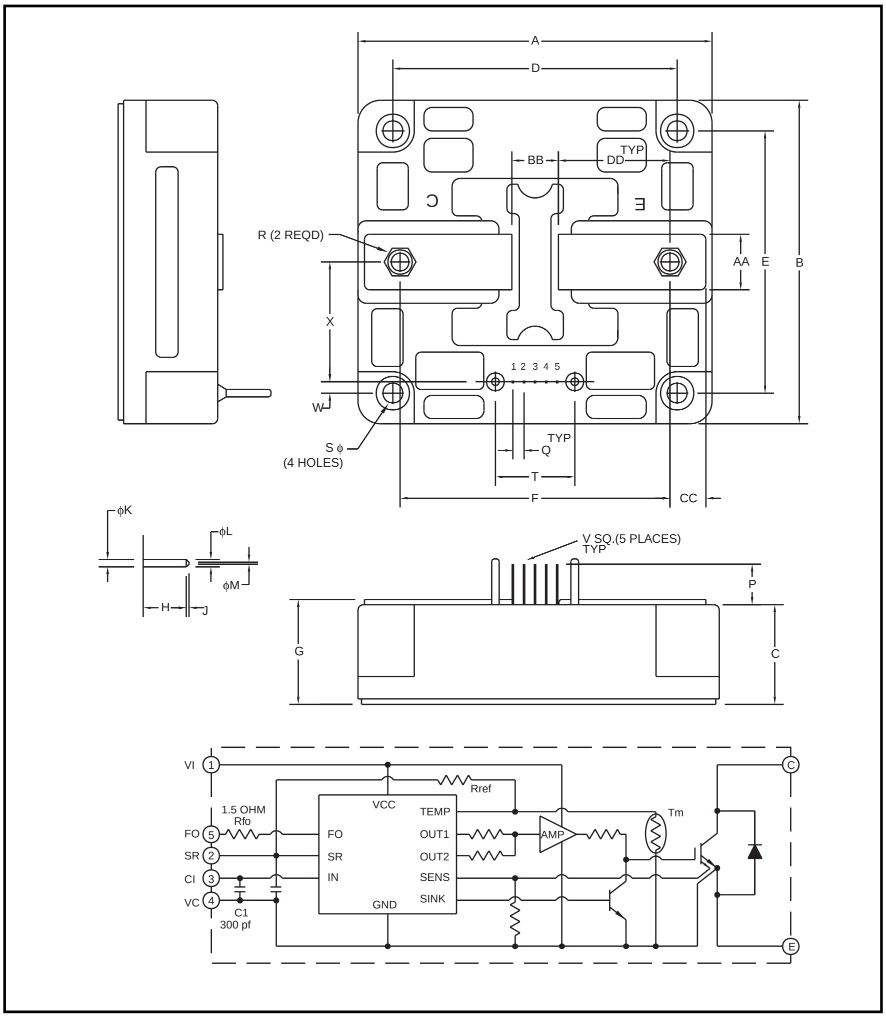
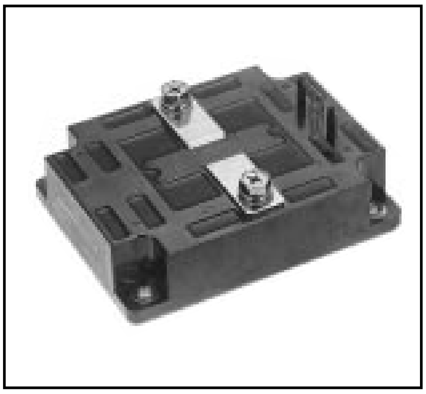
PM800HSA120

FLAT-BASE TYPE
INSULATED PACKAGE



Outline Drawing and Circuit Diagram



Dimensions	Inches	Millimeters
A	3.94	100.0
B	5.20	132.0
C	1.33	33.7
D	3.23±0.010	82.0±0.25
E	4.33±0.010	110.0±0.25
F	2.84	72.0
G	1.42+0.04/-0.02	36.0+1/-0.5
H	0.53	13.5
J	0.06	1.5
K	0.17	4.4
L	0.15	3.8
M	0.06	1.5
N	0.35	9.0
P	0.53	13.5

Dimensions	Inches	Millimeters
Q	0.10	2.54
R	M8 Metric	M8
S	ϕ 6.5	ϕ 6.5
T	0.24	26.0
U	0.26	6.5
V	0.25	0.64
W	0.20	5.0
X	1.97	50.0
AA	0.71	18.0
BB	0.55	14.0
CC	0.39	10.0
DD	1.14.	29.0

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. PM800HSA120 is a 1200V, 800 Ampere Intelligent Power Module.

