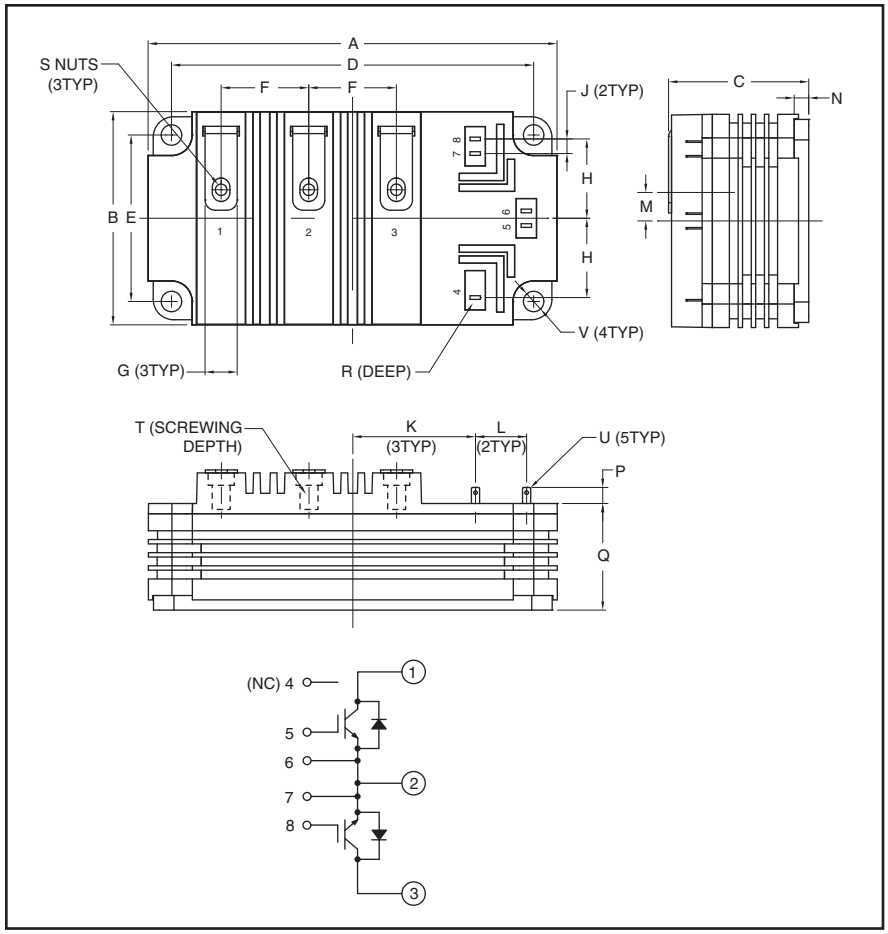
Powerex, Inc., 173 Pavilion Lane, Youngwood, Pennsylvania 15697 (724) 925-7272
www.pwrx.com

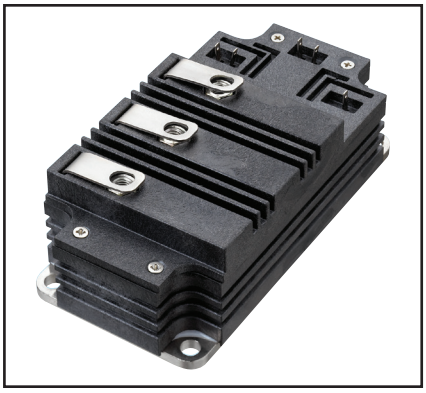
Dual Common Emitter HVIGBT Module
85 Amperes/6500 Volts



Outline Drawing and Circuit Diagram

Dimensions	Inches	Millimeters
A	5.51	140.0
B	2.87	73.0
C	1.89	48.0
D	4.88±0.01	124.0±0.25
E	2.24±0.01	57.0±0.25
F	1.18	30.0
G	0.43	11.0
H	1.07	27.15
J	0.20	5.0
K	1.65	42.0

Dimensions	Inches	Millimeters
L	0.69±0.01	17.5±0.25
M	0.38	9.75
N	0.20	5.0
P	0.22	5.5
Q	1.44	36.5
R	0.16	4.0
S	M6 Metric	M6
T	0.63 Min.	16.0 Min.
U	0.11 x 0.02	2.8 x 0.5
V	0.28 Dia.	7.0 Dia.



