



MPC301X, MPC302X, MPC305X Series

DIP6, DC Input, Random-Phase Photo TRIAC Coupler

Description

The MPC301X, MPC302X and MPC305X series combine an AlGaAs infrared emitting diode as the emitter which is optically coupled to a monolithic silicon random-phase photo triac in a plastic DIP6 package with different lead forming options.

With the robust coplanar double mold structure, MPC301X, MPC302X and MPC305X series provide the most stable isolation feature.

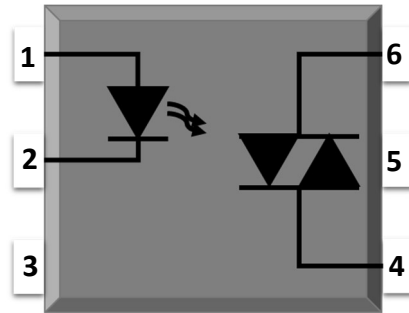
Features

- High isolation 5000 VRMS
- DC input with random-phase photo triac output
- Operating temperature range - 40 °C to 100 °C
- REACH & RoHS compliance
- MSL class 1
- Regulatory Approvals
 - UL - UL1577
 - VDE - EN60747-5-5(VDE0884-5)
 - CQC - GB4943.1, GB8898
 - cUL- CSA Component Acceptance Service Notice No. 5A

Applications

- Solenoid/valve controls
- Lighting controls
- Motor controls
- Temperature controls
- Static AC power switches
- Solid state relays
- Interfacing microprocessors to 115 to

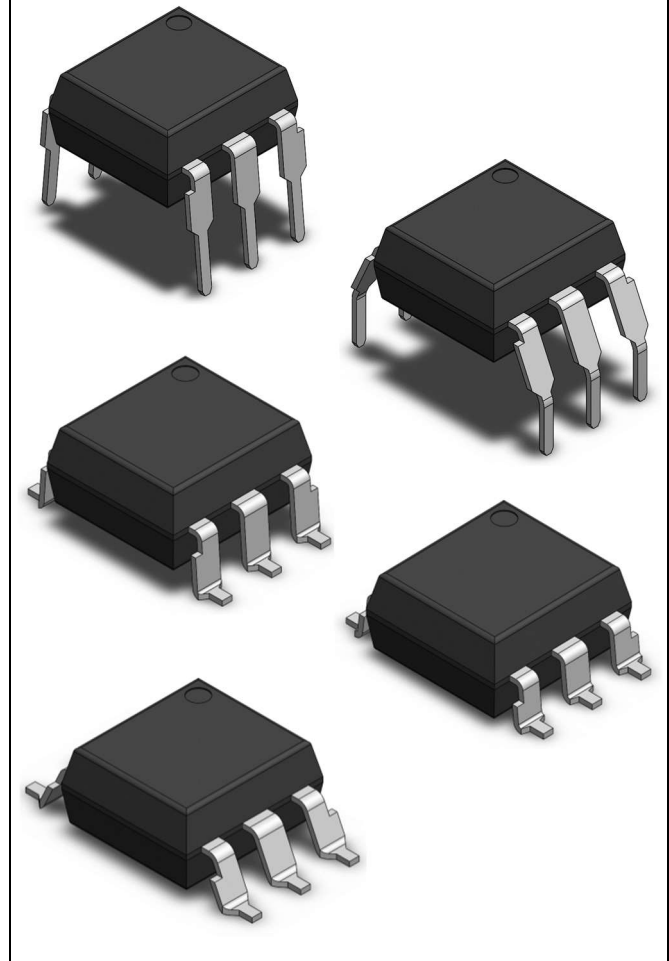
SCHEMATIC



PIN DEFINITION

- | | |
|------------|--------------|
| 1. Anode | 4. Terminal |
| 2. Cathode | 5. Substrate |
| 3. NC | 6. Terminal |

PACKAGE OUTLINE





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ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	VALUE	UNIT	NOTE
INPUT				
Forward Current	I_F	60	mA	
Reverse Voltage	V_R	6	V	
Junction Temperature	T_j	125	°C	
Input Power Dissipation	P_i	100	mW	
OUTPUT				
Off-state Output Terminal Voltage	MPC301X	250	V	
	MPC302X	400		
	MPC305X	600		
Peak Repetitive Surge Current PW=100 μ s, 120pps	I_{TSM}	1	A	
Junction Temperature	T_j	125	°C	
Output Power Dissipation	P_o	300	mW	
COMMON				
Total Power Dissipation	P_{tot}	400	mW	
Isolation Voltage	V_{iso}	5000	V _{rms}	1
Operating Temperature	T_{opr}	-40~100	°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 at Ta=25°C

