

P-CHANNEL ENHANCEMENT MODE MOSFET WITH INTEGRATED SCHOTTKY DIODE
Product Summary

MOSFET		
BV _{DSS}	R _{DS(ON)} max	I _D
-20V	95mΩ @ V _{GS} = -4.5V	-3.4A
	120mΩ @ V _{GS} = -2.5V	-3.0A
	150mΩ @ V _{GS} = -1.8V	-2.7A
SCHOTTKY DIODE		
V _R	V _F max	I _o
20V	400mV @ I _F = 0.5A	1.0A
	470mV @ I _F = 1.0A	

Features and Benefits

- MOSFET with Low R_{DS(ON)} – Minimize Conduction Losses
- Low Gate Threshold Voltage, -1.3V Max
- Schottky Diode with Low Forward Voltage Drop
- Low Profile, 0.5mm Max Height
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. “Green” Device (Note 3)**
- **For automotive applications requiring specific change control (i.e.: parts qualified to AEC-Q100/101/200, PPAP capable, and manufactured in IATF 16949 certified facilities), please refer to the related automotive grade (Q-suffix) part. A listing can be found at <https://www.diodes.com/products/automotive/automotive-products/>.**
- **This part is qualified to JEDEC standards (as references in AEC-Q) for High Reliability. <https://www.diodes.com/quality/product-definitions/>**

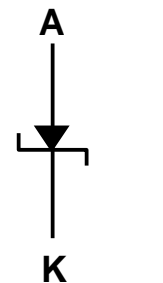
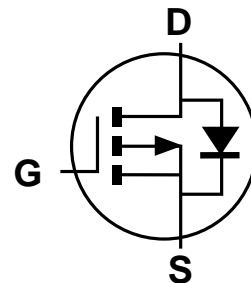
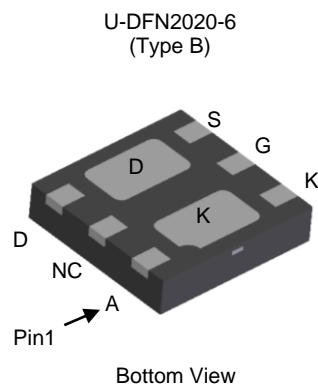
Description and Applications

This new generation 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.

- Power Management Functions

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
- Terminal Connections: See Diagram
- Terminals: Finish – NiPdAu Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208
- Weight: 0.0065 grams (Approximate)

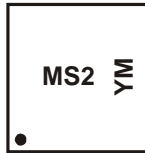

Ordering Information (Note 4)

Part Number	Case	Packaging
DMS2095LFDB-7	U-DFN2020-6 (Type B)	3,000/Tape & Reel
DMS2095LFDB-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

Site 1



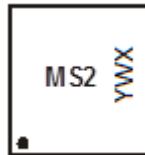
MS2 = Product Type Marking Code
 YM = Date Code Marking
 Y = Year (ex: H = 2020)
 M = Month (ex: 9 = September)

Date Code Key

Year	2012	...	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Code	Z	...	H	I	J	K	L	M	N	O	P	R

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

Site 2



MS2 = Product Type Marking Code
 YWX = Date Code Marking
 Y = Year (ex: 0 = 2020)
 W = Week (ex: a = week 27; z represents week 52 and 53)
 X = Internal Code (ex: U = Monday)

Date Code Key

Year	2012	...	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Code	2	...	0	1	2	3	4	5	6	7	8	9

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 – P-CHANNEL MOSFET – Q1 (@T_A = +25°C, unless otherwise specified.)

Characteristic		Symbol	Value	Unit	
Drain-Source Voltage		V _{DSS}	-20	V	
Gate-Source Voltage (Note 5)		V _{GSS}	±12	V	
Continuous Drain Current (Note 7) V _{GS} = -4.5V	Steady State	I _D	T _A = +25°C T _A = +70°C	-3.4 -2.7	A
	t<10s		T _A = +25°C T _A = +70°C	-3.9 -3.1	A
Maximum Body Diode Forward Current (Note 7)		I _S	-1	A	
Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)		I _{DM}	-10	A	

Maximum Ratings – SCHOTTKY – D1 (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Peak Repetitive Reverse Voltage	V _R RM	20	V
Working Peak Reverse Voltage	V _R WM		
DC Blocking Voltage	V _R		
Average Rectified Output Current (Note 7, t<10s)	I _O	1	A
Peak Repetitive Forward Current (Note 7, t<10s)	I _{FRM}	2	A
Non-Repetitive Peak Forward Surge Current (Note 7, t<10s) Single Half Sine-Wave Superimposed on Rated Load	I _{FSM}	20	A

