

**60V N-CHANNEL ENHANCEMENT MODE MOSFET**
**Product Summary**

BV <sub>DSS</sub>	R <sub>DS(ON)</sub> Max	I <sub>D</sub> Max T <sub>A</sub> = +25°C
60V	16mΩ @ V <sub>GS</sub> = 10V	8.9A
	27mΩ @ V <sub>GS</sub> = 4.5V	6.8A

**Description**

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

**Applications**

- Load Switch
- Adaptor Switch
- Notebook PC

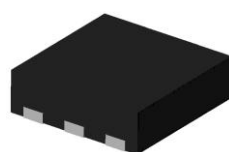
**Features and Benefits**

- 100% Unclamped Inductive Switch (UIS) Test in Production
- 0.6mm Profile – Ideal for Low Profile Applications
- PCB Footprint of 4mm<sup>2</sup>
- Low On-Resistance
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**

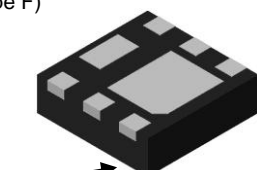
**Mechanical Data**

- Case: U-DFN2020-6 (Type F)
- 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)

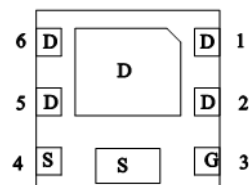
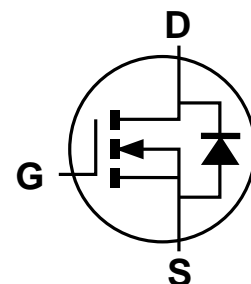
U-DFN2020-6 (Type F)



Top View



Bottom View

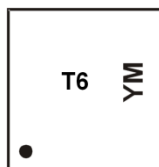

 Pin Out  
Bottom View


Equivalent Circuit

**Ordering Information (Note 4)**

Part Number	Marking	Reel Size (inches)	Quantity per Reel
DMT6016LFDF-7	T6	7	3,000
DMT6016LFDF-13	T6	13	10,000

- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
  2. See [http://www.diodes.com/quality/lead\\_free.html](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 <http://www.diodes.com/products/packages.html>.

**Marking Information**


T6 = Product Type Marking Code  
 YM = Date Code Marking  
 Y = Year (ex: D = 2016)  
 M = Month (ex: 9 = September)

**Date Code Key**

Date Code Key

Year	2014	2015	2016	2017	2018	2019	2020	2021	2022
Code	B	C	D	E	F	G	H	I	J

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<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			V <sub>DSS</sub>	60	V
Gate-Source Voltage			V <sub>GSS</sub>	±20	V
Continuous Drain Current (Note 6) V <sub>GS</sub> = 10V	Steady State	T <sub>A</sub> = +25°C T <sub>A</sub> = +70°C	I <sub>D</sub>	8.9 7.1	A
	t < 10s	T <sub>A</sub> = +25°C T <sub>A</sub> = +70°C	I <sub>D</sub>	11.1 8.9	A
Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)			I <sub>DM</sub>	60	A
Maximum Body Diode Continuous Current			I <sub>S</sub>	2.2	A
Avalanche Current (Note 7) L = 0.1mH			I <sub>AS</sub>	15.3	A
Avalanche Energy (Note 7) L = 0.1mH			E <sub>AS</sub>	11.7	mJ

**Thermal Characteristics**

Characteristic		Symbol	Value	Unit
Total Power Dissipation (Note 5)	T <sub>A</sub> = +25°C	P <sub>D</sub>	0.82	W
	T <sub>A</sub> = +70°C		0.52	
Thermal Resistance, Junction to Ambient (Note 5)	Steady State	R <sub>θJA</sub>	153	°C/W
	t < 10s		97	
Total Power Dissipation (Note 6)	T <sub>A</sub> = +25°C	P <sub>D</sub>	1.9	W
	T <sub>A</sub> = +70°C		1.2	
Thermal Resistance, Junction to Ambient (Note 6)	Steady State	R <sub>θJA</sub>	66	°C/W
	t < 10s		42	
Thermal Resistance, Junction to Case (Note 6)		R <sub>θJC</sub>	14.7	
Operating and Storage Temperature Range		T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C

