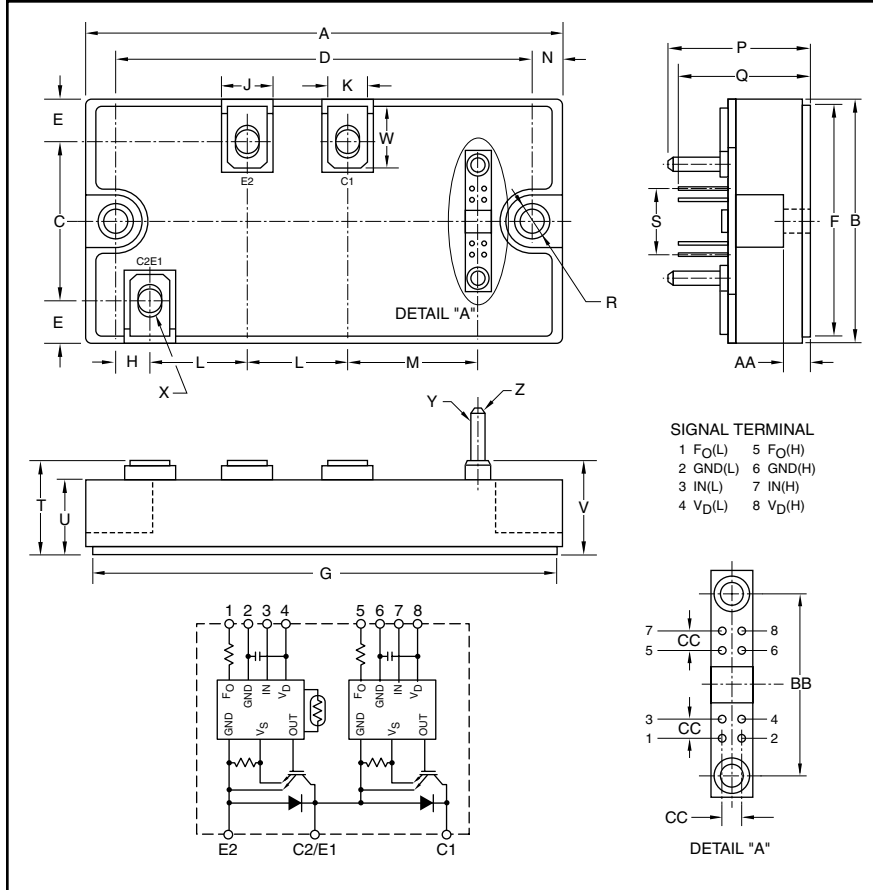


Compact IPM Series Dual Module 300 Amperes/600 Volts



Description:

Powerex Dual Compact IPM Series Modules are designed for use in switching applications. Each module consists of two IGBT Transistors in a half-bridge configuration, with each transistor having a reverse-connected super-fast recovery free-wheel diode. All components and interconnects are isolated from the heat sinking baseplate, offering simplified system assembly and thermal management.

Features:

- Over-Current and Over-Temperature Protection
- Low V_{CE(sat)}
- Isolated Baseplate for Easy Heat Sinking

Applications:

- AC Motor Control
- Motion/Servo Control
- UPS
- Welding Power Supplies
- Laser Power Supplies

Ordering Information:

MIG300J2CSB1W is a 600V (V_{CE(s)}), 300 Ampere Compact IPM Series Dual Module.

Outline Drawing and Circuit Diagram

| Dimensions | Inches | Millimeters |
|------------|-----------------|---------------|
| A | 4.21±0.04 | 107.0±1.0 |
| B | 2.16±0.04 | 55.0±1.0 |
| C | 1.42±0.03 | 36.0±0.8 |
| D | 3.66±0.01 | 93.0±0.3 |
| E | 0.37±0.03 | 9.5±0.8 |
| F | 2.05±0.02 | 52.0±0.5 |
| G | 4.09±0.02 | 104.0±0.5 |
| H | 0.29±0.03 | 7.5±0.8 |
| J | 0.47 | 12.0 |
| K | 0.35 | 9.0 |
| L | 0.87±0.03 | 22.0±0.8 |
| M | 1.15±0.03 | 29.24±0.8 |
| N | 0.28 | 7.0 |
| P | 1.32±0.04/-0.02 | 33.5±1.0/-0.5 |