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

Characteristic		Symbol	Value	Unit
Total Power Dissipation (Note 6)	T _A = +25°C	P _D	0.81	W
	T _A = +70°C		0.52	
Thermal Resistance, Junction to Ambient (Note 6)	Steady State	R _{θJA}	154	°C/W
	t<10s		114	
Total Power Dissipation (Note 7)	T _A = +25°C	P _D	1.64	W
	T _A = +70°C		1.04	
Thermal Resistance, Junction to Ambient (Note 7)	Steady State	R _{θJA}	77	°C/W
	t<10s		57	
Thermal Resistance, Junction to Case (Note 7)		R _{θJC}	27.5	°C/W
Operating and Storage Temperature Range		T _J , T _{STG}	-55 to +150	°C

- Notes: 5. AEC-Q101 V_{GS} maximum is ±9.6V.
6. Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.
7. Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.

Electrical Characteristics – P-CHANNEL MOSFET – Q1 (@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	I _{DSS}	—	—	-1	μA	V _{DS} = -20V, V _{GS} = 0V
Gate-Source Leakage	I _{GSS}	—	—	±800	nA	V _{GS} = ±12V, V _{DS} = 0V
ON CHARACTERISTICS (Note 8)						
Gate Threshold Voltage	V _{GS(TH)}	-0.4	—	-1.3	V	V _{DS} = V _{GS} , I _D = -250μA
Static Drain-Source On-Resistance	R _{DS(ON)}	—	48	95	mΩ	V _{GS} = -4.5V, I _D = -2.8A
		—	65	120		V _{GS} = -2.5V, I _D = -2.0A
		—	90	150		V _{GS} = -1.8V, I _D = -1.0A
Diode Forward Voltage	V _{SD}	—	-0.42	-1.2	V	V _{GS} = 0V, I _S = -1.0A
DYNAMIC CHARACTERISTICS (Note 9)						
Input Capacitance	C _{iss}	—	561	—	pF	V _{DS} = -10V, V _{GS} = 0V f = 1.0MHz
Output Capacitance	C _{oss}	—	78	—	pF	
Reverse Transfer Capacitance	C _{rss}	—	66	—	pF	
Gate Resistance	R _g	—	59.5	—	Ω	V _{DS} = 0V, V _{GS} = 0V, f = 1MHz
Total Gate Charge	Q _g	—	7.0	—	nC	V _{GS} = -4.5V, V _{DS} = -10V, I _D = -2.5A
Gate-Source Charge	Q _{gs}	—	0.9	—	nC	
Gate-Drain Charge	Q _{gd}	—	1.7	—	nC	
Turn-On Delay Time	t _{D(ON)}	—	5.3	—	ns	V _{DD} = -10V, V _{GS} = -4.5V, R _L = 4Ω, R _G = 6Ω
Turn-On Rise Time	t _R	—	5.8	—	ns	
Turn-Off Delay Time	t _{D(OFF)}	—	69	—	ns	
Turn-Off Fall Time	t _F	—	54	—	ns	
Reverse Recovery Time	t _{RR}	—	12.4	—	ns	I _F = -2.5A, di/dt = 100A/μs
Reverse Recovery Charge	Q _{RR}	—	3.7	—	nC	

Electrical Characteristics – SCHOTTKY – D1 (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Reverse Breakdown Voltage (Note 8)	V _{(BR)R}	20	35	—	V	I _R = 1mA
Forward Voltage (Note 8)	V _F	—	—	0.40	V	I _F = 0.5A
		—	—	0.47		I _F = 1.0A
Reverse Current (Note 8)	I _R	—	30	80	μA	V _R = 20V

