

## P-CHANNEL ENHANCEMENT MODE MOSFET WITH INTEGRATED SBR<sup>®</sup> SUPER BARRIER RECTIFIER

### Features

- Low On-Resistance
  - 95mΩ @V<sub>GS</sub> = -4.5V
  - 120mΩ @V<sub>GS</sub> = -2.5V
  - 86mΩ (typ) @V<sub>GS</sub> = -1.8V
- Low Gate Threshold Voltage, -1.3V Max
- Fast Switching Speed
- Low Input/Output Leakage
- Incorporates Low V<sub>F</sub> Super Barrier Rectifier (SBR)
- 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**

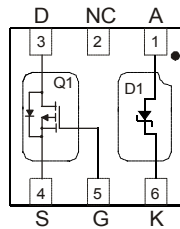
### Mechanical Data

- 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 over Copper leadframe. Solderable per MIL-STD-202, Method 208 <sup>(e4)</sup>
- Weight: 0.0065 grams (approximate)

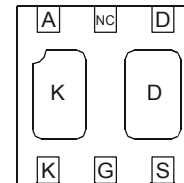
U-DFN2020-6  
Type B



Bottom View



Top View  
Internal Schematic



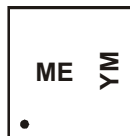
Bottom View  
Pin Configuration

### Ordering Information (Note 4)

Part Number	Case	Packaging
DMS2220LFDB-7	U-DFN2020-6 Type B	3000/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> 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>.

### Marking Information



ME = Marking Code  
 YM = Date Code Marking  
 Y = Year (ex: V = 2008)  
 M = Month (ex: 9 = September)  
 Dot denotes Pin 1

#### Date Code Key

Year	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017		
Code	V	W	X	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 – TOTAL DEVICE** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Power Dissipation (Note 5)	P <sub>D</sub>	1.4	W
Thermal Resistance, Junction to Ambient	R <sub>θJA</sub>	89	°C/W
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C

**Maximum Ratings – P-CHANNEL MOSFET – Q1** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Units
Drain-Source Voltage	V <sub>DSS</sub>	-20	V
Gate-Source Voltage	V <sub>GSS</sub>	±12	V
Drain Current (Note 5)	I <sub>D</sub>	-3.5	A
Pulsed Drain Current (Note 6)	I <sub>DM</sub>	-12	A

**Maximum Ratings – SBR – D1** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Peak Repetitive Reverse Voltage	V <sub>R</sub> RM	20	V
Working Peak Reverse Voltage	V <sub>R</sub> WM		
DC Blocking Voltage	V <sub>R</sub>		
RMS Reverse Voltage	V <sub>R(RMS)</sub>	14	V
Average Rectified Output Current	I <sub>O</sub>	1	A
Non-Repetitive Peak Forward Surge Current 8.3ms single half sine-wave superimposed on rated load	I <sub>FSM</sub>	3	A

**Electrical Characteristics – P-CHANNEL MOSFET – Q1** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS (Note 7)</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	-20	—	—	V	V <sub>GS</sub> = 0V, I <sub>D</sub> = -250μA
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	—	—	-1	μA	V <sub>DS</sub> = -20V, V <sub>GS</sub> = 0V
Gate-Source Leakage	I <sub>GSS</sub>	—	—	±100 ±800	nA	V <sub>GS</sub> = ±8V, V <sub>DS</sub> = 0V V <sub>GS</sub> = ±12V, V <sub>DS</sub> = 0V
<b>ON CHARACTERISTICS (Note 7)</b>						
Gate Threshold Voltage	V <sub>GS(th)</sub>	-0.45	—	-1.3	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -250μA
Static Drain-Source On-Resistance	R <sub>DS(ON)</sub>	—	60	95	mΩ	V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -2.8A
		—	74	120		V <sub>GS</sub> = -2.5V, I <sub>D</sub> = -2.0A
		—	86	—		V <sub>GS</sub> = -1.8V, I <sub>D</sub> = -1.0A
Forward Transfer Admittance	Y <sub>fs</sub>	—	8	—	S	V <sub>DS</sub> = -5V, I <sub>D</sub> = -2.8A
Diode Forward Voltage (Note 7)	V <sub>SD</sub>	—	0.7	-1.2	V	V <sub>GS</sub> = 0V, I <sub>S</sub> = -1.6A
<b>DYNAMIC CHARACTERISTICS</b>						
Input Capacitance	C <sub>iss</sub>	—	632	—	pF	V <sub>DS</sub> = -10V, V <sub>GS</sub> = 0V f = 1.0MHz
Output Capacitance	C <sub>oss</sub>	—	65	—	pF	
Reverse Transfer Capacitance	C <sub>rss</sub>	—	54	—	pF	

