

**COMPLEMENTARY PAIR ENHANCEMENT MODE MOSFET**
**Product Summary**

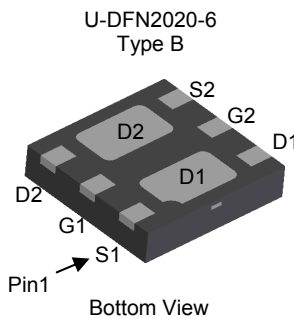
Device	$V_{(BR)DSS}$	$R_{DS(ON) \max}$	$I_{D \max}$ $T_A = +25^\circ\text{C}$
Q1 N-Channel	12V	34m $\Omega$ @ $V_{GS} = 4.5\text{V}$	5.1A
		40m $\Omega$ @ $V_{GS} = 2.5\text{V}$	4.7A
		50m $\Omega$ @ $V_{GS} = 1.8\text{V}$	4.2A
		70m $\Omega$ @ $V_{GS} = 1.5\text{V}$	3.6A
Q2 P-Channel	-12V	59m $\Omega$ @ $V_{GS} = -4.5\text{V}$	-3.9A
		81m $\Omega$ @ $V_{GS} = -2.5\text{V}$	-3.3A
		115m $\Omega$ @ $V_{GS} = -1.8\text{V}$	-2.8A
		215m $\Omega$ @ $V_{GS} = -1.5\text{V}$	-2.0A

**Description**

This 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.

**Applications**

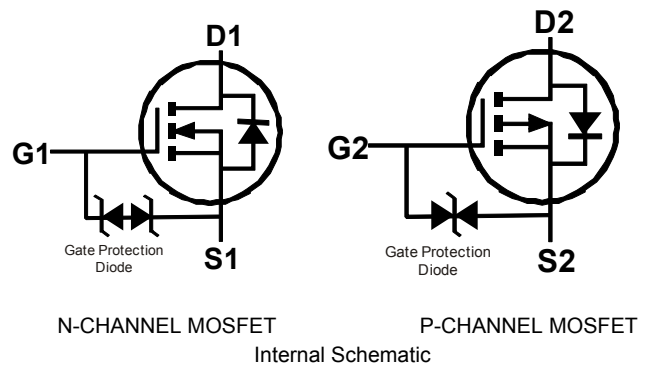
- Load Switch
- Power Management Functions
- Portable Power Adaptors


**Features**

- Low On-Resistance
- Low Input Capacitance
- Low Profile, 0.6mm Max Height
- **ESD Protected Gate**
- **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**

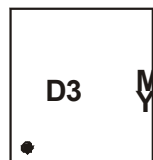
**Mechanical Data**

- 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
- 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
DMC1030UFDB -7	U-DFN2020-6 Type B	3000/Tape & Reel
DMC1030UFDB -13	U-DFN2020-6 Type B	10000/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](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**


D3 = Product Type Marking Code  
 YM = Date Code Marking  
 Y = Year (ex: A = 2013)  
 M = Month (ex: 9 = September)

**Date Code Key**

Year	2012	2013	2014	2015	2016	2017	2018					
Code	Z	A	B	C	D	E	F					
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<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic			Symbol	Q1 N-CHANNEL	Q2 P-CHANNEL	Units
Drain-Source Voltage			V <sub>DSS</sub>	12	-12	V
Gate-Source Voltage			V <sub>GSS</sub>	±8	±8	V
Continuous Drain Current (Note 5) V <sub>GS</sub> = 4.5V	Steady State	T <sub>A</sub> = +25°C T <sub>A</sub> = +70°C	I <sub>D</sub>	5.1 4.1	-3.9 -3.1	A
	t < 5s	T <sub>A</sub> = +25°C T <sub>A</sub> = +70°C	I <sub>D</sub>	6.6 5.3	-5.0 -4.0	A
Maximum Continuous Body Diode Forward Current (Note 5)			I <sub>S</sub>	2	-1.7	A
Pulsed Drain Current (10µs pulse, duty cycle = 1%)			I <sub>DM</sub>	35	-25	A

