

Polar™ High Speed IGBT w/ Diode

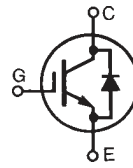
IXGQ85N33PCD1

$$V_{CES} = 330V$$

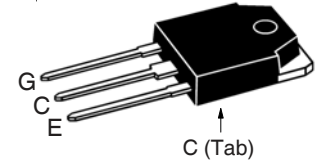
$$I_{CP} = 340A$$

$$V_{CE(sat)} \leq 2.10V$$

Anti-Parallel Diode for PDP Sustain Circuit



TO-3P (IXGQ)



G = Gate C = Collector
E = Emitter Tab = Collector

Symbol	Test Conditions	Maximum Ratings	
V_{CES}	$T_J = 25^\circ\text{C}$ to 150°C	330	V
V_{GES}	Continuous	± 20	V
V_{GEM}	Transient	± 30	V
I_{C25}	$T_C = 25^\circ\text{C}$	85	A
I_{DP}	$T_J \leq 150^\circ\text{C}$, $t_p \leq 10\mu\text{s}$	40	A
I_{CP}	$T_J \leq 150^\circ\text{C}$, $t_p \leq 1\mu\text{s}$, $D \leq 1\%$	340	A
SSOA	$V_{GE} = 15\text{V}$, $T_{VJ} = 150^\circ\text{C}$, $R_G = 20\Omega$	$I_{CM} = 96$	A
(RBSOA)	Clamped Inductive Load	@ $V_{CE} \leq 300$	V
P_C	$T_C = 25^\circ\text{C}$	150	W
T_J		-55 ... +150	$^\circ\text{C}$
T_{JM}		150	$^\circ\text{C}$
T_{stg}		-55 ... +150	$^\circ\text{C}$
T_L	Maximum Lead Temperature for Soldering	300	$^\circ\text{C}$
T_{SOLD}	1.6 mm (0.062in.) from Case for 10s	260	$^\circ\text{C}$
M_d	Mounting Torque	1.13/10	Nm/lb.in
Weight		5.5	g

Features

- International standard package
- Low $V_{CE(sat)}$
 - for minimum on-state conduction losses
- Fast switching
- Anti-Parallel Diode

Advantages

- High Power Density
- Low Gate Drive Requirement

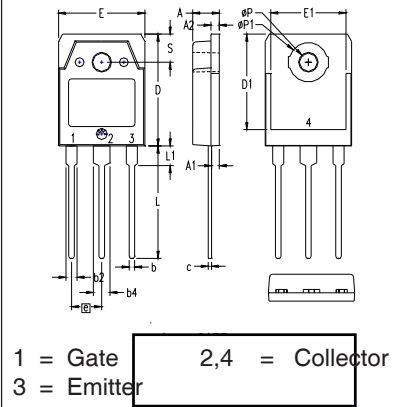
Applications

- PDP Screen Drivers

Symbol	Test Conditions ($T_J = 25^\circ\text{C}$, Unless Otherwise Specified)	Characteristic Values		
		Min.	Typ.	Max.
$V_{GE(th)}$	$I_C = 1\text{mA}$, $V_{CE} = V_{GE}$	3.0		6.0 V
I_{CES}	$V_{CE} = V_{CES}$, $V_{GE} = 0\text{V}$ $T_J = 125^\circ\text{C}$			1 μA 200 μA
I_{GES}	$V_{CE} = 0\text{V}$, $V_{GE} = \pm 20\text{V}$			± 100 nA
$V_{CE(sat)}$	$I_C = 50\text{A}$, $V_{GE} = 15\text{V}$, Note 1 $T_J = 25^\circ\text{C}$		1.43	2.10 V
	$I_C = 100\text{A}$		1.85	3.00 V
	$I_C = 50\text{A}$, $V_{GE} = 15\text{V}$, Note 1 $T_J = 125^\circ\text{C}$		1.47	V
	$I_C = 100\text{A}$		2.00	V

