100V N-CHANNEL ENHANCEMENT MODE MOSFET

Product Summary

$V_{(BR)DSS}$	$R_{DS(ON)}$ Max	I_D T_C = +25°C
100V	140mΩ @ V_{GS} = 10V	12A
	160mΩ @ V_{GS} = 4.5V	11A

Features

- Low On-Resistance
- Low Input Capacitance
- **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**

Description

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.

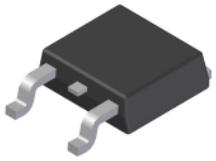
Mechanical Data

- Case: TO252 (DPAK)
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections: See Diagram
- Terminals: Finish – Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.33 grams (Approximate)

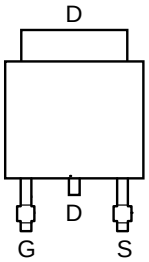
Applications

- DC-DC Converters
- Power Management Functions
- Analog Switch

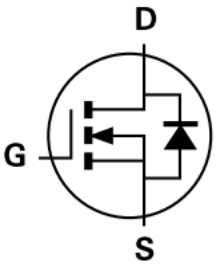
TO252 (DPAK)



Top View



Top View



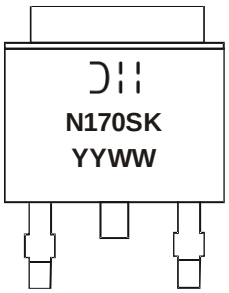
Internal Schematic

Ordering Information (Note 4)

Part Number	Case	Packaging
DMN10H170SK3-13	TO252 (DPAK)	2,500/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 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



=Manufacturer's Marking
N170SK= Product Type Marking Code
YYWW = Date Code Marking
YY= Last Digit of Year (ex: 15 = 2015)
WW= Week Code (01 to 53)

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

Characteristic			Symbol	Value	Units
Drain-Source Voltage			V_{DSS}	100	V
Gate-Source Voltage			V_{GSS}	±20	V
Continuous Drain Current (Note 5) V_{GS} = 10V	Steady State	T_C = +25°C T_C = +100°C	I_D	12 7.5	A
Maximum Body Diode Forward Current (Note 5)			I_S	4	A
Pulsed Drain Current (10µs pulse, duty cycle = 1%)			I_{DM}	16	A
Avalanche Current (Note 6)			I_{AS}	5.3	A
Avalanche Energy (Note 6)			E_{AS}	20	mJ

Thermal Characteristics

Characteristic		Symbol	Value	Units
Total Power Dissipation (Note 5)	T_C = +25°C	P_D	42	W
	T_C = +100°C		17	
Thermal Resistance, Junction to Ambient (Note 5)		$R_{\theta JA}$	44	°C/W
Thermal Resistance, Junction to Case (Note 5)		$R_{\theta JC}$	3	
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}	100	—	—	V	V_{GS} = 0V, I_D = 250µA
Zero Gate Voltage Drain Current	I_{DSS}	—	—	1	µA	V_{DS} = 100V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	—	—	100	nA	V_{GS} = ±20V, V_{DS} = 0V
ON CHARACTERISTICS (Note 7)						
Gate Threshold Voltage	$V_{GS(th)}$	1.0	2.0	3.0	V	V_{DS} = V_{GS}, I_D = 250µA
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	99	140	mΩ	V_{GS} = 10V, I_D = 5A
		—	104	160		V_{GS} = 4.5V, I_D = 5A
Diode Forward Voltage	V_{SD}	—	0.7	1.0	V	V_{GS} = 0V, I_S = 10A
DYNAMIC CHARACTERISTICS (Note 8)						
Input Capacitance	C_{iss}	—	1,167	—	pF	V_{DS} = 25V, V_{GS} = 0V, f = 1.0MHz
Output Capacitance	C_{oss}	—	36	—		
Reverse Transfer Capacitance	C_{rss}	—	25	—		
Gate Resistance	R_G	—	1.3	—	Ω	V_{DS} = 0V, V_{GS} = 0V, f = 1.0MHz
Total Gate Charge (V_{GS} = 4.5V)	Q_g	—	4.9	—	nC	V_{DS} = 80V, I_D = 12.8A
Total Gate Charge (V_{GS} = 10V)	Q_g	—	9.7	—		
Gate-Source Charge	Q_{gs}	—	2.0	—		
Gate-Drain Charge	Q_{gd}	—	2.0	—		
Turn-On Delay Time	$t_{D(on)}$	—	10.5	—	nS	V_{DD} = 50V, R_G = 25Ω, I_D = 12.8A
Turn-On Rise Time	t_r	—	11.1	—		
Turn-Off Delay Time	$t_{D(off)}$	—	42.6	—		
Turn-Off Fall Time	t_f	—	12.8	—		
Body Diode Reverse Recovery Time	t_{rr}	—	30.3	—	nS	V_{GS} = 0V, I_S = 12.8A, dI/dt = 100A/µs
Body Diode Reverse Recovery Charge	Q_{rr}	—	35.2	—	nC	V_{GS} = 0V, I_S = 12.8A, dI/dt = 100A/µs

