

Product Summary

$V_{(BR)DSS}$	$R_{DS(ON) max}$	$I_D max$ $T_A = +25^\circ C$
20V	9.5mΩ @ $V_{GS} = 4.5V$	11.7A
	11mΩ @ $V_{GS} = 2.5V$	10.8A

Description

This new generation 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.

Applications

- General Purpose Interfacing Switch
- Power Management Functions

Features

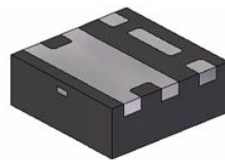
- 0.6mm Profile – Ideal for Low Profile Applications
- PCB Footprint of 4mm²
- Low Gate Threshold Voltage
- Low On-Resistance
- ESD Protected Gate
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. “Green” Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**

Mechanical Data

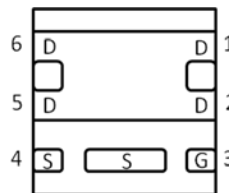
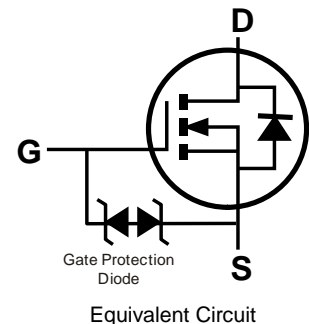
- Case: U-DFN2020-6
- Case Material: Molded Plastic, “Green” Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – NiPdAu over Copper Leadframe. Solderable per MIL-STD-202, Method 208 (e4)
- Weight: 0.0065 grams (Approximate)



U-DFN2020-6



Bottom View


 Bottom View
Pin Out


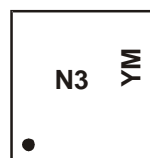
Equivalent Circuit

Ordering Information (Note 4)

Part Number	Marking	Reel size (inches)	Quantity per reel
DMN2011UFDE-7	N3	7	3,000
DMN2011UFDE-13	N3	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 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



N3 = Product Type Marking Code
 YM = Date Code Marking
 Y = Year (ex: A = 2013)
 M = Month (ex: 9 = September)

Date Code Key

Year	2011	2012	2013	2014	2015	2016	2017
Code	Y	Z	A	B	C	D	E

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

Characteristic		Symbol	Value	Units
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	11.7 9.3	A
	$t < 10\text{s}$	I_D	14.2 11.4	A
Continuous Drain Current (Note 6) $V_{GS} = 2.5\text{V}$	Steady State $T_A = +25^\circ\text{C}$ $T_A = +70^\circ\text{C}$	I_D	10.8 8.7	A
	$t < 10\text{s}$	I_D	13.2 10.6	A
Pulsed Drain Current (10 μs pulse, duty cycle = 1%)		I_{DM}	80	A
Maximum Body Diode Continuous Current		I_S	2.5	A
Avalanche Current (Note 7) $L = 0.1\text{mH}$		I_{AS}	18	A
Avalanche Energy (Note 7) $L = 0.1\text{mH}$		E_{AS}	17	mJ

Thermal Characteristics

Characteristic		Symbol	Value	Units
Total Power Dissipation (Note 5)	$T_A = +25^\circ\text{C}$	P_D	0.61	W
	$T_A = +70^\circ\text{C}$		0.39	
Thermal Resistance, Junction to Ambient (Note 5)	Steady state	$R_{\theta JA}$	209	$^\circ\text{C/W}$
	$t < 10\text{s}$		142	
Total Power Dissipation (Note 6)	$T_A = +25^\circ\text{C}$	P_D	1.97	W
	$T_A = +70^\circ\text{C}$		1.27	
Thermal Resistance, Junction to Ambient (Note 6)	Steady state	$R_{\theta JA}$	64	$^\circ\text{C/W}$
	$t < 10\text{s}$		43	
Thermal Resistance, Junction to Case (Note 6)		$R_{\theta JC}$	9.8	
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +150	$^\circ\text{C}$

