## Product Summary

| $BV_{DSS}$ | $R_{DS(ON)}$ Max | $I_D$ Max $T_A$ = +25°C |
|---|---|---|
| -60V | 110mΩ @ $V_{GS}$ = -10V | -4.2A |
| | 130mΩ @ $V_{GS}$ = -4.5V | -3.9A |

## Description and Applications

This MOSFET is designed to meet the stringent requirements of automotive applications. It is qualified to AEC-Q101, supported by a PPAP and is ideal for use in:

- Battery Management Application
- Power Management Functions
- DC-DC Converters

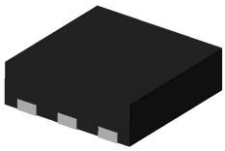
## Features and Benefits

- 100% Unclamped Inductive Switching Test in Production – Ensures More Reliable and Robust End Application
- Low On-Resistance
- Low Gate Threshold Voltage
- Low Input Capacitance
- Fast Switching Speed
- Low Input/Output Leakage
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Notes 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**
- **PPAP Capable (Note 4)**

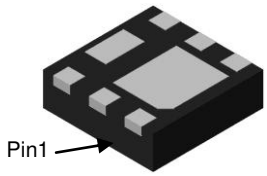
## Mechanical Data

- Case: U-DFN2020-6
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – NiPdAu over Copper Leadframe. Solderable per MIL-STD-202, Method 208 e4
- Weight: 0.007 grams (Approximate)

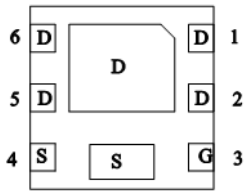
U-DFN2020-6 (Type F)



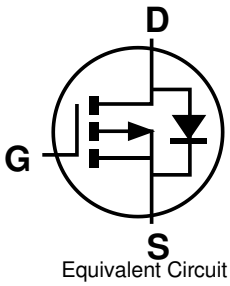
Top View




Bottom View




Pin Out
Bottom View



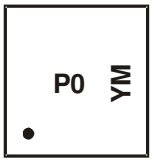

Equivalent Circuit

## Ordering Information (Note 5)

| Part Number | Case | Packaging |
|---|---|---|
| DMP6110SFDFQ-7 | U-DFN2020-6 (Type F) | 3,000/Tape & Reel |
| DMP6110SFDFQ-13 | U-DFN2020-6 (Type F) | 10,000/Tape & Reel |

Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
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. Automotive products are AEC-Q101 qualified and are PPAP capable. Refer to https://www.diodes.com/quality/.
5. For packaging details, go to our website at https://www.diodes.com/design/support/packaging/diodes-packaging/.

## Marking Information




P0 = Product Type Marking Code
YM = Date Code Marking
Y = Year (ex: G = 2019)
M = Month (ex: 9 = September)

Date Code Key

| Year | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 |
|---|---|---|---|---|---|---|---|---|---|---|
| Code | F | G | H | I | J | K | L | M | N | O |

| 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 | | | $V_{DSS}$ | -60 | V |
| Gate-Source Voltage | | | $V_{GSS}$ | ±20 | V |
| Continuous Drain Current (Note 7) $V_{GS}$ = -10V | Steady State | $T_A$ = +25°C<br>$T_A$ = +70°C | $I_D$ | -3.5<br>-2.8 | A |
| | t<10s | $T_A$ = +25°C<br>$T_A$ = +70°C | $I_D$ | -4.2<br>-3.4 | A |
| Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%) | | | $I_{DM}$ | -20 | A |
| Continuous Source-Drain Diode Current (Note 7) | | $T_A$ = +25°C | $I_S$ | -2.1 | A |
| Pulsed Source Current (10µs Pulse, Duty Cycle = 1%) | | | $I_{SM}$ | -20 | A |
| Avalanche Current (Note 8) L = 0.1mH | | | $I_{AS}$ | -19 | A |
| Avalanche Energy (Note 8) L = 0.1mH | | | $E_{AS}$ | 18 | mJ |