Notes:
5. Device mounted on FR-4 substrate PC board, 2oz copper, with 1-inch square copper pad layout.
6. UIS in production with L = 1.43mH, T_J = +25°C.
7. Short duration pulse test used to minimize self-heating effect.
8. Guaranteed by design; not subject to production testing.

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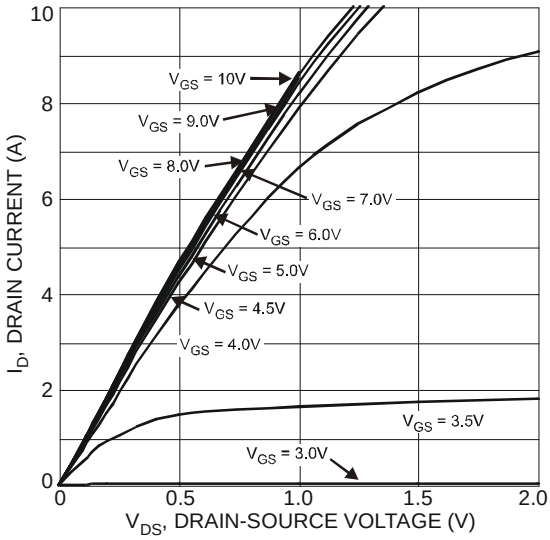


