Logic Gate Photo Coupler Packing SOP5

Description

The SLM601 consists of a high efficient AlGaAs Light Emitting Diode and a high speed optical detector with SOP5 package.The operating parameters are guaranteed over the tempterature range of - 55 ° C to 100 ° C. It can reach 10Mbit/s and is a high-speed logic gate optocoupler

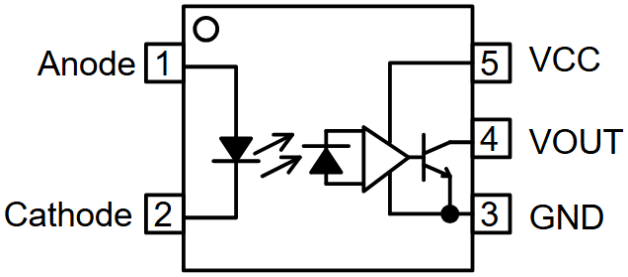
Features

- High isolation 3750 VRMS
- DC input with logic gate output
- Maximum forward current is 25mA
- REACH compliance
- Halogen free
- MSL class free

Applications

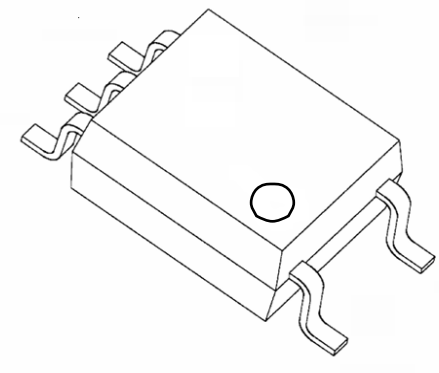
- Ground loop elimination
- LSTTL to TTL，LSTTL or CMOS
- Industrial control and ADC
- Data multiplexing
- Switching power supply
- Pulse transformer replacement

Functional Diagram



Fruth Table Positive Logic

LED	VO
ON	LOW
OFF	HIGH



SLM601 SOP-5

Absolute maximum ratings (TA = 25°C unless otherwise noted)

PARAMETER	SYMBOL	VALUE	UNIT	Note
Forward Current	I_F	25	mA	
Peak Forward Current	I_{FP}	50	mA	1
Peak Transient Current	$I_{F(trans)}$	1	A	2
Reverse Voltage	V_R	5	V	
Enable Voltage	V_E	VCC+0.5	V	
Input Power Dissipation	P_I	100	mW	
Supply Voltage	V_{CC}	7	V	
Output Voltage	V_O	7	V	
Output Current	I_O	50	mA	
Output Power Dissipation	P_O	85	mW	
Total Power Dissipation	Ptot	200	mW	
Isolation Voltage	Viso	3750	Vrms	3
Operating Temperature	Topr	-55~100	°C	
Storage Temperature	Tstg	-55~125	°C	
Soldering Temperature	Tsol	260	°C	4

Note 1. 50% duty, 1ms P.W

Note 2. ≤1μs P.W,300pps

Note 3. AC For 1 Minute, R.H. = 40 ~ 60%

Note 4. For 10 seconds

Recommeded Operation Conditions (TA = 25°C unless otherwise noted)

PARAMETER	SYMBOL	MIN.	MAX.	UNIT
Operating Temperature	TA	-40	100	°C
Supply Voltage	VCC	2.7	3.6	V
	VCC	4.5	5.5	V
Low Level Input Current	IFL	0	250	μA
High Level Input Current	IFH	5	15	mA
Low Level Enable Voltage	VEL	0	0.8	V
High Level Enable Voltage	VEH	2	VCC	V
Output Pull-up Resistor	RL	330	4k	Ω
Fan Out (at RL=1kΩ per channel)	N	-	5	TTL Loads

Electrical Optical characteristics (TA = 25°C unless otherwise noted)

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITION	NOTE
Forward Voltage	V_F	-	1.38	1.8	V	I_F=10mA	
Reverse Current	I_R	-	-	10	μA	V_R=5V	
Input Capacitance	Cin	-	13	-	pF	V=0, f=1MHz	
High Level Supply Current	I_{CCH}	-	6.3	10	mA	I_F=0mA, V_E=0.5V,V_{CC}=5.5V	
Low Level Supply Current	I_{CCL}	-	8.3	13	mA	I_F=10mA, V_{CC}=5.5V	
TRANSFER CHARACTERISTICS (Ta=-40 to 85°C)							
High Level Output Current	I_{OH}	-	0.73	100	μA	V_{CC}=5.5V, V_O=5.5V, I_F=250μA, V_E=2.0V	
Low Level Output Voltage	V_{OL}	-	0.28	0.6	V	V_{CC}=5.5V, I_F=5mA, V_E=2.0V, I_{CL}=13mA	
Input Threshold Current	I_{FT}	-	2.5	5	mA	V_{CC}=5.5V, V_O=0.6V, V_E=2.0V, I_{OL}=13mA	
Isolation Resistance	Riso	10^12	10^14	-	Ω	DC500V, 40 ~ 60% R.H.	
Floating Capacitance	C_{IO}	-	1.0	-	pF	V=0, f=1MHz	

