

Product Summary

BV _{DSS}	R _{DS(ON)} Max	I _D Max T _A = +25°C
12V	4.8mΩ @ V _{GS} = 4.5V	15A
	7.0mΩ @ V _{GS} = 2.5V	12A

Description

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

Applications

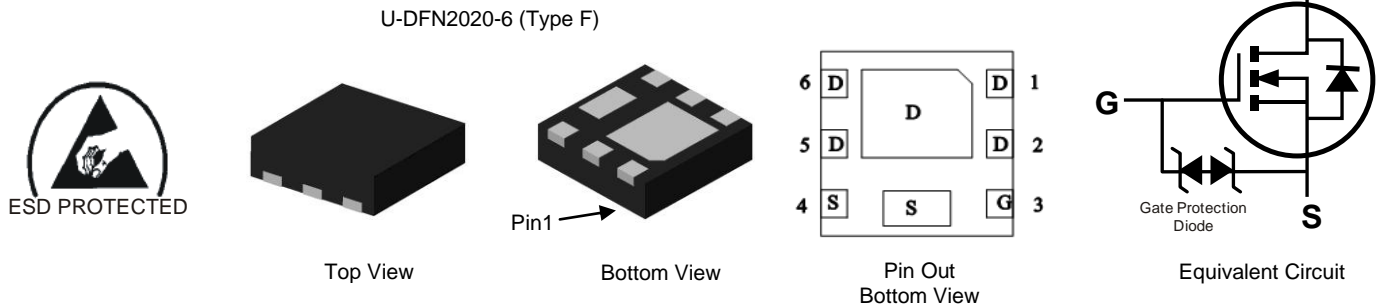
- General Purpose Interfacing Switch
- Power Management Functions

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)**

Mechanical Data

- Case: U-DFN2020-6 (Type F)
- 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)

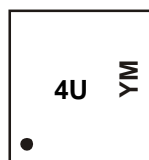


Ordering Information (Note 4)

Part Number	Case	Packaging
DMN1004UFDF-7	U-DFN2020-6 (Type F)	3,000/Tape & Reel
DMN1004UFDF-13	U-DFN2020-6 (Type F)	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 <https://www.diodes.com/design/support/packaging/diodes-packaging/>.

Marking Information



4U = Product Type Marking Code
 YM = Date Code Marking
 Y = Year (ex: E = 2017)
 M = Month (ex: 9 = September)

Date Code Key

Year	2017	2018	2019	2020	2021	2022	2023	2024	2025
Code	E	F	G	H	I	J	K	L	M

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	Unit
Drain-Source Voltage			V _{DSS}	12	V
Gate-Source Voltage			V _{GSS}	±8	V
Continuous Drain Current (Note 6) V _{GS} = 4.5V	Steady State	T _A = +25°C	I _D	15	A
		T _A = +70°C		12	
Pulsed Drain Current (380µs Pulse, Duty Cycle = 1%)			I _{DM}	70	A
Maximum Body Diode Continuous Current (Note 6)			I _S	3	A
Avalanche Current (Note 7) L = 0.1mH			I _{AS}	34	A
Avalanche Energy (Note 7) L = 0.1mH			E _{AS}	55	mJ

