

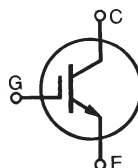
GenX3™ 1200V IGBTs

IXGA12N120A3
IXGP12N120A3
IXGH12N120A3

$V_{CES} = 1200V$
 $I_{C90} = 12A$
 $V_{CE(sat)} \leq 3.0V$

High Surge Current

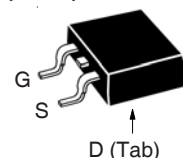
**Ultra-Low V_{sat} PT IGBTs for
up to 3kHz Switching**



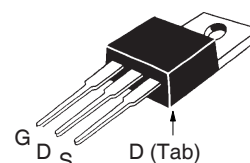
Symbol	Test Conditions	Maximum Ratings	
V_{CES}	$T_J = 25^\circ C$ to $150^\circ C$	1200	V
V_{CGR}	$T_J = 25^\circ C$ to $150^\circ C$, $R_{GE} = 1M\Omega$	1200	V
V_{GES}	Continuous	± 20	V
V_{GEM}	Transient	± 30	V
I_{C25}	$T_C = 25^\circ C$	22	A
I_{C90}	$T_C = 90^\circ C$	12	A
I_{CM}	$T_C = 25^\circ C$, 1ms	60	A
SSOA (RBSOA)	$V_{GE} = 15V$, $T_{VJ} = 125^\circ C$, $R_G = 10\Omega$ Clamped Inductive Load	$I_{CM} = 24$ $V_{CE} \leq 0.8 \cdot V_{CES}$	A
P_C	$T_C = 25^\circ C$	100	W
T_J		-55 ... +150	$^\circ C$
T_{JM}		150	$^\circ C$
T_{stg}		-55 ... +150	$^\circ C$
T_L	Maximum Lead Temperature for Soldering	300	$^\circ C$
T_{SOLD}	1.6 mm (0.062in.) from Case for 10s	260	$^\circ C$
F_C	Mounting Force (TO-263)	10..65 / 2.2..14.6	N/lb.
M_d	Mounting Torque (TO-220 & TO-247)	1.13 / 10	Nm/lb.in.
Weight	TO-263	2.5	g
	TO-220	3.0	g
	TO-247	6.0	g

Symbol	Test Conditions ($T_J = 25^\circ C$, Unless Otherwise Specified)	Characteristic Values		
		Min.	Typ.	Max.
BV_{CES}	$I_C = 250\mu A$, $V_{GE} = 0V$	1200		V
$V_{GE(th)}$	$I_C = 250\mu A$, $V_{CE} = V_{GE}$	2.5		5.0 V
I_{CES}	$V_{CE} = V_{CES}$, $V_{GE} = 0V$ $T_J = 125^\circ C$			10 μA 275 μA
I_{GES}	$V_{CE} = 0V$, $V_{GE} = \pm 20V$			± 100 nA
$V_{CE(sat)}$	$I_C = I_{C90}$, $V_{GE} = 15V$, Note 1 $T_J = 125^\circ C$		2.40 2.75	3.0 V V

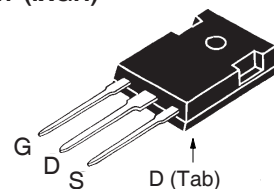
TO-263 AA (IXGA)



TO-220AB (IXGP)



TO-247 (IXGH)



