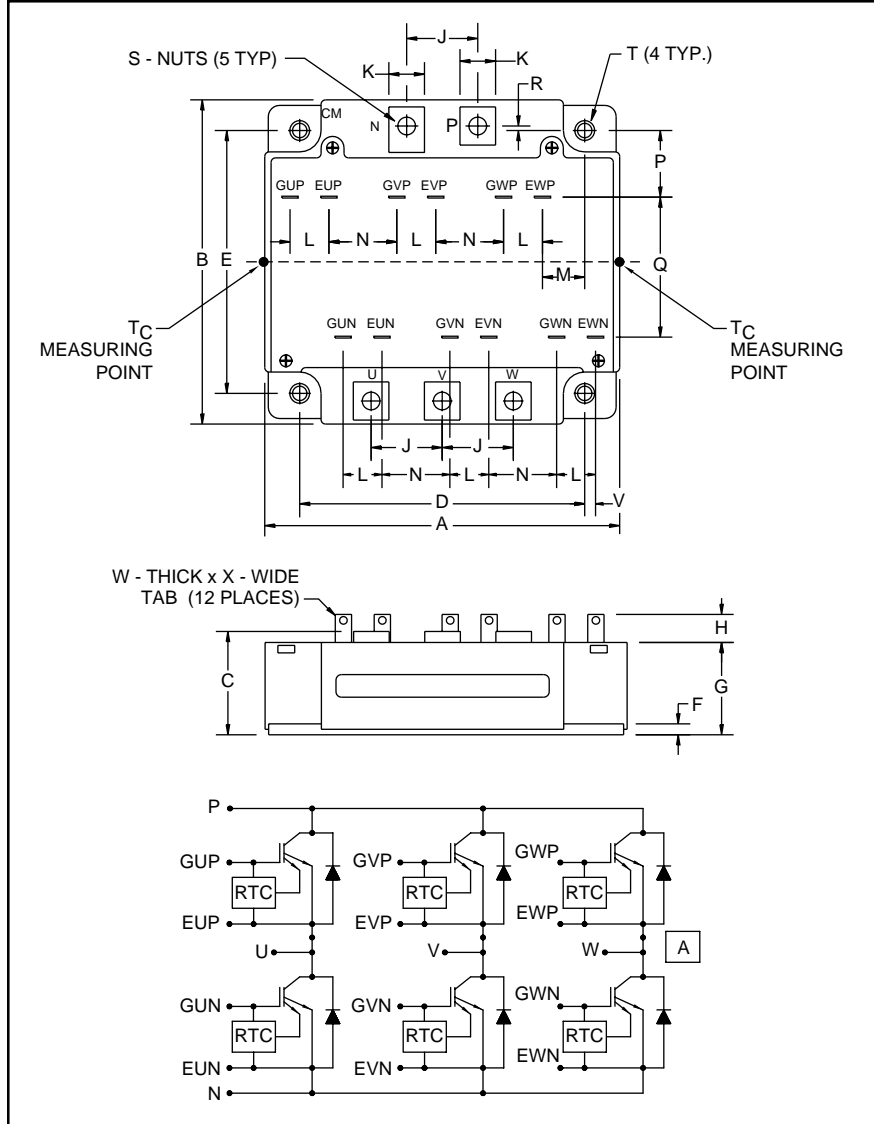


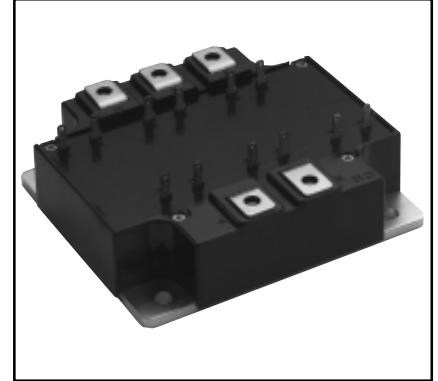
### Trench Gate Design Six IGBTMOD™ 50 Amperes/1200 Volts



