

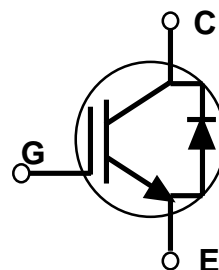
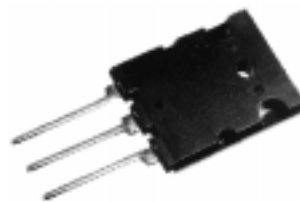
## FEATURES

- \* Short Circuit rated 10uS @Tc=100°C
- \* High Speed Switching
- \* Low Saturation Voltage  
:  $V_{CE(sat)} = 2.0\text{ V @ } I_C=20\text{A}$
- \* High Input Impedance
- \* CO-PAK, IGBT with FRD  
:  $T_{rr} = 50\text{nS (Typ)}$

## APPLICATIONS

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

TO-264



## ABSOLUTE MAXIMUM RATINGS

Symbol	Characteristics	Rating	Units
$V_{CES}$	Collector-Emitter Voltage	600	V
$V_{GES}$	Gate-Emitter Voltage	$\pm 20$	V
$I_C$	Collector Current @ $T_c = 25^\circ\text{C}$	32	A
	Collector Current @ $T_c = 100^\circ\text{C}$	20	A
$I_{CM(1)}$	Pulsed Collector Current	60	A
$I_F$	Diode Continuous Forward Current @ $T_c = 100^\circ\text{C}$	25	A
$I_{FM}$	Diode Maximum Forward Current	220	A
$P_D$	Maximum Power Dissipation @ $T_c = 25^\circ\text{C}$	190	W
	Maximum Power Dissipation @ $T_c = 100^\circ\text{C}$	75	W
$T_{sc}$	Short Circuit Withstand Time	10	uS
$T_j$	Operating Junction Temperature	-55 ~ 150	°C
$T_{stg}$	Storage Temperature Range	-55 ~ 150	°C
$T_L$	Maximum Lead Temp. For Soldering	300	°C
	Purposes, 1/8" from case for 5 seconds		

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

## ELECTRICAL CHARACTERISTICS (IGBT PART)

(T<sub>c</sub>=25°C, Unless Otherwise Specified)

Symbol	Characteristics	Test Conditions	Min	Typ	Max	Units
BV <sub>CES</sub>	C - E Breakdown Voltage	V <sub>GE</sub> = 0V , I <sub>C</sub> = 250uA	600	-	-	V
ΔV <sub>CES</sub> / ΔT <sub>J</sub>	Temperature Coeff. of Breakdown Voltage	V <sub>GE</sub> = 0V , I <sub>C</sub> = 1mA	-	0.6	-	V/°C
V <sub>GE(th)</sub>	G - E threshold voltage	I <sub>C</sub> = 20mA , V <sub>CE</sub> = V <sub>GE</sub>	5.0	6.0	8.0	V
I <sub>CES</sub>	Collector cutoff Current	V <sub>CE</sub> = V <sub>CES</sub> , V <sub>GE</sub> = 0V	-	-	250	uA
I <sub>GES</sub>	G - E leakage Current	V <sub>GE</sub> = V <sub>GES</sub> , V <sub>CE</sub> = 0V	-	-	100	nA
V <sub>CE(sat)</sub>	Collector to Emitter saturation voltage	I <sub>C</sub> = 20A, V <sub>GE</sub> = 15V	-	2.0	2.7	V
		I <sub>C</sub> = 32A, V <sub>GE</sub> = 15V	-	2.4	-	V
C <sub>ies</sub>	Input capacitance	V <sub>GE</sub> = 0V , f = 1MHz V <sub>CE</sub> = 30V	-	1260	-	pF
C <sub>oes</sub>	Output capacitance		-	266	-	pF
C <sub>res</sub>	Reverse transfer capacitance		-	45	-	pF
t <sub>d(on)</sub>	Turn on delay time	V <sub>CC</sub> = 300V , I <sub>C</sub> = 20A V <sub>GE</sub> = 15V R <sub>G</sub> = 10Ω Inductive Load	-	18	-	nS
t <sub>r</sub>	Turn on rise time		-	22	-	nS
t <sub>d(off)</sub>	Turn off delay time		-	65	95	nS
t <sub>f</sub>	Turn off fall time		-	84	168	nS
E <sub>on</sub>	Turn on Switching Loss		-	0.1	-	mJ
E <sub>off</sub>	Turn off Switching Loss		-	0.5	-	mJ
E <sub>ts</sub>	Total Switching Loss		-	0.6	1.1	mJ
T <sub>sc</sub>	Short Circuit withstand Time	V <sub>CC</sub> = 300V, V <sub>GE</sub> = 15V @T <sub>c</sub> = 100°C	10	-	-	uS
Q <sub>g</sub>	Total Gate Charge	V <sub>CC</sub> = 300V V <sub>GE</sub> = 15V I <sub>C</sub> = 20A	-	83	124	nC
Q <sub>ge</sub>	Gate-Emitter Charge		-	20	30	nC
Q <sub>gc</sub>	Gate-Collector Charge		-	32	48	nC

