



Micro Commercial Components

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# SI2301

## Features

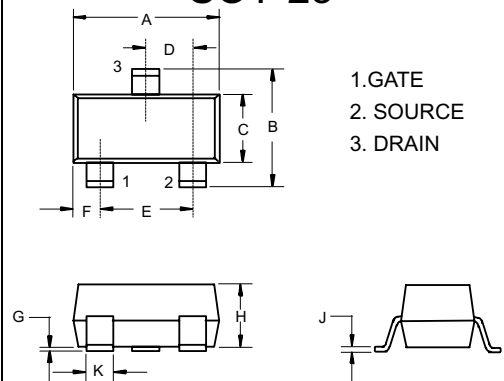
- 20V, -2.8A,  $R_{DS(ON)}=120m\Omega @ V_{GS}=-4.5V$   
 $R_{DS(ON)}=150m\Omega @ V_{GS}=-2.5V$
- High dense cell design for extremely low  $R_{DS(ON)}$
- Rugged and reliable
- High Speed Switching
- SOT-23 Package
- Marking Code: S1
- Case Material: Molded Plastic. UL Flammability Classification Rating 94V-0

### Maximum Ratings @ 25°C Unless Otherwise Specified

Symbol	Parameter	Rating	Unit
$V_{DS}$	Drain-source Voltage	-20	V
$I_D$	Drain Current-Continuous	-2.8	A
$I_{DM}$	Drain Current-Pulsed <sup>a</sup>	-10	A
$V_{GS}$	Gate-source Voltage	$\pm 8$	V
$P_D$	Total Power Dissipation	1.25	W
$R_{\theta JA}$	Thermal Resistance Junction to Ambient <sup>b</sup>	100	°C/W
$T_J$	Operating Junction Temperature	-55 to +150	°C
$T_{STG}$	Storage Temperature	-55 to +150	°C

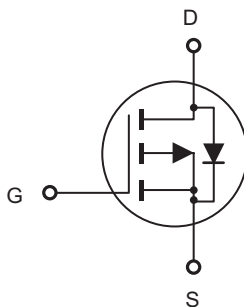
## P-Channel Enhancement Mode Field Effect Transistor

### SOT-23

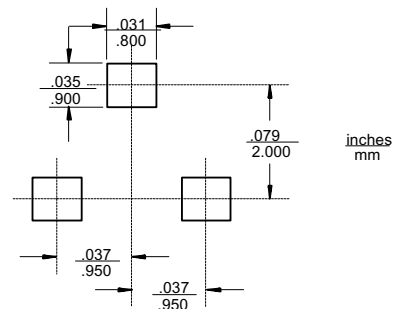


DIM	INCHES		MM		NOTE
	MIN	MAX	MIN	MAX	
A	.110	.120	2.80	3.04	
B	.083	.098	2.10	2.64	
C	.047	.055	1.20	1.40	
D	.035	.041	.89	1.03	
E	.070	.081	1.78	2.05	
F	.018	.024	.45	.60	
G	.0005	.0039	.013	.100	
H	.035	.044	.89	1.12	
J	.003	.007	.085	.180	
K	.015	.020	.37	.51	

## Internal Block Diagram



### Suggested Solder Pad Layout





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

Parameter	Symbol	Test Condition	Min	Typ	Max	Units
<b>Off Characteristics</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS} = 0V, I_D = -250\mu A$	-20			V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = -20V, V_{GS} = 0V$			-1	$\mu A$
Gate Body Leakage Current, Forward	$I_{GSSF}$	$V_{GS} = 8V, V_{DS} = 0V$			100	nA
Gate Body Leakage Current, Reverse	$I_{GSSR}$	$V_{GS} = -8V, V_{DS} = 0V$			-100	nA
<b>On Characteristics <sup>c</sup></b>						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{GS} = V_{DS}, I_D = -250\mu A$	-0.45			V
Static Drain-Source On-Resistance	$R_{DS(on)}$	$V_{GS} = -4.5V, I_D = -2.8A$		80	120	$m\Omega$
		$V_{GS} = -2.5V, I_D = -2.0A$		110	150	$m\Omega$
Forward Transconductance	$g_{FS}$	$V_{DS} = -5V, I_D = -2.8A$		8		S
<b>Dynamic Characteristics <sup>d</sup></b>						
Input Capacitance	$C_{iss}$	$V_{DS} = -6V, V_{GS} = 0V, f = 1.0\text{ MHz}$		880		pF
Output Capacitance	$C_{oss}$			270		pF
Reverse Transfer Capacitance	$C_{rss}$			175		pF
<b>Switching Characteristics <sup>d</sup></b>						
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = -6V, I_D = -1A, V_{GS} = -4.5V, R_{GEN} = 6\Omega$		11	20	ns
Turn-On Rise Time	$t_r$			5	10	ns
Turn-Off Delay Time	$t_{d(off)}$			32	65	ns
Turn-Off Fall Time	$t_f$			23	45	ns
Total Gate Charge	$Q_g$	$V_{DS} = -6V, I_D = -2.8A, V_{GS} = -4.5V$		11	14.5	nC
Gate-Source Charge	$Q_{gs}$			1.5		nC
Gate-Drain Charge	$Q_{gd}$			2.1		nC
<b>Drain-Source Diode Characteristics and Maximum Ratings</b>						
Drain-Source Diode Forward Current <sup>b</sup>	$I_S$				-0.75	A
Drain-Source Diode Forward Voltage <sup>c</sup>	$V_{SD}$	$V_{GS} = 0V, I_S = -0.75A$			-1.2	V
<b>Notes :</b> a.Repetitive Rating : Pulse width limited by maximum junction temperature. b.Surface Mounted on FR4 Board, $t < 5\text{ sec}$ . c.Pulse Test : Pulse Width $\leq 300\mu s$ , Duty Cycle $\leq 2\%$ . d.Guaranteed by design, not subject to production testing.						

