

# MT2300

## N-Channel Enhancement Mode Field Effect Transistor

### Product Summary

PRODUCT SUMMARY		
V <sub>DSS</sub>	I <sub>D</sub>	R <sub>DS(ON)</sub> (mΩ) Typ
20V	4.2A	18 @ V <sub>GS</sub> =10V
		21 @ V <sub>GS</sub> =4.5V

### Features

- Super high dense cell design for low R<sub>DS(ON)</sub>
- Rugged and reliable
- Simple drive requirement

### Applications

- LED Display

### Absolute Maximum Ratings (T<sub>A</sub> = 25°C unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V <sub>DS</sub>	20	V
Gate-Source Voltage	V <sub>GS</sub>	± 12	V
Drain Current-Continuous <sup>a</sup> @T <sub>j</sub> =125°C	I <sub>D</sub>	4.2	A
	- Pulse $d^b$	I <sub>DM</sub>	12
Drain-source Diode Forward Current <sup>a</sup>	I <sub>S</sub>	1.25	A
Maximum Power Dissipation <sup>a</sup>	P <sub>D</sub>	1.25	W
Operating Junction and Storage Temperature Range	T <sub>J</sub> ,T <sub>STG</sub>	-55 to 150	°C

### THERMAL CHARACTERISTICS

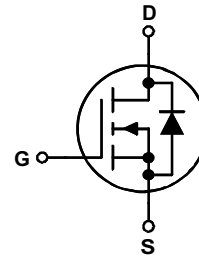
Thermal Resistance, Junction-to Ambient <sup>a</sup>	R <sub>th JA</sub>	100	°C/W
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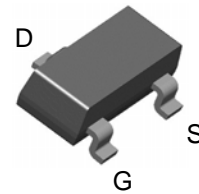
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### Simplified Schematic



### MARKING DIAGRAM & PIN ASSIGNMENT



**SOT-23**

ELECTRICAL CHARACTERISTICS (T<sub>A</sub>=25°C unless otherwise noted)

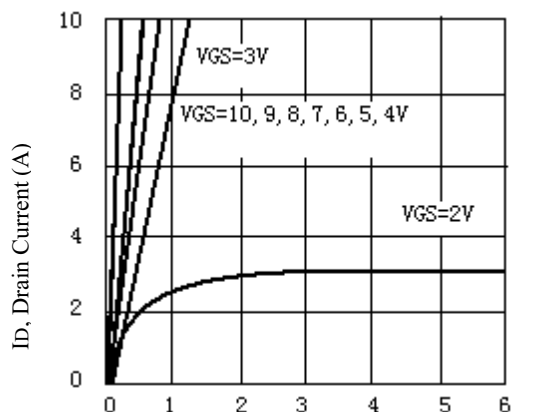
Parameter	Symbol	Condition	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	V <sub>GS</sub> =0V, I <sub>D</sub> =250μA	20			V
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> =16V, V <sub>GS</sub> =0V			1	μA
Gate-Body Leakage	I <sub>GSS</sub>	V <sub>GS</sub> =±8V, V <sub>DS</sub> =0V			±100	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	0.5	0.8	1.5	V
Drain-Source On-State Resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =2.8A		18	27	mΩ
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =2.0A		21	32	
Forward Transconductance	g <sub>FS</sub>	V <sub>GS</sub> =7V, I <sub>D</sub> =5A		5		S
DYNAMIC CHARACTERISTICS						
Input Capacitance	C <sub>ISS</sub>	V <sub>DS</sub> =10V, V <sub>GS</sub> =0V f=1.0MHz		608		pF
Output Capacitance	C <sub>OSS</sub>			115		pF
Reverse Transfer Capacitance	C <sub>RSS</sub>			86		pF
SWITCHING CHARACTERISTICS						
Turn-On Delay Time	t <sub>D(ON)</sub>	V <sub>DD</sub> =10V I <sub>D</sub> =3.6A, V <sub>GEN</sub> =4.5V R <sub>L</sub> =10ohm R <sub>GEN</sub> =10ohm		10		ns
Rise Time	t <sub>r</sub>			14		ns
Turn-Off Delay Time	t <sub>D(OFF)</sub>			39		ns
Fall Time	t <sub>f</sub>			26		ns
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> =10V, I <sub>D</sub> =1A V <sub>GS</sub> =4.5V		9.2		nC
Gate-Source Charge	Q <sub>gs</sub>			1.6		nC
Gate-Drain Charge	Q <sub>gd</sub>			2.6		nC

