



# MPC814X1 Series

## DIP4, AC Input, Photo Transistor Coupler

### Description

The MPC814 series combine two AlGaAs infrared emitting diodes as the AC input 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, MPC814 series provide the most stable isolation feature.

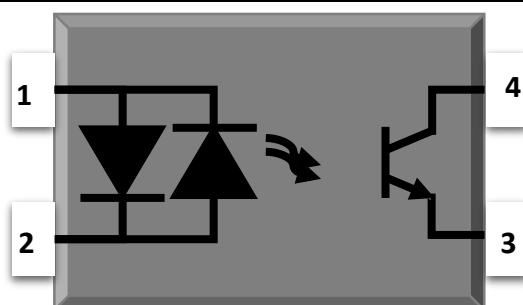
### Features

- High isolation 5000 VRMS
- CTR flexibility available see order information
- AC input with transistor output
- Operating temperature range - 55 °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

- AC line monitor
- Programmable controller
- Telephone line interface
- System appliance
- Measurement instrument

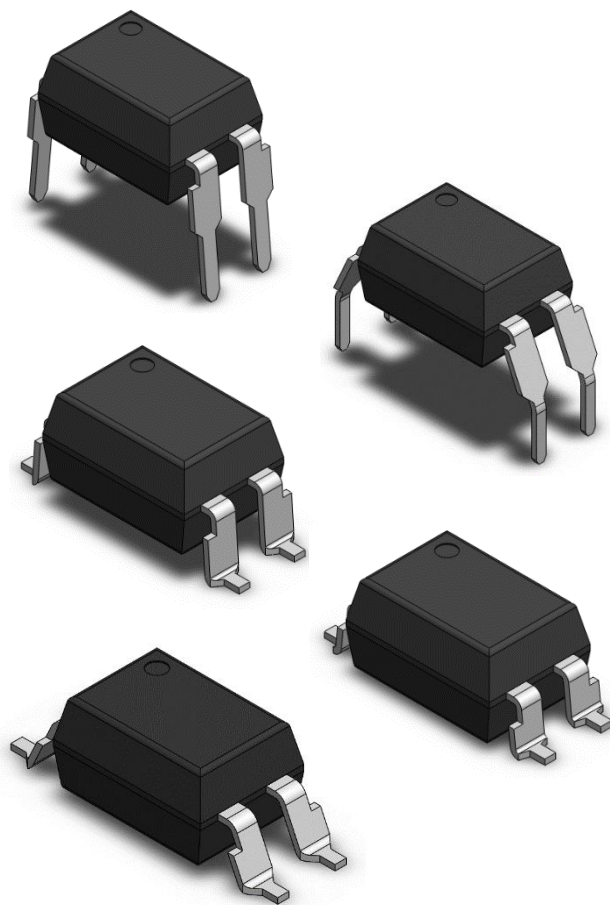
### SCHEMATIC



### PIN DEFINITION

1. Anode/Cathode
2. Cathode/Anode
3. Emitter
4. Collector

### PACKAGE OUTLINE





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## **DIP4, AC Input, Photo Transistor Coupler**

### **ABSOLUTE MAXIMUM RATINGS**

| PARAMETER                   | SYMBOL    | VALUE    | UNIT | NOTE |
|-----------------------------|-----------|----------|------|------|
| INPUT                       |           |          |      |      |
| Forward Current             | $I_F$     | $\pm 60$ | mA   |      |
| Peak Forward Current        | $I_{FP}$  | $\pm 1$  | 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     | Vrms | 2    |
| Operating Temperature       | $T_{opr}$ | -55~110  | °C   |      |
| Storage Temperature         | $T_{stg}$ | -55~125  | °C   |      |
| Soldering Temperature       | $T_{sol}$ | 260      | °C   |      |

Note 1. 100 $\mu$ s pulse, 100Hz frequency

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



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| ELECTRICAL OPTICAL CHARACTERISTICS at Ta=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>    | 35               | -                | -    | 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                        | MPC814               | CTR              | 20               | -    | 300  | I <sub>F</sub> =±1mA, V <sub>CE</sub> =5V                              |      |
|   | MPC814A1             |                  | 50               | -    | 150  |  |      |
|   | MPC814B1             |                  | 80               | -    | 400  |  |      |
| 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 | 4    |
| 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       | 3    |
| Response Time (Fall)                          | t <sub>f</sub>       | -                | 4                | 18   | μs   |  | 3    |

Note 3. Fig.12&13

Note 4. Fig.14

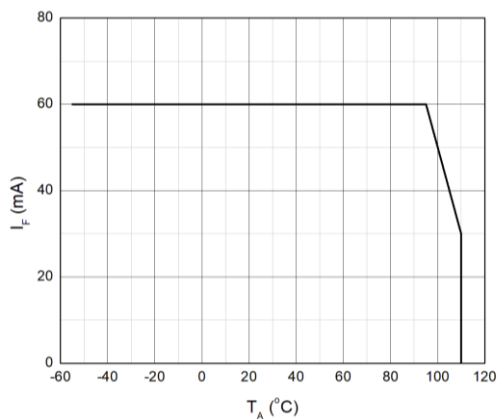


# MPC814X1 Series

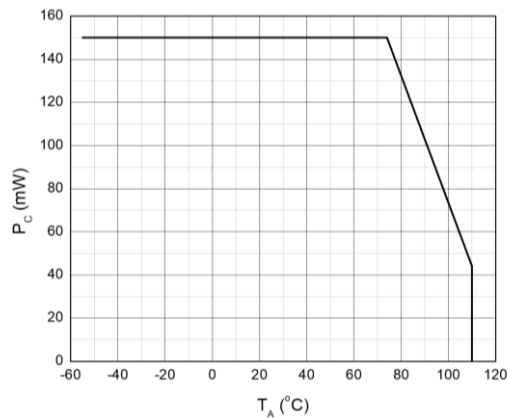
## DIP4, AC Input, Photo Transistor Coupler

### CHARACTERISTIC CURVES

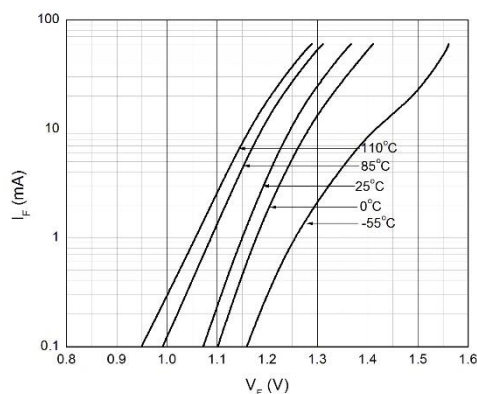
**Fig.1 Forward Current vs. Ambient Temperature**



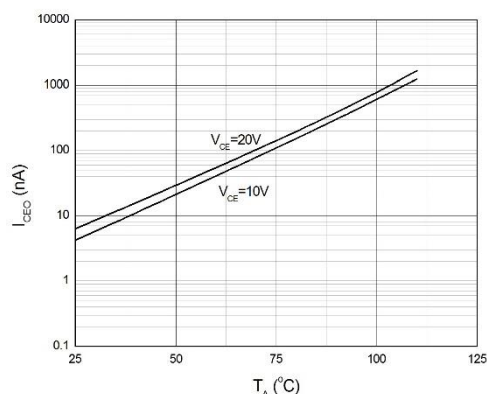
**Fig.2 Collector Power Dissipation vs. Ambient Temperature**



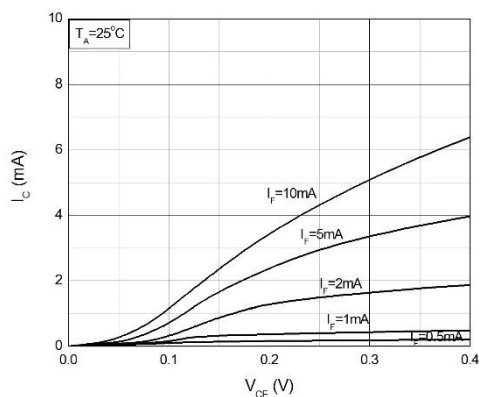
**Fig.3 Forward Current vs. Forward Voltage**