Symbol Test Conditions ($T_J = 25^\circ\text{C}$ Unless Otherwise Specified)		Characteristic Values		
		Min.	Typ.	Max.
g_{fs}	$I_C = 43\text{A}, V_{CE} = 10\text{V}$, Note 1	30	49	S
C_{ies}	$V_{CE} = 25\text{V}, V_{GE} = 0\text{V}, f = 1\text{MHz}$		2200	pF
C_{oes}			155	pF
C_{res}			25	pF
Q_g	$I_C = 43\text{A}, V_{GE} = 15\text{V}, V_{CE} = 0.5 \cdot V_{CES}$		80	nC
Q_{ge}			15	nC
Q_{gc}			23	nC
$t_{d(on)}$	Resistive load, $T_J = 25^\circ\text{C}$ $I_C = 50\text{A}, V_{GE} = 15\text{V}$ $V_{CE} = 240\text{V}, R_G = 5\Omega$		20	ns
t_r			43	ns
$t_{d(off)}$			87	ns
t_f			72	350 ns
t_f				
$t_{d(on)}$	Resistive load, $T_J = 125^\circ\text{C}$ $I_C = 50\text{A}, V_{GE} = 15\text{V}$ $V_{CE} = 240\text{V}, R_G = 5\Omega$		20	ns
t_r			95	ns
$t_{d(off)}$			88	ns
t_f			130	ns
t_f				
R_{thJC}			0.833	$^\circ\text{C/W}$
R_{thCS}		0.25		$^\circ\text{C/W}$

TO-3P Outline



1 = Gate
3 = Emitter
2, 4 = Collector

SYM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.185	.193	4.70	4.90
A1	.051	.059	1.30	1.50
A2	.057	.065	1.45	1.65
b	.035	.045	0.90	1.15
b2	.075	.087	1.90	2.20
b4	.114	.126	2.90	3.20
c	.022	.031	0.55	0.80
D1	.780	.799	19.80	20.30
E	.610	.622	15.50	15.80
E1	.531	.539	13.50	13.70
e	.215 BSC		5.45 BSC	
L	.779	.795	19.80	20.20
L1	.134	.142	3.40	3.60
phi P1	.126	.134	3.20	3.40
phi P1	.272	.280	6.90	7.10
S	.193	.201	4.90	5.10

Reverse Diode (FRED)

Symbol Test Conditions ($T_J = 25^\circ\text{C}$ Unless Otherwise Specified)		Characteristic Values		
		Min.	Typ.	Max.
V_F	$I_F = 30\text{A}, V_{GE} = 0\text{V}$, Note 1 $I_F = 60\text{A}$	$T_J = 25^\circ\text{C}$		1.40 V
	$I_F = 30\text{A}, V_{GE} = 0\text{V}$, Note 1 $I_F = 60\text{A}$	$T_J = 150^\circ\text{C}$		1.69 V
I_{RM}	$I_F = 30\text{A}, -di_F/dt = 200\text{A}/\mu\text{s}$ $V_R = 270\text{V}$	$T_J = 25^\circ\text{C}$	4.0	A
t_{rr}		$T_J = 125^\circ\text{C}$	8.5	A
		$T_J = 25^\circ\text{C}$	45	ns
		$T_J = 125^\circ\text{C}$	85	ns
R_{thJC}				0.95 $^\circ\text{C/W}$

Note: 1. Pulse test, $t \leq 300\mu\text{s}$, duty cycle, $d \leq 2\%$.

IXYS Reserves the Right to Change Limits, Test Conditions, and Dimensions.

IXYS MOSFETs and IGBTs are covered by one or more of the following U.S. patents:	4,835,592	4,931,844	5,049,961	5,237,481	6,162,665	6,404,065 B1	6,683,344	6,727,585	7,005,734 B2	7,157,338B2
	4,860,072	5,017,508	5,063,307	5,381,025	6,259,123 B1	6,534,343	6,710,405 B2	6,759,692	7,063,975 B2	
	4,881,106	5,034,796	5,187,117	5,486,715	6,306,728 B1	6,583,505	6,710,463	6,771,478 B2	7,071,537	