**ELECTRICAL CHARACTERISTICS (DIODE PART)**(T<sub>c</sub>=25°C, Unless Otherwise Specified)

Symbol	Characteristics	Test Conditions		Min	Typ	Max	Units
VFM	Diode Forward Voltage	IF=25A	Tc =25°C	-	1.4	1.7	V
			Tc =100°C	-	1.3	-	
Trr	Diode Reverse Recovery Time	IF=25A, VR=200V  -di/dt=200A/uS	Tc =25°C	-	50	75	nS
			Tc =100°C	-	105	-	
Irr	Diode Peak Reverse Recovery Current		Tc =25°C	-	4.5	10	A
			Tc =100°C	-	8.5	-	
Qrr	Diode Reverse Recovery Charge		Tc =25°C	-	112	375	nC
			Tc =100°C	-	420	-	

**THERMAL RESISTANCE**

Symbol	Characteristics	Min	Typ	Max	Units
R <sub>θJC</sub>	Junction-to-Case (IGBT)	-	-	0.64	°C/W
R <sub>θJC</sub>	Junction-to-Case (DIODE)	-	-	0.83	°C/W
R <sub>θJA</sub>	Junction-to-Ambient	-	-	25	°C/W
R <sub>θCS</sub>	Case-to-Sink	-	0.2	-	°C/W

