N-Channel 20 V (D-S) MOSFET

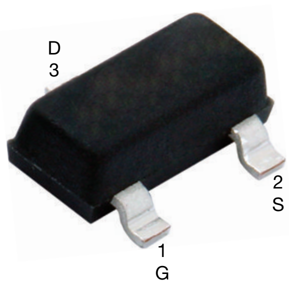
PRODUCT SUMMARY			
V_{DS} (V)	$R_{DS(on)}$ (Ω) MAX.	I_D (A) [d]	Q_g (TYP.)
20	0.030 at V_{GS} = 4.5 V	5.9	7.7 nC
	0.034 at V_{GS} = 2.5 V	5.5	
	0.041 at V_{GS} = 1.8 V	5	

FEATURES

- TrenchFET® power MOSFET
- 100 % R_g tested
- Material categorization: For definitions of compliance please see www.vishay.com/doc?99912

Pb-free
RoHS
COMPLIANT
HALOGEN
FREE

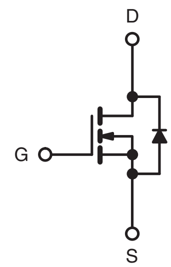
SOT-23 (TO-236)



Top View

APPLICATIONS

- Load switch
- Power management



N-Channel MOSFET

Marking Code: F5

Ordering Information:
Si2374DS-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}	20	V
Gate-Source Voltage		V_{GS}	± 8	
Continuous Drain Current (T_J = 150 °C)	T_C = 25 °C	I_D	5.9	A
	T_C = 70 °C		4.7	
	T_A = 25 °C		4.5 [a, b]	
	T_A = 70 °C		3.6 [a, b]	
Pulsed Drain Current (t = 100 μs)		I_{DM}	25	
Continuous Source-Drain Diode Current	T_C = 25 °C	I_S	1.4	
	T_A = 25 °C		0.8 [a, b]	
Maximum Power Dissipation	T_C = 25 °C	P_D	1.7	W
	T_C = 70 °C		1.1	
	T_A = 25 °C		0.96 [a, b]	
	T_A = 70 °C		0.62 [a, b]	
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, c]	t ≤ 5 s	R_{thJA}	100	130	°C/W
Maximum Junction-to-Foot (Drain)	Steady State	R_{thJF}	60	75	

Notes
a. Surface mounted on 1" x 1" FR4 board.
b. t = 5 s.
c. Maximum under steady state conditions is 175 °C/W.
d. T_C = 25 °C.