**Thermal Characteristics**

Characteristic		Symbol	Value	Units
Total Power Dissipation (Note 5)	Steady State	P <sub>D</sub>	1.36	W
	t < 5s		1.89	
Thermal Resistance, Junction to Ambient (Note 5)	Steady State	R <sub>θJA</sub>	92	°C/W
	t < 5s		66	
Thermal Resistance, Junction to Case (Note 5)		R <sub>θJC</sub>	18	
Operating and Storage Temperature Range		T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS (Note 6)</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	12	—	—	V	V <sub>GS</sub> = 0V, I <sub>D</sub> = 250µA
Zero Gate Voltage Drain Current T <sub>J</sub> = +25°C	I <sub>DSS</sub>	—	—	1.0	µA	V <sub>DS</sub> = 12V, V <sub>GS</sub> = 0V
Gate-Source Leakage	I <sub>GSS</sub>	—	—	±10	µA	V <sub>GS</sub> = ±8V, V <sub>DS</sub> = 0V
<b>ON CHARACTERISTICS (Note 6)</b>						
Gate Threshold Voltage	V <sub>GS(th)</sub>	0.4	—	1	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250µA
Static Drain-Source On-Resistance	R <sub>DS(on)</sub>	—	17	34	mΩ	V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 4.6A
		—	20	40		V <sub>GS</sub> = 2.5V, I <sub>D</sub> = 4.2A
		—	24	50		V <sub>GS</sub> = 1.8V, I <sub>D</sub> = 3.8A
		—	28	70		V <sub>GS</sub> = 1.5V, I <sub>D</sub> = 1.5A
Diode Forward Voltage	V <sub>SD</sub>	—	0.7	1.2	V	V <sub>GS</sub> = 0V, I <sub>S</sub> = 4.8A
<b>DYNAMIC CHARACTERISTICS (Note 7)</b>						
Input Capacitance	C <sub>iss</sub>	—	1003	—	pF	V <sub>DS</sub> = 6V, V <sub>GS</sub> = 0V, f = 1.0MHz
Output Capacitance	C <sub>oss</sub>	—	132	—	pF	
Reverse Transfer Capacitance	C <sub>rss</sub>	—	115	—	pF	
Gate Resistance	R <sub>g</sub>	—	11.3	—	Ω	V <sub>DS</sub> = 0V, V <sub>GS</sub> = 0V, f = 1MHz
Total Gate Charge (V <sub>GS</sub> = 4.5V)	Q <sub>g</sub>	—	12.2	—	nC	V <sub>DS</sub> = 10V, I <sub>D</sub> = 6.8A
Total Gate Charge (V <sub>GS</sub> = 8V)		—	23.1	—	nC	
Gate-Source Charge	Q <sub>gs</sub>	—	1.3	—	nC	
Gate-Drain Charge	Q <sub>gd</sub>	—	1.5	—	nC	
Turn-On Delay Time	t <sub>D(on)</sub>	—	4.4	—	ns	V <sub>DD</sub> = 6V, V <sub>GS</sub> = 4.5V, R <sub>L</sub> = 1.1Ω, R <sub>G</sub> = 1Ω
Turn-On Rise Time	t <sub>r</sub>	—	7.4	—	ns	
Turn-Off Delay Time	t <sub>D(off)</sub>	—	18.8	—	ns	
Turn-Off Fall Time	t <sub>f</sub>	—	4.9	—	ns	
Body Diode Reverse Recovery Time	t <sub>rr</sub>	—	7.6	—	nS	I <sub>S</sub> = 5.4A, dI/dt = 100A/µs
Body Diode Reverse Recovery Charge	Q <sub>rr</sub>	—	0.9	—	nC	I <sub>S</sub> = 5.4A, dI/dt = 100A/µs

- Notes:
- Device mounted on 1" x 1" FR-4 PCB with high coverage 2oz. Copper, single sided.
  - Short duration pulse test used to minimize self-heating effect.
  - Guaranteed by design. Not subject to product testing.

