



# **MPC357 Series**

## **SOP4, DC Input Photo Transistor Coupler**

### ■ Features

- High isolation 3750 VRMS
- CTR flexibility available see order information
- DC 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 – GB4943.1-2022

### ■ Applications

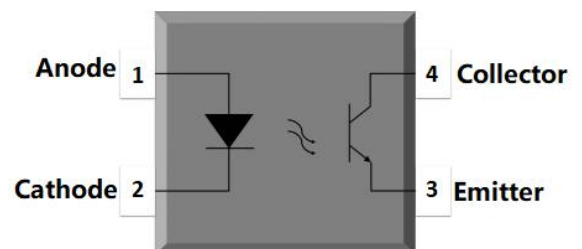
- Switch mode power supplies
- Programmable controllers
- Household appliances
- Office equipment

### Description

The MPC357 series combine an AlGaAs infrared emitting diode as the emitter which is optically coupled to a silicon planar phototransistor detector in a plastic SOP4 package.

With the robust coplanar double mold structure, MPC357 series provide the most stable isolation feature.

### ■ Schematic





# MPC357 Series

## SOP4, DC Input Photo Transistor Coupler

### ABSOLUTE MAXIMUM RATINGS

| PARAMETER                   | SYMBOL    | VALUE   | UNIT             | REMARK   |
|-----------------------------|-----------|---------|------------------|----------|
| INPUT                       |           |         |                  |          |
| Forward Current             | $I_F$     | 60      | mA               |          |
| Peak Forward Current        | $I_{FP}$  | 1       | A                | (Note 1) |
| Reverse Voltage             | $V_R$     | 6       | V                |          |
| Input Power Dissipation     | $P_I$     | 100     | mW               |          |
| OUTPUT                      |           |         |                  |          |
| Collector - Emitter Voltage | $V_{CEO}$ | 35      | 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           | $V_{iso}$ | 3750    | V <sub>rms</sub> | (Note 2) |
| Operating Temperature       | $T_{opr}$ | -55~110 | °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%



# MPC357 Series

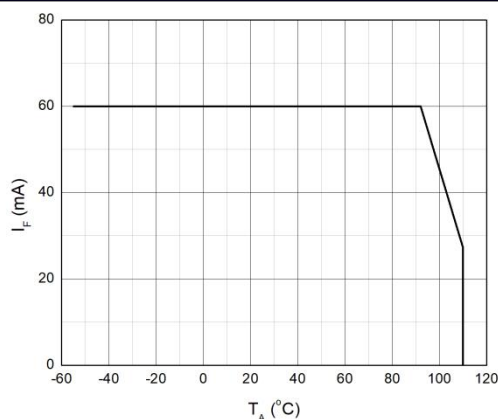
## SOP4, DC Input Photo Transistor Coupler

| ELECTRICAL OPTICAL CHARACTERISTICS at Ta=25°C |                      |                  |                  |      |      |                                                                        |          |
|-----------------------------------------------|----------------------|------------------|------------------|------|------|------------------------------------------------------------------------|----------|
| PARAMETER                                     | SYMBOL               | MIN              | TYP.             | MAX. | UNIT | TEST CONDITION                                                         | REMARK   |
| 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>    | 6                | -                | -    | V    | I <sub>E</sub> =0.1mA, I <sub>F</sub> =0                               |          |
| TRANSFER CHARACTERISTICS                      |                      |                  |                  |      |      |                                                                        |          |
| Current Transfer Ratio                        | MPC356               | CTR              | 50               | -    | 600  | I <sub>F</sub> =5mA, V <sub>CE</sub> =5V                               |          |
|                                               | MPC356A              |                  | 80               | -    | 160  |                                                                        |          |
|                                               | MPC356B              |                  | 130              | -    | 260  |                                                                        |          |
|                                               | MPC356C              |                  | 200              | -    | 400  |                                                                        |          |
|                                               | MPC356D              |                  | 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 | (Note 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       | (Note 3) |
| Response Time (Fall)                          | t <sub>f</sub>       | -                | 4                | 18   | μs   |                                                                        |          |

