

Product Summary

BV _{DSS}	R _{DSON} max	I _D max T _C = +25°C
-20V	32mΩ @ V _{GS} = -4.5V	-13A
	53mΩ @ V _{GS} = -2.5V	-10A

Description and Applications

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

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

Features and Benefits

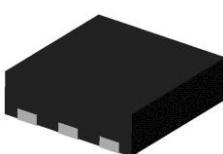
- 0.6mm Profile – Ideal for Low Profile Applications
- PCB Footprint of 4mm²
- Low Gate Threshold Voltage
- Low On-Resistance
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- Halogen and Antimony Free. "Green" Device (Note 3)
- For automotive applications requiring specific change control (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/>

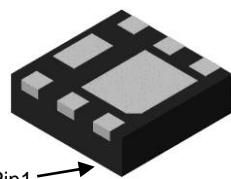
Mechanical Data

- Case: U-DFN2020-6
- 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 208^④
- Weight: 0.0065 grams (Approximate)

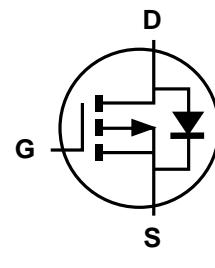
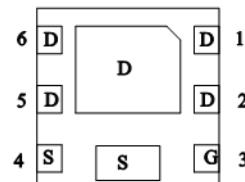
U-DFN2020-6 (Type F)



Top View



Bottom View



Ordering Information (Note 4)

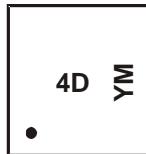
Part Number	Case	Packaging
DMP2040UFDF-7	U-DFN2020-6 (Type F)	3,000/Tape & Reel
DMP2040UFDF-13	U-DFN2020-6 (Type F)	10,000/Tape & Reel

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. For packaging details, go to our website at <https://www.diodes.com/design/support/packaging/diodes-packaging/>.

Marking Information

Site 1

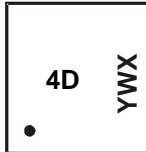


4D = Product Type Marking Code
 YM = Date Code Marking
 Y = Year (ex: H = 2020)
 M = Month (ex: 9 = September)

Date Code Key

Year	2016	...	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Code	D	...	H	I	J	K	L	M	N	O	P	R
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



4D = Product Type Marking Code
 YWX = Date Code Marking
 Y = Year (ex: 0 = 2020)
 W = Week (ex: a = Week 27; z Represents Week 52 and 53)
 X = Internal Code (ex: U = Monday)

Date Code Key

Year	2016	...	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Code	6	...	0	1	2	3	4	5	6	7	8	9
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}	-20	V
Gate-Source Voltage			V_{GSS}	± 12	V
Continuous Drain Current (Note 6) $V_{GS} = -4.5\text{V}$	Steady State	$T_A = +25^\circ\text{C}$ $T_A = +70^\circ\text{C}$	I_D	-6.1 -4.9	A
Continuous Drain Current (Note 7) $V_{GS} = -4.5\text{V}$	Steady State	$T_C = +25^\circ\text{C}$ $T_C = +70^\circ\text{C}$	I_D	-13 -10	A
Pulsed Drain Current (10 μs Pulse, Duty Cycle = 1%)			I_{DM}	-35	A
Continuous Source-Drain Diode Current (Note 6)			I_S	-2.0	A
Avalanche Current (Note 8) $L = 0.1\text{mH}$			I_{AS}	-17	A
Avalanche Energy (Note 8) $L = 0.1\text{mH}$			E_{AS}	14	mJ

