

## Features

- High isolation 5000 VRMS
- CTR flexibility available see order information
- DC input with transistor output
- Operating temperature range - 40 °C to 110 °C
- REACH compliance
- Halogen free
- MSL class 1
- Regulatory Approvals
  - UL - UL1577
  - VDE - EN60747-5-5(VDE0884-5)
  - CQC – GB4943.1

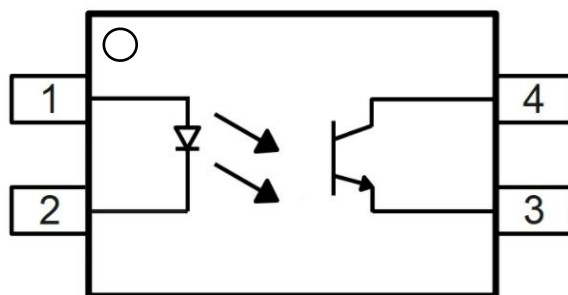
## Applications

- Switch mode power supplies
- Programmable controllers
- Household appliances
- Office equipment

## Description

The ICPL-817 series combine an AlGaAs infrared emitting diode as the emitter which is optically coupled to a silicon planar phototransistor detector in a plastic DIP4 package with different lead forming options.

With the robust coplanar double mold structure, ICPL-817 series provide the most stable isolation feature.



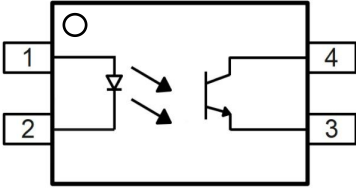
## ORDERING INFORMATION

| Outline                                                                             | Part Number   | Package | Marking                 | Packing | Packing Size | Quantity |
|-------------------------------------------------------------------------------------|---------------|---------|-------------------------|---------|--------------|----------|
|  | ICPL-817-00XE | DIP4    | ICPL<br>817X<br>/YYWW A | Tube    | 500mm        | 100      |
|  | ICPL-817-10XE | DIP4-M  |                         | Tube    | 500mm        | 100      |
|  | ICPL-817-50XE | DIP4-SL |                         | Reel    | 13 "         | 1000     |

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## PIN CONFIGURATION AND FUNCTIONS

|  | Pin | Name      |
|-----------------------------------------------------------------------------------|-----|-----------|
|                                                                                   | 1   | Anode     |
|                                                                                   | 2   | Cathode   |
|                                                                                   | 3   | Emitter   |
|                                                                                   | 4   | Collector |

## ABSOLUTE MAXIMUM RATINGS

| Parameter                   | Symbol    | Value   | Unit             | Note |
|-----------------------------|-----------|---------|------------------|------|
| INPUT                       |           |         |                  |      |
| Forward Current             | $I_F$     | 60      | mA               |      |
| Peak Forward Current        | $I_{FP}$  | 1       | A                | 1    |
| Reverse Voltage             | $V_R$     | 6       | V                |      |
| Input Power Dissipation     | $P_I$     | 100     | mW               |      |
| OUTPUT                      |           |         |                  |      |
| Collector - Emitter Voltage | $V_{CEO}$ | 80      | V                |      |
| Emitter - Collector Voltage | $V_{ECO}$ | 7       | V                |      |
| Collector Current           | $I_C$     | 50      | mA               |      |
| Output Power Dissipation    | $P_O$     | 150     | mW               |      |
| COMMON                      |           |         |                  |      |
| Total Power Dissipation     | $P_{tot}$ | 200     | mW               |      |
| Isolation Voltage           | $V_{iso}$ | 5000    | V <sub>rms</sub> | 2    |
| Operating Temperature       | $T_{opr}$ | -40~110 | °C               |      |
| Storage Temperature         | $T_{stg}$ | -55~125 | °C               |      |
| Soldering Temperature       | $T_{sol}$ | 260     | °C               |      |