**Electrical Characteristics – SBR – D1** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Reverse Breakdown Voltage (Note 7)	V <sub>(BR)R</sub>	20	—	—	V	I <sub>R</sub> = 1mA
Forward Voltage	V <sub>F</sub>	—	—	0.45	V	I <sub>F</sub> = 0.5A
		—	—	0.52		I <sub>F</sub> = 1.0A
Reverse Current (Note 7)	I <sub>R</sub>	—	—	100	μA	V <sub>R</sub> = 20V

- Notes:
- Device mounted on FR-4 PCB, on minimum recommended, 2oz Copper pad layout.
  - Repetitive rating, pulse width limited by junction temperature.
  - Short duration pulse test used to minimize self-heating effect.

**Q1 - P-CHANNEL MOSFET**

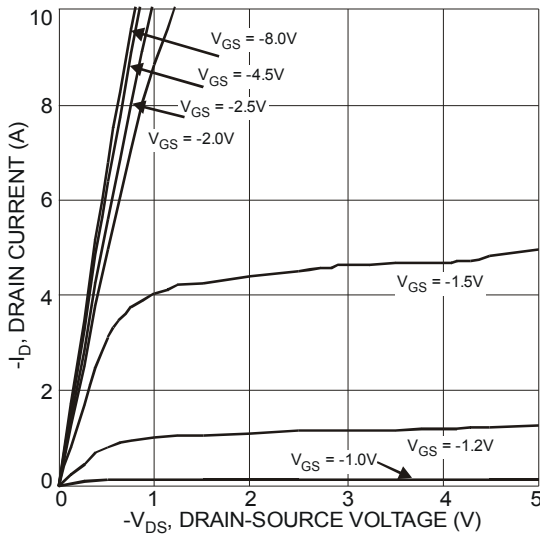


Fig. 1 Typical Output Characteristics

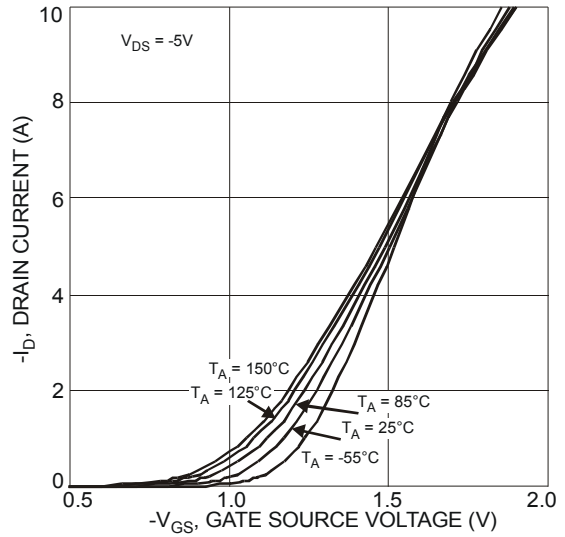


Fig. 2 Typical Transfer Characteristics

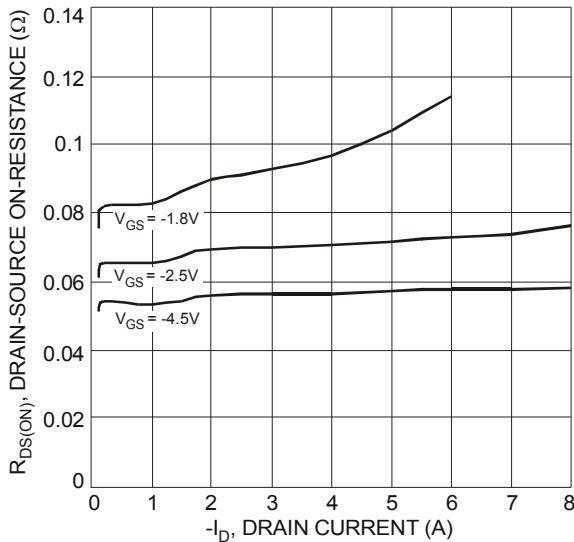


Fig. 3 Typical On-Resistance vs. Drain Current and Gate Voltage

