

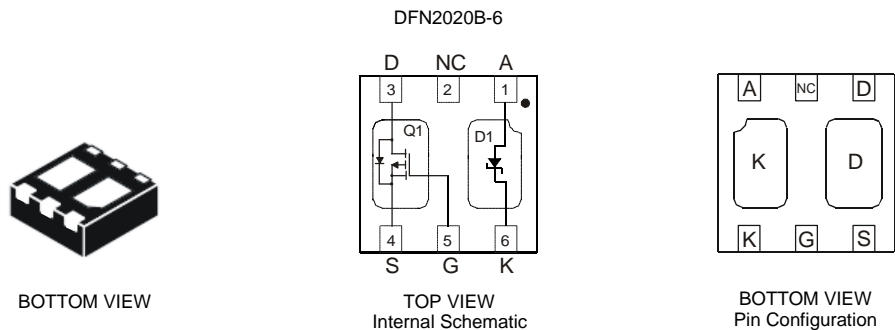
# P-CHANNEL ENHANCEMENT MODE MOSFET WITH INTEGRATED SBR<sup>®</sup> SUPER BARRIER RECTIFIER

## 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<sup>®</sup>)
- Low Profile, 0.5mm Max Height
- Lead Free/RoHS Compliant (Note 2)
- "Green" Device (Note 3)
- Qualified to AEC-Q101 Standards for High Reliability

## Mechanical Data

- Case: DFN2020B-6
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020D
- Terminal Connections: See Diagram
- Terminals: Finish – NiPdAu over Copper leadframe. Solderable per MIL-STD-202, Method 208
- Marking Information: See Page 6
- Ordering Information: See Page 6
- Weight: 0.0065 grams (approximate)



## Maximum Ratings – TOTAL DEVICE @T<sub>A</sub> = 25°C unless otherwise specified

Characteristic	Symbol	Value	Unit
Power Dissipation (Note 1)	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 1)	I <sub>D</sub>	-3.5	A
Pulsed Drain Current (Note 4)	I <sub>DM</sub>	-12	A

## Maximum Ratings – SBR<sup>®</sup> – D1 @T<sub>A</sub> = 25°C unless otherwise specified

Characteristic	Symbol	Value	Unit
Peak Repetitive Reverse Voltage	V <sub>R</sub> RM	35	V
Working Peak Reverse Voltage	V <sub>R</sub> WM		
DC Blocking Voltage	V <sub>R</sub>		
RMS Reverse Voltage	V <sub>R</sub> (RMS)	25	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

- Notes:
- Device mounted on FR-4 PCB, on minimum recommended, 2oz Copper pad layout.
  - No purposefully added lead.
  - Diodes Inc.'s "Green" policy can be found on our website at [http://www.diodes.com/products/lead\\_free/index.php](http://www.diodes.com/products/lead_free/index.php).
  - Repetitive rating, pulse width limited by junction temperature.

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**Electrical Characteristics – P-CHANNEL MOSFET – Q1** @  $T_A = 25^\circ\text{C}$  unless otherwise specified

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS (Note 5)</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	-20	—	—	V	$V_{GS} = 0V, I_D = -250\mu A$
Zero Gate Voltage Drain Current	$I_{DSS}$	—	—	-1	$\mu A$	$V_{DS} = -20V, V_{GS} = 0V$
Gate-Source Leakage	$I_{GSS}$	—	—	$\pm 100$ $\pm 800$	nA	$V_{GS} = \pm 8V, V_{DS} = 0V$ $V_{GS} = \pm 12V, V_{DS} = 0V$
<b>ON CHARACTERISTICS (Note 5)</b>						
Gate Threshold Voltage	$V_{GS(th)}$	-0.45	—	-1.3	V	$V_{DS} = V_{GS}, I_D = -250\mu A$
Static Drain-Source On-Resistance	$R_{DS(on)}$	—	60	95	m $\Omega$	$V_{GS} = -4.5V, I_D = -2.8A$
		—	74	120		$V_{GS} = -2.5V, I_D = -2.0A$
		—	86	—		$V_{GS} = -1.8V, I_D = -1.0A$
		—	—	—		$V_{GS} = -1.0V, I_D = -1.0A$
Forward Transfer Admittance	$ Y_{fs} $	—	8	—	S	$V_{DS} = -5V, I_D = -2.8A$
Diode Forward Voltage (Note 5)	$V_{SD}$	—	0.7	-1.2	V	$V_{GS} = 0V, I_S = -1.6A$
<b>DYNAMIC CHARACTERISTICS</b>						
Input Capacitance	$C_{iss}$	—	632	—	pF	$V_{DS} = -10V, V_{GS} = 0V$ $f = 1.0MHz$
Output Capacitance	$C_{oss}$	—	65	—	pF	
Reverse Transfer Capacitance	$C_{rss}$	—	54	—	pF	