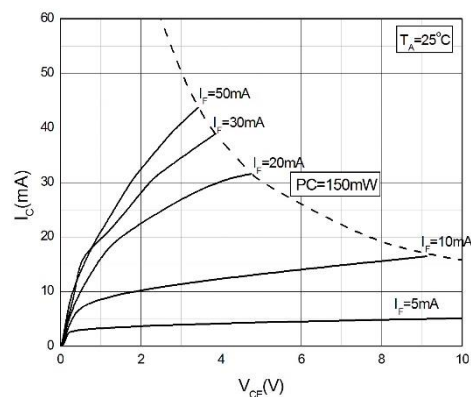
**Fig.4 Collector Dark Current vs. Ambient Temperature**



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



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



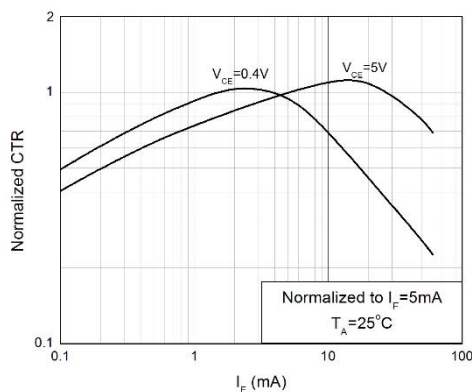


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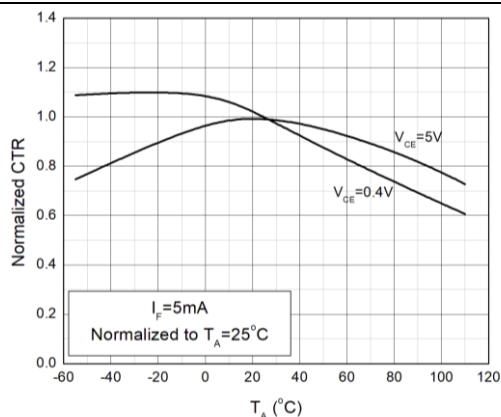
## DIP4, AC Input, Photo Transistor Coupler

### CHARACTERISTIC CURVES

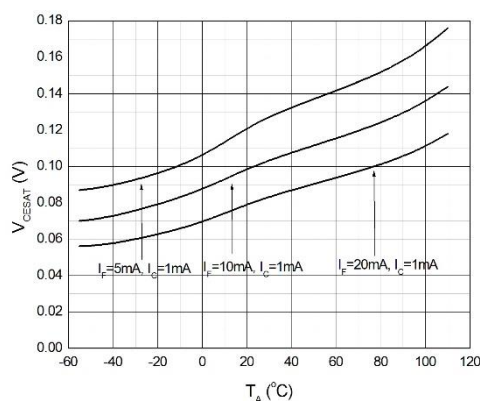
**Fig.7 Normalized Current Transfer Ratio  
vs. Forward Current**



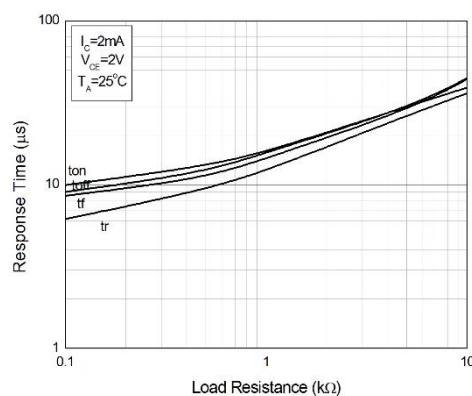
**Fig.8 Normalized Current Transfer Ratio  
vs. Ambient Temperature**



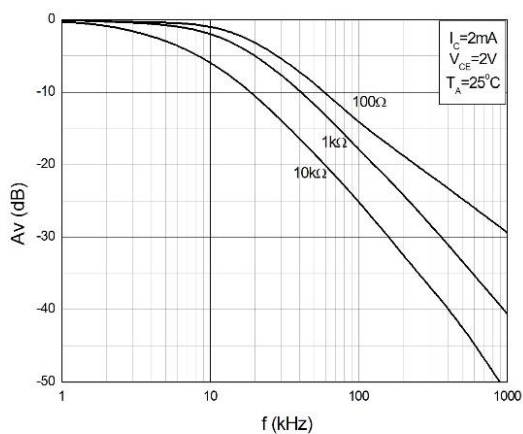
**Fig.9 Collector-emitter Saturation Voltage  
vs. Ambient Temperature**



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



**Fig.11 Frequency Response**





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## DIP4, AC Input, Photo Transistor Coupler

### TEST CIRCUITS

Fig.12 Test Circuits of Response Time

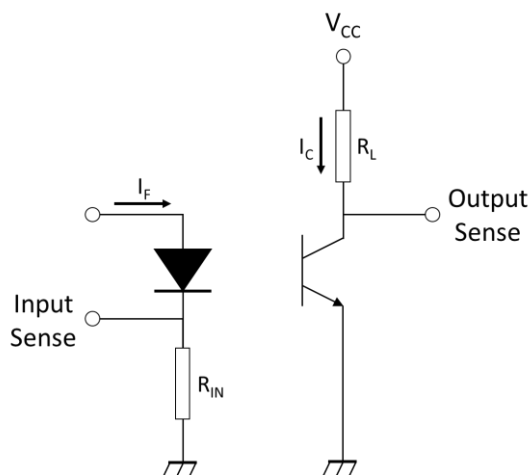


Fig.13 Curves of Response Time

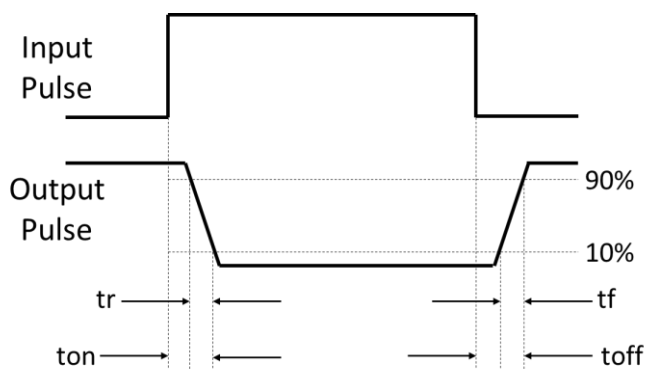
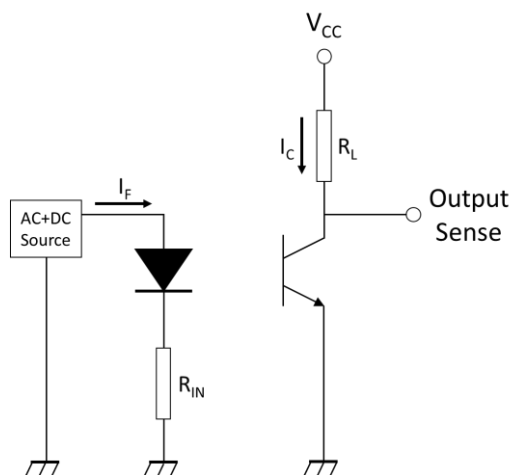


