

# TrenchT2™ Power MOSFET

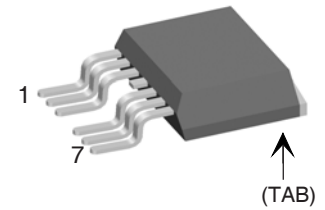
## IXTA220N04T2-7

$V_{DSS} = 40V$   
 $I_{D25} = 220A$   
 $R_{DS(on)} \leq 3.5m\Omega$

N-Channel Enhancement Mode  
Avalanche Rated



TO-263 (7-lead)



Pins: 1 - Gate  
 2, 3 - Source  
 5,6,7 - Source  
 TAB (8) - Drain

Symbol	Test Conditions	Maximum Ratings	
$V_{DSS}$	$T_J = 25^\circ C$ to $175^\circ C$	40	V
$V_{DGR}$	$T_J = 25^\circ C$ to $175^\circ C$ , $R_{GS} = 1M\Omega$	40	V
$V_{GSM}$	Transient	$\pm 20$	V
$I_{D25}$	$T_C = 25^\circ C$	220	A
$I_{LRMS}$	Lead Current Limit, RMS	160	A
$I_{DM}$	$T_C = 25^\circ C$ , pulse width limited by $T_{JM}$	660	A
$I_{AR}$	$T_C = 25^\circ C$	110	A
$E_{AS}$	$T_C = 25^\circ C$	600	mJ
$P_D$	$T_C = 25^\circ C$	360	W
$T_J$		-55 ... +175	$^\circ C$
$T_{JM}$		175	$^\circ C$
$T_{stg}$		-55 ... +175	$^\circ C$
$T_L$	1.6mm (0.062in.) from case for 10s	300	$^\circ C$
$T_{SOLD}$	Plastic body for 10 seconds	260	$^\circ C$
Weight		3	g

### Features

- International standard package
- $175^\circ C$  Operating Temperature
- High current handling capability
- Avalanche Rated
- Low  $R_{DS(on)}$

### Advantages

- Easy to mount
- Space savings
- High power density

### Applications

- Synchronous Buck Converters
- High Current Switching Power Supplies
- Battery Powered Electric Motors
- Resonant-mode power supplies
- Electronics Ballast Application
- Class D Audio Amplifiers

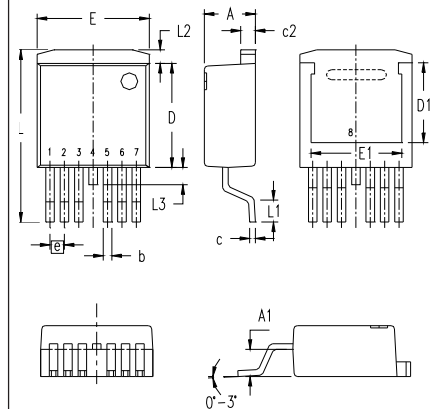
Symbol	Test Conditions ( $T_J = 25^\circ C$ unless otherwise specified)	Characteristic Values		
		Min.	Typ.	Max.
$BV_{DSS}$	$V_{GS} = 0V$ , $I_D = 250\mu A$	40		V
$V_{GS(th)}$	$V_{DS} = V_{GS}$ , $I_D = 250\mu A$	2.0		4.0 V
$I_{GSS}$	$V_{GS} = \pm 20V$ , $V_{DS} = 0V$			$\pm 200$ nA
$I_{DSS}$	$V_{DS} = V_{DSS}$			5 $\mu A$
	$V_{GS} = 0V$ $T_J = 150^\circ C$			50 $\mu A$
$R_{DS(on)}$	$V_{GS} = 10V$ , $I_D = 50A$ , Notes 1, 2	2.8	3.5	$m\Omega$

Symbol	Test Conditions ( $T_J = 25^\circ\text{C}$ , unless otherwise specified)	Characteristic Values		
		Min.	Typ.	Max.
$g_{fs}$	$V_{DS} = 10\text{V}, I_D = 60\text{A}$ , Note 1	40	66	S
$C_{iss}$	$V_{GS} = 0\text{V}, V_{DS} = 25\text{V}, f = 1\text{MHz}$		6820	pF
$C_{oss}$			1185	pF
$C_{rss}$			250	pF
$t_{d(on)}$	<b>Resistive Switching Times</b> $V_{GS} = 10\text{V}, V_{DS} = 20\text{V}, I_D = 50\text{A}$ $R_G = 3.3\Omega$ (External)		15	ns
$t_r$			21	ns
$t_{d(off)}$			31	ns
$t_f$			21	ns
$Q_{g(on)}$	$V_{GS} = 10\text{V}, V_{DS} = 0.5 \cdot V_{DSS}, I_D = 0.5 \cdot I_{D25}$		112	nC
$Q_{gs}$			33	nC
$Q_{gd}$			30	nC
$R_{thJC}$				0.42 $^\circ\text{C/W}$

