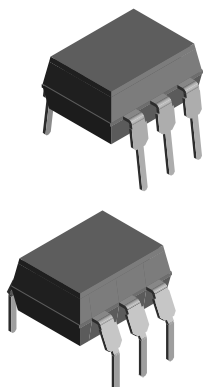
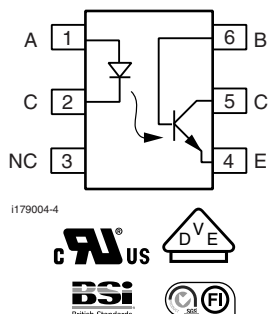




## Optocoupler, Phototransistor Output, with Base Connection



17201\_4



### FEATURES

- Isolation test voltage 5000 V<sub>RMS</sub>
- Long term stability
- Industry standard dual-in-line package
- V<sub>IORM</sub> = 850 V
- Material categorization:  
For definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)

RoHS  
COMPLIANT

### AGENCY APPROVALS

- UL file no. E52744
- cUL tested to CSA 22.2 bulletin 5A
- DIN EN 60747-5-5 (0884-5) available with option 1
- BSI IEC 60950-1:2006 IEC 60065
- FIMKO
- CQC

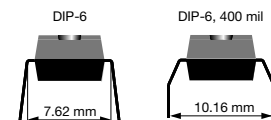
### DESCRIPTION

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 (%)  |           |            |            |
|---------------------------|----------|-----------|------------|------------|
| cUL, VDE, BSI, FIMKO, CQC | 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            | CNY17G-1 | CNY17G-2  | CNY17G-3   | CNY17G-4   |

### ABSOLUTE MAXIMUM RATINGS (T<sub>amb</sub> = 25 °C, unless otherwise specified)

| PARAMETER                           | TEST CONDITION | SYMBOL            | VALUE | UNIT |
|-------------------------------------|----------------|-------------------|-------|------|
| <b>INPUT</b>                        |                |                   |       |      |
| Reverse voltage                     |                | V <sub>R</sub>    | 5     | V    |
| Forward current                     |                | I <sub>F</sub>    | 60    | mA   |
| Surge current                       | t ≤ 10 μs      | I <sub>FSM</sub>  | 3     | A    |
| Power dissipation                   |                | P <sub>diss</sub> | 100   | mW   |
| <b>OUTPUT</b>                       |                |                   |       |      |
| Collector emitter breakdown voltage |                | BV <sub>CEO</sub> | 70    | V    |
| Emitter base breakdown voltage      |                | BV <sub>EBO</sub> | 7     | V    |
| Collector current                   |                | I <sub>C</sub>    | 50    | mA   |
|                                     | t < 1 ms       | I <sub>C</sub>    | 100   | mA   |
| Power dissipation                   |                | P <sub>diss</sub> | 150   | mW   |



| <b>ABSOLUTE MAXIMUM RATINGS</b> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified) |                                                                          |           |                |                    |
|--------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|-----------|----------------|--------------------|
| PARAMETER                                                                                              | TEST CONDITION                                                           | SYMBOL    | VALUE          | UNIT               |
| <b>COUPLER</b>                                                                                         |                                                                          |           |                |                    |
| Isolation test voltage between emitter and detector referred to climate DIN 50014, part 2, Nov. 74     | $t = 1\text{ min}$                                                       | $V_{ISO}$ | 5000           | $V_{RMS}$          |
| Creepage distance (CNY17.)                                                                             |                                                                          |           | $\geq 7$       | mm                 |
| Clearance distance (CNY17.)                                                                            |                                                                          |           | $\geq 7$       | mm                 |
| Creepage distance (CNY17G)                                                                             |                                                                          |           | $\geq 8$       | mm                 |
| Clearance distance (CNY17G)                                                                            |                                                                          |           | $\geq 8$       | mm                 |
| Isolation thickness between emitter and detector                                                       |                                                                          |           | $\geq 0.4$     | mm                 |
| Comparative tracking index per DIN IEC 112/VDE 0303, part 1                                            |                                                                          |           | 250            |                    |
| 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                                                                                    |                                                                          | $T_{stg}$ | - 55 to + 125  | $^{\circ}\text{C}$ |
| Operating temperature                                                                                  |                                                                          | $T_{amb}$ | - 55 to + 100  | $^{\circ}\text{C}$ |
| 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 wave profile for soldering conditions for through hole devices.

