

PM200CVA060

FLAT-BASE TYPE
INSULATED PACKAGE

PM200CVA060



FEATURE

- 3φ 200A, 600V 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 22kW class inverter application
- UL Recognized

Yellow Card No. E80276(N)

File No. E80271

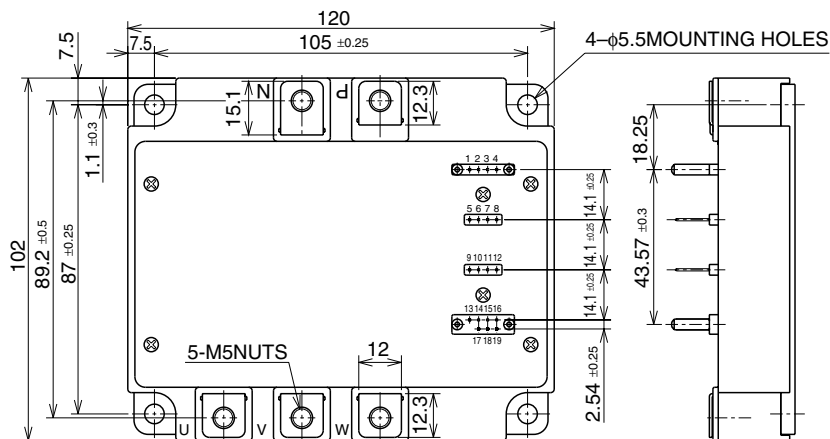
APPLICATION

General purpose inverter, servo drives and other motor controls

PACKAGE OUTLINES

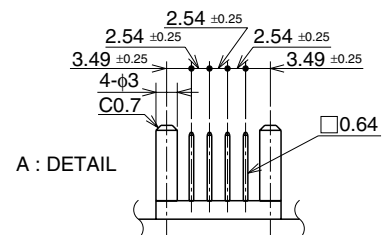
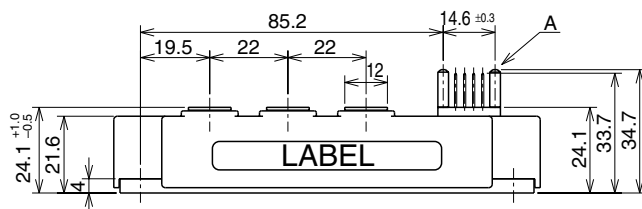
Dimensions in mm

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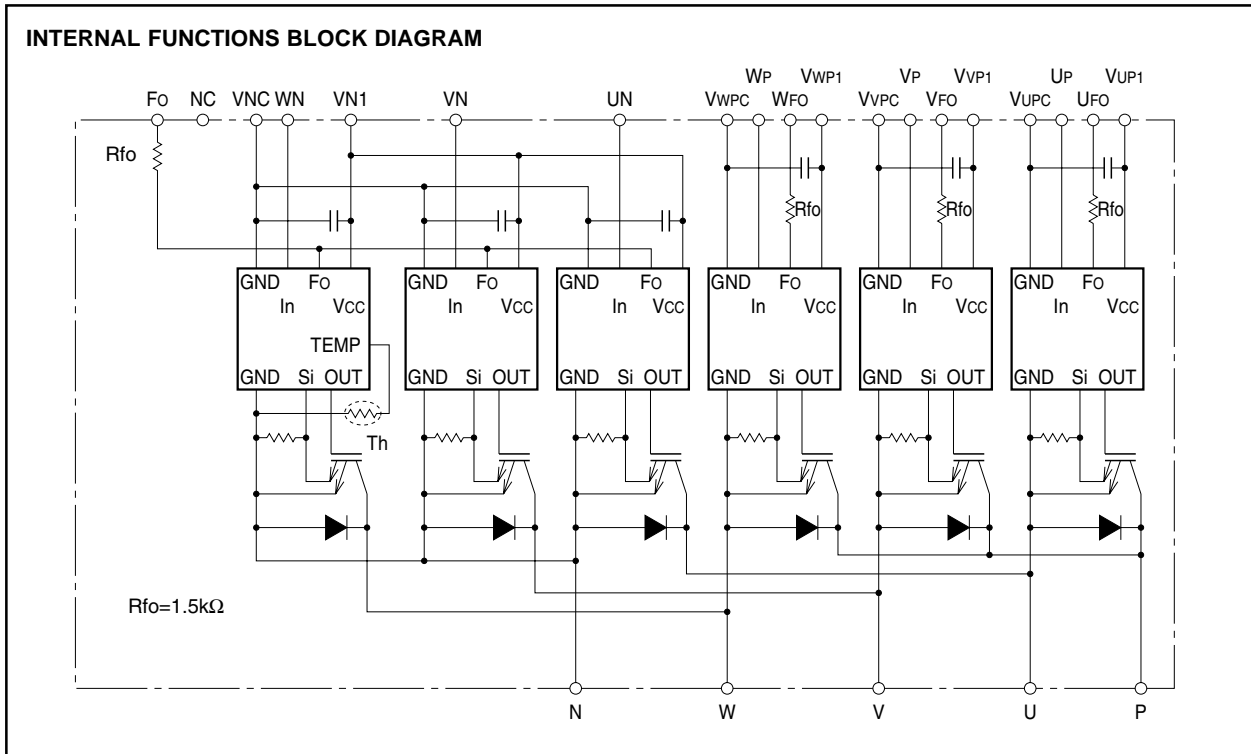
TERMINAL CODE

