PC817XNNSZ0F Series

DIP 4pin Photocoupler

■Description

PC817XNNSZ0F Series contains an IRED optically coupled to a phototransistor. It is packaged in a 4-pin DIP. Input-output isolation voltage (rms) is 5kV. Collector-emitter voltage is 80V.

■Features

1. 4-pin DIP package
2. Double transfer mold package (Ideal for Flow Soldering)
3. High isolation voltage between input and output (Viso(rms) : 5kV)
4. High collector-emitter voltage (V_{CEO} : 80V)
5. Current transfer ratio (CTR : MIN. 50% at I_F=5 mA, V_{CE}=5V)
6. RoHS directive compliant

■Agency approvals/Compliance

1. Approved by UL file No. E64380 (as model No. PC817)
2. Approved by CSA file No. CA95323 (as model No. PC817)
3. Package resin : UL flammability grade (94V-0)

■Applications

1. Programmable controllers
2. Facsimiles
3. Telephones

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■Internal Connection Diagram

Anode ① ① Collector
Cathode ② ③ Emitter

■Outline

Epoxy resin

θ : 0°~13°

UNIT : 1/1 mm

<table>
<thead>
<tr>
<th>Name</th>
<th>PC817 Outline Dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(Business dealing name : PC817X*NSZ0F)</td>
</tr>
</tbody>
</table>

Product mass : Approx. 0.23g

Marking is laser marking

*1) 2-digit number shall be marked according to OLD DIN standard.
*2) Factory identification mark applies to the below.

Without : SUN-S Corporation (Japan)

*: WUXI WONDERFUL ELECTRONICS CO., LTD. (CHINA)
or *: SUN-S Electronic Technology (KUNSHAN) Co., Ltd (CHINA)

Pin material : Copper Alloy
Pin finish : SnCu plating (Cu : TYP. 2%)
## Absolute maximum ratings

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Rating</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Forward current</td>
<td>$I_F$</td>
<td>50</td>
<td>mA</td>
</tr>
<tr>
<td>Peak forward current</td>
<td>$I_{FM}$</td>
<td>1</td>
<td>A</td>
</tr>
<tr>
<td>Reverse voltage</td>
<td>$V_R$</td>
<td>6</td>
<td>V</td>
</tr>
<tr>
<td>Power dissipation</td>
<td>$P$</td>
<td>70</td>
<td>mW</td>
</tr>
<tr>
<td>Collector-emitter voltage</td>
<td>$V_{CEO}$</td>
<td>80</td>
<td>V</td>
</tr>
<tr>
<td>Emitter-collector voltage</td>
<td>$V_{ECO}$</td>
<td>6</td>
<td>V</td>
</tr>
<tr>
<td>Collector current</td>
<td>$I_C$</td>
<td>50</td>
<td>mA</td>
</tr>
<tr>
<td>Collector power dissipation</td>
<td>$P_C$</td>
<td>150</td>
<td>mW</td>
</tr>
<tr>
<td>Total power dissipation</td>
<td>$P_{tot}$</td>
<td>200</td>
<td>mW</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>$T_{opr}$</td>
<td>-30 to +100</td>
<td>°C</td>
</tr>
<tr>
<td>Storage temperature</td>
<td>$T_{stg}$</td>
<td>-55 to +125</td>
<td>°C</td>
</tr>
<tr>
<td>Isolation voltage</td>
<td>$V_{iso(rms)}$</td>
<td>5</td>
<td>kV</td>
</tr>
<tr>
<td>Soldering temperature</td>
<td>$T_{sol}$</td>
<td>270</td>
<td>°C</td>
</tr>
</tbody>
</table>

*1 The derating factors of absolute maximum ratings due to ambient temperature are shown in Fig. 1 to 4.
*2 Pulse width $\leq 100\mu s$, Duty ratio : 0.001 (Refer to Fig. 5)
*3 AC for 1 min, 40 to 60%RH
*4 For 10 s