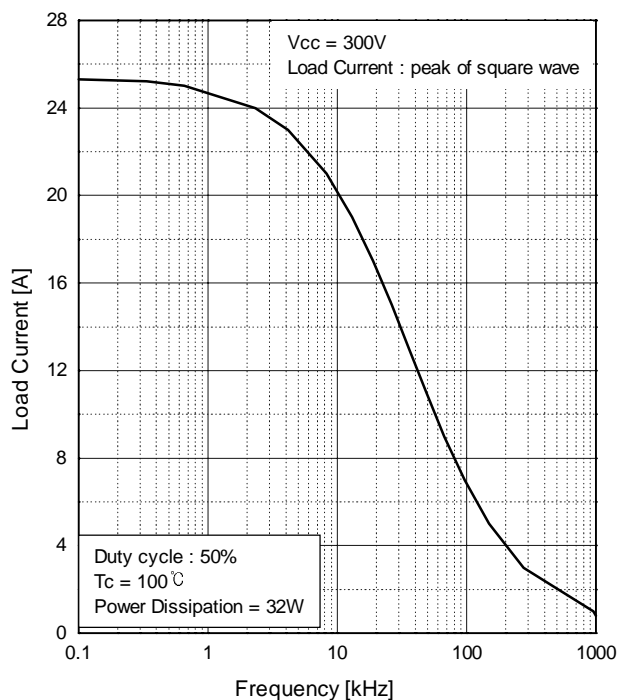


Fig.1 Typical Load Current vs. Frequency

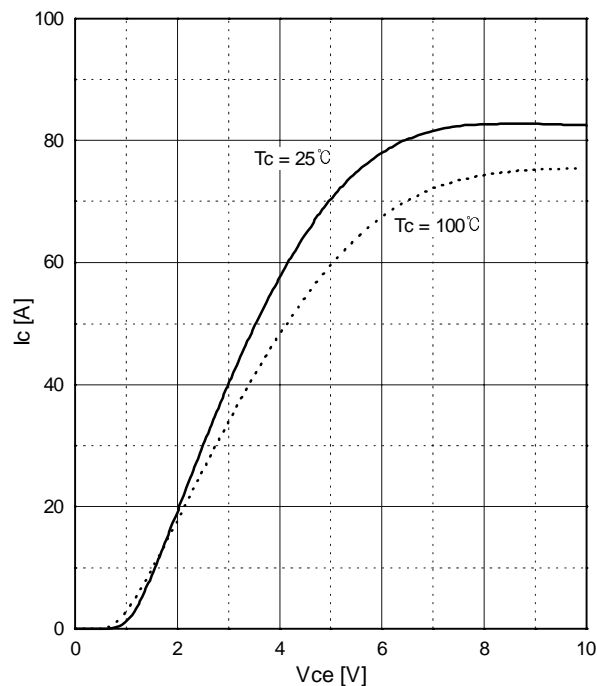


Fig.2 Typical Output Characteristics

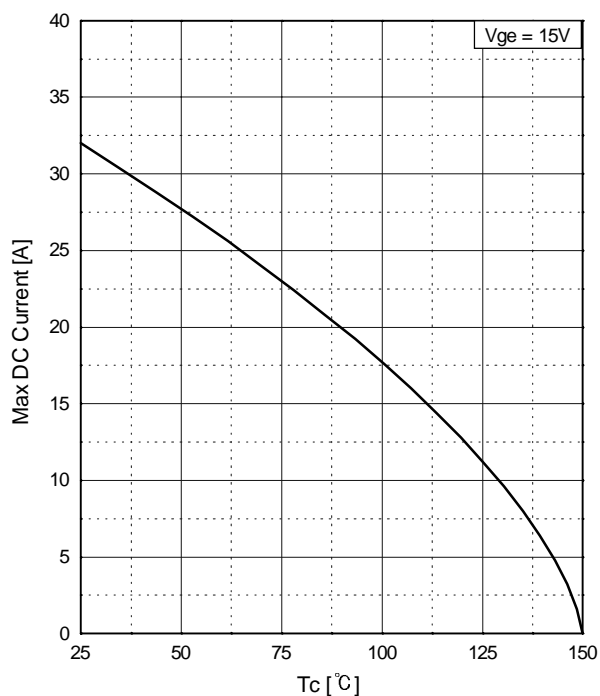


Fig.3 Maximum Collector Current vs. Case Temperature

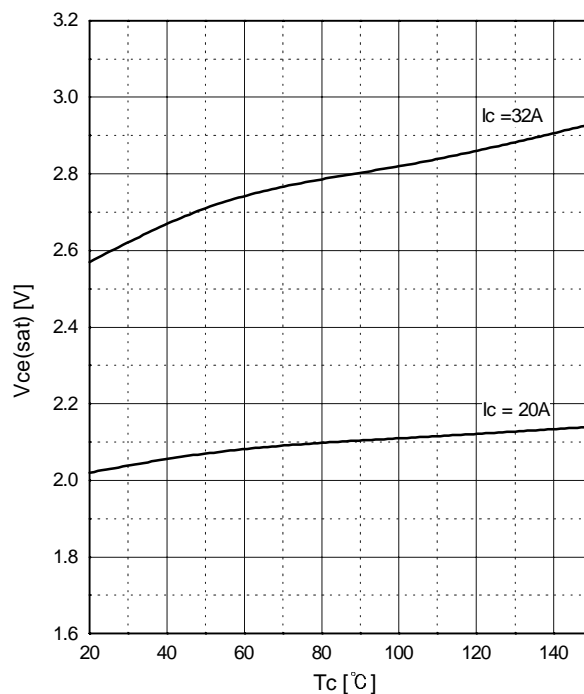


