

Optocoupler, Phototransistor Output, SSOP-4, Half Pitch, Mini-Flat Package



22628-1



DESCRIPTION

The VOS617A 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.

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 V_{RMS}
- Low coupling capacitance
- High common mode transient immunity
- Material categorization:
For definitions of compliance please see www.vishay.com/doc?99912



APPLICATIONS

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

AGENCY APPROVALS

Safety application model number covering all products in this datasheet is VOS617A. This model number should be used when consulting safety agency documents.

- UL1577, file no. E52744
- cUL
- DIN EN 60747-5-5 (VDE 0884-5), available with option 1
- FIMKO EN 60065, EN 60950-1
- CQC GB4943.1-2011 and GB8898-2011 (suitable for installation altitude below 2000 m)

| ORDERING INFORMATION | | | | | | | |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;"> <div style="border: 1px solid black; padding: 2px;">V</div> <div style="border: 1px solid black; padding: 2px;">O</div> <div style="border: 1px solid black; padding: 2px;">S</div> <div style="border: 1px solid black; padding: 2px;">6</div> <div style="border: 1px solid black; padding: 2px;">1</div> <div style="border: 1px solid black; padding: 2px;">7</div> <div style="border: 1px solid black; padding: 2px;">A</div> <div style="border: 1px solid black; padding: 2px;">-</div> <div style="border: 1px solid black; padding: 2px;">#</div> <div style="border: 1px solid black; padding: 2px;">X</div> <div style="border: 1px solid black; padding: 2px;">0</div> <div style="border: 1px solid black; padding: 2px;">0</div> <div style="border: 1px solid black; padding: 2px;">1</div> <div style="border: 1px solid black; padding: 2px;">T</div> </div> <div style="margin-left: 20px;"> </div> </div> | | | | | | | |
| AGENCY CERTIFIED/ PACKAGE | CTR (%) | | | | | | |
| | 5 mA | | | | | | |
| UL, cUL, FIMKO, CQC | 50 to 600 | 63 to 125 | 100 to 200 | 160 to 320 | 80 to 160 | 130 to 260 | 200 to 400 |
| SSOP-4, 50 mil pitch | VOS617AT | VOS617A-2T | VOS617A-3T | VOS617A-4T | VOS617A-7T | VOS617A-8T | VOS617A-9T |
| UL, CUL, FIMKO, CQC, VDE (option 1) | 50 to 600 | 63 to 125 | 100 to 200 | 160 to 320 | 80 to 160 | 130 to 260 | 200 to 400 |
| SSOP-4, 50 mil pitch | VOS617A- X001T | VOS617A- 2X001T | VOS617A- 3X001T | VOS617A- 4X001T | VOS617A- 7X001T | VOS617A- 8X001T | VOS617A- 9X001T |

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 |
| INPUT | | | | |
| Reverse voltage | | V_R | 6 | V |
| Power dissipation | | P_{diss} | 70 | mW |
| Surge forward current | $t_p \leq 10\text{ }\mu\text{s}$ | I_{FSM} | 1.5 | A |
| Forward current | | I_F | 50 | mA |
| OUTPUT | | | | |
| Collector emitter voltage | | V_{CEO} | 80 | V |
| Emitter collector voltage | | V_{ECO} | 7 | V |
| Collector current | | I_C | 50 | mA |
| Power dissipation | | P_{diss} | 150 | mW |
| COUPLER | | | | |
| Isolation test voltage between emitter and detector | $t = 1\text{ min}$ | V_{ISO} | 3750 | V_{RMS} |
| Total power dissipation | | P_{tot} | 170 | mW |
| Storage temperature range | | T_{stg} | -55 to +150 | $^{\circ}\text{C}$ |
| Ambient temperature range | | T_{amb} | -55 to +110 | $^{\circ}\text{C}$ |
| Junction temperature | | T_j | 125 | $^{\circ}\text{C}$ |
| Soldering temperature ⁽¹⁾ | $t = 10\text{ s}$ | T_{slid} | 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.
- ⁽¹⁾ Refer to reflow profile for soldering conditions for surface mounted devices.

