

Product Summary

$V_{(BR)DSS}$	$R_{DS(on)}$	I_D $T_C = +25^\circ C$
-60V	150m Ω @ $V_{GS} = -10V$	-9.4A
	185m Ω @ $V_{GS} = -4.5V$	-8.5A

Description

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

Applications

- Backlighting
- DC-DC Converters
- Power management functions

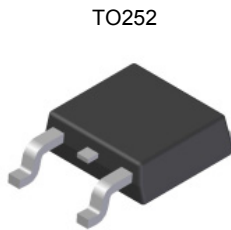
Features

- 100% Unclamped Inductive Switch (UIS) test in production
- Low on-resistance
- Fast switching speed
- **Totally Lead-Free & Fully RoHS compliant (Note 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**

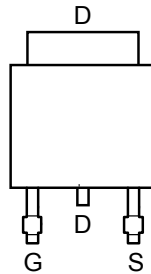
Mechanical Data

- Case: TO252
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Matte Tin Finish annealed over Copper leadframe. Solderable per MIL-STD-202, Method 208 ⁽³⁾
- Weight: 0.33 grams (approximate)

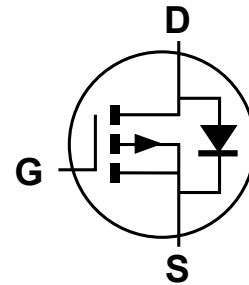
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Top View



Top View
Pin-Out



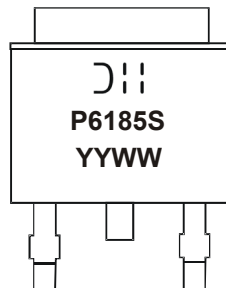
Equivalent Circuit

Ordering Information (Notes 4)

Product	Case	Packaging
DMP6185SK3-13	TO252	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



$\text{D}|||$ = Manufacturer's Marking
 P6185S = Product Type Marking Code
 YYWW = Date Code Marking
 YY = Year (ex: 13 = 2013)
 WW = Week (01 - 53)

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

Characteristic	Symbol	Value	Units
Drain-Source Voltage	V _{DSS}	-60	V
Gate-Source Voltage	V _{GSS}	±20	V
Continuous Drain Current (Note 6) V _{GS} = -10V	I _D	T _C = +25°C	-3.6
		T _C = +100°C	-2.8
Maximum Body Diode Continuous Current	I _S	-2	A
Pulsed Drain Current (10µs pulse, duty cycle = 1%)	I _{DM}	-15	A
Avalanche Current (Notes 7) L = 0.1mH	I _{AS}	-16	A
Avalanche Energy (Notes 7) L = 0.1mH	E _{AS}	13	mJ

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

Characteristic	Symbol	Value	Units
Total Power Dissipation (Note 5)	P _D	T _A = +25°C	1.6
		T _A = +70°C	1.0
Thermal Resistance, Junction to Ambient (Note 5)	R _{θJA}	Steady state	75
		t < 10s	38
Total Power Dissipation (Note 6)	P _D	T _A = +25°C	2.8
		T _A = +70°C	1.8
Thermal Resistance, Junction to Ambient (Note 6)	R _{θJA}	Steady state	44
		t < 10s	20
Thermal Resistance, Junction to Case (Note 6)	R _{θJC}	6.2	°C/W
Operating and Storage Temperature Range	T _J , T _{STG}	-55 to +150	

