High Speed-10 MBit/s Logic Gate Optocouplers

1.Description

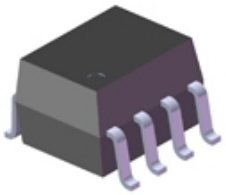
The SL0601 optocouplers consists of an 850nm AlGaAS LED,optically coupled to a very high speedintegrated photo−detector logic gate that quickly outputs.This device is housed in an 8-pin standard package, conforming to the standard package outline.

2.Features

- Very high speed−10 MBit/s
- High isolation voltage between input and output(Viso=3750Vrms)
- Range of working temperature：-40°C ～85°C
- Logic Gate Output
- Strobable output

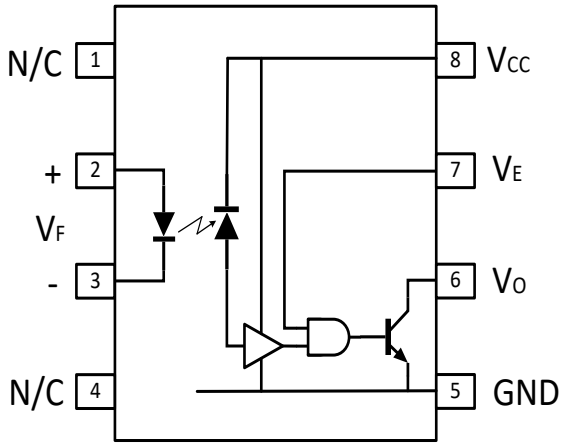
3.Applications

- Ground loop elimination
- LSTTL to TTL,LSTTL or 5-volt CMOS
- Line Receiver, Data Transmission
- Data Multiplexing
- Switching Power Supplies
- Pulse Transformer Replacement
- Computer−peripheral Interface



SOP-8

4.Structural schematics and packaging



TRUTH TABLE (Positive Logic)		
Input	Enable	Output
H	H	L
L	H	H
H	L	H
L	L	H
H	NC	L
L	NC	H

5.Absolute Maximum Ratings (Unless otherwise specified,T_A= 25)

Exceeding the absolute maximum ratings may damage the device. It is recommended that the device not operate beyond the specified operating conditions, as this may affect the device's functionality. Additionally, prolonged operation beyond the recommended operating conditions may impact the device's reliability.

Symbol	Parameter	Value	Units
T_{STG}	Storage temperature	-55 to +125	℃
T_{OPR}	Operating temperature	-40 to +85	℃
T_{SOL}	Soldering temperature	260 for 10 sec	℃
EMITTER			
I_F	Forward input current	50	mA
V_E	Enable input voltage.Not to exceed V_{cc} by more than 500 mV	5.5	V
V_R	Reverse input voltage	5.0	V
P_I	Power dissipation	100	mW
DETECTOR			
V_{CC} (1 minute max)	Supply voltage	7.0	V
I_O	Output current	50	mA
V_O	Output Voltage	7.0	V
P_O	Collector output power dissipation	85	mW

6.Recommended operating conditions

The recommended operating conditions table specifies the recommended operating conditions to ensure optimal performance in accordance with the datasheet specifications. It is not advisable to exceed these or design to absolute maximum ratings.

Symbol	Parameter	Min.	Max.	Unit
I_{FL}	Input current, low level	0	250	μA
I_{FH}	Input current, high level	6.3	15	mA
V_{CC}	Supply voltage, output	4.5	5.5	V
V_{EL}	Enable voltage, low level	0	0.8	V
V_{EH}	Enable voltage, high level	2.0	V_{CC}	V
T_A	Operating temperature	-40	+85	℃

