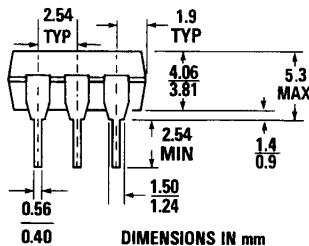
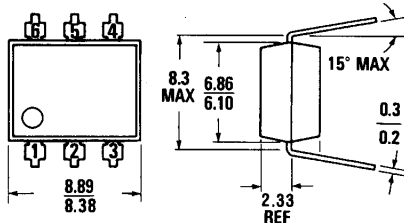


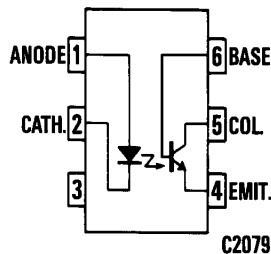
**H11D1 H11D2  
H11D3**

**PACKAGE DIMENSIONS**



DIMENSIONS IN mm  
PACKAGE CODE K

ST1603A



Equivalent Circuit

**DESCRIPTION**

The H11DX is a phototransistor-type optically coupled isolator. An infrared emitting diode manufactured from specially grown gallium arsenide is selectively coupled with an NPN silicon phototransistor. The device is supplied in a standard plastic six-pin dual-in-line package.

**FEATURES**

- High voltage  
H11D1-D2,  $BV_{CER}=300\text{ V}$   
H11D3,  $BV_{CER}=200\text{ V}$
- High isolation voltage  
5300 VAC RMS—1 minute  
7500 VAC PEAK—1 minute
- Minimum current transfer ratio of H11D1, H11D2, H11D3—20%
- Underwriters Laboratory (UL) recognized File #E90700

**APPLICATIONS**

- Power supply regulators
- Digital logic inputs
- Microprocessor inputs
- Appliance sensor systems
- Industrial controls

**ABSOLUTE MAXIMUM RATINGS** ( $T_A=25^\circ\text{C}$  Unless Otherwise Specified)

**TOTAL PACKAGE**

|                                                                |                |
|----------------------------------------------------------------|----------------|
| Storage temperature                                            | −55°C to 150°C |
| Operating temperature                                          | −55°C to 100°C |
| Lead temperature<br>(soldering, 10 sec)                        | 260°C          |
| Total package power dissipation at 25°C<br>(LED plus detector) | 260 mW         |
| Derate linearly from 25°C                                      | 3.5 mW/°C      |

**INPUT DIODE**

|                                                          |           |
|----------------------------------------------------------|-----------|
| Forward DC current                                       | 60 mA     |
| Reverse voltage                                          | 6 V       |
| Peak forward current<br>(1 $\mu\text{s}$ pulse, 300 pps) | 3.0 A     |
| Power dissipation 25°C ambient                           | 100 mW    |
| Derate linearly from 25°C                                | 1.8 mW/°C |

**OUTPUT TRANSISTOR**

|                           |           |
|---------------------------|-----------|
| Power dissipation at 25°C | 300 mW    |
| Derate linearly from 25°C | 4.0 mW/°C |

|                                | H11D1-D2 | H11D3  |
|--------------------------------|----------|--------|
| $V_{CER}$                      | 300 V    | 200 V  |
| $V_{CBO}$                      | 300 V    | 200 V  |
| $V_{ECO}$                      | 6 V      | 6 V    |
| Collector current (continuous) | 100 mA   | 100 mA |

