

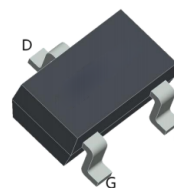


# TS2301BE

## Single P-Channel Power MOSFET

V <sub>DSS</sub> (V)	R <sub>DS(ON)</sub>	I <sub>D(A)</sub>
-20	95mΩ(Typ)@V <sub>GS</sub> =-4.5V	-2.8
	123mΩ(Typ)@V <sub>GS</sub> =-2.5V	

### Pin Description



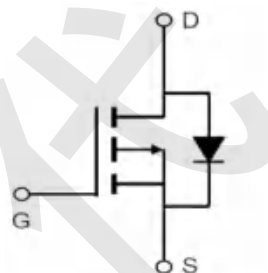
### FEATURE:

- The TS2301BE uses advanced trench technology to provide excellent R<sub>DS(ON)</sub>, low gate charge and operation with gate voltages as low as 2.5V. This device is suitable for use as a Battery protection or in other Switching application.

### APPLICATIONS:

- Load Switch for Portable Devices
- Power Management

### SOT-23



### Ordering and Marking Information

Product ID	Marking	Package	Packaging	Quantity
TS2301BE	A1SHB	SOT23	Tape&Reel	3000

### Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
V <sub>DSS</sub>	Drain-Source Voltage	-20	V
V <sub>GSS</sub>	Gate-Source Voltage	±12	V
I <sub>D</sub>	Continuous Drain Current(V <sub>GS</sub> = -4.5V)	T <sub>A</sub> =25°C	-2.8
		T <sub>A</sub> =70°C	-1.2
T <sub>J</sub>	Maximum Junction Temperature	150	°C
T <sub>STG</sub>	Storage Temperature Range	-55 to 150	°C
I <sub>DM</sub>	Pulsed Drain Current	-8	A
P <sub>D</sub>	Maximum Power Dissipation	T <sub>A</sub> =25°C	0.8
		T <sub>A</sub> =70°C	---
E <sub>AS</sub>	Avalanche Energy, Single Pulsed	---	mJ
R <sub>θJC</sub>	Thermal Resistance-Junction to Case	---	°C/W
R <sub>θJA</sub>	Thermal Resistance-Junction to Ambient	125	°C/W



# TS2301BE

## Single N-Channel Power MOSFET

Electrical Characteristics ( $T_A=25^{\circ}\text{C}$  Unless Otherwise Noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
<b>Static Characteristics</b>						
BVDSS	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	-20	---	---	V
$V_{GS(th)}$	Gate threshold voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	-0.4	-0.7	1.1	V
RDS(on)	Drain-Source On-state Resistance	$V_{GS}=-4.5V, I_D=-3.5A$	---	93	123	m $\Omega$
		$V_{GS}=-2.5V, I_D=-2A$	---	135	180	m $\Omega$
IGSS	Gate-source leakage current	$V_{GS}=\pm 12V, V_{DS}=0V$	---	---	$\pm 100$	A
IDSS	Zero gate voltage drain current	$V_{DS}=-20V, V_{GS}=0V, T_J=25^{\circ}\text{C}$	---	---	-1	$\mu A$
		$T_J=55^{\circ}\text{C}$	---	---	---	
<b>Dynamic Characteristic</b>						
Ciss	Input Capacitance	$V_{GS}=0V, V_{DS}=-10V,$ Frequency=1.0MHz	---	185	---	pF
Coss	Output Capacitance		---	35	---	
Crss	Reverse Transfer Capacitance		---	25	---	
QG	Gate Total Charge	$V_{DS}=-10V, V_{GS}=-5V,$ $I_{DS}=-3A$	---	3.1	---	nC
Qgs	Gate-Source charge		---	0.5	---	
Qgd	Gate-Drain charge		---	0.8	---	
td(on)	Turn-on delay time	$V_{DD}=-10V, V_{GS}=-5V,$ $R_G=5\Omega, I_D=-3A$	---	10	---	ns
tr	Turn-on Rise Time		---	30	---	
td(off)	Turn-off Delay Time		---	63	---	
tf	Turn-off Fall Time		---	50	---	
RG	Gate Resistance	$V_{GS}=0V, V_{DS}=0V, F=1\text{MHz}$	---	---	---	$\Omega$
<b>Diode Characteristics</b>						
VSD	Diode Forward Voltage	$V_{GS}=0V, I_S=-1A,$ $T_J=25^{\circ}\text{C}$	---	---	-1.2	V
trr	Reverse Recovery Time	$I_{SD}=-4.1A,$ $dI_{SD}/dt=-100A/\mu s$	---	---	---	ns
Qrr	Reverse Recovery Charge		---	---	---	nC

### TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

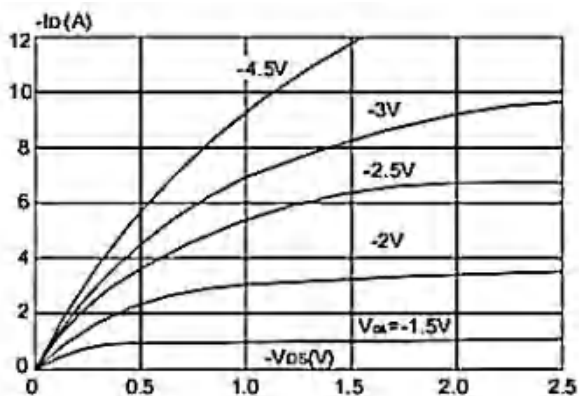


Figure 1: Output Characteristics

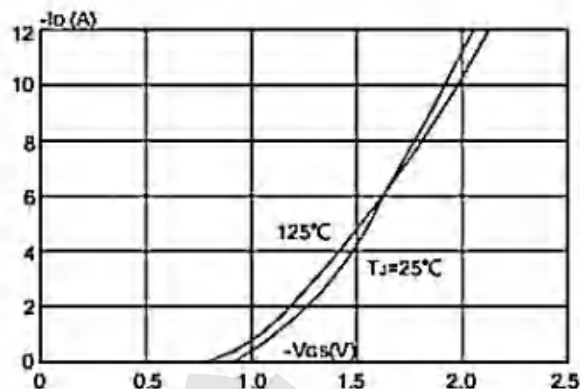


Figure 2: Typical Transfer Characteristics

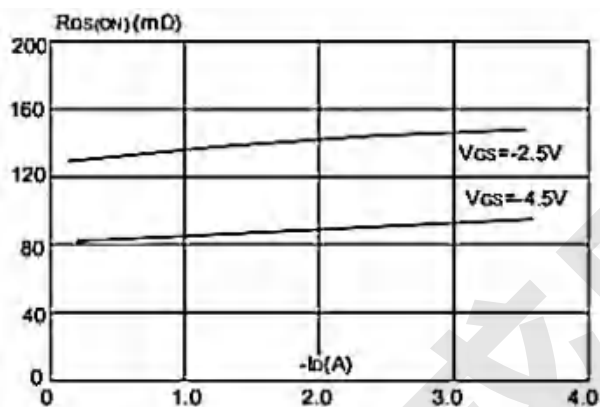


Figure 3: On-resistance vs. Drain Current

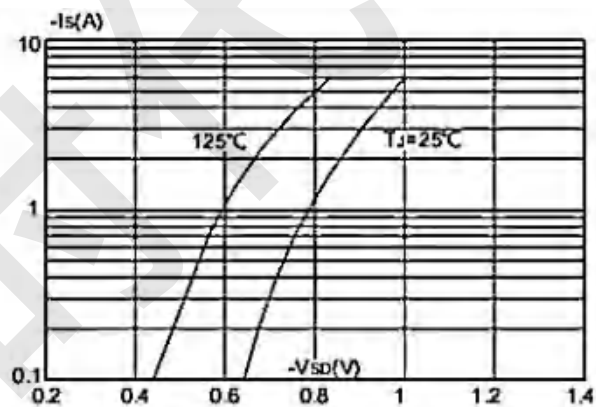


Figure 4: Body Diode Characteristics

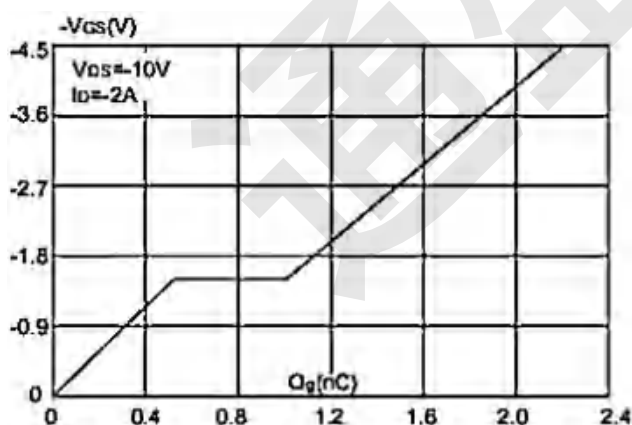


Figure 5: Gate Charge Characteristics

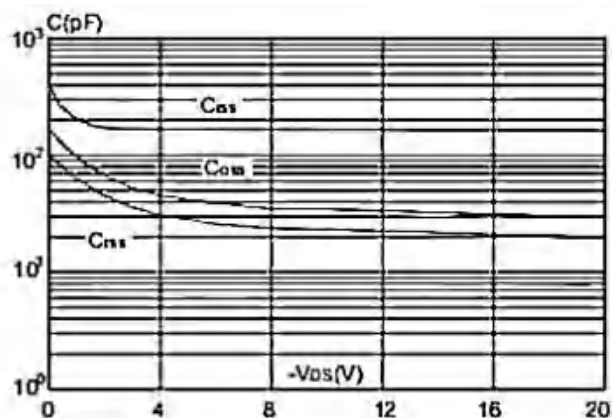


