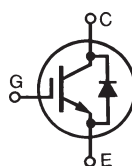


Polar™ High Speed IGBT w/ Diode

IXGQ85N33PCD1

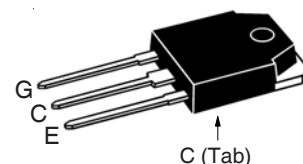
Anti-Parallel Diode for
PDP Sustain Circuit



$$\begin{aligned} V_{CES} &= 330V \\ I_{CP} &= 340A \\ V_{CE(sat)} &\leq 2.10V \end{aligned}$$

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 (RBSOA)	$V_{GE} = 15V$, $T_{VJ} = 150^\circ\text{C}$, $R_G = 20\Omega$ Clamped Inductive Load	$I_{CM} = 96$ @ $V_{CE} \leq 300$	A 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

TO-3P (IXGQ)



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

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}	$V_{CE} = V_{CES}$, $V_{GE} = 0V$ $T_J = 125^\circ\text{C}$			1 μA 200 μA
I_{GES}	$V_{CE} = 0V$, $V_{GE} = \pm 20V$			± 100 nA
$V_{CE(sat)}$	$I_C = 50A$, $V_{GE} = 15V$, Note 1 $T_J = 25^\circ\text{C}$	1.43	2.10	V
	$I_C = 100A$	1.85	3.00	V
	$I_C = 50A$, $V_{GE} = 15V$, Note 1 $T_J = 125^\circ\text{C}$	1.47		V
	$I_C = 100A$	2.00		V

Symbol Test Conditions

($T_J = 25^\circ\text{C}$ Unless Otherwise Specified)

Characteristic Values

		Min.	Typ.	Max.
g_{fs}	$I_C = 43\text{A}, V_{CE} = 10\text{V}, \text{Note } 1$	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	ns
$t_{d(on)}$	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
R_{thJC}			0.25	0.833°C/W
R_{thCS}				$^\circ\text{C/W}$

Reverse Diode (FRED)

Symbol Test Conditions

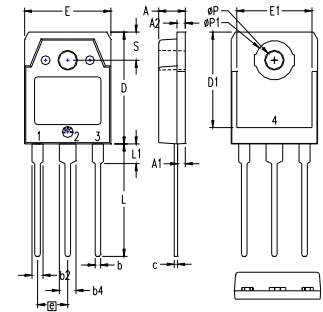
($T_J = 25^\circ\text{C}$ Unless Otherwise Specified)

Characteristic Values

(T _J = 25°C Unless Otherwise Specified)			Min.	Typ.	Max.
V _F	I _F = 30A, V _{GE} = 0V, Note 1	T _J = 25°C			1.40 V
	I _F = 60A				1.69 V
	I _F = 30A, V _{GE} = 0V, Note 1	T _J = 150°C			1.13 V
	I _F = 60A				1.46 V
I _{RM}	I _F = 30A, -di _F /dt = 200A/μs, V _R = 270V	T _J = 25°C		4.0	A
t _{rr}		T _J = 125°C		8.5	A
		T _J = 25°C		45	ns
		T _J = 125°C		85	ns
R _{thJC}					0.95 °C/W

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

TO-3P Outline



1 = Gate
2, 3 = Emitter
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
D	.780	.799	19.80	20.30
D1	.665	.677	16.90	17.20
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
ØP	.126	.134	3.20	3.40
ØP1	.272	.280	6.90	7.10
S	.193	.201	4.90	5.10

