

# MOSFET - Power, Dual N-Channel, Logic Level, Dual SO8FL

## 60 V, 39 mΩ, 17 A

### NVMFD5877NL

#### Features

- Low  $R_{DS(on)}$  to Minimize Conduction Losses
- Low Capacitance to Minimize Driver Losses
- NVMFD5877NLWF – Wettable Flanks Option for Enhanced Optical Inspection
- AEC-Q101 Qualified and PPAP Capable
- These Devices are Pb-Free, Halogen Free and are RoHS Compliant

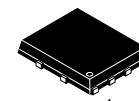
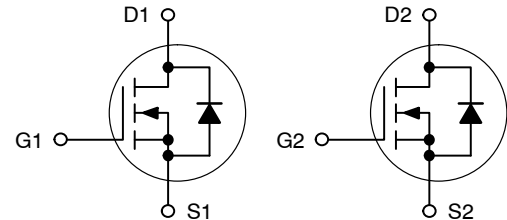
#### MAXIMUM RATINGS ( $T_J = 25^\circ\text{C}$ unless otherwise noted)

Parameter			Symbol	Value	Unit	
Drain-to-Source Voltage			V <sub>DSS</sub>	60	V	
Gate-to-Source Voltage			V <sub>GS</sub>	± 20	V	
Continuous Drain Current R <sub>ΨJ-mb</sub> (Notes 1, 2, 3, 4)	Steady State	T <sub>mb</sub> = 25 °C	I <sub>D</sub>	17	A	
		T <sub>mb</sub> = 100 °C		12		
		Power Dissipation R <sub>ΨJ-mb</sub> (Notes 1, 2, 3)	T <sub>mb</sub> = 25 °C	P <sub>D</sub>	23	W
			T <sub>mb</sub> = 100 °C		12	
Continuous Drain Current R <sub>θJA</sub> (Notes 1 & 3, 4)	Steady State	T <sub>A</sub> = 25 °C	I <sub>D</sub>	6	A	
		T <sub>A</sub> = 100 °C		5		
Power Dissipation R <sub>θJA</sub> (Notes 1, 3)	Steady State	T <sub>A</sub> = 25 °C	P <sub>D</sub>	3.2	W	
		T <sub>A</sub> = 100°C		1.6		
Pulsed Drain Current	T <sub>A</sub> = 25 °C, t <sub>p</sub> = 10 μs		I <sub>DM</sub>	74	A	
Operating Junction and Storage Temperature			T <sub>J</sub> , T <sub>stg</sub>	-55 to +175	°C	
Source Current (Body Diode)			I <sub>S</sub>	19	A	
Single Pulse Drain-to-Source Avalanche Energy (T <sub>J</sub> = 25°C, V <sub>DD</sub> = 24 V, V <sub>GS</sub> = 10 V, R <sub>G</sub> = 25 Ω)	(I <sub>L(pk)</sub> = 14.5 A, L = 0.1 mH)		E <sub>AS</sub>	10.5	mJ	
	(I <sub>L(pk)</sub> = 6.3 A, L = 2 mH)			40		
Lead Temperature for Soldering Purposes (1/8" from case for 10 s)			T <sub>L</sub>	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.

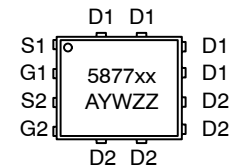
$V_{(BR)DSS}$	$R_{DS(on)} \text{ MAX}$	$I_D \text{ MAX}$
60 V	39 mΩ @ 10 V	17 A
	60 mΩ @ 4.5 V	

#### Dual N-Channel



DFN8 5x6  
(SO8FL)  
CASE 506BT

#### MARKING DIAGRAM



5877NL = Specific Device Code  
for NVMFD5877NL

5877LW = Specific Device Code  
for NVMFD5877NLWF

A = Assembly Location

Y = Year

W = Work Week

ZZ = Lot Traceability

#### ORDERING INFORMATION

See detailed ordering, marking and shipping information on page 6 of this data sheet.

NOTE: Some of the devices on this data sheet have been **DISCONTINUED**. Please refer to the table on page 6.