G = Gate D = Drain
S = Source Tab = Drain

Features

- Optimized for Low Conduction Losses
- 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 ($T_J = 25^\circ\text{C}$, Unless Otherwise Specified)	Characteristic Values		
		Min.	Typ.	Max.
g_{fs}	$I_C = I_{C90}$, $V_{CE} = 10\text{V}$, Note 1	5.2	8.8	S
$I_{C(on)}$	$V_{GE} = 10\text{V}$, $V_{CE} = 10\text{V}$, Note 1		44	A
C_{ies}	$V_{CE} = 25\text{V}$, $V_{GE} = 0\text{V}$, $f = 1\text{MHz}$		550	pF
C_{oes}			30	pF
C_{res}			8	pF
Q_g	$I_C = I_{C90}$, $V_{GE} = 15\text{V}$, $V_{CE} = 600\text{V}$		20.4	nC
Q_{ge}			3.1	nC
Q_{gc}			8.5	nC
$t_{d(on)}$	Resistive Switching Times, $T_J = 25^\circ\text{C}$ $I_C = I_{C90}$, $V_{GE} = 15\text{V}$ $V_{CE} = 960\text{V}$, $R_G = 10\Omega$		35	ns
t_r			140	ns
$t_{d(off)}$			62	ns
t_f			1035	ns
$t_{d(on)}$	Resistive Switching Times, $T_J = 125^\circ\text{C}$ $I_C = I_{C90}$, $V_{GE} = 15\text{V}$ $V_{CE} = 960\text{V}$, $R_G = 10\Omega$		35	ns
t_r			167	ns
$t_{d(off)}$			70	ns
t_f			1475	ns
R_{thJC}				1.25 $^\circ\text{C/W}$
R_{thCS}	TO-247		0.21	$^\circ\text{C/W}$
	TO-220		0.50	$^\circ\text{C/W}$

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

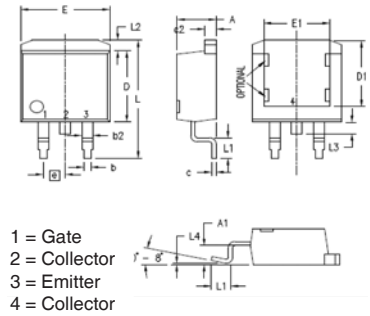
TO-247 Outline

The image shows three views of the TO-247 package: a top view, a side view, and a terminal view. The top view shows a rectangular body with a central circular feature (hole) and three leads (1, 2, 3) extending from the bottom. Dimensions labeled include E (body width), D (body height), R (lead width), Q (lead spacing), S (lead length), L (lead length), L1 (lead length), b1 (lead width), b2 (lead width), and e (lead length). The side view shows the package profile with dimensions A (total height), A2 (lead height), and C (lead length). The terminal view shows the three leads with dimensions b1, b2, and e.

Dim.	Millimeter		Inches	
	Min.	Max.	Min.	Max.
A	4.7	5.3	.185	.209
A ₁	2.2	2.54	.087	.102
A ₂	2.2	2.6	.059	.098
b	1.0	1.4	.040	.055
b ₁	1.65	2.13	.065	.084
b ₂	2.87	3.12	.113	.123
C	.4	.8	.016	.031
D	20.80	21.46	.819	.845
E	15.75	16.26	.610	.640
e	5.20	5.72	0.205	0.225
L	19.81	20.32	.780	.800
L ₁		4.50		.177
ØP	3.55	3.65	.140	.144
Q	5.89	6.40	0.232	0.252
R	4.32	5.49	.170	.216
S	6.15	BSC	242	BSC

Terminals: 1 - Gate 2 - Collector
 3 - Emitter

TO-263 Outline



SYM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.160	.190	4.06	4.83
A1	.080	.110	2.03	2.79
b	.020	.039	0.51	0.99
b2	.045	.055	1.14	1.40
c	.016	.029	0.40	0.74
c2	.045	.055	1.14	1.40
D	.340	.380	8.64	9.65
D1	.315	.350	8.00	8.89
E	.380	.410	9.65	10.41
E1	.245	.320	6.22	8.13
e	.100	BSC	2.54	BSC
L	.575	.625	14.61	15.88
L1	.090	.110	2.29	2.79
L2	.040	.055	1.02	1.40
L3	.050	.070	1.27	1.78
L4	0	.005	0	0.13

