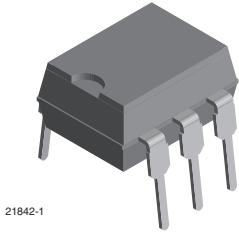
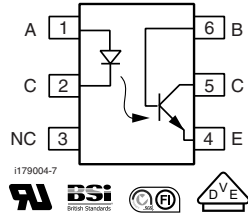


Optocoupler, Phototransistor Output, with Base Connection



21842-1


FEATURES

- Isolation test voltage: 5300 V_{RMS}
- Long term stability
- Industry standard dual-in-line package
- Compliant to RoHS Directive 2002/95/EC and in accordance to WEEE 2002/96/EC


RoHS
COMPLIANT

AGENCY APPROVALS

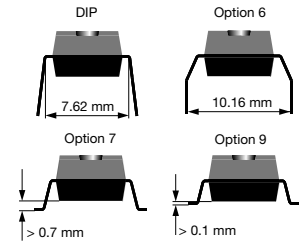
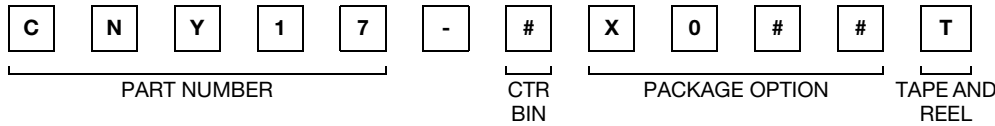
- Underwriters lab file no. E52744 system code H or J
- DIN EN 60747-5-2 (VDE 0884)
- BSI IEC 60950, IEC 60065
- FIMKO

DESCRIPTION

The CNY17 is an optically coupled pair consisting of a gallium arsenide infrared emitting diode optically coupled to a silicon NPN phototransistor.

Signal information, including a DC level, can be transmitted by the device while maintaining a high degree of electrical isolation between input and output.

The CNY17 can be used to replace relays and transformers in many digital interface applications, as well as analog applications such as CRT modulation.

ORDERING INFORMATION


| AGENCY CERTIFIED/PACKAGE | CTR (%) | | | |
|----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|
| UL, BSI, FIMKO | 40 to 80 | 63 to 125 | 100 to 200 | 160 to 320 |
| DIP-6 | CNY17-1 | CNY17-2 | CNY17-3 | CNY17-4 |
| DIP-6, 400 mil, option 6 | CNY17-1X006 | CNY17-2X006 | CNY17-3X006 | CNY17-4X006 |
| SMD-6, option 7 | CNY17-1X007T ⁽¹⁾ | CNY17-2X007T ⁽¹⁾ | CNY17-3X007T ⁽¹⁾ | CNY17-4X007T ⁽¹⁾ |
| SMD-6, option 9 | CNY17-1X009T ⁽¹⁾ | CNY17-2X009T ⁽¹⁾ | CNY17-3X009T ⁽¹⁾ | CNY17-4X009T ⁽¹⁾ |
| VDE, UL, BSI, FIMKO | 40 to 80 | 63 to 125 | 100 to 200 | 160 to 320 |
| DIP-6 | CNY17-1X001 | CNY17-2X001 | CNY17-3X001 | CNY17-4X001 |
| DIP-6, 400 mil, option 6 | CNY17-1X016 | CNY17-2X016 | CNY17-3X016 | CNY17-4X016 |
| SMD-64, option 7 | CNY17-1X017 | CNY17-2X017T ⁽¹⁾ | CNY17-3X017T ⁽¹⁾ | CNY17-4X017T ⁽¹⁾ |
| SMD-6, option 9 | - | CNY17-2X019T ⁽¹⁾ | - | - |

Note

⁽¹⁾ Also available in tubes, do not put T on the end.

