Description

The ELM4xxA 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. The devices in a 4-pin small outline SOP package.

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= 3,750Vrms)
- RoHS

Applications

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

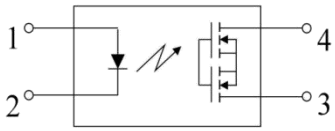
Package Marking and Ordering Information

Product ID	Pack	Qty(PCS)	Packaging
ELM4xxA	SOP-4	6000	Reel

xx: From 40, 60

Pin 1

SOP-4



Pin Configuration

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

Maximum Ratings

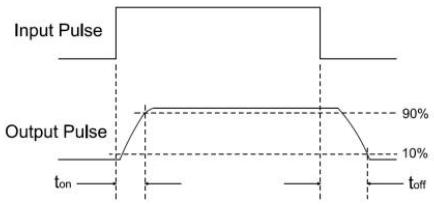
Parameter		Symbol	Values		Unit
Input	Forward Current	I_F	50		mA
	Reverse Voltage	V_R	6		V
	Power Dissipation	P	75		MW
	Peak Forward Current (100μs pulse, 100Hz)	I_{FP}	1		A
	Thermal Resistance Junction-Ambient	R_{thJ-A}	325		°C/W
	Thermal Resistance Junction-Case	R_{thJ-C}	200		°C/W
Output	Break Down Voltage	V_L	ELM440A	400	V
			ELM460A	600	
	Continuous Load Current	I_L	ELM440A	120	mA
			ELM460A	50	
	Pulse Load Current*(1)	I_{LPeak}	ELM440A	0.3	A
			ELM460A	0.15	
Power Dissipation		P_{out}	500		mW
Operating temperature range		T_{op}	–40 ~ 85		°C
Storage temperature range		T_{stg}	–40 ~ 125		°C
Total Power consumption		P(W)	550		mW
Isolation Voltage(2)		V_{ISO}	5000		Vrms
Soldering Temperature(3)		T_{SOL}	260		°C

Notes:
(1). A connection: 100ms (1 shot), VL = 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_F	-	1.2	1.5	V	I_F=10mA
	Reverse Current		I_R	-	-	1	μA	V_R=5V
Output	Off State leakage Current		I_{leak}	-	-	1	μA	I_F=0mA, V_L=Max
	On Resistance	ELM440A	$R_{d(ON)}$	-	20	30	Ω	I_F=10mA,I_L= Max. t = 1s
		ELM460A		-	40	70		
	Output Capacitance	ELM440A	C_{out}	-	45	-	pF	VL = 0V, f = 1MHz
		ELM460A		-	30	-		
Transfer Characteristics		LED turn on Current	$IF_{(on)}$		2.5	5	mA	IL = Max.
		LED turn off current	$IF_{(off)}$	0.4	2.5	-	mA	IL = Max.
Turn On Time		ELM440A	T_{ON}	-	0.4	3	ms	IF = 10 mA, IL = Max. RL = 200Ω,
		ELM460A		-	1.4	3		
Turn Off Time		ELM440A	T_{OFF}	-	0.05	0.5		
		ELM460A		-	0.05	0.5		

