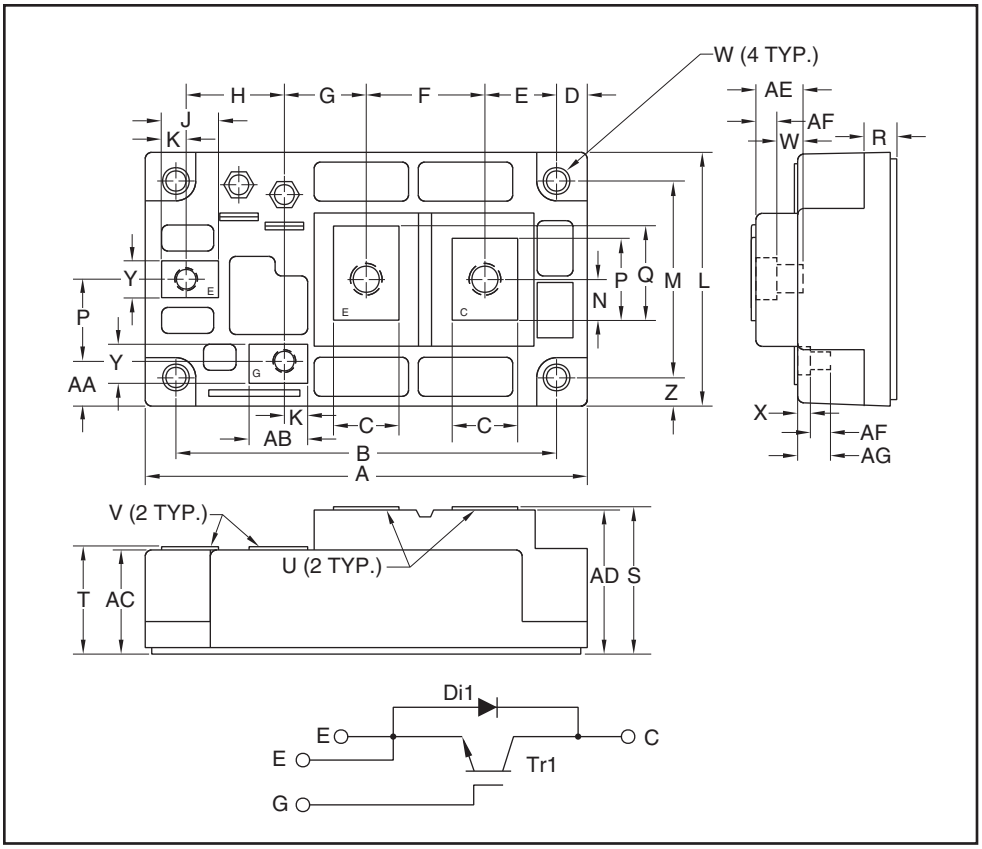
Powerex, Inc., 173 Pavilion Lane, Youngwood, Pennsylvania 15697 (724) 925-7272
www.pwrx.com

CM500HA-34A

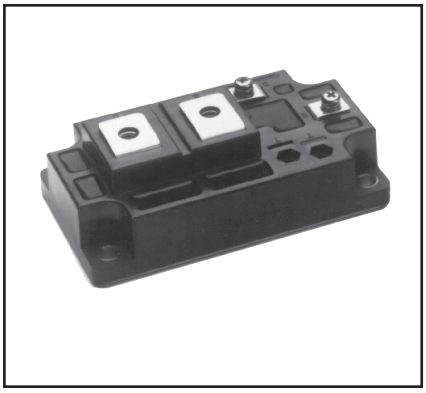
Single IGBT
A-Series Module
500 Amperes/1700 Volts



Outline Drawing and Circuit Diagram

Dimensions	Inches	Millimeters
A	4.25	108.0
B	3.66±0.01	93.0±0.25
C	0.63	16.0
D	0.30	7.5
E	0.69	17.5
F	1.14	29.0
G	0.79	20.0
H	0.94	24.0
J	0.55	13.9
K	0.24	6.0
L	2.44	62.0
M	1.89±0.01	48.0±0.25
N	0.39	10.0
P	0.79	20.0
Q	0.9	23.0
R	0.33	8.5

