

## Product Summary

BV <sub>DSS</sub>	R <sub>DS(ON)</sub> MAX	I <sub>D</sub> T <sub>C</sub> = +25°C
-40V	70mΩ @ V <sub>GS</sub> = -10V	-15A
	104mΩ @ V <sub>GS</sub> = -4.5V	-14A

## Description and Applications


This new generation MOSFET is designed to minimize the on-state resistance (R<sub>DS(ON)</sub>) yet maintain superior switching performance, making it ideal for high efficiency power management applications.

- Battery Charging
- Power Management Functions
- DC-DC Converters
- Portable Power Adaptors

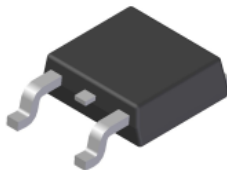
## Features and Benefits

- 100% Unclamped Inductive Switch (UIS) Test in Production
  - Low On-Resistance
  - Low Input Capacitance
  - Fast Switching Speed
  - Low Input/Output Leakage
  - **Lead-Free Finish; RoHS Compliant (Notes 1 & 2)**
  - **Halogen and Antimony Free. "Green" Device (Note 3)**
  - **For automotive applications requiring specific change control (i.e. parts qualified to AEC-Q100/101/200, PPAP capable, and manufactured in IATF 16949 certified facilities), please [contact us](https://www.diodes.com/quality/product-definitions/) or your local Diodes representative.**
- <https://www.diodes.com/quality/product-definitions/>

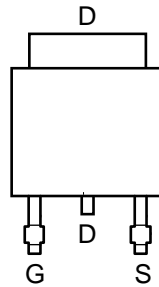
## Mechanical Data

- Case: TO252
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 3 per J-STD-020
- Terminal Connections: See Diagram
- Terminals: Finish – Matte Tin Finish Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 
- Weight: 0.33 grams (Approximate)

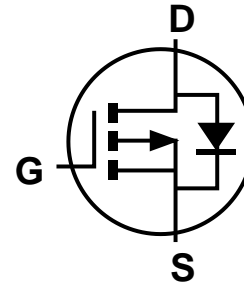
TO252 (DPAK)



Top View



Top View  
Pin-Out



Equivalent Circuit

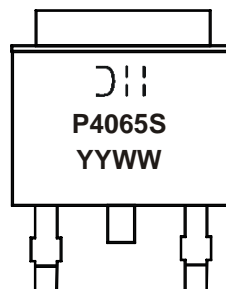
## Ordering Information (Note 4)


Part Number	Case	Packaging
DMP4065SK3-13	TO252 (DPAK)	2,500/Tape & Reel

- 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

TO252 (DPAK)



 = Manufacturer's Marking  
 P4065S = Product Type Marking Code  
 YYWW = Date Code Marking  
 YY = Year (ex: 20 = 2020)  
 WW = Week (01 to 53)

**Maximum Ratings** (@  $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			$V_{DS}$	-40	V
Gate-Source Voltage			$V_{GS}$	$\pm 20$	V
Continuous Drain Current (Note 6) $V_{GS} = -10\text{V}$	Steady State	$T_C = +25^\circ\text{C}$ $T_C = +70^\circ\text{C}$	$I_D$	-15 -12	A
Pulsed Drain Current (10 $\mu\text{s}$ Pulse, Duty Cycle = 1%)			$I_{DM}$	-60	A
Maximum Body Diode Forward Current (Note 6)			$I_S$	-15	A
Pulsed Source Current (10 $\mu\text{s}$ Pulse, Duty Cycle = 1%)			$I_{SM}$	-60	A
Avalanche Current, $L = 0.1\text{mH}$			$I_{AS}$	-14	A
Avalanche Energy, $L = 0.1\text{mH}$			$E_{AS}$	9.8	mJ

