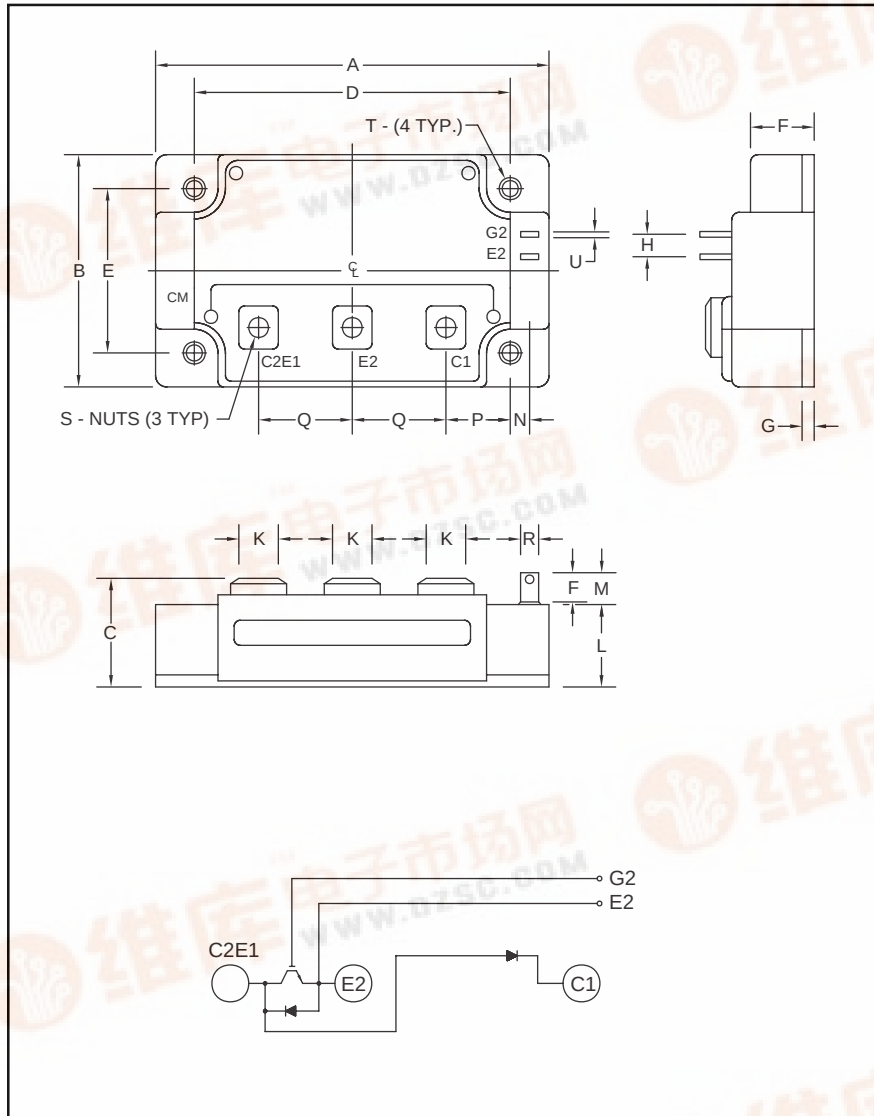




Powerex, Inc., 200 Hillis Street, Youngwood, Pennsylvania 15697-1800 (724) 925-7272

CM300E3U-12H

Chopper IGBTMOD™ U-Series Module 300 Amperes/600 Volts



Outline Drawing and Circuit Diagram

Dimensions	Inches	Millimeters
A	4.25	108.0
B	2.44	62.0
C	1.14 +0.04/-0.02	29.0 +1.0/-0.5
D	3.66±0.01	93.0±0.25
E	1.88±0.01	48.0±0.25
F	0.30	7.5
G	0.16	4.0
H	0.24	6.0
J	0.11	2.8
K	0.71	18.0

Dimensions	Inches	Millimeters
L	0.87	22.0
M	0.33	8.5
N	0.10	2.5
P	0.85	21.5
Q	0.98	25.0
R	0.16	4.0
S	M6	M6
T	0.26 Dia.	6.5 Dia.
U	0.02	0.5



Description:

Powerex Chopper IGBTMOD™ Modules are designed for use in switching applications. Each module consists of one IGBT Transistor having a reverse-connected super-fast recovery free-wheel diode and an anode-collector 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
- ☐ High Frequency Operation (15-20kHz)
- ☐ Isolated Baseplate for Easy Heat Sinking

Applications:

- ☐ DC Motor Control
- ☐ Boost Regulator

Ordering Information:

Example: Select the complete module number you desire from the table - i.e. CM300E3U-12H is a 600V (V_{CES}), 300 Ampere Chopper IGBTMOD™ Power Module.

