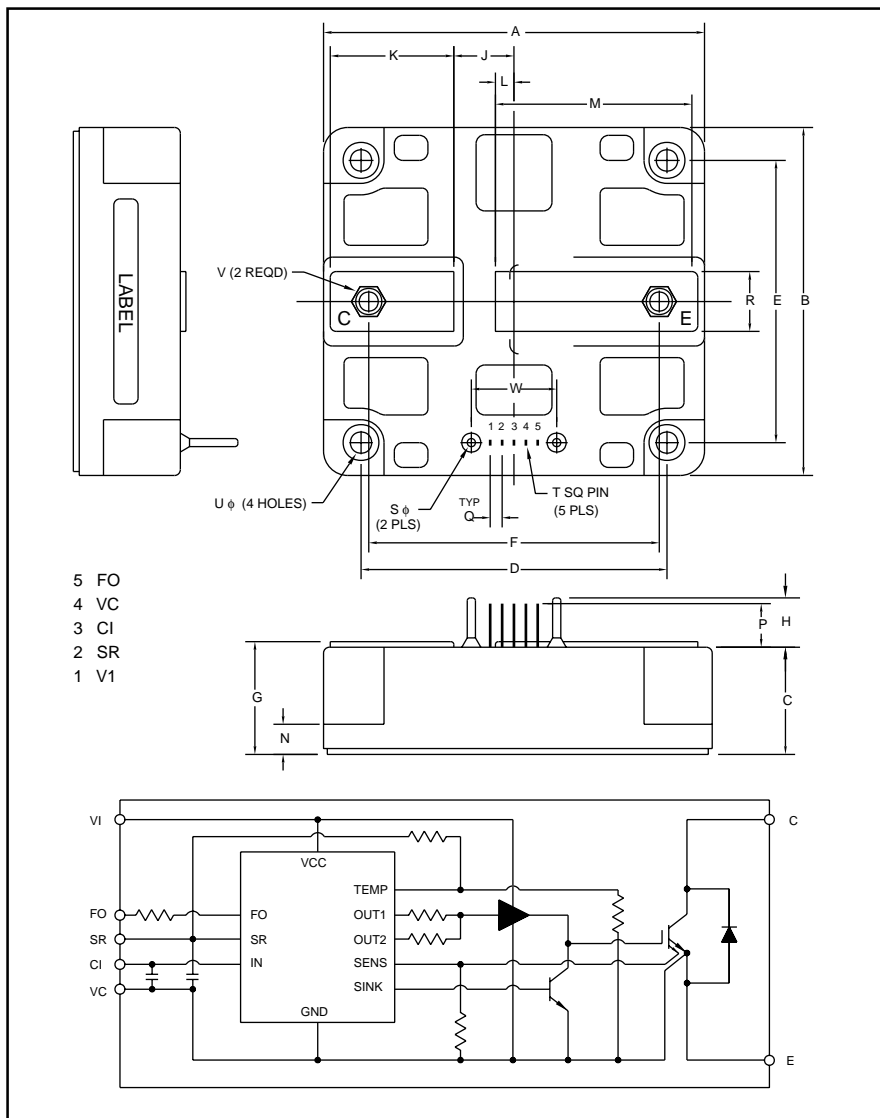
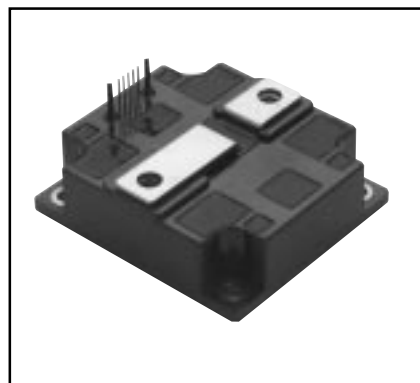


# PM800HSA060

FLAT-BASE TYPE  
INSULATED PACKAGE



Outline Drawing and Circuit Diagram



**Description:**

Mitsubishi Intelligent Power Modules are isolated base modules designed for power switching applications operating at frequencies to 20kHz. Built-in control circuits provide optimum gate drive and protection for the IGBT and free-wheel diode power devices.