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

Characteristic		Symbol	Value	Unit
Total Power Dissipation (Note 5)	$T_A = +25^\circ\text{C}$	P_D	0.8	W
Thermal Resistance, Junction to Ambient (Note 5)	Steady State	$R_{\theta JA}$	149	$^\circ\text{C/W}$
	$t < 10\text{s}$		95	
Total Power Dissipation (Note 6)		P_D	1.8	W
Thermal Resistance, Junction to Ambient (Note 6)	Steady State	$R_{\theta JA}$	70	$^\circ\text{C/W}$
	$t < 10\text{s}$		45	
Thermal Resistance, Junction to Case (Note 7)	Steady State	$R_{\theta JC}$	16	$^\circ\text{C/W}$
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
OFF CHARACTERISTICS (Note 9)						
Drain-Source Breakdown Voltage	BV_{DSS}	-20	—	—	V	$V_{GS} = 0\text{V}, I_D = -250\mu\text{A}$
Zero Gate Voltage Drain Current	I_{DSS}	—	—	-1	μA	$V_{DS} = -16\text{V}, V_{GS} = 0\text{V}$
Gate-Source Leakage	I_{GSS}	—	—	± 100	nA	$V_{GS} = \pm 12\text{V}, V_{DS} = 0\text{V}$
ON CHARACTERISTICS (Note 9)						
Gate Threshold Voltage	$V_{GS(\text{TH})}$	-0.6	—	-1.5	V	$V_{DS} = V_{GS}, I_D = -250\mu\text{A}$
Static Drain-Source On-Resistance	$R_{DS(\text{ON})}$	—	22	32	$\text{m}\Omega$	$V_{GS} = -4.5\text{V}, I_D = -8.9\text{A}$
		—	31	53		$V_{GS} = -2.5\text{V}, I_D = -6.9\text{A}$
Diode Forward Voltage	V_{SD}	—	-0.7	-1.2	V	$V_{GS} = 0\text{V}, I_S = -2.9\text{A}$
DYNAMIC CHARACTERISTICS (Note 10)						
Input Capacitance	C_{iss}	—	834	—	pF	$V_{DS} = -10\text{V}, V_{GS} = 0\text{V}, f = 1.0\text{MHz}$
Output Capacitance	C_{oss}	—	133	—		
Reverse Transfer Capacitance	C_{rss}	—	105	—		
Gate Resistance	R_G	—	4.9	—	Ω	$V_{DS} = 0\text{V}, V_{GS} = 0\text{V}, f = 1.0\text{MHz}$
Total Gate Charge ($V_{GS} = -4.5\text{V}$)	Q_g	—	8.6	—	nC	$V_{DS} = -6\text{V}, I_D = -8.9\text{A}$
Total Gate Charge ($V_{GS} = -8\text{V}$)	Q_g	—	19	—		
Gate-Source Charge	Q_{gs}	—	1.5	—		
Gate-Drain Charge	Q_{gd}	—	2.5	—		
Turn-On Delay Time	$t_{D(\text{ON})}$	—	5.8	—	ns	$V_{DD} = -6\text{V}, R_L = 6\Omega$ $V_{GS} = -4.5\text{V}, R_G = 6\Omega, I_D = -1\text{A}$
Turn-On Rise Time	t_r	—	7.7	—		
Turn-Off Delay Time	$t_{D(\text{OFF})}$	—	28.1	—		
Turn-Off Fall Time	t_f	—	14.6	—		
Body Diode Reverse Recovery Time	t_{RR}	—	9.8	—	ns	$I_F = -8.9\text{A}, di/dt = -100\text{A}/\mu\text{s}$
Body Diode Reverse Recovery Charge	Q_{RR}	—	2.7	—	nC	$I_F = -8.9\text{A}, di/dt = -100\text{A}/\mu\text{s}$

Notes:

- Device mounted on FR-4 PC board, with minimum recommended pad layout, single sided.
- Device mounted on FR-4 substrate PC board, 2oz copper, with thermal bias to bottom layer 1inch square copper plate.
- Thermal resistance from junction to soldering point (on the exposed drain pad).
- I_{AS} and E_{AS} ratings 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.

