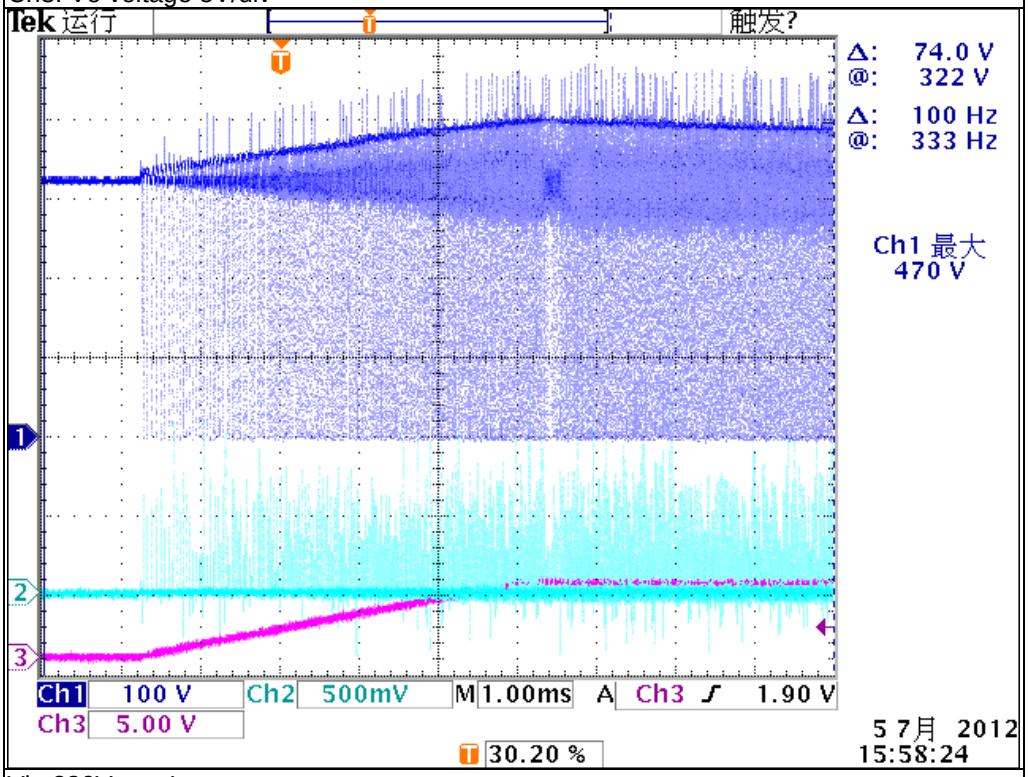
Vin:110Vac Io: full load
Ch1: MOSFET drain voltage, 100V/div
Ch2: Vdd voltage, 20V/div
Ch4: Vo voltage 2V/div



Vin:230Vac Io: full load
Ch1: MOSFET drain voltage, 100V/div
Ch2: Vdd voltage, 20V/div
Ch4: Vo voltage 2V/div



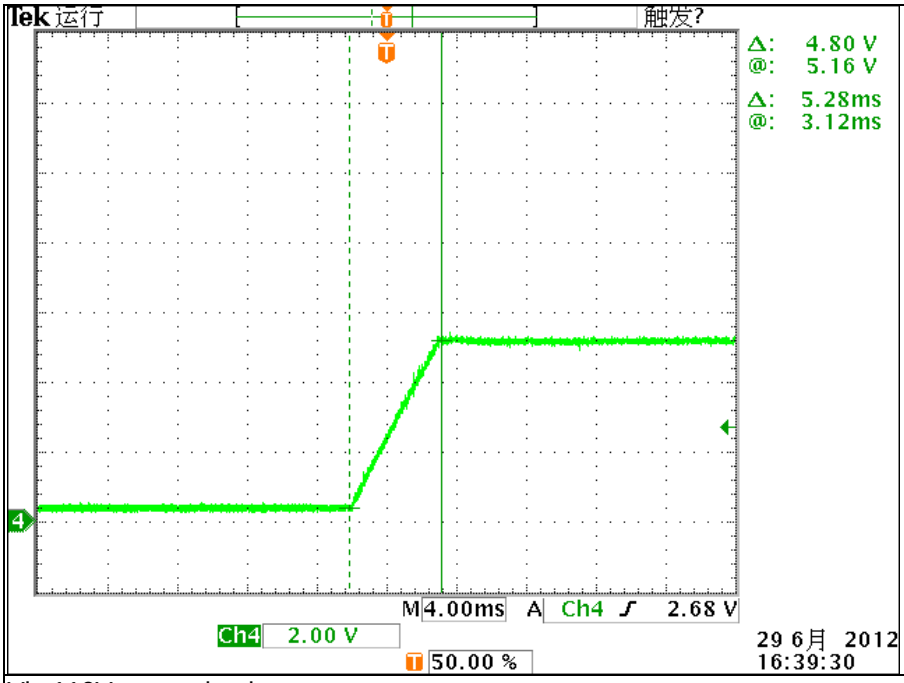
Vin:110Vac Io: full load
Ch1: MOSFET drain voltage, 100V/div
Ch2: Vcs voltage, 500mV/div
Ch3: Vo voltage 5V/div



