

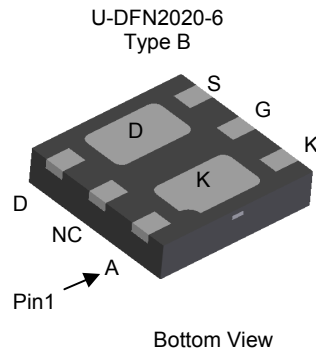
Product Summary

MOSFET		
$V_{(BR)DSS}$	$R_{DS(on) max}$	I_D
-20V	95mΩ @ $V_{GS} = -4.5V$	-3.4A
	120mΩ @ $V_{GS} = -2.5V$	-3.0A
	150mΩ @ $V_{GS} = -1.8V$	-2.7A
SCHOTTKY DIODE		
V_R	$V_F max$	I_o
20V	400mV @ $I_F = 0.5A$	1.0A
	470mV @ $I_F = 1.0A$	

Description and Applications

This new generation MOSFET has been 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.

- Power management functions

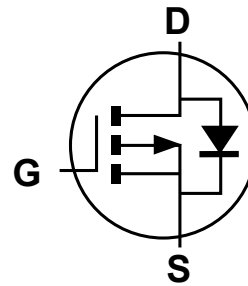


Features and Benefits

- MOSFET with Low $R_{DS(ON)}$ – minimize conduction losses
- Low Gate Threshold Voltage, -1.3V Max
- Schottky Diode with Low Forward Voltage Drop
- Low Profile, 0.5mm Max Height
- 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 B
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections: See Diagram
- Terminals: Finish – NiPdAu annealed over Copper leadframe. Solderable per MIL-STD-202, Method 208 ④
- Weight: 0.0065 grams (approximate)



Ordering Information (Note 4)

Part Number	Case	Packaging
DMS2095LFDB-7	U-DFN2020-6 Type B	3,000/Tape & Reel
DMS2095LFDB-13	U-DFN2020-6 Type B	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



MS2 = Product Type Marking Code
 YM = Date Code Marking
 Y = Year (ex: V = 2008)
 M = Month (ex: 9 = September)

Date Code Key

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

Month Code	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	1	2	3	4	5	6	7	8	9	O	N	D

Maximum Ratings – P-CHANNEL MOSFET – Q1 (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

Characteristic		Symbol	Value	Units	
Drain-Source Voltage		V_{DSS}	-20	V	
Gate-Source Voltage (Note 5)		V_{GSS}	± 12	V	
Continuous Drain Current (Note 7) $V_{GS} = -4.5\text{V}$	Steady State	I_D	$T_A = +25^\circ\text{C}$ $T_A = +70^\circ\text{C}$	-3.4 -2.7	A
	$t < 10\text{s}$		$T_A = +25^\circ\text{C}$ $T_A = +70^\circ\text{C}$	-3.9 -3.1	A
Maximum Body Diode Forward Current (Note 7)		I_S	-1	A	
Pulsed Drain Current (10 μs pulse, duty cycle = 1%)		I_{DM}	-10	A	

Maximum Ratings – SCHOTTKY – D1 (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Peak Repetitive Reverse Voltage	V_{RRM}	20	V
Working Peak Reverse Voltage	V_{RWM}		
DC Blocking Voltage	V_R		
Average Rectified Output Current (Note 7, $t < 10\text{s}$)	I_O	1	A
Peak Repetitive Forward Current (Note 7, $t < 10\text{s}$)	I_{FRM}	2	A
Non-Repetitive Peak Forward Surge Current (Note 7, $t < 10\text{s}$) Single half sine-wave superimposed on rated load	I_{FSM}	20	A

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

Characteristic		Symbol	Value	Units
Total Power Dissipation (Note 6)	$T_A = +25^\circ\text{C}$	P_D	0.81	W
	$T_A = +70^\circ\text{C}$		0.52	
Thermal Resistance, Junction to Ambient (Note 6)	Steady State	$R_{\theta JA}$	154	$^\circ\text{C/W}$
	$t < 10\text{s}$		114	
Total Power Dissipation (Note 7)	$T_A = +25^\circ\text{C}$	P_D	1.64	W
	$T_A = +70^\circ\text{C}$		1.04	
Thermal Resistance, Junction to Ambient (Note 7)	Steady State	$R_{\theta JA}$	77	$^\circ\text{C/W}$
	$t < 10\text{s}$		57	
Thermal Resistance, Junction to Case (Note 7)		$R_{\theta JC}$	27.5	$^\circ\text{C/W}$
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +150	$^\circ\text{C}$

- Notes: 5. AEC-Q101 V_{GS} maximum is $\pm 9.6\text{V}$
6. Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.
7. Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.