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITION	NOTE
INPUT							
Forward Voltage	V_F	-	1.24	1.4	V	$I_F=10\text{mA}$	
Reverse Current	I_R	-	-	10	μA	$V_R=6\text{V}$	
Input Capacitance	C_{in}	-	8.5	250	pF	$V=0, f=1\text{kHz}$	
OUTPUT							
Peak Off-state Current, Either Direction	I_{DRM}	-	-	100	nA	$V_{DRM}=\text{Rated } V_{DRM}$ $I_F=0$	3
Peak On-state Current, Either Direction	V_{TM}	-	1.58	2.5	V	$I_{TM}=100\text{mA}$	
Critical Rate of Rise of Off-state Voltage	dV/dt	1000	-	-	V/ μs	$V_{PEAK}=\text{Rated } V_{DRM}$	4
TRANSFER CHARACTERISTICS							
LED Trigger Current	MPC3010, MPC3021, MPC3051	I_{FT}	-	-	15	mA	Terminal Voltage = 3V $I_{TM}=100\text{mA}$
	MPC3011, MPC3022, MPC3052		-	-	10		
	MPC3012, MPC3023, MPC3053		-	-	5		
Holding Current	I_H	-	257	-	μA		
Isolation Resistance	R_{iso}	10^{12}	10^{14}	-	Ω	DC500V, 40 ~ 60% R.H.	
Floating Capacitance	C_{IO}	-	0.8	-	pF	$V=0, f=1\text{MHz}$	

Note3. Test voltage must be applied within dV/dt rating.

