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NEW PRODUCT

DMC1029UFDB

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
		210mΩ @ V_{GS} = -1.5V	-2.3A

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

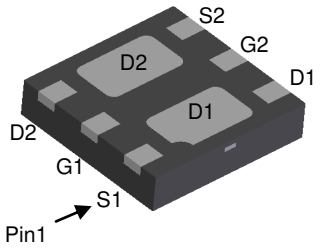
Features

- Low On-Resistance
- Low Input Capacitance
- Low Profile, 0.6mm Max Height
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**

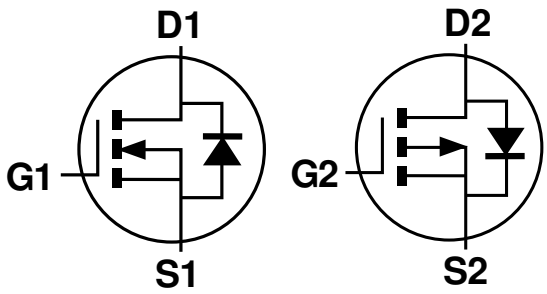
Mechanical Data

- 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
- Terminals Connections: See Diagram Below
- Weight: 0.0065 grams (Approximate)

U-DFN2020-6



Bottom View



N-CHANNEL MOSFET P-CHANNEL MOSFET

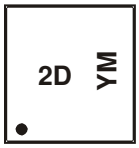
Internal Schematic

Ordering Information (Note 4)

Part Number	Case	Packaging
DMC1029UFDB -7	U-DFN2020-6	3000/Tape & Reel
DMC1029UFDB -13	U-DFN2020-6	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 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



2D = 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

NEW PRODUCT

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	T_A = +25°C T_A = +70°C	I_D	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
Avalanche Current (L = 0.1mH)			I_{AS}	15	-12	A
Avalanche Energy (L = 0.1mH)			E_{AS}	12	8	mJ

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	$R_{\theta JA}$	91	°C/W
	t < 5s		55	
Thermal Resistance, Junction to Case		$R_{\theta JC}$	20	
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.

NEW PRODUCT

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
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	V_{DD} = 6V, V_{GS} = 4.5V, R_L = 1.2Ω, R_G = 1Ω
Turn-On Rise Time	t_R	—	10.5	—	ns	
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	210		V_{GS} = -1.5V, I_D = -1A
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	V_{DD} = -6V, V_{GS} = -4.5V, R_L = 1.6Ω, R_G = 1Ω
Turn-On Rise Time	t_R	—	11.5	—	ns	
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.

