Power MOSFET

40 V, 2.8 m Ω , 110 A, Single 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
- NVMFS5C450NLWF 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	Gate-to-Source Voltage			±20	V
Continuous Drain		T _C = 25°C	I _D	110	Α
Current R _{θJC} (Notes 1, 3)	Steady	T _C = 100°C		81	
Power Dissipation	State	T _C = 25°C	P_{D}	68	W
R _{θJC} (Note 1)		T _C = 100°C		34	
Continuous Drain		T _A = 25°C	I _D	27	Α
Current R _{0JA} (Notes 1, 2, 3)	Steady	T _A = 100°C		19	
Power Dissipation	State	T _A = 25°C	P_{D}	3.7	W
R _{θJA} (Notes 1 & 2)		T _A = 100°C		1.6	
Pulsed Drain Current	$T_A = 25^{\circ}C, t_p = 10 \mu s$		I _{DM}	740	Α
Operating Junction and Storage Temperature			T _J , T _{stg}	–55 to + 175	°C
Source Current (Body Diode)			I _S	76	Α
Single Pulse Drain-to-Source Avalanche Energy (I _{L(pk)} = 7 A)			E _{AS}	215	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

Parameter	Symbol	Value	Unit
Junction-to-Case - Steady State	$R_{\theta JC}$	2.2	°C/W
Junction-to-Ambient - Steady State (Note 2)	$R_{\theta JA}$	41	

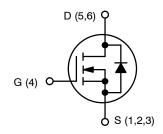
- The entire application environment impacts the thermal resistance values shown, they are not constants and are only valid for the particular conditions noted.
- 2. Surface-mounted on FR4 board using a 650 mm², 2 oz. Cu pad.
- 3. Maximum current for pulses as long as 1 second is higher but is dependent on pulse duration and duty cycle.



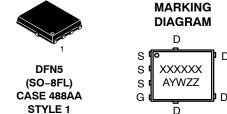
ON Semiconductor®

www.onsemi.com

V _{(BR)DSS}	R _{DS(ON)} MAX	I _D MAX	
40 V	2.8 m Ω @ 10 V	110 A	
	4.4 mΩ @ 4.5 V	HOA	



N-CHANNEL MOSFET



XXXXXX = 5C450L

(NVMFS5C450NL) or

450LWF

(NVMFS5C450NLWF)

A = Assembly Location
Y = Year
W = Work Week

ZZ = Lot Traceability

ORDERING INFORMATION

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

ELECTRICAL CHARACTERISTICS ($T_J = 25^{\circ}C$ unless otherwise specified)

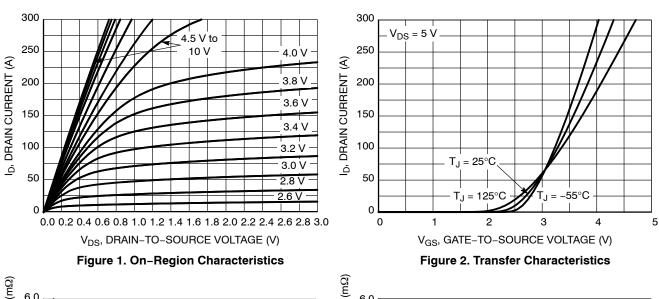
Parameter	Symbol	Test Condition		Min	Тур	Max	Unit
OFF CHARACTERISTICS							•
Drain-to-Source Breakdown Voltage	V _{(BR)DSS}	$V_{GS} = 0 \text{ V}, I_D = 250 \mu\text{A}$		40			V
Drain-to-Source Breakdown Voltage Temperature Coefficient	V _{(BR)DSS} /				1.6		mV/°C
Zero Gate Voltage Drain Current	I _{DSS}	V _{GS} = 0 V,	T _J = 25°C			10	
		V _{DS} = 40 V	T _J = 125°C			250	μΑ
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)}	$V_{GS} = V_{DS}, I_D = 250 \mu A$		1.2		2.0	V
Threshold Temperature Coefficient	V _{GS(TH)} /T _J				-5.3		mV/°C
Drain-to-Source On Resistance	R _{DS(on)}	V _{GS} = 4.5 V	I _D = 40 A		3.5	4.4	mΩ
		V _{GS} = 10 V	I _D = 40 A		2.3	2.8	1
Forward Transconductance	9 _{FS}	V _{DS} =15 V, I _D) = 40 A		120		S
CHARGES, CAPACITANCES & GATE RE	SISTANCE						•
Input Capacitance	C _{ISS}				2100		
Output Capacitance	Coss	V _{GS} = 0 V, f = 1 MH	lz, V _{DS} = 20 V		1000		pF
Reverse Transfer Capacitance	C _{RSS}				42		1
Total Gate Charge	Q _{G(TOT)}	$V_{GS} = 4.5 \text{ V}, V_{DS} = 20 \text{ V}; I_D = 40 \text{ A}$			16		nC
Total Gate Charge	Q _{G(TOT)}	V _{GS} = 10 V, V _{DS} = 20 V; I _D = 40 A			35		nC
Threshold Gate Charge	Q _{G(TH)}	V _{GS} = 4.5 V, V _{DS} = 20 V; I _D = 40 A			4		
Gate-to-Source Charge	Q _{GS}				7		nC
Gate-to-Drain Charge	Q_{GD}				5		
Plateau Voltage	V_{GP}				3.2		٧
SWITCHING CHARACTERISTICS (Note 5	5)						
Turn-On Delay Time	t _{d(ON)}				11		
Rise Time	t _r	V _{GS} = 4.5 V, V _E	ne = 20 V.		110		1
Turn-Off Delay Time	t _{d(OFF)}	$I_D = 40 \text{ A}, R_G = 1 \Omega$			21		ns -
Fall Time	t _f				5		
DRAIN-SOURCE DIODE CHARACTERIS	TICS				•	•	•
Forward Diode Voltage	V _{SD}	V _{GS} = 0 V,	T _J = 25°C		0.84	1.2	V
			T _J = 125°C		0.72		
Reverse Recovery Time	t _{RR}	$V_{GS} = 0 \text{ V, } dI_{s}/dt = 100 \text{ A}/\mu s,$ $I_{S} = 40 \text{ A}$			41		
Charge Time	ta				19		ns
Discharge Time	t _b				22		1
Reverse Recovery Charge	Q _{RR}				31		nC

