

SM1A23DSK-VB Datasheet

Dual N-Channel 100-V (D-S) MOSFET

PRODUCT SUMMARY

V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A) ^d	Q_g (Typ.)
100	0.063 at $V_{GS} = 10$ V	5.8	9 nC
	0.084 at $V_{GS} = 6$ V	4.8	

FEATURES

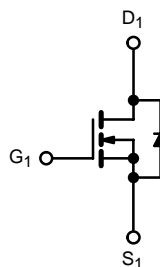
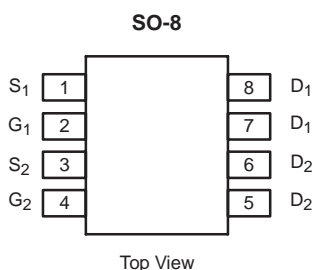
- Halogen-free According to IEC 61249-2-21 Available
- Trench Power MOSFET
- 100 % UIS Tested



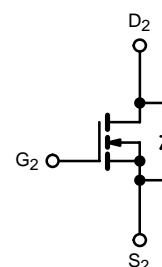
RoHS
COMPLIANT
HALOGEN
FREE
Available

APPLICATIONS

- High Frequency Boost Converter
- LED Backlight for LCD TV



N-Channel MOSFET



N-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS $T_A = 25$ °C, unless otherwise noted

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	100	V
Gate-Source Voltage	V_{GS}	± 20	
Continuous Drain Current ($T_J = 150$ °C)	$T_C = 25$ °C	5.8	A
	$T_C = 70$ °C	4.4	
	$T_A = 25$ °C	3.4 ^{a, b}	
	$T_A = 70$ °C	2.5 ^{a, b}	
Pulsed Drain Current	I_{DM}	20	A
Continuous Source-Drain Diode Current	$T_C = 25$ °C	5	
	$T_A = 25$ °C	2.1 ^{a, b}	
Single Avalanche Current	I_{AS}	19	mJ
Single Avalanche Energy	E_{AS}	18	
Maximum Power Dissipation	$T_C = 25$ °C	5	W
	$T_C = 70$ °C	3.2	
	$T_A = 25$ °C	2.5 ^{a, b}	
	$T_A = 70$ °C	1.6 ^{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 ^{b, c}	R_{thJA}	37	50	°C/W
Maximum Junction-to-Foot (Drain)	R_{thJF}	17	21	

Notes:

a. Surface Mounted on 1" x 1" FR4 board.

b. $t = 10$ s.

c. Maximum under Steady State conditions is 85 °C/W.

d. $T_C = 25$ °C.

