



**THE DATASHEET OF  
SI2312B-TP**



### Features

- Trench LV MOSFET Technology
- High Power and Current Handling Capability
- Moisture Sensitivity Level 1
- Halogen Free. "Green" Device (Note 1)
- Epoxy Meets UL 94 V-0 Flammability Rating
- Lead Free Finish/RoHS Compliant ("P" Suffix Designates RoHS Compliant. See Ordering Information)

### Maximum Ratings

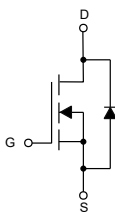
- Operating Junction Temperature Range : -55°C to +150°C
- Storage Temperature Range: -55°C to +150°C
- Thermal Resistance: 100°C/W Junction to Ambient (Note 2)

Parameter	Symbol	Rating	Unit
Drain-Source Voltage	$V_{DS}$	20	V
Gate-Source Voltage	$V_{GS}$	±10	V
Continuous Drain Current	$I_D$	$T_A=25^\circ\text{C}$	6.8
		$T_A=70^\circ\text{C}$	5.4
Pulsed Drain Current (Note 3)	$I_{DM}$	27.2	A
Total Power Dissipation (Note 4)	$P_D$	1.25	W

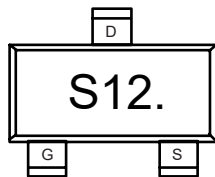
Note:

1. Halogen free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
2. The value of  $R_{\theta JA}$  is measured with the device mounted on 1in<sup>2</sup> FR-4 board with 2oz. Copper, in a still air environment with  $T_A = 25^\circ\text{C}$ .
3. Repetitive rating; pulse width limited by max. junction temperature.
4.  $P_D$  is based on max. junction temperature, using junction-ambient thermal resistance.

### Internal Structure and Marking Code

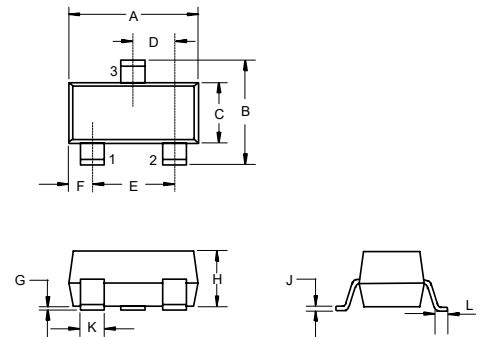


1. GATE
2. SOURCE
3. DRAIN



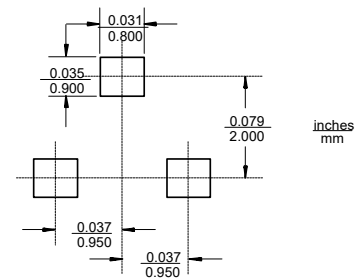
## N-Channel MOSFET

### SOT-23



DIM	DIMENSIONS				NOTE
	INCHES		MM		
	MIN	MAX	MIN	MAX	
A	0.110	0.120	2.80	3.04	
B	0.083	0.104	2.10	2.64	
C	0.047	0.055	1.20	1.40	
D	0.034	0.041	0.85	1.05	
E	0.067	0.083	1.70	2.10	
F	0.018	0.024	0.45	0.60	
G	0.0004	0.006	0.01	0.15	
H	0.035	0.043	0.90	1.10	
J	0.003	0.007	0.08	0.18	
K	0.012	0.020	0.30	0.51	
L	0.007	0.020	0.20	0.50	

