



ORIENT

Photo coupler

Product Data Sheet

Part Number: OR-6N137

Customer: _____

Date: _____

SHENZHEN ORIENT COMPONENTS CO., LTD

Block A 3rd Floor No.4 Building, Tian'an Cyber Park, Huangge Rd, LongGang Dist, Shenzhen, GD

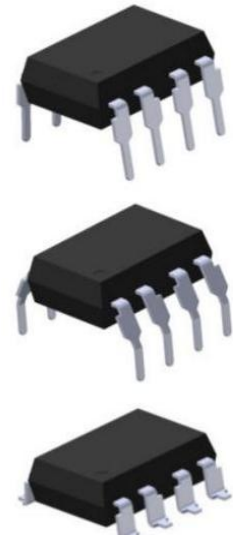
TEL: 0755-29681816

FAX: 0755-29681200

www.orient-opto.com

1. Features

- (1) 3.3v / 5V supply voltage
- (2) Low power consumption
- (3) High speed: 15MBd(typical)
- (4) $V_{CM}=1000V$, and the lowest common mode inhibition (CMR) is 10 kv/ μ s.
- (5) - 40 °C ~ + 110 °C temperature of AC and DC performance.
- (6) Safety approval
 - UL approved (No.E323844)
 - VDE approved (No.40029733)
 - CQC approved (No.CQC19001231254)
- (7) In compliance with RoHS, REACH standards
- (8) MSL Class I



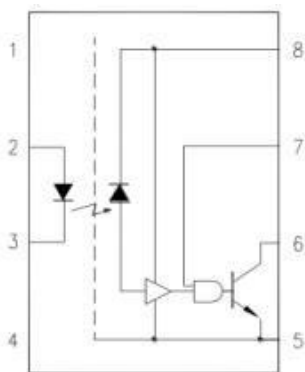
2. Instructions

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/ps at 3.3 v. The photoelectric couple operating temperature range: - 40 °C ~ + 110 °C.

3. Application Range

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

4. Functional Diagram



- 1. NC 5. GND
- 2. Anode 6. Output
- 3. Cathode 7. V_E (Enable)
- 4. NC 8. V_{CC}

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°C)*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 | mW |
| | Enable Input Voltage | V _E | V _{CC} +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 | V _{rms} |
| Working Temperature | | T _{opr} | -40 ~ + 110 | °C |
| Storage Temperature | | T _{stg} | -55 ~ + 125 | |
| *2 | Soldering Temperature | T _{sol} | 260 | |

*1. Room temperature = 25 °C. 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 | 110 | °C |
| 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 | 4000 | Ω |
| Fan Out (at R _L =1kΩ per channel) | N | — | 5 | TTL Loads |

7. Opto-electronic Characteristics

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

Recommended temperature range ($T_A = -40^\circ\text{C} \sim +110^\circ\text{C}, 2.7\text{V} \leq V_{CC} \leq 3.6\text{V}$), $I_F = 7.5\text{mA}$ Unless otherwise stated. Typical values $T_A = 25^\circ\text{C}, V_{CC} = 3.3\text{V}$.

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

Recommended temperature range ($T_A = -40^\circ\text{C} \sim +110^\circ\text{C}, 4.5\text{V} \leq V_{CC} \leq 5.5\text{V}$), $I_F = 7.5\text{mA}$ Unless otherwise stated.

Typical values $T_A = 25^\circ\text{C}, V_{CC} = 5.0\text{V}$.

8. Switching Characteristics

| Parameter | Symbol | Min | Typ | Max | Unit | Condition |
|--|---------------------|-----|-----|-----|------|---|
| Propagation delay time to output High level | t_{PLH} | 25 | 48 | 90 | ns | $R_L=350\Omega, C_L=15pF$ |
| 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%) | t_r | — | 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} | — | 27 | — | ns | $R_L=350\Omega, C_L=15pF$ $V_{EL}=0V, V_{EH}=3V$ |
| Propagation Delay Time of Enable from V_{EL} to V_{EH} | t_{EHL} | — | 9 | — | ns | |

Recommended temperature range ($T_A = -40^\circ C \sim +110^\circ C, 2.7V \leq V_{CC} \leq 3.6V$), $I_F = 7.5mA$ Unless otherwise stated.

Typical values $T_A = 25^\circ C, V_{CC} = 3.3V$.

| Parameter | Symbol | Min | Typ | Max | Unit | Condition |
|--|---------------------|-----|-----|-----|------|---|
| Propagation delay time to output High Level | t_{PLH} | 25 | 40 | 75 | ns | $T_A=25^\circ C,$ $R_L=350\Omega,$ $C_L=15pF$ |
| | | — | — | 100 | | |
| Propagation delay time to output Low Level | t_{PHL} | 25 | 32 | 75 | ns | |
| | | — | — | 100 | | |
| Pulse Width Distortion | $ t_{PLH}-t_{PHL} $ | — | 8 | — | ns | |
| Output Rise Time (10 to 90%) | t_r | — | 22 | — | ns | |
| Output Fall Time (90 to 10%) | t_f | — | 6.9 | — | ns | |
| Propagation Delay Time of Enable from V_{EH} to V_{EL} | t_{ELH} | — | 28 | — | ns | $R_L=350\Omega$ $C_L=15pF$ $V_{EL}=0V$ $V_{EH}=3V$ |
| Propagation Delay Time of Enable from V_{EL} to V_{EH} | t_{EHL} | — | 12 | — | ns | |

Recommended temperature range ($T_A = -40^\circ C \sim +110^\circ C, 4.5V \leq V_{CC} \leq 5.5V$), $I_F = 7.5mA$ Unless otherwise stated.

