DUAL N-CHANNEL ENHANCEMENT MODE MOSFET

Product Summary

$V_{(BR)DSS}$	$R_{DS(on)}$ max	I_D T_A = +25°C
20V	13mΩ @ V_{GS} = 4.5V	9.0A
	14mΩ @ V_{GS} = 4.0V	8.7A
	17mΩ @ V_{GS} = 3.1V	8.0A
	18mΩ @ V_{GS} = 2.5V	6.7A
	28mΩ @ V_{GS} = 1.8V	6.3A

Description

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.

Applications

- Power Management Functions
- Battery Pack
- Load Switch

Features

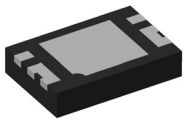
- Low On-Resistance
- Low Gate Threshold Voltage
- Low Input Capacitance
- Fast Switching Speed
- **ESD Protected Gate**
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**

Mechanical Data

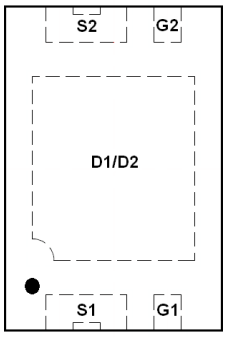
- Case: U-DFN2030-6
- Case Material: Molded Plastic, "Green" Molding Compound UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections: See Diagram Below
- Weight: 0.012 grams (approximate)

ESD PROTECTED TO 2kV

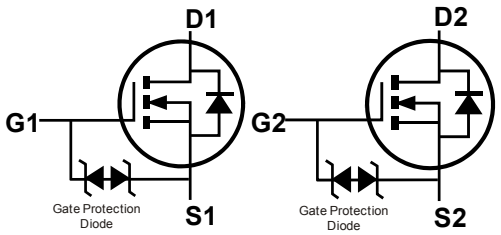
U-DFN2030-6



Bottom View



Top View



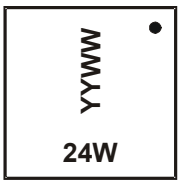
Equivalent Circuit

Ordering Information (Note 4)

Part Number	Case	Packaging
DMN2014LHAB-7	U-DFN2030-6	3,000 / Tape & Reel
DMN2014LHAB-13	U-DFN2030-6	10,000 / 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



24W = 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°C, unless otherwise specified.)

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			V_{DSS}	20	V
Gate-Source Voltage			V_{GSS}	±12	V
Continuous Drain Current (Note 6) V_{GS} = 4.5V	Steady State	T_A = +25°C T_A = +70°C	I_D	9.0 7.1	A
	t < 10s	T_A = +25°C T_A = +70°C	I_D	9.3 7.4	A
Pulsed Drain Current (10µs pulse, duty cycle = 1%)			I_{DM}	45	A

Thermal Characteristics

Characteristic		Symbol	Value	Units
Total Power Dissipation (Note 5)	T_A = +25°C	P_D	0.8	W
	T_A = +70°C		0.5	
Thermal Resistance, Junction to Ambient (Note 5)	Steady State	$R_{\theta JA}$	157	°C/W
	t < 10s		148	
Total Power Dissipation (Note 6)	T_A = +25°C	P_D	1.7	W
	T_A = +70°C		1.1	
Thermal Resistance, Junction to Ambient (Note 6)	Steady State	$R_{\theta JA}$	73.7	°C/W
	t < 10s		68	
Thermal Resistance, Junction to Case		$R_{\theta JC}$	9.4	
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to 150	°C

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 7)						
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 7)						
Gate Threshold Voltage	$V_{GS(th)}$	0.3	0.71	1.1	V	V_{DS} = V_{GS}, I_D = 250µA
Static Drain-Source On-Resistance	$R_{DS\ (ON)}$	—	10	13	mΩ	V_{GS} = 4.5V, I_D = 4.0A
			11	14		V_{GS} = 4.0V, I_D = 4.0A
			12	17		V_{GS} = 3.1V, I_D = 4.0A
			13	18		V_{GS} = 2.5V, I_D = 4.0A
			19	28		V_{GS} = 1.8V, I_D = 3.5A
Forward Transfer Admittance	$\|Y_{fs}\|$	—	25	—	S	V_{DS} = 5V, I_D = 6A
Diode Forward Voltage	V_{SD}	—	0.75	1.0	V	V_{GS} = 0V, I_S = 1A
DYNAMIC CHARACTERISTICS (Note 8)						
Input Capacitance	C_{iss}	—	1550	—	pF	V_{DS} = 10V, V_{GS} = 0V, f = 1.0MHz
Output Capacitance	C_{oss}	—	166	—	pF	
Reverse Transfer Capacitance	C_{rss}	—	145	—	pF	
Gate Resistance	R_g	—	1.37	—	Ω	V_{DS} = 0V, V_{GS} = 0V, f = 1MHz
Total Gate Charge (V_{GS} = 2.5V)	Q_g	—	8.4	—	nC	V_{DS} = 10V, I_D = 6A
Total Gate Charge (V_{GS} = 4.5V)	Q_g	—	16	—	nC	
Gate-Source Charge	Q_{gs}	—	2.3	—	nC	
Gate-Drain Charge	Q_{gd}	—	2.5	—	nC	
Turn-On Delay Time	$t_{D(on)}$	—	6.9	—	ns	V_{DD} = 10V, R_L = 1.7Ω, V_{GS} = 5.0V, R_G = 3Ω
Turn-On Rise Time	t_r	—	15.5	—	ns	
Turn-Off Delay Time	$t_{D(off)}$	—	40.9	—	ns	
Turn-Off Fall Time	t_f	—	12	—	ns	

