Power MOSFET

40 V, 2.65 m Ω , 145 A, Dual N–Channel

Features

- Small Footprint (5x6 mm) for Compact Design
- Low R_{DS(on)} to Minimize Conduction Losses
- Low Q_G and Capacitance to Minimize Driver Losses
- NVMFD5C446NLWF 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_J = 25°C unless otherwise noted)

	,					
Parameter			Symbol	Value	Unit	
Drain-to-Source Voltage			V _{DSS}	40	V	
Gate-to-Source Voltage			V _{GS}	±20	V	
Continuous Drain Current R _{0.IC}		T _C = 25°C	I _D	145	А	
(Notes 1, 2, 3)	Steady	T _C = 100°C		105		
Power Dissipation	State	T _C = 25°C	PD	125	W	
R _{θJC} (Notes 1, 2)		$T_{C} = 100^{\circ}C$		62		
Continuous Drain		$T_A = 25^{\circ}C$	Ι _D	25	А	
Current R _{0JA} (Notes 1, 2, 3)	Steady	$T_A = 100^{\circ}C$		18	1	
Power Dissipation	State	T _A = 25°C	PD	3.5	W	
R _{θJA} (Notes 1 & 2)		$T_A = 100^{\circ}C$		1.8		
Pulsed Drain Current	T _A = 25	°C, t _p = 10 μs	I _{DM}	644	А	
Operating Junction and Storage Temperature			T _J , T _{stg}	–55 to + 175	°C	
Source Current (Body Diode)			ا _S	91	А	
Single Pulse Drain-to-Source Avalanche Energy (T_J = 25°C, $I_{L(pk)}$ = 11 A)			E _{AS}	171	mJ	
Lead Temperature for Soldering Purposes (1/8" from case for 10 s)			ΤL	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

Parameter	Symbol	Value	Unit
Junction-to-Case - Steady State	$R_{\theta JC}$	1.38	°C/W
Junction-to-Ambient - Steady State (Note 2)	$R_{\theta JA}$	46.9	

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

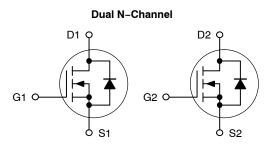
- Surface-mounted on FR4 board using a 650 mm², 2 oz. Cu pad.
- 3. Maximum current for pulses as long as 1 second is higher but is dependent on pulse duration and duty cycle.

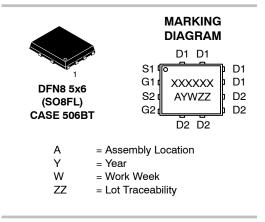


ON Semiconductor®

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V _{(BR)DSS}	R _{DS(ON)} MAX	I _D MAX
40 V	$2.65~\mathrm{m}\Omega\ensuremath{@}10~\mathrm{V}$	1 4 E A
40 V	3.9 mΩ @ 4.5 V	145 A





ORDERING INFORMATION

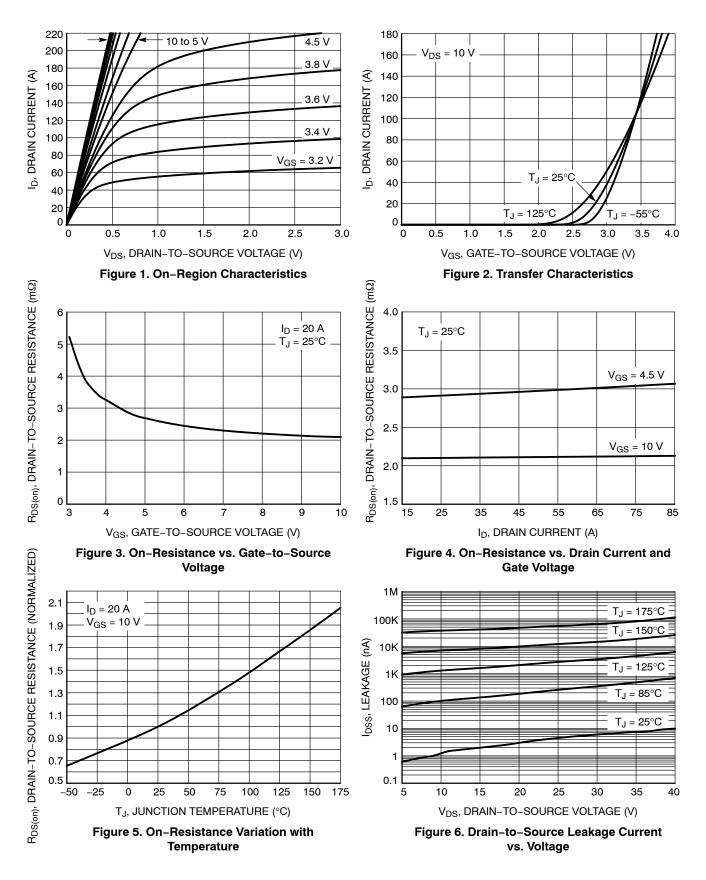
See detailed ordering, marking and shipping information in the package dimensions section on page 5 of this data sheet.

