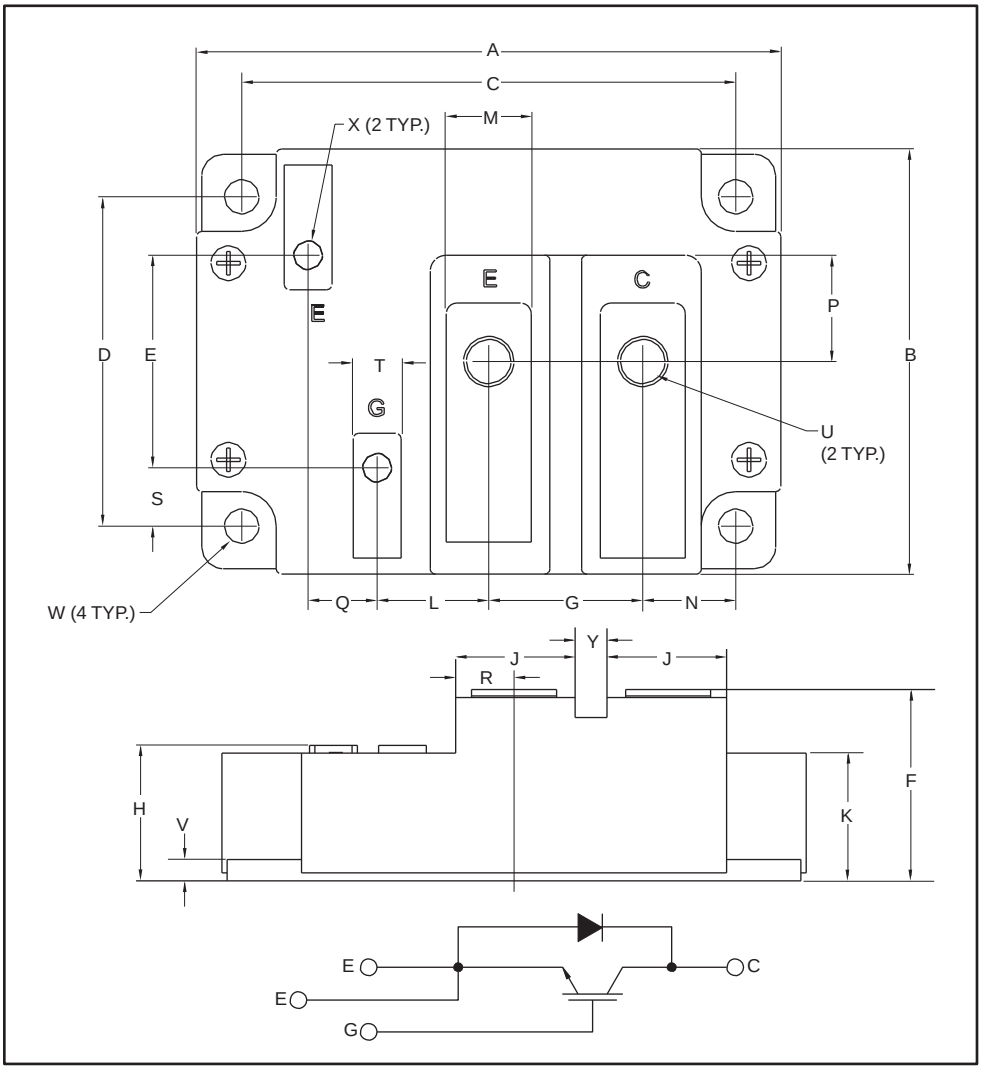
Powerex, Inc., 173 Pavilion Lane, Youngwood, Pennsylvania 15697 (724) 925-7272
www.pwrx.com

QIS1760002

Single IGBT Module
600 Amperes/1700 Volts

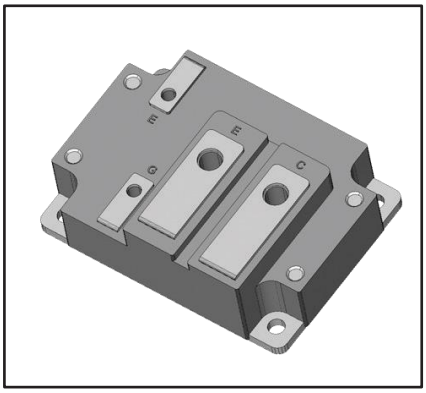
Note: All electrical characteristics scaled from 600A module CM600DXL-34SA.