Note 1. 100μs pulse, 100Hz frequency

Note 2. AC For 1 Minute, R.H. = 40 ~ 60%

**ELECTRICAL OPTICAL CHARACTERISTICS(T<sub>a</sub>=25°C)**

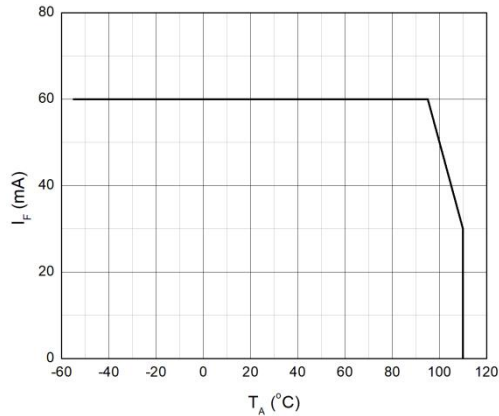
| Parameter                            | Symbol               | Min              | Typ.             | Max. | Unit | Test Condition                                                         | Note |
|--------------------------------------|----------------------|------------------|------------------|------|------|------------------------------------------------------------------------|------|
| INPUT                                |                      |                  |                  |      |      |                                                                        |      |
| Forward Voltage                      | V <sub>F</sub>       | -                | 1.24             | 1.4  | V    | I <sub>F</sub> =10mA                                                   |      |
| Reverse Current                      | I <sub>R</sub>       | -                | -                | 10   | μA   | V <sub>R</sub> =6V                                                     |      |
| Input Capacitance                    | C <sub>in</sub>      | -                | 10               | -    | pF   | V=0, f=1kHz                                                            |      |
| OUTPUT                               |                      |                  |                  |      |      |                                                                        |      |
| Collector Dark Current               | I <sub>CEO</sub>     | -                | -                | 100  | nA   | V <sub>CE</sub> =20V, I <sub>F</sub> =0                                |      |
| Collector-Emitter Breakdown Voltage  | BV <sub>CEO</sub>    | 80               | -                | -    | V    | I <sub>C</sub> =0.1mA, I <sub>F</sub> =0                               |      |
| Emitter-Collector Breakdown Voltage  | BV <sub>ECO</sub>    | 7                | -                | -    | V    | I <sub>E</sub> =0.1mA, I <sub>F</sub> =0                               |      |
| TRANSFER CHARACTERISTICS             |                      |                  |                  |      |      |                                                                        |      |
| Current Transfer Ratio               | A                    | CTR              | 80               | -    | 160  | I <sub>F</sub> =5mA, V <sub>CE</sub> =5V                               |      |
|                                      | B                    |                  | 130              | -    | 260  |                                                                        |      |
|                                      | C                    |                  | 200              | -    | 400  |                                                                        |      |
|                                      | D                    |                  | 300              | -    | 600  |                                                                        |      |
| Collector-Emitter Saturation Voltage | V <sub>CE(sat)</sub> | -                | 0.06             | 0.2  | V    | I <sub>F</sub> =20mA, I <sub>C</sub> =1mA                              |      |
| Isolation Resistance                 | R <sub>ISO</sub>     | 10 <sup>12</sup> | 10 <sup>14</sup> | -    | Ω    | DC500V, 40 ~ 60% R.H.                                                  |      |
| Floating Capacitance                 | C <sub>IO</sub>      | -                | 0.4              | 1    | pF   | V=0, f=1MHz                                                            |      |
| Cut-off Frequency                    | f <sub>c</sub>       | -                | 80               | -    | kHz  | V <sub>CE</sub> =2V, I <sub>C</sub> =2mA<br>R <sub>L</sub> =100Ω, -3dB | 3    |
| Response Time (Rise)                 | t <sub>r</sub>       | -                | 3                | 18   | μs   | V <sub>CE</sub> =2V, I <sub>C</sub> =2mA<br>R <sub>L</sub> =100Ω       | 4    |
| Response Time (Fall)                 | t <sub>f</sub>       | -                | 4                | 18   | μs   |                                                                        | 4    |

Note 3. Fig.12&13

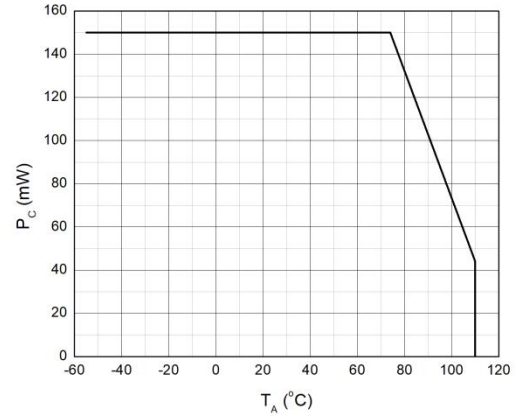
Note 4. Fig.14

## CHARACTERISTIC CURVES

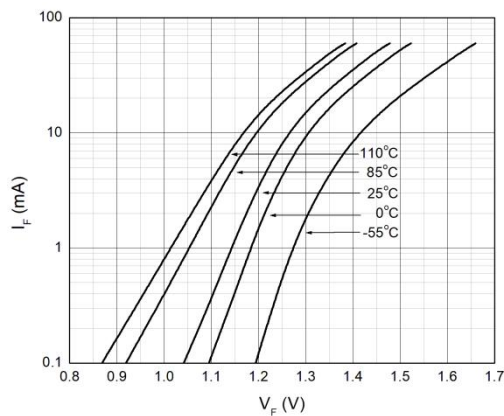
**Fig.1 Forward Current vs. Ambient Temperature**



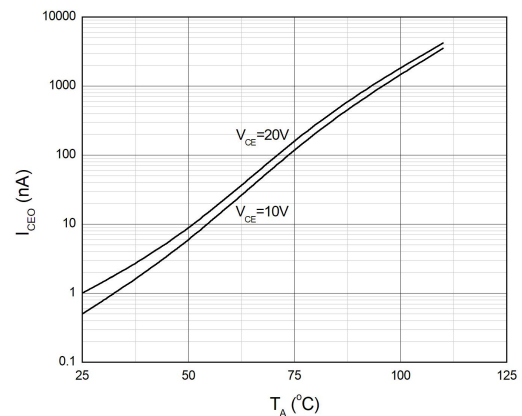
**Fig.2 Collector Power Dissipation vs. Ambient Temperature**



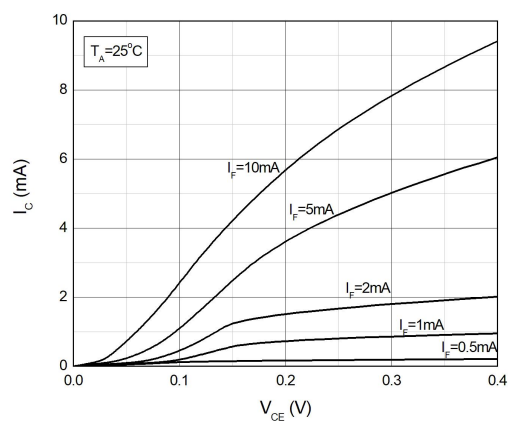
**Fig.3 Forward Current vs. Forward Voltage**



