N-Channel 20 V (D-S) MOSFET

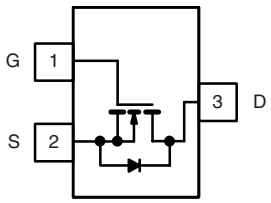
PRODUCT SUMMARY			
V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A)	Q_g (Typ.)
20	0.031 at V_{GS} = 4.5 V	5.0	7.5
	0.037 at V_{GS} = 2.5 V	4.6	
	0.047 at V_{GS} = 1.8 V	4.1	

FEATURES

- **Halogen-free According to IEC 61249-2-21 Definition**
- TrenchFET® Power MOSFET
- 100 % R_g Tested
- Compliant to RoHS Directive 2002/95/EC

Pb-free
RoHS COMPLIANT
HALOGEN FREE Available

TO-236
(SOT-23)



Top View

Si2312BDS (M2)*

* Marking Code

Ordering Information: Si2312BDS-T1-E3 (Lead (Pb)-free)
Si2312BDS-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}	20		V
Gate-Source Voltage		V_{GS}	± 8		
Continuous Drain Current (T_J = 150 °C)[a]	T_A = 25 °C	I_D	5.0	3.9	A
	T_A = 70 °C		4.0	3.1	
Pulsed Drain Current[b]		I_{DM}	15		
Avalanche Current[b]	L = 0.1 mH	I_{AS}	13		
Single Avalanche Energy		E_{AS}	8.45		mJ
Continuous Source Current (Diode Conduction)[a]		I_S	1.0	0.63	A
Power Dissipation[a]	T_A = 25 °C	P_D	1.25	0.75	W
	T_A = 70 °C		0.80	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		120	166	
Maximum Junction-to-Foot	Steady State	R_{thJF}	50	60	

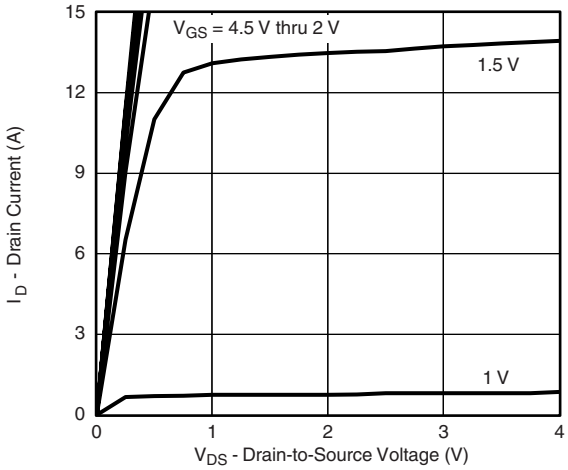
Notes:
a. Surface mounted on 1" x 1" FR4 board.
b. Pulse width limited by maximum junction temperature.

SPECIFICATIONS T_A = 25 °C, unless otherwise noted						
Parameter	**Symbol**	**Test Conditions**	**Limits**			**Unit**
			Min.	**Typ.**	**Max.**	
Static						
Drain-Source Breakdown Voltage	V_{DS}	V_{GS} = 0 V, I_D = 250 µA	20			V
Gate-Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250 µA	0.45		0.85	
Gate-Body Leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ± 8 V			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 20 V, V_{GS} = 0 V			1	µA
		V_{DS} = 20 V, V_{GS} = 0 V, T_J = 70 °C			75	
On-State Drain Current[a]	$I_{D(on)}$	V_{DS} ≥ 10 V, V_{GS} = 4.5 V	15			A
Drain-Source On-Resistance[a]	$R_{DS(on)}$	V_{GS} = 4.5 V, I_D = 5.0 A		0.025	0.031	Ω
		V_{GS} = 2.5 V, I_D = 4.6 A		0.030	0.037	
		V_{GS} = 1.8 V, I_D = 4.1 A		0.036	0.047	
Forward Transconductance[a]	g_{fs}	V_{DS} = 15 V, I_D = 5.0 A		30		S
Diode Forward Voltage	V_{SD}	I_S = 1.0 A, V_{GS} = 0 V		0.8	1.2	V
Dynamic[b]						
Total Gate Charge	Q_g	V_{DS} = 10 V, V_{GS} = 4.5 V, I_D = 5.0 A		7.5	12	nC
Gate-Source Charge	Q_{gs}			1.4		
Gate-Drain Charge	Q_{gd}			1.2		
Gate Resistance	R_g	f = 1.0 MHz	1.1	2.2	3.3	Ω
Switching						
Turn-On Delay Time	$t_{d(on)}$	V_{DD} = 10 V, R_L = 10 Ω I_D ≅ 1.0 A, V_{GEN} = 4.5 V, R_g = 6 Ω		9	15	ns
Rise Time	t_r			30	45	
Turn-Off Delay Time	$t_{d(off)}$			35	55	
Fall Time	t_f			10	15	
Source-Drain Reverse Recovery Time	t_{rr}	I_F = 1.0 A, dI/dt = 100 A/µs		13	25	
Body Diode Reverse Recovery Charge	Q_{rr}			4.5	7	nC

