

**-4.2A, -30V P-Channel Power MOSFET**

**GENERAL DESCRIPTION**

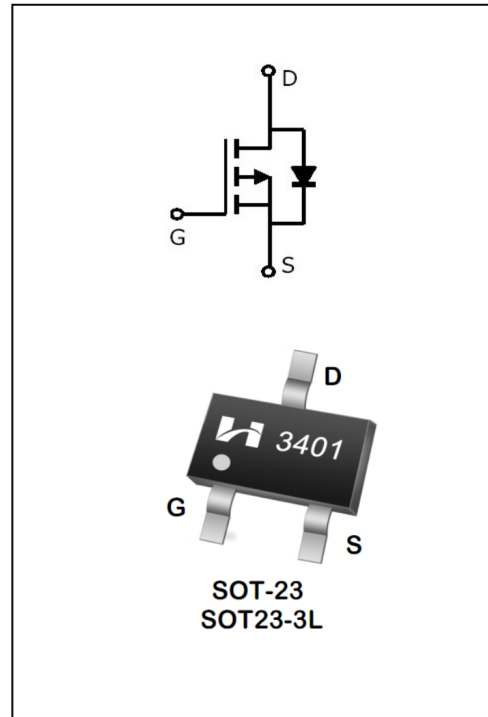
The Power MOSFET has extremely low on resistance, making it especially suitable for applications which require superior power density and outstanding efficiency.

**Features**

- ◆  $V_{DS} = -30V$ ,  $I_D = -4.2A$
- ◆  $R_{DS(ON)}$   
TYP:  $50m\Omega @ V_{GS} = -10V$ ,  $I_D = -4.0A$

**Applications**

- ◆ Power factor correction (PFC)
- ◆ Switched mode power supplies (SMPS)
- ◆ Uninterruptible power supply (UPS)
- ◆ LED lighting power



**ORDERING INFORMATION**

Part No.	Package	Marking	Material	Packing
SFS3401	SOT23-3L/SOT-23	3401	Pb Free	Reel

## ABSOLUTE MAXIMUM RATINGS (T<sub>J</sub>=25°C unless otherwise noted)

Characteristics		Symbol	Ratings	Unit
Drain-Source Voltage		V <sub>DS</sub>	-30	V
Gate-Source Voltage		V <sub>GS</sub>	±12	V
Drain Current	T <sub>C</sub> = 25°C	I <sub>D</sub>	-4.2	A
	T <sub>C</sub> = 75°C		-3.5	
Drain Current Pulsed(Note 1)		I <sub>DM</sub>	-16	A
Power Dissipation(T <sub>C</sub> =25°C) -Derate above 25°C		P <sub>D</sub>	1.0	W
Operation Junction Temperature Range		T <sub>J</sub>	-55~+150	°C
Storage Temperature Range		T <sub>stg</sub>	-55~+150	°C
Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds		TL	300	°C

## ELECTRICAL CHARACTERISTICS

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Unit
<b>Off Characteristics</b>						
Drain -Source Breakdown Voltage	B <sub>VDS</sub>	V <sub>GS</sub> = 0V, I <sub>D</sub> = -250μA	-30	--	--	V
Drain-Source Leakage Current	I <sub>DSS</sub>	V <sub>DS</sub> = -25V, V <sub>GS</sub> = 0V	--	--	1	uA
Gate-Source Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> = 12V, V <sub>DS</sub> = 0V	--	--	100	nA
Gate-Source Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> = -12V, V <sub>DS</sub> = 0V	--	--	-100	
<b>On Characteristics</b>						
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>GS</sub> = V <sub>DS</sub> , I <sub>D</sub> = -250μA	-0.6	-0.8	-1.3	V
Static Drain- Source On State Resistance	R <sub>DS(on)</sub>	V <sub>GS</sub> = -10V, I <sub>D</sub> = -4.0A	--	50	59	mΩ
		V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -4.0A	--	61	74	
		V <sub>GS</sub> = -2.5V, I <sub>D</sub> = -2.0A	--	83	100	
<b>Dynamic Characteristics</b>						
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> = -15V V <sub>GS</sub> = 0V f=1.0MHZ	--	511	--	pF
Output Capacitance	C <sub>oss</sub>		--	55	--	
Reverse Transfer Capacitance	C <sub>rss</sub>		--	40	--	
<b>Switching Characteristics</b>						
Turn-on Delay Time	t <sub>d(on)</sub>	V <sub>DD</sub> = -15V; V <sub>GS</sub> = -10V R <sub>G</sub> = 6Ω (Note 2.3)	--	6.5	--	nS
Turn-on Rise Time	t <sub>r</sub>		--	3.6	--	
Turn-off Delay Time	t <sub>d(off)</sub>		--	31.5	--	
Turn-off Fall Time	t <sub>f</sub>		--	11	--	
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> =-15V, I <sub>D</sub> =-4.2A V <sub>GS</sub> =-4.5V	--	9.2	--	nC
Gate-Source Charge	Q <sub>gs</sub>		--	2.1	--	
Gate-Drain Charge	Q <sub>gd</sub>		--	2.9	--	

**SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS**

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Continuous Source Current	$I_S$	Integral Reverse P-N Junction Diode in the MOSFET	--	--	-4.2	A
Pulsed Source Current	$I_{SM}$		--	--	-16	
Forward Transconductance	$g_{FS}$	$V_{DS} = -5V, I_D = -5.0A$	--	8.0	--	S
Diode Forward Voltage	$V_{SD}$	$I_S = -3A, V_{GS} = 0V$	--	-0.87	-1.2	V

## NOTE:

1. Pulse width limited by maximum junction temperature
2. Pulse Test: Pulse width  $\leq 300\mu s$ , Duty cycle  $\leq 2\%$
3. Essentially independent of operating temperature

Typical Performance Characteristics

Figure 1. Output Characteristics

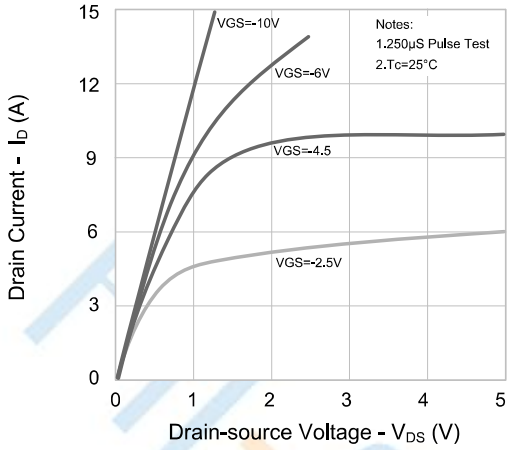


Figure 2. Transfer Characteristics

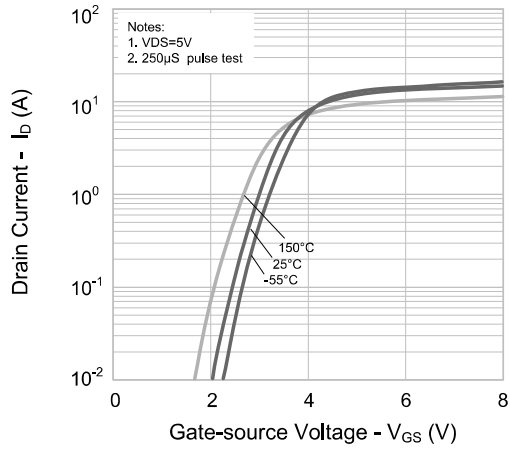


Figure 3. On-resistance vs. Drain Current

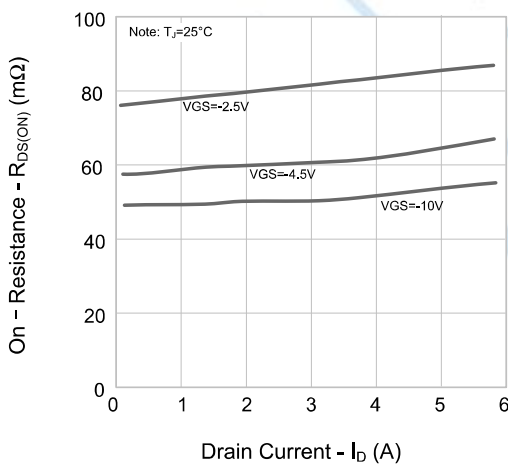


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

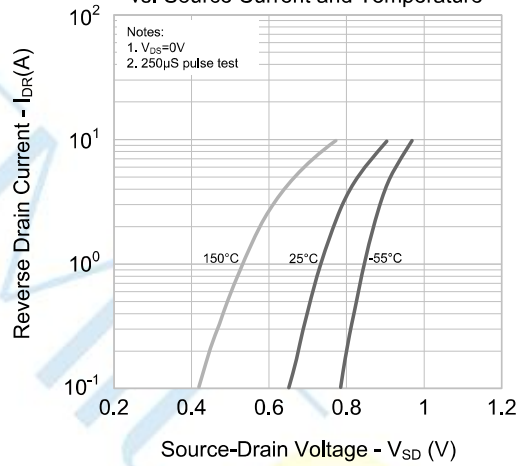


Figure 5. Capacitance Characteristics

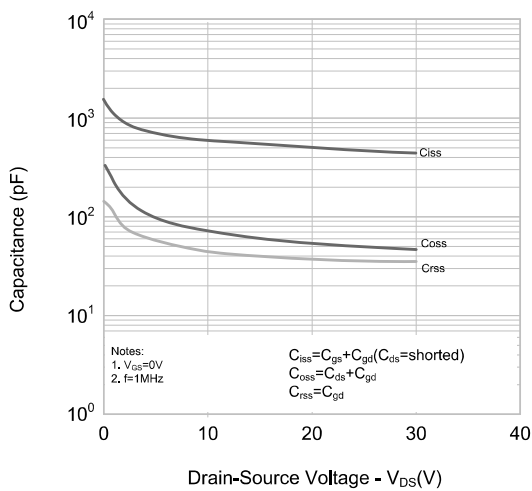
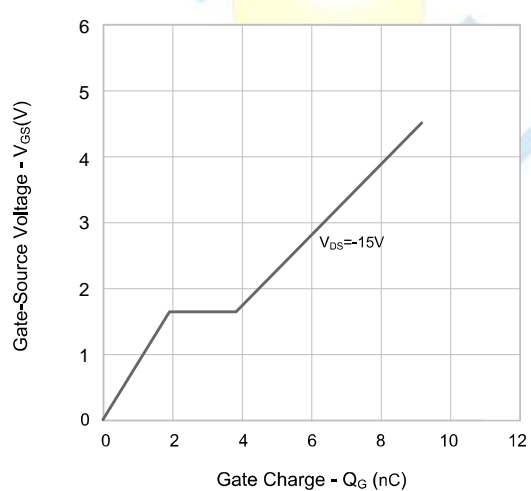
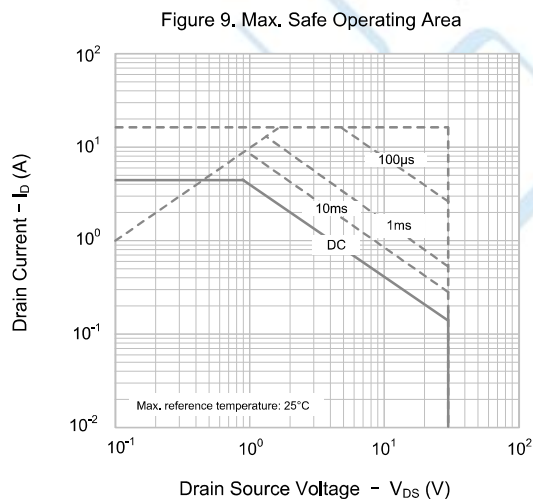
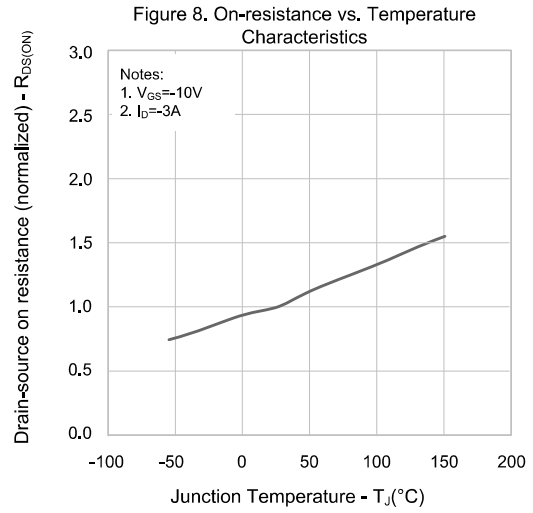
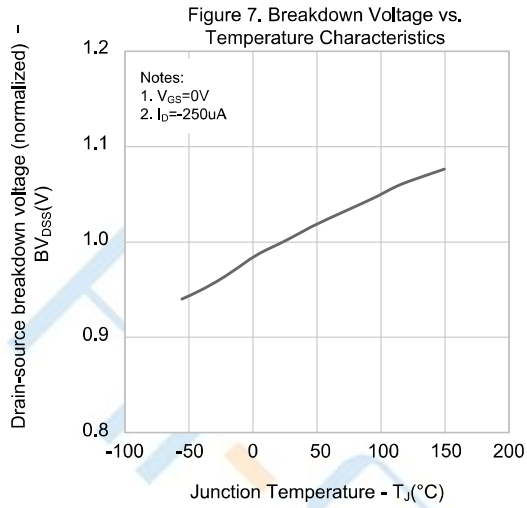


