

DUAL N-CANNEL ENHANCEMENT MODE MOSFET

Product Summary

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

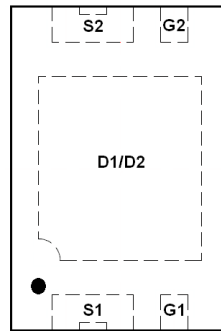
NEW PRODUCT



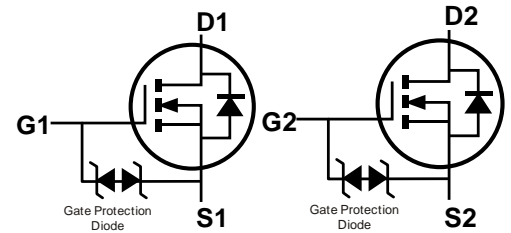
U-DFN2030-6



Bottom View



Top View



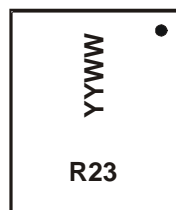
Equivalent Circuit

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

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			V_{DSS}	20	V
Gate-Source Voltage			V_{GSS}	± 10	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	7.5 6.0	A
	$t < 10\text{s}$	$T_A = +25^\circ\text{C}$ $T_A = +70^\circ\text{C}$	I_D	9.9 7.9	A
Pulsed Drain Current (10 μs Pulse, Duty Cycle = 1%)			I_{DM}	40	A
Avalanche Current (Note 7) $L = 0.1\text{mH}$			I_{AS}	12	A
Avalanche Energy (Note 7) $L = 0.1\text{mH}$			E_{AS}	8	mJ

Thermal Characteristics

Characteristic		Symbol	Value	Unit
Total Power Dissipation (Note 5)	$T_A = +25^\circ\text{C}$	P_D	0.9	W
Thermal Resistance, Junction to Ambient (Note 5)	Steady State	$R_{\theta JA}$	144	$^\circ\text{C/W}$
	$t < 10\text{s}$		84	
Total Power Dissipation (Note 6)	$T_A = +25^\circ\text{C}$	P_D	1.8	W
Thermal Resistance, Junction to Ambient (Note 6)	Steady State	$R_{\theta JA}$	69	$^\circ\text{C/W}$
	$t < 10\text{s}$		40	
Thermal Resistance, Junction to Case		$R_{\theta JC}$	8.4	$^\circ\text{C}$
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
OFF CHARACTERISTICS (Note 8)						
Drain-Source Breakdown Voltage	BV_{DSS}	20	—	—	V	$V_{GS} = 0\text{V}, I_D = 250\mu\text{A}$
Zero Gate Voltage Drain Current $T_J = +25^\circ\text{C}$	I_{DSS}	—	—	1	μA	$V_{DS} = 20\text{V}, V_{GS} = 0\text{V}$
Gate-Source Leakage	I_{GSS}	—	—	± 10	μA	$V_{GS} = \pm 8\text{V}, V_{DS} = 0\text{V}$
ON CHARACTERISTICS (Note 8)						
Gate Threshold Voltage	$V_{GS(TH)}$	0.5	—	1.0	V	$V_{DS} = V_{GS}, I_D = 250\mu\text{A}$
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	15.3	20.2	m Ω	$V_{GS} = 4.5\text{V}, I_D = 4.5\text{A}$
			15.4	22.5		$V_{GS} = 4.0\text{V}, I_D = 4.0\text{A}$
			16.7	23.0		$V_{GS} = 3.1\text{V}, I_D = 4.0\text{A}$
			18.3	23.5		$V_{GS} = 2.5\text{V}, I_D = 3.5\text{A}$
			24.2	30.0		$V_{GS} = 1.8\text{V}, I_D = 3.5\text{A}$
Diode Forward Voltage	V_{SD}	—	0.7	1.2	V	$V_{GS} = 0\text{V}, I_S = 1\text{A}$
DYNAMIC CHARACTERISTICS (Note 9)						
Input Capacitance	C_{iss}	—	887	—	pF	$V_{DS} = 10\text{V}, V_{GS} = 0\text{V}, f = 1.0\text{MHz}$
Output Capacitance	C_{oss}	—	91	—		
Reverse Transfer Capacitance	C_{rss}	—	37	—		
Gate Resistance	R_g	—	191	—	Ω	$V_{DS} = 0\text{V}, V_{GS} = 0\text{V}, f = 1\text{MHz}$
Total Gate Charge ($V_{GS} = 4.5\text{V}$)	Q_g	—	10	—	nC	$V_{DS} = 10\text{V}, I_D = 6.5\text{A}$
Total Gate Charge ($V_{GS} = 8\text{V}$)	Q_g	—	18.4	—		
Gate-Source Charge	Q_{gs}	—	1.3	—		
Gate-Drain Charge	Q_{gd}	—	1.8	—		
Turn-On Delay Time	$t_{D(ON)}$	—	53	—	ns	$V_{DS} = 10\text{V}, V_{GS} = 4.5\text{V}, R_G = 6\Omega, R_L = 10\Omega, I_D = 1\text{A}$
Turn-On Rise Time	t_R	—	66	—		
Turn-Off Delay Time	$t_{D(OFF)}$	—	619	—		
Turn-Off Fall Time	t_F	—	197	—		
Reverse Recovery Time	t_{RR}	—	119	—	ns	$I_F = 4\text{A}, di/dt = 100\text{A}/\mu\text{s}$
Reverse Recovery Charge	Q_{RR}	—	96	—	nC	$I_F = 4\text{A}, di/dt = 100\text{A}/\mu\text{s}$

