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

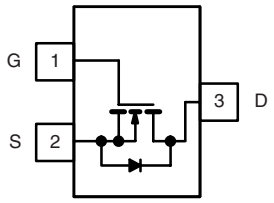
PRODUCT SUMMARY			
V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A)	Q_g (Typ.)
30	0.047 at V_{GS} = 10 V	4.0	3.0
	0.065 at V_{GS} = 4.5 V	3.5	

FEATURES

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

Pb-free
RoHS COMPLIANT

TO-236
(SOT-23)



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}	± 20		
Continuous Drain Current (T_J = 150 °C)[a, b]	T_A = 25 °C	I_D	4.0	3.16	A
	T_A = 70 °C		3.5	2.7	
Pulsed Drain Current		I_{DM}	20		
Continuous Source Current (Diode Conduction)[a, b]		I_S	1.04	0.62	
Maximum Power Dissipation[a, 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[a]	t ≤ 5 s	R_{thJA}	80	100	°C/W
	Steady State		130	166	
Maximum Junction-to-Foot (Drain)	Steady State	R_{thJF}	60	75	

Notes:
a. Surface Mounted on FR4 board, t ≤ 5 s.
b. Pulse width limited by maximum junction temperature.
c. Surface Mounted on FR4 board.

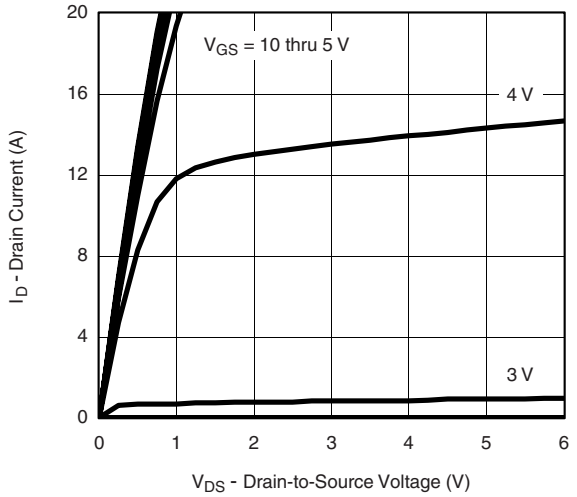
For SPICE model information via the Worldwide Web: http://www.vishay.com/www/product/spice.htm

SPECIFICATIONS T_A = 25 °C, unless otherwise noted						
Parameter	**Symbol**	**Test Conditions**	**Limits**			**Unit**
			Min.	**Typ.**	**Max.**	
Static						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS} = 0 V, I_D = 250 µA	30			V
Gate-Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250 µA	1.0		3.0	
Gate-Body Leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ± 20 V			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 30 V, V_{GS} = 0 V			0.5	µA
		V_{DS} = 30 V, V_{GS} = 0 V, T_J = 55 °C			10	
On-State Drain Current[a]	$I_{D(on)}$	$V_{DS} \geq$ 4.5 V, V_{GS} = 10 V	6			A
Drain-Source On-Resistance[a]	$R_{DS(on)}$	V_{GS} = 10 V, I_D = 3.5 A		0.038	0.047	Ω
		V_{GS} = 4.5 V, I_D = 2.8 A		0.052	0.065	
Forward Transconductance[a]	g_{fs}	V_{DS} = 4.5 V, I_D = 2.5 A		7.0		S
Diode Forward Voltage	V_{SD}	I_S = 1.25 A, V_{GS} = 0 V		0.8	1.2	V
Dynamic						
Gate Charge	Q_g	V_{DS} = 15 V, V_{GS} = 5 V, I_D = 2.5 A		3.0	4.5	nC
Total Gate Charge	Q_{gt}	V_{DS} = 15 V, V_{GS} = 10 V, I_D = 2.5 A		6	9	
Gate-Source Charge	Q_{gs}			1.6		
Gate-Drain Charge	Q_{gd}			0.6		
Gate Resistance	R_g	f = 1.0 MHz	2.5	5	7.5	Ω
Input Capacitance	C_{iss}	V_{DS} = 15 V, V_{GS} = 0 V, f = 1 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 V, R_L = 15 Ω $I_D \cong$ 1 A, V_{GEN} = 10 V, R_g = 6 Ω		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 A, di/dt = 100 A/µs		14	21	
Body Diode Reverse Recovery Charge	Q_{rr}			6	10	nC