ABSOLUTE MAXIMUM RATINGS (T_{amb} = 25 °C, unless otherwise specified)

| PARAMETER | TEST CONDITION | SYMBOL | VALUE | UNIT |
|-------------------|----------------|-------------------|-------|------|
| INPUT | | | | |
| Reverse voltage | | V _R | 6 | V |
| Forward current | | I _F | 60 | mA |
| Surge current | t ≤ 10 μs | I _{FSM} | 2.5 | A |
| Power dissipation | | P _{diss} | 100 | mW |

Vishay Semiconductors Optocoupler, Phototransistor Output,
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| ABSOLUTE MAXIMUM RATINGS ($T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified) | | | | |
|--|--|------------|----------------|--------------------|
| PARAMETER | TEST CONDITION | SYMBOL | VALUE | UNIT |
| OUTPUT | | | | |
| Collector emitter breakdown voltage | | BV_{CEO} | 70 | V |
| Emitter base breakdown voltage | | BV_{EBO} | 7 | V |
| Collector current | | I_C | 50 | mA |
| | $t < 1\text{ ms}$ | I_C | 100 | mA |
| Power dissipation | | P_{diss} | 150 | mW |
| COUPLER | | | | |
| Isolation test voltage between emitter and detector | $t = 1\text{ s}$ | V_{ISO} | 5300 | V_{RMS} |
| Creepage distance | | | ≥ 7 | mm |
| Clearance distance | | | ≥ 7 | mm |
| Isolation thickness between emitter and detector | | | ≥ 0.4 | mm |
| Comparative tracking index per DIN IEC 112/VDE 0303, part 1 | | | 175 | |
| Isolation resistance | $V_{IO} = 500\text{ V}, T_{amb} = 25\text{ }^{\circ}\text{C}$ | R_{IO} | $\geq 10^{12}$ | Ω |
| | $V_{IO} = 500\text{ V}, T_{amb} = 100\text{ }^{\circ}\text{C}$ | R_{IO} | $\geq 10^{11}$ | Ω |
| Storage temperature | | T_{stg} | - 55 to + 150 | $^{\circ}\text{C}$ |
| Operating temperature | | T_{amb} | - 55 to + 100 | $^{\circ}\text{C}$ |
| Soldering temperature | max. 10 s, dip soldering: distance to seating plane $\geq 1.5\text{ mm}$ | T_{slid} | 260 | $^{\circ}\text{C}$ |

Note

- 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.

| ELECTRICAL CHARACTERISTICS ($T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified) | | | | | | | |
|--|---|---------|-------------|------|------|------|---------------|
| PARAMETER | TEST CONDITION | PART | SYMBOL | MIN. | TYP. | MAX. | UNIT |
| INPUT | | | | | | | |
| Forward voltage | $I_F = 60\text{ mA}$ | | V_F | | 1.25 | 1.65 | V |
| Breakdown voltage | $I_R = 10\text{ mA}$ | | V_{BR} | 6 | | | 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_O | | 25 | | pF |
| Thermal resistance | | | R_{th} | | 750 | | K/W |
| OUTPUT | | | | | | | |
| Collector emitter capacitance | $V_{CE} = 5\text{ V}, f = 1\text{ MHz}$ | | C_{CE} | | 5.2 | | pF |
| Collector base capacitance | $V_{CB} = 5\text{ V}, f = 1\text{ MHz}$ | | C_{CB} | | 6.5 | | pF |
| Emitter base capacitance | $V_{EB} = 5\text{ V}, f = 1\text{ MHz}$ | | C_{EB} | | 7.5 | | pF |
| Thermal resistance | | | R_{th} | | 500 | | K/W |
| COUPLER | | | | | | | |
| Collector emitter, saturation voltage | $V_F = 10\text{ mA}, I_C = 2.5\text{ mA}$ | | V_{CEsat} | | 0.25 | 0.4 | V |
| Coupling capacitance | | | C_C | | 0.6 | | pF |
| Collector emitter, leakage current | $V_{CE} = 10\text{ V}$ | CNY17-1 | I_{CEO} | | 2 | 50 | nA |
| | | CNY17-2 | I_{CEO} | | 2 | 50 | nA |
| | | CNY17-3 | I_{CEO} | | 5 | 100 | nA |
| | | CNY17-4 | I_{CEO} | | 5 | 100 | nA |

