

DMG3415U-13 Datasheet



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DiGi Electronics Part Number	DMG3415U-13-DG
Manufacturer	Diodes Incorporated
Manufacturer Product Number	DMG3415U-13
Description	MOSFET P-CH DFN-3
Detailed Description	P-Channel 20 V 4A (Ta) 900mW (Ta) Surface Mount SOT-23-3



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Purchase and inquiry

Manufacturer Product Number:

DMG3415U-13

Series:

-

FET Type:

P-Channel

Drain to Source Voltage (Vdss):

20 V

Drive Voltage (Max Rds On, Min Rds On):

1.8V, 4.5V

Vgs(th) (Max) @ Id:

1V @ 250 μ A

Vgs (Max):

\pm 8V

FET Feature:

-

Operating Temperature:

-55°C ~ 150°C (Tj)

Qualification:

AEC-Q101

Supplier Device Package:

SOT-23-3

Base Product Number:

DMG3415

Manufacturer:

Diodes Incorporated

Product Status:

Active

Technology:

MOSFET (Metal Oxide)

Current - Continuous Drain (Id) @ 25°C:

4A (Ta)

Rds On (Max) @ Id, Vgs:

42.5mOhm @ 4A, 4.5V

Gate Charge (Qg) (Max) @ Vgs:

9.1 nC @ 4.5 V

Input Capacitance (Ciss) (Max) @ Vds:

294 pF @ 10 V

Power Dissipation (Max):

900mW (Ta)

Grade:

Automotive

Mounting Type:

Surface Mount

Package / Case:

TO-236-3, SC-59, SOT-23-3

Environmental & Export classification

RoHS Status:

ROHS3 Compliant

REACH Status:

REACH Unaffected

HTSUS:

8541.21.0095

Moisture Sensitivity Level (MSL):

1 (Unlimited)

ECCN:

EAR99



NOT RECOMMENDED FOR NEW DESIGN
USE **DMP2045U**



DMG3415U

P-CHANNEL ENHANCEMENT MODE MOSFET

Product Summary

BV_{DSS}	$R_{DS(ON) \max}$	I_D $T_A = +25^\circ C$
-20V	42.5m Ω @ $V_{GS} = -4.5V$	-4.0A
	71m Ω @ $V_{GS} = -1.8V$	-2.0A

Description

This new generation MOSFET is designed to minimize the on-state resistance ($R_{DS(ON)}$) and yet maintain superior switching performance, making it ideal for high efficiency power management applications.

Applications

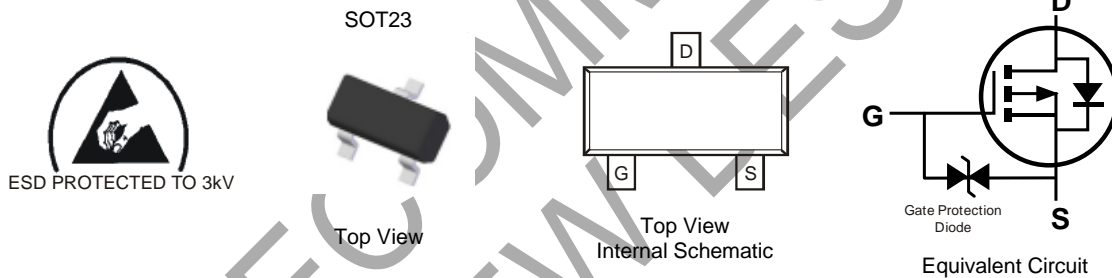
- DC-DC Converters
- Power Management Functions

Features

- Low On-Resistance
- Low Input Capacitance
- Fast Switching Speed
- Low Input/Output Leakage
- ESD Protected Up To 3kV
- Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)
- Halogen and Antimony Free. "Green" Device (Note 3)
- Qualified to AEC-Q101 Standards for High Reliability
- PPAP Capable (Note 4)

Mechanical Data

- Case: SOT23
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 e3
- Terminals Connections: See Diagram Below
- Weight: 0.008 grams (Approximate)



Ordering Information (Note 5)

Part Number	Compliance	Case	Packaging
DMG3415U-7	Standard	SOT23	3,000/Tape & Reel
DMG3415U-13	Standard	SOT23	10,000/Tape & Reel

- Notes:
- No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
 - See <https://www.diodes.com/quality/lead-free/> for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
 - Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
 - Automotive products are AEC-Q101 qualified and are PPAP capable. Automotive, AEC-Q101 and standard products are electrically and thermally the same, except where specified. For more information, please refer to <https://www.diodes.com/quality/>.
 - For packaging details, go to our website at <https://www.diodes.com/design/support/packaging/diodes-packaging/>.