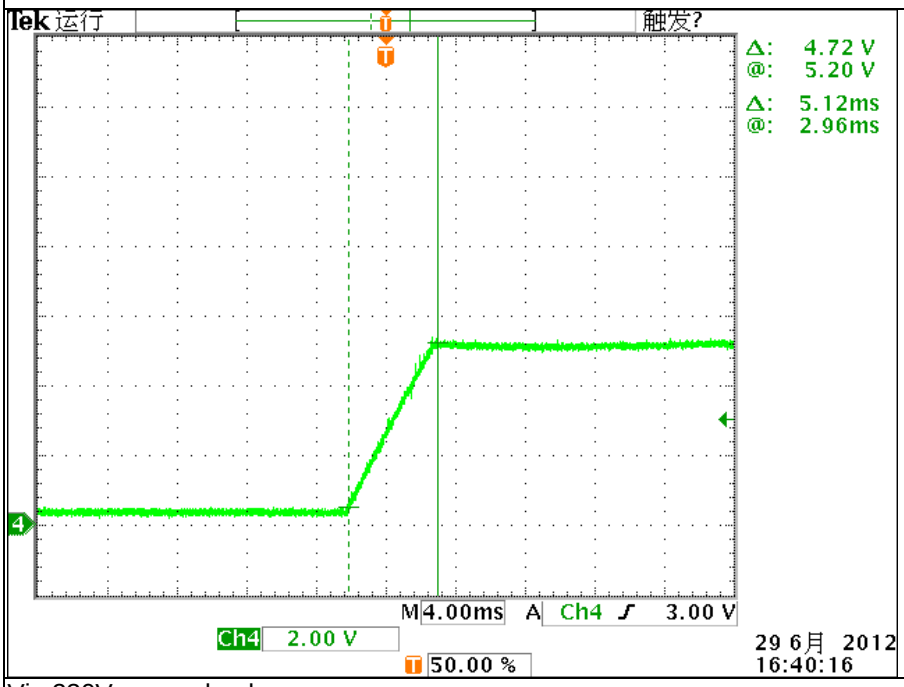
Vin:230Vac Io: full load
Ch1: MOSFET drain voltage, 100V/div
Ch2: Vcs voltage, 500mV/div
Ch3: Vo voltage 5V/div

2.9 OUTPUT VOLTAGE RISE TIME

CONDITIONS Vin (Vac)	Load condition	Vo rise time(ms）	Pass/Fail
110	No load	5.28	
	Full load	800	
230	No load	5.12	
	Full load	360	