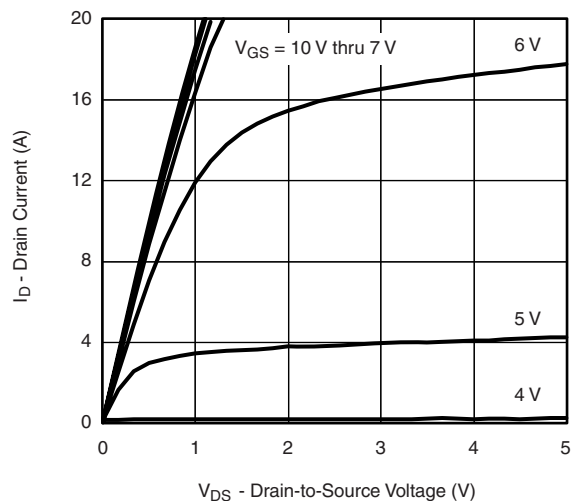
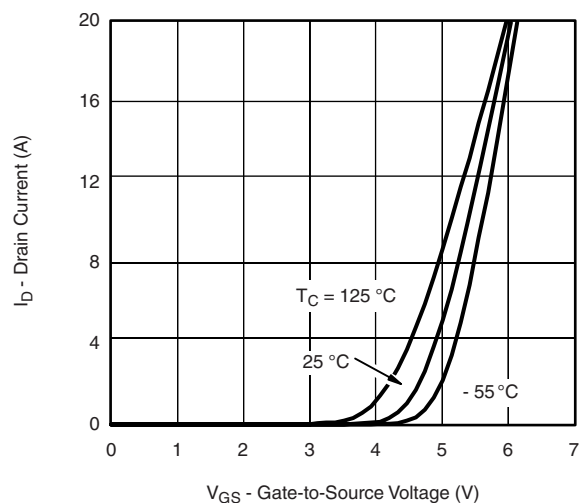
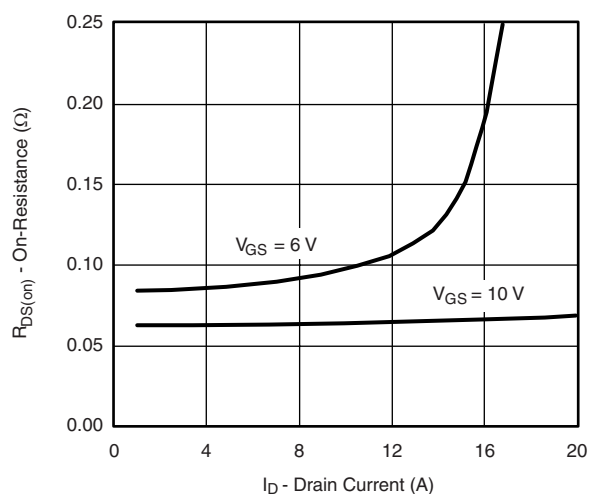
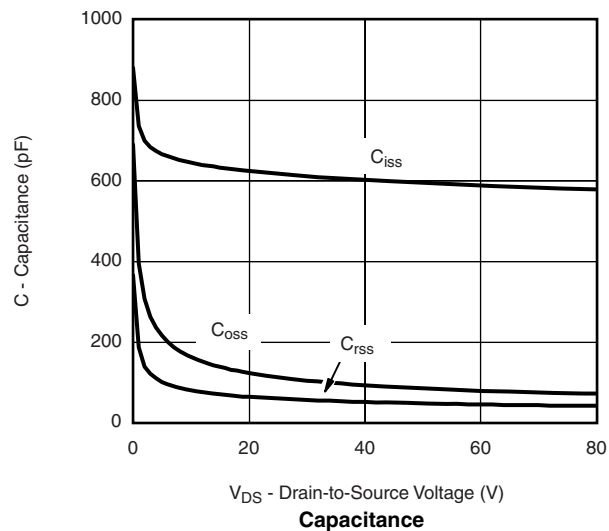
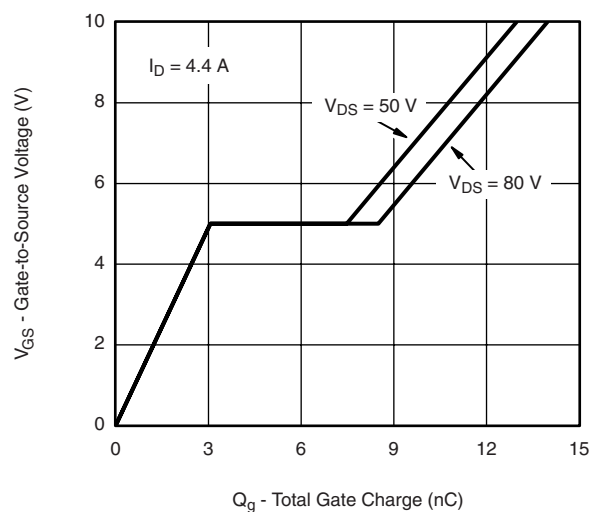
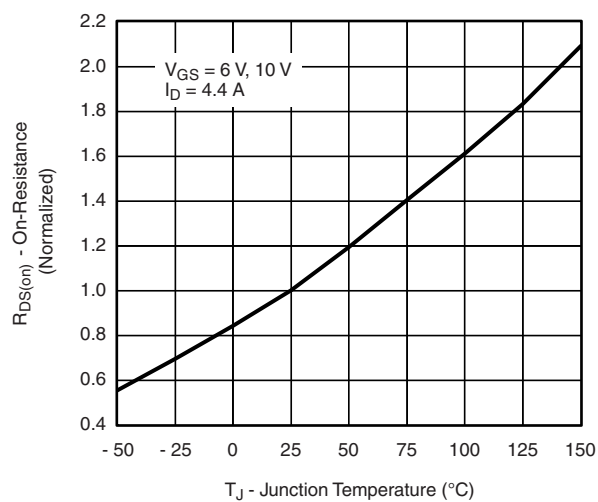
SPECIFICATIONS $T_J = 25\text{ }^{\circ}\text{C}$, unless otherwise noted						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V_{DS}	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	100			V
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	$I_D = 250\text{ }\mu\text{A}$		120		mV/ $^{\circ}\text{C}$
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}/T_J$			- 9		
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	2		4.5	V
Gate-Source Leakage	I_{GSS}	$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 100\text{ V}, V_{GS} = 0\text{ V}$			1	μA
		$V_{DS} = 100\text{ V}, V_{GS} = 0\text{ V}, T_J = 55\text{ }^{\circ}\text{C}$			10	
On-State Drain Current ^a	$I_{D(on)}$	$V_{DS} \geq 5\text{ V}, V_{GS} = 10\text{ V}$	20			A
Drain-Source On-State Resistance ^a	$R_{DS(on)}$	$V_{GS} = 10\text{ V}, I_D = 3.4\text{ A}$		0.063		Ω
		$V_{GS} = 6\text{ V}, I_D = 2.8\text{ A}$		0.084		
Forward Transconductance ^a	g_{fs}	$V_{DS} = 15\text{ V}, I_D = 3.4\text{ A}$		10		S
Dynamic ^b						
Input Capacitance	C_{iss}	$V_{DS} = 50\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$		600		pF
