

### Description

The HSS3401 is the high cell density trenched P-ch MOSFETs, which provides excellent R<sub>DS(ON)</sub> and efficiency for most of the small power switching and load switch applications.

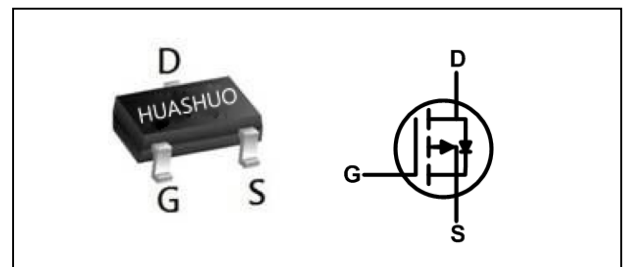
The HSS3401 meet the RoHS and Green Product requirement with full function reliability approved.

- Green Device Available
- Super Low Gate Charge
- Excellent CdV/dt effect decline
- Advanced high cell density Trench technology

### Product Summary

V <sub>DS</sub>	-30	V
R <sub>DS(ON),max</sub>	53	mΩ
I <sub>D</sub>	-4.5	A

### SOT 23 Pin Configurations



### Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
V <sub>DS</sub>	Drain-Source Voltage	-30	V
V <sub>GS</sub>	Gate-Source Voltage	±12	V
I <sub>D</sub> @T <sub>A</sub> =25°C	Continuous Drain Current	-4.5	A
I <sub>D</sub> @T <sub>A</sub> =70°C	Continuous Drain Current	-3.8	A
I <sub>DM</sub>	Pulsed Drain Current <sup>2</sup>	-21	A
P <sub>D</sub> @T <sub>A</sub> =25°C	Total Power Dissipation <sup>3</sup>	1.25	W
P <sub>D</sub> @T <sub>A</sub> =70°C	Total Power Dissipation <sup>3</sup>	0.95	W
T <sub>STG</sub>	Storage Temperature Range	-55 to 150	°C
T <sub>J</sub>	Operating Junction Temperature Range	-55 to 150	°C

### Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
R <sub>θJA</sub>	Thermal Resistance Junction-Ambient <sup>1</sup>	---	125	°C/W
R <sub>θJA</sub>	Thermal Resistance Junction-Ambient <sup>1</sup> (t ≤ 10s)	---	85	°C/W



**Electrical Characteristics ( $T_J=25\text{ }^\circ\text{C}$ , unless otherwise noted)**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=-250\mu A$	-30	---	---	V
$\Delta BV_{DSS}/\Delta T_J$	$BV_{DSS}$ Temperature Coefficient	Reference to $25^\circ\text{C}$ , $I_D=-1\text{mA}$	---	-0.014	---	$V/^\circ\text{C}$
$R_{DS(ON)}$	Static Drain-Source On-Resistance <sup>2</sup>	$V_{GS}=-10V, I_D=-3A$	---	---	53	m $\Omega$
		$V_{GS}=-4.5V, I_D=-3A$	---	---	60	
		$V_{GS}=-2.5V, I_D=-2A$	---	---	80	
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS}=V_{DS}, I_D=-250\mu A$	-0.5	---	-1.2	V
$\Delta V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient		---	2.6	---	$\text{mV}/^\circ\text{C}$
$I_{DSS}$	Drain-Source Leakage Current	$V_{DS}=-24V, V_{GS}=0V, T_J=25^\circ\text{C}$	---	---	-1	$\mu\text{A}$
		$V_{DS}=-24V, V_{GS}=0V, T_J=55^\circ\text{C}$	---	---	-5	
$I_{GSS}$	Gate-Source Leakage Current	$V_{GS}=\pm 12V, V_{DS}=0V$	---	---	$\pm 100$	nA
gfs	Forward Transconductance	$V_{DS}=-5V, I_D=-3A$	---	5.6	---	S
$Q_g$	Total Gate Charge (-4.5V)	$V_{DS}=-15V, V_{GS}=-4.5V, I_D=-3A$	---	11.9	---	nC
$Q_{gs}$	Gate-Source Charge		---	1.8	---	
$Q_{gd}$	Gate-Drain Charge		---	3	---	
$T_{d(on)}$	Turn-On Delay Time	$V_{DD}=-15V, V_{GS}=-4.5V,$ $R_G=3.3\Omega, I_D=-3A$	---	6.6	---	ns
$T_r$	Rise Time		---	27.8	---	
$T_{d(off)}$	Turn-Off Delay Time		---	46.2	---	
$T_f$	Fall Time		---	20.6	---	
$C_{iss}$	Input Capacitance	$V_{DS}=-15V, V_{GS}=0V, f=1\text{MHz}$	---	920	---	pF
$C_{oss}$	Output Capacitance		---	73	---	
$C_{rss}$	Reverse Transfer Capacitance		---	71	---	