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	

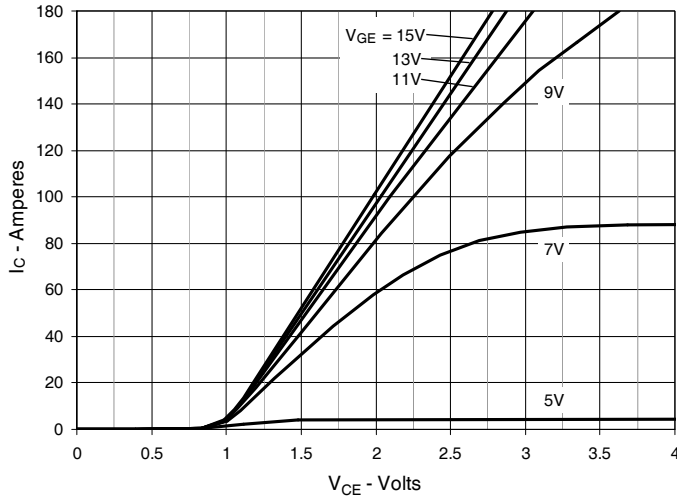
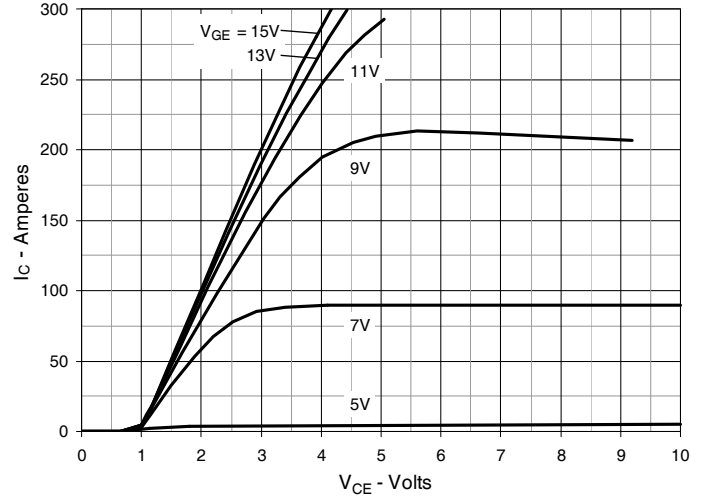
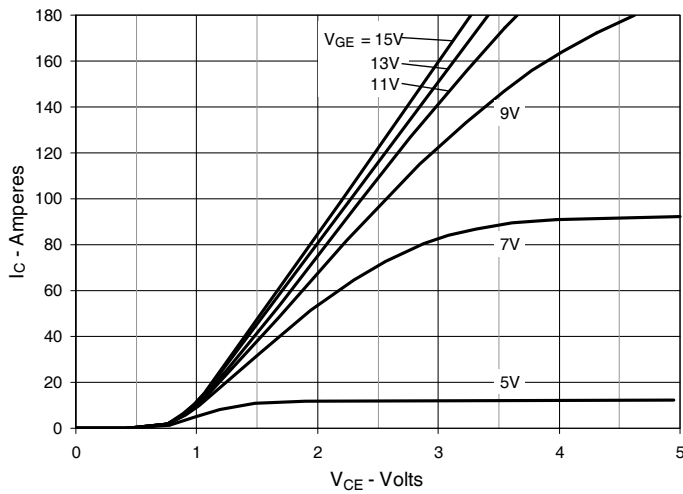
