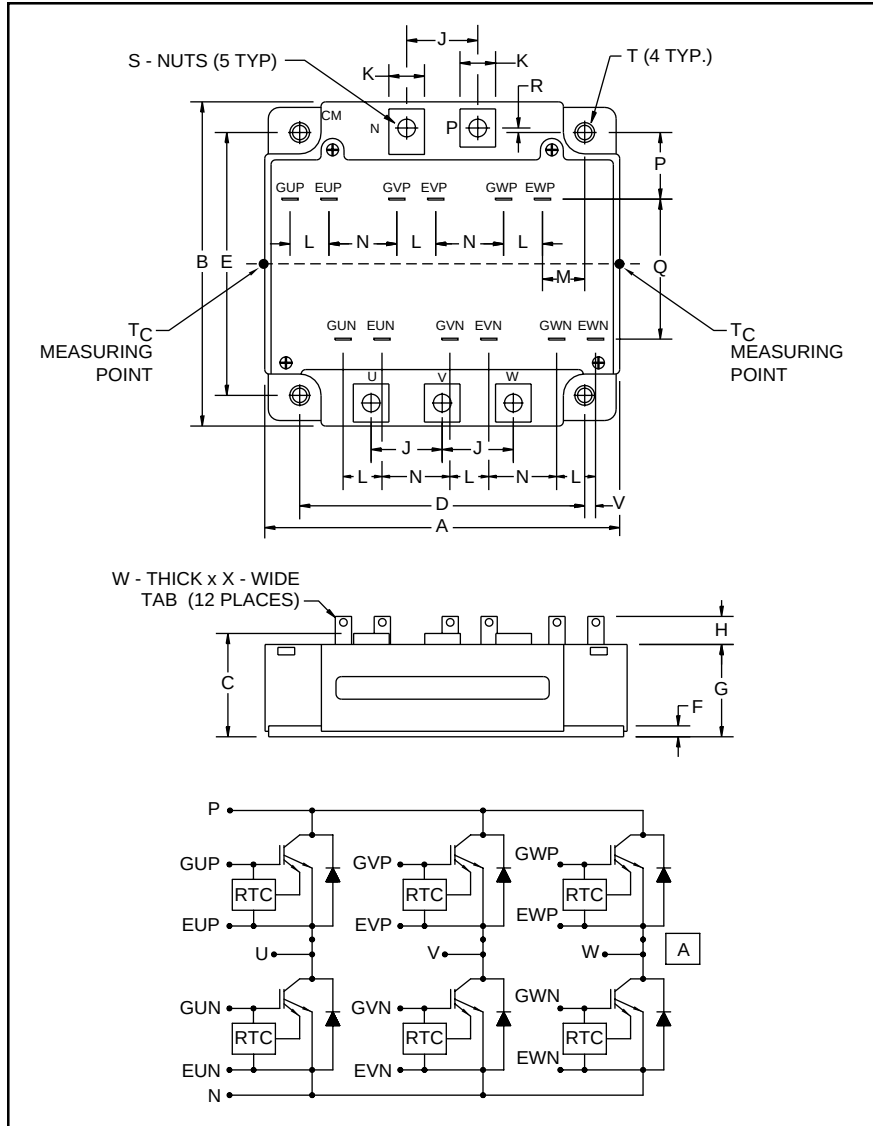


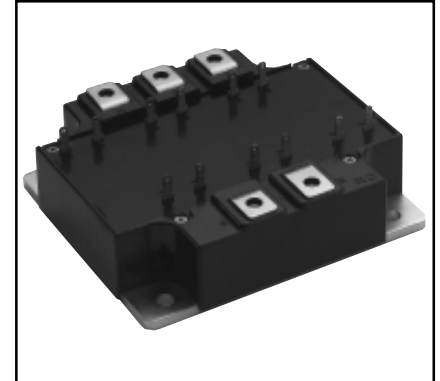
Trench Gate Design Six IGBTMOD™ 50 Amperes/1200 Volts



Outline Drawing and Circuit Diagram

Dimensions	Inches	Millimeters
A	4.02	102.0
B	3.58	91.0
C	1.14 +0.04/-0.02	29.0 +1.0/-0.5
D	3.15±0.01	80.0±0.25
E	2.91±0.01	74.0±0.25
F	0.16	4.0
G	1.02	26.0
H	0.31	8.1
J	0.79	20.0
K	0.39	10.0
L	0.43	11.0

Dimensions	Inches	Millimeters
M	0.47	11.85
N	0.75	19.1
P	0.74	18.7
Q	1.55	39.3
R	0.05	1.25
S	M4	M4
T	0.22	5.5
U	0.02	0.5
V	0.12	3.05
W	0.02	0.5
X	0.110	2.79



Description:

Powerex IGBTMOD™ Modules are designed for use in switching applications. Each module consists of six IGBT Transistors in a three phase 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 module number you desire from the table - i.e. CM50TU-24F is a 1200V (V_{CES}), 50 Ampere Six-IGBT IGBTMOD™ Power Module.

