

## MSP2301N3

### P-Channel 20V Enhancement Mode MOSFET

#### Features

- $V_{DS}=-20V$   $R_{DS(ON)}=130m\Omega@V_{GS}=-4.5V$ ,  
 $I_{DS}=-2.8A$   $R_{DS(ON)}=190m\Omega@V_{GS}=-2.5V$ ,  
 $I_{DS}=-2A$
- Advanced trench process technology
- High density cell design for ultra low on resistance
- Excellent thermal and electrical capabilities
- Compact and low profile SOT-23 package
- RoHS compliant package

Package type : SOT-23

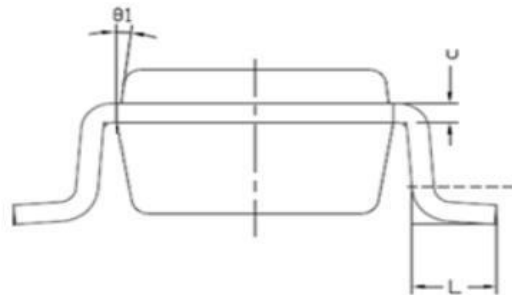
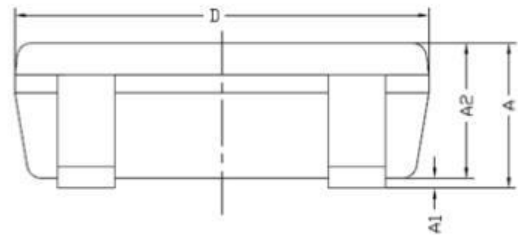
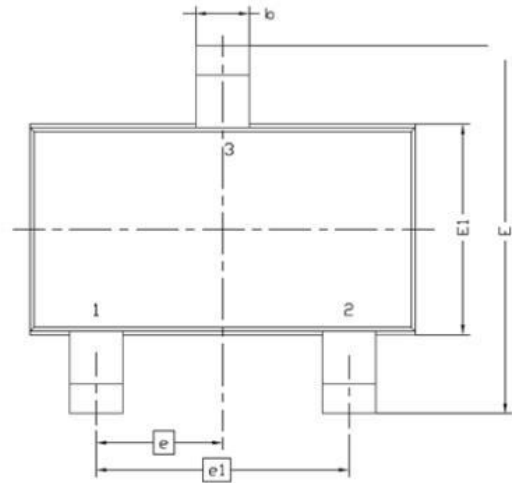
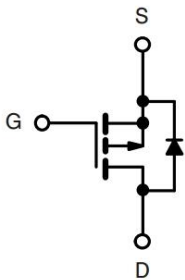
#### Packing & Order Information

3,000/Reel



**RoHS  
COMPLIANT**

Graphic symbol



Symbol	MILLIMETERS	
	MIN	MAX
A	0.8	1.2
A1	0	0.1
A2	0.7	1.1
b	0.3	0.5
c	0.1	0.2
D	2.7	3.1
E	2.6	3
E1	1.4	1.8
e	0.95 BSC	
e1	1.9 BSC	
L	0.3	0.6
θ1	7° NOM	

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#### MAXIMUM RATINGS AND ELECTRICAL CHARACTERISTICS

Absolute Maximum Ratings ( $T_A=25^{\circ}\text{C}$  Unless Otherwise Noted)

Symbol	Parameter	Value	Unit
$V_{DS}$	Drain-Source Voltage	-20	V
$V_{GS}$	Gate-Source Voltage	$\pm 8$	V
$I_D$	Drain Current -Continuous	-2.3	A
$I_{DM}$	Pulsed Drain Current	-10	A
$P_D$	Total Power Dissipation ( $T_A=25^{\circ}\text{C}$ )	1.25	W
	Total Power Dissipation ( $T_A=70^{\circ}\text{C}$ )	0.8	W
$T_J$	Operating Junction Temperature	-55 to +150	$^{\circ}\text{C}$
$T_{STG}$	Storage Temperature	-55 to +150	$^{\circ}\text{C}$

#### Thermal Performance

Symbol	Parameter	Max.	Units
$R_{thja}$	Thermal Resistance, Junction-to- Ambient ( PCB mounted )	100	$^{\circ}\text{C}/\text{W}$
$T_L$	Lead Temperature, for 5 second soldering ( 1/8" from case )	260	$^{\circ}\text{C}$

