

PM52AUBW060

FLAT-BASE TYPE
INSULATED PACKAGE

PM52AUBW060



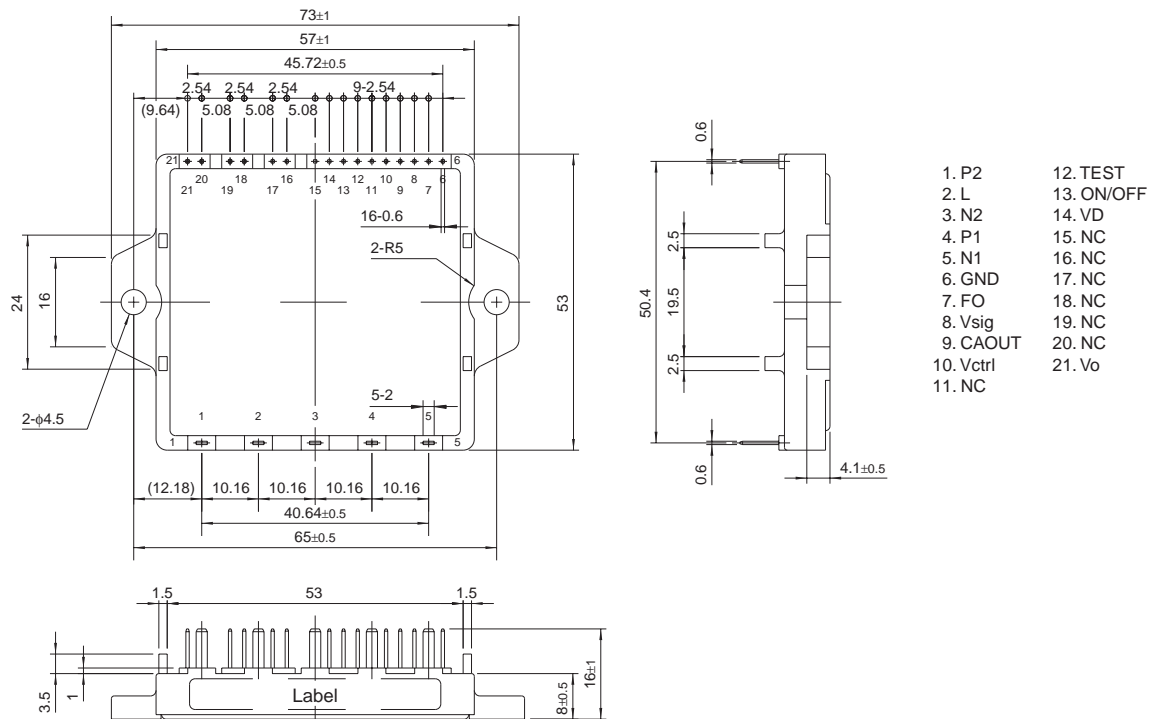
OUTLINE AND RATING

- A/F IPM Input Current Rating I_i : 100% load: 20A(rms)
125% load: 25A(rms), 1min.
- Variable DC Output Voltage Control Function
- With control function of output voltage repression under light load
- With Function of Soft Start
- Protection Functions
 - Output Voltage repression under light load ----- OV1
 - Output Over Voltage protection ----- OV2 (OV2 > OV1)
 - Under Voltage lockout protection ----- UV
 - Over temperature protection ----- OT
 - Short circuit current protection ----- SC