Fig. 1. Output Characteristics @ $T_J = 25^\circ\text{C}$

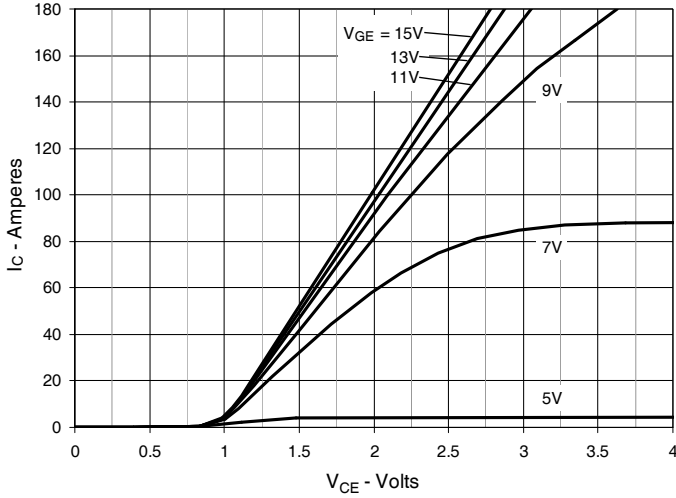


Fig. 2. Extended Output Characteristics @ $T_J = 25^\circ\text{C}$

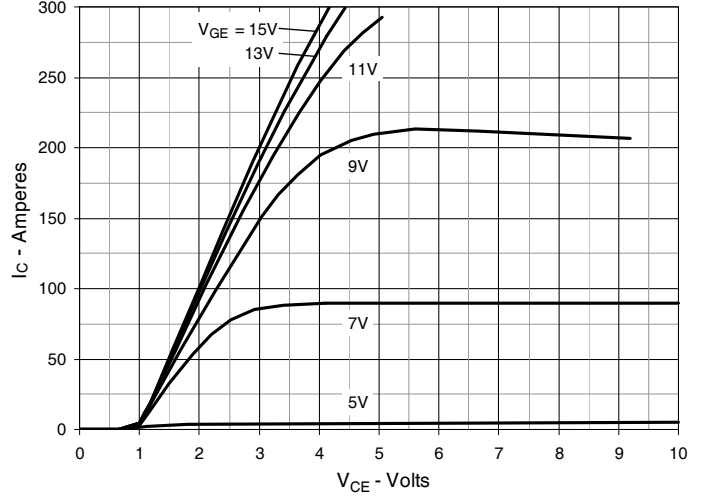


Fig. 3. Output Characteristics @ $T_J = 125^\circ\text{C}$

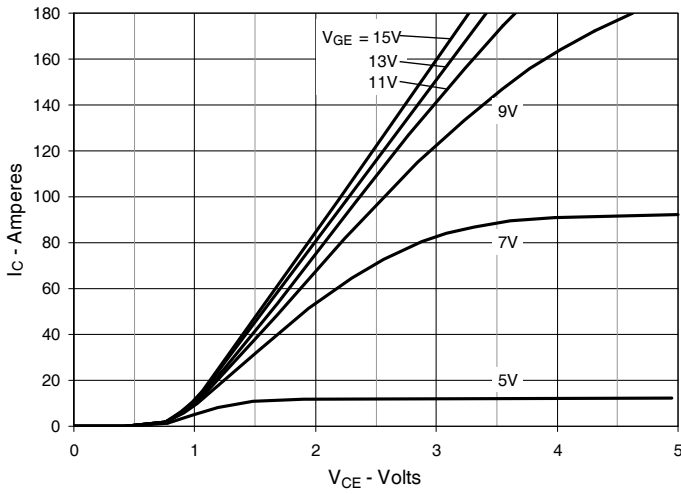


