

Product Summary

BV _{DSS}	R _{DS(ON)} Max	I _D Max T _A = +25°C
-20V	16mΩ @ V _{GS} = -4.5V	-9.0A
	22mΩ @ V _{GS} = -2.5V	-7.7A

Description and Applications

This MOSFET is 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.

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

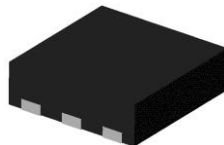
Features and Benefits

- 0.6mm Profile – Ideal for Low Profile Applications
- Low Gate Threshold Voltage
- Low On-Resistance
- ESD Protected Gate
- **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](mailto:contact_us@diodes.com) or your local Diodes representative.
<https://www.diodes.com/quality/product-definitions/>

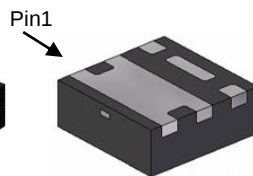
Mechanical Data

- 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: 0.007 grams (Approximate)

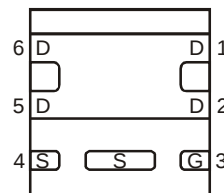
U-DFN2020-6 (Type E)



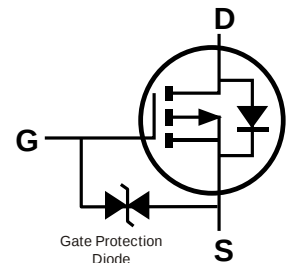
Top View



Bottom View



Pin Out
Bottom View



Equivalent Circuit

Ordering Information (Note 4)

Part Number	Case	Packaging
DMP2021UFDE-7	U-DFN2020-6 (Type E)	3,000/Tape & Reel
DMP2021UFDE-13	U-DFN2020-6 (Type E)	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



FP = 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



FP = 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°C, unless otherwise specified.)

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			V _{DSS}	-20	V
Gate-Source Voltage			V _{GSS}	±10	V
Continuous Drain Current (Note 6) V _{GS} = -4.5V	Steady State	T _A = +25°C T _A = +70°C	I _D	-9.0 -7.2	A
	t < 10s	T _A = +25°C T _A = +70°C	I _D	-11.1 -8.9	A
Pulsed Drain Current (10μs Pulse, Duty Cycle = 1%)			I _{DM}	-60	A
Continuous Source-Drain Diode Current (Note 6)		T _A = +25°C	I _S	-2.4	A
Avalanche Current (Note 7) L = 0.1mH			I _{AS}	-27	A
Avalanche Energy (Note 7) L = 0.1mH			E _{AS}	38	mJ

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

Characteristic		Symbol	Value	Unit
Total Power Dissipation (Note 5)	T _A = +25°C	P _D	0.76	W
	T _A = +70°C		0.48	
Thermal Resistance, Junction to Ambient (Note 5)	Steady state	R _{θJA}	165	°C/W
	t < 10s		116	
Total Power Dissipation (Note 6)	T _A = +25°C	P _D	1.90	W
	T _A = +70°C		1.20	
Thermal Resistance, Junction to Ambient (Note 6)	Steady state	R _{θJA}	67	°C/W
	t < 10s		47	
Thermal Resistance, Junction to Case (Note 6)	Steady state	R _{θJC}	18	
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 8)						
Drain-Source Breakdown Voltage	BV _{DSS}	-20	—	—	V	V _{GS} = 0V, I _D = -250μA
Zero Gate Voltage Drain Current T _J = +25°C	I _{DSS}	—	—	-1	μA	V _D = -20V, V _{GS} = 0V
Gate-Source Leakage	I _{GSS}	—	—	±10	μA	V _{GS} = ±8V, V _D = 0V
ON CHARACTERISTICS (Note 8)						
Gate Threshold Voltage	V _{GS(TH)}	-0.35	—	-1.0	V	V _D = V _{GS} , I _D = -250μA
Static Drain-Source On-Resistance	R _{DS(ON)}	—	12	16	mΩ	V _{GS} = -4.5V, I _D = -7.0A
			15	22		V _{GS} = -2.5V, I _D = -5.0A
			19	40		V _{GS} = -1.8V, I _D = -3.0A
			21	80		V _{GS} = -1.5V, I _D = -1.0A
Diode Forward Voltage	V _{SD}	—	-0.8	-1.2	V	V _{GS} = 0V, I _S = -1.0A
DYNAMIC CHARACTERISTICS (Note 9)						
Input Capacitance	C _{iss}	—	2,760	—	pF	V _D = -15V, V _{GS} = 0V, f = 1.0MHz
Output Capacitance	C _{oss}	—	262	—		
Reverse Transfer Capacitance	C _{rss}	—	220	—		
Gate Resistance	R _g	—	16	—	Ω	V _D = 0V, V _{GS} = 0V, f = 1MHz
Total Gate Charge (V _{GS} = -4.5V)	Q _g	—	34	—	nC	V _D = -15V, I _D = -4.0A
Total Gate Charge (V _{GS} = -8V)	Q _g	—	59	—		
Gate-Source Charge	Q _{gs}	—	3.5	—		
Gate-Drain Charge	Q _{gd}	—	8.3	—		
Turn-On Delay Time	t _{D(ON)}	—	7.5	—	ns	V _D = -15V, V _{GS} = -4.5V, R _G = 1Ω, I _D = -4.0A
Turn-On Rise Time	t _r	—	25	—		
Turn-Off Delay Time	t _{D(OFF)}	—	125	—		
Turn-Off Fall Time	t _f	—	96	—		
Reverse Recovery Time	t _{RR}	—	48	—	ns	I _F = -1.0A, di/dt = 100A/μs
Reverse Recovery Charge	Q _{RR}	—	33	—	nC	I _F = -1.0A, 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_{AS} and E_{AS} ratings are based on low frequency and duty cycles to keep T_J = +25°C.
 - Short duration pulse test used to minimize self-heating effect.
 - Guaranteed by design. Not subject to product testing.

