

Product Summary

BV_{DS}	$R_{DS(ON)}$ Max	I_D Max $T_C = +25^\circ\text{C}$
60V	10m Ω @ $V_{GS} = 10\text{V}$	57A
	12.8m Ω @ $V_{GS} = 4.5\text{V}$	51A

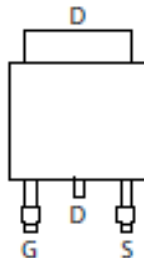
Description and Applications

This new generation MOSFET is 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.

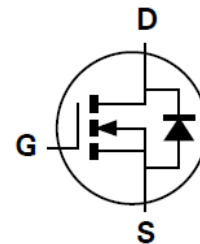
- Power Management Functions
- DC-DC Converters
- Backlighting



Top View



Pin Out Top View




Equivalent Circuit

Features

- Low $R_{DS(ON)}$ – Ensures On State Losses Are Minimized
- Excellent $Q_{gd} \times R_{DS(ON)}$ Product (FOM)
- Advanced Technology for DC/DC Converters
- Small Form Factor Thermally Efficient Package Enables Higher Density End Products
- **Lead-Free Finish; RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**

Mechanical Data

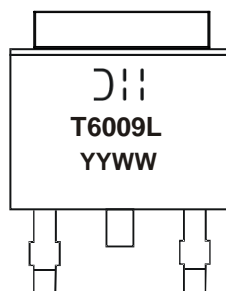
- Case: TO252
- Case Material: Molded Plastic, "Green" Molding Compound.
- UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Finish - Matte Tin Annealed over Copper Leadframe; Solderable per MIL-STD-202, Method 208 
- Weight: 0.33 grams (Approximate)


Ordering Information (Note 4)

Part Number	Case	Packaging
DMT6009LK3-13	TO252	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 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
 T6009L = Product Type Marking Code
 YYWW = Date Code Marking
 YY = Last Two Digits of Year (ex: 15 = 2015)
 WW = Week Code (01 to 53)

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

Characteristic		Symbol	Value	Unit
Drain-Source Voltage		V _{DSS}	60	V
Gate-Source Voltage		V _{GSS}	±16	V
Continuous Drain Current (Note 5) V _{GS} = 10V	T _A = +25°C T _A = +70°C	I _D	13.3 10.6	A
Continuous Drain Current (Note 6) V _{GS} = 10V	T _C = +25°C T _C = +70°C	I _D	57 46	A
Maximum Continuous Body Diode Forward Current (Note 6)		I _S	80	A
Pulsed Drain Current (10μs Pulse, Duty Cycle = 1%)		I _{DM}	90	A
Avalanche Current, L=0.1mH		I _{AS}	20.3	A
Avalanche Energy, L=0.1mH		E _{AS}	20.6	mJ

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

Characteristic	Symbol	Value	Unit
Total Power Dissipation (Note 5)	P _D	2.6	W
Thermal Resistance, Junction to Ambient (Note 5)	R _{θJA}	47	°C/W
Total Power Dissipation (Note 6)	P _D	50	W
Thermal Resistance, Junction to Case (Note 6)	R _{θJC}	2.5	°C/W
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}	60	-	-	V	V _{GS} = 0V, I _D = 1mA
Zero Gate Voltage Drain Current	I _{DSS}	-	-	1	μA	V _{DS} = 48V, V _{GS} = 0V
Gate-Source Leakage	I _{GSS}	-	-	±100	nA	V _{GS} = ±16V, V _{DS} = 0V
ON CHARACTERISTICS (Note 7)						
Gate Threshold Voltage	V _{GS(TH)}	0.7	1.4	2	V	V _{DS} = V _{GS} , I _D = 250μA
Static Drain-Source On-Resistance	R _{DS(ON)}	-	8.3	10	mΩ	V _{GS} = 10V, I _D = 13.5A
		-	9.6	12.8	mΩ	V _{GS} = 4.5V, I _D = 11.5A
Diode Forward Voltage	V _{SD}	-	0.9	1.2	V	V _{GS} = 0V, I _S = 20A
DYNAMIC CHARACTERISTICS (Note 8)						
Input Capacitance	C _{iss}	-	1,925	-	pF	V _{DS} = 30V, V _{GS} = 0V, f = 1MHz
Output Capacitance	C _{oss}	-	438	-		
Reverse Transfer Capacitance	C _{rss}	-	41	-		
Gate Resistance	R _g	-	1.7	-	Ω	V _{DS} = 0V, V _{GS} = 0V, f = 1MHz
Total Gate Charge (V _{GS} = 4.5V)	Q _g	-	15.6	-	nC	V _{DS} = 30V, I _D = 13.5A
Total Gate Charge (V _{GS} = 10V)	Q _g	-	33.5	-		
Gate-Source Charge	Q _{gs}	-	4.7	-		
Gate-Drain Charge	Q _{gd}	-	5.3	-		
Turn-On Delay Time	t _{D(ON)}	-	4.5	-	ns	V _{DD} = 30V, V _{GS} = 10V, R _G = 6Ω, I _D = 13.5A
Turn-On Rise Time	t _R	-	8.6	-		
Turn-Off Delay Time	t _{D(OFF)}	-	35.9	-		
Turn-Off Fall Time	t _F	-	15.7	-		
Body Diode Reverse Recovery Time	t _{RR}	-	18.2	-	ns	I _F = 13.5A, di/dt = 400A/μs
Body Diode Reverse Recovery Charge	Q _{RR}	-	33.1	-	nC	

