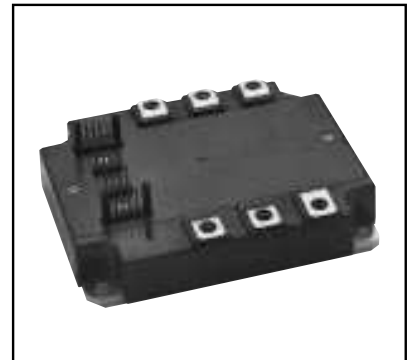
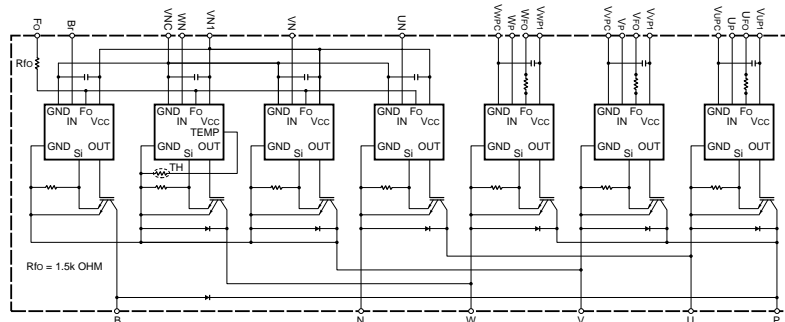
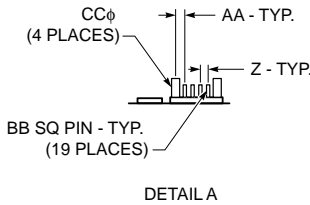
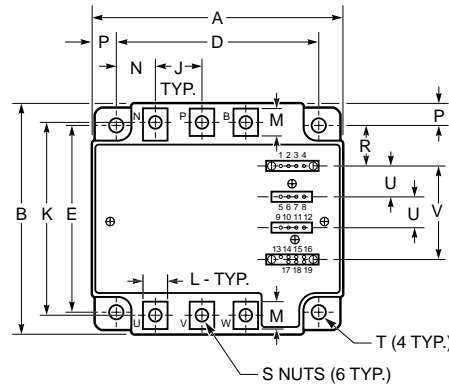


PM50RVA120

FLAT-BASE TYPE
INSULATED PACKAGE

TERMINAL CODE

- | | |
|----------|----------|
| 1. WFO | 11. Up |
| 2. VWPC | 12. VUP1 |
| 3. WP | 13. Br |
| 4. VWP1 | 14. Fo |
| 5. VFO | 15. VNC |
| 6. VVPC | 16. VN1 |
| 7. Vp | 17. UN |
| 8. VVP1 | 18. VN |
| 9. UFO | 19. WN |
| 10. VUPC | |



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. PM50RVA120 is a 1200V, 50 Ampere Intelligent Power Module.

Type	Current Rating Amperes	V _{CES} Volts (x 10)
PM	50	120

Outline Drawing and Circuit Diagram

Dimensions	Inches	Millimeters
A	4.33	110.0
B	3.50	89.0
C	0.87 +0.04/-0.02	22.0 +1.0/-0.5
D	3.74±0.010	95.0±0.25
E	2.91±0.010	74.0±0.25
F	0.16	4.0
G	0.87	22.0
H	0.42	10.6
J	0.79	20.0
K	2.99±0.02	76.0±0.5
L	0.39	10.0
M	0.49	12.5
N	0.67	17.0

Dimensions	Inches	Millimeters
P	0.30	7.5
R	0.65	16.5
S	M5 Metric	M5
T	0.22 Dia.	Dia. 5.5
U	0.56±0.010	14.1±0.25
V	1.72±0.012	43.57±0.3
W	0.57±0.012	14.6±0.3
X	2.90	73.7
Y	0.78	19.7
Z	0.10±0.010	2.54±0.25
AA	1.37±0.010	3.49±0.25
BB	0.02 SQ	0.64 SQ
CC	0.12 +0.04/-0.02	3.0 +1.0/-0.5

