

**DUAL N-CANNEL ENHANCEMENT MODE MOSFET**

**Product Summary**

$V_{(BR)DSS}$	$R_{DS(ON) Max}$	$I_D$ $T_A = +25^\circ C$
20V	20.2mΩ @ $V_{GS} = 4.5V$	7.5A
	23.5mΩ @ $V_{GS} = 2.5V$	7.0A

**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**

- Power Management Functions
- Battery Pack
- Load Switch

**Features**

- Low On-Resistance
- Low Gate Threshold Voltage
- Low Input Capacitance
- Fast Switching Speed
- **ESD Protected Gate**
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**

**Mechanical Data**

- Case: U-DFN2030-6
- 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 Below
- Weight: 0.012 grams (Approximate)

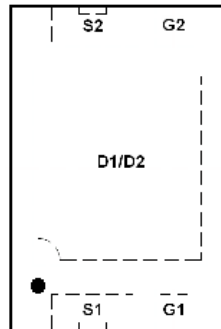
NEW PRODUCT



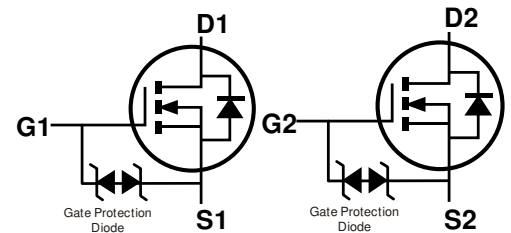
U-DFN2030-6



Bottom View



Top View



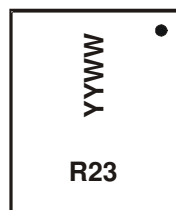
Equivalent Circuit

**Ordering Information** (Note 4)

Part Number	Case	Packaging
DMN2028UFU-7	U-DFN2030-6	3000 / Tape & Reel
DMN2028UFU-13	U-DFN2030-6	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](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**



R23 = Product Type Marking Code  
 YYWW = Date Code Marking  
 YY = Last Digit of Year (ex: 14 for 2014)  
 WW = Week Code (01 to 53)

**Maximum Ratings** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			V <sub>DSS</sub>	20	V
Gate-Source Voltage			V <sub>GSS</sub>	±10	V
Continuous Drain Current (Note 6) V <sub>GS</sub> = 4.5V	Steady State	T <sub>A</sub> = +25°C T <sub>A</sub> = +70°C	I <sub>D</sub>	7.5 6.0	A
	t < 10s	T <sub>A</sub> = +25°C T <sub>A</sub> = +70°C	I <sub>D</sub>	9.9 7.9	A
Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)			I <sub>DM</sub>	40	A
Avalanche Current (Note 7) L = 0.1mH			I <sub>AS</sub>	12	A
Avalanche Energy (Note 7) L = 0.1mH			E <sub>AS</sub>	8	mJ

**Thermal Characteristics**

Characteristic		Symbol	Value	Unit
Total Power Dissipation (Note 5)	T <sub>A</sub> = +25°C	P <sub>D</sub>	0.9	W
Thermal Resistance, Junction to Ambient (Note 5)	Steady State	R <sub>θJA</sub>	144	°C/W
	t < 10s		84	
Total Power Dissipation (Note 6)	T <sub>A</sub> = +25°C	P <sub>D</sub>	1.8	W
Thermal Resistance, Junction to Ambient (Note 6)	Steady State	R <sub>θJA</sub>	69	°C/W
	t < 10s		40	
Thermal Resistance, Junction to Case		R <sub>θJC</sub>	8.4	
Operating and Storage Temperature Range		T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C

