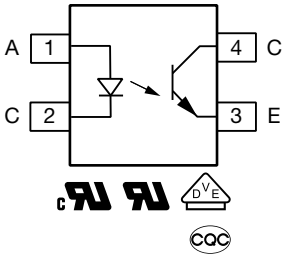
# Optocoupler, Phototransistor Output, 4 Pin SOP, Low Profile Package




## FEATURES

- Low profile package
- High CTR at low forward current
- High collector emitter voltage, $V_{CEO}$ = 80 V
- High isolation voltage, $V_{ISO}$ = 3750 $V_{RMS}$
- Enhanced CTR linearity over temperature and forward current
- Operating temperature up to 125 °C
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

Pb-free

e3

RoHS COMPLIANT

HALOGEN FREE GREEN (5-2008)

## DESCRIPTION

The VOM619A series has an infrared emitting diode, which is optically coupled to a phototransistor detector, and is incorporated in a green 4-pin small outline package.

It features a high current transfer ratio at low input current with enhanced linearity over temperature.

The coupling device is designed for signal transmission between two electrically separated circuits.

## APPLICATIONS

- DC/DC converters
- Programmable controllers
- Power supplies
- Signal transmission with galvanic and noise isolation

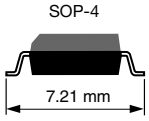
## AGENCY APPROVALS

(All parts are certified under base model VOM619A)

- UL
- cUL
- DIN EN 60747-5-5 (VDE 0884-5)
- CQC

## ORDERING INFORMATION

| V | O | M | 6 | 1 | 9 | A | - | # | X | 0 | 0 | 1 | T |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PART NUMBER | | | | | | | | CTR BIN | PACKAGE OPTION | | | | TAPE AND REEL |




| AGENCY CERTIFIED / PACKAGE | CTR (%) | | |
|---|---|---|---|
| | 0.5 mA | | |
| **UL, cUL, CQC, VDE** | **100 to 250** | **160 to 320** | **200 to 400** |
| SOP-4 | VOM619A-3X001T | VOM619A-4X001T | VOM619A-9X001T |

**Note**

- Additional options may be possible, please contact sales office.

| **ABSOLUTE MAXIMUM RATINGS** ($T_{amb}$ = 25 °C, unless otherwise specified) | | | | |
|---|---|---|---|---|
| **PARAMETER** | **TEST CONDITION** | **SYMBOL** | **VALUE** | **UNIT** |
| **INPUT** | | | | |
| Reverse voltage | | $V_R$ | 5 | V |
| Power dissipation | | $P_{diss}$ | 50 | mW |
| Forward current | | $I_F$ | 30 | mA |
| Surge forward current | $t_p \leq 1$ µs | $I_{FSM}$ | 1.0 | A |
| Junction temperature | | $T_J$ | 135 | °C |
| **OUTPUT** | | | | |
| Collector emitter voltage | | $V_{CEO}$ | 80 | V |
| Emitter collector voltage | | $V_{ECO}$ | 7 | V |
| Collector current | | $I_C$ | 30 | mA |
| Power dissipation | | $P_{diss}$ | 200 | mW |
| Junction temperature | | $T_J$ | 135 | °C |
| **COUPLER** | | | | |
| Total power dissipation | | $P_{tot}$ | 200 | mW |
| Storage temperature range | | $T_{stg}$ | -55 to +125 | °C |
| Ambient temperature range | | $T_{amb}$ | -55 to +125 | °C |
| Soldering temperature [1] | t = 10 s | $T_{sld}$ | 260 | °C |

**Notes**

- Stresses in excess of the absolute maximum ratings can cause permanent damage to the device. Functional operation of the device is not implied at these or any other conditions in excess of those given in the operational sections of this document. Exposure to absolute maximum ratings for extended periods of the time can adversely affect reliability.