Electrical Optical characteristics

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITION	NOTE
SWITCHING CHARACTERISTICS (Ta=-40 to 85°C, V_{CC}=5V, I_F=7.5mA unless specified otherwise)							
Propagation Delay Time to Output Low Level	TPHL	-	35	75	ns	C_L=15pF, R_L=350Ω, Ta=25°C	Fig.23
Propagation Delay Time to Output High Level	TPLH	-	40	75	ns	C_L=15pF, R_L=350Ω, Ta=25°C	Fig.23
Pulse Width Distortion	|TPHL-TPLH|	-	5	35	ns	C_L=15pF, R_L=350Ω	Fig.23
Rise Time	tr	-	27	-	ns	C_L=15pF, R_L=350Ω	Fig.23
Fall Time	tf	-	7	-	ns	C_L=15pF, R_L=350Ω	Fig.23
Common Mode Transient Immunity at Logic High	CMH	10000	-	-	V/μs	I_F = 7.5mA , V_{OH}=2.0V, R_L=350Ω, Ta=25°C V_{CM}=400Vp-p	Fig.24
Common Mode Transient Immunity at Logic Low	CML	10000	-	-	V/μs	I_F = 0mA , V_{OH}=0.8V, R_L=350Ω, Ta=25°C V_{CM}=400Vp-p	Fig.24

Electrical Optical characteristics (TA = 25°C unless otherwise noted)

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITION	NOTE
Forward Voltage	V_F	-	1.38	1.8	V	I_F=10mA	
Reverse Current	I_R	-	-	10	μA	V_R=5V	
Input Capacitance	Cin	-	13	-	pF	V=0, f=1MHz	
High Level Supply Current	I_{CCH}	-	4.3	10	mA	I_F=0mA, V_E=0.5V,V_{CC}=3.3V	
Low Level Supply Current	I_{CCL}	-	6.4	13	mA	I_F=10mA, V_{CC}=3.3V	
Transfer Characteristics (Ta=-40 to 85°C)							
High Level Output Current	I_{OH}	-	4.1	100	μA	V_{CC}=3.3V, V_O=3.3V, I_F=250μA, V_E=2.0V	
Low Level Output Voltage	V_{OL}	-	0.29	0.6	V	V_{CC}=3.3V, I_F=5mA, V_E=2.0V, I_{CL}=13mA	
Input Threshold Current	I_{FT}	-	2.2	5	mA	V_{CC}=3.3V, V_O=0.6V, V_E=2.0V, I_{OL}=13mA	
Isolation Resistance	Riso	10^12	10^14	-	Ω	DC500V, 40 ~ 60% R.H.	
Floating Capacitance	C_{IO}	-	1.0	-	pF	V=0, f=1MHz	

Electrical Optical characteristics (TA = 25°C unless otherwise noted)

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITION	NOTE
SWITCHING CHARACTERISTICS (Ta=-40 to 85°C, V_{CC}=3.3V, I_F=7.5mA unless specified otherwise)							
Propagation Delay Time to Output Low Level	TPHL	-	35	75	ns	C_L=15pF, R_L=350Ω, Ta=25°C	Fig.21
Propagation Delay Time to Output High Level	TPLH	-	47	75	ns	C_L=15pF, R_L=350Ω, Ta=25°C	Fig.21
Pulse Width Distortion	|TPHL-TPLH|	-	12	35	ns	C_L=15pF, R_L=350Ω	Fig.21
Rise Time	tr	-	30	-	ns	C_L=15pF, R_L=350Ω	Fig.21
Fall Time	tf	-	8.5	-	ns	C_L=15pF, R_L=350Ω	Fig.21
Common Mode Transient Immunity at Logic High	CMH	10000	-	-	V/μs	I_F = 7.5mA , V_{OH}=2.0V, R_L=350Ω, Ta=25°C V_{CM}=400Vp-p	Fig.22
Common Mode Transient Immunity at Logic Low	CML	10000	-	-	V/μs	I_F = 0mA , V_{OH}=0.8V, R_L=350Ω, Ta=25°C V_{CM}=400Vp-p	Fig.22

