

PM300CVA060

FLAT-BASE TYPE
INSULATED PACKAGE

PM300CVA060



FEATURE

- 3φ 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 Card No. E80276(N)

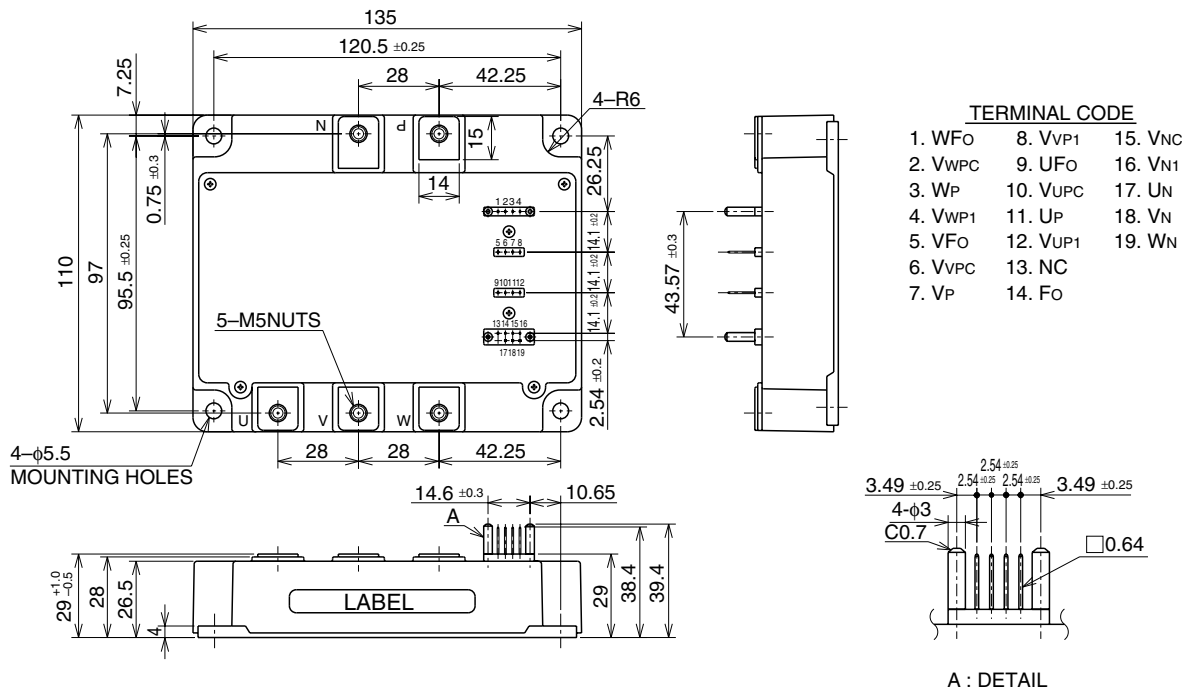
File No. E80271

APPLICATION

General purpose inverter, servo drives and other motor controls

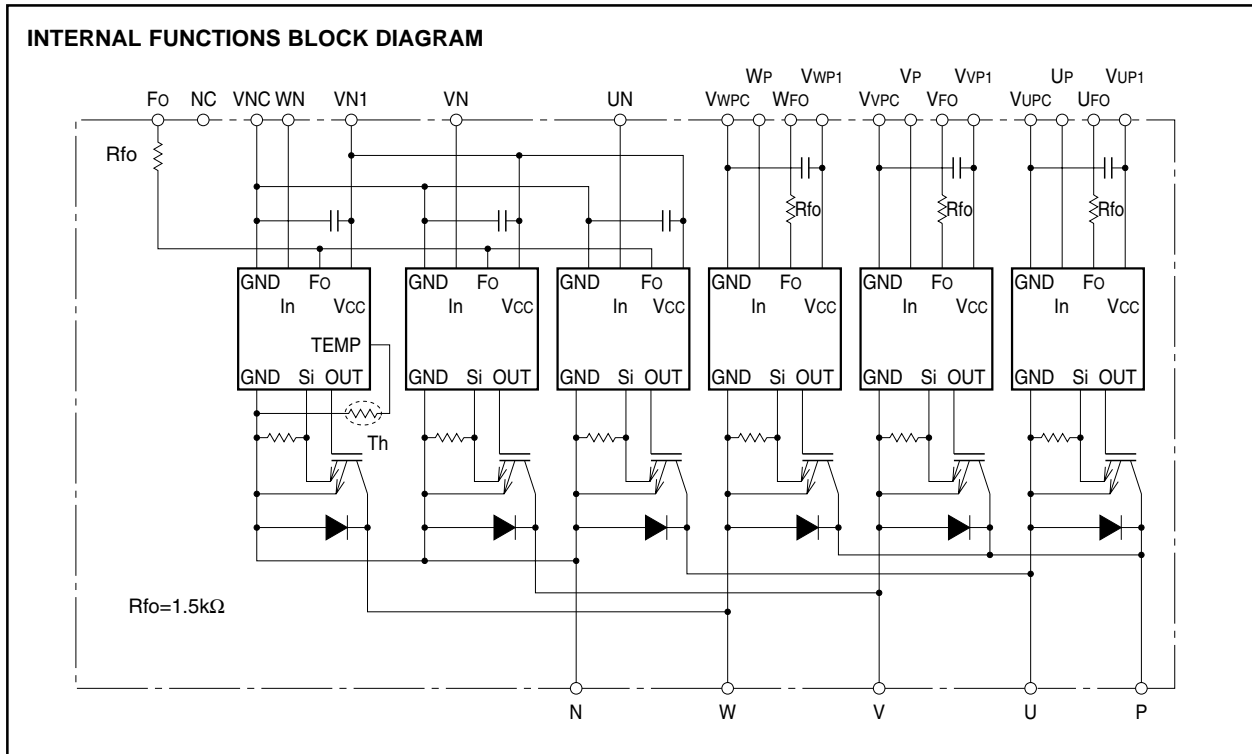
PACKAGE OUTLINES

Dimensions in mm



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

INVERTER PART

Symbol	Parameter	Condition	Ratings	Unit
V_{CES}	Collector-Emitter Voltage	$V_D = 15\text{V}$, $V_{CIN} = 15\text{V}$	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 ~ +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

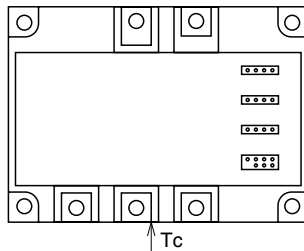
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TOTAL SYSTEM

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	(Note-1)	-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}

(Note-1) T_c measurement point is below. (3mm depth at the center of the side of base plate)



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

INVERTER PART

Symbol	Parameter	Test Condition	Limits			Unit	
			Min.	Typ.	Max.		
V _{CE(sat)}	Collector-Emitter Saturation Voltage	V _D = 15V, I _c = 300A V _{CIN} = 0V	T _j = 25°C	—	2.35	2.80	V
			T _j = 125°C	—	2.55	3.05	
V _{EC}	FWDI Forward Voltage	-I _c = 300A, V _D = 15V, V _{CIN} = 15V	—	2.20	3.30	V	
t _{on}	Switching Time	V _D = 15V, V _{CIN} = 0V↔15V V _{CC} = 300V, I _c = 300A T _j = 125°C Inductive Load (upper and lower arm)	—	0.4	0.8	2.1	μs
t _{tr}			—	0.2	0.3		
t _{c(on)}			—	0.3	1.1		
t _{off}			—	1.8	2.9		
t _{c(off)}			—	0.6	1.2		
I _{CES}	Collector-Emitter Cutoff Current	V _{CE} = V _{CES} , V _{CIN} = 15V	T _j = 25°C	—	—	1	mA
			T _j = 125°C	—	—	10	