Fig.14 Test Circuits of Frequency Response



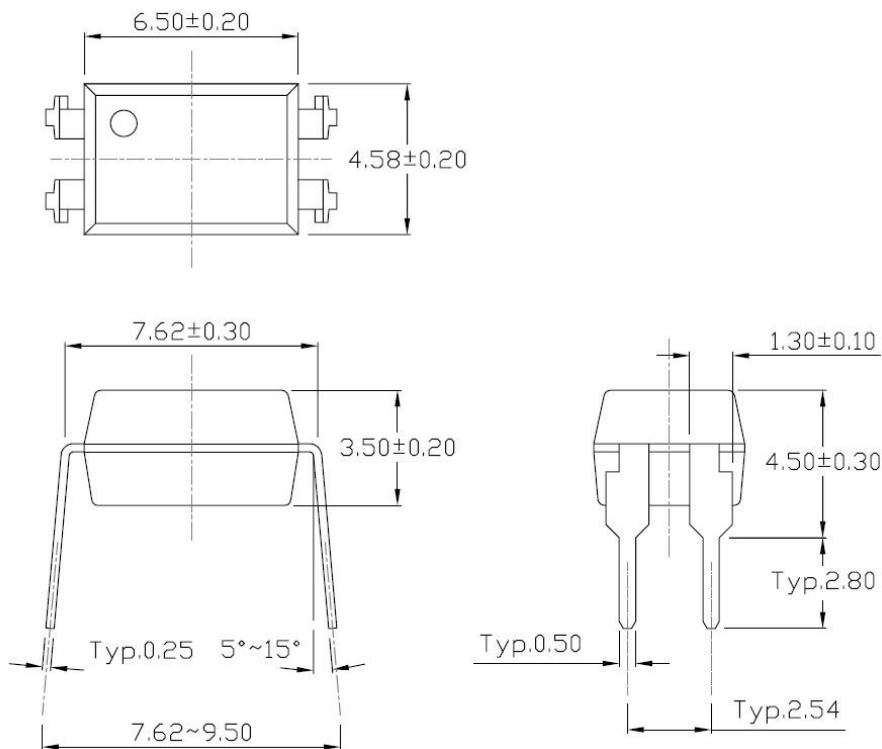


# MPC814X1 Series

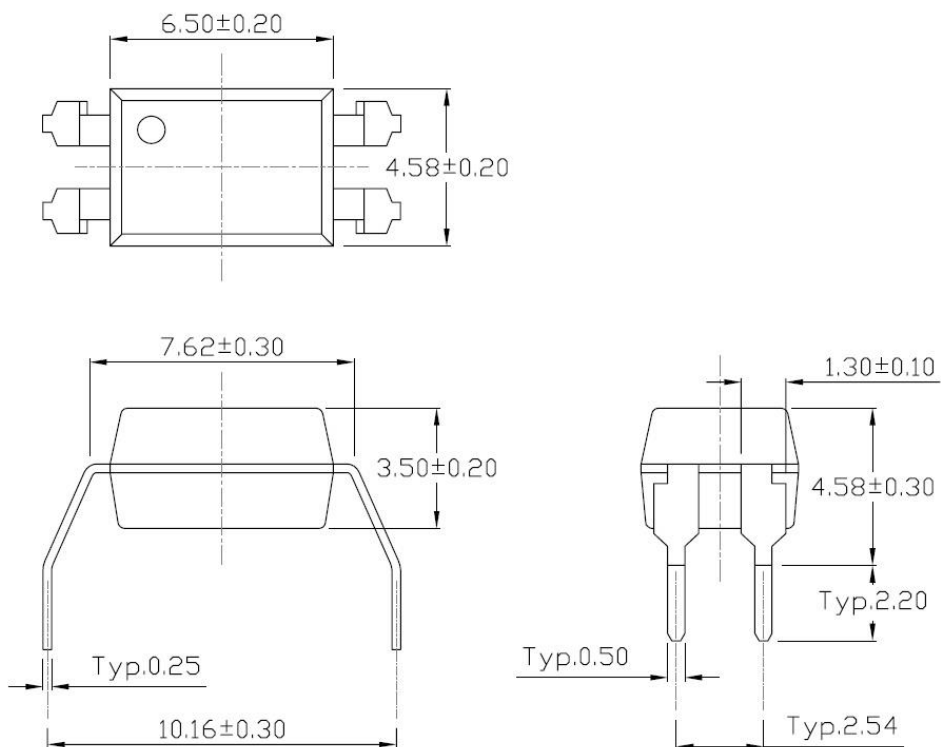
## DIP4, AC Input, Photo Transistor Coupler