NEW PRODUCT

Typical Characteristics - N-CHANNEL

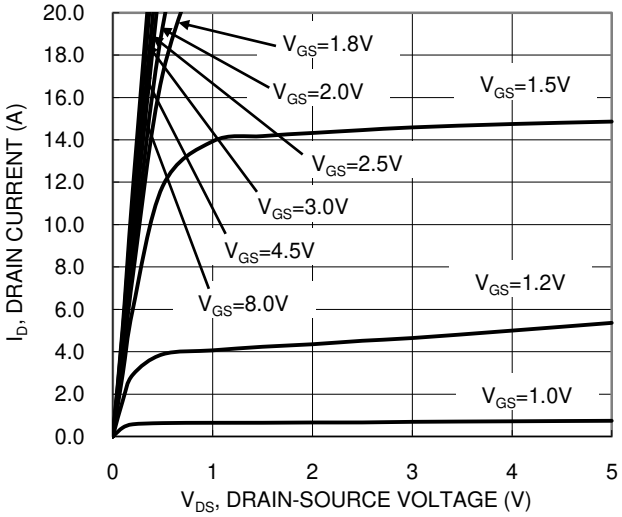


Figure 1. Typical Output Characteristic

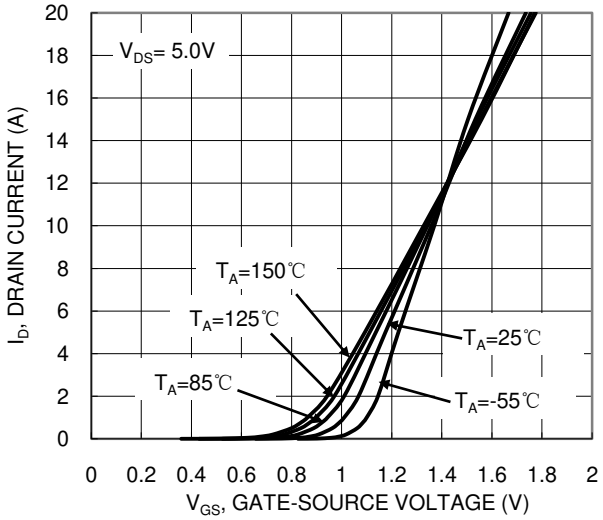


Figure 2. Typical Transfer Characteristic

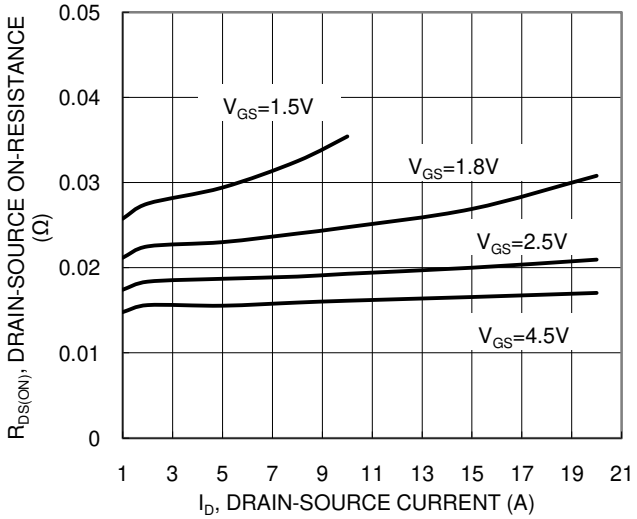


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

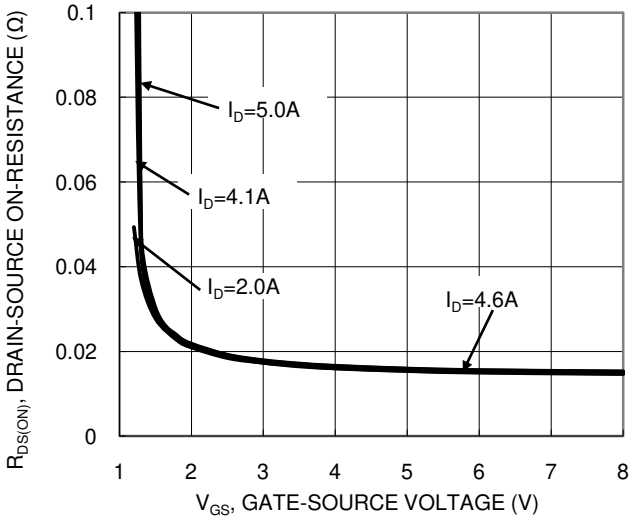


Figure 4. Typical Transfer Characteristic

