

N-CHANNEL ENHANCEMENT MODE MOSFET

Product Summary

$V_{(BR)DSS}$	$R_{DS(ON)}$	Package	I_D $T_C = 25^\circ C$
650V	$3.0 \Omega @ V_{GS} = 10V$	TO220-3	4.0 A

Features and Benefits

- Low Input Capacitance
- High BVD_{SS} rating for power application
- Low Input/Output Leakage
- **Lead-Free Finish; RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**

Description and Applications

This new generation complementary MOSFET features low on-resistance and fast switching, making it ideal for high efficiency power management applications.

- Motor control
- Backlighting
- DC-DC Converters
- Power management functions

Mechanical Data

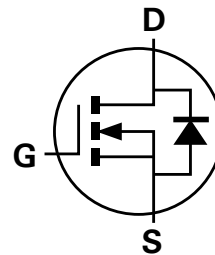
- Case: TO220-3
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish-Matte Tin annealed over Copper Leadframe Solderable per MIL-STD-202, Method 208
- Terminal Connections: See Diagram Below
- Weight: 0.008 grams (approximate)

TO220-3

Top View



Top View
Pin Out Configuration



Equivalent Circuit

Ordering Information (Note 4)

Part Number	Case	Packaging
DMG4N65CT	TO220-3	50 pieces/tube

- Notes:
1. EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant. All applicable RoHS exemptions applied.
 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



4N65CT = Product Type Marking Code
 YYWW = Date Code Marking
 YY = Last two digits of year (ex: 12 = 2012)
 WW = Week (01 - 53)

Maximum Ratings @ $T_A = 25^\circ\text{C}$ unless otherwise specified

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			V_{DSS}	650	V
Gate-Source Voltage			V_{GSS}	± 30	V
Continuous Drain Current (Note 5) $V_{GS} = 10\text{V}$	Steady State	$T_C = 25^\circ\text{C}$	I_D	4.0	A
		$T_C = 70^\circ\text{C}$		3.0	
Pulsed Drain Current (Note 7)			I_{DM}	14	A
Avalanche Current (Note 8) $V_{DD} = 100\text{V}$, $V_{GS} = 10\text{V}$, $L = 60\text{mH}$			I_{AS}	3.9	A
Repetitive avalanche energy (Note 7)			E_{AS}	456	mJ

Thermal Characteristics

Characteristic	Symbol	Max	Unit
Power Dissipation (Note 5)	P_D	2.19	W
Thermal Resistance, Junction to Ambient @ $T_A = 25^\circ\text{C}$ (Note 5)	$R_{\theta JA}$	58.5	$^\circ\text{C/W}$
Power Dissipation (Note 6)	P_D	9.14	W
Thermal Resistance, Junction to Ambient @ $T_A = 25^\circ\text{C}$ (Note 6)	$R_{\theta JA}$	2.85	$^\circ\text{C/W}$
Thermal Resistance, Junction to Case @ $T_A = 25^\circ\text{C}$ (Note 6)	$R_{\theta JC}$	0.86	$^\circ\text{C/W}$
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 stated