### PACKAGE DIMENSIONS (Dimensions in mm unless otherwise stated)

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



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



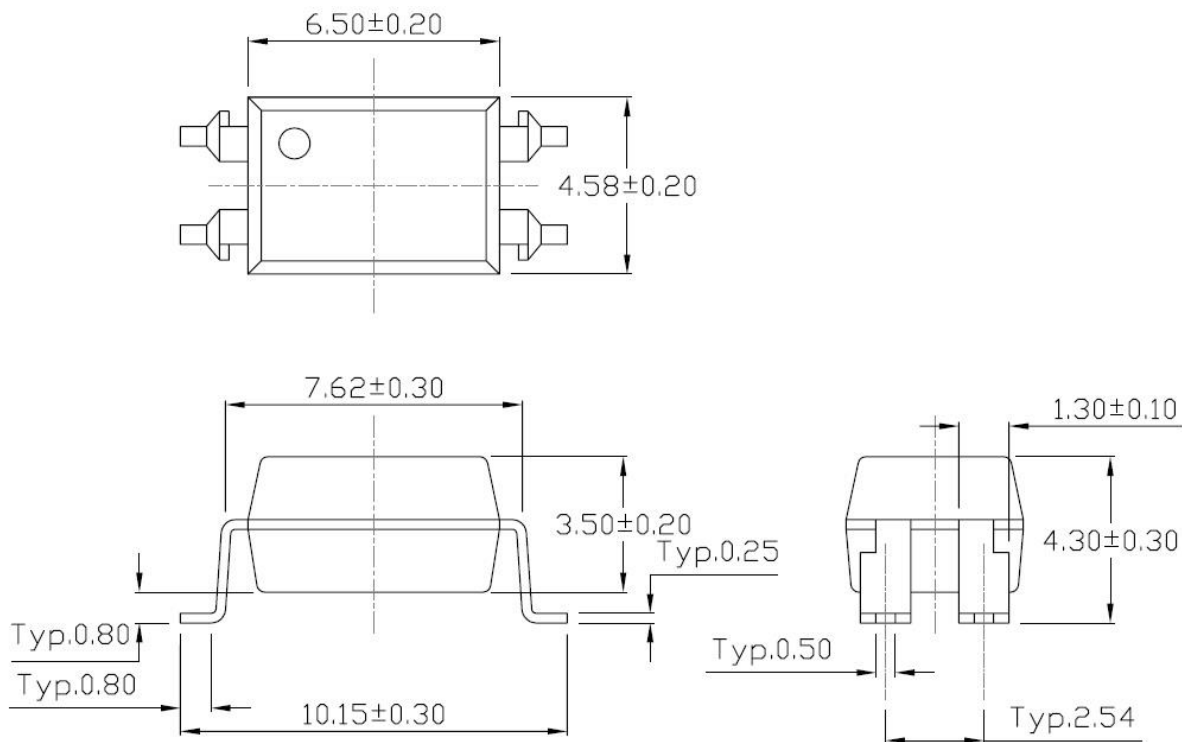


# MPC814X1 Series

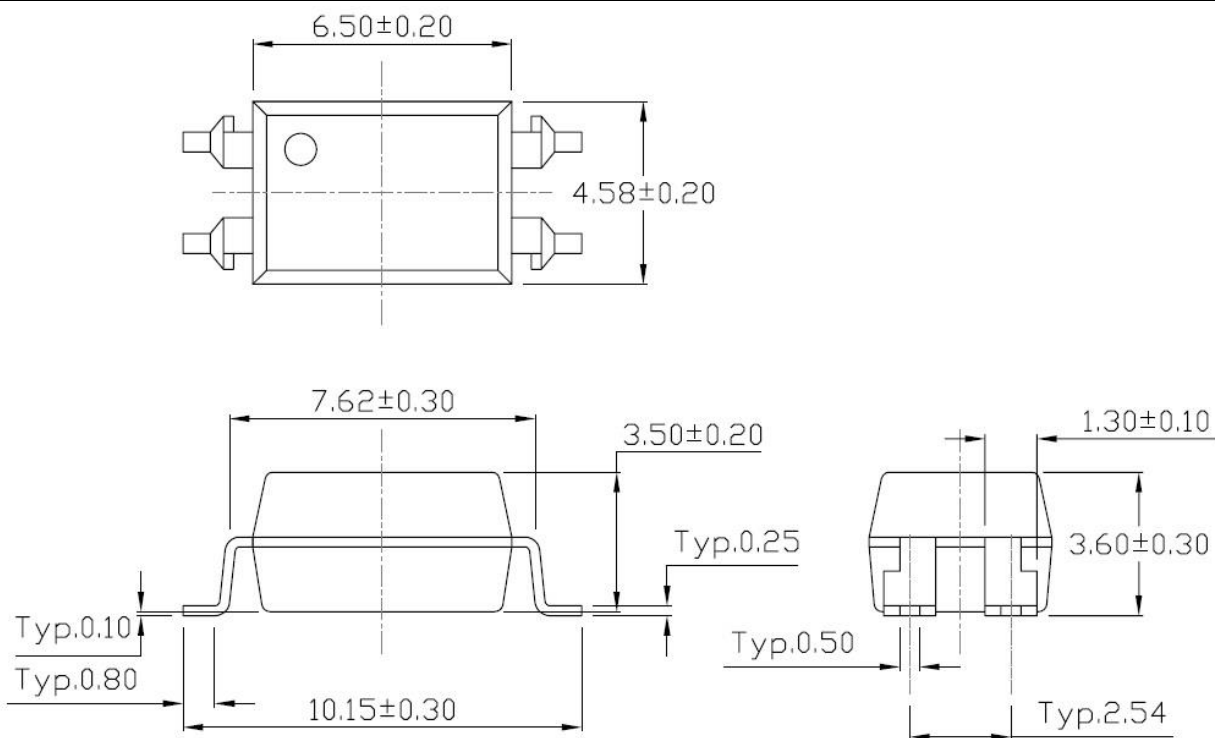
## DIP4, AC Input, Photo Transistor Coupler

### PACKAGE DIMENSIONS (Dimensions in mm unless otherwise stated)

#### Surface Mount Lead Forming (S Type)



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





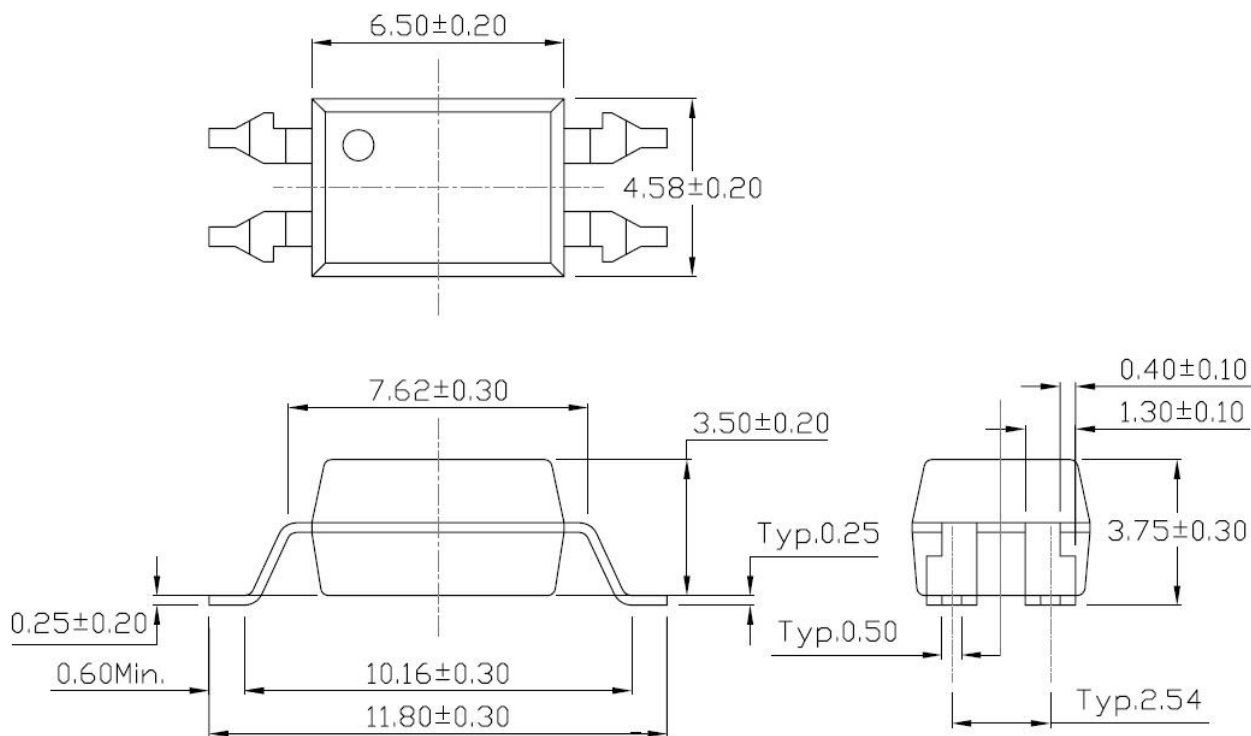


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## DIP4, AC Input, Photo Transistor Coupler

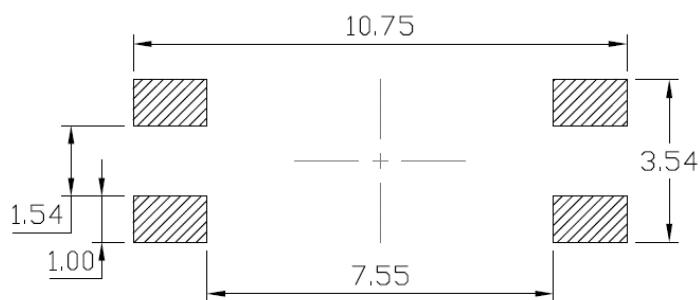
### PACKAGE DIMENSIONS (Dimensions in mm unless otherwise stated)

#### Surface Mount (Gullwing) Lead Forming (SLM Type)

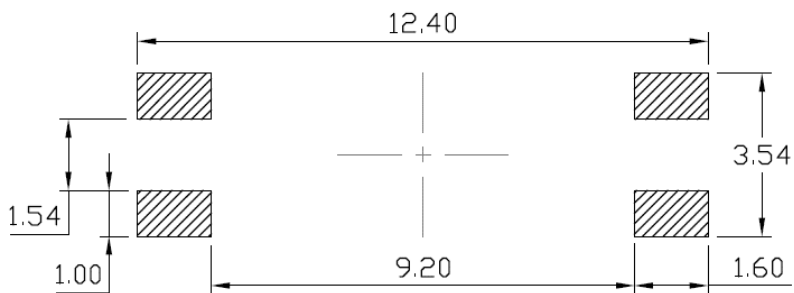


### RECOMMENDED SOLDER MASK (Dimensions in mm unless otherwise stated)

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



#### Surface Mount (Gullwing) Lead Forming



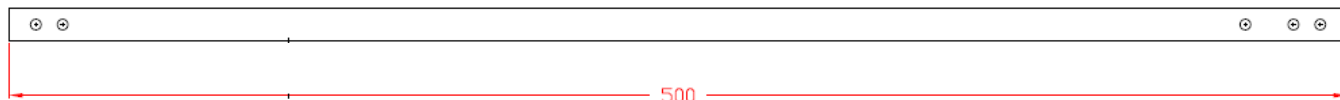
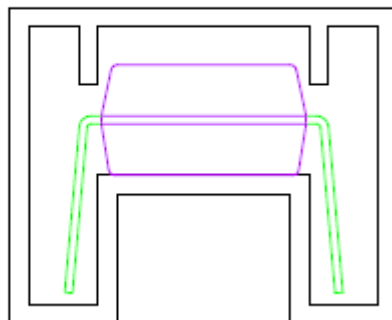
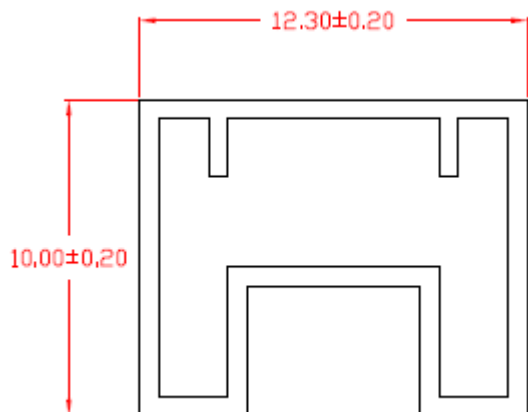