Typical values $T_A = 25^\circ C, V_{CC} = 5.0V$.

| Parameter | Symbol | Min | Typ | Max | Unit | Condition |
|---|-----------------|-----|-----|-----|-------|---|
| Logic High Common Mode Transient Immunity | CM _H | 10 | 15 | — | kV/μs | V _{CC} =3.3V, V _{CM} =1000V, R _L =350Ω I _F =0mA, T _A =25°C |
| | | 10 | 15 | — | | V _{CC} =5V, V _{CM} =1000V, R _L =350Ω I _F =0mA, T _A =25°C |
| Logic Low Common Mode Transient Immunity | CM _L | 10 | 15 | — | kV/μs | V _{CC} =3.3V, V _{CM} =1000V, R _L =350Ω I _F =10mA, T _A =25°C |
| | | 10 | 15 | — | | V _{CC} =5V, V _{CM} =1000V, R _L =350Ω I _F =10mA, T _A =25°C |

| Parameter | Symbol | Min | Typ | Max | Unit | Condition |
|---|------------------|------|------------------|-----|------------------|--|
| Input-Output Insulation Leakage Current | I _{I-O} | — | — | 1 | μA | 45% RH, t=5s, V _{I-O} = 3KV DC, T _A =25 C |
| Withstand Insulation Test Voltage | V _{ISO} | 5000 | — | — | V _{RMS} | RH ≤ 50%, t =1min, T _A =25°C |
| Input-Output Resistance | R _{I-O} | — | 10 ¹² | — | Ω | V _{I-O} =500V DC |
| Input-Output Capacitance | C _{I-O} | — | 1 | | p | f = 1MHz, T _A = 25 C |

Recommended temperature range (T_A=40°C-110°C) Unless otherwise stated. Typical values T_A =25°C.

9. Order Information

Part Number

OR-6N137Y-Z

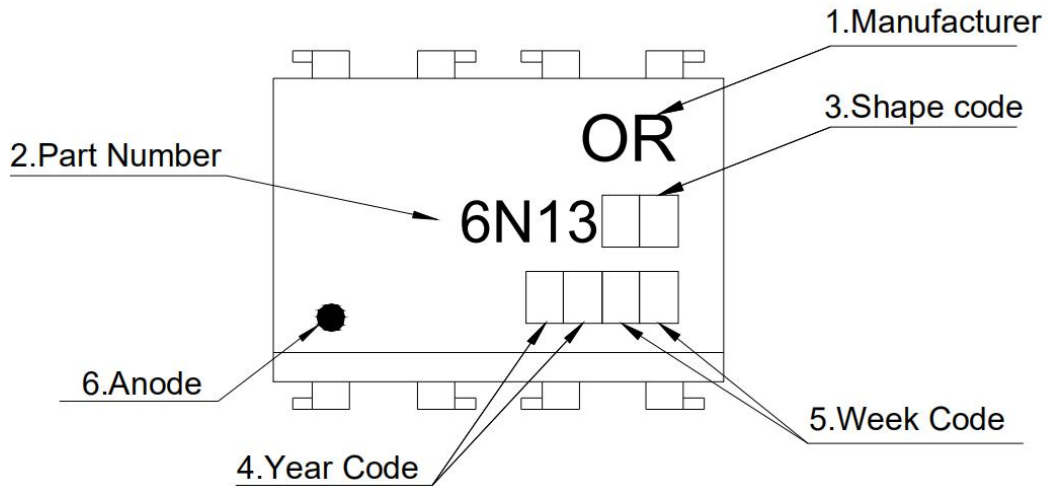
Note

Y = Lead form option (S, M or none)

Z = Tape and reel option (TA,TA1 or none).

| Option | Description | Packing quantity |
|--------|--|---------------------|
| None | Standard SMD Option | 45 units per tube |
| M | Wide lead bend (0.4 inch spacing) | 45 units per tube |
| TA | Surface mount lead form (low profile) + TA tape & reel option | 1000 units per reel |
| TA1 | Surface mount lead form (low profile) + TA1 tape & reel option | 1000 units per reel |