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 8)						
Drain-Source Breakdown Voltage	BV _{DSS}	-60	—	—	V	V _{GS} = 0V, I _D = -250µA
Zero Gate Voltage Drain Current	I _{DSS}	—	—	-1	µA	V _{DS} = -48V, V _{GS} = 0V
Gate-Source Leakage	I _{GSS}	—	—	±100	nA	V _{GS} = ±20V, V _{DS} = 0V
ON CHARACTERISTICS (Note 8)						
Gate Threshold Voltage	V _{GS(th)}	-1.0	—	-3.0	V	V _{DS} = V _{GS} , I _D = -250µA
Static Drain-Source On-Resistance	R _{DS(on)}	—	120	150	mΩ	V _{GS} = -10V, I _D = -12A
			150	185		V _{GS} = -4.5V, I _D = -8A
Diode Forward Voltage	V _{SD}	—	-0.75	-1.2	V	V _{GS} = 0V, I _S = -1A
DYNAMIC CHARACTERISTICS (Note 9)						
Input Capacitance	C _{iss}	—	708	—	pF	V _{DS} = -30V, V _{GS} = 0V, f = 1.0MHz
Output Capacitance	C _{oss}	—	39	—	pF	
Reverse Transfer Capacitance	C _{rss}	—	32	—	pF	
Gate Resistance	R _g	—	17	40	Ω	V _{DS} = 0V, V _{GS} = 0V, f = 1MHz
Total Gate Charge (V _{GS} = -4.5V)	Q _g	—	6.2	—	nC	
Total Gate Charge (V _{GS} = -10V)	Q _g	—	14	—	nC	
Gate-Source Charge	Q _{gs}	—	2.8	—	nC	
Gate-Drain Charge	Q _{gd}	—	3.1	—	nC	V _{DS} = -30V, I _D = -12A
Turn-On Delay Time	t _{D(on)}	—	5.2	—	ns	
Turn-On Rise Time	t _r	—	23	—	ns	
Turn-Off Delay Time	t _{D(off)}	—	33	—	ns	
Turn-Off Fall Time	t _f	—	39	—	ns	V _{DS} = -30V, R _L = 2.5Ω V _{GS} = -10V, R _G = 3Ω
Body Diode Reverse Recovery Time	t _{rr}	—	22	—	ns	
Body Diode Reverse Recovery Charge	Q _{rr}	—	17	—	nC	I _F = -12A, di/dt = 100A/µs

- Notes:
- Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.
 - Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.
 - I_{AS} and E_{AS} rating are based on low frequency and duty cycles to keep T_J = 25°C
 - Short duration pulse test used to minimize self-heating effect.
 - Guaranteed by design. Not subject to product testing.

