

**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>) yet maintain superior switching performance, making it ideal for high-efficiency power management applications.

**Applications**

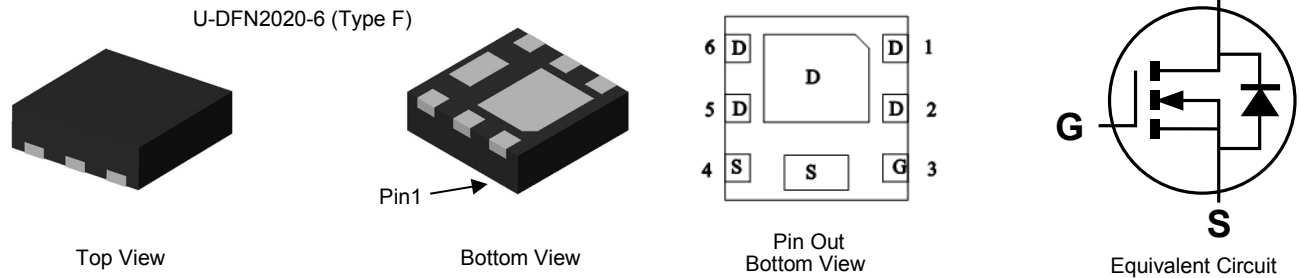
- Load Switch
- Adaptor Switch
- Notebook PC

**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)**
- **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](#) or your local Diodes representative. <https://www.diodes.com/quality/product-definitions/>**

**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 <sup>(4)</sup>
- Weight: 0.007 grams (Approximate)



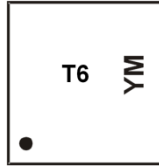
**Ordering Information** (Note 4)

Part Number	Marking	Reel Size (inches)	Quantity per Reel
DMT6016LDFD-7	T6	7	3000
DMT6016LDFD-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

Site 1:



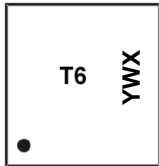
T6 = Product Type Marking Code  
 YM = Date Code Marking  
 Y = Year (ex: H = 2020)  
 M = Month (ex: 9 = September)

Date Code Key

Year	2013	...	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Code	A	...	G	H	I	J	K	L	M	N	O	P

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

Site 2:



T6 = Product Type Marking Code  
 YWX = Date Code Marking  
 Y = Year (ex: H = 2020)  
 W = Week (ex: a = week 27; z represents week 52 and 53)  
 X = Internal code (ex: U = Monday)

Date Code Key

Year	2020	2021	2022	2023	2024	2025	2026	2027	2028
Code	0	1	2	3	4	5	6	7	8

Week	1-26	27-52	53
Code	A-Z	a-z	z

Internal Code	Sun	Mon	Tue	Wed	Thu	Fri	Sat
Code	T	U	V	W	X	Y	Z

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

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			$V_{DSS}$	60	V
Gate-Source Voltage			$V_{GSS}$	$\pm 20$	V
Continuous Drain Current (Note 6) $V_{GS} = 10\text{V}$	Steady State	$T_A = +25^\circ\text{C}$ $T_A = +70^\circ\text{C}$	$I_D$	8.9 7.1	A
	$t < 10\text{s}$	$T_A = +25^\circ\text{C}$ $T_A = +70^\circ\text{C}$	$I_D$	11.1 8.9	A
Pulsed Drain Current (10 $\mu\text{s}$ Pulse, Duty Cycle = 1%)			$I_{DM}$	60	A
Maximum Body Diode Continuous Current			$I_S$	2.2	A
Avalanche Current (Note 7) $L = 0.1\text{mH}$			$I_{AS}$	15.3	A
Avalanche Energy (Note 7) $L = 0.1\text{mH}$			$E_{AS}$	11.7	mJ

