



Description

The HL3H7C is a photoelectric coupler composed of light-emitting diode and phototransistor. It is packaged in a 4-pin package.



SSOP-4

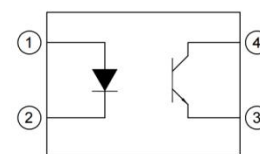
Features

- Current transfer ratio(CTR:MIN.50% at $I_F=5mA, V_{CE}=5V$)
- High input-output isolation voltage ($V_{iso}=3,750V_{rms}$)
- Operating Temperature:-55°C~100°C
- Safety approval (UL 1577, VDE DIN EN60747-5-5(VDE 0884-5), CQC11-471543-2022)
- RoHS

Applications

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

Schematic



Pin Configuration

- 1 Anode
- 2 Cathode
- 3 Emitter
- 4 Collector

Absolute Ratings($T_{amb} = 25^{\circ}C$)

Parameter		Symbol	Values	Unit
Input	Forward Current	I_F	50	mA
	Reverse Voltage	V_R	6	V
	Power Dissipation	P_D	70	mW
	Derating factor (above $T_a = 90^{\circ}C$)		2.0	mW/ $^{\circ}C$
Output	Collector - Emitter Voltage	V_{CEO}	80	V
	Emitter - Collector Voltage	V_{ECO}	7	V
	Collector Current	I_C	50	mA
	Collector Power Dissipation	P_C	150	mW
	Derating factor (above $T_a = 70^{\circ}C$)		3.1	mW/ $^{\circ}C$
Operating temperature range		T_{op}	-55 ~ 110	$^{\circ}C$
Storage temperature range		T_{stg}	-55 ~ 125	$^{\circ}C$
Total Power consumption		$P(W)$	200	mW
Isolation Voltage ⁽¹⁾		V_{ISO}	3750	V_{rms}
Soldering Temperature ⁽²⁾		T_{SOL}	260	$^{\circ}C$

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	$I_F=20\text{mA}$
	Reverse Current	I_R	-	-	10	μA	$V_R=4\text{V}$
	Terminal Capacitance	C_t	-	30	250	pF	$V=0, f=1\text{KHz}$
Output	Collector Dark Current	I_{CEO}	-	-	100	nA	$V_{CE}=20\text{V}, I_F=0$
	Collector-Emitter Breakdown Voltage	BV_{CEO}	80			V	$I_C=0.1\text{mA}, I_F=0$
	Emitter-Collector Breakdown Voltage	BV_{ECO}	7			V	$I_E=10\mu\text{A}, I_F=0$
Collector-Emitter Saturation Voltage		$V_{CE(sat)}$		0.1	0.2	V	$I_F=20\text{mA}, I_C=1\text{mA}$
Isolation Resistance		R_{iso}	5×10^{10}	1×10^{11}	-	Ω	DC500V, 40 ~ 60% R.H.
Floating Capacitance		C_f		0.6	1	pF	$V=0, f=1\text{MHz}$
Cut-off Frequency		f_c		80		kHz	$V_{CE}=5\text{V}, I_C=2\text{mA}, R_L=100\Omega, -3\text{dB}$
Response Time (Rise)		t_r		4	18	μs	$V_{CE}=2\text{V}, I_C=2\text{mA}, R_L=100\Omega,$
Response Time (Fall)		t_f		3	18	μs	

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

Rank Code	Symbol	Min	Max	Conditon
NONE	CTR	50	600	$I_F=5\text{mA}, V_{CE}=5\text{V}, T_a=25^\circ\text{C}$
A		80	160	
B		130	260	
C		200	400	
D		300	600	