Outline Drawing and Circuit Diagram

Dimensions	Inches	Millimeters
A	4.33	110.0
B	3.15	80.0
C	3.66±0.008	93.0±0.25
D	2.44±0.008	62.0±0.25
E	1.57	40.0
F	1.42 Max.	36.0 Max.
G	1.14	29.0
H	1.00 Max.	25.5 Max.
J	0.89	22.5
K	0.93	23.5
L	0.83	21.0
M	0.63	16.0

Dimensions	Inches	Millimeters
N	0.69	17.5
P	0.79	20.0
Q	0.51	13.0
R	0.43	11.0
S	0.43	11.0
T	0.35	9.0
U	M8 Metric	M8
V	0.16	4.0
W	0.256 Dia.	6.5 Dia.
X	M4 Metric	M4
Y	0.24	6.0



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

QIS1760002
Single IGBT Module
600 Amperes/1700 Volts

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 (DC, T_C = TBD°C)*2,*4	I_C	600	Amperes
Collector Current (Pulse, Repetitive)*3	I_{CRM}	1200	Amperes
Total Power Dissipation (T_C = 25°C)*2,*4	P_{tot}	5600	Watts
Emitter Current (T_C = TBD°C)*2,*4	I_E*1	600	Amperes
Emitter Current (Pulse, Repetitive)*3	I_{ERM}*1	1200	Amperes
Maximum Junction Temperature	$T_{j(max)}$	175	°C
Maximum Case Temperature*2	$T_{C(max)}$	125	°C
Operating Junction Temperature	$T_{j(op)}$	-40 to +150	°C
Storage Temperature	T_{stg}	-40 to +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. 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.

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

QIS1760002
Single IGBT Module
600 Amperes/1700 Volts

Electrical Characteristics, T_j = 25°C unless otherwise specified

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Collector-Emitter Cutoff Current	I_{CES}	$V_{CE} = V_{CES}$, V_{GE} = 0V	—	—	2	mA
Gate-Emitter Leakage Current	I_{GES}	$V_{GE} = V_{GES}$, V_{CE} = 0V	—	—	1.0	µA
Gate-Emitter Threshold Voltage	$V_{GE(th)}$	I_C = 60mA, V_{CE} = 10V	5.4	6.0	6.6	Volts
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	I_C = 600A, V_{GE} = 15V, T_j = 25°C*6	—	2.0	2.5	Volts
		I_C = 600A, V_{GE} = 15V, T_j = 125°C*6	—	2.2	—	Volts
		I_C = 600A, V_{GE} = 15V, T_j = 150°C*6	—	2.25	—	Volts
Input Capacitance	C_{ies}	V_{CE} = 10V, V_{GE} = 0V	—	—	158	nF
Output Capacitance	C_{oes}		—	—	13	nF
Reverse Transfer Capacitance	C_{res}		—	—	2.9	nF
Gate Charge	Q_G	V_{CC} = 1000V, I_C = 600A, V_{GE} = 15V	—	3312	—	nC
Turn-on Delay Time	$t_{d(on)}$	V_{CC} = 1000V, I_C = 600A, V_{GE} = ±15V, R_G = 0Ω, Inductive Load	—	900	—	ns
Rise Time	t_r		—	150	—	ns
Turn-off Delay Time	$t_{d(off)}$		—	900	—	ns
Fall Time	t_f		—	400	—	ns
Emitter-Collector Voltage	V_{EC}*1	I_E = 600A, V_{GE} = 0V, T_j = 25°C*6	—	4.1	5.3	Volts
		I_E = 600A, V_{GE} = 0V, T_j = 125°C*6	—	2.9	—	Volts
		I_E = 600A, V_{GE} = 0V, T_j = 150°C*6	—	2.7	—	Volts
Reverse Recovery Time	t_{rr}*1	V_{CC} = 1000V, I_E = 600A, V_{GE} = ±15V R_G = 0Ω, Inductive Load	—	—	300	ns
Reverse Recovery Charge	Q_{rr}*1		—	23	—	µC
Turn-on Switching Energy per Pulse	E_{on}	V_{CC} = 1000V, $I_C = I_E$ = 600A, V_{GE} = ±15V, R_G = 0Ω, T_j = 150°C, Inductive Load	—	167	—	mJ
Turn-off Switching Energy per Pulse	E_{off}		—	168	—	mJ
Reverse Recovery Energy per Pulse	E_{rr}*1		—	106	—	mJ
Internal Gate Resistance	r_g		—	0.85	—	Ω

