



Texas Instruments

PMP4447 Test Procedure

China Power Reference Design

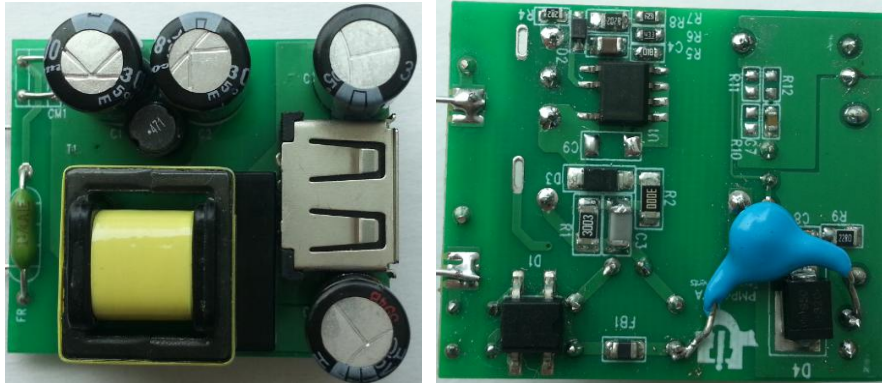
REV A

07/23/2014

1 GENERAL

1.1 PURPOSE

To provide detailed data for evaluating and verifying the PMP4447 which is used TI new Primary Side Controller UCC28910 for 12V0.5A power supply with 36mmx30mmx15mm. The photo shows this demo board.



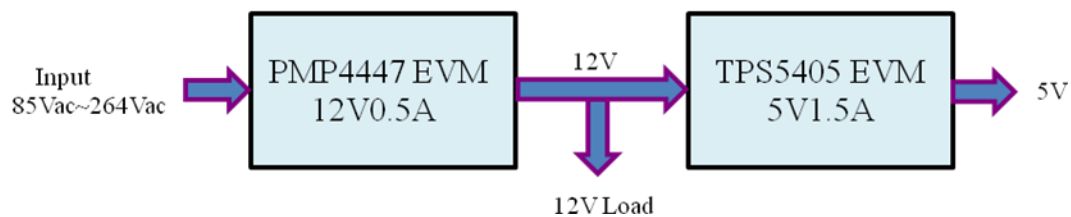
1.2 REFERENCE DOCUMENTATION

Schematic PMP447_SCH.PDF
Assembly PMP4447_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
Load: Chroma 63110A module
Testing demo board: PMP4447 and TPS5405 EVM

1.4 TEST DIAGRAM



2 INPUT CHARACTERISTICS

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

2.1 EFFICIENCY

Notes: The EVM is combined with TPS5405 EVM to test efficiency, efficiency test is based USB port

Vin=85Vac

Pin(W)	12Vo(V)	12V Io(A)	5Vo(V)	5V Io(A)	Effi.(%)
1.547	11.9	0.1	5.008	0.01	80.2
2.975	11.89	0.2	5.008	0.01	81.6
4.452	11.88	0.3	5.008	0.01	81.2
5.98	11.88	0.4	5.008	0.01	80.3
7.62	11.88	0.5	5.008	0.01	78.6