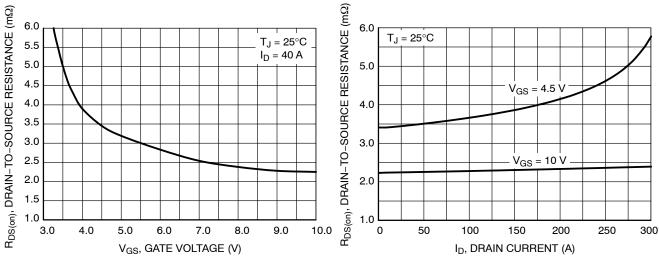
Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

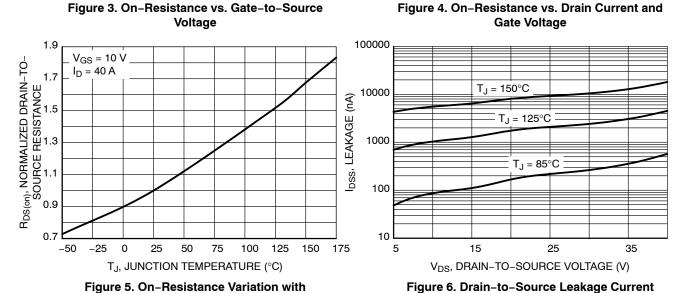
4. Pulse Test: pulse width $\leq 300~\mu s$, duty cycle $\leq 2\%$.