PM50RVA120

FLAT-BASE TYPE
INSULATED PACKAGE

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

Ratings	Symbol	PM50RVA120	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, M5 Mounting Screws	—	2.5 ~ 3.5	N · m
Mounting Torque, M5 Main Terminal Screws	—	2.5 ~ 3.5	N · m
Module Weight (Typical)	—	560	Grams
Supply Voltage (Applied between P - N)	$V_{\text{CC(surge)}}$	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	Vrms

Control Sector

Supply Voltage (Applied between $V_{\text{UP1}}-V_{\text{UPC}}$, $V_{\text{VP1}}-V_{\text{VPC}}$, $V_{\text{WP1}}-V_{\text{WPC}}$, $V_{\text{N1}}-V_{\text{NC}}$)	V_D	20	Volts
Input Voltage (Applied between U_P-V_{UPC} , V_P-V_{VPC} , W_P-V_{WPC} , $U_N \cdot V_N \cdot W_N \cdot B_r-V_{\text{NC}}$)	V_{CIN}	20	Volts
Fault Output Supply Voltage (Applied between F_O-V_{NC} , $*F_O-V_{\text{PC}}$)	V_{FO}	20	Volts
Fault Output Current (Sink Current at U_{FO} , V_{FO} , W_{FO} and F_O Terminal)	I_{FO}	20	mA

IGBT Inverter Sector

Collector-Emitter Voltage ($V_D = 15\text{V}$, $V_{\text{CIN}} = 15\text{V}$)	V_{CES}	1200	Volts
Collector Current, ($T_C = 25^\circ\text{C}$)	I_C	50	Amperes
Peak Collector Current, ($T_C = 25^\circ\text{C}$)	I_{CP}	100	Amperes
Collector Dissipation ($T_C = 25^\circ\text{C}$)	P_C	338	Watts

Brake Sector

Collector-Emitter Voltage ($V_D = 15\text{V}$, $V_{\text{CIN}} = 15\text{V}$)	V_{CES}	1200	Volts
Collector Current, ($T_C = 25^\circ\text{C}$)	I_C	15	Amperes
Peak Collector Current, ($T_C = 25^\circ\text{C}$)	I_{CP}	30	Amperes
Collector Dissipation ($T_C = 25^\circ\text{C}$)	P_C	134	Watts
FWDi Forward Current ($T_C = 25^\circ\text{C}$)	I_F	15	Amperes
FWDi Rated DC Reverse Voltage ($T_C = 25^\circ\text{C}$)	$V_{\text{R(DC)}}$	1200	Volts

PM50RVA120FLAT-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						
Over Current Trip Level Brake Part	OC	$-20^\circ\text{C} \leq T_j \leq 125^\circ\text{C}$, $V_D = 15\text{V}$	22	—	—	Amperes
Short Circuit Trip Level Inverter Part	SC	$-20^\circ\text{C} \leq T_j \leq 125^\circ\text{C}$, $V_D = 15\text{V}$	59	—	—	Amperes
Short Circuit Trip Level Brake Part			—	52	—	Amperes
Short Circuit Current Shut-off Time	$t_{\text{off(SC)}}$	$V_D = 15\text{V}$	—	10	—	μs
Over Temperature Protection	OT	Trip Level	111	118	125	$^\circ\text{C}$
($V_D = 15\text{V}$, Lower Arm)	OT_r	Reset Level	90	100	110	$^\circ\text{C}$
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
Supply Voltage	V_D	Applied between $V_{UP1}-V_{UPC}$, $V_{VP1}-V_{VPC}$, $V_{WP1}-V_{WPC}$, $V_{N1}-V_{NC}$	—	15	—	Volts
Circuit Current	I_D	$V_D = 15\text{V}$, $V_{CIN} = 15\text{V}$, $V_{N1}-V_{NC}$	—	44	60	mA
		$V_D = 15\text{V}$, $V_{CIN} = 15\text{V}$, $V_{XP1}-V_{XPC}$	—	13	18	mA
Input ON Threshold Voltage	$V_{\text{th(on)}}$	Applied between U_P-V_{UPC} , V_P-V_{VPC} ,	1.2	1.5	1.8	Volts
Input OFF Threshold Voltage	$V_{\text{th(off)}}$	W_P-V_{WPC} , $U_N \cdot V_N \cdot W_N \cdot B_r-V_{NC}$	1.7	2.0	2.3	Volts
Fault Output Current	$I_{FO(H)}$	$V_D = 15\text{V}$, $V_{FO} = 15\text{V}$	—	—	0.01	mA
	$I_{FO(L)}$	$V_D = 15\text{V}$, $V_{FO} = 15\text{V}$	—	10	15	mA
Minimum Fault Output Pulse Width	t_{FO}	$V_D = 15\text{V}$	1.0	1.8	—	ms

