

**N-CHANNEL ENHANCEMENT MODE FIELD EFFECT TRANSISTOR**

NEW PRODUCT

**Product Summary**

BV <sub>DSS</sub>	R <sub>DS(ON)</sub> Max	I <sub>D</sub> Max T <sub>A</sub> = +25°C
60V	2Ω @ V <sub>GS</sub> = 10V	320mA
	3Ω @ V <sub>GS</sub> = 5V	260mA

**Description**

This MOSFET is designed to minimize the on-state resistance (R<sub>DS(ON)</sub>) and yet maintain superior switching performance, making it ideal for high efficiency power management applications.

**Applications**

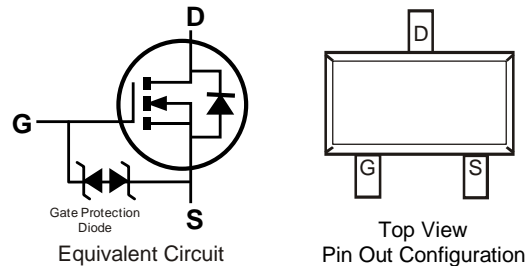
- Motor Control
- Power Management Functions

**Features**

- Low On-Resistance: R<sub>DS(ON)</sub>
- 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)**
- **Qualified to AEC-Q101 Standards for High Reliability**

**Mechanical Data**

- Case: SOT-523
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020D
- Terminals: Finish – Matte Tin Annealed over Alloy 42 Leadframe. Solderable per MIL-STD-202, Method 208 Ⓔ3
- Terminal Connections: See Diagram
- Weight: 0.002 grams (Approximate)

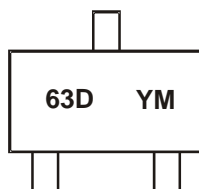


**Ordering Information** (Note 4)

Part Number	Case	Packaging
DMN63D1LT-7	SOT-523	3000/Tape & Reel
DMN63D1LT-13	SOT-523	10000/Tape & Reel

- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
  2. See [http://www.diodes.com/quality/lead\\_free.html](http://www.diodes.com/quality/lead_free.html) 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 <http://www.diodes.com/products/packages.html>.

**Marking Information**



63D = Product Type Marking Code  
 YM = Date Code Marking  
 Y = Year (ex: C = 2015)  
 M = Month (ex: 9 = September)

Date Code Key

Year	2014	2015	2016	2017	2018	2019	2020	2021
Code	B	C	D	E	F	G	H	I

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	$V_{DSS}$	60	V
Gate-Source Voltage	$V_{GSS}$	$\pm 20$	V
Continuous Drain Current (Note 6), $V_{GS} = 10\text{V}$	$I_D$	320	mA
Steady State $T_A = +25^\circ\text{C}$ $T_A = +70^\circ\text{C}$		260	
Maximum Continuous Body Diode Forward Current (Note 6)	$I_S$	0.5	A
Pulsed Drain Current (10 $\mu\text{s}$ Pulse, Duty Cycle = 1%)	$I_{DM}$	1.2	A

