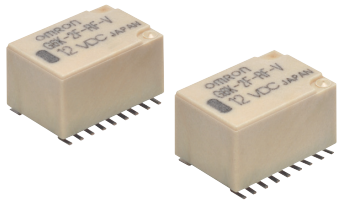
# G6K-2F-RF-V

Surface-mounting High-frequency Relay

## 8-GHz Band Miniature DPDT High Frequency Relay for High-speed Differential Transmission Signal Switching



NEW

- High-frequency characteristics (insertion loss 3 dB or less at 8 GHz)
- Miniaturized to 11.7 × 7.9 × 7.1 mm (L × W × H).
- Rated power consumption of 100 mW with high sensitivity

## ■Model Number Legend

G6K-2F-RF-V
(1 = 2, 2 = F, 3 = RF, 4 = V)

1. **Number of poles/ Contact Form**
2: 2-pole/ DPDT (2c)

2. **Terminal Shape**
F: Outside-L surface mounting terminals

3. **Special Function 1**
RF: High-frequency compatible

4. **Special Function 2**
V: 8-GHz band
High-speed differential transmission compatible type

Application Examples
- Semiconductor test equipment
- Test&measurement equipment
- Communication equipment

## ■Standard type specifications

Contact type: Bifurcated crossbar
Ag (Surface Au alloy)

Note. We have a lineup of G6K (U)-2F(P)-RF(-S,-T) products for 1-GHz/3-GHz band high-frequency signal applications.

## ■Ordering Information

| Relay Function | Enclosure rating | Contact form | Model | Rated coil voltage | Minimum packing unit |
|---|---|---|---|---|---|
| Single-side stable | Fully sealed | DPDT (2c) | G6K-2F-RF-V | 3, 4.5, 5, 12 VDC | 40 pcs/tube |

Note 1. When ordering, add the rated coil voltage to the model number.
Example: G6K-2F-RF-V DC5
Rated coil voltage
However, the notation of the coil voltage on the product case as well as on the packing will be marked as □□ VDC.

## ■Ratings

### ●Contacts

| Item / Load | Resistive load |
|---|---|
| Rated load | 125 VAC, 0.3 A<br>30 VDC, 1 A<br>10 VDC, 10 mA<br>8 GHz, 1 W ✻ |
| Rated carry current | 1 A |
| Max. switching voltage | 125 VAC or 60 VDC |
| Max. switching current | 1A |

✻ This value is for a V.SWR of 1.2 max. at the load.

### ●High-frequency Characteristics *1

| Item / Frequency | | | 8GHz |
|---|---|---|---|
| Differential transmission characteristics | Insertion loss | | 3 dB max. |
| | Isolation | | 15 dB min. |
| | Return loss (V.SWR) | | 5 dB min. (3.57 max.) |
| Single-ended characteristics (reference value) | Insertion loss | | 4 dB max. |
| | Isolation | Between contacts of the same polarity | 15 dB min. |
| | | Between contacts of different polarity | 15 dB min. |
| | Return loss (V.SWR) | | 5 dB min. (3.57 max.) |
| Maximum carry power | | | 1 W *2 |
| Maximum switching power | | | 1 W *2 |

Note 1. The impedance of the measurement system is 50 Ω. (Differential impedance is 100 Ω.)
Note 2. The above values are initial values.
✻1. Contact your OMRON representative if the Relay will be used in an application that requires high repeatability in high-frequency characteristics.
✻2. These values are for a V.SWR of 1.2 max. at the load.





Downloaded from Arrow.com.

### ●Coil: Single

| Item / Rated voltage | Rated current (mA) | Coil resistance (Ω) | Must operate voltage (V) | Must release voltage (V) | Maximum voltage (V) | Power consumption (mW) |
|---|---|---|---|---|---|---|
| | | | % of rated voltage | | | |
| 3 VDC | 33.0 | 91 | 80% max. | 10% min. | 150% | Approx. 100 |
| 4.5 VDC | 23.2 | 194 | | | | |
| 5 VDC | 21.1 | 237 | | | | |
| 12 VDC | 9.1 | 1,315 | | | | |

Note 1. The rated current and coil resistance are measured at a coil temperature of 23°C with a tolerance of ±10%.
Note 2. The operating characteristics are measured at a coil temperature of 23°C.
Note 3. The maximum voltage is the highest voltage that can be imposed on the Relay coil instantaneously.

