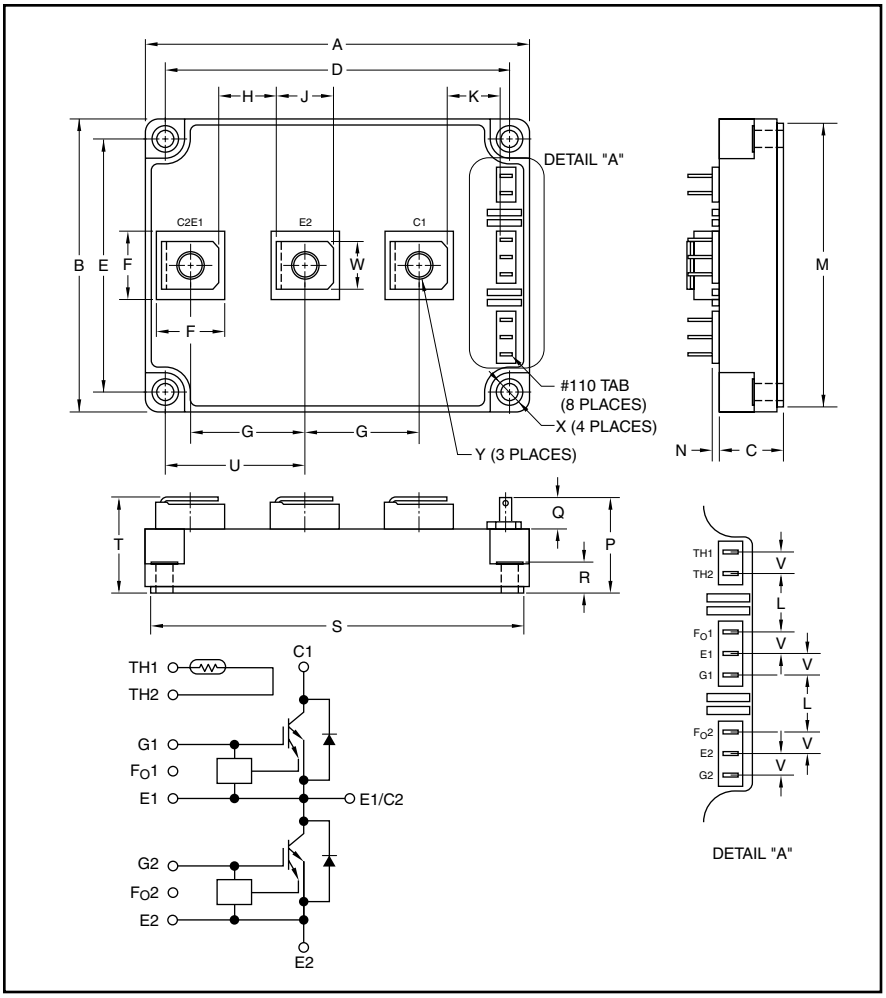
Powerex, Inc., 200 E. Hillis Street, Youngwood, Pennsylvania 15697-1800 (724) 925-7272

Dual IGBTMOD™ Compact IGBT Series Module

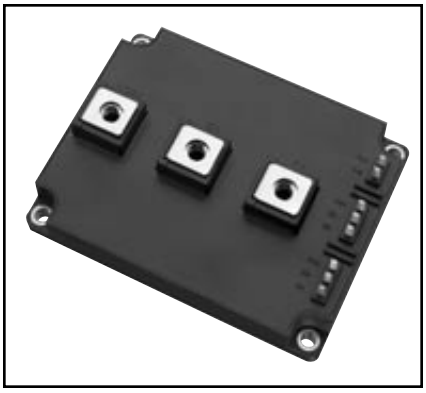
400 Amperes/1700 Volts



Outline Drawing and Circuit Diagram

Dimensions	Inches	Millimeters
A	4.92±0.04	125.0±1.0
B	3.78±0.04	96.0±1.0
C	0.84±0.04	21.3±1.0
D	4.49±0.03	113.0±0.8
E	3.30±0.03	84.0±0.8
F	0.86±0.04	22.0±1.0
G	1.46±0.04	37.0±1.0
H	0.75±0.04	19.0±1.0
J	0.71±0.04	18.0±1.0
K	0.73±0.04	18.6±1.0
L	0.59±0.04	15.0±1.0
M	3.66±0.03	93.0±0.8