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

Characteristic	Symbol	Value	Unit
Total Power Dissipation (Note 5)	$P_D$	260	mW
Thermal Resistance, Junction to Ambient (Note 5)	$R_{\theta JA}$	497	$^\circ\text{C/W}$
Steady State			
Total Power Dissipation (Note 6)	$P_D$	330	mW
Thermal Resistance, Junction to Ambient (Note 6)	$R_{\theta JA}$	389	$^\circ\text{C/W}$
Steady State			
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
<b>OFF CHARACTERISTICS (Note 7)</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	60	—	—	V	$V_{GS} = 0\text{V}, I_D = 10\mu\text{A}$
Zero Gate Voltage Drain Current	$I_{DSS}$	—	—	1.0	$\mu\text{A}$	$V_{DS} = 60\text{V}, V_{GS} = 0\text{V}$
Gate-Source Leakage	$I_{GSS}$	—	—	$\pm 10$	$\mu\text{A}$	$V_{GS} = \pm 20\text{V}, V_{DS} = 0\text{V}$
<b>ON CHARACTERISTICS (Note 7)</b>						
Gate Threshold Voltage	$V_{GS(TH)}$	1.0	1.6	2.5	V	$V_{DS} = 10\text{V}, I_D = 1\text{mA}$
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	—	2.0	$\Omega$	$V_{GS} = 10\text{V}, I_D = 0.5\text{A}$
						3.0
Forward Transfer Admittance	$ Y_{fs} $	80	—	—	mS	$V_{DS} = 10\text{V}, I_D = 0.2\text{A}$
Diode Forward Voltage	$V_{SD}$	—	0.75	1.2	V	$V_{GS} = 0\text{V}, I_S = 115\text{mA}$
<b>DYNAMIC CHARACTERISTICS (Note 8)</b>						
Input Capacitance	$C_{iss}$	—	30	—	pF	$V_{DS} = 25\text{V}, V_{GS} = 0\text{V}$ $f = 1.0\text{MHz}$
Output Capacitance	$C_{oss}$	—	4.2	—	pF	
Reverse Transfer Capacitance	$C_{rss}$	—	2.9	—	pF	
Gate Resistance	$R_g$	—	133	—	$\Omega$	$f = 1\text{MHz}, V_{GS} = 0\text{V}, V_{DS} = 0\text{V}$
Total Gate Charge	$Q_g$	—	392	—	pC	$V_{GS} = 4.5\text{V}, V_{DS} = 10\text{V},$ $I_D = 250\text{mA}$
Gate-Source Charge	$Q_{gs}$	—	157	—	pC	
Gate-Drain Charge	$Q_{gd}$	—	92	—	pC	
Turn-On Delay Time	$t_{D(ON)}$	—	3.9	—	ns	$V_{DD} = 30\text{V}, V_{GS} = 10\text{V},$ $R_G = 25\Omega, I_D = 200\text{mA}$
Turn-On Rise Time	$t_R$	—	3.4	—	ns	
Turn-Off Delay Time	$t_{D(OFF)}$	—	15.7	—	ns	
Turn-Off Fall Time	$t_F$	—	9.9	—	ns	

- Notes:
- Device mounted on FR-4 PCB, with minimum recommended pad layout.
  - Device mounted on 1" x 1" FR-4 PCB with high coverage 2oz. Copper, single sided.
  - Short duration pulse test used to minimize self-heating effect.
  - Guaranteed by design. Not subject to product testing.

