40V 175°C N-CHANNEL ENHANCEMENT MODE MOSFET

Product Summary

BV_{DSS}	$R_{DS(ON)}$ Max	Q_g Typ	I_D T_C = +25°C (Note 10)
40V	3mΩ @ V_{GS} = 10V	68.6nC	100A

Features

- Rated to +175°C – Ideal for High Ambient Temperature Environments
- 100% Unclamped inductive switching ensures more reliable and robust end application
- Low $R_{DS(ON)}$ – Minimizes Power Losses
- Low Q_g – Minimizes Switching Losses
- **Lead-Free Finish; RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**
- **PPAP Capable (Note 4)**

Description and Applications

This MOSFET is designed to meet the stringent requirements of Automotive applications. It is qualified to AEC-Q101, supported by a PPAP and is ideal for use in:

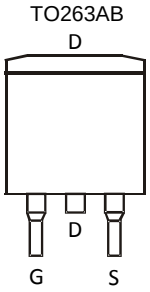
- Engine Management Systems
- Body Control Electronics
- DC-DC Converters

Mechanical Data

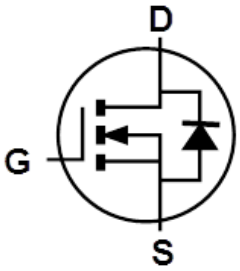
- Case: TO263AB
- Case Material: Molded Plastic, "Green" Molding Compound; UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Finish - Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 e3
- Weight: 1.7 grams (Approximate)



Top View



Pin Out Top View



Internal Schematic

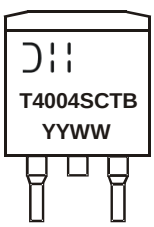
Ordering Information (Note 5)

Part Number	Case	Packaging
DMTH4004SCTBQ-13	TO263AB	800/Tape & Reel

Notes:
1. EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant. All applicable RoHS exemptions applied.
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. Automotive products are AEC-Q101 qualified and are PPAP capable. For more information, please refer to http://www.diodes.com/product_compliance_definitions.html.
5. For packaging details, go to our website at http://www.diodes.com/products/packages.html.

Marking Information

TO263AB



T4004SCTB = Product Type Marking Code
YYWW = Date Code Marking
YY = Last Two Digits of Year (ex: 14 = 2014)
WW = Week (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}	40	V
Gate-Source Voltage		V_{GSS}	±20	V
Continuous Drain Current (Note 7)	T_C = +25°C (Note 10) T_C = +100°C	I_D	100 100	A
Maximum Continuous Body Diode Forward Current		I_S	100	A
Pulsed Drain Current (10µs pulse, duty cycle = 1%)		I_{DM}	200	A
Avalanche Current, L=0.2mH		I_{AS}	45	A
Avalanche Energy, L=0.2mH		E_{AS}	200	mJ

Thermal Characteristics

Characteristic		Symbol	Value	Units
Total Power Dissipation (Note 6)	T_A = +25°C	P_D	4.7	W
Thermal Resistance, Junction to Ambient (Note 6)		$R_{\theta JA}$	32	°C/W
Total Power Dissipation (Note 7)	T_C = +25°C	P_D	136	W
Thermal Resistance, Junction to Case (Note 7)		$R_{\theta JC}$	1.1	°C/W
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +175	°C