## Electro-optical Characteristics

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Condition</th>
<th>MIN.</th>
<th>TYP.</th>
<th>MAX.</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Forward voltage</td>
<td>$V_F$</td>
<td>$I_F=20mA$</td>
<td>-</td>
<td>1.2</td>
<td>1.4</td>
<td>V</td>
</tr>
<tr>
<td>Peak forward voltage</td>
<td>$V_{FM}$</td>
<td>$I_{FM}=0.5A$</td>
<td>-</td>
<td>-</td>
<td>3.0</td>
<td>V</td>
</tr>
<tr>
<td>Reverse current</td>
<td>$I_R$</td>
<td>$V_R=4V$</td>
<td>-</td>
<td>-</td>
<td>10</td>
<td>µA</td>
</tr>
<tr>
<td>Terminal capacitance</td>
<td>$C_t$</td>
<td>$V=0$, $f=1kHz$</td>
<td>-</td>
<td>30</td>
<td>250</td>
<td>pF</td>
</tr>
<tr>
<td>Output</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dark current</td>
<td>$I_{CEO}$</td>
<td>$V_{CE}=50V$, $I_F=0$</td>
<td>-</td>
<td>-</td>
<td>100</td>
<td>nA</td>
</tr>
<tr>
<td>Collector-emitter breakdown voltage</td>
<td>$B_{VCEO}$</td>
<td>$I_F=0.1mA$, $I_R=0$</td>
<td>80</td>
<td>-</td>
<td>-</td>
<td>V</td>
</tr>
<tr>
<td>Emitter-collector breakdown voltage</td>
<td>$B_{VECO}$</td>
<td>$I_F=10\mu A$, $I_R=0$</td>
<td>6</td>
<td>-</td>
<td>-</td>
<td>V</td>
</tr>
<tr>
<td>Collector current</td>
<td>$I_C$</td>
<td>$I_F=5mA$, $V_{CE}=5V$</td>
<td>2.5</td>
<td>-</td>
<td>30</td>
<td>mA</td>
</tr>
<tr>
<td>Collector-emitter saturation voltage</td>
<td>$V_{CEO(sat)}$</td>
<td>$I_F=20mA$, $I_R=1mA$</td>
<td>-</td>
<td>0.1</td>
<td>0.2</td>
<td>V</td>
</tr>
<tr>
<td>Isolation resistance</td>
<td>$R_{ISO}$</td>
<td>DC$500V$</td>
<td>$40$ to $60%$RH</td>
<td>$5\times10^{10}$</td>
<td>$10^{12}$</td>
<td>-</td>
</tr>
<tr>
<td>Floating capacitance</td>
<td>$C_f$</td>
<td>$V=0$, $f=1MHz$</td>
<td>-</td>
<td>0.6</td>
<td>1.0</td>
<td>pF</td>
</tr>
<tr>
<td>Cut-off frequency</td>
<td>$f_c$</td>
<td>$V_{CE}=5V$, $I_f=2mA$, $R_L=100\Omega$, -3dB</td>
<td>-</td>
<td>80</td>
<td>-</td>
<td>kHz</td>
</tr>
<tr>
<td>Rise time</td>
<td>$tr$</td>
<td>$V_{CE}=2V$, $I_f=2mA$, $R_L=100\Omega$</td>
<td>-</td>
<td>4</td>
<td>18</td>
<td>µs</td>
</tr>
<tr>
<td>Fall time</td>
<td>$tf$</td>
<td>$V_{CE}=2V$, $I_f=2mA$, $R_L=100\Omega$</td>
<td>-</td>
<td>3</td>
<td>18</td>
<td>µs</td>
</tr>
</tbody>
</table>
(Fig. 1) Forward current vs. ambient temperature

(Fig. 2) Diode power dissipation vs. ambient temperature

(Fig. 3) Collector power dissipation vs. ambient temperature

(Fig. 4) Total power dissipation vs. ambient temperature

(Fig. 5) Peak forward current vs. duty ratio
Supplements

- Isolation voltage shall be measured in the following method.
  1. Short between anode and cathode on the primary side and between collector and emitter on the secondary side.
  2. The dielectric withstanding tester with zero-cross circuit shall be used.
  3. The wave form of applied voltage shall be a sine wave.
     (It is recommended that the isolation voltage be measured in insulation oil.)

