# MOSFET – Power, Single, P-Channel, μCool, WDFN, 2X2 mm

## -12 V, -7.7 A

# NTLJS2103P

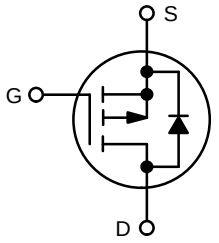
| $V_{(BR)DSS}$ | $R_{DS(on)}$ TYP | $I_D$ MAX (Note 1) |
|---|---|---|
| −12 V | 25 mΩ @ −4.5 V | −5.9 A |
| | 35 mΩ @ −2.5 V | −5.3 A |
| | 45 mΩ @ −1.8 V | −2.0 A |
| | 60 mΩ @ −1.5 V | −1.0 A |
| | 95 mΩ @ −1.2 V | −0.2 A |

### Features

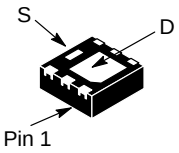
- **Recommended Replacement Device − NTLUS3A40P**
- WDFN Package Provides Exposed Drain Pad for Excellent Thermal Conduction
- 2x2 mm Footprint Same as SC-88 Package
- Lowest $R_{DS(on)}$ Solution in 2x2 mm Package
- 1.2 V $R_{DS(on)}$ Rating for Operation at Low Voltage Logic Level Gate Drive
- Low Profile (< 0.8 mm) for Easy Fit in Thin Environments
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

### Applications

- High Side Load Switch
- DC-DC Converters (Buck and Boost Circuits)
- Optimized for Battery and Load Management Applications in Portable Equipment
- Li-Ion Battery Linear Mode Charging

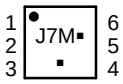



**P-CHANNEL MOSFET**




**WDFN6**
**CASE 506AP**

**MARKING DIAGRAM**




J7 = Specific Device Code
M = Date Code
▪ = Pb-Free Package
(Note: Microdot may be in either location)

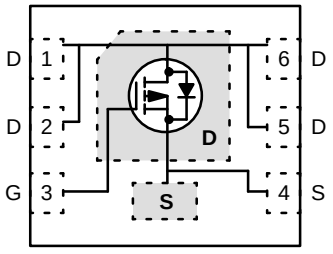
### MAXIMUM RATINGS ($T_J$ = 25 °C unless otherwise noted)

| Parameter | | | Symbol | Value | Unit |
|---|---|---|---|---|---|
| Drain-to-Source Voltage | | | $V_{DSS}$ | −12 | V |
| Gate-to-Source Voltage | | | $V_{GS}$ | ±8.0 | V |
| Continuous Drain Current (Note 1) | Steady State | $T_A$ = 25 °C | $I_D$ | −5.9 | A |
| | | $T_A$ = 85 °C | | −4.2 | |
| | t ≤ 5 s | $T_A$ = 25 °C | | −7.7 | |
| Power Dissipation (Note 1) | Steady State | $T_A$ = 25 °C | $P_D$ | 1.9 | W |
| | t ≤ 5 s | | | 3.3 | |
| Continuous Drain Current (Note 2) | Steady State | $T_A$ = 25 °C | $I_D$ | −3.5 | A |
| | | $T_A$ = 85 °C | | −2.5 | |
| Power Dissipation (Note 2) | | $T_A$ = 25 °C | $P_D$ | 0.7 | W |
| Pulsed Drain Current | $t_p$ = 10 μs | | $I_{DM}$ | −24 | A |
| Operating Junction and Storage Temperature | | | $T_J$, $T_{STG}$ | −55 to 150 | °C |
| Source Current (Body Diode) (Note 2) | | | $I_S$ | −2.7 | A |
| Lead Temperature 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.

1. Surface Mounted on FR4 Board using 1 in sq pad size (Cu area = 1.127 in sq [2 oz] including traces).
2. Surface Mounted on FR4 Board using the minimum recommended pad size, (30 $mm^2$, 2 oz Cu).

