MOSFET – Power, Single N-Channel

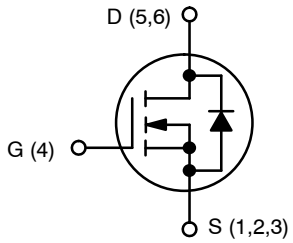
100 V, 38 mΩ, 21 A

NVMFS040N10MCL

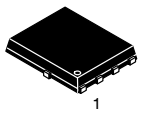
$V_{(BR)DSS}$	$R_{DS(ON)}$ MAX	I_D MAX
100 V	38 mΩ @ 10 V	21 A
	53 mΩ @ 4.5 V	

Features

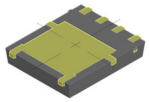
- Small Footprint (5x6 mm) for Compact Design
- Low $R_{DS(on)}$ to Minimize Conduction Losses
- Low Q_G and Capacitance to Minimize Driver Losses
- AEC−Q101 Qualified and PPAP Capable
- NVMFWS040N10MCL − Wettable Flanks Product
- These Devices are Pb−Free, Halogen Free/BFR Free, Beryllium Free and are RoHS Compliant



N−CHANNEL MOSFET



DFN5
(SO−8FL)
CASE 488AA



DFN5
(SO8FL WF)
CASE 507BA

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

Parameter			Symbol	Value	Unit
Drain−to−Source Voltage			V_{DSS}	100	V
Gate−to−Source Voltage			V_{GS}	±20	V
Continuous Drain Current $R_{\theta JC}$ (Note 1)	Steady State	T_C = 25°C	I_D	21	A
		T_C = 100°C		15	
Power Dissipation $R_{\theta JC}$ (Note 1)		T_C = 25°C	P_D	36	W
		T_C = 100°C		18	
Continuous Drain Current $R_{\theta JA}$ (Notes 1, 2)	Steady State	T_A = 25°C	I_D	6.5	A
		T_A = 100°C		4.6	
Power Dissipation $R_{\theta JA}$ (Notes 1, 2)		T_A = 25°C	P_D	3.5	W
		T_A = 100°C		1.7	
Pulsed Drain Current	T_A = 25°C, t_p = 10 μs		I_{DM}	94	A
Operating Junction and Storage Temperature Range			T_J, T_{stg}	−55 to +175	°C
Source Current (Body Diode)			I_S	28	A
Single Pulse Drain−to−Source Avalanche Energy ($I_{L(pk)}$ = 0.9 A)			E_{AS}	109	mJ
Lead Temperature Soldering Reflow for Soldering Purposes (1/8″ from case for 10 s)			T_L	260	°C

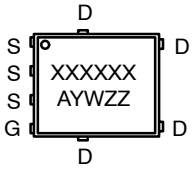
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

THERMAL RESISTANCE RATINGS

Parameter	Symbol	Value	Unit
Junction−to−Case − Steady State (Note 1)	$R_{\theta JC}$	4.2	°C/W
Junction−to−Ambient − Steady State (Note 2)	$R_{\theta JA}$	43	

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 1 in^2 pad size, 1 oz. Cu pad.