*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. The heatsink thermal resistance should be measured just under the chips.
*6 Pulse width and repetition rate should be such as to cause negligible temperature rise.

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

QIS1760002
Single IGBT Module
600 Amperes/1700 Volts

Electrical Characteristics, T_j = 25°C unless otherwise specified (continued)

Thermal Resistance Characteristics

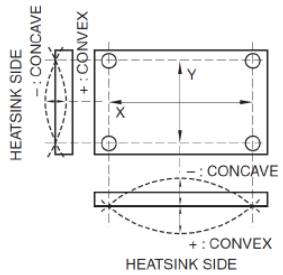
Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Thermal Resistance, Junction to Case*2	$R_{th(j-c)}Q$	Per Inverter IGBT	—	—	26.8	K/kW
Thermal Resistance, Junction to Case*2	$R_{th(j-c)}D$	Per Inverter FWDi	—	—	37.9	K/kW
Contact Thermal Resistance, Case to Heatsink*2	$R_{th(c-f)}$	Thermal Grease Applied	—	10.3	—	K/kW

*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.
The heatsink thermal resistance should be measured just under the chips.

Mechanical Characteristics

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Mounting Torque		Mounting to Terminal, M8 Screw	—	—	95	in-lb
		Mounting to Terminal, M4 Screw	—	—	15	in-lb
		Mounting to Heatsink, M6 Screw	—	—	40	in-lb
Creepage Distance	d_s	Terminal to Terminal	18	—	—	mm
		Terminal to Baseplate	20	—	—	mm
Clearance	d_a	Terminal to Terminal	13	—	—	mm
		Terminal to Baseplate	20	—	—	mm
Weight	m		—	600	—	Grams
Flatness of Baseplate	e_c	On Centerline X, Y	-0	—	+200	µm

BASEPLATE FLATNESS
MEASUREMENT POINT



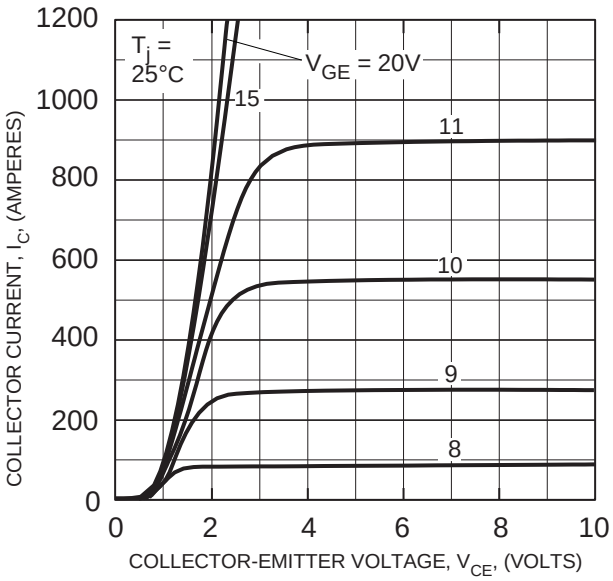
Recommended Operating Conditons, T_a = 25°C

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
(DC) Supply Voltage	V_{CC}	Applied Across C-E	—	1000	1200	Volts
Gate (-Emitter Drive) Voltage	$V_{GE(on)}$	Applied Across G-E	13.5	15.0	16.5	Volts
External Gate Resistance	R_G	Per Switch	0	—	13.5	Ω