Characteristics Curves

Fig.1 Relative Current Transfer Ratio vs. Forward Current

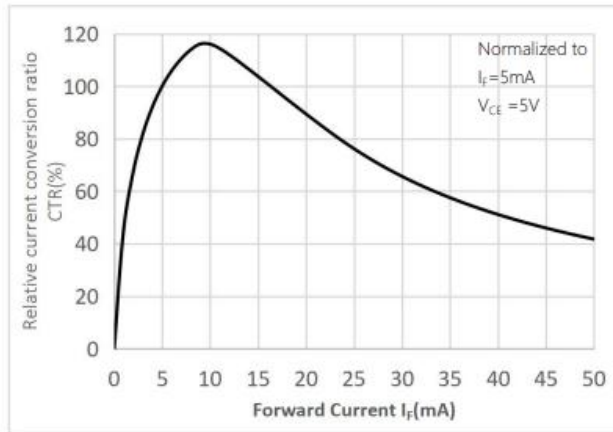


Fig.2 Forward Current vs. Forward Voltage

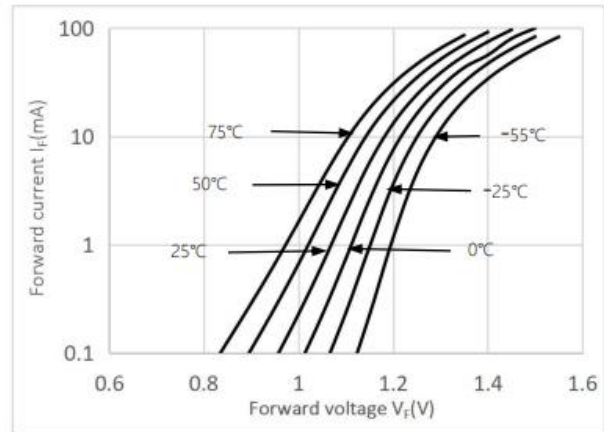


Fig.3 Collector Current vs. Collector-emitter Voltage

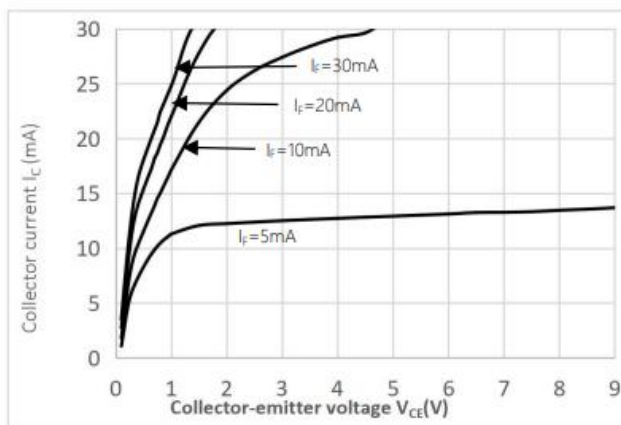


