

**N-CHANNEL ENHANCEMENT MODE MOSFET**

**Product Summary**

$V_{(BR)DSS}$	$R_{DS(ON)}$	Package	$I_D$ $T_C = +25^\circ C$
650V	$V_{GS} = 10V$	TO-220AB	9.0 A

**Description**

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

**Applications**

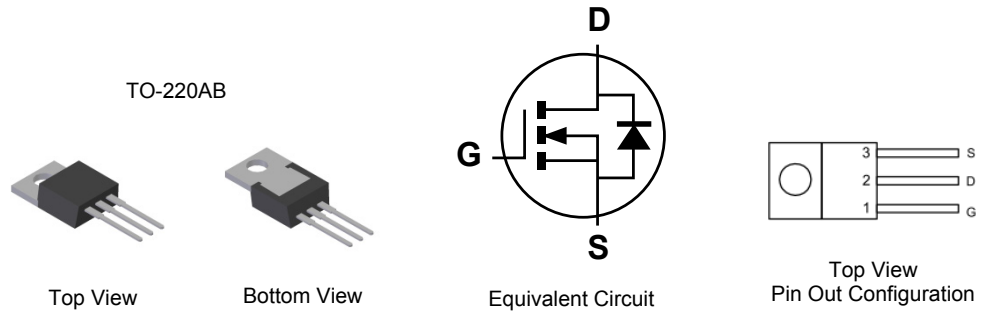
- Motor Control
- Backlighting
- DC-DC Converters
- Power Management Functions

**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: TO-220AB
- Case Material: Molded Plastic, "Green" Molding Compound, UL Flammability Classification Rating 94V-0
- Terminals: Matte Tin Finish annealed over Copper leadframe. Solderable per MIL-STD-202, Method 208 <sup>(3)</sup>
- Terminal Connections: See Diagram Below
- Weight: TO-220AB – 1.85 grams (approximate)

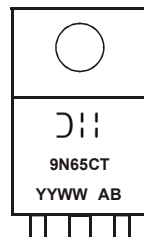


**Ordering Information** (Note 4)

Part Number	Case	Packaging
DMG9N65CT	TO-220AB	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/quality/lead\\_free.html](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**



9N65CT = Product Type Marking Code  
 AB = Foundry and Assembly Code  
 YYWW = Date Code Marking  
 YY = Last two digits of year (ex: 11 = 2011)  
 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	$V_{GSS}$	$\pm 30$	V	
Continuous Drain Current (Note 5) $V_{GS} = 10\text{V}$	Steady State	$T_C = +25^\circ\text{C}$	9.0	A
		$T_C = +70^\circ\text{C}$	7.0	A
Pulsed Drain Current (Note 6)	$I_{DM}$	30	A	
Avalanche Current (Note 7) $V_{DD} = 100\text{V}$ , $V_{GS} = 10\text{V}$ , $L = 60\text{mH}$	$I_{AR}$	2.7	A	
Repetitive Avalanche Energy (Note 7) $V_{DD} = 100\text{V}$ , $V_{GS} = 10\text{V}$ , $L = 60\text{mH}$	$E_{AR}$	260	mJ	