| <b>ELECTRICAL CHARACTERISTICS</b> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified) |                                           |         |             |      |      |      |               |
|----------------------------------------------------------------------------------------------------------|-------------------------------------------|---------|-------------|------|------|------|---------------|
| PARAMETER                                                                                                | TEST CONDITION                            | PART    | SYMBOL      | MIN. | TYP. | MAX. | UNIT          |
| <b>INPUT</b>                                                                                             |                                           |         |             |      |      |      |               |
| Forward voltage                                                                                          | $I_F = 60\text{ mA}$                      |         | $V_F$       |      | 1.25 | 1.65 | V             |
| Breakdown voltage                                                                                        | $I_R = 10\text{ }\mu\text{A}$             |         | $V_{BR}$    | 6    |      |      | V             |
| Reverse current                                                                                          | $V_R = 6\text{ V}$                        |         | $I_R$       |      | 0.01 | 10   | $\mu\text{A}$ |
| Capacitance                                                                                              | $V_R = 0\text{ V}, f = 1\text{ MHz}$      |         | $C_O$       |      | 25   |      | pF            |
| Thermal resistance                                                                                       |                                           |         | $R_{th}$    |      | 750  |      | K/W           |
| <b>OUTPUT</b>                                                                                            |                                           |         |             |      |      |      |               |
| 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           |
| <b>COUPLER</b>                                                                                           |                                           |         |             |      |      |      |               |
| Collector emitter, saturation voltage                                                                    | $I_F = 10\text{ mA}, I_C = 2.5\text{ mA}$ |         | $V_{CEsat}$ |      | 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.

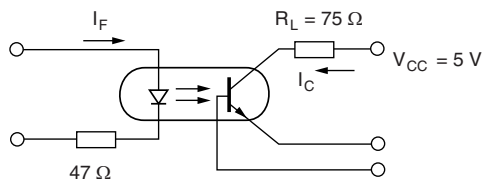


| <b>CURRENT TRANSFER RATIO</b> |                                           |         |        |      |      |      |      |
|-------------------------------|-------------------------------------------|---------|--------|------|------|------|------|
| PARAMETER                     | TEST CONDITION                            | 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**

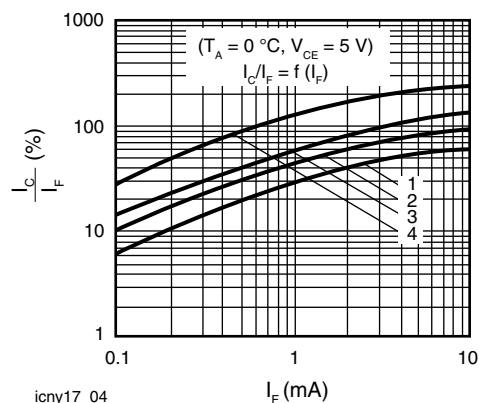
- Current transfer ratio and collector-emitter leakage current by dash number ( $T_{amb}$  °C).

