

## Features

- High isolation 6000 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, GB8898

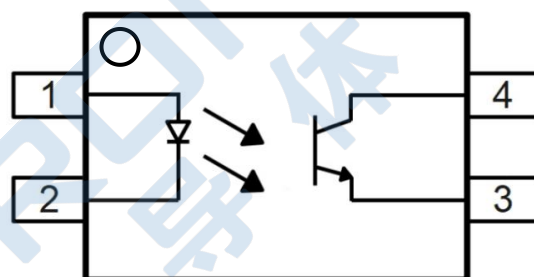
## Applications

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

## Description

The ISP817 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, ISP817 series provide the most stable isolation feature.



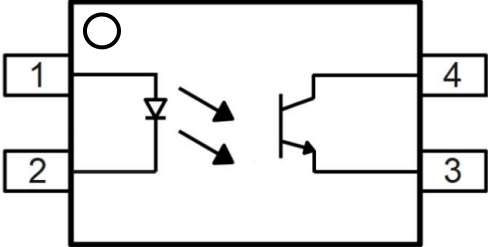
## ORDERING INFORMATION

| Outline                                                                             | Part Number      | Package | Marking             | Packing             | Packing Size | Quantity |      |
|-------------------------------------------------------------------------------------|------------------|---------|---------------------|---------------------|--------------|----------|------|
|  | ISP817XA         | DIP4    | ISP817XX<br>/YYWW A | Tube                | 500mm        | 100      |      |
|                                                                                     | ISP817XB         |         |                     |                     |              |          |      |
|                                                                                     | ISP817XC         |         |                     |                     |              |          |      |
|                                                                                     | ISP817XD         |         |                     |                     |              |          |      |
|  | ISP817XASMT&R    | DIP4-SL |                     | ISP817XX<br>/YYWW A | Reel         | 13 "     | 1000 |
|                                                                                     | ISP817XBSMT&R    |         |                     |                     |              |          |      |
|                                                                                     | ISP817XCSMT&R    |         |                     |                     |              |          |      |
|                                                                                     | ISP817XDSMT&R    |         |                     |                     |              |          |      |
|  | ISP817XASMT&R-Cu | DIP4-SL | ISP817XX<br>/YYWW A |                     | Reel         | 13 "     | 1000 |
|                                                                                     | ISP817XBSMT&R-Cu |         |                     |                     |              |          |      |
|                                                                                     | ISP817XCSMT&R-Cu |         |                     |                     |              |          |      |
|                                                                                     | ISP817XDSMT&R-Cu |         |                     |                     |              |          |      |

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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           | $V_{iso}$ | 6000    | Vrms | 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%

