



Description

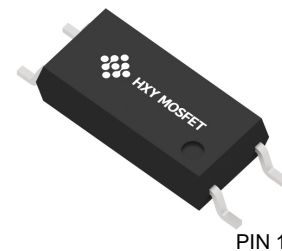
The HL101x is a photoelectric coupler composed of light-emitting diode and phototransistor. It is packaged in a 4-pin LSOP 4package.

Features

- Current transfer ratio(CTR:MIN.50% at $I_F=5mA, V_{CE}=5V$)
- High input-output isolation voltage ($V_{iso}=5,000V_{rms}$)
- Operating Temperature:-55°C~100°C
- Safety approval (UL 1577, VDE DIN EN60747-5-5(VDE 0884-5), CQC11-471543-2022)
- RoHS
- MSL1

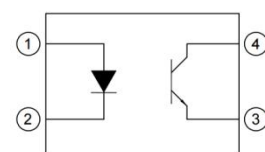
Applications

- Programmable controllers
- Switching power supply, intelligent meter
- Home appliances: such as air conditioners, fans, water heaters, etc



LSOP-4

Schematic



Pin Configuration
1 Anode
2 Cathode
3 Emitter
4 Collector

Rank Table Of Current Transfer Ratio (CTR= $I_C/I_F \times 100\%$)

| Rank Code | Symbol | Min | Max | Conditon |
|-----------|--------|-----|-----|---|
| HL1010 | CTR | 50 | 600 | $I_F=5mA,$ $V_{CE}=5V,$ $T_a=25^\circ C$ |
| HL1017 | | 80 | 160 | |
| HL1018 | | 130 | 260 | |
| HL1019 | | 200 | 400 | |
| HL1012 | CTR | 63 | 125 | $I_F=10mA,$ $V_{CE}=5V,$ $T_a=25^\circ C$ |
| HL1013 | | 100 | 200 | |
| HL1014 | | 160 | 320 | |
| HL1012 | CTR | 22 | | $I_F=1mA,$ $V_{CE}=5V,$ $T_a=25^\circ C$ |
| HL1013 | | 34 | | |
| HL1014 | | 56 | | |



Absolute Ratings(Tamb = 25°C)

| | Parameter | Symbol | Values | Unit |
|--------------------------------------|--|--------------------|-----------|------------------|
| Input | Forward Current | I _F | 50 | mA |
| | Reverse Voltage | V _R | 6 | V |
| | Power Dissipation | P | 70 | mW |
| | Peak Forward Current (100μs pulse, 100Hz) | I _{FP} | 1 | A |
| | Thermal Resistance Junction-Ambient | R _{thJ-A} | 325 | °C/W |
| | Thermal Resistance Junction-Case | R _{thJ-C} | 200 | °C/W |
| Output | Collector - Emitter Voltage | V _{CEO} | 80 | V |
| | Emitter - Collector Voltage | V _{ECO} | 6 | V |
| | Collector Current | I _C | 50 | mA |
| | Collector Power Dissipation | P _C | 150 | mW |
| Operating temperature range | | T _{op} | -55 ~ 110 | °C |
| Storage temperature range | | T _{stg} | -55 ~ 125 | °C |
| Total Power consumption | | P(W) | 200 | mW |
| Isolation Voltage ⁽¹⁾ | | V _{ISO} | 5000 | V _{rms} |
| Soldering Temperature ⁽²⁾ | | T _{SOL} | 260 | °C |

Notes:

(1). AC for 1 minute, R.H.= 40 ~ 60% R.H. In this test, pins 1, 2 are shorted together, and pins 3, 4 are shorted together.

