

## N-Channel 30-V (D-S) MOSFET

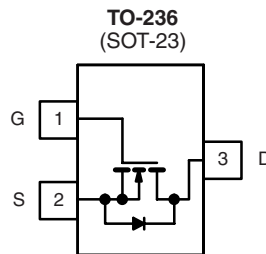
PRODUCT SUMMARY			
$V_{DS}$ (V)	$R_{DS(on)}$ ( $\Omega$ )	$I_D$ (A)	$Q_g$ (Typ.)
30	0.070 at $V_{GS} = 10$ V	3.2	2.6
	0.105 at $V_{GS} = 4.5$ V	2.6	

### FEATURES

- Halogen-free Option Available



**RoHS**  
COMPLIANT



Top View  
Si2304BDS (L4)\*  
\* Marking Code

Ordering Information: Si2304BDS-T1-E3 (Lead (Pb)-free)  
Si2304BDS-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	$V_{DS}$	30		V	
Gate-Source Voltage	$V_{GS}$	$\pm 20$			
Continuous Drain Current ( $T_J = 150$ °C) <sup>a, b</sup>	$I_D$	$T_A = 25$ °C	3.2	2.6	A
		$T_A = 70$ °C	2.5	2.1	
Pulsed Drain Current	$I_{DM}$	10			
Continuous Source Current (Diode Conduction) <sup>a, b</sup>	$I_S$	0.9	0.62		
Maximum Power Dissipation <sup>a, b</sup>	$P_D$	$T_A = 25$ °C	1.08	0.75	W
		$T_A = 70$ °C	0.69	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>a</sup>	$t \leq 5$ s	$R_{thJA}$	90	115	°C/W
	Steady State		130	166	
Maximum Junction-to-Foot (Drain)	Steady State	$R_{thJF}$	60	75	

Notes:

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

For SPICE model information via the Worldwide Web: <http://www.vishay.com/www/product/spice.htm>

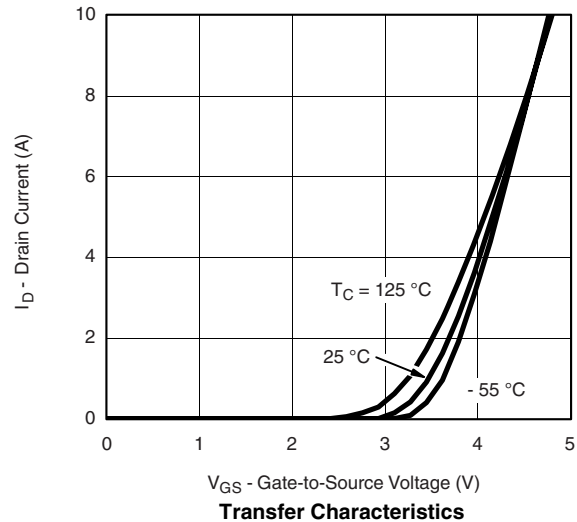
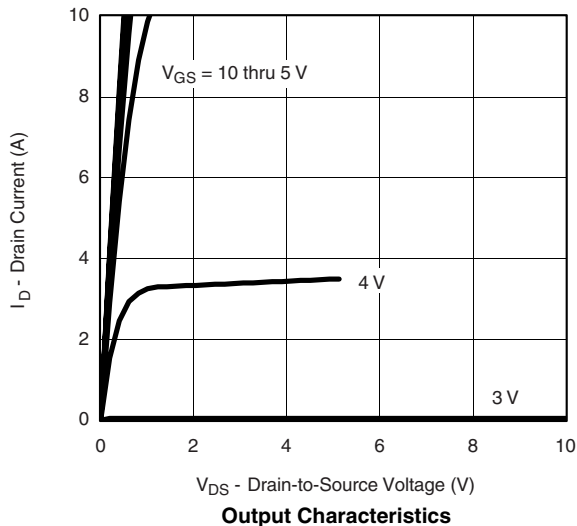
SPECIFICATIONS $T_A = 25\text{ }^\circ\text{C}$ , unless otherwise noted						
Parameter	Symbol	Test Conditions	Limits			Unit
			Min.	Typ.	Max.	
<b>Static</b>						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	30			V
Gate-Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	1.5		3.0	V
Gate-Body Leakage	$I_{GSS}$	$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$			$\pm 100$	nA
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 30\text{ V}, V_{GS} = 0\text{ V}$			0.5	$\mu\text{A}$
		$V_{DS} = 30\text{ V}, V_{GS} = 0\text{ V}, T_J = 55\text{ }^\circ\text{C}$			10	
		$V_{DS} = 30\text{ V}, V_{GS} = 1.0\text{ V}, T_J = 25\text{ }^\circ\text{C}$			1	
On-State Drain Current <sup>a</sup>	$I_{D(on)}$	$V_{DS} \geq 4.5\text{ V}, V_{GS} = 10\text{ V}$	6			A
Drain-Source On-Resistance <sup>a</sup>	$R_{DS(on)}$	$V_{GS} = 10\text{ V}, I_D = 2.5\text{ A}$		0.055	0.070	$\Omega$
		$V_{GS} = 4.5\text{ V}, I_D = 2.0\text{ A}$		0.080	0.105	
Forward Transconductance <sup>a</sup>	$g_{fs}$	$V_{DS} = 4.5\text{ V}, I_D = 2.5\text{ A}$		6.0		S
Diode Forward Voltage	$V_{SD}$	$I_S = 1.25\text{ A}, V_{GS} = 0\text{ V}$		0.8	1.2	V
<b>Dynamic</b>						
Gate Charge	$Q_g$	$V_{DS} = 15\text{ V}, V_{GS} = 5\text{ V}, I_D = 2.5\text{ A}$		2.6	4	nC
Total Gate Charge	$Q_{gt}$	$V_{DS} = 15\text{ V}, V_{GS} = 10\text{ V}, I_D = 2.5\text{ A}$		4.6	7	
Gate-Source Charge	$Q_{gs}$			0.8		
Gate-Drain Charge	$Q_{gd}$			1.15		
Gate Resistance	$R_g$	$f = 1.0\text{ MHz}$		3.0		$\Omega$
Input Capacitance	$C_{iss}$	$V_{DS} = 15\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$		225		pF
Output Capacitance	$C_{oss}$			50		
Reverse Transfer Capacitance	$C_{rss}$			28		
<b>Switching</b>						
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 15\text{ V}, R_L = 15\text{ }\Omega$ $I_D \cong 1\text{ A}, V_{GEN} = 10\text{ V}, R_g = 6\text{ }\Omega$		7.5	12	ns
Rise Time	$t_r$			12.5	20	
Turn-Off Delay Time	$t_{d(off)}$			19	30	
Fall Time	$t_f$			15	25	

