Texas Instruments

PMP4339 Test Procedure

China Power Reference Design

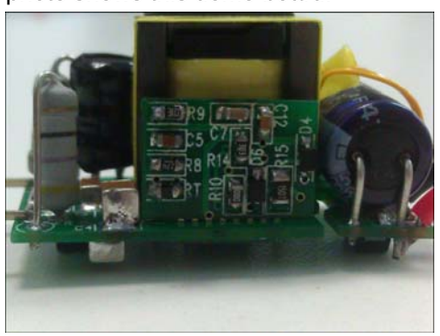
REV A

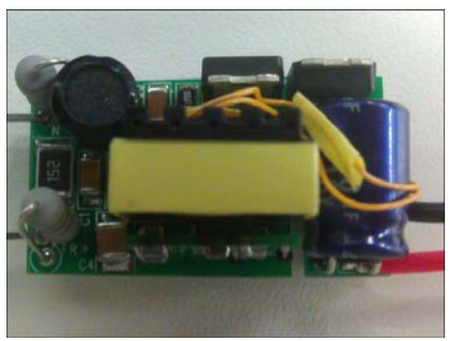
3/22/2013

1 GENERAL

1.1 PURPOSE

To provide detailed data for evaluating and verifying the PMP4339, which uses TI new Primary Side Controller LM3447 for dimmable GU10 LED driver with 30mmx18mmx18mm. The below photo shows this demo board.





1.2 REFERENCE DOCUMENTATION

Schematic PMP4339_SCH.PDF
Assembly PMP4339_PCB.PDF
PMP4339 BOM

1.3 TEST EQUIPMENTS

Power-meter: YOKOGAWA WT210
Multi-meter(current): Agilent 34401A
Multi-meter(voltage): Fluke 187
AC Source: Chroma 61530
LED load: Chroma 63110A module
Testing demoboard: without line regulation circuit

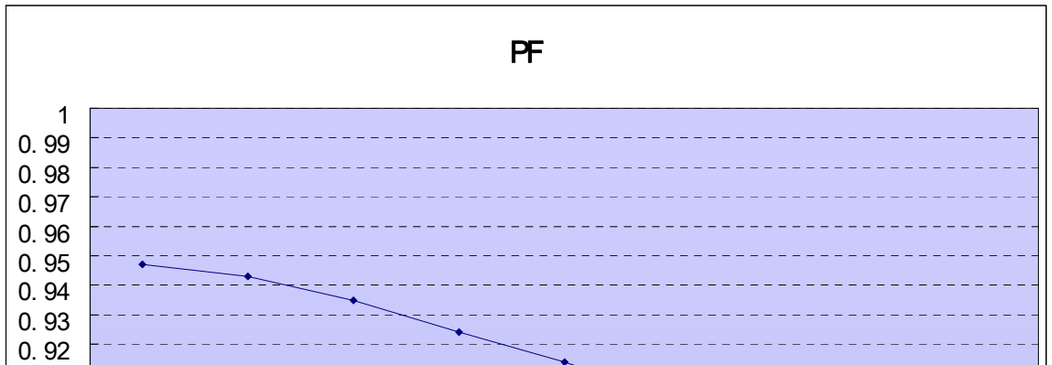
2 INPUT CHARACTERISTICS

Otherwise Specified, the test is under the condition With LED lamp Load (4 LEDs in series).

2.1 POWER FACTOR

Pass/Fail criteria: THD meets to IEC61000-3-2 with 230Vac input at 100% load.

