

## P-Channel 40-V (D-S) MOSFET

PRODUCT SUMMARY		
$V_{DS}$ (V)	$R_{DS(on)}$ ( $\Omega$ )	$I_D$ (A) <sup>b</sup>
- 40	0.082 at $V_{GS} = - 10$ V	- 3.0
	0.130 at $V_{GS} = - 4.5$ V	- 2.4

### FEATURES

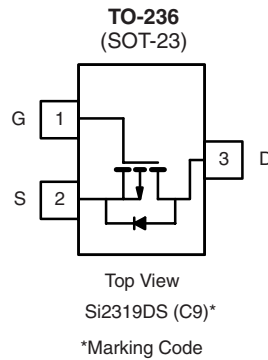
- Halogen-free According to IEC 61249-2-21 Available
- TrenchFET<sup>®</sup> Power MOSFET

### APPLICATIONS

- Load Switch



**RoHS**  
COMPLIANT  
**HALOGEN**  
**FREE**  
Available



**Ordering Information:** Si2319DS-T1-E3 (Lead (Pb)-free)  
Si2319DS-T1-GE3 (Lead (Pb)-free and Halogen-free)

ABSOLUTE MAXIMUM RATINGS $T_A = 25$ °C, unless otherwise noted					
Parameter		Symbol	5 s	Steady State	Unit
Drain-Source Voltage		$V_{DS}$	- 40		V
Gate-Source Voltage		$V_{GS}$	$\pm 20$		
Continuous Drain Current ( $T_J = 150$ °C) <sup>b</sup>	$T_A = 25$ °C	$I_D$	- 3.0	- 2.3	A
	$T_A = 70$ °C		- 2.4	- 1.85	
Pulsed Drain Current <sup>a</sup>		$I_{DM}$	- 12		
Continuous Source Current (Diode Conduction) <sup>b</sup>		$I_S$	- 1.0	- 0.62	
Power Dissipation <sup>b</sup>	$T_A = 25$ °C	$P_D$	1.25	0.75	W
	$T_A = 70$ °C		0.8	0.48	
Operating Junction and Storage Temperature Range		$T_J, T_{stg}$	- 55 to 150		°C

THERMAL RESISTANCE RATINGS				
Parameter	Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient <sup>b</sup>	$R_{thJA}$	75	100	°C/W
Maximum Junction-to-Ambient <sup>c</sup>		120	166	
Maximum Junction-to-Foot (Drain)	$R_{thJF}$	40	50	

Notes:

- Pulse width limited by maximum junction temperature.
- Surface mounted on FR4 board,  $t \leq 5$  s.
- Surface Mounted on FR4 board.

For Spice model information via the worldwide web: [www.vishay.com/www/product/spice.htm](http://www.vishay.com/www/product/spice.htm).