**Electrical Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition	
<b>OFF CHARACTERISTICS (Note 8)</b>							
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	20	—	—	V	V <sub>GS</sub> = 0V, I <sub>D</sub> = 250µA	
Zero Gate Voltage Drain Current T <sub>J</sub> = +25°C	I <sub>DSS</sub>	—	—	1	µA	V <sub>DS</sub> = 20V, V <sub>GS</sub> = 0V	
Gate-Source Leakage	I <sub>GSS</sub>	—	—	±10	µA	V <sub>GS</sub> = ±8V, V <sub>DS</sub> = 0V	
<b>ON CHARACTERISTICS (Note 8)</b>							
Gate Threshold Voltage	V <sub>GS(TH)</sub>	0.5	—	1.0	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250µA	
Static Drain-Source On-Resistance	R <sub>DS(ON)</sub>	—	15.3	20.2	mΩ	V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 4.5A	
			15.4	22.5			V <sub>GS</sub> = 4.0V, I <sub>D</sub> = 4.0A
			16.7	23.0			V <sub>GS</sub> = 3.1V, I <sub>D</sub> = 4.0A
			18.3	23.5			V <sub>GS</sub> = 2.5V, I <sub>D</sub> = 3.5A
			24.2	30.0			V <sub>GS</sub> = 1.8V, I <sub>D</sub> = 3.5A
Diode Forward Voltage	V <sub>SD</sub>	—	0.7	1.2	V	V <sub>GS</sub> = 0V, I <sub>S</sub> = 1A	
<b>DYNAMIC CHARACTERISTICS (Note 9)</b>							
Input Capacitance	C <sub>iss</sub>	—	887	—	pF	V <sub>DS</sub> = 10V, V <sub>GS</sub> = 0V, f = 1.0MHz	
Output Capacitance	C <sub>oss</sub>	—	91	—			
Reverse Transfer Capacitance	C <sub>rss</sub>	—	37	—			
Gate Resistance	R <sub>g</sub>	—	191	—	Ω	V <sub>DS</sub> = 0V, V <sub>GS</sub> = 0V, f = 1MHz	
Total Gate Charge (V <sub>GS</sub> = 4.5V)	Q <sub>g</sub>	—	10	—	nC	V <sub>DS</sub> = 10V, I <sub>D</sub> = 6.5A	
Total Gate Charge (V <sub>GS</sub> = 8V)	Q <sub>g</sub>	—	18.4	—			
Gate-Source Charge	Q <sub>gs</sub>	—	1.3	—			
Gate-Drain Charge	Q <sub>gd</sub>	—	1.8	—			
Turn-On Delay Time	t <sub>D(ON)</sub>	—	53	—	ns	V <sub>DS</sub> = 10V, V <sub>GS</sub> = 4.5V, R <sub>G</sub> = 6Ω, R <sub>L</sub> = 10Ω, I <sub>D</sub> = 1A	
Turn-On Rise Time	t <sub>R</sub>	—	66	—			
Turn-Off Delay Time	t <sub>D(OFF)</sub>	—	619	—			
Turn-Off Fall Time	t <sub>F</sub>	—	197	—			
Reverse Recovery Time	t <sub>RR</sub>	—	119	—	ns	I <sub>F</sub> = 4A, di/dt = 100A/µs	
Reverse Recovery Charge	Q <sub>RR</sub>	—	96	—	nC	I <sub>F</sub> = 4A, di/dt = 100A/µs	

- Notes:
- Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.
  - Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.
  - I<sub>AS</sub> and E<sub>AS</sub> ratings are based on low frequency and duty cycles to keep T<sub>J</sub> = +25°C.
  - Short duration pulse test used to minimize self-heating effect.
  - Guaranteed by design. Not subject to product testing.

