



# MPCS-816 Series

DIP4, DC Input, High Switching Time Photo Transistor Coupler

## Description

The MPCS-816 series combine an Light emitting diode as the emitter which is optically coupled to a silicon phototransistor enabling relatively high switching speed with high load resistor of several K $\Omega$ . The MPCS-816 Series is in a plastic DIP4 package.

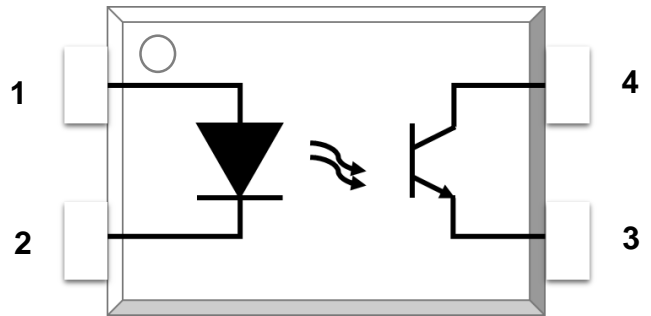
## Features

- High isolation 5000 VRMS
- CTR flexibility available see order information
- DC input with transistor output
- MSL class 1
- Guaranteed performance over temperature -40°C ~ +110°C.

## Applications

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

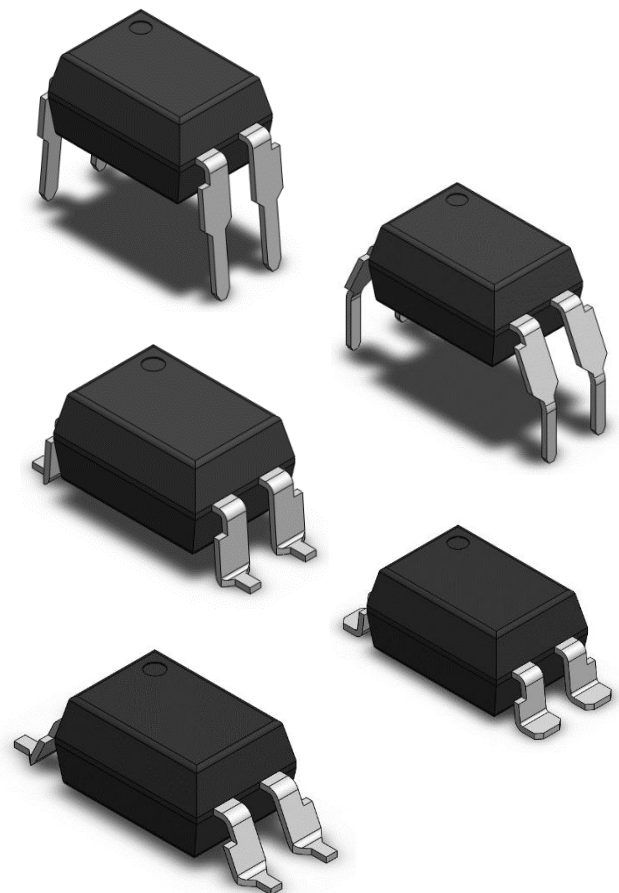
## SCHEMATIC



## PIN DEFINITION

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

## PACKAGE OUTLINE





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## ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	VALUE	UNIT	NOTE
INPUT				
Forward Current	$I_F$	20	mA	
Reverse Voltage	$V_R$	6	V	
Input Power Dissipation	$P_I$	50	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>	1
Operating Temperature	$T_{opr}$	-40~110	°C	
Storage Temperature	$T_{stg}$	-55~125	°C	
Soldering Temperature	$T_{sol}$	260	°C	2

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

Note 2. For 10 Seconds



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## ELECTRICAL OPTICAL CHARACTERISTICS

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITION	NOTE
INPUT CHARACTERISTICS							
Forward Voltage	$V_F$	1.6	2.0	2.4	V	$I_F = 10 \text{ mA}$	
Input Reverse Current	$I_R$	-	-	10	$\mu\text{A}$	$V_R = 4\text{V}$	
Input Capacitance	$C_{IN}$	-	60	-	pF	$V = 0\text{V}, f = 1\text{MHz}$	
OUTPUT CHARACTERISTICS							
Collector Dark Current	$I_{CEO}$	-	10	100	nA	$V_{CE} = 20\text{V}, I_F = 0\text{mA}$	
Collector- Emitter Breakdown Voltage	$BV_{CEO}$	80	-	-	V	$I_C = 100\mu\text{A}, I_F = 0\text{mA}$	
Emitter -Collector Breakdown Voltage	$BV_{ECO}$	7	-	-	V	$I_E = 100\mu\text{A}, I_F = 0\text{mA}$	
TRANSFER CHARACTERISTICS							
Collector Current	$I_C$	2.5	-	30	mA	$I_F = 5 \text{ mA}, V_{CE} = 5\text{V}$	
Current Transfer Ratio	CTR	80	-	600	%	$I_F = 5 \text{ mA}, V_{CE} = 5\text{V}$	1
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	-	-	0.3	V	$I_F = 10 \text{ mA}, I_C = 1\text{mA}$	
Isolation Resistance	$R_{iso}$	$1 \times 10^{12}$	-	-	$\Omega$	DC500V, 40 ~ 60% R.H.	
Floating Capacitance	$C_f$	-	0.3	-	pF	$V = 0\text{V}, f = 1\text{MHz}$	
Response Time (Rise)	$t_r$		0.3	10	us	$V_{CC} = 5 \text{ V}, I_F = 5 \text{ mA},$ $RL = 1 \text{ k}\Omega$	2
Response Time (Fall)	$t_f$		1.3	10			
Turn-on Time	$T_{on}$		0.5	10			
Turn-off Time	$T_{off}$		4.5	10			

Note 1:  $CTR = I_C / I_F \times 100\%$ .

Note 2: Fig.13&14.

## RANK TABLE OF CTR (CURRENT TRANSFER RATIO)

CTR Rank	Min.	Typ.	Max.	Unit	Test Condition
MPCS-816A	80	-	160	%	$I_F = 5 \text{ mA}, V_{CE} = 5\text{V}$
MPCS-816B	130	-	260	%	
MPCS-816C	200	-	400	%	
MPCS-816D	300	-	600	%	