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}	40	—	—	V	V_{GS} = 0V, I_D = 1mA
Zero Gate Voltage Drain Current	I_{DSS}	—	—	1	µA	V_{DS} = 32V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	—	—	±100	nA	V_{GS} = ±20V, V_{DS} = 0V
ON CHARACTERISTICS (Note 8)						
Gate Threshold Voltage	$V_{GS(TH)}$	2	—	4	V	V_{DS} = V_{GS}, I_D = 250µA
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	2.5	3	mΩ	V_{GS} = 10V, I_D = 100A
Diode Forward Voltage	V_{SD}	—	—	1.3	V	V_{GS} = 0V, I_S = 100A
DYNAMIC CHARACTERISTICS (Note 9)						
Input Capacitance	C_{iss}	—	4,305	—	pF	V_{DS} = 25V, V_{GS} = 0V f = 1MHz
Output Capacitance	C_{oss}	—	1,441	—		
Reverse Transfer Capacitance	C_{rss}	—	102	—		
Gate Resistance	R_G	—	0.77	—	Ω	V_{DS} = 0V, V_{GS} = 0V, f = 1MHz
Total Gate Charge	Q_g	—	68.6	—	nC	V_{DD} = 20V, I_D = 90A, V_{GS} = 10V
Gate-Source Charge	Q_{gs}	—	16.8	—		
Gate-Drain Charge	Q_{gd}	—	14.2	—		
Turn-On Delay Time	$t_{D(ON)}$	—	9.5	—	ns	V_{DD} = 20V, V_{GS} = 10V, I_D = 90A, R_G = 3.5Ω
Turn-On Rise Time	t_R	—	6.7	—		
Turn-Off Delay Time	$t_{D(OFF)}$	—	26.4	—		
Turn-Off Fall Time	t_F	—	8.1	—		
Reverse Recovery Time	t_{RR}	—	52.4	—	ns	I_F = 50A, di/dt = 100A/µs
Reverse Recovery Charge	Q_{RR}	—	78.2	—	nC	

Notes: 6. Device mounted on FR-4 substrate PC board, 2oz copper, with thermal bias to bottom layer 1-inch square copper plate.
7. Thermal resistance from junction to soldering point (on the exposed drain pad).
8. Short duration pulse test used to minimize self-heating effect.
9. Guaranteed by design. Not subject to product testing.
10. Package limited.

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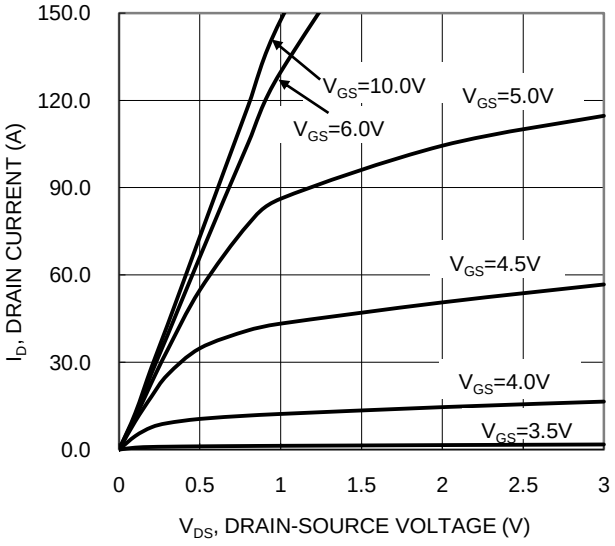


