DMP21D1UTQ-7 Datasheet

DiGi Electronics Part Number	DMP21D1UTQ-7-DG
Manufacturer	Diodes Incorporated
Manufacturer Product Number	DMP21D1UTQ-7
Description	MOSFET BVDSS: 8V~24V SOT523 T&R
Detailed Description	P-Channel 20 V 630mA (Ta) 260mW (Ta) Surface Mount SOT-523

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Purchase and inquiry

Manufacturer Product Number:	Manufacturer:
DMP21D1UTQ-7	Diodes Incorporated
Series:	Product Status:
-	Active
FET Type:	Technology:
P-Channel	MOSFET (Metal Oxide)
Drain to Source Voltage (Vdss):	Current - Continuous Drain (Id) @ 25°C:
20 V	630mA (Ta)
Drive Voltage (Max Rds On, Min Rds On):	Rds On (Max) @ Id, Vgs:
1.8V, 4.5V	710mOhm @ 400mA, 4.5V
Vgs(th) (Max) @ Id:	Gate Charge (Qg) (Max) @ Vgs:
1V @ 250µA	1.4 nC @ 4.5 V
Vgs (Max):	Input Capacitance (Ciss) (Max) @ Vds:
±8V	33 pF @ 10 V
FET Feature:	Power Dissipation (Max):
-	260mW (Ta)
Operating Temperature:	Grade:
-55°C ~ 150°C (TJ)	Automotive
Qualification:	Mounting Type:
AEC-Q101	Surface Mount
Supplier Device Package:	Package / Case:
SOT-523	SOT-523

Environmental & Export classification

RoHS Status:	REACH Status:
ROHS3 Compliant	REACH Unaffected

Lead-free Green

DMP21D1UTQ

P-CHANNEL ENHANCEMENT MODE MOSFET

Product Summary

BV_{DSS}	$R_{DS(ON)}$	I_D T_A = +25°C
-20V	710mΩ @ V_{GS} = -4.5V	-0.63A
	930mΩ @ V_{GS} = -2.5V	-0.55A
	1250mΩ @ V_{GS} = -1.8V	-0.48A

Features and Benefits

- Low On-Resistance
- Low Gate Threshold Voltage
- Low Input Capacitance
- Fast Switching Speed
- Low Input/Output Leakage
- ESD Protected Gate
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **The DMP21D1UTQ is suitable for automotive applications requiring specific change control; this part is AEC-Q101 qualified, PPAP capable, and manufactured in IATF16949 certified facilities.**
  https://www.diodes.com/quality/product-definitions/

Description and Applications

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.

- DC-DC converters
- Load switches
- Power-management functions

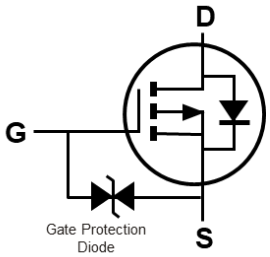
Mechanical Data

- Package: SOT523
- 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 Alloy 42 Leadframe. Solderable per MIL-STD-202, Method 208 e3
- Terminal Connections: See Diagram
- Weight: 0.002 grams (Approximate)

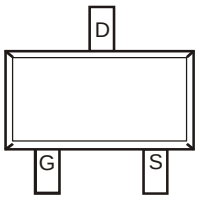
ESD PROTECTED

SOT523

Top View



Equivalent Circuit



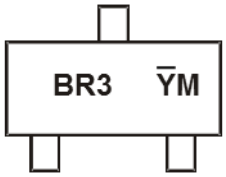
Top View

Ordering Information (Note 4)

Part Number	Package	Packing	
		Qty.	Carrier
DMP21D1UTQ-7	SOT523	3000	Tape & Reel
DMP21D1UTQ-13	SOT523	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



BR3 = Product Type Marking Code
$\overline{Y}$M = Date Code Marking
Y or $\overline{Y}$ = Year (ex: K = 2023)
M = Month (ex: 9 = September)

Date Code Key

Year	2023	2024	2025	2026	2027	2028	2029	2030	20231	2032	2033	2034
Code	K	L	M	N	P	R	S	T	U	V	W	X