### Suggested Solder Pad Layout



**Electrical Characteristics @ 25°C (Unless Otherwise Specified)**

Parameter	Symbol	Test conditions	Min	Typ	Max	Unit
<b>Static Characteristics</b>						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS}=0V, I_D=250\mu A$	20			V
Gate-Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	0.5	0.7	0.9	V
Gate-Body Leakage Current	$I_{GSS}$	$V_{GS}=\pm 10V, V_{DS}=0V$			$\pm 100$	nA
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=20V, V_{GS}=0V$			0.3	$\mu A$
Drain-Source On-Resistance	$R_{DS(on)}$	$V_{GS}=4.5V, I_D=4.5A$		14	21	m $\Omega$
		$V_{GS}=2.5V, I_D=4.0A$		18	30	
Forward Transconductance	$g_{FS}$	$V_{DS}=10V, I_D=4A$		30		S
Gate Resistance	$R_g$	f=1 MHz, Open drain		3		$\Omega$
<b>Diode Characteristics</b>						
Continuous Body Diode Current	$I_S$				6.8	A
Diode Forward Voltage	$V_{SD}$	$V_{GS}=0V, I_S=4A$			1.2	V
Reverse Recovery Time	$t_{rr}$	$I_F=3.4A, di_F/dt=200A/\mu s$		10		ns
Reverse Recovery Charge	$Q_{rr}$			6		nC
<b>Dynamic Characteristics</b>						
Input Capacitance	$C_{iss}$	$V_{DS}=8V, V_{GS}=0V, f=1MHz$		686		pF
Output Capacitance	$C_{oss}$			126		
Reverse Transfer Capacitance	$C_{rss}$			123		
Total Gate Charge	$Q_g$	$V_{DS}=10V, V_{GS}=4.5V, I_D=3A$		11		nC
Gate-Source Charge	$Q_{gs}$			1.8		
Gate-Drain Charge	$Q_{gd}$			3		
Turn-On Delay Time	$t_{d(on)}$	$V_{DD}=10V, V_{GS}=10V, R_G=2.2\Omega, I_D=1A$		6.4		ns
Turn-On Rise Time	$t_r$			12.6		
Turn-Off Delay Time	$t_{d(off)}$			21		
Turn-Off Fall Time	$t_f$			2.6		

