

Product Summary

BV _{DSS}	R _{DS(ON)} Max	I _D Max T _A = +25°C
-20V	160mΩ @ V _{GS} = -4.5V	-2.4A
	210mΩ @ V _{GS} = -2.5V	-2.1A

Features and Benefits

- Low On-Resistance
- Low Input Capacitance
- Fast Switching Speed
- ESD Protected Gate
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **For automotive applications requiring specific change control (i.e.: parts qualified to AEC-Q100/101/104/200, PPAP capable, and manufactured in IATF 16949 certified facilities), please refer to the related automotive grade (Q-suffix) part. A listing can be found at <https://www.diodes.com/products/automotive/automotive-products/>.**
- **This part is qualified to JEDEC standards (as references in AEC-Q) for High Reliability. <https://www.diodes.com/quality/product-definitions/>**

Description and Applications

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

- Backlighting
- Power management functions
- DC-DC converters
- Motor controls

Mechanical Data

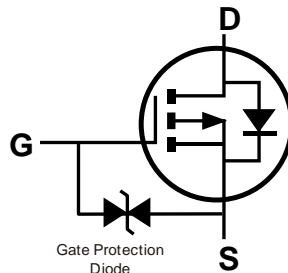
- Package: SOT23
- Package Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 e3
- Terminals Connections: See Diagram Below
- Weight: 0.009 grams (Approximate)



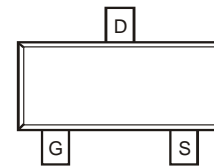
SOT23 (Standard)



Top View



Internal Schematic



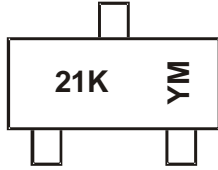
Top View

Ordering Information (Note 4)

Part Number	Package	Packing	
		Qty.	Carrier
DMG2301LK-7	SOT23 (Standard)	3,000	Tape & Reel
DMG2301LK-13	SOT23 (Standard)	10,000	Tape & Reel

- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
 2. 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.
 3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
 4. For packaging details, go to our website at <https://www.diodes.com/design/support/packaging/diodes-packaging/>.

Marking Information



21K = Product Type Marking Code
 YM = Date Code Marking
 Y or \bar{Y} = Year (ex: J = 2022)
 M = Month (ex: 9 = September)

Date Code Key

Year	2016	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Code	D	J	K	L	M	N	O	P	R	S	T
Month	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

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

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			V_{DS}	-20	V
Gate-Source Voltage			V_{GS}	± 12	V
Continuous Drain Current (Note 5) $V_{GS} = -4.5\text{V}$	Steady State	$T_A = +25^\circ\text{C}$	I_D	-2.4	A
		$T_A = +70^\circ\text{C}$		-1.9	
Maximum Continuous Body Diode Forward Current (Note 5)			I_S	-1.12	A
Pulsed Drain Current (10 μs Pulse, Duty Cycle = 1%)			I_{DM}	-8	A

Thermal Characteristics

Characteristic			Symbol	Value	Unit
Total Power Dissipation (Note 6)			P_D	0.84	W
Thermal Resistance, Junction to Ambient (Note 6)		Steady State	$R_{\theta JA}$	150	$^\circ\text{C/W}$
Total Power Dissipation (Note 5)			P_D	1.40	W
Thermal Resistance, Junction to Ambient (Note 6)		Steady State	$R_{\theta JA}$	91	$^\circ\text{C/W}$
Operating and Storage Temperature Range			T_J, T_{STG}	-55 to +150	$^\circ\text{C}$

Notes: 5. Device mounted on 1" x 1" FR-4 PCB with high coverage 2oz. copper, single sided.
 6. Device mounted on FR-4 PCB, with minimum recommended pad layout.

