

DMN2053UQ-7 Datasheet



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DiGi Electronics Part Number	DMN2053UQ-7-DG
Manufacturer	Diodes Incorporated
Manufacturer Product Number	DMN2053UQ-7
Description	MOSFET BVDSS: 8V~24V SOT23 T&R 3
Detailed Description	N-Channel 20 V 6.5A (Ta) 800mW (Ta) Surface Mount SOT-23-3



Tel: +00 852-30501935

RFQ Email: Info@DiGi-Electronics.com

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Purchase and inquiry

Manufacturer Product Number:

DMN2053UQ-7

Series:

-

FET Type:

N-Channel

Drain to Source Voltage (Vdss):

20 V

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

1.8V, 10V

Vgs(th) (Max) @ Id:

1.2V @ 250µA

Vgs (Max):

±12V

FET Feature:

-

Operating Temperature:

-55°C ~ 150°C (Tj)

Qualification:

AEC-Q101

Supplier Device Package:

SOT-23-3

Base Product Number:

DMN2053

Manufacturer:

Diodes Incorporated

Product Status:

Active

Technology:

MOSFET (Metal Oxide)

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

6.5A (Ta)

Rds On (Max) @ Id, Vgs:

29mOhm @ 6A, 10V

Gate Charge (Qg) (Max) @ Vgs:

4.6 nC @ 4.5 V

Input Capacitance (Ciss) (Max) @ Vds:

414 pF @ 10 V

Power Dissipation (Max):

800mW (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



DMN2053UQ

N-CHANNEL ENHANCEMENT MODE MOSFET

Product Summary

BV _{DSS}	R _{DS(ON)} max	I _D max T _A = +25°C
20V	29mΩ @ V _{GS} = 10V	6.5A
	35mΩ @ V _{GS} = 4.5V	5.4A

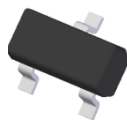
Description

This new generation 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.

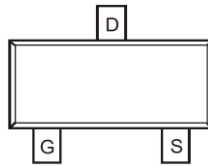
Applications

- General purpose interfacing switches
- Power management functions

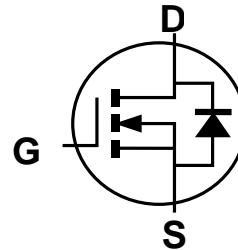
SOT23



Top View



Top View



Equivalent Circuit

Features

- Low On-Resistance
- Low Input Capacitance
- Fast Switching Speed
- Low Input/Output Leakage
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **The DMN2053UQ is suitable for automotive applications requiring specific change control; this part is AEC-Q101 qualified, PPAP capable, and manufactured in IATF 16949 certified facilities.**

<https://www.diodes.com/quality/product-definitions/>

Mechanical Data

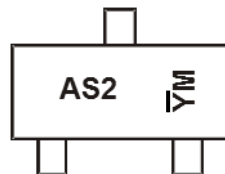
- Package: SOT23
- Package Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish — Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 (e3)
- Terminals Connections: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

Ordering Information (Note 4)

Part Number	Package	Packing	
		Qty.	Carrier
DMN2053UQ-7	SOT23	3000	Tape & Reel
DMN2053UQ-13	SOT23	10000	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



AS2 = Product Type Marking Code
 YM = Date Code Marking
 Y = Last Digit of Year (ex: J = 2022)
 M = Month (ex: 1 = January)

Date Code Key

Year	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Code	I	J	K	L	M	N	O	P	R	S	T	U

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



DMN2053UQ

Maximum Ratings (@T_A = +25°C, unless otherwise specified.)

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			V _{DSS}	20	V
Gate-Source Voltage			V _{GSS}	±12	V
Continuous Drain Current (Note 6)	Steady State	T _A = +25°C	I _D	6.5	A
		T _A = +70°C		5.4	
Pulsed Drain Current (380µs Pulse, Duty Cycle = 1%)			I _{DM}	22	A

Thermal Characteristics (@T_A = +25°C, unless otherwise specified.)