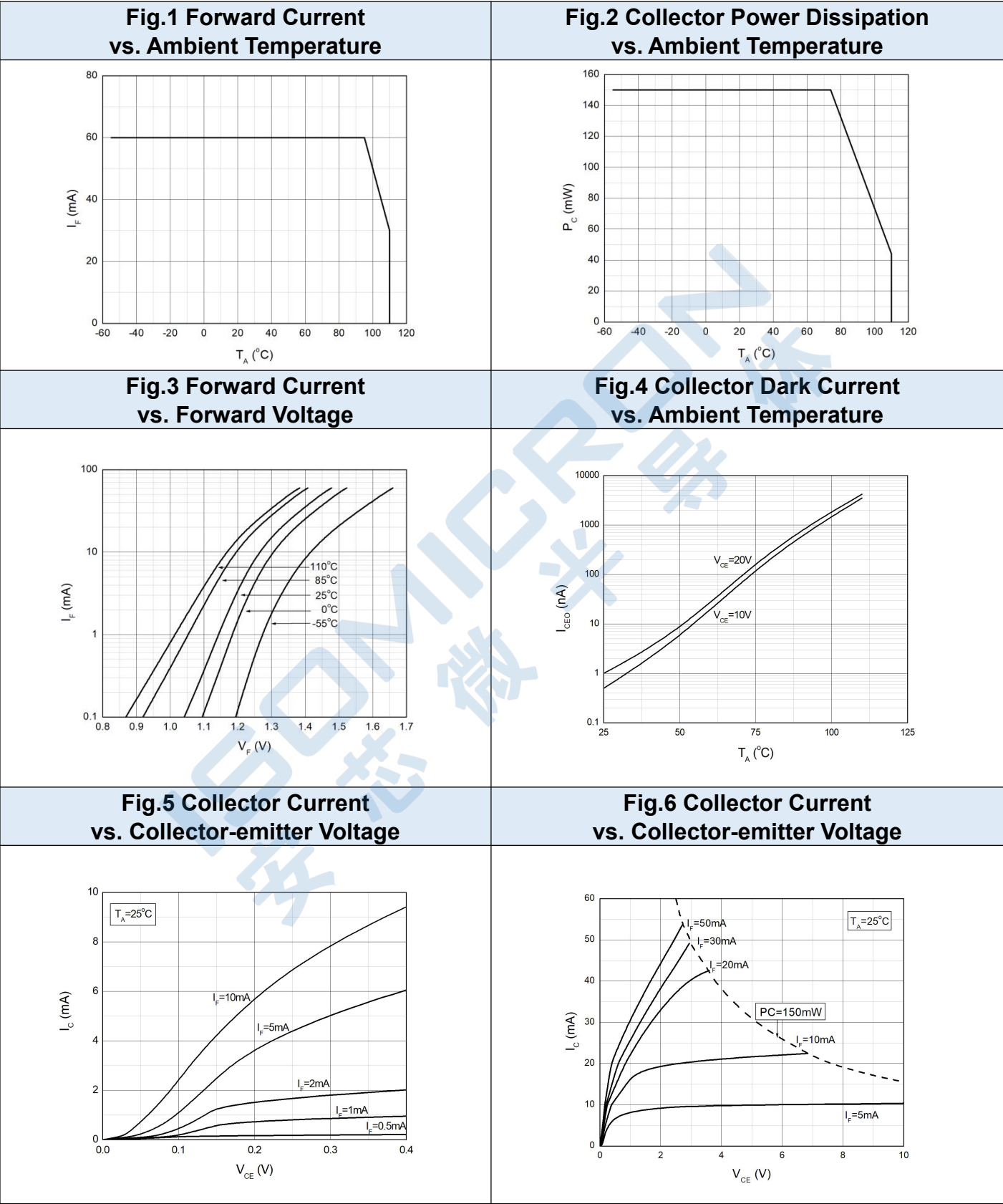
ELECTRICAL OPTICAL CHARACTERISTICS(T<sub>a</sub>=25°C)