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

| Characteristic | | Symbol | Value | Unit |
|---|---|---|---|---|
| Total Power Dissipation (Note 6) | $T_A$ = +25°C | $P_D$ | 0.76 | W |
| | $T_A$ = +70°C | | 0.47 | |
| Thermal Resistance, Junction to Ambient (Note 6) | Steady State | $R_{\theta JA}$ | 167 | °C/W |
| | t<10s | | 121 | |
| Total Power Dissipation (Note 7) | $T_A$ = +25°C | $P_D$ | 1.97 | W |
| | $T_A$ = +70°C | | 1.30 | |
| Thermal Resistance, Junction to Ambient (Note 7) | Steady State | $R_{\theta JA}$ | 64 | °C/W |
| | t<10s | | 42 | |
| Thermal Resistance, Junction to Case (Note 7) | Steady State | $R_{\theta JC}$ | 8 | |
| 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 9) | | | | | | |
| Drain-Source Breakdown Voltage | $BV_{DSS}$ | -60 | — | — | V | $V_{GS}$ = 0V, $I_D$ = -250µA |
| Zero Gate Voltage Drain Current $T_J$ = +25°C | $I_{DSS}$ | — | — | -1 | µA | $V_{DS}$ = -48V, $V_{GS}$ = 0V |
| Gate-Source Leakage | $I_{GSS}$ | — | — | ±100 | nA | $V_{GS}$ = ±16V, $V_{DS}$ = 0V |
| **ON CHARACTERISTICS** (Note 9) | | | | | | |
| Gate Threshold Voltage | $V_{GS(TH)}$ | -1 | — | -3 | V | $V_{DS}$ = $V_{GS}$, $I_D$ = -250µA |
| Static Drain-Source On-Resistance | $R_{DS(ON)}$ | — | 56 | 110 | mΩ | $V_{GS}$ = -10V, $I_D$ = -4.5A |
| | | | 72 | 130 | | $V_{GS}$ = -4.5V, $I_D$ =-3.5A |
| Diode Forward Voltage | $V_{SD}$ | — | -0.7 | -1.2 | V | $V_{GS}$ = 0V, $I_S$ = -1A |
| **DYNAMIC CHARACTERISTICS** (Note 10) | | | | | | |
| Input Capacitance | $C_{iss}$ | — | 969 | — | pF | $V_{DS}$ = -30V, $V_{GS}$ = 0V, f = 1.0MHz |
| Output Capacitance | $C_{oss}$ | — | 58 | — | | |
| Reverse Transfer Capacitance | $C_{rss}$ | — | 44 | — | | |
| Gate Resistance | $R_g$ | — | 14 | — | Ω | $V_{DS}$ = 0V, $V_{GS}$ = 0V, f = 1.0MHz |
| Total Gate Charge ($V_{GS}$ = -4.5V) | $Q_g$ | — | 8.2 | — | nC | $V_{DS}$ = -30V, $I_D$ = -12A |
| Total Gate Charge ($V_{GS}$ = -10V) | $Q_g$ | — | 17.2 | — | | |
| Gate-Source Charge | $Q_{gs}$ | — | 3.0 | — | | |
| Gate-Drain Charge | $Q_{gd}$ | — | 3.1 | — | | |
| Turn-On Delay Time | $t_{D(ON)}$ | — | 4.4 | — | ns | $V_{GS}$ = -10V, $V_{DS}$ = -30V, $R_{GEN}$ = 6Ω, $I_D$ = -12A |
| Turn-On Rise Time | $t_R$ | — | 23 | — | | |
| Turn-Off Delay Time | $t_{D(OFF)}$ | — | 34 | — | | |
| Turn-Off Fall Time | $t_F$ | — | 42 | — | | |
| Reverse Recovery Time | $t_{RR}$ | — | 13.2 | — | ns | $I_S$ = -12A, di/dt = -100A/µs |
| Reverse Recovery Charge | $Q_{RR}$ | — | 6.2 | — | nC | $I_S$ = -12A, di/dt = -100A/µs |

Notes: 6. Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.
7. Device mounted on FR-4 substrate PC board, 2oz copper, with 1-inch square copper plate.
8. $I_{AS}$ and $E_{AS}$ ratings are based on low frequency and duty cycles to keep $T_J$ = +25°C.
9. Short duration pulse test used to minimize self-heating effect.
10. Guaranteed by design. Not subject to product testing.