- 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_{AS} and E_{AS} ratings are based on low frequency and duty cycles to keep $T_J = +25^\circ\text{C}$.
 - Short duration pulse test used to minimize self-heating effect.
 - Guaranteed by design. Not subject to product testing.

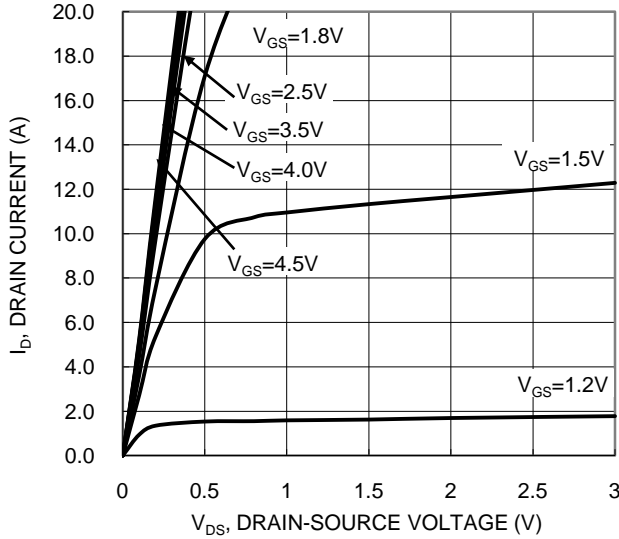