## ■Characteristics

| | | |
|---|---|---|
| Contact resistance ✻1 | | 100 mΩ max. |
| Operating time ✻2 | | 3 ms max. (approx. 1.4 ms) |
| Release time ✻2 | | 3 ms max. (approx. 0.7 ms) |
| Insulation resistance ✻3 | | 500 MΩ min. (at 500 VDC) |
| Dielectric strength | Between coil and contacts | 350 VAC, 50/60 Hz for 1 min |
| | Between contacts of different polarity | 350 VAC, 50/60 Hz for 1 min |
| | Between contacts of the same polarity | 350 VAC, 50/60 Hz for 1 min |
| | Between ground and coil/contacts | 350 VAC, 50/60 Hz for 1 min |
| Vibration resistance | Destruction | 10 to 55 to 10 Hz, 2.5 mm single amplitude (5 mm double amplitude) |
| | Malfunction | 10 to 55 to 10 Hz, 1.65 mm single amplitude (3.3 mm double amplitude) |
| Shock resistance | Destruction | 1,000 m/s² |
| | Malfunction | 750 m/s² |
| Durability | Mechanical | 50,000,000 operations min. (at a switching frequency of 36,000 operations/hour) |
| | Electrical | 1,000,000 operations min. (10 VDC, 10 mA, at a switching frequency of 1,800 operations/hour) |
| | | 100,000 operations min. (Other rated load, at a switching frequency of 1,800 operations/hour) |
| Ambient operating temperature | | -40°C to 70°C (with no icing or condensation) |
| Ambient operating humidity | | 5% to 85% |
| Weight | | Approx. 1.16 g |

Note. The above values are initial values.
✻1. The contact resistance was measured with 10 mA at 1 VDC with a voltage drop method.
✻2. Values in parentheses are actual values.
✻3. The insulation resistance was measured with a 500 VDC megohmmeter applied to the same parts as those used for checking the dielectric strength.



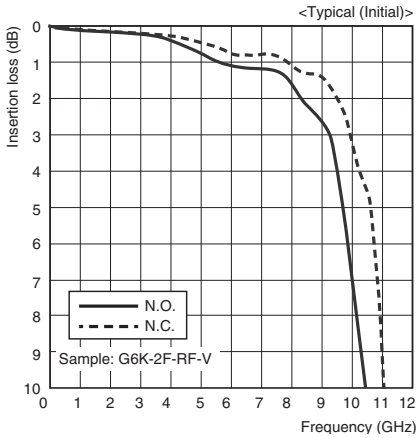


Downloaded from Arrow.com.