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 pad
7. Repetitive rating, pulse width limited by junction temperature
8. Guaranteed by design. Not subject to product testing

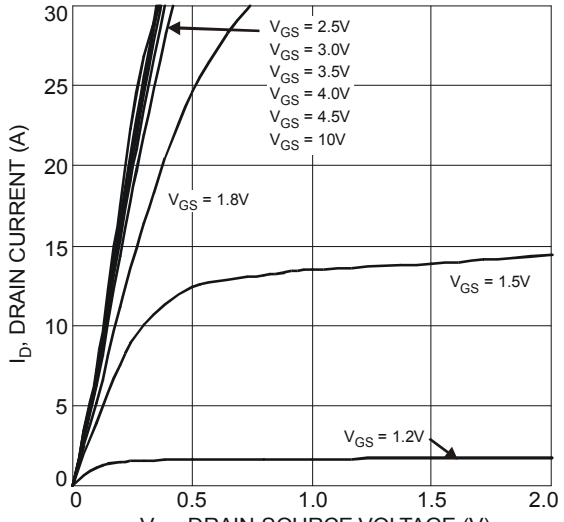


Figure 1 Typical Output Characteristic

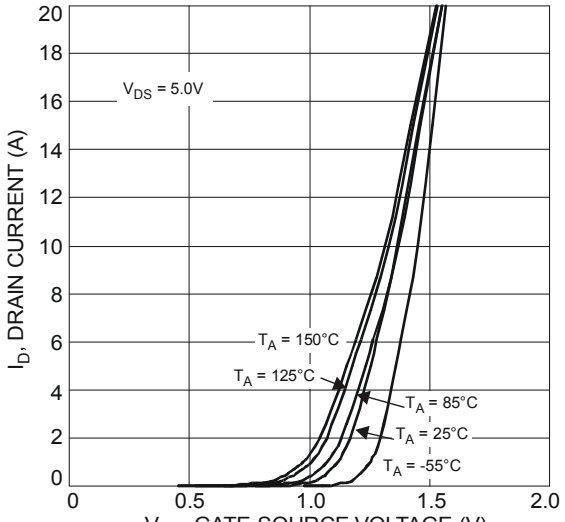


Figure 2 Typical Transfer Characteristics

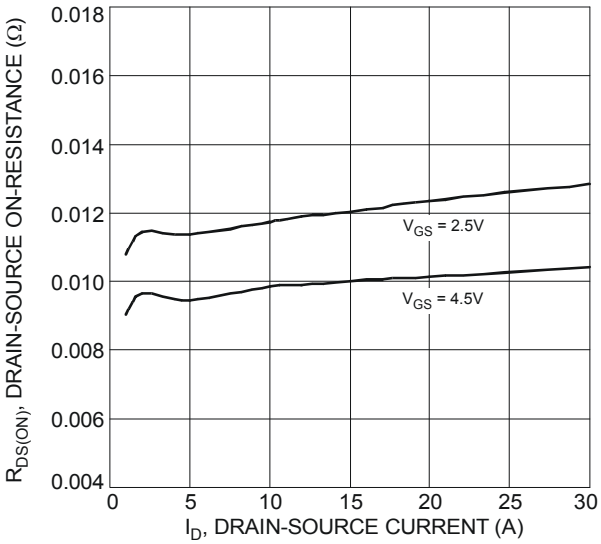


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

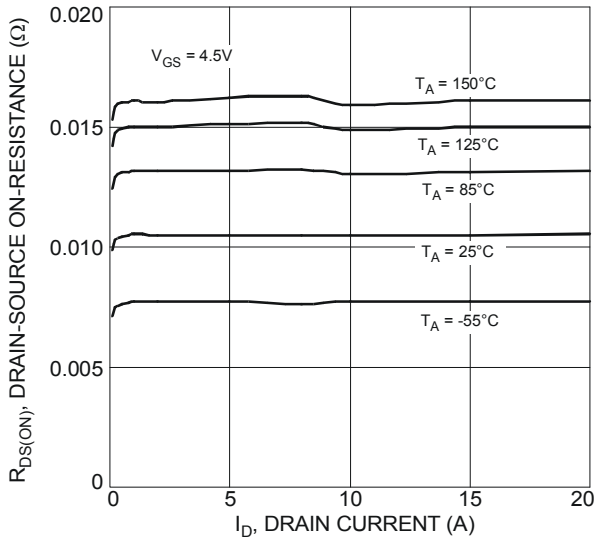


Figure 4 Typical On-Resistance vs. Drain Current and Temperature

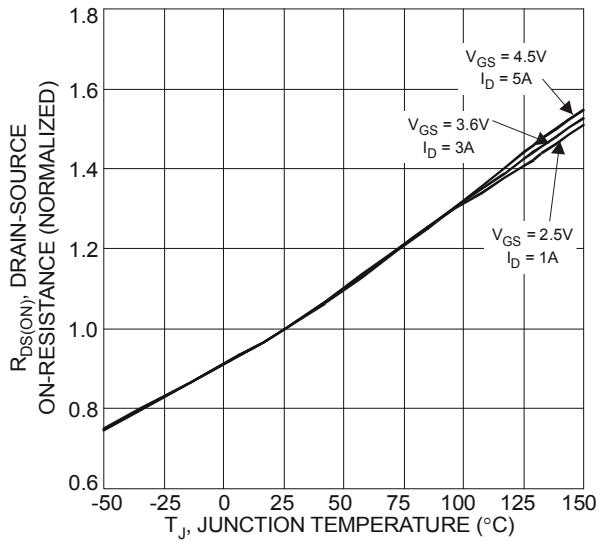