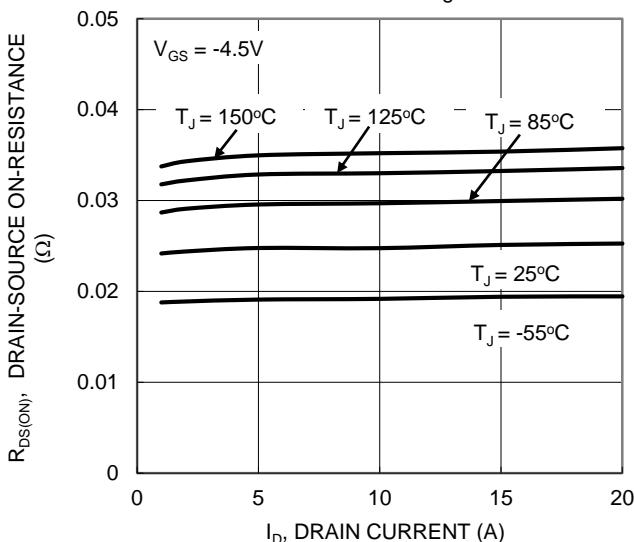
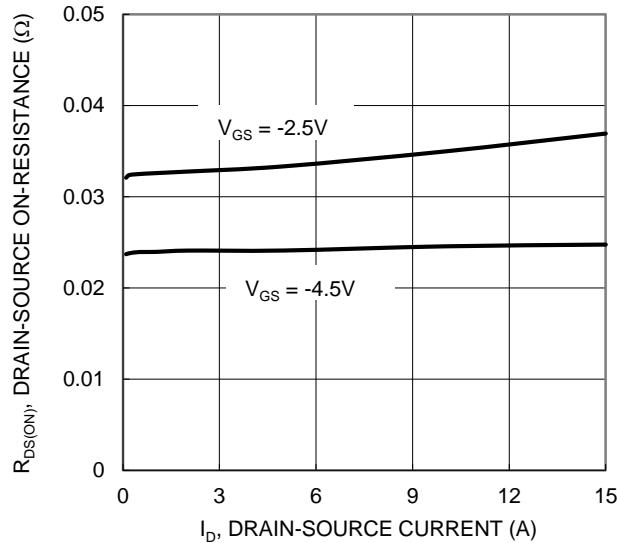
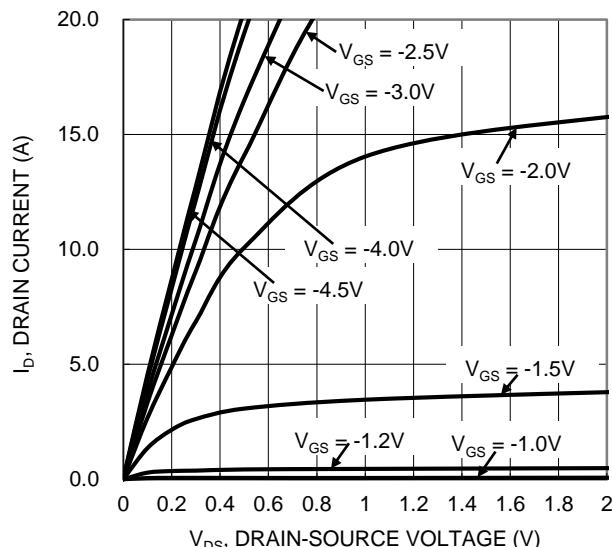


