IXYS

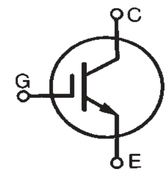
GenX3™ 300V IGBT

IXGK400N30A3
IXGX400N30A3*

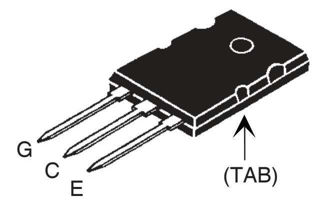
***Obsolete Part Number**

V_{CES} = 300V
I_{C25} = 400A
$V_{CE(sat)}$ ≤ 1.15V

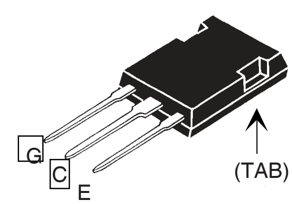
Ultra-low Vsat PT IGBTs for up to 10kHz switching



TO-264



PLUS247™



G = Gate
C = Collector
E = Emitter
TAB = Collector

Symbol	Test Conditions	Maximum Ratings	
V_{CES}	T_J = 25°C to 150°C	300	V
V_{CGR}	T_J = 25°C to 150°C, R_{GE} = 1MΩ	300	V
V_{GES}	Continuous	±20	V
V_{GEM}	Transient	±30	V
I_{C25}	T_C = 25°C	400	A
I_{C110}	T_C = 110°C	200	A
I_{LRMS}	Terminal Current Limit	75	A
I_{CM}	T_C = 25°C, 1ms	400	A
SSOA (RBSOA)	V_{GE} = 15V, T_{VJ} = 125°C, R_G = 1Ω Clamped inductive load	I_{CM} = 400 @ 0.8 • V_{CES}	A
P_C	T_C = 25°C	1000	W
T_J		-55 ... +150	°C
T_{JM}		150	°C
T_{stg}		-55 ... +150	°C
T_L	Maximum lead temperature for soldering	300	°C
T_{SOLD}	1.6 mm (0.062 in.) from case for 10	260	°C
M_d	Mounting torque (IXGK)	1.13/10	Nm/lb.in.
F_C	Mounting force (IXGX)	20..120/4.5..27	N/lb.
Weight	TO-264	10	g
	PLUS247	6	g

Symbol	Test Conditions (T_J = 25°C, unless otherwise specified)		Characteristic Values Min.	Typ.	Max.	
BV_{CES}	I_C = 1mA, V_{GE} = 0V		300			V
$V_{GE(th)}$	I_C = 4mA, V_{CE} = V_{GE}		3.0		5.0	V
I_{CES}	V_{CE} = V_{CES}				50	µA
	V_{GE} = 0V	T_J = 125°C			2	mA
I_{GES}	V_{CE} = 0V, V_{GE} = ±20V				±400	nA
$V_{CE(sat)}$	I_C = 100A, V_{GE} = 15V, Note 1				1.15	V
	I_C = 400A			1.70		V

Features

- Optimized for low switching losses
- Square RBSOA
- High avalanche capability
- International standard packages

Advantages

- High power density
- Low gate drive requirement

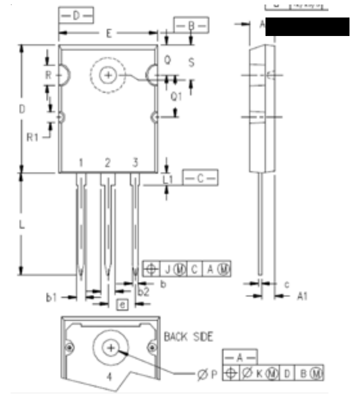
Applications

- Power Inverters
- UPS
- Motor Drives
- SMPS
- PFC Circuits
- Battery Chargers
- Welding Machines
- Lamp Ballasts
- Inrush Current Protection Circuits

