

### Description

These P-Channel enhancement mode power field effect transistors are using trench DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These devices are well suited for high efficiency fast switching applications.

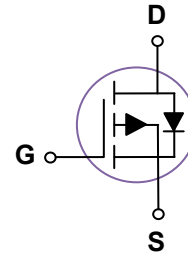
### Dimensions SOT-23



### General Features

$V_{DS}$	-20V
$I_D$ (at $V_{GS}=-4.5V$ )	-5.4A
$R_{DS(ON)}$ (at $V_{GS}=-4.5V$ )	40m $\Omega$ (Max)

### Pin Configuration



### Application

- Battery protection
- Load switch
- Uninterruptible power supply

### Package Marking and Ordering Information

Device	Device Marking	Device Package	Reel Size	Tape width	Quantity
LM2305B	S5B	SOT-23	Ø180mm	8 mm	3000 units

### Absolute Maximum Ratings (TC=25°C unless otherwise noted)

Parameter	Symbol	Maximum	Units	
Drain-Source Voltage	$V_{DS}$	-20	V	
Gate-Source Voltage	$V_{GS}$	±10	V	
Drain Current-Continuous	TC=25°C	$I_D$	-5.4	A
	TC=70°C	$I_D$	-4.2	A
Maximum Power Dissipation	$P_D$	1.56	W	
Drain Current – Pulsed <sup>1</sup>	$I_{DM}$	-21.6	A	
Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 To 150	°C	
<b>Thermal Characteristics</b>				
Parameter	Symbol	Typ	Max	Unit
Thermal Resistance junction-case	$R_{\theta Jc}$		1.1	°C / W
Thermal Resistance junction-to-Ambient	$R_{\theta JA}$		80	°C / W

## Electrical Characteristics (T<sub>J</sub>=25°C, unless otherwise noted)

Symbol	Parameter	Condition	Min	Typ	Max	Unit
<b>STATIC PARAMETERS</b>						
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>D</sub> =-250μA	-20			V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> =-20V, V <sub>GS</sub> =0V			1	μA
I <sub>GSS</sub>	Gate-Body Leakage Current	V <sub>GS</sub> =±10V, V <sub>DS</sub> =0V			±100	nA
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =-250μA	-0.4		-1.0	V
R <sub>DS(ON)</sub>	Drain-Source On-State Resistance	V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-5A		32	40	mΩ
		V <sub>GS</sub> =-2.5V, I <sub>D</sub> =-4A		38	50	mΩ
<b>DYNAMIC PARAMETERS</b>						
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =-10V, V <sub>GS</sub> =0V, F=1.0MHz		830		pF
C <sub>OSS</sub>	Output Capacitance			70		pF
C <sub>rSS</sub>	Reverse Transfer Capacitance			55		pF
<b>SWITCHING PARAMETERS</b>						
t <sub>d(on)</sub>	Turn-on Delay Time	V <sub>DD</sub> =-10V, I <sub>D</sub> =-1A, V <sub>GS</sub> =-4.5V, R <sub>G</sub> =25Ω		6		nS
t <sub>r</sub>	Turn-on Rise Time			21		nS
t <sub>d(off)</sub>	Turn-Off Delay Time			51		nS
t <sub>f</sub>	Turn-Off Fall Time			14		nS
Q <sub>g</sub>	Total Gate Charge	V <sub>DS</sub> =-10V, I <sub>D</sub> =-3A, V <sub>GS</sub> =-4.5V		9.6		nC
Q <sub>gs</sub>	Gate-Source Charge			1.6		nC
Q <sub>gd</sub>	Gate-Drain Charge			2		nC
V <sub>SD</sub>	Diode Forward Voltage	V <sub>GS</sub> =0V, I <sub>SD</sub> =-1A		0.72	1.4	V
R <sub>g</sub>	Gate resistance	V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, F=1MHz		5		Ω

Note:

1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. The data tested by pulsed , pulse width  $\leq$  300us , duty cycle  $\leq$  2%.
3. Essentially independent of operating temperature.