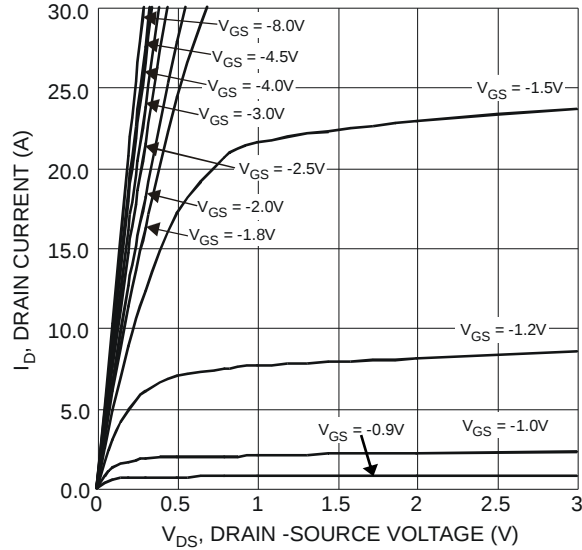


Figure 1 Typical Output Characteristics

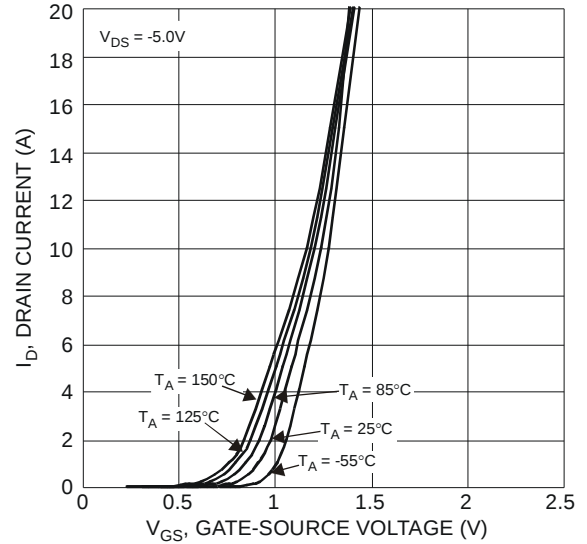


Figure 2 Typical Transfer Characteristics

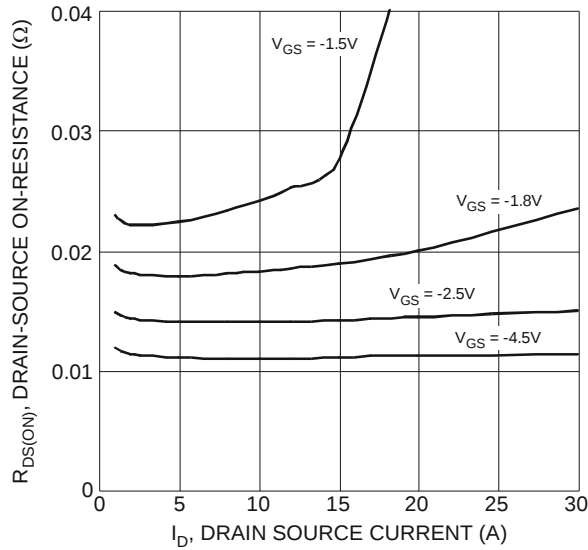


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

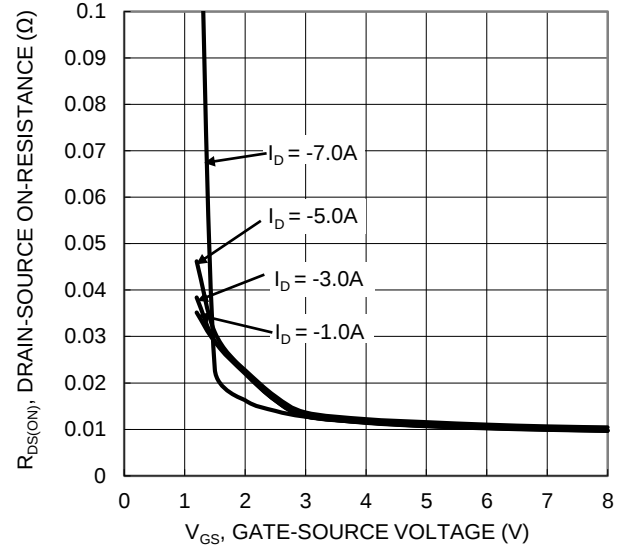


Figure 4 Typical Transfer Characteristic

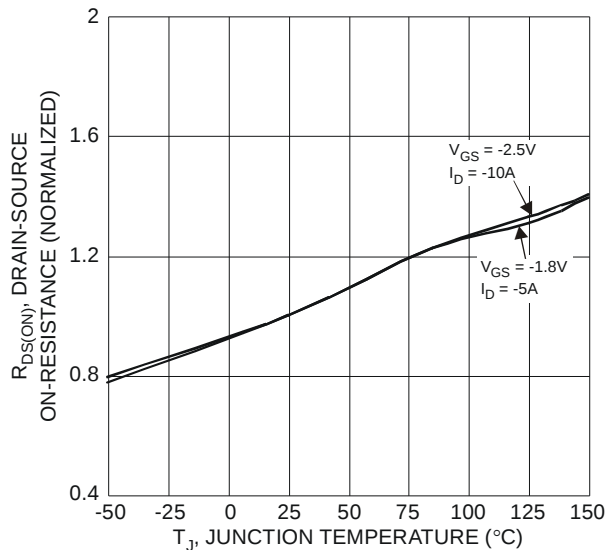


