

Optocoupler

1. Description

The SL851 consists of a phototransistor optically coupled to a GaAs infrared light-emitting diode, packaged in a silicon planar optocoupler. Quadrangular pin package, two forms (DIP,SMD).

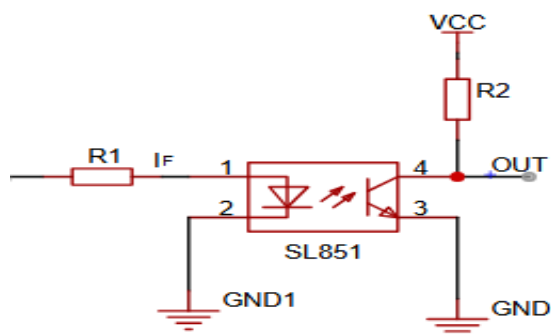
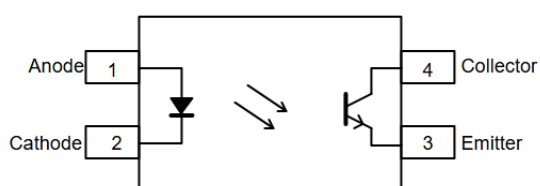
2. Features

- Current Transition Ratio (CTR) Range :50%~600% ($I_F=5\text{mA}$, $V_{CE}=5\text{V}$)
- Input-Output Isolation Voltage ($V_{ISO}=5000\text{Vrms}$)
- Collector-Emitter Breakdown Voltage $BV_{CEO} \geq 350\text{V}$

3. Applications

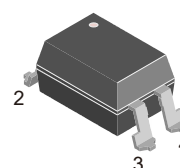
- Switching Power Supply, Motor Control
- Industrial Controls, Measuring Instruments
- Office equipment, such as photocopiers
- Household appliances, such as air conditioners, fans, water heaters, etc.

4. Structure schematic and package

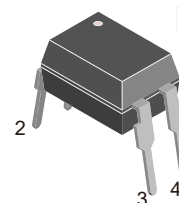


5. Truth table

LED	VO
ON	LOW
OFF	HIGH



SL851S SMD-4



SL851D DIP-4

6. Limit parameters($T_a=25^{\circ}\text{C}$)

Parameters		Symbol	Rating	Unit
Input	Forward current	I_F	60	mA
	Reverse voltage	V_R	6	V
	Power dissipation	P_D	100	mW
	Rated value reduction factor (above $T_a = 100^{\circ}\text{C}$)	P_{DD}	2.9	mW/ $^{\circ}\text{C}$
	Thermal resistance (junction-ambient)	R_{thJ-A}	325	$^{\circ}\text{C/W}$
	Thermal resistance (junction-case)	R_{thJ-C}	200	$^{\circ}\text{C/W}$
Output	Collector power dissipation	P_C	150	mW
	Collector current	I_C	50	mA
	Collector-emitter voltage	V_{CEO}	350	V
	Emitter-collector voltage	V_{ECO}	7	V
Total power dissipation		P_{tot}	200	mW
Isolated voltage		V_{iso}	5000	V_{rms}
Operating temperature		T_{opr}	-55~+100	$^{\circ}\text{C}$
Storage temperature		T_{stg}	-55~+125	$^{\circ}\text{C}$
Welding temperature		T_{sol}	260	$^{\circ}\text{C}$

7. Product Characterization Parameters ($T_a=25^{\circ}\text{C}$)

Parameters		Symbol	Conditions	Min	Typ	Max	Unit
Input	Forward voltage	V_F	$I_F=10\text{mA}$	-	1.2	1.4	V
	Reverse voltage	I_R	$V_R=5\text{V}$	-	-	10	μA
	Terminal capacitance	C_t	$V=0, f=1\text{kHz}$	-	30	250	pF
Output	Collector dark current	I_{CEO}	$V_{CE}=200\text{V}$	-	-	100	nA
	Collector-emitter breakdown voltage	BV_{CEO}	$I_C=0.1\text{mA}, I_F=0$	350	-	-	V
	Emitter-collector breakdown voltage	BV_{ECO}	$I_E=0.1\text{mA}, I_F=0$	7	-	-	V
Transmission Characteristics	Current conversion ratio	CTR*	$I_F=5\text{mA}, V_{CE}=5\text{V}$	50	-	600	%
	Collector-emitter saturation voltage drop	$V_{CE(sat)}$	$I_F=20\text{mA}, I_C=1\text{mA}$	-	-	0.4	V
	Isolation resistor	R_{ISO}	DC500V, 40~60%R.H.	1×10^{11}	-	-	Ω
	Isolation capacitors	C_f	$V=0, f=1\text{MHz}$	-	0.6	-	pF
	Cut-off frequency	F_c	$V_{CE}=5\text{V}, I_C=2\text{mA}, R_L=100\Omega, -3\text{dB}$	-	80	-	kHz
	Rising time	T_r	$V_{CE}=2\text{V}, I_C=2\text{mA}, R_L=100\Omega$	-	4	18	μs
	Descent time	T_f	$V_{CE}=2\text{V}, I_C=2\text{mA}, R_L=100\Omega$	-	5	18	μs

