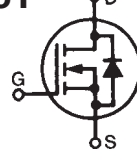


Trench Gate Power MOSFET

N-Channel Enhancement Mode
Avalanche Rated

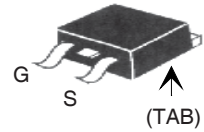
IXTA90N15T
IXTH90N15T
IXTP90N15T
IXTQ90N15T



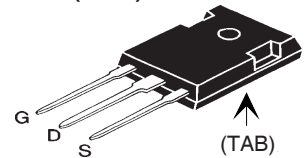
$$\begin{aligned} V_{DSS} &= 150V \\ I_{D25} &= 90A \\ R_{DS(on)} &\leq 20m\Omega \end{aligned}$$

Symbol	Test Conditions	Maximum Ratings		
V_{DSS}	$T_J = 25^\circ\text{C}$ to 175°C	150		V
V_{DGR}	$T_J = 25^\circ\text{C}$ to 175°C , $R_{GS} = 1M\Omega$	150		V
V_{GSM}		± 30		V
I_{D25}	$T_C = 25^\circ\text{C}$ *	90		A
I_{LRMS}	Lead Current Limit, RMS	75		A
I_{DM}	$T_C = 25^\circ\text{C}$, pulse width limited by T_{JM}	250		A
I_A	$T_C = 25^\circ\text{C}$	4		A
E_{AS}	$T_C = 25^\circ\text{C}$	750		μJ
dV/dt	$I_S \leq I_{DM}$, $V_{DD} \leq V_{DSS}$, $T_J \leq 175^\circ\text{C}$	10		V/ns
P_D	$T_C = 25^\circ\text{C}$	455		W
T_J		-55 ... +175		$^\circ\text{C}$
T_{JM}		175		$^\circ\text{C}$
T_{stg}		-55 ... +175		$^\circ\text{C}$
T_L	1.6mm (0.062 in.) from case for 10s	300		$^\circ\text{C}$
T_{SOLD}	Plastic body for 10 seconds	260		$^\circ\text{C}$
M_d	Mounting Torque(TO-220,TO-3P,TO-247)	1.13/10		Nm/lb.in.
F_c	Mounting Force (TO-263)	10..65/2.2..14.6		N/lb.
Weight		TO-263	2.5	g
		TO-220	3	g
		TO-3P	5.5	g
		TO-247	6	g

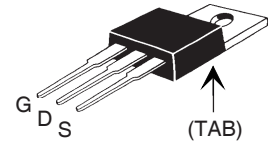
TO-263



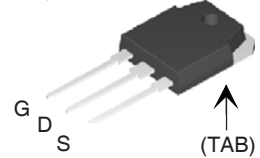
TO-247 (IXTH)



TO-220 (IXTP)



TO-3P (IXTQ)



G = Gate D = Drain
S = Source TAB = Drain

Features

- International standard packages
- Unclamped Inductive Switching (UIS) rated
- Low package inductance
 - easy to drive and to protect

Applications

- DC-DC converters
- Battery chargers
- Switched-mode and resonant-mode power supplies
- DC choppers
- AC motor control
- Uninterruptible power supplies

Symbol	Test Conditions ($T_J = 25^\circ\text{C}$, unless otherwise specified)	Characteristic Values		
		Min.	Typ.	Max.
BV_{DSS}	$V_{GS} = 0V$, $I_D = 250\mu\text{A}$	150		V
$V_{GS(th)}$	$V_{DS} = V_{GS}$, $I_D = 1\text{mA}$	2.5		4.5 V
I_{GSS}	$V_{GS} = \pm 20V$, $V_{DS} = 0V$			± 200 nA
I_{DSS}	$V_{DS} = V_{DSS}$ $V_{GS} = 0V$ $T_J = 150^\circ\text{C}$			5 μA 250 μA
$R_{DS(on)}$	$V_{GS} = 10V$, $I_D = 0.5 \cdot I_{D25}$, Note 1	17	20	m Ω

