

### DESCRIPTION

The SSF2439E uses advanced trench technology to provide excellent  $R_{DS(ON)}$ , low gate charge and operation with gate voltages as low as 2.5V.

### GENERAL FEATURES

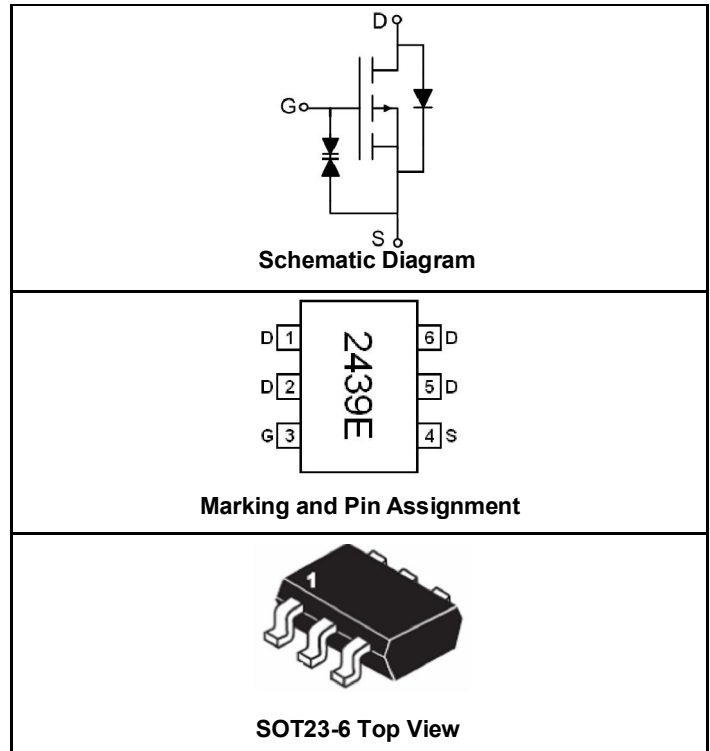
- $V_{DS} = -20V, I_D = -4.5A$
- $R_{DS(ON)} < 180m\Omega @ V_{GS} = -2V$
- $R_{DS(ON)} < 100m\Omega @ V_{GS} = -2.5V$
- $R_{DS(ON)} < 55m\Omega @ V_{GS} = -4.5V$

ESD Rating: 2000V HBM

- High Power and current handing capability
- Lead free product
- Surface Mount Package

### APPLICATIONS

- Battery protection
- Load switch
- Power management



### PACKAGE MARKING AND ORDERING INFORMATION

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
2439E	SSF2439E	SOT23-6	Ø180mm	8mm	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)	$I_D$	-4.5	A
	$I_{DM}$	-18	A
Maximum Power Dissipation	$P_D$	2.2	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)	$R_{\theta JA}$	100	$^\circ C/W$
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# SSF2439E

## 20V P-Channel MOSFET

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

Parameter	Symbol	Condition	Min	Typ	Max	Unit
<b>OFF CHARACTERISTICS</b>						
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> =-20V, V <sub>GS</sub> =0V			-1	μA
Gate-Body Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> =±10V, V <sub>DS</sub> =0V			±10	μA
<b>ON CHARACTERISTICS (Note 3)</b>						
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =-250μA	-0.5		-1.2	V
Drain-Source On-State Resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-2.2A		40	55	mΩ
		V <sub>GS</sub> =-2.5V, I <sub>D</sub> =-2.2A		70	100	mΩ
		V <sub>GS</sub> =-2V, I <sub>D</sub> =-2.2A		110	180	mΩ
Forward Transconductance	g <sub>FS</sub>	V <sub>DS</sub> =-10V, I <sub>D</sub> =-2.2A	3			S
<b>DYNAMIC CHARACTERISTICS (Note4)</b>						
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> =-10V, V <sub>GS</sub> =0V, F=1.0MHz		680		PF
Output Capacitance	C <sub>oss</sub>			130		PF
Reverse Transfer Capacitance	C <sub>rss</sub>			140		PF
<b>SWITCHING CHARACTERISTICS (Note 4)</b>						
Turn-on Delay Time	t <sub>d(on)</sub>	V <sub>DD</sub> =-10V, I <sub>D</sub> =-2.2A V <sub>GS</sub> =-5V, R <sub>GEN</sub> =4.5Ω		6		nS
Turn-on Rise Time	t <sub>r</sub>			16		nS
Turn-Off Delay Time	t <sub>d(off)</sub>			38		nS
Turn-Off Fall Time	t <sub>f</sub>			85		nS
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> =-16V, I <sub>D</sub> =-4.5A, V <sub>GS</sub> =-5V		10		nC
Gate-Source Charge	Q <sub>gs</sub>			2		nC
Gate-Drain Charge	Q <sub>gd</sub>			3		nC
<b>DRAIN-SOURCE DIODE CHARACTERISTICS</b>						
Diode Forward Voltage (Note 3)	V <sub>SD</sub>	V <sub>GS</sub> =0V, I <sub>S</sub> =-4.5A			-1.2	V