* $CTR=I_C/I_F \times 100\%$

8. Typical Photoelectric Characteristic Curve

Fig.1 Dark current vs. ambient temperature

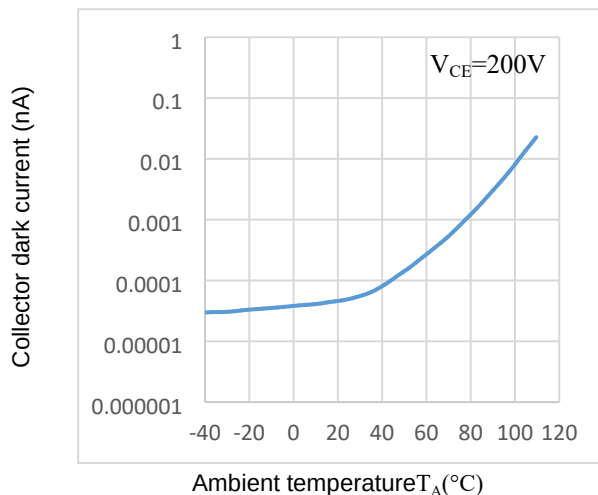


Fig.2 Saturation pressure drop vs. ambient temperature

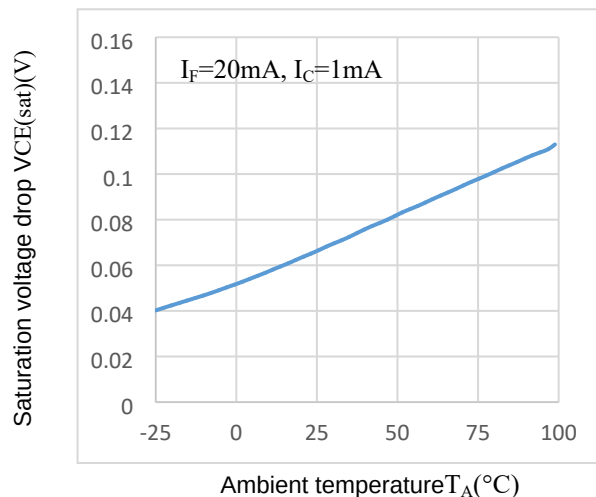


Fig.3 Relative current transfer ratio CTR vs ambient temperature

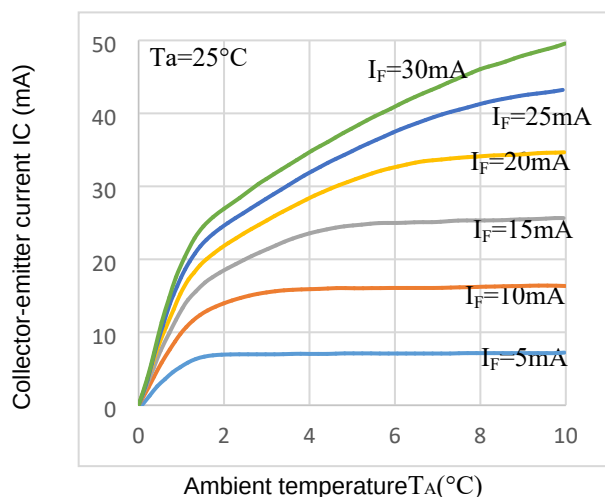


Fig.4 Collector-emitter current vs. collector-emitter voltage

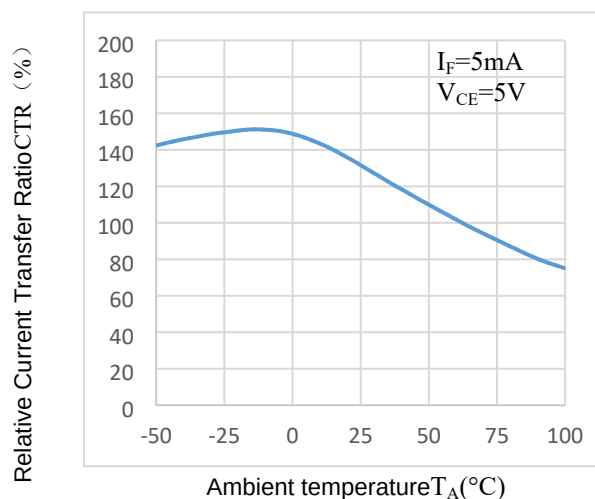


Fig.5 Relative current transfer ratio vs forward current