Turn on/Turn off Time



Characteristics Curves

Fig.1 LED Dropout Voltage vs. Ambient Temperature

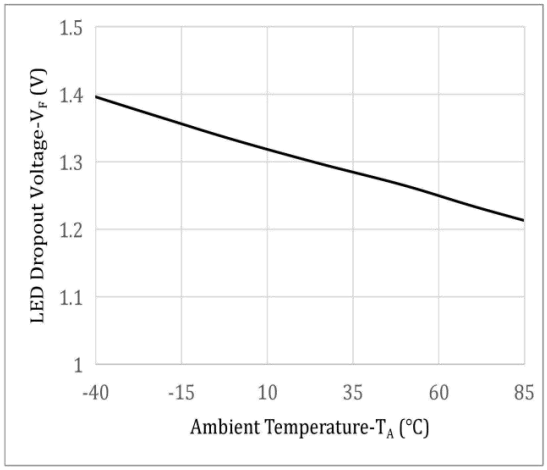


Fig.2 Output Current vs. Output Voltage

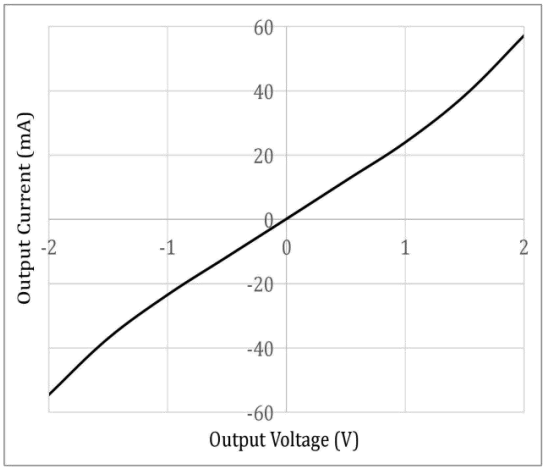


Fig.3 On Resistance vs. Ambient

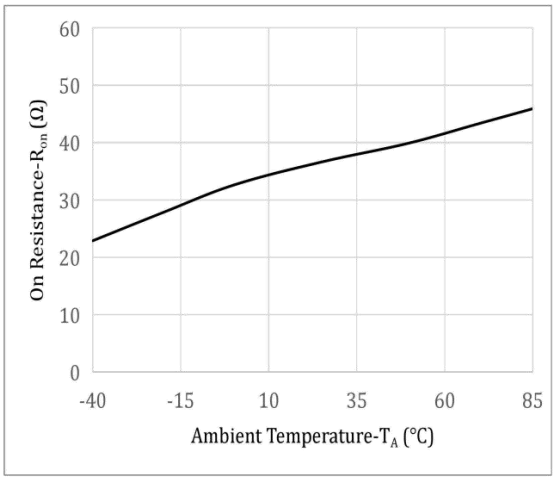


Fig.4 Load Current vs. Ambient Temperature

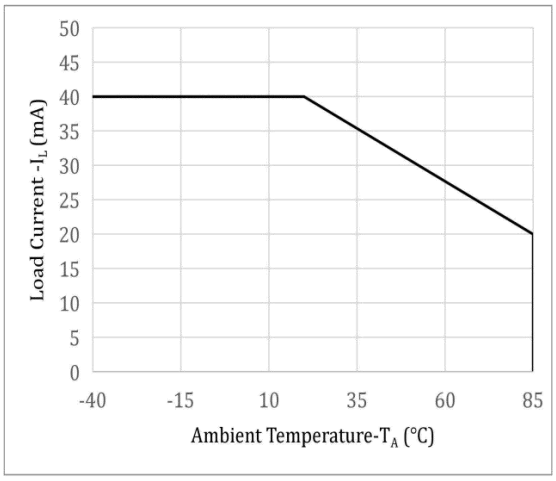


