ORIENT

Photocoupler

Product Data Sheet

Name: ORPC-6N137

Customer:_____

Date: _____

SHENZHEN ORIENT TECHNOLOGY CO.,LTD.

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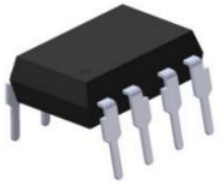
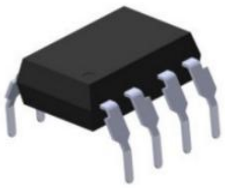
1、Features

(1) 3.3v / 5V supply voltage
(2) low power consumption
(3) high speed: 15MBd(typical)
(4) VCM=1000V, and the lowest common mode inhibition (CMR) is 10 kv/μs
(5) when - 40 ℃ ~ + 85 ℃ temperature of ac and dc performance





2、Instructions

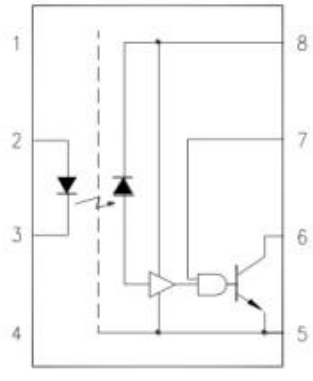
6N137 is made up of an efficient AlGaAs light-emitting diode and high-speed optical detector. This design provides good ac and dc isolation between the input and output ends of the photoelectric coupler. The output characteristic of the photodetector is a collector open circuit schottky clamp transistor. The total mode transient immunity should reach 10 kv/pa at 3.3 v.

The photoelectric coupler operating temperature range: - 40 ℃ ~ + 85 ℃.

3、Application Range

- line receiver isolation
- A/ D, D/A converted digital signal isolation
- eliminate noise from the ground loop
- switching power supply
- alternative pulse transformers
- motor control system
- interface of microprocessor system, computer and peripheral equipment

4、Functional Diagram



1.NC 5.GND
2.Anode 6.Output
3.Cathode 7.VE(Enable)
4.NC 8.Vcc

Truth table

Input (LED)	Enable	Output
ON	H	L
OFF	H	H
ON	L	H
OFF	L	H
ON	NC	L
OFF	NC	H

0.1 capacitor F bypass capacitance needs to be connected between A Pin8 and Pin5

5、Absolute Maximum Ratings (Ta=25℃)*1

Parameter		Symbol	Rated Value	Unit
Input	Average Forward Input Current	I_F	20	mA
	Reverse Input Voltage	V_R	5	V
	Power Dissipation	P_I	40	mV
	Enable Input Voltage	V_E	VCC+0.5	V
	Enable Input current	I_E	5	mA
Output	Output Collector Current	I_O	50	mA
	Output Collector Voltage	V_O	7	V
	Output Collector Power Dissipation	P_O	85	mW
Supply Voltage		V_{CC}	7	V
Insulation Voltage		V_{iso}	5000	Vrms
Working Temperature		T_{opr}	-40 ~ + 85	℃
Storage Temperature		T_{stg}	-55 ~ + 125	
*2	Soldering Temperature	T_{sol}	260	

*1. Room temperature = 25 ℃. Exceeding the maximum absolute rating can permanently damage the device.

Working long hours at the maximum absolute rating can affect reliability.

*2. soldering time is 10 seconds.

6、Recommended Operating Conditions

Parameter	Symbol	Min	Max	Unit
Operating Temperature	T_A	-40	85	℃
Supply Voltage	V_{CC}	2.7	3.6	V
		4.5	5.5	
Low Level Input Current	I_{FL}	0	250	μA
High Level Input Current	I_{FH}	5	15	mA
Low Level Enable Voltage	V_{EL}	0	0.8	V
High Level Enable Voltage	V_{EH}	2	V_{CC}	V
Output Pull-up Resistor	R_L	330	4k	Ω
Fan Out (at RL=1kΩ per channel)	N	—	5	TTL Loads

7、Opto-electronic Characteristics

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Input						
Forward voltage	V_F	I_F= 10mA	—	1.38	1.7	V
Temperature Coefficient OF Forward Voltage	$\Delta V_F/ \Delta T$	I_F= 10mA	—	-1.5	—	mV/℃
Reverse Voltage	BV_R	I_R = 10μA	5	—	—	V
Input Threshold Current	I_{TH}	V_E=2V,V_{CC}=3.3V V_O=0.6V I_{OL} (sinking) =13mA	—	1.5	5	mA
Input Capacitance	C_{IN}	f = 1MHz, VF = 0V	—	34	—	pF
Detector						
High Level Supply Current	I_{CCH}	V_E= 0.5V, V_{CC}=3.3V,I_F=0mA	—	3.8	10	μA
Low Level Supply Current	I_{CCL}	V_E= 0.5V, V_{CC}= 3.3V,I_F=10mA	—	5.8	13	mA
High Level Enable Current	I_{EH}	V_{CC}= 3.3V,V_E=2V	—	-0.19	-1.6	mA
Low Level Enable Current	I_{EL}	V_{CC}= 3.3V,V_E=0.5V	—	-0.41	-1.6	mA
High Level Enable Voltage	V_{EH}		2	—	—	V
Low Level Enable Voltage	V_{EL}			—	0.8	V
High Level Output Current	I_{OH}	V_E=2V, V_{CC}=3.3V , V_O=3.2V,I_F=250μA	—	5	100	μA
Low Level Output Voltage	V_{OL}	V_E=2V, V_{CC}=3.3V , I_F=5mA, I_{OL} (sinking) = 13mA	—	0.3	0.6	V

Recommended temperature range (T_A= -40℃—+85℃,2.7V≤V_{CC}≤3.6 V),I_F= 7.5mA Unless otherwise stated. Typical valuesT_A =25℃,V_{CC} = 3.3 V.