Symbol	Test Conditions (T_J = 25°C, unless otherwise specified)	Characteristic Values Min.	Typ.	Max.
g_{fs}	I_C = 60A, V_{CE} = 10V, Note 1	100	170	S
C_{ies}	V_{CE} = 25V, V_{GE} = 0V, f = 1 MHz		19	nF
C_{oes}			1350	pF
C_{res}			190	pF
$Q_{g(on)}$	I_C = 100A, V_{GE} = 15V, V_{CE} = 0.5 • V_{CES}		560	nC
Q_{ge}			83	nC
Q_{gc}			185	nC
$t_{d(on)}$	**Resistive load, T_J = 25°C**		45	ns
t_r	I_C = 100A, V_{GE} = 15V		45	ns
$t_{d(off)}$	V_{CE} = 240V, R_G = 1Ω		210	ns
t_f			107	ns
$t_{d(on)}$	**Resistive load, T_J = 125°C**		47	ns
t_r	I_C = 100A, V_{GE} = 15V		53	ns
$t_{d(off)}$	V_{CE} = 240V, R_G = 1Ω		240	ns
t_f			315	ns
R_{thJC}				0.125 °C/W
R_{thCK}			0.15	°C/W

Note: 1. Pulse test, t ≤ 300μs; duty cycle, d ≤ 2%.

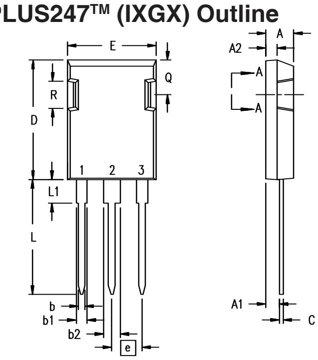
TO-264 (IXGK) Outline



1 – GATE
2, 4 – DRAIN (COLLECTOR)
3 – SOURCE (EMITTER)

SYM	INCHES MIN	INCHES MAX	MILLIMETERS MIN	MILLIMETERS MAX
A	.185	.209	4.70	5.31
A1	.102	.118	2.59	3.00
b	.037	.055	0.94	1.40
b1	.087	.102	2.21	2.59
b2	.110	.126	2.79	3.20
c	.017	.029	0.43	0.74
D	1.007	1.047	25.58	26.59
E	.760	.799	19.30	20.29
e	.215BSC		5.46 BSC	
J	.000	.010	0.00	0.25
K	.000	.010	0.00	0.25
L	.779	.842	19.79	21.39
L1	.087	.102	2.21	2.59
ØP	.122	.138	3.10	3.51
Q	.240	.256	6.10	6.50
Q1	.330	.346	8.38	8.79
ØR	.155	.187	3.94	4.75
ØR1	.085	.093	2.16	2.36
S	.243	.253	6.17	6.43

PLUS247™ (IXGX) Outline



Terminals: 1 - Gate
2 - Drain (Collector)
3 - Source (Emitter)

Dim.	Millimeter Min.	Millimeter Max.	Inches Min.	Inches Max.
A	4.83	5.21	.190	.205
A_1	2.29	2.54	.090	.100
A_2	1.91	2.16	.075	.085
b	1.14	1.40	.045	.055
b_1	1.91	2.13	.075	.084
b_2	2.92	3.12	.115	.123
C	0.61	0.80	.024	.031
D	20.80	21.34	.819	.840
E	15.75	16.13	.620	.635
e	5.45 BSC		.215 BSC	
L	19.81	20.32	.780	.800
L1	3.81	4.32	.150	.170
Q	5.59	6.20	.220	0.244
R	4.32	4.83	.170	.190