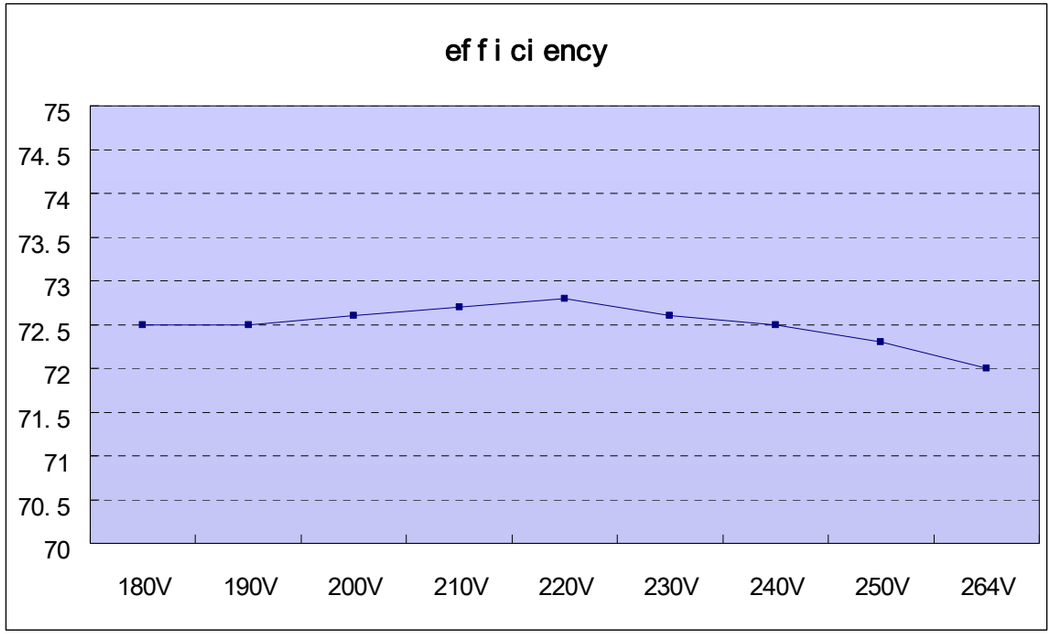
Vin(Vac)	Freq(Hz)	PF	Io(Arms)	THD(%)	Pass/Fail
180	50	**0.947**	**0.37**		
190	50	**0.943**	**0.385**		
200	50	**0.935**	**0.383**		
210	50	**0.924**	**0.375**		
220	50	**0.914**	**0.367**		
230	50	**0.902**	**0.358**		
240	50	**0.894**	**0.358**		
250	50	**0.888**	**0.362**		
264	50	**0.880**	**0.365**		