Dimensions	Inches	Millimeters
N	0.07±0.04	1.8±1.0
P	1.24±0.04	31.5±1.0
Q	0.40±0.03	10.2±0.8
R	0.34±0.03	8.7±0.8
S	4.92±0.04	125.0±1.0
T	1.24-0.01/+0.04	31.5+2.0/-0.8
U	1.81±0.04	46.0±1.0
V	0.22±0.04	5.6±1.0
W	0.63±0.03	16.0±0.8
X	0.21 Dia.	5.5 Dia.
Y	M8 Metric	M8



Description:

Powerex Dual IGBTMOD™ Compact IGBT Series Modules are designed for use in switching applications. Each module consists of two IGBT Transistors in a half-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:

- ☐ Over-Current and Over-Temperature Protection
- ☐ Low $V_{CE(sat)}$
- ☐ Isolated Baseplate for Easy Heat Sinking

Applications:

- ☐ AC Motor Control
- ☐ Motion/Servo Control
- ☐ UPS
- ☐ Welding Power Supplies
- ☐ Laser Power Supplies

Ordering Information:

Example: Select the complete part number from the table below -i.e. MG400V2YS60A is a 1700V (V_{CES}), 400 Ampere Dual IGBTMOD™ Compact IGBT Series Module.

Type	Current Rating Amperes	V_{CES} Volts (x 10)
MG	400	170

MG400V2YS60A
Dual IGBTMOD™
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400 Amperes/1700 Volts

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

Characteristics	Symbol	MG400V2YS60A	Units
Collector-Emitter Voltage	V_{CES}	1700	Volts
Gate-Emitter Voltage	V_{GES}	±20	Volts
Collector Current (DC)	I_C	400	Amperes
Forward Current (DC)	I_F	400	Amperes
Collector Dissipation (T_C = 25°C)	P_C	4300	Watts
Power Device Junction Temperature	T_j	-20 to 150	°C
Storage Temperature	T_{stg}	-40 to 125	°C
Mounting Torque, M5 Mounting Screws	—	27	in-lb
Mounting Torque, M8 Main Terminal Screws	—	88	in-lb
Module Weight (Typical)	—	680	Grams
Isolation Voltage, AC 1 minute, 60Hz Sinusoidal	V_{ISO}	4000	Volts

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

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Gate Leakage Current	I_{GES}	V_{GE} = ±20V, V_{CE} = 0V	—	—	±10	µA
Collector Cutoff Current	I_{CES}	V_{CE} = 1700V, V_{GE} = 0V	—	—	1.0	mA
Gate-Emitter Cutoff Voltage	$V_{GE(off)}$	I_C = 400mA, V_{CE} = 5V	4.5	5.5	6.5	Volts
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	V_{GE} = 15V, I_C = 400A, T_j = 25°C	—	3.0	3.4	Volts
		V_{GE} = 15V, I_C = 400A, T_j = 125°C	—	3.8	4.2	Volts
Input Capacitance	C_{ies}	V_{CE} = 10V, V_{GE} = 0V, f = 1MHz	—	45000	—	pF
Gate-Emitter Voltage	V_{GE}		13.0	15.0	17.0	Volts
Gate Resistance	R_G		8.2	—	15.0	Ω
Inductive Load	$t_{d(on)}$	V_{CC} = 900V, I_C = 400A, V_{GE} = ±15V, R_G = 8.2Ω	—	0.35	—	µs
Switching	t_r		—	0.2	—	µs
Times	t_{on}		—	0.55	—	µs
	$t_{d(off)}$		—	0.9	—	µs
	t_f		—	0.4	0.6	µs
	t_{off}		—	1.3	—	µs
Forward Voltage	V_F	I_F = 400A, V_{GE} = 0V, T_j = 25°C	—	3.2	4.2	Volts
		I_F = 400A, V_{GE} = 0V, T_j = 125°C	—	2.4	—	Volts
Reverse Recovery Time	t_{rr}	I_F = 400A, V_{GE} = -15V, di/dt = 2000A/µs	—	0.2	0.4	µs
Junction to Case Thermal Resistance	$R_{th(j-c)Q}$	IGBT (Per 1/2 Module)	—	—	0.029	°C/Watt
	$R_{th(j-c)D}$	FWDi (Per 1/2 Module)	—	—	0.056	°C/Watt
RTC Operating Current	I_{rtc}	T_j = 25°C	800	—	—	Amperes