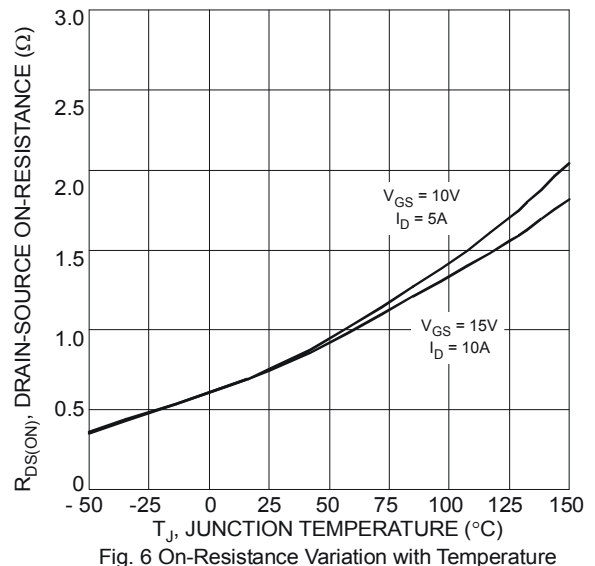
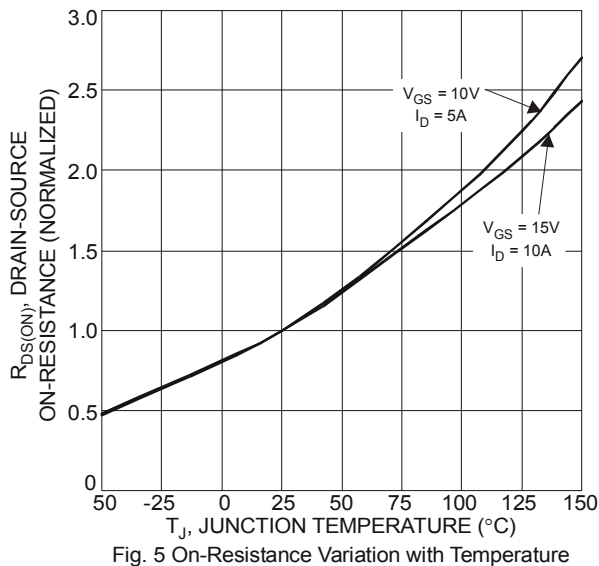
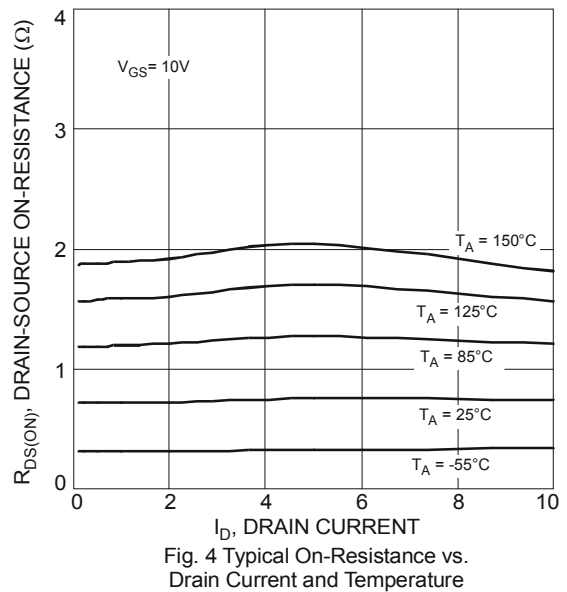
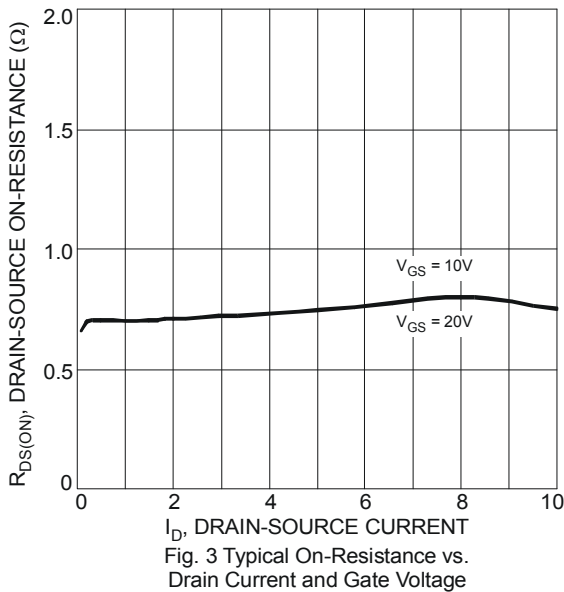
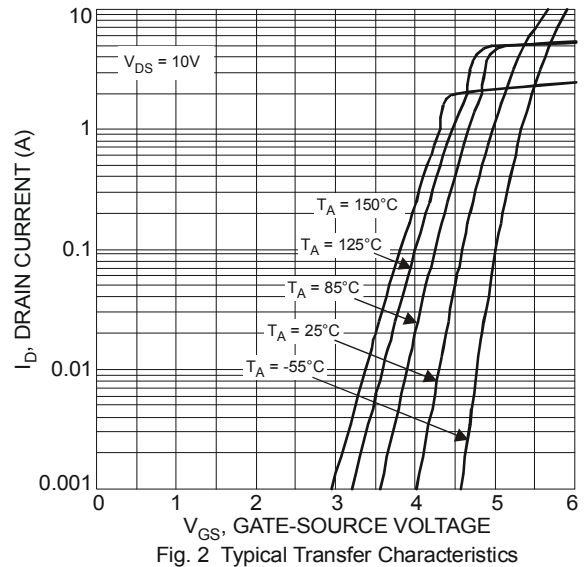
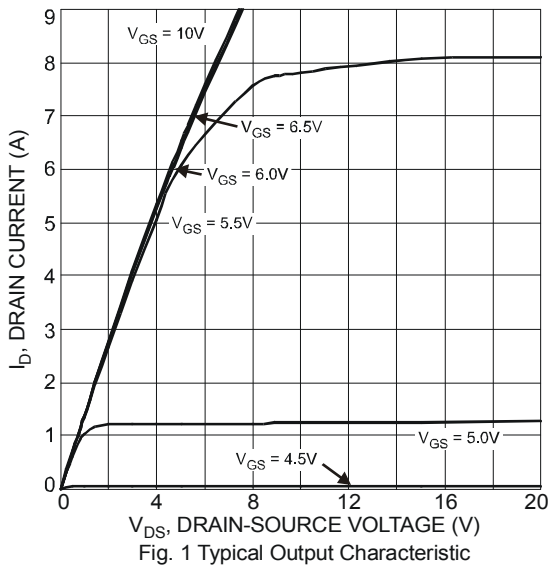
**Thermal Characteristics**