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°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 5) V_{GS} = -4.5V	Steady State	T_A = +25°C T_A = +75°C	I_D	-0.63 -0.51	A
Maximum Continuous Body Diode Forward Current (Note 5)			I_S	-0.4	A
Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)			I_{DM}	-2.5	A

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

Characteristic		Symbol	Value	Unit
Total Power Dissipation (Note 6)	Steady State	P_D	0.26	W
Thermal Resistance, Junction to Ambient (Note 6)	Steady State	$R_{\theta JA}$	480	°C/W
Total Power Dissipation (Note 5)	Steady State	P_D	0.44	W
Thermal Resistance, Junction to Ambient (Note 5)	Steady State	$R_{\theta JA}$	287	°C/W
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +150	°C

Notes: 5. Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.
6. Device mounted on FR-4 substrate PC board, 2oz copper, 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}	—	—	-1	μA	V_{DS} = -20V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	—	—	±10	μA	V_{GS} = ±8V, V_{DS} = 0V
ON CHARACTERISTICS (Note 7)						
Gate Threshold Voltage	$V_{GS(TH)}$	-0.5	—	-1.0	V	V_{DS} = V_{GS}, I_D = -250μA
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	390	710	mΩ	V_{GS} = -4.5V, I_D = -400mA
		—	590	930		V_{GS} = -2.5V, I_D = -300mA
		—	770	1250		V_{GS} = -1.8V, I_D = -100mA
Diode Forward Voltage (Note 7)	V_{SD}	—	-0.8	-1.2	V	V_{GS} = 0V, I_S = -300mA
DYNAMIC CHARACTERISTICS (Note 8)						
Input Capacitance	C_{iss}	—	33	—	pF	V_{DS} = -10V, V_{GS} = 0V f = 1.0MHz
Output Capacitance	C_{oss}	—	10	—	pF	
Reverse Transfer Capacitance	C_{rss}	—	3	—	pF	
Total Gate Charge	Q_g	—	1.4	—	nC	V_{GS} = -4.5V, V_{DS} = -15V I_D = -1A
Gate-Source Charge	Q_{gs}	—	0.5	—	nC	
Gate-Drain Charge	Q_{gd}	—	0.1	—	nC	
Turn-On Delay Time	$t_{D(ON)}$	—	4.6	—	ns	V_{DS} = -10V, I_D = -1A V_{GS} = -4.5V, R_G = 6Ω
Turn-On Rise Time	t_R	—	2.2	—	ns	
Turn-Off Delay Time	$t_{D(OFF)}$	—	14.4	—	ns	
Turn-Off Fall Time	t_F	—	7.9	—	ns	

