恒拓电子
HENGTUO ELECTRONICS

HT series

Photo Coupler
Product Specification

HT-6N137

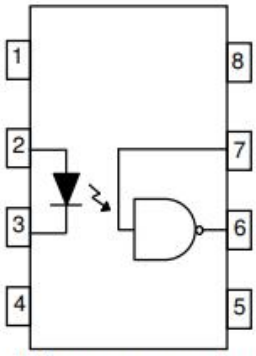
HT-26XX

恒拓电子
HENGTUO ELECTRONICS

-

■ Package

Schematic



A 0.1μF bypass capacitor must be connected between pins 8 and 5 *3

Pin Configuration
1, No Connection
2, Anode
3, Cathode
4. No Connection
5, Gnd
6, Vout
7, V_E
8, V_{CC}

■ Description

The 6N137, HT2601 and HT2611 are consists of an infrared emitting diode optically coupled to a high speed integrated photo detector logic gate with a strobable output. It is packaged in a 8-pin DIP package and available in wide-lead spacing and SMD options.

■ Features

- High speed 10Mbit/s
- 10kV/μs min. common mode transient immunity (HT2611)
- Guaranteed performance from -40 to 85℃
- Logic gate output
- High isolation voltage between input and output (Viso=5000 V rms)
- Pb free and RoHS compliant.
- CQC approved
- UL approved
- VDE approved

恒拓电子
HENGTUO ELECTRONICS

■ 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
- High speed logic ground isolation

■ 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

■ Product Nomenclature

The product name is designated as below:

HT-6N13X -X X- X X- XX
HT-26XX -X X- X X- XX
① ② ③ ④ ⑤

Designation:

HT =Hengtuo Technology Co.,LTD.
6N13X/26XX= Product Series
① = Lead form option(1)
② = Tape and Reel option(2)
③ = VDE order option(fixed code “V”)
④ = Halogen free option(fixed code“G”)
⑤= Customer code

Notes

1. Lead form option:

Symbol	Description
S1	DIP-S1
M	DIP-M

NONE	DIP/SOP Normal

2. Tape and Reel option:

Symbol	Description
TP&TP1	Tape and Reel Type
NONE	DIP&SOP Type

■ Marking Information

Designation:

HT	denotes Hengtuo
6N137	denotes Device
YY	denotes year code
WW	denotes week code
V	denotes VDE

■ Maximum Ratings(Ta=25℃)

Parameter		Symbol	Values	Unit
Input	Forward Current	I_F	50	mA
	Enable input voltage Not exceed VCC by more than 500mV	V_E	5.5	V
	Reverse voltage	V_R	5	V
	Power dissipation	P_D	100	mW
Output	Power dissipation	PC	85	mW
	Output current	V_{ECO}	50	mA
	Output voltage	VO	7.0	V
	Supply voltage	VCC	7.0	V
Output Power Dissipation		P_O	100	mW
Isolation voltage(1)		V_{ISO}	5000	V rms
Operating temperature		T_{OPR}	-40 ~ +85	°C
Storage temperature		T_{STG}	-55 ~ +125	°C
Soldering temperature (2)		T_{SOL}	260	°C

Notes:
(1). AC for 1 minute, R.H.= 40 ~ 60% R.H. In this test, pins 1, 2, 3 & 4 are shorted together, and pins 5, 6, 7 & 8 are shorted together.
(2).For 10 seconds

恒拓电子
HENGTUO ELECTRONICS

■ Electronic Optical Characteristics

(TA = -40 to 85°C unless specified otherwise)

Parameter		Symbol	Min.	Typ.	Max.	Unit	Conditon
Input	Forward Voltage	V_F	-	1.4	1.8	V	I_F=10mA
	Reverse voltage	V_R	5.0	-	-	V	I_R=10μA
	Temperature coefficient of forward voltage	ΔVF/ΔTA	-	-1.8	-	mV/°C	I_F =10mA
	Input capacitance	C_{IN}	-	60	-	pF	V_F=0, f=1MHz
Output	High level supply current	I_{CCH}	-	7	10	mA	I_F=0mA, V_E=0.5V, V_{CC}=5.5V
	Low level supply current	I_{CCL}	-	9	13	mA	I_F=10mA, V_{CC}=5.5V
	High level enable current(3)	I_{EH}	-	-0.6	-1.6	mA	V_E=2.0 V, V_{CC}=5.5V
	Low level enable current(3)	I_{EL}	-	-0.8	-1.6	mA	V_E=0.5 V, V_{CC}=5.5V
	High level enable voltage(3)	V_{EH}	2.0	-	-	V	I_F=10mA, V_{CC}=5.5V
	Low level enable voltage(3)(4)	V_{EL}	-	-	0.8	V	I_F=10mA, V_{CC}=5.5V

■ Transfer Characteristics

(Ta=-40 to 85°C unless specified otherwise)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditon
HIGH Level Output Current	I_{OH}	-	2.1	100	uA	V_{CC}=5.5V, V_O=5.5V, I_F=250μA, V_E=2.0V
LOW Level Output Current	V_{OL}	-	0.35	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

■ Switching Characteristics

(Ta=-40 to 85°C, VCC=5V, IF=7.5mA unless specified otherwise)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditon
Propagation delay time to output High level(5) (Fig.12)	T_{PHL}	-	35	75	ns	C_L = 15pF, R_L=350Ω, T_A=25°C
Propagation delay time to output Low level(6) (Fig.12)	T_{PLH}	-	40	75	ns	C_L = 15pF, R_L=350Ω, T_A=25°C
Pulse width distortion	|Tphl – Tplh|	-	5	35	ns	C_L = 15pF, R_L=350Ω
Output rise time(7) (Fig.12)	tr	-	40	-	ns	C_L = 15pF, R_L=350Ω
Output fall time(8) (Fig.12)	tf	-	10	-	ns	C_L = 15pF, R_L=350Ω

