

Product Summary

$V_{(BR)DSS}$	$R_{DS(ON)} \text{ max}$	$I_D \text{ max}$ $T_A = +25^\circ\text{C}$
-20V	16m Ω @ $V_{GS} = -4.5\text{V}$	-9.0A
	22m Ω @ $V_{GS} = -2.5\text{V}$	-7.7A

Description and Applications

This MOSFET is designed to minimize 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

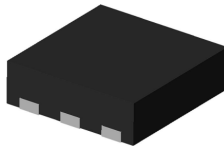
Features and Benefits

- 0.6mm Profile – Ideal for Low Profile Applications
- PCB Footprint of 4mm²
- 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)**
- Qualified to AEC-Q101 Standards for High Reliability**

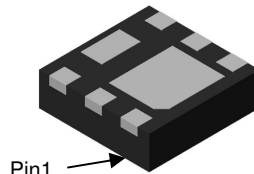
Mechanical Data

- 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)

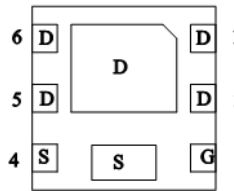
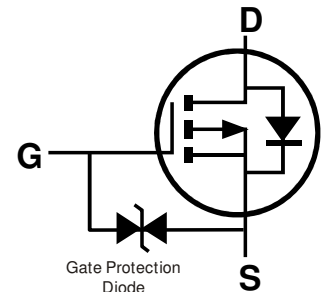
U-DFN2020-6



Top View



Bottom View


 Pin Out
Bottom View


Equivalent Circuit

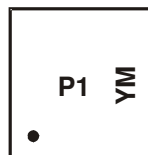
Ordering Information (Note 4)

Part Number	Case	Packaging
DMP2021UFDF-7	U-DFN2020-6	3,000/Tape & Reel
DMP2021UFDF-13	U-DFN2020-6	10,000/Tape & Reel

- Notes:
- No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
 - See 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.
 - Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
 - For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

Marking Information

U-DFN2020-6



P1 = Product Type Marking Code
 YM = Date Code Marking
 Y = Year (ex: C = 2015)
 M = Month (ex: 9 = September)

Date Code Key

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

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_A = +25°C, unless otherwise specified.)

Characteristic			Symbol	Value	Units
Drain-Source Voltage			V _{DSS}	-20	V
Gate-Source Voltage			V _{GSS}	±8	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	Units
Total Power Dissipation (Note 5)	T _A = +25°C	P _D	0.73	W
	T _A = +70°C		0.47	
Thermal Resistance, Junction to Ambient (Note 5)	Steady State	R _{θJA}	172	°C/W
	t < 10s		121	
Total Power Dissipation (Note 6)	T _A = +25°C	P _D	2.02	W
	T _A = +70°C		1.30	
Thermal Resistance, Junction to Ambient (Note 6)	Steady State	R _{θJA}	63	°C/W
	t < 10s		42	
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 _{DS} = -20V, V _{GS} = 0V
Gate-Source Leakage	I _{GSS}	—	—	±10	µA	V _{GS} = ±8V, V _{DS} = 0V
ON CHARACTERISTICS (Note 8)						
Gate Threshold Voltage	V _{GS(th)}	-0.35	—	-1.0	V	V _{DS} = 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 _{DS} = -15V, V _{GS} = 0V, f = 1.0MHz
Output Capacitance	C _{oss}	—	262	—		
Reverse Transfer Capacitance	C _{rss}	—	220	—		
Gate Resistance	R _g	—	16	30	Ω	V _{DS} = 0V, V _{GS} = 0V, f = 1MHz
Total Gate Charge (V _{GS} = -4.5V)	Q _g	—	34	—	nC	V _{DS} = -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 _{DS} = -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:
5. Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.
 6. Device mounted on FR-4 substrate PC board, 2oz copper, with 1-inch square copper plate.
 7. I_{AS} and E_{AS} rating are based on low frequency and duty cycles to keep T_J = +25°C.
 8. Short duration pulse test used to minimize self-heating effect.
 9. Guaranteed by design. Not subject to product testing.

