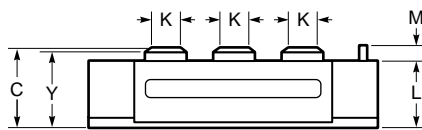
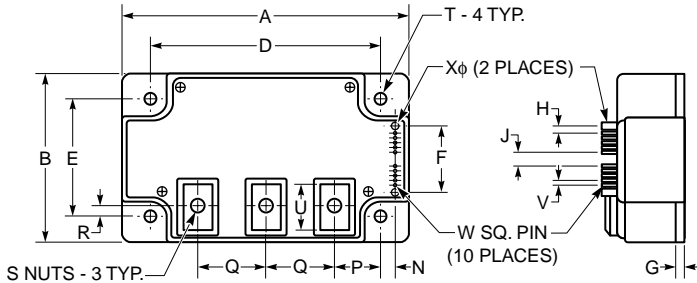


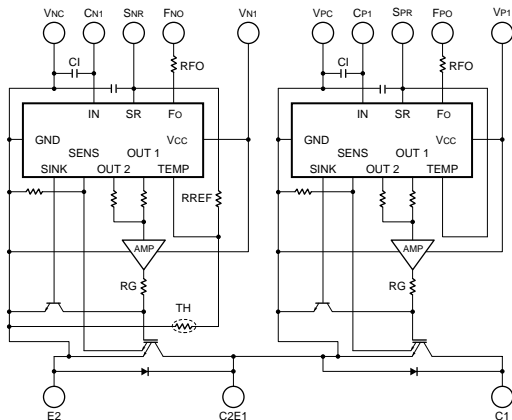
PM200DVA120

FLAT-BASE TYPE
INSULATED PACKAGE



TERMINAL CODE

- | | |
|--------|--------|
| 1. VN1 | 1. VP1 |
| 2. SNR | 2. SPR |
| 3. CN1 | 3. CP1 |
| 4. VNC | 4. VPC |
| 5. FNO | 5. FPO |



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 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. PM200DVA120 is a 1200V, 200 Ampere Intelligent Power Module.

Type	Current Rating Amperes	V _{CES} Volts (x 10)
PM	200	120

Outline Drawing and Circuit Diagram

Dimensions	Inches	Millimeters
A	4.72	120.0
B	2.76	70.0
C	1.14 +0.04/-0.02	29.0 +1.0/-0.5
D	4.17±0.010	106.0±0.25
E	2.20±0.010	56.0±0.25
F	1.52	38.5
G	0.16	4.0
H	0.16	4.01
J	0.40	10.16
K	0.55	14.0
L	1.02	26.0
M	0.45	11.5

Dimensions	Inches	Millimeters
N	0.12	3.0
P	1.50	38.0
Q	0.98	25.0
R	0.37	9.3
S	M6 Metric	M6
T	0.26 Dia.	Dia. 6.5
U	0.72	18.3
V	0.10	2.54
W	0.025 SQ	0.64 SQ
X	0.14 Dia.	3.5 Dia.
Y	1.10	28.0

PM200DVA120

FLAT-BASE TYPE
INSULATED PACKAGE

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

Ratings	Symbol	PM200DVA120	Units
Power Device Junction Temperature	T_j	-20 to 150	$^\circ\text{C}$
Storage Temperature	T_{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, M6 Main Terminal Screws	—	3.92 ~ 5.88	$\text{N} \cdot \text{m}$
Module Weight (Typical)	—	510	Grams
Supply Voltage (Applied between C1-E2)	$V_{\text{CC(surge)}}$	1000	Volts
Supply Voltage Protected by SC ($V_D = 13.5 \sim 16.5\text{V}$, Inverter Part, $T_j = 125^\circ\text{C}$ Start)	$V_{\text{CC(prot.)}}$	800	Volts
Isolation Voltage (Main Terminal to Baseplate, AC 1 min.)	V_{iso}	2500	V_{rms}

Control Sector

Supply Voltage (Applied between $V_{P1}-V_{PC}$, $V_{N1}-V_{NC}$)	V_D	20	Volts
Input Voltage (Applied between $C_{P1}-V_{PC}$, $V_{N1}-V_{NC}$)	V_{CIN}	20	Volts
Fault Output Supply Voltage (Applied between $F_{PO}-V_{PC}$, $F_{NO}-V_{NC}$)	V_{FO}	20	Volts
Fault Output Current (Sink Current at F_{PO} , F_{NO} Terminal)	I_{FO}	20	mA

IGBT Inverter Sector

Collector-Emitter Voltage ($V_D = 15\text{V}$, $V_{\text{CIN}} = 5\text{V}$)	V_{CES}	1200	Volts
Collector Current, ($T_C = 25^\circ\text{C}$)	I_C	200	Amperes
Peak Collector Current, ($T_C = 25^\circ\text{C}$)	I_{CP}	400	Amperes
Collector Dissipation ($T_C = 25^\circ\text{C}$)	P_C	962	Watts

