N-Channel 30 V (D-S) MOSFET

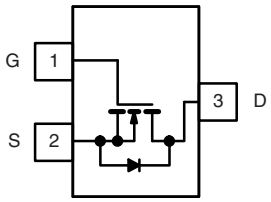
PRODUCT SUMMARY			
V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A)	Q_g (Typ.)
30	0.070 at V_{GS} = 10 V	3.2	2.6
	0.105 at V_{GS} = 4.5 V	2.6	

FEATURES

- **Halogen-free 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
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}	± 20		
Continuous Drain Current (T_J = 150 °C)[a, b]	T_A = 25 °C	I_D	3.2	2.6	A
	T_A = 70 °C		2.5	2.1	
Pulsed Drain Current		I_{DM}	10		
Continuous Source Current (Diode Conduction)[a, b]		I_S	0.9	0.62	
Maximum Power Dissipation[a, b]	T_A = 25 °C	P_D	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[a]	t ≤ 5 s	R_{thJA}	90	115	°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

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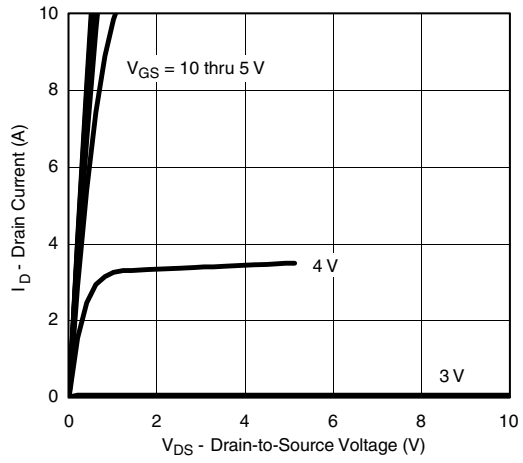
SPECIFICATIONS (T_A = 25 °C, unless otherwise noted)

Parameter	Symbol	Test Conditions	Limits Min.	Limits Typ.	Limits Max.	Unit
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	1.5		3	
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	
		V_{DS} = 30 V, V_{GS} = 1 V, T_J = 25 °C			1	
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 = 2.5 A		0.055	0.070	Ω
		V_{GS} = 4.5 V, I_D = 2 A		0.080	0.105	
Forward Transconductance[a]	g_{fs}	V_{DS} = 4.5 V, I_D = 2.5 A		6		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		2.6	4	nC
Total Gate Charge	Q_{gt}	V_{DS} = 15 V, V_{GS} = 10 V, I_D = 2.5 A		4.6	7	
Gate-Source Charge	Q_{gs}			0.8		
Gate-Drain Charge	Q_{gd}			1.15		
Gate Resistance	R_g	f = 1 MHz	0.6	3	6	Ω
Input Capacitance	C_{iss}	V_{DS} = 15 V, V_{GS} = 0 V, f = 1 MHz		225		pF
Output Capacitance	C_{oss}			50		
Reverse Transfer Capacitance	C_{rss}			28		
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		7.5	12	ns
Rise Time	t_r			12.5	20	
Turn-Off Delay Time	$t_{d(off)}$			19	30	
Fall Time	t_f			15	25	

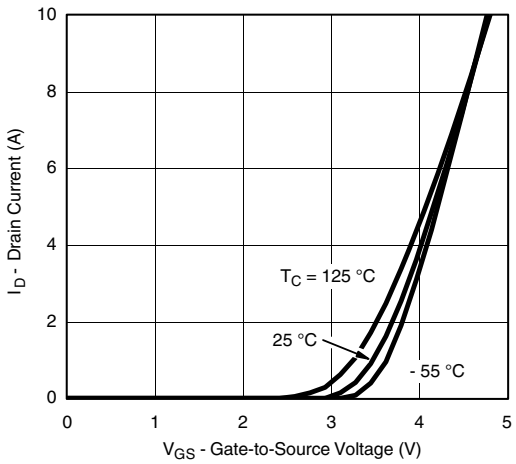
Notes:
a. Pulse test: PW ≤ 300 µs, duty cycle ≤ 2 %.