Description:

Powerex HVIGBTs feature highly insulating housings that offer enhanced protection by means of greater creepage and strike clearance distance for many demanding applications like medium voltage drives and auxiliary traction applications.

Features:

- ☐ -40 to 150°C Extended Temperature Range
- ☐ 100% Dynamic Tested
- ☐ 100% Partial Discharge Tested
- ☐ Advanced Mitsubishi R-Series Chip Technology
- ☐ Aluminum Nitride (AlN) Ceramic Substrate for Low Thermal Impedance
- ☐ Complementary Line-up in Expanding Current Ranges to Mitsubishi HVIGBT Power Modules
- ☐ Copper Baseplate
- ☐ Creepage and Clearance Meet IEC 60077-1
- ☐ Rugged SWSOA and RRSOA

Applications:

- ☐ High Voltage Power Supplies
- ☐ Medium Voltage Drives
- ☐ Motor Drives
- ☐ Traction

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QIC6508001
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Absolute Maximum Ratings, T_j = 25 °C unless otherwise specified

Ratings	Symbol		QIC6508001	Units
Junction Temperature	T_j		-40 to +150	°C
Storage Temperature	T_{stg}		-40 to +125	°C
Collector-Emitter Voltage (V_{GE} = 0V)	V_{CES}	T_j = -40°C	5800	Volts
		T_j = +25°C	6300	Volts
		T_j = +125°C	6500	Volts
Gate-Emitter Voltage (V_{CE} = 0V)	V_{GES}		±20	Volts
Collector Current (T_C = 110°C)	I_C		85	Amperes
Peak Collector Current (Pulse)	I_{CM}		170*2	Amperes
Diode Forward Current (T_C = 102°C)*1	I_F		85	Amperes
Diode Forward Surge Current (Pulse)*1	I_{FM}		170*2	Amperes
Maximum Collector Dissipation (T_C = 25°C, IGBT Part, $T_{j(max)} \leq$ 150°C)	P_C		1100	Watts
Mounting Torque, M6 Terminal Screws	—		44	in-lb
Mounting Torque, M6 Mounting Screws	—		44	in-lb
Module Weight (Typical)	—		900	Grams
Isolation Voltage (Charged Part to Baseplate, AC 60Hz 1 min.)	V_{iso}		9.0	kVolts
Partial Discharge (V1 = 6900 V_{RMS}, V2 = 5200 V_{RMS}, f = 60Hz (Acc. to IEC 1287))	Q_{pd}		10	pC
Maximum Short-Circuit Pulse Width, ($V_{CC} \leq$ 4500V, V_{GE} = ±15V, T_j = 125°C)	t_{psc}		10	µs

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, T_j = 25°C	—	—	3	mA
		$V_{CE} = V_{CES}$, V_{GE} = 0V, T_j = 125°C	—	3	—	mA
Gate Leakage Current	I_{GES}	$V_{GE} = V_{GES}$, V_{CE} = 0V	—	—	0.5	µA
Gate-Emitter Threshold Voltage	$V_{GE(th)}$	I_C = 13mA, V_{CE} = 10V	5.8	6.3	6.8	Volts
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	I_C = 85A, V_{GE} = 15V, T_j = 25°C	—	3.8*3	—	Volts
		I_C = 85A, V_{GE} = 15V, T_j = 125°C	—	4.8	5.6	Volts
Total Gate Charge	Q_G	V_{CC} = 3600V, I_C = 85A, V_{GE} = 15V	—	1.05	—	µC
Emitter-Collector Voltage*1	V_{EC}	I_E = 85A, V_{GE} = 0V, T_j = 25°C	—	3.3	—	Volts
		I_E = 85A, V_{GE} = 0V, T_j = 125°C	—	3.4	4.2	Volts

*1 Represents characteristics of the anti-parallel, emitter-to-collector free-wheel diode (FWDi).
*2 Pulse width and repetition rate should be such that device junction temperature (T_j) does not exceed $T_{j(max)}$ rating.
*3 Pulse width and repetition rate should be such that device junction temperature rise is negligible.