Fig.5 LED Operate Current vs. Ambient Temperature

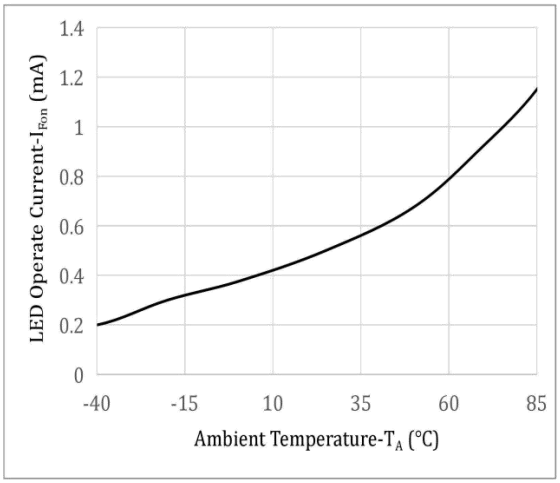


Fig.6 LED Turn Off Current vs. Ambient

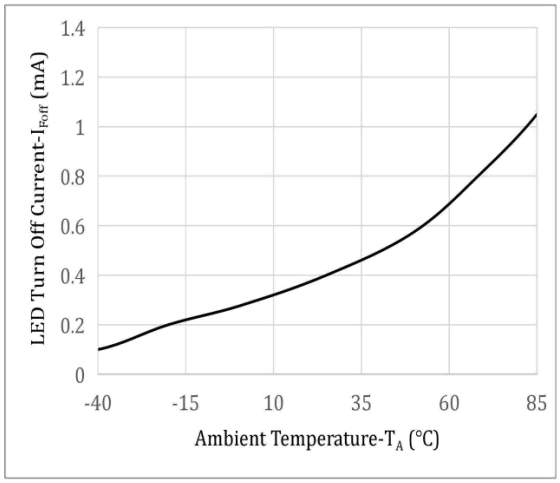


Fig.7 Turn On Time vs. Ambient Temperature

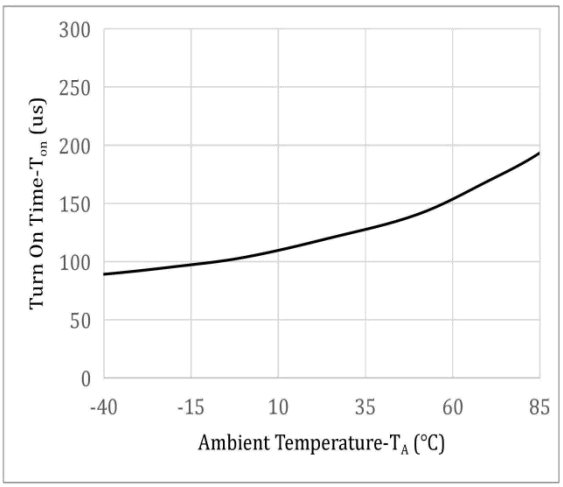


Fig.8 Turn Off Time vs. Ambient Temperature

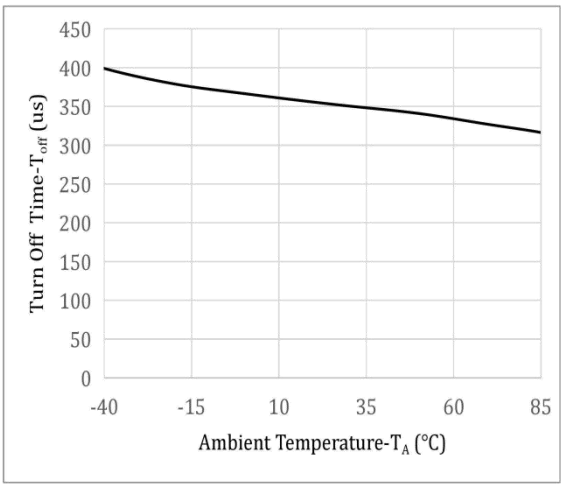