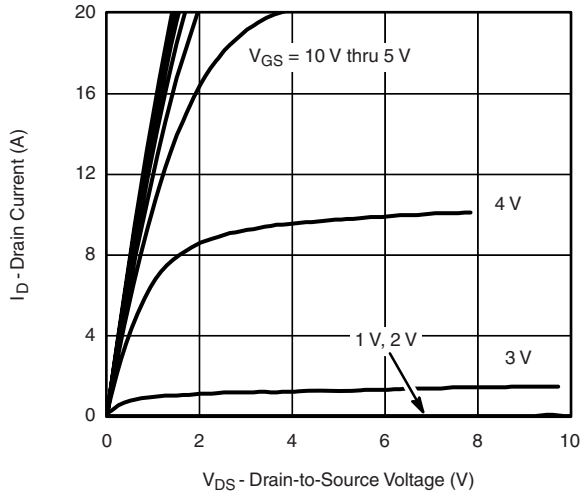
SPECIFICATIONS $T_J = 25\text{ }^\circ\text{C}$ , unless otherwise noted						
Parameter	Symbol	Test Conditions	Limits			Unit
			Min.	Typ.	Max.	
<b>Static</b>						
Drain-Source Breakdown Voltage	$V_{DS}$	$V_{GS} = 0\text{ V}$ , $I_D = -250\text{ }\mu\text{A}$	- 40			V
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$ , $I_D = -250\text{ }\mu\text{A}$	- 1		- 3.0	
Gate-Body Leakage	$I_{GSS}$	$V_{DS} = 0\text{ V}$ , $V_{GS} = \pm 20\text{ V}$			$\pm 100$	nA
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = -40\text{ V}$ , $V_{GS} = 0\text{ V}$			- 1	$\mu\text{A}$
		$V_{DS} = -40\text{ V}$ , $V_{GS} = 0\text{ V}$ , $T_J = 55\text{ }^\circ\text{C}$			- 10	
On-State Drain Current <sup>a</sup>	$I_{D(on)}$	$V_{DS} \leq -5\text{ V}$ , $V_{GS} = -10\text{ V}$	- 6			A
Drain-Source On-State Resistance <sup>a</sup>	$R_{DS(on)}$	$V_{GS} = -10\text{ V}$ , $I_D = -3.0\text{ A}$		0.065	0.082	$\Omega$
		$V_{GS} = -4.5\text{ V}$ , $I_D = -2.4\text{ A}$		0.100	0.130	
Forward Transconductance <sup>a</sup>	$g_{fs}$	$V_{DS} = -5\text{ V}$ , $I_D = -3.0\text{ A}$		7.0		S
Diode Forward Voltage <sup>a</sup>	$V_{SD}$	$I_S = -1.25\text{ A}$ , $V_{GS} = 0\text{ V}$		- 0.8	- 1.2	V
<b>Dynamic<sup>b</sup></b>						
Total Gate Charge	$Q_g$	$V_{DS} = -20\text{ V}$ , $V_{GS} = -10\text{ V}$ $I_D \cong -3\text{ A}$		11.3	17	nC
Gate-Source Charge	$Q_{gs}$			1.7		
Gate-Drain Charge	$Q_{gd}$			3.3		
Input Capacitance	$C_{iss}$	$V_{DS} = -20\text{ V}$ , $V_{GS} = 0\text{ V}$ , $f = 1\text{ MHz}$		470		pF
Output Capacitance	$C_{oss}$			85		
Reverse Transfer Capacitance	$C_{rss}$			65		
<b>Switching<sup>c</sup></b>						
Turn-On Time	$t_{d(on)}$	$V_{DD} = -20\text{ V}$ , $R_L = 20\text{ }\Omega$ $I_D \cong -1.0\text{ A}$ , $V_{GEN} = -4.5\text{ V}$ $R_g = 6\text{ }\Omega$		7	15	ns
	$t_r$			15	25	
Turn-Off Time	$t_{d(off)}$			25	40	
	$t_f$			25	40	

Notes:

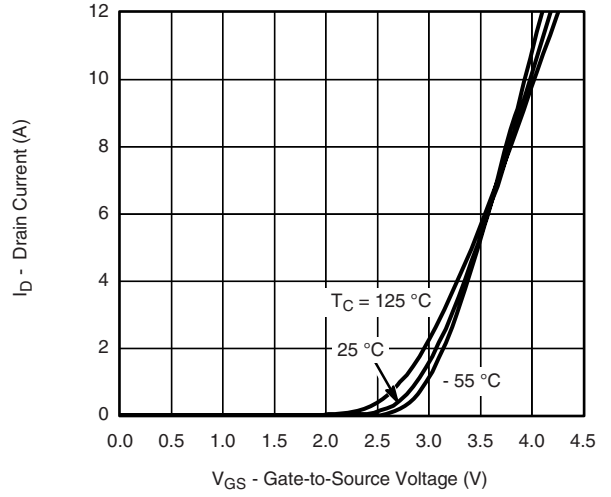
- a. Pulse test:  $PW \leq 300\text{ }\mu\text{s}$  duty cycle  $\leq 2\%$ .  
b. For design aid only, not subject to production testing.  
c. Switching time is essentially independent of operating temperature.

