IXYS

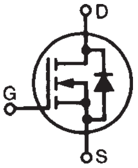
Preliminary Technical Information

TrenchMV™ Power MOSFET

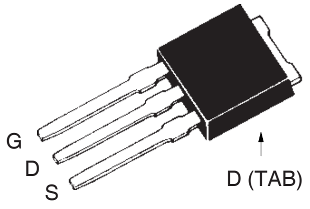
IXTU12N06T
IXTY12N06T

V_{DSS} = 60V
I_{D25} = 12A
$R_{DS(on)} \leq$ 85mΩ

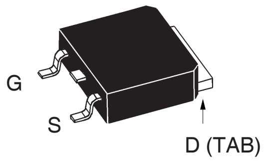
N-Channel Enhancement Mode
Avalanche Rated



TO-251 (IXTU)



TO-252 (IXTY)



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

Symbol	Test Conditions	Maximum Ratings	
V_{DSS}	T_J = 25°C to 175°C	60	V
V_{DGR}	T_J = 25°C to 175°C, R_{GS} = 1MΩ	60	V
V_{GSM}	Transient	±20	V
I_{D25}	T_C = 25°C	12	A
I_{DM}	T_C = 25°C, pulse width limited by T_{JM}	30	A
I_{LRMS}	Package Current Limit, RMS TO-252	25	A
I_{AR}	T_C = 25°C	3	A
E_{AS}	T_C = 25°C	20	mJ
P_D	T_C = 25°C	33	W
T_J		-55 ... +175	°C
T_{JM}		175	°C
T_{stg}		-55 ... +175	°C
T_L	Maximum lead temperature for soldering	300	°C
T_{SOLD}	1.6 mm (0.062 in.) from case for 10s	260	°C
M_d	Mounting torque	1.13/10	Nm/lb.in.
Weight	TO-251	0.40	g
	TO-252	0.35	g

Features

- Ultra-low On Resistance
- Unclamped Inductive Switching (UIS) rated
- Low package inductance
  - easy to drive and to protect
- 175 °C Operating Temperature

Advantages

- Easy to mount
- Space savings
- High power density

Applications

- Automotive
  - Motor Drives
  - 42V Power Bus
  - ABS Systems
- DC/DC Converters and Off-line UPS
- Primary Switch for 24V and 48V Systems
- High Current Switching Applications

Symbol	Test Conditions (T_J = 25°C unless otherwise specified)		Characteristic Values Min.	Typ.	Max.	
BV_{DSS}	V_{GS} = 0V, I_D = 250µA		60			V
$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 25µA		2.0		4.0	V
I_{GSS}	V_{GS} = ± 20V, V_{DS} = 0V				± 50	nA
I_{DSS}	V_{DS} = V_{DSS}				1	µA
	V_{GS} = 0V	T_J = 150°C			100	µA
$R_{DS(on)}$	V_{GS} = 10V, I_D = 0.5 • I_{D25}, Notes 1, 2				85	mΩ

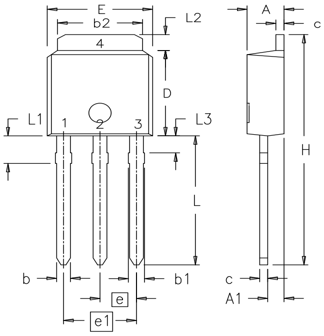
Symbol	Test Conditions ($T_J = 25°C$, unless otherwise specified)	Characteristic Values Min.	Typ.	Max.	
g_{fs}	V_{DS} = 10V, $I_D = 0.5 \bullet I_{D25}$, Notes 1	2.9	4.7		S
C_{iss}	V_{GS} = 0V, V_{DS} = 25V, f = 1MHz		256		pF
C_{oss}			46		pF
C_{rss}			10.4		pF
$t_{d(on)}$	**Resistive Switching Times** V_{GS} = 10V, $V_{DS} = 0.5 \bullet V_{DSS}$, I_D = 6A R_G = 50Ω (External)		12		ns
t_r			29		ns
$t_{d(off)}$			29		ns
t_f			18		ns
$Q_{g(on)}$	V_{GS} = 10V, $V_{DS} = 0.5 \bullet V_{DSS}$, I_D = 6A		3.4		nC
Q_{gs}			1.0		nC
Q_{gd}			0.9		nC
R_{thJC}				4.5	°C/W

