

»Features

$V_{DS} = -20V$   
 $I_D = -2.2A$   
 $R_{DS(ON)} @V_{GS} = -4.5V, Typ = 95m\Omega$   
 $R_{DS(ON)} @V_{GS} = -2.5V, Typ = 130m\Omega$

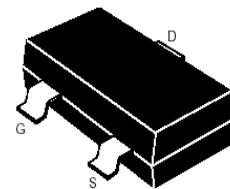
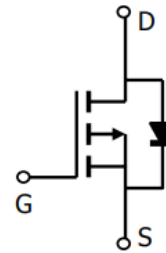
»General Description

- Advanced trench process technology
- High power and current handling capability
- Lead free product is acquired
- SOT-23 for Surface Mount Package.

»Application

- PWM applications
- Load switch

»Pin Configurations



»Absolute Maximum Ratings @ $T_A=25^\circ C$  unless otherwise noted

parameter		symbol	limit	unit
Drain-source voltage		$V_{DS}$	-20	V
Gate-source voltage		$V_{GS}$	$\pm 12$	V
Continuous Drain Current ( $T_J = 150^\circ C$ )	$T_C=25^\circ C$	$I_D$	-2.2	A
	$T_C=70^\circ C$		-1.5	
	$T_A=25^\circ C$		-2.2 <sup>b,c</sup>	
	$T_A=70^\circ C$		-1.4 <sup>b,c</sup>	
Continuous Source-Drain Diode Current	$T_C=25^\circ C$	$I_S$	-1.5	A
	$T_A=25^\circ C$		-1 <sup>b,c</sup>	
Pulsed Drain Current ( $t = 300 \mu s$ )		$I_{DM}$	-8	
Maximum power dissipation	$T_C=25^\circ C$	$P_D$	1.7	W
	$T_C=70^\circ C$		1.1	
	$T_A=25^\circ C$		1 <sup>b,c</sup>	
	$T_A=70^\circ C$		0.6 <sup>b,c</sup>	
Operating Junction and Storage Temperature Range		$T_J, T_{STG}$	-55—150	$^\circ C$

## » THERMAL CHARACTERISTICS

Parameter		Symbol	Typ	Max	Unit
Maximum junction-to-ambient <sup>a</sup>	≤ 5 s	R <sub>θJA</sub>	120	145	°C/W
	Steady-State		140	175	
Maximum junction-to-foot	Steady-State	R <sub>θJC</sub>	62	78	

**Notes**

- a. Surface mounted on 1" x 1" FR4 board  
b. Pulse width limited by maximum junction temperature

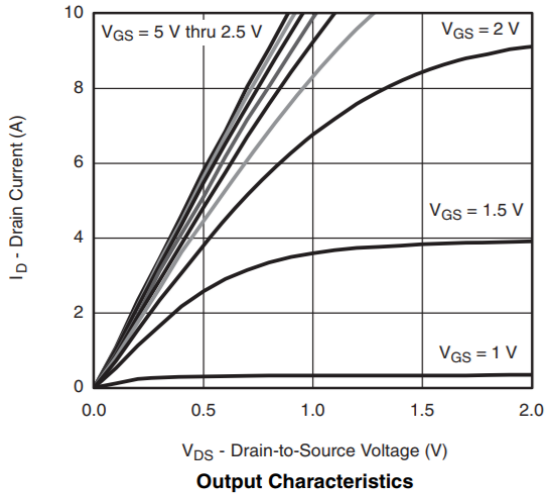
## » Electrical Characteristics @T<sub>A</sub>=25°C unless otherwise noted

