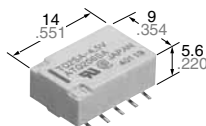


## LOW-PROFILE SURFACE-MOUNT RELAY

## TQ SMD RELAYS



mm inch

### FEATURES

- **Low-profile:** 6 mm .236 inch  
(Tape height: max. 6.5 mm .256 inch)
- **Tape and reel package is available as standard packing style**
- **Surge withstand between contacts and coil:** 2,500 V
- **Breakdown voltage between contacts and coil:** 1,500 V
- **Capacity:** 2 A
- **High sensitivity:**  
2 Form C; 140 mW power consumption (Single side stable type)

RoHS Directive compatibility information  
<http://www.nais-e.com/>

### SPECIFICATIONS

#### Contact

|                                                                  |                                                            |                                                                 |                   |
|------------------------------------------------------------------|------------------------------------------------------------|-----------------------------------------------------------------|-------------------|
| Arrangement                                                      |                                                            | 2 Form C                                                        |                   |
| Initial contact resistance, max.<br>(By voltage drop 6 V DC 1 A) |                                                            | 75 mΩ                                                           |                   |
| Contact material                                                 |                                                            | Au-clad AgNi type                                               |                   |
| Rating                                                           | Nominal switching capacity<br>(resistive load)             | 2 A 30 V DC,<br>0.5 A 125 V AC                                  |                   |
|                                                                  | Max. switching power<br>(resistive load)                   | 60 W, 62.5 VA                                                   |                   |
|                                                                  | Max. switching voltage                                     | 220 V DC, 125 V AC                                              |                   |
|                                                                  | Max. switching current                                     | 2 A                                                             |                   |
|                                                                  | Min. switching capacity<br>(Reference value) <sup>#1</sup> | 10 μA 10 mV DC                                                  |                   |
| Nominal<br>operating<br>power                                    | Single side stable                                         | 140 mW (1.5 to 12 V DC)<br>200 mW (24 V DC)<br>300 mW (48 V DC) |                   |
|                                                                  | 1 coil latching                                            | 70 mW (1.5 to 12 V DC)<br>100 mW (24 V DC)                      |                   |
|                                                                  | 2 coil latching                                            | 140 mW (1.5 to 12 V DC)<br>200 mW (24 V DC)                     |                   |
| Expected<br>life (min.<br>operations)                            | Mechanical (at 180 cpm)                                    |                                                                 | 10 <sup>8</sup>   |
|                                                                  | Electrical<br>(at 20 cpm)                                  | 2 A 30 V DC<br>resistive                                        | 10 <sup>5</sup>   |
|                                                                  |                                                            | 1 A 30 V DC<br>resistive                                        | 2×10 <sup>5</sup> |
|                                                                  |                                                            | 0.5 A 125 V AC<br>resistive                                     | 10 <sup>5</sup>   |

#### Note:

#1 This value can change due to the switching frequency, environmental conditions, and desired reliability level, therefore it is recommended to check this with the actual load. (SX relays are available for low level load switching [10V DC, 10mA max. level])

#### Remarks

\* Specifications will vary with foreign standards certification ratings.

\*1 Measurement at same location as "Initial breakdown voltage" section.

\*2 By resistive method, nominal voltage applied to the coil; contact carrying current: 2 A.

\*3 Nominal voltage applied to the coil, excluding contact bounce time.

\*4 Nominal voltage applied to the coil, excluding contact bounce time without diode.

\*5 Half-wave pulse of sine wave: 6 ms; detection time: 10 μs

\*6 Half-wave pulse of sine wave: 6 ms

\*7 Detection time: 10 μs

\*8 Refer to 6. Conditions for operation, transport and storage mentioned in AMBIENT ENVIRONMENT.