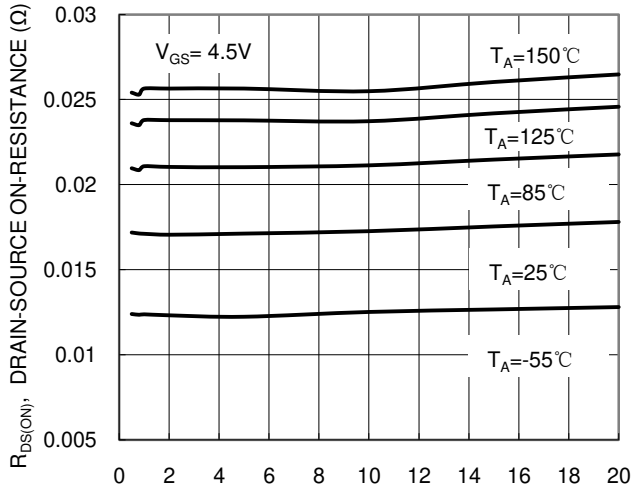


Figure 5. Typical On-Resistance vs. Drain Current and Temperature

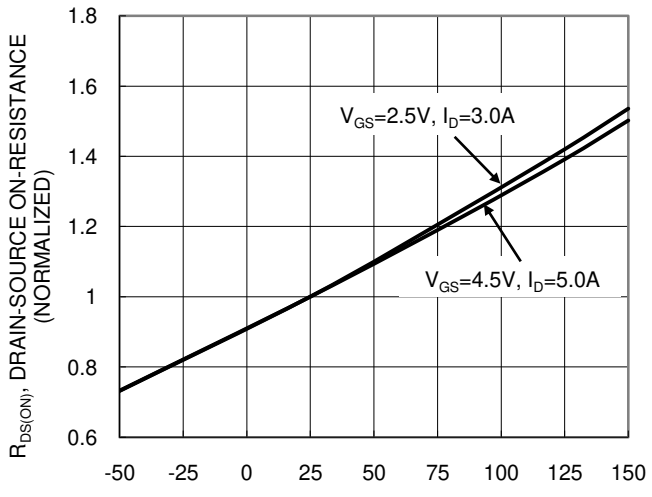


Figure 6. On-Resistance Variation with Temperature

NEW PRODUCT

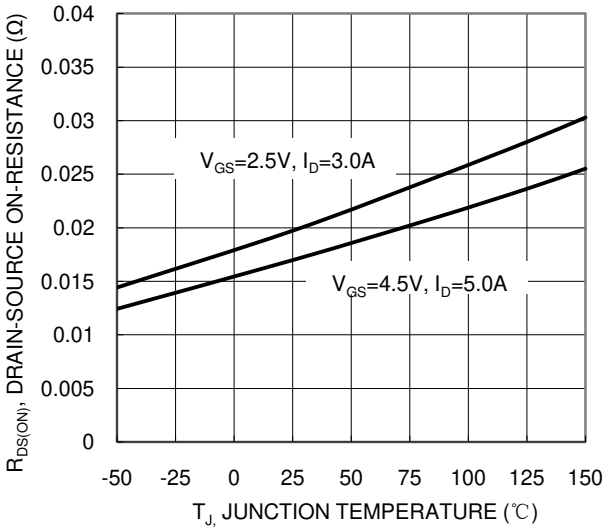


Figure 7. On-Resistance Variation with Temperature

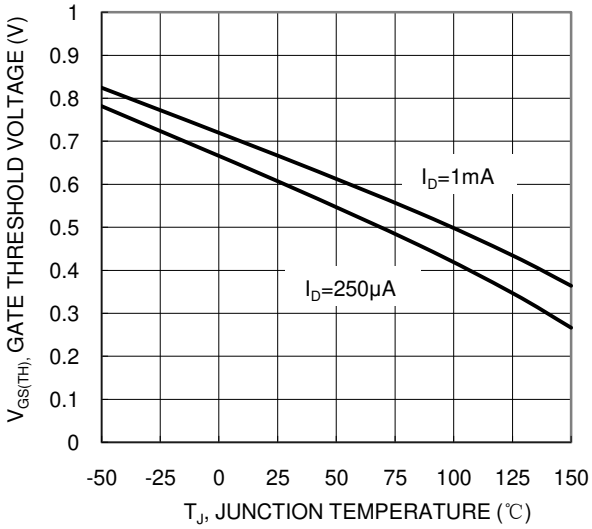