(2).For 10 seconds

Electrical Characteristics (Ratings at 25°C)

| Parameter | | Symbol | Min. | Typ. | Max. | Unit | Conditon |
|--------------------------------------|-------------------------------------|----------------------|----------------------|----------------------|------|------|--|
| Input | Forward Voltage | V _F | - | 1.2 | 1.4 | V | I _F =20mA |
| | Reverse Current | I _R | - | - | 10 | μA | V _R =4V |
| | Terminal Capacitance | C _t | - | 30 | 250 | pF | V=0, f=1KHz |
| Output | Collector Dark Current | I _{CEO} | - | - | 100 | nA | V _{CE} =20V, I _F =0 |
| | Collector-Emitter Breakdown Voltage | BV _{CEO} | 80 | | | V | I _C =0.1mA, I _F =0 |
| | Emitter-Collector Breakdown Voltage | BV _{ECO} | 7 | | | V | I _E =10μA, I _F =0 |
| Collector-Emitter Saturation Voltage | | V _{CE(sat)} | | | 0.3 | V | I _F =10mA, I _C =1mA |
| Isolation Resistance | | R _{iso} | 5 × 10 ¹⁰ | 1 × 10 ¹¹ | - | Ω | DC500V, 40 ~ 60% R.H. |
| Floating Capacitance | | C _f | | 0.6 | 1 | pF | V=0, f=1MHz |
| Response Time (Rise) | | tr | | | 18 | μs | V _{CE} =5V, I _C =5mA RL=100Ω, |
| Response Time (Fall) | | tf | | | 18 | μs | |



Characteristics Curves

Fig.1 Relative Current Transfer Ratio vs. Forward Current Fig.2 Forward Current vs. Forward Voltage

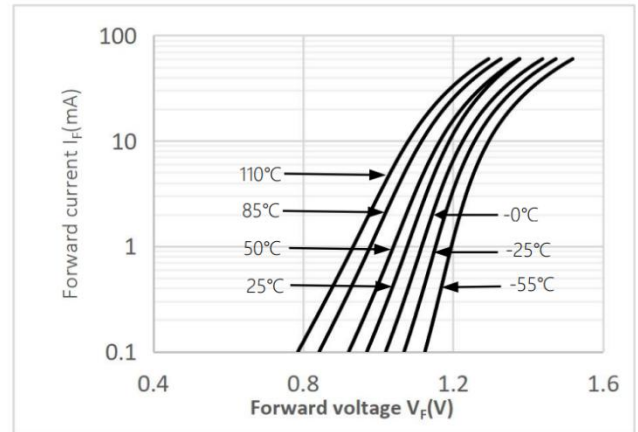
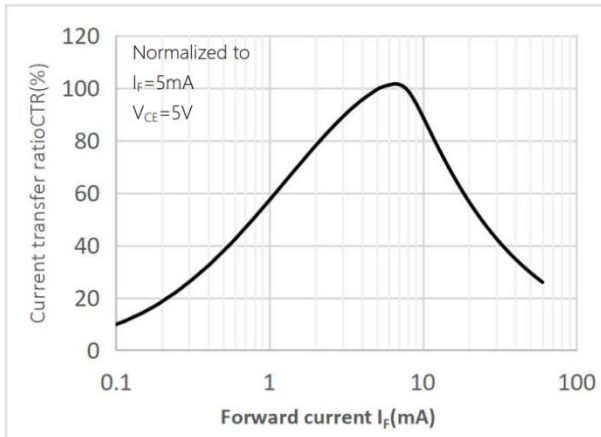


