

CNY 17F-1X, CNY 17F-2X, CNY 17F-3X, CNY 17F-4X



## OPTICALLY COUPLED ISOLATOR NON-BASE LEAD TRANSISTOR OUTPUT

### DESCRIPTION

The CNY 17 is an optically coupled isolator consisting of a Gallium Arsenide infrared emitting diode and a NPN silicon phototransistor mounted in a standard 6-pin dual-in-line package.

### NOTES

- 1 a. The product type number consists of the basic product type followed by the letter "X" which indicates VDE 0884 approval of the basic part.
- b. Letter "X" supercedes letter "V" which denoted the now obsolete VDE 0883 approval.
2. For 10mm lead spread requirements add suffix G.
3. For surface mount requirements add suffix SM.

### APPROVALS

DIN VDE 0884.      Marks Licence No. 70910  
UL 1577              File No. E91231  
BSI 415              Certificate No. 7209

0884  FEATURES

Rated Impulse Voltage (Transient Overvoltage)  
 $V_{IOTM} = 6kV$  peak

Insulation Test Voltage (Partial Discharge Test)  
 $V_{pd} = 1.4kV$  peak

Rated Insulation Voltage (RMS includes d.c.)  
 $V_{IOWM} = 600 V_{RMS}$  (848V peak)

Rated Recurring Peak Voltage (repetitive)  
 $V_{IORM} = 600 V_{RMS}$

Isolation Materials according to UL 94

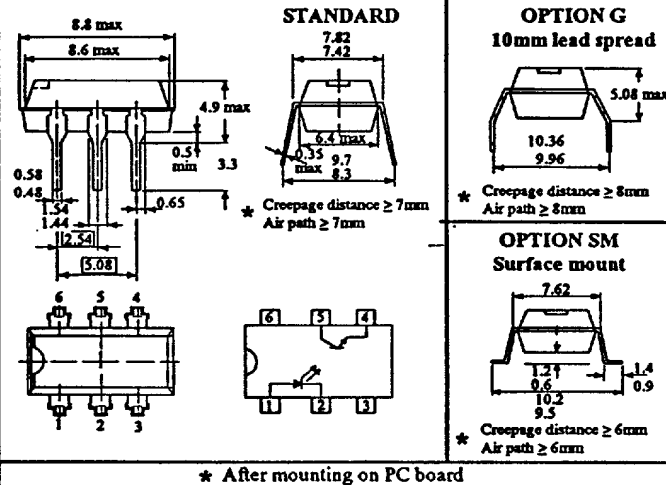
Creeping Current Resistance according to VDE 0303 / IEC 112

Comparative Tracking Index CTI 275 (VDE 0109)

Climatic Classification 55/100/21 (IEC 68 Part 1)

Pollution Degree 2 (VDE 0109)

### PACKAGE DIMENSIONS IN MM



### APPLICATIONS

These couplers meet the requirements of the following Equipment Standards

- |                      |   |
|----------------------|---|
| VDE 0109<br>0110     | Circuits for safe protective separation against electrical shock according to safety class II (reinforced isolation).<br>Application class I-IV at mains voltages $\leq 300V$ .<br>Application class I-III at mains voltage $\leq 600V$ . |
| VDE 0804             | Telecommunication Apparatus and Data Processing   |
| VDE 0805/<br>IEC 435 | Data Processing Equipment (Option G only)   |
| VDE 0806/<br>IEC 950 | Office Machines (Option G only)   |
| VDE 0860/<br>IEC 65  | Safety for Mains Operated Electronic and Related Apparatus for Household.   |
| UL 1577              | Standard for Safety . Optical isolated switch systems. Package type K.  |
| BS 415/<br>IEC 65    | Safety requirements for mains operated electronic and related apparatus for household and similar general use. Class II applications.   |
| BS 7002/<br>IEC 950  | Specification for safety of information technology equipment including electrical business equipment (Option G only)  |

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**ABSOLUTE MAXIMUM RATINGS (25°C UNLESS OTHERWISE NOTED)**

|                                   |                 |
|-----------------------------------|-----------------|
| Storage Temperature               | -55°C to +125°C |
| Operating Temperature             | -55°C to +100°C |
| Lead Soldering Temperature        |                 |
| (2mm from case for 10 seconds)    | 260°C           |
| Input-to-Output Isolation Voltage | ± 5300 Vdc      |

