

## N-Channel High Density Trench MOSFET (20V, 5.4A)



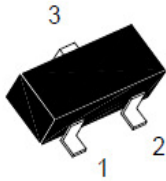
### PRODUCT SUMMARY

V <sub>DSS</sub>	I <sub>D</sub>	R <sub>DS(on)</sub> (m-ohm) Max
20V	5.4A	30 @ V <sub>GS</sub> = 4.0V, I <sub>D</sub> =5.4A
		40 @ V <sub>GS</sub> = 2.5V, I <sub>D</sub> =4.3A

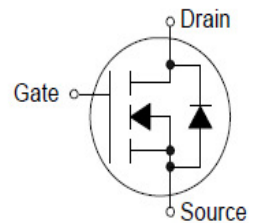
### ◆ Features

- 1、 Advanced Trench Process Technology.
- 2、 High Density Cell Design for Ultra Low On-Resistance.
- 3、 Fully Characterized Avalanche Voltage and Current.
- 4、 Improved Shoot-Through FOM.
- 5、 RoHS Compliant.

### SM2314 Pin Assignment & Symbol




3-Lead Plastic **SOT-23**  
Pin 1: Gate 2: Source 3: Drain



### ◆ Ordering Information

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
SM2314SRL	SM2314SRG	SOT-23	G	S	D	Tape Reel
SM2314LRL	SM2314LRG	SOT-23-3L	G	S	D	Tape Reel

<h2>SM2314-LR-G</h2>	
(1) Package Type	
(2) Packing Type	
(3) Lead Free	

(1) S: SOT-23; L: SOT-23-3L
(2) R: Tape Reel
(3) G: Halogen Free; L: Lead Free



## ◆ Absolute Maximum Ratings ( $T_A=25^\circ\text{C}$ , unless otherwise noted)

Symbol	Parameter	Ratings	Units
$V_{DS}$	Drain-Source Voltage	20	V
$V_{GS}$	Gate-Source Voltage	$\pm 12$	V
$I_D$	Drain Current (Continuous)	6	A
$I_{DM}$	Drain Current (Pulsed) <sup>a</sup>	20	A
$P_D$	Total Power Dissipation @ $T_A=25^\circ\text{C}$	1.25	W
$I_S$	Maximum Diode Forward Current	1.4	A
$T_j, T_{stg}$	Operating Junction and Storage Temperature Range	-55 to +150	$^\circ\text{C}$
$R_{\theta JA}$	Thermal Resistance Junction to Ambient (PCB mounted) <sup>b</sup>	100	$^\circ\text{C/W}$

a: Repetitive Rating: Pulse width limited by the maximum junction temperature.

b: 1-in<sup>2</sup> 2oz Cu PCB board.

