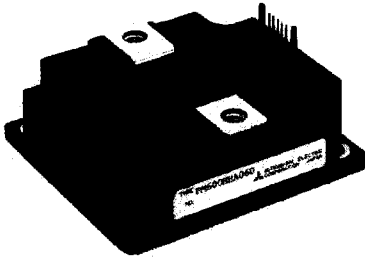


PM600HHA060

FLAT-BASE TYPE
INSULATED PACKAGE

PM600HHA060



- 1/2 φ 600A, 600V 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

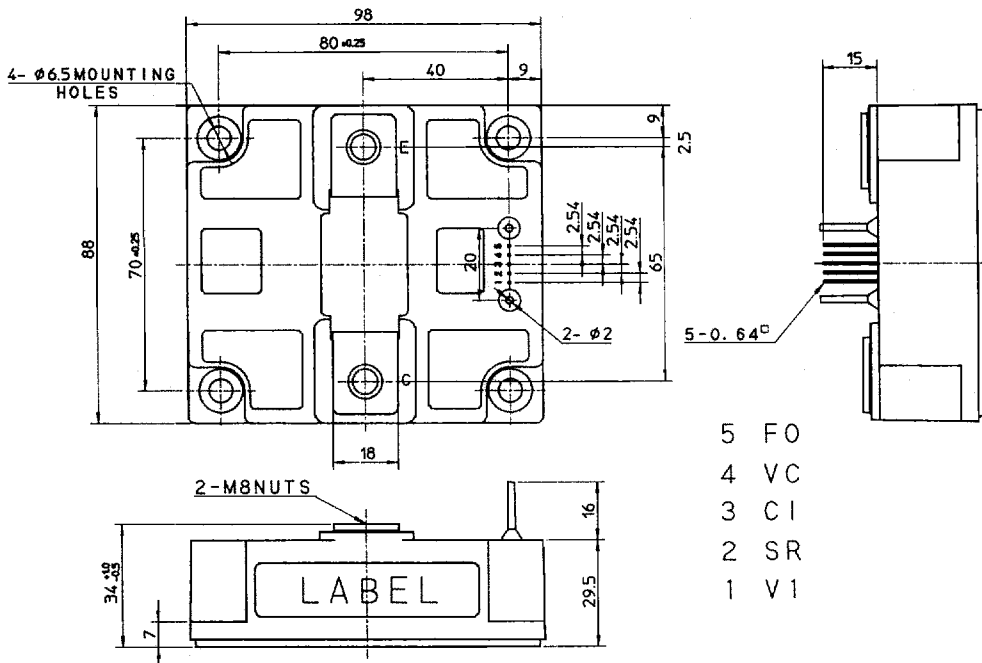
Yellow Card No. E80276 (N)
File No. E80271

APPLICATION

General purpose inverter, servo drives and other motor controls

OUTLINE DRAWING

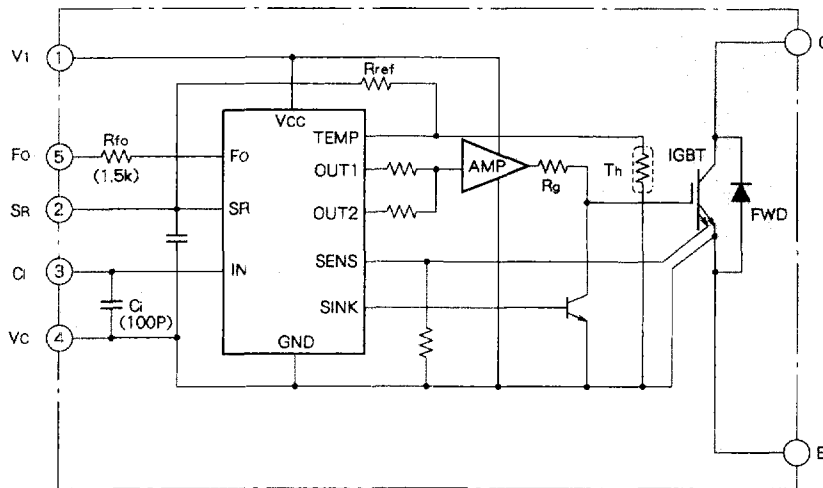
Dimensions in mm



PM600HHA060

FLAT-BASE TYPE
INSULATED PACKAGE

EQUIVALENT CIRCUIT DIAGRAM



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

INVERTER PART

Symbol	Parameter	Conditions	Ratings	Unit
V _{CES}	Collector-emitter voltage		600	V
± I _c	Collector current	T _c = 25 °C	600	A
± I _{cP}	Collector current (peak)	T _c = 25 °C	1200	A
P _c	Collector dissipation	T _c = 25 °C	2080	W
T _j	Junction temperature		- 20 ~ + 150	°C