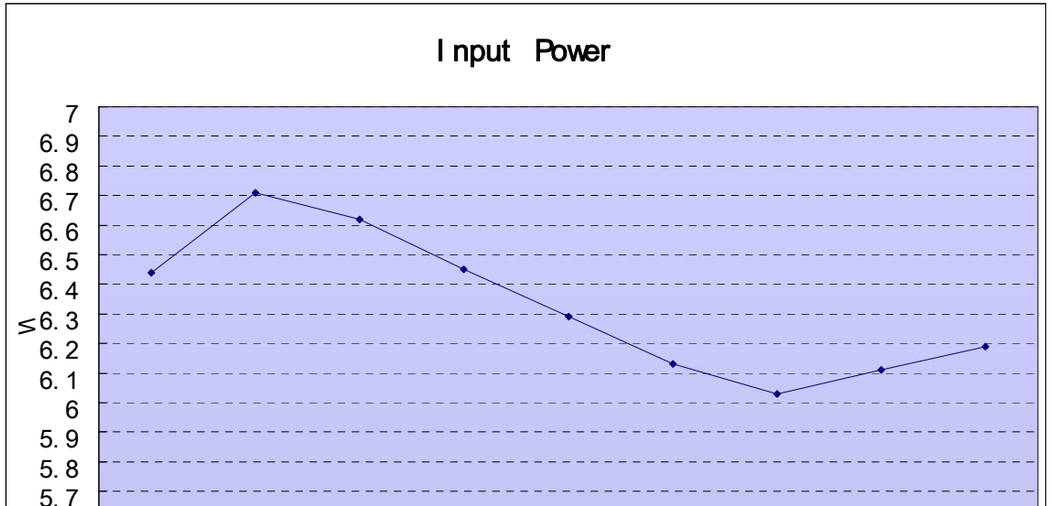


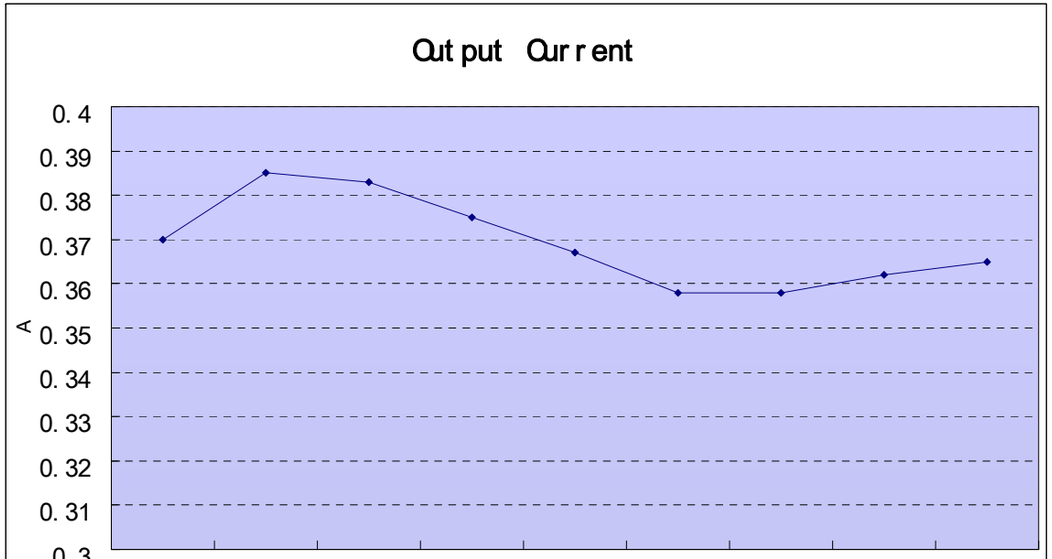
2.2 EFFICIENCY

Pass/Fail criteria: 72.8% minimum with 220v input at 100% load.

Vin(Vac)	Freq(Hz)	Pin(W)	Vo(Vrms)	Io(Arms)	Eff(%)	Pass/Fail
180	50	**6.44**	**12.62**	**0.37**	**72.5**	
190	50	**6.71**	**12.63**	**0.385**	**72.5**	
200	50	**6.62**	**12.55**	**0.383**	**72.6**	
210	50	**6.45**	**12.51**	**0.375**	**72.7**	
220	50	**6.29**	**12.48**	**0.367**	**72.8**	
230	50	**6.13**	**12.43**	**0.358**	**72.6**	
240	50	**6.03**	**12.21**	**0.358**	**72.5**	
250	50	**6.11**	**12.20**	**0.362**	**72.3**	
264	50	**6.19**	**12.21**	**0.365**	**72.0**	


efficiency
75
74.5
74
73.5
73
72.5
72
71.5
71
70.5
70
180V
190V
200V
210V
220V
230V
240V
250V
264V


