

Product Summary

BV_{DSS}	$R_{DS(ON)}$ Max	I_D $T_C = +25^\circ C$
60V	10mΩ @ $V_{GS} = 10V$	74.5A
	12.8mΩ @ $V_{GS} = 4.5V$	65.8A

Features and Benefits

- 100% Unclamped Inductive Switching – Ensures More Reliable and Robust End Application
- 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)**

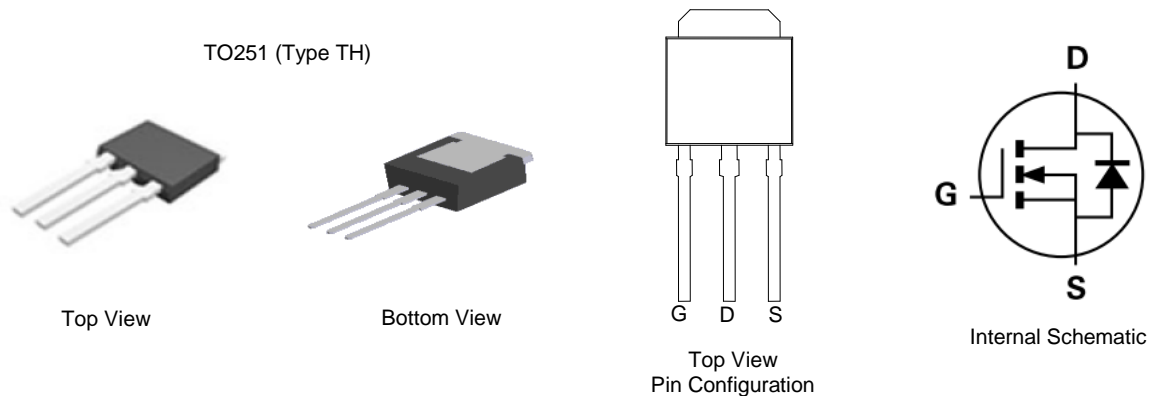
Description and Applications

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

- Power Management Functions
- DC-DC Converters
- Backlighting

Mechanical Data

- Case: TO251 (Type TH)
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections: See Diagram
- Terminals: Finish – Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.33 grams (Approximate)

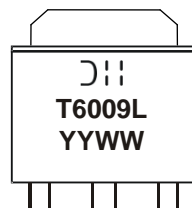


Ordering Information (Note 4)

Part Number	Case	Packaging
DMT6009LJ3	TO251 (Type TH)	75 Pieces / Tube

- Notes:
1. EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3).compliant. All applicable RoHS exemptions applied.
 2. See <https://www.diodes.com/quality/lead-free/> 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 <https://www.diodes.com/design/support/packaging/diodes-packaging/>.

Marking Information



= Manufacturer's Marking
 T6009L = Product Type Marking Code
 YYWW = Date Code Marking
 YY = Last Two Digits of Year (ex: 18 = 2018)
 WW or 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 7)	I _D	T _C = +25°C	74.5	A
		T _C = +70°C	59.6	
Maximum Body Diode Forward Current (Note 7)	I _S	50	A	
Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)	I _{DM}	280	A	
Pulsed Body Diode Forward Current (10µs Pulse, Duty Cycle = 1%)	I _{SM}	280	A	
Avalanche Current, L=0.1mH	I _{AS}	28.2	A	
Avalanche Energy, L=0.1mH	E _{AS}	39.8	mJ	

Thermal Characteristics

Characteristic	Symbol	Value	Unit	
Total Power Dissipation (Note 6)	P _D	T _A = +25°C	2.9	W
Thermal Resistance, Junction to Ambient (Note 6)		R _{θJA}	43	
Thermal Resistance, Junction to Ambient (Note 5)	R _{θJA}	80	°C/W	
Total Power Dissipation (Note 7)	P _D	T _C = +25°C	83.3	W
Thermal Resistance, Junction to Case (Note 7)		R _{θJC}	1.5	
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 8)						
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 8)						
Gate Threshold Voltage	V _{GS(TH)}	0.7	—	2	V	V _{DS} = V _{GS} , I _D = 250µA
Static Drain-Source On-Resistance	R _{DS(ON)}	—	8	10	mΩ	V _{GS} = 10V, I _D = 13.5A
		—	9.8	12.8		V _{GS} = 4.5V, I _D = 11.5A
Diode Forward Voltage	V _{SD}	—	0.8	1.2	V	V _{GS} = 0V, I _S = 5A
DYNAMIC CHARACTERISTICS (Note 9)						
Input Capacitance	C _{iSS}	—	1925	—	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 minimum recommended pad layout.
 - Device mounted on FR-4 substrate PC board, 2oz copper, with thermal bias to bottom layer 1-inch square copper plate.
 - Thermal resistance from junction to soldering point (on the exposed drain pad).
 - Short duration pulse test used to minimize self-heating effect.
 - Guaranteed by design. Not subject to production testing.