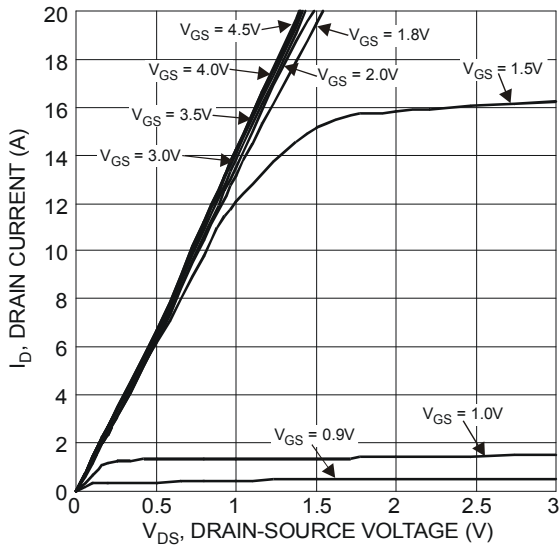


Figure 1 Typical Output Characteristics

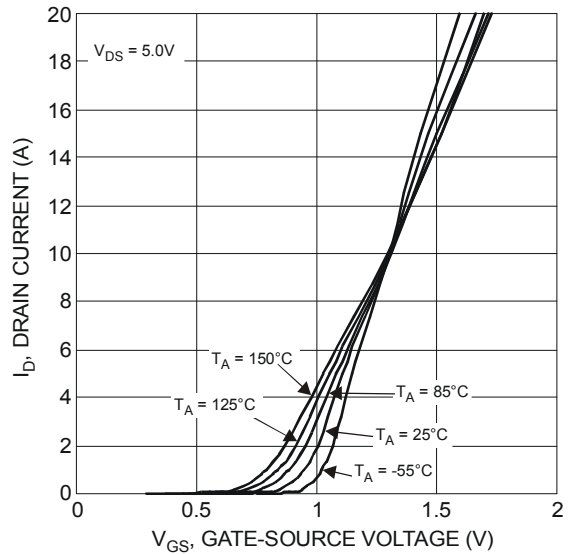


Figure 2 Typical Transfer Characteristics

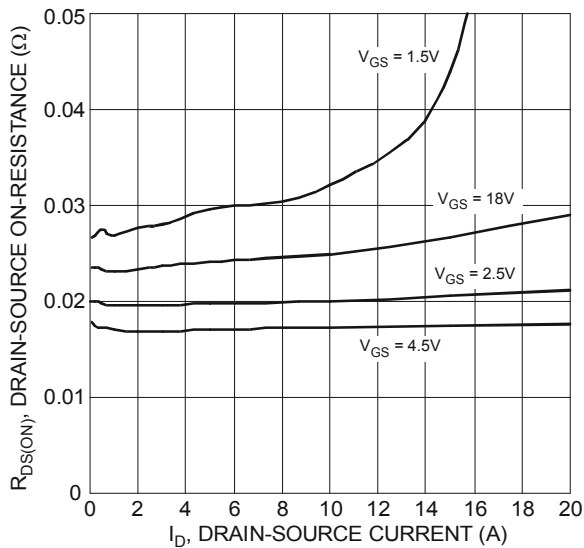


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

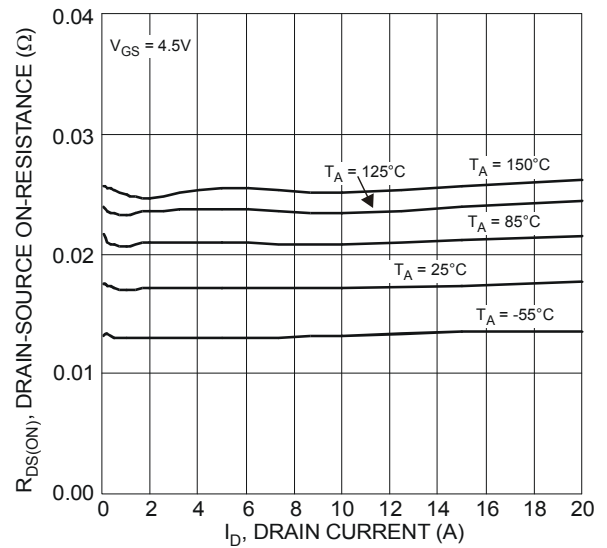


Figure 4 Typical On-Resistance vs. Drain Current and Temperature

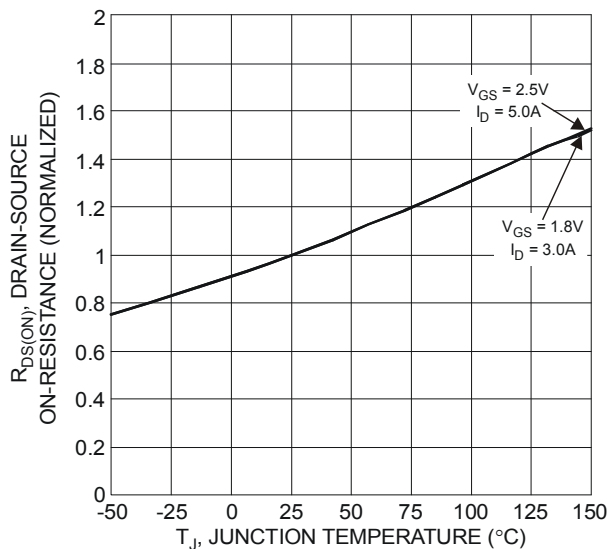


Figure 5 On-Resistance Variation with Temperature

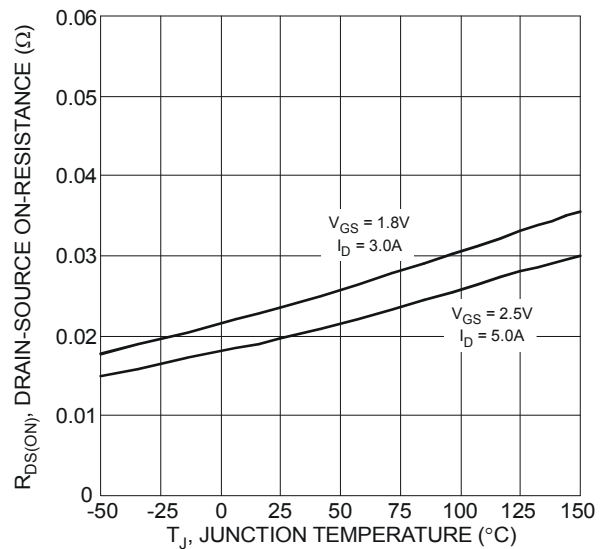


Figure 6 On-Resistance Variation with Temperature

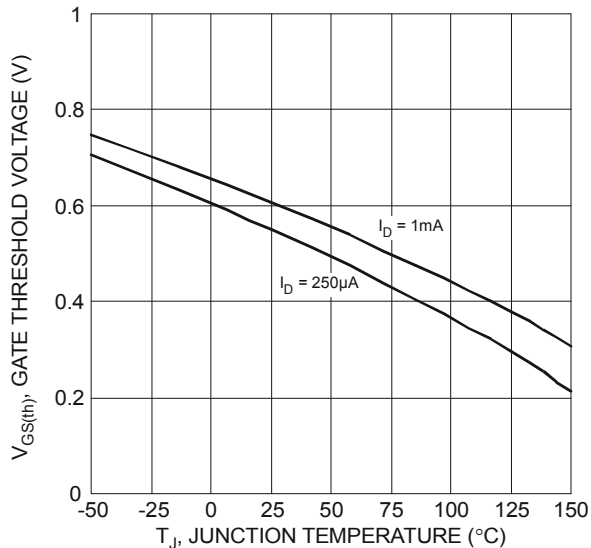


Figure 7 Gate Threshold Variation vs. Ambient Temperature

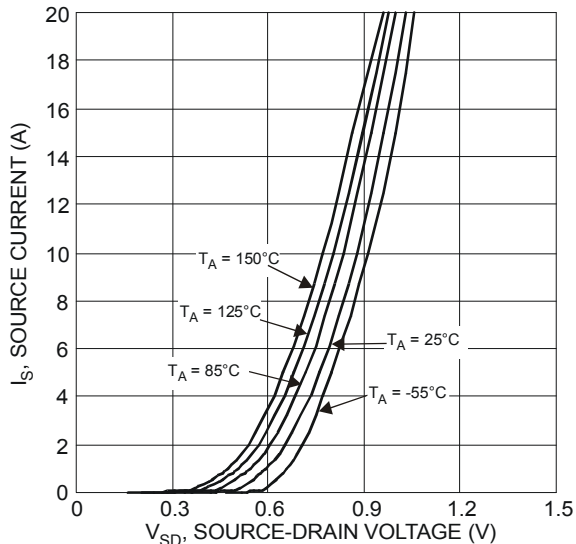


Figure 8 Diode Forward Voltage vs. Current

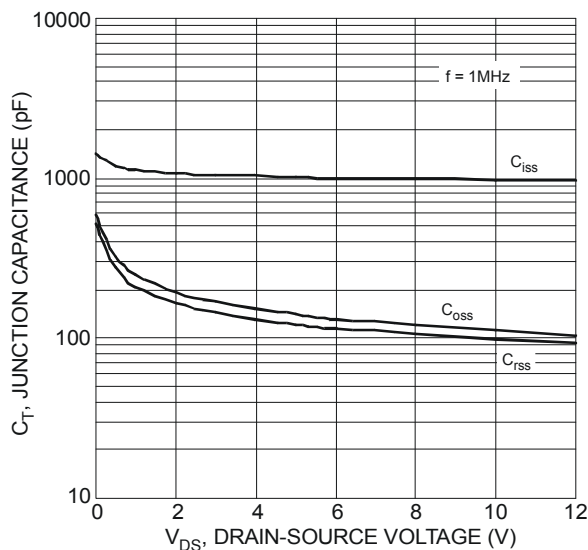


Figure 9 Typical Junction Capacitance

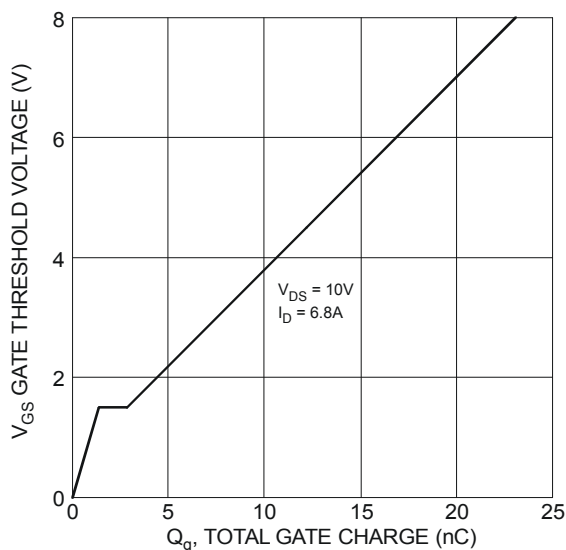


Figure 10 Gate Charge