Figure 5. Typical On-Resistance vs. Drain Current and Temperature

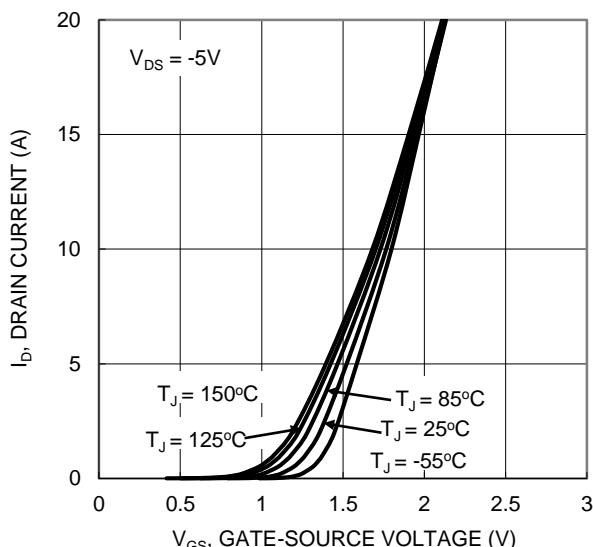
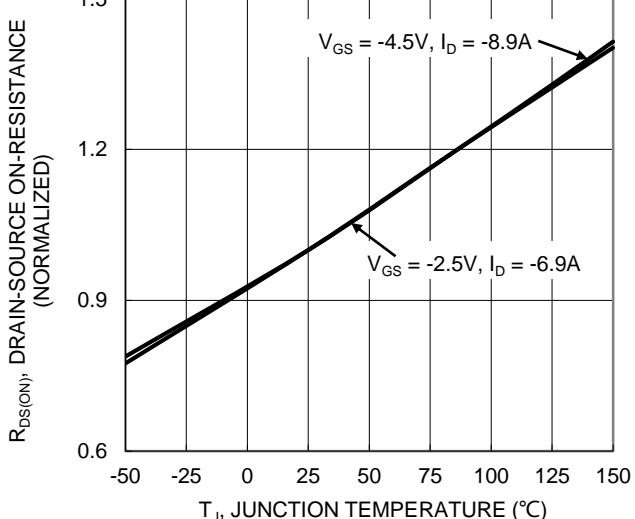