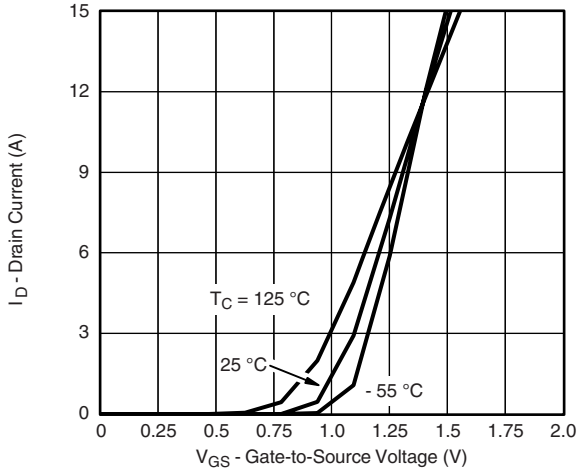
Notes:
a. Pulse test: Pulse width ≤ 300 µs, duty cycle ≤ 2 %.
b. Guaranteed by design, not subject to production testing.

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

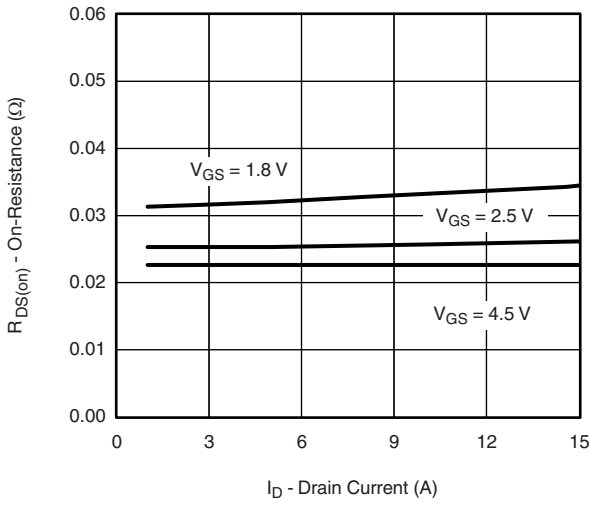


Output Characteristics

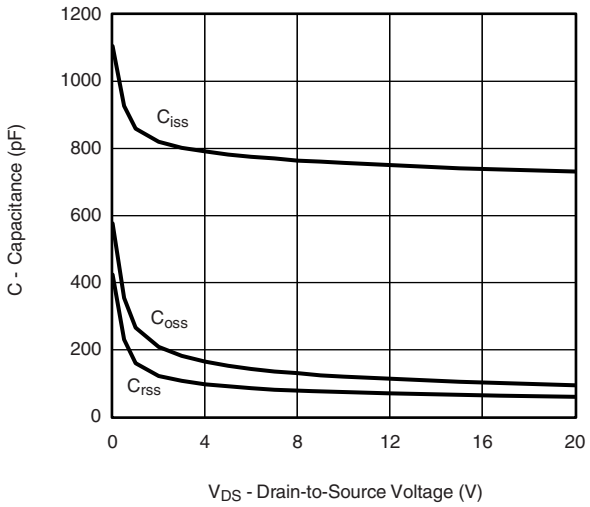


Transfer Characteristics

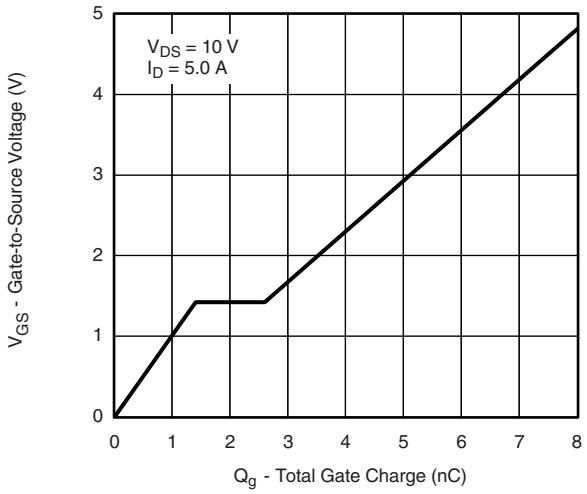
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