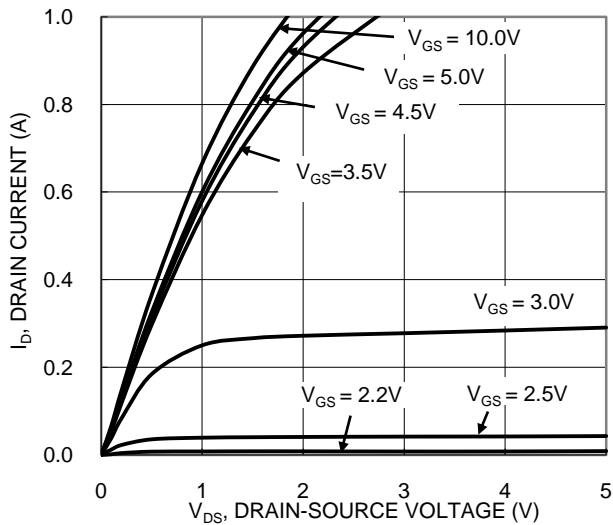


Figure 1. Typical Output Characteristic

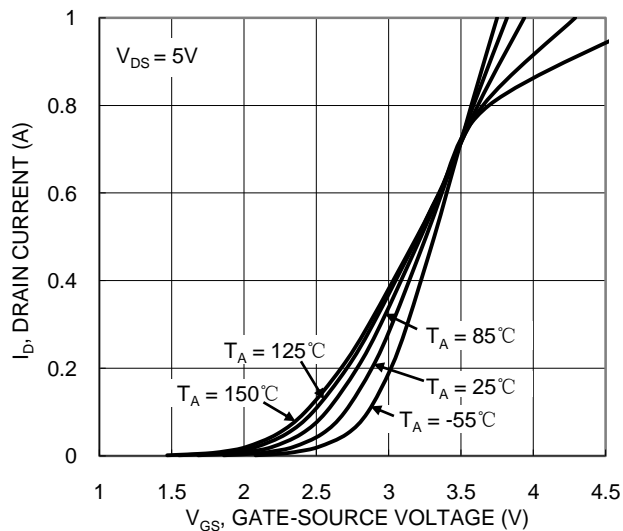


Figure 2. Typical Transfer Characteristic

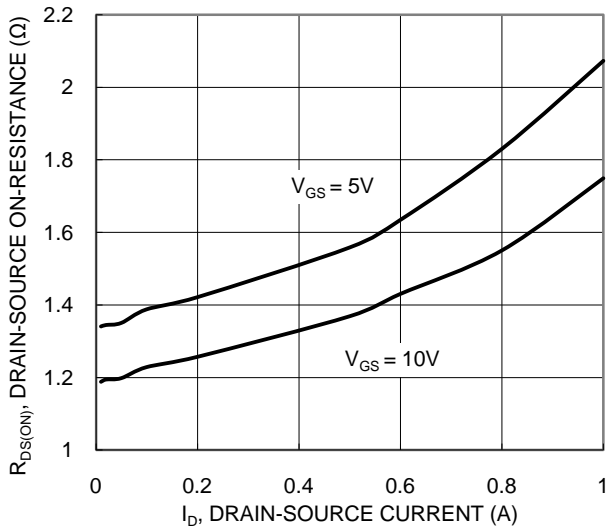


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

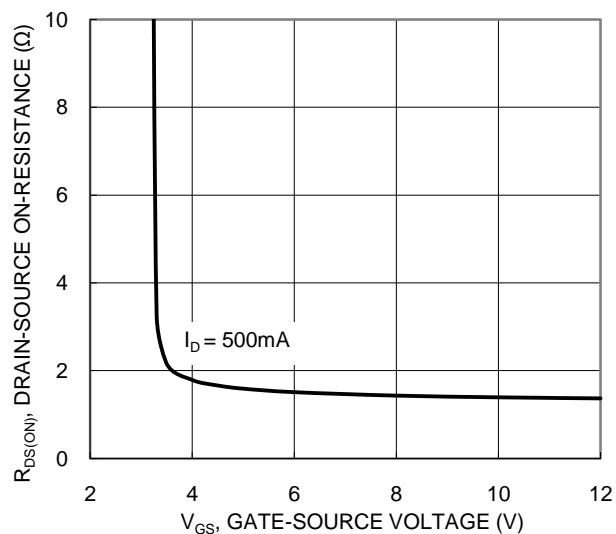


Figure 4. Typical Transfer Characteristic

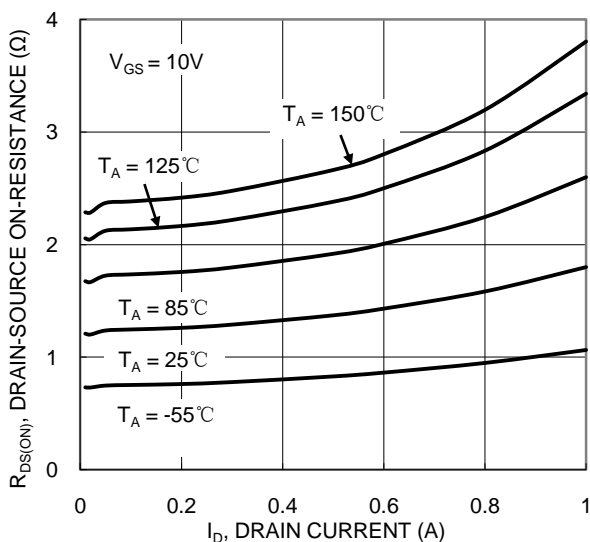


Figure 5. Typical On-Resistance vs. Drain Current and Temperature