Vin=115Vac

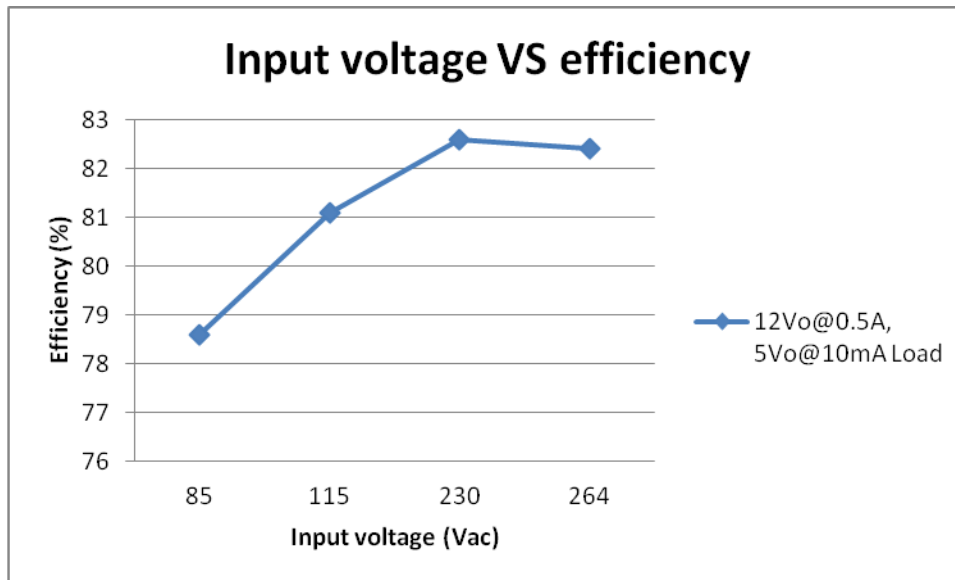
Pin(W)	12Vo(V)	12V Io(A)	5Vo(V)	5V Io(A)	Effi.(%)
1.548	11.907	0.1	5.008	0.01	80.2
2.955	11.918	0.2	5.008	0.01	82.4
4.391	11.913	0.3	5.008	0.01	82.5
5.869	11.911	0.4	5.008	0.01	82.0
7.407	11.91	0.5	5.008	0.01	81.1

Vin=230Vac

Pin(W)	12Vo(V)	12V Io(A)	5Vo(V)	5V Io(A)	Effi.(%)
1.611	11.9	0.1	5.008	0.01	77.0
2.989	11.91	0.2	5.008	0.01	81.3
4.385	11.91	0.3	5.008	0.01	82.6
5.794	11.91	0.4	5.008	0.01	83.1
7.273	11.92	0.5	5.008	0.01	82.6

Vin=264Vac

Pin(W)	12Vo(V)	12V Io(A)	5Vo(V)	5V Io(A)	Effi.(%)
1.638	11.92	0.1	5.008	0.01	75.8
3.038	11.922	0.2	5.008	0.01	80.1
4.43	11.923	0.3	5.008	0.01	81.9
5.837	11.923	0.4	5.008	0.01	82.6
7.3	11.928	0.5	5.008	0.01	82.4



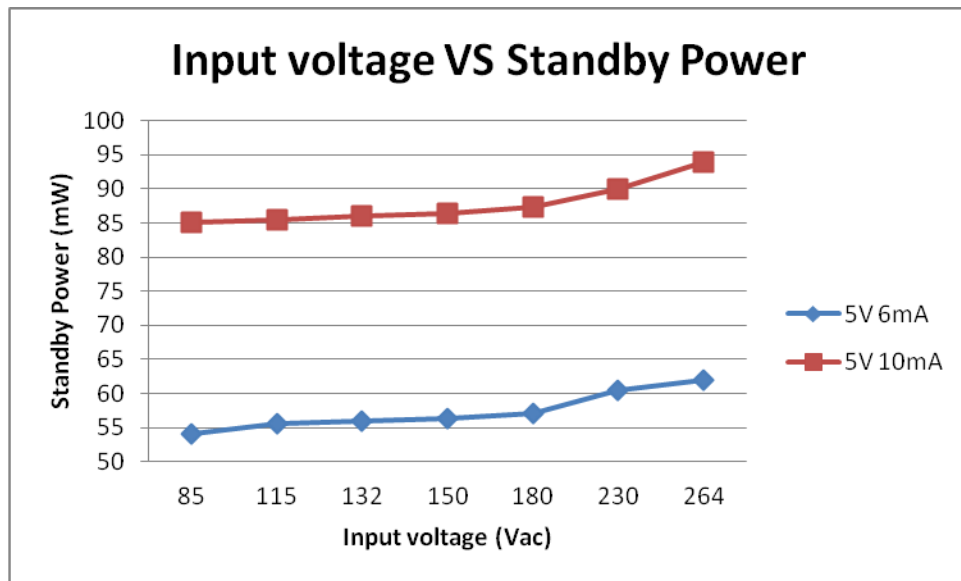
2.2 Standby power at light load, combined with TPS5405 EVM