### Source-Drain Diode

Symbol	Test Conditions ( $T_J = 25^\circ\text{C}$ , unless otherwise specified)	Characteristic Values		
		Min.	Typ.	Max.
$I_s$	$V_{GS} = 0\text{V}$			220 A
$I_{SM}$	Repetitive, Pulse width limited by $T_{JM}$			660 A
$V_{SD}$	$I_F = 50\text{A}, V_{GS} = 0\text{V}$ , Note 1			1.0 V
$t_{rr}$	$I_F = 110\text{A}, V_{GS} = 0\text{V}$ $-di/dt = 100\text{A}/\mu\text{s}$ $V_R = 20\text{V}$		45	ns
$I_{RM}$			1.4	A
$Q_{RM}$			32	nC

### TO-263 (7-lead) (IXTA..7) Outline



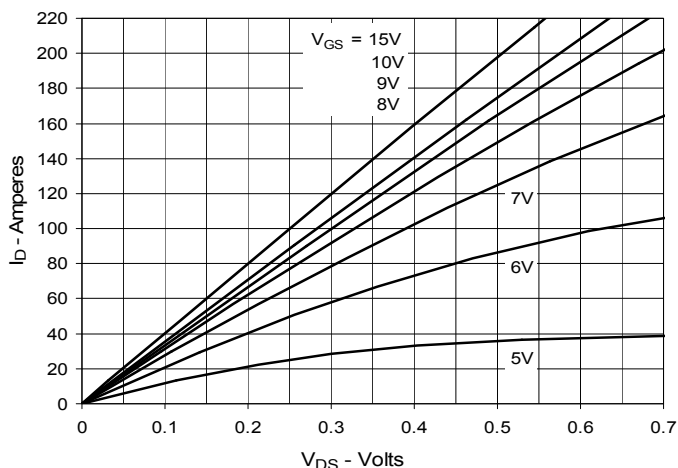
- Pins: 1 - Gate  
2, 3 - Source  
4 - Drain  
5,6,7 - Source  
Tab (8) - Drain

SYM	INCHES		MILLIMETER	
	MIN	MAX	MIN	MAX
A	.170	.185	4.30	4.70
A1	.085	.104	2.15	2.65
b	.026	.035	0.65	0.90
c	.016	.024	0.40	0.60
c2	.049	.055	1.25	1.40
D	.355	.370	9.00	9.40
D1	.272	.280	6.90	7.10
E	.386	.402	9.80	10.20
E1	.311	.319	7.90	8.10
e	.050 BSC		1.27 BSC	
L	.591	.614	15.00	15.60
L1	.091	.110	2.30	2.80
L2	.039	.059	1.00	1.50
L3	.000	.059	0.00	1.50

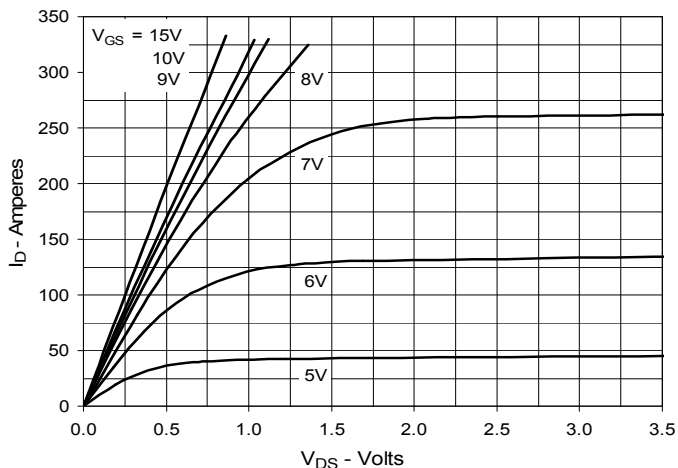
- Notes: 1. Pulse test,  $t \leq 300\mu\text{s}$ ; duty cycle,  $d \leq 2\%$ .  
2. On through-hole packages,  $R_{DS(on)}$  Kelvin test contact location must be 5mm or less from the package body.