Type	Current Rating Amperes	V_{CES} Volts (x 50)
CM	300	12





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

Ratings	Symbol	CM300E3U-12H	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	300	Amperes
Peak Collector Current ($T_j \leq 150^\circ\text{C}$)	I_{CM}	600*	Amperes
Emitter Current** ($T_c = 25^\circ\text{C}$)	I_E	300	Amperes
Peak Emitter Current**	I_{EM}	600*	Amperes
Maximum Collector Dissipation ($T_c = 25^\circ\text{C}$, $T_j \leq 150^\circ\text{C}$)	P_c	890	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_{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 Voltage	I_{GES}	$V_{\text{GE}} = V_{\text{GES}}$, $V_{\text{CE}} = 0\text{V}$	—	—	0.5	μA
Gate-Emitter Threshold Voltage	$V_{\text{GE(th)}}$	$I_c = 30\text{mA}$, $V_{\text{CE}} = 10\text{V}$	4.5	6	7.5	Volts
Collector-Emitter Saturation Voltage	$V_{\text{CE(sat)}}$	$I_c = 300\text{A}$, $V_{\text{GE}} = 15\text{V}$, $T_j = 25^\circ\text{C}$	—	2.4	3.0	Volts
		$I_c = 300\text{A}$, $V_{\text{GE}} = 15\text{V}$, $T_j = 125^\circ\text{C}$	—	2.6	—	Volts
Total Gate Charge	Q_G	$V_{\text{CC}} = 300\text{V}$, $I_c = 300\text{A}$, $V_{\text{GE}} = 15\text{V}$	—	600	—	nC
Emitter-Collector Voltage**	V_{EC}	$I_E = 300\text{A}$, $V_{\text{GE}} = 0\text{V}$	—	—	2.6	Volts
Emitter-Collector Voltage	V_{FM}	$I_F = 300\text{A}$, Clamp Diode Part	—	—	2.6	Volts

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

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

Characteristics		Symbol	Test Conditions	Min.	Typ.	Max.	Units
Input Capacitance		C _{ies}	V _{CE} = 10V, V _{GE} = 0V	—	—	26.4	nf
Output Capacitance		C _{oes}		—	—	14.4	nf
Reverse Transfer Capacitance		C _{res}		—	—	4	nf
Resistive Load	Turn-on Delay Time	t _{d(on)}	V _{CC} = 300V, I _C = 300A,	—	—	250	ns
	Rise Time	t _r	V _{GE1} = V _{GE2} = 15V,	—	—	600	ns
Switch Times	Turn-off Delay Time	t _{d(off)}	R _G = 2.1Ω, Resistive	—	—	350	ns
	Fall Time	t _f	Load Switching Operation	—	—	300	ns
Diode Reverse Recovery Time**		t _{rr}	I _E = 300A, di _E /dt = -600A/μs	—	—	160	ns
Diode Reverse Recovery Charge**		Q _{rr}	I _E = 300A, di _E /dt = -600A/μs	—	0.72	—	μC
Diode Reverse Recovery Time		t _{rr}	I _F = 300A, Clamp Diode Part	—	—	160	ns
Diode Reverse Recovery Charge		Q _{rr}	di _F /dt = -600A/μs	—	0.72	—	μC

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

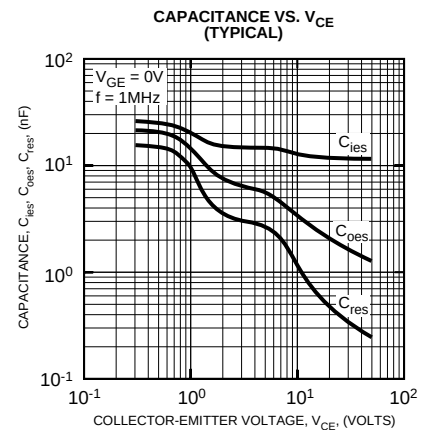
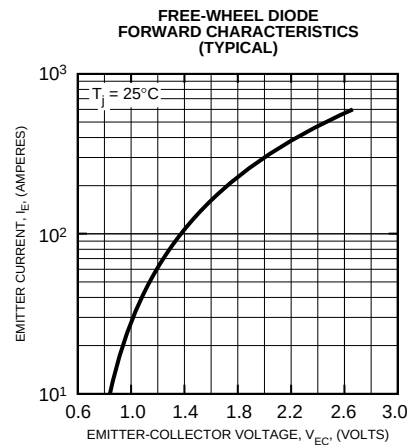
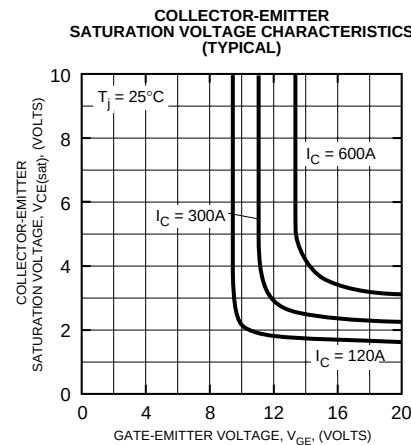
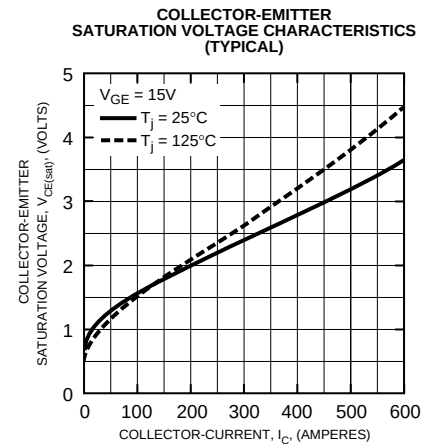
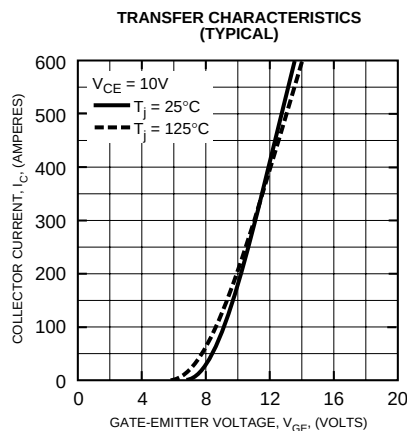
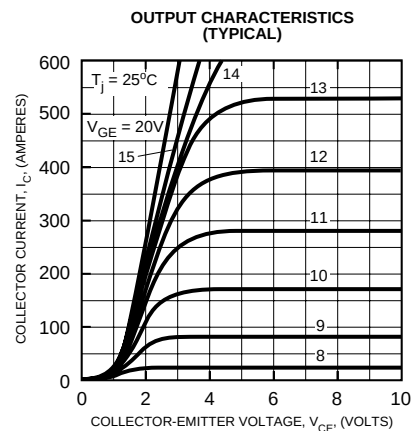


