DMC2041UFDB

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	20V	40mΩ @ V_{GS} = 4.5V	4.7A
		65mΩ @ V_{GS} = 2.5V	3.7A
Q2 P-Channel	-20V	90mΩ @ V_{GS} = -4.5V	-3.2A
		137mΩ @ V_{GS} = -2.5V	-2.6A

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)**

Description

This MOSFET is 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

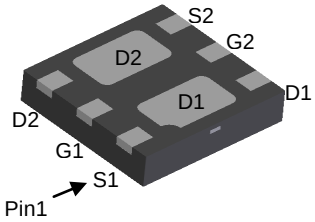
- Load Switch
- Power Management Functions
- Portable Power Adaptors

Mechanical Data

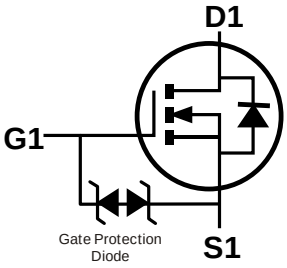
- Case: U-DFN2020-6
- Case Material: Molded Plastic, "Green" Molding Compound; UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish NiPdAu over Copper Leadframe; Solderable per MIL-STD-202, Method 208 e4
- Terminal Connections: See Diagram Below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

ESD PROTECTED

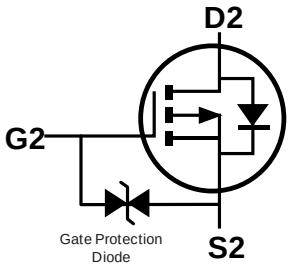
U-DFN2020-6



Bottom View



Q1 N-CHANNEL MOSFET



O2 P-CHANNEL MOSFET

Internal Schematic

Ordering Information (Note 4)

Part Number	Case	Packaging
DMC2041UFDB -7	U-DFN2020-6	3,000/Tape & Reel
DMC2041UFDB -13	U-DFN2020-6	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

U-DFN2020-6

D4 = Product Type Marking Code
YM = Date Code Marking
Y = Year (ex: B = 2014)
M = Month (ex: 9 = September)

Date Code Key

Year	2014	2015	2016	2017	2018	2019	2020
Code	B	C	D	E	F	G	H

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

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

Characteristic			Symbol	Q1 N-CHANNEL	Q2 P-CHANNEL	Units
Drain-Source Voltage			V_{DSS}	20	-20	V
Gate-Source Voltage			V_{GSS}	±12	±12	V
Continuous Drain Current (Note 5) V_{GS} = 4.5V	Steady State	T_A = +25°C T_A = +70°C	I_D	4.7 3.8	-3.2 -2.5	A
	t < 5s	T_A = +25°C T_A = +70°C	I_D	6.1 4.9	-4.1 -3.2	A
Maximum Continuous Body Diode Forward Current (Note 5)			I_S	2	-1.5	A
Pulsed Drain Current (10µs pulse, duty cycle = 1%)			I_{DM}	30	-18	A

Thermal Characteristics

Characteristic		Symbol	Value	Units
Total Power Dissipation (Note 5)	Steady State	P_D	1.4	W
	t < 5s		2.2	
Thermal Resistance, Junction to Ambient (Note 5)	Steady State	$R_{\theta JA}$	92	°C/W
	t < 5s		55	
Thermal Resistance, Junction to Case (Note 5)		$R_{\theta JC}$	30	
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to 150	°C

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}	20	—	—	V	V_{GS} = 0V, I_D = 250µA
Zero Gate Voltage Drain Current T_J = +25°C	I_{DSS}	—	—	1.0	µA	V_{DS} = 20V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	—	—	±10	µA	V_{GS} = ±8V, V_{DS} = 0V
ON CHARACTERISTICS (Note 6)						
Gate Threshold Voltage	$V_{GS(th)}$	0.35	—	1.4	V	V_{DS} = V_{GS}, I_D = 250µA
Static Drain-Source On-Resistance	$R_{DS\ (ON)}$	—	23	40	mΩ	V_{GS} = 4.5V, I_D = 4.2A
		—	26	65		V_{GS} = 2.5V, I_D = 3.3A
Diode Forward Voltage	V_{SD}	—	0.7	1.2	V	V_{GS} = 0V, I_S = 4.4A
DYNAMIC CHARACTERISTICS (Note 7)						
Input Capacitance	C_{iss}	—	713	—	pF	V_{DS} = 10V, V_{GS} = 0V, f = 1.0MHz
Output Capacitance	C_{oss}	—	80	—	pF	
Reverse Transfer Capacitance	C_{rss}	—	68	—	pF	
Gate Resistance	R_g	—	15	—	Ω	V_{DS} = 0V, V_{GS} = 0V, f = 1MHz
Total Gate Charge (V_{GS} = 4.5V)	Q_g	—	8	—	nC	V_{DS} = 10V, I_D = 5.5A
Total Gate Charge (V_{GS} = 8V)		—	15	—	nC	
Gate-Source Charge	Q_{gs}	—	1.0	—	nC	
Gate-Drain Charge	Q_{gd}	—	1.1	—	nC	
Turn-On Delay Time	$t_{D(on)}$	—	3.6	—	ns	V_{DD} = 10V, V_{GS} = 4.5V, R_L = 2.3Ω, R_G = 1Ω
Turn-On Rise Time	t_r	—	15.9	—	ns	
Turn-Off Delay Time	$t_{D(off)}$	—	16.0	—	ns	
Turn-Off Fall Time	t_f	—	2.6	—	ns	
Body Diode Reverse Recovery Time	trr	—	6.6	—	nS	I_S = 4.4A, dI/dt = 100A/µs
Body Diode Reverse Recovery Charge	Qrr	—	1.2	—	nC	I_S = 4.4A, dI/dt = 100A/µs