Figure 6: Capacitance Characteristics

## Single N-Channel Power MOSFET

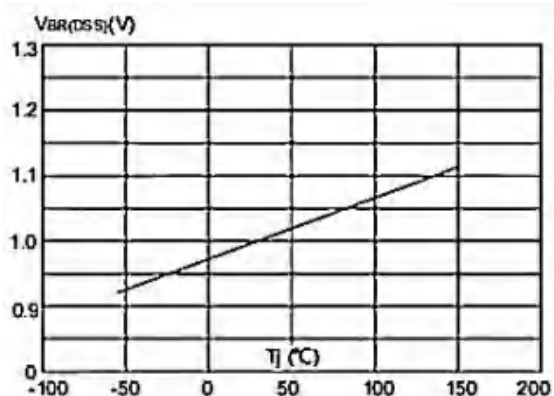


Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

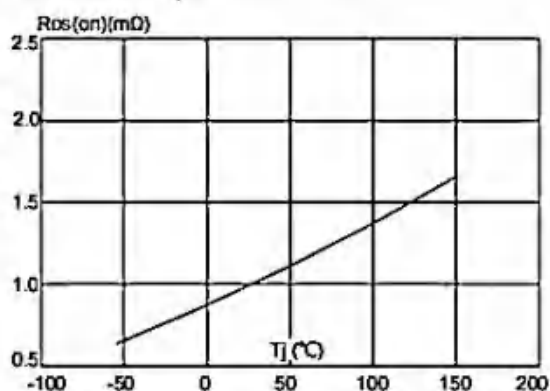


Figure 8: Normalized on Resistance vs. Junction Temperature

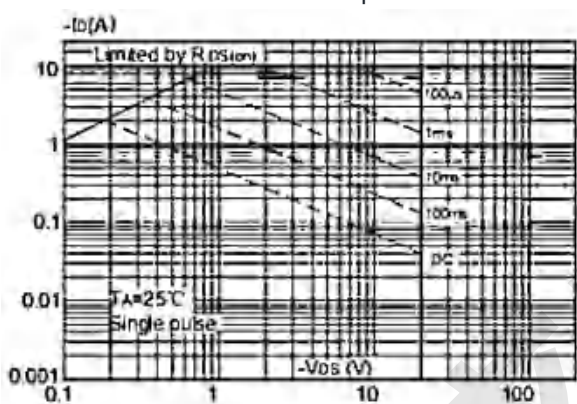


Figure 9: Maximum Safe Operating Area

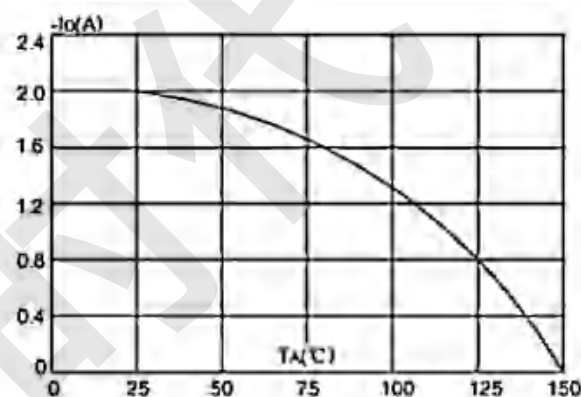


Figure 10: Maximum Continuous Drain Current vs. Ambient Temperature

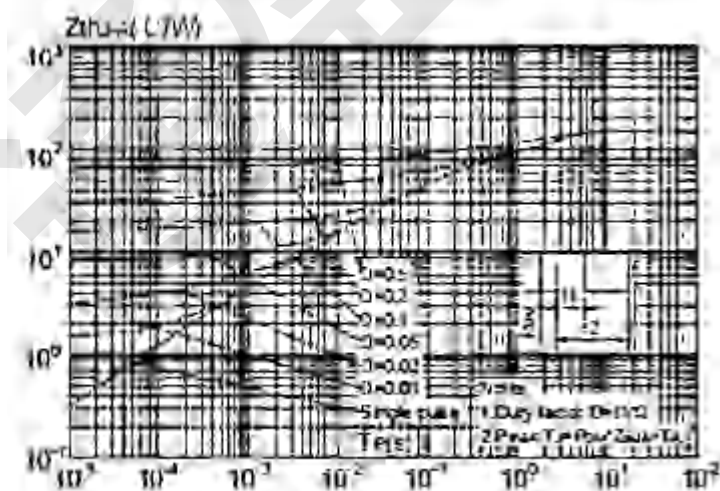