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Characteristics		Symbol	Test Conditions	Min.	Typ.	Max.	Units
Input Capacitance		C_{ies}		—	15	—	nF
Output Capacitance		C_{oes}	V_{GE} = 0V, V_{CE} = 10V	—	0.95	—	nF
Reverse Transfer Capacitance		C_{res}	f = 100kHz	—	0.44	—	nF
Resistive	Turn-on Delay Time	$t_{d(on)}$	V_{CC} = 3600V, I_C = 85A,	—	TBD	—	µs
Load	Rise Time	t_r	V_{GE} = ±15V,	—	TBD	—	µs
Switching	Turn-off Delay Time	$t_{d(off)}$	$R_{G(on)}$ = 30Ω, $R_{G(off)}$ = 300Ω,	—	TBD	—	µs
Times	Fall Time	t_f	Inductive Load	—	TBD	—	µs
Turn-on Switching Energy		E_{on}	T_j = 125°C, I_C = 85A, V_{GE} = ±15V,	—	460	—	mJ
Turn-off Switching Energy		E_{off}	$R_{G(on)}$ = 30Ω, $R_{G(off)}$ = 300Ω, V_{CC} = 3600V, Inductive Load	—	500	—	mJ
Diode Reverse Recovery Time*1		t_{rr}	V_{CC} = 3600V, I_E = 85A,	—	0.7	—	µs
Diode Reverse Recovery Charge*1		Q_{rr}	V_{GE} = ±15V, $R_{G(on)}$ = 30Ω,	—	100*3	—	µC
Diode Reverse Recovery Energy		E_{rec}	Inductive Load, T_j = 125°C	—	200	—	mJ
Stray Inductance (C1-E2)		L_{SCE}		—	60	—	nH
Lead Resistance Terminal-Chip		R_{CE}		—	0.8	—	mΩ

Thermal and Mechanical Characteristics, T_j = 25 °C unless otherwise specified

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Thermal Resistance, Junction to Case*4	$R_{th(j-c)}$ Q	Per IGBT	—	0.100	—	°C/W
Thermal Resistance, Junction to Case*4	$R_{th(j-c)}$ D	Per FWDi	—	0.175	—	°C/W
Contact Thermal Resistance, Case to Fin	$R_{th(c-f)}$	Per Module, Thermal Grease Applied, λ_{grease} = 1W/mK	—	0.018	—	°C/W
Comparative Tracking Index	CTI		600	—	—	
Clearance Distance in Air (Terminal to Terminal)	$d_{a(t-t)}$		19	—	—	mm
Creepage Distance Along Surface (Terminal to Terminal)	$d_{s(t-t)}$		54	—	—	mm

*1 Represents characteristics of the anti-parallel, emitter-to-collector free-wheel diode (FWDi).
*3 Pulse width and repetition rate should be such that device junction temperature rise is negligible.
*4 T_C measurement point is just under the chips.