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Input						
Forward voltage	V_F	I_F= 10mA	—	1.38	1.7	V
Temperature Coefficient OF Forward Voltage	$\Delta V_F/ \Delta T$	I_F= 10mA	—	-1.5	—	mV/℃
Reverse Voltage	BV_R	I_R = 10μA	5	—	—	V
Input Threshold Current	I_{TH}	V_{CC}=5.5V,V_O=0.6V I_{OL}>13mA	—	1.35	5	mA
Input Capacitance	C_{IN}	f = 1MHz, V_F = 0V	—	34	—	pF
Detector						
High Level Supply Current	I_{CCH}	V_E= 0.5V, V_{CC}=5.5V,I_F=0mA	—	6.1	10	μA
Low Level Supply Current	I_{CCL}	V_E= 0.5V, V_{CC}= 5.5V,I_F=10mA	—	8.3	13	mA
High Level Enable Current	I_{EH}	V_{CC}= 5.5V,V_E=2V	—	-0.6	-1.6	mA
Low Level Enable Current	I_{EL}	V_{CC}= 5.5V,V_E=0.5V	—	-0.9	-1.6	mA
High Level Enable Voltage	V_{EH}		2	—	—	V
Low Level Enable Voltage	V_{EL}			—	0.8	V
High Level Output Current	I_{OH}	V_E=2V, V_{CC}=5.5V , V_O=5.5V,I_F=250μA	—	0.9	100	μA
Low Level Output Voltage	V_{OL}	V_E=2V, V_{CC}=5.5V , I_F=5mA, I_{OL} (sinking) = 13mA	—	0.3	0.6	V

Recommended temperature range(T_A= -40℃—+85℃,4.5V≤V_{CC}≤5.5V),I_F= 7.5mA Unless otherwise stated.

Typical values T_A =25℃,V_{CC} = 5.0V.

8、Switching Characteristics

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Propagation delay time to output High level	t_{PLH}	R_L=350Ω C_L=15pF	25	48	90	ns
Propagation delay time to output Low level	t_{PHL}		25	35	75	ns
Pulse Width Distortion	$\|t_{PLH}-t_{PHL}\|$		—	13	—	ns
Output Rise Time (10 to 90%)	tr		—	21	—	ns
Output Fall Time (90 to 10%)	t_f		—	6.6	—	ns
Propagation Delay Time of Enable from V_{EH} to V_{EL}	t_{ELH}	R_L=350Ω C_L=15pF V_{EL}=0V V_{EH}=3V	—	27	—	ns
Propagation Delay Time of Enable from V_{EL} to V_{EH}	t_{EHL}		—	9	—	ns

Recommended temperature range (T_A= -40℃—+85℃,2.7V≤V_{CC}≤3.6 V),I_F= 7.5mA Unless otherwise stated. Typical values T_A =25℃,V_{CC} = 3.3 V。

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Propagation delay time to output High level	t_{PLH}	T_A=25 ℃ R_L=350 Ω C_L=15pF	25	40	75	ns
			—	—	100	
Propagation delay time to output Low level	t_{PHL}		25	32	75	ns
			—	—	100	
Pulse Width Distortion	$\|t_{PLH}-t_{PHL}\|$	R_L=350Ω C_L=15pF	—	8	—	ns
Output Rise Time (10 to 90%)	tr		—	22	—	ns
Output Fall Time (90 to 10%)	t_f		—	6.9	—	ns
Propagation Delay Time of	t_{ELH}	R_L=350Ω	—	28	—	ns

Enable from V_{EH} to V_{EL}		C_L=15pF				
Propagation Delay Time of Enable from V_{EL} to V_{EH}	t_{EHL}	V_{EL}=0V V_{EH}=3V	—	12	—	ns

Recommended temperature range (T_A= -40℃—+85℃,4.5V≤V_{CC}≤5.5V),I_F= 7.5mA Unless otherwise stated.

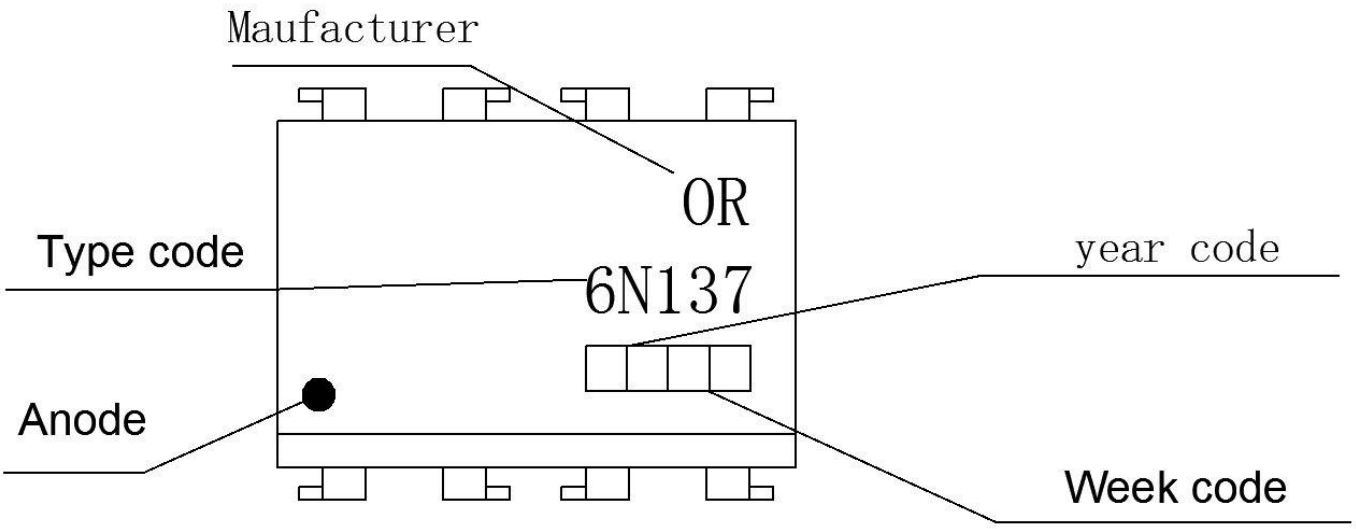
Typical values T_A =25℃,V_{CC} = 5.0 V。

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Logic High Common Mode Transient Immunity	$\|CM_H\|$	V_{CC}=3.3V,V_{CM}=1000V,R_L=350Ω I_F=0mA,T_A=25℃	10	15	—	kV/μs
		V_{CC}=5V,V_{CM}=1000V,R_L=350Ω I_F=0mA,T_A=25℃	10	15	—	
Logic Low Common Mode Transient Immunity	$\|CM_L\|$	V_{CC}=3.3V,V_{CM}=1000V,R_L=350Ω I_F=10mA,T_A=25℃	10	15	—	kV/μs
		V_{CC}=5V,V_{CM}=1000V,R_L=350Ω I_F=10mA,T_A=25℃	10	15	—	

