

Product Summary

Device	BV _{DSS}	R _{DS(ON)} Max	I _D MAX T _A = +25°C
Q1 N-Channel	20V	25mΩ @ V _{GS} = 4.5V	6.0A
		35mΩ @ V _{GS} = 2.5V	5.1A
Q2 P-Channel	-20V	75mΩ @ V _{GS} = -4.5V	-3.5A
		140mΩ @ V _{GS} = -2.5V	-2.5A

Features

- PCB Footprint of 4mm²
- Low On-Resistance
- Low Input Capacitance
- Low Profile, 0.6mm Maximum Height
- ESD Protected Gate
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **The DMC2025UFDBQ is suitable for automotive applications requiring specific change control; this part is AEC-Q101 qualified, PPAP capable, and manufactured in IATF 16949 certified facilities.**

<https://www.diodes.com/quality/product-definitions/>

Description and Applications

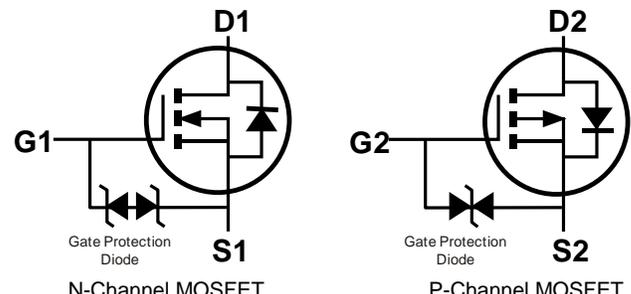
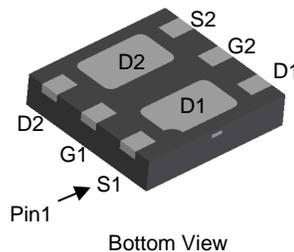
This MOSFET is designed to meet the stringent requirements of automotive applications. It is qualified to AEC-Q101, supported by a PPAP, and is ideal for use in:

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

U-DFN2020-6 (Type B)



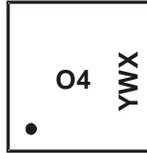
Internal Schematic

Ordering Information (Note 4)

Part Number	Case	Packaging
DMC2025UFDBQ-7	U-DFN2020-6 (Type B)	3,000/Tape & Reel
DMC2025UFDBQ-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) & 2015/863/EU (RoHS 3) compliant.
 2. See <https://www.diodes.com/quality/lead-free/> 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 <https://www.diodes.com/design/support/packaging/diodes-packaging/>.

Marking Information



O4 = Product Type Marking Code
 YWX = Date Code Marking
 Y = Year (ex: 1 = 2021)
 W = Week (ex: a = Week 27; z Represents Week 52 and 53)
 X = Internal Code (ex: U = Monday)

Date Code Key

Year	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Code	1	2	3	4	5	6	7	8	9	0	1	2

Week	1-26	27-52	53
Code	A-Z	a-z	z

Internal Code	Sun	Mon	Tue	Wed	Thu	Fri	Sat
Code	T	U	V	W	X	Y	Z

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

Characteristic	Symbol	Q1	Q2	Unit
		N-CHANNEL	P-CHANNEL	
Drain-Source Voltage	V _{DSS}	20	-20	V
Gate-Source Voltage	V _{GSS}	±10	±8	V
Continuous Drain Current (Note 6)	I _D	6.0	-3.5	A
N-Channel: V _{GS} = 4.5V		4.8	-2.8	
P-Channel: V _{GS} = -4.5V				
Maximum Continuous Body Diode Forward Current (Note 6)	I _S	2	-1.0	A
Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)	I _{DM}	20	-10	A
Avalanche Current (L = 0.1mH) (Note 7)	I _{AS}	8	-13	A
Avalanche Energy (L = 0.1mH) (Note 7)	E _{AS}	8	8.5	mJ

Thermal Characteristics

Characteristic	Symbol	Value	Unit
Total Power Dissipation (Note 5)	P _D	0.7	W
Thermal Resistance, Junction to Ambient (Note 5)	R _{θJA}	178	°C/W
Total Power Dissipation (Note 6)	P _D	1.4	W
Thermal Resistance, Junction to Ambient (Note 6)	R _{θJA}	92	°C/W
Thermal Resistance, Junction to Case (Note 6)	R _{θJC}	30	
Operating and Storage Temperature Range	T _J , T _{STG}	-55 to +150	°C

Notes: 5. Device mounted on FR-4 substrate PCB, 2oz copper, with minimum recommended pad layout.
 6. Device mounted on FR-4 substrate PCB, 2oz copper, with 1inch square copper plate.
 7. I_{AS} and E_{AS} ratings are based on low frequency and duty cycles to keep T_J = +25°C.