**Electrical Characteristics – SBR<sup>®</sup> – D1** @  $T_A = 25^\circ\text{C}$  unless otherwise specified

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Reverse Breakdown Voltage (Note 5)	$V_{(BR)R}$	35	40	—	V	$I_R = 1mA$
Forward Voltage	$V_F$	—	354 415	0.42 0.49	V	$I_F = 0.5A$ $I_F = 1.0A$
Reverse Current (Note 5)	$I_R$	—	—	100	$\mu A$	$V_R = 20V$

Notes: 5. Short duration pulse test used to minimize self-heating effect.

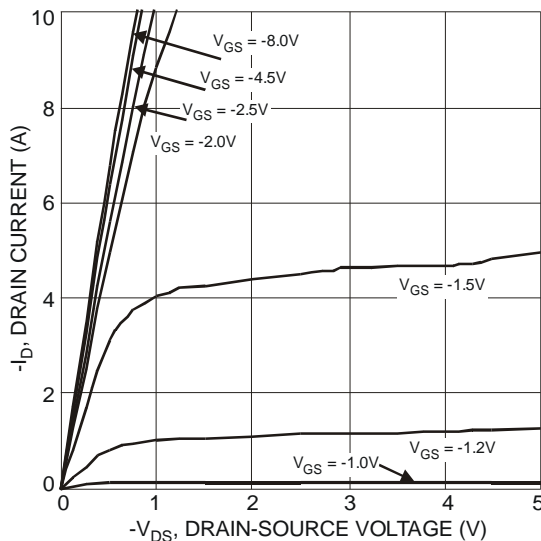
**Q1, P-CHANNEL MOSFET**


Fig. 1 Typical Output Characteristics

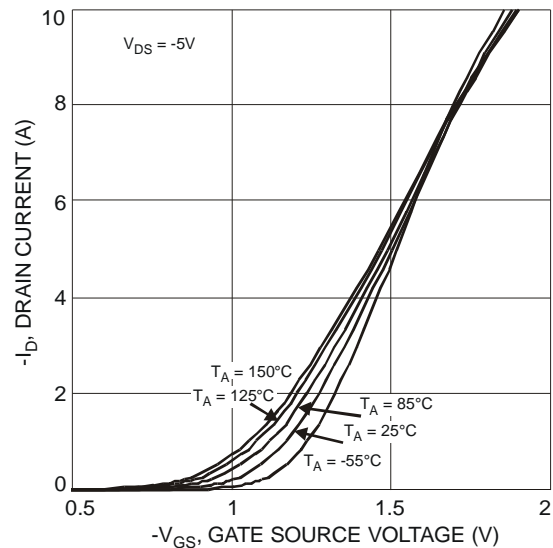


Fig. 2 Typical Transfer Characteristics

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**Q1, P-CHANNEL MOSFET - Continued**

