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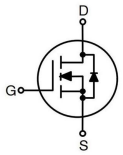
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Si2338DS-T1-GE3
N-Channel 30 V (D-S) MOSFET



SOT–23

1 – Gate
2 – Source
3 – Drain



FEATURES

- TrenchFET® power MOSFET
- Low on-resistance
- 100 % R_g tested

APPLICATIONS

- DC/DC converters, high speed switching

PRODUCT SUMMARY	
V_{DS} (V)	30
$R_{DS(on)}$ max. (Ω) at V_{GS} = 10 V	0.028
$R_{DS(on)}$ max. (Ω) at V_{GS} = 4.5 V	0.033
Q_g typ. (nC)	4.2
I_D (A) [a, e]	6
Configuration	Single

ORDERING INFORMATION	
Package	SOT-23
Lead (Pb)-free and halogen-free	Si2338DS-T1-GE3

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	6 [e]	A
	T_C = 70 °C		6 [e]	
	T_A = 25 °C		5.5 [b, c]	
	T_A = 70 °C		4.4 [b, c]	
Pulsed drain current (t = 300 µs)		I_{DM}	25	
Continuous source-drain diode current	T_C = 25 °C	I_S	2.1	
	T_A = 25 °C		1.1 [b, c]	
Maximum power dissipation	T_C = 25 °C	P_D	2.5	W
	T_C = 70 °C		1.6	
	T_A = 25 °C		1.3 [b, c]	
	T_A = 70 °C		0.8 [b, c]	
Operating junction and storage temperature range		T_J, T_{stg}	-55 to +150	°C
Soldering recommendations (peak temperature)			260	

THERMAL RESISTANCE RATINGS

PARAMETER		SYMBOL	TYPICAL	MAXIMUM	UNIT
Maximum junction-to-ambient [b, d]	t ≤ 5 s	R_{thJA}	75	100	°C/W
Maximum junction-to-foot (drain)	Steady state	Rt_{hJF}	40	50	

Notes

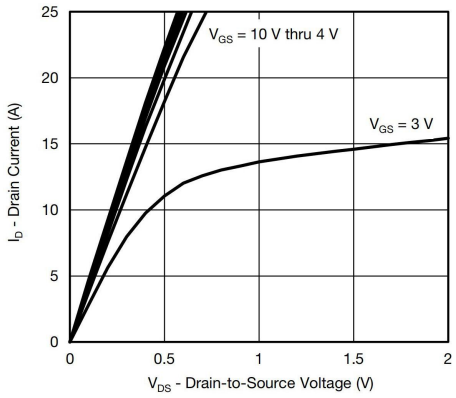
a. Based on T_C = 25 °C
b. Surface mounted on 1" x 1" FR4 board
c. t = 5 s
d. Maximum under steady state conditions is 166 °C/W
e. Package limited