Note

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

Optocoupler, Phototransistor Output, Vishay Semiconductors
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| CURRENT TRANSFER RATIO | | | | | | | |
|------------------------|---|---------|--------|------|------|------|------|
| PARAMETER | TEST CONDITION | PART | SYMBOL | MIN. | TYP. | MAX. | UNIT |
| I_C/I_F | $V_{CE} = 5\text{ V}, I_F = 10\text{ mA}$ | CNY17-1 | CTR | 40 | | 80 | % |
| | | CNY17-2 | CTR | 63 | | 125 | % |
| | | CNY17-3 | CTR | 100 | | 200 | % |
| | | CNY17-4 | CTR | 160 | | 320 | % |
| | $V_{CE} = 5\text{ V}, I_F = 1\text{ mA}$ | CNY17-1 | CTR | 13 | 30 | | % |
| | | CNY17-2 | CTR | 22 | 45 | | % |
| | | CNY17-3 | CTR | 34 | 70 | | % |
| | | CNY17-4 | CTR | 56 | 90 | | % |

Note

- Current transfer ratio and collector-emitter leakage current by dash number (T_{amb} °C).

| SWITCHING CHARACTERISTICS | | | | | | | |
|--|---|---------|-----------|------|------|------|---------------|
| PARAMETER | TEST CONDITION | PART | SYMBOL | MIN. | TYP. | MAX. | UNIT |
| LINEAR OPERATION (without saturation) | | | | | | | |
| Turn-on time | $I_F = 10\text{ mA}, V_{CC} = 5\text{ V}, R_L = 75\ \Omega$ | | t_{on} | | 3 | | μs |
| Rise time | $I_F = 10\text{ mA}, V_{CC} = 5\text{ V}, R_L = 75\ \Omega$ | | t_r | | 2 | | μs |
| Turn-off time | $I_F = 10\text{ mA}, V_{CC} = 5\text{ V}, R_L = 75\ \Omega$ | | t_{off} | | 2.3 | | μs |
| Fall time | $I_F = 10\text{ mA}, V_{CC} = 5\text{ V}, R_L = 75\ \Omega$ | | t_f | | 2 | | μs |
| Cut-off frequency | $I_F = 10\text{ mA}, V_{CC} = 5\text{ V}, R_L = 75\ \Omega$ | | f_{CO} | | 250 | | kHz |
| SWITCHING OPERATION (with saturation) | | | | | | | |
| Turn-on time | $I_F = 20\text{ mA}$ | CNY17-1 | t_{on} | | 3 | | μs |
| | $I_F = 10\text{ mA}$ | CNY17-2 | t_{on} | | 4.2 | | μs |
| | | CNY17-3 | t_{on} | | 4.2 | | μs |
| | | CNY17-4 | t_{on} | | 6 | | μs |
| Rise time | $I_F = 20\text{ mA}$ | CNY17-1 | t_r | | 2 | | μs |
| | $I_F = 10\text{ mA}$ | CNY17-2 | t_r | | 3 | | μs |
| | | CNY17-3 | t_r | | 3 | | μs |
| | | CNY17-4 | t_r | | 4.6 | | μs |
| Turn-off time | $I_F = 20\text{ mA}$ | CNY17-1 | t_{off} | | 18 | | μs |
| | $I_F = 10\text{ mA}$ | CNY17-2 | t_{off} | | 23 | | μs |
| | | CNY17-3 | t_{off} | | 23 | | μs |
| | | CNY17-4 | t_{off} | | 25 | | μs |
| Fall time | $I_F = 20\text{ mA}$ | CNY17-1 | t_f | | 11 | | μs |
| | $I_F = 10\text{ mA}$ | CNY17-2 | t_f | | 14 | | μs |
| | | CNY17-3 | t_f | | 14 | | μs |
| | | CNY17-4 | t_f | | 15 | | μs |