**Fig.4 Collector Dark Current vs. Ambient Temperature**



**Fig.5 Collector Current vs. Collector-emitter Voltage**



**Fig.6 Collector Current vs. Collector-emitter Voltage**

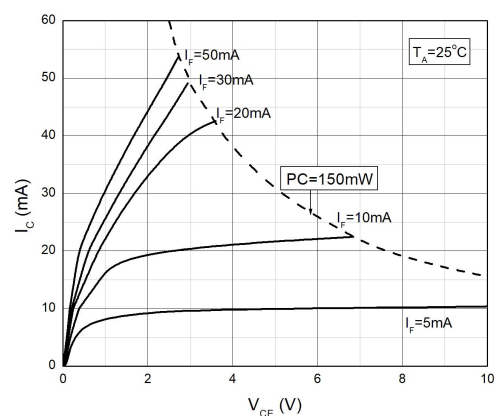


Fig.7 Normalized Current Transfer Ratio  
vs. Forward Current

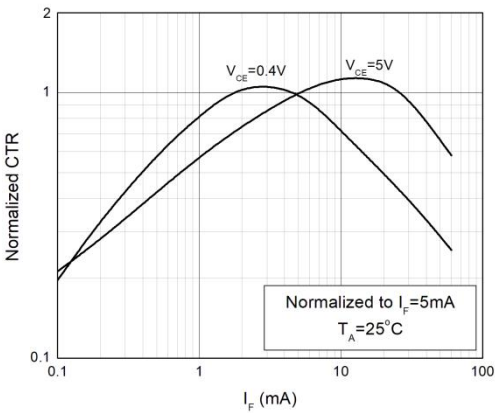


Fig.8 Normalized Current Transfer Ratio  
vs. Ambient Temperature

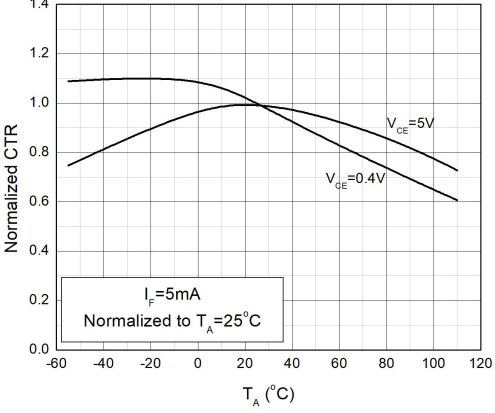


Fig.9 Collector-emitter Saturation Voltage  
vs. Ambient Temperature

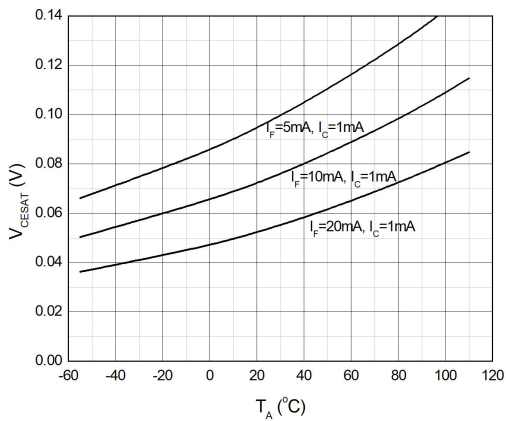


Fig.10 Switching Time  
vs. Load Resistance

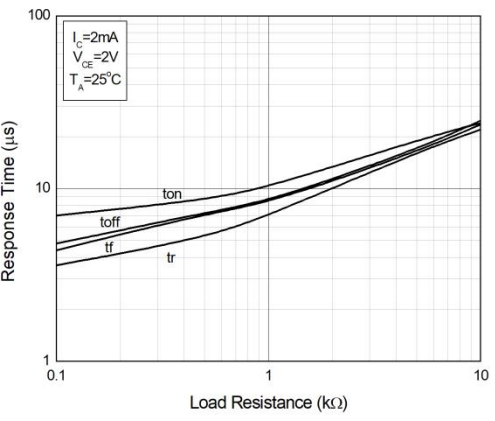
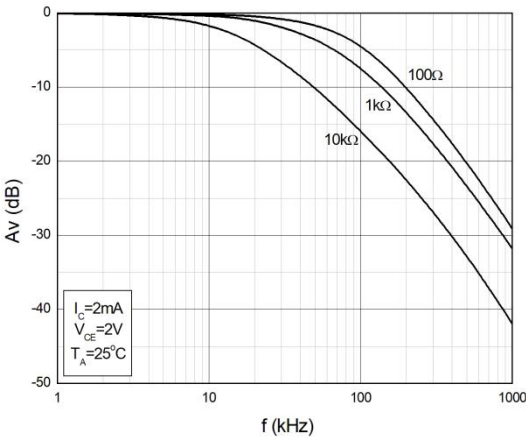
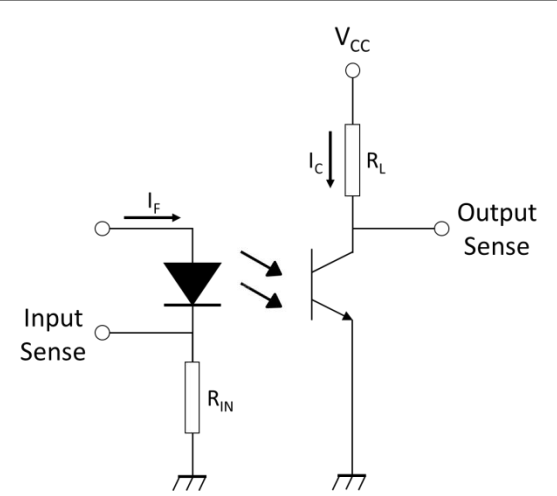
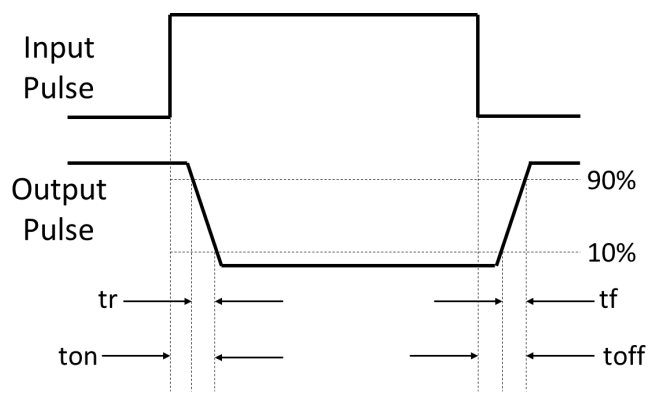
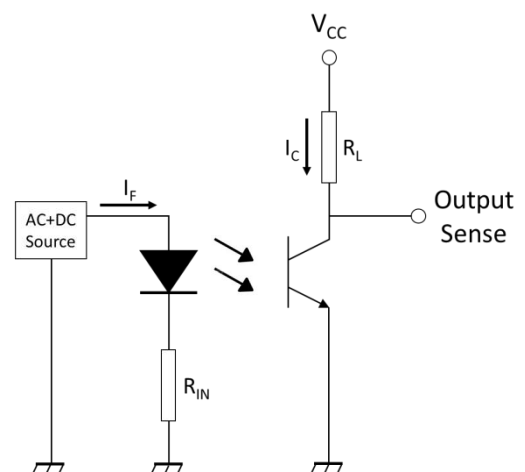