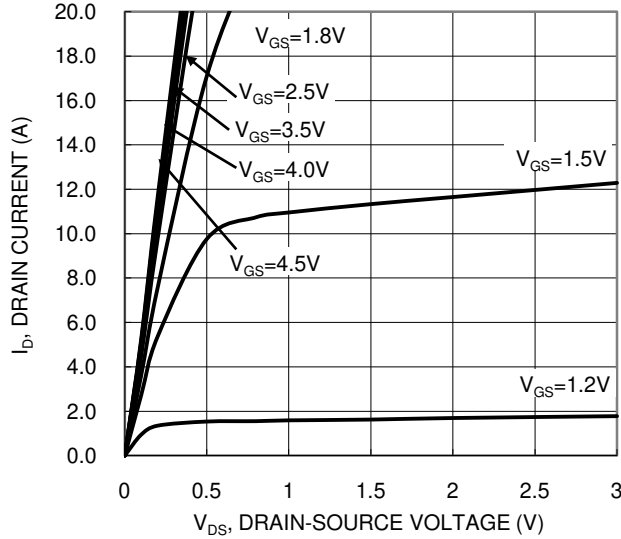


Figure 1. Typical Output Characteristic

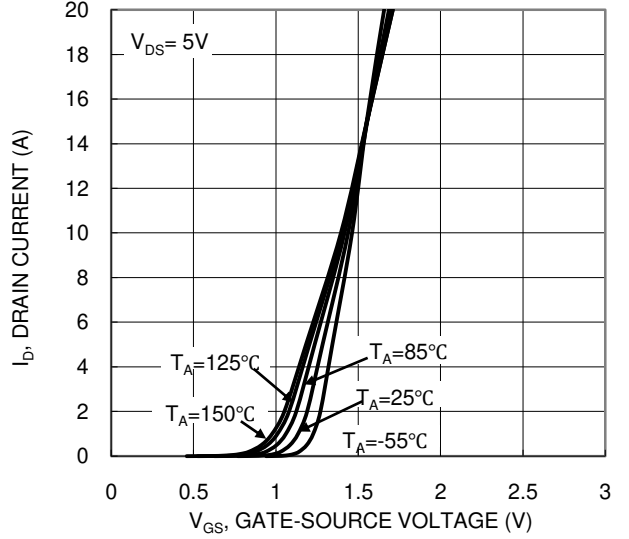


Figure 2. Typical Transfer Characteristic

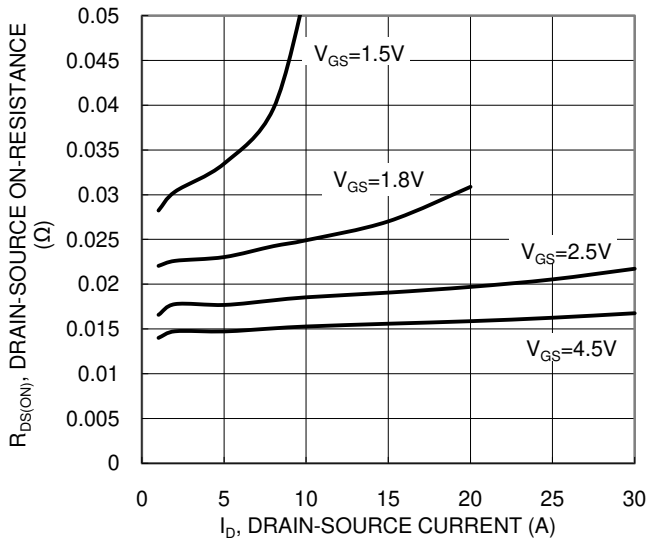


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

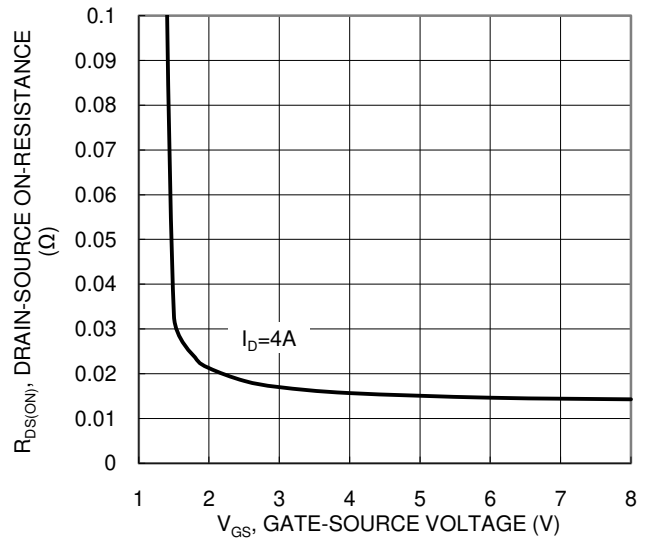


Figure 4. Typical Transfer Characteristic