**Electrical Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS (Note 8)</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	60	—	—	V	V <sub>GS</sub> = 0V, I <sub>D</sub> = 250µA
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	—	—	1	µA	V <sub>DS</sub> = 48V, V <sub>GS</sub> = 0V
Gate-Source Leakage	I <sub>GSS</sub>	—	—	±100	nA	V <sub>GS</sub> = ±20V, V <sub>DS</sub> = 0V
<b>ON CHARACTERISTICS (Note 8)</b>						
Gate Threshold Voltage	V <sub>GS(TH)</sub>	1.0	—	3.0	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250µA
Static Drain-Source On-Resistance	R <sub>DS(ON)</sub>	—	12.2	16	mΩ	V <sub>GS</sub> = 10V, I <sub>D</sub> = 10A
		—	17.2	27		V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 6A
Diode Forward Voltage	V <sub>SD</sub>	—	0.7	1.2	V	V <sub>GS</sub> = 0V, I <sub>S</sub> = 1A
<b>DYNAMIC CHARACTERISTICS (Note 9)</b>						
Input Capacitance	C <sub>iss</sub>	—	864	—	pF	V <sub>DS</sub> = 30V, V <sub>GS</sub> = 0V f = 1.0MHz
Output Capacitance	C <sub>oss</sub>	—	282	—		
Reverse Transfer Capacitance	C <sub>rss</sub>	—	27.1	—		
Gate Resistance	R <sub>g</sub>	—	1.35	—	Ω	V <sub>DS</sub> = 0V, V <sub>GS</sub> = 0V, f = 1.0MHz
Total Gate Charge (V <sub>GS</sub> = 10V)	Q <sub>g</sub>	—	17	—	nC	V <sub>DS</sub> = 30V, I <sub>D</sub> = 10A
Total Gate Charge (V <sub>GS</sub> = 4.5V)	Q <sub>g</sub>	—	8.4	—		
Gate-Source Charge	Q <sub>gs</sub>	—	3.1	—		
Gate-Drain Charge	Q <sub>gd</sub>	—	4.3	—		
Turn-On Delay Time	t <sub>D(ON)</sub>	—	3.4	—	nS	V <sub>GS</sub> = 10V, V <sub>DD</sub> = 30V, R <sub>g</sub> = 6Ω, I <sub>D</sub> = 10A
Turn-On Rise Time	t <sub>R</sub>	—	5.2	—		
Turn-Off Delay Time	t <sub>D(OFF)</sub>	—	12.9	—		
Turn-Off Fall Time	t <sub>F</sub>	—	6.8	—		
Body Diode Reverse Recovery Time	t <sub>RR</sub>	—	22	—	nS	I <sub>S</sub> = 10A, dI/dt = 100A/µs
Body Diode Reverse Recovery Charge	Q <sub>RR</sub>	—	11.1	—	nC	I <sub>S</sub> = 10A, dI/dt = 100A/µs

- 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 1inch square copper plate.
  - I<sub>AS</sub> and E<sub>AS</sub> rating are based on low frequency and duty cycles to keep T<sub>J</sub> = +25°C.
  - Short duration pulse test used to minimize self-heating effect.
  - Guaranteed by design. Not subject to product testing.