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

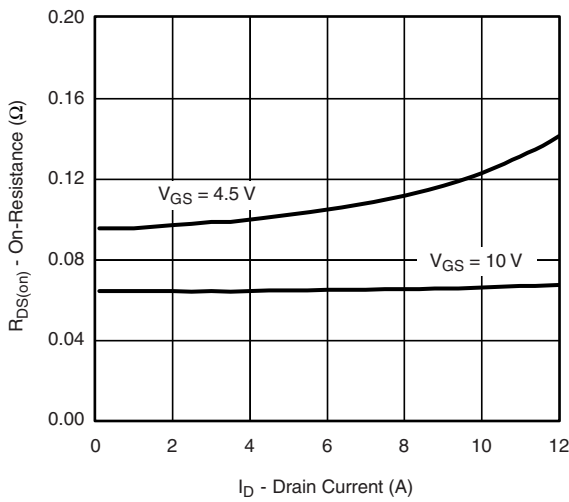
**TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted



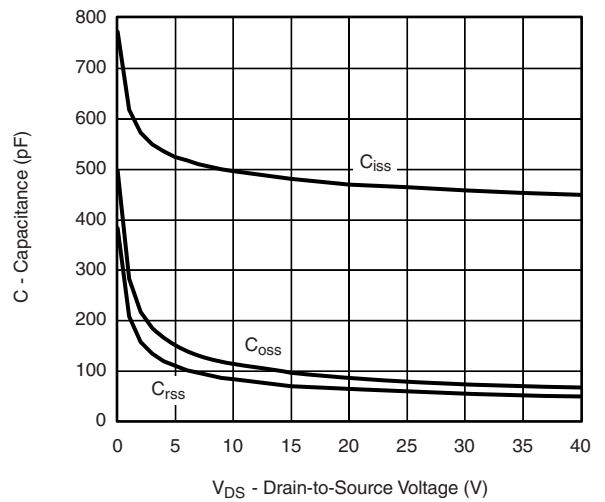
**Output Characteristics**



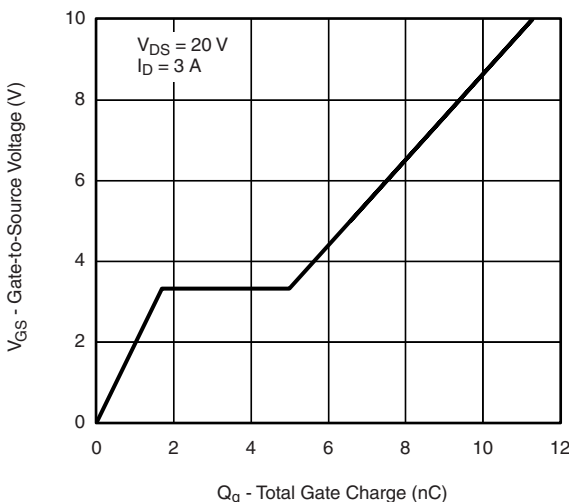
**Transfer Characteristics**



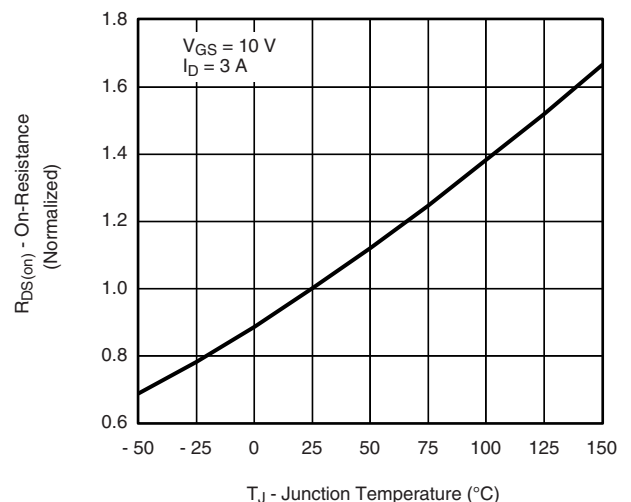