Parameter	Symbol	Condition	Min	Typ	Max	Unit
<b>OFF Characteristics</b>						
Drain-source breakdown voltage	BV <sub>DSS</sub>	V <sub>GS</sub> =0V, I <sub>D</sub> =-250μA	-20	-	-	V
Zero gate voltage drain current	I <sub>DSS</sub>	V <sub>DS</sub> =-20V, V <sub>GS</sub> =0V	-	-	-1	μA
Gate-body leakage	I <sub>GSS</sub>	V <sub>DS</sub> =0V, V <sub>GS</sub> =±12V	-	-	±100	nA
<b>ON Characteristics</b>						
Gate threshold voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =-250μA	-0.5	-0.65	-1.0	V
Drain-source on-state resistance <sup>a</sup>	R <sub>DS(on)</sub>	V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-2A	-	95	120	mΩ
		V <sub>GS</sub> =-2.5V, I <sub>D</sub> =-1A	-	130	150	
Forward transconductance <sup>a</sup>	g <sub>fs</sub>	V <sub>DS</sub> =-5V, I <sub>D</sub> =-1A	-	5	-	S
<b>Dynamic Characteristics <sup>b</sup></b>						
Input capacitance	C <sub>ISS</sub>	V <sub>DS</sub> =-10V, V <sub>GS</sub> =0V f=1.0MHz	-	280	-	pF
Output capacitance	C <sub>OSS</sub>		-	60	-	
Reverse transfer capacitance	C <sub>RSS</sub>		-	48	-	
<b>Switching Characteristics</b>						
Turn-on delay time	t <sub>D(ON)</sub>	V <sub>DD</sub> =-10V I <sub>D</sub> =-2A V <sub>GEN</sub> =-4.5V R <sub>L</sub> =9.1ohm R <sub>GEN</sub> =1ohm	-	13	-	ns
Rise time	t <sub>r</sub>		-	21	-	
Turn-off delay time	t <sub>D(OFF)</sub>		-	23	-	
Fall time	t <sub>f</sub>		-	9	-	
Total gate charge	Q <sub>g</sub>	V <sub>DS</sub> =-10V, I <sub>D</sub> =-2A V <sub>GS</sub> =-4.5V	-	4.8	-	nC
Gate-source charge	Q <sub>gs</sub>		-	0.8	-	
Gate-drain charge	Q <sub>gd</sub>		-	1.2	-	
<b>DRAIN-SOURCE DIODE CHARACTERISTICS</b>						
Diode forward voltage	V <sub>SD</sub>	V <sub>GS</sub> =0V, I <sub>S</sub> =-1A	-	-0.81	-1.2	V

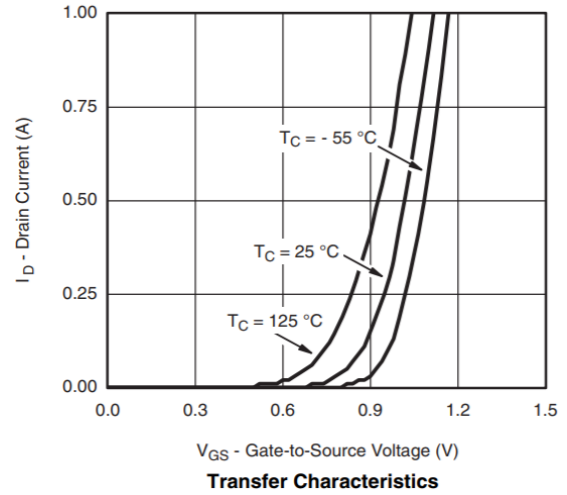
**Notes**

- a. Pulse test: Pulse width ≤ 300 μs, duty cycle ≤ 2 %  
b. Guaranteed by design, not subject to production testing

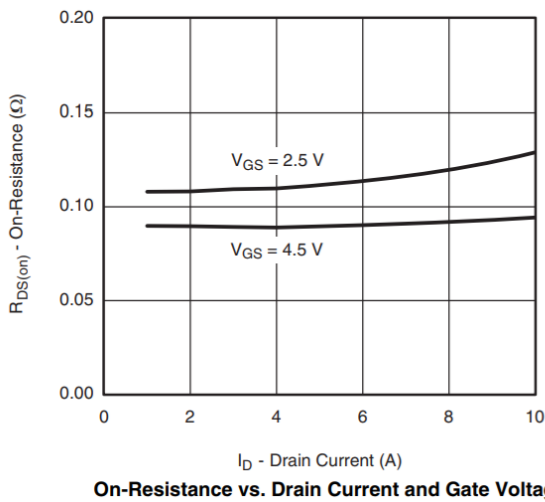
» **Electrical Characteristics** @ $T_A=25^\circ\text{C}$  unless otherwise noted