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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	20	-	-	V
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	I_D = 250 µA	-	34	-	mV/°C
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}/T_J$		-	-5	-	
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$, I_D = 250 µA	0.4	-	1	V
Gate-Source Leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ± 8 V	-	-	± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 20 V, V_{GS} = 0 V	-	-	1	µA
		V_{DS} = 20 V, V_{GS} = 0 V, T_J = 55 °C	-	-	10	
On-State Drain Current [a]	$I_{D(on)}$	$V_{DS} \geq$ 5 V, V_{GS} = 10 V	10	-	-	A
Drain-Source On-State Resistance [a]	$R_{DS(on)}$	V_{GS} = 4.5 V, I_D = 4 A	-	0.025	0.030	Ω
		V_{GS} = 2.5 V, I_D = 3 A	-	0.028	0.034	
		V_{GS} = 1.8 V, I_D = 2 A	-	0.031	0.041	
Forward Transconductance [a]	g_{fs}	V_{DS} = 10 V, I_D = 4 A	-	29	-	S
Dynamic [b]						
Input Capacitance	C_{iss}	V_{DS} = 10 V, V_{GS} = 0 V, f = 1 MHz	-	735	-	pF
Output Capacitance	C_{oss}		-	110	-	
Reverse Transfer Capacitance	C_{rss}		-	40	-	
Total Gate Charge	Q_g	V_{DS} = 10 V, V_{GS} = 10 V, I_D = 4.5 A	-	13.4	20	nC
		V_{DS} = 10 V, V_{GS} = 4.5 V, I_D = 4.5 A	-	7.7	12	
Gate-Source Charge	Q_{gs}		-	1	-	
Gate-Drain Charge	Q_{gd}		-	1	-	
Gate Resistance	R_g	f = 1 MHz	0.12	0.6	1.2	Ω
Turn-On Delay Time	$t_{d(on)}$	V_{DD} = 10 V, R_L = 2.8 Ω $I_D \cong$ 3.6 A, V_{GEN} = 8 V, R_g = 1 Ω	-	4	8	ns
Rise Time	t_r		-	22	33	
Turn-Off Delay Time	$t_{d(off)}$		-	16	24	
Fall Time	t_f		-	9	18	
Turn-On Delay Time	$t_{d(on)}$	V_{DD} = 10 V, R_L = 2.8 Ω $I_D \cong$ 3.6 A, V_{GEN} = 4.5 V, R_g = 1 Ω	-	10	20	
Rise Time	t_r		-	23	35	
Turn-Off Delay Time	$t_{d(off)}$		-	16	24	
Fall Time	t_f		-	10	20	
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I_S	T_C = 25 °C	-	-	1.4	A
Pulse Diode Forward Current (t = 100 µs)	I_{SM}		-	-	25	
Body Diode Voltage	V_{SD}	I_S = 3.6 A, V_{GS} = 0 V	-	0.8	1.2	V
Body Diode Reverse Recovery Time	t_{rr}	I_F = 3.6 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		-	9	-	ns
Reverse Recovery Rise Time	t_b		-	4	-	

Notes

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

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.

For technical questions, contact: pmostechsupport@vishay.com
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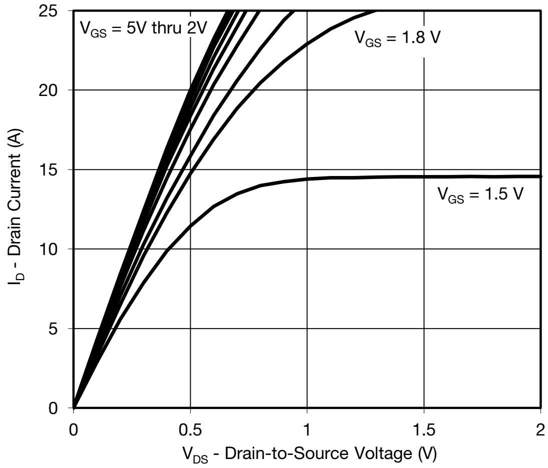
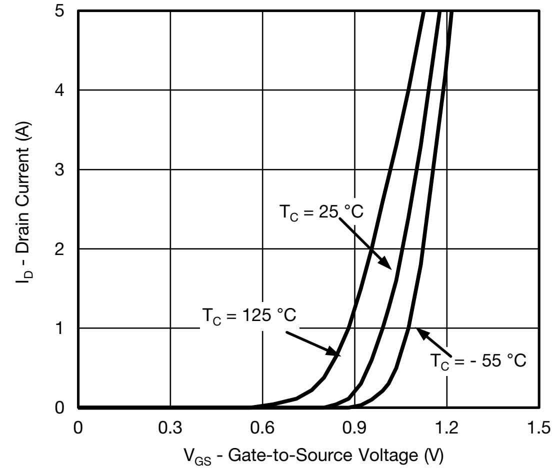
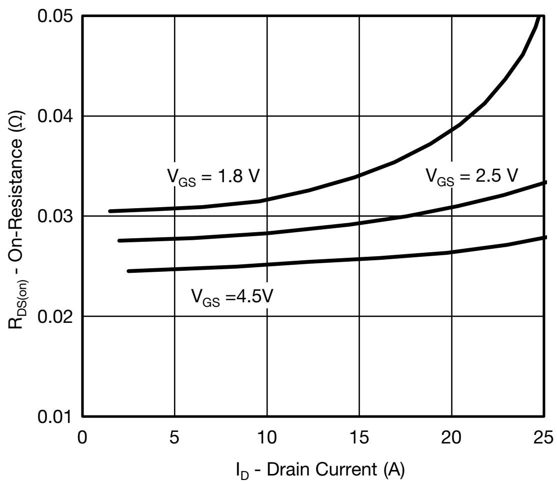
TYPICAL CHARACTERISTICS (T_J = 25 °C, unless otherwise noted)



