

# MOSFET – Power, Dual N-Channel Logic Level, Dual SO-8FL

60 V, 58 A, 13 mΩ

NVMFD5873NL

## Features

- Small Footprint (5x6 mm) for Compact Designs
- Low  $R_{DS(on)}$  to Minimize Conduction Losses
- Low Capacitance to Minimize Driver Losses
- NVMFD5873NLWF – Wettable Flanks Option for Enhanced Optical Inspection
- AEC-Q101 Qualified and PPAP Capable
- This is a Pb-Free Device

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

| Symbol         | Parameter                                                                                                                                                          | Value                                          | Unit             |
|----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------|------------------|
| $V_{DSS}$      | Drain-to-Source Voltage                                                                                                                                            | 60                                             | V                |
| $V_{GS}$       | Gate-to-Source Voltage                                                                                                                                             | $\pm 20$                                       | V                |
| $I_D$          | Continuous Drain Current $R_{\Psi J-mb}$ (Notes 1, 2, 3, 4)                                                                                                        | $T_{mb} = 25^\circ\text{C}$                    | 58               |
|                |                                                                                                                                                                    | $T_{mb} = 100^\circ\text{C}$                   | 41               |
|                |                                                                                                                                                                    | $T_{mb} = 25^\circ\text{C}$                    | 107              |
| $P_D$          | Power Dissipation $R_{\Psi J-mb}$ (Notes 1, 2, 3)                                                                                                                  | $T_{mb} = 25^\circ\text{C}$                    | 107              |
|                |                                                                                                                                                                    | $T_{mb} = 100^\circ\text{C}$                   | 54               |
|                |                                                                                                                                                                    | $T_{mb} = 25^\circ\text{C}$                    | 10               |
| $I_D$          | Continuous Drain Current $R_{\theta JA}$ (Notes 1, 3 & 4)                                                                                                          | $T_A = 25^\circ\text{C}$                       | 10               |
|                |                                                                                                                                                                    | $T_A = 100^\circ\text{C}$                      | 7.0              |
|                |                                                                                                                                                                    | $T_A = 25^\circ\text{C}$                       | 3.1              |
| $P_D$          | Power Dissipation $R_{\theta JA}$ (Notes 1 & 3)                                                                                                                    | $T_A = 25^\circ\text{C}$                       | 3.1              |
|                |                                                                                                                                                                    | $T_A = 100^\circ\text{C}$                      | 1.6              |
|                |                                                                                                                                                                    | $T_A = 100^\circ\text{C}$                      | 1.6              |
| $I_{DM}$       | Pulsed Drain Current                                                                                                                                               | $T_A = 25^\circ\text{C}, t_p = 10 \mu\text{s}$ | 190              |
| $T_J, T_{stg}$ | Operating Junction and Storage Temperature                                                                                                                         | $-55$ to $175$                                 | $^\circ\text{C}$ |
| $I_S$          | Source Current (Body Diode)                                                                                                                                        | 58                                             | A                |
| $E_{AS}$       | Single Pulse Drain-to-Source Avalanche Energy ( $T_J = 25^\circ\text{C}, V_{GS} = 10 \text{ V}, I_{L(pk)} = 28.3 \text{ A}, L = 0.1 \text{ mH}, R_G = 25 \Omega$ ) | 40                                             | mJ               |
| $T_L$          | Lead Temperature for Soldering Purposes (1/8" from case for 10 s)                                                                                                  | 260                                            | $^\circ\text{C}$ |

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)

| Symbol          | Parameter                                                    | Value | Unit                      |
|-----------------|--------------------------------------------------------------|-------|---------------------------|
| $R_{\Psi J-mb}$ | Junction-to-Mounting Board (top) – Steady State (Notes 2, 3) | 1.4   | $^\circ\text{C}/\text{W}$ |
| $R_{\theta JA}$ | Junction-to-Ambient – Steady State (Note 3)                  | 48    | $^\circ\text{C}/\text{W}$ |