Notes: 5. Device mounted on 1" x 1" FR-4 PCB with high coverage 2oz. Copper, single sided.
6. Short duration pulse test used to minimize self-heating effect.
7. Guaranteed by design. Not subject to product testing.

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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}	-20	—	—	V	V_{GS} = 0V, I_D = -250μA
Zero Gate Voltage Drain Current T_J = +25°C	I_{DSS}	—	—	-1.0	μA	V_{DS} = -20V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	—	—	±10	μA	V_{GS} = ±8V, V_{DS} = 0V
ON CHARACTERISTICS (Note 6)						
Gate Threshold Voltage	$V_{GS(th)}$	-0.35	—	-1.4	V	V_{DS} = V_{GS}, I_D = -250μA
Static Drain-Source On-Resistance	$R_{DS\ (ON)}$	—	59	90	mΩ	V_{GS} = -4.5V, I_D = -2.9A
		—	76	137		V_{GS} = -2.5V, I_D = -2.3A
Diode Forward Voltage	V_{SD}	—	-0.65	-1.2	V	V_{GS} = 0V, I_S = -3.0A
DYNAMIC CHARACTERISTICS (Note 7)						
Input Capacitance	C_{iss}	—	881	—	pF	V_{DS} = -10V, V_{GS} = 0V, f = 1.0MHz
Output Capacitance	C_{oss}	—	84	—	pF	
Reverse Transfer Capacitance	C_{rss}	—	67	—	pF	
Gate Resistance	R_g	—	14.3	—	Ω	V_{DS} = 0V, V_{GS} = 0V, f = 1MHz
Total Gate Charge (V_{GS} = -4.5V)	Q_g	—	11	—	nC	V_{DS} = -10V, I_D = -3.7A
Total Gate Charge (V_{GS} = -8V)		—	18	—	nC	
Gate-Source Charge	Q_{gs}	—	1.5	—	nC	
Gate-Drain Charge	Q_{gd}	—	2.3	—	nC	
Turn-On Delay Time	$t_{D(on)}$	—	5.0	—	ns	V_{DD} = -10V, V_{GS} = -4.5V, R_L = 3.3Ω, R_G = 1Ω
Turn-On Rise Time	t_r	—	9.5	—	ns	
Turn-Off Delay Time	$t_{D(off)}$	—	29.7	—	ns	
Turn-Off Fall Time	t_f	—	20.4	—	ns	
Body Diode Reverse Recovery Time	trr	—	23.6	—	nS	I_S = -3.0A, dI/dt = 100A/μs
Body Diode Reverse Recovery Charge	Qrr	—	11.4	—	nC	I_S = -3.0A, dI/dt = 100A/μs

