60V N-CHANNEL ENHANCEMENT MODE MOSFET

Product Summary

BV_{DSS}	$R_{DS(ON)}$ Max	I_D Max T_C = +25°C
60V	18mΩ @ V_{GS} = 10V	43A
	20mΩ @ V_{GS} = 4.5V	41A

Features

- Low On-Resistance
- Low Input Capacitance
- **Lead-Free Finish; RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**

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.

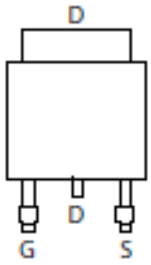
- Power Management Functions
- DC-DC Converters
- Industrial

Mechanical Data

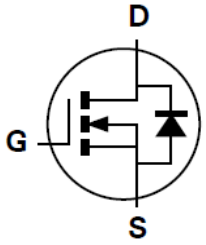
- Case: TO252 (DPAK)
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections: See Diagram
- Weight: 0.33 grams (Approximate)



Top View



Pin Out Top View



Equivalent Circuit

Ordering Information (Note 4)

Part Number	Case	Packaging
DMN6017SK3-13	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 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/.

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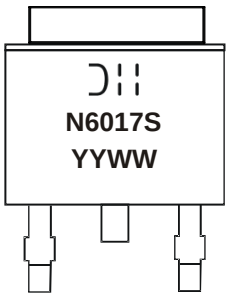

=Manufacturer's Marking
N6017S = Product Type Marking Code
YYWW = Date Code Marking
YY = Last Two Digits of Year (ex: 17 = 2017)
WW = Week Code (01 to 53)

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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}	±20	V
Continuous Drain Current, V_{GS} = 10V (Note 5)	T_C = +25°C T_C = +70°C	I_D	43 34	A
	T_A = +25°C T_A = +70°C	I_D	11 8.8	A
Pulsed Drain Current (380µs Pulse, Duty Cycle = 1%)		I_{DM}	70	A
Maximum Continuous Body Diode Forward Current (Note 5)		I_S	3.6	A
Avalanche Current, L = 0.1mH		I_{AS}	25	A
Avalanche Energy, L = 0.1mH		E_{AS}	32	mJ

Thermal Characteristics

Characteristic		Symbol	Value	Unit
Total Power Dissipation (Note 5)	T_A = +25°C	P_D	3.3	W
	T_C = +25°C		50	
Thermal Resistance, Junction to Ambient (Note 5)		$R_{\theta JA}$	38	°C/W
Thermal Resistance, Junction to Case (Note 5)		$R_{\theta JC}$	2.5	
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 6)						
Drain-Source Breakdown Voltage	BV_{DSS}	60	-	-	V	V_{GS} = 0V, I_D = 250µA
Zero Gate Voltage Drain Current	I_{DSS}	-	-	1	µA	V_{DS} = 48V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	-	-	±100	nA	V_{GS} = ±20V, V_{DS} = 0V
ON CHARACTERISTICS (Note 6)						
Gate Threshold Voltage	$V_{GS(TH)}$	1	-	3	V	V_{DS} = V_{GS}, I_D = 250µA
Static Drain-Source On-Resistance	$R_{DS(ON)}$	-	-	18	mΩ	V_{GS} = 10V, I_D = 6A
		-	-	20		V_{GS} = 4.5V, I_D = 4A
Diode Forward Voltage	V_{SD}	-	-	1	V	V_{GS} = 0V, I_S = 1A
DYNAMIC CHARACTERISTICS (Note 7)						
Input Capacitance	C_{iss}	-	2711	-	pF	V_{DS} = 15V, V_{GS} = 0V, f = 1MHz
Output Capacitance	C_{oss}	-	152	-	pF	
Reverse Transfer Capacitance	C_{rss}	-	126	-	pF	
Gate Resistance	R_g	-	1.4	-	Ω	V_{DS} = 0V, V_{GS} = 0V, f = 1MHz
Total Gate Charge (V_{GS} = 4.5V)	Q_g	-	26	-	nC	V_{DS} = 48V, I_D = 6A
Total Gate Charge (V_{GS} = 10V)	Q_g	-	55	-	nC	
Gate-Source Charge	Q_{gs}	-	6.2	-	nC	
Gate-Drain Charge	Q_{gd}	-	8.5	-	nC	
Turn-On Delay Time	$t_{D(ON)}$	-	4.9	-	ns	V_{DD} = 30V, V_{GS} = 10V, R_g = 3.3Ω, , I_D = 6A
Turn-On Rise Time	t_R	-	5.4	-	ns	
Turn-Off Delay Time	$t_{D(OFF)}$	-	38.2	-	ns	
Turn-Off Fall Time	t_F	-	11	-	ns	
Reverse Recovery Time	t_{RR}	-	16.6	-	ns	I_F = 6A, di/dt = 100A/µs
Reverse Recovery Charge	Q_{RR}	-	10.3	-	nC	

