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SI2335DS-T1-E3 Datasheet

P-Channel 30 V (D-S) MOSFET

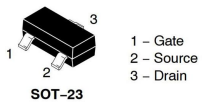
PRODUCT SUMMARY			
V_{DS} (V)	$R_{DS(on)}$ (Ω) Typ.	I_D (A)[a]	Q_g (Typ.)
- 30	0.046 at V_{GS} = - 10 V	- 5.6	11.4 nC
	0.049 at V_{GS} = - 6 V	- 5	
	0.054 at V_{GS} = - 4.5 V	-4.5	

FEATURES

- Trench Power MOSFET
- 100 % R_g Tested

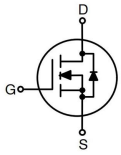
APPLICATIONS

- For Mobile Computing
  - Load Switch
  - Notebook Adaptor Switch
  - DC/DC Converter



SOT–23

1 – Gate
2 – Source
3 – Drain



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	- 5.6	A
	T_C = 70 °C		- 5.1	
	T_A = 25 °C		- 5.4[b,c]	
	T_A = 70 °C		- 4.3[b,c]	
Pulsed Drain Current (t = 100 µs)		I_{DM}	- 18	
Continous Source-Drain Diode Current	T_C = 25 °C	I_S	- 2.1	
	T_A = 25 °C		- 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		1.25[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]	t ≤ 5 s	R_{thJA}	75	100	°C/W
Maximum Junction-to-Foot (Drain)	Steady State	R_{thJF}	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.

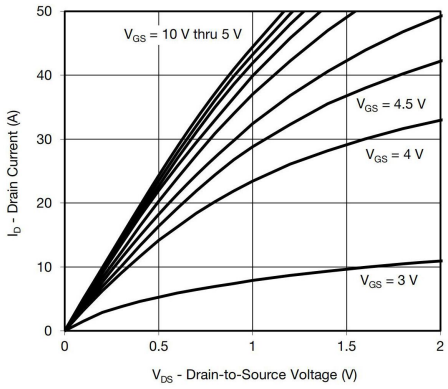
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SPECIFICATIONS (T_J = 25 °C, unless otherwise noted)						
Parameter	**Symbol**	**Test Conditions**	**Min.**	**Typ.**	**Max.**	**Unit**
Static						
Drain-Source Breakdown Voltage	V_{DS}	V_{GS} = 0 V, I_D = - 250 µA	- 30			V
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	I_D = - 250 µA		- 19		mV/°C
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}/T_J$			4		
Gate-Source Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS} , I_D = - 250 µA	- 0.5		- 2.0	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			- 5	
On-State Drain Current[a]	$I_{D(on)}$	$V_{DS} \leq$ - 5 V, V_{GS} = - 10 V	- 2.5			A
Drain-Source On-State Resistance[a]	$R_{DS(on)}$	V_{GS} =- 10 V, I_D = - 4.4 A		0.046		Ω
		V_{GS} =- 6 V, I_D = - 4 A		0.049		
		V_{GS} =- 4.5 V, I_D = - 3.6 A		0.054		
Forward Transconductance[a]	g_{fs}	V_{DS} = - 15 V, I_D = - 3.4 A		18		S
Dynamic[b]						
Input Capacitance	C_{iss}	V_{DS} = - 15 V, V_{GS} = 0 V, f = 1 MHz		1295		pF
Output Capacitance	C_{oss}			150		
Reverse Transfer Capacitance	C_{rss}			130		
Total Gate Charge	Q_g	V_{DS} = - 15 V, V_{GS} = - 10 V, I_D = - 5.4 A		24	36	nC
		V_{DS} = - 15 V, V_{GS} = - 4.5 V, I_D = - 5.4 A		11.4	17	
Gate-Source Charge	Q_{gs}			3.4		
Gate-Drain Charge	Q_{gd}			3.8		
Gate Resistance	R_g	f = 1 MHz	1.5	7.7	15.4	Ω
Turn-On Delay Time	$t_{d(on)}$	V_{DD} = - 15 V, R_L = 3.5 Ω $I_D \cong$ - 4.3 A, V_{GEN} = - 10 V, R_g = 1 Ω		13	20	ns
Rise Time	t_r			4	8	
Turn-Off Delay Time	$t_{d(off)}$			38	57	
Fall Time	t_f			6	12	
Turn-On Delay Time	$t_{d(on)}$	V_{DD} = - 15 V, R_L = 3.5 Ω $I_D \cong$ - 4.3 A, V_{GEN} = - 4.5 V, R_g = 1 Ω		28	42	
Rise Time	t_r			16	24	
Turn-Off Delay Time	$t_{d(off)}$			30	45	
Fall Time	t_f			10	20	
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I_S	T_C = 25 °C			- 2.1	A
Pulse Diode Forward Current (t = 100 µs)	I_{SM}				- 80	
Body Diode Voltage	V_{SD}	I_S = - 4.3 A, V_{GS} = 0 V		- 0.8	- 1.2	V
Body Diode Reverse Recovery Time	t_{rr}	I_F = - 4.3 A, dI/dt = 100 A/µs, T_J = 25 °C		15	23	ns
Body Diode Reverse Recovery Charge	Q_{rr}			7	14	nC
Reverse Recovery Fall Time	t_a			8		ns
Reverse Recovery Rise Time	t_b			7		