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

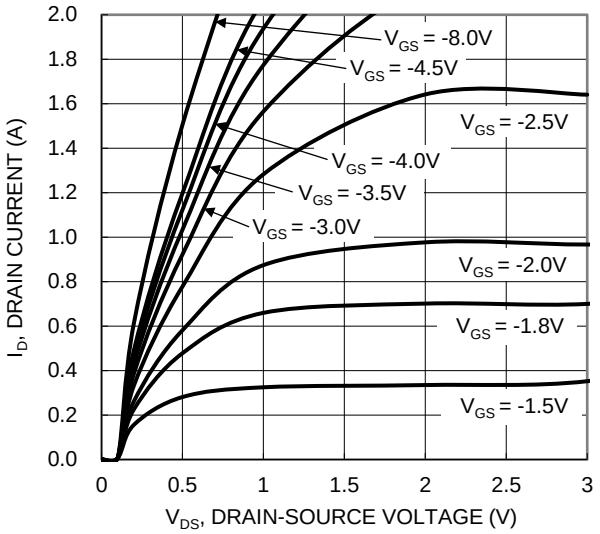


Figure 1. Typical Output Characteristic

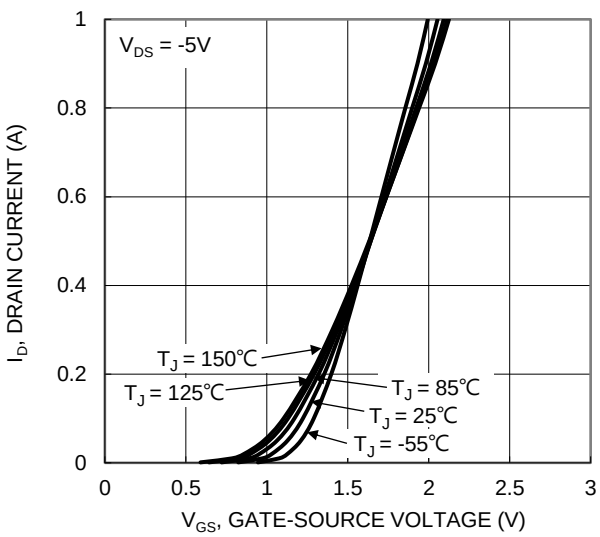


Figure 2. Typical Transfer Characteristic

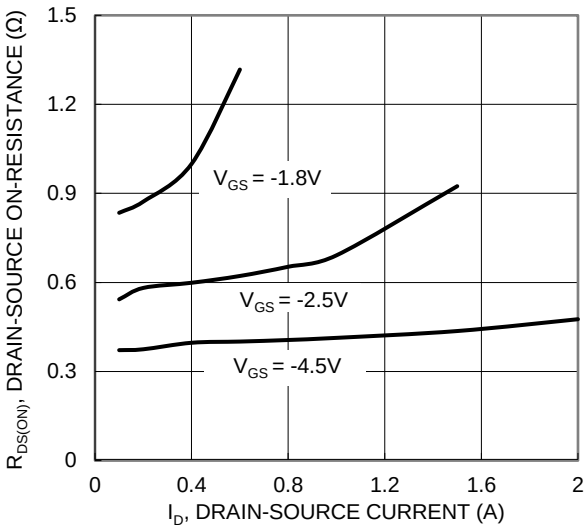


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