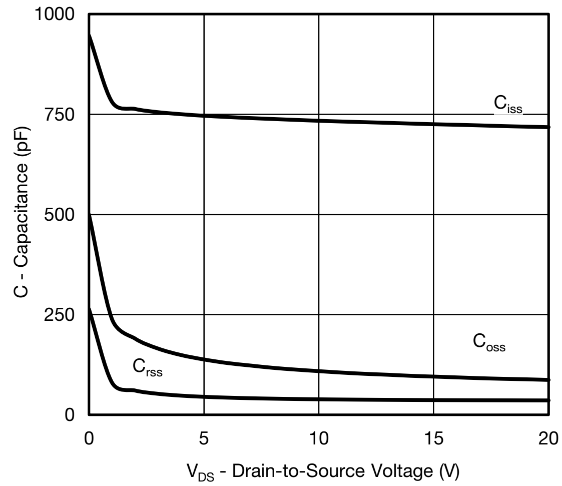
Output Characteristics



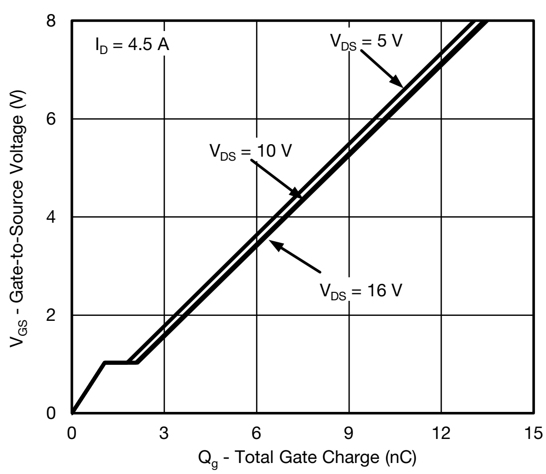
Transfer Characteristics



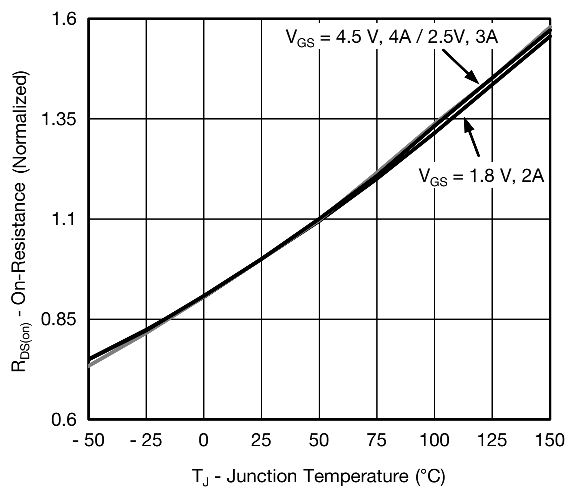
On-Resistance vs. Drain Current and Gate Voltage



