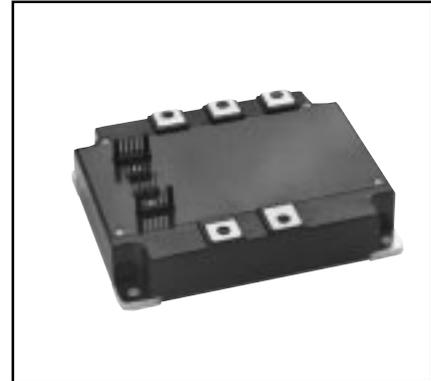# PM150CVA120

**FLAT-BASE TYPE
INSULATED PACKAGE**

TERMINAL CODE

1. W$_{FO}$	11. U$_P$
2. V$_{WPC}$	12. V$_{UP1}$
3. W$_P$	13. NC
4. V$_{WP1}$	14. F$_O$
5. V$_{FO}$	15. VNC
6. V$_{VPC}$	16. VN1
7. V$_P$	17. UN
8. V$_{VP1}$	18. VN
9. U$_{FO}$	19. WN
10. V$_{UPC}$	

CCϕ
(4 PLACES)

AA - TYP.

Z - TYP.

BB SQ PIN - TYP.
(19 PLACES)

DETAIL A

SEE
DETAIL A

Rfo = 1.5k OHM
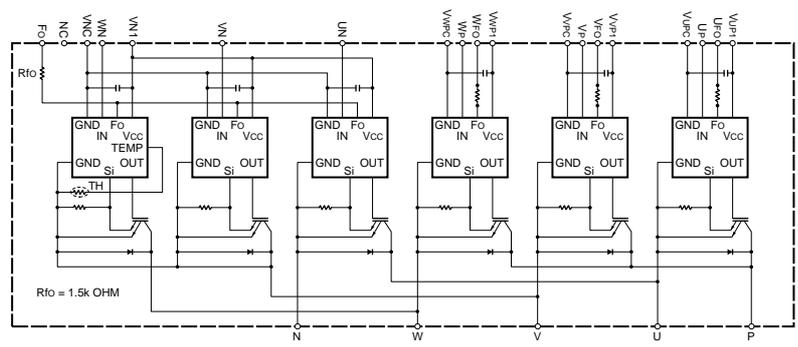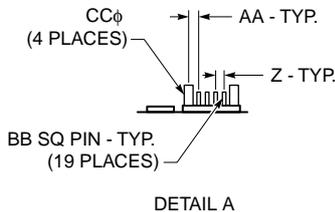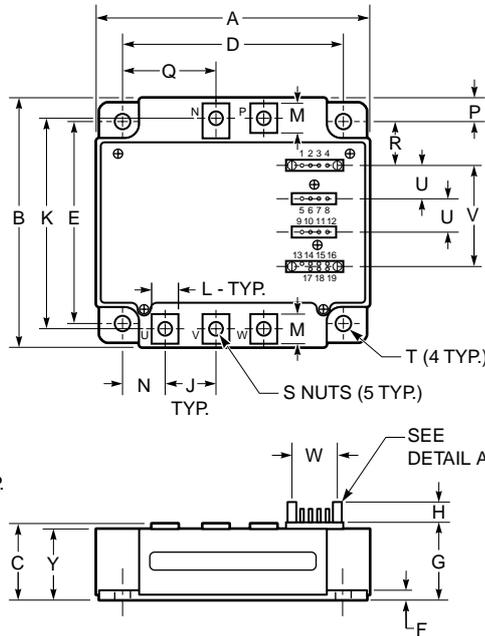
Description:

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. PM150CVA120 is a 1200V, 150 Ampere Intelligent Power Module.

Type	Current Rating Amperes	V$_{CES}$ Volts (x 10)
PM	150	120

Outline Drawing and Circuit Diagram

Dimensions	Inches	Millimeters
A	5.31	135.0
B	4.33	110.0
C	1.14 +0.04/-0.02	29.0 +1.0/-0.5
D	4.74±0.010	120.5±0.25
E	3.76±0.010	95.5±0.25
F	0.16	4.0
G	1.14	29.0
H	0.41	10.4
J	1.10	28.0
K	3.82	97.0
L	0.55	14.0
M	0.59	15.0
N	0.88	22.25

Dimensions	Inches	Millimeters
P	0.29	7.25
Q	1.98	50.25
R	1.03	26.25
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
Y	1.04	26.5
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

Sep.1998

MITSUBISHI ELECTRIC

PM150CVA120

FLAT-BASE TYPE
INSULATED PACKAGE

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

Ratings	Symbol	PM150CVA120	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, M5 Mounting Screws	—	2.5 ~ 3.5	N · m
Mounting Torque, M5 Main Terminal Screws	—	2.5 ~ 3.5	N · m
Module Weight (Typical)	—	1000	Grams
Supply Voltage (Applied between P - N)	$V_{CC(surge)}$	1000	Volts
Supply Voltage Protected by SC (V_D = 13.5 ~16.5V, Inverter Part, T_j = 125°C Start)	$V_{CC(prot.)}$	800	Volts
Isolation Voltage (Main Terminal to Baseplate, AC 1 min.)	V_{iso}	2500	Vrms