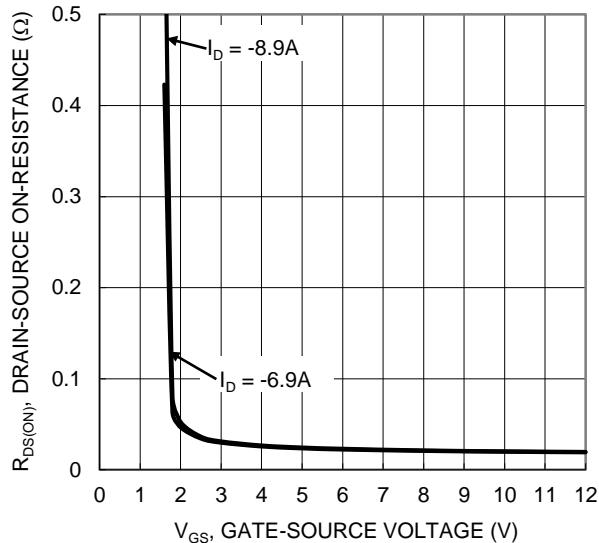
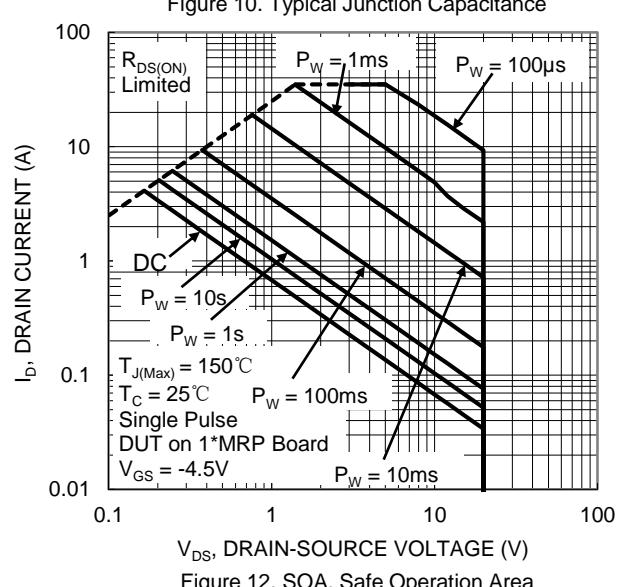
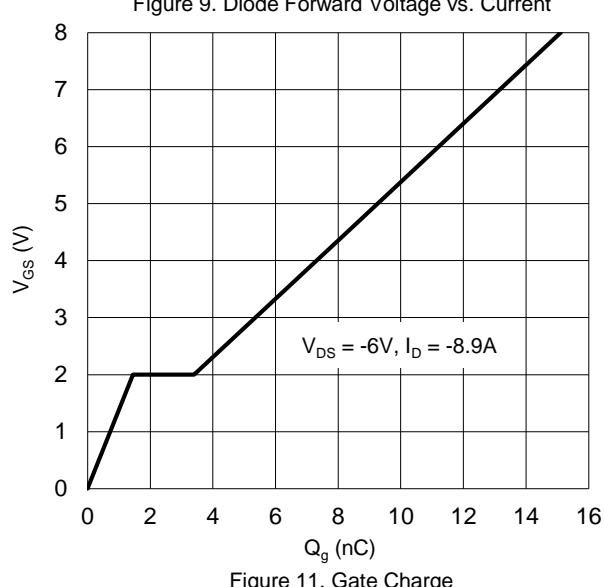