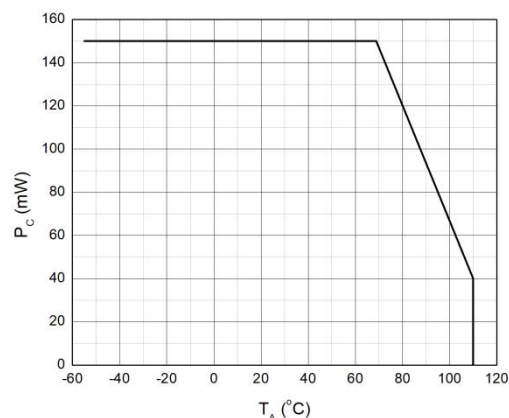
Note 3. Fig.12&13

Note 4. Fig.14

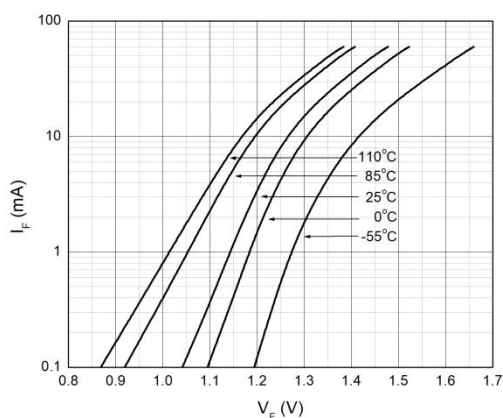
### CHARACTERISTIC CURVES



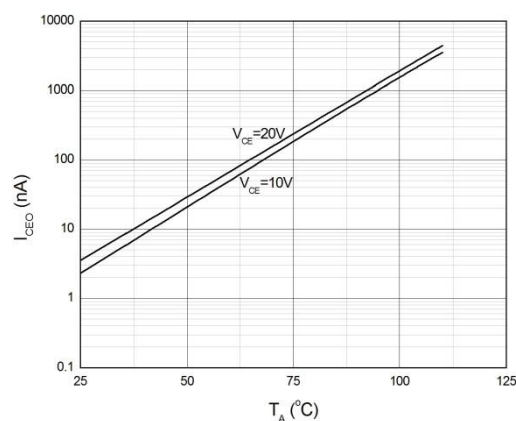
**Fig.1 Forward Current vs. Ambient Temperature**



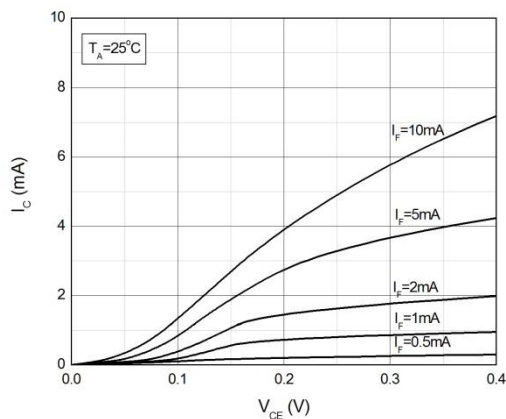
**Fig.2 Collector Power Dissipation vs. Ambient Temperature**



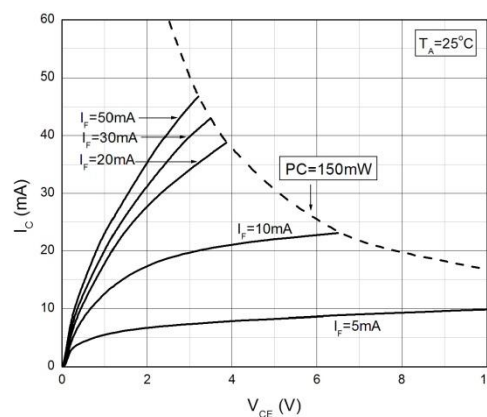
**Fig.3 Forward Current vs. Forward Voltage**



