

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

### PRODUCT SUMMARY

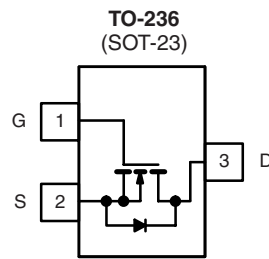
$V_{DS}$ (V)	$R_{DS(on)}$ ( $\Omega$ )	$I_D$ (A)	$Q_g$ (Typ.)
30	0.047 at $V_{GS} = 10$ V	4.0	3.0
	0.065 at $V_{GS} = 4.5$ V	3.5	

### FEATURES

- Halogen-free Option Available
- TrenchFET® Power MOSFET
- 100 %  $R_g$  Tested



**RoHS**  
COMPLIANT



Top View  
Si2306BDS (L6)\*

\* Marking Code

Ordering Information: Si2306BDS-T1-E3 (Lead (Pb)-free)  
Si2306BDS-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>	$I_D$	4.0	3.16	A
		3.5	2.7	
Pulsed Drain Current	$I_{DM}$	20		
Continuous Source Current (Diode Conduction) <sup>a, b</sup>	$I_S$	1.04	0.62	
Maximum Power Dissipation <sup>a, b</sup>	$P_D$	1.25	0.75	W
		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>a</sup>	$R_{thJA}$	80	100	°C/W
		130	166	
Maximum Junction-to-Foot (Drain)	$R_{thJF}$	60	75	

Notes:

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

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

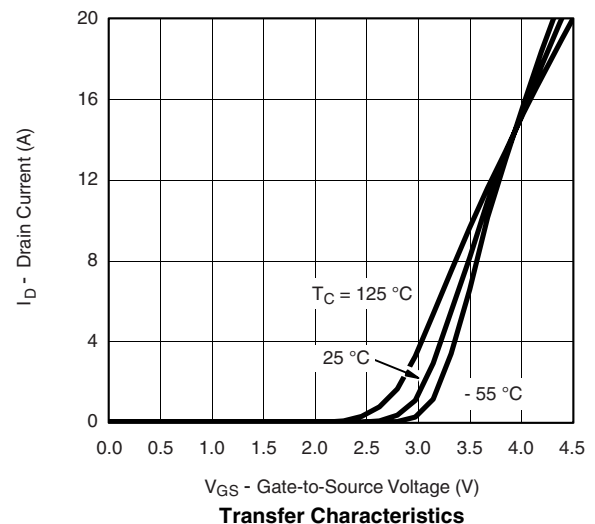
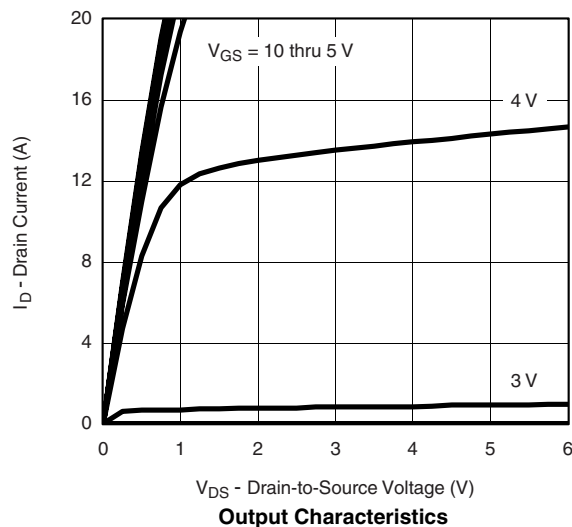
**SPECIFICATIONS**  $T_A = 25^\circ\text{C}$ , unless otherwise noted