Fig. 1. Output Characteristics @ 25ºC

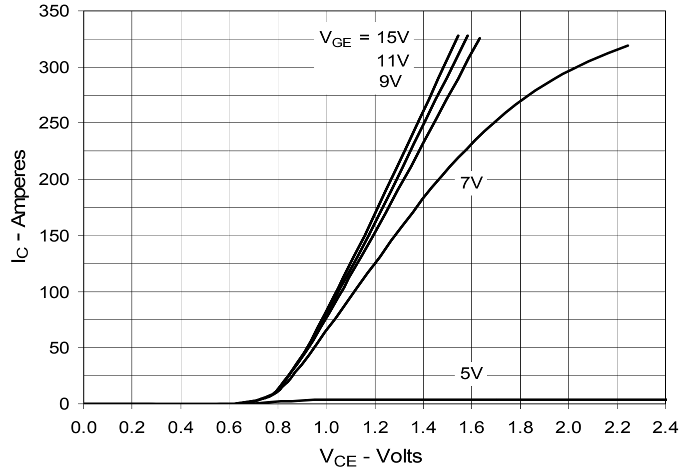


Fig. 2. Output Characteristics @ 125ºC

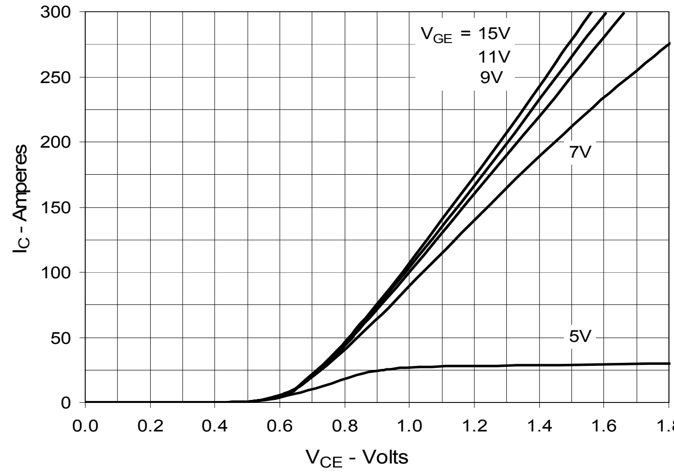


Fig. 3. Dependence of $V_{CE(sat)}$ on Junction Temperature

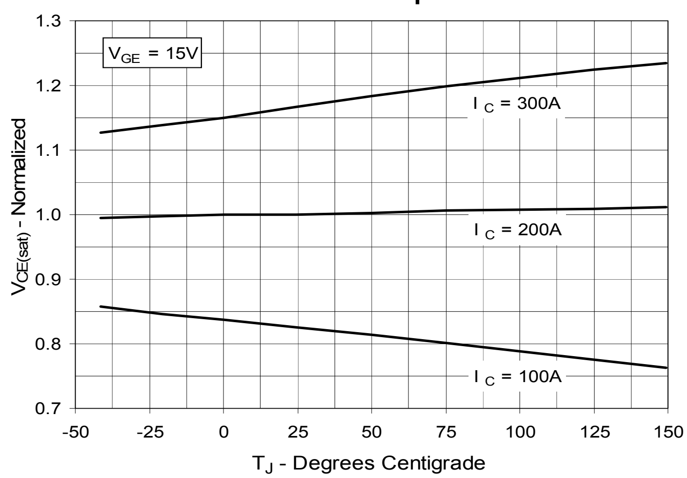


Fig. 4. Collector-to-Emitter Voltage vs. Gate-to-Emitter Voltage

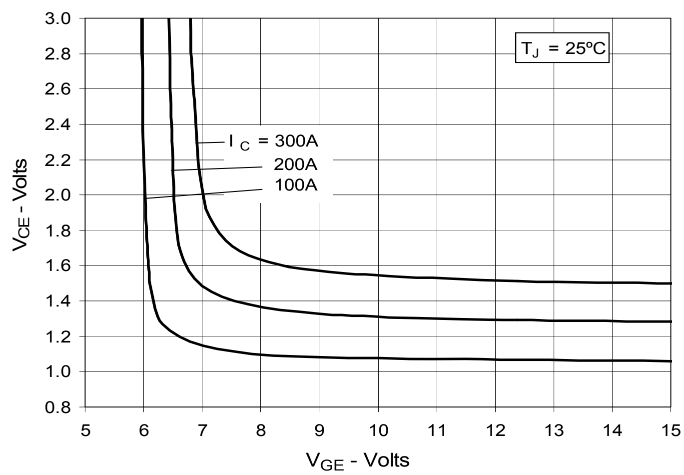