MARKING DIAGRAM



A = Assembly Location
Y = Year
W = Work Week
ZZ = Lot Traceability

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	Typ	Max	Unit
OFF CHARACTERISTICS							
Drain−to−Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS} = 0 V, I_D = 250 μA		100			V
Drain−to−Source Breakdown Voltage Temperature Coefficient	$V_{(BR)DSS}/T_J$	I_D = 250 μA, ref to 25°C			70		mV/°C
Zero Gate Voltage Drain Current	I_{DSS}	V_{GS} = 0 V, V_{DS} = 100 V	T_J = 25°C			1	μA
			T_J = 125°C			100	
Gate−to−Source Leakage Current	I_{GSS}	V_{DS} = 0 V, V_{GS} = 20 V				100	nA
ON CHARACTERISTICS							
Gate Threshold Voltage	$V_{GS(TH)}$	V_{GS} = V_{DS}, I_D = 26 μA		1		3	V
Threshold Temperature Coefficient	$V_{GS(TH)}/T_J$	I_D = 250 μA, ref to 25°C			−5.9		mV/°C
Drain−to−Source On Resistance	$R_{DS(on)}$	V_{GS} = 10 V, I_D = 5 A			31	38	mΩ
		V_{GS} = 4.5 V, I_D = 4 A			42	53	
Forward Transconductance	g_{FS}	V_{DS} = 10 V, I_D = 5 A			18		S
CHARGES & CAPACITANCES							
Input Capacitance	C_{ISS}	V_{GS} = 0 V, f = 1 MHz, V_{DS} = 50 V			500		pF
Output Capacitance	C_{OSS}				200		
Reverse Transfer Capacitance	C_{RSS}				3.7		
Total Gate Charge	$Q_{G(TOT)}$	V_{GS} = 4.5 V, V_{DS} = 50 V, I_D = 4 A			4.0		nC
Total Gate Charge	$Q_{G(TOT)}$	V_{GS} = 10 V, V_{DS} = 50 V, I_D = 5 A			8.3		
Threshold Gate Charge	$Q_{G(TH)}$				0.8		
Gate−to−Source Charge	Q_{GS}				1.6		
Gate−to−Drain Charge	Q_{GD}				1.2		
Plateau Voltage	V_{GP}				2.9		V
SWITCHING CHARACTERISTICS (Note 3)							
Turn−On Delay Time	$t_{d(ON)}$	V_{GS} = 10 V, V_{DS} = 50 V, I_D = 5 A, R_G = 6 Ω			7.2		ns
Rise Time	t_r				9.3		
Turn−Off Delay Time	$t_{d(OFF)}$				15.9		
Fall Time	t_f				3.1		
DRAIN−SOURCE DIODE CHARACTERISTICS							
Forward Diode Voltage	V_{SD}	V_{GS} = 0 V, I_S = 5 A	T_J = 25°C		0.85	1.2	V
			T_J = 125°C		0.73		
Reverse Recovery Time	t_{RR}	V_{GS} = 0 V, dI_S/dt = 100 A/μs, I_S = 2 A			23		ns
Reverse Recovery Charge	Q_{RR}				11		nC
Charge Time	t_a				11.2		ns
Discharge Time	t_b				11.4		ns

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.