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 Dia.	5.5 Dia.
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

## 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)	$V_{GES}$	$\pm 20$	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	$I_{CES}$	$V_{CE} = V_{CES}, V_{GE} = 0V$	–	–	1	mA
Gate Leakage Voltage	$I_{GES}$	$V_{GE} = V_{GES}, V_{CE} = 0V$	–	–	20	$\mu\text{A}$
Gate-Emitter Threshold Voltage	$V_{GE(th)}$	$I_C = 5.0\text{mA}, V_{CE} = 10V$	5	6	7	Volts
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C = 50A, V_{GE} = 15V, T_j = 25^\circ\text{C}$	–	1.8	2.4	Volts
		$I_C = 50A, V_{GE} = 15V, T_j = 125^\circ\text{C}$	–	1.9	–	Volts
Total Gate Charge	$Q_G$	$V_{CC} = 600V, I_C = 50A, V_{GE} = 15V$	–	550	–	nC
Emitter-Collector Voltage**	$V_{EC}$	$I_E = 50A, V_{GE} = 0V$	–	–	3.2	Volts

\* Pulse width and repetition rate should be such that the device junction temperature ( $T_j$ ) does not exceed  $T_{j(max)}$  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 <sub>ies</sub>		—	—	20	nf
Output Capacitance		C <sub>oes</sub>	V <sub>CE</sub> = 10V, V <sub>GE</sub> = 0V	—	—	0.85	nf
Reverse Transfer Capacitance		C <sub>res</sub>		—	—	0.5	nf
Inductive	Turn-on Delay Time	t <sub>d(on)</sub>	V <sub>CC</sub> = 600V, I <sub>C</sub> = 50A,	—	—	100	ns
Load	Rise Time	t <sub>r</sub>	V <sub>GE1</sub> = V <sub>GE2</sub> = 15V,	—	—	50	ns
Switch	Turn-off Delay Time	t <sub>d(off)</sub>	R <sub>G</sub> = 6.3Ω,	—	—	300	ns
Times	Fall Time	t <sub>f</sub>	Inductive Load	—	—	300	ns
Diode Reverse Recovery Time**		t <sub>rr</sub>	Switching Operation	—	—	150	ns
Diode Reverse Recovery Charge**		Q <sub>rr</sub>	I <sub>E</sub> = 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	—	$^{\circ}\text{C/W}$

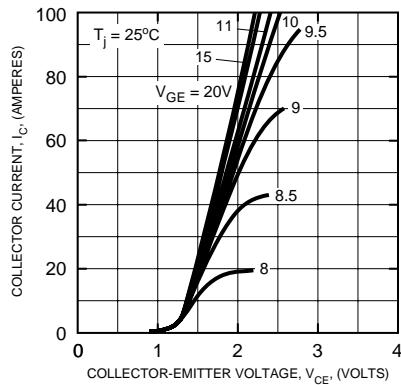
\*\* Represents characteristics of the anti-parallel, emitter-to-collector free-wheel diode (FWDi).

## CM50TU-24F

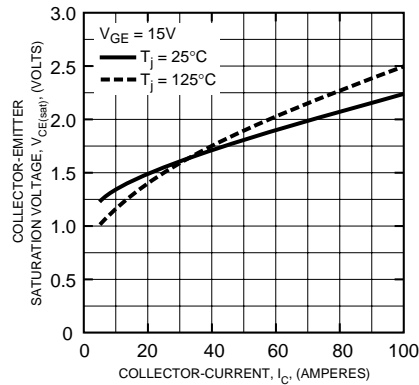
### Trench Gate Design Six IGBTMOD™

50 Amperes/1200 Volts

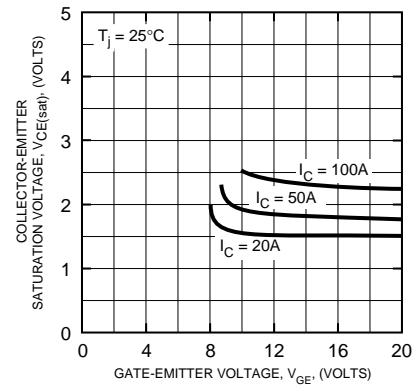
OUTPUT CHARACTERISTICS  
(TYPICAL)



