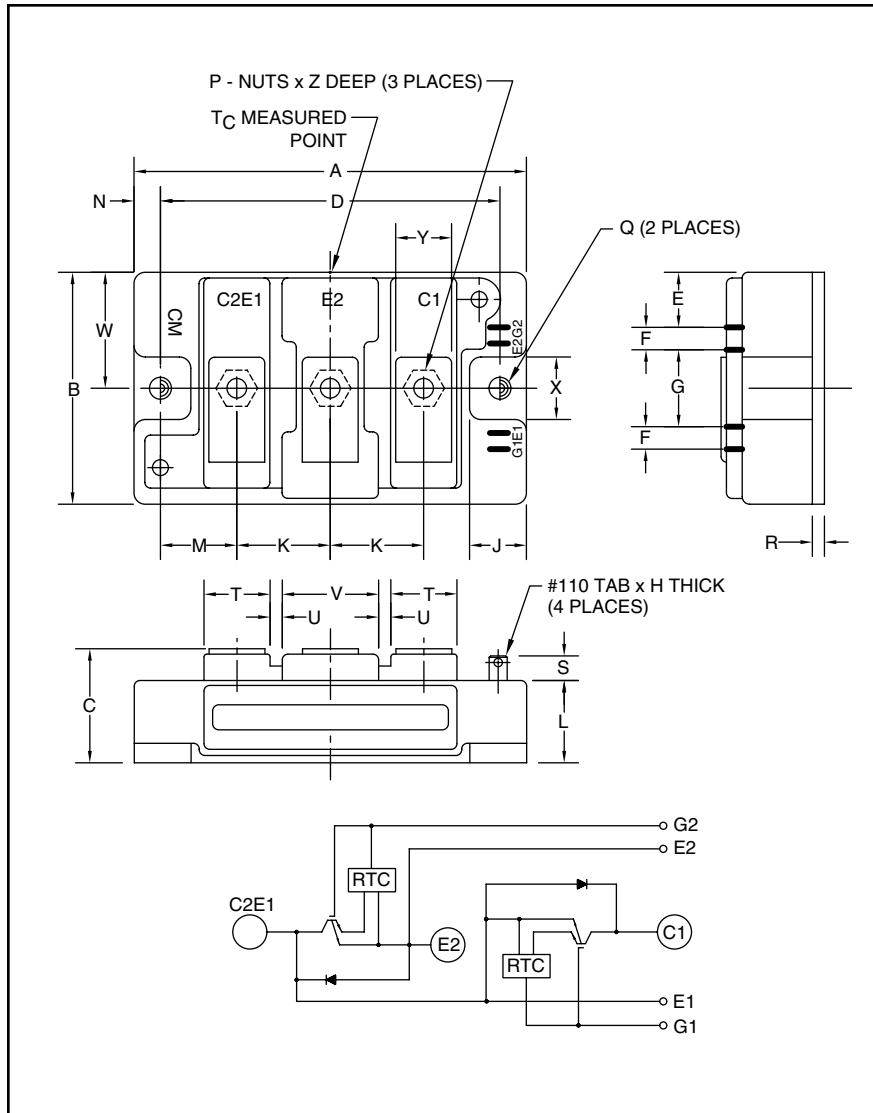


Trench Gate Design Dual IGBTMOD™ 150 Amperes/600 Volts



Outline Drawing and Circuit Diagram

Dimensions	Inches	Millimeters
A	3.70	94.0
B	1.89	48.0
C	1.18 +0.04/-0.02	30.0 +1.0/-0.5
D	3.15±0.01	80.0±0.25
E	0.43	11.0
F	0.16	4.0
G	0.71	18.0
H	0.02	0.5
J	0.53	13.5
K	0.91	23.0
L	0.83	21.2
M	0.67	17.0

Dimensions	Inches	Millimeters
N	0.28	7.0
P	M5	M5
Q	0.26 Dia.	6.5 Dia.
R	0.02	4.0
S	0.30	7.5
T	0.63	16.0
U	0.10	2.5
V	1.0	25.0
W	0.94	24.0
X	0.51	13.0
Y	0.47	12.0
Z	0.47	12.0



Description:

Powerex IGBTMOD™ Modules are designed for use in high frequency applications; 30 kHz for hard switching applications and 60 to 70 kHz for soft 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 $V_{CE(sat)}$
- ☐ Low $E_{SW(off)}$
- ☐ Discrete Super-Fast Recovery Free-Wheel Diode
- ☐ Isolated Baseplate for Easy Heat Sinking

Applications:

- ☐ Power Supplies
- ☐ Induction Heating
- ☐ Welders

Ordering Information:

Example: Select the complete module number you desire from the table - i.e. CM150DUS-12F is a 600V (V_{CES}), 150 Ampere Dual IGBTMOD™ Power Module.