5V Io=6mA

Vin(Vac)	12Vo (V)	12V Io (mA)	5Vo (V)	5V Io (mA)	Standby Power (mW)
85	11.93	3.13	5.008	6mA	54.0
115	11.94	3.13	5.008	6mA	55.5
132	11.94	3.13	5.008	6mA	56.0
150	11.94	3.13	5.008	6mA	56.3
180	11.94	3.13	5.008	6mA	57.0
230	11.95	3.13	5.008	6mA	60.5
264	11.95	3.13	5.008	6mA	62.0

5V I_o=10mA

V _{in} (Vac)	12V _o (V)	12V I _o (mA)	5V _o (V)	5V I _o (mA)	Standby Power (mW)
85	11.92	5.2	5.008	10mA	85.0
115	11.93	5.2	5.008	10mA	85.5
132	11.94	5.2	5.008	10mA	86.0
150	11.94	5.2	5.008	10mA	86.4
180	11.94	5.2	5.008	10mA	87.4
230	11.94	5.2	5.008	10mA	90.0
264	11.94	5.2	5.008	10mA	94.0

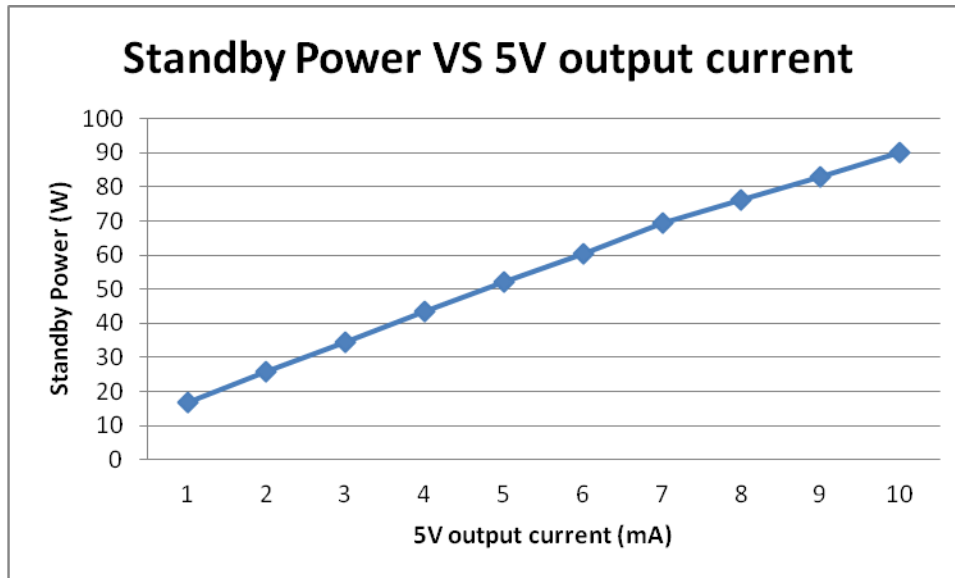


2.3 Standby Power at different 5V load, combined with TPS5405 EVM

V_{in}=230Vac

12V _o (V)	12V I _o (mA)	5V _o (V)	5V I _o (mA)	Standby Power (mW)
12.04	0.55	5.008	1	16.6
11.98	1.08	5.008	2	25.8
11.96	1.58	5.008	3	34.5
11.96	2.12	5.008	4	43.6
11.96	2.62	5.008	5	52.0
11.95	2.98	5.008	6	60.5