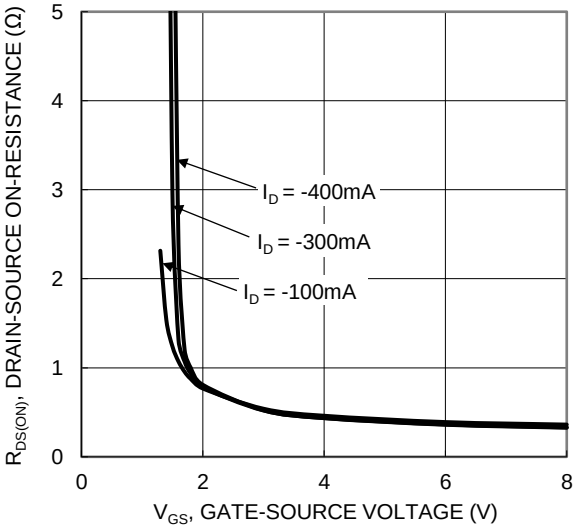


Figure 4. Typical Transfer Characteristic

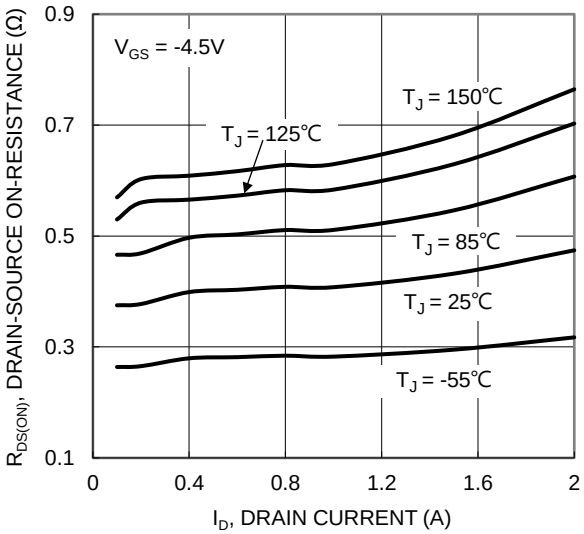


Figure 5. Typical On-Resistance vs. Drain Current and Junction Temperature

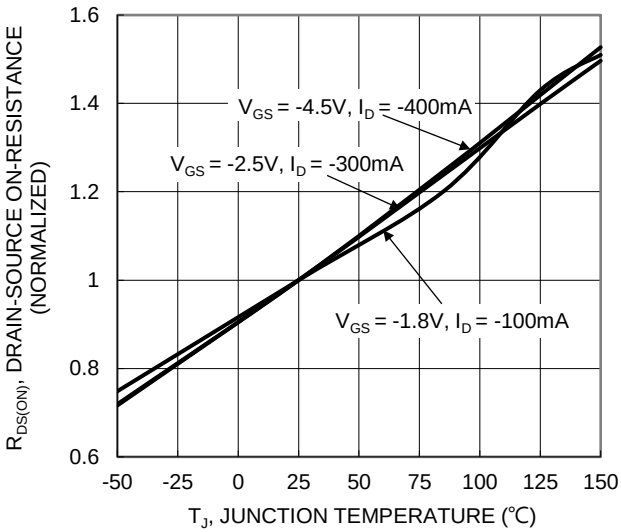


Figure 6. On-Resistance Variation with Junction Temperature

