



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 $I_F=5\text{mA}$, $V_{CE}=5\text{V}$)
- High input-output isolation voltage ($V_{iso}=5,000\text{Vrms}$)
- Operating Temperature: $-55^\circ\text{C}\sim 100^\circ\text{C}$
- Safety approval (UL 1577, VDE DIN EN60747-5-5(VDE 0884-5), CQC11-471543-2022)
- RoHS
- MSL1

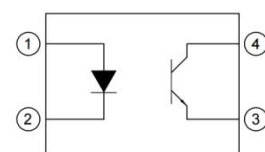
Applications

- 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	$I_F=5\text{mA}$, $V_{CE}=5\text{V}$, $T_a=25^\circ\text{C}$
HL1017		80	160	
HL1018		130	260	
HL1019		200	400	
HL1012	CTR	63	125	$I_F=10\text{mA}$, $V_{CE}=5\text{V}$, $T_a=25^\circ\text{C}$
HL1013		100	200	
HL1014		160	320	
HL1012	CTR	22		$I_F=1\text{mA}$, $V_{CE}=5\text{V}$, $T_a=25^\circ\text{C}$
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

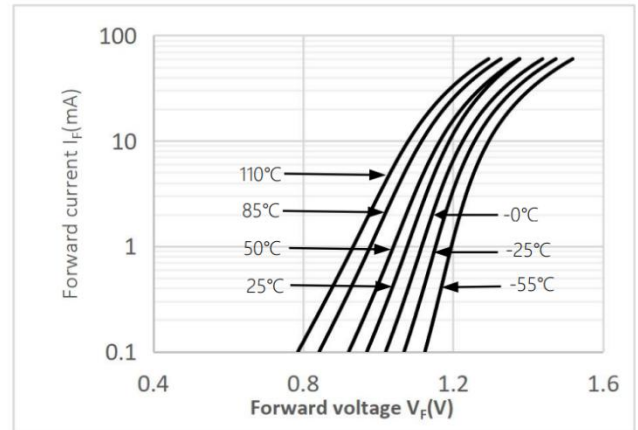
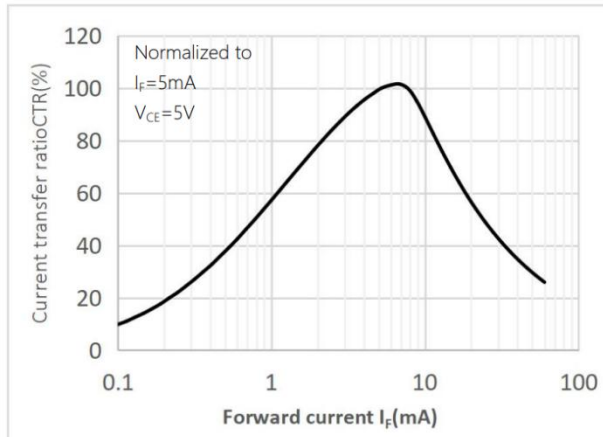