Source-Drain Diode

Symbol	Test Conditions ($T_J = 25°C$, unless otherwise specified)	Characteristic Values Min.	Typ.	Max.	
I_S	V_{GS} = 0V			12	A
I_{SM}	Repetitive, pulse width limited by T_{JM}			48	A
V_{SD}	I_F = 6A, V_{GS} = 0V, Note 1			1.2	V
t_{rr}	I_F = 6A, V_{GS} = 0V, -di/dt = 100A/μs V_R = 30V		30		ns
I_{RM}			1.34		A

Notes: 1. Pulse test: t ≤ 300μs; duty cycle, d ≤ 2%.
2. On through-hole packages, $R_{DS(on)}$ Kelvin test contact location must be 5mm or less from the package body.

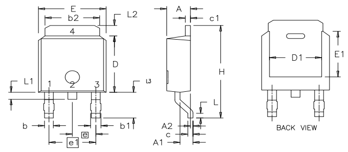
TO-251 (IXTU) Outline



1. Gate 2. Drain
3. Source 4. Drain

Dim.	Millimeter Min.	Millimeter Max.	Inches Min.	Inches Max.
A	2.19	2.38	.086	.094
A1	0.89	1.14	0.35	.045
b	0.64	0.89	.025	.035
b1	0.76	1.14	.030	.045
b2	5.21	5.46	.205	.215
c	0.46	0.58	.018	.023
c1	0.46	0.58	.018	.023
D	5.97	6.22	.235	.245
E	6.35	6.73	.250	.265
e	2.28	BSC	.090	BSC
e1	4.57	BSC	.180	BSC
H	17.02	17.78	.670	.700
L	8.89	9.65	.350	.380
L1	1.91	2.28	.075	.090
L2	0.89	1.27	.035	.050

TO-252 (IXTY) Outline



Pins: 1 - Gate 2,4 - Drain
3 - Source

Dim.	Millimeter Min.	Millimeter Max.	Inches Min.	Inches Max.
A	2.19	2.38	0.086	0.094
A1	0.89	1.14	0.035	0.045
A2	0	0.13	0	0.005
b	0.64	0.89	0.025	0.035
b1	0.76	1.14	0.030	0.045
b2	5.21	5.46	0.205	0.215
c	0.46	0.58	0.018	0.023
c1	0.46	0.58	0.018	0.023
D	5.97	6.22	0.235	0.245
D1	4.32	5.21	0.170	0.205
E	6.35	6.73	0.250	0.265
E1	4.32	5.21	0.170	0.205
e	2.28 BSC		0.090 BSC	
e1	4.57 BSC		0.180 BSC	
H	9.40	10.42	0.370	0.410
L	0.51	1.02	0.020	0.040
L1	0.64	1.02	0.025	0.040
L2	0.89	1.27	0.035	0.050
L3	2.54	2.92	0.100	0.115

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.

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Fig. 1. Output Characteristics @ 25ºC