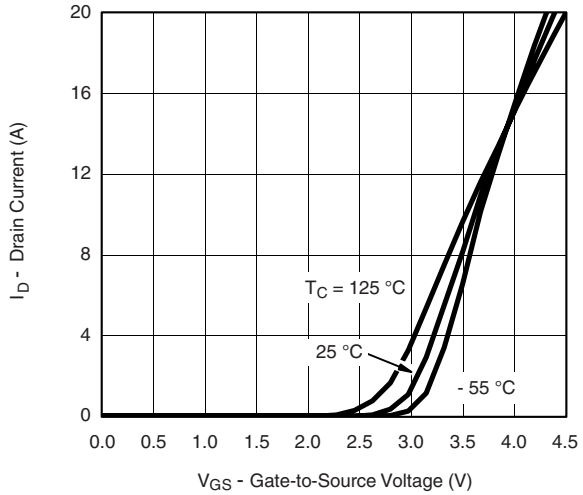
Notes:
a. Pulse test: Pulse width ≤ 300 µs, duty cycle ≤ 2 %.

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 °C, unless otherwise noted

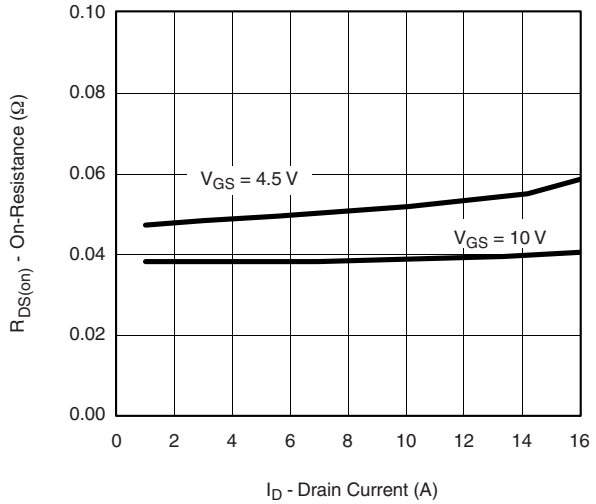


Output Characteristics

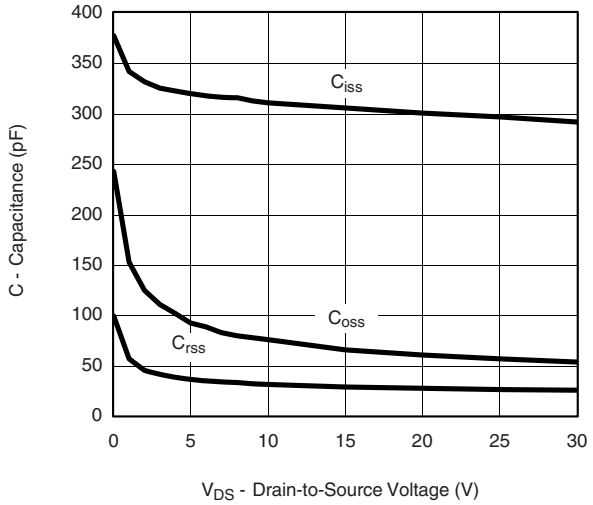


Transfer Characteristics

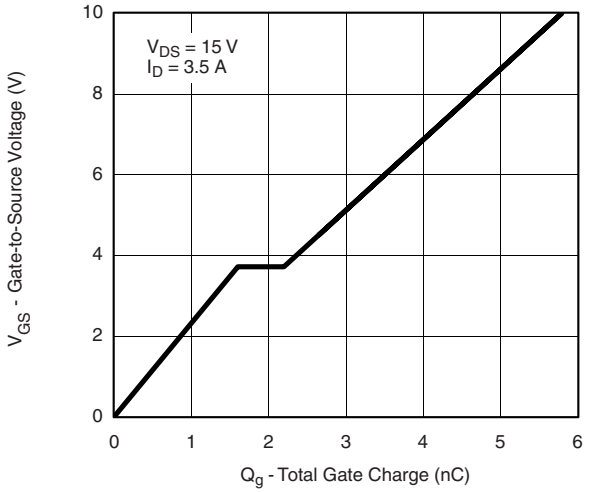
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



