

# NL27WZU04

## Dual Unbuffered Inverter

The NL27WZU04 is a high performance dual unbuffered inverter operating from a 1.65 to 5.5 V supply. These devices are well suited for use as oscillators, pulse shapers, and in many other applications requiring a high-input impedance amplifier. For digital applications, the NL27WZU04 is recommended.

### Features

- Designed for 1.65 V to 5.5 V  $V_{CC}$  Operation
- Unbuffered for Crystal Oscillator and Analog Applications
- LVC MOS Compatible
- Source/Sink  $\pm 16$  mA @ 4.5 V  $V_{CC}$
- Near Zero Static Supply Current Substantially Reduces System Power Requirements
- Chip Complexity: FET = 72; Equivalent Gate = 18
- These Devices are Pb-Free and are RoHS Compliant
- NLV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q100 Qualified and PPAP Capable

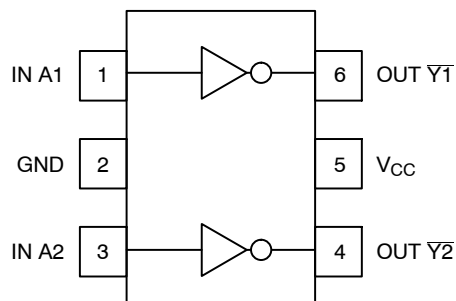


Figure 1. Pinout (Top View)

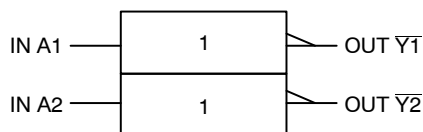


Figure 2. Logic Symbol

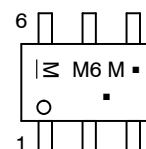


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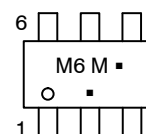
<http://onsemi.com>

### MARKING DIAGRAMS

  
SC-88/SOT-363/SC-70  
DF SUFFIX  
CASE 419B



  
TSOP-6  
DT SUFFIX  
CASE 318G



M6 = Device Code  
M = Date Code\*  
▪ = Pb-Free Package

(Note: Microdot may be in either location)

\*Date Code orientation and/or position may vary depending upon manufacturing location.

### PIN ASSIGNMENT

| Pin | Function       |
|-----|----------------|
| 1   | IN A1          |
| 2   | GND            |
| 3   | IN A2          |
| 4   | OUT $\bar{Y}2$ |
| 5   | $V_{CC}$       |
| 6   | OUT $\bar{Y}1$ |

### FUNCTION TABLE

| A Input | $\bar{Y}$ Output |
|---------|------------------|
| L       | H                |
| H       | L                |

### ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 4 of this data sheet.

# MAXIMUM RATINGS

| Symbol               | Characteristics                                                                                               | Value                                   | Units |
|----------------------|---------------------------------------------------------------------------------------------------------------|-----------------------------------------|-------|
| V <sub>CC</sub>      | DC Supply Voltage                                                                                             | −0.5 to +7.0                            | V     |
| V <sub>I</sub>       | DC Input Voltage                                                                                              | −0.5 ≤ V <sub>I</sub> ≤ V <sub>CC</sub> | V     |
| V <sub>O</sub>       | DC Output Voltage                                                                                             | −0.5 to +7.0                            | V     |
| I <sub>IK</sub>      | DC Input Diode Current<br>V <sub>I</sub> < GND                                                                | −50                                     | mA    |
| I <sub>OK</sub>      | DC Output Diode Current<br>V <sub>O</sub> < GND<br>V <sub>O</sub> > V <sub>CC</sub>                           | −50<br>+50                              | mA    |
| I <sub>O</sub>       | DC Output Sink Current                                                                                        | ±50                                     | mA    |
| I <sub>CC</sub>      | DC Supply Current per Supply Pin                                                                              | ±100                                    | mA    |
| I <sub>GND</sub>     | DC Ground Current per Ground Pin                                                                              | ±100                                    | mA    |
| T <sub>STG</sub>     | Storage Temperature Range                                                                                     | −65 to +150                             | °C    |
| P <sub>D</sub>       | Power Dissipation in Still Air<br>SC−88, TSOP−6                                                               | 200                                     | mW    |
| θ <sub>JA</sub>      | Thermal Resistance<br>SC−88, TSOP−6                                                                           | 333                                     | °C/W  |
| T <sub>L</sub>       | Lead Temperature, 1 mm from Case for 10 s                                                                     | 260                                     | °C    |
| T <sub>J</sub>       | Junction Temperature under Bias                                                                               | +150                                    | °C    |
| V <sub>ESD</sub>     | ESD Withstand Voltage<br>Human Body Model (Note 1)<br>Machine Model (Note 2)<br>Charged Device Model (Note 3) | > 2000<br>> 200<br>N/A                  | V     |
| I <sub>Latchup</sub> | Latchup Performance<br>Above V <sub>CC</sub> and Below GND at 85°C (Note 4)                                   | ±500                                    | mA    |

