DUAL N-CHANNEL ENHANCEMENT MODE MOSFET

Product Summary

$V_{(BR)DSS}$	$R_{DS(ON)}$ max	I_D max T_A = 25°C
20V	0.99Ω @ V_{GS} = 4.5V	450mA
	1.2Ω @ V_{GS} = 2.5V	400mA
	1.8Ω @ V_{GS} = 1.8V	330mA
	2.4Ω @ V_{GS} = 1.5V	300mA

Description

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.

Applications

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

Features

- Dual N-Channel MOSFET
- Low On-Resistance
- Very low Gate Threshold Voltage, 1.0V max
- Low Input Capacitance
- Fast Switching Speed
- Ultra-Small Surface Mount Package 1mm x 1mm
- Low Package Profile, 0.45mm Maximum Package height
- 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**

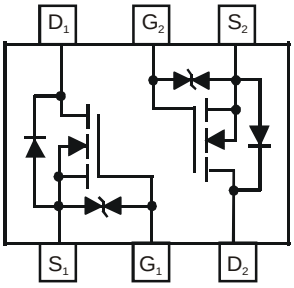
Mechanical Data

- Case: SOT963
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections Indicator: See diagram
- Terminals: Finish — Matte Tin annealed over Copper leadframe. Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.027 grams (approximate)

ESD PROTECTED

SOT963

Top View



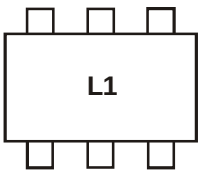
Top View
Schematic and Transistor Diagram

Ordering Information (Note 4)

Part Number	Case	Packaging
DMN2990UDJ-7	SOT963	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 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.

Marking Information



L1 = Product Type Marking Code

Maximum Ratings (@T_A = +25°C, unless otherwise specified.)

Characteristic			Symbol	Value	Units
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°C T_A = +70°C	I_D	450 350	mA
Continuous Drain Current (Note 5) V_{GS} = 1.8V	Steady State	T_A = +25°C T_A = +70°C	I_D	330 220	mA
Pulsed Drain Current (Note 6)			I_{DM}	800	mA

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

Characteristic	Symbol	Value	Units
Total Power Dissipation (Note 5)	P_D	350	mW
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	360	°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	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_c = +25°C	I_{DSS}	-	-	50	nA	V_{DS} = 5V, V_{GS} = 0V
		-	-	100		V_{DS} = 16V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	-	-	±100	nA	V_{GS} = ±5V, V_{DS} = 0V
ON CHARACTERISTICS (Note 7)						
Gate Threshold Voltage	$V_{GS(th)}$	0.4	-	1.0	V	V_{DS} = V_{GS}, I_D = 250µA
Static Drain-Source On-Resistance	$R_{DS\ (ON)}$	-	0.60	0.99	Ω	V_{GS} = 4.5V, I_D = 100mA
		-	0.75	1.2		V_{GS} = 2.5V, I_D = 50mA
		-	0.90	1.8		V_{GS} = 1.8V, I_D = 20mA
		-	1.2	2.4		V_{GS} = 1.5V, I_D = 10mA
		-	2.0	-		V_{GS} = 1.2V, I_D = 1mA
Forward Transfer Admittance	$\|Y_{fs}\|$	180	-	-	mS	V_{DS} = 10V, I_D = 400mA
Diode Forward Voltage (Note 6)	V_{SD}	-	0.6	1.0	V	V_{GS} = 0V, I_S = 150mA
DYNAMIC CHARACTERISTICS (Note 8)						
Input Capacitance	C_{iss}	-	27.6	-	pF	V_{DS} = 16V, V_{GS} = 0V, f = 1.0MHz
Output Capacitance	C_{oss}	-	4.0	-	pF	
Reverse Transfer Capacitance	C_{rss}	-	2.8	-	pF	
Total Gate Charge	Q_g	-	0.5	-	nC	V_{GS} = 4.5V, V_{DS} = 10V, I_D = 250mA
Gate-Source Charge	Q_{gs}	-	0.07	-	nC	
Gate-Drain Charge	Q_{gd}	-	0.07	-	nC	
Turn-On Delay Time	$t_{D(on)}$	-	4.0	-	ns	V_{DD} = 10V, V_{GS} = 4.5V, R_L = 47Ω, R_G = 10Ω, I_D = 200mA
Turn-On Rise Time	t_r	-	3.3	-	ns	
Turn-Off Delay Time	$t_{D(off)}$	-	19.0	-	ns	
Turn-Off Fall Time	t_f	-	6.4	-	ns	

Notes: 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.