Thermal Characteristics

Characteristic		Symbol	Value	Unit
Total Power Dissipation (Note 5)	T _A = +25°C	P _D	0.9	W
Thermal Resistance, Junction to Ambient (Note 5)	Steady State	R _{θJA}	167	°C/W
Total Power Dissipation (Note 6)	T _A = +25°C	P _D	2.1	W
Thermal Resistance, Junction to Ambient (Note 6)	Steady State	R _{θJA}	72	°C/W
Thermal Resistance, Junction to Case (Note 6)		R _{θJC}	22	
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}	12	—	—	V	V _{GS} = 0V, I _D = 250µA
Zero Gate Voltage Drain Current T _J = +25°C	I _{DSS}	—	—	1	µA	V _{DS} = 9.6V, 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)}	0.3	—	1.0	V	V _{DS} = V _{GS} , I _D = 250µA
Static Drain-Source On-Resistance	R _{DS(ON)}	—	4.1	4.8	mΩ	V _{GS} = 4.5V, I _D = 15A
		—	4.5	7.0		V _{GS} = 2.5V, I _D = 10A
Diode Forward Voltage	V _{SD}	—	0.6	1.2	V	V _{GS} = 0V, I _S = 3.2A
DYNAMIC CHARACTERISTICS (Note 9)						
Input Capacitance	C _{ISS}	—	2,385	—	pF	V _{DS} = 6V, V _{GS} = 0V, f = 1.0MHz
Output Capacitance	C _{OSS}	—	678	—	pF	
Reverse Transfer Capacitance	C _{RSS}	—	520	—	pF	
Gate Resistance	R _G	—	2.2	—	Ω	V _{DS} = 0V, V _{GS} = 0V, f = 1MHz
Total Gate Charge (V _{GS} = 4.5V)	Q _G	—	26	—	nC	V _{DS} = 6V, I _D = 10A
Total Gate Charge (V _{GS} = 10V)	Q _G	—	47	—	nC	
Gate-Source Charge	Q _{GS}	—	2.8	—	nC	
Gate-Drain Charge	Q _{GD}	—	5.3	—	nC	
Turn-On Delay Time	t _{D(ON)}	—	5.3	—	ns	V _{DS} = 6V, I _D = 5.0A V _{GS} = 4.5V, R _G = 1.0Ω
Turn-On Rise Time	t _R	—	10.7	—	ns	
Turn-Off Delay Time	t _{D(OFF)}	—	31.6	—	ns	
Turn-Off Fall Time	t _F	—	16.9	—	ns	I _F = 2.0A, di/dt = 100A/µs
Reverse Recovery Time	t _{RR}	—	24.3	—	ns	
Reverse Recovery Charge	Q _{RR}	—	7.4	—	nC	

- 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 1-inch 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.