Note4. Refer to Fig.15 & Fig.16



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CHARACTERISTIC CURVES

Fig.1 Forward Current vs. Ambient Temperature

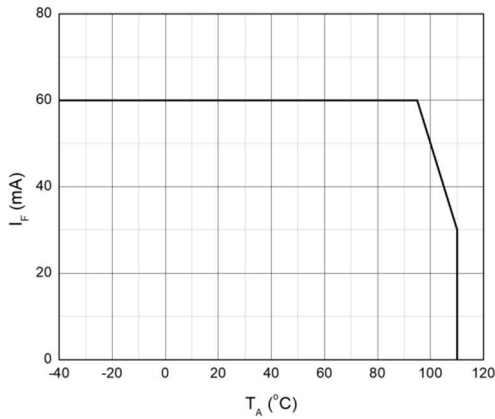


Fig.2 On-state Terminal Current vs. Ambient Temperature

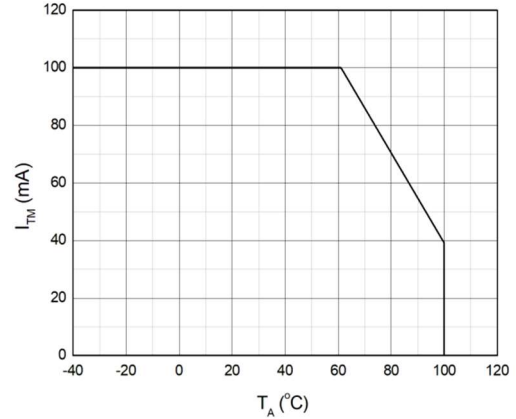


Fig.3 Forward Current vs. Forward Voltage

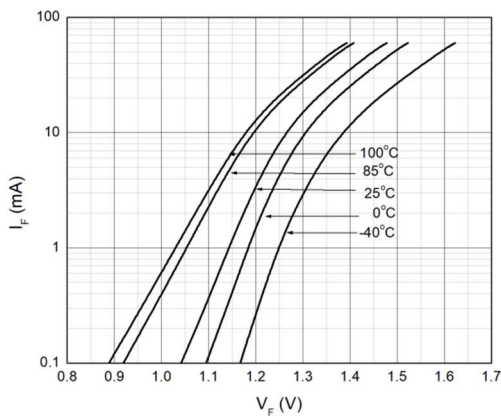


Fig.4 Off-state Terminal Current vs. Ambient Temperature

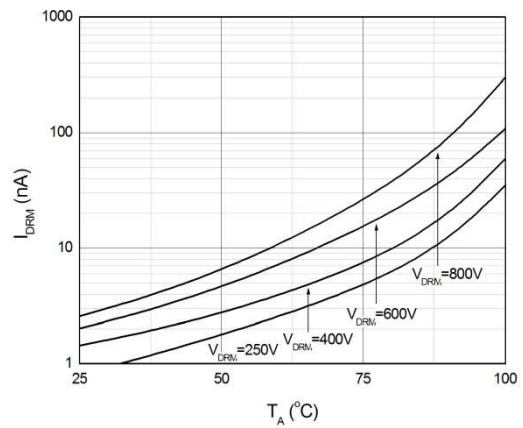


Fig.5 Normalized Off-state Terminal Voltage vs. Ambient Temperature

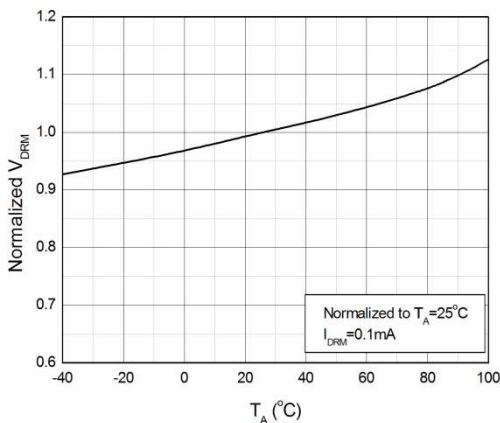
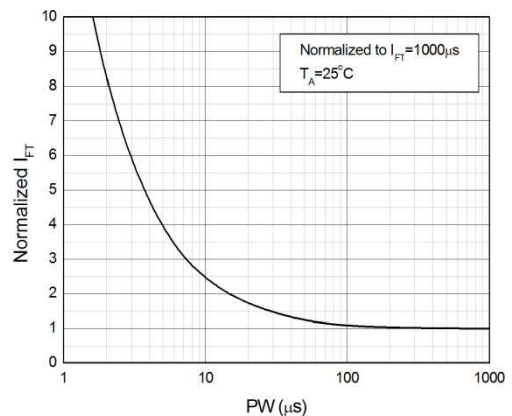