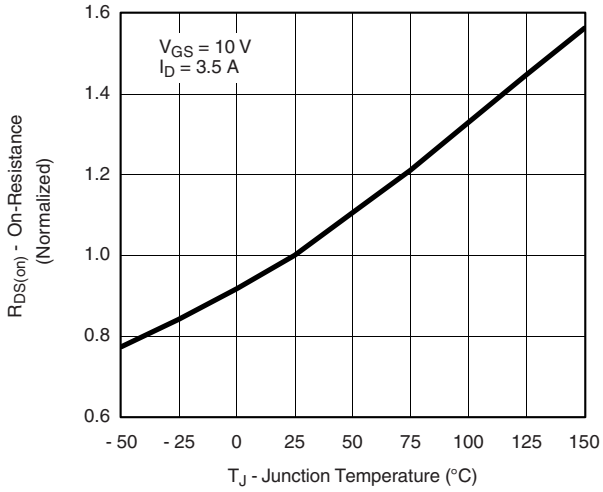
On-Resistance vs. Drain Current



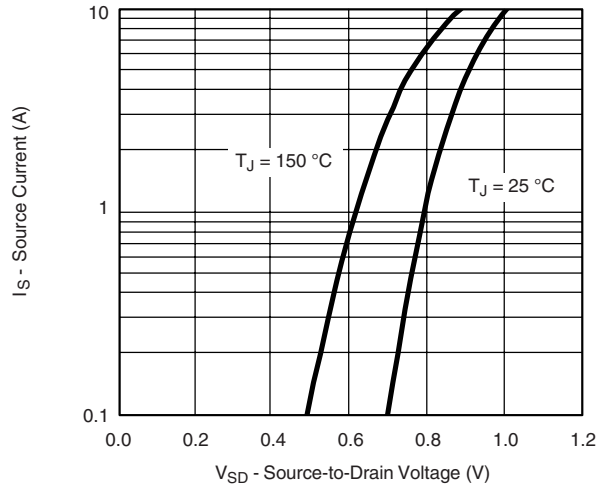
Capacitance



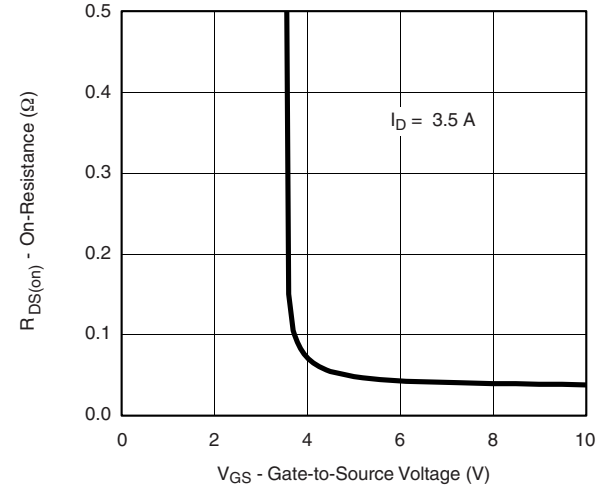
Gate Charge



On-Resistance vs. Junction Temperature

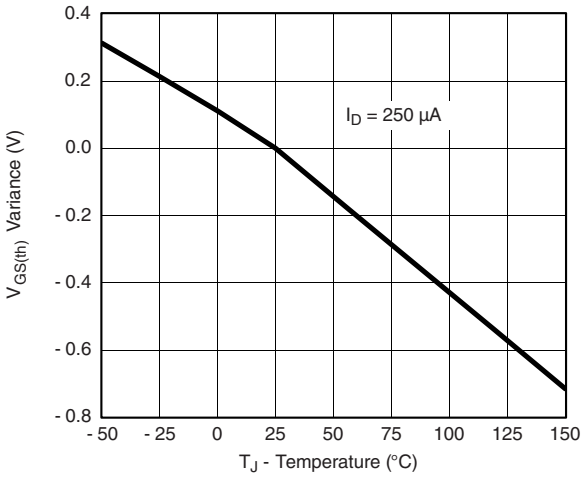


Source-Drain Diode Forward Voltage

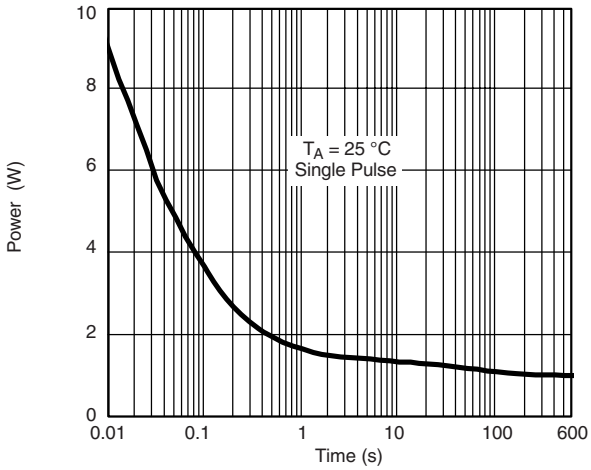


On-Resistance vs. Gate-to-Source Voltage