**THERMAL RESISTANCE MAXIMUM RATINGS** (Note 1)

Parameter	Symbol	Value	Unit
Junction-to-Mounting Board (top) – Steady State (Note 2, 3)	$R_{\Psi J-mb}$	6.5	°C/W
Junction-to-Ambient – Steady State (Note 3)	$R_{\theta JA}$	47	

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. Psi ( $\Psi$ ) is used as required per JESD51-12 for packages in which substantially less than 100% of the heat flows to single case surface.
3. Surface-mounted on FR4 board using a 650 mm<sup>2</sup>, 2 oz. Cu pad.
4. Maximum current for pulses as long as 1 second is higher but is dependent on pulse duration and duty cycle.

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

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
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**OFF CHARACTERISTICS**

Drain-to-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	60			V
Drain-to-Source Breakdown Voltage Temperature Coefficient	$V_{(BR)DSS}/T_J$			53		mV/°C
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{GS} = 0\text{ V}, V_{DS} = 60\text{ V}$	$T_J = 25^\circ\text{C}$		1.0	$\mu\text{A}$
			$T_J = 125^\circ\text{C}$		10	
Gate-to-Source Leakage Current	$I_{GSS}$	$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$			$\pm 100$	nA

**ON CHARACTERISTICS** (Note 5)

Gate Threshold Voltage	$V_{GS(TH)}$	$V_{GS} = V_{DS}, I_D = 250\text{ }\mu\text{A}$	1.0		3.0	V
Negative Threshold Temperature Coefficient	$V_{GS(TH)}/T_J$			3.5		mV/°C
Drain-to-Source On Resistance	$R_{DS(on)}$	$V_{GS} = 10\text{ V}, I_D = 7.5\text{ A}$		31	39	m $\Omega$
		$V_{GS} = 4.5\text{ V}, I_D = 7.5\text{ A}$		42	60	
Forward Transconductance	$g_{FS}$	$V_{DS} = 15\text{ V}, I_D = 5.0\text{ A}$		7.0		S

**CHARGES AND CAPACITANCES**

Input Capacitance	$C_{iss}$	$V_{GS} = 0\text{ V}, f = 1.0\text{ MHz}, V_{DS} = 25\text{ V}$		540		pF
Output Capacitance	$C_{oss}$			55		
Reverse Transfer Capacitance	$C_{rss}$			36		
Total Gate Charge	$Q_{G(TOT)}$	$V_{GS} = 4.5\text{ V}, V_{DS} = 48\text{ V}, I_D = 5.0\text{ A}$		5.9		nC
Threshold Gate Charge	$Q_{G(TH)}$			0.62		
Gate-to-Source Charge	$Q_{GS}$			1.64		
Gate-to-Drain Charge	$Q_{GD}$			2.80		
Total Gate Charge	$Q_{G(TOT)}$	$V_{GS} = 10\text{ V}, V_{DS} = 48\text{ V}, I_D = 5.0\text{ A}$		11	20	nC

**SWITCHING CHARACTERISTICS** (Note 6)

Turn-On Delay Time	$t_{d(on)}$	$V_{GS} = 4.5\text{ V}, V_{DS} = 48\text{ V}, I_D = 5.0\text{ A}, R_G = 2.5\text{ }\Omega$		8.1		ns
Rise Time	$t_r$			15.8		
Turn-Off Delay Time	$t_{d(off)}$			11.8		
Fall Time	$t_f$			3.9		
Turn-On Delay Time	$t_{d(on)}$	$V_{GS} = 10\text{ V}, V_{DS} = 48\text{ V}, I_D = 5.0\text{ A}, R_G = 2.5\text{ }\Omega$		4.9		ns
Rise Time	$t_r$			6.4		
Turn-Off Delay Time	$t_{d(off)}$			14.5		
Fall Time	$t_f$			2.4		

5. Pulse Test: pulse width = 300  $\mu\text{s}$ , duty cycle  $\leq 2\%$ .
6. Switching characteristics are independent of operating junction temperatures.