#### Characteristics

|                                                                                                                   |                                         |                                                                          |
|-------------------------------------------------------------------------------------------------------------------|-----------------------------------------|--------------------------------------------------------------------------|
| Initial insulation resistance*1                                                                                   |                                         | Min. 1,000 MΩ (at 500 V DC)                                              |
| Initial<br>breakdown<br>voltage                                                                                   | Between open<br>contacts                | 1,000 Vrms for 1 min.<br>(Detection current: 10 mA)                      |
|                                                                                                                   | Between contact sets                    | 1,500 Vrms for 1 min.<br>(Detection current: 10 mA)                      |
|                                                                                                                   | Between contact and<br>coil             | 1,500 Vrms for 1 min.<br>(Detection current: 10 mA)                      |
| Initial surge<br>voltage                                                                                          | Between open<br>contacts<br>(10×160 μs) | 1,500 V (FCC Part 68)                                                    |
|                                                                                                                   | Between contacts and<br>coil (2×10 μs)  | 2,500 V (Telcordia)                                                      |
| Temperature rise*2 (at 20°C)                                                                                      |                                         | Max. 50°C                                                                |
| Operate time [Set time]*3 (at 20°C)                                                                               |                                         | Max. 4 ms [Max. 4 ms]                                                    |
| Release time [Reset time]*4<br>(at 20°C)                                                                          |                                         | Max. 4 ms [Max. 4 ms]                                                    |
| Shock resistance                                                                                                  | Functional*5                            | Min. 750 m/s <sup>2</sup> {75 G}                                         |
|                                                                                                                   | Destructive*6                           | Min. 1,000 m/s <sup>2</sup> {100 G}                                      |
| Vibration resistance                                                                                              | Functional*7                            | 200 m/s <sup>2</sup> {20G}, 10 to 55 Hz<br>at double amplitude of 3.3 mm |
|                                                                                                                   | Destructive                             | 294 m/s <sup>2</sup> {30G}, 10 to 55 Hz<br>at double amplitude of 5 mm   |
| Conditions for<br>operation, transport<br>and storage*8<br>(Not freezing and<br>condensing at low<br>temperature) | Ambient<br>temperature                  | −40°C to +85°C*3<br>−40°F to +185°F                                      |
|                                                                                                                   | Humidity                                | 5 to 85% R.H.                                                            |
| Unit weight                                                                                                       |                                         | Approx. 2 g .071 oz                                                      |

## ORDERING INFORMATION

Ex. TQ 2 SA - L - 3V - Z

| Contact arrangement | Surface-mount availability                                                                                                                              | Operating function                                                   | Coil voltage (DC)                   | Packing style                                                                       |
|---------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------|-------------------------------------|-------------------------------------------------------------------------------------|
| 2: 2 Form C         | SA: Standard surface-mount terminal type<br>SL: High connection reliability surface-mount terminal type<br>SS: Space saving surface-mount terminal type | Nil: Single side stable<br>L: 1 coil latching<br>L2: 2 coil latching | 1.5, 3, 4.5, 5, 6, 9, 12, 24, 48* V | Nil: Tube packing<br>Z: Tape and reel packing (picked from the 6/7/8/9/10-pin side) |

Notes: 1. Tape and reel (picked from 1/2/3/4/5-pin side) is also available by request. Part No. suffix "-X" is needed when ordering. (ex.) TQ2SA-3V-X  
 2. Tape and reel packing symbol "-Z" or "-X" are not marked on the relay.

## TYPES

## 1. Single side stable

| Part No.    | Nominal voltage, V DC | Pick-up voltage, V DC (max.) | Drop-out voltage, V DC (min.) | Nominal operating current, mA ( $\pm 10\%$ ) | Coil resistance, $\Omega$ ( $\pm 10\%$ ) | Nominal operating power, mW | Max. allowable voltage, V DC |
|-------------|-----------------------|------------------------------|-------------------------------|----------------------------------------------|------------------------------------------|-----------------------------|------------------------------|
| TQ2SO-1.5 V | 1.5                   | 1.13                         | 0.15                          | 93.8                                         | 16                                       | 140                         | 2.2                          |
| TQ2SO-3 V   | 3                     | 2.25                         | 0.3                           | 46.7                                         | 64.3                                     | 140                         | 4.5                          |
| TQ2SO-4.5 V | 4.5                   | 3.38                         | 0.45                          | 31                                           | 145                                      | 140                         | 6.7                          |
| TQ2SO-5 V   | 5                     | 3.75                         | 0.5                           | 28.1                                         | 178                                      | 140                         | 7.5                          |
| TQ2SO-6 V   | 6                     | 4.5                          | 0.6                           | 23.3                                         | 257                                      | 140                         | 9                            |
| TQ2SO-9 V   | 9                     | 6.75                         | 0.9                           | 15.5                                         | 579                                      | 140                         | 13.5                         |
| TQ2SO-12 V  | 12                    | 9                            | 1.2                           | 11.7                                         | 1,028                                    | 140                         | 18                           |
| TQ2SO-24 V  | 24                    | 18                           | 2.4                           | 8.3                                          | 2,880                                    | 200                         | 36                           |
| TQ2SO-48 V  | 48                    | 36                           | 4.8                           | 6.3                                          | 7,680                                    | 300                         | 57.6                         |