| Dimensions | Inches | Millimeters |
|------------|------------------|---------------|
| Q | 1.24±0.03 | 31.5±0.8 |
| R | 0.22 Dia. | 5.5 Dia. |
| S | 0.6 | 15.24 |
| T | 0.87±0.04/-0.01 | 22.0±1.0/-0.3 |
| U | 0.73±0.03 | 18.5±0.8 |
| V | 0.89±0.04/-0.024 | 22.0±1.0/-0.6 |
| W | 0.55 | 13.9 |
| X | M5 Metric | M5 |
| Y | 0.12 Dia. | 3.0 Dia. |
| Z | 0.025 Sq. | 0.64 Sq. |
| AA | 0.28 | 7.0 |
| BB | 1.0±0.024 | 25.4±0.6 |
| CC | 0.1 | 2.54 |



Powerex, Inc., 200 E. Hillis Street, Youngwood, Pennsylvania 15697-1800 (724) 925-7272

MIG300J2CSB1W
Compact IPM Series Dual Module
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Absolute Maximum Ratings, $T_j = 25^\circ\text{C}$ unless otherwise specified

| Characteristics | Symbol | MIG300J2CSB1W | Units |
|---|------------------|---------------|------------------|
| Power Device Junction Temperature | T_j | -20 to 150 | $^\circ\text{C}$ |
| Storage Temperature | T_{stg} | -40 to 125 | $^\circ\text{C}$ |
| Operating Temperature | T_C | -20 to 100 | $^\circ\text{C}$ |
| Mounting Torque, M5 Mounting Screws | — | 31 | in-lb |
| Module Weight (Typical) | — | 278 | Grams |
| Isolation Voltage, AC 1 minute, 60Hz Sinusoidal | V_{ISO} | 2500 | Volts |

IGBT Inverter Sector

| | | | |
|--|------------------|------|---------|
| Supply Voltage (P-N Power Terminal) | V_{CC} | 450 | Volts |
| Collector-Emitter Voltage | V_{CES} | 600 | Volts |
| Collector Current ($T_C = 25^\circ\text{C}$, DC) | I_C | 300 | Amperes |
| Forward Current ($T_C = 25^\circ\text{C}$, DC) | I_F | 300 | Amperes |
| Collector Power Dissipation ($T_C = 25^\circ\text{C}$) | P_C | 1600 | Watts |

IGBT Control Sector

| | | | |
|---|-----------------|----|-------|
| Control Supply Voltage (V_D -GND Terminal) | V_D | 20 | Volts |
| Input Voltage (IN-GND Terminal) | V_{IN} | 20 | Volts |
| Fault Output Voltage (F_O -GND (L) Terminal) | V_{FO} | 20 | Volts |
| Fault Output Current (F_O Sink Current) | I_{FO} | 10 | mA |



