DUAL P-CHANNEL ENHANCEMENT MODE MOSFET

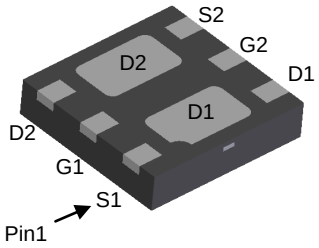
Features

- Low On-Resistance
  - 70mΩ @V_{GS} = -4.5V
  - 85mΩ @V_{GS} = -2.5V
  - 86mΩ (typ) @V_{GS} = -1.8V
- Low Gate Threshold Voltage, -0.9V Max
- Fast Switching Speed
- Low Input/Output Leakage
- 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**

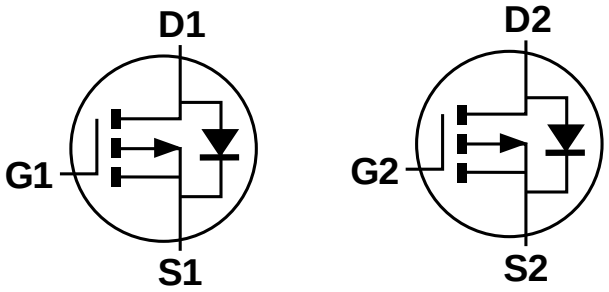
Mechanical Data

- 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 e4
- Weight: 0.0065 grams (Approximate)

U-DFN2020-6
Type B



Bottom View



Equivalent Circuit

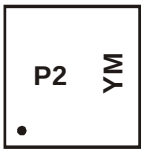
Ordering Information (Note 4)

Part Number	Case	Packaging
DMP2160UFDB-7	U-DFN2020-6 Type B	3,000/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

U-DFN2020-6
Type B



P2 = Marking Code
YM = Date Marking
Y = Year (ex: V = 2008)
M = Month (ex: 9 = September)
Dot Denotes Pin 1

Date Code Key

Year	2008	2009	…..	2015	2016	2017	2018	2019	2020	2021	2022
Code	V	W	…..	C	D	E	F	G	H	I	J

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	Units
Drain-Source Voltage	V_{DSS}	-20	V
Gate-Source Voltage	V_{GSS}	±12	V
Drain Current (Note 5)	I_D	-3.8	A
Pulsed Drain Current (Note 6)	I_{DM}	-13	A

Thermal Characteristics (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Power Dissipation (Note 5)	P_D	1.4	W
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	89	°C/W
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 7						
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}	— —	— —	±100 ±800	nA	V_{GS} = ±8V, V_{DS} = 0V V_{GS} = ±12V, V_{DS} = 0V
ON CHARACTERISTICS (Note 7)						
Gate Threshold Voltage	$V_{GS(th)}$	-0.45	—	-0.9	V	V_{DS} = V_{GS}, I_D = -250µA
Static Drain-Source On-Resistance	$R_{DS\ (ON)}$	— — —	54 68 86	70 85 —	mΩ	V_{GS} = -4.5V, I_D = -2.8A V_{GS} = -2.5V, I_D = -2.0A V_{GS} = -1.8V, I_D = -1.0A
Forward Transfer Admittance	$\|Y_{fs}\|$	—	8	—	S	V_{DS} = -5V, I_D = -2.8A
Diode Forward Voltage (Note 7)	V_{SD}	—	0.7	-1.2	V	V_{GS} = 0V, I_S = -1.6A
DYNAMIC CHARACTERISTICS						
Input Capacitance	C_{iss}	—	536	—	pF	V_{DS} = -10V, V_{GS} = 0V f = 1.0MHz
Output Capacitance	C_{oss}	—	68	—	pF	
Reverse Transfer Capacitance	C_{rss}	—	59	—	pF	
Gate Resistance	R_g	-	34	-	Ω	V_{DS} = 0V, V_{GS} = 0V, f = 1MHz
Total Gate Charge	Q_g	-	6.5	-	nC	V_{GS} = -4.5V, V_{DD} = -10V, I_D = -1.5A
Gate-Source Charge	Q_{gs}	-	0.8	-	nC	
Gate-Drain Charge	Q_{gd}	-	1.4	-	nC	
Turn-On Delay Time	$t_{D(on)}$	-	11.51	-	ns	V_{GEN} = -4.5V, V_{DD} = -10V, R_L = 10Ω, R_G = 6Ω
Turn-On Rise Time	t_r	-	12.09	-	ns	
Turn-Off Delay Time	$t_{D(off)}$	-	55.34	-	ns	
Turn-Off Fall Time	t_f	-	27.54	-	ns	

