

## N-Channel Enhancement Mode Field Effect Transistor

### General Description

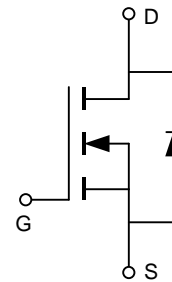
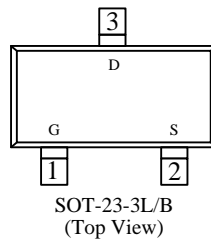
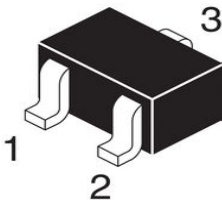
Product Summary		
$V_{DSS}$	$I_D$	$R_{DS(ON)}(m\Omega)TYP$
20V	3.6A	65 @ $V_{GS}= 4.5V$
		90 @ $V_{GS}= 2.5V$

### Features

- Super high dense cell design for low  $R_{DS(ON)}$
- Rugged and reliable
- Simple drive requirement
- SOT-23-3L/B package

### Package

- SOT-23-3L/B



### Ordering Information

Part Number	Storage Temperature	Package	Devices Per Reel
LN2302	-55°C to +150°C	SOT-23-3L/B	3000

### 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	$V_{GS}$	$\pm 8$	V
Drain current-continuous <sup>a</sup> @ $T_j=125^\circ C$ -pulse $d^b$	$I_D$	3.6	A
	$I_{DM}$	12	A
Drain-source Diode forward current	$I_S$	1.25	A
Maximum power dissipation	$P_D$	1.25	W
Operating junction Temperature range	$T_j$	-55—150	$^\circ C$

**Electrical Characteristics**

(TA=25°C unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
<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	$I_{DSS}$	$V_{DS}=16V, V_{GS}=0V$			1	$\mu A$
Gate-body leakage	$I_{GSS}$	$V_{DS}=0V, V_{GS}=\pm 8V$			$\pm 100$	nA
<b>ON Characteristics</b>						
Gate threshold voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	0.5	0.8	1.5	V
Drain-source on-state resistance	$R_{DS(on)}$	$V_{GS}=4.5V, I_D=2.8A$		65	80	m $\Omega$
		$V_{GS}=2.5V, I_D=2.0A$		90	110	
Forward transconductance	$g_{fs}$	$V_{GS}=5V, I_D=5A$		5		S
<b>Dynamic Characteristics</b>						
Input capacitance	$C_{ISS}$	$V_{DS}=10V, V_{GS}=0V$ $f=1.0MHz$		586		pF
Output capacitance	$C_{OSS}$			101		
Reverse transfer capacitance	$C_{RSS}$			59		
<b>Switching Characteristics</b>						
Turn-on delay time	$t_{D(ON)}$	$V_{DD}=10V$ $I_D=3.6A,$ $V_{GEN}=4.5V$ $R_L=10ohm$ $R_{GEN}=10ohm$		6.5		ns
Rise time	$t_r$			32.1		
Turn-off delay time	$t_{D(OFF)}$			58.4		
Fall time	$t_f$			48		
Total gate charge	$Q_g$	$V_{DS}=10V, I_D=1A$ $V_{GS}=4.5V$		6		nC
Gate-source charge	$Q_{gs}$			1.35		
Gate-drain charge	$Q_{gd}$			1.5		
<b>Drain-Source Diode Characteristics</b>						
Diode forward voltage	$V_{SD}$	$V_{GS}=0V, I_S=1.25A$		0.84	1.2	V

**Notes:**

- surface mounted on FR4 board,  $t \leq 10sec$
- pulse test: pulse width  $\leq 300\mu s$ , duty  $\leq 2\%$
- guaranteed by design, not subject to production testing

**Thermal Characteristics**

Thermal Resistance junction-to ambient	$R_{th JA}$	100	$^{\circ}C/W$
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■ Typical Performance Characteristics