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 8)						
Drain-Source Breakdown Voltage	B _V DSS	20	—	—	V	V _{GS} = 0V, I _D = 250μA
Zero Gate Voltage Drain Current T _J = +25°C	I _{DSS}	—	—	1	μA	V _{DS} = 20V, V _{GS} = 0V
Gate-Source Leakage	I _{GSS}	—	—	±10	μA	V _{GS} = ±10V, V _{DS} = 0V
ON CHARACTERISTICS (Note 8)						
Gate Threshold Voltage	V _{GS(TH)}	0.5	—	1.0	V	V _{DS} = V _{GS} , I _D = 250μA
Static Drain-Source On-Resistance	R _{DS(ON)}	—	—	25	mΩ	V _{GS} = 4.5V, I _D = 4A
			—	35		V _{GS} = 2.5V, I _D = 4A
Diode Forward Voltage	V _{SD}	—	0.7	1.2	V	V _{GS} = 0V, I _S = 5A
DYNAMIC CHARACTERISTICS (Note 9)						
Input Capacitance	C _{iss}	—	486	—	pF	V _{DS} = 10V, V _{GS} = 0V, f = 1.0MHz
Output Capacitance	C _{oss}	—	92	—		
Reverse Transfer Capacitance	C _{rss}	—	77	—		
Gate Resistance	R _g	—	3.2	—	Ω	V _{DS} = 0V, V _{GS} = 0V, f = 1MHz
Total Gate Charge (V _{GS} = 4.5V)	Q _g	—	5.9	—	nC	V _{DS} = 10V, I _D = 6.5A
Total Gate Charge (V _{GS} = 10V)	Q _g	—	12.3	—		
Gate-Source Charge	Q _{gs}	—	0.8	—		
Gate-Drain Charge	Q _{gd}	—	2.2	—		
Turn-On Delay Time	t _{D(ON)}	—	3.4	—	ns	V _{DS} = 10V, V _{GS} = 4.5V, R _g = 6Ω, R _L = 10Ω, I _D = 1A
Turn-On Rise Time	t _R	—	5.4	—		
Turn-Off Delay Time	t _{D(OFF)}	—	17.6	—		
Turn-Off Fall Time	t _F	—	9.3	—		
Reverse Recovery Time	t _{RR}	—	7.7	—	ns	I _F = 1A, di/dt = 100A/μs
Reverse Recovery Charge	Q _{RR}	—	1.5	—	nC	I _F = 1A, di/dt = 100A/μs

Notes: 8. Short duration pulse test used to minimize self-heating effect.
9. Guaranteed by design. Not subject to product testing.

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 8)						
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 8)						
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)}	—	—	75	mΩ	V _{GS} = -4.5V, I _D = -2.9A
		—	—	140		V _{GS} = -2.5V, I _D = -2.3A
Diode Forward Voltage	V _{SD}	—	—	-1.2	V	V _{GS} = 0V, I _S = -3.0A
DYNAMIC CHARACTERISTICS (Note 9)						
Input Capacitance	C _{iss}	—	642	—	pF	V _{DS} = -10V, V _{GS} = 0V, f = 1.0MHz
Output Capacitance	C _{oss}	—	98	—	pF	
Reverse Transfer Capacitance	C _{rss}	—	87	—	pF	
Gate Resistance	R _g	—	26.5	—	Ω	V _{DS} = 0V, V _{GS} = 0V, f = 1MHz
Total Gate Charge (V _{GS} = -4.5V)	Q _g	—	8.8	—	nC	V _{DS} = -10V, I _D = -3.7A
Total Gate Charge (V _{GS} = -8V)		—	15	—	nC	
Gate-Source Charge	Q _{gs}	—	0.9	—	nC	
Gate-Drain Charge	Q _{gd}	—	2.9	—	nC	
Turn-On Delay Time	t _{D(ON)}	—	5.5	—	ns	
Turn-On Rise Time	t _R	—	22.6	—	ns	V _{DD} = -10V, V _{GS} = -4.5V, R _L = 3.3Ω, R _g = 1Ω
Turn-Off Delay Time	t _{D(OFF)}	—	34.1	—	ns	
Turn-Off Fall Time	t _F	—	34.3	—	ns	
Body Diode Reverse Recovery Time	t _{RR}	—	13	—	ns	I _S = -3.0A, di/dt = 100A/μs
Body Diode Reverse Recovery Charge	Q _{RR}	—	3.3	—	nC	I _S = -3.0A, di/dt = 100A/μs

Notes: 8. Short duration pulse test used to minimize self-heating effect.
9. Guaranteed by design. Not subject to product testing.