Characteristic Curves

Fig.1 Low Level Output Current vs. Ambient Temperature

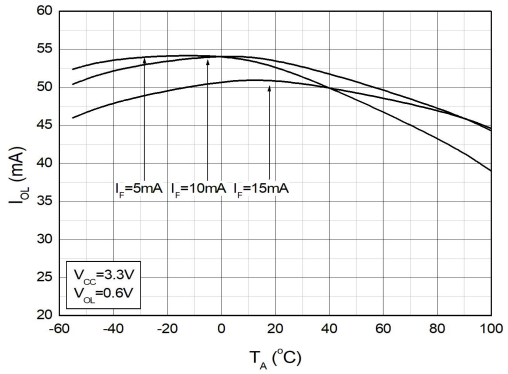


Fig.2 Low Level Output Current vs. Ambient Temperature

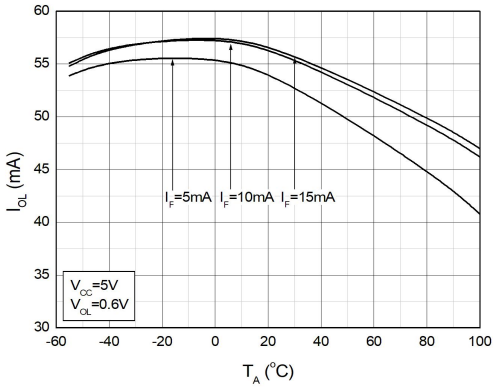


Fig.3 Input Threshold Current vs. Ambient Temperature

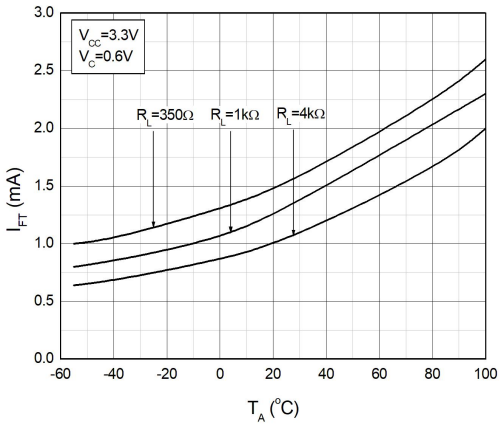


Fig.4 Input Threshold Current vs. Ambient Temperature

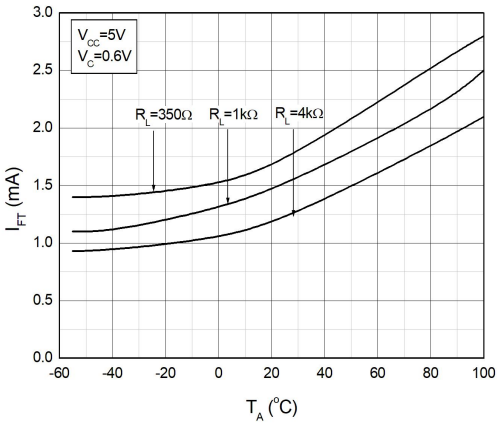


Fig.5 Forward Voltage vs. Ambient Temperature

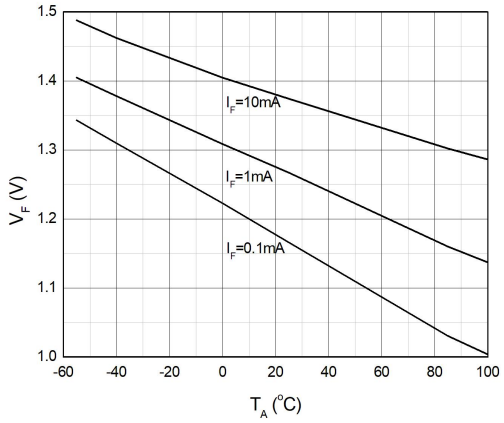
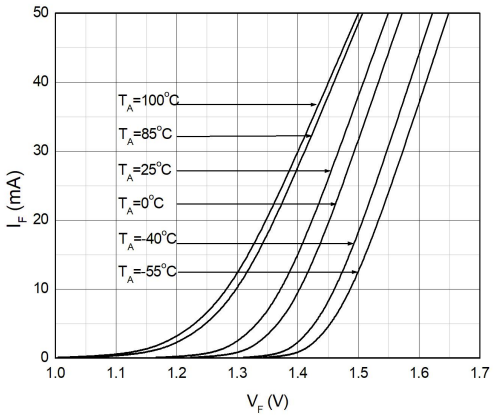


