FUJITSU THE POSSIBILITIES ARE INFINITE

# POWER RELAY

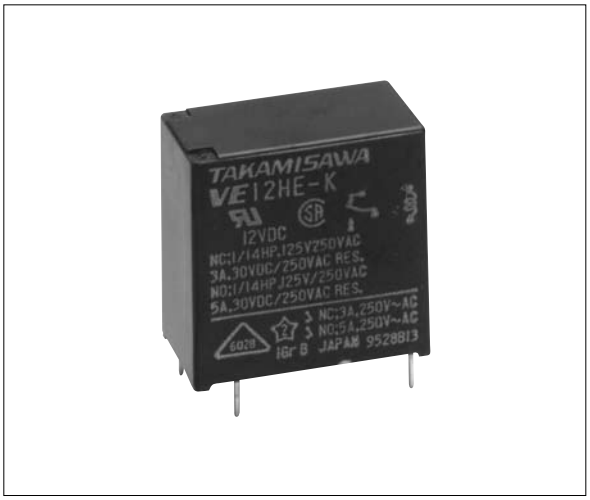
# 1 POLE—5 A (MEDIUM LOAD CONTROL)

# VE SERIES

**RoHS compliant**

## ■ FEATURES

- UL, CSA, VDE, CQC recognized
- 1 form A (SPST-NO) or 1 form C (SPDT) contact
- Low cost, miniature relay with big performance in small package
  —Higher surge voltage type is available (6,000 V)
  —2,000 VAC between coil and contacts
- Slim type—meets high density mounting requirement
- Wide operating range
- Easy circuit design with completely separated terminal arrangement (coil and contact terminals)
- Plastic sealed type
- RoHS compliant since date code: 0434R
  Please see page 8 for more information
- Crepage min. 3.2 mm




## ■ ORDERING INFORMATION

[Example] VE – 12 H M S E – K – HV – VD
(a) (*) (b) (c) (d) (e) (f) (g) (h) (i)

| | | |
|---|---|---|
| (a) | Series Name | VE: VE Series |
| (b) | Nominal Voltage | Refer to the COIL DATA CHART |
| (c) | Contact Rating | H : Heavy duty type |
| (d) | Contact Arrangement | Nil : 1 form C (SPDT)<br>M : 1 form A (SPST-NO) |
| (e) | Coil Type | Nil : Standard type (360 mW)<br>S : High sensitivity type (250 mW) |
| (f) | Contact Material (Rating) | Nil : Gold overlay silver-nickel (N.C.: 3 A, N.O.: 5 A)<br>E : Silver-nickel (N.C.: 3 A, N.O.: 5 A)<br>5 : Silver cadmium oxide (N.C.: 5 A, N.O.: 5 A) |
| (g) | Enclosure | K : Plastic sealed type |
| (h) | Surge Strength | Nil : Standard type (4,000 V)<br>HV: High dielectric strength type (6,000 V) |
| (i) | Standard | VD: UL, CSA, VDE approved type |

Note: Actual marking omits the hyphen (-) of (*)

## ■ COIL DATA CHART

| | MODEL | | Nominal voltage | Coil resistance (±10%) | Must operate voltage* | Must release voltage* | Nominal power |
|---|---|---|---|---|---|---|---|
| | VE-( ) HM VE-( ) HME<br>VE-( ) H VE-( ) HE | VE-( ) HM5<br>VE-( ) H5 | | | | | |
| Standard Type | VE- 5H (M) (E)-K | VE- 5H (M) 5-K | 5 VDC | 69 Ω | 3.5 VDC | 0.25 VDC | 360 mW |
| | VE- 6H (M) (E)-K | VE- 6H (M) 5-K | 6 VDC | 100 Ω | 4.2 VDC | 0.3 VDC | 360 mW |
| | VE- 9H (M) (E)-K | VE- 9H (M) 5-K | 9 VDC | 225 Ω | 6.3 VDC | 0.45 VDC | 360 mW |
| | VE 12H (M) (E)-K | VE-12H (M) 5-K | 12 VDC | 400 Ω | 8.4 VDC | 0.6 VDC | 360 mW |
| | VE-18H (M) (E)-K | VE-18H (M) 5-K | 18 VDC | 900 Ω | 12.6 VDC | 0.9 VDC | 360 mW |
| | VE-24H (M) (E)-K | VE-24H (M) 5-K | 24 VDC | 1,600 Ω | 16.8 VDC | 1.2 VDC | 360 mW |
| | VE-48H (M) (E)-K | VE-48H (M) 5-K | 48 VDC | 6,400 Ω | 33.6 VDC | 2.4 VDC | 360 mW |
| High Sensitive Type | VE- 5H (M) S (E)-K | VE- 5H (M) S5-K | 5 VDC | 100 Ω | 3.6 VDC | 0.25 VDC | 250 mW |
| | VE- 6H (M) S (E)-K | VE- 6H (M) S5-K | 6 VDC | 145 Ω | 4.3 VDC | 0.3 VDC | 250 mW |
| | VE- 9H (M) S (E)-K | VE- 9H (M) S5-K | 9 VDC | 325 Ω | 6.5 VDC | 0.45 VDC | 250 mW |
| | VE 12H (M) S (E)-K | VE-12H (M) S5-K | 12 VDC | 575 Ω | 8.6 VDC | 0.6 VDC | 250 mW |
| | VE-18H (M) S (E)-K | VE-18H (M) S5-K | 18 VDC | 1,300 Ω | 13.0 VDC | 0.9 VDC | 250 mW |
| | VE-24H (M) S (E)-K | VE-24H (M) S5-K | 24 VDC | 2,310 Ω | 17.3 VDC | 1.2 VDC | 250 mW |
| | VE-48H (M) S (E)-K | VE-48H (M) S5-K | 48 VDC | 9,220 Ω | 34.7 VDC | 2.4 VDC | 250 mW |

