

PM300CVA060

FLAT-BASE TYPE
INSULATED PACKAGE

PM300CVA060



FEATURE

- 3 ϕ 300A, 600V Current-sense IGBT for 20kHz switching
- Monolithic gate drive & protection logic
- Detection, protection & status indication circuits for over-current, short-circuit, over-temperature & under-voltage (P-Fo available from upper leg devices)
- Acoustic noise-less 30kW class inverter application
- UL Recognized

Yellow Cord No. E80276(N)

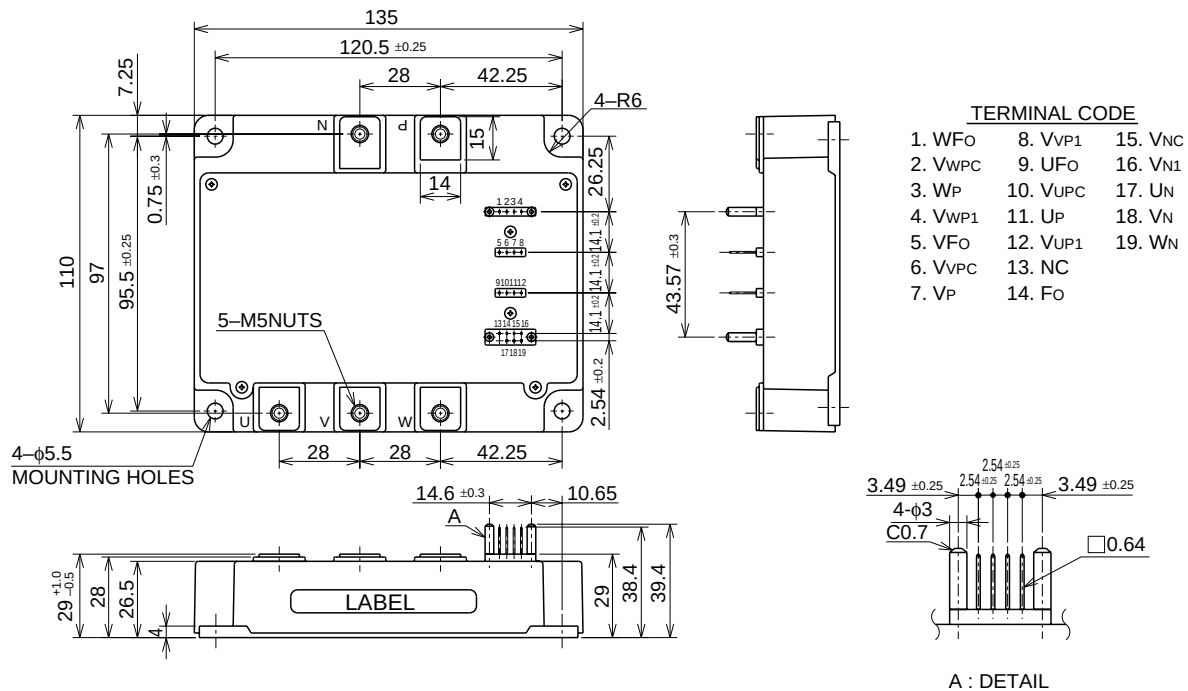
File No. E80271

APPLICATION

General purpose inverter, servo drives and other motor controls

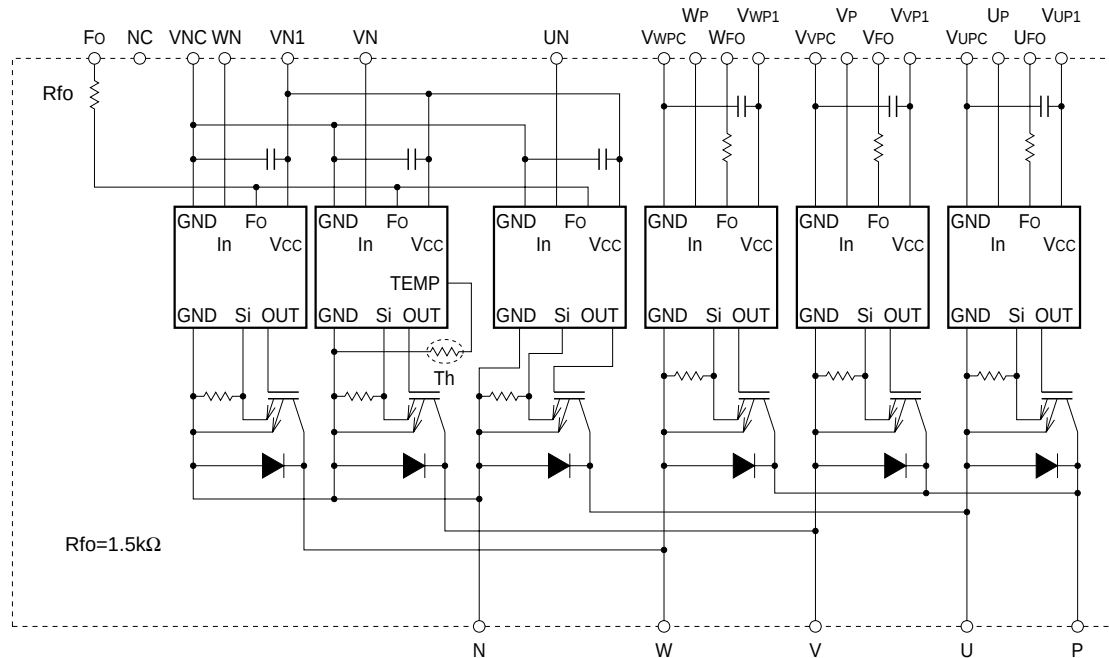
PACKAGE OUTLINES

Dimensions in mm



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INTERNAL FUNCTIONS BLOCK DIAGRAM

MAXIMUM RATINGS ($T_j = 25^\circ\text{C}$, unless otherwise noted)

INVERTER PART

Symbol	Parameter	Condition	Ratings	Unit
V_{CES}	Collector-Emitter Voltage	$V_D = 15\text{V}$, $V_{CIN} = 5\text{V}$	600	V
$\pm I_C$	Collector Current	$T_c = 25^\circ\text{C}$	300	A
$\pm I_{CP}$	Collector Current (Peak)	$T_c = 25^\circ\text{C}$	600	A
P_C	Collector Dissipation	$T_c = 25^\circ\text{C}$	668	W
T_j	Junction Temperature		$-20 \sim +150$	$^\circ\text{C}$

CONTROL PART

Symbol	Parameter	Condition	Ratings	Unit
V_D	Supply Voltage	Applied between : $V_{UP1}-V_{UPC}$ $V_{VP1}-V_{VPC}$, $V_{WP1}-V_{WPC}$, $V_{N1}-V_{NC}$	20	V
V_{CIN}	Input Voltage	Applied between : U_P-V_{UPC} , V_P-V_{VPC} , W_P-V_{WPC} $U_N \cdot V_N \cdot W_N-V_{NC}$	20	V