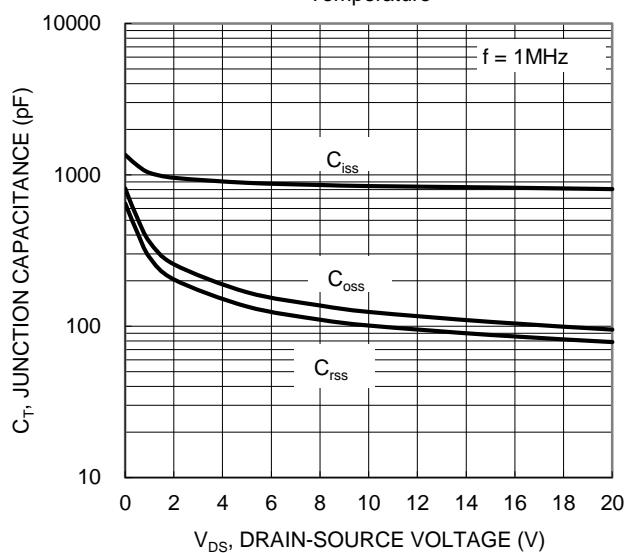
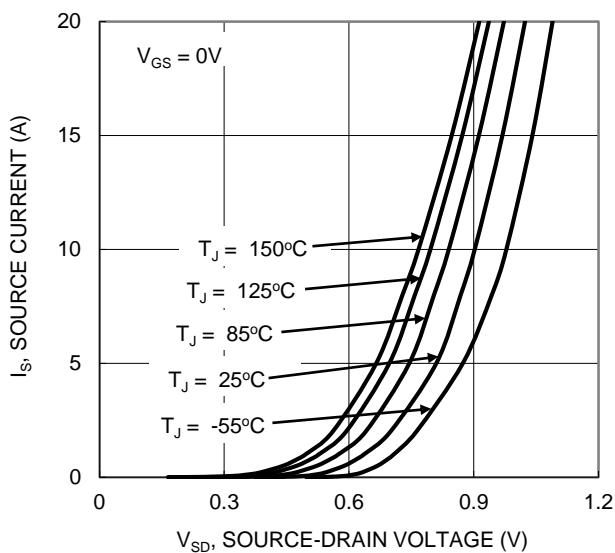
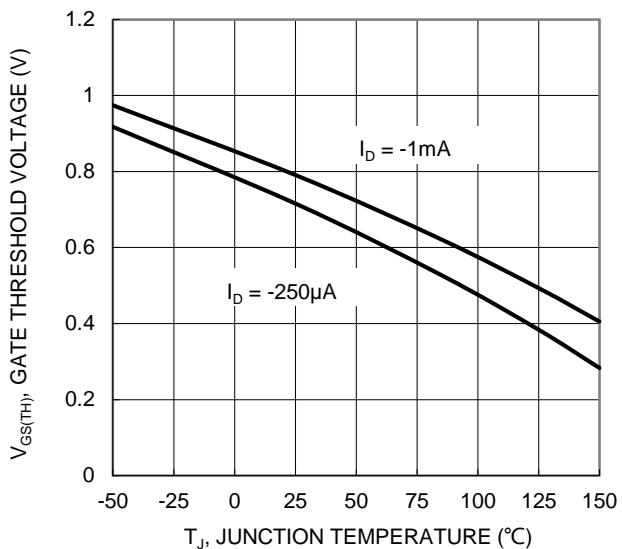
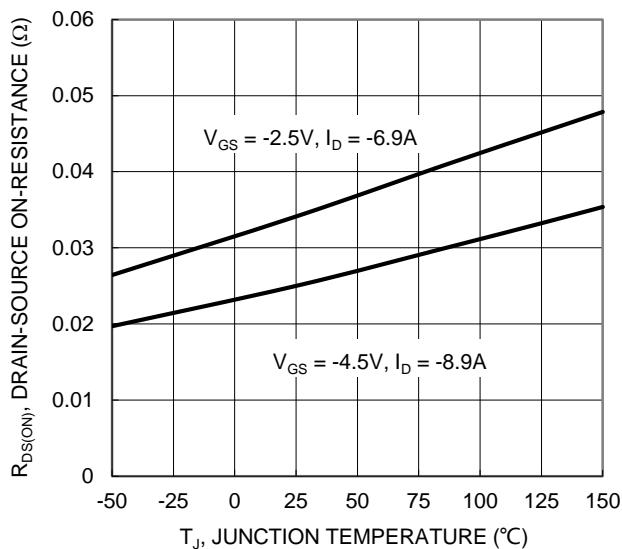