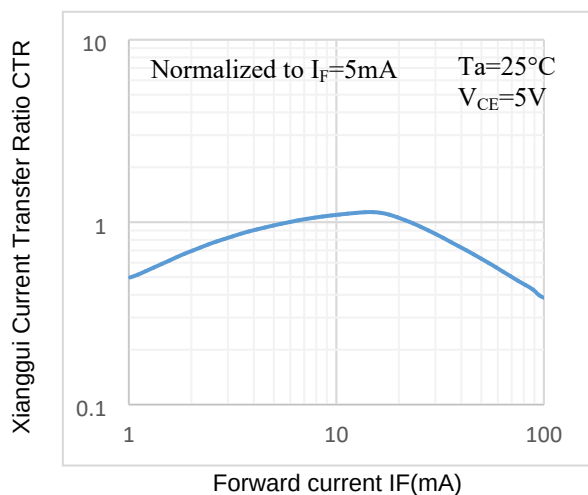


Fig.6 Forward current vs. forward voltage

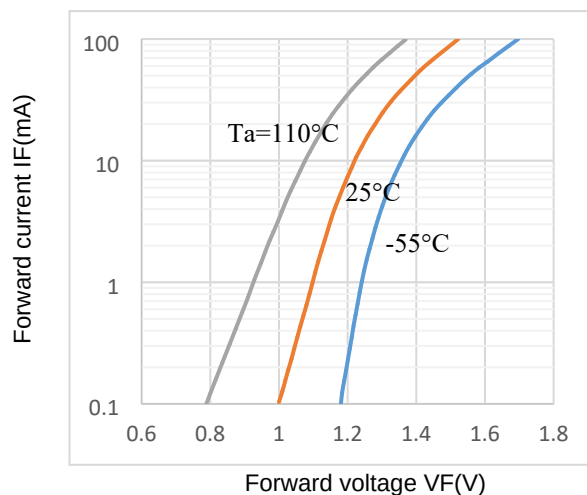


Fig.7 Response time vs. load resistance

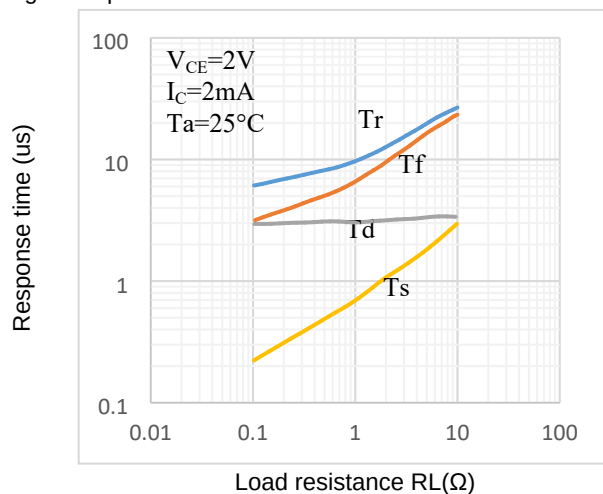


Fig.8 Saturation voltage drop vs forward current

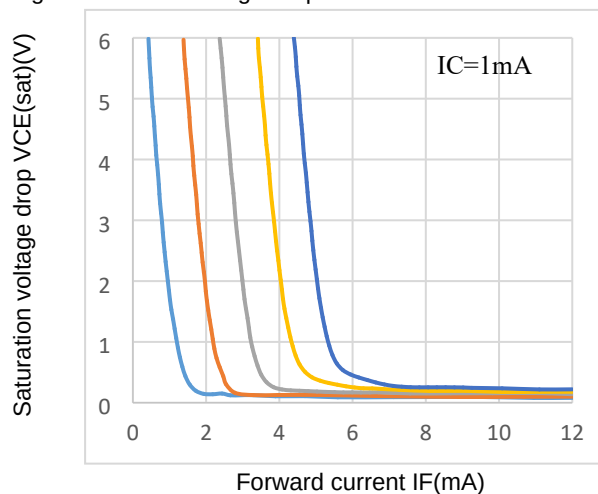
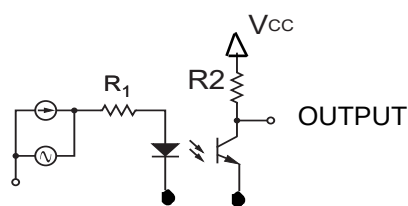
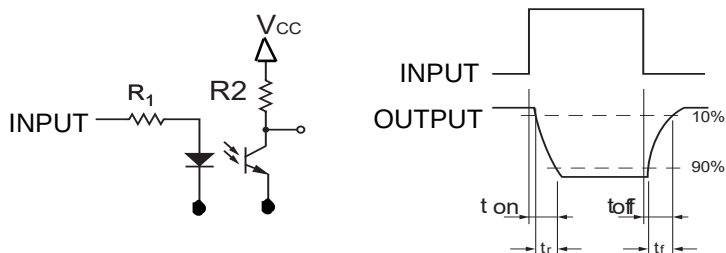


Fig.9 Test Circuit

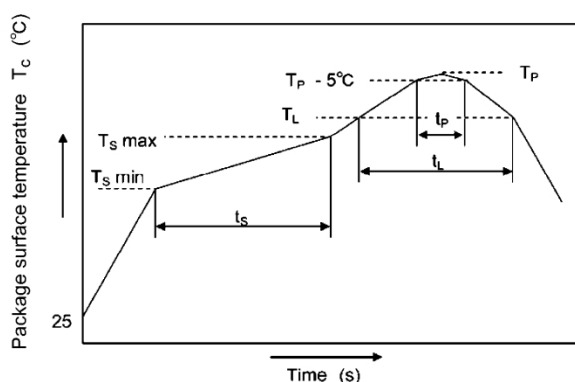


Response Frequency Test



Response Time Test

9. Reflow temperature profile