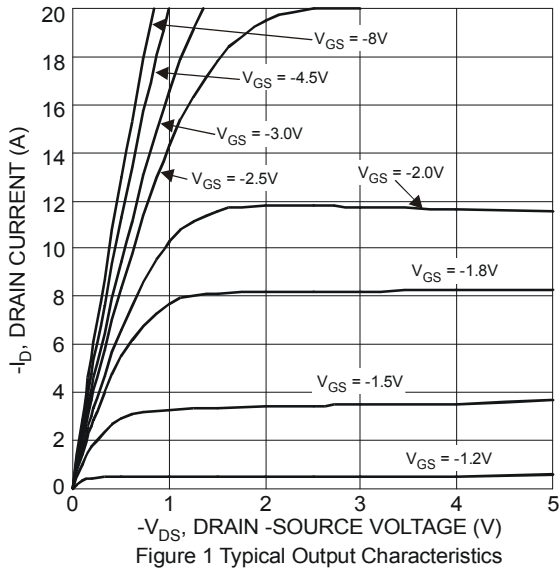


Figure 1 Typical Output Characteristics

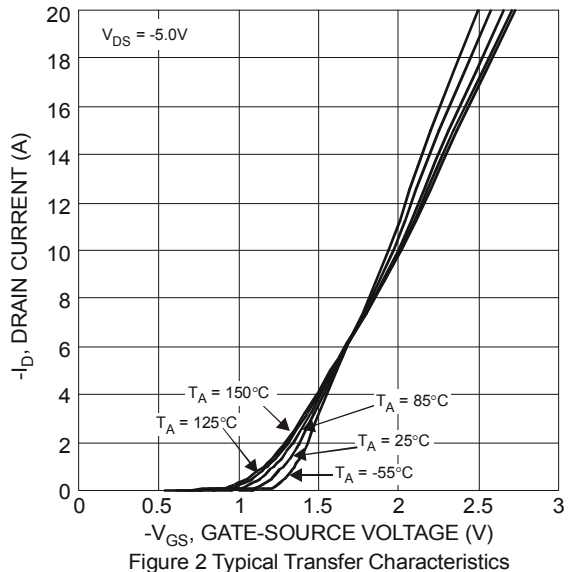


Figure 2 Typical Transfer Characteristics

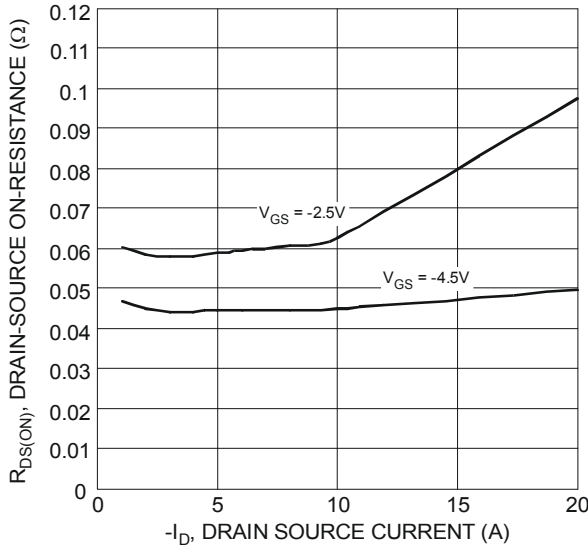


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

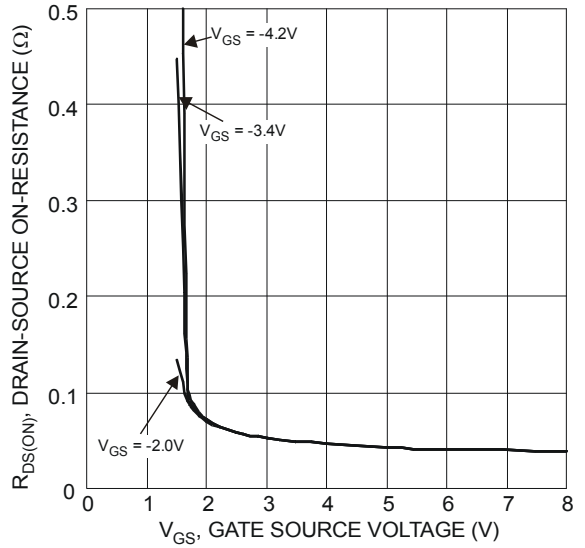