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**INPUT DIODE**

|  |       |
|--|-------|
| Forward D.C. Current                   | 60mA  |
| Reverse D.C. Voltage                   | 6V    |
| Peak Forward Current (tp ≤ 10 μs)      | 2.5A  |
| Power Dissipation                      |       |
| (derate linearly 1.33mW/°C above 25°C) | 100mW |
| Junction Temperature                   | 100°C |

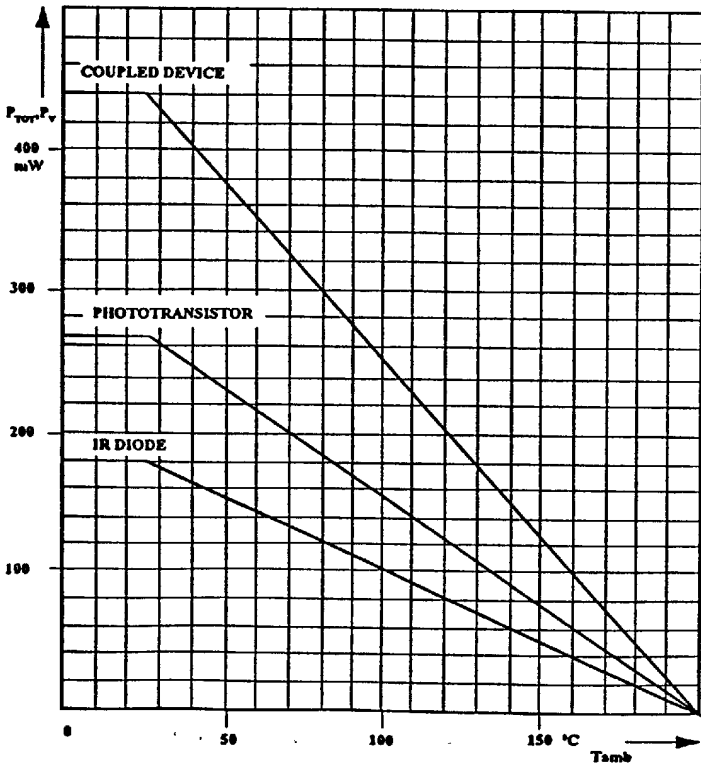
**OUTPUT TRANSISTOR**

|  |       |
|--|-------|
| Collector-emitter Voltage $BV_{CEO}$   | 70V   |
| Emitter-collector Voltage $BV_{ECO}$   | 7V    |
| Collector Current                      | 50mA  |
| Collector Current (t ≤ 1ms)            | 100mA |
| Power Dissipation                      |       |
| (derate linearly 2.00mW/°C above 25°C) | 150mW |
| Junction Temperature                   | 100°C |

**PACKAGE**

|                                       |       |
|---------------------------------------|-------|
| Total Power Dissipation               |       |
| (derate linearly 3.3mW/°C above 25°C) | 250mW |