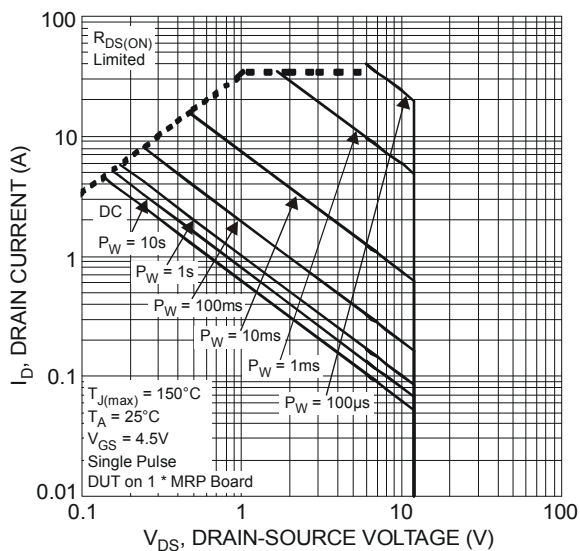


Figure 11 SOA Safe Operation Area

**Electrical Characteristics Q2 P-CHANNEL** (@  $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS (Note 6)</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	-12	—	—	V	$V_{GS} = 0V, I_D = -250\mu A$
Zero Gate Voltage Drain Current $T_J = +25^\circ\text{C}$	$I_{DSS}$	—	—	-1.0	$\mu A$	$V_{DS} = -12V, V_{GS} = 0V$
Gate-Source Leakage	$I_{GSS}$	—	—	$\pm 10$	$\mu A$	$V_{GS} = \pm 8V, V_{DS} = 0V$
<b>ON CHARACTERISTICS (Note 6)</b>						
Gate Threshold Voltage	$V_{GS(th)}$	-0.4	—	-1	V	$V_{DS} = V_{GS}, I_D = -250\mu A$
Static Drain-Source On-Resistance	$R_{DS(on)}$	—	37	59	m $\Omega$	$V_{GS} = -4.5V, I_D = -3.6A$
		—	48	81		$V_{GS} = -2.5V, I_D = -3.1A$
		—	69	115		$V_{GS} = -1.8V, I_D = -2.6A$
		—	88	215		$V_{GS} = -1.5V, I_D = -0.5A$
		—	—	—		—
Diode Forward Voltage	$V_{SD}$	—	-0.7	-1.2	V	$V_{GS} = 0V, I_S = -3.7A$
