

## Product Summary

BV <sub>DSS</sub>	R <sub>DS(ON)</sub> Max	I <sub>D</sub> Max T <sub>C</sub> = +25°C
80V	16mΩ @ V <sub>GS</sub> = 10V	50A
	21mΩ @ V <sub>GS</sub> = 4.5V	43A

## Features

- Rated to +175°C – Ideal for High Ambient Temperature Environments
- Low R<sub>DS(ON)</sub> – Ensures On-State Losses are Minimized
- High Conversion Efficiency
- Low Input Capacitance
- Fast Switching Speed
- **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 AECQ101, supported by a PPAP and is ideal for use in:

- Engine Management Units
- Motor Control
- DC-DC Converters

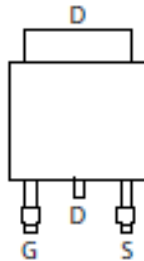
## Mechanical Data

- 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 Finish — Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 <sup>(e3)</sup>
- Weight: 0.33 grams (Approximate)

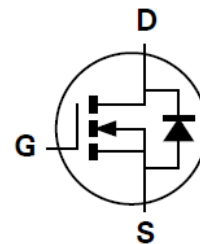


Top View

### TO252 (DPAK)



Pin Out Top View



Equivalent Circuit

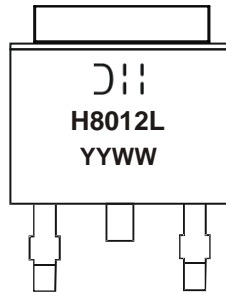
## Ordering Information (Note 5)

Part Number	Case	Packaging
DMTH8012LK3Q-13	TO252 (DPAK)	2,500/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](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. Automotive, AEC-Q101 and standard products are and thermally the same, except where specified. For more information, please refer to [http://www.diodes.com/quality/product\\_compliance\\_definitions/](http://www.diodes.com/quality/product_compliance_definitions/).
  5. For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

## Marking Information

TO252 (DPAK)



D||| = Manufacturer's Marking  
 H8012L = Product Type Marking Code  
 YYWW = Date Code Marking  
 YY = Last Two Digits of Year (ex: 14 = 2014)  
 WW = Week Code (01 to 53)

## Maximum Ratings (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Units
Drain-Source Voltage	V <sub>DSS</sub>	80	V
Gate-Source Voltage	V <sub>GSS</sub>	±20	V
Continuous Drain Current (Note 7) V <sub>GS</sub> = 10V	I <sub>D</sub>	T <sub>C</sub> = +25°C	50
		T <sub>C</sub> = +100°C	35
Maximum Continuous Body Diode Forward Current (Note 7)	I <sub>S</sub>	80	A
Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)	I <sub>DM</sub>	80	A
Avalanche Energy, L = 60mH	E <sub>AS</sub>	147	mJ

## Thermal Characteristics

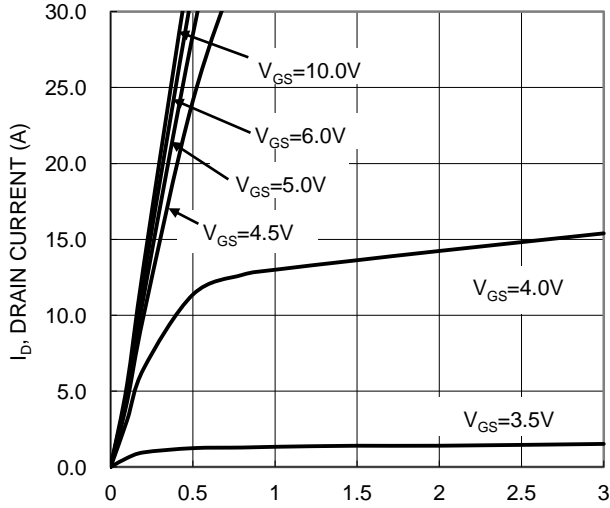
Characteristic	Symbol	Value	Units
Total Power Dissipation (Note 6)	P <sub>D</sub>	2.6	W
Thermal Resistance, Junction to Ambient (Note 6)	R <sub>θJA</sub>	47	°C/W
Total Power Dissipation (Note 7)	P <sub>D</sub>	60	W
Thermal Resistance, Junction to Case (Note 7)	R <sub>θJC</sub>	2.5	°C/W
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to +175	°C