V_{FO}	Fault Output Supply Voltage	Applied between : $U_{FO}-V_{UPC}$, $V_{FO}-V_{VPC}$, $W_{FO}-V_{WPC}$ F_O-V_{NC}	20	V
I_{FO}	Fault Output Current	Sink current at U_{FO} , V_{FO} , W_{FO} and F_O terminal	20	mA

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Symbol	Parameter	Condition	Ratings	Unit
V _{CC(Prot)}	Supply Voltage Protected by SC	V _D = 13.5 ~ 16.5V, Inverter Part, T _j = 125°C Start	400	V
V _{CC(surge)}	Supply Voltage (Surge)	Applied between : P-N, Surge value or without switching	500	V
T _C	Module Case Operating Temperature		-20 ~ +100	°C
T _{stg}	Storage Temperature		-40 ~ +125	°C
V _{iso}	Isolation Voltage	60Hz, Sinusoidal, Charged part to Base, AC 1 min.	2500	V _{rms}

ELECTRICAL CHARACTERISTICS (T_j = 25°C, unless otherwise noted)**INVERTER PART**

Symbol	Parameter	Test Condition		Limits			Unit
				Min.	Typ.	Max.	
VCE(sat)	Collector-Emitter Saturation Voltage	V _D = 15V, I _C = 300A	T _J = 25°C	—	2.35	2.80	V
		V _{CIN} = 0V	T _J = 125°C	—	2.55	3.05	
VEC	FWDi Forward Voltage	-I _C = 300A, V _D = 15V, V _{CIN} = 5V		—	2.20	3.30	V
ton	Switching Time	V _D = 15V, I _{CIN} = 0V↔5V V _{CC} = 300V, I _C = 300A T _J = 125°C Inductive Load (upper and lower arm)		0.4	0.8	2.1	μs
trr				—	0.2	0.3	
tc(on)				—	0.3	1.1	
toff				—	1.8	2.9	
tc(off)				—	0.6	1.2	
ICES	Collector-Emitter Cutoff Current	VCE = VCES, V _D = 15V	T _J = 25°C	—	—	1	mA
			T _J = 125°C	—	—	10	