IXYS reserves the right to change limits, test conditions, and dimensions.

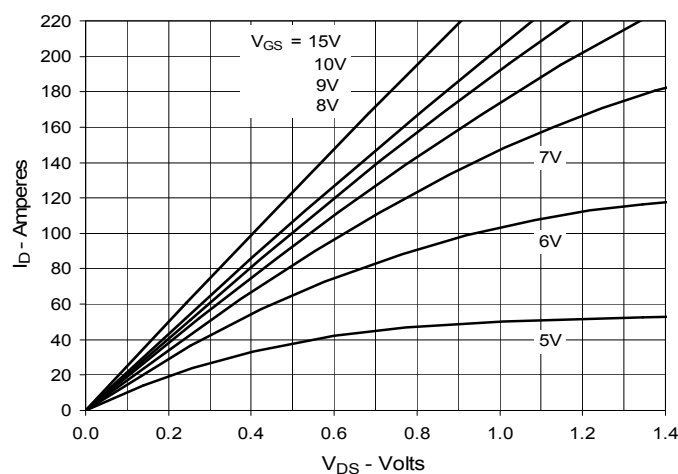
**Fig. 1. Output Characteristics @ 25°C**



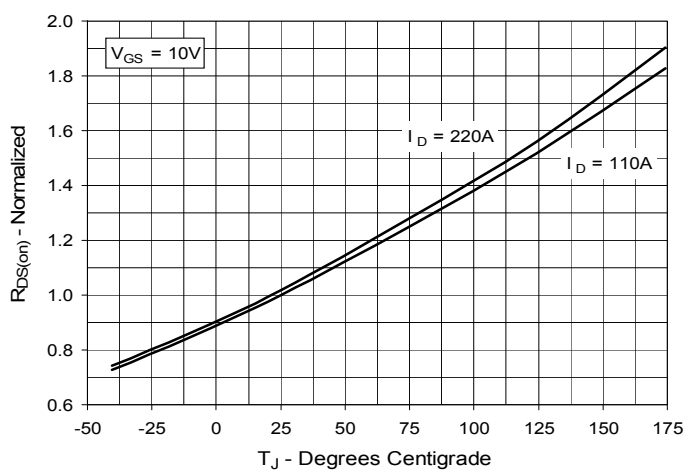
**Fig. 2. Extended Output Characteristics @ 25°C**



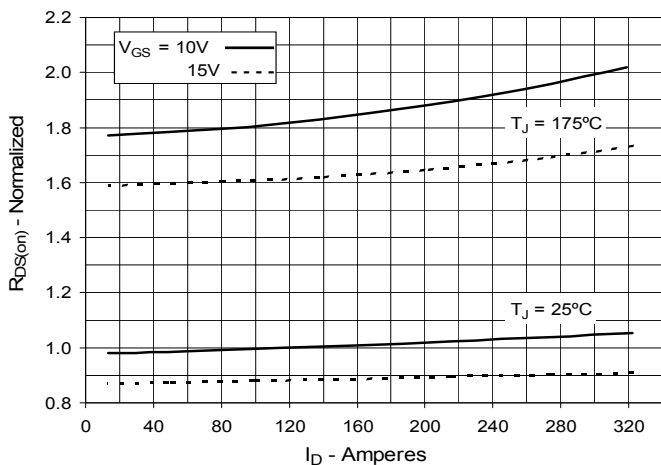
**Fig. 3. Output Characteristics @ 150°C**



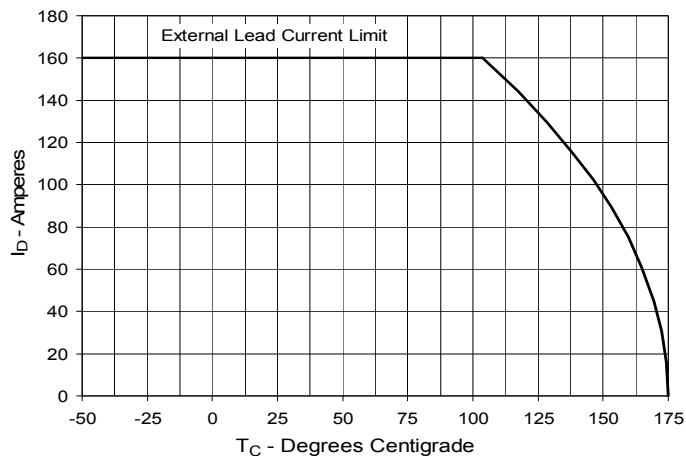
**Fig. 4.  $R_{DS(on)}$  Normalized to  $I_D = 110A$  Value vs. Junction Temperature**