APPLICATION

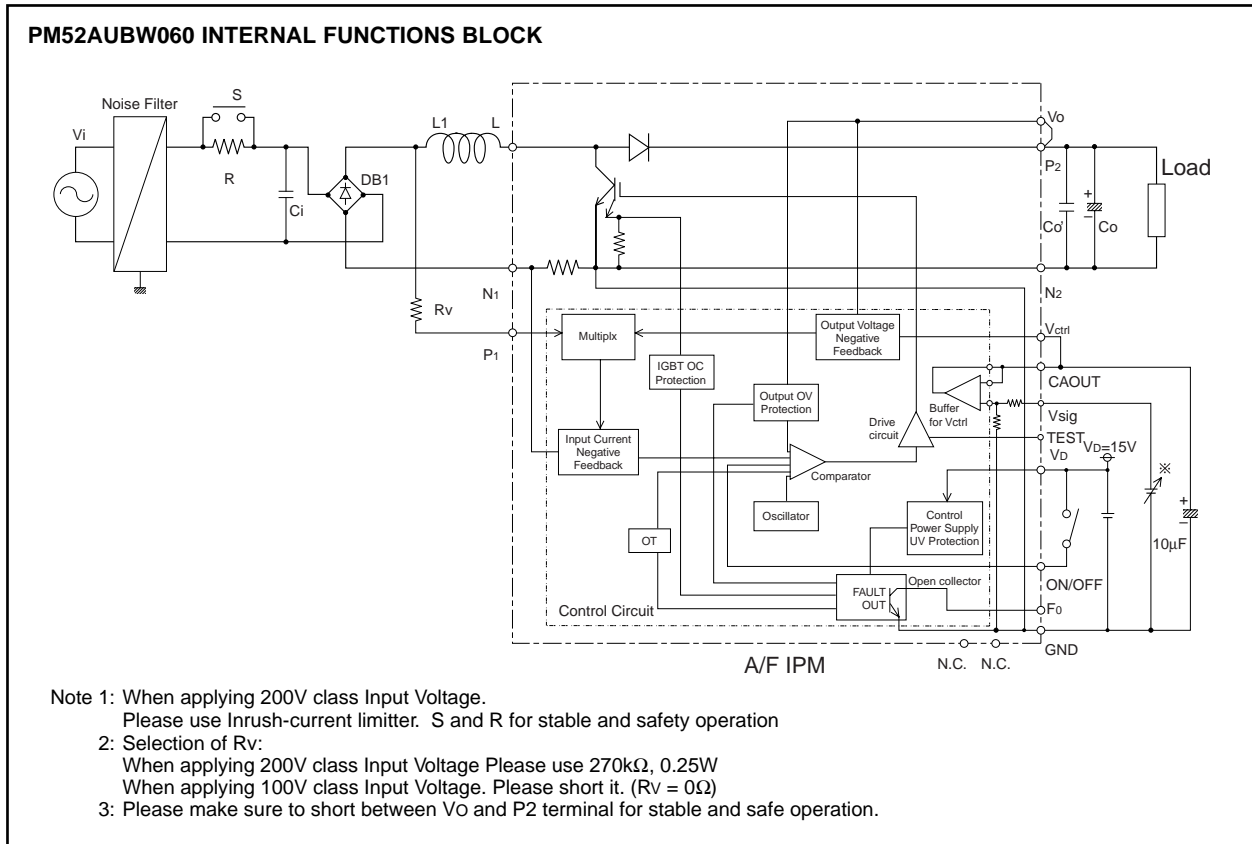
AC100V/20A, 200V/20A input Power Factor Corrector, PAM controller for Air Conditioner and General purpose Condenser Input Type Invertor use.

PACKAGE OUTLINES



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MAXIMUM RATINGS (Tj = 25°C, unless otherwise noted)

MAIN CIRCUIT PART

Symbol	Parameter	Conditions	Ratings	Unit
Vi	Supply Voltage	Applied Between: P1-N1	255	Vrms
VCC(surge)	Supply Voltage (surge)	Applied Between: P1-N1, Surge value, Non-operating	500	V
VO(surge)	Output Voltage (surge)	Applied Between: P2-N2, Surge value, Non-operating	500	V
VCEs	Collector-Emitter Voltage	—	600	V
VRRM	Repetitive Peak Reverse Voltage	—	600	V
li	Input Current (100% Load)	Tc ≤ +90°C, Vi = 100~200V, Vo = 300V	20	Arms
li(OVER LOAD)	Input Current (125% Load)	Tc ≤ +90°C, Vi = 100~200V, Vo = 300V Non-repetitive within 1 min.	25	Arms
I ² t	I ² t for Fu sing	Value for 1 msec of Surge Current	120	A ² s
	Load	Vi = 100V	2.0	kW
	Load	Vi = 200V	4.0	kW
Tj	Junction Temperature		-20 ~ +125	°C

CONTROL PART

Symbol	Parameter	Conditions	Ratings	Unit
Vd	Supply Voltage	Applied Between: Vd-GND	20	V
Vsig	Control Voltage	Applied Between: Vsig-GND	0 ~ Vd	V
VON/OFF	ON/OFF Signal Voltage	Applied Between: ON/OFF-GND	0 ~ Vd	V

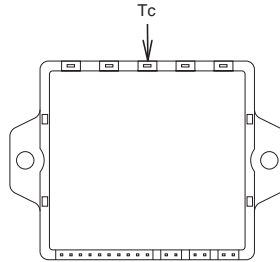
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TOTAL SYSTEM

Symbol	Parameter	Conditions	Ratings	Unit
V _o	Output Voltage		370	V
T _c	Module Case Operating Temperature	(Note 1)	-20 ~ +100	°C
T _{stg}	Storage Temperature		-40 ~ +125	
V _{iso}	Isolation Voltage	60Hz, Sinusoidal Charged part to Base, AC 1 min.	2500	V _{rms}

