

Product Summary

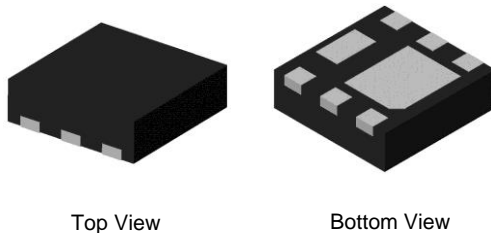
$V_{(BR)DSS}$	$R_{DS(ON)}$ Max	I_D Max $T_A = +25^\circ\text{C}$
30V	15m Ω @ $V_{GS} = 10\text{V}$	9.3A
	20m Ω @ $V_{GS} = 4.5\text{V}$	8.1A

Description

This 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.

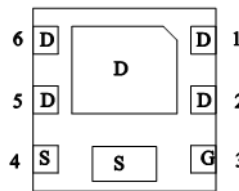
- Battery Management Application
- Power Management Functions
- DC-DC Converters

U-DFN2020-6 (Type F)

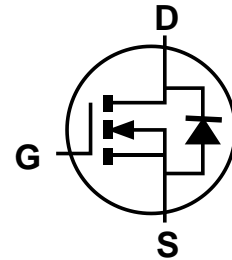


Top View

Bottom View



Pin Out
Bottom View



Internal Schematic

Features

- 0.6mm Profile – Ideal for Low Profile Applications
- PCB Footprint of 4mm²
- Low Gate Threshold Voltage
- Fast Switching Speed
- **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

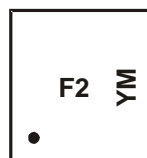
- Case: U-DFN2020-6 (Type F)
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – NiPdAu over Copper Leadframe. Solderable per MIL-STD-202, Method 208 @4
- Weight: 0.007 grams (Approximate)

Ordering Information (Note 4)

Part Number	Case	Packaging
DMN3021LFDF-7	U-DFN2020-6 (Type F)	3,000/Tape & Reel
DMN3021LFDF-13	U-DFN2020-6 (Type F)	10,000/Tape & Reel

- 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



F2 = Product Type Marking Code
 YM = Date Code Marking
 Y = Year (ex: D = 2016)
 M = Month (ex: 9 = September)

Date Code Key

Year	2016	2017	2018	2019	2020	2021	2022	2023
Code	D	E	F	G	H	I	J	K

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	Unit
Drain-Source Voltage			V_{DSS}	30	V
Gate-Source Voltage			V_{GSS}	± 20	V
Continuous Drain Current (Note 6) $V_{GS} = 10\text{V}$	Steady State	$T_A = +25^\circ\text{C}$ $T_A = +70^\circ\text{C}$	I_D	9.3 7.5	A
	$t < 5\text{s}$	$T_A = +25^\circ\text{C}$ $T_A = +70^\circ\text{C}$	I_D	11.8 9.4	A
Pulsed Drain Current (380 μs Pulse, Duty Cycle = 1%)			I_{DM}	50	A
Maximum Continuous Drain-Source Diode Forward Current (Note 6)			I_S	1.8	A
Avalanche Current (Note 7) $L = 0.1\text{mH}$			I_{AS}	18	A
Repetitive Avalanche Energy (Note 7) $L = 0.1\text{mH}$			E_{AS}	16	mJ

Thermal Characteristics

Characteristic			Symbol	Value	Unit
Total Power Dissipation (Note 5)	$T_A = +25^\circ\text{C}$		P_D	0.73	W
	$T_A = +70^\circ\text{C}$			0.47	
Thermal Resistance, Junction to Ambient (Note 5)	Steady State		$R_{\theta JA}$	174	$^\circ\text{C/W}$
	$t < 5\text{s}$			112	
Total Power Dissipation (Note 6)	$T_A = +25^\circ\text{C}$		P_D	2.03	W
	$T_A = +70^\circ\text{C}$			1.30	
Thermal Resistance, Junction to Ambient (Note 6)	Steady State		$R_{\theta JA}$	64	$^\circ\text{C/W}$
	$t < 5\text{s}$			40	
Thermal Resistance, Junction to Case (Note 6)			$R_{\theta JC}$	13	
Operating and Storage Temperature Range			T_J, T_{STG}	-55 to +150	$^\circ\text{C}$