Output Capacitance	C_{oss}			90		
Reverse Transfer Capacitance	C_{rss}			50		
Total Gate Charge	Q_g	$V_{DS} = 50\text{ V}, V_{GS} = 10\text{ V}, I_D = 3.4\text{ A}$		13.5	20	nC
		$V_{DS} = 50\text{ V}, V_{GS} = 6\text{ V}, I_D = 3.4\text{ A}$		9	13.5	
Q_{gs}			3			
Q_{gd}			4.6			
Gate Resistance	R_g	$f = 1\text{ MHz}$		1		Ω
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 50\text{ V}, R_L = 14.3\text{ }\Omega$ $I_D \cong 3.5\text{ A}, V_{GEN} = 6\text{ V}, R_g = 1\text{ }\Omega$		15	25	ns
Rise Time	t_r			12	20	
Turn-Off Delay Time	$t_{d(off)}$			12	20	
Fall Time	t_f			10	15	
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 50\text{ V}, R_L = 14.3\text{ }\Omega$ $I_D \cong 3.5\text{ A}, V_{GEN} = 10\text{ V}, R_g = 1\text{ }\Omega$		10	15	
Rise Time	t_r			12	20	
Turn-Off Delay Time	$t_{d(off)}$			15	25	
Fall Time	t_f			10	15	
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I_S	$T_C = 25\text{ }^{\circ}\text{C}$			5	A
Pulse Diode Forward Current	I_{SM}				20	
Body Diode Voltage	V_{SD}	$I_S = 3.5\text{ A}, V_{GS} = 0\text{ V}$		0.8	1.2	V
Body Diode Reverse Recovery Time	t_{rr}	$I_F = 3.5\text{ A}, dI/dt = 100\text{ A}/\mu\text{s}, T_J = 25\text{ }^{\circ}\text{C}$		45	70	ns
Body Diode Reverse Recovery Charge	Q_{rr}			80	120	nC
Reverse Recovery Fall Time	t_a			33		ns
Reverse Recovery Rise Time	t_b			12		