Note: All values in the table are measured at 20 °C.

*: Specified values are subject to pulse voltage.

## ■ SPECIFICATIONS

| Item | | | VE-( ) HM(S)E-K<br>VE-( ) HM(S)-K | VE-( ) H(S)E-K<br>VE-( ) H(S)-K | VE-( ) HM(S)5-K | VE-( ) H(S)5-K |
|---|---|---|---|---|---|---|
| Contact | Arrangement | | 1 form A (SPST-NO) | 1 form C (SPDT) | 1 form A (SPST-NO) | 1 form C (SPDT) |
| | Material | | Gold overlay silver nickel, silver nickel | | Silver-cadmium oxide alloy | |
| | Style | | Single | | | |
| | Resistance (initial) (at 1 A 6 VDC) | | Maximum 70 mΩ (VE-HM, H)<br>Maximum 100 mΩ (VE-HME, HE) | | Maximum 200 mΩ | |
| | Rating (resistive) | | 5 A 250 VAC | 5 A 250 VAC (N.O.)<br>3 A 250 VAC (N.C.) | 5 A 250 VAC | |
| | Maximum Carrying Current | | 7 A | | | |
| | Maximum Switching Power | | 1,250 VA | 1,250 VA (N.O.)<br>750 VA (N.C.) | 1,250 VA | |
| | Maximum Switching Voltage | | 250 VAC, 150 VDC | | | |
| | Maximum Switching Current | | 5 A | 5 A (N.O.)<br>3 A (N.C.) | 5 A | |
| | Minimum Switching Load*1 | | 10 mA, 5 VDC (VE-HM, H), 100 mA 5 VDC (VE-HME, HE, HM5, H5) | | | |
| Coil | Nominal Power (at 20°C) | | Standard type: 360 mW. High sensitivity type: 250 mW | | | |
| | Operate Power (at 20°C) | | Standard type: 177 mW. High sensitivity type: 130 mW | | | |
| | Operating Temperature | | Standard: –40°C to +85°C. High sensitivity: –40°C to +90°C (no frost) | | | |
| Time Value | Operate (at nominal voltage) | | Maximum 10 ms | | | |
| | Release (at nominal voltage) | | Maximum 5 ms | | | |
| Life | Mechanical | | $1 \times 10^7$ operations minimum | | | |
| | Electrical (at Rating) | | Standard Type: $1 \times 10^5$ ops. min. | | High sensitivity type: $5 \times 10^4$ ops. min. | |
| Other | Vibration Resistance | Misoperation | 10 to 55 Hz (double amplitude of 3.3 mm) | | | |
| | | Endurance | 10 to 55 Hz (double amplitude of 3.3 mm) | | | |
| | Shock Resistance | Misoperation | 100 m/s$^2$ (11 ±1 ms) | | | |
| | | Endurance | 500 m/s$^2$ (6 ±1 ms) | | | |
| | Weight | | Approximately 8 g | | | |

*1 Minimum switching loads mentioned above are reference values. Please perform the confirmation test with the actual load before production since reference values may vary according to switching frequencies, environmental conditions and expected reliability levels.