PM50RVA120FLAT-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}	$V_{CE} = V_{CES}, V_D = 15V, T_j = 25^\circ\text{C}$	—	—	1.0	mA
		$V_{CE} = V_{CES}, V_D = 15V, T_j = 125^\circ\text{C}$	—	—	10.0	mA
FWDi Forward Voltage	V_{EC}	$-I_C = 50A, V_D = 15V, V_{CIN} = 15V$	—	2.50	3.50	Volts
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$V_D = 15V, V_{CIN} = 0V, I_C = 50A,$ Pulsed, $T_j = 25^\circ\text{C}$	—	2.65	3.30	Volts
		$V_D = 15V, V_{CIN} = 0V, I_C = 50A,$ Pulsed, $T_j = 125^\circ\text{C}$	—	2.60	3.25	Volts
Inductive Load Switching Times	t_{on}	$V_D = 15V, V_{CIN} = 0V \leftrightarrow 15V$ $V_{CC} = 600V, I_C = 50A,$ $T_j = 125^\circ\text{C}$	0.4	0.9	2.3	μs
	t_{rr}		—	0.2	0.3	μs
	$t_{C(on)}$		—	0.4	1.0	μs
	t_{off}		—	2.4	3.4	μs
	$t_{C(off)}$		—	0.7	1.2	μs

Brake Sector

Collector-Emitter Cutoff Current	I_{CES}	$V_{CE} = V_{CES}, V_D = 15V, T_j = 25^\circ\text{C}$	—	—	1.0	mA
		$V_{CE} = V_{CES}, V_D = 15V, T_j = 125^\circ\text{C}$	—	—	10.0	mA
FWDi Forward Voltage	V_{FM}	$I_F = 15A$	—	2.50	3.50	Volts
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$V_D = 15V, V_{CIN} = 0V, I_C = 15A,$ $T_j = 25^\circ\text{C}$	—	2.50	3.30	Volts
		$V_D = 15V, V_{CIN} = 0V, I_C = 15A,$ $T_j = 125^\circ\text{C}$	—	2.20	3.20	Volts

PM50RVA120

FLAT-BASE TYPE
INSULATED PACKAGE

Thermal Characteristics

Characteristic	Symbol	Condition	Min.	Typ.	Max.	Units
Junction to Case Thermal Resistance	$R_{th(j-c)Q}$	Each Inverter IGBT	—	—	0.37	°C/Watt
	$R_{th(j-c)F}$	Each Inverter FWDi	—	—	0.70	°C/Watt
	$R_{th(j-c)Q}$	Each Brake IGBT	—	—	0.93	°C/Watt
	$R_{th(j-c)F}$	Each Brake FWDi Part	—	—	1.50	°C/Watt
Contact Thermal Resistance	$R_{th(c-f)}$	Case to Fin Per Module, Thermal Grease Applied	—	—	0.027	°C/Watt