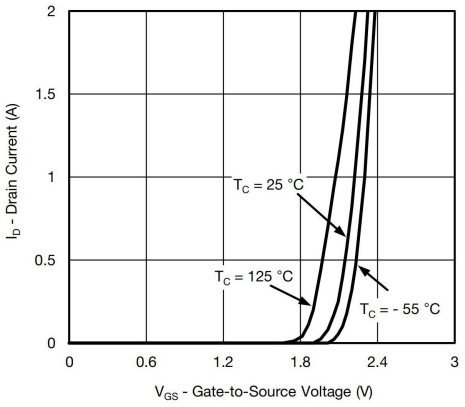
Notes:
a. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2 %.
b. Guaranteed by design, not subject to production testing.

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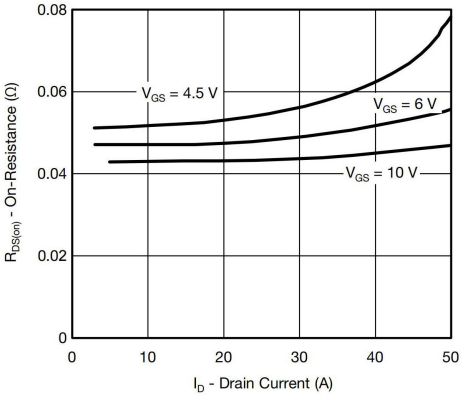
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



