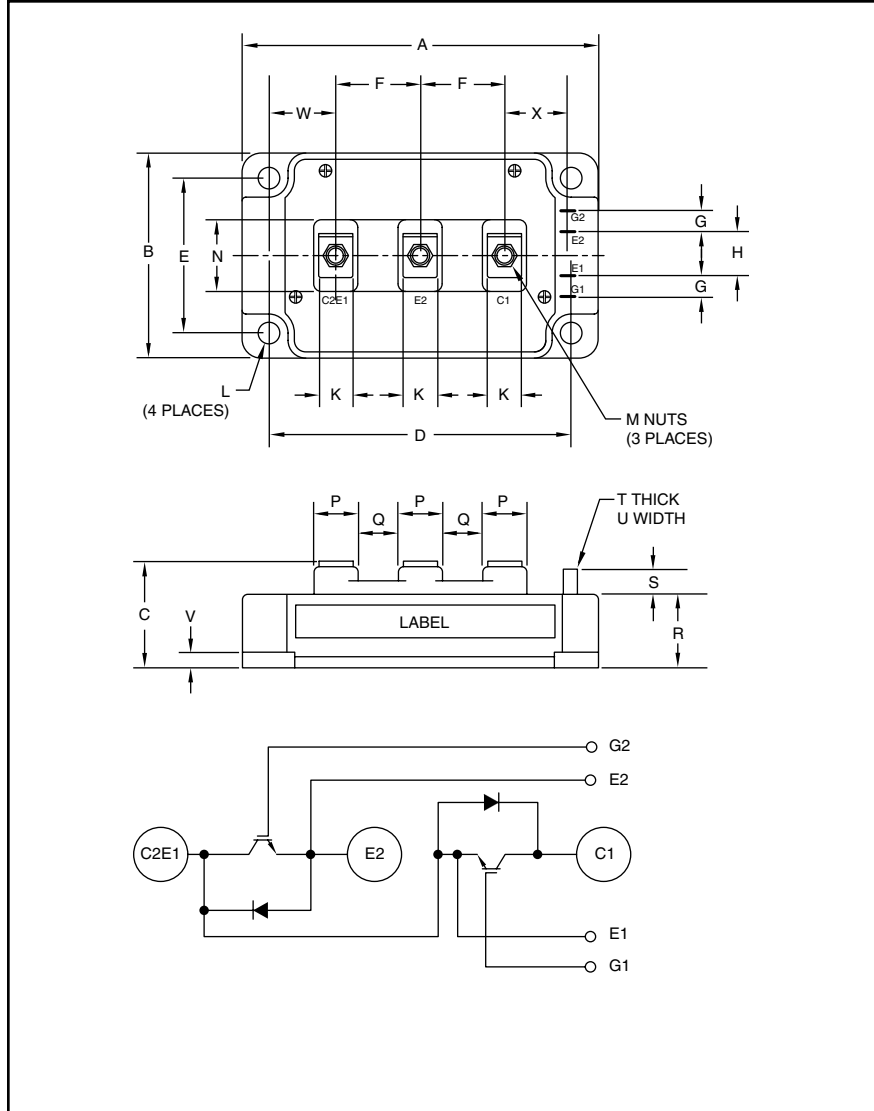


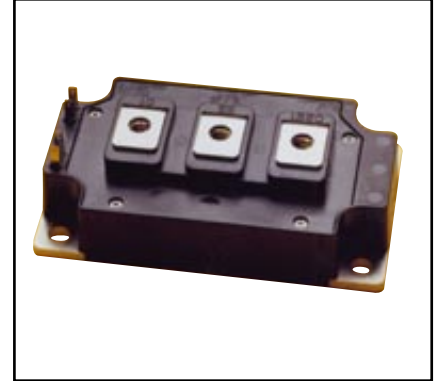
### Dual IGBTMOD™ A-Series Module 300 Amperes/1200 Volts