Fig.1 Typical Output Characteristic

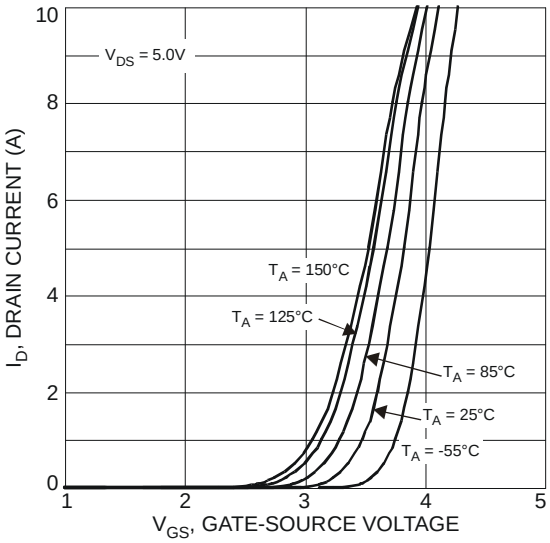


Fig.2 Typical Transfer Characteristics

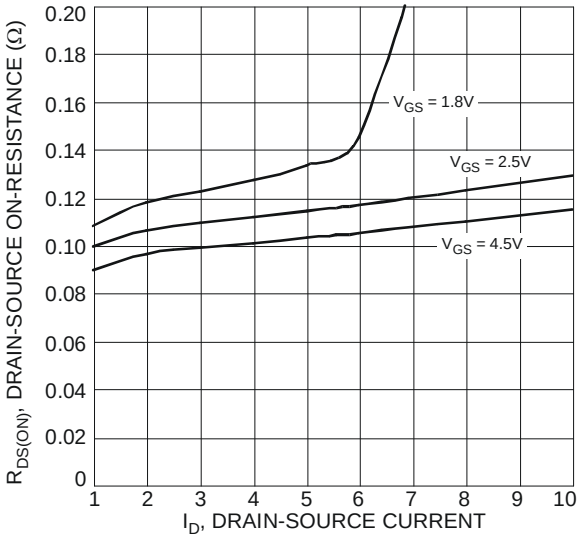


Fig. 3 Typical On-Resistance vs. Drain Current and Gate Voltage

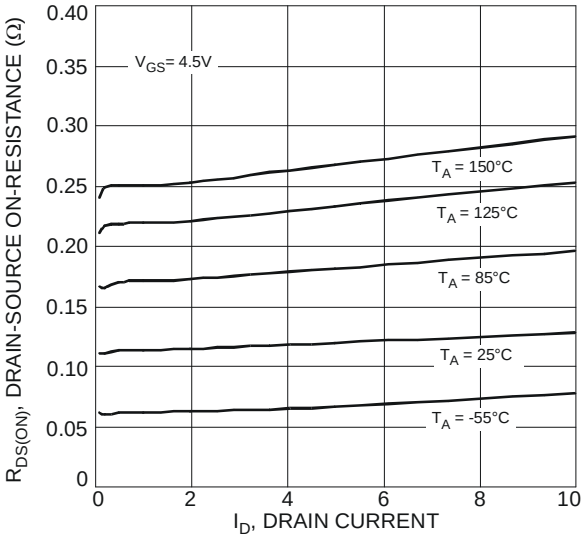


Fig. 4 Typical On-Resistance vs. Drain Current and Temperature

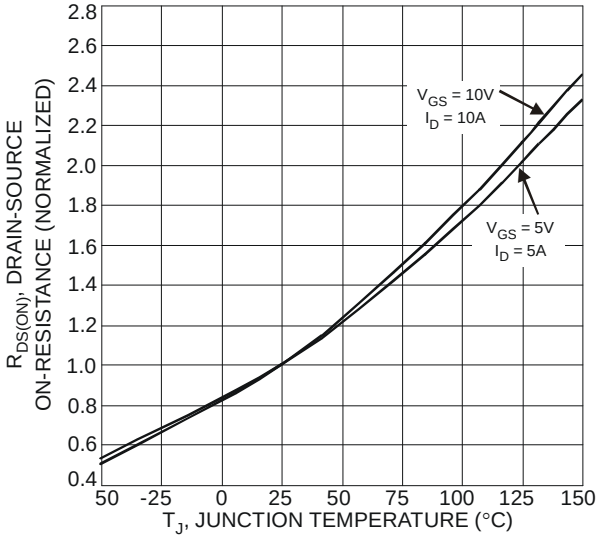


Fig. 5 On-Resistance Variation with Temperature

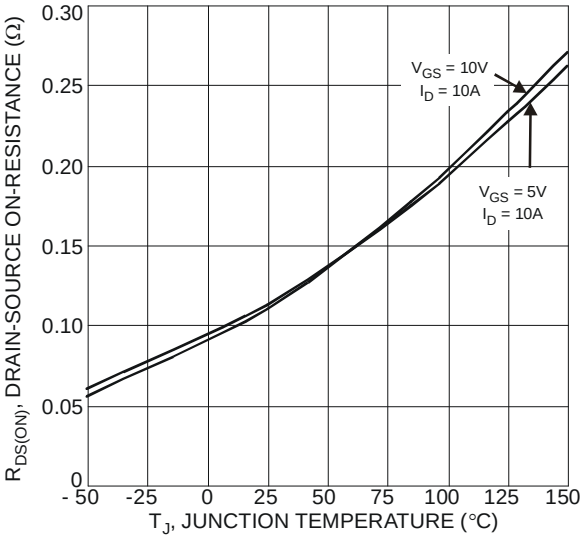


Fig. 6 On-Resistance Variation with Temperature

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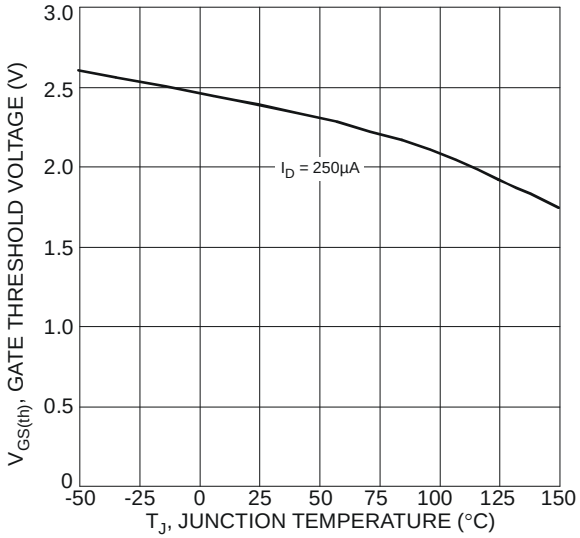