Figure 1. Typical Output Characteristic

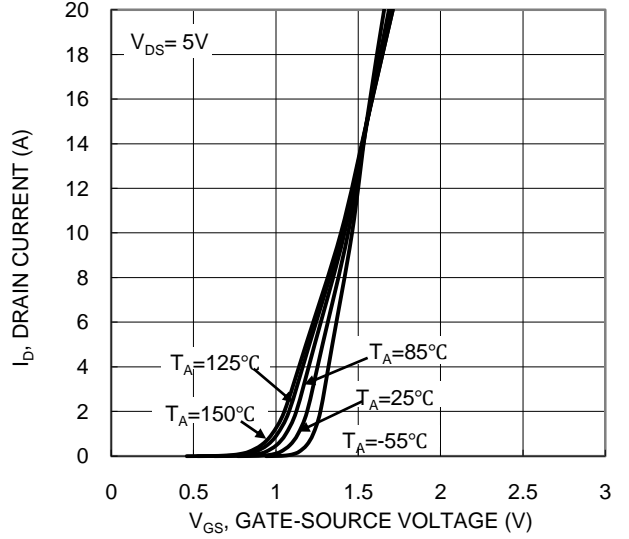


Figure 2. Typical Transfer Characteristic

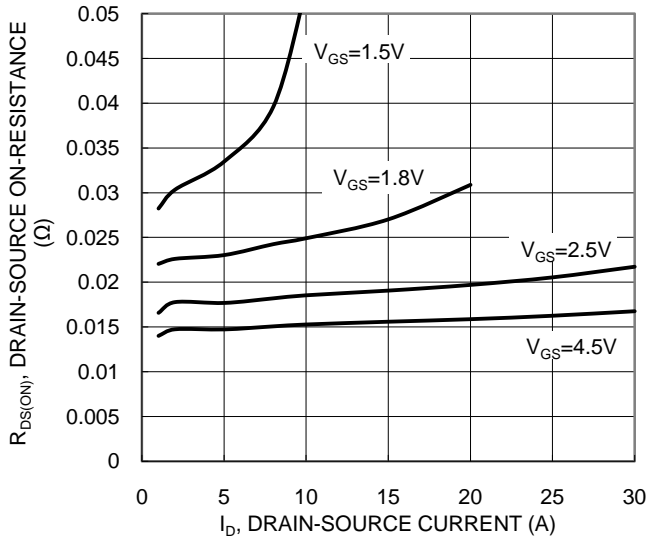


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

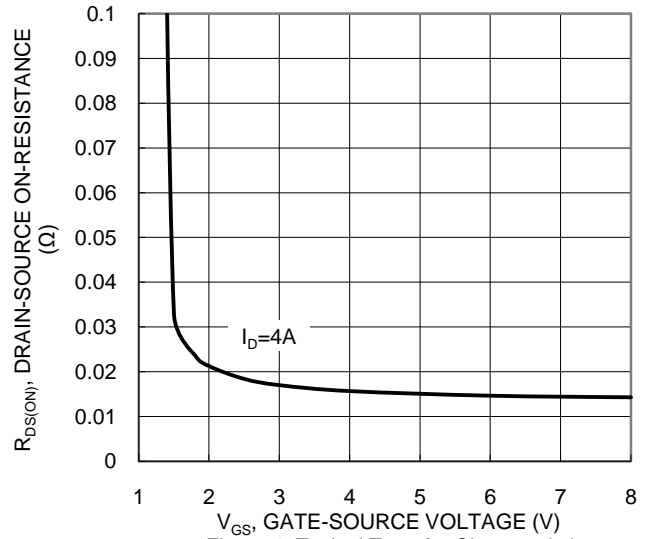


Figure 4. Typical Transfer Characteristic

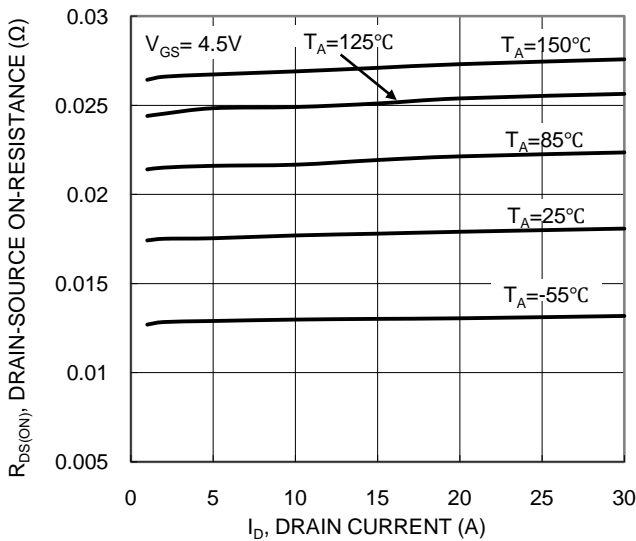