CONTROL PART

Symbol	Parameter	Conditions	Ratings	Unit
V _D	Supply voltage	Applied between : V _i -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

PM600HHA060

**FLAT-BASE TYPE
INSULATED PACKAGE**

THERMAL RESISTANCES

Symbol	Parameter	Test conditions	Limits			Unit
			Min	Typ	Max	
$R_{th(j-c)}$	Junction to case thermal resistances	Inverter IGBT part	-	-	0.06	°C/W
$R_{th(j-c)F}$		Inverter FWDi part	-	-	0.12	°C/W
$R_{th(c-f)}$	Contact thermal resistances	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 20	2.45 25	2.94 30	N · m kg · cm
-	Mounting torque	Main terminals part screw : M8	8.83 90	9.81 100	10.8 110	N · m 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	300	400	V
V_D		Applied between : V_1 - 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

PM600HHA060
**FLAT-BASE TYPE
INSULATED PACKAGE**
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	400	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	V _{rms}

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 I _c = 600A, T _J = 25°C I _c = 600A, T _J = 125°C	-	2.6 2.4	3.5 3.4	V
V _{EC}	FWDi forward voltage	- I _c = 600A, V _{CIN} = 5V	-	1.6	2.5	V
t _{on}	Switching time	V _D = 15V, V _{CIN} = 0V ↔ 5V V _{CC} = 300V, I _c = 600A T _J = 125°C (Per 1arm) Inductive load	0.5	1.4	2.5	μs
t _{rr}			-	0.2	0.4	μs
t _{c(on)}			-	0.5	1.0	μs
t _{off}			-	2.0	3.0	μs
t _{c(off)}			-	0.5	1.0	μs
I _{CES}	Collector-emitter cutoff current	V _{CE} = V _{CEs} , V _{CIN} = 5V T _J = 25°C T _J = 125°C	-	-	1 10	mA

CONTROL PART

Symbol	Parameter	Test conditions	Limits			Unit
			Min	Typ	Max	
V _D	Supply voltage	Applied between : V _I -V _C	13.5	15	16.5	V
I _D	Circuit current	V _D = 15V, V _{CIN} = 5V, V _I terminal current	-	23	30	mA
V _{CIN(ON)}	Input on threshold voltage	Applied between : C _I -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 Using application circuit I _F = 12mA	4 6	- -	- -	μs
OC	Over current trip level	T _J ≤ 125°C, V _D = 15V	740	1000	-	A
SC	Short circuit trip level	T _J ≤ 125°C, V _D = 15V	1000	1400	-	A
t _{off(oc)}	Over current delay time	V _D = 15V	-	5	-	μs
OT	Over temperature protection	Trip level	100	110	120	°C
OT _r		Reset level	Base-plate temperature detection, V _D = 15V	85	95	105
UV	Supply circuit under voltage protection	Trip level	11.5	12.0	12.5	V
UV _r		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	mA
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

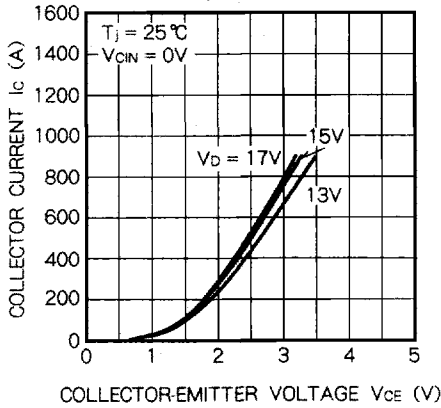
Note 1. Fault output is given only when the internal OC, SC, OT & UV protections schemes of either upper or lower arm device operate to protect it.

PM600HHA060

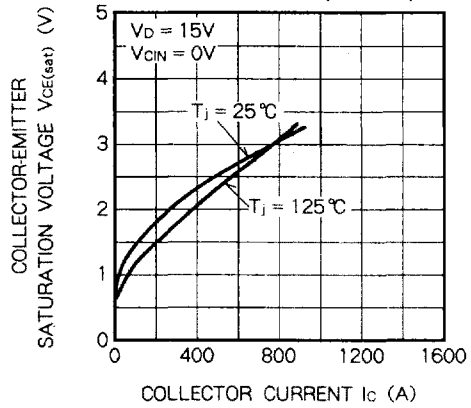
FLAT-BASE TYPE
INSULATED PACKAGE

PERFORMANCE CURVES

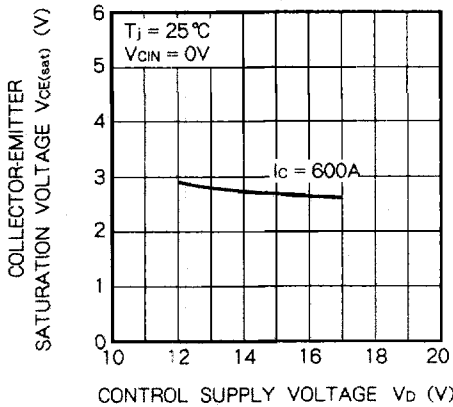
OUTPUT CHARACTERISTICS (TYPICAL)