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 9)						
Drain-Source Breakdown Voltage	BV_{DSS}	650	-	-	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}	-	-	1.0	μA	$V_{DS} = 650\text{V}$, $V_{GS} = 0\text{V}$
Gate-Source Leakage	I_{GSS}	-	-	± 100	nA	$V_{GS} = \pm 30\text{V}$, $V_{DS} = 0\text{V}$
ON CHARACTERISTICS (Note 9)						
Gate Threshold Voltage	$V_{GS(th)}$	3	-	5	V	$V_{DS} = V_{GS}$, $I_D = 250\mu\text{A}$
Static Drain-Source On-Resistance	$R_{DS(on)}$	-	2.1	3.0	Ω	$V_{GS} = 10\text{V}$, $I_D = 2\text{A}$
Forward Transfer Admittance	$ Y_{fs} $	-	3.7	-	S	$V_{DS} = 40\text{V}$, $I_D = 2\text{A}$
Diode Forward Voltage	V_{SD}	-	0.7	1.0	V	$V_{GS} = 0\text{V}$, $I_S = 1\text{A}$
DYNAMIC CHARACTERISTICS (Note 10)						
Input Capacitance	C_{iss}	-	900	-	pF	$V_{DS} = 25\text{V}$, $V_{GS} = 0\text{V}$, $f = 1.0\text{MHz}$
Output Capacitance	C_{oss}	-	50	-		
Reverse Transfer Capacitance	C_{rss}	-	1.1	-		
Gate Resistance	R_g	-	2.4	-	Ω	$V_{DS} = 0\text{V}$, $V_{GS} = 0\text{V}$, $f = 1\text{MHz}$
Total Gate Charge $V_{GS} = 10\text{V}$	Q_g	-	13.5	-	nC	$V_{GS} = 10\text{V}$, $V_{DS} = 520\text{V}$, $I_D = 4\text{A}$
Gate-Source Charge	Q_{gs}	-	2.7	-		
Gate-Drain Charge	Q_{gd}	-	3.8	-		
Turn-On Delay Time	$t_{D(on)}$	-	15.1	-	ns	$V_{GS} = 10\text{V}$, $V_{DS} = 325\text{V}$, $R_G = 25\Omega$, $I_D = 4\text{A}$
Turn-On Rise Time	t_r	-	13.8	-		
Turn-Off Delay Time	$t_{D(off)}$	-	40	-		
Turn-Off Fall Time	t_f	-	16	-		
Body Diode Reverse Recovery Time	t_{rr}	-	515	-		
Body Diode Reverse Recovery Charge	Q_{rr}	-	2330	-	nC	$dI/dt = 100\text{A}/\mu\text{s}$, $V_{DS} = 100\text{V}$, $I_F = 4\text{A}$

- Notes:
- Device mounted on FR-4 PCB with minimum recommended pad layout, single sided.
 - Device mounted on an infinite heatsink
 - Repetitive rating, pulse width limited by junction temperature.
 - I_{AS} and E_{AS} rating 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 production testing.