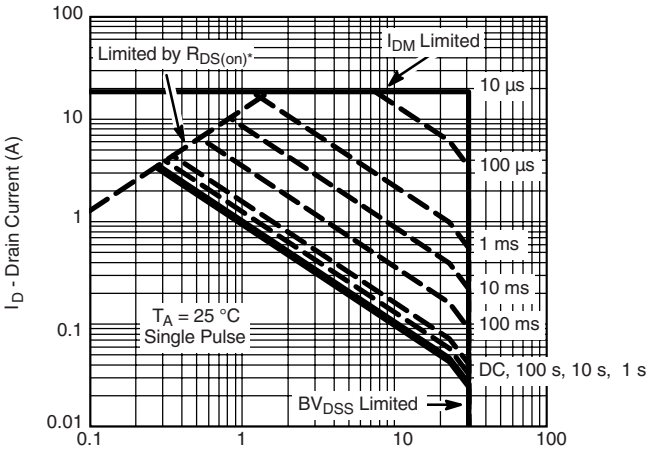
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



Threshold Voltage

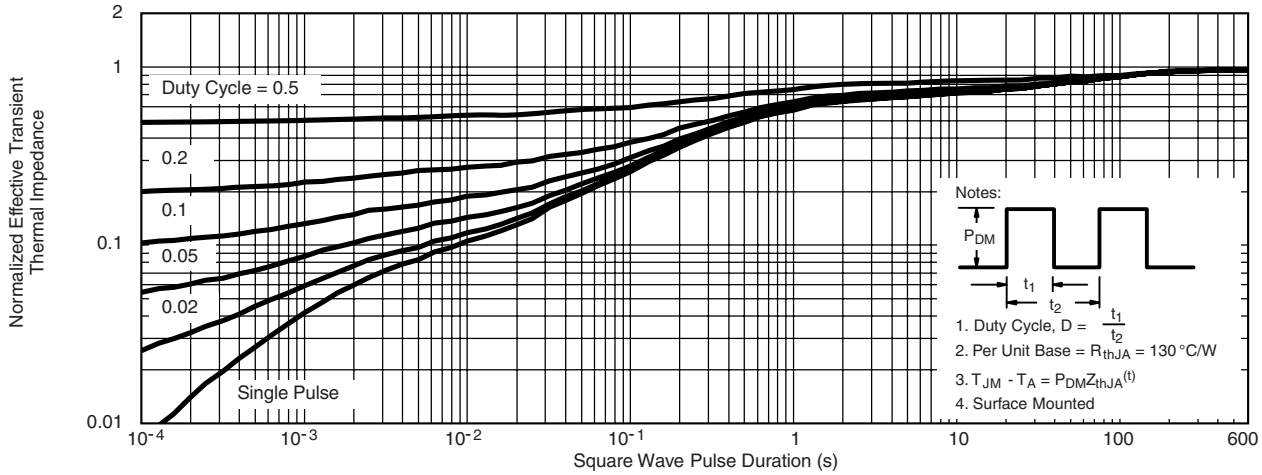


Single Pulse Power



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

Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Ambient

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