### PIN CONNECTIONS




(Top View)

### ORDERING INFORMATION

| Device | Package | Shipping† |
|---|---|---|
| NTLJS2103PTBG | WDFN6 (Pb-Free) | 3000/Tape & Reel |

**DISCONTINUED** (Note 1)

| | | |
|---|---|---|
| NTLJS2103PTAG | WDFN6 (Pb-Free) | 3000/Tape & Reel |

† For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specification Brochure, BRD8011/D.

1. **DISCONTINUED:** This device is not recommended for new design. Please contact your **onsemi** representative for information. The most current information on this device may be available on www.onsemi.com.

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## THERMAL RESISTANCE RATINGS

| Parameter | Symbol | Max | Unit |
|---|---|---|---|
| Junction-to-Ambient − Steady State (Note 3) | $R_{\theta JA}$ | 65 | °C/W |
| Junction-to-Ambient − t ≤ 5 s (Note 3) | $R_{\theta JA}$ | 38 | |
| Junction-to-Ambient − Steady State Min Pad (Note 4) | $R_{\theta JA}$ | 180 | |

3. Surface Mounted on FR4 Board using 1 in sq pad size (Cu area = 1.127 in sq [2 oz] including traces).
4. Surface Mounted on FR4 Board using the minimum recommended pad size (30 $mm^2$, 2 oz Cu).

## MOSFET ELECTRICAL CHARACTERISTICS ($T_J$ = 25 °C unless otherwise noted)

| Parameter | Symbol | Test Conditions | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| **OFF CHARACTERISTICS** | | | | | | | |
| Drain-to-Source Breakdown Voltage | $V_{(BR)DSS}$ | $V_{GS}$ = 0 V, $I_D$ = −250 μA | | −12 | | | V |
| Drain-to-Source Breakdown Voltage Temperature Coefficient | $V_{(BR)DSS}/T_J$ | $I_D$ = −250 μA, Ref to 25 °C | | | −8.0 | | mV/°C |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$ = −12 V, $V_{GS}$ = 0 V | $T_J$ = 25 °C | | | −1.0 | μA |
| | | | $T_J$ = 85 °C | | | −5.0 | |
| Gate-to-Source Leakage Current | $I_{GSS}$ | $V_{DS}$ = 0 V, $V_{GS}$ = ±8.0 V | | | | ±0.1 | μA |
| **ON CHARACTERISTICS** (Note 5) | | | | | | | |
| Gate Threshold Voltage | $V_{GS(TH)}$ | $V_{GS}$ = $V_{DS}$, $I_D$ = −250 μA | | −0.3 | | −0.8 | V |
| Negative Gate Threshold Temperature Coefficient | $V_{GS(TH)}/T_J$ | | | | 2.6 | | mV/°C |
| Drain-to-Source On-Resistance | $R_{DS(on)}$ | $V_{GS}$ = −4.5, $I_D$ = −5.9 A | | | 25 | 40 | mΩ |
| | | $V_{GS}$ = −4.5, $I_D$ = −3.0 A | | | 25 | 40 | |
| | | $V_{GS}$ = −2.5, $I_D$ = −5.3 A | | | 35 | 50 | |
| | | $V_{GS}$ = −2.5, $I_D$ = −3.0 A | | | 35 | 50 | |
| | | $V_{GS}$ = −1.8, $I_D$ = −2.0 A | | | 45 | 75 | |
| | | $V_{GS}$ = −1.5, $I_D$ = −1.0 A | | | 60 | 100 | |
| | | $V_{GS}$ = −1.2, $I_D$ = −200 mA | | | 95 | 400 | |
| Forward Transconductance | $g_{FS}$ | $V_{DS}$ = −6.0 V, $I_D$ = −2.0 A | | | 8.8 | | S |
| **CHARGES, CAPACITANCES AND GATE RESISTANCE** | | | | | | | |
| Input Capacitance | $C_{ISS}$ | $V_{GS}$ = 0 V, f = 1.0 MHz, $V_{DS}$ = −6.0 V | | | 1157 | | pF |
| Output Capacitance | $C_{OSS}$ | | | | 300 | | |
| Reverse Transfer Capacitance | $C_{RSS}$ | | | | 200 | | |
| Total Gate Charge | $Q_{G(TOT)}$ | $V_{GS}$ = −4.5 V, $V_{DS}$ = −9.6 V, $I_D$ = −5.9 A | | | 12.8 | 15 | nC |
| Threshold Gate Charge | $Q_{G(TH)}$ | | | | 0.4 | | |
| Gate-to-Source Charge | $Q_{GS}$ | | | | 1.6 | | |
| Gate-to-Drain Charge | $Q_{GD}$ | | | | 3.6 | | |
| Gate Resistance | $R_G$ | | | | 15.7 | | Ω |
| **SWITCHING CHARACTERISTICS** (Note 6) | | | | | | | |
| Turn-On Delay Time | $t_{d(ON)}$ | $V_{GS}$ = −4.5 V, $V_{DD}$ = −8.0 V, $I_D$ = −5.9 A, $R_G$ = 2.0 Ω | | | 8.0 | | ns |
| Rise Time | $t_r$ | | | | 27 | | |
| Turn-Off Delay Time | $t_{d(OFF)}$ | | | | 74 | | |
| Fall Time | $t_f$ | | | | 88 | | |
| **DRAIN-SOURCE DIODE CHARACTERISTICS** | | | | | | | |
| Forward Recovery Voltage | $V_{SD}$ | $V_{GS}$ = 0 V, $I_S$ = −1.0 A | $T_J$ = 25 °C | | 0.62 | 1.0 | V |
| | | | $T_J$ = 85 °C | | 0.56 | | |
| Reverse Recovery Time | $t_{RR}$ | $V_{GS}$ = 0 V, $d_{ISD}/d_t$ = 100 A/μs, $I_S$ = −1.0 A | | | 27 | 50 | ns |
| Charge Time | $t_a$ | | | | 10 | | |
| Discharge Time | $t_b$ | | | | 17 | | |
| Reverse Recovery Time | $Q_{RR}$ | | | | 14 | | 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.

5. Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2%.
6. Switching characteristics are independent of operating junction temperatures.



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## TYPICAL PERFORMANCE CURVES ($T_J$ = 25 °C unless otherwise noted)

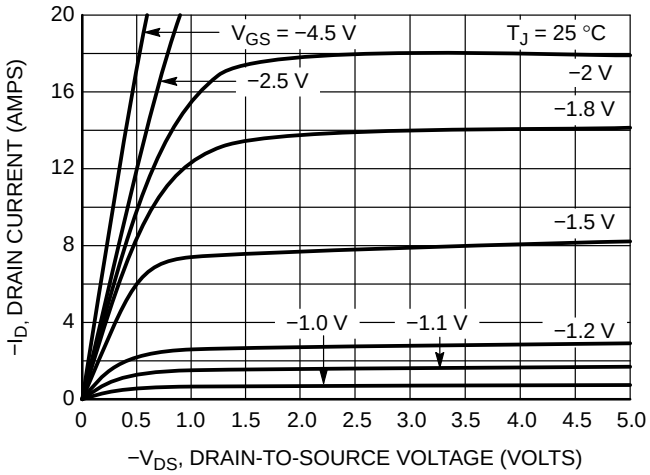



**Figure 1. On-Region Characteristics**

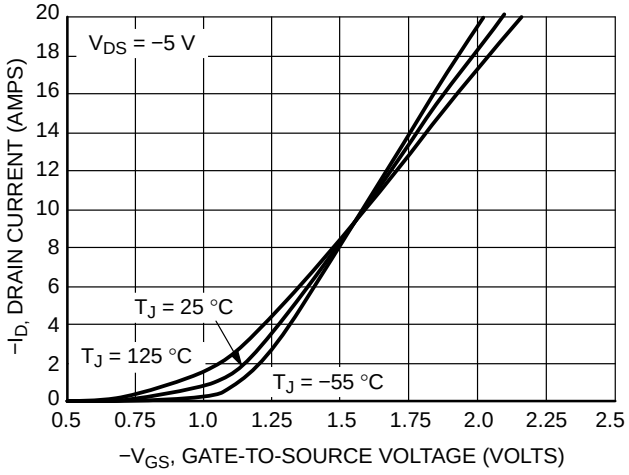



**Figure 2. Transfer Characteristics**

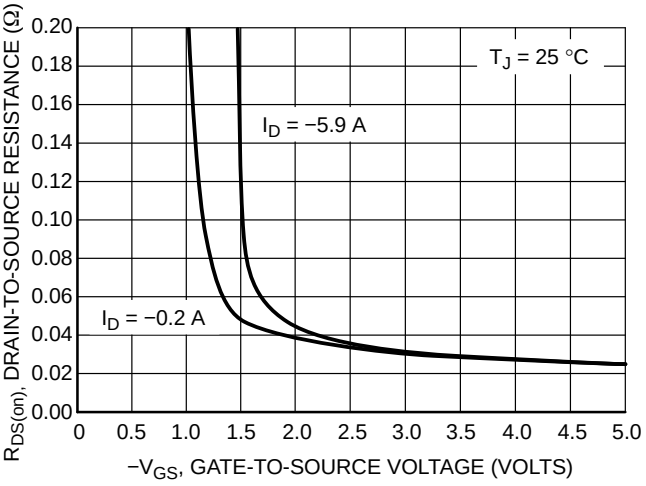