Figure 1 Typical Output Characteristic

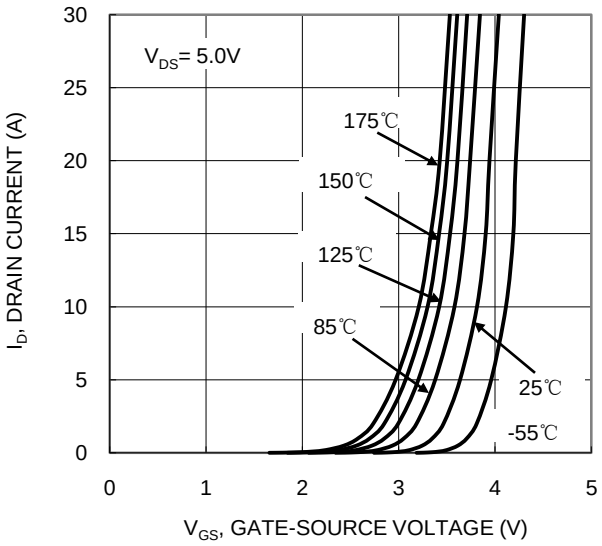


Figure 2 Typical Transfer Characteristic

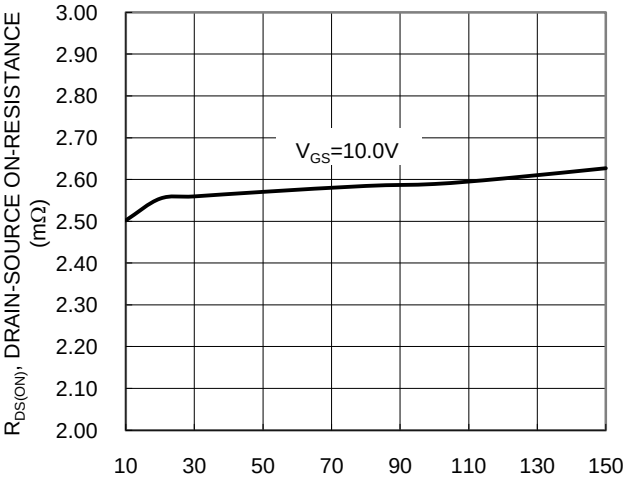


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

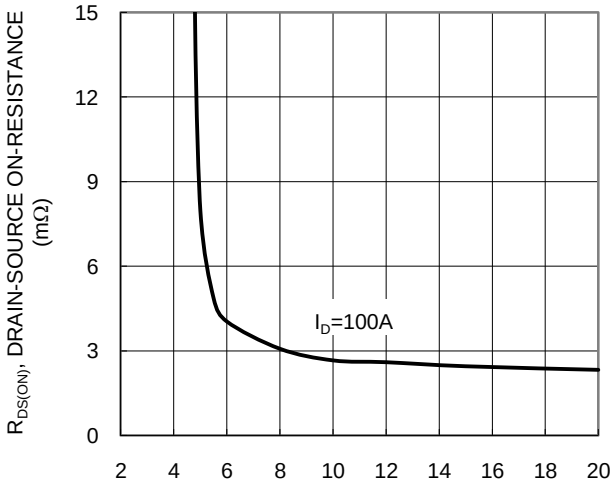


Figure 4 Typical Transfer Characteristic

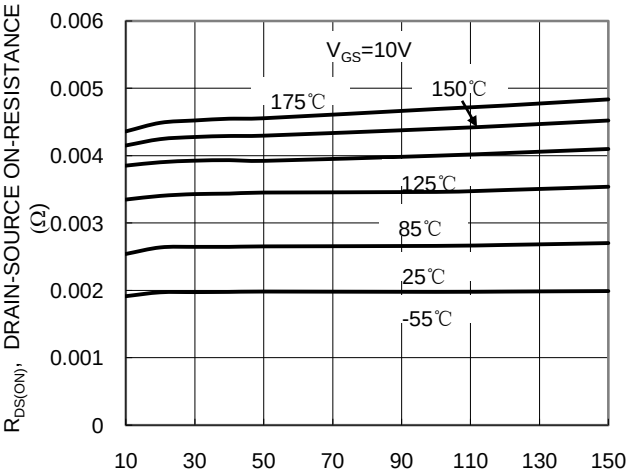


Figure 5 Typical On-Resistance vs. Drain Current and Temperature

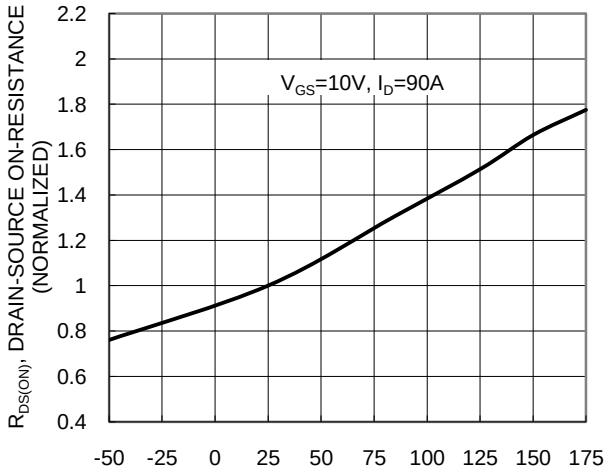


Figure 6 On-Resistance Variation with Temperature

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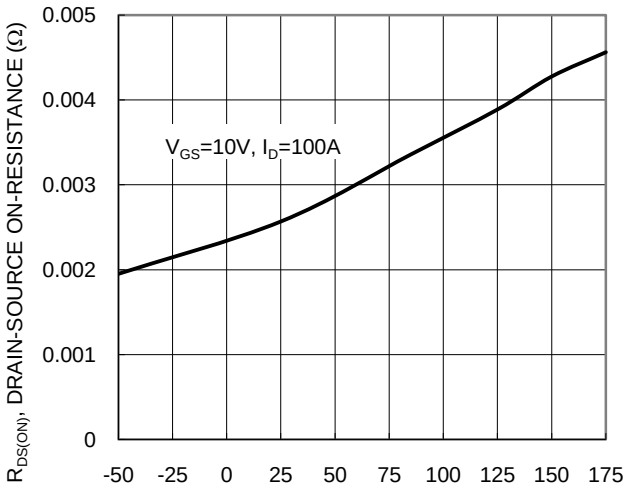