■ Switching Characteristics

(Ta=-40 to 85°C, VCC=5V, IF=7.5mA unless specified otherwise)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditon
Enable Propagation Delay Time to Output High Level(9)(Fig.13)	t_{ELH}	-	15	-	ns	I_F = 7.5mA , V_{EH}=3.5V, C_L = 15pF, R_L=350Ω
Enable Propagation Delay Time to Output Low Level(10) (Fig.13)	t_{EHL}	-	15	-	ns	I_F = 7.5mA , V_{EH}=3.5V, C_L=15pF, R_L=350Ω
Common Mode Transient Immunity at Logic High (11)	CM_H				V/μS	
	6N137		-	-		I_F = 7.5mA , V_{OH}=2.0V, R_L=350Ω,T_A=25°C V_{CM}=10Vp-p (Fig.14)
	HT2601	5,000	-	-		I_F = 7.5mA , V_{OH}=2.0V, R_L=350Ω,T_A=25°C V_{CM}=50Vp-p (Fig.14)
	HT 2611	10,000	-	-		I_F = 7.5mA , V_{OH}=2.0V, R_L=350Ω,T_A=25°C V_{CM}=400Vp-p (Fig.14)
	HT 2611	20,000				I_F = 7.5mA , V_{OH}=2.0V, R_L=350Ω,T_A=25°C V_{CM}=400Vp-p (Fig.15)
Common 6N137	CM_L	-	-	-	V/μS	I_F = 0mA , V_{OL}=0.8V,

Mode Transient Immunity at Logic Low (12)					R_L=350Ω,T_A=25°C V_{CM}=10Vp-p (Fig.14)
	HT 2601	5,000	-	-	I_F = 0mA , V_{OL}=0.8V, R_L=350Ω,T_A=25°C V_{CM}=50Vp-p (Fig.14)
	HT 2611	10,000	-	-	I_F = 0mA , V_{OL}=0.8V, R_L=350Ω,T_A=25°C V_{CM}=400Vp-p (Fig.14)
	HT 2611	20,000	-	-	I_F = 7.5mA , V_{OH}=2.0V, R_L=350Ω, T_A=25°C V_{CM}=400Vp-p (Fig.15)