Fig.6 Normalized Trigger Current vs. LED Trigger Pulse Width





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CHARACTERISTIC CURVES

Fig.7 Normalized Trigger Current vs. Ambient Temperature

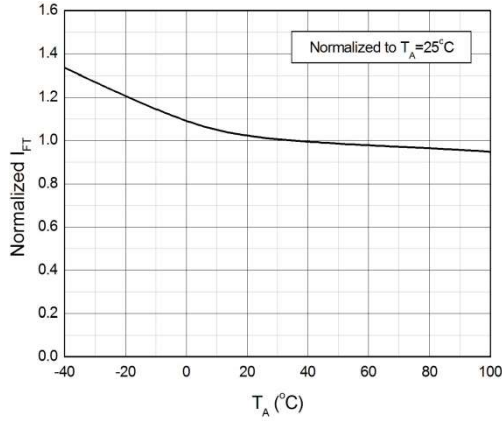


Fig.8 On-state Terminal Voltage vs. Ambient Temperature

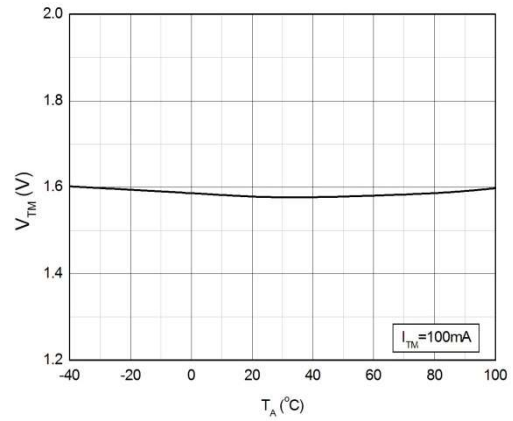


Fig.9 On-state Terminal Voltage vs. On-state Terminal Current

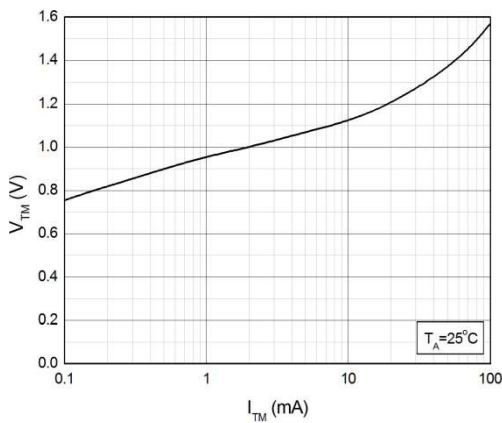


Fig.10 Holding Current vs. Ambient Temperature

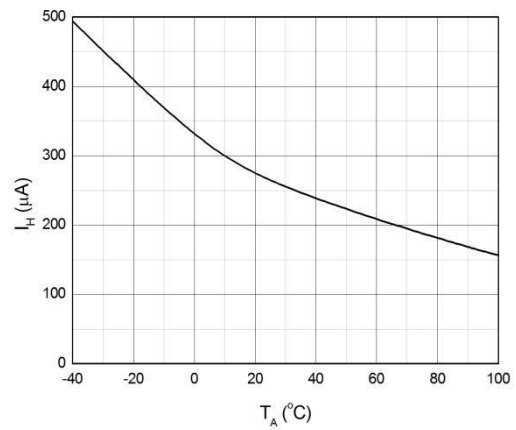


Fig.11 Turn On Time vs. Forward Current

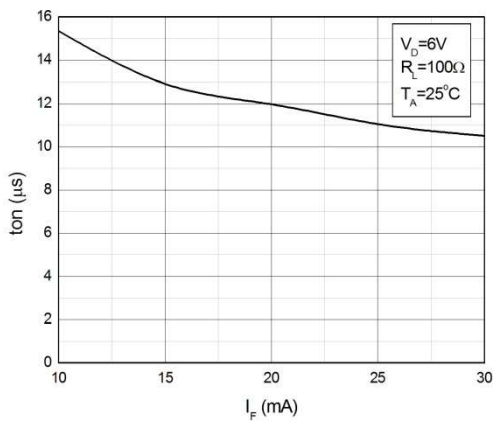
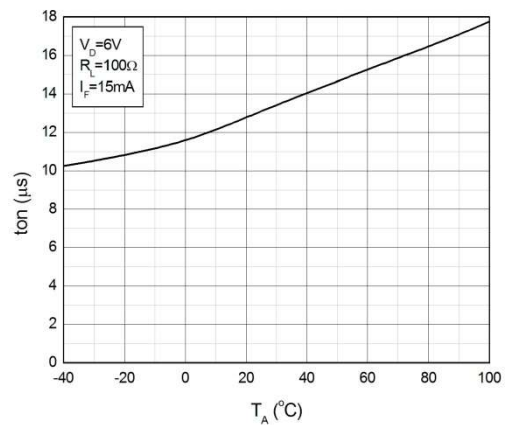