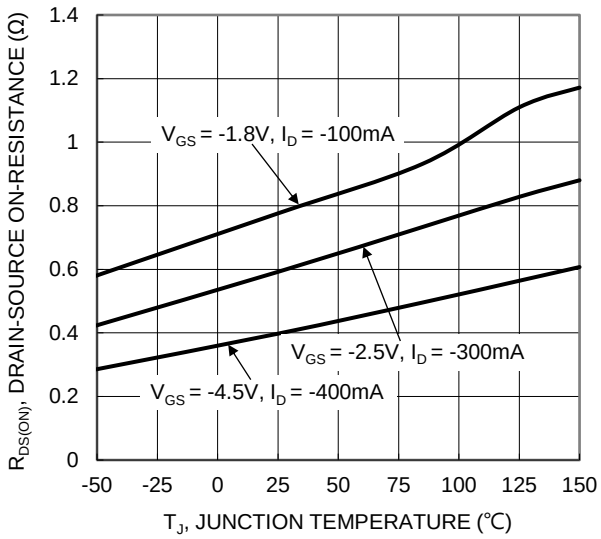


Figure 7. On-Resistance Variation with Junction Temperature

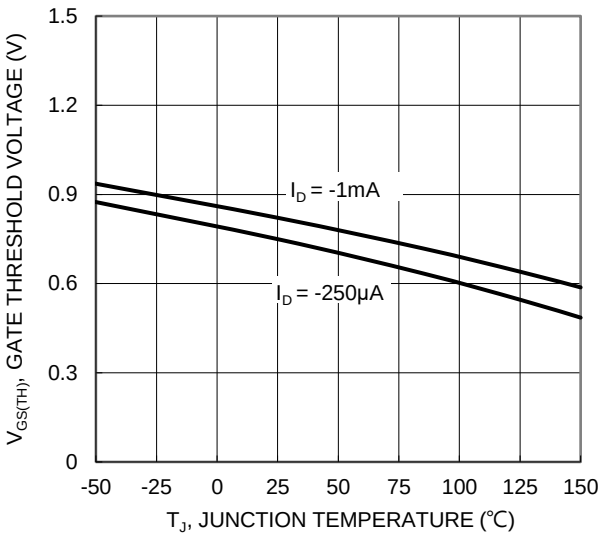


Figure 8. Gate Threshold Variation vs. Junction Temperature

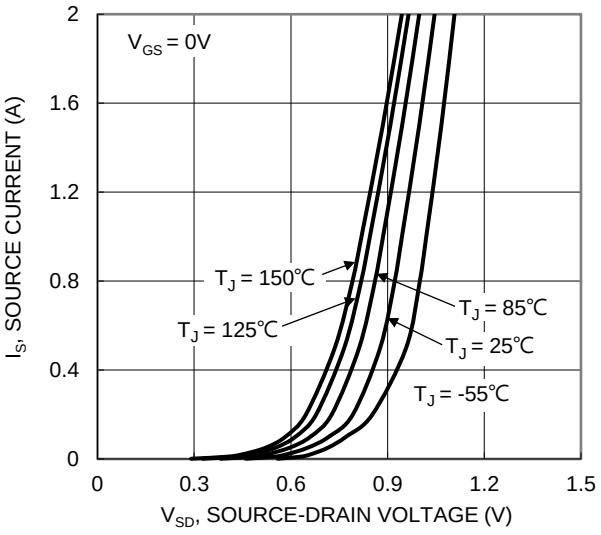


Figure 9. Diode Forward Voltage vs. Current