Capacitance



Gate Charge



On-Resistance vs. Junction Temperature

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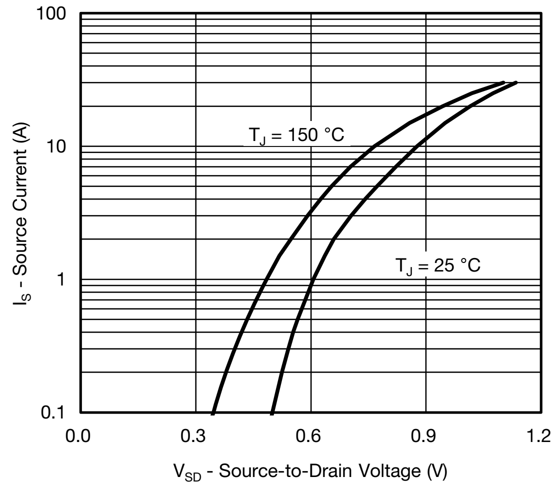
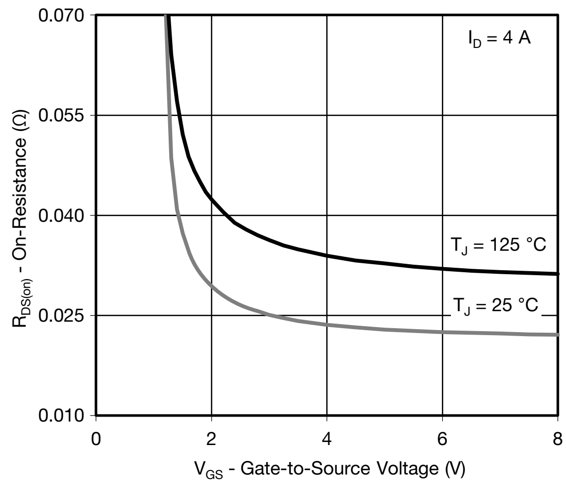
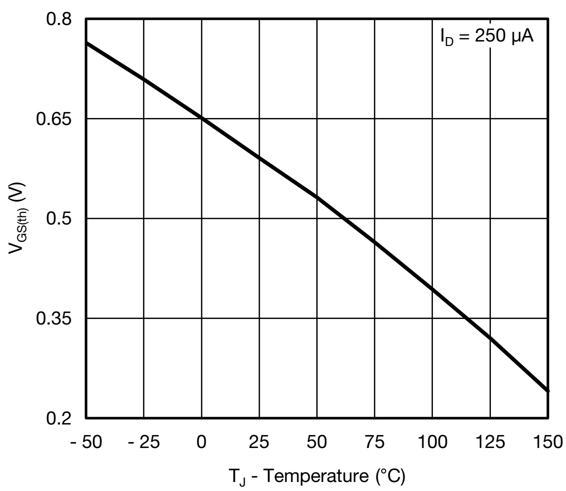


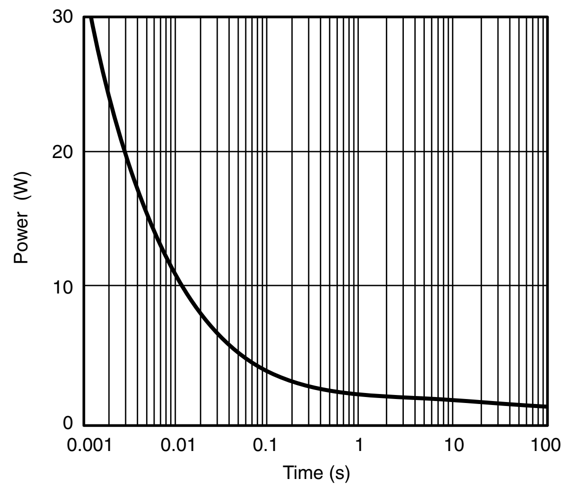
Source-Drain Diode Forward Voltage



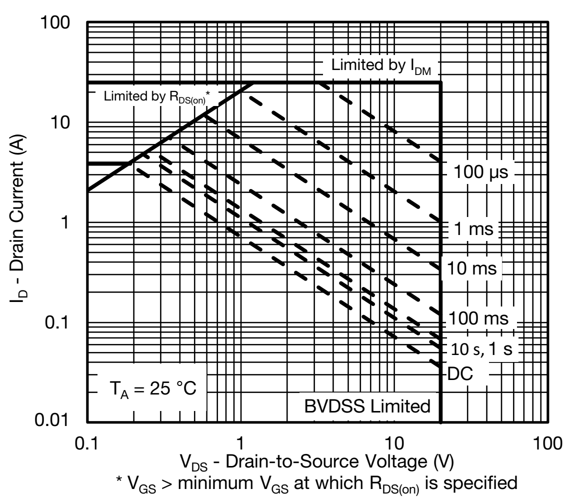
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage



Single Pulse Power (Junction-to-Ambient)



Safe Operating Area, Junction-to-Ambient

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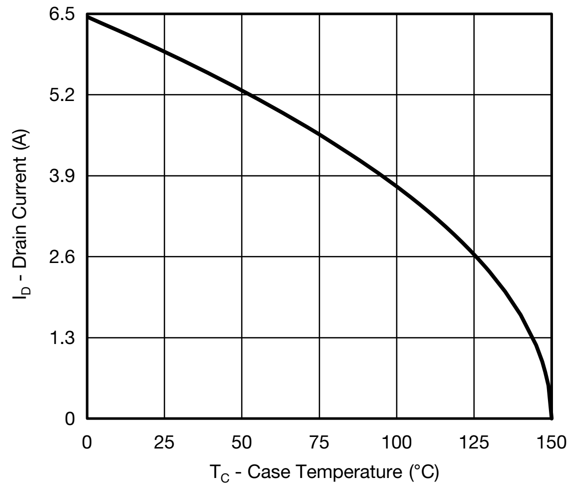
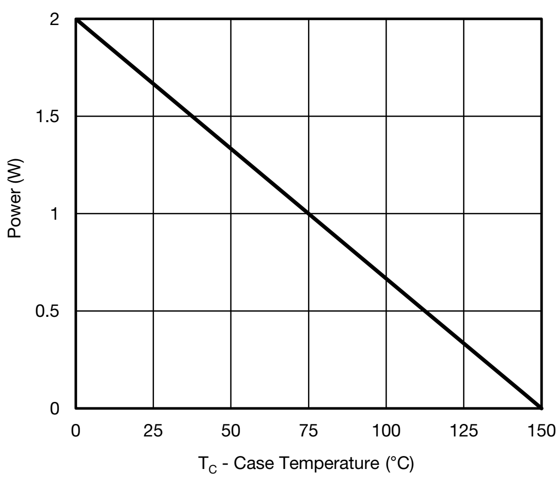
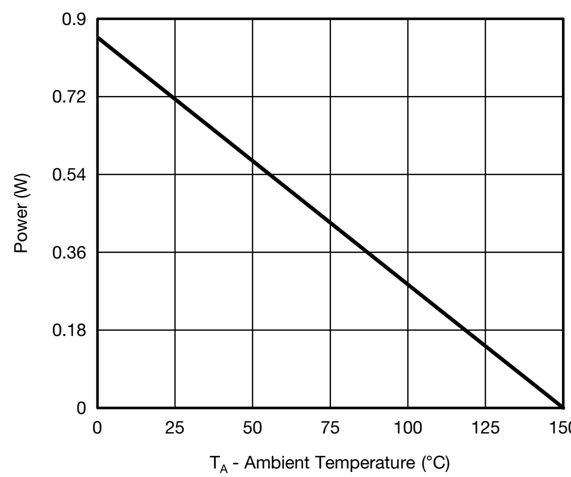


Current Derating*



Power Junction-to-Foot



Power Junction-to-Ambient

* 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.