Type	Current Rating Amperes	V_{CES} Volts (x 50)
CM	150	12



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

CM150DUS-12F

Trench Gate Design Dual IGBTMOD™

150 Amperes/600 Volts

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

Ratings	Symbol	CM150DUS-12F	Units
Junction Temperature	T_j	-40 to 150	$^\circ\text{C}$
Storage Temperature	T_{stg}	-40 to 125	$^\circ\text{C}$
Collector-Emitter Voltage (G-E SHORT)	V_{CES}	600	Volts
Gate-Emitter Voltage (C-E SHORT)	V_{GES}	± 20	Volts
Collector Current ($T_c = 25^\circ\text{C}$)	I_C	150	Amperes
Peak Collector Current	I_{CM}	300*	Amperes
Emitter Current** ($T_c = 25^\circ\text{C}$)	I_E	150	Amperes
Peak Emitter Current**	I_{EM}	300*	Amperes
Maximum Collector Dissipation ($T_c = 25^\circ\text{C}$, $T_j \leq 150^\circ\text{C}$)	P_c	520	Watts
Mounting Torque, M5 Main Terminal	—	31	in-lb
Mounting Torque, M6 Mounting	—	40	in-lb
Weight	—	310	Grams
Isolation Voltage (Main Terminal to Baseplate, AC 1 min.)	V_{iso}	2500	Volts

* Pulse width and repetition rate should be such that the 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).

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

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Collector-Cutoff Current	I_{CES}	$V_{\text{CE}} = V_{\text{CES}}$, $V_{\text{GE}} = 0\text{V}$	—	—	1	mA
Gate Leakage Current	I_{GES}	$V_{\text{GE}} = V_{\text{GES}}$, $V_{\text{CE}} = 0\text{V}$	—	—	20	μA
Gate-Emitter Threshold Voltage	$V_{\text{GE(th)}}$	$I_C = 15\text{mA}$, $V_{\text{CE}} = 10\text{V}$	5	6	7	Volts
Collector-Emitter Saturation Voltage	$V_{\text{CE(sat)}}$	$I_C = 150\text{A}$, $V_{\text{GE}} = 15\text{V}$, $T_j = 25^\circ\text{C}$	1.7	2.0	2.7	Volts
		$I_C = 150\text{A}$, $V_{\text{GE}} = 15\text{V}$, $T_j = 125^\circ\text{C}$	—	1.95	—	Volts
Total Gate Charge	Q_G	$V_{\text{CC}} = 300\text{V}$, $I_C = 150\text{A}$, $V_{\text{GE}} = 15\text{V}$	—	930	—	nC
Emitter-Collector Voltage**	V_{EC}	$I_E = 150\text{A}$, $V_{\text{GE}} = 0\text{V}$	—	—	2.6	Volts

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

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

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Input Capacitance	C_{ies}		—	—	41	nF
Output Capacitance	C_{oes}	$V_{\text{CE}} = 10\text{V}$, $V_{\text{GE}} = 0\text{V}$	—	—	2.7	nF
Reverse Transfer Capacitance	C_{res}		—	—	1.5	nF
Resistive	Turn-on Delay Time	$V_{\text{CC}} = 300\text{V}$, $I_C = 150\text{A}$, $V_{\text{GE1}} = V_{\text{GE2}} = 15\text{V}$, $R_G = 4.2\Omega$, Inductive Load Switching Operation	—	—	120	ns
	Rise Time		—	—	100	ns
Switch	Turn-off Delay Time	$R_G = 4.2\Omega$, Inductive Load Switching Operation	—	—	350	ns
Times	Fall Time		—	—	150	ns
Diode Reverse Recovery Time**	t_{rr}	$I_E = 150\text{A}$	—	—	150	ns
Diode Reverse Recovery Charge**	Q_{rr}		—	2.8	—	μC