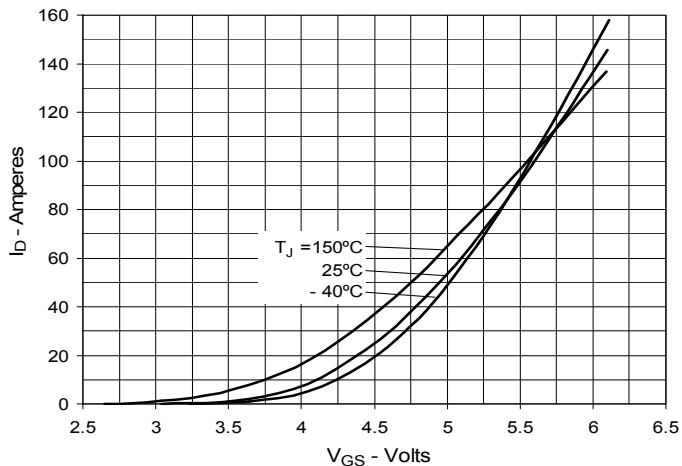
**Fig. 5.  $R_{DS(on)}$  Normalized to  $I_D = 110A$  Value vs. Drain Current**



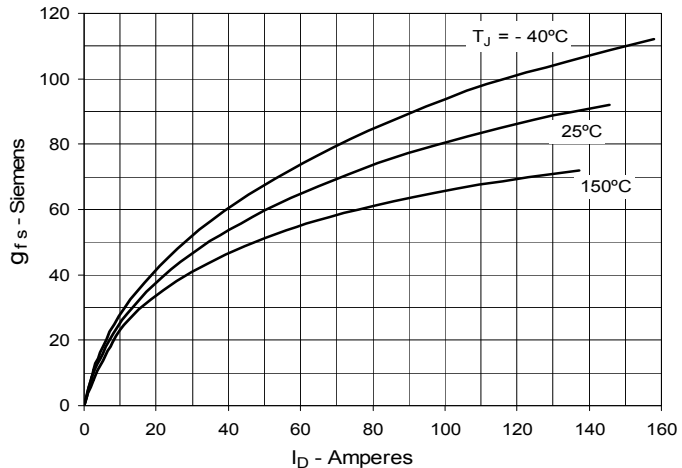
**Fig. 6. Drain Current vs. Case Temperature**