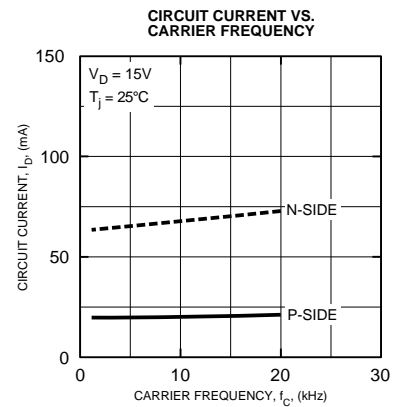
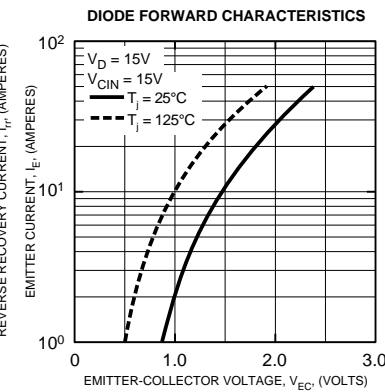
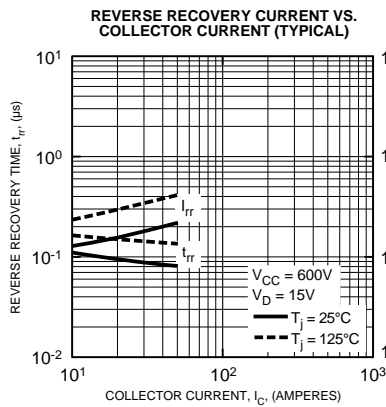
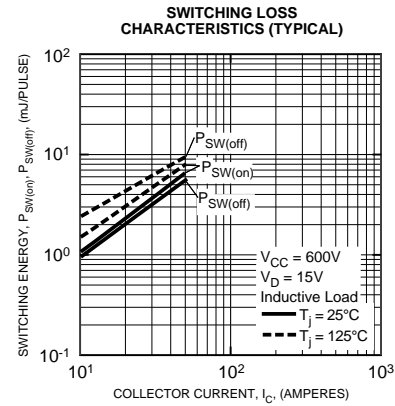
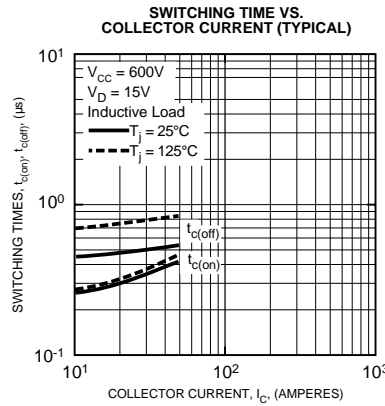
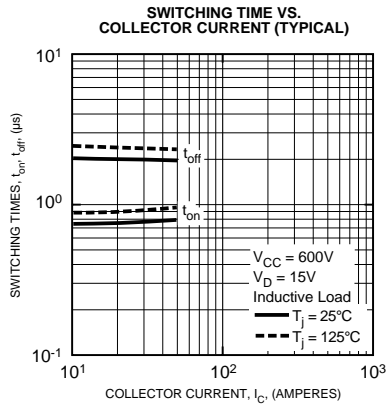
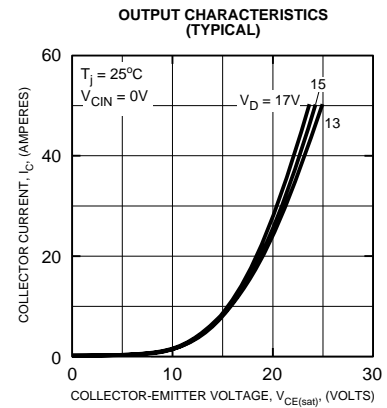
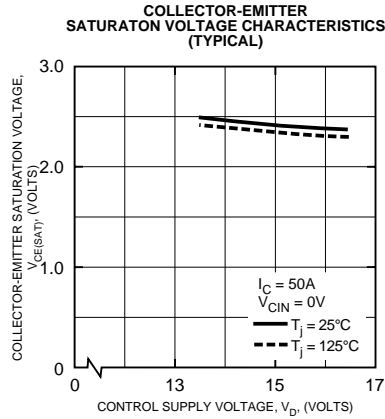
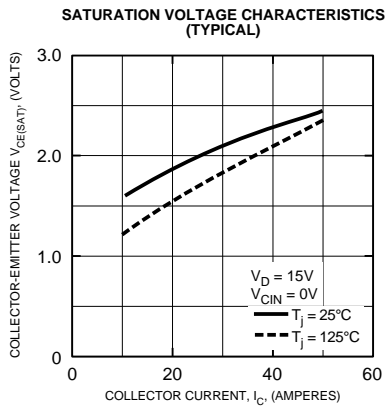
Recommended Conditions for Use