# NVMFD5877NL

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

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
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### DRAIN-SOURCE DIODE CHARACTERISTICS

Forward Diode Voltage	$V_{SD}$	$V_{GS} = 0\text{ V},$ $I_S = 5.0\text{ A}$	$T_J = 25^\circ\text{C}$		0.8	1.2	V
			$T_J = 125^\circ\text{C}$		0.7		
Reverse Recovery Time	$t_{RR}$	$V_{GS} = 0\text{ V}, dI_S/dt = 100\text{ A}/\mu\text{s},$ $I_S = 5.0\text{ A}$			14.5		ns
Charge Time	$t_a$				11.5		
Discharge Time	$t_b$				3.1		
Reverse Recovery Charge	$Q_{RR}$				11		nC

### PACKAGE PARASITIC VALUES

Source Inductance	$L_S$	$T_A = 25^\circ\text{C}$		0.93		nH
Drain Inductance	$L_D$			0.005		
Gate Inductance	$L_G$			1.84		
Gate Resistance	$R_G$			1.5		$\Omega$

5. Pulse Test: pulse width = 300  $\mu\text{s}$ , duty cycle  $\leq 2\%$ .
6. Switching characteristics are independent of operating junction temperatures.

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.

TYPICAL CHARACTERISTICS

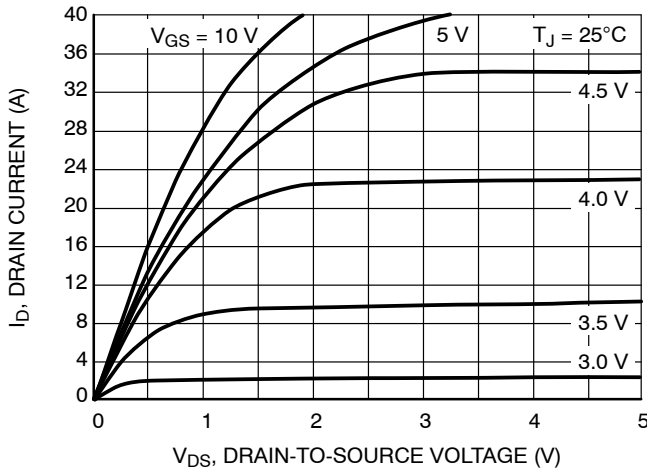


Figure 1. On-Region Characteristics

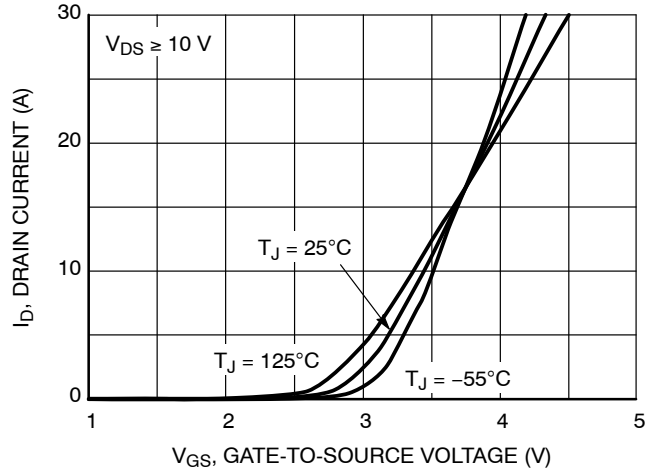


Figure 2. Transfer Characteristics

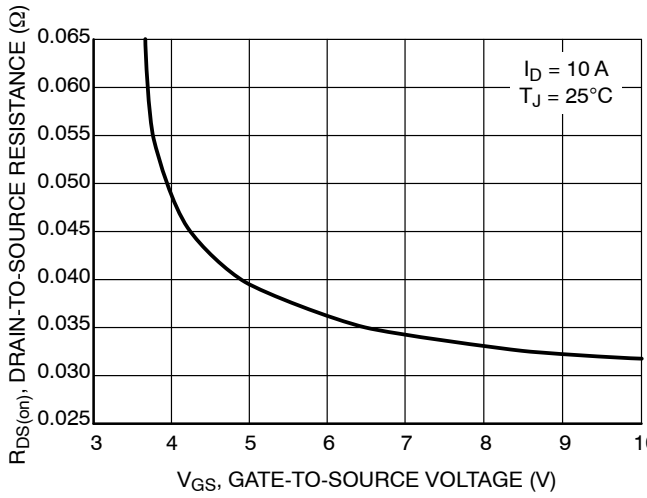


Figure 3. On-Resistance vs. Gate-to-Source Voltage

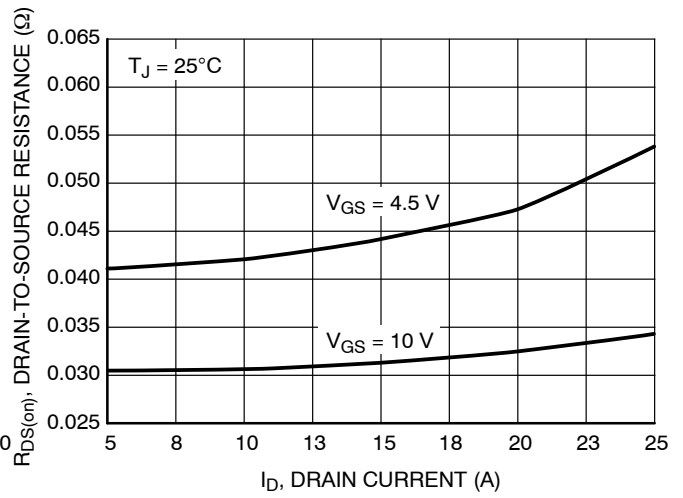


Figure 4. On-Resistance vs. Drain Current and Gate Voltage

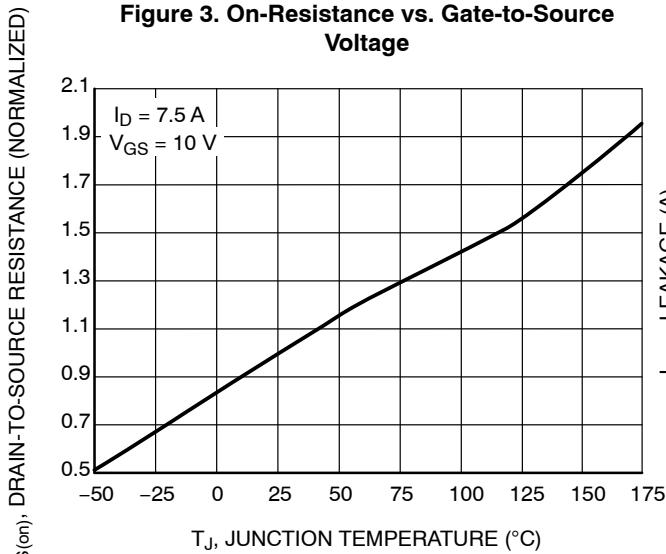


Figure 5. On-Resistance Variation with Temperature

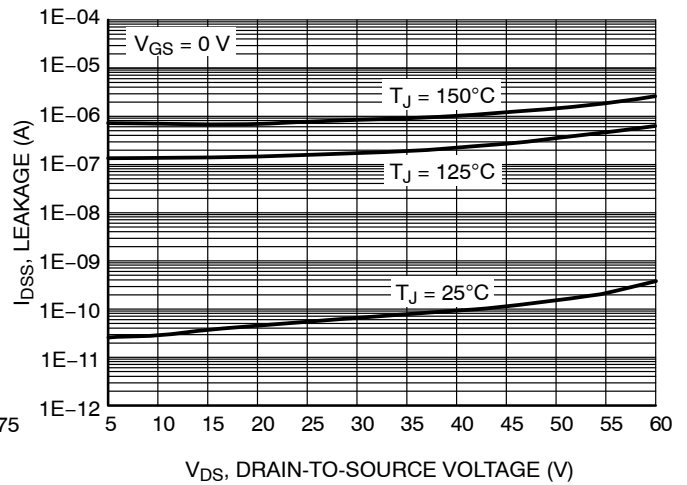


