Product Summary

BV_{DSS}	$R_{DS(ON)}$ max	Package	I_D T_A = +25°C
-25V	27mΩ @ V_{GS} = -4.5V	U-DFN2020-6 (Type E)	-6.7A
	40mΩ @ V_{GS} = -1.8V		-5.4A

Description

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

Features

- Low $R_{DS(ON)}$ – Ensures on State Losses are Minimized
- 0.6mm Profile – Ideal for Low Profile Applications
- PCB Footprint of 4mm^2
- ESD Protected Gate
- **Lead-Free Finish; 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 refer to the related automotive grade (Q-suffix) part. A listing can be found at https://www.diodes.com/products/automotive/automotive-products/.**
- **This part is qualified to JEDEC standards (as references in AEC-Q) for High Reliability. https://www.diodes.com/quality/product-definitions/**

Applications

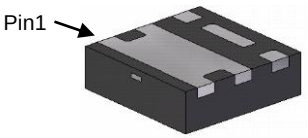
- Load Switching
- Battery Management Application
- Power Management Functions

Mechanical Data

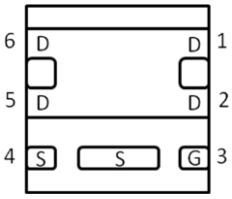
- Case: U-DFN2020-6
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections: See Diagram
- Terminals: Finish – NiPdAu over Copper Leadframe. Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.001 grams (Approximate)

ESD PROTECTED

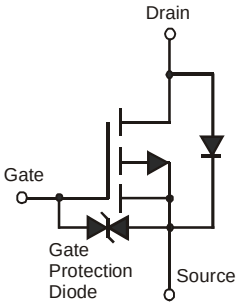
U-DFN2020-6
(Type E)



Bottom View



Bottom View
Pin-Out



Equivalent Circuit

Ordering Information (Note 4)

Part Number	Case	Packaging
DMP2039UFDE-7	U-DFN2020-6 (Type E)	3,000/Tape & 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

Site 1

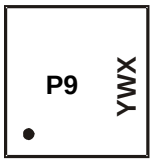
P9 = Product Type Marking Code
YM = Date Code Marking
Y = Year (ex: H = 2020)
M = Month (ex: 9 = September)

Date Code Key

Year	2011	…	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Code	Y	…	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



P9 = 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	2011	…	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Code	1	…	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

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

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			V_{DSS}	-25	V
Gate-Source Voltage			V_{GSS}	±8	V
Continuous Drain Current (Note 5) V_{GS} = -4.5V	Steady State	T_A = +25°C T_A = +70°C	I_D	-6.7 -5.3	A
	t<5s	T_A = +25°C T_A = +70°C	I_D	-8.3 -6.6	A
Continuous Drain Current (Note 5) V_{GS} = -1.8V	Steady State	T_A = +25°C T_A = +70°C	I_D	-5.4 -4.3	A
	t<5s	T_A = +25°C T_A = +70°C	I_D	-6.6 -5.2	A
Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)			I_{DM}	-60	A
Continuous Source-Drain Diode Current			I_S	-2.0	A