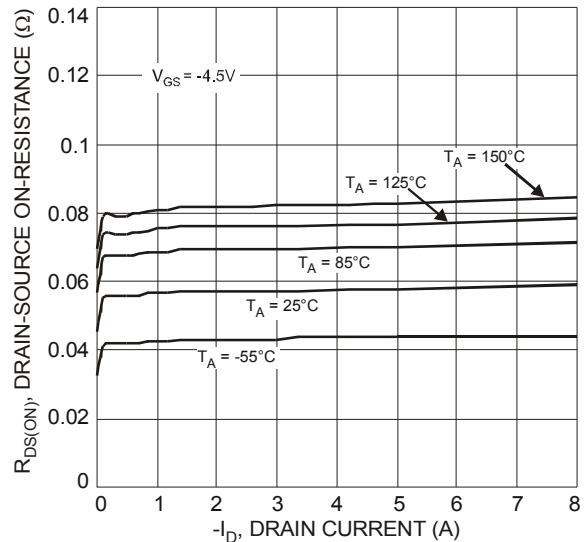


Fig. 4 Typical Drain-Source On-Resistance vs. Drain Current and Temperature

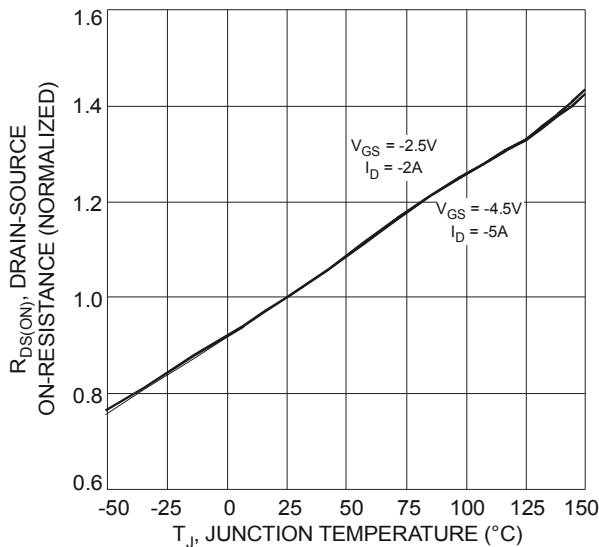


Fig. 5 On-Resistance Variation with Temperature

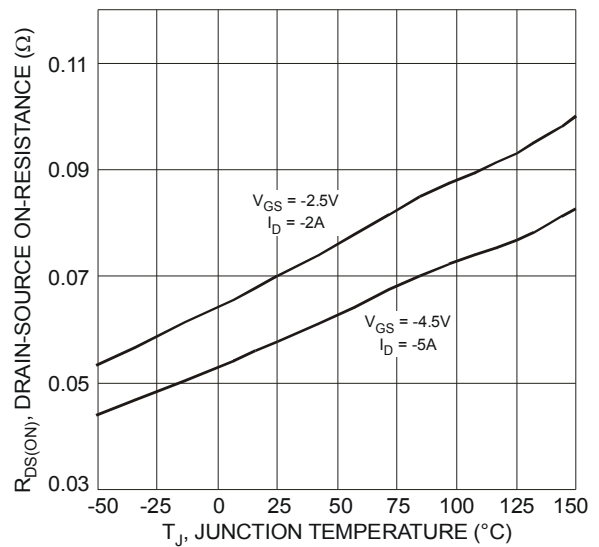
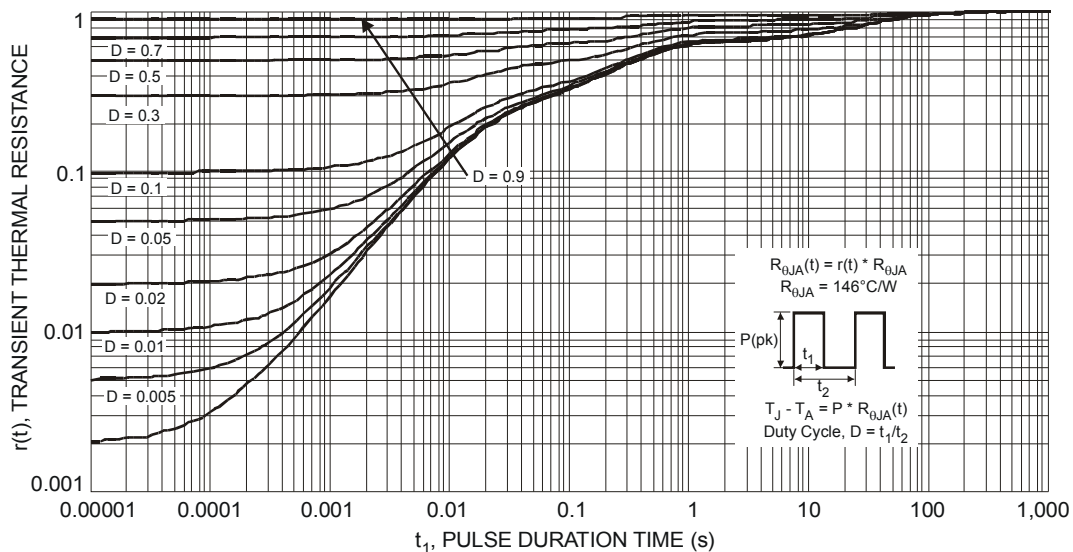
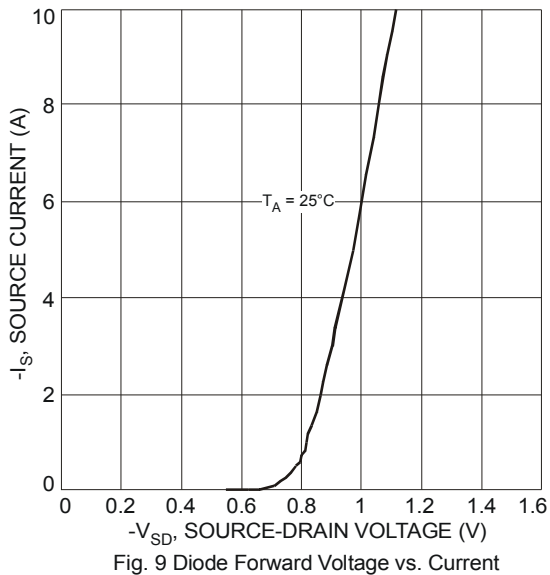
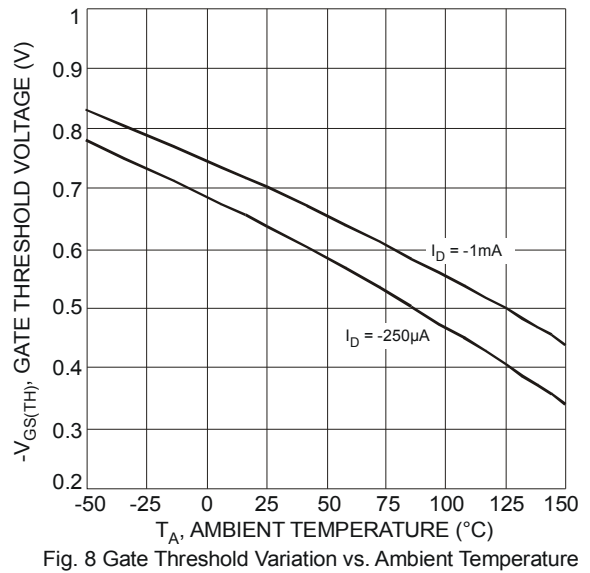
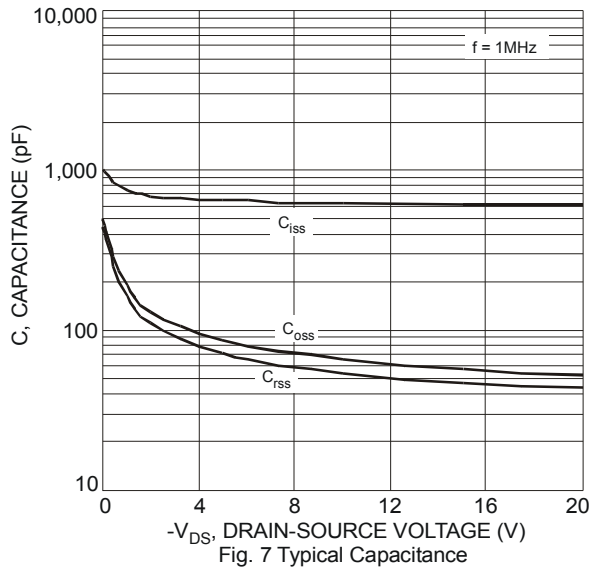


