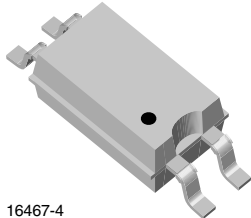
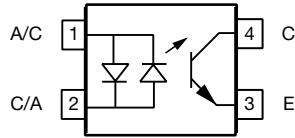




## Optocoupler, Phototransistor Output, AC Input, Low Input Current, SSOP-4, Half Pitch, Mini-Flat Package



16467-4



### FEATURES

- High CTR with low input current
- Low profile package (half pitch)
- High collector emitter voltage,  $V_{CE0} = 80\text{ V}$
- Isolation test voltage,  $3750\text{ V}_{RMS}$
- Low coupling capacitance
- High common mode transient immunity
- Compliant to RoHS Directive 2002/95/EC and in accordance to WEEE 2002/96/EC



RoHS COMPLIANT

### DESCRIPTION

The VOS628A series has a GaAs infrared emitting diode emitter, which is optically coupled to a silicon planar phototransistor detector, and is incorporated in a 4-pin 50 mil lead pitch mini-flat package.

It features a high current transfer ratio at low input current, low coupling capacitance, and high isolation voltage.

The coupling devices are designed for signal transmission between two electrically separated circuits.

### APPLICATIONS

- Telecom
- Industrial controls
- Battery powered equipment
- Office machines
- Programmable controllers

### AGENCY APPROVALS

- UL1577, file no. E76222 system code M, double protection (pending)
- cUL CSA 22.2 bulletin 5A, double protection (pending)
- DIN EN 60747-5-2 (pending) (VDE 0884)/DIN EN 60747-5-5 available with option 1
- BSI: EN 60065:2002 (pending), EN 60950-1:2006 (pending)
- FIMKO

| ORDERING INFORMATION     |            |                |               |
|--------------------------|------------|----------------|---------------|
| V                        | O          | S              | 6             |
| 2                        | 8          | A              | -             |
| #                        | X          | 0              | 0             |
| 1                        | T          |                |               |
| PART NUMBER              |            |                | CTR BIN       |
|                          |            | PACKAGE OPTION | TAPE AND REEL |
|                          |            |                | SSOP-#        |
|                          |            |                | 7 mm          |
| AGENCY CERTIFIED/PACKAGE | CTR (%)    |                |               |
|                          | ± 1 mA     |                |               |
| UL, cUL, BSI             | 63 to 125  | 100 to 200     | 160 to 320    |
| SSOP-4, 50 mil pitch     | VOS628A-2T | VOS628A-3T     | VOS628A-4T    |
| UL, cUL, BSI, VDE        | 63 to 125  | 100 to 200     | 160 to 320    |
| SSOP-4, 50 mil pitch     | -          | VOS628A-3X001T | -             |

### Note

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



| ABSOLUTE MAXIMUM RATINGS ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified) |   |            |                |                    |
|---|---|------------|----------------|--------------------|
| PARAMETER   | TEST CONDITION  | SYMBOL     | VALUE          | UNIT               |
| <b>INPUT</b>  |   |            |                |                    |
| Power dissipation   |   | $P_{diss}$ | 100            | mW                 |
| Forward current   |   | $I_F$      | 60             | mA                 |
| <b>OUTPUT</b>   |   |            |                |                    |
| Collector emitter voltage   |   | $V_{CE}$   | 80             | V                  |
| Emitter collector voltage   |   | $V_{EC}$   | 7              | V                  |
| Collector current   |   | $I_C$      | 50             | mA                 |
|   | $t_p/T = 0.5$ , $t_p < 10\text{ ms}$                                    | $I_C$      | 100            | mA                 |
| Power dissipation   |   | $P_{diss}$ | 150            | mW                 |
| <b>COUPLER</b>  |   |            |                |                    |
| Isolation test voltage between emitter and detector   |   | $V_{ISO}$  | 3750           | $V_{RMS}$          |
| Isolation resistance  | $V_{IO} = 500\text{ V}$ , $T_{amb} = 25\text{ }^{\circ}\text{C}$        | $R_{IO}$   | $\geq 10^{12}$ | $\Omega$           |
|   | $V_{IO} = 500\text{ V}$ , $T_{amb} = 100\text{ }^{\circ}\text{C}$       | $R_{IO}$   | $\geq 10^{11}$ | $\Omega$           |
| Storage temperature range   |   | $T_{stg}$  | - 40 to + 125  | $^{\circ}\text{C}$ |
| Ambient temperature range   |   | $T_{amb}$  | - 40 to + 110  | $^{\circ}\text{C}$ |
| Junction temperature  |   | $T_j$      | 125            | $^{\circ}\text{C}$ |
| Soldering temperature <sup>(1)</sup>  | max. 10 s, dip soldering distance to seating plane $\geq 1.5\text{ mm}$ | $T_{sld}$  | 260            | $^{\circ}\text{C}$ |