7.Electrical optical characteristics at Ta=25°C

Parameter		Symbol	Conditions	Min.	Type	Max.	Unit
Input	Forwrward voltage	V_F	I_F=10mA	-	1.33	1.75	V
	Reverse breakdown voltage	B_{VR}	I_R=10μA	5	20	45	V
	Input capacitance	C_{IN}	V=0,f=1kHz	-	70	-	pF
	Temperature coefficient of forward voltage	$\Delta V_F/\Delta T_A$	I_F=10mA	-	-1.4	-	mV/°C
Output	High level supply current	I_{CCH}	V_{CC}=5.5V,I_F=0mA，VE=0.5V	-	6.5	10	mA
	Low level supply current	I_{CCL}	V_{CC}=5.5V,I_F=10mA	-	9	13	mA
	Low level enable current	I_{EL}	VCC=5.5V,VE=0.5V		-0.8	-1.6	mA
	High level enable current	I_{EH}	VCC=5.5V,VE=2.0V		-0.6	-1.6	mA
	High level enable voltage	V_{EH}	V_{CC}=5.5V,I_F=10mA	2.0			V
	Low level enable voltage	V_{EL}	V_{CC}=5.5V,I_F=10mA(1)			0.8	V
Transfer characteristics	High level output current	I_{OH}	V_{CC}=5.5V V_O=5.5V I_F= 250μA，VE=2V	-	-	100	μA
	Low level output voltage	V_{OL}	V_{CC}=5.5V I_F=5mA I_{CL}=13mA,VE=2V	-	0.35	0.6	V
	Input threshold current	I_{FT}	V_{CC}=5.5V V_O=0.6V I_{OL}=13mA,VE=2V	-	3	5	mA
Isolation voltage		V_{ISO}	R_H<50% T_A=25℃ I_{I-O}≤50μA	3750			V_{RMS}
Isolation resistance		R_{I-O}	V_{I-O}=500V	10^{12}			Ω
Isolation capacitor		C_{I-O}	f=1MHz		0.6		pF

7.1 Switching characteristics

(T_A = −40°C to +85°C, V_{CC} = 5 V, I_F = 7.5 mA unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Type	Max.	Unit
Propagation delay time to output high level	T_{PLH}	C_L=15pF R_L=350Ω T_A=25°C (Fig. 12)	20	41	75	ns
Propagation delay time to output low level	T_{PHL}		25	50	75	ns
Pulse width distortion	$\|T_{PHL}-T_{PLH}\|$		-	5	35	ns
Output rise time(10%-90%)	t_r		-	30	-	ns
Output fall time(90−10%)	t_f		-	10	-	ns
Enable propagation delay time to output high level	t_{ELH}	IF=7.5mA, VEH=3.5V, RL=350Ω, CL=15pF (Fig. 13)		15		ns
Enable propagation delay time to output low level	t_{EHL}			40		ns
Common mode transient immunity (at output high level)	$\|CM_H\|$	T_A=25°C,I_F=0mA $\|V_{CM}\|$=50V(Peak) V_{OH}=2.0V,R_L=350Ω(Fig. 14)	5000	10000	-	V/μs
Common mode transient immunity (at output low level)	$\|CM_L\|$	I_F=7.5mA,V_{OL}=0.8V R_L=350Ω,T_A=25℃(Fig. 14)	5000	10000	-	V/μs