**ELECTRO-OPTICAL CHARACTERISTICS** ( $T_A = 25^\circ\text{C}$  Unless Otherwise Specified)

**INDIVIDUAL COMPONENT CHARACTERISTICS**

| CHARACTERISTIC                                                                           | SYMBOL                          | MIN. | TYP.     | MAX. | UNITS                | TEST CONDITIONS                                                              |
|------------------------------------------------------------------------------------------|---------------------------------|------|----------|------|----------------------|------------------------------------------------------------------------------|
| <b>INPUT DIODE</b>                                                                       |                                 |      |          |      |                      |                                                                              |
| Forward voltage                                                                          | $V_F$                           |      | 1.1      | 1.50 | V                    | $I_F = 10\text{ mA}$                                                         |
| Forward voltage temp. coefficient                                                        | $\frac{\Delta V_F}{\Delta T_A}$ |      | -1.8     |      | mV/ $^\circ\text{C}$ |                                                                              |
| Reverse breakdown voltage                                                                | $V_R$                           | 3.0  | 25       |      | V                    | $I_R = 10\text{ }\mu\text{A}$                                                |
| Junction capacitance                                                                     | $C_J$                           |      | 50<br>65 |      | pF<br>pF             | $V_F = 0\text{ V}, f = 1\text{ MHz}$<br>$V_F = 1\text{ V}, f = 1\text{ MHz}$ |
| Reverse leakage current                                                                  | $I_R$                           |      | 0.35     | 10   | $\mu\text{A}$        | $V_R = 3.0\text{ V}$                                                         |
| <b>OUTPUT TRANSISTOR</b>                                                                 |                                 |      |          |      |                      |                                                                              |
| Breakdown voltage<br>Collector to emitter<br>H11D1, H11D2,                               | $BV_{CE}$                       | 300  |          |      | V                    | $I_C = 1\text{ mA}; I_F = 0,$                                                |
| H11D3                                                                                    |                                 | 200  |          |      | V                    | $R_{BE} = 1\text{ meg}$                                                      |
| Collector to base<br>H11D1, H11D2,                                                       | $BV_{CB}$                       | 300  |          |      | V                    | $I_C = 100\text{ }\mu\text{A}; I_F = 0$                                      |
| H11D3                                                                                    |                                 | 200  |          |      | V                    |                                                                              |
| Emitter to base                                                                          | $BV_{EB}$                       | 5    | 7        |      | V                    | $I_E = 100\text{ }\mu\text{A}, I_F = 0$                                      |
| Leakage current<br>Collector to emitter<br>( $R_{BE} = 1\text{ meg.}$ )<br>H11D1, H11D2, | $I_{CER}$                       |      |          | 100  | nA                   | $V_{CE} = 200\text{ V}; I_F = 0; T_A = 25^\circ\text{C}$                     |
|                                                                                          |                                 |      |          | 250  | $\mu\text{A}$        | $V_{CE} = 200\text{ V}; I_F = 0; T_A = 100^\circ\text{C}$                    |
| H11D3                                                                                    | $I_{CER}$                       |      |          | 100  | nA                   | $V_{CE} = 100\text{ V}; I_F = 0; T_A = 25^\circ\text{C}$                     |
|                                                                                          |                                 |      |          | 250  | $\mu\text{A}$        | $V_{CE} = 100\text{ V}; I_F = 0; T_A = 100^\circ\text{C}$                    |

**TRANSFER CHARACTERISTICS**

| DC CHARACTERISTICS                                                     | SYMBOL        | MIN. | TYP. | MAX. | UNITS | TEST CONDITIONS                                                       |
|------------------------------------------------------------------------|---------------|------|------|------|-------|-----------------------------------------------------------------------|
| Current Transfer Ratio,<br>collector to emitter<br>H11D1, H11D2, H11D3 | CTR           | 20   |      |      | %     | $I_F = 10\text{ mA}; V_{CE} = 10\text{ V}$<br>$R_{BE} = 1\text{ meg}$ |
| Saturation voltage                                                     | $V_{CE(SAT)}$ |      | 0.1  | .40  | V     | $I_F = 10\text{ mA}; I_C = 0.5\text{ mA}$<br>$R_{BE} = 1\text{ meg}$  |

**TRANSFER CHARACTERISTICS**

| CHARACTERISTICS          | SYMBOL    | MIN. | TYP. | MAX. | UNITS         | TEST CONDITIONS                               |
|--------------------------|-----------|------|------|------|---------------|-----------------------------------------------|
| <b>SWITCHING TIMES</b>   |           |      |      |      |               |                                               |
| Non-saturated<br>Turn-on | $t_{on}$  |      | 5    |      | $\mu\text{s}$ | $V_{CE} = 10\text{ V}, I_{CE} = 2\text{ mA},$ |
| Turn-off time            | $t_{off}$ |      | 5    |      | $\mu\text{s}$ | $R_L = 100\text{ }\Omega$                     |