Note 1: T_c measurement point



ELECTRICAL CHARACTERISTICS (T_j = 25°C, V_D = 15V, L₁ = 1mH, C_o = 1mF unless otherwise noted)

MAIN CIRCUIT PART

Symbol	Parameter	Test Conditions	Limits			Unit
			Min.	Typ.	Max.	
t _{c(on)}	Switching Time	V _{CE} = 300V, I _{CE} = 30A, T _j = 125°C	—	0.07	—	μs
t _{c(off)}			—	0.24	—	
t _{rr}			V _{CE} = 300V, I _F = 30A, T _j = 125°C	—	0.07	
V _{CE(sat)}	Collector-Emitter Saturation Voltage	I _{CE} = 50A	—	1.8	2.4	V
V _F	FWDi Forward Voltage	I _F = 50A	—	2.1	2.6	V
I _{CES}	Collector-Emitter Cutoff Current	V _{CE} = 600V	—	—	1.0	mA
I _{RRM}	Repetitive Peak Reverse Current	V _{RRM} = 600V	—	—	1.0	mA
I _{rr}	Reverse Recovery Current	V _{CE} = 300V, I _{CE} = 30A	—	45	—	A

CONTROL PART

Symbol	Parameter	Test Conditions	Limits			Unit
			Min.	Typ.	Max.	
V _D	Supply Voltage	Applied between: V _D -GND	13.5	15	16.5	V
I _D	Circuit Current (Active)		—	25	30	mA
I _D	Circuit Current		—	13	—	mA
V _{th(ON)}	Input On Threshold Voltage		—	2.75	3.3	V
V _{th(OFF)}	Input Off Threshold Voltage		1.9	2.45	—	V
f _{sw}	Switching Frequency		18	20	22	kHz
UV	Supply Circuit Under Voltage Protection	Trip Level (Note 2)	11.5	12.0	12.5	V
UV _r		Reset Level (Note 2)	12.0	12.5	13.0	V
I _{ctrl}	V _{ctrl} Current	V _o = 300V, V _D = 15V, V _{ctrl} = 1.04V	—	-0.31	—	mA
OV1	Output Voltage Protection	Trip Level (Note 2)	V _o +10	V _o +20	V _o +30	V
OV1 _r		Reset Level (Note 2)	OV1-9	OV1-7	OV1-5	V
OV2	Over Voltage Protection	Trip Level (Note 2)	400	415	430	V
SC	Short Circuit Current Trip Level	Trip Level (Note 2)	—	150	—	A
OT	Oner Temperature Protection	Trip Level (Note 2)	100	110	120	°C
OT _r		Reset Level (Note 2)	—	90	—	°C
V _{FOH}	Fault Output Voltage	I _{FOL} ≤ 20μA (Non-Operating)	4.5	—	—	V
V _{FOL}		I _{FOL} ≤ 10mA (Operating)	—	—	1.0	V

Note 2: Fault output is given when the internal UV protection (Auto-reset)

Fault output is not given when the internal OV1 protection (Auto-reset)

Fault output is given when the internal OV2 protection (Reset when ON/OFF (Terminal-13) is Low)

Fault output is given when the internal SC protection (Reset when ON/OFF (Terminal-13) is Low)

Fault output is given when the internal OT protection (Auto-reset)

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TOTAL SYSTEM

Symbol	Parameter	Test Conditions	Limits			Unit
			Min.	Typ.	Max.	
Vo	Output Voltage Adjust (1)	Vi = 100V, LR = 400Ω, Vsig = 1.38V	353	360	367	V
Vo	Output Voltage Adjust (2)	Vi = 100V, LR = 400Ω, Vsig = 2.08V	293	300	307	V
Vo	Output Voltage Adjust (3)	Vi = 100V, LR = 400Ω, Vsig = 3.26V	193	200	207	V
—	Output Voltage Stability (1-1) (vs Input Voltage)	Vo = 300V, LR = 400Ω $\frac{V_o (V_i = 90V) - V_o (V_i = 100V)}{V_o (V_i = 100V)} \times 100 (\%)$	-1	—	+1	%
—	Output Voltage Stability (1-2) (vs Input Voltage)	Vo = 300V, LR = 400Ω $\frac{V_o (V_i = 110V) - V_o (V_i = 100V)}{V_o (V_i = 100V)} \times 100 (\%)$	-1	—	+1	%
—	Output Voltage Stability (2) (vs Load)	Vi = 100V, Vo = 300V $\frac{V_o (Load = 400\Omega) - V_o (Load = 48\Omega)}{V_o (Load = 48\Omega)} \times 100 (\%)$	0	—	+6	%
—	Output Voltage Stability (3-1) (vs Ambient Temp.)	Vi = 100V, Vo = 300V, LR = 400Ω $\frac{V_o (T_a = -20^\circ C) - V_o (T_a = +25^\circ C)}{V_o (T_a = +25^\circ C)} \times 100 (\%)$	-3	—	0	%
—	Output Voltage Stability (3-2) (vs Ambient Temp.)	Vi = 100V, Vo = 300V, LR = 400Ω $\frac{V_o (T_a = +100^\circ C) - V_o (T_a = +25^\circ C)}{V_o (T_a = +25^\circ C)} \times 100 (\%)$	0	—	+3	%
—	Rise Time	Vi = 100V, Vo = 300V, LR = 48Ω	—	—	100	ms
—	Over Shoot Voltage	Vi = 100V, Vo = 300V, LR = 400Ω, L1 = 1mH	—	—	30	V
cosΦ	Power Factor	Vi = 100V, Vo = 300V, LR = 48Ω	0.99	0.995	1.0	—