Thermal Characteristics

Characteristic		Symbol	Value	Unit
Total Power Dissipation (Note 5)	T_A = +25°C	P_D	0.8	W
	T_A = +70°C		1.2	
Thermal Resistance, Junction to Ambient (Note 5)	Steady State	$R_{\theta JA}$	160	°C/W
	t<5s		104	
Total Power Dissipation (Note 6)	T_A = +25°C	P_D	2.0	W
	T_A = +70°C		2.9	
Thermal Resistance, Junction to Ambient (Note 6)	Steady State	$R_{\theta JA}$	63	°C/W
	t<5s		42	
Thermal Resistance, Junction to Case (Note 6)	Steady State	$R_{\theta JC}$	10.8	°C/W
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 7)						
Drain-Source Breakdown Voltage	BV_{DSS}	-25	—	—	V	V_{GS} = 0V, I_D = -250µA
Zero Gate Voltage Drain Current	I_{DSS}	—	—	-1	µA	V_{DS} = -25V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	—	—	±10	µA	V_{GS} = ±8.0V, V_{DS} = 0V
ON CHARACTERISTICS (Note 7)						
Gate Threshold Voltage	$V_{GS(TH)}$	-0.4	—	-1.0	V	V_{DS} = V_{GS}, I_D = -250µA
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	20	27	mΩ	V_{GS} = -4.5V, I_D = -6.4A
		—	24	34		V_{GS} = -2.5V, I_D = -4.8A
		—	28	40		V_{GS} = -1.8V, I_D = -2.5A
		—	33	70		V_{GS} = -1.5V, I_D = -1.5A
Forward Transfer Admittance	$\|Y_{fs}\|$	—	16	—	S	V_{DS} = -5V, I_D = -4A
Diode Forward Voltage	V_{SD}	—	-0.7	-1.0	V	V_{GS} = 0V, I_S = -1A
DYNAMIC CHARACTERISTICS (Note 8)						
Input Capacitance	C_{iss}	—	2530	—	pF	V_{DS} = -15V, V_{GS} = 0V f = 1.0MHz
Output Capacitance	C_{oss}	—	203	—	pF	
Reverse Transfer Capacitance	C_{rss}	—	177	—	pF	
Gate Resistance	R_g	—	9.1	—	Ω	V_{DS} = 0V, V_{GS} = 0V, f = 1.0MHz
Total Gate Charge (V_{GS} = -4.5V)	Q_g	—	28.2	—	nC	V_{DS} = -15V, I_D = -4.0A
Total Gate Charge (V_{GS} = -8V	Q_g	—	48.7	—	nC	
Gate-Source Charge	Q_{gs}	—	3.2	—	nC	
Gate-Drain Charge	Q_{gd}	—	5.0	—	nC	
Turn-On Delay Time	$t_{D(ON)}$	—	15.1	—	ns	V_{DD} = -15V, V_{GS} = -4.5V, R_G = 1Ω, I_D = -4.0A
Turn-On Rise Time	t_R	—	23.5	—	ns	
Turn-Off Delay Time	$t_{D(OFF)}$	—	137.6	—	ns	
Turn-Off Fall Time	t_F	—	80.5	—	ns	

Notes:
5. Device mounted on FR-4 PC board, with minimum recommended pad layout, single sided.
6. Device mounted on FR-4 substrate PC board, 2oz copper, with thermal bias to bottom layer 1inch square copper plate.
7. Short duration pulse test used to minimize self-heating effect.
8. Guaranteed by design. Not subject to production testing.

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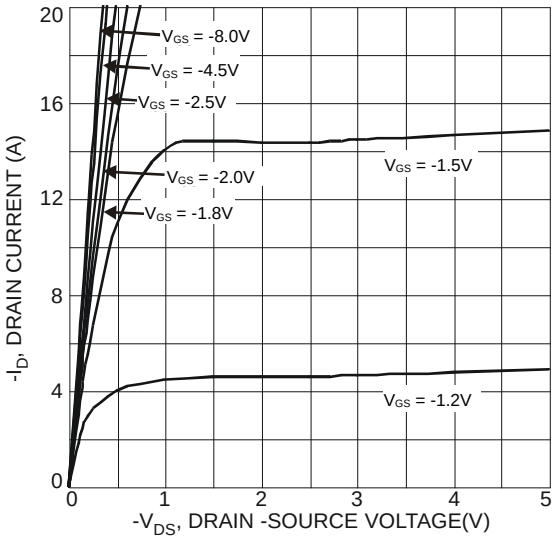

