

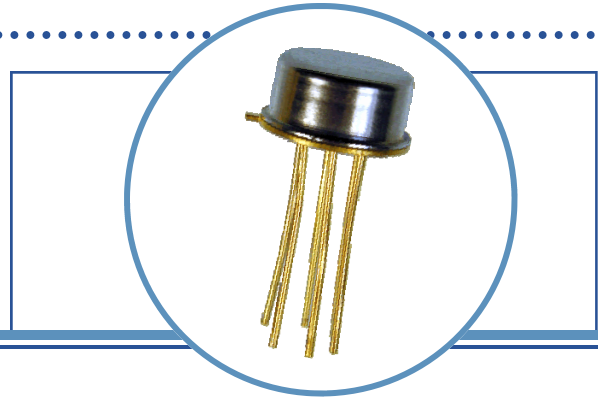
# Hi-Reliability Optically Coupled Isolator

## JAN / JANTX / JANTXV 4N47, 4N48, 4N49 [A]



### Features:

- TO-78 hermetically sealed package
- High current transfer ratio
- 1 kV electrical isolation
- Base contact provided for conventional transistor biasing
- JAN, JANTX and JANTXV devices processed to MIL-PRF-19500
- Patent No. 4124860



### Description:

Each isolator in this series consists of an infrared emitting diode and a NPN silicon phototransistor, which are mounted in a hermetically sealed TO-78 package. Devices are designed for military and/or harsh environments. The suffix letter "A" denotes the collector is electrically isolated from the case.

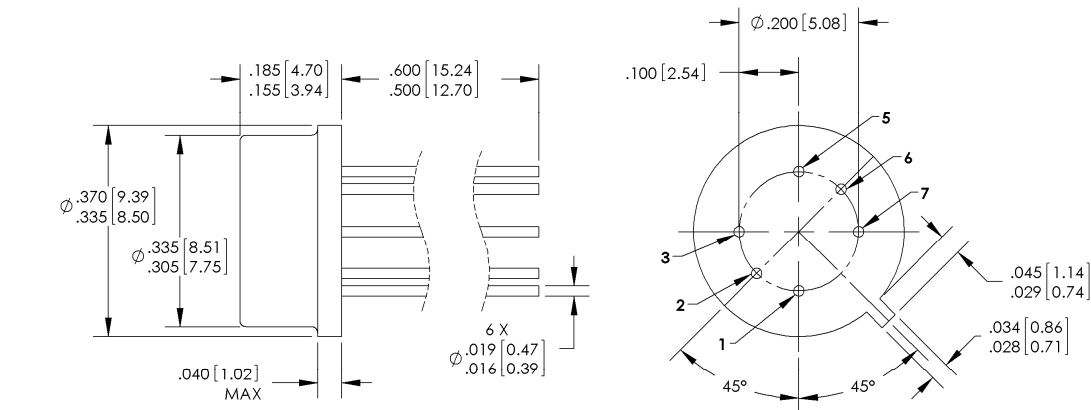
The JAN / JANTX / JANTXV 4N47, 4N47A, 4N48, 4N48A, 4N49, and 4N49A devices are processed to MIL-PRF-19500/548.

This series of 4N products are JEDEC registered, DSCC qualified.

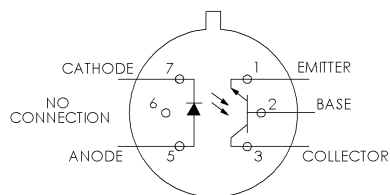
Please contact your local representative or OPTEK for more information.

### Applications:

- High-voltage isolation between input and output
- Electrical isolation in dirty environments
- Industrial equipment
- Medical equipment
- Office



DIMENSIONS ARE IN INCHES [MM]



**BOTTOM VIEW**

| Pin # | Function  | Pin # | Function |
|-------|-----------|-------|----------|
| 3     | Collector | 5     | Anode    |
| 2     | Base      | 6     | Open     |
| 1     | Emitter   | 7     | Cathode  |

This product is built, tested and shipped from the USA



OPTEK reserves the right to make changes at any time in order to improve design and to supply the best product possible.

