

COMPLEMENTARY PAIR ENHANCEMENT MODE MOSFET
Product Summary

Device	V _{(BR)DSS}	R _{DS(ON)} Max	I _D Max T _A = +25°C
Q1 N-Channel	12V	29mΩ @ V _{GS} = 4.5V	5.6A
		34mΩ @ V _{GS} = 2.5V	5.1A
		44mΩ @ V _{GS} = 1.8V	4.5A
		65mΩ @ V _{GS} = 1.5V	3.7A
Q2 P-Channel	-12V	61mΩ @ V _{GS} = -4.5V	-3.8A
		81mΩ @ V _{GS} = -2.5V	-3.3A
		115mΩ @ V _{GS} = -1.8V	-2.8A
		170mΩ @ V _{GS} = -1.5V	-2.3A

Features

- Low On-Resistance
- Low Input Capacitance
- Low Profile, 0.6mm 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**

Description

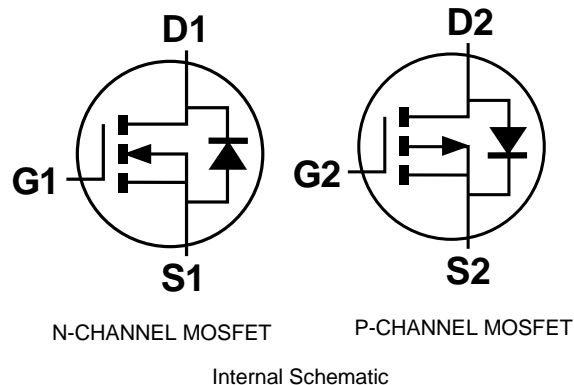
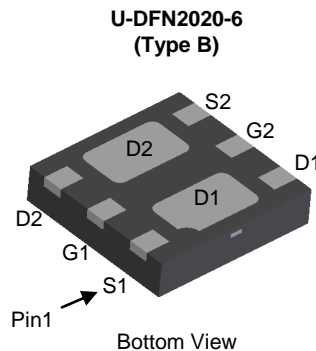
This MOSFET is designed to minimize the on-state resistance (R_{DS(ON)}), yet maintain superior switching performance, making it ideal for high efficiency power management applications.

Applications

- Loadswitch
- Power Management Functions
- Portable Power Adaptors

Mechanical Data

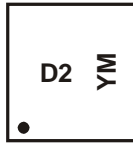
- Case: U-DFN2020-6 (Type B)
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish NiPdAu over Copper leadframe. Solderable per MIL-STD-202, Method 208 ^(e4)
- Terminals Connections: See Diagram Below
- Weight: 0.0065 grams (Approximate)


Ordering Information (Note 4)

Part Number	Case	Packaging
DMC1229UFDB -7	U-DFN2020-6 Type B	3,000/Tape & Reel
DMC1229UFDB -13	U-DFN2020-6 Type B	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



D2 = Product Type Marking Code
 YM = Date Code Marking
 Y = Year (ex: A = 2013)
 M = Month (ex: 9 = September)

Date Code Key

Year Code	2012	2013	2014	2015	2016	2017	2018
	Z	A	B	C	D	E	F

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

Characteristic	Symbol	Q1 N-Channel	Q2 P-Channel	Units	
Drain-Source Voltage	V _{DSS}	12	-12	V	
Gate-Source Voltage	V _{GSS}	±8	±8	V	
Continuous Drain Current (Note 5) V _{GS} = 4.5V	Steady State T _A = +25°C T _A = +70°C	I _D	5.6 4.4	-3.8 -3.0	A
		t<5s	7.2 5.8	-5.0 -4.0	A
Maximum Continuous Body Diode Forward Current (Note 5)	I _S	1	-1	A	
Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)	I _{DM}	20	-15	A	

Thermal Characteristics

Characteristic	Symbol	Value	Units	
Total Power Dissipation (Note 5)	P _D	Steady State	1.4	W
		t<5s	2.2	
Thermal Resistance, Junction to Ambient (Note 5)	R _{θJA}	Steady State	92	°C/W
		t<5s	55	
Thermal Resistance, Junction to Case (Note 5)	R _{θJC}	30		
Operating and Storage Temperature Range	T _J , T _{STG}	-55 to +150	°C	

Note: 5. Device mounted on 1" x 1" FR-4 PCB with high coverage 2oz. copper, single sided.