Outline Drawing and Circuit Diagram

| Dimensions | Inches         | Millimeters   |
|------------|----------------|---------------|
| A          | 4.25           | 108.0         |
| B          | 2.44           | 62.0          |
| C          | 1.18+0.4/-0.02 | 30.0+1.0/-0.5 |
| D          | 3.66±0.01      | 93.0±0.25     |
| E          | 1.89±0.01      | 48.0±0.25     |
| F          | 0.98           | 25.0          |
| G          | 0.24           | 6.0           |
| H          | 0.59           | 15.0          |
| K          | 0.55           | 14.0          |
| L          | 0.26 Dia.      | Dia. 6.5      |
| M          | M6 Metric      | M6            |

| Dimensions | Inches | Millimeters |
|------------|--------|-------------|
| N          | 1.18   | 30.0        |
| P          | 0.71   | 18.0        |
| Q          | 0.28   | 7.0         |
| R          | 0.87   | 22.2        |
| S          | 0.33   | 8.5         |
| T          | 0.02   | 0.5         |
| U          | 0.110  | 2.8         |
| V          | 0.16   | 4.0         |
| W          | 0.85   | 21.5        |
| X          | 0.94   | 24.0        |



#### Description:

Powerex IGBTMOD™ 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:

- ☐ Low Drive Power
- ☐ Low  $V_{CE(sat)}$
- ☐ Discrete Super-Fast Recovery Free-Wheel Diode
- ☐ Isolated Baseplate for Easy Heat Sinking

#### Applications:

- ☐ AC Motor Control
- ☐ UPS
- ☐ Battery Powered Supplies

#### Ordering Information:

Example: Select the complete part module number you desire from the table below -i.e. CM300DY-24A is a 1200V ( $V_{CES}$ ), 300 Ampere Dual IGBTMOD™ Power Module.

| Type | Current Rating<br>Amperes | $V_{CES}$<br>Volts (x 50) |
|------|---------------------------|---------------------------|
| CM   | 300                       | 24                        |



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

#### CM300DY-24A

#### Dual IGBTMOD™ A-Series Module

300 Amperes/1200 Volts

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

| Ratings                                                                                     | Symbol           | CM300DY-24A | Units            |
|---------------------------------------------------------------------------------------------|------------------|-------------|------------------|
| Junction Temperature                                                                        | $T_j$            | -40 to 150  | $^\circ\text{C}$ |
| Storage Temperature                                                                         | $T_{\text{stg}}$ | -40 to 125  | $^\circ\text{C}$ |
| Collector-Emitter Voltage (G-E Short)                                                       | $V_{\text{CES}}$ | 1200        | Volts            |
| Gate-Emitter Voltage (C-E Short)                                                            | $V_{\text{GES}}$ | $\pm 20$    | Volts            |
| Collector Current (DC, $T_C = 82^\circ\text{C}^*$ )                                         | $I_C$            | 300         | Amperes          |
| Peak Collector Current                                                                      | $I_{\text{CM}}$  | 600**       | Amperes          |
| Emitter Current*** ( $T_C = 25^\circ\text{C}$ )                                             | $I_E$            | 300         | Amperes          |
| Peak Emitter Current***                                                                     | $I_{\text{EM}}$  | 600**       | Amperes          |
| Maximum Collector Dissipation ( $T_C = 25^\circ\text{C}^*$ , $T_j \leq 150^\circ\text{C}$ ) | $P_C$            | 1890        | Watts            |
| Mounting Torque, M6 Main Terminal                                                           | —                | 40          | in-lb            |
| Mounting Torque, M6 Mounting                                                                | —                | 40          | in-lb            |
| Weight                                                                                      | —                | 400         | Grams            |
| Isolation Voltage (Main Terminal to Baseplate, AC 1 min.)                                   | $V_{\text{ISO}}$ | 2500        | Volts            |