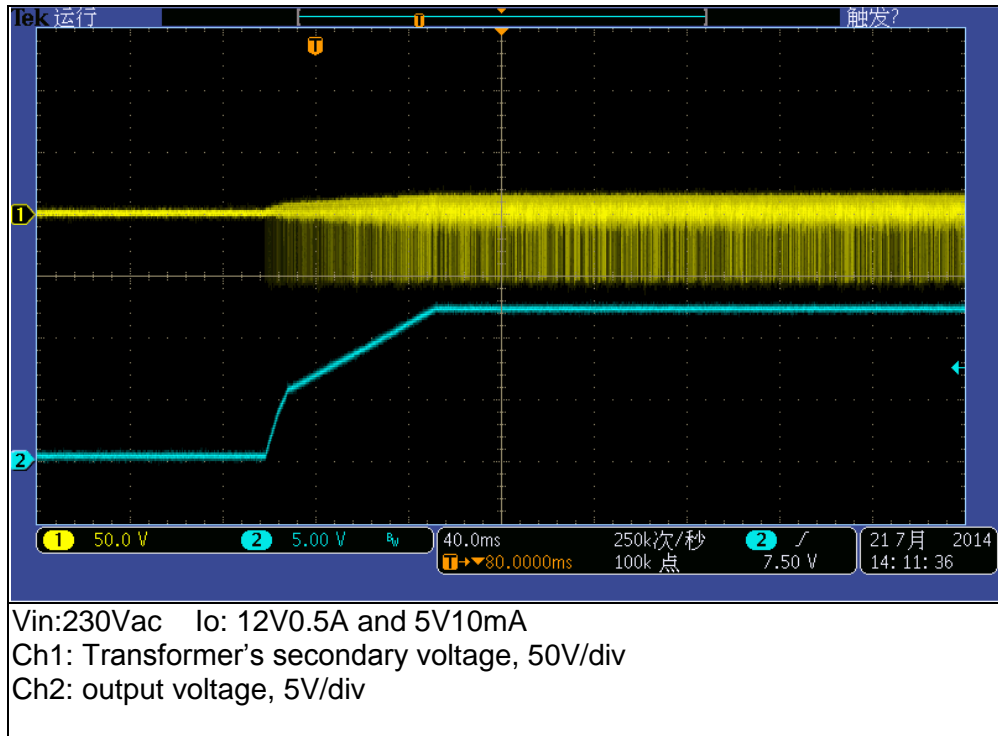
11.95	3.49	5.008	7	69.5
11.94	3.96	5.008	8	76.0
11.94	4.45	5.008	9	83.0
11.94	5.2	5.008	10	90.0