Input Power
7
6.9
6.8
6.7
6.6
6.5
6.4
6.3
6.2
6.1
6
5.9
5.8
5.7


Qut put Qur r ent
0. 4
0. 39
0. 38
0. 37
0. 36
0. 35
0. 34
0. 33
0. 32
0. 31
A

2.3 INPUT CURRENT

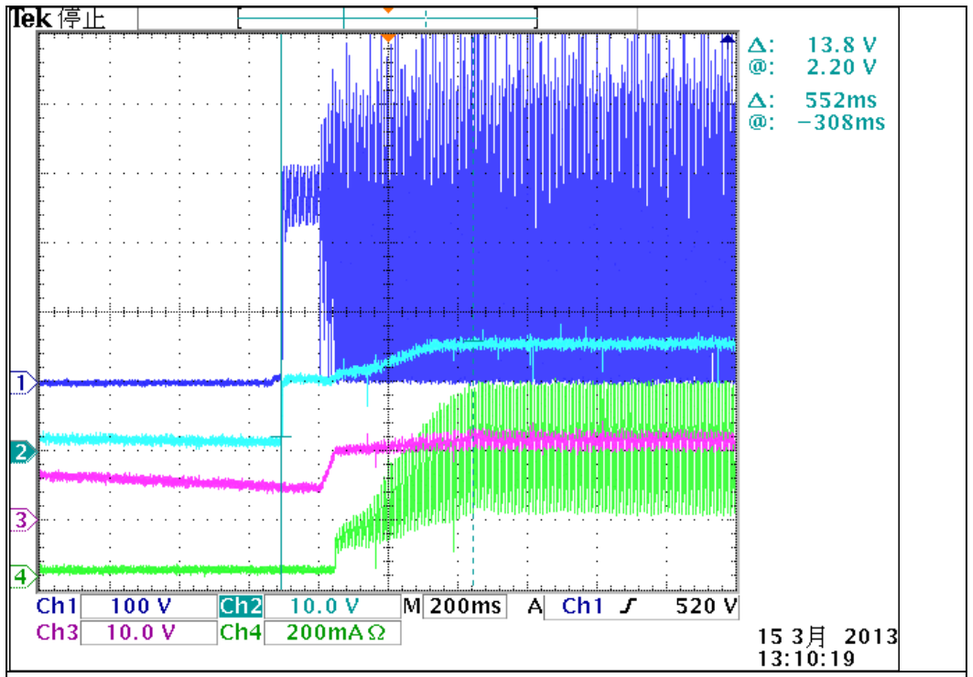
Pass/Fail criteria: XX Amps RMS maximum at low line, full load.