Electrical Characteristics (@ T_A = +25°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} = 0V, I _D = -250μA
Zero Gate Voltage Drain Current (T _J = +25°C)	I _{DSS}	—	—	-10	μA	V _{DS} = -16V, V _{GS} = 0V
Gate-Source Leakage	I _{GSS}	—	—	±10	μA	V _{GS} = ±10V, V _{DS} = 0V
ON CHARACTERISTICS (Note 7)						
Gate Threshold Voltage	V _{GS(TH)}	-0.3	-0.6	-1.0	V	V _{DS} = V _{GS} , I _D = -250μA
Static Drain-Source On-Resistance	R _{DS(ON)}	—	136	160	mΩ	V _{GS} = -4.5V, I _D = -1.0A
			183	210		
			229	298		
Diode Forward Voltage	V _{SD}	—	-0.8	-1.2	V	V _{GS} = 0V, I _S = -1.0A
DYNAMIC CHARACTERISTICS (Note 8)						
Input Capacitance	C _{iss}	—	156	—	pF	V _{DS} = -6V, V _{GS} = 0V f = 1.0MHz
Output Capacitance	C _{oss}	—	36	—	pF	
Reverse Transfer Capacitance	C _{rss}	—	28	—	pF	
Gate Resistance	R _g	—	41	—	Ω	V _{DS} = 0V, V _{GS} = 0V, f = 1MHz
Total Gate Charge (V _{GS} = -4.5V)	Q _g	—	1.6	—	nC	V _{DS} = -6V I _D = -2.2A
Total Gate Charge (V _{GS} = -10V)	Q _g	—	3.4	—	nC	
Gate-Source Charge	Q _{gs}	—	0.3	—	nC	
Gate-Drain Charge	Q _{gd}	—	0.4	—	nC	
Turn-On Delay Time	t _{D(ON)}	—	3.2	—	ns	V _{DS} = -6V, V _{GS} = -4.5V R _{GEN} = 6Ω, I _D = -1A
Turn-On Rise Time	t _R	—	7.4	—	ns	
Turn-Off Delay Time	t _{D(OFF)}	—	11.0	—	ns	
Turn-Off Fall Time	t _F	—	10.5	—	ns	
Reverse Recovery Time	t _{RR}	—	6.5	—	ns	I _F = -1.0A, dI/dt = 100A/μs
Reverse Recovery Charge	Q _{RR}	—	0.8	—	nC	

Notes: 7. Short duration pulse test used to minimize self-heating effect.
8. Guaranteed by design. Not subject to product testing.