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 8)						
Drain-Source Breakdown Voltage	BV_{DSS}	30	—	—	V	$V_{GS} = 0\text{V}, I_D = 250\mu\text{A}$
Zero Gate Voltage Drain Current $T_J = +25^\circ\text{C}$	I_{DSS}	—	—	1	μA	$V_{DS} = 30\text{V}, V_{GS} = 0\text{V}$
Gate-Source Leakage	I_{GSS}	—	—	± 100	nA	$V_{GS} = \pm 20\text{V}, V_{DS} = 0\text{V}$
ON CHARACTERISTICS (Note 8)						
Gate Threshold Voltage	$V_{GS(TH)}$	1.0	—	2.2	V	$V_{DS} = V_{GS}, I_D = 250\mu\text{A}$
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	—	15	m Ω	$V_{GS} = 10\text{V}, I_D = 7\text{A}$
		—	—	20		$V_{GS} = 4.5\text{V}, I_D = 7\text{A}$
Diode Forward Voltage	V_{SD}	—	0.8	1.2	V	$V_{GS} = 0\text{V}, I_S = 2.2\text{A}$
DYNAMIC CHARACTERISTICS (Note 9)						
Input Capacitance	C_{ISS}	—	706	—	pF	$V_{DS} = 15\text{V}, V_{GS} = 0\text{V}, f = 1.0\text{MHz}$
Output Capacitance	C_{OSS}	—	112	—		
Reverse Transfer Capacitance	C_{RSS}	—	81	—		
Gate Resistance	R_G	—	2.6	—	Ω	$V_{DS} = 0\text{V}, V_{GS} = 0\text{V}, f = 1\text{MHz}$
Total Gate Charge ($V_{GS} = 10\text{V}$)	Q_G	—	14	—	nC	$V_{DS} = 15\text{V}, I_D = 5\text{A}$
Total Gate Charge ($V_{GS} = 4.5\text{V}$)	Q_G	—	6.7	—		
Gate-Source Charge	Q_{GS}	—	1.9	—		
Gate-Drain Charge	Q_{GD}	—	2.5	—		
Turn-On Delay Time	$t_{D(ON)}$	—	5.4	—	ns	$V_{DS} = 15\text{V}, V_{GS} = 4.5\text{V}, R_G = 1.7\Omega, I_D = 5\text{A}$
Turn-On Rise Time	t_R	—	6.8	—		
Turn-Off Delay Time	$t_{D(OFF)}$	—	9.7	—		
Turn-Off Fall Time	t_F	—	4.7	—		

- 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 1-inch square copper plate.
 - I_{AS} and E_{AS} rating are based on low frequency and duty cycles to keep $T_J = +25^\circ\text{C}$.
 - Short duration pulse test used to minimize self-heating effect.
 - Guaranteed by design. Not subject to product testing.

