# Onsemi

# **MOSFET** - Single N-Channel 150 V, 4.1 mΩ, 185 A

# NTBGS4D1N15MC

#### Features

- Low R<sub>DS(on)</sub> to Minimize Conduction Losses
- Low Q<sub>G</sub> and Capacitance to Minimize Driver Losses
- Lowers Switching Noise/EMI
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

## **Typical Applications**

- Power Tools, Battery Operated Vacuums
- UAV/Drones, Material Handling
- BMS/Storage, Home Automation

#### MAXIMUM RATINGS (T<sub>J</sub> = 25°C unless otherwise noted)

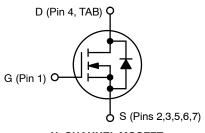
Parameter		Symbol	Value	Unit			
Drain-to-Source Voltage		V <sub>DSS</sub>	150	V			
Gate-to-Source Voltage	Э		V <sub>GS</sub>	±20	V		
Continuous Drain Current $R_{\theta JC}$ (Note 2)	Steady State T <sub>C</sub> = 25°C		ID	185	A		
Power Dissipation $R_{\theta JC}$ (Note 2)	otalo	State		316	W		
Continuous Drain Current $R_{\theta JA}$ (Notes 1, 2)	Steady State		Ι <sub>D</sub>	20	A		
Power Dissipation $R_{\theta JA}$ (Notes 1, 2)			P <sub>D</sub>	3.7	W		
Pulsed Drain Current	$T_A = 25^{\circ}C, t_p = 10 \ \mu s$		I <sub>DM</sub>	2564	А		
Operating Junction and Storage Temperature Range			T <sub>J</sub> , T <sub>stg</sub>	–55 to +175	°C		
Source Current (Body Diode)			۱ <sub>S</sub>	263	А		
Single Pulse Drain-to-Source Avalanche Energy (I <sub>L</sub> = 81.5 A <sub>pk</sub> , L = 0.1 mH)			E <sub>AS</sub>	332	mJ		
Lead Temperature for Soldering Purposes (1/8" from case for 10 s)						260	°C

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

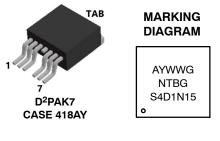
1. Surface-mounted on FR4 board using a 1 in<sup>2</sup>, 1 oz. Cu pad.

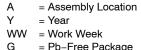
2. The entire application environment impacts the thermal resistance values shown, they are not constants and are only valid for the particular conditions noted.

V <sub>(BR)DSS</sub>	R <sub>DS(ON)</sub> MAX	I <sub>D</sub> MAX
150 V	4.1 mΩ @ 10 V	185 A
150 V	4.7 mΩ @ 8 V	100 A



**N-CHANNEL MOSFET** 





= Pb-Free Package

## **ORDERING INFORMATION**

Device	Package	Shipping <sup>†</sup>
NTBGS4D1N15MC	D <sup>2</sup> PAK7 (Pb-Free)	800 / Tape & Reel

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

#### THERMAL RESISTANCE MAXIMUM RATINGS

Parameter	Symbol	Value	Unit
Junction-to-Case - Steady State (Note 2)	$R_{ extsf{ heta}JC}$	0.5	°C/W
Junction-to-Ambient - Steady State (Note 2)	$R_{ hetaJA}$	40	

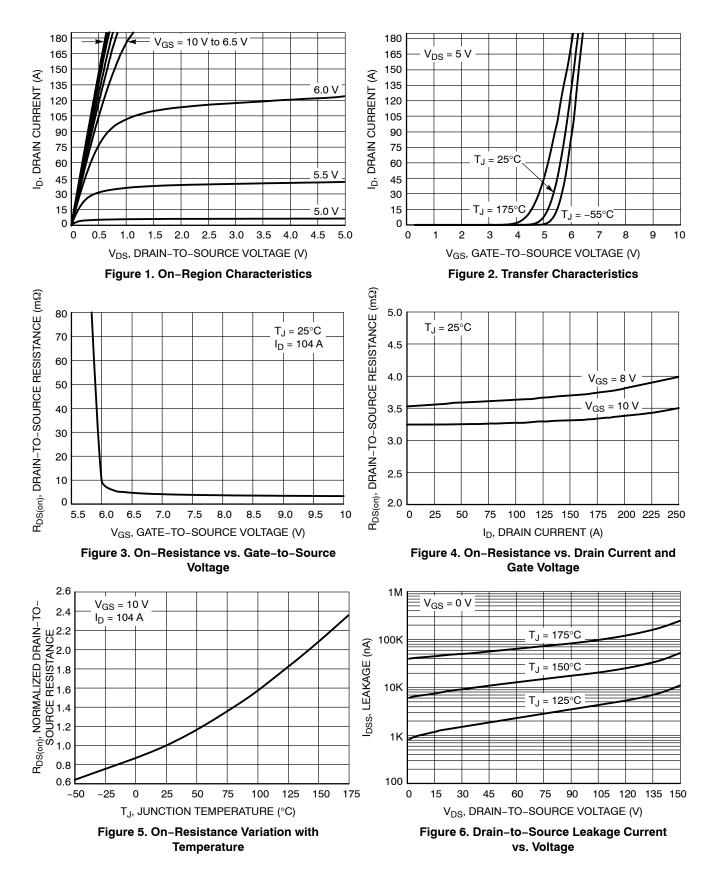
#### ELECTRICAL CHARACTERISTICS (T<sub>J</sub> = 25°C unless otherwise specified)