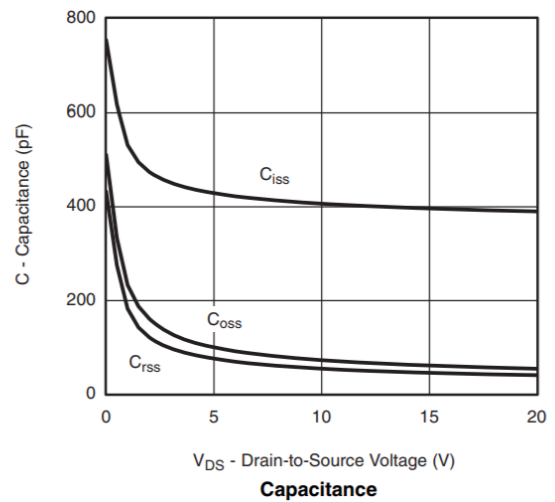
**Output Characteristics**



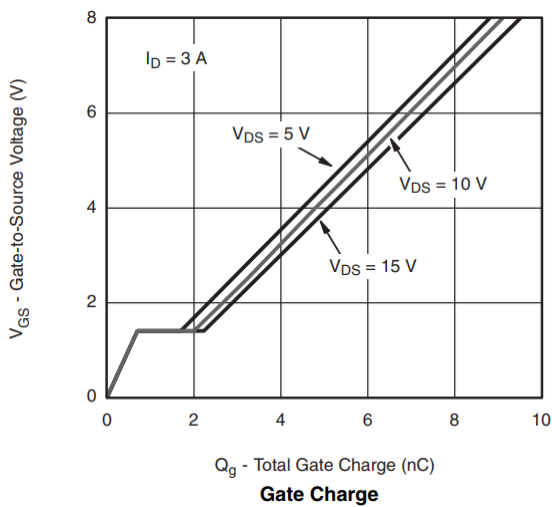
**Transfer Characteristics**



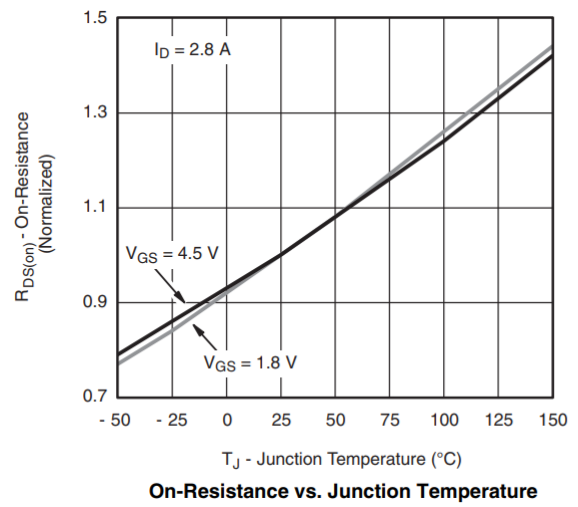
**On-Resistance vs. Drain Current and Gate Voltage**