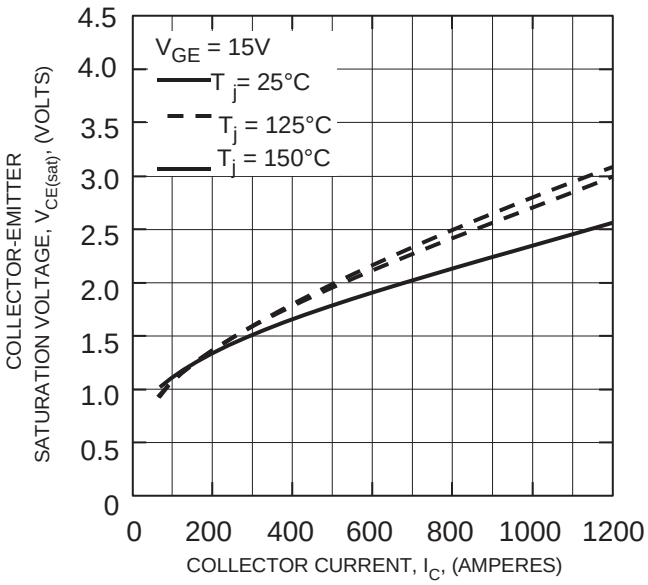
Powerex, Inc., 173 Pavilion Lane, Youngwood, Pennsylvania 15697 (724) 925-7272 www.pwrx.com

QIS1760002
Single IGBT Module
600 Amperes/1700 Volts

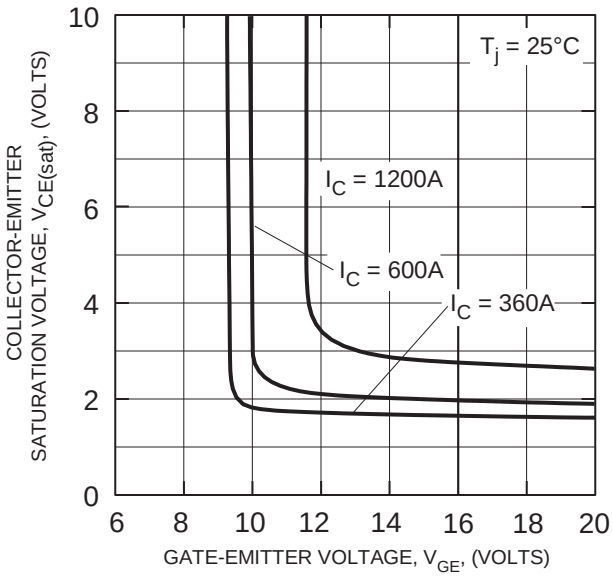
OUTPUT CHARACTERISTICS (CHIP - TYPICAL)



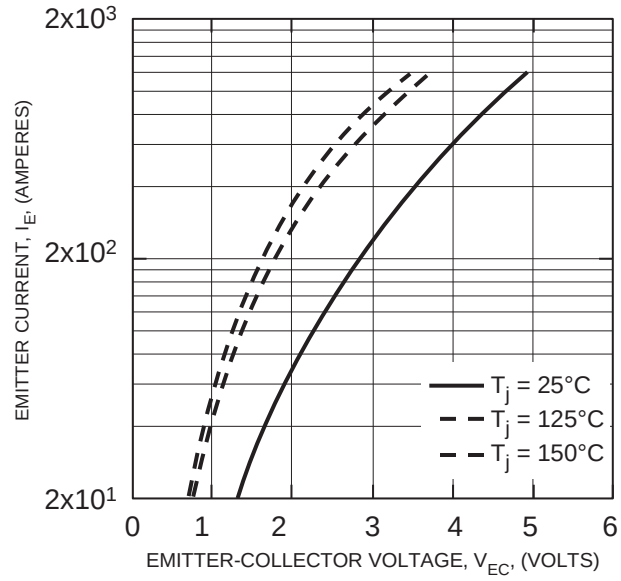
COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (CHIP - TYPICAL)



COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (CHIP - TYPICAL)



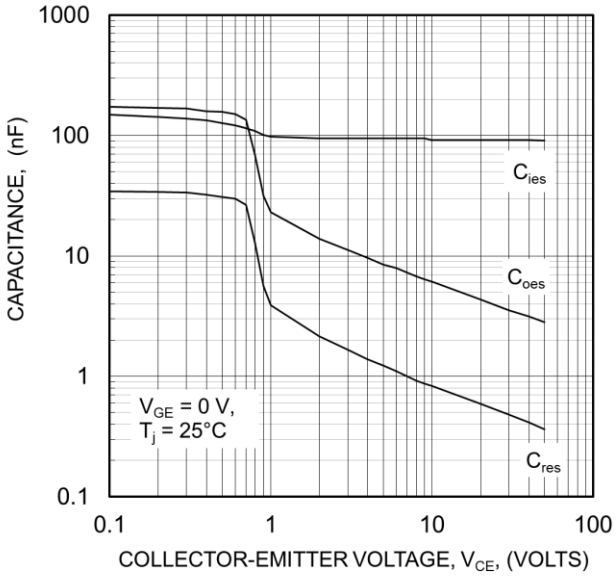
FREE-WHEEL DIODE FORWARD CHARACTERISTICS (CHIP - TYPICAL)



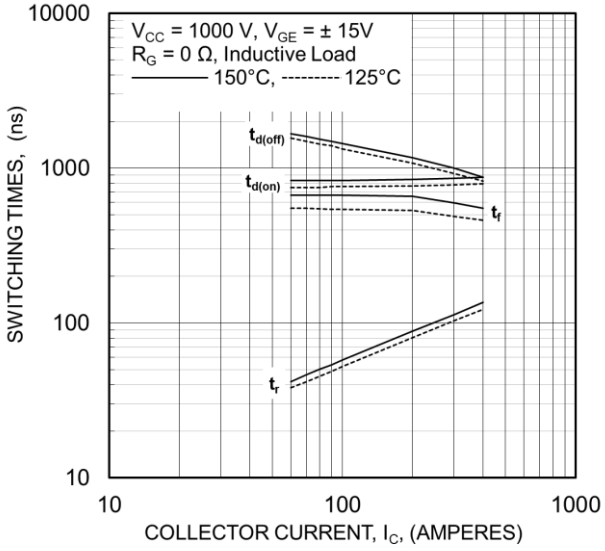
Powerex, Inc., 173 Pavilion Lane, Youngwood, Pennsylvania 15697 (724) 925-7272 www.pwrx.com

QIS1760002
Single IGBT Module
600 Amperes/1700 Volts

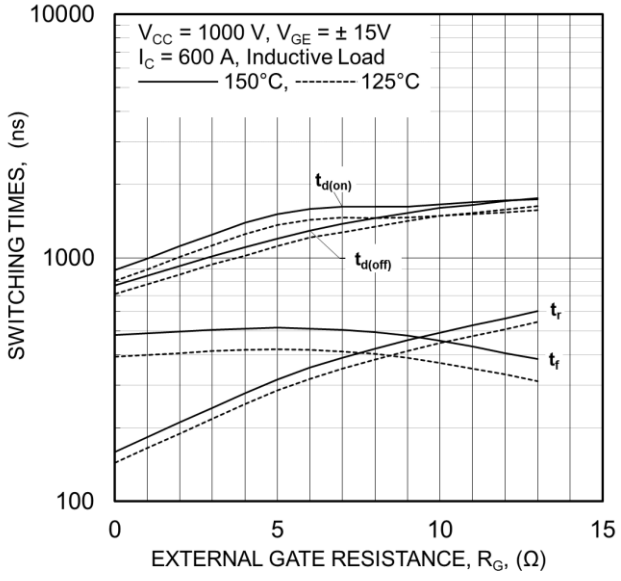
CAPACITANCE CHARACTERISTICS (TYPICAL)