Fig.3 Collector Current vs. Collector-emitter Voltage

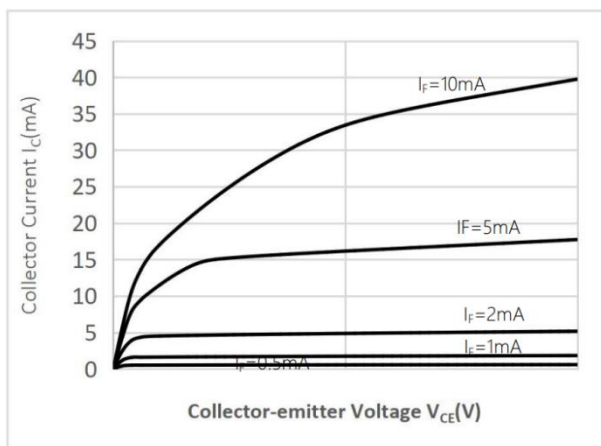


Fig.4 Relative Current Transfer Ratio vs. Ambient Temperature

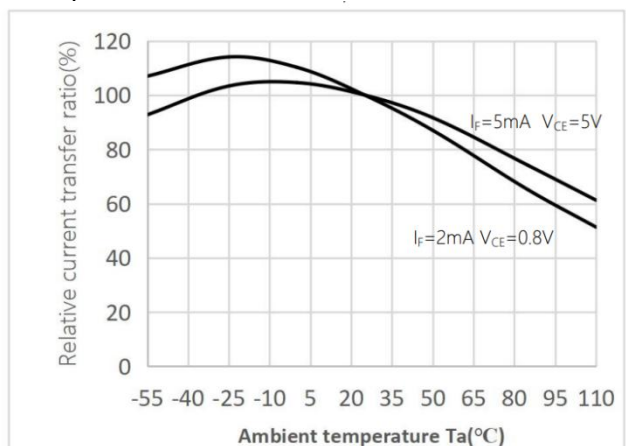


Fig.5 Collector-emitter Saturation Voltage vs. Ambient Temperature

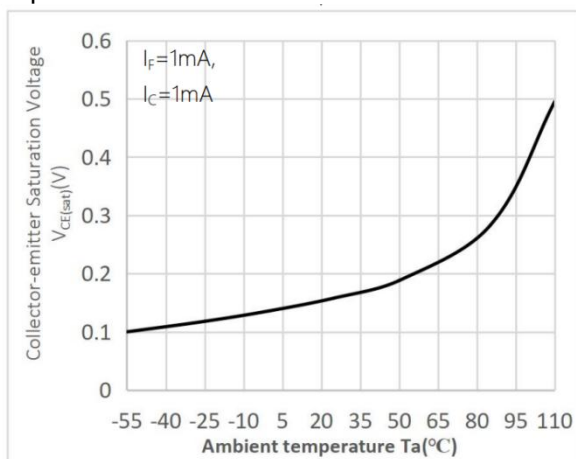


Fig.6 Collector Dark Current vs Ambient Temperature