Figure 6. Drain-to-Source Leakage Current vs. Voltage

TYPICAL CHARACTERISTICS

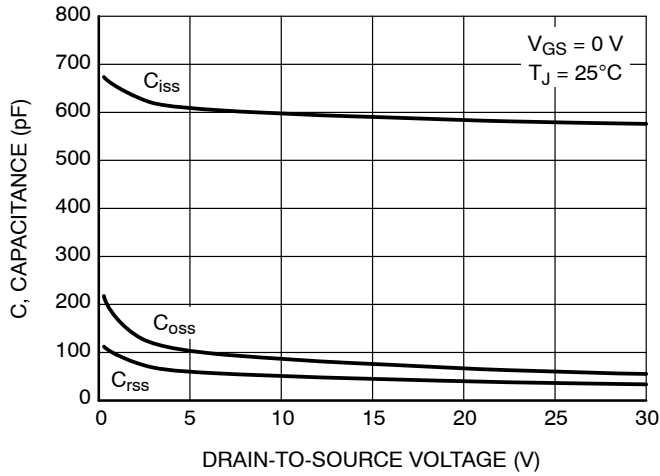


Figure 7. Capacitance Variation

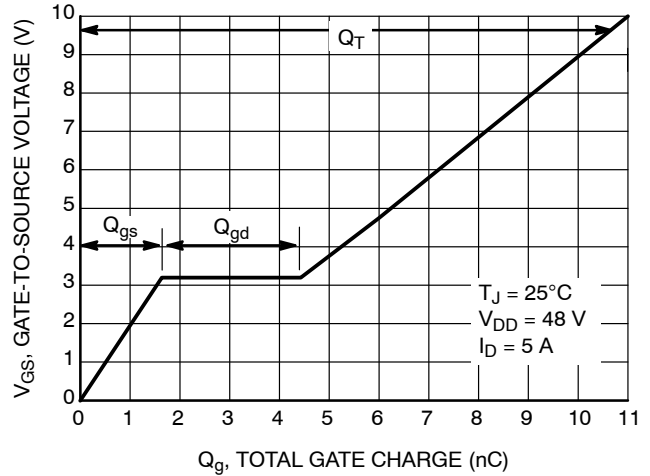


Figure 8. Gate-to-Source vs. Gate Charge

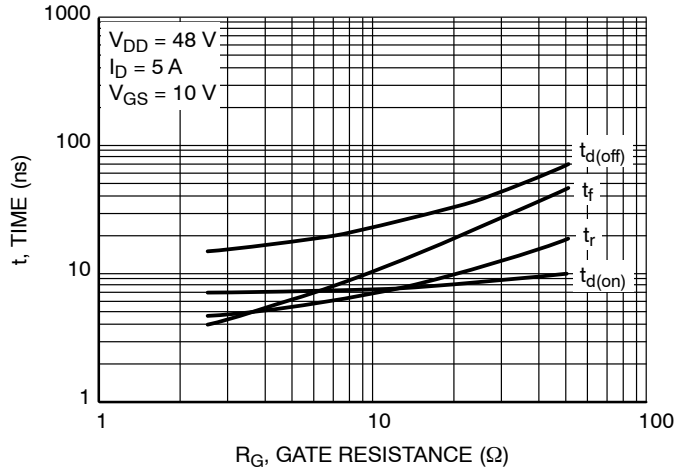


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

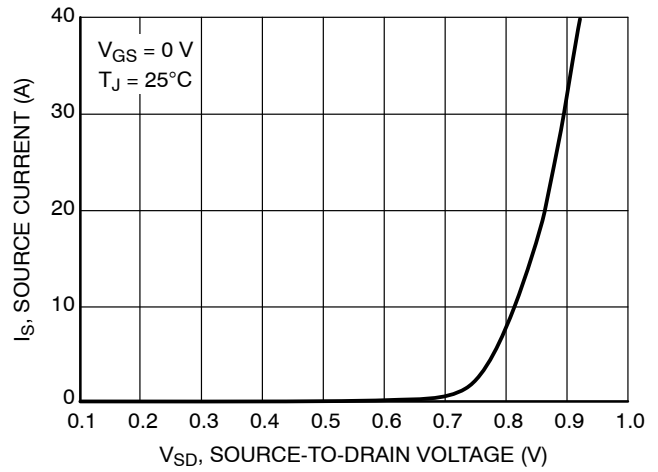


Figure 10. Diode Forward Voltage

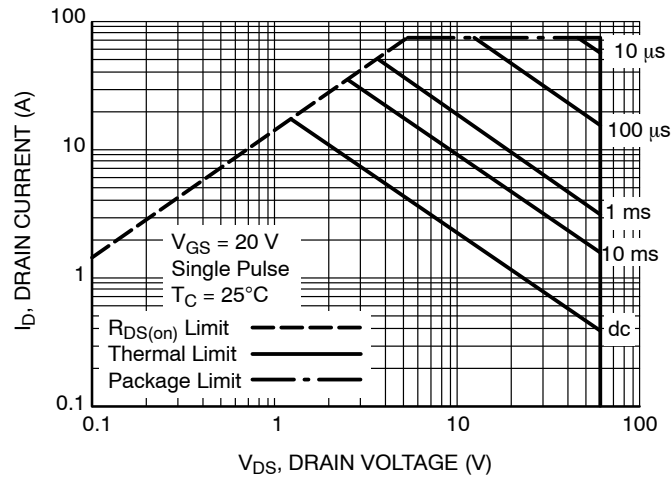


Figure 11. Maximum Rated Forward Biased Safe Operating Area

# NVMFD5877NL

## TYPICAL CHARACTERISTICS

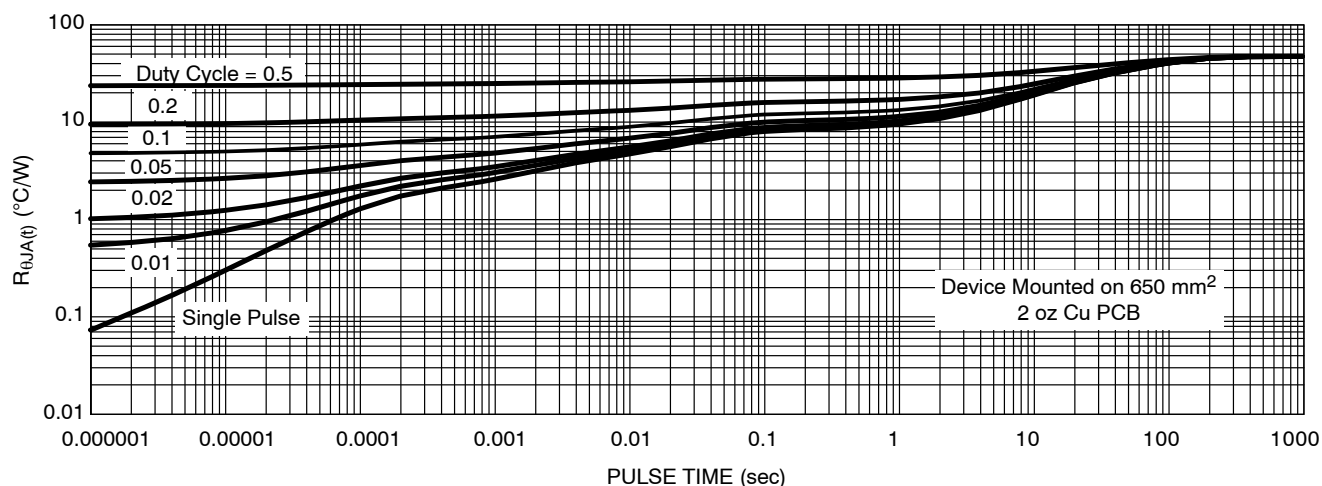


Figure 12. Thermal Response

### DEVICE ORDERING INFORMATION

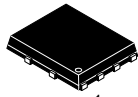
Device	Marking	Package	Shipping†
NVMFD5877NLWFT1G-UM	5877LW	DFN8 (Pb-Free)	1500 / Tape & Reel