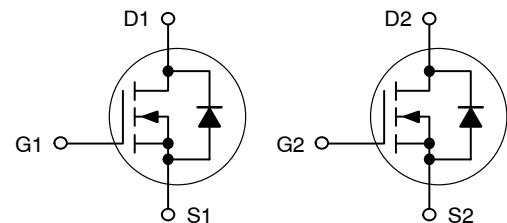
1. The entire application environment impacts the thermal resistance values shown, they are not constants and are only valid for the particular conditions noted.
2. Psi ( $\Psi$ ) is used as required per JESD51-12 for packages in which substantially less than 100% of the heat flows to single case surface.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

| $V_{(BR)DSS}$ | $R_{DS(on)}$ MAX | $I_D$ MAX |
|---------------|------------------|-----------|
| 60 V          | 13 mΩ @ 10 V     | 58 A      |
|               | 16.5 mΩ @ 4.5 V  |           |

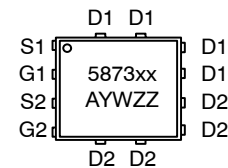


DFN8 5x6  
(SO8FL)  
CASE 506BT

## Dual N-Channel



## MARKING DIAGRAM



5873NL = Specific Device Code for NVMFD5873NL  
 5873LW = Specific Device Code for NVMFD5873NLWF  
 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.

NOTE: Some of the devices on this data sheet have been **DISCONTINUED**. Please refer to the table on page 5.

# NVMFD5873NL

## ELECTRICAL CHARACTERISTICS (T<sub>J</sub> = 25°C unless otherwise specified)

| Symbol | Parameter | Test Condition | Min | Typ | Max | Unit |
|--------|-----------|----------------|-----|-----|-----|------|
|--------|-----------|----------------|-----|-----|-----|------|

### OFF CHARACTERISTICS

|                                      |                                                           |                                                  |                                                 |      |            |       |
|--------------------------------------|-----------------------------------------------------------|--------------------------------------------------|-------------------------------------------------|------|------------|-------|
| V <sub>(BR)DSS</sub>                 | Drain-to-Source Breakdown Voltage                         | V <sub>GS</sub> = 0 V, I <sub>D</sub> = 250 μA   | 60                                              |      |            | V     |
| V <sub>(BR)DSS</sub> /T <sub>J</sub> | Drain-to-Source Breakdown Voltage Temperature Coefficient |                                                  |                                                 | 54.9 |            | mV/°C |
| I <sub>DSS</sub>                     | Zero Gate Voltage Drain Current                           | V <sub>GS</sub> = 0 V,<br>V <sub>DS</sub> = 60 V | T <sub>J</sub> = 25°C<br>T <sub>J</sub> = 125°C |      | 1.0<br>100 | μA    |
| I <sub>GSS</sub>                     | Gate-to-Source Leakage Current                            | V <sub>DS</sub> = 0 V, V <sub>GS</sub> = ±20 V   |                                                 |      | ±100       | nA    |

### ON CHARACTERISTICS (Note 7)

|                                     |                                   |                                                                                                 |     |              |            |       |
|-------------------------------------|-----------------------------------|-------------------------------------------------------------------------------------------------|-----|--------------|------------|-------|
| V <sub>GS(TH)</sub>                 | Gate Threshold Voltage            | V <sub>GS</sub> = V <sub>DS</sub> , I <sub>D</sub> = 250 μA                                     | 1.5 |              | 2.5        | V     |
| V <sub>GS(TH)</sub> /T <sub>J</sub> | Threshold Temperature Coefficient |                                                                                                 |     | -5.8         |            | mV/°C |
| R <sub>DS(on)</sub>                 | Drain-to-Source On Resistance     | V <sub>GS</sub> = 10 V, I <sub>D</sub> = 15 A<br>V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 10 A |     | 10.7<br>13.6 | 13<br>16.5 | mΩ    |
| g <sub>FS</sub>                     | Forward Transconductance          | V <sub>DS</sub> = 5.0 V, I <sub>D</sub> = 15 A                                                  |     | 15           |            | S     |