Electrical Characteristics Q1 N-Channel (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 6)						
Drain-Source Breakdown Voltage	BV _{DSS}	12	—	—	V	V _{GS} = 0V, I _D = 250μA
Zero Gate Voltage Drain Current T _J = +25°C	I _{DSS}	—	—	1.0	μA	V _{DS} = 12V, V _{GS} = 0V
Gate-Source Leakage	I _{GSS}	—	—	±100	nA	V _{GS} = ±8V, V _{DS} = 0V
ON CHARACTERISTICS (Note 6)						
Gate Threshold Voltage	V _{GS(th)}	0.4	—	1	V	V _{DS} = V _{GS} , I _D = 250μA
Static Drain-Source On-Resistance	R _{DS(on)}	—	17	29	mΩ	V _{GS} = 4.5V, I _D = 5A
		—	20	34		V _{GS} = 2.5V, I _D = 4.6A
		—	24	44		V _{GS} = 1.8V, I _D = 4.1A
		—	30	65		V _{GS} = 1.5V, I _D = 2A
Forward Transfer Admittance	Y _{fs}	—	6.5	—	S	V _{DS} = 10V, I _D = 5A
Diode Forward Voltage	V _{SD}	—	0.6	1.2	V	V _{GS} = 0V, I _S = 1A
DYNAMIC CHARACTERISTICS (Note 7)						
Input Capacitance	C _{iss}	—	914	—	pF	V _{DS} = 6V, V _{GS} = 0V, f = 1.0MHz
Output Capacitance	C _{oss}	—	132	—	pF	
Reverse Transfer Capacitance	C _{rss}	—	119	—	pF	
Gate Resistance	R _g	—	1.26	—	Ω	V _{DS} = 0V, V _{GS} = 0V, f = 1MHz
Total Gate Charge (V _{GS} = 4.5V)	Q _g	—	10.5	—	nC	V _{DS} = 6V, I _D = 6.5A
Total Gate Charge (V _{GS} = 8V)		—	19.6	—	nC	
Gate-Source Charge	Q _{gs}	—	1.2	—	nC	
Gate-Drain Charge	Q _{gd}	—	1.6	—	nC	
Turn-On Delay Time	t _{D(on)}	—	5.0	—	nS	
Turn-On Rise Time	t _r	—	10.5	—	nS	V _{DD} = 6V, V _{GS} = 4.5V, R _L = 1.2Ω, R _G = 1Ω
Turn-Off Delay Time	t _{D(off)}	—	16.6	—	nS	
Turn-Off Fall Time	t _f	—	4.1	—	nS	

Electrical Characteristics Q2 P-Channel (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 6)						
Drain-Source Breakdown Voltage	BV _{DSS}	-12	—	—	V	V _{GS} = 0V, I _D = -250μA
Zero Gate Voltage Drain Current T _J = +25°C	I _{DSS}	—	—	-1.0	μA	V _{DS} = -12V, V _{GS} = 0V
Gate-Source Leakage	I _{GSS}	—	—	±100	nA	V _{GS} = ±8V, V _{DS} = 0V
ON CHARACTERISTICS (Note 6)						
Gate Threshold Voltage	V _{GS(th)}	-0.4	—	-1	V	V _{DS} = V _{GS} , I _D = -250μA
Static Drain-Source On-Resistance	R _{DS(on)}	—	37	61	mΩ	V _{GS} = -4.5V, I _D = -3.6A
		—	47	81		V _{GS} = -2.5V, I _D = -3.2A
		—	63	115		V _{GS} = -1.8V, I _D = -1A
		—	90	170		V _{GS} = -1.5V, I _D = -1A
Forward Transfer Admittance	Y _{fs}	—	5.5	—	S	V _{DS} = -10V, I _D = -3.6A
Diode Forward Voltage	V _{SD}	—	-0.65	-1.2	V	V _{GS} = 0V, I _S = -1A
DYNAMIC CHARACTERISTICS (Note 7)						
Input Capacitance	C _{iss}	—	915	—	pF	V _{DS} = -6V, V _{GS} = 0V, f = 1.0MHz
Output Capacitance	C _{oss}	—	225	—	pF	
Reverse Transfer Capacitance	C _{rss}	—	183	—	pF	
Gate Resistance	R _g	—	56.9	—	Ω	V _{DS} = 0V, V _{GS} = 0V, f = 1MHz
Total Gate Charge (V _{GS} = -4.5V)	Q _g	—	10.7	—	nC	V _{DS} = -6V, I _D = -4.3A
Total Gate Charge (V _{GS} = -8V)		—	17.9	—	nC	
Gate-Source Charge	Q _{gs}	—	1.7	—	nC	
Gate-Drain Charge	Q _{gd}	—	3.0	—	nC	
Turn-On Delay Time	t _{D(on)}	—	5.7	—	nS	
Turn-On Rise Time	t _r	—	11.5	—	nS	V _{DD} = -6V, V _{GS} = -4.5V, R _L = 1.6Ω, R _G = 1Ω
Turn-Off Delay Time	t _{D(off)}	—	27.8	—	nS	
Turn-Off Fall Time	t _f	—	26.4	—	nS	