Characteristic	Symbol	Max	Unit
Power Dissipation (Note 5) $T_C = +25^\circ\text{C}$ $T_C = +70^\circ\text{C}$	$P_D$	165	W
		100	
Thermal Resistance, Junction to Case (Note 5)	$R_{\theta JC}$	0.7	$^\circ\text{C/W}$
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 specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS (Note 8)</b>						
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	$\mu\text{A}$	$V_{DS} = 650\text{V}$ , $V_{GS} = 0\text{V}$
Gate-Source Leakage	$I_{GSS}$	—	—	$\pm 100$	nA	$V_{GS} = \pm 30\text{V}$ , $V_{DS} = 0\text{V}$
<b>ON CHARACTERISTICS (Note 8)</b>						
Gate Threshold Voltage	$V_{GS(th)}$	3	—	5	V	$V_{DS} = V_{GS}$ , $I_D = 250\mu\text{A}$
Static Drain-Source On-Resistance	$R_{DS(on)}$	—	0.7	1.3	$\Omega$	$V_{GS} = 10\text{V}$ , $I_D = 4.5\text{A}$
Forward Transfer Admittance	$ Y_{fs} $	—	8.5	—	S	$V_{DS} = 40\text{V}$ , $I_D = 4.5\text{A}$
Diode Forward Voltage	$V_{SD}$	—	0.7	1.0	V	$V_{GS} = 0\text{V}$ , $I_S = 1\text{A}$
<b>DYNAMIC CHARACTERISTICS (Note 9)</b>						
Input Capacitance	$C_{iss}$	—	2310	—	pF	$V_{DS} = 25\text{V}$ , $V_{GS} = 0\text{V}$ , $f = 1.0\text{MHz}$
Output Capacitance	$C_{oss}$	—	122	—		
Reverse Transfer Capacitance	$C_{rss}$	—	2.2	—		
Gate Resistance	$R_g$	—	2.2	—	$\Omega$	$V_{DS} = 0\text{V}$ , $V_{GS} = 0\text{V}$ , $f = 1\text{MHz}$
Total Gate Charge $V_{GS} = 10\text{V}$	$Q_g$	—	39	—	nC	$V_{GS} = 10\text{V}$ , $V_{DS} = 520\text{V}$ , $I_D = 8\text{A}$
Gate-Source Charge	$Q_{gs}$	—	8.5	—		
Gate-Drain Charge	$Q_{gd}$	—	11.9	—		
Turn-On Delay Time	$t_{D(on)}$	—	39	—	ns	$V_{GS} = 10\text{V}$ , $V_{DS} = 325\text{V}$ , $R_G = 25\Omega$ , $I_D = 8\text{A}$
Turn-On Rise Time	$t_r$	—	29	—	ns	
Turn-Off Delay Time	$t_{D(off)}$	—	122	—	ns	
Turn-Off Fall Time	$t_f$	—	28	—	ns	
Body Diode Reverse Recovery Time	$t_{rr}$	—	570	—	ns	
Body Diode Reverse Recovery Charge	$Q_{rr}$	—	4.17	—	$\mu\text{C}$	$dI/dt = 100\text{A}/\mu\text{s}$ , $V_{DS} = 100\text{V}$ , $I_F = 8\text{A}$