**Features:**

- Complete Output Power Circuit
- Gate Drive Circuit
- Protection Logic
  - Short Circuit
  - Over Current
  - Over Temperature
  - Under Voltage

**Applications:**

- Inverters
- UPS
- Motion/Servo Control
- Power Supplies

**Ordering Information:**

Example: Select the complete part number from the table below -i.e. PM800HSA060 is a 600V, 800 Ampere Intelligent Power Module.

Type	Current Rating Amperes	V <sub>CE</sub> S Volts (x 10)
PM	800	60

Dimensions	Inches	Millimeters
A	3.46	88.0
B	3.85	98.0
C	1.16	29.5
D	2.76	70.0
E	3.15±0.01	80.0±0.25
F	2.56	65.0
G	1.34+0.04/-0.02	34.0+1/-0.5
H	0.63	16.0
J	0.63	16.1
K	1.00	25.4
L	0.20	5.1

Dimensions	Inches	Millimeters
M	1.83	46.6
N	0.28	7.0
P	0.59	15.0
Q	0.10	2.54
R	0.71	18.0
S	0.08	2.0
T	0.02 SQ	0.64 SQ
U	0.26	6.5
V	M8	M8
W	0.79	20.0

**PM800HSA060**

**FLAT-BASE TYPE  
INSULATED PACKAGE**

**Absolute Maximum Ratings,  $T_j = 25^\circ\text{C}$  unless otherwise specified**

Ratings	Symbol	PM800HSA060	Units
Power Device Junction Temperature	$T_j$	-20 to 150	$^\circ\text{C}$
Storage Temperature	$T_{\text{stg}}$	-40 to 125	$^\circ\text{C}$
Case Operating Temperature	$T_C$	-20 to 100	$^\circ\text{C}$
Mounting Torque, M6 Mounting Screws	—	3.92 ~ 5.88	$\text{N} \cdot \text{m}$
Mounting Torque, M8 Main Terminal Screws	—	8.83 ~ 10.8	$\text{N} \cdot \text{m}$
Module Weight (Typical)	—	630	Grams
Supply Voltage Protected by OC and SC ( $V_D = 13.5 \sim 16.5\text{V}$ , Inverter Part)	$V_{\text{CC(prot.)}}$	400	Volts
Isolation Voltage (Main Terminal to Baseplate, AC 1 min.)	$V_{\text{iso}}$	2500	$V_{\text{rms}}$

**Control Sector,  $T_j = 25^\circ\text{C}$  unless otherwise specified**

Supply Voltage (Applied between $V_1$ - $V_C$ )	$V_D$	20	Volts
Input Voltage (Applied between $C_1$ - $V_C$ )	$V_{\text{CIN}}$	10	Volts
Fault Output Supply Voltage (Applied between $F_O$ and $V_{\text{NC}}$ )	$V_{\text{FO}}$	20	Volts
Fault Output Current (Sink Current of $F_O$ Terminal)	$I_{\text{FO}}$	20	mA

**IGBT Inverter Sector,  $T_j = 25^\circ\text{C}$  unless otherwise specified**

Collector-Emitter Voltage ( $V_D = 15\text{V}$ , $V_{\text{CIN}} = 5\text{V}$ )	$V_{\text{CES}}$	600	Volts
Collector Current, ( $T_C = 25^\circ\text{C}$ )	$I_C$	800	Amperes
Peak Collector Current, ( $T_C = 25^\circ\text{C}$ )	$I_{\text{CP}}$	1600	Amperes
Collector Dissipation	$P_C$	2100	Watts

Electrical and Mechanical Characteristics,  $T_j = 25^\circ\text{C}$  unless otherwise specified