| 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    |

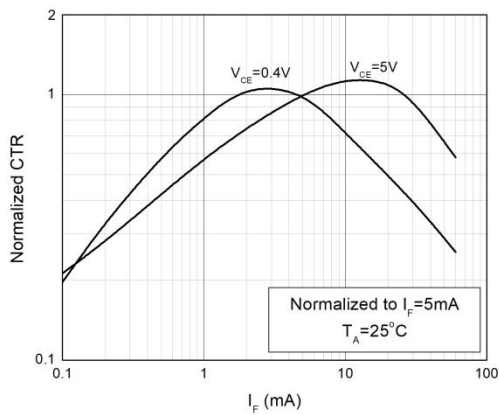
Note 3. Fig.12&amp;13

Note 4. Fig.14

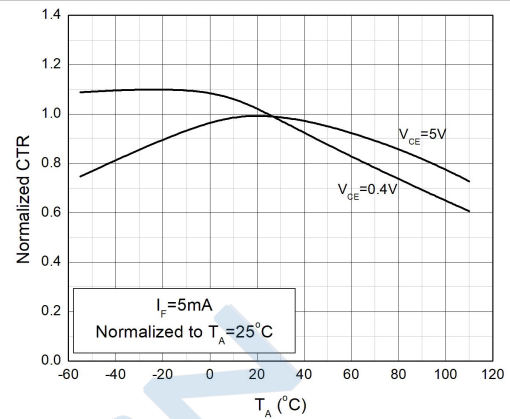
CHARACTERISTIC CURVES



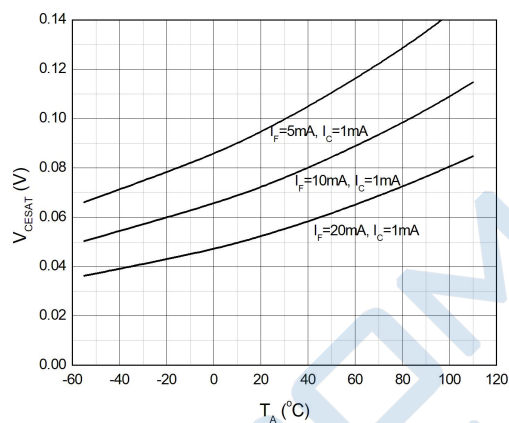
**Fig.7 Normalized Current Transfer Ratio vs. Forward Current**



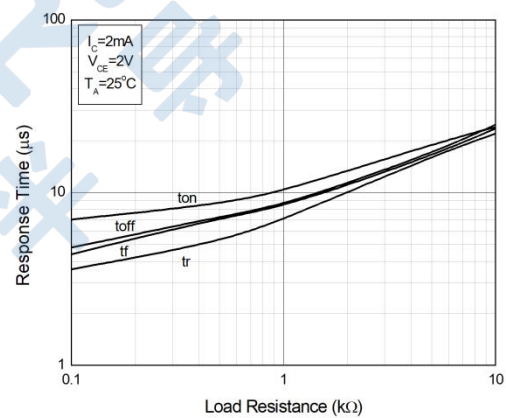
**Fig.8 Normalized Current Transfer Ratio vs. Ambient Temperature**



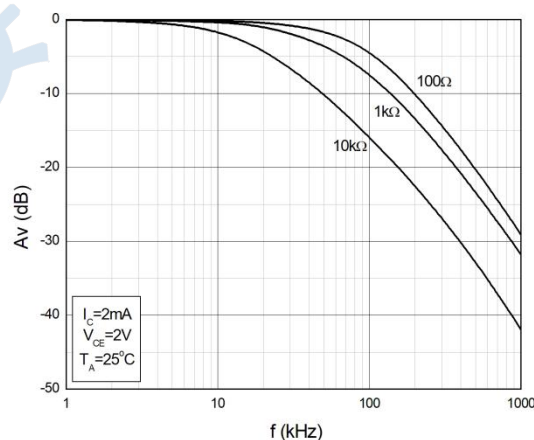
**Fig.9 Collector-emitter Saturation Voltage vs. Ambient Temperature**



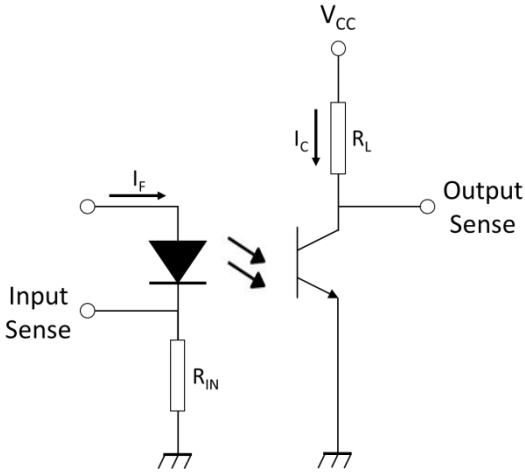
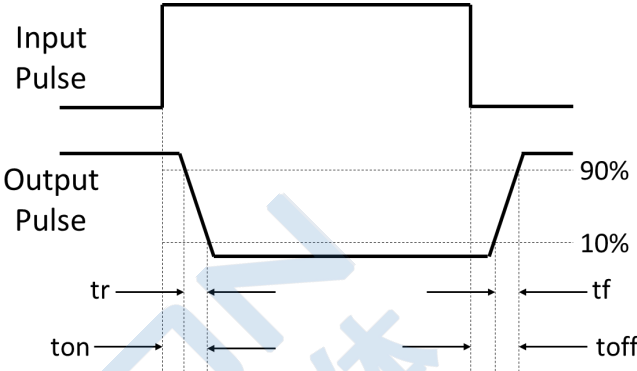
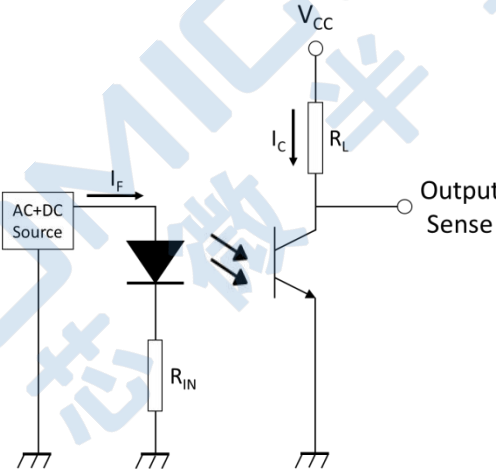
**Fig.10 Switching Time vs. Load Resistance**