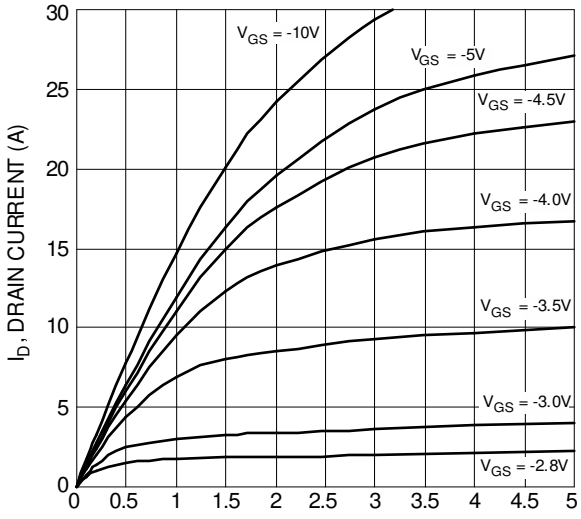



Figure 1 Typical Output Characteristic

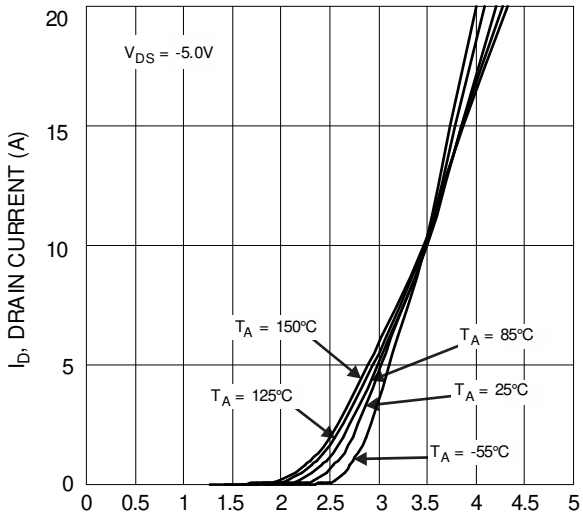



Figure 2 Typical Transfer Characteristics

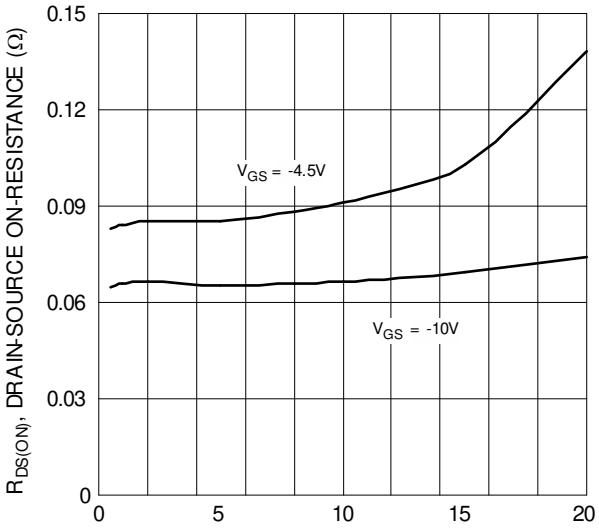



Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