8.Characteristic curves

Fig.1 Low Level Voltage vs. Temperature

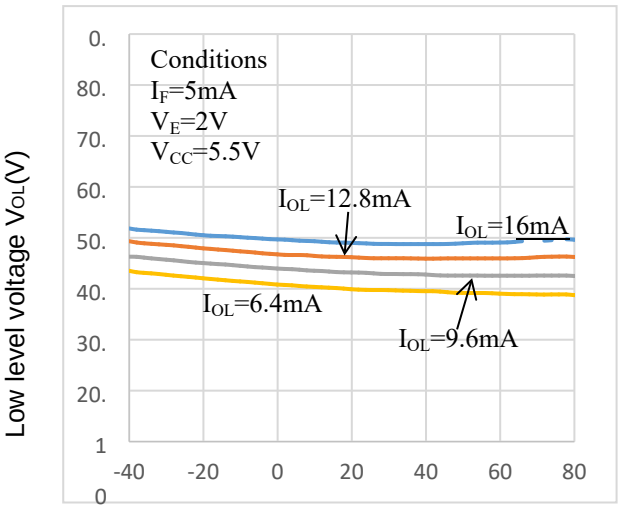


Fig.2 Forward Voltage vs. Forward Current

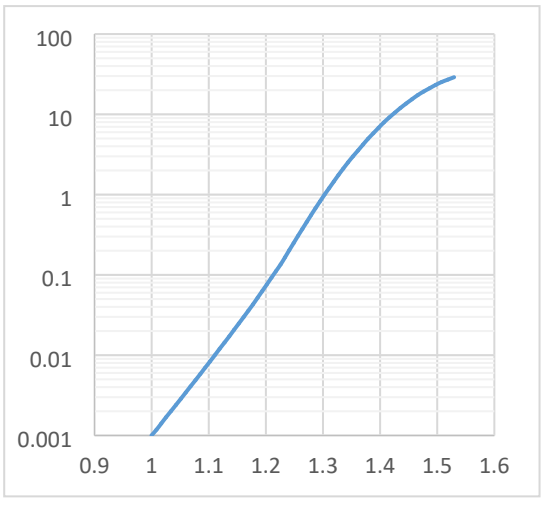


Fig.3 Switching Time vs. Forward Current

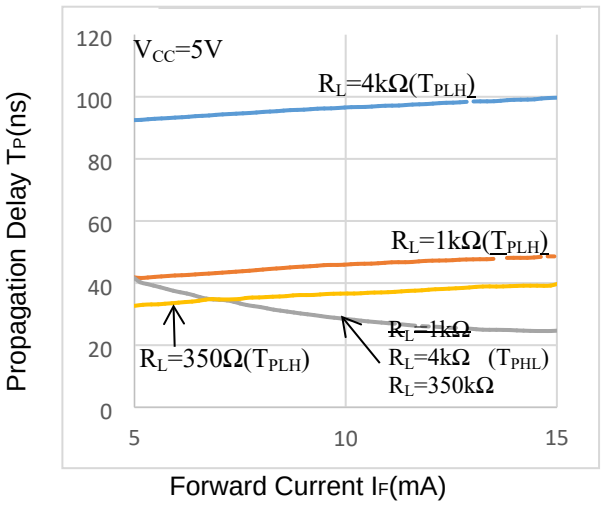


Fig.4 Low Level Output Current vs. Ambient Temperature