Fig. 5. Input Admittance

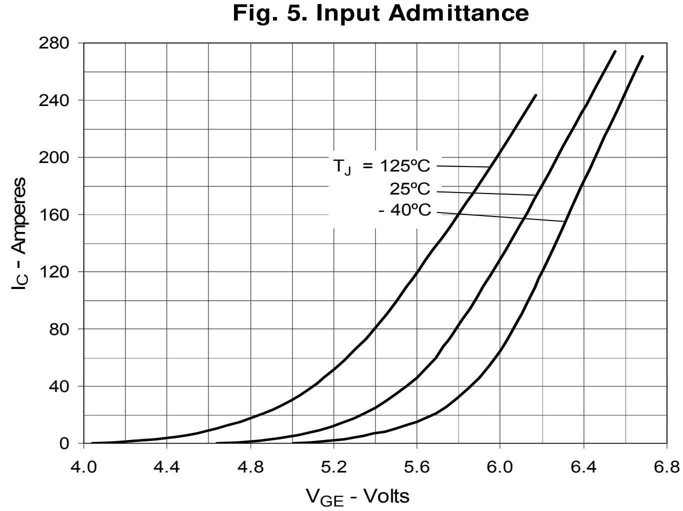
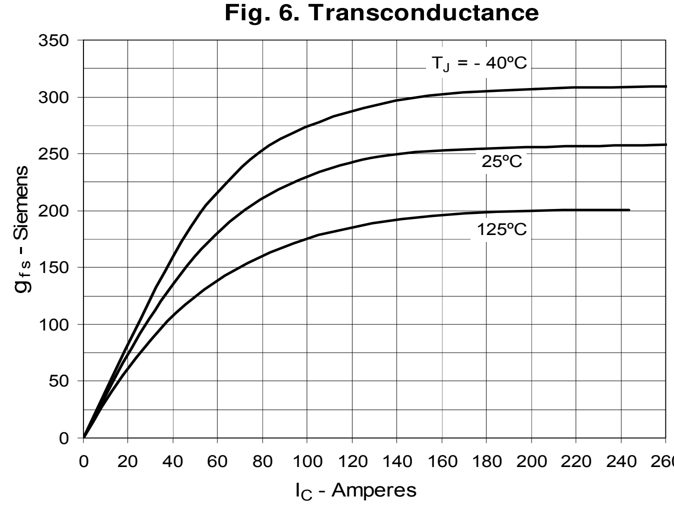


Fig. 6. Transconductance



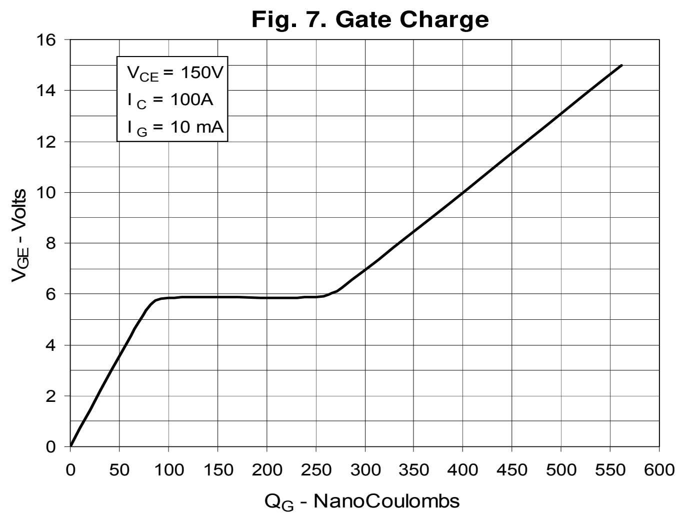


Fig. 7. Gate Charge
VCE = 150V
I C = 100A
I G = 10 mA
VGE - Volts
QG - NanoCoulombs

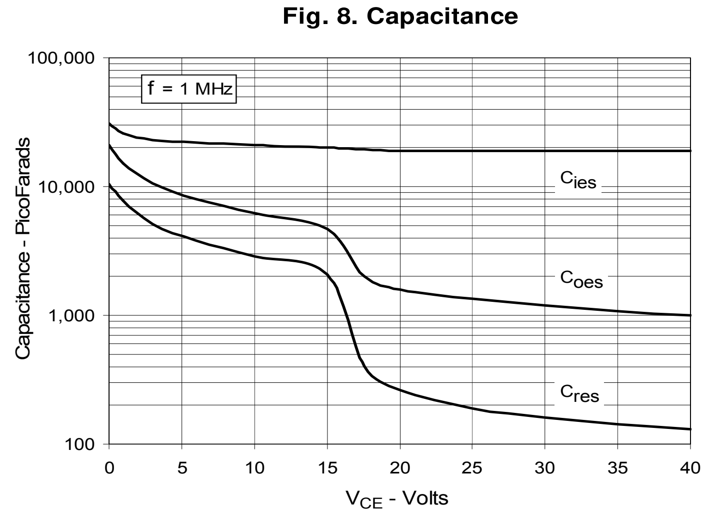


Fig. 8. Capacitance
f = 1 MHz
Cies
Coes
Cres
Capacitance - PicoFarads
VCE - Volts