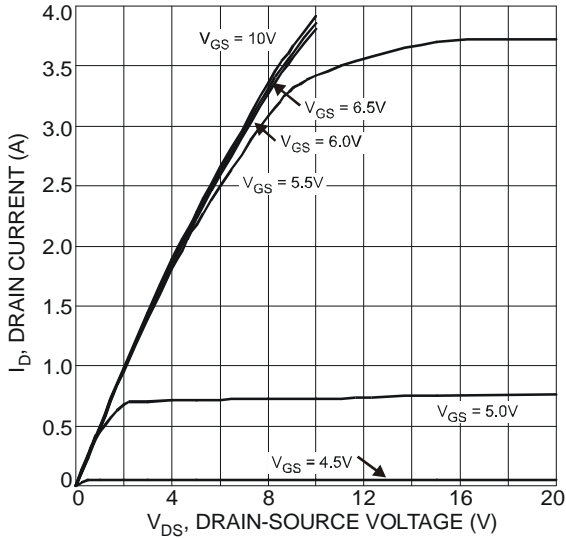


Fig. 1 Typical Output Characteristic

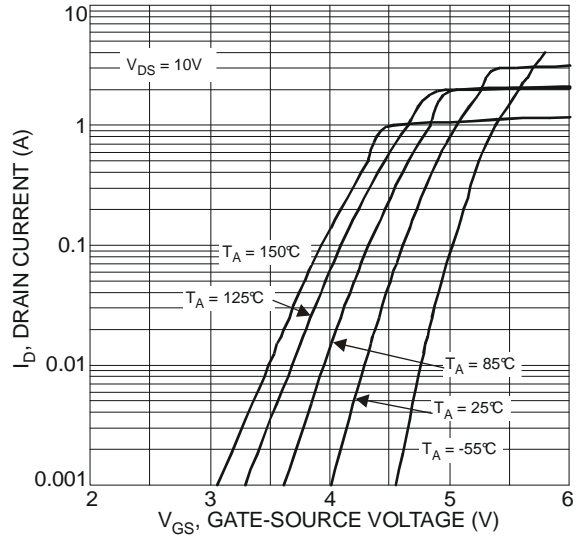


Fig. 2 Typical Transfer Characteristics

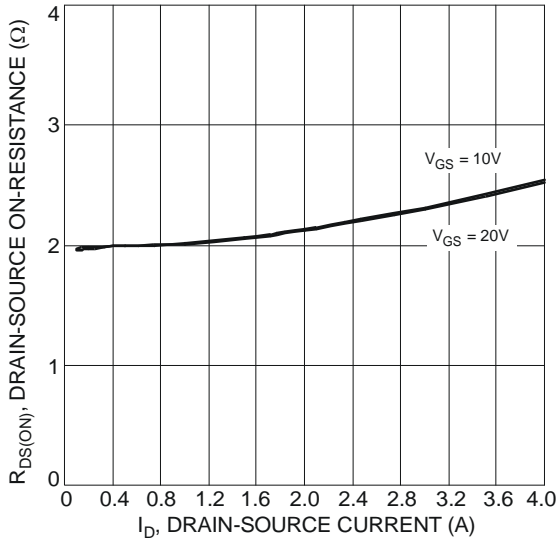


Fig. 3 Typical On-Resistance vs. Drain Current and Gate Voltage

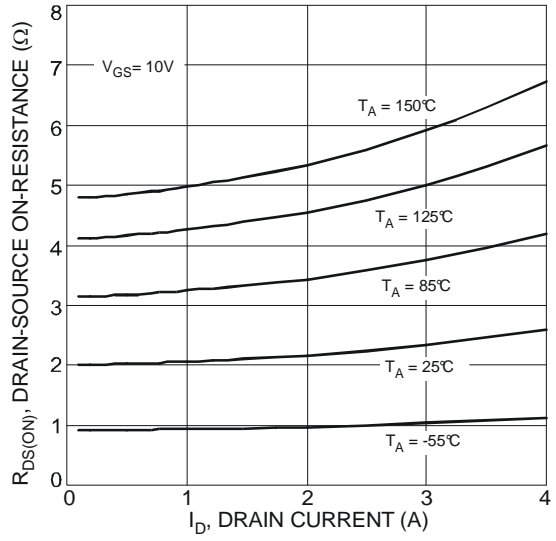


Fig. 4 Typical On-Resistance vs. Drain Current and Temperature

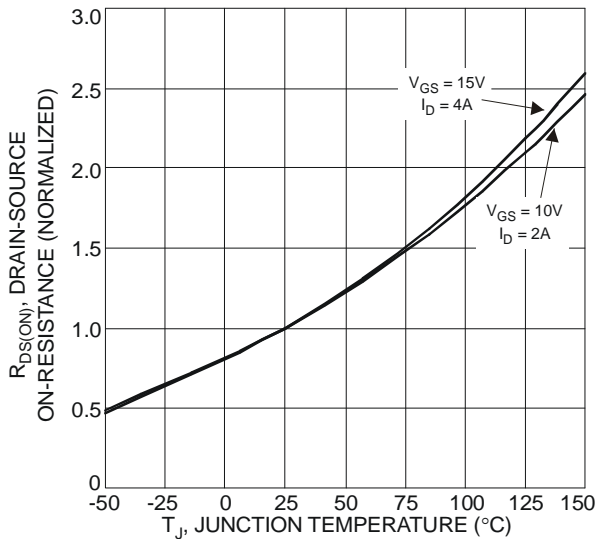


