

N-Channel 30 V (D-S) MOSFET

PRODUCT SUMMARY

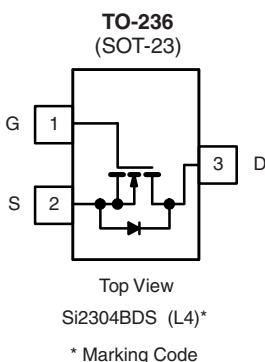
V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A)	Q_g (Typ.)
30	0.070 at $V_{GS} = 10$ V	3.2	2.6
	0.105 at $V_{GS} = 4.5$ V	2.6	

FEATURES

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



RoHS
COMPLIANT
HALOGEN
FREE
Available



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}	I_D	3.2	2.6	A
		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}	P_D	1.08	0.75	W
		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	R_{thJA}	90	115	°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>

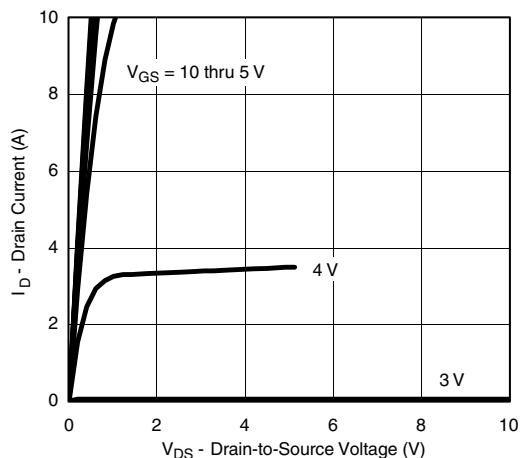
SPECIFICATIONS ($T_A = 25\text{ }^{\circ}\text{C}$, unless otherwise noted)

Parameter	Symbol	Test Conditions	Limits			Unit
			Min.	Typ.	Max.	
Static						
Drain-Source Breakdown Voltage	V _{(BR)DSS}	V _{GS} = 0 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} ≥ 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}			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 ≅ 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	

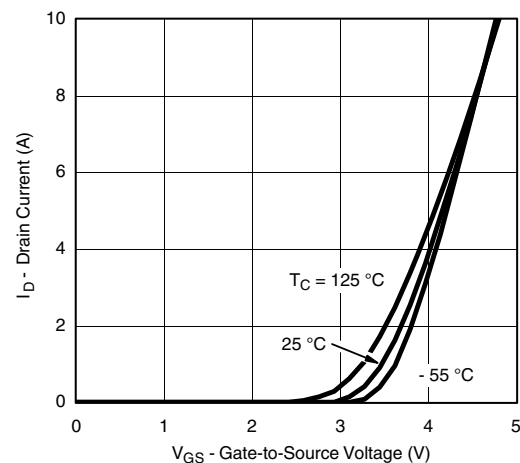
Notes:

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

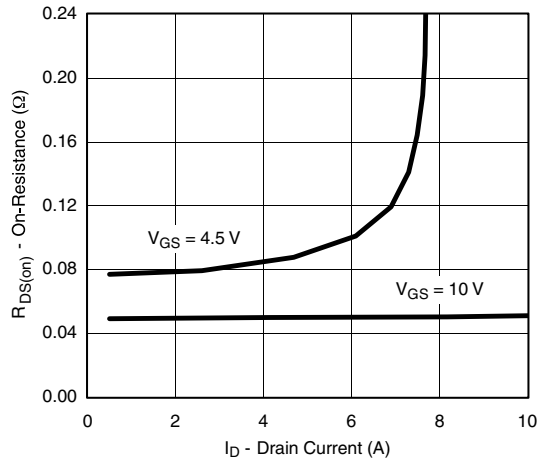
TYPICAL CHARACTERISTICS ($25\text{ }^{\circ}\text{C}$, unless otherwise noted)