## ■ INSULATION

| Item | | VE - ( ) HME<br>VE - ( ) HM | VE - ( ) HE<br>VE - ( ) H | VE - ( ) HM5 | VE - ( ) H5 | Note |
|---|---|---|---|---|---|---|
| Resistance (initial) | | Minimum 1,000 MΩ 1 min. | | | | at 500 VDC |
| Dielectric Strength | open contacts | 1,000 VAC<br>1 min. | 750 VAC<br>1 min. | 1,000 VAC<br>1 min. | 750 VAC<br>1 min. | |
| | coil and contacts | 2,000 VAC 1 min. | | | | |
| Surge Voltage<br>(coil and contact) | | Standard: 4,000 V, High Sensitive: 6,000V | | | | 1.2 x 50μs<br>standard wave |

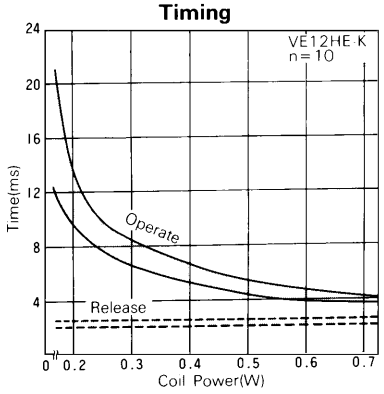
## ■ SAFETY STANDARDS

| Type | Compliance | Contact rating |
|---|---|---|
| UL | UL 508<br>E56140 | Flammability: UL 94-V0 (plastics)<br>VE-( )-H:<br>5A, 250VA/30VDC (N.O. resistive)<br>3A, 250VAC (N.C. resistive)<br>5A, 30VDC (N.C. resistive)<br>1/14 HP, 250VAC /125VAC<br>VE-( )-HM<br>5A, 250VAC/30VDC (resistive)<br>1/12 HP, 250VAC /125VAC<br>VE-( )-H5<br>5A, 250VAC/30VDC (N.O. resistive)<br>1/10 HP, 250VAC /125VAC (N.O. resistive)<br>5A, 250VAC/30VDC (N.C. resistive)<br>1/14 HP, 250VAC /125VAC (N.C. resistive)<br>VE-( )-HM5<br>5A, 250VAC/30VDC (resistive)<br>1/10 HP, 250VAC /125VAC |
| CSA | C22.2 No. 14<br>LR 35579 | |
| VDE | | |