(1) Refer to reflow profile for soldering conditions for surface mounted devices.

| **RECOMMENDED OPERATING CONDITIONS** ($T_{amb}$ = 25 °C, unless otherwise specified) | | | | |
|---|---|---|---|---|
| **PARAMETER** | **SYMBOL** | **MIN.** | **MAX.** | **UNIT** |
| Forward current | $I_F$ | 0.5 | 10 | mA |

| **ELECTRICAL CHARACTERISTICS** ($T_{amb}$ = 25 °C, unless otherwise specified) | | | | | | |
|---|---|---|---|---|---|---|
| **PARAMETER** | **TEST CONDITION** | **SYMBOL** | **MIN.** | **TYP.** | **MAX.** | **UNIT** |
| **INPUT** | | | | | | |
| Forward voltage | $I_F$ = 10 mA | $V_F$ | - | - | 1.6 | V |
| Capacitance | $V_R$ = 0 V, f = 1 kHz | $C_O$ | - | 30 | - | pF |
| Reverse current | $V_R$ = 5 V | $I_R$ | - | - | 5 | µA |
| **OUTPUT** | | | | | | |
| Collector emitter dark current | $V_{CE}$ = 20 V, $I_F$ = 0 A | $I_{CEO}$ | - | - | 200 | nA |
| Collector emitter breakdown voltage | $I_C$ = 0.5 mA | $BV_{CEO}$ | 80 | - | - | |
| Emitter-Collector breakdown voltage | $I_E$ = 0.1 mA | $BV_{ECO}$ | 7 | - | - | |
| **COUPLER** | | | | | | |
| Collector emitter saturation voltage | $I_C$ = 2.4 mA, $I_F$ = 8 mA | $V_{CEsat}$ | - | - | 0.3 | V |
| Floating capacitance | f = 1 MHz | $C_C$ | - | 0.8 | - | pF |

**Note**

- Minimum and maximum values are testing requirements. Typical values are characteristics of the device and are the result of engineering evaluation. Typical values are for information only and are not part of the testing requirements.

| CURRENT TRANSFER RATIO ($T_{amb}$ = 25 °C, unless otherwise specified) | | | | | | | |
|---|---|---|---|---|---|---|---|
| **PARAMETER** | **TEST CONDITION** | **PART** | **SYMBOL** | **MIN.** | **TYP.** | **MAX.** | **UNIT** |
| $I_C/I_F$ | $I_F$ = 0.5 mA, $V_{CE}$ = 5 V | VOM619A-3 | CTR | 100 | - | 250 | % |
| | | VOM619A-4 | CTR | 160 | - | 320 | % |
| | | VOM619A-9 | CTR | 200 | - | 400 | % |

| SWITCHING CHARACTERISTICS ($T_{amb}$ = 25 °C, unless otherwise specified) | | | | | | |
|---|---|---|---|---|---|---|
| **PARAMETER** | **TEST CONDITION** | **SYMBOL** | **MIN.** | **TYP.** | **MAX.** | **UNIT** |
| Rise time | $V_{CE}$ = 2 V, $I_C$ = 2 mA, $R_L$ = 100 Ω | $t_r$ | - | 6 | 18 | µs |
| Fall time | $V_{CE}$ = 2 V, $I_C$ = 2 mA, $R_L$ = 100 Ω | $t_f$ | - | 8 | 18 | µs |

