



Texas Instruments

China Power Reference Design

PMP4311 Test Procedure

REV A

07/07/11

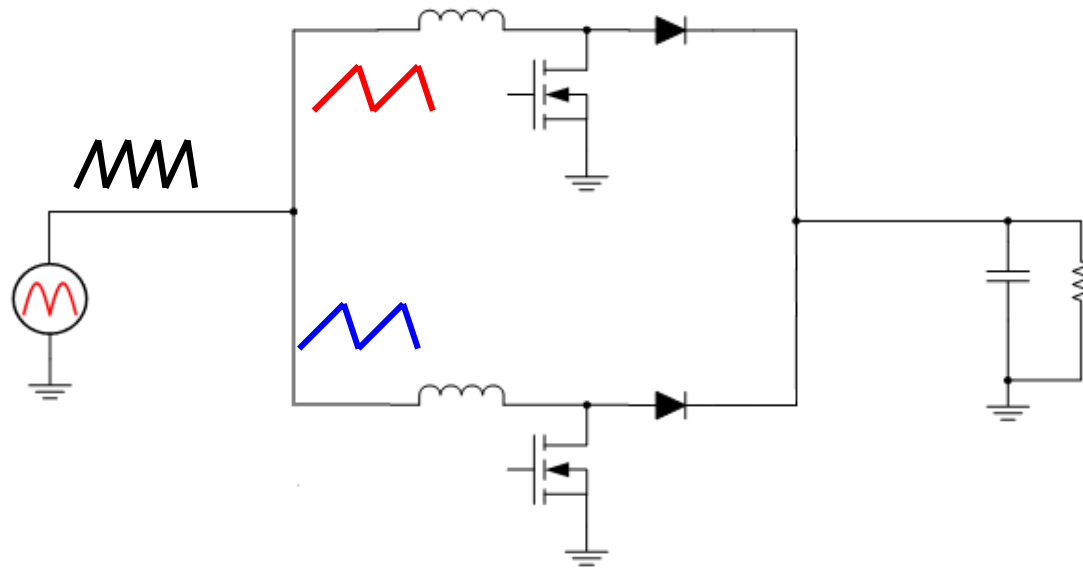
Preliminary Version

1. General

1.1 PURPOSE

To provide detailed data for evaluating and verifying the PMP4311 for VFAC (Variable Frequency Air-Conditioner) applications, which use TI Interleaved CCM PFC controller

UCC28070 to achieve 5KW two phases interleaved PFC (as below) and use UCC28610 as an auxiliary Flyback Power Supply. The operating frequency is setting at 38 KHz for each channel. And use TI MOSFET driver UCC27322 as MOSFET gate driver.

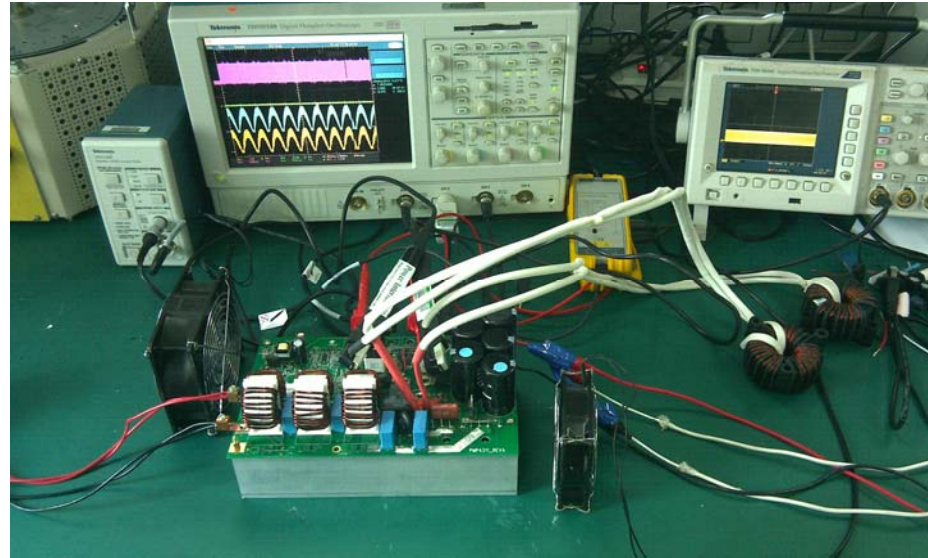


1.2 REFERENCE DOCUMENTATION

Schematic PMP4311_SCH_RevA.PDF

Assembly PMP4311_PCB_RevA.PDF

BOM



1.3 TEST EQUIPMENTS

Oscilloscope: TDS5034B
 Power Meter: WT210
 Power Meter: PM100
 Current Probe: TCP202 TCPA300
 Voltage Probe: Differential Probe