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Input-Output Insulation Leakage Current	I_{I-O}	45% RH,t=5s, V_{I-O} = 3kV DC,T_A =25 C	—	—	1	μA
Withstand Insulation Test Voltage	V_{ISO}	RH ≤ 50%, t =1min,T_A=25℃	5000	—	—	V_{RMS}
Input-Output Resistance	R_{I-O}	V_{I-O} = 500V DC	—	10^{12}	—	Ω
Input-Output Capacitance	C_{I-O}	f = 1MHz, T_A = 25 C	—	1		p

Recommended temperature range (T_A=40℃-85℃) Unless otherwise stated. Typical values T_A =25℃.

9、Naming Rule



NOTE :

(1) year Code : □□ '08' means' 2008 ', '09' means' 2009 'and so on.

(2) Week Code : □□ 01 represents the first week, 02 represents the second week, and so on.

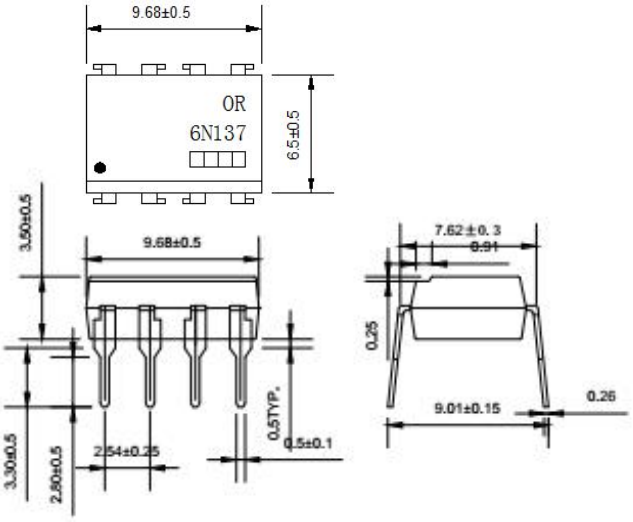
(3)OR :Manufacturer name, representing manufacturer Shenzhen Orient Components Co., Ltd.

(4) Type code: representing type 6N137.