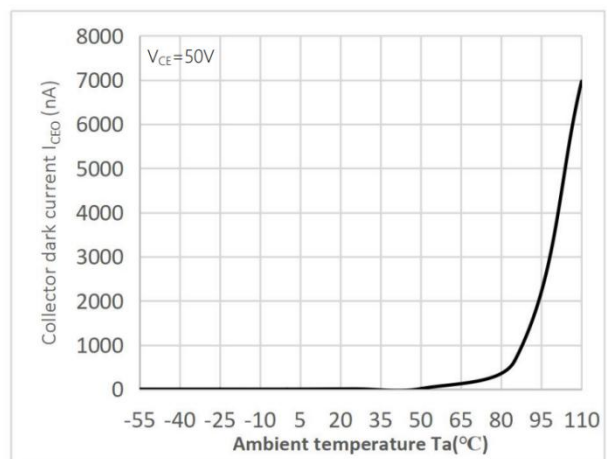




Fig.7 Response Time vs. Load Resistance

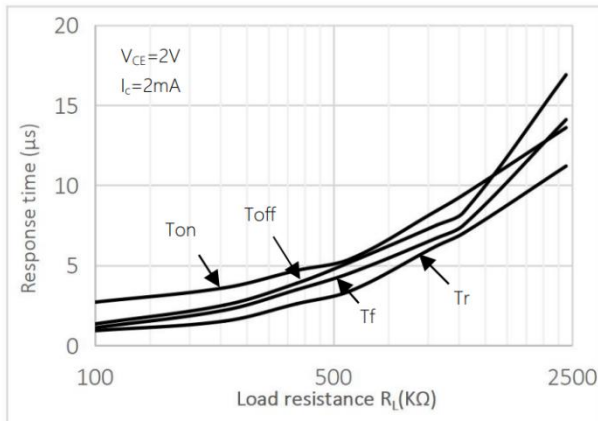


Fig.8 Frequency Response

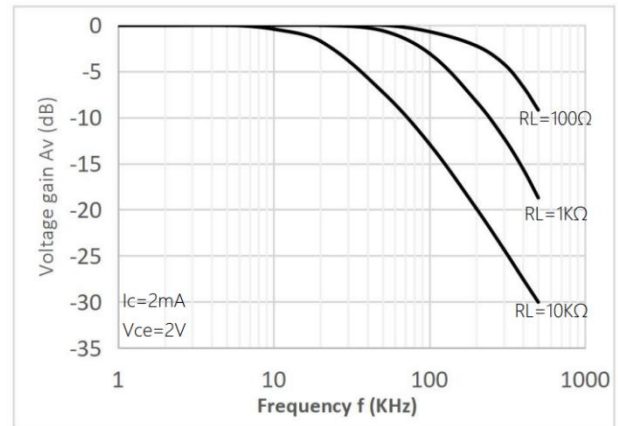


Fig.9 Collector-emitter Saturation Voltage vs Forward Current

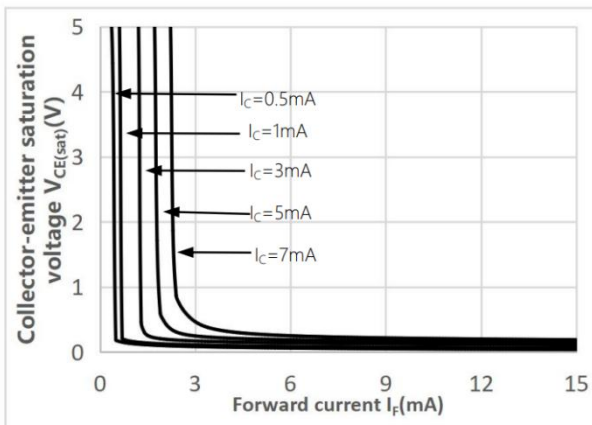
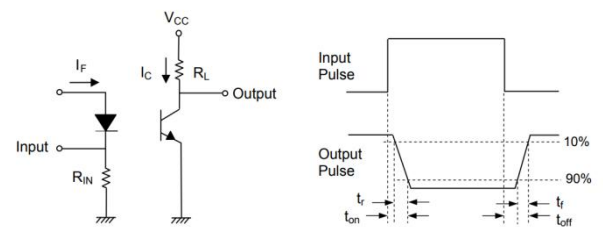
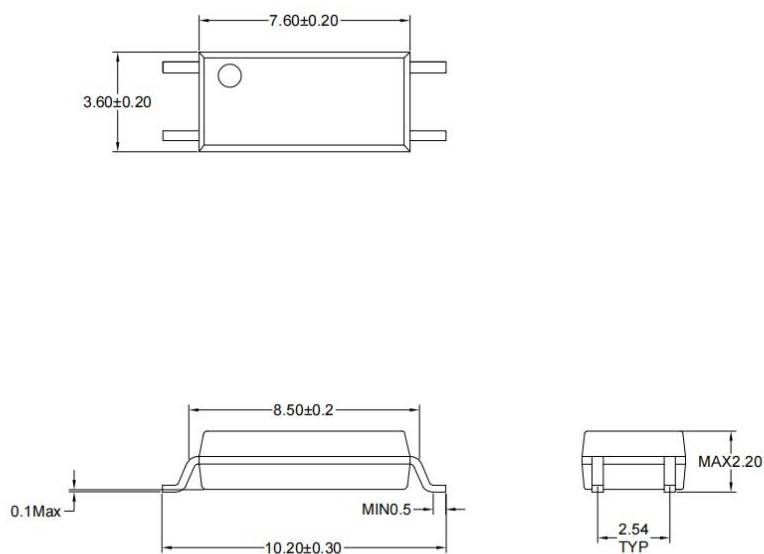