Fig. 4. Dependence of $V_{CE(sat)}$ on Junction Temperature

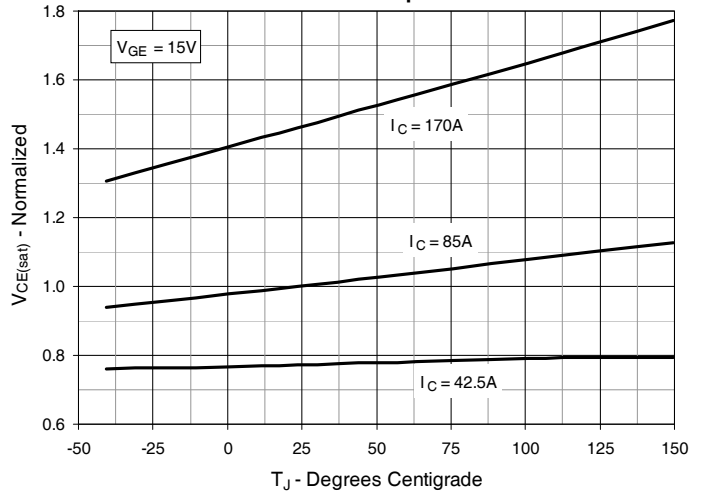


Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter Voltage

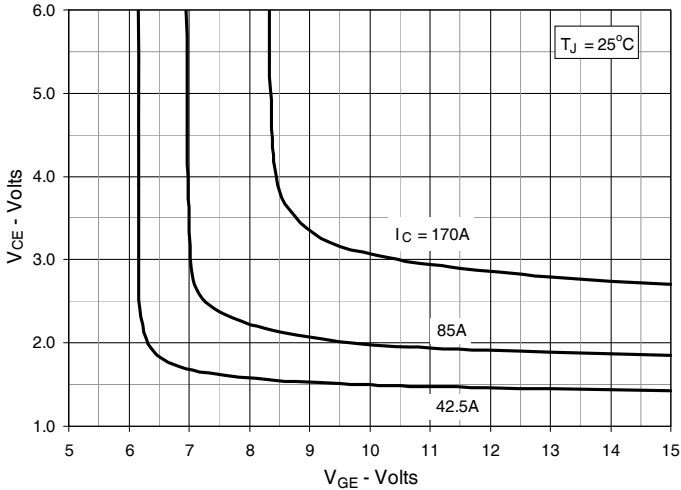


Fig. 6. Input Admittance

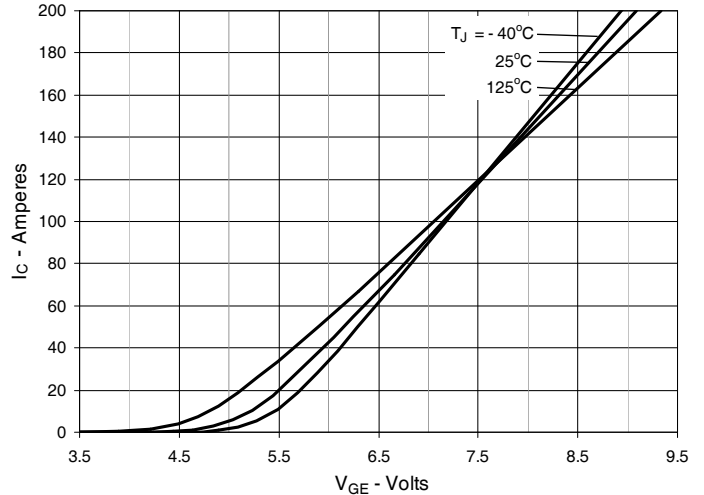


Fig. 7. Transconductance