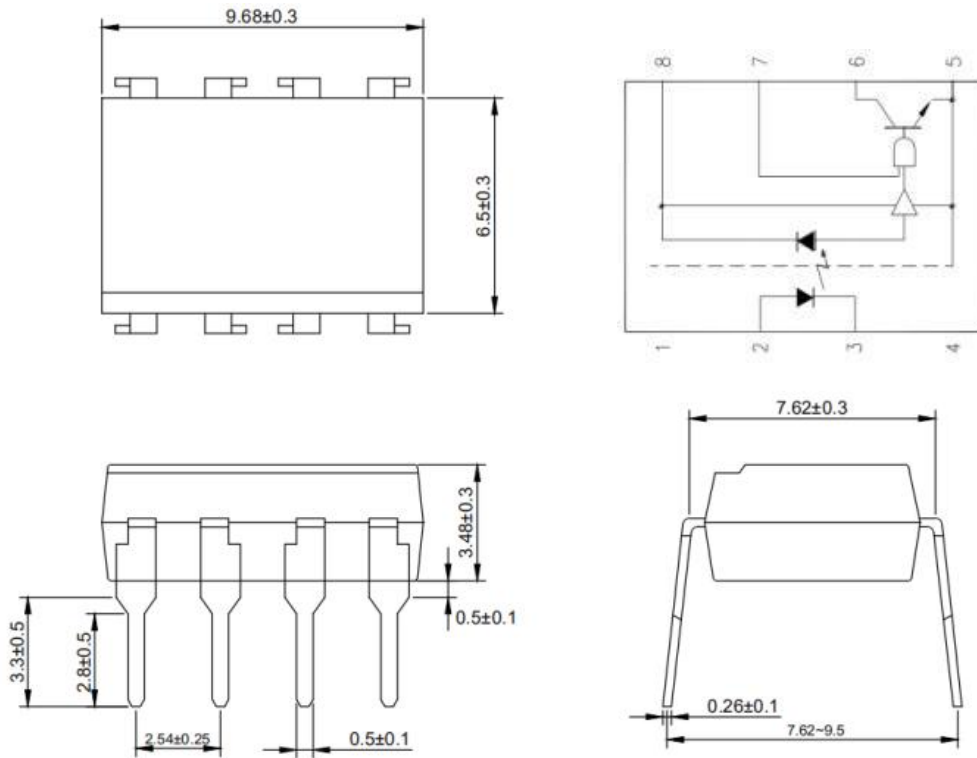
10. Naming Rule



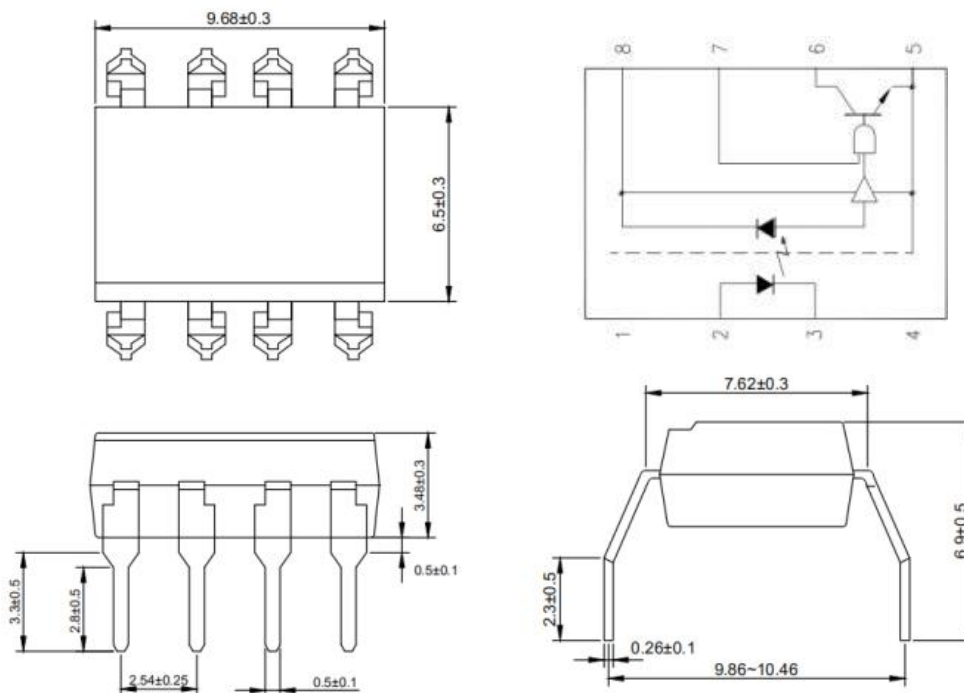
1. Manufacturer : ORIENT.
2. Part Number : 6N137.
3. Shape Code .
4. Year Code : '21' means '2021' and so on.
5. Week Code : 01 means the first week, 02 means the second week and so on.
6. Anode.