5. Switching characteristics are independent of operating junction temperatures.

TYPICAL CHARACTERISTICS







vs. Voltage

Temperature

TYPICAL CHARACTERISTICS

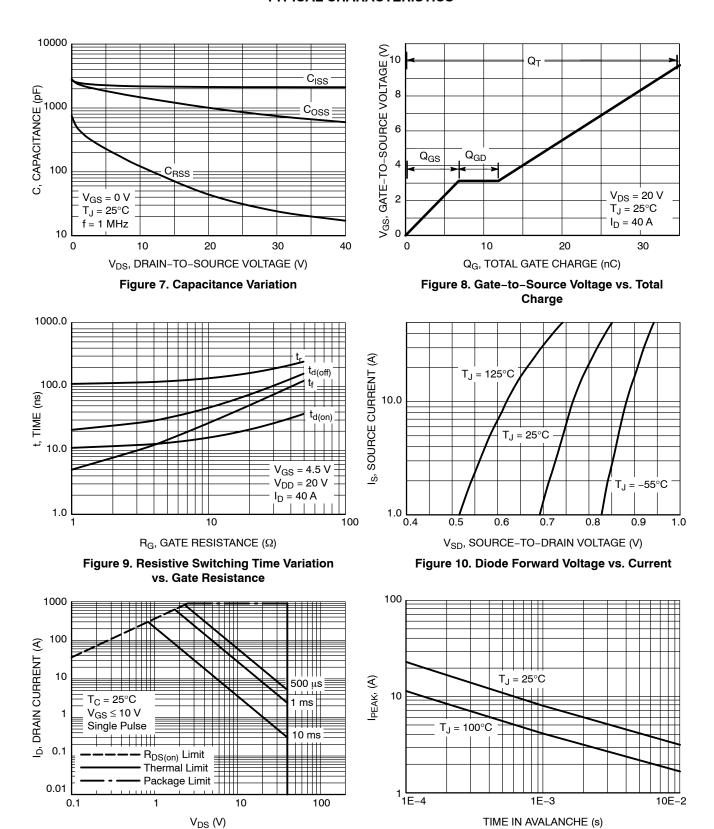


Figure 12. I_{PEAK} vs. Time in Avalanche

Figure 11. Safe Operating Area

TYPICAL CHARACTERISTICS

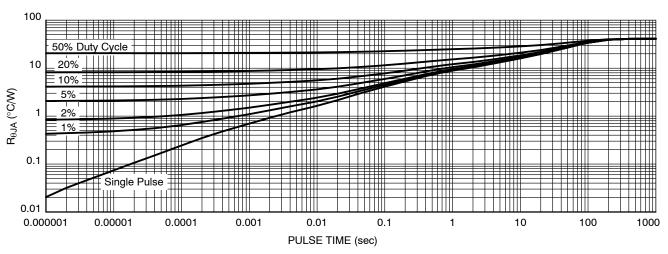


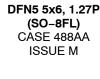
Figure 13. Thermal Characteristics

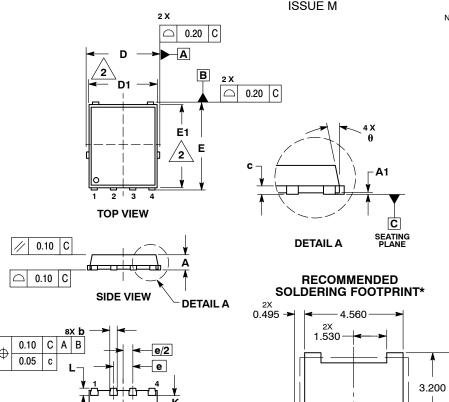
DEVICE ORDERING INFORMATION

Device	Marking	Package	Shipping [†]
NVMFS5C450NLT1G	5C450L	DFN5 (Pb-Free)	1500 / Tape & Reel
NVMFS5C450NLWFT1G	450LWF	DFN5 (Pb-Free, Wettable Flanks)	1500 / Tape & Reel
NVMFS5C450NLT3G	5C450L	DFN5 (Pb-Free)	5000 / Tape & Reel
NVMFS5C450NLWFT3G	450LWF	DFN5 (Pb-Free, Wettable Flanks)	5000 / Tape & Reel
NVMFS5C450NLAFT1G	5C450L	DFN5 (Pb-Free)	1500 / Tape & Reel
NVMFS5C450NLWFAFT1G	450LWF	DFN5 (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





NOTES:

- DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994
- CONTROLLING DIMENSION: MILLIMETER. DIMENSION D1 AND E1 DO NOT INCLUDE MOLD FLASH PROTRUSIONS OR GATE BURRS

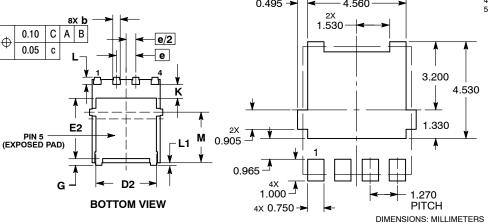
	MILLIMETERS			
DIM	MIN	NOM	MAX	
Α	0.90	1.00	1.10	
A1	0.00		0.05	
b	0.33	0.41	0.51	
С	0.23	0.28	0.33	
D	5.00	5.15	5.30	
D1	4.70	4.90	5.10	
D2	3.80	4.00	4.20	
Е	6.00	6.15	6.30	
E1	5.70	5.90	6.10	
E2	3.45	3.65	3.85	
е	1.27 BSC			
G	0.51	0.575	0.71	
K	1.20	1.35	1.50	
L	0.51	0.575	0.71	
L1	0.125 REF			
М	3.00	3.40	3.80	
θ	0 °		12 °	

STYLE 1: PIN 1. SOURCE

2. SOURCE 3. SOURCE

4 GATE

DRAIN



*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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