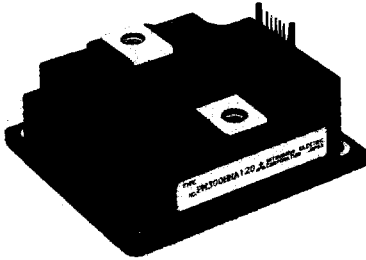


PM300HHA120

FLAT-BASE TYPE
INSULATED PACKAGE

PM300HHA120



- 1/2 φ 300A, 1200V Current-sense IGBT type inverter
- Monolithic gate drive & protection logic
- Detection, protection & status indication circuits for over-current, short-circuit, over-temperature & under-voltage
- Acoustic noise-less 45 / 55kW class inverter application
- UL Recognized

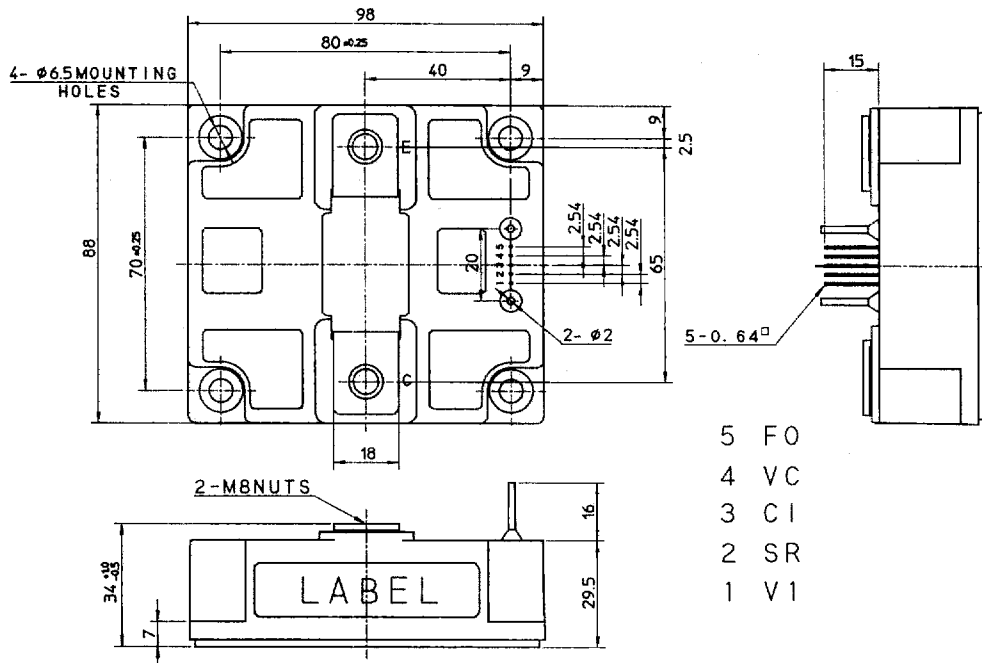
Yellow Card No. E80276 (N)
File No. E80271