## 2. 1 coil latching

| Part No.      | Nominal voltage, V DC | Set voltage, V DC (max.) | Reset voltage, V DC (max.) | Nominal operating current, mA ( $\pm 10\%$ ) | Coil resistance, $\Omega$ ( $\pm 10\%$ ) | Nominal operating power, mW | Max. allowable voltage, V DC |
|---------------|-----------------------|--------------------------|----------------------------|----------------------------------------------|------------------------------------------|-----------------------------|------------------------------|
| TQ2SO-L-1.5 V | 1.5                   | 1.13                     | 1.13                       | 46.9                                         | 32                                       | 70                          | 2.2                          |
| TQ2SO-L-3 V   | 3                     | 2.25                     | 2.25                       | 23.3                                         | 128.6                                    | 70                          | 4.5                          |
| TQ2SO-L-4.5 V | 4.5                   | 3.38                     | 3.38                       | 15.6                                         | 289.3                                    | 70                          | 6.7                          |
| TQ2SO-L-5 V   | 5                     | 3.75                     | 3.75                       | 14                                           | 357                                      | 70                          | 7.5                          |
| TQ2SO-L-6 V   | 6                     | 4.5                      | 4.5                        | 11.7                                         | 514                                      | 70                          | 9                            |
| TQ2SO-L-9 V   | 9                     | 6.75                     | 6.75                       | 7.8                                          | 1,157                                    | 70                          | 13.5                         |
| TQ2SO-L-12 V  | 12                    | 9                        | 9                          | 5.8                                          | 2,057                                    | 70                          | 18                           |
| TQ2SO-L-24 V  | 24                    | 18                       | 18                         | 4.2                                          | 5,760                                    | 100                         | 36                           |

## 3. 2 coil latching

| Part No.       | Nominal voltage, V DC | Set voltage, V DC (max.) | Reset voltage, V DC (max.) | Nominal operating current, mA ( $\pm 10\%$ ) | Coil resistance, $\Omega$ ( $\pm 10\%$ ) | Nominal operating power, mW | Max. allowable voltage, V DC |
|----------------|-----------------------|--------------------------|----------------------------|----------------------------------------------|------------------------------------------|-----------------------------|------------------------------|
| TQ2SO-L2-1.5 V | 1.5                   | 1.13                     | 1.13                       | 93.8                                         | 16                                       | 140                         | 2.2                          |
| TQ2SO-L2-3 V   | 3                     | 2.25                     | 2.25                       | 46.7                                         | 64.3                                     | 140                         | 4.5                          |
| TQ2SO-L2-4.5 V | 4.5                   | 3.38                     | 3.38                       | 31                                           | 145                                      | 140                         | 6.7                          |
| TQ2SO-L2-5 V   | 5                     | 3.75                     | 3.75                       | 28.1                                         | 178                                      | 140                         | 7.5                          |
| TQ2SO-L2-6 V   | 6                     | 4.5                      | 4.5                        | 23.3                                         | 257                                      | 140                         | 9                            |
| TQ2SO-L2-9 V   | 9                     | 6.75                     | 6.75                       | 15.5                                         | 579                                      | 140                         | 13.5                         |
| TQ2SO-L2-12 V  | 12                    | 9                        | 9                          | 11.7                                         | 1,028                                    | 140                         | 18                           |
| TQ2SO-L2-24 V  | 24                    | 18                       | 18                         | 8.3                                          | 2,880                                    | 200                         | 36                           |

○: For each surface-mounted terminal variation, input the following letter.