Figure 4 Typical Transfer Characteristics

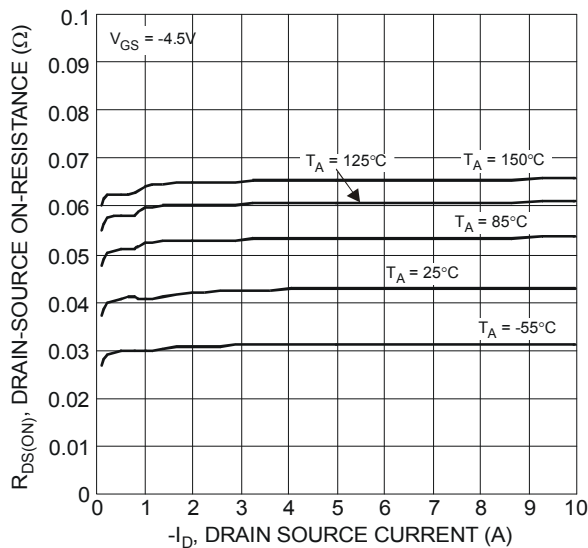


Figure 5 Typical On-Resistance vs. Drain Current and Temperature

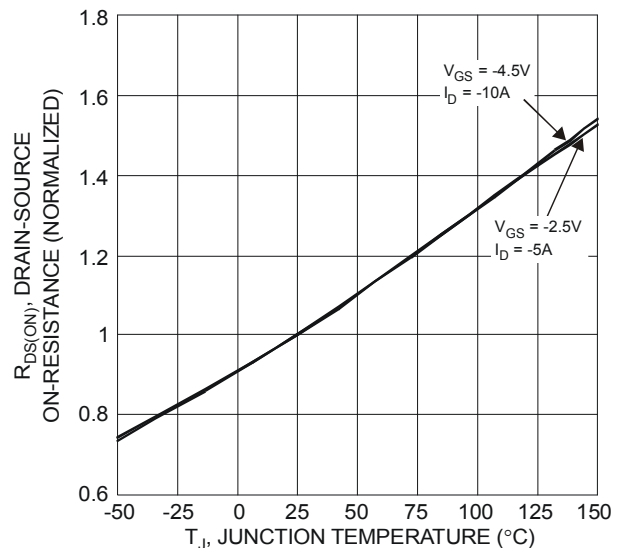


Figure 6 On-Resistance Variation with Temperature

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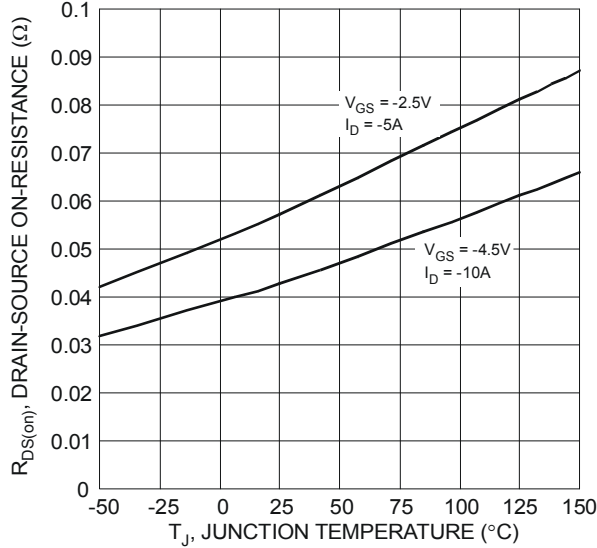