- Notes:
- Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper pad layout.
 - Device mounted on infinite heat sink and measured by thermal couple attached on bottom heat sink of package.
 - Short duration pulse test used to minimize self-heating effect.
 - Guaranteed by design. Not subject to product testing.

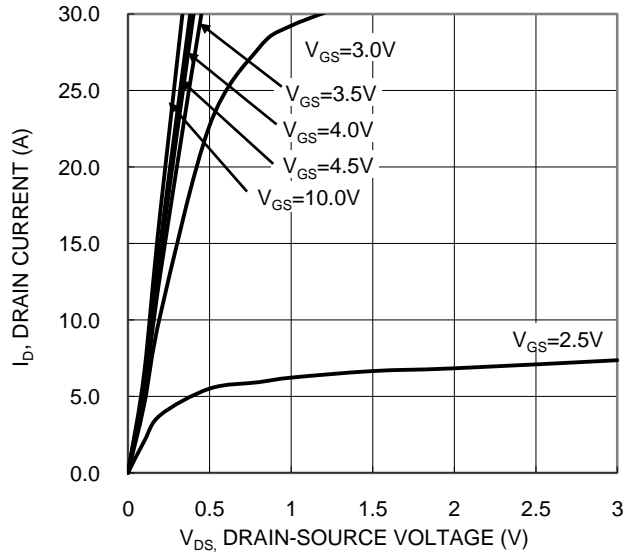


Figure 1. Typical Output Characteristic

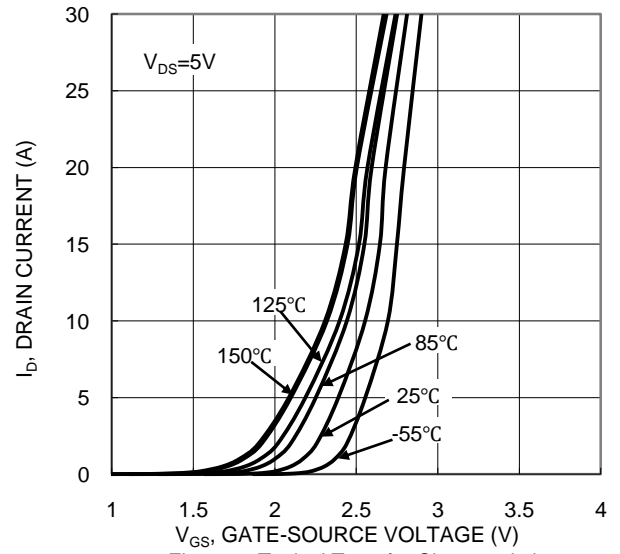


Figure 2. Typical Transfer Characteristic

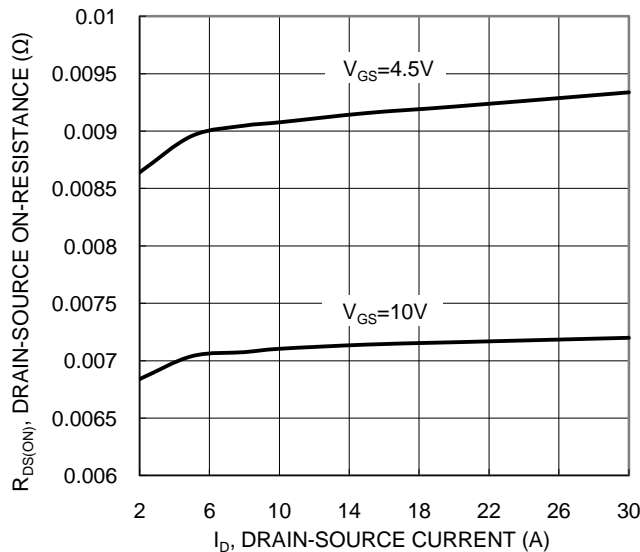


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