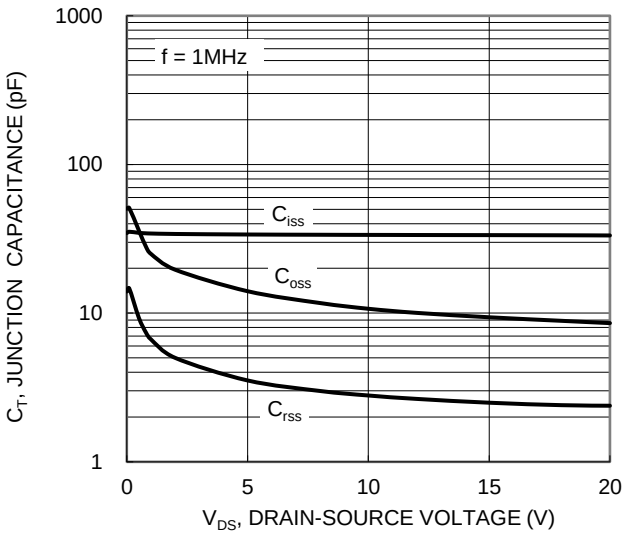


Figure 10. Typical Junction Capacitance

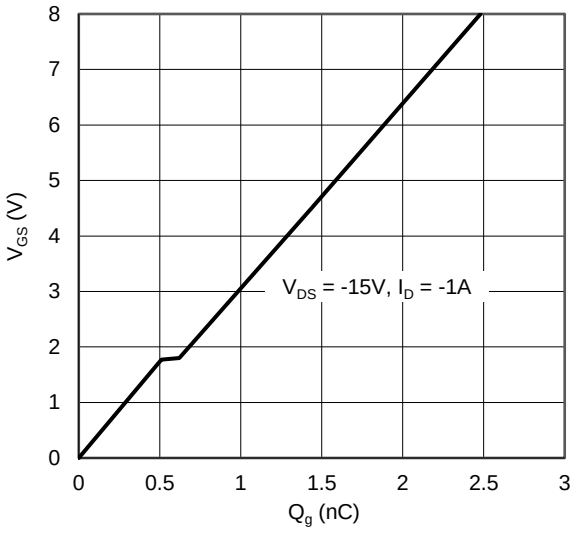


Figure 11. Gate Charge

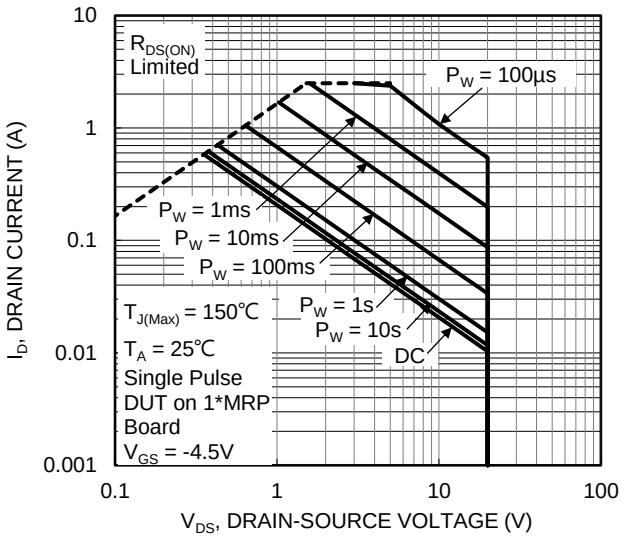


Figure 12. SOA, Safe Operation Area

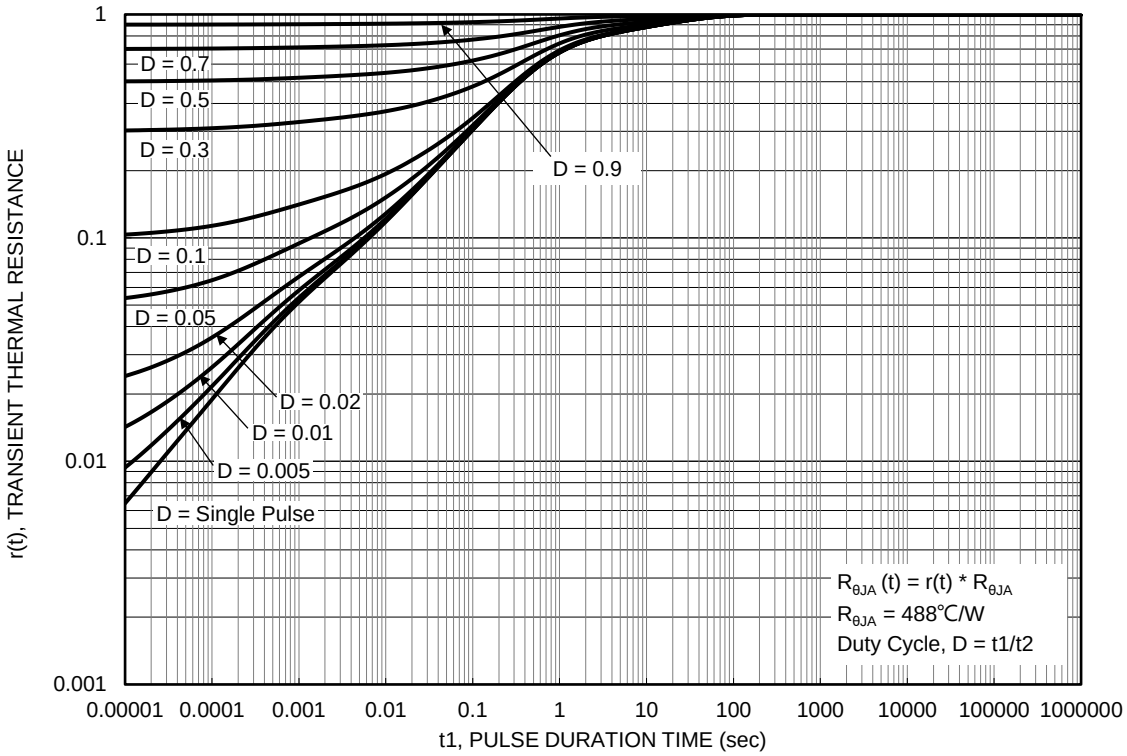
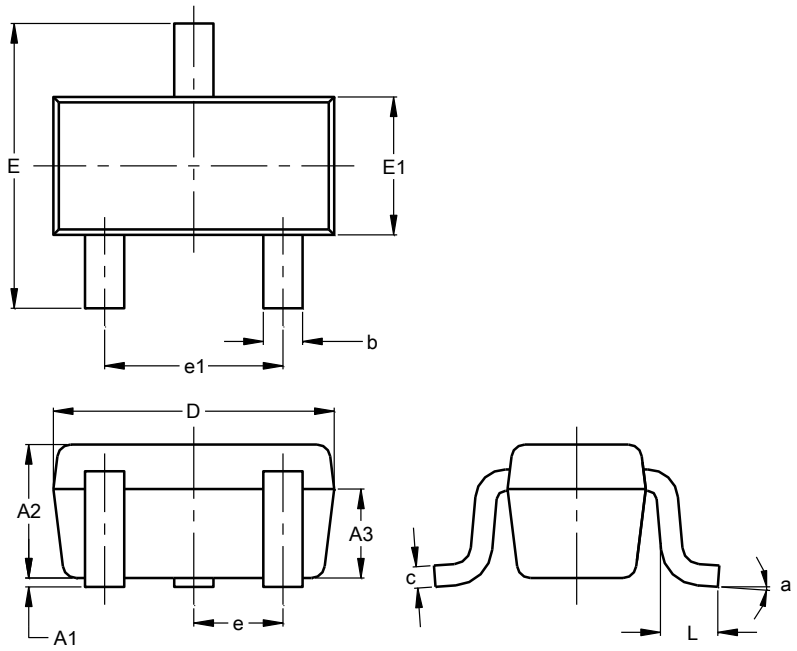