Dimensions	Inches	Millimeters
S	1.42+0.04/-0.02	36.0+1.0/-0.5
T	1.02+0.04/-0.02	25.8+1.0/-0.5
U	M6 Metric	M6
V	M4 Metric	M4
W	0.256	6.5
X	0.126	3.2
Y	0.35	9.0
Z	0.27	7.0
AA	0.43	11.0
AB	0.53	13.55
AC	0.98	25.0
AD	1.37	35.0
AE	0.45	11.5
AF	0.19	5.0
AG	0.32	8.2



Description:
Powerex IGBT Modules are designed for use in switching applications. Each module consists of one IGBT Transistor in a single configuration with 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:
- ☐ DC Chopper
- ☐ Inverter
- ☐ UPS
- ☐ Forklift

Ordering Information:
Example: Select the complete part module number you desire from the table below -i.e. CM500HA-34A is a 1700V (V_{CES}), 500 Ampere Single IGBT Power Module.

Type	Current Rating Amperes	V_{CES} Volts (x 50)
CM	500	34

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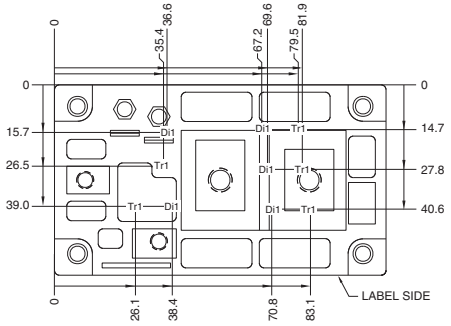
Absolute Maximum Ratings, T_j = 25°C unless otherwise specified

Characteristics	Symbol	Rating	Units
Collector-Emitter Voltage (G-E Short-Circuited)	V_{CES}	1700	Volts
Gate-Emitter Voltage (C-E Short-Circuited)	V_{GES}	±20	Volts
Collector Current (DC, T_C = 87°C)*2	I_C	500	Amperes
Collector Current (Pulse, Repetitive)*3	I_{CRM}	1000	Amperes
Total Power Dissipation (T_C = 25°C)*2,*4	P_{tot}	5000	Watts
Emitter Current, Freewheeling Diode Forward Current (T_C = 25°C)*2,*4	I_E*1	500	Amperes
Emitter Current, Freewheeling Diode Forward Current (Pulse, Repetitive)*3	I_{ERM}*1	1000	Amperes
Junction Temperature	T_j	-40 ~ +150	°C
Storage Temperature	T_{stg}	-40 ~ +125	°C
Isolation Voltage (Terminals to Baseplate, RMS, f = 60Hz, AC 1 minute)	V_{iso}	3500	Volts

*1 Represent ratings and characteristics of the anti-parallel, emitter-to-collector free wheeling diode (FWDi).
*2 Case temperature (T_C) and heatsink temperature (T_s) is measured on the surface (mounting side) of the baseplate and the heatsink side just under the chips. Refer to the figure to the right for chip location. The heatsink thermal resistance should be measured just under the chips.
*3 Pulse width and repetition rate should be such that device junction temperature (T_j) does not exceed $T_{j(max)}$ rating.
*4 Junction temperature (T_j) should not increase beyond maximum junction temperature ($T_{j(max)}$) rating.



Tr1: IGBT, Di1: FWDi
EACH MARK POINTS TO THE CENTER POSITION OF EACH CHIP

CM500HA-34A
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Electrical Characteristics, T_j = 25°C unless otherwise specified

