

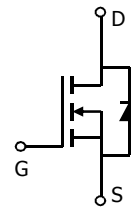
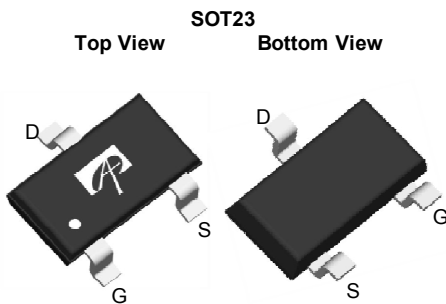
## N-Channel Enhancement Mode Field Effect Transistor

### General Description

The GX3404A uses advanced trench technology to provide excellent  $R_{DS(ON)}$  and low gate charge. This device is suitable for use as a load switch or in PWM applications.

### Features

$V_{DS}$  (V) = 30V  
 $I_D$  = 5.8A ( $V_{GS} = 10V$ )  
 $R_{DS(ON)} < 25m\Omega$  ( $V_{GS} = 10V$ )  
 $R_{DS(ON)} < 35m\Omega$  ( $V_{GS} = 4.5V$ )



### Absolute Maximum Ratings $T_A=25^\circ\text{C}$ unless otherwise noted

Parameter	Symbol	Maximum	Units
Drain-Source Voltage	$V_{DS}$	30	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Continuous Drain Current <sup>A,F</sup>	$I_D$	$T_A=25^\circ\text{C}$	5.8
		$T_A=70^\circ\text{C}$	4.9
Pulsed Drain Current <sup>B</sup>	$I_{DM}$	64	A
Power Dissipation	$P_D$	$T_A=25^\circ\text{C}$	1.4
		$T_A=70^\circ\text{C}$	0.9
Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 to 150	$^\circ\text{C}$

### Thermal Characteristics

Parameter	Symbol	Typ	Max	Units
Maximum Junction-to-Ambient <sup>A</sup>	$R_{\theta JA}$	65	90	$^\circ\text{C/W}$
$t \leq 10\text{s}$				
Maximum Junction-to-Ambient <sup>A</sup>	$R_{\theta JL}$	63	80	$^\circ\text{C/W}$
Steady-State				
Maximum Junction-to-Lead <sup>C</sup>				

### Electrical Characteristics ( $T_J=25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
<b>STATIC PARAMETERS</b>						
$BV_{DSS}$	Drain-Source Breakdown Voltage	$I_D=250\mu\text{A}, V_{GS}=0\text{V}$	30			V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS}=30\text{V}, V_{GS}=0\text{V}$ $T_J=55^\circ\text{C}$			1 5	$\mu\text{A}$
$I_{GSS}$	Gate-Body leakage current	$V_{DS}=0\text{V}, V_{GS}=\pm 20\text{V}$			100	nA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu\text{A}$	1.5	2.1	2.6	V
$I_{D(ON)}$	On state drain current	$V_{GS}=4.5\text{V}, V_{DS}=5\text{V}$	64			A
$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS}=10\text{V}, I_D=5.8\text{A}$ $T_J=125^\circ\text{C}$		18.4 26.2	25 36	$\text{m}\Omega$
		$V_{GS}=4.5\text{V}, I_D=4.8\text{A}$		24.5	35	$\text{m}\Omega$
$g_{FS}$	Forward Transconductance	$V_{DS}=5\text{V}, I_D=5.8\text{A}$		22		S
$V_{SD}$	Diode Forward Voltage	$I_S=1\text{A}, V_{GS}=0\text{V}$		0.75	1	V
$I_S$	Maximum Body-Diode Continuous Current				2.5	A
<b>DYNAMIC PARAMETERS</b>						
$C_{iss}$	Input Capacitance	$V_{GS}=0\text{V}, V_{DS}=15\text{V}, f=1\text{MHz}$		373	448	pF
$C_{oss}$	Output Capacitance			67		pF
$C_{rss}$	Reverse Transfer Capacitance			41		pF
$R_g$	Gate resistance	$V_{GS}=0\text{V}, V_{DS}=0\text{V}, f=1\text{MHz}$	0.9	1.8	2.8	$\Omega$
<b>SWITCHING PARAMETERS</b>						
$Q_g(10\text{V})$	Total Gate Charge	$V_{GS}=10\text{V}, V_{DS}=15\text{V}, I_D=5.8\text{A}$		7.1	11	nC
$Q_g(4.5\text{V})$	Total Gate Charge			3.3		nC
$Q_{gs}$	Gate Source Charge			1.4		nC
$Q_{gd}$	Gate Drain Charge			1.7		nC
$t_{D(on)}$	Turn-On DelayTime	$V_{GS}=10\text{V}, V_{DS}=15\text{V}, R_L=2.6\Omega,$ $R_{GEN}=3\Omega$		4.5	6.5	ns
$t_r$	Turn-On Rise Time			2.4		ns
$t_{D(off)}$	Turn-Off DelayTime			14.8		ns
$t_f$	Turn-Off Fall Time			2.5		ns
$t_{rr}$	Body Diode Reverse Recovery Time	$I_F=5.8\text{A}, di/dt=100\text{A}/\mu\text{s}$		10.5	12.6	ns
$Q_{rr}$	Body Diode Reverse Recovery Charge	$I_F=5.8\text{A}, di/dt=100\text{A}/\mu\text{s}$		4.5		nC