Fig.12 Turn On Time vs. Ambient Temperature





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TEST CIRCUITS

Fig.13 Test Circuits of Turn On Time

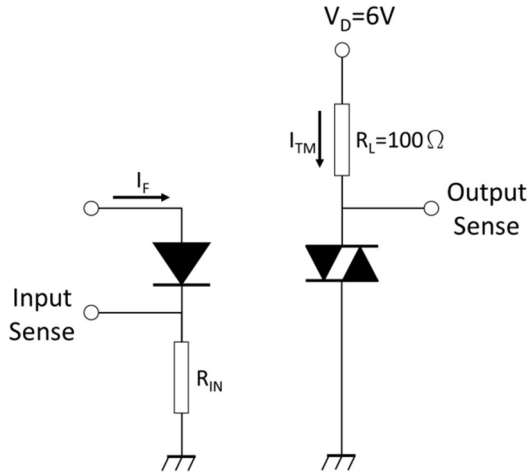


Fig.14 Waveforms of Turn On Time

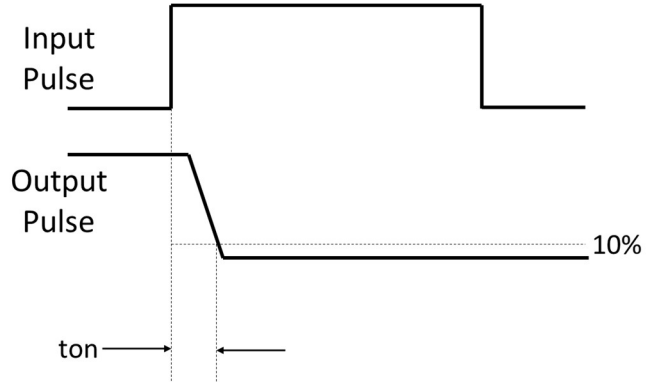


Fig.15 Test Circuits of dV/dt

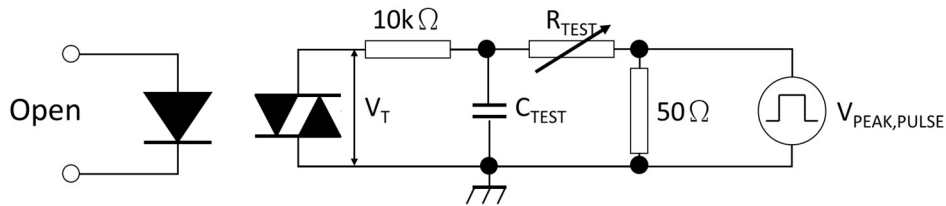
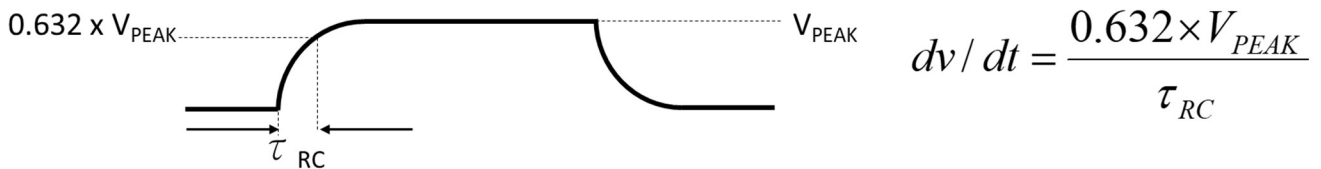