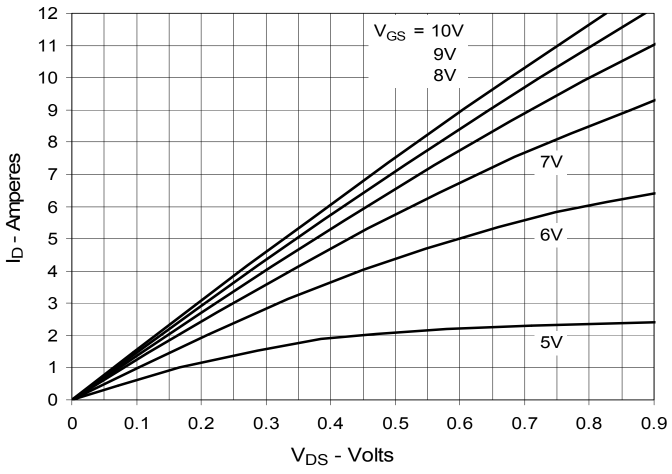


Fig. 2. Extended Output Characteristics @ 25ºC

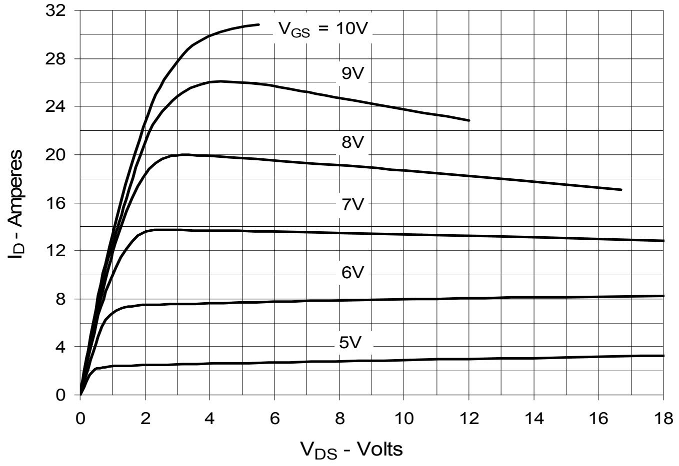


Fig. 3. Output Characteristics @ 150ºC

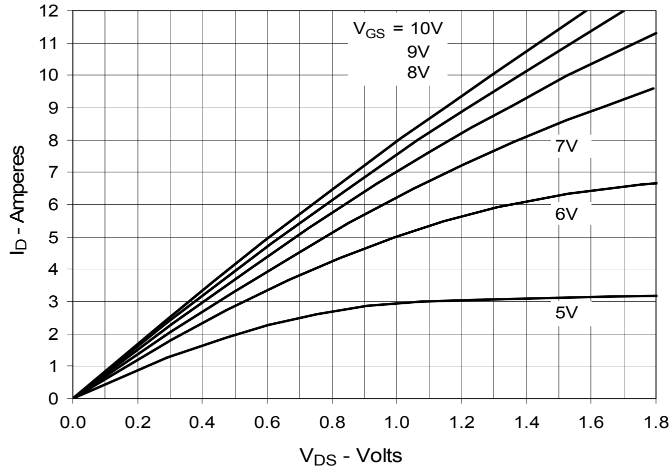


Fig. 4. $R_{DS(on)}$ Normalized to I_D = 6A Value vs. Junction Temperature

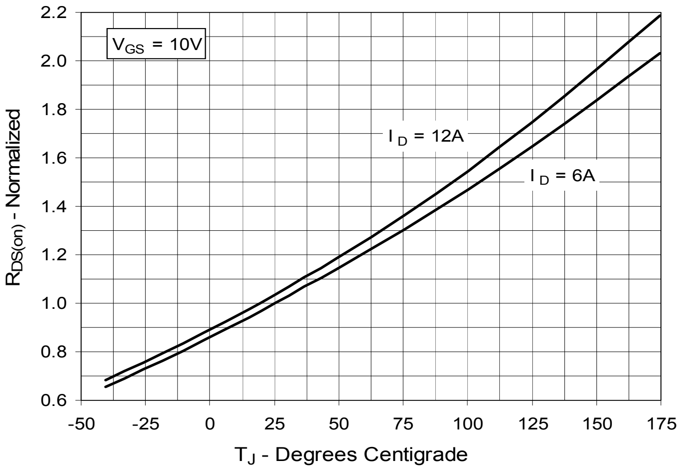