Notes: 5. Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.
6. Short duration pulse test used to minimize self-heating effect.
7. Guaranteed by design. Not subject to product testing.

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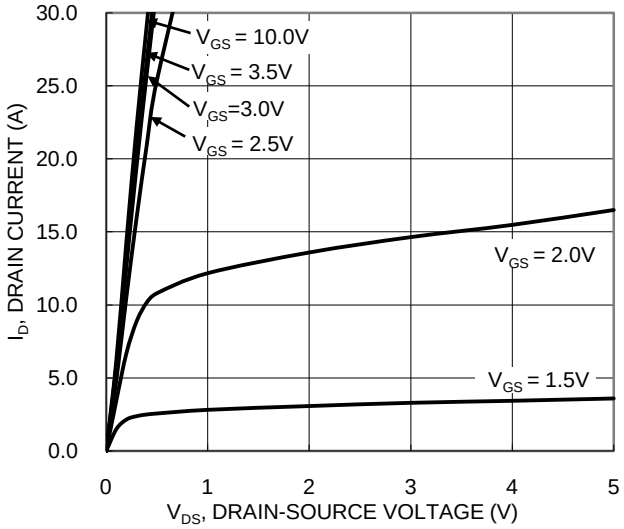

Figure 1. Typical Output Characteristic

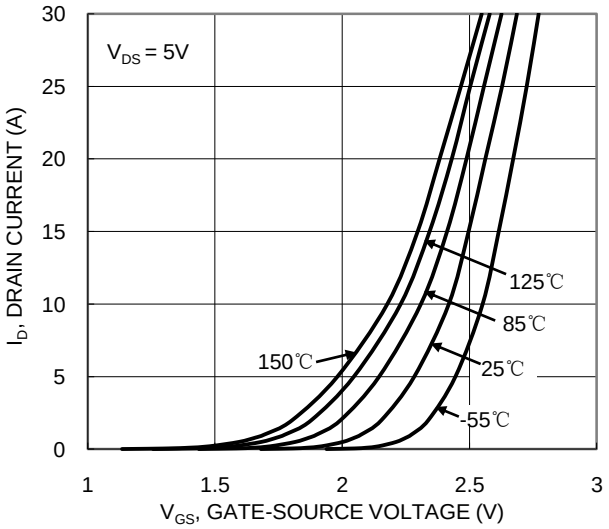

Figure 2. Typical Transfer Characteristic

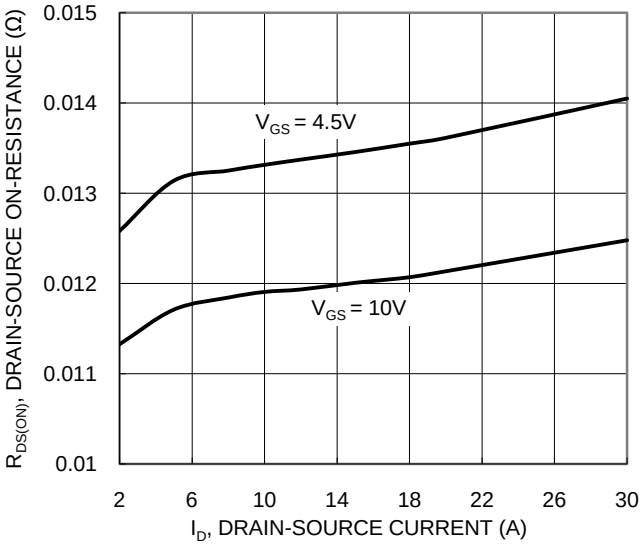

Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

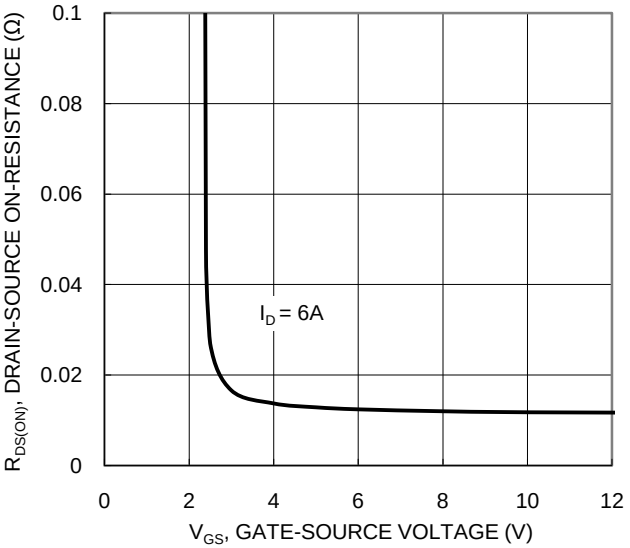

Figure 4. Typical Transfer Characteristic

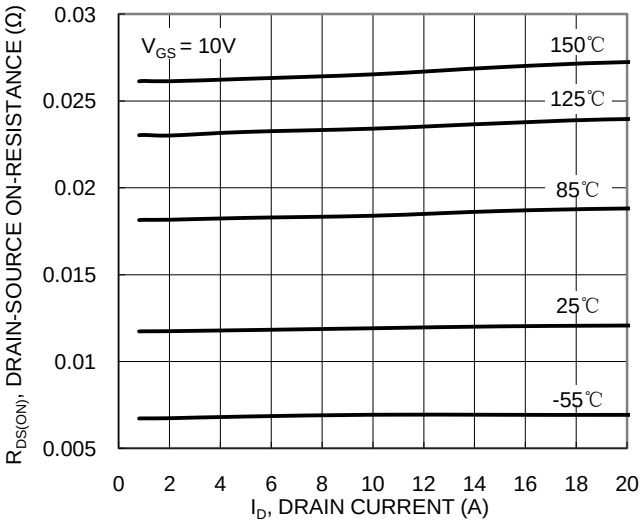

Figure 5. Typical On-Resistance vs. Drain Current and Temperature

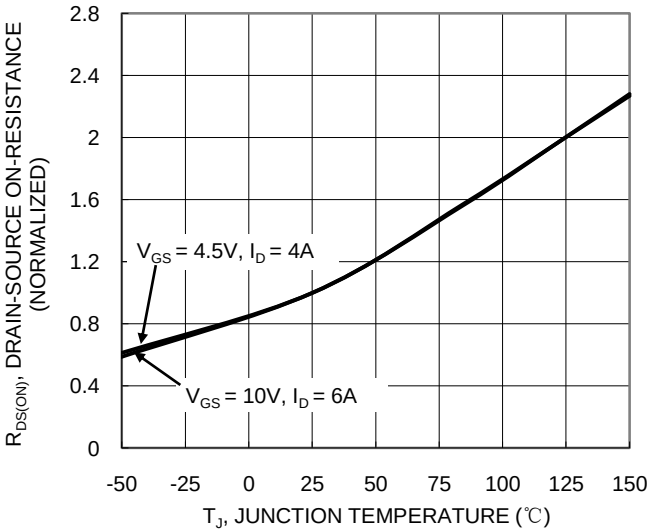

Figure 6. On-Resistance Variation with Temperature

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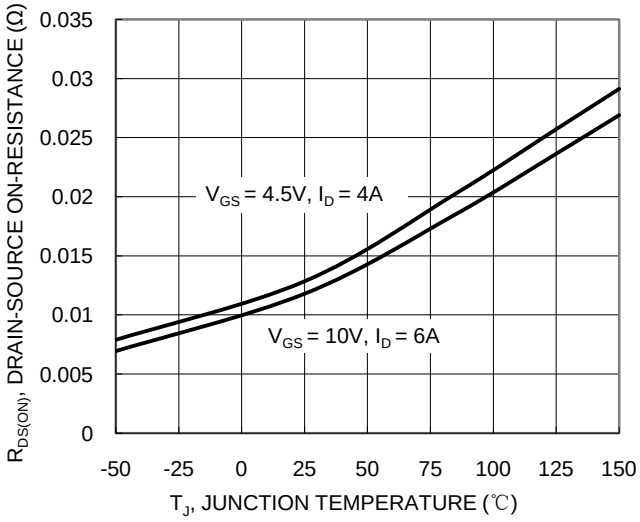