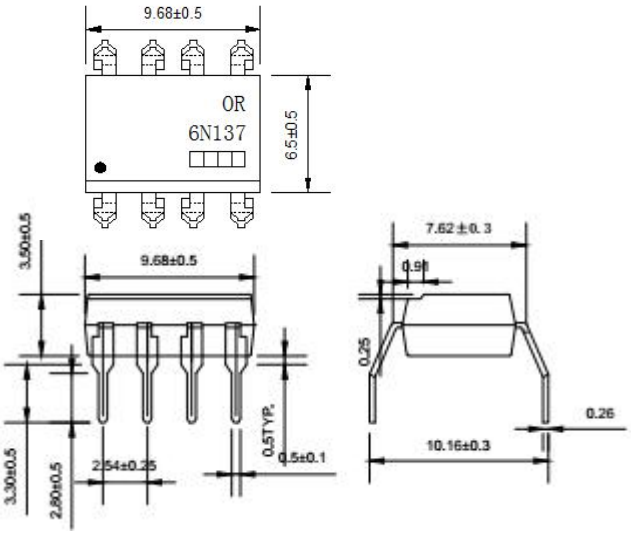
(5)Anode

10、 Outer Dimension

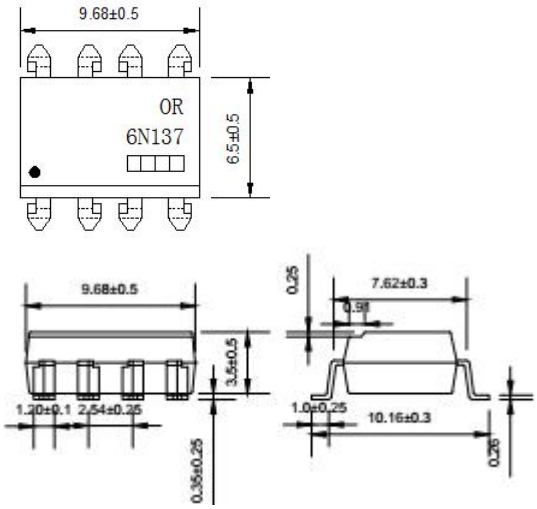
(1) OR-6N137



(2) OR-6N137M

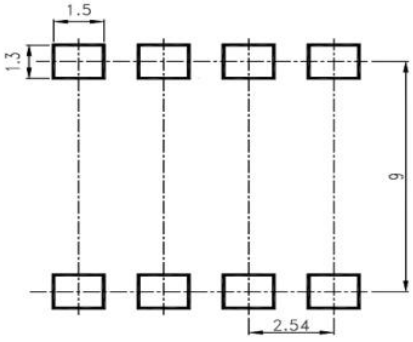


(3) OR-6N137S



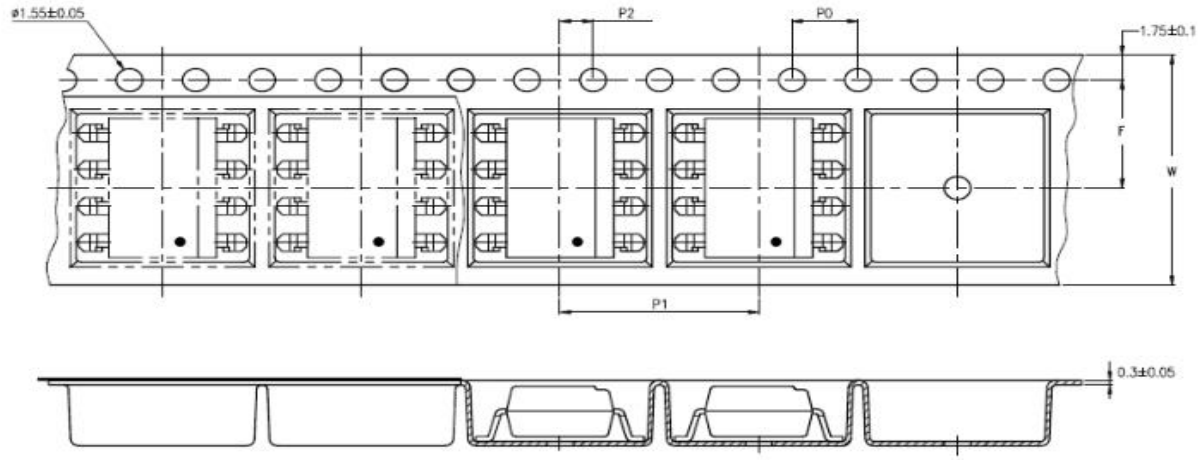
11、Recommended Foot Print Patterns (Mount Pad)

(unit : mm)

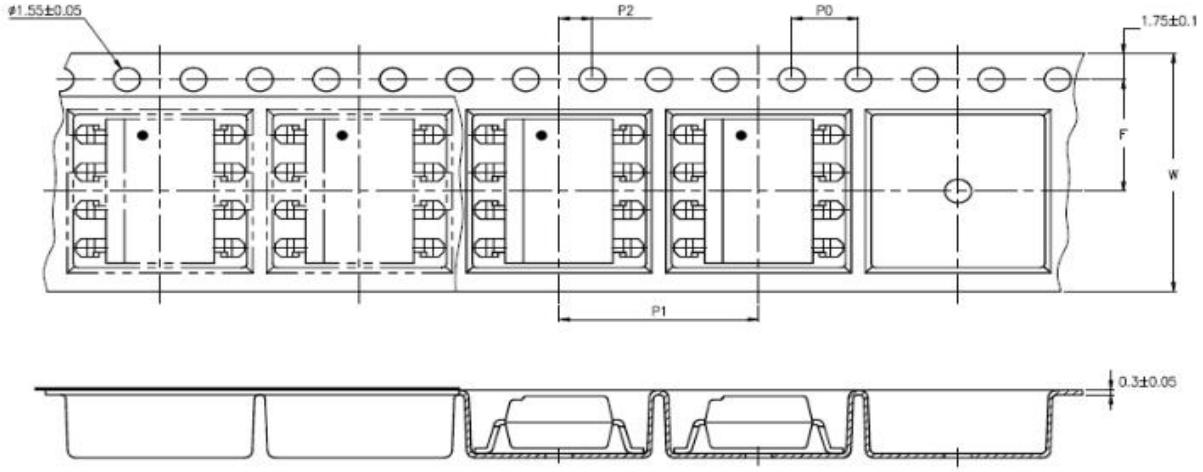


12、Taping Dimensions

(1) OR-6N137-TA



(2) OR-6N137-TA1



type	symbol	Size: mm (inches)
bandwidth	W	16±0.3 (0.63)
pitch	P0	4±0.1 (0.15)
pitch	F	7.5±0.1 (0.295)
	P2	2±0.1 (0.079)
interval	P1	12±0.1 (0.472)

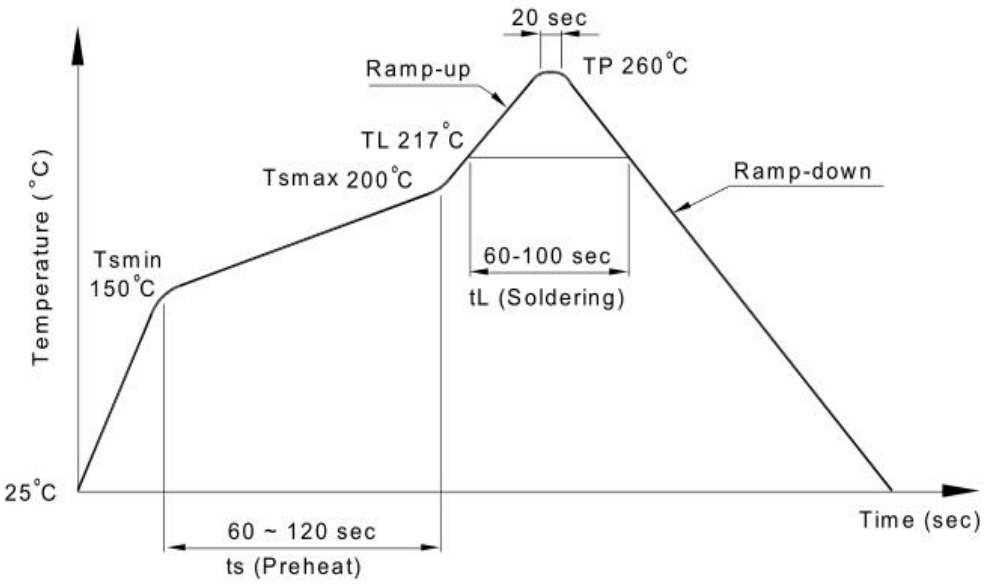
Encapsulation type	TA/TA1
amount (pcs)	1000

13、Temperature Profile Of Soldering

（1）IR Reflow soldering (JEDEC-STD-020C compliant)

Note: one solder backflow is recommended under the conditions described below in the temperature and time profile. Do not weld more than three times.