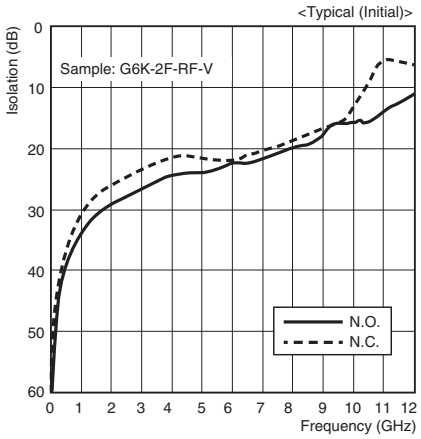
## ■Engineering Data

### ●High-frequency characteristics (differential transmission characteristics)

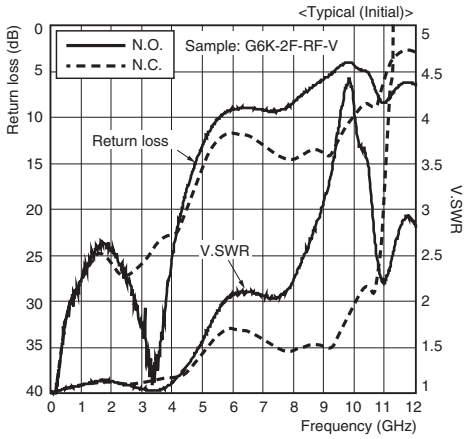
**Insertion loss**




**Isolation**

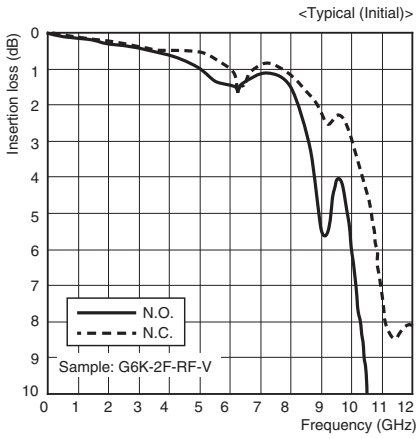



**Return loss, V.SWR**

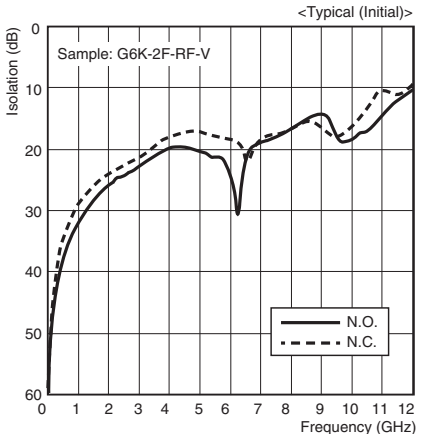



### ●High-frequency characteristics (single-ended characteristics)

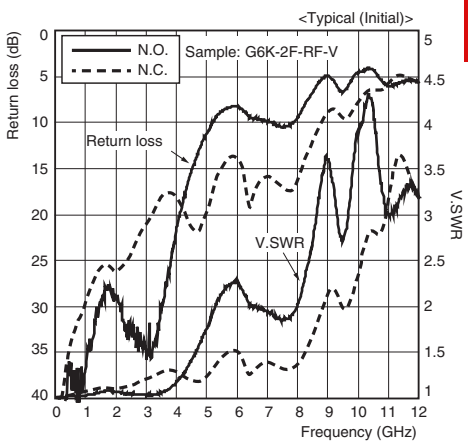
**Insertion loss**




**Isolation**




**Return loss, V.SWR**




Note 1. The high-frequency characteristics depend on the mounting board. Be sure to check operation including durability in actual equipment before use.
Note 2. Ambient temperature condition: 23°C.
Note 3. The impedance of the measurement system is 50 Ω. (Differential impedance is 100 Ω.)
Note 4. S parameter (Touchstone format) data used for circuit simulation is available. Please inquire.



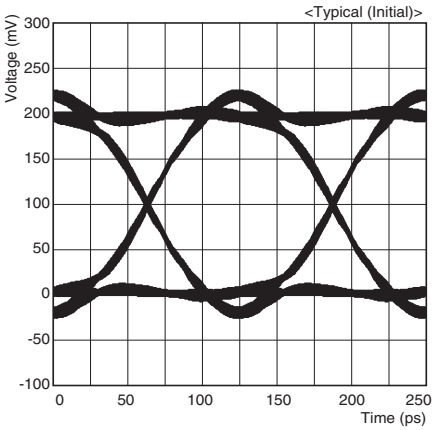


Downloaded from Arrow.com.

## ●High-frequency characteristics (Signal Integrity, differential transmission)

**at 8.1 Gbps**

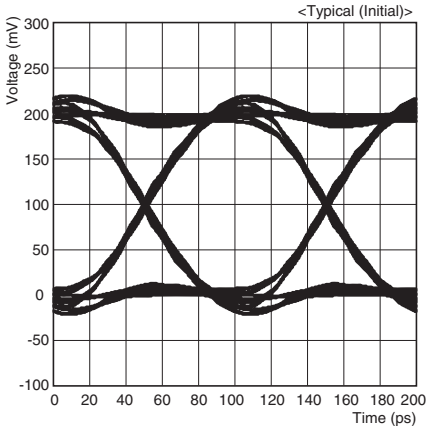
N.O. Contact




| Eye Height | Eye Width | Jitter P-P |
|---|---|---|
| 173 mV | 121.0 ps | 2.5 ps |