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

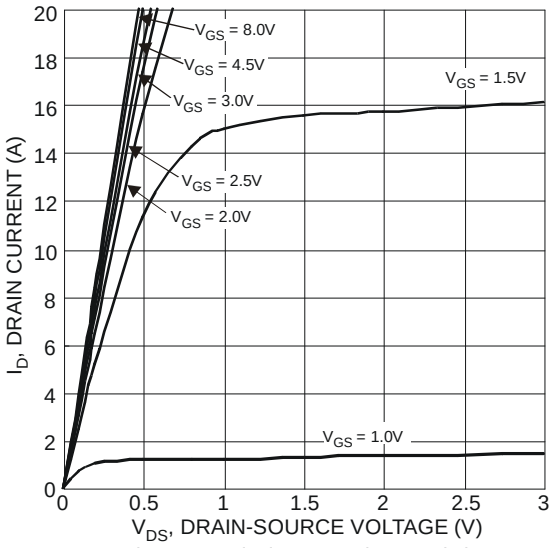

Figure 1 Typical Output Characteristics

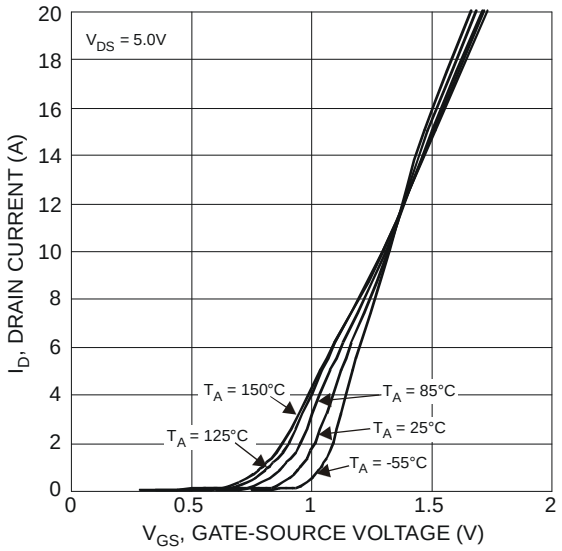

Figure 2 Typical Transfer Characteristics

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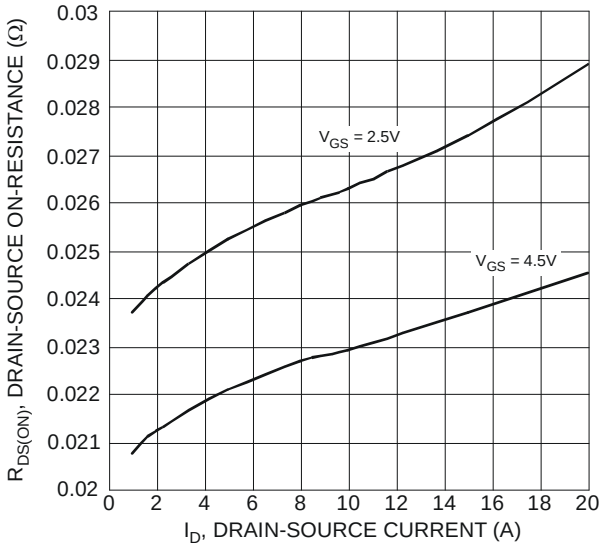

Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

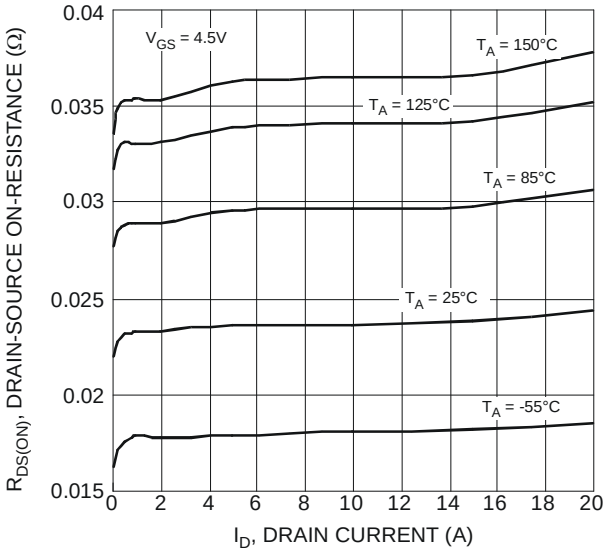

Figure 4 Typical On-Resistance vs. Drain Current and Temperature

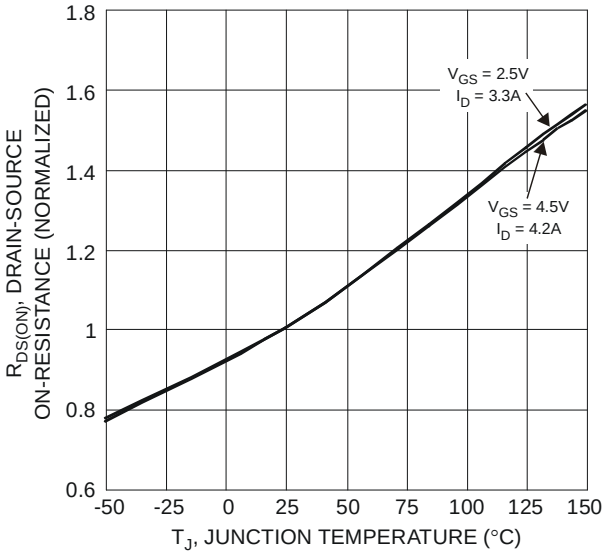

Figure 5 On-Resistance Variation with Temperature

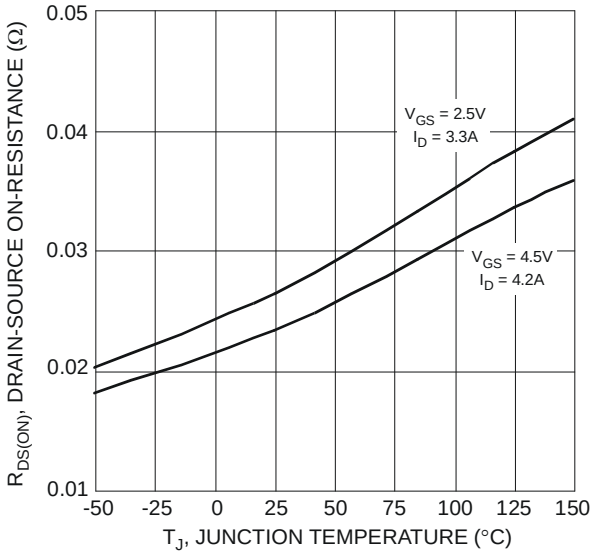

Figure 6 On-Resistance Variation with Temperature

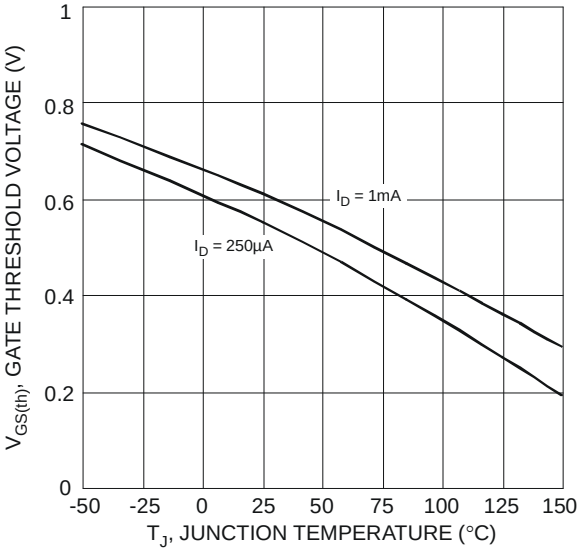

Figure 7 Gate Threshold Variation vs. Ambient Temperature

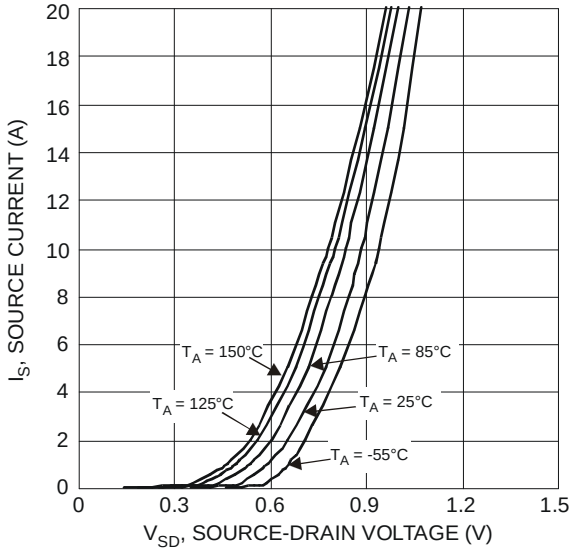

Figure 8 Diode Forward Voltage vs. Current

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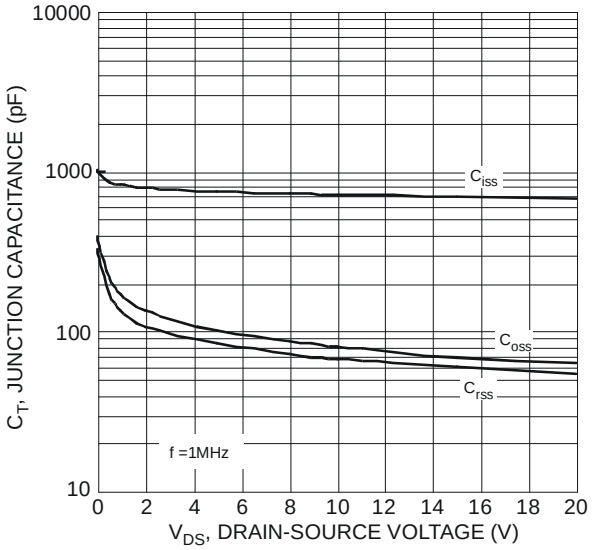