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## TYPICAL PERFORMANCE CURVES & TEST CIRCUITS

Fig.1  $I_F$  vs.  $V_F$

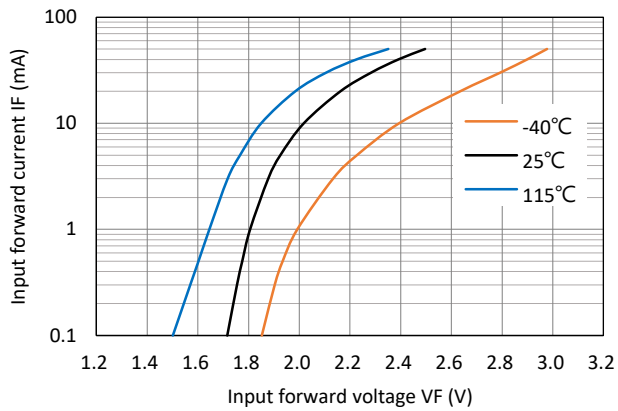


Fig.2 Dark Current vs.  $T_a$

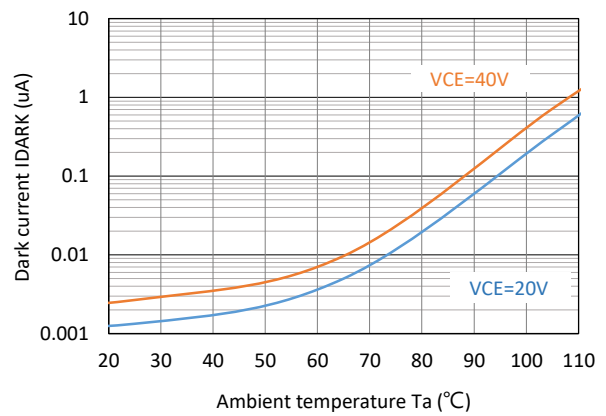


Fig.3  $I_C$  vs.  $V_{CE}$

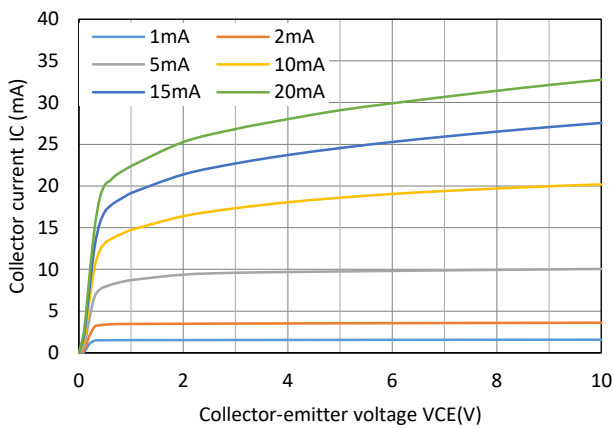


Fig.4  $I_C$  vs.  $V_{CE}$

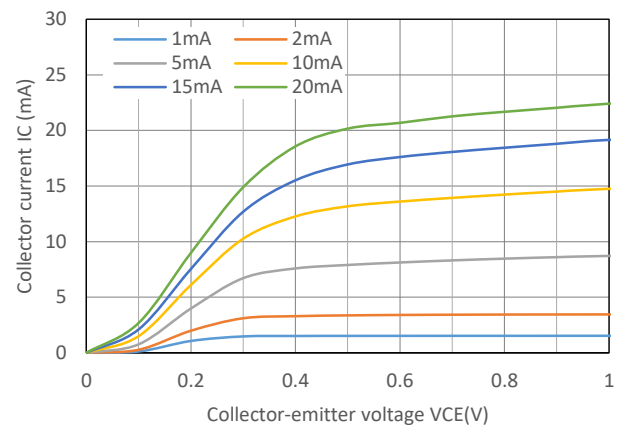


Fig.5  $I_C$  vs.  $I_F$

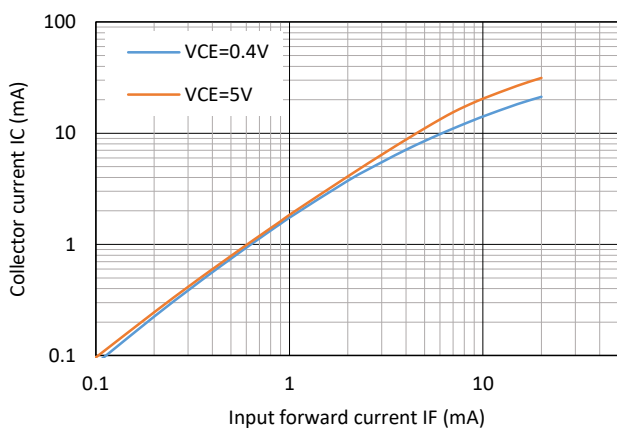
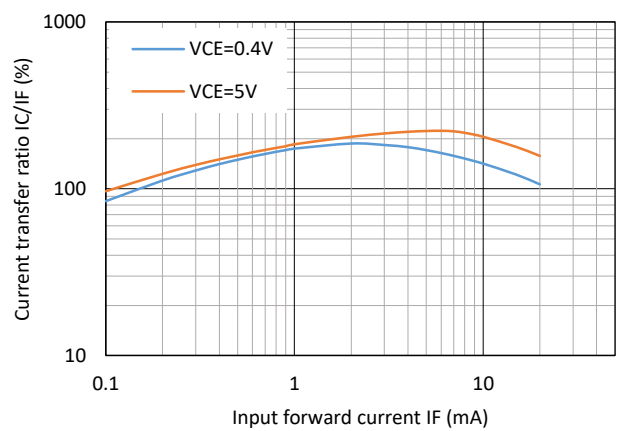


Fig.6 CTR vs.  $I_F$



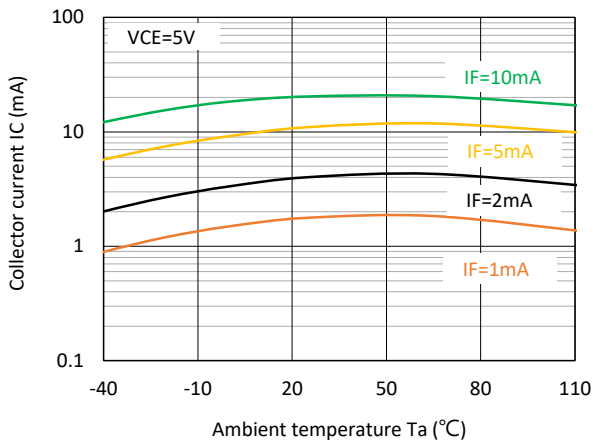


# MPCS-816 Series

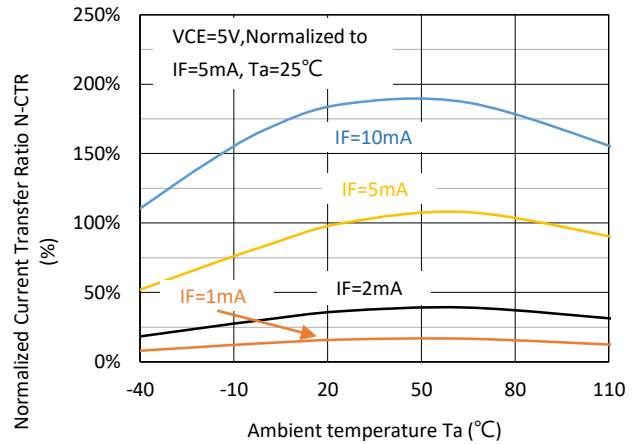
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## TYPICAL PERFORMANCE CURVES & TEST CIRCUITS