Curve Characteristics

Fig.1 - Typical Output Characteristics

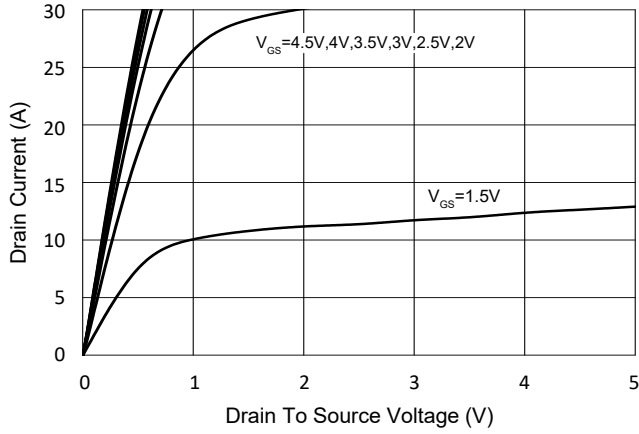


Fig.2 - Transfer Characteristic

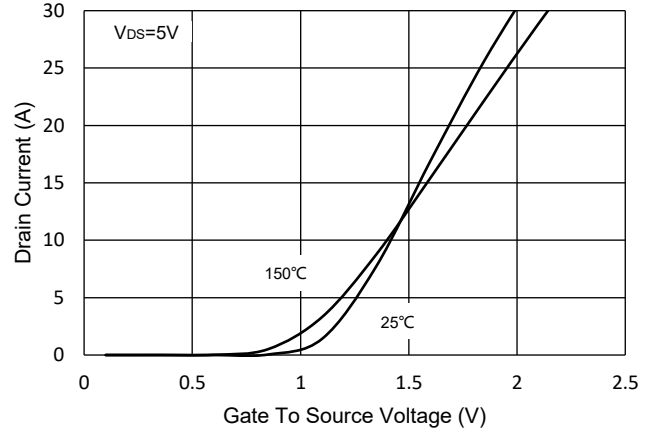


Fig.3 -  $R_{DS(ON)}$  -  $V_{GS}$

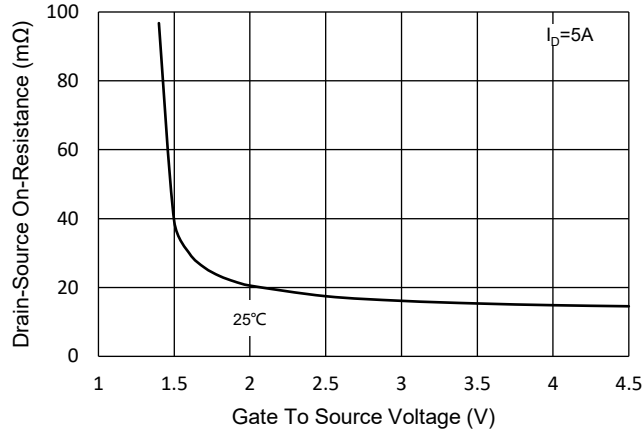


Fig.4 -  $R_{DS(ON)}$  -  $I_D$

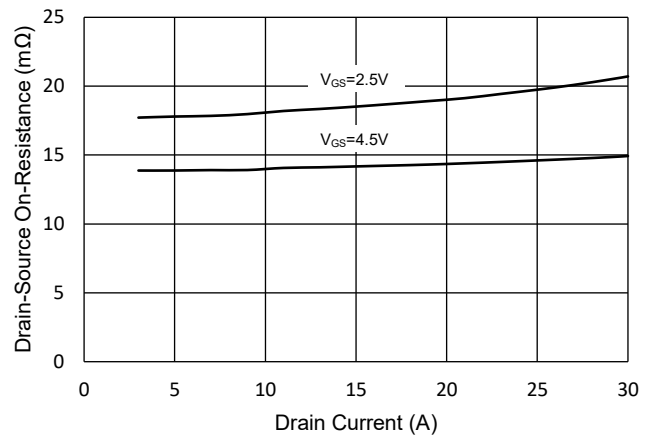


Fig.5 - Capacitance Characteristics

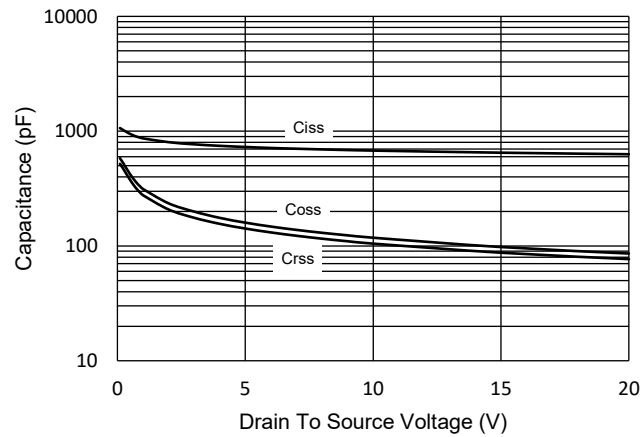
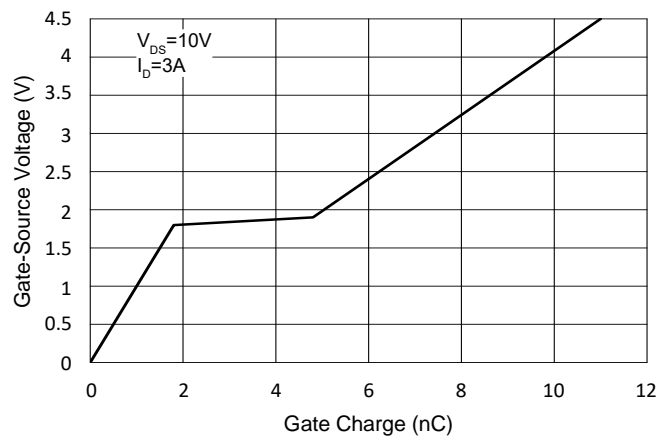
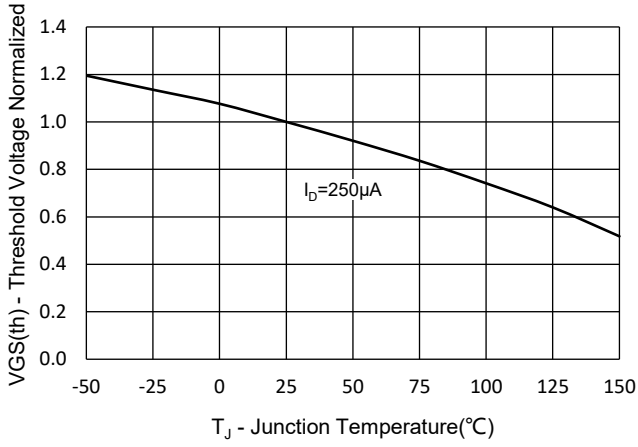