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Thermal and Mechanical Characteristics, $T_j = 25^\circ\text{C}$ unless otherwise specified

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Thermal Resistance, Junction to Case	$R_{th(j-c)Q}$	Per IGBT	—	—	0.14	$^\circ\text{C/W}$
Thermal Resistance, Junction to Case	$R_{th(j-c)D}$	Per FWDi	—	—	0.24	$^\circ\text{C/W}$
Thermal Resistance, Junction to Case	$R_{th(j-c)}$	Clamp Diode Part	—	—	0.24	$^\circ\text{C/W}$
Contact Thermal Resistance	$R_{th(c-f)}$	Per Module, Thermal Grease Applied	—	0.020	—	$^\circ\text{C/W}$

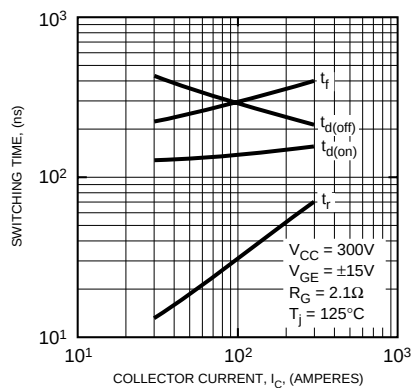




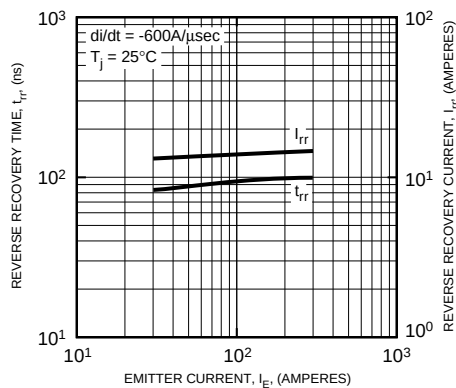
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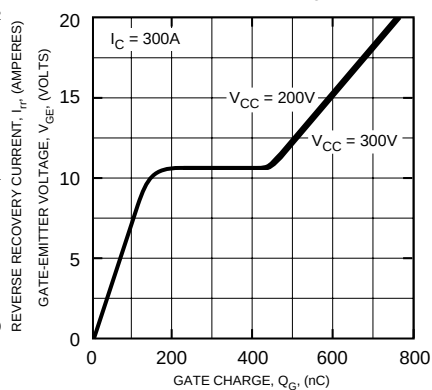
**HALF-BRIDGE
SWITCHING CHARACTERISTICS
(TYPICAL)**



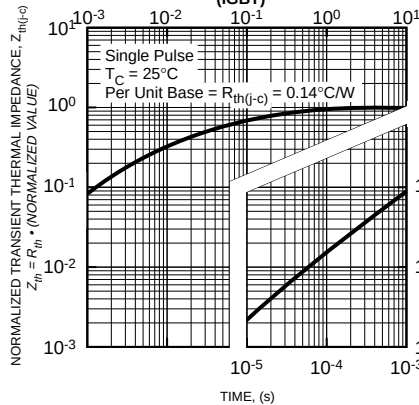
**REVERSE RECOVERY CHARACTERISTICS
(TYPICAL)**



GATE CHARGE, V_{GE}



**TRANSIENT THERMAL
IMPEDANCE CHARACTERISTICS
(IGBT)**



**TRANSIENT THERMAL
IMPEDANCE CHARACTERISTICS
(FWD)**

