# 80V +175°C N-CHANNEL ENHANCEMENT MODE MOSFET

## Product Summary

| $BV_{DSS}$ | $R_{DS(ON)}$ Max | $I_D$ Max<br>$T_A$ = +25°C |
|---|---|---|
| 80V | 22mΩ @ $V_{GS}$ = 10V | 5A |
| | 38mΩ @ $V_{GS}$ = 4.5V | 4A |

## Features and Benefits

- Rated to +175°C—Ideal for High Ambient Temperature Environments
- 0.6mm Profile – Ideal for Low Profile Applications
- Low On-Resistance
- 100% Unclamped Inductive Switching (UIS) Test in Production – Ensures More Reliable and Robust End Application
- **Lead-Free Finish; RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **The DMTH8022LFDFWQ is suitable for automotive applications requiring specific change control; this part is AEC-Q101 qualified, PPAP capable, and manufactured in IATF 16949 certified facilities.**
  **https://www.diodes.com/quality/product-definitions/**

## Description and Applications

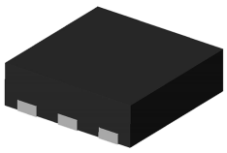
This new generation MOSFET is designed to minimize the on-state resistance ($R_{DS(ON)}$) yet maintain superior switching performance, making it ideal for high-efficiency power-management applications.

- Power-management functions
- Battery-operated systems and solid-state relays
- Drivers: relays, solenoids, lamps, hammers, displays, memories, transistors, etc.

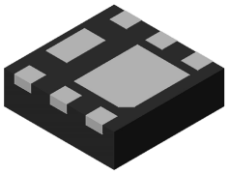
## Mechanical Data

- Package: U-DFN2020-6
- Package Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish -Matte Tin Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.008 grams (Approximate)

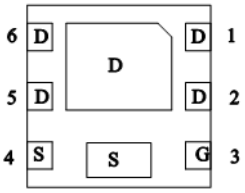
U-DFN2020-6/SWP (Type F)



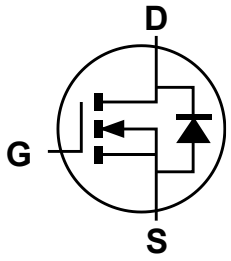
Top View



Bottom View




Pinout
Bottom View




Internal Schematic

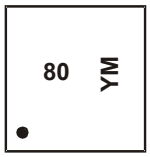
## Ordering Information (Note 4)

| Orderable Part Number | Package | Packing | |
|---|---|---|---|
| | | Qty. | Carrier |
| DMTH8022LFDFWQ-7 | U-DFN2020-6/SWP (Type F) | 3,000 | Reel |
| DMTH8022LFDFWQ-13 | U-DFN2020-6/SWP (Type F) | 10,000 | 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/.


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## Marking Information




80 = Product Type Marking Code
YM = Date Code Marking
Y = Year (ex: M = 2025)
M = Month (ex: 9 = September)

Date Code Key

| Year | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 | 2035 | 2036 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Code | M | N | P | R | S | T | U | V | W | X | Y | Z |

| Month | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Code | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | O | N | D |

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

| Characteristic | | Symbol | Value | Unit |
|---|---|---|---|---|
| Drain-Source Voltage | | $V_{DSS}$ | 80 | V |
| Gate-Source Voltage | | $V_{GSS}$ | ±20 | V |
| Continuous Drain Current, $V_{GS}$ = 10V (Note 6) | $T_A$ = +25°C<br>$T_A$ = +100°C | $I_D$ | 5<br>3.5 | A |
| Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%) | | $I_{DM}$ | 52 | A |
| Maximum Body Diode Continuous Current (Note 6) | | $I_S$ | 3.4 | A |
| Pulsed Body Diode Current (10µs Pulse, Duty Cycle = 1%) | | $I_{SM}$ | 52 | A |
| Avalanche Current, L = 1mH | | $I_{AS}$ | 8.7 | A |
| Avalanche Energy, L = 1mH | | $E_{AS}$ | 39 | mJ |

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

| Characteristic | Symbol | Value | Unit |
|---|---|---|---|
| Total Power Dissipation (Note 5) | $P_D$ | 1.16 | W |
| Thermal Resistance, Junction to Ambient (Note 5) | $R_{\theta JA}$ | 129 | °C/W |
| Total Power Dissipation (Note 6) | $P_D$ | 2.5 | W |
| Thermal Resistance, Junction to Ambient (Note 6) | $R_{\theta JA}$ | 60 | °C/W |
| Operating and Storage Temperature Range | $T_J$, $T_{STG}$ | -55 to +175 | °C |

Notes: 5. Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.
6. Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.