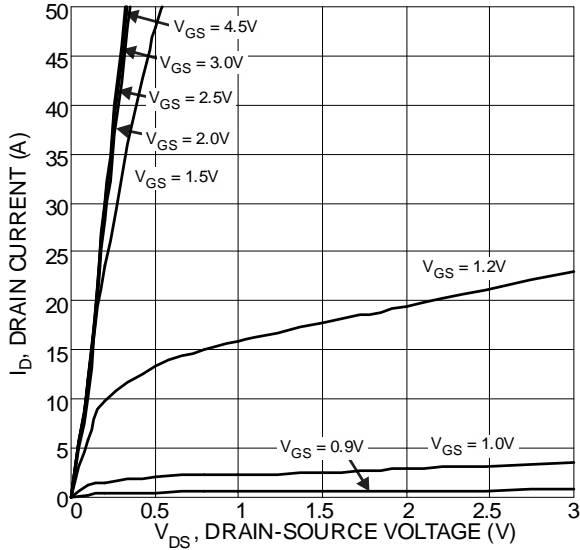


Figure 1 Typical Output Characteristic

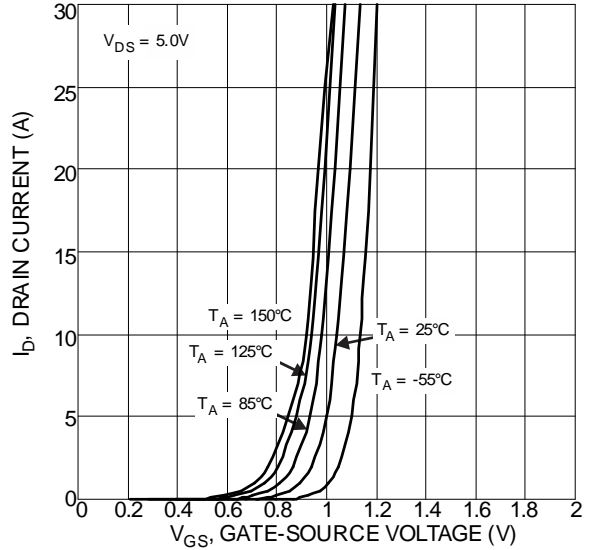


Figure 2 Typical Transfer Characteristics

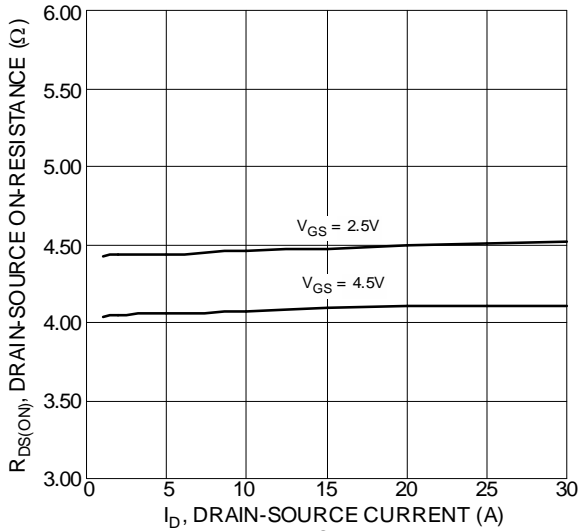


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

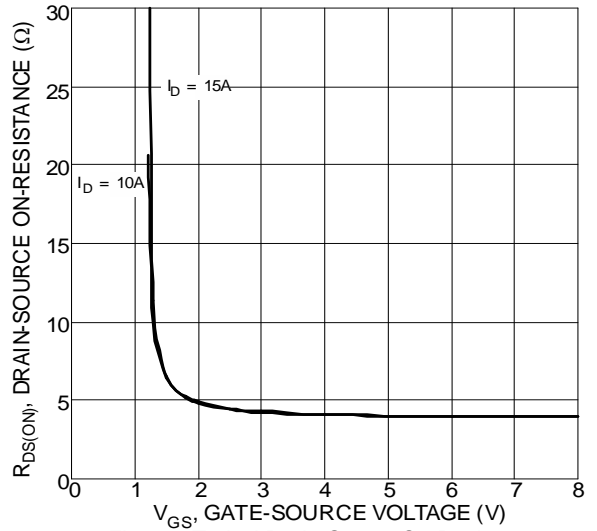


Figure 4 Typical Drain-Source On-Resistance vs. Gate-Source Voltage