THERMAL RESISTANCE

Symbol	Parameter	Test Conditions	Limits			Unit
			Min.	Typ.	Max.	
Rth(j-c)Q	Junction to case Thermal Resistance	IGBT FWDi	—	—	0.94	°C/W
Rth(j-c)Di			—	—	1.15	
Rth(c-f)	Contact Thermal Resistance	Case to fin, (per 1 module) Thermal grease applied	—	—	0.09	

MECHANICAL RATINGS AND CHARACTERISTICS

Symbol	Parameter	Test Conditions	Limits			Unit
			Min.	Typ.	Max.	
—	Mounting torque	Mounting part screw: M4	0.98	1.18	1.47	N·m
—	Weight	—	—	50	—	g

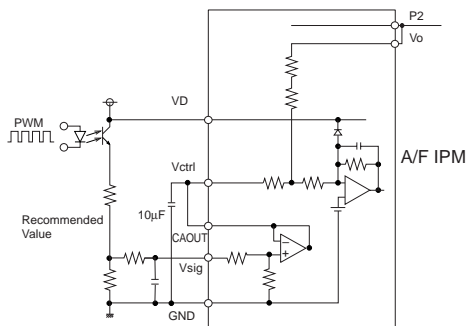
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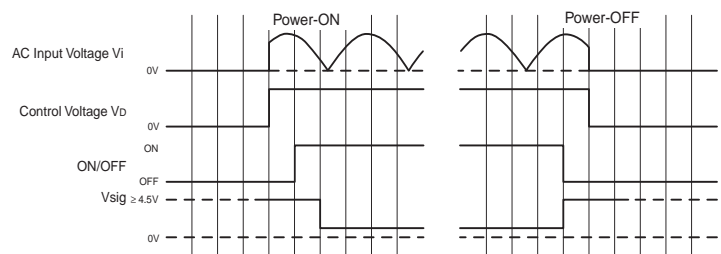
RECOMMENDED CONDITIONS FOR USE

Symbol	Parameter	Test Conditions	Limits			Unit
			Min.	Typ.	Max.	
V_i	Supply Voltage	Applied Between: P1-N1,	90	—	255	V_{rms}
V_D	Supply Voltage	Applied Between: V_D -GND	13.5	15	16.5	V
I_i	Input Current		—	—	20	A_{rms}
V_o	Output Voltage		170	300	350	V
—	Load	$V_i = 100V, V_o = 300V$	100	—	2000	W
L	Reactor		—	1	—	mH
C_i	Input Capacitor		—	3.3	—	μF
C_o	Output Capacitor		1000	—	—	μF
C_o'	Outrut Capacitor		—	3.3	—	μF

CIRCUIT OF TERMINAL V_{ctrl}

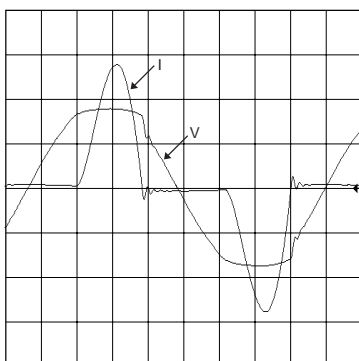


AC INPUT VOLTAGE AND CONTROL SIGNAL TIMING CHART



Please apply the POWER-ON/OFF signals as described in the above timing chart.
And please apply to adjust the PAM control signal (V_{sig}) after turning on the ON/OFF switch.

AC INPUT WAVEFORMS WITHOUT A/F IPM



AC INPUT WAVEFORM WITH A/F IPM