Figure 7 On-Resistance Variation with Temperature

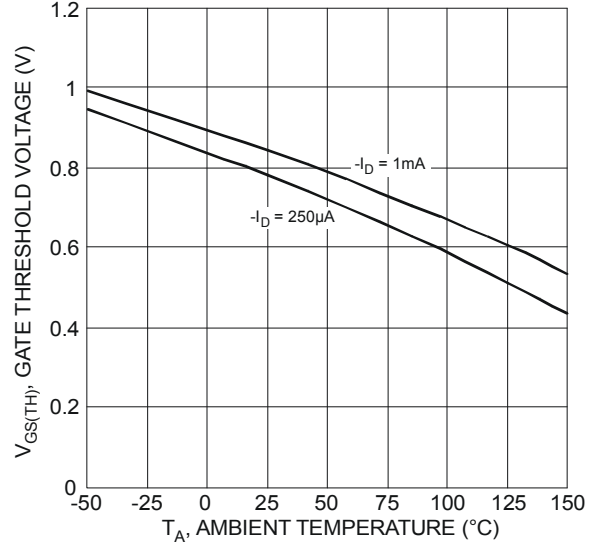


Figure 8 Gate Threshold Variation vs. Ambient Temperature

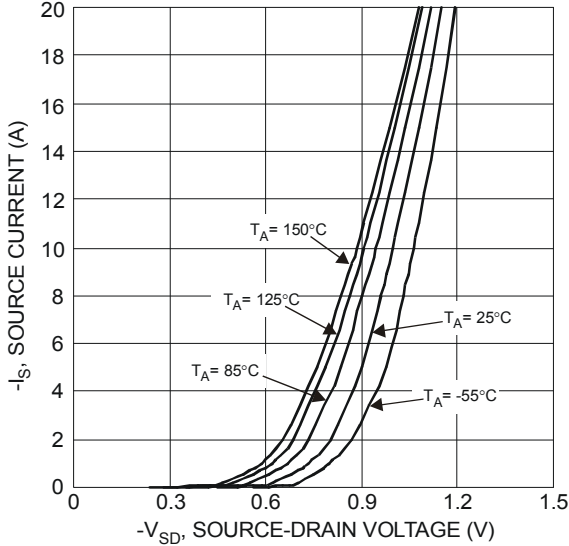


Figure 9 Diode Forward Voltage vs. Current

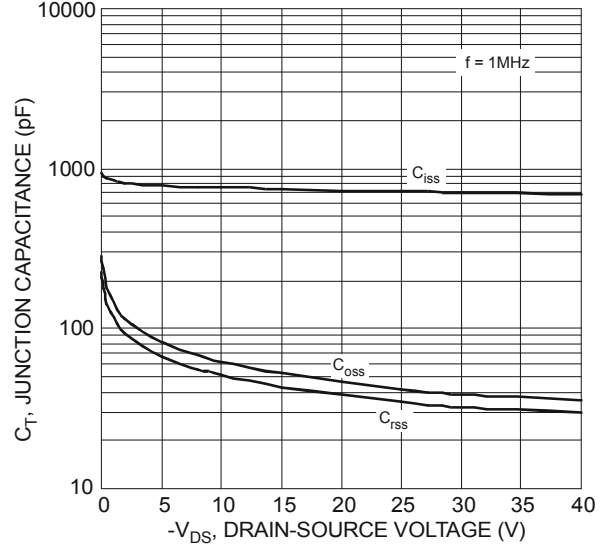


Figure 10 Typical Junction Capacitance

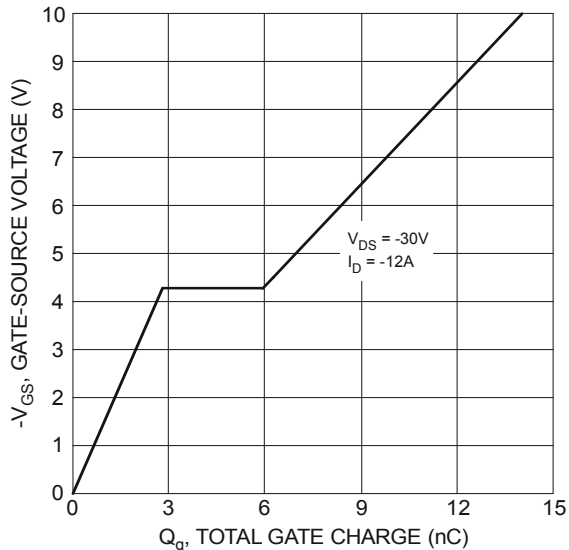


Figure 11 Gate-Charge Characteristics

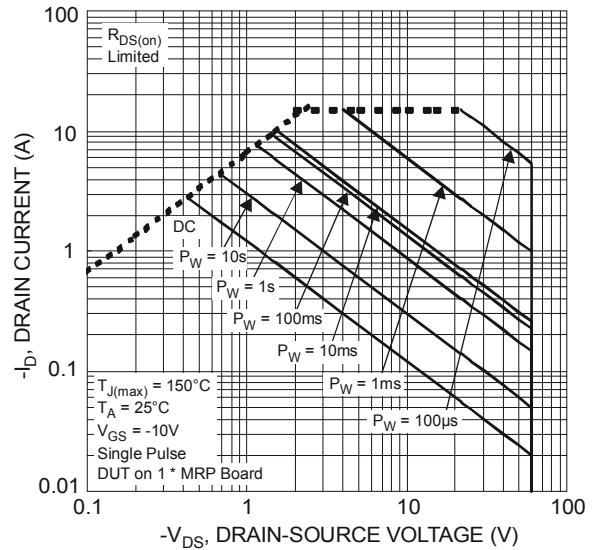
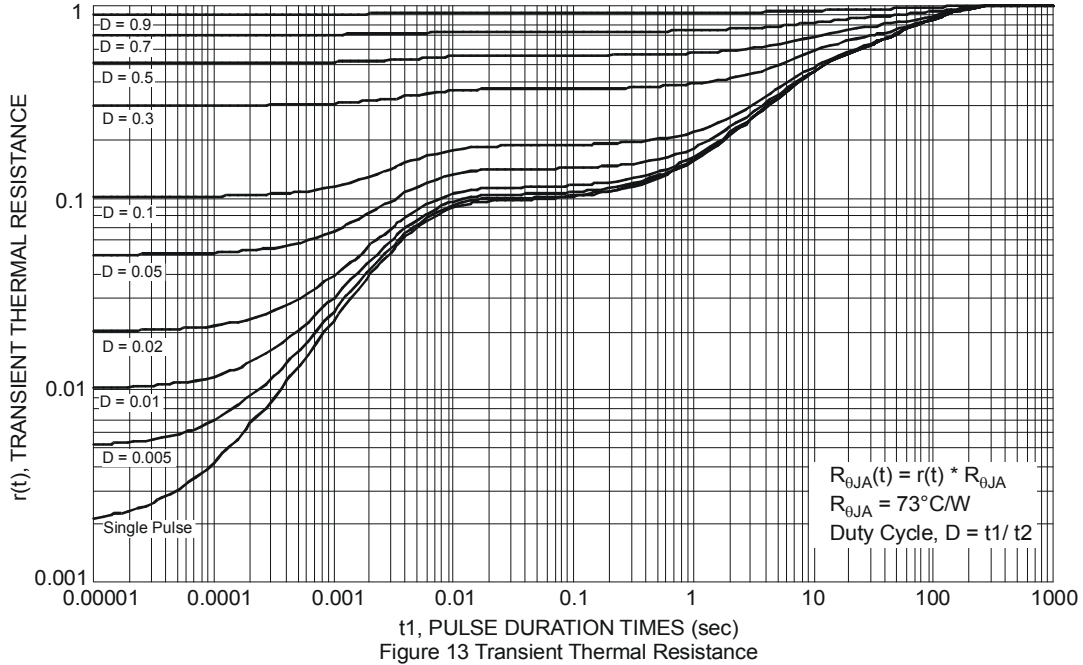