Type	Current Rating Amperes	V_{CES} Volts (x 10)
PM	800	120

Absolute Maximum Ratings, T_j = 25°C unless otherwise specified

	Symbol	Ratings	Units
Power Device Junction Temperature	T_j	-20 to 150	°C
Storage Temperature	T_{stg}	-40 to 125	°C
Case Operating Temperature	T_C	-20 to 100	°C
Mounting Torque, M6 Mounting Screws	—	3.92 ~ 5.88	N · m
Mounting Torque, M8 Main Terminal Screws	—	8.83 ~ 10.8	N · m
Module Weight (Typical)	—	1170	Grams
Supply Voltage Protected by OC and SC (V_D = 13.5 - 16.5V, Inverter Part)	$V_{CC(prot.)}$	800	Volts
Isolation Voltage (Main Terminal to Baseplate, AC 1 min.)	V_{iso}	2500	Vrms

Control Sector

Supply Voltage Applied between (V_1-V_C)	V_D	20	Volts
Input Voltage Applied between (C_1-V_C)	V_{CIN}	10	Volts
Fault Output Supply Voltage (Applied between F_o-V_c)	V_{FO}	20	Volts
Fault Output Current (Fault Current of F_O Terminal)	I_{FO}	20	mA

IGBT Inverter Sector

Collector-Emitter Voltage (V_D = 15V, V_{CIN} = 5V)	V_{CES}	1200	Volts
Collector Current, (T_C = 25°C)	I_C	800	Amperes
Peak Collector Current, (T_C = 25°C)	I_{CP}	1600	Amperes
Collector Dissipation	P_C	4630	Watts

Electrical and Mechanical Characteristics, T_j = 25°C unless otherwise specified

Control Sector

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Over Current Trip Level Inverter Part	OC	-20°C ≤ T_j ≤ 125°C, V_D = 15V	1060	1300	—	Amperes
Short Circuit Trip Level Inverter Part	SC	-20°C ≤ T_j ≤ 125°C, V_D = 15V	1350	1700	—	Amperes
Over Current Delay Time	$t_{off(OC)}$	V_D = 15V	—	5	—	µs
Over Temperature Protection	OT	Trip Level	100	110	120	°C
	OT_r	Reset Level	85	95	105	°C
Supply Circuit Under Voltage Protection	UV	Trip Level	11.5	12.0	12.5	Volts
	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 = 15V, V_{CIN} = 5V, V_1-V_C	—	23	40	mA
Input ON Threshold Voltage	$V_{CIN(on)}$	Applied between C_1-V_C	1.2	1.5	1.8	Volts
Input OFF Threshold Voltage	$V_{CIN(off)}$	Applied between C_1-V_C	1.7	2.0	2.3	Volts
PWM Input Frequency	f_{PWM}	3-ϕ Sinusoidal	—	15	20	kHz
Fault Output Current	$I_{FO(H)}$	V_D = 15V, V_{FO} = 15V	—	—	0.01	mA
	$I_{FO(L)}$	V_D = 15V, V_{FO} = 15V	—	10	15	mA
Minimum Fault Output Pulse Width	t_{FO}	V_D = 15V	1.0	1.8	—	ms
SR Terminal Output Voltage	V_{SR}	-20°C ≤ T_j ≤ 125°C, Rin = 6.8kΩ	4.5	5.1	5.6	Volts

Electrical and Mechanical Characteristics, T_j = 25°C unless otherwise specified

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units

IGBT Inverter Sector

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Collector Cutoff Current	I_{CES}	$V_{CE} = V_{CES}$, T_j = 25°C	—	—	1.0	mA
		$V_{CE} = V_{CES}$, T_j = 125°C	—	—	10	mA
Emitter-Collector Voltage	V_{EC}	$-I_C$ = 800A, V_D = 15V, V_{CIN} = 5V	—	2.6	3.5	Volts
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	V_D = 15V, V_{CIN} = 0V, I_C = 800A, T_j = 25°C	—	2.5	3.5	Volts
		V_D = 15V, V_{CIN} = 0V, I_C = 800A, T_j = 125°C	—	2.3	3.3	Volts
Inductive Load Switching Times	t_{on}	V_D = 15V, V_{CIN} = 0 ↔ 5V V_{CC} = 600V, I_C = 800A T_j = 125°C	0.5	1.4	2.5	µs
	t_{rr}		—	0.2	0.4	µs
	$t_{C(on)}$		—	0.4	1.0	µs
	t_{off}		—	3.0	4.0	µs
	$t_{C(off)}$		—	0.6	1.1	µs