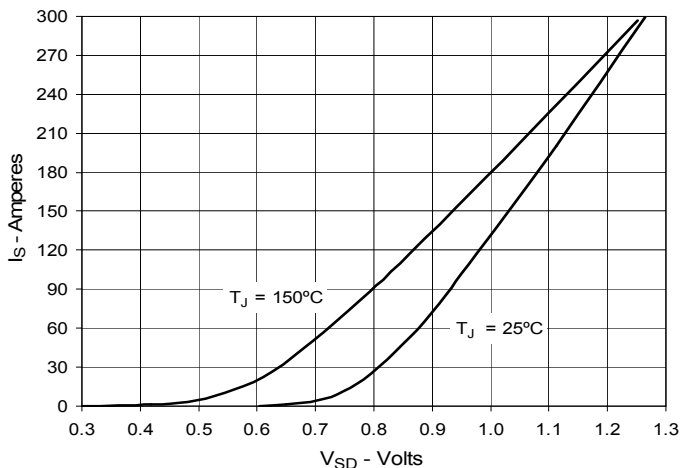
**Fig. 7. Input Admittance**



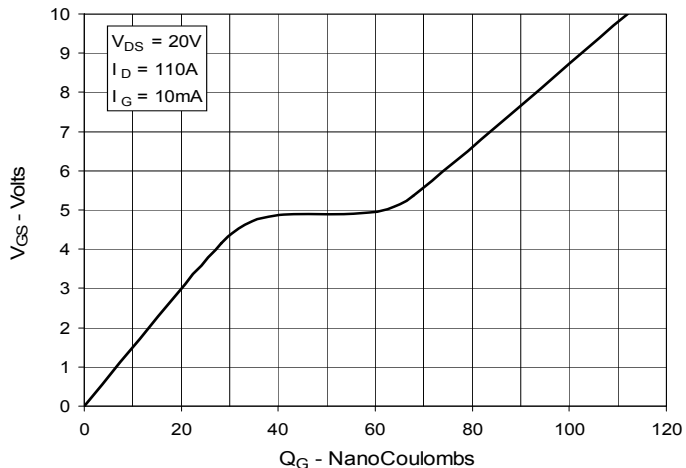
**Fig. 8. Transconductance**



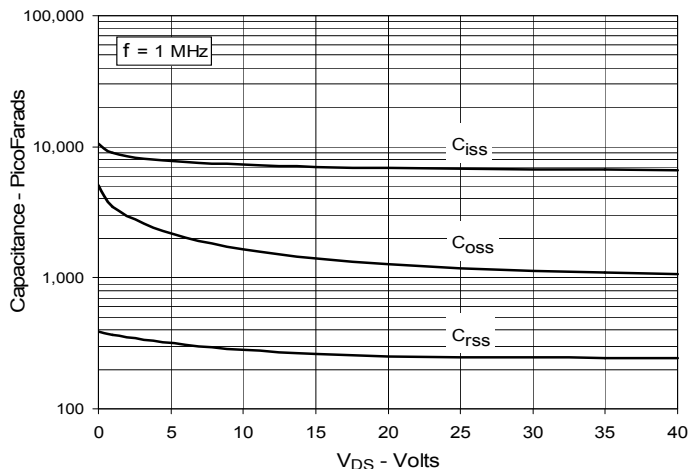
**Fig. 9. Forward Voltage Drop of Intrinsic Diode**