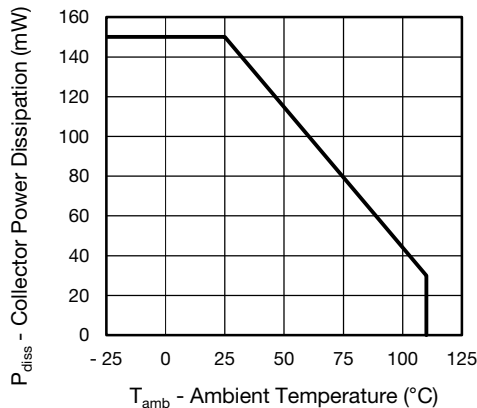


Fig. 1 - Power Dissipation vs. Ambient Temperature

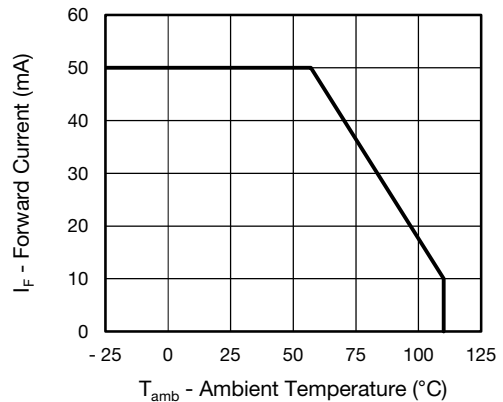


Fig. 2 - Forward Current vs. Ambient Temperature

| ELECTRICAL CHARACTERISTICS ($T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified) | | | | | | |
|----------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|-------------|------|------|------|---------------|
| PARAMETER | TEST CONDITION | SYMBOL | MIN. | TYP. | MAX. | UNIT |
| INPUT | | | | | | |
| Forward voltage | $I_F = 50\text{ mA}$ | V_F | | 1.18 | 1.5 | V |
| Reverse current | $V_R = 6\text{ V}$ | I_R | | 0.01 | 10 | μA |
| Capacitance | $V_R = 0\text{ V}$, $f = 1\text{ MHz}$ | C_I | | 7.3 | | pF |
| OUTPUT | | | | | | |
| Collector emitter leakage current | $V_{CE} = 10\text{ V}$ | I_{CEO} | | 0.3 | 100 | nA |
| Collector emitter breakdown voltage | $I_C = 100\text{ }\mu\text{A}$ | BV_{CEO} | 80 | | | V |
| Emitter collector breakdown voltage | $I_E = 10\text{ }\mu\text{A}$ | BV_{ECO} | 7 | | | V |
| Collector emitter capacitance | $V_{CE} = 5\text{ V}$, $f = 1\text{ MHz}$ | C_{CE} | | 5 | | pF |
| COUPLER | | | | | | |
| Collector emitter saturation voltage | $I_F = 5\text{ mA}$, $I_C = 2.5\text{ mA}$ | V_{CEsat} | | 0.25 | 0.4 | V |
| Cut-off frequency | $I_F = 10\text{ mA}$, $V_{CC} = 5\text{ V}$, $R_L = 100\text{ }\Omega$ | f_{ctr} | | 155 | | kHz |

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 | $I_F = 5\text{ mA}$, $V_{CE} = 5\text{ V}$ | VOS617A | CTR | 50 | | 600 | % |
| | | VOS617A-2 | CTR | 63 | | 125 | % |
| | | VOS617A-3 | CTR | 100 | | 200 | % |
| | | VOS617A-4 | CTR | 160 | | 320 | % |
| | | VOS617A-7 | CTR | 80 | | 160 | % |
| | | VOS617A-8 | CTR | 130 | | 260 | % |
| | | VOS617A-9 | CTR | 200 | | 400 | % |