Typical Characteristics

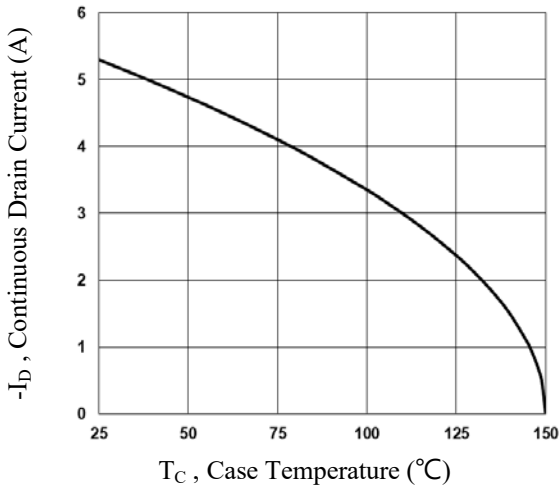


Fig.1 Continuous Drain Current vs.  $T_C$

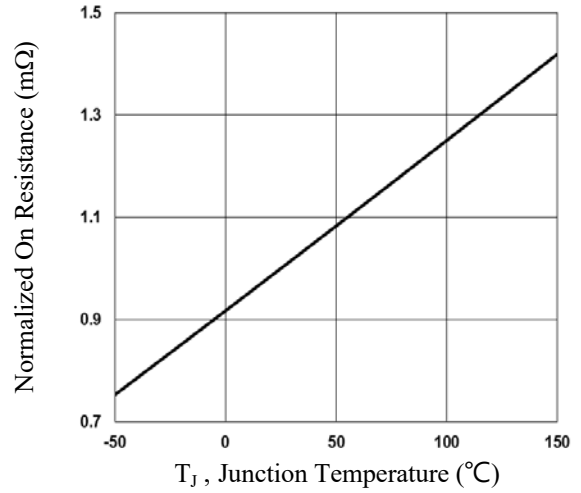


Fig.2 Normalized  $R_{DS(on)}$  vs.  $T_J$

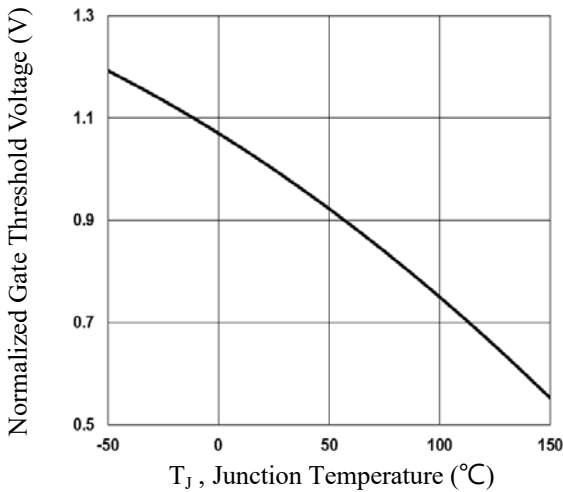


Fig.3 Normalized  $V_{th}$  vs.  $T_J$

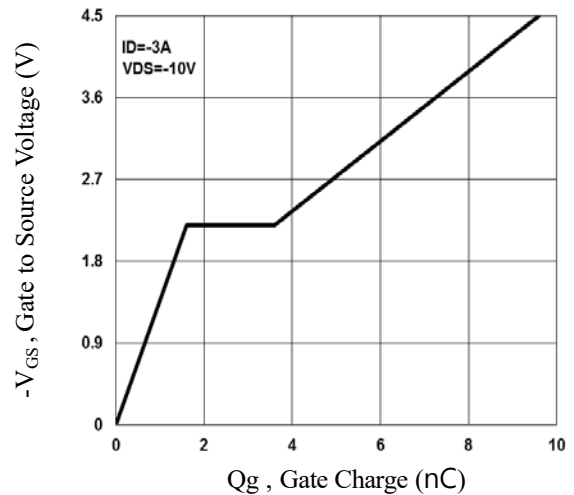


Fig.4 Gate Charge Waveform

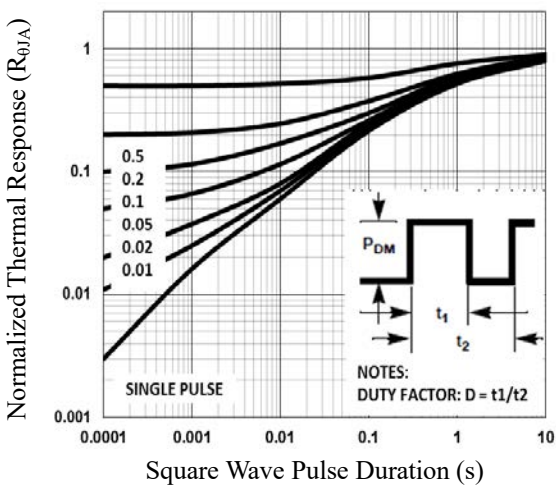


Fig.5 Normalized Transient Impedance

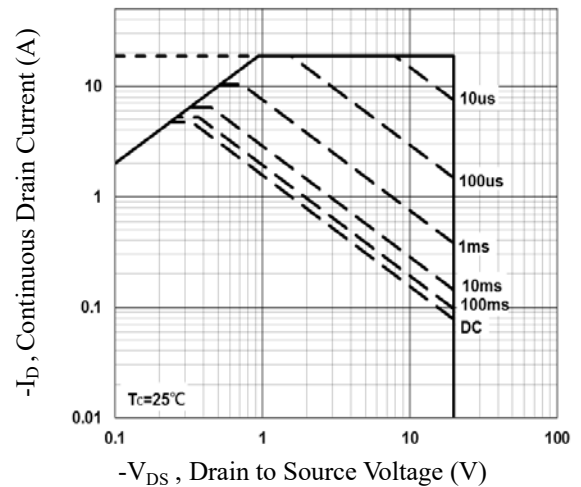
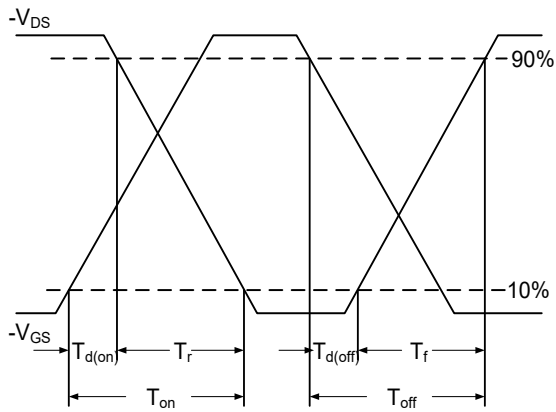
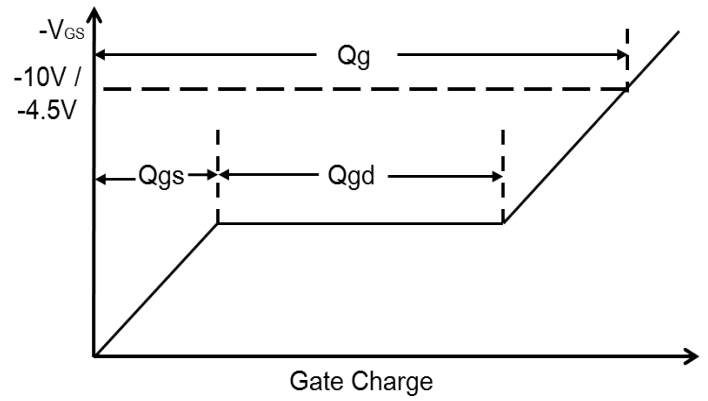


Fig.6 Maximum Safe Operation Area