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Collector-Emitter Cutoff Current	I_{CES}	$V_{CE} = V_{CES}$, G-E Short-Circuited	—	—	1.0	mA
Gate-Emitter Leakage Current	I_{GES}	$\pm V_{GE} = V_{GES}$, C-E Short-Circuited	—	—	3.0	µA
Gate-Emitter Threshold Voltage	$V_{GE(th)}$	I_C = 50mA, V_{CE} = 10V	5.5	7.0	8.5	Volts
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	I_C = 500A, V_{GE} = 15V, T_j = 25°C*6	—	2.2	3.0	Volts
		I_C = 500A, V_{GE} = 15V, T_j = 125°C*6	—	2.45	—	Volts
Input Capacitance	C_{ies}	V_{CE} = 10V, G-E Short-Circuited	—	—	120	nF
Output Capacitance	C_{oes}		—	—	14.0	nF
Reverse Transfer Capacitance	C_{res}		—	—	2.6	nF
Gate Charge	Q_G	V_{CC} = 1000V, I_C = 500A, V_{GE} = 15V	—	3300	—	nC
Turn-on Delay Time	$t_{d(on)}$	V_{CC} = 1000V, I_C = 500A, V_{GE} = ±15V, R_G = 3.0Ω, Inductive Load	—	—	900	ns
Rise Time	t_r		—	—	500	ns
Turn-off Delay Time	$t_{d(off)}$		—	—	700	ns
Fall Time	t_f		—	—	350	ns
Emitter-Collector Voltage	V_{EC}*1	I_E = 500A, G-E Short-Circuited*6	—	2.3	3.2	Volts
Reverse Recovery Time	t_{rr}*1	V_{CC} = 1000V, I_E = 500A, V_{GE} = ±15V R_G = 3.0Ω, Inductive Load	—	—	650	ns
Reverse Recovery Charge	Q_{rr}*1		—	50	—	µC
Turn-on Switching Energy per Pulse	E_{on}	V_{CC} = 1000V, I_C = I_E = 500A, V_{GE} = ±15V, R_G = 3.0Ω, T_j = 125°C, Inductive Load	—	267.8	—	mJ
Turn-off Switching Energy per Pulse	E_{off}		—	138.5	—	mJ
Reverse Recovery Energy per Pulse	E_{rr}*1		—	98.1	—	mJ
Internal Gate Resistance	r_g	T_C = 25°C	—	1.0	—	Ω
External Gate Resistance	R_G	—	3.0	—	10	Ω

*1 Represent ratings and characteristics of the anti-parallel, emitter-to-collector free wheeling diode (FWDi).
*6 Pulse width and repetition rate should be such as to cause negligible temperature rise.

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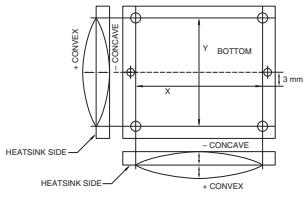
Thermal Resistance Characteristics, T_j = 25°C unless otherwise specified

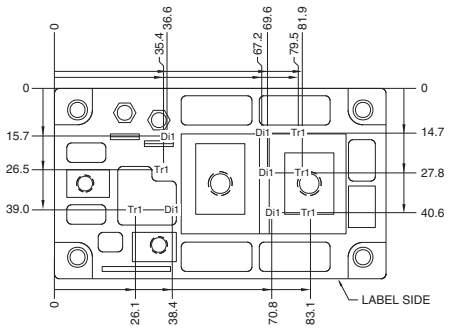
Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Thermal Resistance, Junction to Case*2	$R_{th(j-c)}Q$	IGBT Part	—	—	25	K/kW
Thermal Resistance, Junction to Case*2	$R_{th(j-c)}D$	FWDi Part	—	—	42	K/kW
Contact Thermal Resistance, Case to Heatsink	$R_{th(c-s)}$	Thermal Grease Applied*7	—	20	—	K/kW

Mechanical Characteristics

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Mounting Torque	M_t	Main Terminals, M6 Screw	18	22	26	in-lb
		Auxiliary Terminals, M4 Screw	9	11	13	in-lb
	M_s	Mounting to Heatsink, M6 Screw	18	22	26	in-lb
Weight	m		—	480	—	Grams
Flatness of Baseplate	e_c	On Centerline X, Y*5	±0	—	+100	µm

*2 Case temperature (T_C) and heatsink temperature (T_S) is measured on the surface (mounting side) of the baseplate and the heatsink side just under the chips.
Refer to the figure to the right for chip location.
The heatsink thermal resistance should be measured just under the chips.
*5 Baseplate (mounting side) flatness measurement points (X, Y) are shown in the figure below.
*7 Typical value is measured by using thermally conductive grease of λ = 0.9 [W/(m • K)].