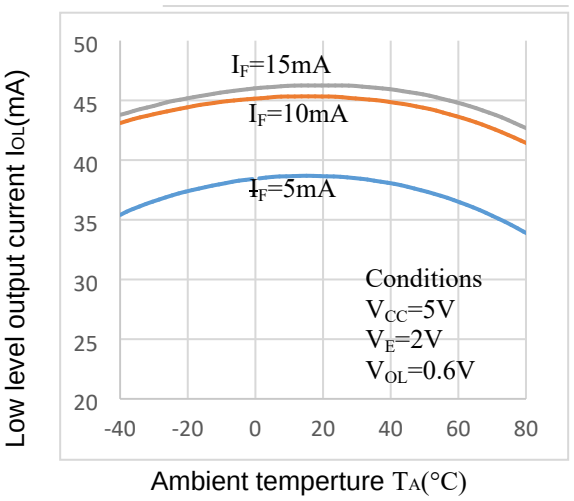


Fig.5 Starting Current vs. Ambient Temperature

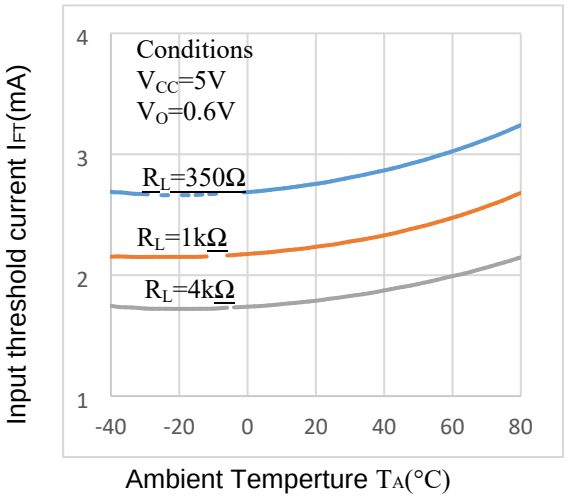


Fig.6 Output Voltage vs. Input Forward Current

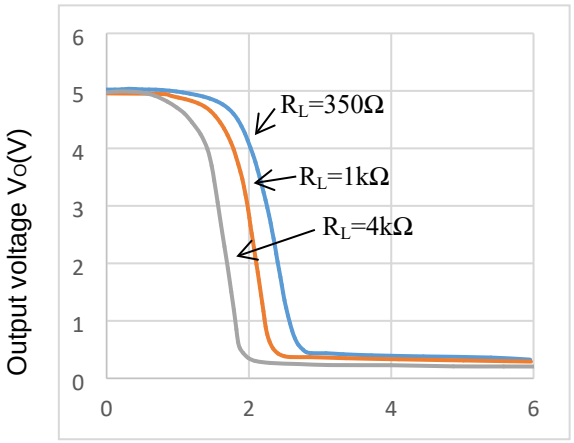


Fig.7 Pulse Width Distortion vs. Ambient Temperature

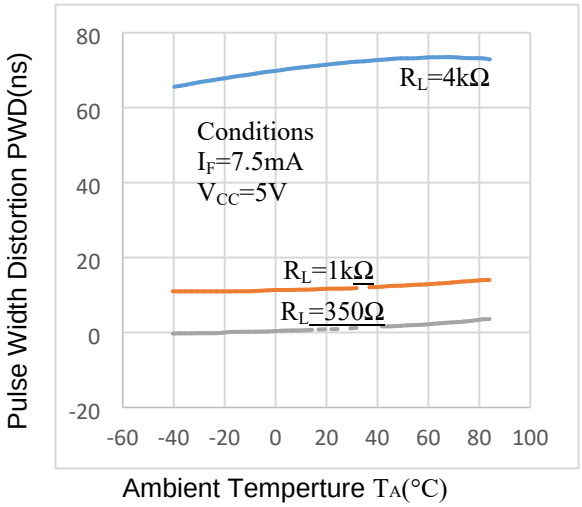