Symbol	Test Conditions ($T_J = 25^\circ\text{C}$ unless otherwise specified)	Characteristic Values		
		Min.	Typ.	Max.
g_{fs}	$V_{DS} = 10\text{V}$, $I_D = 0.5 \cdot I_{D25}$, Note 1	40	69	S
C_{iss}	$V_{GS} = 0\text{V}$, $V_{DS} = 25\text{V}$, $f = 1\text{MHz}$		4100	pF
C_{oss}			560	pF
C_{rss}			92	pF
$t_{d(on)}$	Resistive Switching Times $V_{GS} = 15\text{V}$, $V_{DS} = 0.5 \cdot V_{DSS}$, $I_D = 0.5 \cdot I_{D25}$ $R_G = 3.3\Omega$ (External)		24	ns
t_r			22	ns
$t_{d(off)}$			44	ns
t_f			19	ns
$Q_{g(on)}$	$V_{GS} = 10\text{V}$, $V_{DS} = 0.5 \cdot V_{DSS}$, $I_D = 25\text{A}$		80	nC
Q_{gs}			20	nC
Q_{gd}			20	nC
R_{thJC}	TO-220 TO-3P, TO-263, TO-247			0.33 $^\circ\text{C/W}$
R_{thCH}		0.25 0.21		$^\circ\text{C/W}$ $^\circ\text{C/W}$

Source-Drain Diode

Symbol	Test Conditions ($T_J = 25^\circ\text{C}$, unless otherwise specified)	Characteristic Values		
		Min.	Typ.	Max.
I_S	$V_{GS} = 0\text{V}$			90 A
I_{SM}	Repetitive			300 A
V_{SD}	$I_F = 50\text{A}$, $V_{GS} = 0\text{V}$, Note 1			1.2 V
t_{rr}	$I_F = 45\text{A}$, $-di/dt = 250\text{A}/\mu\text{s}$ $V_R = 75\text{V}$, $V_{GS} = 0\text{V}$		110	ns

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

*: Current may be limited by external terminal current limit.

PRELIMINARY TECHNICAL INFORMATION

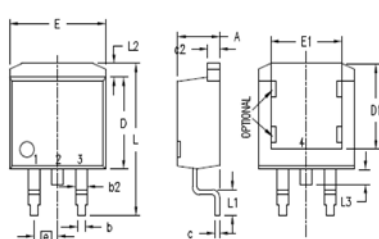
The product presented herein is under development. The Technical Specifications offered are derived from data gathered during objective characterizations of preliminary engineering lots; but also may yet contain some information supplied during a pre-production design evaluation. IXYS reserves the right to change limits, test conditions, and dimensions without notice.

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
4,850,072	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	

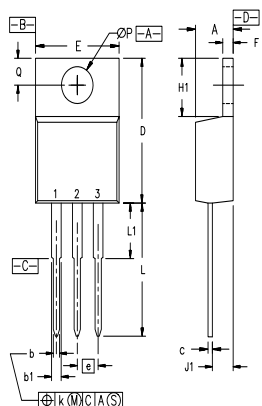
TO-263 (IXTA) Outline



1. GATE
2. DRAIN (COLLECTOR)
3. SOURCE (EMITTER)
4. DRAIN (COLLECTOR)
BOTTOM SIDE

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

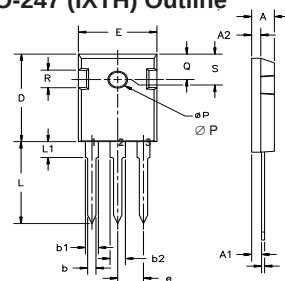
TO-220 (IXTP) Outline



Pins: 1 - Gate 2 - Drain 3 - Source

SYM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.170	.190	4.32	4.83
b	.025	.040	0.64	1.02
b1	.045	.065	1.15	1.65
c	.014	.022	0.35	0.56
D	.580	.630	14.73	16.00
E	.390	.420	9.91	10.66
e	.100 BSC		2.54 BSC	
F	.045	.055	1.14	1.40
H1	.230	.270	5.85	6.85
J1	.090	.110	2.29	2.79
k	0	.015	0	0.38
L	.500	.550	12.70	13.97
L1	.110	.230	2.79	5.84
ØP	.139	.161	3.53	4.08
Q	.100	.125	2.54	3.18