Notes:

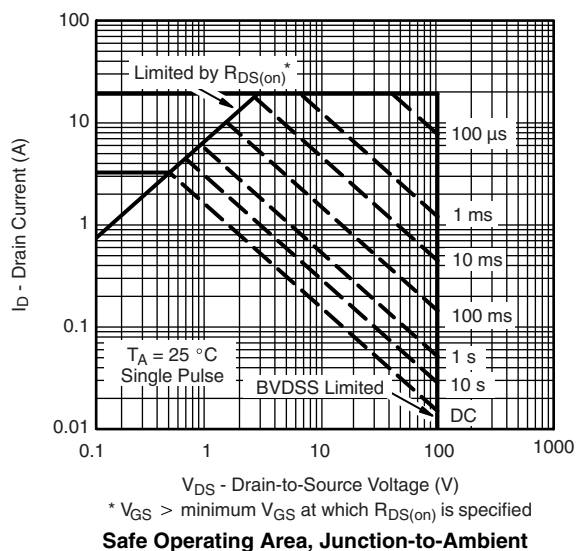
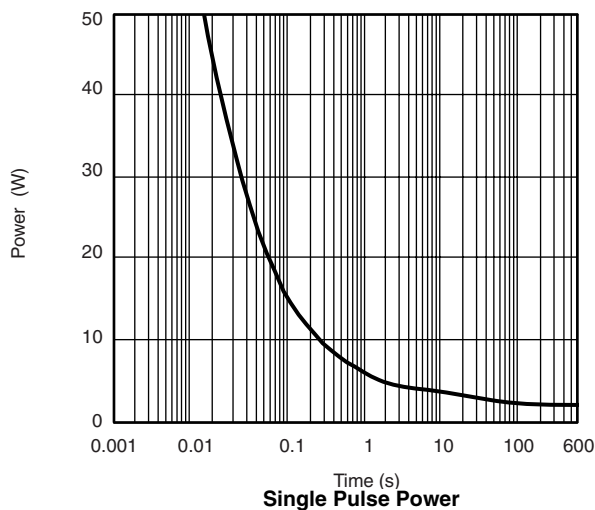
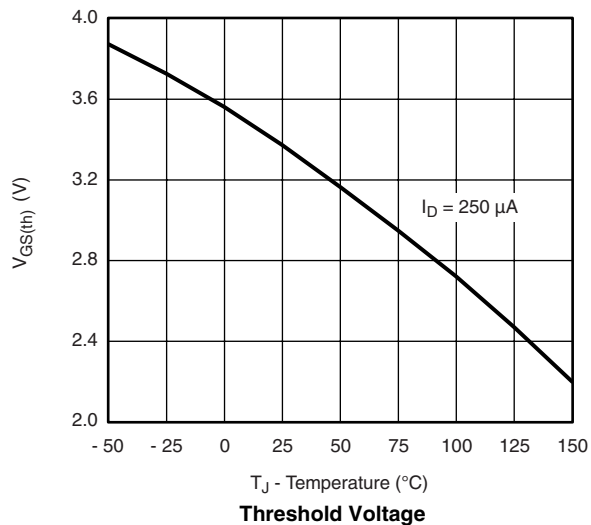
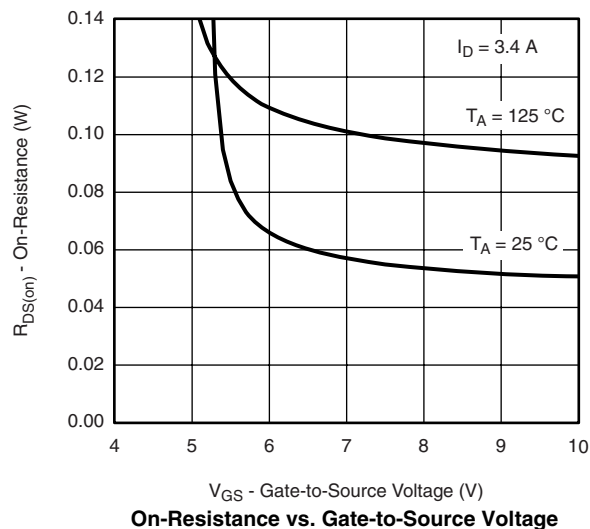
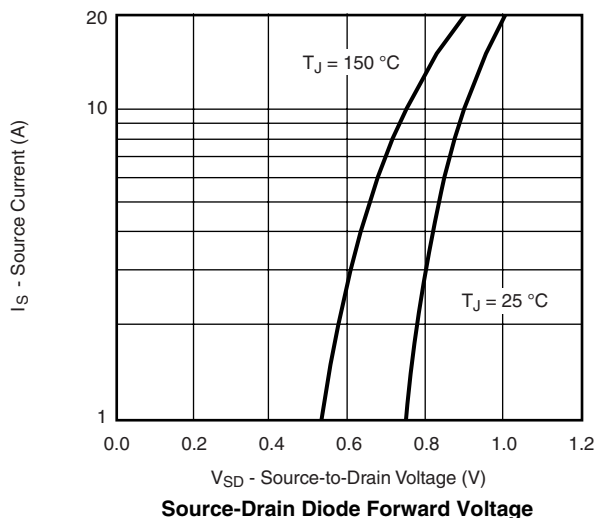
a. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$

