



## Description

The EL4xxA is solid state relays containing an AlGaAs infrared LEDs on the light emitting side (input side) optically coupled to a high voltage output detector circuit. The detector consists of a photovoltaic diode array and MOSFETs on the output side. The single channel configuration is equivalent to 1 form A EMR. It is packaged in a 4-pin package and in wide-lead spacing and SMD option.

## Features

- Normally open signal pole signal throw relay
- Low operating current
- 60 to 600V output withstand voltage
- Wide operating temperature range of -40°C to 85°C
- High input-output isolation voltage(Viso= 5,000Vrms)
- RoHS

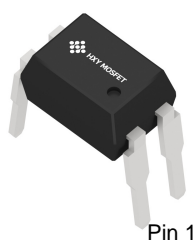
## Applications

- Measurement equipment
- Exchange equipment
- FA/OA equipment
- Security
- Industrial controls

## Package Marking and Ordering Information

Product ID	Pack	Qty(PCS)	Packaging
EL4xxA	DIP-4	100	Tube
EL4xxA	SMD-4	4000	Reel

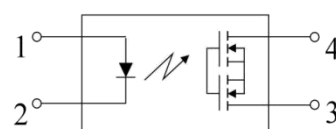
xx: From 06, 40, 60



**DIP-4**



**SMD-4**



Pin Configuration

1. AN
2. CA
3. D1
4. D2



## Maximum Ratings

Parameter		Symbol	Values		Unit
Input	Forward Current	I <sub>F</sub>	50		mA
	Reverse Voltage	V <sub>R</sub>	6		V
	Power Dissipation	P	75		MW
	Peak Forward Current (100μs pulse, 100Hz)	I <sub>FP</sub>	1		A
	Thermal Resistance Junction-Ambient	R <sub>thJ-A</sub>	325		°C/W
	Thermal Resistance Junction-Case	R <sub>thJ-C</sub>	200		°C/W
Output	Break Down Voltage	V <sub>L</sub>	EL406A	60	V
			EL440A	400	
			EL460A	600	
	Continuous Load Current	I <sub>L</sub>	EL406A	550	mA
			EL440A	120	
			EL460A	50	
	Pulse Load Current <sup>*(1)</sup>	I <sub>LPeak</sub>	EL406A	1.2	A
			EL440A	0.3	
			EL460A	0.15	
Power Dissipation		P <sub>out</sub>	500		mW
Operating temperature range		T <sub>op</sub>	−40 ~ 85		°C
Storage temperature range		T <sub>stg</sub>	−40 ~ 125		°C
Total Power consumption		P(W)	550		mW
Isolation Voltage <sup>(2)</sup>		V <sub>ISO</sub>	5000		Vrms
Soldering Temperature <sup>(3)</sup>		T <sub>SOL</sub>	260		°C

Notes:

(1). A connection: 100ms (1 shot),  $V_L$  = DC

(2)AC for 1 minute, R.H.= 40 ~ 60% R.H. In this test, pins 1, 3 are shorted together, and pins 4, 6 are shorted together.

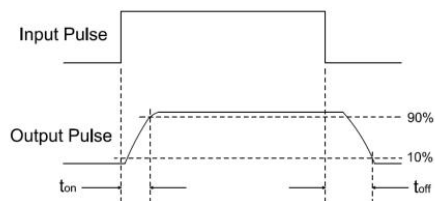
(3).For 10 seconds



Electronic Optical Characteristics (TA = 25°C)

Parameter			Symbol	Min.	Typ.	Max.	Unit	Condition
Input	Forward Voltage		V <sub>F</sub>	-	1.2	1.5	V	I <sub>F</sub> =10mA
	Reverse Current		I <sub>R</sub>	-	-	1	μA	V <sub>R</sub> =5V
Output	Off State leakage Current		I <sub>leak</sub>	-	-	1	μA	I <sub>F</sub> =0mA, V <sub>L</sub> =Max
	On Resistance	EL406A	R <sub>d(ON)</sub>	-	0.7	2.5	Ω	I <sub>F</sub> =10mA, I <sub>L</sub> = Max. t = 1s
		EL440A		-	20	30		
		EL460A		-	40	70		
	Output Capacitance	EL406A	C <sub>out</sub>	-	80	-	pF	V <sub>L</sub> = 0V, f = 1MHz
		EL440A		-	45	-		
		EL460A		-	30	-		
Transfer Characteristics		LED turn on Current	I <sub>F(on)</sub>		2.5	5	mA	IL = Max.
		LED turn off current	I <sub>F(off)</sub>	0.4	2.5	-	mA	IL = Max.
Turn On Time		EL406A	T <sub>ON</sub>	-	1.4	3	ms	IF = 10 mA, IL = Max. RL = 200 Ω ,
		EL440A		-	0.4	3		
		EL460A		-	1.4	3		
Turn Off Time		EL406A	T <sub>OFF</sub>	-	0.05	0.5		
		EL440A		-	0.05	0.5		
		EL460A		-	0.05	0.5		