Notes:

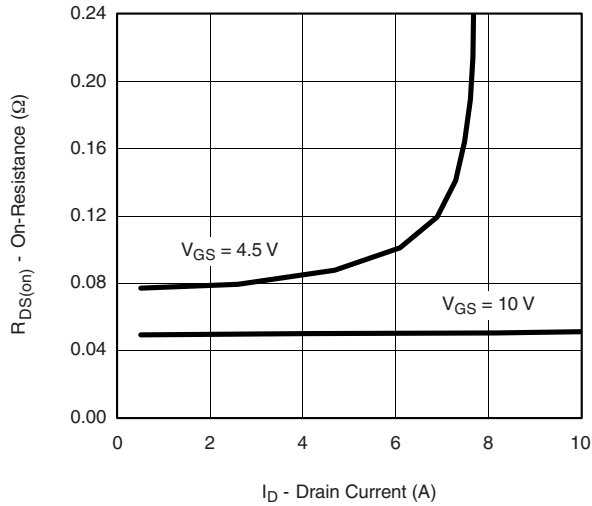
a. Pulse test:  $PW \leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$ .

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.

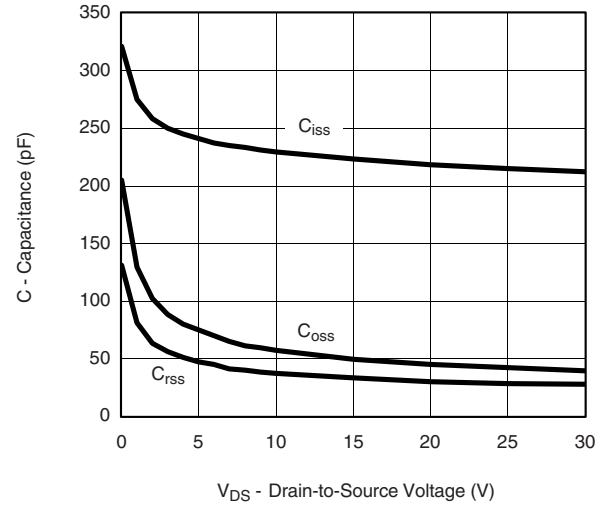
## TYPICAL CHARACTERISTICS $25\text{ }^\circ\text{C}$ , unless otherwise noted