<b>DYNAMIC CHARACTERISTICS (Note 7)</b>						
Input Capacitance	$C_{iss}$	—	1028	—	pF	$V_{DS} = -6V, V_{GS} = 0V, f = 1.0\text{MHz}$
Output Capacitance	$C_{oss}$	—	285	—	pF	
Reverse Transfer Capacitance	$C_{rss}$	—	254	—	pF	
Gate Resistance	$R_g$	—	19.6	—	$\Omega$	$V_{DS} = 0V, V_{GS} = 0V, f = 1\text{MHz}$
Total Gate Charge ( $V_{GS} = -4.5V$ )	$Q_g$	—	13	—	nC	$V_{DS} = -10V, I_D = -4.7A$
Total Gate Charge ( $V_{GS} = -8V$ )		—	20.8	—	nC	
Gate-Source Charge	$Q_{gs}$	—	1.8	—	nC	
Gate-Drain Charge	$Q_{gd}$	—	4.5	—	nC	
Turn-On Delay Time	$t_{D(on)}$	—	5.6	—	ns	
Turn-On Rise Time	$t_r$	—	12.8	—	ns	$V_{DD} = -6V, V_{GS} = -4.5V, R_L = 1.6\Omega, R_G = 1\Omega$
Turn-Off Delay Time	$t_{D(off)}$	—	30.7	—	ns	
Turn-Off Fall Time	$t_f$	—	25.4	—	ns	
Body Diode Reverse Recovery Time	$t_{rr}$	—	31.6	—	nS	$I_S = -3.6A, dI/dt = 100A/\mu s$
Body Diode Reverse Recovery Charge	$Q_{rr}$	—	7.8	—	nC	$I_S = -3.6A, dI/dt = 100A/\mu s$