SA type: A, SL type: L, SS type: S

Notes: 1. Specified value of the pick-up, drop-out, set and reset voltage is with the condition of square wave coil pulse.

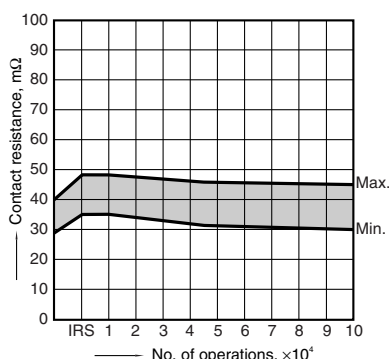
2. Standard packing: Tube: 50 pcs.; Case: 1,000 pcs.

Tape and reel: 500 pcs.; Case: 1,000 pcs.

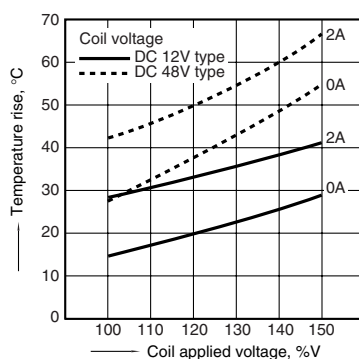
3. In case of 5 V transistor drive circuit, it is recommended to use 4.5 V type relay.



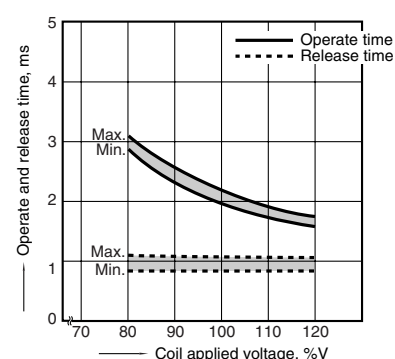
Change of contact resistance  
(mounting by IRS method)



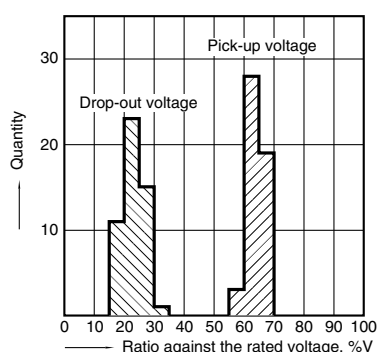
5. Coil temperature rise  
Tested sample: TQ2SA-12V, 6 pcs.  
Point measured: Inside the coil  
Ambient temperature: 25°C 77°F



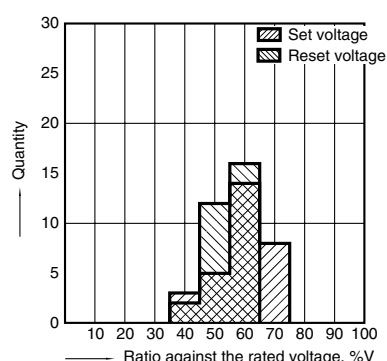
6. Operate/release time  
Tested sample: TQ2SA-12V, 6 pcs.



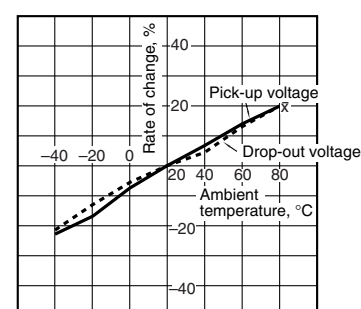
7. Distribution of pick-up and drop out voltage  
Tested sample: TQ2SA-12V, 50 pcs.