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## 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 | $BV_{DSS}$ | 80 | — | — | V | $V_{GS}$ = 0, $I_D$ = 1mA |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | — | — | 1 | μA | $V_{DS}$ = 64V, $V_{GS}$ = 0 |
| Gate-Source Leakage | $I_{GSS}$ | — | — | ±100 | nA | $V_{GS}$ = ±20V, $V_{DS}$ = 0 |
| **ON CHARACTERISTICS (Note 7)** | | | | | | |
| Gate Threshold Voltage | $V_{GS(TH)}$ | 1.3 | — | 2.5 | V | $V_{DS}$ = $V_{GS}$, $I_D$ = 250μA |
| Static Drain-Source On-Resistance | $R_{DS(ON)}$ | — | 16 | 22 | mΩ | $V_{GS}$ = 10V, $I_D$ = 5A |
| | | — | 25 | 38 | | $V_{GS}$ = 4.5V, $I_D$ = 4A |
| Diode Forward Voltage | $V_{SD}$ | — | 0.8 | 1.0 | V | $V_{GS}$ = 0, $I_S$ = 10A |
| **DYNAMIC CHARACTERISTICS (Note 8)** | | | | | | |
| Input Capacitance | $C_{iss}$ | — | 591 | — | pF | $V_{DS}$ = 40V, $V_{GS}$ = 0, f = 1MHz |
| Output Capacitance | $C_{oss}$ | — | 214 | — | pF | |
| Reverse Transfer Capacitance | $C_{rss}$ | — | 15 | — | pF | |
| Gate Resistance | $R_g$ | — | 1.38 | — | Ω | $V_{DS}$ = 0, $V_{GS}$ = 0, f = 1MHz |
| Total Gate Charge ($V_{GS}$ = 4.5V) | $Q_g$ | — | 5.6 | — | nC | $V_{DS}$ = 40V, $I_D$ = 7.5A |
| Total Gate Charge ($V_{GS}$ = 10V) | $Q_g$ | — | 11.3 | — | nC | |
| Gate-Source Charge | $Q_{gs}$ | — | 2.6 | — | nC | |
| Gate-Drain Charge | $Q_{gd}$ | — | 2.3 | — | nC | |
| Turn-On Delay Time | $t_{D(ON)}$ | — | 13 | — | ns | $V_{DD}$ = 40V, $V_{GS}$ = 4.5V, $R_g$ = 2.7Ω, $I_D$ = 10A |
| Turn-On Rise Time | $t_R$ | — | 34 | — | ns | |
| Turn-Off Delay Time | $t_{D(OFF)}$ | — | 11 | — | ns | |
| Turn-Off Fall Time | $t_F$ | — | 13 | — | ns | |
| Reverse-Recovery Time | $t_{RR}$ | — | 24 | — | ns | $I_F$ = 7.5A, di/dt = 100A/μs |
| Reverse-Recovery Charge | $Q_{RR}$ | — | 14 | — | nC | |

Notes: 7. Short duration pulse test used to minimize self-heating effect.
8. Guaranteed by design. Not subject to product testing.


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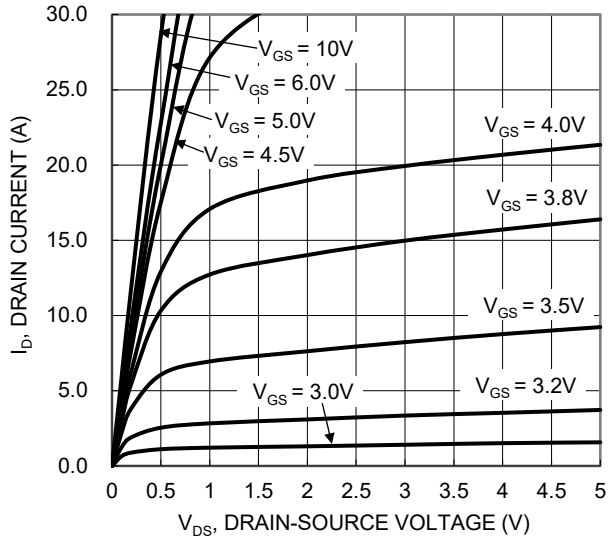