3. Switching characteristics are independent of operating junction temperatures

TYPICAL CHARACTERISTICS

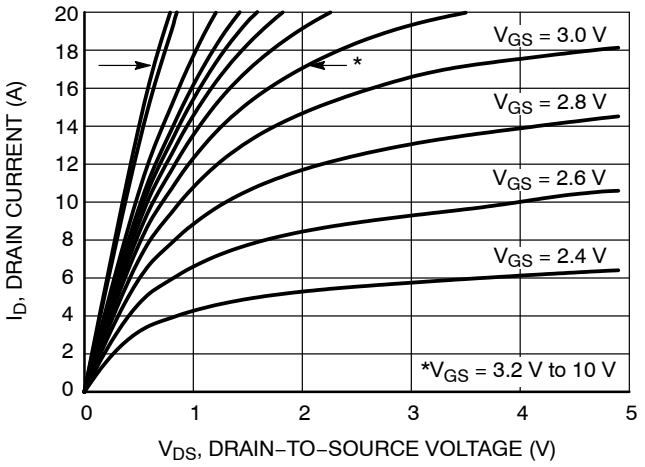


Figure 1. On−Region Characteristics

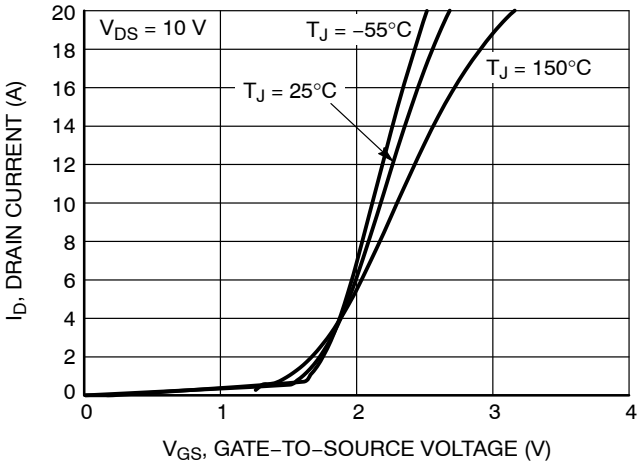


Figure 2. Transfer Characteristics

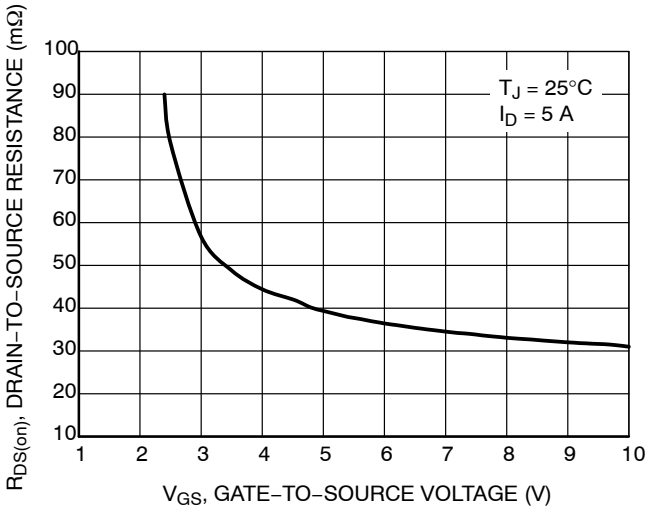


Figure 3. On−Resistance vs. Gate−to−Source Voltage

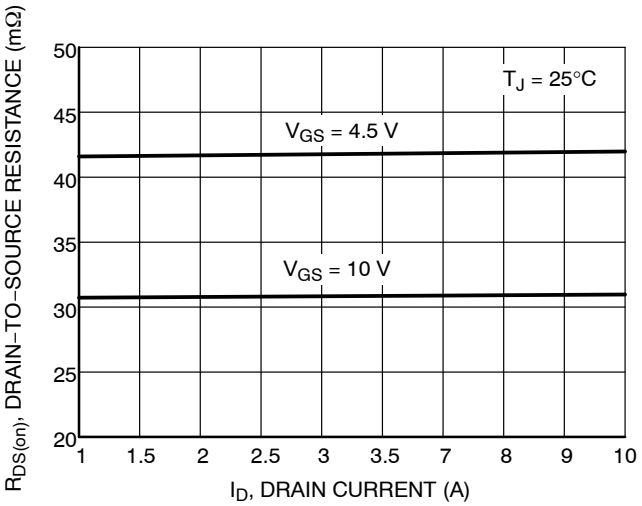


Figure 4. On−Resistance vs. Drain Current and Gate Voltage

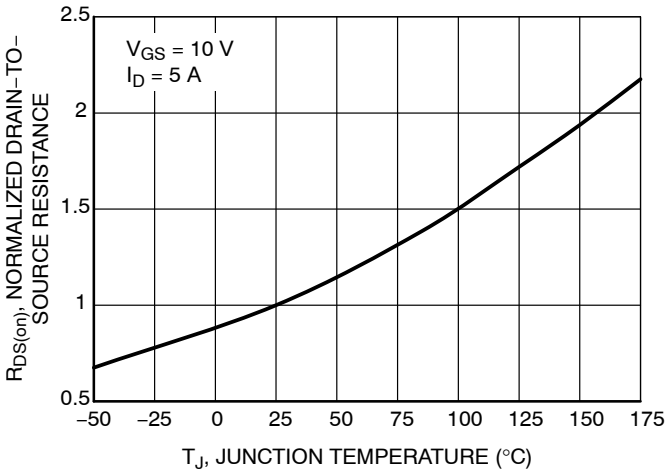