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

1. Tested to EIA/JESD22−A114−A.
2. Tested to EIA/JESD22−A115−A.
3. Tested to JESD22−C101−A.
4. Tested to EIA/JESD78.

# RECOMMENDED OPERATING CONDITIONS

| Symbol          | Parameter                                                                                                                                   | Min         | Max           | Units |
|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------|-------------|---------------|-------|
| V <sub>CC</sub> | Supply Voltage<br>Operating<br>Data Retention Only                                                                                          | 1.65<br>1.5 | 5.5<br>5.5    | V     |
| V <sub>I</sub>  | Input Voltage                                                                                                                               | 0           | 5.5           | V     |
| V <sub>O</sub>  | Output Voltage (High or LOW State)                                                                                                          | 0           | 5.5           | V     |
| T <sub>A</sub>  | Operating Free−Air Temperature                                                                                                              | −55         | +125          | °C    |
| Δt/ΔV           | Input Transition Rise or Fall Rate<br>V <sub>CC</sub> = 2.5 V ± 0.2 V<br>V <sub>CC</sub> = 3.0 V ± 0.3 V<br>V <sub>CC</sub> = 5.0 V ± 0.5 V | 0<br>0<br>0 | 20<br>10<br>5 | ns/V  |

# DC ELECTRICAL CHARACTERISTICS

| Symbol           | Parameter                                                      | Condition                                           | V <sub>CC</sub> (V) | T <sub>A</sub> = 25°C |      |                      | -55°C ≤ T <sub>A</sub> ≤ 125°C |                      | Units |
|------------------|----------------------------------------------------------------|-----------------------------------------------------|---------------------|-----------------------|------|----------------------|--------------------------------|----------------------|-------|
|                  |                                                                |                                                     |                     | Min                   | Typ  | Max                  | Min                            | Max                  |       |
| V <sub>IH</sub>  | High-Level Input Voltage                                       |                                                     | 1.65 to 1.85        | 0.85 V <sub>CC</sub>  |      |                      | 0.85 V <sub>CC</sub>           |                      | V     |
|                  |                                                                |                                                     | 2.3 to 5.5          | 0.8 V <sub>CC</sub>   |      |                      | 0.8 V <sub>CC</sub>            |                      |       |
| V <sub>IL</sub>  | Low-Level Input Voltage                                        |                                                     | 1.65 to 1.85        |                       |      | 0.15 V <sub>CC</sub> |                                | 0.15 V <sub>CC</sub> | V     |
|                  |                                                                |                                                     | 2.3 to 5.5          |                       |      | 0.2 V <sub>CC</sub>  |                                | 0.2 V <sub>CC</sub>  |       |
| V <sub>OH</sub>  | High-Level Output Voltage<br>V <sub>IN</sub> = V <sub>IL</sub> | I <sub>OH</sub> = -100 μA                           | 1.65 to 5.5         | V <sub>CC</sub> -0.1  |      |                      | V <sub>CC</sub> -0.1           |                      | V     |
|                  |                                                                |                                                     |                     |                       |      |                      |                                |                      |       |
|                  | V <sub>IN</sub> = GND                                          | I <sub>OH</sub> = -3 mA                             | 1.65                | 1.29                  | 1.52 |                      | 1.29                           |                      |       |
|                  |                                                                | I <sub>OH</sub> = -4 mA                             | 2.3                 | 1.9                   | 2.1  |                      | 1.9                            |                      |       |
|                  |                                                                | I <sub>OH</sub> = -6 mA                             | 2.7                 | 2.2                   | 2.3  |                      | 2.2                            |                      |       |
|                  |                                                                | I <sub>OH</sub> = -8 mA                             | 3.0                 | 2.4                   | 2.6  |                      | 2.4                            |                      |       |
|                  |                                                                | I <sub>OH</sub> = -12 mA                            | 3.0                 | 2.3                   | 2.5  |                      | 2.3                            |                      |       |
|                  |                                                                | I <sub>OH</sub> = -16 mA                            | 4.5                 | 3.8                   | 4.2  |                      | 3.8                            |                      |       |
| V <sub>OL</sub>  | Low-Level Output Voltage<br>V <sub>IN</sub> = V <sub>IH</sub>  | I <sub>OL</sub> = 100 μA                            | 1.65 to 5.5         |                       |      | 0.1                  |                                | 0.1                  | V     |
|                  |                                                                |                                                     |                     |                       |      |                      |                                |                      |       |
|                  | V <sub>IN</sub> = V <sub>CC</sub>                              | I <sub>OL</sub> = 3 mA                              | 1.65                |                       | 0.08 | 0.24                 |                                | 0.24                 |       |
|                  |                                                                | I <sub>OL</sub> = 4 mA                              | 2.3                 |                       | 0.12 | 0.3                  |                                | 0.3                  |       |
|                  |                                                                | I <sub>OL</sub> = 6 mA                              | 2.7                 |                       | 0.20 | 0.4                  |                                | 0.4                  |       |
|                  |                                                                | I <sub>OL</sub> = 8 mA                              | 3.0                 |                       | 0.24 | 0.4                  |                                | 0.4                  |       |
|                  |                                                                | I <sub>OL</sub> = 12 mA                             | 3.0                 |                       | 0.26 | 0.55                 |                                | 0.55                 |       |
|                  |                                                                | I <sub>OL</sub> = 16 mA                             | 4.5                 |                       | 0.31 | 0.55                 |                                | 0.55                 |       |
| I <sub>IN</sub>  | Input Leakage Current                                          | V <sub>IN</sub> = 5.5 V or GND                      | 0 to 5.5            |                       |      | ±0.1                 |                                | ±1.0                 | μA    |
| I <sub>OFF</sub> | Power Off Leakage Current                                      | V <sub>IN</sub> = 5.5 V or V <sub>OUT</sub> = 5.5 V | 0                   |                       |      | 1                    |                                | 10                   | μA    |
| I <sub>CC</sub>  | Maximum Quiescent Supply Current                               | V <sub>IN</sub> = 5.5 V or GND                      | 5.5                 |                       |      | 1.0                  |                                | 10                   | μA    |