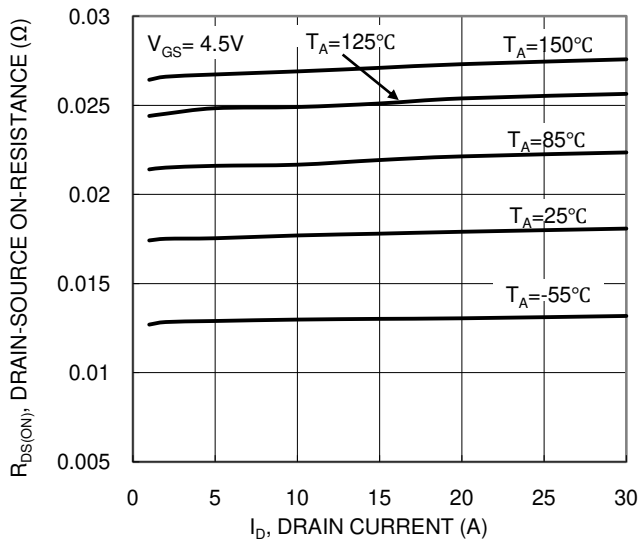


Figure 5. Typical On-Resistance vs. Drain Current and Temperature

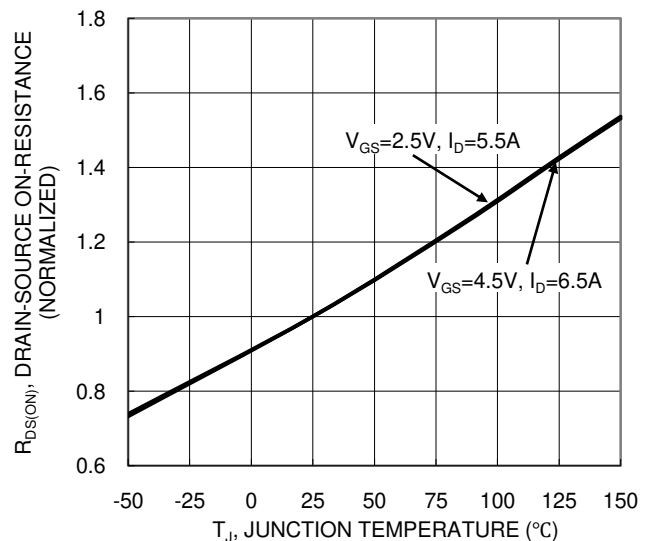


Figure 6. On-Resistance Variation with Temperature

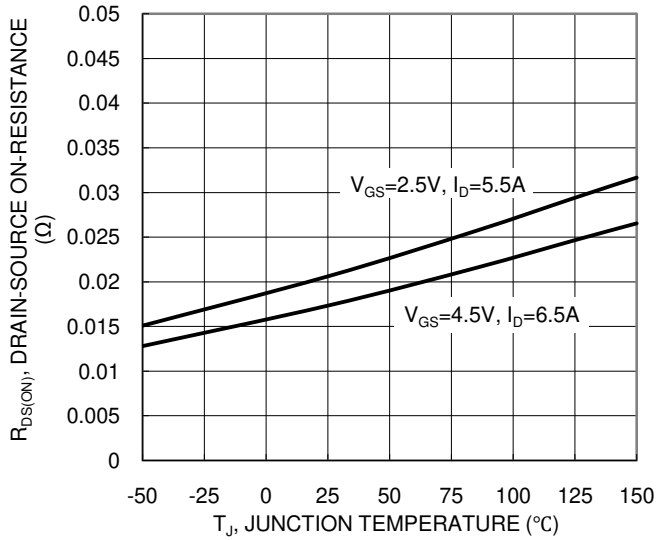


Figure 7. On-Resistance Variation with Temperature

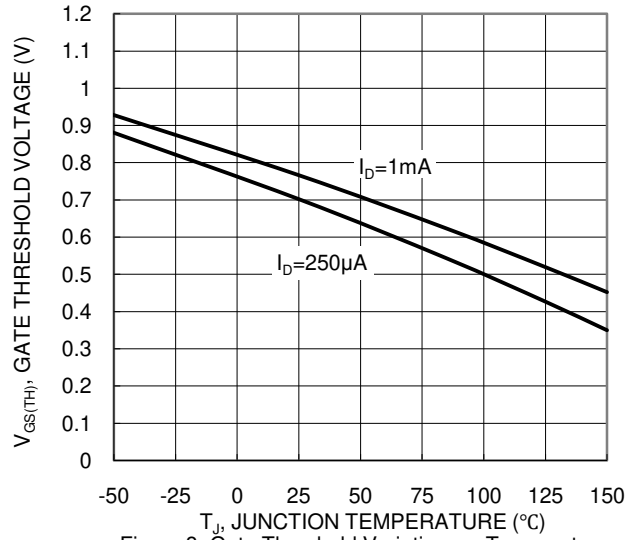