**MAXIMUM SAFETY DERATING CURVE**

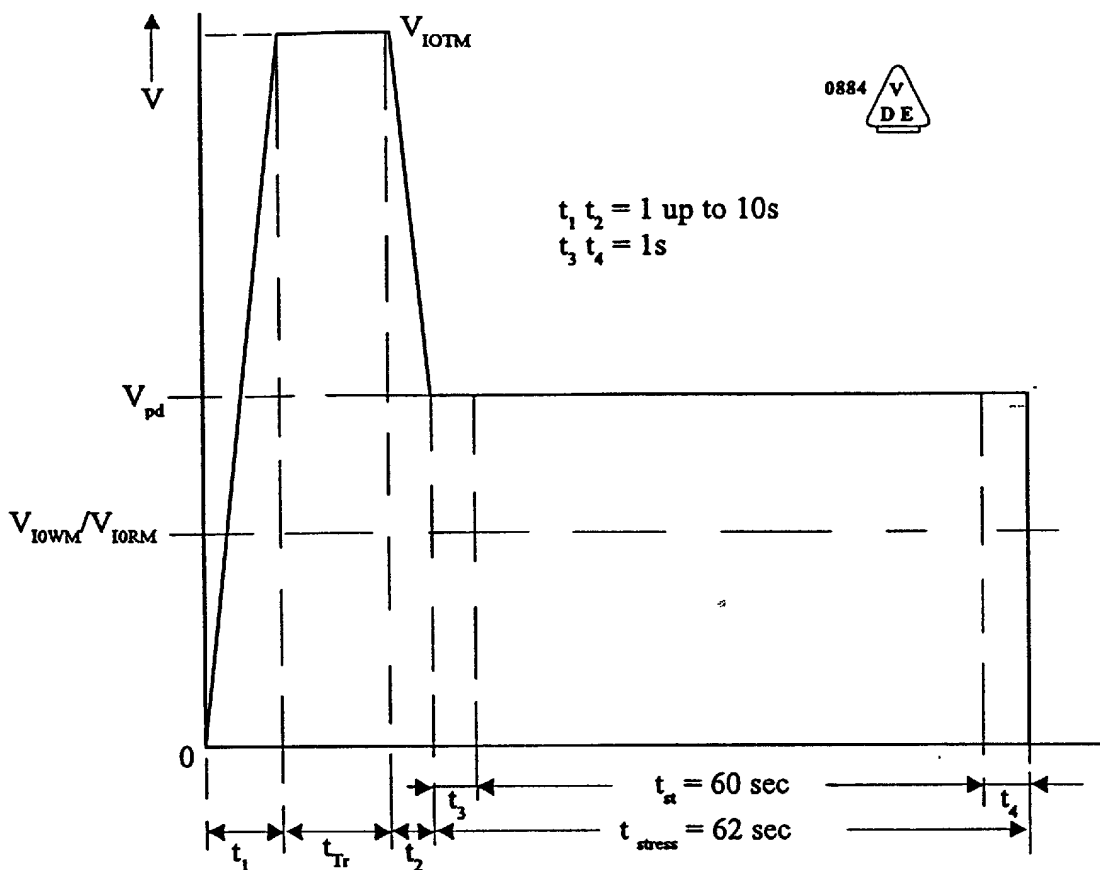


**MAXIMUM SAFETY RATINGS**

|                             |            |
|-----------------------------|------------|
| Input Diode $I_{si}$        | 130 mA max |
| Output Transistor $P_{si}$  | 265 mW max |
| <b>Coupled Device</b>       |            |
| Impulse Voltage $V_{IOTM}$  | 6 KV max   |
| Safety Temperature $T_{si}$ | 200°C max  |

**Note**  
 This device is suitable for safe electrical isolation **only** within the maximum safety ratings. This must be ensured by protective circuits in the applications.

TEST PULSE DIAGRAM FOR SAMPLE TESTS acc. DIN VDE 0884



INSULATION RATED PARAMETERS

| PARAMETER                      |                        | TEST CONDITIONS   | SYMBOL     | MIN       | MAX | UNIT |
|--------------------------------|------------------------|---|------------|-----------|-----|------|
| Partial Discharge Test Voltage | routine test           | 100% $t_m = 1s$   | $V_{pd}$   | 1.4       |     | kV   |
|                                | lot test (sample test) | $t_{Tr} = 10 s$<br>$t_m = 60 s$<br>see Test Pulse Diagram         | $V_{IOTM}$ | 6         |     | kV   |
|                                |                        |   | $V_{pd}$   | 1.05      |     | kV   |
| Insulation Resistance          |                        | $V_{10} = 500V, T_{amb} = 25^{\circ}C$                            | $R_{15}$   | $10^{12}$ |     | OHM  |
|                                |                        | $V_{10} = 500V, T_{amb} = 100^{\circ}C$                           | $R_{15}$   | $10^{11}$ |     | OHM  |
|                                |                        | $V_{10} = 500V, T_{a} = 200^{\circ}C$<br>(only construction test) | $R_{15}$   | $10^9$    |     | OHM  |

ELECTRICAL CHARACTERISTICS (25°C unless otherwise noted)