Note: Surface mounted on FR-4 board,  $t \leq 5$  sec

#### Static

Symbol	Test Conditions	Min	Typ.	Max.	Units
$BV_{DSS}$	$V_{GS} = 0$ , $I_D = 250\mu\text{A}$	-20	--	--	V
$V_{GS(th)}$	$V_{DS} = V_{GS}$ , $I_D = 250\mu\text{A}$	-0.45	--	--	V
$I_{DSS}$	$V_{DS} = -16$ V , $V_{GS} = 0$ V	--	--	-1	$\mu\text{A}$
$I_{GSS}$	$V_{GS} = \pm 8$ V , $V_{DS} = 0$ V	--	--	$\pm 100$	nA
$*I_{D(ON)}$	$V_{DS} \geq -10$ V , $V_{GS} = -5$ V	-6	--	--	A
$*R_{DS(ON)}$	$V_{GS} = -4.5$ V, $I_D = -2.8$ A	--	95	130	m $\Omega$
	$V_{GS} = -2.5$ V, $I_D = -2$ A	--	122	190	
$*G_{FS}$	$V_{DS} = 5$ V, $I_D = -2.8$ A		6.5		S

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Dynamic Characteristics						
Symbol	Parameter	Test Conditions	Min	Typ.	Max.	Units
$C_{ISS}$	Input Capacitance	$V_{DS} = -6\text{ V}$ , $V_{GS} = 0\text{ V}$ , $f = 1.0\text{ MHz}$	--	447	--	pF
$C_{OSS}$	Output Capacitance		--	127	--	pF
$C_{RSS}$	Reverse Transfer Capacitance		--	80	--	pF
$Q_g$	Total Gate Charge	$V_{DS} = -6\text{ V}$ , $I_D = -2.8\text{ A}$ , $V_{GS} = -4.5\text{ V}$	--	5.4	10	nC
$Q_{gs}$	Gate-Source Charge		--	0.8	--	nC
$Q_{gd}$	Gate-Drain Charge		--	1.1	--	nC
$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 6\text{ V}$ , $I_D = -1\text{ A}$ , $R_L = 6\ \Omega$ , $V_{GEN} = -4.5\text{ V}$ , $R_{GEN} = 6\ \Omega$	--	5	60	ns
$t_r$	Rise Time		--	19	110	ns
$t_{d(off)}$	Turn-Off Delay Time		--	95	80	ns
$t_f$	Fall Time		--	65	10	ns

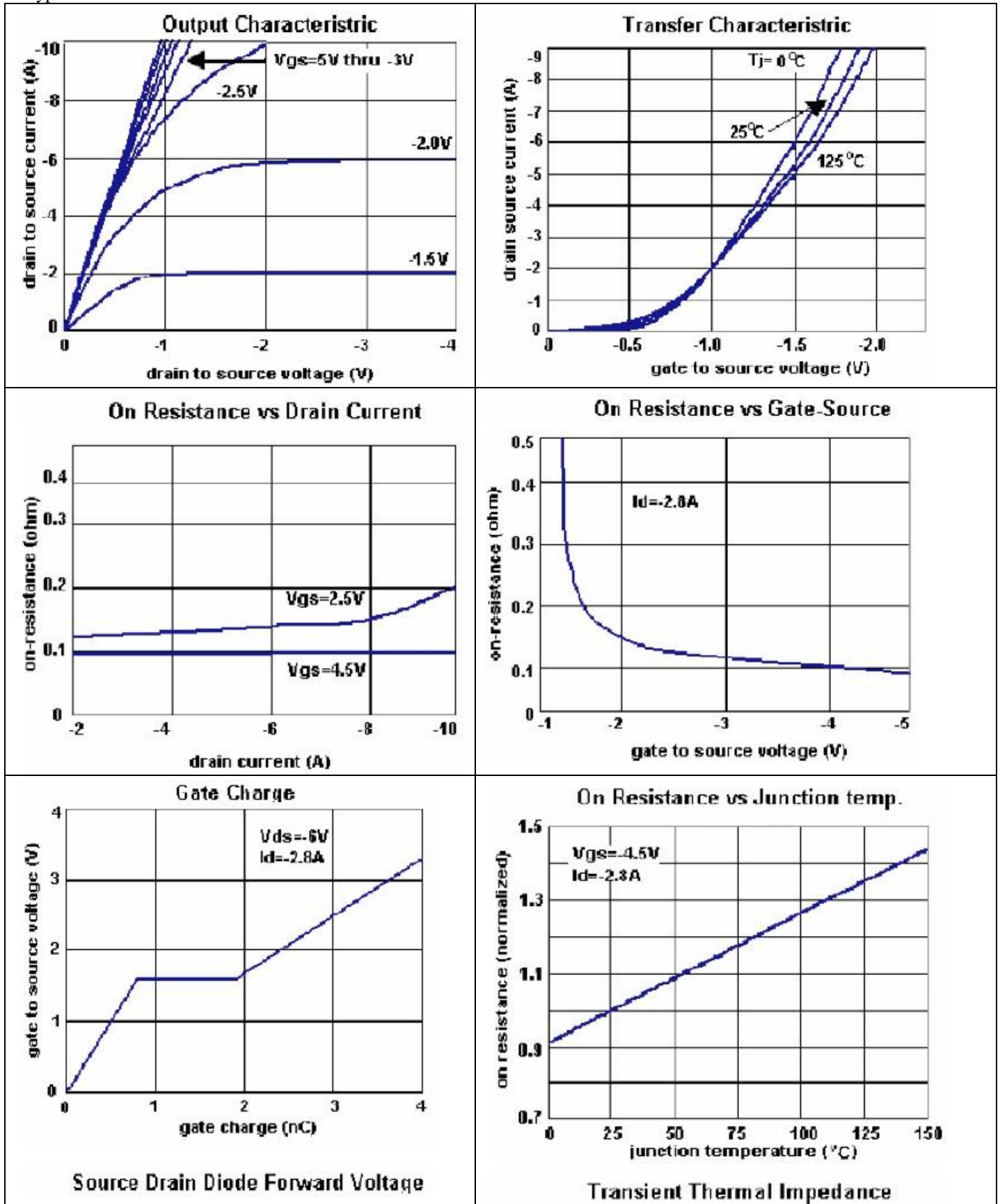
Static					
Symbol	Test Conditions	Min	Typ.	Max.	Units
$I_{SD}$	-	--	--	1.6	A
$V_{SD}$	$V_{GS} = 0\text{ V}$ , $I_{SD} = -1.6\text{ A}$	--	-0.8	-1.2	V