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} = 16V, V _{GS} = 0V
Zero Gate Voltage Drain Current T _J = +150°C (Note 9)	I _{DSS}	—	—	100	μA	V _{DS} = 16V, V _{GS} = 0V
Gate-Source Leakage	I _{GSS}	—	—	±10	μA	V _{GS} = ±10V, V _{DS} = 0V
ON CHARACTERISTICS (Note 8)						
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)}	—	6.5	9.5	mΩ	V _{GS} = 4.5V, I _D = 7A
			7.5	11		
			10	20		
			15	35		
Diode Forward Voltage	V _{SD}	—	0.7	1.2	V	V _{GS} = 0V, I _S = 8.5A
On State Drain Current (Note 9)	I _{D(ON)}	20	—	—	A	V _{DS} ≤ 5V, V _{GS} = 4.5V
DYNAMIC CHARACTERISTICS (Note 9)						
Input Capacitance	C _{iss}	—	2248	3372	pF	V _{DS} = 10V, V _{GS} = 0V, f = 1.0MHz
Output Capacitance	C _{oss}	—	295	443	pF	
Reverse Transfer Capacitance	C _{riss}	—	265	398	pF	
Gate Resistance	R _g	—	1.5	3	Ω	V _{DS} = 0V, V _{GS} = 0V, f = 1MHz
Total Gate Charge (V _{GS} = 4.5V)	Q _g	—	24	36	nC	V _{DS} = 10V, I _D = 8.5A
Total Gate Charge (V _{GS} = 10V)	Q _g	—	56	84	nC	
Gate-Source Charge	Q _{gs}	—	3.5	6	nC	
Gate-Drain Charge	Q _{gd}	—	5.1	8	nC	
Turn-On Delay Time	t _{D(on)}	—	3.6	6	ns	V _{DS} = 10V, I _D = 8.5A V _{GS} = 4.5V, R _G = 1.8Ω
Turn-On Rise Time	t _r	—	2.6	4	ns	
Turn-Off Delay Time	t _{D(off)}	—	21.6	33	ns	
Turn-Off Fall Time	t _f	—	13.5	21	ns	
Reverse Recovery Time	T _{rr}	—	12.8	20	ns	I _F = 8.5A, di/dt = 210A/μs
Reverse Recovery Charge	Q _{rr}	—	6.9	11	nC	

- 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°C
 - Short duration pulse test used to minimize self-heating effect.
 - Guaranteed by design. Not subject to product testing.