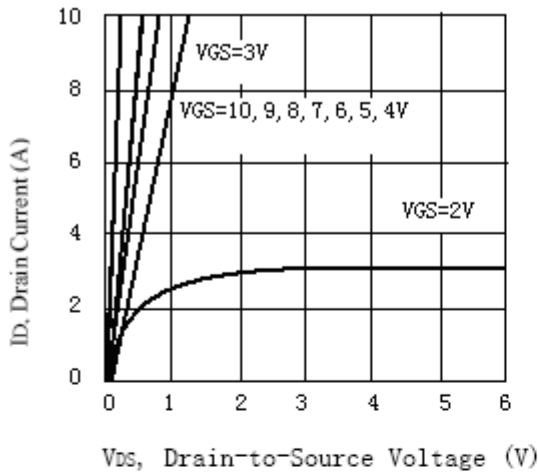


Figure 1. Output Characteristics

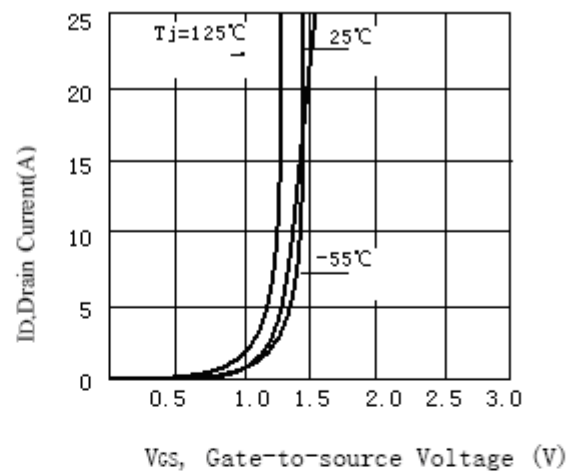


Figure 2. Transfer Characteristics

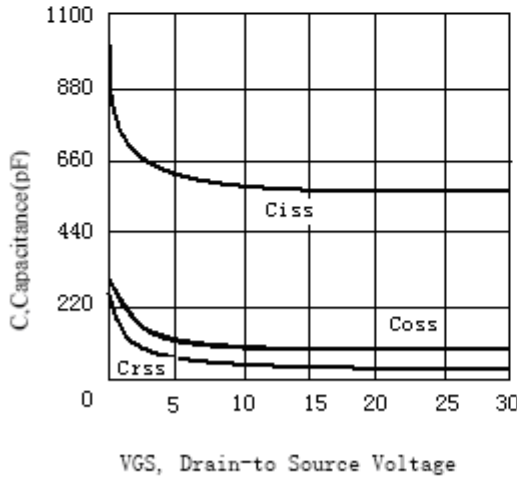


Figure3. Capacitance

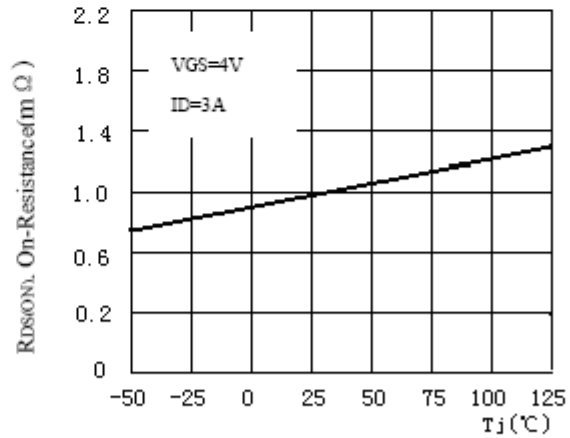


Figure4. On-Resistance Variation with Temperature

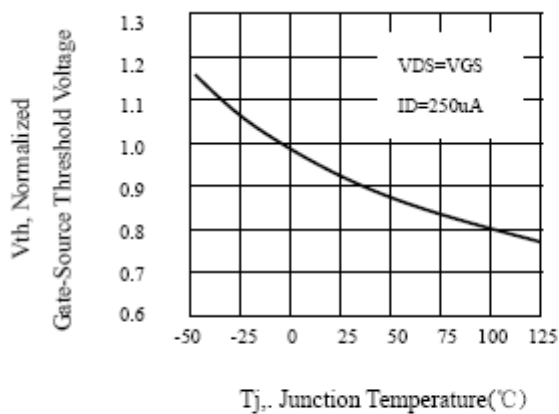


Figure5. Gate Threshold Variation With Temperature

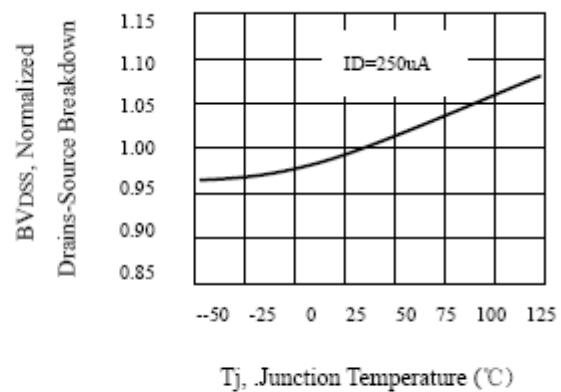


