

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

PRODUCT SUMMARY		
V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A) ^b
- 40	0.082 at $V_{GS} = - 10$ V	- 3.0
	0.130 at $V_{GS} = - 4.5$ V	- 2.4

FEATURES

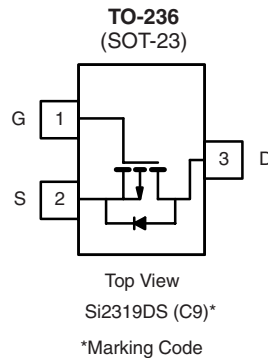
- Halogen-free According to IEC 61249-2-21 Available
- TrenchFET[®] Power MOSFET

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}	± 20		
Continuous Drain Current ($T_J = 150$ °C) ^b	$T_A = 25$ °C	I_D	- 3.0	- 2.3	A
	$T_A = 70$ °C		- 2.4	- 1.85	
Pulsed Drain Current ^a		I_{DM}	- 12		
Continuous Source Current (Diode Conduction) ^b		I_S	- 1.0	- 0.62	
Power Dissipation ^b	$T_A = 25$ °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 ^b	R_{thJA}	75	100	°C/W
Maximum Junction-to-Ambient ^c		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.

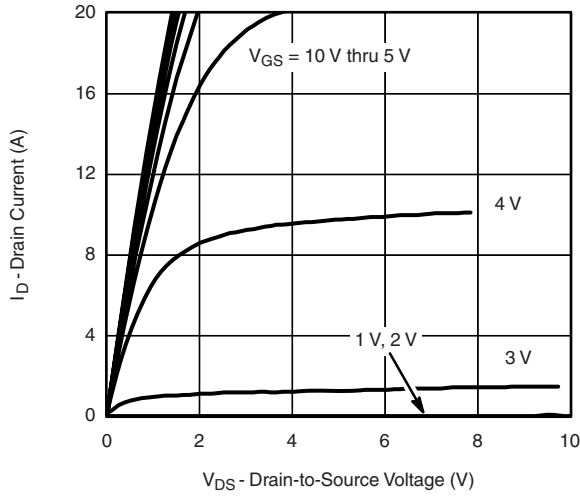
SPECIFICATIONS $T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted						
Parameter	Symbol	Test Conditions	Limits			Unit
			Min.	Typ.	Max.	
Static						
Drain-Source Breakdown Voltage	V_{DS}	$V_{GS} = 0\text{ V}$, $I_D = -250\text{ }\mu\text{A}$	- 40			V
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$, $I_D = -250\text{ }\mu\text{A}$	- 1		- 3.0	
Gate-Body Leakage	I_{GSS}	$V_{DS} = 0\text{ V}$, $V_{GS} = \pm 20\text{ V}$			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = -40\text{ V}$, $V_{GS} = 0\text{ V}$			- 1	μA
		$V_{DS} = -40\text{ V}$, $V_{GS} = 0\text{ V}$, $T_J = 55\text{ }^\circ\text{C}$			- 10	
On-State Drain Current ^a	$I_{D(on)}$	$V_{DS} \leq -5\text{ V}$, $V_{GS} = -10\text{ V}$	- 6			A
Drain-Source On-State Resistance ^a	$R_{DS(on)}$	$V_{GS} = -10\text{ V}$, $I_D = -3.0\text{ A}$		0.065	0.082	Ω
		$V_{GS} = -4.5\text{ V}$, $I_D = -2.4\text{ A}$		0.100	0.130	
Forward Transconductance ^a	g_{fs}	$V_{DS} = -5\text{ V}$, $I_D = -3.0\text{ A}$		7.0		S
Diode Forward Voltage ^a	V_{SD}	$I_S = -1.25\text{ A}$, $V_{GS} = 0\text{ V}$		- 0.8	- 1.2	V
Dynamic^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		
Switching^c						
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:

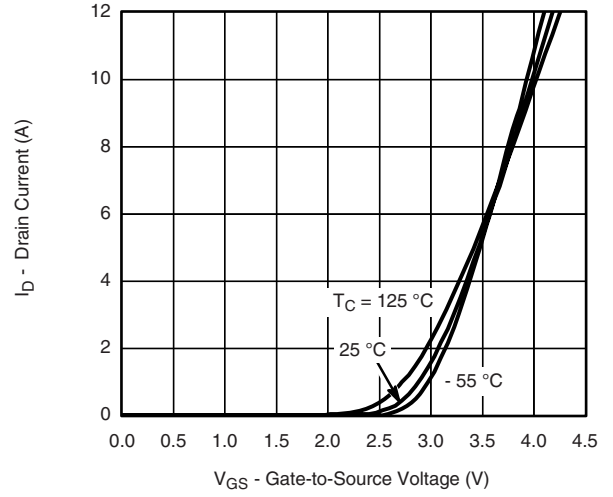
- a. Pulse test: $PW \leq 300\text{ }\mu\text{s}$ duty cycle $\leq 2\%$.
b. For design aid only, not subject to production testing.
c. Switching time is essentially independent of operating temperature.

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.

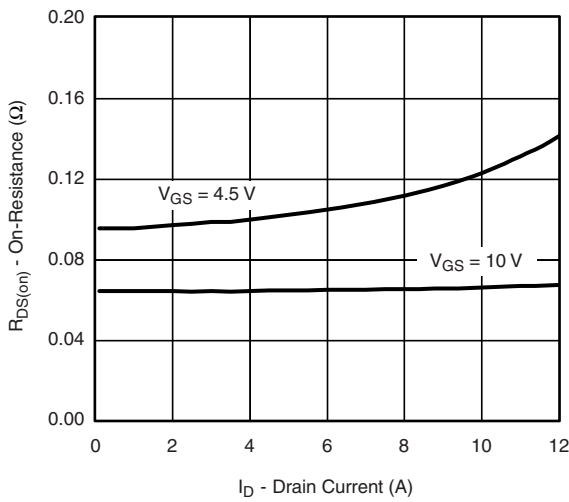
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