Figure 5. On−Resistance Variation with Temperature

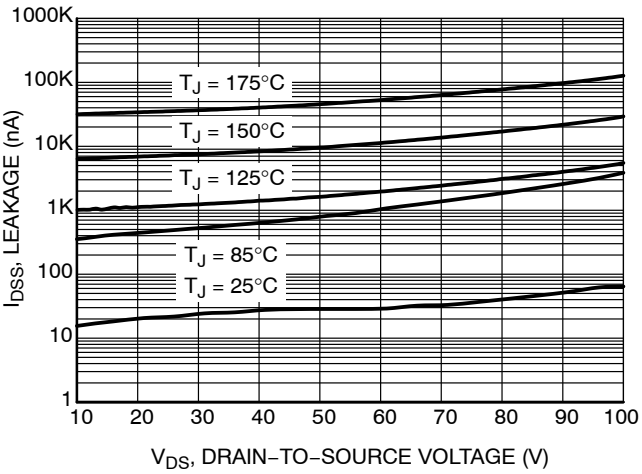


Figure 6. Drain−to−Source Leakage Current vs. Voltage

TYPICAL CHARACTERISTICS

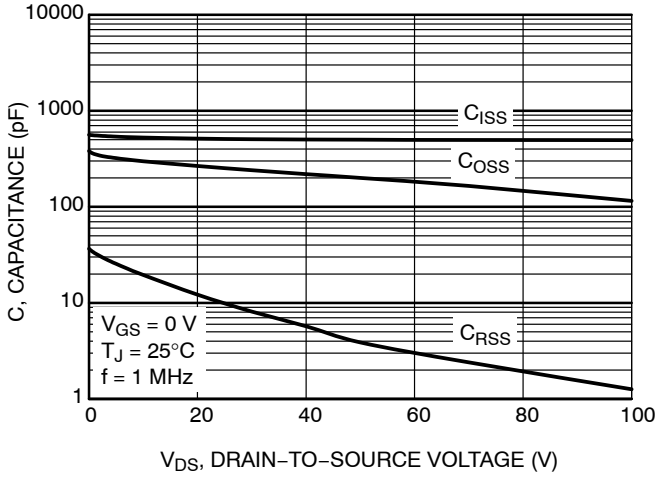


Figure 7. Capacitance Variation

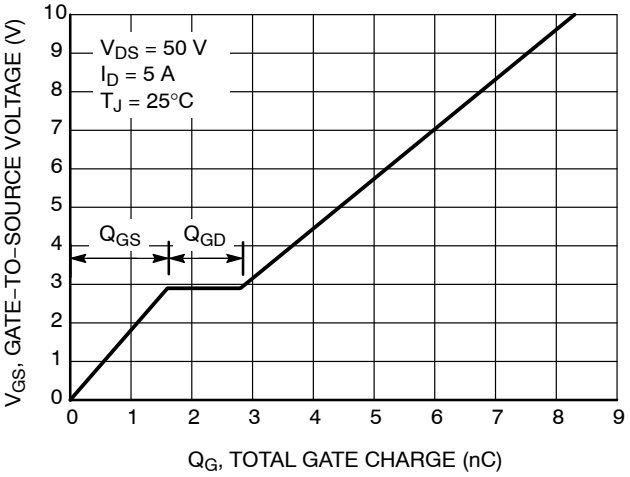


Figure 8. Gate−to−Source Voltage vs. Total Charge

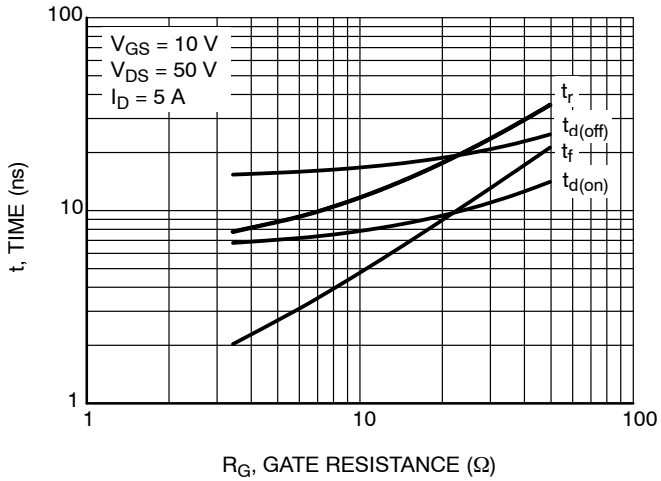


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

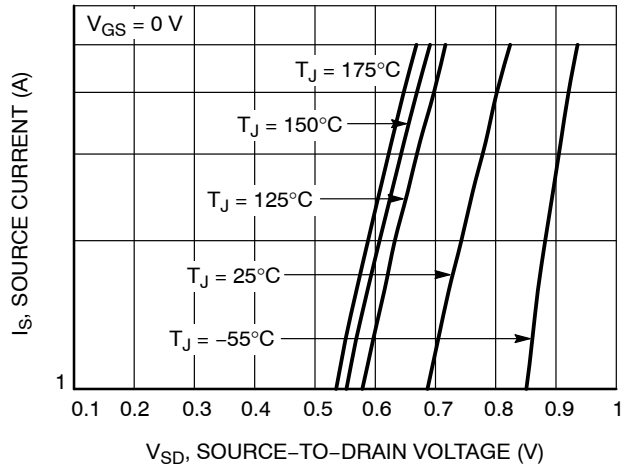


Figure 10. Diode Forward Voltage vs. Current