Figure 5 On-Resistance Variation with Temperature

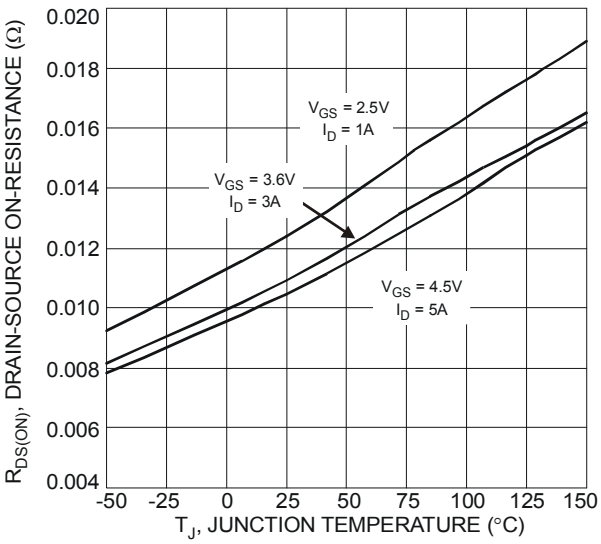


Figure 6 On-Resistance Variation with Temperature

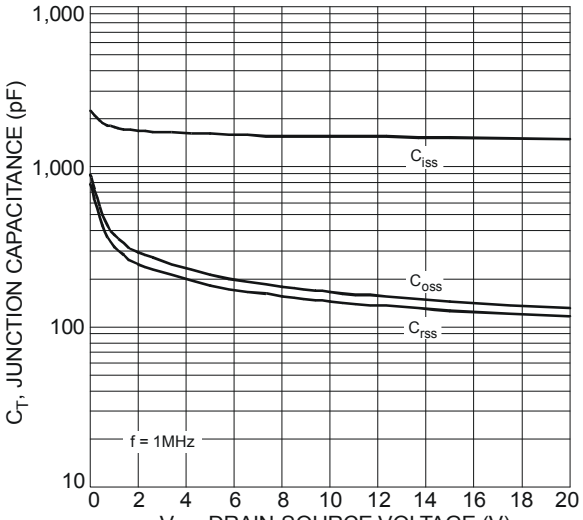


Figure 7 Typical Junction Capacitance

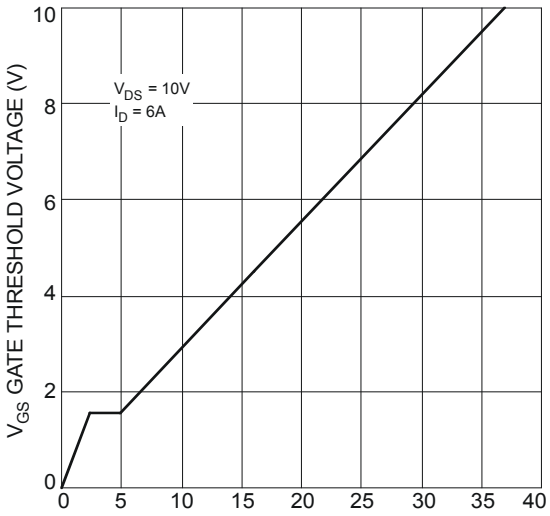


Figure 8 Gate Charge

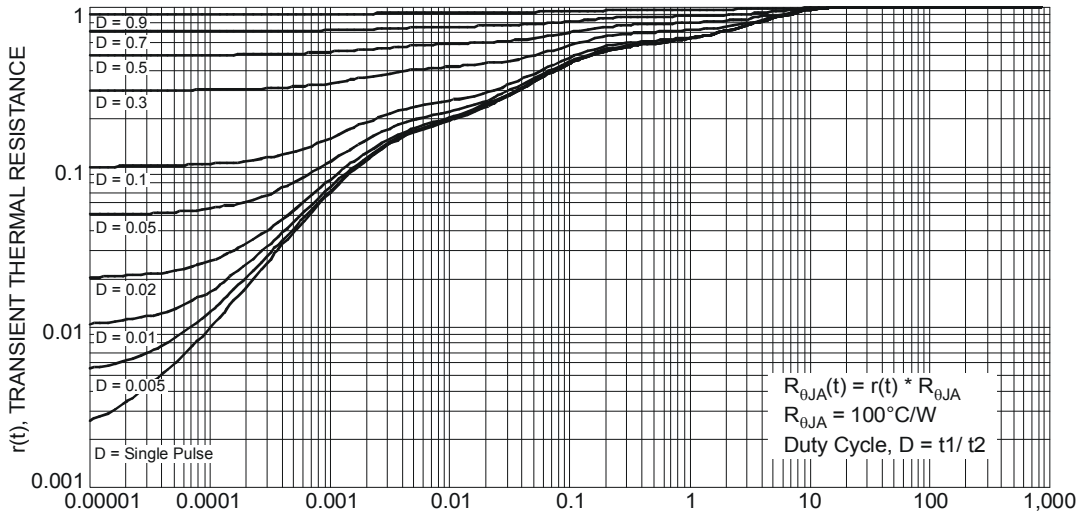
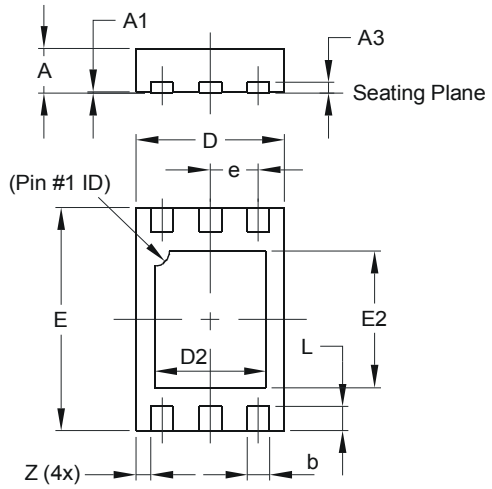


Figure 11 Transient Thermal Resistance

Package Outline Dimensions

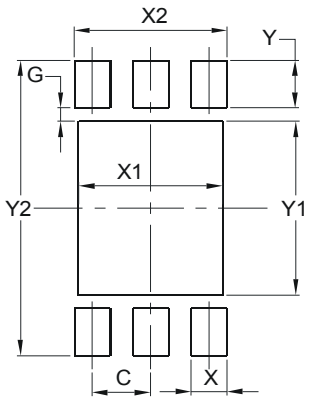
Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for latest version.



U-DFN2030-6 Type B			
Dim	**Min**	**Max**	**Typ**
A	0.55	0.65	0.60
A1	0	0.05	0.02
A3	-	-	0.15
b	0.25	0.35	0.30
D	1.95	2.05	2.00
D2	1.40	1.60	1.50
E	2.95	3.05	3.00
E2	1.74	1.94	1.84
e	-	-	0.65
L	0.28	0.38	0.33
Z	-	-	0.20
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)
C	0.650
G	0.150
X	0.400
X1	1.600
X2	1.700
Y	0.530
Y1	1.940
Y2	3.300

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  Email amall@ameya360.com

  QQ 800077892

  Skype ameyasales1 ameyasales2

- ### Customer Service :

  Email service@ameya360.com

- ### Partnership :

  Tel +86 (21) 64016692-8333

  Email mkt@ameya360.com