Fig.8 Rise and Fall Times vs. Ambient Temperature

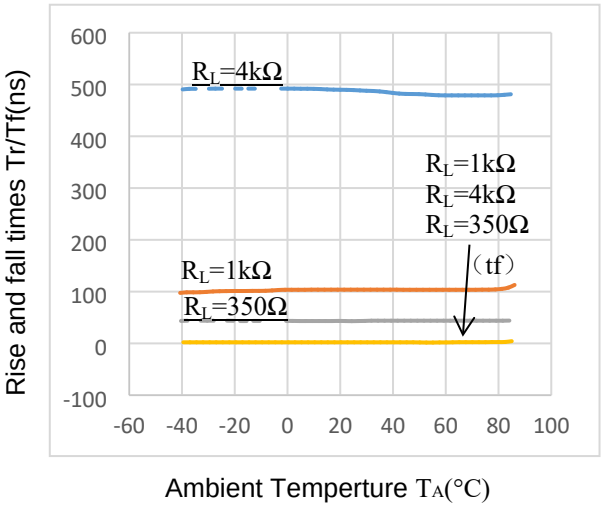


Fig.9 Enable Propagation Delay vs. Ambient Temperature

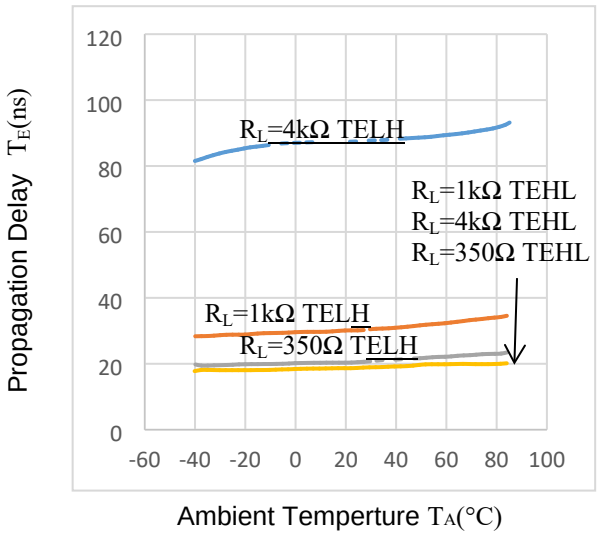


Fig.10 Switching Time vs. Ambient Temperature

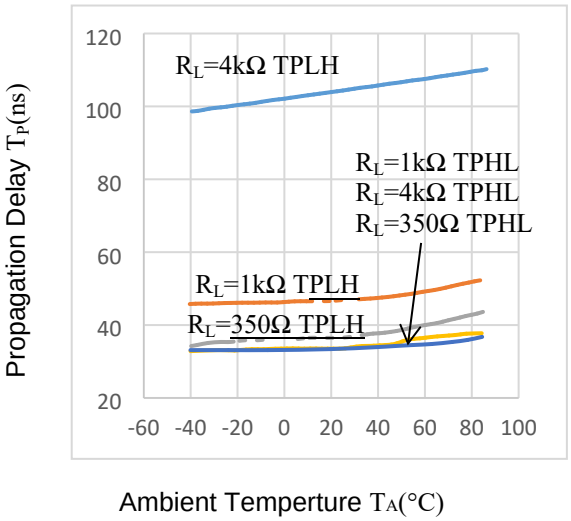
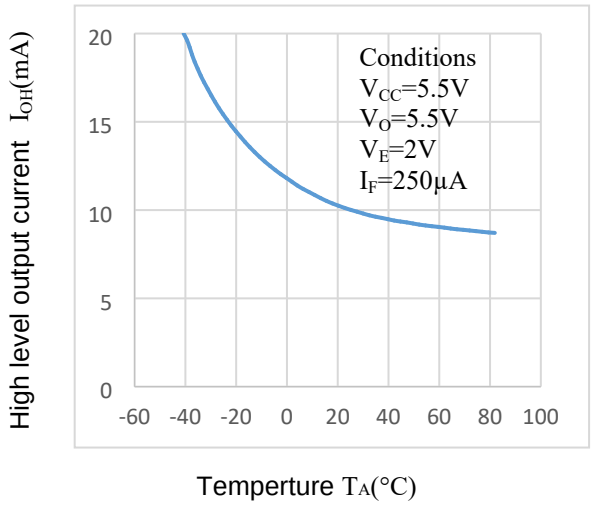