**Thermal Characteristics** (@  $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

Characteristic		Symbol	Value	Unit
Total Power Dissipation (Note 5)		$P_D$	3.0	W
Thermal Resistance, Junction to Ambient (Note 5)	Steady State	$R_{\theta JA}$	42	$^\circ\text{C/W}$
Total Power Dissipation (Note 6)		$P_D$	32	W
Thermal Resistance, Junction to Case (Note 6)	Steady State	$R_{\theta JC}$	3.9	$^\circ\text{C/W}$
Operating and Storage Temperature Range		$T_J, T_{STG}$	-55 to +150	$^\circ\text{C}$

**Electrical Characteristics** (@  $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS (Note 7)</b>						
Drain-Source Breakdown Voltage	$BV_{DS}$	-40	—	—	V	$V_{GS} = 0\text{V}, I_D = -250\mu\text{A}$
Zero Gate Voltage Drain Current	$I_{DSS}$	—	—	-1.0	$\mu\text{A}$	$V_{DS} = -40\text{V}, V_{GS} = 0\text{V}$
Gate-Source Leakage	$I_{GSS}$	—	—	$\pm 100$	nA	$V_{GS} = \pm 20\text{V}, V_{DS} = 0\text{V}$
<b>ON CHARACTERISTICS (Note 7)</b>						
Gate Threshold Voltage	$V_{GS(TH)}$	-1.0	—	-3.0	V	$V_{DS} = V_{GS}, I_D = -250\mu\text{A}$
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	53	70	$\text{m}\Omega$	$V_{GS} = -10\text{V}, I_D = -4.2\text{A}$
			72	104		$V_{GS} = -4.5\text{V}, I_D = -3.3\text{A}$
Diode Forward Voltage	$V_{SD}$	—	-0.8	-1.2	V	$V_{GS} = 0\text{V}, I_S = -1\text{A}$
<b>DYNAMIC CHARACTERISTICS (Note 8)</b>						
Input Capacitance	$C_{iss}$	—	650	—	pF	$V_{DS} = -20\text{V}, V_{GS} = 0\text{V},$ $f = 1.0\text{MHz}$
Output Capacitance	$C_{oss}$	—	55	—	pF	
Reverse Transfer Capacitance	$C_{rss}$	—	43	—	pF	
Gate Resistance	$R_g$	—	14.4	—	$\Omega$	$V_{DS} = 0\text{V}, V_{GS} = 0\text{V}, f = 1\text{MHz}$
Total Gate Charge ( $V_{GS} = -4.5\text{V}$ )	$Q_g$	—	6.1	—	nC	
Total Gate Charge ( $V_{GS} = -10\text{V}$ )	$Q_g$	—	12.2	—	nC	
Gate-Source Charge	$Q_{gs}$	—	1.8	—	nC	
Gate-Drain Charge	$Q_{gd}$	—	2.4	—	nC	
Turn-On Delay Time	$t_{D(ON)}$	—	3.6	—	ns	$V_{DD} = -15\text{V}, V_{GS} = -10\text{V},$ $I_D = -1.0\text{A}, R_G = 6\Omega$
Turn-On Rise Time	$t_R$	—	2.9	—	ns	
Turn-Off Delay Time	$t_{D(OFF)}$	—	36.3	—	ns	
Turn-Off Fall Time	$t_F$	—	15.3	—	ns	

- Notes:
- Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch 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 product testing.