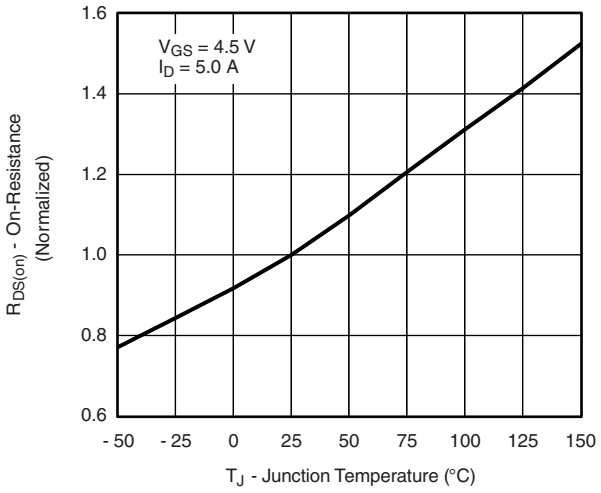
On-Resistance vs. Drain Current



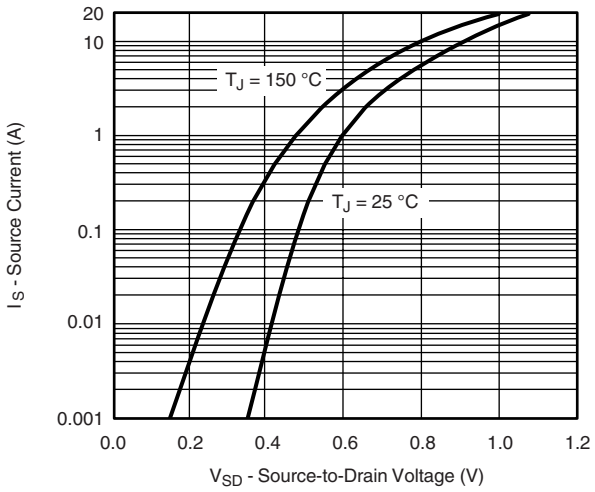
Capacitance



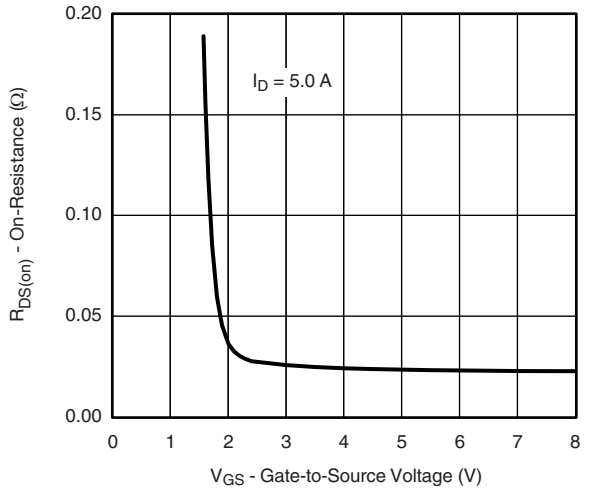
Gate Charge



On-Resistance vs. Junction Temperature

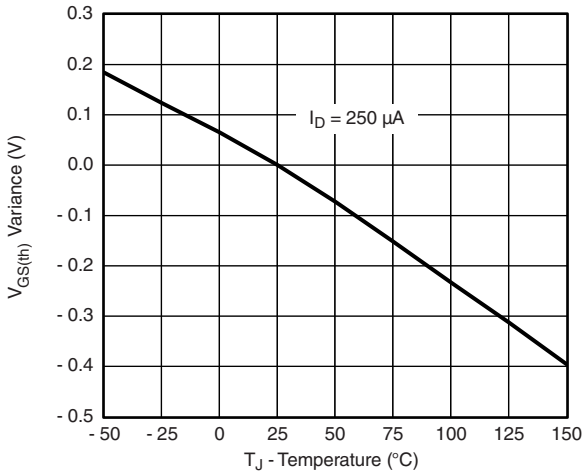


Source-Drain Diode Forward Voltage

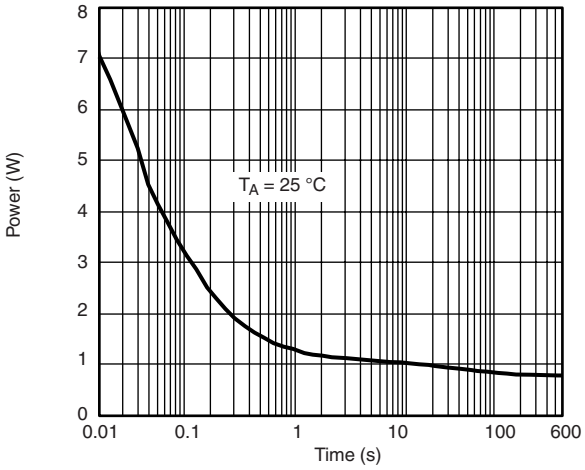


On-Resistance vs. Gate-to-Source Voltage

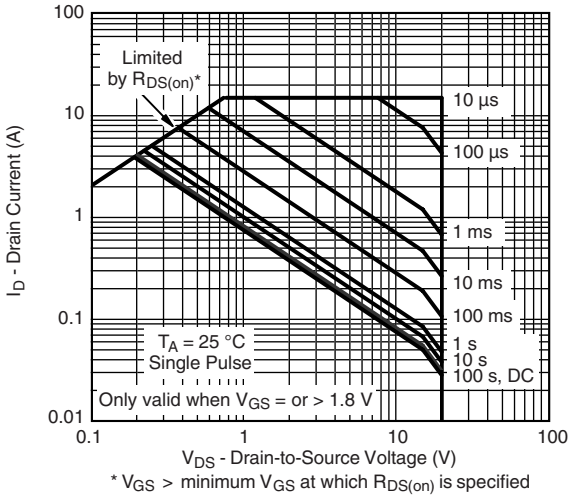
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