**On-Resistance vs. Drain Current**



**Capacitance**

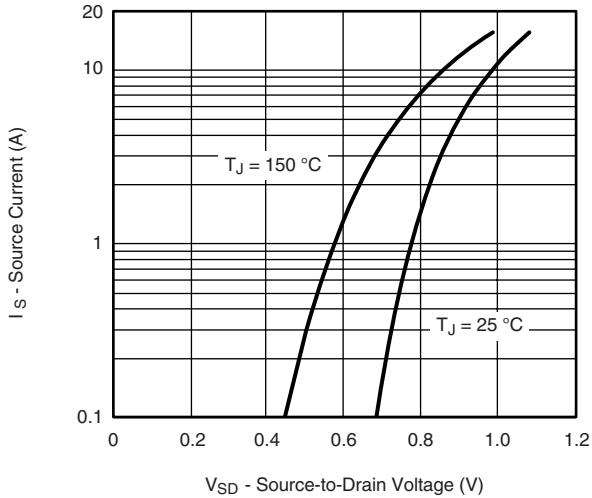


**Gate Charge**

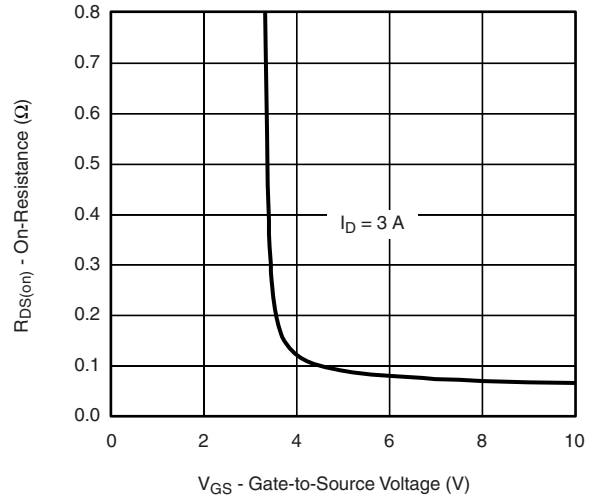


**On-Resistance vs. Junction Temperature**

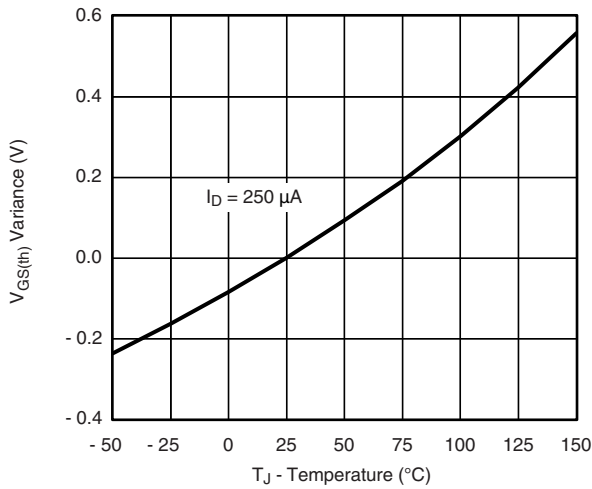
## TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