Electrical Characteristics – P-CHANNEL MOSFET – Q1 (@T_A = +25°C, unless otherwise specified.)

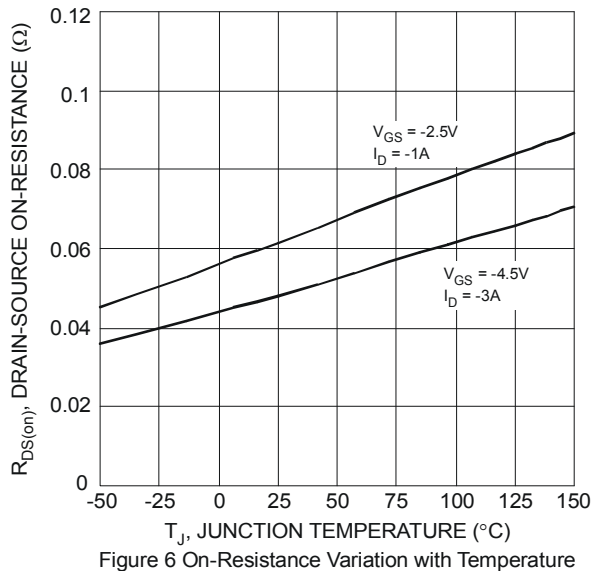
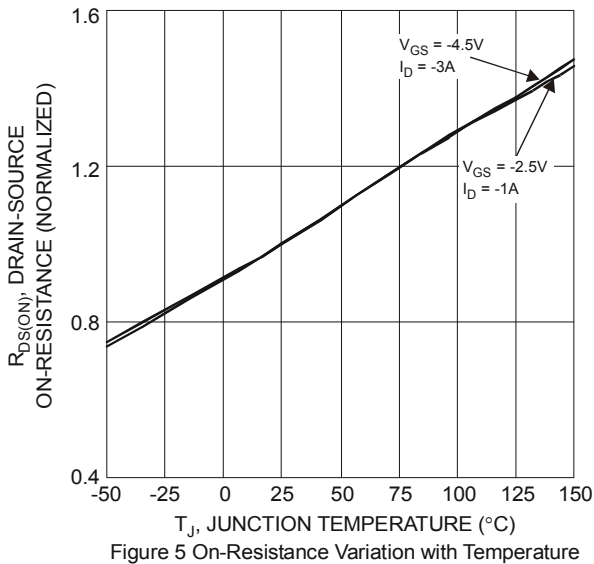
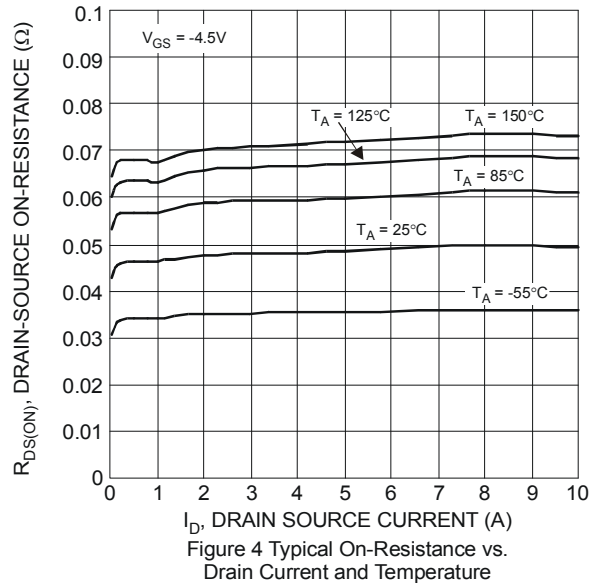
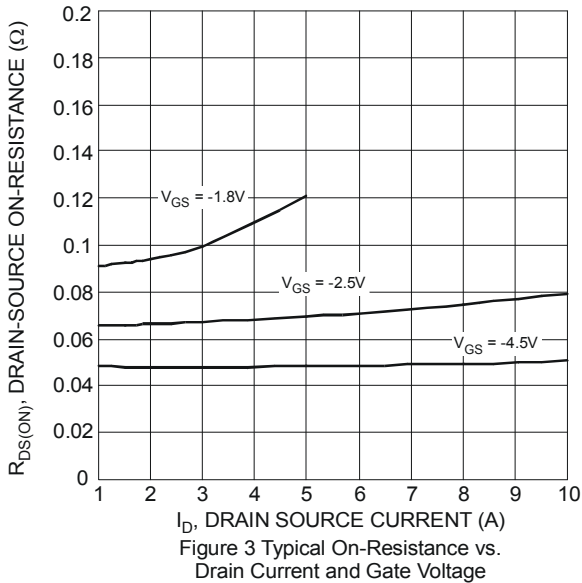
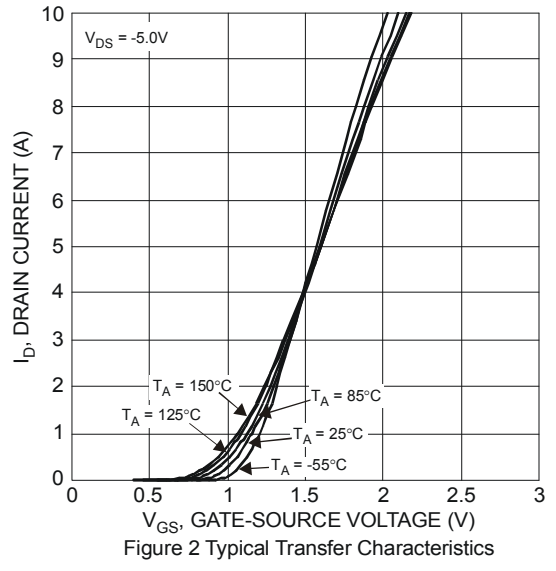
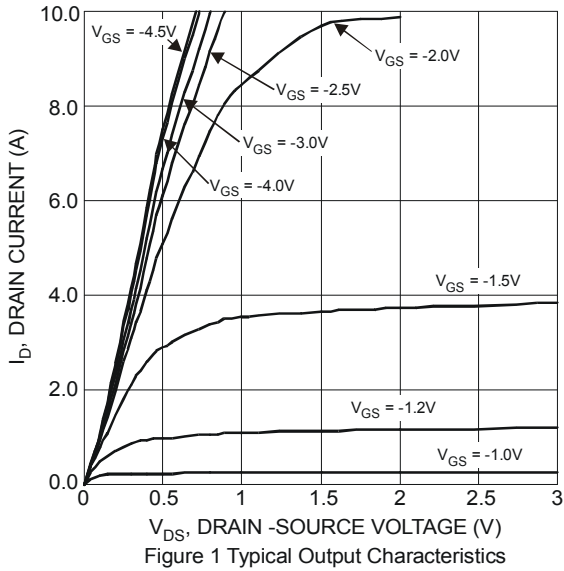
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 8)						
Drain-Source Breakdown Voltage	BV _{DSS}	-20	—	—	V	V _{GS} = 0V, I _D = -250μA
Zero Gate Voltage Drain Current	I _{DSS}	—	—	-1	μA	V _{DS} = -20V, V _{GS} = 0V
Gate-Source Leakage	I _{GSS}	—	—	±800	nA	V _{GS} = ±12V, V _{DS} = 0V
ON CHARACTERISTICS (Note 8)						
Gate Threshold Voltage	V _{GS(th)}	-0.4	—	-1.3	V	V _{DS} = V _{GS} , I _D = -250μA
Static Drain-Source On-Resistance	R _{DS(on)}	—	48	95	mΩ	V _{GS} = -4.5V, I _D = -2.8A
		—	65	120		V _{GS} = -2.5V, I _D = -2.0A