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

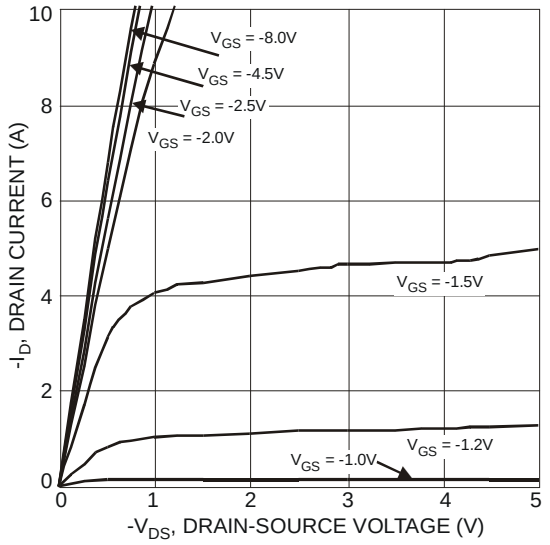


Fig. 1 Typical Output Characteristics

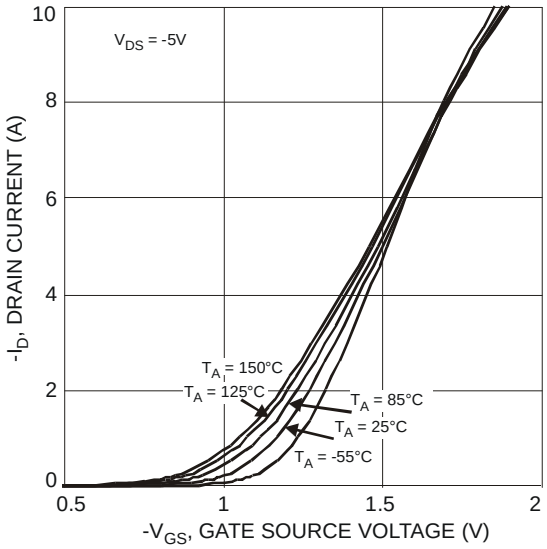


Fig. 2 Typical Transfer Characteristics

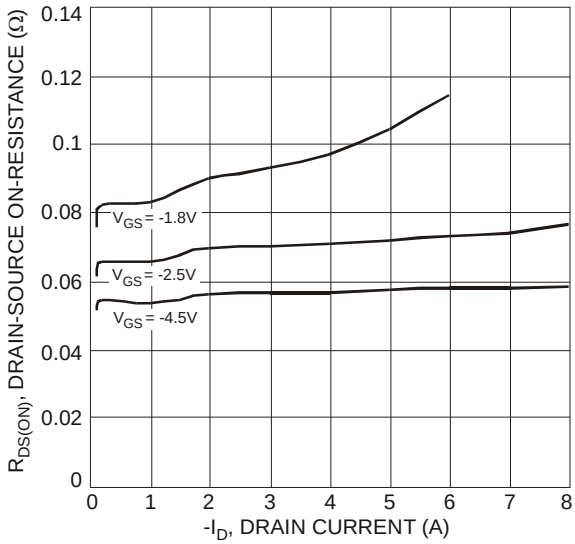


Fig. 3 Typical On-Resistance
vs. Drain Current and Gate Voltage

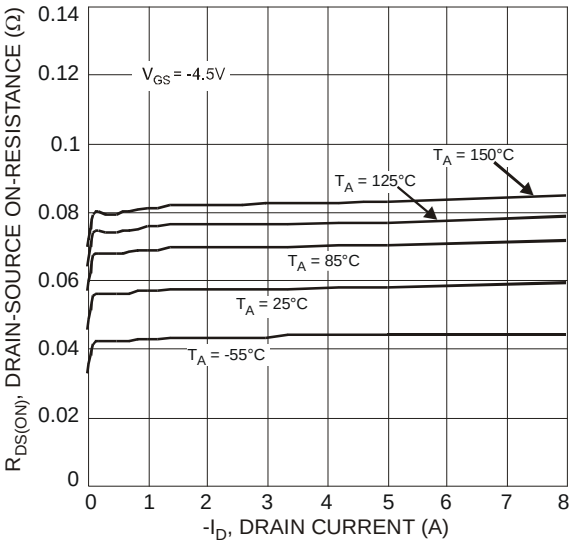


Fig. 4 Typical Drain-Source On-Resistance