Figure 7. On-Resistance Variation with Temperature

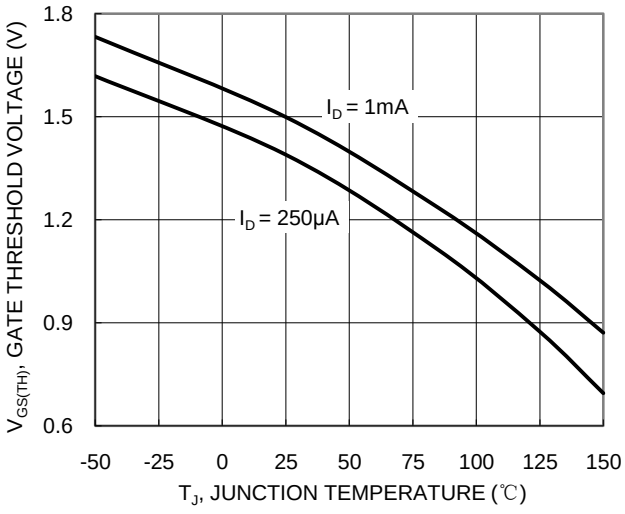

Figure 8. Gate Threshold Variation vs. Temperature

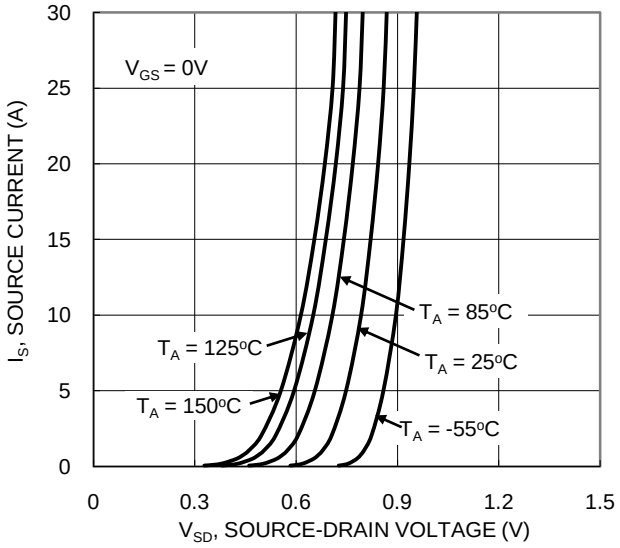

Figure 9. Diode Forward Voltage vs. Current

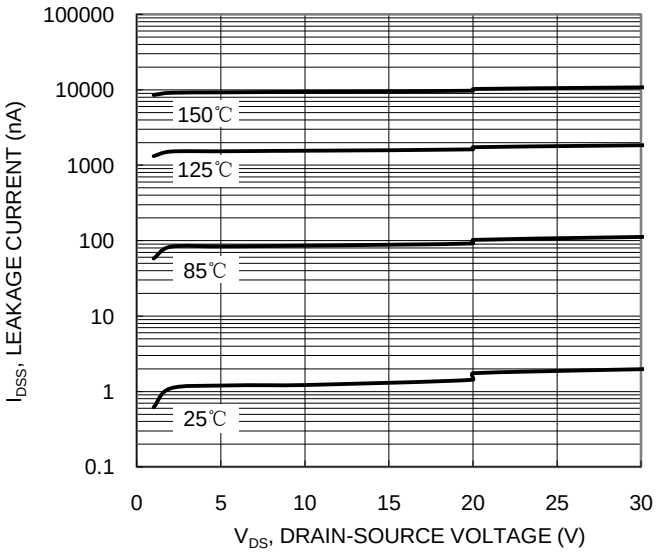