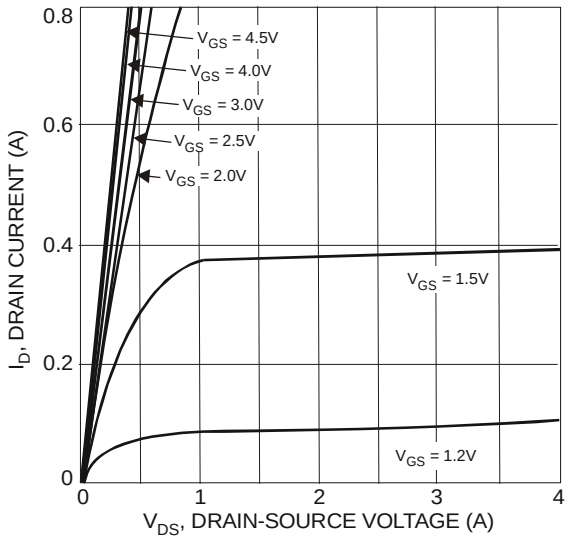


Fig. 1 Typical Output Characteristics

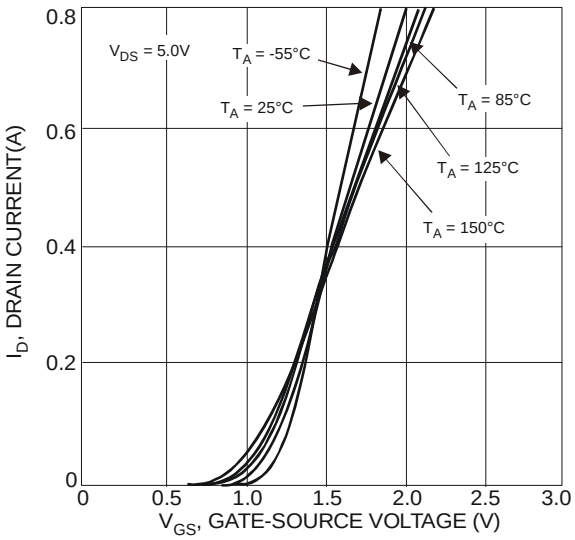


Fig. 2 Typical Transfer Characteristics

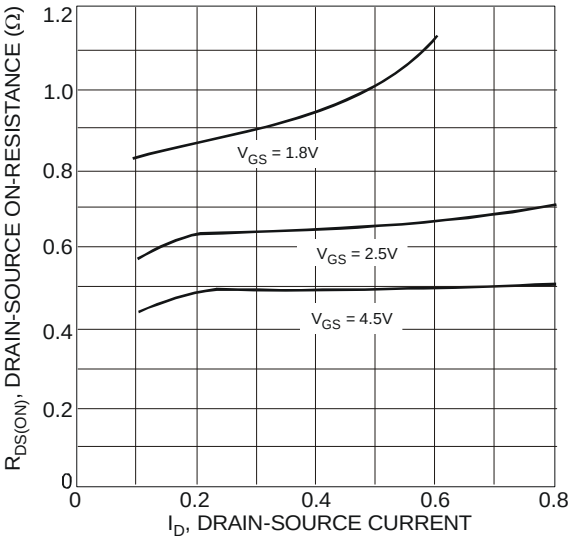


Fig. 3 Typical On-Resistance vs. Drain Current and Gate Voltage

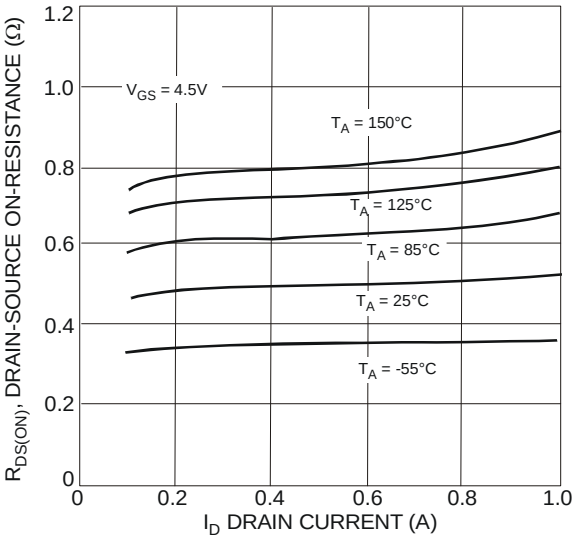


Fig. 4 Typical On-Resistance vs. Drain Current and Temperature

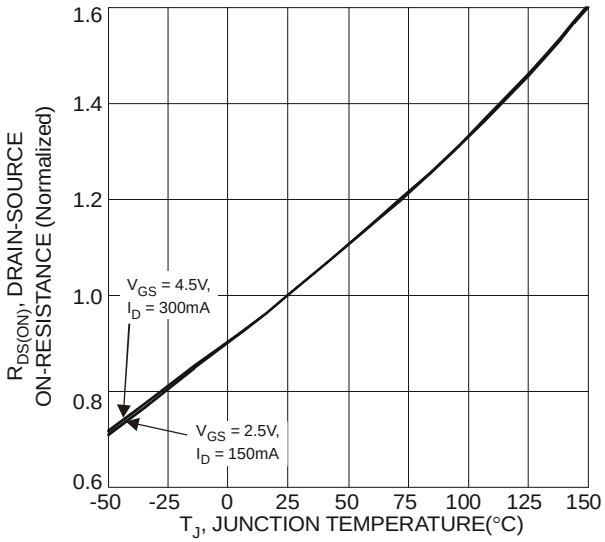