| <b>SWITCHING CHARACTERISTICS</b> ( $T_{amb} = 25\text{ °C}$ , unless otherwise specified) |                                                                   |         |           |      |      |      |               |
|-------------------------------------------------------------------------------------------|-------------------------------------------------------------------|---------|-----------|------|------|------|---------------|
| PARAMETER                                                                                 | TEST CONDITION                                                    | PART    | SYMBOL    | MIN. | TYP. | MAX. | UNIT          |
| <b>LINEAR OPERATION (WITHOUT SATURATION)</b>                                              |                                                                   |         |           |      |      |      |               |
| Turn-on time                                                                              | $I_F = 10\text{ mA}, V_{CC} = 5\text{ V}, R_L = 75\text{ }\Omega$ |         | $t_{on}$  |      | 3    |      | $\mu\text{s}$ |
| Rise time                                                                                 | $I_F = 10\text{ mA}, V_{CC} = 5\text{ V}, R_L = 75\text{ }\Omega$ |         | $t_r$     |      | 2    |      | $\mu\text{s}$ |
| Turn-off time                                                                             | $I_F = 10\text{ mA}, V_{CC} = 5\text{ V}, R_L = 75\text{ }\Omega$ |         | $t_{off}$ |      | 2.3  |      | $\mu\text{s}$ |
| Fall time                                                                                 | $I_F = 10\text{ mA}, V_{CC} = 5\text{ V}, R_L = 75\text{ }\Omega$ |         | $t_f$     |      | 2    |      | $\mu\text{s}$ |
| Cut-off frequency                                                                         | $I_F = 10\text{ mA}, V_{CC} = 5\text{ V}, R_L = 75\text{ }\Omega$ |         | $f_{CO}$  |      | 250  |      | kHz           |
| <b>SWITCHING OPERATION (WITH SATURATION)</b>                                              |                                                                   |         |           |      |      |      |               |
| Turn-on time                                                                              | $I_F = 20\text{ mA}$                                              | CNY17-1 | $t_{on}$  |      | 3    |      | $\mu\text{s}$ |
|                                                                                           | $I_F = 10\text{ mA}$                                              | CNY17-2 | $t_{on}$  |      | 4.2  |      | $\mu\text{s}$ |
|                                                                                           |                                                                   | CNY17-3 | $t_{on}$  |      | 4.2  |      | $\mu\text{s}$ |
|                                                                                           | $I_F = 5\text{ mA}$                                               | CNY17-4 | $t_{on}$  |      | 6    |      | $\mu\text{s}$ |
| Rise time                                                                                 | $I_F = 20\text{ mA}$                                              | CNY17-1 | $t_r$     |      | 2    |      | $\mu\text{s}$ |
|                                                                                           | $I_F = 10\text{ mA}$                                              | CNY17-2 | $t_r$     |      | 3    |      | $\mu\text{s}$ |
|                                                                                           |                                                                   | CNY17-3 | $t_r$     |      | 3    |      | $\mu\text{s}$ |
|                                                                                           | $I_F = 5\text{ mA}$                                               | CNY17-4 | $t_r$     |      | 4.6  |      | $\mu\text{s}$ |
| Turn-off time                                                                             | $I_F = 20\text{ mA}$                                              | CNY17-1 | $t_{off}$ |      | 18   |      | $\mu\text{s}$ |
|                                                                                           | $I_F = 10\text{ mA}$                                              | CNY17-2 | $t_{off}$ |      | 23   |      | $\mu\text{s}$ |
|                                                                                           |                                                                   | CNY17-3 | $t_{off}$ |      | 23   |      | $\mu\text{s}$ |
|                                                                                           | $I_F = 5\text{ mA}$                                               | CNY17-4 | $t_{off}$ |      | 25   |      | $\mu\text{s}$ |
| Fall time                                                                                 | $I_F = 20\text{ mA}$                                              | CNY17-1 | $t_f$     |      | 11   |      | $\mu\text{s}$ |
|                                                                                           | $I_F = 10\text{ mA}$                                              | CNY17-2 | $t_f$     |      | 14   |      | $\mu\text{s}$ |
|                                                                                           |                                                                   | CNY17-3 | $t_f$     |      | 14   |      | $\mu\text{s}$ |
|                                                                                           | $I_F = 5\text{ mA}$                                               | CNY17-4 | $t_f$     |      | 15   |      | $\mu\text{s}$ |

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

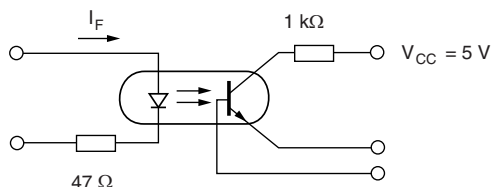
icny17\_01

Fig. 1 - Linear Operation (without Saturation)



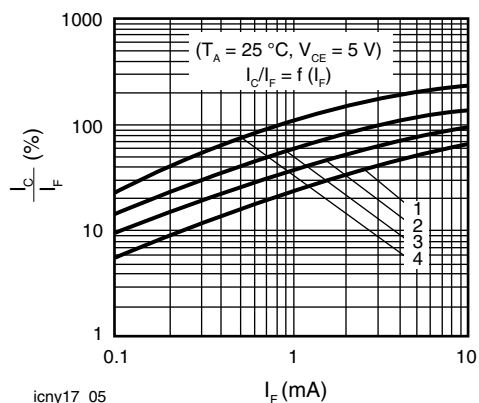
icny17\_04

Fig. 3 - Current Transfer Ratio vs. Diode Current



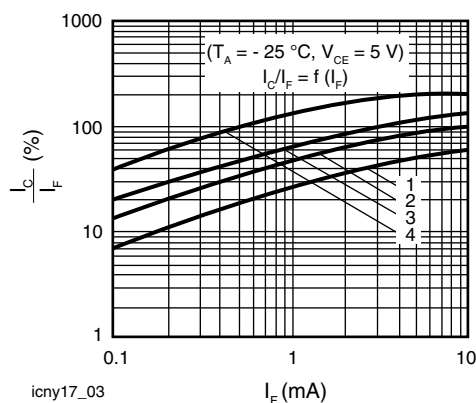
icny17\_02

Fig. 1 - Switching Operation (with Saturation)