**Fig.11 Frequency Response**

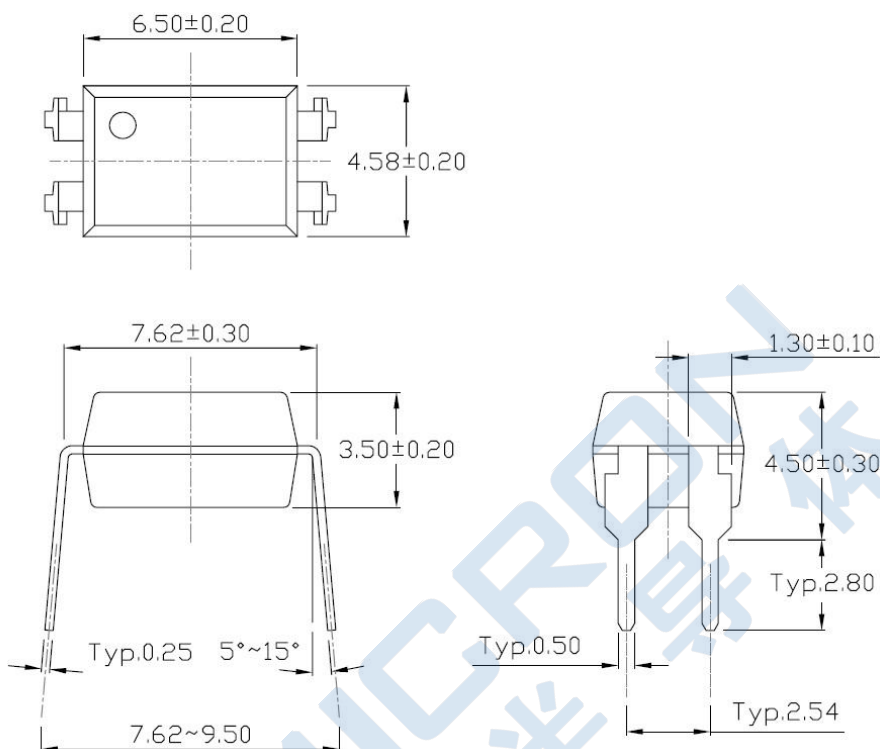


TEST CIRCUITS

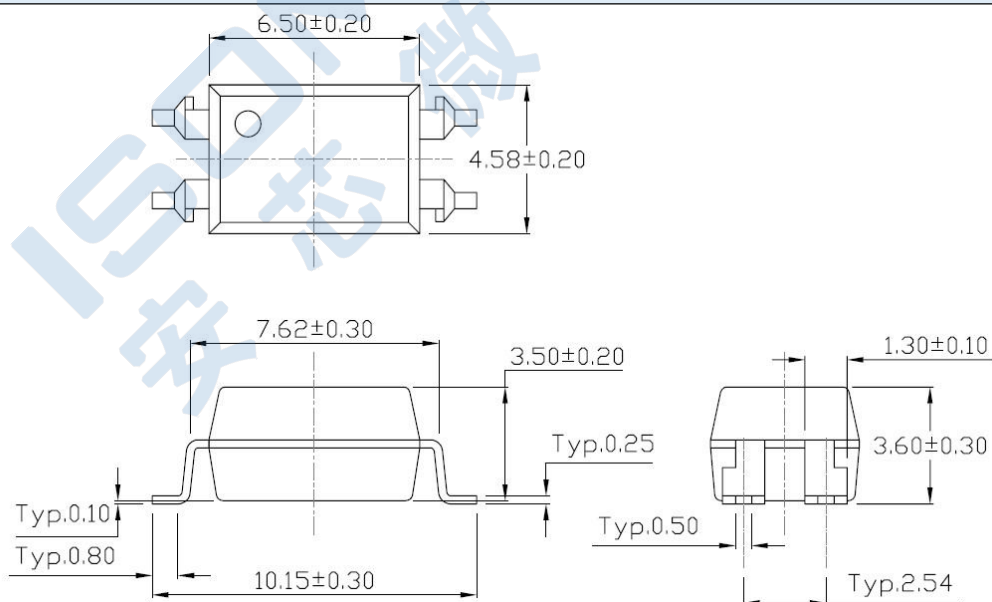
| Fig.12 Test Circuits of Response Time                                                | Fig.13 Curves of Response Time                                                     |
|--------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|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