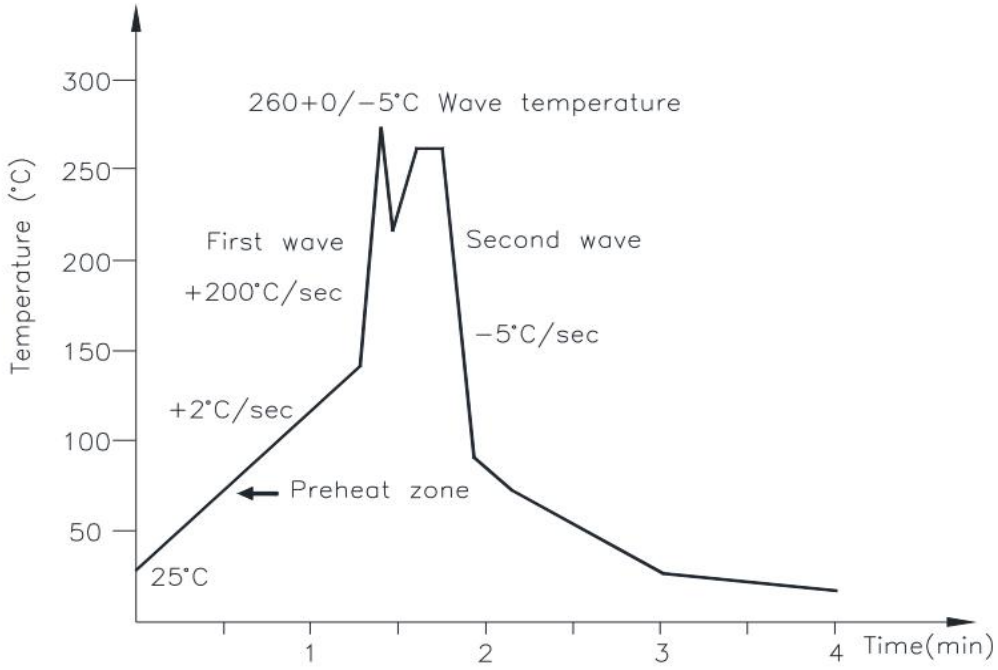
Configuration items	conditions
Preheat - TSmin - TSmax - Time (min to Max (TS)	 150˚C 200˚C 90±30 sec
Soldering zone - temperature （T_L） - time (t_L)	 217˚C 60 ~ 100 sec
Peak Temperature	260˚C
Ramp-up rate	3˚C / sec max.
Drop rate （3˚C / sec max.）	3 ~ 6˚C / sec



（2）Wave soldering (JEDEC22A111 compliant)

One-time welding is recommended under the temperature condition.

Temperature Time	260+0/-5˚C 10 sec
Preheat temperature Preheat time	5 to 140˚C 30 to 80 sec



（3）Hand soldering by soldering iron

Single lead welding is allowed in each process and one-time welding is recommended.