Fig.6 Forward Current vs. Forward Voltage



Characteristic Curves

Fig.7 Output Voltage vs. Forward Current

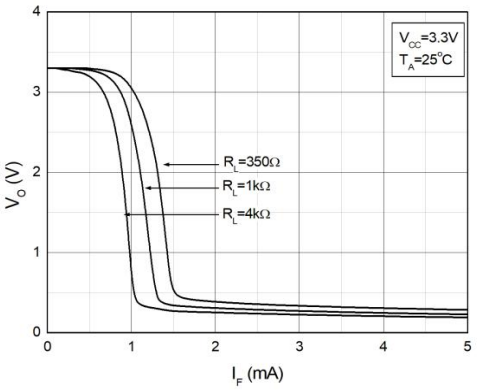


Fig.8 Output Voltage vs. Forward Current

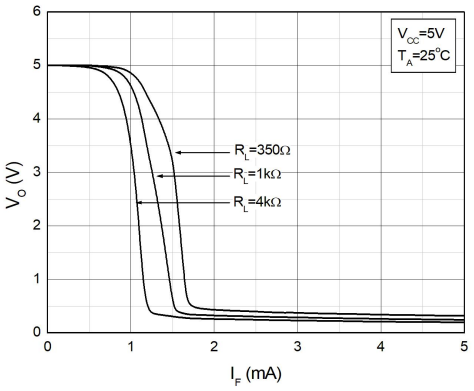


Fig.9 High Level Output Current vs. Ambient Temperature

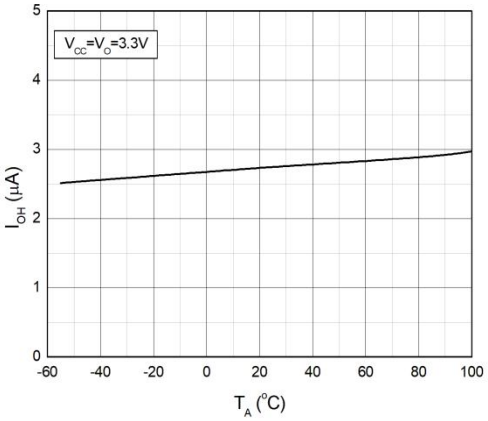


Fig.10 High Level Output Current vs. Ambient Temperature

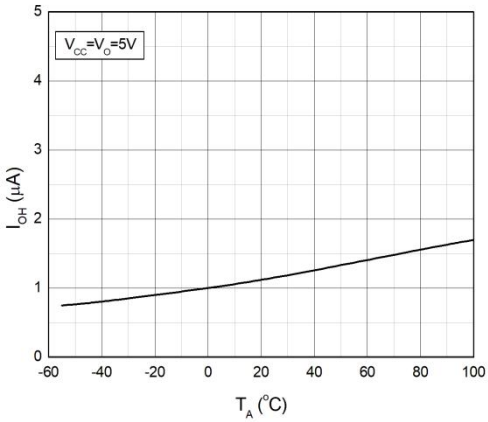


Fig.11 Low Level Output Voltage vs. Ambient Temperature

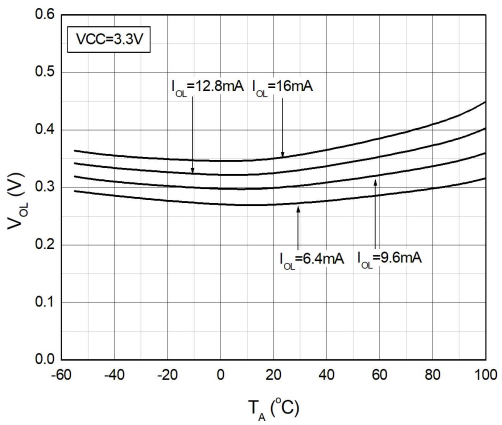
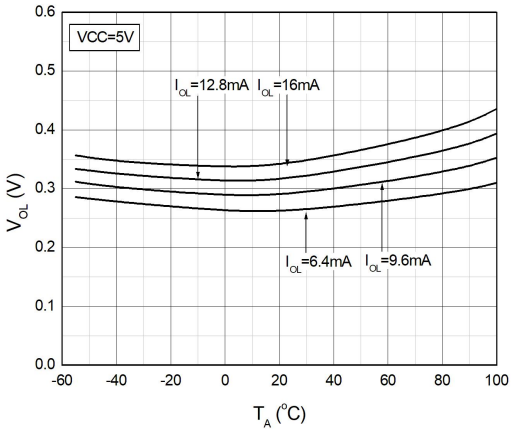