Fig. 5 On-Resistance Variation with Temperature

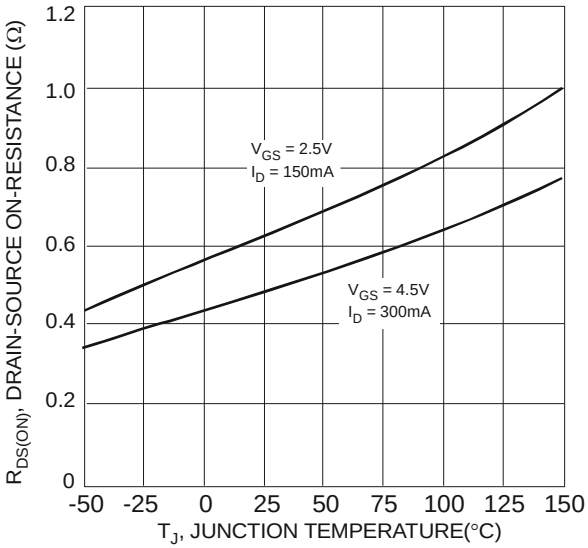


Fig. 6 On-Resistance Variation with Temperature

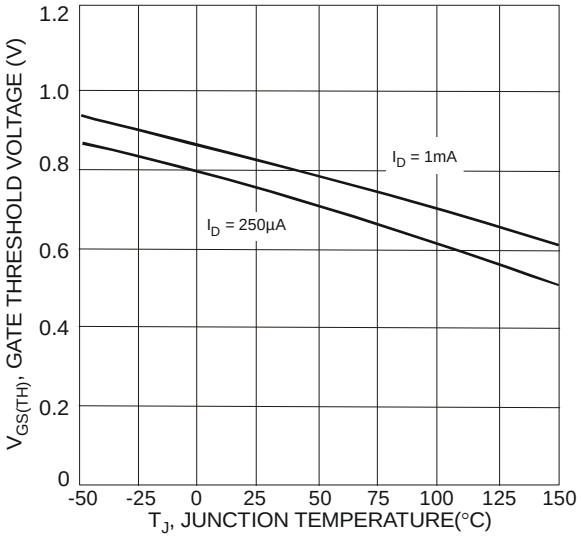


Fig. 7 Gate Threshold Variation vs. Ambient Temperature

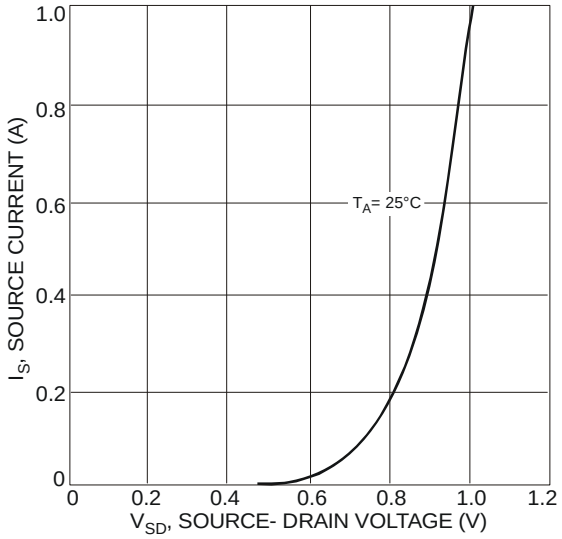


Fig. 8 Diodes Forward Voltage vs. Current

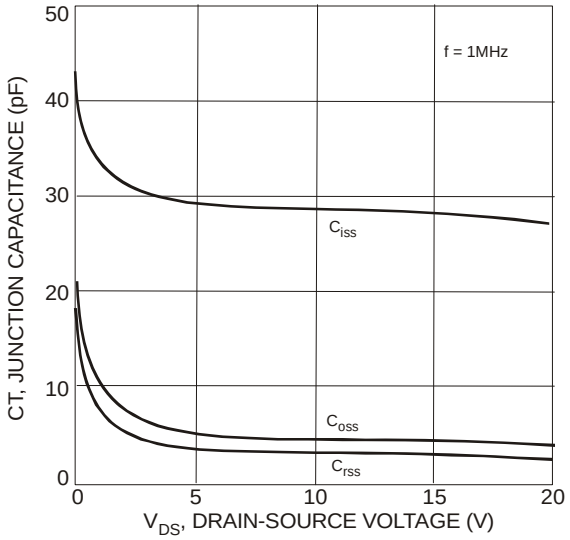


Fig. 9 Typical Junction Capacitance