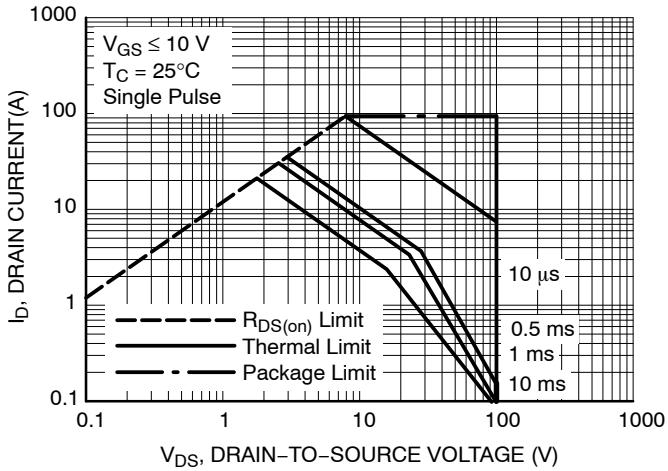


Figure 11. Maximum Rated Forward Biased Safe Operating Area

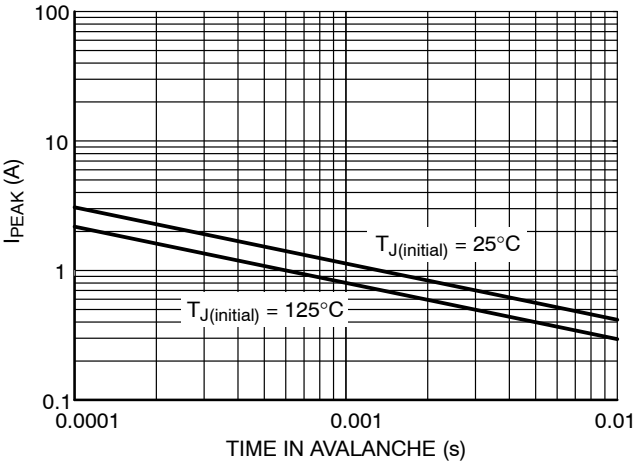


Figure 12. I_{PEAK} vs. Time in Avalanche

TYPICAL CHARACTERISTICS

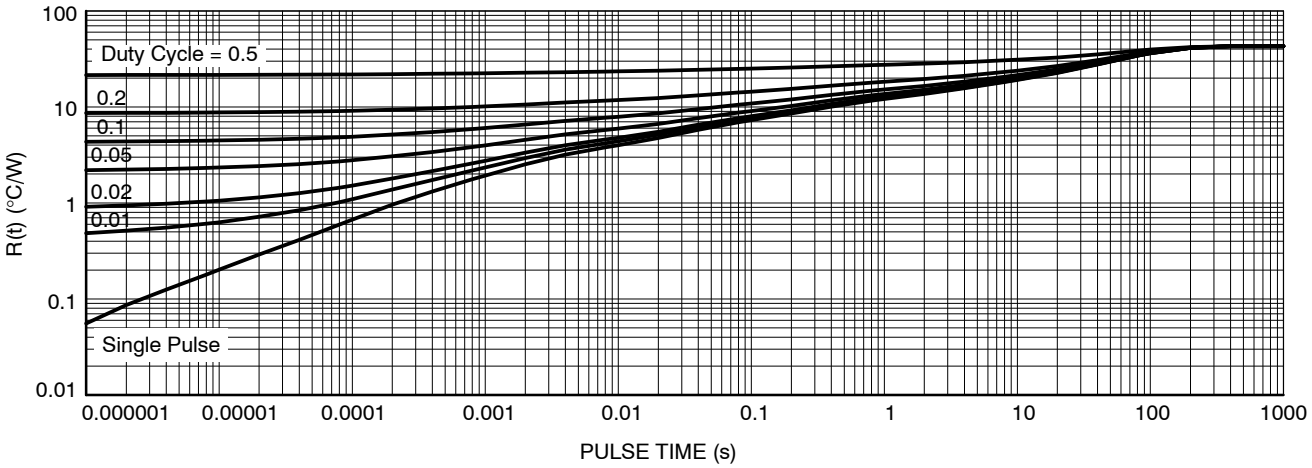


Figure 13. Thermal Characteristics

DEVICE ORDERING INFORMATION

Device	Package	Shipping†
NVMFS040N10MCLT1G	DFN5 (Pb−Free)	1500 / Tape & Reel
NVMFWS040N10MCLT1G	Wettable Flank DFN5 (Pb−Free)	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.