Figure 1. Typical Output Characteristic

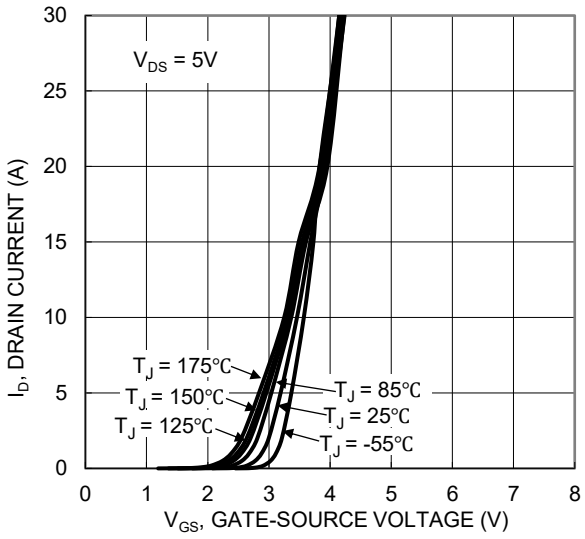



Figure 2. Typical Transfer Characteristic

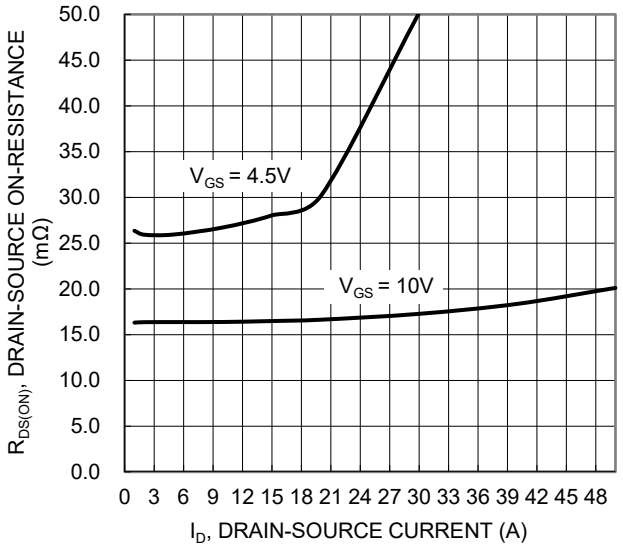



Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

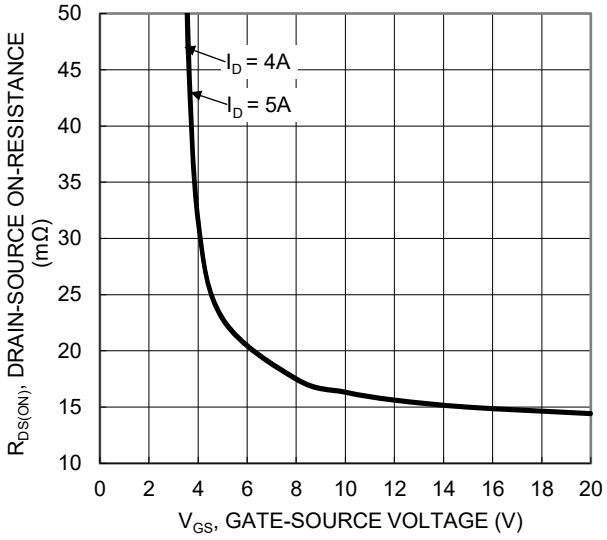



Figure 4. Typical Transfer Characteristic