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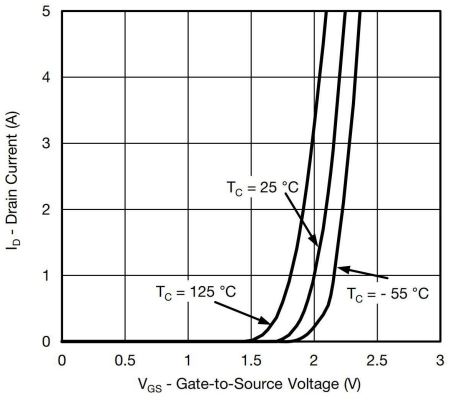
SPECIFICATIONS (T_J = 25 °C, unless otherwise noted)						
PARAMETER	**SYMBOL**	**TEST CONDITIONS**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
Static						
Drain-source breakdown voltage	V_{DS}	V_{GS} = 0 V, I_D = 250 µA	30	-	-	V
V_{DS} temperature coefficient	$\Delta V_{DS}/T_J$	I_D = 250 µA	-	30	-	mV/°C
$V_{GS(th)}$ temperature coefficient	$\Delta V_{GS(th)}/T_J$		-	-4.8	-	
Gate-source threshold voltage	$V_{GS(th)}$	V_{DS} = V_{GS} , I_D = 250 µA	1.2	-	2.5	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 = 70 °C	-	-	10	
On-state drain current [a]	$I_{D(on)}$	$V_{DS} \leq$ 5 V, V_{GS} = 10 V	20	-	-	A
Drain-source on-state resistance [a]	$R_{DS(on)}$	V_{GS} = 10 V, I_D = 5.5 A	-	0.023	0.028	Ω
		V_{GS} = 4.5 V, I_D = 5 A	-	0.027	0.033	
Forward transconductance [a]	g_{fs}	V_{DS} = 15 V, I_D = 5.5 A	-	24	-	S
Dynamic [b]						
Input capacitance	C_{iss}	V_{DS} = 15 V, V_{GS} = 0 V, f = 1 MHz	-	424	-	pF
Output capacitance	C_{oss}		-	100	-	
Reverse transfer capacitance	C_{rss}		-	42	-	
Total gate charge	Q_g	V_{DS} = 15 V, V_{GS} = 10 V, I_D = 5.5 A	-	8.2	13	nC
		V_{DS} = 15 V, V_{GS} = 4.5 V, I_D = 5.5 A	-	4.2	7	
Gate-source charge	Q_{gs}		-	1.4	-	
Gate-drain charge	Q_{gd}		-	1.4	-	
Gate resistance	R_g	f = 1 MHz	2.5	12.6	25.2	Ω
Turn-on delay time	$t_{d(on)}$	V_{DD} = 15 V, R_L = 3.4 Ω $I_D \cong$ 4.4 A, V_{GEN} = 4.5 V, R_g = 1 Ω	-	6	12	ns
Rise time	t_r		-	20	30	
Turn-off delay time	$t_{d(off)}$		-	14	21	
Fall time	t_f		-	10	20	
Turn-on delay time	$t_{d(on)}$	V_{DD} = 15 V, R_L = 3.4 Ω $I_D \cong$ 4.4 A, V_{GEN} = 10 V, R_g = 1 Ω	-	3	6	
Rise time	t_r		-	11	20	
Turn-off delay time	$t_{d(off)}$		-	20	30	
Fall time	t_f		-	7	14	
Drain-Source Body Diode Characteristics						
Continuous source-drain diode current	I_S	T_C = 25 °C	-	-	2.1	A
Pulse diode forward current	I_{SM}		-	-	25	
Body diode voltage	V_{SD}	I_S = 4.4 A, V_{GS} = 0 V	-	0.82	1.2	V
Body diode reverse recovery time	t_{rr}	I_F = 4.4 A, di/dt = 100 A/µs, T_J = 25 °C	-	13	20	ns
Body diode reverse recovery charge	Q_{rr}		-	6	12	nC
Reverse recovery fall time	t_a		-	8	-	ns
Reverse recovery rise Time	t_b		-	5	-	

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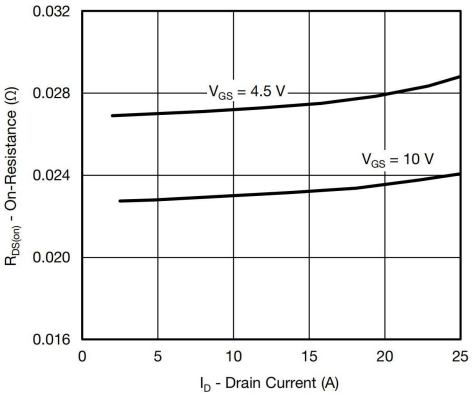
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



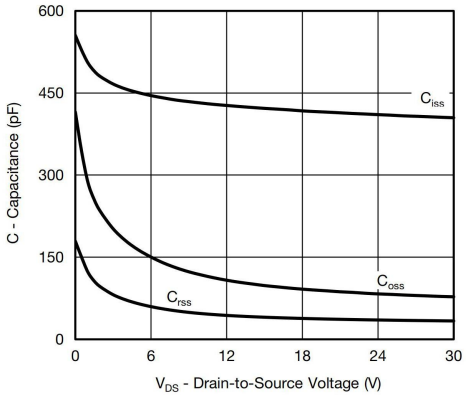
Output Characteristics



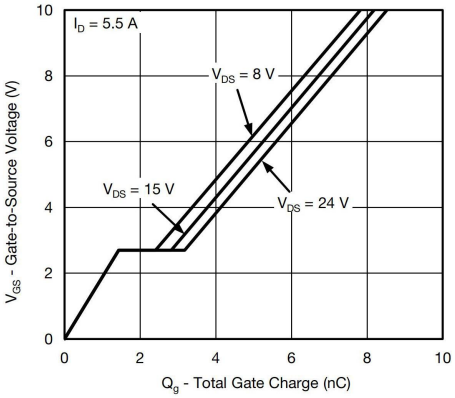
Transfer Characteristics



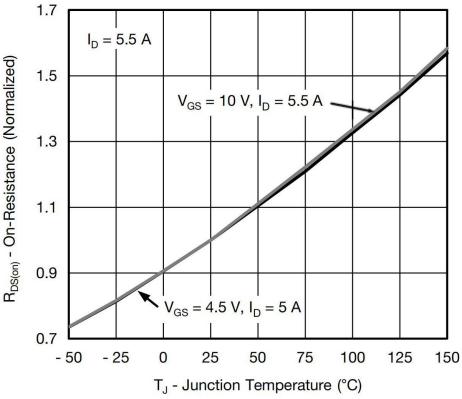
On-Resistance vs. Drain Current and Gate Voltage