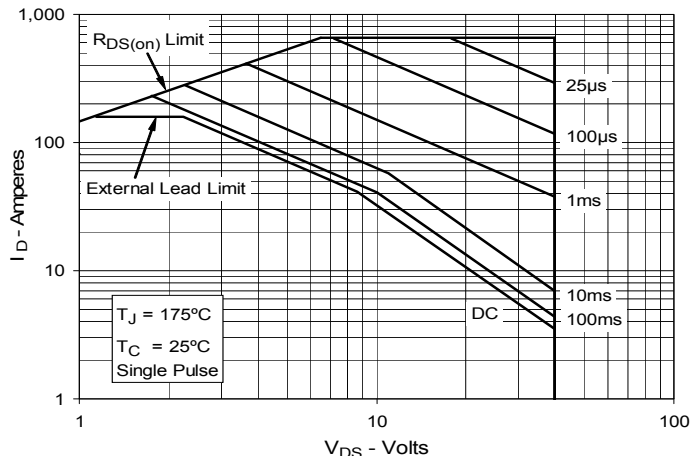
**Fig. 10. Gate Charge**



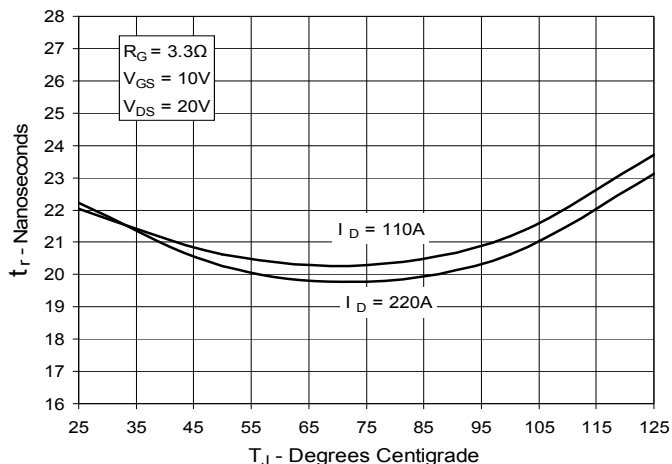
**Fig. 11. Capacitance**



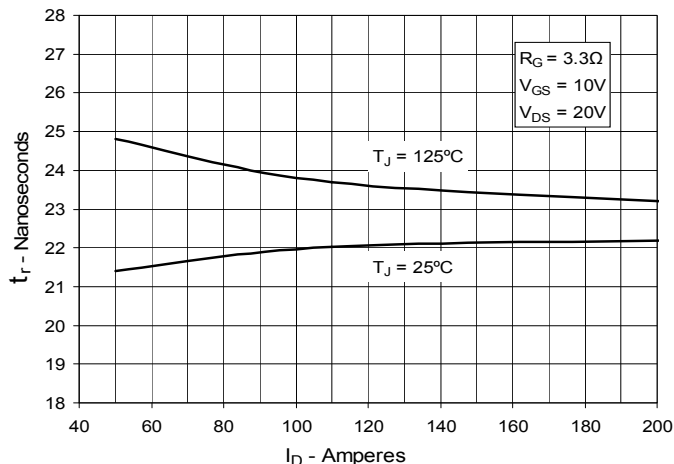
**Fig. 12. Forward-Bias Safe Operating Area**



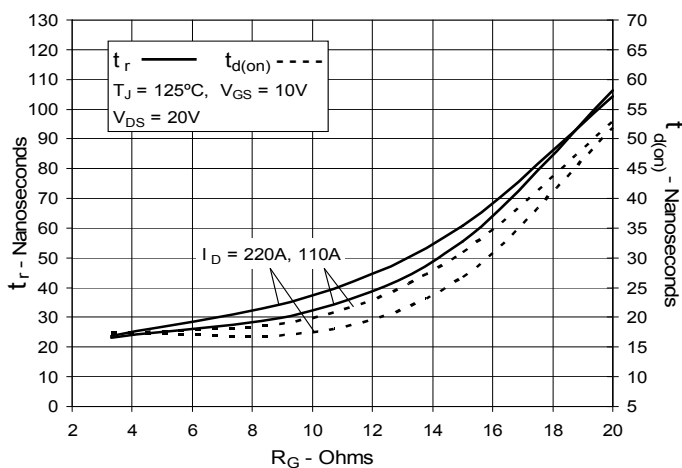
**Fig. 13. Resistive Turn-on Rise Time vs. Junction Temperature**



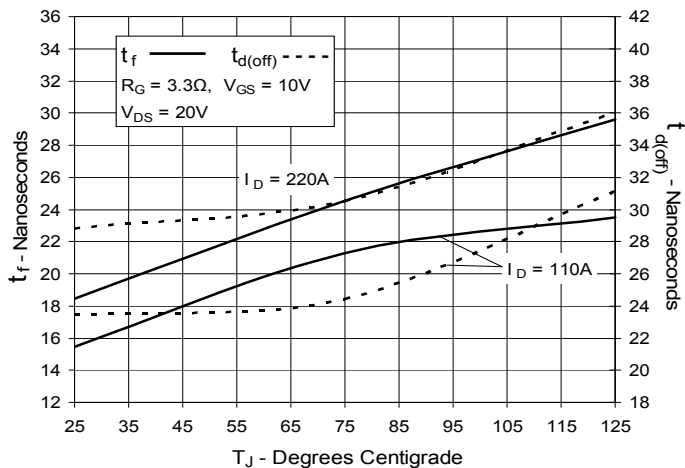
**Fig. 14. Resistive Turn-on Rise Time vs. Drain Current**



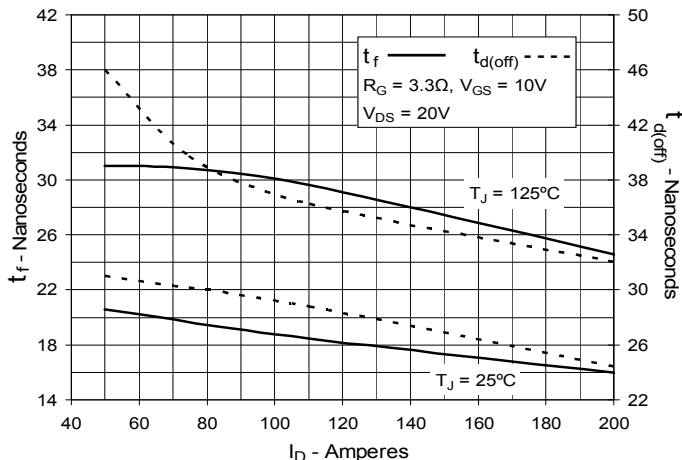
**Fig. 15. Resistive Turn-on Switching Times vs. Gate Resistance**