Notes: Pulse test: PW ≤ 300us duty cycle ≤ 2%.

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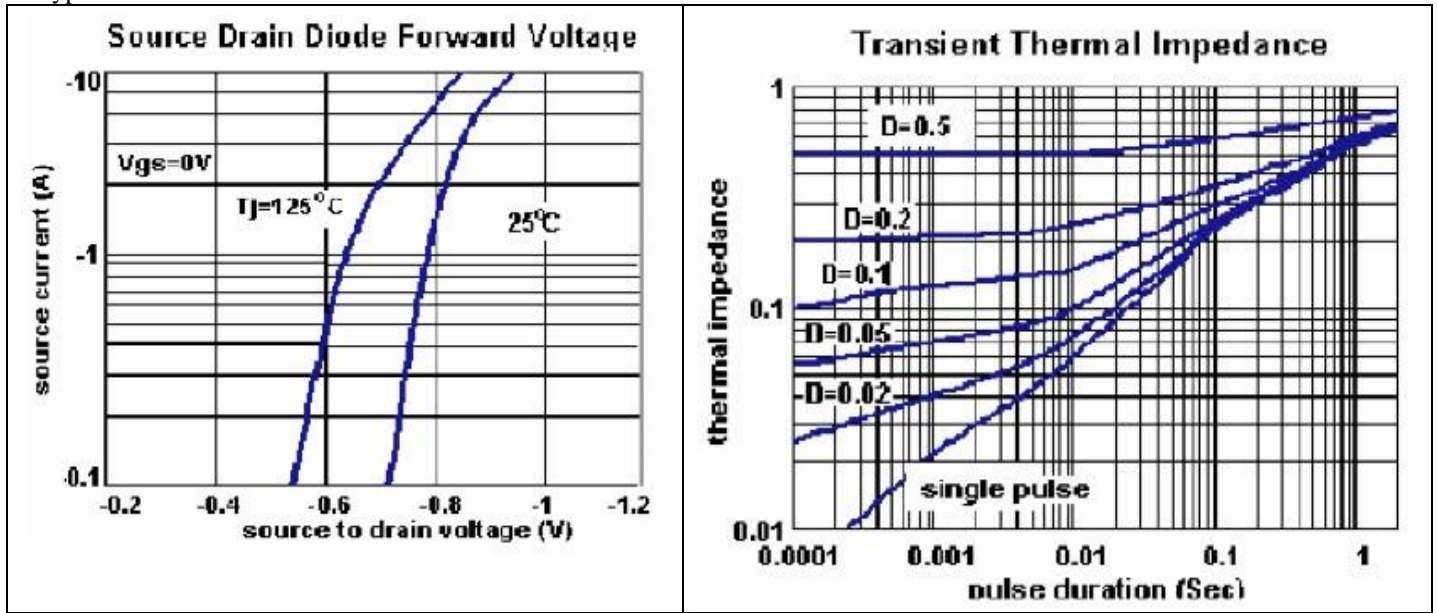
#### Typical Characteristics



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■ Typical Characteristics



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#### Disclaimer

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