Fig.16 Waveforms of dV/dt



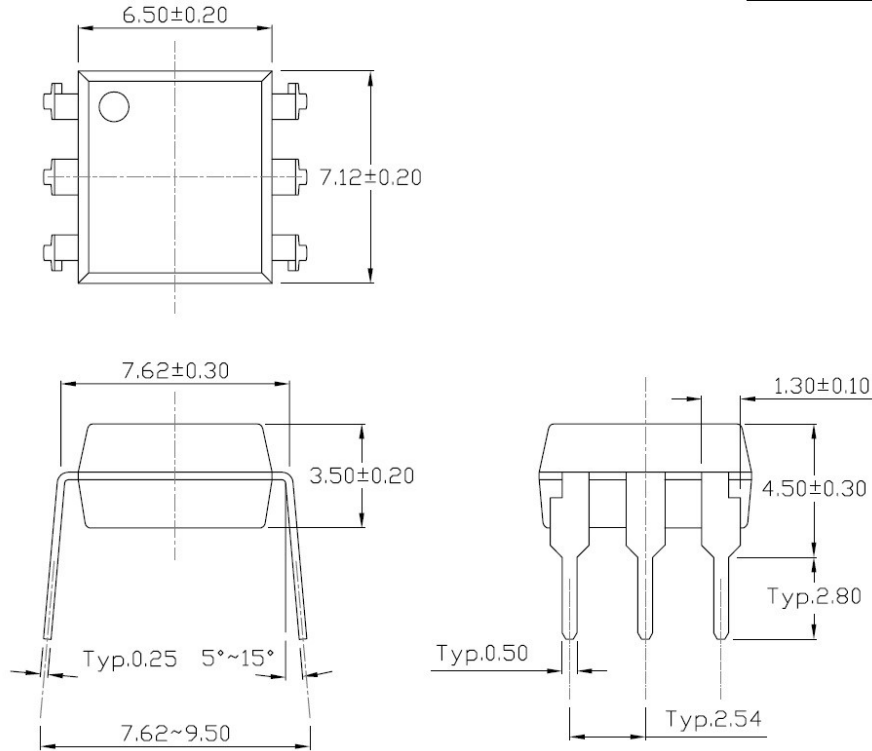


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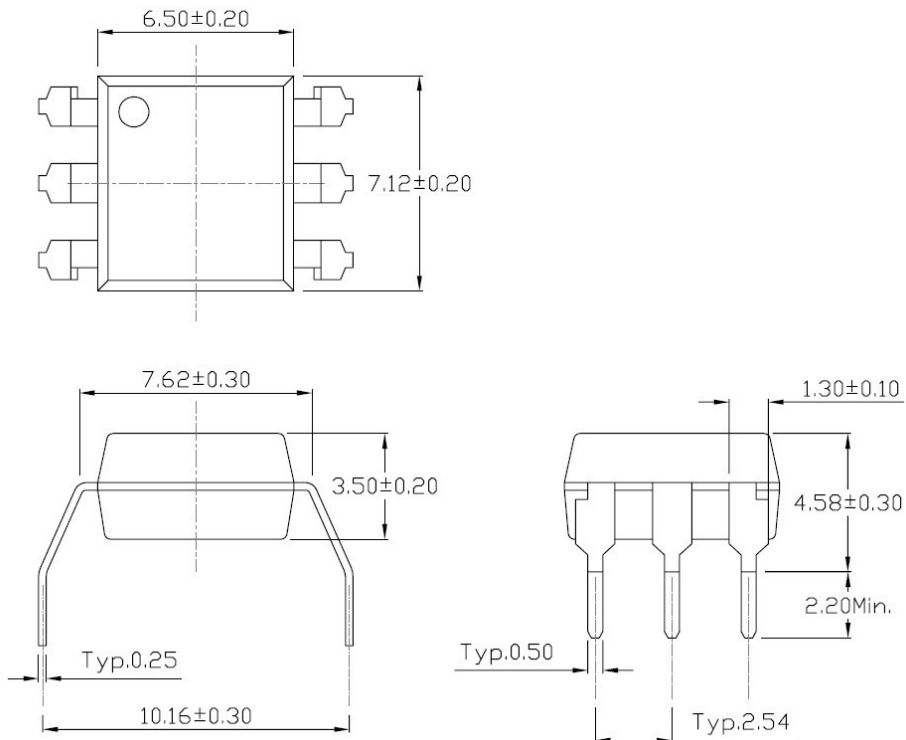
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PACKAGE DIMENSIONS (Dimensions in mm unless otherwise stated)

Standard DIP – Through Hole (DIP Type)