Fig.11 Frequency Response

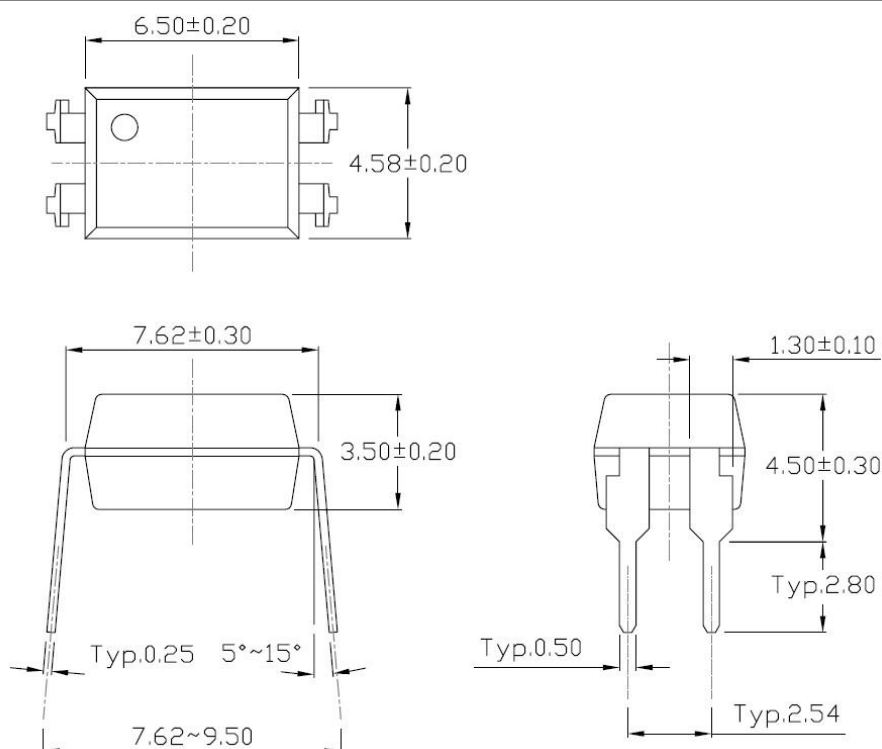


TEST CIRCUITS

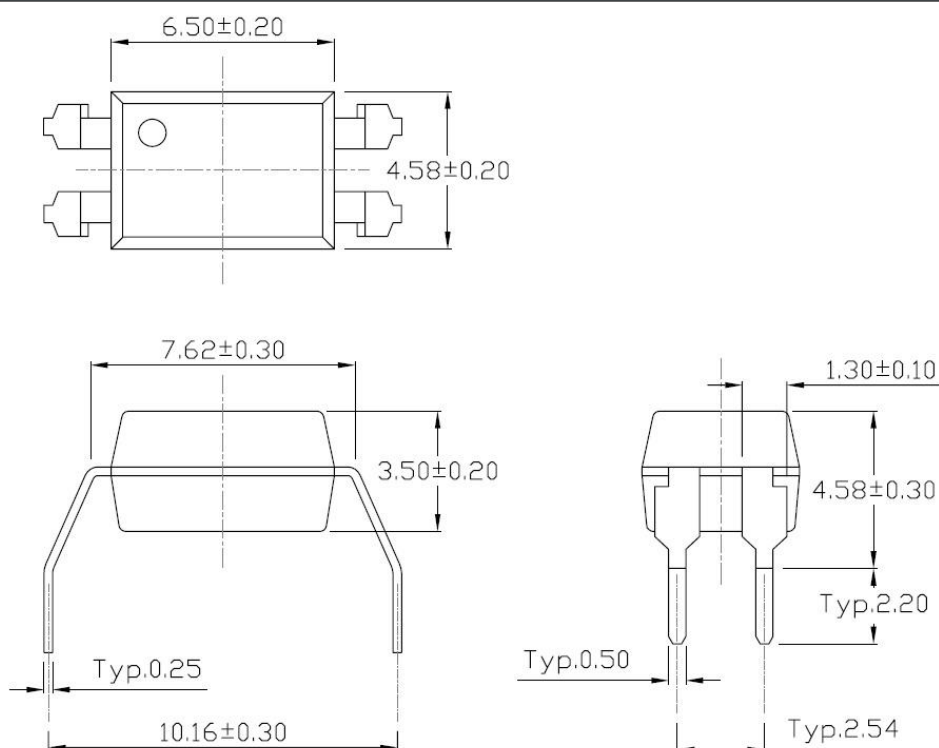
| Fig.12 Test Circuits of Response Time                                               | Fig.13 Curves of Response Time                                                     |
|-------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|
|    |  |
| Fig.14 Test Circuits of Frequency Response                                          |                                                                                    |
|  |                                                                                    |

