

PM150CVA120

FLAT-BASE TYPE
INSULATED PACKAGE

PM150CVA120



FEATURE

- 3φ 150A, 1200V Current-sense IGBT for 20kHz switching
- Monolithic gate drive & protection logic
- Detection, protection & status indication circuits for over-current, short-circuit, over-temperature & under-voltage (P-Fo available from upper leg devices)
- Acoustic noise-less 30kW class inverter application
- UL Recognized

Yellow Card No. E80276(N)

File No. E80271

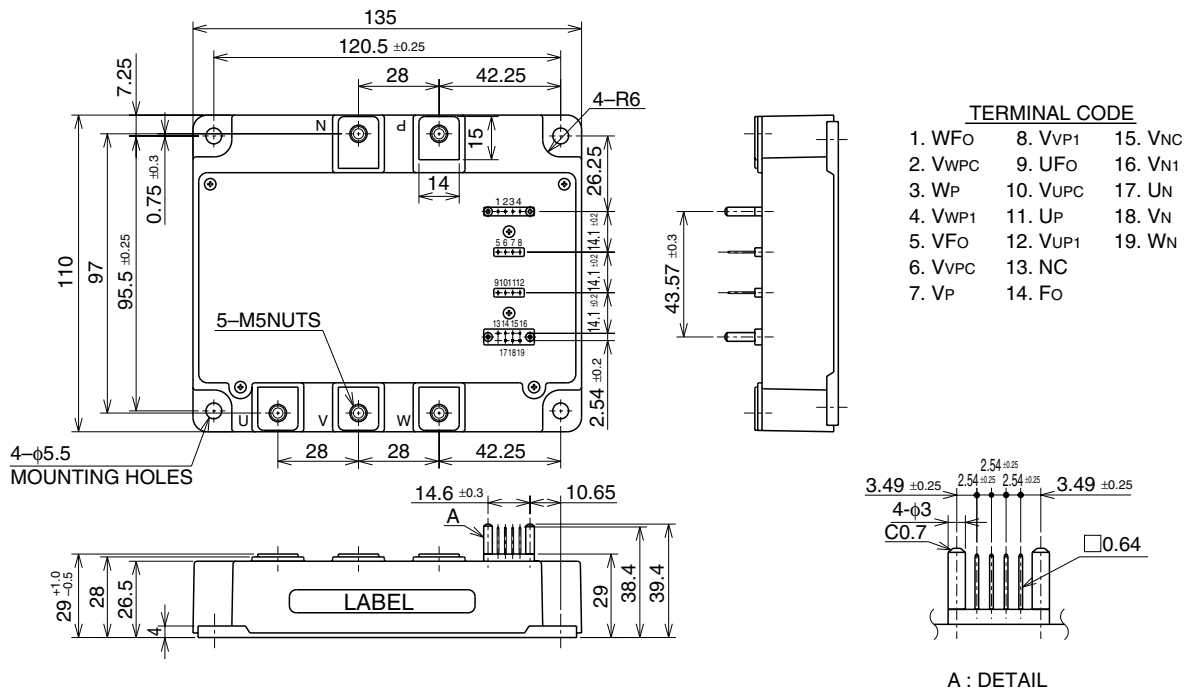
APPLICATION

General purpose inverter, servo drives and other motor controls

PACKAGE OUTLINES

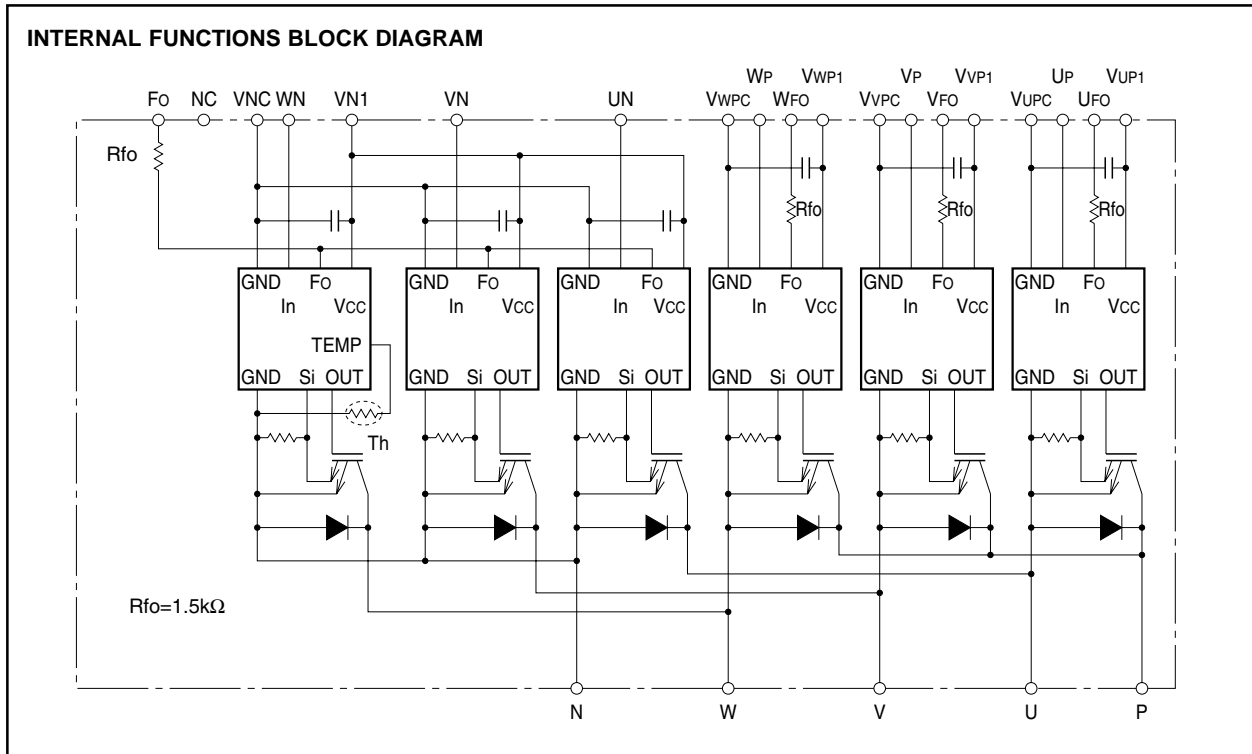
Dimensions in mm

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MAXIMUM RATING (Tj = 25°C unless otherwise noted)
INVERTER PART

Symbol	Parameter	Condition	Ratings	Unit
V _{CES}	Collector-Emitter Voltage	V _D = 15V, V _{CIN} = 15V	1200	V