CONTROL PART

Symbol	Parameter	Test Condition	Limits			Unit	
			Min.	Typ.	Max.		
I _D	Circuit Current	V _D = 15V, V _{CIN} = 15V	V _{N1} -V _{Nc}	—	72	100	mA
			V*P1-V*PC	—	24	34	
V _{th(ON)}	Input ON Threshold Voltage	Applied between : UP-V _{UPC} , VP-V _{VPC} , WP-V _{WPC}	1.2	1.5	1.8	V	
V _{th(OFF)}	Input OFF Threshold Voltage	UN • VN • WN-V _{Nc}	1.7	2.0	2.3		
SC	Short Circuit Trip Level	-20 ≤ T _j ≤ 125°C, V _D = 15V	396	—	—	A	
t _{off(SC)}	Short Circuit Current Delay Time	V _D = 15V	—	10	—	μs	
OT	Over Temperature Protection	Base-plate Temperature detection, V _D = 15V	Trip level	111	118	125	°C
			Reset level	—	100	—	
UV	Supply Circuit Under-Voltage Protection	-20 ≤ T _j ≤ 125°C	Trip level	11.5	12.0	12.5	V
			Reset level	—	12.5	—	
I _{FO(H)}	Fault Output Current	V _D = 15V, V _{FO} = 15V	(Note-2)	—	—	0.01	mA
I _{FO(L)}			(Note-2)	—	10	15	
t _{FO}	Minimum Fault Output Pulse Width	V _D = 15V	(Note-2)	1.0	1.8	—	ms

(Note-2) 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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INSULATED PACKAGE**THERMAL RESISTANCES**

Symbol	Parameter	Test Condition	Limits			Unit
			Min.	Typ.	Max.	
R _{th(j-c)Q}	Junction to case Thermal Resistances	Inverter IGBT part (per 1/6 module)	—	—	0.187	°C/W
R _{th(j-c)F}		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} (Note-3)	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

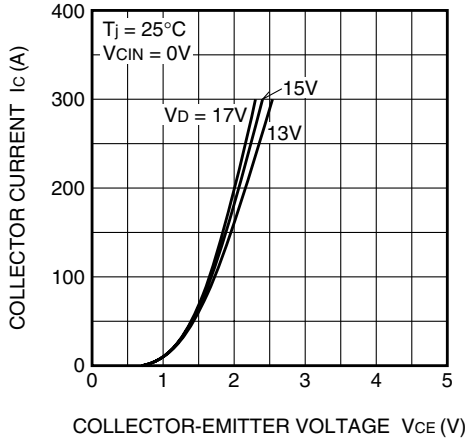
(Note-3) With ripple satisfying the following conditions dv/dt swing ≤ ±5V/μs, Variation ≤ 2V peak to peak

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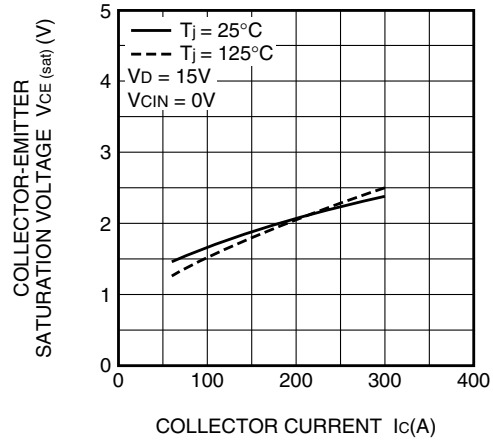
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PERFORMANCE CURVES