**at 10 Gbps**

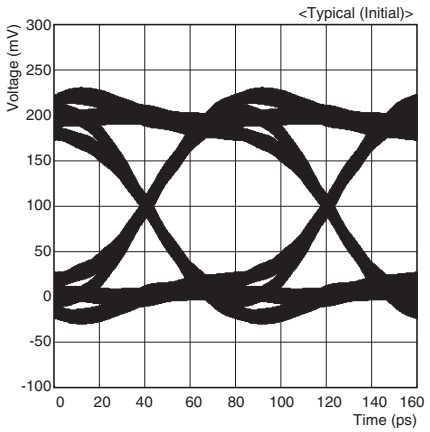
N.O. Contact




| Eye Height | Eye Width | Jitter P-P |
|---|---|---|
| 177 mV | 96.5 ps | 3.5 ps |

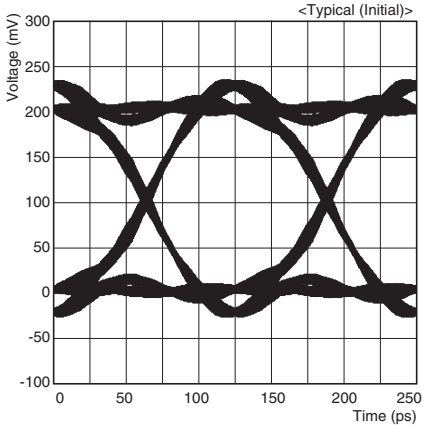
**at 12.5 Gbps**

N.O. Contact



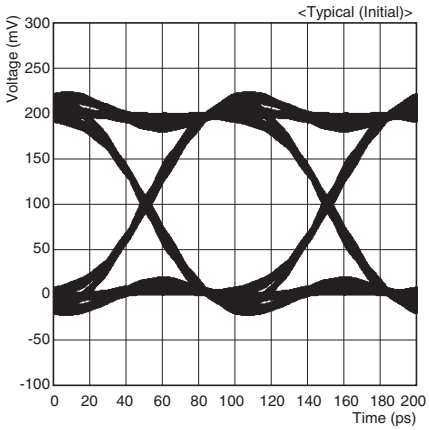

| Eye Height | Eye Width | Jitter P-P |
|---|---|---|
| 147 mV | 75.2 ps | 4.8 ps |

N.C. Contact



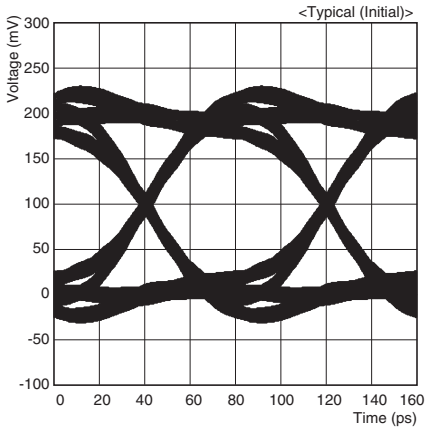

| Eye Height | Eye Width | Jitter P-P |
|---|---|---|
| 166 mV | 116.0 ps | 7.4 ps |

N.C. Contact




| Eye Height | Eye Width | Jitter P-P |
|---|---|---|
| 172 mV | 94.5 ps | 5.5 ps |

N.C. Contact




| Eye Height | Eye Width | Jitter P-P |
|---|---|---|
| 137 mV | 74.4 ps | 5.6 ps |

### Conditions

- $2^{11}$-1 PRBS signal
- Input differential voltage 200 mV
- Rise time 25 ps @10 - 90%

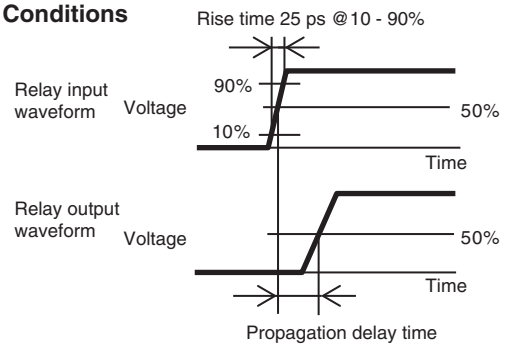
Note 1. Ambient temperature condition: 23°C.
Note 2. The impedance of the measurement system is 50 Ω. (Differential impedance is 100 Ω.)
Note 3. This data includes loss due to the test board.