2 Electric Performance

2.1 PF&THD

Vin	Pin	PF	THD
220Vac	651W	0.983	
	1292W	0.986	

	1938W	0.989	
	2594W	0.991	
	3248W	0.993	
	3884W	0.994	
	4527W	0.995	
	5079W	0.996	<8.7%
180Vac	667W	0.983	
	1319W	0.986	
	1966W	0.99	
	2620W	0.993	
	3284W	0.995	
	3934W	0.994	
	4527W	0.997	
	4263W	0.997	<6.9%
	The unit will power limit at 180Vac@4300W. 220Vac@about 4900W		

2.2 Efficiency

Vin(Vac)	Pin(W)	Vo(V)	Io(A)	Pout	Eff
220	652.5	390.5	1.589	621	0.951724
	1296.1	391.7	3.182	1246	0.961346
	1937.6	392.15	4.77	1871	0.965628
	2590	392.29	6.387	2506	0.967568
	3243	392.24	7.999	3138	0.967623
	3887	392.47	9.576	3760	0.967327
	4537	392.47	11.165	4384	0.966277

	4858	392.5	11.966	4699	0.96727
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2.3 Protections

Under Voltage (UV) Protection

UV protect at 164Vac and recovery at 174Vac **Pass**

Over Voltage (OV) Protection

OV protect at 274Vac and recovery at 264Vac **Pass**

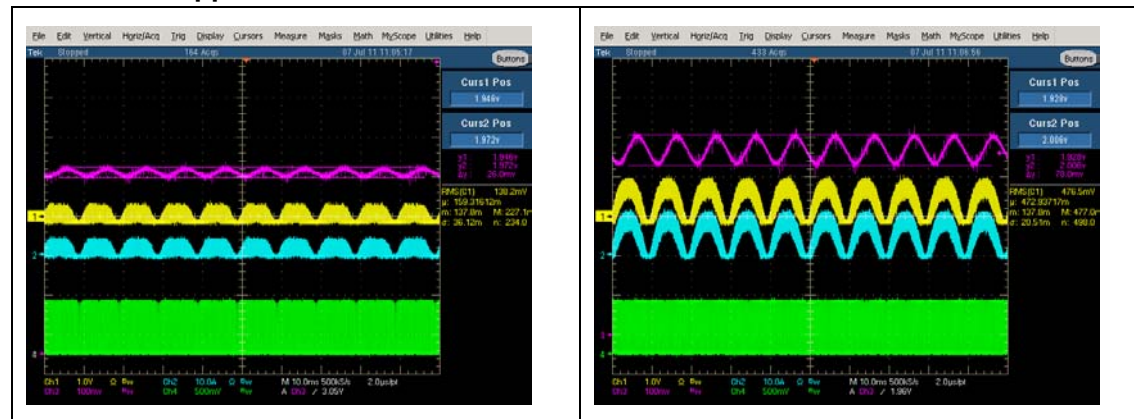
Power Limit Protection

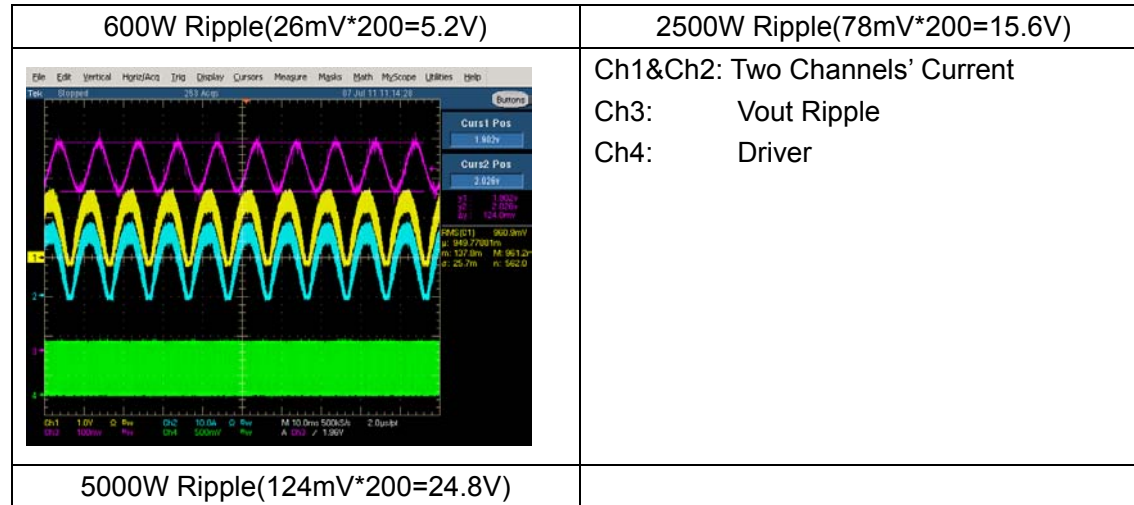
The unit will go to Power Limit at around 4900W at 220Vac and set RIMO resistor to 30Kohm **Pass**