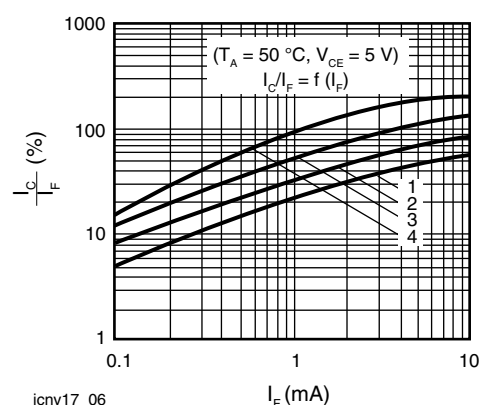
icny17\_05

Fig. 4 - Current Transfer Ratio vs. Diode Current



icny17\_03

Fig. 2 - Current Transfer Ratio vs. Diode Current



icny17\_06

Fig. 5 - Current Transfer Ratio vs. Diode Current

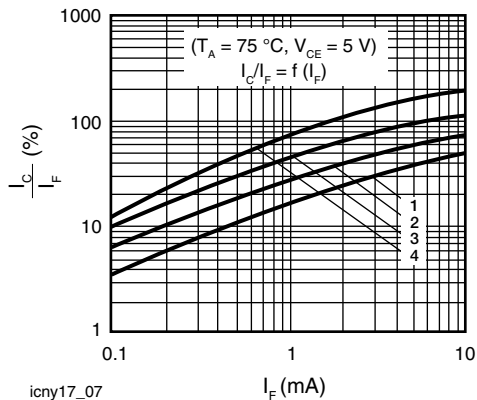


Fig. 6 - Current Transfer Ratio vs. Diode Current

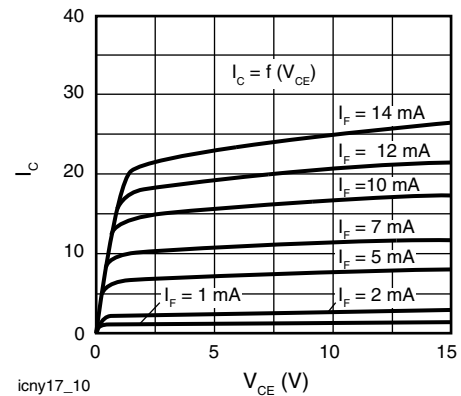


Fig. 9 - Output Characteristics

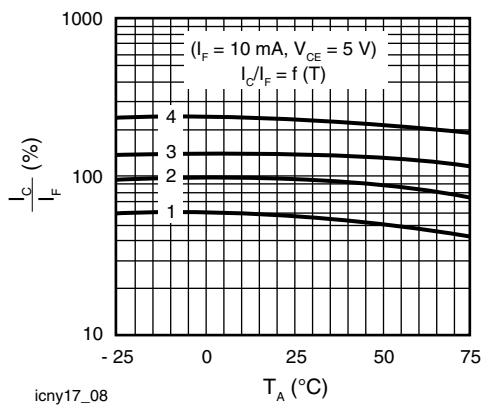


Fig. 7 - Current Transfer Ratio (CTR) vs. Temperature

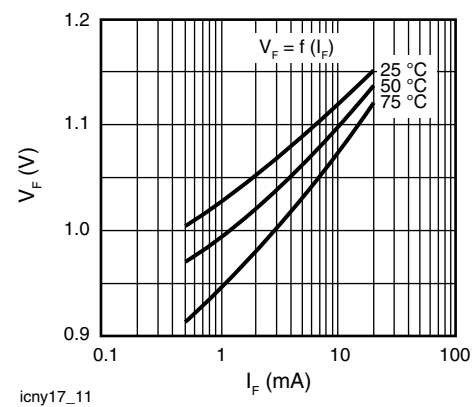