TO-220 Outline

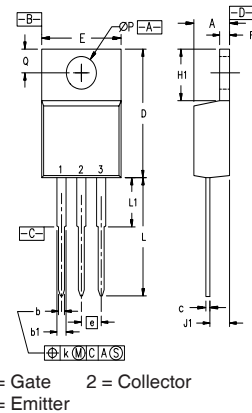


Fig. 1. Output Characteristics @ $T_J = 25^\circ\text{C}$

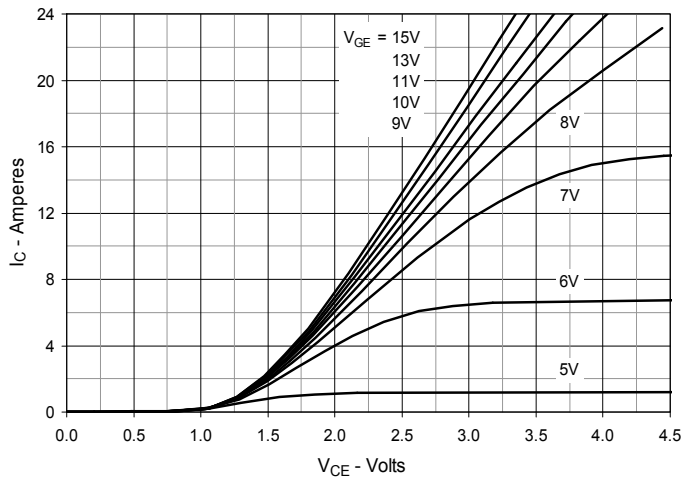


Fig. 2. Extended Output Characteristics @ $T_J = 25^\circ\text{C}$

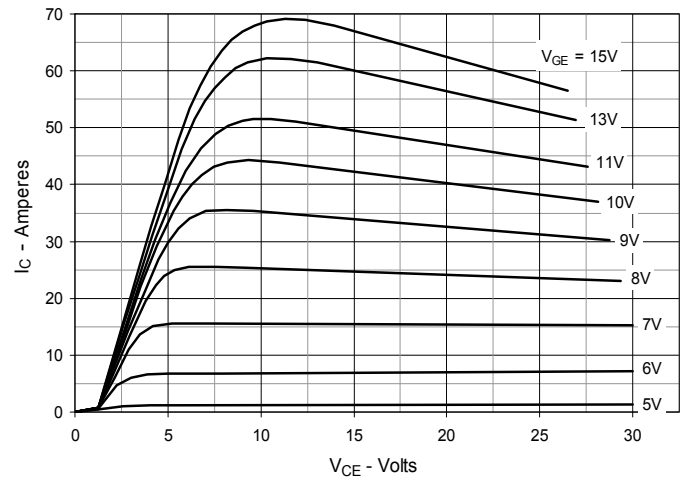


Fig. 3. Output Characteristics @ $T_J = 125^\circ\text{C}$