Fig.12 Low Level Output Voltage vs. Ambient Temperature



Characteristic Curves

Fig.13 Propagation Delay vs. Ambient Temperature

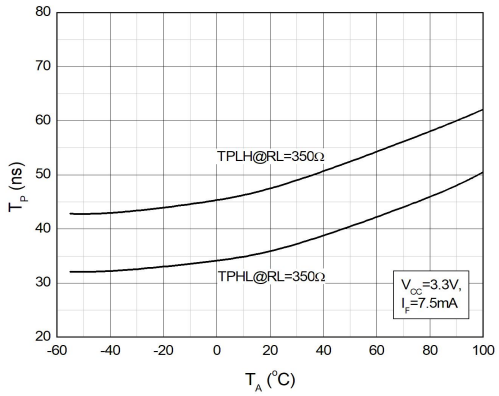


Fig.14 Propagation Delay vs. Ambient Temperature

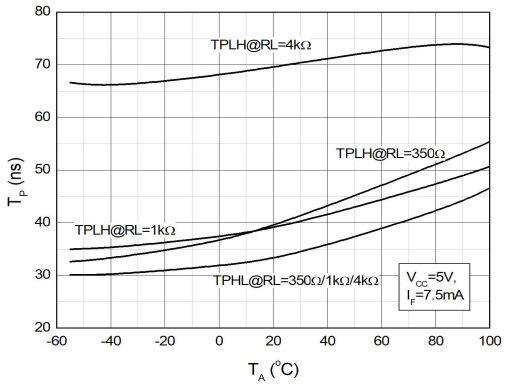


Fig.15 Rise and Fall Time vs. Ambient Temperature

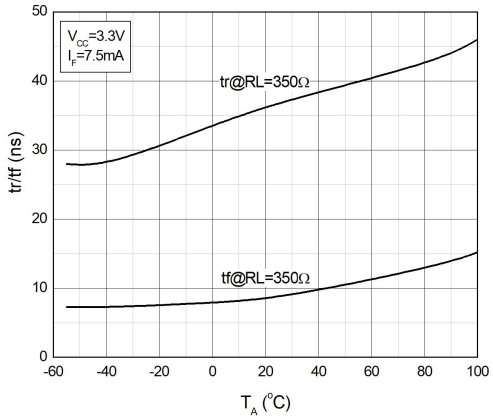


Fig.16 Rise and Fall Time vs. Ambient Temperature

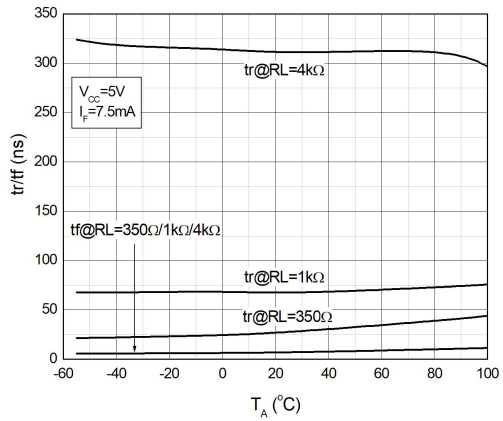


Fig.17 Propagation Delay vs. Forward Current

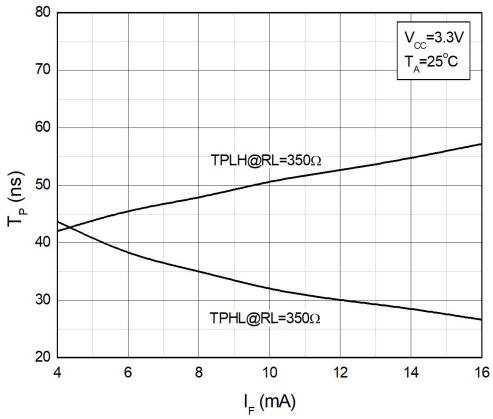
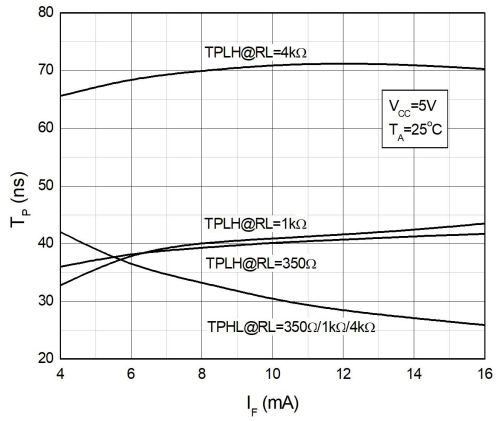


Fig.18 Propagation Delay vs. Forward Current



Characteristic Curves

Fig.19 Pulse Width Distortion vs. Ambient Temperature

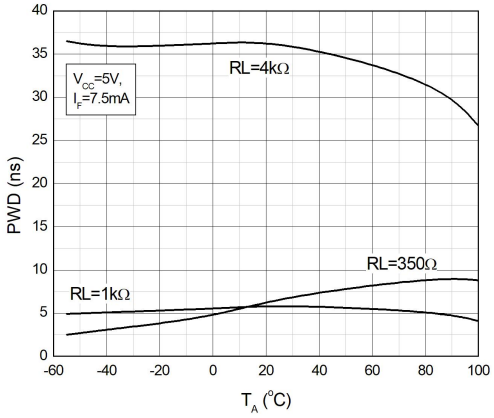
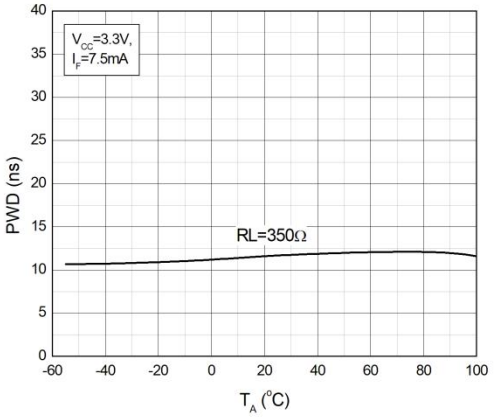