Fig. 5. $R_{DS(on)}$ Normalized to I_D = 6A Value vs. Drain Current

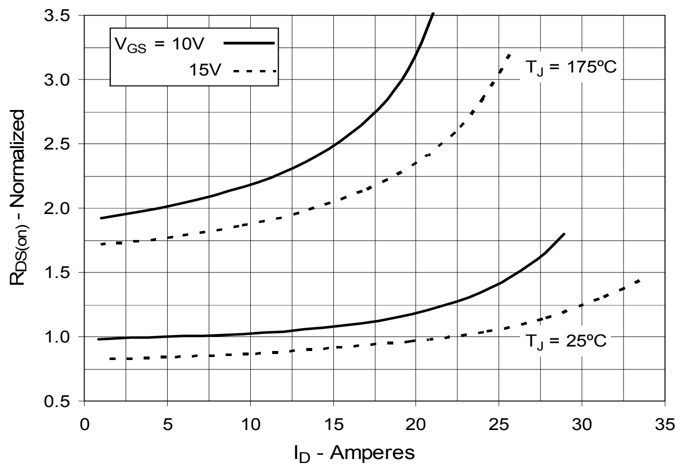


Fig. 6. Drain Current vs. Case Temperature

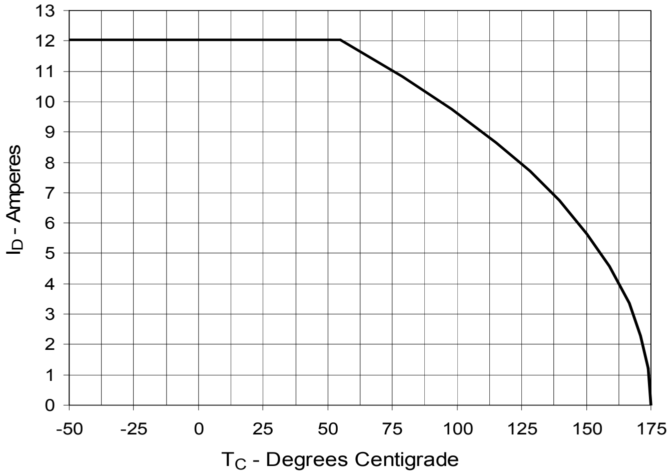


Fig. 7. Input Admittance

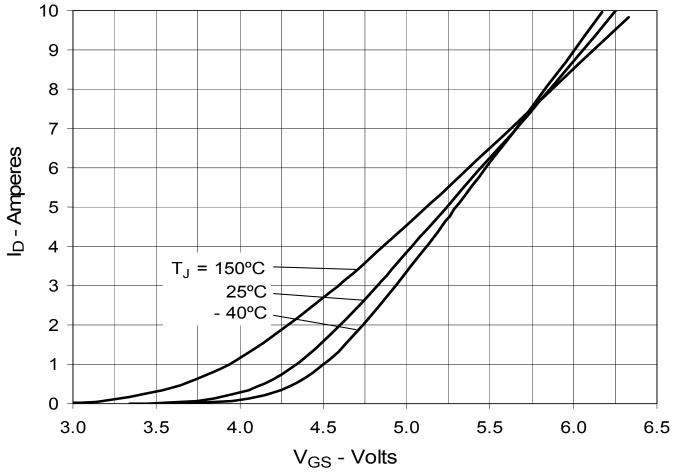


Fig. 8. Transconductance

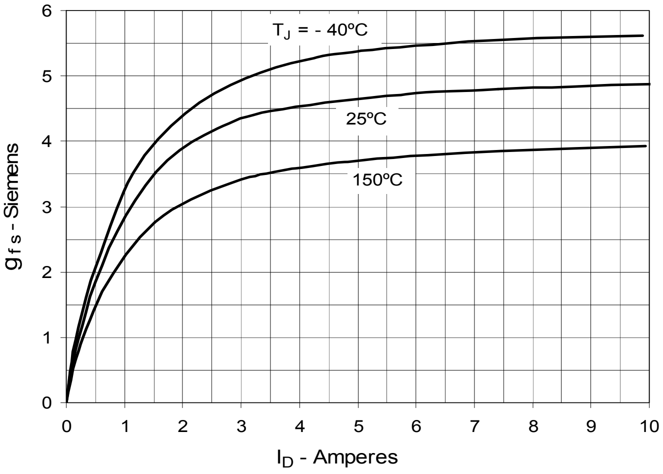