Characteristic		Symbol	Value	Unit
Total Power Dissipation (Note 5)		P _D	0.8	W
Thermal Resistance, Junction to Ambient (Note 5)	Steady State	R _{θJA}	160	°C/W
Total Power Dissipation (Note 6)		P _D	1.3	W
Thermal Resistance, Junction to Ambient (Note 6)	Steady State	R _{θJA}	93	°C/W
Operating and Storage Temperature Range		T _J , T _{STG}	-55 to +150	°C

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}	—	—	1.0	µA	V _{DS} = 20V, V _{GS} = 0V
Gate-Source Leakage	I _{GSS}	—	—	±100	nA	V _{GS} = ±12V, V _{DS} = 0V
ON CHARACTERISTICS (Note 7)						
Gate Threshold Voltage	V _{GS(TH)}	0.5	0.95	1.2	V	V _{DS} = V _{GS} , I _D = 250µA
Static Drain-Source On-Resistance	R _{DS(ON)}	—	26	29	mΩ	V _{GS} = 10V, I _D = 6A
			28	35		V _{GS} = 4.5V, I _D = 5A
			35	48		V _{GS} = 2.5V, I _D = 4A
			47	91		V _{GS} = 1.8V, I _D = 2A
Diode Forward Voltage	V _{SD}	—	0.7	1.0	V	V _{GS} = 0V, I _S = 1A
DYNAMIC CHARACTERISTICS (Note 8)						
Input Capacitance	C _{iss}	—	414	—	pF	V _{DS} = 10V, V _{GS} = 0V, f = 1.0MHz
Output Capacitance	C _{oss}	—	58	—	pF	
Reverse Transfer Capacitance	C _{rss}	—	43	—	pF	
Gate Resistance	R _g	—	3.6	—	Ω	V _{DS} = 0V, V _{GS} = 0V, f = 1MHz
Total Gate Charge	Q _g	—	4.6	—	nC	V _{GS} = 4.5V, V _{DS} = 10V, I _D = 6A
Gate-Source Charge	Q _{gs}	—	0.5	—	nC	
Gate-Drain Charge	Q _{gd}	—	1.4	—	nC	
Turn-On Delay Time	t _{D(ON)}	—	2.6	—	ns	V _{DD} = 10V, V _{GS} = 5V, R _L = 1.7Ω, R _G = 6Ω
Turn-On Rise Time	t _R	—	2.9	—	ns	
Turn-Off Delay Time	t _{D(OFF)}	—	13.5	—	ns	
Turn-Off Fall Time	t _F	—	3.8	—	ns	
Reverse Recovery Time	t _{RR}	—	6.8	—	ns	I _F = 1.0A, di/dt = 100A/µs
Reverse Recovery Charge	Q _{RR}	—	1.2	—	nC	I _F = 1.0A, di/dt = 100A/µs

- Notes:
5. Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.
 6. Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.
 7. Short duration pulse test used to minimize self-heating effect.
 8. Guaranteed by design. Not subject to product testing