±I _C	Collector Current	T _C = 25°C	150	A
±I _{CP}	Collector Current (Peak)	T _C = 25°C	300	A
P _C	Collector Dissipation	T _C = 25°C	710	W
T _j	Junction Temperature		-20 ~ +150	°C

CONTROL PART

Symbol	Parameter	Condition	Ratings	Unit
V _D	Supply Voltage	Applied between : V _{UP1} -V _{UPC} V _{VVP1} -V _{VVPC} , V _{WVP1} -V _{VWPC} , V _{VN1} -V _{VNC}	20	V
V _{CIN}	Input Voltage	Applied between : U _P -V _{UPC} , V _P -V _{VVPC} , W _P -V _{VWPC} U _N • V _N • W _N -V _{VNC}	20	V
V _{FO}	Fault Output Supply Voltage	Applied between : U _{FO} -V _{UPC} , V _{FO} -V _{VVPC} , W _{FO} -V _{VWPC} F _O -V _{VNC}	20	V
I _{FO}	Fault Output Current	Sink current at U _{FO} , V _{FO} , W _{FO} and F _O terminal	20	mA

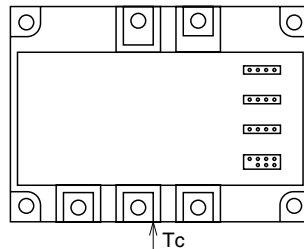
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TOTAL SYSTEM