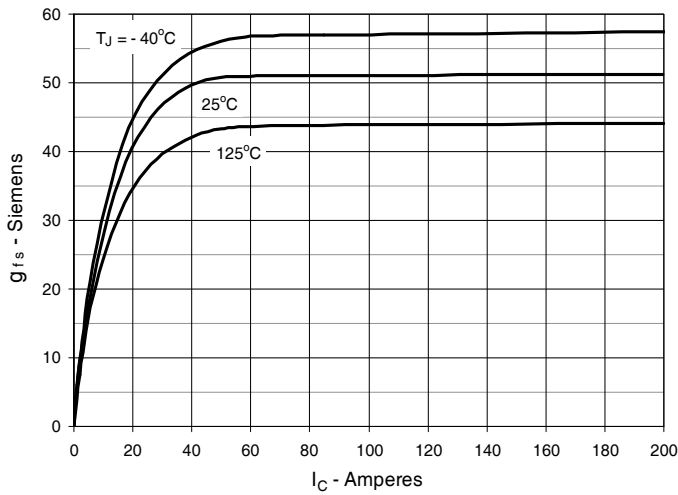


Fig. 8. Gate Charge

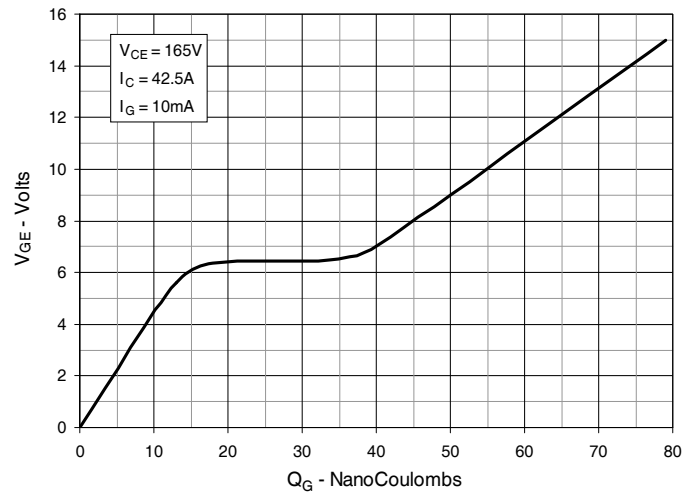


Fig. 9. Capacitance

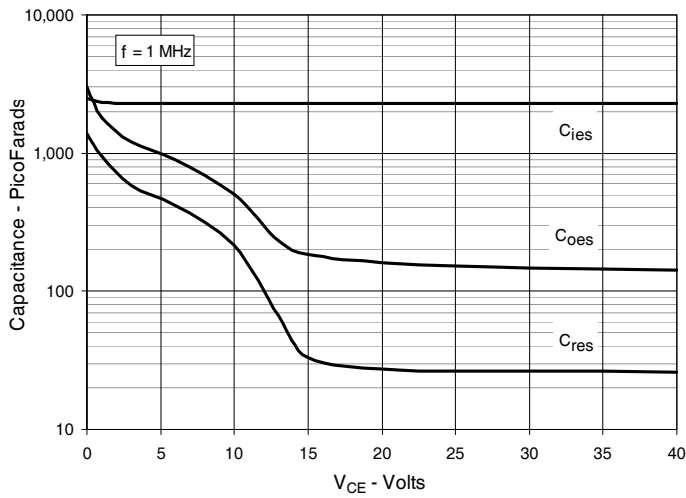


Fig. 10. Reverse-Bias Safe Operating Area

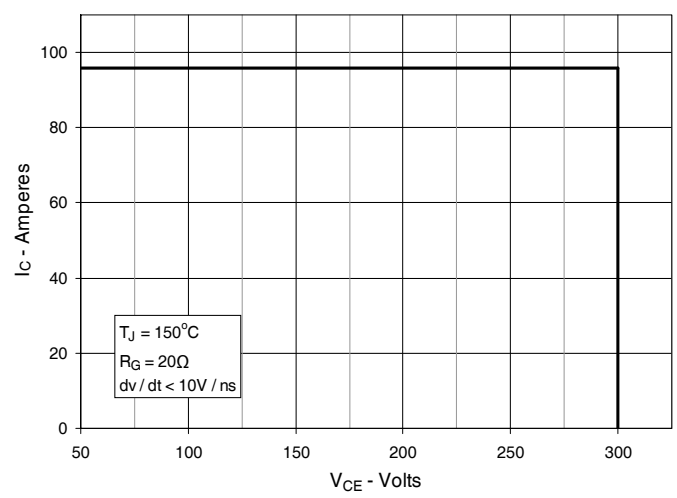


Fig. 11. Maximum Transient Thermal Impedance (IGBT)

