

**DESCRIPTION**

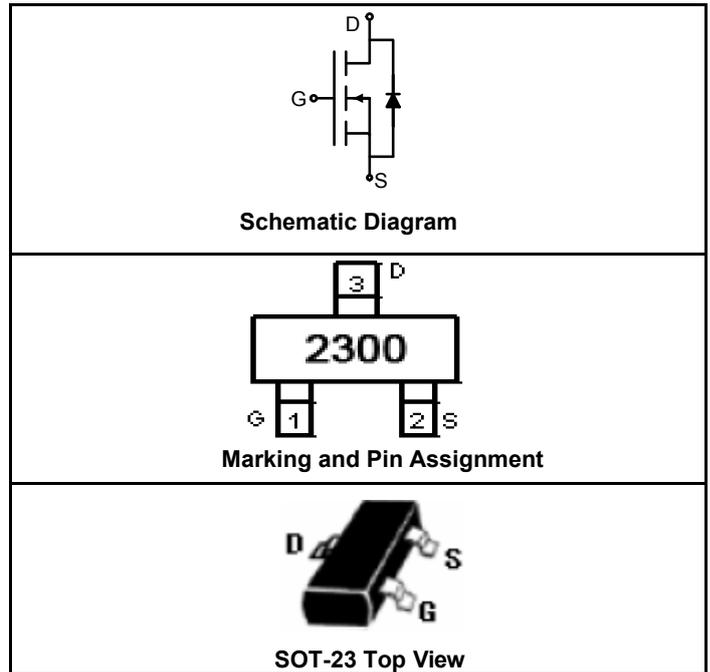
The SSF2300 uses advanced trench technology to provide excellent  $R_{DS(ON)}$ , low gate charge and operation with gate voltages as low as 2.5V. This device is suitable for use as a battery protection or in other switching applications.

**FEATURES**

- $V_{DS} = 20V, I_D = 4.5A$   
 $R_{DS(ON)} < 110m\Omega @ V_{GS}=2.5V$   
 $R_{DS(ON)} < 55m\Omega @ V_{GS}=4.5V$
- High Power and Current Handling Capability
- Lead Free

**APPLICATIONS**

- Battery Protection
- Load Switch
- Power Management



**PACKAGE MARKING AND ORDERING INFORMATION**

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
2300	SSF2300	SOT-23	Ø180mm	8 mm	3000 units

**ABSOLUTE MAXIMUM RATINGS** ( $T_A=25^{\circ}C$  unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	$V_{DS}$	20	V
Gate-Source Voltage	$V_{GS}$	$\pm 12$	V
Drain Current-Continuous@ Current-Pulsed (Note 1)	$I_D (25^{\circ}C)$	4.5	A
	$I_D (70^{\circ}C)$	2.8	A
	$I_{DM}$	16	A
Maximum Power Dissipation	$P_D$	1.3	W
Operating Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 To 150	$^{\circ}C$

**THERMAL CHARACTERISTICS**

Thermal Resistance, Junction-to-Ambient (Note 2)	$R_{\theta JA}$	140	$^{\circ}C/W$
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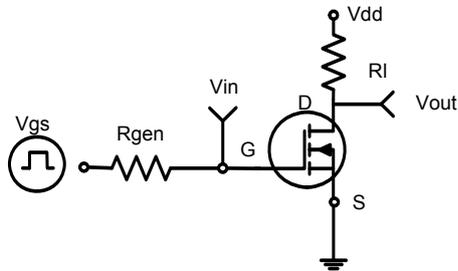
**ELECTRICAL CHARACTERISTICS** ( $T_A=25^\circ\text{C}$  unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
<b>OFF CHARACTERISTICS</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=250\mu A$	20			V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=20V, V_{GS}=0V$			1	$\mu A$
Gate-Body Leakage Current	$I_{GSS}$	$V_{GS}=\pm 8V, V_{DS}=0V$			$\pm 100$	nA
<b>ON CHARACTERISTICS (Note 3)</b>						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	0.65		1.2	V
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS}=2.5V, I_D=3.1A$		68	110	m $\Omega$
		$V_{GS}=4.5V, I_D=3.6A$		42	55	m $\Omega$
Forward Transconductance	$g_{FS}$	$V_{DS}=5V, I_D=3.6A$		8		S
<b>DYNAMIC CHARACTERISTICS (Note4)</b>						
Input Capacitance	$C_{iss}$	$V_{DS}=10V, V_{GS}=0V,$ $F=1.0MHz$		300		PF
Output Capacitance	$C_{oss}$			120		PF
Reverse Transfer Capacitance	$C_{riss}$			80		PF
<b>SWITCHING CHARACTERISTICS (Note 4)</b>						
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=10V, R_L = 2.8 \Omega$ $V_{GS}=4.5V, R_{GEN}=6\Omega,$ $I_D=3.6A,$		7	15	nS
Turn-on Rise Time	$t_r$			55	80	nS
Turn-Off Delay Time	$t_{d(off)}$			16	60	nS
Turn-Off Fall Time	$t_f$			10	25	nS
Total Gate Charge	$Q_g$	$V_{DS}=10V, I_D=3.6A, V_{GS}=4.5V$		4.0	10	nC
Gate-Source Charge	$Q_{gs}$			0.65		nC
Gate-Drain Charge	$Q_{gd}$			1.5		nC
<b>DRAIN-SOURCE DIODE CHARACTERISTICS</b>						
Diode Forward Voltage (Note 3)	$V_{SD}$	$V_{GS}=0V, I_S=0.94A$		0.76	1.2	V
Diode Forward Current (Note 2)	$I_S$			0.94		A

