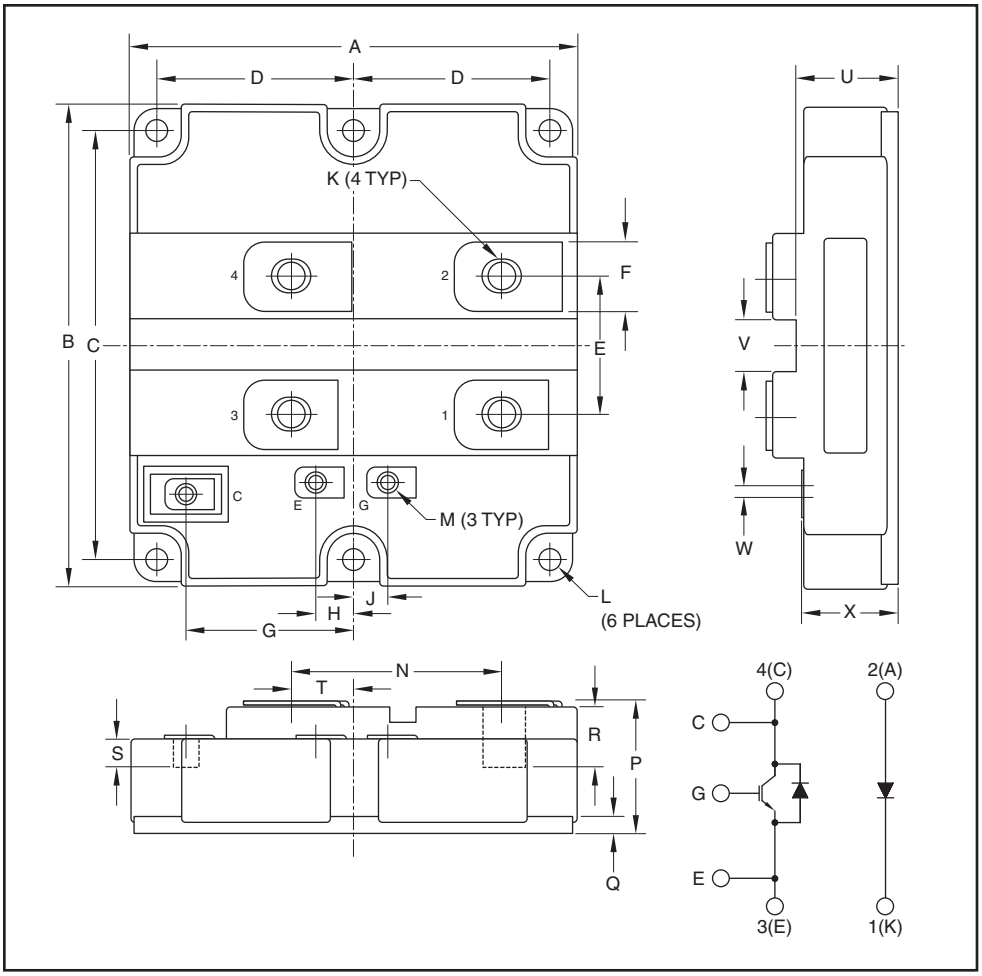
Powerex, Inc., 173 Pavilion Lane, Youngwood, Pennsylvania 15697 (724) 925-7272
www.pwrx.com

CM1200E4C-34N

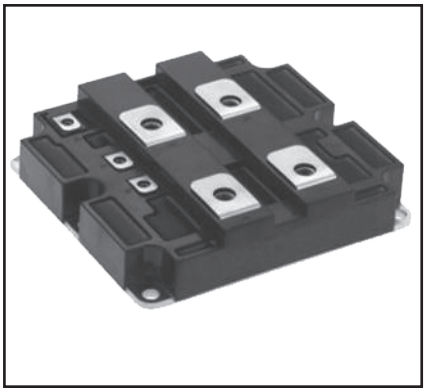
Chopper HVIGBT Module
1200 Amperes/1700 Volts



Outline Drawing and Circuit Diagram

Dimensions	Inches	Millimeters
A	5.19±0.02	130.0±0.5
B	5.51±0.02	140.0±0.5
C	4.88±0.01	124.0±0.25
D	2.24±0.01	57.0±0.25
E	1.57±0.008	40.0±0.2
F	0.79±0.004	20.0±0.1
G	1.92±0.008	48.8±0.2
H	0.42±0.008	10.65±0.2
J	0.41±0.008	10.35±0.2
K	M8 Metric	M8
L	0.28 Dia.	7.0 Dia.