Typical Characteristics - N-CHANNEL

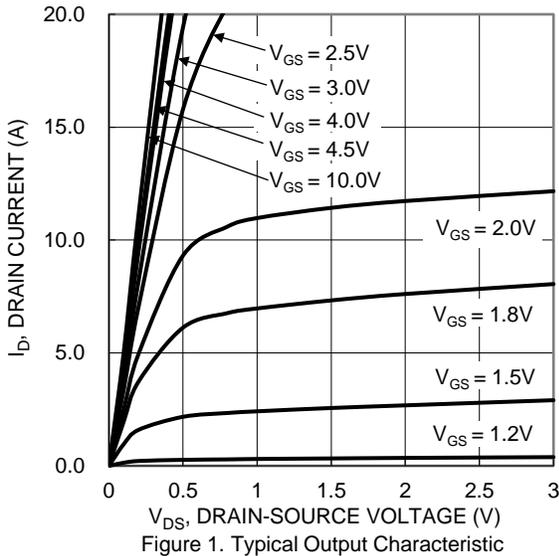


Figure 1. Typical Output Characteristic

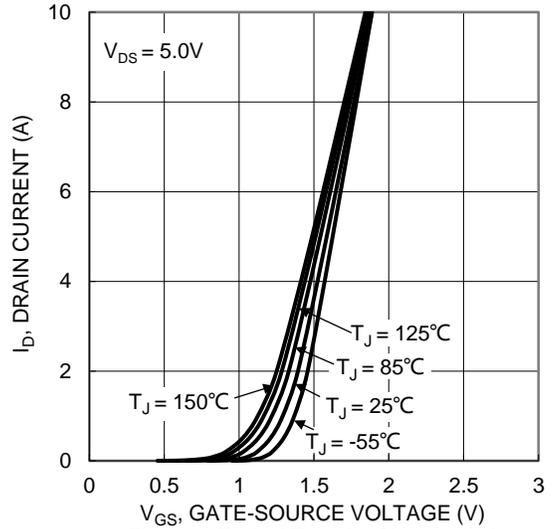


Figure 2. Typical Transfer Characteristic

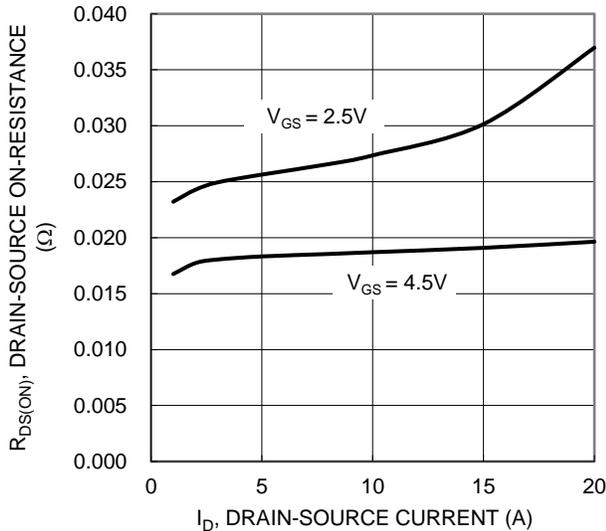


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

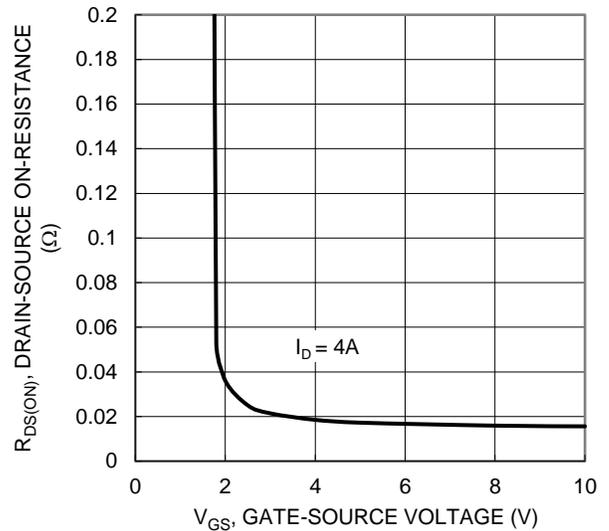


Figure 4. Typical Transfer Characteristic

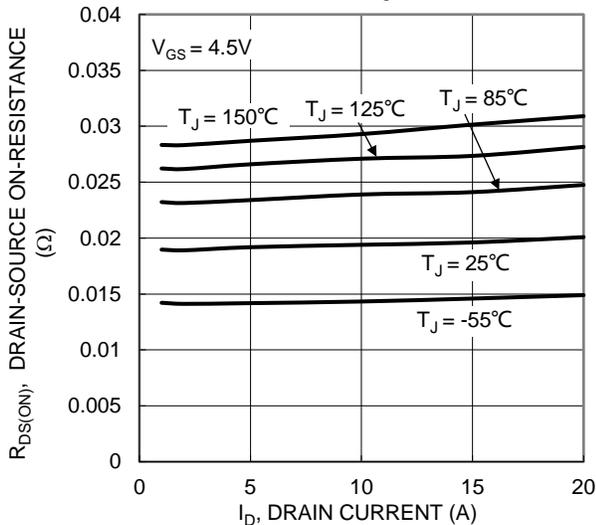


Figure 5. Typical On-Resistance vs. Drain Current and Temperature

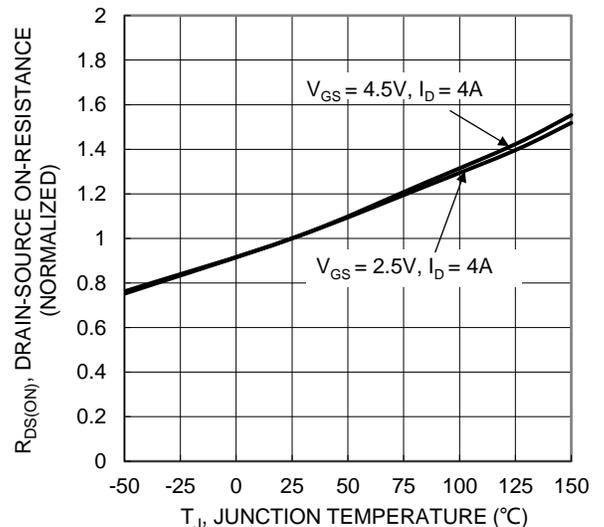


Figure 6. On-Resistance Variation with Temperature

Typical Characteristics - N-CHANNEL (continued)

