

## Product Summary

$V_{(BR)DSS}$	$R_{DS(ON)}$ max	$I_D$ max $T_A = +25^\circ C$
20V	9.5m $\Omega$ @ $V_{GS} = 4.5V$	11.7A
	11m $\Omega$ @ $V_{GS} = 2.5V$	10.8A

## Description

This new generation 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

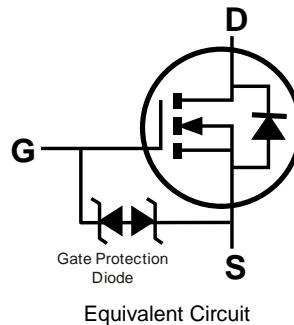
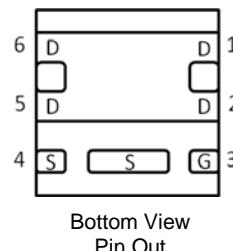
- General Purpose Interfacing Switch
- Power Management Functions

## Features

- 0.6mm Profile – Ideal for Low Profile Applications
- PCB Footprint of 4mm<sup>2</sup>
- Low Gate Threshold Voltage
- Low On-Resistance
- 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
- 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 @4
- Weight: 0.0065 grams (Approximate)



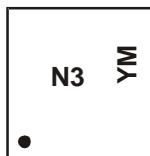
## Ordering Information (Note 4)

Part Number	Marking	Reel size (inches)	Quantity per reel
DMN2011UFDE-7	N3	7	3,000
DMN2011UFDE-13	N3	13	10,000

Notes:

- No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
- 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.
- Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
- For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

## Marking Information



N3 = Product Type Marking Code  
YM = Date Code Marking  
Y = Year (ex: A = 2013)  
M = Month (ex: 9 = September)

### Date Code Key

Year	2011	2012	2013	2014	2015	2016	2017					
Code	Y	Z	A	B	C	D	E					
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** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

Characteristic			Symbol	Value	Units
Drain-Source Voltage			$V_{DSS}$	20	V
Gate-Source Voltage			$V_{GSS}$	$\pm 12$	V
Continuous Drain Current (Note 6) $V_{GS} = 4.5\text{V}$	Steady State	$T_A = +25^\circ\text{C}$ $T_A = +70^\circ\text{C}$	$I_D$	11.7 9.3	A
	$t < 10\text{s}$	$T_A = +25^\circ\text{C}$ $T_A = +70^\circ\text{C}$	$I_D$	14.2 11.4	A
Continuous Drain Current (Note 6) $V_{GS} = 2.5\text{V}$	Steady State	$T_A = +25^\circ\text{C}$ $T_A = +70^\circ\text{C}$	$I_D$	10.8 8.7	A
	$t < 10\text{s}$	$T_A = +25^\circ\text{C}$ $T_A = +70^\circ\text{C}$	$I_D$	13.2 10.6	A
Pulsed Drain Current (10 $\mu\text{s}$ pulse, duty cycle = 1%)			$I_{DM}$	80	A
Maximum Body Diode Continuous Current			$I_S$	2.5	A
Avalanche Current (Note 7) $L = 0.1\text{mH}$			$I_{AS}$	18	A
Avalanche Energy (Note 7) $L = 0.1\text{mH}$			$E_{AS}$	17	$\text{mJ}$

**Thermal Characteristics**

Characteristic		Symbol	Value	Units
Total Power Dissipation (Note 5)	$T_A = +25^\circ\text{C}$	$P_D$	0.61	W
	$T_A = +70^\circ\text{C}$		0.39	
Thermal Resistance, Junction to Ambient (Note 5)	Steady state	$R_{\theta JA}$	209	$^\circ\text{C/W}$
	$t < 10\text{s}$		142	
Total Power Dissipation (Note 6)	$T_A = +25^\circ\text{C}$	$P_D$	1.97	W
	$T_A = +70^\circ\text{C}$		1.27	
Thermal Resistance, Junction to Ambient (Note 6)	Steady state	$R_{\theta JA}$	64	$^\circ\text{C/W}$
	$t < 10\text{s}$		43	
Thermal Resistance, Junction to Case (Note 6)		$R_{\theta JC}$	9.8	
Operating and Storage Temperature Range		$T_J, T_{STG}$	-55 to +150	$^\circ\text{C}$