**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.
- <sup>(1)</sup> Refer to reflow profile for soldering conditions for surface mounted devices.

| ELECTRICAL CHARACTERISTICS ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified) |  |           |             |      |      |      |      |
|---|--|-----------|-------------|------|------|------|------|
| PARAMETER   | TEST CONDITION                                   | PART      | SYMBOL      | MIN. | TYP. | MAX. | UNIT |
| <b>INPUT</b>  |  |           |             |      |      |      |      |
| Forward voltage   | $I_F = \pm 5\text{ mA}$                          |           | $V_F$       |      | 1.16 | 1.5  | V    |
| Capacitance   | $V_R = 0\text{ V}$ , $f = 1\text{ MHz}$          |           | $C_O$       |      | 25   |      | pF   |
| <b>OUTPUT</b>   |  |           |             |      |      |      |      |
| Collector emitter leakage current   | $V_{CE} = 10\text{ V}$                           |           | $I_{CEO}$   |      | 10   | 200  | nA   |
| Collector emitter capacitance   | $V_{CE} = 5\text{ V}$ , $f = 1\text{ MHz}$       |           | $C_{CE}$    |      | 7    |      | pF   |
| <b>COUPLER</b>  |  |           |             |      |      |      |      |
| Collector emitter saturation voltage  | $I_C = 0.32\text{ mA}$ , $I_F = \pm 1\text{ mA}$ | VOS628A-2 | $V_{CEsat}$ |      | 0.25 | 0.4  | V    |
|   | $I_C = 0.5\text{ mA}$ , $I_F = \pm 1\text{ mA}$  | VOS628A-3 | $V_{CEsat}$ |      | 0.25 | 0.4  | V    |
|   | $I_C = 0.8\text{ mA}$ , $I_F = \pm 1\text{ mA}$  | VOS628A-4 | $V_{CEsat}$ |      | 0.25 | 0.4  | V    |
| Coupling capacitance  |  |           | $C_C$       |      | 0.25 |      | 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 ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified) |   |           |        |      |      |      |      |
|---|---|-----------|--------|------|------|------|------|
| PARAMETER   | TEST CONDITION                                  | PART      | SYMBOL | MIN. | TYP. | MAX. | UNIT |
| $I_C/I_F$   | $I_F = \pm 1\text{ mA}$ , $V_{CE} = 5\text{ V}$ | VOS628A-2 | CTR    | 63   |      | 125  | %    |
|   |   | VOS628A-3 | CTR    | 100  |      | 200  | %    |
|   |   | VOS628A-4 | CTR    | 160  |      | 320  | %    |

| SWITCHING CHARACTERISTICS ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified) |   |           |      |      |      |               |
|--|---|-----------|------|------|------|---------------|
| PARAMETER  | TEST CONDITION  | SYMBOL    | MIN. | TYP. | MAX. | UNIT          |
| Turn on time   | $V_{CC} = 5\text{ V}$ , $I_C = 2\text{ mA}$ , $R_L = 100\ \Omega$ | $t_{on}$  |      | 6    |      | $\mu\text{s}$ |
| Rise time  | $V_{CC} = 5\text{ V}$ , $I_C = 2\text{ mA}$ , $R_L = 100\ \Omega$ | $t_r$     |      | 3.5  |      | $\mu\text{s}$ |
| Turn off time  | $V_{CC} = 5\text{ V}$ , $I_C = 2\text{ mA}$ , $R_L = 100\ \Omega$ | $t_{off}$ |      | 5.5  |      | $\mu\text{s}$ |
| Fall time  | $V_{CC} = 5\text{ V}$ , $I_C = 2\text{ mA}$ , $R_L = 100\ \Omega$ | $t_f$     |      | 5    |      | $\mu\text{s}$ |