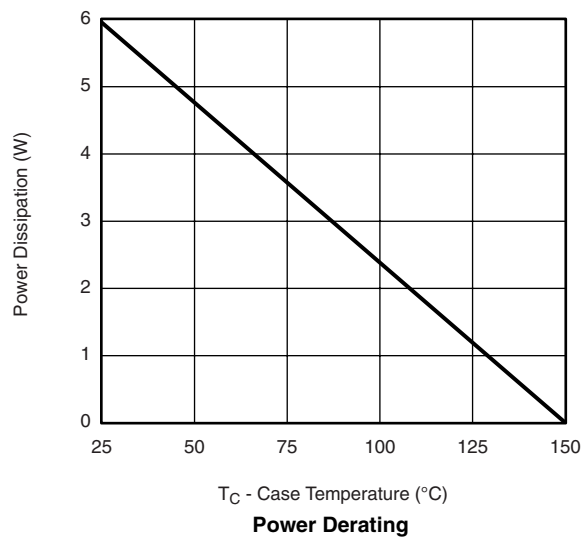
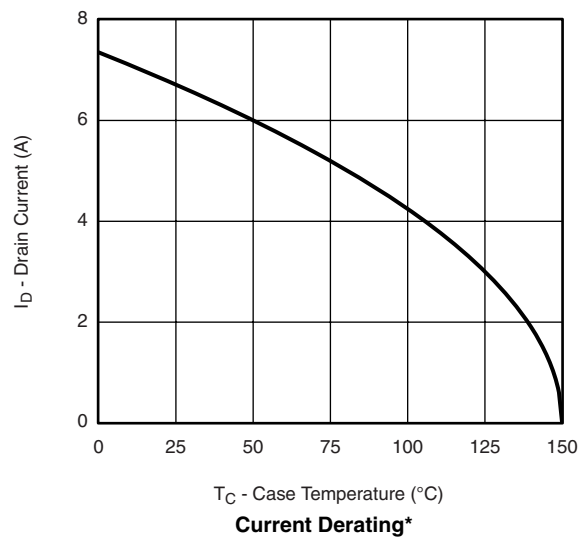
b. Guaranteed by design, not subject to production testing.

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.

TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted

Output Characteristics

Transfer Characteristics

On-Resistance vs. Drain Current

Capacitance

Gate Charge

On-Resistance vs. Junction Temperature

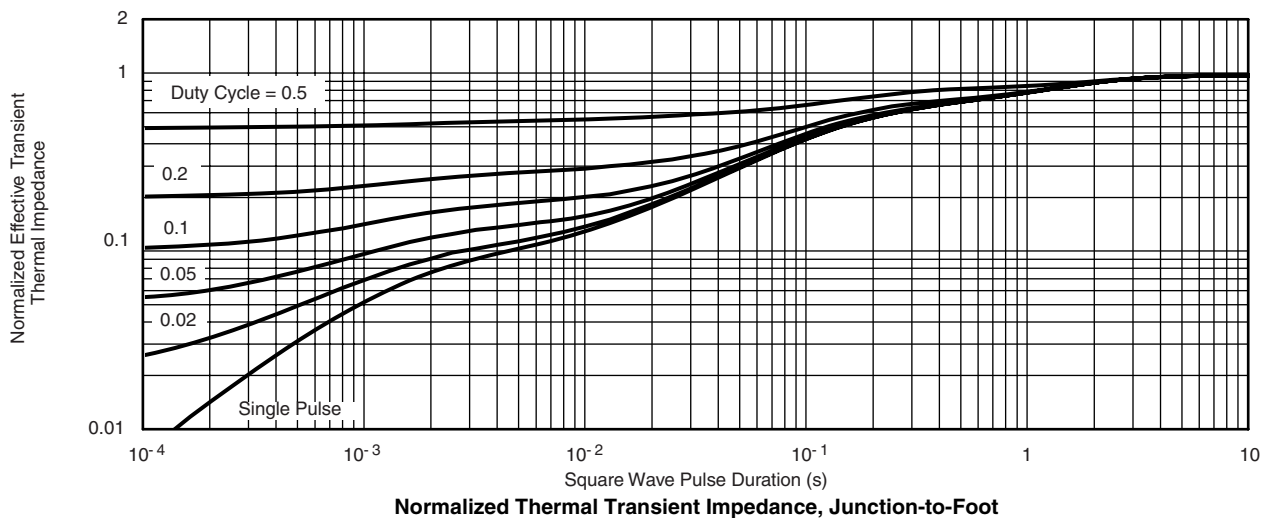
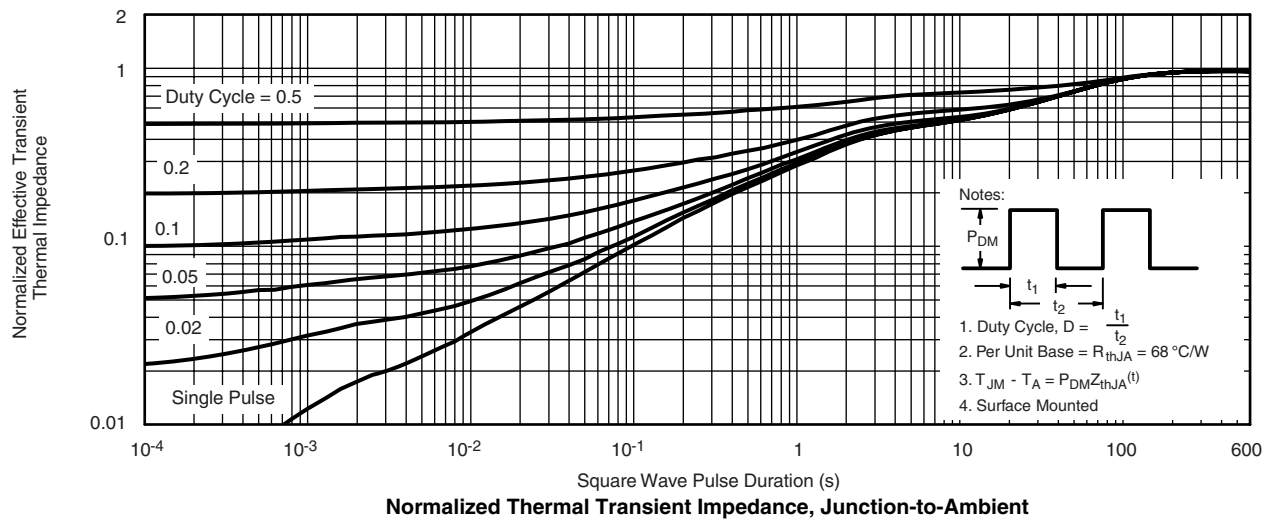
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