Fig.3 Collector Current vs. Collector-emitter Voltage

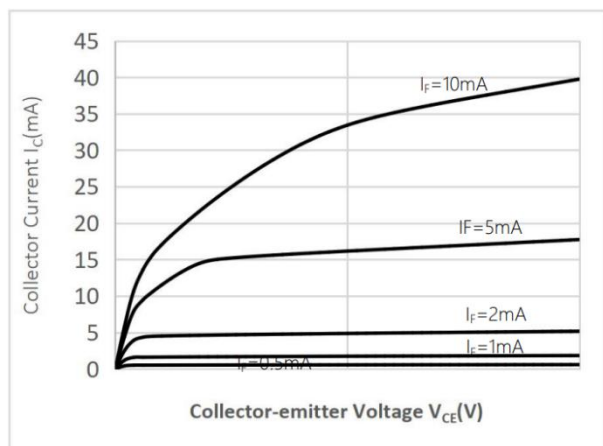


Fig.4 Relative Current Transfer Ratio vs. Ambient Temperature

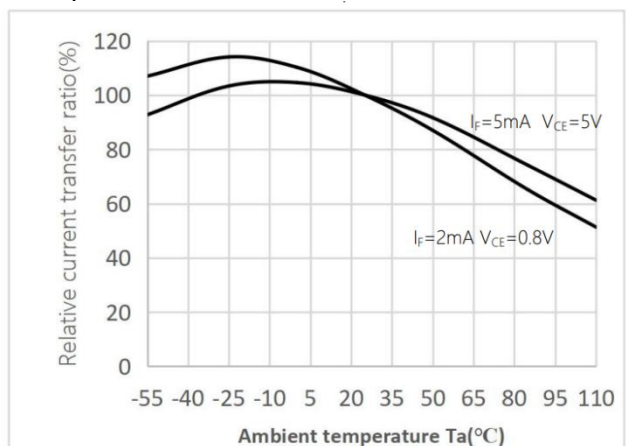


Fig.5 Collector-emitter Saturation Voltage vs. Ambient Temperature

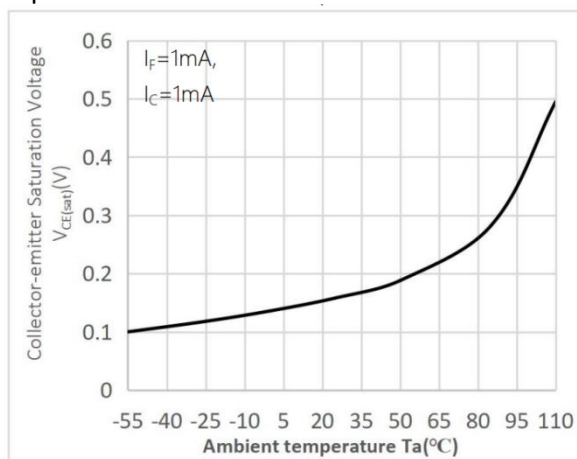


Fig.6 Collector Dark Current vs Ambient Temperature

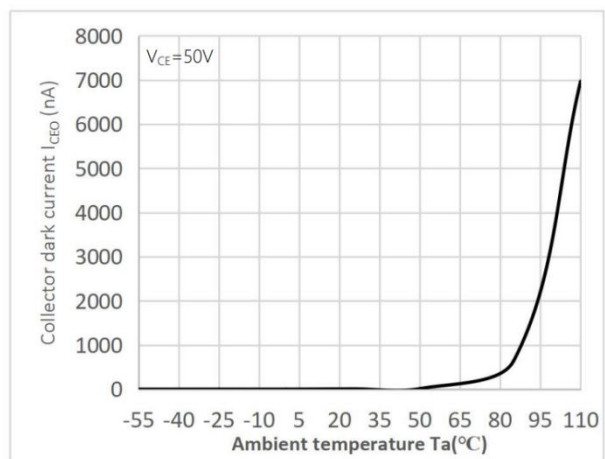




Fig.7 Response Time vs. Load Resistance

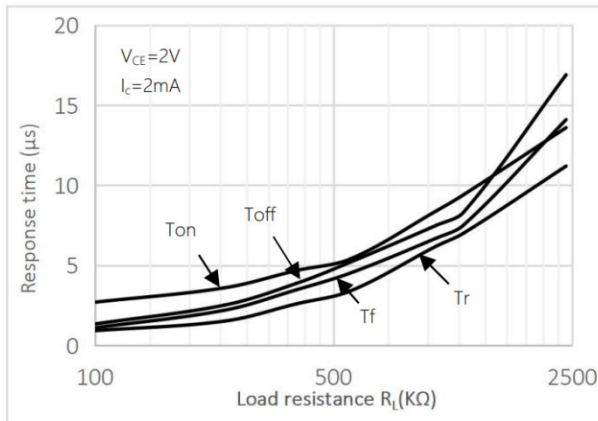


Fig.8 Frequency Response

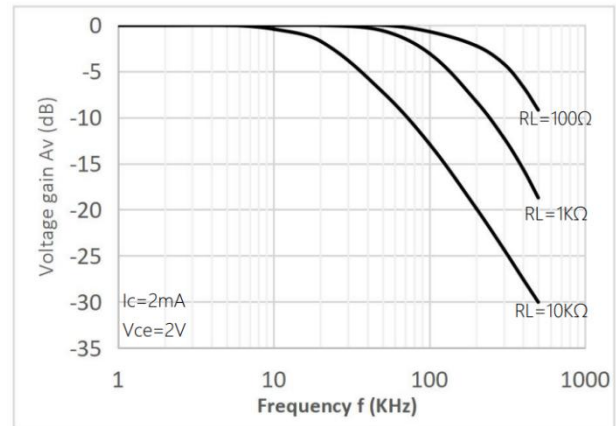


Fig.9 Collector-emitter Saturation Voltage vs Forward Current

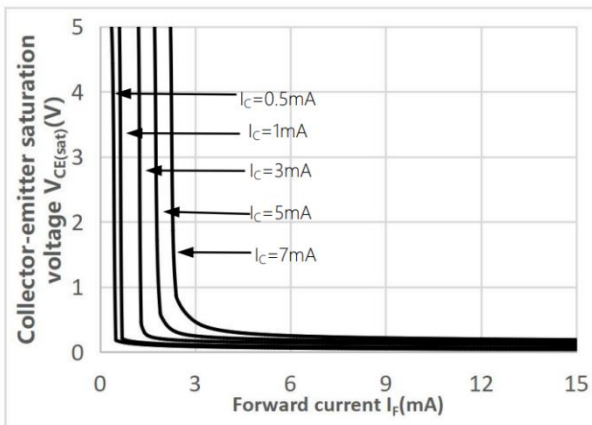