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

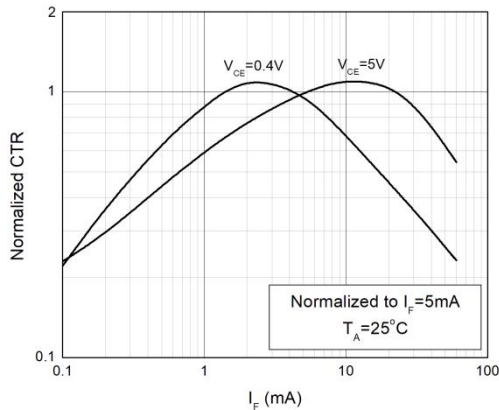


**Fig.5 Collector Current vs. Collector-emitter Voltage**

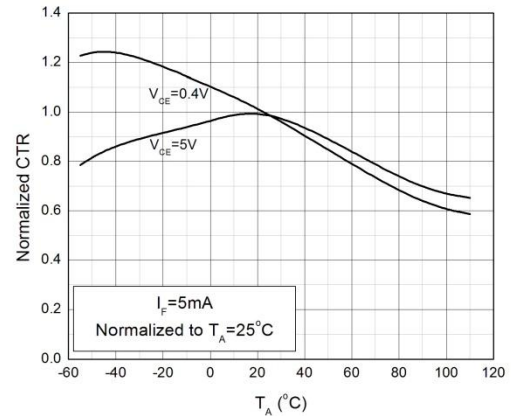


**Fig.6 Collector Current vs. Collector-emitter Voltage**

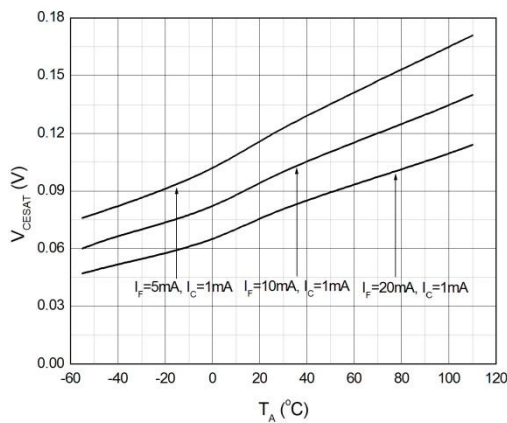
### CHARACTERISTIC CURVES



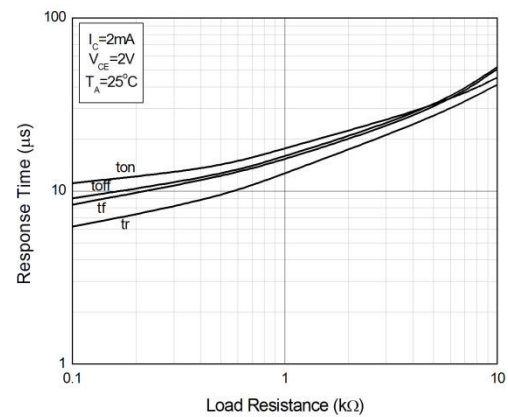
**Fig.7 Normalized Current Transfer Ratio vs. Forward Current**



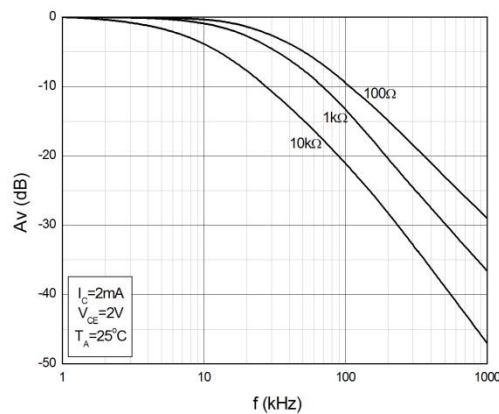
**Fig.8 Normalized Current Transfer Ratio vs. Ambient Temperature**