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

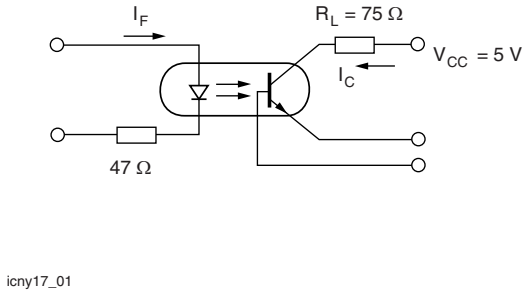


Fig. 1 - Linear Operation (without Saturation)

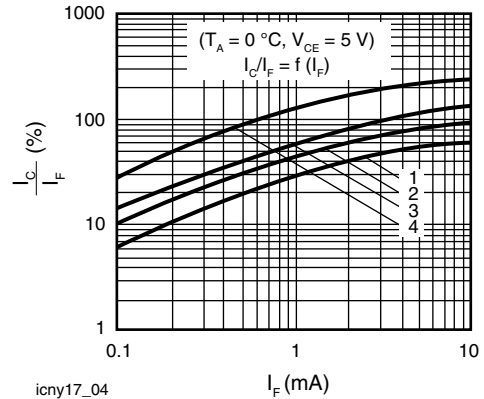


Fig. 4 - Current Transfer Ratio vs. Diode Current

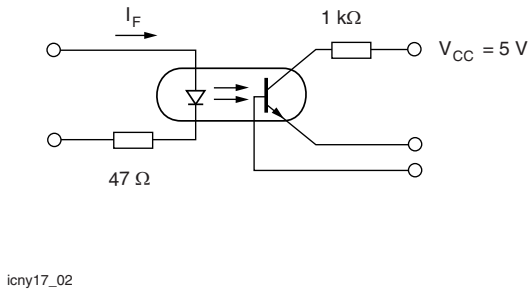


Fig. 2 - Switching Operation (with Saturation)