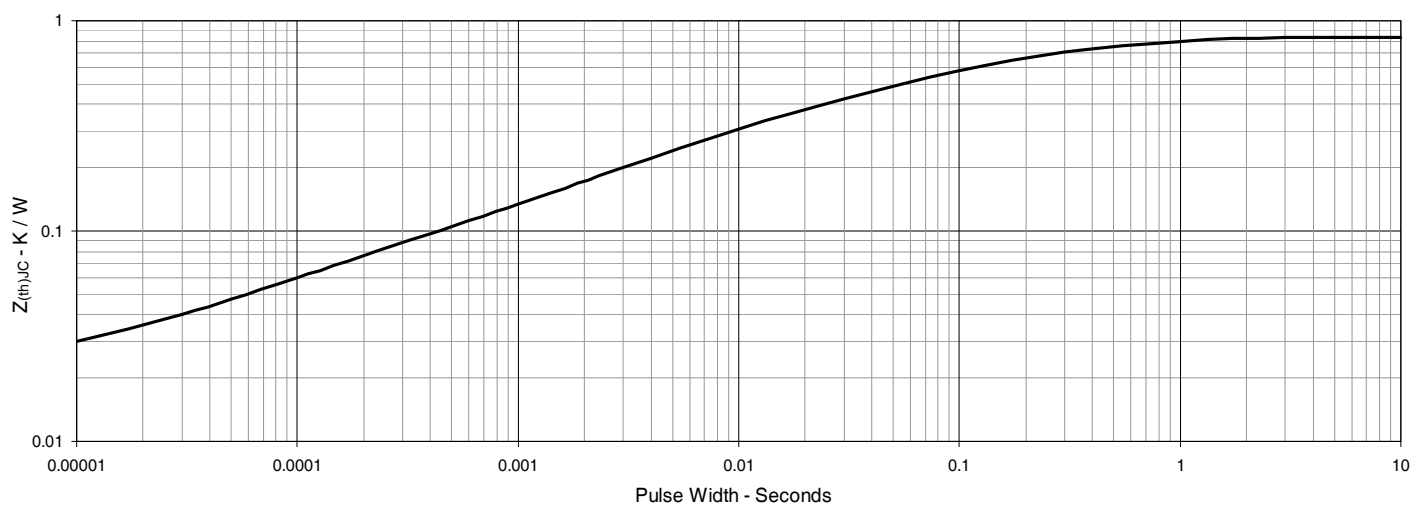


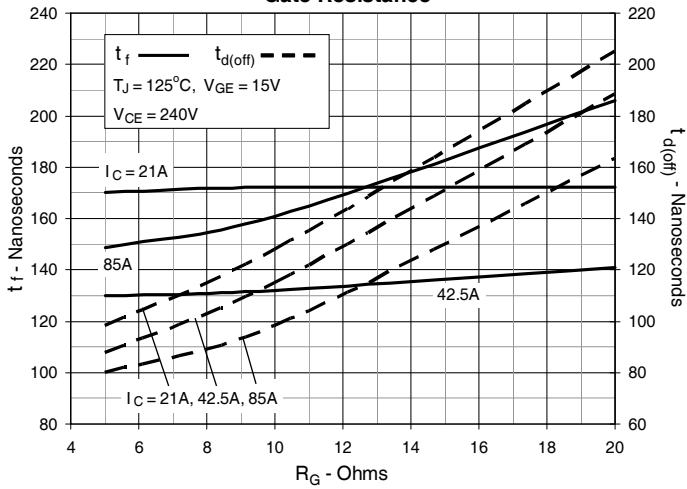
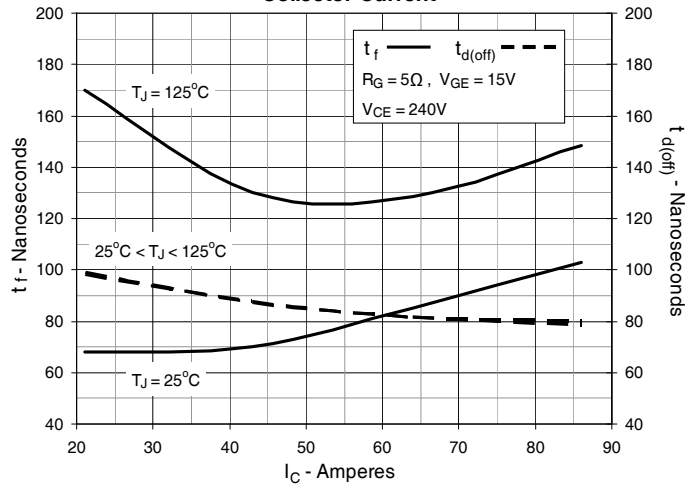
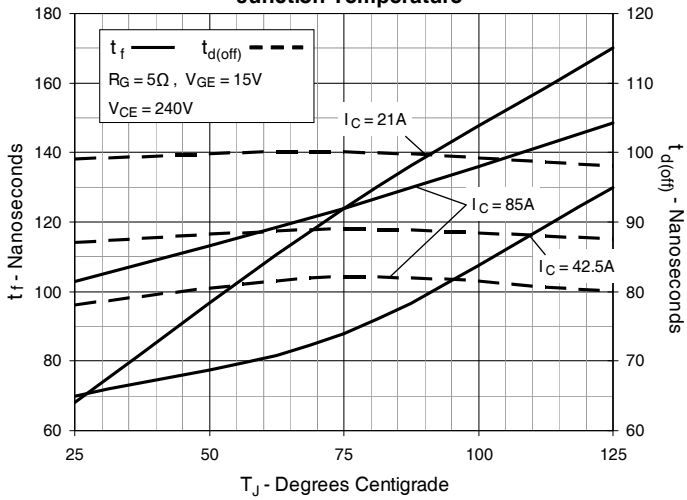