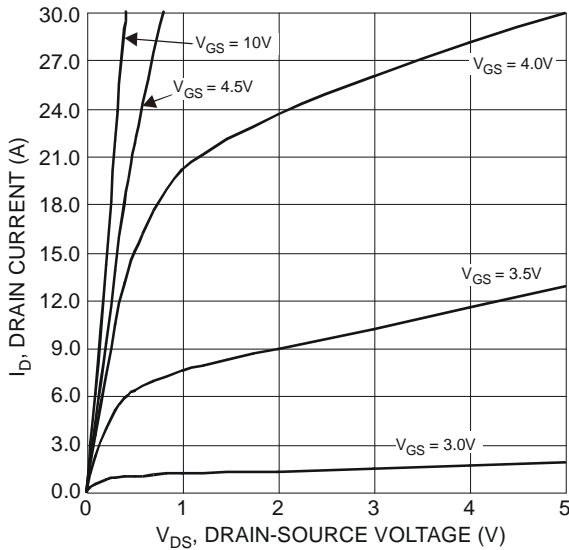


Figure 1 Typical Output Characteristics

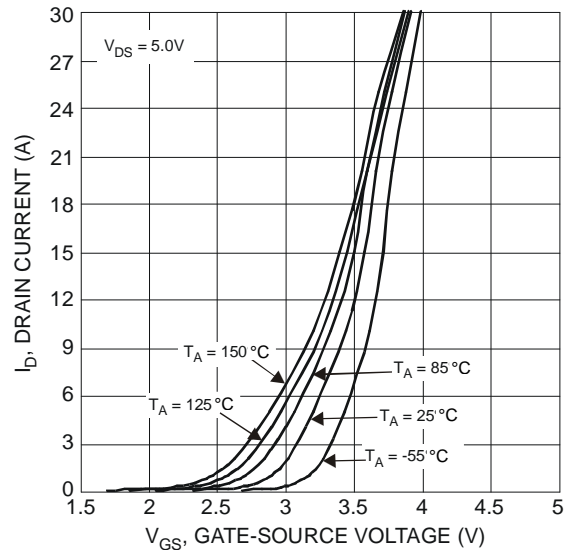


Figure 2 Typical Transfer Characteristics

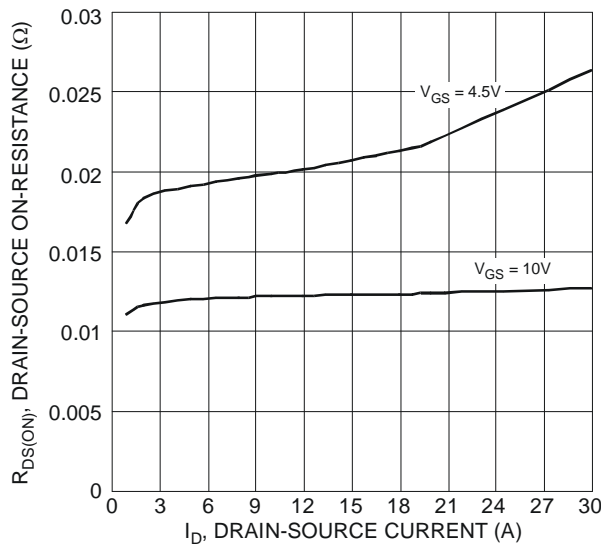


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

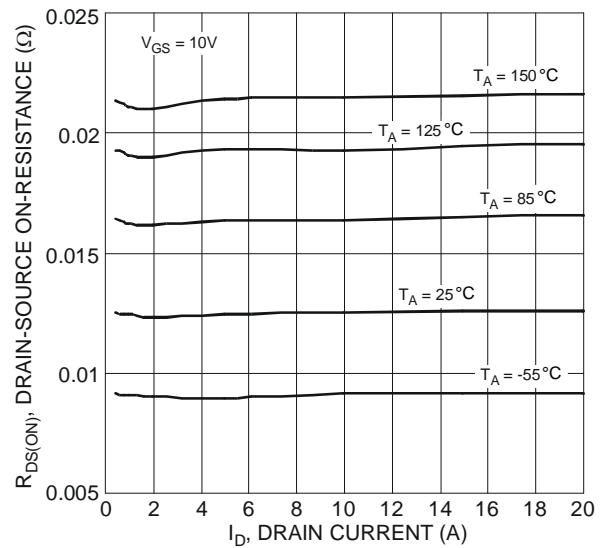


Figure 4 Typical On-Resistance vs. Drain Current and Temperature

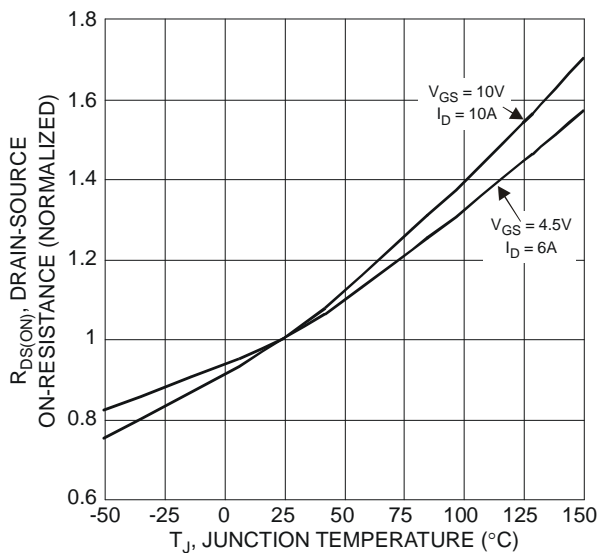