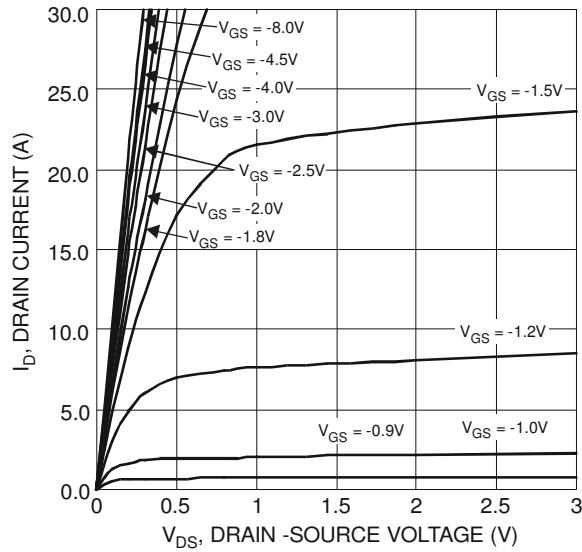


Figure 1 Typical Output Characteristics

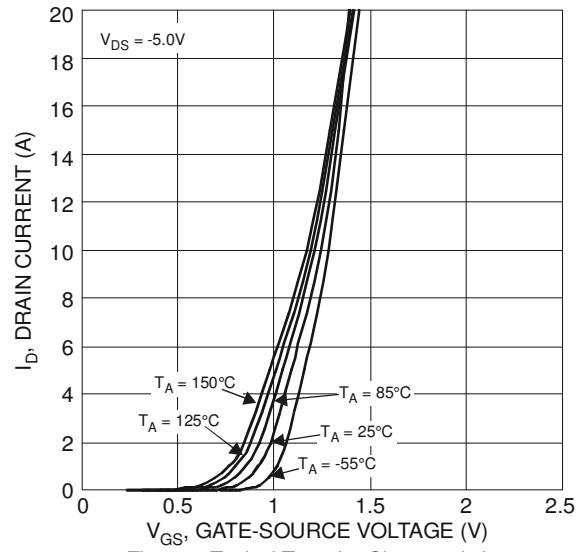


Figure 2 Typical Transfer Characteristics

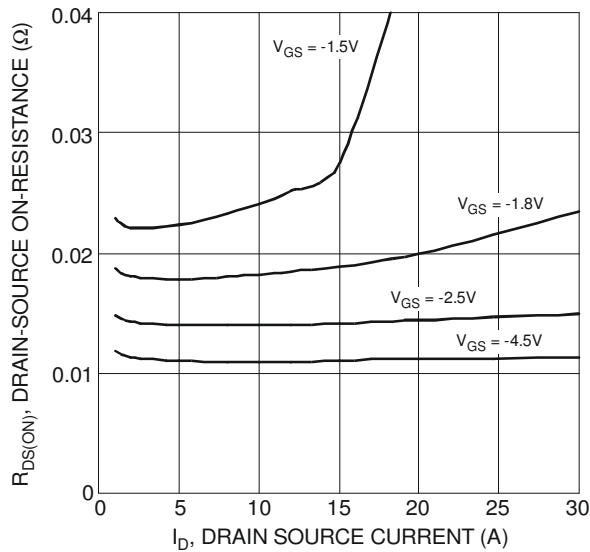


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

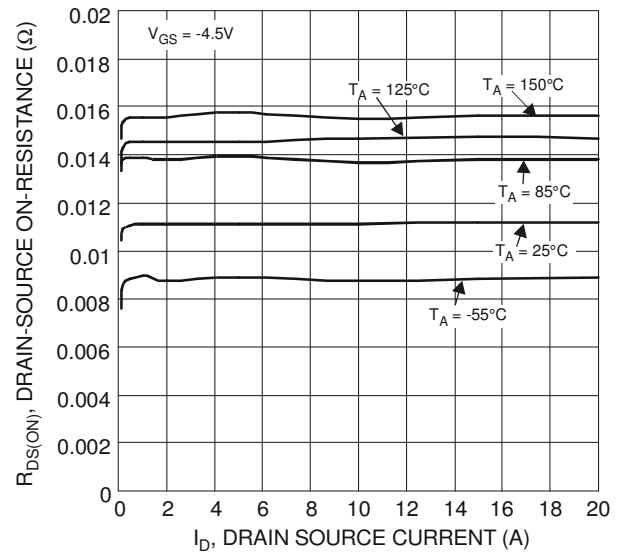


Figure 4 Typical On-Resistance vs. Drain Current and Temperature

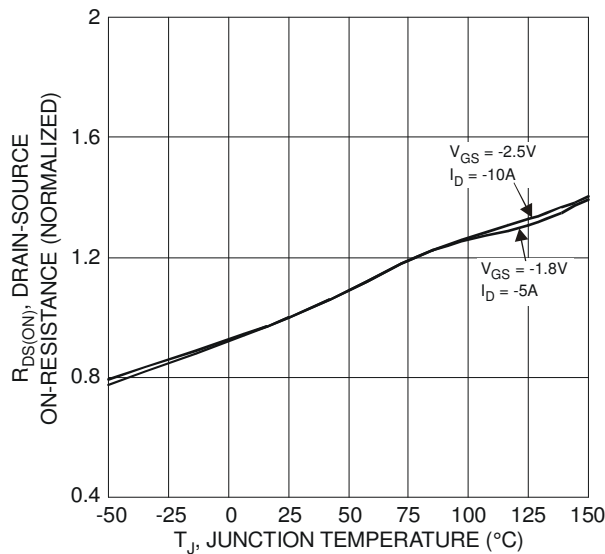


Figure 5 On-Resistance Variation with Temperature