Figure 5. Typical On-Resistance vs. Drain Current and Temperature

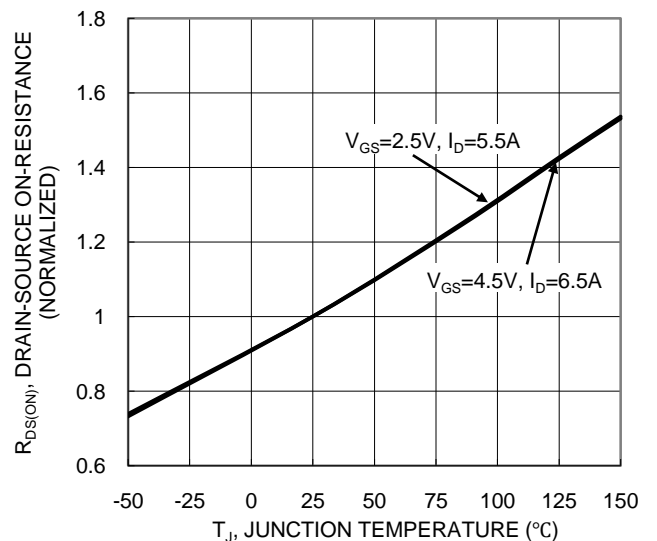


Figure 6. On-Resistance Variation with Temperature

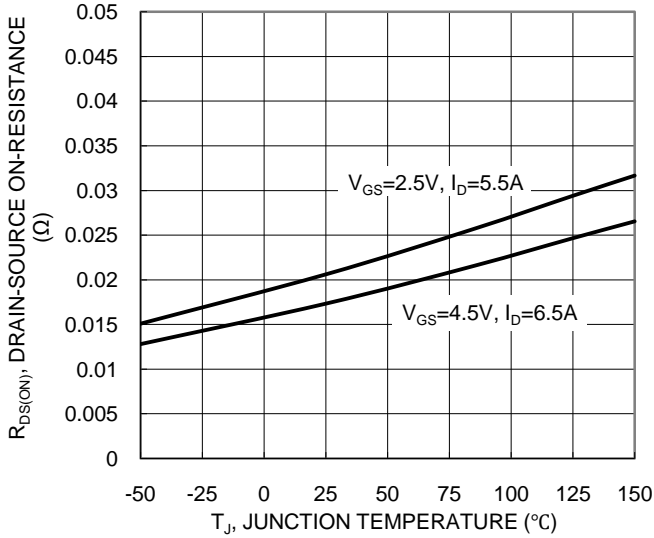


Figure 7. On-Resistance Variation with Temperature

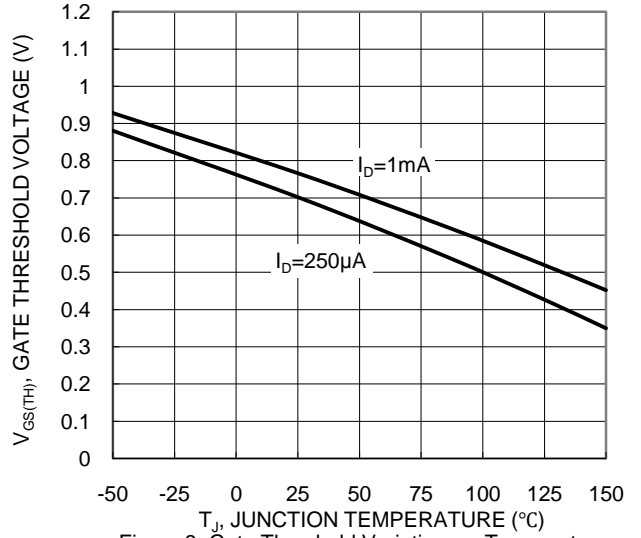


Figure 8. Gate Threshold Variation vs. Temperature

