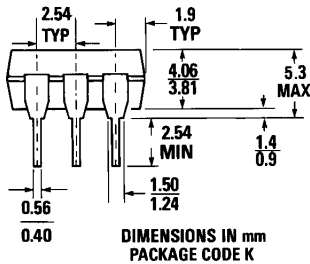
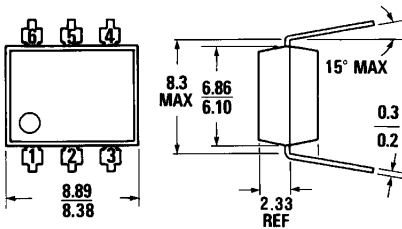
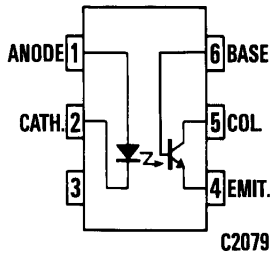


PACKAGE DIMENSIONS



ST1603A



Equivalent Circuit

DESCRIPTION

The MCT2200, MCT2201 and MCT2202 are opto-isolators with phototransistor output. A gallium arsenide infrared emitting diode is selectively coupled with an NPN silicon phototransistor.

FEATURES

- Minimum current transfer ratio of 100%
- Maximum turn-on, turn-off time — 10 μ s
- Underwriters Laboratory (UL) recognized File #E90700

APPLICATIONS

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

ABSOLUTE MAXIMUM RATINGS

TOTAL PACKAGE

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

INPUT DIODE

| | | |
|---|-------|-----------|
| Forward current | ..... | 60 mA |
| Reverse voltage | ..... | 3.0 V |
| Peak forward current (1 μ s pulse, 300 pps) | ..... | 3.0 A |
| Power dissipation at 25°C ambient | ..... | 135 mW |
| Derate linearly from 25°C | ..... | 1.8 mW/°C |

OUTPUT TRANSISTOR

| | | |
|-----------------------------------|-------|------------|
| Power dissipation at 25°C ambient | ..... | 200 mW |
| Derate linearly from 25°C | ..... | 2.67 mW/°C |



PHOTOTRANSISTOR OPTOCOUPLEDERS

ELECTRO-OPTICAL CHARACTERISTICS (25°C Unless Otherwise Specified)

INDIVIDUAL COMPONENT CHARACTERISTICS

| CHARACTERISTIC | SYMBOL | MIN. | TYP. | MAX. | UNITS | TEST CONDITIONS |
|---|---------------------------------|------|------|------|---------|----------------------------|
| INPUT DIODE | | | | | | |
| Forward voltage | V_F | | 1.3 | 1.50 | V | $I_F=20$ mA |
| Forward voltage temperature coefficient | $\frac{\Delta V_F}{\Delta T_A}$ | | -1.8 | | mV/°C | |
| Reverse voltage | V_R | 3.0 | 25 | | V | $I_R=10$ μ A |
| Junction capacitance | C_J | | 50 | | pF | $V_F=0$ V, $f=1$ MHz |
| | | | 65 | | pF | $V_F=0$ V, $f=1$ MHz |
| Reverse leakage current | I_R | | .35 | 10 | μ A | $V_R=3.0$ V |
| OUTPUT TRANSISTOR | | | | | | |
| Breakdown voltage Collector to emitter | BV_{CEO} | 30 | 45 | | V | $I_C=1.0$ mA, $I_F=0$ |
| Collector to base | BV_{CBO} | 70 | 130 | | V | $I_C=10$ μ A, $I_F=0$ |
| Emitter to base | BV_{EBO} | 5 | 7 | | V | $I_E=100$ μ A, $I_F=0$ |
| Leakage current Collector to emitter | I_{CEO} | | 5 | 50 | nA | $V_{CE}=10$ V, $I_F=0$ |
| Collector to base | I_{CBO} | | | 20 | nA | $V_{CB}=10$ V, $I_F=0$ |
| Capacitance Collector to emitter | | | 8 | | pF | $V_{CE}=0$, $f=1$ MHz |
| Collector to base | | | 20 | | pF | $V_{CB}=5$, $f=1$ MHz |
| Emitter to base | | | 10 | | pF | $V_{EB}=0$, $f=1$ MHz |