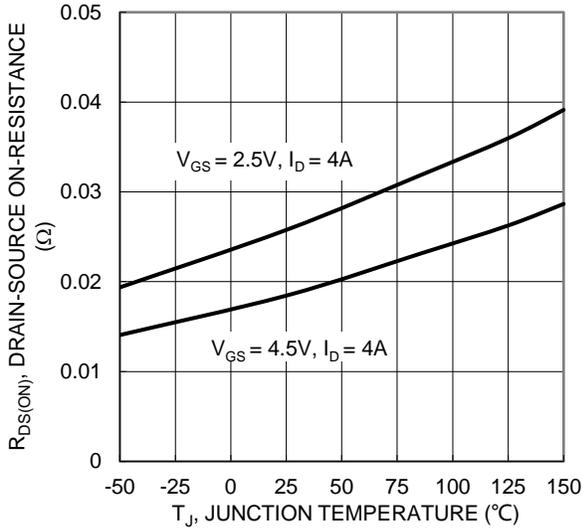


Figure 7. On-Resistance Variation with Temperature

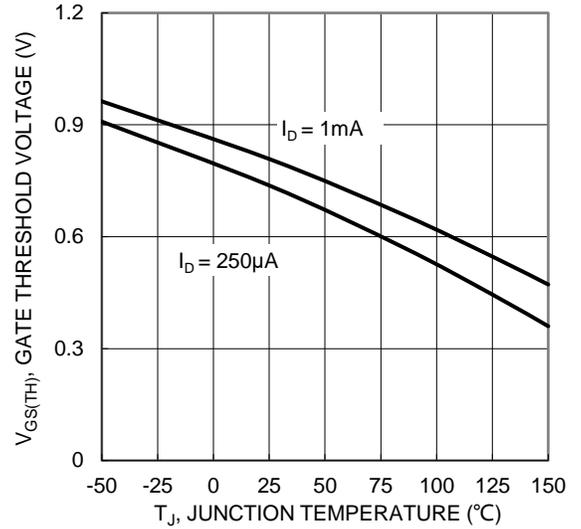


Figure 8. Gate Threshold Variation vs. Junction Temperature

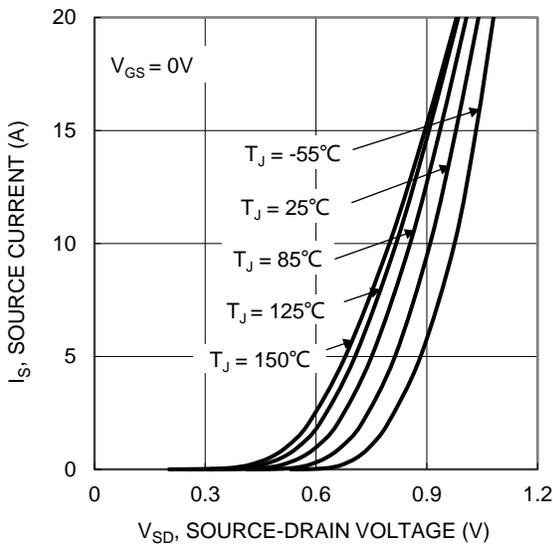


Figure 9. Diode Forward Voltage vs. Current

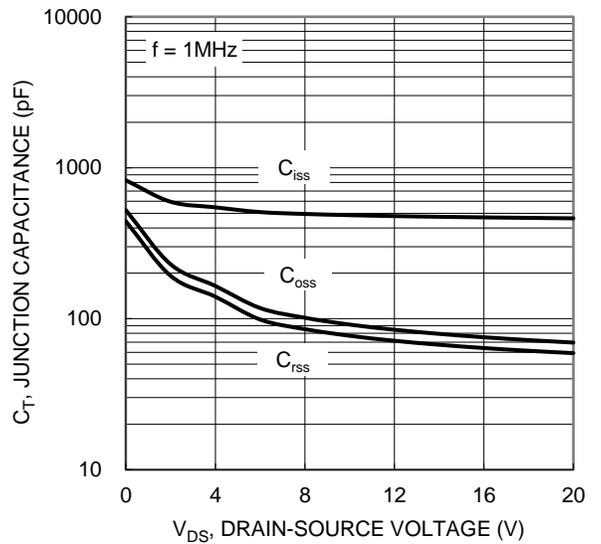


Figure 10. Typical Junction Capacitance

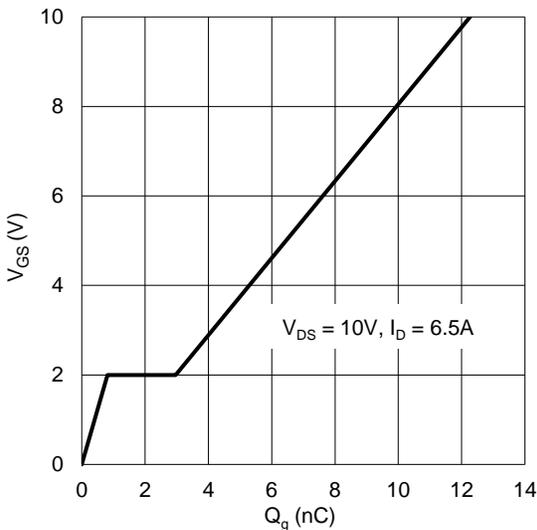