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



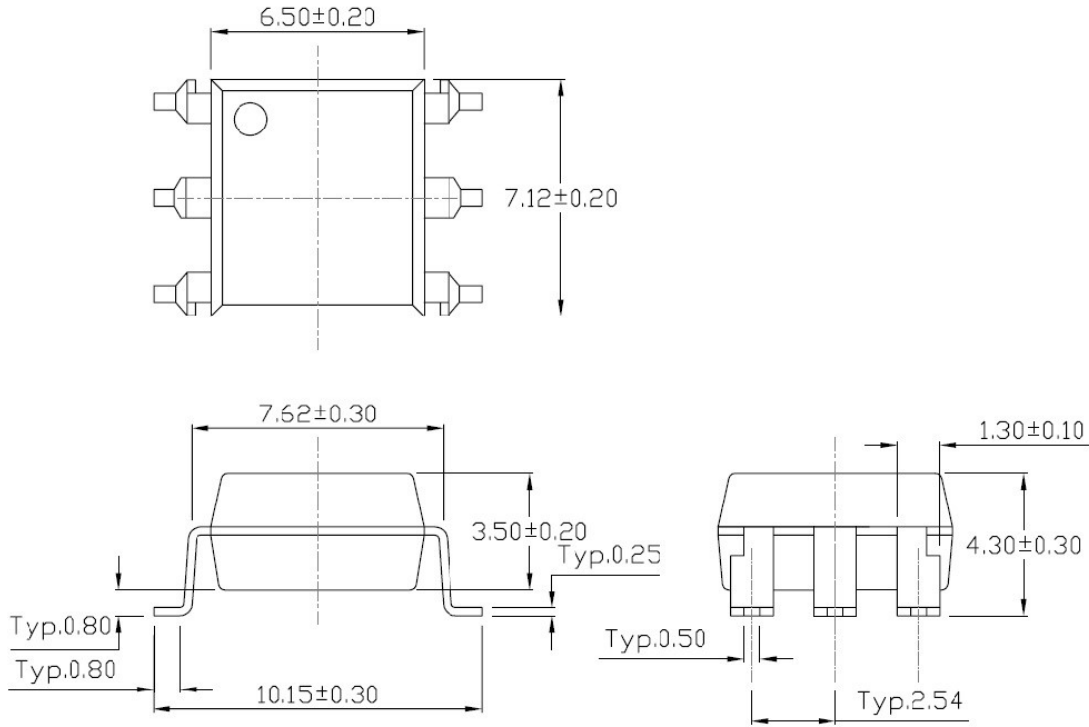


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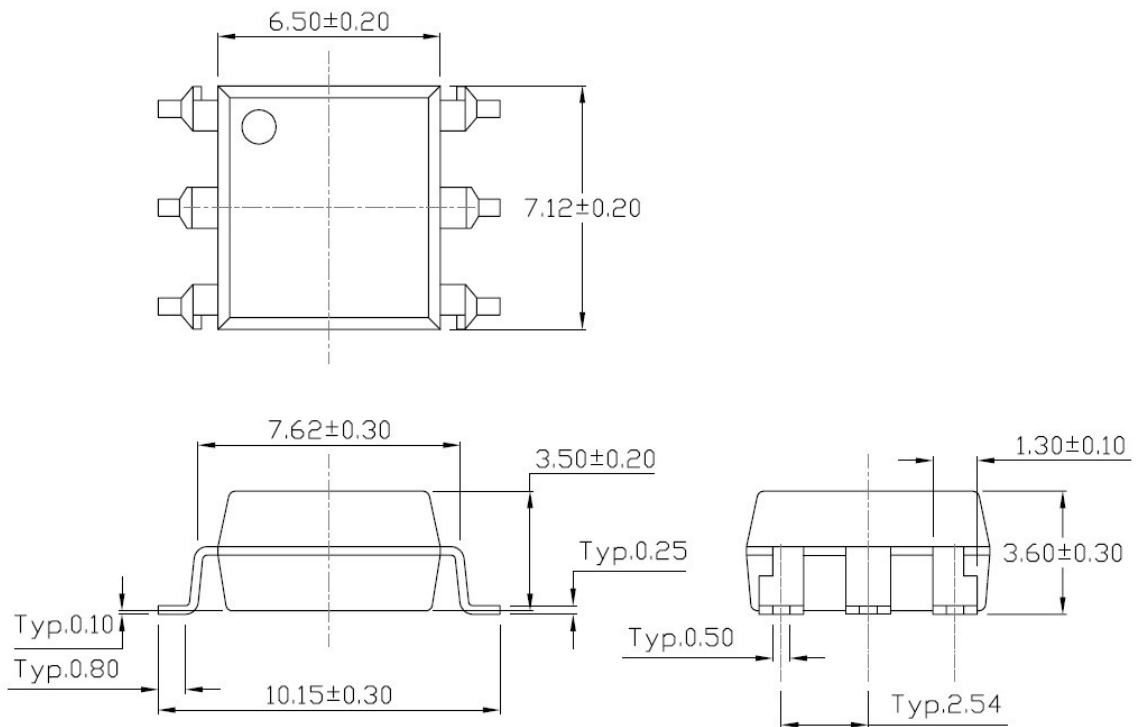
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PACKAGE DIMENSIONS (Dimensions in mm unless otherwise stated)

Surface Mount Lead Forming (S Type)



