

4 PIN SOP PHOTOTRANSISTOR AC INPUT PHOTOCOUPLER

EL354 Series

Features:

- AC input response
- Current transfer ratio
(CTR: Min. 20% at $I_F = \pm 1\text{mA}$, $V_{CE} = 5\text{V}$)
- High isolation voltage between input and output ($V_{iso} = 3750\text{ V rms}$)
- Compact small outline package
- Pb free and RoHS compliant.
- UL approved (No. E214129)
- VDE approved (No. 132249)
- SEMKO approved (No. 716108)
- NEMKO approved (No. P06206474)
- DEMKO approved (No. 313924)
- FIMKO approved (No. FI 22807)
- CSA approved (No. 1408633)

Description

The EL354 series of devices each consist of two infrared emitting diode, connected in inverse parallel, optically coupled to a phototransistor detector.

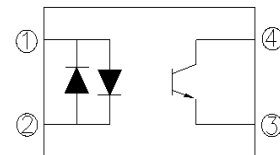
They are packaged in a 4-pin small outline package.

Applications

- AC line monitor
- Programmable controllers
- Telephone line interface
- Unknown polarity DC sensor



Schematic



Pin Configuration

1. Anode / Cathode
2. Cathode / Anode
3. Emitter
4. Collector

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EL354 Series

Absolute Maximum Ratings ($T_a=25^{\circ}\text{C}$)

Parameter		Symbol	Rating	Unit
Input	Forward current	I_F	± 50	mA
	Peak forward current ($t = 10\mu\text{s}$)	I_{FM}	1	A
	Power dissipation No derating required up to $T_a = 100^{\circ}\text{C}$	P_D	70	mW
Output	Power dissipation Derating factor (above $T_a = 80^{\circ}\text{C}$)	P_C	150	mW
			3.7	mW/ $^{\circ}\text{C}$
	Collector-Emitter voltage	V_{CEO}	80	V
	Emitter-Collector voltage	V_{ECO}	6	V
Total power dissipation		P_{tot}	200	mW
Isolation voltage ^{*1}		V_{iso}	3750	V rms
Operating temperature		T_{opr}	-55~+100	$^{\circ}\text{C}$
Storage temperature		T_{stg}	-55~+125	$^{\circ}\text{C}$
Soldering temperature ^{*2}		T_{sol}	260	$^{\circ}\text{C}$

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.

4 PIN SOP PHOTOTRANSISTOR AC INPUT PHOTOCOUPLER

EL354 Series

Electrical Characteristics ($T_a=25^{\circ}\text{C}$ unless specified otherwise)

Input

Parameter	Symbol	Min.	Typ.*	Max.	Unit	Condition
Forward voltage	V_F	-	1.2	1.4	V	$I_F = \pm 20\text{mA}$
Reverse current	I_R	-	-	10	μA	$V_R = 4\text{V}$
Input capacitance	C_{in}	-	50	250	pF	$V = 0, f = 1\text{KHz}$

Output

Parameter	Symbol	Min.	Typ.*	Max.	Unit	Condition
Collector-Emitter dark current	I_{CEO}	-	-	100	nA	$V_{CE} = 20\text{V}, I_F = 0\text{mA}$
Collector-Emitter breakdown voltage	BV_{CEO}	80	-	-	V	$I_C = 0.1\text{mA}$
Emitter-Collector breakdown voltage	BV_{ECO}	6	-	-	V	$I_E = 0.01\text{mA}$

Transfer Characteristics ($T_a=25^{\circ}\text{C}$ unless specified otherwise)