**Diode Characteristics**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$I_S$	Continuous Source Current <sup>1,4</sup>	$V_G=V_D=0V$ , Force Current	---	---	-4.5	A
$V_{SD}$	Diode Forward Voltage <sup>2</sup>	$V_{GS}=0V, I_S=-1A, T_J=25^\circ\text{C}$	---	---	-1.2	V

Note :

1.The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 2OZ copper.

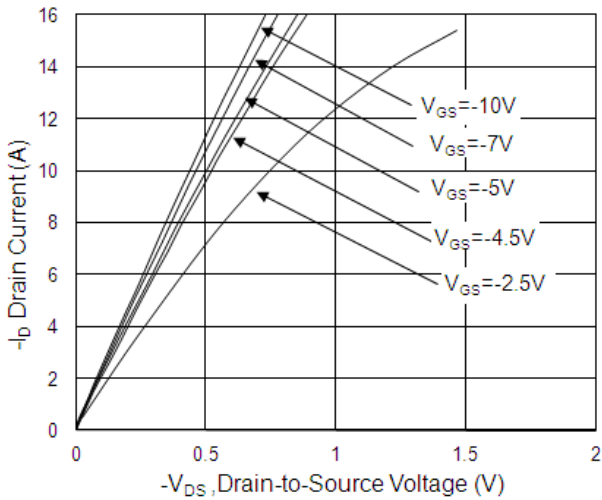
2.The data tested by pulsed , pulse width  $\leq 300\mu\text{s}$  , duty cycle  $\leq 2\%$

3.The power dissipation is limited by  $150^\circ\text{C}$  junction temperature

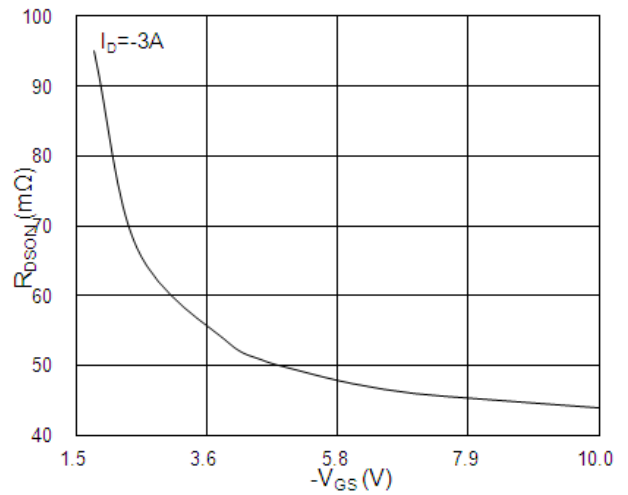
4.The data is theoretically the same as  $I_D$  and  $I_{DM}$  , in real applications , should be limited by total power dissipation.