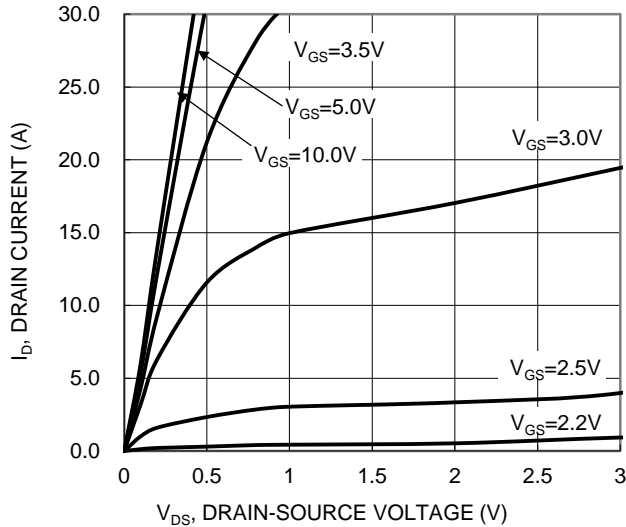


Figure 1. Typical Output Characteristic

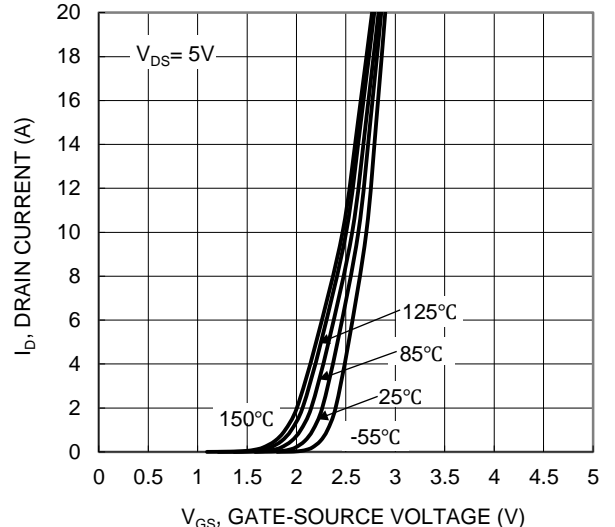


Figure 2. Typical Transfer Characteristic

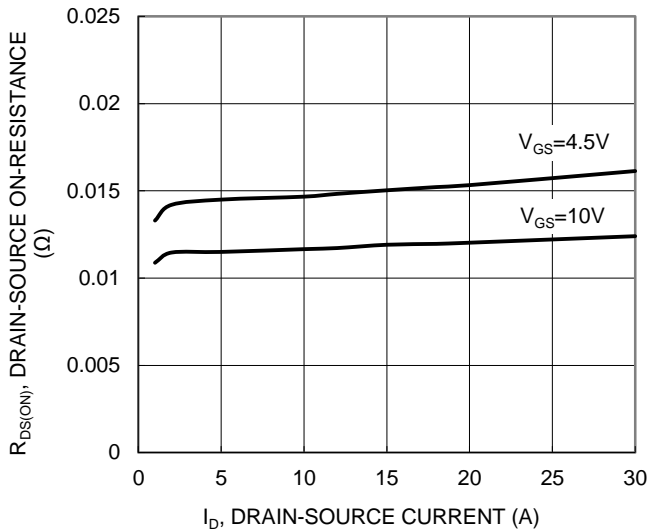


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

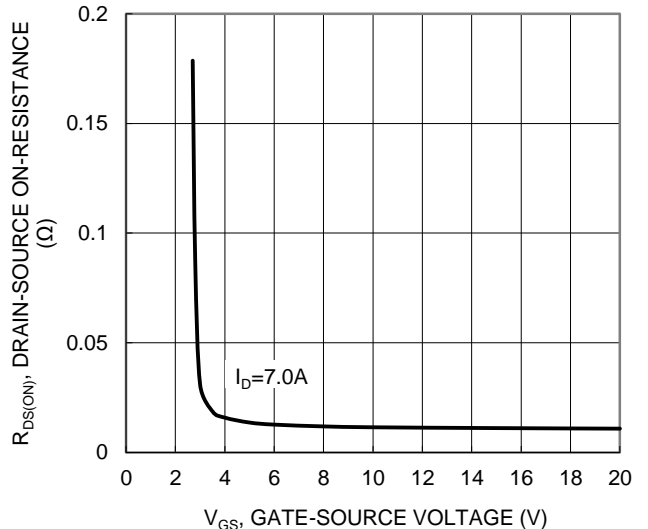