Figure 8. Gate Threshold Variation vs. Temperature

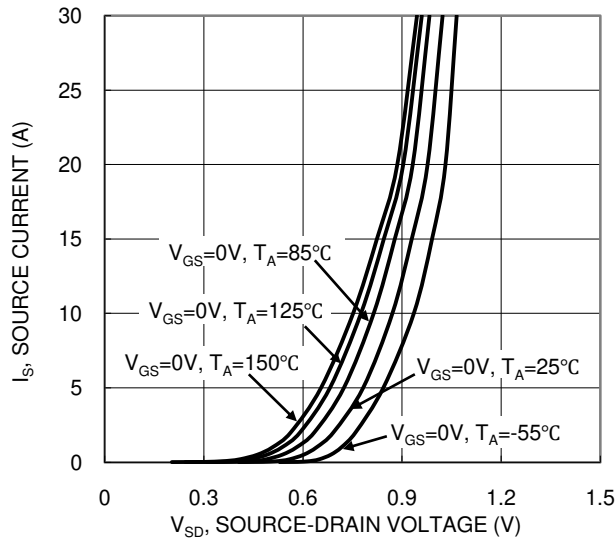


Figure 9. Diode Forward Voltage vs. Current

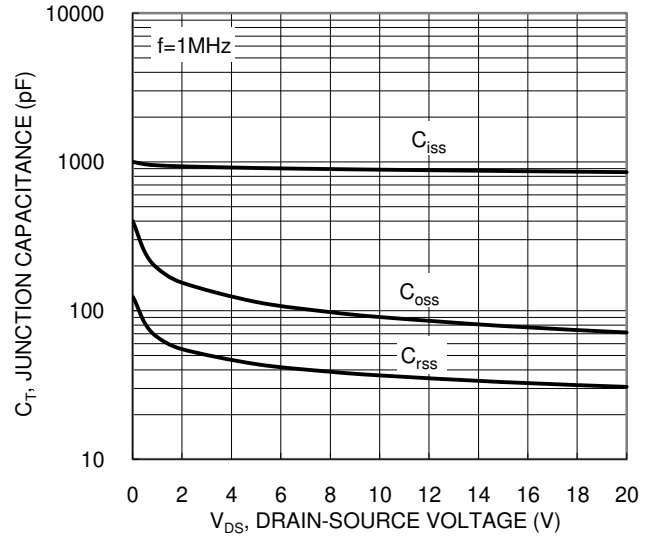


Figure 10. Typical Junction Capacitance

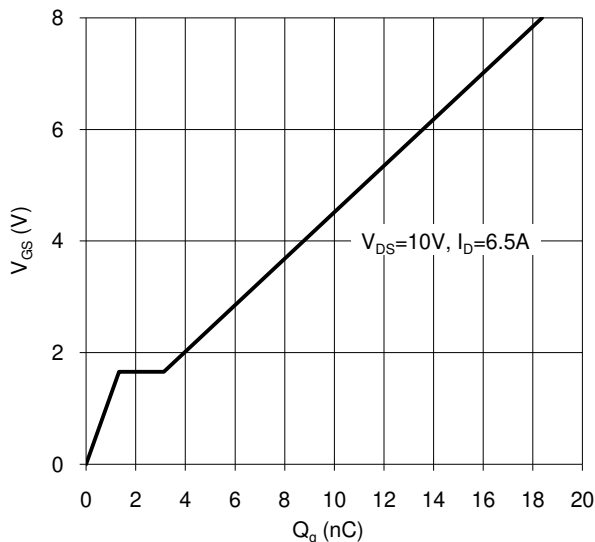


Figure 11. Gate Charge

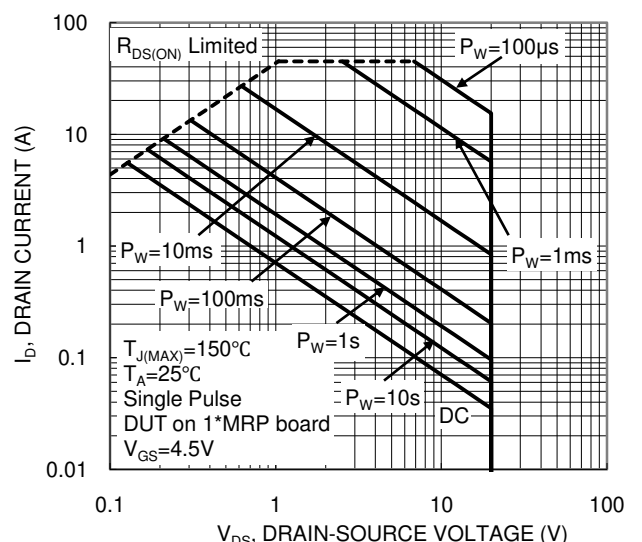