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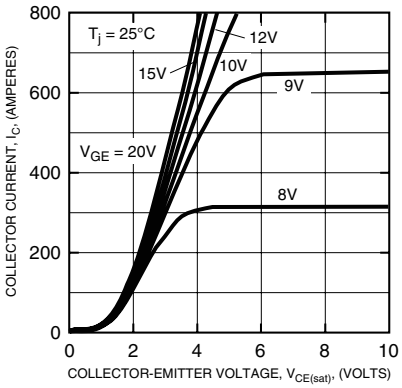
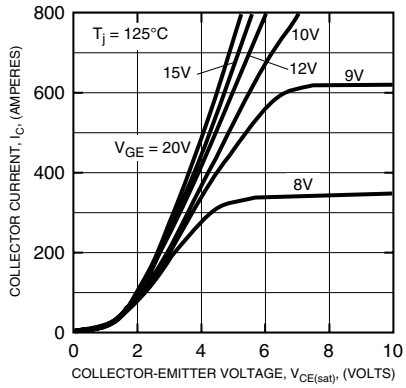
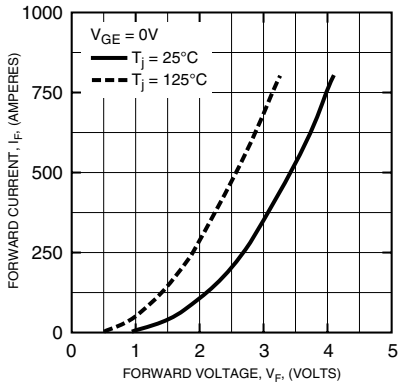
OUTPUT CHARACTERISTICS (TYPICAL)



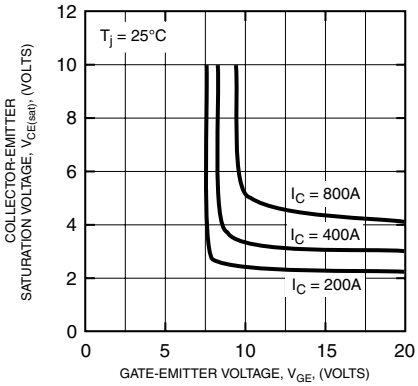
OUTPUT CHARACTERISTICS (TYPICAL)



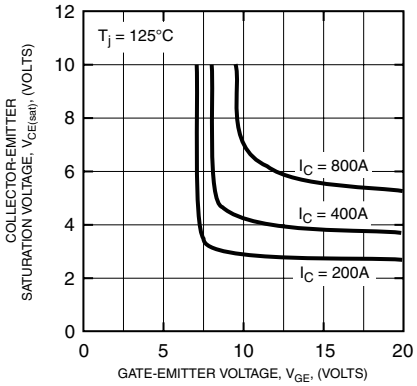
FREE-WHEEL CHARACTERISTICS (TYPICAL)



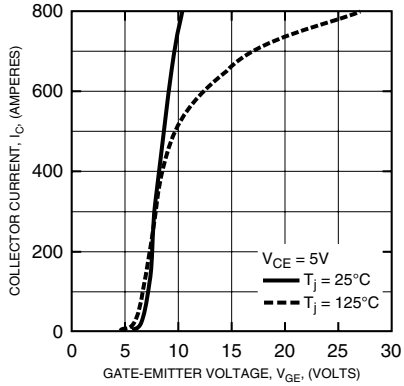
COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



