

## 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

## Description

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

## Applications

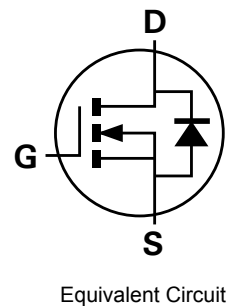
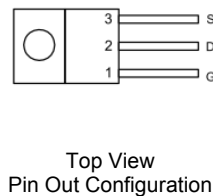
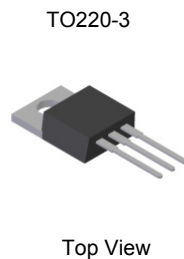
- Motor control
- Backlighting
- DC-DC Converters
- Power management functions

## Features

- Low Input Capacitance
- High BVDSS 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**

## 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 (e3)
- Terminal Connections: See Diagram Below
- Weight: 0.008 grams (approximate)

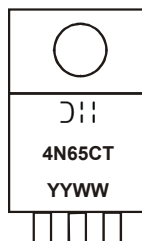


## Ordering Information (Note 4)

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<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			V <sub>DSS</sub>	650	V
Gate-Source Voltage			V <sub>GSS</sub>	±30	V
Continuous Drain Current (Note 5) V <sub>GS</sub> = 10V	Steady State	T <sub>C</sub> = +25°C	I <sub>D</sub>	4.0	A
		T <sub>C</sub> = +70°C		3.0	
Pulsed Drain Current (Note 7)			I <sub>DM</sub>	6	A
Avalanche Current (Note 8) V <sub>DD</sub> = 100V, V <sub>GS</sub> = 10V, L = 60mH			I <sub>AS</sub>	3.9	A
Repetitive avalanche energy (Note 7)			E <sub>AS</sub>	456	mJ

**Thermal Characteristics**

Characteristic	Symbol	Max	Unit
Power Dissipation (Note 5)	P <sub>D</sub>	2.19	W
Thermal Resistance, Junction to Ambient @T <sub>A</sub> = +25°C (Note 5)	R <sub>θJA</sub>	58.5	°C/W
Power Dissipation (Note 6)	P <sub>D</sub>	9.14	W
Thermal Resistance, Junction to Ambient @T <sub>A</sub> = +25°C (Note 6)	R <sub>θJA</sub>	2.85	°C/W
Thermal Resistance, Junction to Case @T <sub>A</sub> = +25°C (Note 6)	R <sub>θJC</sub>	0.86	°C/W
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C

**Electrical Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS (Note 9)</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	650	-	-	V	V <sub>GS</sub> = 0V, I <sub>D</sub> = 250μA
Zero Gate Voltage Drain Current T <sub>J</sub> = 25°C	I <sub>DSS</sub>	-	-	1.0	μA	V <sub>DS</sub> = 650V, V <sub>GS</sub> = 0V
Gate-Source Leakage	I <sub>GSS</sub>	-	-	±100	nA	V <sub>GS</sub> = ±30V, V <sub>DS</sub> = 0V
<b>ON CHARACTERISTICS (Note 9)</b>						
Gate Threshold Voltage	V <sub>GS(th)</sub>	3	-	5	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA
Static Drain-Source On-Resistance	R <sub>DS(on)</sub>	-	2.1	3.0	Ω	V <sub>GS</sub> = 10V, I <sub>D</sub> = 2A
Forward Transfer Admittance	Y <sub>fs</sub>	-	3.7	-	S	V <sub>DS</sub> = 40V, I <sub>D</sub> = 2A
Diode Forward Voltage	V <sub>SD</sub>	-	0.7	1.0	V	V <sub>GS</sub> = 0V, I <sub>S</sub> = 1A
<b>DYNAMIC CHARACTERISTICS (Note 10)</b>						
Input Capacitance	C <sub>iSS</sub>	-	900	-	pF	V <sub>DS</sub> = 25V, V <sub>GS</sub> = 0V, f = 1.0MHz
Output Capacitance	C <sub>oss</sub>	-	50	-		
Reverse Transfer Capacitance	C <sub>rss</sub>	-	1.1	-		
Gate Resistance	R <sub>g</sub>	-	2.4	-	Ω	V <sub>DS</sub> = 0V, V <sub>GS</sub> = 0V, f = 1MHz
Total Gate Charge V <sub>GS</sub> = 10V	Q <sub>g</sub>	-	13.5	-	nC	V <sub>GS</sub> = 10V, V <sub>DS</sub> = 520V, I <sub>D</sub> = 4A
Gate-Source Charge	Q <sub>gs</sub>	-	2.7	-		
Gate-Drain Charge	Q <sub>gd</sub>	-	3.8	-		
Turn-On Delay Time	t <sub>D(on)</sub>	-	15.1	-	ns	V <sub>GS</sub> = 10V, V <sub>DS</sub> = 325V, R <sub>G</sub> = 25Ω, I <sub>D</sub> = 4A
Turn-On Rise Time	t <sub>r</sub>	-	13.8	-	ns	
Turn-Off Delay Time	t <sub>D(off)</sub>	-	40	-	ns	
Turn-Off Fall Time	t <sub>f</sub>	-	16	-	ns	
Body Diode Reverse Recovery Time	t <sub>rr</sub>	-	515	-	ns	dI/dt = 100A/μs, V <sub>DS</sub> = 100V,
Body Diode Reverse Recovery Charge	Q <sub>rr</sub>	-	2330	-	nC	I <sub>F</sub> = 4A