Fig.6 - Gate Charge

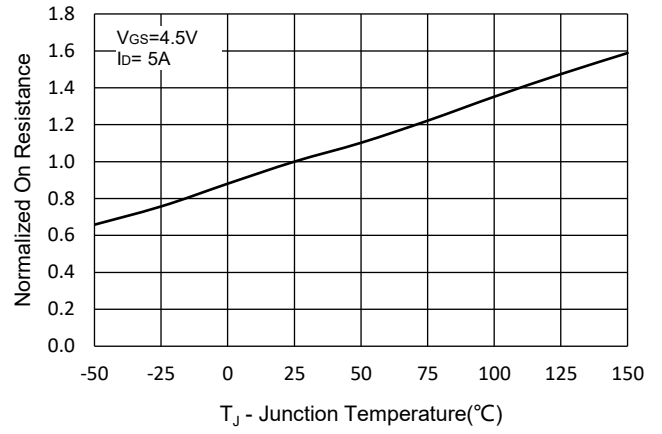


**Curve Characteristics**

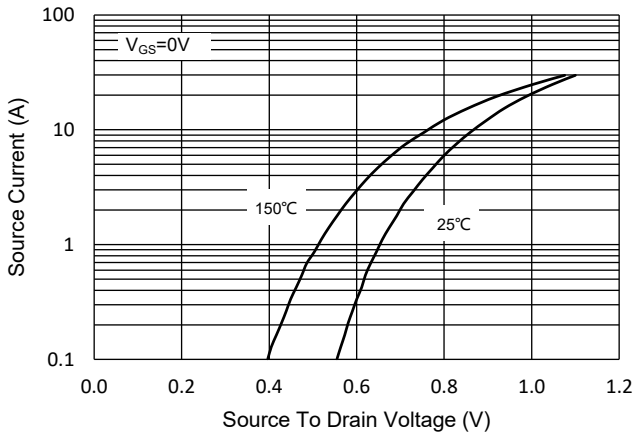
**Fig.7 - Normalized Threshold Voltage**



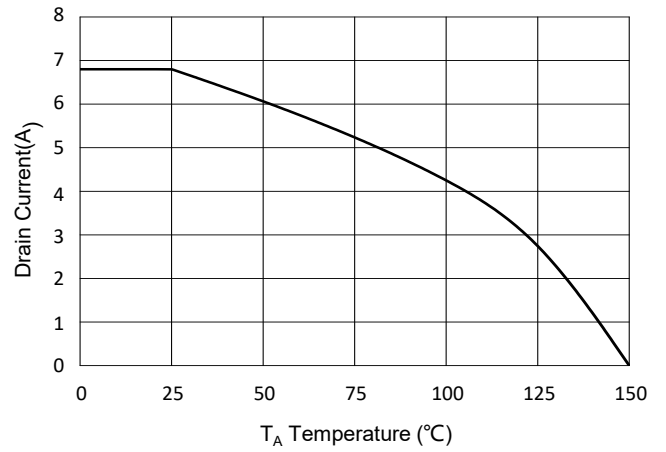
**Fig.8 - Normalized On Resistance Characteristics**