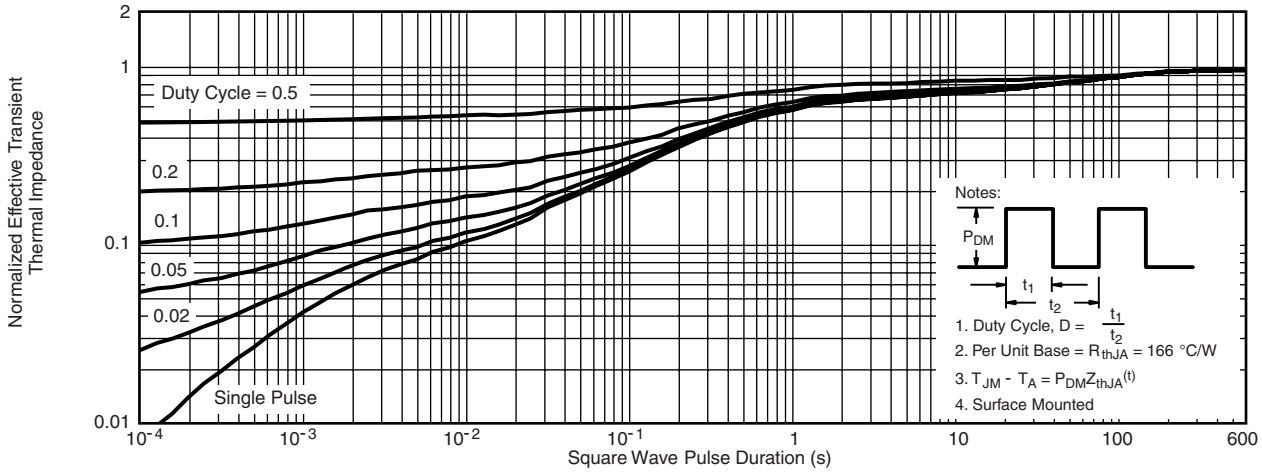
Threshold Voltage



Single Pulse Power



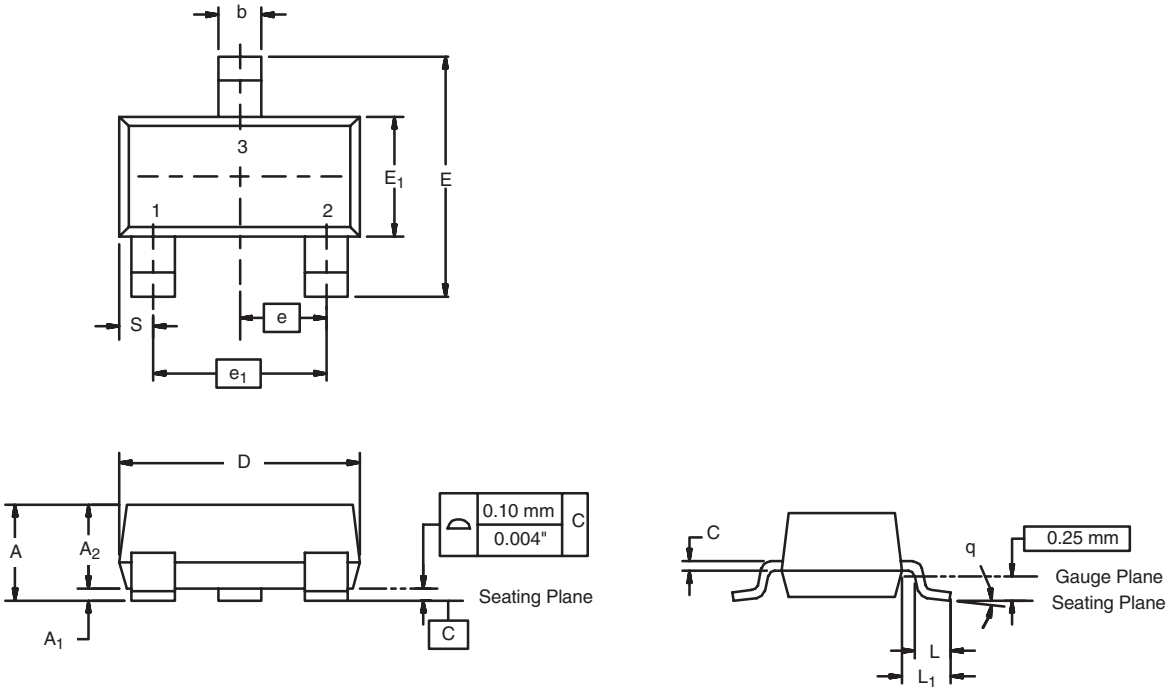
Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Ambient