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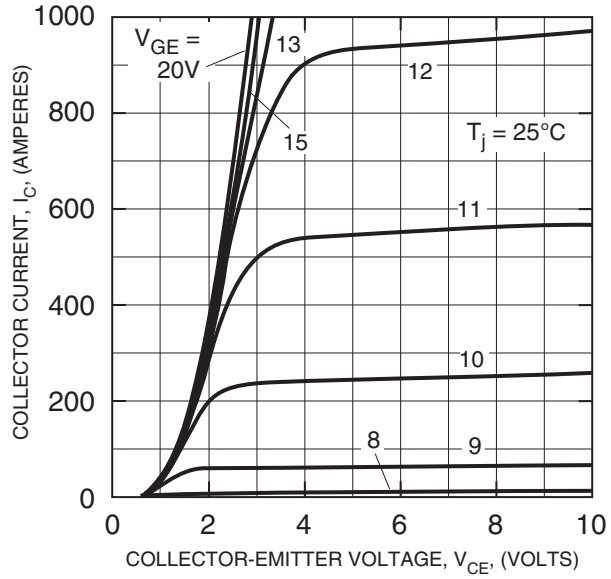
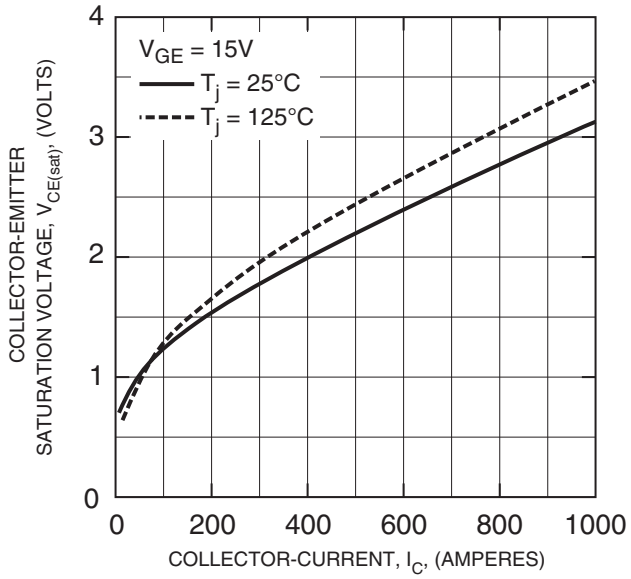
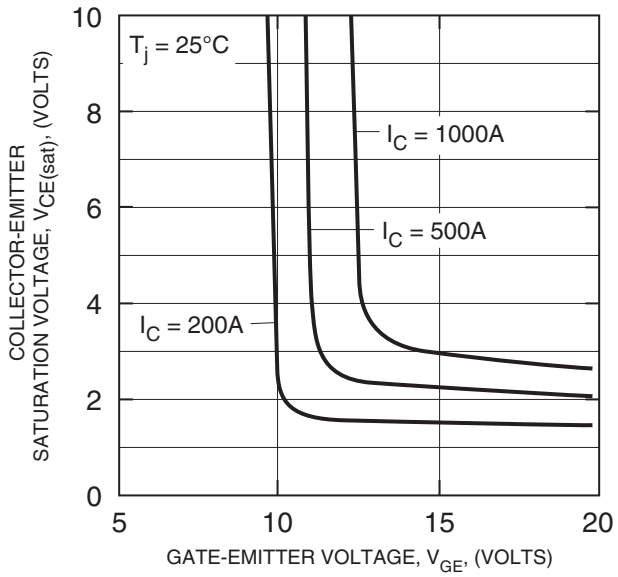
OUTPUT CHARACTERISTICS (TYPICAL)



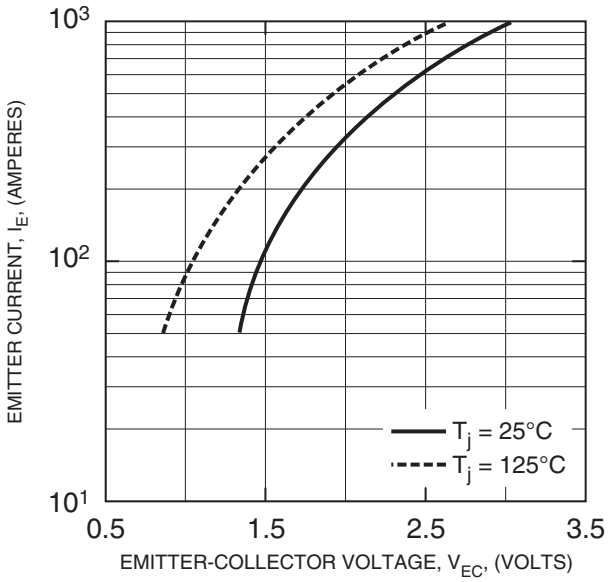
COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



FREE-WHEEL DIODE FORWARD CHARACTERISTICS (TYPICAL)