		—	90	150		V _{GS} = -1.8V, I _D = -1.0A
Diode Forward Voltage	V _{SD}	—	-0.42	-1.2	V	V _{GS} = 0V, I _S = -1.0A
DYNAMIC CHARACTERISTICS (Note 9)						
Input Capacitance	C _{iss}	—	561	—	pF	V _{DS} = -10V, V _{GS} = 0V f = 1.0MHz
Output Capacitance	C _{oss}	—	78	—	pF	
Reverse Transfer Capacitance	C _{rss}	—	66	—	pF	
Gate Resistance	R _g	—	59.5	—	Ω	V _{DS} = 0V, V _{GS} = 0V, f = 1MHz
Total Gate Charge	Q _g	—	7.0	—	nC	V _{GS} = -4.5V, V _{DS} = -10V, I _D = -2.5A
Gate-Source Charge	Q _{gs}	—	0.9	—	nC	
Gate-Drain Charge	Q _{gd}	—	1.7	—	nC	
Turn-On Delay Time	t _{D(on)}	—	5.3	—	ns	V _{DD} = -10V, V _{GS} = -4.5V, R _L = 4Ω, R _G = 6Ω
Turn-On Rise Time	t _r	—	5.8	—	ns	
Turn-Off Delay Time	t _{D(off)}	—	69	—	ns	
Turn-Off Fall Time	t _f	—	54	—	ns	
Reverse Recovery Time	t _{rr}	—	12.4	—	ns	I _F = -2.5A, di/dt = 100A/μs
Reverse Recovery Charge	Q _{rr}	—	3.7	—	nC	