Figure 4. Typical Transfer Characteristic

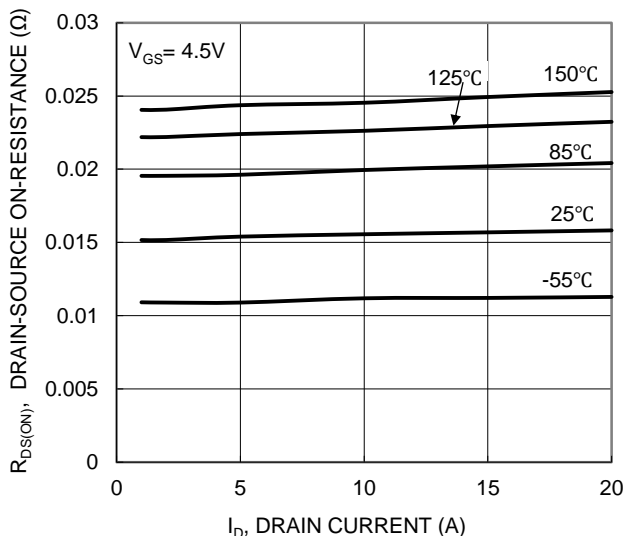


Figure 5. Typical On-Resistance vs. Drain Current and Temperature

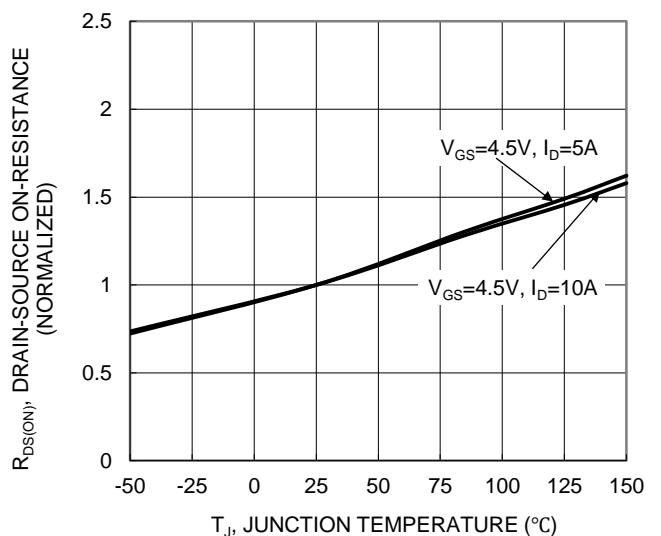


Figure 6. On-Resistance Variation with Temperature