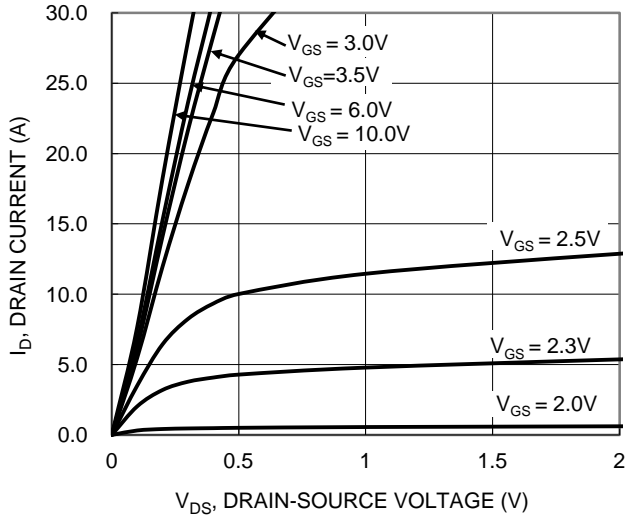


Figure 1. Typical Output Characteristic

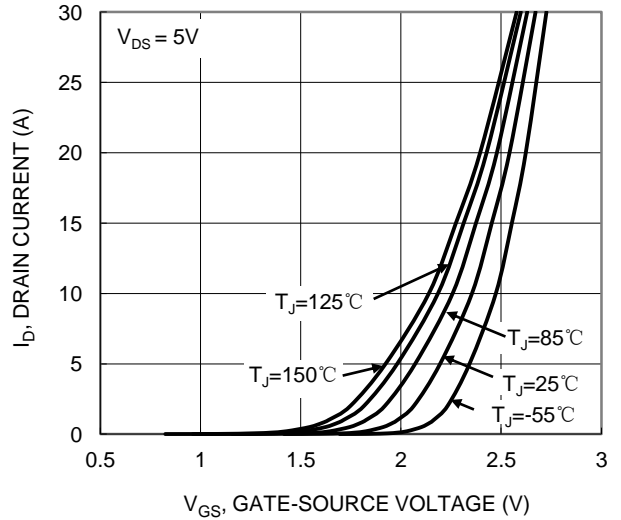


Figure 2. Typical Transfer Characteristic

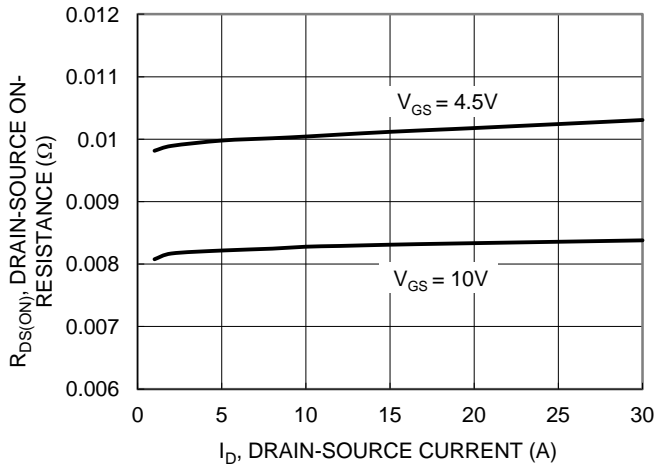


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

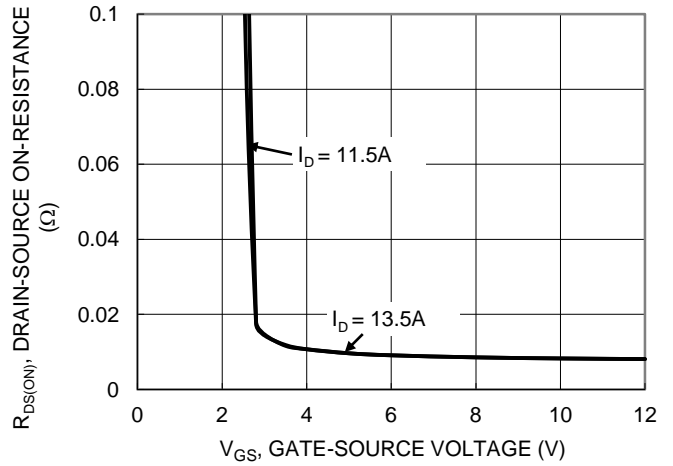


Figure 4. Typical Transfer Characteristic

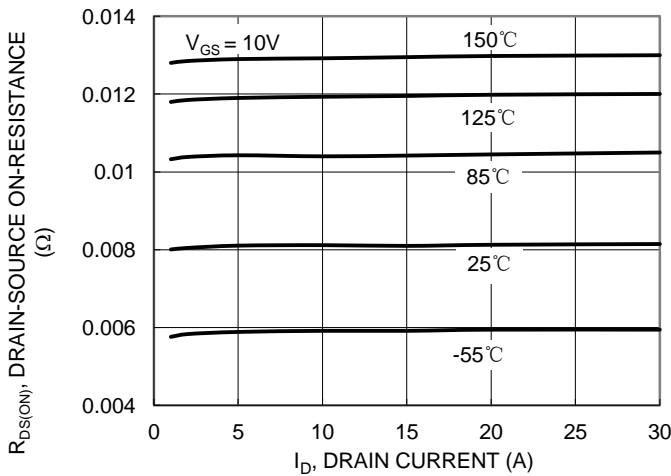


Figure 5. Typical On-Resistance vs. Drain Current and Junction Temperature