ELECTRICAL CHARACTERICS (TA=25°C unless otherwise noted)

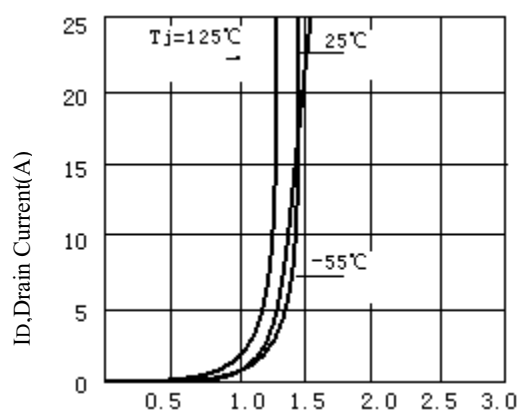
Parameter	Symbol	Condition	Min	Typ	Max	Unit
DRAIN-SOURCE DIODE CHARACTERISTICS						
Diode Forward Voltage	VSD	VGS=0V,Is=1.25A		0.84	1.3	V

Notes

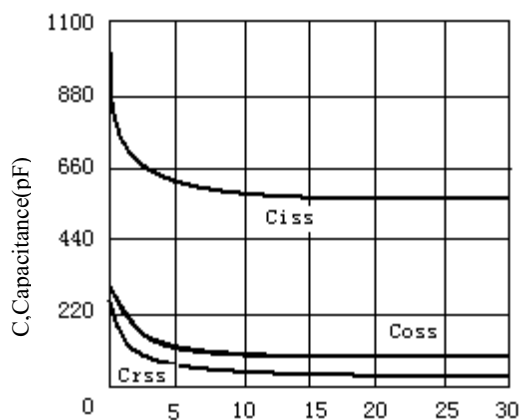
- a. Surface Mounted on FR4 Board,  $t \leq 10\text{sec}$
- b. Pulse Test: Pulse Width  $\leq 300\mu\text{s}$ , Duty Cycle  $\leq 2\%$
- c. Guaranteed by design, not subject to production testing.



VDS, Drain-to-Source Voltage (V)  
Figure 1. Output Characteristics



VGS, Gate-to-source Voltage (V)  
Figure 2. Transfer Characteristics



VGS, Drain-to Source Voltage  
Figure3. Capacitance

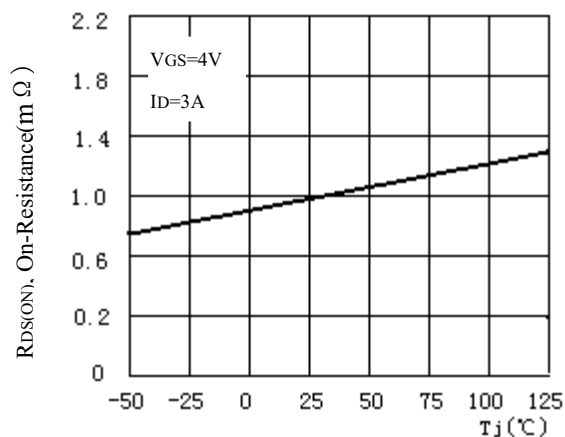
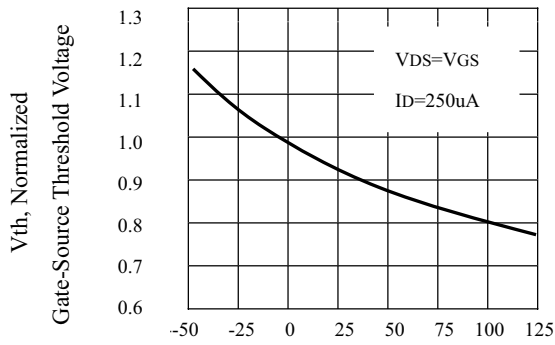
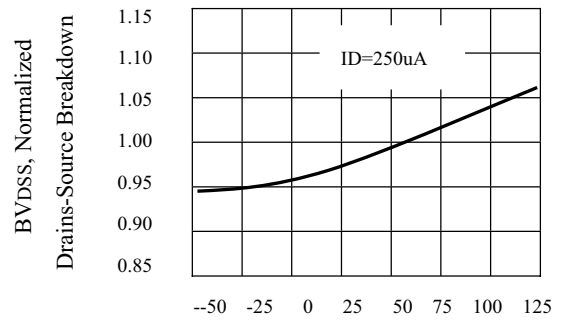


