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16 PIN ULTRA SMALL SSOP AC INPUT PHOTOTRANSISTOR PHOTOCOUPLER ELQ3H4 Series



Features

- Halogens free
- AC input response
- Current transfer ratio (CTR: 20~300% at IF =1mA, VCE =5V)
- High isolation voltage between input and output (Viso=3750 V rms)
- Compact SSOP with a 2.0 mm profile
- Pb free and RoHS compliant.
- UL approved (No. E214129)
- VDE approved (No. 40028116)
- SEMKO approved
- NEMKO approved
- DEMKO approved
- FIMKO approved
- CQC approved

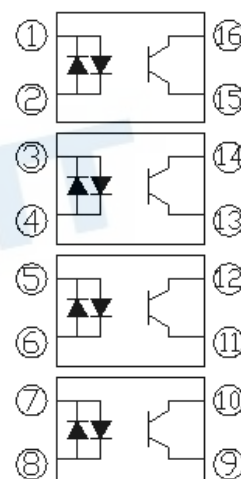
Description

The ELQ3H4 is optically coupled isolator containing GaAs light emitting diodes and an NPN silicon phototransistors in a plastic SOP for high density applications. This package has shield effect to cut off ambient light.

Applications

- Programmable logic controllers
- Measuring instruments
- Hybrid IC

Schematic



- ① ③ ⑤ ⑦ Anode/Cathode
- ② ④ ⑥ ⑧ Cathode/Anode
- ⑨ ⑪ ⑬ ⑮ Emitter
- ⑩ ⑫ ⑭ ⑯ Collector

Absolute Maximum Ratings (T_A=25°C)

	Parameter	Symbol	Rating	Unit
Input	Forward current	I _F	±60	mA
	Peak forward current (1us, pulse)	I _{FP}	1	A
	Power dissipation	P _D	70	mW/Ch
	Power Dissipation Derating		0.7	mW/°C
Output	Collector current	I _C	50	mA
	Collector-Emitter voltage	V _{CEO}	80	V
	Emitter-Collector voltage	V _{ECO}	7	V
	Power dissipation	P _C	150	mW /Ch
	Power Dissipation Derating		1.4	mW/°C
	Total power dissipation	P _{TOT}	200	mW
	Isolation voltage ^{*1}	V _{ISO}	3750	V rms
	Operating temperature	T _{OPR}	-55 ~ +110	°C
	Storage temperature	T _{STG}	-55 ~ +125	°C
	Soldering temperature ^{*2}	T _{SOL}	260	°C

Notes:

*1 AC for 1 minute, R.H.= 40 ~ 60% R.H. In this test, LED side pins shorted together, and detector side pins shorted together.

*2 For 10 seconds

Electrical Characteristics (T_A=25°C unless specified otherwise)

Input

Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition
Forward voltage	V _F	-	1.2	1.4	V	I _F = ± 20mA
Input Capacitance	C _{in}	-	30	250	pF	V = 0, f = 1KHz

Output

Parameter	Symbol	Min	Typ.	Max.	Unit	Condition
Collector-Emitter dark current	I _{CEO}	-	-	100	nA	V _{CE} = 20V, I _F = 0mA
Collector-Emitter breakdown voltage	BV _{CEO}	80	-	-	V	I _C = 0.1mA
Emitter-Collector breakdown voltage	BV _{ECO}	7	-	-	V	I _E = 0.1mA

Transfer Characteristics (T_A=-40 to 85°C unless specified otherwise)

Parameter	Symbol	Min	Typ.	Max.	Unit	Condition
Current Transfer ratio	CTR	20	-	300	%	I _F = ± 1mA, V _{CE} = 5V
CTR Ratio	CTR1/ CTR2	0.5	-	2.0		I _F = ± 1mA, V _{CE} = 5V
Collector-Emitter saturation voltage	V _{CE(sat)}	-	0.1	0.2	V	I _F = ± 20mA, I _C = 1mA
Isolation resistance	R _{IO}	5×10 ¹⁰	-	-	Ω	V _{IO} = 500Vdc, 40~60% R.H.
Floating capacitance	C _{IO}	-	0.3	1.0	pF	V _{IO} = 0, f = 1MHz
Rise time	t _r	-	5	18	μs	V _{CE} = 2V, I _C = 2mA, R _L = 100Ω
Fall time	t _f	-	3	18	μs	