Dimensions	Inches	Millimeters
M	M4 Metric	M4
N	2.42±0.012	61.5±0.3
P	1.50+0.04/-0.0	38.0+1.0/-0.0
Q	0.2±0.008	5.0±0.2
R	0.65 Min.	16.5 Min.
S	0.30 Min.	7.7 Min.
T	0.71±0.008	18.0±0.2
U	1.16±0.02	29.5±0.5
V	0.60±0.008	15.0±0.2
W	0.21±0.008	5.2±0.2
X	1.10+0.04/-0.0	28.0+1.0/-0.0



Description:
Powerex Chopper HVIGBT 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 $V_{CE(sat)}$
- ☐ Super-Fast Recovery Free-Wheel Diode
- ☐ Isolated Baseplate for Easy Heat Sinking

Applications:
- ☐ Traction
- ☐ Medium Voltage Drives
- ☐ High Voltage Power Supplies

Ordering Information:
Example: Select the complete module number you desire from the table below -i.e. CM1200E4C-34N is a 1700V (V_{CES}), 1200 Ampere Chopper HVIGBT Power Module.

Type	Current Rating Amperes	V_{CES} Volts (x 50)
CM	1200	34

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Absolute Maximum Ratings, T_j = 25°C unless otherwise specified

Characteristics	Symbol	Rating	Units
Collector-Emitter Voltage (V_{GE} = 0V)	V_{CES}	1700	Volts
Gate-Emitter Voltage (V_{CE} = 0V)	V_{GES}	±20	Volts
Collector Current (T_C = 75°C)	I_C	1200	Amperes
Collector Current (Pulse)*1	I_{CM}	2400	Amperes
Emitter Current	I_E*2	1200	Amperes
Emitter Current (Pulse)*1	I_{EM}*2	2400	Amperes
Maximum Power Dissipation (T_C = 25°C, IGBT Part)*3	P_C*3	6500	Watts
Junction Temperature	T_j	-40 to +150	°C
Operating Temperature	T_{op}	-40 to +125	°C
Storage Temperature	T_{stg}	-40 to +125	°C
Isolation Voltage (RMS, Sinusoidal, f = 60Hz, 1 minute)	V_{ISO}	4000	Volts
Maximum Short Circuit Pulse Width (V_{CC} = 1200V, V_{CES} ≤ 1700V, V_{GE} = 15V, T_j = 125°C)	t_{psc}	10	µs

*1 Pulse width and repetition rate should be such that device junction temperature (T_j) does not exceed $T_{opr(max)}$ rating (125°C).
*2 Represent ratings and characteristics of the anti-parallel, emitter-to-collector clamp diode.
*3 Junction temperature (T_j) should not increase beyond maximum junction temperature $T_{j(max)}$ rating (150°C).

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Electrical Characteristics, T_j = 25°C unless otherwise specified