**ISOLATION CHARACTERISTICS**

| CHARACTERISTICS       | SYMBOL    | MIN.      | TYP. | MAX. | UNITS                | TEST CONDITIONS                                     |
|-----------------------|-----------|-----------|------|------|----------------------|-----------------------------------------------------|
| Isolation voltage     | $V_{ISO}$ | 5300      |      |      | $V_{ACRMS}$          | $I_{IO} \leq 1\text{ }\mu\text{A}, 1\text{ minute}$ |
|                       | $V_{ISO}$ | 7500      |      |      | $V_{AC\text{ PEAK}}$ | $I_{IO} \leq 1\text{ }\mu\text{A}, 1\text{ minute}$ |
| Isolation resistance  | $R_{ISO}$ | $10^{11}$ |      |      | ohms                 | $V_{IO} = 500\text{ VDC}$                           |
| Isolation capacitance | $C_{ISO}$ |           | 0.5  |      | pF                   | $f = 1\text{ MHz}$                                  |

**TYPICAL CHARACTERISTICS**

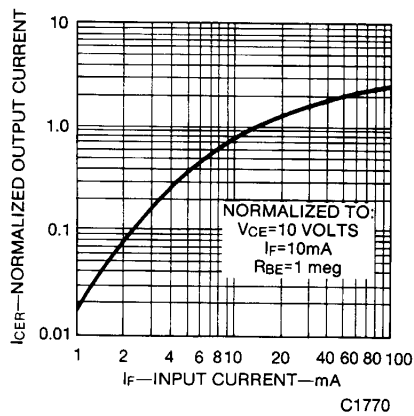


Fig. 1. Output Current vs. Input Current

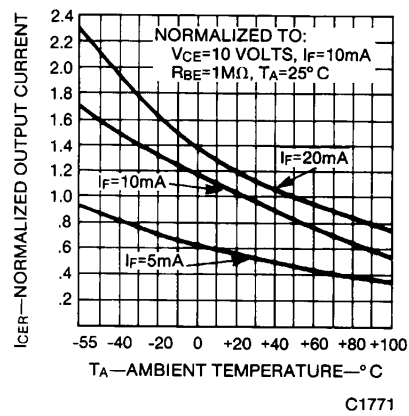


Fig. 2. Output Current vs. Temperature

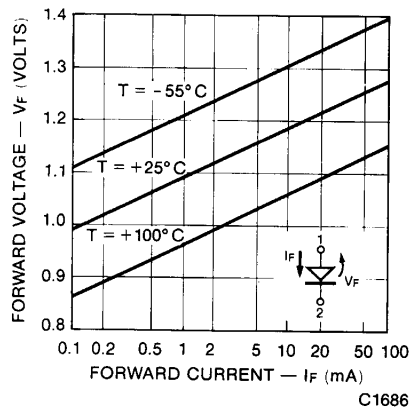


Fig. 3. Input Characteristics

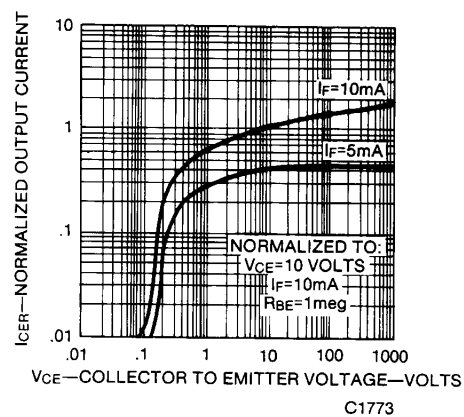


Fig. 4. Output Characteristics

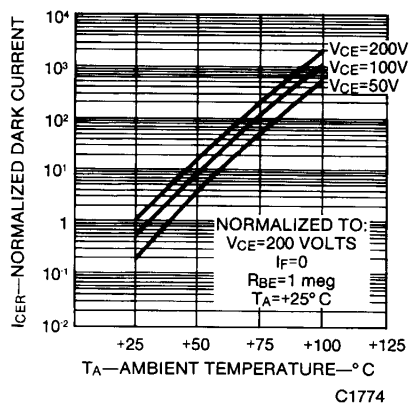


Fig. 5. Normalized Dark Current vs. Temperature

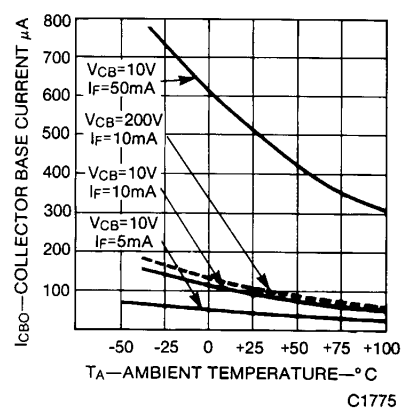


Fig. 6. Collector Base Current vs. Temperature