# Hi-Reliability Optically Coupled Isolator

## JAN / JANTX / JANTXV 4N47, 4N48, 4N49 [A]



### Absolute Maximum Ratings ( $T_A = 25^\circ \text{C}$ unless otherwise noted)

|                                                                                             |                               |
|---------------------------------------------------------------------------------------------|-------------------------------|
| Storage Temperature Range                                                                   | -55° C to +150° C             |
| Operating Temperature Range                                                                 | -55° C to +125° C             |
| Input-to-Output Isolation Voltage                                                           | $\pm 1.00 \text{ kVDC}^{(1)}$ |
| Lead Soldering Temperature [1/16 inch (1.6 mm) from case for 5 seconds with soldering iron] | 260° C <sup>(2)</sup>         |

### Input Diode

|                                     |                      |
|-------------------------------------|----------------------|
| Forward DC Current (65° C or below) | 40 mA                |
| Reverse Voltage                     | 2 V                  |
| Power Dissipation                   | 60 mW <sup>(3)</sup> |

### Output Phototransistor:

|                              |                       |
|------------------------------|-----------------------|
| Continuous Collector Current | 50 mA                 |
| Collector-Emitter Voltage    | 40 V                  |
| Collector-Base Voltage       | 45 V                  |
| Emitter-Base Voltage         | 7.0 V                 |
| Power Dissipation            | 300 mW <sup>(4)</sup> |

#### Notes:

1. Measured with input leads shorted together and output leads shorted together.
2. RMA flux is recommended. Duration can be extended to 10 seconds maximum when flow soldering.
3. Derate linearly 1.0 mW/° C above 65° C.
4. Derate linearly 3.0 mW/° C above 25° C.

| Ordering Information      |                        |                         |                         |                              |
|---------------------------|------------------------|-------------------------|-------------------------|------------------------------|
| Part Number               | Isolation Voltage (kV) | $I_F$ (mA)<br>Typ / Max | $V_{CE}$ (Volts)<br>Max | Processing<br>MIL-PRF-195000 |
| JAN4N47 or JAN4N47A       | 1                      | 1 / 40                  | 40                      | 548                          |
| JANTX4N47 or JANTX4N47A   |                        |                         |                         |                              |
| JANTXV4N47 or JANTXV4N47A |                        |                         |                         |                              |
| JAN4N48 or JAN4N48A       |                        |                         |                         |                              |
| JANTX4N48 or JANTX4N48A   |                        |                         |                         |                              |
| JANTXV4N48 or JANTXV4N48A |                        |                         |                         |                              |
| JAN4N49 or JAN4N49A       |                        |                         |                         |                              |
| JANTX4N49 or JANTX4N49A   |                        |                         |                         |                              |
| JANTXV4N49 or JANTXV4N49A |                        |                         |                         |                              |

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# Hi-Reliability Optically Coupled Isolator

## JAN / JANTX / JANTXV 4N47, 4N48, 4N49 [A]



### Electrical Characteristics ( $T_A = 25^\circ\text{C}$ unless otherwise noted)

| SYMBOL | PARAMETER | MIN | TYP | MAX | UNITS | TEST CONDITIONS |
|--------|-----------|-----|-----|-----|-------|-----------------|
|--------|-----------|-----|-----|-----|-------|-----------------|

#### Input Diode

|       |                 |                      |             |                      |               |                                                                                                                                          |
|-------|-----------------|----------------------|-------------|----------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------|
| $V_F$ | Forward Voltage | 0.80<br>1.00<br>0.70 | -<br>-<br>- | 1.50<br>1.70<br>1.30 | V             | $I_F = 10.0\text{ mA}$<br>$I_F = 10.0\text{ mA}, T_A = -55^\circ\text{C}^{(1)}$<br>$I_F = 10.0\text{ mA}, T_A = 100^\circ\text{C}^{(1)}$ |
| $I_R$ | Reverse Current | -                    | -           | 100                  | $\mu\text{A}$ | $V_R = 2.0\text{ V}$                                                                                                                     |

#### Output Phototransistor

|                |                                     |    |   |     |               |                                                                         |
|----------------|-------------------------------------|----|---|-----|---------------|-------------------------------------------------------------------------|
| $V_{(BR)CEO}$  | Collector-Emitter Breakdown Voltage | 40 | - | -   | V             | $I_C = 1.0\text{ mA}, I_B = 0, I_F = 0$                                 |
| $V_{(BR)CBO}$  | Collector-Base Breakdown Voltage    | 45 | - | -   | V             | $I_C = 100\text{ }\mu\text{A}, I_B = 0, I_F = 0$                        |
| $V_{(BR)EBO}$  | Emitter-Base Breakdown Voltage      | 7  | - | -   | V             | $I_E = 100\text{ }\mu\text{A}, I_C = 0, I_F = 0$                        |
| $I_{C(OFF)}^1$ | Collector-Emitter Dark Current      | -  | - | 100 | nA            | $V_{CE} = 20\text{ V}, I_B = 0, I_F = 0$                                |
| $I_{C(OFF)}^2$ | Collector-Emitter Dark Current      | -  | - | 100 | $\mu\text{A}$ | $V_{CE} = 20\text{ V}, I_B = 0, I_F = 0, T_A = 100^\circ\text{C}^{(1)}$ |
| $I_{CB(OFF)}$  | Collector-Base Dark Current         | -  | - | 10  | nA            | $V_{CB} = 20\text{ V}, I_E = 0, I_F = 0$                                |