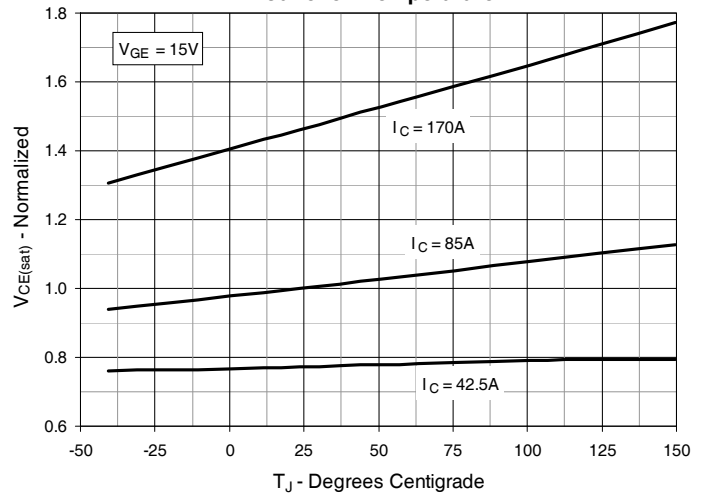
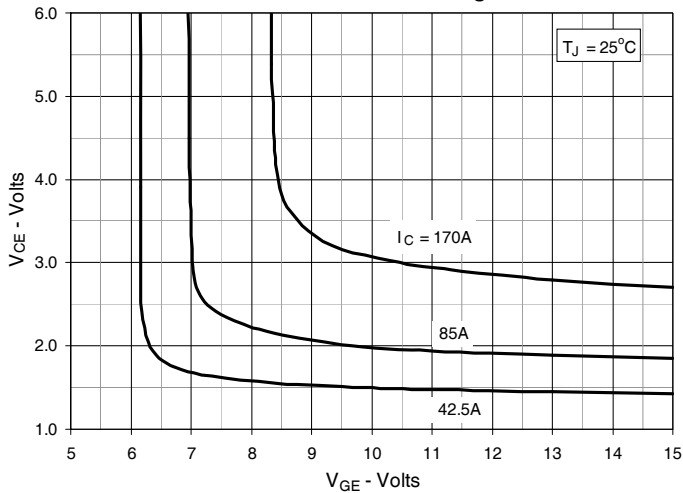
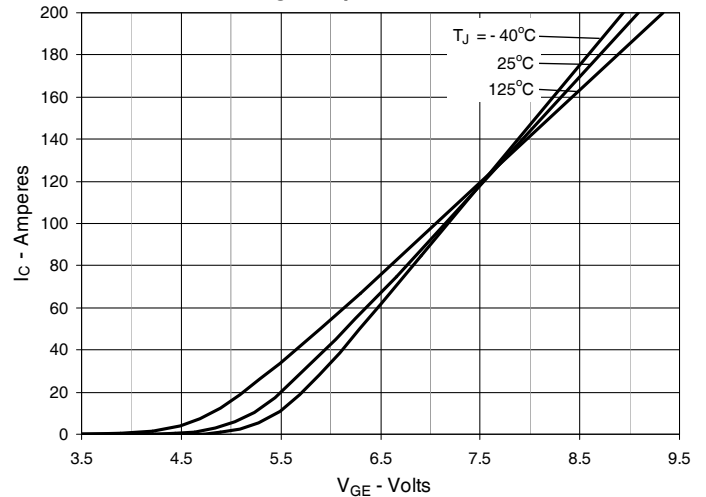
Fig. 1. Output Characteristics @ $T_J = 25^\circ\text{C}$