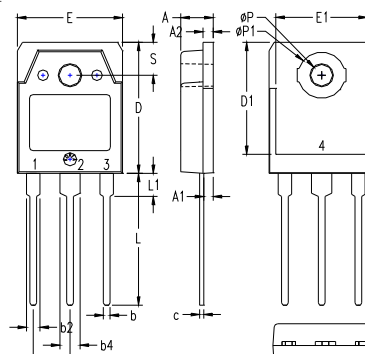
TO-247 (IXTH) Outline



Terminals: 1 - Gate 2 - Drain
3 - Source

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
L1		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

TO-3P (IXTQ) Outline



1 - GATE
2 - DRAIN (COLLECTOR)
3 - SOURCE (EMITTER)
4 - DRAIN (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

Fig. 1. Output Characteristics
@ 25°C

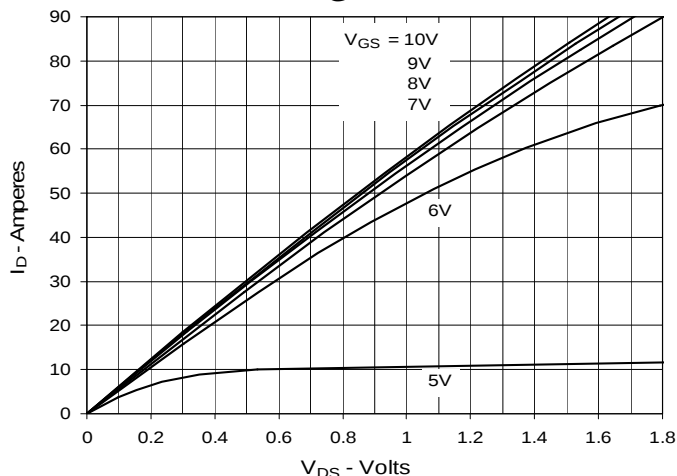


Fig. 2. Extended Output Characteristics
@ 25°C

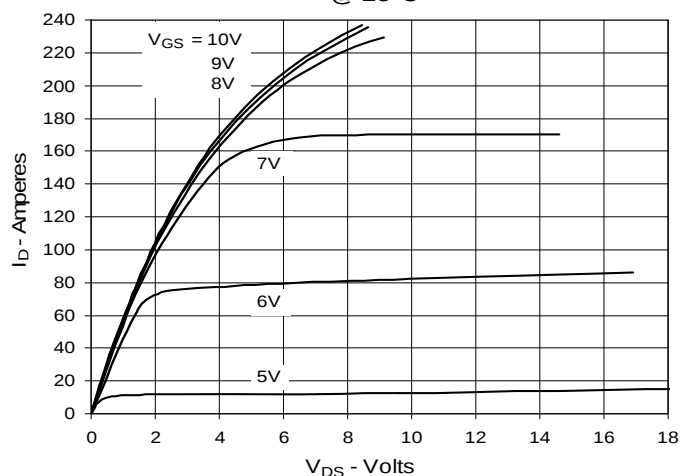


Fig. 3. Output Characteristics
@ 150°C

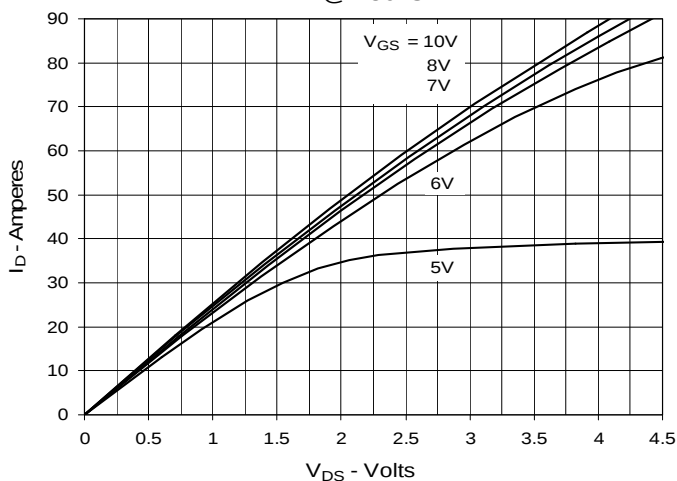


Fig. 4. $R_{DS(on)}$ Normalized to $I_D = 45A$ Value
vs. Junction Temperature

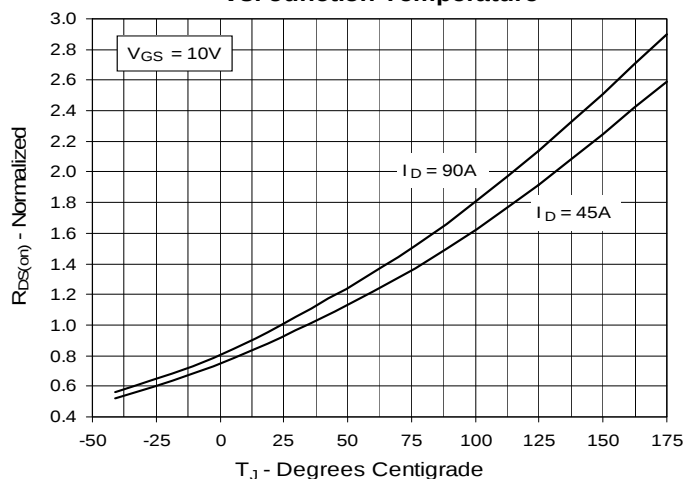