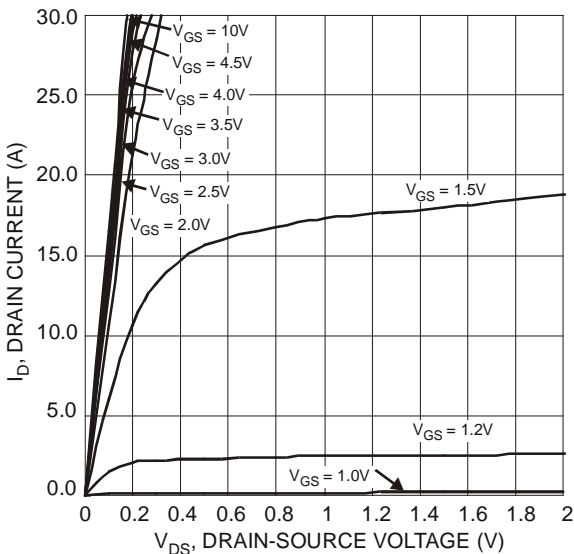


Figure 1 Typical Output Characteristic

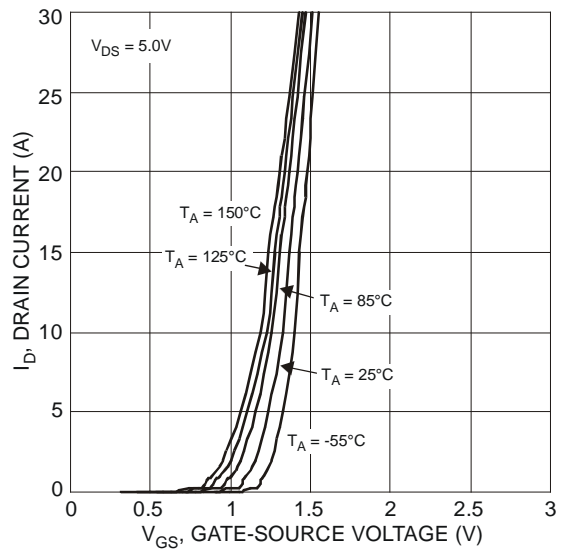


Figure 2 Typical Transfer Characteristics

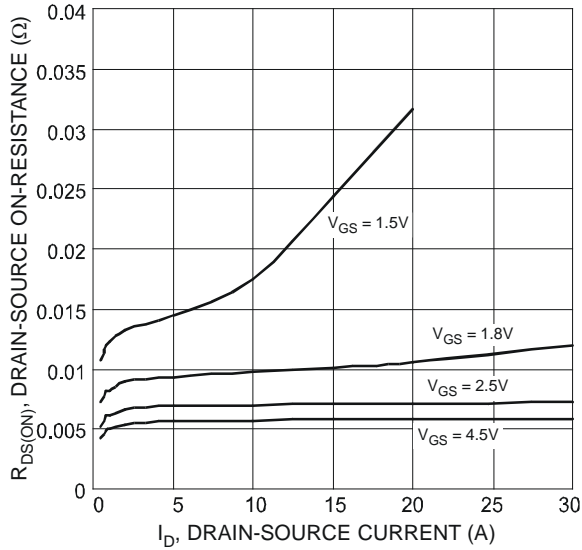


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

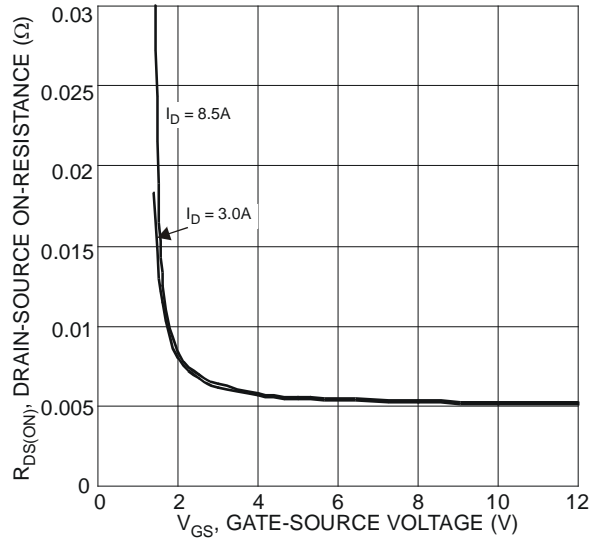


Figure 4 Typical Transfer Characteristics

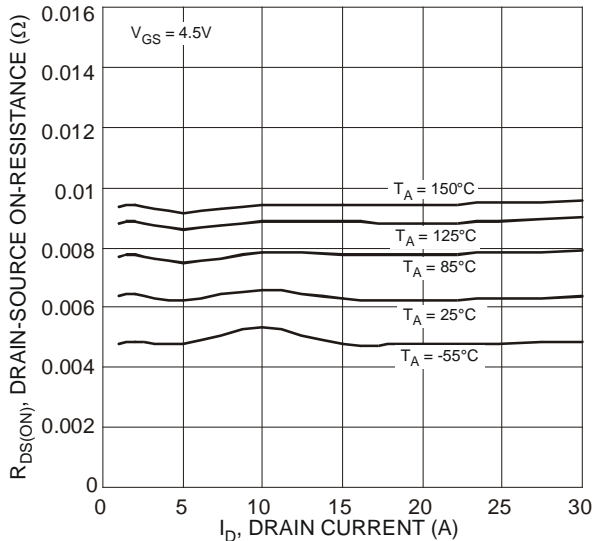


Figure 5 Typical On-Resistance vs. Drain Current and Temperature