vs. Drain Current and Temperature

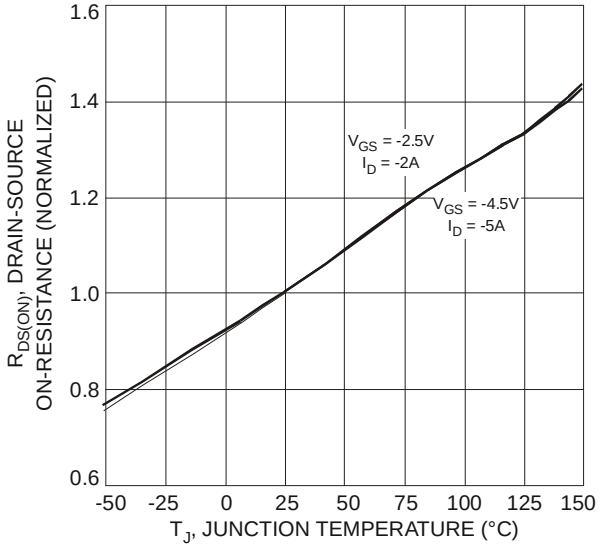


Fig. 5 On-Resistance Variation with Temperature

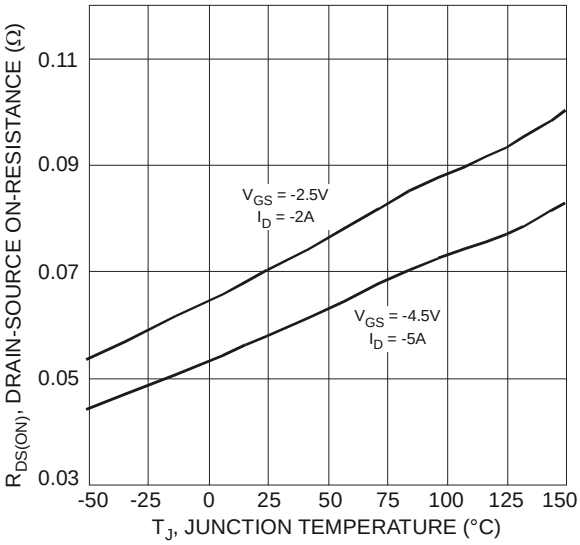


Fig. 6 On-Resistance Variation with Temperature

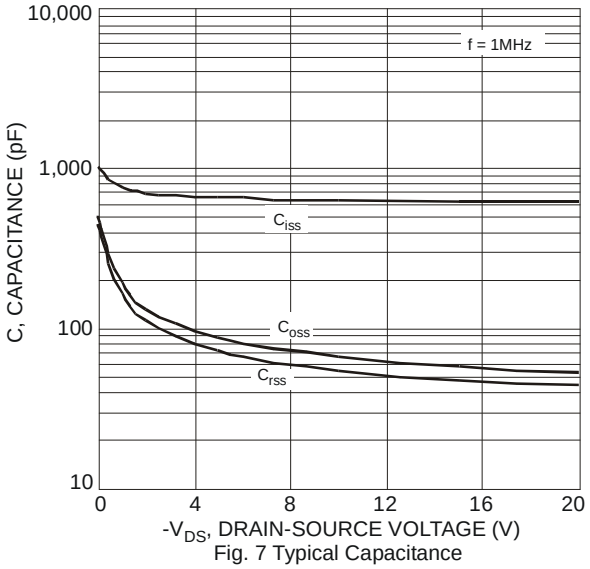


Fig. 7 Typical Capacitance

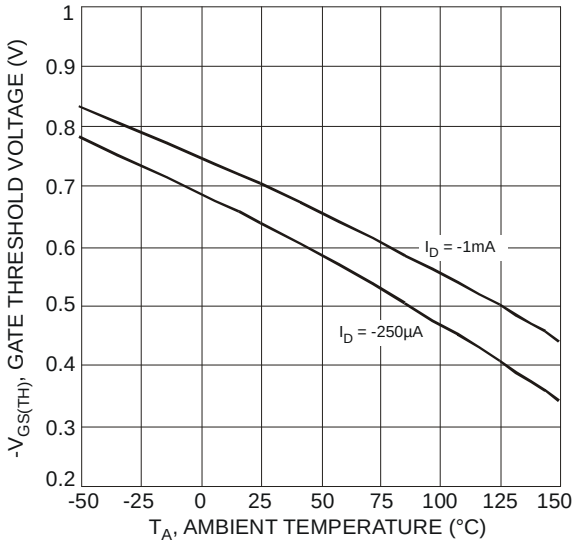


Fig. 8 Gate Threshold Variation vs. Ambient Temperature

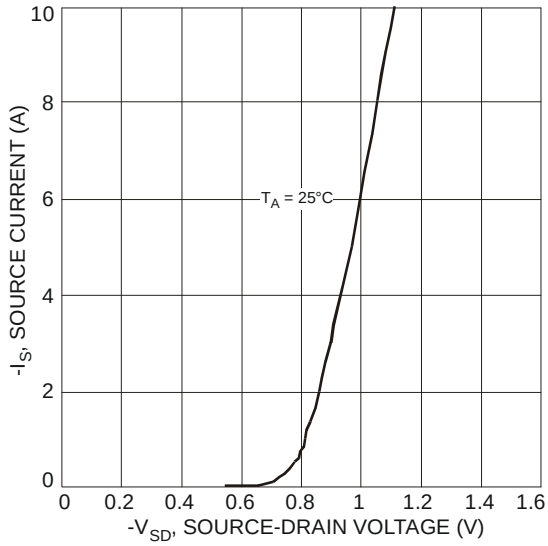