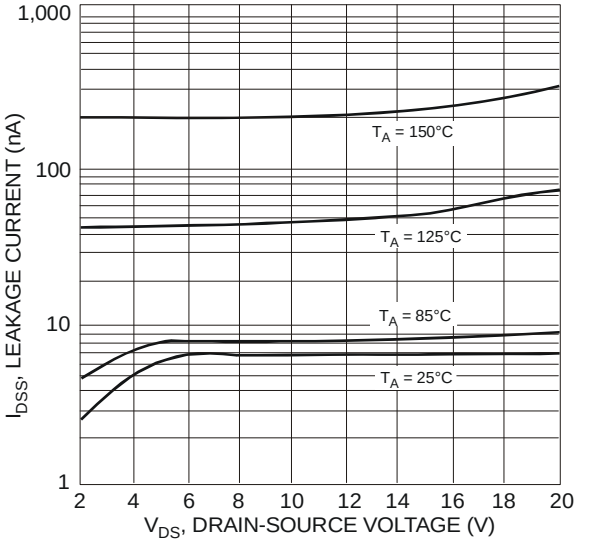


Fig. 10 Typical Drain-Source Leakage Current vs. Voltage

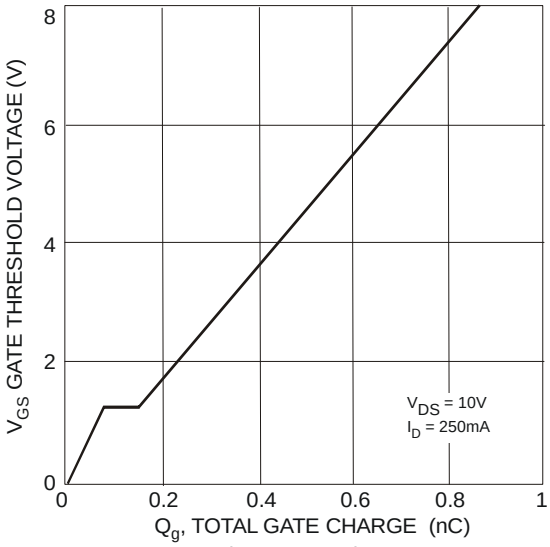


Fig. 11 Gate Charge

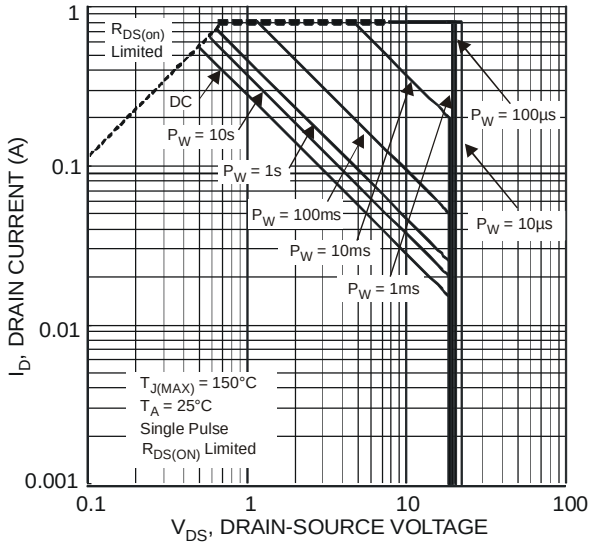


Fig. 12 SOA, Safe Operation Area

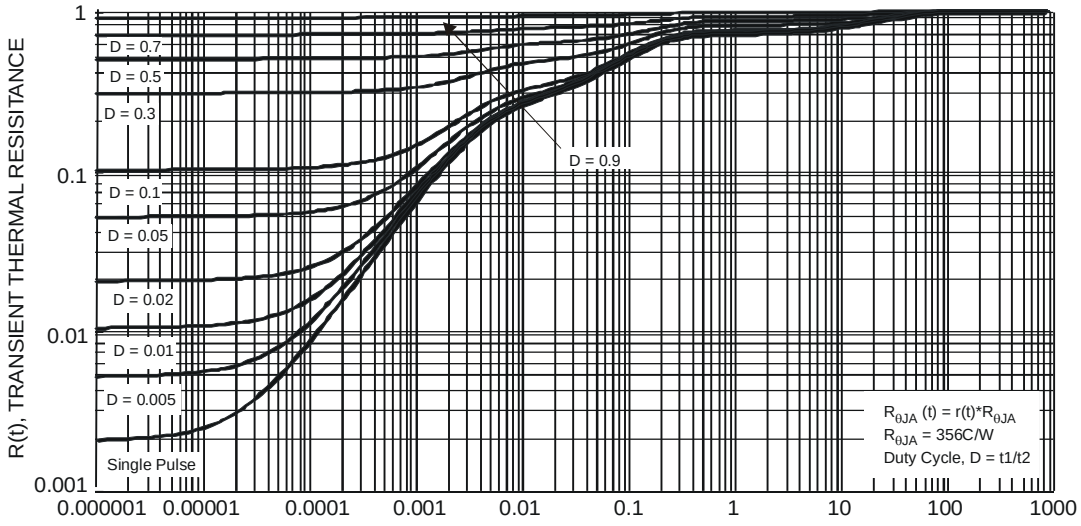
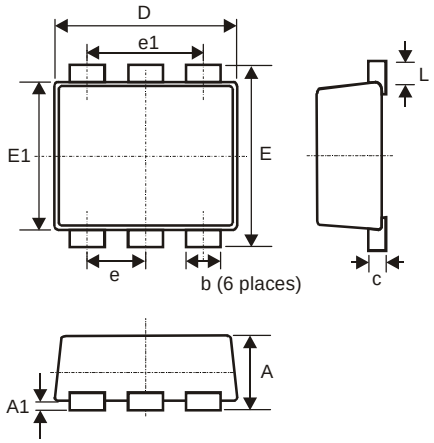


Fig. 13 Transient Thermal Resisitance

Package Outline Dimensions

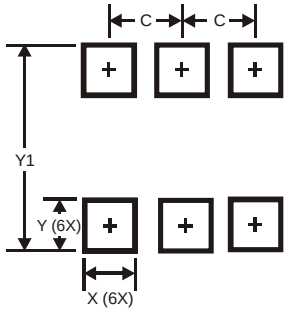
Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for latest version.



SOT963			
Dim	**Min**	**Max**	**Typ**
A	0.40	0.50	0.45
A1	0	0.05	-
c	0.120	0.180	0.150
D	0.95	1.05	1.00
E	0.95	1.05	1.00
E1	0.75	0.85	0.80
L	0.05	0.15	0.10
b	0.10	0.20	0.15
e	0.35 Typ		
e1	0.70 Typ		
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	0.350
X	0.200
Y	0.200
Y1	1.100

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