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

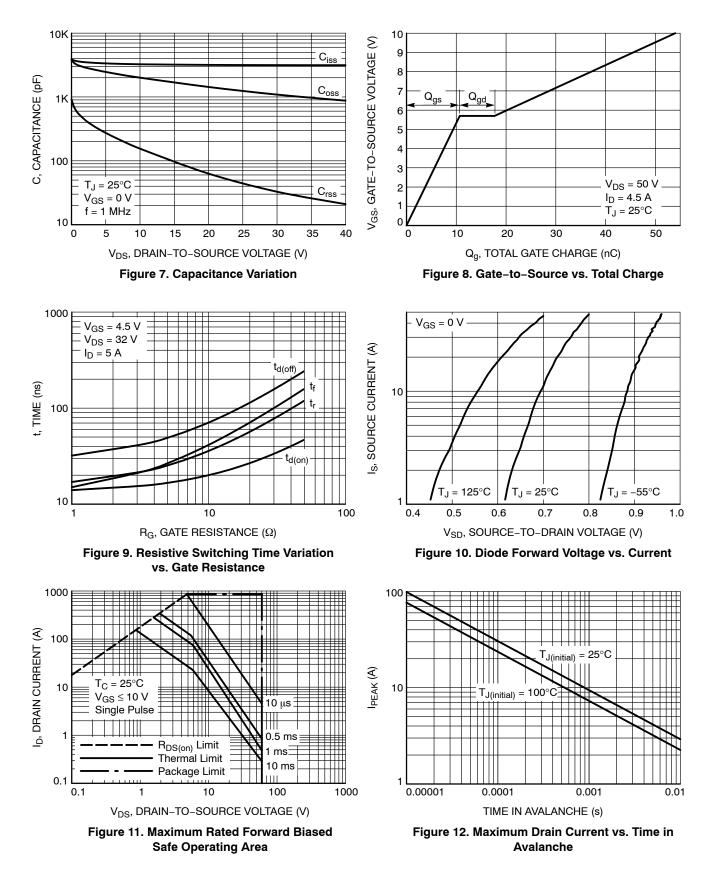
Parameter	Symbol	Test Condition		Min	Тур	Max	Unit
OFF CHARACTERISTICS							
Drain-to-Source Breakdown Voltage	V _{(BR)DSS}	V_{GS} = 0 V, I _D = 250 μ A		40			V
Drain-to-Source Breakdown Voltage Temperature Coefficient	V _{(BR)DSS} / T _J				23		mV/°C
Zero Gate Voltage Drain Current	I _{DSS}	V _{GS} = 0 V, V _{DS} = 40 V	T _J = 25 °C			10	μΑ
			T _J = 125°C			100	
Gate-to-Source Leakage Current	I _{GSS}	V _{DS} = 0 V, V _{GS} = 20 V				100	nA
ON CHARACTERISTICS (Note 4)				-			
Gate Threshold Voltage	V _{GS(TH)}	$V_{GS} = V_{DS}, I_D = 90 \ \mu A$		1.2		2.2	V
Negative Threshold Temperature Coefficient	V _{GS(TH)} /T _J				-5.2		mV/°C
Drain-to-Source On Resistance	R _{DS(on)}	V _{GS} = 10 V	I _D = 20 A		2.2	2.65	mΩ
		V _{GS} = 4.5 V	I _D = 20 A		3.0	3.9	
Forward Transconductance	9 _{FS}	V _{DS} = 15 V, I _D = 50 A			138		S
CHARGES, CAPACITANCES & GATE RESIS	TANCE						
Input Capacitance	C _{ISS}	V _{GS} = 0 V, f = 1 MHz, V _{DS} = 25 V			3170		
Output Capacitance	C _{OSS}				1270		pF
Reverse Transfer Capacitance	C _{RSS}				48		
Total Gate Charge	Q _{G(TOT)}	V_{GS} = 4.5 V, V_{DS} = 32 V; I_{D} = 50 A			25		
Total Gate Charge	Q _{G(TOT)}	V_{GS} = 10 V, V_{DS} = 32 V; I_{D} = 50 A			54		
Threshold Gate Charge	Q _{G(TH)}	V _{GS} = 4.5 V, V _{DS} = 32 V; I _D = 50 A			5.7		nC
Gate-to-Source Charge	Q _{GS}				10.7		
Gate-to-Drain Charge	Q _{GD}				7.0		
Plateau Voltage	V _{GP}				5.7		V
SWITCHING CHARACTERISTICS (Note 5)				-			
Turn-On Delay Time	t _{d(ON)}	V_{GS} = 4.5 V, V_{DS} = 32 V, I _D = 5 A, R _G = 1.0 Ω			14.8		
Rise Time	t _r				16.8		ns
Turn-Off Delay Time	t _{d(OFF)}				34.9		
Fall Time	t _f				15.2		
DRAIN-SOURCE DIODE CHARACTERISTIC	s				•		
Forward Diode Voltage	V _{SD}	VGS – O V,	$T_J = 25^{\circ}C$		0.8	1.2	v
			$T_J = 125^{\circ}C$		0.7		
Reverse Recovery Time	t _{RR}	V _{GS} = 0 V, dIS/dt = 50 A/µs, I _S = 5 A			54		ns
Charge Time	t _a				24		
Discharge Time	t _b				30		
Reverse Recovery Charge	Q _{RR}				55		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 ≤ 300 µs, duty cycle ≤ 2%.
5. Switching characteristics are independent of operating junction temperatures.