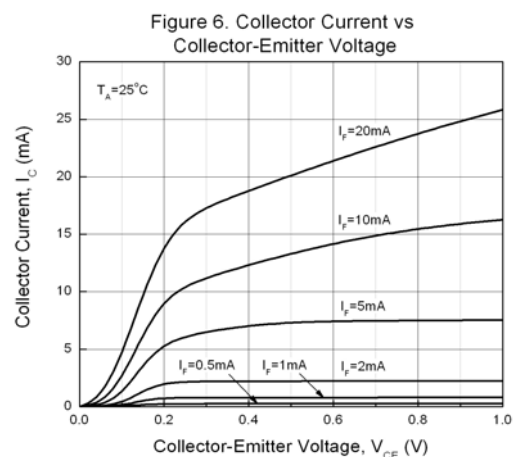
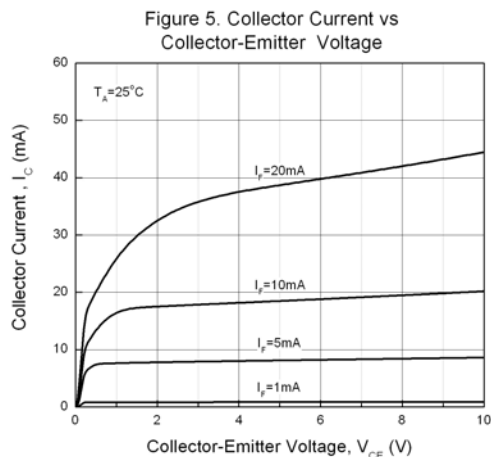
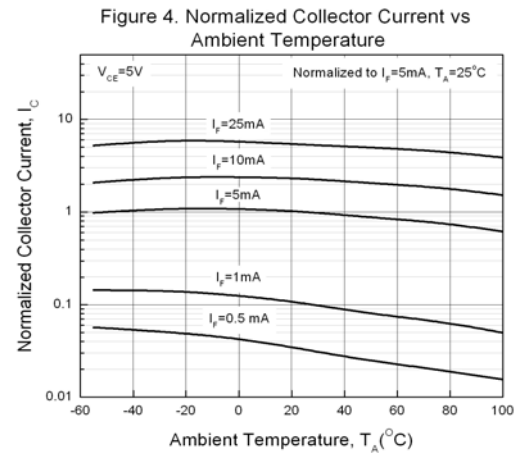
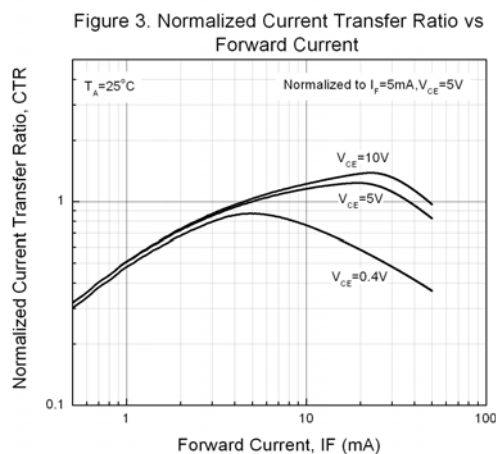
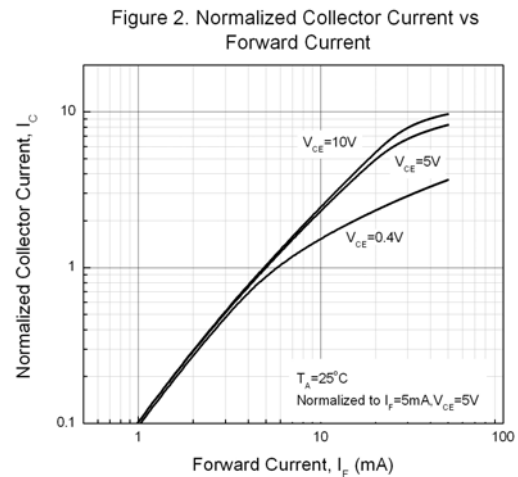
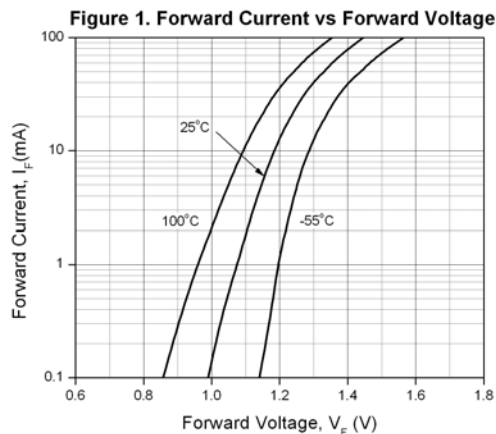
Parameter	Symbol	Min.	Typ.*	Max.	Unit	Condition
Current Transfer ratio	EL354	20	-	300	%	$I_F = \pm 1\text{mA}, V_{CE} = 5\text{V}$
	EL354A	50	-	150		
Collector-emitter saturation voltage	$V_{CE(sat)}$	-	0.1	0.2	V	$I_F = \pm 20\text{mA}, I_C = 1\text{mA}$
Isolation resistance	R_{IO}	5×10^{10}	10^{11}	-	Ω	$V_{IO} = 500\text{Vdc}, 40 \sim 60\% R.H$
Cut-off frequency	f_c	-	80	-	kHz	$V_{CE} = 5\text{V}, I_C = 2\text{mA}, R_L = 100\Omega, -3\text{dB}$
Floating capacitance	C_{IO}	-	0.6	1.0	pF	$V_{IO} = 0, f = 1\text{MHz}$
Rise time	T_r	-	6	18	μs	$V_{CE} = 2\text{V}, I_C = 2\text{mA}, R_L = 100\Omega$
Fall time	T_f	-	8	18	μs	