Capacitance



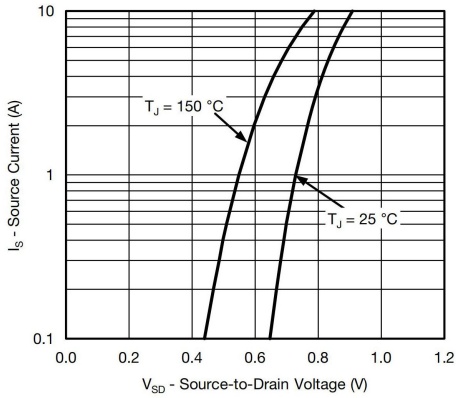
Gate Charge



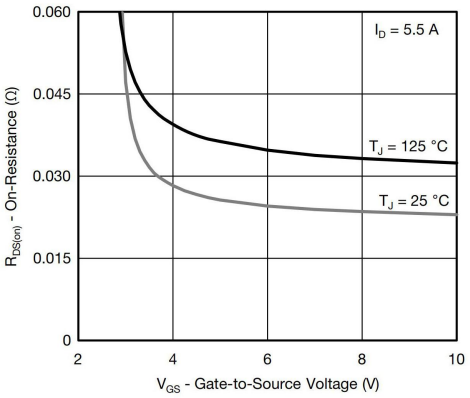
On-Resistance vs. Junction Temperature

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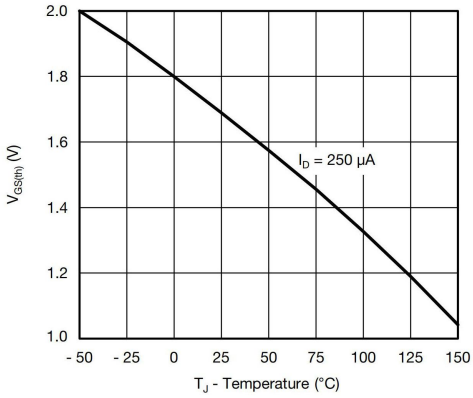
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



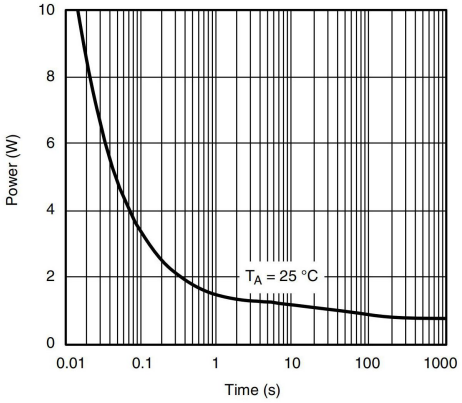
Source-Drain Diode Forward Voltage



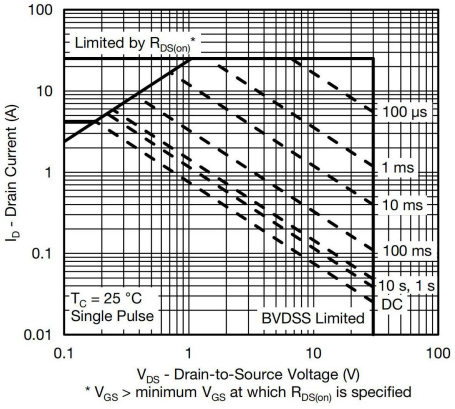
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage



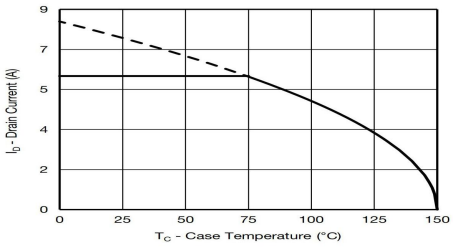
Single Pulse Power (Junction-to-Ambient)



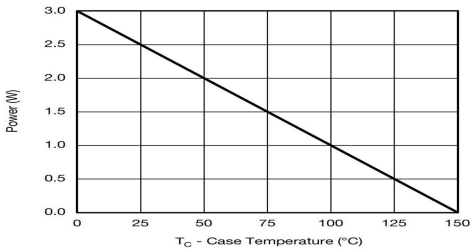
Safe Operating Area, Junction-to-Ambient

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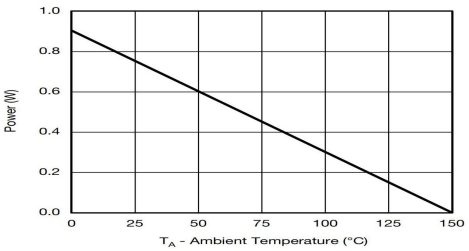
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