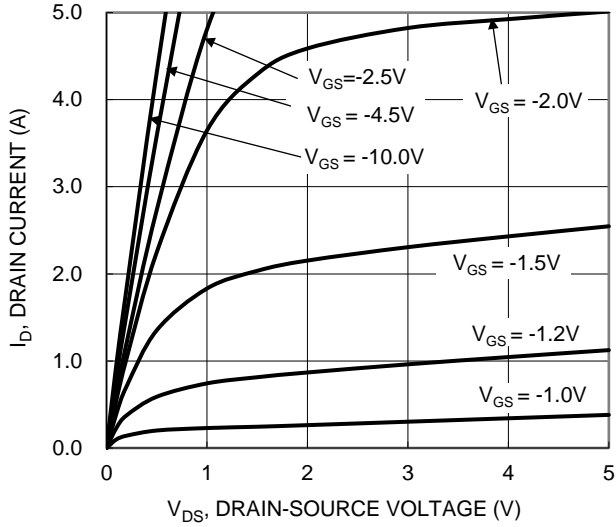


Figure 1. Typical Output Characteristic

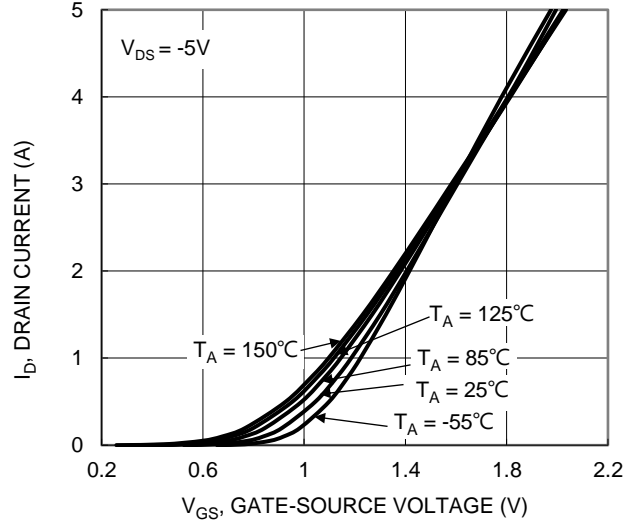


Figure 2. Typical Transfer Characteristic

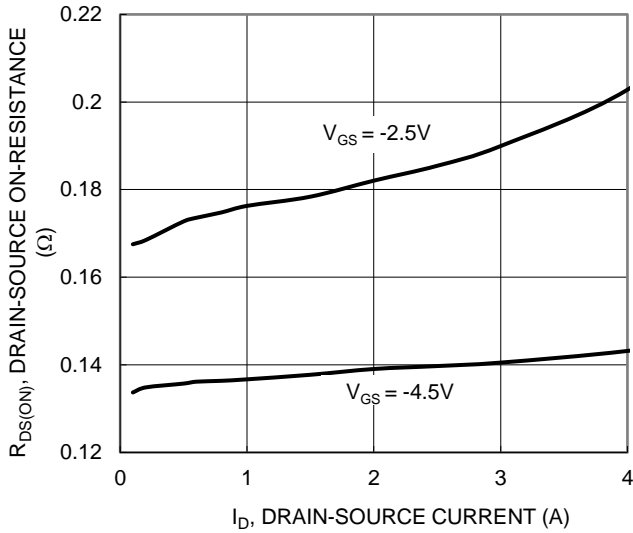


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

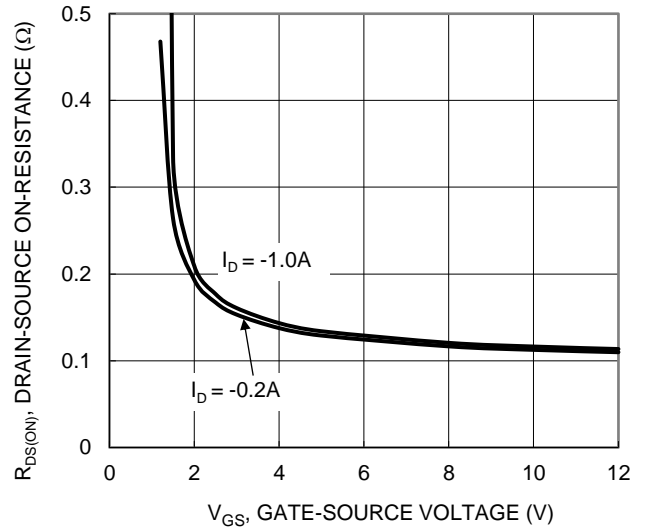


Figure 4. Typical Transfer Characteristic

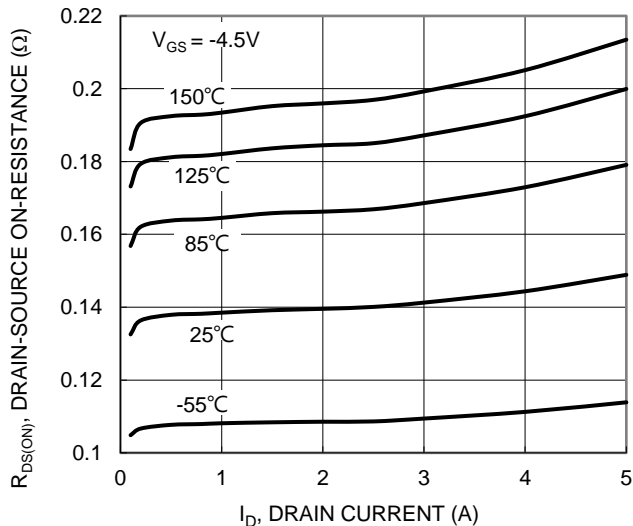