- 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<sub>AS</sub> and E<sub>AS</sub> rating are based on low frequency and duty cycles to keep T<sub>J</sub> = +25°C.
  - Short duration pulse test used to minimize self-heating effect.
  - Guaranteed by design. Not subject to production testing.

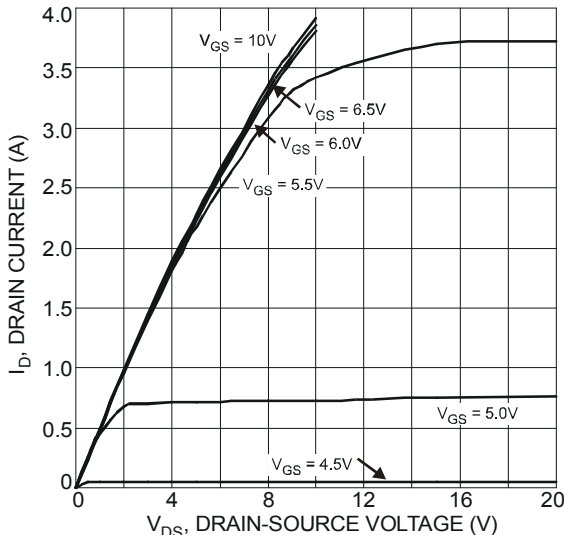


Fig. 1 Typical Output Characteristic

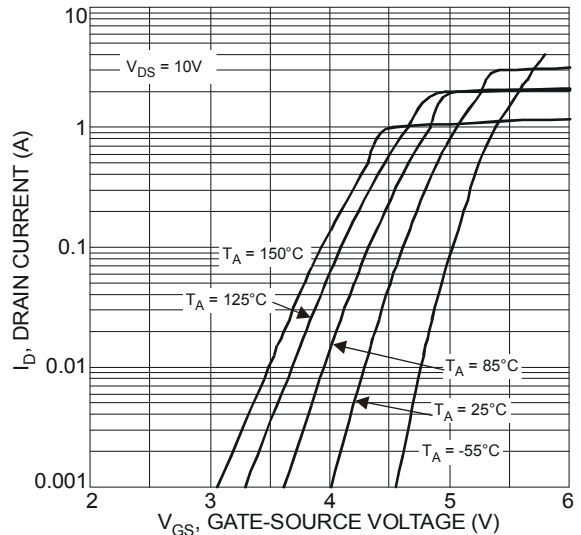


Fig. 2 Typical Transfer Characteristics

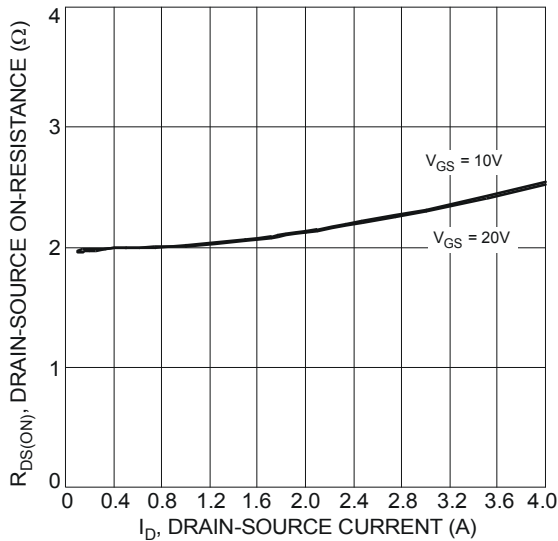


Fig. 3 Typical On-Resistance vs. Drain Current and Gate Voltage

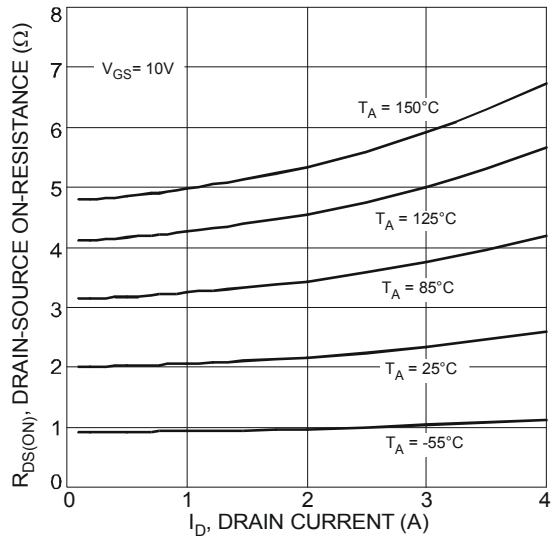


Fig. 4 Typical On-Resistance vs. Drain Current and Temperature

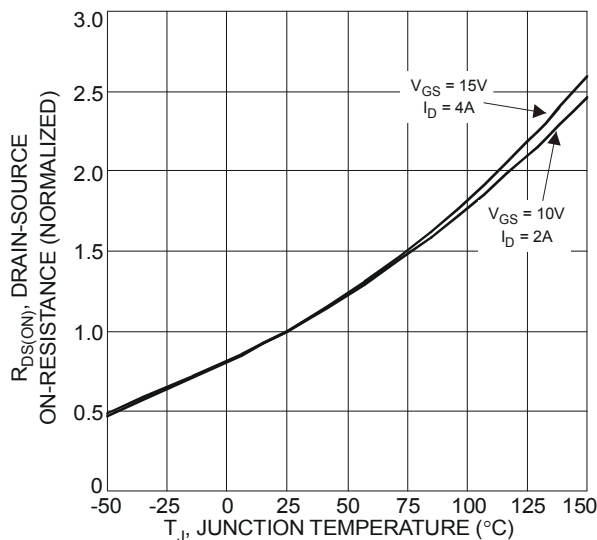


Fig. 5 On-Resistance Variation with Temperature

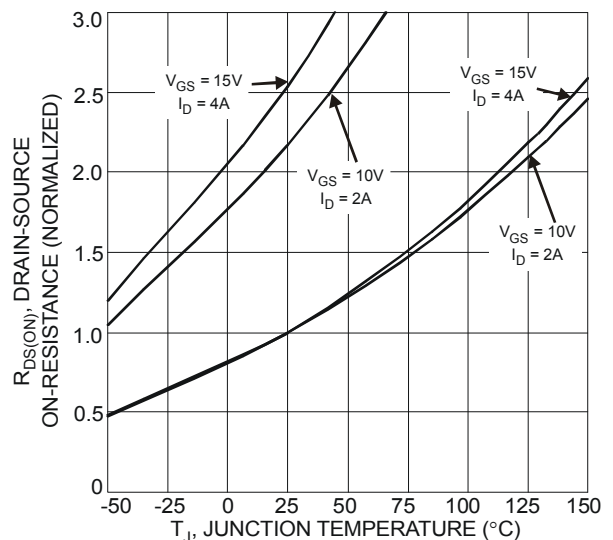


Fig. 6 On-Resistance Variation with Temperature

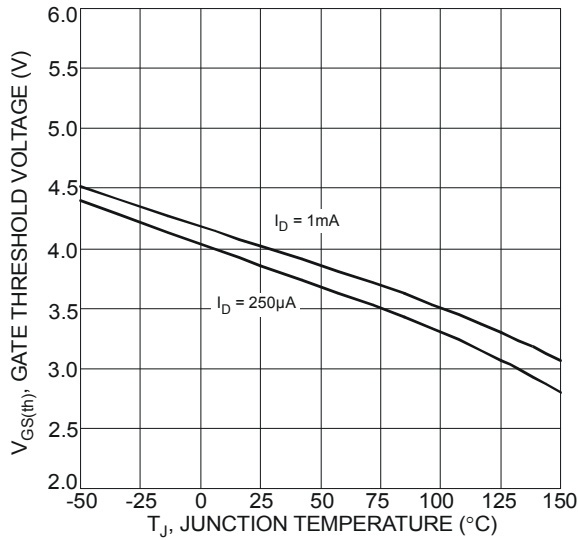


Fig. 7 Gate Threshold Variation vs. Ambient Temperature