### DISCONTINUED (Note 7)

NVMFD5877NLT1G	5877NL	DFN8 (Pb-Free)	1500 / Tape & Reel
NVMFD5877NLWFT1G	5877LW	DFN8 (Pb-Free)	1500 / Tape & Reel
NVMFD5877NLT3G	5877NL	DFN8 (Pb-Free)	5000 / Tape & Reel
NVMFD5877NLWFT3G	5877LW	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 Specifications Brochure, [BRD8011/D](#).

7. **DISCONTINUED:** These devices are not recommended for new design. Please contact your **onsemi** representative for information. The most current information on these devices may be available on [www.onsemi.com](http://www.onsemi.com).



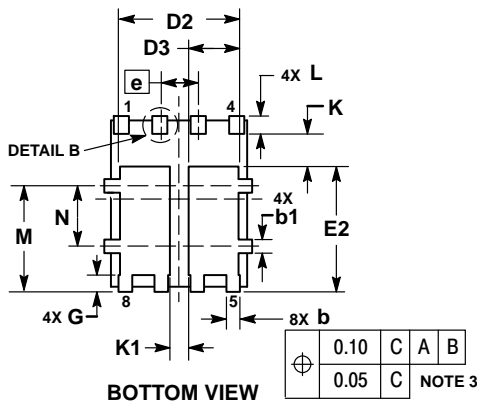
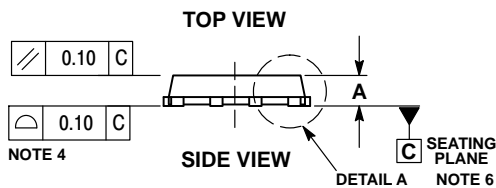
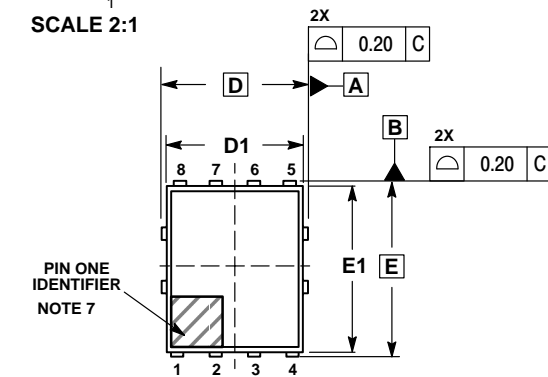
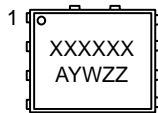
SCALE 2:1