Figure 5 On-Resistance Variation with Temperature

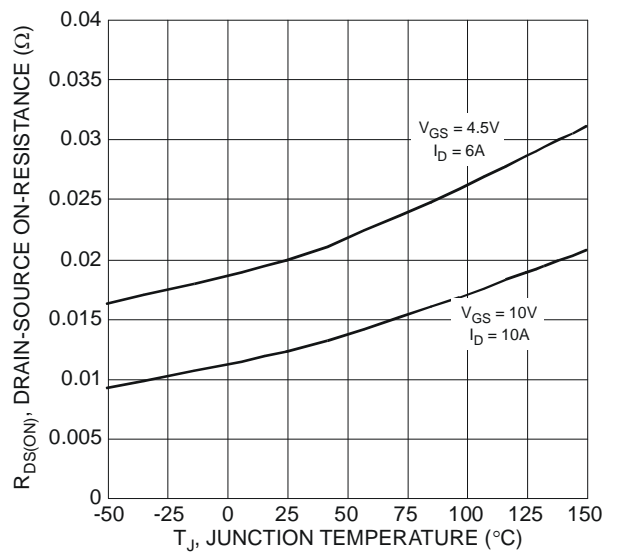


Figure 6 On-Resistance Variation with Temperature

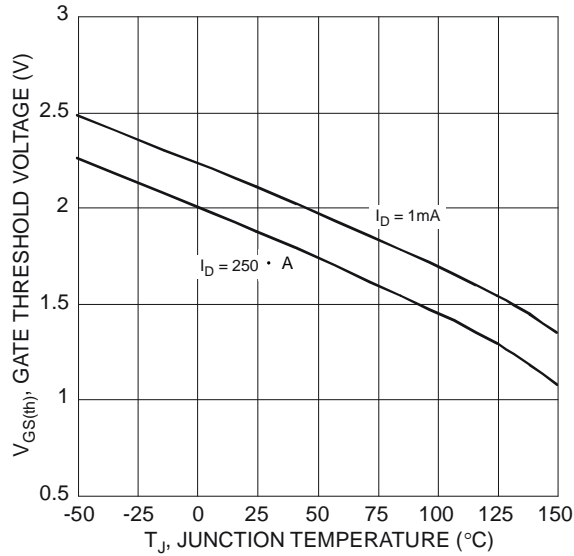


Figure 7 Gate Threshold Variation vs. Ambient Temperature

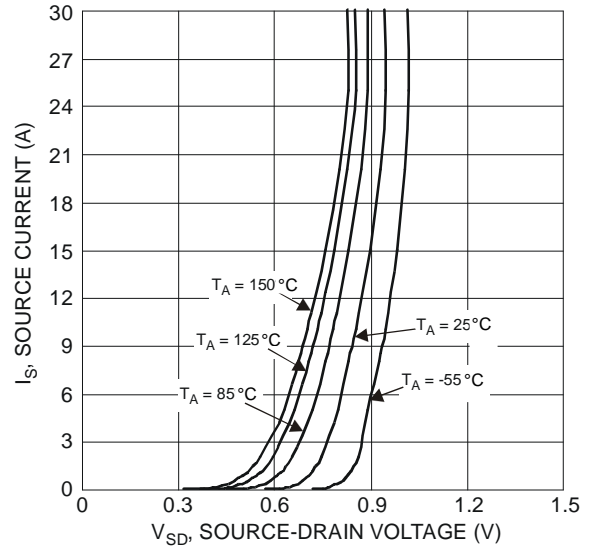


Figure 8 Diode Forward Voltage vs. Current

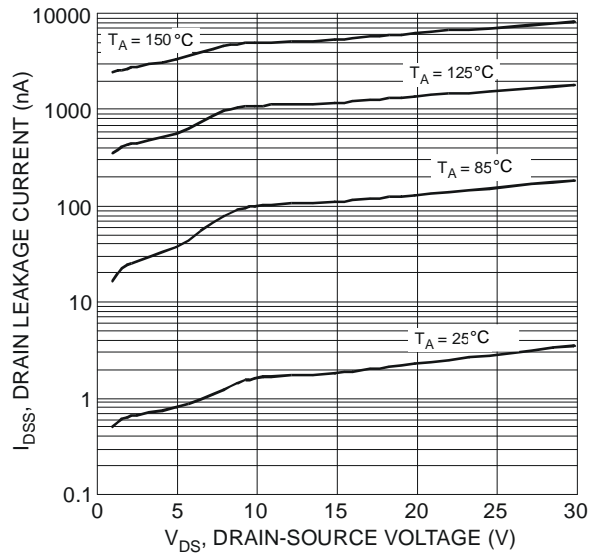


Figure 9 Typical Drain-Source Leakage Current vs. Voltage

