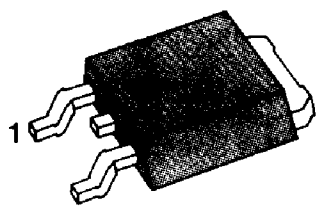
SGW13N60UFD

IGBT CO-PAK

FEATURES

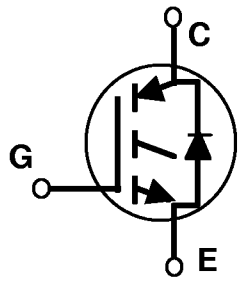
* High Speed Switching
* Low Saturation Volatge
  : V_{CE}(sat) = 2.2 V (at Ic=6.5A)
* High Input Impedance
* CO-PAK, IGBT with FRD
  : Trr = 37nS (Typ)

D²-PAK



APPLICATIONS

* AC & DC Motor controls
* General Purpose Inverters
* Robotics , Servo Controls
* Power Supply
* Lamp Ballast



ABSOLUTE MAXIMUM RATINGS

Symbol	Characteristics		Rating	Unit
V_{CES}	Collector-Emitter Voltage		600	V
V_{GE}	Gate - Emitter Voltage		±20	V
I_C	Continuous Collector Current	Tc = 25°C	13	A
		Tc = 100°C	6.5	
$I_{CM\ (1)}$	Pulsed Collector Current		52	A
I_F	Diode Continuous Forward Current	Tc = 100°C	8	A
I_{FM}	Diode Maximum Forward Current		56	
P_D	Maximum Power Dissipation	Tc = 25°C	60	W
		Tc = 100°C	24	
Tj	Operating Junction Temperature		-55 ~ 150	°C
Tstg	Storage Temperature Range			
T_L	Maximum Lead Temp. For Soldering Purposes, 1/8" from case for 5 seconds		300	°C

Notes: (1) Repeatitive rating : Pulse width limited by max. junction temperature

ELECTRICAL CHARACTERISTICS (IGBT PART)

(T_j=25°C,Unless Otherwise Specified)

Symbol	Characteristics	Test Conditions	Min	Typ	Max	Units
BV_{CES}	C - E Breakdown Voltage	V_{GE} = 0V , I_C = 250μA	600			V
$\Delta V_{CES}/\Delta T_J$	Temperature Coeff. of Breakdown Voltage	V_{GE} = 0V , I_C = 1mA		0.6		V/°C
$V_{GE(th)}$	G - E threshold voltage	I_C =250μA , V_{CE} = V_{GE}	3.5	5.5	7.5	V
I_{CES}	Collector cutoff Current	V_{CE} = V_{CES} , V_{GE} = 0V			250	μA
I_{GES}	G - E leakage Current	V_{GE} = V_{GES} , V_{CE} = 0V			100	nA
V_{CE}(sat)	Collector to Emitter saturation voltage	V_{GE} = 15V, Ic=6.5A V_{GE} = 15V, Ic=13A		2.2 2.8	3.0	V
Cies	Input capacitance	V_{GE} = 0V , f = 1MHz V_{CE} = 30V		350		pF
Coes	Output capacitance			35		pF
Cres	Reverse transfer capacitance			12		pF
ton	Turn on time	V_{CC} = 480V , I_C = 6.5A V_{GE} = 15V R_G = 50Ω Inductive Load		17		ns
tr	Turn on rise time			20		ns
toff	Turn off time			70	95	ns
tf	Turn off fall time			120	280	ns
Eon	Turn on Switching Loss			0.14		mJ
Eoff	Turn off Switching Loss			0.24		mJ
Ets	Total Switching Loss			0.38	0.6	mJ
Qg	Total Gate Charge	Vcc = 480V V_{GE} = 15V Ic = 6.5A		19	26	nC
Qge	Gate-Emitter Charge			6	8.8	nC
Qgc	Gate-Collector Chaege			7.3	11.5	nC
Le	Internal Emitter Inductance	Measured 5mm from PKG		7.5		nH