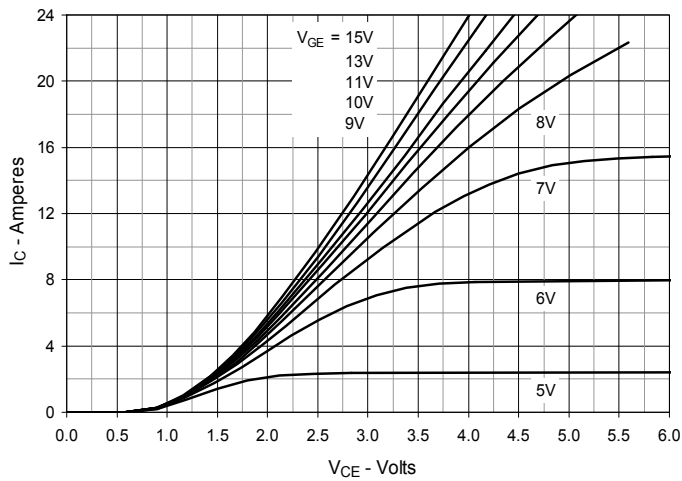


Fig. 4. Dependence of $V_{CE(sat)}$ on Junction Temperature

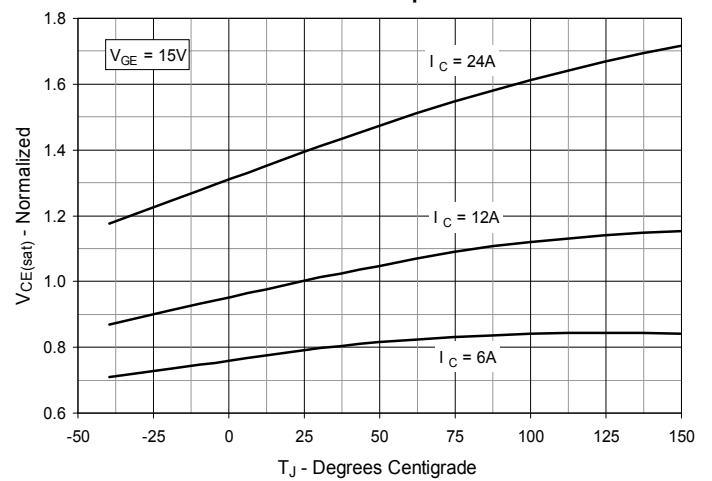


Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter Voltage

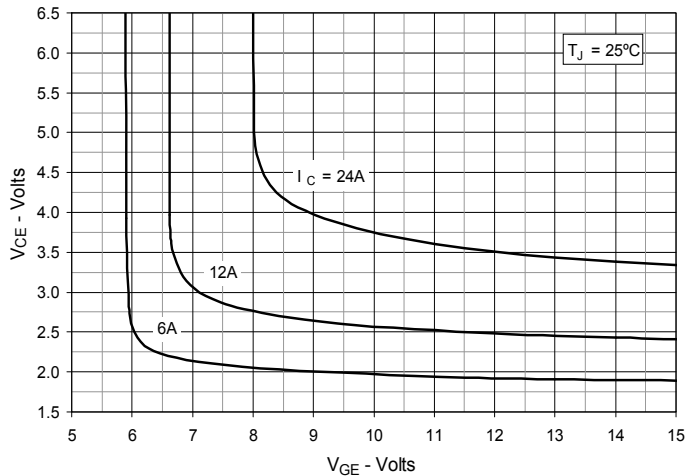


Fig. 6. Input Admittance

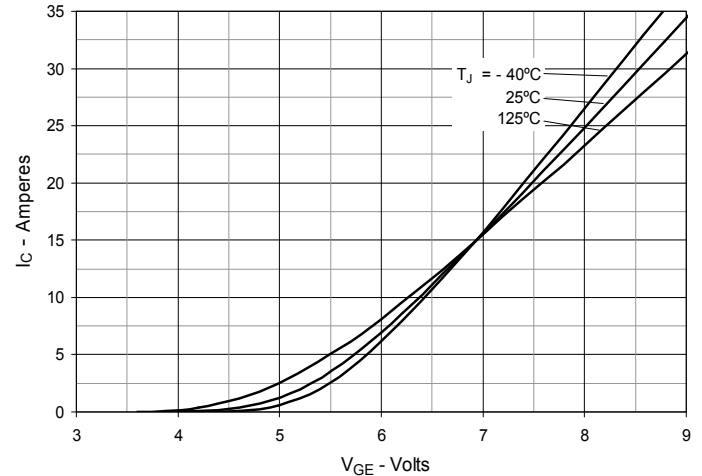


Fig. 7. Transconductance