## PACKAGE DIMENSIONS

### Standard DIP – Through Hole (DIP Type)

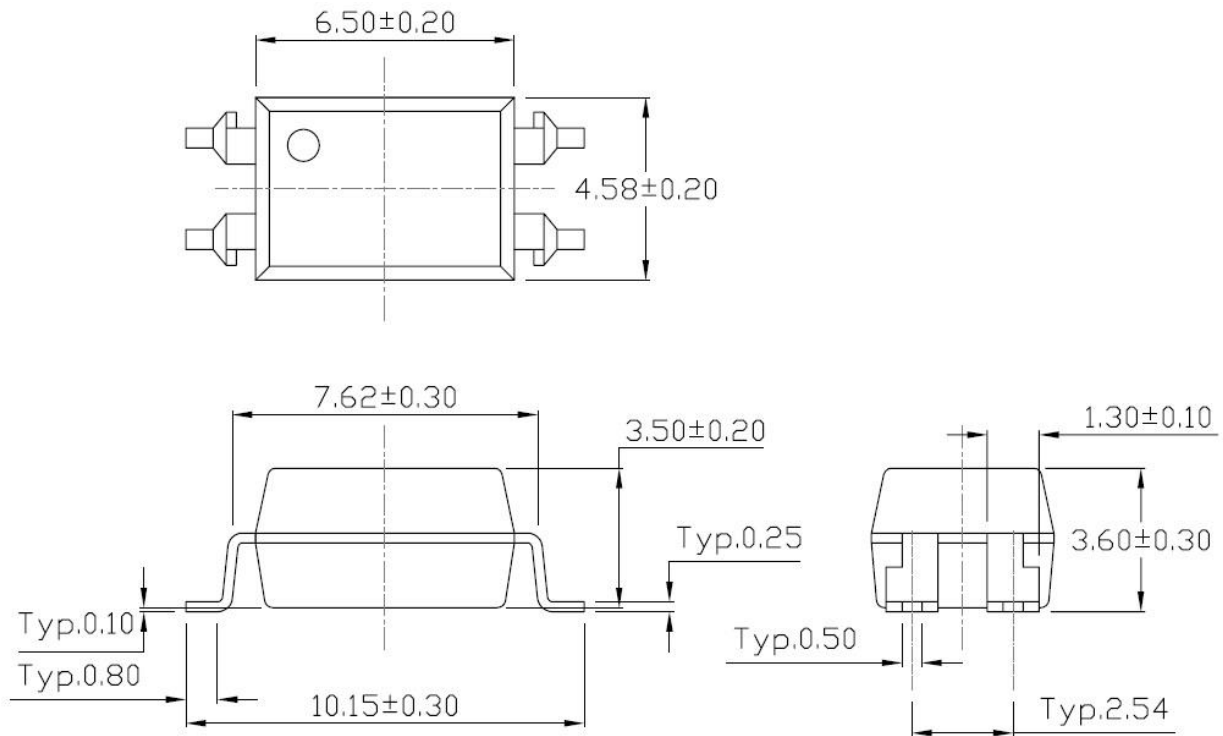


### Gullwing (400mil) Lead Forming – Through Hole (M Type)





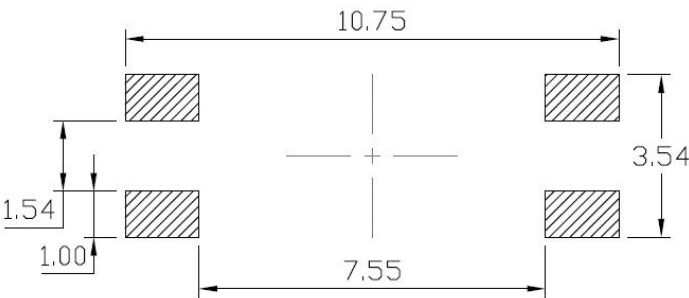
Surface Mount (Low Profile) Lead Forming (SL Type)



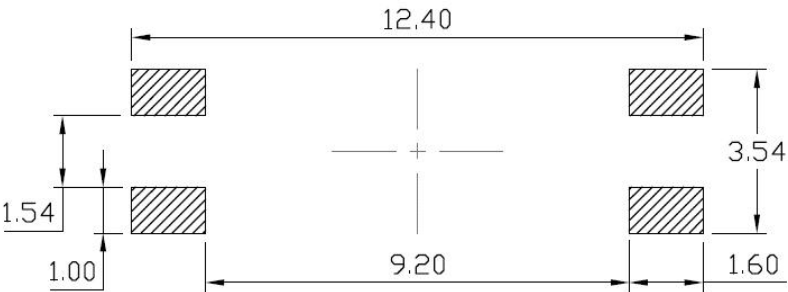
- Dimensions in mm unless otherwise stated