Over Current Protection

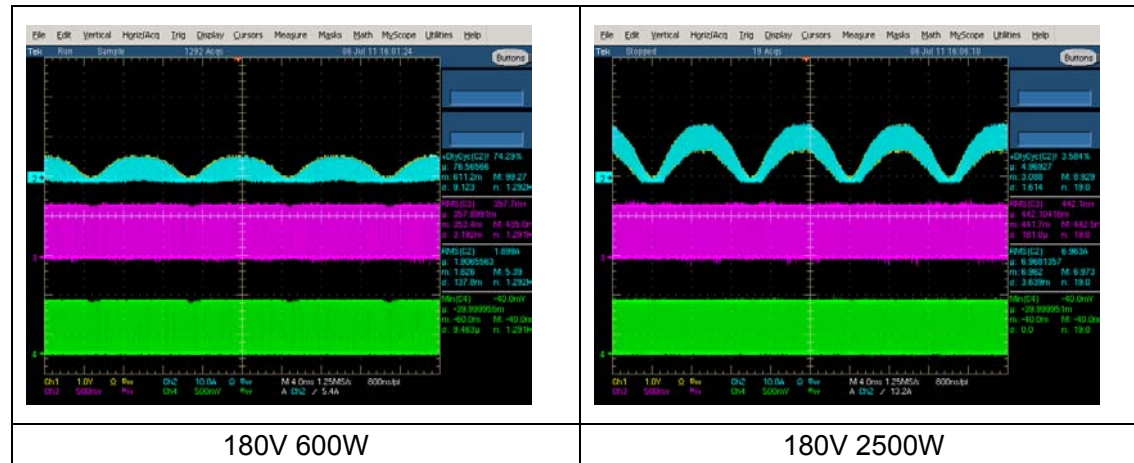
The OC trigger point is set at 1.2 times of peak current of MOSFET **Pass**