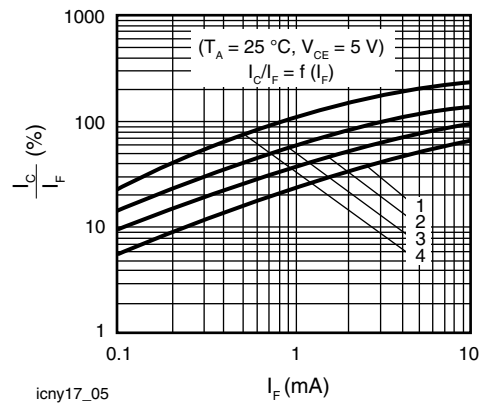


Fig. 5 - Current Transfer Ratio vs. Diode Current

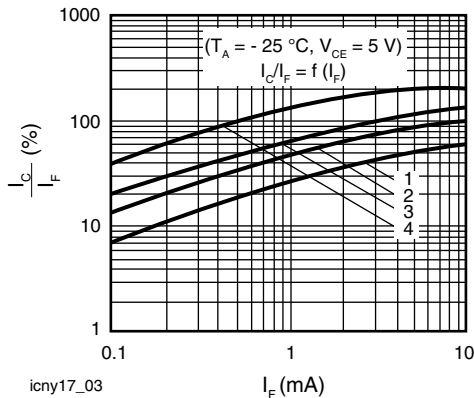


Fig. 3 - Current Transfer Ratio vs. Diode Current

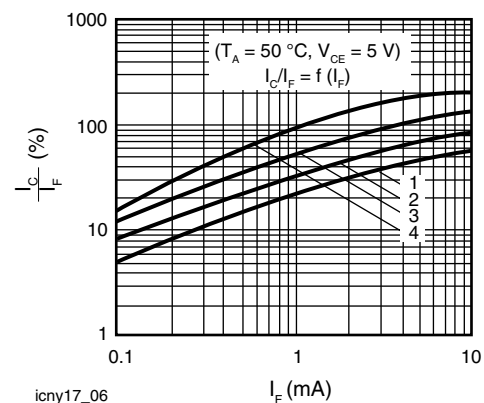


Fig. 6 - Current Transfer Ratio vs. Diode Current

Optocoupler, Phototransistor Output, Vishay Semiconductors with Base Connection

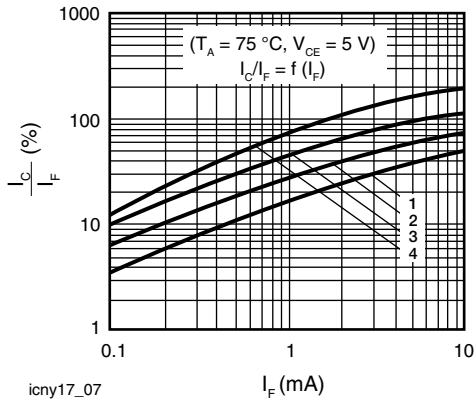


Fig. 7 - Current Transfer Ratio vs. Diode Current

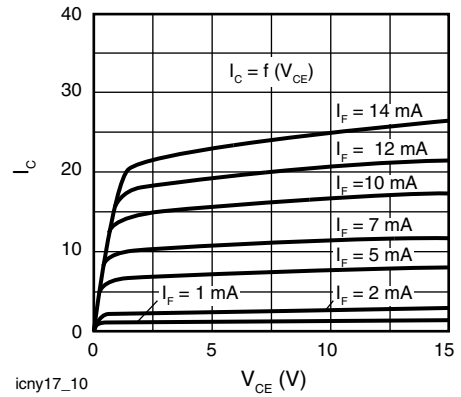


Fig. 10 - Output Characteristics

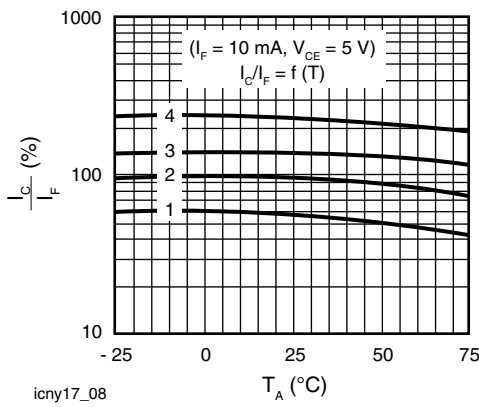