Fig.9 Turn On Time vs. LED Forward Current

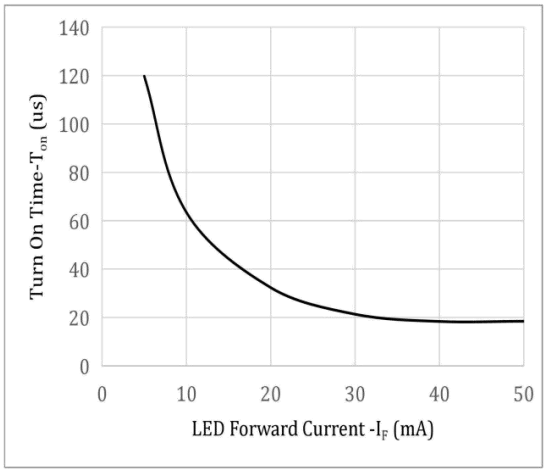


Fig.10 Turn Off Time vs. LED Forward

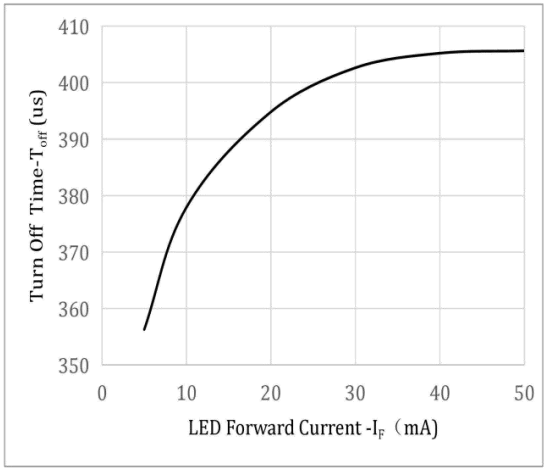
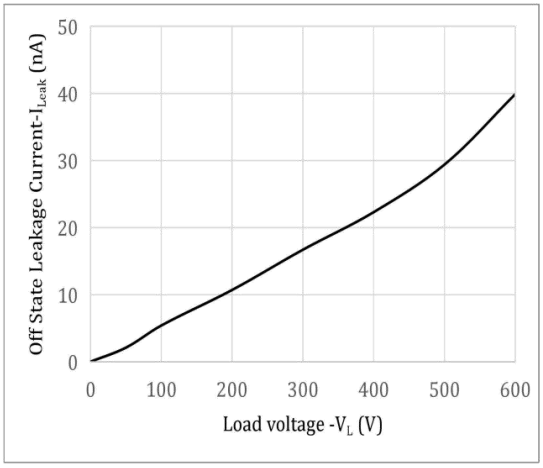
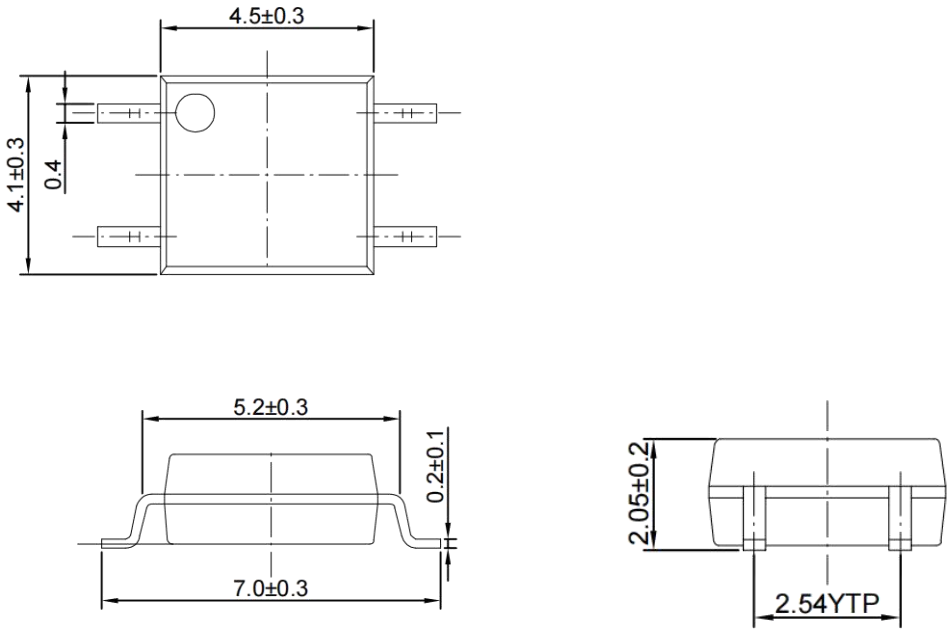


Fig.11 Off State Leakage Current vs Load Voltage



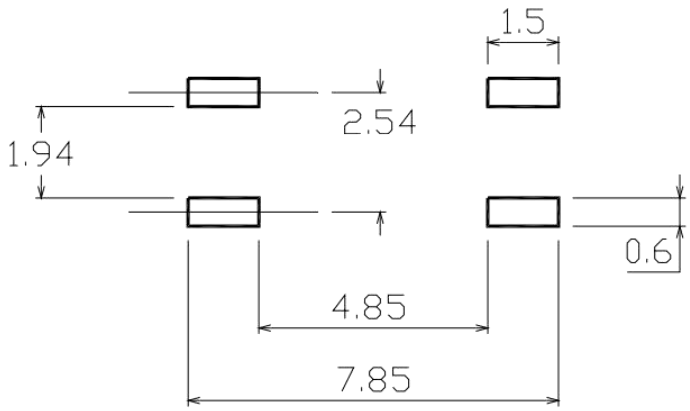
Outline Dimension

SOP-4 Type:



Unit: mm
Tolerance: ±0.1mm

Recommended solder pad Design



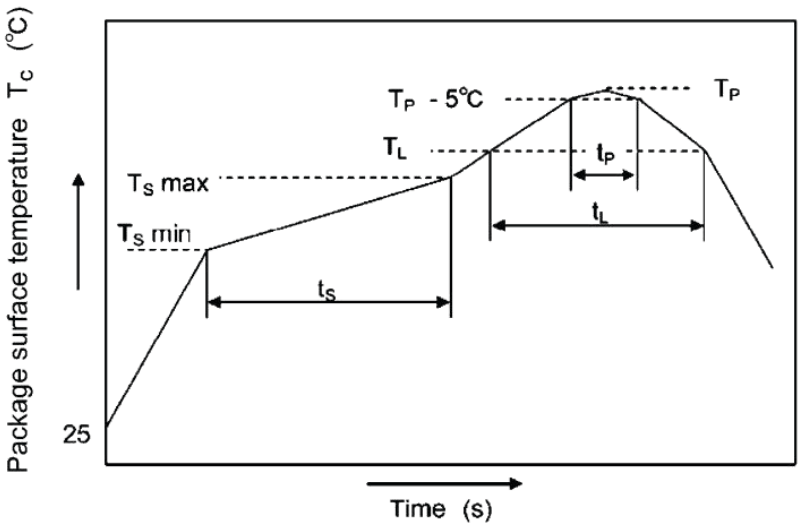
Unit: mm
Tolerance: ±0.1mm

Temperature Profile Of Soldering

1. IR Reflow soldering

(JEDEC-STD-020D compliant)

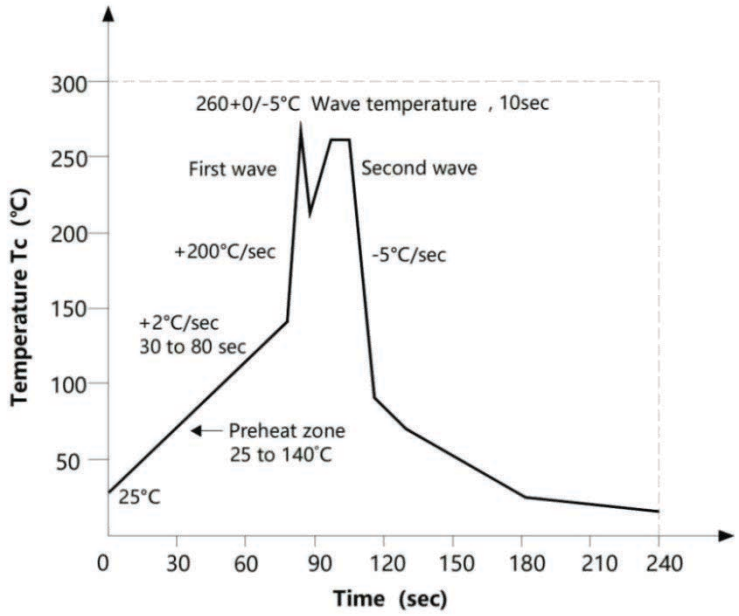
Profile item	Conditon
Preheat	
-Temperature Min (TSmin)	150°C
-Temperature Max (TSmax)	200°C
-Time (min to max) (ts)	90±30 sec
Soldering zone	
-Temperature (TL)	217°C
-Time (t_L)	60-150 sec
Peak Temperature (TP)	260°C
-Time (TP-5℃to TP) (ts)	30 sec
Ramp-up rate	3°C / sec max
Ramp-down rate	3~6°C/ sec



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+0/-5˚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+0/-5˚C
Time: 3 sec max.

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