Fig. 5 On-Resistance Variation with Temperature

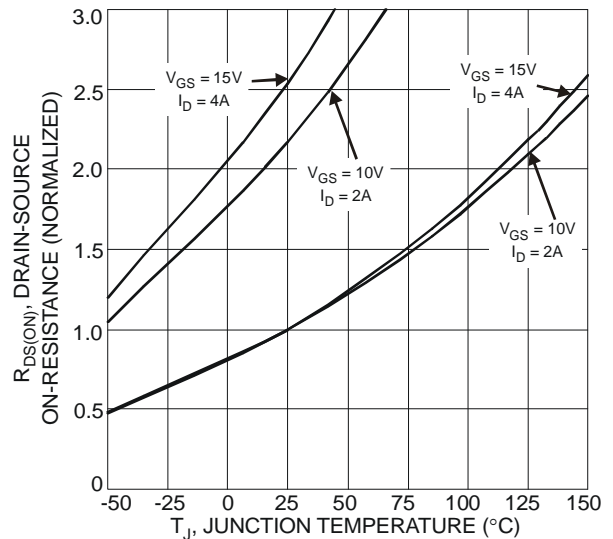


Fig. 6 On-Resistance Variation with Temperature

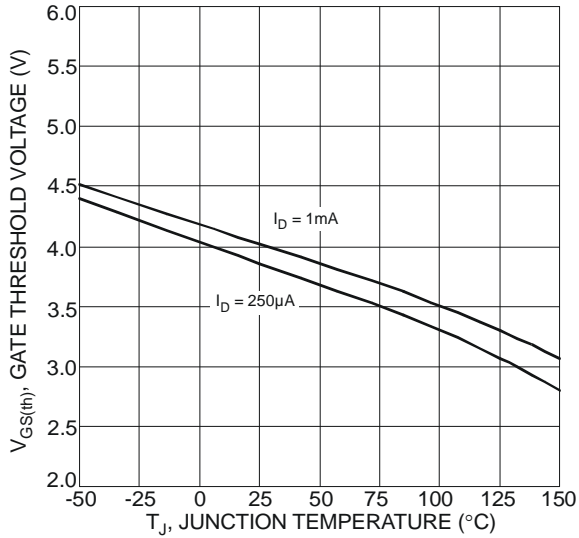


Fig. 7 Gate Threshold Variation vs. Ambient Temperature

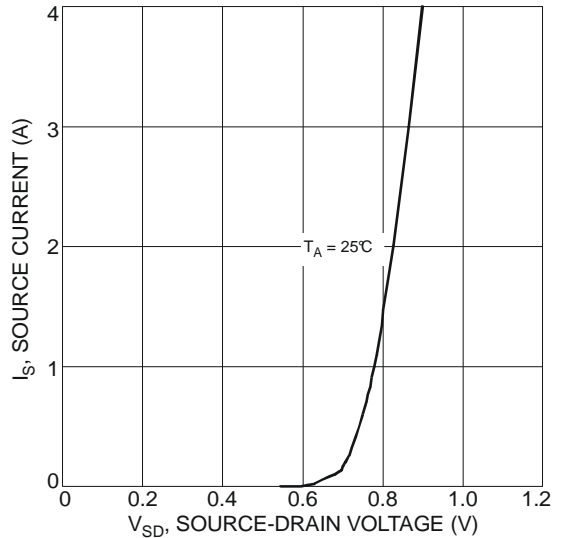


Fig.8 Diode Forward Voltage vs. Current

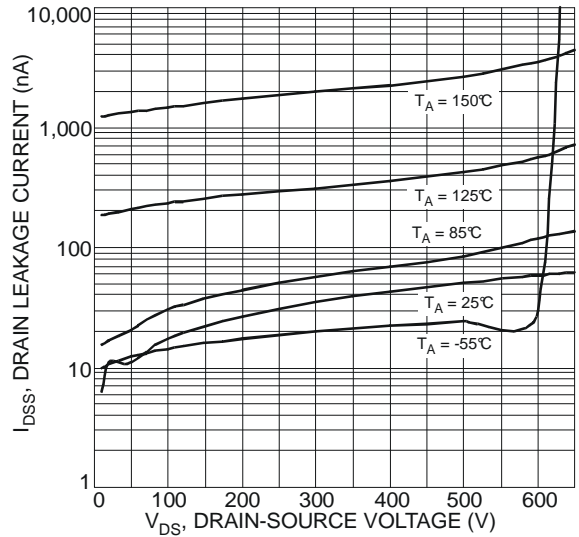


Fig. 9 Typical Drain-Source Leakage Current vs. Voltage