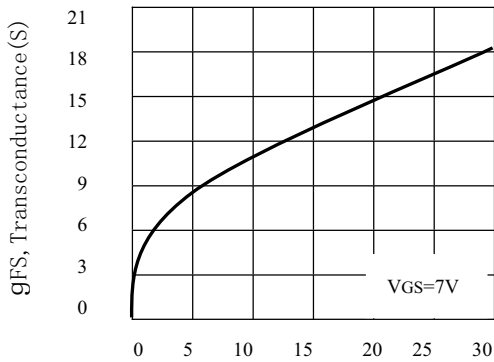
Figure4. On-Resistance Variation with Temperature



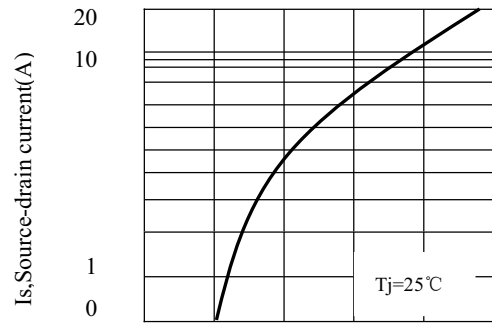
Tj, Junction Temperature(°C)  
**Figure5.Gate Threshold Variation With Temperature**



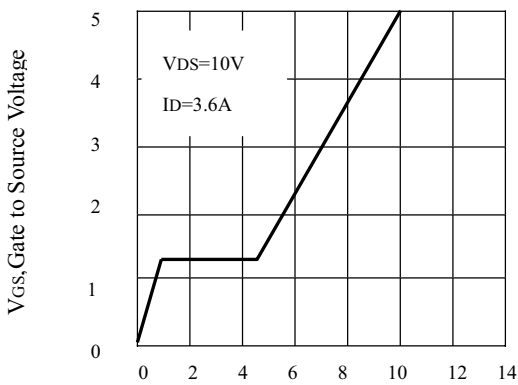
Tj, Junction Temperature (°C)  
**Figure6.Breakdown Voltage Variation With Temperature**



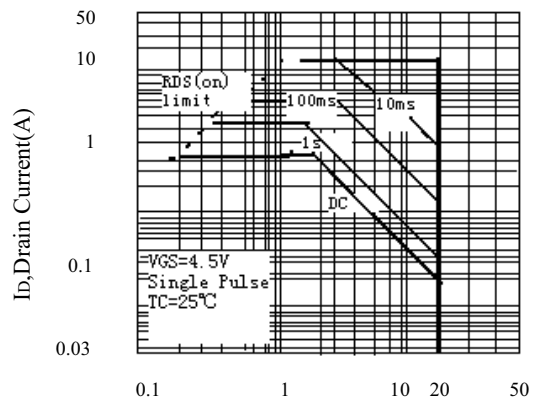
Ids, Drain-Source Current (A)  
**Figure7.Transconductance Variation With Drain Current**



Vsd, Body Diode Forward Voltage  
**Figure8.Body Diode Forward Voltage Variation with Source Current**



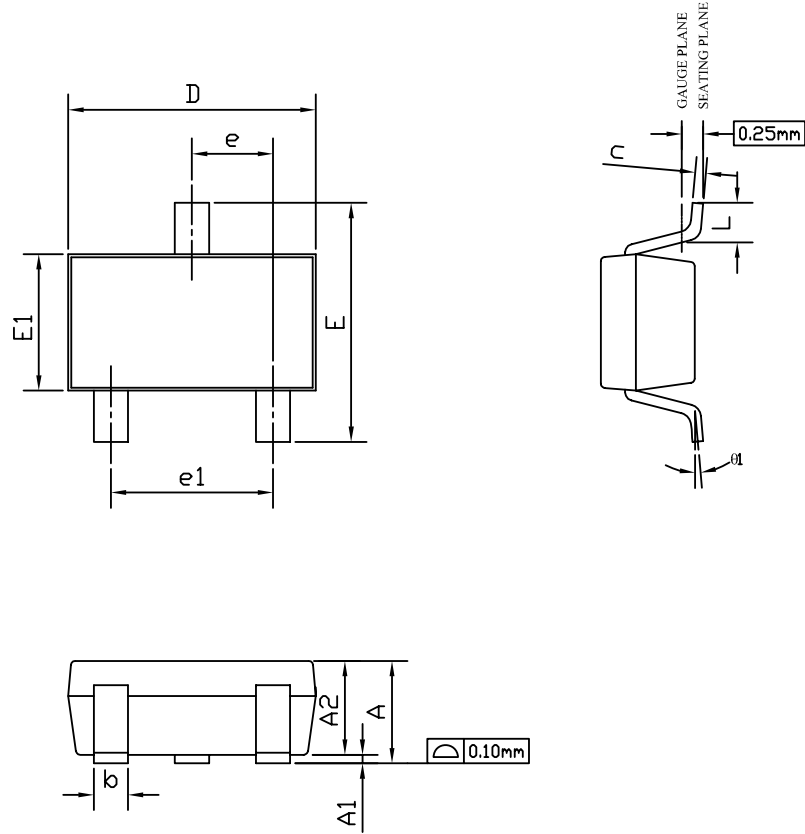
Qg, Total Gate Charge (nC)  
**Figure9. Gate Charge**