Figure 10. Typical Drain-Source Leakage Current vs. Voltage

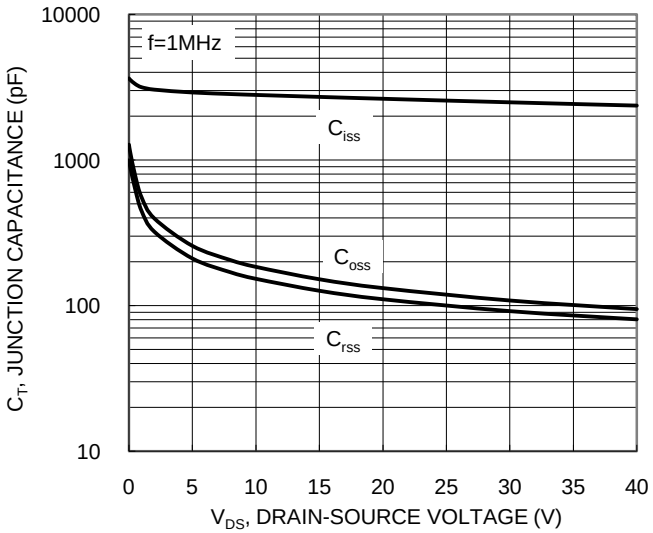

Figure 11. Typical Junction Capacitance

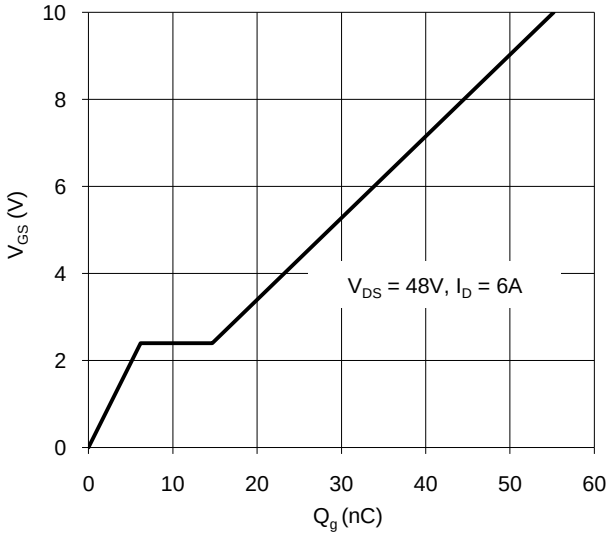

Figure 12. Gate Charge

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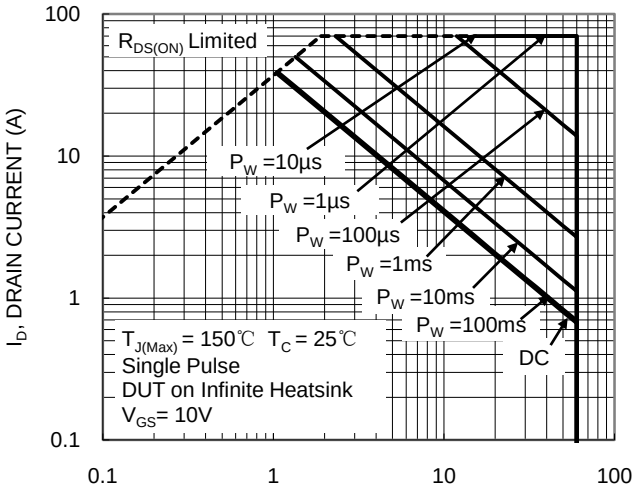