Fig. 5. $R_{DS(on)}$ Normalized to $I_D = 45A$ Value
vs. Drain Current

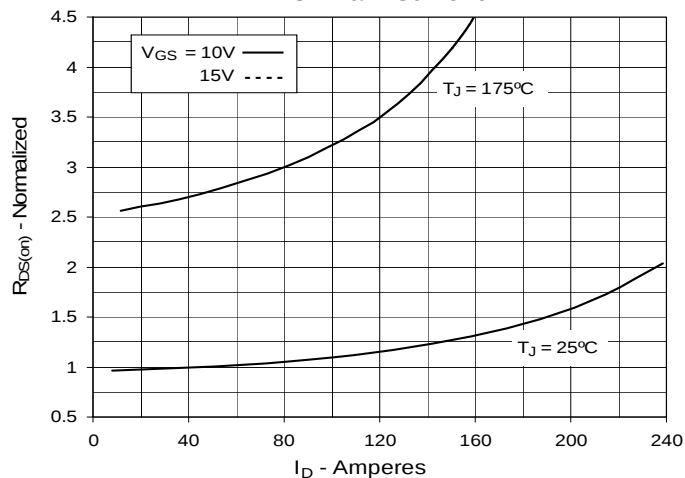


Fig. 6. Drain Current vs. Case Temperature

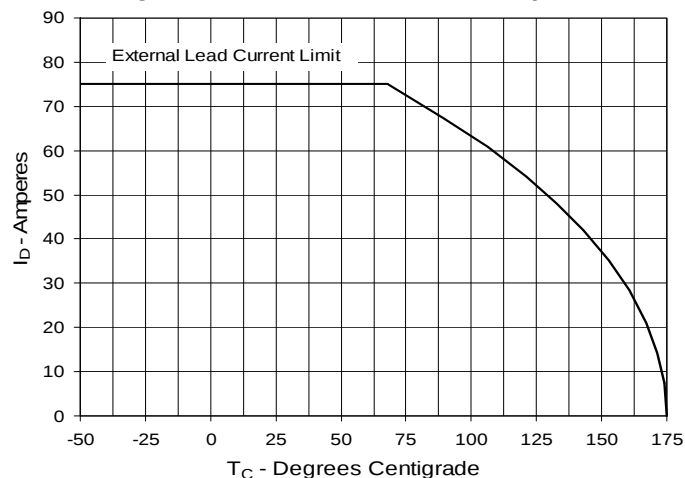


Fig. 7. Input Admittance

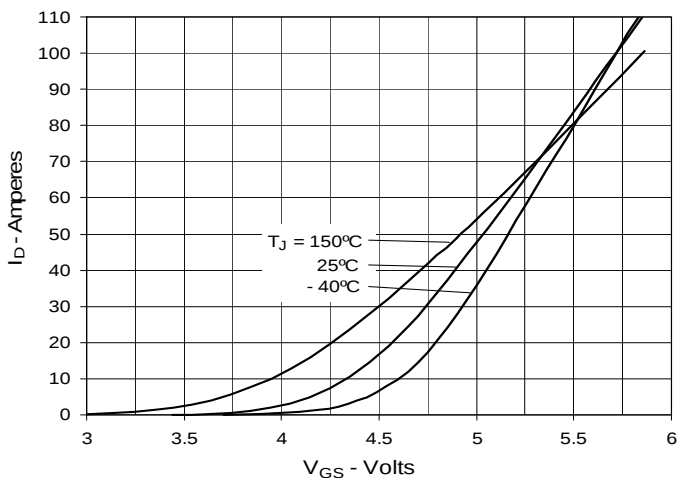


Fig. 8. Transconductance

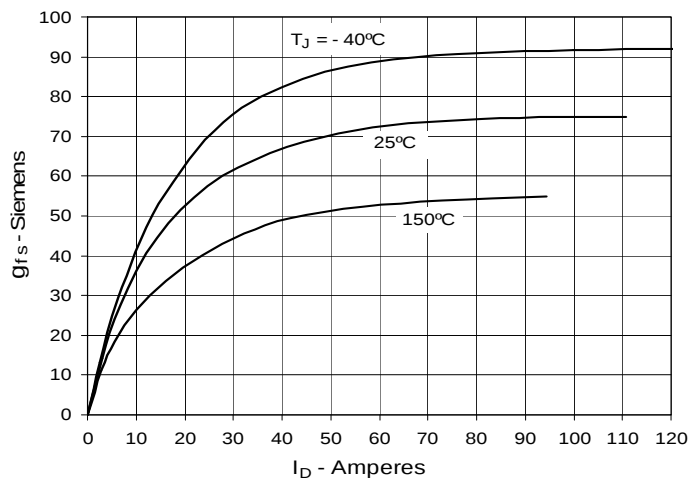