Figure 5 On-Resistance Variation with Temperature

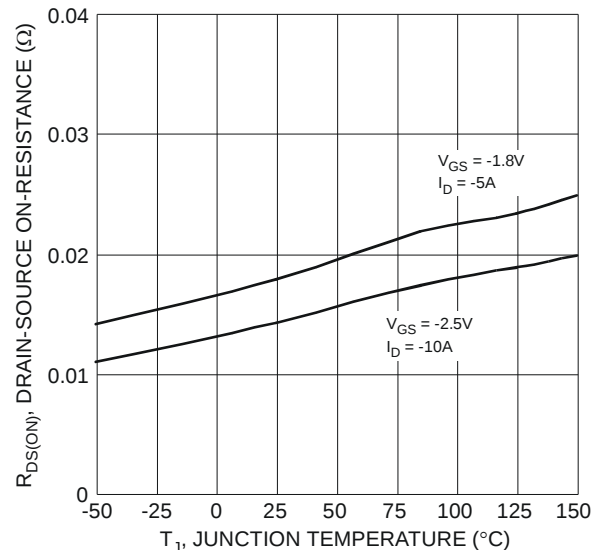


Figure 6 On-Resistance Variation with Temperature

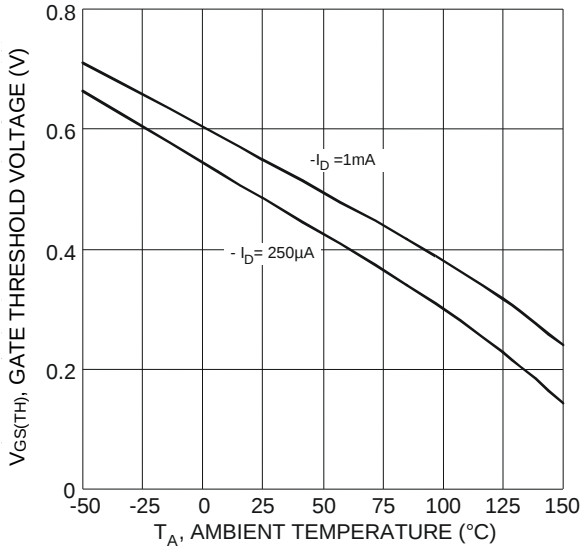


Figure 7 Gate Threshold Variation vs. Ambient Temperature

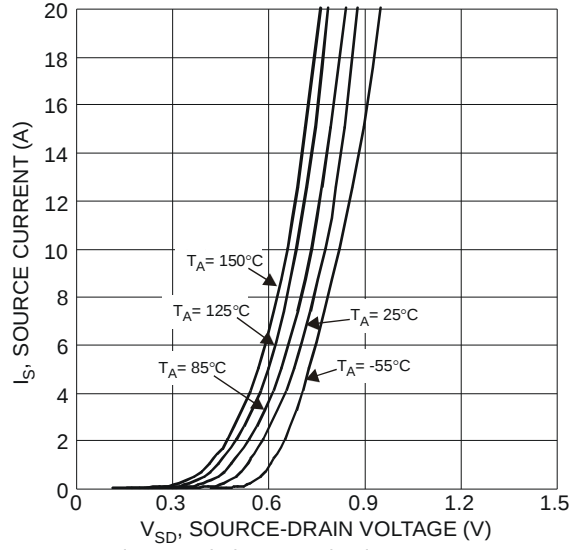


Figure 8 Diode Forward Voltage vs. Current

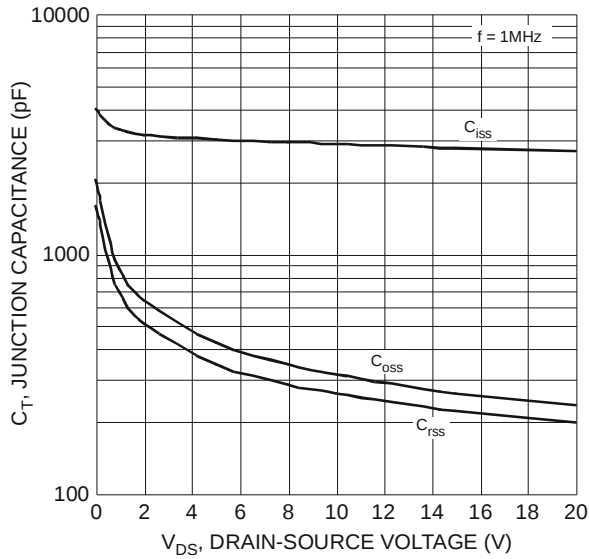


Figure 9 Typical Junction Capacitance