DMN2053UQ

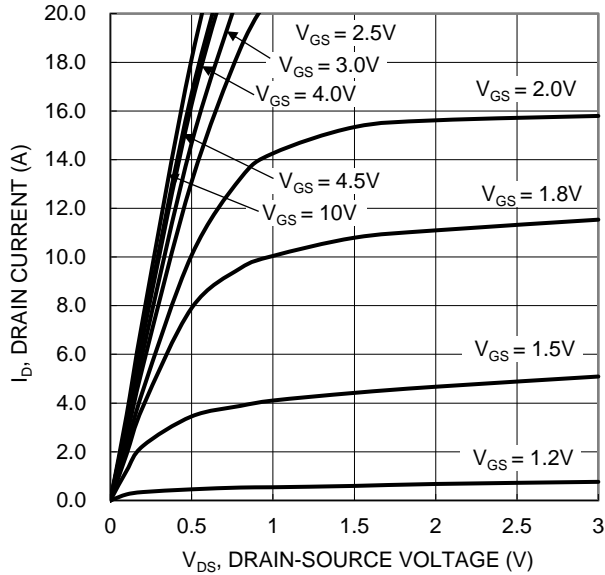


Figure 1. Typical Output Characteristic

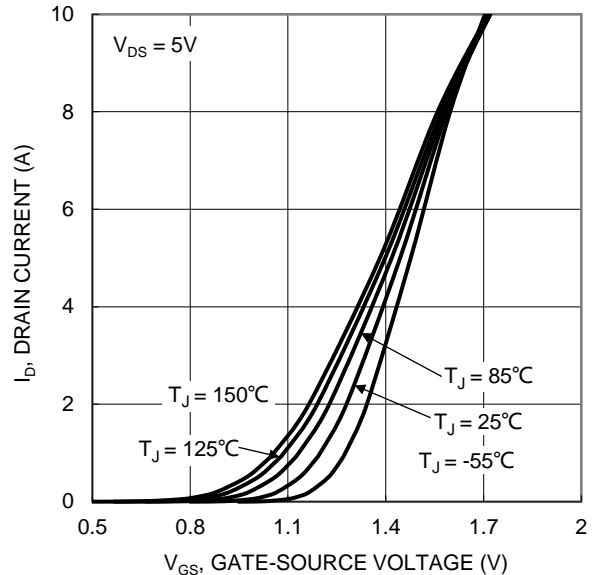


Figure 2. Typical Transfer Characteristic

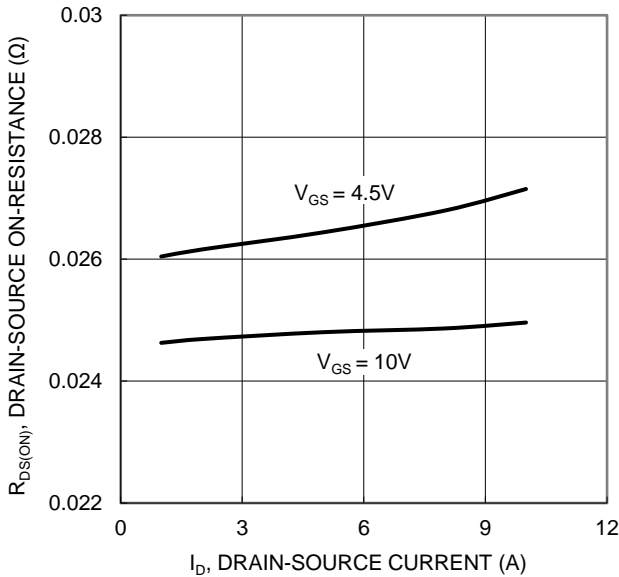


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

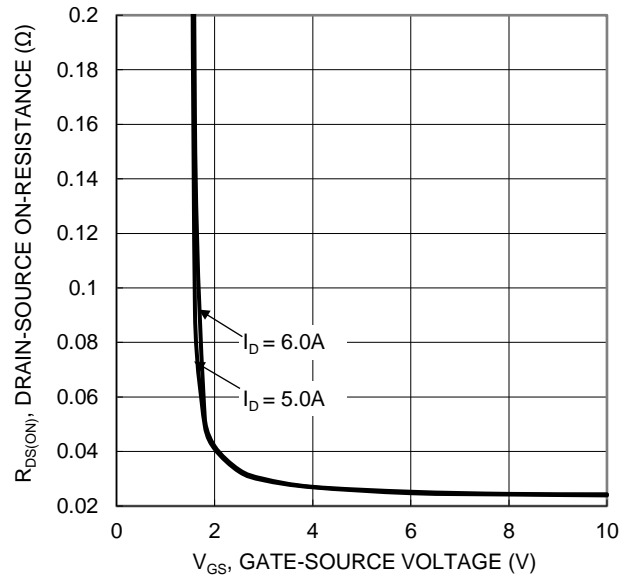


Figure 4. Typical Transfer Characteristic

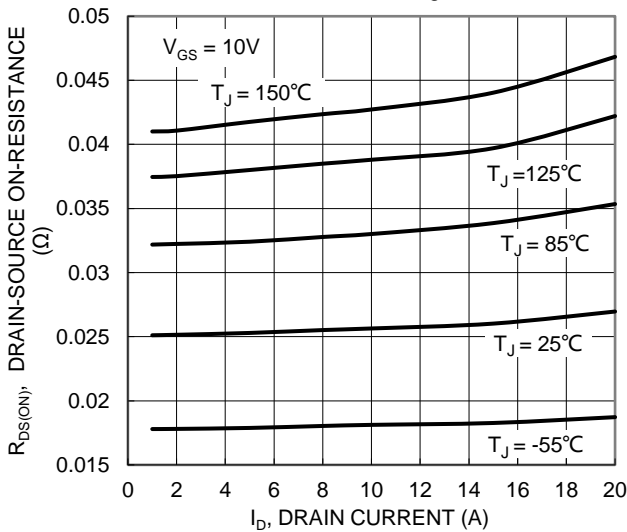


Figure 5. Typical On-Resistance vs. Drain Current and Junction Temperature