* Typical values at $T_a = 25^{\circ}\text{C}$

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EL354 Series

Typical Performance Curves



4 PIN SOP PHOTOTRANSISTOR AC INPUT PHOTOCOUPLER

EL354 Series

Figure 7. Collector Dark Current vs Ambient Temperature

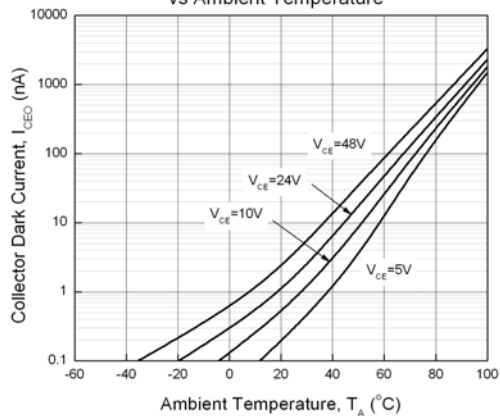


Figure 8. Switching Time vs Load Resistance

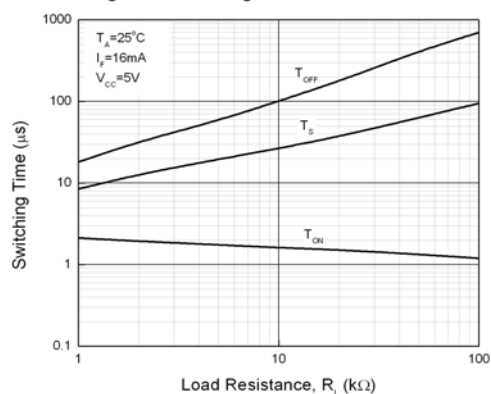


Figure 9. Collector-Emitter Saturation Voltage vs Ambient Temperature

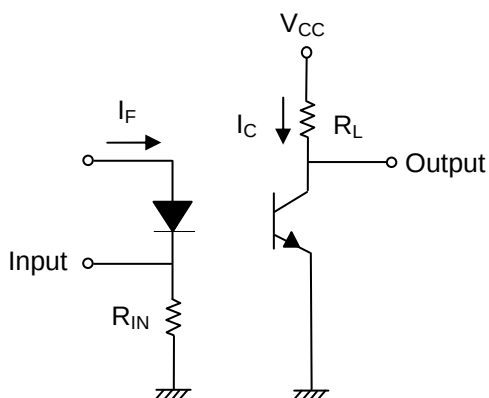
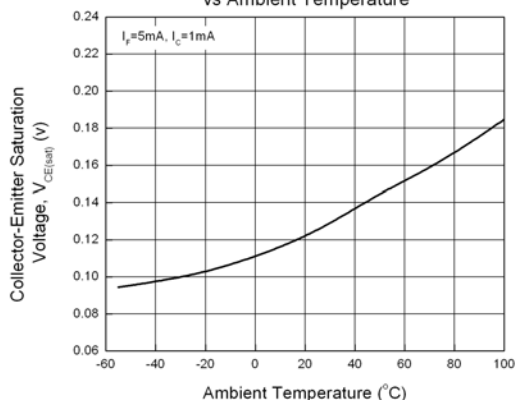


Figure 10. Switching Time Test Circuit & Waveforms

4 PIN SOP PHOTOTRANSISTOR AC INPUT PHOTOCOUPLER

EL354 Series