Fig. 9. Forward Voltage Drop of Intrinsic Diode

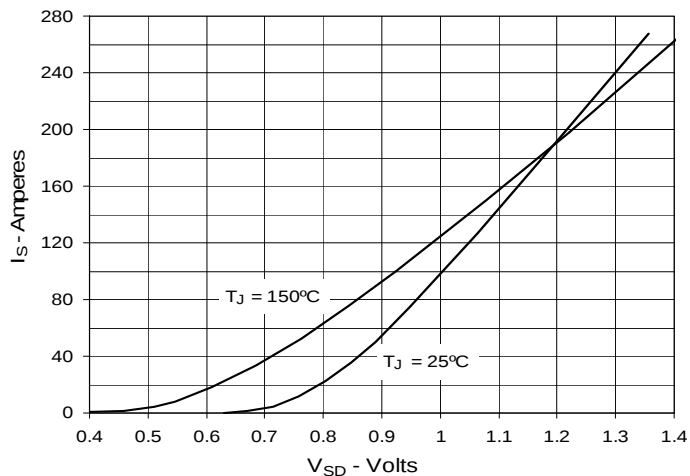


Fig. 10. Gate Charge

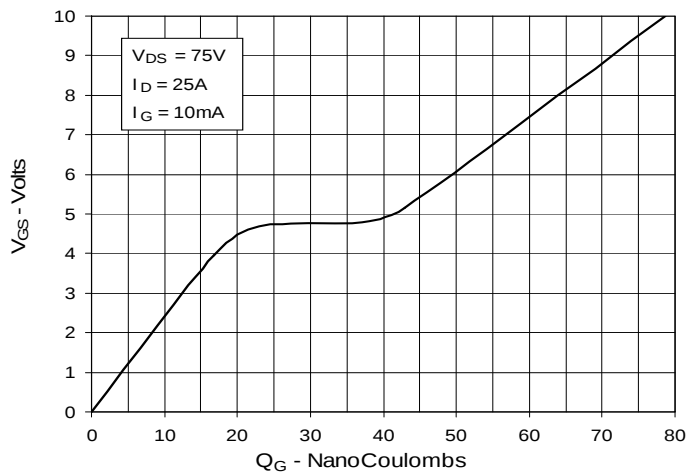


Fig. 11. Capacitance

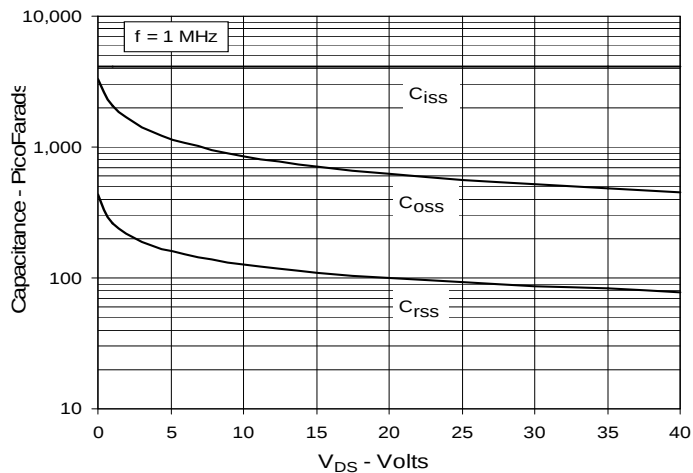
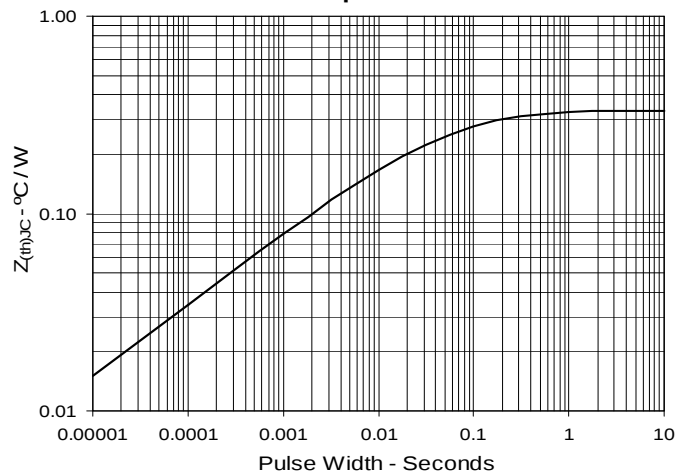
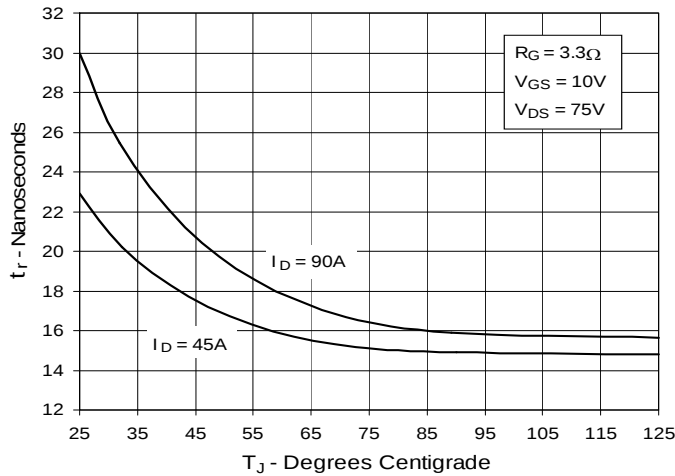


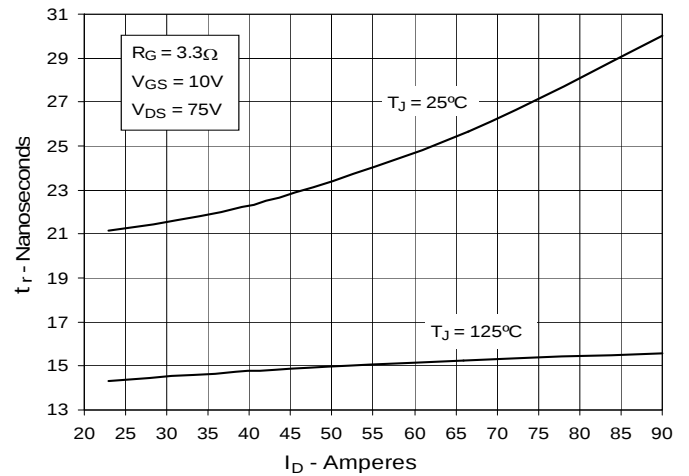
Fig. 12. Maximum Transient Thermal Impedance