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Collector Cutoff Current	I_{CES}	$V_{CE} = V_{CES}$, V_{GE} = 0V	—	—	4	mA
Gate-Emitter Threshold Voltage	$V_{GE(th)}$	I_C = 120mA, V_{CE} = 10V	6.0	7.0	8.0	Volts
Gate Leakage Current	I_{GES}	$V_{GE} = V_{GES}$, V_{CE} = 0V	—	—	0.5	µA
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	I_C = 1200A, V_{GE} = 15V, T_j = 25°C*4	—	2.15	2.80	Volts
		I_C = 1200A, V_{GE} = 15V, T_j = 125°C*4	—	2.40	—	Volts
Input Capacitance	C_{ies}	V_{CE} = 10V, f = 100kHz, V_{GE} = 0V	—	176	—	nF
Output Capacitance	C_{oes}		—	9.6	—	nF
Reverse Transfer Capacitance	C_{res}		—	2.8	—	nF
Total Gate Charge	Q_g	V_{CC} = 850V, I_C = 1200A, V_{GE} = 15V	—	6.8	—	µC
Emitter-Collector Voltage	V_{EC}*2	I_E = 1200A, V_{GE} = 15V, T_j = 25°C*4	—	2.60	3.30	Volts
		I_E = 1200A, V_{GE} = 15V, T_j = 125°C*4	—	2.30	—	Volts
Turn-on Delay Time	$t_{d(on)}$	V_{CC} = 850V, I_C = 1200A, V_{GE} = ±15V,	—	1.00	—	µs
Turn-on Rise Time	t_r	$R_{G(on)}$ = 0.6Ω, T_j = 125°C, L_S = 150nH,	—	0.40	—	µs
Turn-on Switching Energy	E_{on}	Inductive Load	—	380	—	mJpulse
Turn-off Delay Time	$t_{d(off)}$	V_{CC} = 850V, I_C = 1200A, V_{GE} = ±15V,	—	1.20	—	µs
Turn-off Fall Time	t_f	$R_{G(off)}$ = 3.3Ω, T_j = 125°C, L_S = 150nH,	—	0.30	—	µs
Turn-off Switching Energy	E_{off}	Inductive Load	—	360	—	mJpulse
Reverse Recovery Time	t_{rr}*2	V_{CC} = 850V, I_C = 1200A,	—	1.00	—	µs
Repetitive Reverse Current	I_{rr}*2	V_{GE} = ±15V, $R_{G(on)}$ = 0.6Ω,	—	560	—	Amperes
Reverse Recovery Charge	Q_{rr}*2	T_j = 125°C, L_S = 150nH,	—	300	—	µC
Reverse Recovery Energy	E_{rec}*2	Inductive Load	—	220	—	mJpulse
Forward Voltage	V_F*5	I_E = 1200A, V_{GE} = 0V, T_j = 25°C*4	—	2.60	3.30	Volts
		I_E = 1200A, V_{GE} = 0V, T_j = 125°C*4	—	2.30	—	Volts
Reverse Recovery Time	t_{rr}*5	V_{CC} = 850V, I_C = 1200A,	—	1.00	—	µs
Reverse Reverse Current	I_{rr}*5	V_{GE} = ±15V, di/dt = 2900A/µs,	—	560	—	Amperes
Reverse Recovery Charge	Q_{rr}*5	T_j = 125°C, L_S = 150nH,	—	300	—	µC
Reverse Recovery Energy	E_{rec}*5	Inductive Load	—	220	—	mJpulse

*2 Represent ratings and characteristics of the anti-parallel, emitter-to-collector clamp diode.
*4 Pulse width and repetition rate should be such as to cause negligible temperature rise.
*5 Represent characteristics of the clamp diode.

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Thermal Resistance Characteristics

Thermal Resistance, Junction to Case	$R_{th(j-c)}Q$	IGBT Part	—	—	19.0	K/kW
Thermal Resistance, Junction to Case	$R_{th(j-c)}D$	FWDi Part	—	—	42.0	K/kW
Thermal Resistance, Junction to Case	$R_{th(j-c)}D$	Clamp-Di Part	—	—	42.0	K/kW
Contact Thermal Resistance, Case to Fin	$R_{th(c-f)}$	λgrease = 1W/m • K	—	16.0	—	K/kW

Mechanical Characteristics

Mounting Torque	M	Main Terminals, M8 Screw	—	177	—	in-lb
		Mounting Screw, M6	—	53	—	in-lb
		Auxiliary Terminals, M4 Screw	—	27	—	in-lb
Weight	m		—	0.8	—	kg
Comparative Tracking Index	CTI		600	—	—	—
Clearance Distance in Air	d_a		19.5	—	—	mm
Creepage Distance Along Surface	d_s		32.0	—	—	mm
Internal Inductance	$L_{C-E(int)}$	IGBT Part	—	30	—	nH
Internal Lead Resistance	$R_{C-E(int)}$	TC = 25°C	—	0.28	—	mΩ