Fig.4 Collector to Emitter Voltage vs. Case Temperature

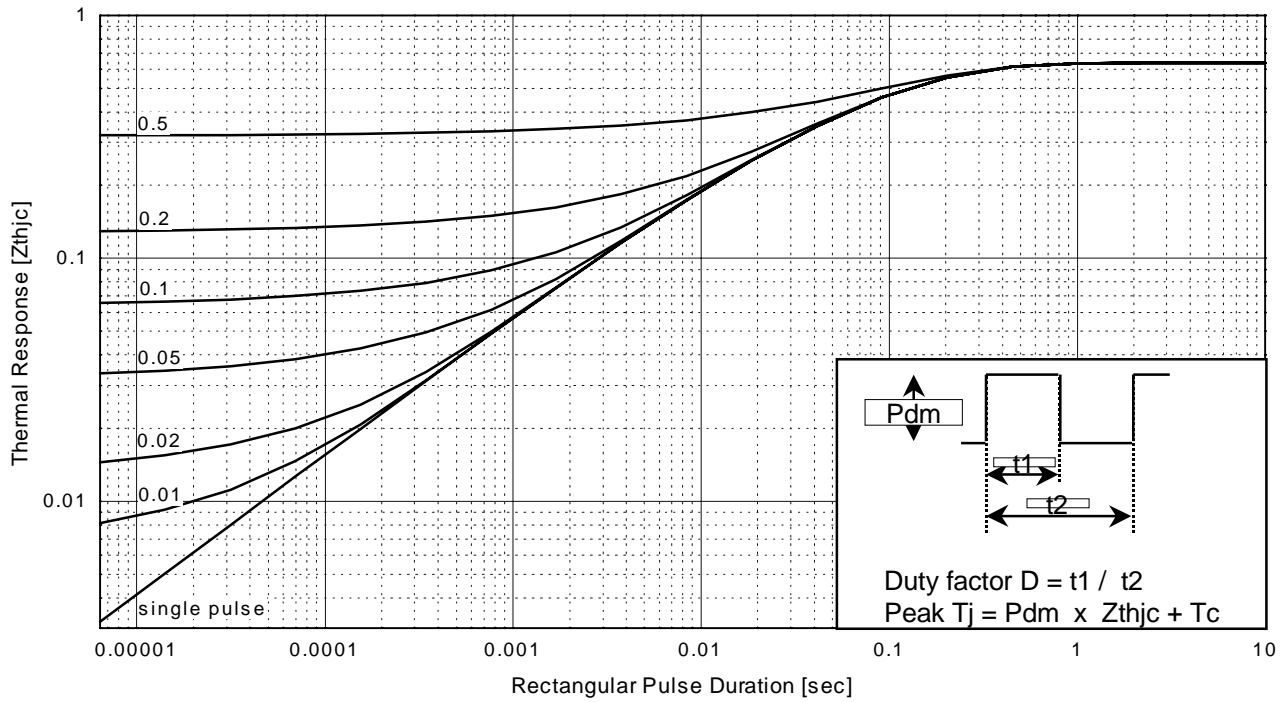


Fig.5 Maximum Effective Transient Thermal Impedance, Junction to Case

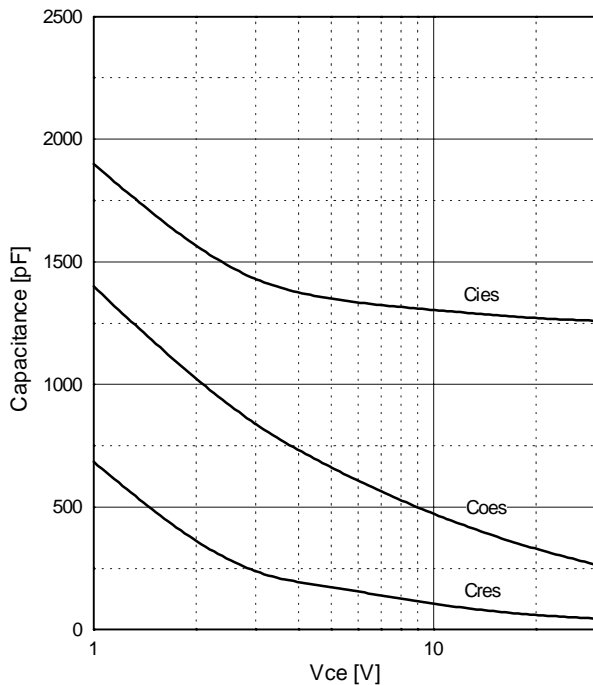


Fig.6 Typical Capacitance vs. Collector to Emitter Voltage