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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 Cut-off Current | I_{CEX} | $V_{CE} = 600\text{V}, T_j = 25^\circ\text{C}$ | — | — | 1 | mA |
| | | $V_{CE} = 600\text{V}, T_j = 125^\circ\text{C}$ | — | — | 10 | mA |
| Collector-Emitter Saturation Voltage | $V_{CE(sat)}$ | $V_D = 15\text{V}, I_C = 300\text{A}, V_{IN} = 15\text{V to } 0\text{V}, T_j = 25^\circ\text{C}$ | 1.6 | 1.9 | 2.3 | Volts |
| Saturation Voltage | | $V_D = 15\text{V}, I_C = 300\text{A}, V_{IN} = 15\text{V to } 0\text{V}, T_j = 125^\circ\text{C}$ | — | 2.1 | — | Volts |
| Forward Voltage | V_F | $I_F = 300\text{A}, T_j = 25^\circ\text{C}$ | — | 2.1 | 2.5 | Volts |
| Switching Time | t_{on} | | — | 2.0 | 3.0 | μs |
| | $t_{c(on)}$ | $V_{CC} = 300\text{V}, I_C = 300\text{A},$ | — | 0.4 | — | μs |
| | t_{rr} | $V_D = 15\text{V}, V_{IN} = 15\text{V} \leftrightarrow 0\text{V},$ | — | 0.2 | — | μs |
| | t_{off} | $T_j = 25^\circ\text{C}, \text{ Inductive Load}$ | — | 1.5 | 2.5 | μs |
| | $t_{c(off)}$ | | — | 0.25 | — | μs |
| Control Sector | | | | | | |
| Control Circuit Current | $I_{D(H)}$ | High Side, $V_D = 15\text{V}$ | — | 13 | 17 | mA |
| | $I_{D(L)}$ | Low Side, $V_D = 15\text{V}$ | — | 13 | 17 | mA |
| Input-ON Signal Voltage | $V_{IN(on)}$ | $V_D = 15\text{V}$ | 1.4 | 1.6 | 1.8 | Volts |
| Input-OFF Signal Voltage | $V_{IN(off)}$ | $V_D = 15\text{V}$ | 2.2 | 2.5 | 2.8 | Volts |
| Fault Output Current | $I_{FO(on)}$ | Protection Current, $V_D = 15\text{V}$ | — | 10 | 12 | mA |
| | $I_{FO(off)}$ | Normal Current, $V_D = 15\text{V}$ | — | — | 0.1 | mA |
| Over-Current Protection Trip Level | O_C | $V_D = 15\text{V}, T_j \leq 125^\circ\text{C}$ | 480 | — | — | Amperes |
| Short-Circuit Current | S_C | $V_D = 15\text{V}, T_j \leq 125^\circ\text{C}$ | 480 | — | — | Amperes |
| Protection Trip Level | | | | | | |
| Over-Current Cut-off Time | $t_{off(OC)}$ | — | — | 5 | — | μs |
| Over-Temperature | O_T | Trip Level Case Temperature | 110 | 118 | 125 | $^\circ\text{C}$ |
| Protection | O_{Tr} | Reset Level Case Temperature | — | 98 | — | $^\circ\text{C}$ |
| Control Supply Under Voltage Protection | U_V | Trip Level | 11.0 | 12.0 | 12.5 | Volts |
| | U_{Vr} | Reset Level | 12.0 | 12.5 | 13.0 | Volts |
| Fault Output Pulse Width | $t_d(FO)$ | $V_D = 15\text{V}$ | 1 | 2 | 3 | ms |



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Thermal Characteristics

| Characteristic | Symbol | Condition | Min. | Typ. | Max. | Units |
|----------------------------|----------------|-----------------------|------|-------|-------|---------|
| Junction to Case | $R_{th(j-c)Q}$ | IGBT (Per 1/2 Module) | — | — | 0.078 | °C/Watt |
| Thermal Resistance | $R_{th(j-c)D}$ | FWDi (Per 1/2 Module) | — | — | 0.130 | °C/Watt |
| Contact Thermal Resistance | $R_{th(c-f)}$ | — | — | 0.017 | — | °C/Watt |