#### Static Electrical Characteristics, $T_j = 25^\circ\text{C}$ unless otherwise specified

| Characteristics                      | Symbol               | Test Conditions                                                                    | Min. | Typ. | Max. | Units         |
|--------------------------------------|----------------------|------------------------------------------------------------------------------------|------|------|------|---------------|
| Collector-Cutoff Current             | $I_{\text{CES}}$     | $V_{\text{CE}} = V_{\text{CES}}$ , $V_{\text{GE}} = 0\text{V}$                     | —    | —    | 1.0  | mA            |
| Gate Leakage Current                 | $I_{\text{GES}}$     | $V_{\text{GE}} = V_{\text{GES}}$ , $V_{\text{CE}} = 0\text{V}$                     | —    | —    | 0.5  | $\mu\text{A}$ |
| Gate-Emitter Threshold Voltage       | $V_{\text{GE(th)}}$  | $I_C = 30\text{mA}$ , $V_{\text{CE}} = 10\text{V}$                                 | 6.0  | 7.0  | 8.0  | Volts         |
| Collector-Emitter Saturation Voltage | $V_{\text{CE(sat)}}$ | $I_C = 300\text{A}$ , $V_{\text{GE}} = 15\text{V}$ , $T_j = 25^\circ\text{C}$      | —    | 2.1  | 3.0  | Volts         |
|                                      |                      | $I_C = 300\text{A}$ , $V_{\text{GE}} = 15\text{V}$ , $T_j = 125^\circ\text{C}$     | —    | 2.4  | —    | Volts         |
| Total Gate Charge                    | $Q_G$                | $V_{\text{CC}} = 600\text{V}$ , $I_C = 300\text{A}$ , $V_{\text{GE}} = 15\text{V}$ | —    | 1350 | —    | nC            |
| Emitter-Collector Voltage**          | $V_{\text{EC}}$      | $I_E = 300\text{A}$ , $V_{\text{GE}} = 0\text{V}$                                  | —    | —    | 3.8  | Volts         |

#### Dynamic Electrical Characteristics, $T_j = 25^\circ\text{C}$ unless otherwise specified

| Characteristics                  | Symbol              | Test Conditions                                                                                                               | Min. | Typ. | Max. | Units         |
|----------------------------------|---------------------|-------------------------------------------------------------------------------------------------------------------------------|------|------|------|---------------|
| Input Capacitance                | $C_{\text{ies}}$    | $V_{\text{CE}} = 10\text{V}$ , $V_{\text{GE}} = 0\text{V}$                                                                    | —    | —    | 47   | nf            |
| Output Capacitance               | $C_{\text{oes}}$    |                                                                                                                               | —    | —    | 4    | nf            |
| Reverse Transfer Capacitance     | $C_{\text{res}}$    |                                                                                                                               | —    | —    | 0.9  | nf            |
| Inductive                        | Turn-on Delay Time  | $V_{\text{CC}} = 600\text{V}$ , $I_C = 300\text{A}$ ,<br>$V_{\text{GE1}} = V_{\text{GE2}} = 15\text{V}$ , $R_G = 1.0\Omega$ , | —    | —    | 550  | ns            |
| Load                             | Rise Time           |                                                                                                                               | —    | —    | 180  | ns            |
| Switch                           | Turn-off Delay Time |                                                                                                                               | —    | —    | 600  | ns            |
| Time                             | Fall Time           |                                                                                                                               | —    | —    | 350  | ns            |
| Diode Reverse Recovery Time***   | $t_{\text{rr}}$     | Switching Operation,                                                                                                          | —    | —    | 250  | ns            |
| Diode Reverse Recovery Charge*** | $Q_{\text{rr}}$     | $I_E = 300\text{A}$                                                                                                           | —    | 9.0  | —    | $\mu\text{C}$ |

\* $T_C$ ,  $T_f$  measured point is just under the chips.

\*\*Pulse width and repetition rate should be such that device junction temperature ( $T_j$ ) does not exceed  $T_{j(\text{max})}$  rating.

\*\*\*Represents characteristics of the anti-parallel, emitter-to-collector free-wheel diode (FWDI).