11. Outer Dimension

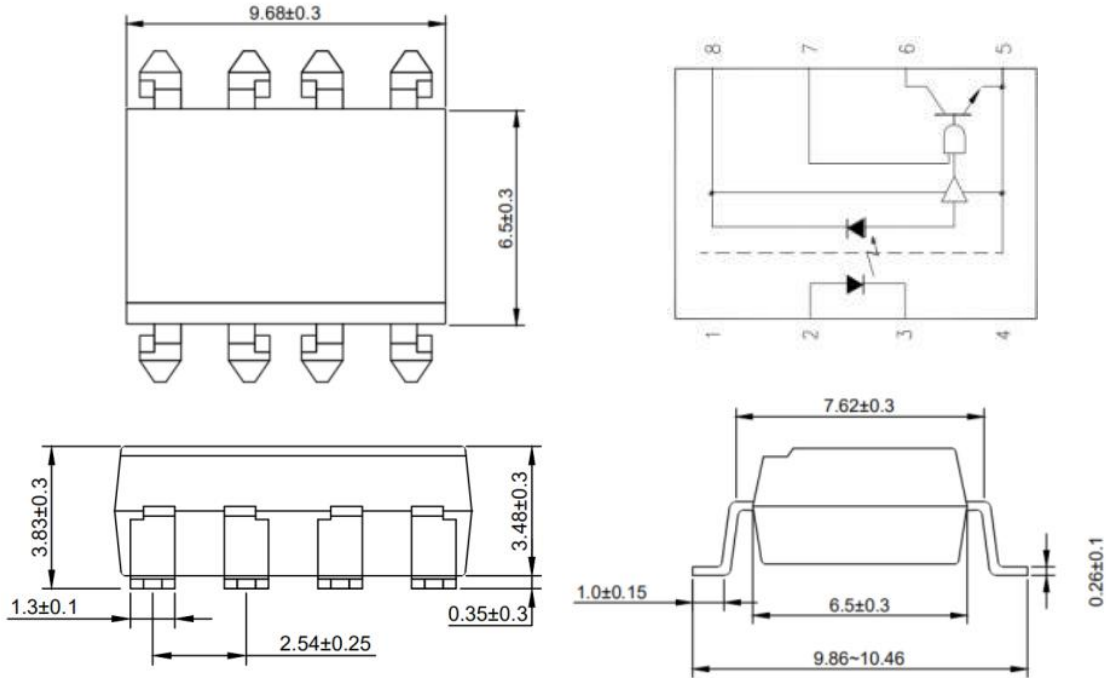
(1) OR-6N137



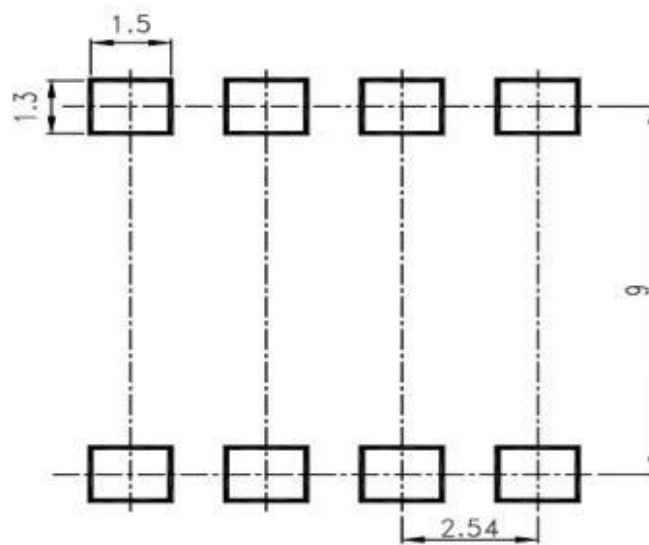
(2) OR-6N137M



(3) OR-6N137S



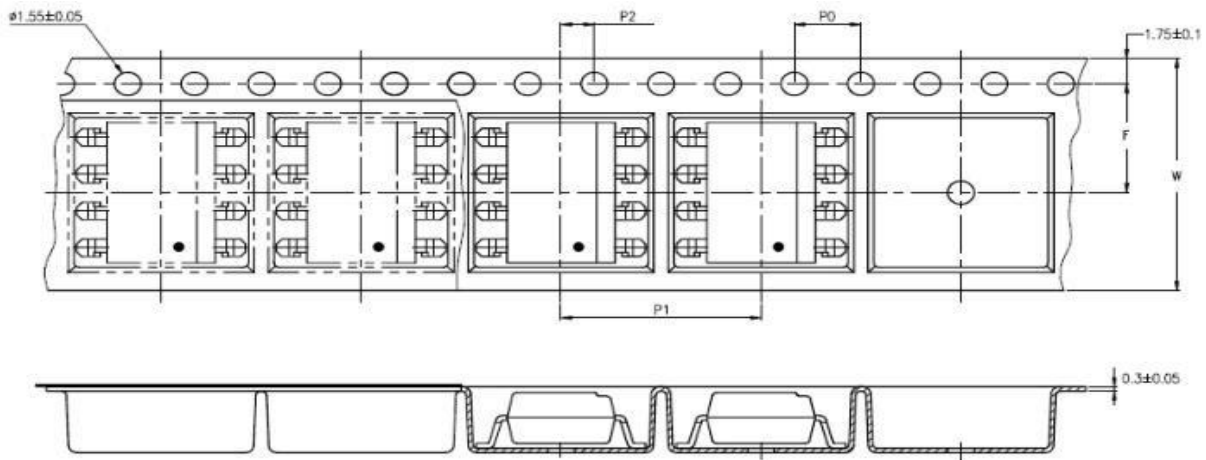
12、 Recommended Foot Print Patterns (Mount Pad)



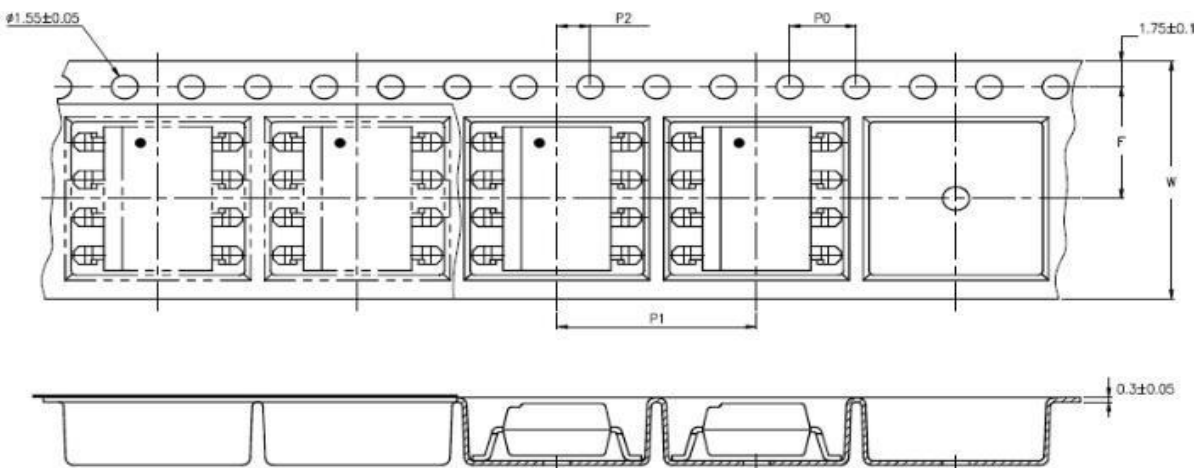
unit: mm

12. Taping Dimensions

(1) OR-6N137S-TA



(2) OR-6N137S-TA1



| type | symbol | Size: mm (inches) |
|-----------|--------|-----------------------|
| bandwidth | W | 16 ± 0.3 (0.63) |
| pitch | P_0 | 4 ± 0.1 (0.15) |
| pitch | F | 7.5 ± 0.1 (0.295) |
| | P_2 | 2 ± 0.1 (0.079) |
| interval | P_1 | 12 ± 0.1 (0.472) |

| | |
|--------------------|--------|
| Encapsulation type | TA/TA1 |
| amount (pcs) | 1000 |

13. Package Dimension

(1) package dimension

DIP Type

| Packing Information | |
|-----------------------------|---------------|
| Packing type | Tube |
| Qty per Tube | 45pcs |
| Small box (Inner) Dimension | 525*128*60mm |
| Large box (Outer) Dimension | 545*290*335mm |
| The Amount per Inner Box | 2,250pcs |
| The Amount per Outer Box | 22,500pcs |

SOP Type

| Packing Information | |
|-----------------------------|----------------|
| Packing type | Reel type |
| Tape Width | 16mm |
| Qty per Reel | 1,000pcs |
| Small box (inner) Dimension | 345*345*58.5mm |
| Large box (Outer) Dimension | 620x360x360mm |
| Max qty per small box | 2,000pcs |
| Max qty per large box | 20,000pcs |

(2)Packing Label Sample



Note:

1. P/N :Contents with "Order Information" in the specification.
2. LOT NO : The production lot.
3. BATCH : The Electrical rank.
4. Quantity :Packaging quantity.
5. Product Data :Date of manufacture.