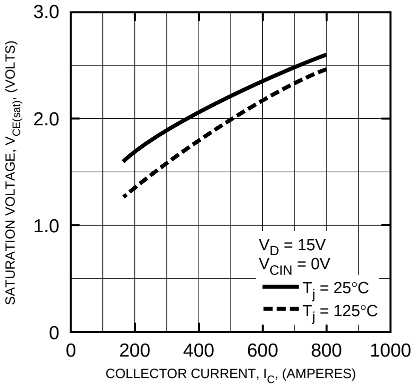
Thermal Characteristics

Characteristic	Symbol	Condition	Min.	Typ.	Max.	Units
Junction to Case Thermal Resistance	$R_{th(j-c)Q}$	Each IGBT	—	—	0.027	°C/Watt
	$R_{th(j-c)F}$	Each FWDi	—	—	0.045	°C/Watt
Contact Thermal Resistance	$R_{th(c-f)}$	Case to Fin Per Module, Thermal Grease Applied	—	—	0.022	°C/Watt

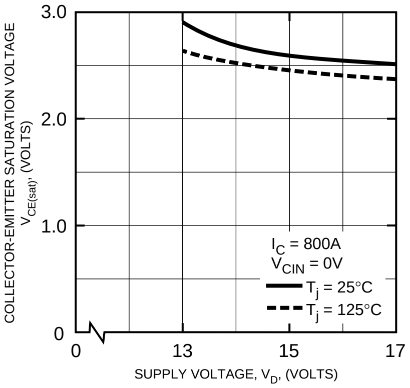
Recommended Conditions for Use

Characteristic	Symbol	Condition	Value	Units
Supply Voltage	V_{CC}	Applied across C1-E2 Terminals	0 ~ 800	Volts
	V_D	Applied between V_1-V_C	15 ± 1.5	Volts
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 ~ V_{SR}	Volts
PWM Input Frequency	f_{PWM}	Using Application Circuit	5 ~ 20	kHz
Minimum Dead Time	t_{dead}	Input Signal	≥ 4.0	µs

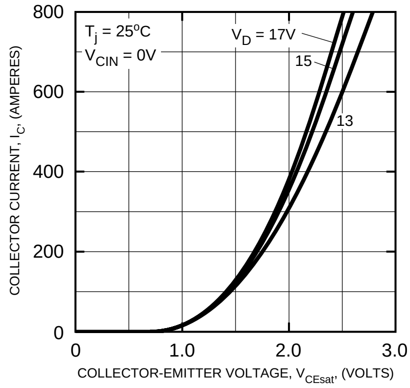
SATURATON VOLTAGE CHARACTERISTICS
(TYPICAL)



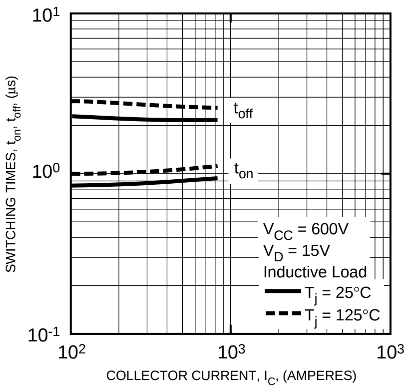
COLLECTOR-EMITTER
SATURATON VOLTAGE CHARACTERISTICS
(TYPICAL)



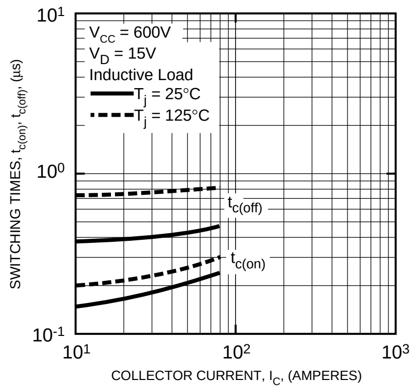
OUTPUT CHARACTERISTICS
(TYPICAL)