Output Characteristics

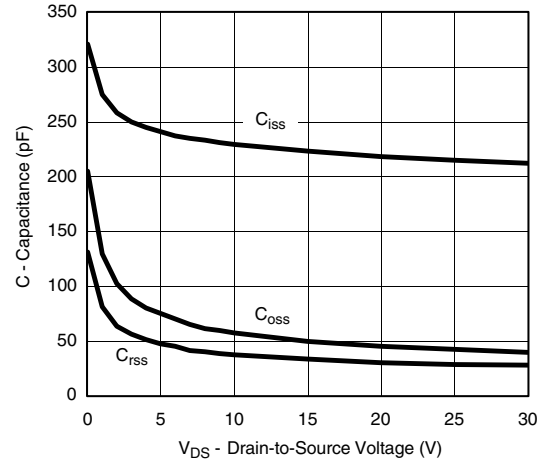


Transfer Characteristics

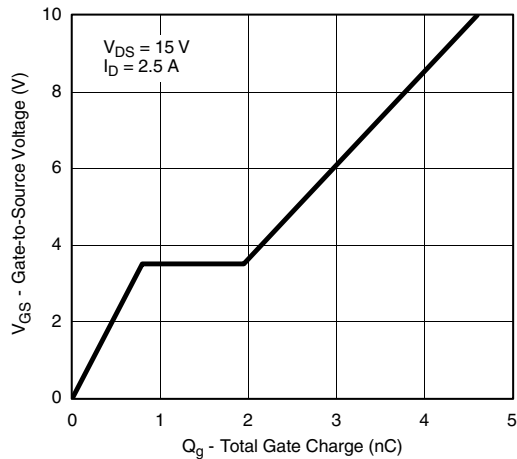
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