Figure 9 Typical Junction Capacitance

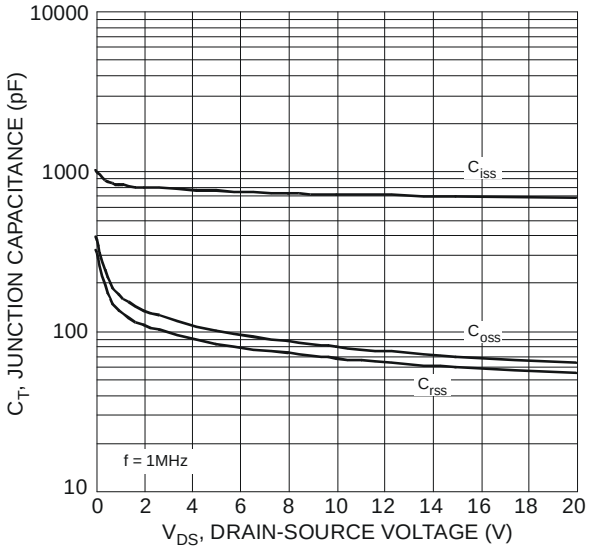

Figure 10 Typical Junction Capacitance

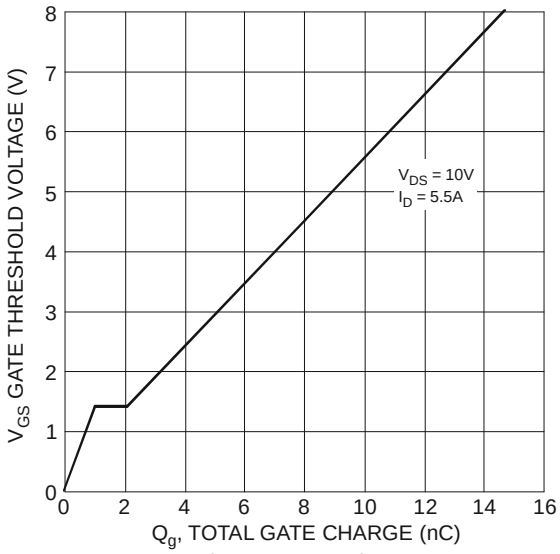

Figure 11 Gate Charge

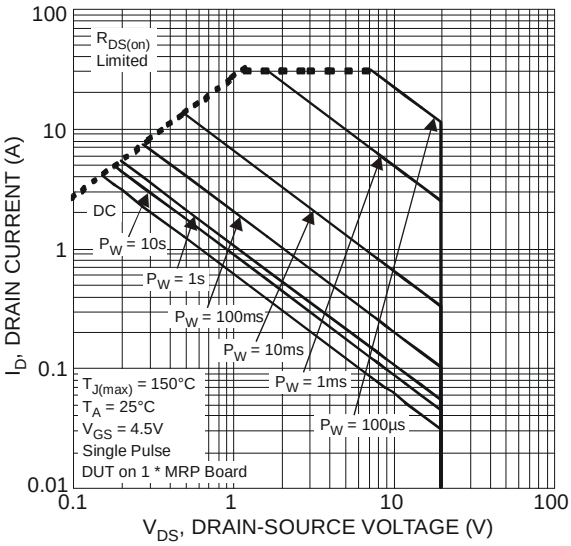

Figure 12 SOA, Safe Operation Area

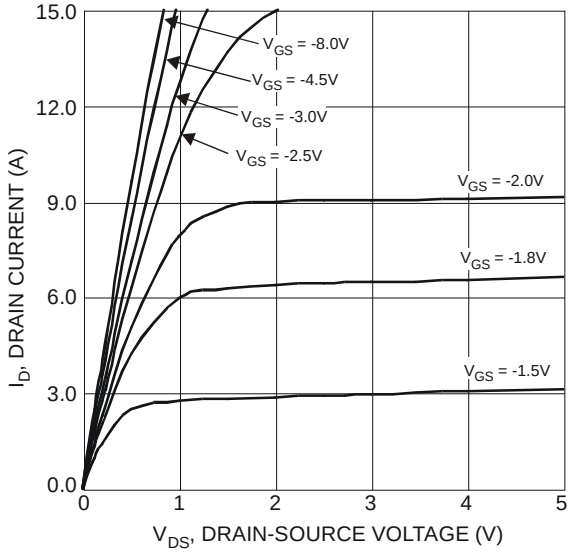

Figure 13 Typical Output Characteristics

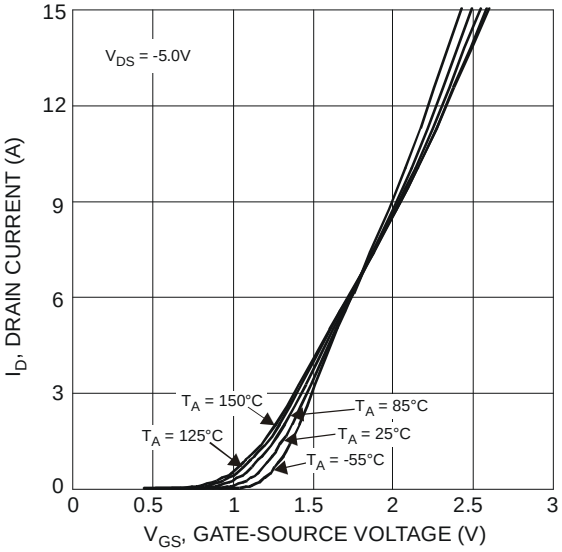

Figure14 Typical Transfer Characteristics

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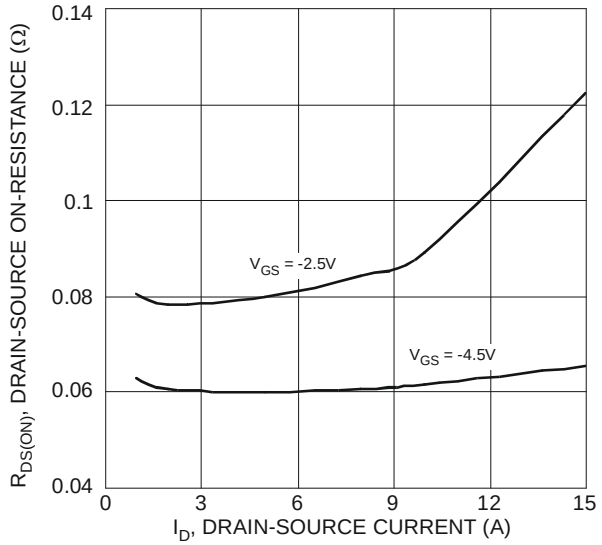