Vin(Vac)	Freq(Hz)	Iin(Arms)	Pass/Fail
220	50	**0.029**	

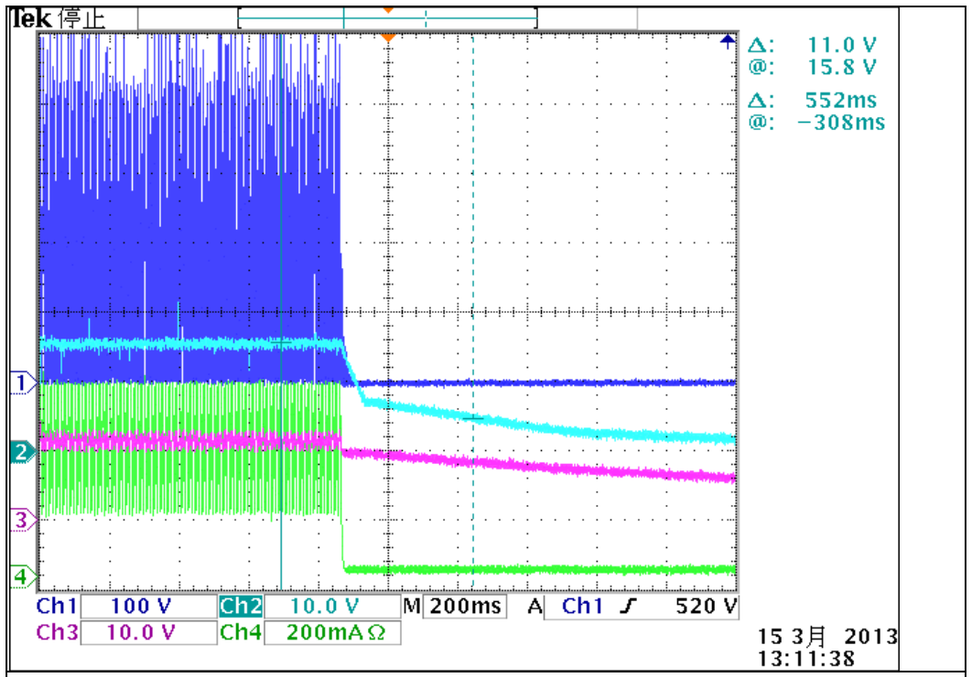
3 OUTPUT CHARACTERISTICS

3.1 TURN ON DELAY AND TURN OFF

CONDITIONS		Delay time (S)		Pass/Fail
Vin (Vac)	Load			
220	Full load	0.552		

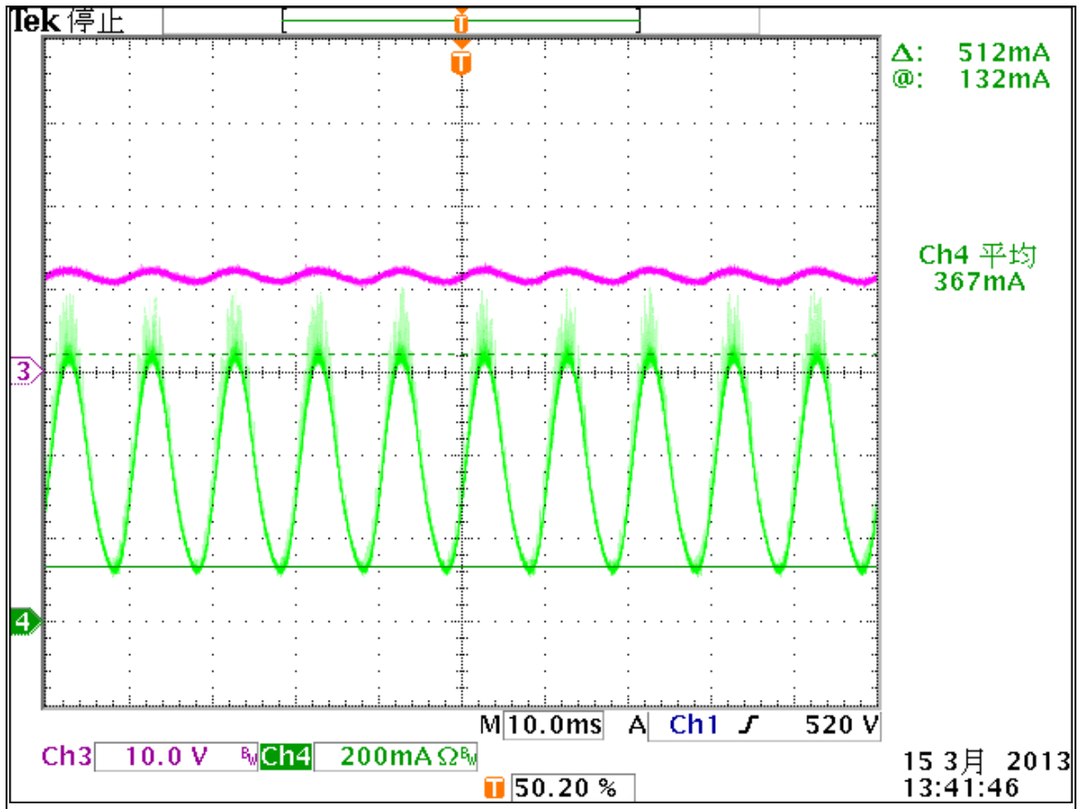


Vin:220Vac Io: full load (LED Lamp Load)
Ch1: Drain voltage of MOSFET, 100V/div
Ch2: Vcc voltage, 10V/div
Ch3: LED voltage, 10V/div
Ch4: LED current 200mA/div



Vin:220Vac Io: full load (LED Lamp Load)
Ch1: Drain voltage of MOSFET, 100V/div
Ch2: Vcc voltage, 10V/div
Ch3: LED voltage, 10V/div
Ch4: LED current 200mA/div