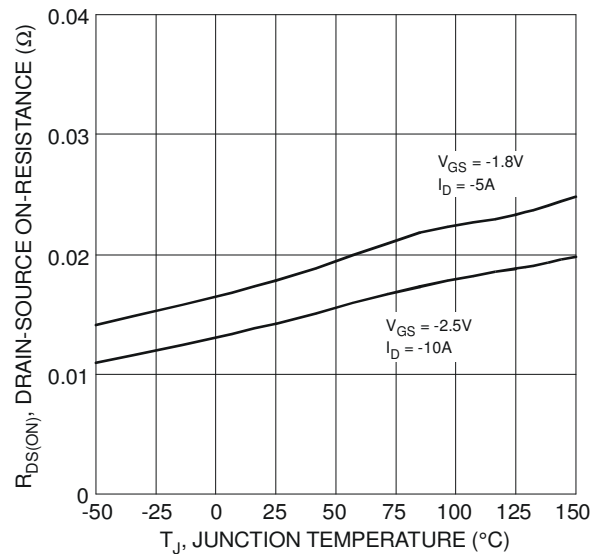


Figure 6 On-Resistance Variation with Temperature

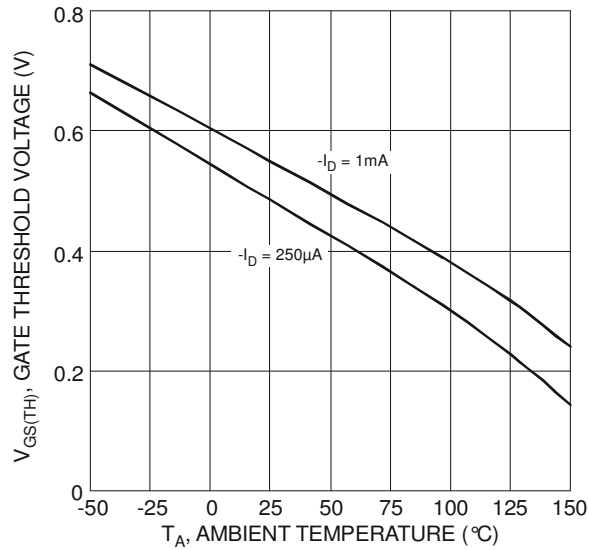


Figure 7 Gate Threshold Variation vs. Ambient Temperature

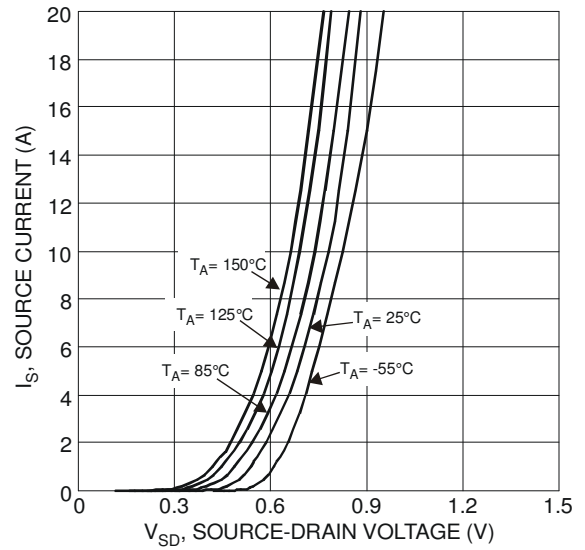


Figure 8 Diode Forward Voltage vs. Current

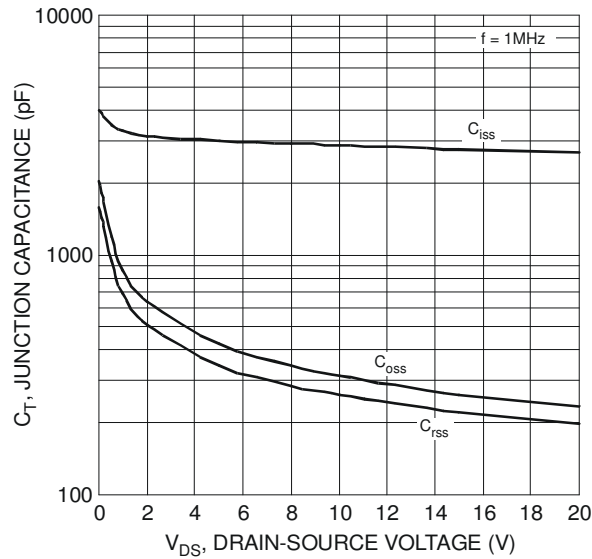


Figure 9 typical Junction Capacitance

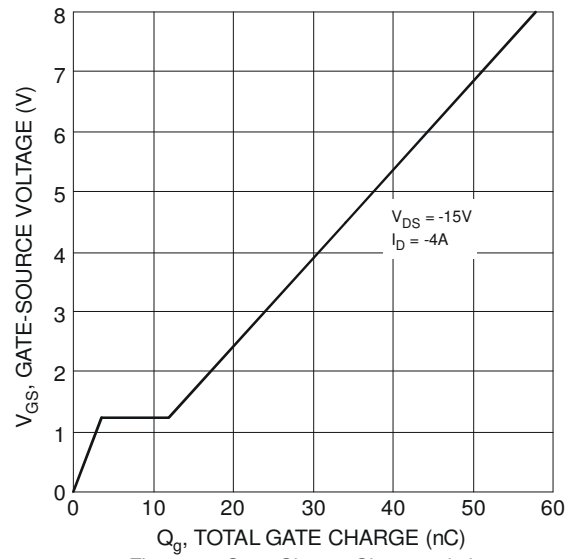


Figure 10 Gate-Charge Characteristics

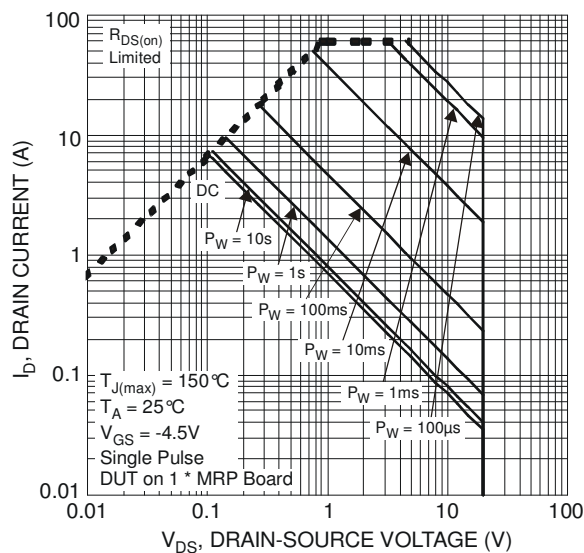