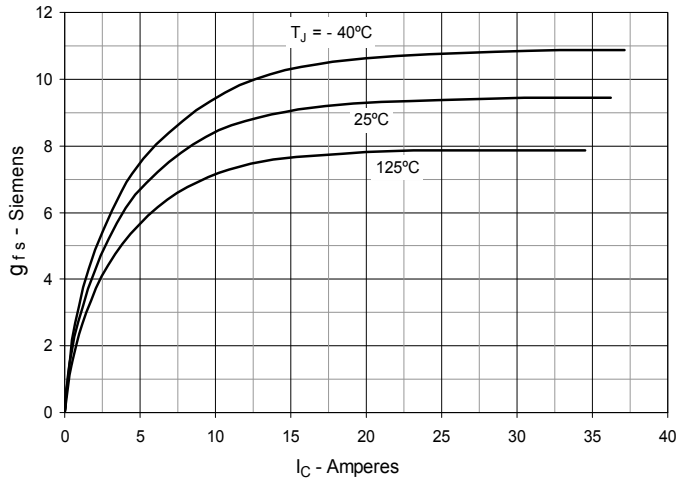


Fig. 8. Gate Charge

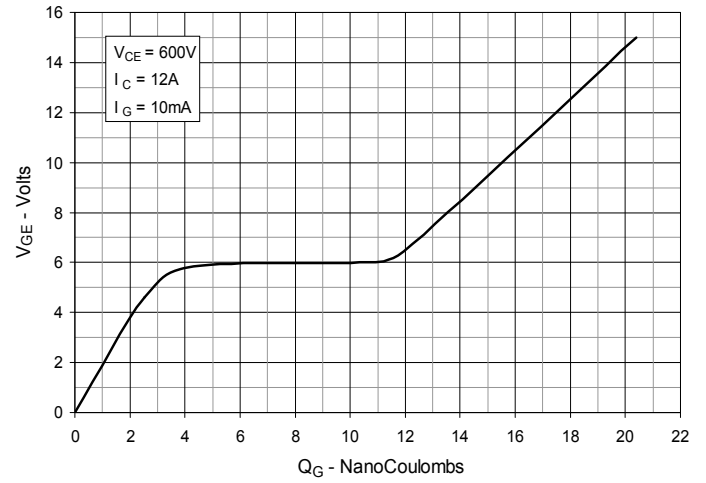


Fig. 9. Reverse-Bias Safe Operating Area

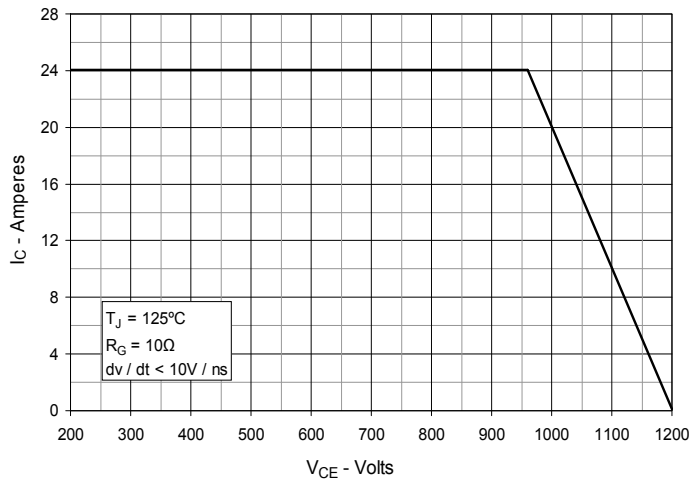


Fig. 10. Capacitance

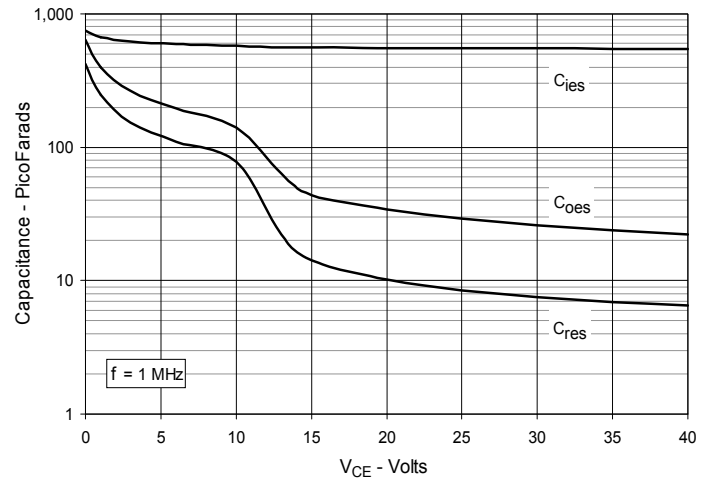
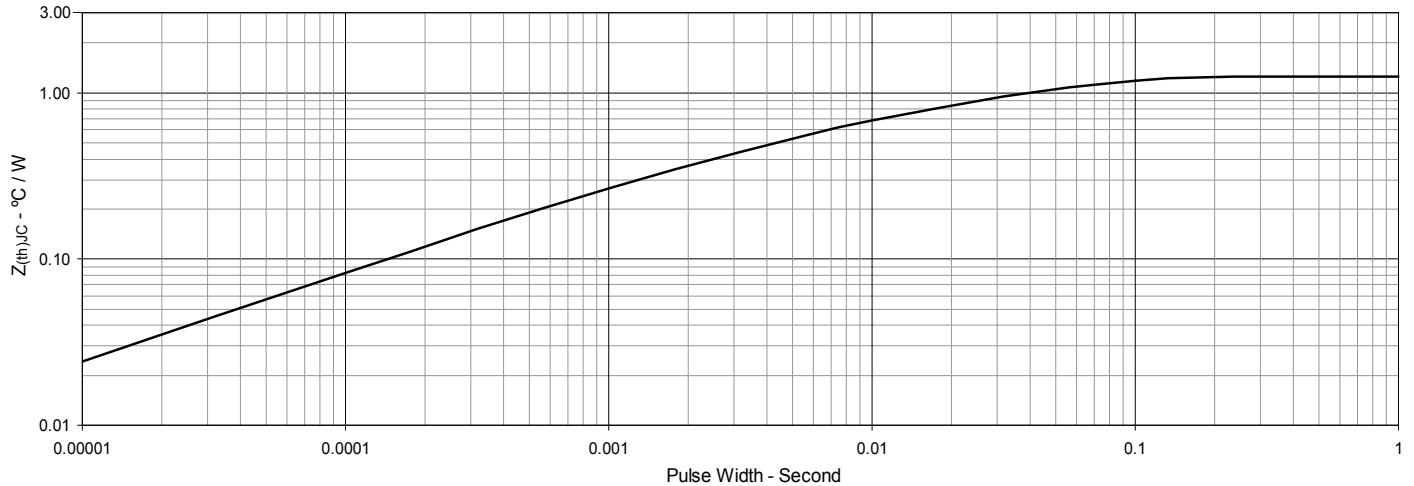
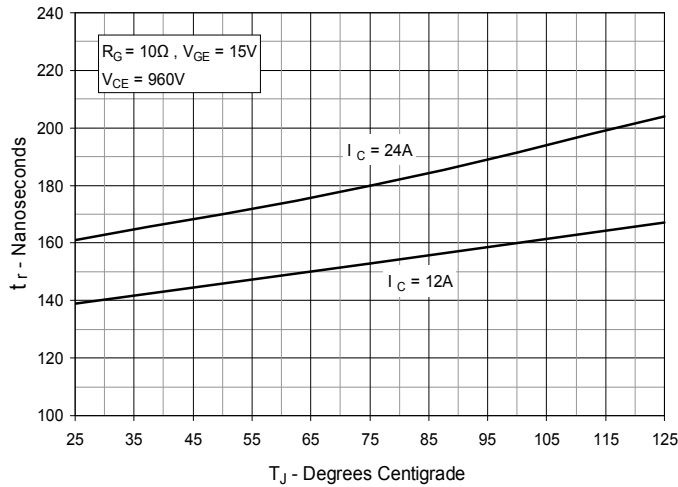