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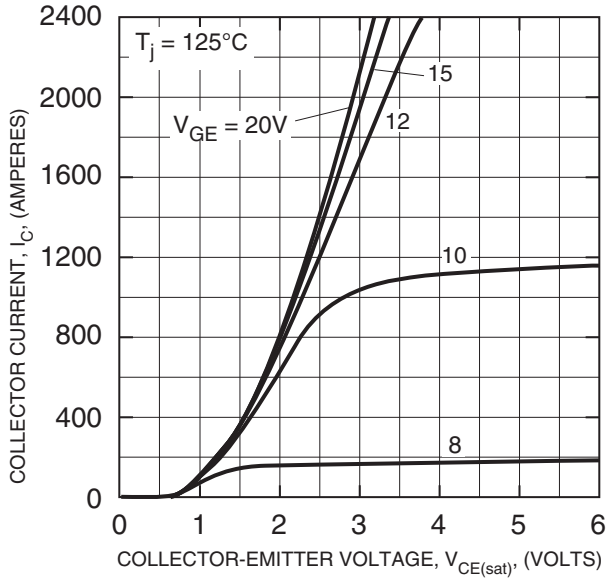
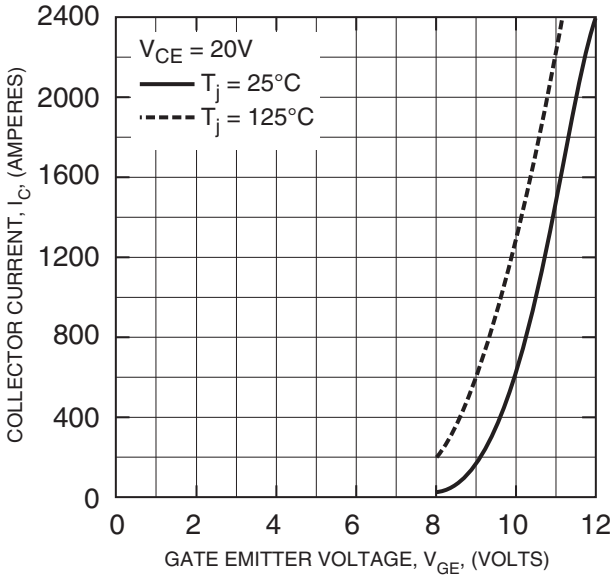
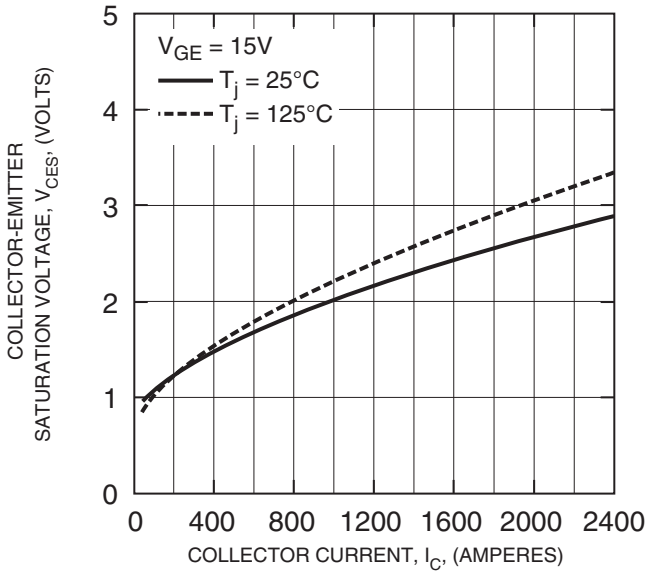
OUTPUT CHARACTERISTICS (TYPICAL)



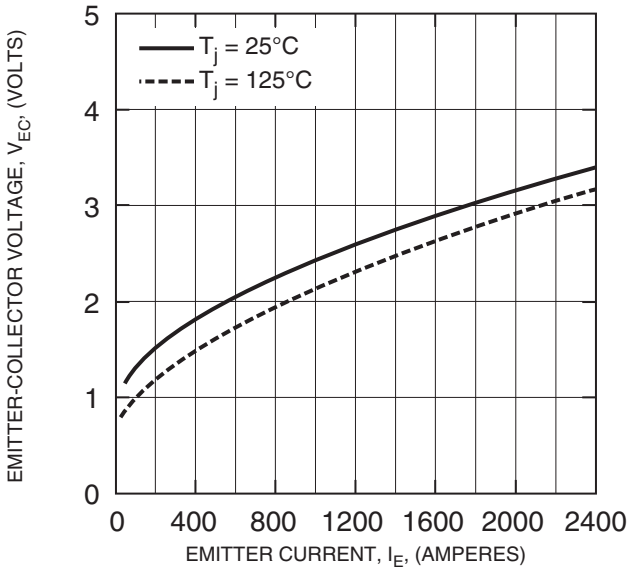
TRANSFER CHARACTERISTICS (TYPICAL)



COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



FREE-WHEEL DIODE FORWARD CHARACTERISTICS (TYPICAL)