Fig. 9 Diode Forward Voltage vs. Current

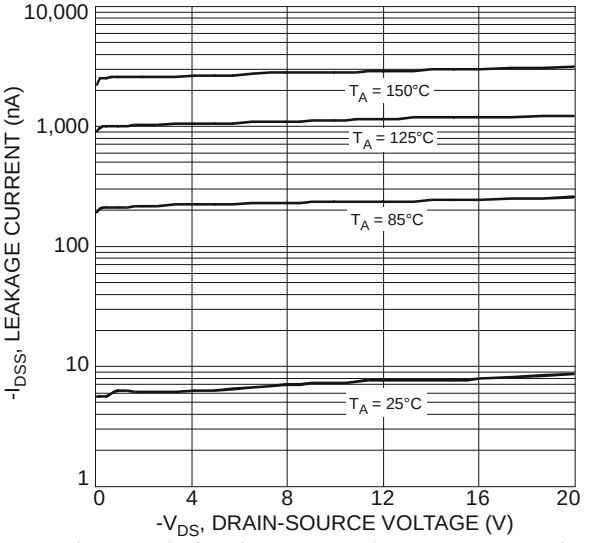


Fig. 10 Typical Drain-Source Leakage Current vs. Voltage

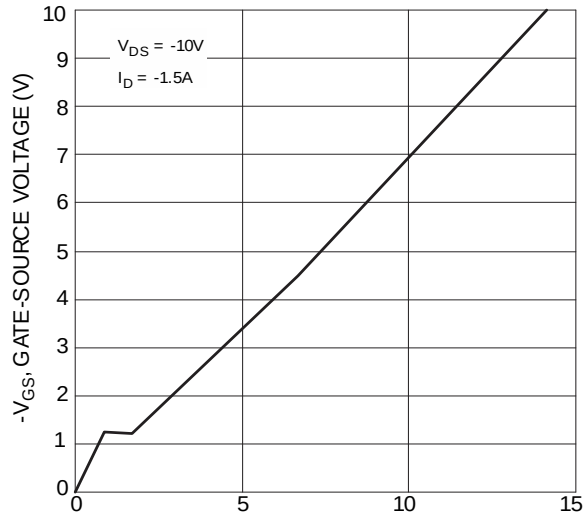


Figure 11 Gate-Charge Characteristics

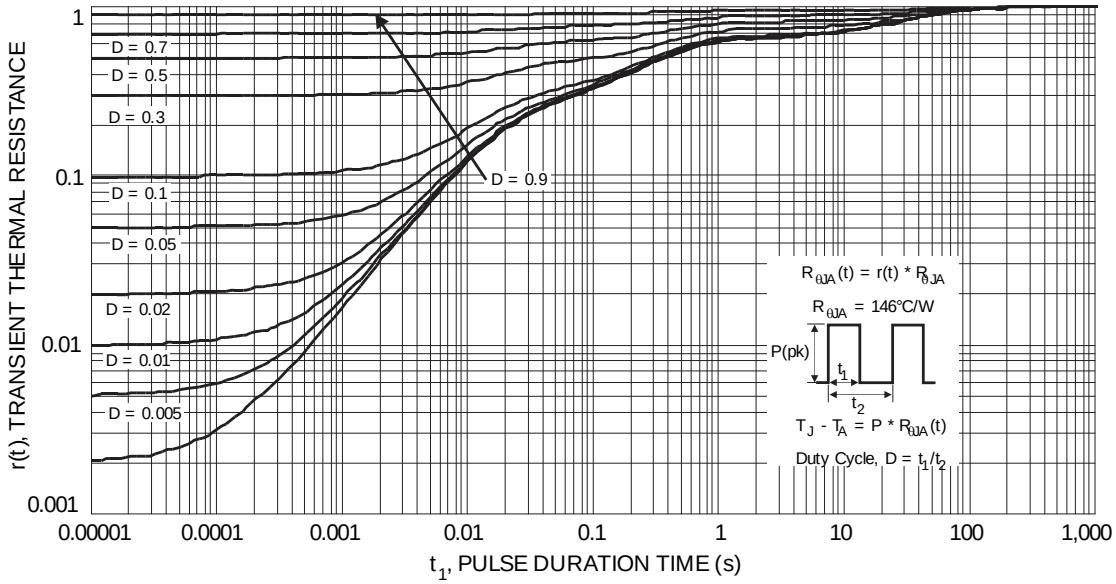
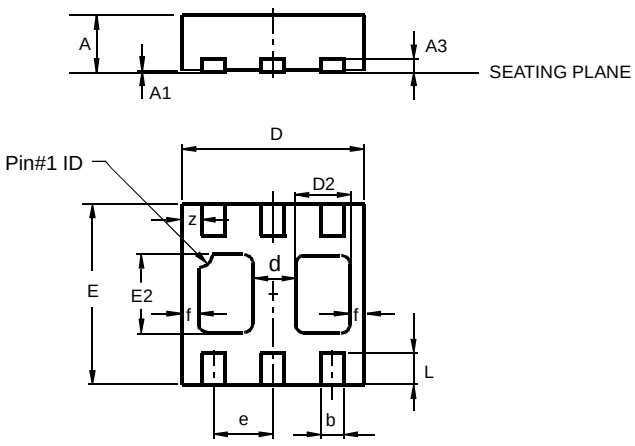


Fig. 12 Transient Thermal Response

Package Outline Dimensions

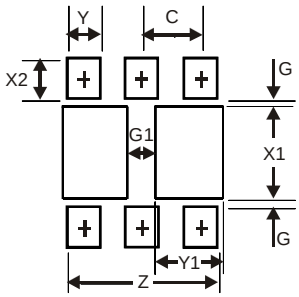
Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for the latest version.



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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  Email amall@ameya360.com

  QQ 800077892

  Skype ameyasales1 ameyasales2

- ### Customer Service :

  Email service@ameya360.com

- ### Partnership :

  Tel +86 (21) 64016692-8333

  Email mkt@ameya360.com