



20V N-CHANNEL ENHANCEMENT MODE MOSFET

Product Summary

BV _{DSS}	R _{DS(ON)} max	I _D max T _A = +25°C
20V	0.99Ω @ V _{GS} = 4.5V	750mA
	1.2Ω @ V _{GS} = 2.5V	680mA
	1.8Ω @ $V_{GS} = 1.8V$	555mA
	2.4Ω @ V _{GS} = 1.5V	471mA

Description and Applications

This 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.

- General Purpose Interfacing Switch
- Power Management Functions
- Analog Switch

Features and Benefits

- Low Package Profile
- 0.6mm x 0.4mm Package Footprint
- Low On-Resistance
- Very Low Gate Threshold Voltage, 1.0V Max
- ESD Protected Gate
- Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)
- Halogen and Antimony Free. "Green" Device (Note 3)

Mechanical Data

- Case: X2-DFN0604-3
- Case Material: Molded Plastic, "Green" Molding Compound.
 UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish Matte Tin Annealed over Copper Leadframe.
 Solderable per MIL-STD-202, Method 208 63
- Weight: 0.001 grams (Approximate)

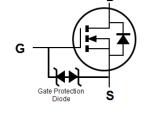
X2-DFN0604-3











Top View Package Pin Configuration

Equivalent Circuit

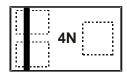
Ordering Information (Note 4)

Part Number	Case	Packaging	
DMN2990UFO-7B	X2-DFN0604-3	10k/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



Top View Bar Denotes Gate and Source Side

4N = Product Type Marking Code



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}	±8	V		
Continuous Drain Current (Note 5) V _{GS} = 4.5V	Steady State	$T_A = +25^{\circ}C$ $T_A = +85^{\circ}C$	I _D	750 600	mA
Pulsed Drain Current (Note 6)	I _{DM}	1.5	Α		

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

Characteristic	Symbol	Value	Unit	
Total Power Dissipation (Note 5)	Steady State	P_{D}	840	mW
Thermal Resistance, Junction to Ambient (Note 5)	Steady State	R _{0JA}	150	°C/W
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	Тур	Max	Unit	Test Condition	
OFF CHARACTERISTICS (Note 7)	- 7		- 71-	1		110101000000000	
Drain-Source Breakdown Voltage	BV _{DSS}	20	_	_	V	$V_{GS} = 0V, I_D = 250\mu A$	
Zero Gate Voltage Drain Current	I _{DSS}	_	_	1	μΑ	V _{DS} = 16V, V _{GS} = 0V	
Gate-Source Leakage	I _{GSS}		_	±10	μA	$V_{GS} = \pm 5V$, $V_{DS} = 0V$	
ON CHARACTERISTICS (Note 7)	•		•			•	
Gate Threshold Voltage	V _{GS(TH)}	0.4	0.75	1.0	V	$V_{DS} = V_{GS}, I_{D} = 250 \mu A$	
		1	0.5	0.99		$V_{GS} = 4.5V, I_D = 100mA$	
Static Drain-Source On-Resistance	D	_	0.6	1.2	Ω	$V_{GS} = 2.5V, I_D = 50mA$	
Static Drain-Source On-Resistance	R _{DS(ON)}	_	0.8	1.8	Ω	$V_{GS} = 1.8V, I_D = 20mA$	
		_	1.0	2.4		$V_{GS} = 1.5V, I_D = 10mA$	
Diode Forward Voltage	V _{SD}	_	0.6	1.0	V	V _{GS} = 0V, I _S = 150mA	
DYNAMIC CHARACTERISTICS (Note 8)							
Input Capacitance	Ciss	_	31	_	pF	V _{DS} = 15V, V _{GS} = 0V, f = 1.0MHz	
Output Capacitance	Coss	_	3.6	_	pF		
Reverse Transfer Capacitance	Crss	_	2.6	_	pF	1 - 1.00112	
Gate Resistance	Rg	_	113	_	Ω	$V_{DS} = 0V, V_{GS} = 0V, f = 1.0MHz$	
Total Gate Charge	Qg	_	0.41	_	nC	451414 4014	
Gate-Source Charge	Q _{gs}	_	0.06	_	nC	$V_{GS} = 4.5V, V_{DS} = 10V,$ $I_{D} = 250 \text{mA}$	
Gate-Drain Charge	Q _{gd}	_	0.05	_	nC	ID = ZOUIIA	
Turn-On Delay Time	t _{D(ON)}	_	4.5	_	ns	$V_{DD} = 15V, V_{GS} = 4.5V,$ $R_{G} = 2\Omega, I_{D} = 200 \text{mA}$	
Turn-On Rise Time	t _R	_	3.4	_	ns		
Turn-Off Delay Time	t _{D(OFF)}	_	24	_	ns		
Turn-Off Fall Time	t _F		12	_	ns		