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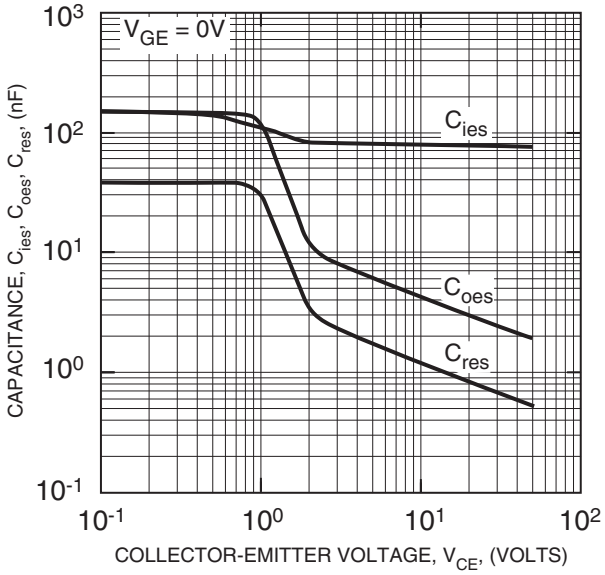
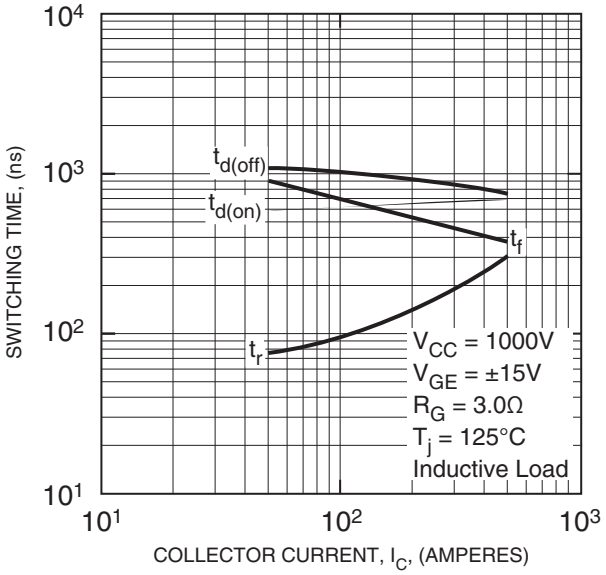
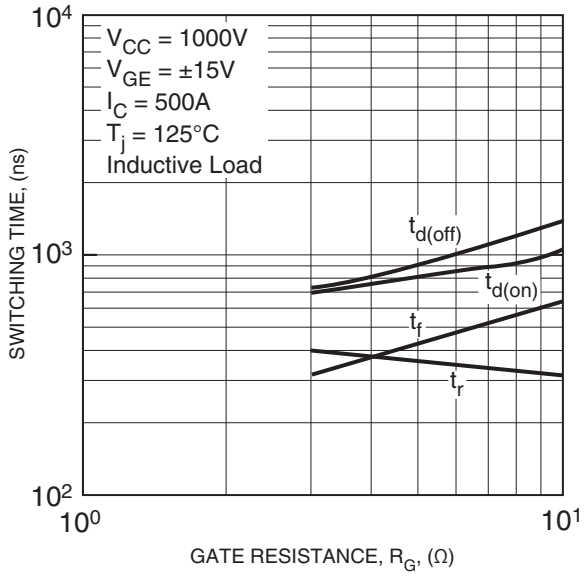
CAPACITANCE VS. V_{CE} (TYPICAL)



HALF-BRIDGE SWITCHING CHARACTERISTICS (TYPICAL)



SWITCHING TIME VS. GATE RESISTANCE (TYPICAL)