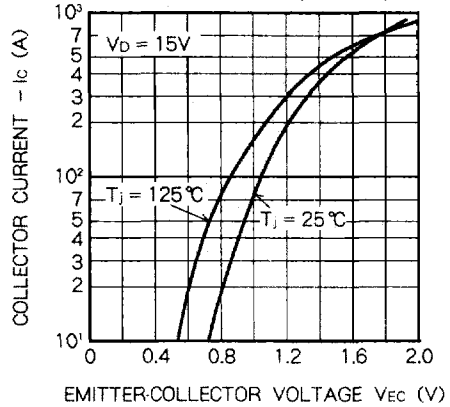
SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



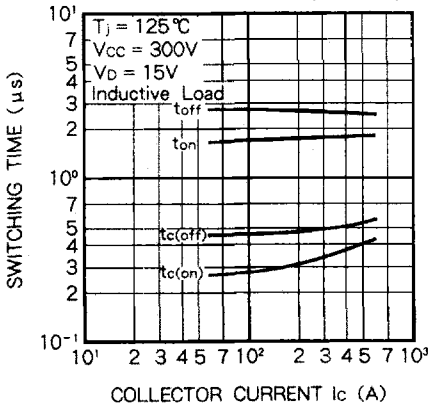
COLLECTOR-EMITTER SATURATION VOLTAGE (TYPICAL)



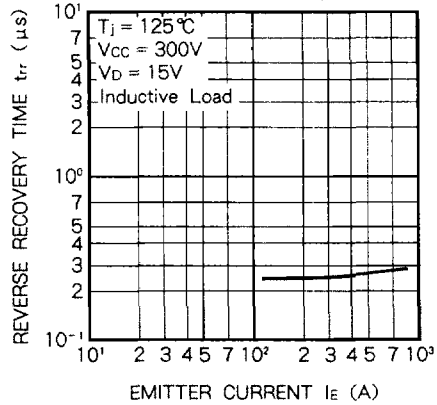
FREE-WHEEL DIODE FORWARD CHARACTERISTICS (TYPICAL)



SWITCHING TIME VS. COLLECTOR CURRENT (TYPICAL)



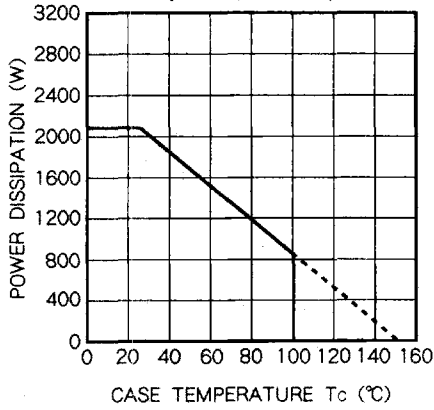
REVERSE RECOVERY CHARACTERISTICS OF FREE-WHEEL DIODE (TYPICAL)



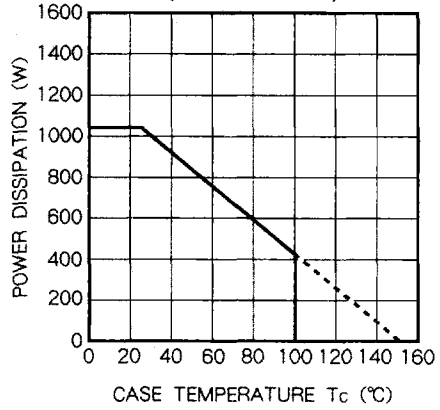
PM600HHA060

FLAT-BASE TYPE
INSULATED PACKAGE

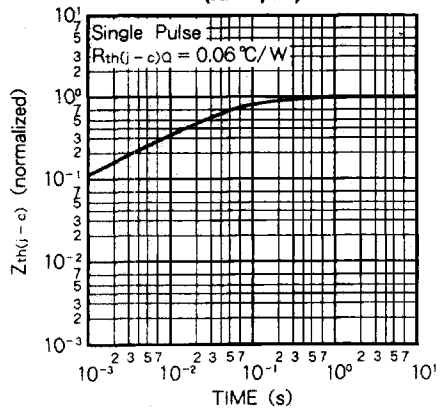
POWER DISSIPATION DERATING CURVE
(Per IGBT element)



POWER DISSIPATION DERATING CURVE
(Per FWDI element)



TRANSIENT THERMAL
IMPEDANCE CHARACTERISTICS
(IGBT part)



TRANSIENT THERMAL
IMPEDANCE CHARACTERISTICS
(FWDI part)