# AC ELECTRICAL CHARACTERISTICS t<sub>R</sub> = t<sub>F</sub> = 2.5 ns; C<sub>L</sub> = 50 pF; R<sub>L</sub> = 500 Ω

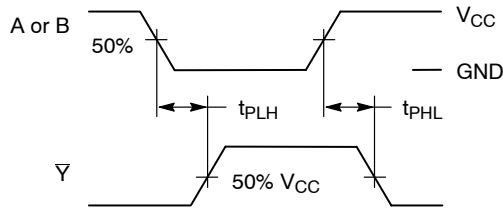
| Symbol                               | Parameter                                             | Condition                                      | V <sub>CC</sub> (V) | T <sub>A</sub> = 25°C |     |     | -55°C ≤ T <sub>A</sub> ≤ 125°C |      | Units |
|--------------------------------------|-------------------------------------------------------|------------------------------------------------|---------------------|-----------------------|-----|-----|--------------------------------|------|-------|
|                                      |                                                       |                                                |                     | Min                   | Typ | Max | Min                            | Max  |       |
| t <sub>PLH</sub><br>t <sub>PHL</sub> | Propagation Delay<br>Input A to Y<br>(Figure 3 and 4) | R <sub>L</sub> = 1 MΩ, C <sub>L</sub> = 50 pF  | 1.8 ± 0.15          | 1.5                   | 5.5 | 1.8 | 1.5                            | 11.0 | ns    |
|                                      |                                                       | R <sub>L</sub> = 1 MΩ, C <sub>L</sub> = 15 pF  | 2.5 ± 0.2           | 1.2                   | 3.3 | 5.7 | 1.2                            | 6.3  |       |
|                                      |                                                       | R <sub>L</sub> = 1 MΩ, C <sub>L</sub> = 15 pF  | 3.3 ± 0.3           | 0.8                   | 2.7 | 4.1 | 0.8                            | 4.5  |       |
|                                      |                                                       | R <sub>L</sub> = 500 Ω, C <sub>L</sub> = 50 pF |                     | 1.2                   | 4.0 | 6.4 | 1.2                            | 7.0  |       |
|                                      |                                                       | R <sub>L</sub> = 1 MΩ, C <sub>L</sub> = 15 pF  | 5.0 ± 0.5           | 0.5                   | 2.2 | 3.3 | 0.5                            | 3.6  |       |
|                                      |                                                       | R <sub>L</sub> = 500 Ω, C <sub>L</sub> = 50 pF |                     | 0.8                   | 3.4 | 5.6 | 0.8                            | 6.2  |       |