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

MOSFET Characteristics

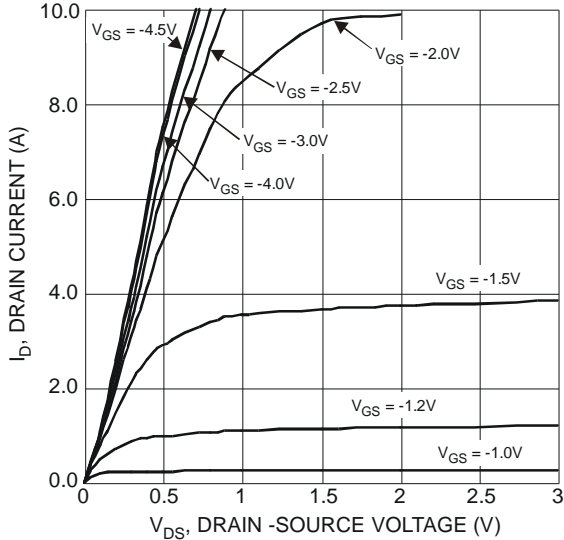


Figure 1 Typical Output Characteristics

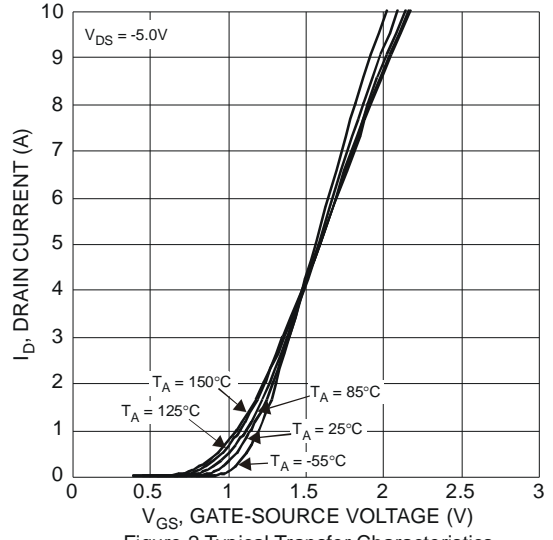


Figure 2 Typical Transfer Characteristics

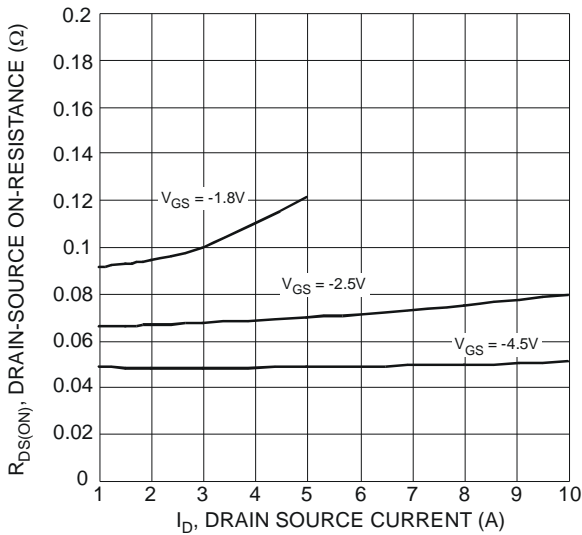


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

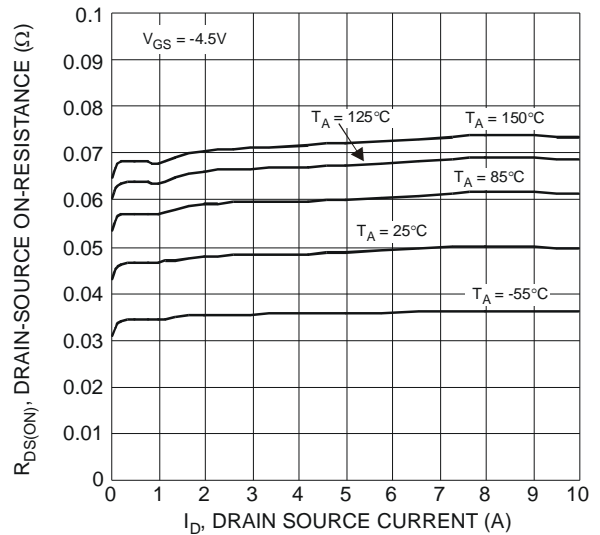


Figure 4 Typical On-Resistance vs. Drain Current and Temperature

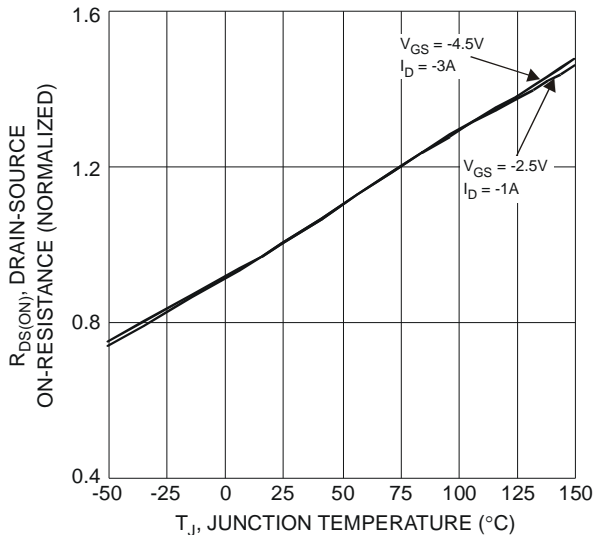


Figure 5 On-Resistance Variation with Temperature

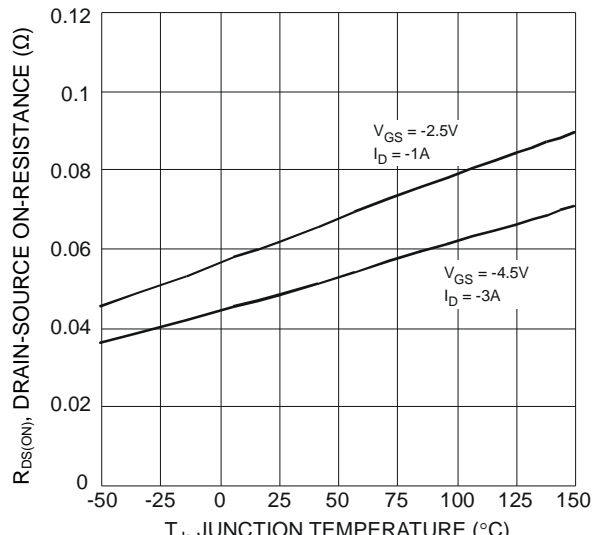


Figure 6 On-Resistance Variation with Temperature

MOSFET Characteristics (continued)