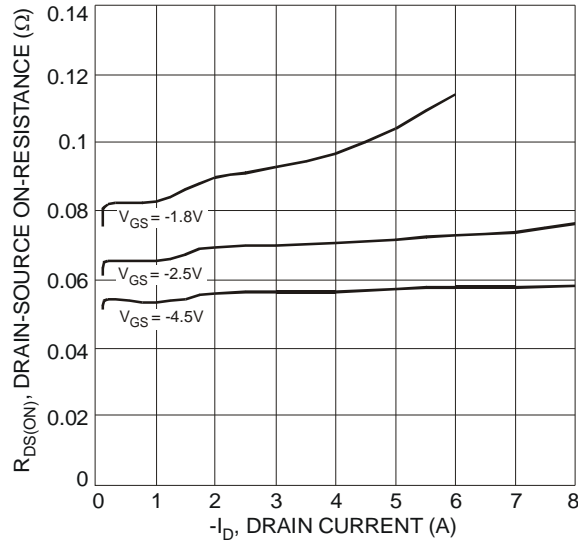


Fig. 3 Typical On-Resistance vs. Drain Current and Gate Voltage

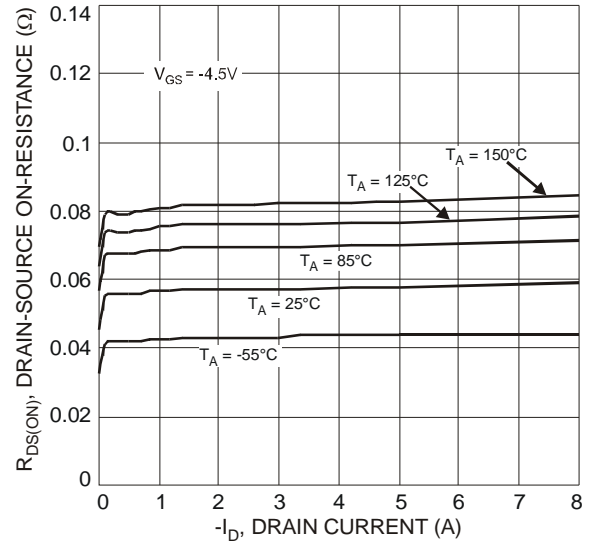


Fig. 4 Typical Drain-Source On-Resistance vs. Drain Current and Temperature

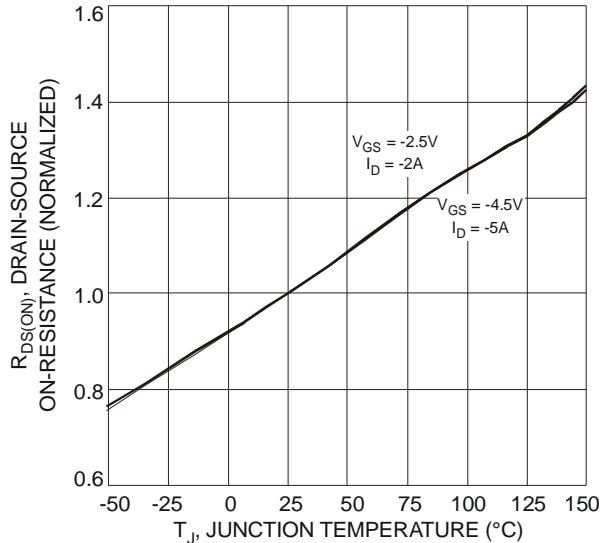


Fig. 5 On-Resistance Variation with Temperature

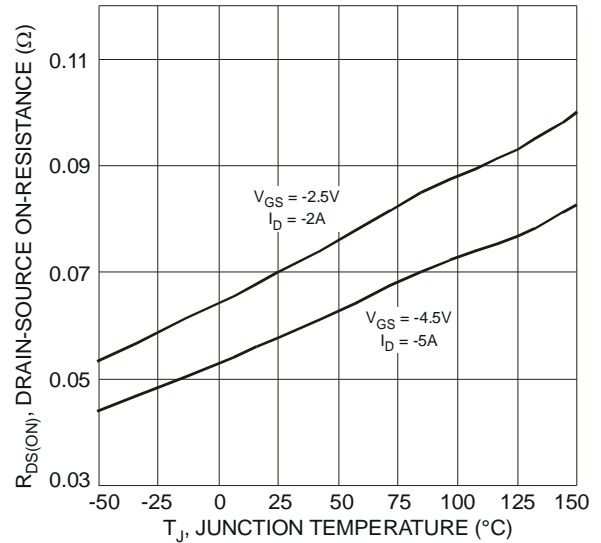


Fig. 6 On-Resistance Variation with Temperature

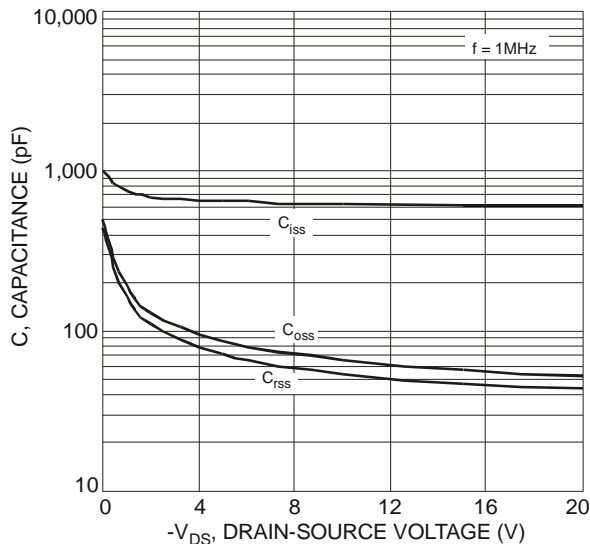


Fig. 7 Typical Capacitance

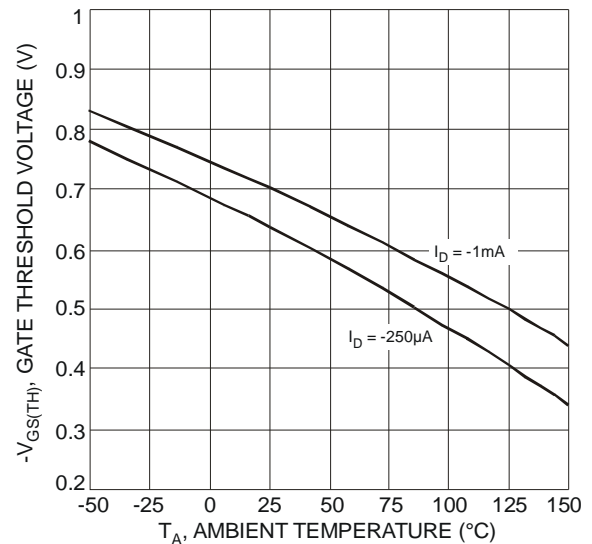


Fig. 8 Gate Threshold Variation vs. Ambient Temperature

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**Q1, P-CHANNEL MOSFET - Continued**