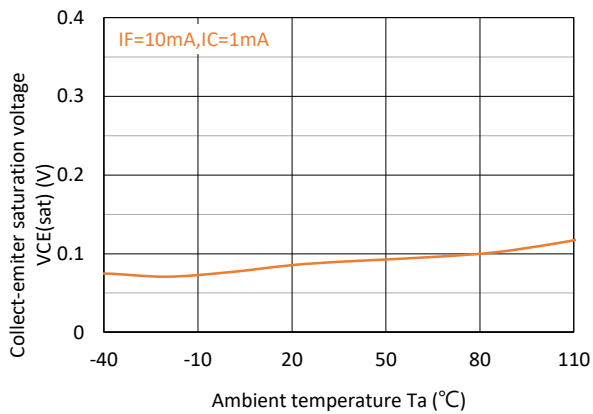
**Fig.7.  $I_c$  vs.  $T_a$**



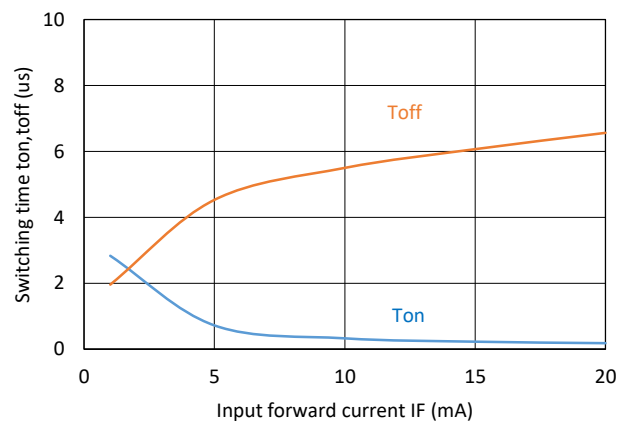
**Fig.8 Normalized CTR vs.  $T_a$**



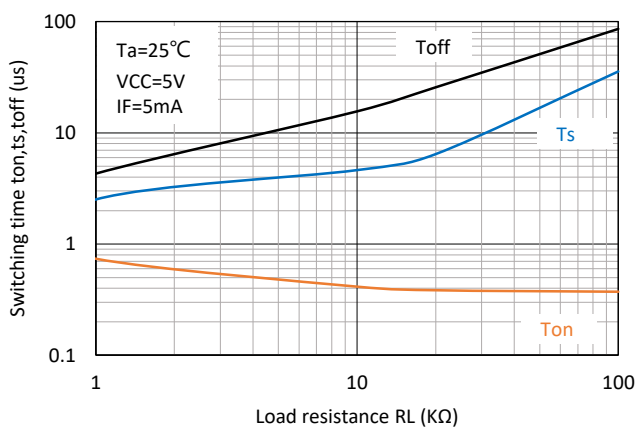
**Fig.9  $V_{CE(sat)}$  vs.  $T_a$**



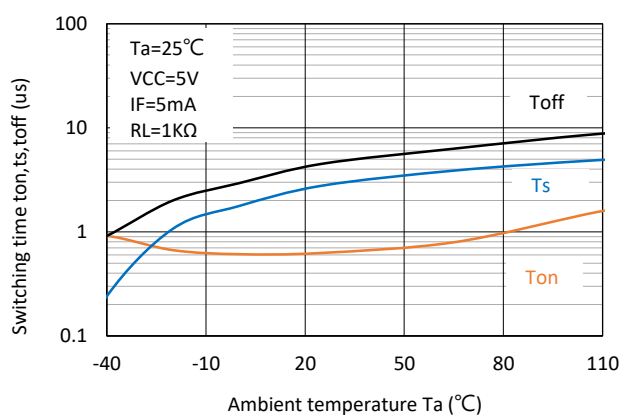
**Fig.10 Switching Time vs.  $I_F$**



**Fig.11 Switching Time vs.  $R_L$**

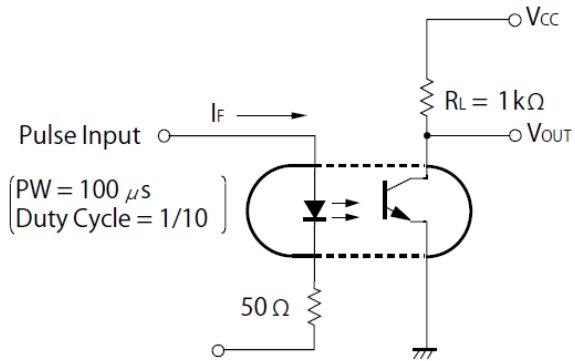


**Fig.12 Switching Time vs.  $T_a$**

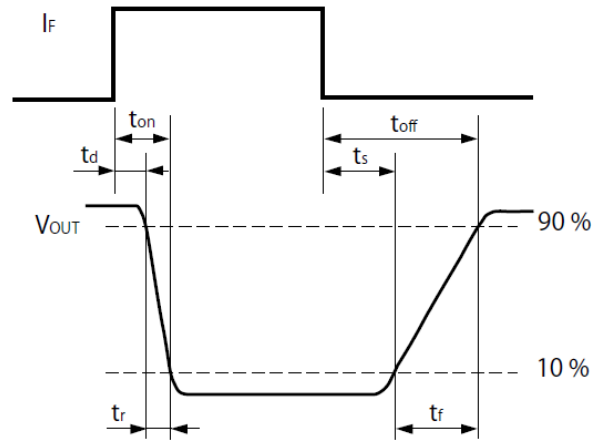


### TYPICAL PERFORMANCE CURVES & TEST CIRCUITS

**Fig.13 Test Circuits of Switching Time**



**Fig.14 Curves of Switching Time**



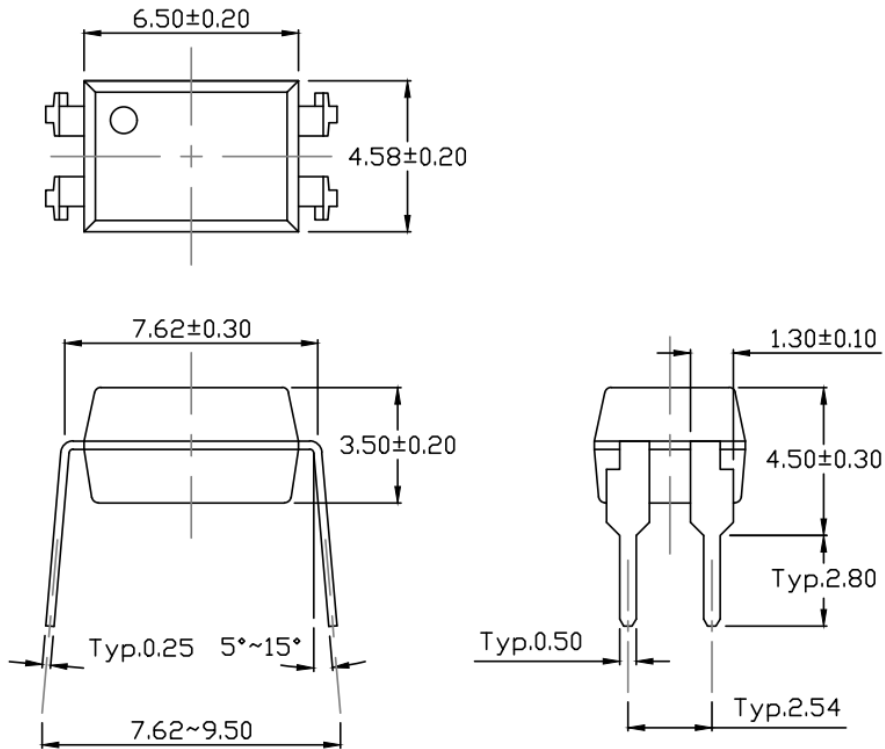


# MPCS-816 Series

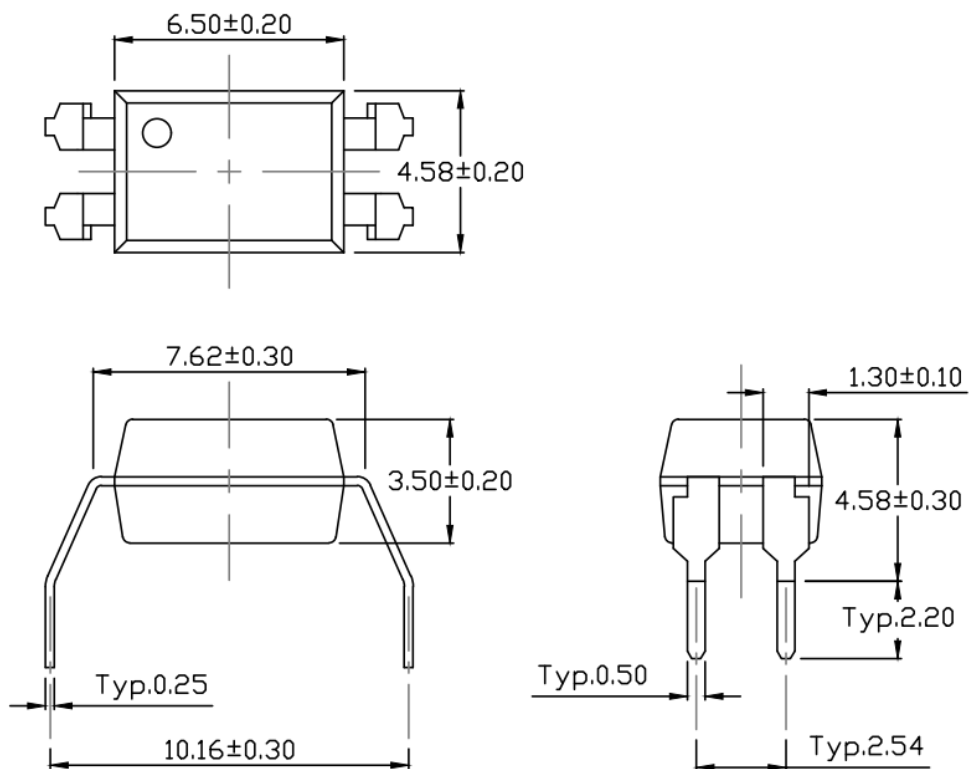
DIP4, DC Input, High Switching Time Photo Transistor Coupler