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


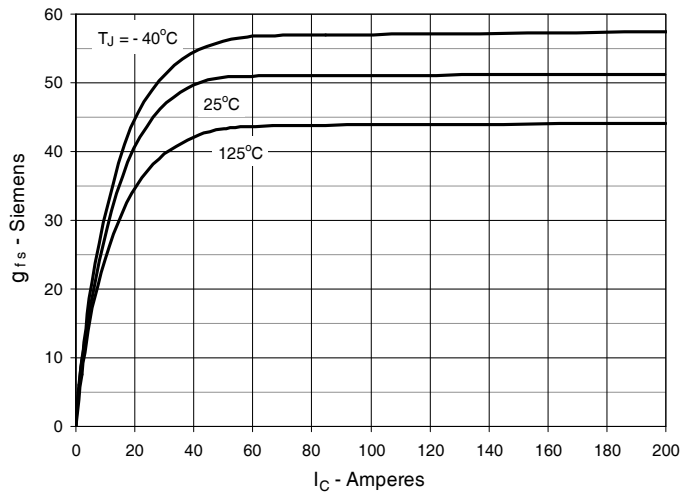
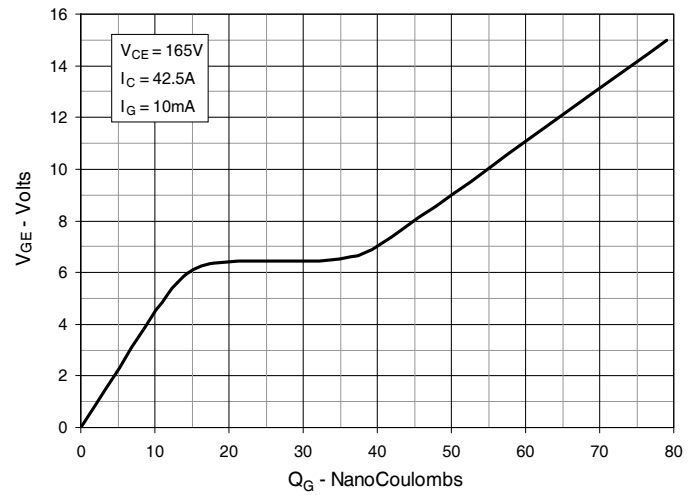