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

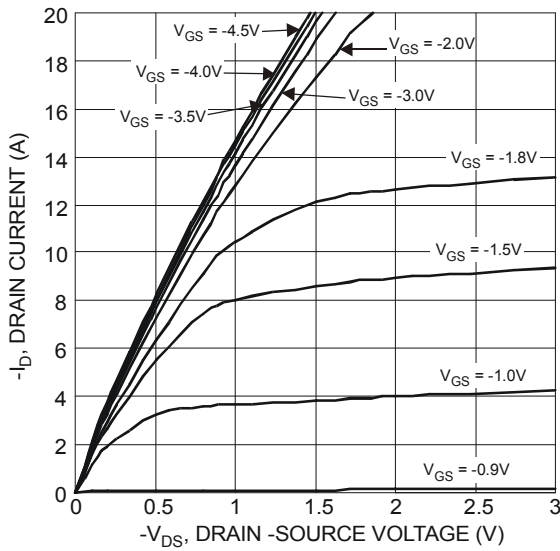


Figure 12 Typical Output Characteristics

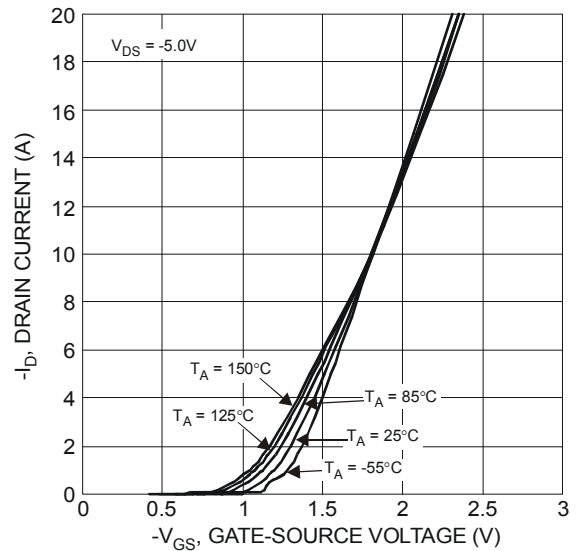


Figure 13 Typical Transfer Characteristics

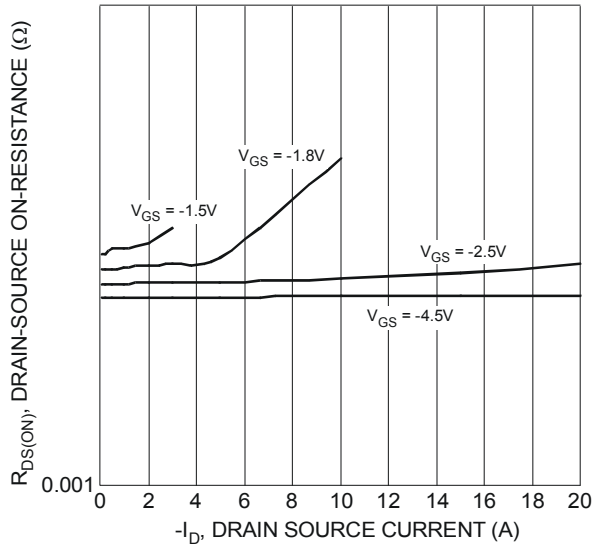


Figure 14 Typical On-Resistance vs. Drain Current and Gate Voltage

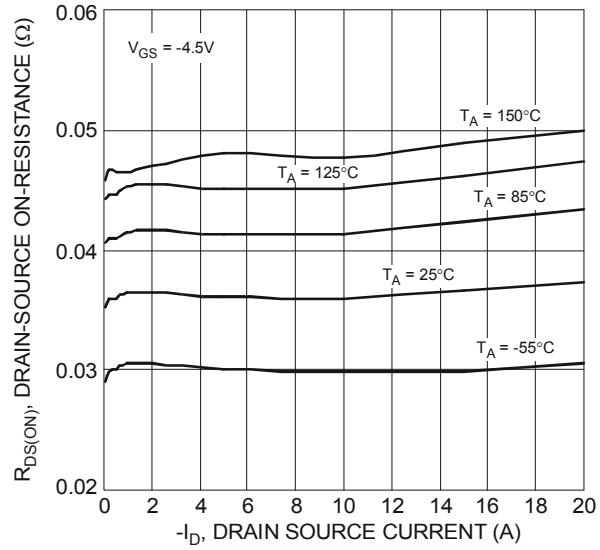


Figure 15 Typical On-Resistance vs. Drain Current and Temperature

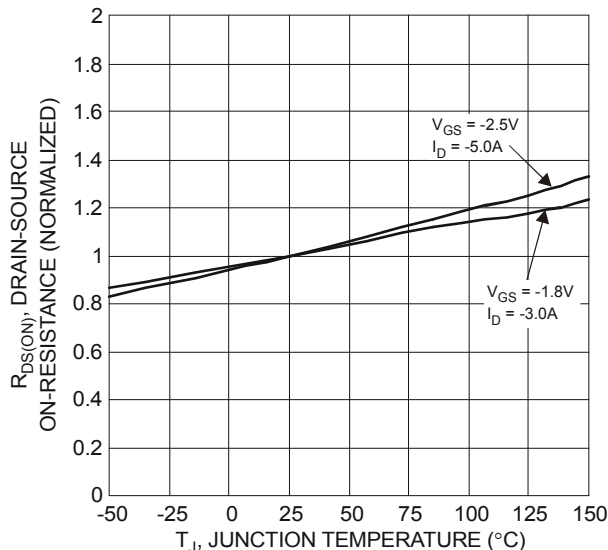