**Thermal Characteristics**

Characteristic		Symbol	Value	Unit
Total Power Dissipation (Note 5)	$T_A = +25^\circ\text{C}$	$P_D$	0.82	W
	$T_A = +70^\circ\text{C}$		0.52	
Thermal Resistance, Junction to Ambient (Note 5)	Steady State	$R_{\theta JA}$	153	$^\circ\text{C/W}$
	$t < 10\text{s}$		97	
Total Power Dissipation (Note 6)	$T_A = +25^\circ\text{C}$	$P_D$	1.9	W
	$T_A = +70^\circ\text{C}$		1.2	
Thermal Resistance, Junction to Ambient (Note 6)	Steady State	$R_{\theta JA}$	66	$^\circ\text{C/W}$
	$t < 10\text{s}$		42	
Thermal Resistance, Junction to Case (Note 6)		$R_{\theta JC}$	14.7	$^\circ\text{C}$
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 8)</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	60	—	—	V	$V_{GS} = 0\text{V}, I_D = 250\mu\text{A}$
Zero Gate Voltage Drain Current	$I_{DSS}$	—	—	1	$\mu\text{A}$	$V_{DS} = 48\text{V}, V_{GS} = 0\text{V}$
Gate-Source Leakage	$I_{GSS}$	—	—	$\pm 100$	nA	$V_{GS} = \pm 20\text{V}, V_{DS} = 0\text{V}$
<b>ON CHARACTERISTICS (Note 8)</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	$R_{DS(ON)}$	—	12.2	16	m $\Omega$	$V_{GS} = 10\text{V}, I_D = 10\text{A}$
		—	17.2	27		$V_{GS} = 4.5\text{V}, I_D = 6\text{A}$
Diode Forward Voltage	$V_{SD}$	—	0.7	1.2	V	$V_{GS} = 0\text{V}, I_S = 1\text{A}$
<b>DYNAMIC CHARACTERISTICS (Note 9)</b>						
Input Capacitance	$C_{iss}$	—	864	—	pF	$V_{DS} = 30\text{V}, V_{GS} = 0\text{V}$ $f = 1.0\text{MHz}$
Output Capacitance	$C_{oss}$	—	282	—		
Reverse Transfer Capacitance	$C_{rss}$	—	27.1	—		
Gate Resistance	$R_g$	—	1.35	—	$\Omega$	$V_{DS} = 0\text{V}, V_{GS} = 0\text{V}, f = 1.0\text{MHz}$
Total Gate Charge ( $V_{GS} = 10\text{V}$ )	$Q_g$	—	17	—	nC	$V_{DS} = 30\text{V}, I_D = 10\text{A}$
Total Gate Charge ( $V_{GS} = 4.5\text{V}$ )	$Q_g$	—	8.4	—		
Gate-Source Charge	$Q_{gs}$	—	3.1	—		
Gate-Drain Charge	$Q_{gd}$	—	4.3	—		
Turn-On Delay Time	$t_{D(ON)}$	—	3.4	—	nS	$V_{GS} = 10\text{V}, V_{DD} = 30\text{V}, R_g = 6\Omega,$ $I_D = 10\text{A}$
Turn-On Rise Time	$t_R$	—	5.2	—		
Turn-Off Delay Time	$t_{D(OFF)}$	—	12.9	—		
Turn-Off Fall Time	$t_F$	—	6.8	—		
Body Diode Reverse Recovery Time	$t_{RR}$	—	22	—	nS	$I_S = 10\text{A}, dI/dt = 100\text{A}/\mu\text{s}$
Body Diode Reverse Recovery Charge	$Q_{RR}$	—	11.1	—	nC	$I_S = 10\text{A}, dI/dt = 100\text{A}/\mu\text{s}$

- 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.
  - $I_{AS}$  and  $E_{AS}$  rating are based on low frequency and duty cycles to keep  $T_J = +25^\circ\text{C}$ .
  - Short duration pulse test used to minimize self-heating effect.
  - Guaranteed by design. Not subject to product testing.