**Figure 3. On-Resistance vs. Gate-to-Source Voltage**

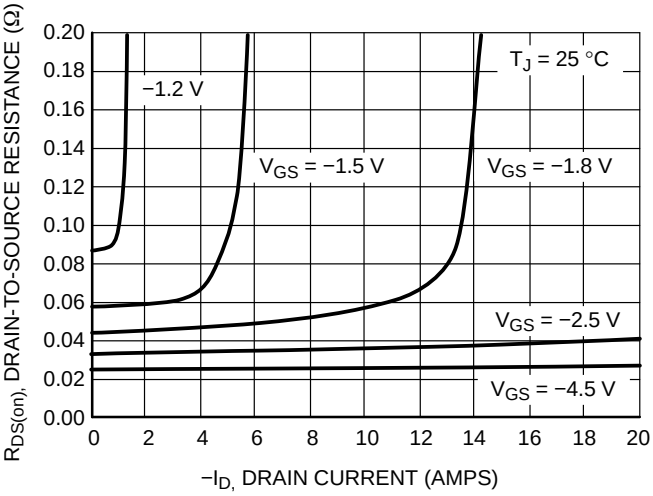



**Figure 4. On-Resistance vs. Drain Current and Gate Voltage**

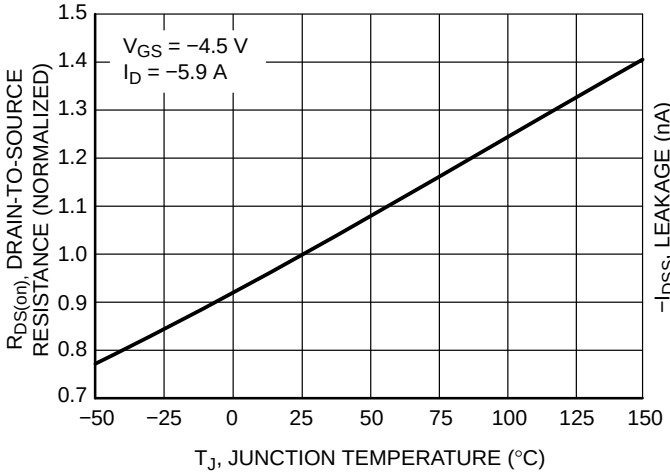



**Figure 5. On-Resistance Variation with Temperature**

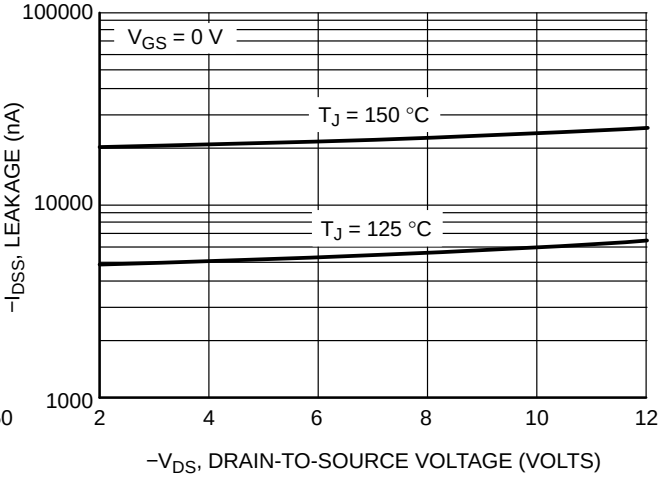



**Figure 6. Drain-to-Source Leakage Current vs. Voltage**



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## TYPICAL PERFORMANCE CURVES ($T_J$ = 25 °C unless otherwise noted)