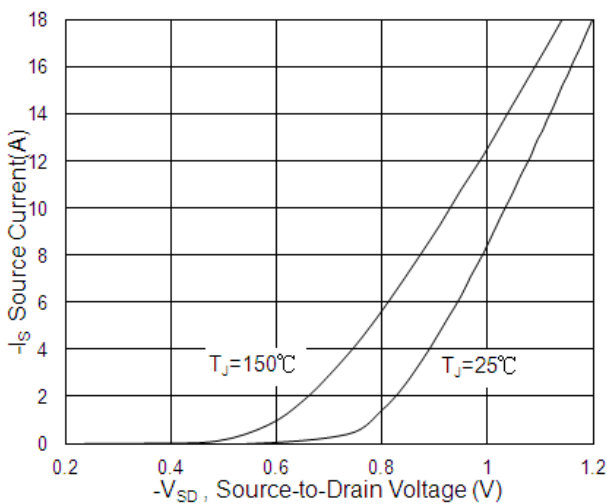
### Typical Characteristics



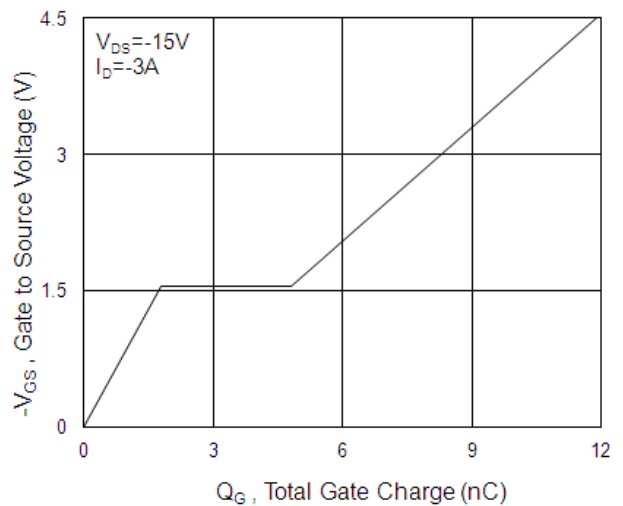
**Fig.1 Typical Output Characteristics**



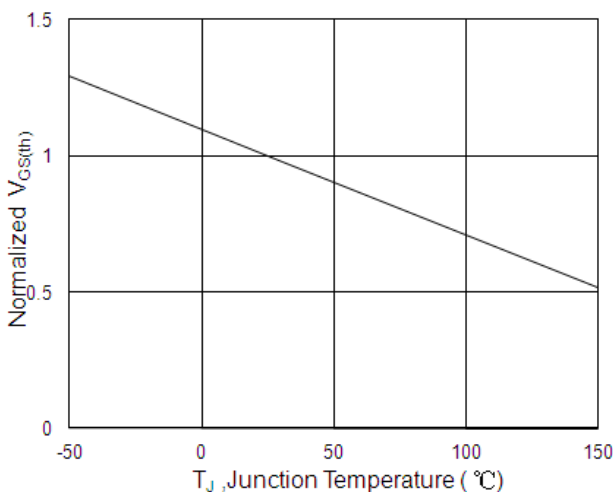
**Fig.2 On-Resistance vs. G-S Voltage**



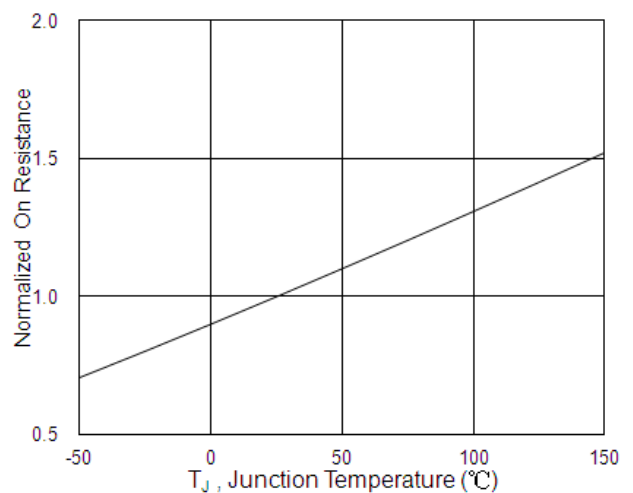
**Fig.3 Forward Characteristics Of Reverse**