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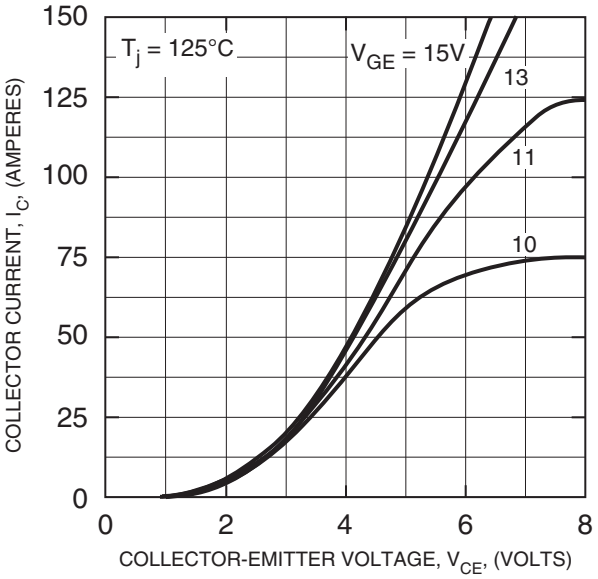
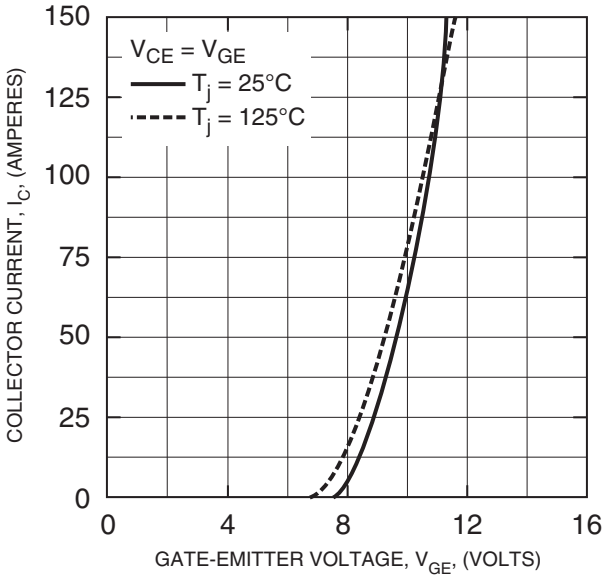
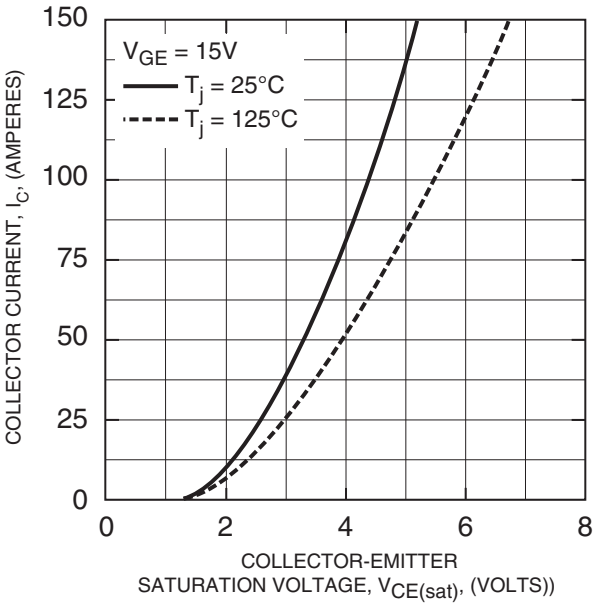
OUTPUT CHARACTERISTICS (TYPICAL)



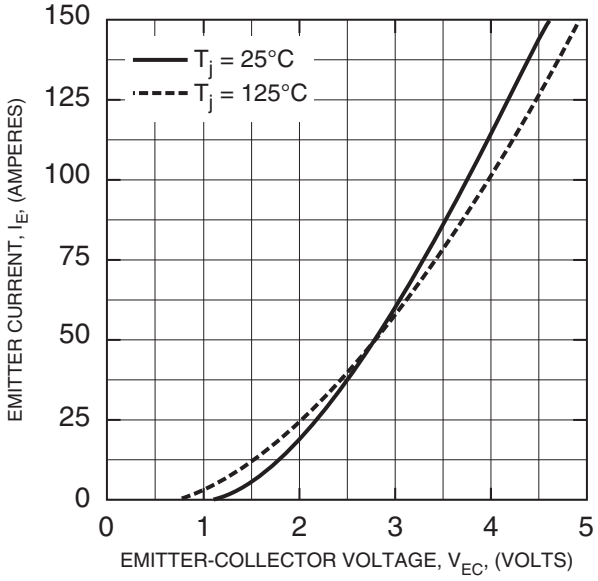
TRANSFER CHARACTERISTICS (TYPICAL)



COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



FREE-WHEEL DIODE FORWARD CHARACTERISTICS TYPICAL)



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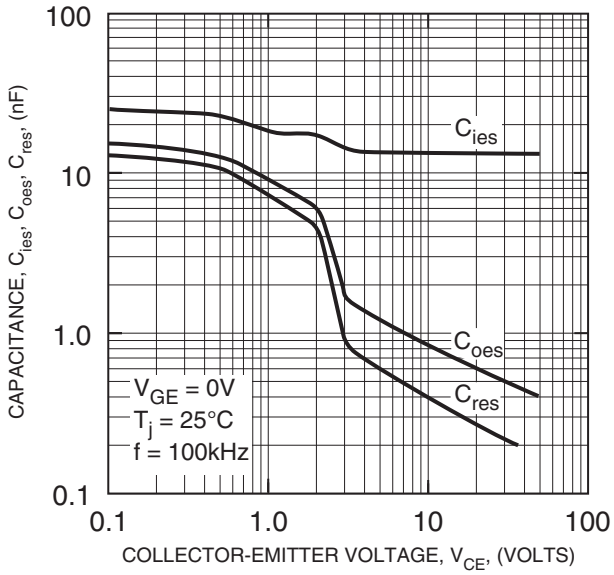
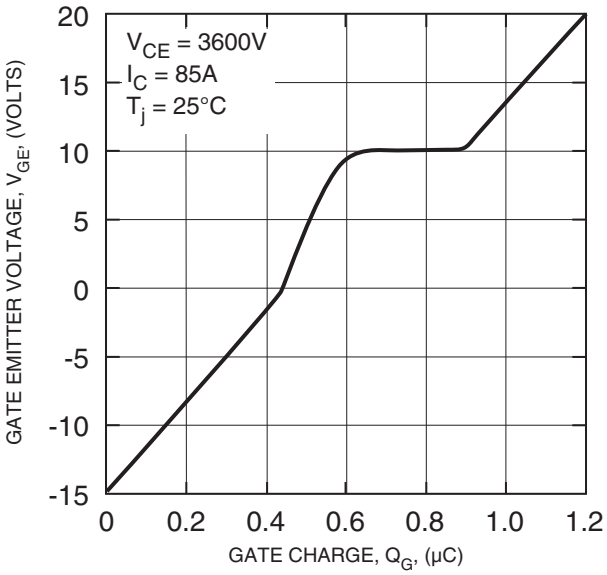
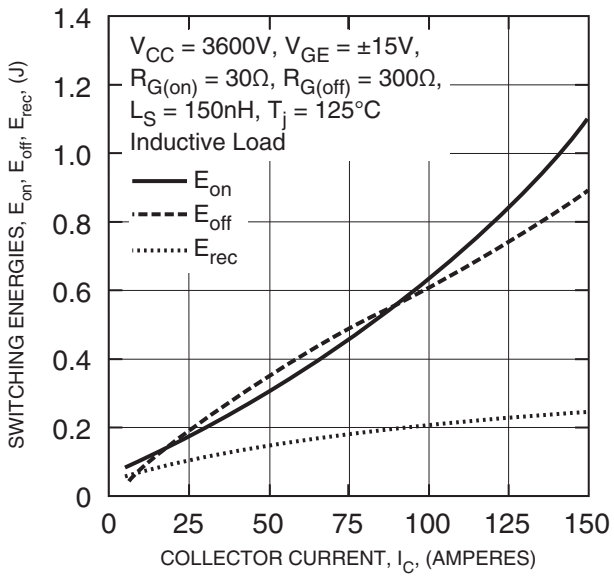
CAPACITANCE CHARACTERISTICS (TYPICAL)