## ◆ Electrical Characteristics ( $T_A=25^\circ\text{C}$ , unless otherwise noted)

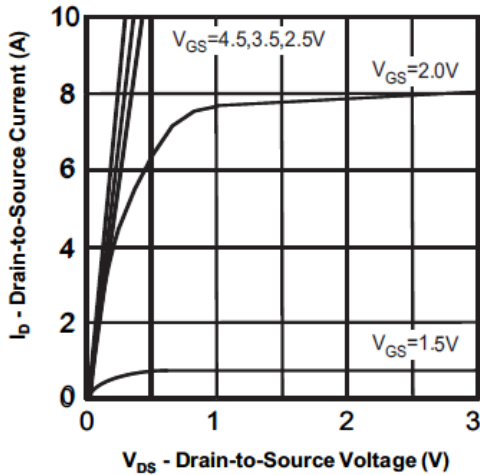
Symbol	Characteristi	Test Conditions	Min.	Typ.	Max.	Unit
<b>• Off Characteristics</b>						
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu\text{A}$	20	-	-	V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS}=20V, V_{GS}=0V$	-	-	1	$\mu\text{A}$
$I_{GSS}$	Gate-Body Leakage Current	$V_{GS}=\pm 12V, V_{DS}=0V$	-	-	$\pm 100$	nA
<b>• On Characteristics<sup>c</sup></b>						
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu\text{A}$	0.6	0.78	1.2	V
$R_{DS(on)}$	Drain-Source On-State Resistance	$V_{GS}=4V, I_D=5.4A$	-	23	30	m $\Omega$
		$V_{GS}=2.5V, I_D=4.3A$	-	30	40	
$g_{FS}$	Forward Transconductance	$V_{DS}=10V, I_D=5A$	-	15.4	-	S
<b>• Dynamic Characteristics<sup>d</sup></b>						
$C_{iss}$	Input Capacitance	$V_{DS}=8V, V_{GS}=0V, f=1\text{MHz}$	-	522.3	-	pF
$C_{oss}$	Output Capacitance		-	98.48	-	
$C_{rss}$	Reverse Transfer Capacitance		-	74.69	-	
<b>• Switching Characteristics<sup>d</sup></b>						
$Q_g$	Total Gate Charge	$V_{DS}=10V, I_D=6.0, V_{GS}=4.5V$	-	6.24	-	nC
$Q_{gs}$	Gate-Source Charge		-	1.64	-	
$Q_{gd}$	Gate-Drain Charge		-	1.34	-	
$t_{d(on)}$	Turn-on Delay Time	$V_{DD}=10V, R_G=6\Omega, I_D=1A, V_{GEN}=4.5V,$	-	10.4	20.8	nS
$t_r$	Turn-on Rise Time		-	4.4	8.8	
$t_{d(off)}$	Turn-off Delay Time		-	27.36	54.72	
$t_f$	Turn-off Fall Time		-	4.16	8.32	
<b>• Drain-Source Diode Characteristics</b>						
$V_{SD}$	Drain-Source Diode Forward Voltage	$V_{GS}=0V, I_S=1.7A$	-	0.74	-	V

c : Pulse Test : Pulse Width < 300 $\mu\text{s}$ , Duty Cycle < 2%.

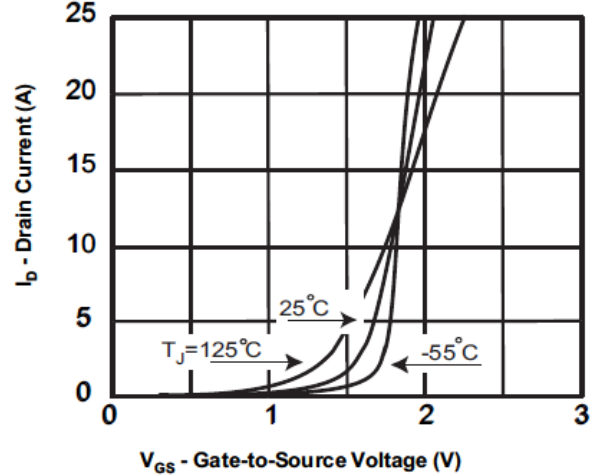
d: Guaranteed by design, not subject to production testing.