Figure 11. Gate Charge

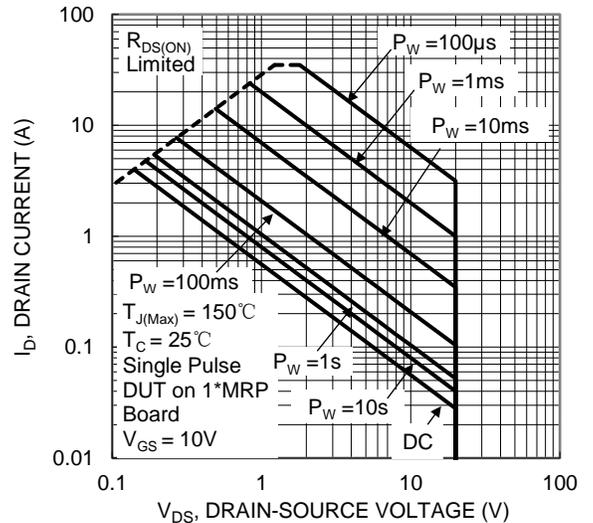


Figure 12. SOA, Safe Operation Area

Typical Characteristics - P-CHANNEL

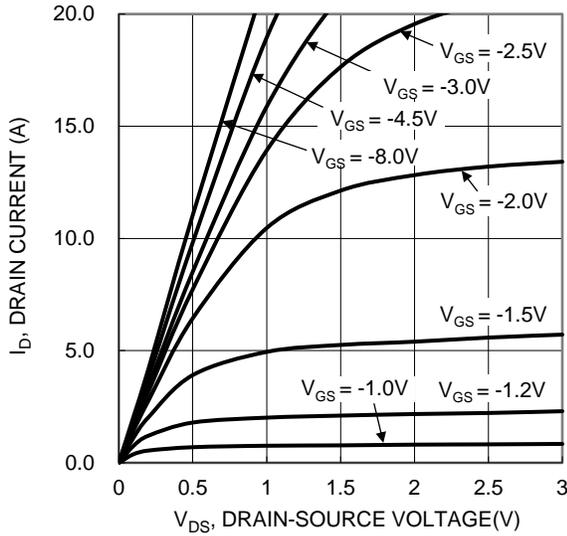


Figure 13. Typical Output Characteristic

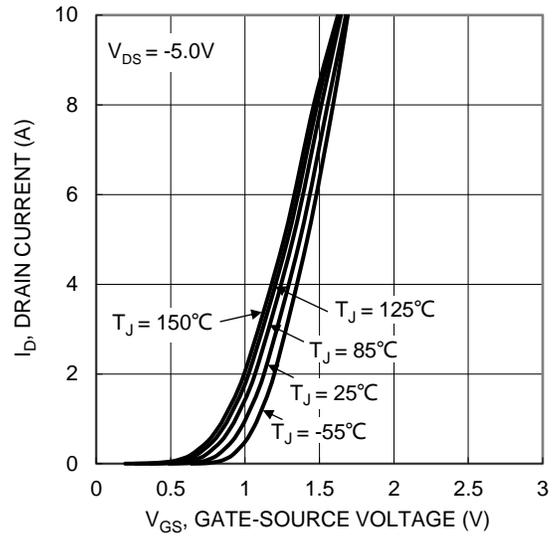


Figure 14. Typical Transfer Characteristic

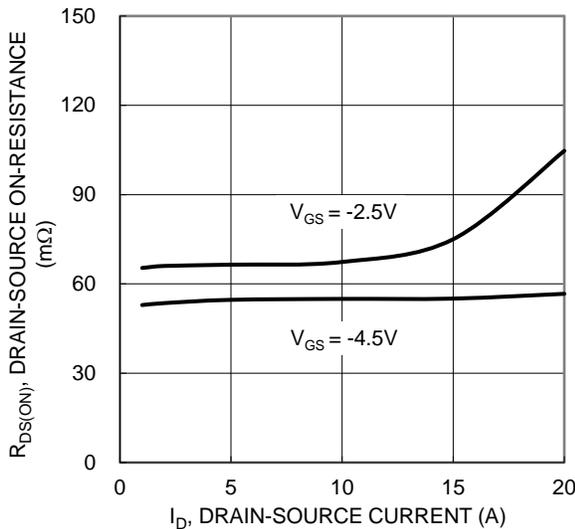