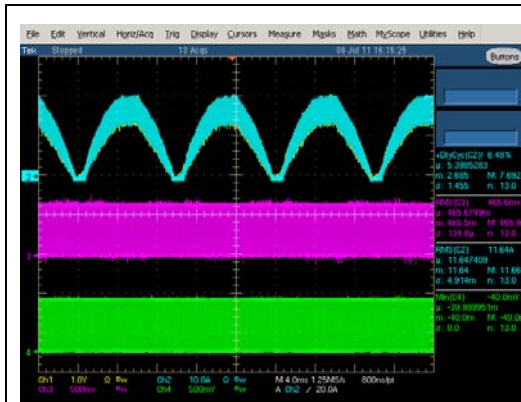
2.4 Vout Ripple





2.5 Waveform





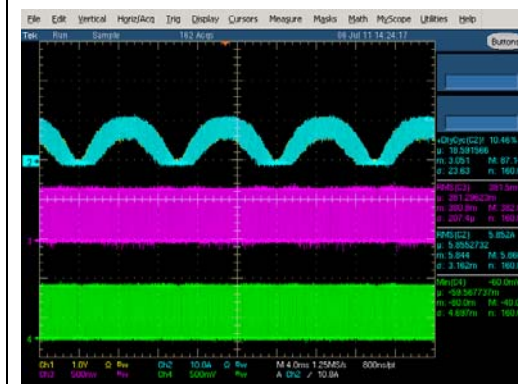
Ch1&Ch2 : Two Inductor Current

Ch3&Ch4: Two Channel Driver

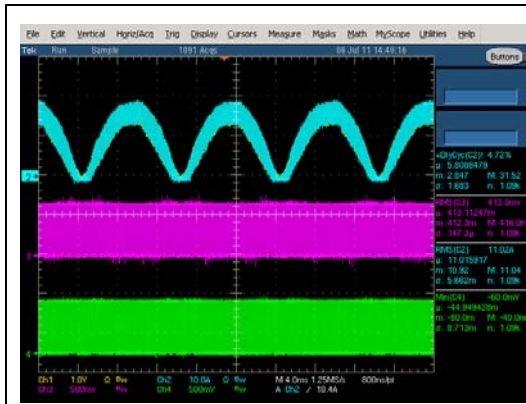
180V 4200W



220V 600W



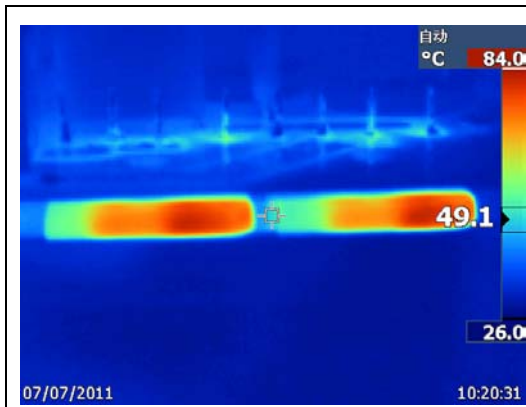
220V 2500W



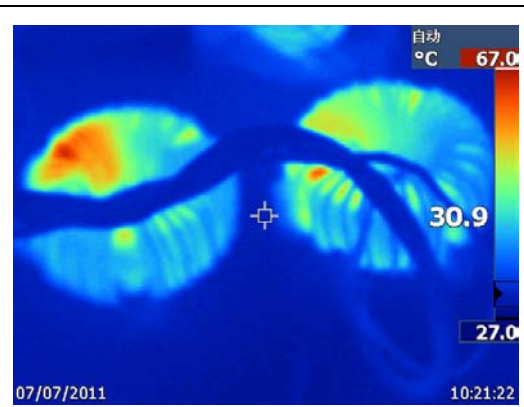
Ch1&Ch2 : Two Inductor Current
 Ch3&Ch4: Two Channel Driver

220V 5000W

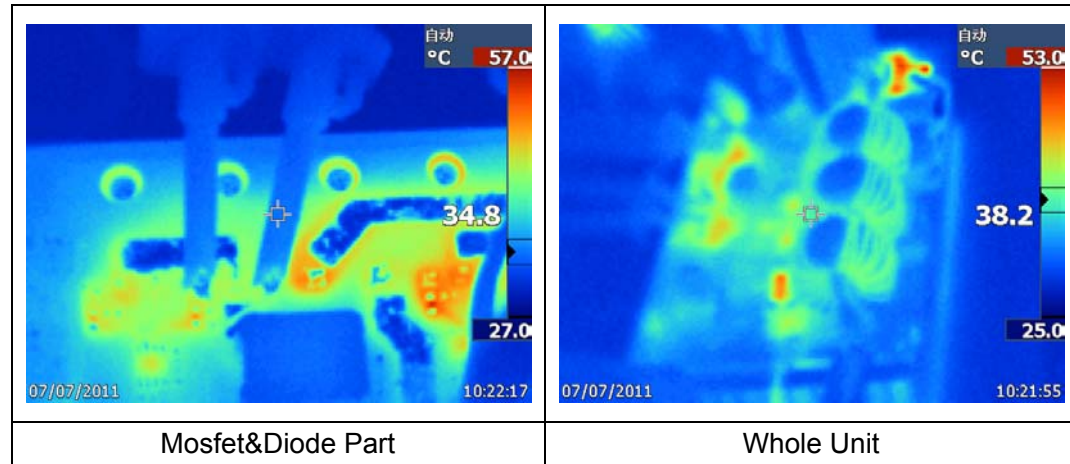
2.6 thermal



Input Bridge Rectifier



Power Inductor



2.7 EMI Performance

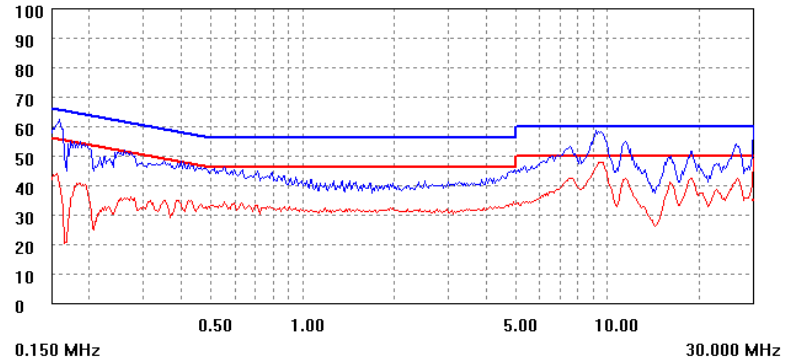
The EMI Performance is tested with 2500W Load because of the Equipment Limitation.

EMI TEST REPORT

----- parameter
Organization: Operator: EUT:
Place: Time: 2011/7/18/14:39
Detector: PK+AV Test-time(ms): 30
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
dBuV



Main changes: RECT_AC derived from after EMI filter; Change L8 to a small 8mH CM choke.
Heatsink connect to Bulk-.

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