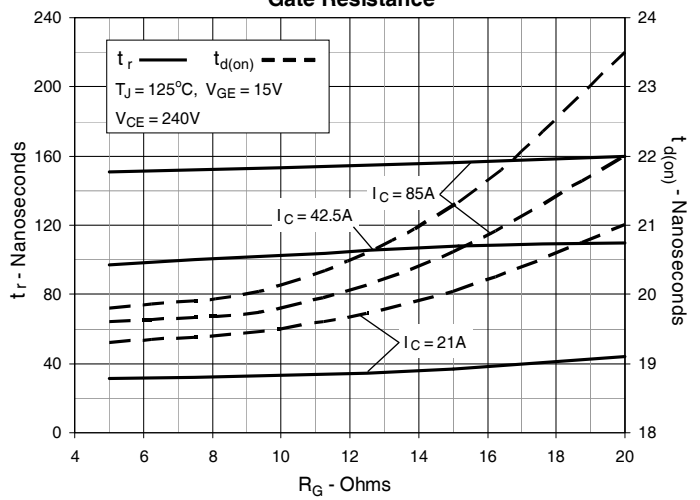
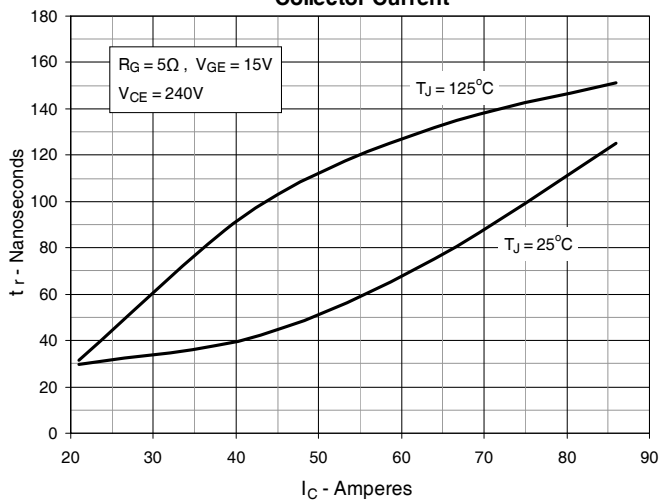
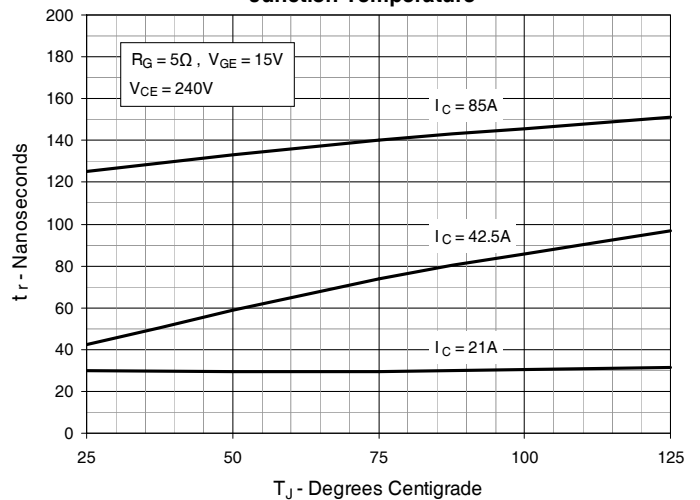
Fig. 12. Resistive Turn-off Switching Times vs. Gate Resistance