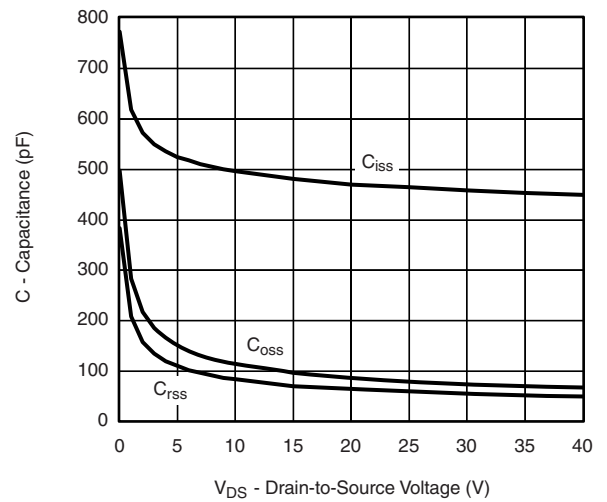
Output Characteristics



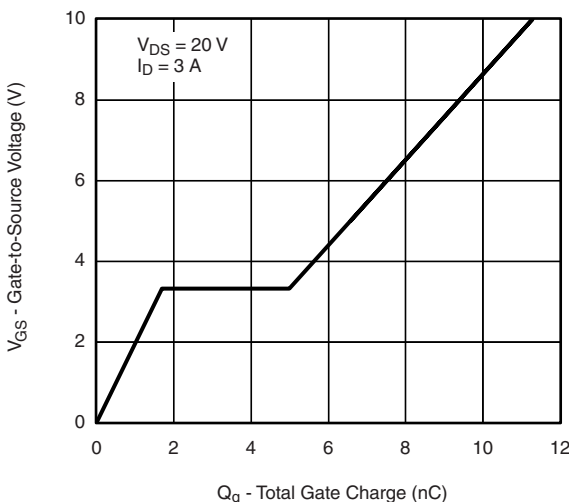
Transfer Characteristics



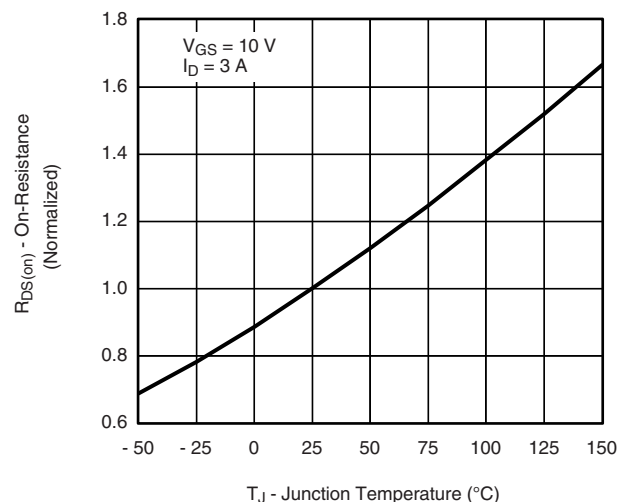
On-Resistance vs. Drain Current



Capacitance

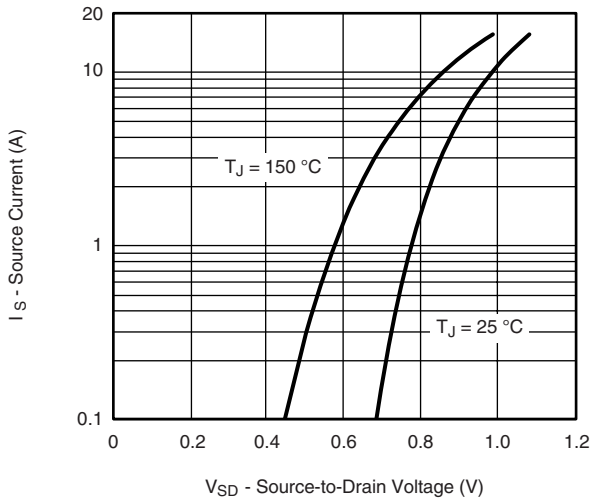


Gate Charge

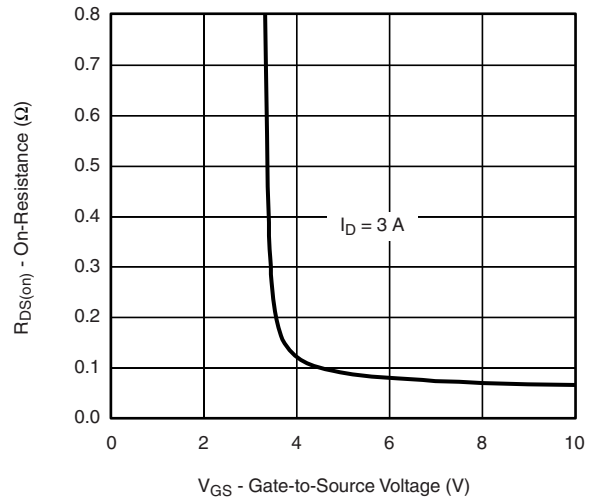


On-Resistance vs. Junction Temperature

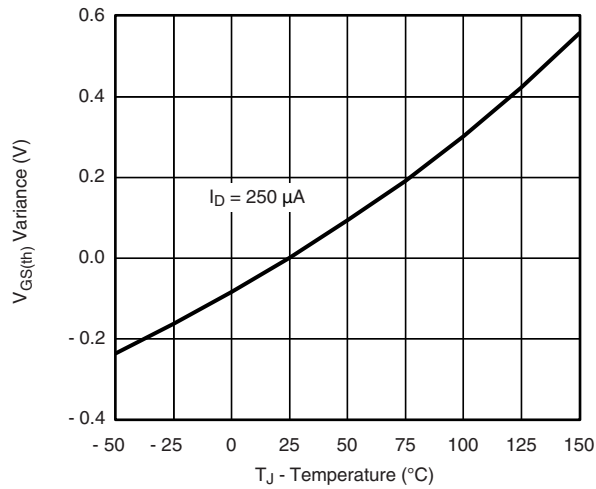
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