Fig.4 Relative Current Transfer Ratio vs. Ambient Temperature

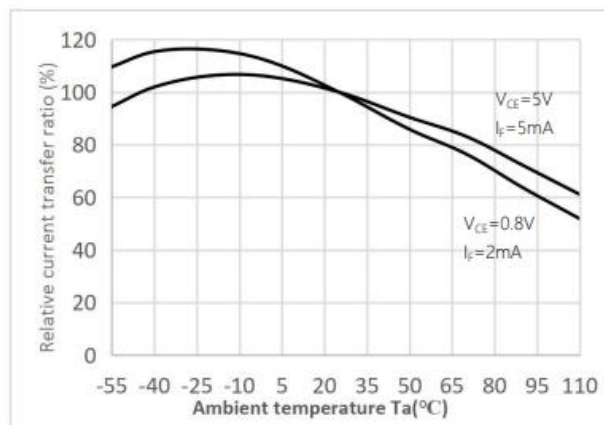


Fig.5 Collector-emitter Saturation Voltage vs. Ambient Temperature

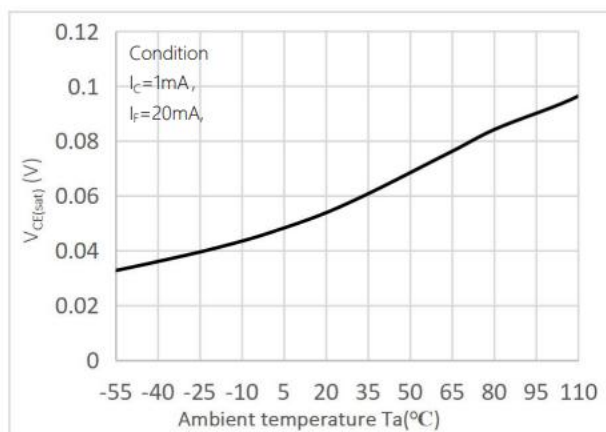


Fig.6 Collector Dark Current vs Ambient Temperature

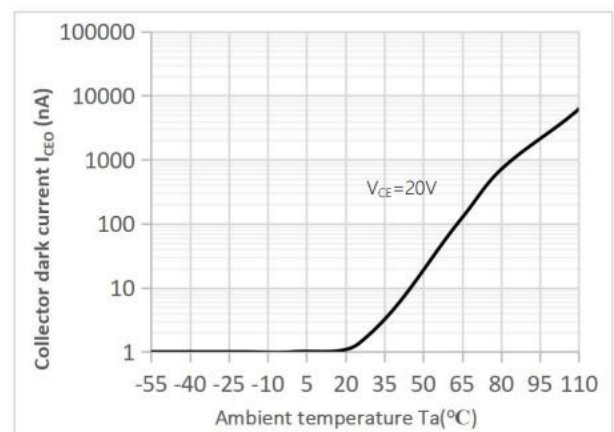