### CHARGES AND CAPACITANCES

|                     |                              |                                                                           |  |      |  |    |
|---------------------|------------------------------|---------------------------------------------------------------------------|--|------|--|----|
| C <sub>iss</sub>    | Input Capacitance            | V <sub>GS</sub> = 0 V, f = 1.0 MHz, V <sub>DS</sub> = 25 V                |  | 1560 |  | pF |
| C <sub>oss</sub>    | Output Capacitance           |                                                                           |  | 145  |  |    |
| C <sub>rss</sub>    | Reverse Transfer Capacitance |                                                                           |  | 98   |  |    |
| Q <sub>G(TOT)</sub> | Total Gate Charge            | V <sub>GS</sub> = 4.5 V, V <sub>DS</sub> = 48 V,<br>I <sub>D</sub> = 15 A |  | 16.5 |  | nC |
| Q <sub>G(TH)</sub>  | Threshold Gate Charge        |                                                                           |  | 1.3  |  |    |
| Q <sub>GS</sub>     | Gate-to-Source Charge        |                                                                           |  | 4.0  |  |    |
| Q <sub>GD</sub>     | Gate-to-Drain Charge         |                                                                           |  | 8.8  |  |    |
| Q <sub>G(TOT)</sub> | Total Gate Charge            | V <sub>GS</sub> = 10 V, V <sub>DS</sub> = 48V, I <sub>D</sub> = 15 A      |  | 30.5 |  | nC |

### SWITCHING CHARACTERISTICS (Note 8)

|                     |                     |                                                                                                   |  |      |  |    |
|---------------------|---------------------|---------------------------------------------------------------------------------------------------|--|------|--|----|
| t <sub>d(on)</sub>  | Turn-On Delay Time  | V <sub>GS</sub> = 4.5 V, V <sub>DS</sub> = 48 V,<br>I <sub>D</sub> = 15 A, R <sub>G</sub> = 2.5 Ω |  | 10.8 |  | ns |
| t <sub>r</sub>      | Rise Time           |                                                                                                   |  | 51   |  |    |
| t <sub>d(off)</sub> | Turn-Off Delay Time |                                                                                                   |  | 21   |  |    |
| t <sub>f</sub>      | Fall Time           |                                                                                                   |  | 42.6 |  |    |
| t <sub>d(on)</sub>  | Turn-On Delay Time  | V <sub>GS</sub> = 10 V, V <sub>DS</sub> = 48 V,<br>I <sub>D</sub> = 15 A, R <sub>G</sub> = 2.5 Ω  |  | 9.5  |  | ns |
| t <sub>r</sub>      | Rise Time           |                                                                                                   |  | 13   |  |    |
| t <sub>d(off)</sub> | Turn-Off Delay Time |                                                                                                   |  | 25   |  |    |
| t <sub>f</sub>      | Fall Time           |                                                                                                   |  | 6.6  |  |    |

### DRAIN-SOURCE DIODE CHARACTERISTICS

|                 |                         |                                                                                 |                                                 |            |     |    |
|-----------------|-------------------------|---------------------------------------------------------------------------------|-------------------------------------------------|------------|-----|----|
| V <sub>SD</sub> | Forward Diode Voltage   | V <sub>GS</sub> = 0 V,<br>I <sub>S</sub> = 15 A                                 | T <sub>J</sub> = 25°C<br>T <sub>J</sub> = 125°C | 0.8<br>0.7 | 1.0 | V  |
| t <sub>RR</sub> | Reverse Recovery Time   | V <sub>GS</sub> = 0 V, dI <sub>S</sub> /dI = 100 A/μs,<br>I <sub>S</sub> = 15 A |                                                 | 22.4       |     | ns |
| t <sub>a</sub>  | Charge Time             |                                                                                 |                                                 | 14.5       |     |    |
| t <sub>b</sub>  | Discharge Time          |                                                                                 |                                                 | 9.0        |     |    |
| Q <sub>RR</sub> | Reverse Recovery Charge |                                                                                 |                                                 | 18         |     | nC |