Figure 7 On-Resistance Variation with Temperature

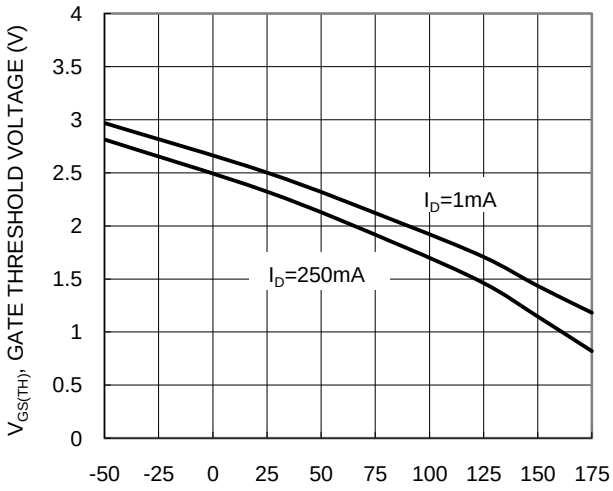


Figure 8 Gate Threshold Variation vs. Temperature

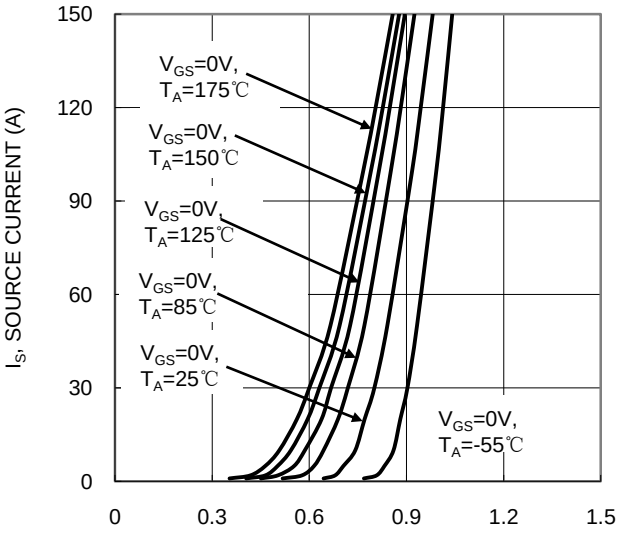


Figure 9 Diode Forward Voltage vs. Current

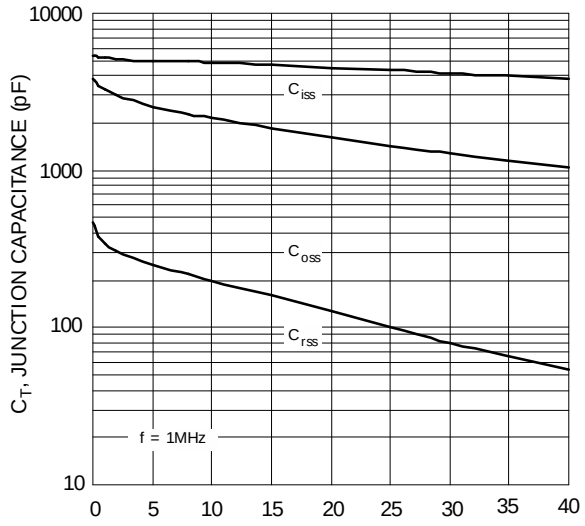