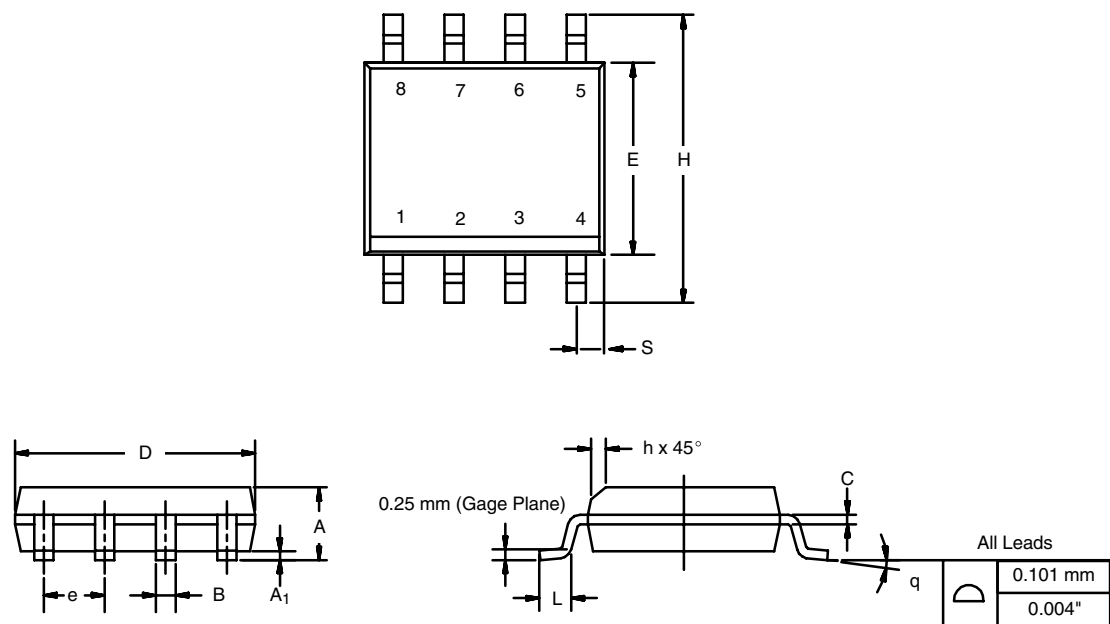
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted

* 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.

TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted

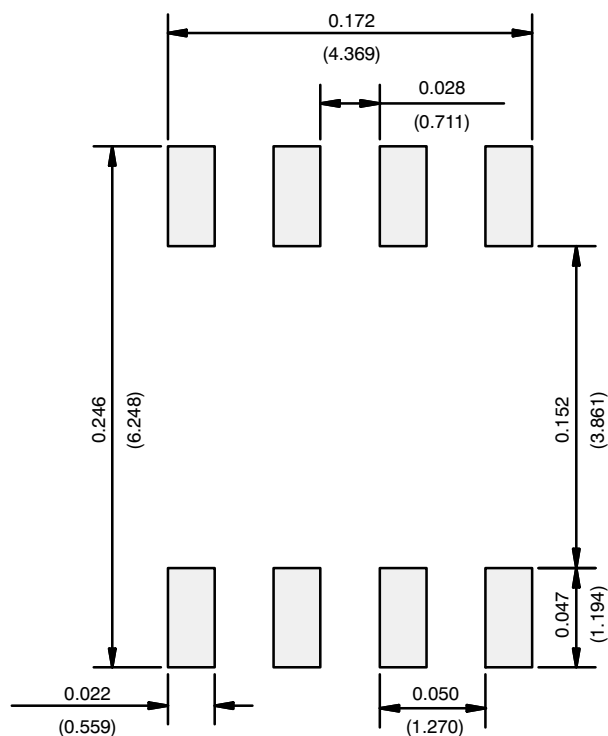


SOIC (NARROW): 8-LEAD
JEDEC Part Number: MS-012



DIM	MILLIMETERS		INCHES	
	Min	Max	Min	Max
A	1.35	1.75	0.053	0.069
A ₁	0.10	0.20	0.004	0.008
B	0.35	0.51	0.014	0.020
C	0.19	0.25	0.0075	0.010
D	4.80	5.00	0.189	0.196
E	3.80	4.00	0.150	0.157
e	1.27 BSC		0.050 BSC	
H	5.80	6.20	0.228	0.244
h	0.25	0.50	0.010	0.020
L	0.50	0.93	0.020	0.037
q	0°	8°	0°	8°
S	0.44	0.64	0.018	0.026
ECN: C-06527-Rev. I, 11-Sep-06				
DWG: 5498				

RECOMMENDED MINIMUM PADS FOR SO-8



Recommended Minimum Pads
Dimensions in Inches/(mm)

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