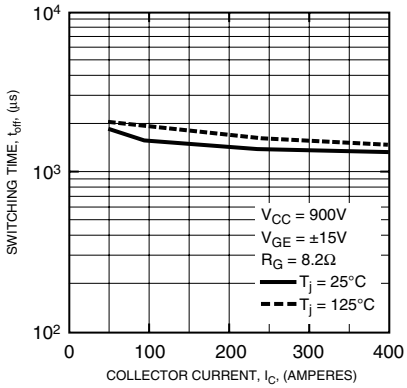
COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



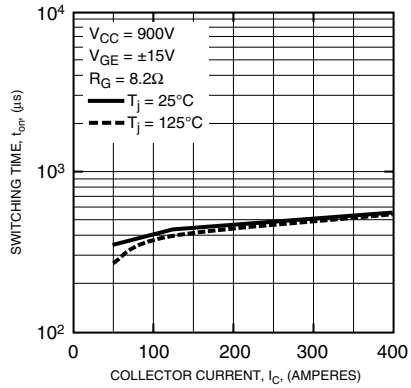
TRANSFER CHARACTERISTICS (TYPICAL)



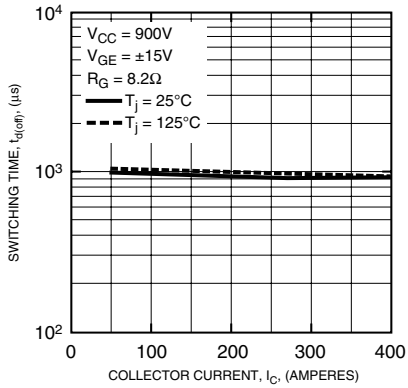
TURN-OFF TIME VS. COLLECTOR CURRENT (TYPICAL)



TURN-ON TIME VS. COLLECTOR CURRENT (TYPICAL)



TURN-OFF DELAY TIME VS. COLLECTOR CURRENT (TYPICAL)



MG400V2YS60A
Dual IGBTMOD™
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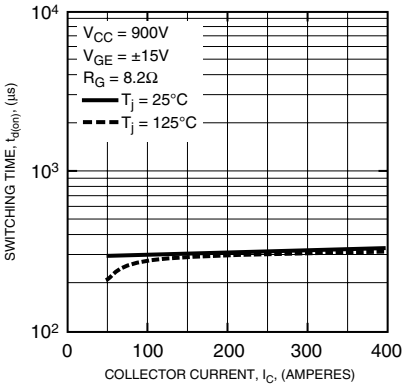
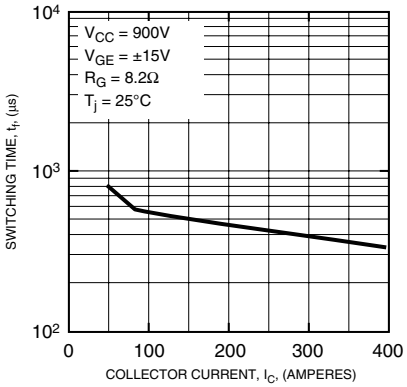
400 Amperes/1700 Volts

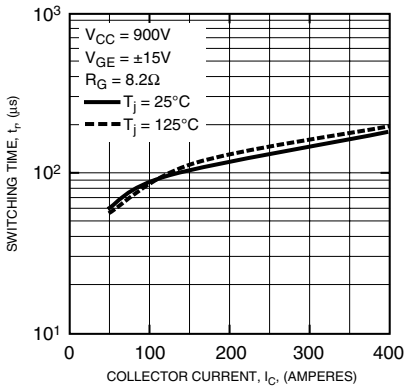
TURN-ON DELAY TIME VS. COLLECTOR CURRENT (TYPICAL)



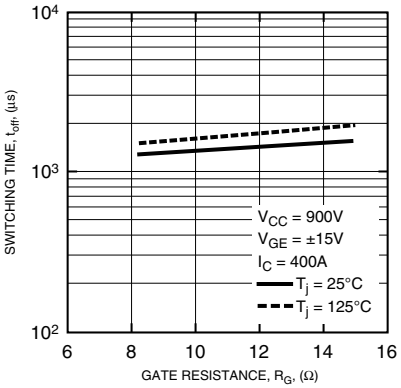
FALL TIME VS. COLLECTOR CURRENT (TYPICAL)