Electrical Characteristics – SCHOTTKY – D1 (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Reverse Breakdown Voltage (Note 8)	V _{(BR)R}	20	35	—	V	I _R = 1mA
Forward Voltage (Note 8)	V _F	—	—	0.40 0.47	V	I _F = 0.5A I _F = 1.0A
Reverse Current (Note 8)	I _R	—	30	80	μA	V _R = 20V

Notes: 8. Short duration pulse test used to minimize self-heating effect.
9. Guaranteed by design. Not subject to product testing

MOSFET Characteristics



MOSFET Characteristics (cont.)

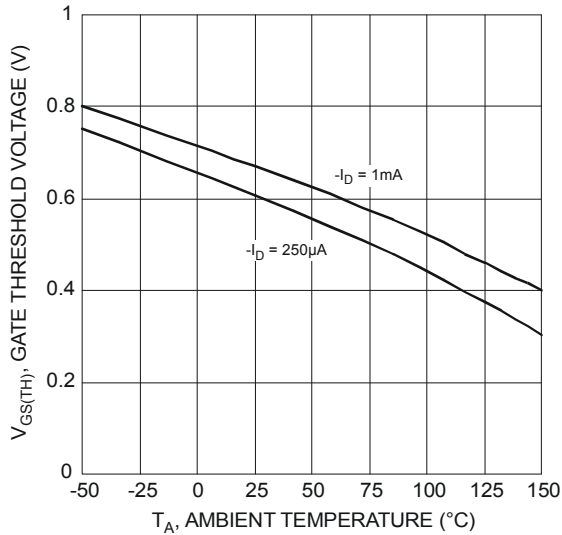