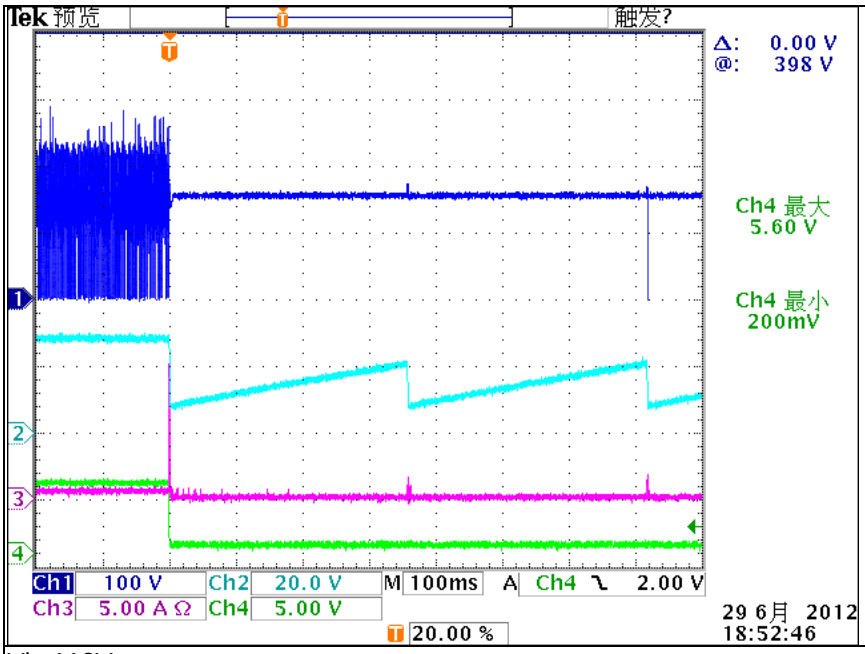


Vin:110Vac no load
Ch4: Vo voltage, 2V/div

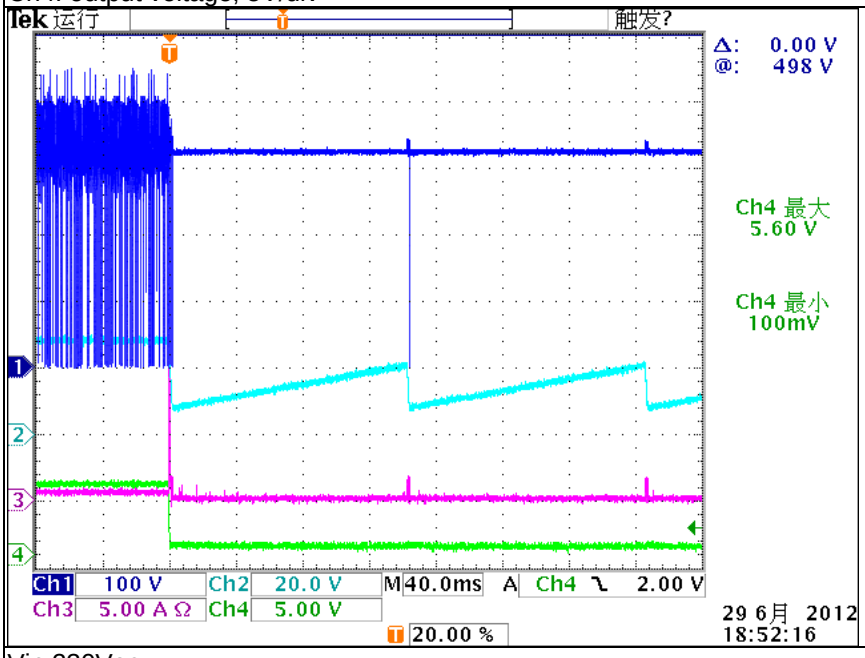


Vin:230Vac no load
Ch4: Vo voltage, 2V/div

2.10 OUTPUT SHORT-CIRCUIT PROTECTION

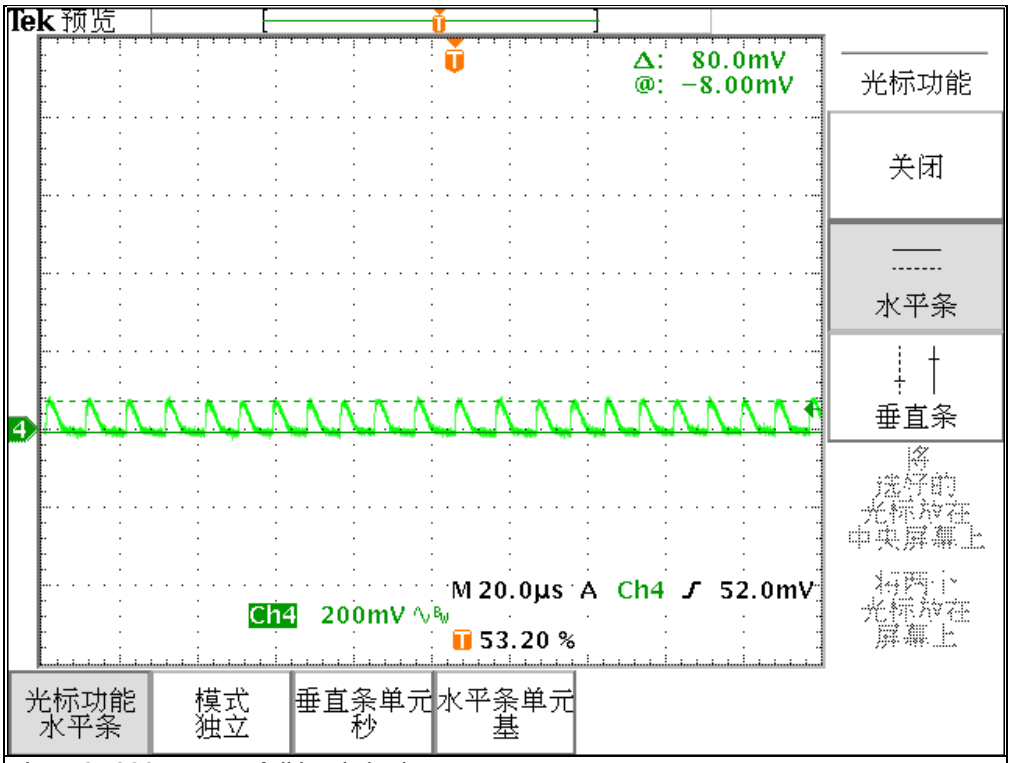


Vin:110Vac
Ch1: Mosfet drain voltage, 100V/div
Ch2: Vdd, 20V/div
Ch3: output current, 5A/div
Ch4: output voltage, 5V/div



Vin:230Vac
Ch1: Mosfet drain voltage, 100V/div
Ch2: Vdd, 20V/div
Ch3: output current, 5A/div
Ch4: output voltage, 5V/div