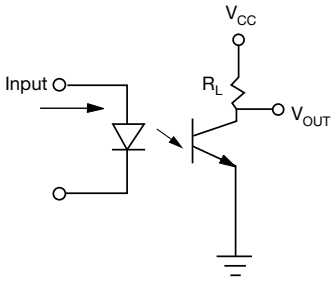



Fig. 1 - Test Circuit

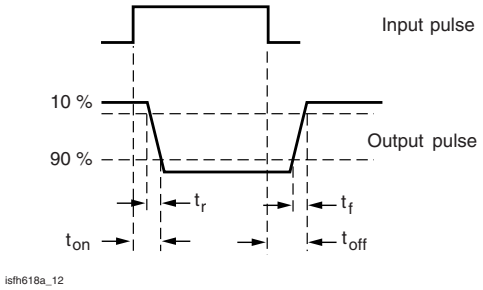



Fig. 2 - Test Circuit and Waveforms

| SAFETY AND INSULATION RATINGS | | | | |
|---|---|---|---|---|
| **PARAMETER** | **TEST CONDITION** | **SYMBOL** | **VALUE** | **UNIT** |
| Climatic classification | According to IEC 68 part 1 | | 55 / 125 / 21 | |
| Pollution degree | According to DIN VDE 0109 | | 2 | |
| Comparative tracking index | Insulation group IIIa | CTI | 175 | |
| Maximum rated withstanding isolation voltage | According to UL1577, t = 1 min | $V_{ISO}$ | 3750 | $V_{RMS}$ |
| Maximum transient isolation voltage | According to DIN EN 60747-5-5 | $V_{IOTM}$ | 4800 | $V_{peak}$ |
| Maximum repetitive peak isolation voltage | According to DIN EN 60747-5-5 | $V_{IORM}$ | 850 | $V_{peak}$ |
| Isolation resistance | $T_{amb}$ = 25 °C, $V_{IO}$ = 500 V | $R_{IO}$ | ≥ 5 x $10^{10}$ | Ω |
| | $T_{amb}$ = $T_S$, $V_{IO}$ = 500 V | $R_{IO}$ | ≥ $10^9$ | Ω |
| Output safety power | | $P_{SO}$ | 150 | mW |
| Input safety current | | $I_{SI}$ | 130 | mA |
| Input safety temperature | | $T_S$ | 150 | °C |
| Creepage distance | | | ≥ 5 | mm |
| Clearance distance | | | ≥ 5 | mm |
| Insulation thickness | | DTI | ≥ 0.4 | mm |

**Note**

- According to DIN EN 60747-5-5 (VDE 0884). This optocoupler is suitable for safe electrical isolation only within the safety ratings. Compliance with the safety ratings shall be ensured by means of suitable protective circuits.

**TYPICAL CHARACTERISTICS** ($T_{amb}$ = 25 °C, unless otherwise specified)

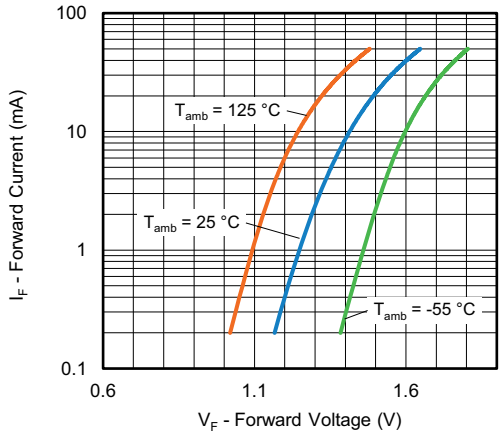



Fig. 3 - Forward Current vs. Forward Voltage

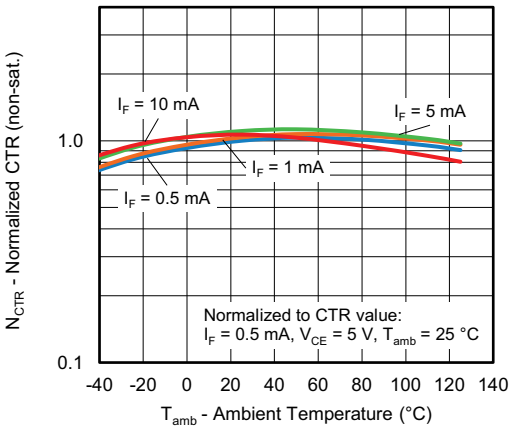



Fig. 6 - Normalized CTR vs. Ambient Temperature

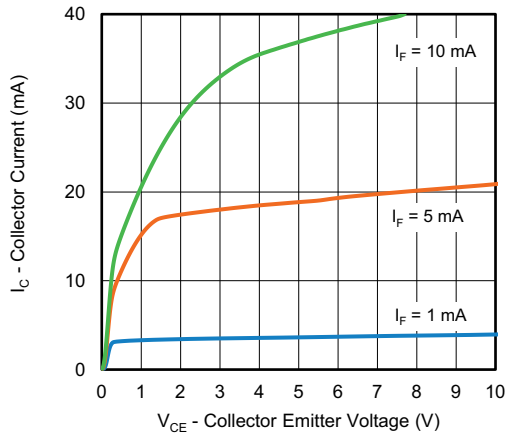



Fig. 4 - Collector Current vs. Collector Emitter Voltage (non-saturated)