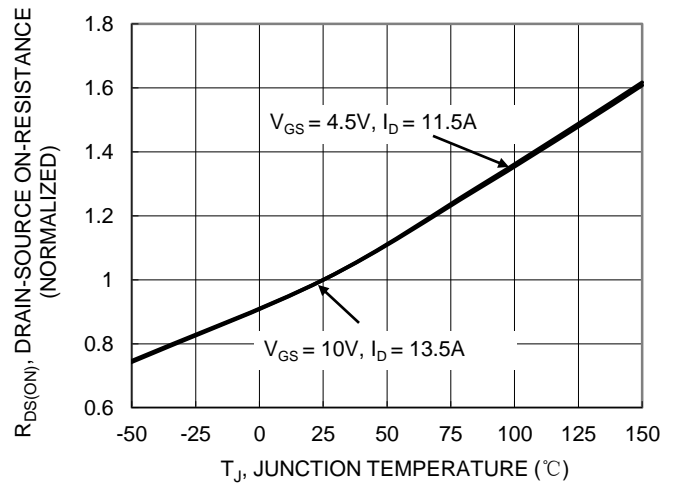


Figure 6. On-Resistance Variation with Junction Temperature

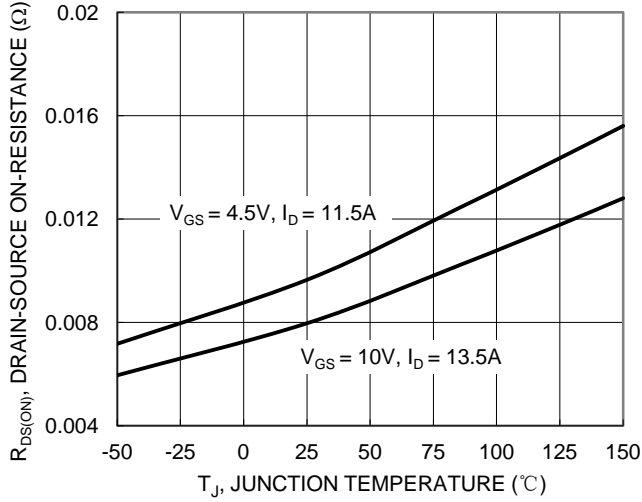


Figure 7. On-Resistance Variation with Junction Temperature

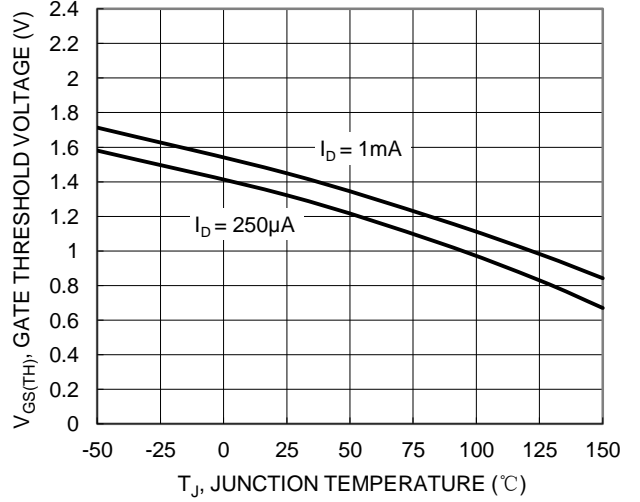


Figure 8. Gate Threshold Variation vs. Junction Temperature

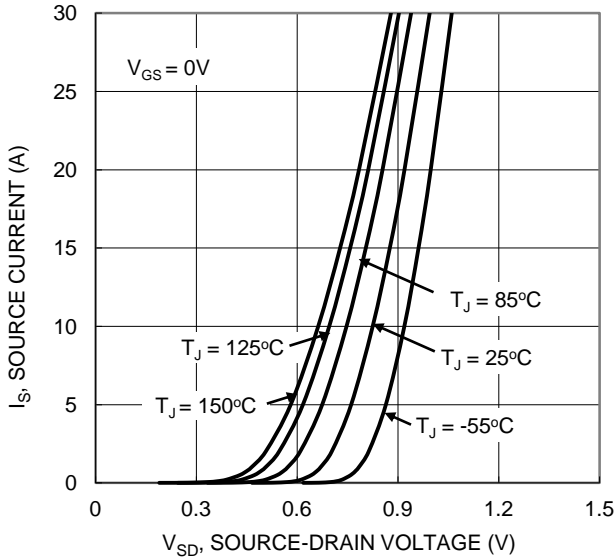


Figure 9. Diode Forward Voltage vs. Current