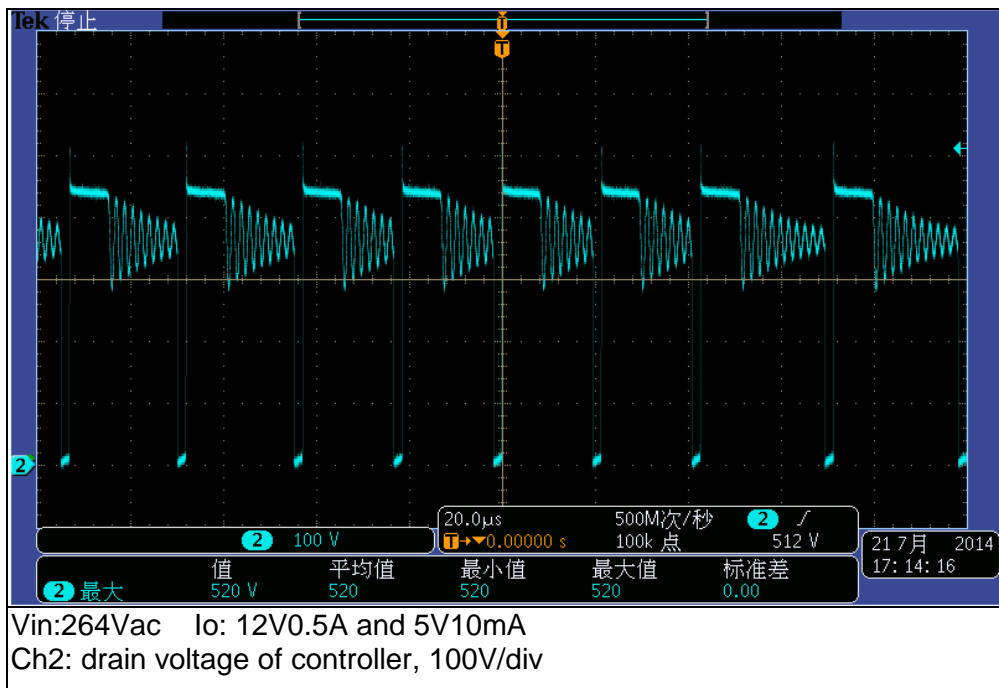
3 OUTPUT CHARACTERISTICS

3.1 Startup and output voltage

Input voltage	Output current	Startup time	Pass/Fail
115Vac	1.2A	106mS	
230Vac	1.2A	102.6mS	