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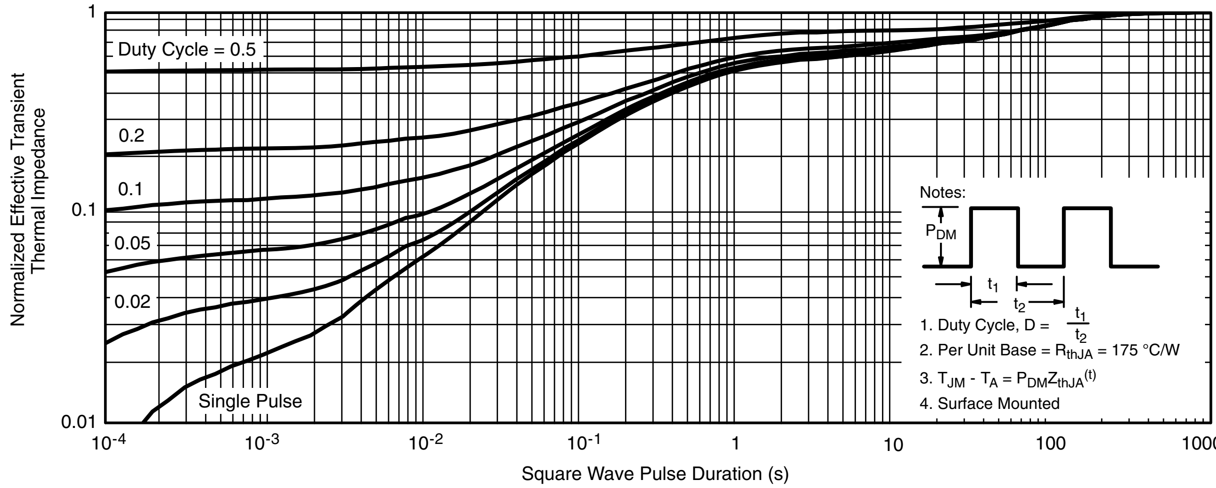
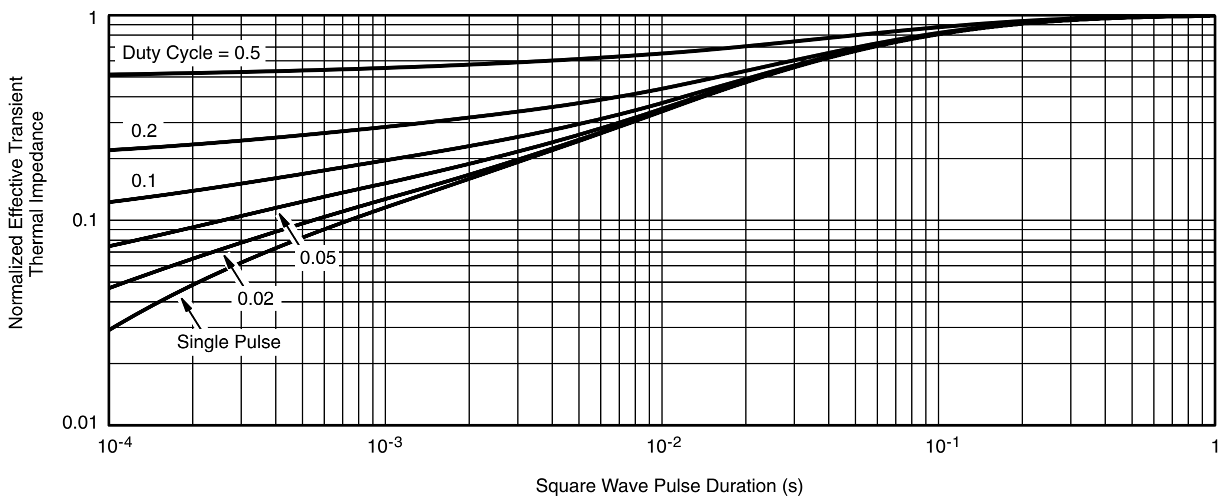