RECOMMENDED SOLDER MASK

Surface Mount Lead Forming & Surface Mount (Low Profile) Lead Forming



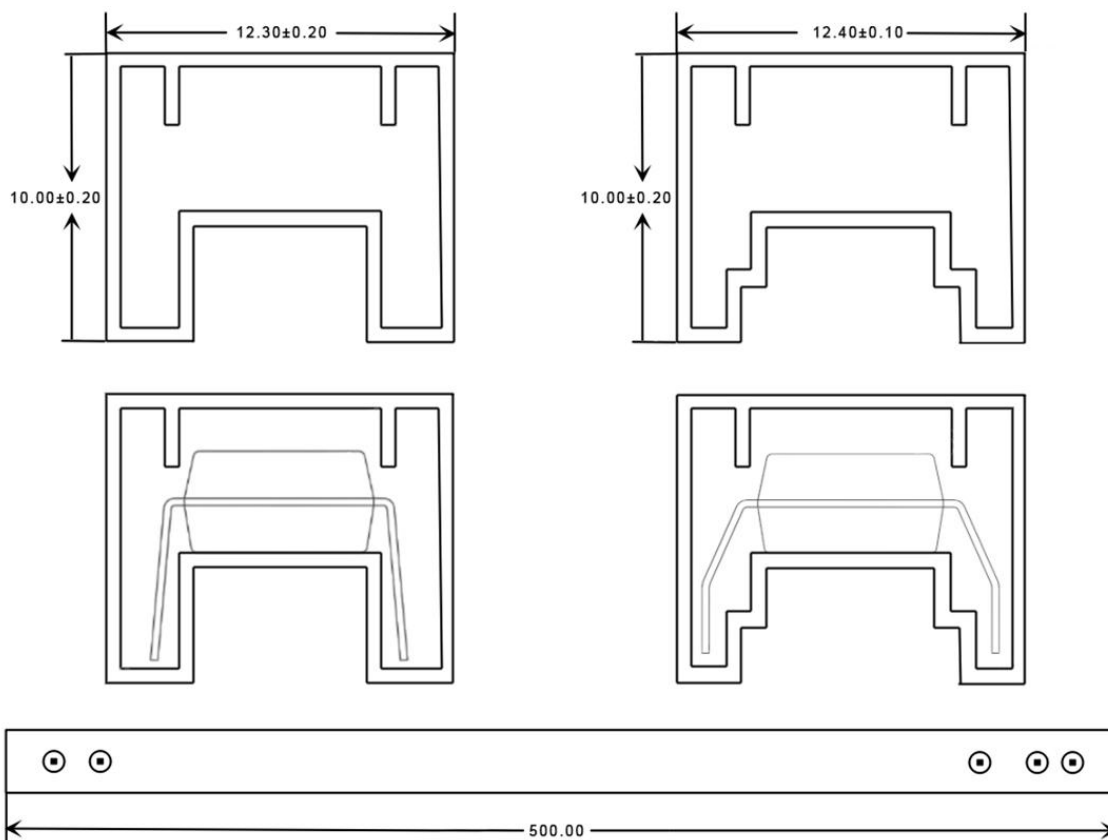
Surface Mount (Gullwing) Lead Forming



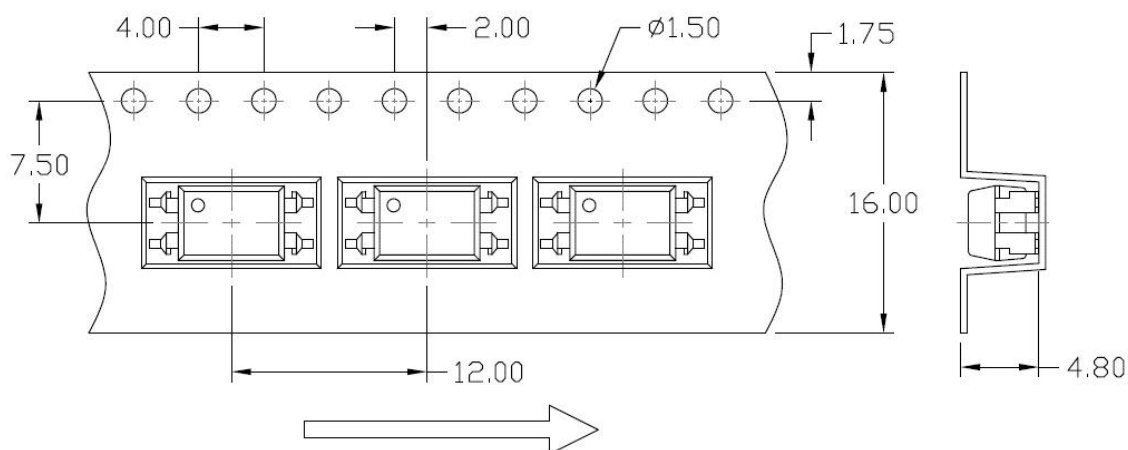
- Dimensions in mm unless otherwise stated