Order Information

Part Number

EL354(X)(Y)-V

Note

X = CTR Rank option (A or none)
Y = Tape and reel option (TA, TB, or none).
V = VDE safety option

Option	Description	Packing quantity
None	Standard SMD option	100 units per tube
-V	Standard SMD option + VDE	100 units per tube
(TA)	TA Tape & reel option	3000 units per reel
(TB)	TB Tape & reel option	3000 units per reel
(TA)-V	TA Tape & reel option + VDE	3000 units per reel
(TB)-V	TB Tape & reel option + VDE	3000 units per reel

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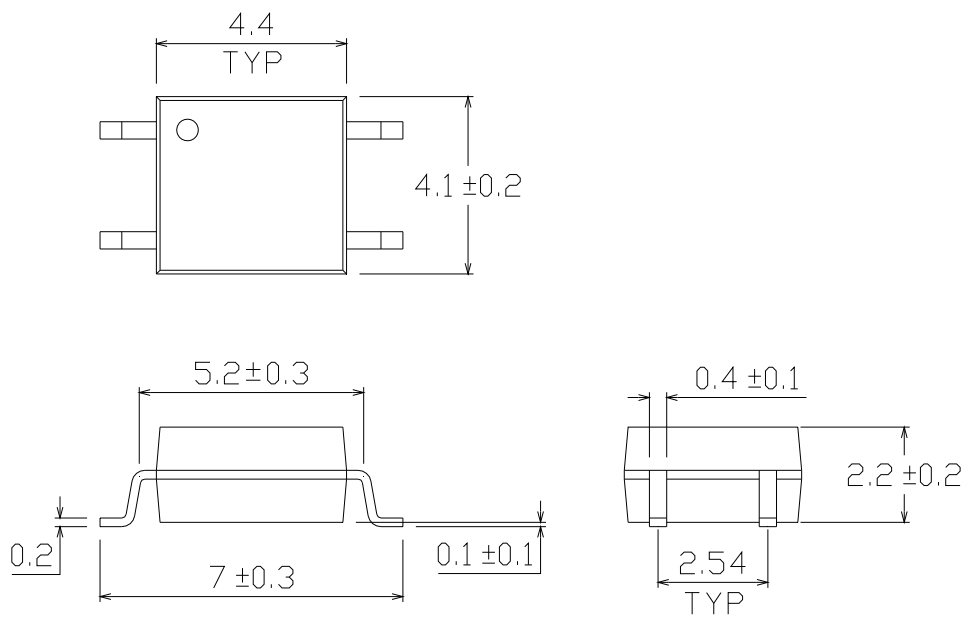
EL354 Series

Package Drawings

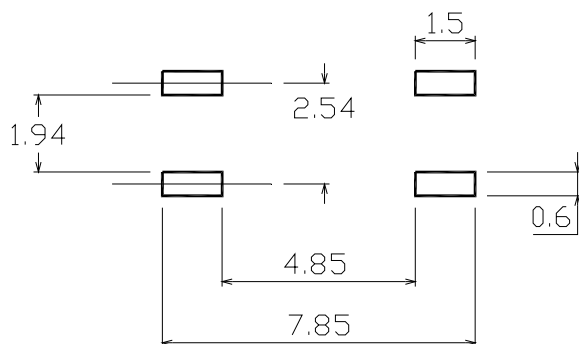
(Dimensions in mm)