| SWITCHING CHARACTERISTICS ($T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified) | | | | | | |
|---------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------|-----------|------|------|------|---------------|
| PARAMETER | TEST CONDITION | SYMBOL | MIN. | TYP. | MAX. | UNIT |
| NON-SATURATED | | | | | | |
| Rise and fall time | $I_C = 2\text{ mA}$, $V_{CC} = 5\text{ V}$, $R_L = 100\text{ }\Omega$ | t_r | | 3 | | μs |
| Fall time | | t_f | | 3 | | μs |
| Turn-on time | | t_{on} | | 6 | | μs |
| Turn-off time | | t_{off} | | 4 | | μs |
| SATURATED | | | | | | |
| Rise and fall time | $I_F = 1.6\text{ mA}$, $V_{CC} = 5\text{ V}$, $R_L = 1.9\text{ k}\Omega$ | t_r | | 3 | | μs |
| Fall time | | t_f | | 12 | | μs |
| Turn-on time | | t_{on} | | 4 | | μs |
| Turn-off time | | t_{off} | | 18 | | μs |

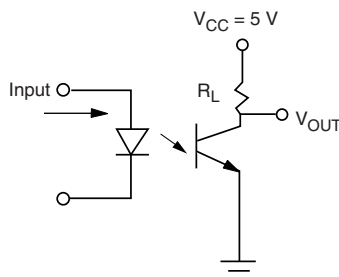


Fig. 3 - Test Circuit

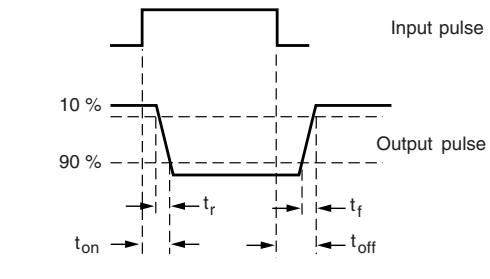


Fig. 4 - Test Circuit and Waveforms

| SAFETY AND INSULATION RATINGS | | | | |
|--------------------------------------------------------------|--------------------------------------------------|------------|----------------|------------|
| PARAMETER | | SYMBOL | VALUE | UNIT |
| MAXIMUM SAFETY RATINGS | | | | |
| Output safety power | | P_{SO} | 300 | mW |
| Input safety current | | I_{si} | 200 | mA |
| Safety temperature | | T_s | 150 | °C |
| Comparative tracking index | | CTI | 175 | |
| INSULATION RATED PARAMETERS | | | | |
| Maximum withstanding isolation voltage | 40 % to 60 % RH, AC test of 1 min | V_{ISO} | 3750 | V_{RMS} |
| Maximum transient isolation voltage | | V_{IOTM} | 6000 | V_{peak} |
| Maximum repetitive peak isolation voltage | | V_{IORM} | 565 | V_{peak} |
| Insulation resistance | $T_{amb} = 25\text{ °C}, V_{DC} = 500\text{ V}$ | R_{IO} | $\geq 10^{12}$ | Ω |
| Isolation resistance | $T_{amb} = 100\text{ °C}, V_{DC} = 500\text{ V}$ | R_{IO} | $\geq 10^{11}$ | Ω |
| Climatic classification (according to IEC 68 part 1) | | | 55/110/21 | |
| Environment (pollution degree in accordance to DIN VDE 0109) | | | 2 | |
| Creepage distance | | | ≥ 5 | mm |
| Clearance distance | | | ≥ 5 | mm |
| Insulation thickness | | | ≥ 0.4 | mm |

Note

- As per IEC 60747-5-5, § 7.4.3.8.2, 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 ($T_{amb} = 25\text{ °C}$, unless otherwise specified)


Fig. 5 - Forward Voltage vs. Forward Current



Fig. 6 - Collector Current vs. Collector Emitter Voltage



Fig. 7 - Leakage Current vs. Ambient Temperature



Fig. 10 - Normalized Current Transfer Ratio (saturated) vs. Ambient Temperature



Fig. 8 - Collector Current vs. Collector Emitter Voltage



Fig. 11 - Collector Emitter Voltage vs. Ambient Temperature



Fig. 9 - Normalized Current Transfer Ratio (non-saturated) vs. Ambient Temperature