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS (Note 8)</b>						
Drain-Source Breakdown Voltage	$\text{BV}_{\text{DSS}}$	20	—	—	V	$\text{V}_{\text{GS}} = 0\text{V}$ , $\text{I}_D = 250\mu\text{A}$
Zero Gate Voltage Drain Current $T_J = +25^\circ\text{C}$	$\text{I}_{\text{DSS}}$	—	—	1	$\mu\text{A}$	$\text{V}_{\text{DS}} = 16\text{V}$ , $\text{V}_{\text{GS}} = 0\text{V}$
Zero Gate Voltage Drain Current $T_J = +150^\circ\text{C}$ (Note 9)	$\text{I}_{\text{DSS}}$	—	—	100	$\mu\text{A}$	$\text{V}_{\text{DS}} = 16\text{V}$ , $\text{V}_{\text{GS}} = 0\text{V}$
Gate-Source Leakage	$\text{I}_{\text{GSS}}$	—	—	$\pm 10$	$\mu\text{A}$	$\text{V}_{\text{GS}} = \pm 10\text{V}$ , $\text{V}_{\text{DS}} = 0\text{V}$
<b>ON CHARACTERISTICS (Note 8)</b>						
Gate Threshold Voltage	$\text{V}_{\text{GS}(\text{th})}$	0.4	—	1.0	V	$\text{V}_{\text{DS}} = \text{V}_{\text{GS}}$ , $\text{I}_D = 250\mu\text{A}$
Static Drain-Source On-Resistance	$\text{R}_{\text{DS}(\text{ON})}$	—	6.5	9.5	$\text{m}\Omega$	$\text{V}_{\text{GS}} = 4.5\text{V}$ , $\text{I}_D = 7\text{A}$
			7.5	11		$\text{V}_{\text{GS}} = 2.5\text{V}$ , $\text{I}_D = 7\text{A}$
			10	20		$\text{V}_{\text{GS}} = 1.8\text{V}$ , $\text{I}_D = 5\text{A}$
			15	35		$\text{V}_{\text{GS}} = 1.5\text{V}$ , $\text{I}_D = 3\text{A}$
			—	—		—
Diode Forward Voltage	$\text{V}_{\text{SD}}$	—	0.7	1.2	V	$\text{V}_{\text{GS}} = 0\text{V}$ , $\text{I}_S = 8.5\text{A}$
On State Drain Current (Note 9)	$\text{I}_{\text{D}(\text{ON})}$	20	—	—	A	$\text{V}_{\text{DS}} \leq 5\text{V}$ , $\text{V}_{\text{GS}} = 4.5\text{V}$
<b>DYNAMIC CHARACTERISTICS (Note 9)</b>						
Input Capacitance	$\text{C}_{\text{iss}}$	—	2248	3372	pF	$\text{V}_{\text{DS}} = 10\text{V}$ , $\text{V}_{\text{GS}} = 0\text{V}$ , $f = 1.0\text{MHz}$
Output Capacitance	$\text{C}_{\text{oss}}$	—	295	443	pF	
Reverse Transfer Capacitance	$\text{C}_{\text{rss}}$	—	265	398	pF	
Gate Resistance	$\text{R}_{\text{g}}$	—	1.5	3	$\Omega$	
Total Gate Charge ( $\text{V}_{\text{GS}} = 4.5\text{V}$ )	$\text{Q}_{\text{g}}$	—	24	36	nC	
Total Gate Charge ( $\text{V}_{\text{GS}} = 10\text{V}$ )	$\text{Q}_{\text{g}}$	—	56	84	nC	$\text{V}_{\text{DS}} = 10\text{V}$ , $\text{I}_D = 8.5\text{A}$
Gate-Source Charge	$\text{Q}_{\text{gs}}$	—	3.5	6	nC	
Gate-Drain Charge	$\text{Q}_{\text{gd}}$	—	5.1	8	nC	
Turn-On Delay Time	$\text{t}_{\text{D}(\text{on})}$	—	3.6	6	ns	
Turn-On Rise Time	$\text{t}_r$	—	2.6	4	ns	
Turn-Off Delay Time	$\text{t}_{\text{D}(\text{off})}$	—	21.6	33	ns	$\text{V}_{\text{GS}} = 4.5\text{V}$ , $\text{R}_{\text{G}} = 1.8\Omega$
Turn-Off Fall Time	$\text{t}_f$	—	13.5	21	ns	
Reverse Recovery Time	$\text{T}_{\text{rr}}$	—	12.8	20	ns	
Reverse Recovery Charge	$\text{Q}_{\text{rr}}$	—	6.9	11	nC	$\text{I}_F = 8.5\text{A}$ , $\text{di/dt} = 210\text{A}/\mu\text{s}$