Figure 2. Typical Transfer Characteristic





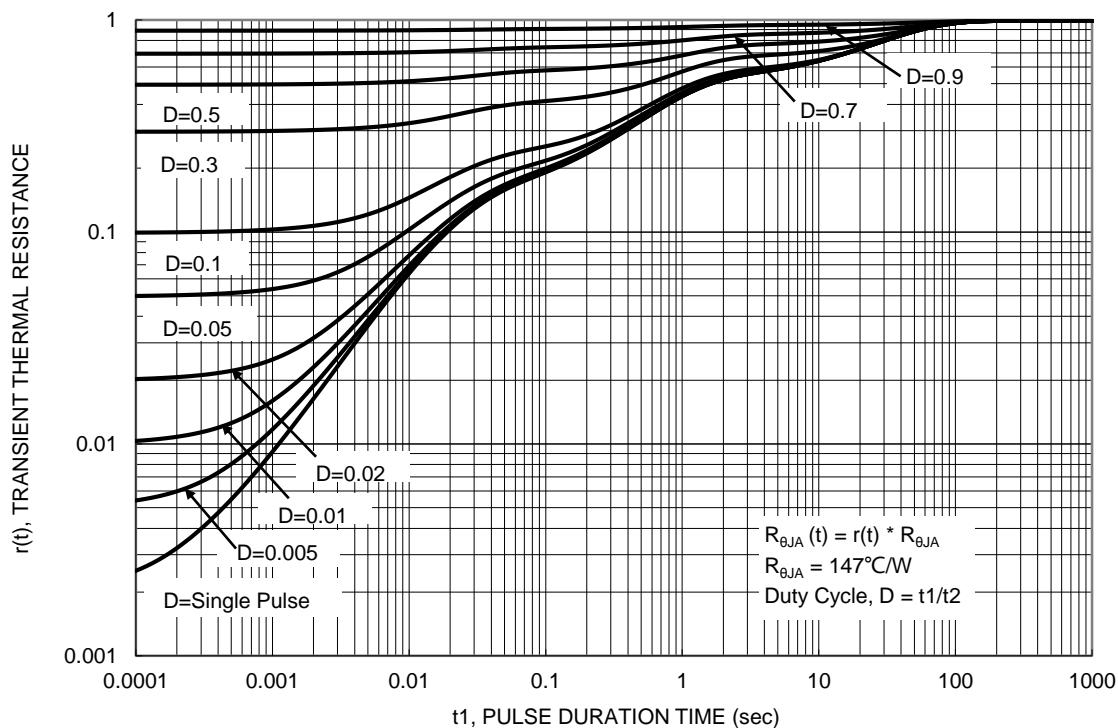
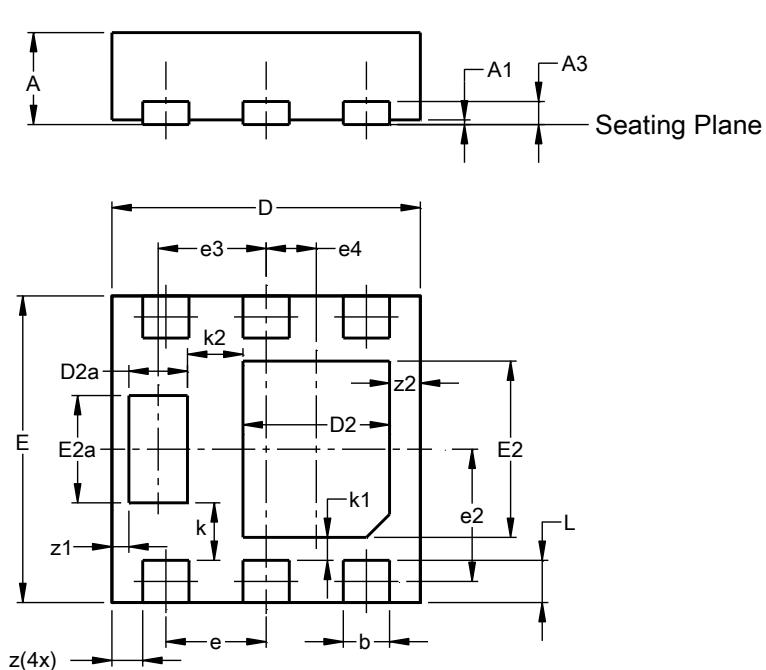


Figure 13. Transient Thermal Resistance

Package Outline Dimension

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

U-DFN2020-6 (Type F)



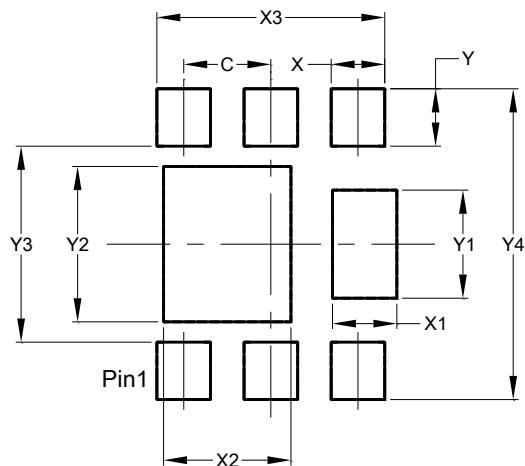
U-DFN2020-6 (Type F)			
Dim	Min	Max	Typ
A	0.57	0.63	0.60
A1	0.00	0.05	0.03
A3	-	-	0.15
b	0.25	0.35	0.30
D	1.95	2.05	2.00
D2	0.85	1.05	0.95
D2a	0.33	0.43	0.38
E	1.95	2.05	2.00
E2	1.05	1.25	1.15
E2a	0.65	0.75	0.70
e	0.65	BSC	
e2	0.863	BSC	
e3	0.70	BSC	
e4	0.325	BSC	
k	0.37	BSC	
k1	0.15	BSC	
k2	0.36	BSC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