14. Reliability Test

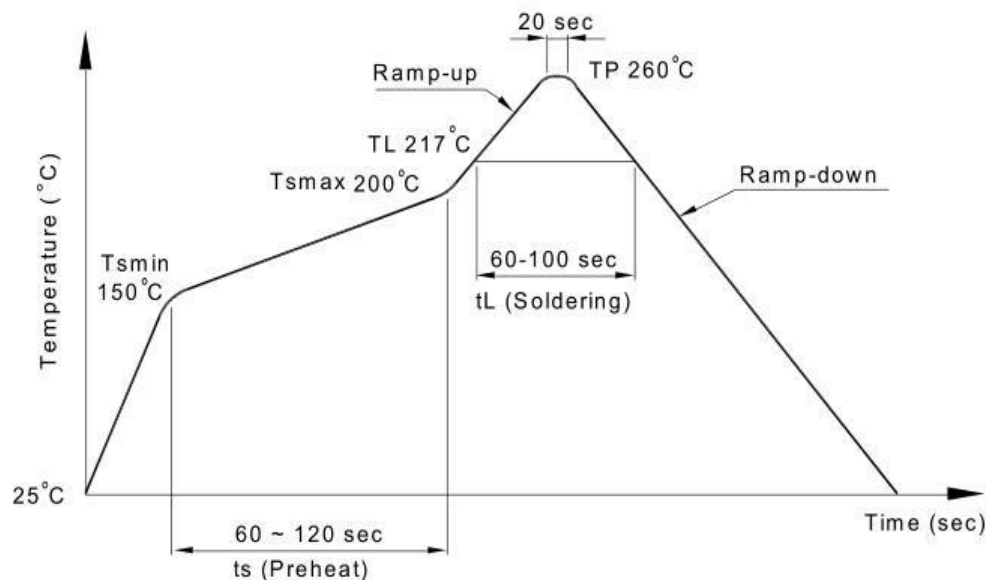
| NO. | ITEMS | Reliability Testing | | | | |
|-----|---------------------|---------------------|---|--------------|---------------------------|-------------|
| | | QTY. (Pcs) | Condition | Process | Device | Standard |
| 1 | RSH 耐焊接热 | 22 | 260±5°C | 5s/3 次 | 锡炉 | JESD22-A106 |
| 2 | HTSL 高温存储 | 77 | 125°C | 168 hrs | 高温烤箱 测试仪 | JESD22-A103 |
| | | | | 500 hrs | | |
| | | | | 1000 hrs | | |
| 3 | LTSL 低温存储 | 77 | -40°C | 168 hrs | 低温箱 测试仪 | JESD22-A119 |
| | | | | 500 hrs | | |
| | | | | 1000 hrs | | |
| 4 | TC 温度循环 | 77 | H:125°C 15min ↓5min L:-55°C 15min | 300 cycle | 冷热冲击 机 | JESD22-A104 |
| 5 | TS 温度冲击 | 77 | H:100°C 5min ↓15s L:-40°C 5min | 300 cycle | 冷热冲击 机 | JESD22-A106 |
| 6 | HTOL 高温操作 | 77 | 100°C IF=10mA Vcc=5V | 168 hrs | 高温烤箱 测试仪、 老化电路 板 | JESD22-A108 |
| | | | | 500 hrs | | |
| | | | | 1000 hrs | | |
| 7 | ESD- HBM 人体模式 | 22 | ≥8KV 1Cycle | 1次 | ESD静电 测试仪 | JESD22-A114 |
| 8 | SD 可焊性 | 22 | Pb-free 245±5°C | 5s/1次 | 锡炉 | JESD22-B102 |
| 9 | HTHB 温湿寿命 试验 | 77 | 85°C,85%RH IF=10mA,Vcc=5V | 168 hrs | 恒温恒湿 机, 测试 仪 | JESD22-A101 |
| | | | | 500 hrs | | |
| | | | | 1000 hrs | | |
| 10 | Autoclave 压力锅 | 77 | Ta=121 °C,100%RH,2atm | 96hrs | 压力锅 | JESD22-A102 |

15. 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.

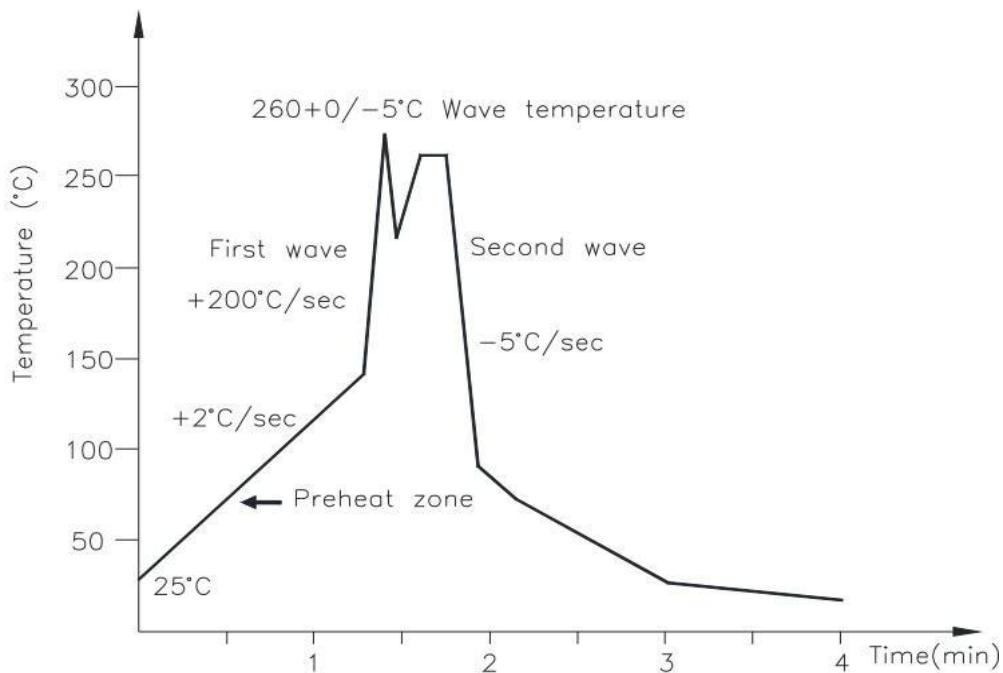
| Profile item | Conditions |
|---|-----------------------------|
| Preheat - Temperature Min (T Smin) - Temperature Max (T Smax) - Time (min to max) (ts) | 150°C 200°C 90±30 sec |
| Soldering zone - Temperature (TL) - Time (t L) | 217°C 60 sec |
| Peak Temperature | 260°C |
| Peak Temperature time | 20 sec |
| Ramp-up rate | 3°C / sec max. |
| Ramp-down rate from peak temperature | 3~6°C / sec |
| Reflow times | ≤3 |



(2) Wave soldering (JEDEC22A111 compliant)

One-time welding is recommended under the temperature condition.

| | |
|---------------------|--------------|
| Temperature | 260+0/-5°C |
| Time | 10 sec |
| Preheat temperature | 5 to 140°C |
| Preheat time | 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 | 380+0/-5°C |
| Time | 3 sec max |