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

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



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



Rev: 1.1

Release Date: 2024/4/12

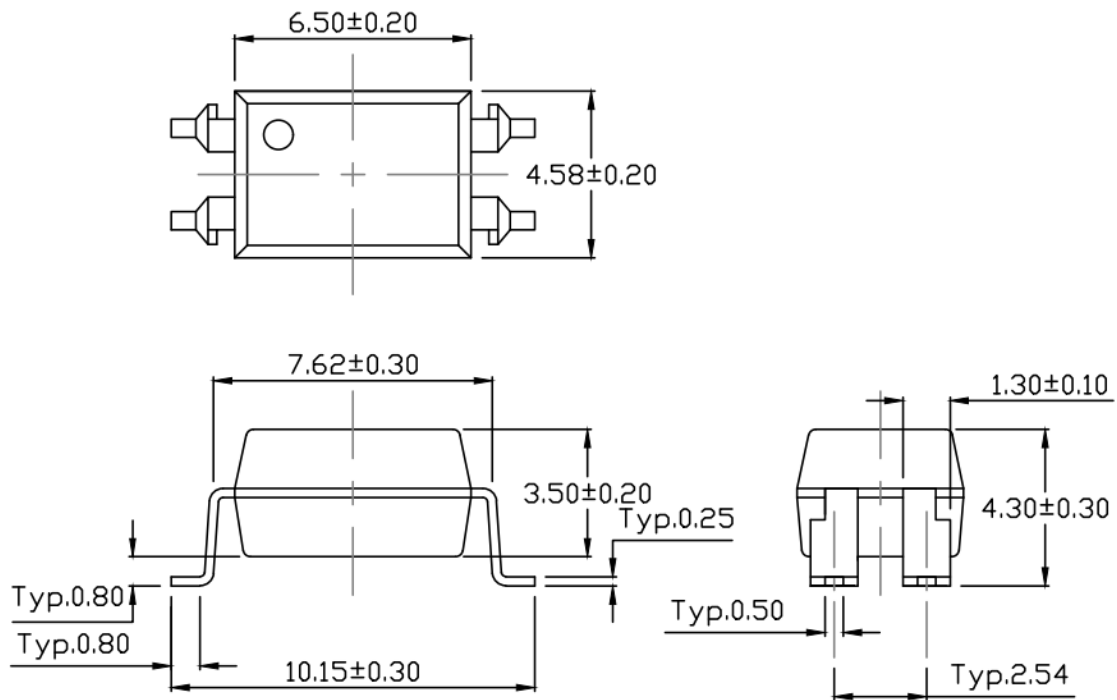


# MPCS-816 Series

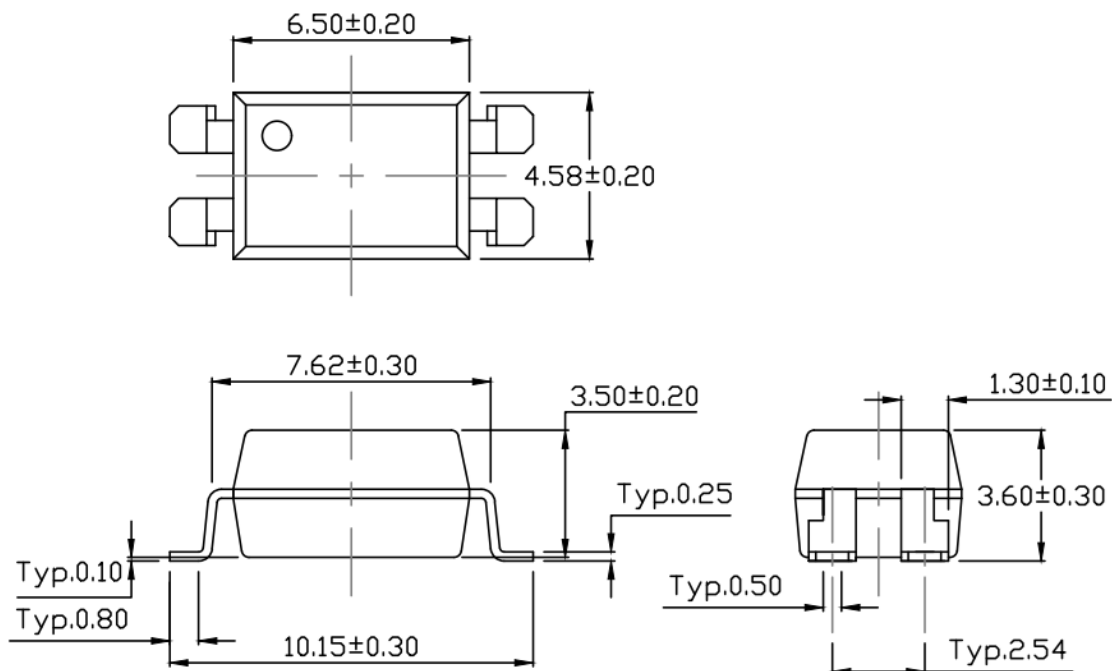
DIP4, DC Input, High Switching Time Photo Transistor Coupler

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

### Surface Mount Lead Forming (S Type)



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



Rev: 1.1

Release Date: 2024/4/12



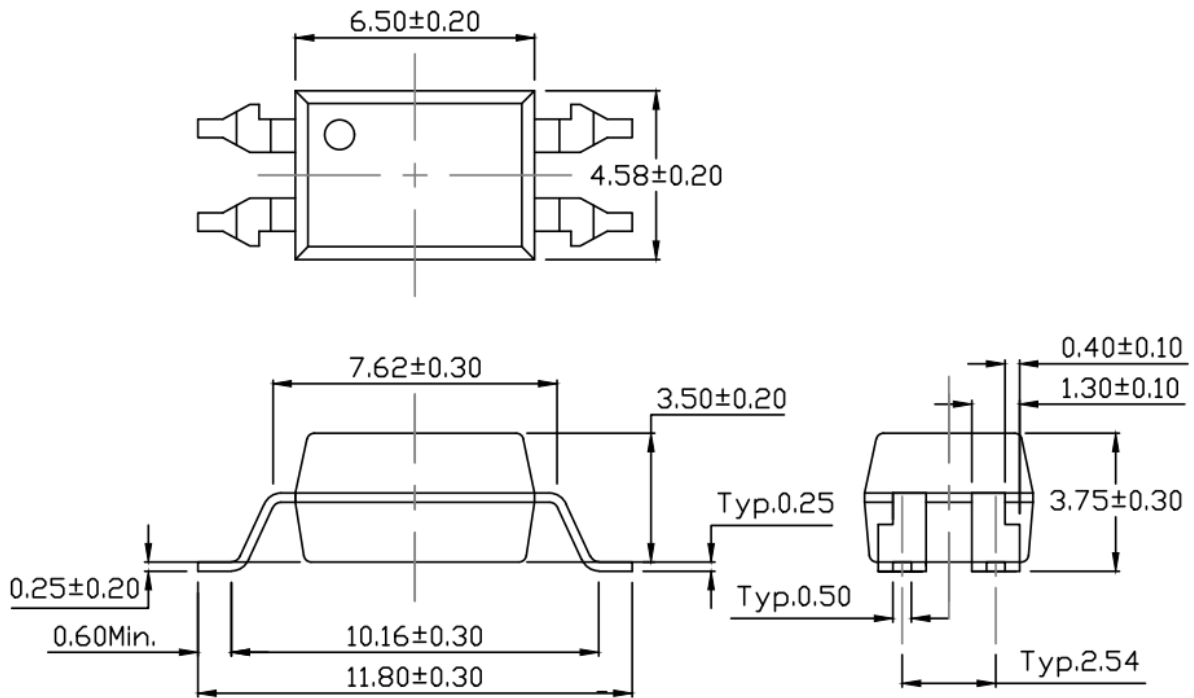


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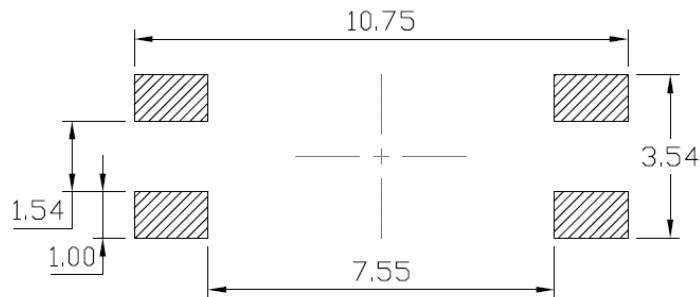
## PACKAGE DIMENSIONS (Dimensions in mm unless otherwise stated)