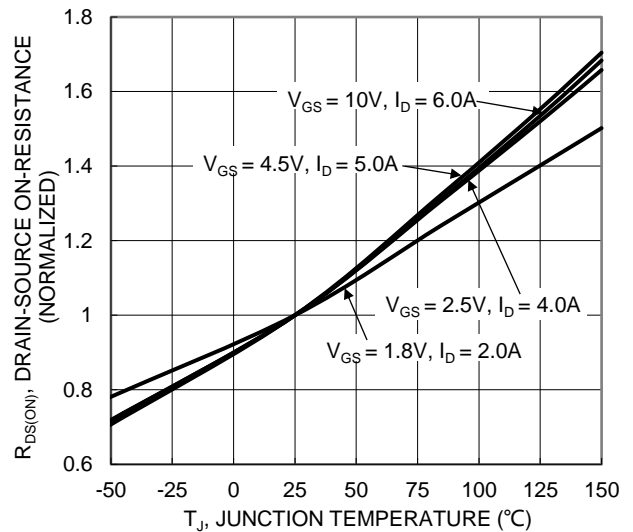


Figure 6. On-Resistance Variation with Junction Temperature



DMN2053UQ

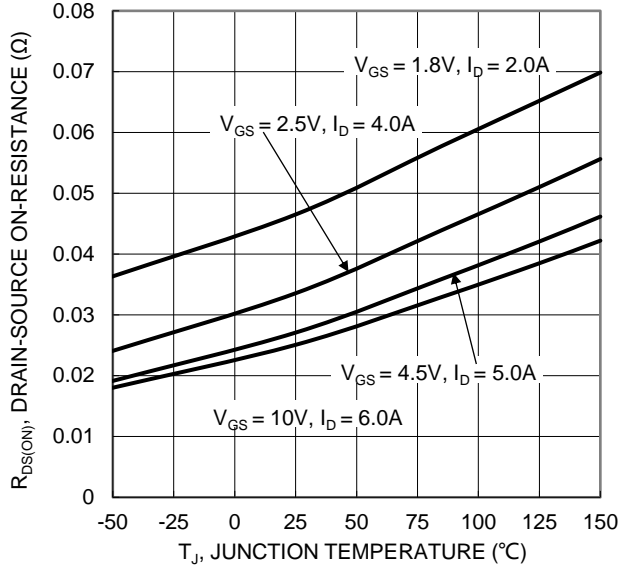


Figure 7. On-Resistance Variation with Junction Temperature

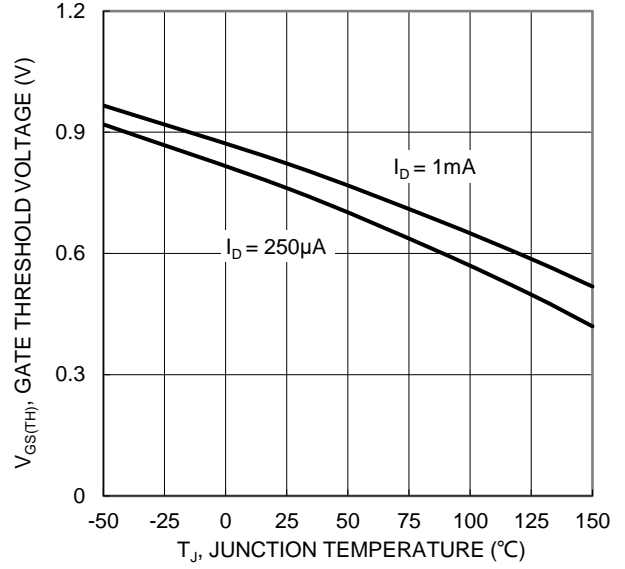


Figure 8. Gate Threshold Variation vs. Junction Temperature

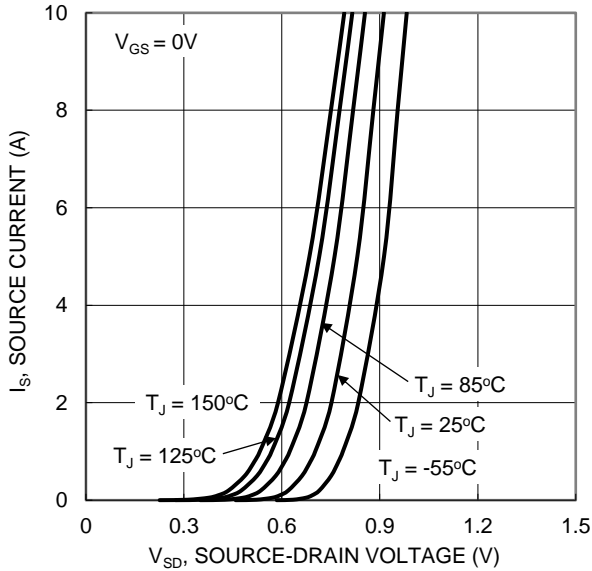


Figure 9. Diode Forward Voltage vs. Current