16. Switching time test circuit

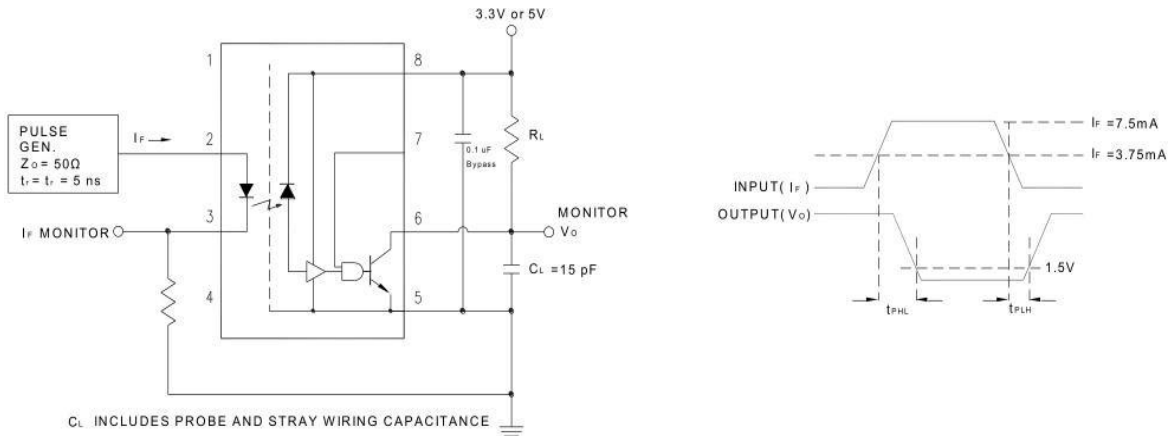


Figure 1: Test Circuit for t_{PHL} and t_{PLH}

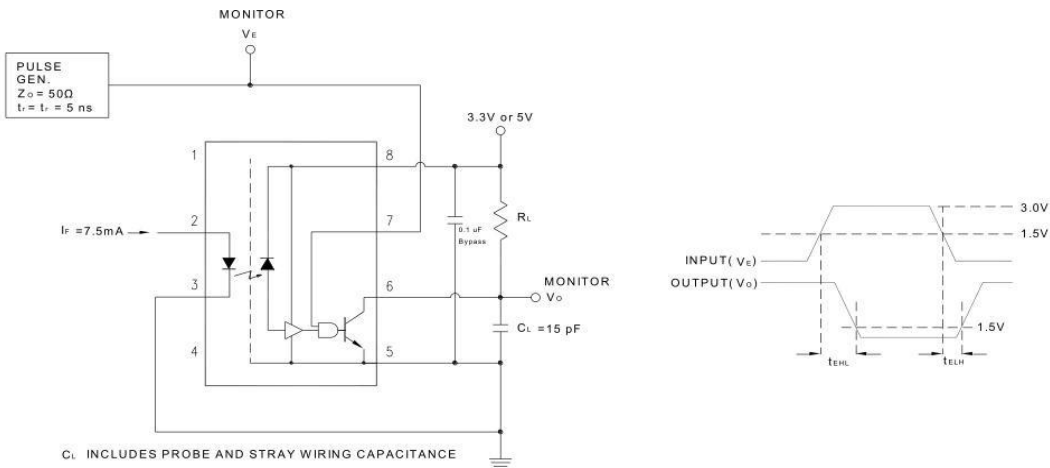


Figure 2: Single Channel Test Circuit for Common Mode Transient Immunity

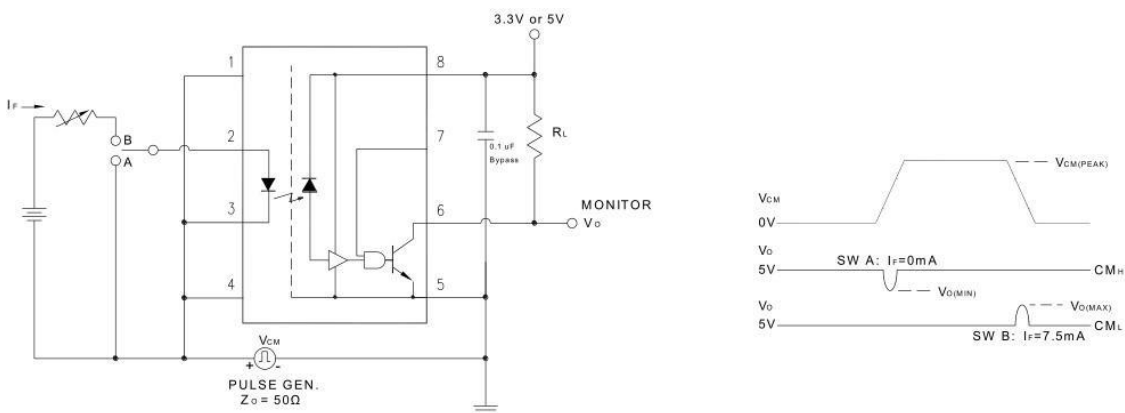


Figure 3: Single Channel Test Circuit for Common Mode Transient Immunity

17. Characteristics Curve

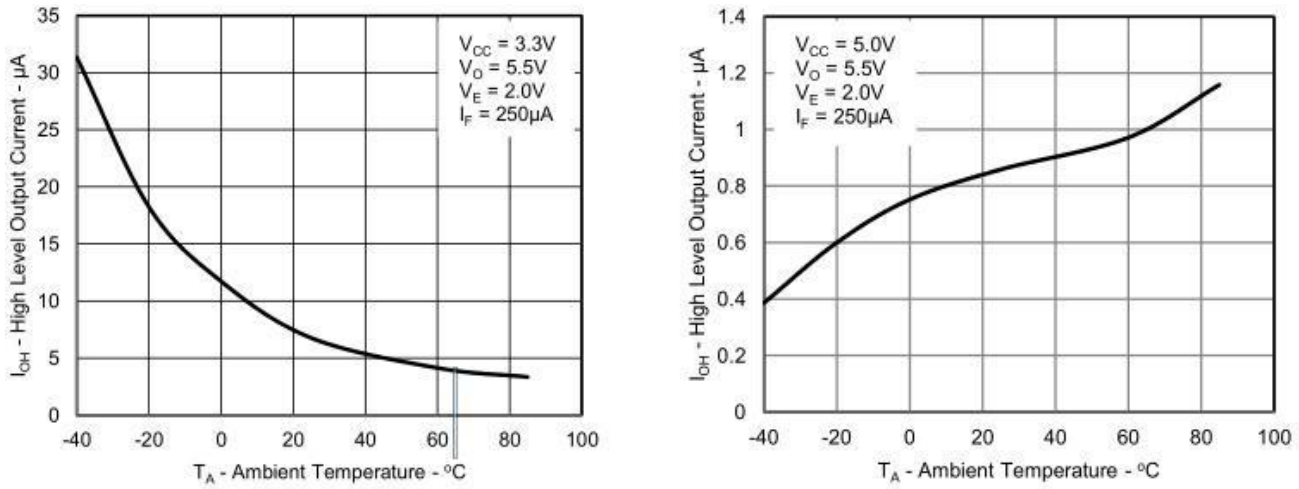