**Fig.4 Gate-Charge Characteristics**



**Fig.5 Normalized  $V_{GS(th)}$  vs.  $T_J$**



**Fig.6 Normalized  $R_{DS(on)}$  vs.  $T_J$**

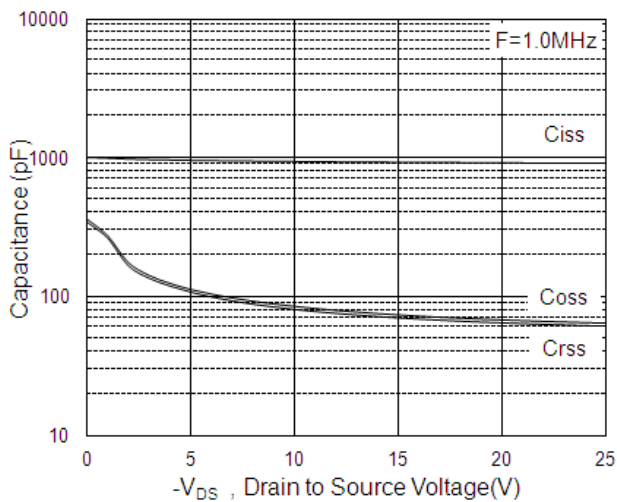


Fig.7 Capacitance

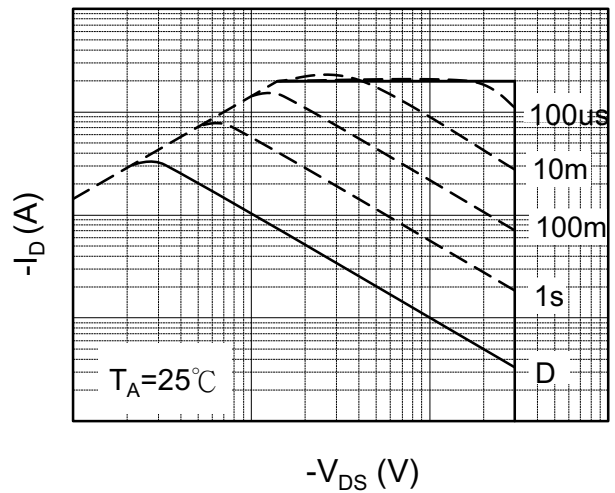


Fig.8 Safe Operating Area

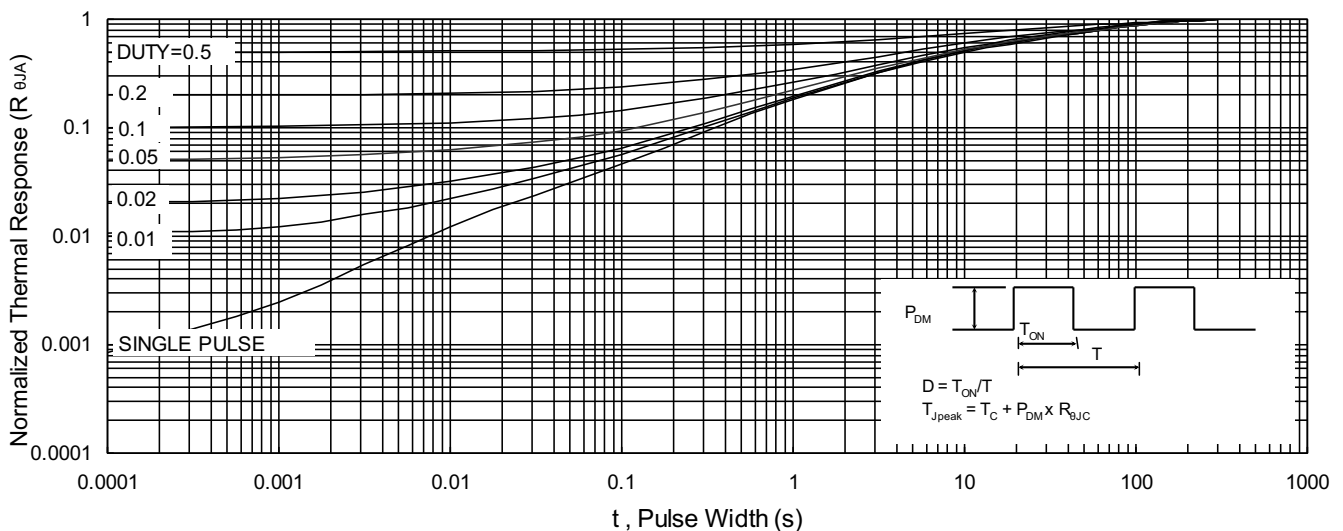


Fig.9 Normalized Maximum Transient Thermal Impedance

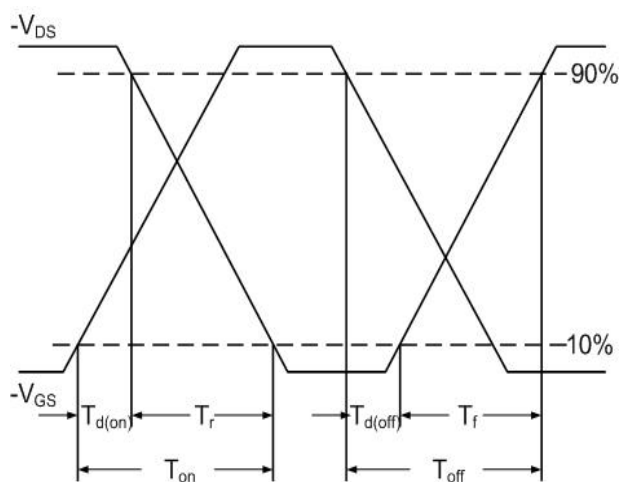


