Product Preview

Power MOSFET

40 V, 300 A, 0.57 m Ω , Single N-Channel

Features

- Typical $R_{DS(on)} = 0.46 \text{ m}\Omega$ at $V_{GS} = 10 \text{ V}$, $I_D = 80 \text{ A}$
- Typical $Q_{g(tot)} = 220 \text{ nC}$ at $V_{GS} = 10 \text{ V}$, $I_D = 80 \text{ A}$
- UIS Capability
- AEC-Q101 Qualified and PPAP Capable
- These Devices are Pb-Free and are RoHS Compliant

MAXIMUM RATINGS T_J = 25°C unless otherwise noted

Parameter	Symbol	Ratings	Units	
Drain-to-Source Voltage	V _{DSS}	40	V	
Gate-to-Source Voltage	V_{GS}	±20	V	
Drain Current – Continuous ($V_{GS} = 10$) (Note 1) $T_C = 25^{\circ}C$	I _D	300	А	
Pulsed Drain Current $T_C = 25^{\circ}C$		See Figure 4		
Single Pulse Avalanche Energy (Note 2)	E _{AS}	1064	mJ	
Power Dissipation	P _D	429	W	
Derate Above 25°C		2.86	W/°C	
Operating and Storage Temperature	T_J , T_{STG}	-55 to +175	°C	
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	0.35	°C/W	
Maximum Thermal Resistance, Junction–to–Ambient (Note 3)	$R_{\theta JA}$	43	°C/W	

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. Current is limited by bondwire configuration.
- 2. Starting T_J = 25°C, \acute{L} = 0.3 mH, I_{AS} = 84 A, V_{DD} = 40 V during inductor charging and V_{DD} = 0 V during time in avalanche.
- 3. $R_{\theta JA}$ is the sum of the junction–to–case and case–to–ambient thermal resistance, where the case thermal reference is defined as the solder mounting surface of the drain pins. $R_{\theta JC}$ is guaranteed by design, while $R_{\theta JA}$ is determined by the board design. The maximum rating presented here is based on mounting on a 1 in² pad of 2 oz copper.

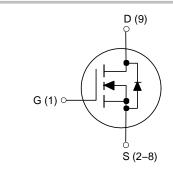


ON Semiconductor®

www.onsemi.com



MO-299A CASE 100CU



ORDERING INFORMATION

Device	Package	Marking	
NVBLS0D5N04M8TXG	MO-299A (Pb-Free)	0D5N04M8	

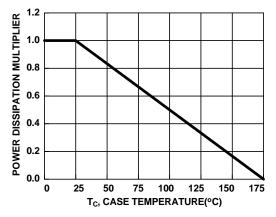
This document contains information on a product under development. ON Semiconductor reserves the right to change or discontinue this product without notice.

Table 1. ELECTRICAL CHARACTERISTICS (T_J = 25°C unless otherwise noted)

Symbol	Parameter	Test Conditions		Min	Тур	Max	Units
OFF CHA	ARACTERISTICS						
B _{VDSS}	Drain-to-Source Breakdown Voltage	$I_D = 250 \mu\text{A}, V_{GS} = 0 \text{V}$		40	-	_	V
I _{DSS}	Drain-to-Source Leakage Current	V _{DS} = 40 V, V _{GS} = 0 V	T _J = 25°C	_	-	1	μΑ
			T _J = 175°C (Note 4)	_	-	1	mA
I _{GSS}	Gate-to-Source Leakage Current	V _{GS} = ±20 V		_	-	±100	nA
ON CHA	RACTERISTICS						
V _{GS(th)}	Gate-to-Source Threshold Voltage	$V_{GS} = V_{DS}$	I _D = 250 μA	2.0	3.0	4.0	V
R _{DS(on)}	Drain-to-Source On Resistance	I _D = 80 A, V _{GS} = 10 V	T _J = 25°C	_	0.46	0.57	mΩ
DYNAMI	C CHARACTERISTICS						
C _{iss}	Input Capacitance	V _{DS} = 25 V, V _{GS} = 0 V, f = 1 MHz		_	15900	_	pF
Coss	Output Capacitance			_	4000	_	pF
C _{rss}	Reverse Transfer Capacitance			_	600	-	pF
R _g	Gate Resistance	f = 1 MHz		_	2.6	-	Ω
Q _{g(ToT)}	Total Gate Charge at 10 V	V _{GS} = 0 to 10 V	$V_{DD} = 20 \text{ V}$ $I_{D} = 80 \text{ A}$	_	220	296	nC
Q _{g(th)}	Threshold Gate Charge	V _{GS} = 0 to 2 V		_	29	39	nC
Q_{gs}	Gate-to-Source Gate Charge			_	73	-	nC
Q_{gd}	Gate-to-Drain "Miller" Charge			_	41	-	nC
SWITCH	ING CHARACTERISTICS						
t _{on}	Turn-On Time	$V_{DD} = 20 \text{ V, } I_{D} = 80 \text{ A,}$ $V_{GS} = 10 \text{ V, } R_{GEN} = 6 \Omega$		_	-	221	ns
t _{d(on)}	Turn-On Delay			_	54	_	ns
t _r	Rise Time			_	82	_	ns
$t_{d(off)}$	Turn-Off Delay			_	106	-	ns
t _f	Fall Time			_	52	-	ns
t _{off}	Turn-Off Time			_	-	215	ns
DRAIN-S	SOURCE DIODE CHARACTERISTICS						
V_{SD}	Source-to-Drain Diode Voltage	$I_{SD} = 80 \text{ A}, V_{GS} = 0 \text{ V}$		_	-	1.25	V
		I _{SD} = 40 A, V _{GS} = 0 V		_	-	1.2	V
t _{rr}	Reverse–Recovery Time	$I_F = 80 \text{ A}, dI_{SD}/d_t = 100 \text{ A}/\mu\text{s}, \\ V_{DD} = 32 \text{ V}$		_	119	133	ns
Q _{rr}	Reverse–Recovery Charge			_	228	274	nC

^{4.} The maximum value is specified by design at T_J = 175°C. Product is not tested to this condition in production. 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.

Typical Characteristics



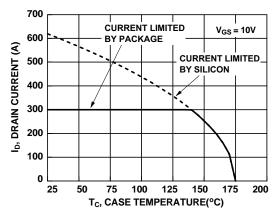
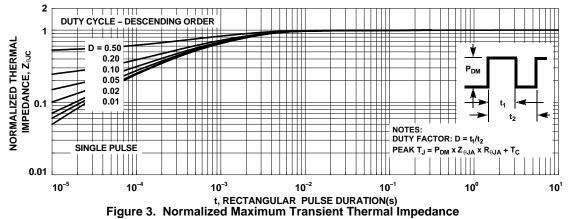


Figure 1. Normalized Power Dissipation vs. Case **Temperature**

Figure 2. Maximum Continuous Drain Current vs. **Case Temperature**



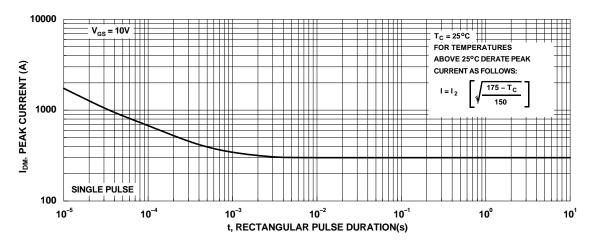


Figure 4. Peak Current Capability

Typical Characteristics

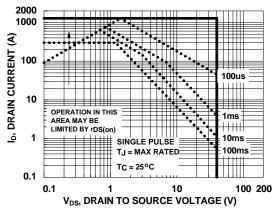
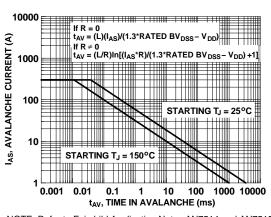


Figure 5. Forward Bias Safe Operating Area



NOTE: Refer to Fairchild Application Notes AN7514 and AN7515

Figure 6. Unclamped Inductive Switching

Capability

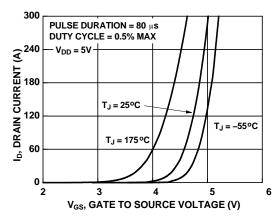


Figure 7. Transfer Characteristics

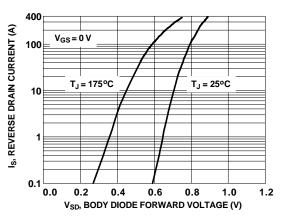


Figure 8. Forward Diode Characteristics

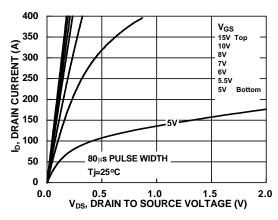


Figure 9. Saturation Characteristics

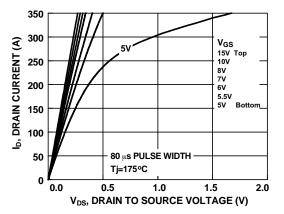


Figure 10. Saturation Characteristics

Typical Characteristics

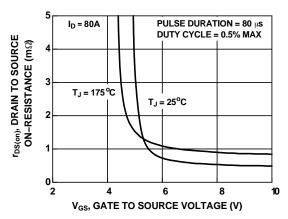


Figure 11. R_{DSON} vs. Gate Voltage

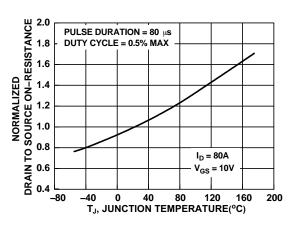


Figure 12. Normalized R_{DSON} vs. Junction Temperature

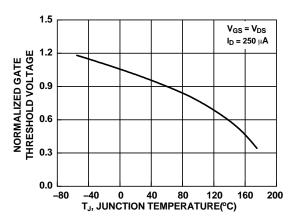


Figure 13. Normalized Gate Threshold Voltage vs. Temperature

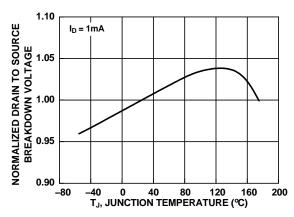


Figure 14. Normalized Drain to Source Breakdown Voltage vs. Junction Temperature

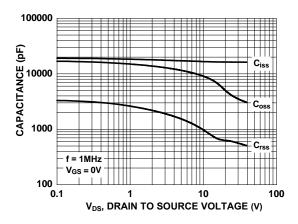


Figure 15. Capacitance vs. Drain to Source Voltage

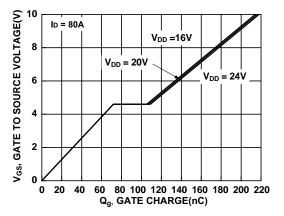
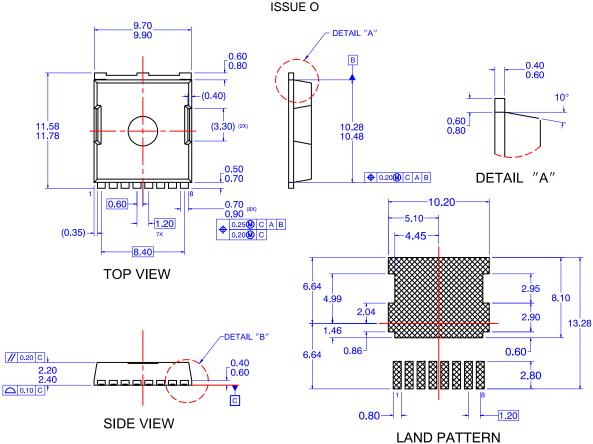


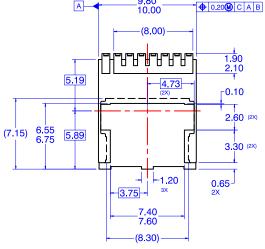
Figure 16. Gate Charge vs. Gate to Source Voltage

PACKAGE DIMENSIONS

H-PSOF8L 11.68x9.80 CASE 100CU



9.80 10.00 \$\rightarrow\$ 0.20 \text{\text{\$\color{1000}} CAB}\$



BOTTOM VIEW

10°

RECOMMENDATION

DETAIL "B"

NOTES: UNLESS OTHERWISE SPECIFIED

A) PACKAGE STANDARD REFERENCE: JEDEC MO-299, ISSUE A, DATED NOVEMBER 2009.

- (0.35)

- B) ALL DIMENSIONS ARE IN MILLIMETERS.
- C) DIMENSIONS DO NOT INCLUDE BURRS OR MOLD FLASH. MOLD FLASH OR BURRS DOES NOT EXCEED 0.10MM.
- D) DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994.

PowerTrench is a registered trademark of Semiconductor Components Industries, LLC.

ON Semiconductor and lill are trademarks of Semiconductor Components Industries, LLC dba ON Semiconductor or its subsidiaries in the United States and/or other countries. ON Semiconductor owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of ON Semiconductor's product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent-Marking.pdf. ON Semiconductor reserves the right to make changes without further notice to any products herein. ON Semiconductor makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does ON Semiconductor assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. Buyer is responsible for its products and applications using ON Semiconductor products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by ON Semiconductor products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by ON Semiconductor, "Typical" parameters which may be provided in ON Semiconductor data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. ON Semiconductor does not convey any license under its patent rights nor the rights of others. ON Semiconductor products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any d

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:

Literature Distribution Center for ON Semiconductor 19521 E. 32nd Pkwy, Aurora, Colorado 80011 USA Phone: 303–675–2175 or 800–344–3860 Toll Free USA/Canada Fax: 303–675–2176 or 800–344–3867 Toll Free USA/Canada Email: orderlit@onsemi.com N. American Technical Support: 800–282–9855 Toll Free USA/Canada

Europe, Middle East and Africa Technical Support: Phone: 421 33 790 2910 ON Semiconductor Website: www.onsemi.com

Order Literature: http://www.onsemi.com/orderlit

For additional information, please contact your local Sales Representative