## ◆ Characteristics Curve

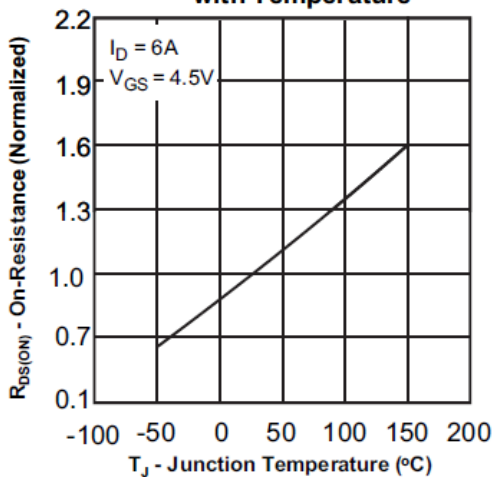
**Fig.1 Output Characteristic**



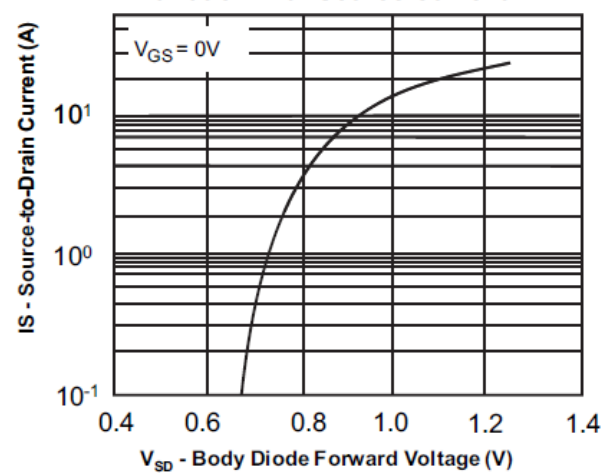
**Fig.2 Transfer Characteristics**



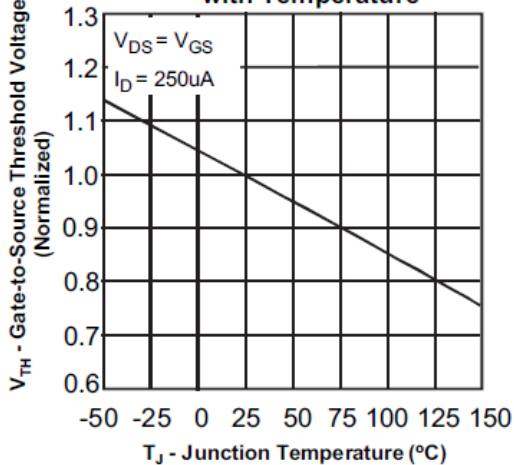
**Fig.3 On-Resistance Variation with Temperature**



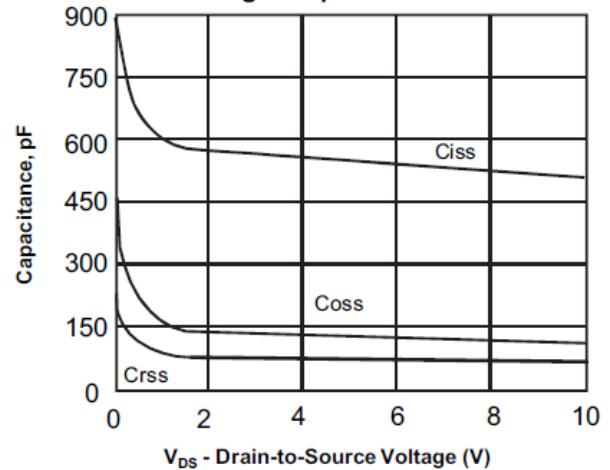
**Fig.4 Body Diode Forward Voltage Variation with Source Current**