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
<b>Control Sector</b>						
Over Current Trip Level Inverter Part	OC	$-20^\circ\text{C} \leq T_j \leq 125^\circ\text{C}$ , $V_D = 15\text{V}$	1000	1350	—	Amperes
Short Circuit Trip Level Inverter Part	SC	$-20^\circ\text{C} \leq T_j \leq 125^\circ\text{C}$ , $V_D = 15\text{V}$	1350	1870	—	Amperes
Over Current Delay Time	$t_{\text{off}}(\text{OC})$	$V_D = 15\text{V}$	—	5	—	$\mu\text{s}$
Over Temperature Protection	OT	Trip Level	100	110	120	$^\circ\text{C}$
	$\text{OT}_r$	Reset Level	85	95	105	$^\circ\text{C}$
Supply Circuit Under Voltage Protection	UV	Trip Level	11.5	12.0	12.5	Volts
	$\text{UV}_r$	Reset Level	—	12.5	—	Volts
Supply Voltage	$V_D$	Applied between $V_1$ - $V_C$	13.5	15	16.5	Volts
Circuit Current	$I_D$	$V_D = 15\text{V}$ , $V_{\text{CIN}} = 5\text{V}$	—	23	30	mA
Input ON Threshold Voltage	$V_{\text{th(on)}}$	Applied between $C_1$ - $V_C$	1.2	1.5	1.8	Volts
Input OFF Threshold Voltage	$V_{\text{th(off)}}$	Applied between $C_1$ - $V_C$	1.7	2.0	2.3	Volts
PWM Input Frequency	$f_{\text{PWM}}$	3- $\phi$ Sinusoidal	—	15	20	kHz
Arm Shoot-through Blocking Time	$t_{\text{dead}}$	At IPM's Input Terminals	3.5	—	—	$\mu\text{s}$
Fault Output Current	$I_{\text{FO(H)}}$	$V_D = 15\text{V}$ , $V_{\text{FO}} = 15\text{V}$	—	—	0.01	mA
	$I_{\text{FO(L)}}$	$V_D = 15\text{V}$ , $V_{\text{FO}} = 15\text{V}$	—	10	15	mA
Minimum Fault Output Pulse Width	$t_{\text{FO}}$	$V_D = 15\text{V}$	1.0	1.8	—	ms
SR Terminal Output Voltage	$V_{\text{SR}}$	$-20^\circ\text{C} \leq T_j \leq 125^\circ\text{C}$ , $R_{\text{in}} = 6.8\text{k}\Omega$	4.5	5.1	5.6	Volts

## PM800HSA060

FLAT-BASE TYPE  
INSULATED PACKAGEElectrical and Mechanical Characteristics,  $T_j = 25^\circ\text{C}$  unless otherwise specified

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
<b>IGBT Inverter Sector</b>						
Collector Cutoff Current	$I_{CES}$	$V_{CE} = V_{CES}, T_j = 25^\circ\text{C}$	—	—	1.0	mA
		$V_{CE} = V_{CES}, T_j = 125^\circ\text{C}$	—	—	10.0	mA
Emitter-Collector Voltage	$V_{EC}$	$-I_C = 800\text{A}, V_D = 15\text{V}, V_{CIN} = 5\text{V}$	—	1.9	2.8	Volts
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$V_D = 15\text{V}, V_{CIN} = 0\text{V}, I_C = 800\text{A},$ $T_j = 25^\circ\text{C}, \text{ Pulsed}$	—	2.0	2.7	Volts
		$V_D = 15\text{V}, V_{CIN} = 0\text{V}, I_C = 800\text{A},$ $T_j = 125^\circ\text{C}, \text{ Pulsed}$	—	2.1	2.8	Volts
Inductive Load Switching Times	$t_{on}$		0.5	1.4	2.5	$\mu\text{s}$
	$t_{rr}$	$V_D = 15\text{V}, V_{CIN} = 0 \leftrightarrow 5\text{V}$	—	0.15	0.3	$\mu\text{s}$
	$t_{C(on)}$	$V_{CC} = 300\text{V}, I_C = 800\text{A}$	—	0.4	1.0	$\mu\text{s}$
	$t_{off}$	$T_j = 125^\circ\text{C}$	—	2.5	3.5	$\mu\text{s}$
	$t_{C(off)}$		—	0.5	1.0	$\mu\text{s}$

## Thermal Characteristics

Characteristic	Symbol	Condition	Min.	Typ.	Max.	Units
Junction to Case Thermal Resistance	$R_{th(j-c)Q}$	Each IGBT	—	—	0.06	$^\circ\text{C/Watt}$
	$R_{th(j-c)F}$	Each FWDi	—	—	0.09	$^\circ\text{C/Watt}$
Contact Thermal Resistance	$R_{th(c-f)}$	Case to Fin Per Module, Thermal Grease Applied	—	—	0.038	$^\circ\text{C/Watt}$