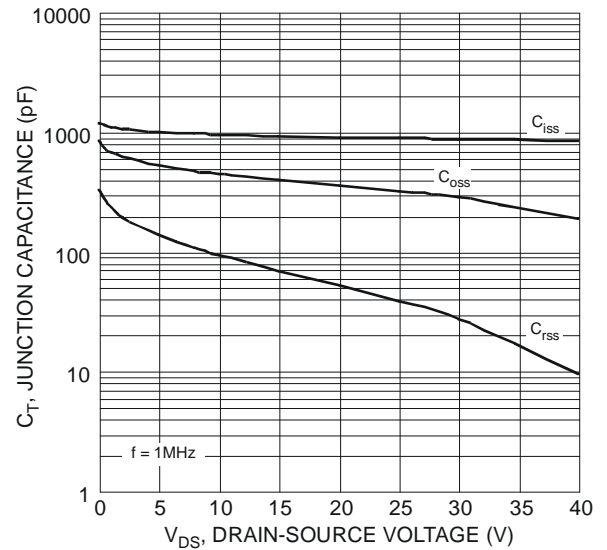


Figure 10 Typical Junction Capacitance

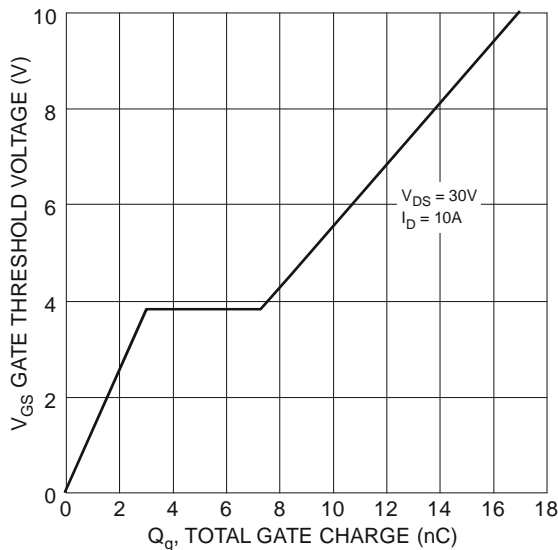


Figure 11 Gate Charge

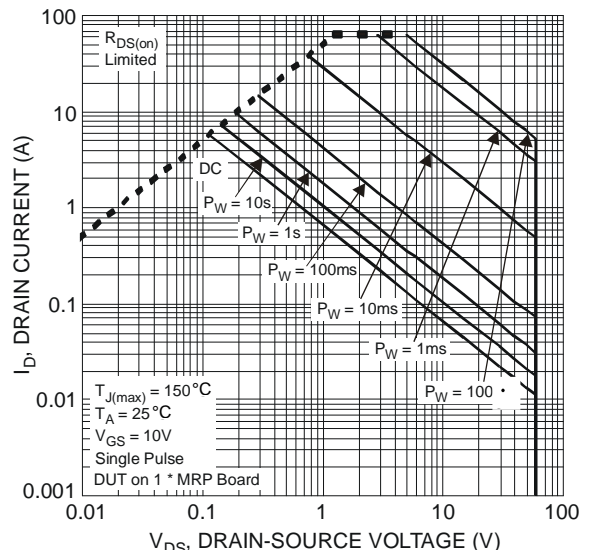


Figure 12 SOA, Safe Operation Area

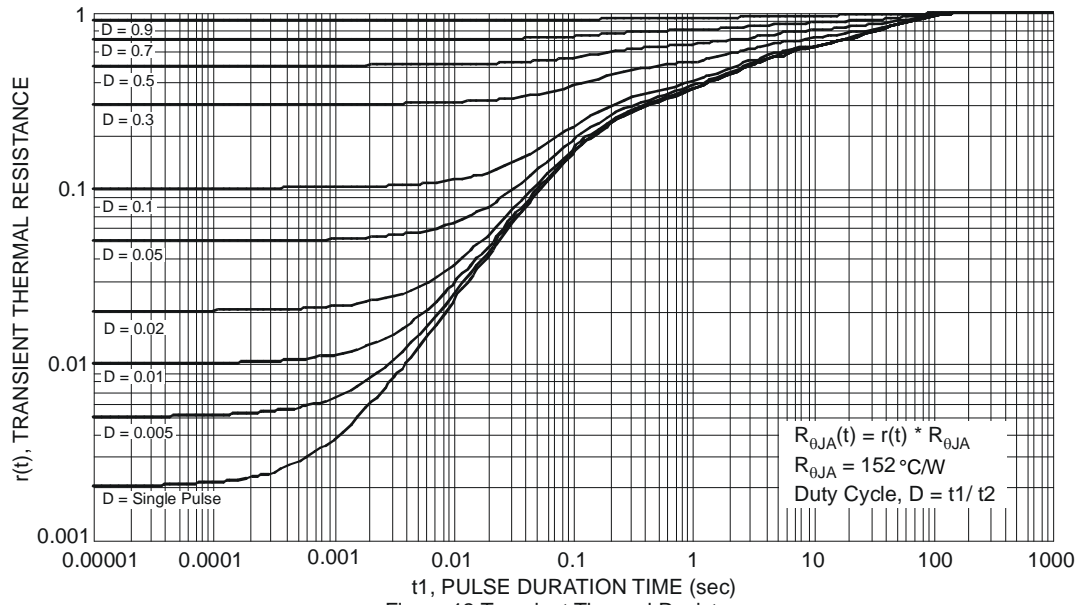
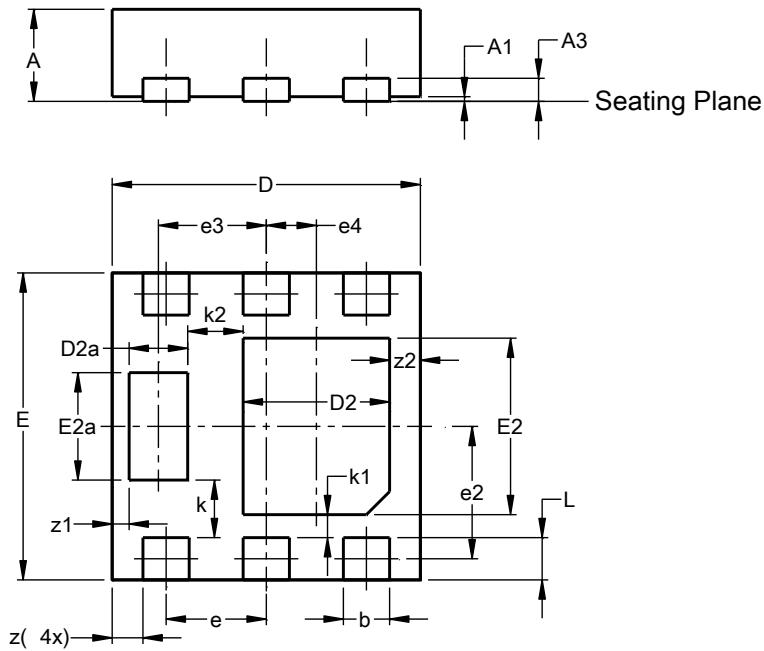


Figure 12 Transient Thermal Resistance

## Package Outline Dimensions

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