APPLICATION

General purpose inverter, servo drives and other motor controls

OUTLINE DRAWING

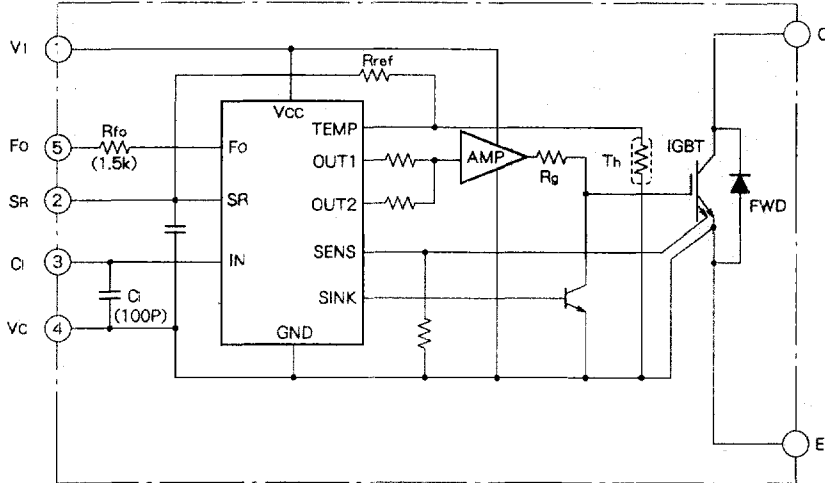
Dimensions in mm



PM300HHA120

**FLAT-BASE TYPE
INSULATED PACKAGE**

EQUIVALENT CIRCUIT DIAGRAM



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

INVERTER PART

Symbol	Parameter	Conditions	Ratings	Unit
V_{CES}	Collector-emitter voltage		1200	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	$T_c = 25^\circ\text{C}$	2080	W
T_j	Junction temperature		- 20 ~ + 150	$^\circ\text{C}$

CONTROL PART

Symbol	Parameter	Conditions	Ratings	Unit
V_D	Supply voltage	Applied between : V_1 - V_c	20	V
V_{CIN}	Input voltage	Applied between : C_i - V_c	10	V
V_{Fo}	Fault output supply voltage	Applied between : F_o - V_c	20	V
I_{Fo}	Fault output current	Sink current of F_o terminal	20	mA

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TOTAL SYSTEM

Symbol	Parameter	Conditions	Ratings	Unit
V _{CC(Prot)}	Supply voltage protected by OC & SC	V _D = 13.5~16.5V Inverter part, T _J = 125°C start	800	V
T _C	Module case operating temperature		- 20~ + 100	°C
T _{stg}	Storage temperature		- 40~ + 125	°C
V _{iso}	Isolation voltage	60Hz, sinusoidal, AC, 1min	2500	Vrms

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

INVERTER PART

Symbol	Parameter	Test conditions	Limits			Unit
			Min	Typ	Max	
V _{CE(sat)}	Collector-emitter saturation voltage	V _D = 15V, V _{CIN} = 0V Pulsed				V
		I _C = 300A, T _J = 25°C	-	2.8	3.8	
		I _C = 300A, T _J = 125°C	-	2.4	3.4	
V _{EC}	FWDi forward voltage	- I _C = 300A, V _{CIN} = 5V	-	1.8	3.0	V
t _{on}	Switching time	V _D = 15V, V _{CIN} = 0V↔5V V _{CC} = 600V, I _C = 300A T _J = 125°C (Per 1arm) Inductive load	0.5	1.4	2.5	μs
t _{rr}			-	0.3	0.6	μs
t _{c(on)}			-	0.4	1.0	μs
t _{off}			-	3.5	4.0	μs
t _{c(off)}			-	0.8	1.2	μs
I _{CES}	Collector-emitter cutoff current	V _{CE} = V _{CES} , V _{CIN} = 5V				mA
		T _J = 25°C	-	-	1	
		T _J = 125°C	-	-	10	

CONTROL PART

Symbol	Parameter	Test conditions	Limits			Unit
			Min	Typ	Max	
V _D	Supply voltage	Applied between : V ₁ -V _C	13.5	15	16.5	V
I _D	Circuit current	V _D = 15V, V _{CIN} = 5V, V ₁ terminal current	-	23	30	mA
V _{CIN(ON)}	Input on threshold voltage	Applied between : C ₁ -V _C	1.2	1.5	1.8	V
V _{CIN(OFF)}	Input off threshold voltage		1.7	2.0	2.3	V
f _{PWM}	PWM input frequency	3φ sinusoidal	-	15	20	kHz
t _{dead}	Arm shoot-through blocking time	For each IPM's input signals	4	-	-	μs
		Using application circuit I _F = 12mA	6	-	-	
OC	Over current trip level	T _J ≤ 125°C, V _D = 15V	380	560	-	A
SC	Short circuit trip level	T _J ≤ 125°C, V _D = 15V	500	840	-	A
t _{off(oc)}	Over current delay time	V _D = 15V	-	5	-	μs
OT	Over temperature protection	Trip level	100	110	120	°C
		Reset level	85	95	105	°C
UV	Supply circuit under voltage protection	Trip level	11.5	12.0	12.5	V
		Reset level	-	12.5	-	V
I _{Fo(H)}	Fault output current (Note 1)	V _D = 15V, V _{Fo} = 15V	-	-	0.01	mA
I _{Fo(L)}			-	10	15	
t _{Fo}	Minimum fault output pulse width (Note 1)	V _D = 15V	1.0	1.8	-	ms
V _{SR}	SR terminal output voltage	T _J ≤ 125°C, R _{in} = 6.8kΩ	4.5	5.1	5.6	V

Note 1. Fault output is given only when the internal OC, SC, OT & UV protections schemes of either upper or lower arm device operate to protect it.