Fig. 13. Resistive Turn-off Switching Times vs. Collector Current

Fig. 14. Resistive Turn-off Switching Times vs. Junction Temperature

Fig. 15. Resistive Turn-on Switching Times vs. Gate Resistance

Fig. 16. Resistive Turn-on Rise Time vs. Collector Current

Fig. 17. Resistive Turn-on Rise Time vs. Junction Temperature


Fig. 18. Forward characteristics

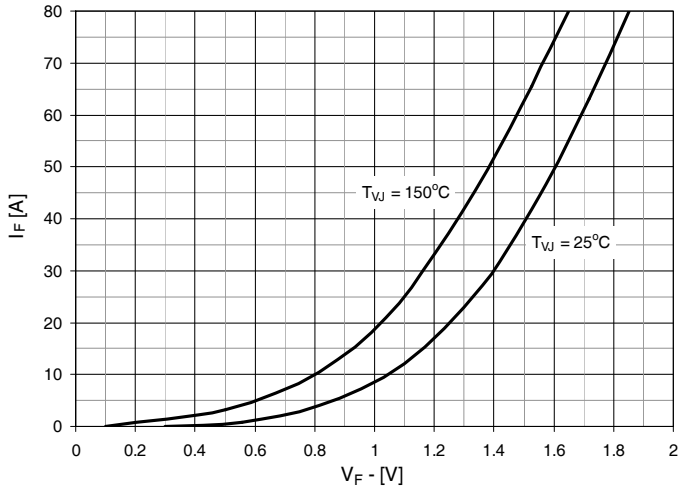


Fig. 19. Reverse Recovery Charge Q_{rr} vs. $-di_F/dt$

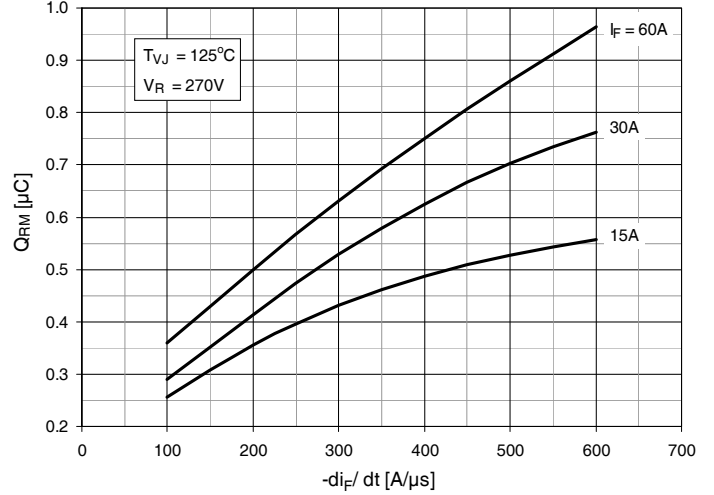


Fig. 20. Peak Reverse Current I_{RM} vs. $-di_F/dt$

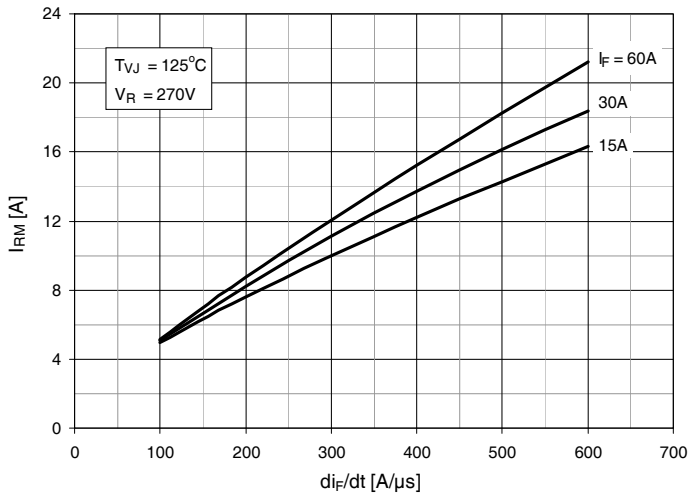


Fig. 21. Recovery Time t_{rr} vs. $-di_F/dt$

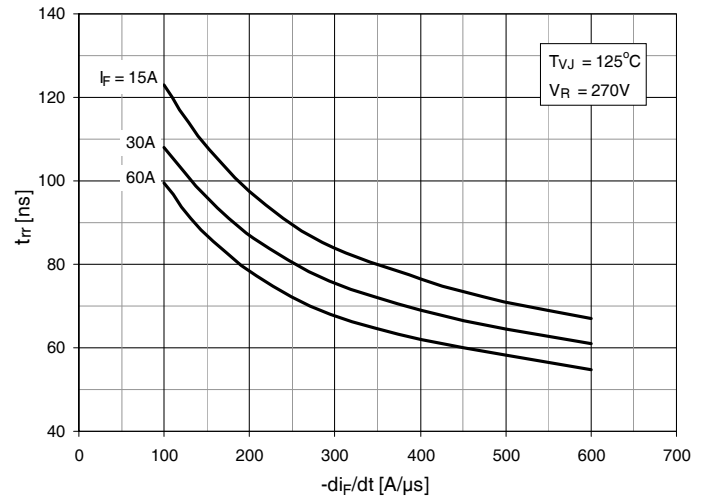


Fig. 22. Typ. Recovery Energy E_{rec} vs. $-di_F/dt$

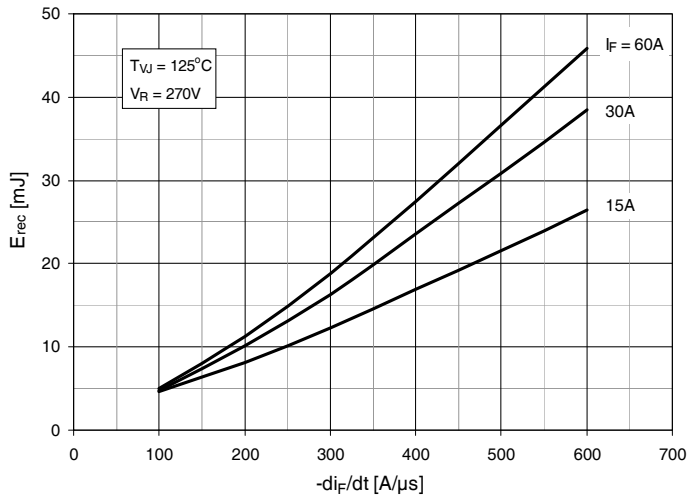


Fig. 23. Maximum Transient Thermal Impedance (Diode)