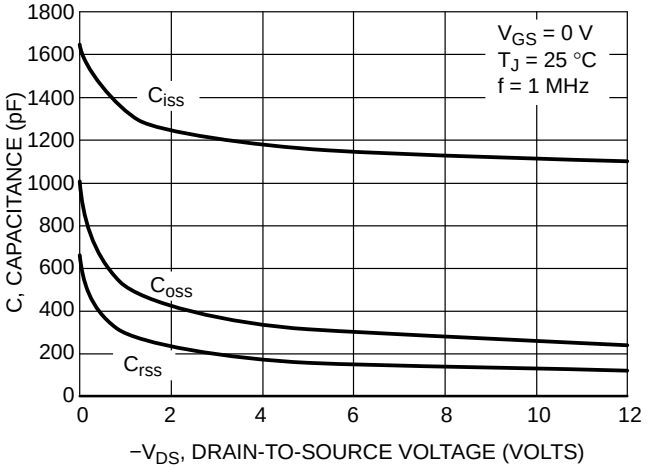



**Figure 7. Capacitance Variation**

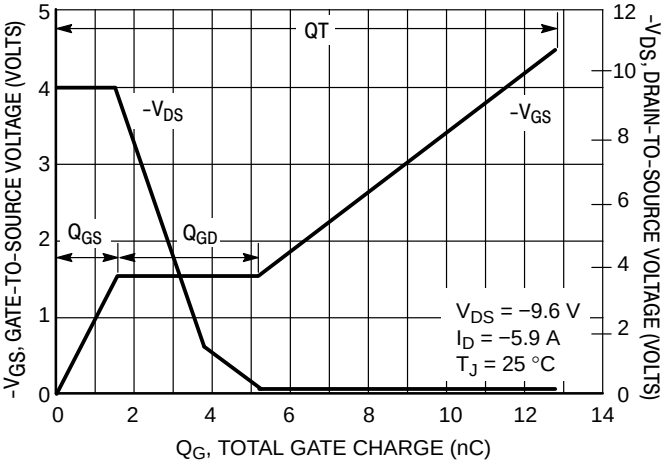



**Figure 8. Gate-to-Source and Drain-to-Source Voltage vs. Total Charge**

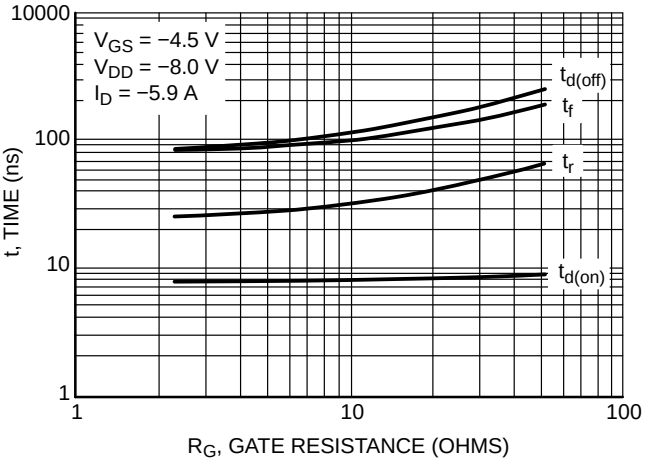



**Figure 9. Resistive Switching Time Variation versus Gate Resistance**

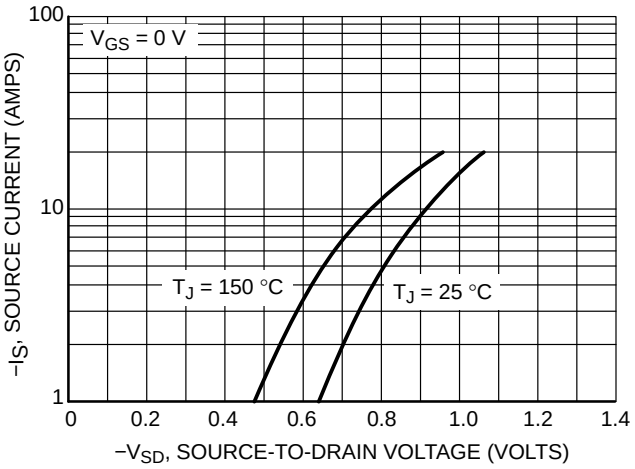



