40V +175°C N-CHANNEL ENHANCEMENT MODE MOSFET

Product Summary

$V_{(BR)DSS}$	$R_{DS(ON)}$	I_D T_C = +25°C
40V	4.0mΩ @ V_{GS} = 10V	150A

Features

- Low Input Capacitance
- Low Input/Output Leakage
- **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

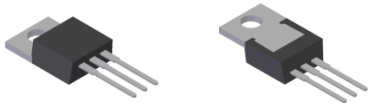
This MOSFET is designed to meet the stringent requirements of automotive applications. It is qualified to AEC-Q101, supported by a PPAP and is ideal for use in:

- Motor Control
- Backlighting
- DC-DC Converters
- Power Management Functions

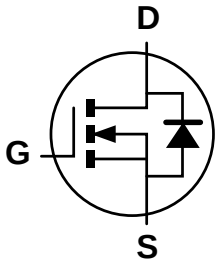
Mechanical Data

- Case: TO220AB
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Terminals: Matte Tin Finish Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 e3
- Terminal Connections: See Diagram Below
- Weight: 1.85 grams (Approximate)

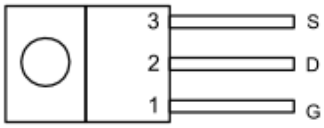
TO220AB



Top View Bottom View



Equivalent Circuit



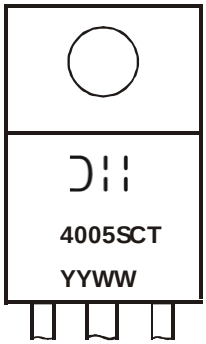
Top View
Pin Out Configuration

Ordering Information (Note 5)

Part Number	Case	Packaging
DMNH4005SCTQ	TO220AB	50 Pieces/Tube

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. 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



4005SCT = Product Type Marking Code
YYWW = Date Code Marking
YY = Last Two Digits of Year (ex: 16 = 2016)
WW = Week (01 to 53)

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

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			V_{DSS}	40	V
Gate-Source Voltage			V_{GSS}	20	V
Continuous Drain Current V_{GS} = 10V	Steady State	T_C = +25°C T_C = +100°C	I_D	150 100	A
Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)			I_{DM}	90	A
Maximum Continuous Body Diode Forward Current (Note 6)			I_S	80	A
Avalanche Current (Note 7) L=1mH			I_{AS}	30	A
Avalanche Energy (Note 7) L=1mH			E_{AS}	500	mJ

Thermal Characteristics

Characteristic		Symbol	Value	Unit
Power Dissipation	T_C = +25°C	P_D	165	W
	T_C = +70°C		100	
Thermal Resistance, Junction to Case		$R_{\theta JC}$	0.9	°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 = 250µA
Zero Gate Voltage Drain Current	I_{DSS}	—	—	1	µA	V_{DS} = 32V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	—	—	±100	nA	V_{GS} = ±16V, V_{DS} = 0V
ON CHARACTERISTICS (Note 8)						
Gate Threshold Voltage	$V_{GS(TH)}$	1	—	3	V	V_{DS} = V_{GS}, I_D = 250µA
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	3.4	4.0	mΩ	V_{GS} = 10V, I_D = 20A
Diode Forward Voltage	V_{SD}	—	—	1.2	V	V_{GS} = 0V, I_S = 1A
DYNAMIC CHARACTERISTICS (Note 9)						
Input Capacitance	C_{iss}	—	2,846	—	pF	V_{DS} = 20V, V_{GS} = 0V f = 1.0MHz
Output Capacitance	C_{oss}	—	742	—		
Reverse Transfer Capacitance	C_{rss}	—	242	—		
Gate Resistance	R_G	—	1.9	—	Ω	V_{DS} = 0V, V_{GS} = 0V, f = 1.0MHz
Total Gate Charge (V_{GS} = 10V)	Q_g	—	48	—	nC	V_{DD} = 20V, I_D = 20A
Total Gate Charge (V_{GS} = 4.5V)	Q_g	—	23	—		
Gate-Source Charge	Q_{gs}	—	9.5	—		
Gate-Drain Charge	Q_{gd}	—	11.5	—		
Turn-On Delay Time	$t_{D(ON)}$	—	6.6	—	ns	V_{DD} = 20V, V_{GS} = 10V, R_G = 1Ω, I_D = 20A
Turn-On Rise Time	t_R	—	12.1	—		
Turn-Off Delay Time	$t_{D(OFF)}$	—	18.3	—		
Turn-Off Fall Time	t_F	—	4.9	—		
Reverse Recovery Time	t_{RR}	—	29	—	ns	I_F = 15A, di/dt = 100A/µs
Reverse Recovery Charge	Q_{RR}	—	24	—	nC	