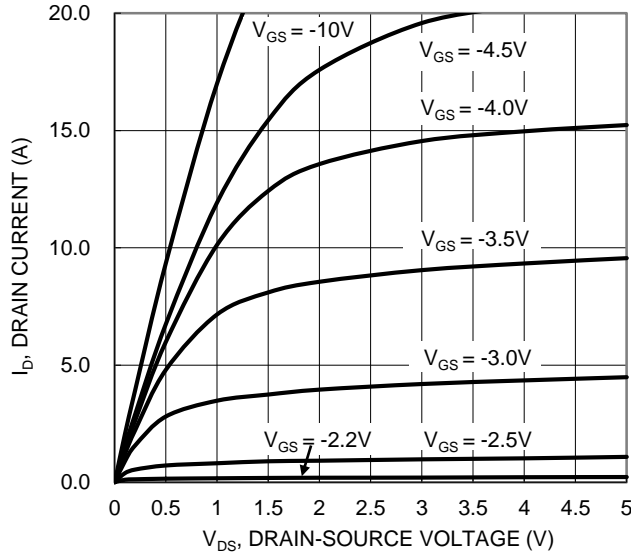


Figure 1. Typical Output Characteristic

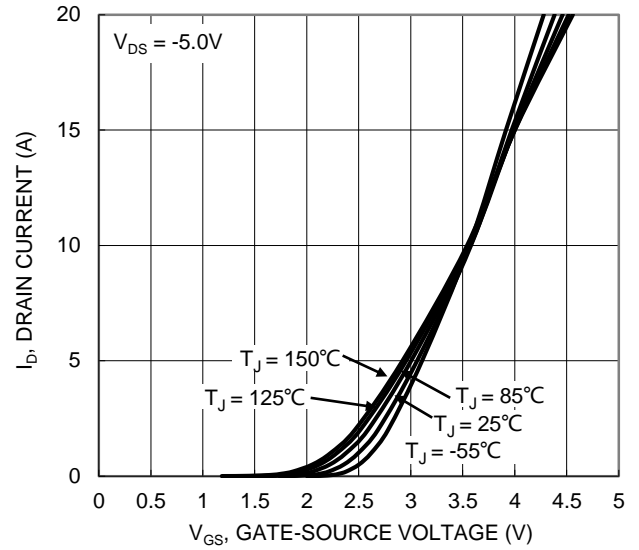


Figure 2. Typical Transfer Characteristic

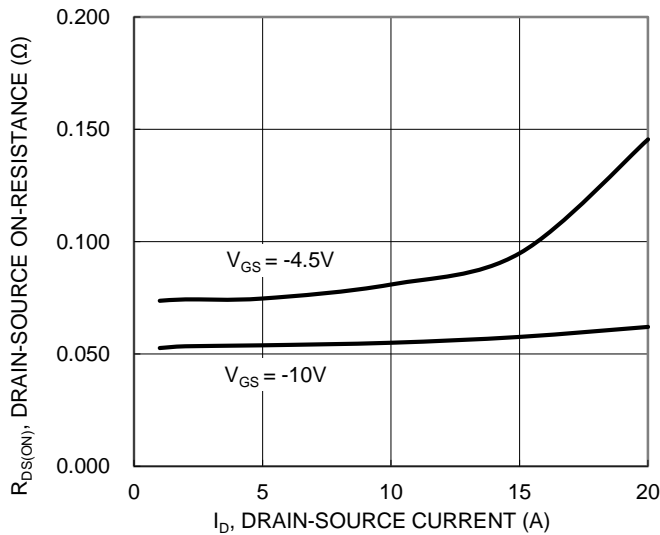


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

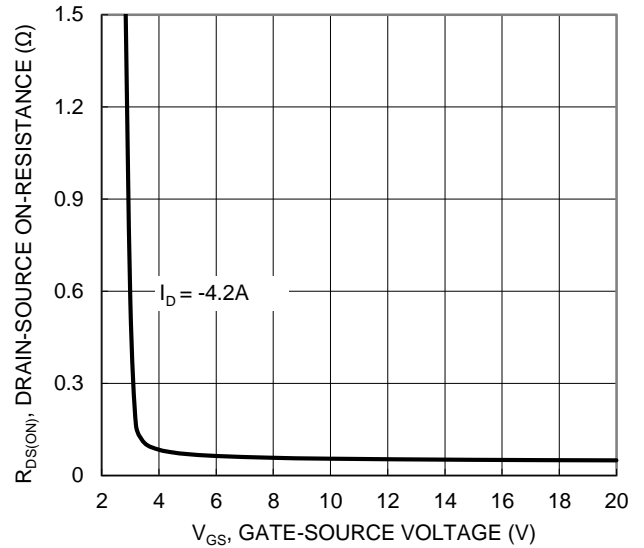


Figure 4. Typical Transfer Characteristic