**DFN8 5x6, 1.27P Dual Flag (SO8FL-Dual)**  
CASE 506BT  
ISSUE F

DATE 23 NOV 2021

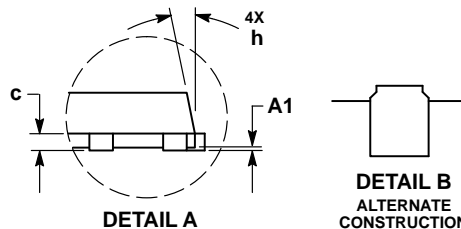
## NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. DIMENSION b APPLIES TO PLATED TERMINAL AND IS MEASURED BETWEEN 0.15 AND 0.30 MM FROM THE TERMINAL TIP.
4. PROFILE TOLERANCE APPLIES TO THE EXPOSED PAD AS WELL AS THE TERMINALS.
5. DIMENSIONS D1 AND E1 DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.
6. SEATING PLANE IS DEFINED BY THE TERMINALS. A1 IS DEFINED AS THE DISTANCE FROM THE SEATING PLANE TO THE LOWEST POINT ON THE PACKAGE BODY.
7. A VISUAL INDICATOR FOR PIN 1 MUST BE LOCATED IN THIS AREA.

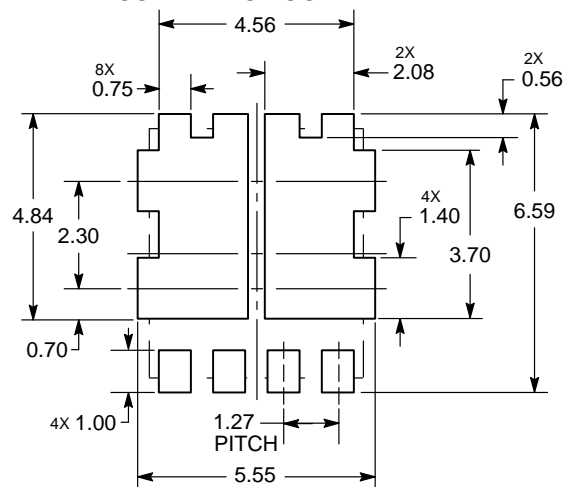

**GENERIC MARKING DIAGRAM\***


XXXXXX = Specific Device Code  
A = Assembly Location  
Y = Year  
W = Work Week  
ZZ = Lot Traceability

\*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "•", may or may not be present. Some products may not follow the Generic Marking.



DIM	MILLIMETERS		
	MIN	NOM	MAX
A	0.90	—	1.10
A1	—	—	0.05
b	0.33	0.42	0.51
b1	0.33	0.42	0.51
c	0.20	—	0.33
D	5.15 BSC		
D1	4.70	4.90	5.10
D2	3.90	4.10	4.30
D3	1.50	1.70	1.90
E	6.15 BSC		
E1	5.70	5.90	6.10
E2	3.90	4.15	4.40
e	1.27 BSC		
G	0.45	0.55	0.65
h	—	—	12 °
K	0.51	—	—
K1	0.56	—	—
L	0.48	0.61	0.71
M	3.25	3.50	3.75
N	1.80	2.00	2.20

**SOLDERING FOOTPRINT\***


DIMENSION: MILLIMETERS

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

**DOCUMENT NUMBER:** 98AON50417E

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**DESCRIPTION:** DFN8 5X6, 1.27P DUAL FLAG (SO8FL-DUAL)

**PAGE 1 OF 1**

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