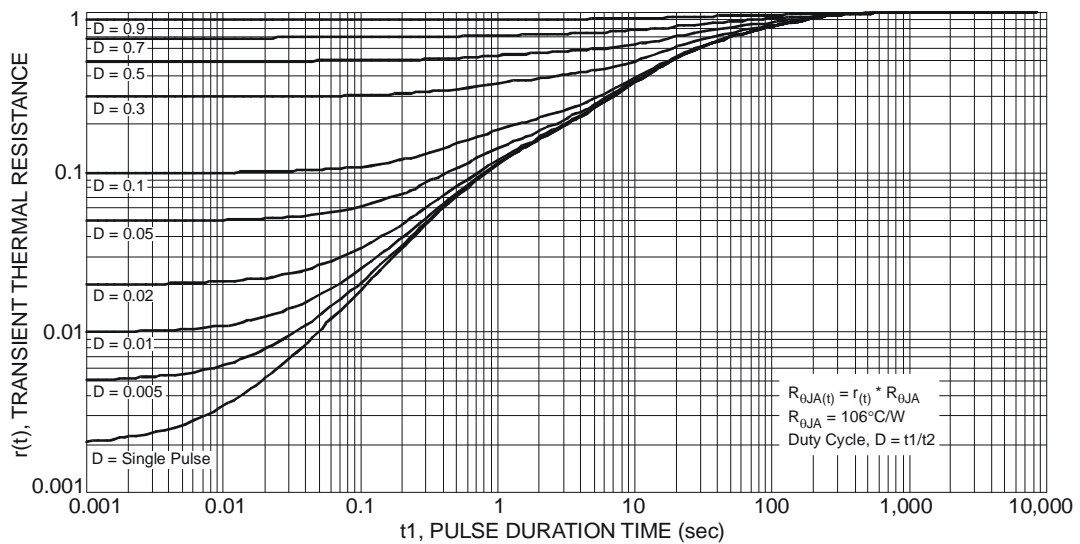
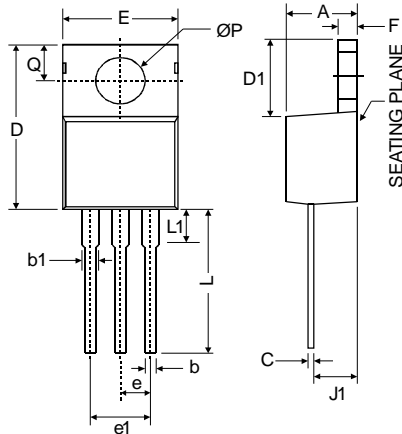


Fig. 10 Transient Thermal Resistance

Package Outline Dimensions



T0220-3		
Dim	Min	Max
A	3.55	4.85
b	0.51	1.14
b1	1.14	1.78
C	0.31	1.14
D	14.20	16.50
D1	5.84	6.86
E	9.70	10.70
e	2.79	2.99
e1	4.83	5.33
F	0.51	1.40
J1	2.03	2.92
L	12.72	14.72
L1	3.66	6.35
P	3.53	4.09
Q	2.54	3.43
All Dimensions in mm		

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