Turn on/Turn off Time





## Characteristics Curves

Fig.1 LED Dropout Voltage vs. Ambient Temperature

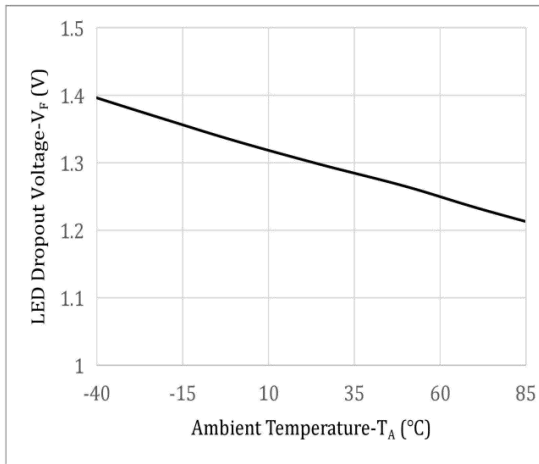


Fig.2 Output Current vs. Output Voltage

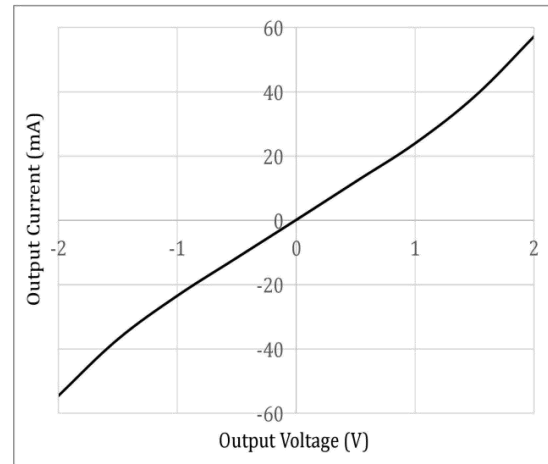


Fig.3 On Resistance vs. Ambient

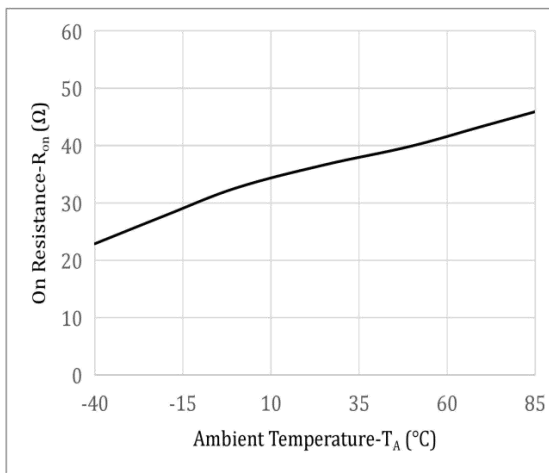


Fig.4 Load Current vs. Ambient Temperature

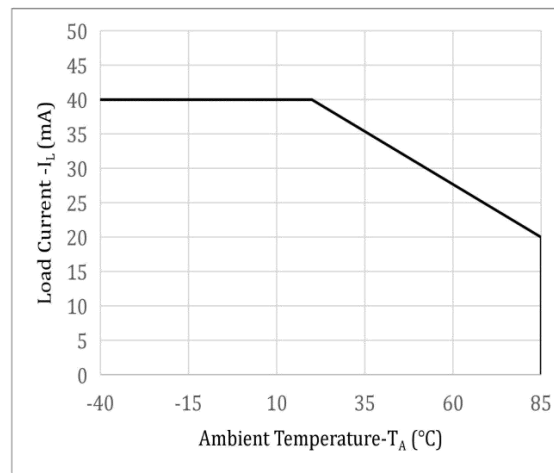