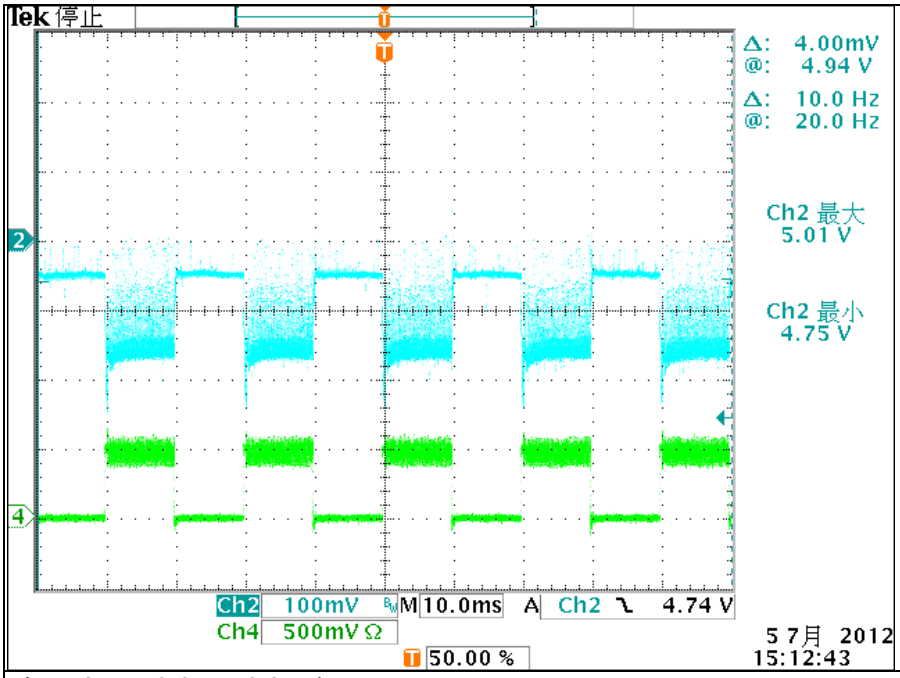
2.11 OUTPUT VOLTAGE RIPPLE



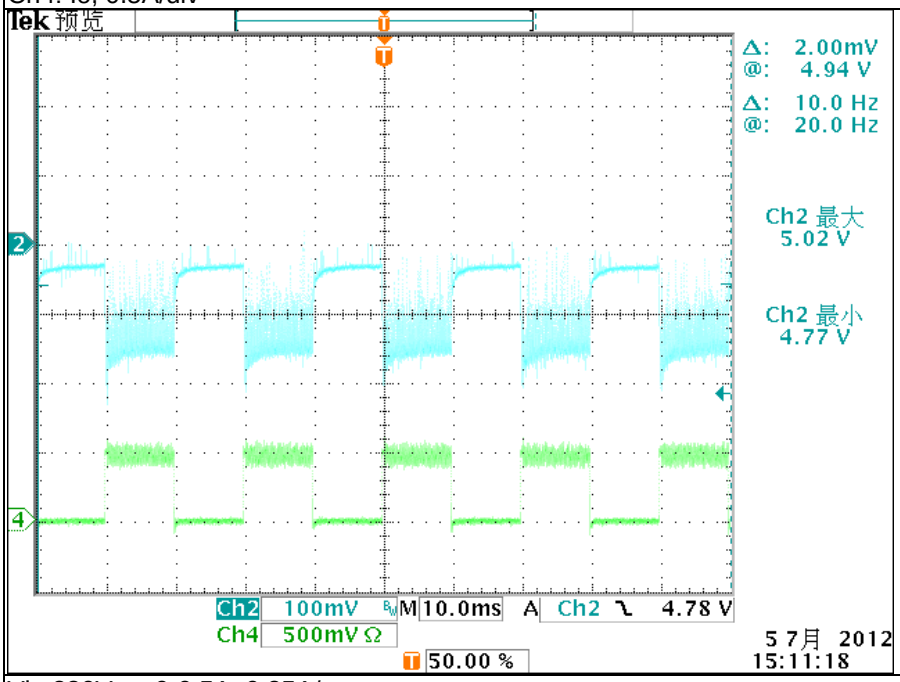
Vin:110&230Vac Io: full load (1A)
Ch4: Vo, 200mV/div

2.12 OUTPUT DYNAMIC REPONSE