Figure 8. Gate Threshold Variation vs. Junction Temperature

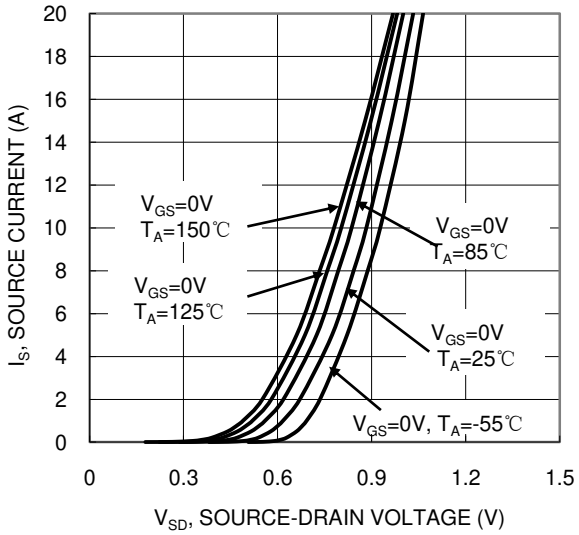


Figure 9. Diode Forward Voltage vs. Current

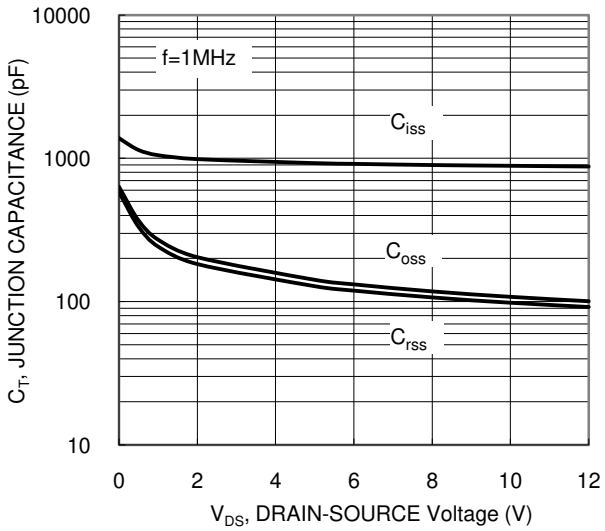


Figure 10. Typical Junction Capacitance

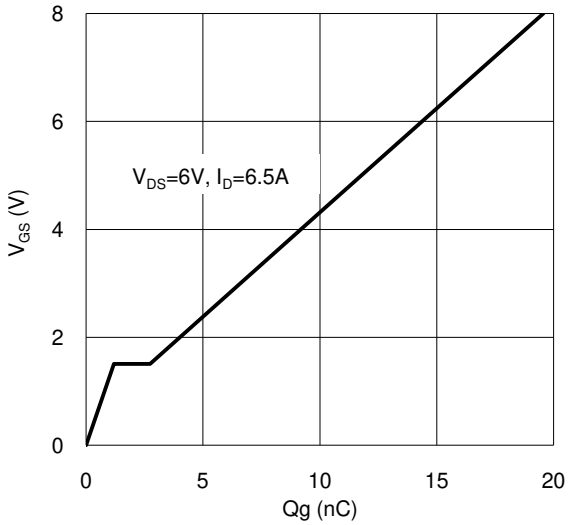


Figure 11. Gate Charge

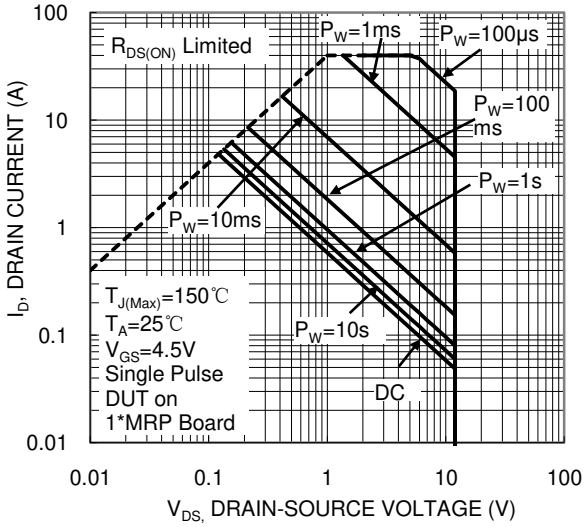


Figure 12. SOA, Safe Operation Area

NEW PRODUCT