## CARRIER TAPE SPECIFICATIONS

### Option DIP-Standard & DIP-M



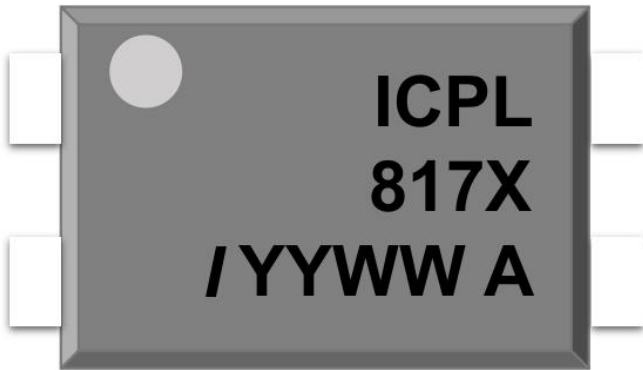
### Option SM-SL



- Dimensions in mm unless otherwise stated

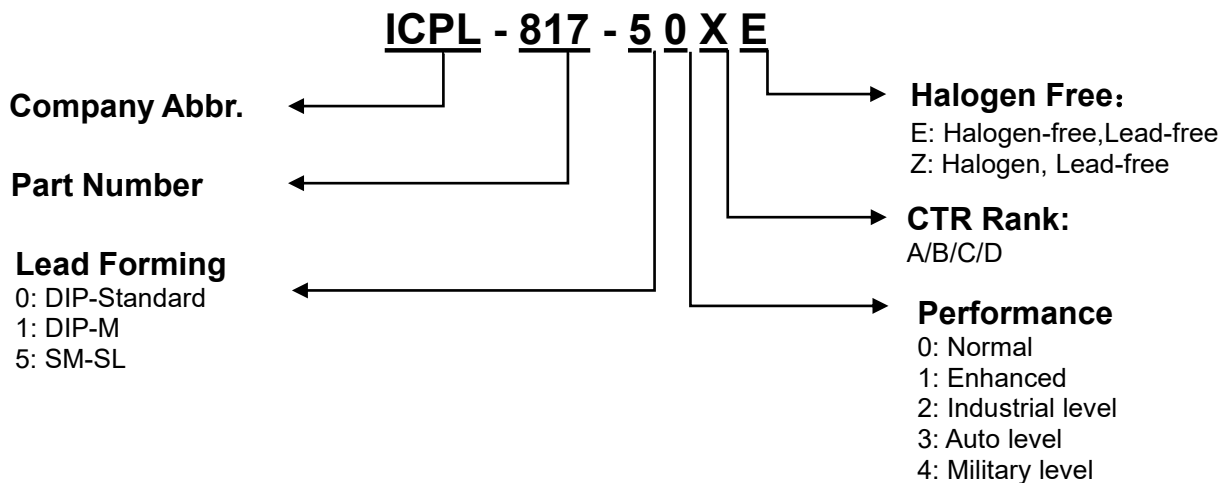
## ORDERING AND MARKING INFORMATION

### Marking Information



ICPL : Company Abbr.  
817 : Part Number  
X : CTR Rank  
/ : ISOMICRON  
YY : Fiscal Year  
WW : Work Week  
A : Manufacturing Code

### Order Code

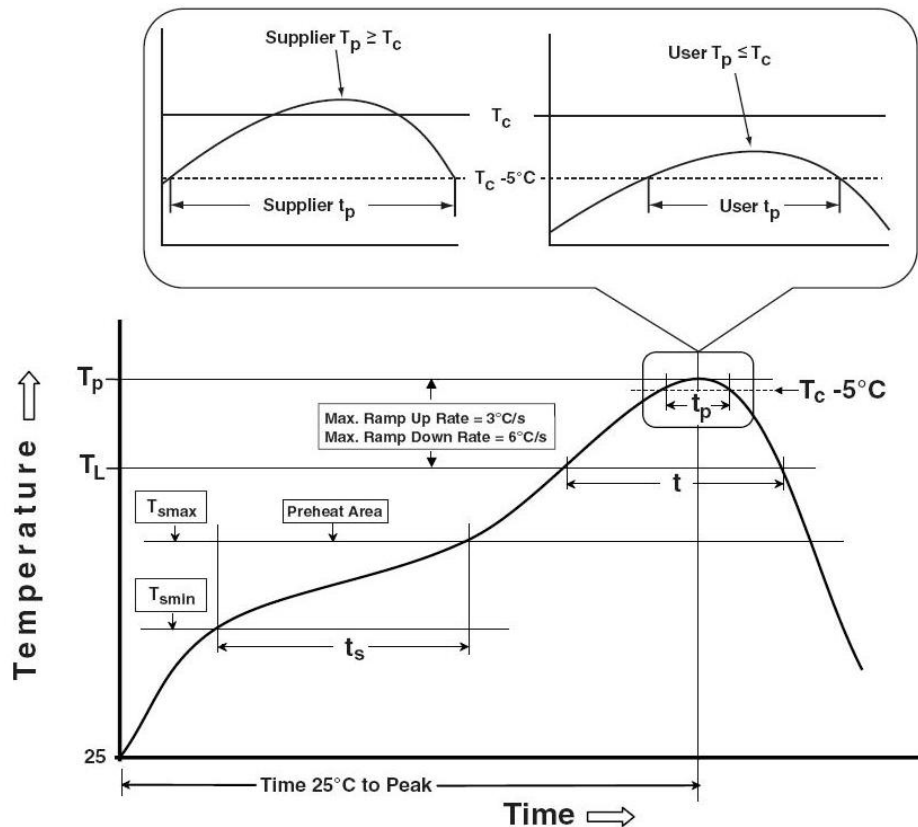


### Packing Quantity

| Option       | Quantity        | Quantity – Inner box | Quantity – Outer box              |
|--------------|-----------------|----------------------|-----------------------------------|
| DIP-Standard | 100 Units/Tube  | 20 Tubes/Inner box   | 6 Inner box/Outer box = 12k Units |
| DIP-M        | 100 Units/Tube  | 20 Tubes/Inner box   | 6 Inner box/Outer box = 12k Units |
| SM-SL        | 1000 Units/Reel | 2 Reels/Inner box    | 5 Inner box/Outer box = 10k Units |