Parameter	Symbol	Test Conditions	Limits			Unit
			Min.	Typ.	Max.	
Static						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	30			V
Gate-Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	1.0		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	$I_{DSS}$	$V_{DS} = 30\text{ V}, V_{GS} = 0\text{ V}$			0.5	$\mu\text{A}$
		$V_{DS} = 30\text{ V}, V_{GS} = 0\text{ V}, T_J = 55\text{ }^\circ\text{C}$			10	
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>	$R_{DS(on)}$	$V_{GS} = 10\text{ V}, I_D = 3.5\text{ A}$		0.038	0.047	$\Omega$
		$V_{GS} = 4.5\text{ V}, I_D = 2.8\text{ A}$		0.052	0.065	
Forward Transconductance <sup>a</sup>	$g_{fs}$	$V_{DS} = 4.5\text{ V}, I_D = 2.5\text{ A}$		7.0		S
Diode Forward Voltage	$V_{SD}$	$I_S = 1.25\text{ A}, V_{GS} = 0\text{ V}$		0.8	1.2	V
Dynamic						
Gate Charge	$Q_g$	$V_{DS} = 15\text{ V}, V_{GS} = 10\text{ V}, I_D = 2.5\text{ A}$		3.0	4.5	nC
Total Gate Charge	$Q_{gt}$			6	9	
Gate-Source Charge	$Q_{gs}$			1.6		
Gate-Drain Charge	$Q_{gd}$			0.6		
Gate Resistance	$R_g$	$f = 1.0\text{ MHz}$	2.5	5	7.5	$\Omega$
Input Capacitance	$C_{iss}$	$V_{DS} = 15\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$		305		pF
Output Capacitance	$C_{oss}$			65		
Reverse Transfer Capacitance	$C_{rss}$			29		
Switching						
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	11	ns
Rise Time	$t_r$			12	18	
Turn-Off Delay Time	$t_{d(off)}$			14	25	
Fall Time	$t_f$			6	10	
Reverse Recovery Time	$t_{rr}$	$I_F = 1.25\text{ A}, di/dt = 100\text{ A}/\mu\text{s}$		14	21	nC
Body Diode Reverse Recovery Charge	$Q_{rr}$			6	10	

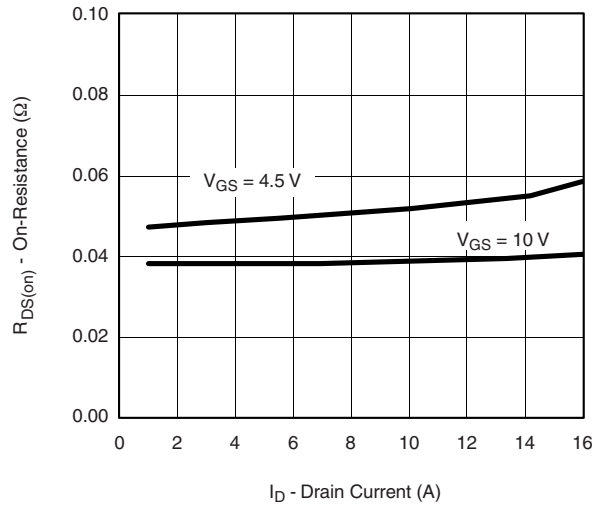
Notes:

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

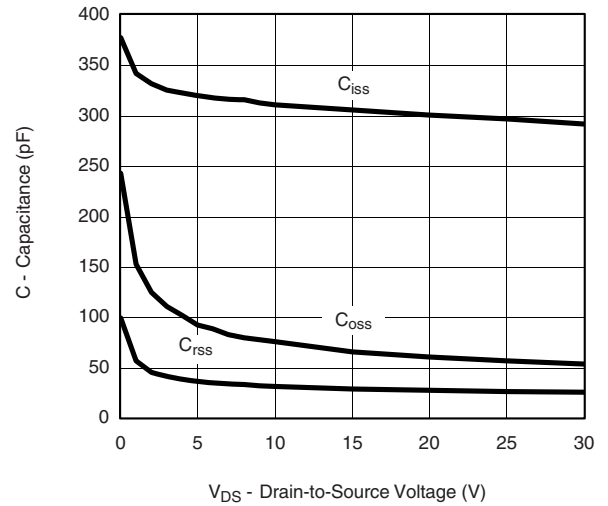
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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

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

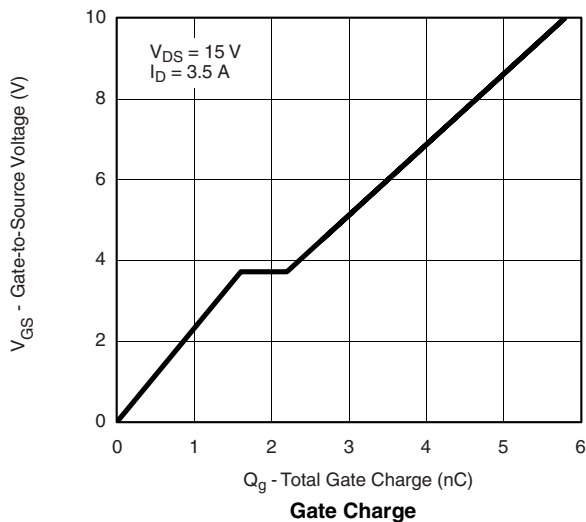
## TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