Notes:

5. Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.
6. Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.
7.  $\text{I}_{\text{AS}}$  and EAS rating are based on low frequency and duty cycles to keep  $T_J = +25^\circ\text{C}$
8. Short duration pulse test used to minimize self-heating effect.
9. Guaranteed by design. Not subject to product testing.

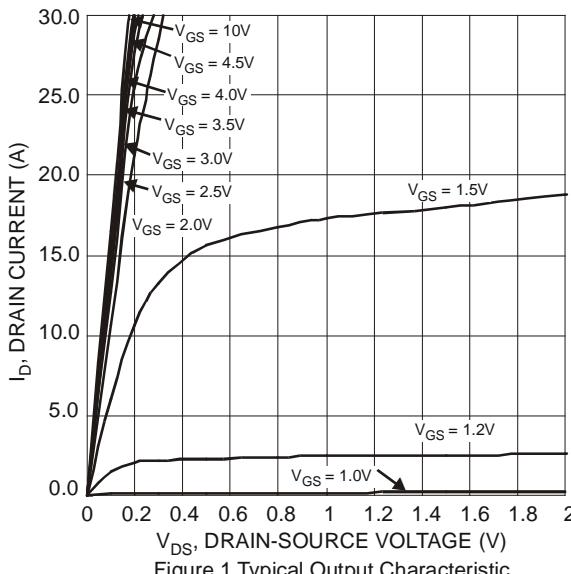


Figure 1 Typical Output Characteristic

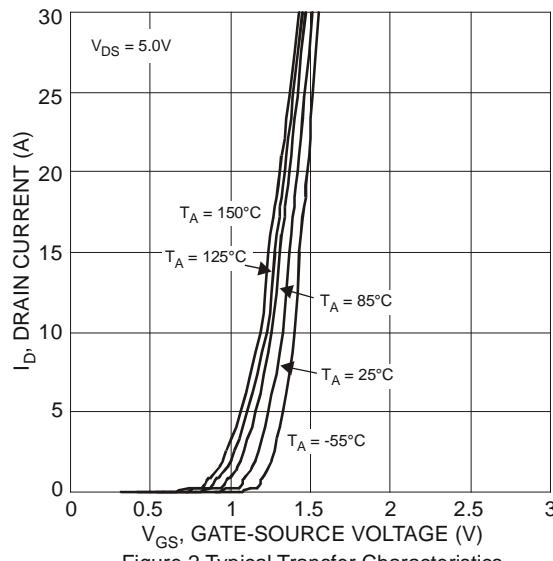