Fig. 1 Typical Output Characteristics

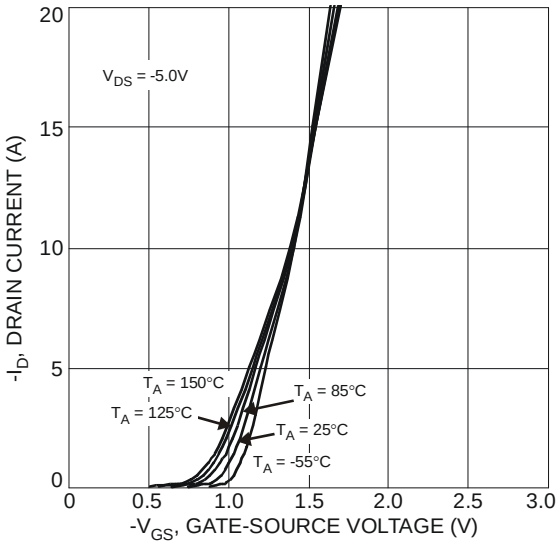

Fig. 2 Typical Transfer Characteristics

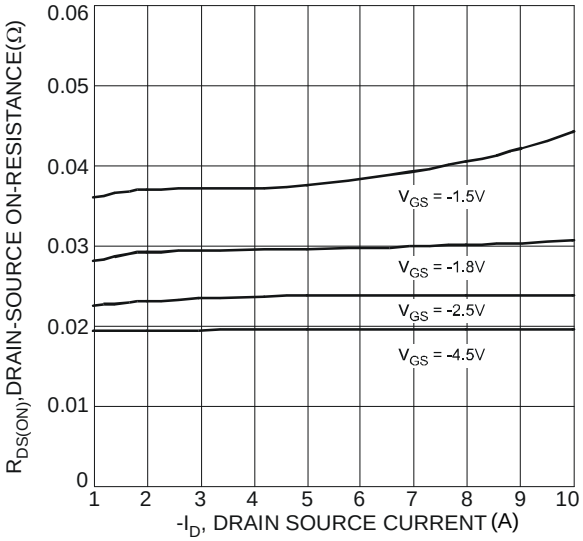

Fig. 3 Typical On-Resistance vs. Drain Current and Gate Voltage

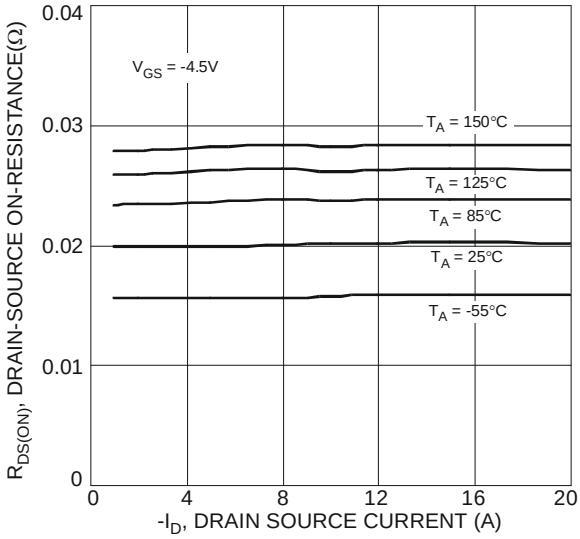

Fig. 4 Typical On-Resistance vs. Drain Current and Temperature