Fig. 12 - Normalized CTR (non-saturated) vs. Forward Current



Fig. 13 - Normalized CTR (saturated) vs. Forward Current



Fig. 15 - F_{CTR} vs. Collector Current



Fig. 14 - F_{CTR} vs. Phase Angle

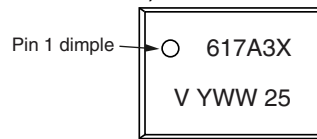


Fig. 16 - Switching Time vs. Load Resistance

PACKAGE DIMENSIONS in millimeters



PACKAGE MARKING (example of VOS617A-3X001T)



Notes

- Option 1 is reflected with letter "X".
- Tape and reel suffix (T) is not part of the package marking.

TAPE AND REEL DIMENSIONS in millimeters

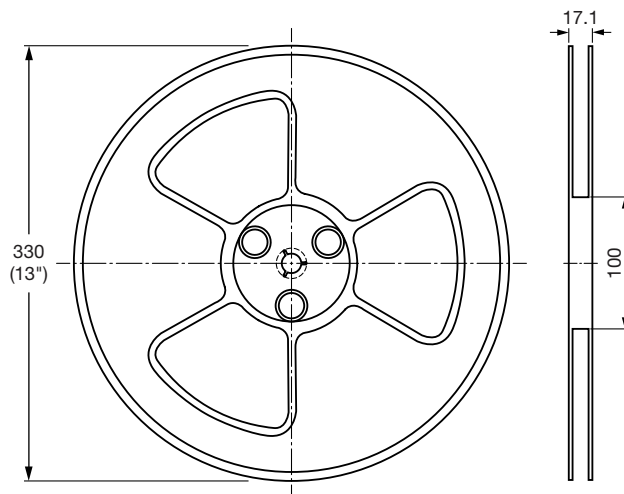


Fig. 17 - Reel Dimensions (3000 units per reel)



Fig. 18 - Tape Dimensions



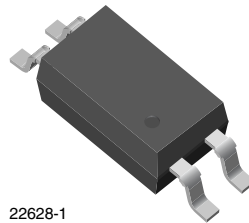
Footprint and Schematic Information for VOS617A

The footprint and schematic symbols for the following parts can be accessed using the associated links. They are available in Eagle, Altium, KiCad, OrCAD / Allegro, Pulsonix, and PADS.

Note that the 3D models for these parts can be found on the Vishay product page.

| PART NUMBER | FOOTPRINT / SCHEMATIC |
|----------------|----------------------------------------------------------------------------------------------------------------------------------|
| VOS617A-2T | www.snapeda.com/parts/VOS617A-2T/Vishay/view-part |
| VOS617A-2X001T | www.snapeda.com/parts/VOS617A-2X001T/Vishay/view-part |
| VOS617A-3T | www.snapeda.com/parts/VOS617A-3T/Vishay/view-part |
| VOS617A-3X001T | www.snapeda.com/parts/VOS617A-3X001T/Vishay/view-part |
| VOS617A-4T | www.snapeda.com/parts/VOS617A-4T/Vishay/view-part |
| VOS617A-4X001T | www.snapeda.com/parts/VOS617A-4X001T/Vishay/view-part |
| VOS617A-7T | www.snapeda.com/parts/VOS617A-7T/Vishay/view-part |
| VOS617A-7X001T | www.snapeda.com/parts/VOS617A-7X001T/Vishay/view-part |
| VOS617A-8T | www.snapeda.com/parts/VOS617A-8T/Vishay/view-part |
| VOS617A-8X001T | www.snapeda.com/parts/VOS617A-8X001T/Vishay/view-part |
| VOS617A-9T | www.snapeda.com/parts/VOS617A-9T/Vishay/view-part |
| VOS617A-9X001T | www.snapeda.com/parts/VOS617A-9X001T/Vishay/view-part |
| VOS617AT | www.snapeda.com/parts/VOS617AT/Vishay/view-part |
| VOS617AX001T | www.snapeda.com/parts/VOS617AX001T/Vishay/view-part |

For technical issues and product support, please contact optocoupleranswers@vishay.com.





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