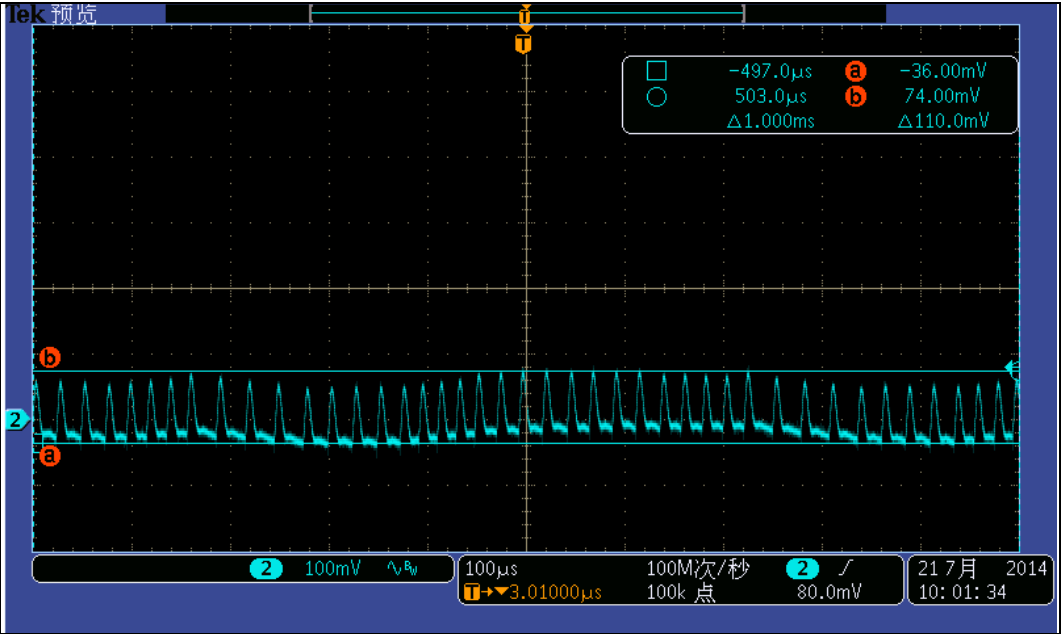


3.2 Drain voltage waveform at start up

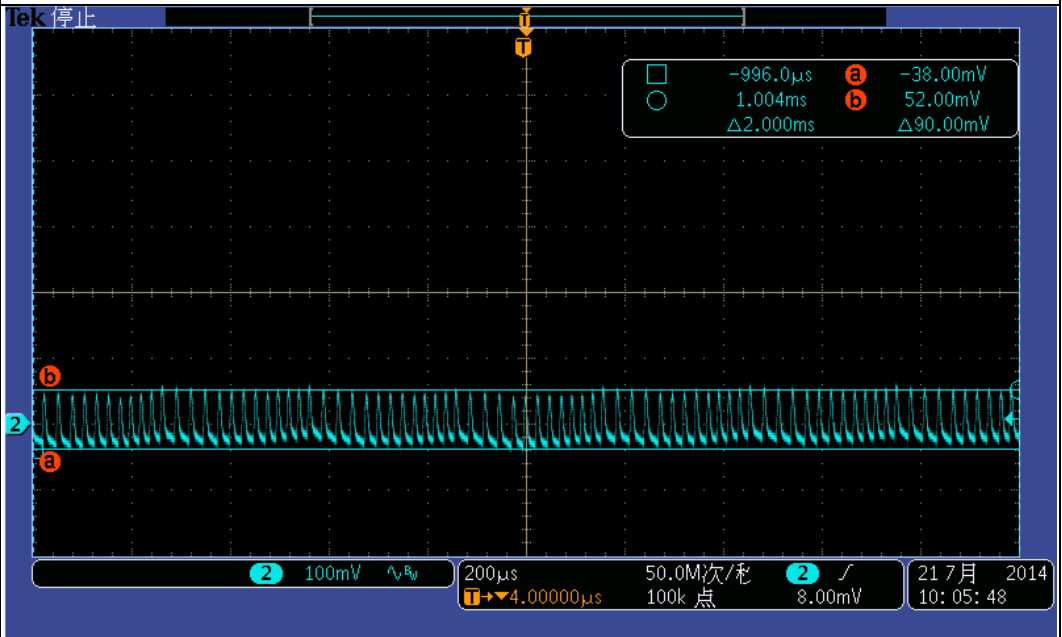


3.3 Ripple voltage

Input voltage	Output current	Ripple voltage	Pass/Fail
115Vac	12V0.5A	110mV	
230Vac	12V0.5A	90mV	



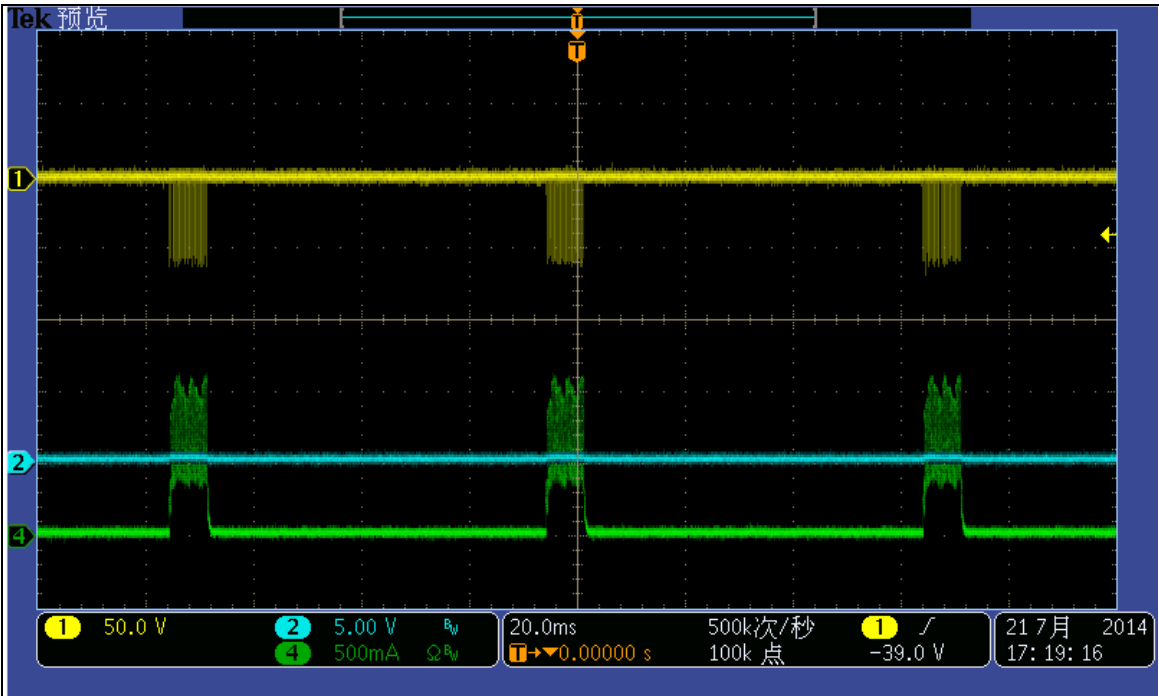
Vin:115Vac Output: 12V0.5A
Ch2: output ripple voltage, 100mV/div