Test condition: 20cm cable with 70mohm resistance, a10uF E-CAP and a 0.1uF ceramic in parallel

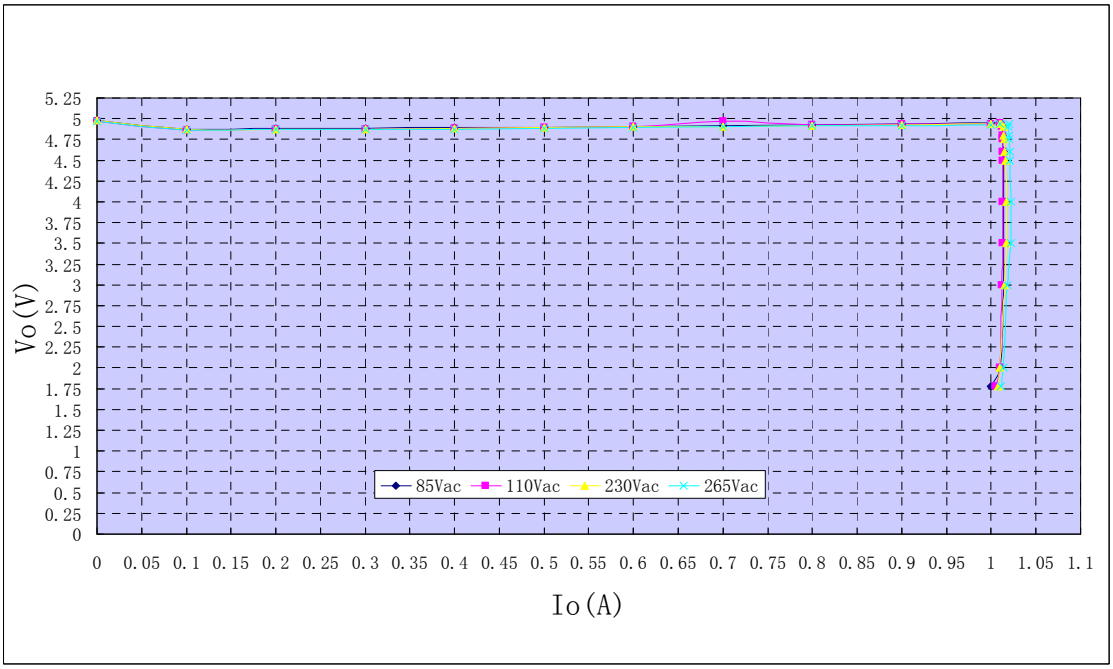


Vin:110Vac, 0-0.5A, 0.25A/us
Ch2: Vo, 100mV/div with 5V offset in 20MHz BW
Ch4: Io, 0.5A/div