# CAPACITIVE CHARACTERISTICS

| Symbol           | Parameter                              | Condition                                                                | Typical | Units |
|------------------|----------------------------------------|--------------------------------------------------------------------------|---------|-------|
| C <sub>IN</sub>  | Input Capacitance                      | V <sub>CC</sub> = 5.5 V, V <sub>I</sub> = 0 V or V <sub>CC</sub>         | 7       | pF    |
| C <sub>OUT</sub> | Output Capacitance                     | V <sub>CC</sub> = 5.5 V, V <sub>I</sub> = 0 V or V <sub>CC</sub>         | 8       | pF    |
| C <sub>PD</sub>  | Power Dissipation Capacitance (Note 5) | 10 MHz, V <sub>CC</sub> = 5.5 V, V <sub>I</sub> = 0 V or V <sub>CC</sub> | 25      | pF    |

5. C<sub>PD</sub> is defined as the value of the internal equivalent capacitance which is calculated from the operating current consumption without load. Average operating current can be obtained by the equation: I<sub>CC(OPR)</sub> = C<sub>PD</sub> • V<sub>CC</sub> • f<sub>in</sub> + I<sub>CC</sub>. C<sub>PD</sub> is used to determine the no-load dynamic power consumption; P<sub>D</sub> = C<sub>PD</sub> • V<sub>CC</sub><sup>2</sup> • f<sub>in</sub> + I<sub>CC</sub> • V<sub>CC</sub>.

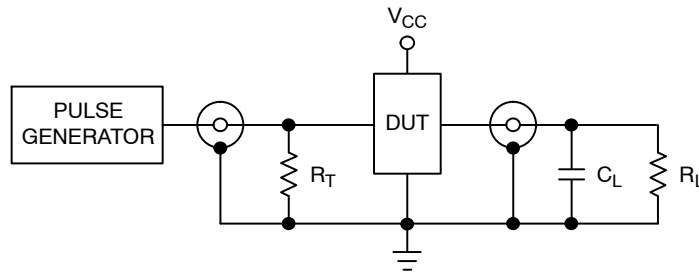
## NL27WZU04



### PROPAGATION DELAYS

$t_R = t_F = 2.5 \text{ ns}$ , 10% to 90%;  $f = 1 \text{ MHz}$ ;  $t_W = 500 \text{ ns}$

**Figure 3. Switching Waveforms**



$C_L = 50 \text{ pF}$  or equivalent (includes jig and probe capacitance)

$R_L = R_1 = 500 \Omega$  or equivalent

$R_T = Z_{OUT}$  of pulse generator (typically  $50 \Omega$ )

**Figure 4. Test Circuit**

### ORDERING INFORMATION

| Device           | Package                              | Shipping <sup>†</sup> |
|------------------|--------------------------------------|-----------------------|
| NL27WZU04DFT2G   | SC-88 / SOT-363 / SC-70<br>(Pb-Free) | 3000 / Tape & Reel    |
| NLV27WZU04DFT2G* | SC-88 / SOT-363 / SC-70<br>(Pb-Free) | 3000 / Tape & Reel    |
| NL27WZU04DTT1G   | TSOP-6<br>(Pb-Free)                  | 3000 / Tape & Reel    |

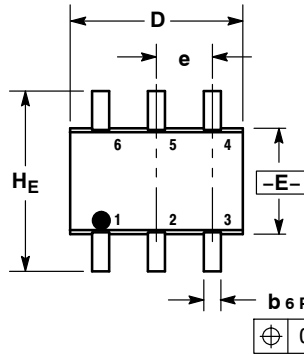
<sup>†</sup>For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

\*NLV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q100 Qualified and PPAP Capable.

# NL27WZU04

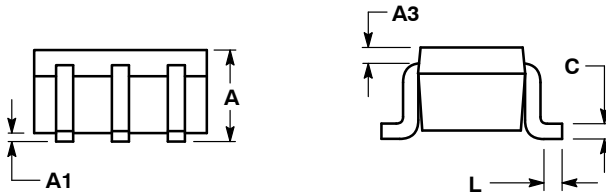
## PACKAGE DIMENSIONS

SC-88/SC70-6/SOT-363  
CASE 419B-02  
ISSUE W

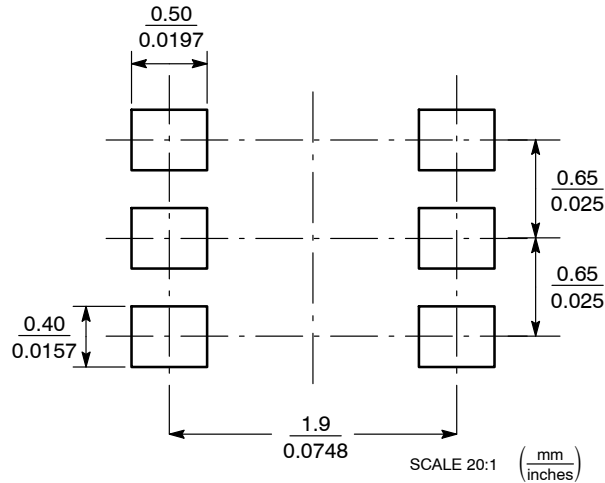


- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
  2. CONTROLLING DIMENSION: INCH.
  3. 419B-01 OBSOLETE, NEW STANDARD 419B-02.