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

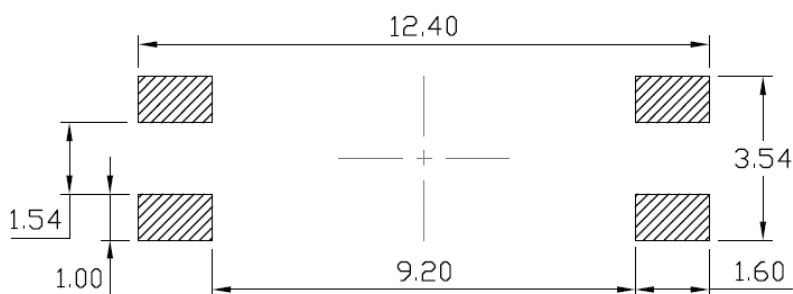


## RECOMMENDED SOLDER MASK (Dimensions in mm unless otherwise stated)

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



### Surface Mount (Gullwing) Lead Forming



Rev: 1.1

Release Date: 2024/4/12

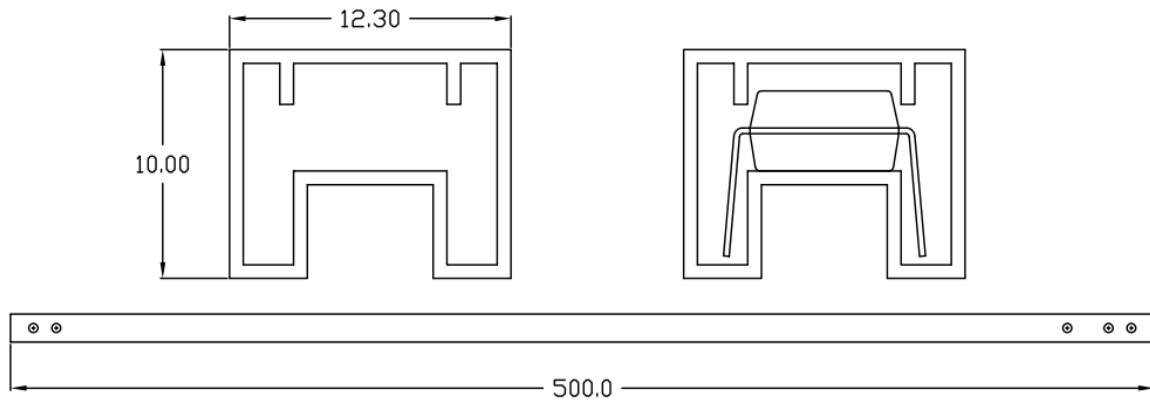


# MPCS-816 Series

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

### Standard DIP / Option M



L x W x H = 500mm x 12.3mm x 10.0mm

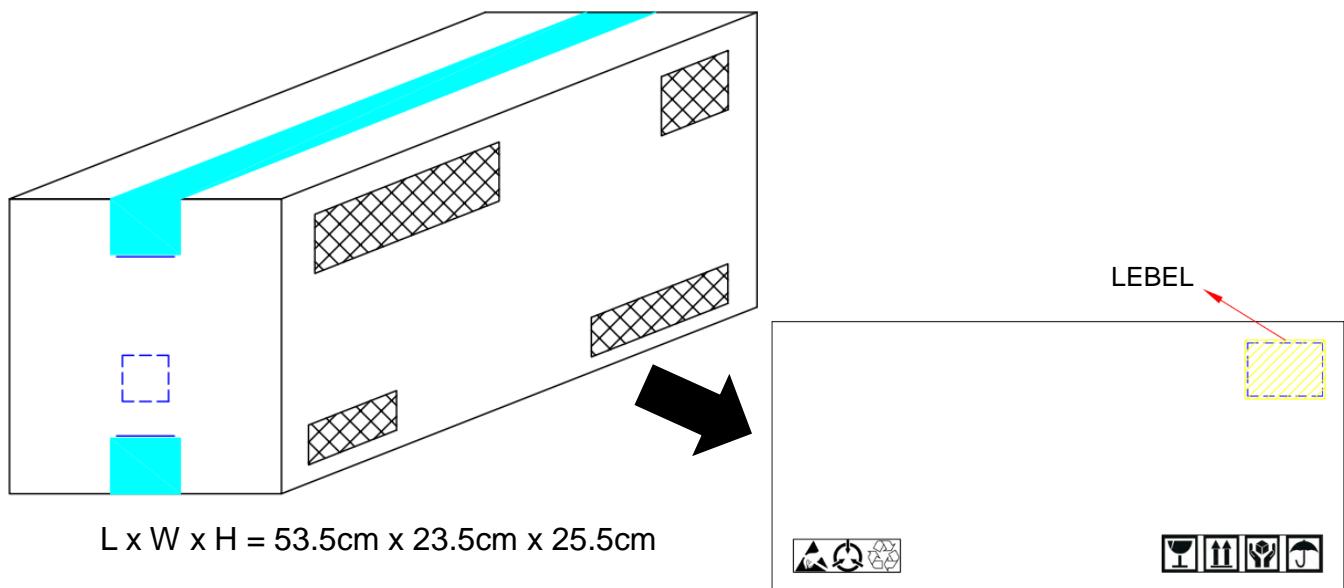
## BOX SPECIFICATIONS (Tube Type)