## CM300DY-24A

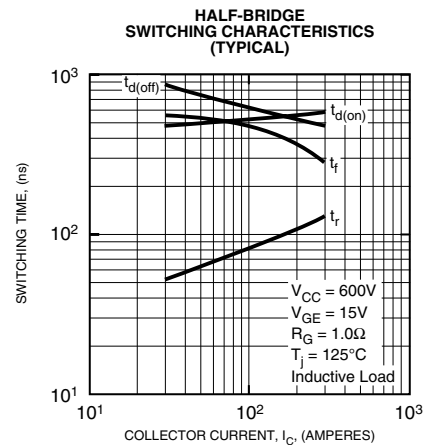
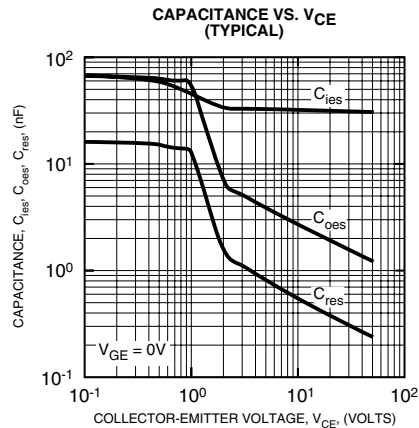
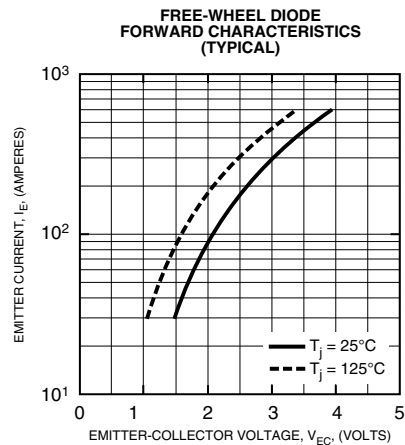
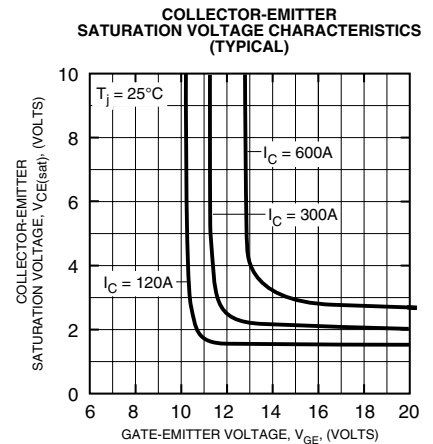
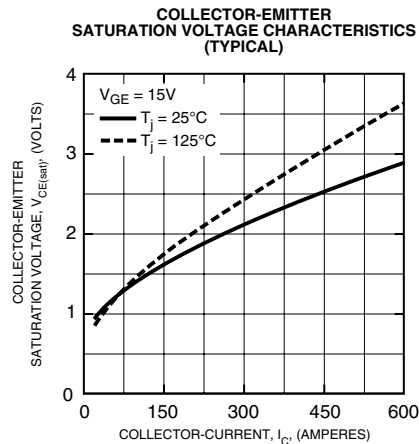
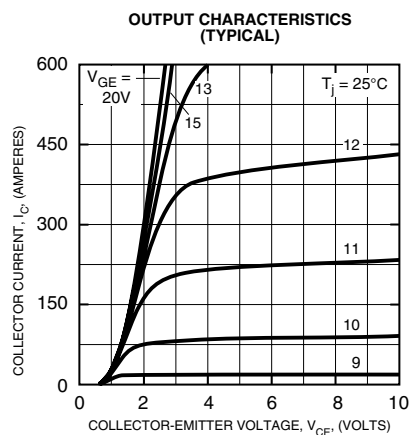
### Dual IGBTMOD™ A-Series Module

300 Amperes/1200 Volts

## Thermal and Mechanical Characteristics, $T_j = 25^\circ\text{C}$ unless otherwise specified

| Characteristics                       | Symbol         | Test Conditions                        | Min. | Typ. | Max.  | Units              |
|---------------------------------------|----------------|----------------------------------------|------|------|-------|--------------------|
| Thermal Resistance, Junction to Case* | $R_{th(j-c)Q}$ | Per IGBT 1/2 Module                    | —    | —    | 0.066 | $^\circ\text{C/W}$ |
| Thermal Resistance, Junction to Case* | $R_{th(j-c)D}$ | Per FWDi 1/2 Module                    | —    | —    | 0.12  | $^\circ\text{C/W}$ |
| Contact Thermal Resistance            | $R_{th(c-f)}$  | Per 1/2 Module, Thermal Grease Applied | —    | 0.02 | —     | $^\circ\text{C/W}$ |
| External Gate Resistance              | $R_G$          |                                        | 1.0  | —    | 16    | $\Omega$           |

\* $T_C$ ,  $T_f$  measured point is just under the chips.