**Figure 10. Diode Forward Voltage vs. Current**

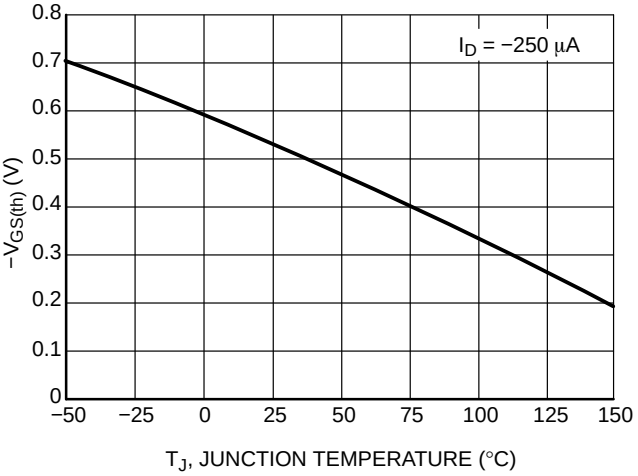



**Figure 11. Threshold Voltage**

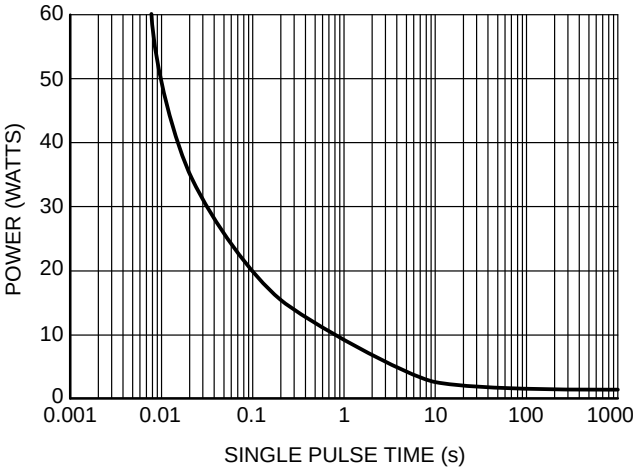



**Figure 12. Single Pulse Maximum Power Dissipation**



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## TYPICAL PERFORMANCE CURVES ($T_J$ = 25 °C unless otherwise noted)