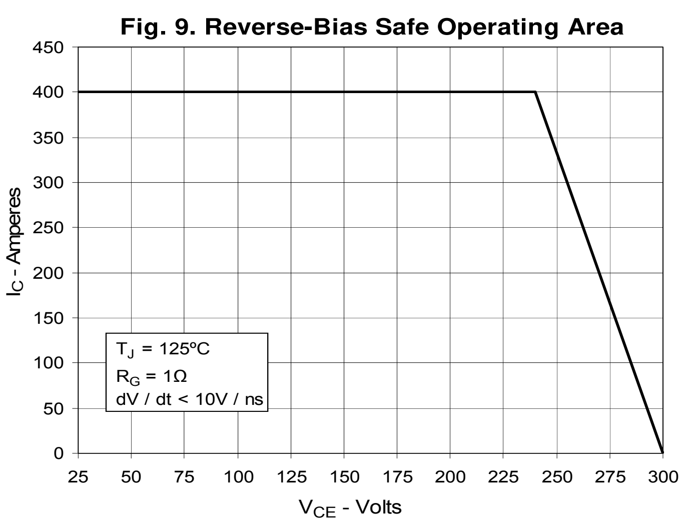


Fig. 9. Reverse-Bias Safe Operating Area
TJ = 125ºC
RG = 1Ω
dV / dt < 10V / ns
IC - Amperes
VCE - Volts

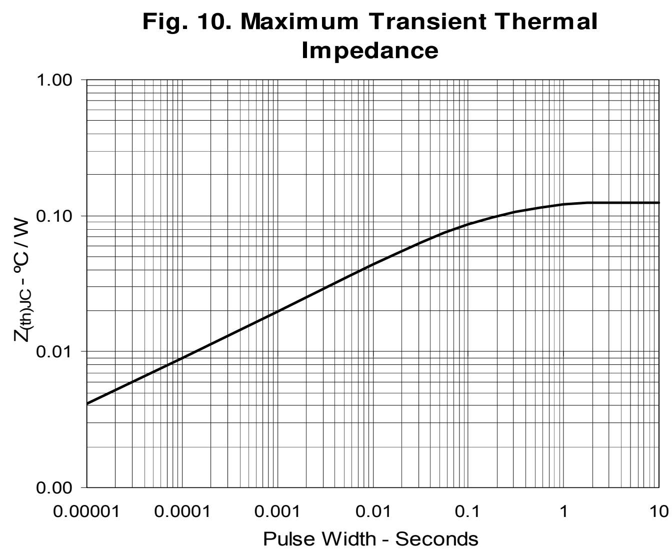


Fig. 10. Maximum Transient Thermal Impedance
Z(th)JC - ºC / W
Pulse Width - Seconds

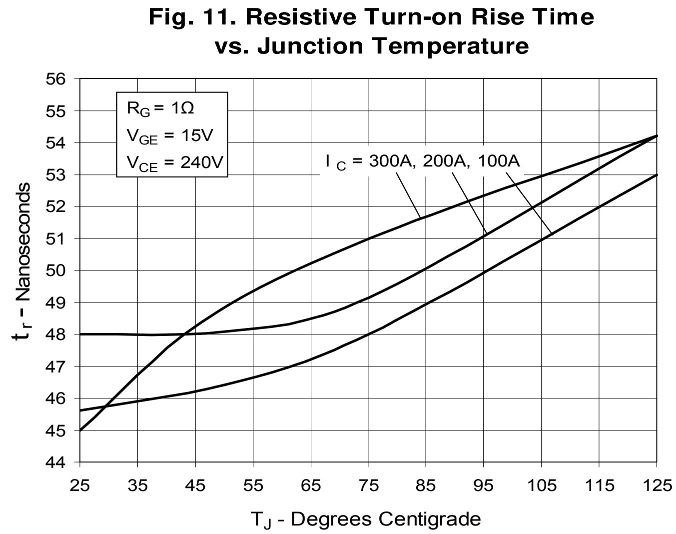


Fig. 11. Resistive Turn-on Rise Time vs. Junction Temperature
R_G = 1Ω
V_GE = 15V
V_CE = 240V
I C = 300A, 200A, 100A
t r - Nanoseconds
T J - Degrees Centigrade