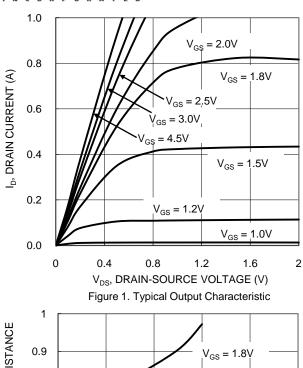
5. Device mounted on FR-4 PCB, with minimum recommended pad layout.

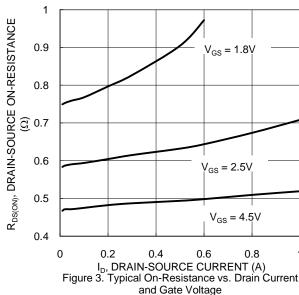
^{6.} Device mounted on minimum recommended pad layout test board, 10µs pulse duty cycle = 1%. 7. Short duration pulse test used to minimize self-heating effect.

^{8.} Guaranteed by design. Not subject to product testing.









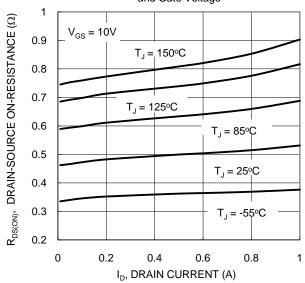
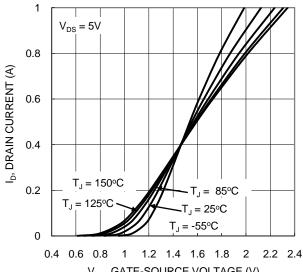
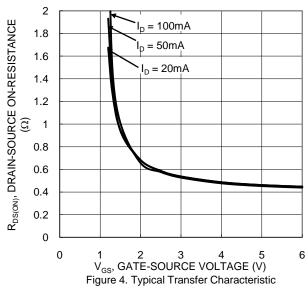


Figure 5. Typical On-Resistance vs. Drain Current and Junction Temperature



 $V_{\rm GS}$, GATE-SOURCE VOLTAGE (V) Figure 2. Typical Transfer Characteristic



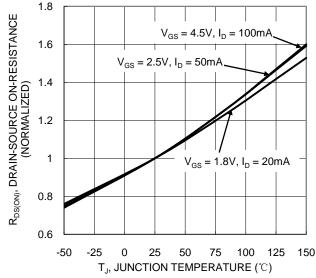
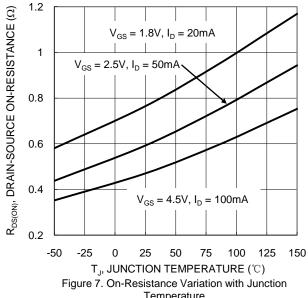