Typical Characteristics - P-CHANNEL

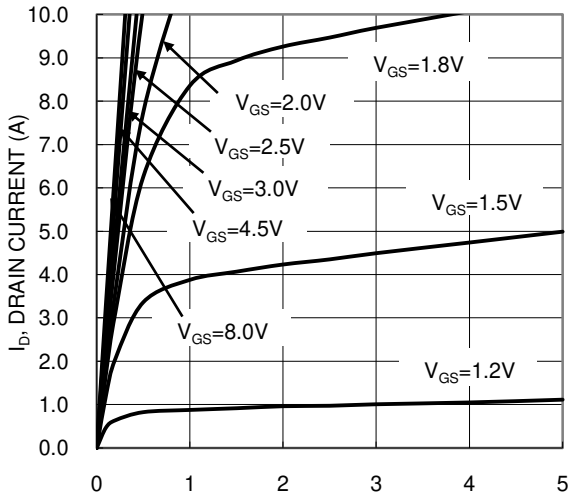


Figure 13. Typical Output Characteristic

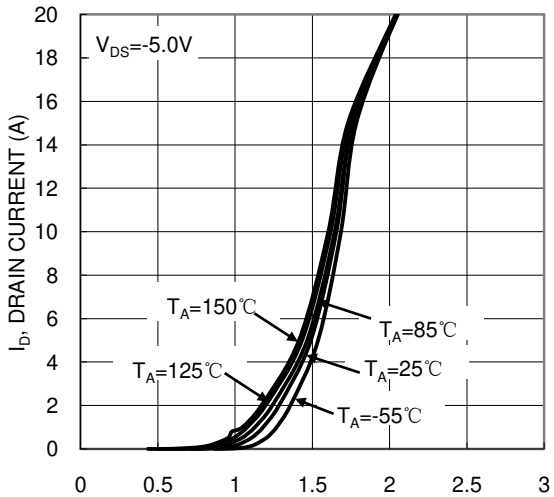


Figure 14. Typical Transfer Characteristic

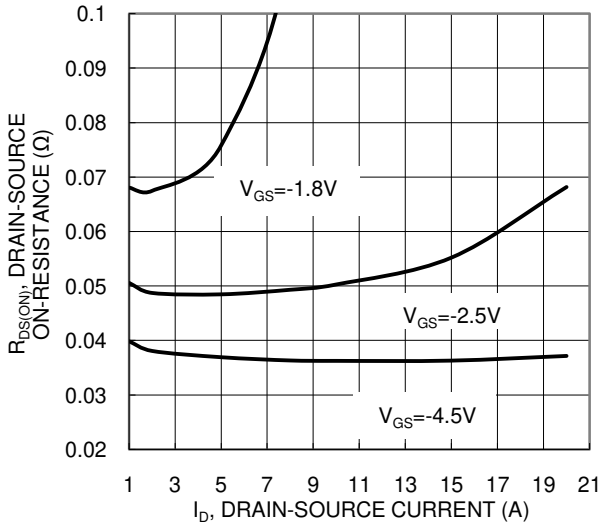


Figure 15. Typical On-Resistance vs Drain Current and Gate Voltage

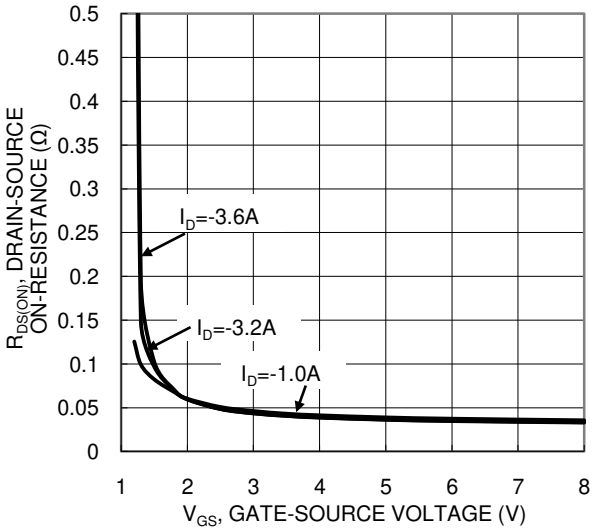


Figure 16. Typical Transfer Characteristic