Parameter	Symbol	Test Condition		Min	Тур	Max	Unit
OFF CHARACTERISTICS	-					-	-
Drain-to-Source Breakdown Voltage	V <sub>(BR)DSS</sub>	$V_{GS}$ = 0 V, I <sub>D</sub> = 250 µA		150			V
Drain-to-Source Breakdown Voltage Temperature Coefficient	V <sub>(BR)DSS</sub> /T <sub>J</sub>	$I_D$ = 250 µA, referenced to 25°C			20.28		mV/°C
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>GS</sub> = 0 V,	T <sub>J</sub> = 25°C			1	μΑ
		$V_{DS} = 120 V$	T <sub>J</sub> = 125°C			10	μΑ
Gate-to-Source Leakage Current	I <sub>GSS</sub>	$V_{GS}$ = ±20 V, V <sub>I</sub>	<sub>DS</sub> = 0 V			±100	nA
ON CHARACTERISTICS (Note 3)							
Gate Threshold Voltage	V <sub>GS(TH)</sub>	V <sub>GS</sub> = V <sub>DS</sub> , I <sub>D</sub> =	= 574 μA	2.5	3.5	4.5	V
Negative Threshold Temperature Coefficient	V <sub>GS(TH)</sub> /T <sub>J</sub>	I <sub>D</sub> = 250 μA, referer	nced to 25°C		-10.21		mV/°C
Drain-to-Source On Resistance	istance $R_{DS(on)}$ $V_{GS}$ = 10 V, $I_D$ = 104 A		= 104 A		3.3	4.1	mΩ
		V <sub>GS</sub> = 8 V, I <sub>D</sub> = 52 A			3.5	4.7	
Forward Transconductance	9 <sub>FS</sub>	V <sub>DS</sub> = 5 V, I <sub>D</sub> = 90 A			177		S
Gate-Resistance	R <sub>G</sub>	$T_A = 25^{\circ}C$			1.2		Ω
CHARGES & CAPACITANCES							
Input Capacitance	C <sub>ISS</sub>	V <sub>GS</sub> = 0 V, f = 1 MHz, V <sub>DS</sub> = 75 V			7285		pF
Output Capacitance	C <sub>OSS</sub>				2025		]
Reverse Transfer Capacitance	C <sub>RSS</sub>				10.6		
Total Gate Charge	Q <sub>G(TOT)</sub>	V <sub>GS</sub> = 10 V, V <sub>DS</sub> = 75 V, I <sub>D</sub> = 104 A			88.9		nC
Threshold Gate Charge	Q <sub>G(TH)</sub>				22.8		
Gate-to-Source Charge	Q <sub>GS</sub>				37.5		
Gate-to-Drain Charge	Q <sub>GD</sub>				13.0		
Output Charge	Q <sub>OSS</sub>	V <sub>GS</sub> = 0 V, V <sub>DS</sub>	s = 75 V		272		nC
SWITCHING CHARACTERISTICS, VGS =	10 V (Note 3)						
Turn-On Delay Time	t <sub>d(ON)</sub>				49		ns
Rise Time	t <sub>r</sub>	V <sub>GS</sub> = 10 V, V <sub>DS</sub>	s = 75 V,		38		
Turn-Off Delay Time	t <sub>d(OFF)</sub>	$\begin{array}{l} V_{GS} = 10 \; V, \; V_{DS} = 75 \; V, \\ I_{D} = 104 \; A, \; R_{G} = 6 \; \Omega \end{array}$			64		
Fall Time	t <sub>f</sub>				10		
DRAIN-SOURCE DIODE CHARACTERIST	TICS						
Forward Diode Voltage	V <sub>SD</sub>	$V_{GS} = 0 \text{ V}, \text{ I}_{S} = 104 \text{ A}$	A, T <sub>J</sub> = 25°C		0.88	1.2	V
		V <sub>GS</sub> = 0 V, I <sub>S</sub> = 104 A	∧, T <sub>J</sub> = 125°C		0.79		
Reverse Recovery Time	t <sub>RR</sub>	V <sub>GS</sub> = 0 V, I <sub>S</sub> = 104 A, dI <sub>S</sub> /dt = 100 A/µs			89		ns
Charge Time	t <sub>a</sub>				47		1
Discharge Time	t <sub>b</sub>				42		
Reverse Recovery Charge	Q <sub>RR</sub>				164		nC