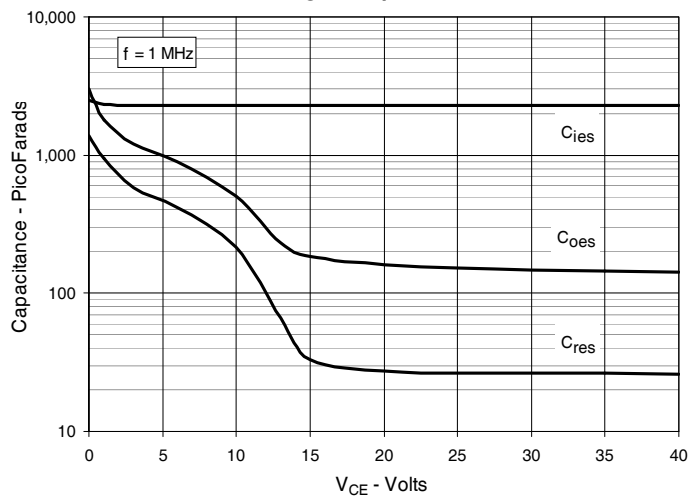
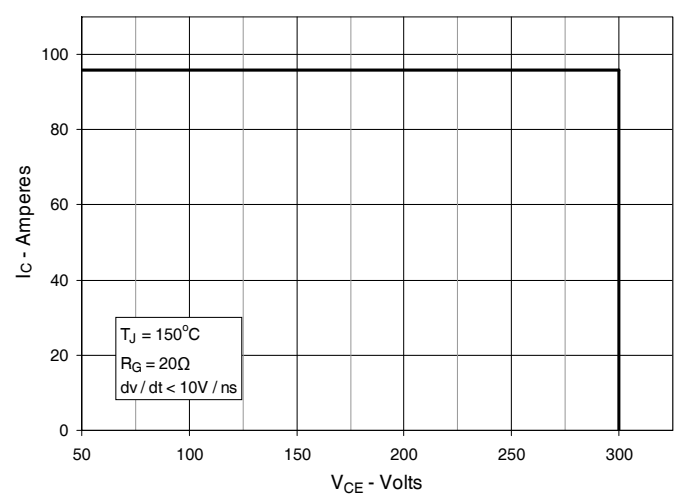
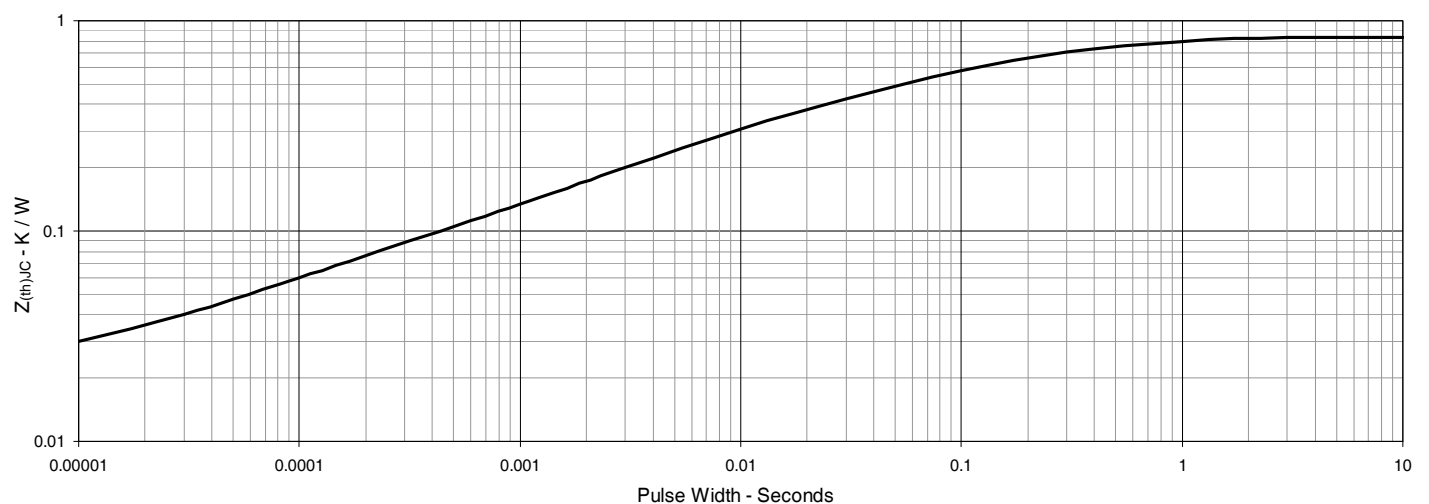
Fig. 7. Transconductance