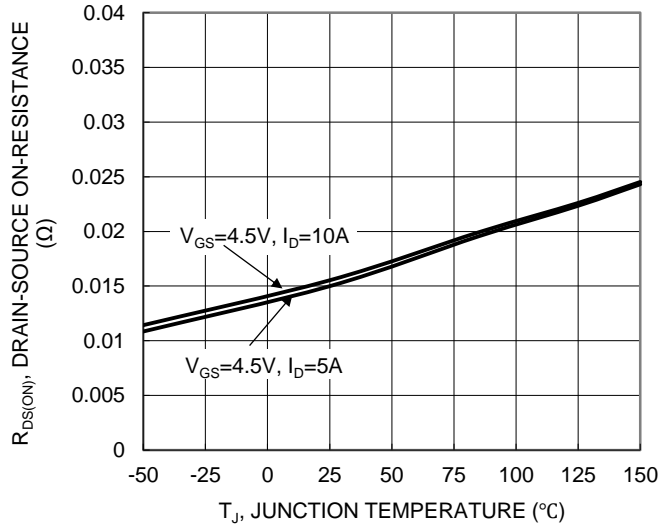


Figure 7. On-Resistance Variation with Temperature

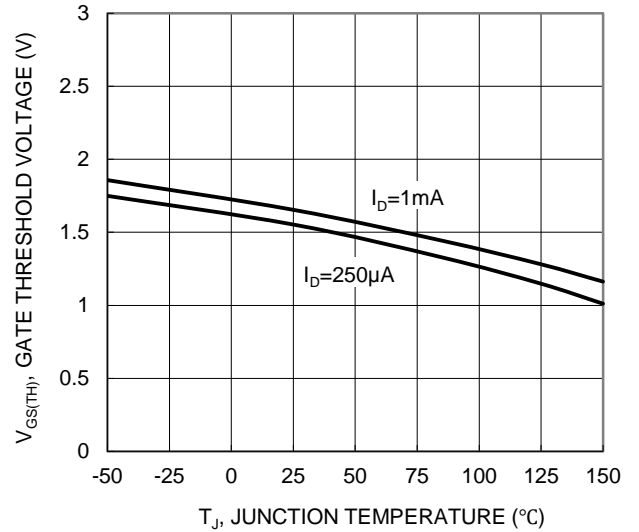


Figure 8. Gate Threshold Variation vs. Junction Temperature

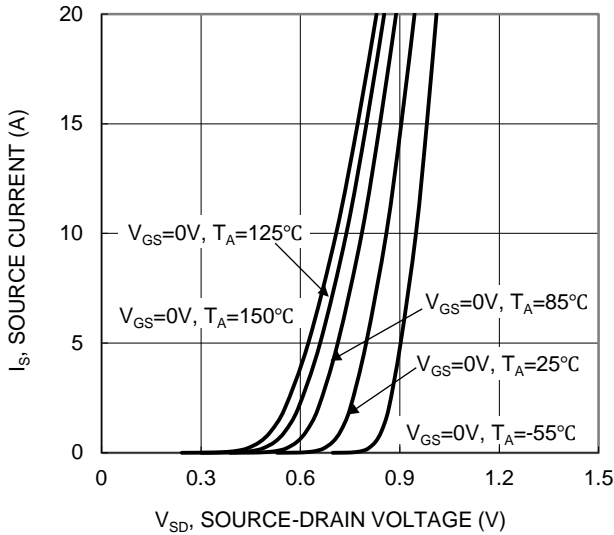


Figure 9. Diode Forward Voltage vs. Current

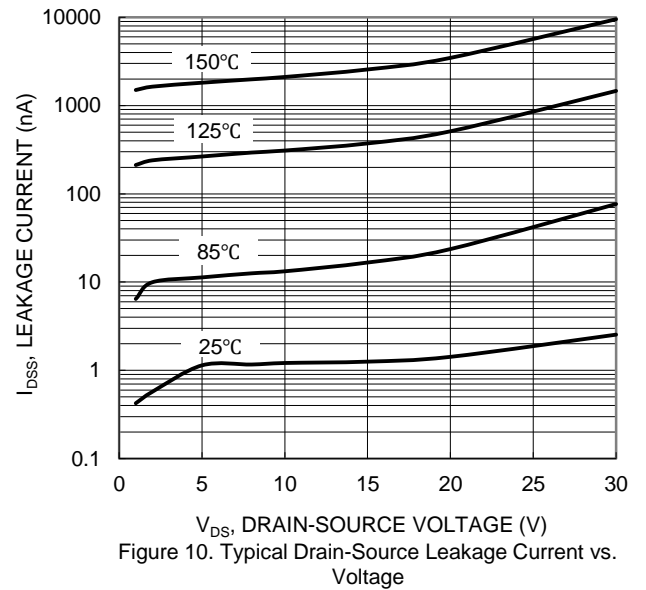