Fig. 7 Gate Threshold Variation vs. Ambient Temperature

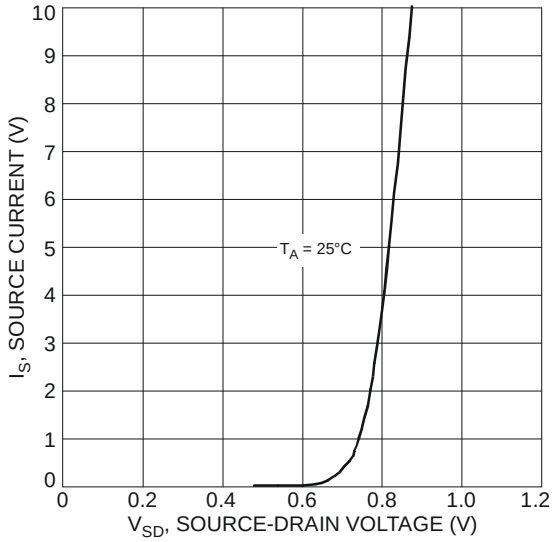


Fig.8 Diode Forward Voltage vs. Current

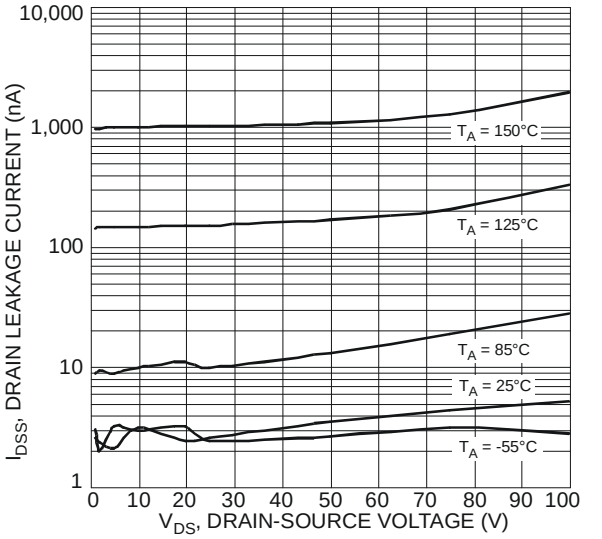


Fig. 9 Typical Drain-Source Leakage Current vs. Voltage

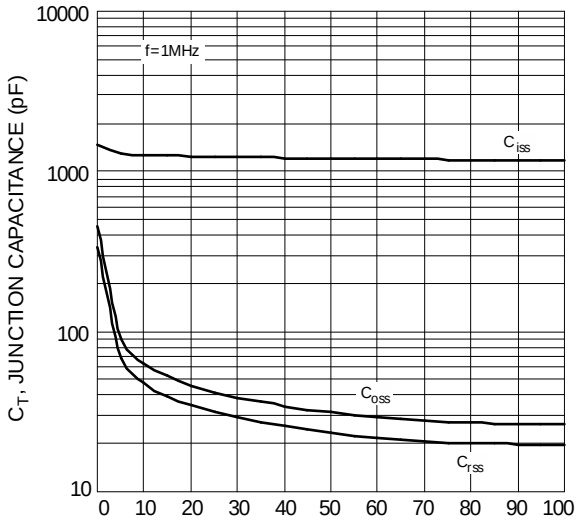