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)



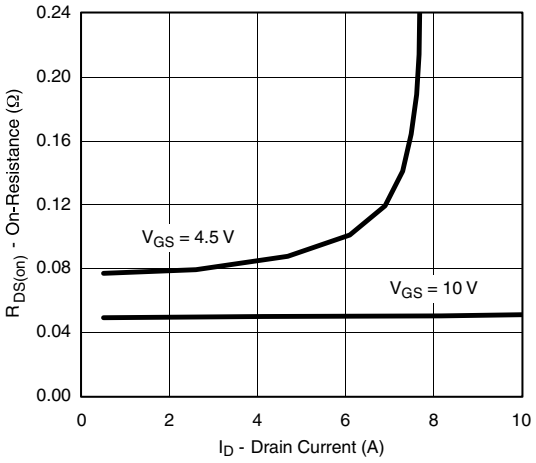
Output Characteristics



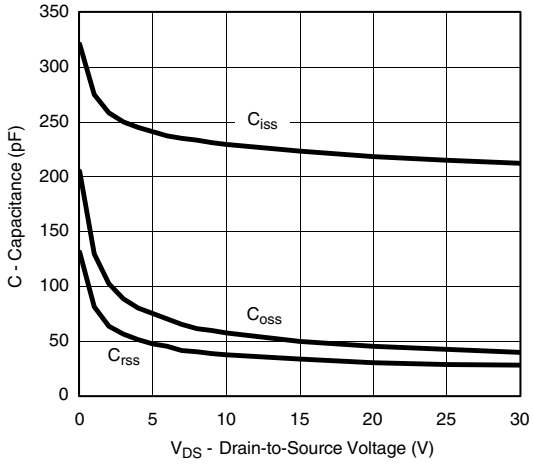
Transfer Characteristics

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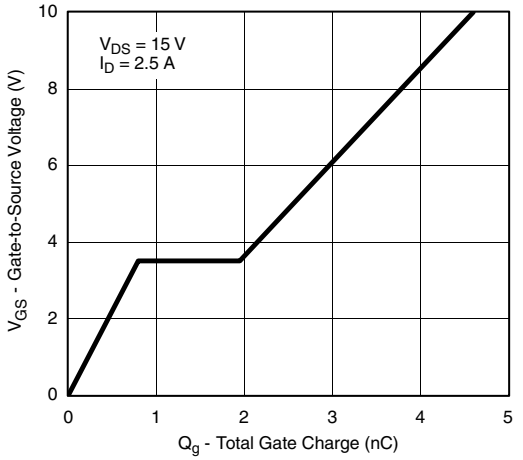
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