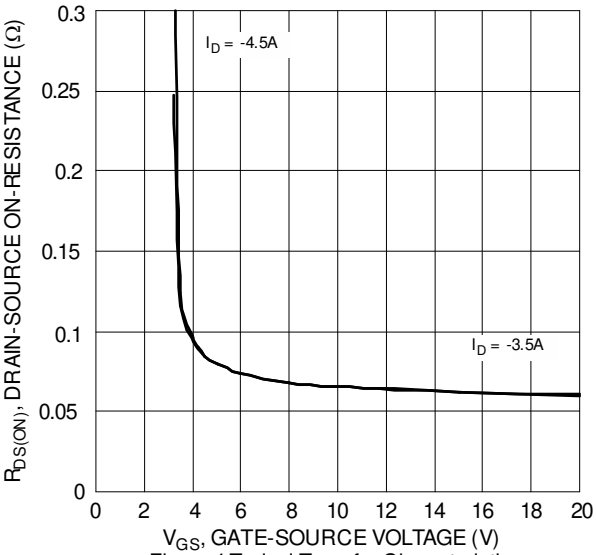



Figure 4 Typical Transfer Characteristic

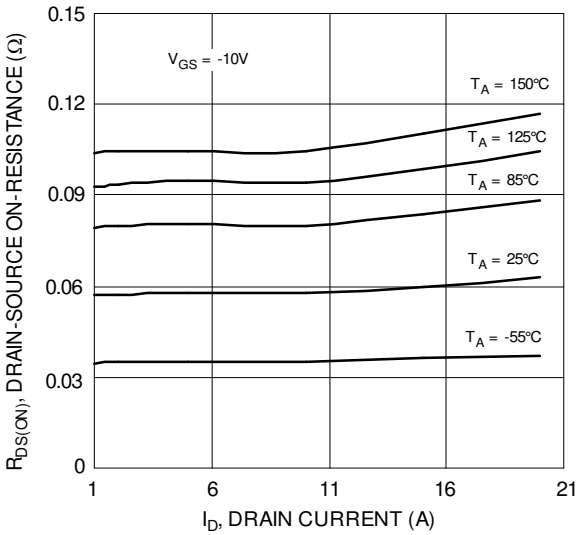



Figure 5 Typical On-Resistance vs. Drain Current and Temperature

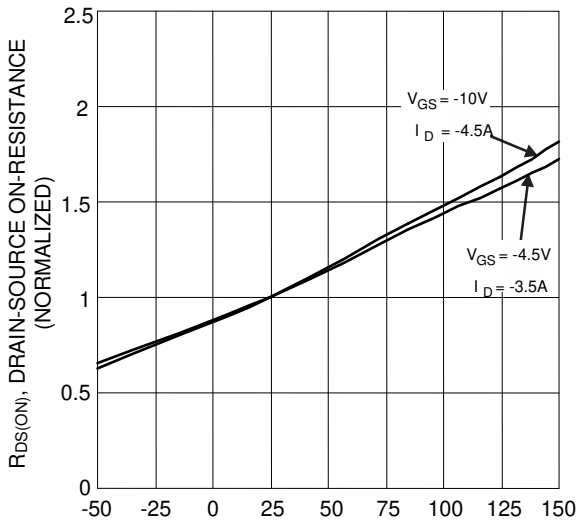



Figure 6 On-Resistance Variation with Temperature