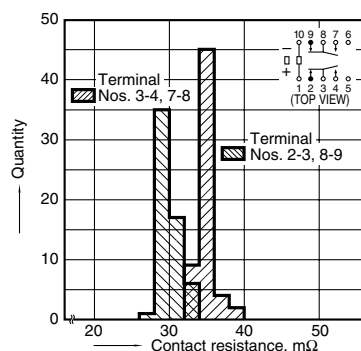
8. Distribution of set and reset voltage  
Tested sample: TQ2SA-L-12V, 30 pcs.



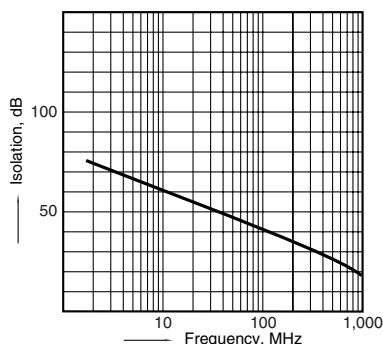
9. Ambient temperature characteristics  
Tested sample: TQ2SA-12V, 5 pcs.



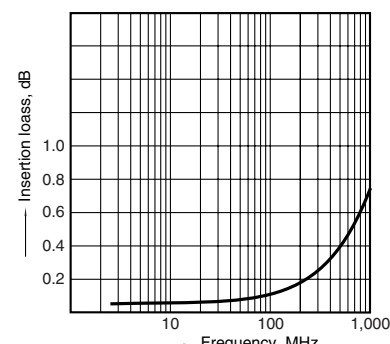
10. Distribution of contact resistance  
Tested sample: TQ2SA-5V, 30 pcs. (30 x 4 contacts)



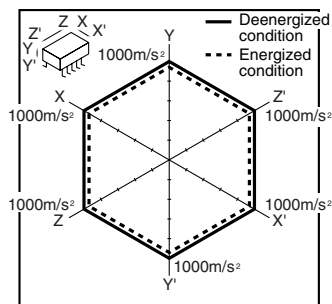
11.-(1) High-frequency characteristics  
Isolation characteristics



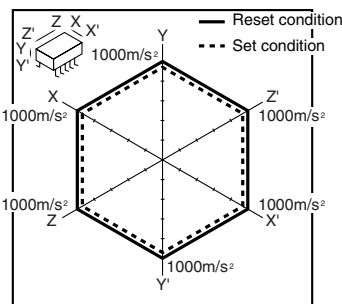
11.-(2) High-frequency characteristics  
Insertion loss characteristics



12.-(1) Malfunctional shock (single side stable)  
Tested sample: TQ2SA-12V, 6 pcs

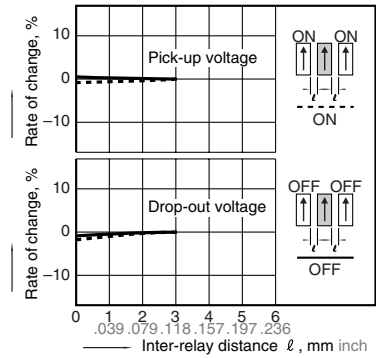


12.-(2) Malfunctional shock (latching)  
Tested sample: TQ2SA-L2-12V, 6 pcs.

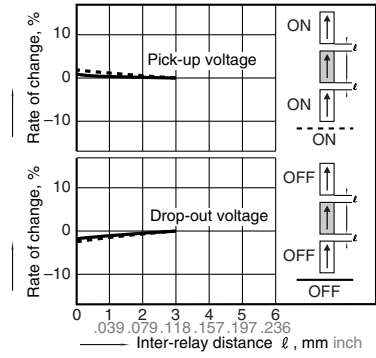


TQ SMD

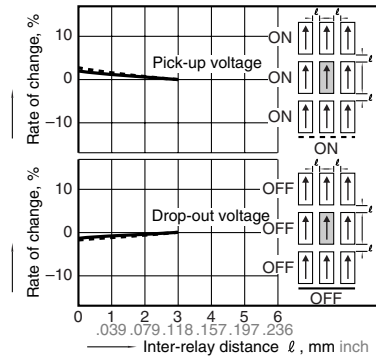
13.-(1) Influence of adjacent mounting  
Tested sample: TQ2SA-12V, 5 pcs.