Vin:115Vac Output: 12V0.5A
Ch2: output ripple voltage, 100mV/div

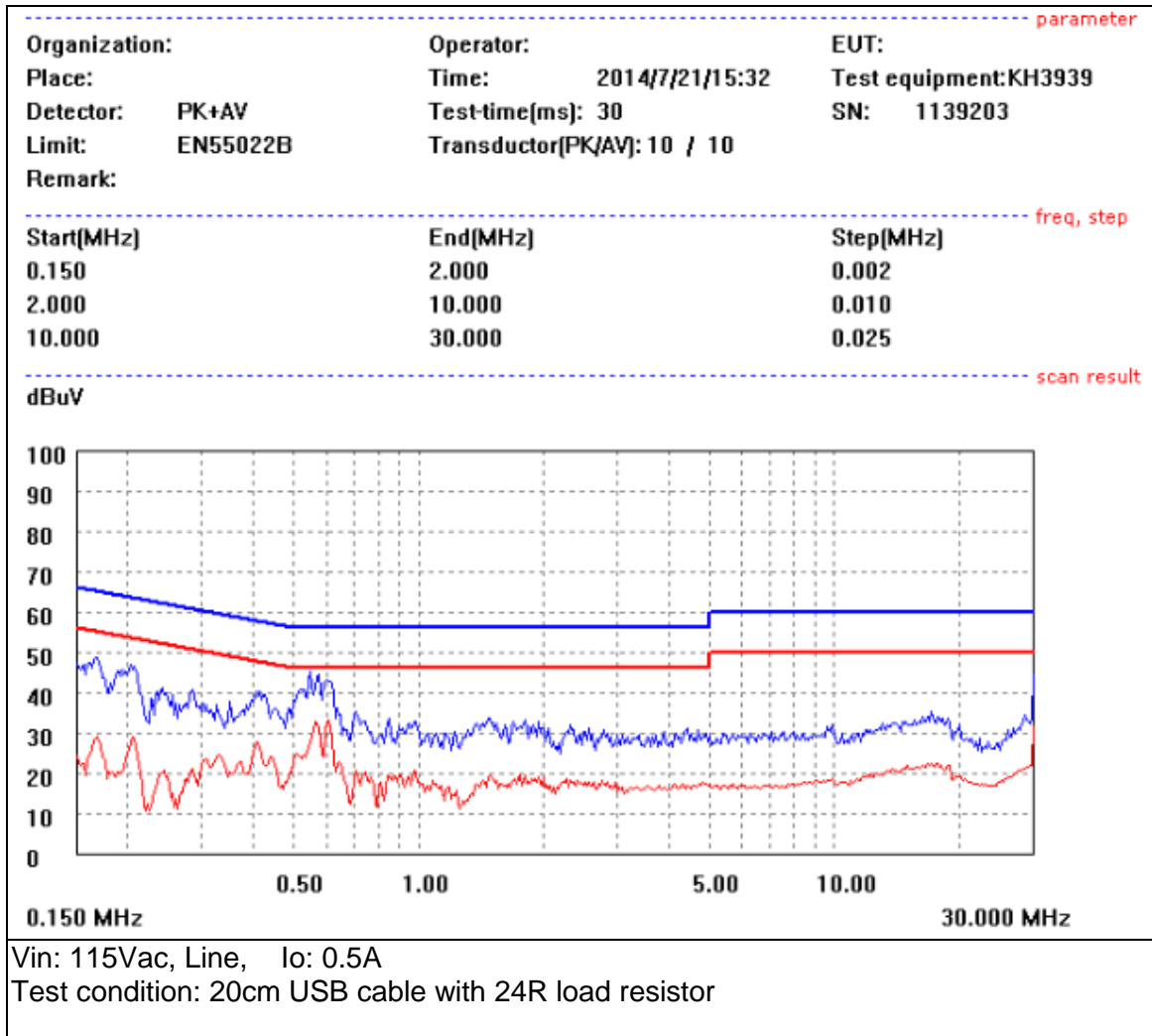
3.4 Ouput short protection

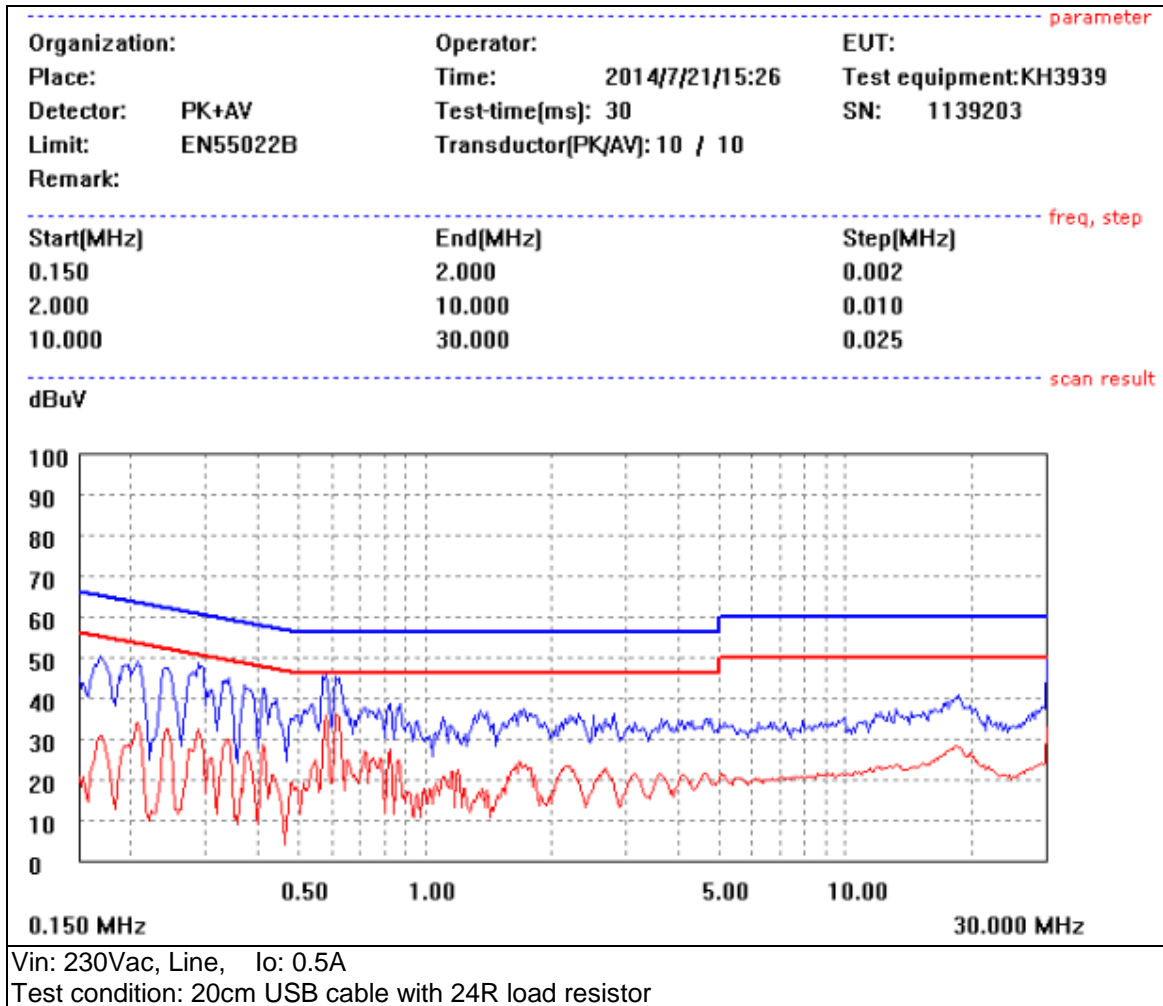
Input voltage	Output short protection
115&230Vac	Hiccup up mode



Vin:230Vac
Ch1: secondary winding voltage, 50V/div
Ch2: output voltage, 5V/div
Ch4: output current, 500mA/div

4 EMI Test CE





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