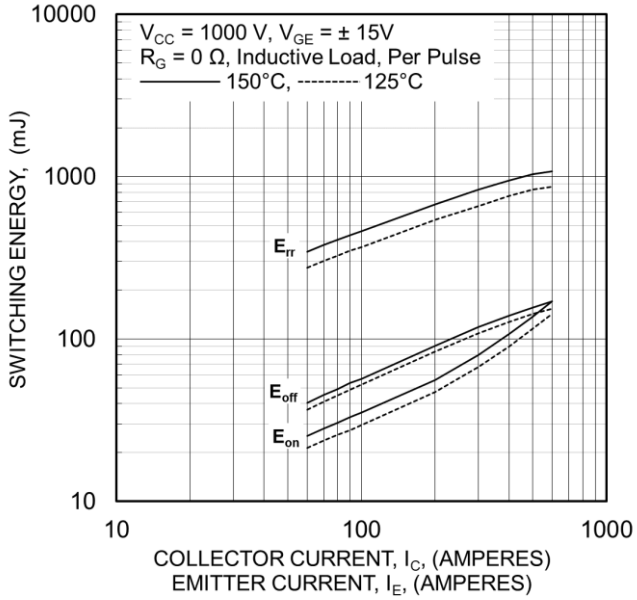
SWITCHING CHARACTERISTICS (TYPICAL)



SWITCHING CHARACTERISTICS (TYPICAL)

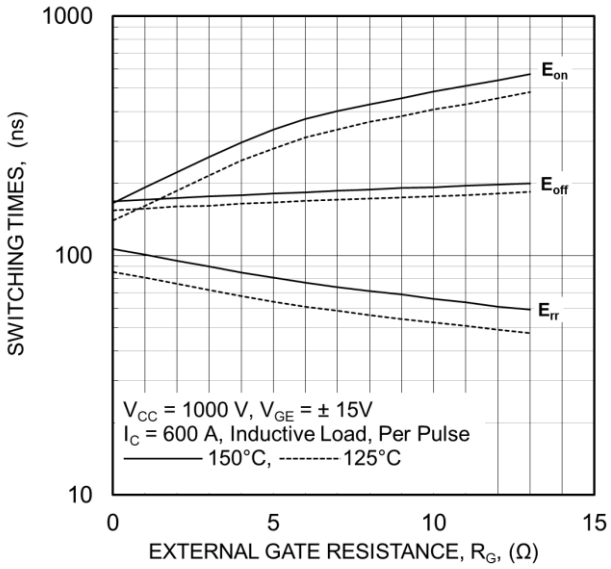


SWITCHING CHARACTERISTICS (TYPICAL)

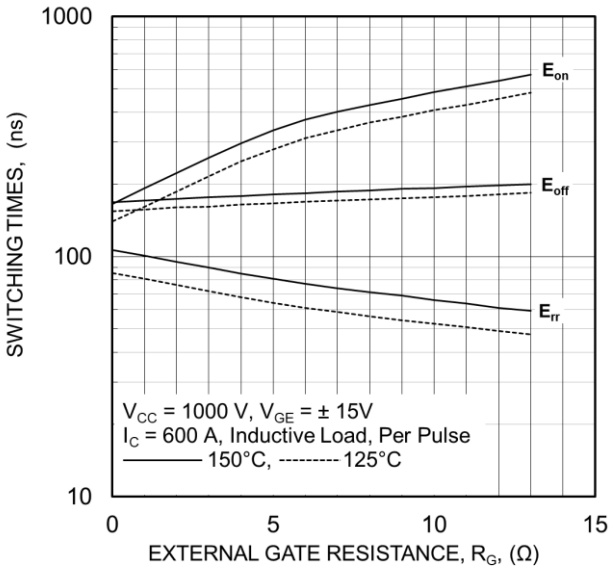


QIS1760002
Single IGBT Module
600 Amperes/1700 Volts

SWITCHING CHARACTERISTICS (TYPICAL)



SWITCHING CHARACTERISTICS (TYPICAL)



GATE CHARGE VS. V_{GE} (TYPICAL)