

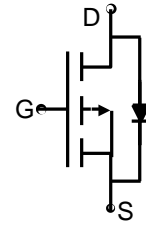
P-Channel Enhancement Mode Field Effect Transistor

Feature

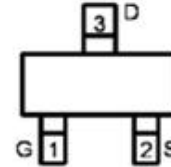
- $V_{DS} = -15V, I_D = -3.8A$
- $R_{DS(ON)} < 52m\Omega @ V_{GS} = -4.5V$
- $R_{DS(ON)} < 78m\Omega @ V_{GS} = -2.5V$
- Epoxy meets UL 94 V-0 flammability rating
- Moisture Sensitivity Level1
- High density cell design for low $R_{DS(ON)}$
- High Speed switching
- Rugged and reliable
- SOT-23 Package

Application

- Battery protection
- Load switch
- Power management



Schematic diagram



Marking and pin Assignment



SOT23 top view

■ Maximum Ratings ($T_A = 25^\circ C$ unless otherwise noted)

Symbol	Parameter	Value	Unit
V_{DS}	Drain-source Voltage	-15	V
V_{GS}	Gate-source Voltage	± 10	V
I_D	Drain Current	-3.8	A
P_D	Total Power Dissipation	1	W
R_{thJA}	Thermal Resistance From Junction To Ambient	125	$^\circ C/W$
T_J	Operation Junction Temperature	-55~+150	$^\circ C$
T_{STG}	Storage Temperature	-55~+150	$^\circ C$

■ Ordering Information

PREFERRED P/N	PACKING CODE	Marking	MINIMUM PACKAGE(pcs)	INNER BOX QUANTITY(pcs)	OUTER CARTON QUANTITY(pcs)	DELIVERY MODE
SP2301D	F2		3000	30000	120000	7" reel

■ Electrical Characteristics (TA=25°C unless otherwise specified)

Parameter	Symbol	Test conditions	Min	Typ	Max	Unit
Static Characteristics						
Drain-source breakdown voltage	$V_{(BR)DSS}$	$V_{GS}=0V, I_D=-250\mu A$	-15	-19		V
Zero gate voltage drain current	I_{DSS}	$V_{DS}=-15V, V_{GS}=0V$			-1	μA
Gate-body leakage current	I_{GSS}	$V_{GS}=\pm 10V, V_{DS}=0V$			± 100	nA
Gate threshold voltage*	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=-250\mu A$	-0.4	-0.7	-1.0	V
Drain-source on-resistance*	$R_{DS(ON)}$	$V_{GS}=-4.5V, I_D=-3.8A$		40	52	m Ω
		$V_{GS}=-2.5V, I_D=-3.0A$		52	78	
Forward Transconductance	g_{FS}	$V_{DS}=-5V, I_D=-3.8A$	5			s
Dynamic Characteristics **						
Input Capacitance	C_{iss}	$V_{DS}=-10V, V_{GS}=0V, f=1MHz$		478		pF
Output Capacitance	C_{oss}			81		
Reverse Transfer Capacitance	C_{rss}			52		
Switching Characteristics**						
Turn-on delay time	$t_{d(on)}$	$V_{DD}=-10V, V_{GS}=-4.5V, R_L=2.8\Omega, I_D=-1A, R_{GEN}=6\Omega$		12		ns
Turn-on rise time	t_r			54		
Turn-off delay time	$t_{d(off)}$			15		
Turn-off Fall time	t_f			9		
Total Gate Charge	Q_g	$V_{DS}=-10V, I_D=-3.8A, V_{GS}=-4.5V$		4.3		nC
Gate-Source Charge	Q_{gs}			0.8		
Gate-Drain Charge	Q_{gd}			1.1		
Source-Drain Diode characteristics						
Drain-Source Diode Forward Current	I_S				-3.8	A
Diode Forward voltage	V_{SD}	$V_{GS}=0V, I_S=-3.8A$		-0.8	-1.2	V

Notes:

 *Pulse Test: Pulse Width $\leq 300\mu A$, Duty Cycle $\leq 2\%$.

**These parameters have no way to verify.

■ Characteristics (Typical)