TRANSFER CHARACTERISTICS

| DC CHARACTERISTICS | SYMBOL | MIN. | TYP. | MAX. | UNITS | TEST CONDITIONS |
|--|---------------|------|------|------|-------|---------------------------|
| Current Transfer Ratio, collector to emitter MCT2200 | CTR | 20 | 60 | | % | |
| | | 100 | 200 | | % | $I_F=10$ mA; $V_{CE}=5$ V |
| | | 63 | 95 | 125 | % | |
| Saturation voltage | $V_{CE(SAT)}$ | | .21 | .40 | V | $I_F=10$ mA; $I_C=2.5$ mA |

TRANSFER CHARACTERISTICS

| CHARACTERISTICS | SYMBOL | MIN. | TYP. | MAX. | UNITS | TEST CONDITIONS |
|-------------------------------|-----------|------|------|------|---------|---|
| SWITCHING TIMES | | | | | | |
| Non-saturated Turn-on time | t_{on} | | 6.0 | 10 | μ S | $R_L=100$ Ω ; $I_C=2$ mA; $V_{CC}=10$ V |
| Turn-off time | t_{off} | | 5.5 | 10 | μ S | See Figure 10. |

ISOLATION CHARACTERISTICS

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

ELECTRICAL CHARACTERISTIC CURVES
(25°C Free Air Temperature Unless Otherwise Specified)

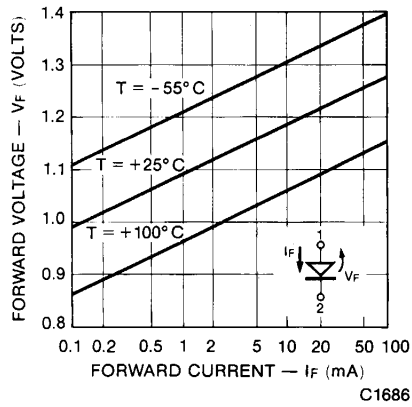


Fig. 1. Forward Voltage vs. Current

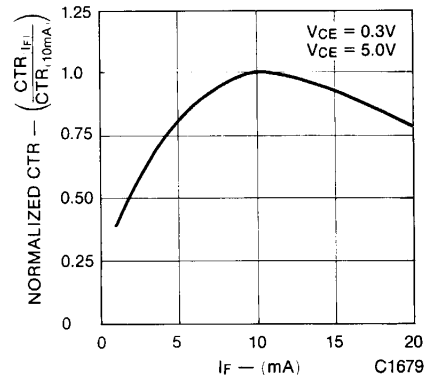


Fig. 2. Normalized CTR vs. Forward Current

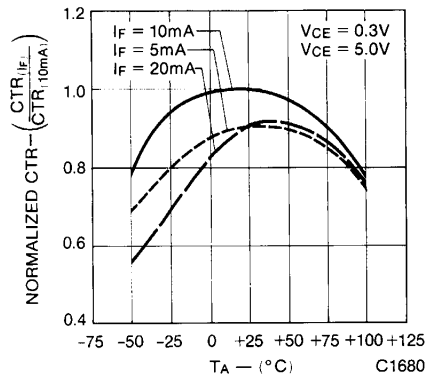


Fig. 3. Normalized CTR vs. Temperature

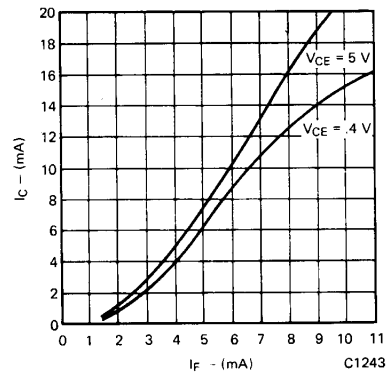


Fig. 4. Collector Current vs. Forward Current

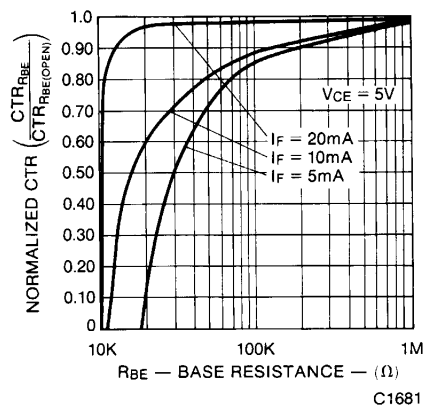


Fig. 5. CTR vs. RBE (Unsaturated)