Notes: 6. Short duration pulse test used to minimize self-heating effect.
7. Guaranteed by design. Not subject to product testing.

Q1 N-CHANNEL

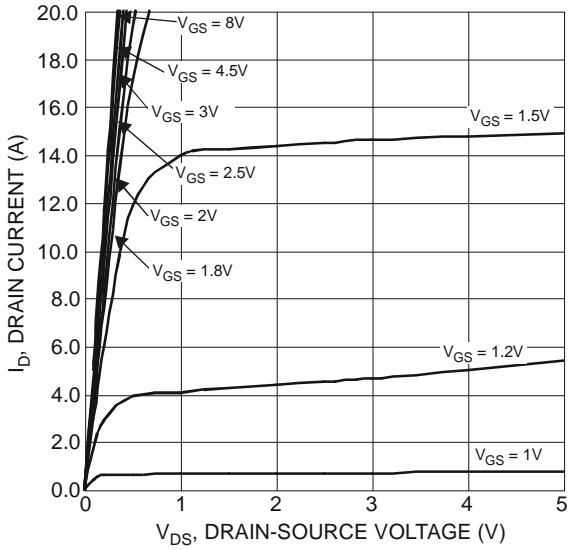


Figure 1 Typical Output Characteristics

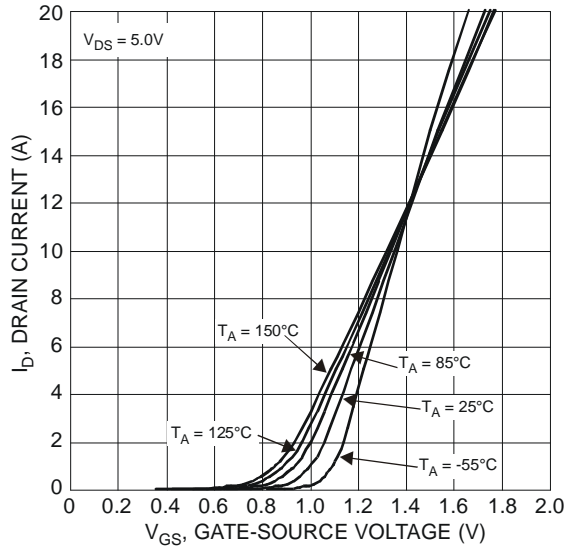


Figure 2 Typical Transfer Characteristics

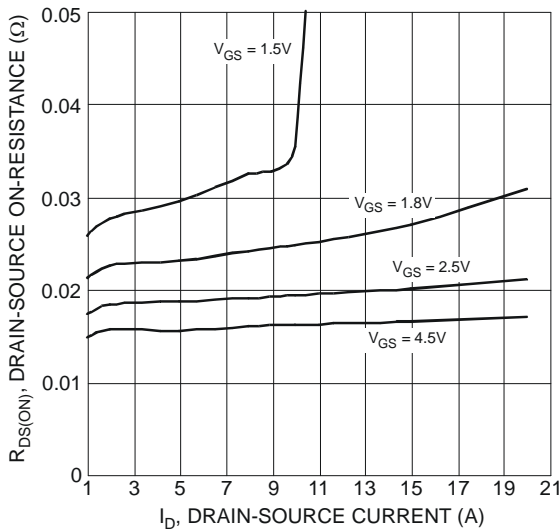