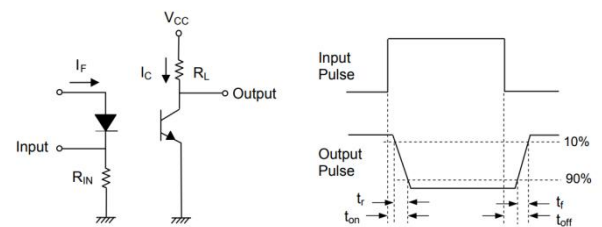
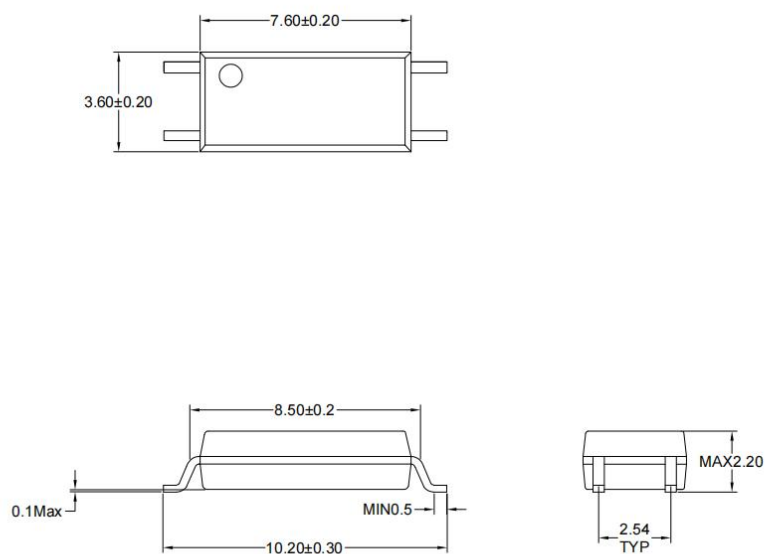


Fig.10 Switching Time Test Circuit & Waveforms





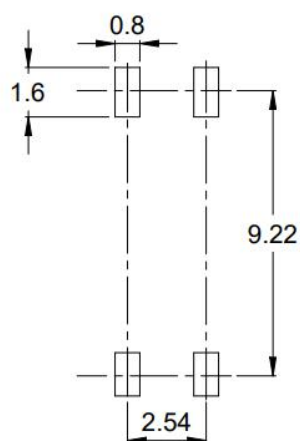
Outline Dimension



Unit: mm

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

Recommended solder pad Design



Unit: mm

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

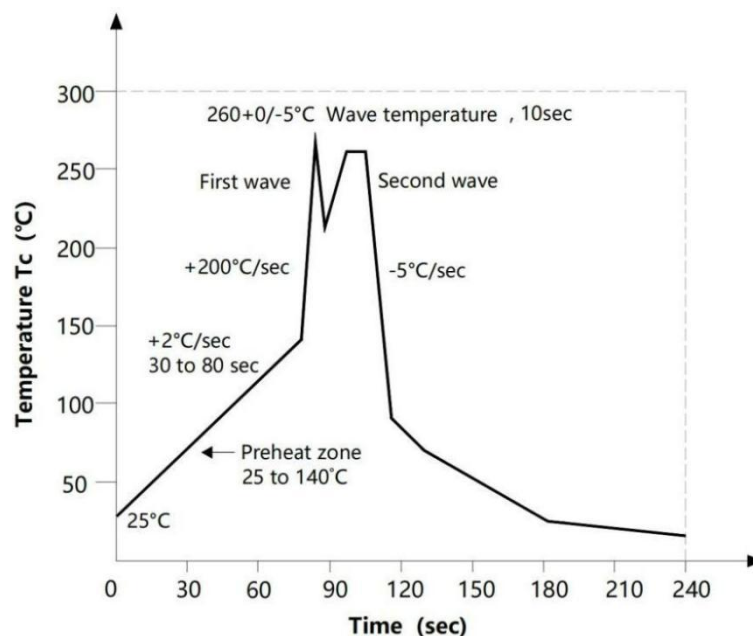


Temperature Profile Of Soldering

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

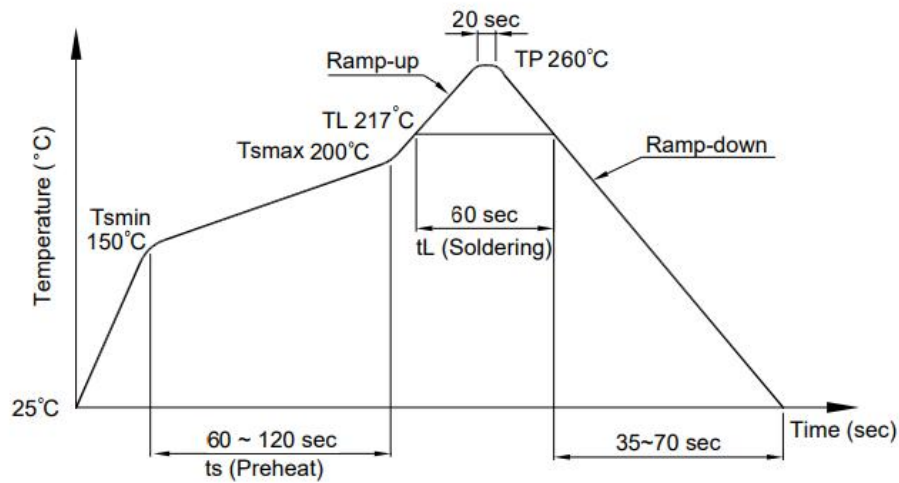


Notes:

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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