A: The value of  $R_{\theta JA}$  is measured with the device mounted on 1in<sup>2</sup> FR-4 board with 2oz. Copper, in a still air environment with  $T_A=25^\circ\text{C}$ . The value in any given application depends on the user's specific board design. The current rating is based on the  $t \leq 10\text{s}$  thermal resistance rating.

B: Repetitive rating, pulse width limited by junction temperature.

C: The  $R_{\theta JA}$  is the sum of the thermal impedance from junction to lead  $R_{\theta JL}$  and lead to ambient.

D: The static characteristics in Figures 1 to 6 are obtained using  $<300\mu\text{s}$  pulses, duty cycle 0.5% max.

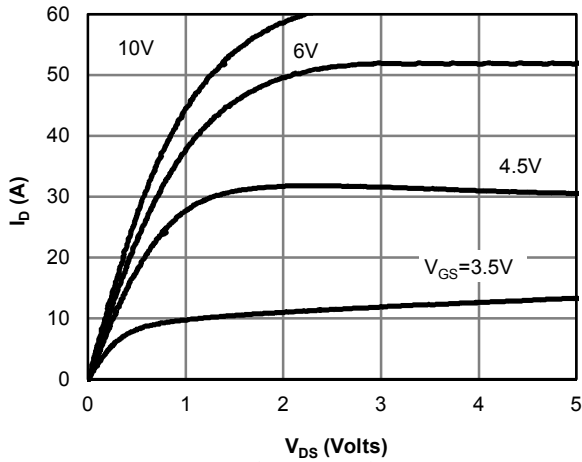
E: These tests are performed with the device mounted on 1 in<sup>2</sup> FR-4 board with 2oz. Copper, in a still air environment with  $T_A=25^\circ\text{C}$ . The SOA curve provides a single pulse rating.

F: The current rating is based on the  $t \leq 10\text{s}$  thermal resistance rating.

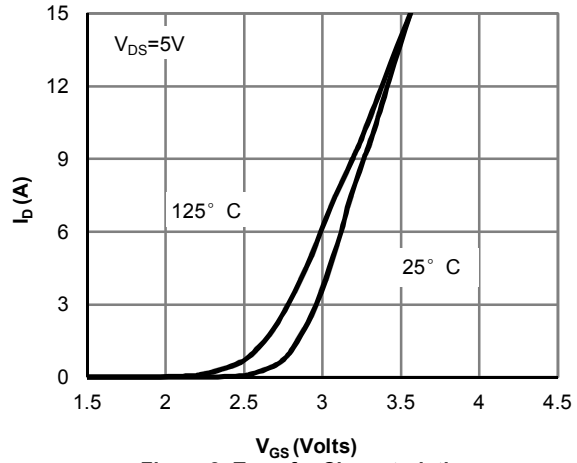
THIS PRODUCT HAS BEEN DESIGNED AND QUALIFIED FOR THE CONSUMER MARKET. APPLICATIONS OR USES AS CRITICAL COMPONENTS IN LIFE SUPPORT SYSTEMS DOES NOT ASSUME ANY LIABILITY ARISING OUT OF SUCH APPLICATIONS OR USES OF ITS PRODUCTS.

GXS RESERVES THE RIGHT TO IMPROVE PRODUCT DESIGN, FUNCTIONS AND RELIABILITY WITHOUT NOTICE.