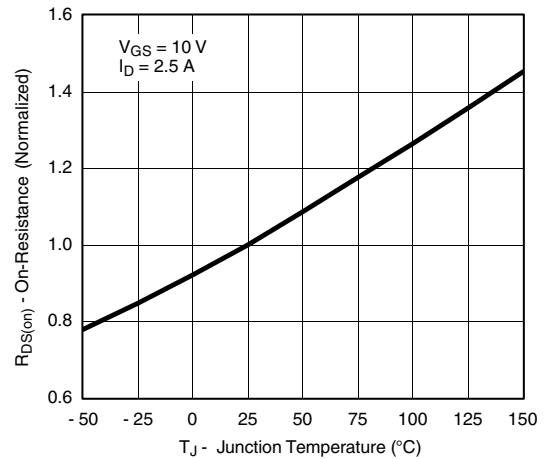
On-Resistance vs. Drain Current



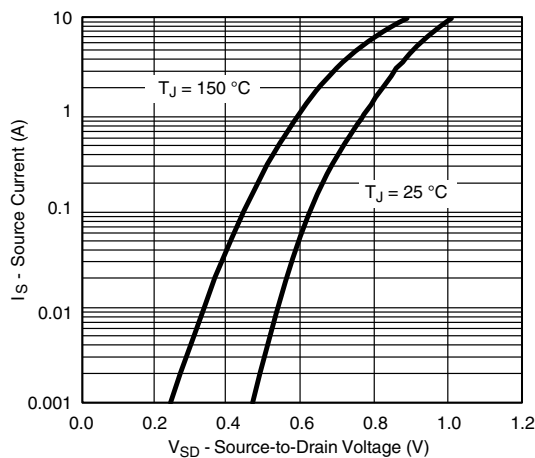
Capacitance



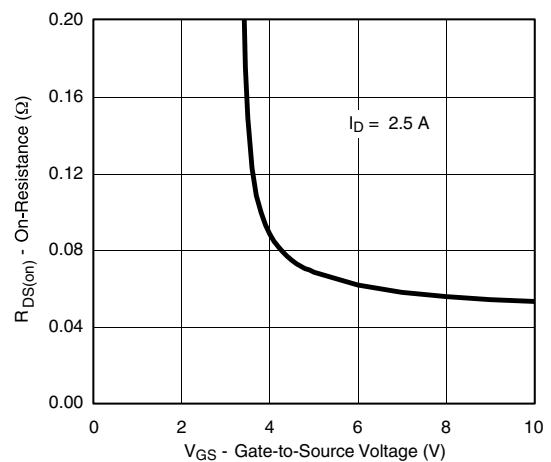
Gate Charge



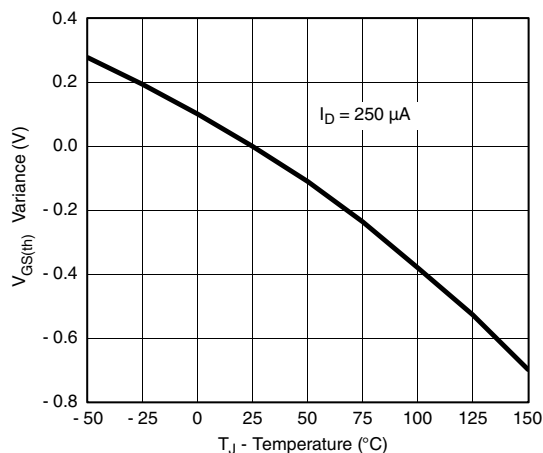
On-Resistance vs. Junction Temperature



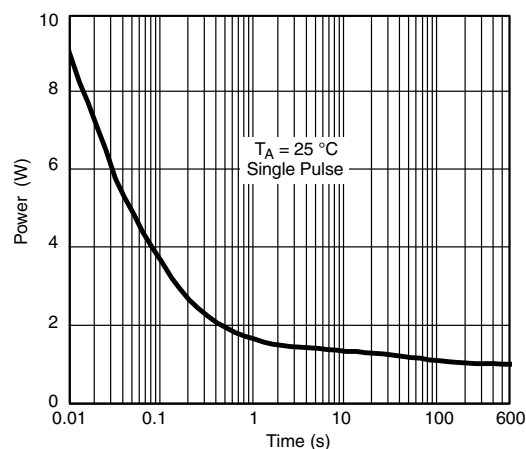
Source-Drain Diode Forward Voltage



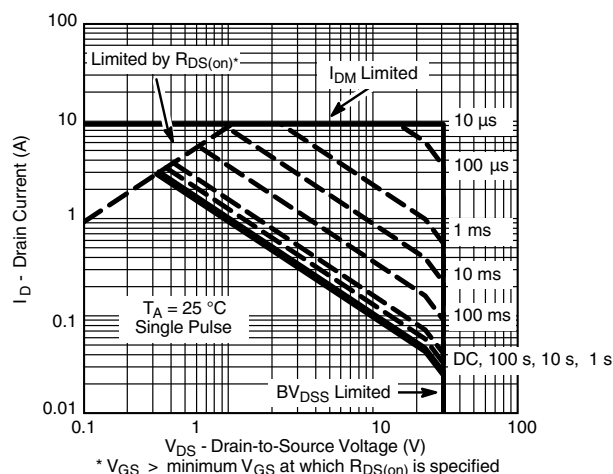
On-Resistance vs. Gate-to-Source Voltage

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

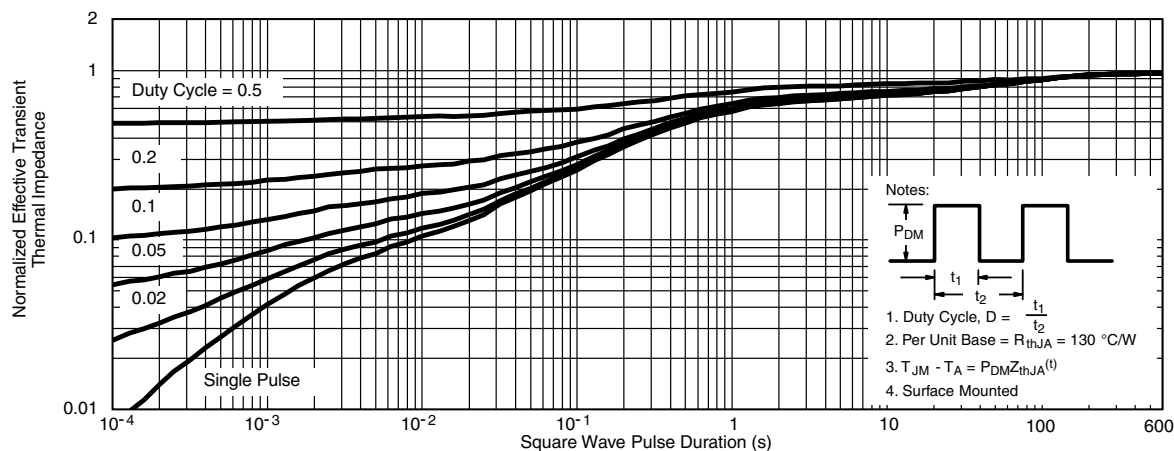
Threshold Voltage



Single Pulse Power



Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Ambient

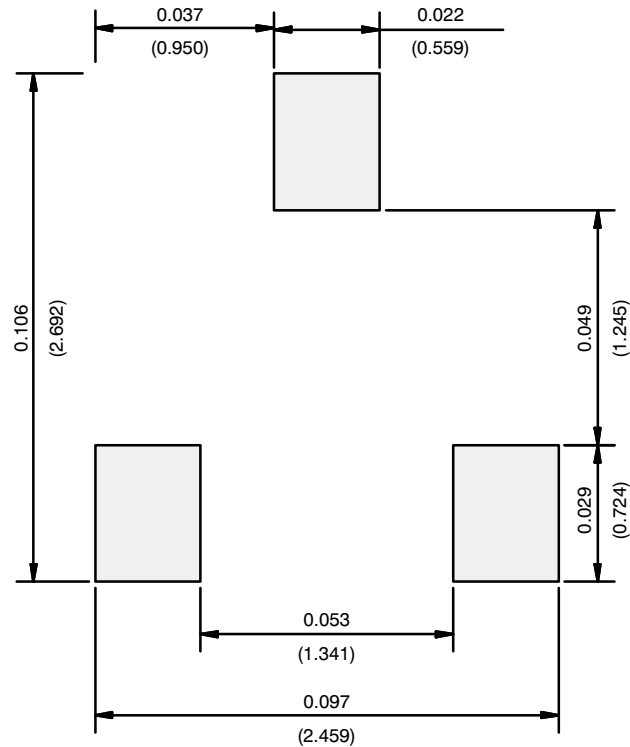
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SOT-23 (TO-236): 3-LEAD



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)

[Return to Index](#)



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