# imall

Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from, Europe, America and south Asia, supplying obsolete and hard-to-find components to meet their specific needs.

With the principle of "Quality Parts, Customers Priority, Honest Operation, and Considerate Service", our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip, ALPS, ROHM, Xilinx, Pulse, ON, Everlight and Freescale. Main products comprise IC, Modules, Potentiometer, IC Socket, Relay, Connector. Our parts cover such applications as commercial, industrial, and automotives areas.

We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!



# Contact us

Tel: +86-755-8981 8866 Fax: +86-755-8427 6832 Email & Skype: info@chipsmall.com Web: www.chipsmall.com Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China



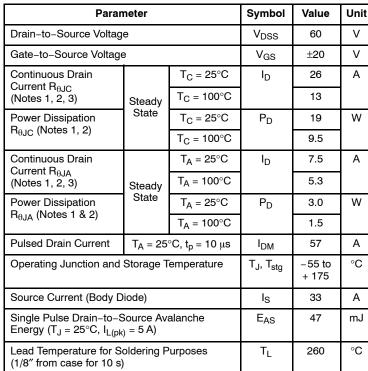
# **Power MOSFET**

## 60 V, 28 m $\Omega$ , 26 A, Dual N–Channel

#### Features

- Small Footprint (5x6 mm) for Compact Design
- Low R<sub>DS(on)</sub> to Minimize Conduction Losses
- Low Q<sub>G</sub> and Capacitance to Minimize Driver Losses
- NVMFD5C680NLWF Wettable Flank Option for Enhanced Optical Inspection
- AEC-Q101 Qualified and PPAP Capable
- These Devices are Pb-Free and are RoHS Compliant

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



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.

#### THERMAL RESISTANCE MAXIMUM RATINGS

Parameter	Symbol	Value	Unit
Junction-to-Case - Steady State	$R_{\theta JC}$	3.74	°C/W
Junction-to-Ambient - Steady State (Note 2)	$R_{\theta JA}$	49	

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

2. Surface-mounted on FR4 board using a 650 mm<sup>2</sup>, 2 oz. Cu pad.

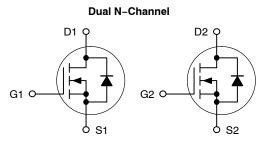
3. Maximum current for pulses as long as 1 second is higher but is dependent on pulse duration and duty cycle.

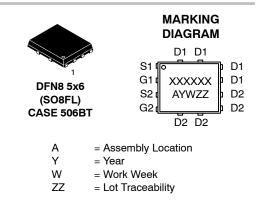


### **ON Semiconductor®**

#### www.onsemi.com

V <sub>(BR)DSS</sub>	R <sub>DS(ON)</sub> MAX	I <sub>D</sub> MAX
60 V	28 mΩ @ 10 V	00.4
60 V	41 mΩ @ 4.5 V	26 A





#### ORDERING INFORMATION

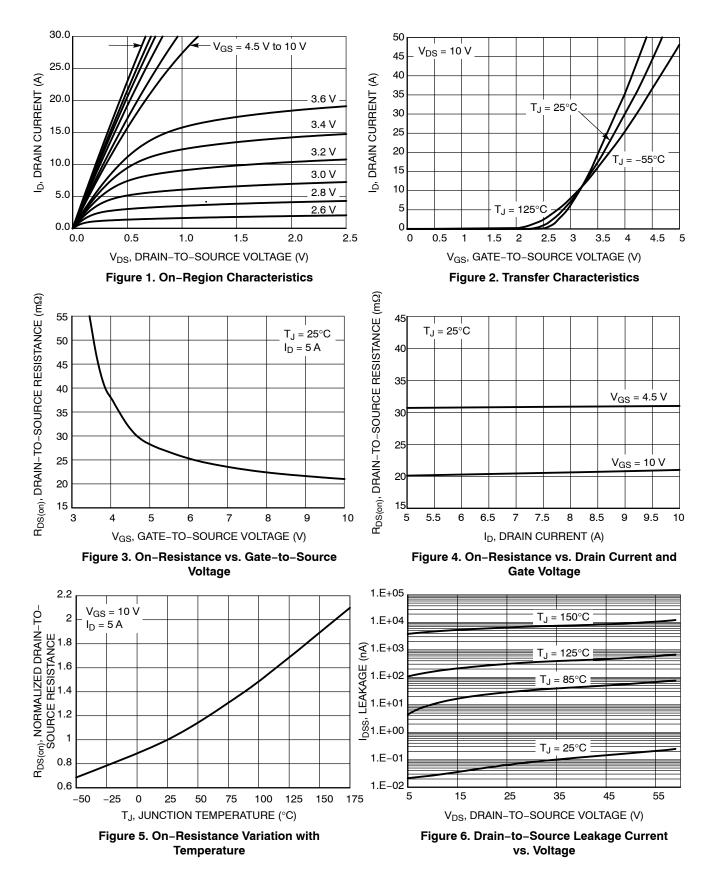
See detailed ordering, marking and shipping information on page 5 of this data sheet.

#### **ELECTRICAL CHARACTERISTICS** (T<sub>J</sub> = $25^{\circ}$ C unless otherwise specified)

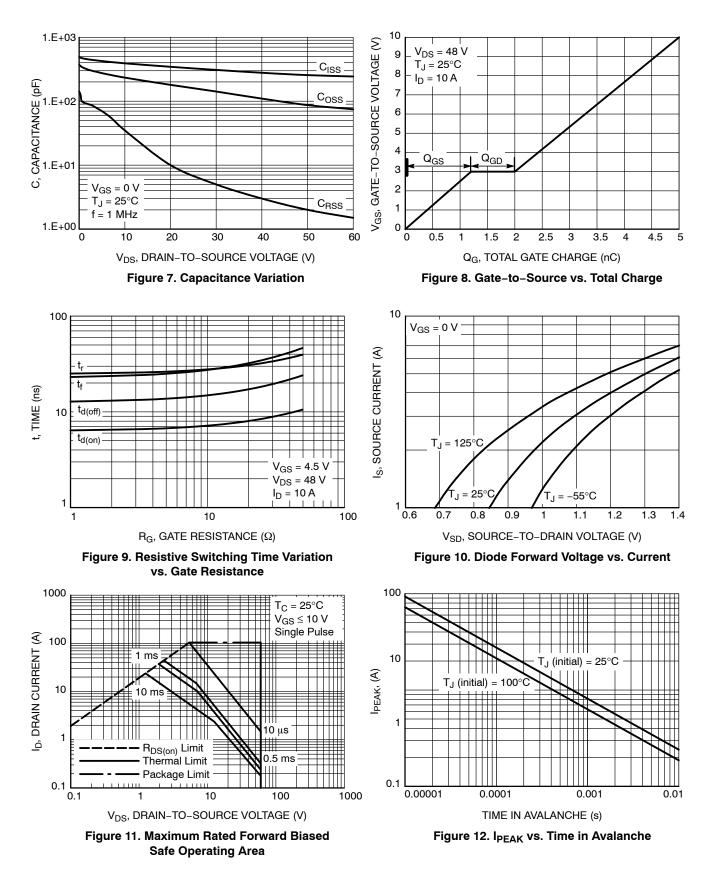
Parameter	Symbol	Test Condition		Min	Тур	Max	Unit
OFF CHARACTERISTICS							
Drain-to-Source Breakdown Voltage	V <sub>(BR)DSS</sub>	V <sub>GS</sub> = 0 V, I <sub>D</sub> = 250 μA		60			V
Drain-to-Source Breakdown Voltage Temperature Coefficient	V <sub>(BR)DSS</sub> / T <sub>J</sub>				29		mV/°C
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>GS</sub> = 0 V,	T <sub>J</sub> = 25 °C			10	
		V <sub>DS</sub> = 60 V	T <sub>J</sub> = 125°C			100	μΑ
Gate-to-Source Leakage Current	I <sub>GSS</sub>	V <sub>DS</sub> = 0 V, V <sub>GS</sub> = 20 V				100	nA
ON CHARACTERISTICS (Note 4)				-		-	
Gate Threshold Voltage	V <sub>GS(TH)</sub>	$V_{GS} = V_{DS}$ , $I_D = 13 \ \mu A$		1.2		2.2	V
Negative Threshold Temperature Coefficient	V <sub>GS(TH)</sub> /T <sub>J</sub>				-4.3		mV/°C
Drain-to-Source On Resistance	R <sub>DS(on)</sub>	V <sub>GS</sub> = 10 V	I <sub>D</sub> = 5 A		23	28	
		V <sub>GS</sub> = 4.5 V	I <sub>D</sub> = 5 A		33	41	mΩ 41
Forward Transconductance	9 <sub>FS</sub>	V <sub>DS</sub> = 15 V, I <sub>D</sub> = 5 A			50		S
CHARGES, CAPACITANCES & GATE RESIS	TANCE				•		
Input Capacitance	C <sub>ISS</sub>	V <sub>GS</sub> = 0 V, f = 1 MHz, V <sub>DS</sub> = 25 V			350		
Output Capacitance	C <sub>OSS</sub>				150		pF
Reverse Transfer Capacitance	C <sub>RSS</sub>				6		
Total Gate Charge	Q <sub>G(TOT)</sub>	$V_{GS}$ = 4.5 V, $V_{DS}$ = 48 V; $I_{D}$ = 10 A			2.0		
Total Gate Charge	Q <sub>G(TOT)</sub>	$V_{GS}$ = 10 V, $V_{DS}$ = 48 V; $I_{D}$ = 10 A			5.0		1
Threshold Gate Charge	Q <sub>G(TH)</sub>	V <sub>GS</sub> = 4.5 V, V <sub>DS</sub> = 48 V; I <sub>D</sub> = 10 A			0.8		nC
Gate-to-Source Charge	Q <sub>GS</sub>				1.2		
Gate-to-Drain Charge	Q <sub>GD</sub>				0.8		
Plateau Voltage	V <sub>GP</sub>				3.0		V
SWITCHING CHARACTERISTICS (Note 5)					•		
Turn-On Delay Time	t <sub>d(ON)</sub>	V <sub>GS</sub> = 4.5 V, V <sub>DS</sub> = 48 V, I <sub>D</sub> = 5 A, R <sub>G</sub> = 1.0 Ω			6.4		
Rise Time	t <sub>r</sub>				25		- ns
Turn-Off Delay Time	t <sub>d(OFF)</sub>				13		
Fall Time	t <sub>f</sub>				23		
DRAIN-SOURCE DIODE CHARACTERISTIC	s						
Forward Diode Voltage	V <sub>SD</sub>	$V_{GS} = 0 V,$ $I_{S} = 5 A$	$T_J = 25^{\circ}C$		0.9	1.2	
			T <sub>J</sub> = 125°C		0.8		V
Reverse Recovery Time	t <sub>RR</sub>	V <sub>GS</sub> = 0 V, dIS/dt = 10 A/μs, I <sub>S</sub> = 5 A			17		
Charge Time	t <sub>a</sub>				8		ns
Discharge Time	t <sub>b</sub>				9		
Reverse Recovery Charge	Q <sub>RR</sub>				7		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. 4. Pulse Test: pulse width  $\leq 300 \ \mu$ s, duty cycle  $\leq 2\%$ . 5. Switching characteristics are independent of operating junction temperatures.

#### **TYPICAL CHARACTERISTICS**



#### **TYPICAL CHARACTERISTICS**



#### **TYPICAL CHARACTERISTICS**

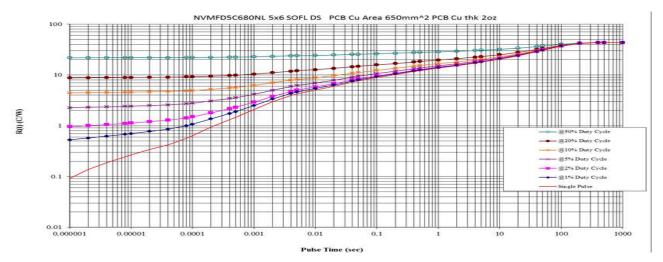


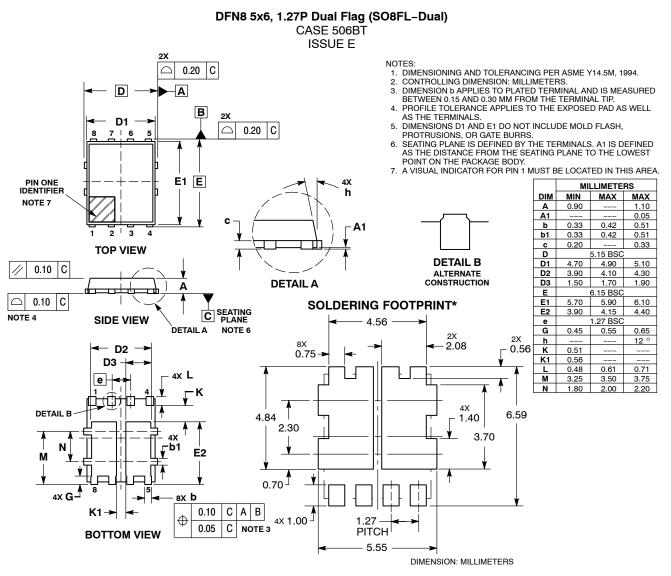
Figure 13. Thermal Characteristics

#### **DEVICE ORDERING INFORMATION**

Device	Marking	Package	Shipping <sup>†</sup>
NVMFD5C680NLT1G	5C680L	DFN8 (Pb–Free)	1500 / Tape & Reel
NVMFD5C680NLWFT1G	680LWF	DFN8 (Pb-Free, Wettable Flanks)	1500 / 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.

#### PACKAGE DIMENSIONS



\*For additional information on our Pb–Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

ON Semiconductor and 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/pdt/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 roducts, including compliance with all way, regulations and safety requirements or standards, regardless of any support or 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 or 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 devices intended for implantation in the human body. Should Buyer purchase or use ON Semiconductor handless, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized application. Buyer shall indemnify and hold ON Semiconductor and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, 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 Japan Customer Focus Center Phone: 81-3-5817-1050 ON Semiconductor Website: www.onsemi.com

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

For additional information, please contact your local Sales Representative