## PACKAGE DIMENSIONS

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



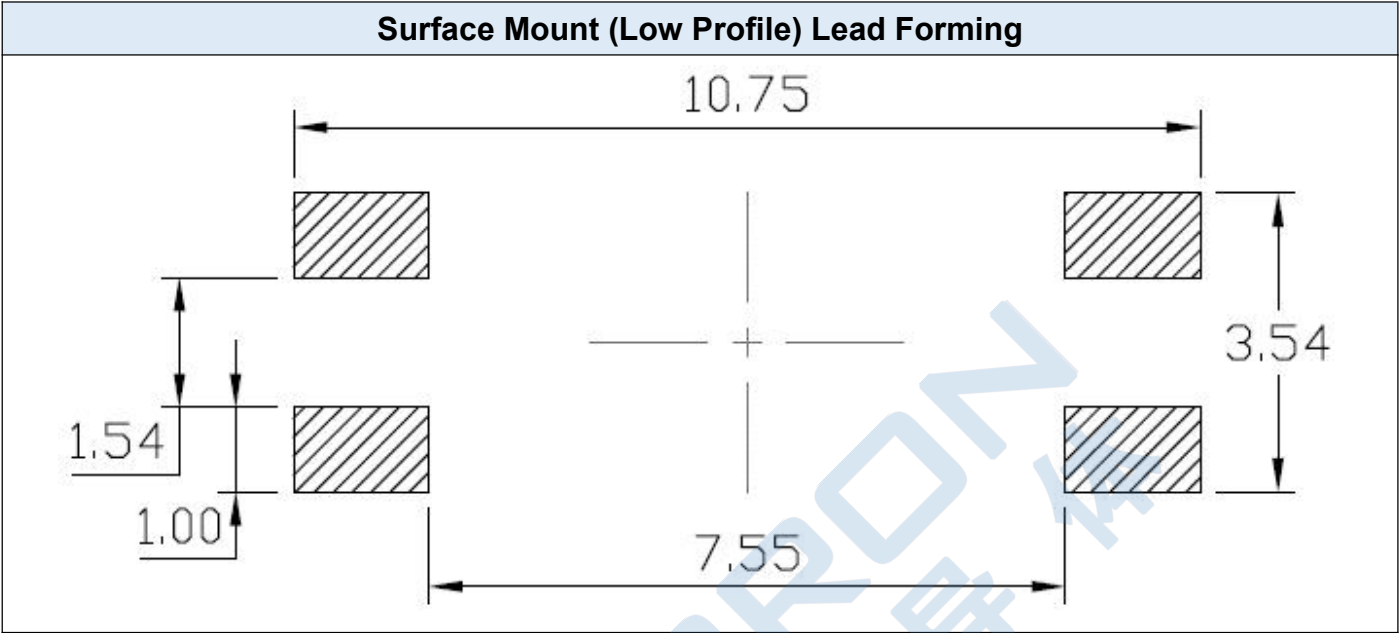
### Surface Mount (Low Profile) Lead Forming (SL Type)