Figure 10 Typical Junction Capacitance

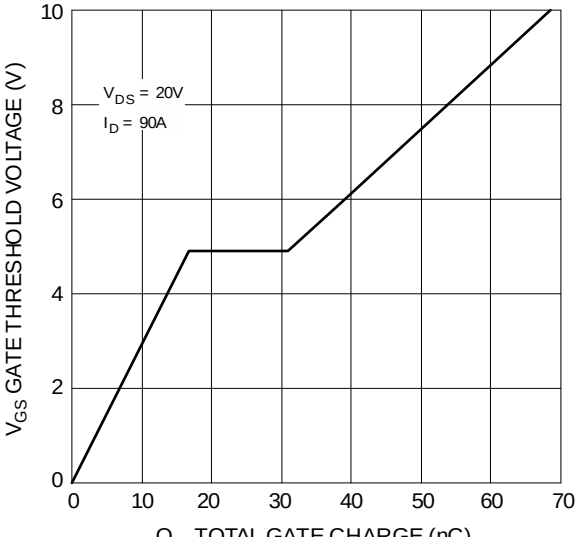


Figure 11 Gate Charge

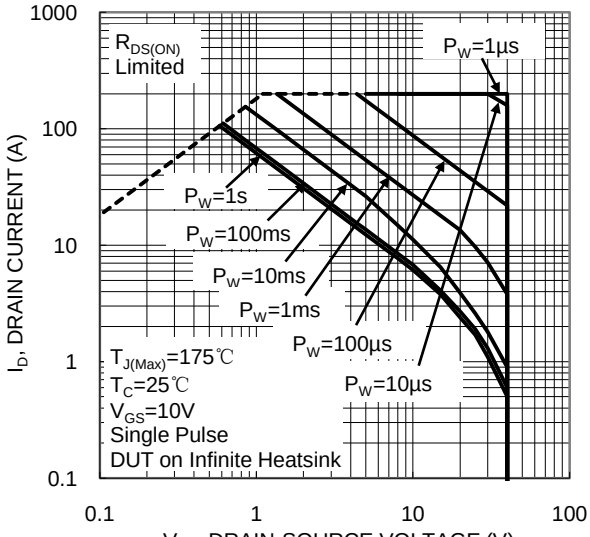


Figure 12 SOA, Safe Operation Area

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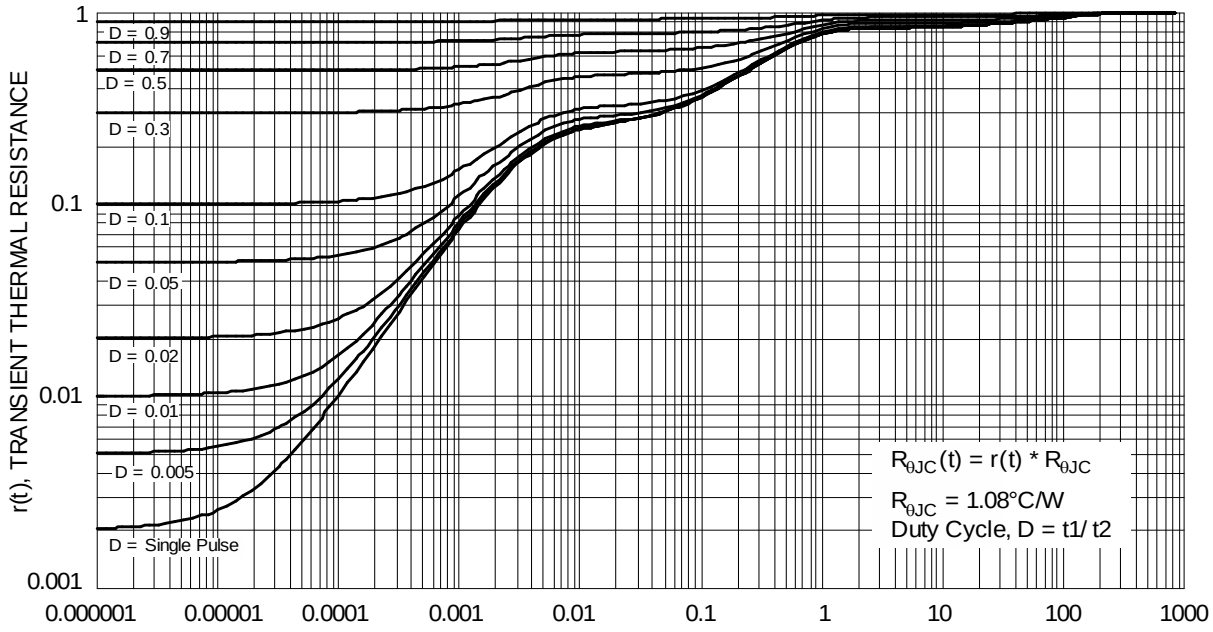