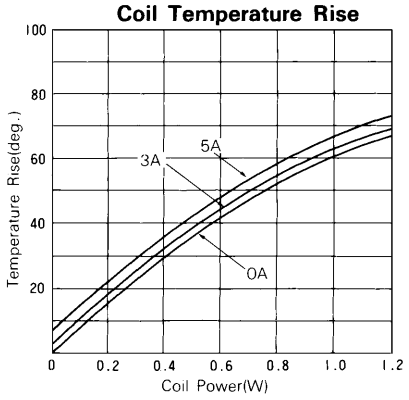
Complies with CQC

## ■ REFERENCE DATA

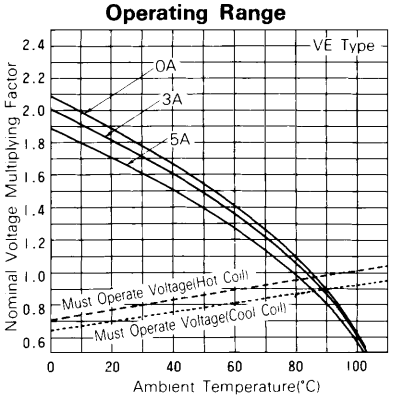
### Timing



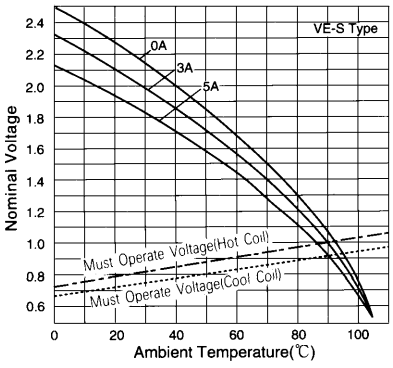

### Coil Temperature Rise



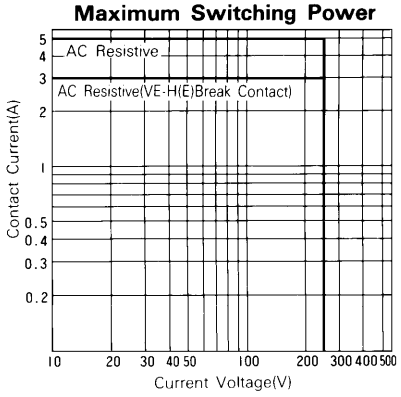

### Operating Range



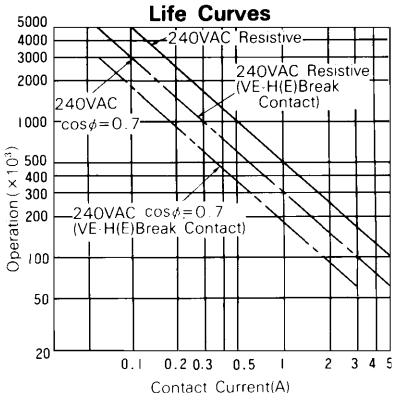

### Operating Range



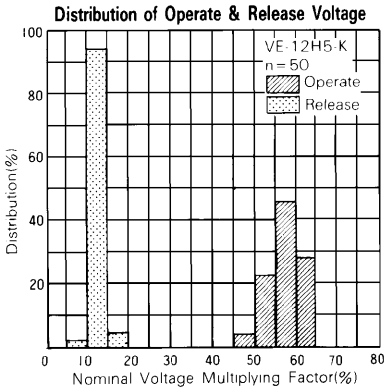

### Maximum Switching Power



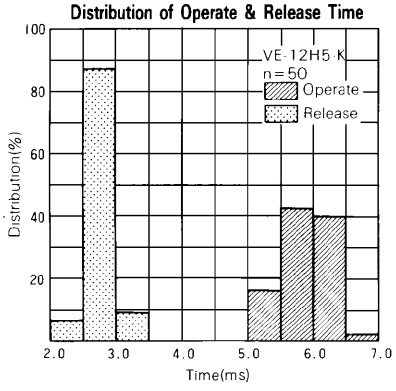

### Life Curves



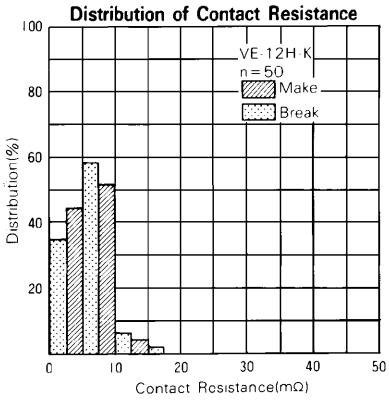

### Distribution of Operate & Release Voltage



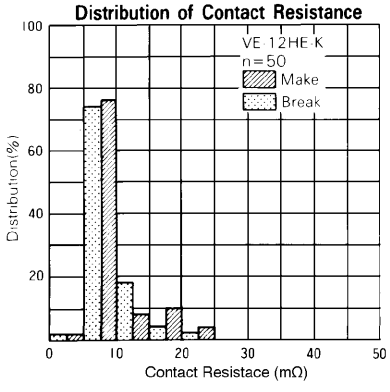

### Distribution of Operate & Release Time



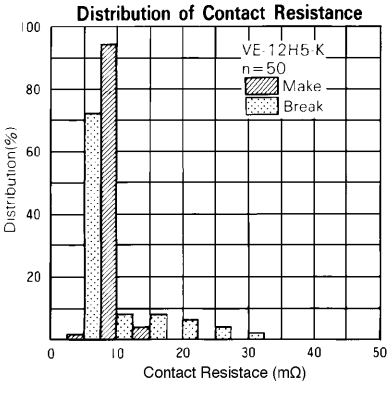

### Distribution of Contact Resistance



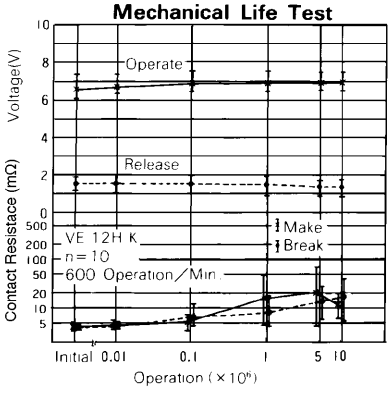

### Distribution of Contact Resistance

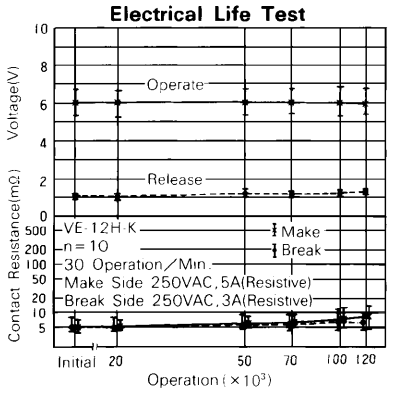


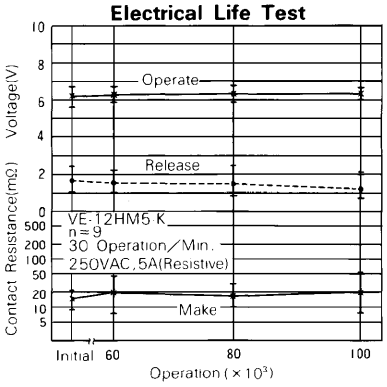

### Distribution of Contact Resistance




### Mechanical Life Test



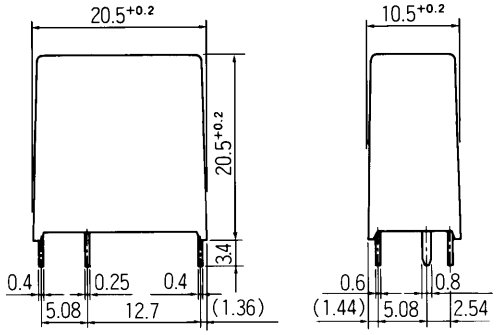


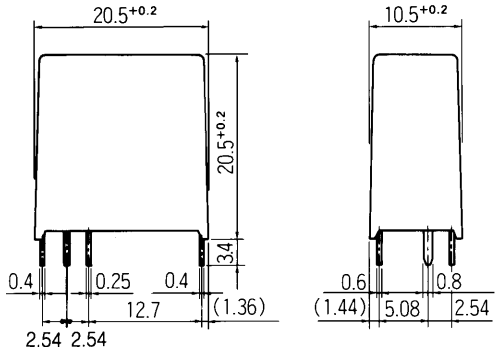

## ■ DIMENSIONS

### ● Dimensions

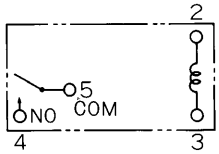
VE-M type

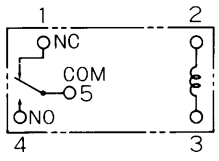



VE type

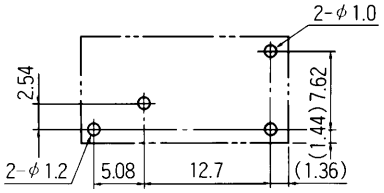


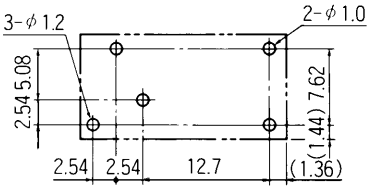

### ● Schematics
(BOTTOM VIEW)




### ● PC board mounting hole layout
(BOTTOM VIEW)




Unit: mm

# RoHS Compliance and Lead Free Relay Information

## 1. General Information

- Relays produced after the specific date code that is indicated on each data sheet are lead-free now. All of our signal and power relays are lead-free. Please refer to Lead-Free Status Info. (http://www.fujitsu.com/us/downloads/MICRO/fcai/relays/lead-free-letter.pdf)