## REFLOW INFORMATION

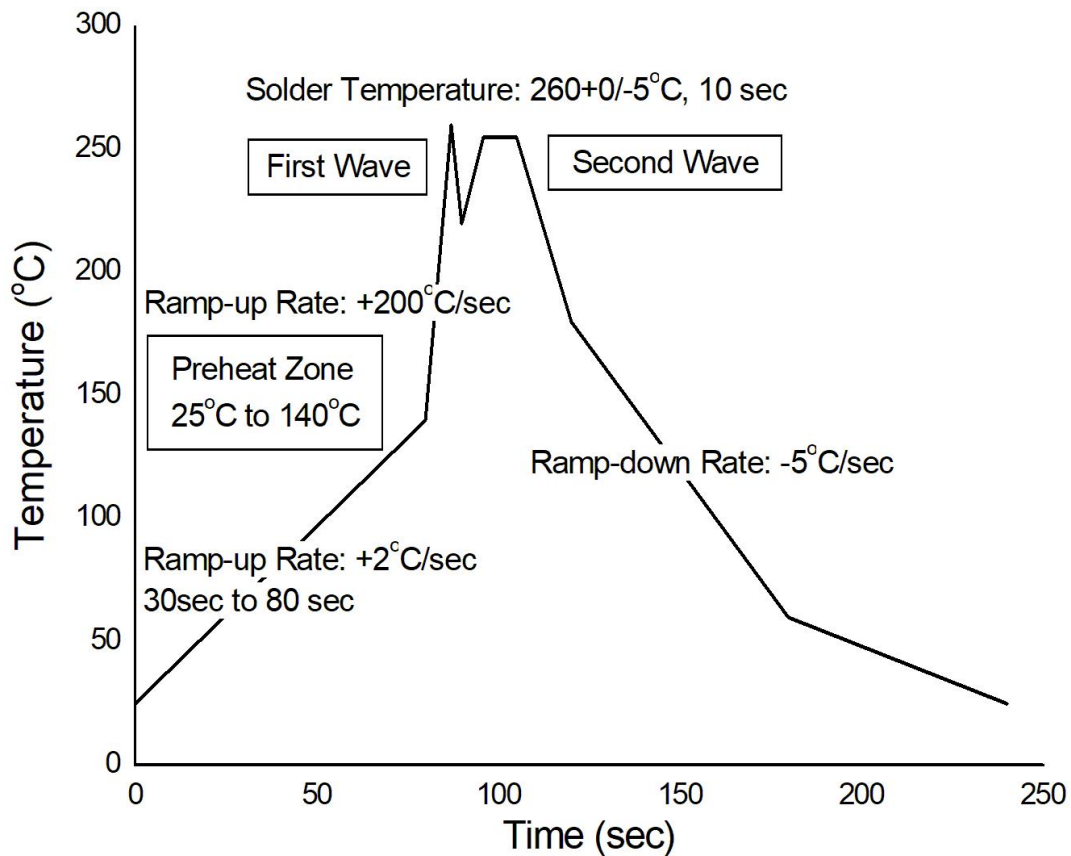
### Reflow Profile



| Profile Feature                                                       | Sn-Pb Assembly Profile | Pb-Free Assembly Profile |
|-----------------------------------------------------------------------|------------------------|--------------------------|
| Temperature Min. (T <sub>smin</sub> )                                 | 100                    | 150°C                    |
| Temperature Max. (T <sub>smax</sub> )                                 | 150                    | 200°C                    |
| Time (t <sub>s</sub> ) from (T <sub>smin</sub> to T <sub>smax</sub> ) | 60-120 seconds         | 60-120 seconds           |
| Ramp-up Rate (t <sub>L</sub> to t <sub>p</sub> )                      | 3°C/second max.        | 3°C/second max.          |
| Liquidous Temperature (T <sub>L</sub> )                               | 183°C                  | 217°C                    |
| Time (t <sub>L</sub> ) Maintained Above (T <sub>L</sub> )             | 60 – 150 seconds       | 60 – 150 seconds         |
| Peak Body Package Temperature                                         | 235°C +0°C / -5°C      | 260°C +0°C / -5°C        |
| Time (t <sub>p</sub> ) within 5°C of 260°C                            | 20 seconds             | 30 seconds               |
| Ramp-down Rate (T <sub>p</sub> to T <sub>L</sub> )                    | 6°C/second max         | 6°C/second max           |
| Time 25°C to Peak Temperature                                         | 6 minutes max.         | 8 minutes max.           |

## TEMPERATURE PROFILE OF SOLDERING

### Wave Soldering (JESD22-A111 Compliant)



### Hand Soldering By Soldering Iron

|                       |                           |
|-----------------------|---------------------------|
| Soldering Temperature | $380 \pm 5^\circ\text{C}$ |
| Soldering Time        | 3 sec max.                |

- One time soldering is recommended for all soldering method.
- Do not solder more than three times for IR reflow soldering.

## DISCLAIMER

- ISOMICRON is continually improving the quality, reliability, function and design. ISOMICRON reserves the right to make changes without further notices.
- The characteristic curves shown in this datasheet are representing typical performance which are not guaranteed.
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- This product is not intended to be used for military, aircraft, automotive, medical, life sustaining or lifesaving applications or any other application which can result in human injury or death.
- Please contact ISOMICRON sales agent for special application request.
- Immerge unit's body in solder paste is not recommended.
- Parameters provided in datasheets may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated in each customer application by the customer's technical experts. Product specifications do not expand or otherwise modify ISOMICRON's terms and conditions of purchase, including but not limited to the warranty expressed therein.
- Discoloration might be occurred on the package surface after soldering, reflow or long-time use. It neither impacts the performance nor reliability.

