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Si2316BDS-T1-GE3
N-Channel 30-V (D-S) MOSFET

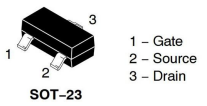
PRODUCT SUMMARY			
V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A)[a]	Q_g (Typ)
30	0.050 at V_{GS} = 10 V	4.5	3.16 nC
	0.080 at V_{GS} = 4.5 V	3.4	

FEATURES

- **Halogen-free According to Definition**
- TrenchFET® Power MOSFET
- PWM Optimized
- 100 % R_g tested
- Compliant to RoHS

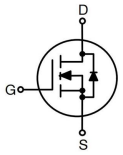
APPLICATIONS

- Battery Switch
- DC/DC Converter



SOT–23

1 – Gate
2 – Source
3 – Drain



Ordering Information: Si2316BDS-T1-E3 (Lead (Pb)-free)
Si2316BDS-T1-GE3 (Lead (Pb)-free and Halogen-free)

ABSOLUTE MAXIMUM RATINGS T_A = 25 °C, unless otherwise noted				
Parameter		**Symbol**	**Limit**	**Unit**
Drain-Source Voltage		V_{DS}	30	V
Gate-Source Voltage		V_{GS}	± 20	
Continuous Drain Current (T_J = 150 °C)	T_C = 25 °C	I_D	4.5	A
	T_C = 70 °C		3.6	
	T_A = 25 °C		3.9[b, c]	
	T_A = 70 °C		3.13[b, c]	
Pulsed Drain Current		I_{DM}	20	
Continuous Source-Drain Diode Current	T_C = 25 °C	I_S	1.39	
	T_A = 25 °C		1.04[b, c]	
Maximum Power Dissipation	T_C = 25 °C	P_D	1.66	W
	T_C = 70 °C		1.06	
	T_A = 25 °C		1.25[b, c]	
	T_A = 70 °C		0.8[b, c]	
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[b, d]	≤ 5 s	R_{thJA}	80	100	°C/W
Maximum Junction-to-Foot (Drain)	Steady State	R_{thJF}	60	75	

Notes:
a. Based on T_C = 25 °C.
b. Surface mounted on 1" x 1" FR4 moard.
c. t = 5 s.
d. Maximum under Steady State conditions is 130 °C/W.