Fig. 10 - Forward Voltage vs. Forward Current

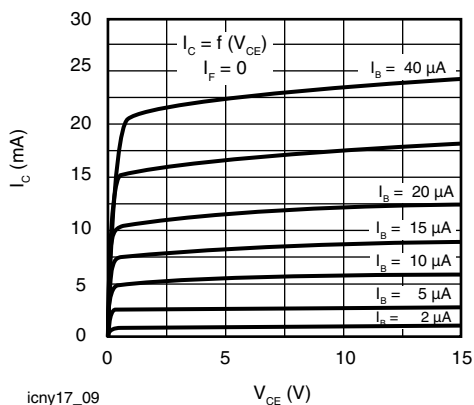


Fig. 8 - Transistor Characteristics

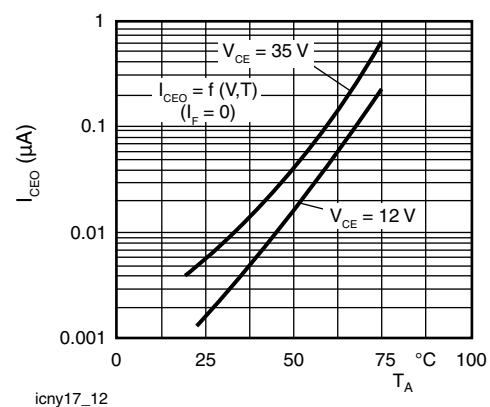


Fig. 11 - Leakage Current vs. Ambient Temperature

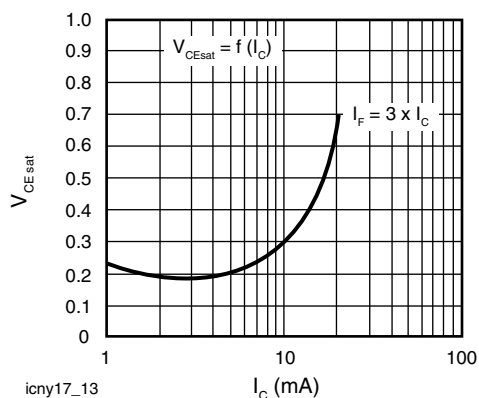


Fig. 12 - Saturation Voltage vs. Collector Current and Modulation Depth CNY17-1

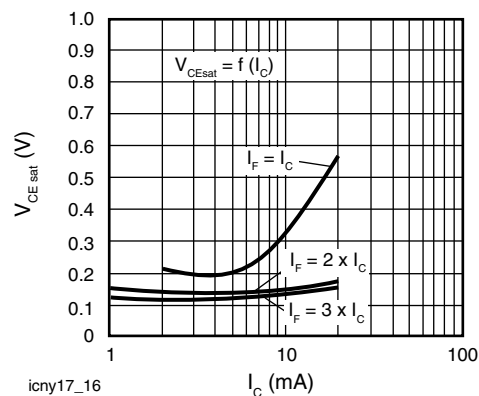


Fig. 15 - Saturation Voltage vs. Collector Current and Modulation Depth CNY17-4

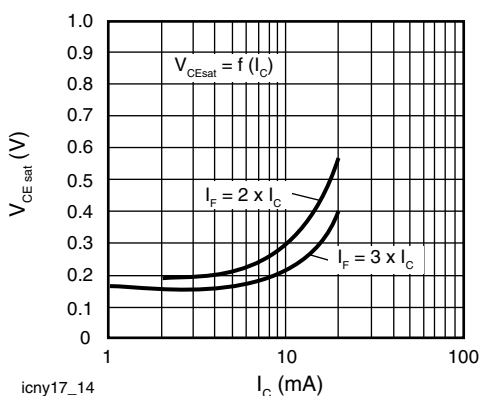