恒拓电子
HENGTUO ELECTRONICS

■ Typical Electro-Optical Characteristics Curves

Fig.1 Input Diode Forward Voltage vs. Forward Current

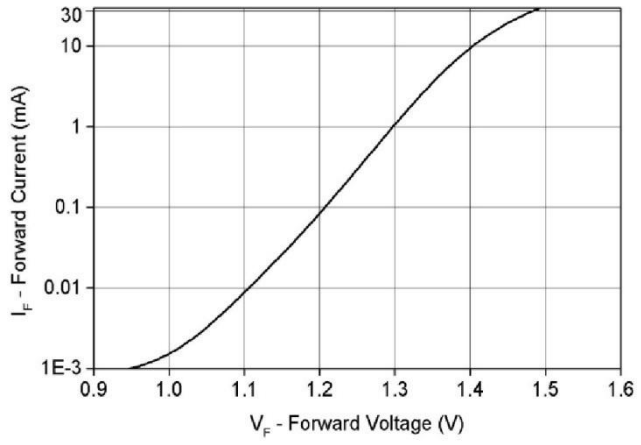


Fig.2 Low Level Output Voltage vs. Ambient Temperature

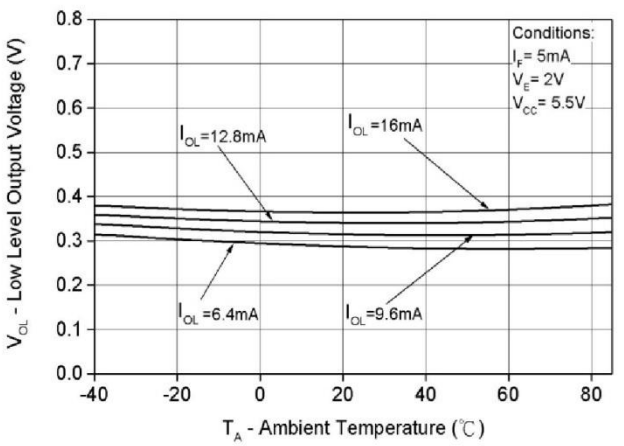


Fig.3 Low Level Output Current vs. Ambient Temperature

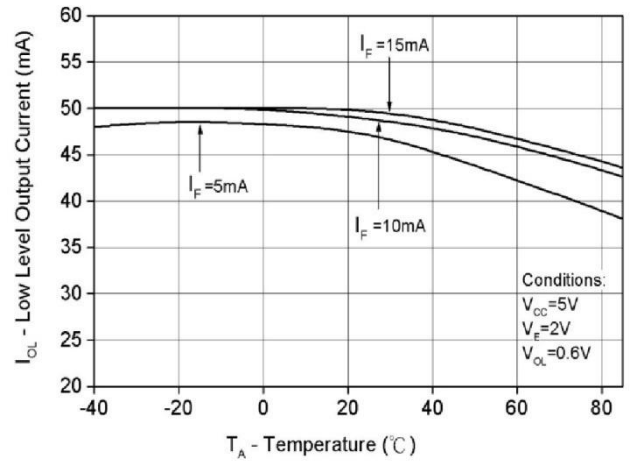


Fig.4 Input Threshold Current vs. Ambient Temperature

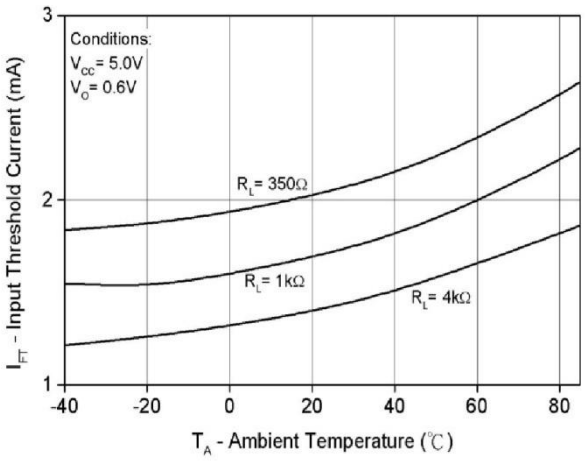


Fig.5 Output Voltage vs. Input Forward Current

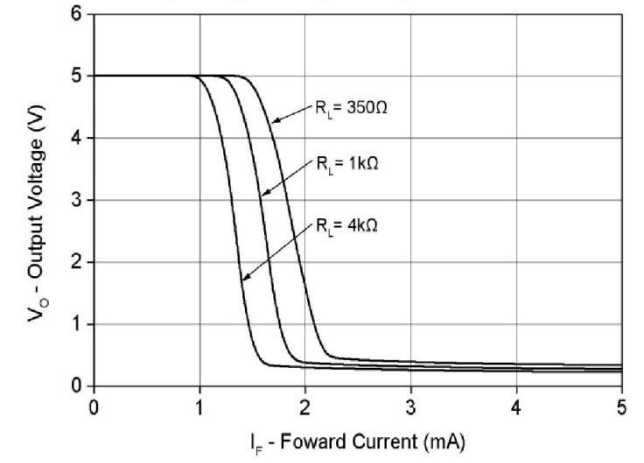


Fig.6 High Level Output Current vs. Temperature