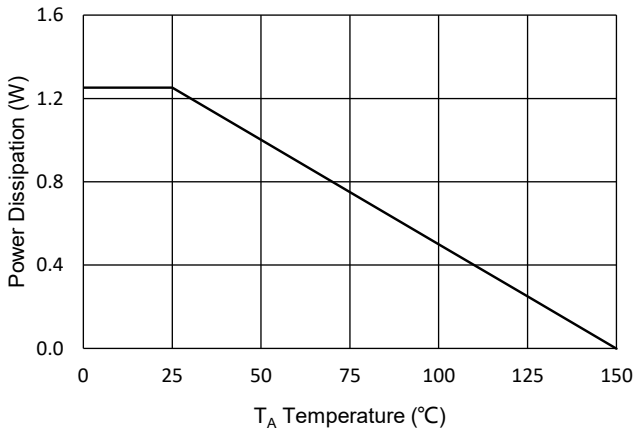
**Fig.9 - I<sub>S</sub> - V<sub>SD</sub>**



**Fig.10 - Drain Current**



**Fig.11 - PD Dissipation**



Curve Characteristics

Fig.12 - Safe Operation Area

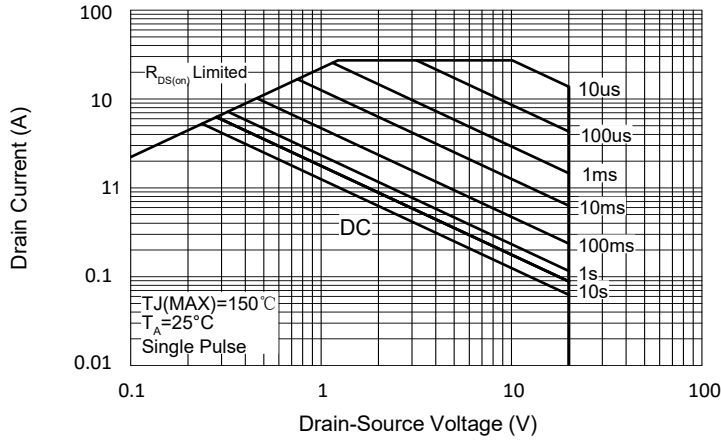
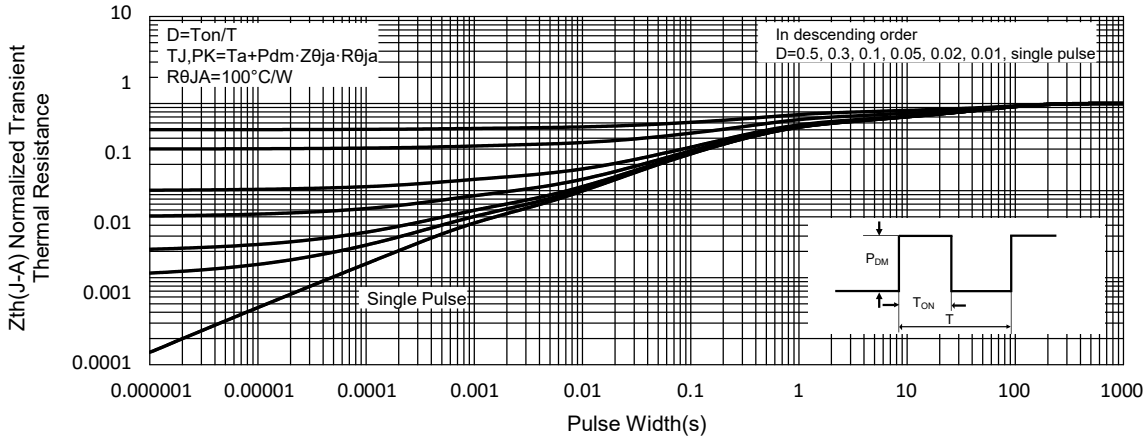


Fig.13 - Normalized Transient Thermal Impedance



## Ordering Information

Device	Packing
Part Number-TP	Tape&Reel:3Kpcs/Reel

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