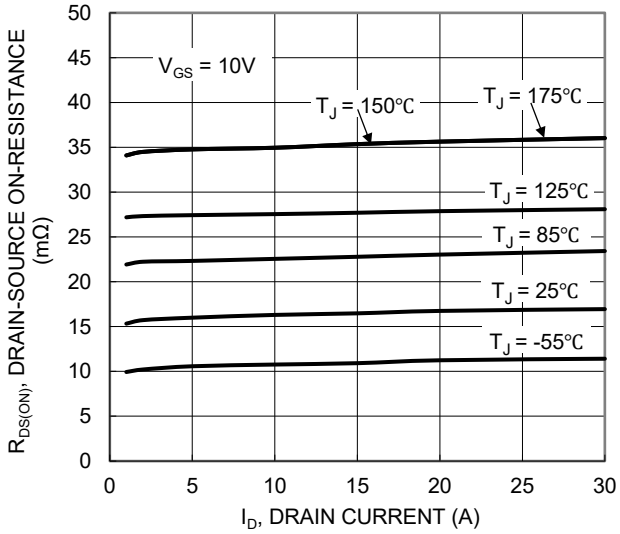



Figure 5. Typical On-Resistance vs. Drain Current and Junction Temperature

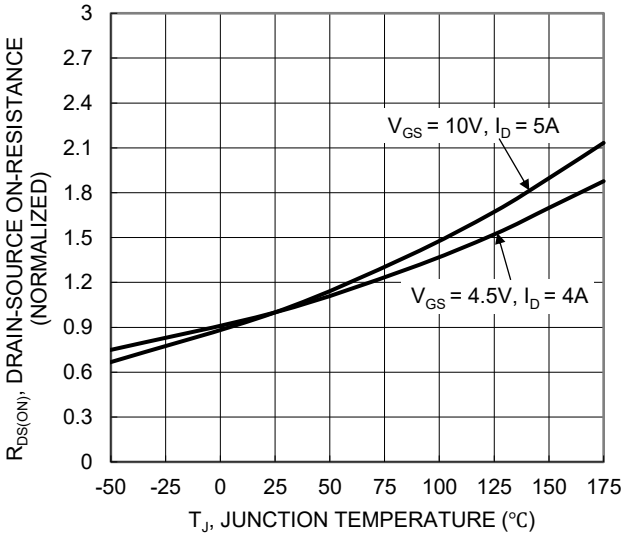



Figure 6. On-Resistance Variation with Temperature


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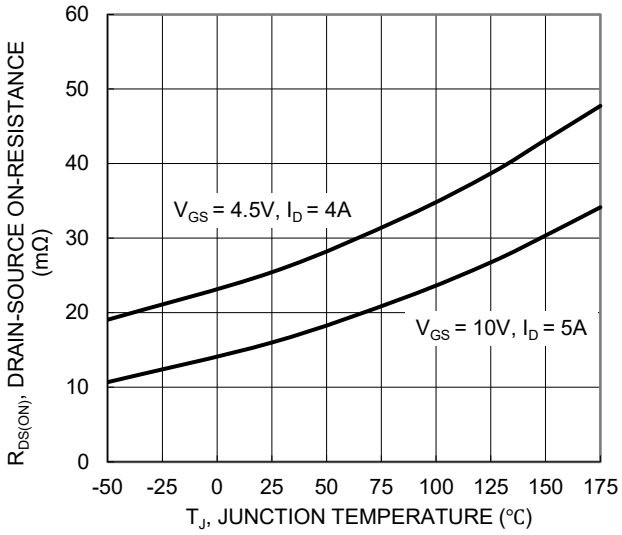