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

TYPICAL CHARACTERISTICS

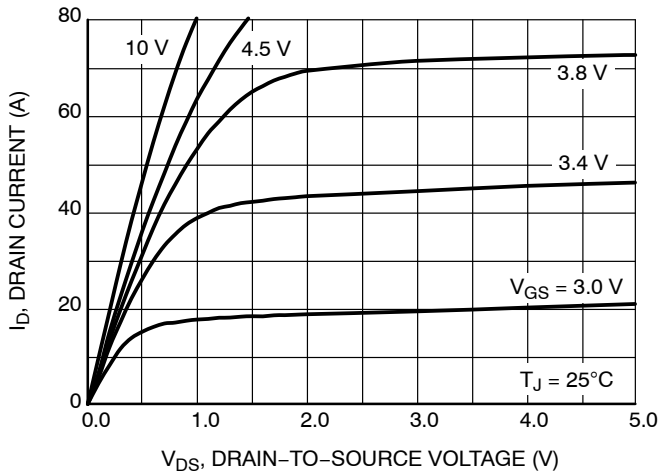


Figure 1. On-Region Characteristics

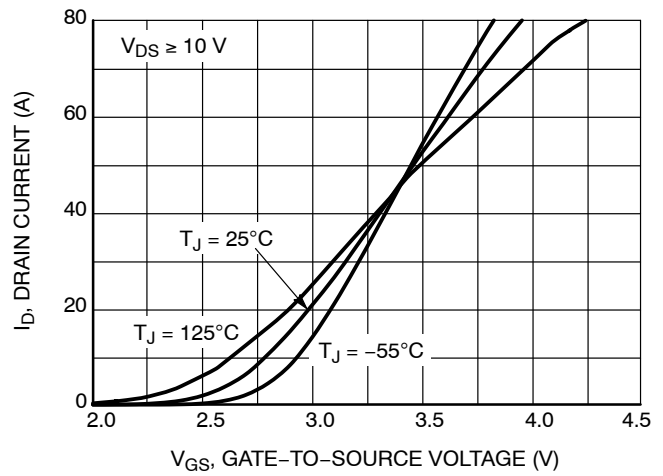


Figure 2. Transfer Characteristics

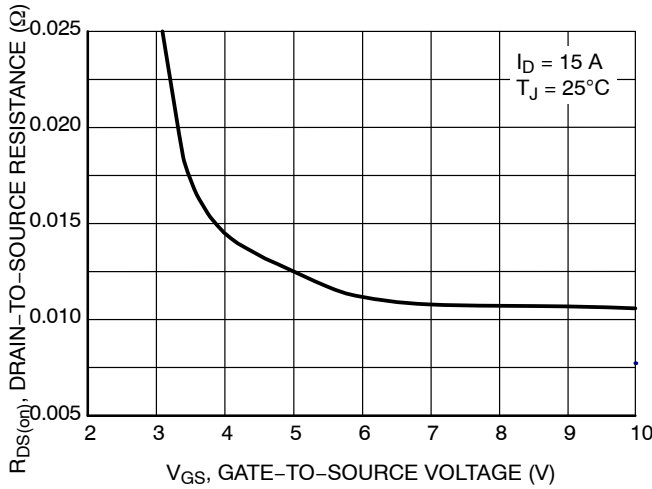


Figure 3. On-Resistance vs.  $V_{GS}$

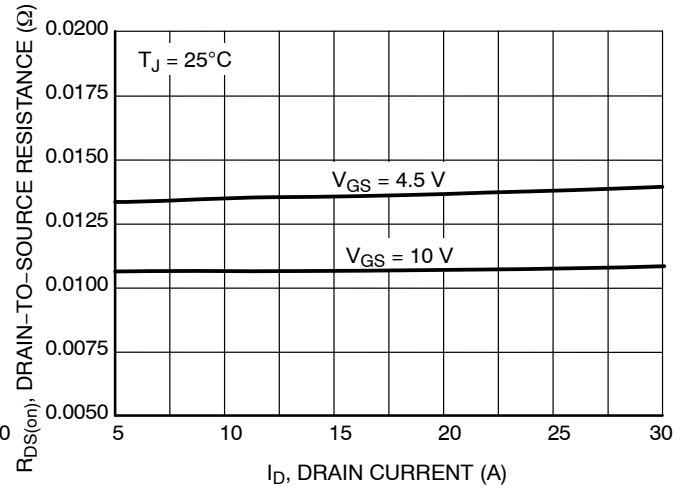


Figure 4. On-Resistance vs. Drain Current and Gate Voltage

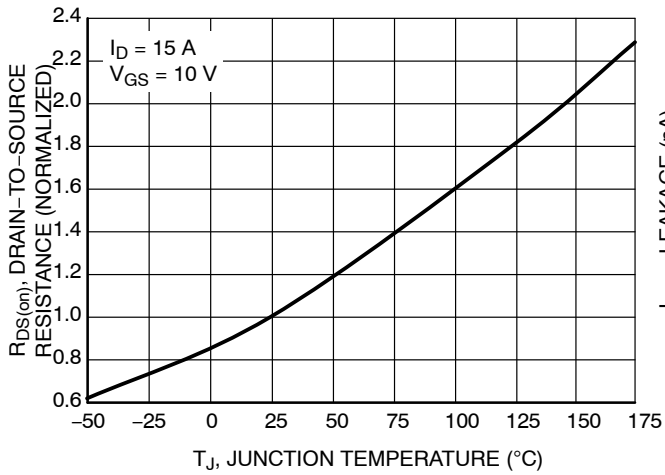


Figure 5. On-Resistance Variation with Temperature

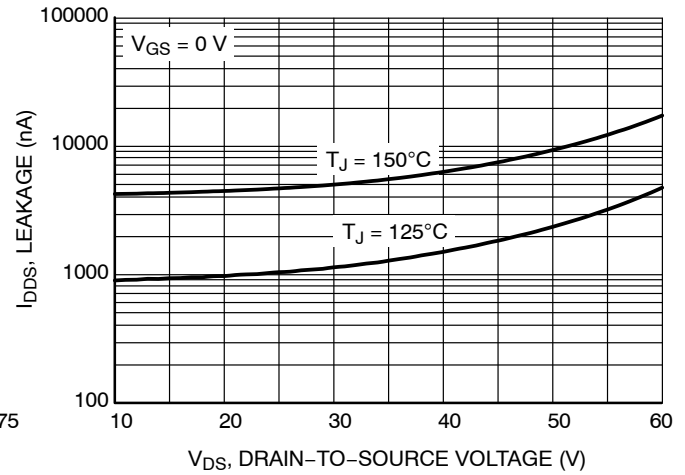


Figure 6. Drain-to-Source Leakage Current vs. Voltage

TYPICAL CHARACTERISTICS (continued)