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

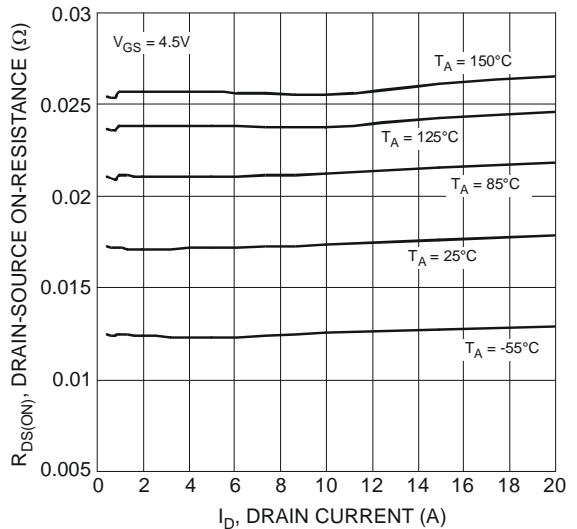


Figure 4 Typical On-Resistance vs. Drain Current and Temperature

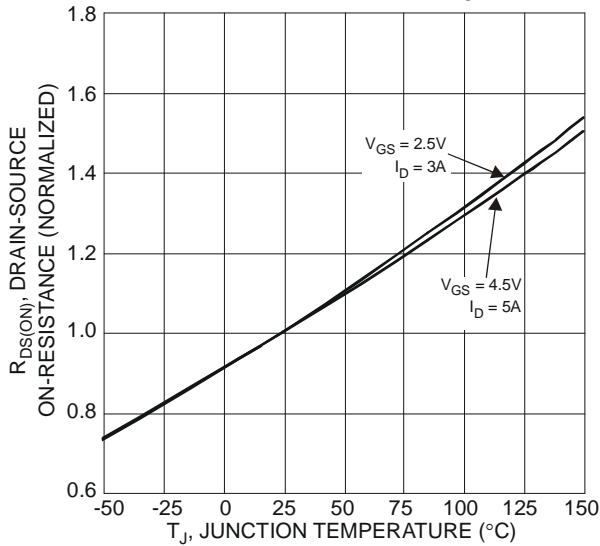


Figure 5 On-Resistance Variation with Temperature

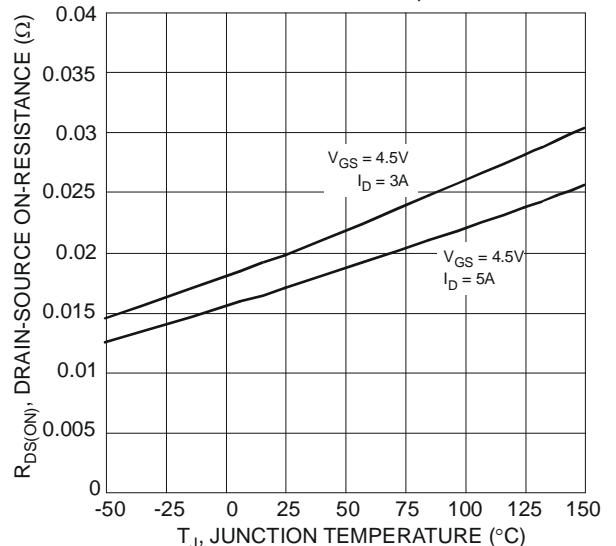


Figure 6 On-Resistance Variation with Temperature

Q1 N-CHANNEL (Continued)