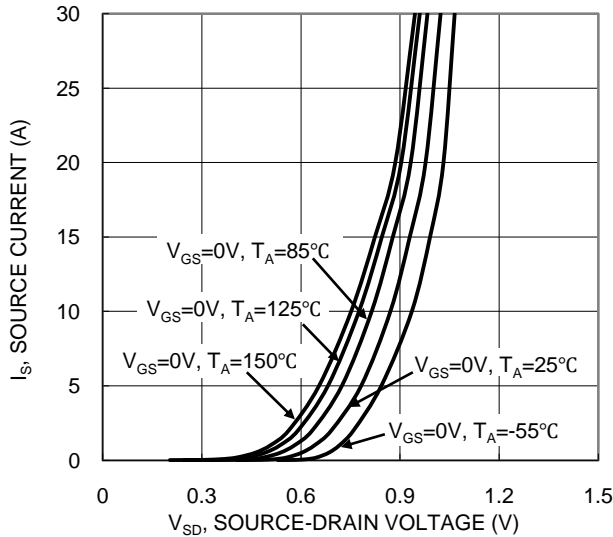


Figure 9. Diode Forward Voltage vs. Current

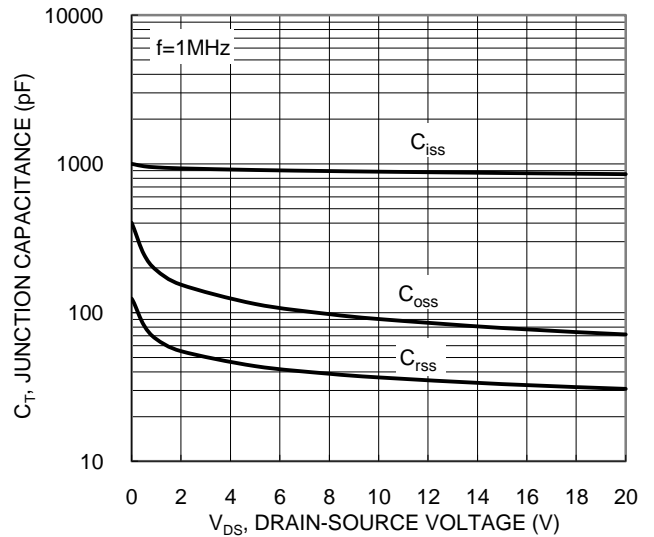


Figure 10. Typical Junction Capacitance

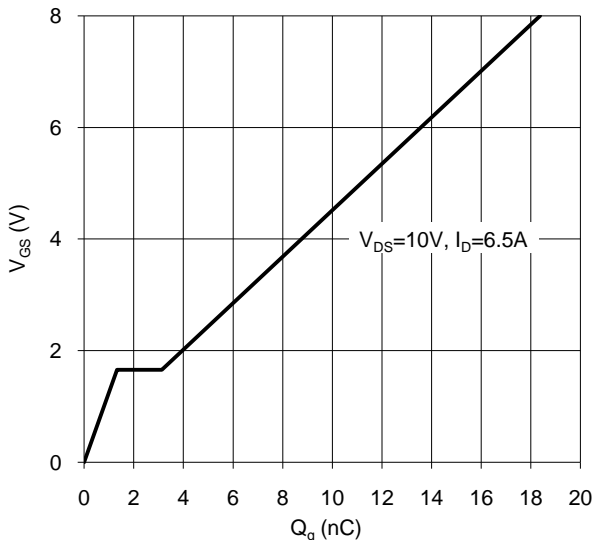


Figure 11. Gate Charge

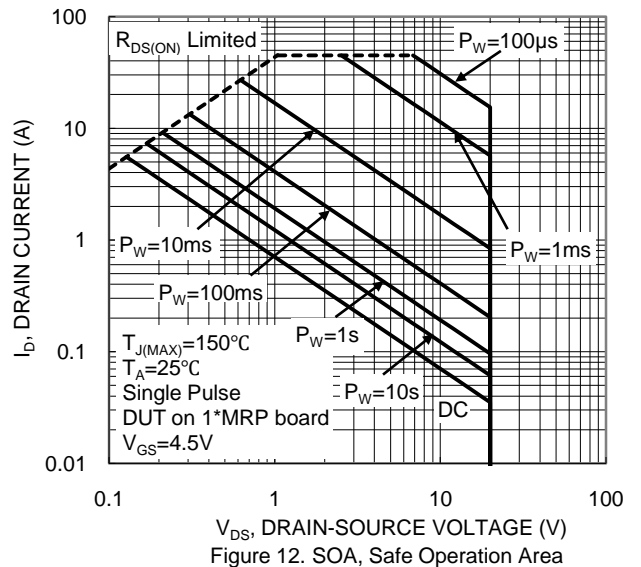
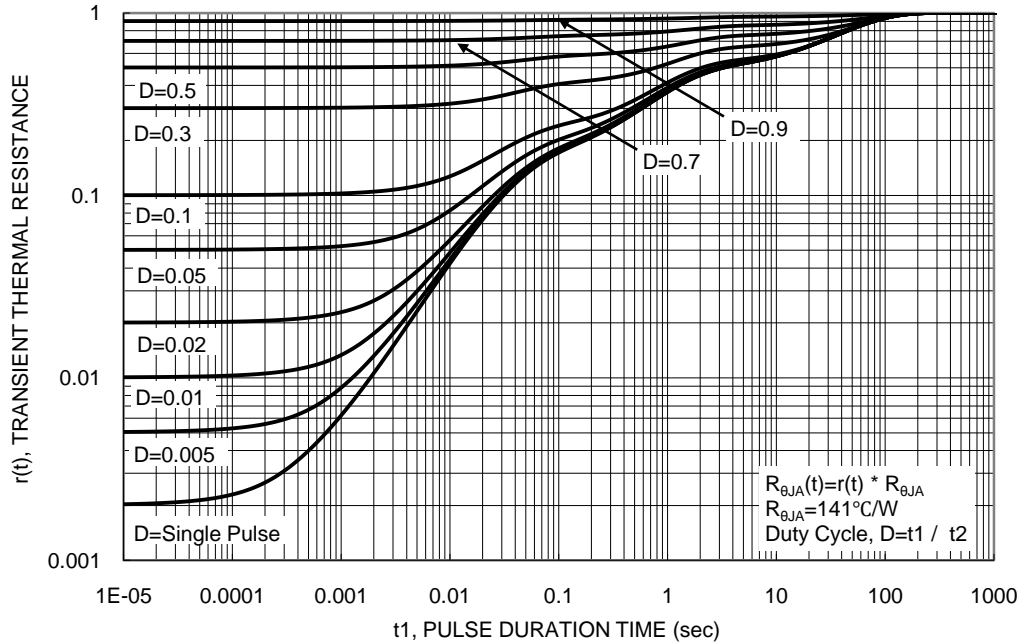