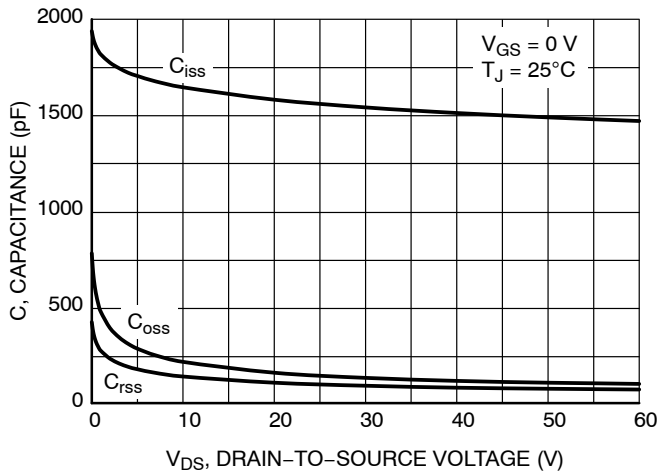


Figure 7. Capacitance Variation

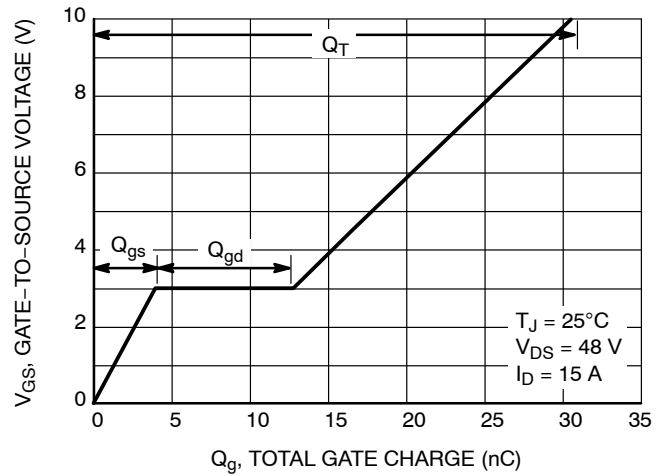


Figure 8. Gate-to-Source and Drain-to-Source Voltage vs. Total Charge

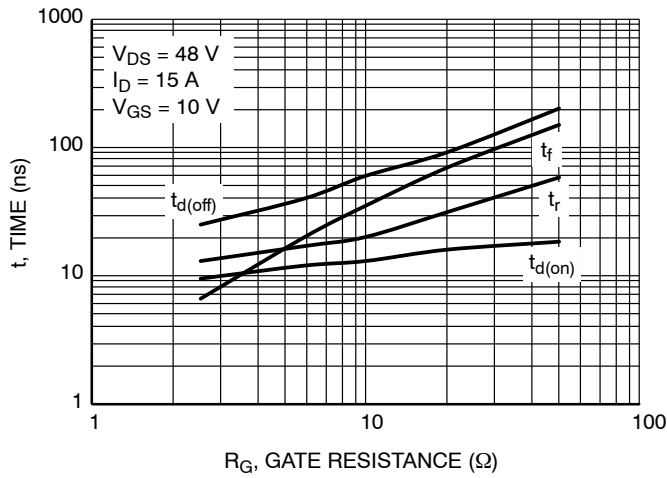


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

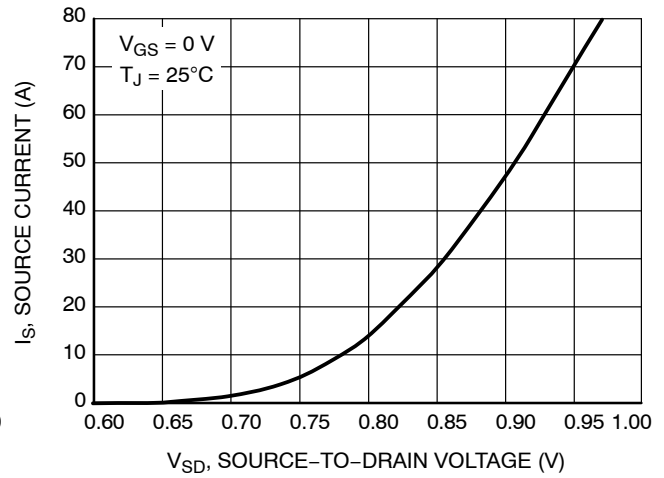


Figure 10. Diode Forward Voltage vs. Current

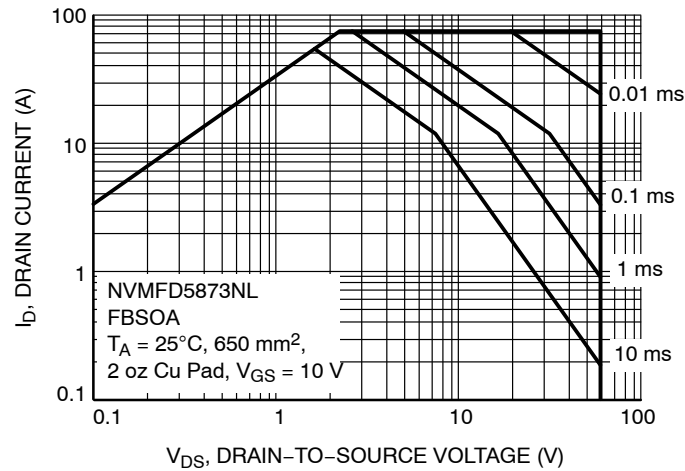


Figure 11. Maximum Rated Forward Biased Safe Operating Area

# NVMFD5873NL

## TYPICAL CHARACTERISTICS (continued)

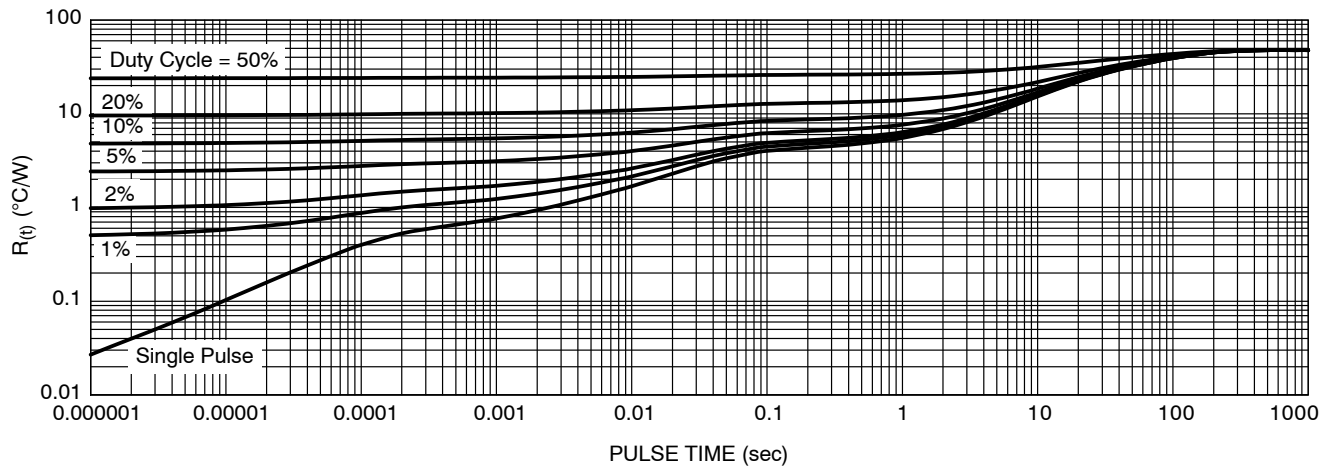


Figure 12. Thermal Response

### DEVICE ORDERING INFORMATION

| Device              | Package        | Shippingg <sup>†</sup> |
|---------------------|----------------|------------------------|