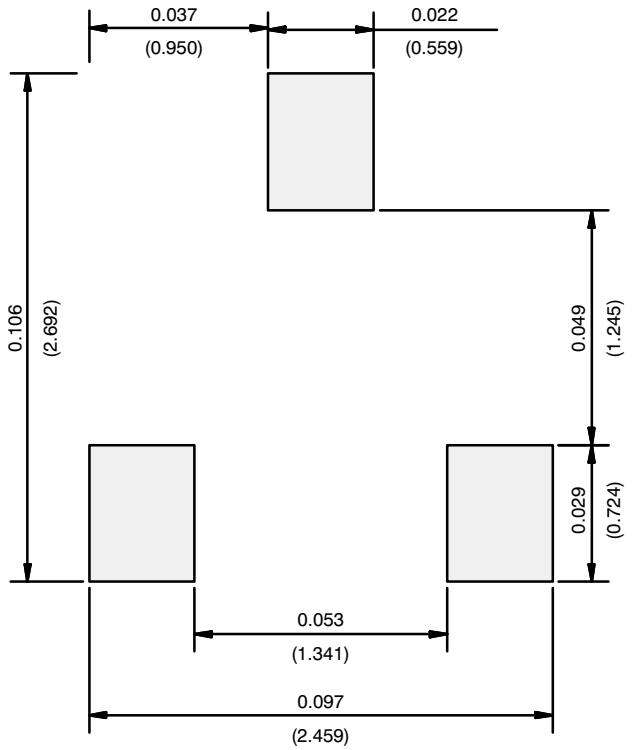
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SOT-23 (TO-236): 3-LEAD



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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