Notes: 6. Device mounted on FR-4 substrate PC board, 2oz copper, with 1-inch square copper plate.  
 7. Device mounted on infinite heat sink and measured by thermal couple attached on bottom heat sink of package.

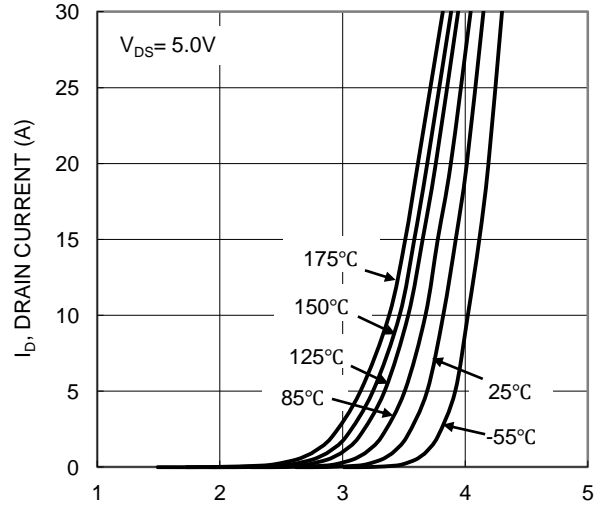
**Electrical Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS</b> (Note 8)						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	80	—	—	V	V <sub>GS</sub> = 0V, I <sub>D</sub> = 1mA
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	—	—	1	μA	V <sub>DS</sub> = 64V, V <sub>GS</sub> = 0V
Gate-Source Leakage	I <sub>GSS</sub>	—	—	±100	nA	V <sub>GS</sub> = ±20V, V <sub>DS</sub> = 0V
<b>ON CHARACTERISTICS</b> (Note 8)						
Gate Threshold Voltage	V <sub>GS(TH)</sub>	1	—	3	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA
Static Drain-Source On-Resistance	R <sub>DS(ON)</sub>	—	12.1	16	mΩ	V <sub>GS</sub> = 10V, I <sub>D</sub> = 12A
		—	14.8	21		V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 6A
Diode Forward Voltage	V <sub>SD</sub>	—	0.9	1.2	V	V <sub>GS</sub> = 0V, I <sub>S</sub> = 25A
<b>DYNAMIC CHARACTERISTICS</b> (Note 9)						
Input Capacitance	C <sub>iss</sub>	—	2051	—	pF	V <sub>DS</sub> = 40V, V <sub>GS</sub> = 0V, f = 1MHz
Output Capacitance	C <sub>oss</sub>	—	189.9	—		
Reverse Transfer Capacitance	C <sub>rss</sub>	—	24.6	—		
Gate Resistance	R <sub>g</sub>	—	0.44	—	Ω	V <sub>DS</sub> = 0V, V <sub>GS</sub> = 0V, f = 1MHz
Total Gate Charge (V <sub>GS</sub> = 4.5V)	Q <sub>g</sub>	—	24.1	—	nC	V <sub>DS</sub> = 40V, I <sub>D</sub> = 12A
Total Gate Charge (V <sub>GS</sub> = 10V)	Q <sub>g</sub>	—	46.8	—		
Gate-Source Charge	Q <sub>gs</sub>	—	6.9	—		
Gate-Drain Charge	Q <sub>gd</sub>	—	12.2	—		
Turn-On Delay Time	t <sub>D(ON)</sub>	—	5.8	—	nS	V <sub>DD</sub> = 40V, V <sub>GS</sub> = 10V, I <sub>D</sub> = 12A, R <sub>G</sub> = 1.6Ω
Turn-On Rise Time	t <sub>R</sub>	—	6.5	—		
Turn-Off Delay Time	t <sub>D(OFF)</sub>	—	17.3	—		
Turn-Off Fall Time	t <sub>F</sub>	—	4.7	—		
Body Diode Reverse Recovery Time	t <sub>RR</sub>	—	33.5	—	nS	I <sub>F</sub> = 12A, di/dt = 100A/μs
Body Diode Reverse Recovery Charge	Q <sub>RR</sub>	—	38.9	—	nC	