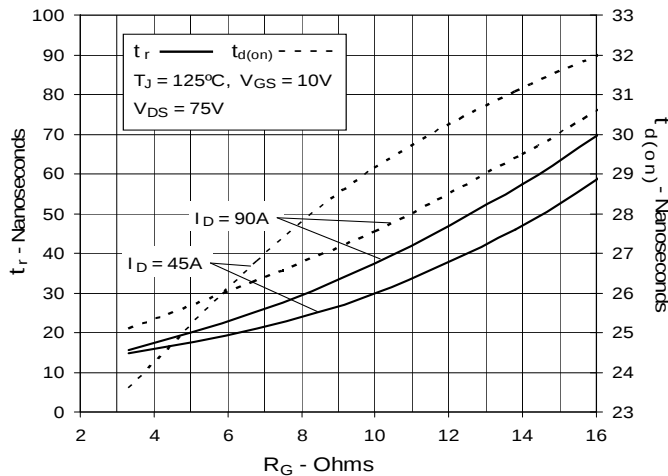
**Fig. 13. Resistive Turn-on
Rise Time vs. Junction Temperature**



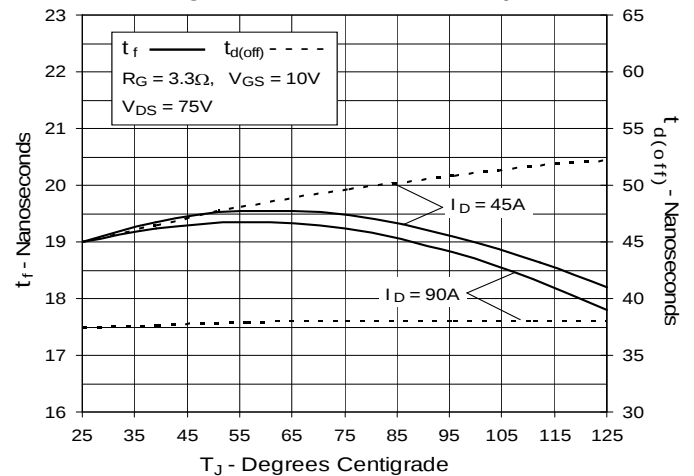
**Fig. 14. Resistive Turn-on
Rise Time vs. Drain Current**



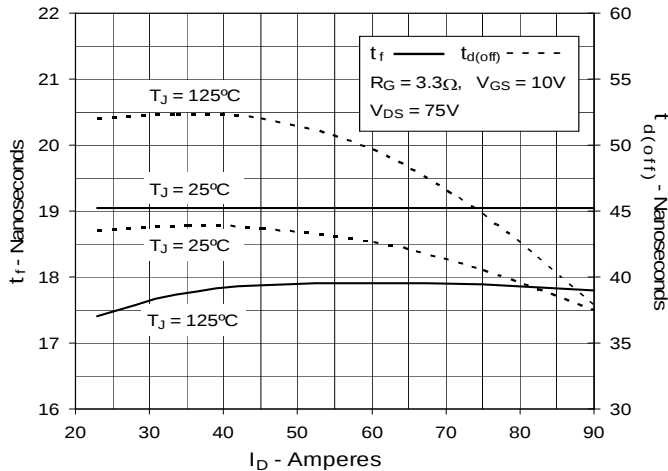
**Fig. 15. Resistive Turn-on
Switching Times vs. Gate Resistance**



**Fig. 16. Resistive Turn-off
Switching Times vs. Junction Temperature**



**Fig. 17. Resistive Turn-off
Switching Times vs. Drain Current**



**Fig. 18. Resistive Turn-off
Switching Times vs. Gate Resistance**