Figure 2 Typical Transfer Characteristics

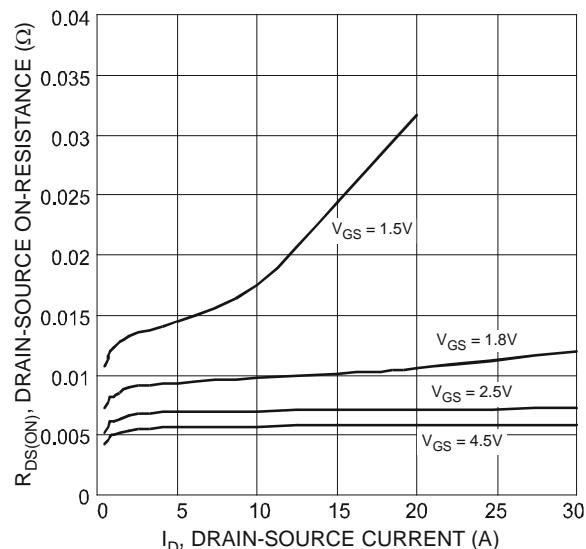


Figure 3 Typical On-Resistance vs.  
Drain Current and Gate Voltage

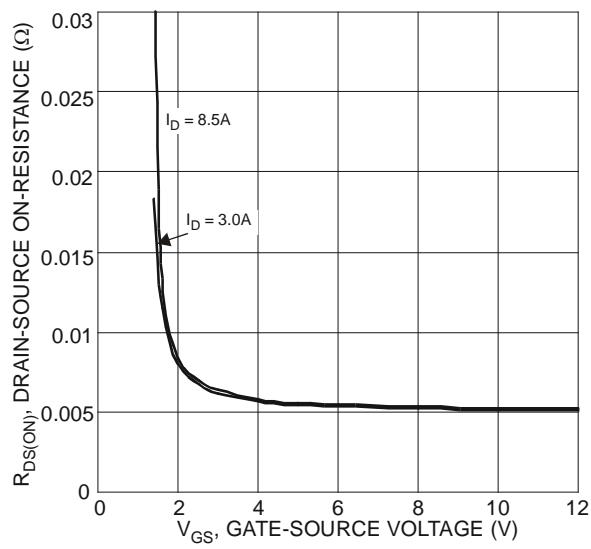


Figure 4 Typical Transfer Characteristics

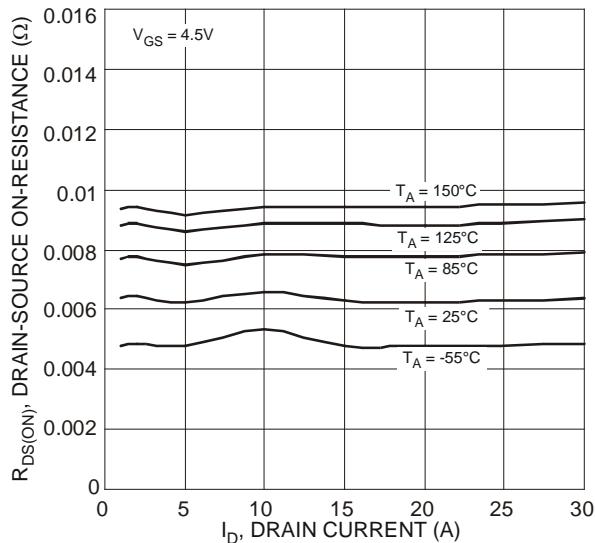


Figure 5 Typical On-Resistance vs.  
Drain Current and Temperature

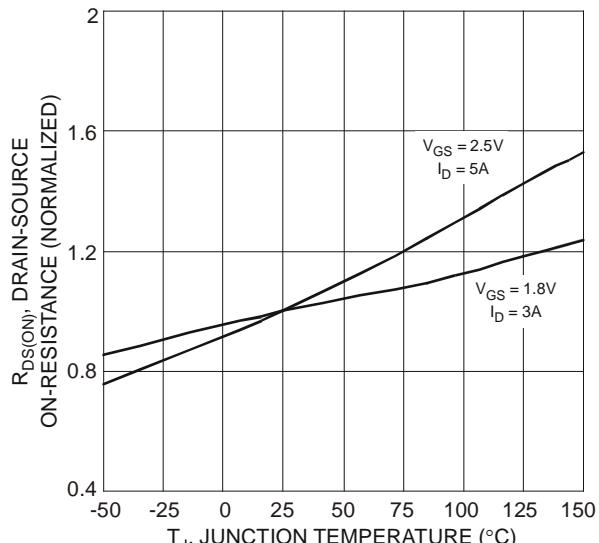


Figure 6 On-Resistance Variation with Temperature