Fig. 8 - Current Transfer Ratio (CTR) vs. Temperature

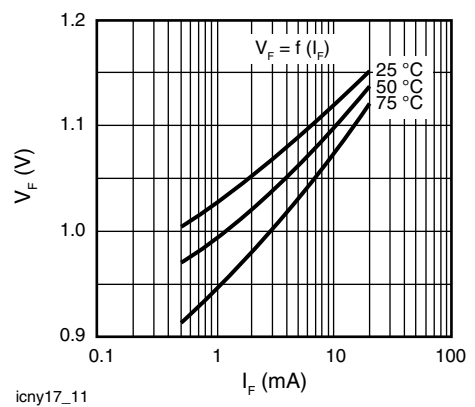


Fig. 11 - Forward Voltage

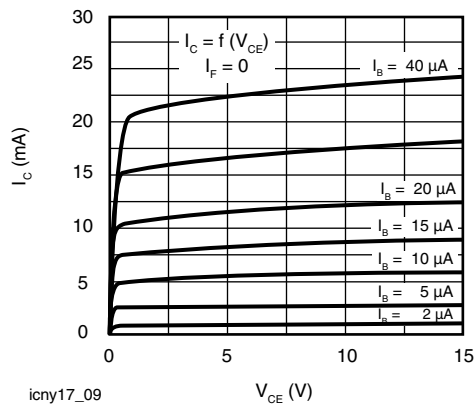


Fig. 9 - Transistor Characteristics

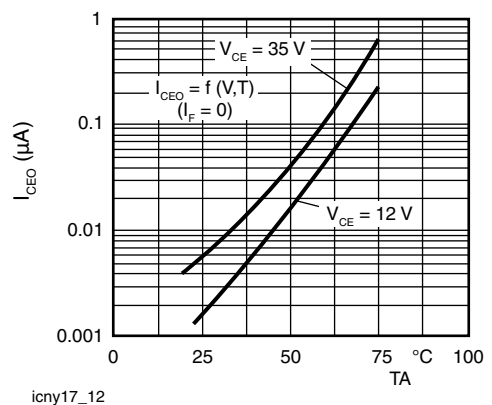


Fig. 12 - Collector Emitter Off-state Current

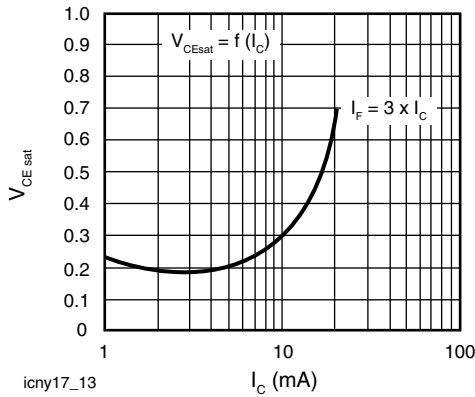


Fig. 13 - Saturation Voltage vs. Collector Current and Modulation Depth CNY17-1

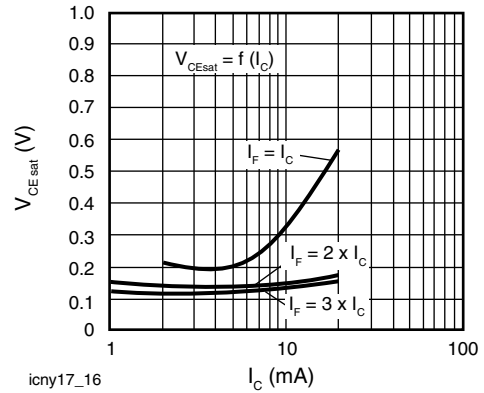


Fig. 16 - Saturation Voltage vs. Collector Current and Modulation Depth CNY17-4