Figure 6. Gate Charge

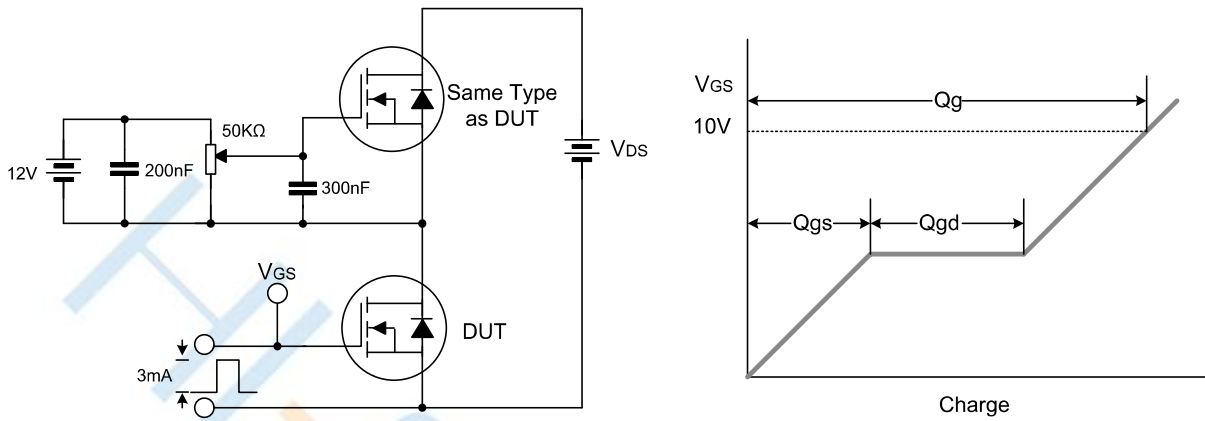


Typical Performance Characteristics

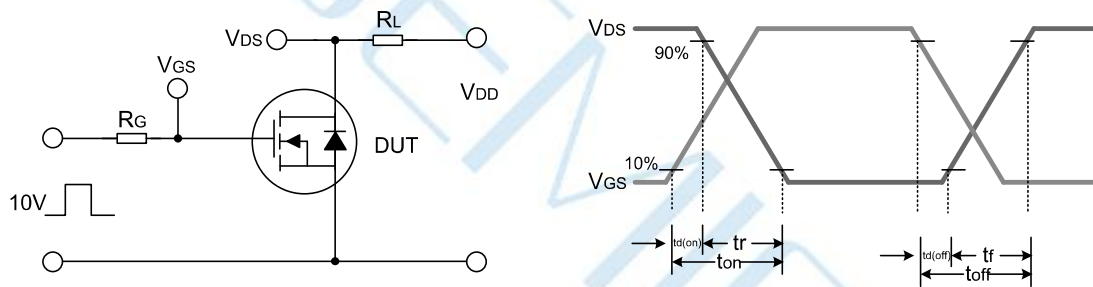


Test Circuit