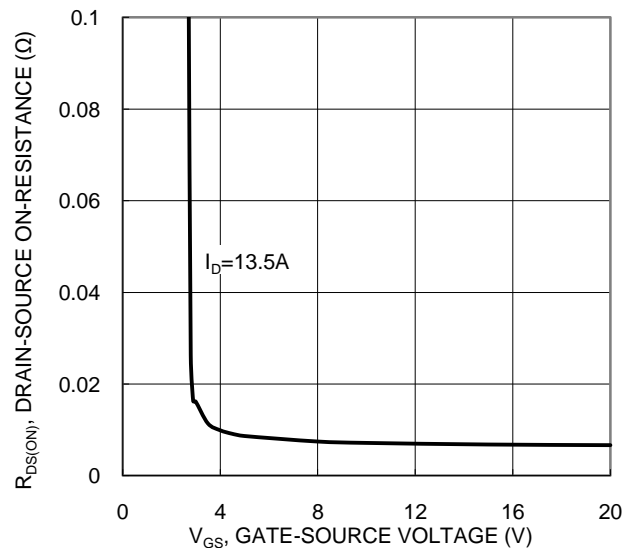


Figure 4. Typical Transfer Characteristic

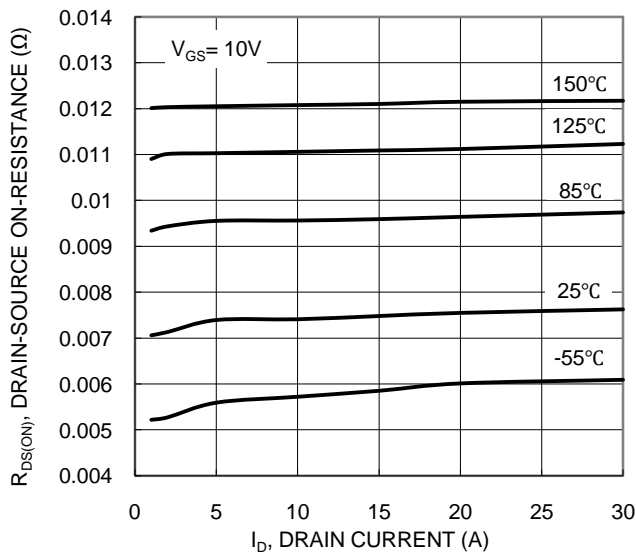


Figure 5. Typical On-Resistance vs. Drain Current and Junction Temperature

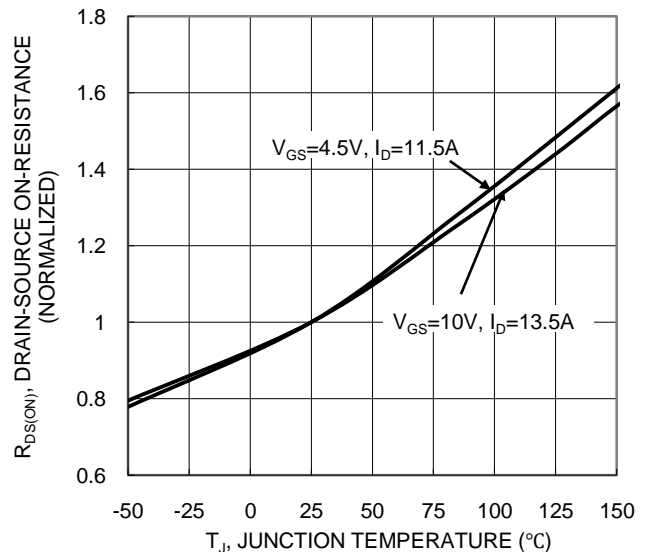