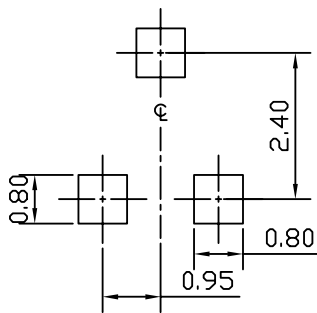
VDS, Drain-Source Voltage(V)  
**Figure10.Maximum Safe Operating Area**

Document No.	PO-00001
Version	L

SOT23 PACKAGE OUTLINE



RECOMMENDED LAND PATTERN



UNIT: mm

SYMBOLS	DIMENSIONS IN MILLIMETERS			DIMENSIONS IN INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.85	---	1.25	0.033	---	0.049
A1	0.00	---	0.13	0.000	---	0.005
A2	0.70	1.00	1.15	0.028	0.039	0.045
b	0.30	0.40	0.50	0.012	0.016	0.020
c	0.08	0.13	0.20	0.003	0.005	0.008
D	2.80	2.90	3.10	0.110	0.114	0.122
E	2.50	2.70	2.90	0.102	0.110	0.118
E1	1.30	1.50	1.70	0.050	0.060	0.667
e	0.95 BSC			0.037 BSC		
e1	1.90 BSC			0.075 BSC		
L	0.30	---	0.60	0.012	---	0.024
θ1	0°	5°	8°	0°	5°	8°

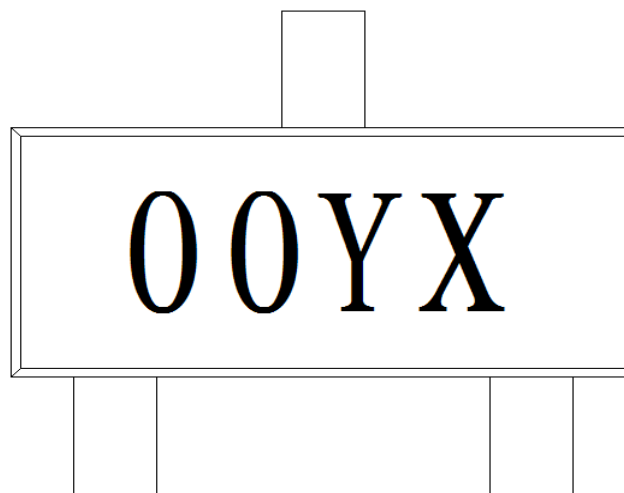
5

NOTE

1. PACKAGE BODY SIZES EXCLUDE MOLD FLASH OR GATE BURRS.  
MOLD FLASH AT THE NON-LEAD SIDES SHOULD BE LESS THAN 5 MILS EACH.
2. TOLERANCE  $\pm 0.100$  mm (4 mil) UNLESS OTHERWISE SPECIFIED.
3. DIMENSION L IS MEASURED IN GAUGE PLANE.
4. CONTROLLING DIMENSION IS MILLIMETER. CONVERTED INCH DIMENSIONS ARE NOT NECESSARILY EXACT.
5. ALL DIMENSIONS ARE IN MILLIMETERS.

## Part Marking Information

SOT-23 (PMG Code )



00: Product model  
Y: Year code  
X: Month code

**NOTE:**

1. For analog switches base part includes DG prefix. Package suffix may or may not be present, depending on room available.

The current marking strategy is reflected. Contact your local sales representative for historical marking strategies for these packages.

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