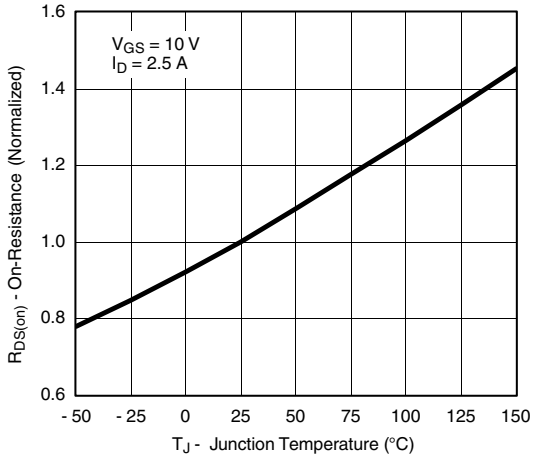
On-Resistance vs. Drain Current



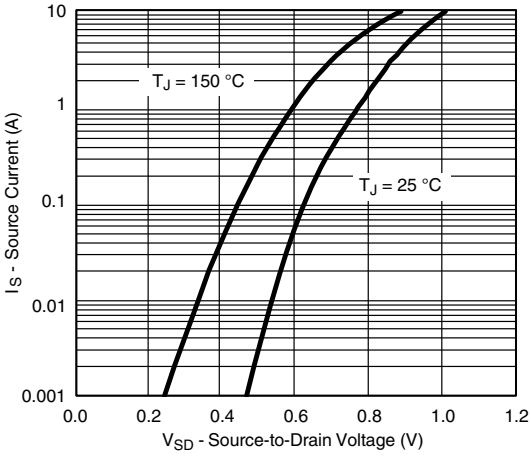
Capacitance



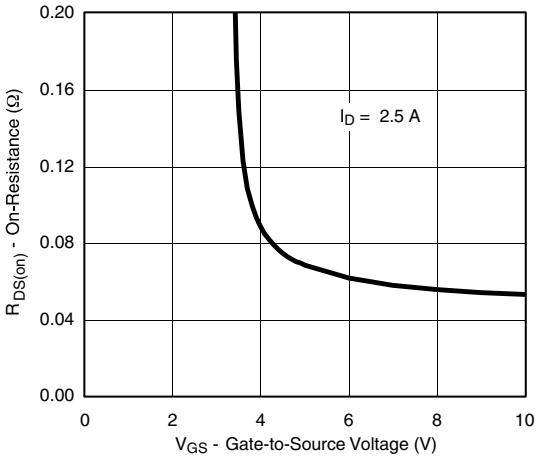
Gate Charge



On-Resistance vs. Junction Temperature



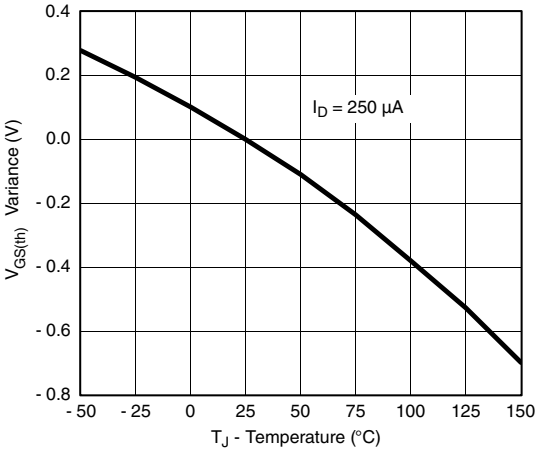
Source-Drain Diode Forward Voltage



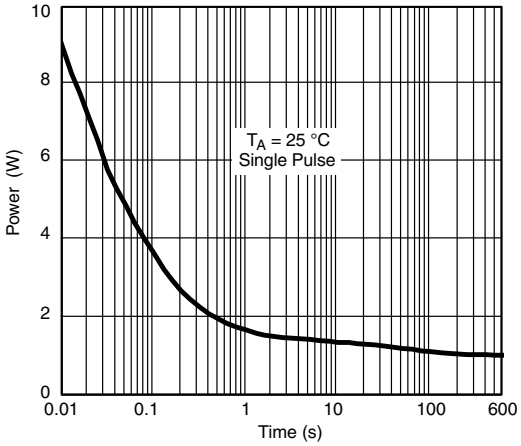
On-Resistance vs. Gate-to-Source Voltage

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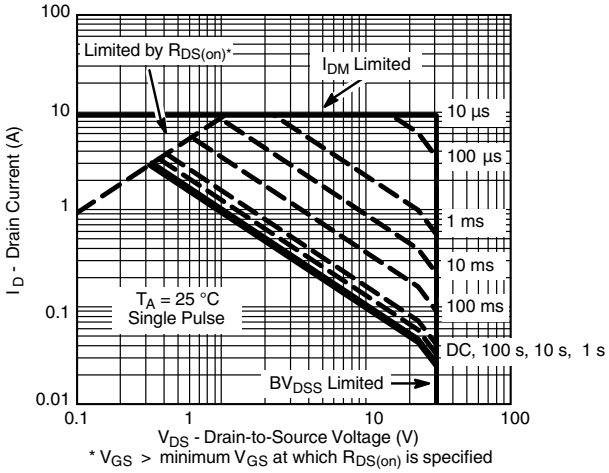
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