Fig.10 Switching Time Waveform

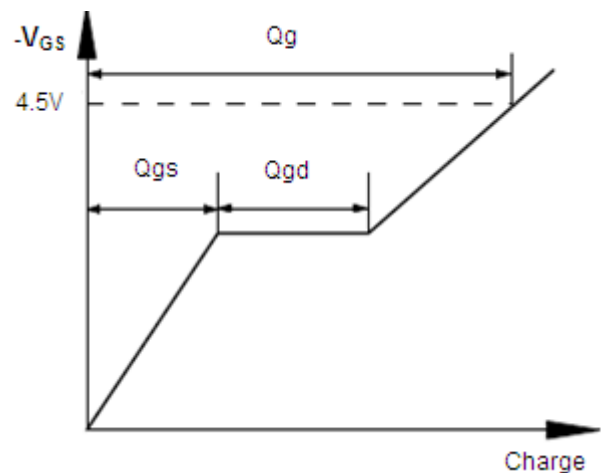
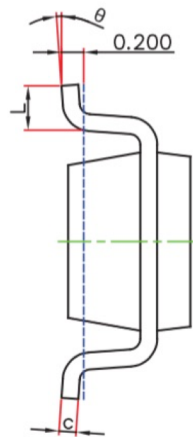
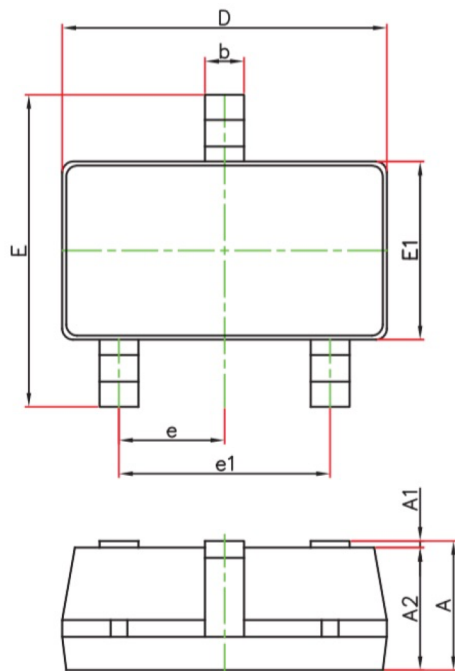


Fig.11 Gate Charge Waveform



## Ordering Information

Part Number	Package code	Packaging
HSS3401	SOT-23L	3000/Tape&Reel



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E1	1.500	1.700	0.059	0.067
E	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°