### NOTES:

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

## ELECTRICAL AND THERMAL CHARACTERISTICS

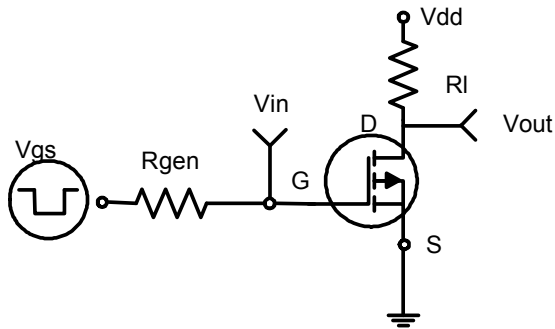


Figure 1: Switching Test Circuit

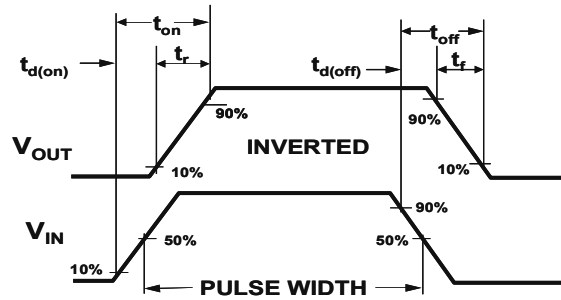
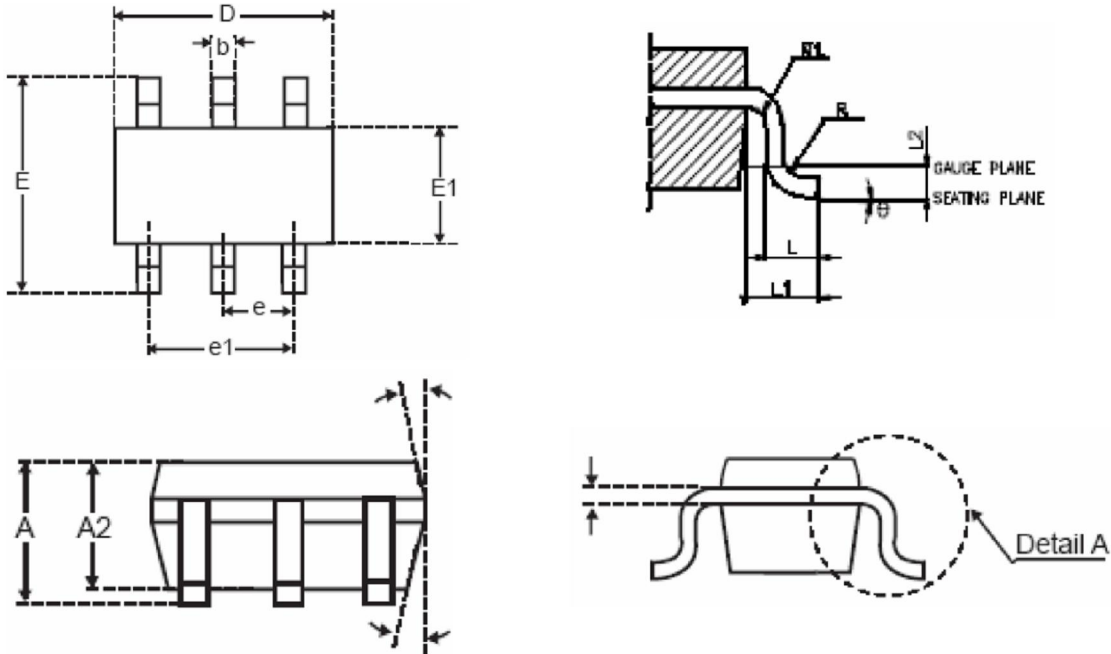


Figure 2: Switching Waveforms

## SOT23-6 PACKAGE INFORMATION

Dimensions in Millimeters (UNIT: mm)



SYMBOLS	MILLIMETERS		
	MIN.	NOM.	MAX.
A			1.45
A1			0.15
A2	0.90	1.15	1.30
b	0.30		0.50
c	0.08		0.22
D	2.90 BSC.		
E	2.80 BSC.		
E1	1.60 BSC.		
e	0.95 BSC.		
e1	1.90 BSC.		
L	0.30	0.45	0.60
L1	0.60 REF		
L2	0.25 BSC.		
R	0.10		
R1	0.10		0.25
$\theta$	0°	4°	8°
$\theta1$	5°	10°	15°

### NOTES:

1. All dimensions are in millimeters.
2. Dimensions are inclusive of plating
3. Package body sizes exclude mold flash and gate burrs. Mold flash at the non-lead sides should be less than 6 mils.
4. Dimension L is measured in gauge plane.
5. Controlling dimension is millimeter, converted inch dimensions are not necessarily exact.