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

CM150DUS-12F

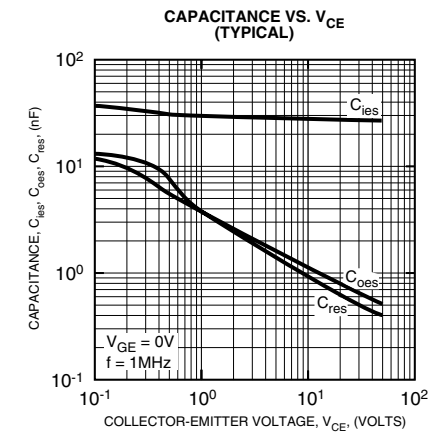
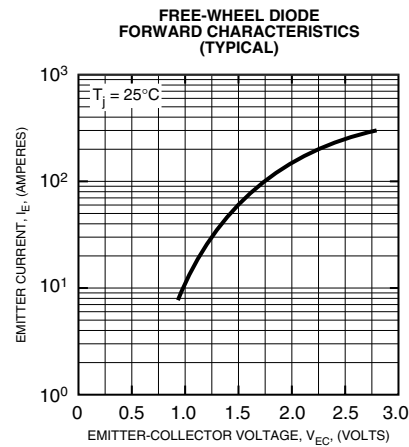
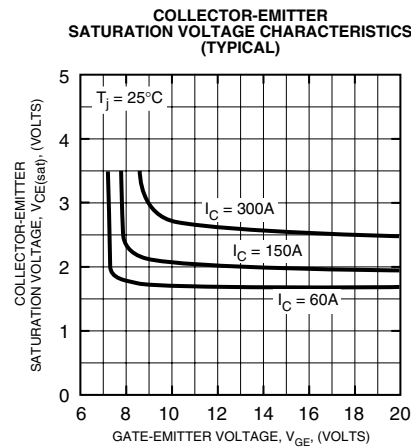
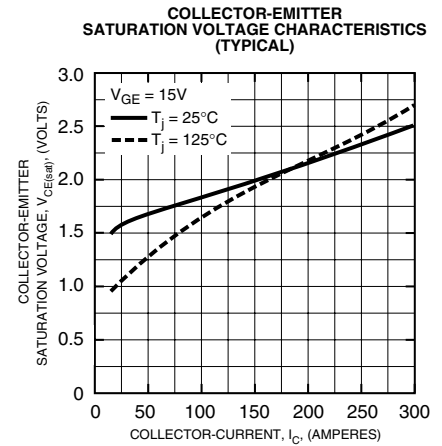
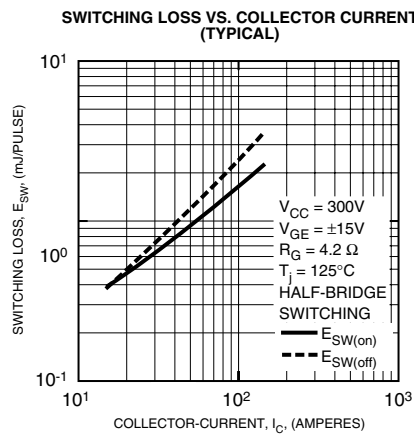
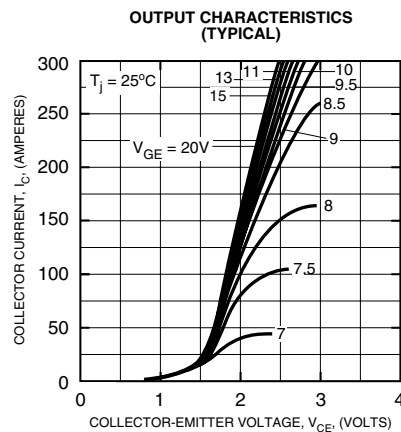
Trench Gate Design Dual IGBTMOD™

150 Amperes/600 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, T_c Reference Point per Outline Drawing	—		0.24	$^\circ\text{C/W}$
Thermal Resistance, Junction to Case	$R_{th(j-c)D}$	Per FWDi 1/2 Module, T_c Reference Point per Outline Drawing	—	—	0.47	$^\circ\text{C/W}$
Thermal Resistance, Junction to Case	$R_{th(j-c')Q}$	Per IGBT 1/2 Module, T_c Reference Point Under Chip	—	—	0.19**	$^\circ\text{C/W}$
Contact Thermal Resistance	$R_{th(c-f)}$	Per Module, Thermal Grease Applied	—	0.07	—	$^\circ\text{C/W}$
External Gate Resistance	R_G		4.2	—	42	Ω