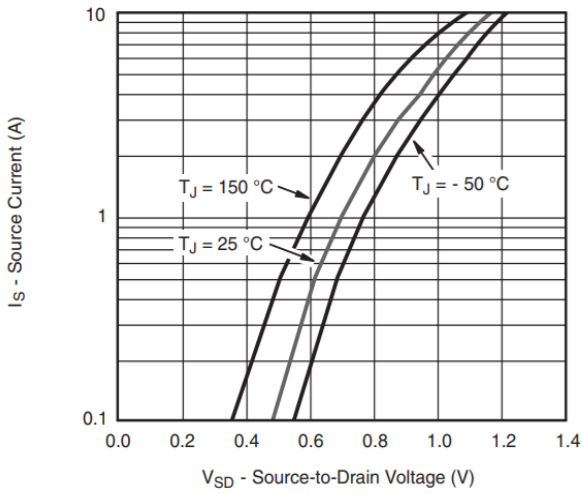
**Capacitance**



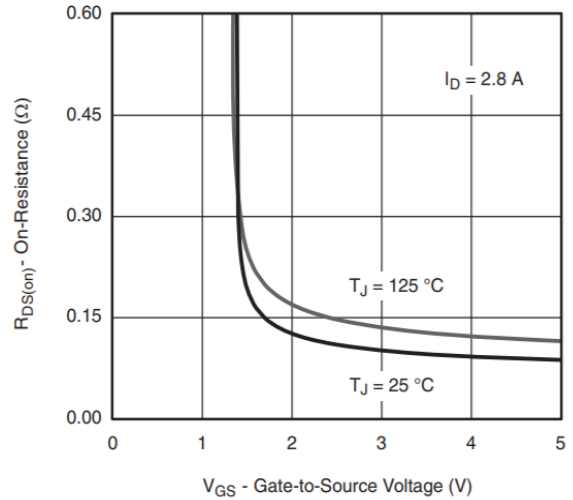
**Gate Charge**



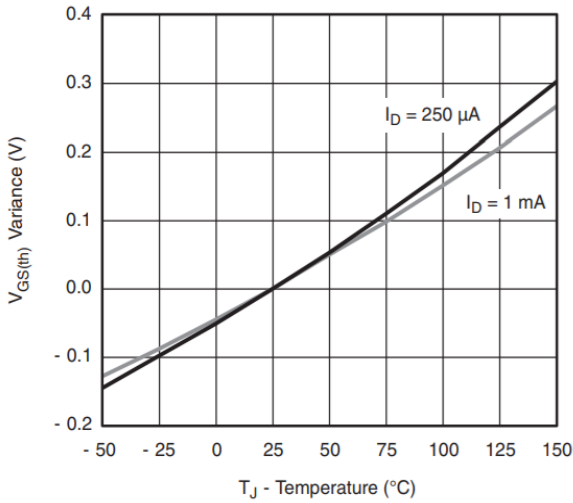
**On-Resistance vs. Junction Temperature**



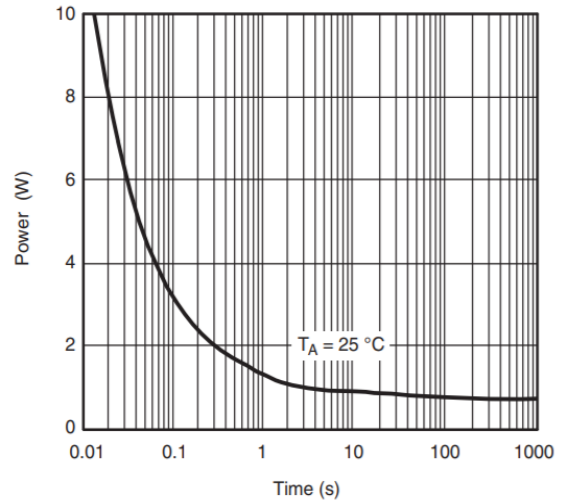
**Source-Drain Diode Forward Voltage**



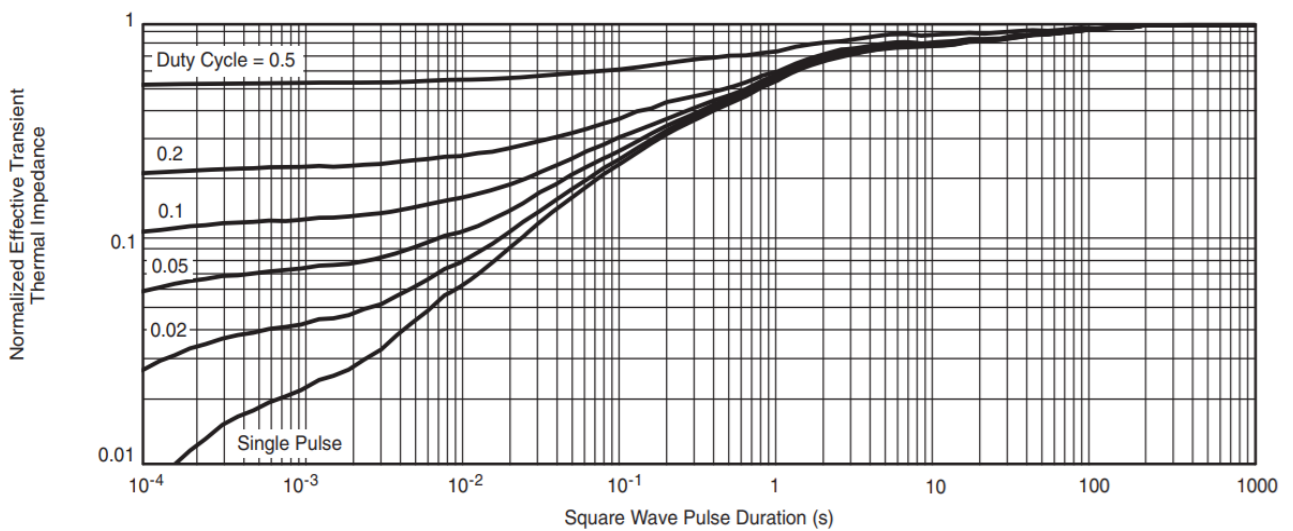
**On-Resistance vs. Gate-to-Source Voltage**