GATE CHARGE CHARACTERISTICS (TYPICAL)



HALF-BRIDGE SWITCHING ENERGY CHARACTERISTICS (TYPICAL)



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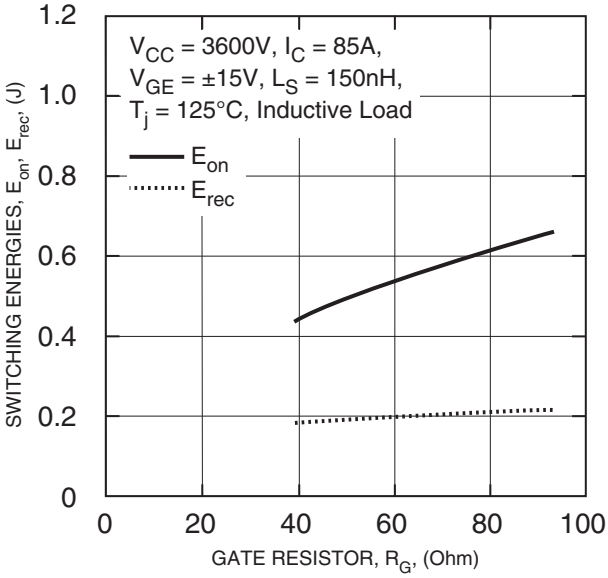

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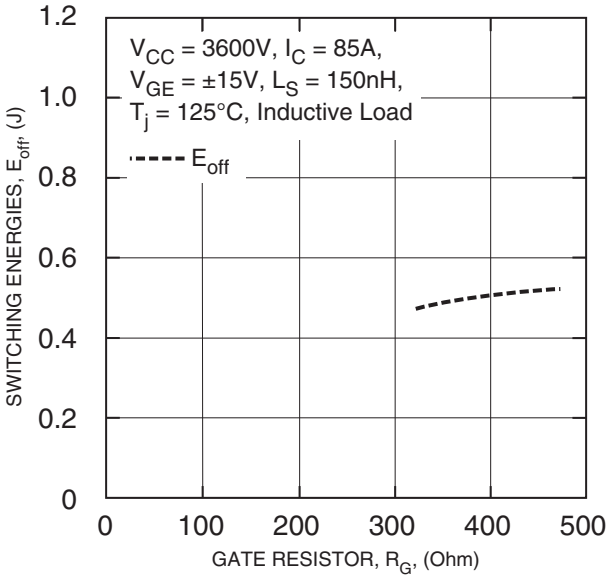
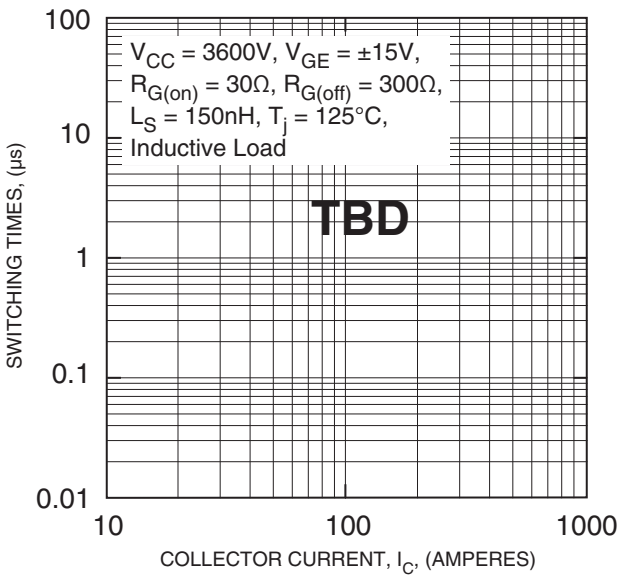
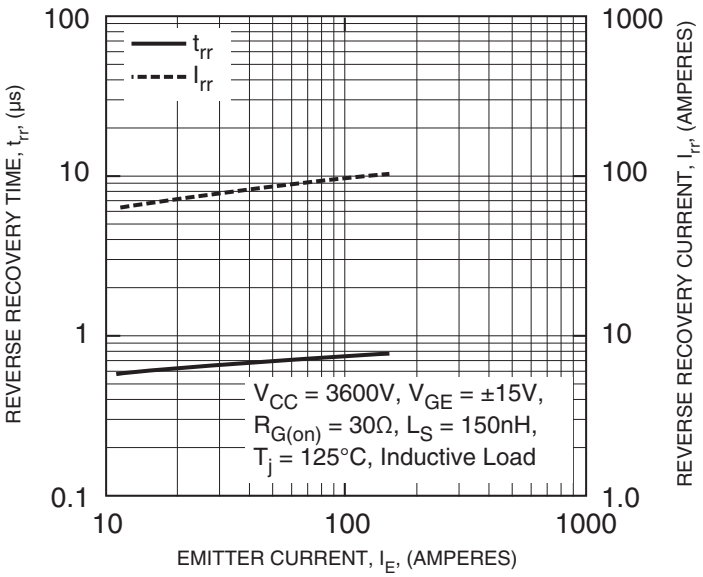