- Notes:
- Device mounted on an infinite heatsink
  - Repetitive rating, pulse width limited by junction temperature.
  - $I_{AR}$  and  $E_{AR}$  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.



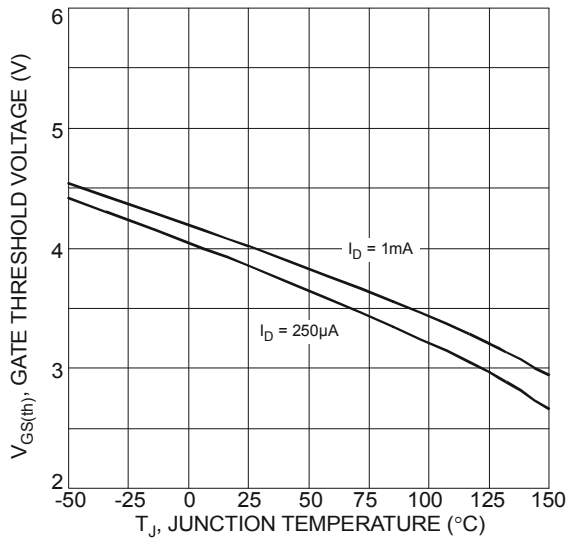


Fig. 7 Gate Threshold Variation vs. Ambient Temperature

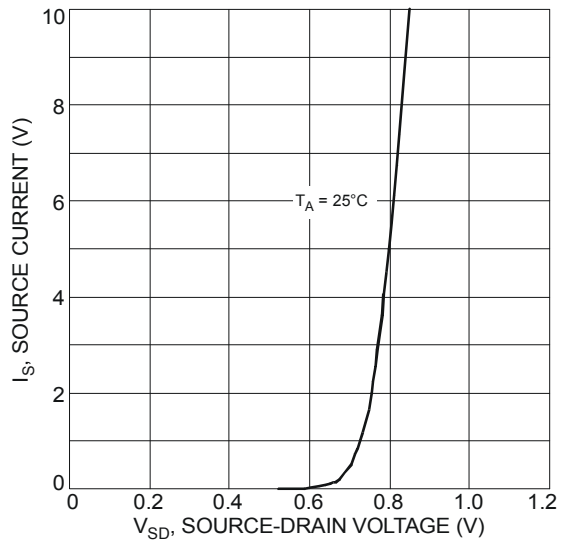


Fig. 8 Diode Forward Voltage vs. Current

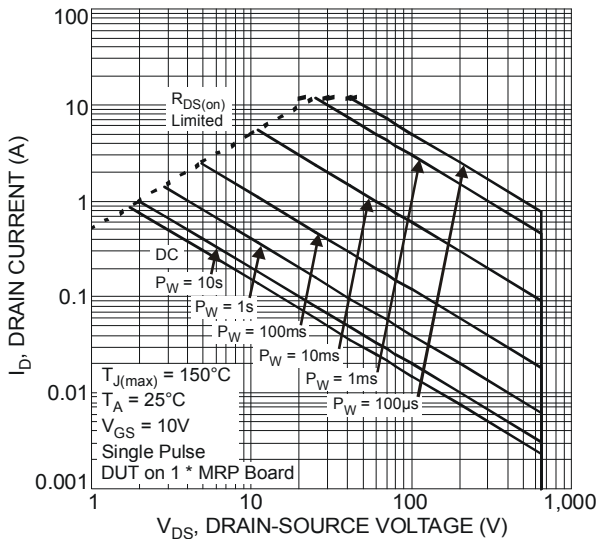


Fig. 9 SOA, Safe Operation Area

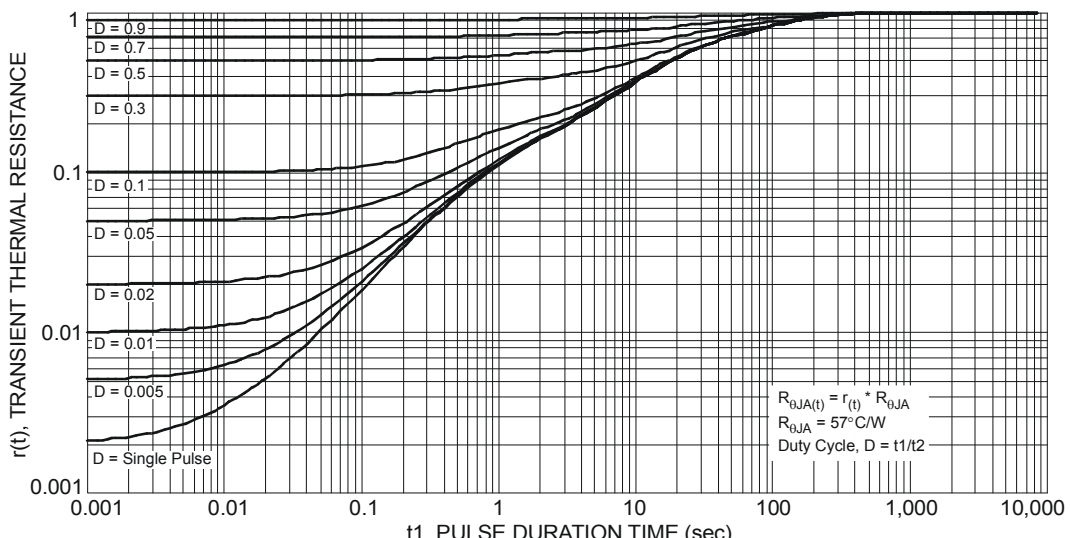