Marking Information



34P = Product Type Marking Code
YM or YM = Date Code Marking
Y or Y = Year (ex: F = 2018)
M = Month (ex: 9 = September)

Date Code Key

Year Code	2018	2019	2020	2021	2022	2023	2024					
Code	F	G	H	I	J	K	L					
Month Code	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Code	1	2	3	4	5	6	7	8	9	O	N	D



DMG3415U

Maximum Ratings (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			V_{DSS}	-20	V
Gate-Source Voltage			V_{GSS}	± 8	V
Continuous Drain Current (Note 6) $V_{GS} = -4.5\text{V}$	Steady State	$T_A = +25^\circ\text{C}$	I_D	-4.0	A
		$T_A = +70^\circ\text{C}$		-3.5	
Pulsed Drain Current (10 μs Pulse, Duty Cycle = 1%)			I_{DM}	-30	A

Thermal Characteristics (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Total Power Dissipation (Note 6)	P_D	0.9	W
Thermal Resistance, Junction to Ambient (Note 6)	$R_{\theta JA}$	139	$^\circ\text{C/W}$
Thermal Resistance, Junction to Case (Note 6)	$R_{\theta JC}$	32	$^\circ\text{C/W}$
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to +150	$^\circ\text{C}$

Electrical Characteristics (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 7)						
Drain-Source Breakdown Voltage	BV_{DSS}	-20	—	—	V	$V_{GS} = 0\text{V}, I_D = -250\mu\text{A}$
Zero Gate Voltage Drain Current	I_{DSS}	—	—	-1	μA	$V_{DS} = -20\text{V}, V_{GS} = 0\text{V}$
Gate-Source Leakage	I_{GSS}	—	—	± 10	μA	$V_{GS} = \pm 8.0\text{V}, V_{DS} = 0\text{V}$
ON CHARACTERISTICS (Note 7)						
Gate Threshold Voltage	$V_{GS(TH)}$	-0.3	-0.55	-1.0	V	$V_{DS} = V_{GS}, I_D = -250\mu\text{A}$
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	31	42.5	m Ω	$V_{GS} = -4.5\text{V}, I_D = -4.0\text{A}$
		—	40	53		$V_{GS} = -2.5\text{V}, I_D = -3.5\text{A}$
		—	51	71		$V_{GS} = -1.8\text{V}, I_D = -2.0\text{A}$
Forward Transfer Admittance	$ g_{FS} $	—	3	—	S	$V_{DS} = -5\text{V}, I_D = -4\text{A}$
DYNAMIC CHARACTERISTICS (Note 8)						
Input Capacitance	C_{iss}	—	294	—	pF	$V_{DS} = -10\text{V}, V_{GS} = 0\text{V}$ $f = 1.0\text{MHz}$
Output Capacitance	C_{oss}	—	104	—	pF	
Reverse Transfer Capacitance	C_{rss}	—	25	—	pF	
Gate Resistance	R_g	—	250	—	Ω	$V_{DS} = 0\text{V}, V_{GS} = 0\text{V}, f = 1.0\text{MHz}$
SWITCHING CHARACTERISTICS (Note 8)						
Total Gate Charge	Q_g	—	9.1	—	nC	$V_{GS} = -4.5\text{V}, V_{DS} = -10\text{V}$ $I_D = -4\text{A}$
Gate-Source Charge	Q_{gs}	—	1.5	—	nC	
Gate-Drain Charge	Q_{gd}	—	1.7	—	nC	
Turn-On Delay Time	$t_{D(ON)}$	—	71	—	ns	$V_{DS} = -10\text{V}, V_{GS} = -4.5\text{V},$ $R_D = 2.5\Omega, R_G = 3.0\Omega, I_D = -1\text{A}$
Turn-On Rise Time	t_R	—	117	—	ns	
Turn-Off Delay Time	$t_{D(OFF)}$	—	795	—	ns	
Turn-Off Fall Time	t_F	—	393	—	ns	

- Notes:
6. Device mounted on FR-4 substrate PC board, with minimum recommended pad layout.
 7. Short duration pulse test used to minimize self-heating effect.
 8. Guaranteed by design. Not subject to production testing.