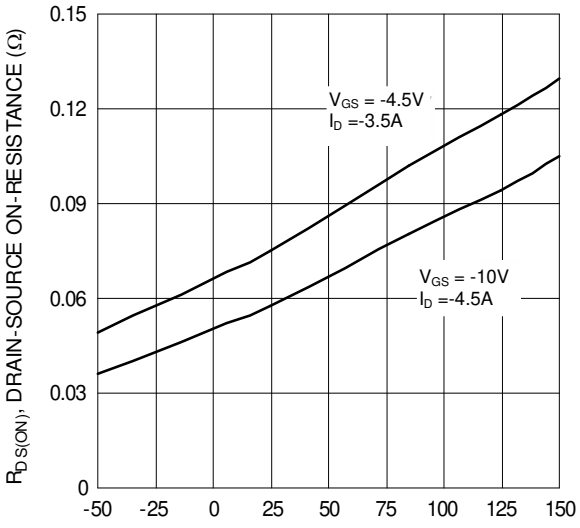


Figure 7 On-Resistance Variation with Temperature

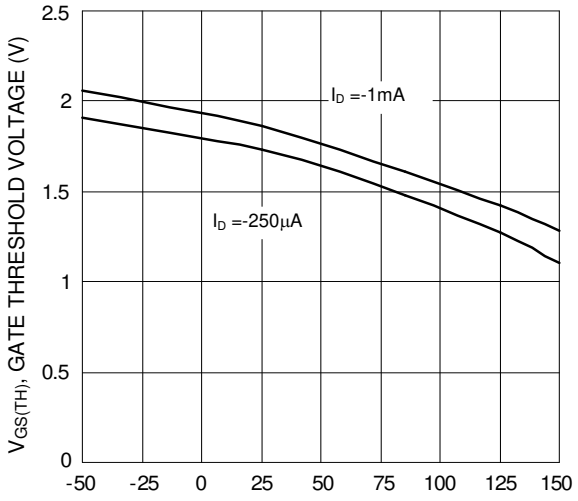


Figure 8 Gate Threshold Variation vs. Junction Temperature

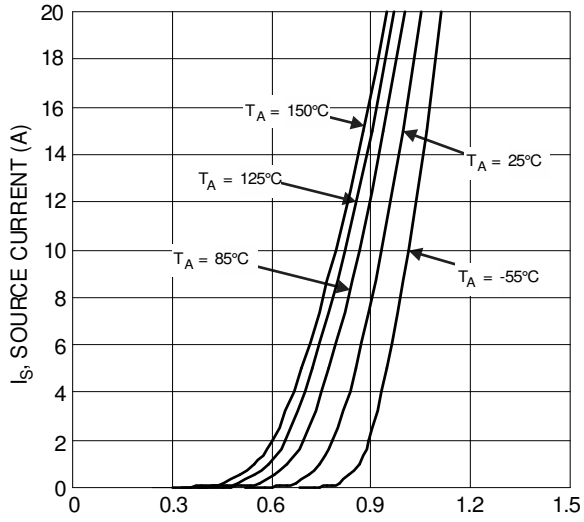


Figure 9 Diode Forward Voltage vs. Current

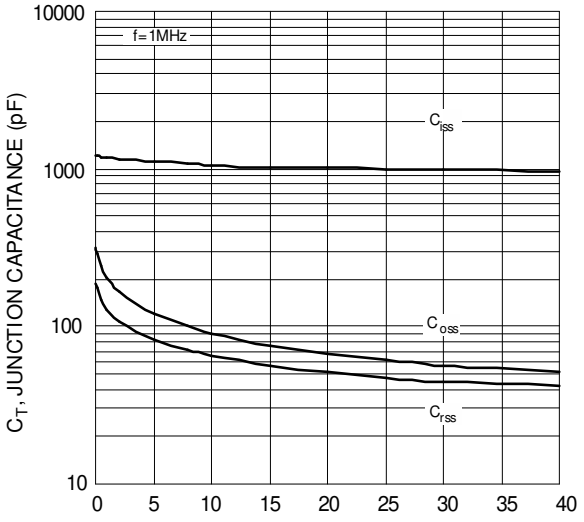