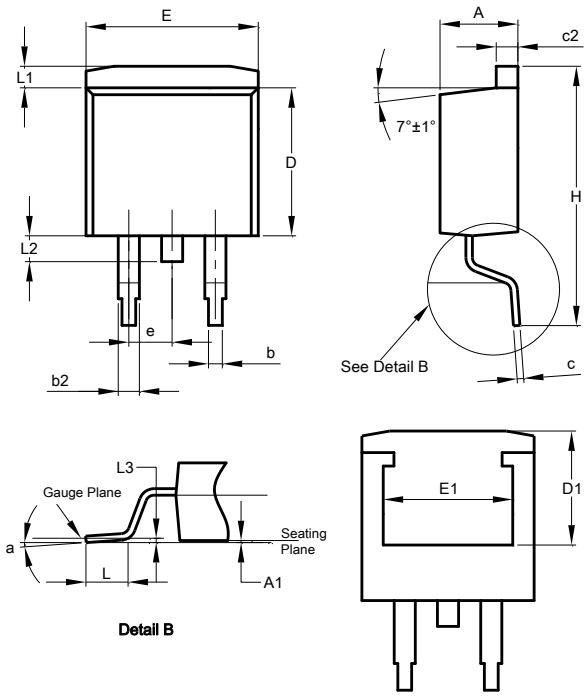
Figure 13 Transient Thermal Resistance

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Package Outline Dimensions

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

TO263AB (D2PAK)

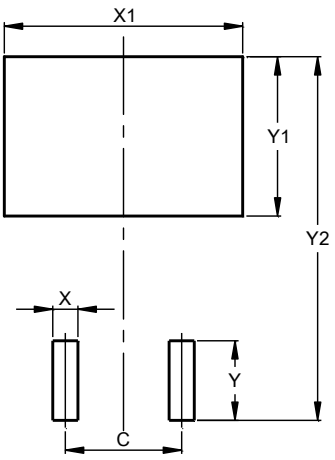


TO263AB (D2PAK)			
Dim	**Min**	**Max**	**Typ**
A	4.07	4.82	-
A1	0.00	0.25	-
b	0.51	0.99	-
b2	1.15	1.77	-
c	0.356	0.73	-
c2	1.143	1.65	-
D	8.39	9.65	-
D1	6.55	6.95	-
e	2.54 TYP		
E	9.66	10.66	-
E1	6.23	8.23	-
H	14.61	15.87	-
L	1.78	2.79	-
L1	-	1.67	-
L2	-	1.77	-
L3	-	-	0.254
a	0°	8°	-
All Dimensions in mm			

Suggested Pad Layout

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

TO263AB (D2PAK)



Dimensions	Value (in mm)
C	5.08
X	1.10
X1	10.41
Y	3.50
Y1	7.01
Y2	15.99

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