Figure 4: Typical High Level Output Current vs. Ambient Temperature

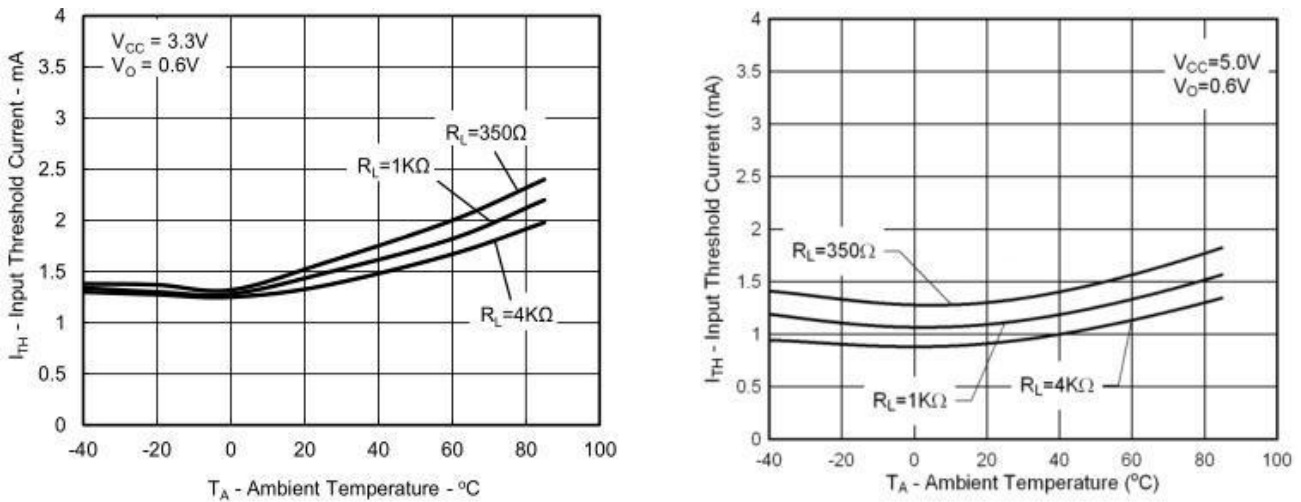


Figure 5: Typical Input Diode Threshold Current vs. Ambient Temperature

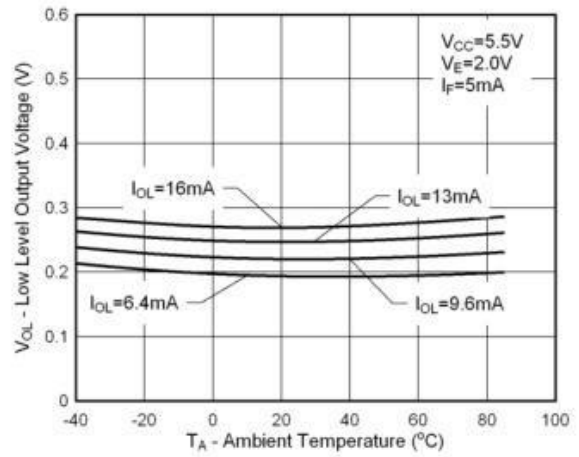
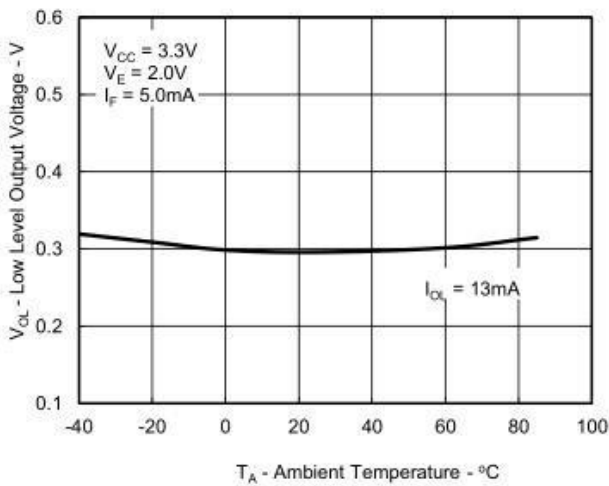


Figure 6: Typical Low Level Output Voltage vs. Ambient Temperature

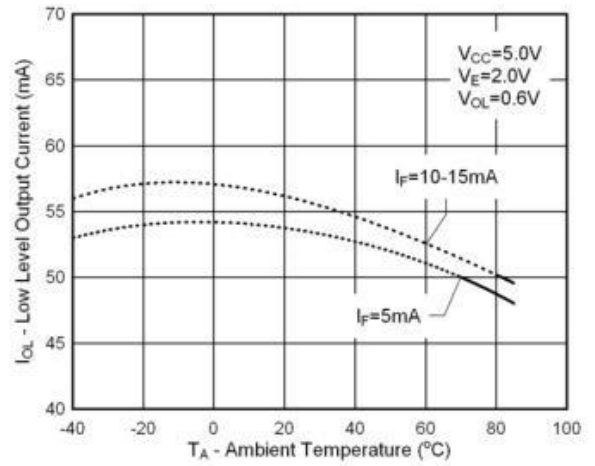
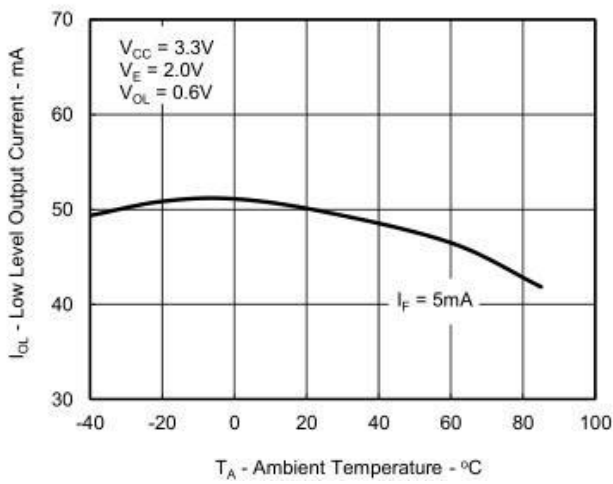