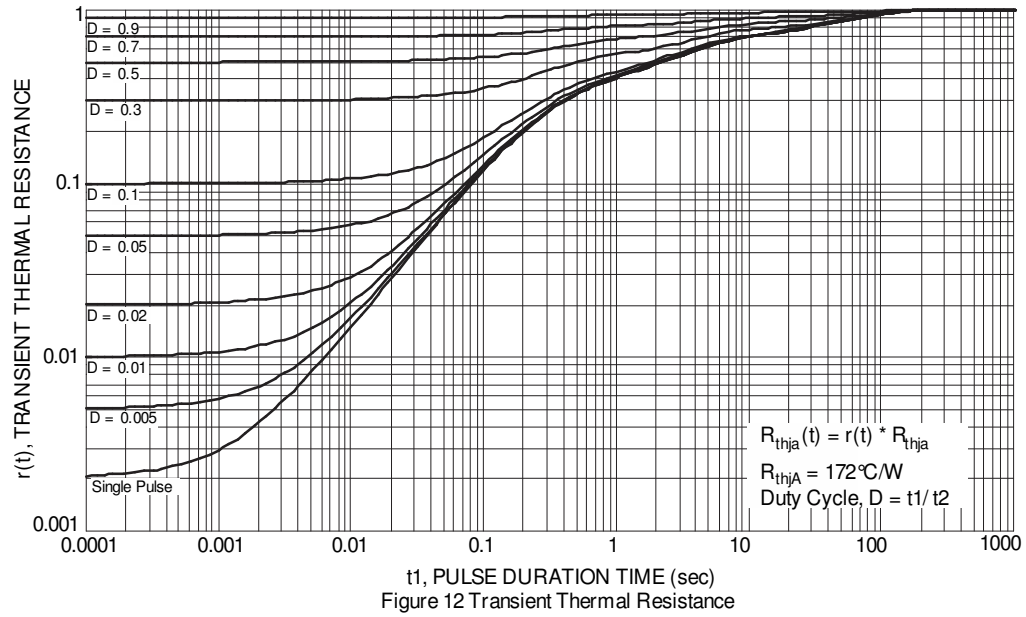
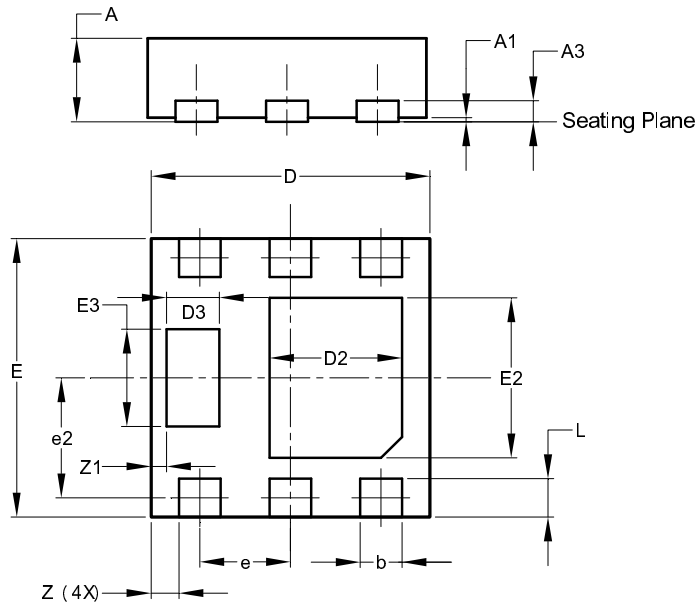


Figure 11 SOA, Safe Operation Area



Package Outline Dimensions

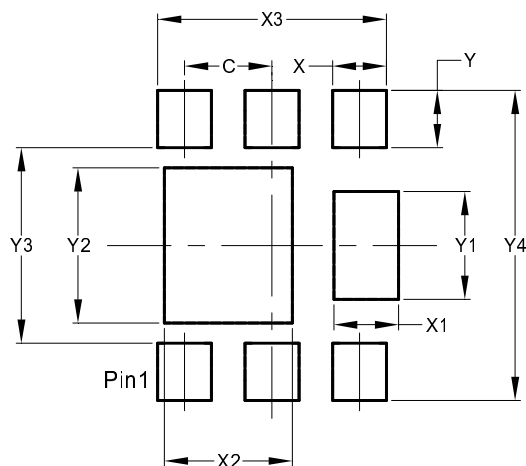
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for the latest version.



U-DFN2020-6 (Type F)			
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
D	1.95	2.05	2.00
D2	0.85	1.05	0.95
D3	0.33	0.43	0.38
e	0.65 BSC		
e2	0.863 BSC		
E	1.95	2.05	2.00
E2	1.05	1.25	1.15
E3	0.65	0.75	0.70
L	0.225	0.325	0.275
Z	0.20 BSC		
Z1	0.110 BSC		
All Dimensions in mm			

Suggested Pad Layout

Please see AP02001 at <http://www.diodes.com/datasheets/ap02001.pdf> for the latest version.



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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Телефон: 8 (812) 309-75-97 (многоканальный)

Факс: 8 (812) 320-03-32

Электронная почта: ocean@oceanchips.ru

Web: <http://oceanchips.ru/>

Адрес: 198099, г. Санкт-Петербург, ул. Калинина, д. 2, корп. 4, лит. А