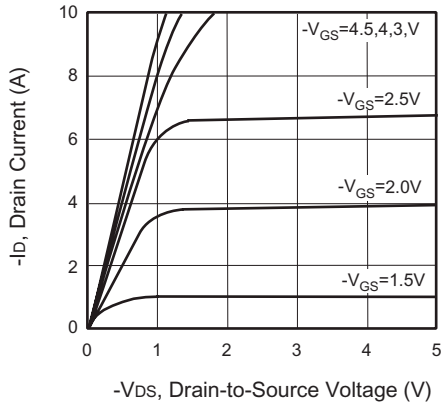


Figure 1. Output Characteristics

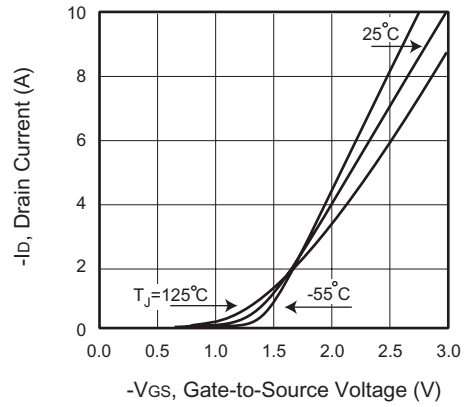


Figure 2. Transfer Characteristics

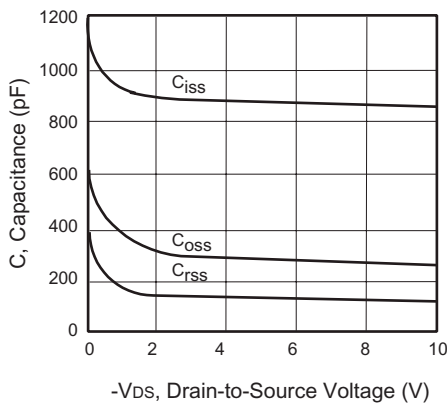


Figure 3. Capacitance

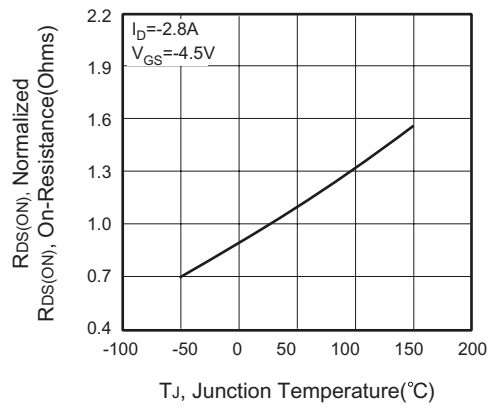


Figure 4. On-Resistance Variation with Temperature

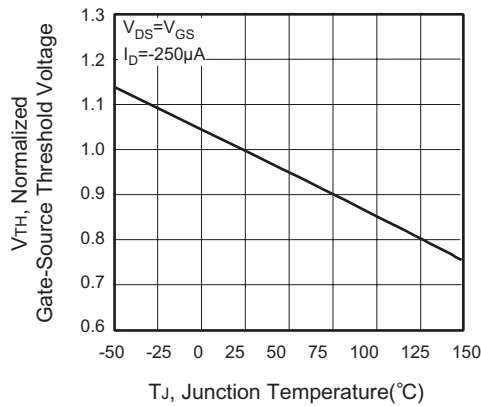


Figure 5. Gate Threshold Variation with Temperature

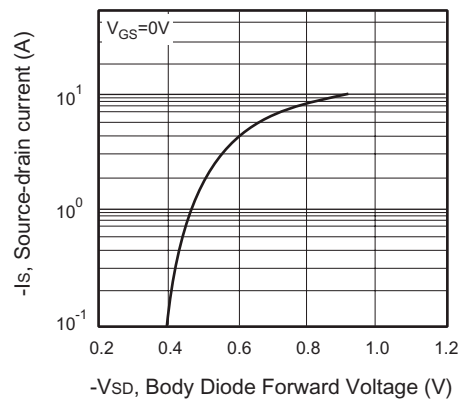