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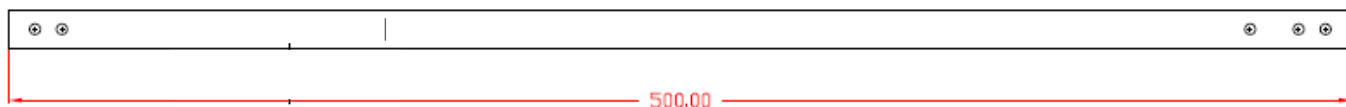
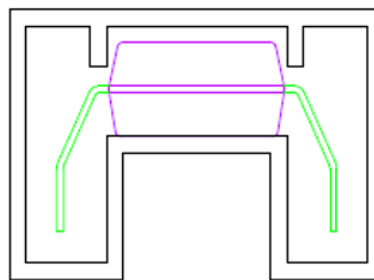
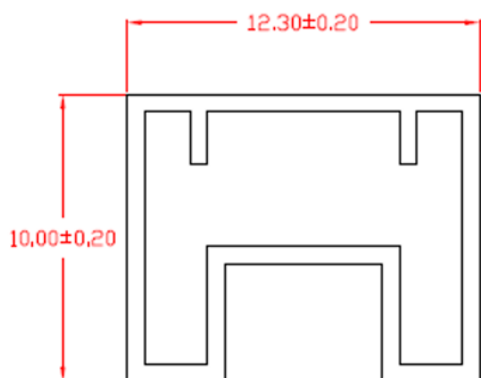
## DIP4, AC Input, Photo Transistor Coupler

### TUBE SPECIFICATIONS (Dimensions in mm unless otherwise stated)

#### Standard DIP

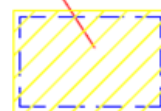


#### Option M



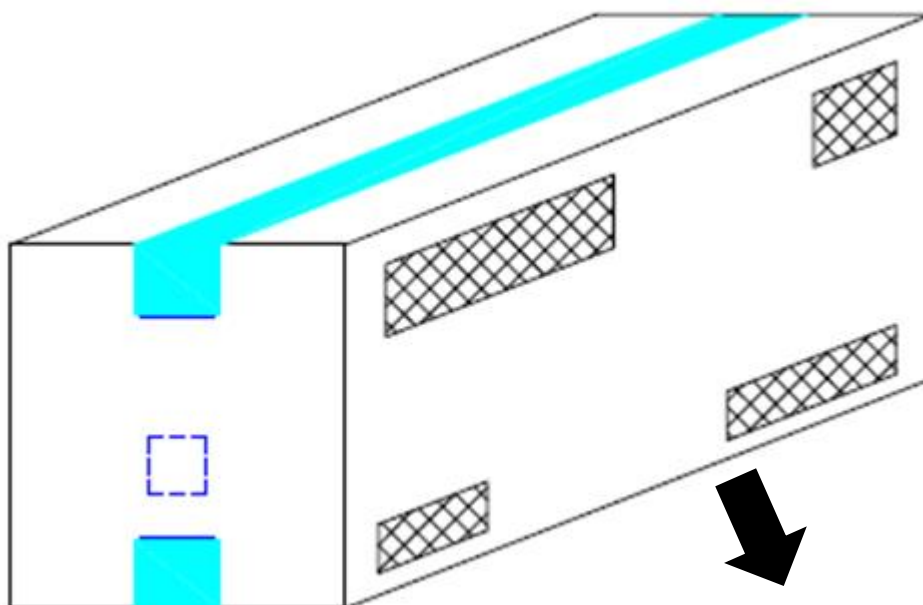


## Inner Box



- L x W x H = 52.5cm x 10.7cm x 4.7cm

## Outer Box



- L x W x H = 53.5cm x 23.5cm x 25.5cm



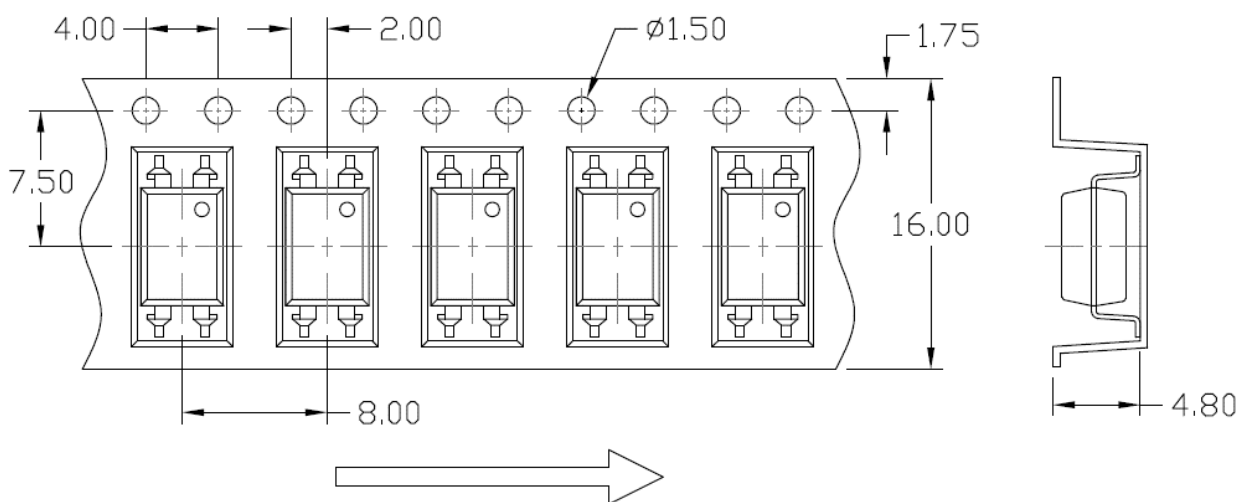


# MPC814X1 Series

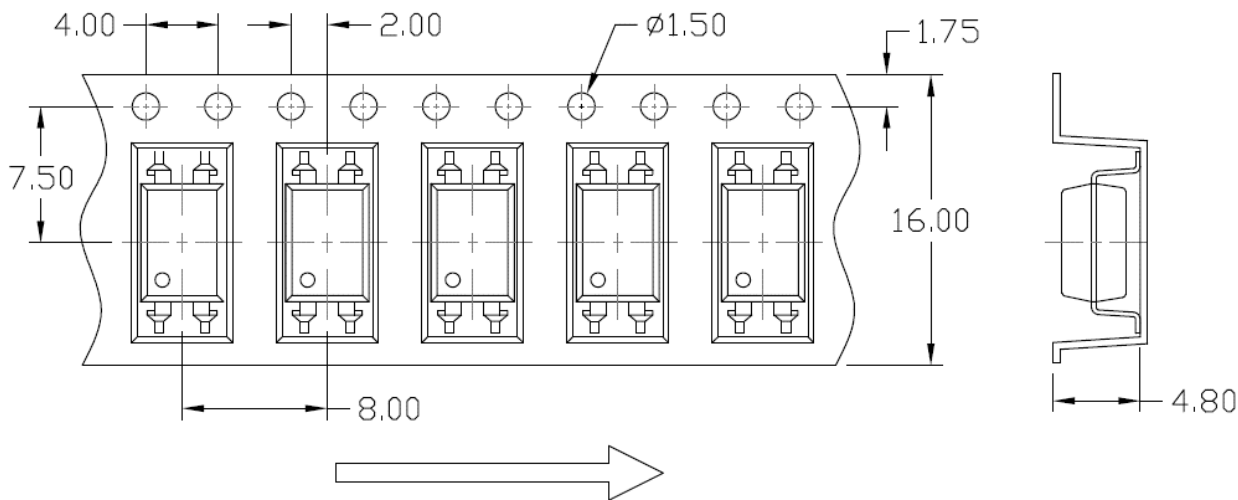
## DIP4, AC Input, Photo Transistor Coupler