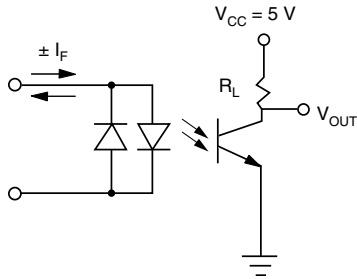


Fig. 1 - Test Circuit

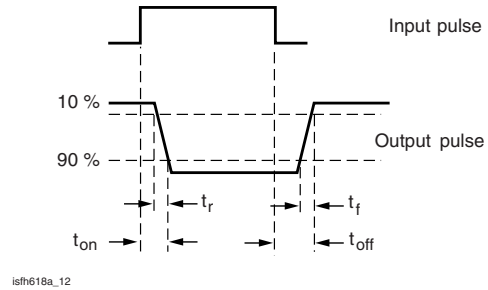


Fig. 2 - Test Circuit and Waveforms

| SAFETY AND INSULATION RATINGS                        |   |        |      |           |      |                    |
|--|---|--------|------|-----------|------|--------------------|
| PARAMETER  | TEST CONDITION                          | SYMBOL | MIN. | TYP.      | MAX. | UNIT               |
| Climatic classification (according to IEC 68 part 1) |   |        |      | 40/110/21 |      |                    |
| Comparative tracking index                           |   | CTI    | 175  |           | 399  |                    |
| $V_{IOTM}$   |   |        | 6000 |           |      | $V_{peak}$         |
| $V_{IORM}$   |   |        | 707  |           |      | $V_{peak}$         |
| $P_{SO}$   |   |        |      |           | 265  | mW                 |
| $I_{SI}$   |   |        |      |           | 130  | mA                 |
| $T_{SI}$   |   |        |      |           | 150  | $^{\circ}\text{C}$ |
| Creepage distance                                    |   |        | 5    |           |      | mm                 |
| Clearance distance                                   |   |        | 5    |           |      | mm                 |
| Insulation thickness                                 | Reinforce rated, per IEC 60950 2.10.5.1 |        | 0.4  |           |      | mm                 |

**Note**

- As per IEC 60747-5-2, §7.4.3.8.1, this optocoupler is suitable for “safe electrical insulation” only within the safety ratings. Compliance with the safety ratings shall be ensured by means of protective circuits.

**TYPICAL CHARACTERISTICS** ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)

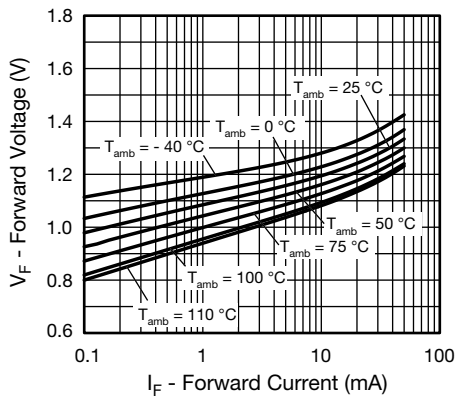


Fig. 3 - Forward Voltage vs. Forward Current

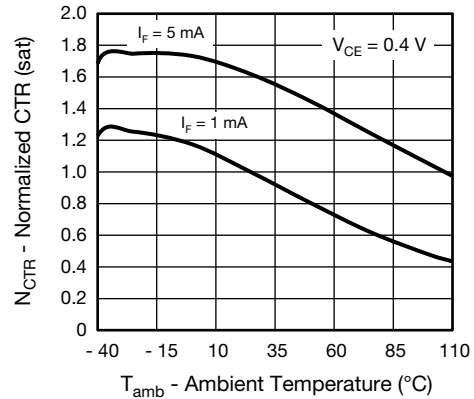


Fig. 6 - Normalized CTR (sat) vs. Ambient Temperature

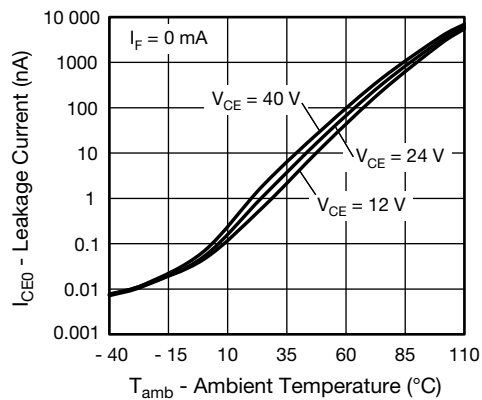


Fig. 4 - Leakage Current vs. Ambient Temperature

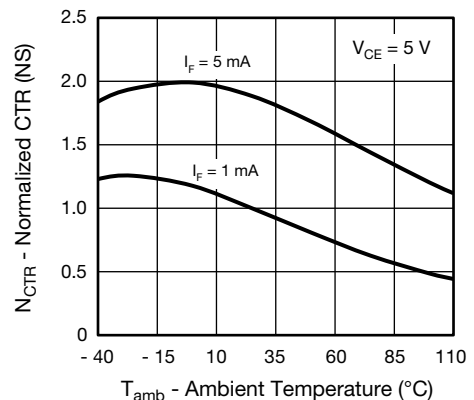


Fig. 7 - Normalized CTR (NS) vs. Ambient Temperature

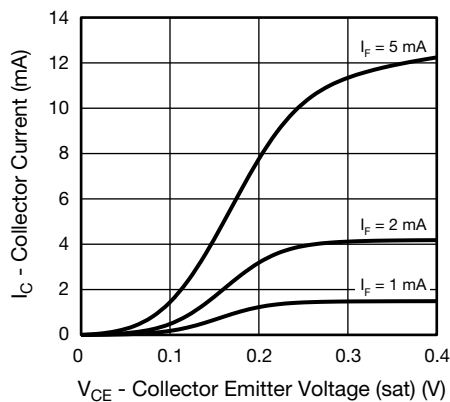


Fig. 5 - Collector Current vs. Collector Emitter Voltage (sat)