Figure 5. Typical On-Resistance vs. Drain Current and Junction Temperature

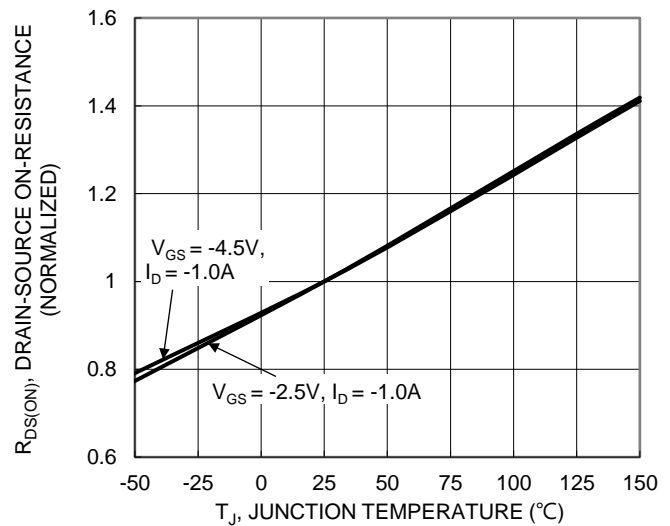
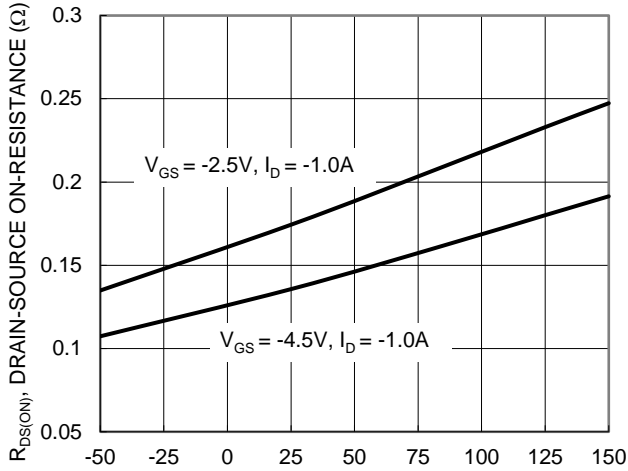
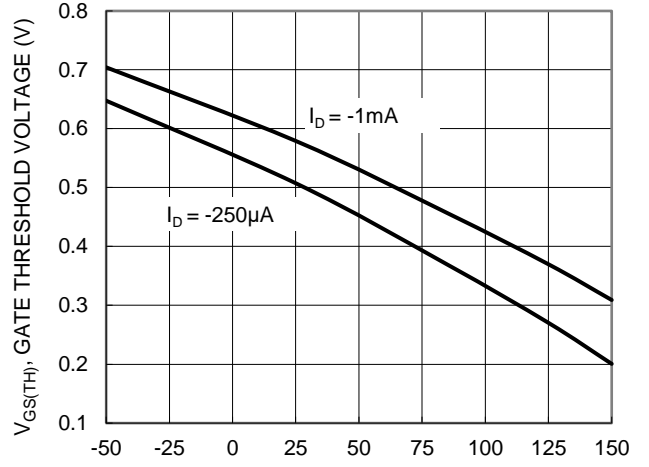


Figure 6. On-Resistance Variation with Junction Temperature



T_J, JUNCTION TEMPERATURE (°C)
Figure 7. On-Resistance Variation with Junction Temperature



T_J, JUNCTION TEMPERATURE (°C)
Figure 8. Gate Threshold Variation vs. Junction Temperature