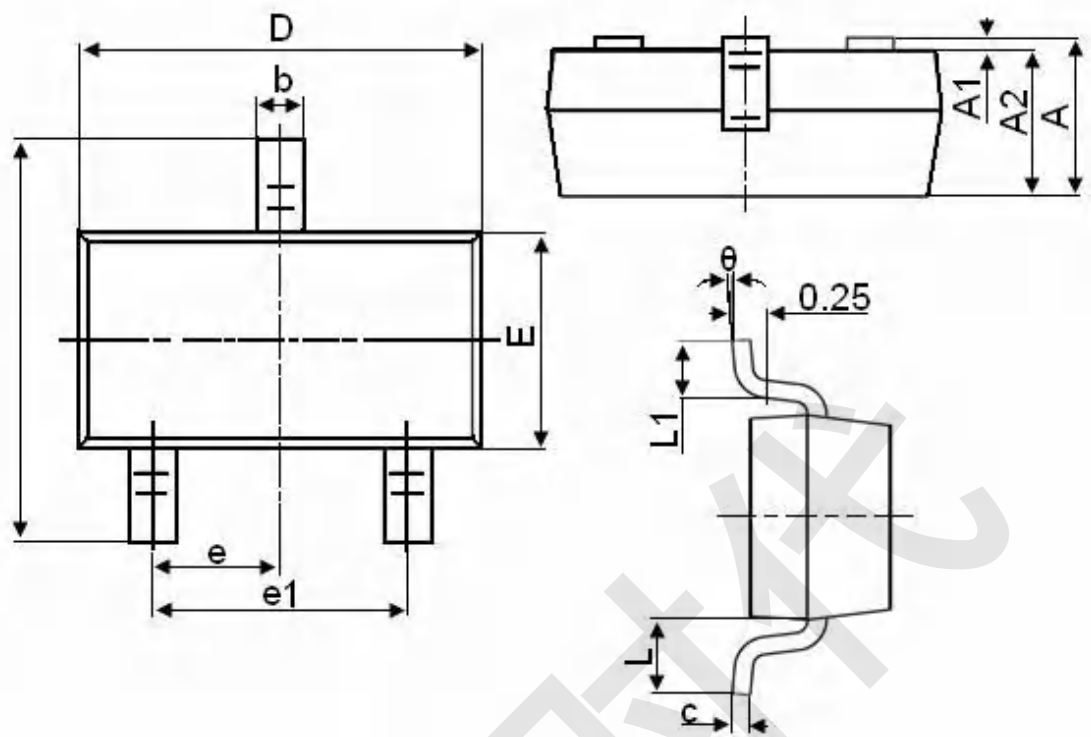


Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Ambient



Symbol	Dimensions in Millimeters	
	MIN.	MAX.
A	0.900	1.150
A1	0.000	0.100
A2	0.900	1.050
b	0.300	0.500
c	0.080	0.150
D	2.800	3.000
E	1.200	1.400
E1	2.250	2.550
e	0.950TYP	
e1	1.800	2.000
L	0.550REF	
L1	0.300	0.500
$\theta$	0°	8°



TS2301BE

Single N-Channel Power MOSFET

Edition	Date	Change
Rve1.0	2022/11	Initial release

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