### 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

Rev: 1.1

Release Date: 2024/4/12

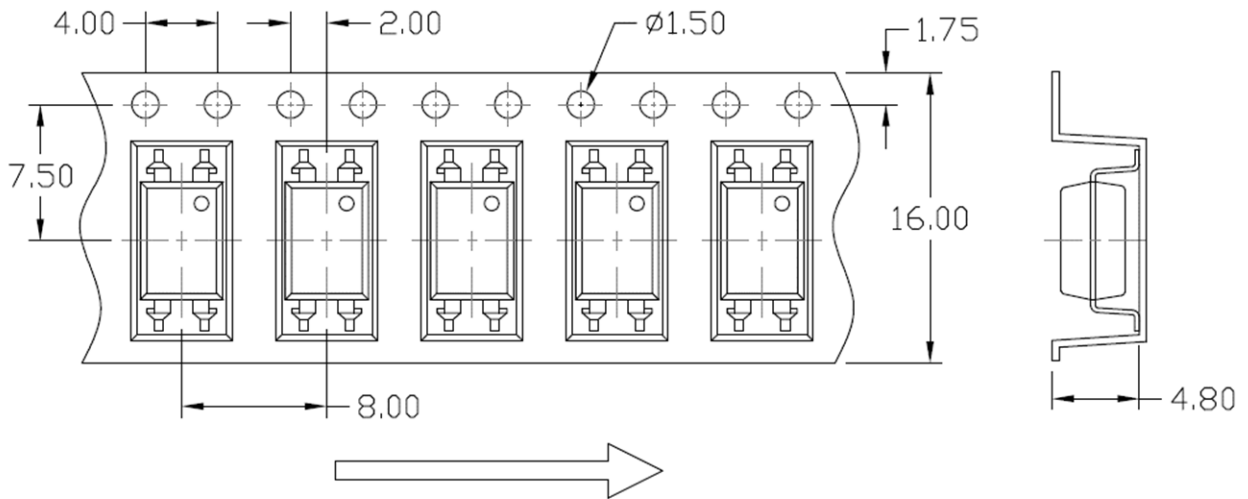


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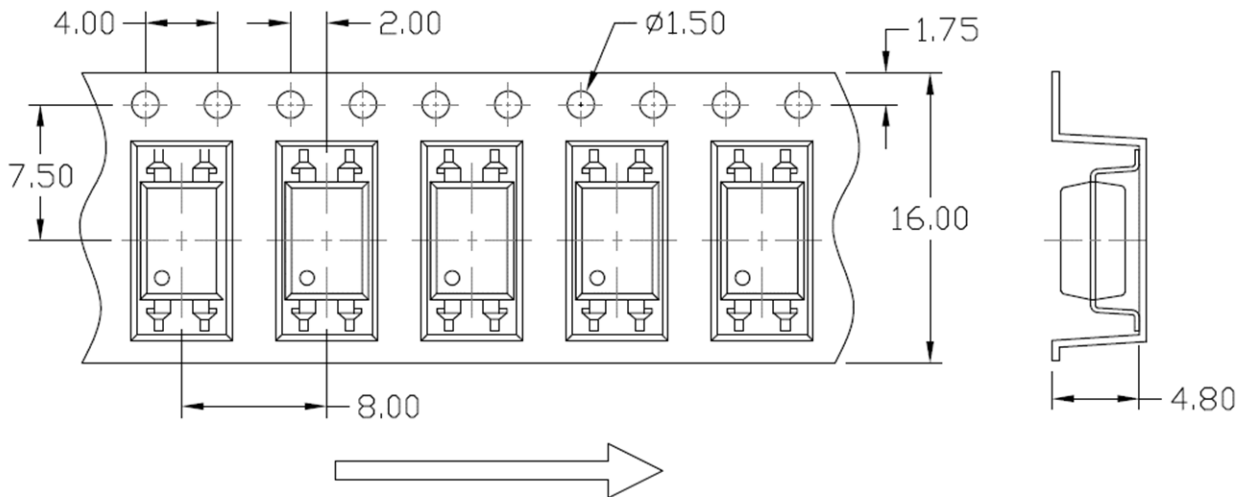
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## CARRIER TAPE SPECIFICATIONS (Dimensions in mm unless otherwise stated)

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



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



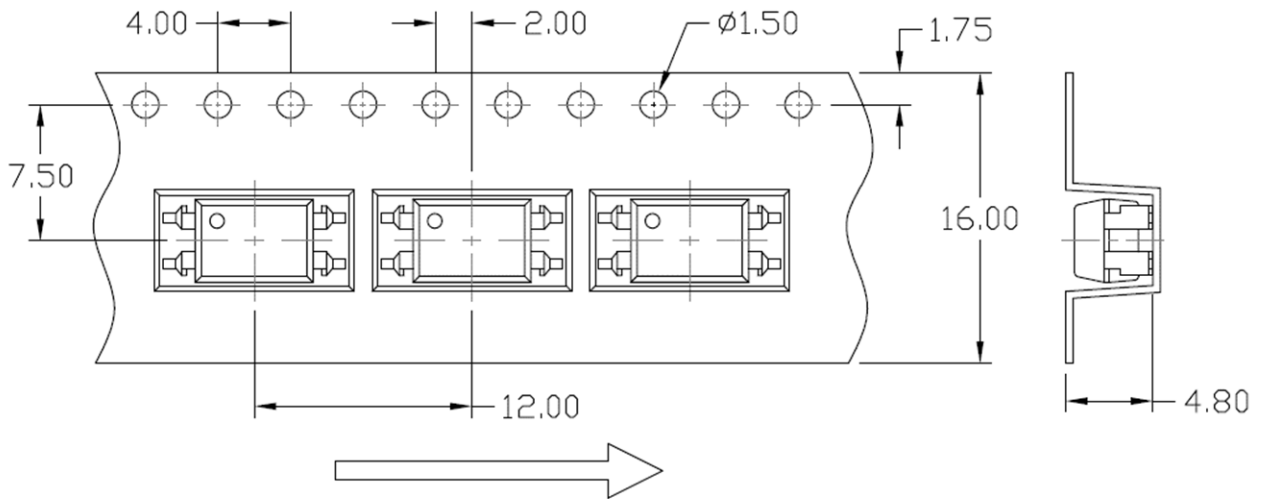


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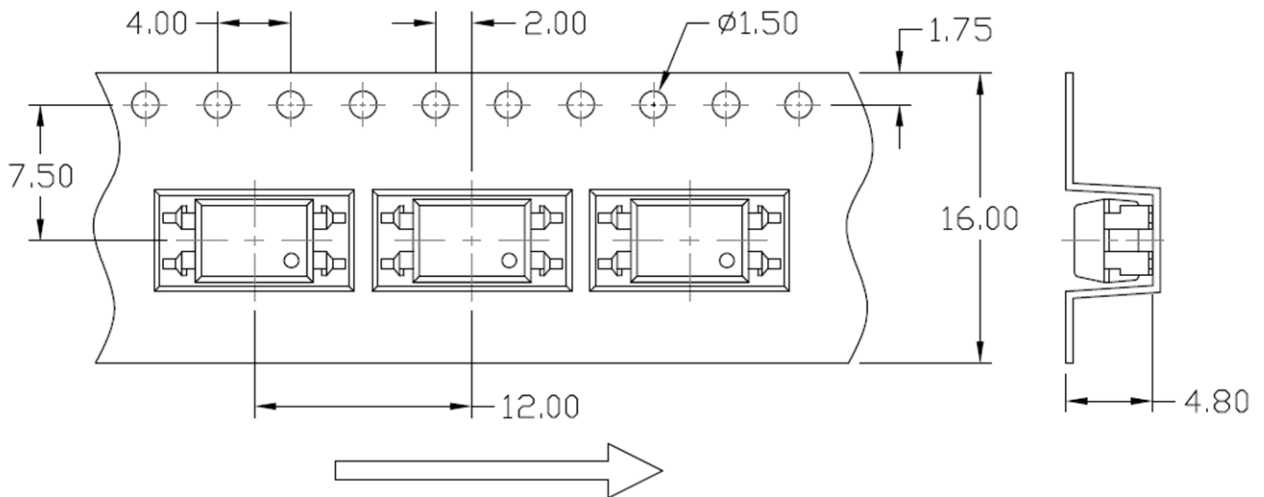
DIP4, DC Input, High Switching Time Photo Transistor Coupler