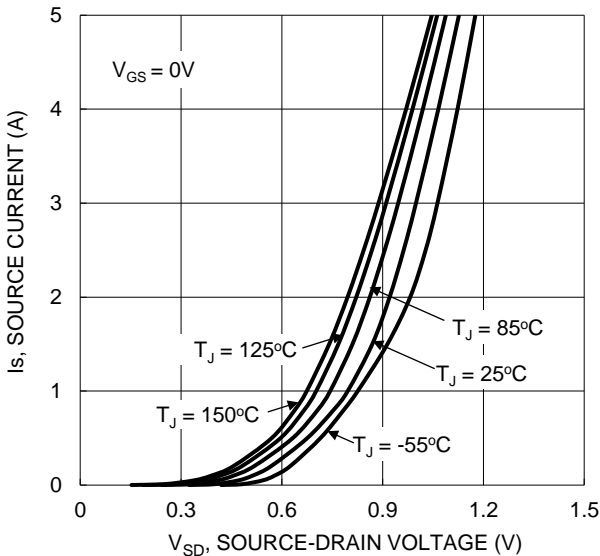


Figure 9. Diode Forward Voltage vs. Current

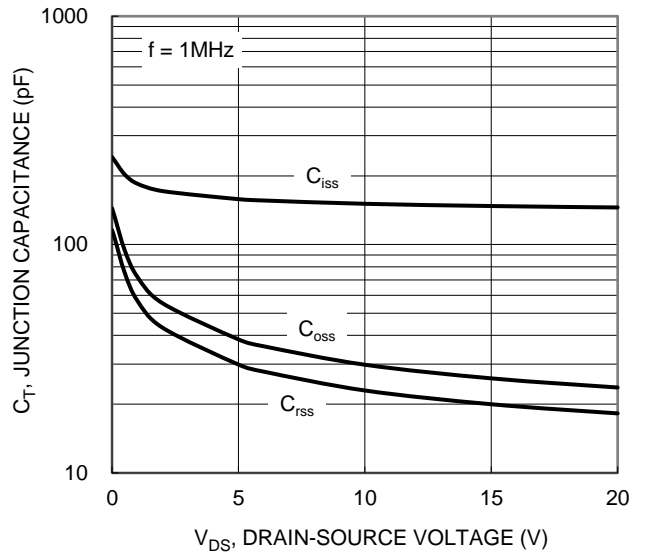


Figure 10. Typical Junction Capacitance

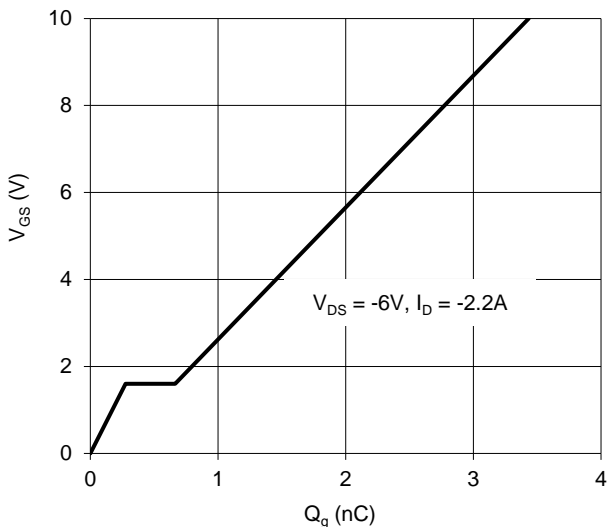
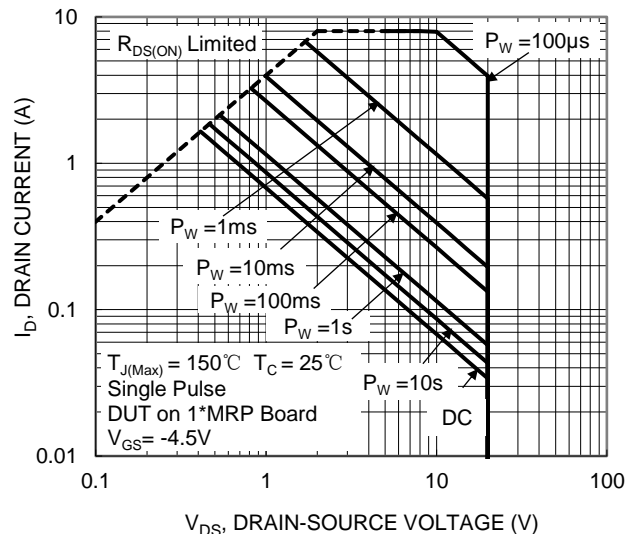