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

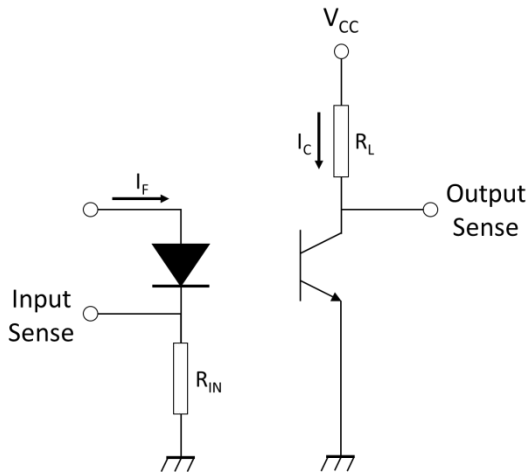


**Fig.10 Switching Time vs. Load Resistance**

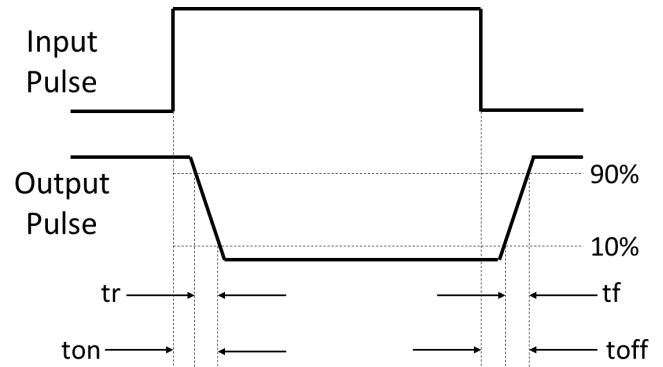


**Fig.11 Frequency Response**

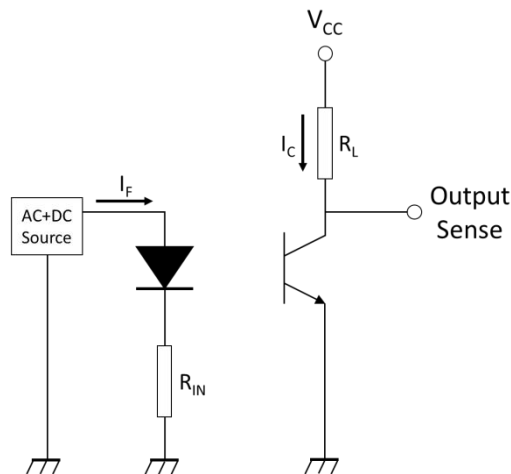
## TEST CIRCUITS



**Fig.12 Test Circuits of Response Time**

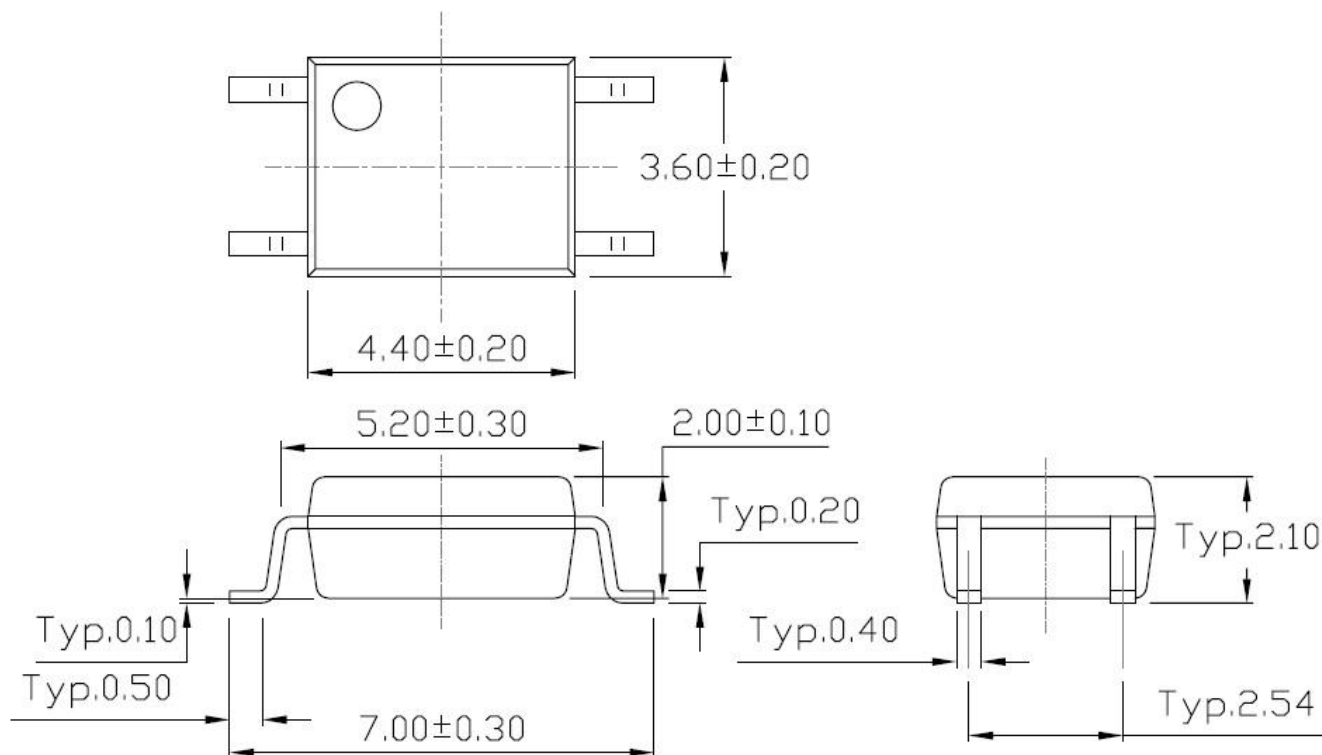