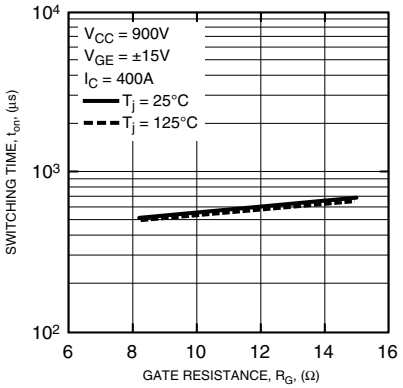
RISE TIME VS. COLLECTOR CURRENT (TYPICAL)



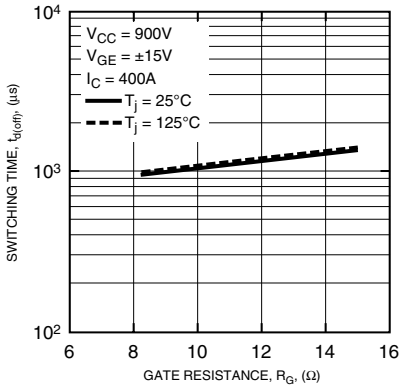
TURN-OFF TIME VS. GATE RESISTANCE (TYPICAL)



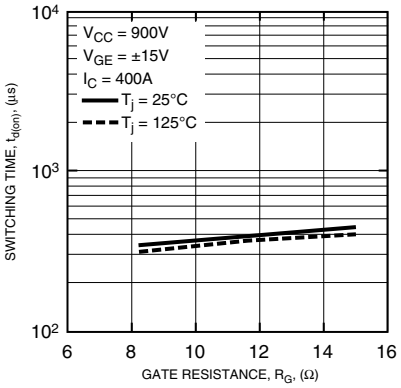
TURN-ON TIME VS. GATE RESISTANCE (TYPICAL)



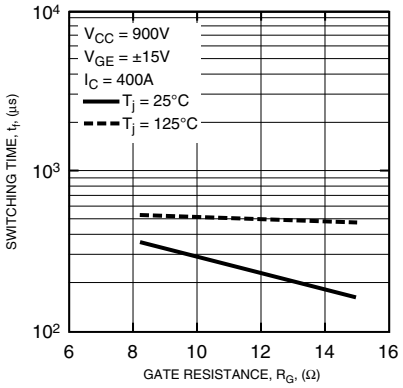
TURN-OFF DELAY TIME VS. GATE RESISTANCE (TYPICAL)



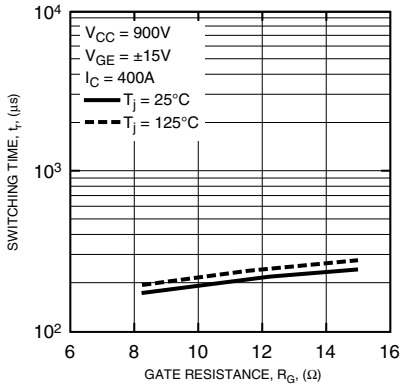
TURN-ON DELAY TIME VS. GATE RESISTANCE (TYPICAL)



FALL TIME VS. GATE RESISTANCE (TYPICAL)



RISE TIME VS. GATE RESISTANCE (TYPICAL)