Characteristic	Symbol	Condition	Value	Units
Supply Voltage	V_{CC}	Applied across P-N Terminals	≤ 800	Volts
	$V_{CE(surge)}$	Applied across C-E Terminals	≤ 1000	Volts
	V_D	Applied between V_{UP1} - V_{UPC} , V_{N1} - V_{NC} , V_{VP1} - V_{VPC} , V_{WP1} - V_{WPC}	15 ± 1.5	Volts
Input ON Voltage	$V_{CIN(on)}$	Applied between	≤ 0.8	Volts
Input OFF Voltage	$V_{CIN(off)}$	U_P - V_{UPC} , V_P - V_{VPC} , W_P - V_{WPC} , U_N · V_N · W_N · B_F - V_{NC}	≥ 4.0	Volts
Arm Shoot-Through Blocking Time	t_{dead}	For IPM's each Input Signal	≥ 3.0	μs

PM50RVA120

FLAT-BASE TYPE
INSULATED PACKAGE

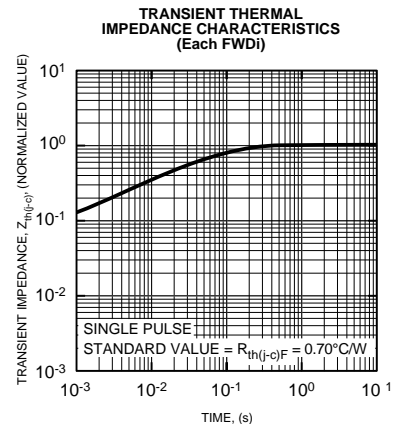
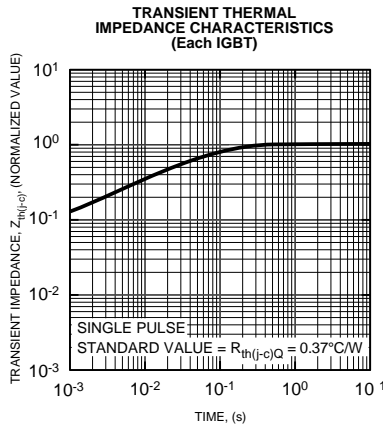
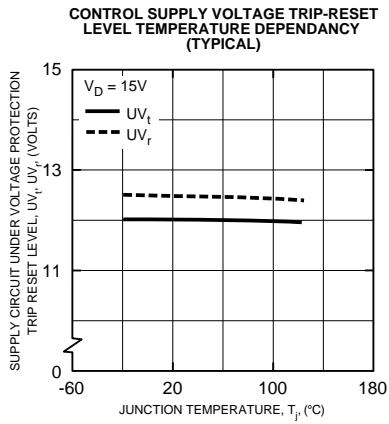
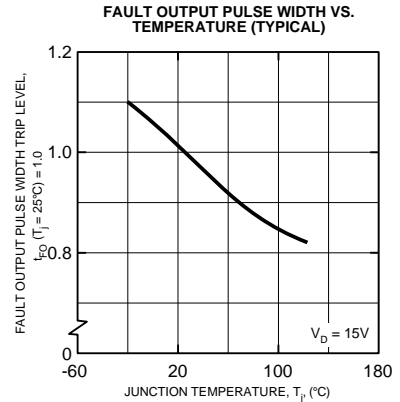
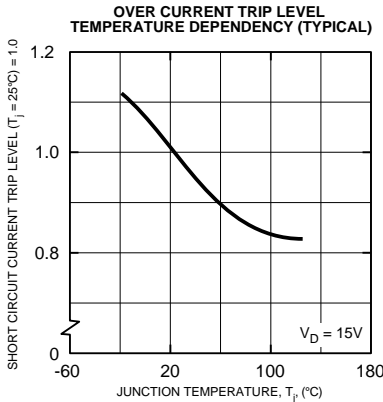
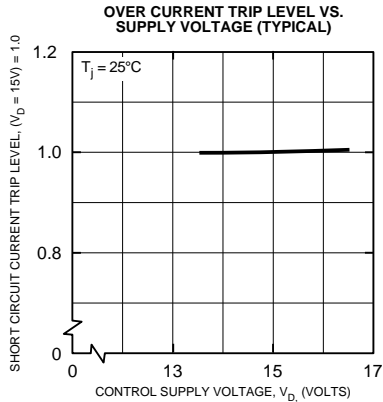
Inverter Part



PM50RVA120

FLAT-BASE TYPE
INSULATED PACKAGE

Inverter Part



PM50RVA120

FLAT-BASE TYPE
INSULATED PACKAGE

Brake Part