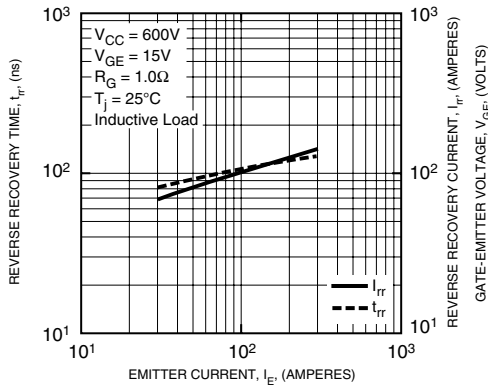


## CM300DY-24A

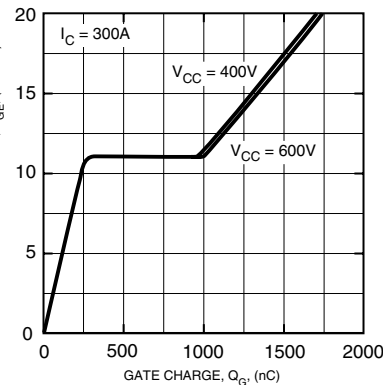
### Dual IGBTMOD™ A-Series Module

300 Amperes/1200 Volts

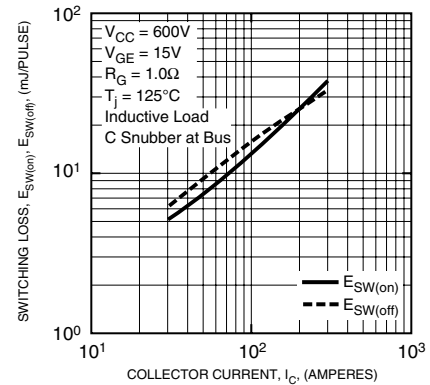
REVERSE RECOVERY CHARACTERISTICS  
(TYPICAL)



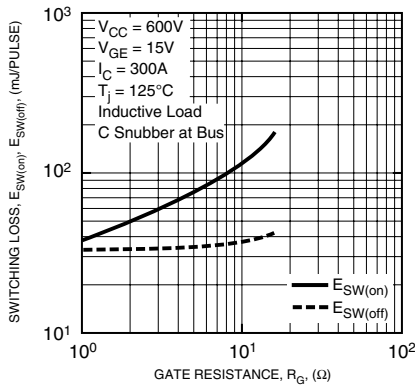
GATE CHARGE VS.  $V_{GE}$



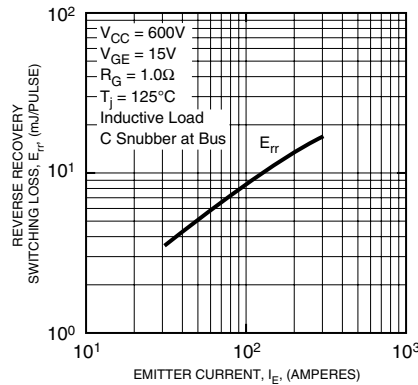
SWITCHING LOSS VS.  
COLLECTOR CURRENT (TYPICAL)



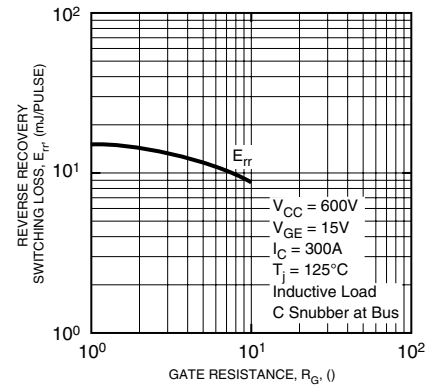
SWITCHING LOSS VS.  
GATE RESISTANCE (TYPICAL)



REVERSE RECOVERY SWITCHING LOSS VS.  
EMITTER CURRENT  
(TYPICAL)



REVERSE RECOVERY SWITCHING LOSS VS.  
GATE RESISTANCE  
(TYPICAL)



TRANSIENT THERMAL  
IMPEDANCE CHARACTERISTICS  
(IGBT & FWDI)