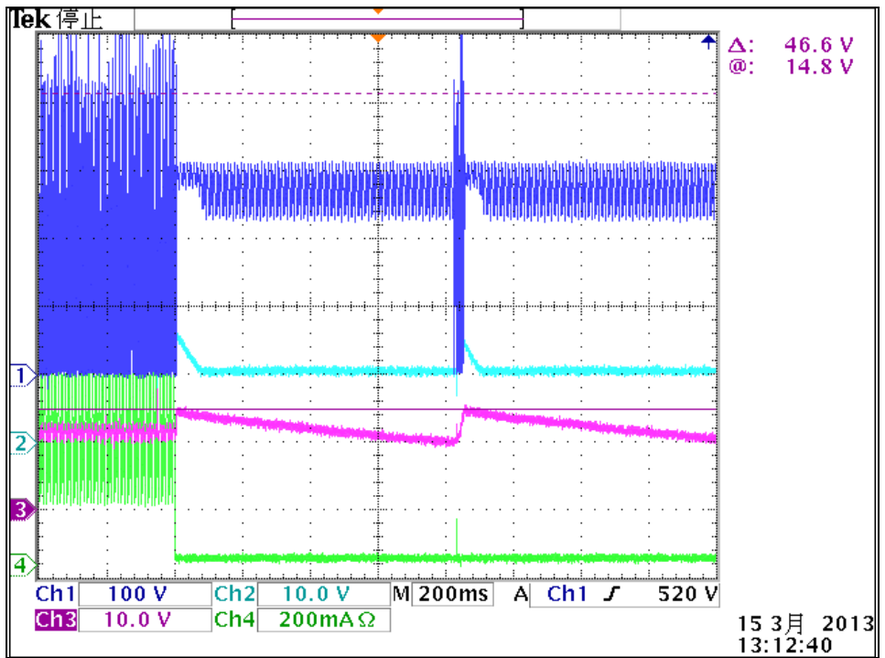
3.2 OUTPUT RIPPLE VOLTAGE AND CURRENT



Vin:110Vac Io: LED load (LED Lamp Load)
Ch3: LED voltage 10V/div
Ch4: LED current 200mA/div

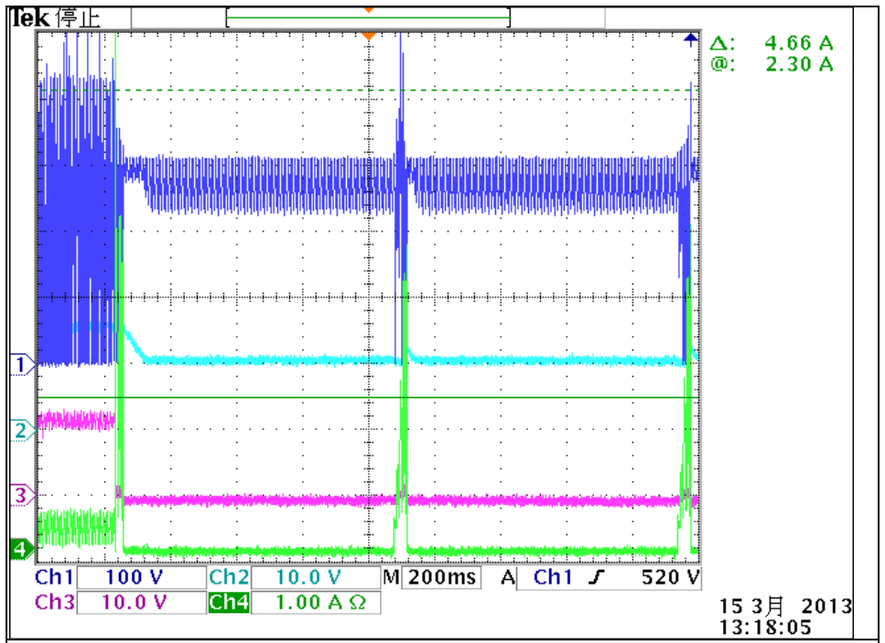
3.3 OUTPUT OVER VOLTAGE PROTECTION

CONDITIONS	Protection voltage (V)	Pass/Fail
Vin (Vac)		
220	14.8	



Vin:220Vac OVP and open LED protection (Chroma 63110A LED load)
Ch1: Mosfet Vds, 100V/div
Ch2: Vcc, 10V/div
Ch3: LED voltage, 10V/div
Ch4: LED current, 200mA/div