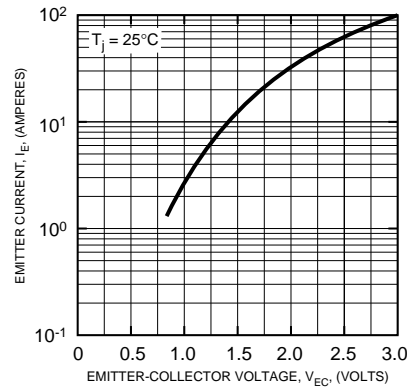
COLLECTOR-EMITTER  
SATURATION VOLTAGE CHARACTERISTICS  
(TYPICAL)



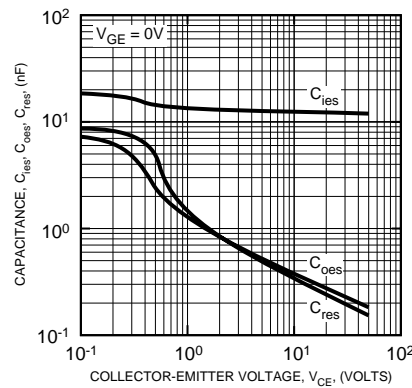
COLLECTOR-EMITTER  
SATURATION VOLTAGE CHARACTERISTICS  
(TYPICAL)



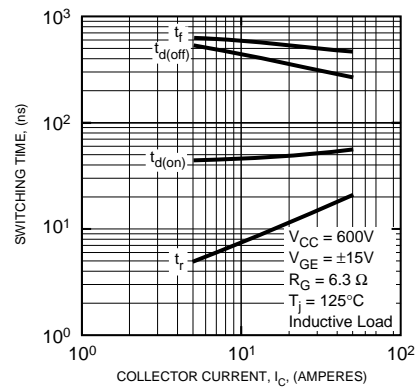
FREE-WHEEL DIODE  
FORWARD CHARACTERISTICS  
(TYPICAL)



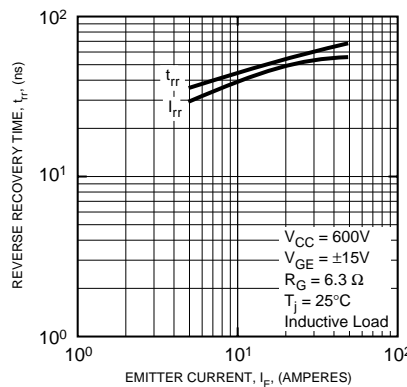
CAPACITANCE VS.  $V_{CE}$   
(TYPICAL)



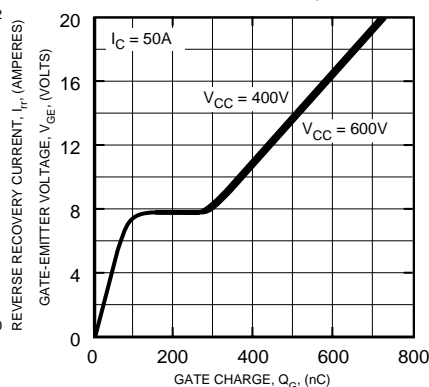
HALF-BRIDGE  
SWITCHING CHARACTERISTICS  
(TYPICAL)



REVERSE RECOVERY CHARACTERISTICS  
(TYPICAL)



GATE CHARGE,  $V_{GE}$



TRANSIENT THERMAL  
IMPEDANCE CHARACTERISTICS  
(IGBT & FWDi)