Temperature Time	380+0/-5˚C 3 sec max

14、Switching time test circuit

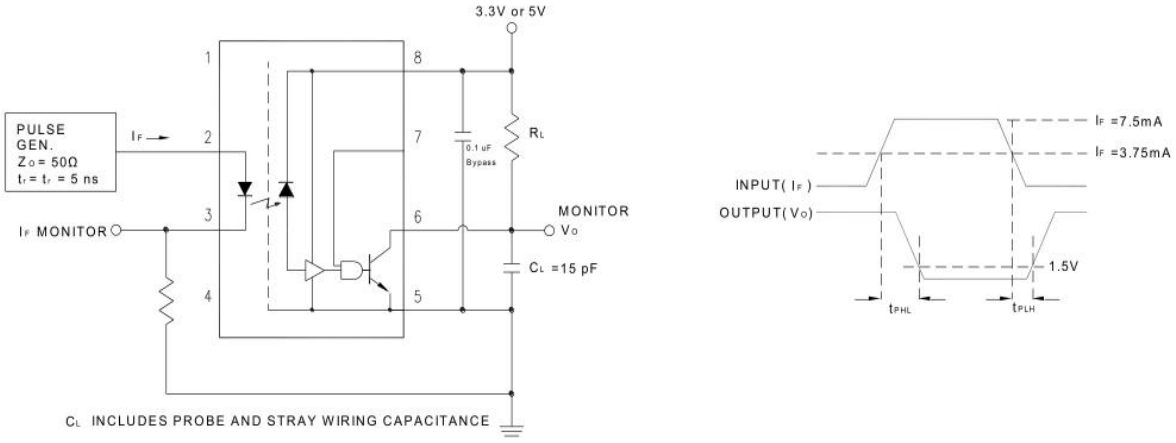


Figure 1: Test Circuit for t_{PHL} and t_{PLH}

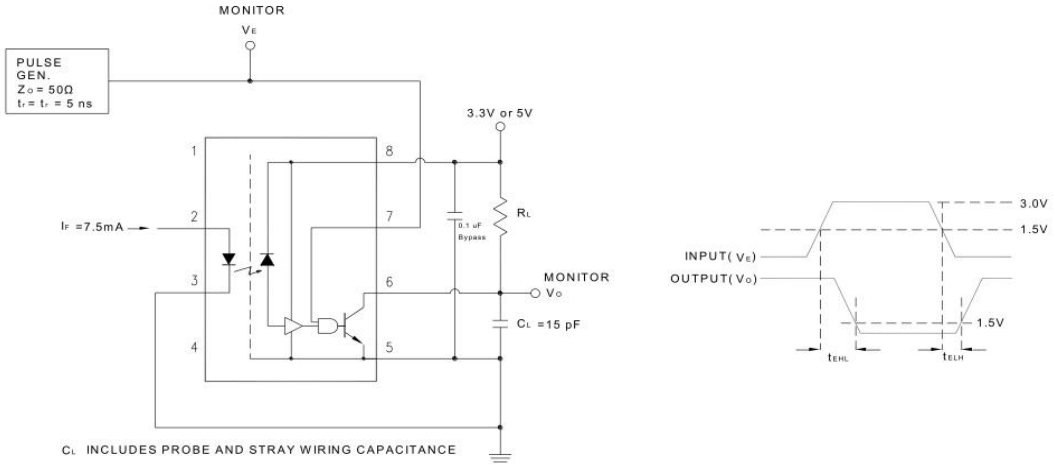


Figure 2: Single Channel Test Circuit for Common Mode Transient Immunity

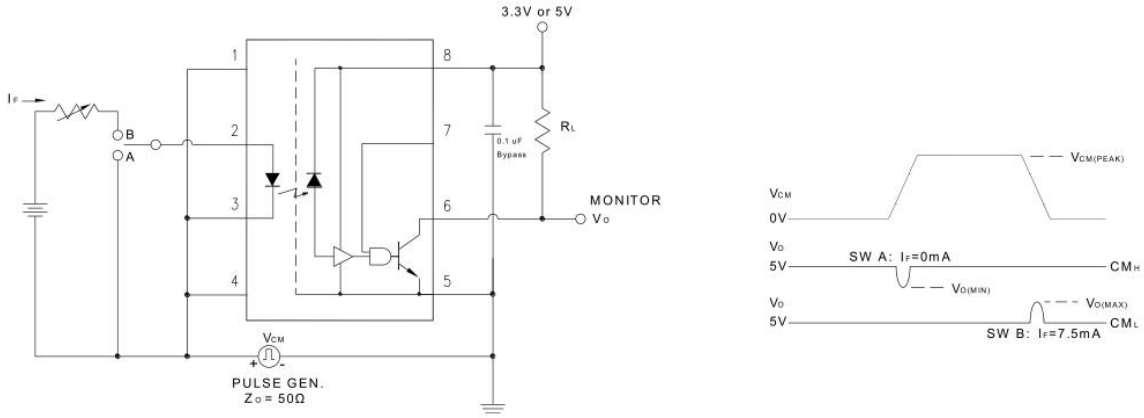


Figure 3: Single Channel Test Circuit for Common Mode Transient Immunity

15、Characteristics Curve