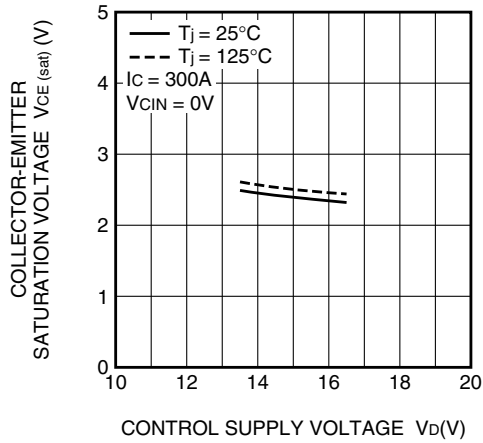
OUTPUT CHARACTERISTICS (TYPICAL)



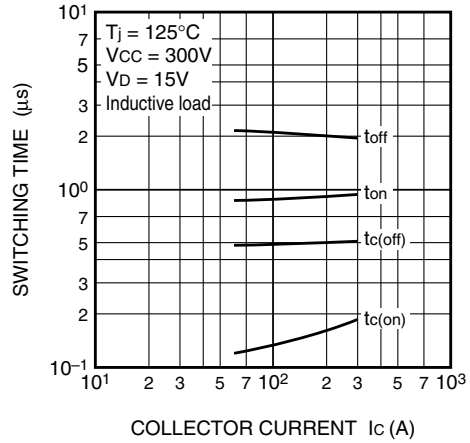
COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



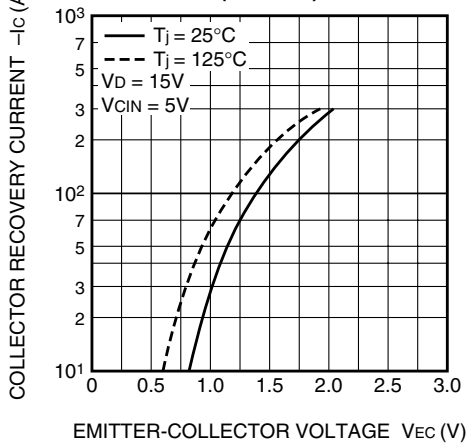
COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



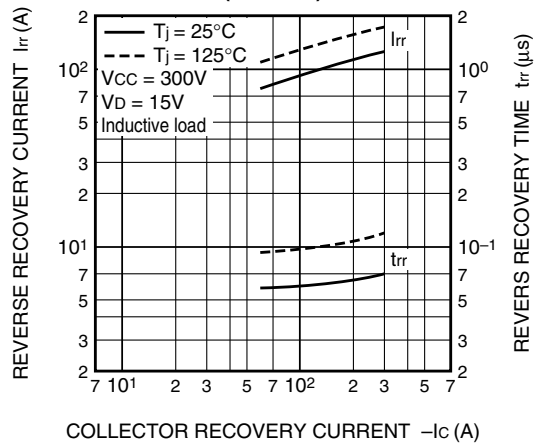
SWITCHING CHARACTERISTICS (TYPICAL)



DIODE FORWARD CHARACTERISTICS (TYPICAL)



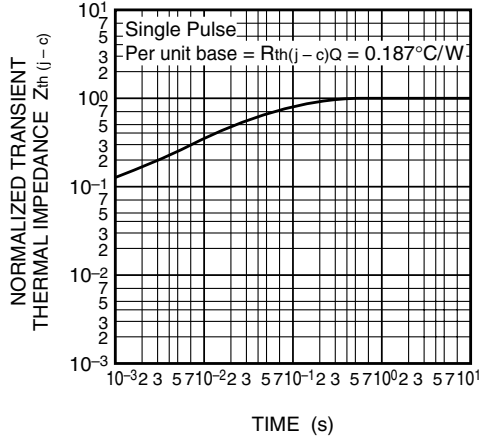
DIODE REVERSE RECOVERY CHARACTERISTICS (TYPICAL)



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**TRANSIENT THERMAL
IMPEDANCE CHARACTERISTICS
(IGBT per 1 element)**



**TRANSIENT THERMAL
IMPEDANCE CHARACTERISTICS
(FWDi per 1 element)**