Figure 7. On-Resistance Variation with Temperature

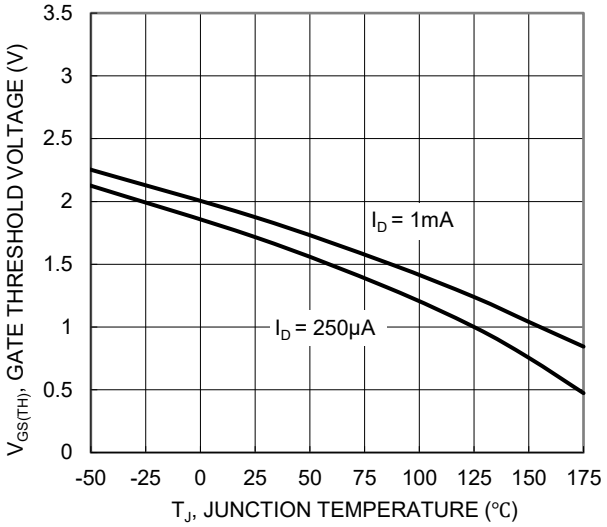



Figure 8. Gate Threshold Variation vs. Junction Temperature

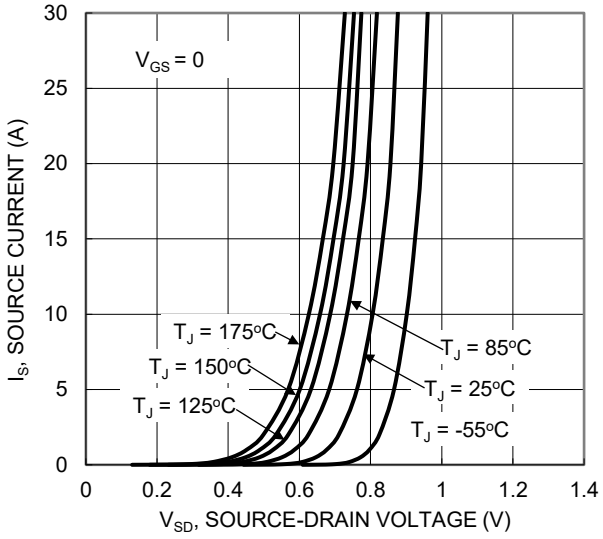



Figure 9. Diode Forward Voltage vs. Current

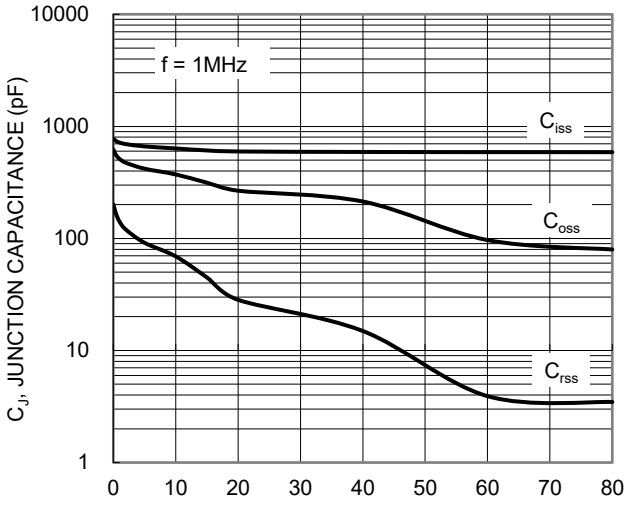