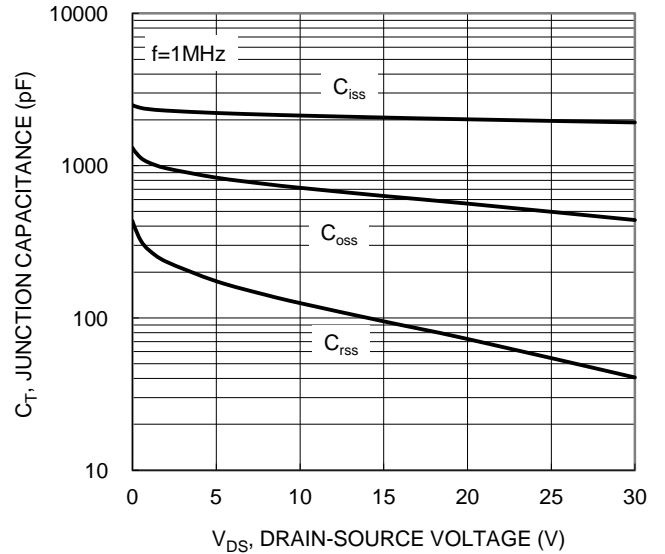


Figure 10. Typical Junction Capacitance

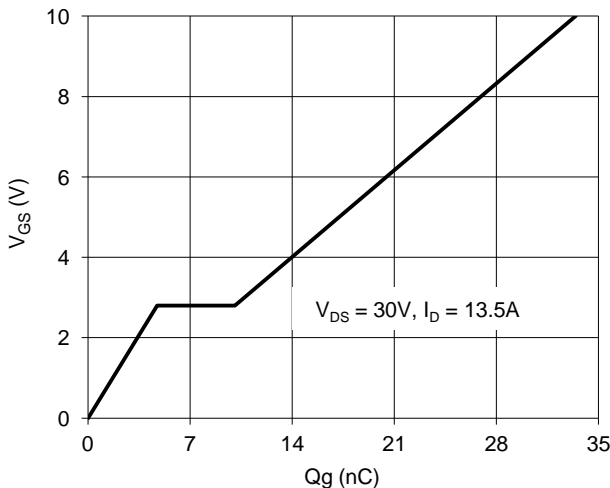


Figure 11. Gate Charge

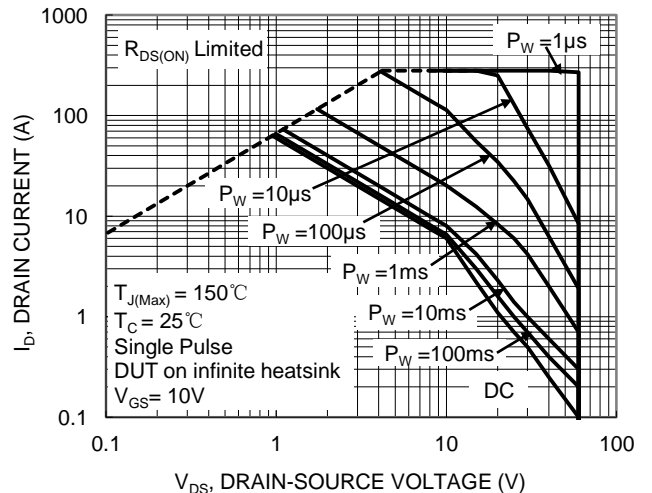


Figure 12. SOA, Safe Operation Area

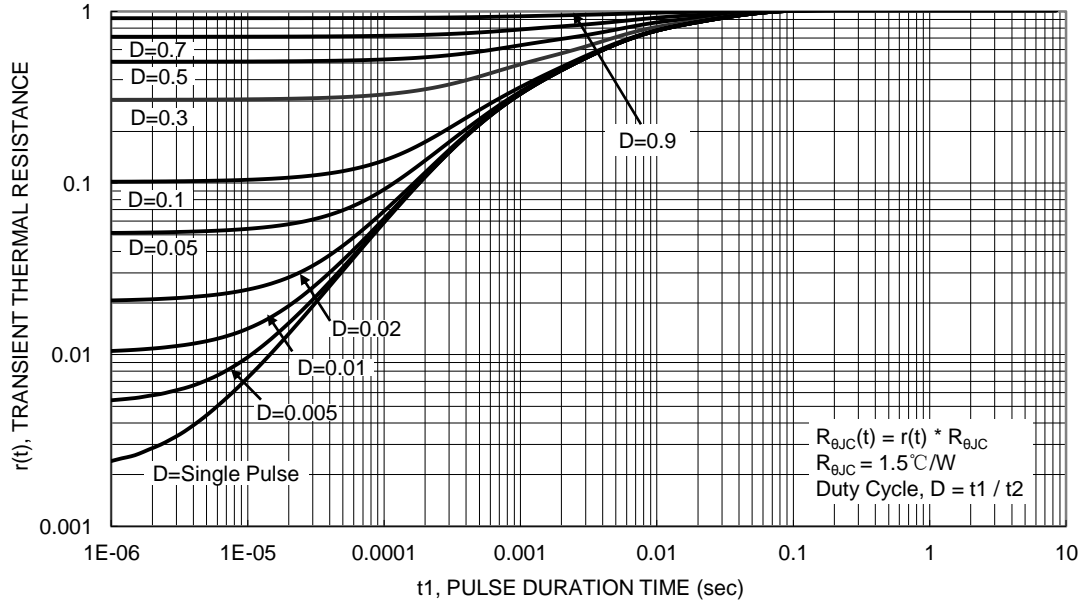
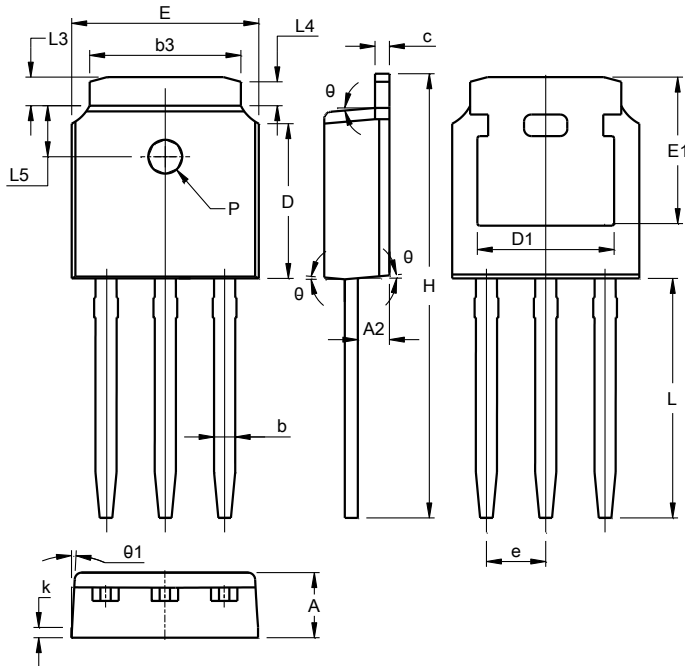


Figure 13. Transient Thermal Resistance

Package Outline Dimensions

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

TO251 (Type TH)



TO251 (Type TH)			
Dim	Min	Max	Typ
A	2.20	2.40	2.30
A2	0.97	1.17	1.07
b	0.68	0.90	0.78
b3	5.20	5.50	5.33
c	0.43	0.63	0.53
D	5.98	6.22	6.10
D1	5.30 REF		
e	2.286 BSC		
E	6.40	6.80	6.60
E1	4.63	5.03	4.83
H	16.22	16.82	16.52
k	0.40REF		
L	9.15	9.65	9.40
L3	0.88	1.28	1.02
L4	0.75 REF		
L5	1.65	1.95	1.80
PØ	1.20		
θ	5°	9°	7°
θ1	5°	9°	7°
All Dimensions in mm			

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