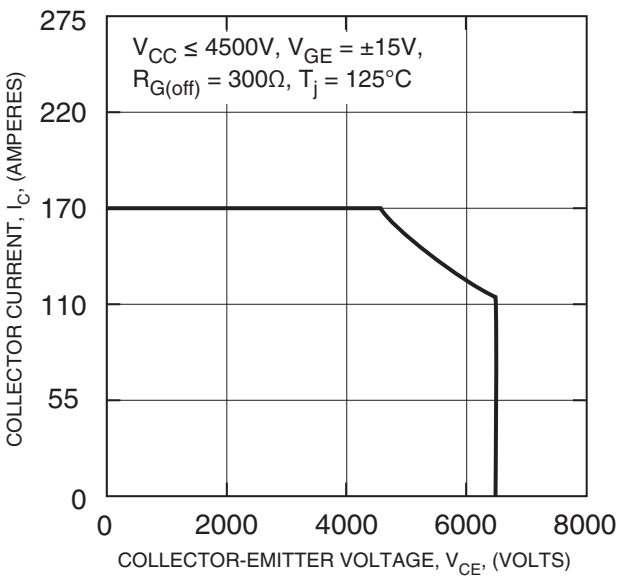
HALF-BRIDGE SWITCHING TIME CHARACTERISTICS (TYPICAL)



FREE-WHEEL DIODE REVERSE RECOVERY (TYPICAL)



REVERSE BIAS SAFE OPERATING AREA (RBSOA)



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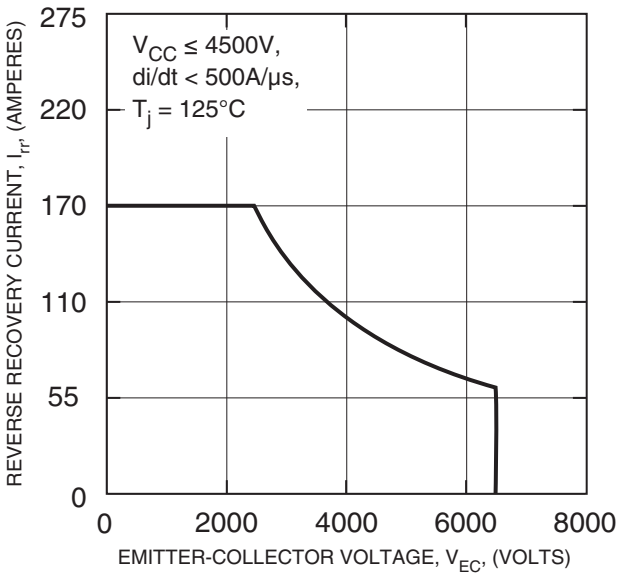

TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS