MOSFET – Power, Dual N-Channel, Logic Level 60 V, 65 m Ω , 12 A

Features

- Small Footprint (5x6 mm) for Compact Designs
- Low R_{DS(on)} to Minimize Conduction Losses
- Low Capacitance to Minimize Driver Losses
- 175°C Operating Temperature
- NVMFD5489NLWF Wettable Flank Option for Enhanced Optical Inspection
- AEC-Q101 Qualified and PPAP Capable
- This is a Pb-Free Device

MAXIMUM RATINGS (T_J = 25°C unless otherwise noted)

Parameter			Symbol	Value	Unit
Drain-to-Source Voltage			V_{DSS}	60	V
Gate-to-Source Voltage			V _{GS}	±20	V
Continuous Drain Current R _{ΨJ-mb}		T _{mb} = 25°C	I _D	12	Α
(Notes 1, 2, 3, 4)	Steady State	T _{mb} = 100°C		8.8	
Power Dissipation		T _{mb} = 25°C	P_{D}	23.4	W
R _{ΨJ-mb} (Notes 1, 2, 3)		T _{mb} = 100°C		11.7	
Continuous Drain Current R _{θJA}		T _A = 25°C	I _D	4.5	Α
(Notes 1, 3 & 4)	Steady State	T _A = 100°C		3.2	
Power Dissipation		T _A = 25°C	P_{D}	3.0	W
R _{θJA} (Notes 1 & 3)		T _A = 100°C		1.5	
Pulsed Drain Current	T _A = 25	°C, t _p = 10 μs	I _{DM}	62	Α
Operating Junction and Storage Temperature			T _J , T _{stg}	-55 to 175	°C
Source Current (Body Diode)			I _S	22	Α
Single Pulse Drain–to–Source Avalanche Energy (T _J = 25°C, $I_{L(pk)}$ = 19.5 A, L = 0.1 mH, R_G = 25 Ω)			E _{AS}	19	mJ
Lead Temperature for Soldering Purposes (1/8" from case for 10 s)			TL	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.

THERMAL RESISTANCE MAXIMUM RATINGS (Note 1)

Parameter	Symbol	Value	Unit
Junction-to-Mounting Board (top) - Steady State (Notes 2, 3)	$R_{\Psi J-mb}$	6.4	
Junction-to-Ambient - Steady State (Note 3)		50	°C/W
Junction-to-Ambient - Steady State (min footprint)	$R_{\theta JA}$	161	

- The entire application environment impacts the thermal resistance values shown, they are not constants and are only valid for the particular conditions noted.
- 2. Psi (Ψ) is used as required per JESD51-12 for packages in which substantially less than 100% of the heat flows to single case surface.

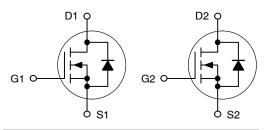


ON Semiconductor®

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V _{(BR)DSS}	R _{DS(on)} MAX	I _D MAX
60 V	65 mΩ @ 10 V	12 A
	79 mΩ @ 4.5 V	127

Dual N-Channel





DFN8 5x6 (SO8FL) CASE 506BT

D1 D1 S1 (6 1 D1 D1



XXXXXX = 5489NL

(NVMFD5489NL) or

5489LW

(NVMFD5489NLWF) = Assembly Location

Y = Year

W = Work Week
ZZ = Lot Traceability

ORDERING INFORMATION

Device	Package	Shipping [†]		
NVMFD5489NLT1G	DFN8 (Pb-Free)	1500/ Tape & Reel		
NVMFD5489NLT3G	DFN8 (Pb-Free)	5000/ Tape & Reel		
NVMFD5489NLWFT1G	DFN8 (Pb-Free)	1500/ Tape & Reel		
NVMFD5489NLWFT3G	DFN8 (Pb-Free)	5000/ Tape & Reel		

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

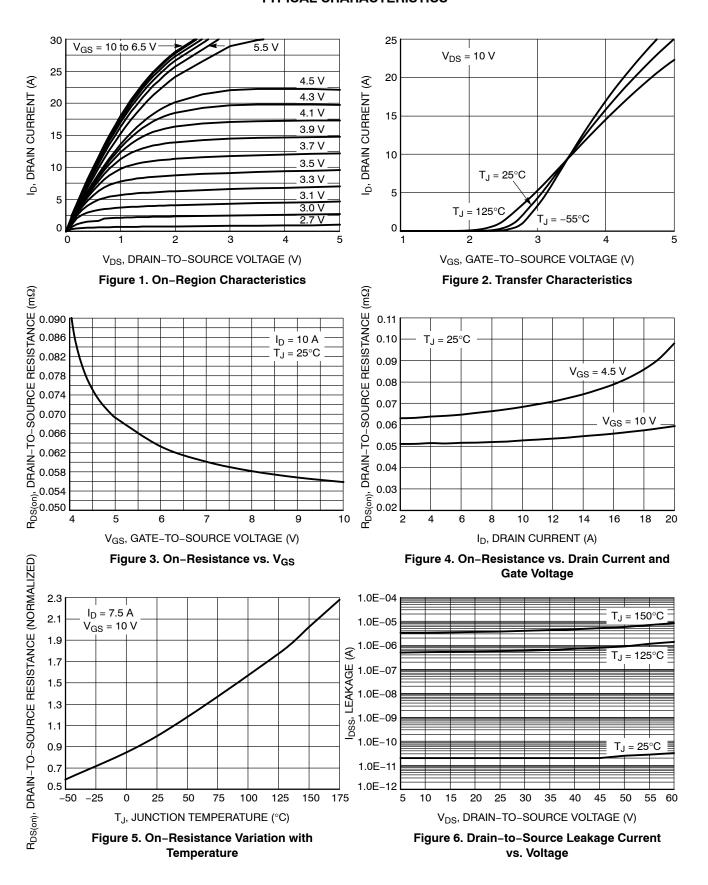
3. 4.	Surface-mounted on FR4 board using a 650 mm ² , 2 oz. Cu pad. Continuous DC current rating. Maximum current for pulses as long as 1 second are higher but are dependent on pulse duration and duty cycle.

ELECTRICAL CHARACTERISTICS (T_J = 25°C unless otherwise specified)

Parameter	Symbol	Test Condition		Min	Тур	Max	Unit
OFF CHARACTERISTICS	•		•				
Drain-to-Source Breakdown Voltage	V _{(BR)DSS}	$V_{GS} = 0 \text{ V, } I_D = 250 \mu\text{A}$		60			V
Drain-to-Source Breakdown Voltage Temperature Coefficient	V _{(BR)DSS} /T _J	Reference to 25°C I _D = 250 μA			67		mV/°C
Zero Gate Voltage Drain Current	I _{DSS}	V _{GS} = 0 V, V _{DS} = 60 V	T _J = 25°C T _J = 125°C			1.0	μΑ
Gate-to-Source Leakage Current	I _{GSS}	V _{DS} = 0 V, V _{GS}	ű			±100	nA
ON CHARACTERISTICS (Note 5)			L				ı
Gate Threshold Voltage	V _{GS(TH)}	$V_{GS} = V_{DS}, I_D =$	= 250 μA	1.5		2.5	V
Negative Threshold Temperature Coefficient	V _{GS(TH)} /T _J	Reference to	25°C		4.86		mV/°C
Drain-to-Source On Resistance	R _{DS(on)}	V _{GS} = 10 V, I _D	, = 15 A		52	65	mΩ
	,	V _{GS} = 4.5 V, I _D	, = 7.5 A		66	79	
CHARGES AND CAPACITANCES							•
Input Capacitance	C _{iss}				330		pF
Output Capacitance	C _{oss}	V _{GS} = 0 V, f = 1.0 MH	V _{GS} = 0 V, f = 1.0 MHz, V _{DS} = 25 V				
Reverse Transfer Capacitance	C _{rss}		ŀ		39		1
Total Gate Charge	Q _{G(TOT)}				12.4		nC
Threshold Gate Charge	Q _{G(TH)}	V _{GS} = 10 V, V _{DS}		0.31			
Gate-to-Source Charge	Q_{GS}	I _D = 6 A			1.3		
Gate-to-Drain Charge	Q_{GD}				4.74		
SWITCHING CHARACTERISTICS (No	ote 6)						
Turn-On Delay Time	t _{d(on)}				7		ns
Rise Time	t _r	$V_{GS} = 10 \text{ V}, V_{DS}$	s = 48 V,		11		
Turn-Off Delay Time	t _{d(off)}	$V_{GS} = 10 \text{ V}, V_{DS}$ $I_{D} = 6 \text{ A}, R_{G} = 10 \text{ A}$	2.5 Ω		31		
Fall Time	t _f		ŀ		21		
DRAIN-SOURCE DIODE CHARACTE	RISTICS						-
Forward Diode Voltage	V_{SD}	V _{GS} = 0 V,	T _J = 25°C		0.83	1.2	V
		I _S = 10 A	T _J = 125°C		0.71		
Reverse Recovery Time	t _{RR}		1		24.2		ns
Charge Time	ta	$V_{GS} = 0 \text{ V, } d_{ S}/d_t = 100 \text{ A/}\mu\text{s,}$ $I_S = 10 \text{ A}$			20.2		1
Discharge Time	t _b				4.0		1
Reverse Recovery Charge	Q _{RR}				26.5		nC
PACKAGE PARASITIC VALUES			•				
Source Inductance	L _S	T _A = 25°C			0.93		nH
Drain Inductance	L _D				0.005		1
Gate Inductance	L _G				1.84		1
Gate Resistance	R _G				12		Ω