Recommended Conditions for Use

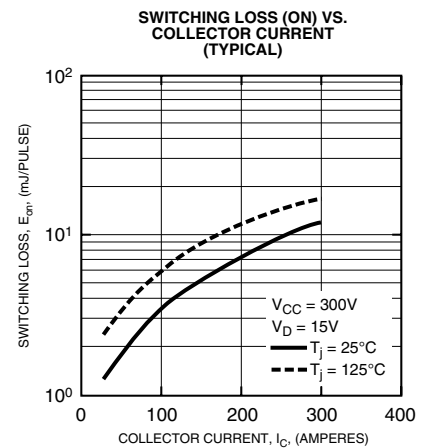
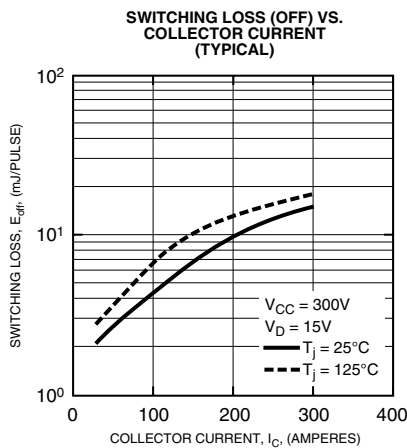
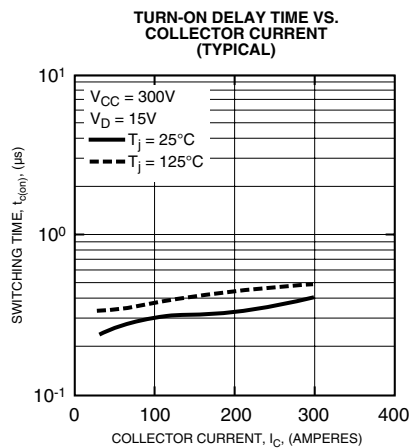
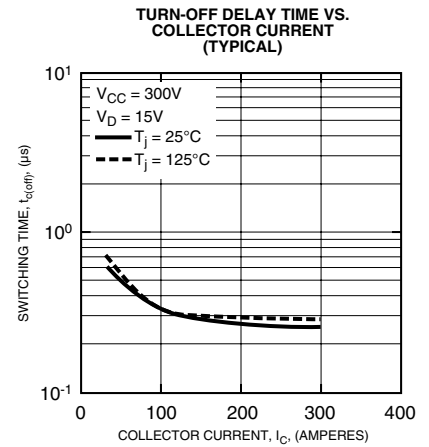
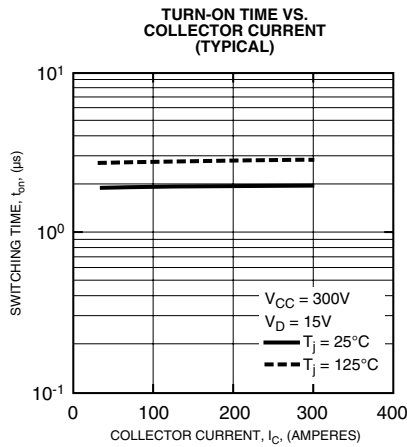
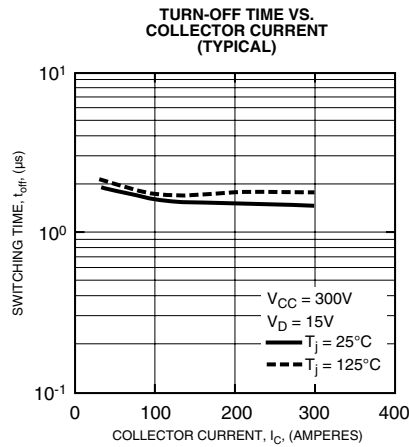
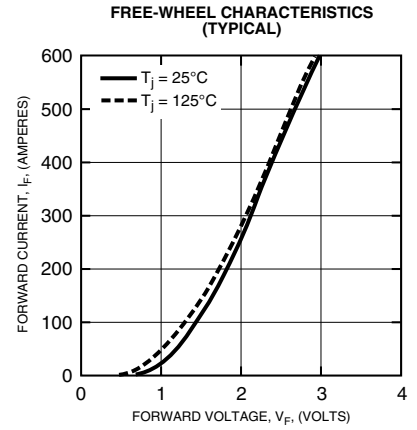
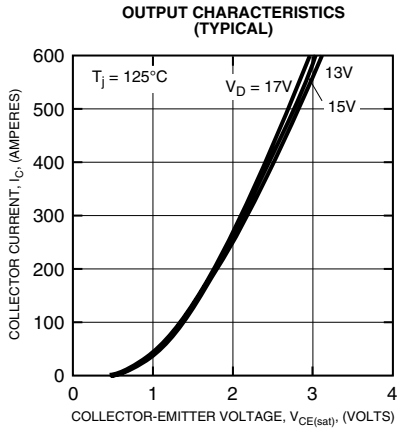
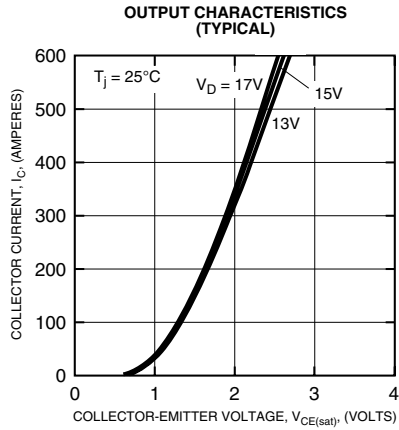
| Characteristic | Symbol | Condition | Min. | Typ. | Max. | Units |
|------------------------|------------|----------------------------|------|------|------|-------|
| Supply Voltage | V_{CC} | P-N Power Terminals | — | 300 | 400 | Volts |
| Control Supply Voltage | V_D | V_D -GND Signal terminal | 13.5 | 15 | 16.5 | Volts |
| Switching Frequency | f_C | PMW Control | — | — | 20 | kHz |
| Dead Time* | t_{DEAD} | — | 5 | — | — | µs |

*The table lists Dead Time requirements for the module input, excluding photocoupler delays. When specifying Dead Time requirements for the photocoupler input, please add photocoupler delays to the Dead Time given above.



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