## ●Propagation delay time

| Item | Propagation delay time (ps) (typical value) |
|---|---|
| N.O. Contact | 107.5 |
| N.C. Contact | 115.0 |

Note 1. Ambient temperature condition: 23°C.
Note 2. The impedance of the measurement system is 50 Ω. (Differential impedance is 100 Ω.)

### Conditions





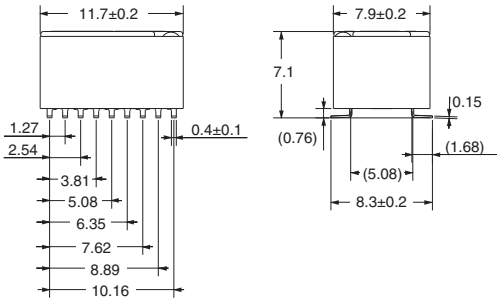



Downloaded from Arrow.com.

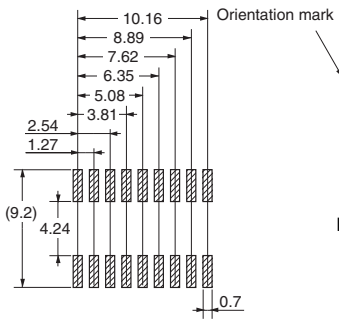
## ■Dimensions

(Unit: mm)

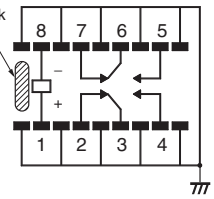
**G6K-2F-RF-V**




**Mounting Dimensions (Top View)**
Tolerance: ±0.1 mm




**Terminal Arrangement/ Internal Connections**
TOP VIEW



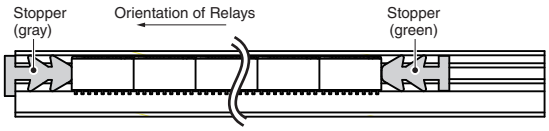

Note. Check carefully the coil polarity of the Relay.

Note 1. Each value has a tolerance of ±0.3 mm.
Note 2. The coplanarity of the terminals is 0.15 mm max.
Note 3. The dimensions of the printed circuit board work drawing are a recommended example that take soldering into consideration. Frequency characteristics vary depending on the band dimensions, so check the effect on high-frequency characteristics using a test board before use.

## ■Package specifications

### Tube Packing

G6K-2F-RF-V in tube packing are arranged so that the orientation mark of each Relay in on the left side.
Be sure not to make mistakes in Relay orientation when mounting the Relay to the PCB.




Tube length: 520 mm (stopper not included)
No. of Relays per tube: 40 pcs



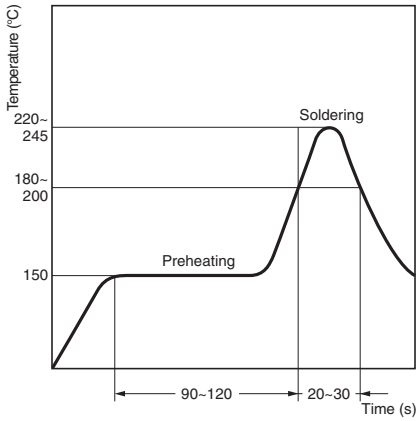


Downloaded from Arrow.com.

## ■G6K-2F-RF-V Recommended Soldering Method

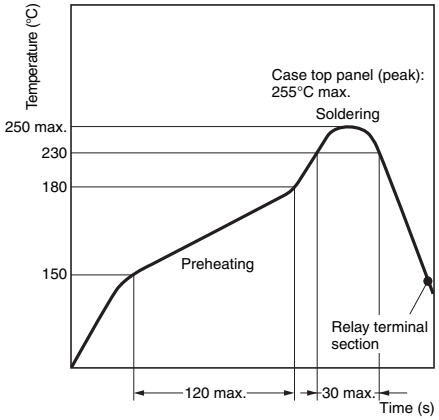
### ●Recommended Conditions for IRS Method (Surface-mounting Terminals)

**(1) IRS Method (Mounting Solder: Lead)**




(The temperature profile indicates the temperature on the circuit board surface.)