Figure 10. Typical Junction Capacitance

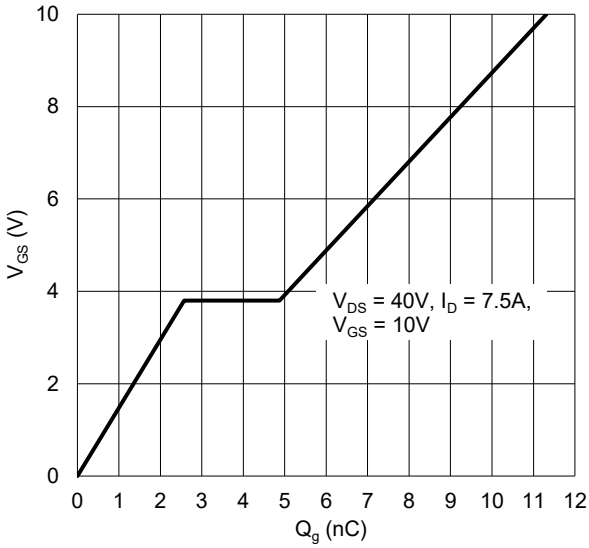



Figure 11. Gate Charge

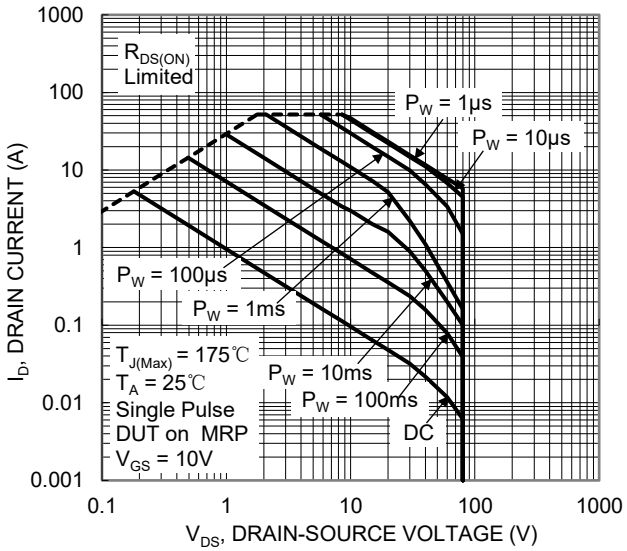



Figure 12. SOA, Safe Operation Area


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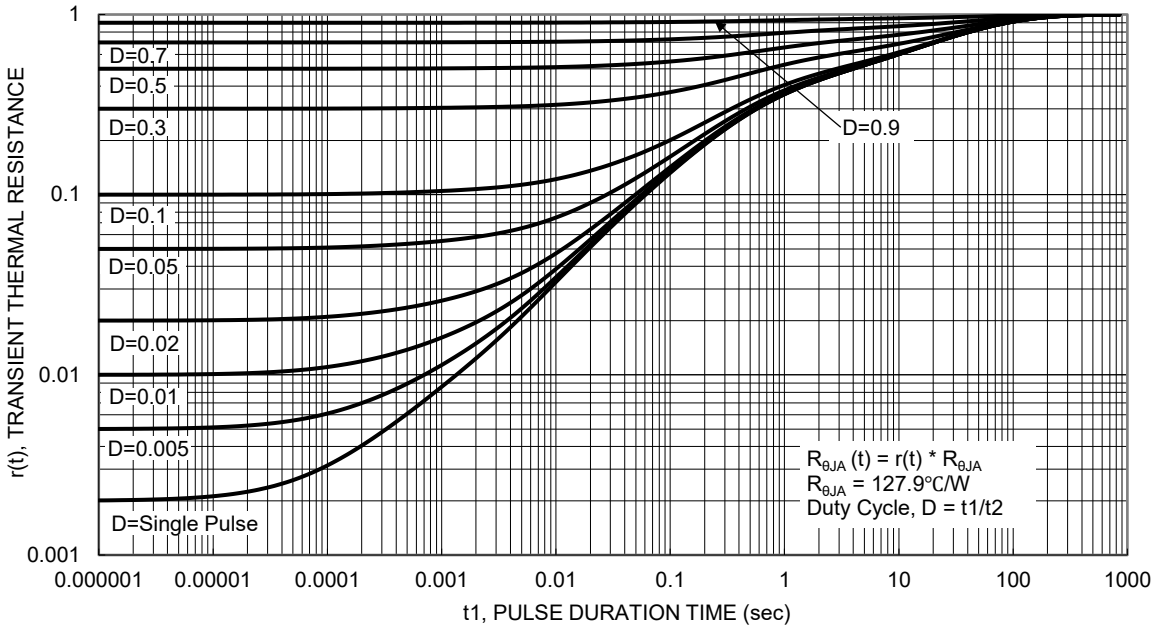