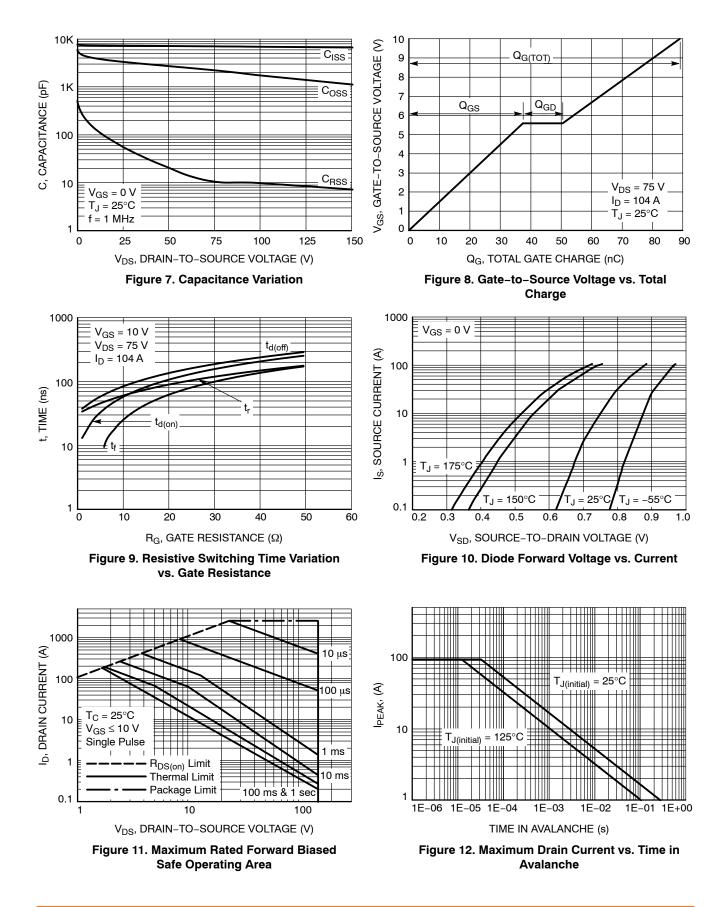
Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions. 3. Switching characteristics are independent of operating junction temperature

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## **TYPICAL CHARACTERISTICS**



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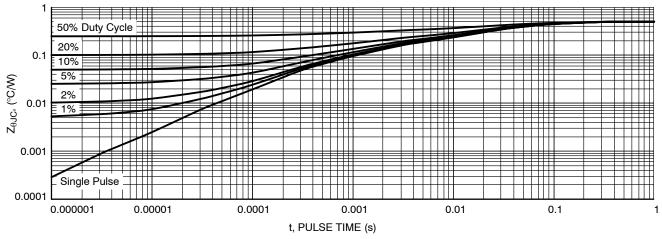
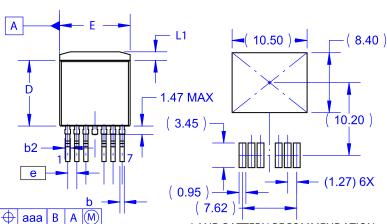


Figure 13. Thermal Response

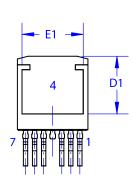
# **NSEM**

D2PAK7 (TO-263 7 LD) CASE 418AY **ISSUE C** 

DATE 15 JUL 2019



LAND PATTERN RECOMMENDATION



GENERIC

**MARKING DIAGRAM\*** 

XXXXXXXXX AYWWG

XXXX = Specific Device Code = Assembly Location

= Pb-Free Package

= Work Week

\*This information is generic. Please refer to

device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "•", may

or may not be present. Some products may

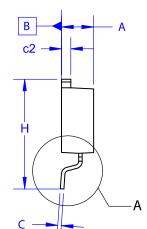
= Year

not follow the Generic Marking.

Α Y

G

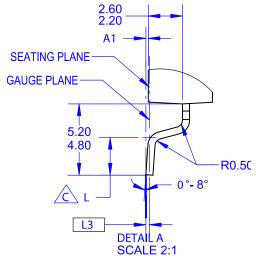
WW



NOTES:

- A. PACKAGE CONFORMS TO JEDEC TO-263 VARIATION CB EXCEPT WHERE NOTED. B. ALL DIMENSIONS ARE IN MILLIMETERS.
- C OUT OF JEDEC STANDARD VALUE. D. DIMENSION AND TOLERANCE AS PER ASME Y14.5-1994. E. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH AND TIE BAR PROTRUSIONS. F. LAND PATTERN RECOMMENDATION PER IPC. TO127P1524X465-8N.

DIM MILLIMETERS					
DIN	MIN	NOM	MAX		
Α	4.30	4.50	4.70		
A1	0.00	0.10	0.20		
b2	0.70	0.80	0.90		
b	0.50	0.60	0.70		
С	0.40	0.50	0.60		
c2	1.20	1.30	1.40		
D	9.00	9.20	9.40		
D1	7.70	~	~		
Е	9.70	9.90	10.20		
E1	8.38	8.58	8.78		
е	~	1.27	~		
Н	15.10	15.40	15.70		
L	2.44	2.64	2.84		
L1	1.00	1.20	1.40		
L3	~	0.25	~		
aaa	~	~	0.25		



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DESCRIPTION:	D2PAK7 (TO-263 7 LD)		PAGE 1 OF 1	

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