CONTROL PART

Symbol	Parameter	Test Condition		Limits			Unit
				Min.	Typ.	Max.	
ID	Circuit Current	VD = 15V, V _{CIN} = 5V	V _{N1} -V _N C	—	72	100	mA
			V _{XP1} -V _{XP} C	—	24	34	
V _{th} (ON)	Input ON Threshold Voltage	Applied between : UP-V _{UPC} , VP-V _{VPC} , WP-V _{WPC} UN • VN • WN-V _N C		1.2	1.5	1.8	V
V _{th} (OFF)	Input OFF Threshold Voltage			1.7	2.0	2.3	
SC	Short Circuit Trip Level	−20≤ Tj ≤ 125°C, VD = 15V		396	—	—	A
toff(SC)	Short Circuit Current Delay Time	VD = 15V		—	10	—	μs
OT	Over Temperature Protection	Base-plate	Trip level	111	118	125	°C
OTr		Temperature detection, VD = 15V	Reset level	—	100	—	
UV	Supply Circuit Under-Voltage Protection	Tj ≤ 125°C	Trip level	11.5	12.0	12.5	V
UVr			Reset level	—	12.5	—	
I _{FO} (H)	Fault Output Current (Note-1)	VD = 15V, V _{FO} = 15V		—	—	0.01	mA
I _{FO} (L)				—	10	15	
t _{FO}	Minimum Fault Output Pulse Width (Note-1)	VD = 15V		1.0	1.8	—	ms

(Note-1) Fault output is given only when the internal SC, OT & UV protection.

Fault output of OT protection operate by lower arm

Fault output of OT, UV protection given pulse while over level.

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Symbol	Parameter	Test Condition	Limits			Unit
			Min.	Typ.	Max.	
R _{th(j-c)Q}	Junction to case Thermal	Inverter IGBT part (per 1/6 module)	—	—	0.187	°C/W
R _{th(j-c)F}	Resistances	Inverter FWDi part (per 1/6 module)	—	—	0.26	
R _{th(c-f)}	Contact Thermal Resistance	Case to fin, Thermal grease applied (per 1 module)	—	—	0.018	

MECHANICAL RATINGS AND CHARACTERISTICS

Symbol	Parameter	Test Condition	Limits			Unit
			Min.	Typ.	Max.	
—	Mounting torque	Mounting part screw : M5	2.5	3.0	3.5	N • m
—	Mounting torque	Main terminal screw : M5	2.5	3.0	3.5	N • m
—	Weight		—	1000	—	g

RECOMMENDED CONDITIONS FOR USE

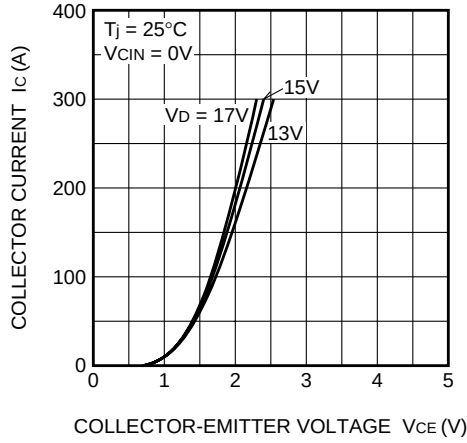
Symbol	Parameter	Test Condition	Recommended value	Unit
V _{CC}	Supply Voltage	Applied across P-N terminals	≤ 400	V
V _D	Control Supply Voltage	Applied between : V _{UP1} -V _{UPC} , V _{VP1} -V _{VPC} V _{WP1} -V _{WPC} , V _{N1} -V _{NVC}	15 ± 1.5	V
V _{CIN(ON)}	Input ON Voltage	Applied between : U _P -V _{UPC} , V _P -V _{VPC} , W _P -V _{WPC} U _N • V _N • W _N -V _{NVC}	≤ 0.8	V
V _{CIN(OFF)}	Input OFF Voltage		≥ 4.0	
t _{dead}	Arm Shoot-through Blocking Time	For IPM's each input signals	≥ 2.5	μs
f _{PWM}	PWM Input Frequency	Using Application Circuit input signal of IPM, 3φ Sinusoidal PWM VVVF inverter	≤ 20	kHz