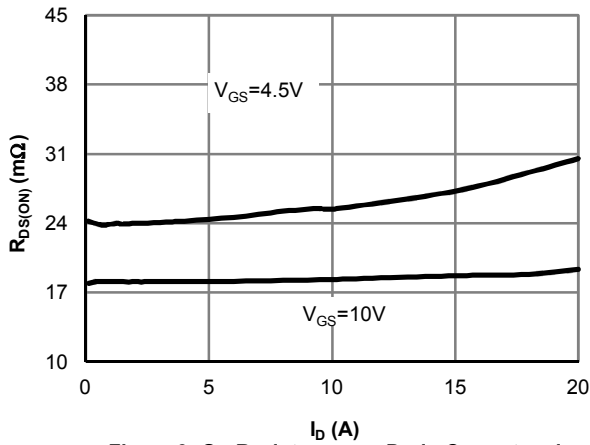
**TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS**



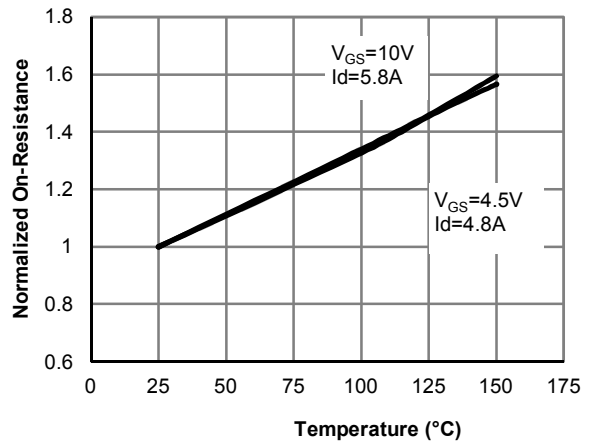
**Figure 1: On-Region Characteristics**



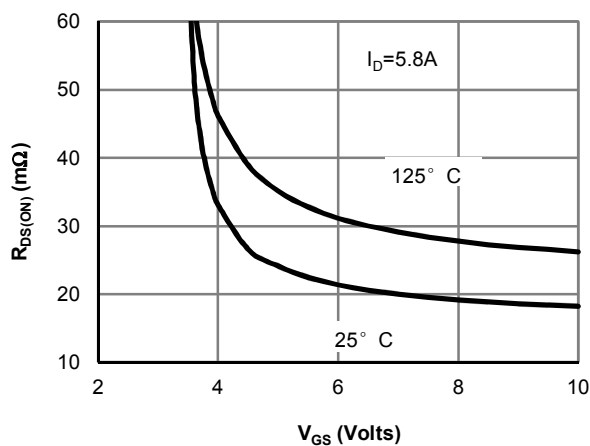
**Figure 2: Transfer Characteristics**



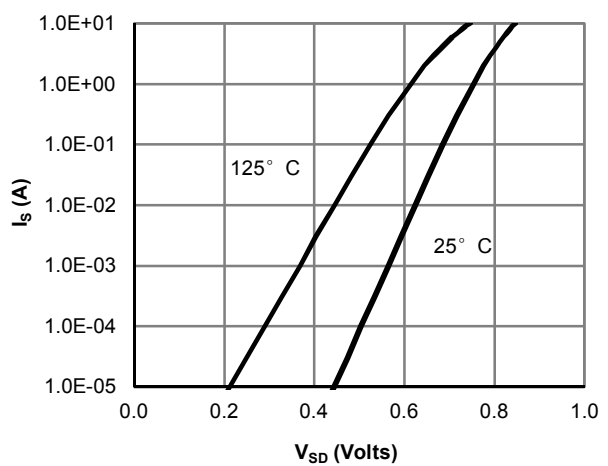
**Figure 3: On-Resistance vs. Drain Current and Gate Voltage**