TYPICAL CHARACTERISTICS



TYPICAL CHARACTERISTICS



TYPICAL CHARACTERISTICS

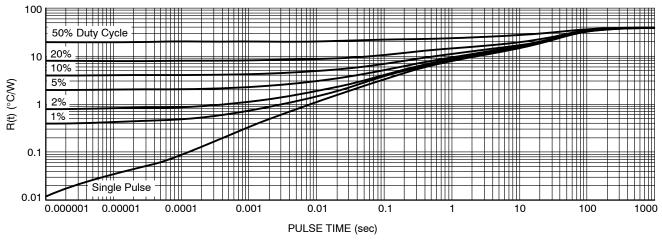


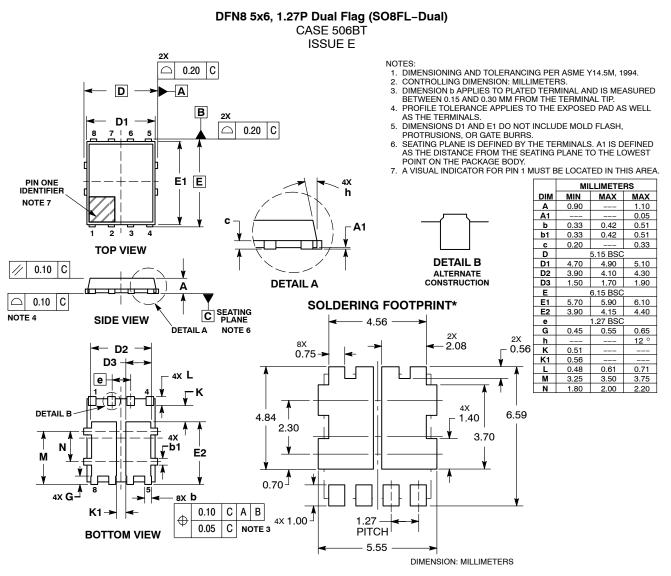
Figure 13. Thermal Response

DEVICE ORDERING INFORMATION

Device	Marking	Package	Shipping [†]
NVMFD5C446NLT1G	5C446L	DFN8 (Pb–Free)	1500 / Tape & Reel
NVMFD5C446NLWFT1G	446LWF	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.

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