Type	Current Rating Amperes	V_{CES} Volts (x 50)
CM	50	24



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

CM50TU-24F

Trench Gate Design Six IGBTMOD™

50 Amperes/1200 Volts

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

Ratings	Symbol	CM50TU-24F	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}	1200	Volts
Gate-Emitter Voltage (C-E SHORT)	V_{GES}	± 20	Volts
Collector Current ($T_c = 25^\circ\text{C}$)	I_C	50	Amperes
Peak Collector Current ($T_j \leq 150^\circ\text{C}$)	I_{CM}	100*	Amperes
Emitter Current**	I_E	50	Amperes
Peak Emitter Current**	I_{EM}	100*	Amperes
Maximum Collector Dissipation ($T_j < 150^\circ\text{C}$)	P_c	320	Watts
Mounting Torque, M4 Main Terminal	–	15	in-lb
Mounting Torque, M5 Mounting	–	31	in-lb
Weight	–	570	Grams
Isolation Voltage (Main Terminal to Baseplate, AC 1 min.)	V_{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_{CES}	$V_{\text{CE}} = V_{\text{CES}}, V_{\text{GE}} = 0\text{V}$	–	–	1	mA
Gate Leakage Voltage	I_{GES}	$V_{\text{GE}} = V_{\text{GES}}, V_{\text{CE}} = 0\text{V}$	–	–	20	μA
Gate-Emitter Threshold Voltage	$V_{\text{GE(th)}}$	$I_C = 5.0\text{mA}, V_{\text{CE}} = 10\text{V}$	5	6	7	Volts
Collector-Emitter Saturation Voltage	$V_{\text{CE(sat)}}$	$I_C = 50\text{A}, V_{\text{GE}} = 15\text{V}, T_j = 25^\circ\text{C}$	–	1.8	2.4	Volts
		$I_C = 50\text{A}, V_{\text{GE}} = 15\text{V}, T_j = 125^\circ\text{C}$	–	1.9	–	Volts
Total Gate Charge	Q_G	$V_{\text{CC}} = 600\text{V}, I_C = 50\text{A}, V_{\text{GE}} = 15\text{V}$	–	550	–	nC
Emitter-Collector Voltage**	V_{EC}	$I_E = 50\text{A}, V_{\text{GE}} = 0\text{V}$	–	–	3.2	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).

CM50TU-24F
Trench Gate Design Six IGBTMOD™
 50 Amperes/1200 Volts

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

Characteristics		Symbol	Test Conditions	Min.	Typ.	Max.	Units
Input Capacitance		C _{ies}		—	—	20	nf
Output Capacitance		C _{oes}	V _{CE} = 10V, V _{GE} = 0V	—	—	0.85	nf
Reverse Transfer Capacitance		C _{res}		—	—	0.5	nf
Inductive	Turn-on Delay Time	t _{d(on)}	V _{CC} = 600V, I _C = 50A,	—	—	100	ns
Load	Rise Time	t _r	V _{GE1} = V _{GE2} = 15V,	—	—	50	ns
Switch	Turn-off Delay Time	t _{d(off)}	R _G = 6.3Ω,	—	—	300	ns
Times	Fall Time	t _f	Inductive Load	—	—	300	ns
Diode Reverse Recovery Time**		t _{rr}	Switching Operation	—	—	150	ns
Diode Reverse Recovery Charge**		Q _{rr}	I _E = 50A,	—	2.1	—	μC

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

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Thermal Resistance, Junction to Case	$R_{th(j-c)Q}$	Per IGBT 1/6 Module, T_c Reference Point per Outline Drawing	–		0.39	$^{\circ}\text{C/W}$
Thermal Resistance, Junction to Case	$R_{th(j-c)D}$	Per FWDi 1/6 Module, T_c Reference Point per Outline Drawing	–	–	0.70	$^{\circ}\text{C/W}$
Thermal Resistance, Junction to Case	$R_{th(j-c)'Q}$	Per IGBT 1/6 Module, T_c Reference Point Under Chip	–	0.26		$^{\circ}\text{C/W}$
Contact Thermal Resistance	$R_{th(c-f)}$	Per Module, Thermal Grease Applied	–	0.018	–	$^{\circ}\text{C/W}$

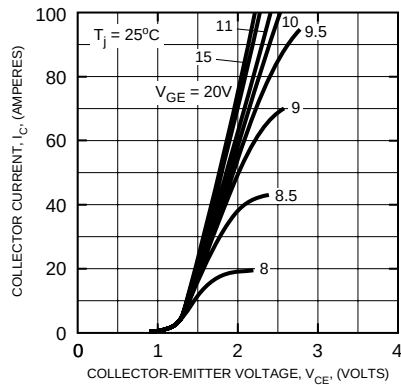
** Represents characteristics of the anti-parallel, emitter-to-collector free-wheel diode (FWDi).