PM200DVA120

**FLAT-BASE TYPE
INSULATED PACKAGE**

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

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Control Sector						
Short Circuit Trip Level	SC	$-20^\circ\text{C} \leq T_j \leq 125^\circ\text{C}$, $V_D = 15\text{V}$	240	—	—	Amperes
Short Circuit Current Delay Time	$t_{\text{off(SC)}}$	$V_D = 15\text{V}$	—	10	—	μs
Over Temperature Protection	OT	Trip Level	100	110	120	$^\circ\text{C}$
($V_D = 15\text{V}$, Lower Arm)	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
($-20^\circ\text{C} \leq T_j \leq 125^\circ\text{C}$)	UV_r	Reset Level	—	12.5	—	Volts
Circuit Current	I_D	$V_D = 15\text{V}$, $V_{\text{CIN}} = 5\text{V}$, $V_{\text{N1}}-V_{\text{NC}}$	—	37	48	mA
		$V_D = 15\text{V}$, $V_{\text{CIN}} = 5\text{V}$, $V_{\text{P1}}-V_{\text{PC}}$	—	37	48	mA
Input ON Threshold Voltage	$V_{\text{th(on)}}$	Applied between	1.2	1.5	1.8	Volts
Input OFF Threshold Voltage	$V_{\text{th(off)}}$	$C_{\text{P1}}-V_{\text{PC}}$, $C_{\text{N1}}-V_{\text{NC}}$	1.7	2.0	2.3	Volts
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_{FO}	$V_D = 15\text{V}$	1.0	1.8	—	ms
SXR Terminal Output Voltage	V_{SXR}	$T_j \leq 125^\circ\text{C}$, $R_{\text{in}} = 6.8\text{k}\Omega$ (S_{PR} , S_{NR})	4.5	5.1	5.6	Volts

PM200DVA120

FLAT-BASE TYPE
INSULATED PACKAGE

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

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
IGBT Inverter Sector						
Collector-Emitter Cutoff Current	I_{CES}	$V_{CE} = V_{CES}, V_D = 15\text{V}, T_j = 25^\circ\text{C}$	—	—	1.0	mA
		$V_{CE} = V_{CES}, V_D = 15\text{V}, T_j = 125^\circ\text{C}$	—	—	10.0	mA
FWDi Forward Voltage	V_{EC}	$-I_C = 200\text{A}, V_D = 15\text{V}, V_{CIN} = 5\text{V}$	—	2.50	3.50	Volts
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$V_D = 15\text{V}, V_{CIN} = 0\text{V}, I_C = 200\text{A},$ Pulsed, $T_j = 25^\circ\text{C}$	—	2.65	3.30	Volts
		$V_D = 15\text{V}, V_{CIN} = 0\text{V}, I_C = 200\text{A},$ Pulsed, $T_j = 125^\circ\text{C}$	—	2.60	3.25	Volts
Inductive Load Switching Times	t_{on}		0.4	0.9	2.3	μs
	t_{rr}	$V_D = 15\text{V}, V_{CIN} = 0\text{V} \leftrightarrow 5\text{V}$	—	0.2	0.3	μs
	$t_{C(on)}$	$V_{CC} = 600\text{V}, I_C = 200\text{A},$ $T_j = 125^\circ\text{C}$	—	0.4	1.0	μs
	t_{off}		—	2.4	3.4	μs
	$t_{C(off)}$		—	0.7	1.2	μs

Thermal Characteristics

Characteristic	Symbol	Condition	Min.	Typ.	Max.	Units
Junction to Case Thermal Resistance	$R_{th(j-c)Q}$	Each Inverter IGBT	—	—	0.11	$^\circ\text{C/Watt}$
	$R_{th(j-c)F}$	Each Inverter FWDi	—	—	0.18	$^\circ\text{C/Watt}$
Contact Thermal Resistance	$R_{th(c-f)}$	Case to Fin Per Module, Thermal Grease Applied	—	—	0.081	$^\circ\text{C/Watt}$

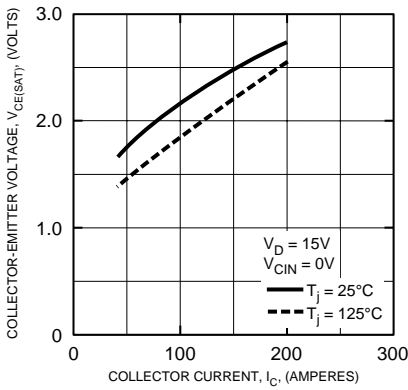
Recommended Conditions for Use

Characteristic	Symbol	Condition	Value	Units
Supply Voltage	V_{CC}	Applied across C1-E2 Terminals	≤ 800	Volts
	$V_{CE(surge)}$	Applied across C1-E1, C2-E2 Terminals	≤ 1000	Volts
	V_D	Applied between $V_{P1}-V_{PC}, V_{N1}-V_{NC}$	15 ± 1.5	Volts
Input ON Voltage	$V_{CIN(on)}$	Applied between	≤ 0.8	Volts
Input OFF Voltage	$V_{CIN(off)}$	$C_{P1}-V_{PC}, C_{N1}-V_{NC}$	≥ 4.0	Volts
Arm Shoot-Through Blocking Time	t_{dead}	For IPM's each Input Signal	≥ 3.5	μs