^{5.} Pulse Test: pulse width = 300 μs, duty cycle ≤ 2%.
6. Switching characteristics are independent of operating junction temperatures.

TYPICAL CHARACTERISTICS



TYPICAL CHARACTERISTICS

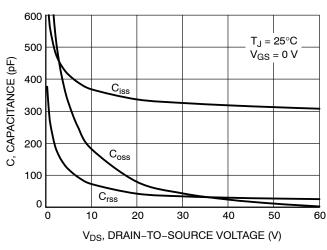


Figure 7. Capacitance Variation

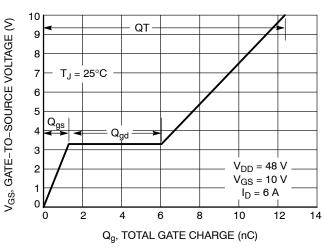


Figure 8. Gate-to-Source and Drain-to-Source Voltage vs. Total Charge

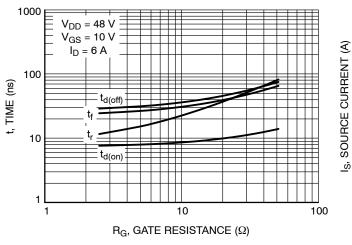


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

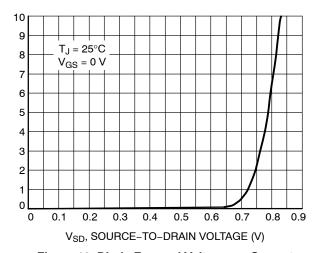


Figure 10. Diode Forward Voltage vs. Current

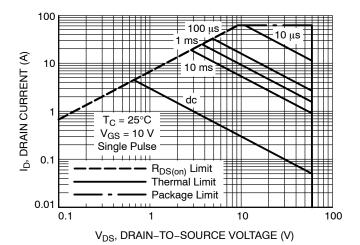


Figure 11. Maximum Rated Forward Biased Safe Operating Area

TYPICAL CHARACTERISTICS

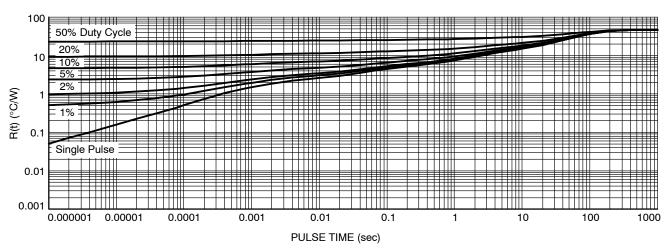
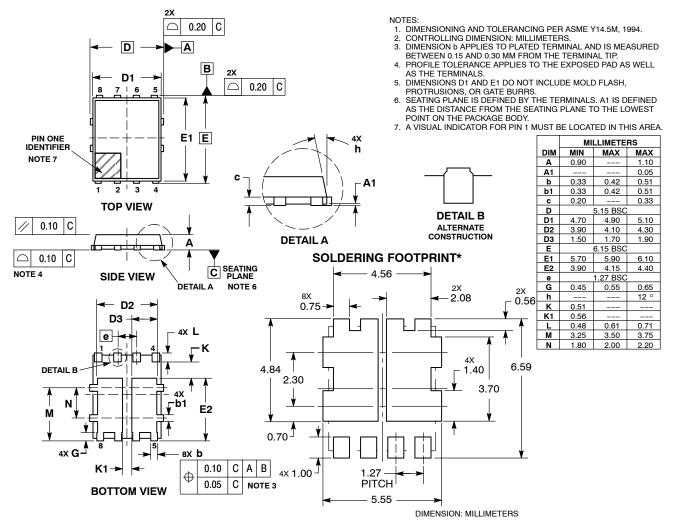


Figure 12. Thermal Response

PACKAGE DIMENSIONS

DFN8 5x6, 1.27P Dual Flag (SO8FL-Dual)

CASE 506BT ISSUE E



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

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