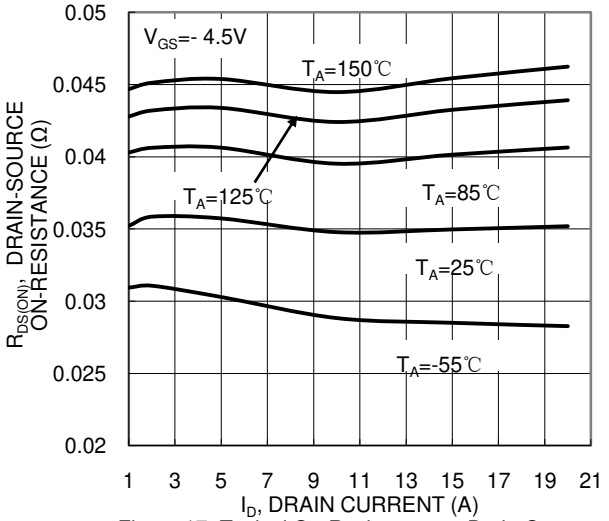


Figure 17. Typical On-Resistance vs Drain Current and Temperature

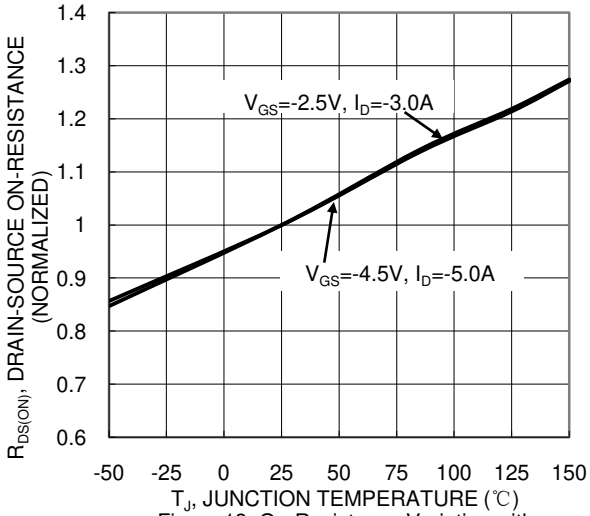


Figure 18. On-Resistance Variation with Temperature

NEW PRODUCT

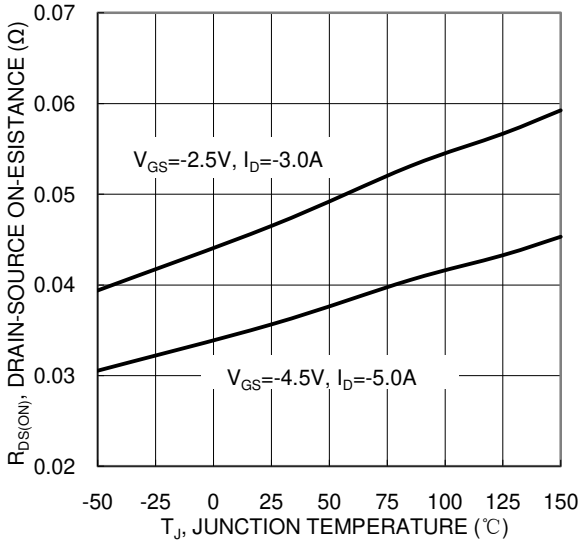


Figure 19. On-Resistance Variation with Temperature

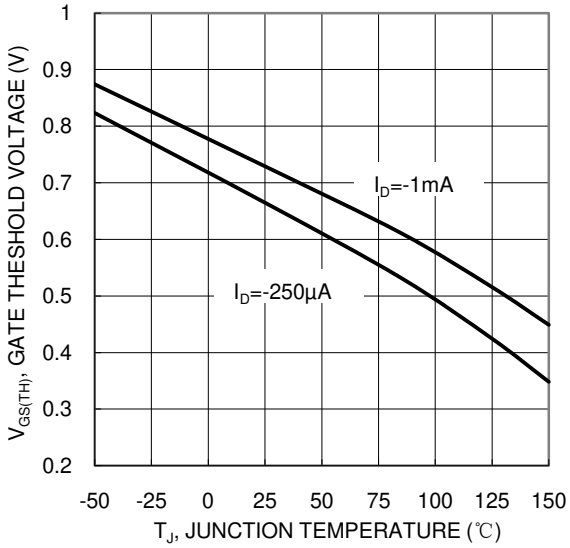


Figure 20. Gate Theshold Variation vs Junction Temperature