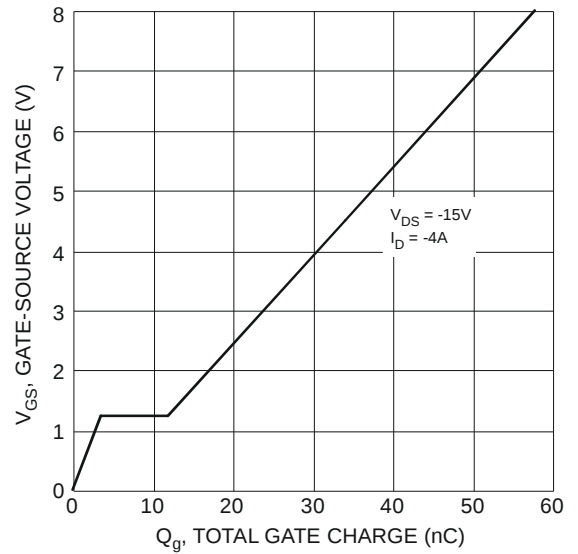


Figure 10 Gate-Charge Characteristics

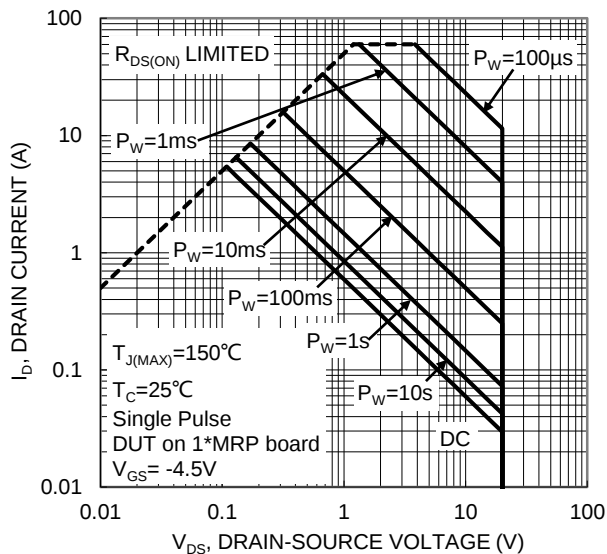
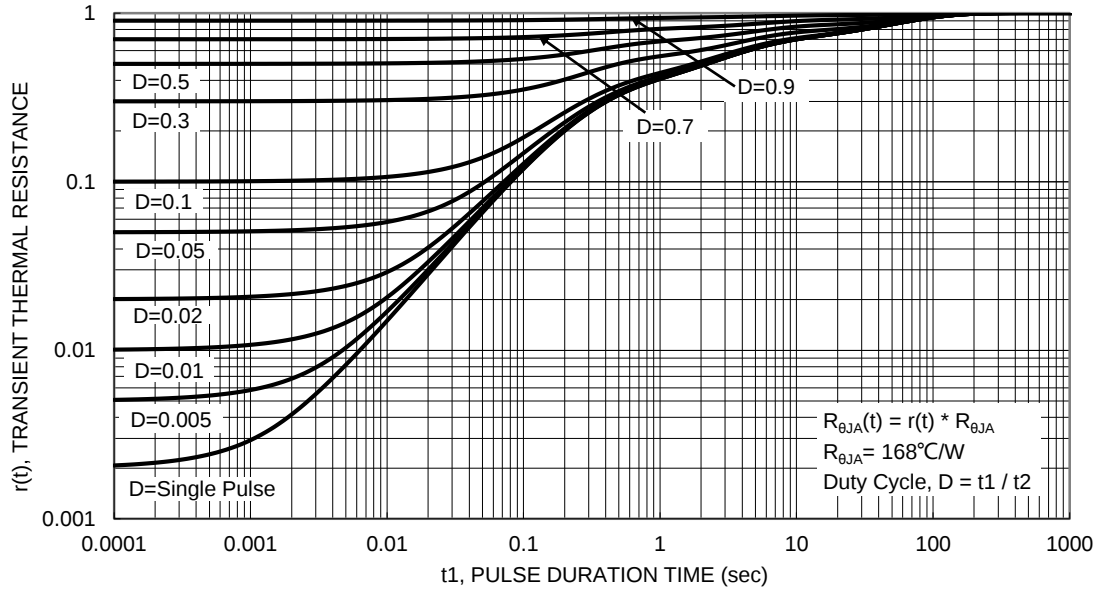


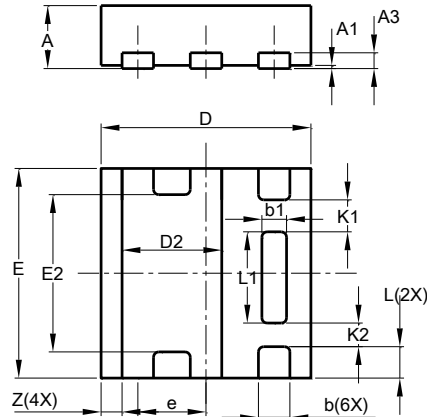
Figure 11 SOA, Safe Operation Area



Package Outline Dimensions

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

U-DFN2020-6 (Type E)

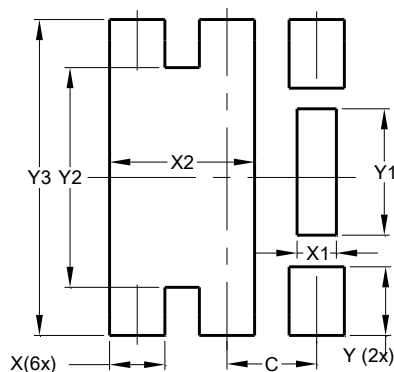


U-DFN2020-6 Type E			
Dim	Min	Max	Typ
A	0.57	0.63	0.60
A1	0	0.05	0.03
A3	—	—	0.15
b	0.25	0.35	0.30
b1	0.185	0.285	0.235
D	1.95	2.05	2.00
D2	0.85	1.05	0.95
E	1.95	2.05	2.00
E2	1.40	1.60	1.50
e	—	—	0.65
L	0.25	0.35	0.30
L1	0.82	0.92	0.87
K1	—	—	0.305
K2	—	—	0.225
Z	—	—	0.20
All Dimensions in mm			

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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