- Dimensions in mm unless otherwise stated

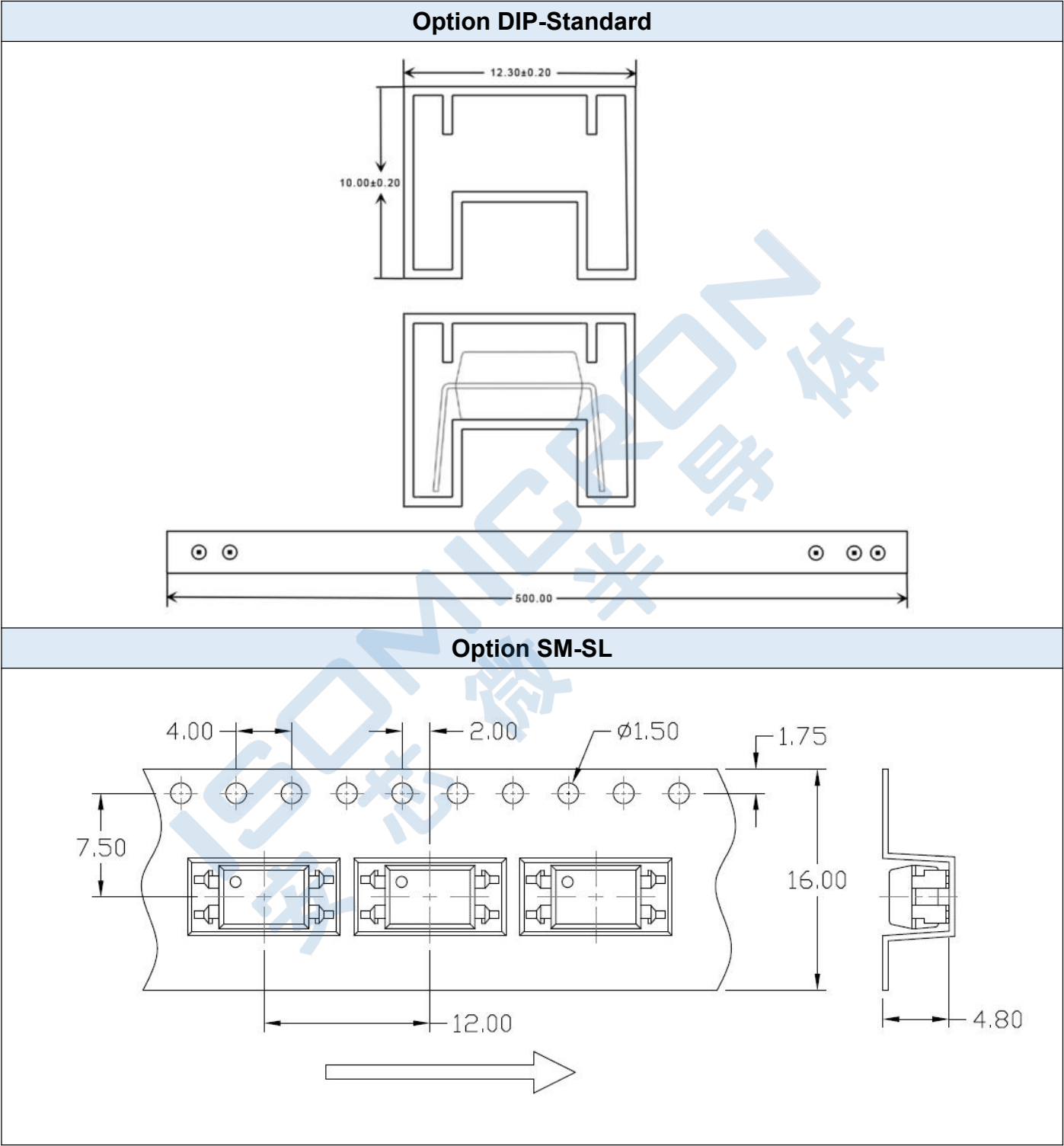


RECOMMENDED SOLDER MASK



- Dimensions in mm unless otherwise stated

CARRIER TAPE SPECIFICATIONS



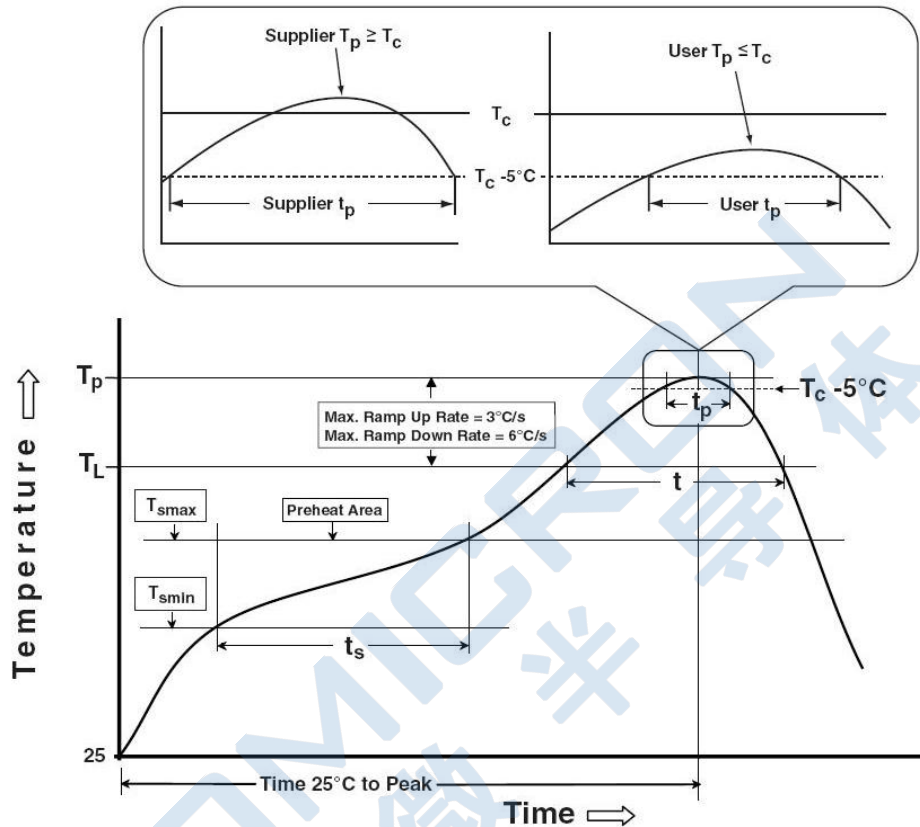
● Dimensions in mm unless otherwise stated

## ORDERING AND MARKING INFORMATION

| Marking Information                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                 |                                                                                                                                                                                                                                          |                                   |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                 | <div>ISP : Company Abbr.</div> <div>817 : Part Number</div> <div>X : VDE Option</div> <div>Y : CTR Rank (A/B/C/D)</div> <div>/ : ISOMICRON</div> <div>YY : Fiscal Year</div> <div>WW : Work Week</div> <div>A : Manufacturing Code</div> |                                   |
| Order Code                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                 |                                                                                                                                                                                                                                          |                                   |
| <div><div><div>ISP</div><div>817</div><div>X</div><div>X</div><div>SM</div><div>T&amp;R</div><div>-</div><div>X</div><div>X</div></div><div><div>Company Abbr.</div><div>Part Number</div><div>VDE Option:<br/>X: VDE approval</div><div>CTR Rank:<br/>A/B/C/D/GB/GR</div></div><div><div>Halogen Free:<br/>E/None:: Halogen-free,Lead-free<br/>Z: Halogen, Lead-free</div><div>Lead Frame Option:<br/>Cu: Copper ; None: Iron</div><div>Tape And Reel Option:<br/>T&amp;R: Reel ; None: Tube</div><div>Lead Forming:<br/>SM: SM-SL<br/>None: DIP-Standard</div></div></div> |                 |                                                                                                                                                                                                                                          |                                   |
| 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 |
| SM-SL                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 1000 Units/Reel | 2 Reels/Inner box                                                                                                                                                                                                                        | 5 Inner box/Outer box = 10k Units |