### CARRIER TAPE SPECIFICATIONS (Dimensions in mm unless otherwise stated)

#### Option S(T1) & SL(T1)



#### Option S(T2) & SL(T2)



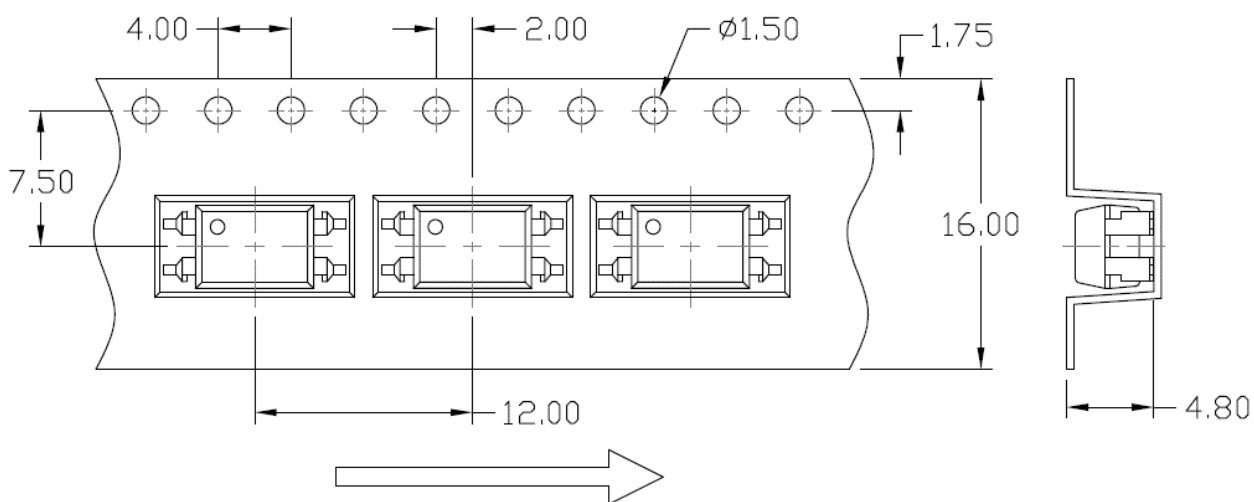


# MPC814X1 Series

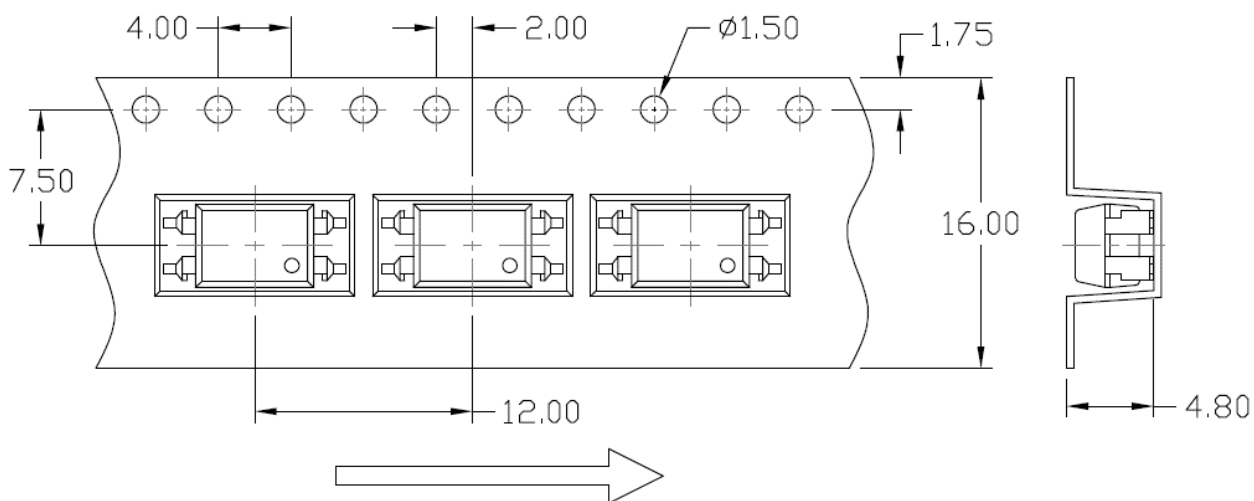
## DIP4, AC Input, Photo Transistor Coupler