**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**

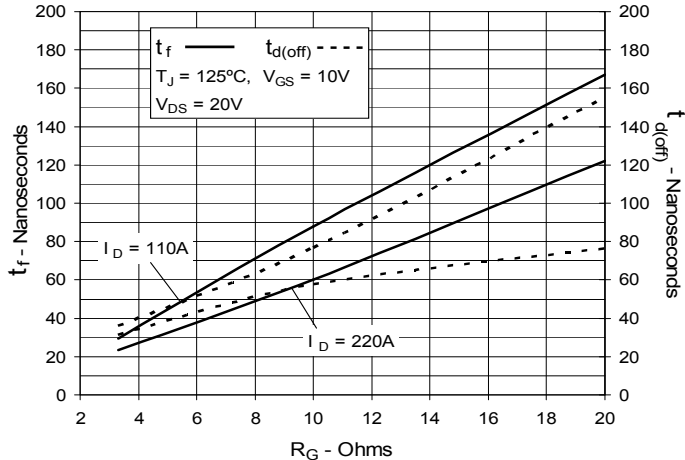
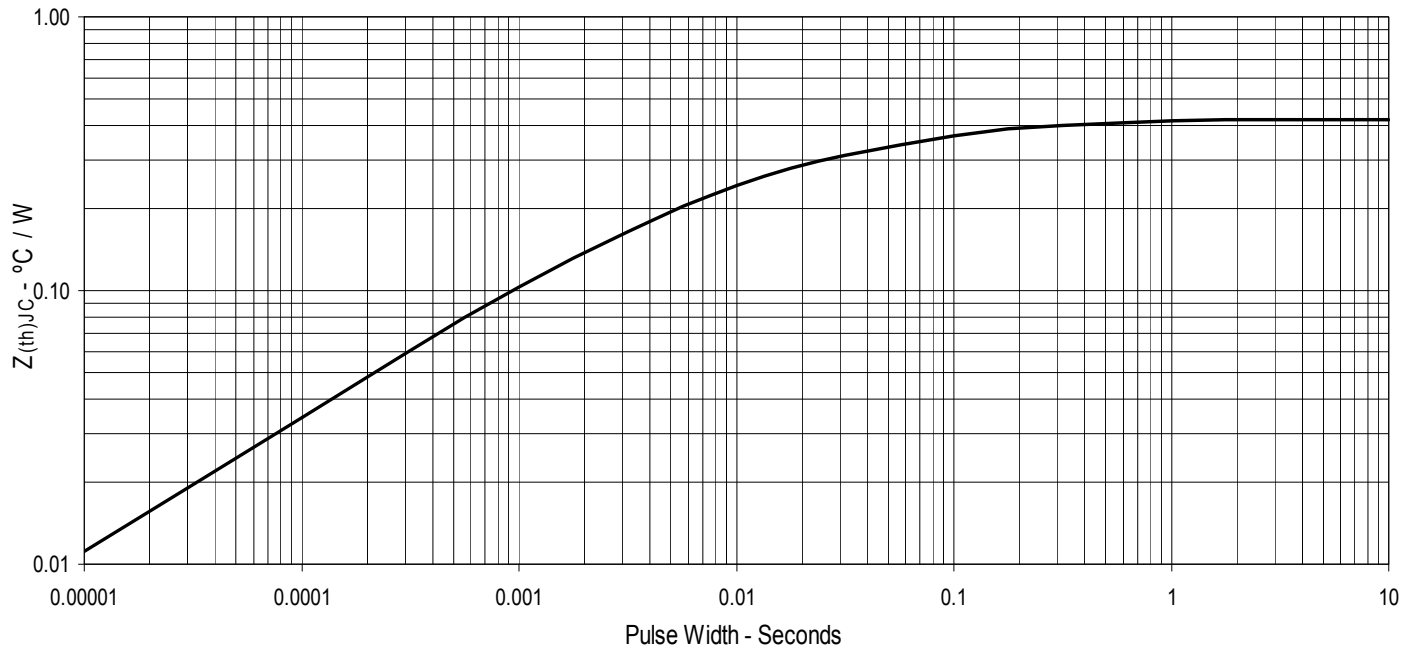


Fig. 19. Maximum Transient Thermal Impedance





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