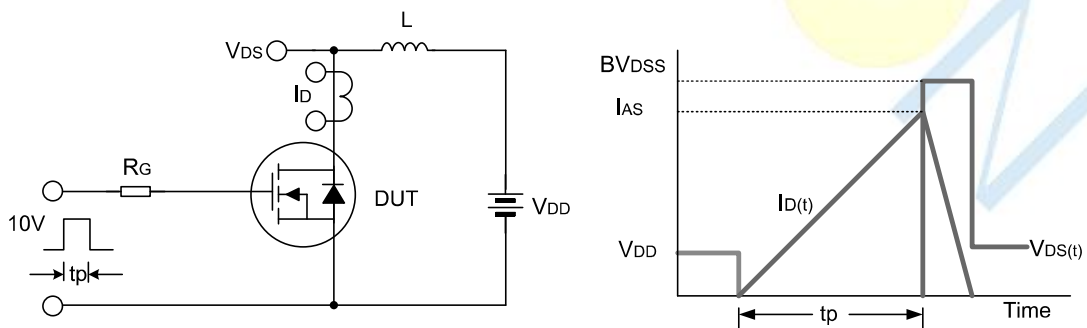
Gate Charge Test Circuit & Waveform



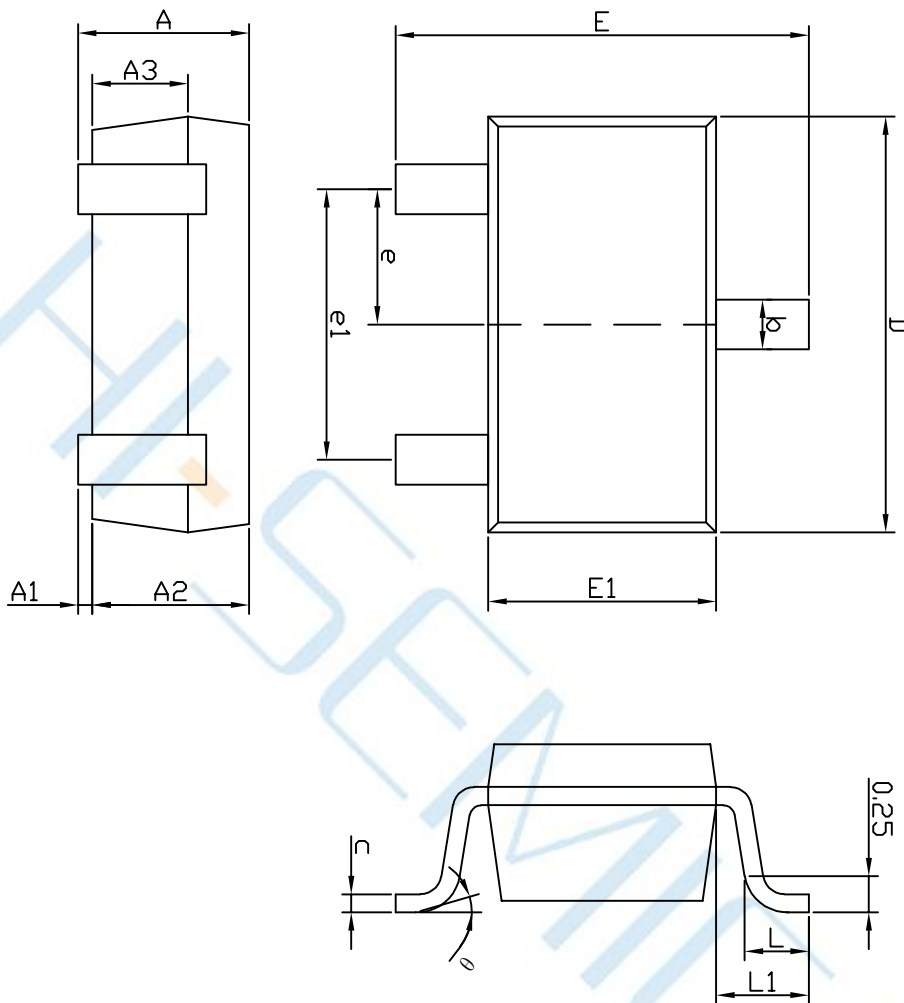
Resistive Switching Test Circuit & Waveform