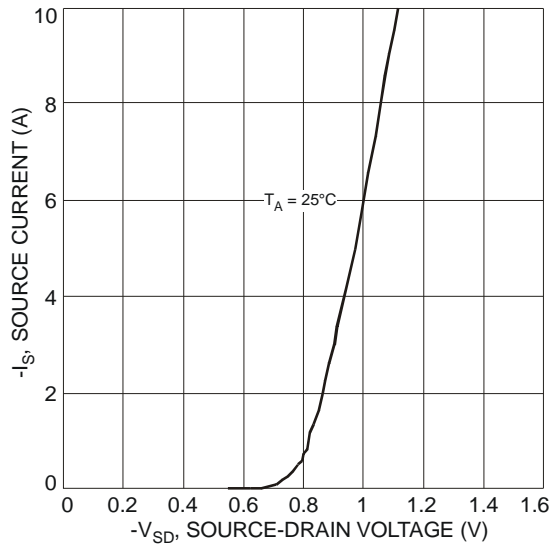


Fig. 9 Diode Forward Voltage vs. Current

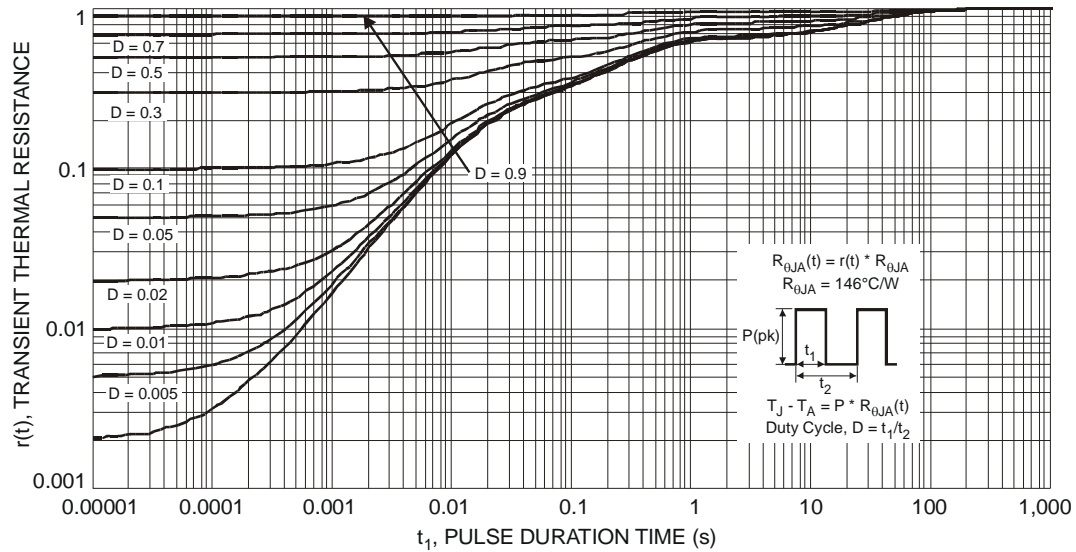
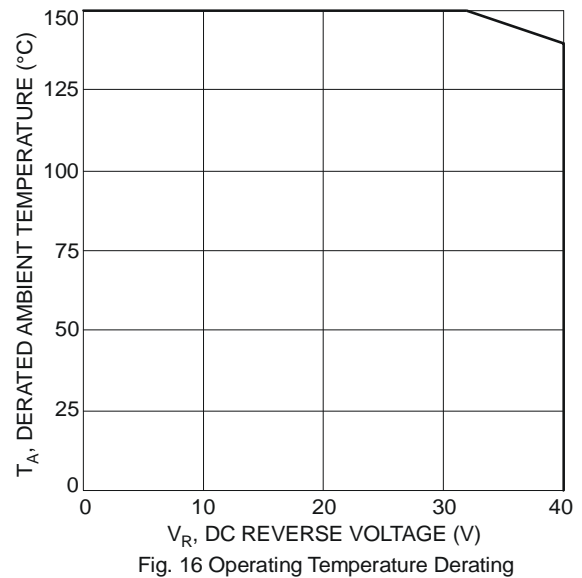