- Business dealing name

<table>
<thead>
<tr>
<th>Business dealing name</th>
<th>Rank mark</th>
<th>Ic (mA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PC817XNNSZ0F</td>
<td>with or without</td>
<td>2.5 to 30</td>
</tr>
<tr>
<td>PC817X1NSZ0F</td>
<td>A</td>
<td>4.0 to 8.0</td>
</tr>
<tr>
<td>PC817X2NSZ0F</td>
<td>B</td>
<td>6.5 to 13</td>
</tr>
<tr>
<td>PC817X3NSZ0F</td>
<td>C</td>
<td>10 to 20</td>
</tr>
<tr>
<td>PC817X4NSZ0F</td>
<td>D</td>
<td>15 to 30</td>
</tr>
<tr>
<td>PC817X5NSZ0F</td>
<td>A or B</td>
<td>4.0 to 13</td>
</tr>
<tr>
<td>PC817X6NSZ0F</td>
<td>B or C</td>
<td>6.5 to 20</td>
</tr>
<tr>
<td>PC817X7NSZ0F</td>
<td>C or D</td>
<td>10 to 30</td>
</tr>
<tr>
<td>PC817X8NSZ0F</td>
<td>A, B or C</td>
<td>4.0 to 20</td>
</tr>
<tr>
<td>PC817X9NSZ0F</td>
<td>B, C or D</td>
<td>6.5 to 30</td>
</tr>
<tr>
<td>PC817X0NSZ0F</td>
<td>A, B, C or D</td>
<td>4.0 to 30</td>
</tr>
</tbody>
</table>

Test conditions

- \( I_c = 5 \text{mA} \)
- \( V_{CE} = 5 \text{V} \)
- \( T_a = 25 \text{°C} \)

- This Model is approved by UL.
  Approved Model No. : PC817
  UL file No. : E64380

- This Model is approved by CSA.
  Approved Model No. : PC817
  However, products shall be approved from date code“A5” (May 2010).
  CSA file No. : CA95323
  CSA approved mark “” shall be indicated on minimum unit package.

- This product is not designed against irradiation.
  This product is assembled with electrical input and output.
  This product incorporates non-coherent light emitting diode.

- ODS materials
  This product shall not contain the following materials.
  Also, the following materials shall not be used in the production process for this product.
  Materials for ODS : CFC, Halon, Carbon tetrachloride, 1,1,1-Trichloroethane (Methyl chloroform)

- Specified brominated flame retardants
  Specified brominated flame retardants (PBB and PBDE) are not used in this device at all.

- Compliance with each regulation
  1. The RoHS directive (2002/95/EC)
     This product complies with the RoHS directive (2002/95/EC).
     Object substances: mercury, lead, cadmium, hexavalent chromium, polybrominated biphenyls (PBB)
     and polybrominated diphenyl ethers (PBDE)
(2) Content of six substances specified in Management Methods for Control of Pollution Caused by Electronic Information Products Regulation (Chinese: 电子信息产品污染控制管理办法).

<table>
<thead>
<tr>
<th>Category</th>
<th>Toxic and hazardous substances</th>
<th>Lead (Pb)</th>
<th>Mercury (Hg)</th>
<th>Cadmium (Cd)</th>
<th>Hexavalent chromium (Cr(^{6+}))</th>
<th>Polybrominated biphenyls (PBB)</th>
<th>Polybrominated diphenyl ethers (PBDE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Photocoupler</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

✓: indicates that the content of the toxic and hazardous substance in all the homogeneous materials of the part is below the concentration limit requirement as described in SJ/T 11363-2006 standard.
■Notes

● Cleaning
  (1) Solvent cleaning: Solvent temperature 45°C or less
      Immersion for 3 min or less

  (2) Ultrasonic cleaning: The effect to device by ultrasonic cleaning differs by cleaning bath size, ultrasonic
      power output, cleaning time, PCB size or device mounting condition etc. Please test it
      in actual using condition and confirm that any defect doesn’t occur before starting
      the ultrasonic cleaning.