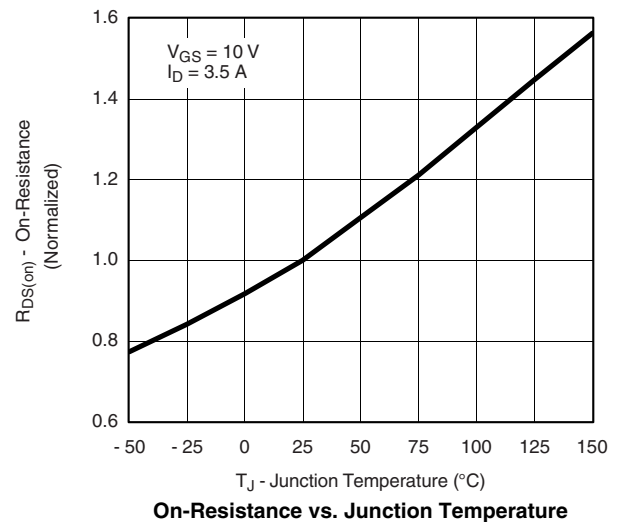
On-Resistance vs. Drain Current



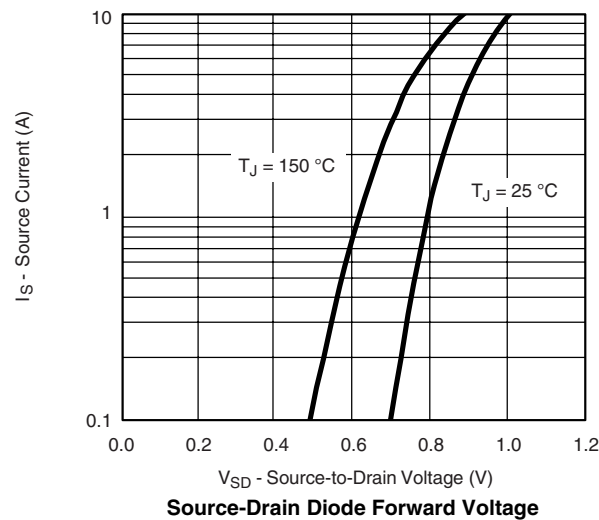
Capacitance



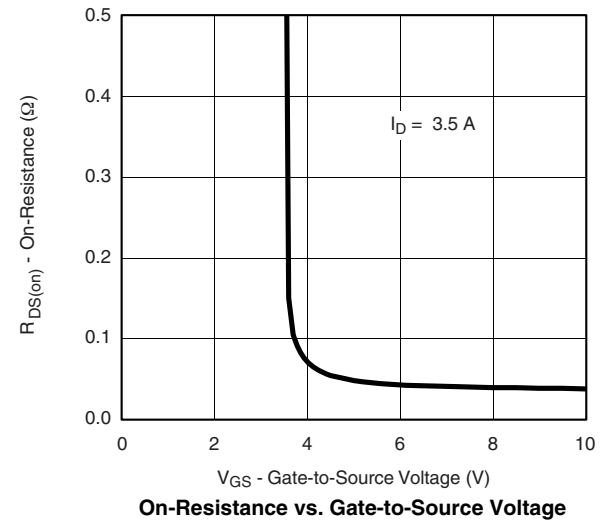
Gate Charge



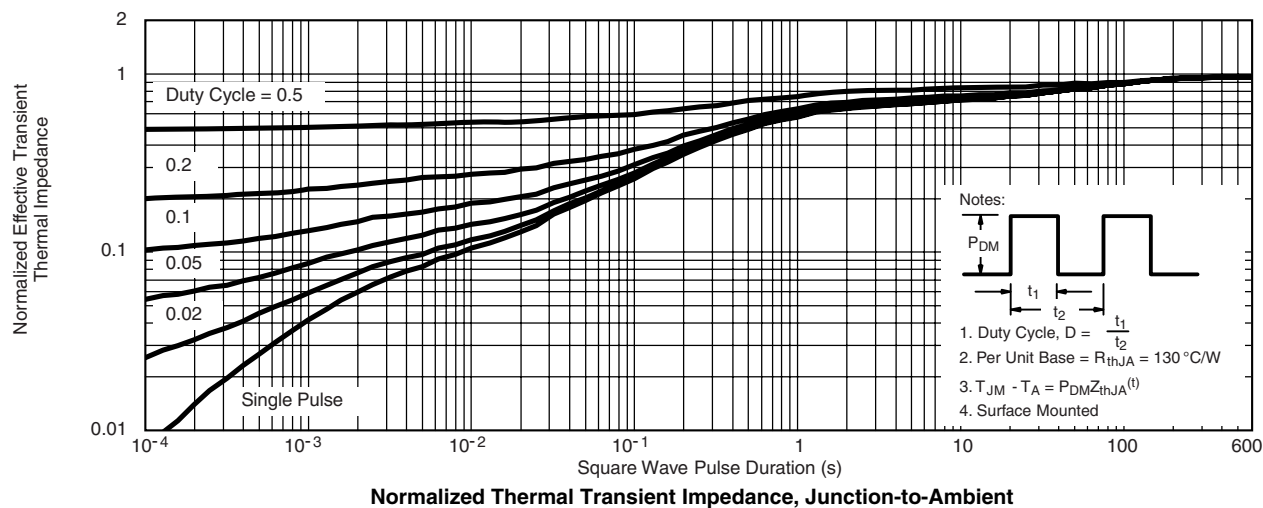
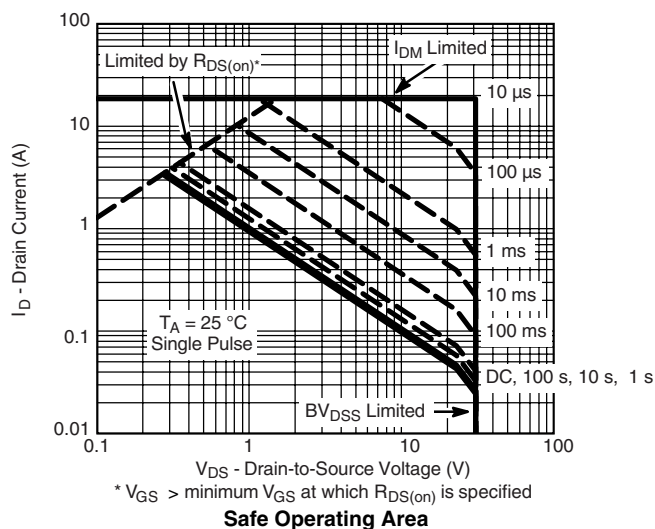
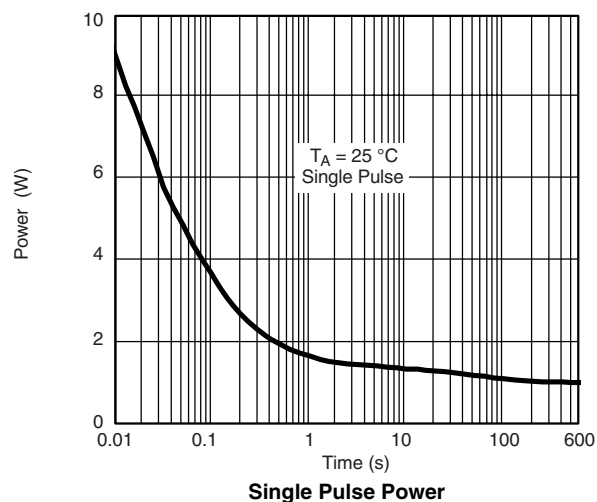
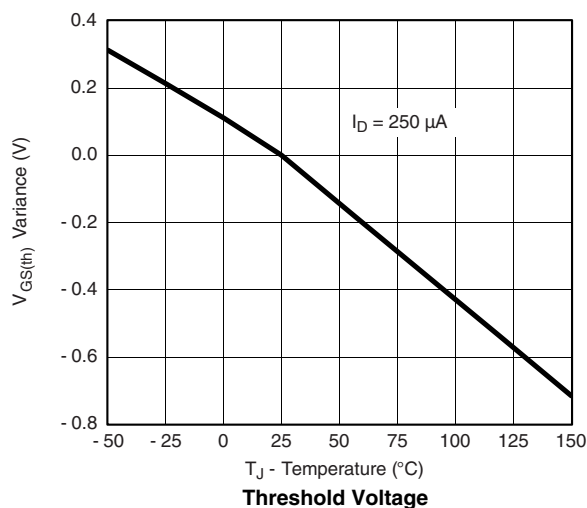
On-Resistance vs. Junction Temperature



Source-Drain Diode Forward Voltage



On-Resistance vs. Gate-to-Source Voltage

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

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