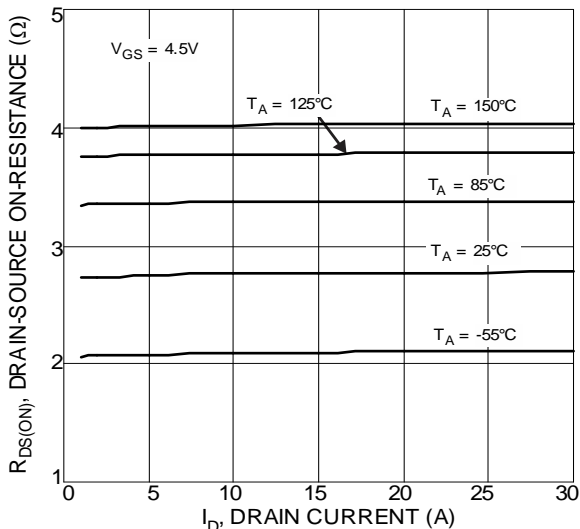


Figure 5 Typical On-Resistance vs. Drain Current and Temperature

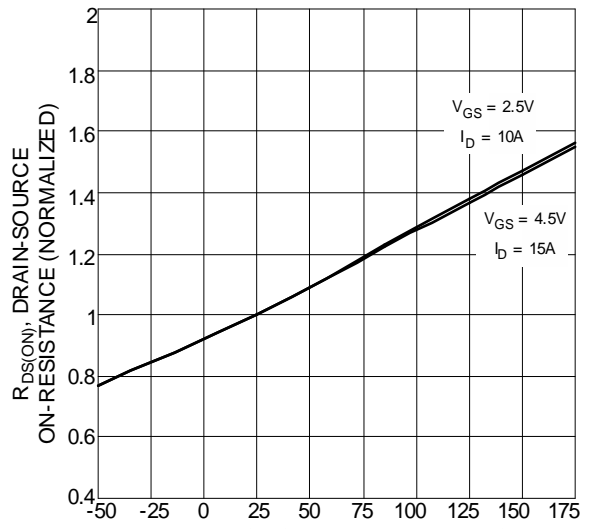


Figure 6 On-Resistance Variation with Temperature

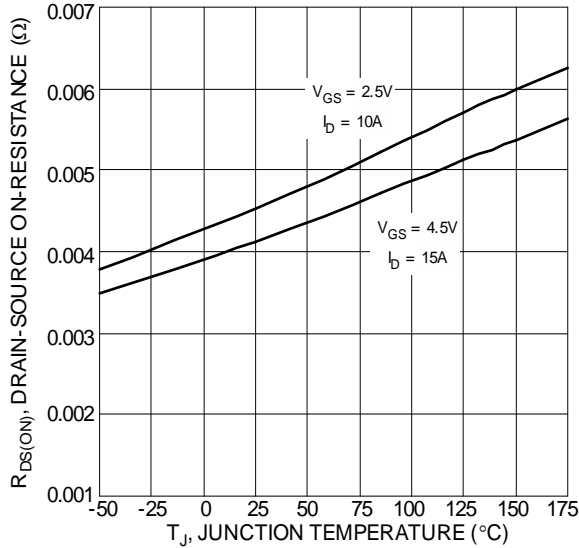


Figure 7 On-Resistance Variation with Temperature

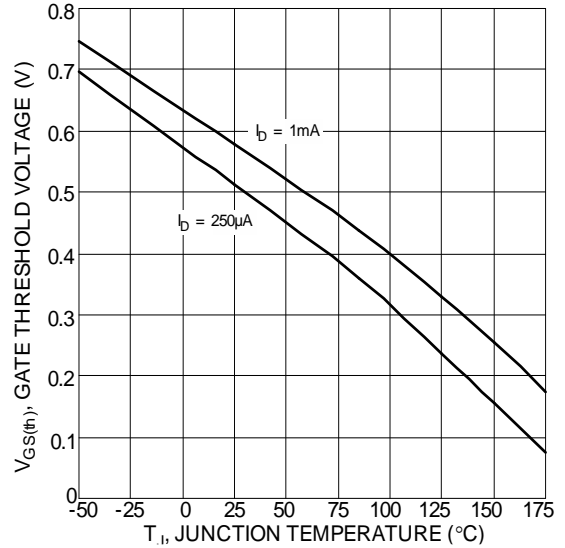