Figure 6. Body Diode Forward Voltage Variation with Source Current

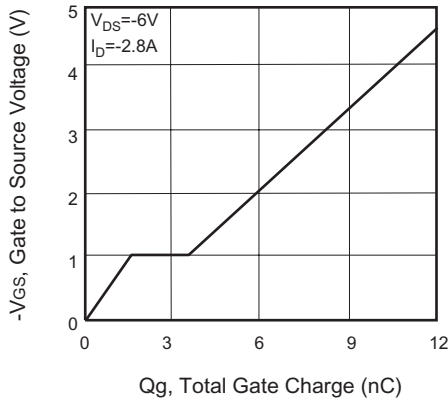


Figure 7. Gate Charge

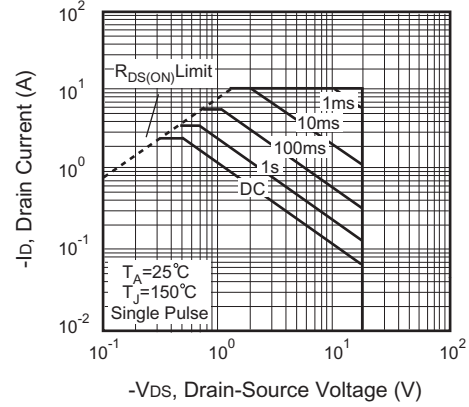


Figure 8. Maximum Safe Operating Area

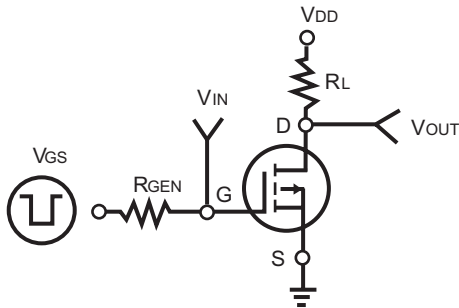


Figure 9. Switching Test Circuit

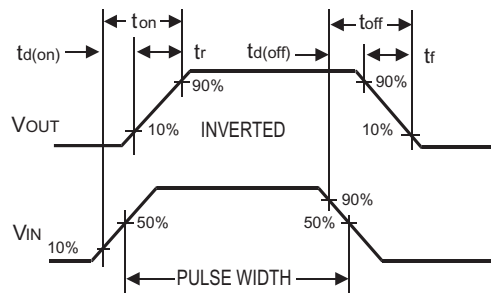


Figure 10. Switching Waveforms

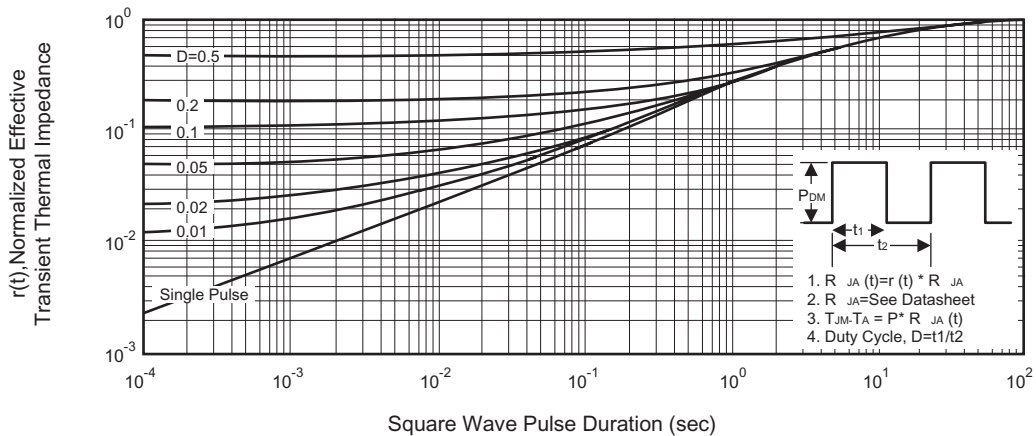


Figure 11. Normalized Thermal Transient Impedance Curve



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