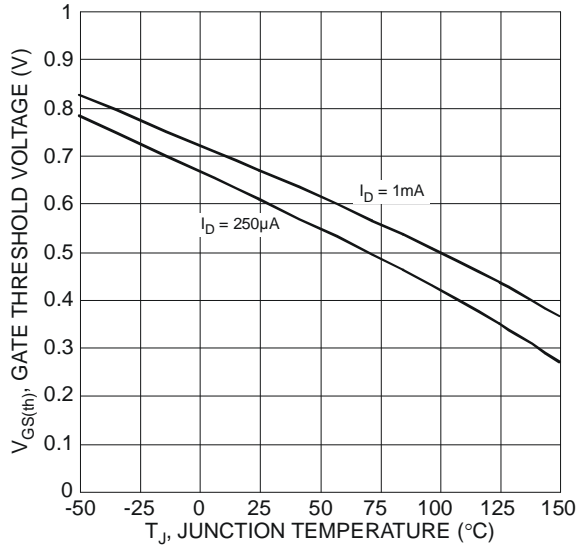


Figure 7 Gate Threshold Variation vs. Ambient Temperature

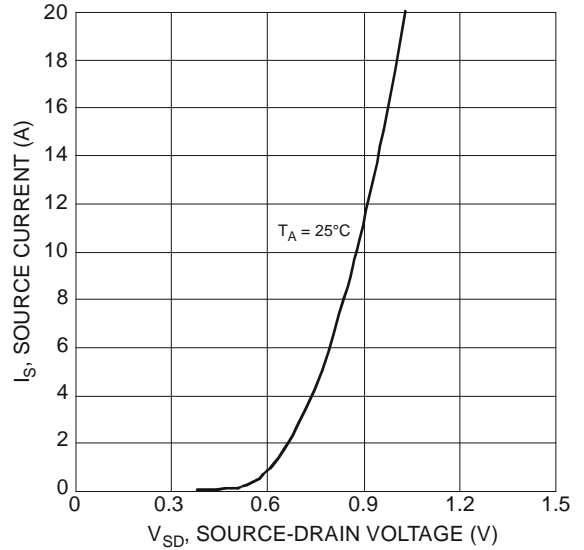


Figure 8 Diode Forward Voltage vs. Current

Q2 P-CHANNEL

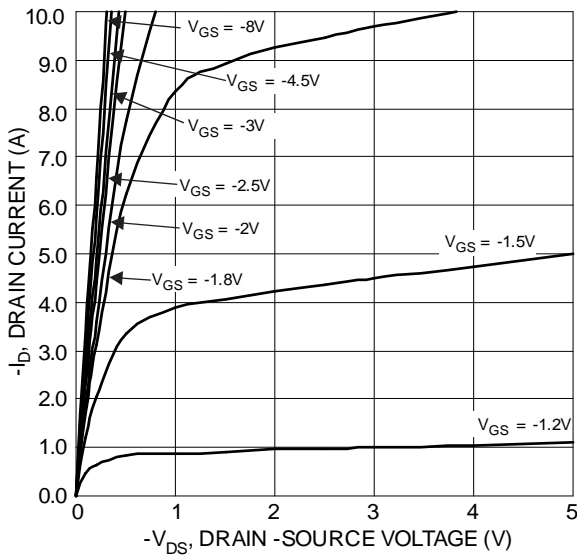


Figure 9 Typical Output Characteristics

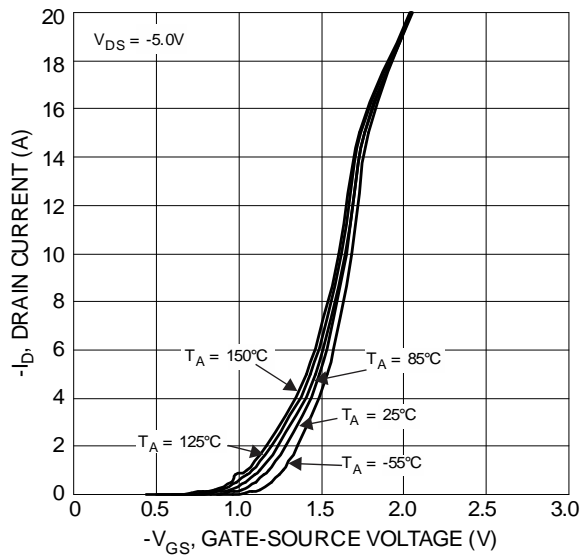


Figure 10 Typical Transfer Characteristics

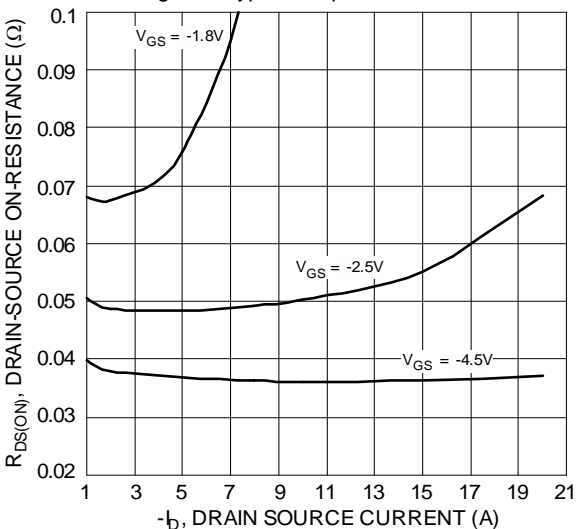