**Fig.13 Curves of Response Time**

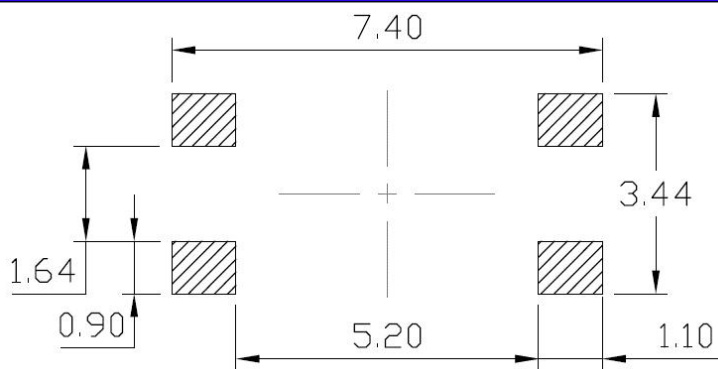


**Fig.14 Test Circuits of Frequency Response**

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

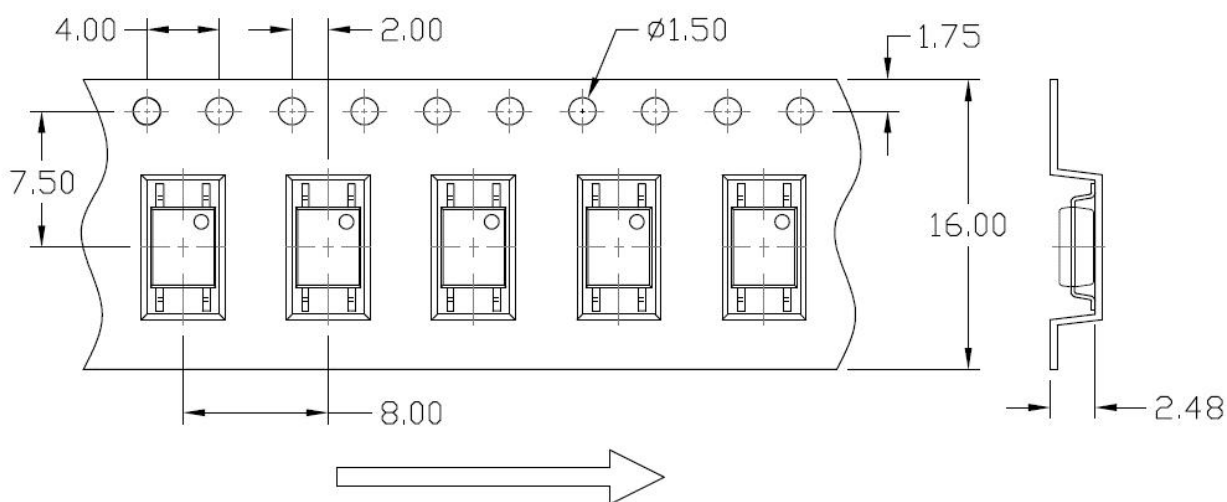


### Recommended Solder Mask (Dimensions in mm unless otherwise stated)

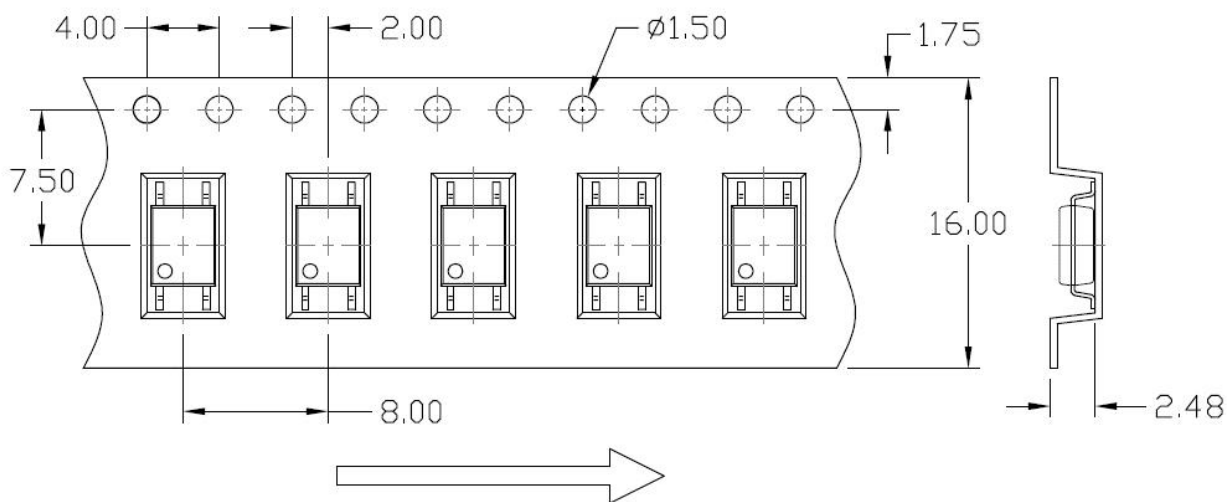


### CARRIER TAPE SPECIFICATIONS (Dimensions in mm unless otherwise stated)

#### Option T1



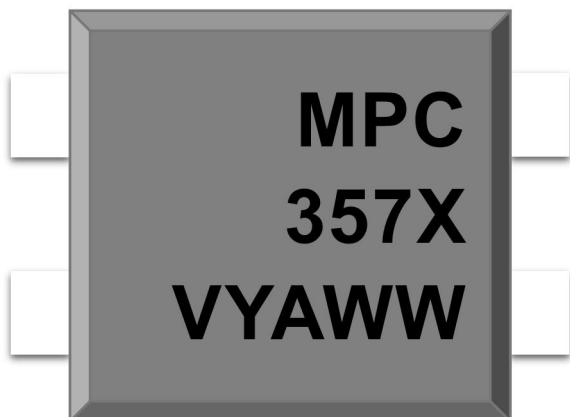
#### Option T2





### ORDERING AND MARKING INFORMATION

#### MARKING INFORMATION



**MPC** : Company Abbr.  
**357** : Part Number  
**X** : CTR Rank  
**V** : VDE Option  
**Y** : Fiscal Year  
**A** : Manufacturing Code  
**WW** : Work Week