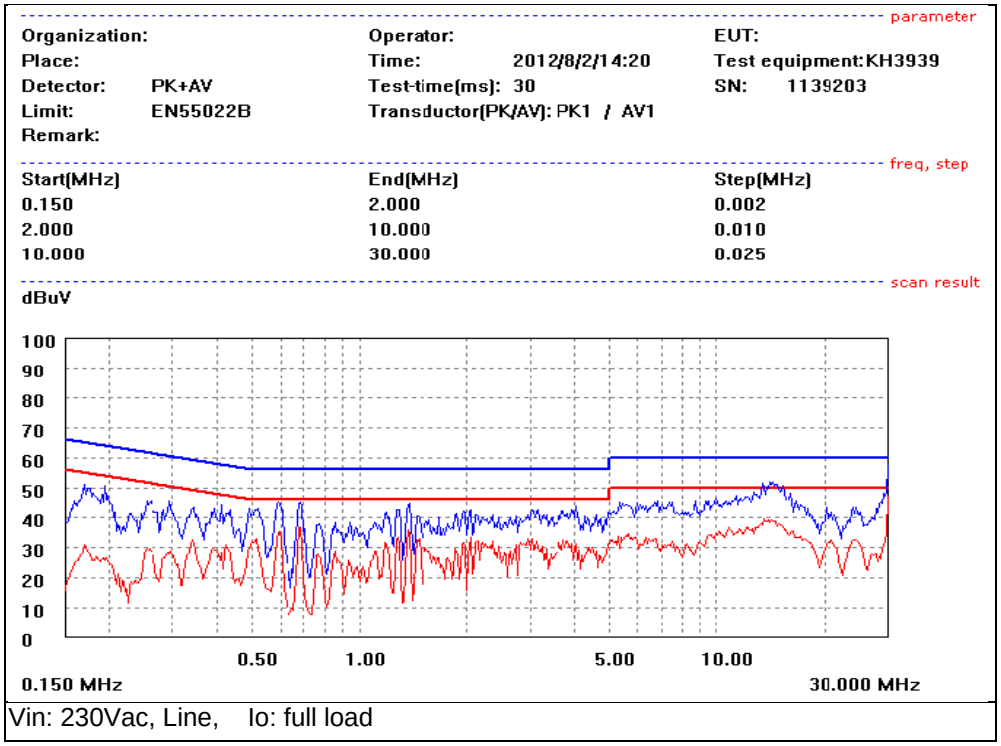


Vin:230Vac, 0-0.5A, 0.25A/us
Ch2: Vo, 100mV/div with 5V offset in 20MHz BW
Ch4: Io, 0.5A/div

2.13 I/V CURVE



3 EMI Test



Vin: 230Vac, Line, Io: full load

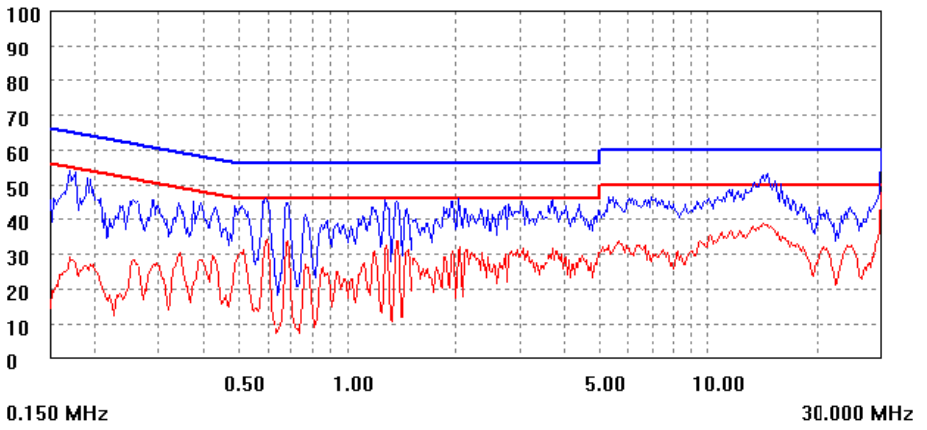
parameter

Organization:	Operator:	EUT:
Place:	Time: 2012/8/2/14:17	Test equipment:KH3939
Detector: PK+AV	Test-time(ms): 30	SN: 1139203
Limit: EN55022B	Transductor(PK/AV): PK1 / AV1	
Remark:		