Typical Electro-Optical Characteristics Curves

Figure 1. Forward Current vs Forward Voltage

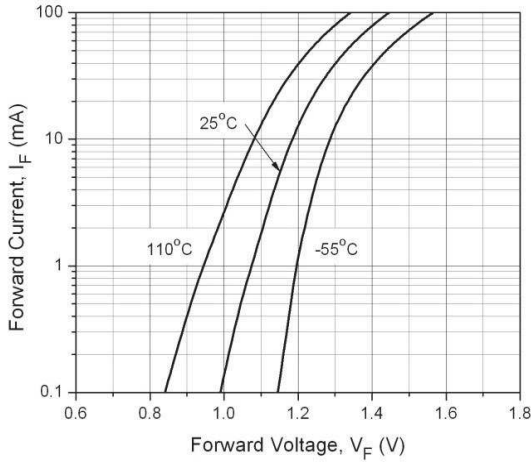


Figure 2. Normalized Collector Current vs Forward Current

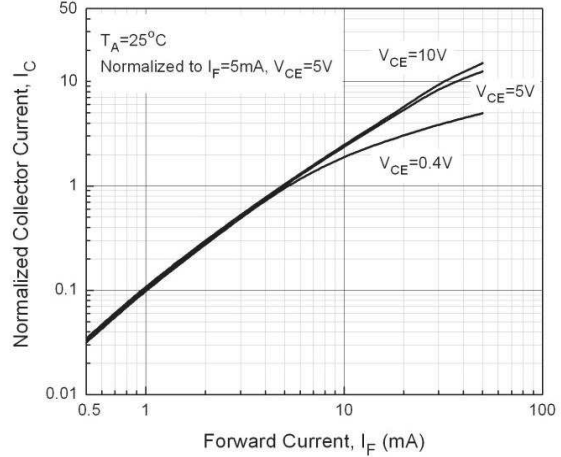


Figure 3. Normalized Current Transfer Ratio vs Forward Current

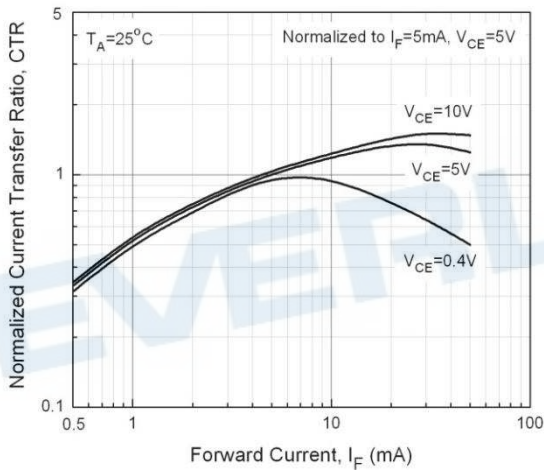


Figure 4. Normalized Collector Current vs Ambient Temperature

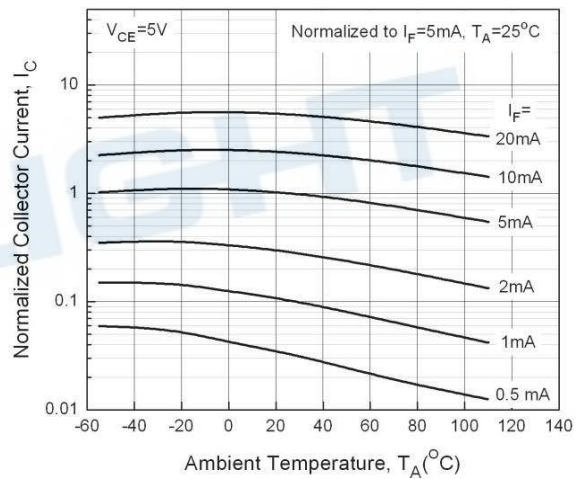


Figure 5. Normalized Current Transfer Ratio vs Ambient Temperature

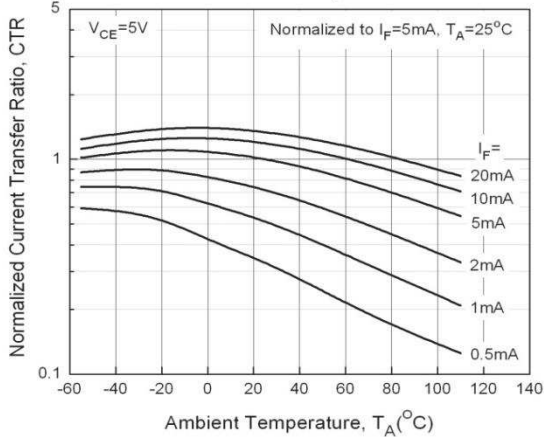


Figure 6. Collector Current vs Collector-Emitter Voltage