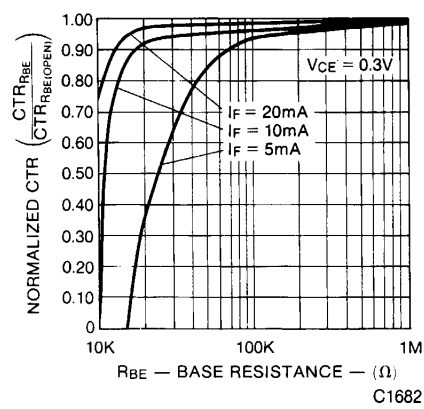


Fig. 6. CTR vs. RBE (Saturated)

ELECTRICAL CHARACTERISTIC CURVES
(25°C Free Air Temperature Unless Otherwise Specified) (Cont'd)

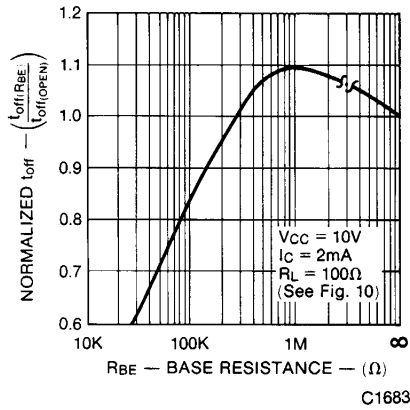


Fig. 7. Normalized T_{OFF} vs. RBE

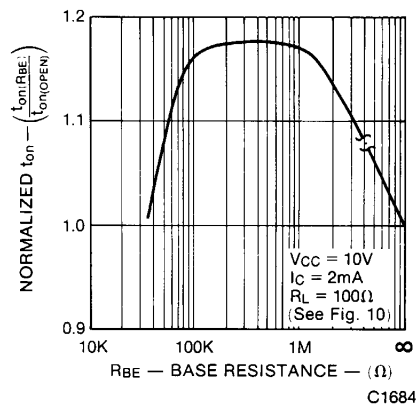


Fig. 8. Normalized T_{ON} vs. RBE

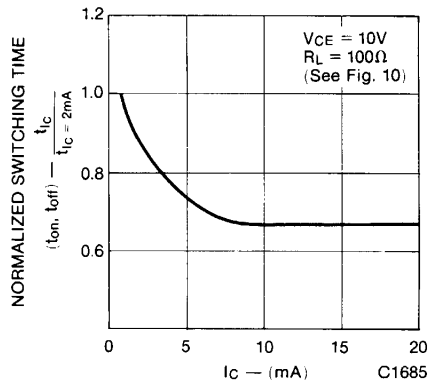


Fig. 9. Switching Time vs. I_C

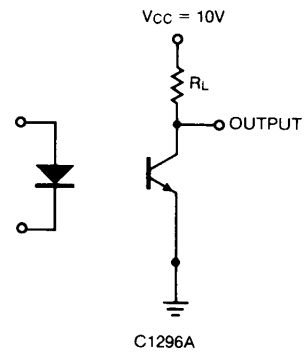


Fig. 10. Switching Time Test Circuit

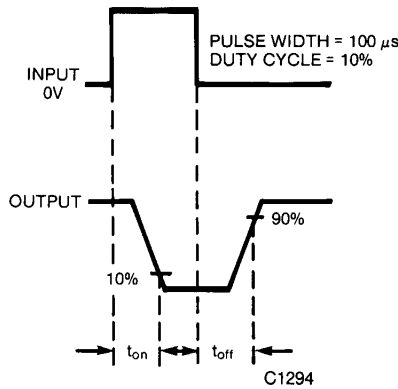


Fig. 11. Switching Time Waveforms