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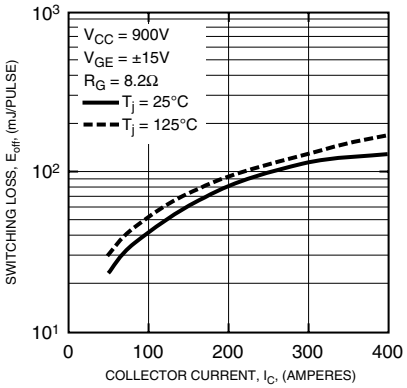
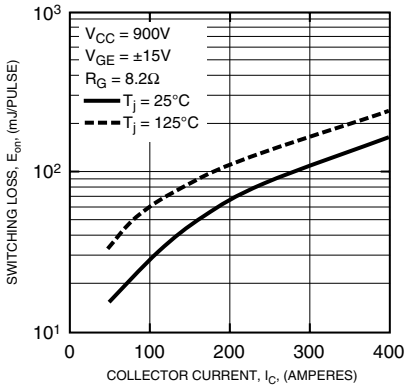
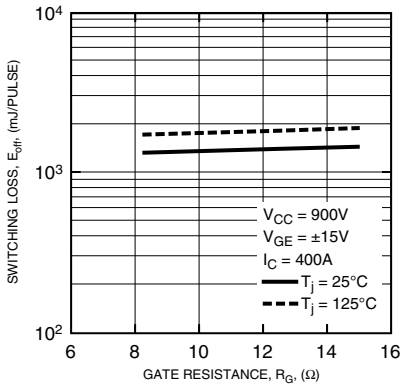
SWITCHING LOSS (OFF) VS. COLLECTOR CURRENT (TYPICAL)



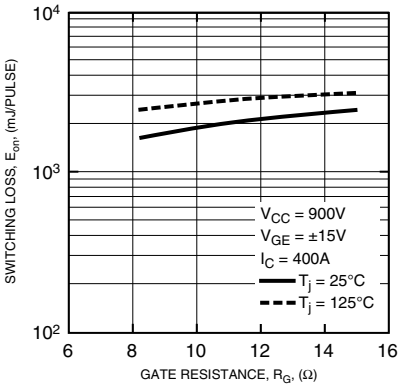
SWITCHING LOSS (ON) VS. COLLECTOR CURRENT (TYPICAL)



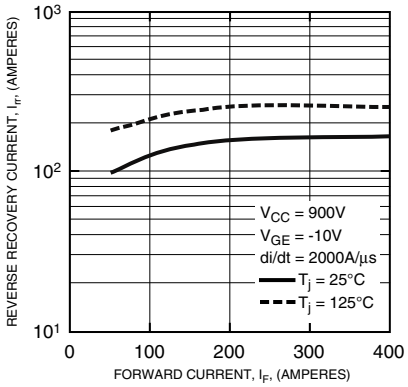
SWITCHING LOSS (OFF) VS. GATE RESISTANCE (TYPICAL)



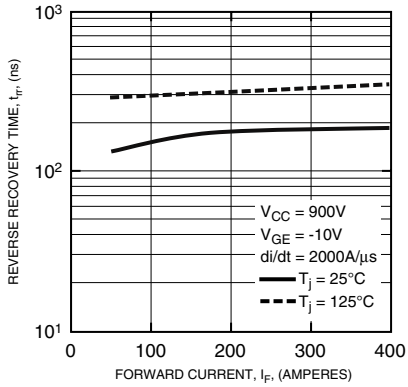
SWITCHING LOSS (ON) VS. GATE RESISTANCE (TYPICAL)



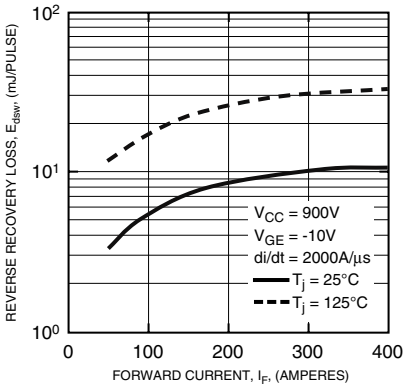
REVERSE RECOVERY CURRENT (TYPICAL)



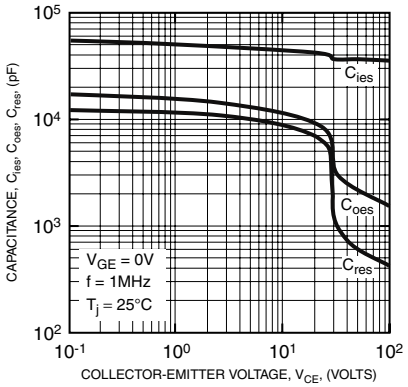
REVERSE RECOVERY TIME (TYPICAL)