Figure 15. Typical On-Resistance vs. Drain Current and Gate Voltage

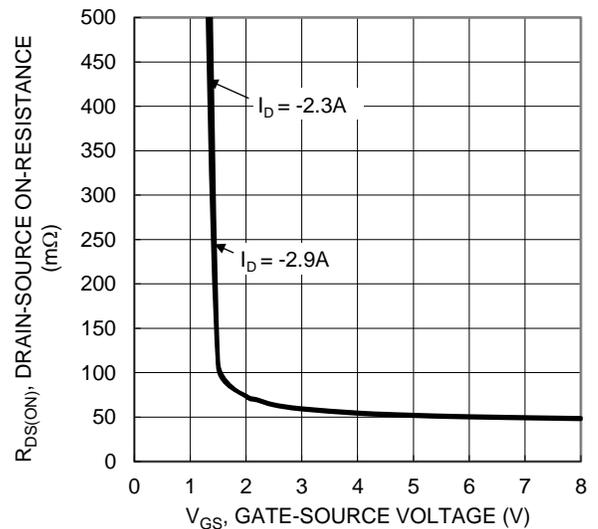


Figure 16. Typical Transfer Characteristic

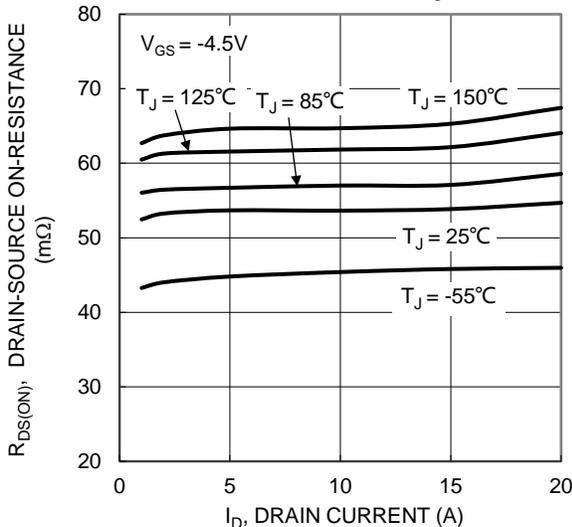


Figure 17. Typical On-Resistance vs. Drain Current and Temperature

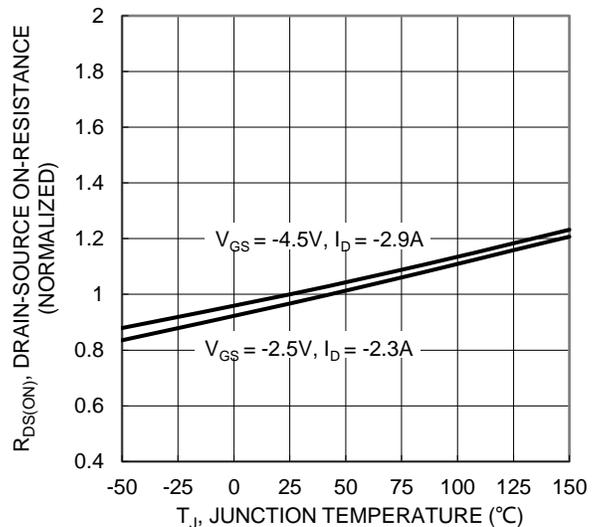


Figure 18. On-Resistance Variation with Temperature

Typical Characteristics - P-CHANNEL (continued)