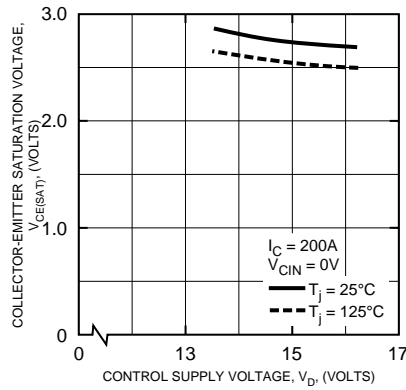
PM200DVA120

FLAT-BASE TYPE
INSULATED PACKAGE

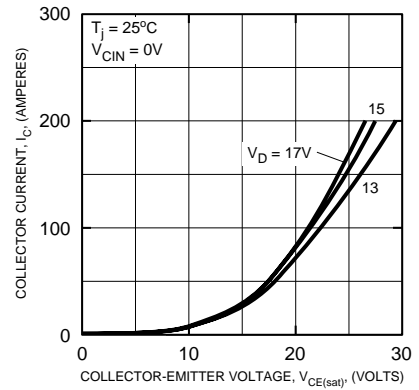
SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



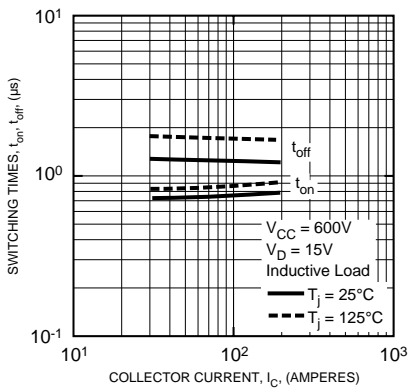
COLLECTOR-EMITTER SATURATON VOLTAGE CHARACTERISTICS (TYPICAL)



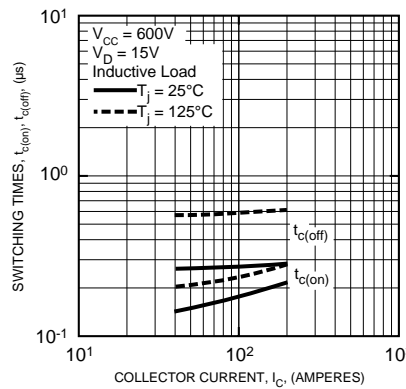
OUTPUT CHARACTERISTICS (TYPICAL)



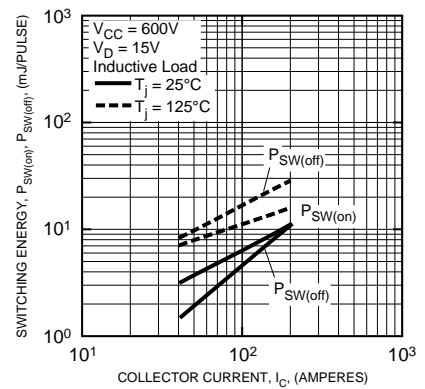
SWITCHING TIME VS. COLLECTOR CURRENT (TYPICAL)



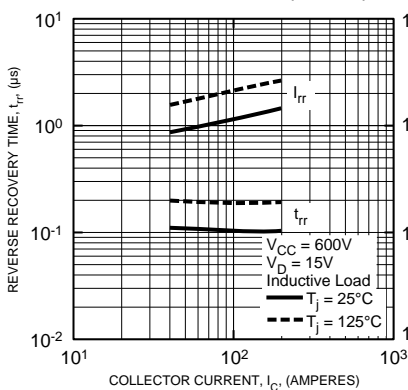
SWITCHING TIME VS. COLLECTOR CURRENT (TYPICAL)



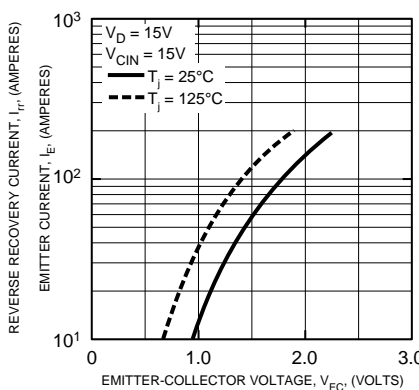
SWITCHING LOSS CHARACTERISTICS (TYPICAL)



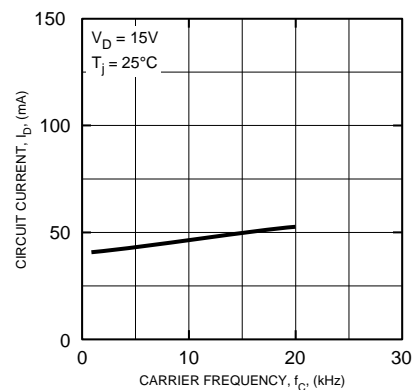
REVERSE RECOVERY CURRENT VS. COLLECTOR CURRENT (TYPICAL)



DIODE FORWARD CHARACTERISTICS



CIRCUIT CURRENT VS. CARRIER FREQUENCY



PM200DVA120

FLAT-BASE TYPE
INSULATED PACKAGE