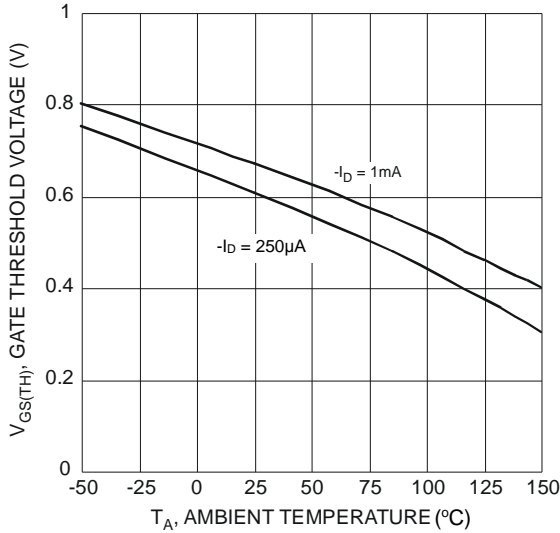


Figure 7 Gate Threshold Variation vs. Ambient Temperature

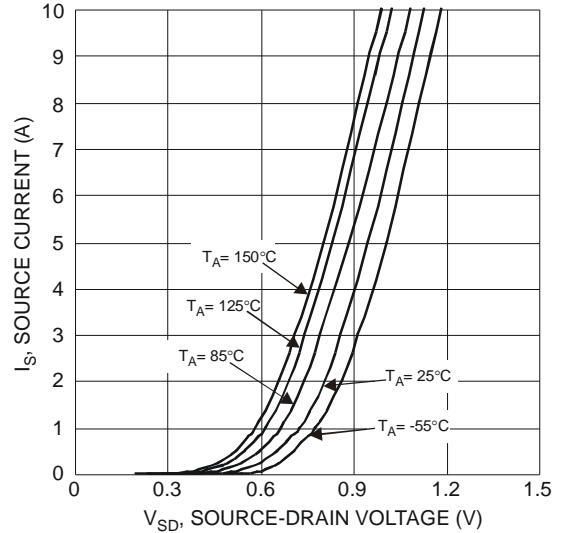


Figure 8 Diode Forward Voltage vs. Current

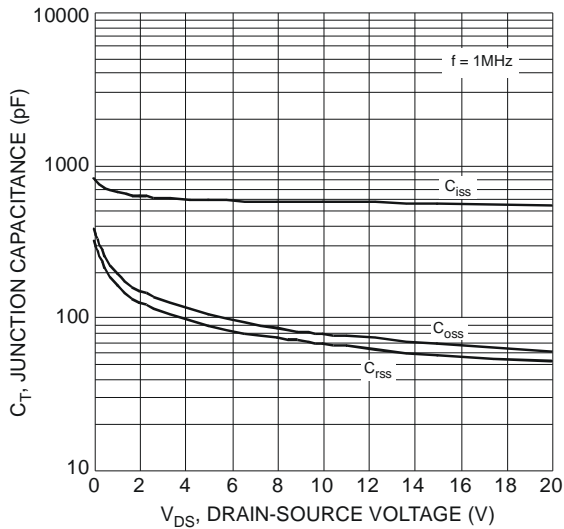