Symbol	Parameter	Condition	Ratings	Unit
V _{CC(Prot)}	Supply Voltage Protected by SC	V _D = 13.5 ~ 16.5V, Inverter Part, T _j = 125°C Start	800	V
V _{CC(surge)}	Supply Voltage (Surge)	Applied between : P-N, Surge value or without switching	1000	V
T _c	Module Case Operating Temperature	(Note-1)	-20 ~ +100	°C
T _{stg}	Storage Temperature		-40 ~ +125	°C
V _{iso}	Isolation Voltage	60Hz, Sinusoidal, Charged part to Base, AC 1 min.	2500	V _{rms}

(Note-1) T_c measurement point is below. (3mm depth at the center of the side of base plate)



ELECTRICAL CHARACTERISTICS (T_j = 25°C, unless otherwise noted)

INVERTER PART

Symbol	Parameter	Test Condition	Limits			Unit
			Min.	Typ.	Max.	
V _{CE(sat)}	Collector-Emitter Saturation Voltage	V _D = 15V, I _C = 150A V _{CIN} = 0V	—	2.65	3.20	V
V _{CE}	Collector-Emitter Forward Voltage	-I _C = 50A, V _D = 15V, V _{CIN} = 5V	—	2.75	3.35	V
t _{on}	Switching Time	V _D = 15V, V _{CIN} = 0V ↔ 15V V _{CC} = 600V, I _C = 150A T _j = 125°C Inductive Load (upper and lower arm)	0.4	0.9	2.3	μs
t _{tr}			—	0.2	0.3	
t _{c(on)}			—	0.4	1.0	
t _{off}			—	2.4	3.4	
t _{c(off)}			—	0.7	1.2	
IC _{ES}	Collector-Emitter Cutoff Current	V _{CE} = V _{CEs} , V _{CIN} = 15V	—	—	1	mA
		T _j = 125°C	—	—	10	

CONTROL PART

Symbol	Parameter	Test Condition	Limits			Unit	
			Min.	Typ.	Max.		
I _D	Circuit Current	V _D = 15V, V _{CIN} = 15V	—	72	100	mA	
		V _{N1} -V _{N2} V _{P1} -V _{P2}	—	24	34		
V _{th(ON)}	Input ON Threshold Voltage	Applied between : UP-V _{UPC} , VP-V _{VPC} , WP-V _{WPC}	1.2	1.5	1.8	V	
V _{th(OFF)}	Input OFF Threshold Voltage	UN • VN • WN-V _{N2}	1.7	2.0	2.3		
SC	Short Circuit Trip Level	-20 ≤ T _j ≤ 125°C, V _D = 15V	200	—	—	A	
t _{off(SC)}	Short Circuit Current Delay Time	V _D = 15V	—	10	—	μs	
OT	Over Temperature Protection	Base-plate	Trip level	111	118	125	°C
OT _r		Temperature detection, V _D = 15V	Reset level	—	100	—	
UV	Supply Circuit Under-Voltage Protection	-20 ≤ T _j ≤ 125°C	Trip level	11.5	12.0	12.5	V
UV _r			Reset level	—	12.5	—	
I _{FO(H)}	Fault Output Current	V _D = 15V, V _{FO} = 15V	(Note-2)	—	—	0.01	mA
I _{FO(L)}			(Note-2)	—	10	15	
t _{FO}	Minimum Fault Output Pulse Width	V _D = 15V	(Note-2)	1.0	1.8	—	ms

(Note-2) Fault output is given only when the internal SC, OT & UV protection.
Fault output of OT protection operate by lower arm
Fault output of OT, UV protection given pulse while over level.