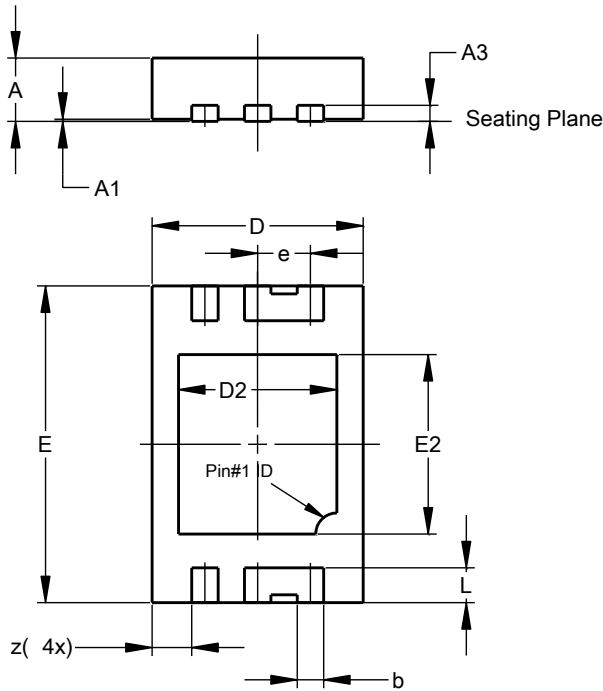


Figure 12. SOA, Safe Operation Area



Package Outline Dimensions

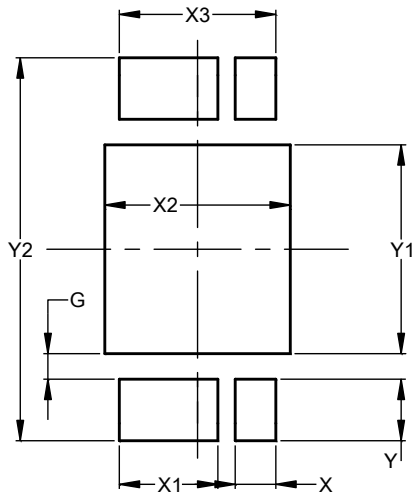
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for the latest version.



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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