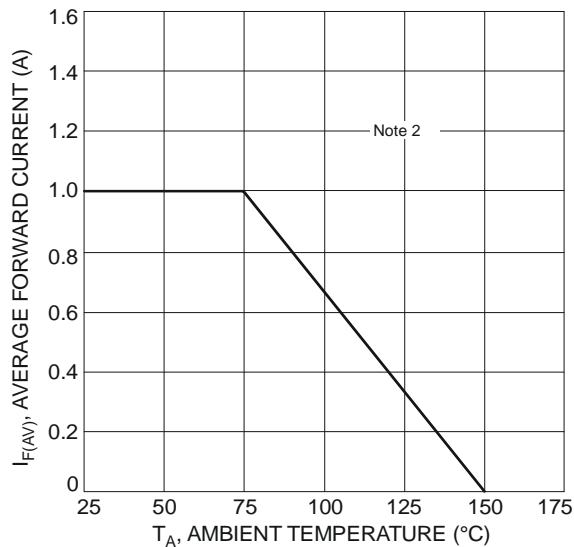
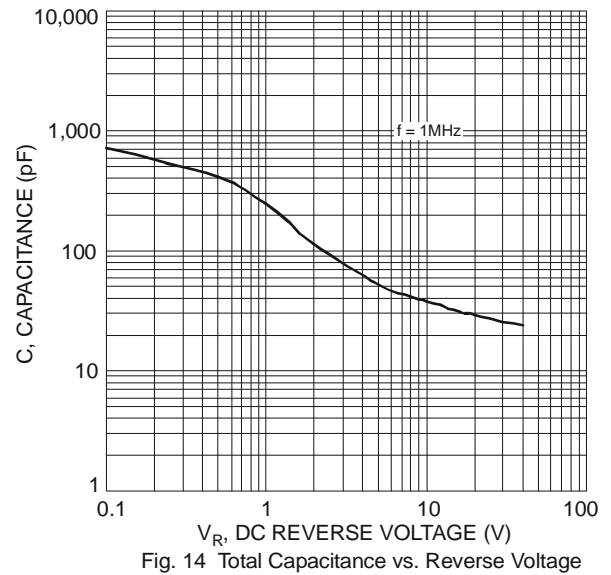
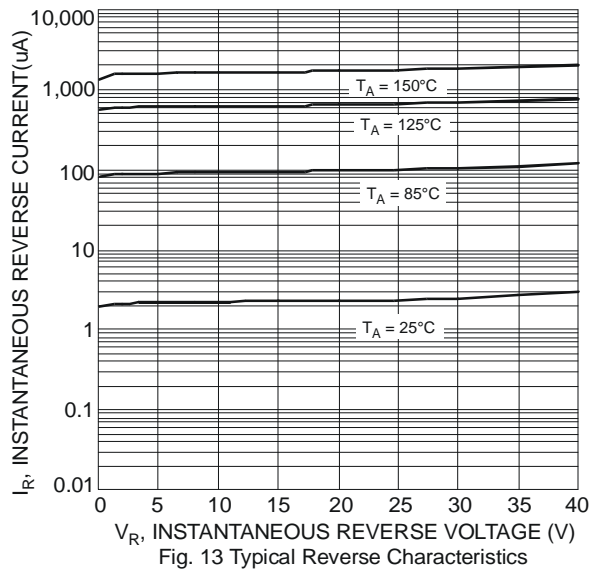
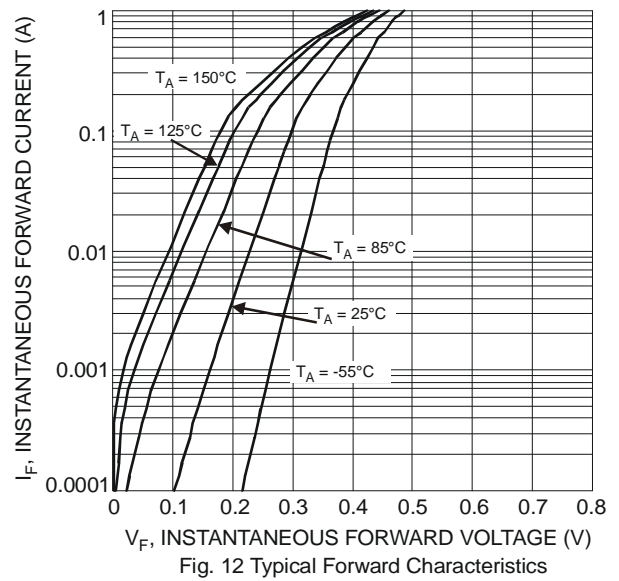
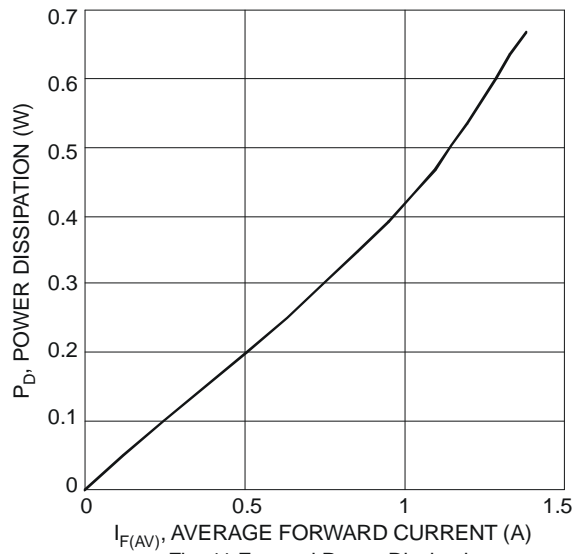