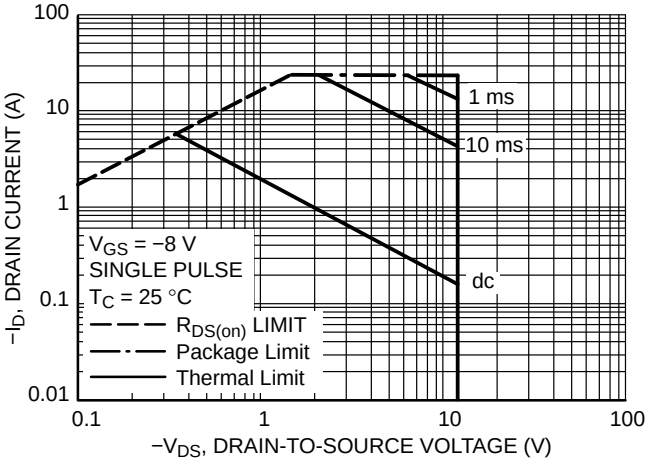



**Figure 13. Maximum Rated Forward Biased Safe Operating Area**

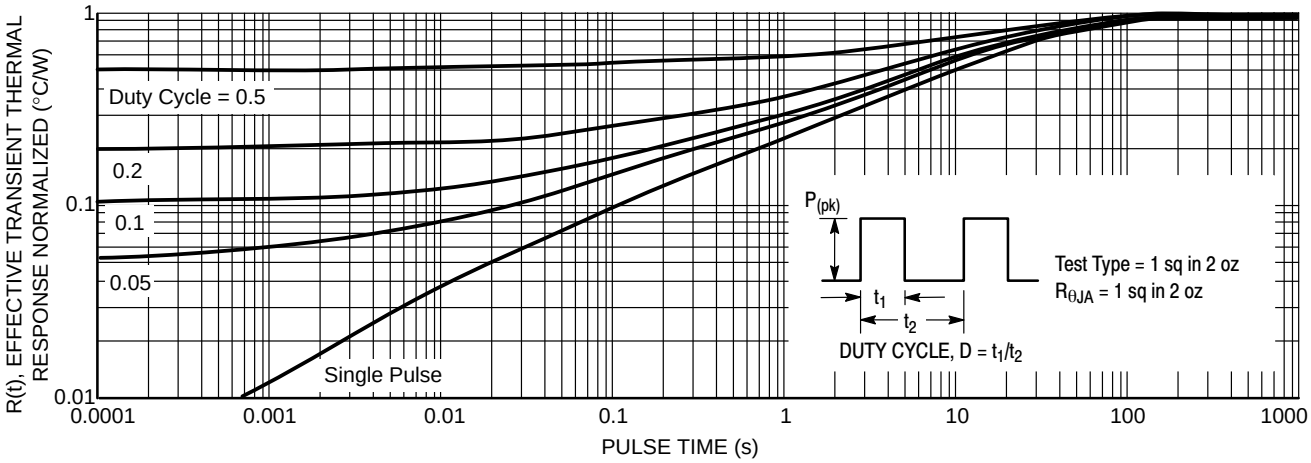



**Figure 14. FET Thermal Response**



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## REVISION HISTORY

| Revision | Description of Changes | Date |
|---|---|---|
| 4 | Rebranded the document to **onsemi** format. NTLJS2103PTAG OPN marked as Discontinued. | 1/27/2026 |

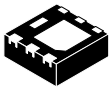
This document has undergone updates prior to the inclusion of this revision history table. The changes tracked here only reflect updates made on the noted approval dates.



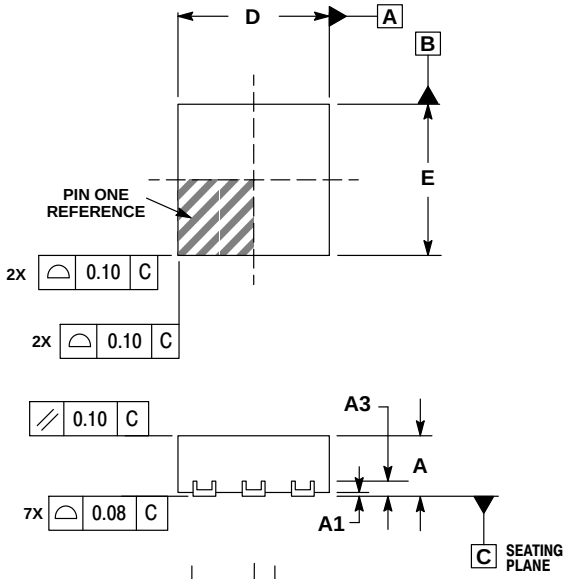
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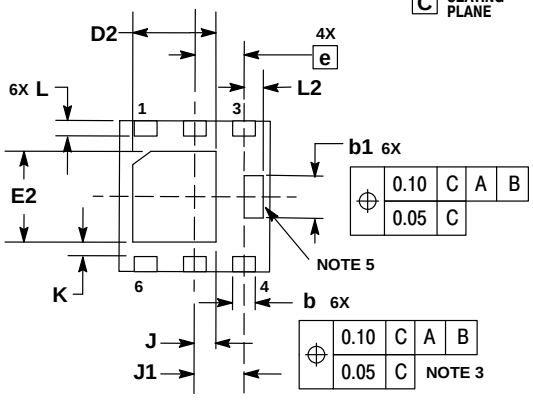
**WDFN6 2x2**
CASE 506AP
ISSUE B