ELECTRICAL CHARACTERISTICS (DIODE PART)

(T_j=25°C,Unless Otherwise Specified)

Symbol	Characteristics	Test Conditions		Min	Typ	Max	Units
V_{FM}	Diode Forward Voltage	I_F=8.0A			1.4	1.7	V
		I_F=8.0A , Tj=150°C			1.3	1.6	
Trr	Diode Reverse Recovery Time	I_F=8.0A, V_R=200V di/dt=200A/uS	Tj =25°C		37	55	nS
			Tj =125°C		55	90	
Irr	Diode Peak Reverse Recovery Current		Tj =25°C		3.5	5.0	A
			Tj =125°C		4.5	8.0	
Qrr	Diode Reverse Recovery Charge		Tj =25°C		65	138	nC
			Tj =125°C		124	360	

THERMAL RESISTANCE

Symbol	Characteristics	Min	Typ	Max	Units
$R_{\theta}JC$	Junction-to-Case(IGBT)			2.0	°C/W
$R_{\theta}JC$	Junction-to-Case(DIODE)			3.5	°C/W
$R_{\theta}JA$	Junction-to-Ambient, (PCB Mount)			40	°C/W
$R_{\theta}JA$	Junction-to-Ambient, Typical socket mount			80	°C/W

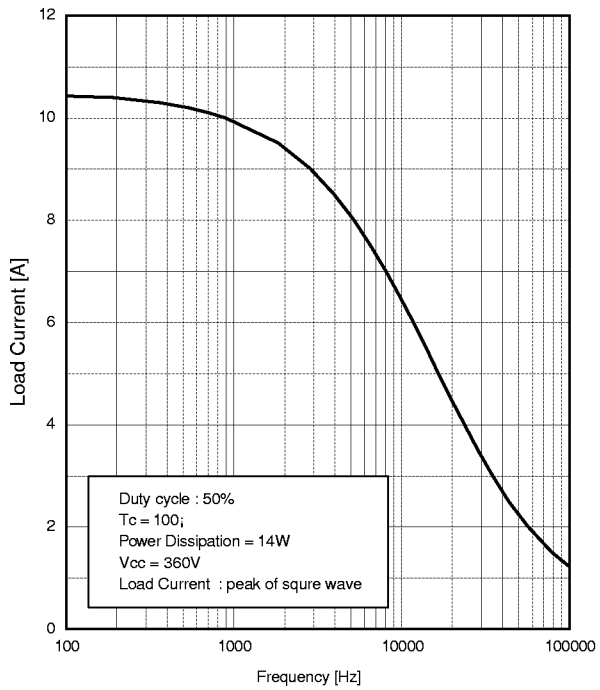


Fig.1 Typical Load Current vs. Frequency

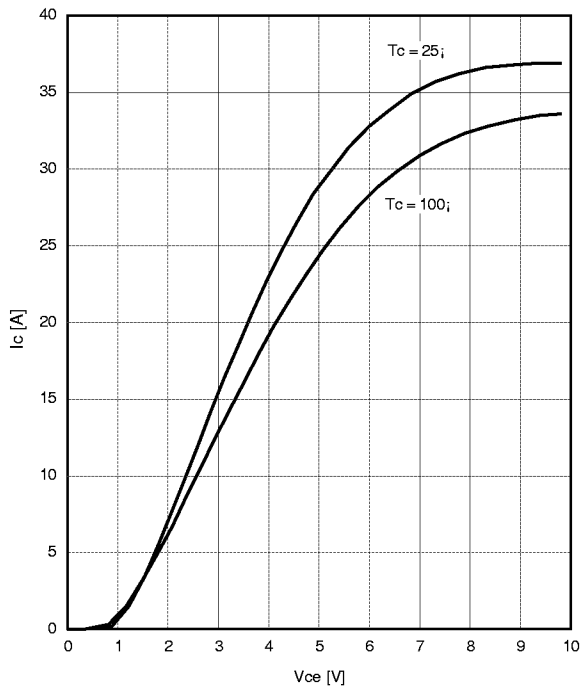


Fig.2 Typical Output Characteristics

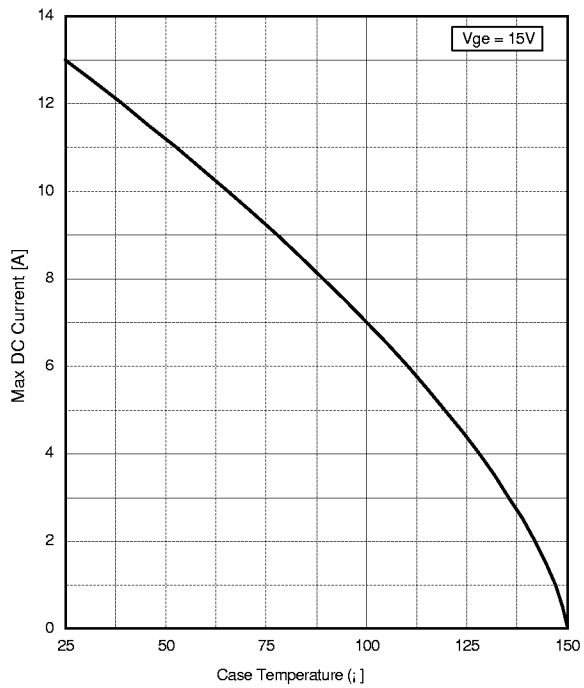


Fig.3 Maximum Collector Current vs. Case Temperature

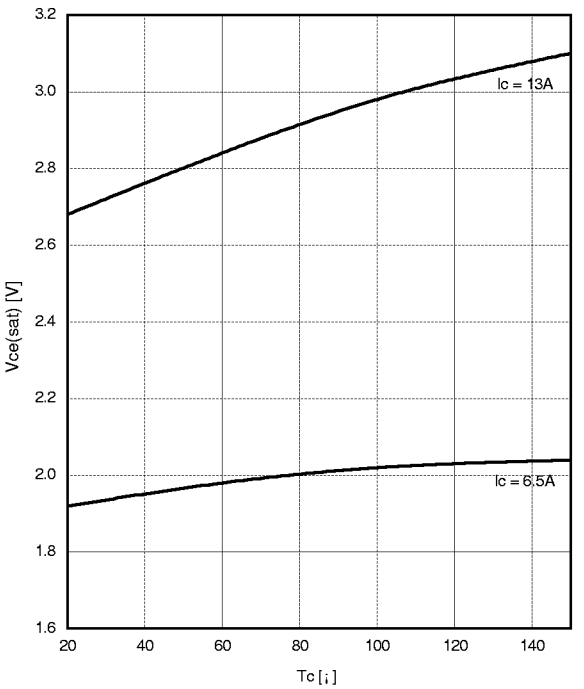