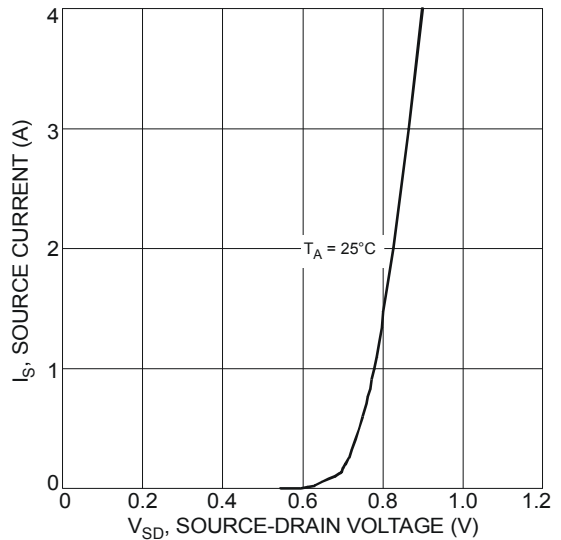


Fig.8 Diode Forward Voltage vs. Current

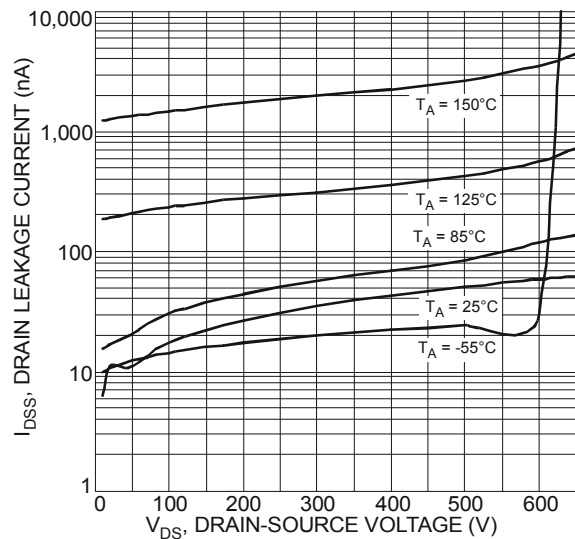


Fig. 9 Typical Drain-Source Leakage Current vs. Voltage

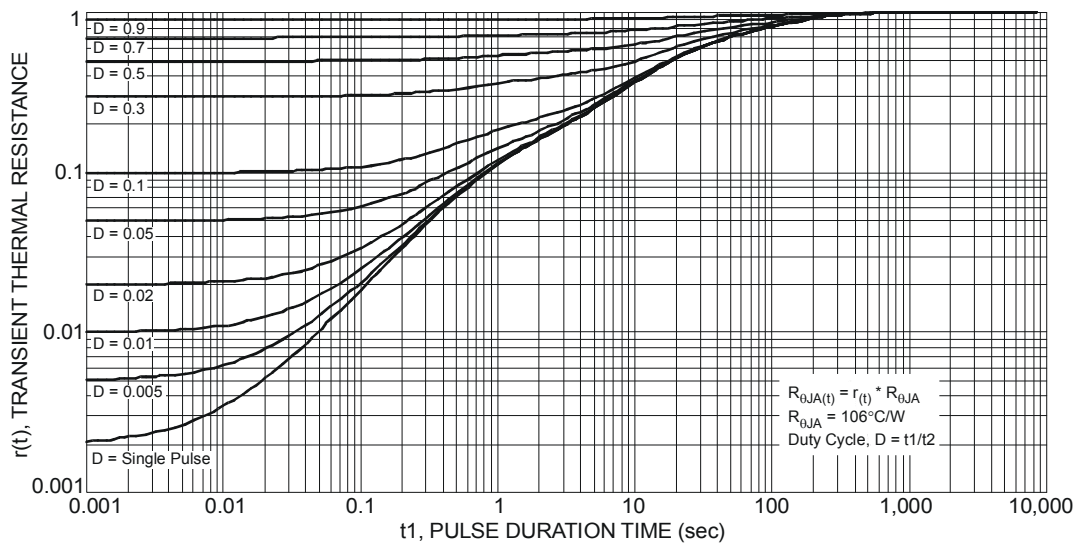
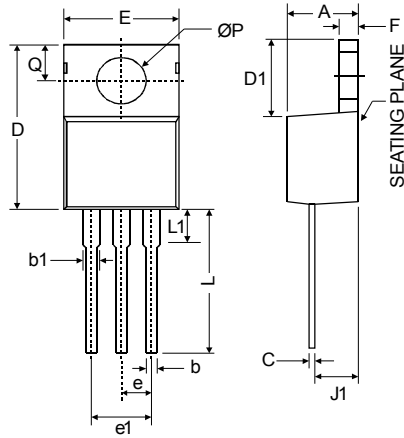


Fig. 10 Transient Thermal Resistance

## Package Outline Dimensions

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



TO220-3		
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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