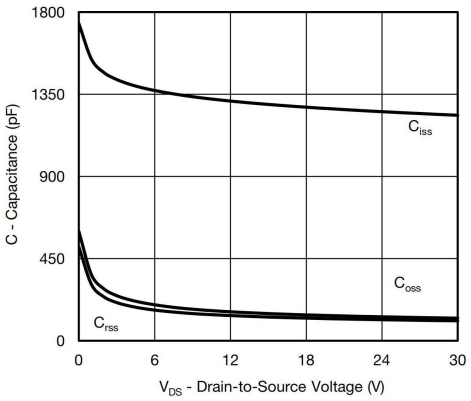
Output Characteristics



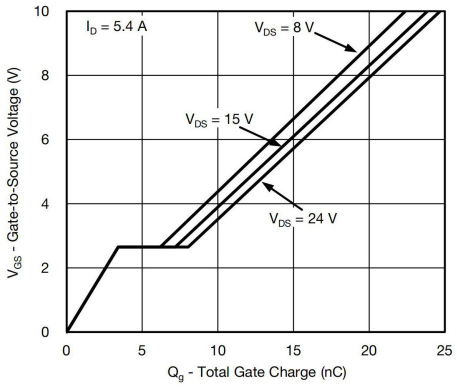
Transfer Characteristics



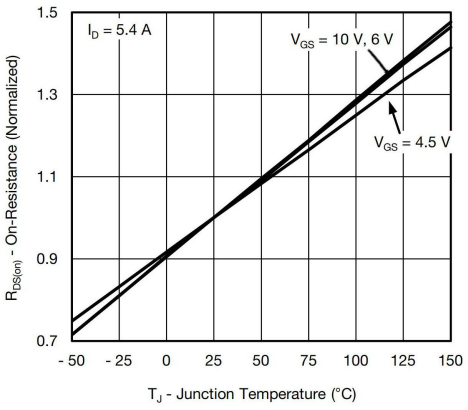
On-Resistance vs. Drain Current



Capacitance



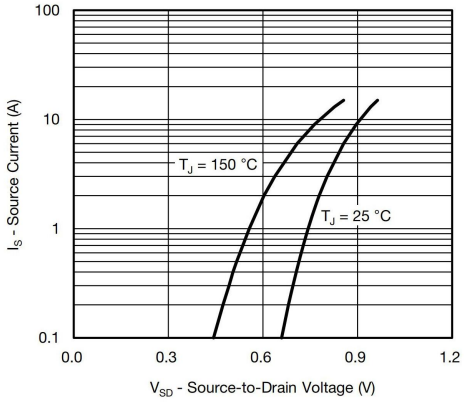
Gate Charge



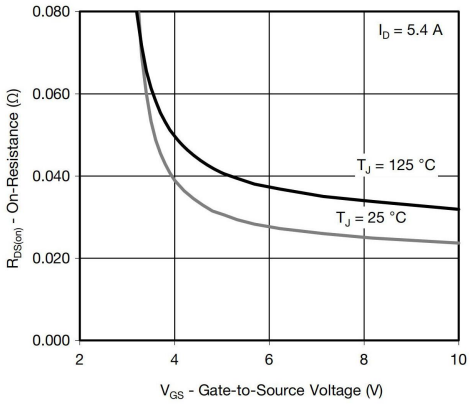
On-Resistance vs. Junction Temperature

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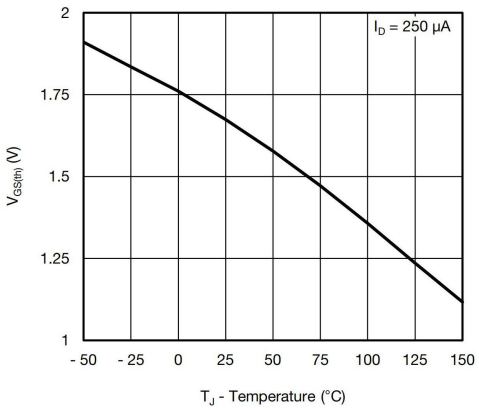
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



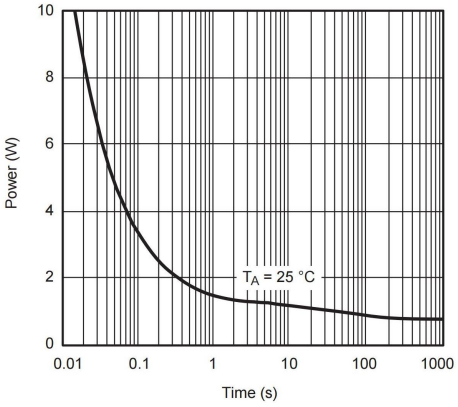
Source-Drain Diode Forward Voltage



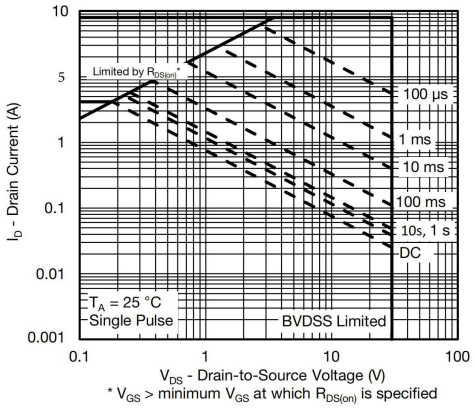
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage



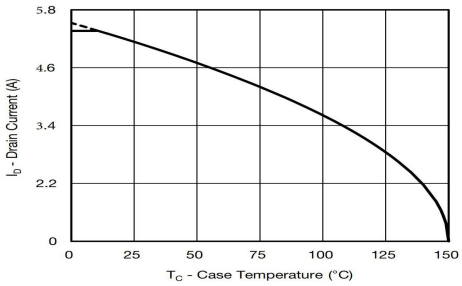
Single Pulse Power (Junction-to-Ambient)



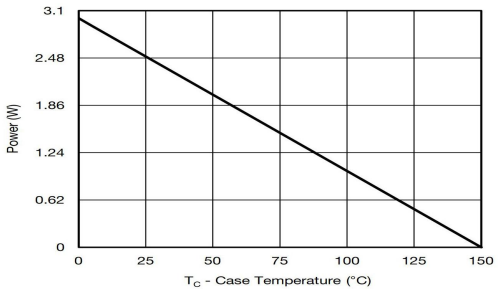
Safe Operating Area, Junction-to-Ambient

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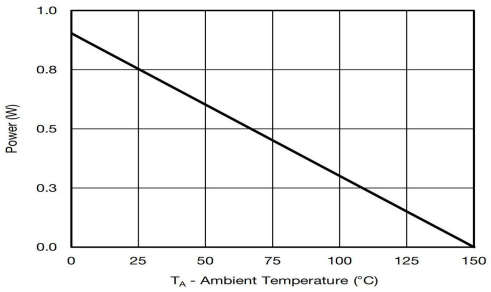
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