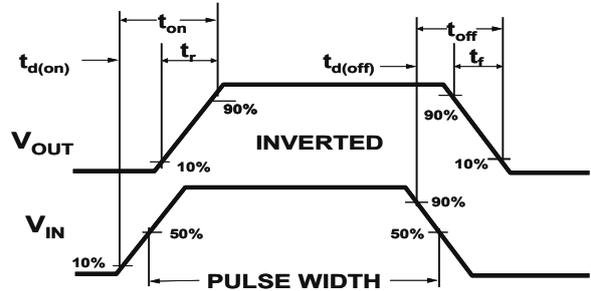
**NOTES:**

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on 1in<sup>2</sup> FR4 Board,  $t \leq 10$  sec.
3. Pulse Test: Pulse Width  $\leq 300\mu s$ , Duty Cycle  $\leq 2\%$ .
4. Guaranteed by design, not subject to production testing.

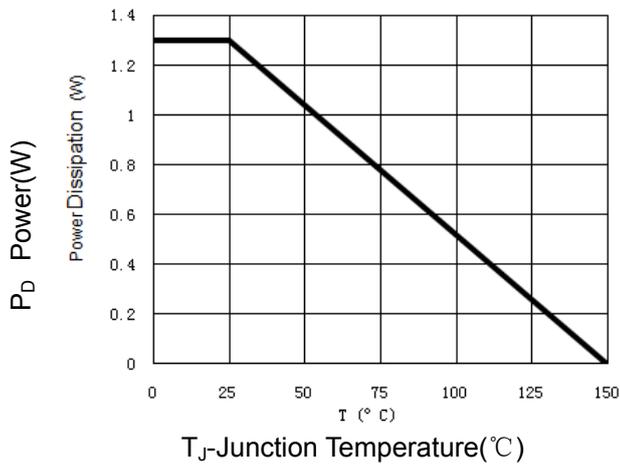
**TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS**