DMG3415U

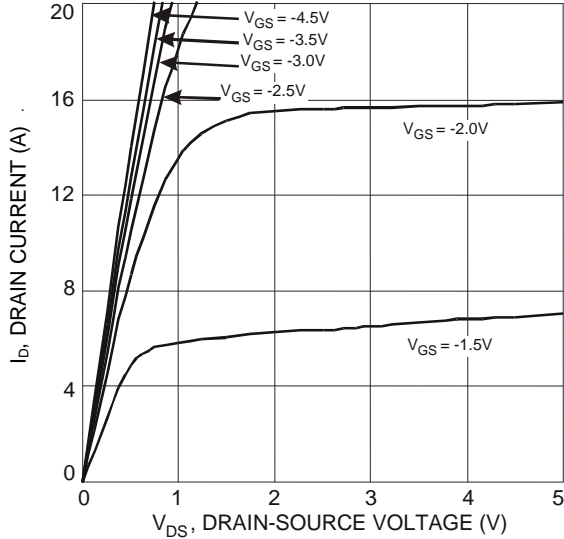


Fig. 1 Typical Output Characteristic

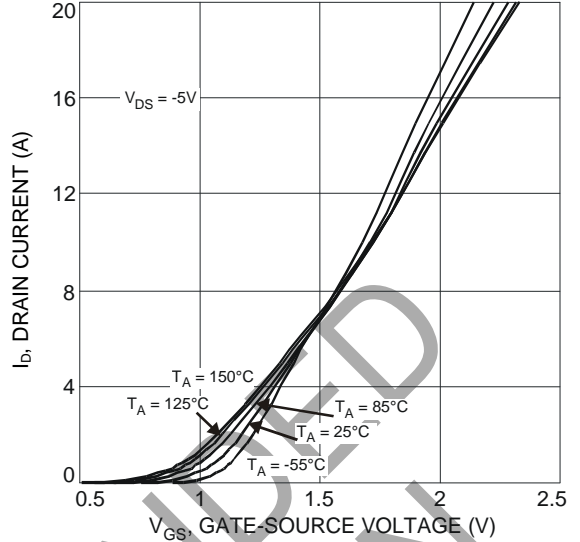


Fig. 2 Typical Transfer Characteristic

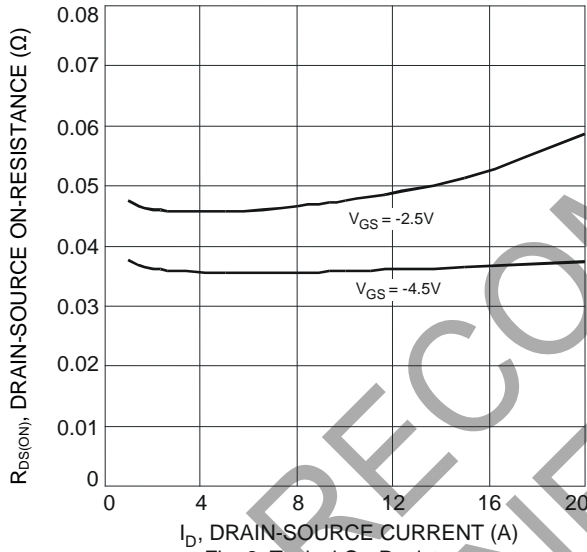


Fig. 3 Typical On-Resistance vs. Drain Current and Gate Voltage

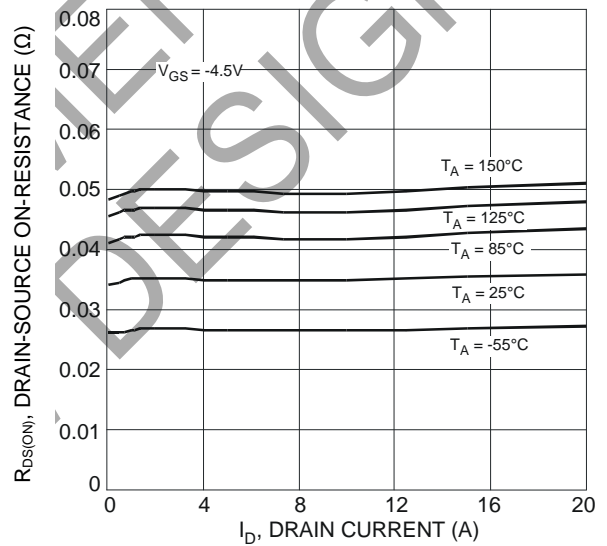