Figure 10. Typical Drain-Source Leakage Current vs. Voltage

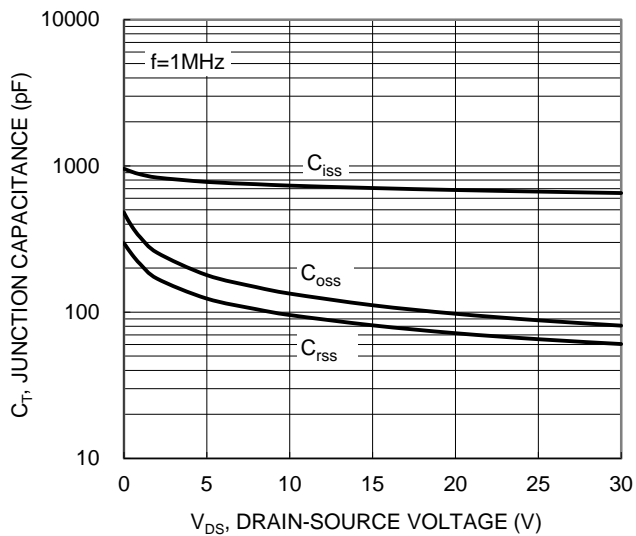


Figure 11. Typical Junction Capacitance

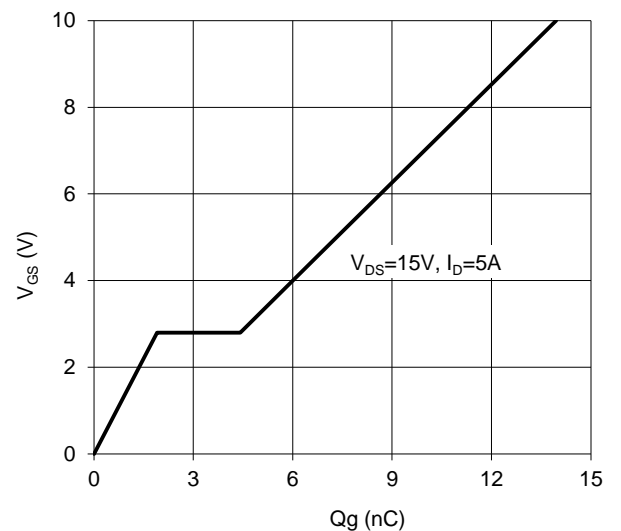
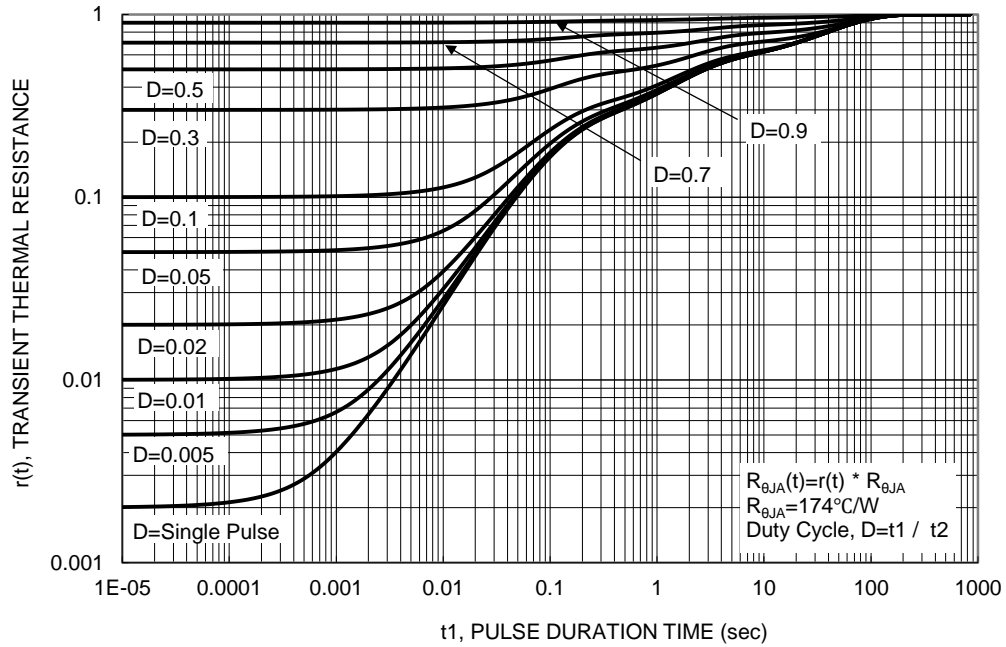
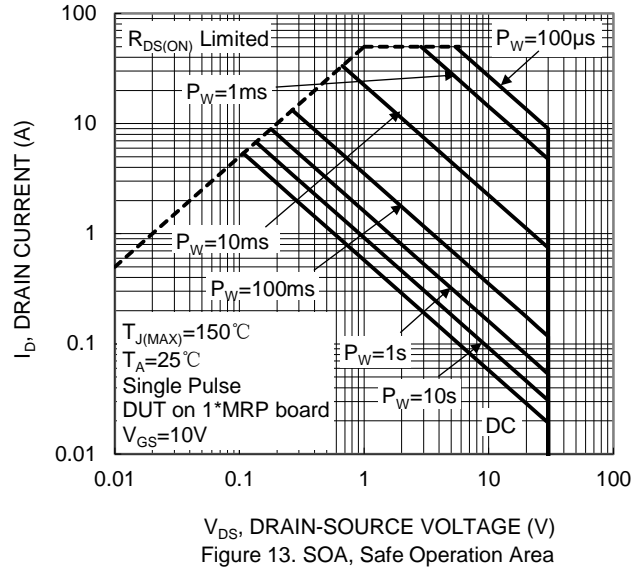