Figure 9 Typical Junction Capacitance

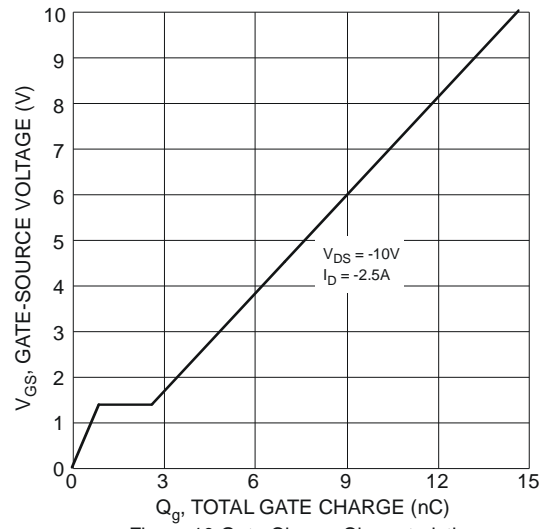


Figure 10 Gate-Charge Characteristics

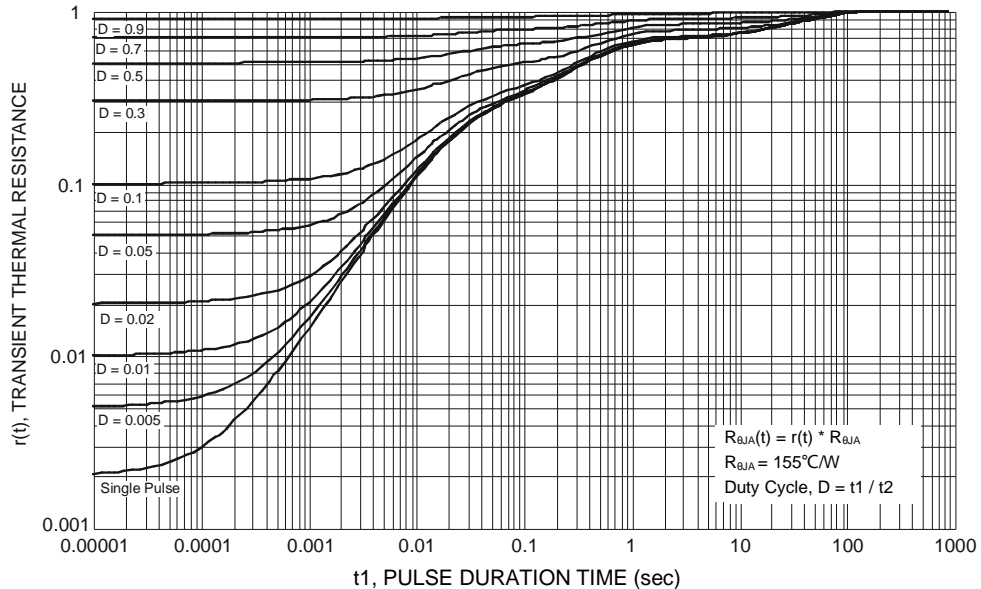
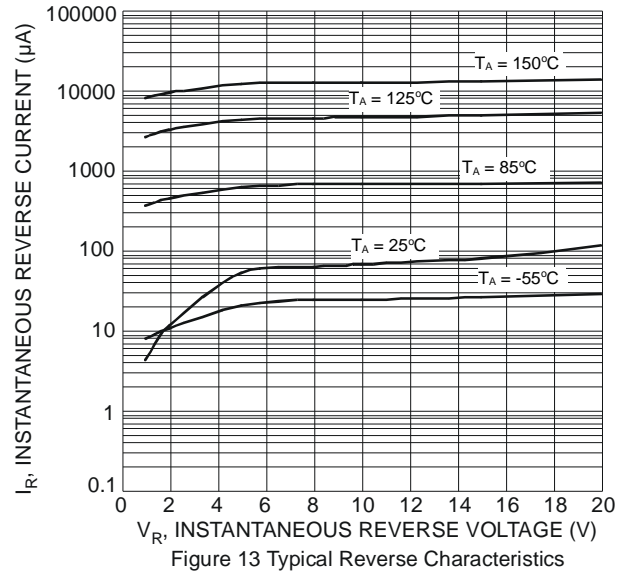
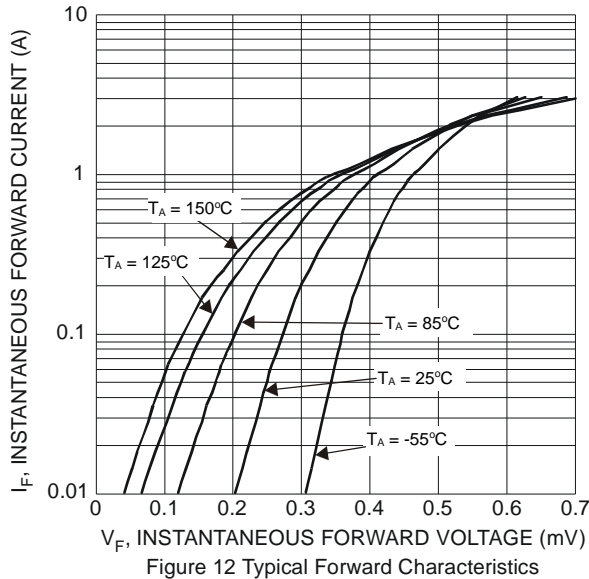