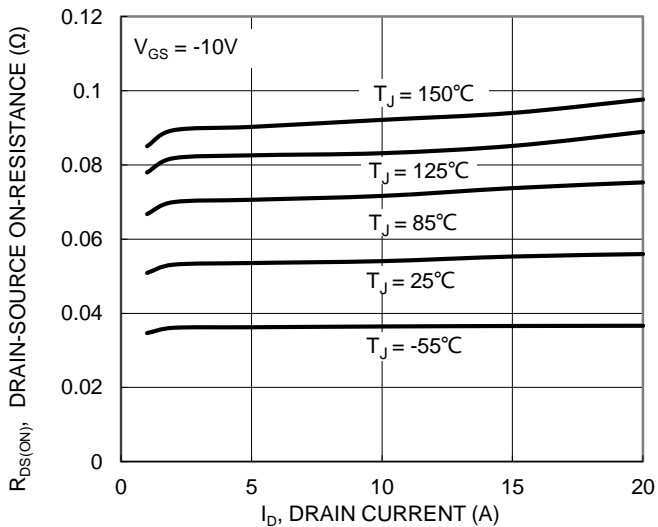


Figure 5. Typical On-Resistance vs. Drain Current and Temperature

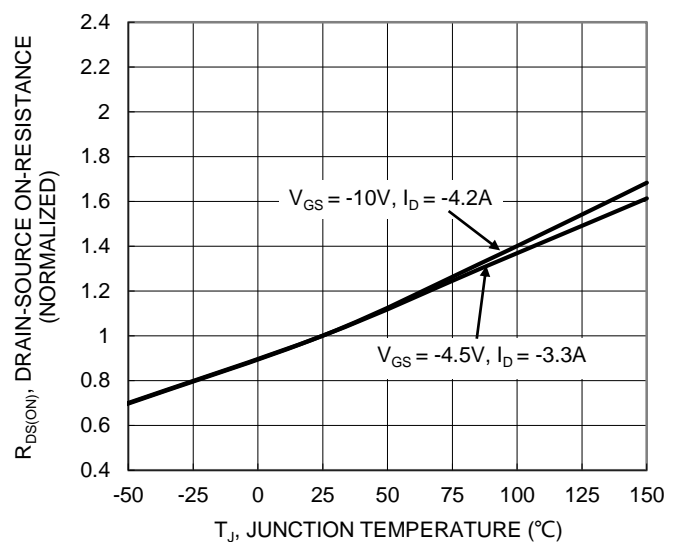


Figure 6. On-Resistance Variation with Junction Temperature

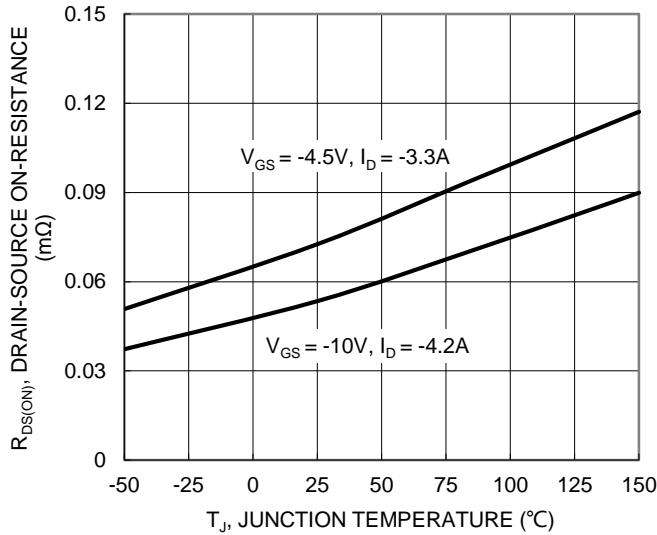


Figure 7. On-Resistance Variation with Junction Temperature