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



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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 | 600 | V |
| ±I _C | Collector Current | T _C = 25°C | 200 | A |
| ±I _{CP} | Collector Current (Peak) | T _C = 25°C | 400 | A |
| P _C | Collector Dissipation | T _C = 25°C | 541 | 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 _{F0} | Fault Output Supply Voltage | Applied between : U _{F0} -V _{UPC} , V _{F0} -V _{VVPC} , W _{F0} -V _{VWPC} F ₀ -V _{VNC} | 20 | V |
| I _{F0} | Fault Output Current | Sink current at U _{F0} , V _{F0} , W _{F0} and F ₀ terminal | 20 | mA |

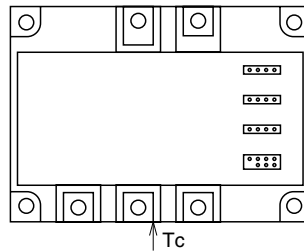
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TOTAL SYSTEM

| 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 | 400 | V |
| V _{CC(surge)} | Supply Voltage (Surge) | Applied between : P-N, Surge value or without switching | 500 | 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 = 200A V _{CIN} = 0V | — | 2.35 | 2.80 | V |
| V _{CE} | AVDi Forward Voltage | -I _C = 200A, V _D = 15V, V _{CIN} = 15V | — | 2.25 | 3.05 | V |
| t _{on} | Switching Time | V _D = 15V, V _{CIN} = 0V↔15V V _{CC} = 300V, I _C = 200A T _j = 125°C Inductive Load (upper and lower arm) | 0.4 | 0.8 | 2.1 | μs |
| t _{tr} | | | — | 0.2 | 0.3 | |
| t _{c(on)} | | | — | 0.3 | 1.1 | |
| t _{off} | | | — | 1.8 | 2.9 | |
| t _{c(off)} | | | — | 0.6 | 1.2 | |
| I _{CES} | 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 | V _{N1} -V _{N2} | — | 40 | 55 | mA |
| | | | V*P1-V*PC | — | 13 | 18 | |
| V _{th(ON)} | Input ON Threshold Voltage | Applied between : UP-VU _{PC} , VP-VV _{PC} , WP-VW _{PC} | 1.2 | 1.5 | 1.8 | V | |
| V _{th(OFF)} | Input OFF Threshold Voltage | UN • VN • WN-VNC | 1.7 | 2.0 | 2.3 | | |
| SC | Short Circuit Trip Level | -20 ≤ T _j ≤ 125°C, V _D = 15V | 310 | — | — | A | |
| t _{off(SC)} | Short Circuit Current Delay Time | V _D = 15V | — | 10 | — | μs | |
| OT | Over Temperature Protection | Base-plate Temperature detection, V _D = 15V | Trip level | 111 | 118 | 125 | °C |
| OT _r | | | 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) | — | — | 0.231 | °C/W |
| Rth(j-c)F | | Inverter FWDi part (per 1/6 module) | — | — | 0.35 | |
| Rth(c-f) | Contact Thermal Resistance | Case to fin, Thermal grease applied (per 1 module) | — | — | 0.022 | |

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 | | — | 730 | — | g |

RECOMMENDED CONDITIONS FOR USE

| Symbol | Parameter | Test Condition | Recommended value | Unit |
|-----------|---------------------------------|--|-------------------|------|
| VCC | Supply Voltage | Applied across P-N terminals | ≤ 400 | 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 | ≥ 2.5 | 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

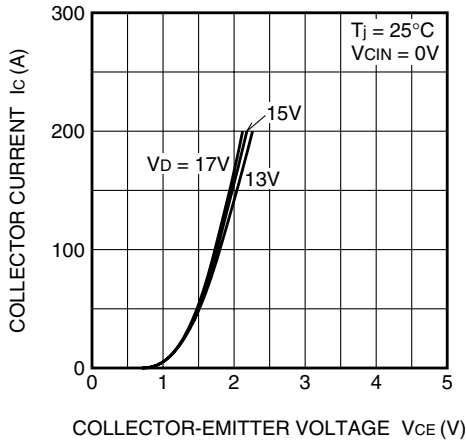
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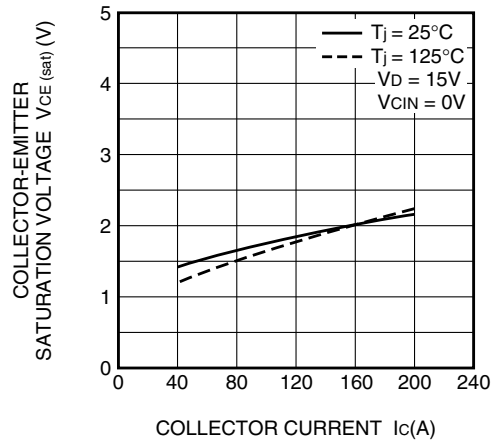
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PERFORMANCE CURVES