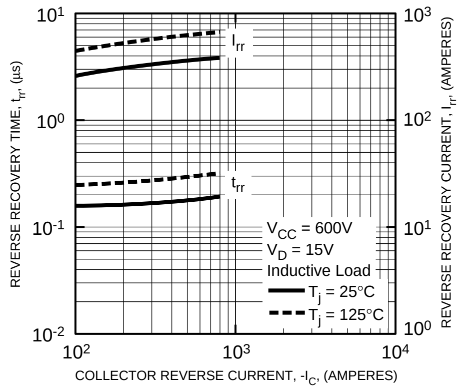
SWITCHING TIME VS.
COLLECTOR CURRENT (TYPICAL)



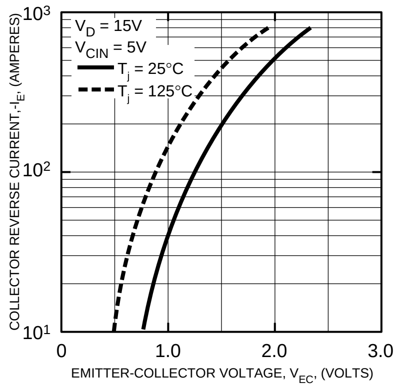
SWITCHING TIME VS.
COLLECTOR CURRENT (TYPICAL)



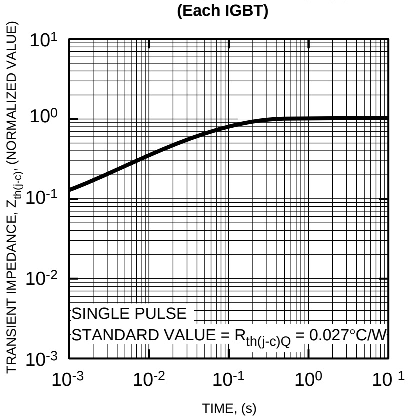
REVERSE RECOVERY CURRENT VS.
COLLECTOR CURRENT (TYPICAL)



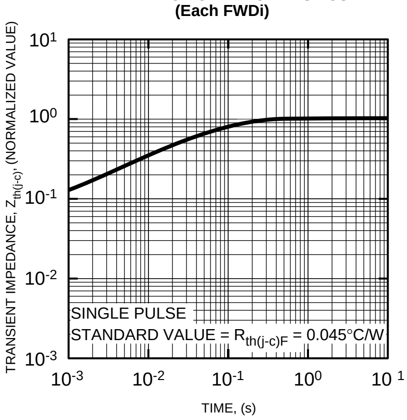
DIODE FORWARD CHARACTERISTICS



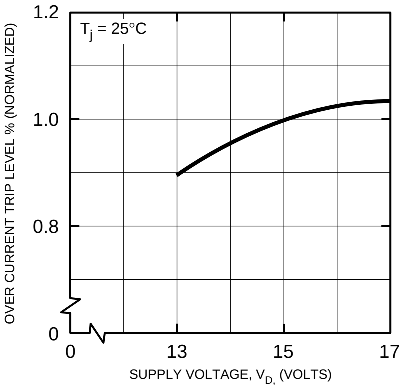
TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (Each IGBT)



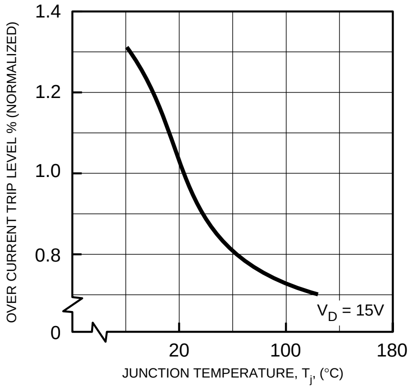
TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (Each FWDi)



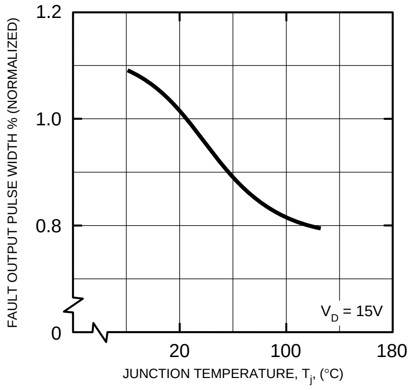
OVER CURRENT TRIP LEVEL VS. SUPPLY VOLTAGE (TYPICAL)



OVER CURRENT TRIP LEVEL VS. TEMPERATURE DEPENDENCY (TYPICAL)



FAULT OUTPUT PULSE WIDTH VS. TEMPERATURE (TYPICAL)



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