Fig.10 Switching Time Test Circuit & Waveforms





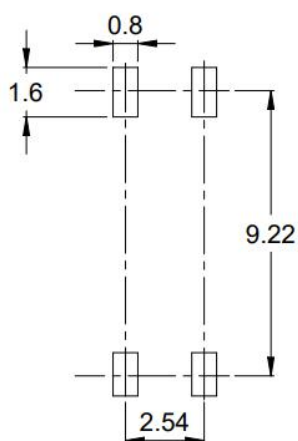
Outline Dimension



Unit: mm

Tolerance: $\pm 0.1 \text{ mm}$

Recommended solder pad Design



Unit: mm

Tolerance: $\pm 0.1 \text{ mm}$

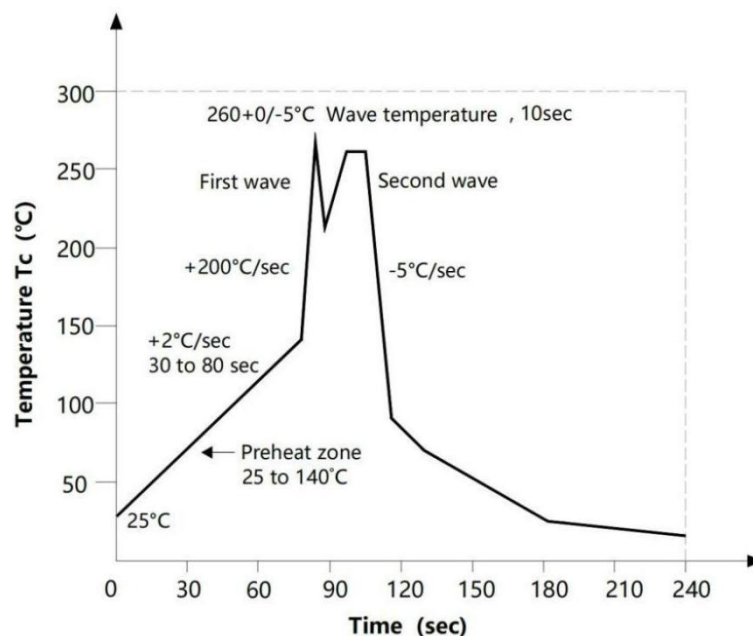


Temperature Profile Of Soldering

1.IR Reflow soldering

(JEDEC-STD-020 compliant)

| Profile item | Conditon |
|--------------------------|---------------|
| Preheat | |
| -Temperature Min (TSmin) | 150°C |
| -Temperature Max (TSmax) | 200°C |
| -Time (min to max) (ts) | 90±30 sec |
| Soldering zone | |
| -Temperature (TL) | 217°C |
| -Time (tL) | 60sec |
| Peak Temperature (TP) | 260°C |
| Ramp-up rate | 3°C / sec max |
| Ramp-down rate | 3~6°C/ sec |

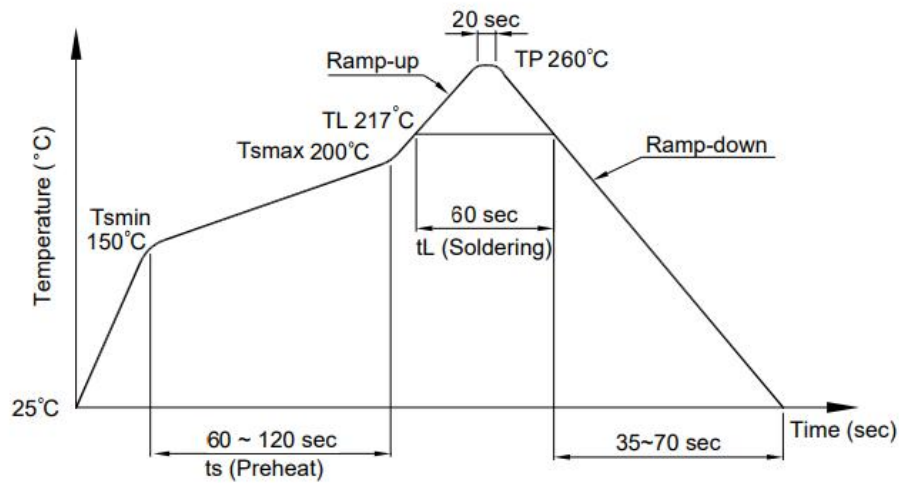


Notes:

One time soldering reflow is recommended within the condition of temperature and time profile shown below. Do not solder more than three times.



2. Wave soldering (JEDEC22A111 compliant)



3. Hand soldering by soldering iron

Allow single lead soldering in every single process. One time soldering is recommended.

Temperature: 380 +0/-5°C

Time: 3 sec max.



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