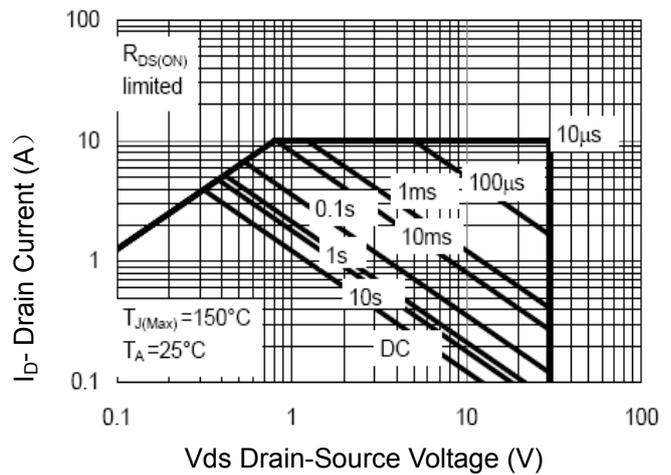
**Figure 1: Switching Test Circuit**



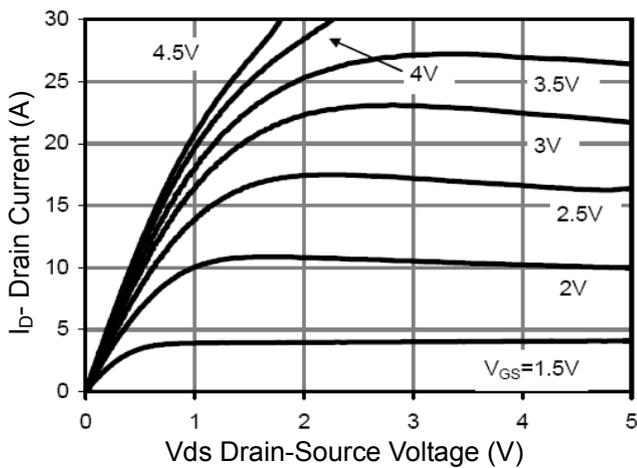
**Figure 2: Switching Waveforms**



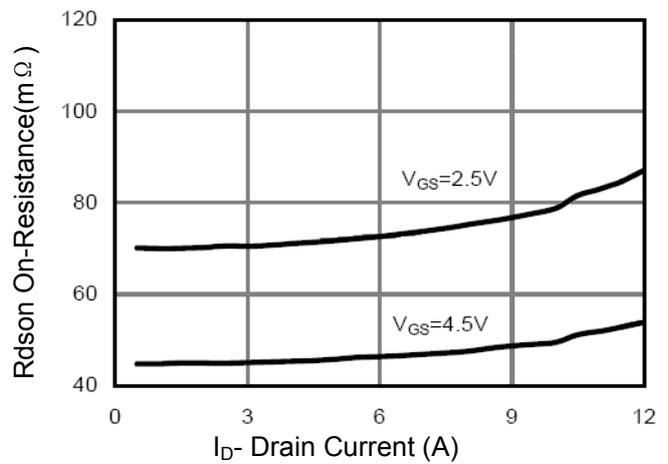
**Figure 3 Power Dissipation**



**Figure 4 Safe Operation Area**

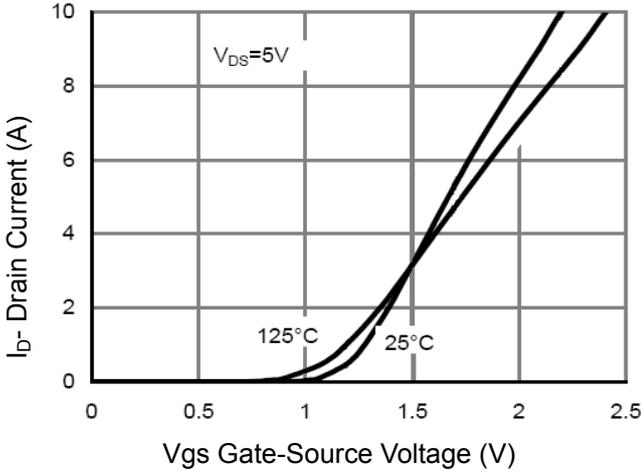


**Figure 5 Output CHARACTERISTICS**

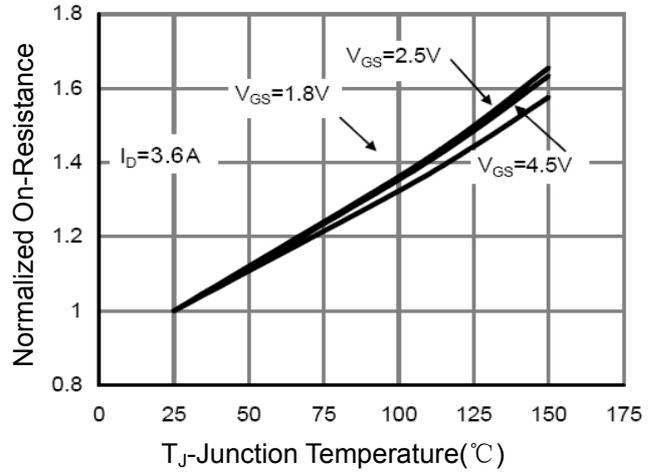


**Figure 6 Drain-Source On-Resistance**

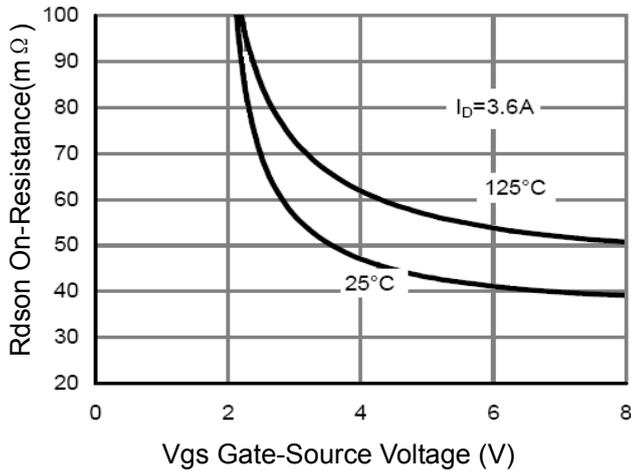
**TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS**