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

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



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



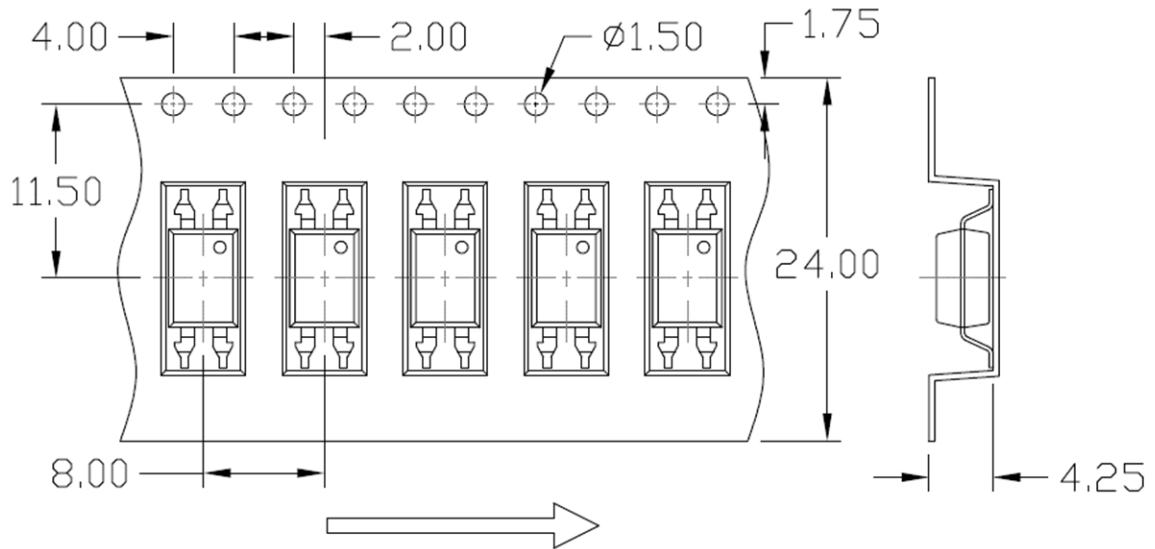


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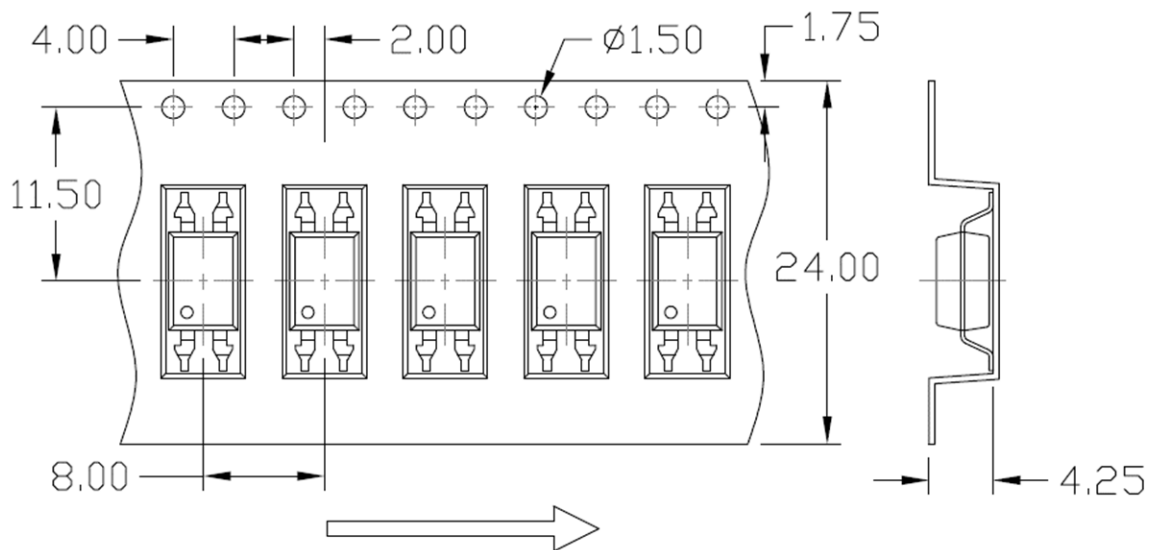
DIP4, DC Input, High Switching Time Photo Transistor Coupler

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

### Option SLM(T1)



### Option SLM(T2)

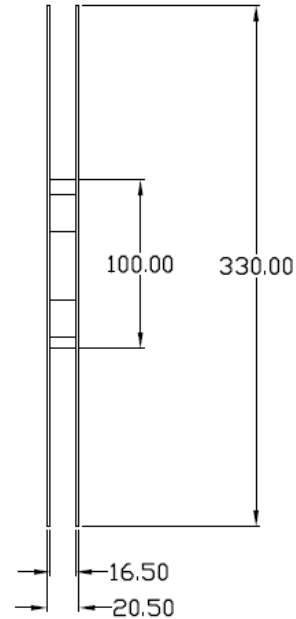
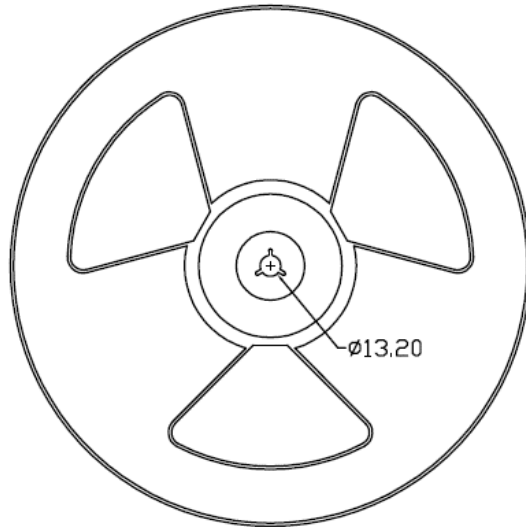




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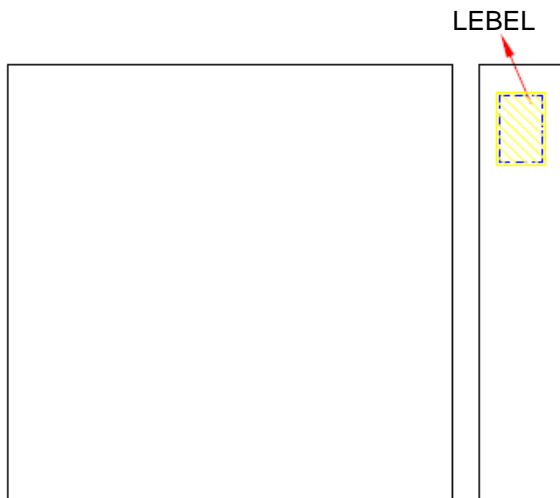
DIP4, DC Input, High Switching Time Photo Transistor Coupler

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



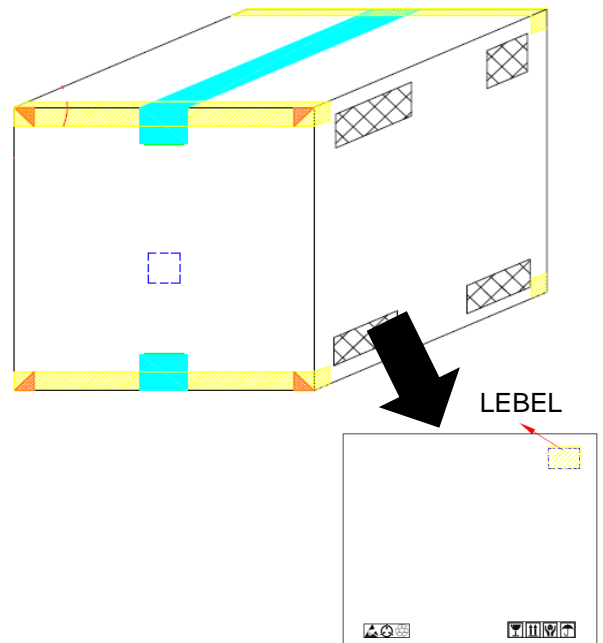
## BOX SPECIFICATIONS (Reel Type)

### 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

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Release Date: 2024/4/12



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## ORDERING AND MARKING INFORMATION

### MARKING INFORMATION



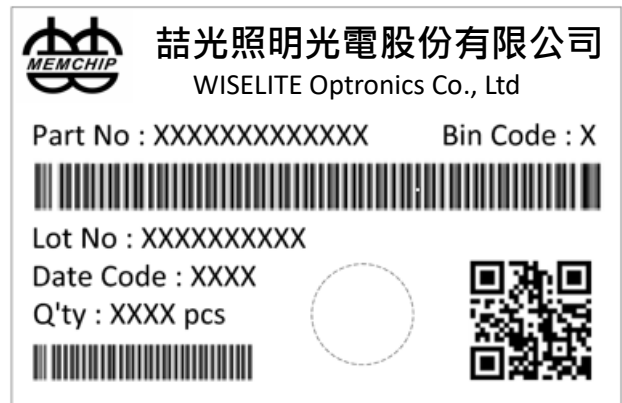
M : Company Abbr.  
 YY : Year date code  
 WW : 2-digit work week  
 816 : Part Number  
 X : CTR Rank  
 T : Factory identification mark  
 V :VDE Identification(Optional)

### ORDERING INFORMATION

### LABEL INFORMATION

## MPCS-816X(Y)(Z)-GV

MPC – Company Abbr.  
 S – Stack  
 816 – Part Number  
 X – CTR Rank(A/B/C/D)  
 Y – Lead Form Option(None/M/S/SL/SM)  
 (None-7mm Clearance or M-10mm Clearance or  
 S/SL-10mm Clearance or SM-11.8mm Clearance)  
 Z – Tape and Reel Option(T1/T2/T3/T4)  
 G – Green Part  
 V – VDE Option (V or None)