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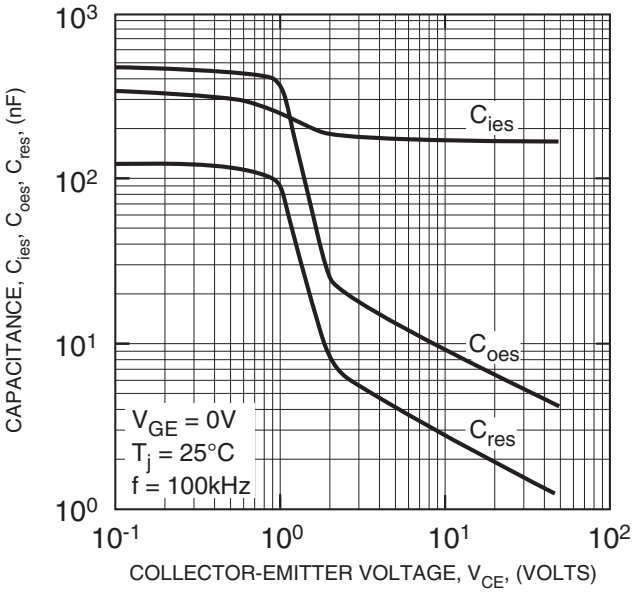
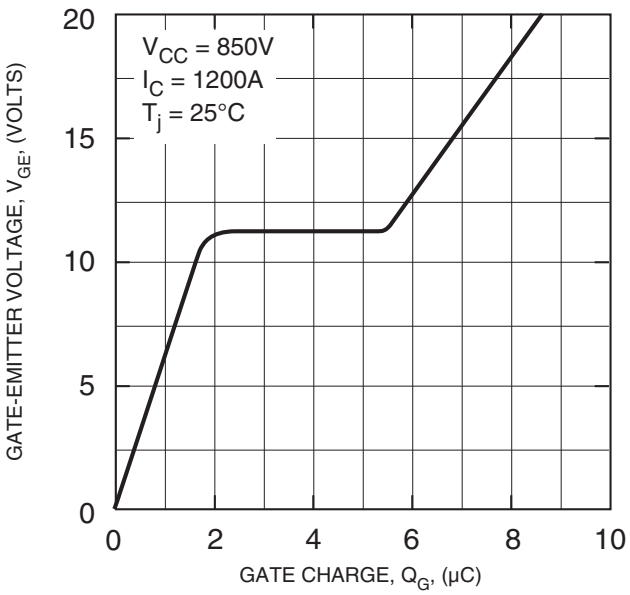
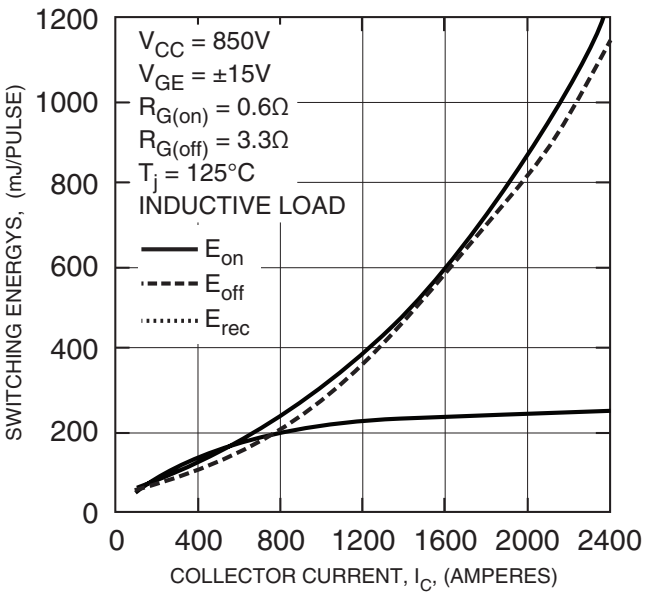
CAPACITANCE VS. V_{CE} (TYPICAL)



GATE CHARGE CHARACTERISTICS (TYPICAL)



HALF-BRIDGE SWITCHING CHARACTERISTICS (TYPICAL)



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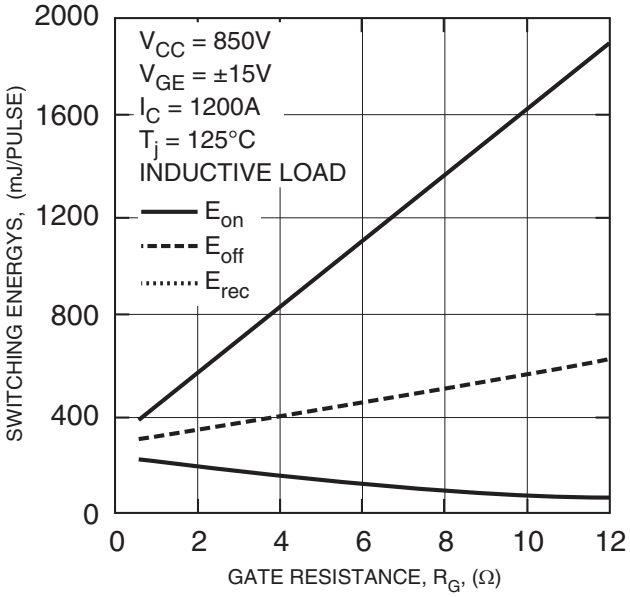