Figure 10 Typical Junction Capacitance

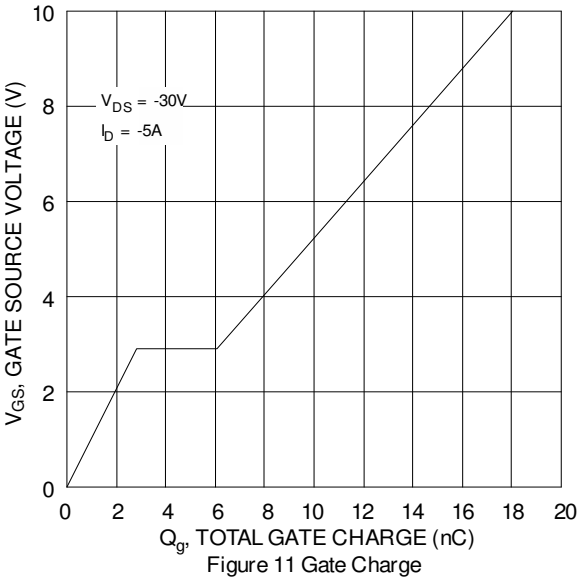


Figure 11 Gate Charge

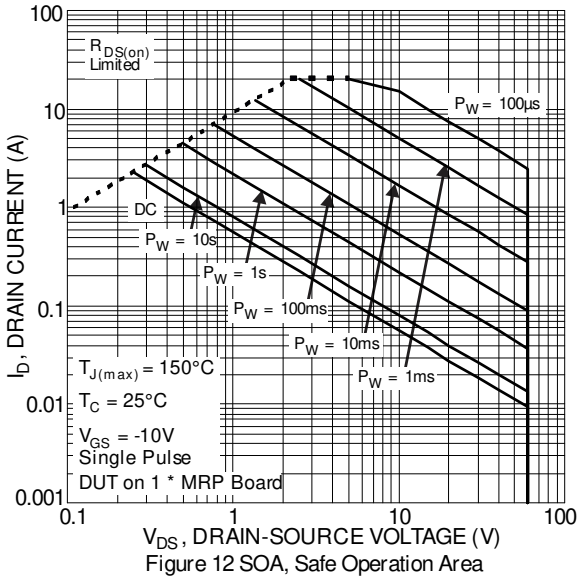


Figure 12 SOA, Safe Operation Area

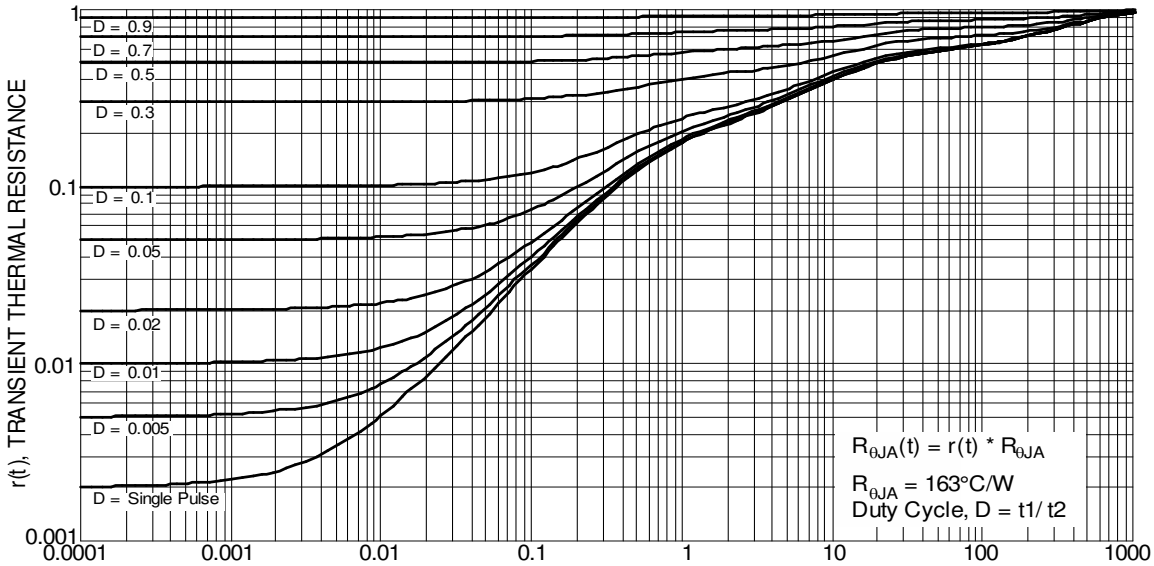
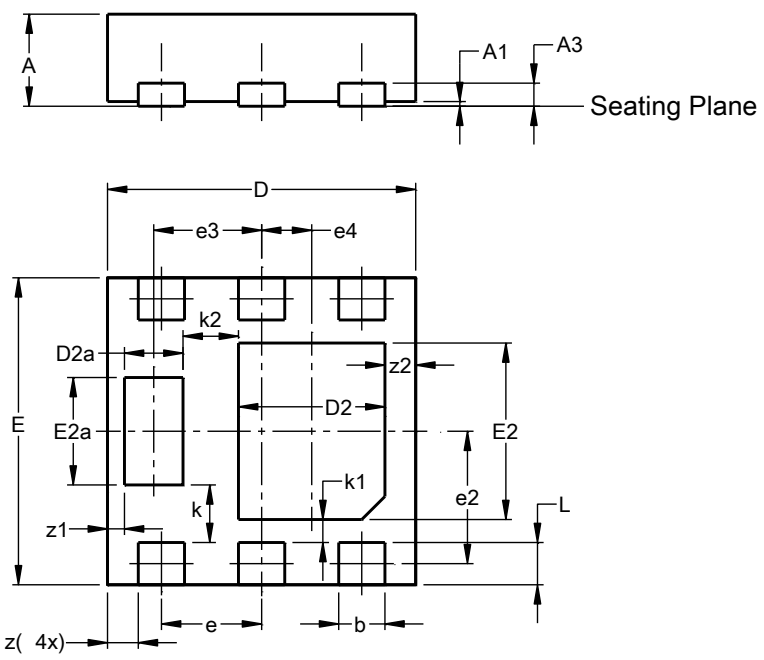