Figure 13. SOA, Safe Operation Area

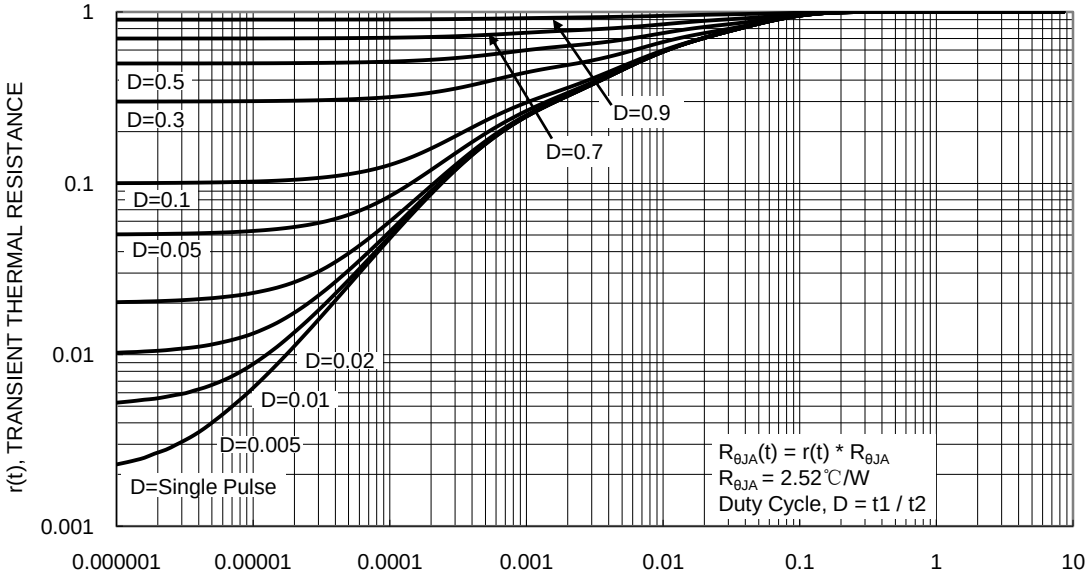

Figure 14. Transient Thermal Resistance

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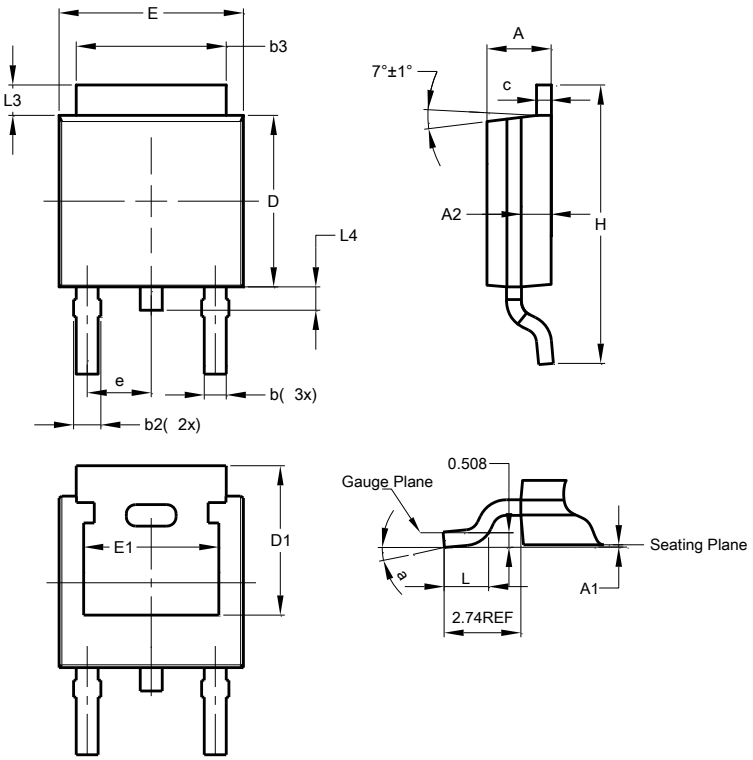
Package Outline Dimensions

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

TO252 (DPAK)

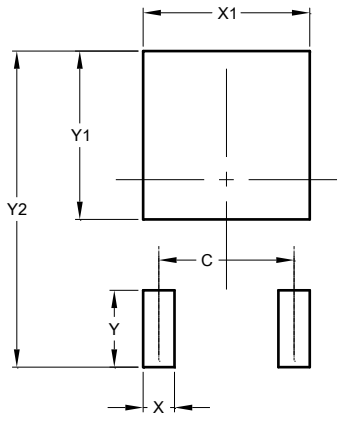


TO252 (DPAK)			
Dim	**Min**	**Max**	**Typ**
A	2.19	2.39	2.29
A1	0.00	0.13	0.08
A2	0.97	1.17	1.07
b	0.64	0.88	0.783
b2	0.76	1.14	0.95
b3	5.21	5.46	5.33
c	0.45	0.58	0.531
D	6.00	6.20	6.10
D1	5.21	-	-
e	-	-	2.286
E	6.45	6.70	6.58
E1	4.32	-	-
H	9.40	10.41	9.91
L	1.40	1.78	1.59
L3	0.88	1.27	1.08
L4	0.64	1.02	0.83
a	0°	10°	-
All Dimensions in mm			

Suggested Pad Layout

Please see http://www.diodes.com/package-outlines.html 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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