Figure 13. Transient Thermal Resistance

Package Outline Dimensions

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

SOT523

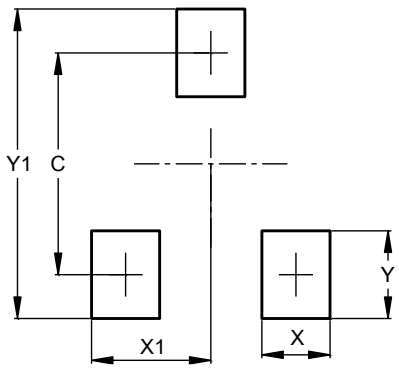


SOT523			
Dim	**Min**	**Max**	**Typ**
A1	0.00	0.10	0.05
A2	0.60	0.80	0.75
A3	0.45	0.65	0.50
b	0.15	0.30	0.22
c	0.10	0.20	0.12
D	1.50	1.70	1.60
E	1.45	1.75	1.60
E1	0.75	0.85	0.80
e	0.50 BSC		
e1	0.90	1.10	1.00
L	0.20	0.40	0.33
a	0°	--	8°
All Dimensions in mm			

Suggested Pad Layout

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

SOT523



Dimensions	Value (in mm)
C	1.29
X	0.40
X1	0.70
Y	0.51
Y1	1.80

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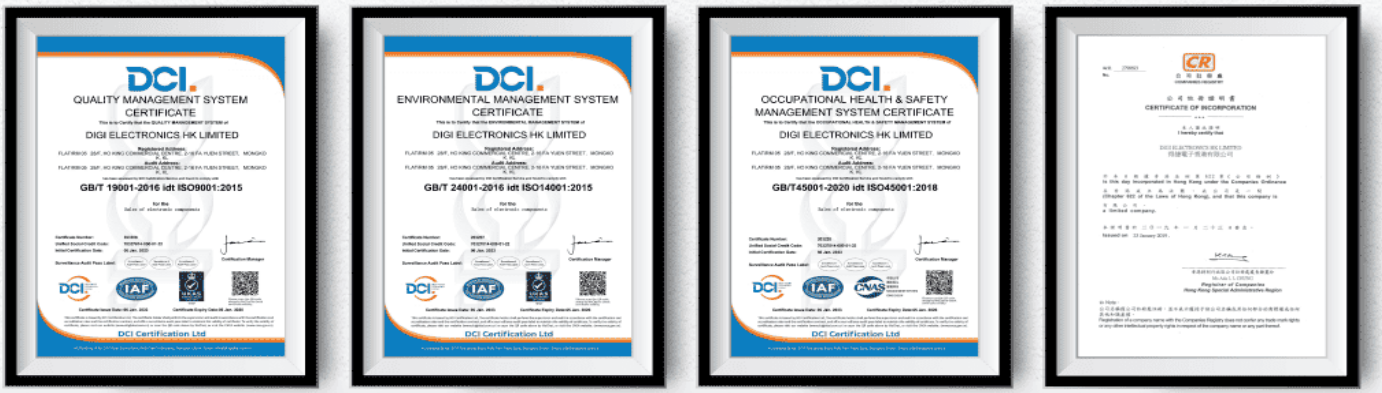

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