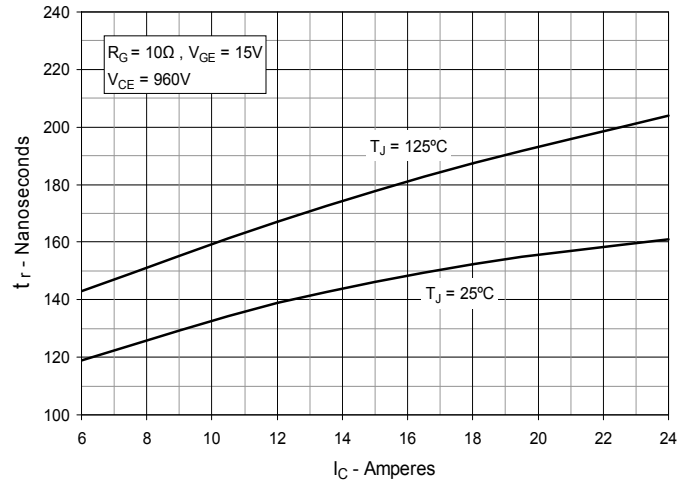
Fig. 11. Maximum Transient Thermal Impedance



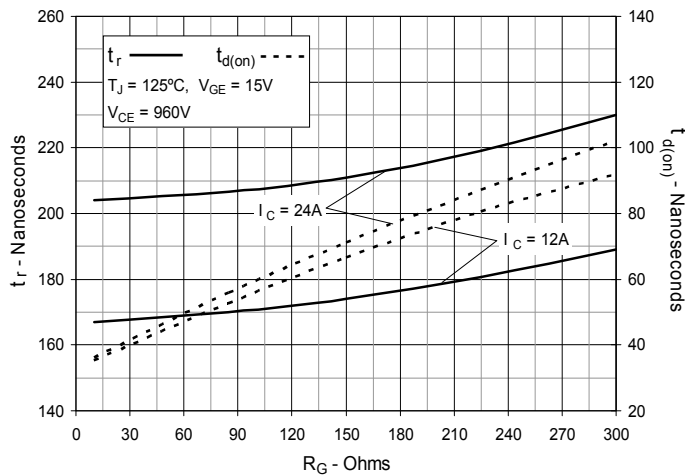
**Fig. 12. Resistive Turn-on Rise Time
vs. Junction Temperature**