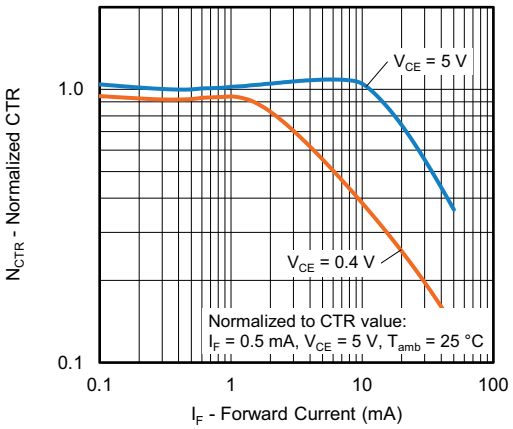



Fig. 7 - Normalized CTR vs. Forward Current

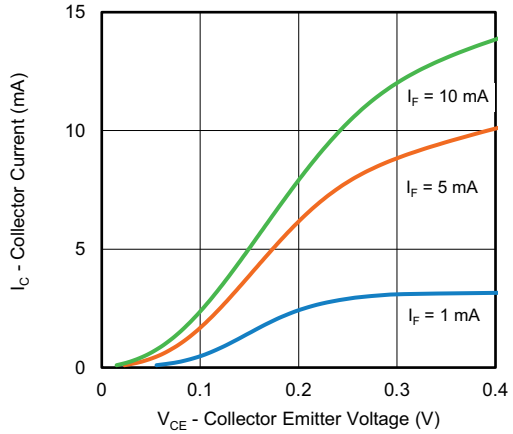



Fig. 5 - Collector Current vs. Collector Emitter Voltage (saturated)

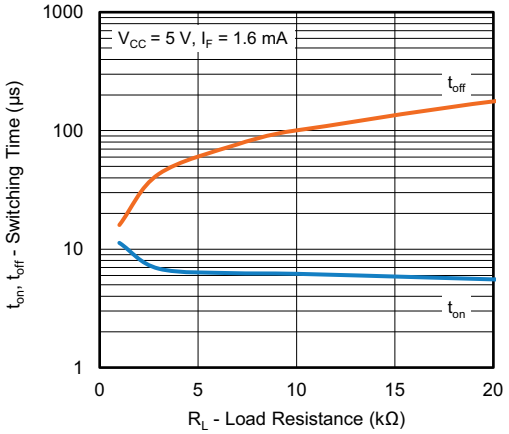



Fig. 8 - Switching Time vs. Load Resistance

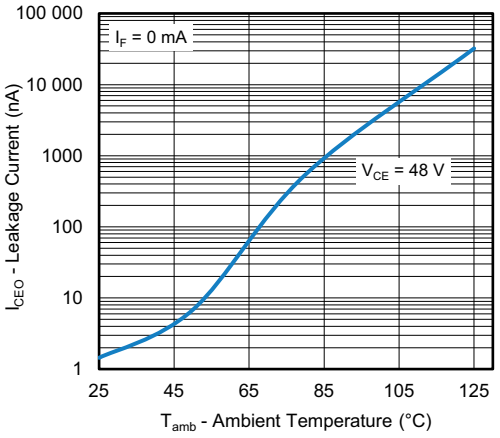
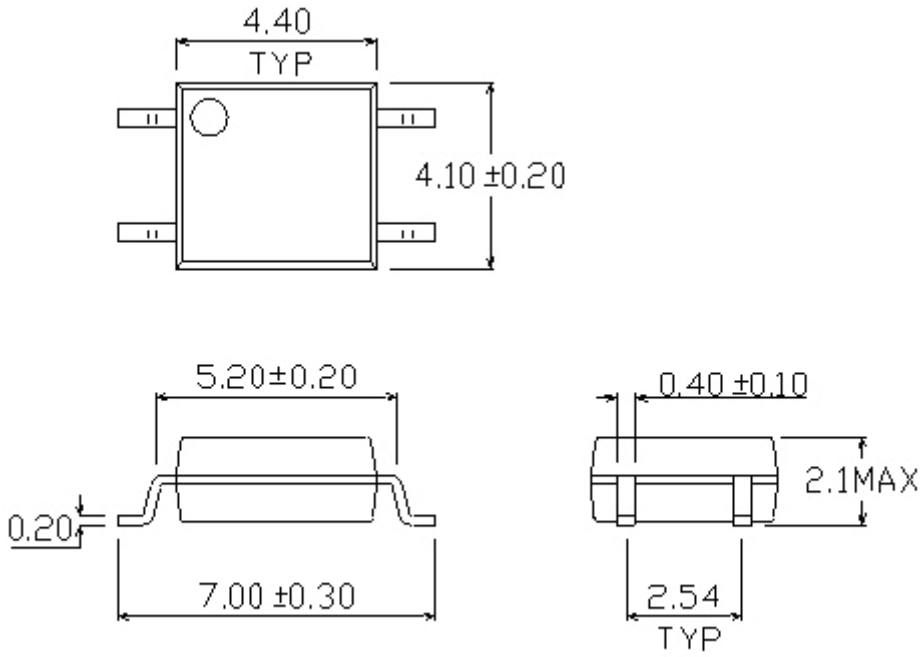
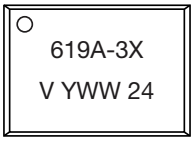