Current Derating*

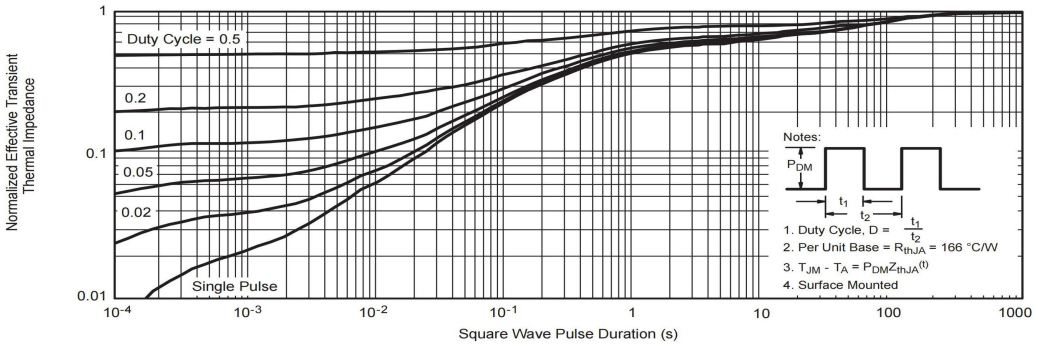


Power, Junction-to-Foot

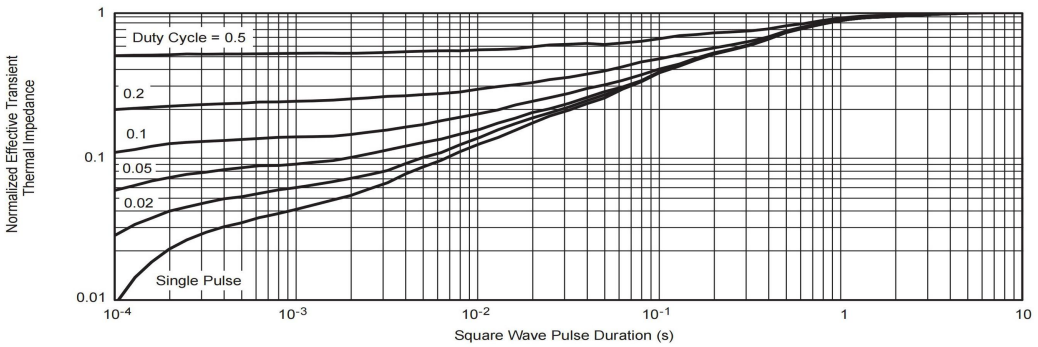


Power, Junction-to-Ambient

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



Normalized Thermal Transient Impedance, Junction-to-Ambient



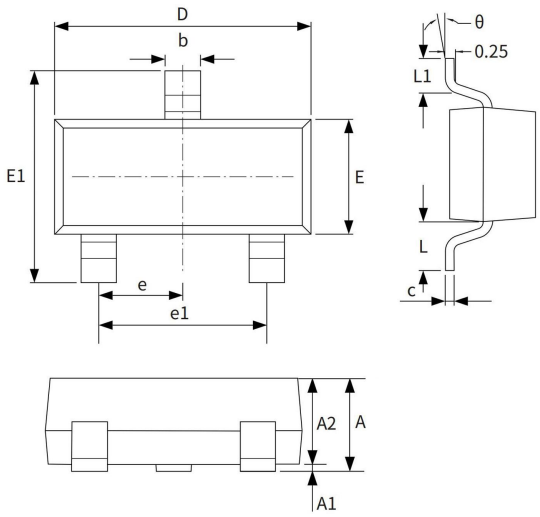
Normalized Thermal Transient Impedance, Junction-to-Foot

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Ordering Information

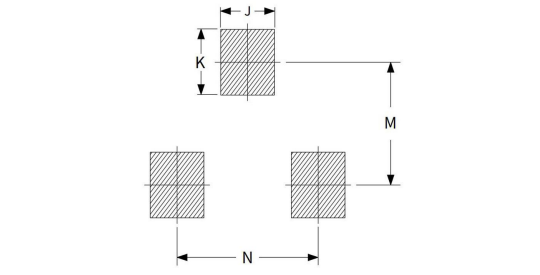
PACKAGE	PACKAGE CODE	UNIT WEIGHT(g)	REEL(pcs)	BOX(pcs)	CARTON(pcs)	DELIVERY MODE
SOT-23	R1	0.008	3000	30000	240000	7''

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