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

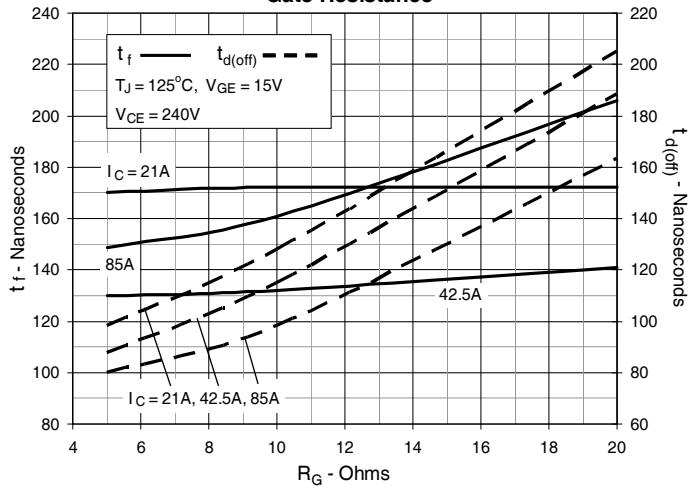


Fig. 13. Resistive Turn-off Switching Times vs. Collector Current

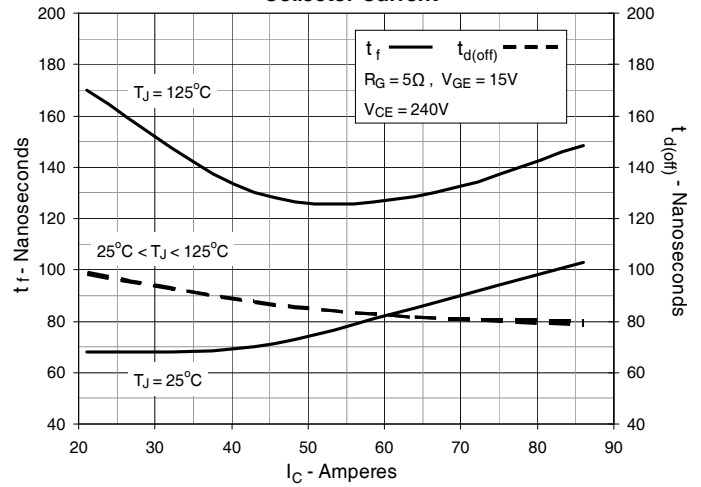


Fig. 14. Resistive Turn-off Switching Times vs. Junction Temperature

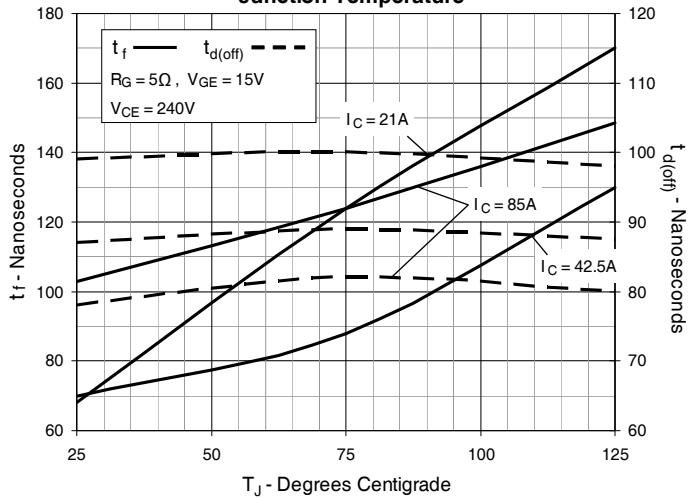


Fig. 15. Resistive Turn-on Switching Times vs. Gate Resistance