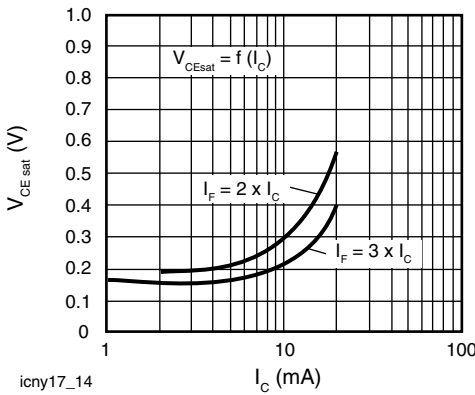


Fig. 14 - Saturation Voltage vs. Collector Current and Modulation Depth CNY17-2

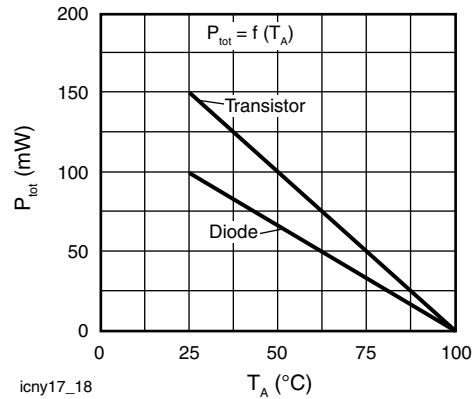


Fig. 17 - Permissible Power Dissipation for Transistor and Diode

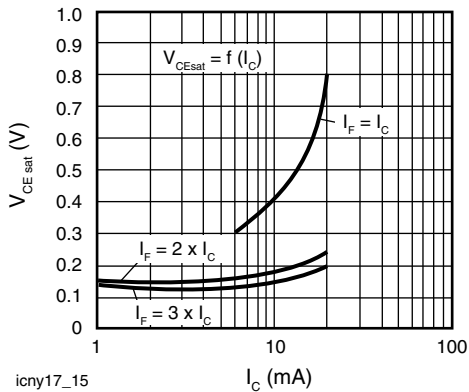
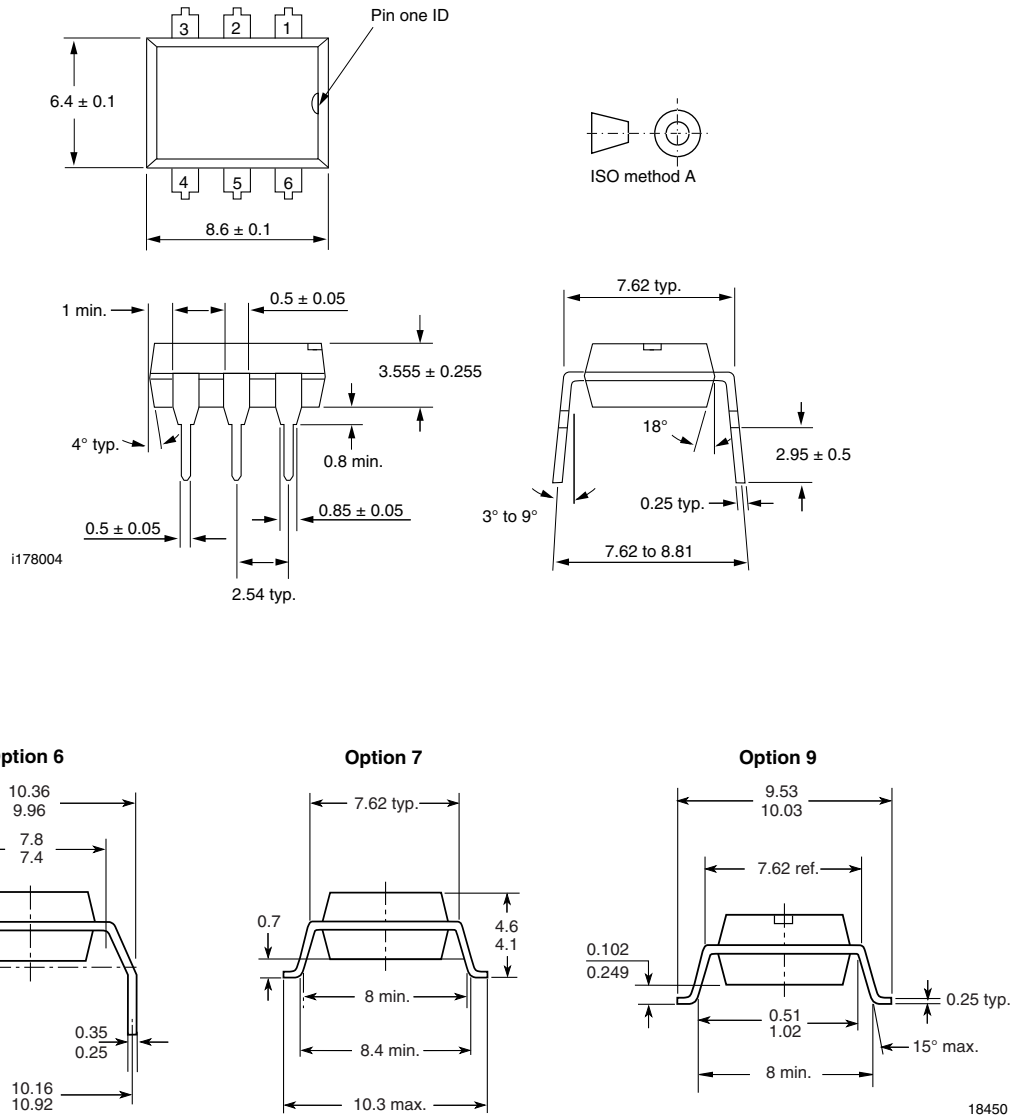


Fig. 15 - Saturation Voltage vs. Collector Current and Modulation Depth CNY17-3

Optocoupler, Phototransistor Output, Vishay Semiconductors with Base Connection

PACKAGE DIMENSIONS in millimeters


18450



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