Fig.20 Pulse Width Distortion vs. Ambient Temperature



Test Circuits

Fig.21 Test Circuits for TPHL, TPLH, tr, tf

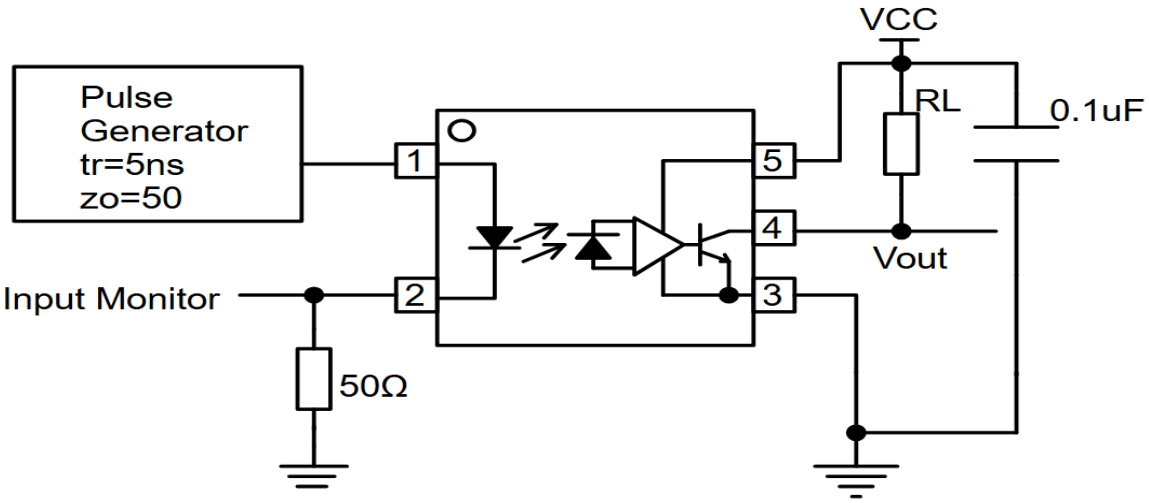
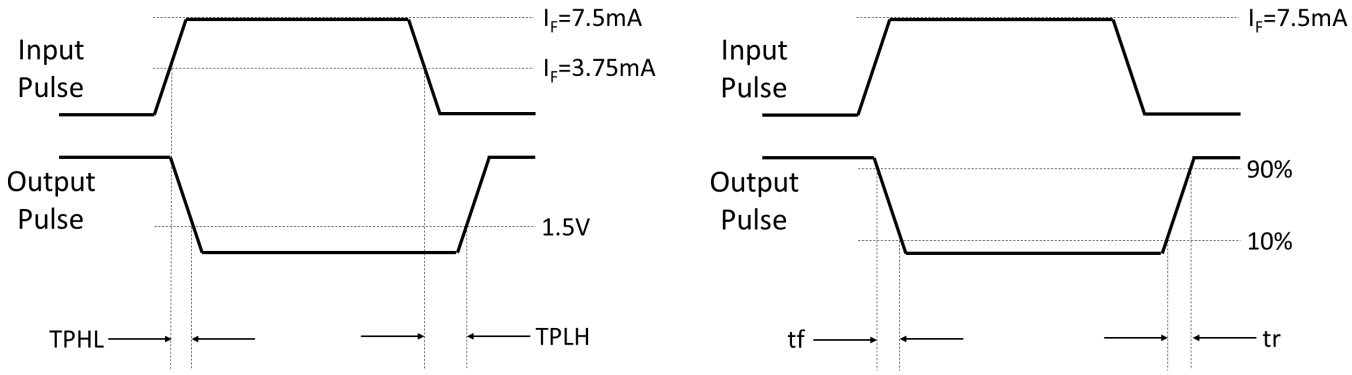