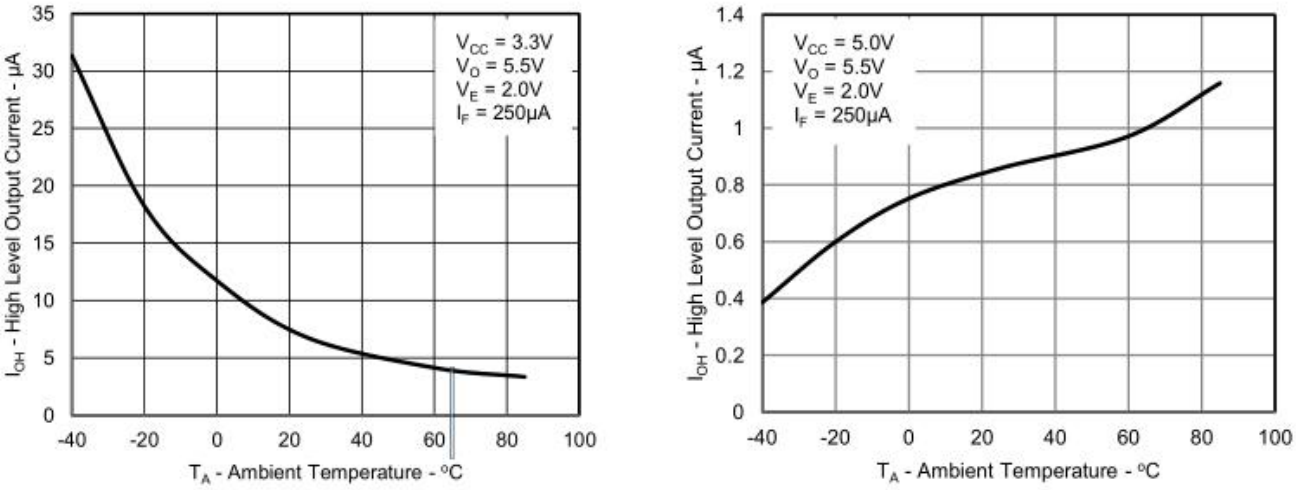


Figure 4: Typical High Level Output Current vs. Ambient Temperature

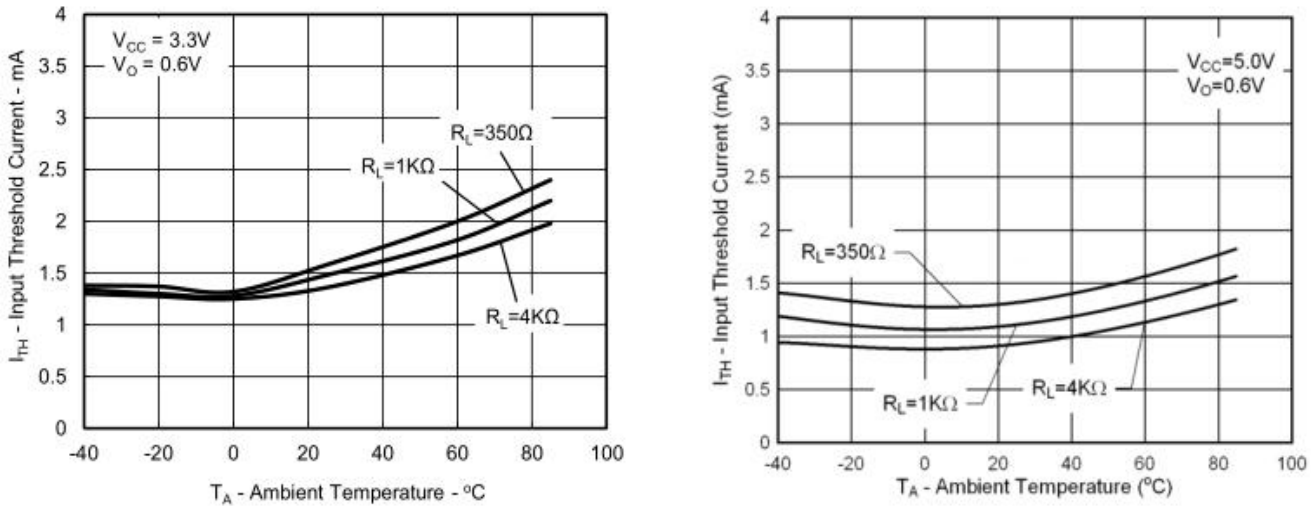


Figure 5: Typical Input Diode Threshold Current vs. Ambient Temperature

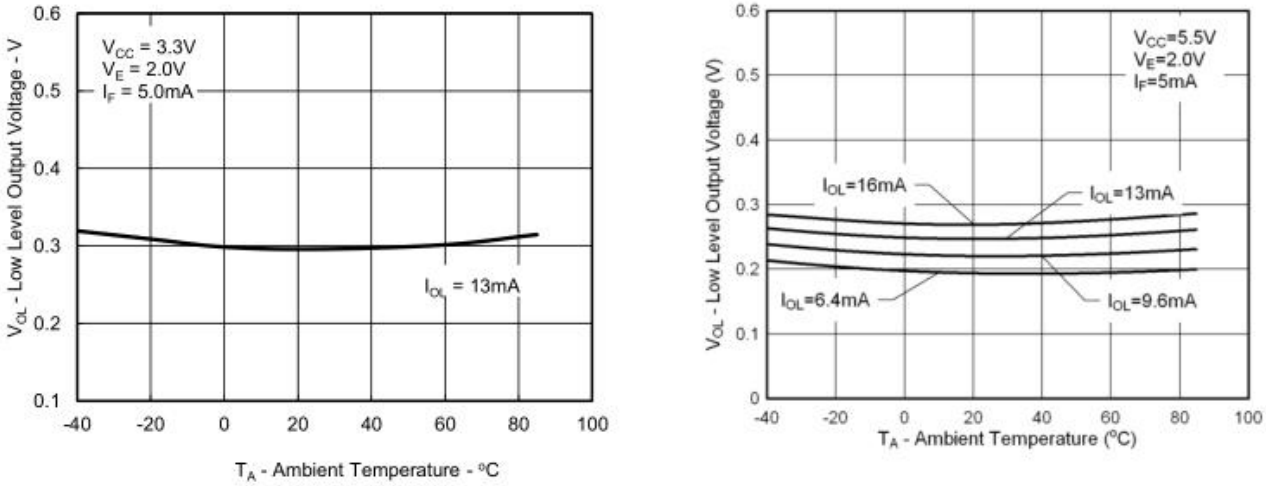


Figure 6: Typical Low Level Output Voltage vs. Ambient Temperature

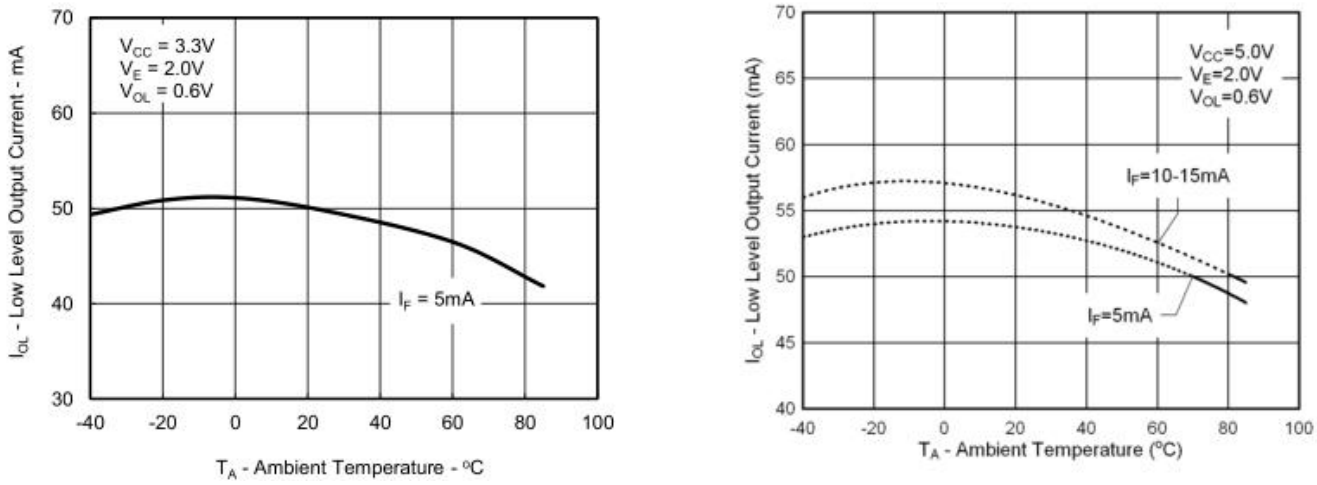