  (3) Applicable solvent: Ethyl alcohol, Methyl alcohol, Isopropyl alcohol
      When the other solvent is used, there are cases that the packaging resin is eroded.
      Please use the other solvent after thorough confirmation is performed in actual using condition.

● Circuit design
  (1) The LED used in the Photocoupler generally decreases the light emission power by operation.
      In case of long operation time, please design the circuit in consideration of the degradation
      of the light emission power of the LED. (50%/5years)

  (2) There are cases that the deviation of the CTR and the degradation of the relative light emission power
      of the LED increase when the setting value of $I_F$ is less than 1.0mA. Please design the circuit in consideration
      of this point.

● Precautions for Soldering
  (1) In the case of flow soldering (Whole dipping is possible)
      It is recommended that flow soldering should be at 270°C or less for 10 s or less
      (Pre-heating: 100 to 150°C, 30 to 80s). (2 times or less)

  (2) In the case of hand soldering
      What is done on the following condition is recommended. (2 times or less)
      Soldering iron temperature: 400°C or less
      Time: 3s or less

  (3) Other precautions
      Depending on equipment and soldering conditions (temperature, Using solder etc.),
      the effect to the device and the PCB is different.
      Please confirm that there is no problem on the actual use conditions in advance.
# Package specification

## Package materials

<table>
<thead>
<tr>
<th>No.</th>
<th>Name</th>
<th>Materials</th>
<th>Purposes</th>
</tr>
</thead>
<tbody>
<tr>
<td>①</td>
<td>Sleeve</td>
<td>HIPS or ABS with preventing static electricity</td>
<td>Products packaged</td>
</tr>
<tr>
<td>②</td>
<td>Stopper</td>
<td>Styrene-Elastomer</td>
<td>Products fixed</td>
</tr>
<tr>
<td>③</td>
<td>Packing case</td>
<td>Corrugated cardboard</td>
<td>Sleeve packaged</td>
</tr>
<tr>
<td>④</td>
<td>Kraft tape</td>
<td>Paper</td>
<td>Lid of packing case fixed</td>
</tr>
<tr>
<td>⑤</td>
<td>Label</td>
<td>Paper</td>
<td>Model No., (Business dealing name), Lot No., Quantity, Country of origin, Company name and Inspection date specified</td>
</tr>
</tbody>
</table>

## Package method

1. MAX. 100pcs. of products shall be packaged in a sleeve ① and both of sleeve edges shall be fixed by stoppers ②.
2. MAX. 20 sleeves (Product : 2000pcs.) above shall be packaged in a packing case ③.
3. The label ⑤ shall be put on the side of the packing case.
4. Case shall be closed with the lid and enclosed with kraft tape ④.

## Sleeve ① outline dimensions

Note:
1) Thickness: 0.5±0.2mm
2) Process with applying antistatic agent.
3) Unless otherwise specified tolerances shall be ±0.5mm. (However except for deformation due to the stopper in sleeve.)
● Packaging case outline dimensions

Anode mark shall be arranged at stopper side without pulled portion.

Regular packing mass: Approx. 860g

(): Reference dimensions
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     - Personal computers
     - Office automation equipment
     - Telecommunication equipment [terminal]
     - Test and measurement equipment
     - Industrial control
     - Audio visual equipment
     - Consumer electronics
  2. Measures such as fail-safe function and redundant design should be taken to ensure reliability and safety when SHARP devices are used for or in connection with equipment that requires higher reliability such as:
     - Transportation control and safety equipment (i.e., aircraft, trains, automobiles, etc.)
     - Traffic signals
     - Gas leakage sensor breakers
     - Alarm equipment
     - Various safety devices, etc.
  3. SHARP devices shall not be used for or in connection with equipment that requires an extremely high level of reliability and safety such as:
     - Space applications
     - Telecommunication equipment [trunk lines]
     - Nuclear power control equipment
     - Medical and other life support equipment (e.g., scuba).

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