Figure6. Breakdown Voltage Variation With Temperature

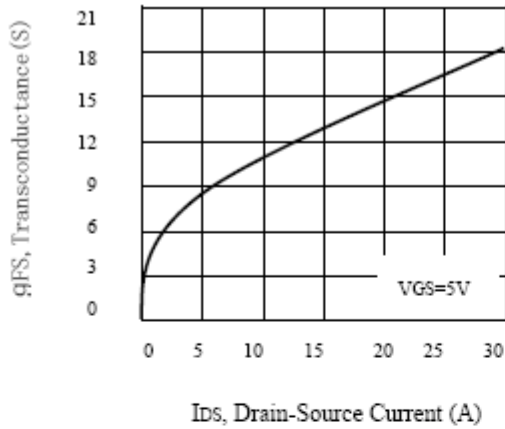


Figure 7. Transconductance Variation With Drain Current

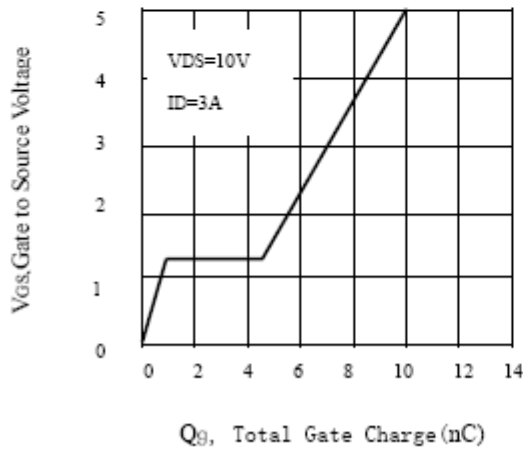


Figure 9. Gate Charge

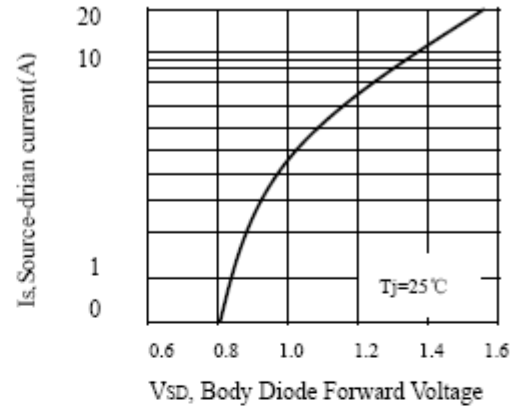


Figure 8. Body Diode Forward Voltage Variation with Source Current

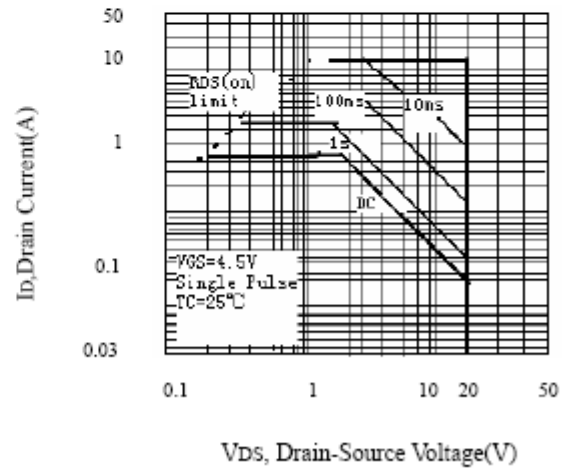
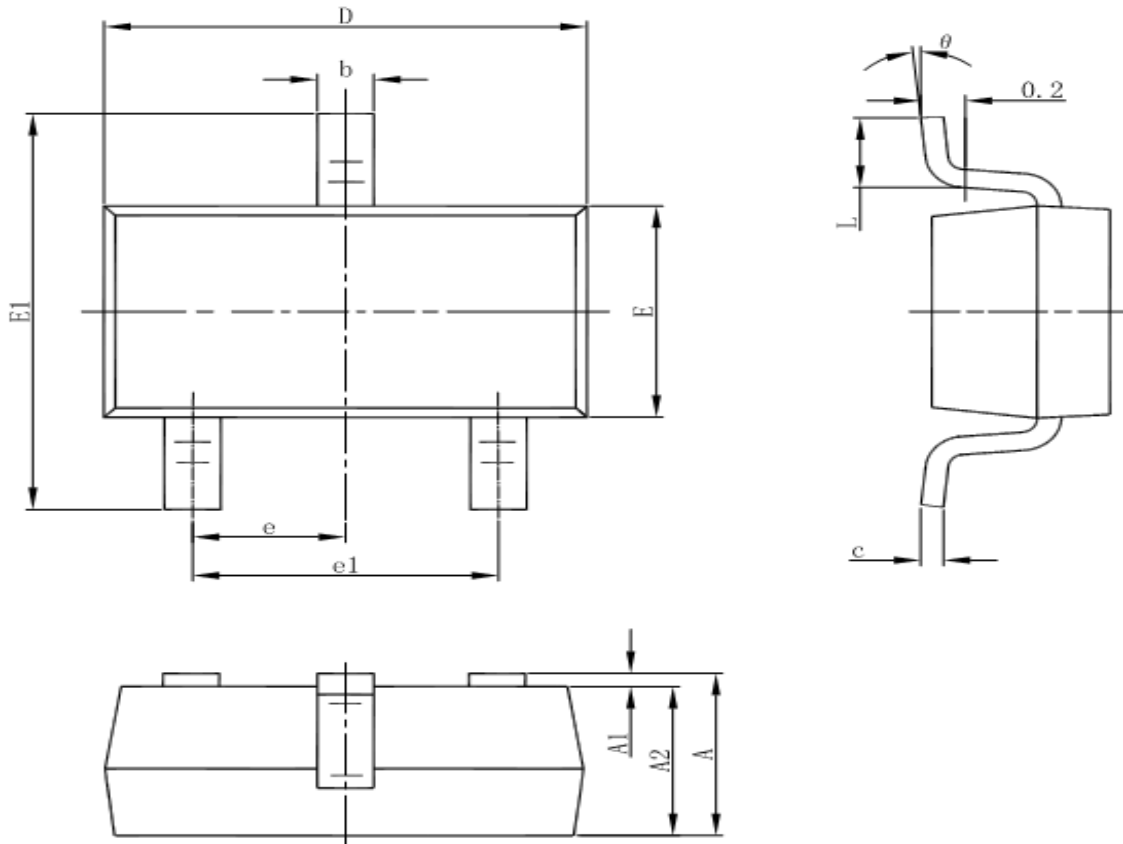