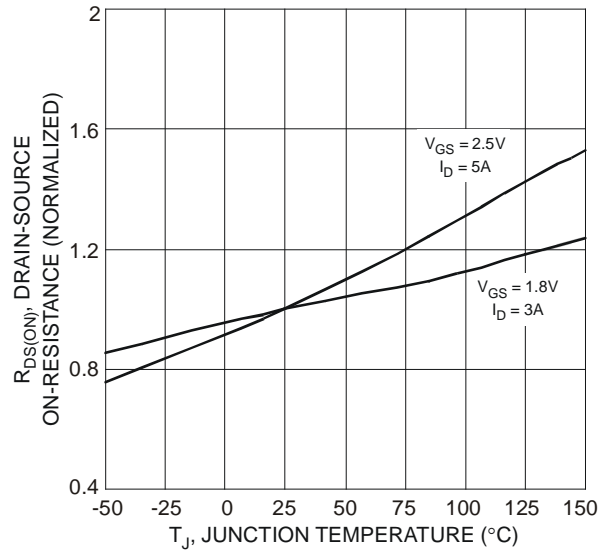


Figure 6 On-Resistance Variation with Temperature

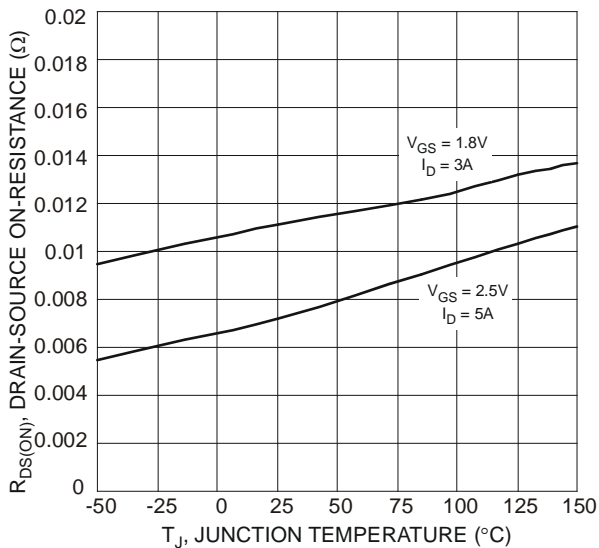


Figure 7 On-Resistance Variation with Temperature

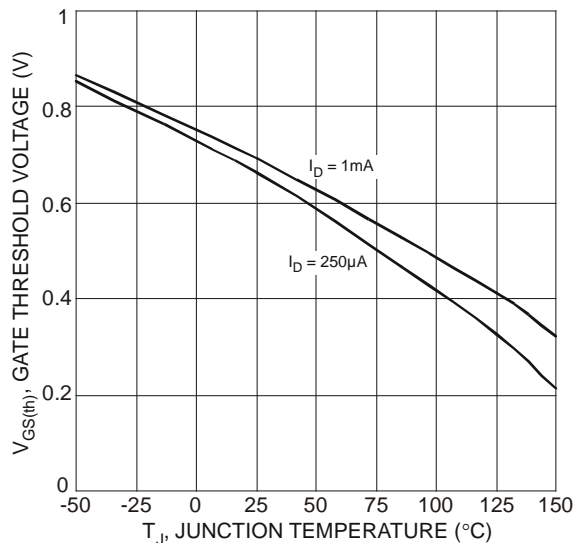


Figure 8 Gate Threshold Variation vs. Ambient Temperature

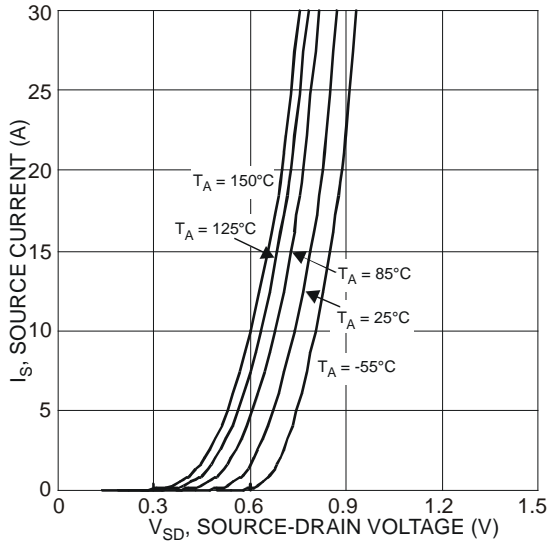


Figure 9 Diode Forward Voltage vs. Current

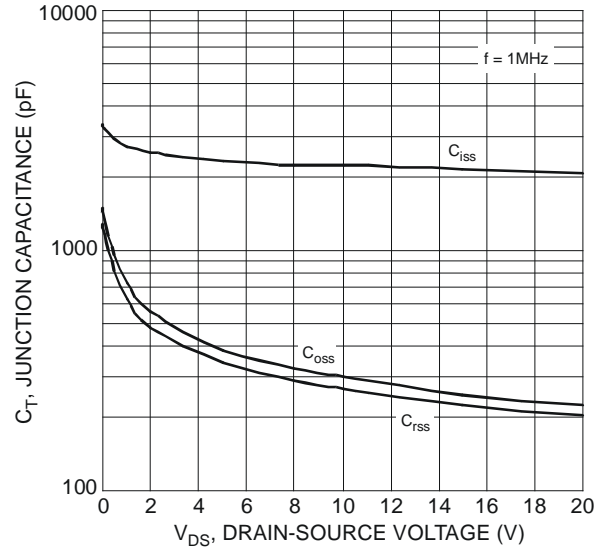