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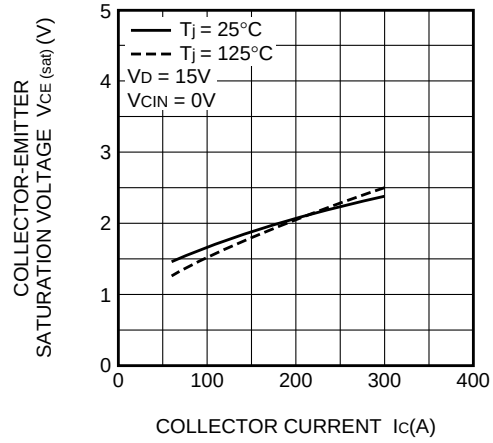
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PERFORMANCE CURVES

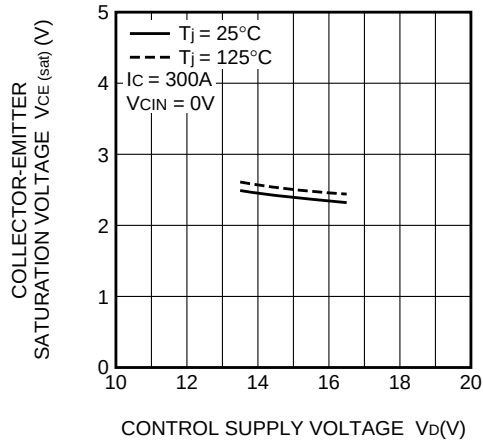
OUTPUT CHARACTERISTICS
(TYPICAL)



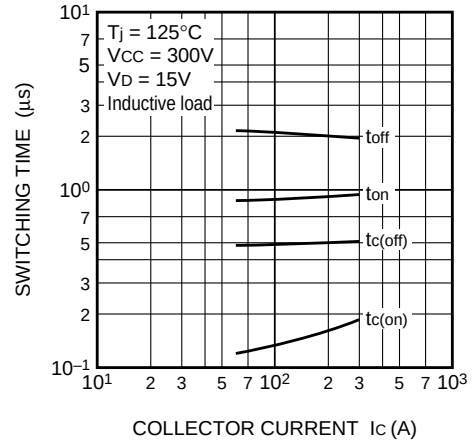
COLLECTOR-EMITTER SATURATION
VOLTAGE CHARACTERISTICS
(TYPICAL)



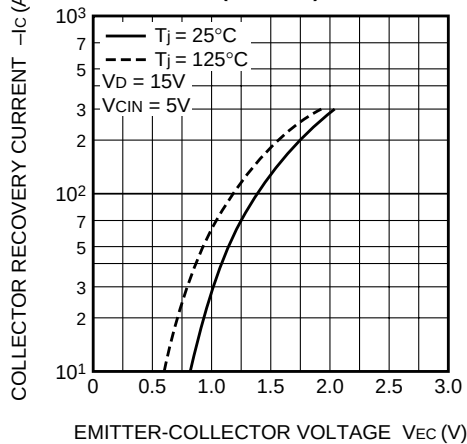
COLLECTOR-EMITTER SATURATION
VOLTAGE CHARACTERISTICS
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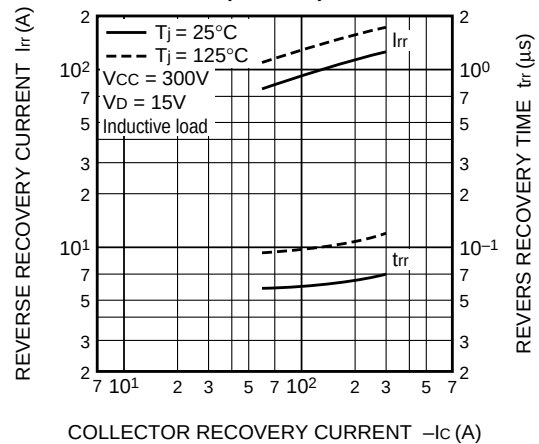
SWITCHING CHARACTERISTICS
(TYPICAL)



DIODE FORWARD CHARACTERISTICS
(TYPICAL)



DIODE REVERSE RECOVERY CHARACTERISTICS
(TYPICAL)



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