Normalized Thermal Transient Impedance, Junction-to-Ambient



Normalized Thermal Transient Impedance, Junction-to-Foot

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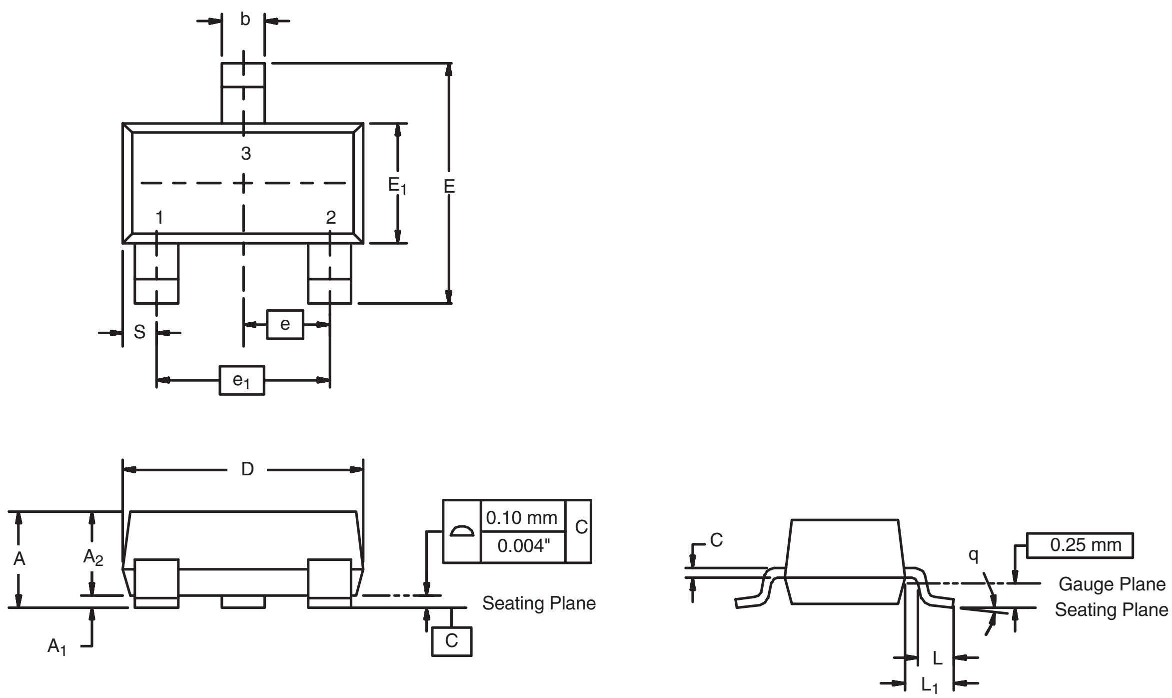
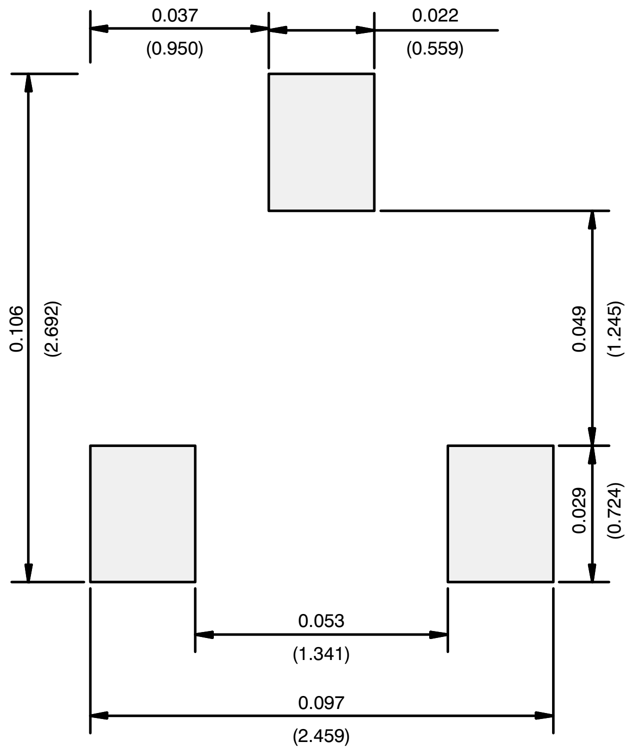
SOT-23 (TO-236): 3-LEAD



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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