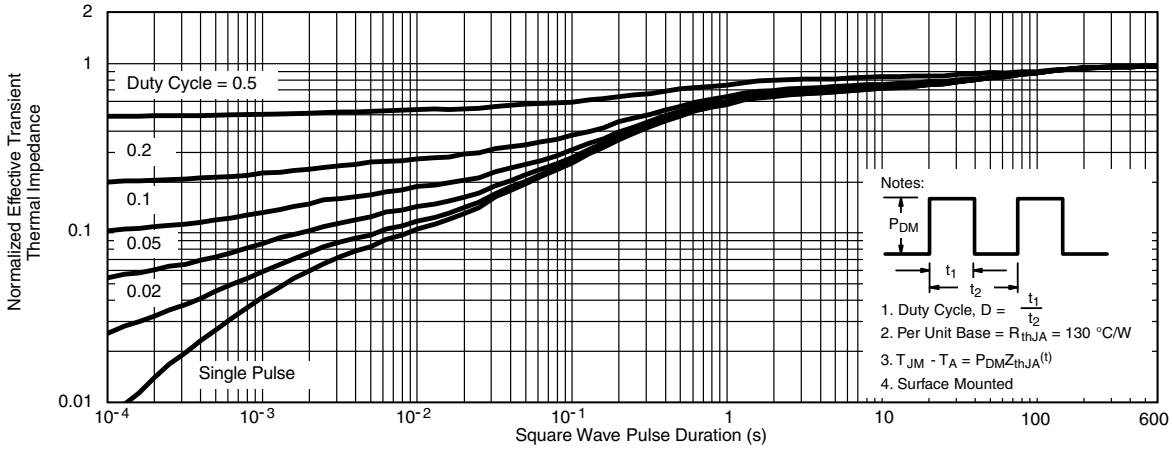
Threshold Voltage



Single Pulse Power



Safe Operating Area

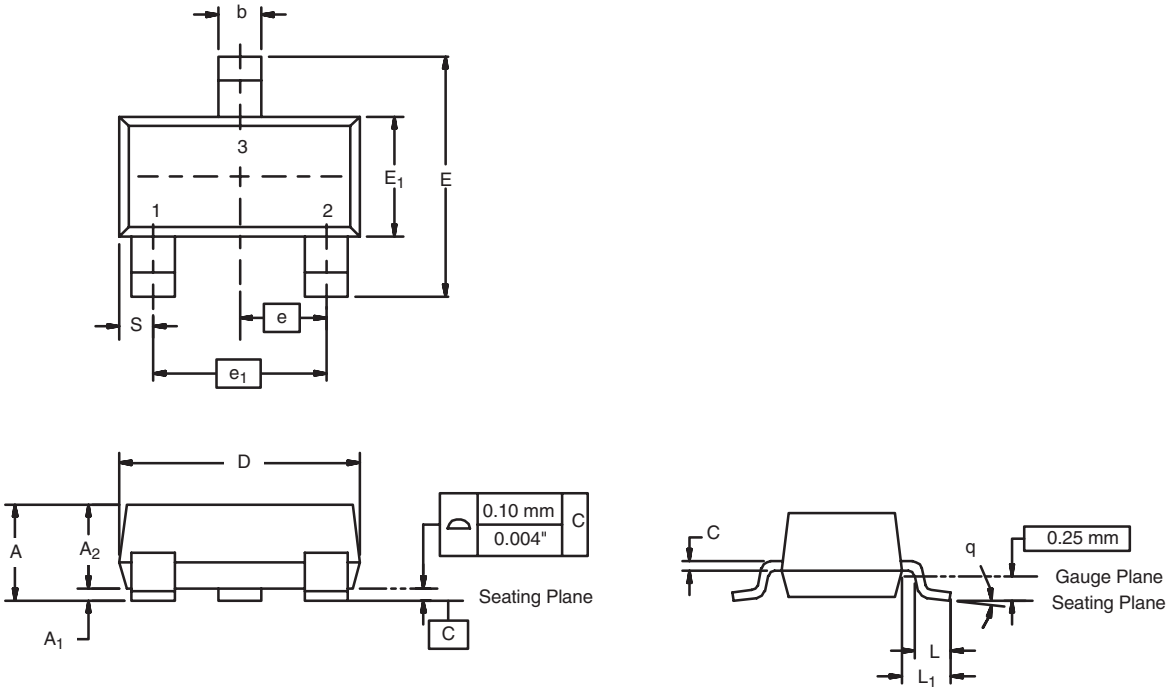


Normalized Thermal Transient Impedance, Junction-to-Ambient

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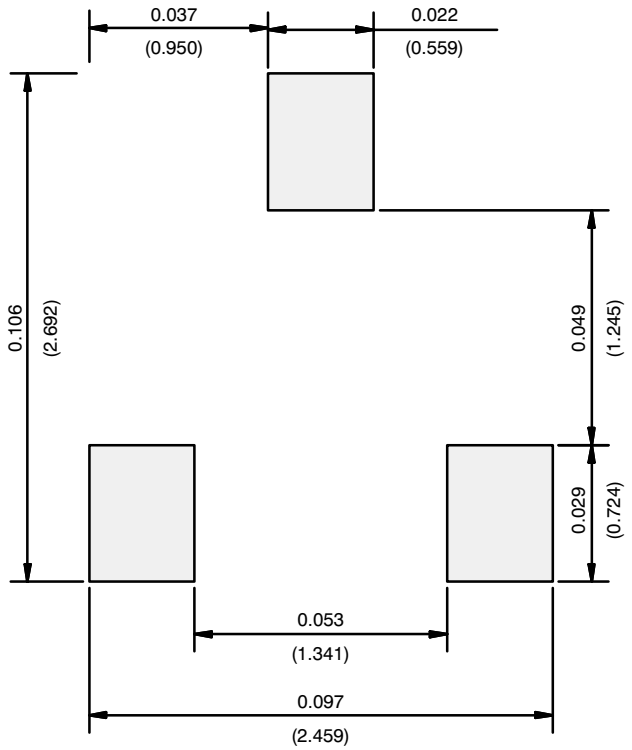
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SOT-23 (TO-236): 3-LEAD



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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APPLICATION NOTE

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