T-41-83

| Parameter                                |   | Min.             | Typ | Max.    | Units         | Test Condition  |
|--|---|------------------|-----|---------|---------------|---|
| Input                                    | Forward Voltage ( $V_F$ )   |                  | 1.2 | 1.65    | Volt          | $I_F = 60 \text{ mA}$<br>$V_R = 0, f = 1 \text{ MHz}$<br>$V_R = 6 \text{ V}$<br>$I_R = 100 \mu\text{A}$           |
|  | Capacitance   |                  | 45  |         | pF            |   |
|  | Reverse Current ( $I_R$ )   |                  |     | 10      | $\mu\text{A}$ |   |
|  | Reverse Breakdown Voltage ( $V_R$ )   | 6.0              |     |         | Volt          |   |
| Output                                   | Collector-emitter Voltage ( $BV_{CE0}$ )  | 70               |     |         | Volt          | $I_C = 1 \text{ mA}, I_B = 0$<br>$I_B = 100 \mu\text{A}, I_C = 0$   |
|  | Emitter-collector Voltage ( $BV_{ECO}$ )  | 7                |     |         | Volt          |   |
|  | Capacitance ( $C_{CE}$ )  |                  | 6.8 |         | pF            | $V_{CE} = 5 \text{ V}, f = 1 \text{ MHz}$   |
|  | Leakage Current ( $I_{CBO}$ )<br>CNY17F-1X, CNY17F-2X,<br>CNY17F-3X, CNY17F-4X            |                  |     | 5<br>15 | 50<br>100     | nA<br>nA  |
| Coupled                                  | DC Current Transfer Ratio $I_C / I_F$<br>CNY17F-1X<br>CNY17F-2X<br>CNY17F-3X<br>CNY17F-4X | 40               |     | 80      | %             | $I_F = 10 \text{ mA}, V_{CE} = 5 \text{ V}$<br>Note 2   |
|  |   | 63               |     | 125     | %             |   |
|  |   | 100              |     | 200     | %             |   |
|  |   | 160              |     | 320     | %             |   |
|  | CNY17F-1X<br>CNY17F-2X<br>CNY17F-3X<br>CNY17F-4X  | 13               |     |         | %             | $I_F = 1 \text{ mA}, V_{CE} = 5 \text{ V}$  |
|  |   | 22               |     |         | %             |   |
|  |   | 34               |     |         | %             |   |
|  |   | 56               |     |         | %             |   |
|  | Input-to-Output Isolation Resistance ( $R_{IO}$ )   | 10 <sup>11</sup> |     |         | ohm           | $V_{IO} = 500 \text{ V},$ (note 1)<br>$I_F = 10 \text{ mA}, I_C = 2.5 \text{ mA}$<br>$f = 1 \text{ MHz}$ (note 1) |
|  | Collector-emitter Saturation Voltage $V_{CE(SAT)}$  |                  | 0.2 | 0.4     | Volt          |   |
| Capacitance Input to Output ( $C_{IO}$ ) |   | 0.6              |     | pF      |               |   |

Note 1. Measured with input leads shorted together and output leads shorted together.

Note 2. We are also willing to offer other CTR parameter selections if required. Please contact our factory to discuss requirements in detail.

SWITCHING CHARACTERISTICS

1. Linear Operation (without saturation) Fig 1  
 $I_F = 10 \text{ mA}, V_{CC} = 5 \text{ V}, R_L = 75 \Omega$

|                            | TYP | MAX | UNITS         |
|----------------------------|-----|-----|---------------|
| Turn-On Time $t_{on}$      | 3.8 | 5.6 | $\mu\text{s}$ |
| Rise Time $t_r$            | 2.8 | 4.0 | $\mu\text{s}$ |
| Turn-Off Time $t_{off}$    | 3.5 | 4.1 | $\mu\text{s}$ |
| Fall Time $t_f$            | 3.0 | 3.5 | $\mu\text{s}$ |
| Cut-Off Frequency $F_{CO}$ |     | 250 | kHz           |

2. Switching Operation (with saturation) Fig 2  
 $V_{CC} = 5 \text{ V}, R_L = 1 \text{ k}\Omega$

| GROUP                   | -1X<br>( $I_F = 20 \text{ mA}$ ) |     | -2X and -3X<br>( $I_F = 10 \text{ mA}$ ) |     | -4X<br>( $I_F = 5 \text{ mA}$ ) |      | UNITS         |
|-------------------------|----------------------------------|-----|--|-----|---------------------------------|------|---------------|
|                         | TYP                              | MAX | TYP                                      | MAX | TYP                             | MAX  |               |
| Turn-On Time $t_{on}$   | 4.0                              | 5.5 | 5.0                                      | 8.0 | 6.0                             | 10.5 | $\mu\text{s}$ |
| Rise Time $t_r$         | 3.0                              | 4.0 | 3.5                                      | 6.0 | 5.2                             | 8.0  | $\mu\text{s}$ |
| Turn-Off Time $t_{off}$ | 26                               | 34  | 28                                       | 39  | 30                              | 43   | $\mu\text{s}$ |
| Fall Time $t_f$         | 15                               | 20  | 17                                       | 24  | 19                              | 26   | $\mu\text{s}$ |
| $V_{CE(SAT)}$           | $\leq 0.4$                       |     |  |     |                                 |      | V             |