Figure 7 Gate Threshold Variation vs. Ambient Temperature

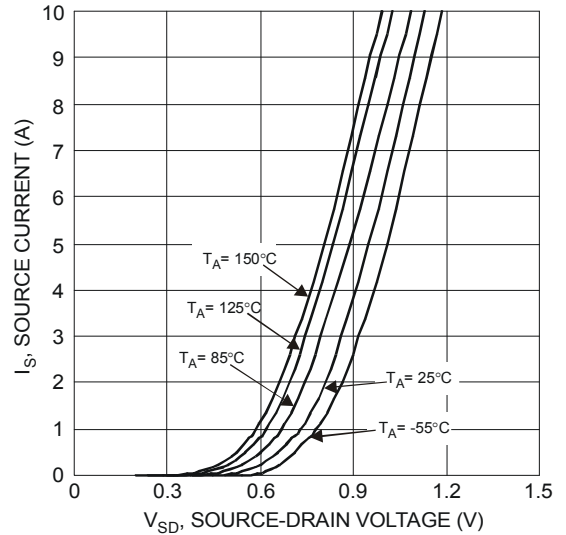


Figure 8 Diode Forward Voltage vs. Current

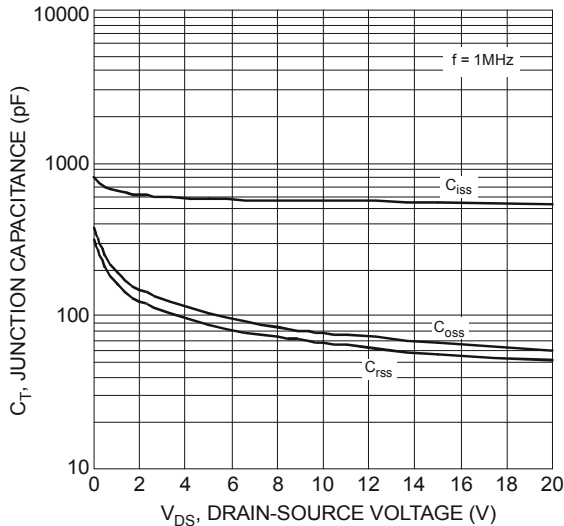


Figure 9 Typical Junction Capacitance

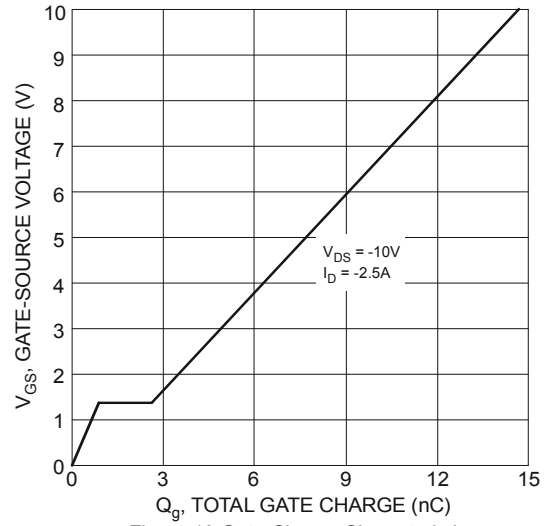


Figure 10 Gate-Charge Characteristics

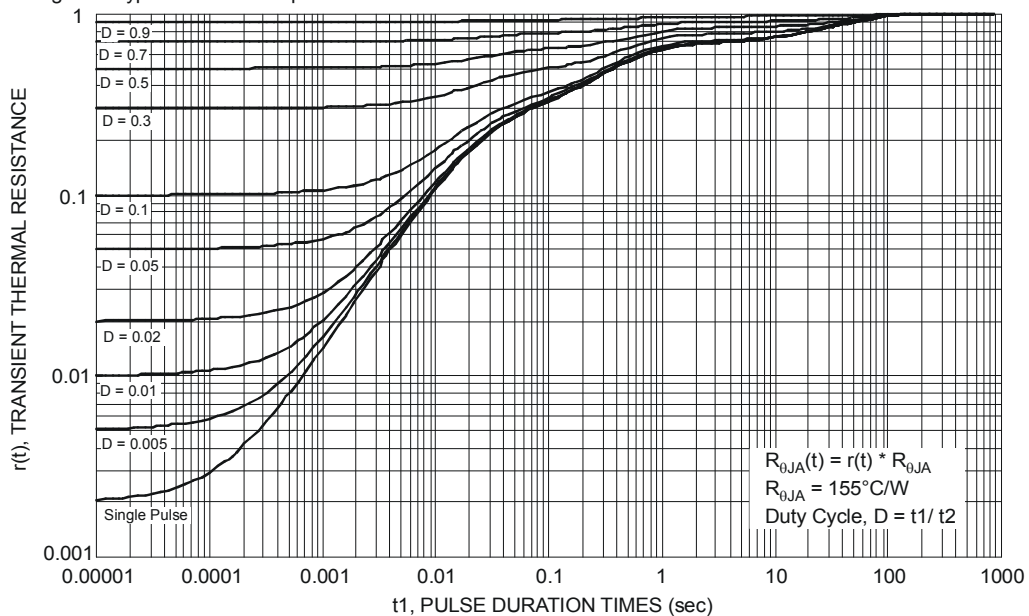


Figure 11 Transient Thermal Resistance

$R_{\theta JA}(t) = r(t) * R_{\theta JA}$
 $R_{\theta JA} = 155^{\circ}\text{C/W}$
 Duty Cycle, $D = t_1 / t_2$