Fig.7 Response Time vs. Load Resistance

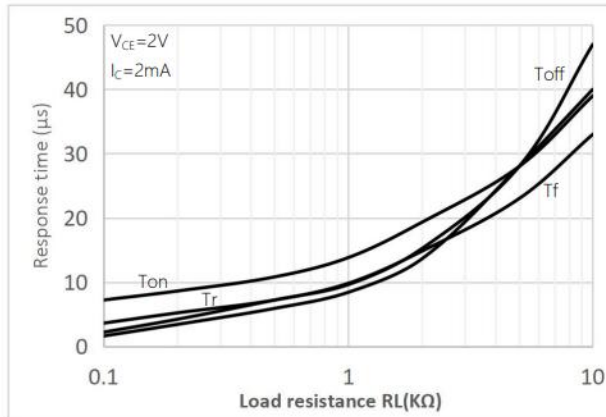


Fig.8 Frequency Response

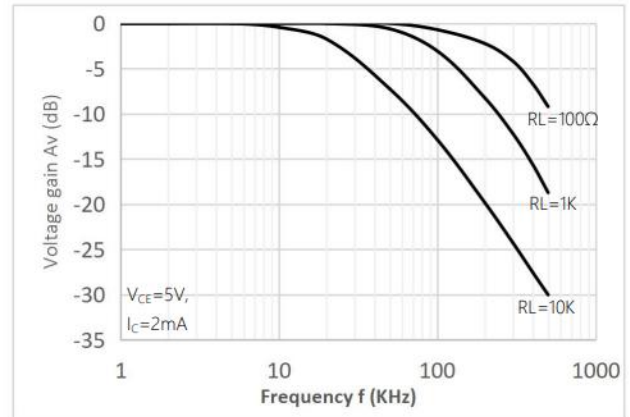


Fig.9 Collector-emitter Saturation Voltage vs Forward Current

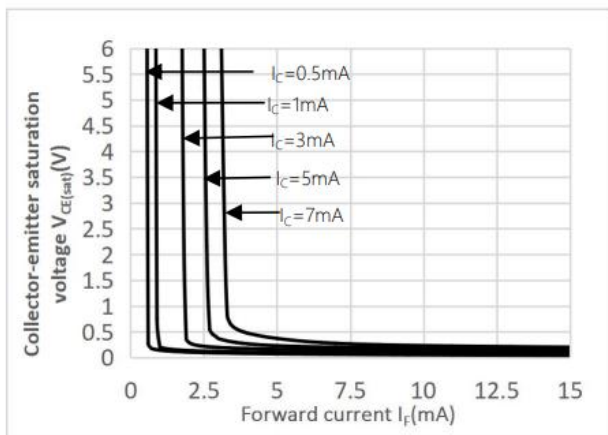
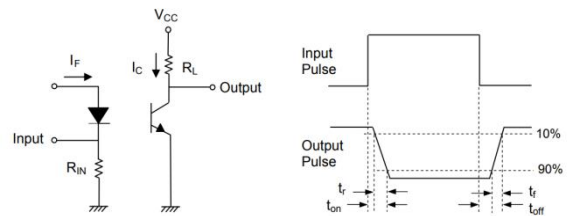
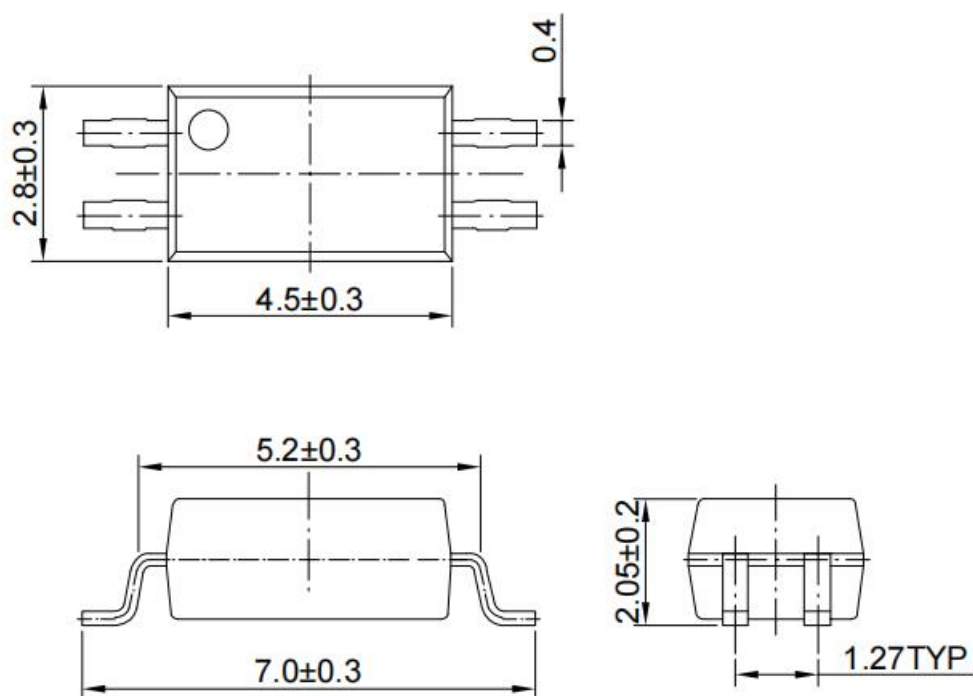