Fig. 10 Transient Thermal Response

**D1, SBR®**



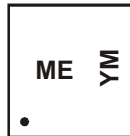
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## Ordering Information (Note 6)

Part Number	Case	Packaging
DMS2220LFDB-7	DFN2020B-6	3000/Tape & Reel

Notes: 6. For packaging details, go to our website at <http://www.diodes.com/datasheets/ap02007.pdf>.

## Marking Information



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

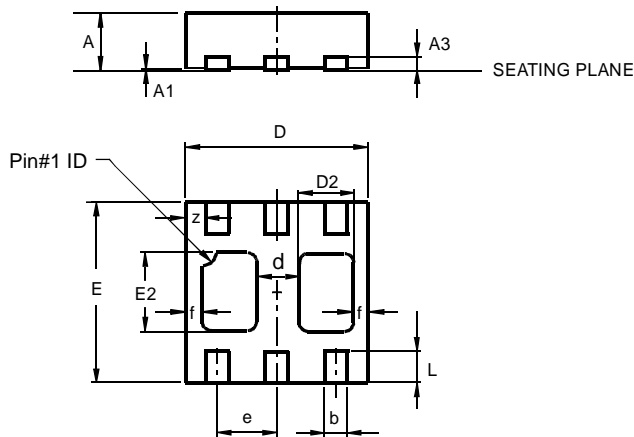
### Date Code Key

Year	2008	2009	2010	2011	2012	2013	2014	2015
Code	V	W	X	Y	Z	A	B	C

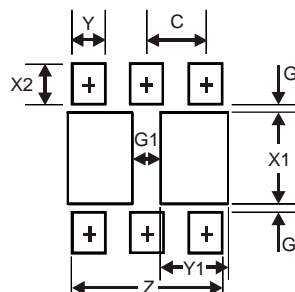
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Code	1	2	3	4	5	6	7	8	9	O	N	D

## Package Outline Dimensions



DFN2020B-6			
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



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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