Figure 11 Typical On-Resistance vs. Drain Current and Gate Voltage

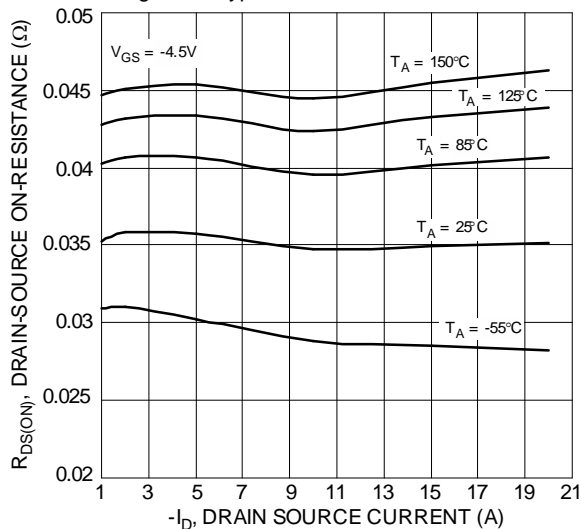


Figure 12 Typical On-Resistance vs. Drain Current and Temperature

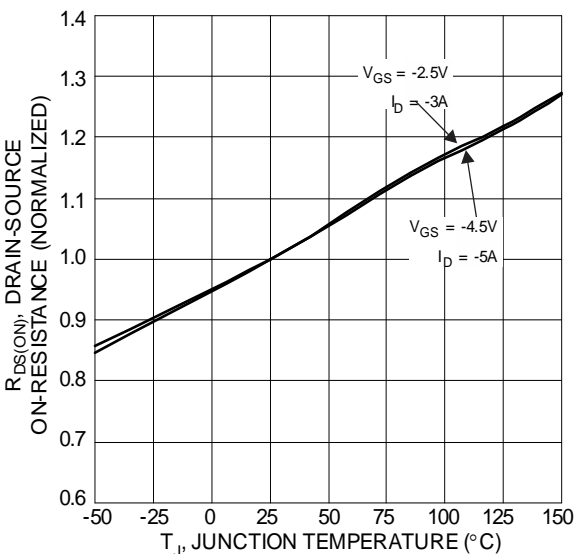


Figure 13 On-Resistance Variation with Temperature

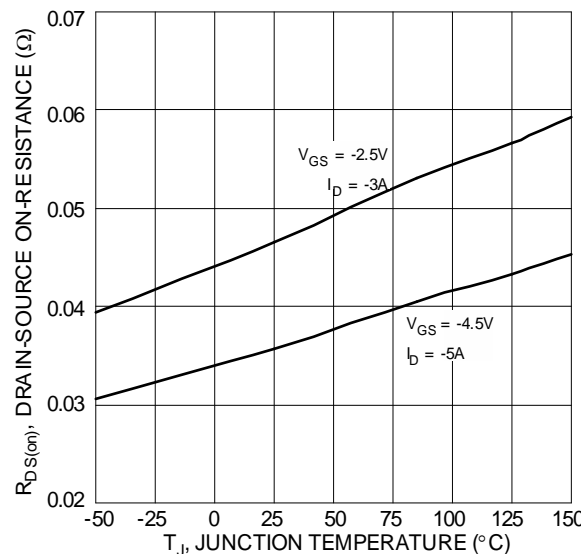


Figure 14 On-Resistance Variation with Temperature

Q2 P-CHANNEL (Continued)