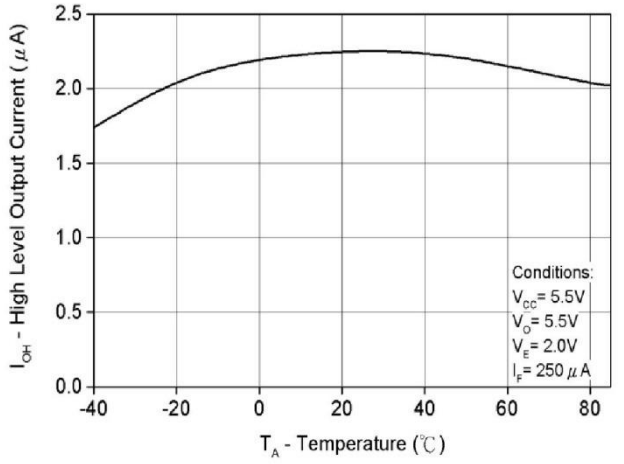


Fig.7 Switching Time vs. Forward Current

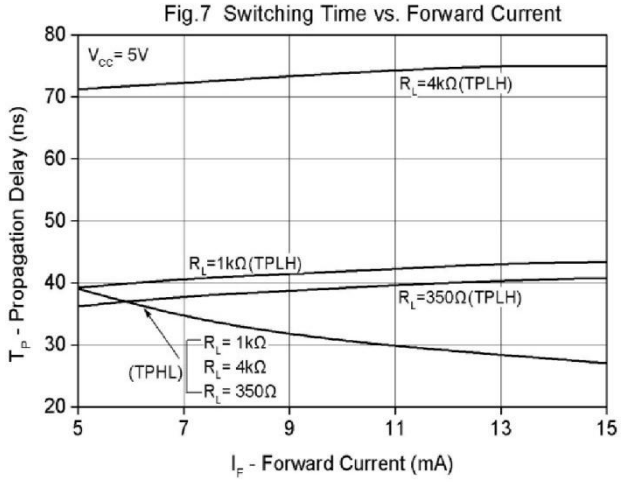


Fig.8 Switching Time vs. Temperature

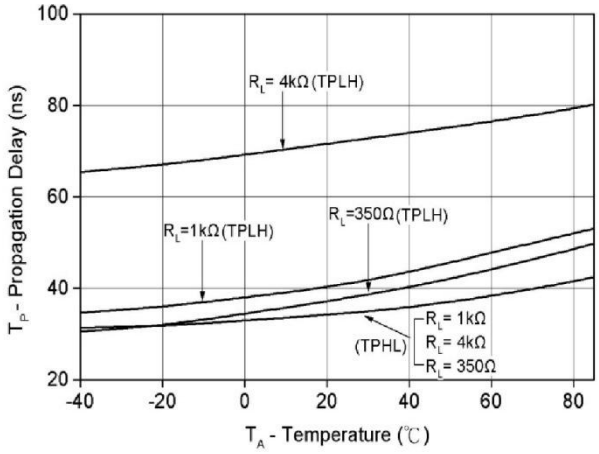


Fig.9 Pulse Width Distortion vs. Temperature

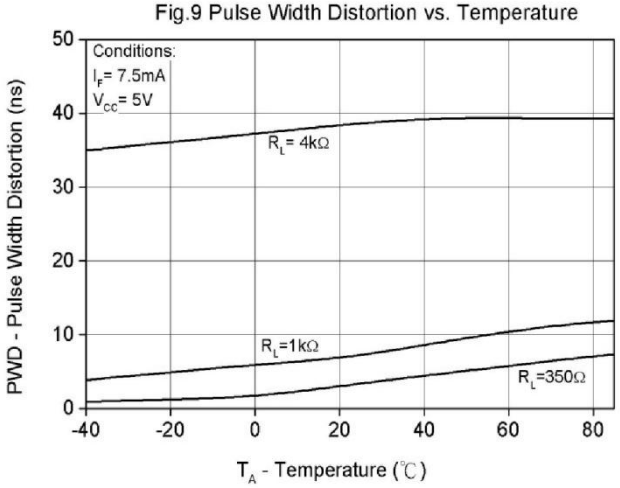


Fig.10 Rise and Fall Time vs. Temperature

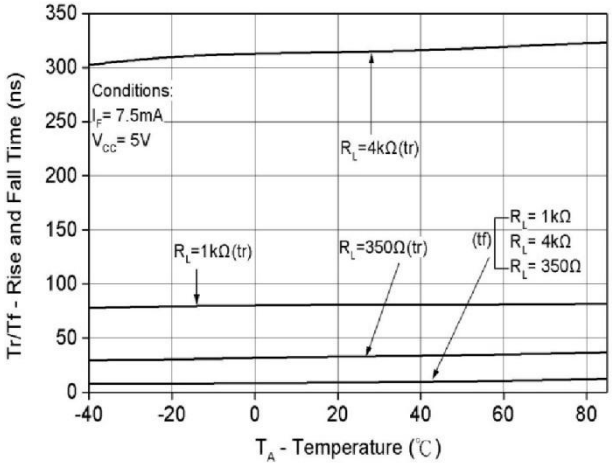


Fig.11 Enable Propagation Delay vs. Temperature

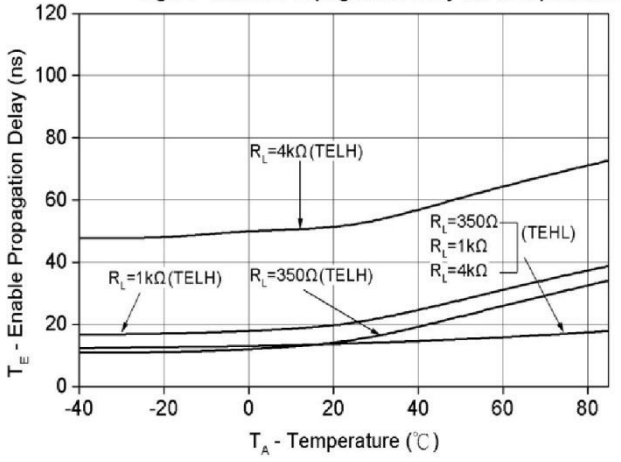


Fig. 12 Test circuit and waveforms for tPHL, tPLH, tr, and tf

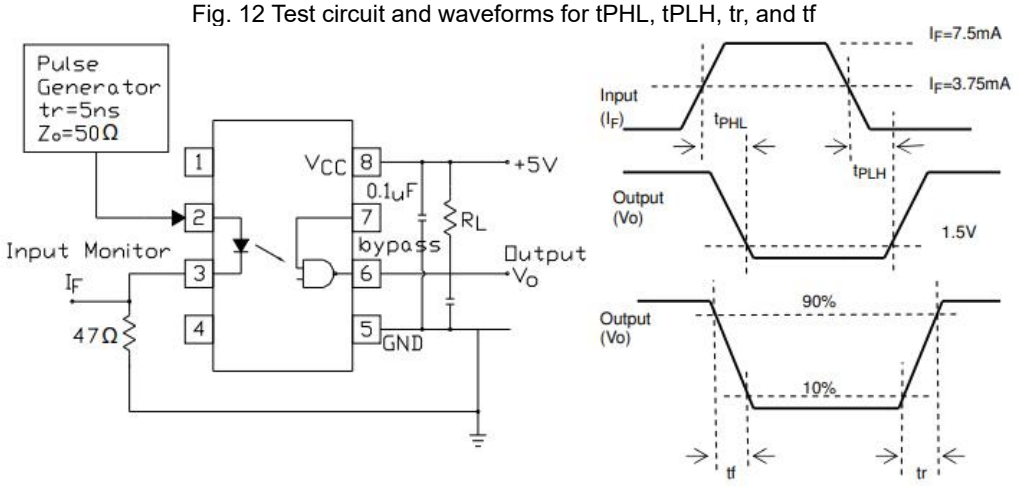


Fig. 13 Test circuit and waveform for tEHLand tELH