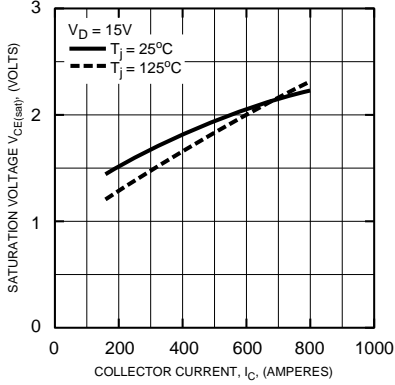
## Recommended Conditions for Use

Characteristic	Symbol	Condition	Value	Units
Supply Voltage	$V_{CC}$	Applied across C-E Terminals	0 ~ 400	Volts
	$V_D$	Applied between $V_1$ - $V_C$	$15 \pm 1.5$	Vol
Input ON Voltage	$V_{CIN(on)}$	Applied between $C_1$ - $V_C$	0 ~ 0.8	Volts
Input OFF Voltage	$V_{CIN(off)}$	Applied between $C_1$ - $V_C$	$4.0 \sim V_{SR}$	Volts
PWM Input Frequency	$f_{PWM}$	Using Application Circuit	5 ~ 20	kHz
Minimum Dead Time	$t_{dead}$	Input Signal	$\geq 3.5$	$\mu\text{s}$

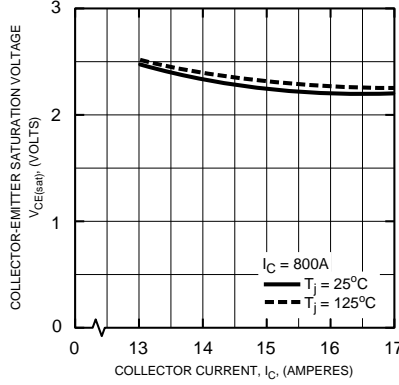
# PM800HSA060

FLAT-BASE TYPE  
INSULATED PACKAGE

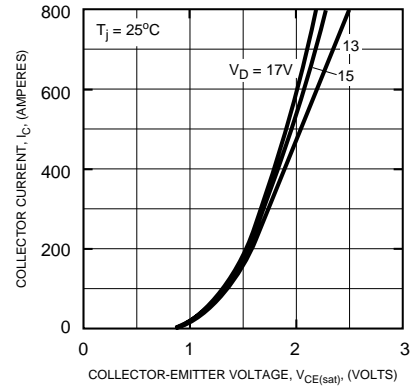
**SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)**



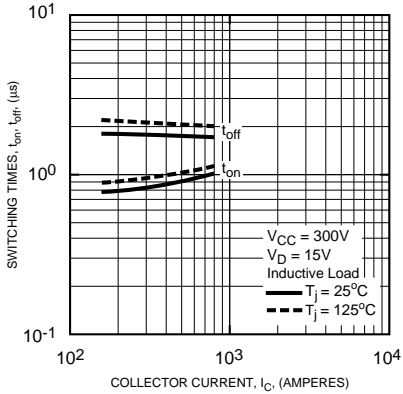
**COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)**