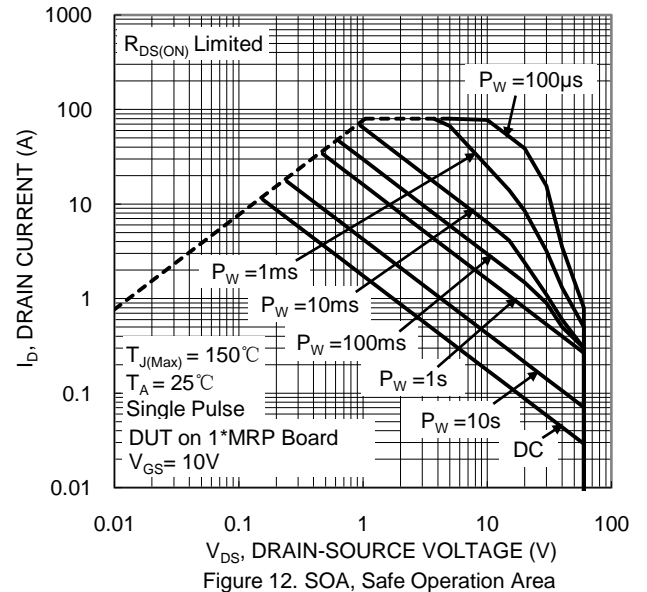
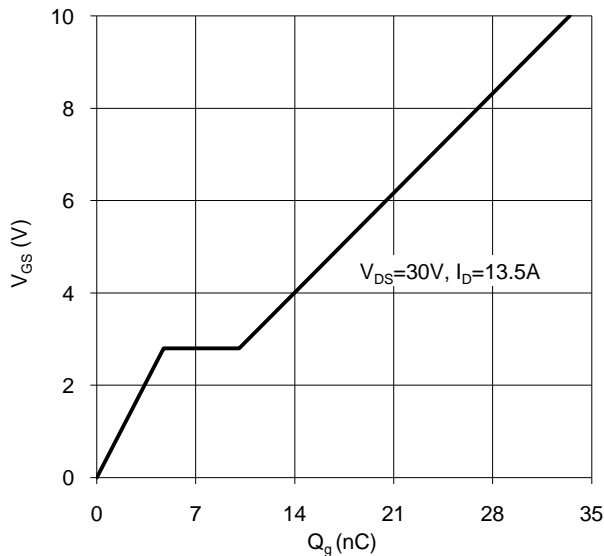
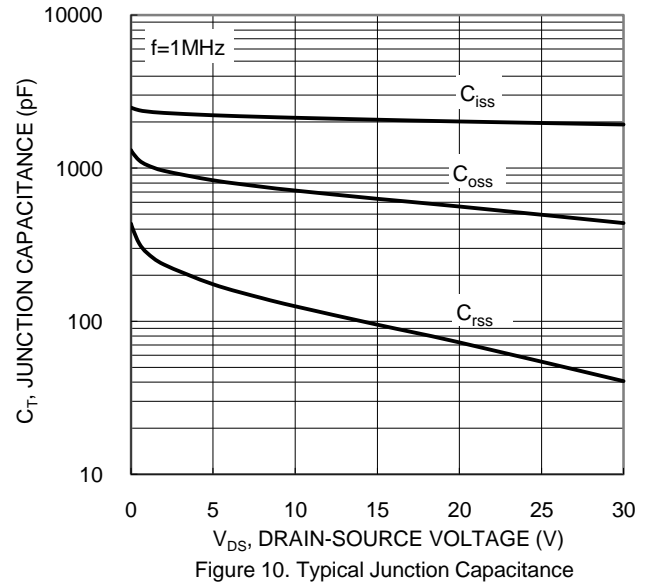
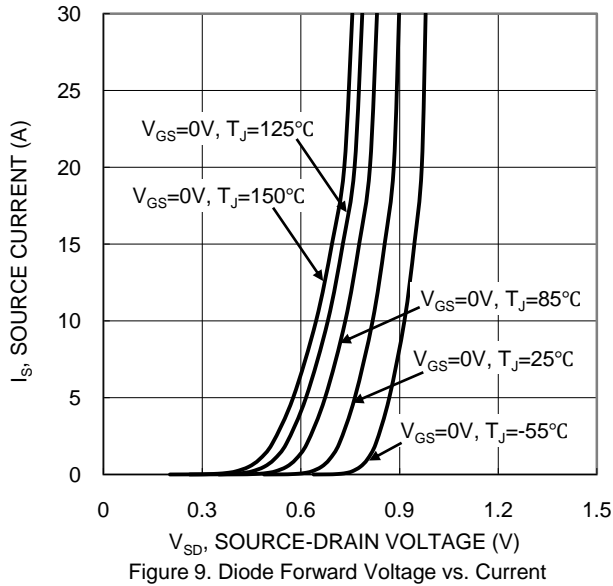
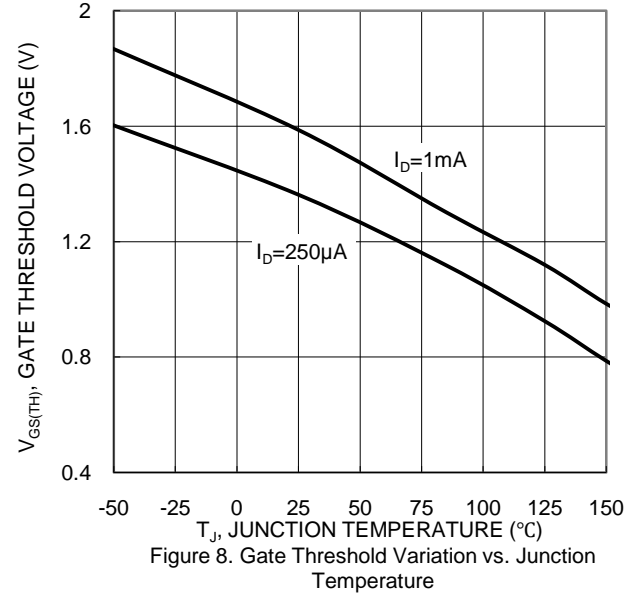
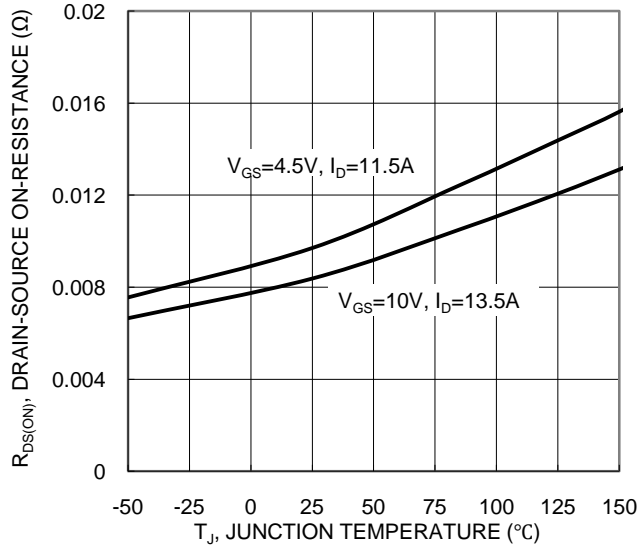
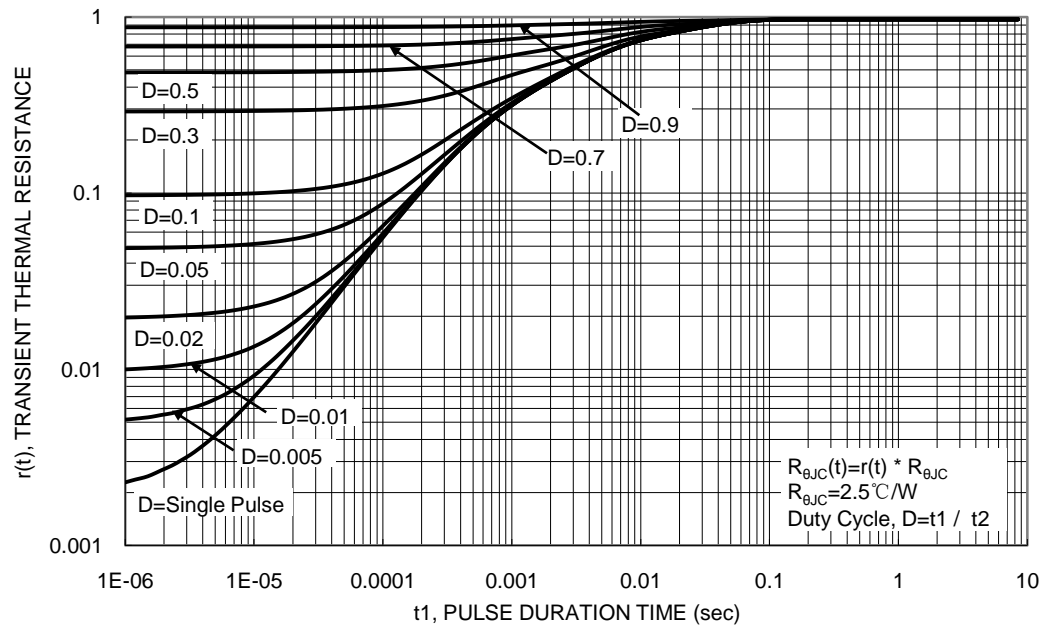