Figure 12. SOA, Safe Operation Area

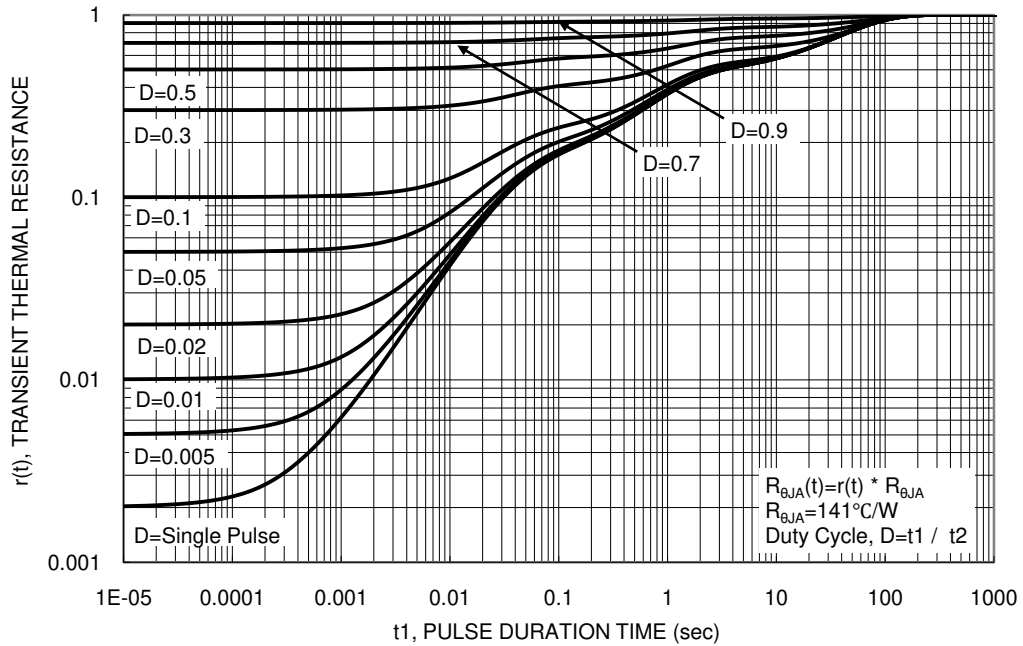
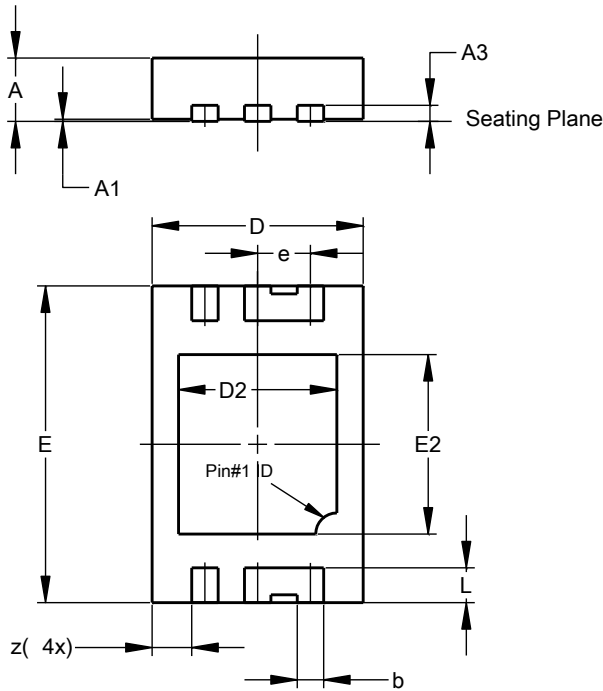


Figure 13. Transient Thermal Resistance

**Package Outline Dimensions**

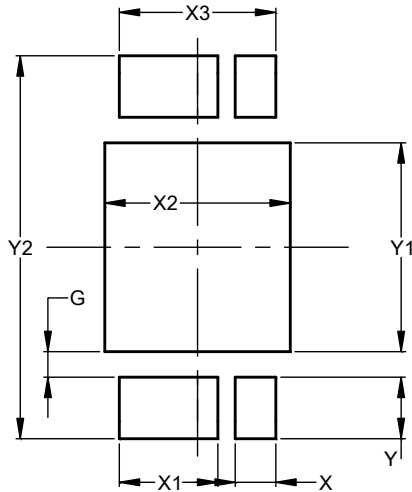
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for the latest version.



U-DFN2030-6 (Type B)			
Dim	Min	Max	Typ
A	0.55	0.65	0.60
A1	0.00	0.05	0.02
A3	--	--	0.15
b	0.20	0.30	0.25
D	1.95	2.05	2.00
D2	1.40	1.60	1.50
E	2.95	3.05	3.00
E2	1.65	1.75	1.70
e	--	--	0.50
L	0.28	0.38	0.33
z	--	--	0.375
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)
G	0.220
X	0.350
X1	0.850
X2	1.600
X3	1.350
Y	0.530
Y1	1.800
Y2	3.300

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