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

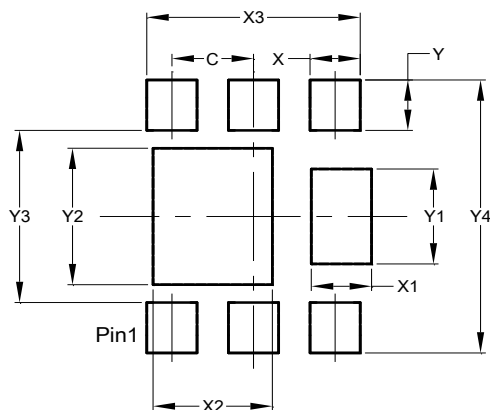


U-DFN2020-6 (Type F)			
Dim	Min	Max	Typ
A	0.57	0.63	0.60
A1	0.00	0.05	0.03
A3	-	-	0.15
b	0.25	0.35	0.30
D	1.95	2.05	2.00
D2	0.85	1.05	0.95
D2a	0.33	0.43	0.38
E	1.95	2.05	2.00
E2	1.05	1.25	1.15
E2a	0.65	0.75	0.70
e	0.65 BSC		
e2	0.863 BSC		
e3	0.70 BSC		
e4	0.325 BSC		
k	0.37 BSC		
k1	0.15 BSC		
k2	0.36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