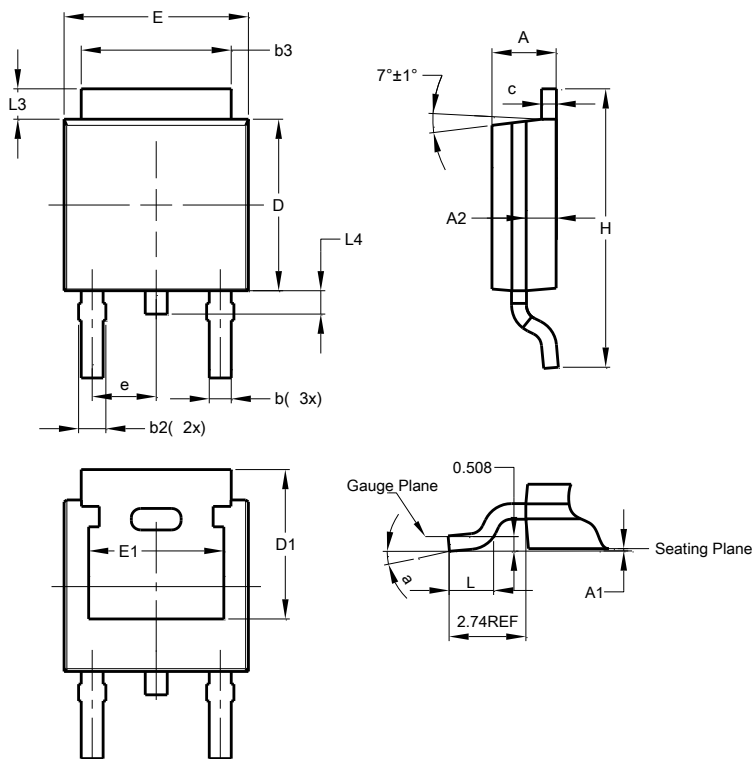
Figure 6. On-Resistance Variation with Junction Temperature





Package Outline Dimensions

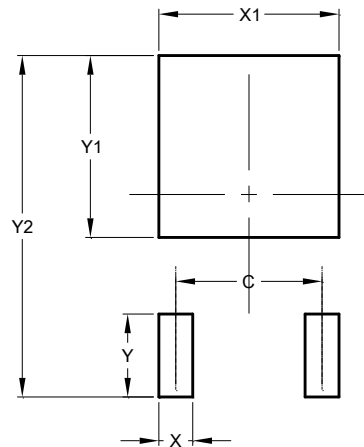
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for the latest version.



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.



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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