Package Drawing

(Dimensions in mm)



Recommended pad layout for surface mount leadform



4 PIN SOP PHOTOTRANSISTOR AC INPUT PHOTOCOUPLER

EL354 Series

Device Marking



Notes

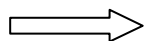
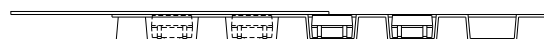
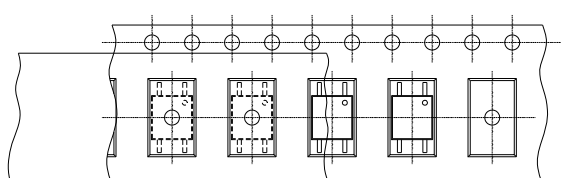
EL	denotes Everlight
354	denotes Device Number
R	denotes CTR Rank (A or none)
Y	denotes 1 digit Year code
WW	denotes 2 digit Week code
V	denotes VDE approved (optional)

4 PIN SOP PHOTOTRANSISTOR AC INPUT PHOTOCOUPLER

EL354 Series

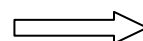
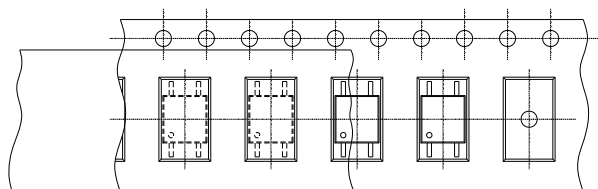
Tape & Reel Packing Specifications