Figure 7: Typical Low Level Output Current vs. temperature

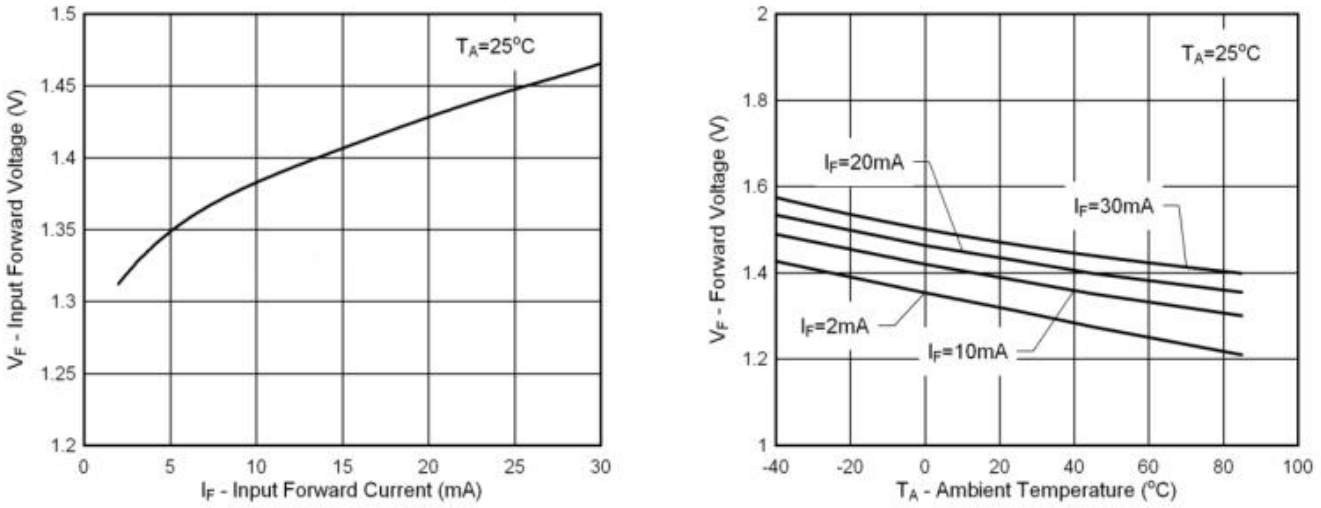


Figure 8: Typical Input Diode Forward Characteristic

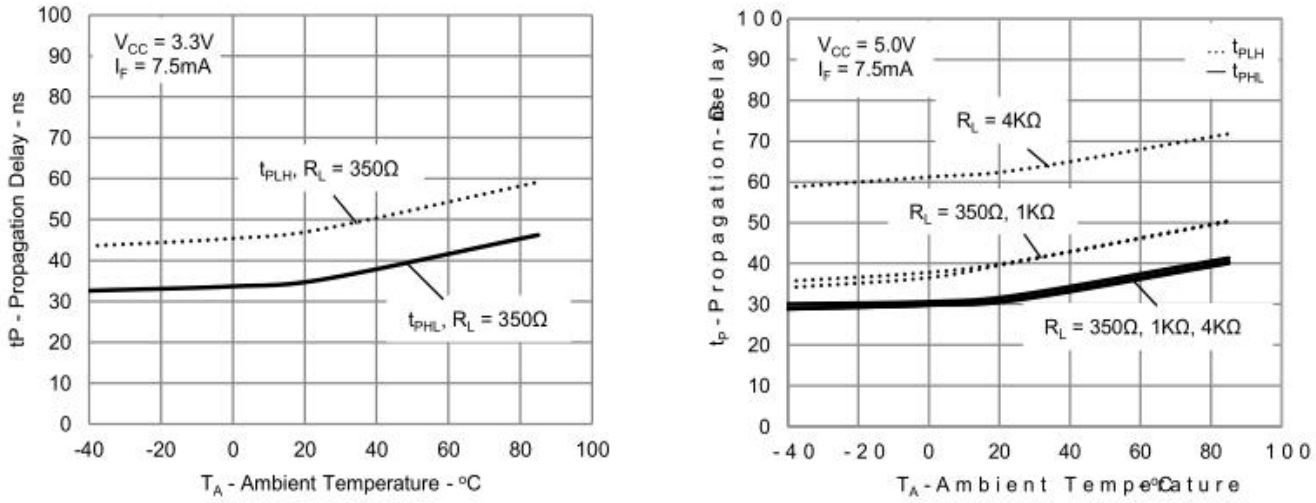


Figure 9: Typical Propagation Delay vs. Ambient Temperature

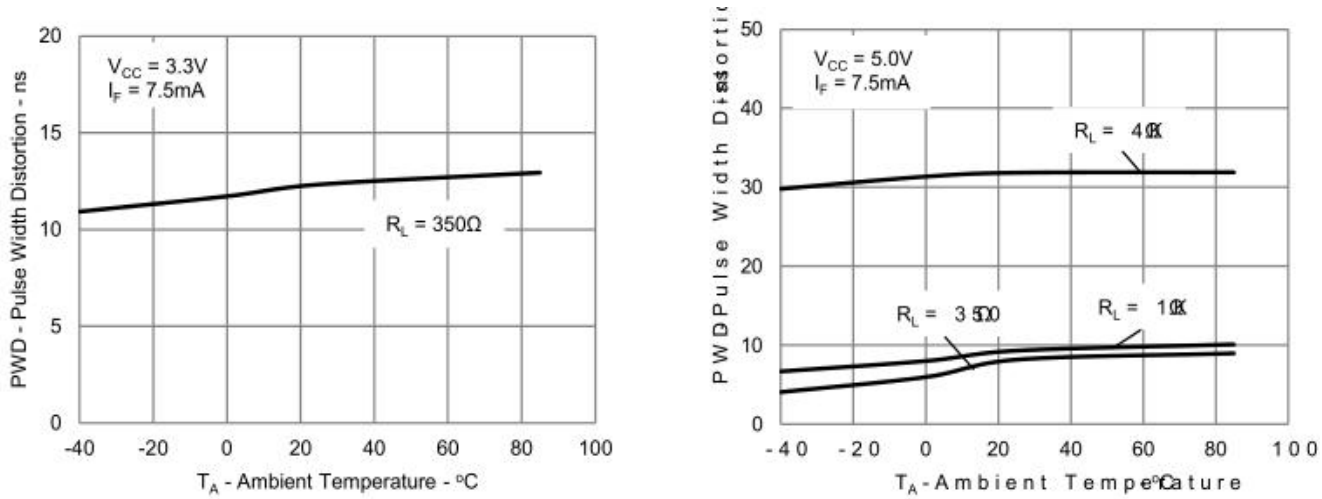


Figure 10: Typical Pulse Width Distortion vs. Ambient Temperature

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