Figure 7: Typical Low Level Output Current vs. temperature

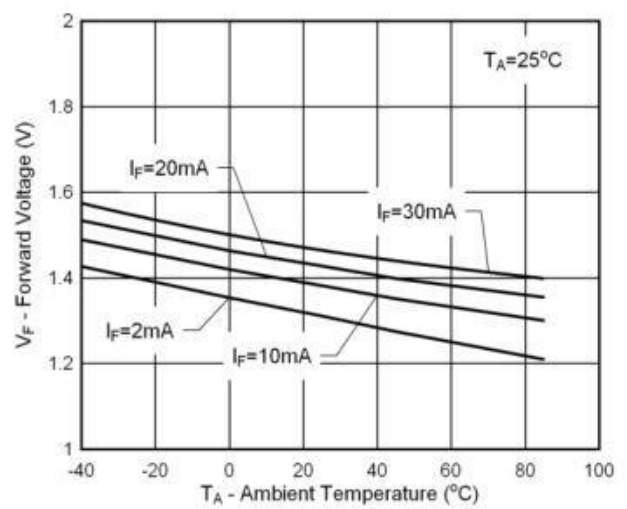
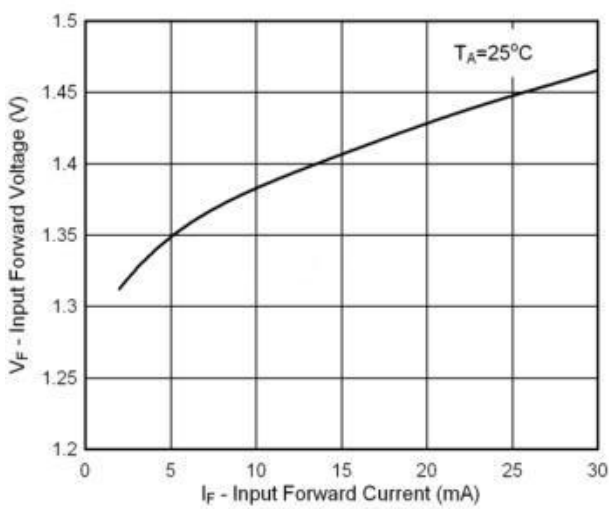


Figure 8: Typical Input Diode Forward Characteristic

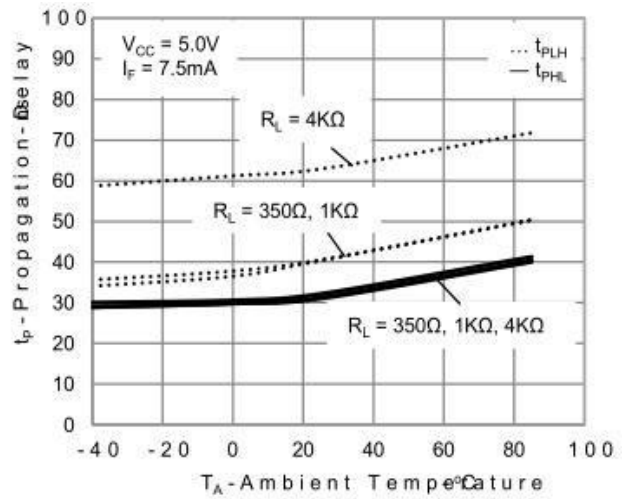
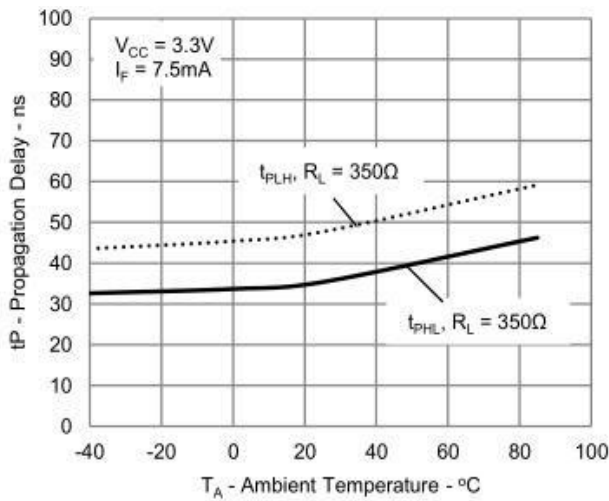


Figure 9: Typical Propagation Delay vs. Ambient Temperature

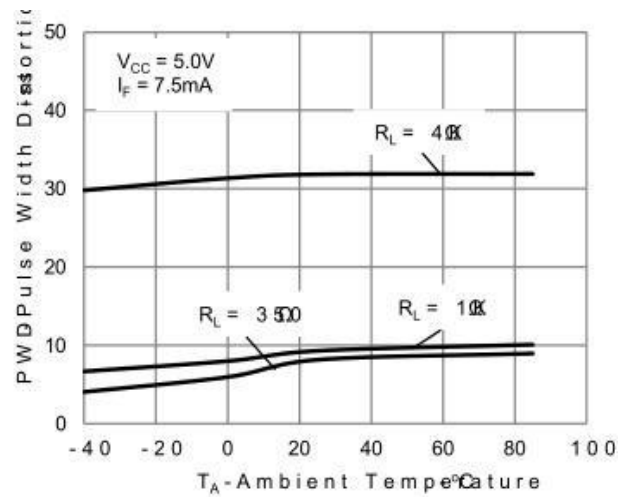
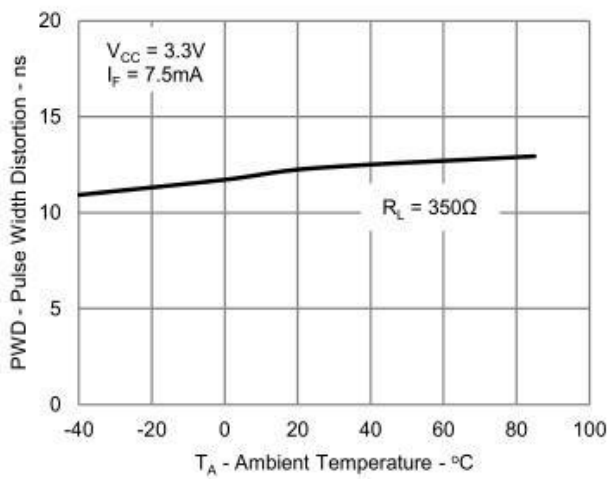


Figure 10: Typical Pulse Width Distortion vs. Ambient Temperature

单击下面可查看定价，库存，交付和生命周期等信息

[>>ORIENT\(奥伦德\)](#)