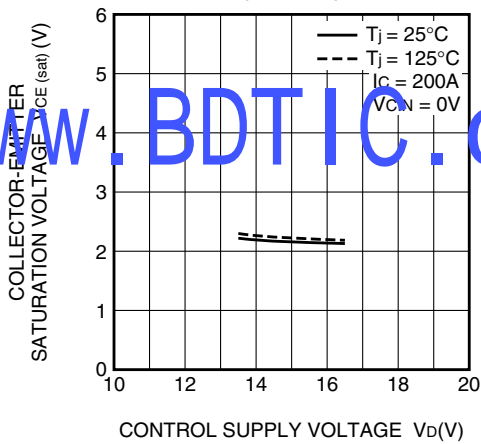
OUTPUT CHARACTERISTICS (TYPICAL)



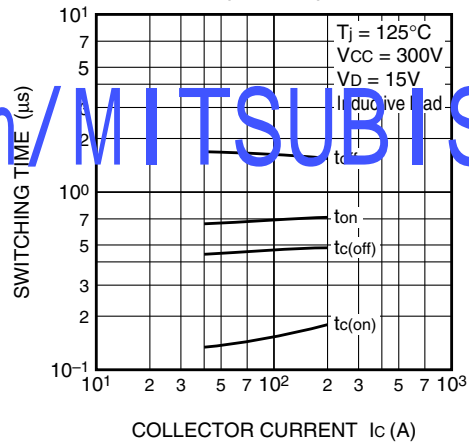
COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



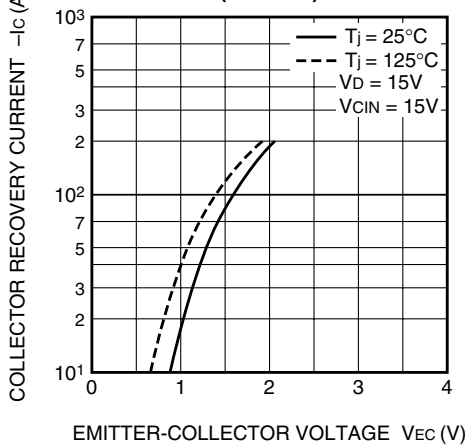
COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



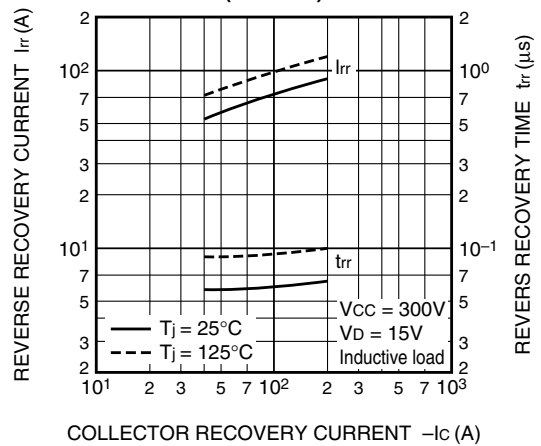
SWITCHING CHARACTERISTICS (TYPICAL)



DIODE FORWARD CHARACTERISTICS (TYPICAL)



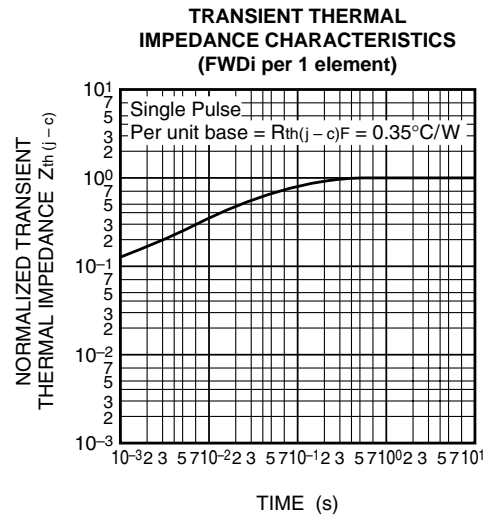
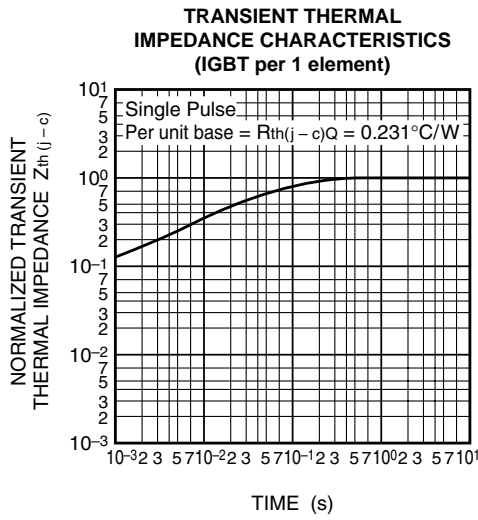
DIODE REVERSE RECOVERY CHARACTERISTICS (TYPICAL)



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