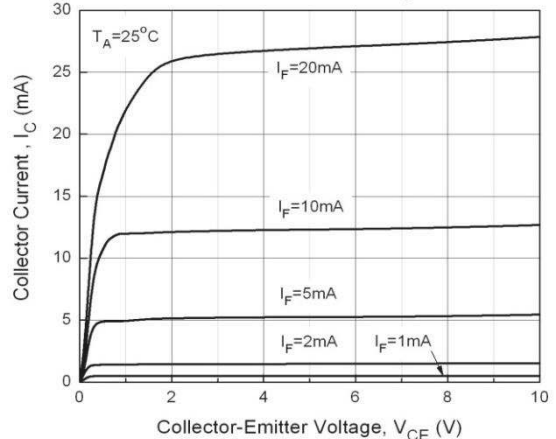


Figure 7. Collector Current vs Collector-Emitter Voltage

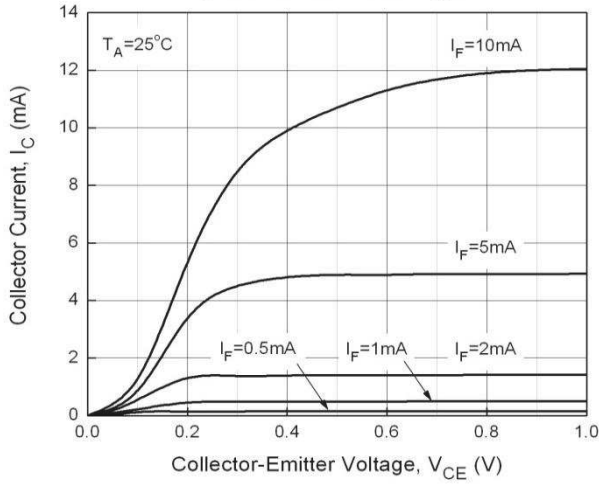


Figure 8. Collector Dark Current vs Ambient Temperature

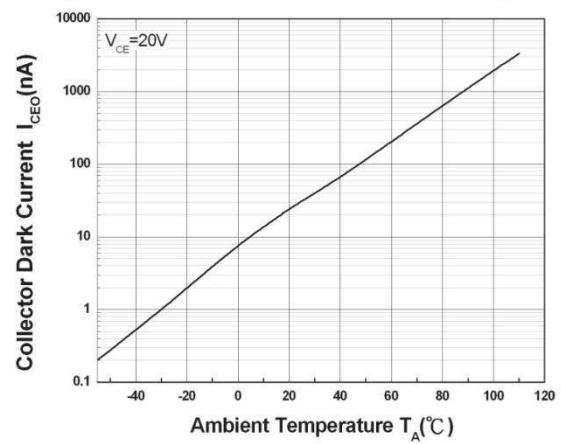


Figure 9. Collector-Emitter Saturation Voltage vs Ambient Temperature

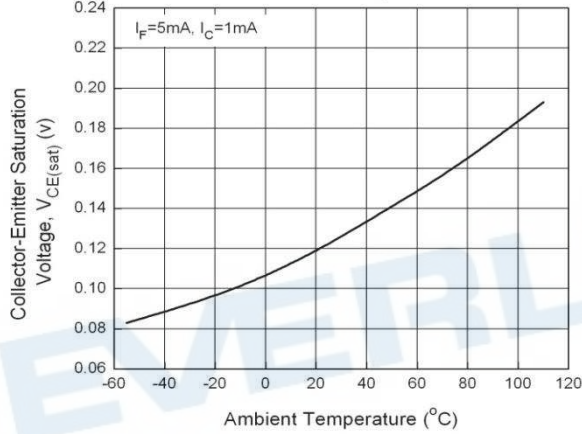


Figure 10. Switching Time vs Load Resistance

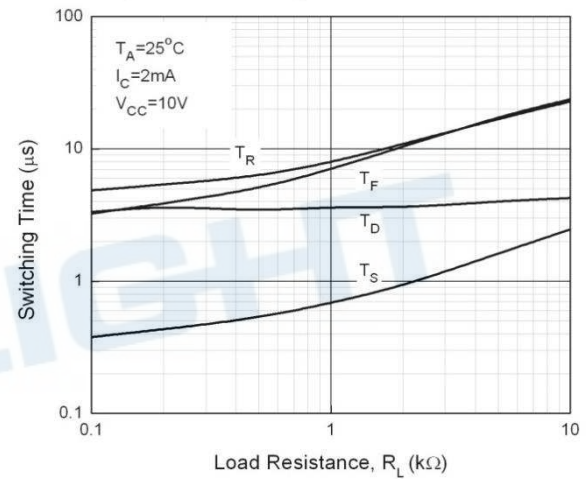
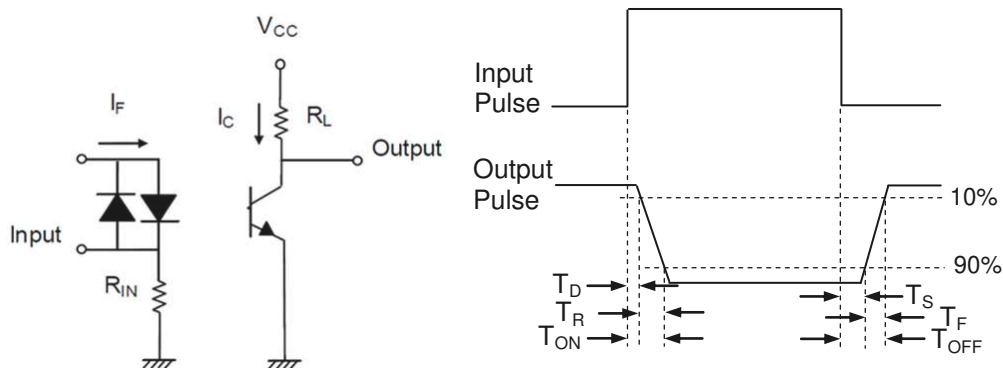


Figure 11. Switching Time Test Circuit & Waveform



Order Information

Part Number

ELQ3H4(Z)-V

Note