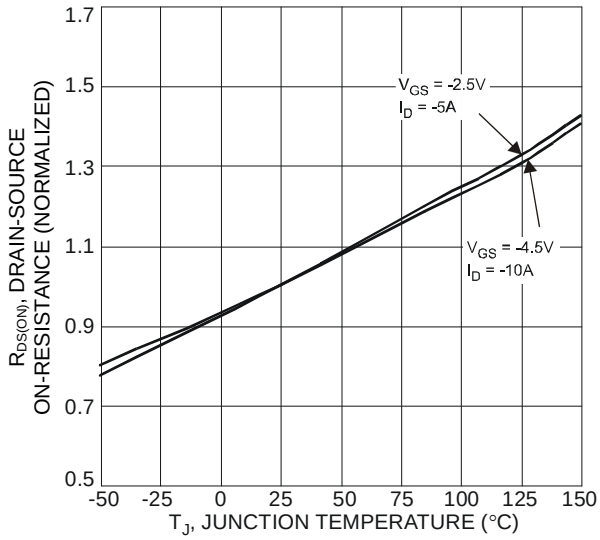

Fig. 5 On-Resistance Variation with Temperature

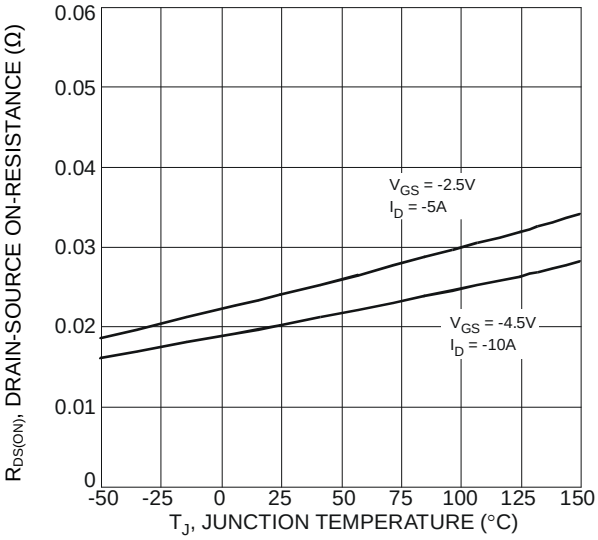

Fig. 6 On-Resistance Variation with Temperature

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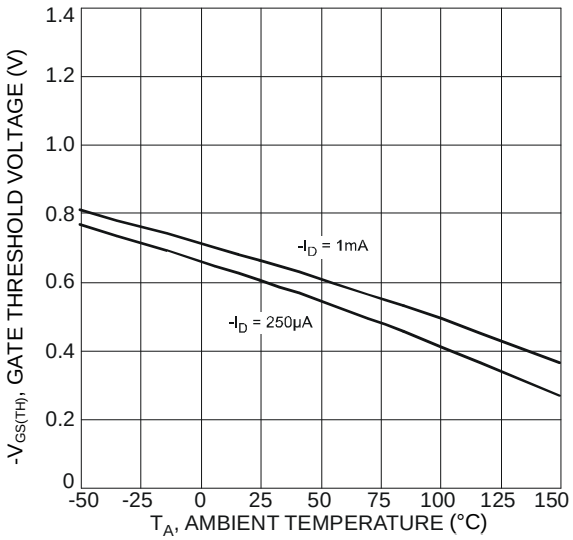