Fig.5 LED Operate Current vs. Ambient Temperature

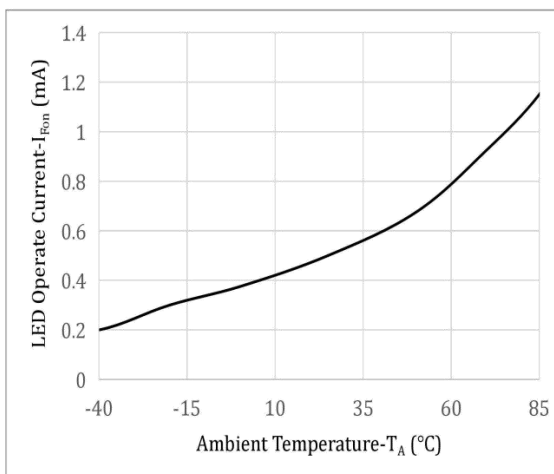


Fig.6 LED Turn Off Current vs. Ambient

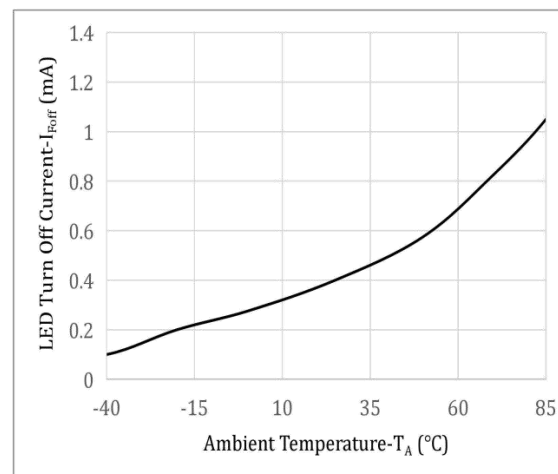




Fig.7 Turn On Time vs. Ambient Temperature

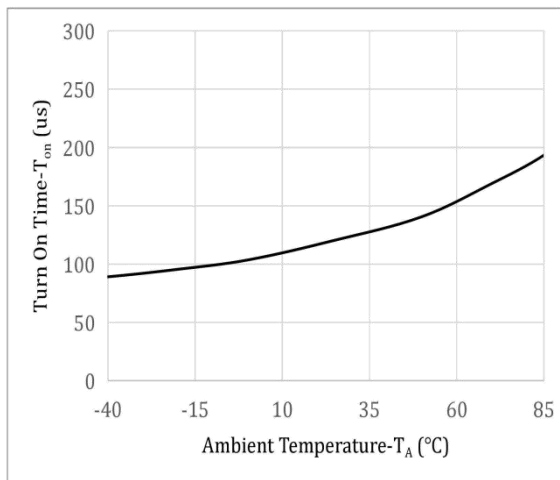


Fig.8 Turn Off Time vs. Ambient Temperature

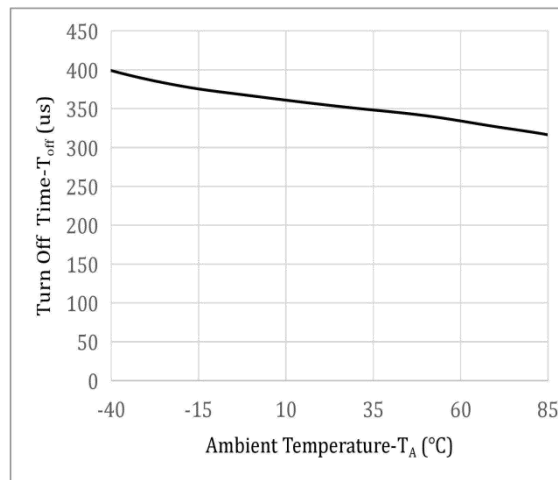


Fig.9 Turn On Time vs. LED Forward Current