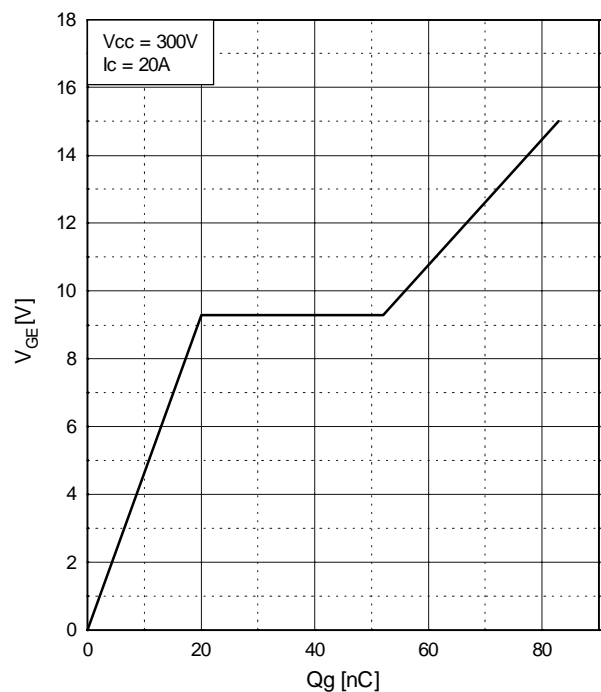


Fig.7 Typical Gate Charge vs. Gate to Emitter Voltage

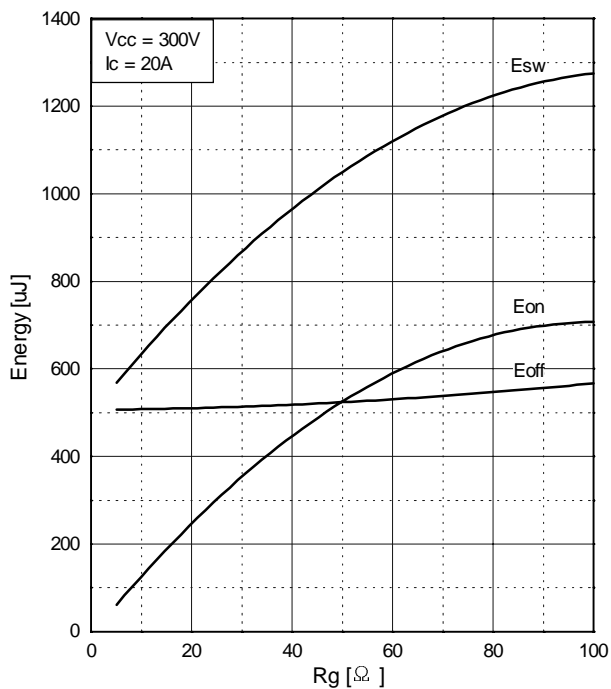


Fig.8 Typical Switching Loss vs. Gate Resistance

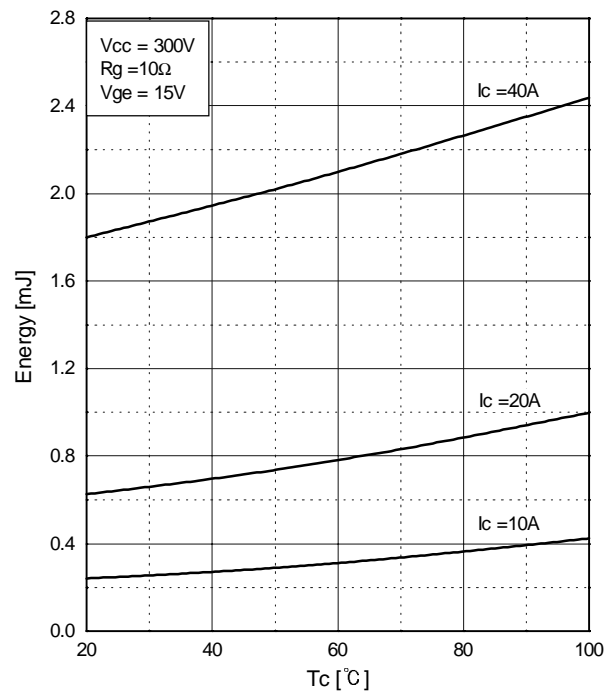


Fig.9 Typical Switching Loss vs. Case Temperature