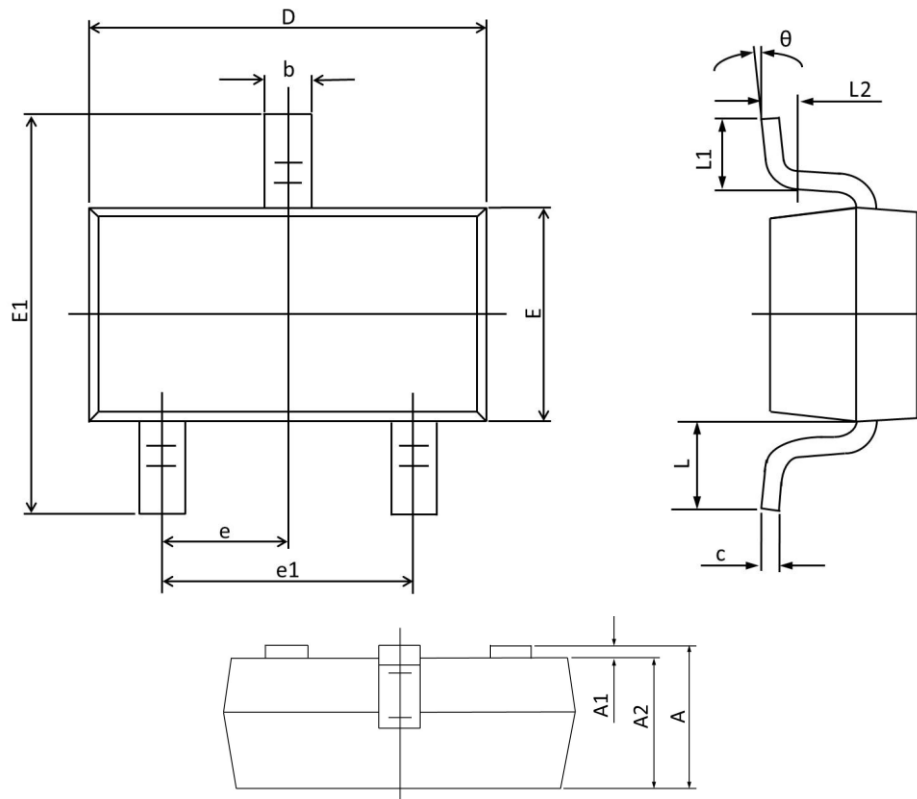


**Fig.7 Switching Time Waveform**



**Fig.8 Gate Charge Waveform**

Package Mechanical Data:SOT-23



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Max	Min	Max	Min
A	1.150	0.900	0.045	0.035
A1	0.100	0.000	0.004	0.000
A2	1.050	0.900	0.041	0.035
b	0.500	0.300	0.020	0.012
c	0.150	0.080	0.006	0.003
D	3.000	2.800	0.118	0.110
E	1.400	1.200	0.055	0.047
E1	2.550	2.250	0.100	0.089
e	0.95 TYP.		0.037 TYP.	
e1	2.000	1.800	0.079	0.071
L	0.55 REF.		0.022 REF.	
L1	0.500	0.300	0.020	0.012
L2	0.25 TYP.		0.01 TYP.	
$\theta$	8°	0°	8°	0°

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