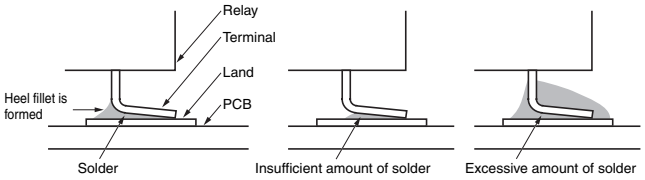
**(2) IRS Method (Mounting Solder: Lead-free)**




(The temperature profile indicates the temperature on the PCB.)

- The thickness of cream solder to be applied should be between 200 and 250 µm and the land pattern should be based on OMRON's recommended PCB pattern.
- To maintain the correct soldering joint shown in the following diagram, we recommend applying solder with the soldering conditions shown on the left.

**Correct Soldering** **Incorrect Soldering**




Check the soldering in the actual mounting conditions before use.





Downloaded from Arrow.com.

## ■Safety Precautions

●**For general precautions on PCB Relays, refer to the precautions provided in General Information of the Relay Product Data Book.**

Correct Use

### ●Relay Handling

- Use the Relay as soon as possible after opening the moistureproof package. (As a guideline, use the Relay within one week at 30°C or less and 60% RH or less.) If the Relay is left for a long time after opening the moisture-proof package, the appearance may suffer and seal failure may occur after the solder mounting process. To store the Relay after opening the moisture-proof package, place it into the original package and seal the package with adhesive tape.
- When washing the product after soldering the Relay to a PCB, use a water-based solvent or alcohol-based solvent and keep the solvent temperature to less than 40°C. Do not put the Relay in a cold cleaning bath immediately after soldering.

### ●Environmental Conditions for Usage, Storage, and Transport

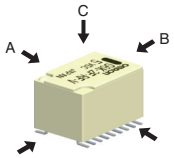
- Avoid direct sunlight when using, storing, or transporting the Relay and maintain normal temperature, humidity, and pressure conditions.

### ●Long-term, Continuous ON Contacts

- Using the Relay in a circuit where the Relay will be ON continuously for long periods (rather than switching) can lead to unstable contacts because the heat generated by the coil itself will affect the insulation and can cause a film to develop on the contact surfaces. We recommend using a latching relay (magnetic-holding relay) in this kind of circuit. If a single-side stable model must be used in this kind of circuit, we recommend adding fail-safe circuits in case the contact fails or the coil burns out.

### ●Claw Securing Force During Automatic Mounting

- During automatic insertion of Relays, be sure to set the securing force of each claw to the following so that the Relay's characteristics will be maintained.




Direction A: 1.96 N max.
Direction B: 4.90 N max.
Direction C: 1.96 N max.

### ●Coating

- Do not use silicone coating to coat the Relay when it is mounted to the PCB. Do not wash the PCB after the Relay is mounted using detergent containing silicone. Otherwise, the detergent may remain on the surface of the Relay.

### ●Repeatability

- Contact your OMRON representative if the Relay will be used in an application that requires high repeatability in high-frequency characteristics and contact resistance.



Please check each region's Terms & Conditions by region website.

**OMRON Corporation**
**Device & Module Solutions Company**

**Regional Contact**

**Americas**
https://components.omron.com/us
**Asia-Pacific**
https://components.omron.com/ap
**Korea**
https://components.omron.com/kr
**Europe**
https://components.omron.com/eu
**China**
https://components.omron.com.cn
**Japan**
https://components.omron.com/jp

© OMRON Corporation 2017-2022 All Rights Reserved.
In the interest of product improvement, specifications are subject to change without notice.

**Cat. No. K290-E1-03**
1122 (0317)



Downloaded from Arrow.com.