- Lead free solder paste currently used in relays is Sn-3.0Ag-0.5Cu.
- All signal and power relays also comply with RoHS. Please refer to individual data sheets. Relays that are RoHS compliant do not contain the 5 hazardous materials that are restricted by RoHS directive (lead, mercury, chromium IV, PBB, PBDE).
- It has been verified that using lead-free relays in leaded assembly process will not cause any problems (compatible).
- “LF” is marked on each outer and inner carton. (No marking on individual relays).
- To avoid leaded relays (for lead-free sample, etc.) please consult with area sales office.
- We will ship leaded relays as long as the leaded relay inventory exists.

Note: Cadmium was exempted from RoHS on October 21, 2005. (Amendment to Directive 2002/95/EC)

## 2. Recommended Lead Free Solder Profile

- Recommended solder paste Sn-3.0Ag-0.5Cu.

### Reflow Solder condtion

**Flow Solder condtion:**

| | |
|---|---|
| Pre-heating: | maximum 120˚C |
| Soldering: | dip within 5 sec. at 260˚C soler bath |

**Solder by Soldering Iron:**

| | |
|---|---|
| Soldering Iron Temperature: | maximum 360˚C |
| Duration: | maximum 3 sec. |

**We highly recommend that you confirm your actual solder conditions**

## 3. Moisture Sensitivity

- Moisture Sensitivity Level standard is not applicable to electromechanical realys.

## 4. Tin Whisker

- Dipped SnAgCu solder is known as low risk tin whisker. No considerable length whisker was found by our in house test.

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