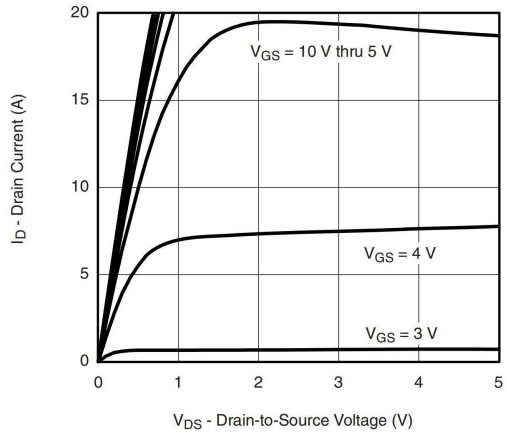
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MOSFET SPECIFICATIONS T_J = 25 °C, unless otherwise noted						
Parameter	**Symbol**	**Test Conditions**	**Min.**	**Typ.**	**Max.**	**Unit**
Static						
Drain-Source Breakdown Voltage	V_{DS}	V_{DS} = 0 V, I_D = 250 µA	30			V
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	I_D = 250 µA		23.92		mV/°C
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}/T_J$			5.2		
Gate-Source Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250 µA	1		3	V
Gate-Source 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			1	µA
		V_{DS} = 30 V, V_{GS} = 0 V, T_J = 55 °C			10	
On-State Drain Current[a]	$I_{D(on)}$	V_{DS} ≥ 5 V, V_{GS} = 10 V	20			A
Drain-Source On-State Resistance[a]	$R_{DS(on)}$	V_{GS} = 10 V, I_D = 3.9 A		0.041	0.050	Ω
		V_{GS} = 4.5 V, I_D = 3.3 A		0.064	0.080	
Forward Transconductance[a]	g_{fs}	V_{DS} = 15V, I_D = 3.9 A		6		S
Dynamic[b]						
Input Capacitance	C_{iss}	V_{DS} = 15 V, V_{GS} = 0 V, f = 1 MHz		350		pF
Output Capacitance	C_{oss}			65		
Reverse Transfer Capacitance	C_{rss}			37		
Total Gate Charge	Q_g	V_{DS} = 15 V, V_{GS} = 10 V, I_D = 3.9 A		6.35	9.6	nC
		V_{DS} = 15 V, V_{GS} = 4.5 V, I_D = 3.9 A		3.16	4.8	
Gate-Source Charge	Q_{gs}			1.56		
Gate-Drain Charge	Q_{gd}			1.1		
Gate Resistance	R_g	f = 1 MHz		2.6	3.9	Ω
Turn-On Delay Time	$t_{d(on)}$	V_{DD} = 15 V, R_L = 4.8 Ω I_D ≅ 3.13 A, V_{GEN} = 10 V, R_G = 1 Ω		4.5	6.75	ns
Rise Time	t_r			11	16.5	
Turn-Off Delay Time	$t_{d(off)}$			12	18	
Fall Time	t_f			7	10.5	
Turn-On Delay Time	$t_{d(on)}$	V_{DD} = 15 V, R_L = 6.25 Ω I_D = 2.4 A, V_{GEN} = 4.5 V, R_g = 1 Ω		20	30	ns
Rise Time	t_r			65	98	
Turn-Off Delay Time	$t_{d(off)}$			11	17	
Fall Time	t_f			23	35	
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I_S	T_C = 25 °C			1.39	A
Pulse Diode Forward Current[a]	I_{SM}				20	
Body Diode Voltage	V_{SD}	I_S = 2.0 A		0.8	1.2	V
Body Diode Reverse Recovery Time	t_{rr}	I_F = 2.0 A, dI/dt = 100 A/µs, T_J = 25 °C		10	15	ns
Body Diode Reverse Recovery Charge	Q_{rr}			4	6	nC
Reverse Recovery Fall Time	t_a			6.6		ns
Reverse Recovery Rise Time	t_b			3.5		

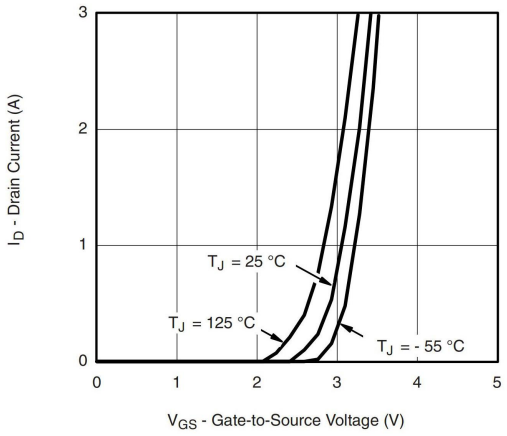
Notes:
a. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2 %.
b. Guaranteed by design, not subject to production testing.

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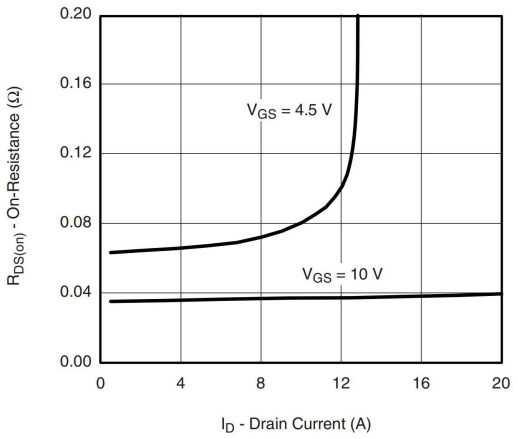
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