3.4 OUTPUT SHORT CIRCUIT PROTECTION

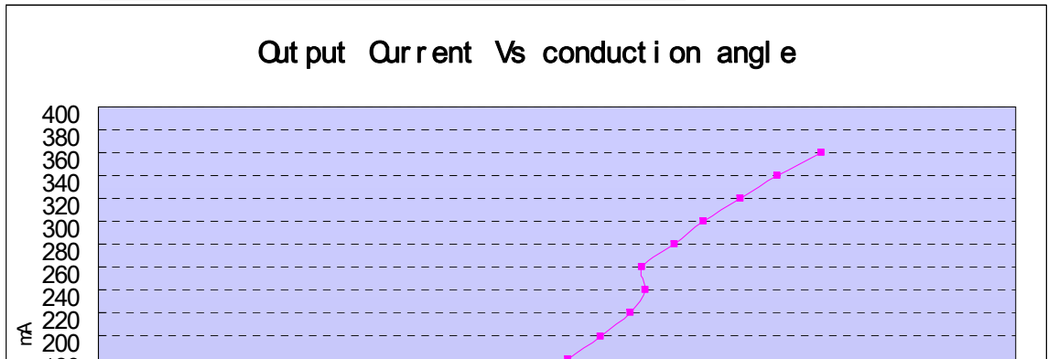


Vin:220Vac LEDs shorted protection (Chroma 63110A LED load)
Ch1: Mosfet Vds, 100V/div
Ch2: Vcc, 10V/div
Ch3: LED voltage, 10V/div
Ch4: LED current, 1A/div