Fig. 4 Typical On-Resistance vs. Drain Current and Temperature

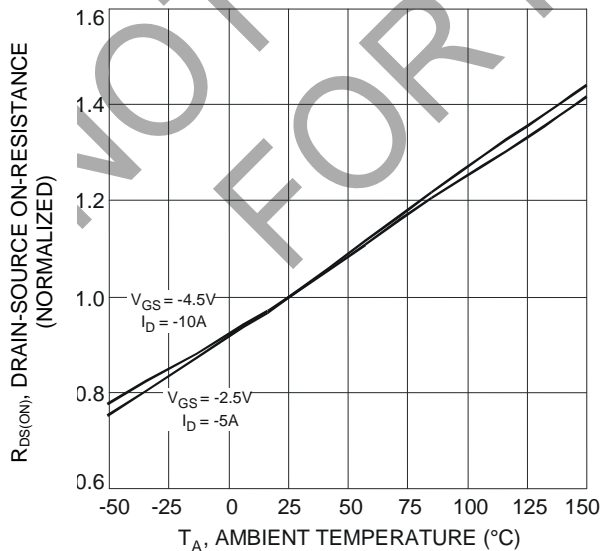


Fig. 5 On-Resistance Variation with Temperature

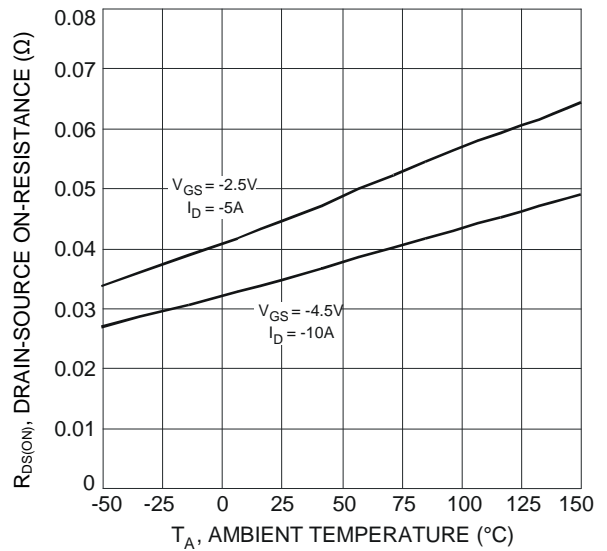


Fig. 6 On-Resistance Variation with Temperature



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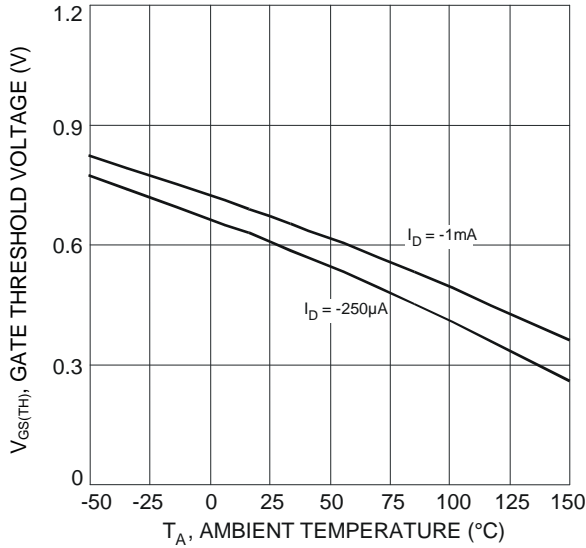