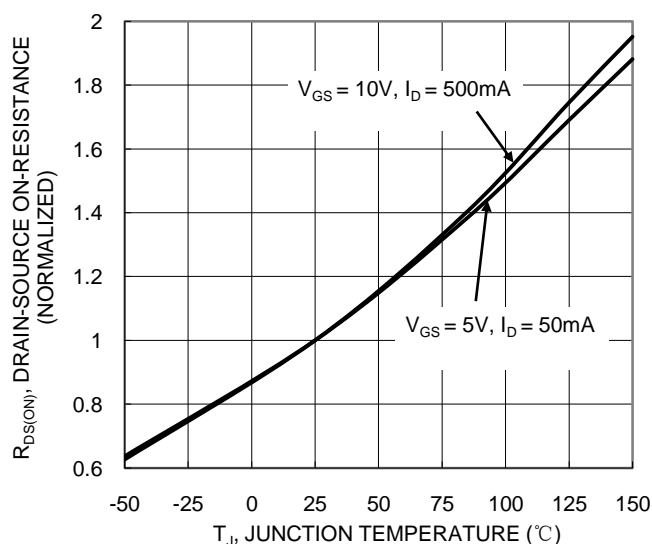


Figure 6. On-Resistance Variation with Junction Temperature

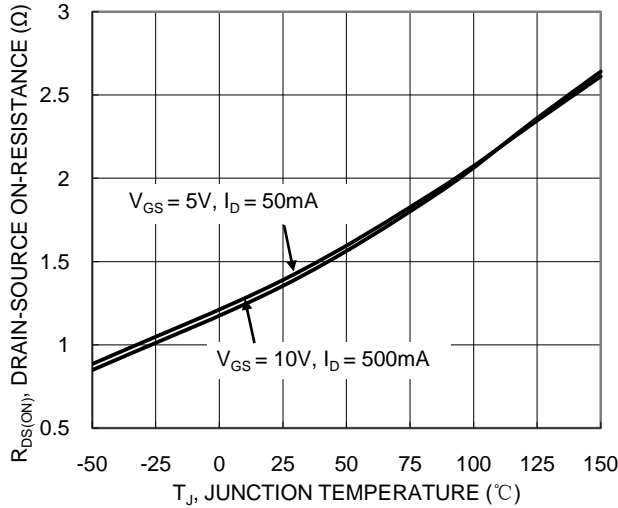


Figure 7. On-Resistance Variation with Junction Temperature

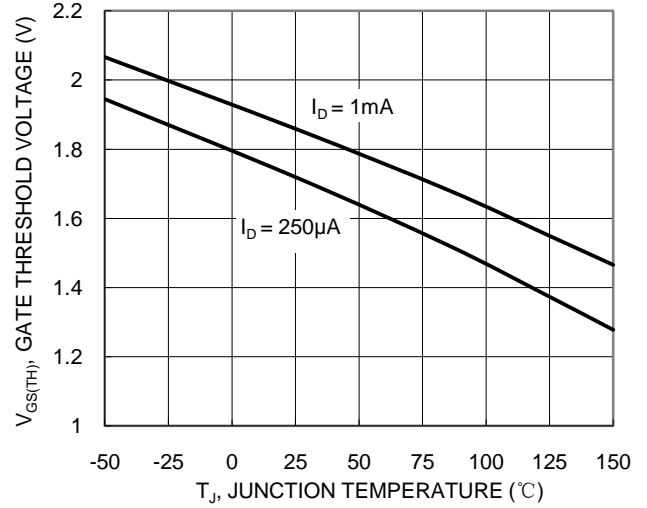


Figure 8. Gate Threshold Variation vs. Junction Temperature

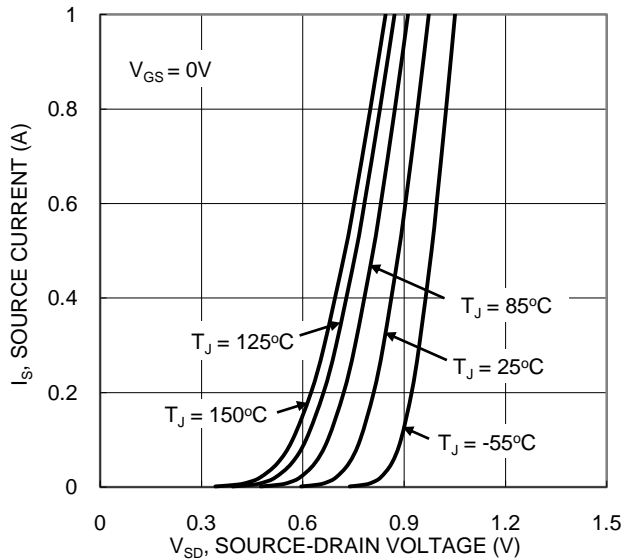


Figure 9. Diode Forward Voltage vs. Current

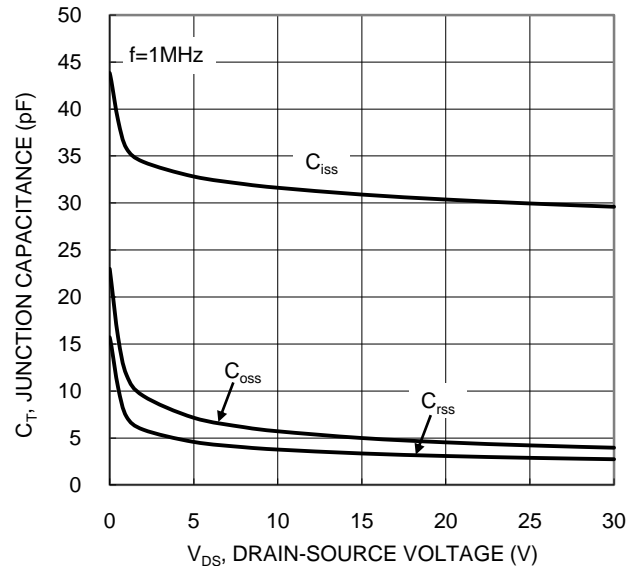


Figure 10. Typical Junction Capacitance