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THERMAL RESISTANCE

Symbol	Parameter	Test conditions	Limits			Unit
			Min	Typ	Max	
$R_{th(j-c)Q}$	Junction to case thermal resistances	Inverter IGBT part	-	-	0.060	°C/W
$R_{th(j-c)F}$	thermal resistances	Inverter FWDi part	-	-	0.12	°C/W
$R_{th(c-f)}$	Contact thermal resistance	Thermal grease applied	-	-	0.038	°C/W

MECHANICAL RATINGS AND CHARACTERISTICS

Symbol	Parameter	Test conditions	Limits			Unit
			Min	Typ	Max	
-	Mounting torque	Mounting part screw : M6	1.96	2.45	2.94	N · m
			20	25	30	kg · cm
-	Mounting torque	Main terminals part screw : M8	8.83	9.81	10.8	N · m
			90	100	110	kg · cm
-	Weight		-	630	-	g

RECOMMENDED CONDITIONS FOR USE

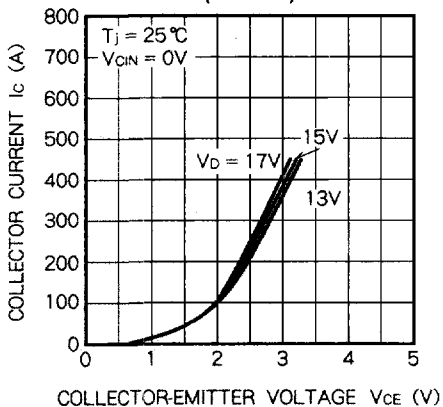
Symbol	Parameter	Test conditions	Value			Unit
			Min	Typ	Max	
V_{cc}	Supply voltage	Applied across C-E terminals	0	600	800	V
V_D		Applied between : V_i - V_c	13.5	15	16.5	V
$V_{CIN(ON)}$	Input on voltage	Applied between : C_i - V_c	0	-	0.8	V
$V_{CIN(OFF)}$	Input off voltage		4	-	V_{SR}	V
f_{PWM}	PWM Input frequency	Using application circuit	5	15	20	kHz
t_{dead}	Arm shoot-through blocking time	Using application circuit opto-coupler's input signal	6	-	-	μs

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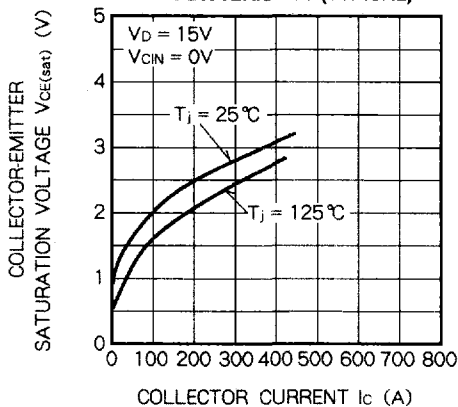
FLAT-BASE TYPE
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PERFORMANCE CURVES

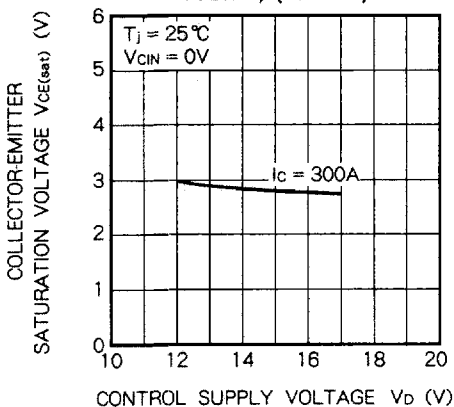
OUTPUT CHARACTERISTICS (TYPICAL)