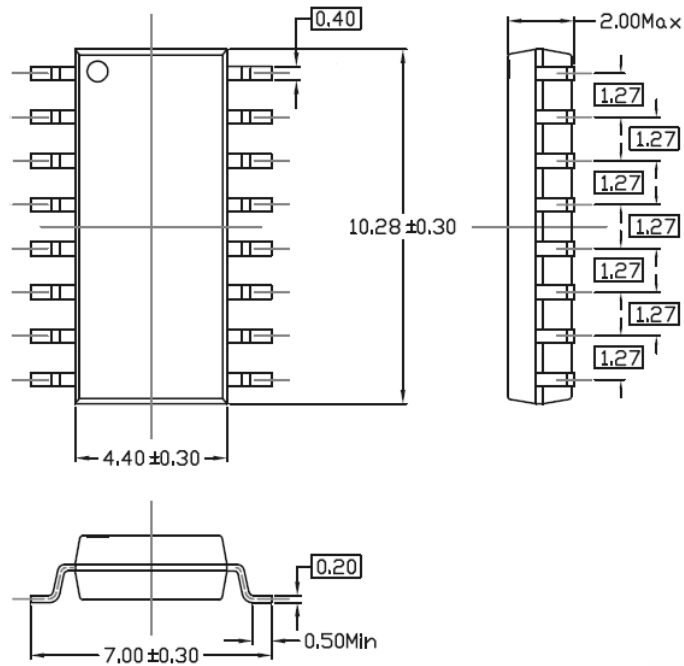
Z = Tape and reel option (TA or none).
V = VDE (optional)

Option	Description	Packing quantity
None	Tube option of ELQ3H4	40 units per tube
(TA)	Tape & reel option of ELQ3H4	1000 units per reel

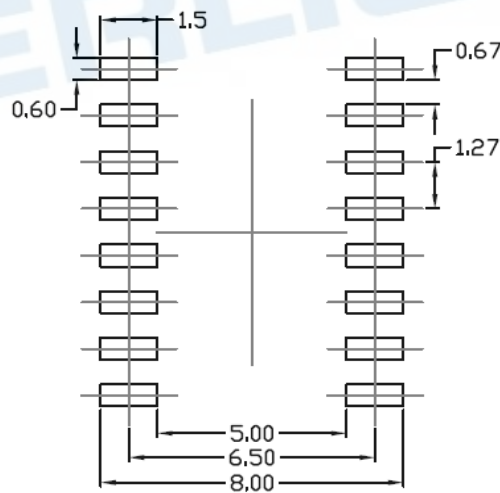
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Package Dimension

(Dimensions in mm)



Recommended pad layout for surface mount leadform



Device Marking



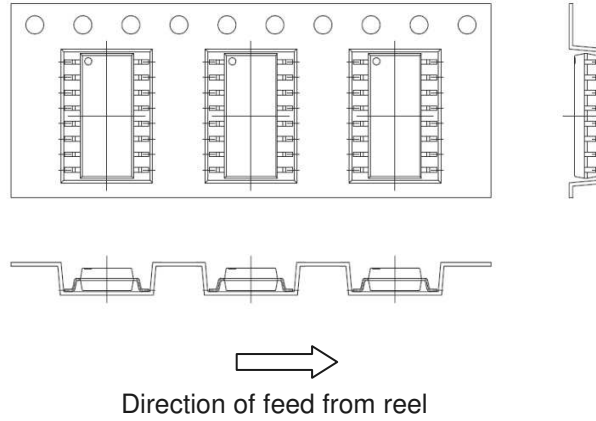
Notes

EL denotes EVERLIGHT
Q3H4 denotes Device Number
Y denotes 1 digit Year code
WW denotes 2 digit Week code
V denotes VDE (optional)