Fig. 7 Gate Threshold Variation vs. Ambient Temperature

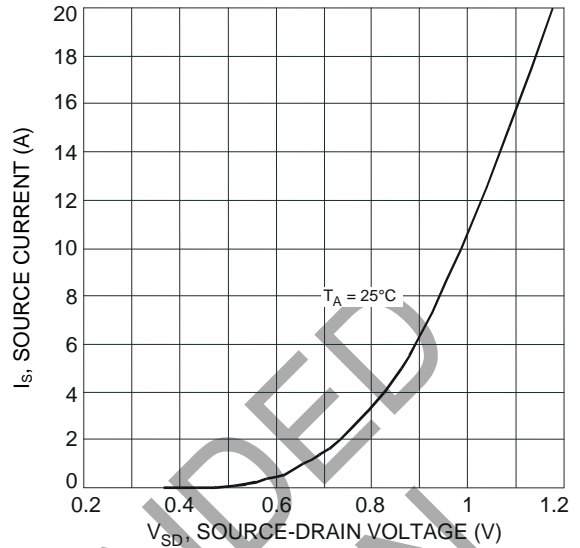


Fig. 8 Diode Forward Voltage vs. Current

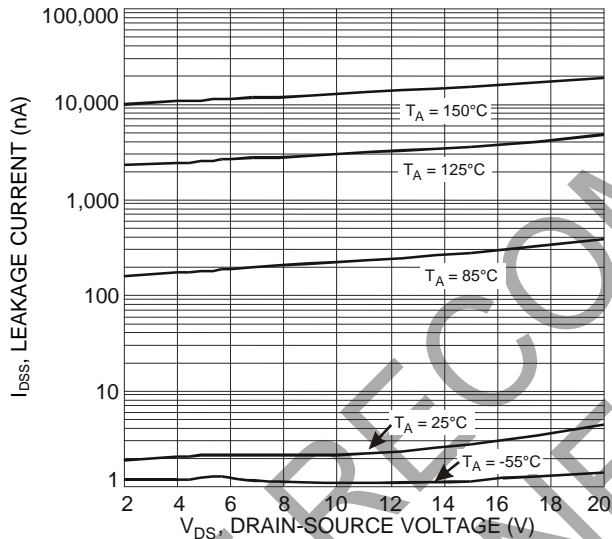


Fig. 9 Typical Leakage Current vs. Drain-Source Voltage

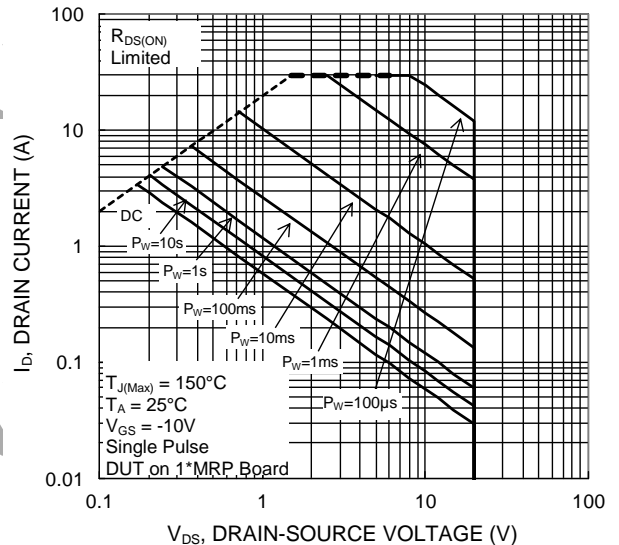


Fig. 10 SOA, Safe Operation Area

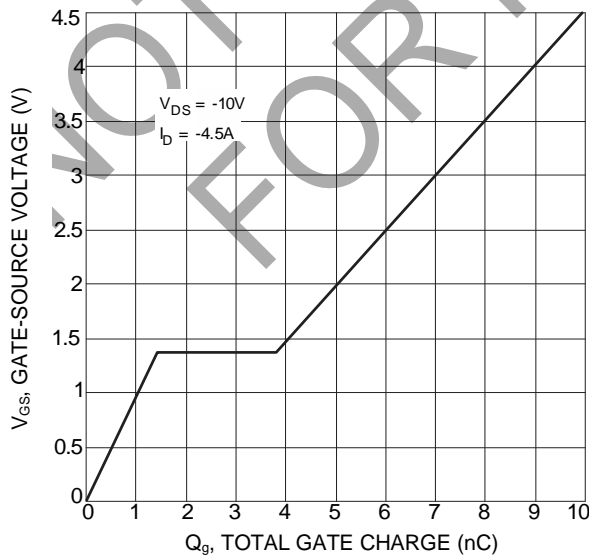


Fig. 11 Gate Charge



DMG3415U

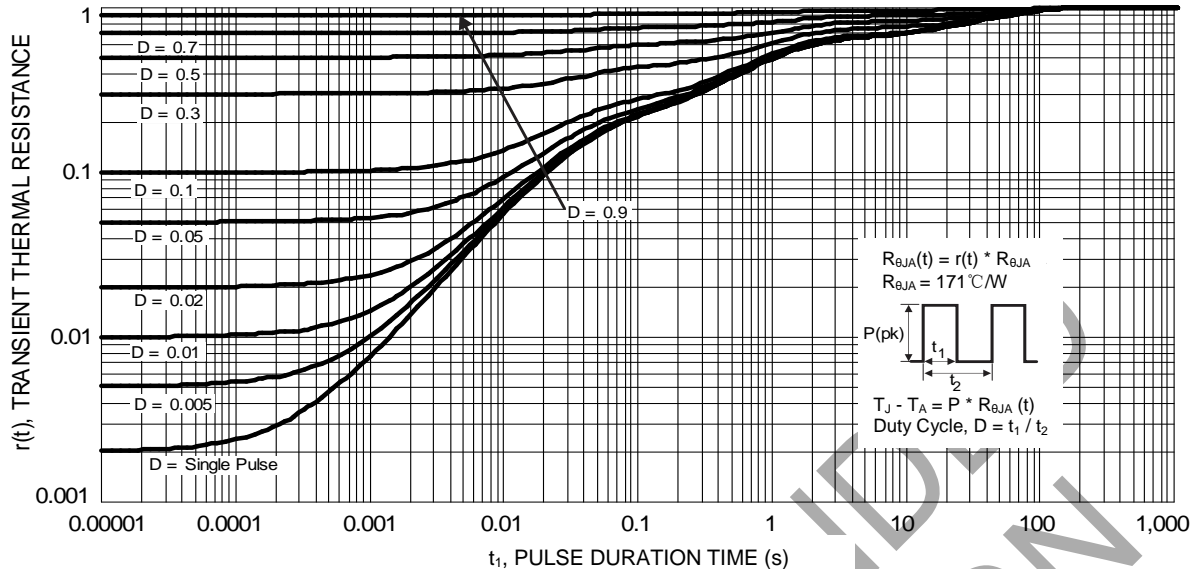


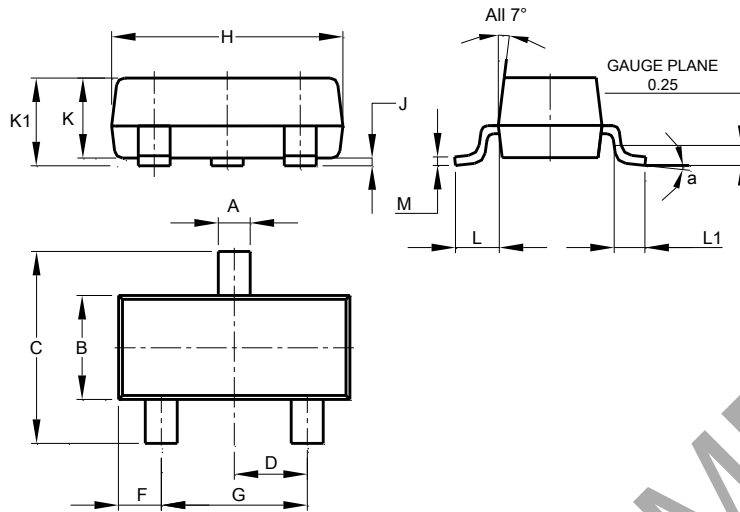
Fig. 12 Transient Thermal Response

NOT RECOMMENDED FOR NEW DESIGN

Package Outline Dimensions

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

SOT23

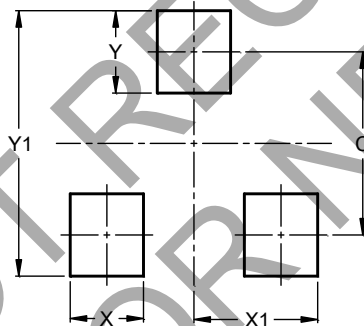


SOT23			
Dim	Min	Max	Typ
A	0.37	0.51	0.40
B	1.20	1.40	1.30
C	2.30	2.50	2.40
D	0.89	1.03	0.915
F	0.45	0.60	0.535
G	1.78	2.05	1.83
H	2.80	3.00	2.90
J	0.013	0.10	0.05
K	0.890	1.00	0.975
K1	0.903	1.10	1.025
L	0.45	0.61	0.55
L1	0.25	0.55	0.40
M	0.085	0.150	0.110
a	0°	8°	--
All Dimensions in mm			

Suggested Pad Layout

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

SOT23



Dimensions	Value (in mm)
C	2.0
X	0.8
X1	1.35
Y	0.9
Y1	2.9

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