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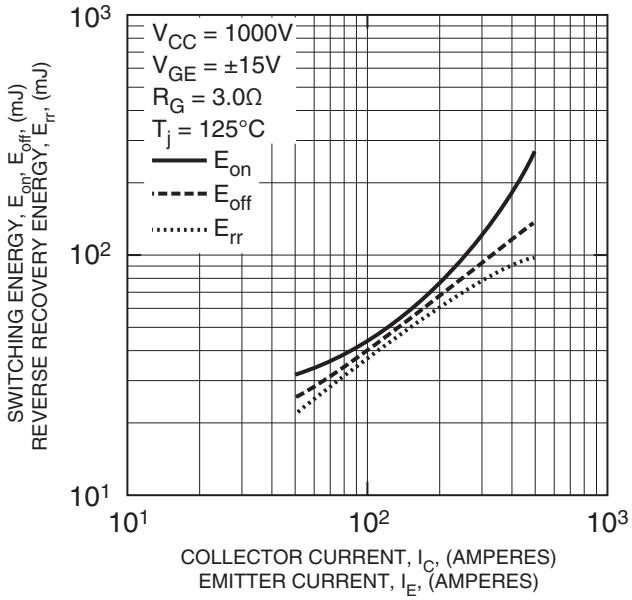
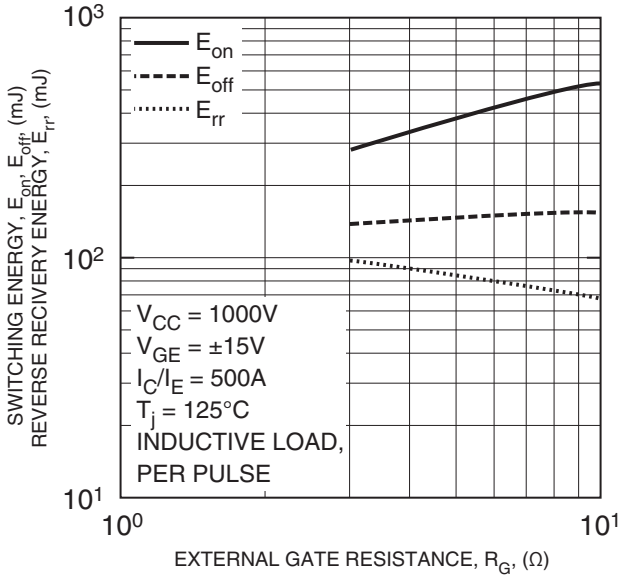
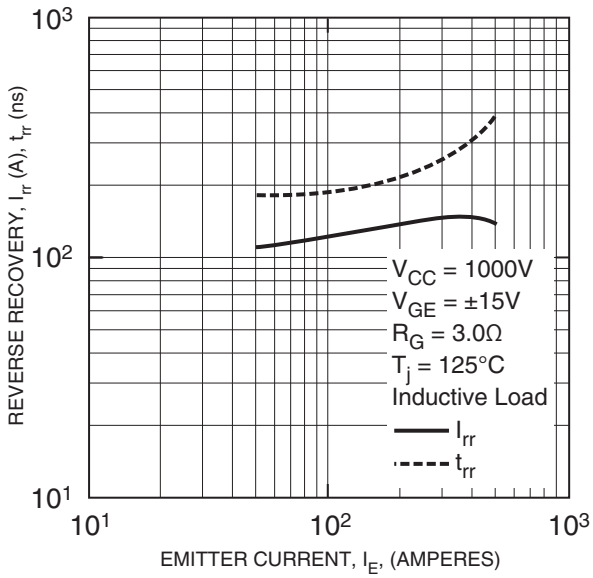


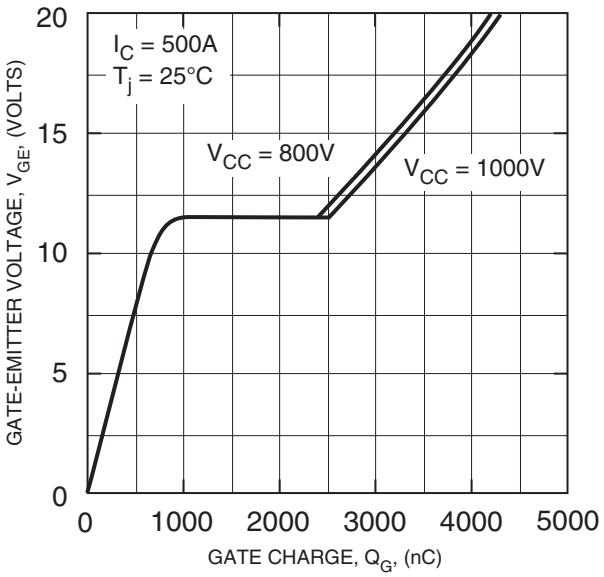
HALF-BRIDGE SWITCHING CHARACTERISTICS (TYPICAL)



REVERSE RECOVERY CHARACTERISTICS (TYPICAL)



GATE CHARGE VS. V_{GE}



TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (MAXIMUM)