Notes: 6. Device mounted on FR-4 PC board, with minimum recommended pad layout, single sided.
7. I_{AS} and E_{AS} ratings are based on low frequency and duty cycles to keep T_J = +25°C.
8. Short duration pulse test used to minimize self-heating effect.
9. Guaranteed by design. Not subject to product testing.

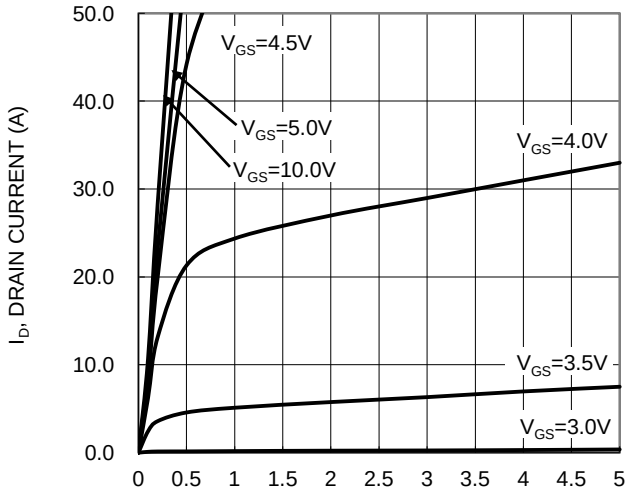


Figure 1. Typical Output Characteristic

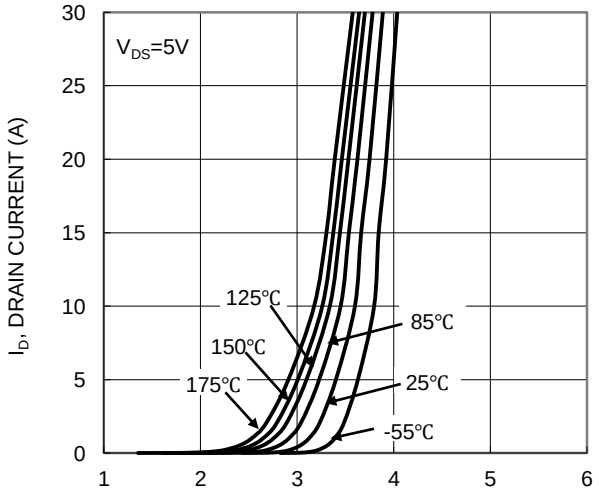