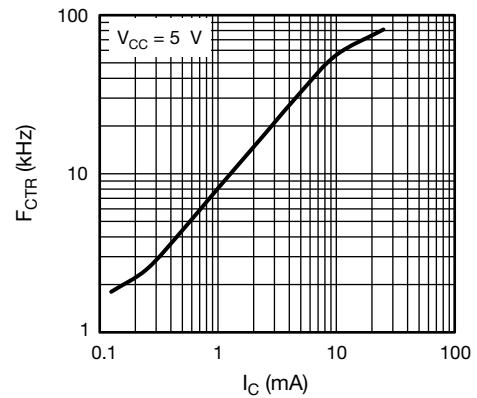


Fig. 8 -  $F_{CTR}$  vs.  $I_C$

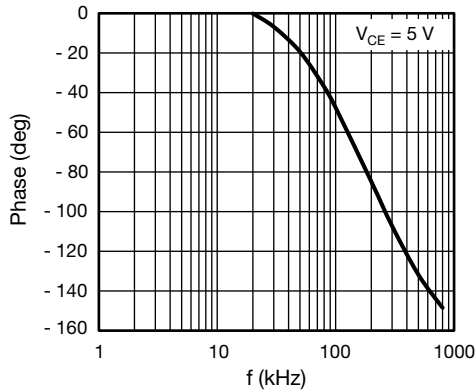
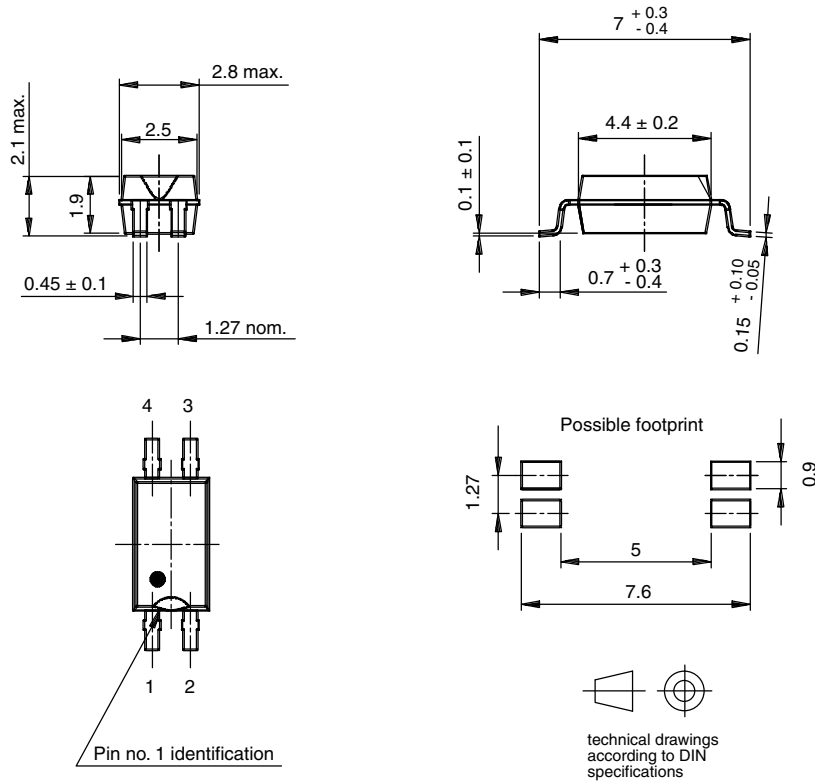


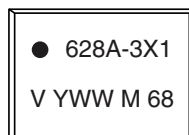
Fig. 9 - F<sub>CTR</sub> vs. Phase Angle

**PACKAGE DIMENSIONS** in millimeters



16283

**PACKAGE MARKING** (example)



**Notes**

- Only option 1 is reflected in the package marking, it is indicated by the characters "X1".
- Tape and reel suffix (T) is not part of the package marking.



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#### Как с нами связаться

**Телефон:** 8 (812) 309 58 32 (многоканальный)

**Факс:** 8 (812) 320-02-42

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

**Адрес:** 198099, г. Санкт-Петербург, ул. Калинина, дом 2, корпус 4, литера А.