**Figure 4: On-Resistance vs. Junction Temperature**



**Figure 5: On-Resistance vs. Gate-Source Voltage**



**Figure 6: Body-Diode Characteristics**

**TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS**

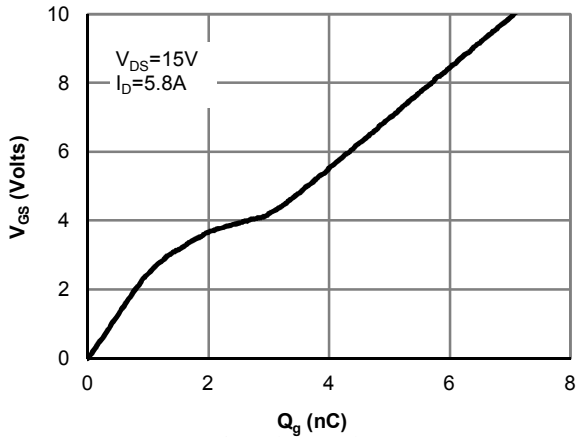


Figure 7: Gate-Charge Characteristics

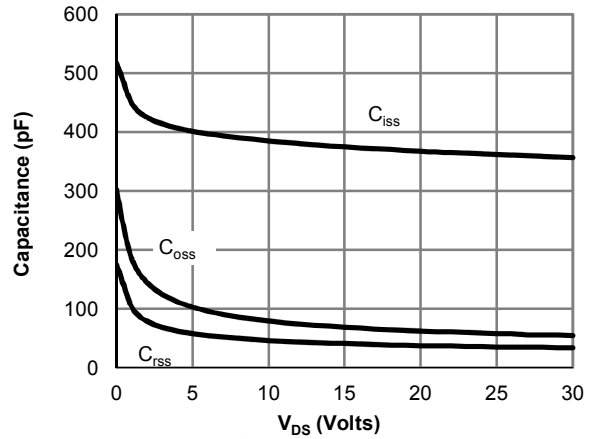


Figure 8: Capacitance Characteristics

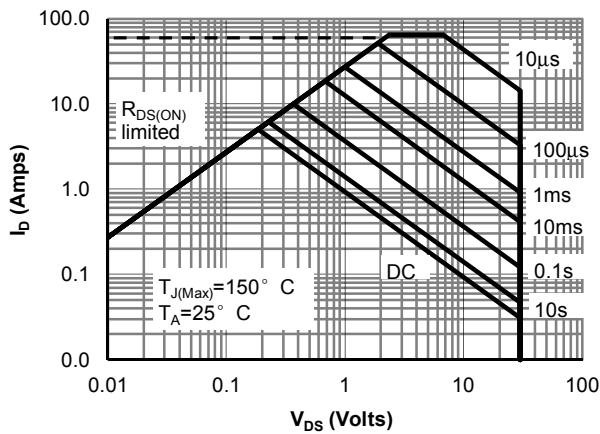


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

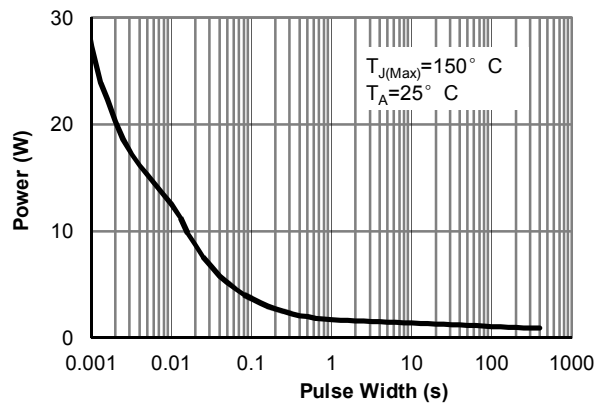


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

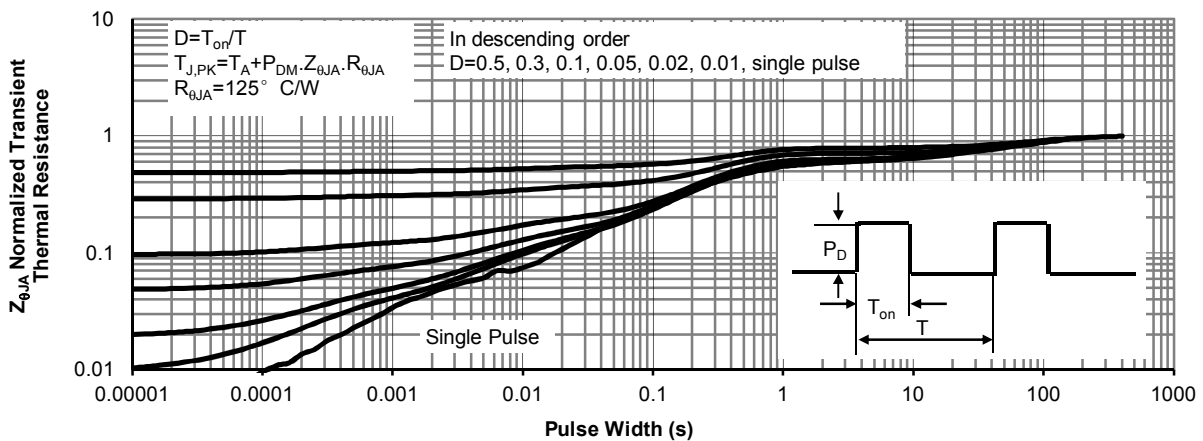


Figure 11: Normalized Maximum Transient Thermal Impedance