Figure 2. Typical Transfer Characteristic

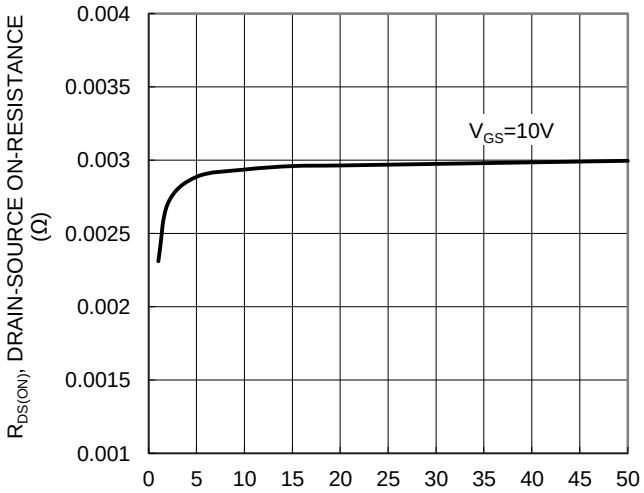


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

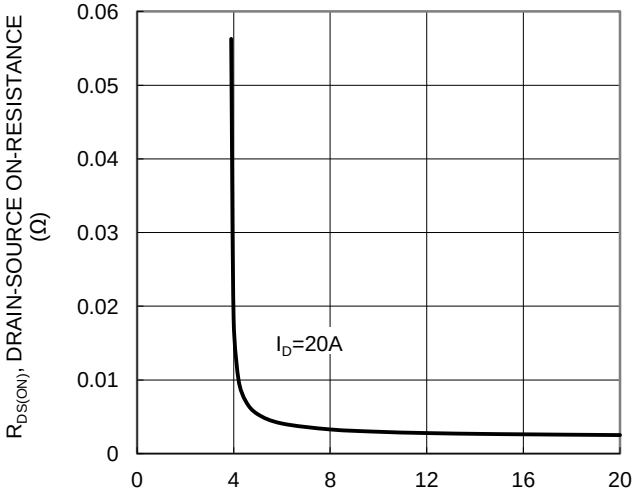


Figure 4. Typical Transfer Characteristic

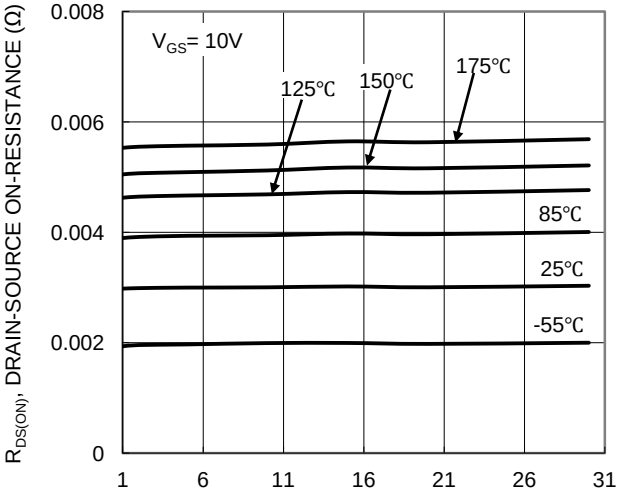


Figure 5. Typical On-Resistance vs. Drain Current and Junction Temperature

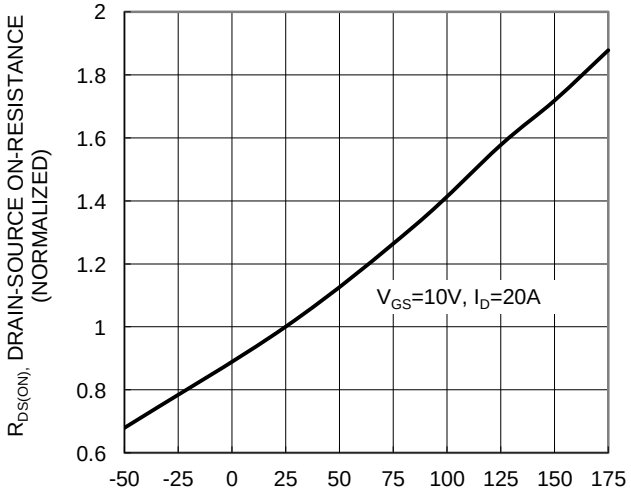