Figure 10 Typical Junction Capacitance

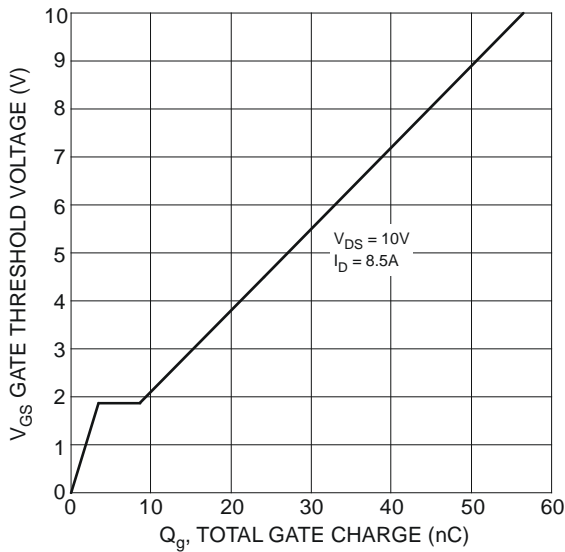


Figure 11 Gate Charge

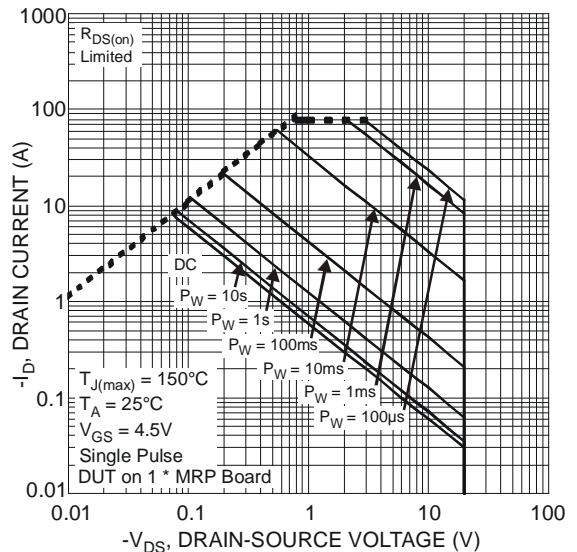


Figure 12 SOA, Safe Operation Area

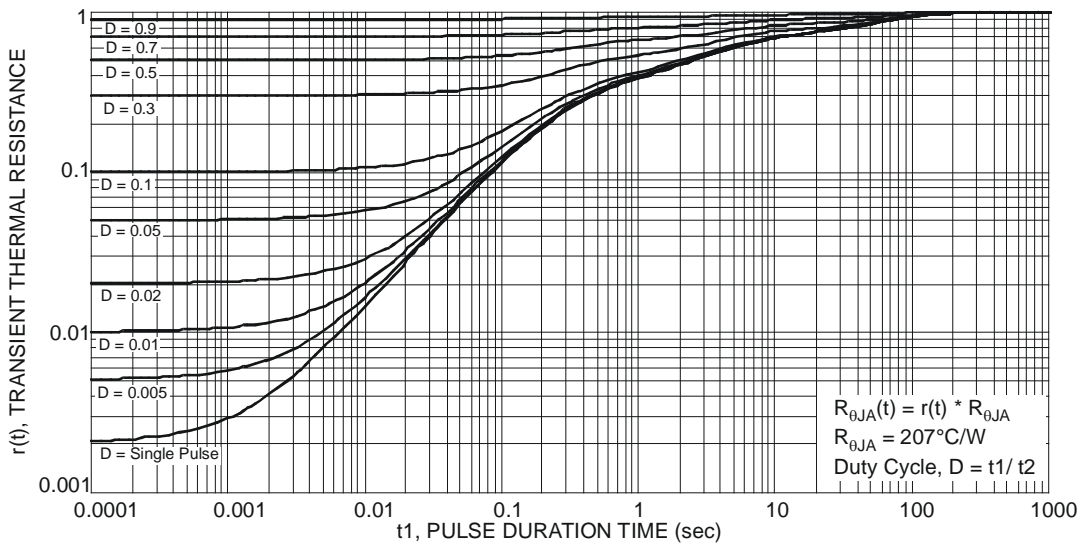
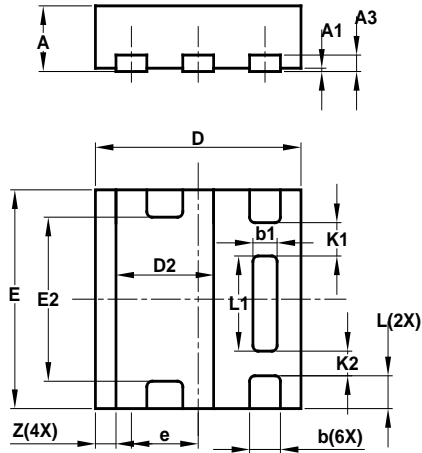


Figure 13 Transient Thermal Resistance

Package Outline Dimensions

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

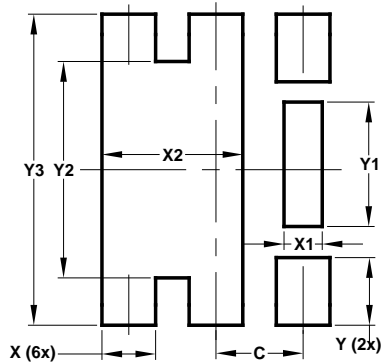


U-DFN2020-6 Type E			
Dim	Min	Max	Typ
A	0.57	0.63	0.60
A1	0	0.05	0.03
A3	—	—	0.15
b	0.25	0.35	0.30
b1	0.185	0.285	0.235
D	1.95	2.05	2.00
D2	0.85	1.05	0.95
E	1.95	2.05	2.00
E2	1.40	1.60	1.50
e	—	—	0.65
L	0.25	0.35	0.30
L1	0.82	0.92	0.87
K1	—	—	0.305
K2	—	—	0.225
Z	—	—	0.20

All Dimensions in mm

Suggested Pad Layout

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



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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