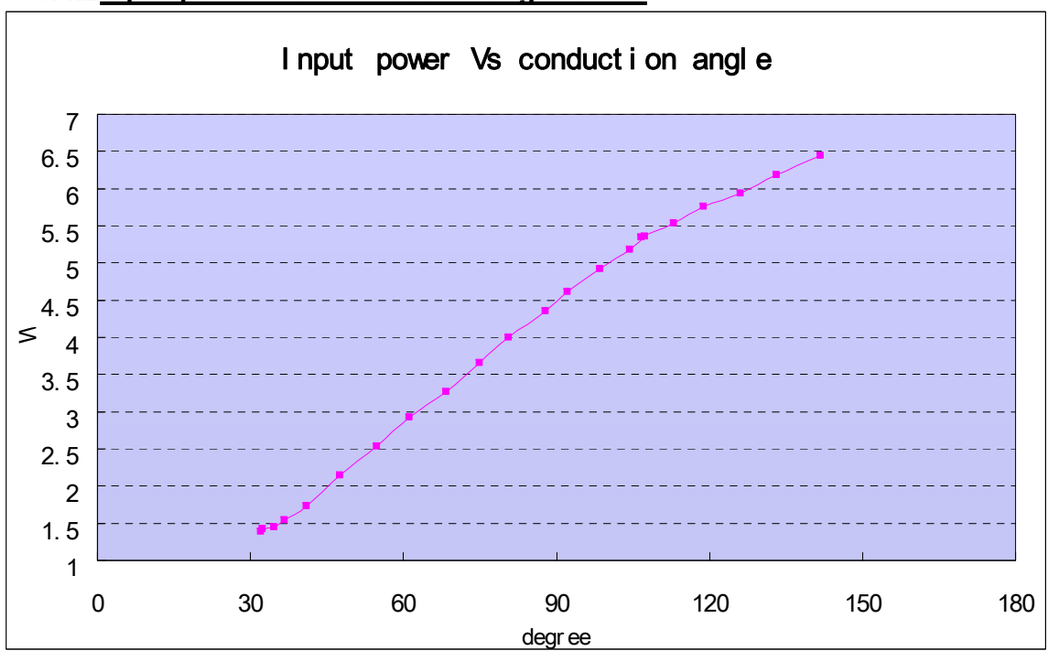
3.5 DIMMING PERFORMANCE

LED current (Ma)	conduction time(mS)	conduction angle(°C)	LED voltage(V)	input power(W)
360	7.88	141.8	12.15	6.44
340	7.4	133.2	12.08	6.19
320	7	126	12.01	5.94
300	6.6	118.8	11.96	5.76
280	6.28	113	11.9	5.53
260	5.92	106.6	11.85	5.35
240	5.96	107.3	11.8	5.36
220	5.8	104.4	11.76	5.18
200	5.48	98.6	11.69	4.92
180	5.12	92.2	11.63	4.62
160	4.88	87.8	11.56	4.35
140	4.48	80.6	11.5	4
120	4.16	74.9	11.41	3.66
100	3.8	68.4	11.33	3.27
80	3.4	61.2	11.25	2.93
60	3.04	54.7	11.12	2.53
40	2.64	47.5	10.96	2.15
20	2.28	41	10.72	1.73
10	2.04	36.7	10.52	1.54
5	1.92	34.6	10.37	1.45
2	1.8	32.4	10.16	1.42
1	1.78	32	10.06	1.39

3.4.1Output current Vs conduction angle curve



3.4.2Input power Vs conduction angle curve



4 EMI Test

EMI TEST REPORT

parameter

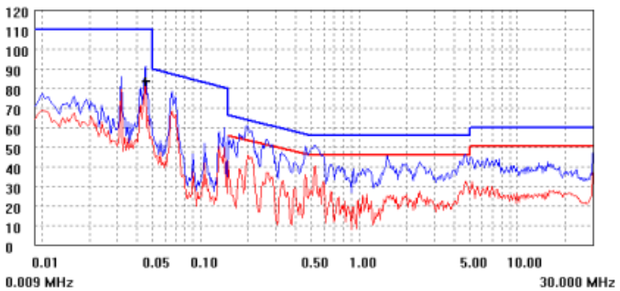
Organization:	Operator:	EUT:
Place:	Time: 2013/3/22/11:25	Test equipment:KH3939
Detector: PK+AV	Test-time(ms): 30	SN: 1139203
Limit: EN55015	Transductor(PK/AV): PK1 / AV1	
Remark:		

freq, step

Start(MHz)	End(MHz)	Step(MHz)
0.009	0.150	0.001
0.150	2.000	0.002
2.000	10.000	0.010
10.000	30.000	0.025

scan result

dBuV



final test

(AV)	freq(MHz)	lev(dBuV)	Lim(dBuV)	Δ(lev-Lim)
	0.045	83.0		

Vin: 220Vac, Line, Io: full load

EMI TEST REPORT

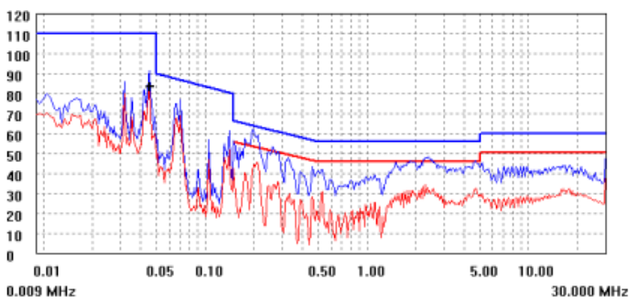
parameter

Organization:	Operator:	EUT:
Place:	Time: 2013/3/22/11:28	Test equipment:KH3939
Detector: PK+AV	Test-time(ms): 30	SN: 1139203
Limit: EN55015	Transductor[PK/AV]: PK1 / AV1	
Remark:		

freq, step

Start(MHz)	End(MHz)	Step(MHz)
0.009	0.150	0.001
0.150	2.000	0.002
2.000	10.000	0.010
10.000	30.000	0.025

scan result



final test

[AV]	freq(MHz)	lev[dBuV]	Lim[dBuV]	Δ[lev-Lim]
	0.045	83.0		

Vin:220Vac, Neutral, Io: full load

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Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265