### CARRIER TAPE SPECIFICATIONS (Dimensions in mm unless otherwise stated)

#### Option S(T3) & SL(T3)



#### Option S(T4) & SL(T4)



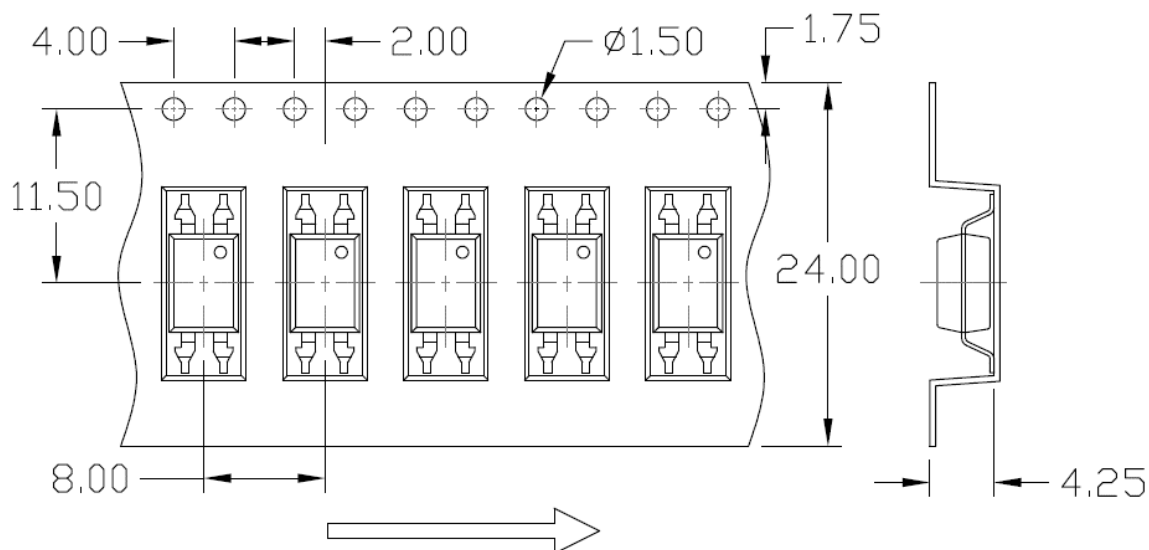


# MPC814X1 Series

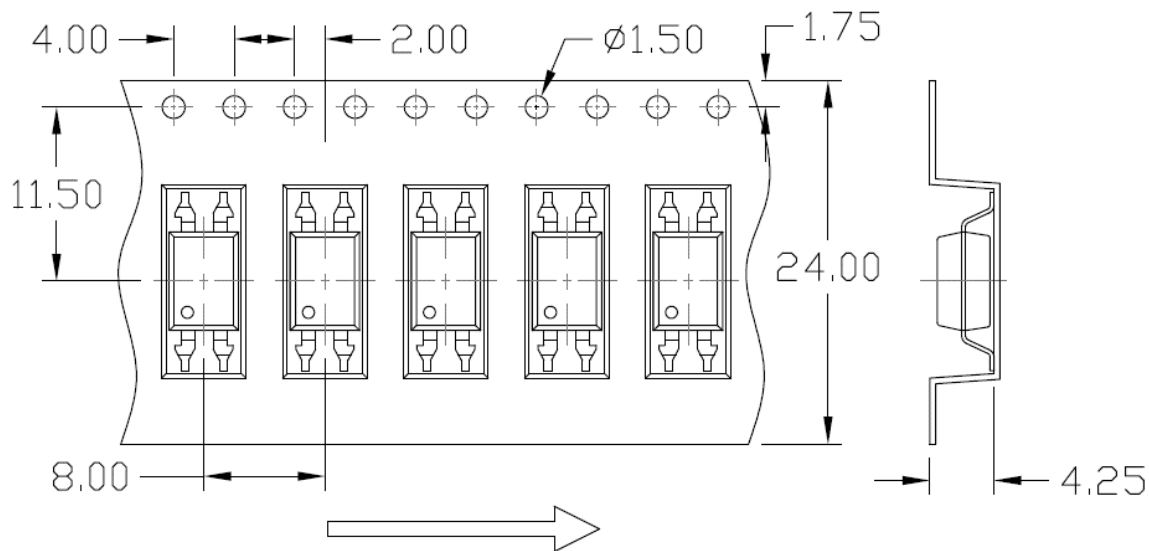
## DIP4, AC Input, Photo Transistor Coupler

### CARRIER TAPE SPECIFICATIONS (Dimensions in mm unless otherwise stated)

#### Option SLM(T1)



#### Option SLM(T2)



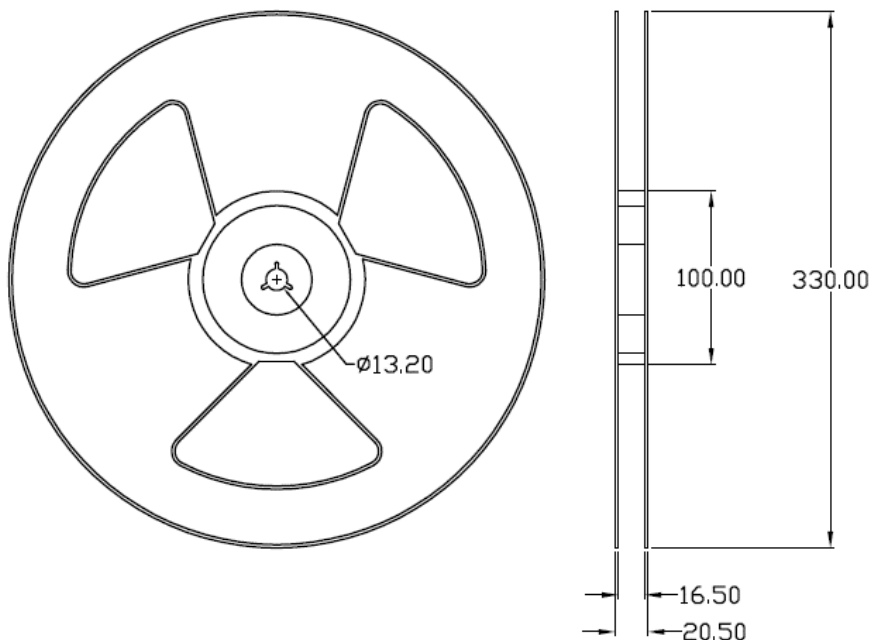


# MPC814X1 Series

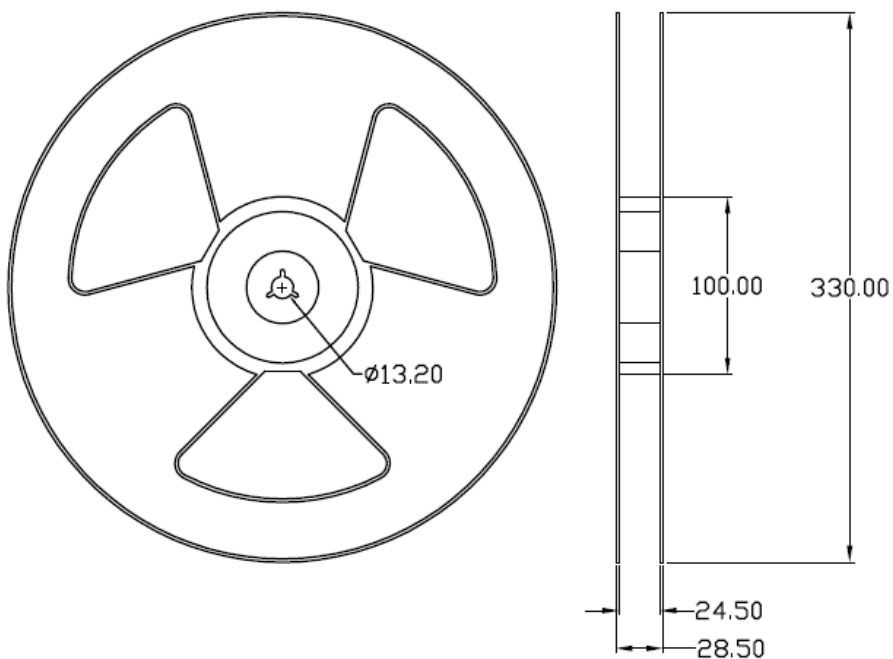
## DIP4, AC Input, Photo Transistor Coupler

### REEL SPECIFICATIONS (Dimensions in mm unless otherwise stated)

#### Option S & Option SL



#### Option SLM



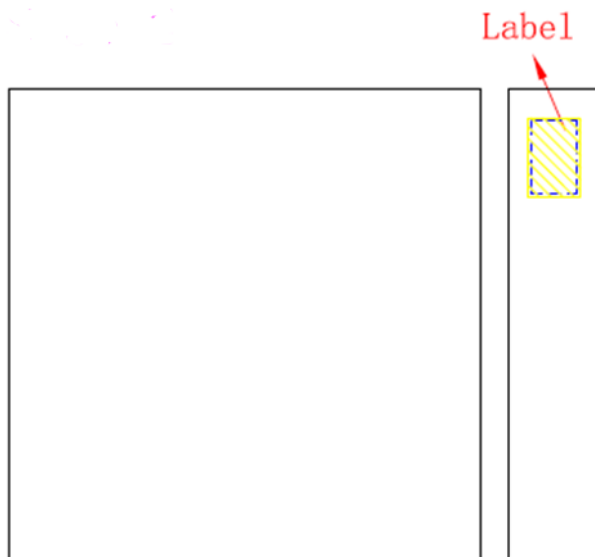


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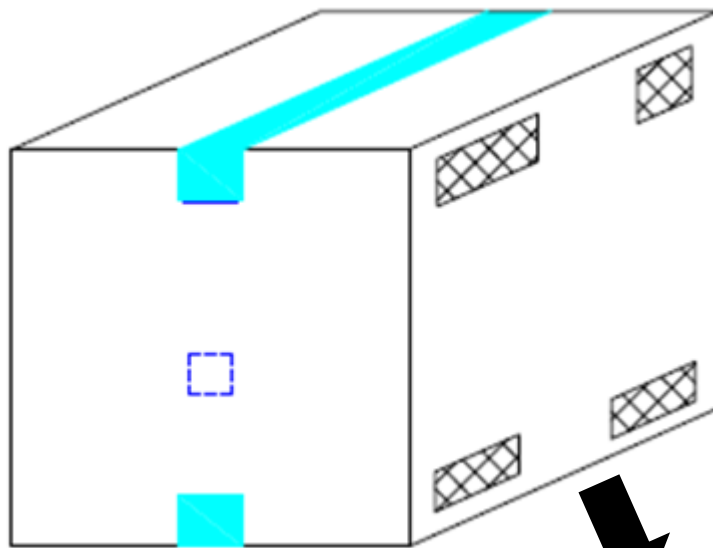
### BOX SPECIFICATIONS (Reel Type)