Fig. 9. Forward Voltage Drop of Intrinsic Diode

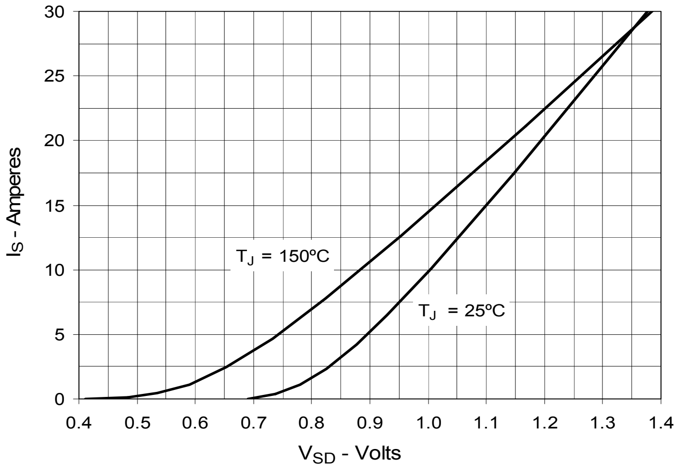


Fig. 10. Gate Charge

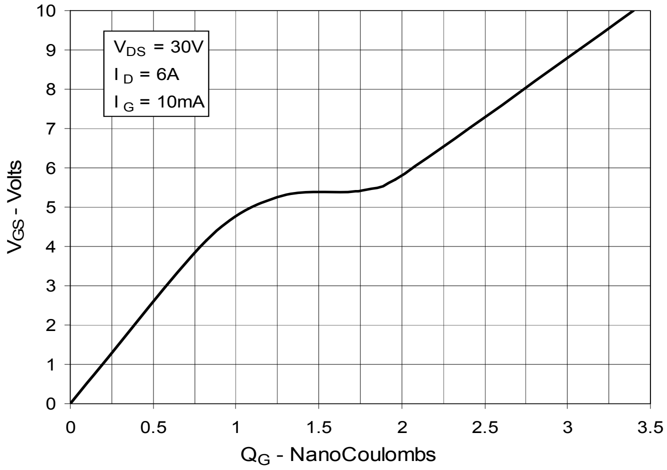


Fig. 11. Capacitance

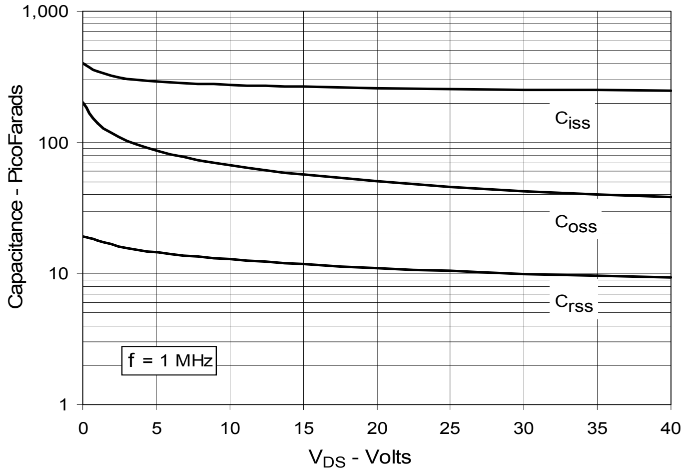


Fig. 12. Maximum Transient Thermal Impedance

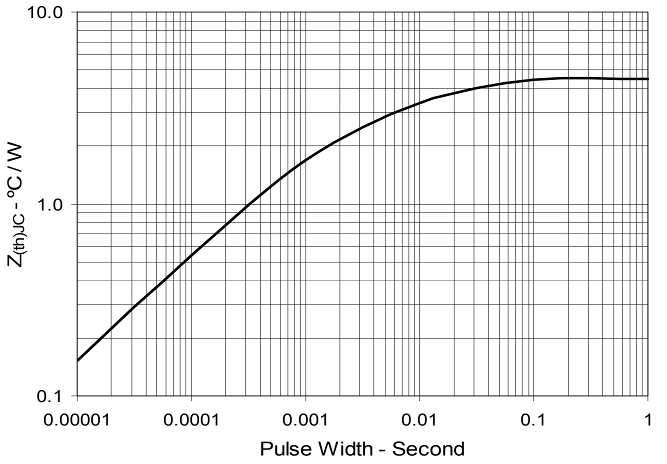