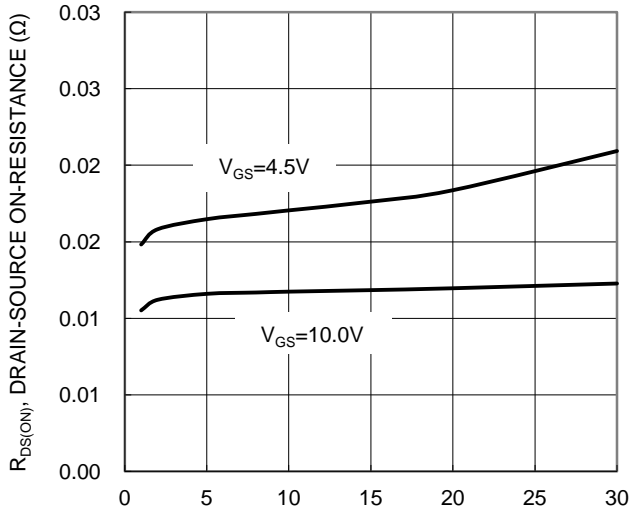
Notes: 8. Short duration pulse test used to minimize self-heating effect.  
9. Guaranteed by design. Not subject to product testing.



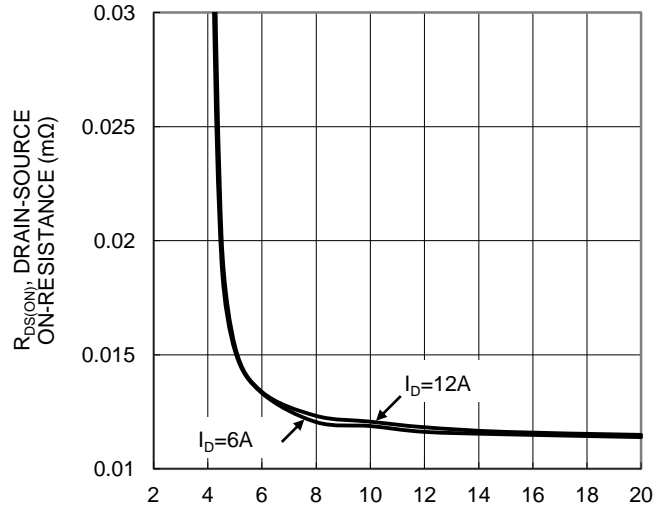
$V_{DS}$ , DRAIN-SOURCE VOLTAGE (V)  
Figure 1. Typical Output Characteristic



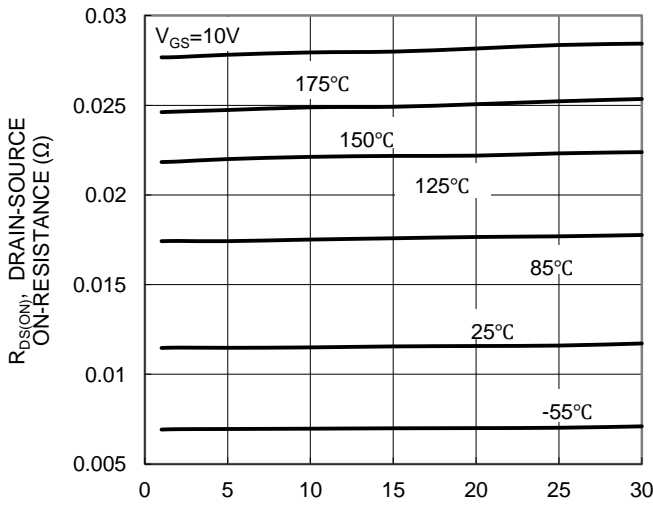
$V_{GS}$ , GATE-SOURCE VOLTAGE (V)  
Figure 2. Typical Transfer Characteristic