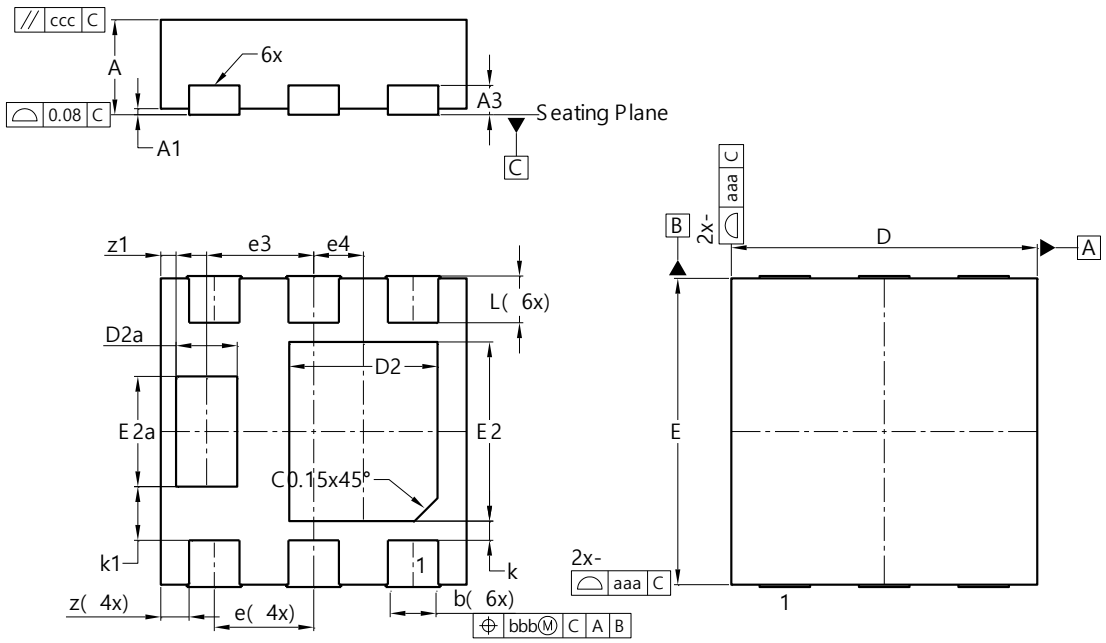

Figure 13. Transient Thermal Resistance


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## Package Outline Dimensions

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

**U-DFN2020-6/SWP (Type F)**

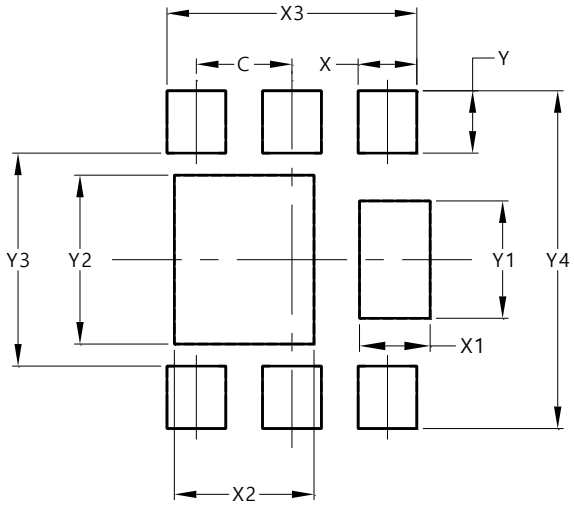



| U-DFN2020-6/SWP (Type F) | | | |
|---|---|---|---|
| **Dim** | **Min** | **Max** | **Typ** |
| **A** | 0.59 | 0.65 | 0.62 |
| **A1** | 0.00 | 0.05 | 0.03 |
| **A3** | -- | -- | 0.192 |
| **b** | 0.28 | 0.38 | 0.33 |
| **D** | 1.95 | 2.05 | 2.00 |
| **D2** | 0.87 | 1.07 | 0.97 |
| **D2a** | 0.35 | 0.45 | 0.40 |
| **E** | 1.95 | 2.05 | 2.00 |
| **E2** | 1.07 | 1.27 | 1.17 |
| **E2a** | 0.67 | 0.77 | 0.72 |
| **e** | 0.65 BSC | | |
| **e3** | 0.70 BSC | | |
| **e4** | 0.325 BSC | | |
| **k** | -- | -- | 0.125 |
| **k1** | -- | -- | 0.35 |
| **L** | 0.225 | 0.355 | 0.305 |
| **z** | -- | -- | 0.185 |
| **z1** | -- | -- | 0.10 |
| **aaa** | 0.250 | | |
| **bbb** | 0.100 | | |
| **ccc** | 0.100 | | |
| **All Dimensions in mm** | | | |

## Suggested Pad Layout

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

**U-DFN2020-6/SWP (Type F)**




| Dimensions | Value (in mm) |
|---|---|
| **C** | 0.650 |
| **X** | 0.400 |
| **X1** | 0.480 |
| **X2** | 0.950 |
| **X3** | 1.700 |
| **Y** | 0.425 |
| **Y1** | 0.800 |
| **Y2** | 1.150 |
| **Y3** | 1.450 |
| **Y4** | 2.300 |


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