#### Coupled

|               |                                                                                                                                         |                      |             |                      |               |                                                                                                                                                                                                                                       |
|---------------|-----------------------------------------------------------------------------------------------------------------------------------------|----------------------|-------------|----------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| $I_{C(ON)}$   | On-State Collector Current<br>JAN / JANTX / JANTXV 4N47 [A]                                                                             | 0.50<br>0.70<br>0.50 | -<br>-<br>- | -<br>-<br>-          | mA            | $I_F = 1.0\text{ mA}, V_{CE} = 5.0\text{ V}, I_B = 0$<br>$I_F = 2.0\text{ mA}, V_{CE} = 5.0\text{ V}, I_B = 0, T_A = -55^\circ\text{C}^{(1)}$<br>$I_F = 2.0\text{ mA}, V_{CE} = 5.0\text{ V}, I_B = 0, T_A = 100^\circ\text{C}^{(1)}$ |
|               | JAN / JANTX / JANTXV 4N48 [A]                                                                                                           | 1.00<br>1.40<br>1.00 | -<br>-<br>- | 5<br>-<br>-          |               | $I_F = 1.0\text{ mA}, V_{CE} = 5.0\text{ V}, I_B = 0$<br>$I_F = 2.0\text{ mA}, V_{CE} = 5.0\text{ V}, I_B = 0, T_A = -55^\circ\text{C}^{(1)}$<br>$I_F = 2.0\text{ mA}, V_{CE} = 5.0\text{ V}, I_B = 0, T_A = 100^\circ\text{C}^{(1)}$ |
|               | JAN / JANTX / JANTXV 4N49 [A]                                                                                                           | 2.00<br>2.80<br>2.00 | -<br>-<br>- | 10<br>-<br>-         |               | $I_F = 1.0\text{ mA}, V_{CE} = 5.0\text{ V}, I_B = 0$<br>$I_F = 2.0\text{ mA}, V_{CE} = 5.0\text{ V}, I_B = 0, T_A = -55^\circ\text{C}^{(1)}$<br>$I_F = 2.0\text{ mA}, V_{CE} = 5.0\text{ V}, I_B = 0, T_A = 100^\circ\text{C}^{(1)}$ |
| $I_{CB(ON)}$  | On-State Collector Base                                                                                                                 | 30                   | -           | -                    | $\mu\text{A}$ | $V_{CB} = 5\text{ V}, I_E = 0, I_F = 10\text{ mA}$                                                                                                                                                                                    |
| $V_{CE(SAT)}$ | Collector-Emitter Saturation Voltage<br>JAN / JANTX / JANTXV 4N47 [A]<br>JAN / JANTX / JANTXV 4N48 [A]<br>JAN / JANTX / JANTXV 4N49 [A] | -<br>-<br>-          | -<br>-<br>- | 0.30<br>0.30<br>0.30 | V             | $I_F = 2.0\text{ mA}, I_C = 0.5\text{ mA}, I_B = 0$<br>$I_F = 2.0\text{ mA}, I_C = 1.0\text{ mA}, I_B = 0$<br>$I_F = 2.0\text{ mA}, I_C = 2.0\text{ mA}, I_B = 0$                                                                     |
| $H_{FE}$      | DC Current Gain                                                                                                                         | 100                  | -           | -                    | V             | $V_{CE} = 5.0\text{ V}, I_C = 10.0\text{ mA}, I_F = 0\text{ mA}$                                                                                                                                                                      |
| $R_{IO}$      | Resistance (Input-to-Output)                                                                                                            | $10^{11}$            | -           | -                    | $\Omega$      | $V_{I-O} = \pm 1000\text{ VDC}^{(3)}$                                                                                                                                                                                                 |
| $C_{IO}$      | Capacitance (Input-to-Output)                                                                                                           | -                    | -           | 5                    | pF            | $V_{I-O} = 0\text{ V}, f = 1.0\text{ MHz}^{(3)}$                                                                                                                                                                                      |
| $T_R, T_F$    | Rise and Fall Time                                                                                                                      | -                    | -           | 20                   | $\mu\text{s}$ | $V_{CC} = 10.0\text{ V}, I_F = 5.0\text{ mA}, R_L = 100\text{ }\Omega$                                                                                                                                                                |