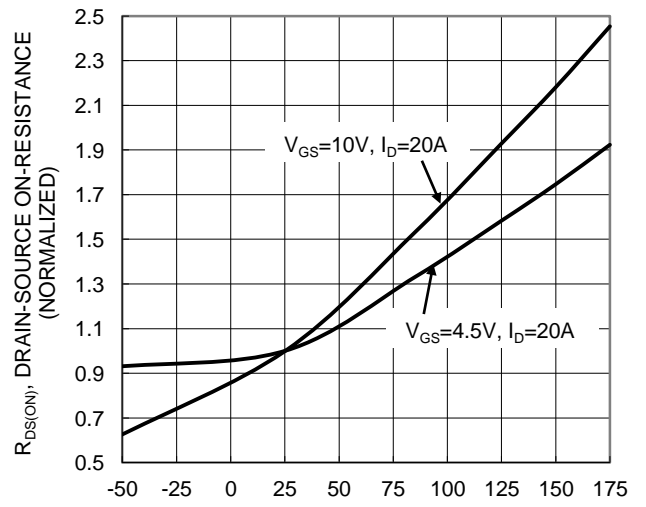
$I_D$ , DRAIN-SOURCE CURRENT (A)  
Figure 3. Typical On-Resistance vs Drain Current and Gate Voltage



$V_{GS}$ , GATE-SOURCE VOLTAGE (V)  
Figure 4. Typical Transfer Characteristic



$I_D$ , DRAIN CURRENT (A)  
Figure 5. Typical On-Resistance vs Drain Current and Temperature



$T_J$ , JUNCTION TEMPERATURE ( $^{\circ}C$ )  
Figure 6. On-Resistance Variation with Temperature