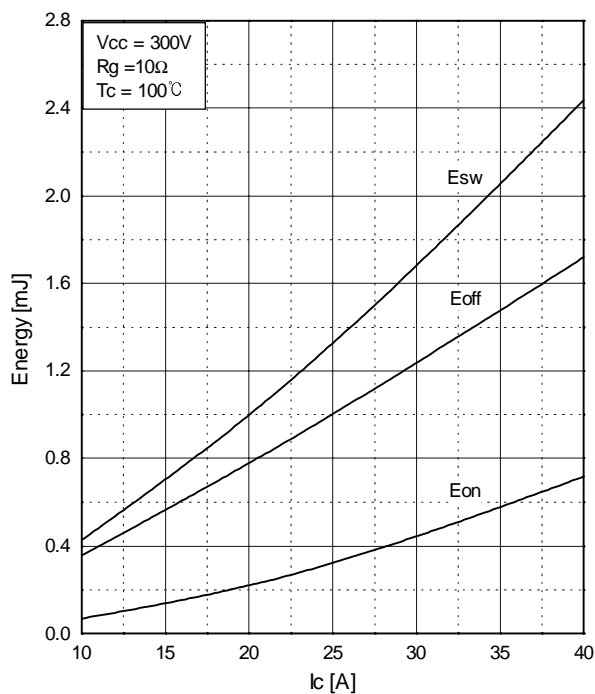


Fig.10 Typical Switching loss vs. Collector to Emitter Current

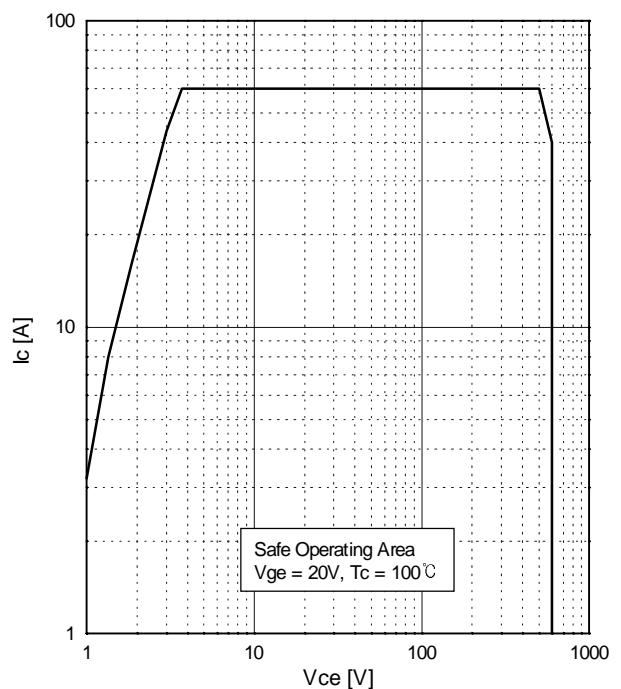


Fig.11 Turn-off SOA

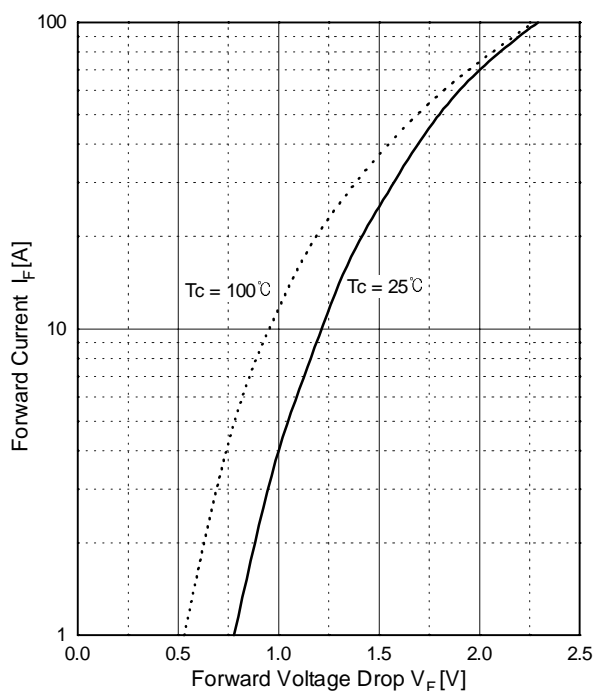


Fig.12 Typical Forward Voltage Drop vs. Forward Current

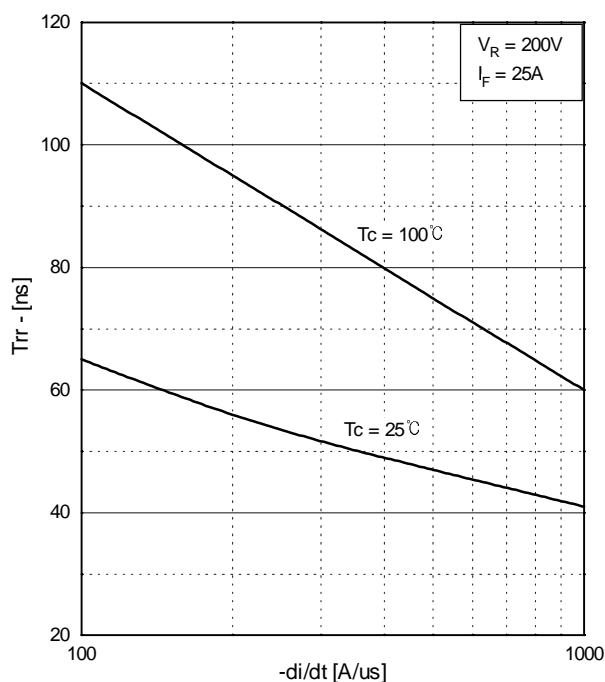