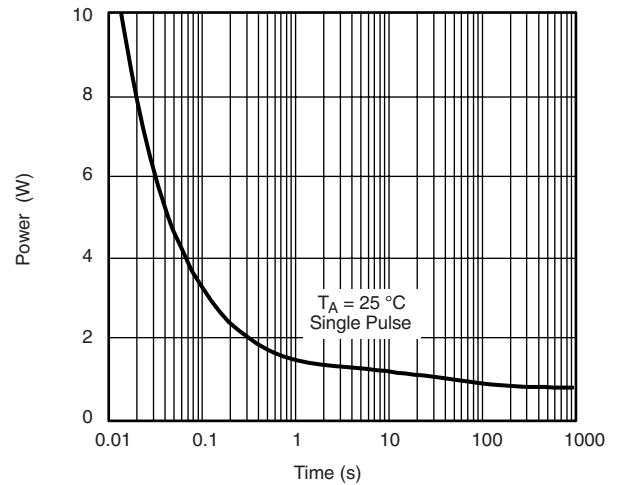
Source-Drain Diode Forward Voltage



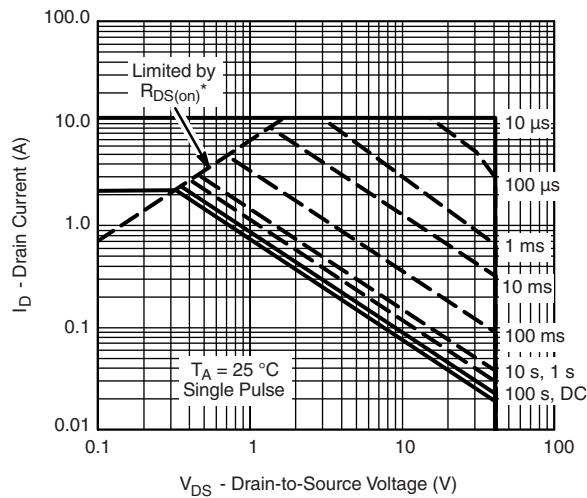
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage



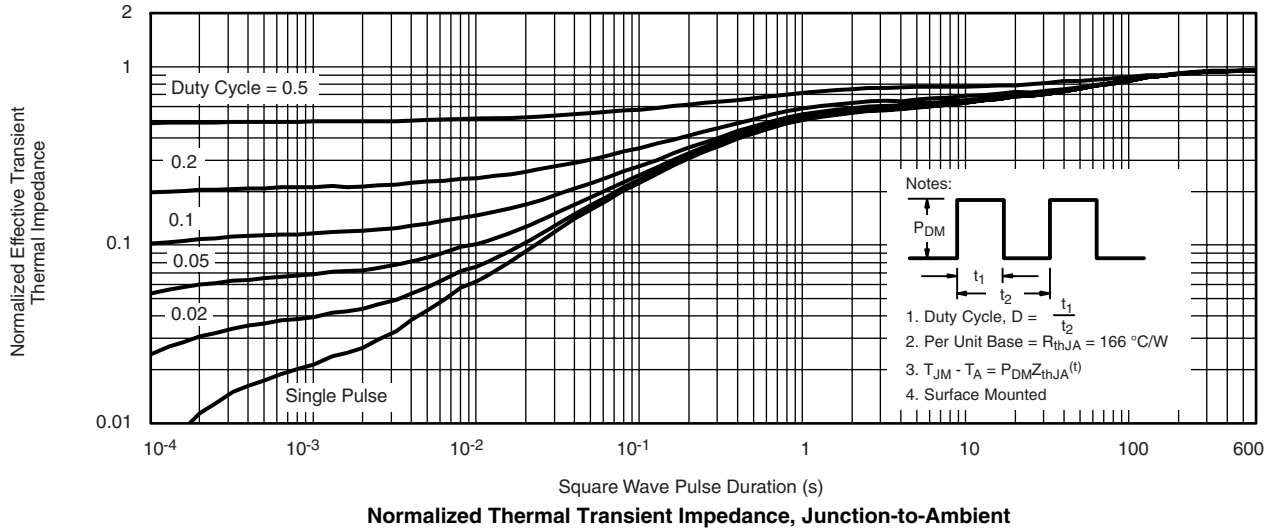
Single Pulse Power



\*  $V_{GS} >$  minimum  $V_{GS}$  at which  $R_{DS(on)}$  is specified

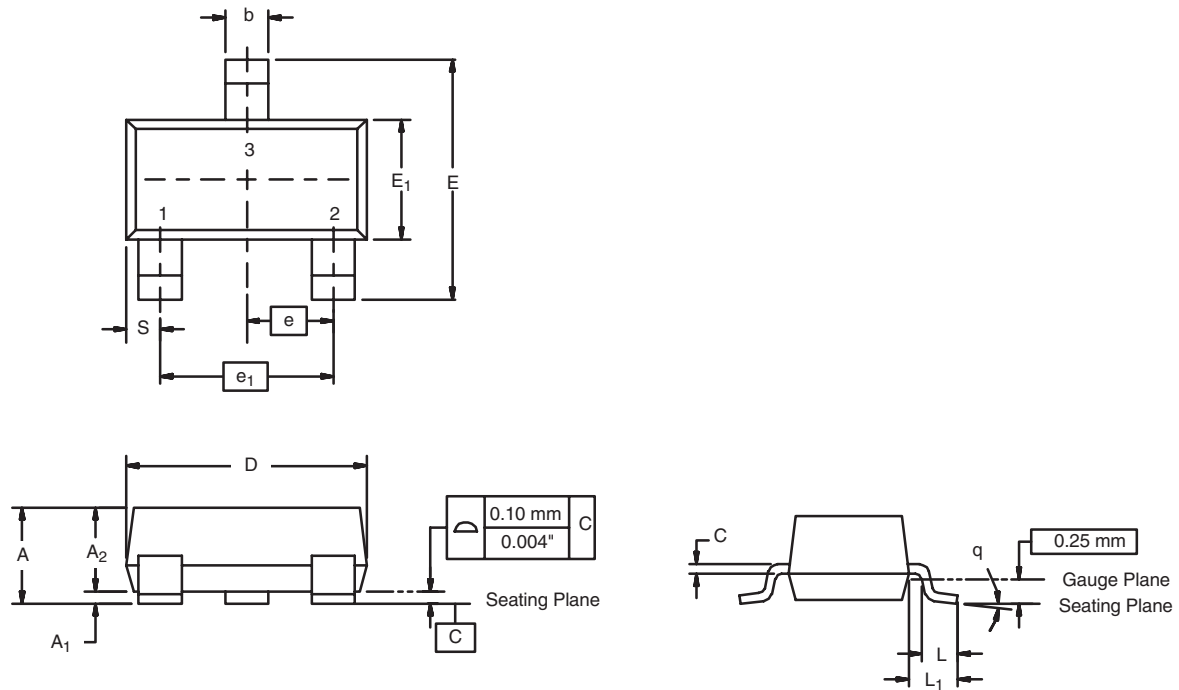
Safe Operating Area, Junction-to-Case

**TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted



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## SOT-23 (TO-236): 3-LEAD



Dim	MILLIMETERS		INCHES	
	Min	Max	Min	Max
A	0.89	1.12	0.035	0.044
A <sub>1</sub>	0.01	0.10	0.0004	0.004
A <sub>2</sub>	0.88	1.02	0.0346	0.040
b	0.35	0.50	0.014	0.020
c	0.085	0.18	0.003	0.007
D	2.80	3.04	0.110	0.120
E	2.10	2.64	0.083	0.104
E <sub>1</sub>	1.20	1.40	0.047	0.055
e	0.95 BSC		0.0374 Ref	
e <sub>1</sub>	1.90 BSC		0.0748 Ref	
L	0.40	0.60	0.016	0.024
L <sub>1</sub>	0.64 Ref		0.025 Ref	
S	0.50 Ref		0.020 Ref	
q	3°	8°	3°	8°

ECN: S-03946-Rev. K, 09-Jul-01  
 DWG: 5479

## RECOMMENDED MINIMUM PADS FOR SOT-23



Recommended Minimum Pads  
Dimensions in Inches/(mm)

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