Fig.11 High Level Output Current vs Temperature



9.Test Circuit

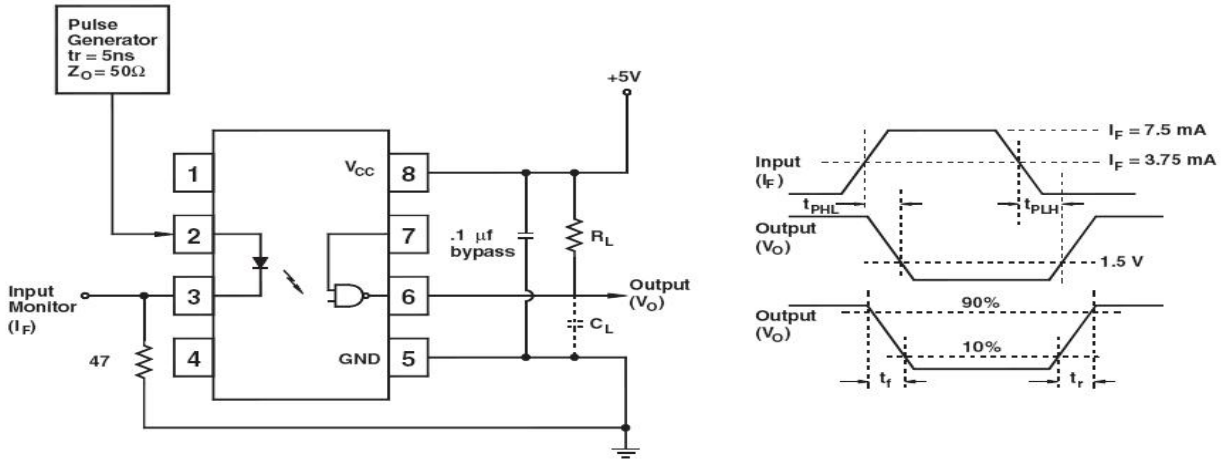


Fig. 12 Test Circuit and Waveforms for t_{PLH}, t_{PHL}, t_r and t_f

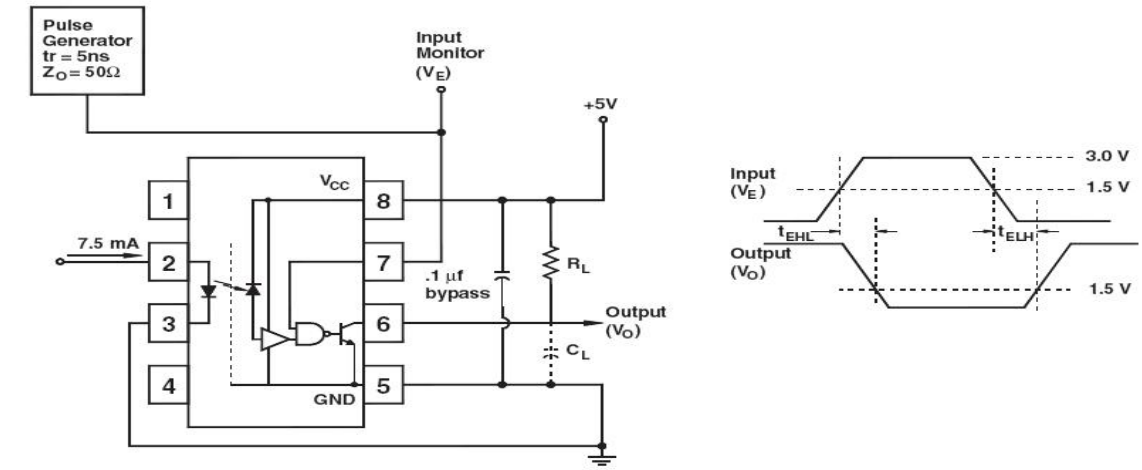