Schottky Characteristics

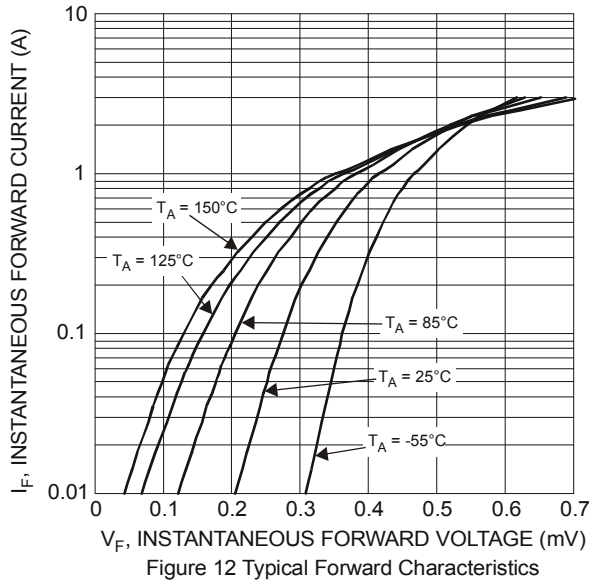


Figure 12 Typical Forward Characteristics

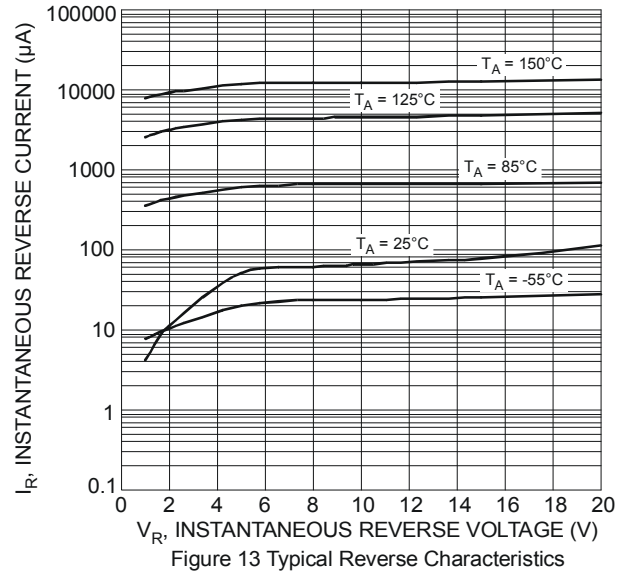
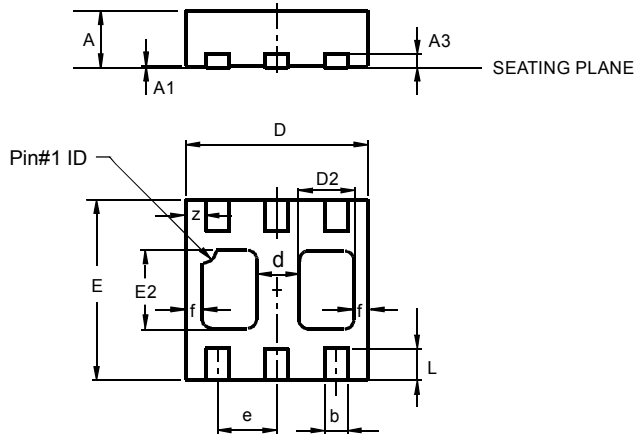


Figure 13 Typical Reverse Characteristics

Package Outline Dimensions

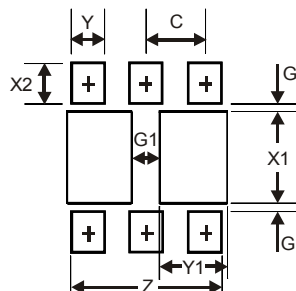
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



U-DFN2020-6 Type B			
Dim	Min	Max	Typ
A	0.545	0.605	0.575
A1	0	0.05	0.02
A3	—	—	0.13
b	0.20	0.30	0.25
D	1.95	2.075	2.00
d	—	—	0.45
D2	0.50	0.70	0.60
e	—	—	0.65
E	1.95	2.075	2.00
E2	0.90	1.10	1.00
f	—	—	0.15
L	0.25	0.35	0.30
z	—	—	0.225
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)
Z	1.67
G	0.20
G1	0.40
X1	1.0
X2	0.45
Y	0.37
Y1	0.70
C	0.65

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