**Threshold Voltage**



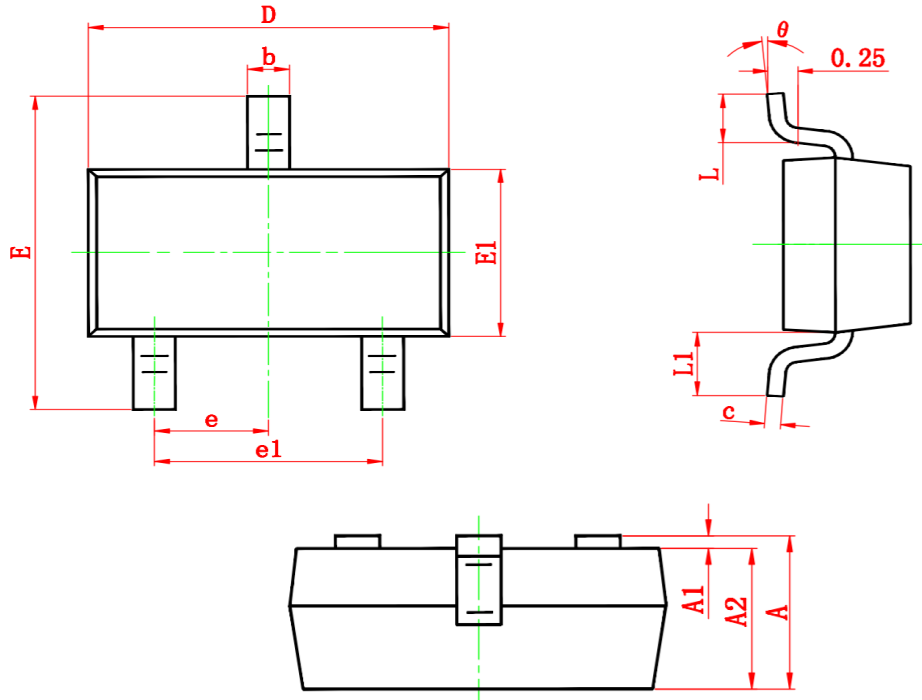
**Single Pulse Power**



**Normalized Thermal Transient Impedance, Junction-to-Ambient**

»Package Information

SOT-23



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.900	1.150	0.035	0.045
A1	0.000	0.100	0.000	0.004
A2	0.900	1.050	0.035	0.041
b	0.300	0.500	0.012	0.020
c	0.080	0.150	0.003	0.006
D	2.800	3.000	0.110	0.118
E	2.250	2.550	0.089	0.100
E1	1.200	1.400	0.047	0.055
e	0.950 TYP.		0.037 TYP.	
e1	1.800	2.000	0.071	0.079
L	0.300	0.500	0.012	0.020
L1	0.550 REF.		0.022 REF.	
θ	0°	8°	0°	8°

»Ordering information

Order code	Package	Marking	Base qty	Delivery mode
SI2301F	SOT-23	2301F	3K	Tape and reel

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