Fig. 13 Test Circuit t_{EHL} and t_{ELH}

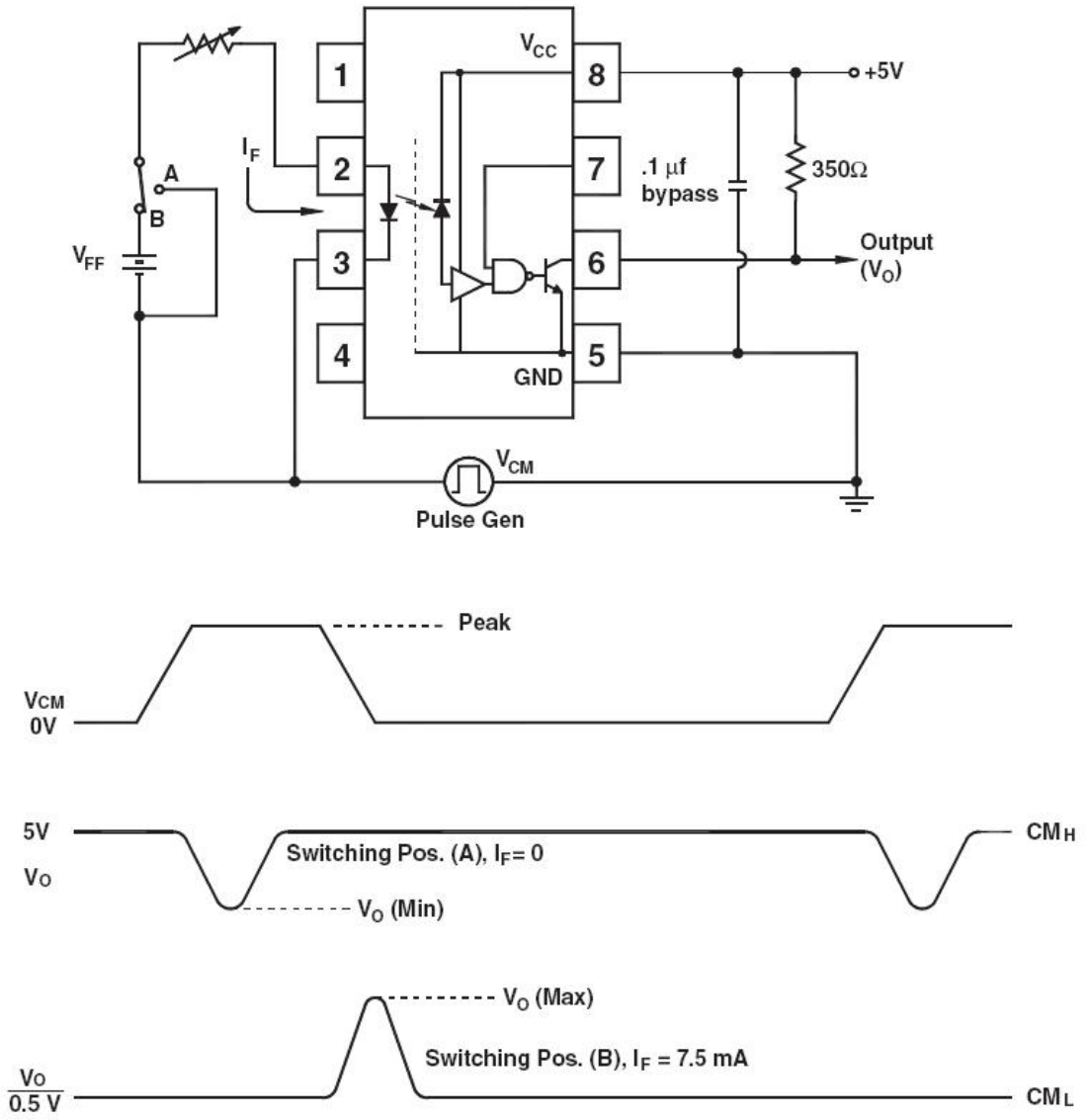
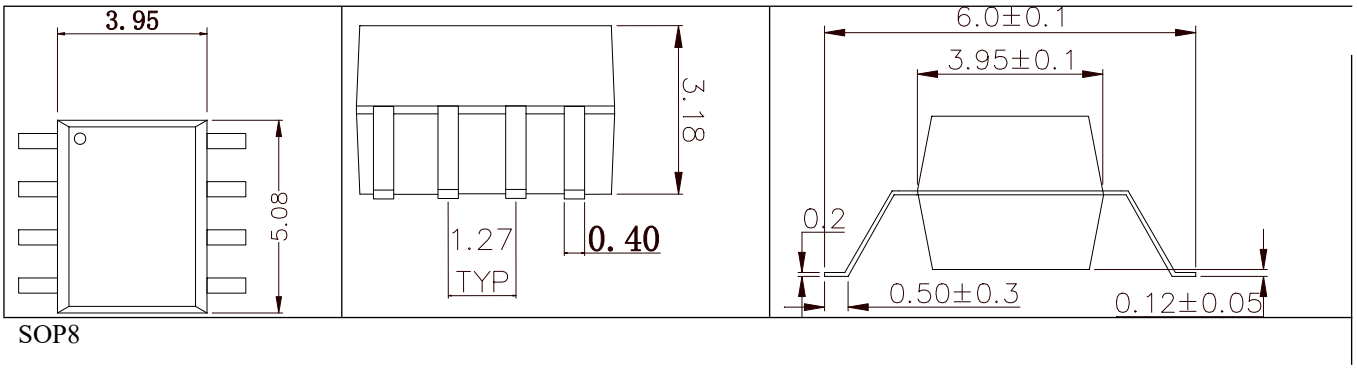


Fig. 14 Test Circuit Common Mode Transient Immunity

10.Package dimensions



SOP8