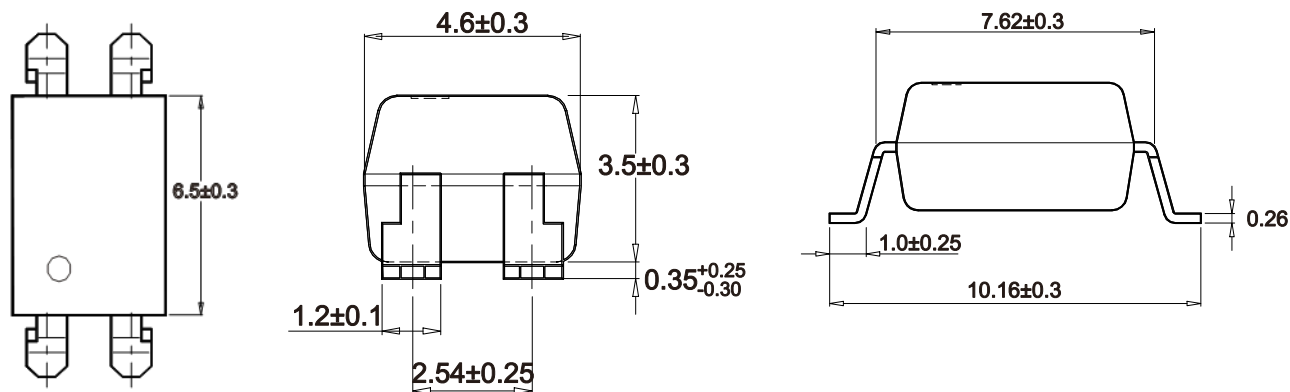
	Symbol	Min	Max	Unit
Preheat temperature	T_s	150	200	$^\circ C$
Preheat time	t_s	60	120	s
Ramp-up rate(T_L to T_P)			3	$^\circ C/s$
Liquidus temperature	T_L		217	$^\circ C$
Time above T_L	t_L	60	150	s
Peak temperature	T_P		260	$^\circ C$
Time during which T_C is between(T_P-5)and T_P	t_p		30	s
Ramp-down rate(T_P to T_L)			6	$^\circ C/s$

Note: Manual soldering iron welding temperature requirements: 360 ± 5 , time 3s

10. Overall dimensions

Unit: mm

SMD-4



DIP-4