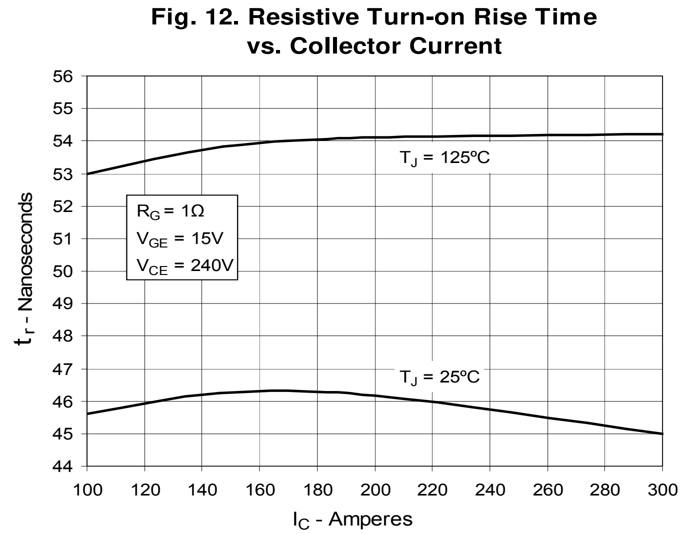


Fig. 12. Resistive Turn-on Rise Time vs. Collector Current
T J = 125ºC
R_G = 1Ω
V_GE = 15V
V_CE = 240V
T J = 25ºC
t r - Nanoseconds
I C - Amperes

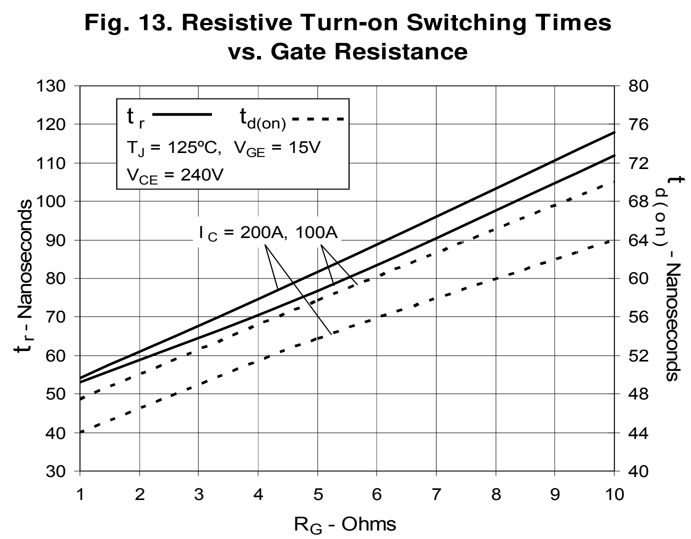


Fig. 13. Resistive Turn-on Switching Times vs. Gate Resistance
t r
t d(on)
T J = 125ºC, V_GE = 15V
V_CE = 240V
I C = 200A, 100A
t r - Nanoseconds
t d(on) - Nanoseconds
R G - Ohms