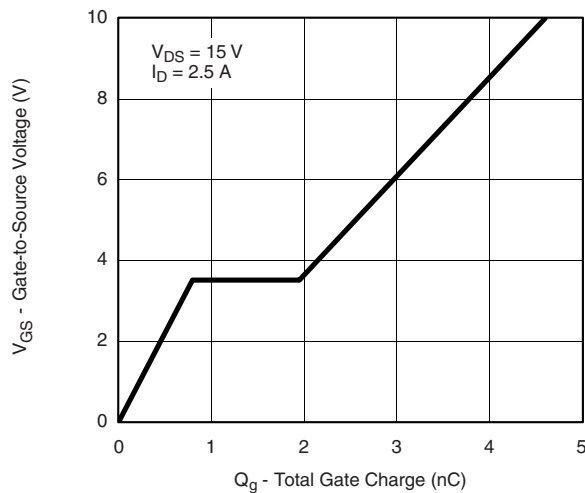
**TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted



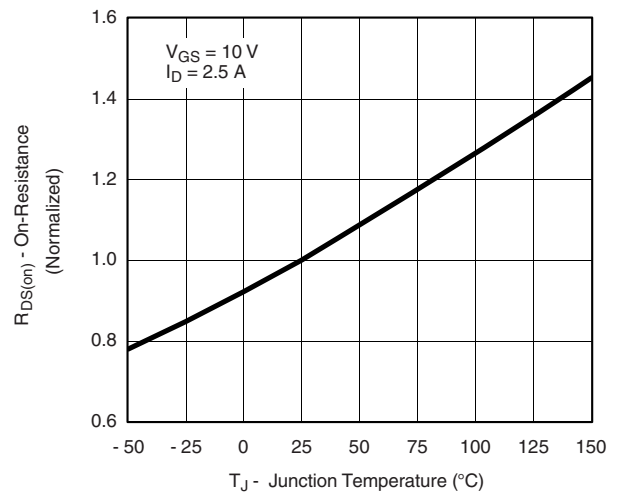
**On-Resistance vs. Drain Current**



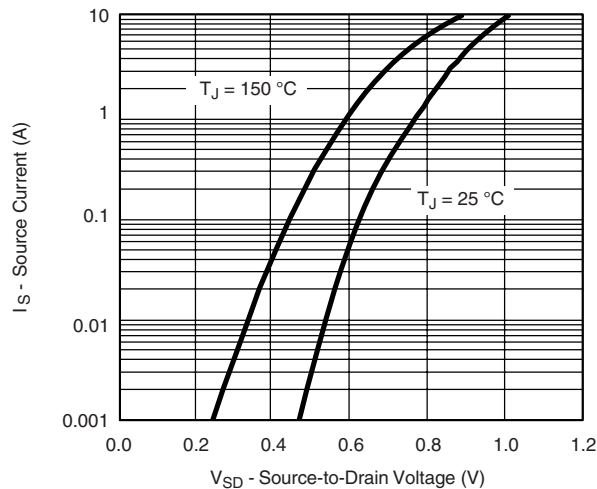
**Capacitance**



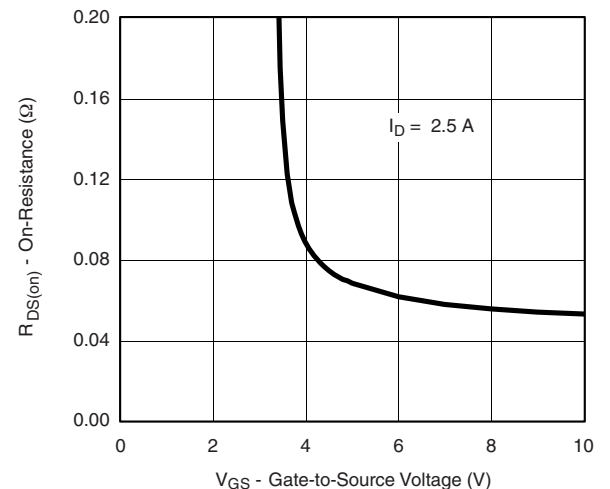
**Gate Charge**



**On-Resistance vs. Junction Temperature**

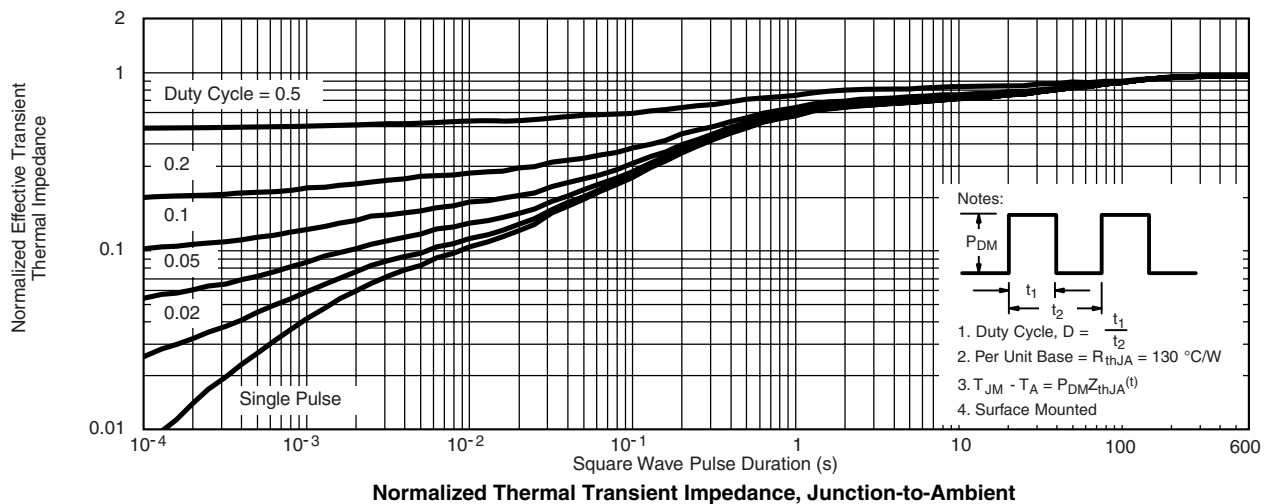