Fig.22 Waveforms of TPHL, TPLH, tr, tf



Test Circuits

Fig.23 Test Circuits for Common Mode Transient Immunity

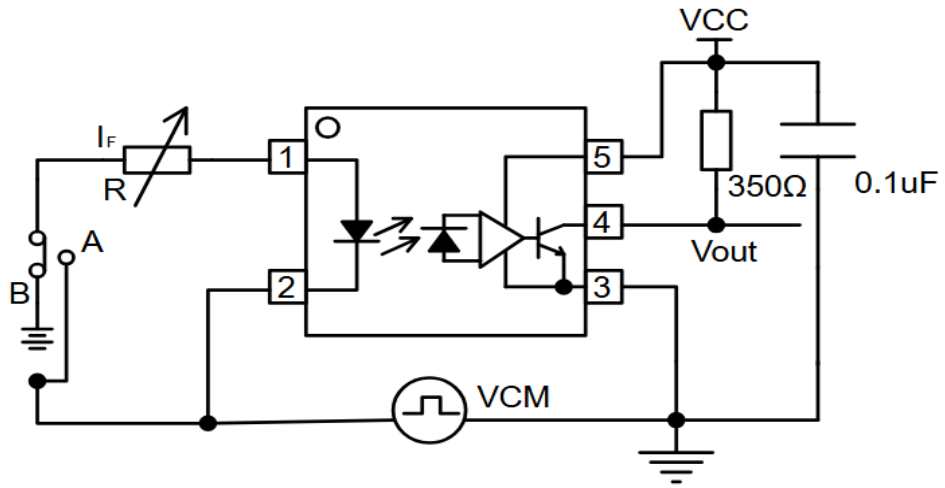
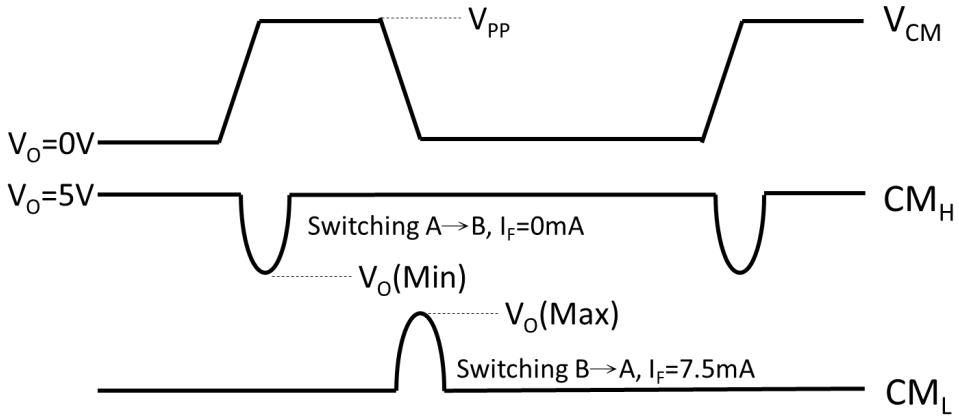
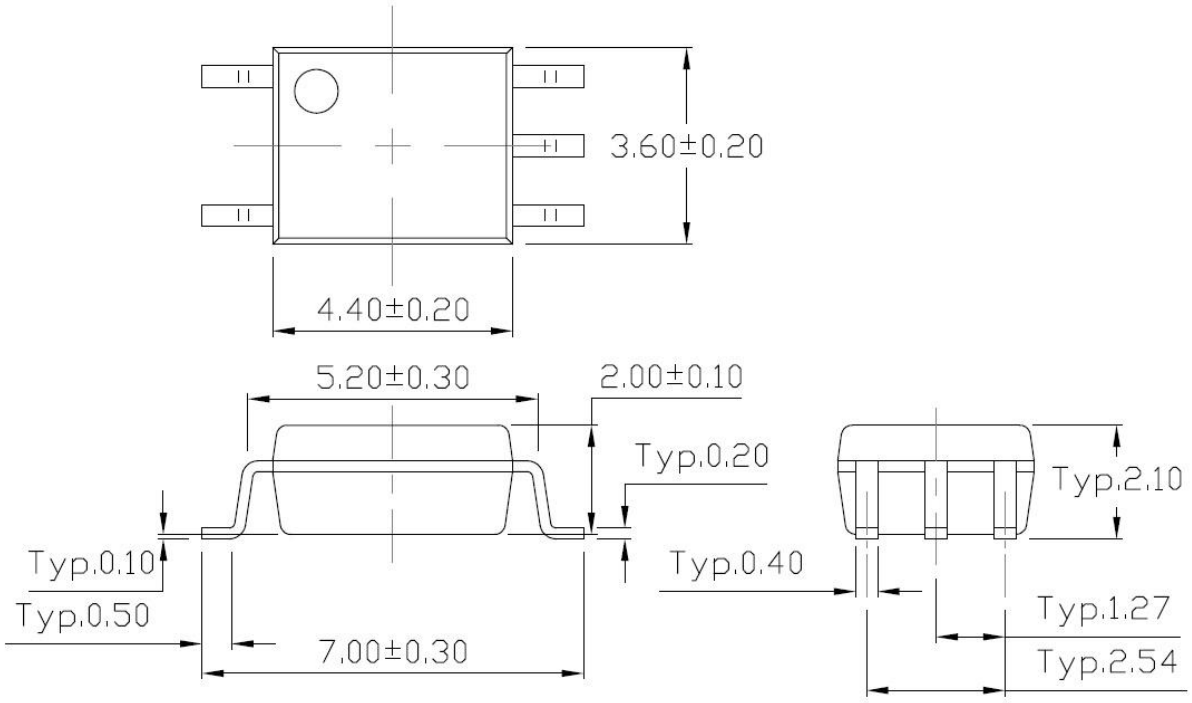


Fig.24 Waveforms of Common Mode Transient Immunity

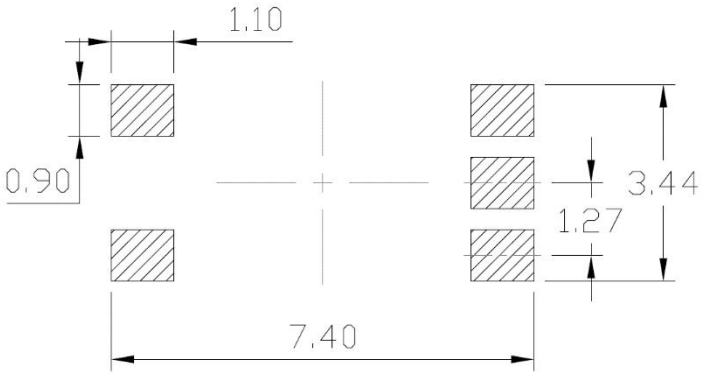


Package Dimensions (Dimensions in mm unless otherwise stated)