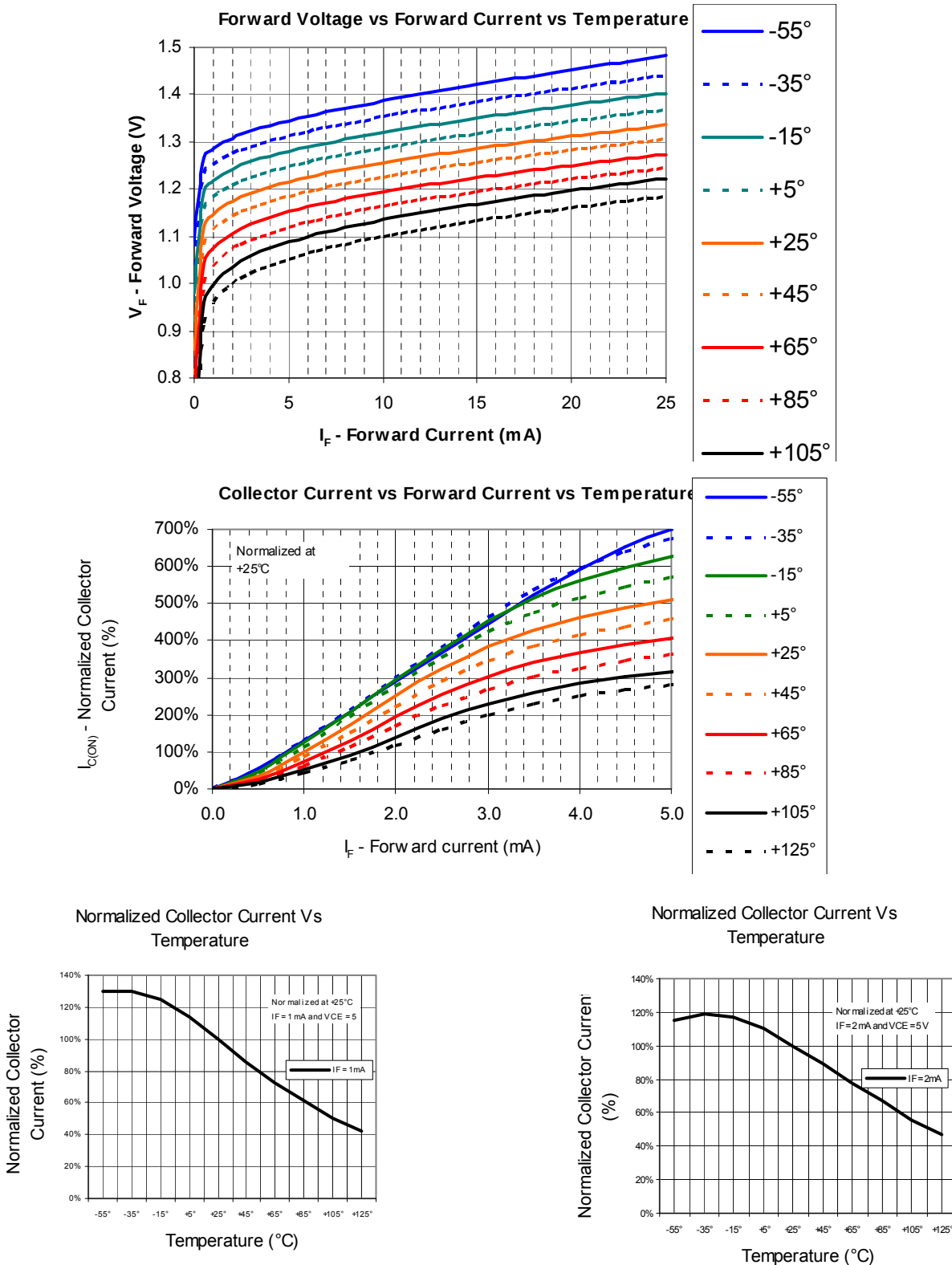
#### Notes:

1. Guaranteed but not tested.
2. Sample tested, LTPD = 10.
3. Measured with input leads shorted together and output leads shorted together.

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### Typical Performance Curves



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Minhang District, Shanghai , China

➤ Sales :

Direct     +86 (21) 6401-6692  
Email       amall@ameya360.com  
QQ         800077892  
Skype       ameyasales1 ameyasales2

➤ Customer Service :

Email       service@ameya360.com

➤ Partnership :

Tel         +86 (21) 64016692-8333  
Email       mkt@ameya360.com