### PACKING QUANTITY

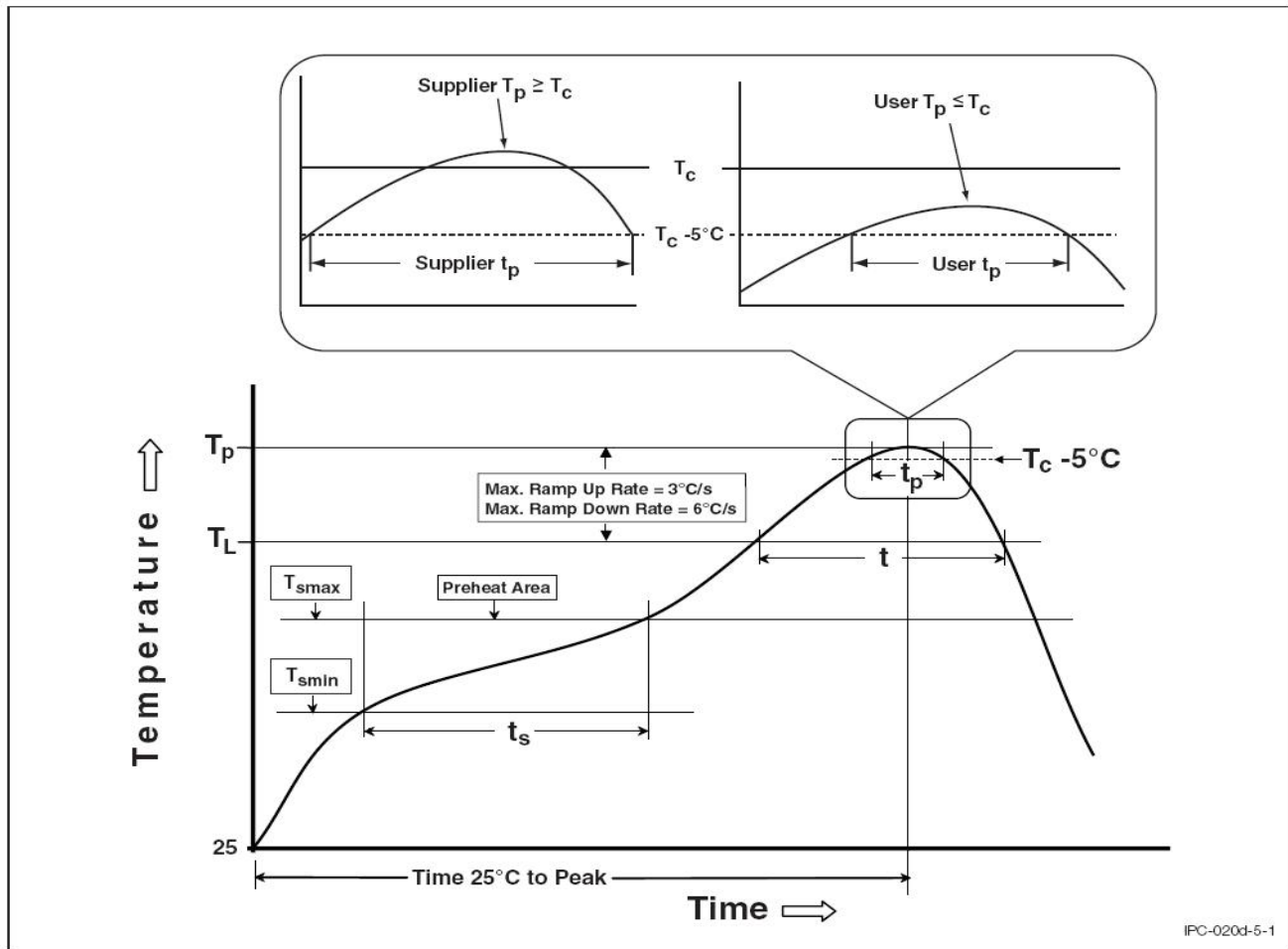
Option	Quantity	Quantity – Inner box	Quantity – Outer box
None	100 Units/Tube	32 Tubes/Inner box	10 Inner box/Outer box = 32k Units
M	100 Units/Tube	32 Tubes/Inner box	10 Inner box/Outer box = 32k Units
S(T1/T2)	1500 Units/Reel	3 Reels/Inner box	5 Inner box/Outer box = 22.5k Units
S(T3/T4)	1000 Units/Reel	3 Reels/Inner box	5 Inner box/Outer box = 15k Units
SL(T1/T2)	1500 Units/Reel	3 Reels/Inner box	5 Inner box/Outer box = 22.5k Units
SL(T3/T4)	1000 Units/Reel	3 Reels/Inner box	5 Inner box/Outer box = 15k Units
SLM(T1/T2)	1500 Units/Reel	2 Reels/Inner box	5 Inner box/Outer box = 15k Units

Rev: 1.1

Release Date: 2024/4/12

### REFLOW INFORMATION

#### REFLOW PROFILE



IPC-020d-5-1

Profile Feature	Sn-Pb Assembly Profile	Pb-Free Assembly Profile
Temperature Min. ( $T_{smin}$ )	100°C	150°C
Temperature Max. ( $T_{smax}$ )	150°C	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.



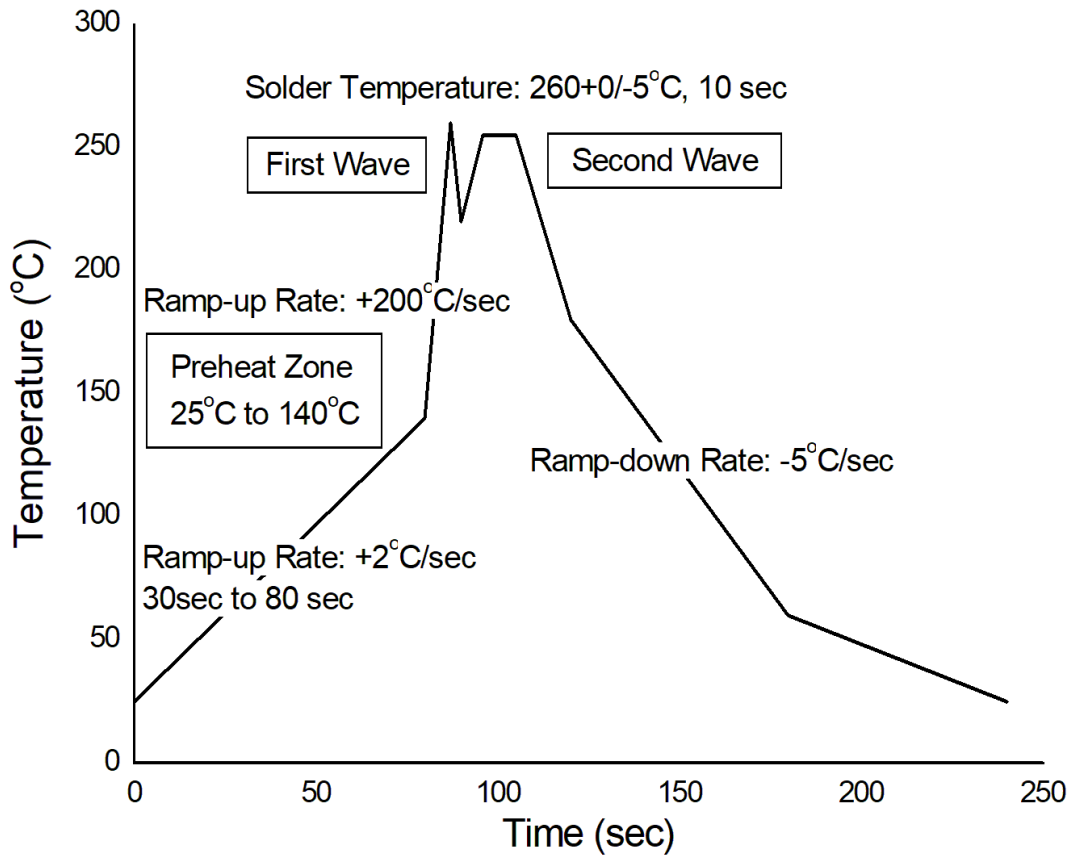


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## TEMPERATURE PROFILE OF SOLDERING

### WAVE SOLDERING (JESD22-A111 COMPLIANT)



### HAND SOLDERING BY SOLDERING IRON

Soldering Temperature	380±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.



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- 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, 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.

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