** If you use this value, $R_{th(f-a)}$ should be measured just under the chips.

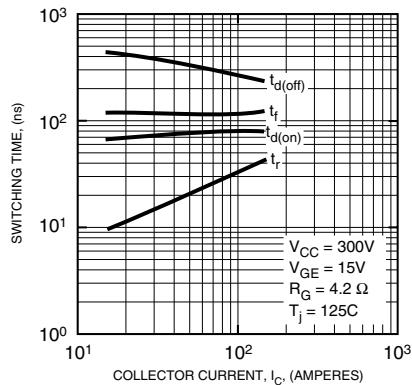


CM150DUS-12F

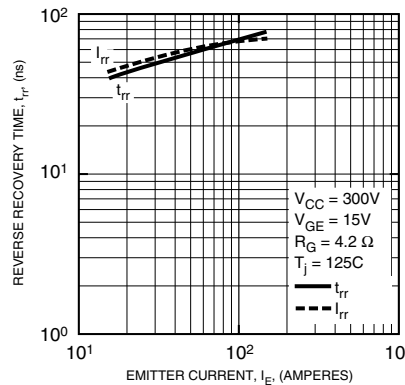
Trench Gate Design Dual IGBTMOD™

150 Amperes/600 Volts

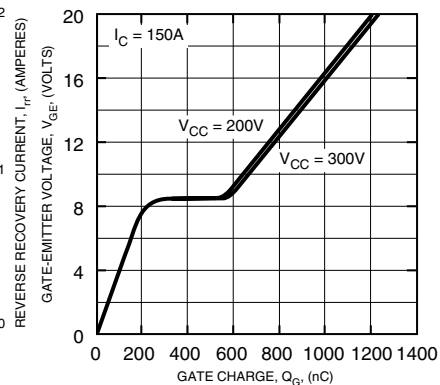
HALF-BRIDGE
SWITCHING CHARACTERISTICS
(TYPICAL)



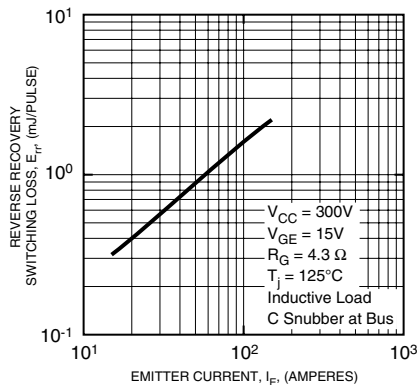
REVERSE RECOVERY CHARACTERISTICS
(TYPICAL)



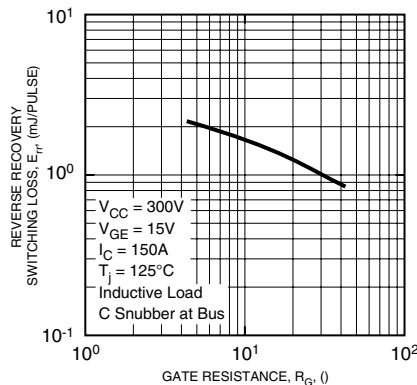
GATE CHARGE, V_{GE}



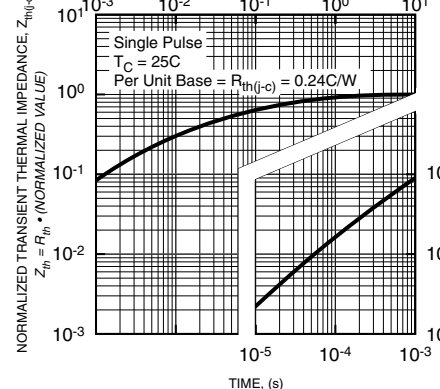
REVERSE RECOVERY SWITCHING LOSS VS.
EMITTER CURRENT
(TYPICAL)



REVERSE RECOVERY SWITCHING LOSS VS.
GATE RESISTANCE
(TYPICAL)



TRANSIENT THERMAL
IMPEDANCE CHARACTERISTICS
(IGBT)



TRANSIENT THERMAL
IMPEDANCE CHARACTERISTICS
(FWDI)