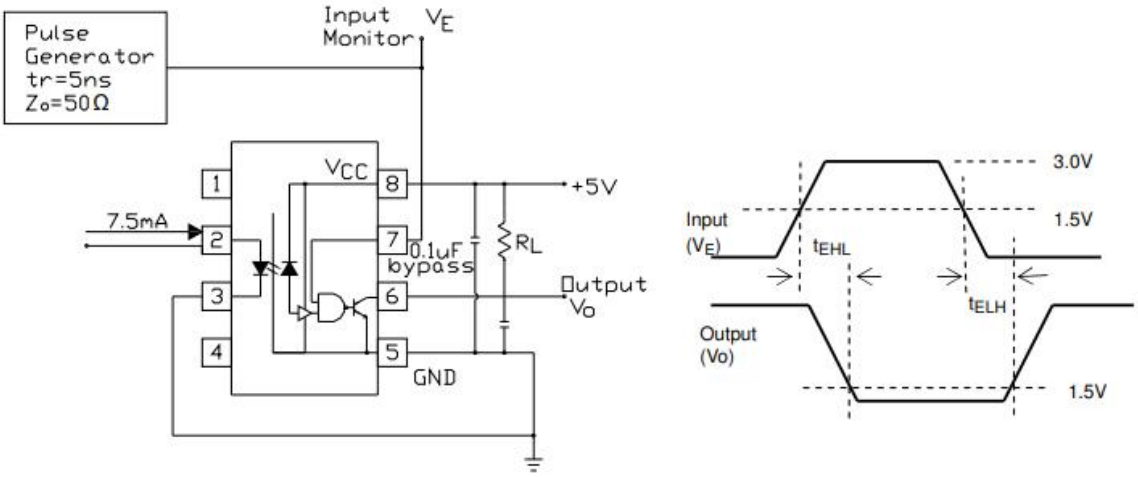
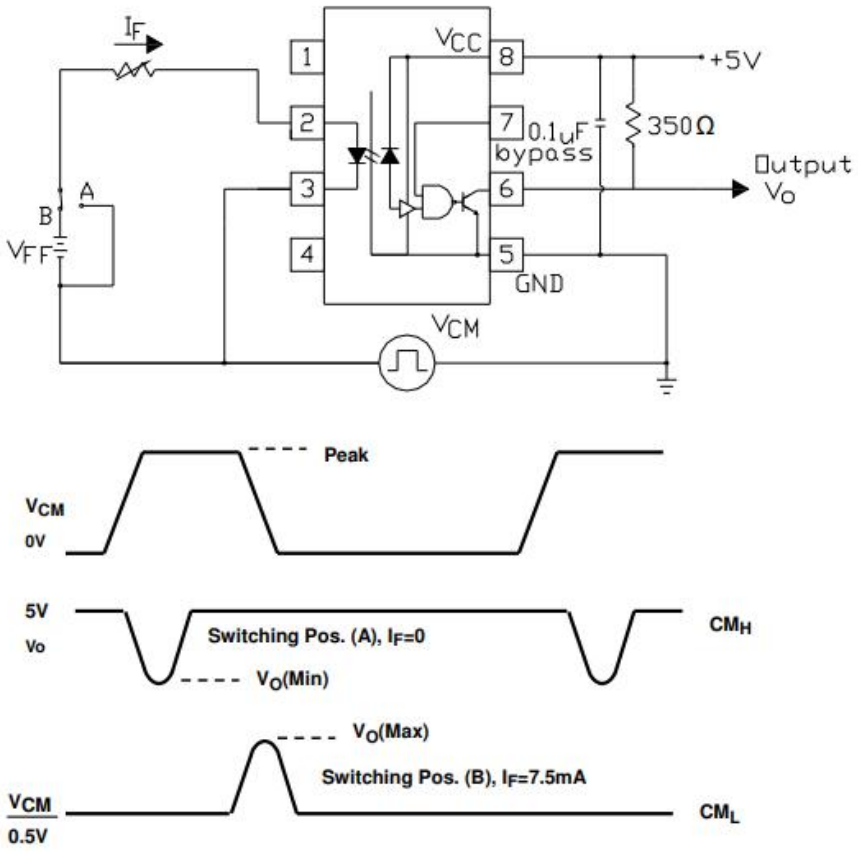


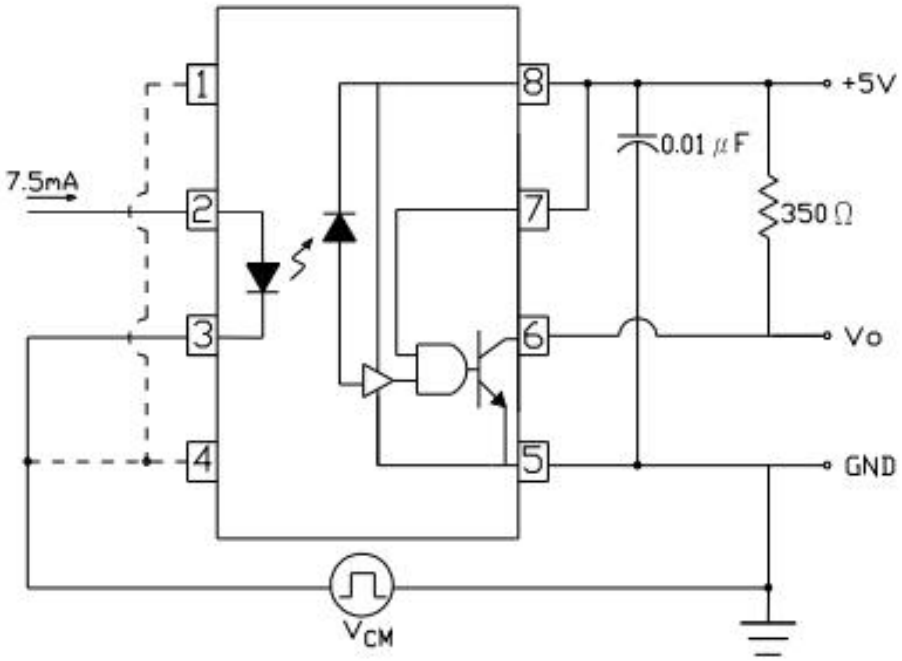
Fig. 14 Test circuit Common mode Transient

恒拓电子
HENGTUO ELECTRONICS



Immunity

Fig. 15 Recommended drive circuit for EL2611 families for high-CMR



Note

(3) The VCC supply must be bypassed by a 0.1μF capacitor or larger. This can be either a ceramic or solid tantalum capacitor with good high frequency characteristic and should be connected as close as possible to the package VCC and GND pins

(4) Enable Input – No pull up resistor required as the device has an internal pull up resistor.