| DIM            | MILLIMETERS |      |      | INCHES    |       |       |
|----------------|-------------|------|------|-----------|-------|-------|
|                | MIN         | NOM  | MAX  | MIN       | NOM   | MAX   |
| A              | 0.80        | 0.95 | 1.10 | 0.031     | 0.037 | 0.043 |
| A1             | 0.00        | 0.05 | 0.10 | 0.000     | 0.002 | 0.004 |
| A3             | 0.20 REF    |      |      | 0.008 REF |       |       |
| b              | 0.10        | 0.21 | 0.30 | 0.004     | 0.008 | 0.012 |
| C              | 0.10        | 0.14 | 0.25 | 0.004     | 0.005 | 0.010 |
| D              | 1.80        | 2.00 | 2.20 | 0.070     | 0.078 | 0.086 |
| E              | 1.15        | 1.25 | 1.35 | 0.045     | 0.049 | 0.053 |
| e              | 0.65 BSC    |      |      | 0.026 BSC |       |       |
| L              | 0.10        | 0.20 | 0.30 | 0.004     | 0.008 | 0.012 |
| H <sub>E</sub> | 2.00        | 2.10 | 2.20 | 0.078     | 0.082 | 0.086 |



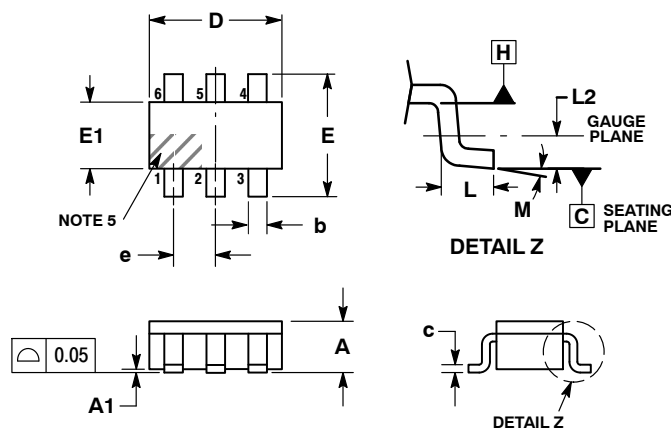
## SOLDERING FOOTPRINT\*



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

## PACKAGE DIMENSIONS

### TSOP-6 CASE 318G-02 ISSUE U

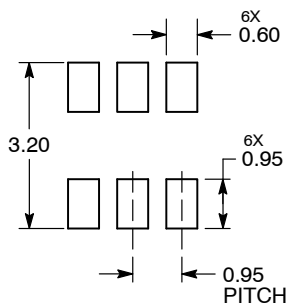


#### NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4. DIMENSIONS D AND E1 DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS. MOLD FLASH, PROTRUSIONS, OR GATE BURRS SHALL NOT EXCEED 0.15 PER SIDE. DIMENSIONS D AND E1 ARE DETERMINED AT DATUM H.
5. PIN ONE INDICATOR MUST BE LOCATED IN THE INDICATED ZONE.

| MILLIMETERS |          |      |      |
|-------------|----------|------|------|
| DIM         | MIN      | NOM  | MAX  |
| A           | 0.90     | 1.00 | 1.10 |
| A1          | 0.01     | 0.06 | 0.10 |
| b           | 0.25     | 0.38 | 0.50 |
| c           | 0.10     | 0.18 | 0.26 |
| D           | 2.90     | 3.00 | 3.10 |
| E           | 2.50     | 2.75 | 3.00 |
| E1          | 1.30     | 1.50 | 1.70 |
| e           | 0.85     | 0.95 | 1.05 |
| L           | 0.20     | 0.40 | 0.60 |
| L2          | 0.25 BSC |      |      |
| M           | 0°       | -    | 10°  |

### RECOMMENDED SOLDERING FOOTPRINT\*



DIMENSIONS: MILLIMETERS

\*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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- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

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- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



#### Как с нами связаться

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**Электронная почта:** [org@eplast1.ru](mailto:org@eplast1.ru)

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