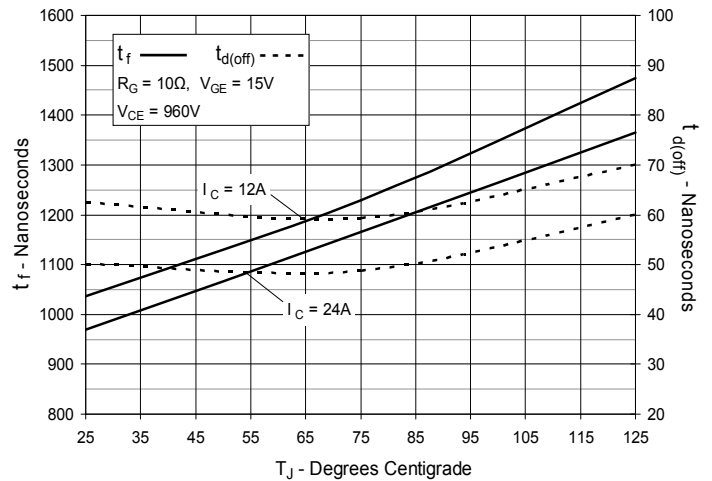
**Fig. 13. Resistive Turn-on Rise Time
vs. Collector Current**



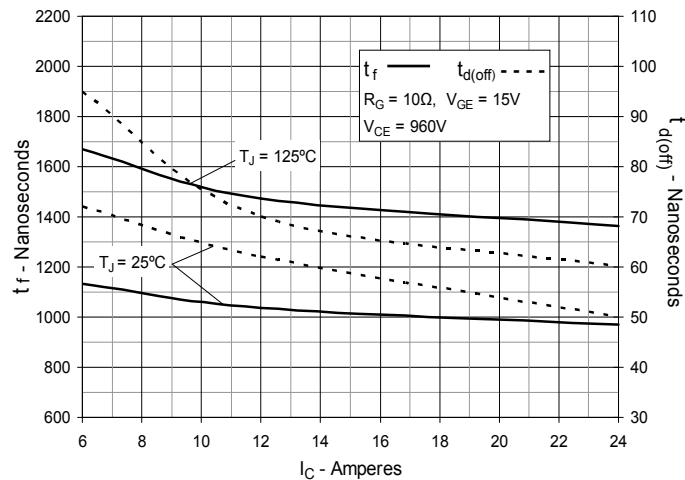
**Fig. 14. Resistive Turn-on Switching Times
vs. Gate Resistance**



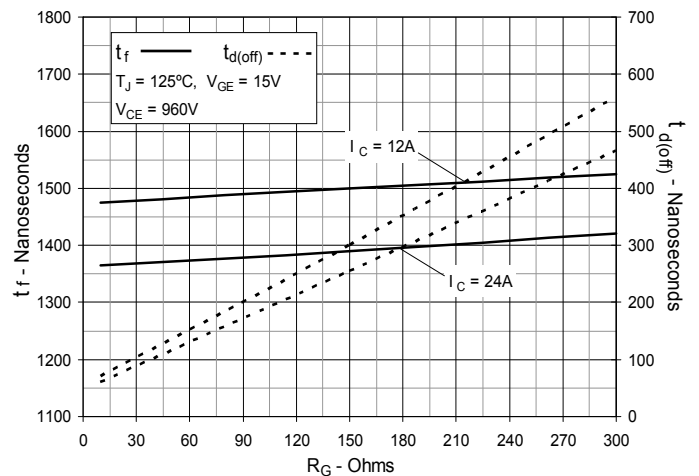
**Fig. 15. Resistive Turn-off Switching Times
vs. Junction Temperature**



**Fig. 16. Resistive Turn-off Switching Times
vs. Collector Current**



**Fig. 17. Resistive Turn-off Switching Times
vs. Gate Resistance**





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