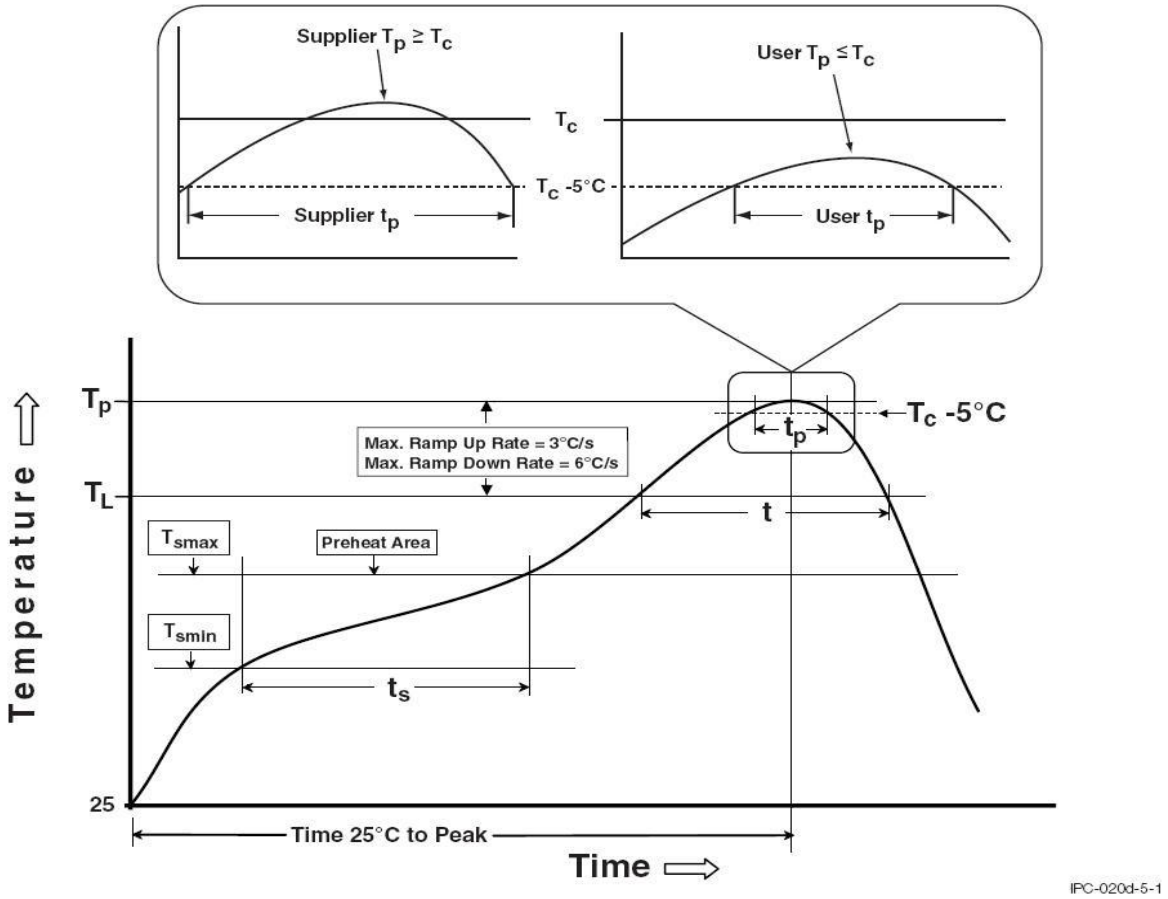
SOP-5



Recommended Solder Mask (Dimensions in mm unless otherwise stated)



REFLOW PROFILE



Profile Feature	Sn-Pb Assembly Profile	Pb-Free Assembly Profile
Temperature Min. (Tsmin)	100	150°C
Temperature Max. (Tsmax)	150	200°C
Time (ts) from (Tsmin to Tsmax)	60-120 seconds	60-120 seconds
Ramp-up Rate (tL to tP)	3°C/second max.	3°C/second max.
Liquidous Temperature (TL)	183°C	217°C
Time (tL) Maintained Above (TL)	60 – 150 seconds	60 – 150 seconds
Peak Body Package Temperature	235°C +0°C / -5°C	260°C +0°C / -5°C
Time (tP) within 5°C of 260°C	20 seconds	30 seconds
Ramp-down Rate (TP to TL)	6°C/second max	6°C/second max
Time 25°C to Peak Temperature	6 minutes max.	8 minutes max.