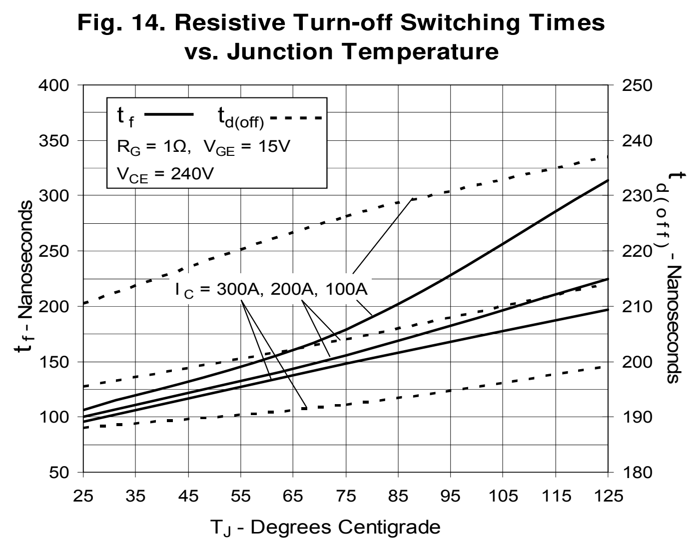


Fig. 14. Resistive Turn-off Switching Times vs. Junction Temperature
t f
t d(off)
R_G = 1Ω, V_GE = 15V
V_CE = 240V
I C = 300A, 200A, 100A
t f - Nanoseconds
t d(off) - Nanoseconds
T J - Degrees Centigrade

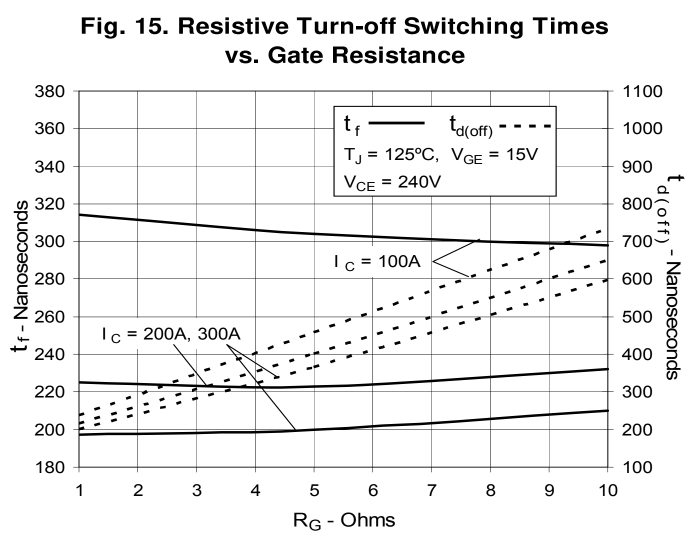


Fig. 15. Resistive Turn-off Switching Times vs. Gate Resistance
t f
t d(off)
T J = 125ºC, V_GE = 15V
V_CE = 240V
I C = 100A
I C = 200A, 300A
t f - Nanoseconds
t d(off) - Nanoseconds
R G - Ohms

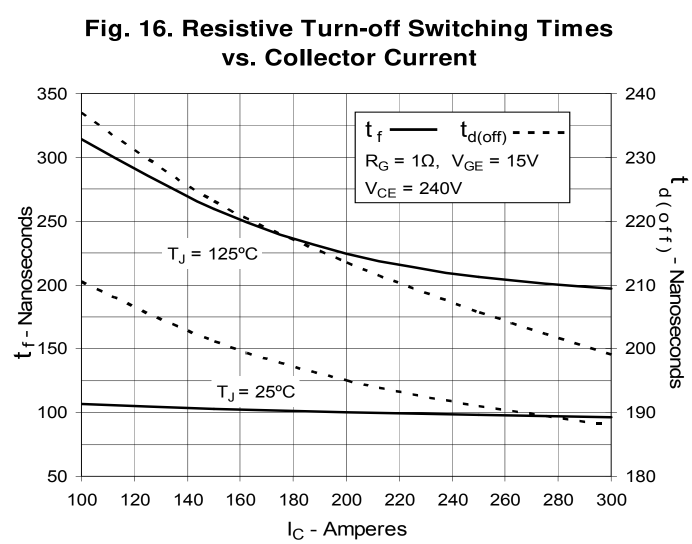


Fig. 16. Resistive Turn-off Switching Times vs. Collector Current
t f
t d(off)
R_G = 1Ω, V_GE = 15V
V_CE = 240V
T J = 125ºC
T J = 25ºC
t f - Nanoseconds
t d(off) - Nanoseconds
I C - Amperes