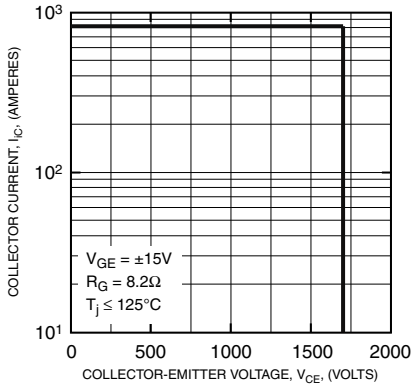
REVERSE RECOVERY LOSS VS. FORWARD CURRENT (TYPICAL)



CAPACITANCE VS. COLLECTOR-EMITTER VOLTAGE (TYPICAL)



REVERSE BIAS SAFE OPERATION AREA (TYPICAL)



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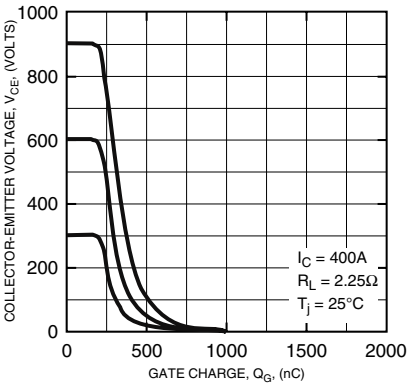
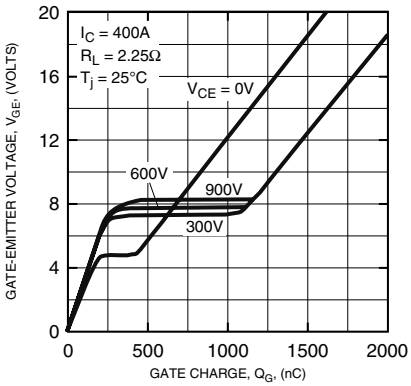
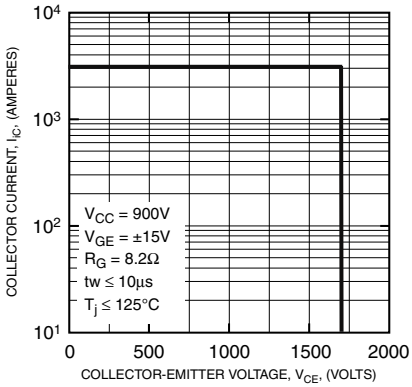
COLLECTOR-EMITTER VOLTAGE VS. GATE CHARGE (TYPICAL)



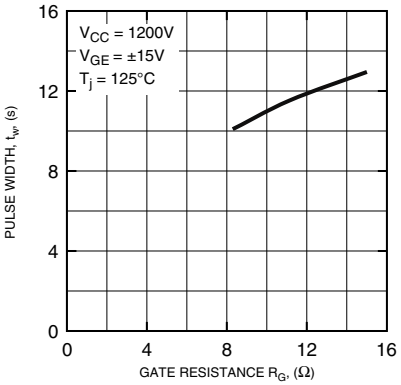
GATE-EMITTER VOLTAGE VS. GATE CHARGE (TYPICAL)



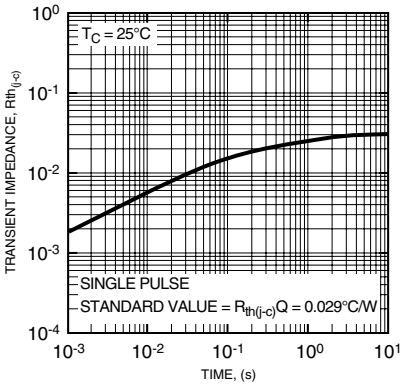
SHORT CIRCUIT SAFE OPERATING AREA (TYPICAL)



SHORT CIRCUIT PULSE WIDTH VS. GATE RESISTANCE (TYPICAL)



TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (IGBT)



TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (FWDi)