Figure 10 Typical Junction Capacitance

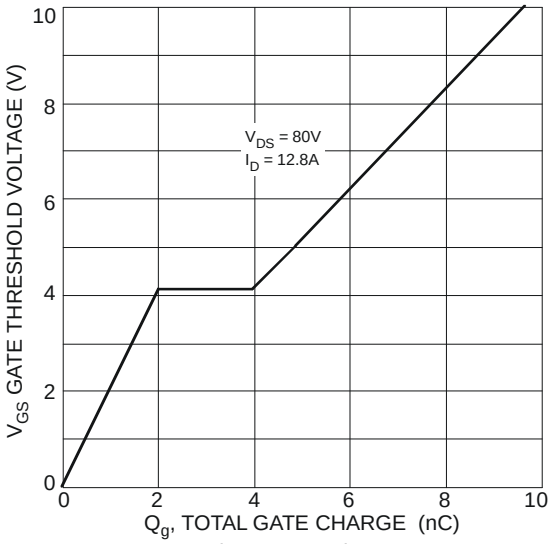


Fig. 11 Gate Charge

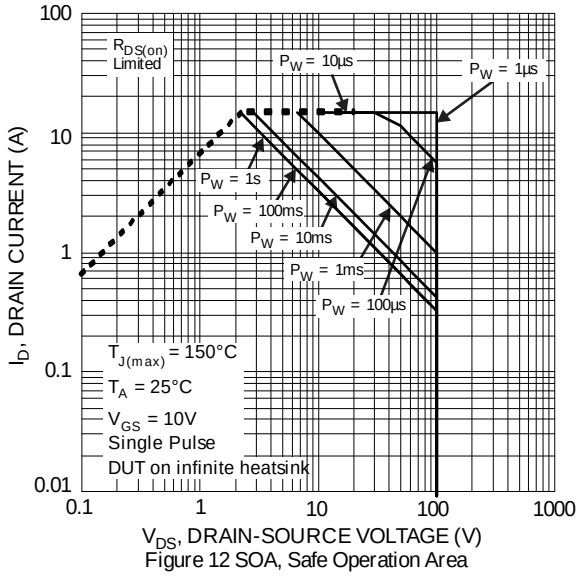


Figure 12 SOA, Safe Operation Area

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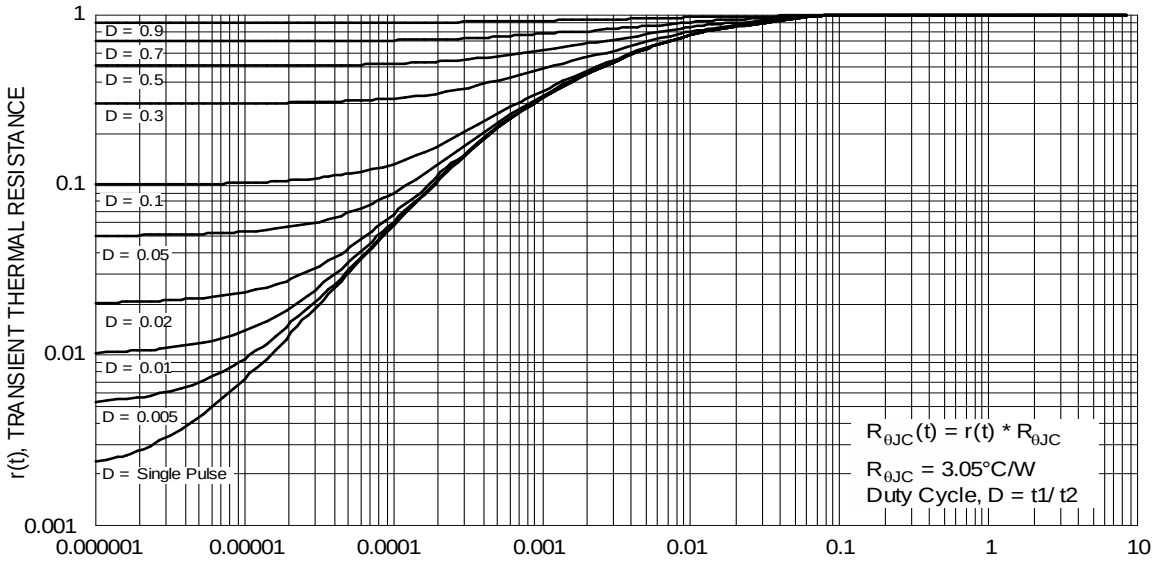