Fig.10 Switching Time Test Circuit & Waveforms





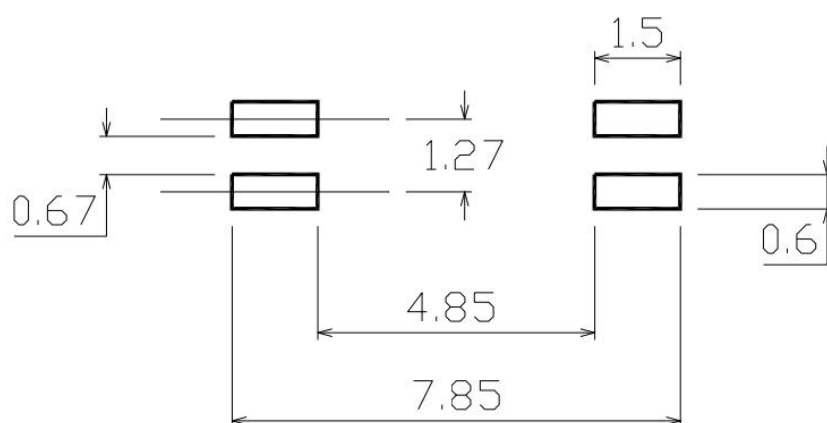
Outline Dimension



Unit: mm

Tolerance: ± 0.1 mm

Recommended solder pad Design



Unit: mm

Tolerance: ± 0.1 mm

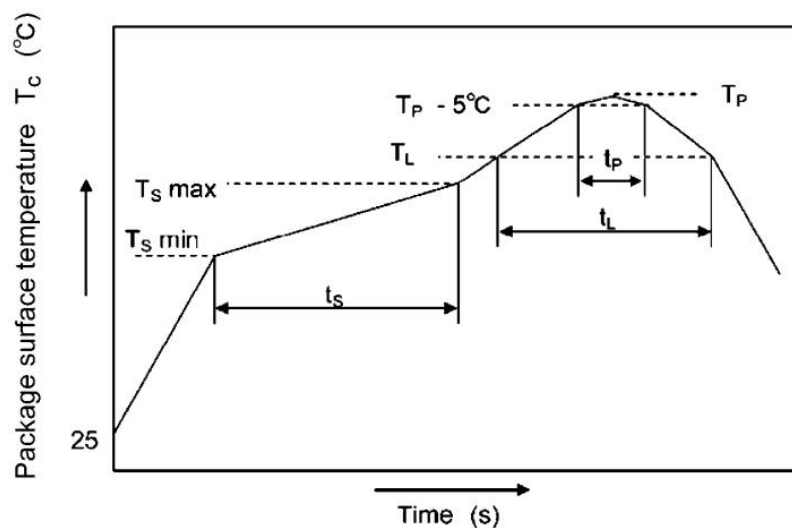


Temperature Profile Of Soldering

1.IR Reflow soldering

(JEDEC-STD-020D 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)	60-150 sec
Peak Temperature (TP)	260°C
-Time (TP-5°C to TP) (ts)	30 sec
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)

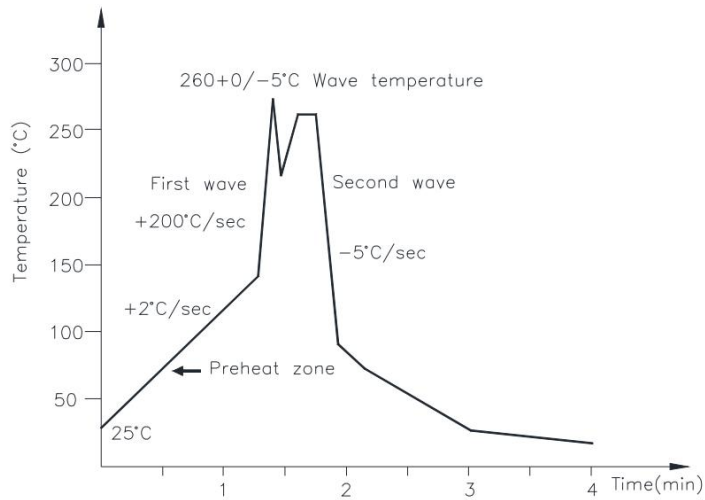
One time soldering is recommended within the condition.

Temperature: $260 \pm 5^\circ\text{C}$.

Time: 10 sec.

Preheat temperature: 25 to 140°C .

Preheat time: 30 to 80 sec.



3. Hand soldering by soldering iron

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

Temperature: $380 \pm 5^\circ\text{C}$

Time: 3 sec max.



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