**Fig.5 Gate Threshold Variation with Temperature**



**Fig.6 Capacitance**



## ◆ Characteristics Curve

Fig. 7 Gate Charge Waveform

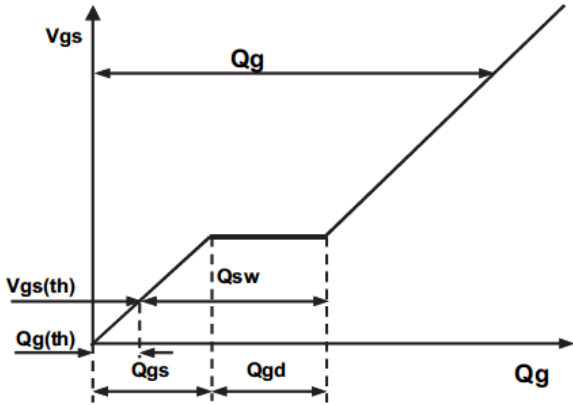


Fig. 8 Gate Charge

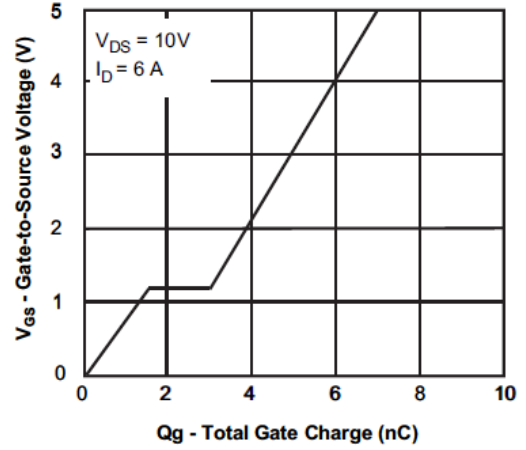


Fig. 9 Maximum Safe Operating Area

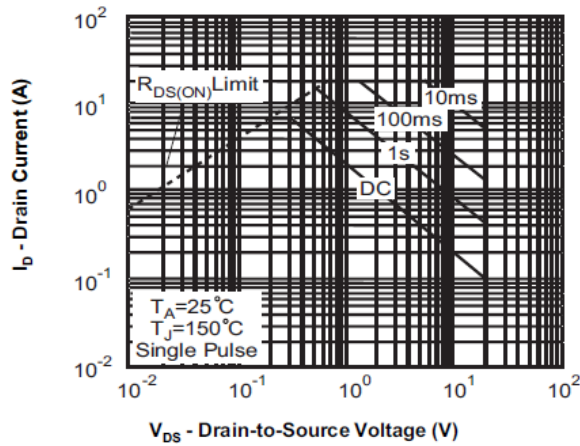
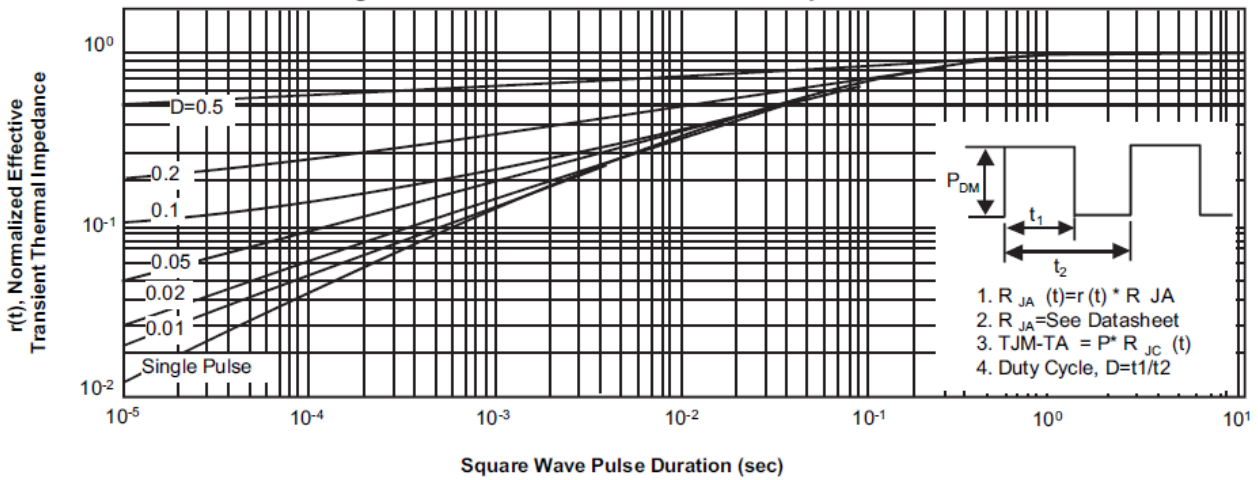


Fig. 10 Normalized Thermal Transient Impedance Curve



◆ Characteristics Curve (Ta=25°C, unless otherwise note)