Fig. 13 - Saturation Voltage vs. Collector Current and Modulation Depth CNY17-2

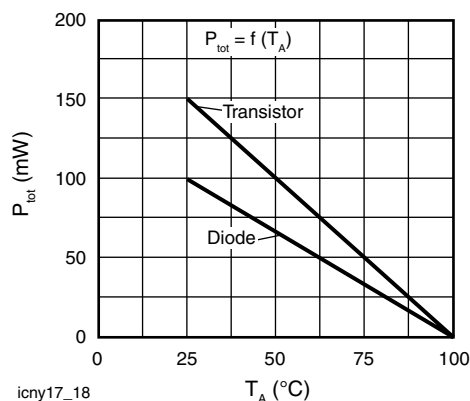


Fig. 16 - Permissible Power Dissipation for Transistor and Diode

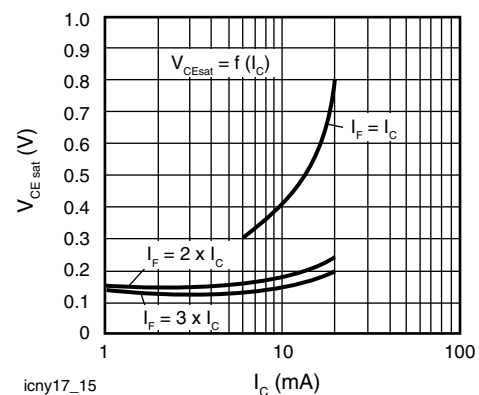
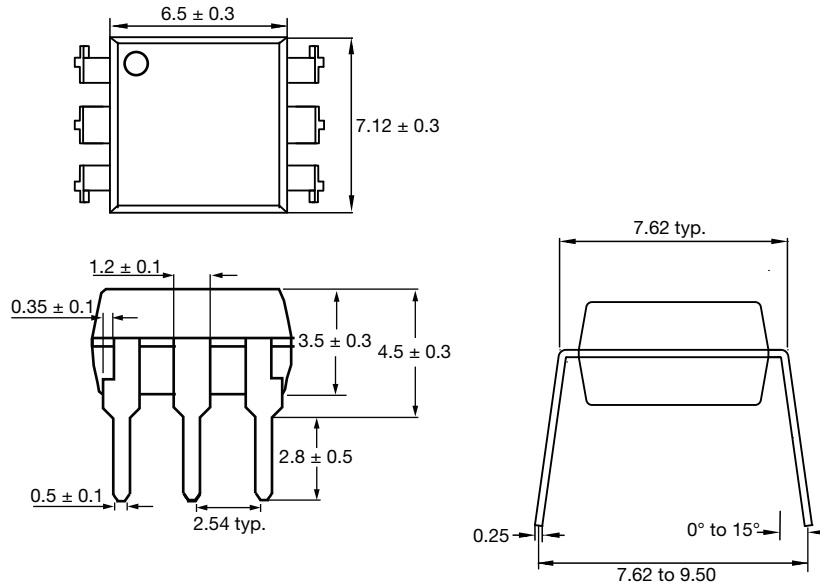
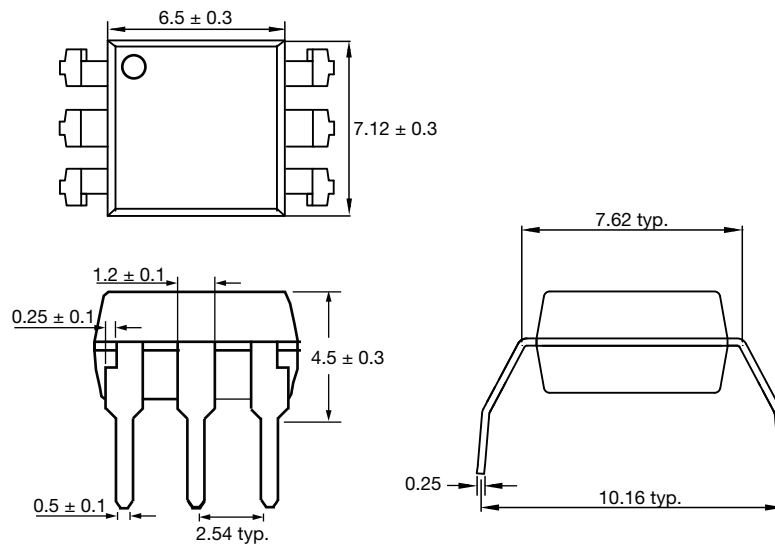
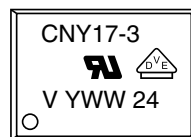


Fig. 14 - Saturation Voltage vs. Collector Current and Modulation Depth CNY17-3

**PACKAGE DIMENSIONS** in millimeters**DIP-6****DIP-6, 400 mil****PACKAGE MARKING**



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