Figure 13 Transient Thermal Resistance

## Package Outline Dimension

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

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

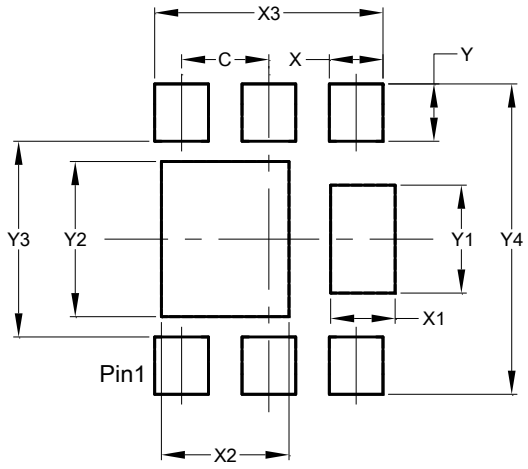



| U-DFN2020-6 (Type F) | | | |
|---|---|---|---|
| **Dim** | **Min** | **Max** | **Typ** |
| **A** | 0.57 | 0.63 | 0.60 |
| **A1** | 0.00 | 0.05 | 0.03 |
| **A3** | - | - | 0.15 |
| **b** | 0.25 | 0.35 | 0.30 |
| **D** | 1.95 | 2.05 | 2.00 |
| **D2** | 0.85 | 1.05 | 0.95 |
| **D2a** | 0.33 | 0.43 | 0.38 |
| **E** | 1.95 | 2.05 | 2.00 |
| **E2** | 1.05 | 1.25 | 1.15 |
| **E2a** | 0.65 | 0.75 | 0.70 |
| **e** | 0.65 BSC | | |
| **e2** | 0.863 BSC | | |
| **e3** | 0.70 BSC | | |
| **e4** | 0.325 BSC | | |
| **k** | 0.37 BSC | | |
| **k1** | 0.15 BSC | | |
| **k2** | 0.36 BSC | | |
| **L** | 0.225 | 0.325 | 0.275 |
| **z** | 0.20 BSC | | |
| **z1** | 0.110 BSC | | |
| **z2** | 0.20 BSC | | |
| **All Dimensions in mm** | | | |

## Suggested Pad Layout

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

**U-DFN2020-6 (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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