Figure 8 Gate Threshold Variation vs. Junction Temperature

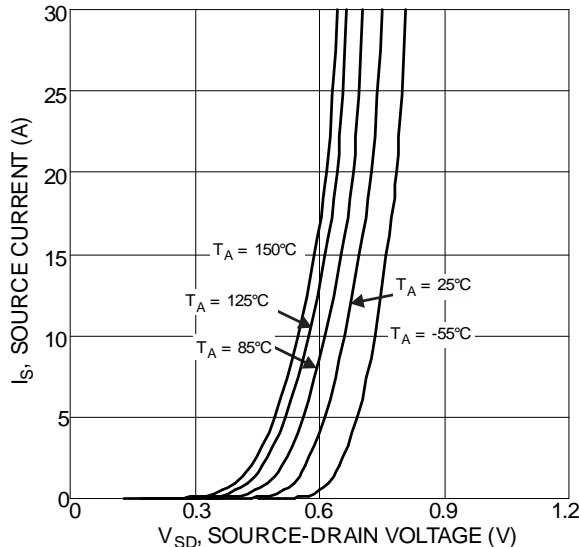


Figure 9 Diode Forward Voltage vs. Current

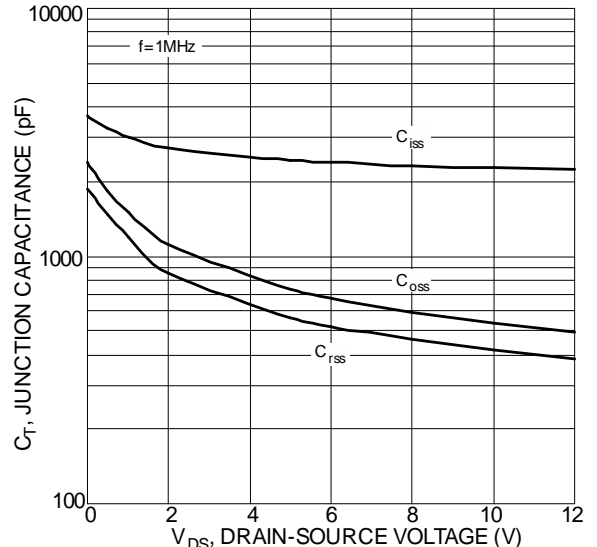


Figure 10 Typical Junction Capacitance

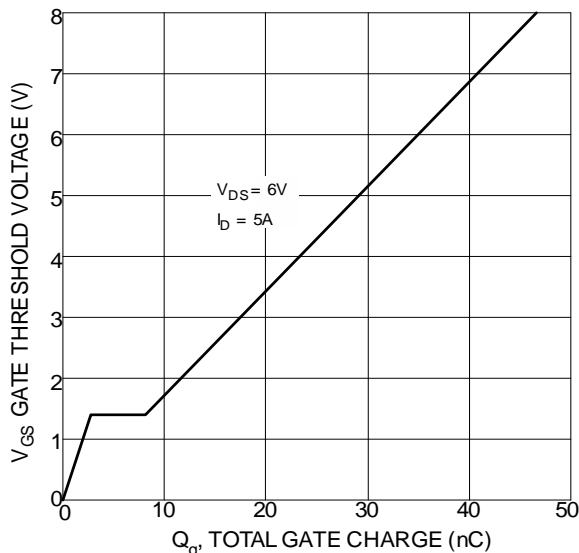


Figure 11 Gate Charge

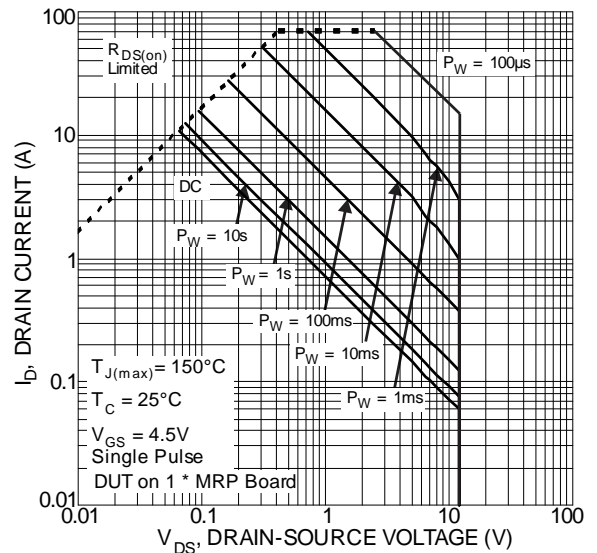
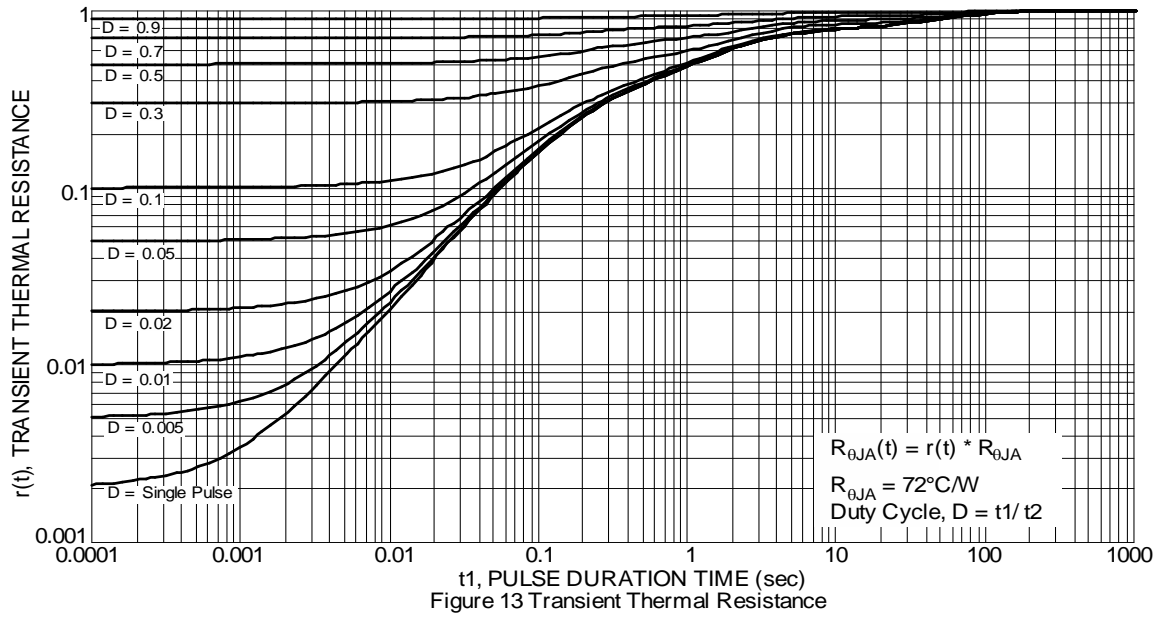