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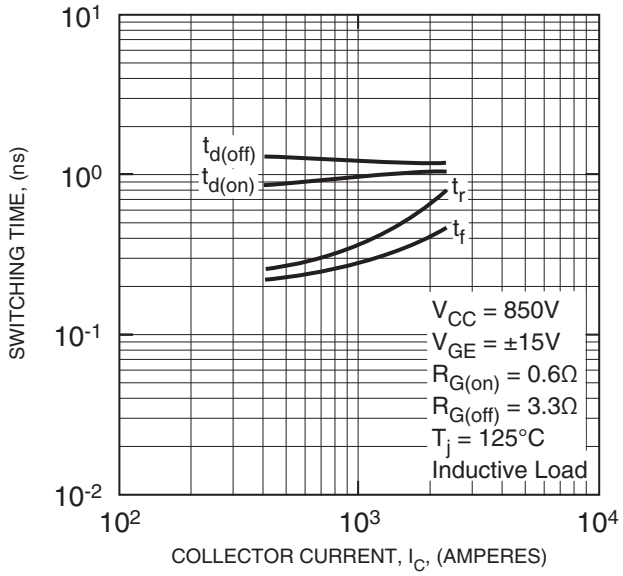
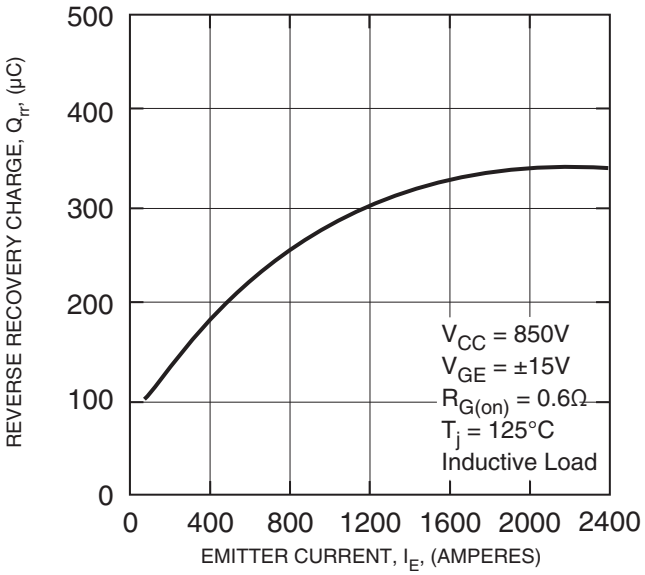
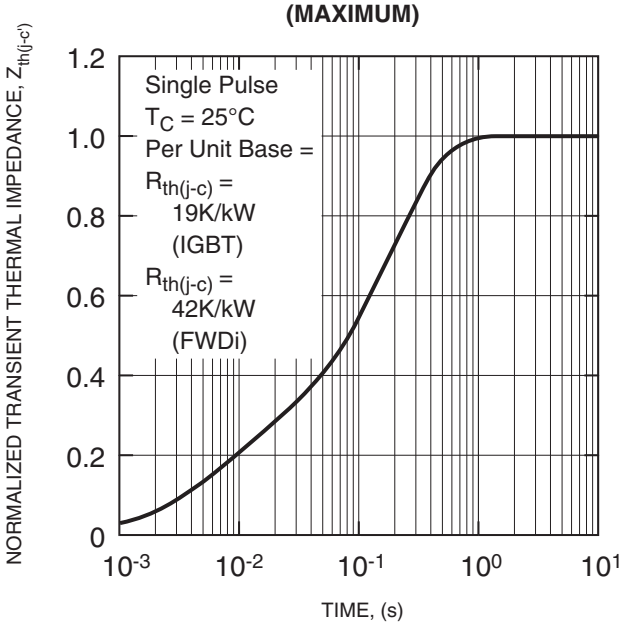


REVERSE RECOVERY CHARACTERISTICS (TYPICAL)



TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (MAXIMUM)



REVERSE BIAS SAFE OPERATING AREA (RBSOA)