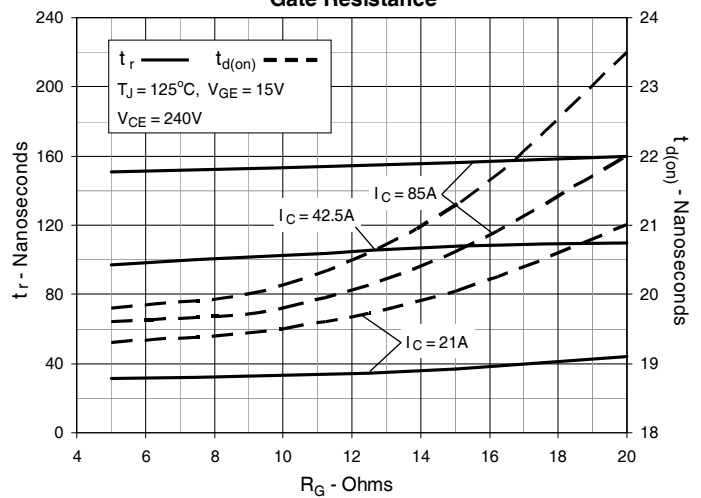


Fig. 16. Resistive Turn-on Rise Time vs. Collector Current

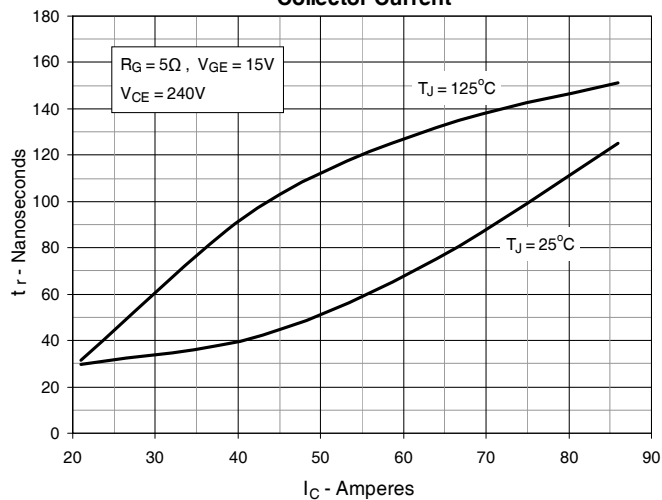


Fig. 17. Resistive Turn-on Rise Time vs. Junction Temperature

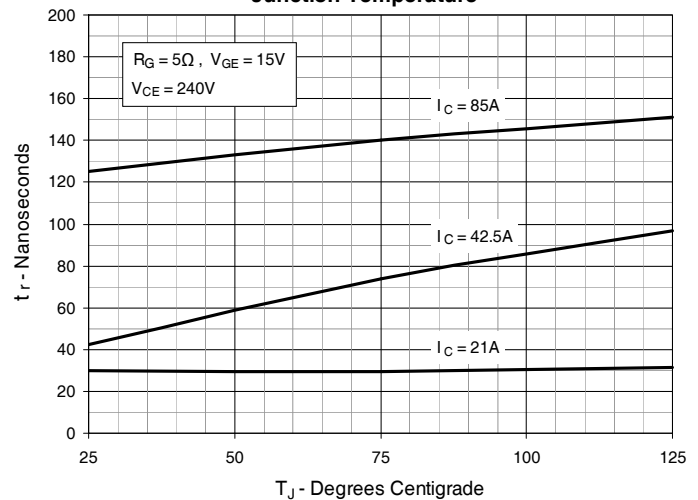


Fig. 18. Forward characteristics

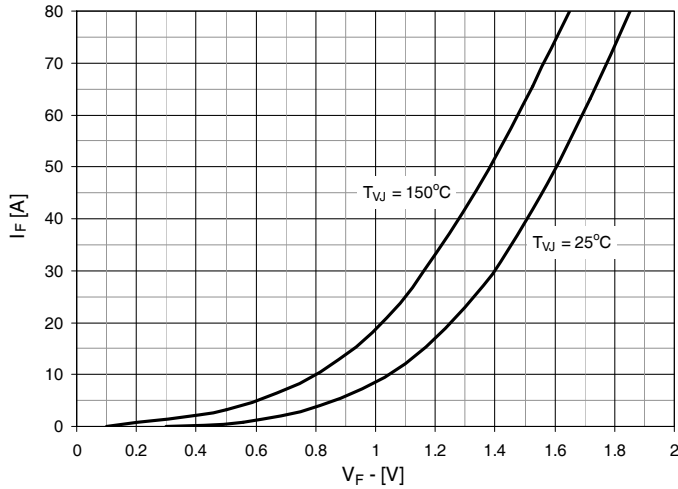


Fig. 19. Reverse Recovery Charge Q_{rr} vs. $-di_F/dt$