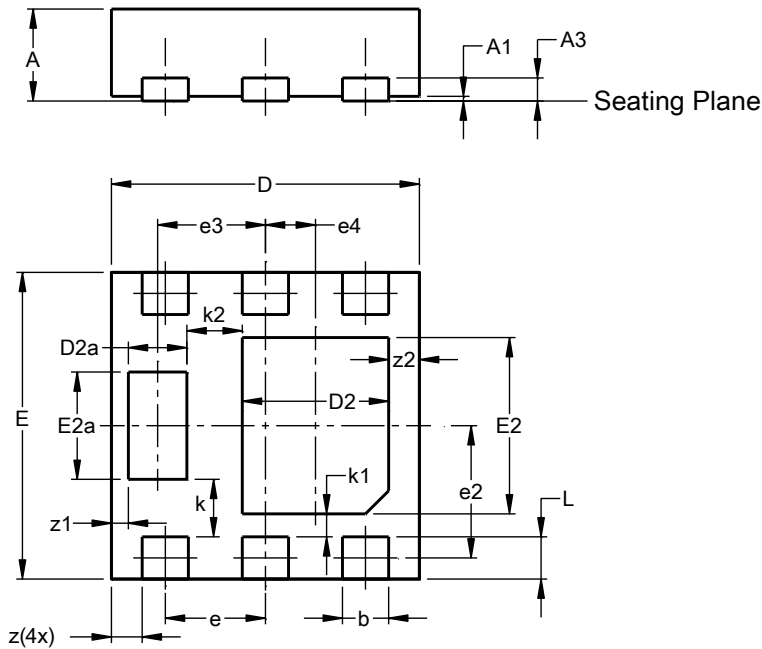
Figure 12. Gate Charge



Package Outline Dimensions

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

U-DFN2020-6 (Type F)

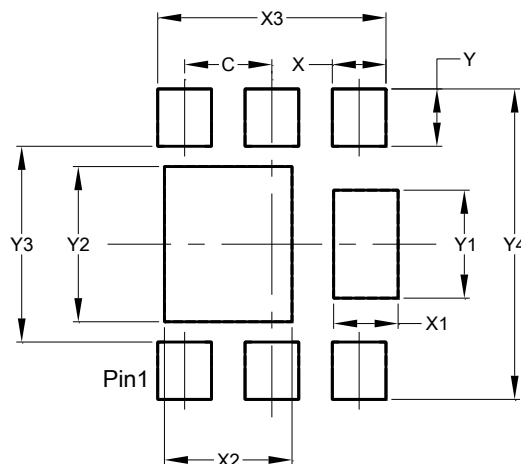


U-DFN2020-6 (Type F)			
Dim	Min	Max	Typ
A	0.57	0.63	0.60
A1	0.00	0.05	0.03
A3	-	-	0.15
b	0.25	0.35	0.30
D	1.95	2.05	2.00
D2	0.85	1.05	0.95
D2a	0.33	0.43	0.38
E	1.95	2.05	2.00
E2	1.05	1.25	1.15
E2a	0.65	0.75	0.70
e	0.65 BSC		
e2	0.863 BSC		
e3	0.70 BSC		
e4	0.325 BSC		
k	0.37 BSC		
k1	0.15 BSC		
k2	0.36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