Figure 10. Maximum Safe Operating Area

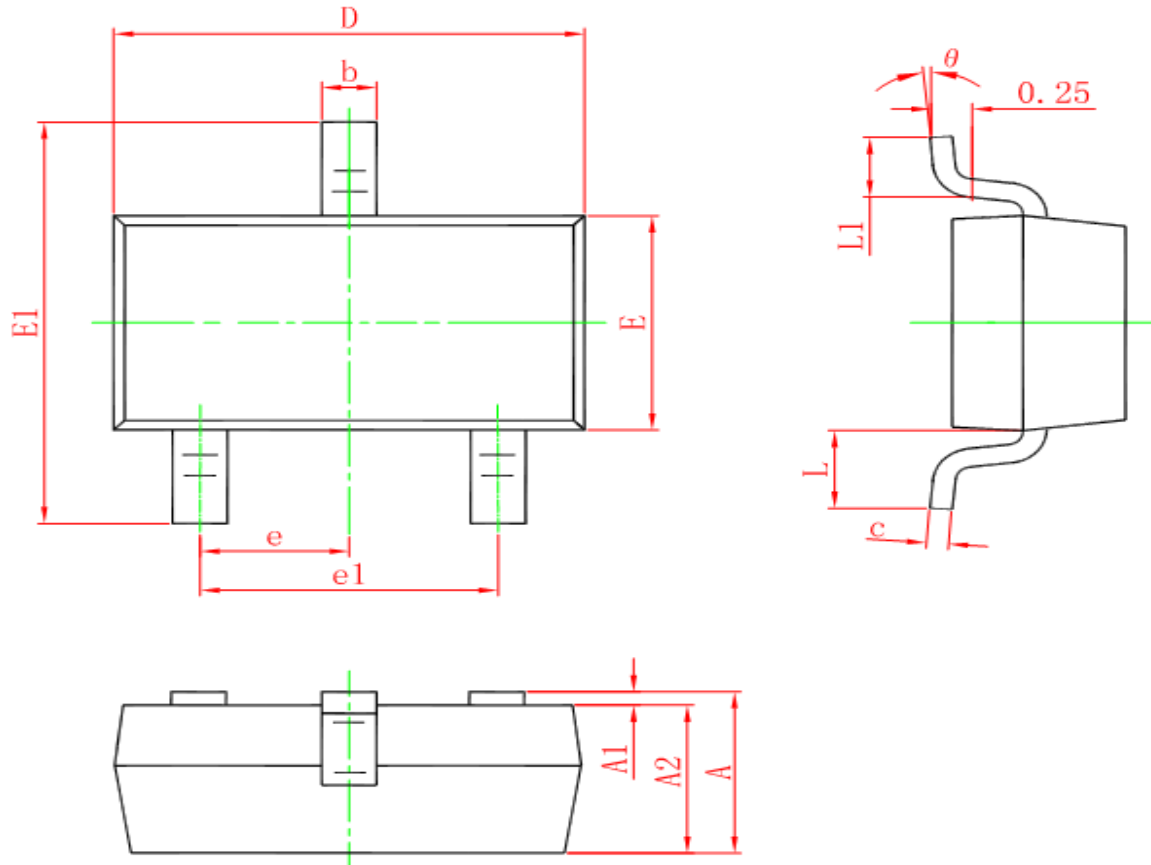
**Package Information**

- SOT-23-3L



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°

- SOT-23-3B



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
$\theta$	0°	8°	0°	8°