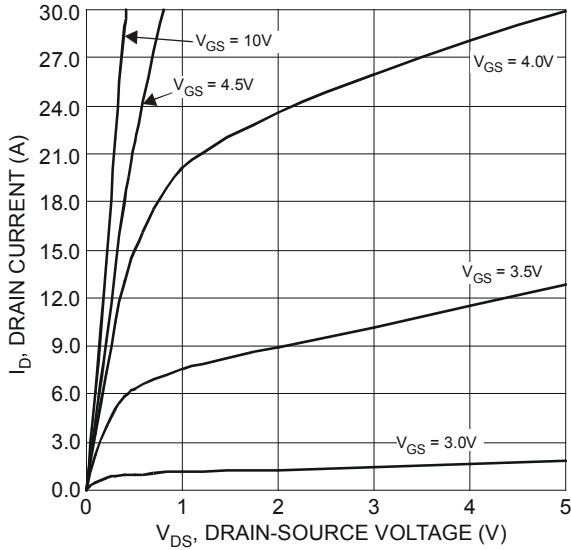


Figure 1 Typical Output Characteristics

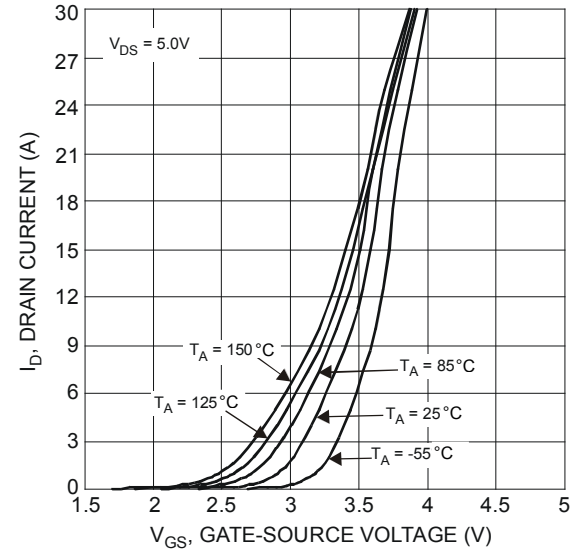


Figure 2 Typical Transfer Characteristics

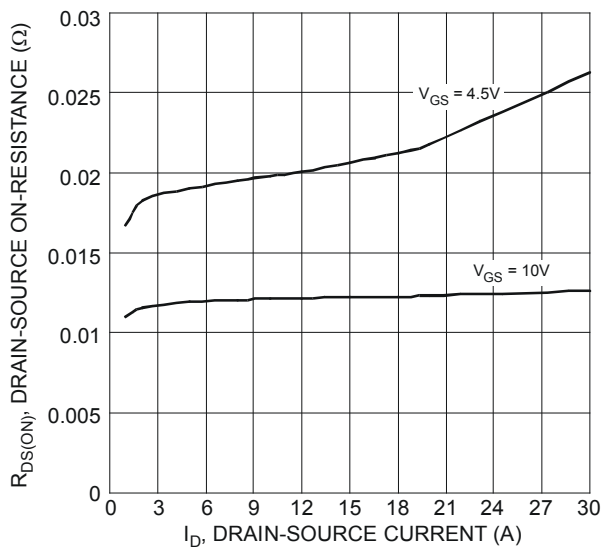


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

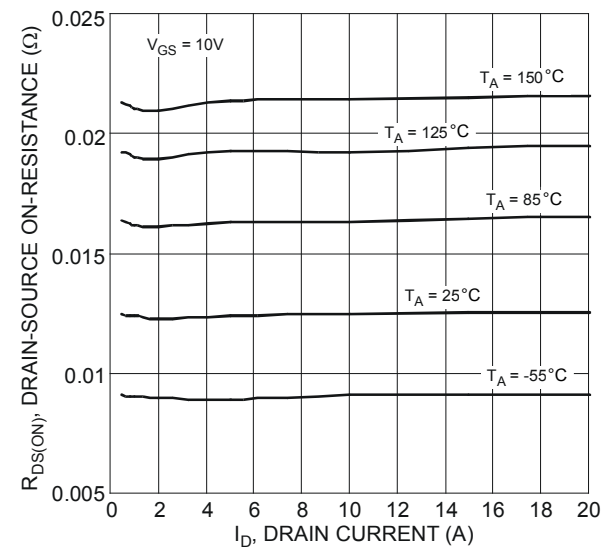


Figure 4 Typical On-Resistance vs. Drain Current and Temperature

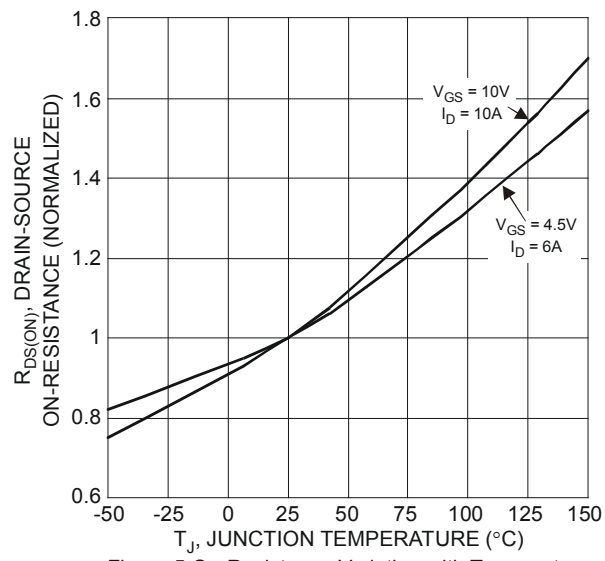


Figure 5 On-Resistance Variation with Temperature