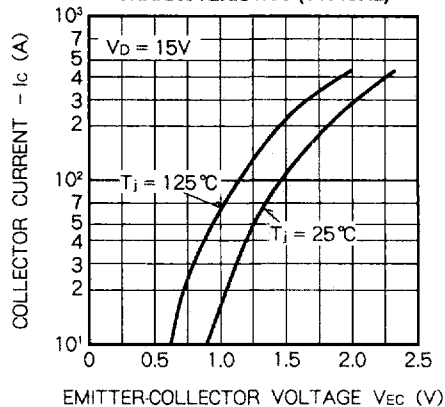
SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



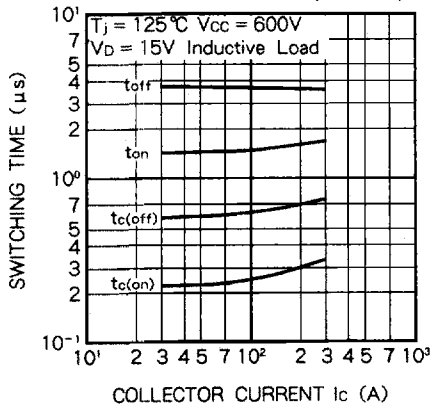
COLLECTOR-EMITTER SATURATION VOLTAGE (TYPICAL)



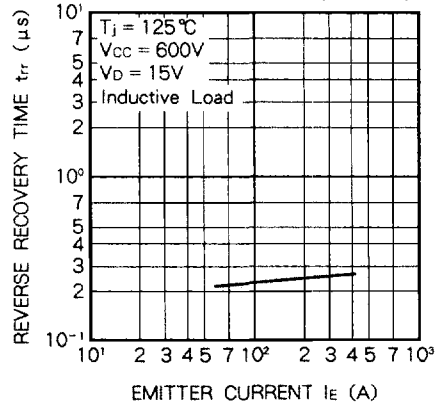
FREE-WHEEL DIODE FORWARD CHARACTERISTICS (TYPICAL)



SWITCHING TIME VS. COLLECTOR CURRENT (TYPICAL)



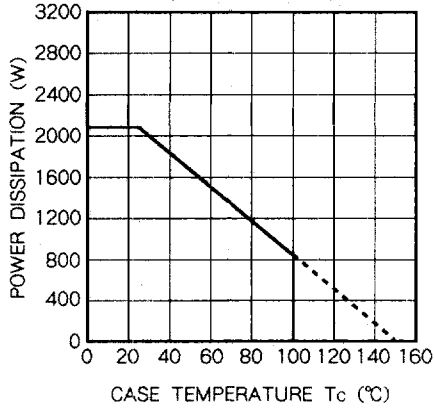
REVERSE RECOVERY CHARACTERISTICS OF FREE-WHEEL DIODE (TYPICAL)



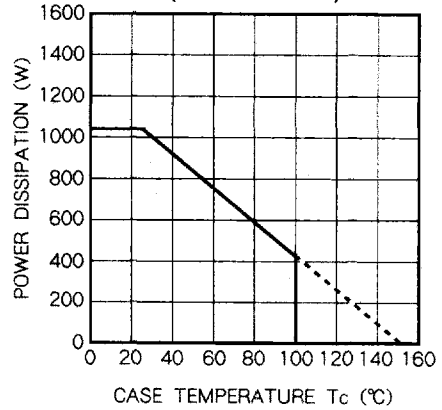
PM300HHA120

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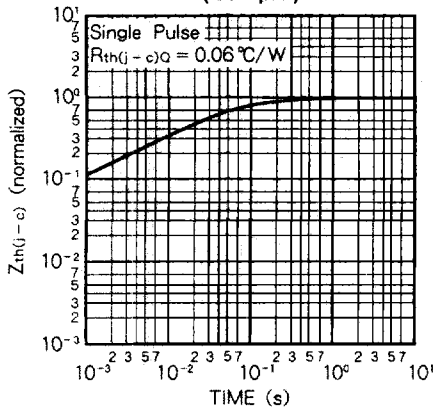
POWER DISSIPATION DERATING CURVE
(Per IGBT element)



POWER DISSIPATION DERATING CURVE
(Per FWDi element)



TRANSIENT THERMAL
IMPEDANCE CHARACTERISTICS
(IGBT part)



TRANSIENT THERMAL
IMPEDANCE CHARACTERISTICS
(FWDi part)