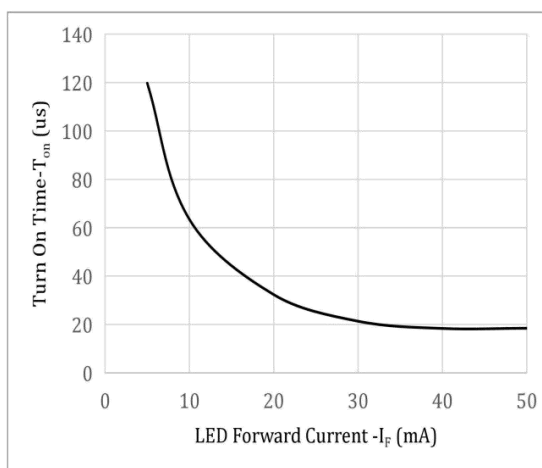


Fig.10 Turn Off Time vs. LED Forward

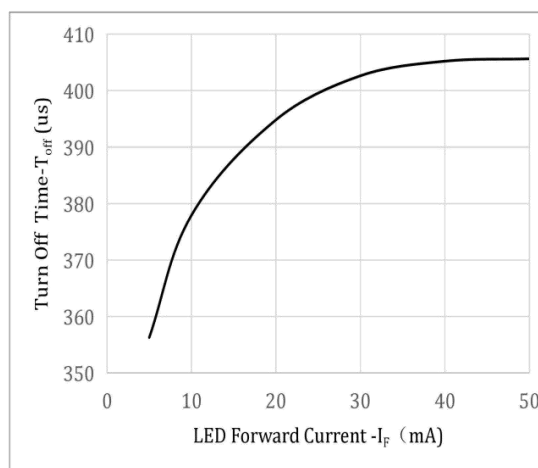
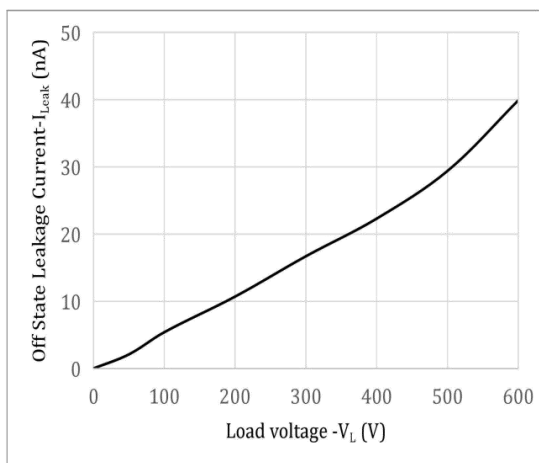


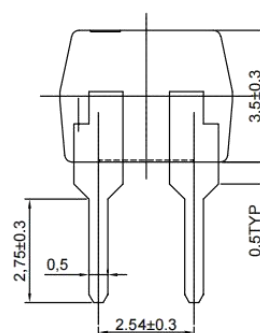
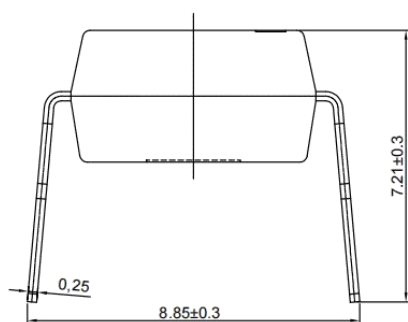
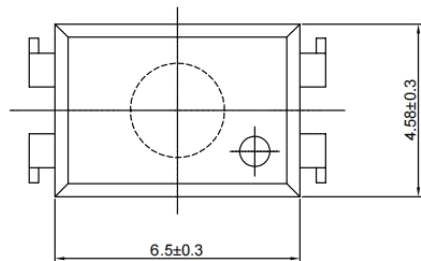
Fig.11 Off State Leakage Current vs Load Voltage





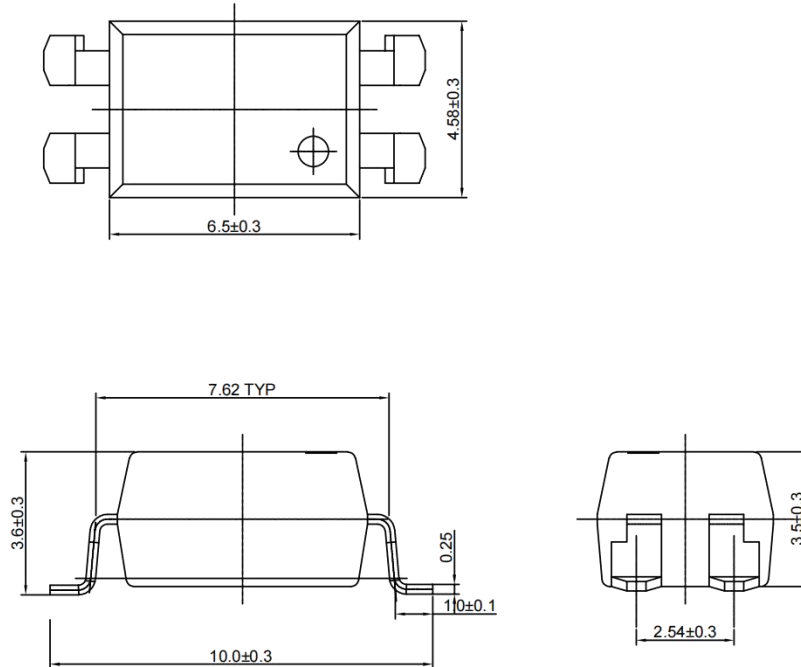
## Outline Dimension

DIP-4 Type:





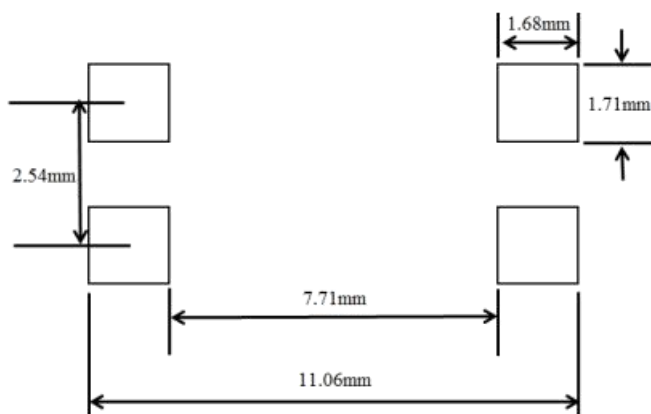
### SMD-4 Type:



Unit: mm

Tolerance:  $\pm 0.1$ mm

### Recommended solder pad Design



Unit: mm

Tolerance:  $\pm 0.1$ mm

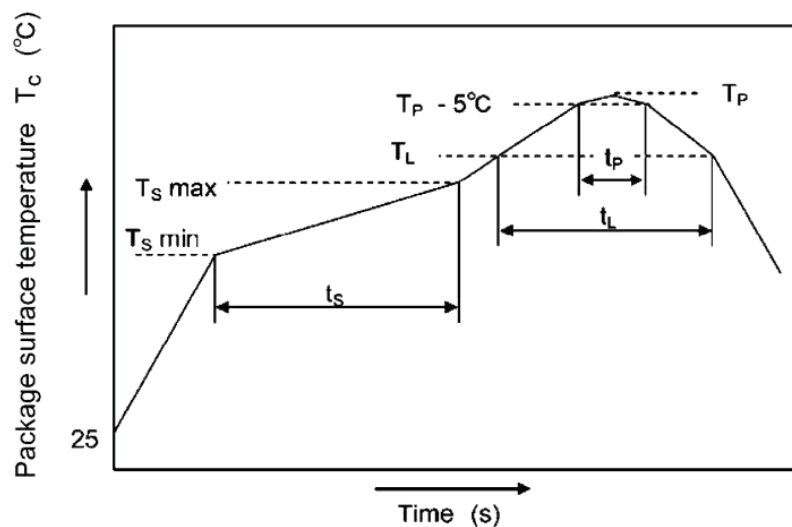


## Temperature Profile Of Soldering

### 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)

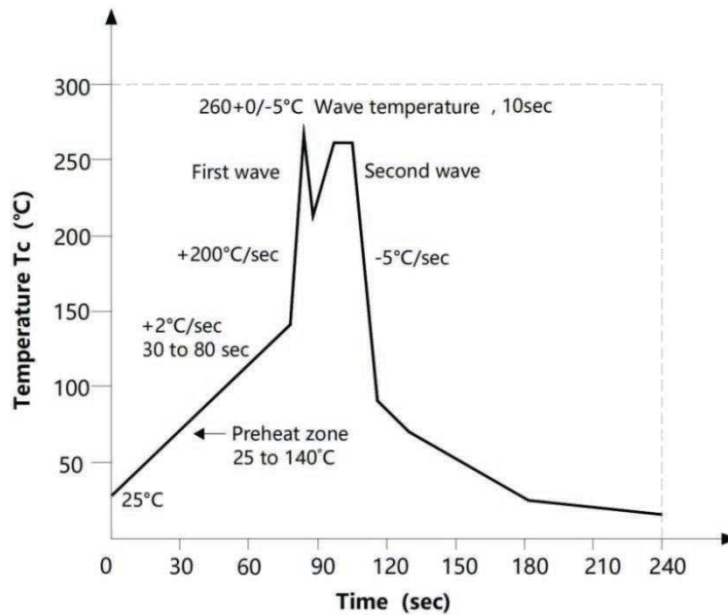
One time soldering is recommended within the condition.

Temperature:  $260 \pm 0/-5^{\circ}\text{C}$ .

Time: 10 sec.

Preheat temperature: 25 to  $140^{\circ}\text{C}$ .

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:  $380 \pm 0/-5^{\circ}\text{C}$

Time: 3 sec max.



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