Fig.4 Collector to Emitter Voltage vs. Case Temperature

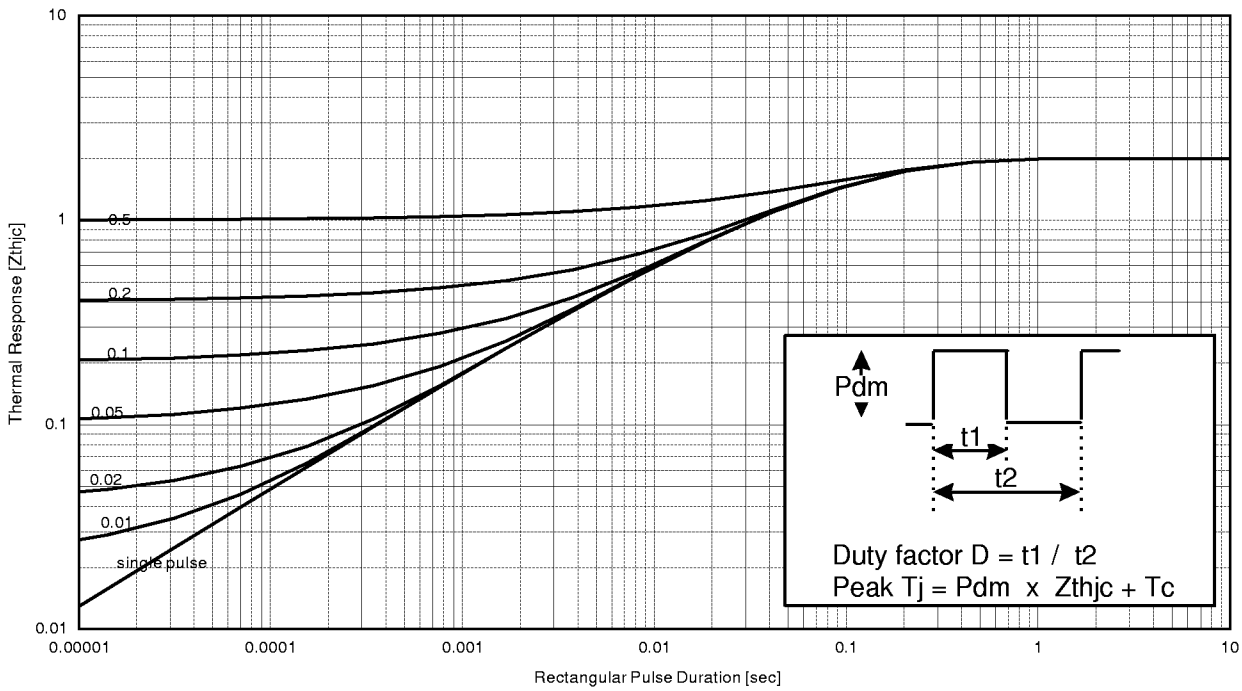


Fig.5 Maximum IGBT Effective Transient Thermal Impedance, Junction to Case

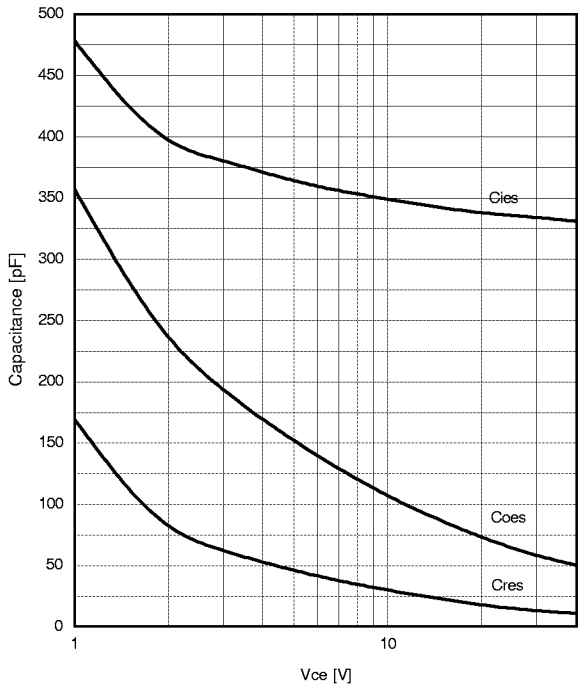


Fig.6 Typical Capacitance vs. Collector to Emitter Voltage

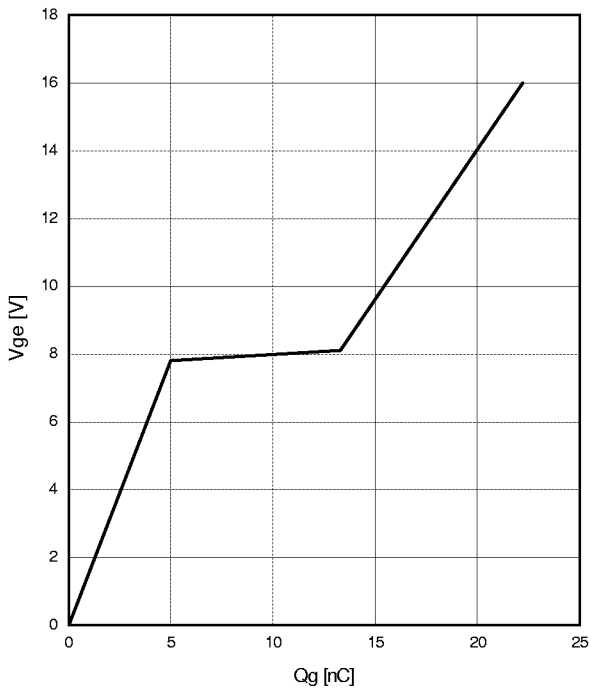


Fig.7 Typical Gate Charge vs. Gate to Emitter Voltage