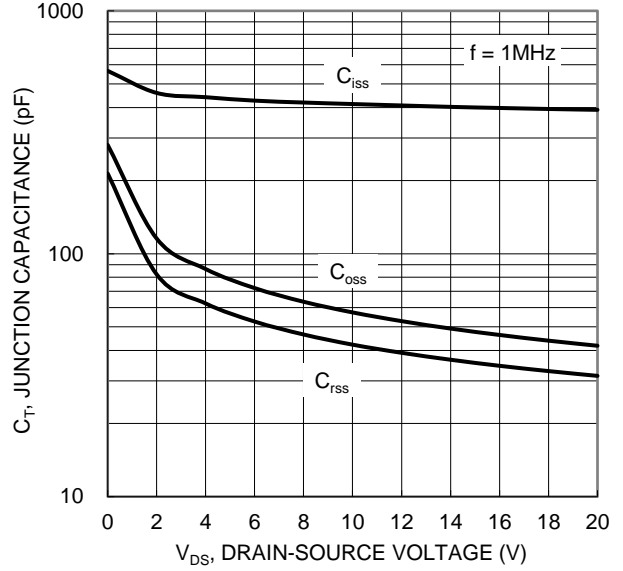


Figure 10. Typical Junction Capacitance

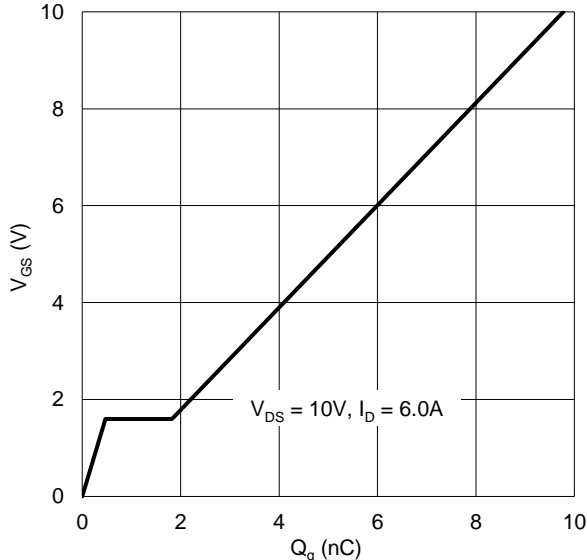


Figure 11. Gate Charge

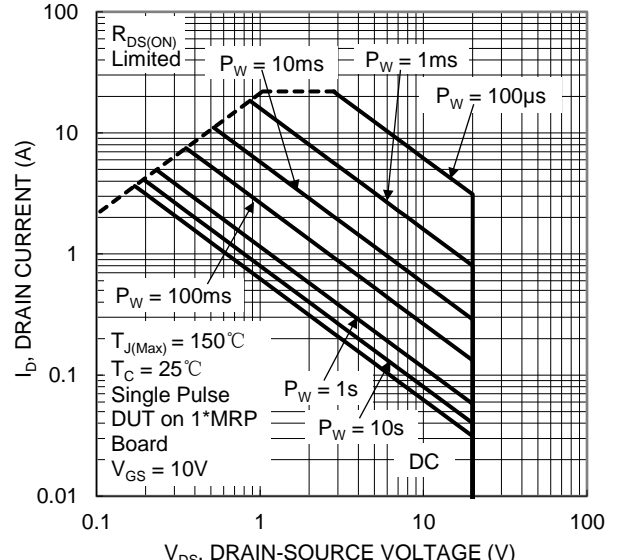


Figure 12. SOA, Safe Operation Area



DMN2053UQ

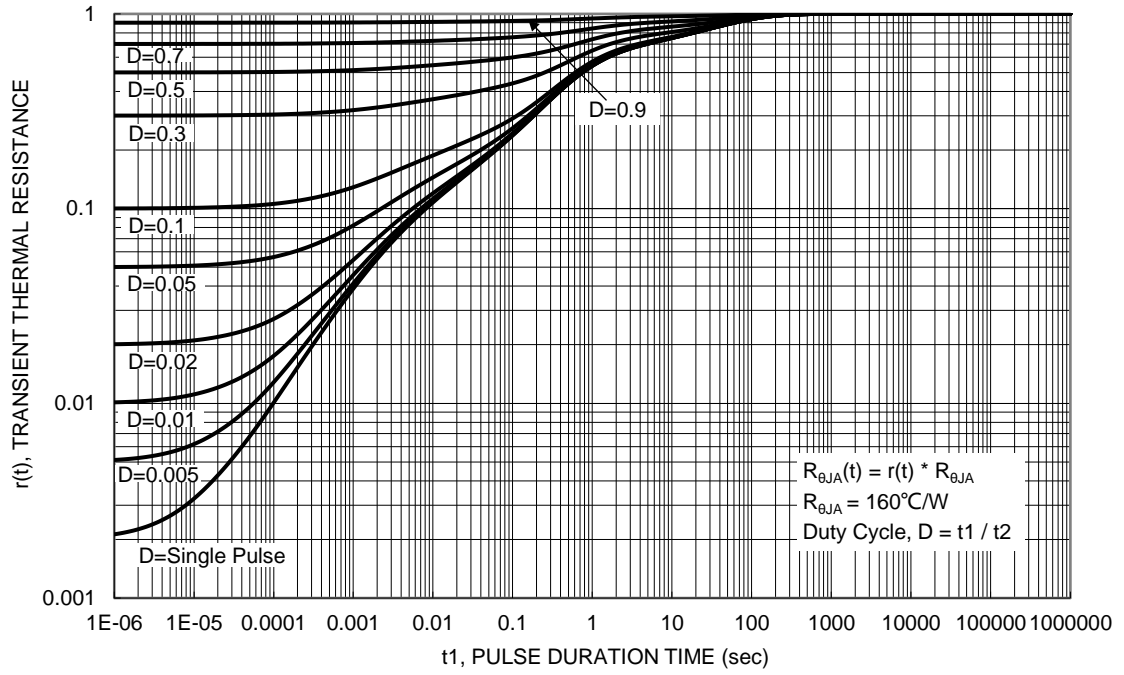
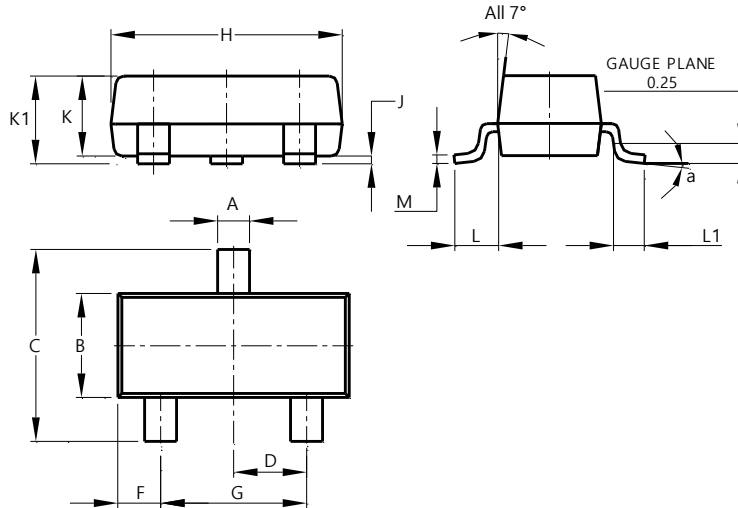


Figure 13. Transient Thermal Resistance

Package Outline Dimensions

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

SOT23

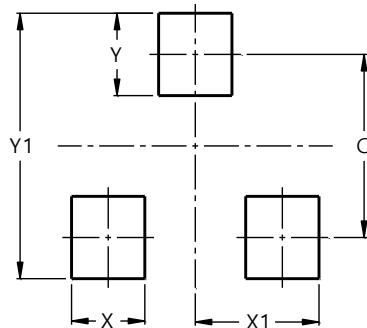


SOT23			
Dim	Min	Max	Typ
A	0.37	0.51	0.40
B	1.20	1.40	1.30
C	2.30	2.50	2.40
D	0.89	1.03	0.915
F	0.45	0.60	0.535
G	1.78	2.05	1.83
H	2.80	3.00	2.90
J	0.013	0.10	0.05
K	0.890	1.00	0.975
K1	0.903	1.10	1.025
L	0.45	0.61	0.55
L1	0.25	0.55	0.40
M	0.085	0.150	0.110
a	0°	8°	--
All Dimensions in mm			

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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