Fig.13 Typical Reverse Recovery Time vs.  $di/dt$

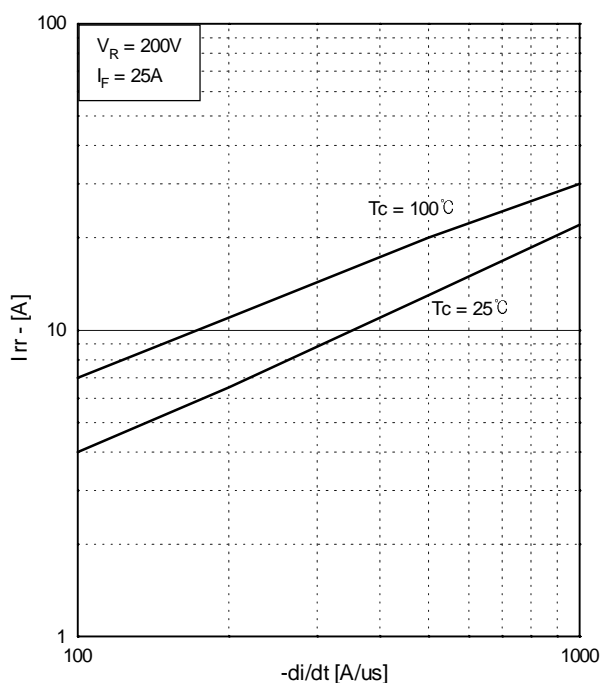


Fig.14 Typical Reverse Recovery Current vs.  $di/dt$

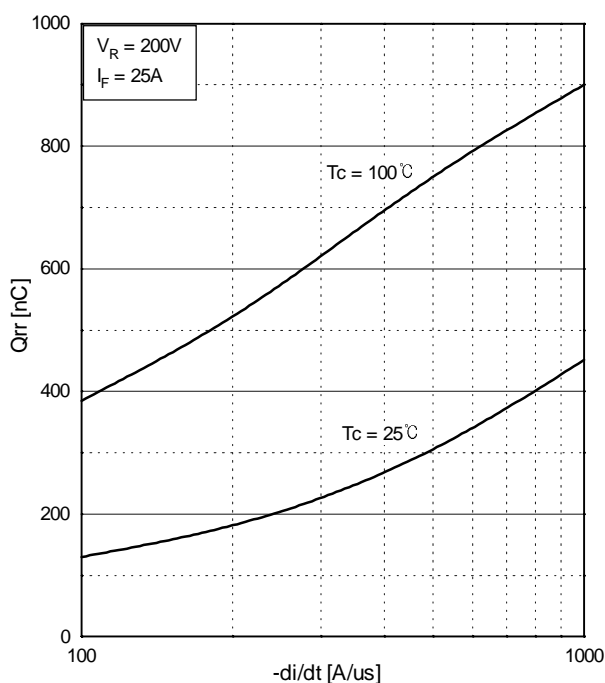


Fig.15 Typical Stored Charge vs.  $di/dt$

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