Fig. 13. Resistive Turn-on Rise Time vs. Junction Temperature

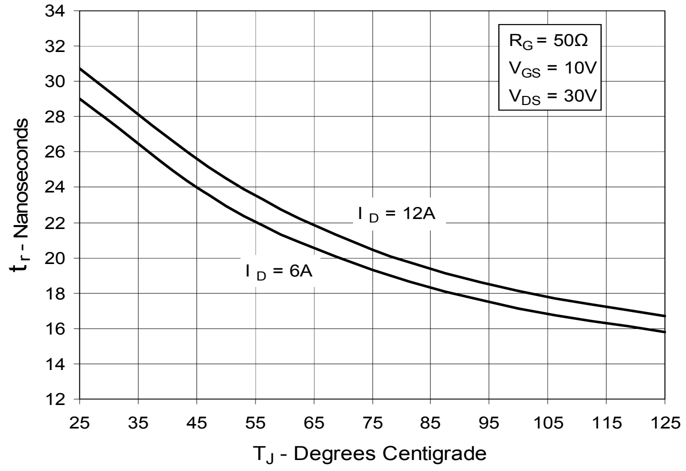


Fig. 14. Resistive Turn-on Rise Time vs. Drain Current

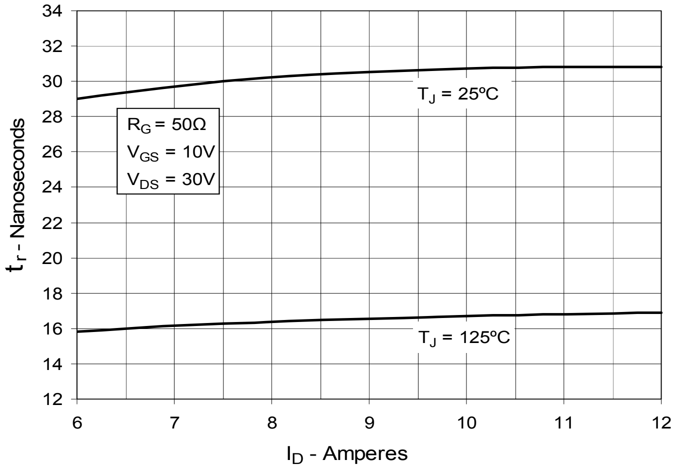


Fig. 15. Resistive Turn-on Switching Times vs. Gate Resistance

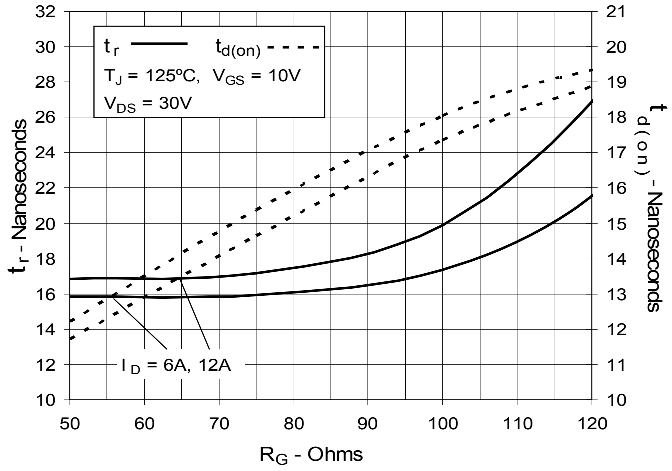


Fig. 16. Resistive Turn-off Switching Times vs. Junction Temperature