(5) tPLH– Propagation delay is measured from the 3.75mA level on the HIGH to LOW transition of the input current pulse to the 1.5 V level on the LOW to HIGH transition of the output voltage pulse.

(6) tPHL– Propagation delay is measured from the 3.75mA level on the LOW to HIGH transition of the input current pulse to the 1.5 V level on the HIGH to LOW transition of the output voltage pulse.

(7) tr– Rise time is measured from the 90% to the 10% levels on the LOW to HIGH transition of the output pulse.

(8) tf– Fall time is measured from the 10% to the 90% levels on the HIGH to LOW transition of the output pulse.

(9) tELH– Enable input propagation delay is measured from the 1.5V level on the HIGH to LOW transition of the input voltage pulse to the 1.5V level on the LOW to HIGH transition of the output voltage pulse.

(10) tEHL– Enable input propagation delay is measured from the 1.5V level on the LOW to HIGH transition of the input voltage pulse to the 1.5V level on the HIGH to LOW transition of the output voltage pulse.

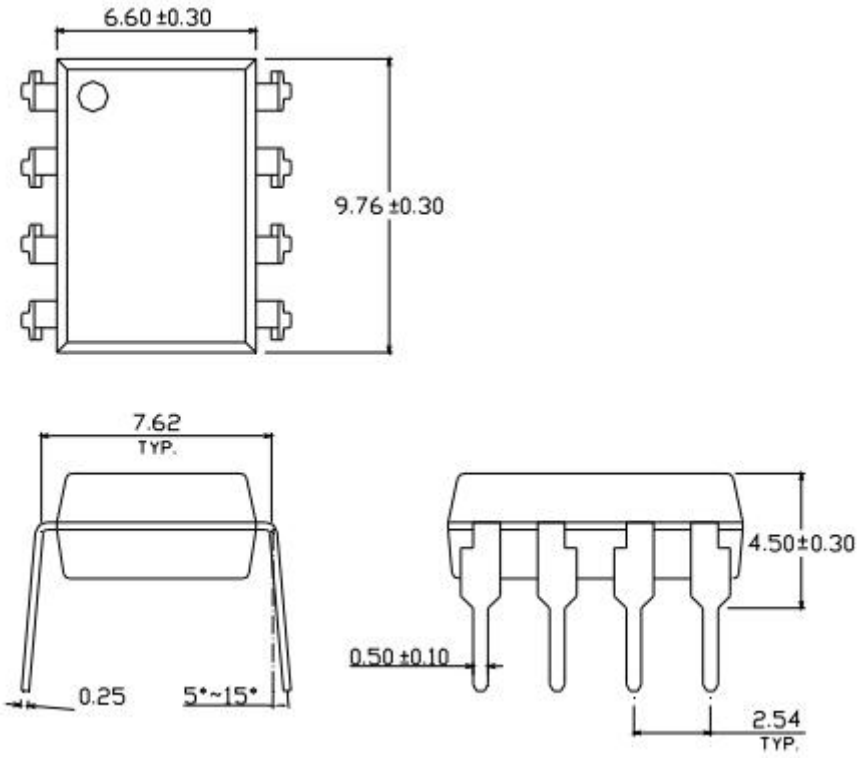
(11) CMH– The maximum tolerable rate of rise of the common mode voltage to ensure the output will remain in the HIGH state (i.e., VOUT > 2.0V).

(12) CML– The maximum tolerable rate of rise of the common mode voltage to ensure the output will remain in the LOW output state (i.e., VOUT < 0.8V).