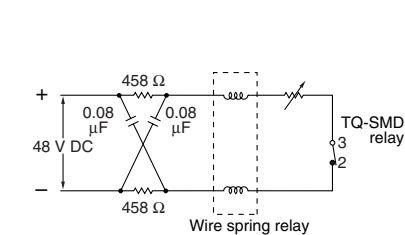
13.-(2) Influence of adjacent mounting  
Tested sample: TQ2SA-12V, 6 pcs.



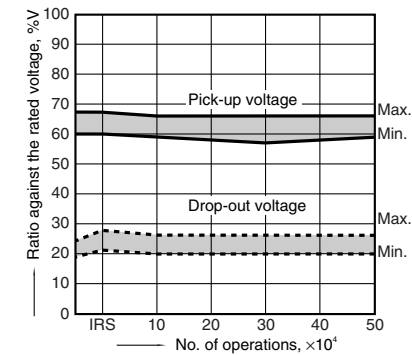
13.-(3) Influence of adjacent mounting  
Tested sample: TQ2SA-12V, 6 pcs.



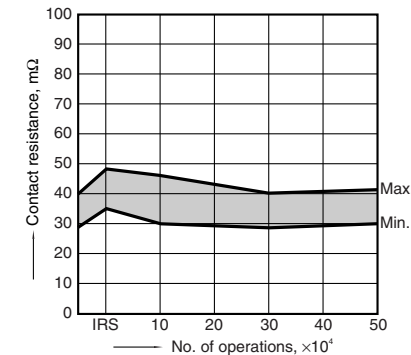
14. Pulse dialing test  
Tested sample: TQ2SA-12V, 6 pcs.  
(35 mA 48 V DC wire spring relay load)  
Circuit



Change of pick-up and drop-out voltage  
(mounting by IRS method)



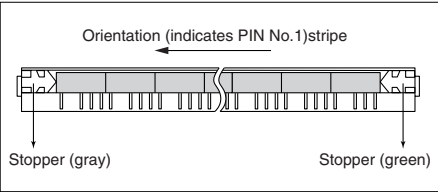
Change of contact resistance  
(mounting by IRS method)



NOTES

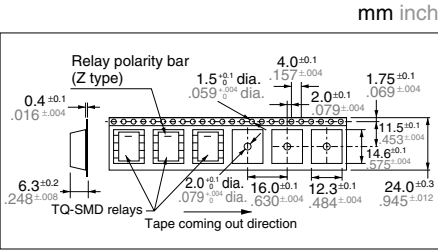
1. Packing style

1) The relay is packed in a tube with the relay orientation mark on the left side, as shown in the figure below.

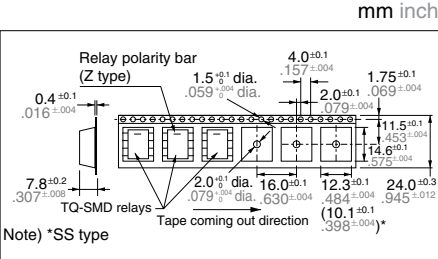


2) Tape and reel packing (surface-mount terminal type)

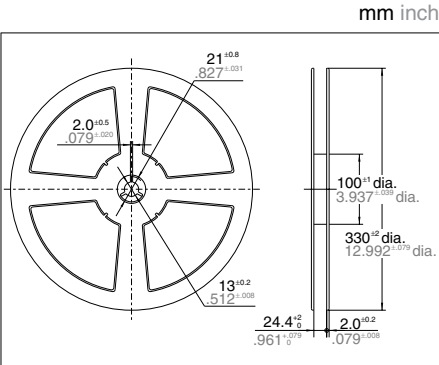
(1) Tape dimensions  
(i) SA type



(ii) SL, SS type



(2) Dimensions of plastic reel



For Cautions for Use, see Relay Technical Information.



Компания «ЭлектроПласт» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Оперативные поставки широкого спектра электронных компонентов отечественного и импортного производства напрямую от производителей и с крупнейших мировых складов;
- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- 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 оптимального решения, техническое обоснование при выборе компонента;
- 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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