Fig. 6 On-Resistance Variation with Temperature



**D1 - SBR**

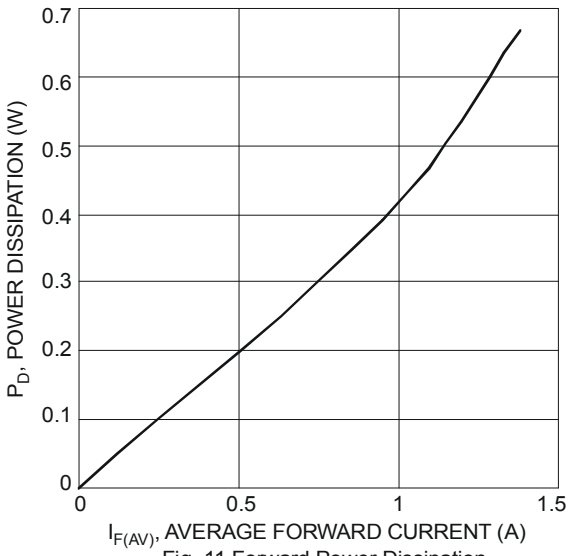


Fig. 11 Forward Power Dissipation

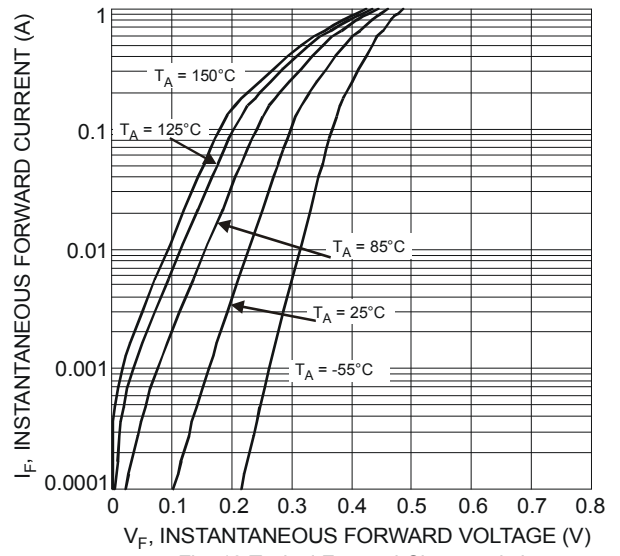


Fig. 12 Typical Forward Characteristics

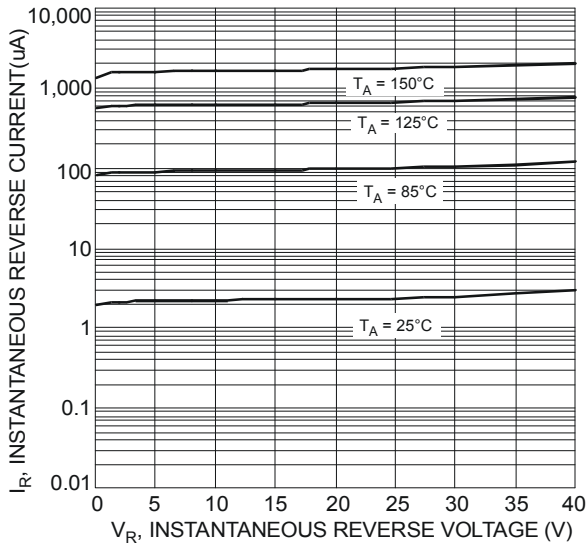


Fig. 13 Typical Reverse Characteristics

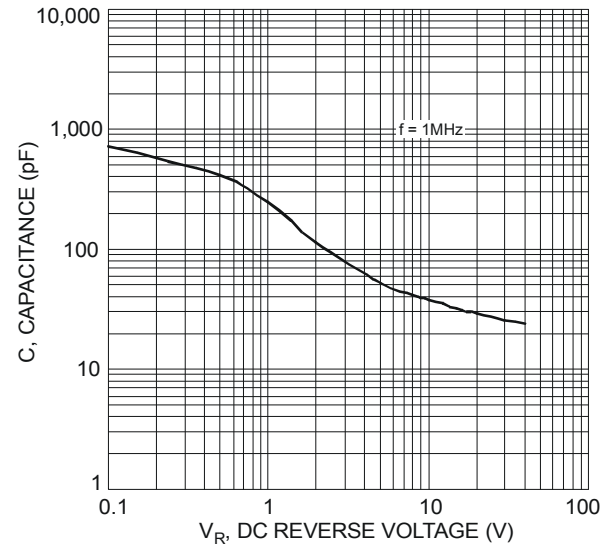


Fig. 14 Total Capacitance vs. Reverse Voltage