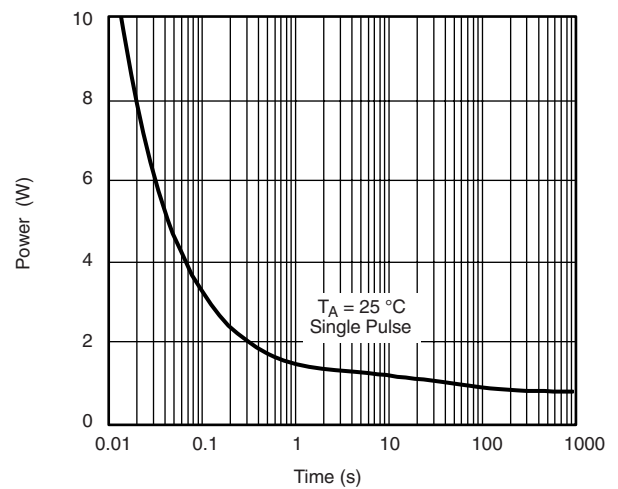
Source-Drain Diode Forward Voltage



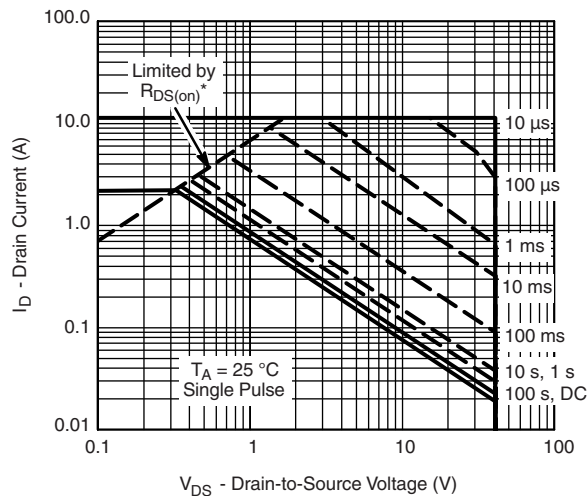
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage



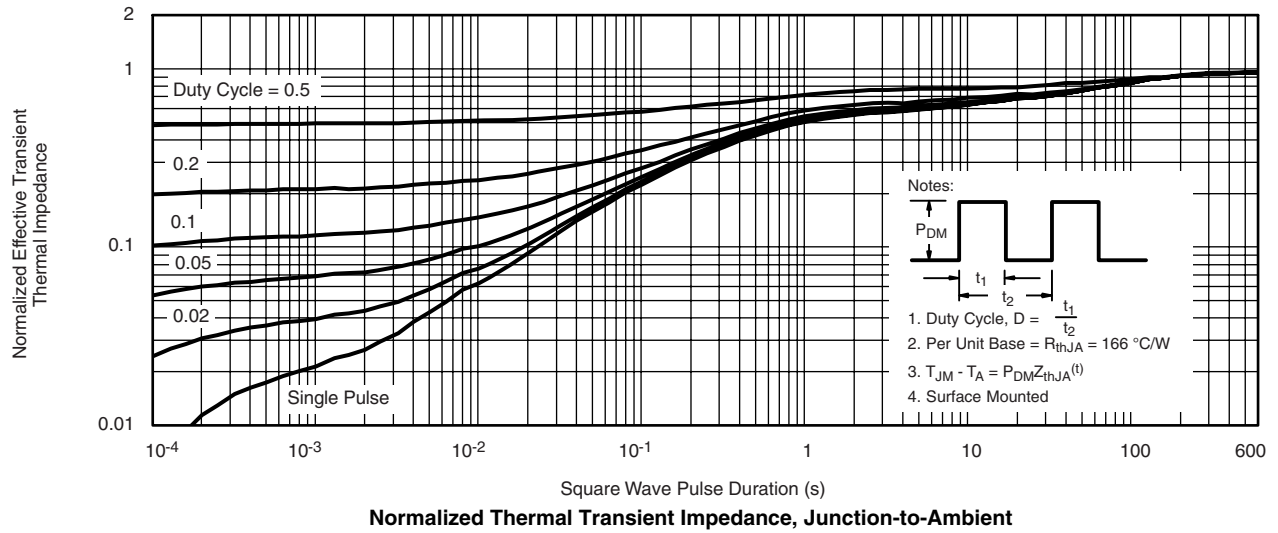
Single Pulse Power



* $V_{GS} >$ 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 ₁	0.01	0.10	0.0004	0.004
A ₂	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 ₁	1.20	1.40	0.047	0.055
e	0.95 BSC		0.0374 Ref	
e ₁	1.90 BSC		0.0748 Ref	
L	0.40	0.60	0.016	0.024
L ₁	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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