Undamped Inductive Switching Test Circuit & Waveform



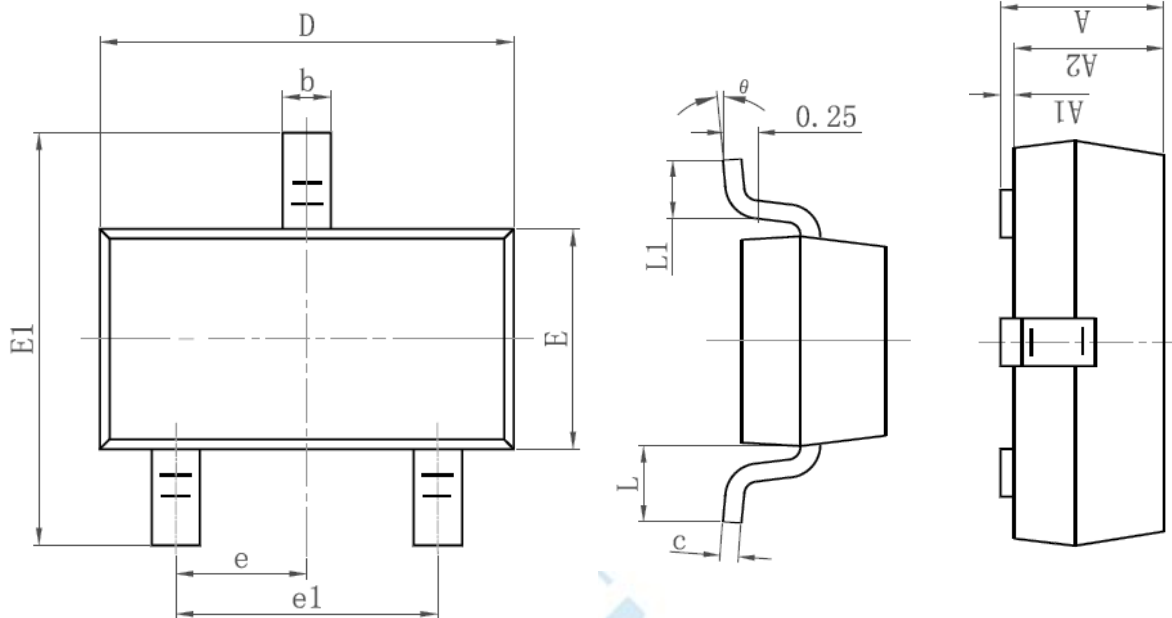
Package Dimensions of SOT23-3L



COMMON DIMENSIONS  
(UNITS OF MEASURE=MILLIMETER)

SYMBOL	MIN	NOM	MAX
A	-	-	1.25
A1	0.04	-	0.10
A2	1.00	1.10	1.20
A3	0.60	0.65	0.70
b	0.33	-	0.41
c	0.11	-	0.20
D	2.82	2.92	3.02
E	2.60	2.80	3.00
E1	1.50	1.60	1.70
e	0.95BSC		
e1	1.90BSC		
L	0.30	-	0.60
L1	0.60REF		
θ	0°	-	8°

Package Dimensions of SOT-23



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°



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