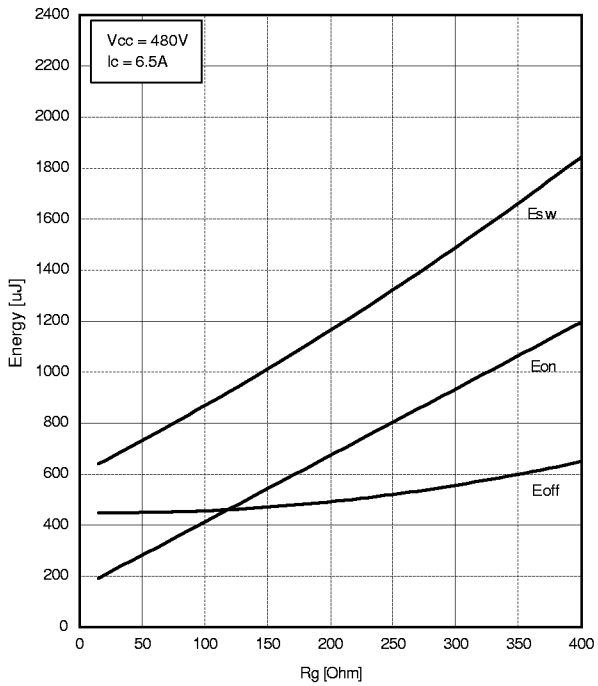


Fig.8 Typical Switching Loss vs. Gate Resistance

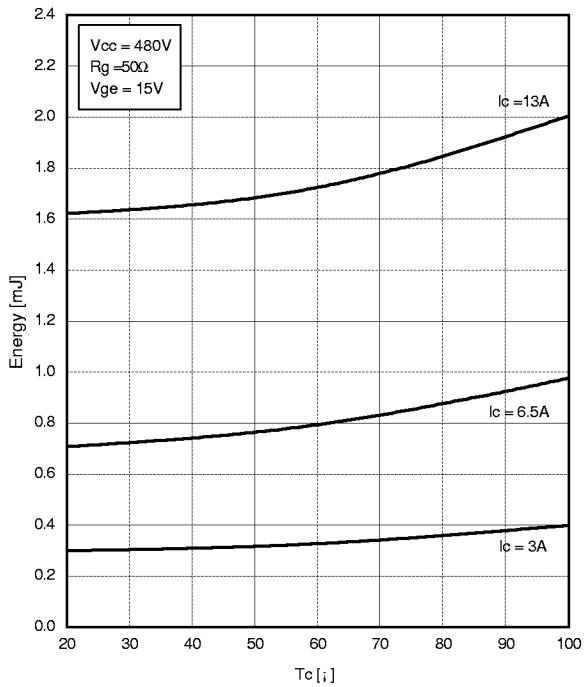


Fig.9 Typical Switching Loss vs. Case Temperature

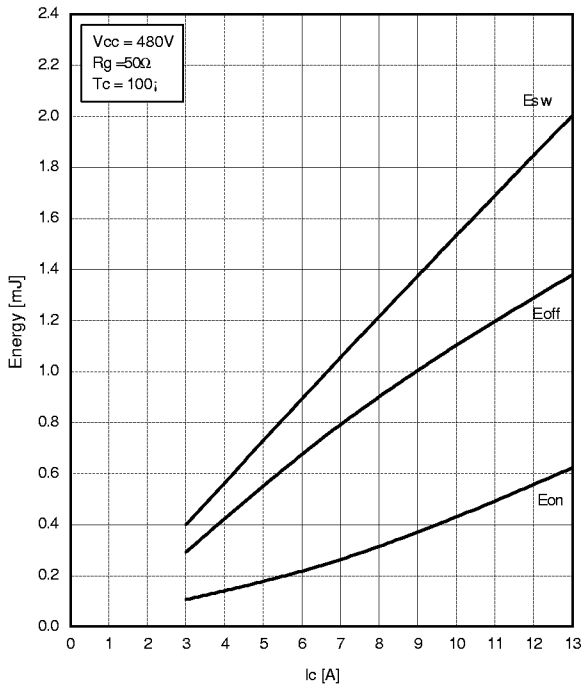


Fig.10 Typical Switching loss vs. Collector to Emitter Current

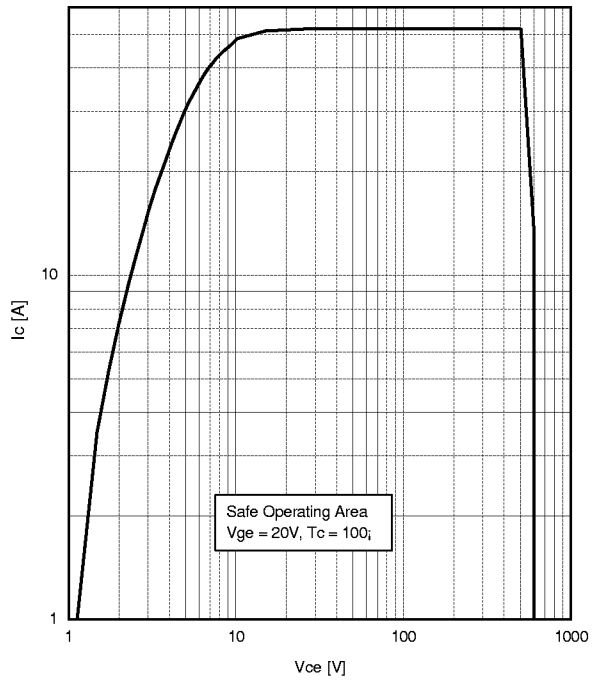


Fig.11 Turn-off SOA