Figure 15 Typical On-Resistance vs. Drain Current and Gate Voltage

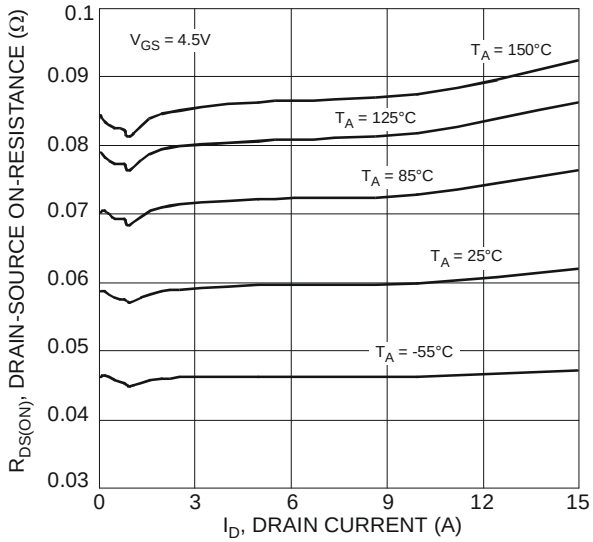

Figure 16 Typical On-Resistance vs. Drain Current and Temperature

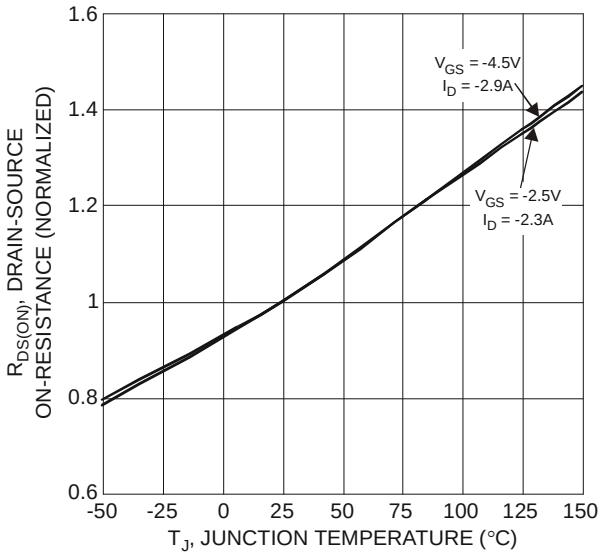

Figure 17 On-Resistance Variation with Temperature

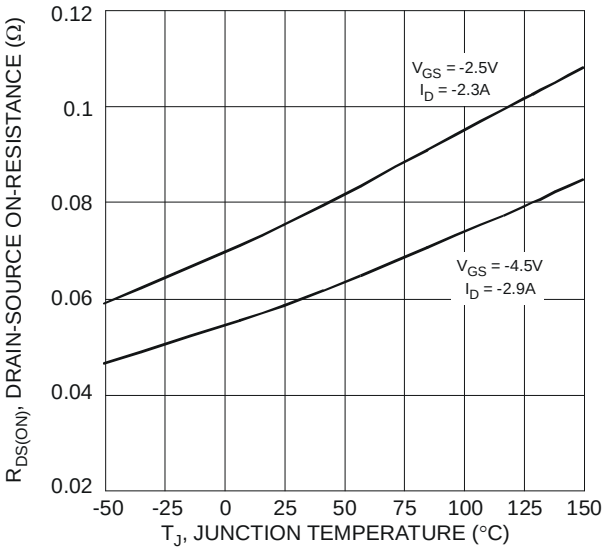