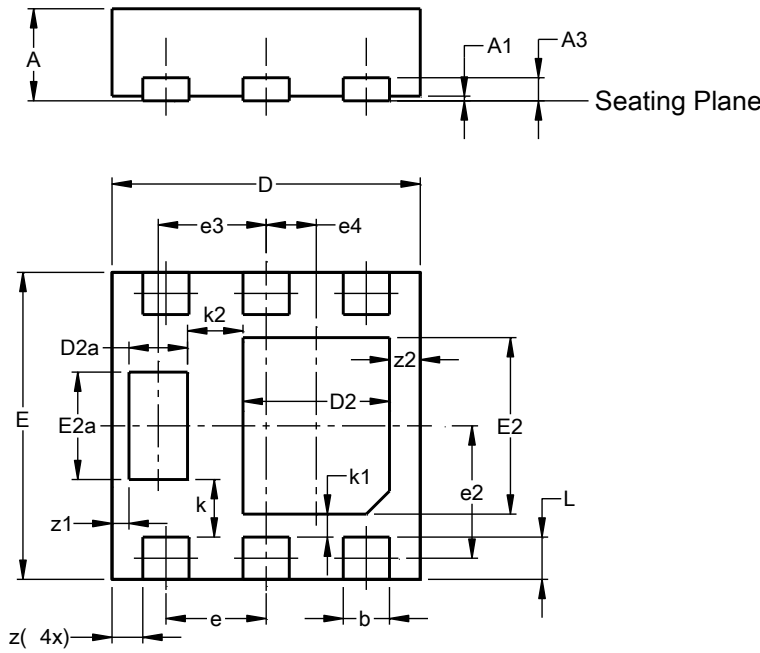
Figure 12 SOA, Safe Operation Area



Package Outline Dimensions

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

U-DFN2020-6 (Type F)

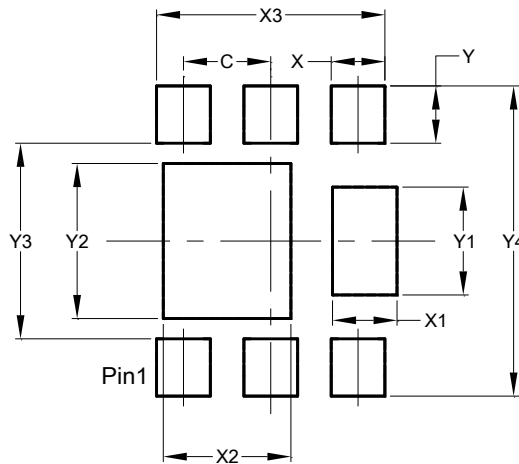


U-DFN2020-6 (Type F)			
Dim	Min	Max	Typ
A	0.57	0.63	0.60
A1	0.00	0.05	0.03
A3	-	-	0.15
b	0.25	0.35	0.30
D	1.95	2.05	2.00
D2	0.85	1.05	0.95
D2a	0.33	0.43	0.38
E	1.95	2.05	2.00
E2	1.05	1.25	1.15
E2a	0.65	0.75	0.70
e	0.65 BSC		
e2	0.863 BSC		
e3	0.70 BSC		
e4	0.325 BSC		
k	0.37 BSC		
k1	0.15 BSC		
k2	0.36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