#### Inner Box

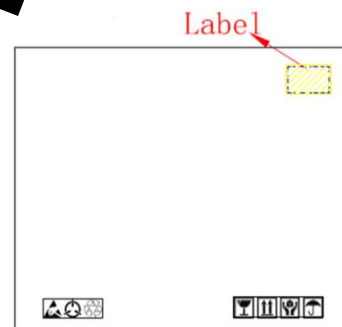


- L x W x H = 36cm x 36cm x 6.9cm

#### Outer Box



- L x W x H = 45cm x 38cm x 38cm







# MPC814X1 Series

## DIP4, AC Input, Photo Transistor Coupler

### ORDERING AND MARKING INFORMATION

#### MARKING INFORMATION

|  |            |                      |
|--|------------|----------------------|
|  | <b>MPC</b> | : Company Abbr.      |
|  | <b>814</b> | : Part Number        |
|  | <b>X</b>   | : CTR Rank           |
|  | <b>V</b>   | : VDE Option         |
|  | <b>Y</b>   | : Fiscal Year        |
|  | <b>A</b>   | : Manufacturing Code |
|  | <b>WW</b>  | : Work Week          |

#### ORDERING INFORMATION

### MPC814X1(Y)(Z)-GV

MPC – Company Abbr.  
814 – Part Number  
X1 – Rank (A/B or None)  
Y – Lead Form Option (M/S/SL/SLM/None)  
Z – Tape and Reel Option (T1/T2/T3/T4)  
G – Green  
V – VDE Option (V or None)

#### LABEL INFORMATION

**喆光照明光電股份有限公司**  
WISELITE Optronics Co., Ltd

Part No : XXXXXXXXXXXXXXXX Bin Code : X



Lot No : XXXXXXXXXXXX

Date Code : XXXX

Q'ty : XXXX pcs







#### Packing Quantity

| Option  | Quantity        | Quantity – Inner box | Quantity – Outer box                |
|---------|-----------------|----------------------|-------------------------------------|
| None    | 100 Units/Tube  | 32 Tubes/Inner box   | 10 Inner box/Outer box = 32k Units  |
| M       | 100 Units/Tube  | 28 Tubes/Inner box   | 10 Inner box/Outer box = 32k Units  |
| S(T1)   | 1500 Units/Reel | 3 Reels/Inner box    | 5 Inner box/Outer box = 22.5k Units |
| S(T2)   | 1500 Units/Reel | 3 Reels/Inner box    | 5 Inner box/Outer box = 22.5k Units |
| S(T3)   | 1000 Units/Reel | 3 Reels/Inner box    | 5 Inner box/Outer box = 15k Units   |
| S(T4)   | 1000 Units/Reel | 3 Reels/Inner box    | 5 Inner box/Outer box = 15k Units   |
| SL(T1)  | 1500 Units/Reel | 3 Reels/Inner box    | 5 Inner box/Outer box = 22.5k Units |
| SL(T2)  | 1500 Units/Reel | 3 Reels/Inner box    | 5 Inner box/Outer box = 22.5k Units |
| SL(T3)  | 1000 Units/Reel | 3 Reels/Inner box    | 5 Inner box/Outer box = 15k Units   |
| SL(T4)  | 1000 Units/Reel | 3 Reels/Inner box    | 5 Inner box/Outer box = 15k Units   |
| SLM(T1) | 1000 Units/Reel | 3 Reels/Inner box    | 5 Inner box/Outer box = 15k Units   |
| SLM(T2) | 1000 Units/Reel | 3 Reels/Inner box    | 5 Inner box/Outer box = 15k Units   |

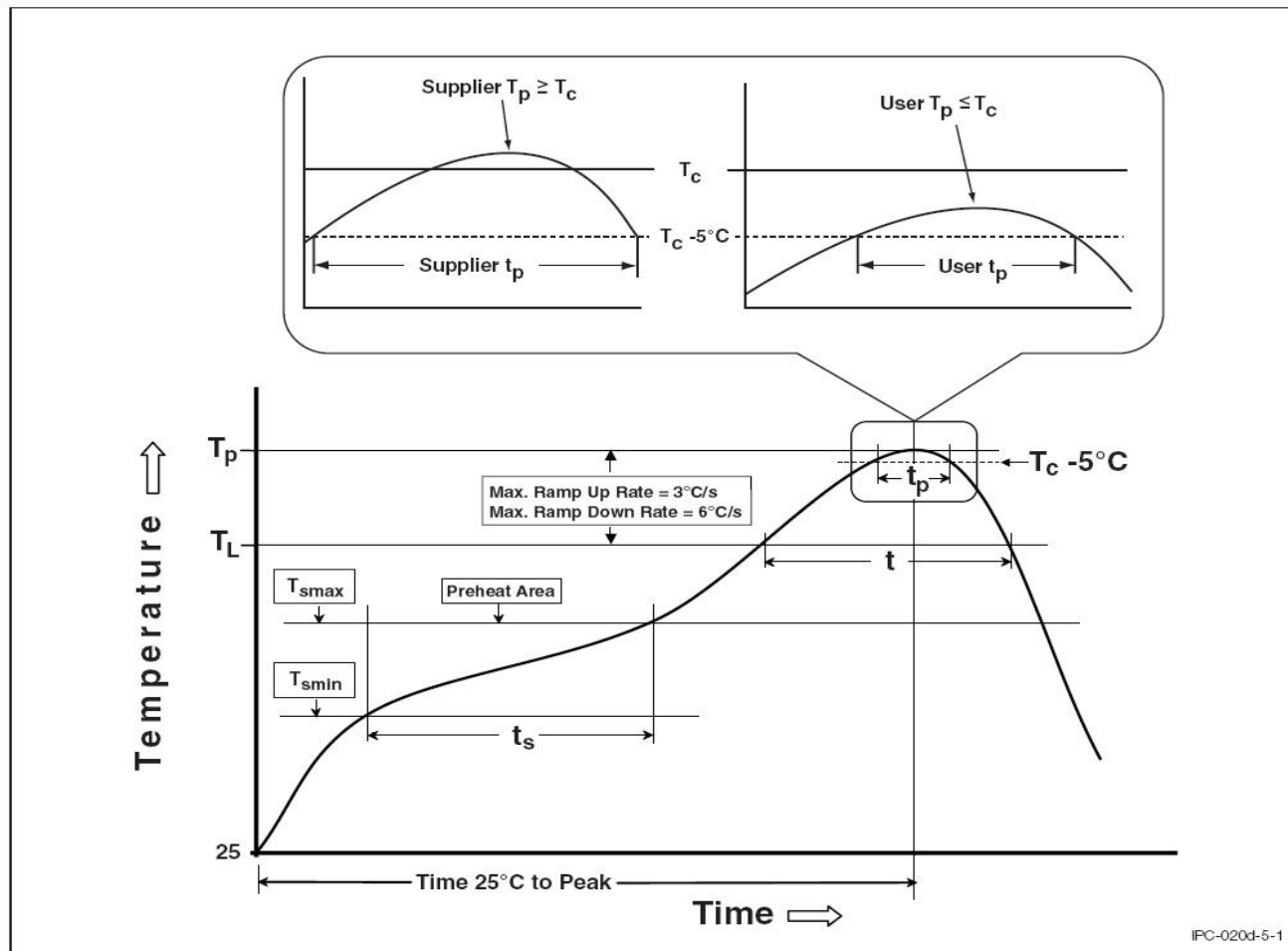


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## DIP4, AC Input, Photo Transistor Coupler

### 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.           |



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### **DISCLAIMER**

- WISELITE is continually improving the quality, reliability, function and design. WISELITE reserves the right to make changes without further notices.
- The characteristic curves shown in this datasheet are representing typical performance which are not guaranteed.
- WISELITE makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, WISELITE disclaims (a) any and all liability arising out of the application or use of any product, (b) any and all liability, including without limitation special, consequential or incidental damages, and (c) any and all implied warranties, including warranties of fitness for particular
- The products shown in this publication are designed for the general use in electronic applications such as office automation, equipment, communications devices, audio/visual equipment, electrical application and instrumentation purpose, non-infringement and merchantability.
- 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 WISELITE 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 WISELITE'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.