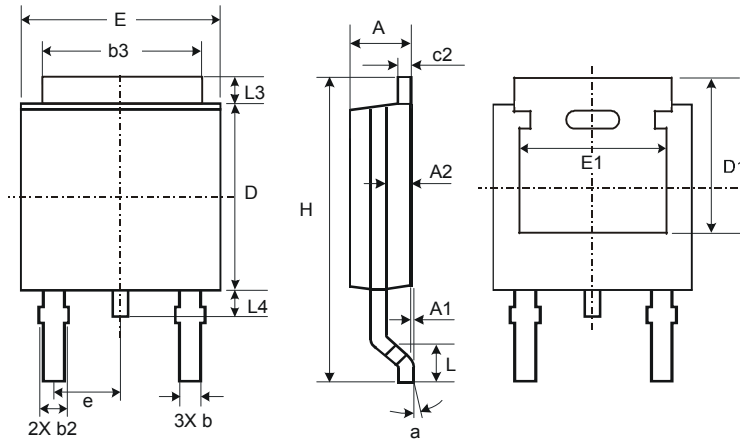
Figure 12 SOA, Safe Operation Area

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Package Outline Dimensions

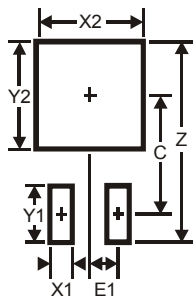
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



TO252			
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
c2	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 latest version.



Dimensions	Value (in mm)
Z	11.6
X1	1.5
X2	7.0
Y1	2.5
Y2	7.0
C	6.9
E1	2.3

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