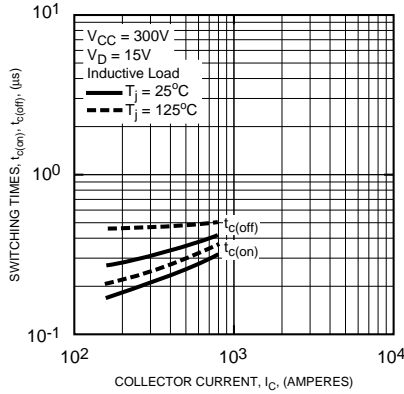
**OUTPUT CHARACTERISTICS (TYPICAL)**



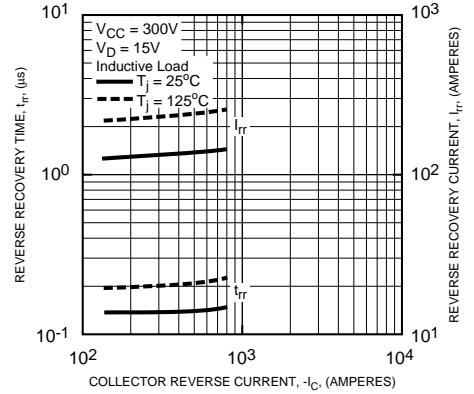
**SWITCHING TIME VS. COLLECTOR CURRENT (TYPICAL)**



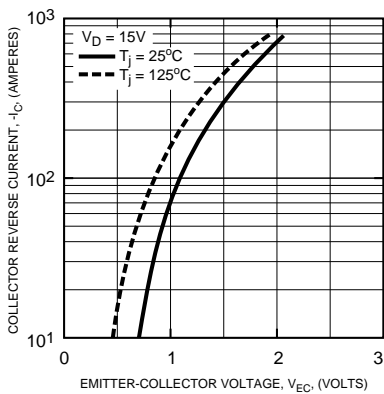
**SWITCHING TIME VS. COLLECTOR CURRENT (TYPICAL)**



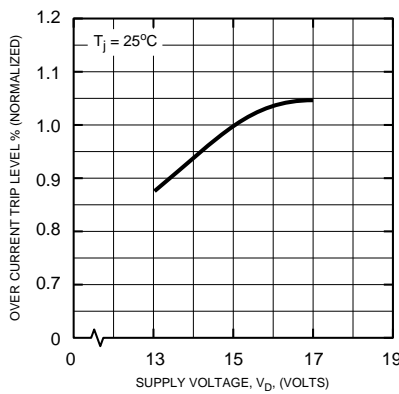
**REVERSE RECOVERY CURRENT VS. COLLECTOR CURRENT (TYPICAL)**



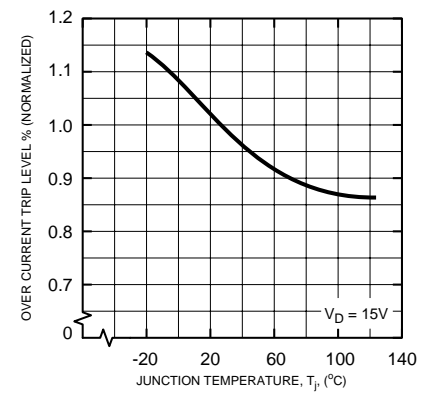
**DIODE FORWARD CHARACTERISTICS**



**OVER CURRENT TRIP LEVEL VS. SUPPLY VOLTAGE (TYPICAL)**



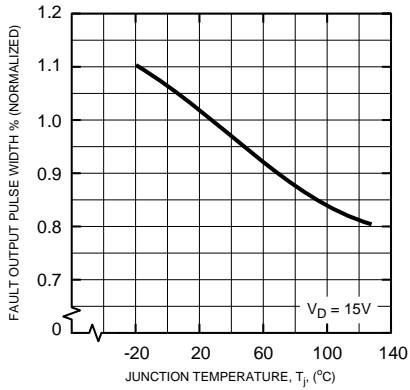
**OVER CURRENT TRIP LEVEL VS. TEMPERATURE (TYPICAL)**



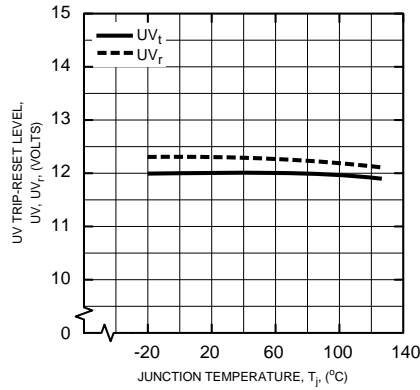
# PM800HSA060

FLAT-BASE TYPE  
INSULATED PACKAGE

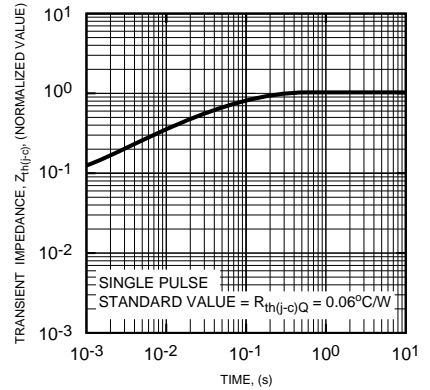
FAULT OUTPUT PULSE WIDTH VS. TEMPERATURE (TYPICAL)



CONTROL SUPPLY VOLTAGE TRIP-RESET LEVEL TEMPERATURE DEPENDENCY (TYPICAL)



TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (Each IGBT)



TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (Each FWDi)