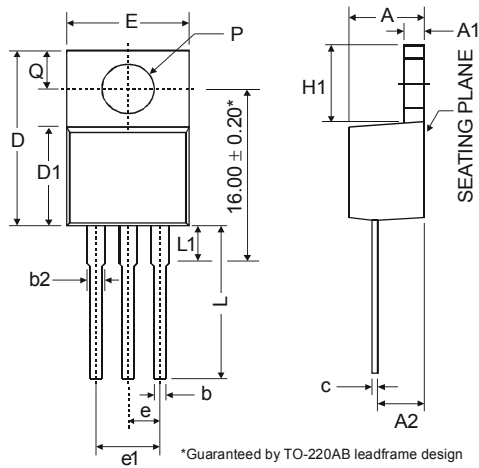


Fig. 10 Transient Thermal Resistance

**Package Outline Dimensions**

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



TO220AB			
Dim	Min	Typ	Max
A	3.56	-	4.82
A1	0.51	-	1.39
A2	2.04	-	2.92
b	0.39	0.81	1.01
b2	1.15	1.24	1.77
c	0.356	-	0.61
D	14.22	-	16.51
D1	8.39	-	9.01
e	2.54		
e1	5.08		
E	9.66	-	10.66
H1	5.85	-	6.85
L	12.70	-	14.73
L1	-	-	6.35
P	3.54	-	4.08
Q	2.54	-	3.42
<b>All Dimensions in mm</b>			

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