freq, step

Start(MHz)	End(MHz)	Step(MHz)
0.150	2.000	0.002
2.000	10.000	0.010
10.000	30.000	0.025

scan result



Vin: 230Vac, Neutral, Io: full load

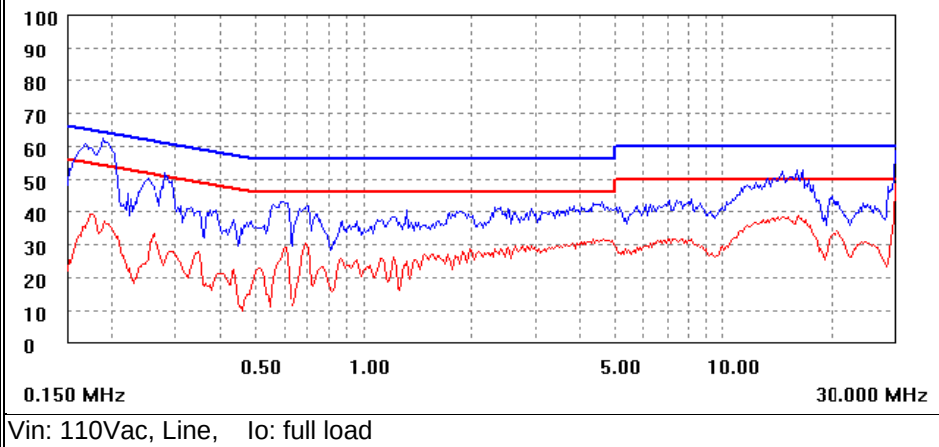
parameter

Organization:	Operator:	EUT:
Place:	Time: 2012/8/2/14:13	Test equipment:KH3939
Detector: PK+AV	Test-time(ms): 30	SN: 1139203
Limit: EN55022B	Transductor(PK/AV): PK1 / AV1	
Remark:		

freq, step

Start(MHz)	End(MHz)	Step(MHz)
0.150	2.000	0.002
2.000	10.000	0.010
10.000	30.000	0.025

scan result



Vin: 110Vac, Line, Io: full load

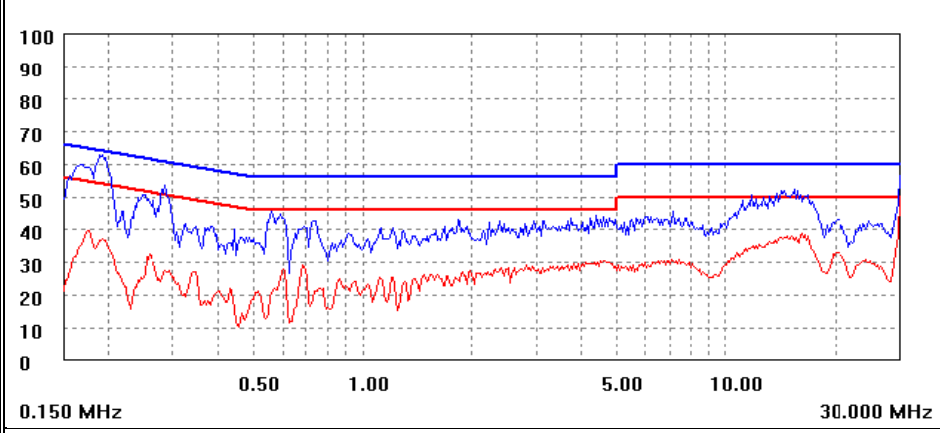
parameter

Organization:	Operator:	EUT:
Place:	Time: 2012/8/2/14:15	Test equipment:KH3939
Detector: PK+AV	Test-time(ms): 30	SN: 1139203
Limit: EN55022B	Transductor(PK/AV): PK1 / AV1	
Remark:		

freq, step

Start(MHz)	End(MHz)	Step(MHz)
0.150	2.000	0.002
2.000	10.000	0.010
10.000	30.000	0.025

scan result



Vin: 110Vac, Neutral, Io: full load

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