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THERMAL RESISTANCES

Symbol	Parameter	Test Condition	Limits			Unit
			Min.	Typ.	Max.	
Rth(j-c)Q	Junction to case Thermal Resistances	Inverter IGBT part (per 1/6 module)	—	—	0.176	°C/W
Rth(j-c)F		Inverter FWDi part (per 1/6 module)	—	—	0.26	
Rth(c-f)	Contact Thermal Resistance	Case to fin, Thermal grease applied (per 1 module)	—	—	0.018	

MECHANICAL RATINGS AND CHARACTERISTICS

Symbol	Parameter	Test Condition	Limits			Unit
			Min.	Typ.	Max.	
—	Mounting torque	Mounting part screw : M5	2.5	3.0	3.5	N • m
—	Mounting torque	Main terminal screw : M5	2.5	3.0	3.5	N • m
—	Weight		—	1000	—	g

RECOMMENDED CONDITIONS FOR USE

Symbol	Parameter	Test Condition	Recommended value	Unit
VCC	Supply Voltage	Applied across P-N terminals	≤ 800	V
VD	Control Supply Voltage	Applied between : VUP1-VUPC, VVP1-VVPC VWP1-VWPC, VN1-VNC (Note-3)	15 ± 1.5	V
VCIN(ON)	Input ON Voltage	Applied between : UP-VUPC, VP-VVPC, WP-VWPC UN • VN • WN-VNC	≤ 0.8	V
VCIN(OFF)	Input OFF Voltage		≥ 4.0	
tdead	Arm Shoot-through Blocking Time	For IPM's each input signals	≥ 3.0	μs
fpwm	PWM Input Frequency	Using Application Circuit input signal of IPM, 3φ Sinosoidal PWM, VV1 inverter	≤ 30	kHz

Note 3: With ripple satisfying the following conditions: dv/dt swing ≤ ±5V/μs, Variation ≤ 2V peak to peak

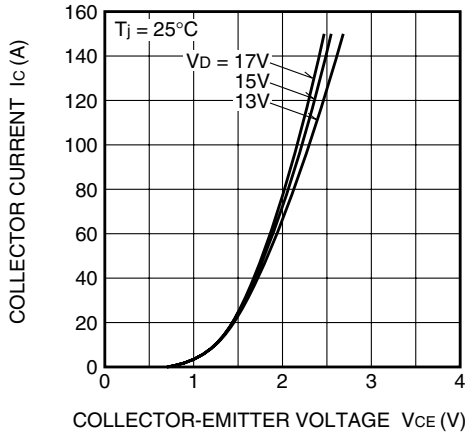
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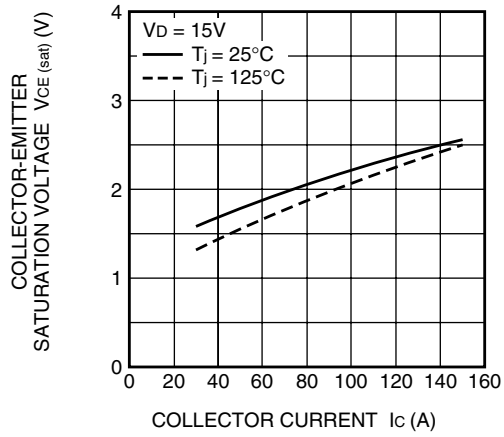
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PERFORMANCE CURVES

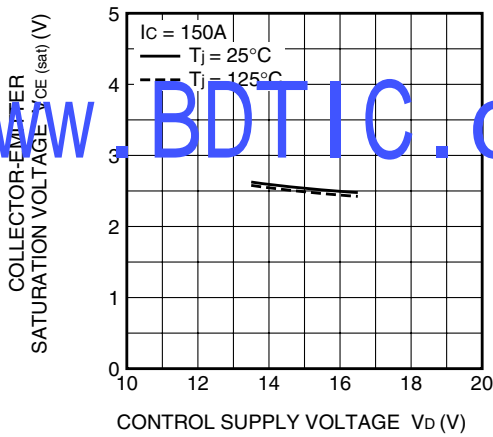
OUTPUT CHARACTERISTICS (TYPICAL)