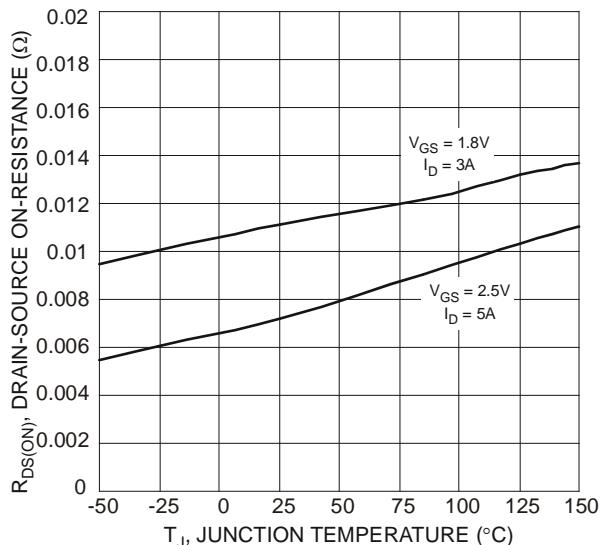


Figure 7 On-Resistance Variation with Temperature

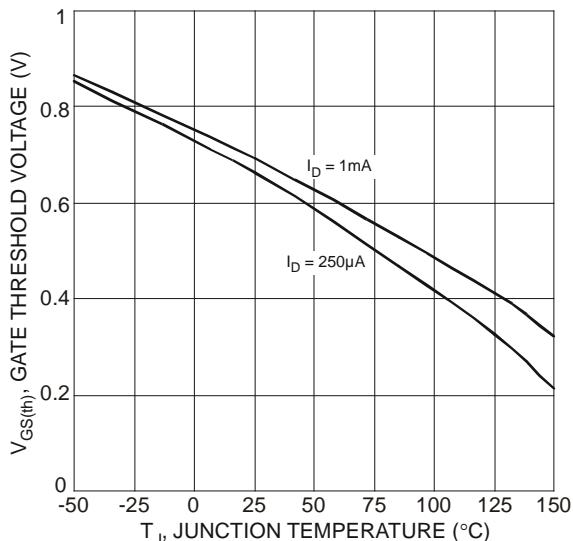


Figure 8 Gate Threshold Variation vs. Ambient Temperature

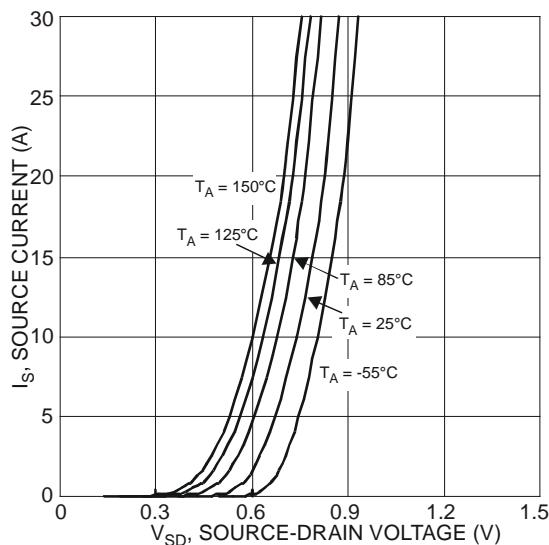


Figure 9 Diode Forward Voltage vs. Current

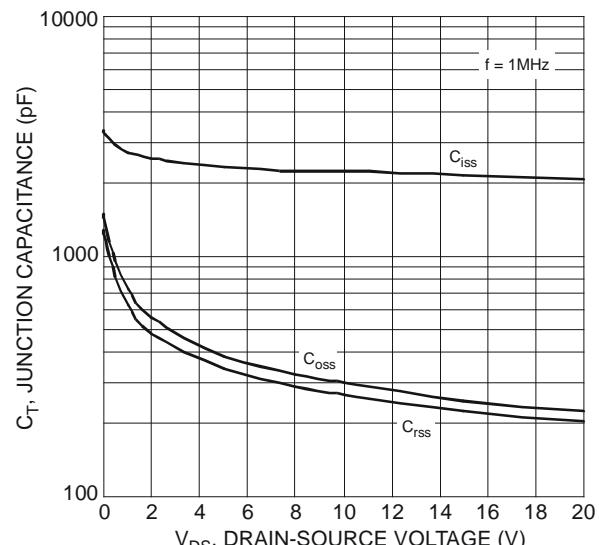


Figure 10 Typical Junction Capacitance

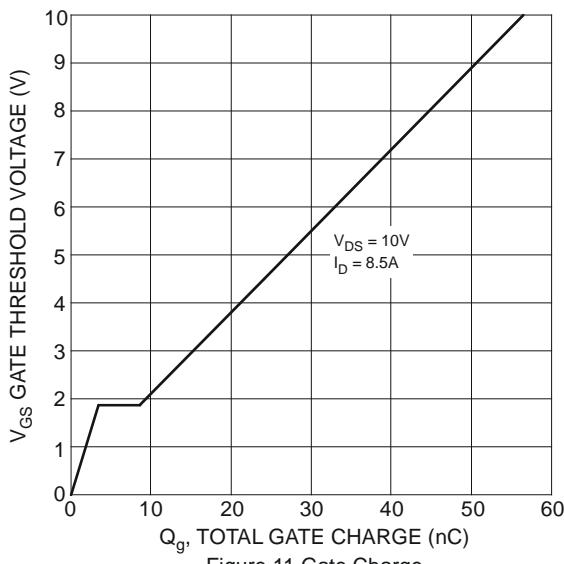


Figure 11 Gate Charge

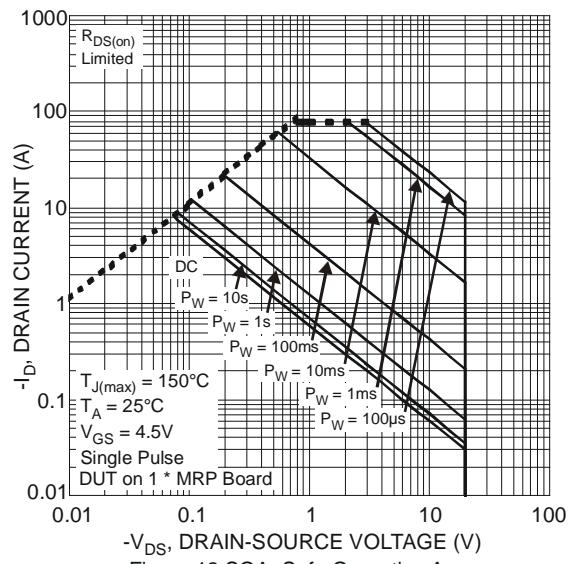


Figure 12 SOA, Safe Operation Area