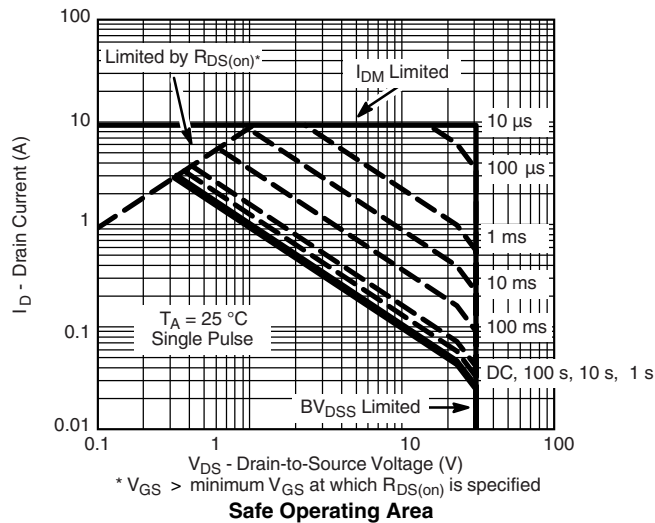
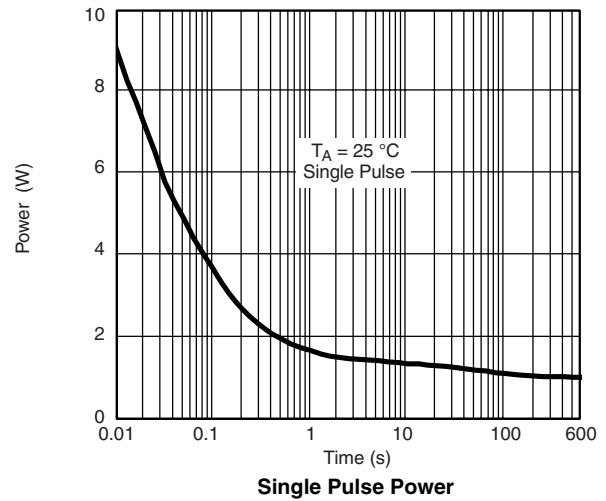
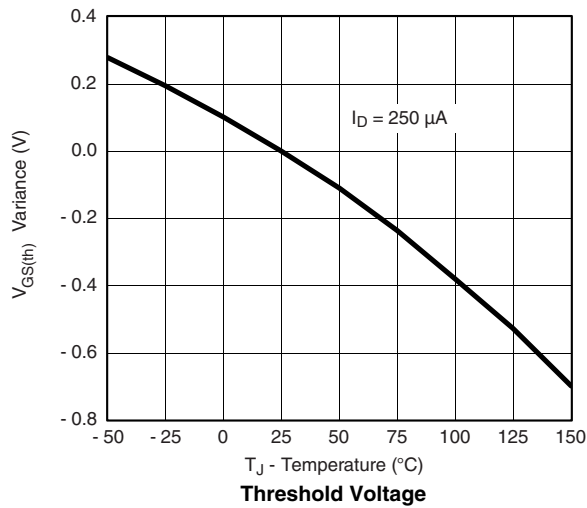


**Source-Drain Diode Forward Voltage**



**On-Resistance vs. Gate-to-Source Voltage**

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



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