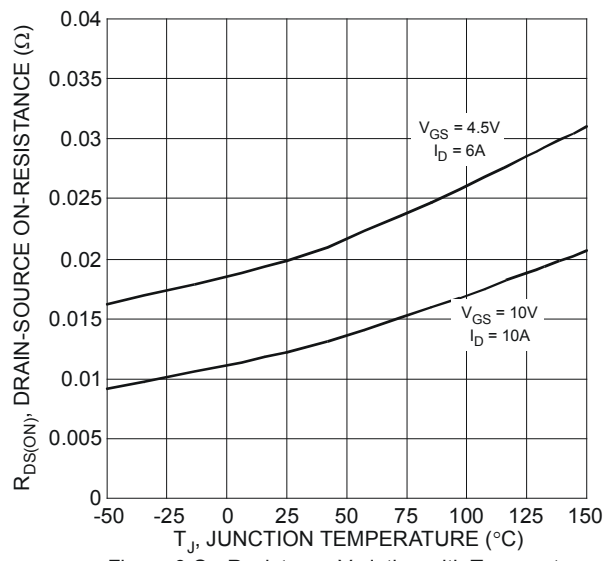


Figure 6 On-Resistance Variation with Temperature

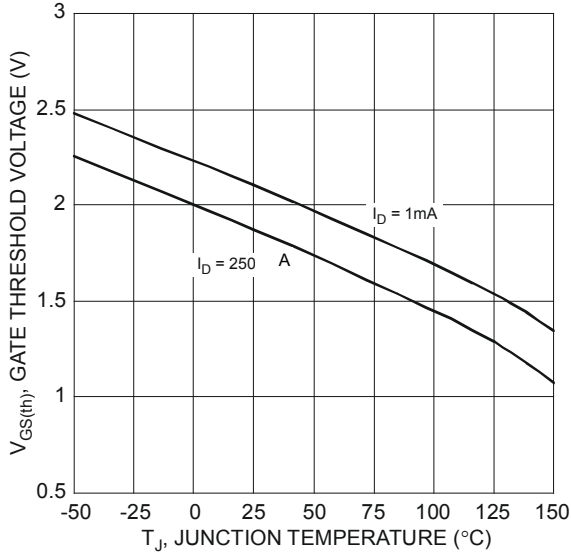


Figure 7 Gate Threshold Variation vs. Ambient Temperature

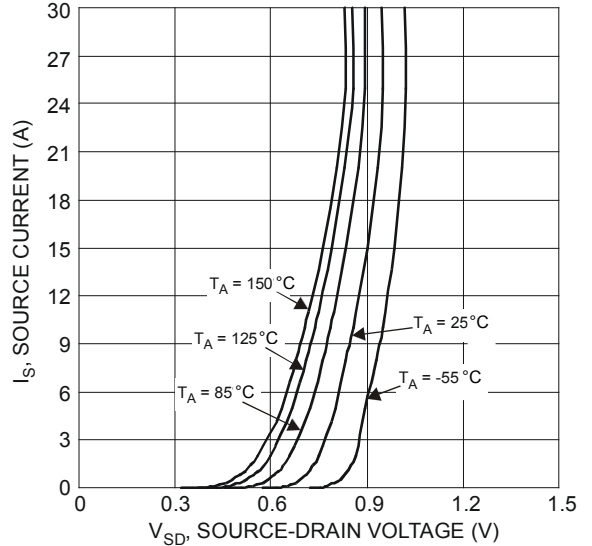


Figure 8 Diode Forward Voltage vs. Current

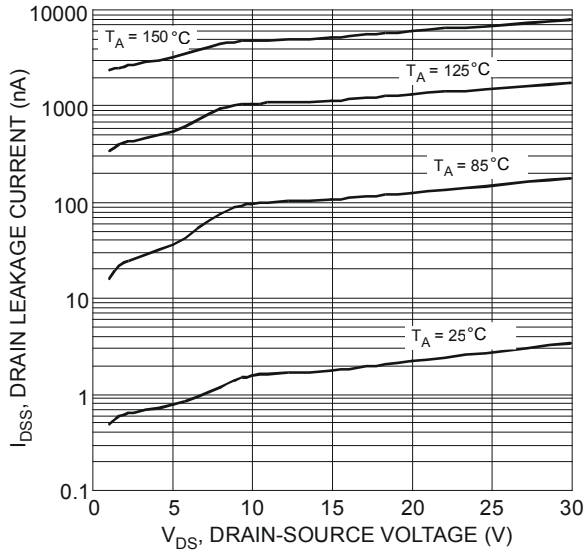


Figure 9 Typical Drain-Source Leakage Current vs. Voltage

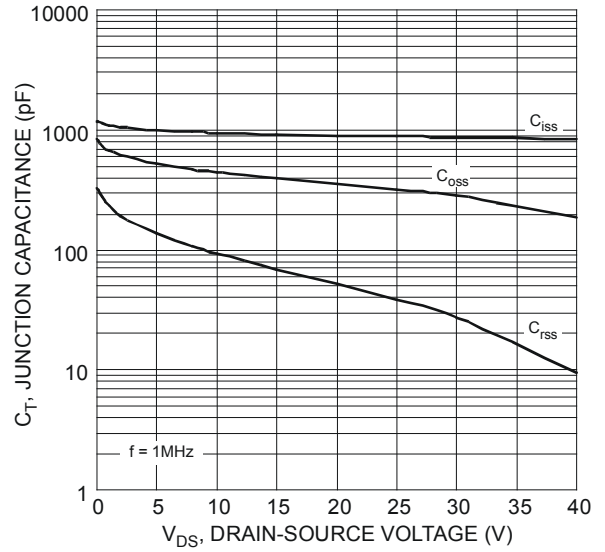