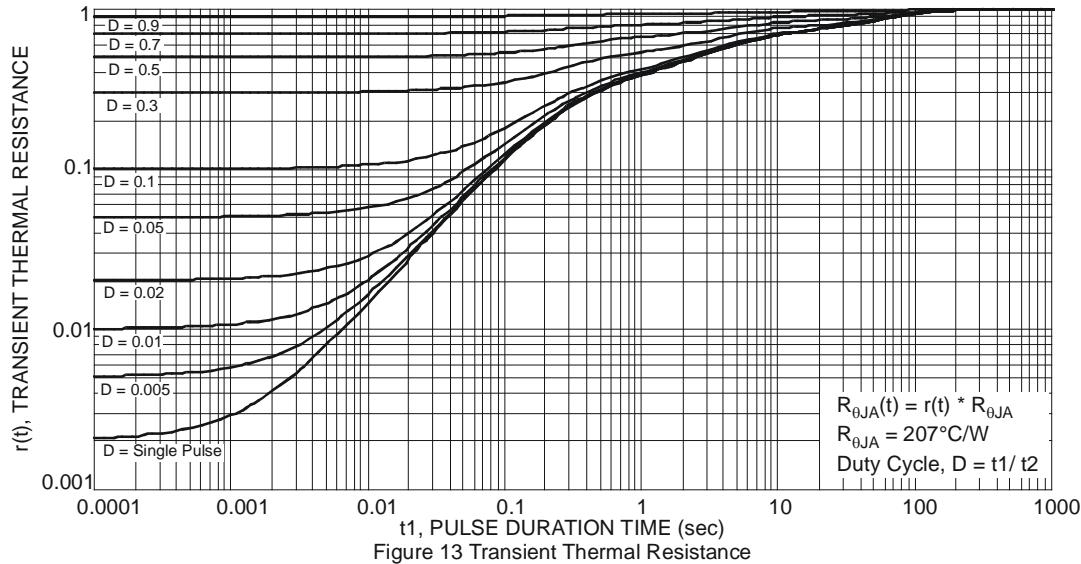
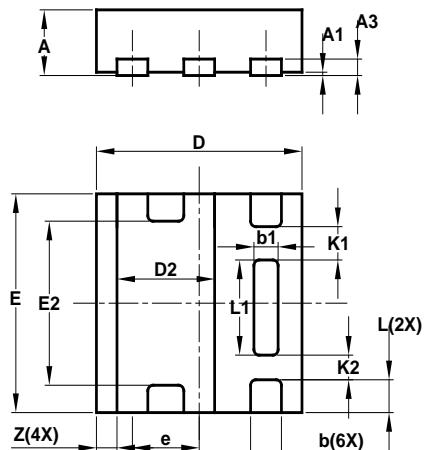


Figure 13 Transient Thermal Resistance

## Package Outline Dimensions

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

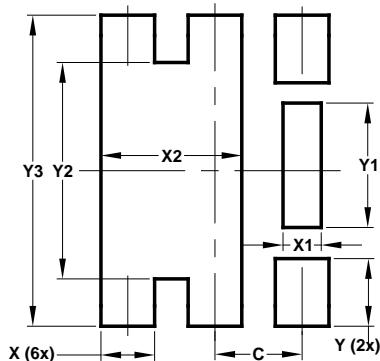


U-DFN2020-6 Type E			
Dim	Min	Max	Typ
<b>A</b>	0.57	0.63	0.60
<b>A1</b>	0	0.05	0.03
<b>A3</b>	—	—	0.15
<b>b</b>	0.25	0.35	0.30
<b>b1</b>	0.185	0.285	0.235
<b>D</b>	1.95	2.05	2.00
<b>D2</b>	0.85	1.05	0.95
<b>E</b>	1.95	2.05	2.00
<b>E2</b>	1.40	1.60	1.50
<b>e</b>	—	—	0.65
<b>L</b>	0.25	0.35	0.30
<b>L1</b>	0.82	0.92	0.87
<b>K1</b>	—	—	0.305
<b>K2</b>	—	—	0.225
<b>Z</b>	—	—	0.20

All Dimensions in mm

## Suggested Pad Layout

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



Dimensions	Value (in mm)
<b>C</b>	0.650
<b>X</b>	0.400
<b>X1</b>	0.285
<b>X2</b>	1.050
<b>Y</b>	0.500
<b>Y1</b>	0.920
<b>Y2</b>	1.600
<b>Y3</b>	2.300

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