## REFLOW INFORMATION

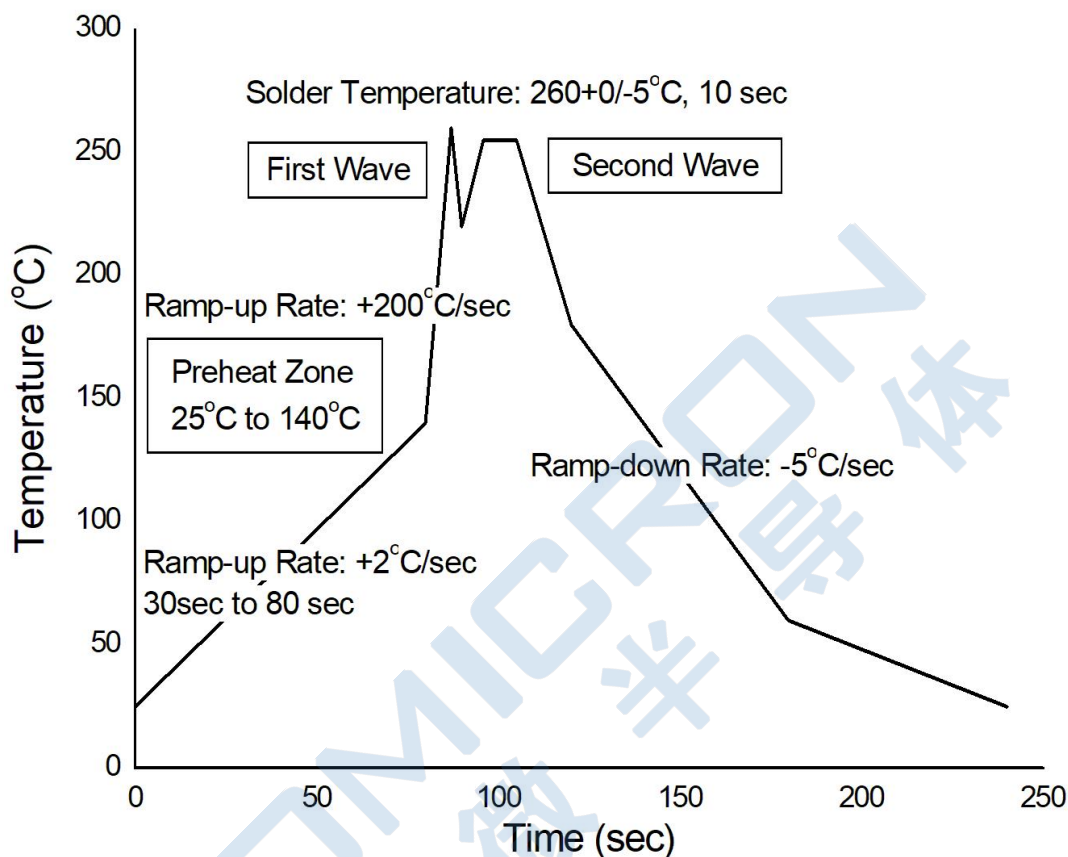
### Reflow Profile



| Profile Feature                                  | Sn-Pb Assembly Profile | Pb-Free Assembly Profile |
|--------------------------------------------------|------------------------|--------------------------|
| Temperature Min. ( $T_{smin}$ )                  | 100                    | 150°C                    |
| Temperature Max. ( $T_{smax}$ )                  | 150                    | 200°C                    |
| Time ( $t_s$ ) from ( $T_{smin}$ to $T_{smax}$ ) | 60-120 seconds         | 60-120 seconds           |
| Ramp-up Rate ( $t_L$ to $t_P$ )                  | 3°C/second max.        | 3°C/second max.          |
| Liquidous Temperature ( $T_L$ )                  | 183°C                  | 217°C                    |
| Time ( $t_L$ ) Maintained Above ( $T_L$ )        | 60 – 150 seconds       | 60 – 150 seconds         |
| Peak Body Package Temperature                    | 235°C +0°C / -5°C      | 260°C +0°C / -5°C        |
| Time ( $t_P$ ) within 5°C of 260°C               | 20 seconds             | 30 seconds               |
| Ramp-down Rate ( $T_P$ to $T_L$ )                | 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+0/-5°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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- Discoloration might be occurred on the package surface after soldering, reflow or long-time use. It neither impacts the performance nor reliability.

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