Figure 18 On-Resistance Variation with Temperature

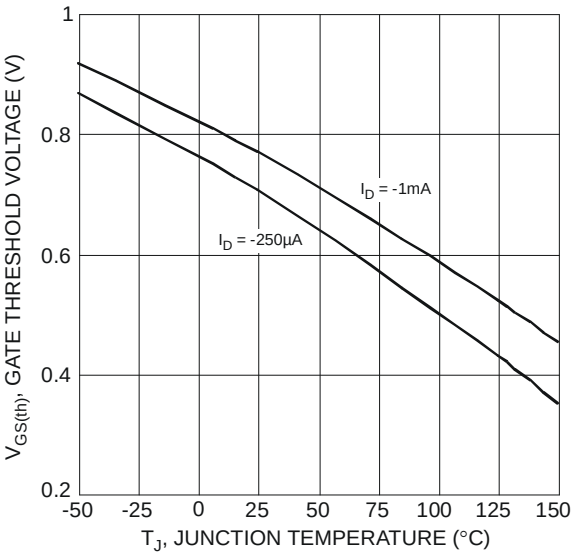

Figure 19 Gate Threshold Variation vs. Ambient Temperature

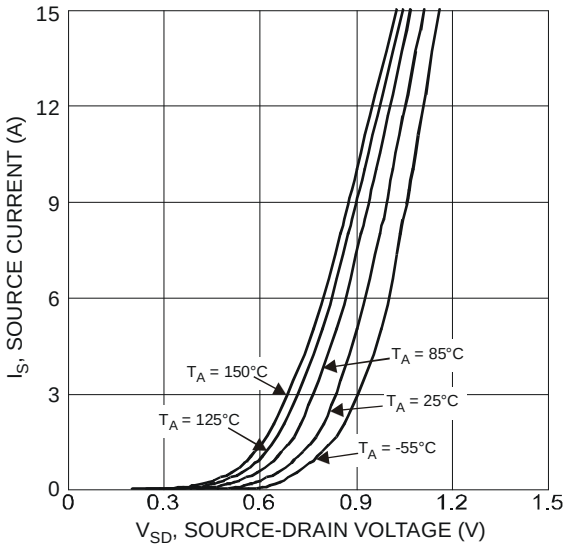

Figure 20 Diode Forward Voltage vs. Current

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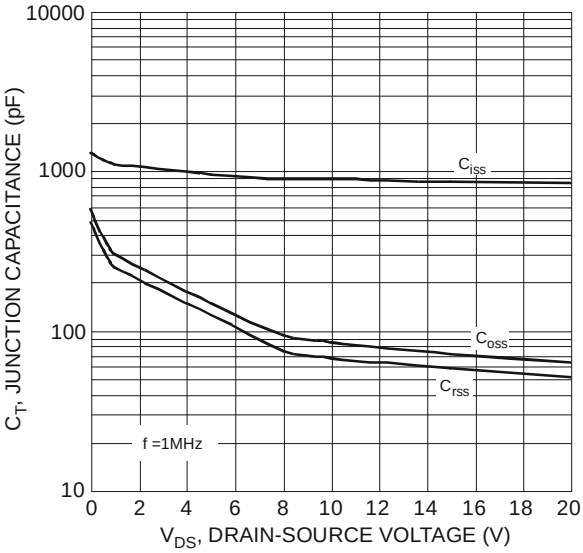