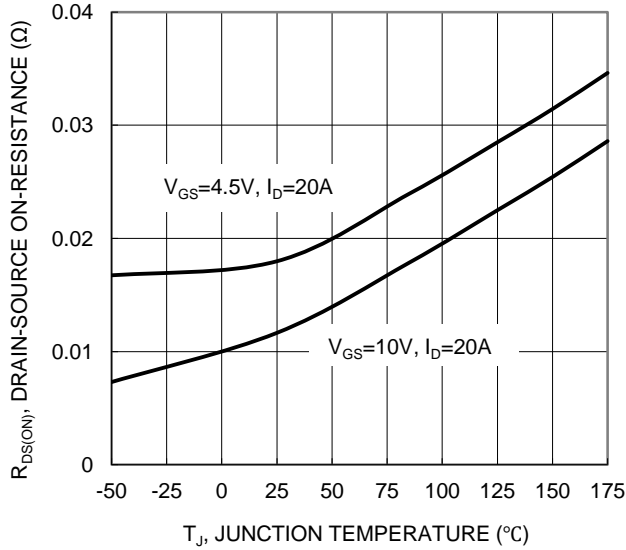


Figure 7. On-Resistance Variation with Temperature

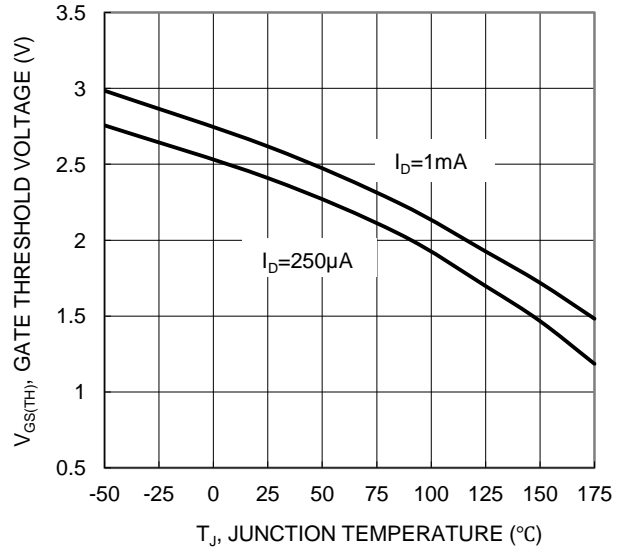


Figure 8. Gate Threshold Variation vs Temperature

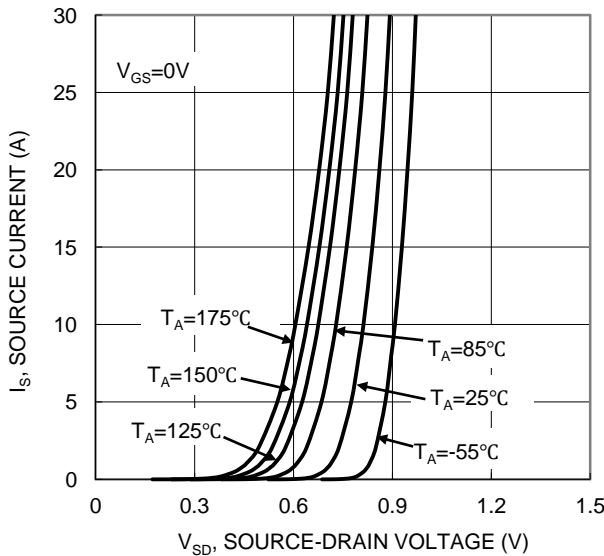


Figure 9. Diode Forward Voltage vs Current

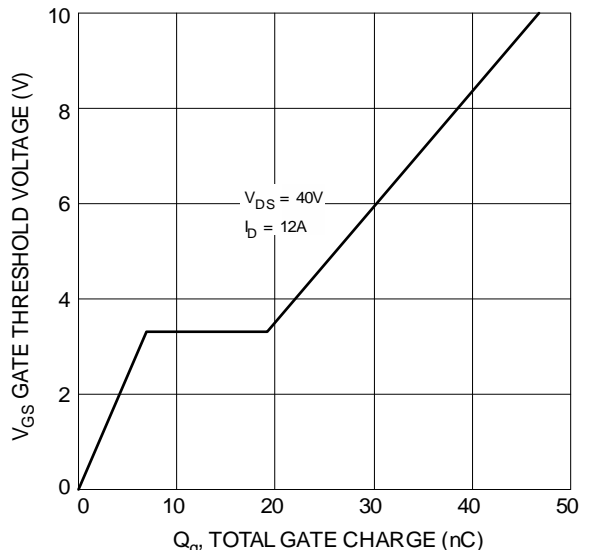


Figure 10. Gate Charge

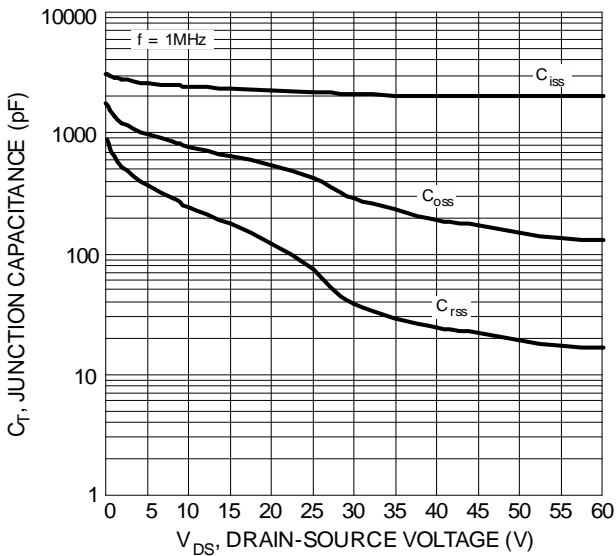