CM50TU-24F

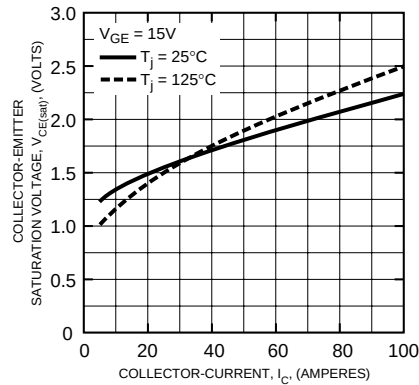
Trench Gate Design Six IGBTMOD™

50 Amperes/1200 Volts

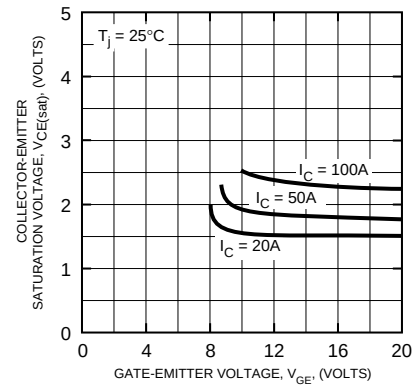
OUTPUT CHARACTERISTICS
(TYPICAL)



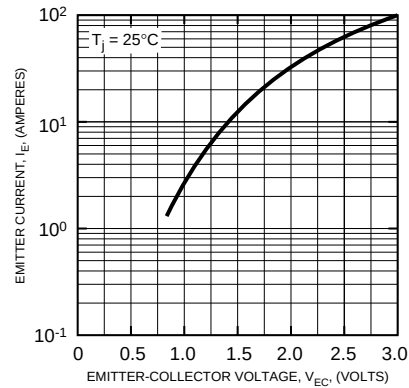
COLLECTOR-EMITTER
SATURATION VOLTAGE CHARACTERISTICS
(TYPICAL)



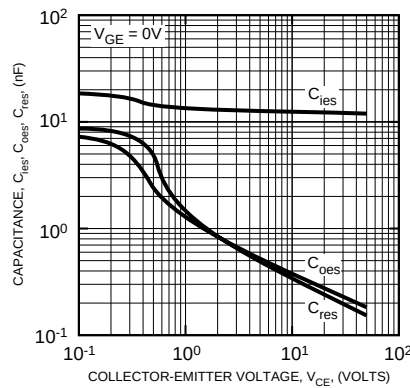
COLLECTOR-EMITTER
SATURATION VOLTAGE CHARACTERISTICS
(TYPICAL)



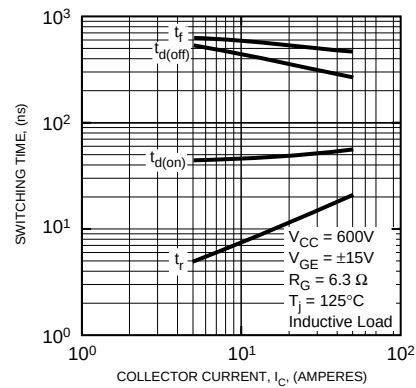
FREE-WHEEL DIODE
FORWARD CHARACTERISTICS
(TYPICAL)



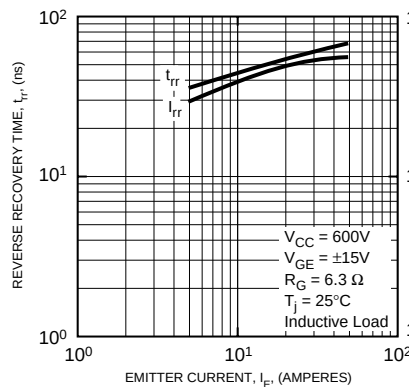
CAPACITANCE VS. V_{CE}
(TYPICAL)



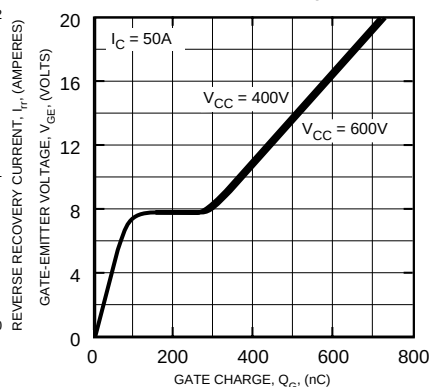
HALF-BRIDGE
SWITCHING CHARACTERISTICS
(TYPICAL)



REVERSE RECOVERY CHARACTERISTICS
(TYPICAL)



GATE CHARGE, V_{GE}



TRANSIENT THERMAL
IMPEDANCE CHARACTERISTICS
(IGBT & FWDI)