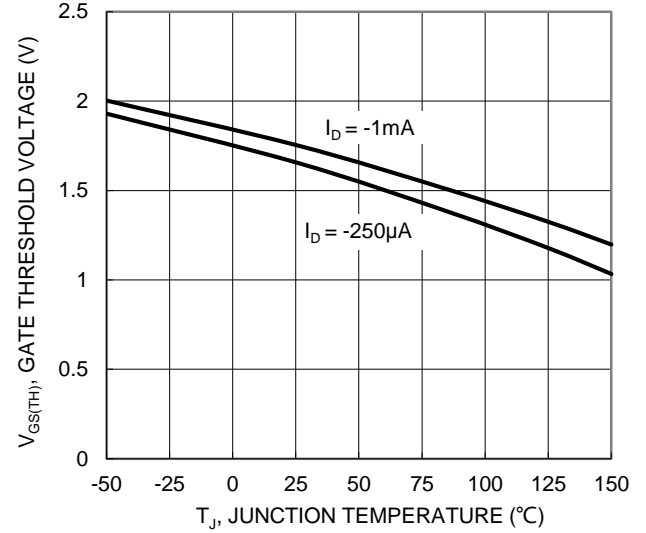


Figure 8. Gate Threshold Variation vs. Junction Temperature

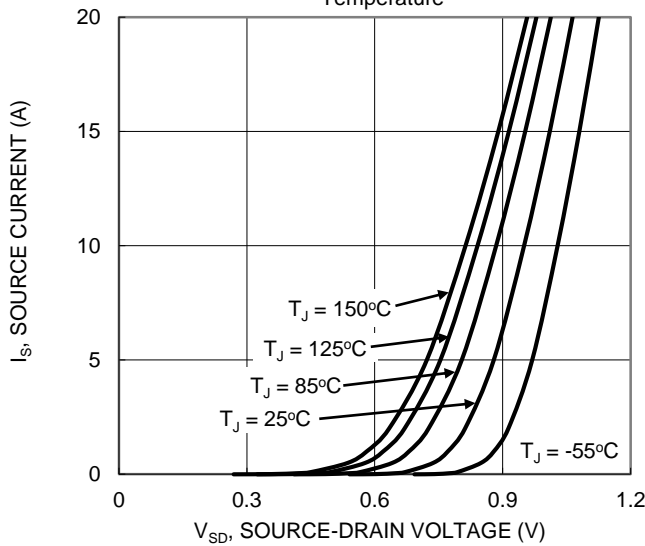


Figure 9. Diode Forward Voltage vs. Current

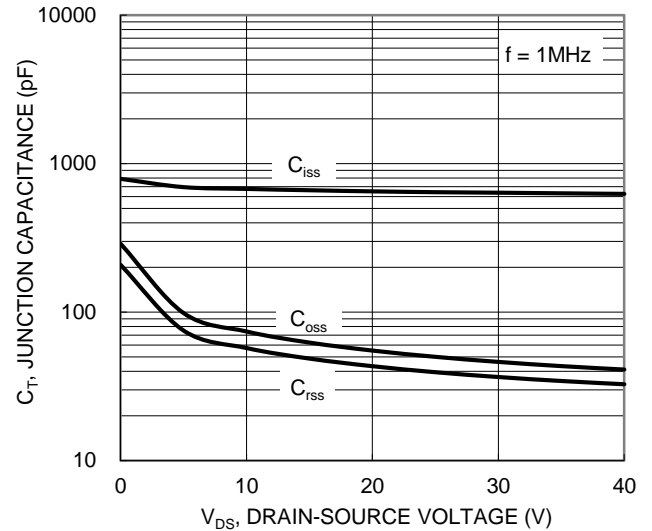


Figure 10. Typical Junction Capacitance

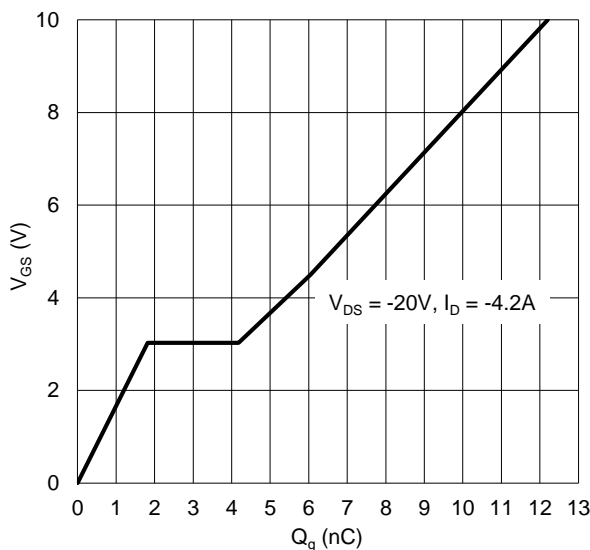


Figure 11. Gate Charge