Figure 11. Typical Junction Capacitance

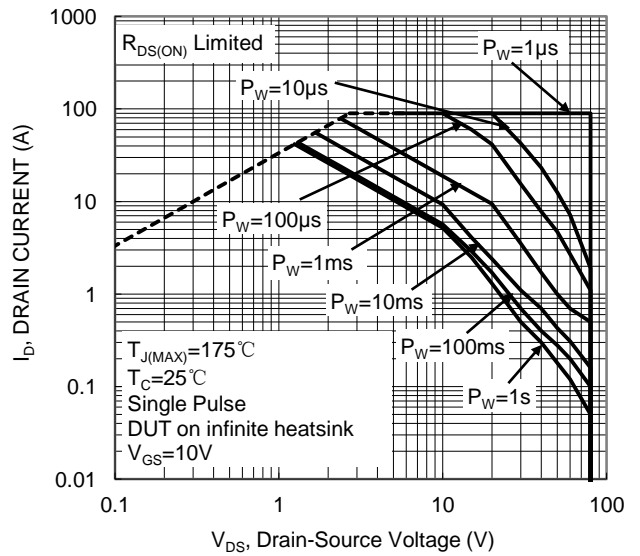


Figure 12. SOA, Safe Operation Area

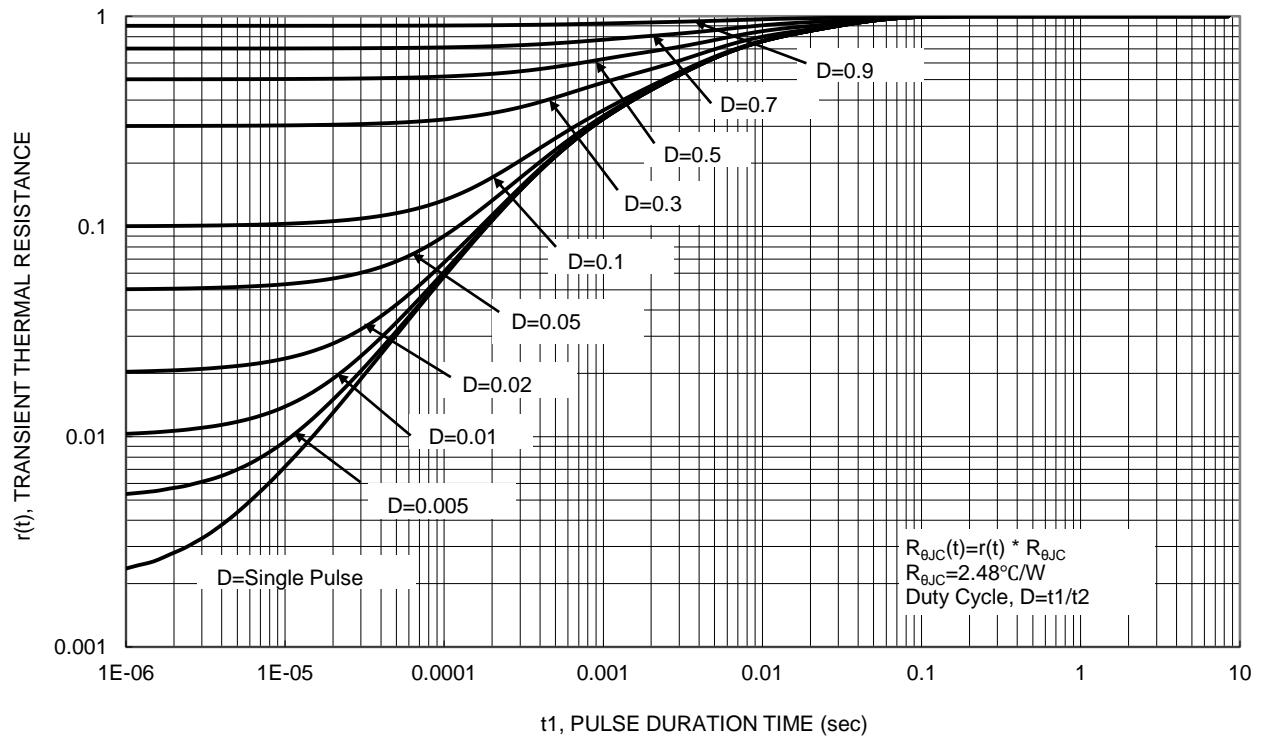
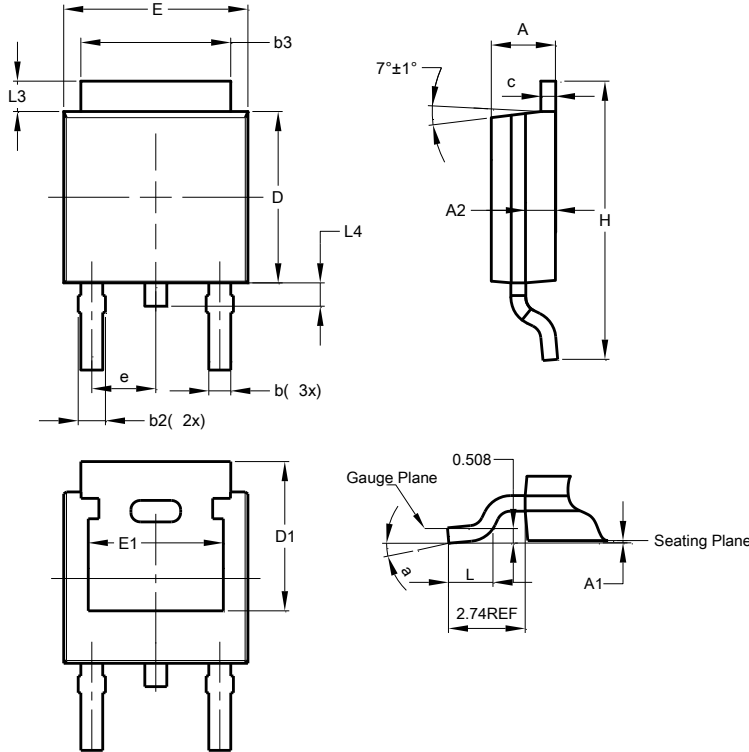


Figure 13. Transient Thermal Resistance

**Package Outline Dimensions**

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

**TO252 (DPAK)**

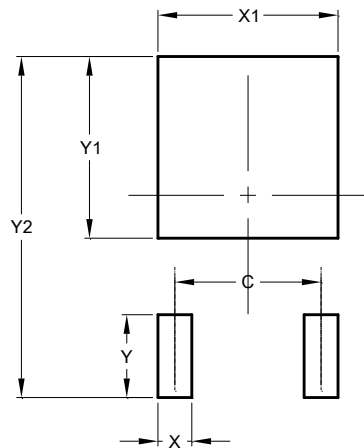


TO252 (DPAK)			
Dim	Min	Max	Typ
A	2.19	2.39	2.29
A1	0.00	0.13	0.08
A2	0.97	1.17	1.07
b	0.64	0.88	0.783
b2	0.76	1.14	0.95
b3	5.21	5.46	5.33
c	0.45	0.58	0.531
D	6.00	6.20	6.10
D1	5.21	—	—
e	—	—	2.286
E	6.45	6.70	6.58
E1	4.32	—	—
H	9.40	10.41	9.91
L	1.40	1.78	1.59
L3	0.88	1.27	1.08
L4	0.64	1.02	0.83
a	0°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