| NVMFD5873NLWFT1G-UM | DFN8 (Pb-Free) | 1,500 / Tape & Reel    |

### DISCONTINUED (Note 9)

|                  |                |                     |
|------------------|----------------|---------------------|
| NVMFD5873NLT1G   | DFN8 (Pb-Free) | 1,500 / Tape & Reel |
| NVMFD5873NLWFT1G | DFN8 (Pb-Free) | 1,500 / Tape & Reel |

<sup>†</sup>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](#).

9. **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).



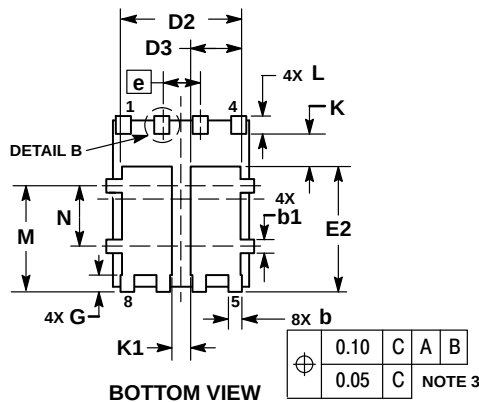
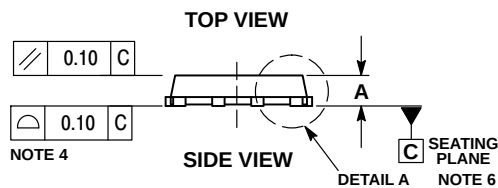
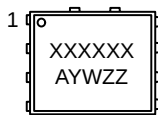
SCALE 2:1

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

DATE 23 NOV 2021

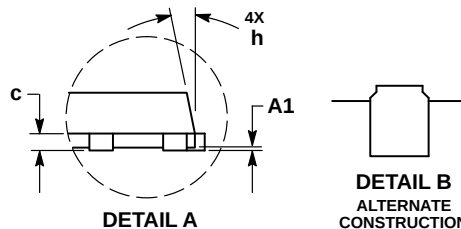
## NOTES:

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.

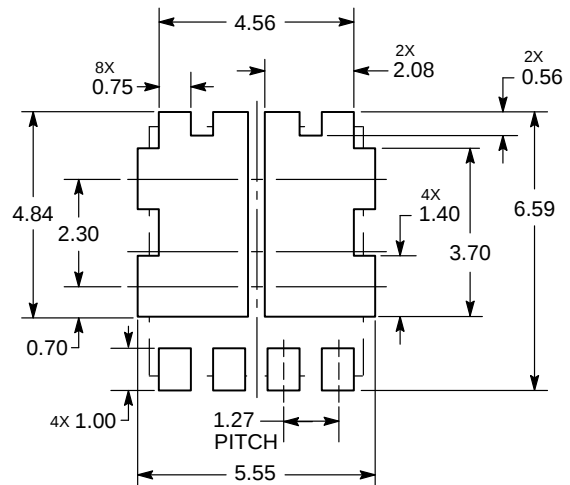

**GENERIC MARKING DIAGRAM\***


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.

|                         |                                               |                                                                                                                                                                                     |
|-------------------------|-----------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
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| <b>DESCRIPTION:</b>     | <b>DFN8 5X6, 1.27P DUAL FLAG (SO8FL-DUAL)</b> | <b>PAGE 1 OF 1</b>                                                                                                                                                                  |

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