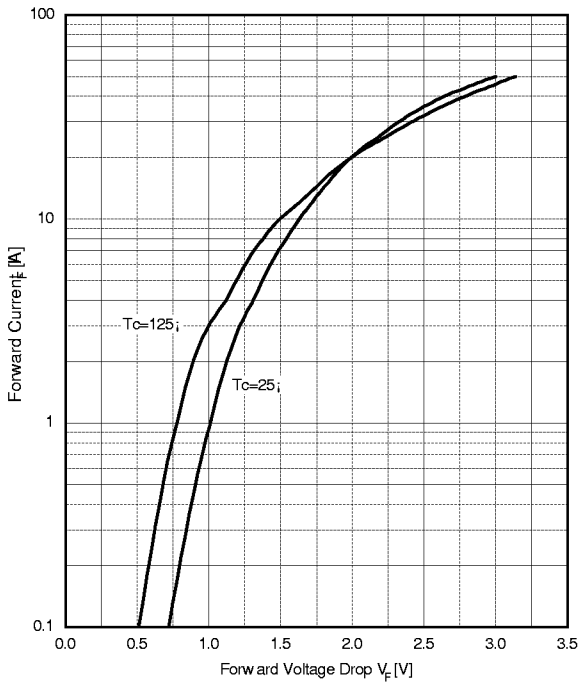


Fig.12 Typical Forward Voltage Drop vs. Forward Current

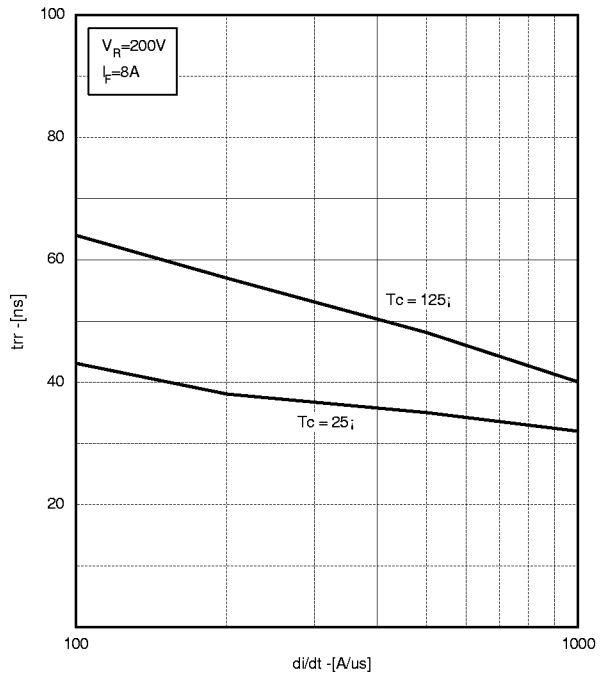


Fig.13 Typical Reverse Recovery Time vs. di/dt

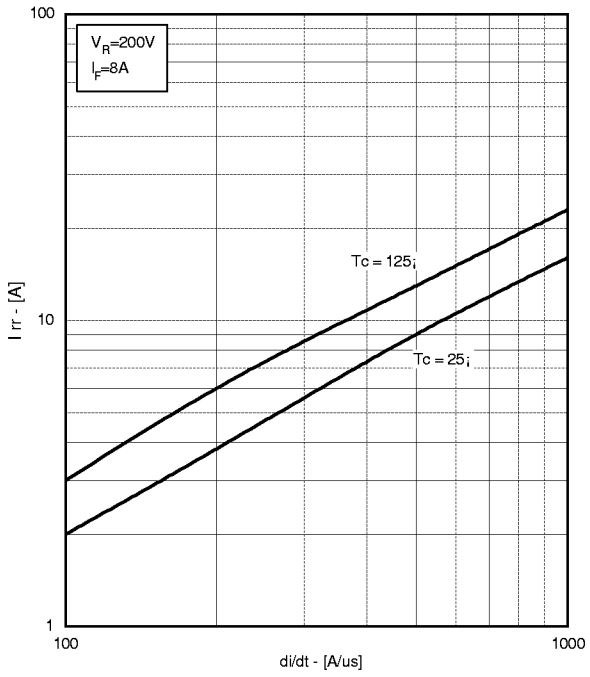


Fig.14 Typical Reverse Recovery Current vs. di/dt

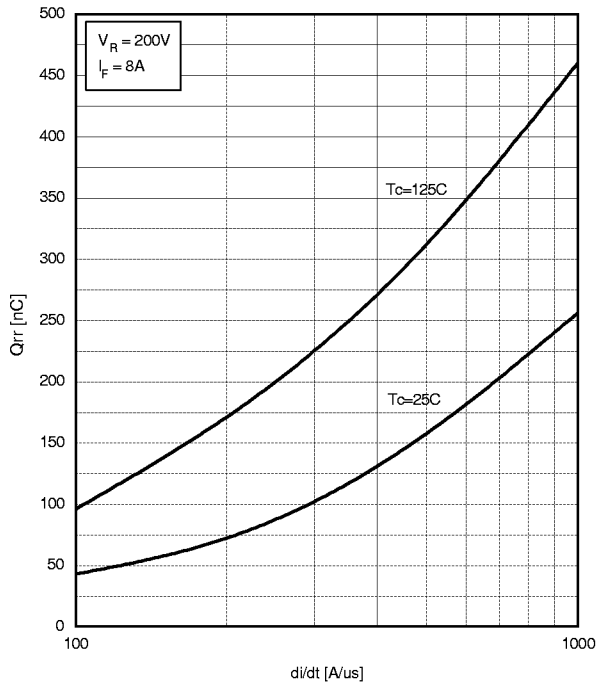


Fig.15 Typical Stored Charge vs. di/dt