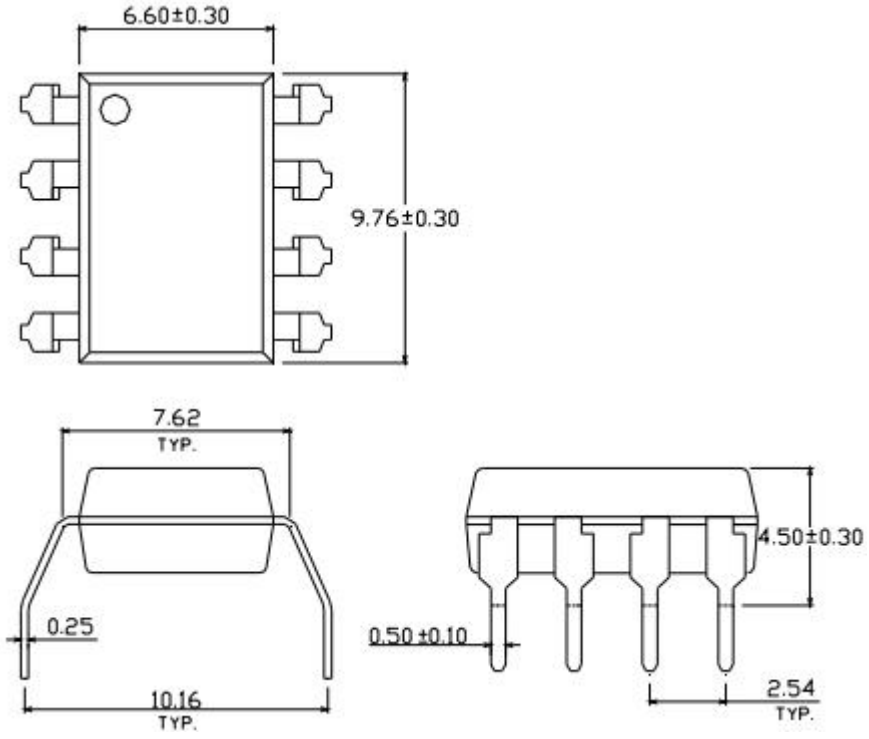
恒拓电子
HENGTUO ELECTRONICS

■ Outline Dimension

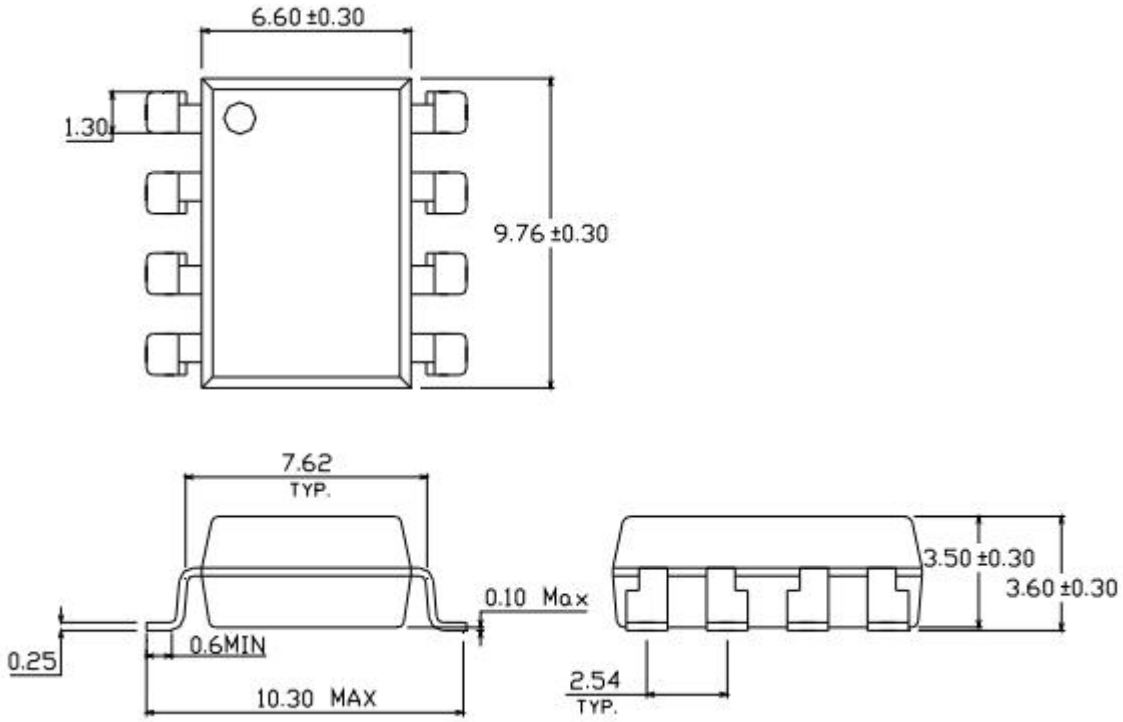
Standard DIP Type



Option M Type

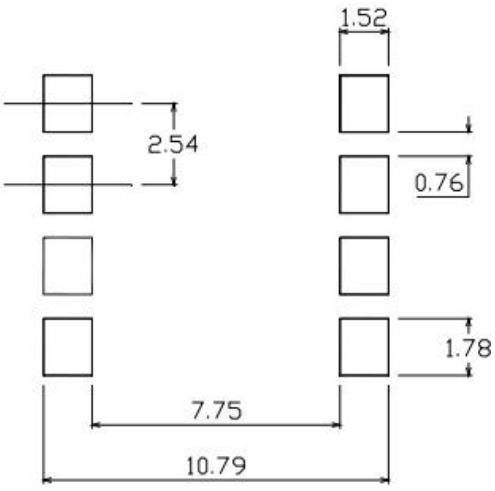


Option S1 Type



Unit: mm
Tolerance: ±0.1mm

■ Recommended solder pad Design

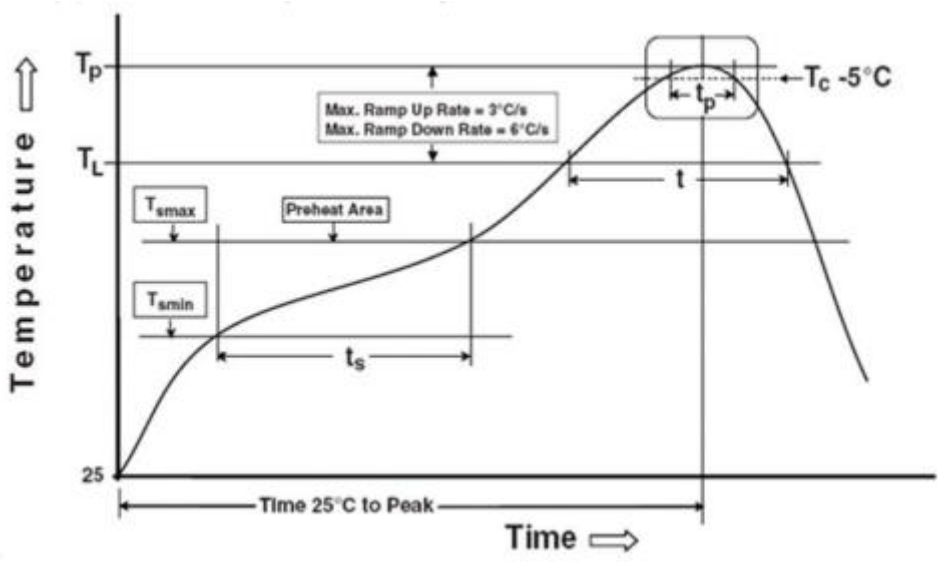


Unit: mm
Tolerance: ±0.1mm

■ Temperature Profile Of Soldering

1. IR Reflow soldering
(IPC/JEDEC J-STD-020D compliant)

Profile item	Conditon
Preheat	
Temperature min (T_{smin})	150 °C
Temperature max (T_{smax})	200°C
Time (T_{smin} to T_{smax}) (t_s)	60-120 seconds
Average ramp-up rate (T_{smax} to T_p)	3 °C/second max
Other	
Liquidus Temperature (T_L)	217 °C
Time above Liquidus Temperature (t_L)	60-100 sec
Peak Temperature (T_P)	260°C
Time within 5 °C of Actual Peak Temperature: T_P - 5°C	30 s
Ramp- Down Rate from Peak Temperature	6°C /second max.
Time 25°C to peak temperature	8 minutes max.
Reflow times	3 times



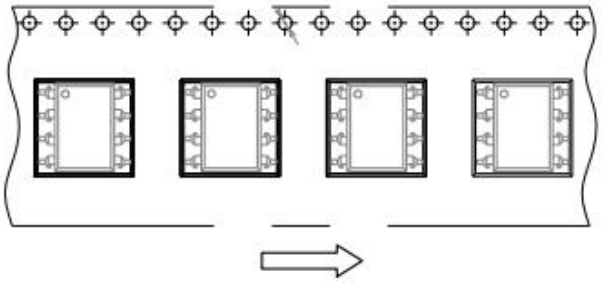
Notes:
One time soldering reflow is recommended within the condition of temperature and time profile shown below. Do not solder more than three times.

恒拓电子
HENGTUO ELECTRONICS

■ Packing