Figure 10 Typical Junction Capacitance

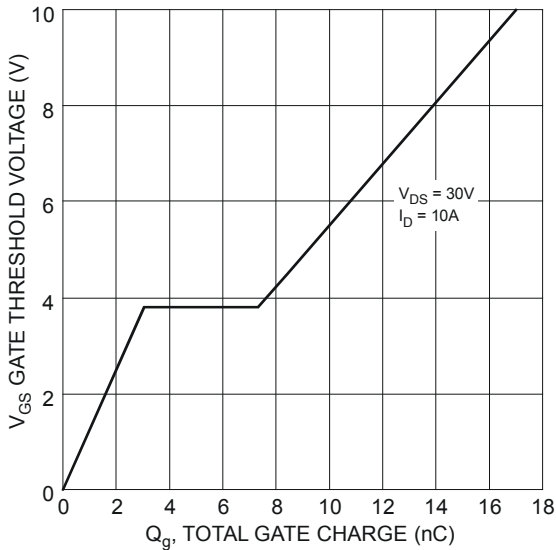


Figure 11 Gate Charge

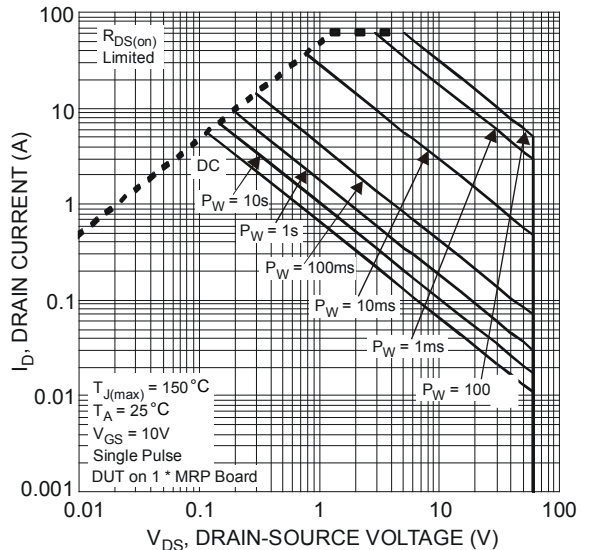


Figure 12 SOA, Safe Operation Area

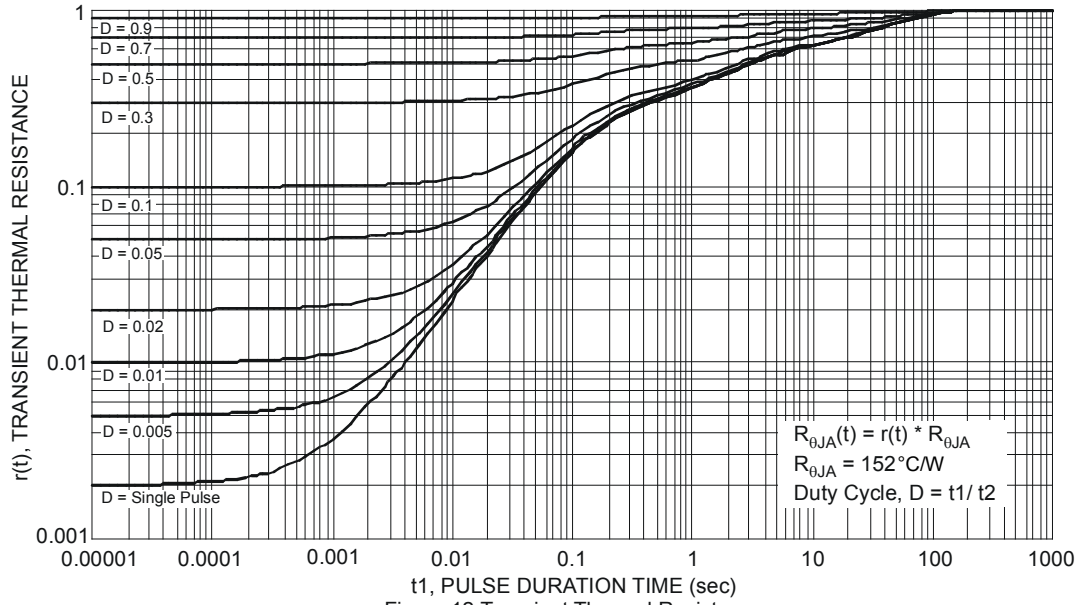
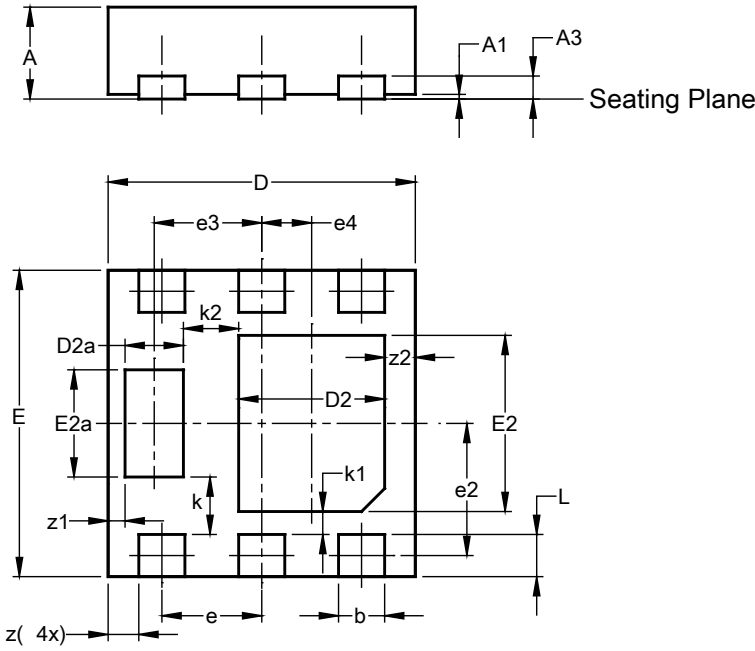


Figure 12 Transient Thermal Resistance

**Package Outline Dimensions**

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

U-DFN2020-6 (Type F)

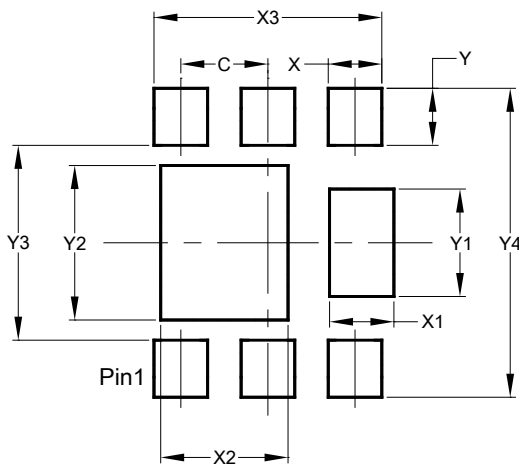


U-DFN2020-6 (Type F)			
Dim	Min	Max	Typ
A	0.57	0.63	0.60
A1	0.00	0.05	0.03
A3	-	-	0.15
b	0.25	0.35	0.30
D	1.95	2.05	2.00
D2	0.85	1.05	0.95
D2a	0.33	0.43	0.38
E	1.95	2.05	2.00
E2	1.05	1.25	1.15
E2a	0.65	0.75	0.70
e	0.65 BSC		
e2	0.863 BSC		
e3	0.70 BSC		
e4	0.325 BSC		
k	0.37 BSC		
k1	0.15 BSC		
k2	0.36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

**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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