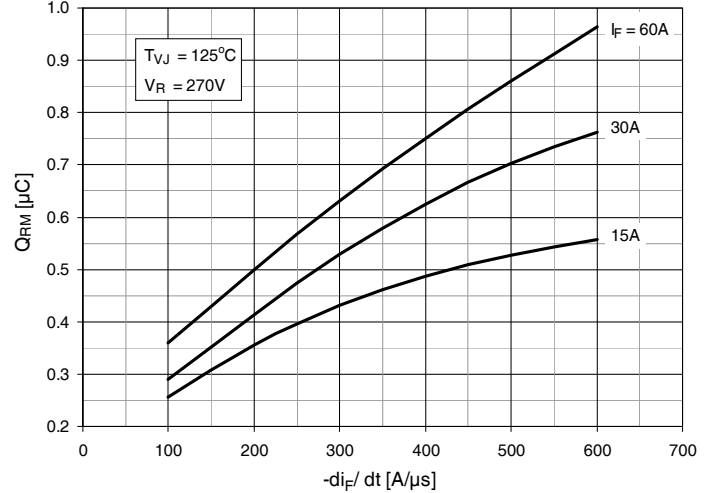


Fig. 20. Peak Reverse Current I_{RM} vs. $-di_F/dt$

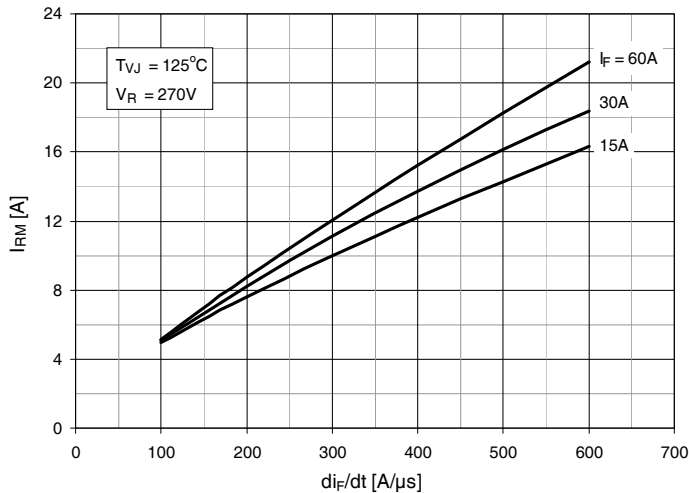


Fig. 21. Recovery Time t_{rr} vs. $-di_F/dt$

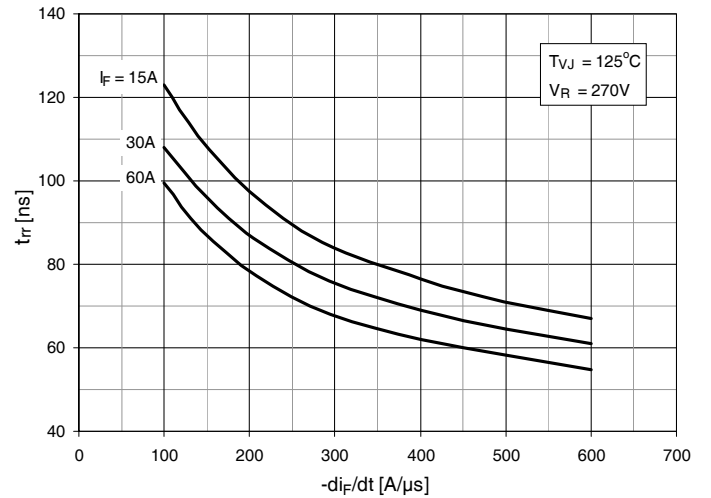


Fig. 22. Typ. Recovery Energy E_{rec} vs. $-di_F/dt$

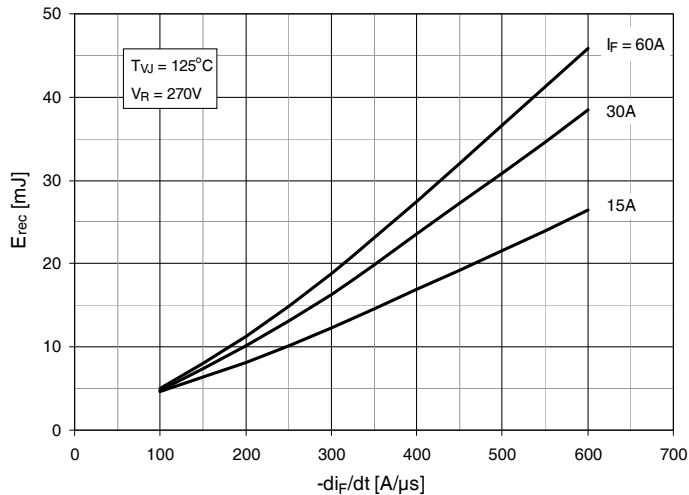


Fig. 23. Maximum Transient Thermal Impedance (Diode)