Control Sector

	Symbol		Units
Supply Voltage (Applied between V_{UP1}-V_{UPC}, V_{VP1}-V_{VPC}, V_{WP1}-V_{WPC}, V_{N1}-V_{NC})	V_D	20	Volts
Input Voltage (Applied between U_P-V_{UPC}, V_P-V_{VPC}, W_P-V_{WPC}, U_N · V_N · W_N-V_{NC})	V_{CIN}	20	Volts
Fault Output Supply Voltage (Applied between U_{FO}-V_{UPC}, V_{FO}-V_{VPC}, W_{FO}-V_{WPC}, F_O-V_{NC})	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

	Symbol		Units
Collector-Emitter Voltage (V_D = 15V, V_{CIN} = 15V)	V_{CES}	1200	Volts
Collector Current, (T_C = 25°C)	I_C	150	Amperes
Peak Collector Current, (T_C = 25°C)	I_{CP}	300	Amperes
Collector Dissipation (T_C = 25°C)	P_C	780	Watts

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

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Control Sector						
Short Circuit Trip Level	SC	$-20°C \leq T_j \leq 125°C$, $V_D = 15V$	200	—	—	Amperes
Short Circuit Current Delay Time	$t_{off(SC)}$	$V_D = 15V$	—	10	—	µs
Over Temperature Protection	OT	Trip Level	100	110	120	°C
($V_D = 15V$, Lower Arm)	OT_r	Reset Level	85	95	105	°C
Supply Circuit Under Voltage Protection	UV	Trip Level	11.5	12.0	12.5	Volts
($-20°C \leq T_j \leq 125°C$)	UV_r	Reset Level	—	12.5	—	Volts
Circuit Current	I_D	$V_D = 15V$, $V_{CIN} = 15V$, $V_{N1}\text{-}V_{NC}$	—	72	100	mA
		$V_D = 15V$, $V_{CIN} = 15V$, $V_{XP1}\text{-}V_{XPC}$	—	24	34	mA
Input ON Threshold Voltage	$V_{th(on)}$	Applied between $U_P\text{-}V_{UPC}$, $V_P\text{-}V_{VPC}$,	1.2	1.5	1.8	Volts
Input OFF Threshold Voltage	$V_{th(off)}$	$W_P\text{-}V_{WPC}$, $U_N \cdot V_N \cdot W_N\text{-}V_{NC}$	1.7	2.0	2.3	Volts
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

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

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
IGBT Inverter Sector						
Collector-Emitter Cutoff Current	I_{CES}	$V_{CE} = V_{CES}$, $V_D = 15V$, $T_j = 25°C$	—	—	1.0	mA
		$V_{CE} = V_{CES}$, $V_D = 15V$, $T_j = 125°C$	—	—	10.0	mA
FWDi Forward Voltage	V_{EC}	$-I_C = 150A$, $V_D = 15V$, $V_{CIN} = 15V$	—	2.50	3.50	Volts
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$V_D = 15V$, $V_{CIN} = 0V$, $I_C = 150A$, Pulsed, $T_j = 25°C$	—	2.65	3.30	Volts
		$V_D = 15V$, $V_{CIN} = 0V$, $I_C = 150A$, Pulsed, $T_j = 125°C$	—	2.60	3.25	Volts
Inductive Load Switching Times	t_{on}		0.4	0.9	2.3	µs
	t_{rr}	$V_D = 15V$, $V_{CIN} = 0 \leftrightarrow 15V$	—	0.2	0.3	µs
	$t_{C(on)}$	$V_{CC} = 600V$, $I_C = 150A$,	—	0.4	1.0	µs
	t_{off}	$T_j = 125°C$	—	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	—	—	0.16	°C/Watt
	$R_{th(j-c)F}$	Each Inverter FWDi	—	—	0.26	°C/Watt
Contact Thermal Resistance	$R_{th(c-f)}$	Case to Fin Per Module, Thermal Grease Applied	—	—	0.018	°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 P-N Terminals	≤ 1000	Volts
	V_D	Applied between V_{UP1}-V_{UPC}, V_{VP1}-V_{VPC}, V_{WP1}-V_{WPC}, V_{N1}-V_{NC}	15 ± 1.5	Volts
Input ON Voltage	$V_{CIN(on)}$	Applied between	≤ 0.8	Volts
Input OFF Voltage	$V_{CIN(off)}$	U_P-V_{UPC}, V_P-V_{VPC}, W_P-V_{WPC}, $U_N \cdot V_N \cdot W_N$-V_{NC}	≥ 4.0	Volts
Arm Shoot-Through Blocking Time	t_{dead}	For IPM's each Input Signal	≥ 3.0	µs

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