Fig. 7 Gate Threshold Variation vs. Ambient Temperature

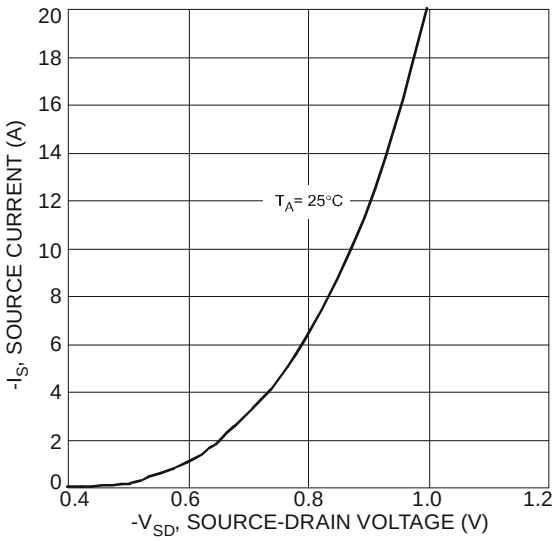

Fig. 8 Diode Forward Voltage vs. Current

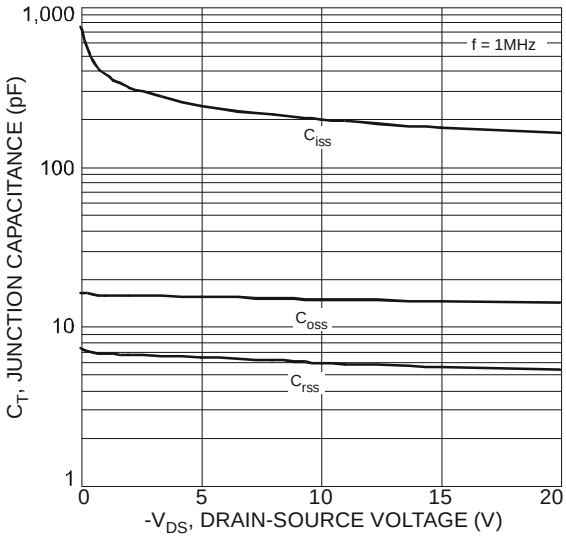

Fig. 9 Typical Junction Capacitance

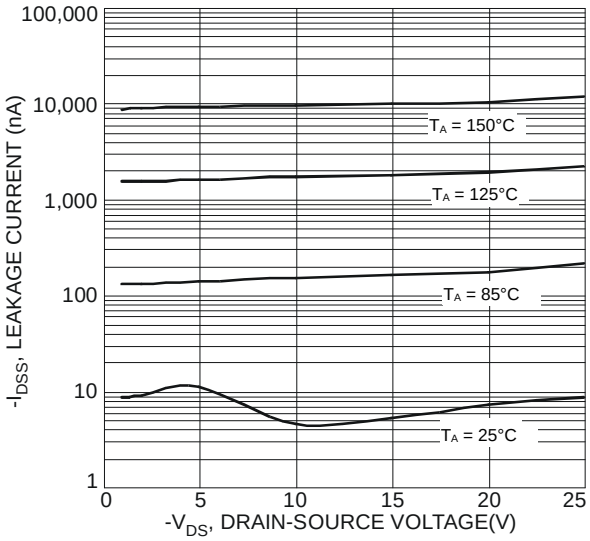

Fig. 10 Typical Drain-Source Leakage Current vs. Voltage

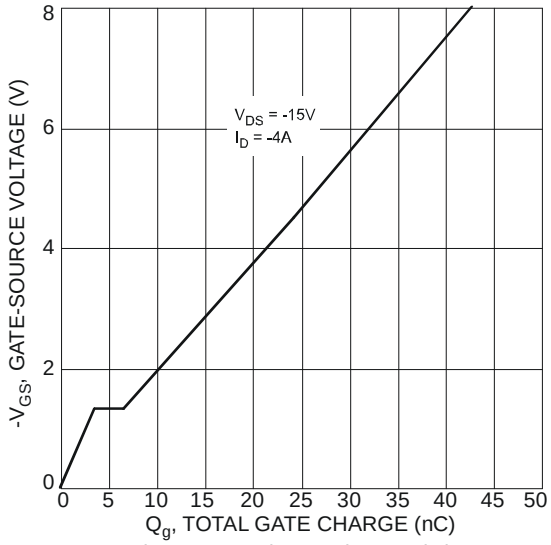

Fig. 11 Gate-Charge Characteristics

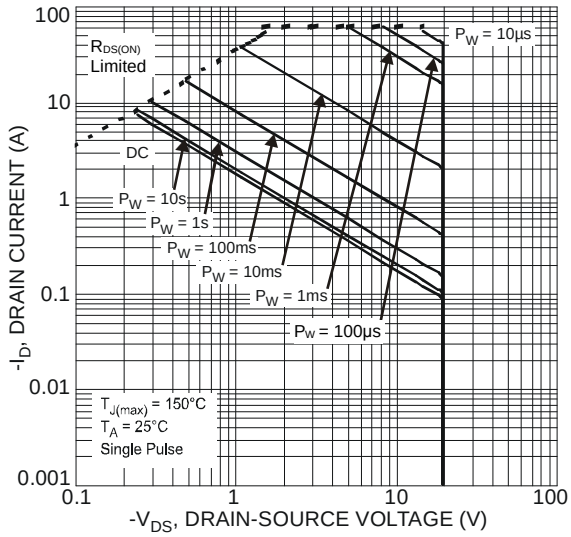

Fig. 12 SOA, Safe Operation Area

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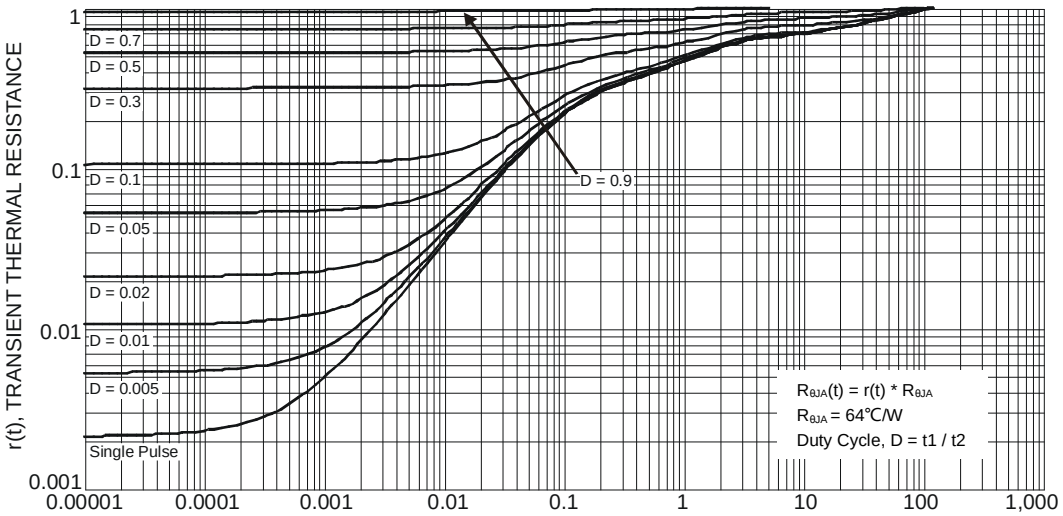

Fig. 13 Transient Thermal Resistance

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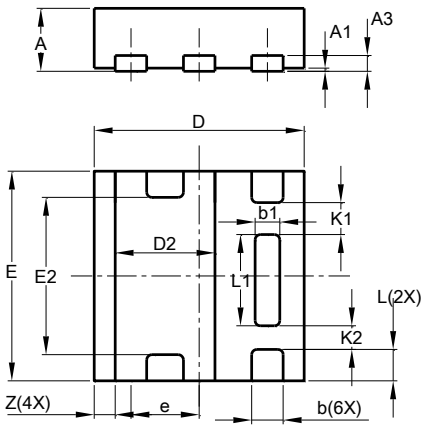
Package Outline Dimensions

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

U-DFN2020-6 (Type E)

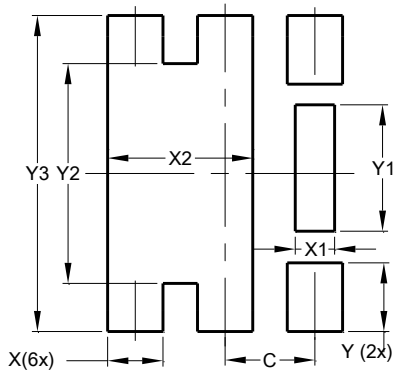


U-DFN2020-6 Type E			
Dim	**Min**	**Max**	**Typ**
A	0.57	0.63	0.60
A1	0	0.05	0.03
A3	–	–	0.15
b	0.25	0.35	0.30
b1	0.185	0.285	0.235
D	1.95	2.05	2.00
D2	0.85	1.05	0.95
E	1.95	2.05	2.00
E2	1.40	1.60	1.50
e	–	–	0.65
L	0.25	0.35	0.30
L1	0.82	0.92	0.87
K1	–	–	0.305
K2	–	–	0.225
Z	–	–	0.20
All Dimensions in mm			

Suggested Pad Layout

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

U-DFN2020-6 (Type E)



Dimensions	Value (in mm)
C	0.650
X	0.400
X1	0.285
X2	1.050
Y	0.500
Y1	0.920
Y2	1.600
Y3	2.300

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2. support or sustain life and whose failure to perform when properly used in accordance with instructions for use provided in the labeling can be reasonably expected to result in significant injury to the user.

B. A critical component is any component in a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or to affect its safety or effectiveness.

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