Current Derating ª

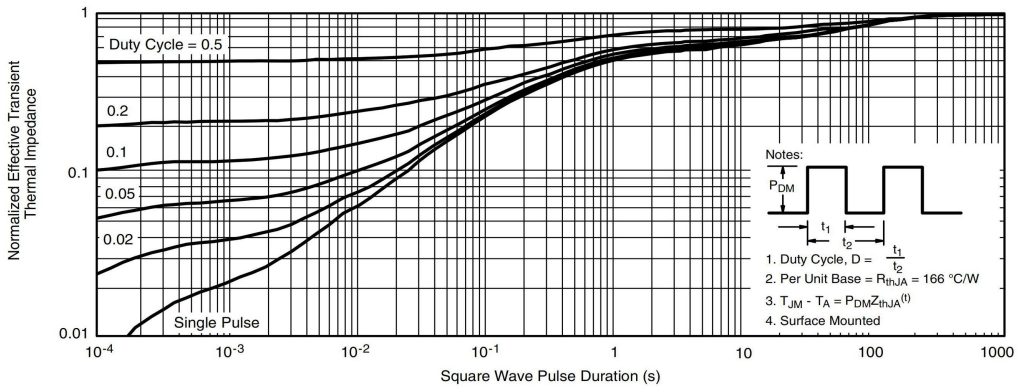


Power Derating, Junction-to-Foot

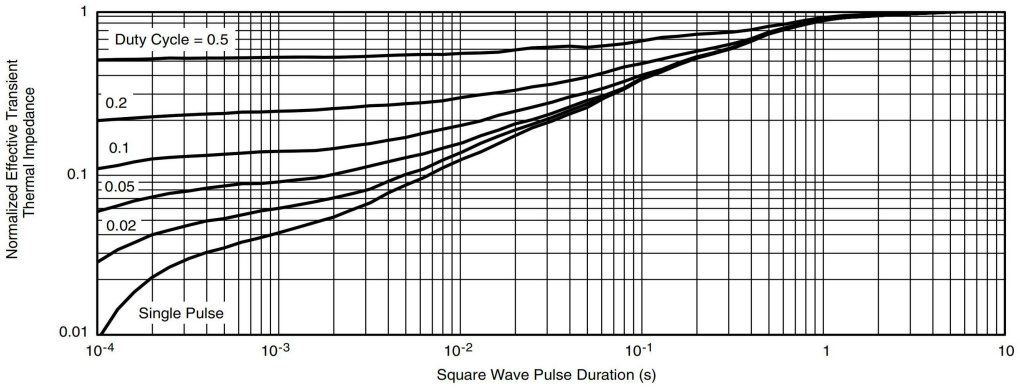


Power Derating, Junction-to-Ambient

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



Normalized Thermal Transient Impedance, Junction-to-Ambient



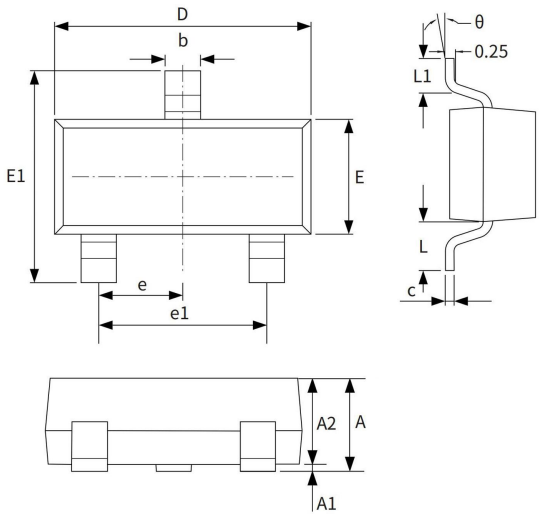
Normalized Thermal Transient Impedance, Junction-to-Foot

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Ordering Information

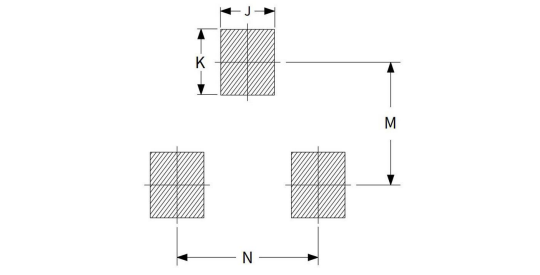
PACKAGE	PACKAGE CODE	UNIT WEIGHT(g)	REEL(pcs)	BOX(pcs)	CARTON(pcs)	DELIVERY MODE
SOT-23	R1	0.008	3000	30000	240000	7''

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