Figure 6. On-Resistance Variation with Junction Temperature







Temperature

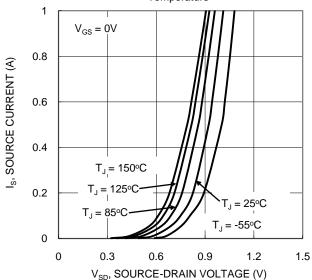


Figure 9. Diode Forward Voltage vs. Current

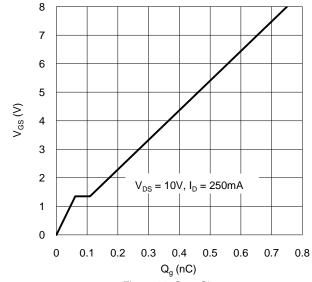


Figure 11. Gate Charge

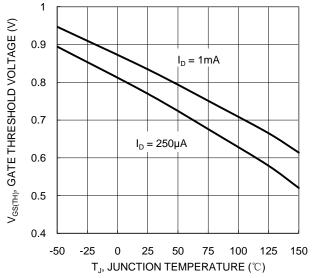


Figure 8. Gate Threshold Variation vs. Junction Temperature

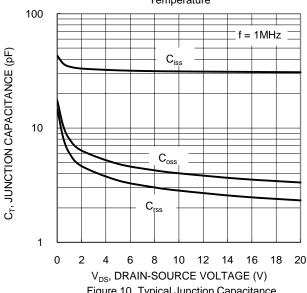
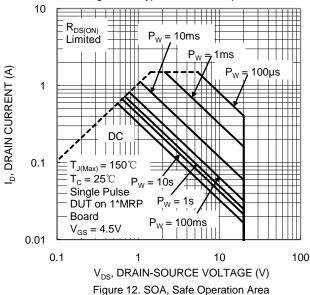


Figure 10. Typical Junction Capacitance





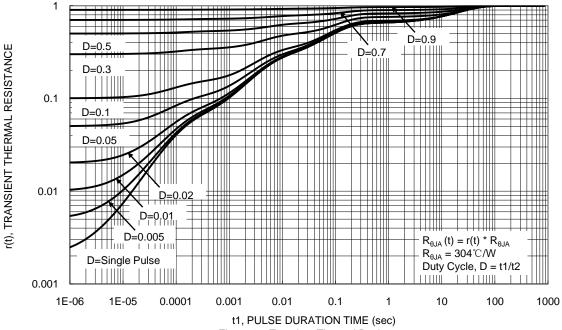


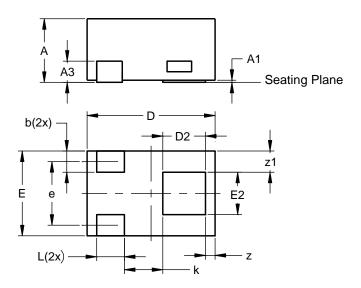
Figure 13. Transient Thermal Resistance



Package Outline Dimensions

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

X2-DFN0604-3

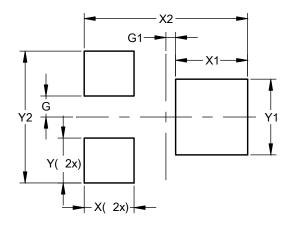


X2-DFN0604-3					
Dim	Min	Max	Тур		
Α		0.40	0.36		
A1	0.00	0.03	0.02		
А3			0.10		
b	0.07	0.15	0.10		
D	0.55	0.65	0.60		
D2	0.15	0.25	0.20		
Е	0.35	0.45	0.40		
E2	0.15	0.25	0.20		
е			0.30		
k	0.15				
L	0.10	0.18	0.13		
Z			0.045		
z1			0.10		
All Dimensions in mm					

Suggested Pad Layout

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

X2-DFN0604-3



Dimensions	Value (in mm)
G	0.075
G1	0.035
X	0.180
X1	0.260
X2	0.590
Υ	0.160
Y1	0.270
Y2	0.470

April 2017

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