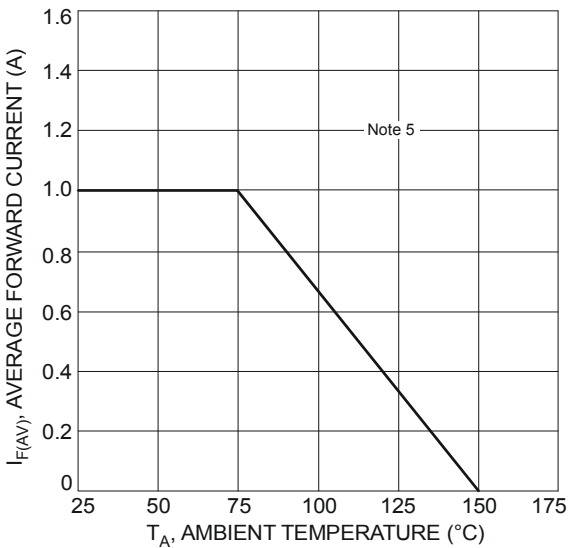


Fig. 15 Forward Current Derating Curve

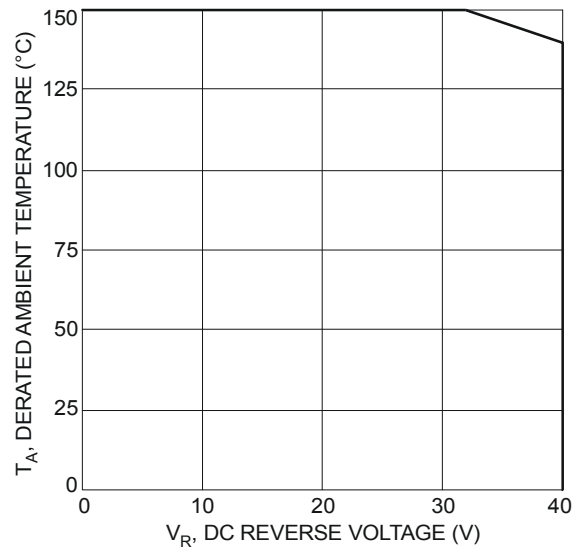
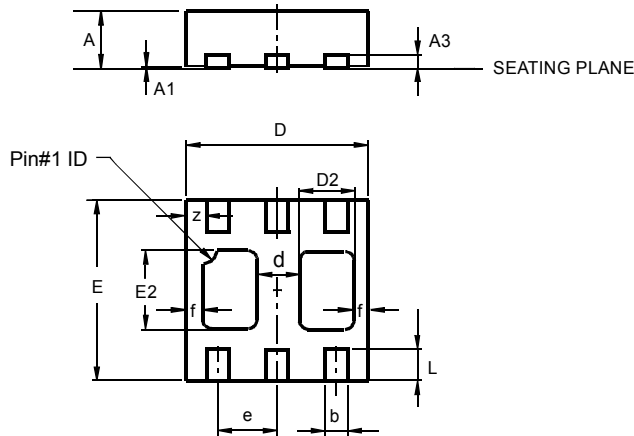


Fig. 16 Operating Temperature Derating

**Package Outline Dimensions**

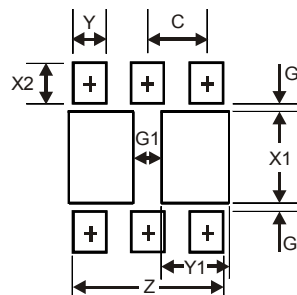
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



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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