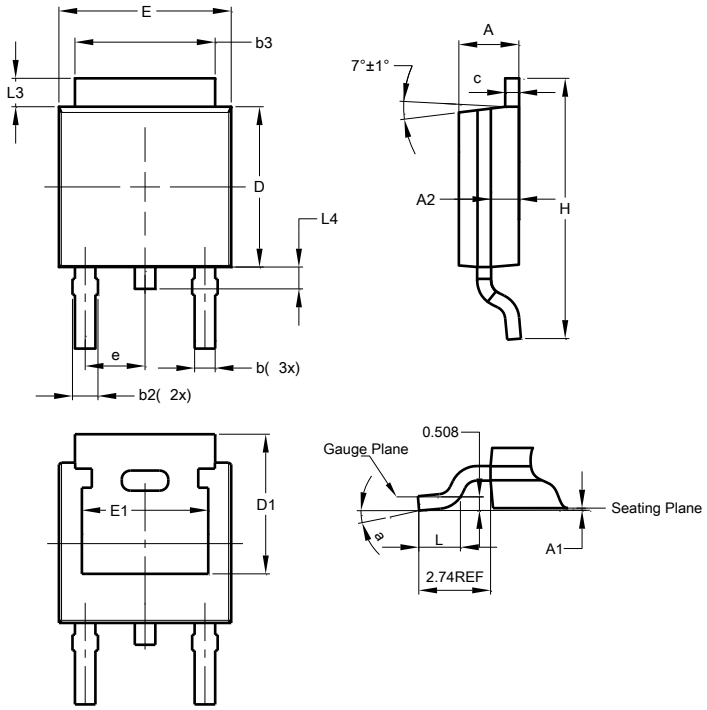
Figure 13 Transient Thermal Resistance

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Package Outline Dimensions

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

TO252 (DPAK)

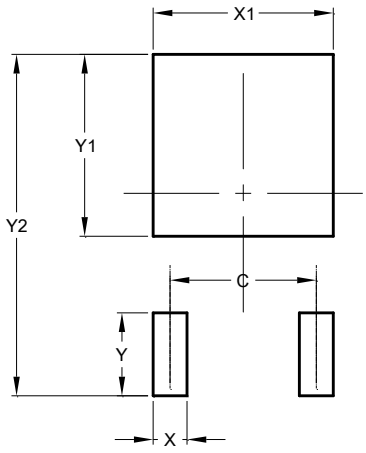


TO252 (DPAK)			
Dim	**Min**	**Max**	**Typ**
A	2.19	2.39	2.29
A1	0.00	0.13	0.08
A2	0.97	1.17	1.07
b	0.64	0.88	0.783
b2	0.76	1.14	0.95
b3	5.21	5.46	5.33
c	0.45	0.58	0.531
D	6.00	6.20	6.10
D1	5.21	-	-
e	-	-	2.286
E	6.45	6.70	6.58
E1	4.32	-	-
H	9.40	10.41	9.91
L	1.40	1.78	1.59
L3	0.88	1.27	1.08
L4	0.64	1.02	0.83
a	0°	10°	-
All Dimensions in mm			

Suggested Pad Layout

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

TO252 (DPAK)



Dimensions	Value (in mm)
C	4.572
X	1.060
X1	5.632
Y	2.600
Y1	5.700
Y2	10.700

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