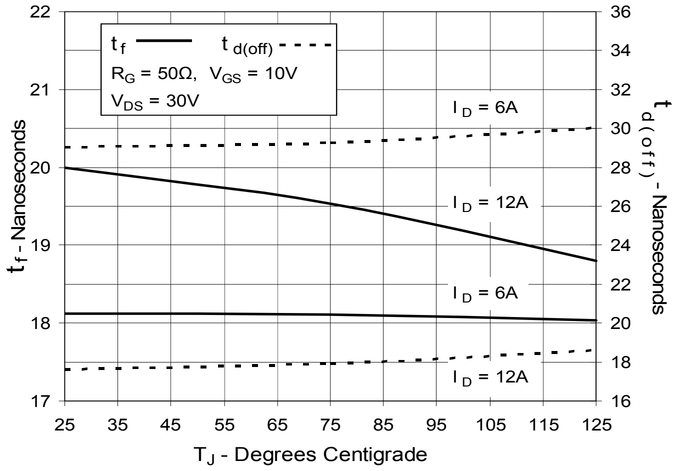


Fig. 17. Resistive Turn-off Switching Times vs. Drain Current

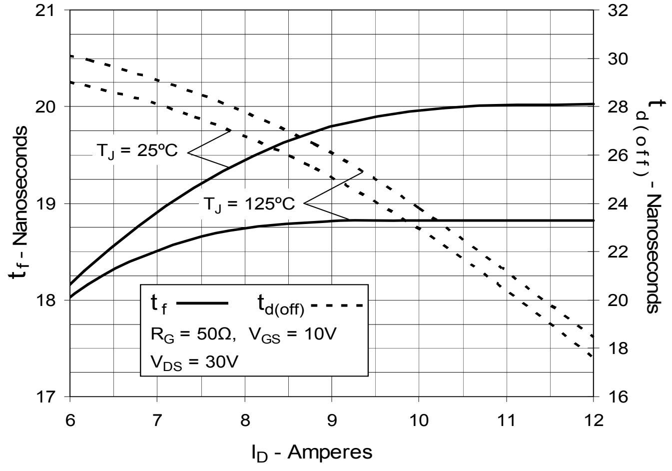
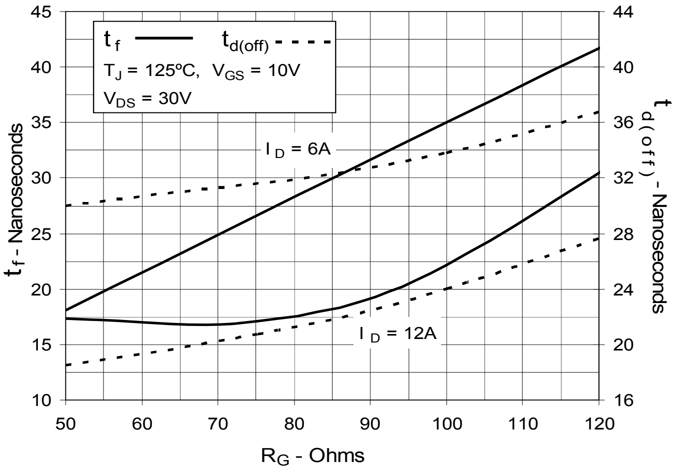


Fig. 18. Resistive Turn-off Switching Times vs. Gate Resistance



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