Figure 16 On-Resistance Variation with Temperature

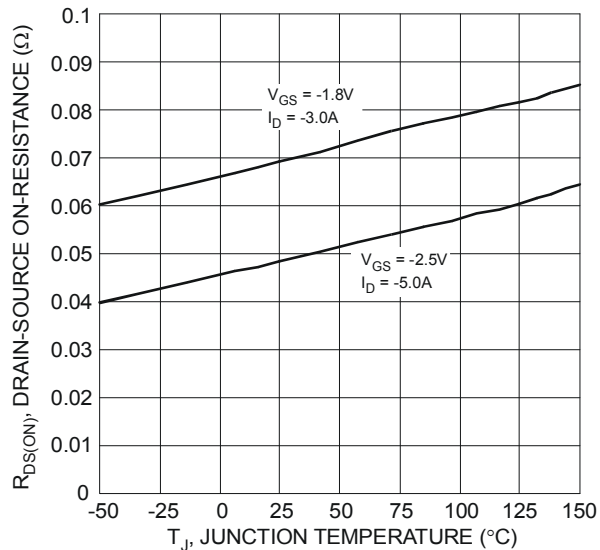


Figure 17 On-Resistance Variation with Temperature

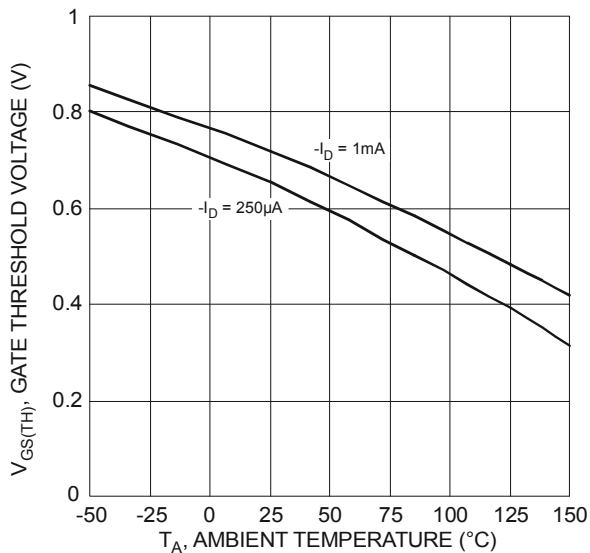


Figure 18 Gate Threshold Variation vs. Ambient Temperature

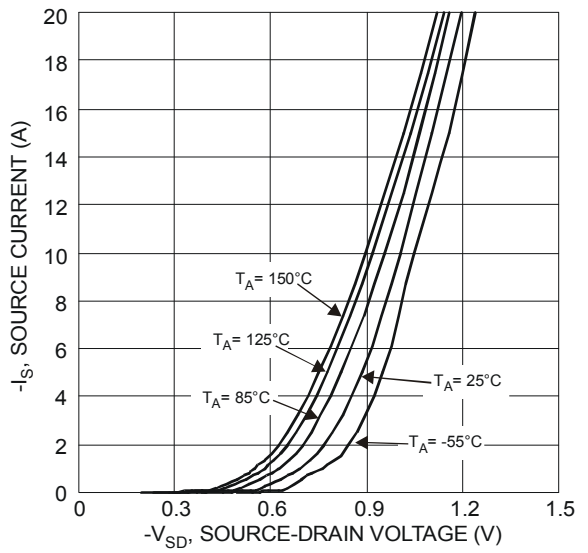


Figure 19 Diode Forward Voltage vs. Current

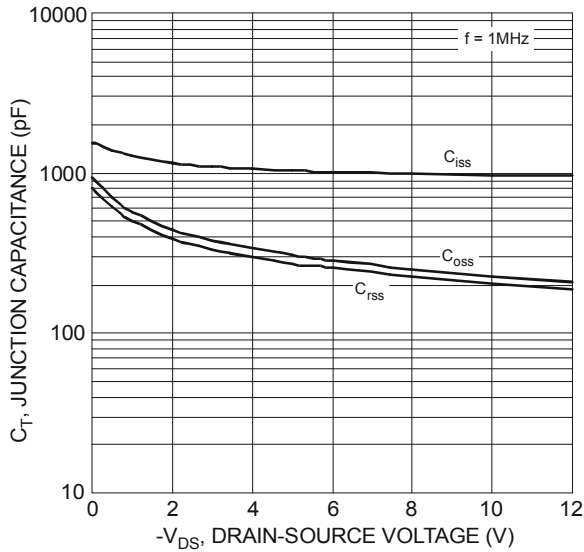


Figure 20 Typical Junction Capacitance

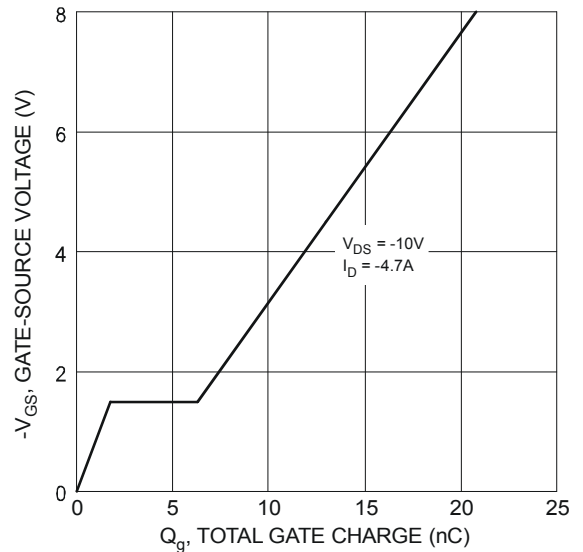