DATE 26 APR 2006



**SCALE 4:1**




**BOTTOM VIEW**

STYLE 1:
PIN 1. DRAIN
2. DRAIN
3. GATE
4. SOURCE
5. DRAIN
6. DRAIN

STYLE 2:
PIN 1. COLLECTOR
2. COLLECTOR
3. BASE
4. EMITTER
5. COLLECTOR
6. COLLECTOR

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 0.20mm FROM TERMINAL.
4. COPLANARITY APPLIES TO THE EXPOSED PAD AS WELL AS THE TERMINALS.
1. CENTER TERMINAL LEAD IS OPTIONAL. TERMINAL LEAD IS CONNECTED TO TERMINAL LEAD # 4.
2. PINS 1, 2, 5 AND 6 ARE TIED TO THE FLAG.

| | MILLIMETERS | |
|---|---|---|
| DIM | MIN | MAX |
| A | 0.70 | 0.80 |
| A1 | 0.00 | 0.05 |
| A3 | 0.20 REF | |
| b | 0.25 | 0.35 |
| b1 | 0.51 | 0.61 |
| D | 2.00 BSC | |
| D2 | 1.00 | 1.20 |
| E | 2.00 BSC | |
| E2 | 1.10 | 1.30 |
| e | 0.65 BSC | |
| K | 0.15 REF | |
| L | 0.20 | 0.30 |
| L2 | 0.20 | 0.30 |
| J | 0.27 REF | |
| J1 | 0.65 REF | |

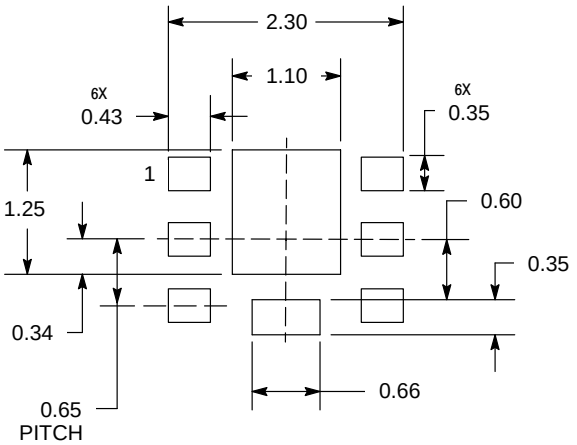
## GENERIC MARKING DIAGRAM*




XX = Specific Device Code
M = Date Code

*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.

## SOLDERMASK DEFINED MOUNTING FOOTPRINT




DIMENSIONS: MILLIMETERS

| | | |
|---|---|---|
| **DOCUMENT NUMBER:** | **98AON20860D** | Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped “CONTROLLED COPY” in red. |
| **DESCRIPTION:** | **6 PIN WDFN 2X2, 0.65P** | **PAGE 1 OF 1** |

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**Kategorilere göz atın**

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Aradığınız üreticinin ürünlerini tek sayfada inceleyin.

**Üreticileri görün**

### Toplu alım ve teklif

Listede olmayan ya da yüksek adetli parçalar için teklif isteyin.

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