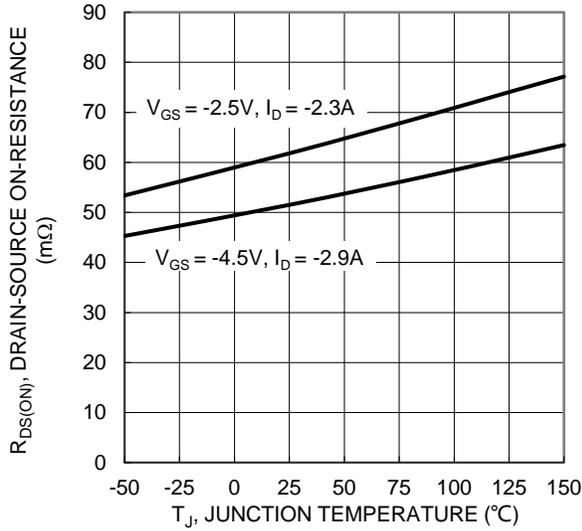


Figure 19. On-Resistance Variation with Temperature

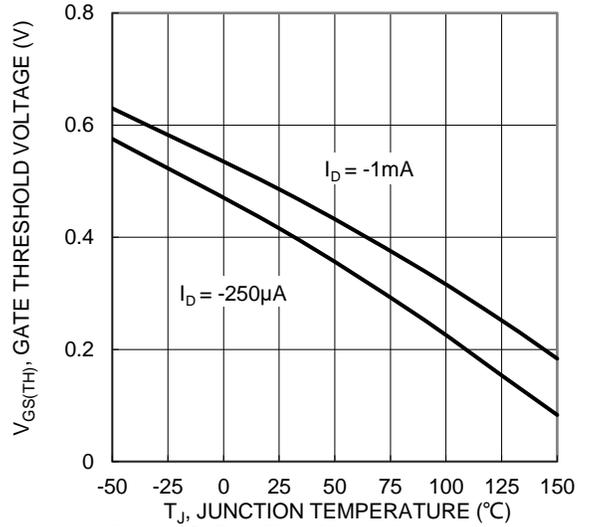


Figure 20. Gate Threshold Variation vs. Junction Temperature

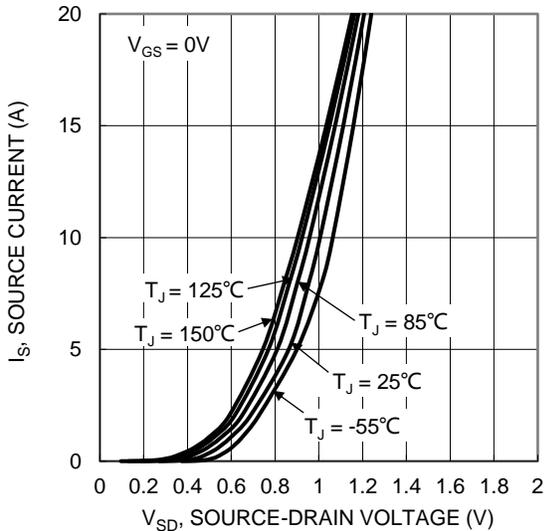


Figure 21. Diode Forward Voltage vs. Current

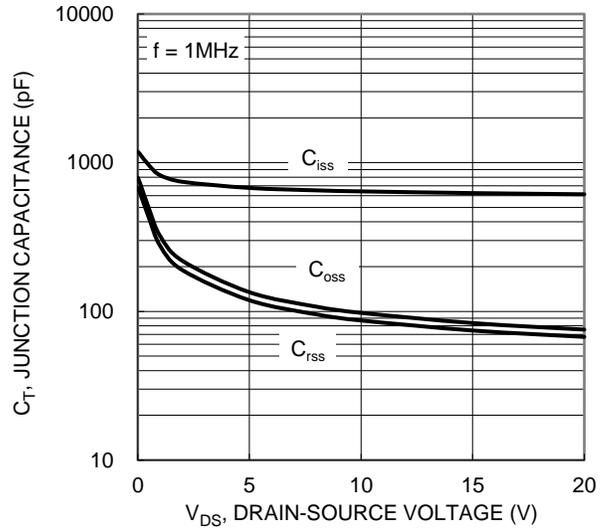


Figure 22. Typical Junction Capacitance

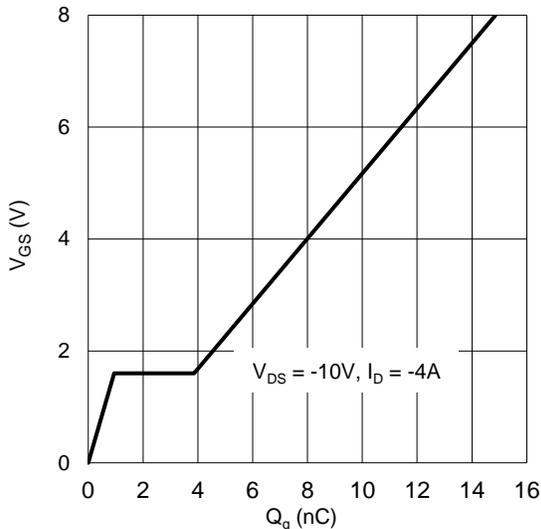


Figure 23. Gate Charge

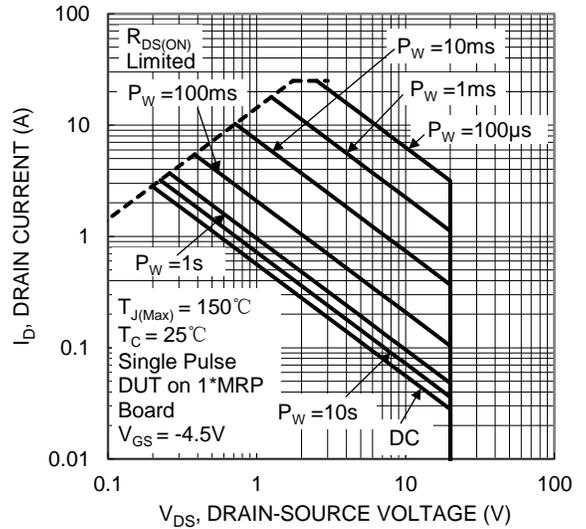


Figure 24. SOA, Safe Operation Area

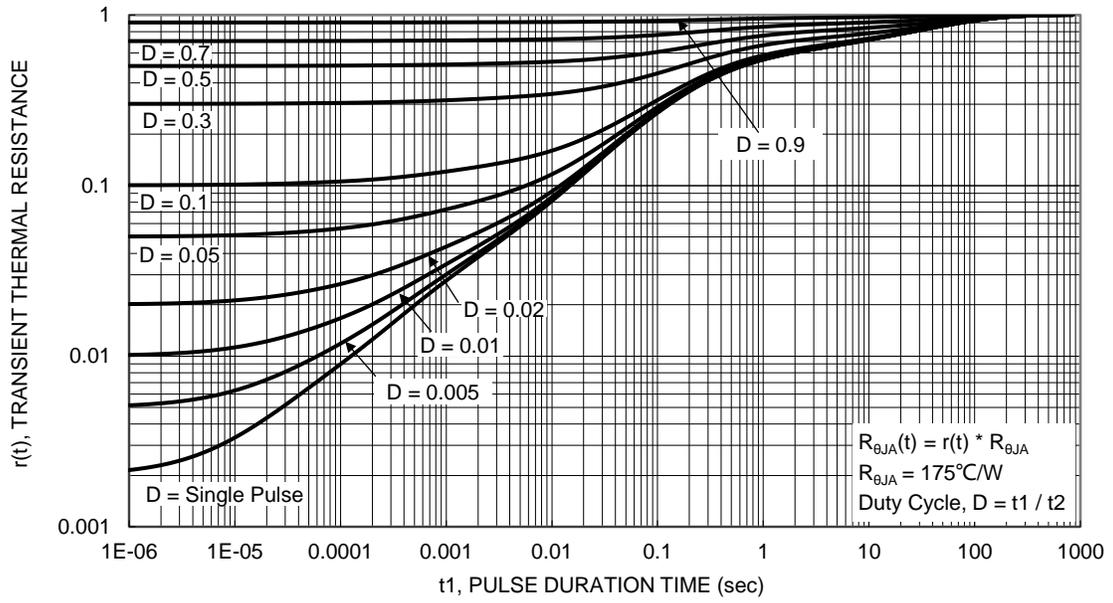
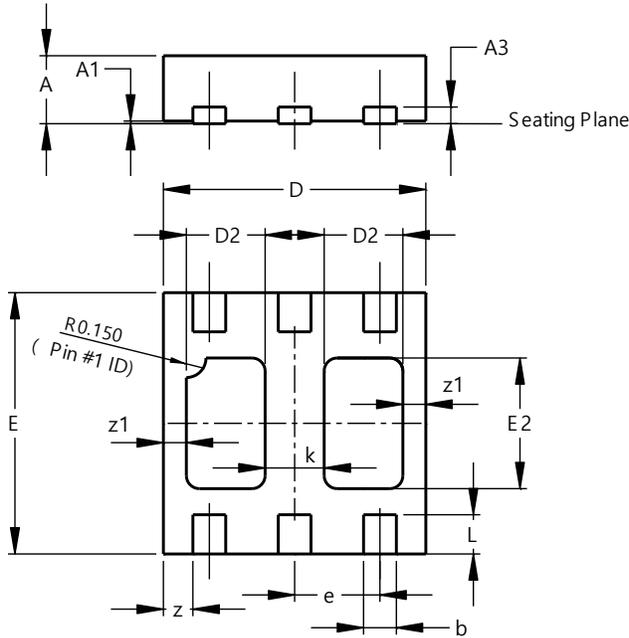