Figure 21 Gate-Charge Characteristics

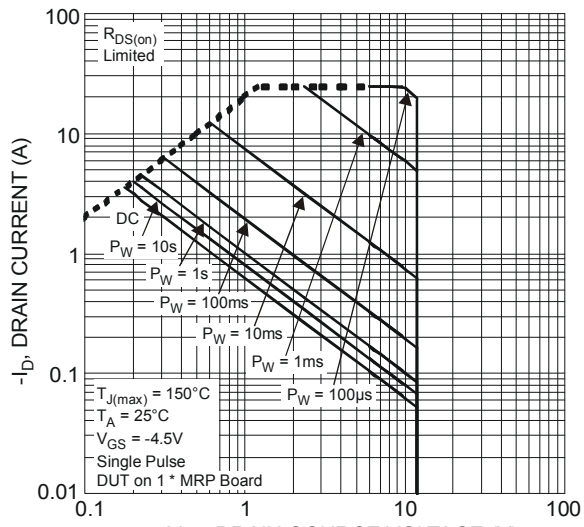


Figure 22 SOA Safe Operation Area

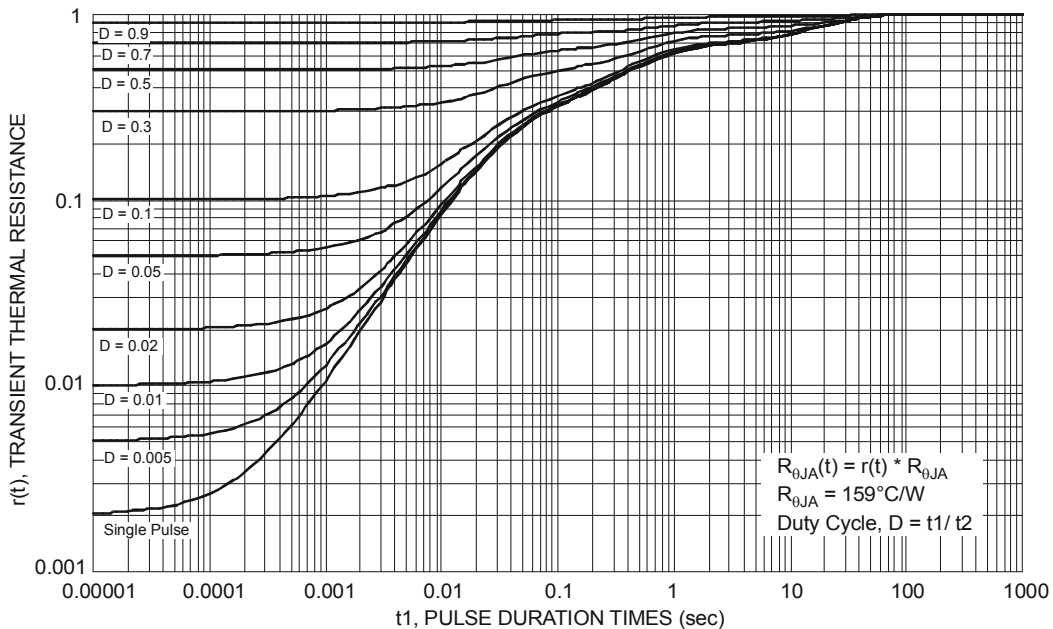
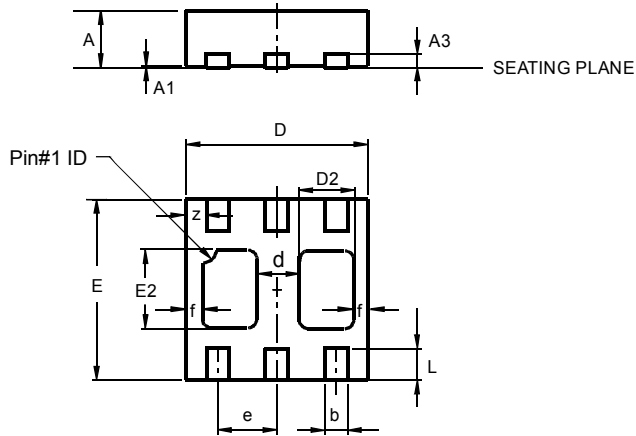


Figure 23 Transient Thermal Resistance

**Package Outline Dimensions**

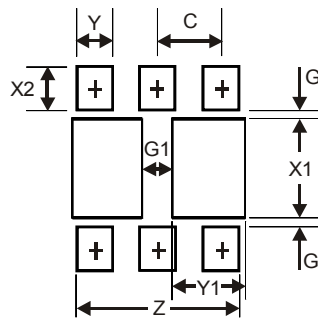
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



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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