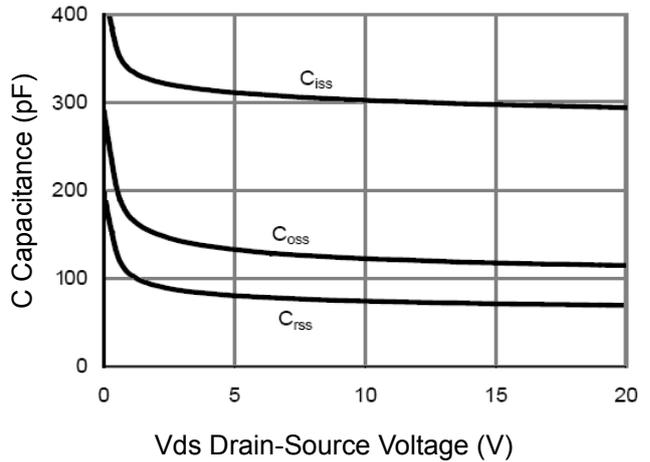
**Figure 7 Transfer Characteristics**



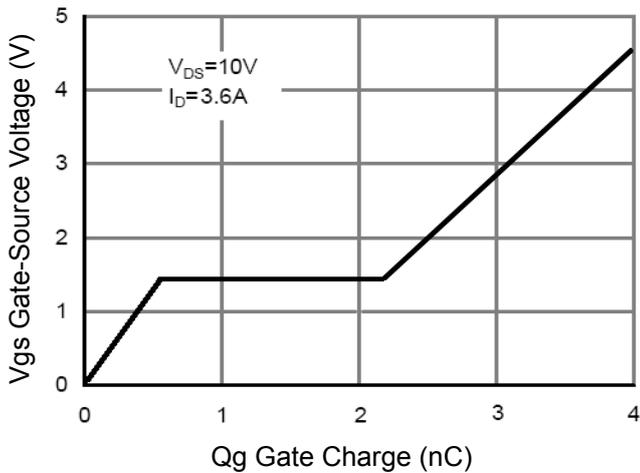
**Figure 8 Drain-Source On-Resistance**



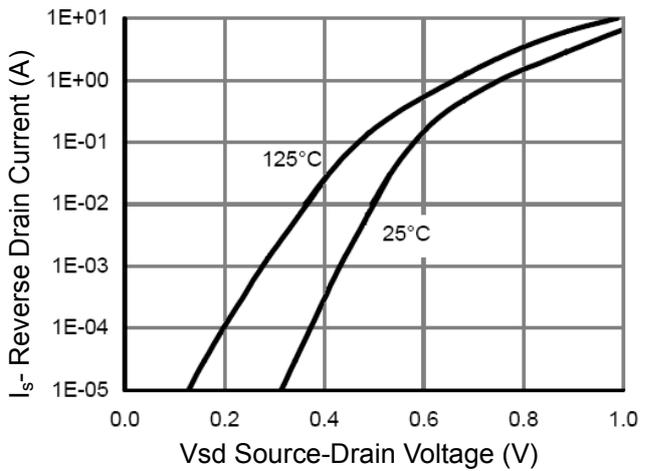
**Figure 9 Rdson vs Vgs**



**Figure 10 Capacitance vs Vds**

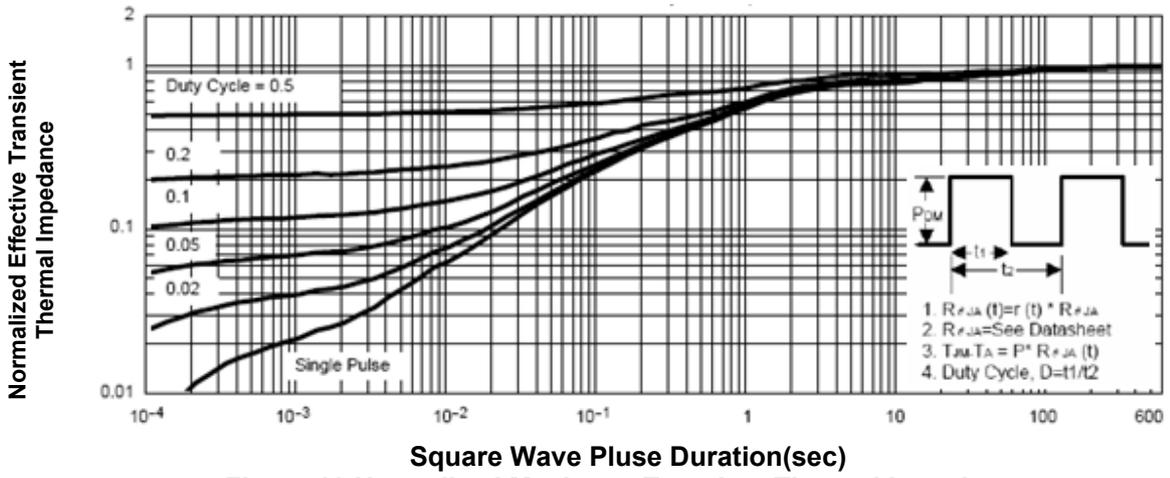


**Figure 11 Gate Charge**



**Figure 12 Source- Drain Diode Forward**

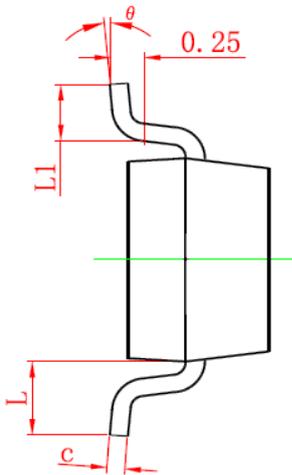
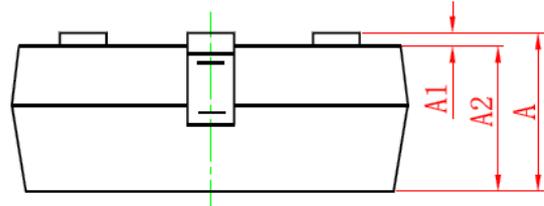
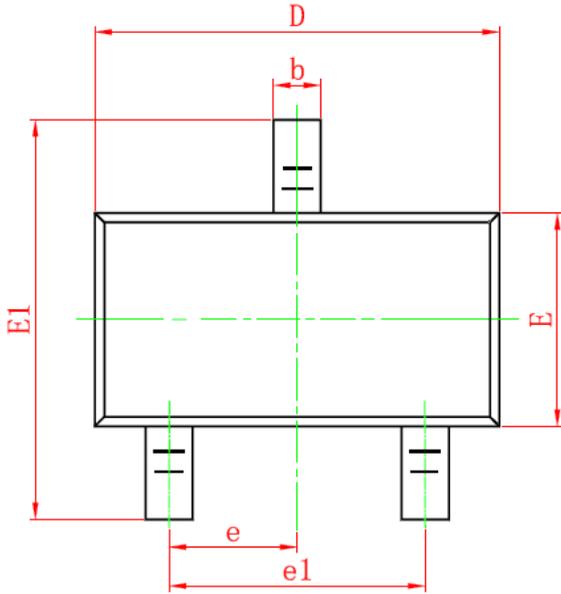
**TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS**



**Figure 13 Normalized Maximum Transient Thermal Impedance**

**SOT-23 PACKAGE INFORMATION**

Dimensions in Millimeters (UNIT:mm)



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
θ	0°	8°

**NOTES**

1. All dimensions are in millimeters.
2. Tolerance  $\pm 0.10\text{mm}$  (4 mil) unless otherwise specified.
3. Package body sizes exclude mold flash and gate burrs. Mold flash at the non-lead sides should be less than 5 mils.
4. Dimension L is measured in gauge plane.
5. Controlling dimension is millimeter, converted inch dimensions are not necessarily exact.