#### ORDERING INFORMATION

### MPC357XN(Z)-GV

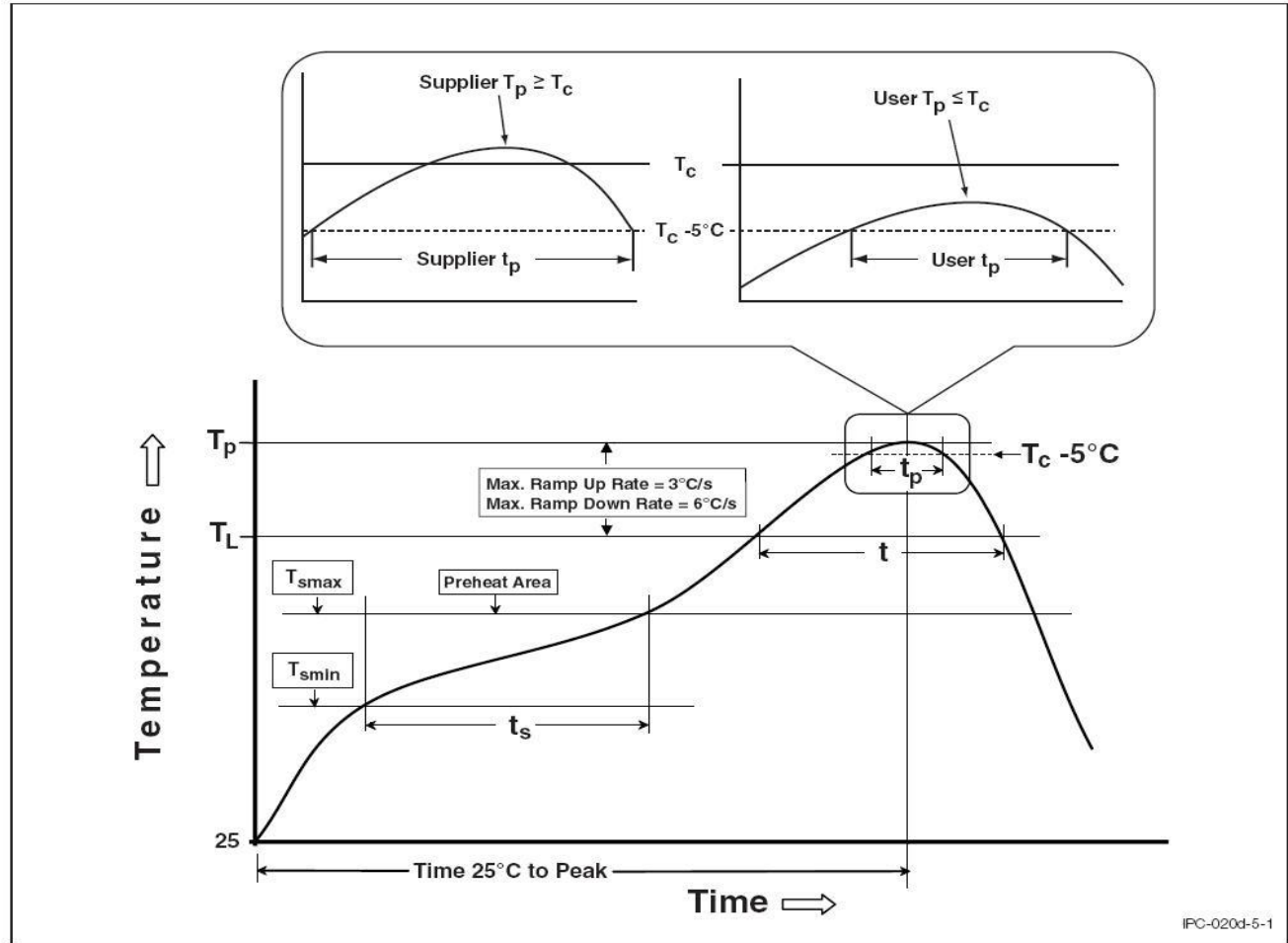
|                                                                                                    |                                                                             |
|----------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|
| MPC – Company Abbr.<br>357 – Part Number<br>X – Rank1 (A/B/C/D or None)<br>N – Rank2 (1~9 or None) | Z – Tape and Reel Option (T1/T2)<br>G – Green<br>V – VDE Option (V or None) |
|----------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|

#### PACKING QUANTITY

| Option | Quantity        | Quantity – Inner box | Quantity – Outer box              |
|--------|-----------------|----------------------|-----------------------------------|
| T1     | 3000 Units/Reel | 3 Reels/Inner box    | 5 Inner box/Outer box = 45k Units |
| T2     | 3000 Units/Reel | 3 Reels/Inner box    | 5 Inner box/Outer box = 45k 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.           |



# **MPC357 Series**

## **SOP4, DC Input Photo Transistor Coupler**

### **DISCLAIMER**

- Our company is continually improving the quality, reliability, function and design. Our company reserves the right to make changes without further notices.
- The characteristic curves shown in this datasheet are representing typical performance which are not guaranteed.
- 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.
- Immerge unit's body in solder paste is not recommended.
- Discoloration might be occurred on the package surface after soldering, reflow or long-time use. It neither impacts the performance nor reliability.

### ■ Revision History

| Version | Date       | Subjects (major changes since last revision) |
|---------|------------|----------------------------------------------|
| 1.0     | 2018-12-21 | Datasheet Complete                           |
| 1.1     | 2023-07-05 | Upgrade Datasheet                            |