Figure 6. On-Resistance Variation with Junction Temperature

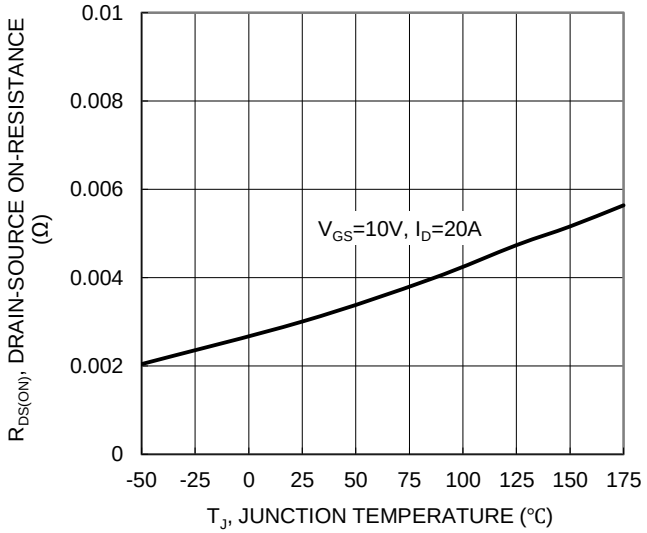


Figure 7. On-Resistance Variation with Junction Temperature

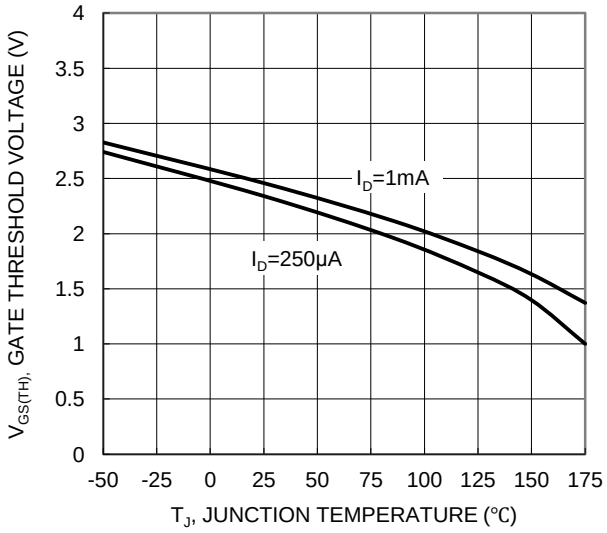


Figure 8. Gate Threshold Variation vs. Junction Temperature

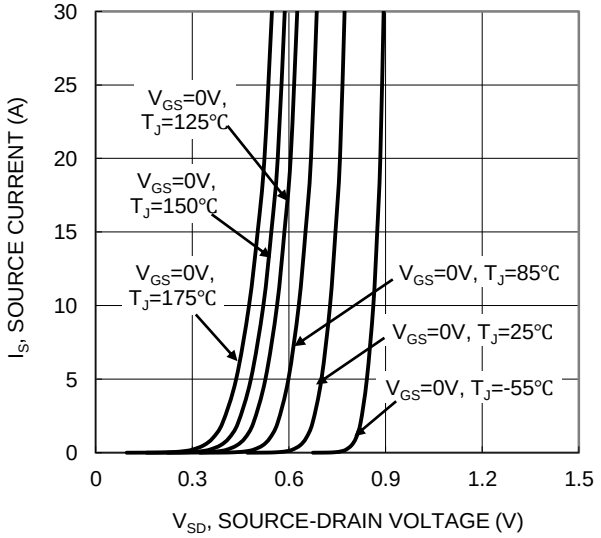


Figure 9. Diode Forward Voltage vs. Current

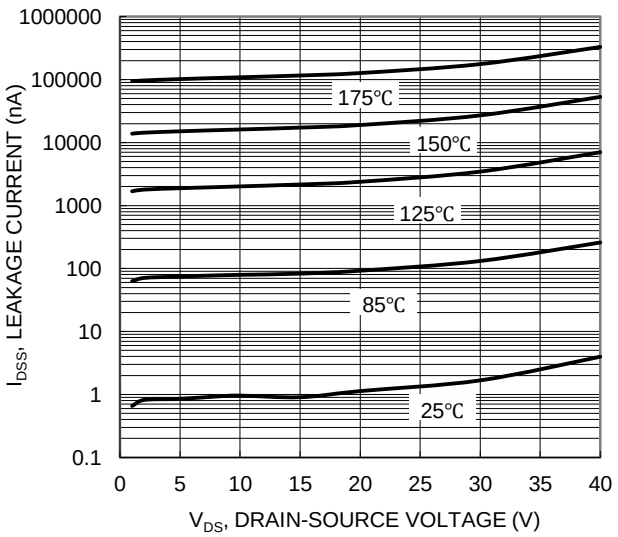


Figure 10. Typical Drain-Source Leakage Current vs. Voltage