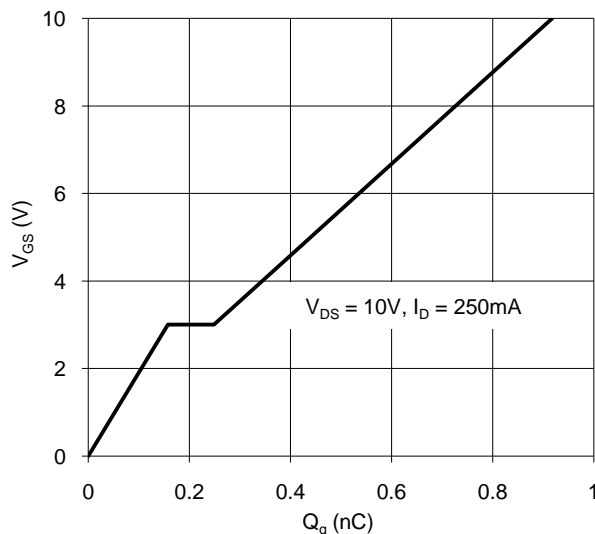


Figure 11. Gate Charge

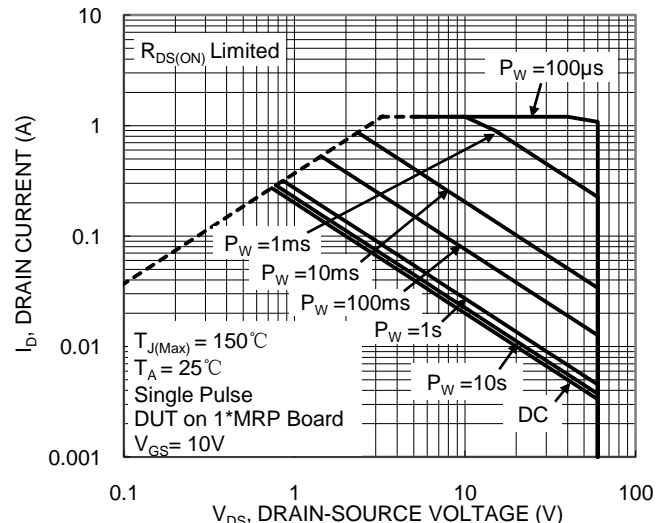


Figure 12. SOA, Safe Operation Area

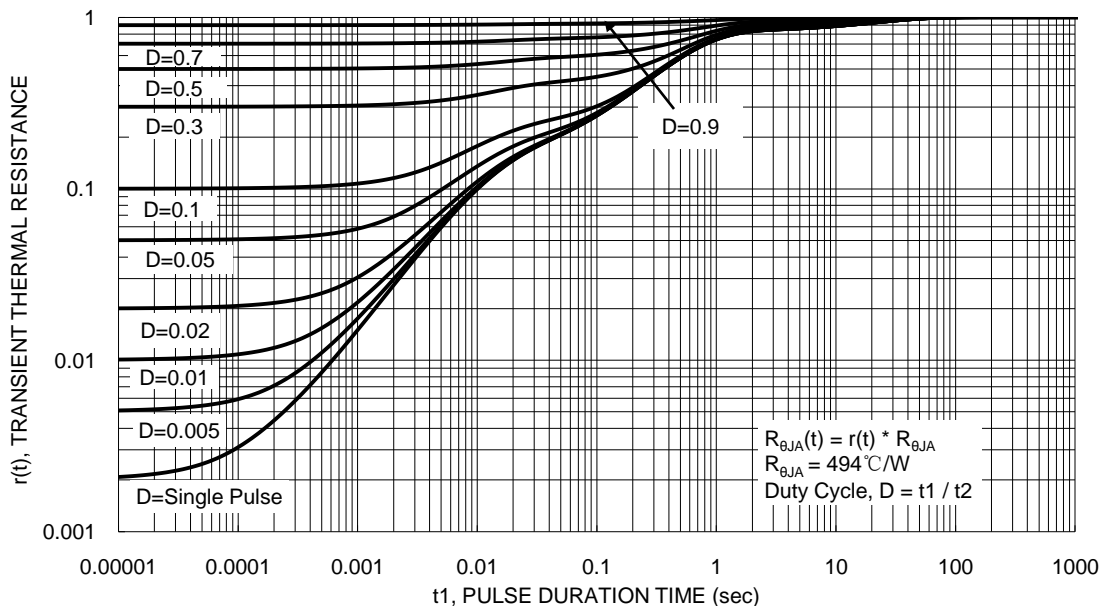
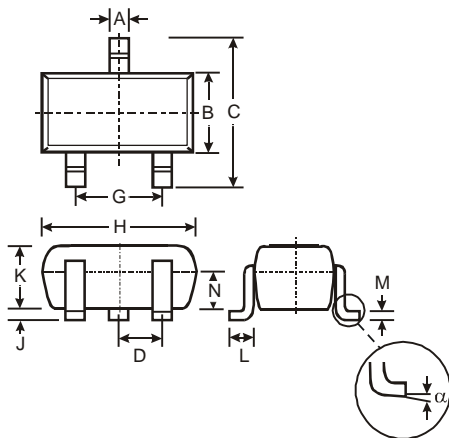


Figure 13. Transient Thermal Resistance

**Package Outline Dimensions**

Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for the latest version.

**SOT523**

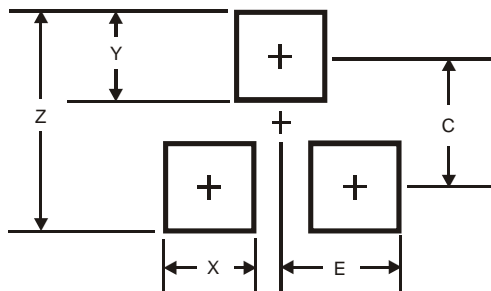


SOT523			
Dim	Min	Max	Typ
A	0.15	0.30	0.22
B	0.75	0.85	0.80
C	1.45	1.75	1.60
D	—	—	0.50
G	0.90	1.10	1.00
H	1.50	1.70	1.60
J	0.00	0.10	0.05
K	0.60	0.80	0.75
L	0.10	0.30	0.22
M	0.10	0.20	0.12
N	0.45	0.65	0.50
α	0°	8°	—
All Dimensions in mm			

**Suggested Pad Layout**

Please see AP02001 at <http://www.diodes.com/datasheets/ap02001.pdf> for the latest version.

**SOT523**



Dimensions	Value (in mm)
Z	1.8
X	0.4
Y	0.51
C	1.3
E	0.7

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