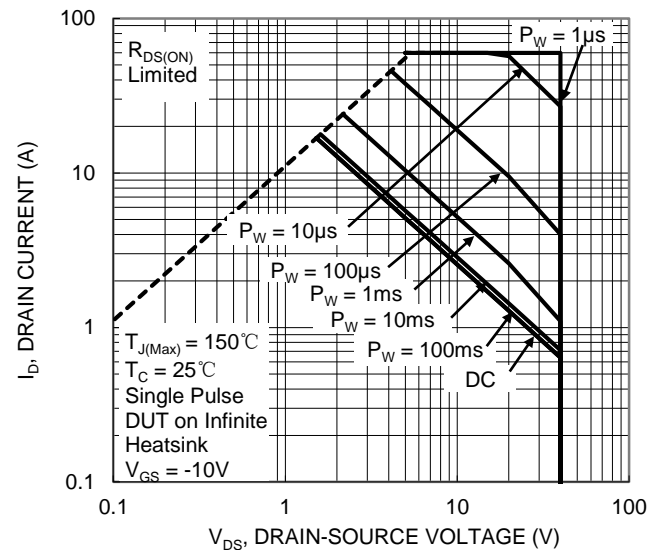


Figure 12. SOA, Safe Operation Area

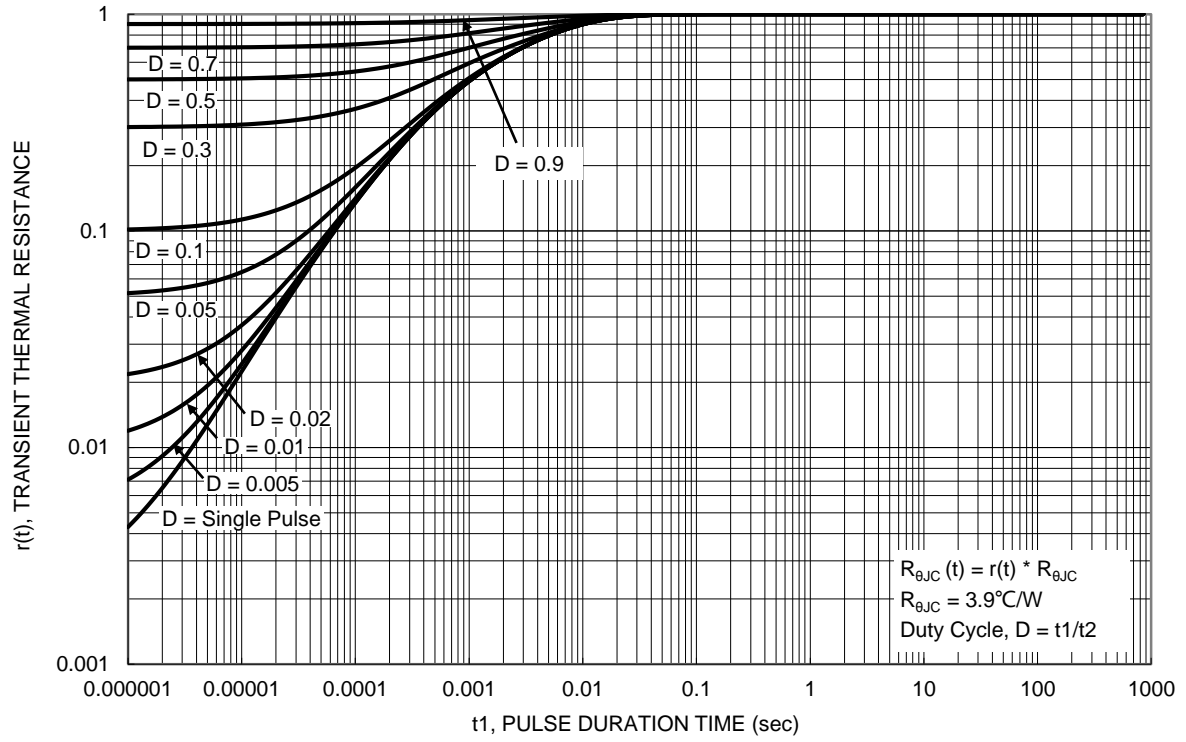
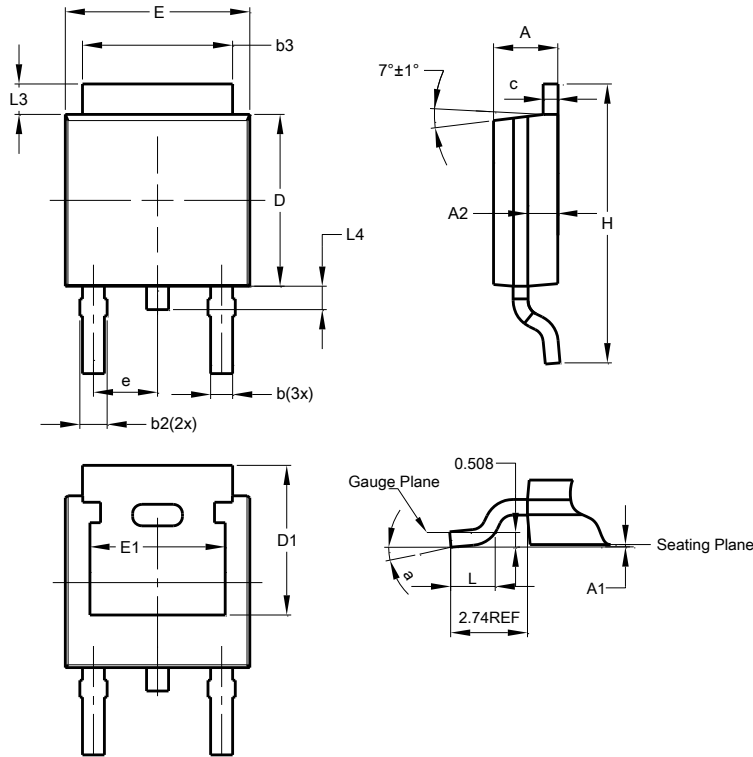


Figure 13. Transient Thermal Resistance

## Package Outline Dimensions

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

### TO252 (DPAK)

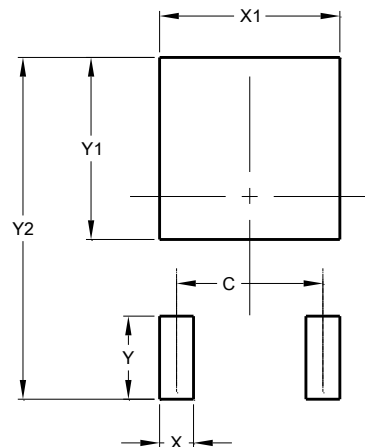


TO252 (DPAK)			
Dim	Min	Max	Typ
A	2.19	2.39	2.29
A1	0.00	0.13	0.08
A2	0.97	1.17	1.07
b	0.64	0.88	0.783
b2	0.76	1.14	0.95
b3	5.21	5.46	5.33
c	0.45	0.58	0.531
D	6.00	6.20	6.10
D1	5.21	-	-
e	-	-	2.286
E	6.45	6.70	6.58
E1	4.32	-	-
H	9.40	10.41	9.91
L	1.40	1.78	1.59
L3	0.88	1.27	1.08
L4	0.64	1.02	0.83
a	0°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