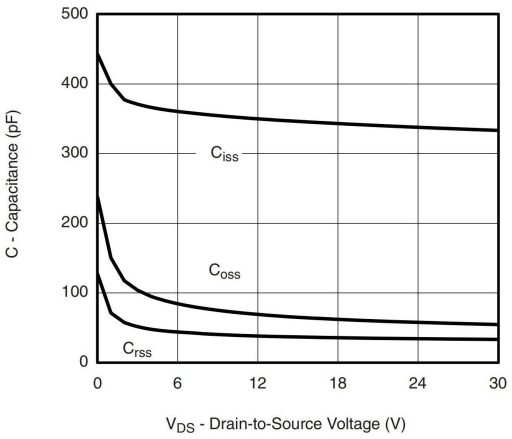
Output Characteristics



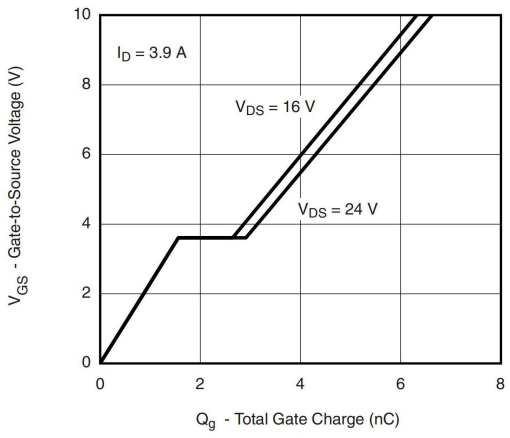
Transfer Characteristics



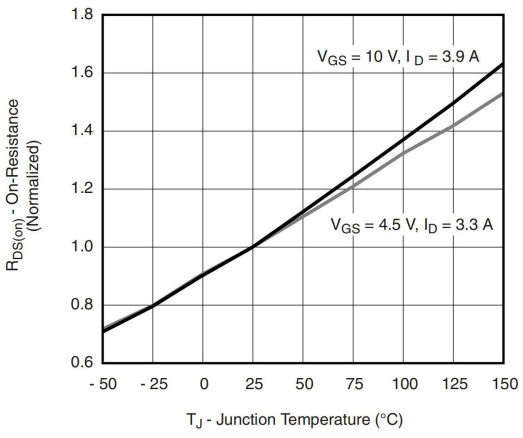
On-Resistance vs. Drain Current and Gate Voltage