Figure 11 Transient Thermal Resistance

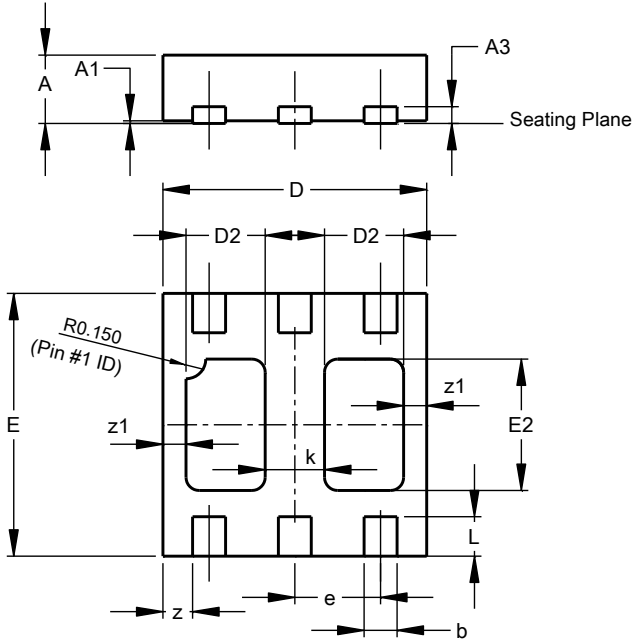
Schottky Characteristics



Package Outline Dimensions

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

U-DFN2020-6 (Type B)

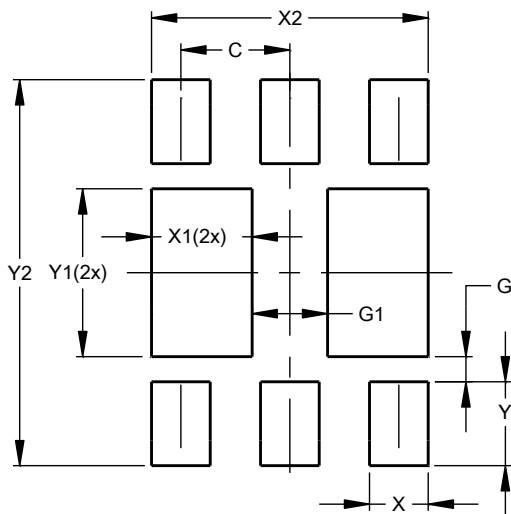


U-DFN2020-6 Type B			
Dim	Min	Max	Typ
A	0.545	0.605	0.575
A1	0.00	0.05	0.02
A3	-	-	0.13
b	0.20	0.30	0.25
D	1.95	2.075	2.00
D2	0.50	0.70	0.60
e	-	-	0.65
E	1.95	2.075	2.00
E2	0.90	1.10	1.00
k	-	-	0.45
L	0.25	0.35	0.30
z	-	-	0.225
z1	-	-	0.175
All Dimensions in mm			

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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