Figure 11. Gate Charge



V_{DS}, DRAIN-SOURCE VOLTAGE (V)
Figure 12. SOA, Safe Operation Area

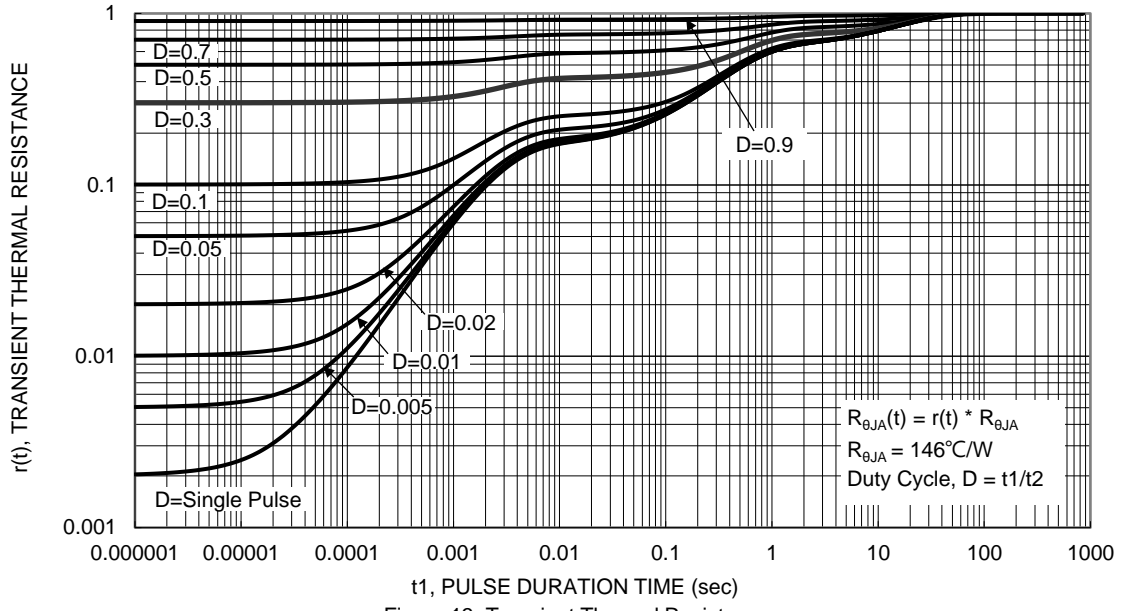
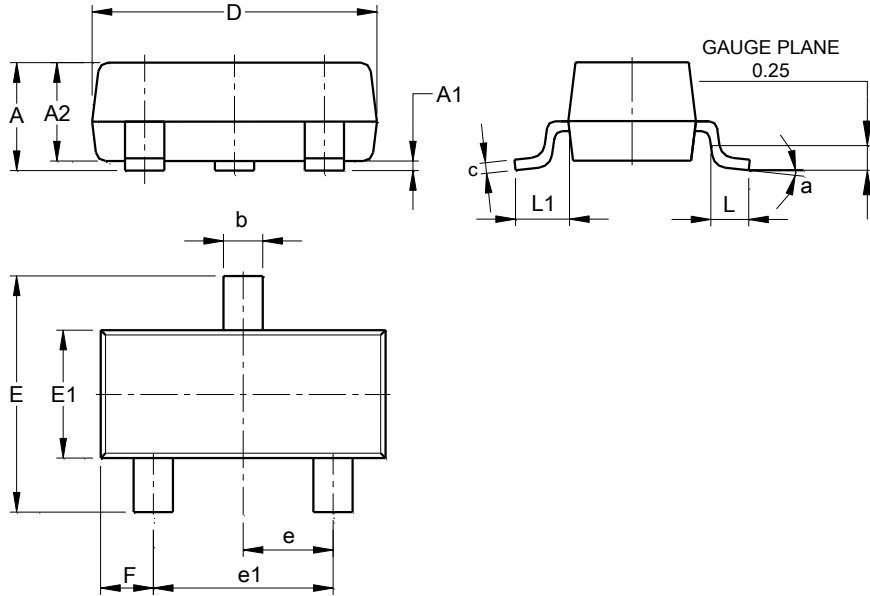


Figure 13. Transient Thermal Resistance

Package Outline Dimensions

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

SOT23 (Standard)

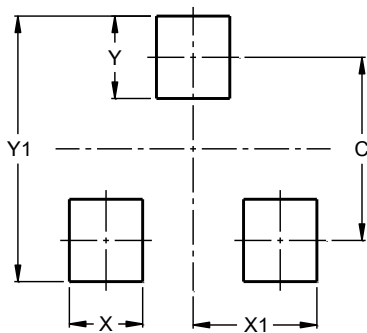


SOT23 (Standard)			
Dim	Min	Max	Typ
A	0.90	1.15	1.025
A1	0.00	0.10	0.05
A2	0.85	1.10	0.975
b	0.30	0.51	0.40
c	0.080	0.202	0.11
D	2.80	3.00	2.90
E	2.25	2.55	2.40
E1	1.20	1.40	1.30
e	0.89	1.03	0.915
e1	1.78	2.05	1.83
F	0.40	0.60	0.535
L1	0.45	0.61	0.55
L	0.25	0.55	0.40
a	0°	8°	--
All Dimensions in mm			

Suggested Pad Layout

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

SOT23 (Standard)



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

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