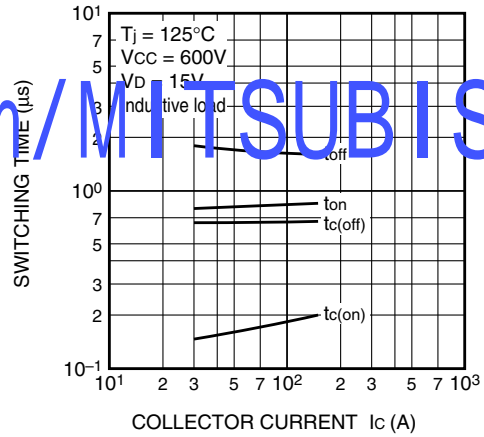
COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



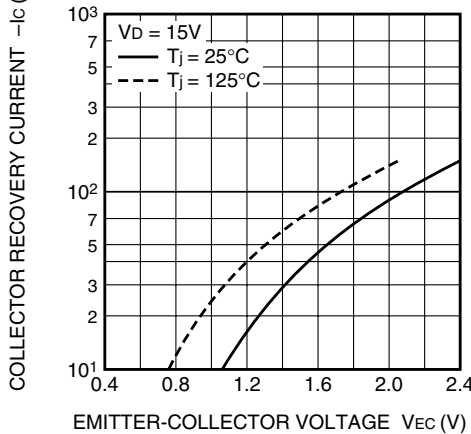
COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



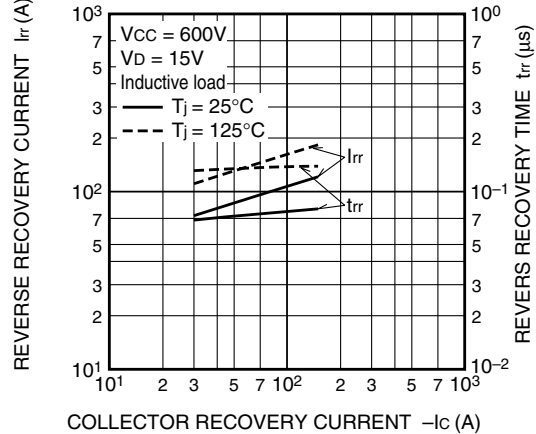
SWITCHING CHARACTERISTICS (TYPICAL)



DIODE FORWARD CHARACTERISTICS (TYPICAL)



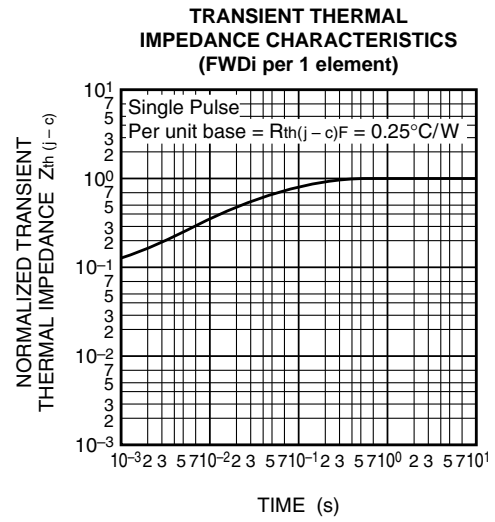
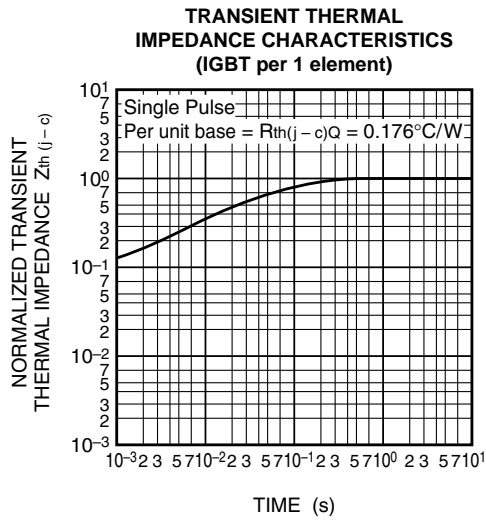
DIODE REVERSE RECOVERY CHARACTERISTICS (TYPICAL)



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