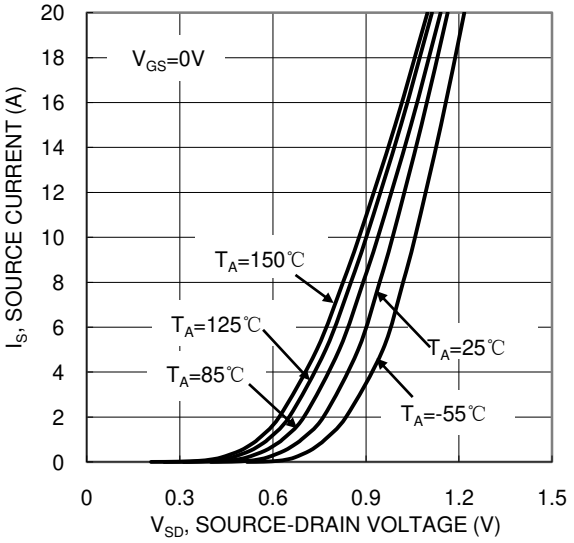


Figure 21. Diode Forward Voltage vs. Current

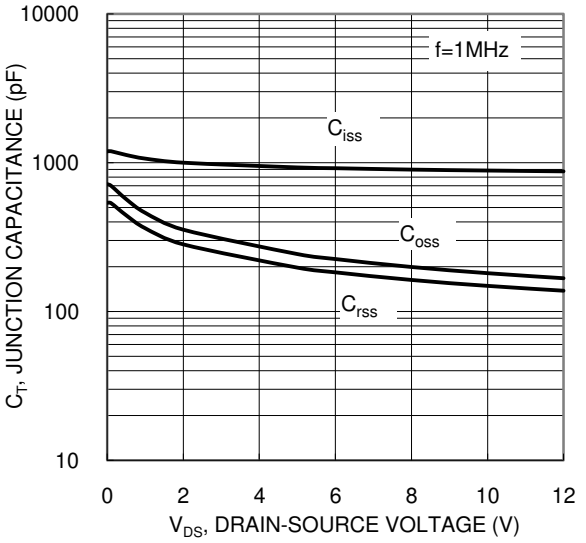


Figure 22. Typical Junction Capacitance

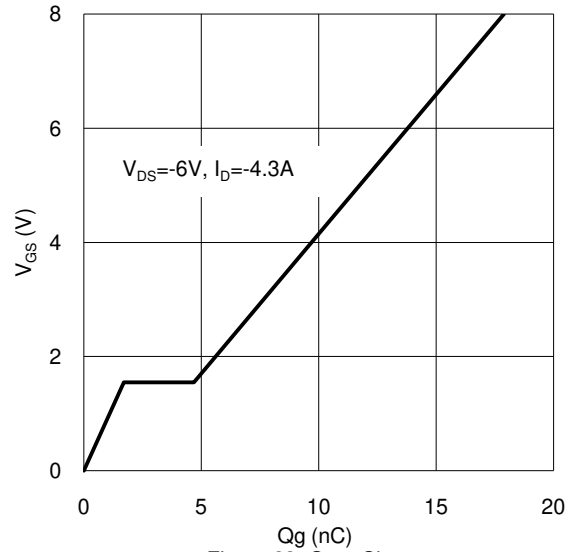


Figure 23. Gate Charge

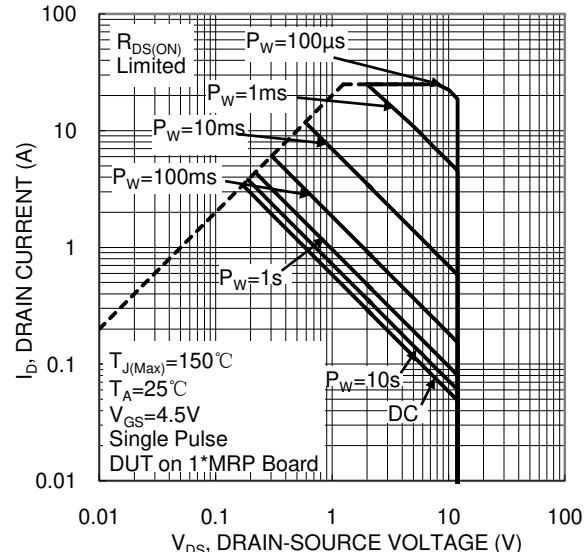


Figure 24. SOA, Safe Operation Area

NEW PRODUCT

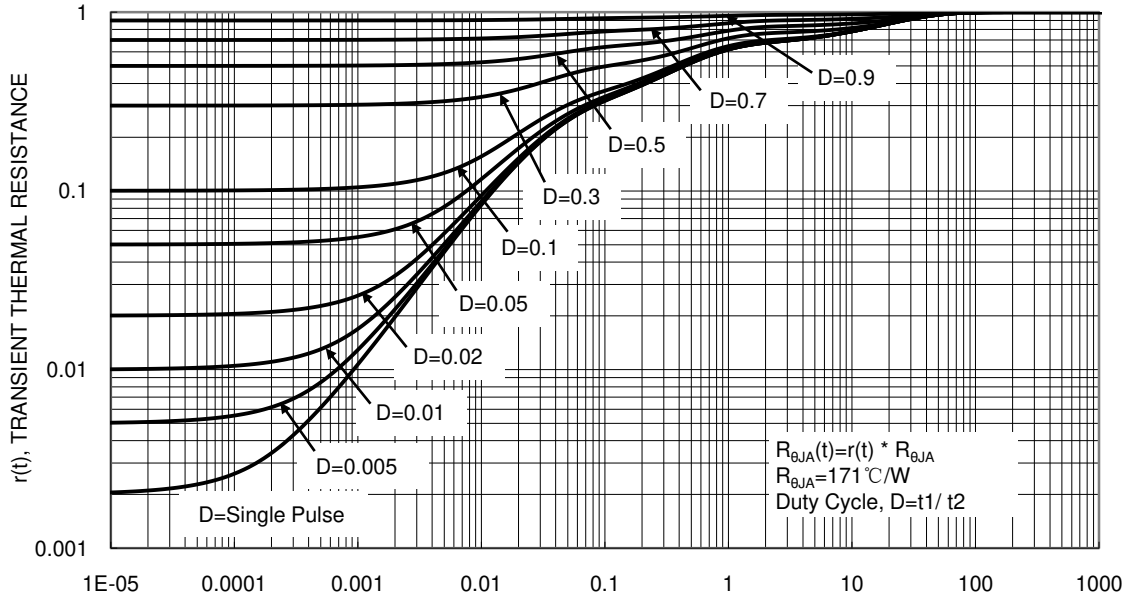