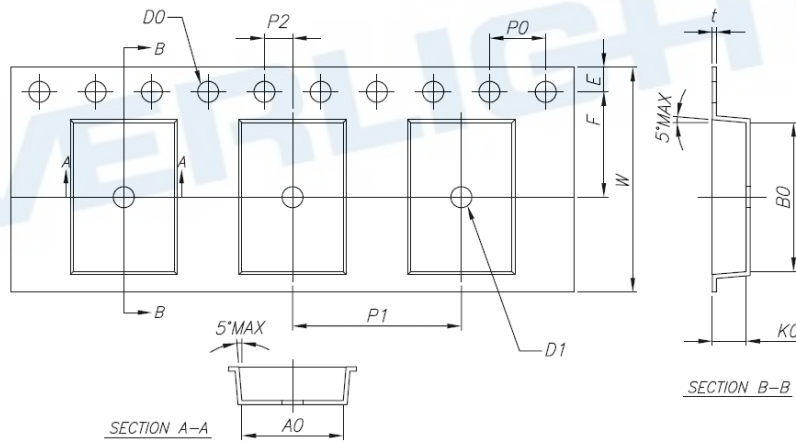
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Tape & Reel Packing Specifications

ELQ3H4



Tape dimension

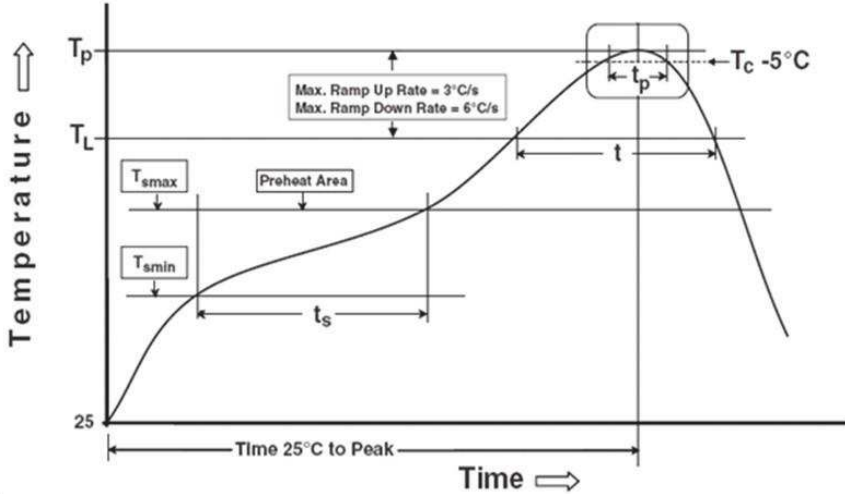


Dimension No.	A0	B0	D0	D1	E	F
Dimension (mm)	7.2±0.1	10.6±0.1	1.5+0.1 -0	1.5+0.1 -0	1.75±0.1	7.5±0.1
Dimension No.	P0	P1	P2	t	W	K0
Dimension (mm)	4.0±0.1	12.0±0.1	2.0±0.1	0.3±0.05	16.0±0.3	2.4±0.1

Precautions for Use

1. Soldering Condition

1.1 (A) Maximum Body Case Temperature Profile for evaluation of Reflow Profile



Note:

Reference: IPC/JEDEC J-STD-020D

Preheat

Temperature min (T_{smin})	150 °C
Temperature max (T_{smax})	200°C
Time (T_{smin} to T_{smax}) (t_s)	60-120 seconds
Average ramp-up rate (T_{smax} to T_p)	3 °C/second max

Other

Liquidus Temperature (T_L)	217 °C
Time above Liquidus Temperature (t_L)	60-100 sec
Peak Temperature (T_p)	260°C
Time within 5 °C of Actual Peak Temperature: $T_p - 5^\circ\text{C}$	30 s
Ramp- Down Rate from Peak Temperature	6°C /second max.
Time 25°C to peak temperature	8 minutes max.
Reflow times	3 times

Disclaimer

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2. The graphs shown in this datasheet are representing typical data only and do not show guaranteed values.
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