Figure 21 Typical Junction Capacitance

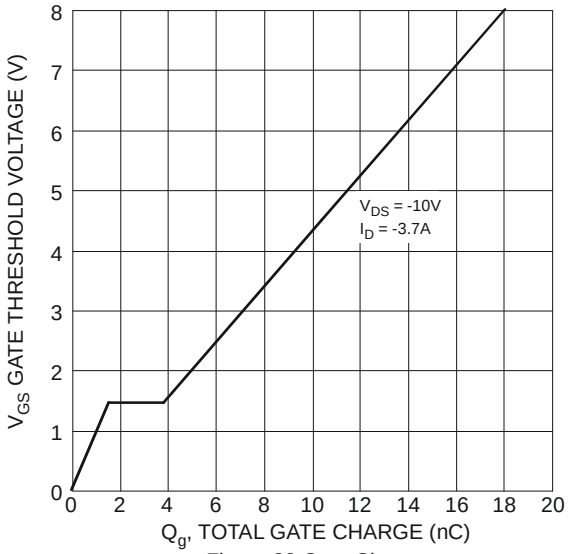

Figure 22 Gate Charge

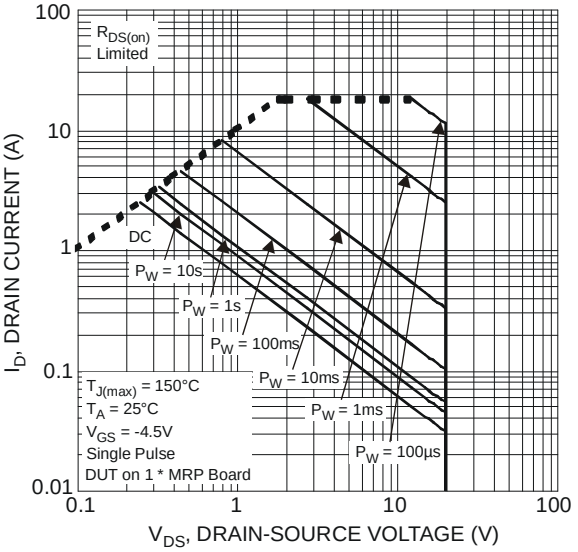

Figure 23 SOA, Safe Operation Area

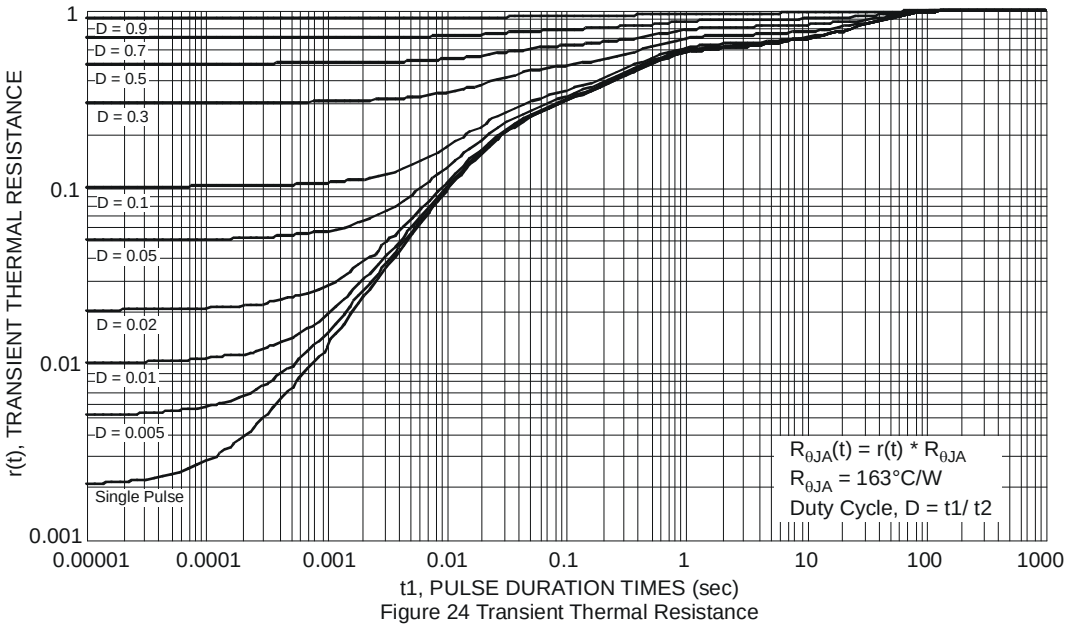

Figure 24 Transient Thermal Resistance

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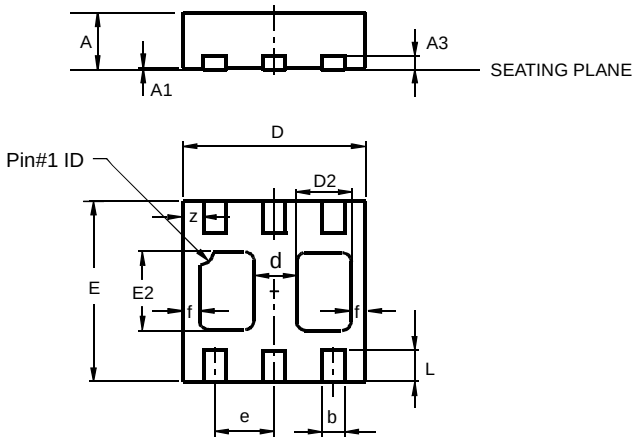
Package Outline Dimensions

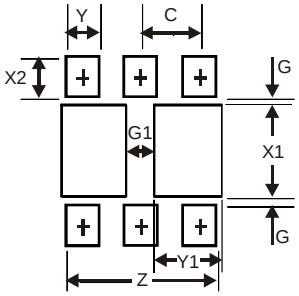
Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for the version.



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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Адрес: 105318, г.Москва, ул.Щербаковская д.3, офис 1107

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Офис по работе с юридическими лицами:

105318, г.Москва, ул.Щербаковская д.3, офис 1107, 1118, ДЦ «Щербаковский»

Телефон: +7 495 668-12-70 (многоканальный)

Факс: +7 495 668-12-70 (доб.304)

E-mail: info@moschip.ru

Skype отдела продаж:
moschip.ru
moschip.ru_4
moschip.ru_6
moschip.ru_9