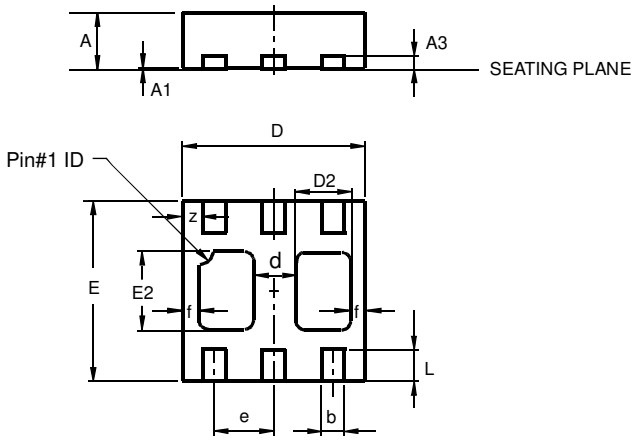


Figure 25. Transient Thermal Resistance

Package Outline Dimensions

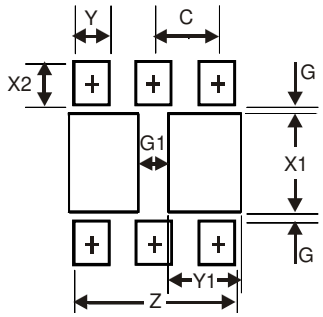
Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for the latest version.



U-DFN2020-6 Type B			
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

NEW PRODUCT

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