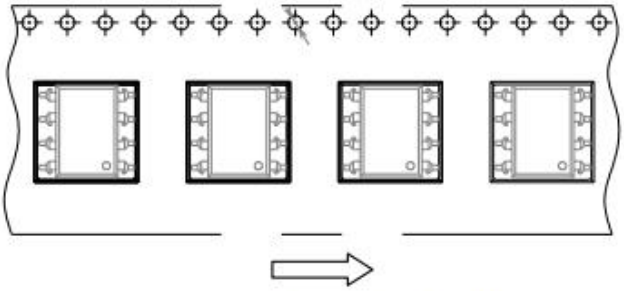
Tape and Reel

Option TP1:



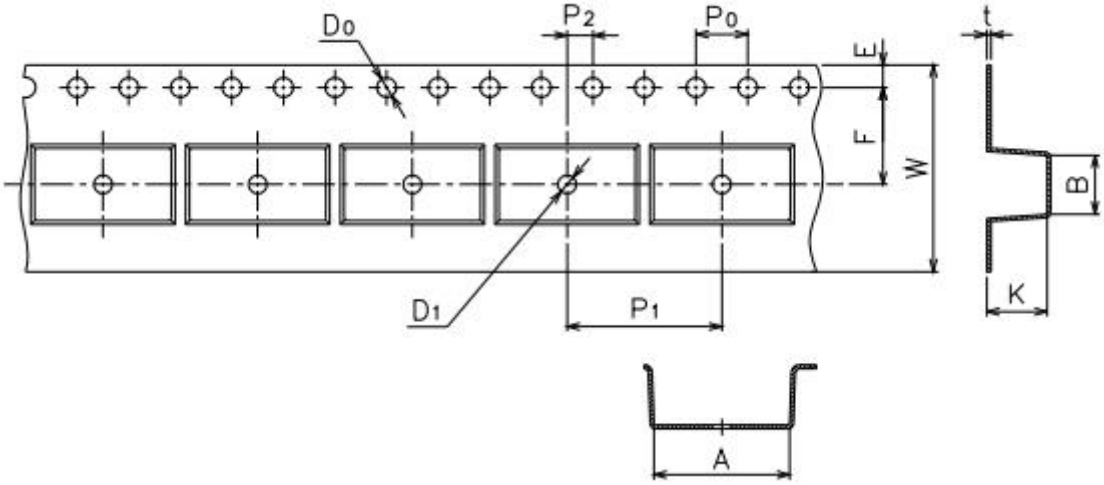
Direction of feed from reel

Option TP:



Direction of feed from reel

Tape dimension



Demension/mm	A	B	Do	D1	E	F
Packagetype:S	10.4±0.1	10.0±0.1	1.5+0.1/-0	1.5±0.25/-0	1.75±0.1	7.5±0.1

Demension/mm	Po	P1	P2	t	W	K
Packagetype:S	4.0±0.1	12.0±0.1	2.0±0.05	0.4±0.05	16.0±0.3/	4.5±0.1

■ Attention:

- Hengtuo is continually improving the quality, reliability, function or design and Hengtuo reserves the right to make changes without further notices.
- The products shown in this publication are designed for the general use in electronic applications such as office automation equipment, communications devices, audio/visual equipment, electrical application and instrumentation.
- For equipment/devices where high reliability or safety is required, such as space applications, nuclear power control equipment, medical equipment, etc, please contact our sales representatives.
- When requiring a device for any "specific" application, please contact our sales in advice.
- If there are any questions about the contents of this publication, please contact us at your convenience.