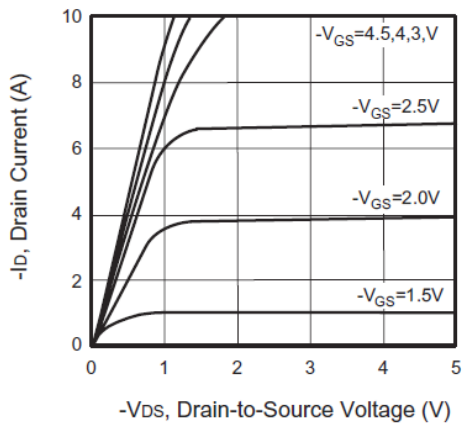


Figure 1. Output Characteristics

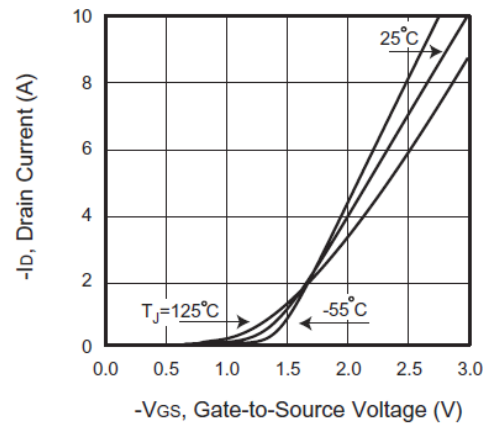


Figure 2. Transfer Characteristics

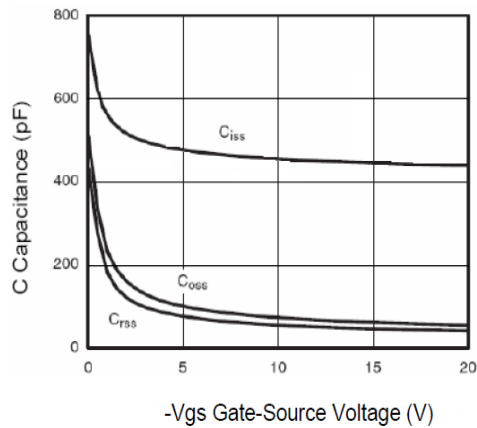


Figure 3. Capacitance

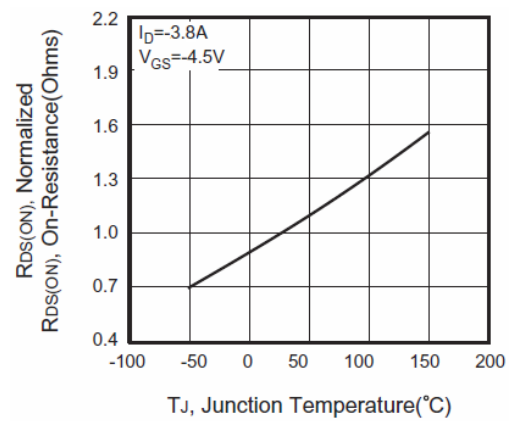


Figure 4. On-Resistance Variation with Temperature

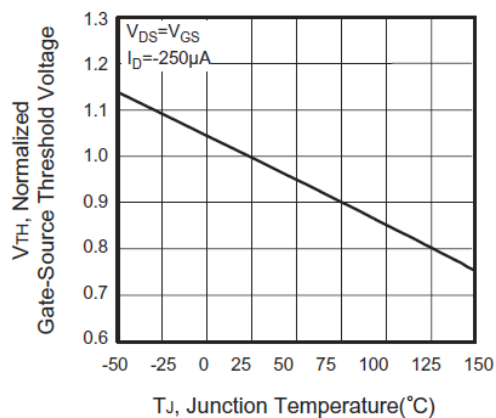


Figure 5. Gate Threshold Variation with Temperature

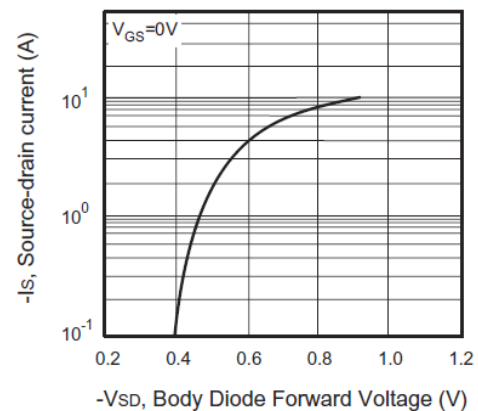
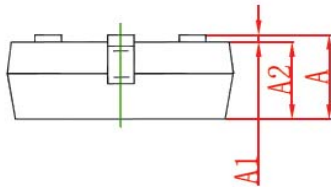
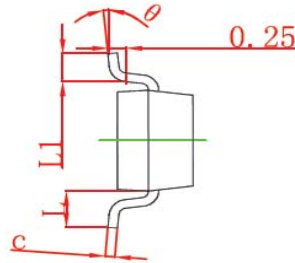
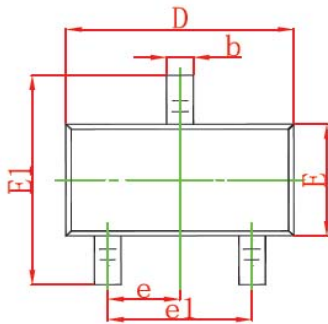


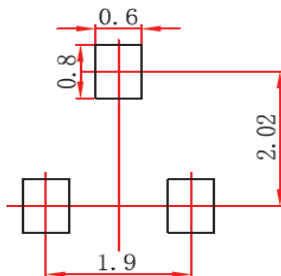
Figure 6. Body Diode Forward Voltage Variation with Source Current

■ SOT-23 Package Outline Dimensions



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	1.200	1.400	0.047	0.055
E1	2.250	2.550	0.089	0.100
e	0.950 TYP		0.037 TYP	
e1	1.800	2.000	0.071	0.079
L	0.550 REF		0.022 REF	
L1	0.300	0.500	0.012	0.020
θ	0°	8°	0°	8°

■ SOT-23 Suggested Pad Layout



- Note:
1. Controlling dimension: in millimeters.
 2. General tolerance: $\pm 0.05\text{mm}$.
 3. The pad layout is for reference purposes only.

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