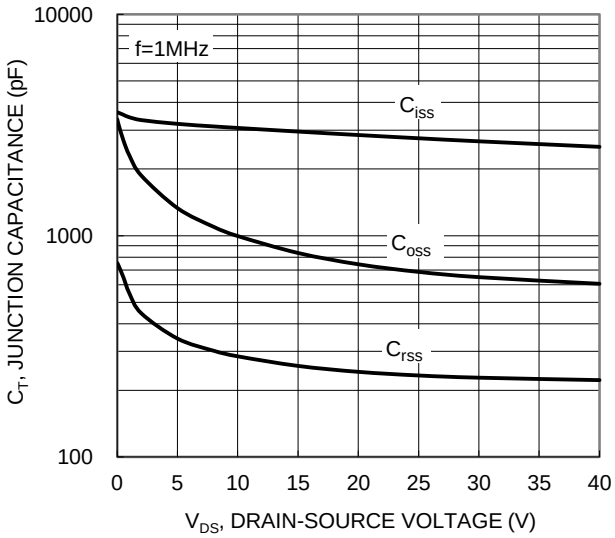


Figure 11. Typical Junction Capacitance

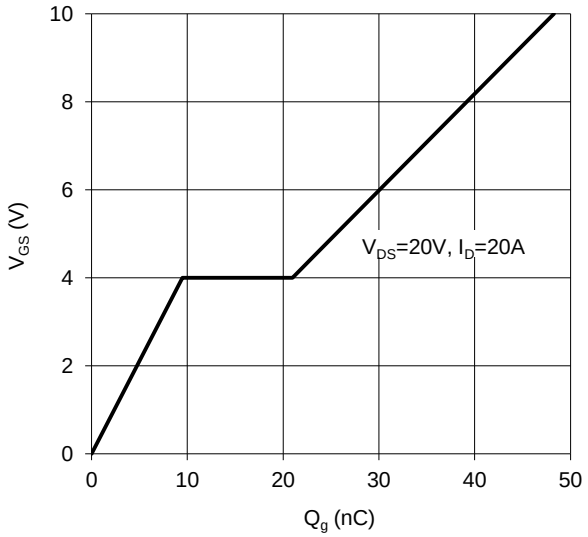


Figure 12. Gate Charge

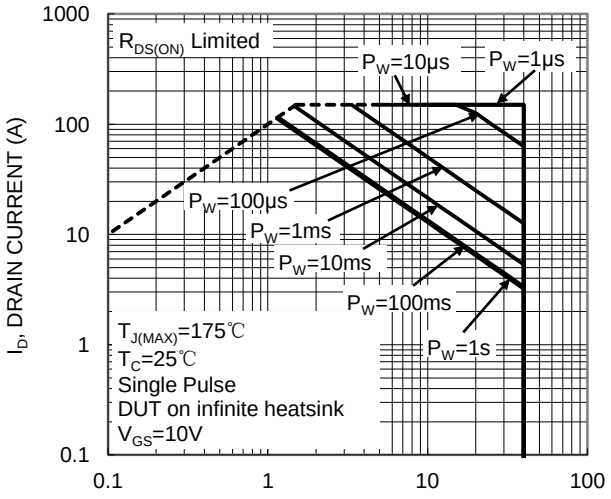


Figure 13. SOA, Safe Operation Area

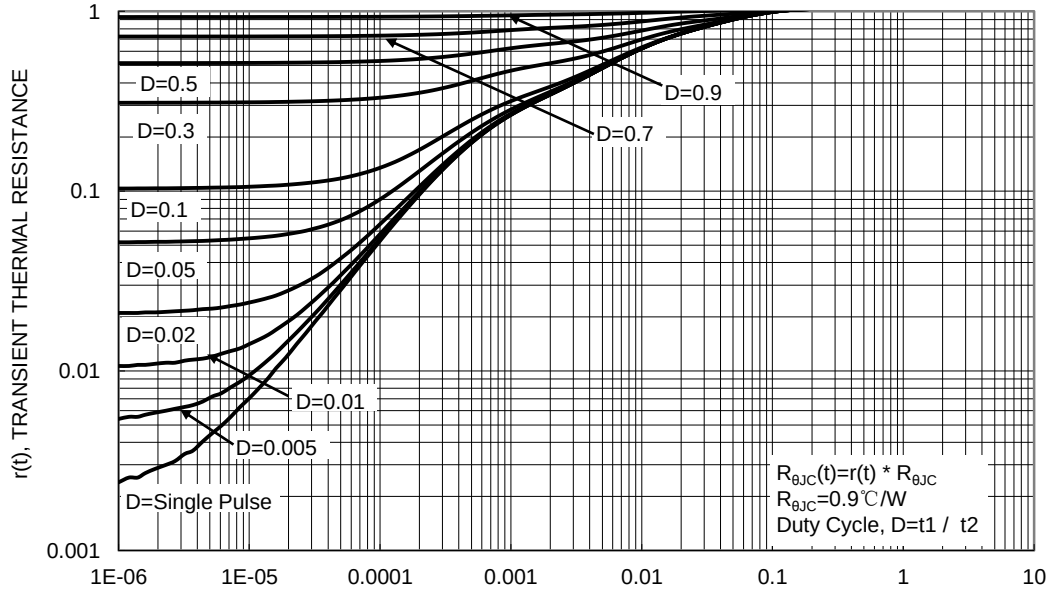
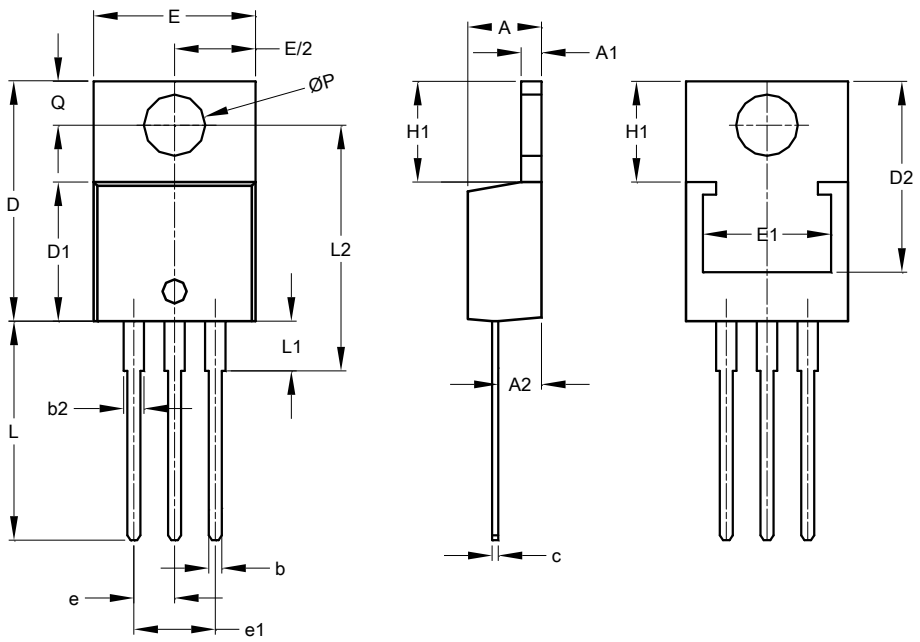


Figure 14. Transient Thermal Resistance

Package Outline Dimensions

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

TO220AB



TO220AB			
Dim	**Min**	**Max**	**Typ**
A	3.56	4.82	-
A1	0.51	1.39	-
A2	2.04	2.92	-
b	0.39	1.01	0.81
b2	1.15	1.77	1.24
c	0.356	0.61	-
D	14.22	16.51	-
D1	8.39	9.01	-
D2	11.45	12.87	-
e	-	-	2.54
e1	-	-	5.08
E	9.66	10.66	-
E1	6.86	8.89	-
H1	5.85	6.85	-
L	12.70	14.73	-
L1	-	6.35	-
L2	15.80	16.20	16.00
P	3.54	4.08	-
Q	2.54	3.42	-
All Dimensions in mm			

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