Option TA



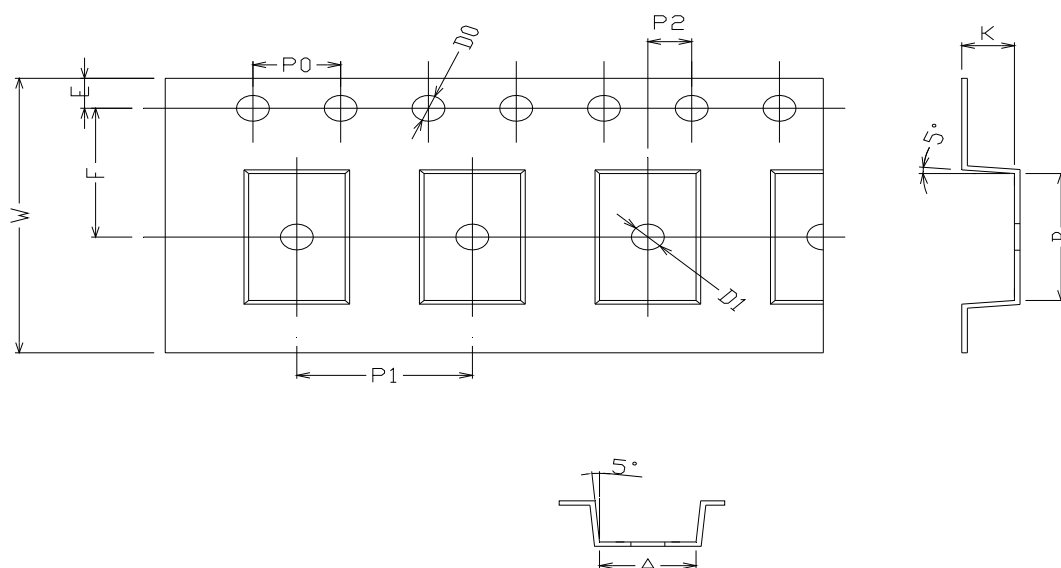
Direction of feed from reel

Option TB



Direction of feed from reel

Tape dimensions



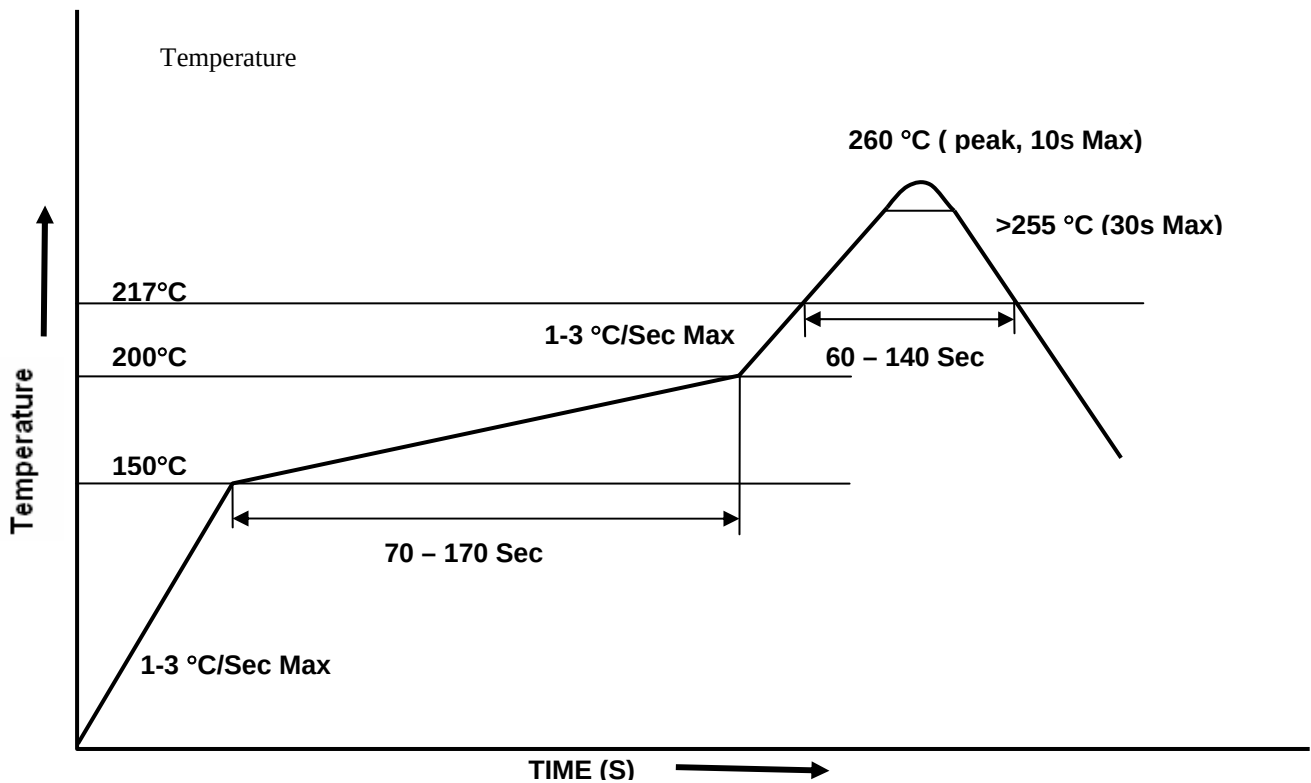
Dimension No.	A	B	Do	D1	E	F
Dimension (mm)	4.4 ± 0.1	7.4 ± 0.1	$1.5 + 0.1/-0$	1.5 ± 0.1	1.75 ± 0.1	7.5 ± 0.1

Dimension No.	Po	P1	P2	t	W	K
Dimension (mm)	4.0 ± 0.15	8.0 ± 0.1	2.0 ± 0.1	0.25 ± 0.03	16.0 ± 0.2	2.4 ± 0.1

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EL354 Series

Solder Reflow Temperature Profile



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EL354 Series

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