Figure 25. Transient Thermal Resistance

Package Outline Dimensions

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

U-DFN2020-6 (Type B)

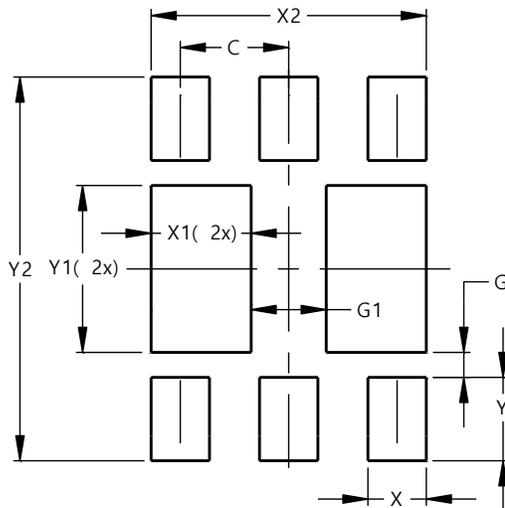


U-DFN2020-6 Type B			
Dim	Min	Max	Typ
A	0.545	0.605	0.575
A1	0.00	0.05	0.02
A3	-	-	0.13
b	0.20	0.30	0.25
D	1.95	2.075	2.00
D2	0.50	0.70	0.60
e	-	-	0.65
E	1.95	2.075	2.00
E2	0.90	1.10	1.00
k	-	-	0.45
L	0.25	0.35	0.30
z	-	-	0.225
z1	-	-	0.175
All Dimensions in mm			

Suggested Pad Layout

Please see <http://www.diodes.com/package-outlines.html> 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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