Fig. 9 - Leakage Current vs. Ambient Temperature

## PACKAGE DIMENSIONS (in millimeters)




## PACKAGE MARKING (example of VOM619A-3X001T)




**Notes**

- Tape and reel suffix (T) is not part of the package marking
- YWW = date code

## TAPE AND REEL DIMENSIONS (in millimeters)

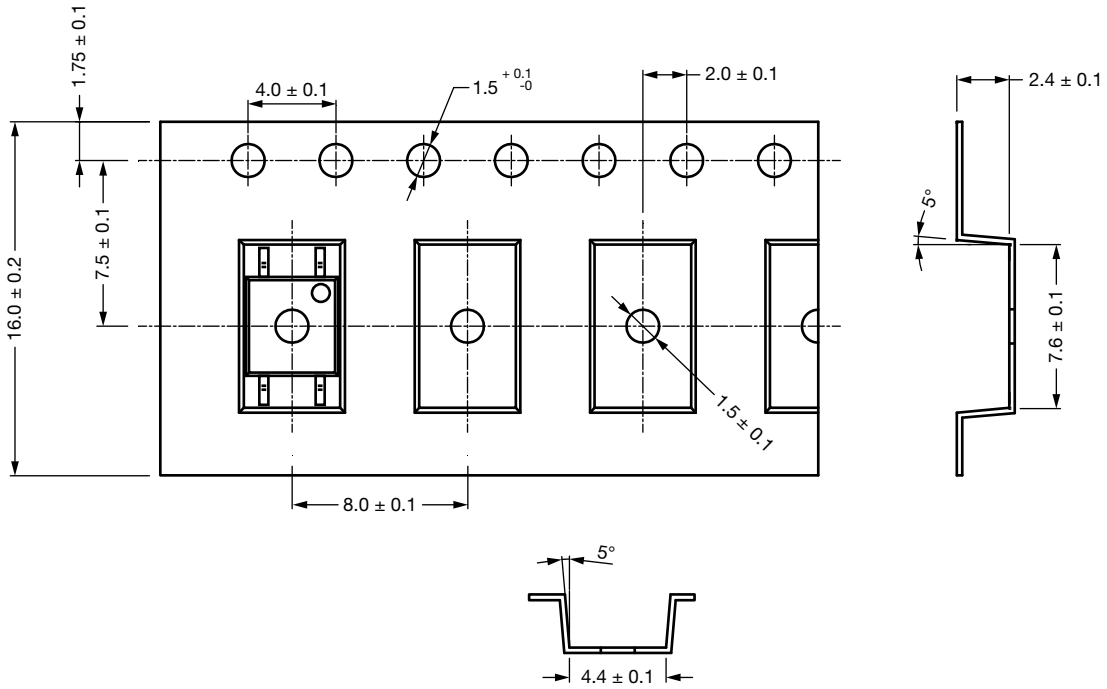



Fig. 10 - Tape and Reel Packing

| TAPE AND REEL PACKING | |
|---|---|
| **TYPE** | **UNITS/REEL** |
| SOP-4 | 3500 |

## SOLDER PROFILE

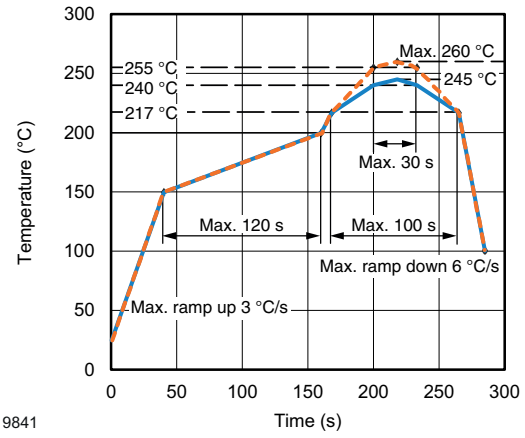



Fig. 11 - Lead (Pb)-free Reflow Solder Profile
According to J-STD-020

## HANDLING AND STORAGE CONDITIONS

ESD level: HBM class 2

Floor life: unlimited

Conditions: $T_{amb}$ < 30 °C, RH < 85 %

Moisture sensitivity level 1, according to J-STD-020

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