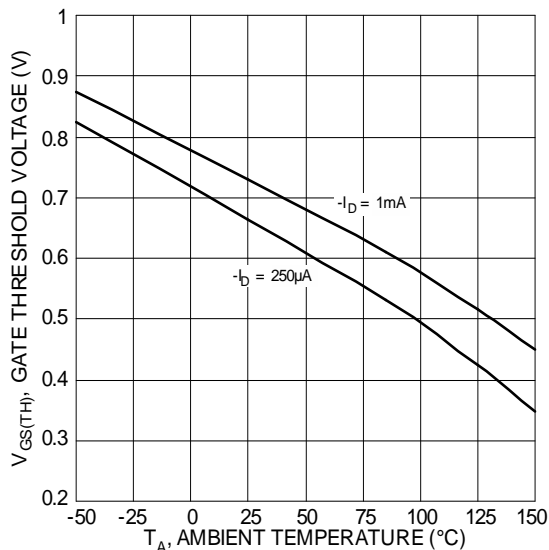


Figure 15 Gate Threshold Variation vs. Ambient Temperature

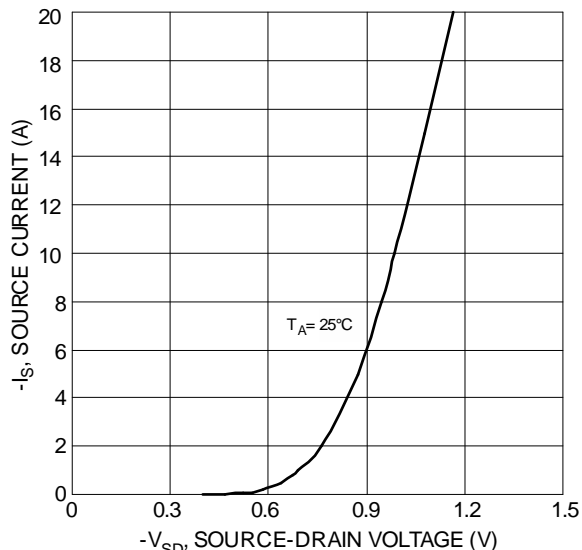


Figure 16 Diode Forward Voltage vs. Current

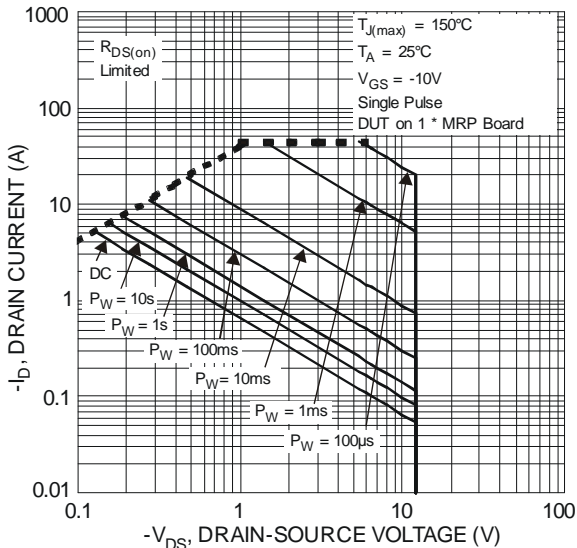


Figure 17 SOA, Safe Operation Area

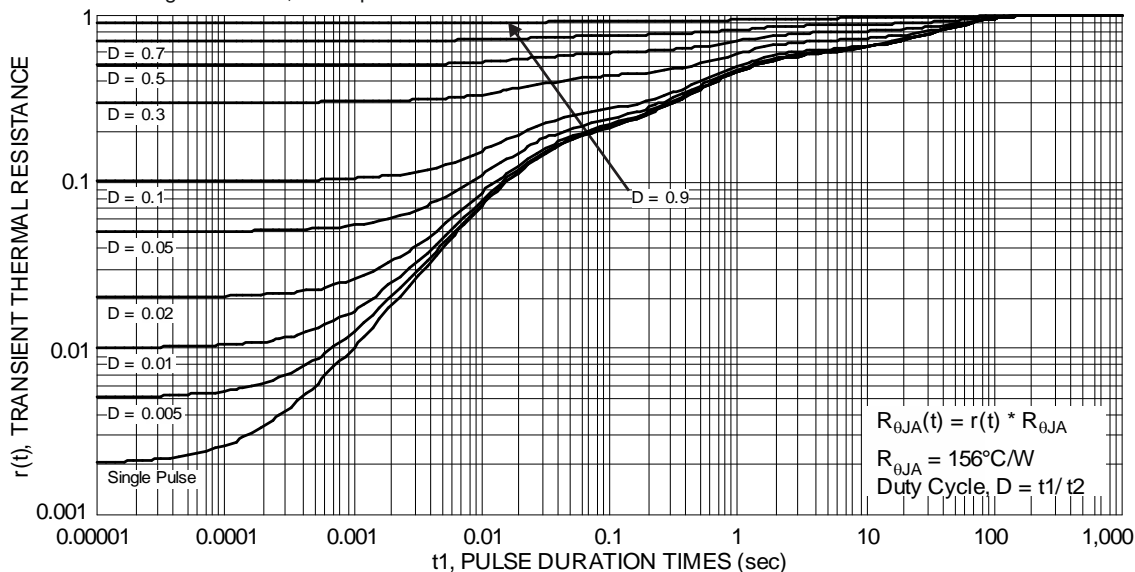
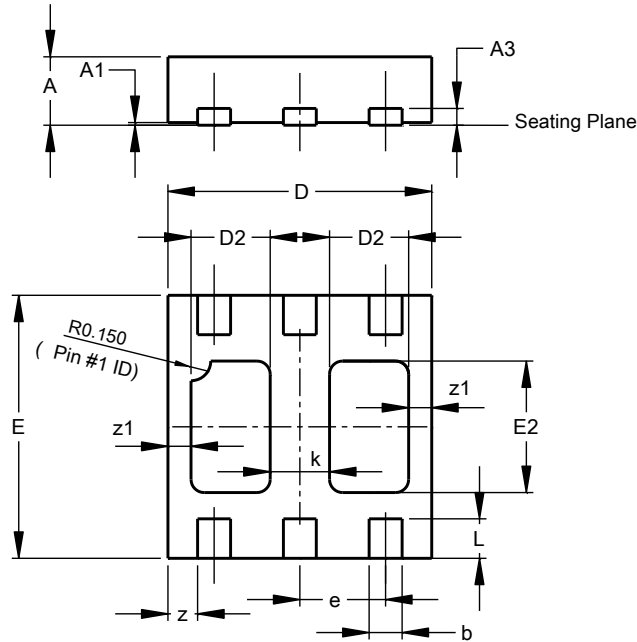


Figure 18 Transient Thermal Resistance

Package Outline Dimensions

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

U-DFN2020-6 (Type B)

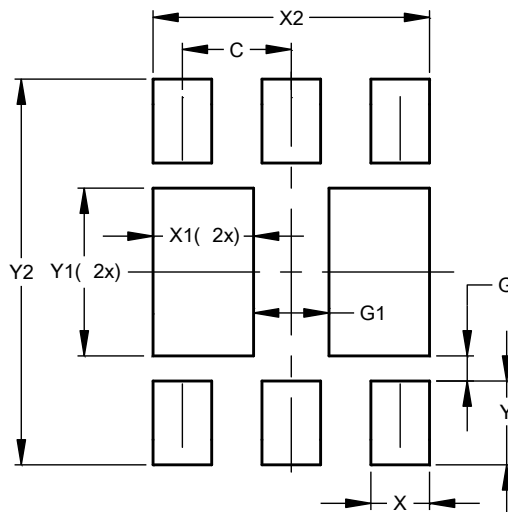


U-DFN2020-6 (Type B)			
Dim	Min	Max	Typ
A	0.545	0.605	0.575
A1	0.00	0.05	0.02
A3	-	-	0.13
b	0.20	0.30	0.25
D	1.95	2.075	2.00
D2	0.50	0.70	0.60
e	-	-	0.65
E	1.95	2.075	2.00
E2	0.90	1.10	1.00
k	-	-	0.45
L	0.25	0.35	0.30
z	-	-	0.225
z1	-	-	0.175
All Dimensions in mm			

Suggested Pad Layout

Please see AP02001 at <http://www.diodes.com/datasheets/ap02001.pdf> for the latest version.

U-DFN2020-6 (Type B)



Dimensions	Value (in mm)
C	0.650
G	0.150
G1	0.450
X	0.350
X1	0.600
X2	1.650
Y	0.500
Y1	1.000
Y2	2.300

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