Capacitance



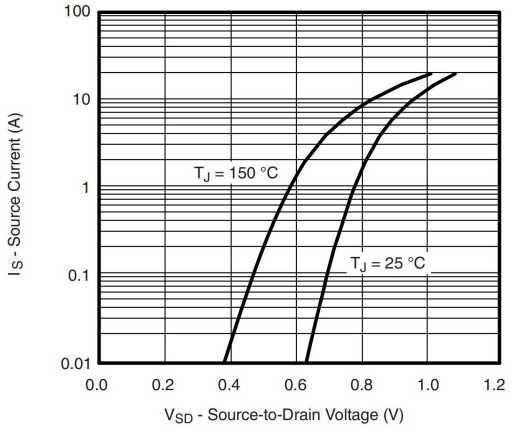
Gate Charge



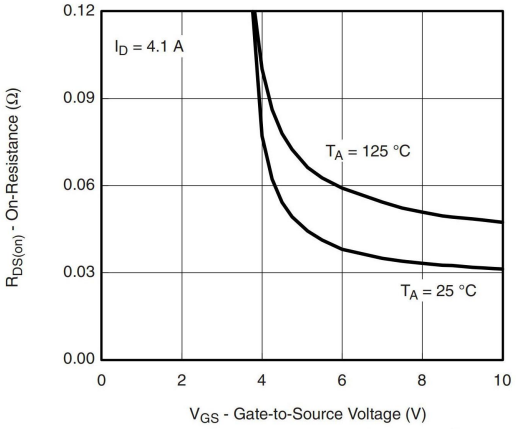
On-Resistance vs. Junction Temperature

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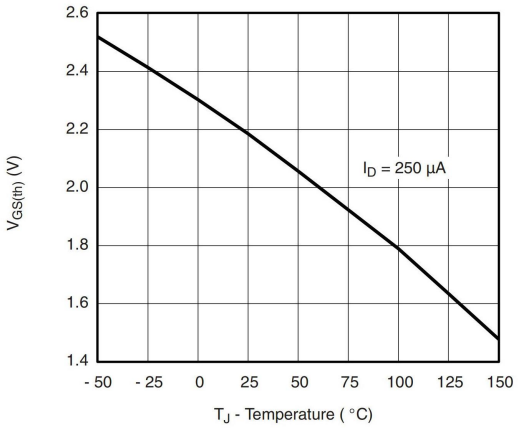
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



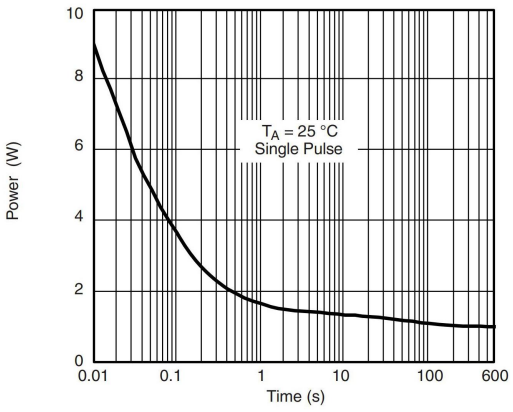
Source-Drain Diode Forward Voltage



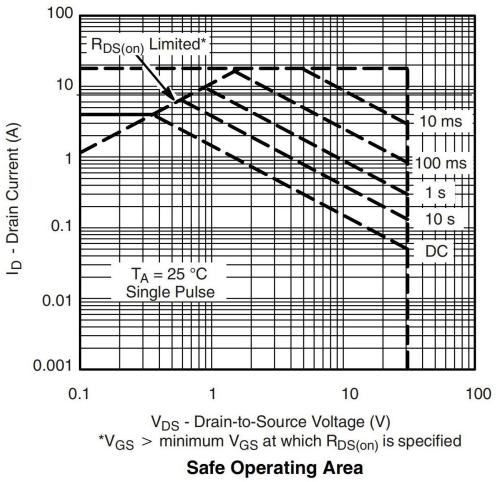
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage



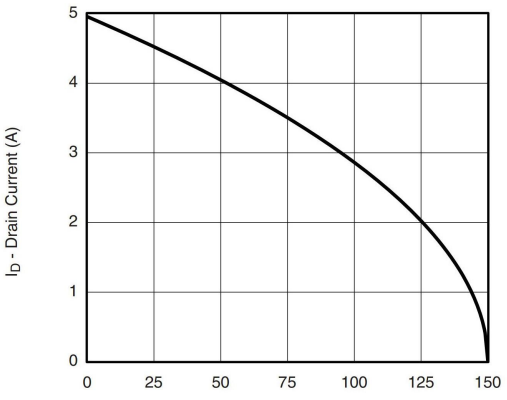
Single Pulse Power



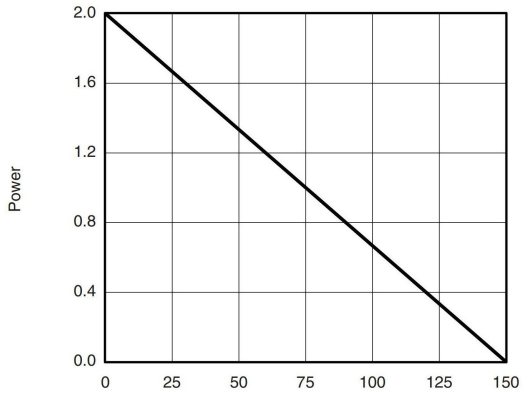
Safe Operating Area

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TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted

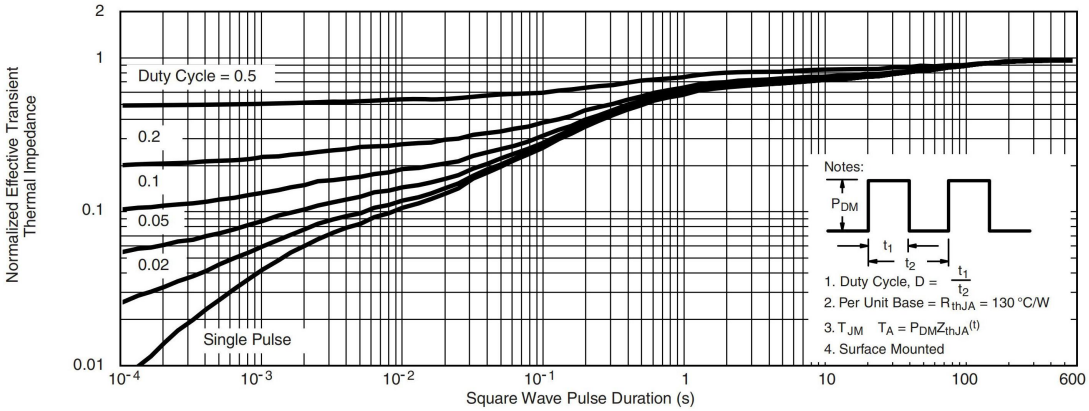


Current Derating*



Power Derating, Junction-to-Foot

*The power dissipation P_D is based on $T_{J(max.)}$ = 150 °C, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit.



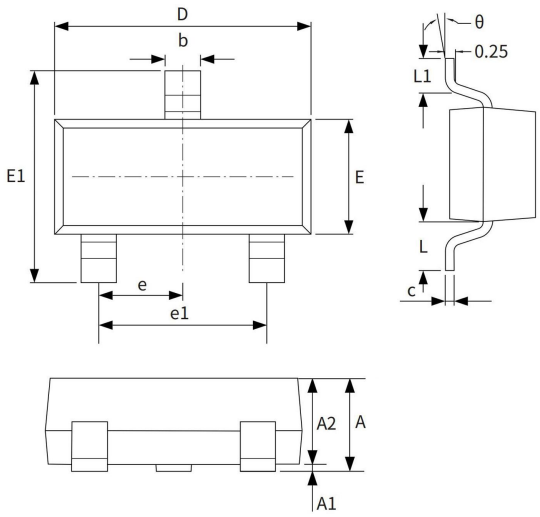
Normalized Thermal Transient Impedance, Junction-to-Ambient

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Ordering Information

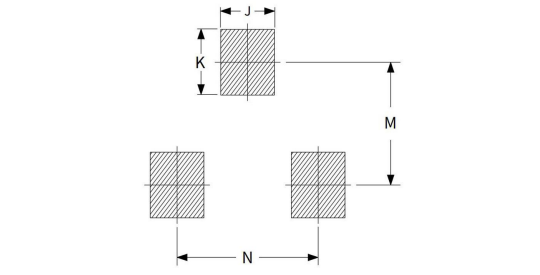
PACKAGE	PACKAGE CODE	UNIT WEIGHT(g)	REEL(pcs)	BOX(pcs)	CARTON(pcs)	DELIVERY MODE
SOT-23	R1	0.008	3000	30000	240000	7''

Package Outline Dimensions (SOT-23)



Symbol	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	0.90	1.15	0.035	0.045
A1	-	0.10	-	0.004
A2	0.90	1.05	0.035	0.041
b	0.30	0.50	0.012	0.020
c	0.10	0.20	0.004	0.008
D	2.80	3.00	0.110	0.118
E	1.20	1.40	0.047	0.055
E1	2.25	2.55	0.089	0.100
e	0.950TYP		0.037TYP	
e1	1.80	2.00	0.071	0.079
L	0.550REF		0.022REF	
L1	0.30	0.50	0.012	0.020
θ	-	8°	-	8°

Suggested Pad Layout



Symbol	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
J	0.75	0.85	0.030	0.033
K	0.85	0.95	0.033	0.037
M	1.95	2.05	0.077	0.081
N	1.85	1.95	0.073	0.077