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



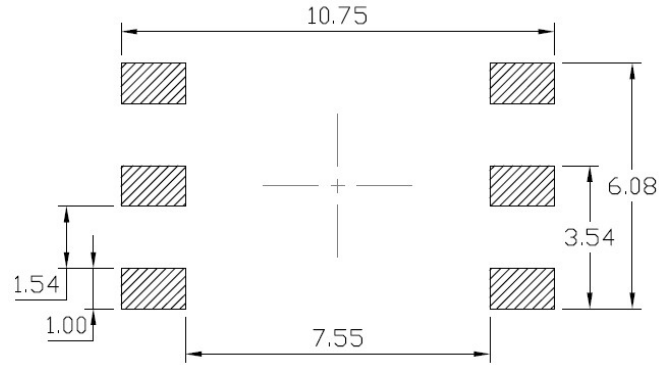


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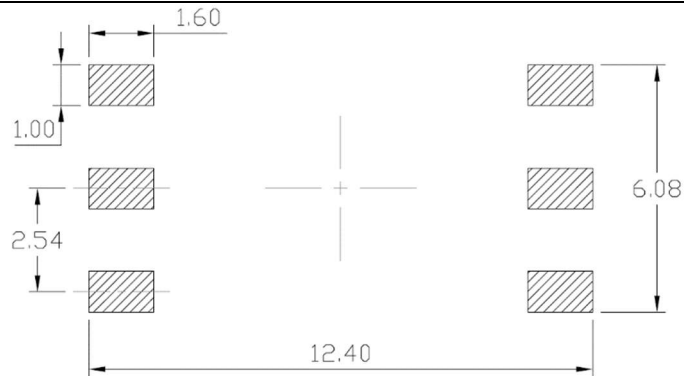
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RECOMMENDED SOLDER MASK (Dimensions in mm unless otherwise stated)

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



Surface Mount (Gullwing) Lead Forming



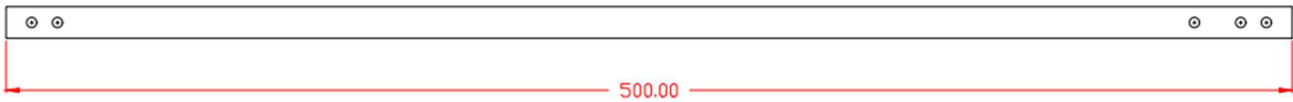
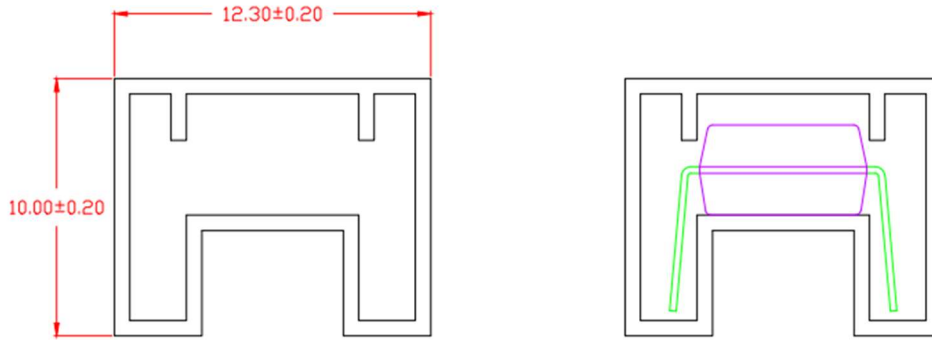


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TUBE SPECIFICATIONS (Dimensions in mm unless otherwise stated)

Standard DIP



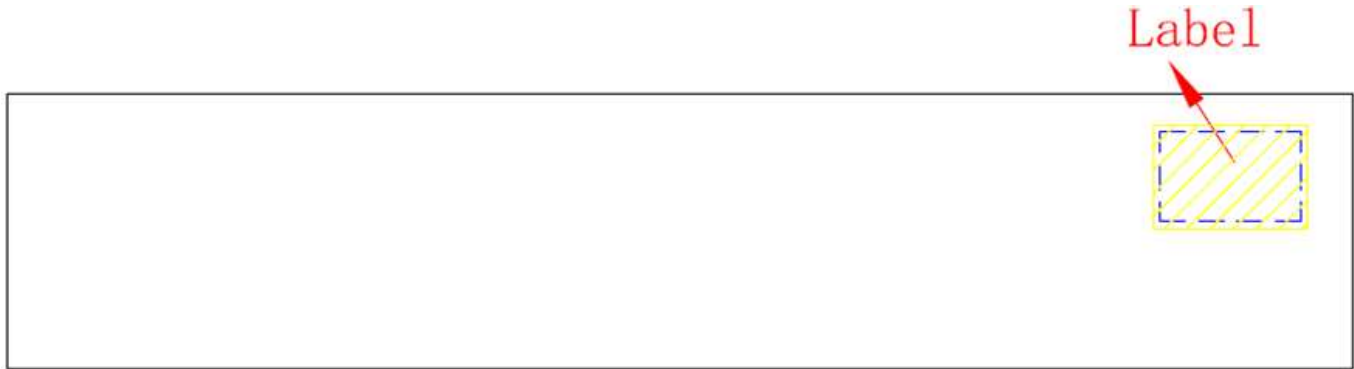


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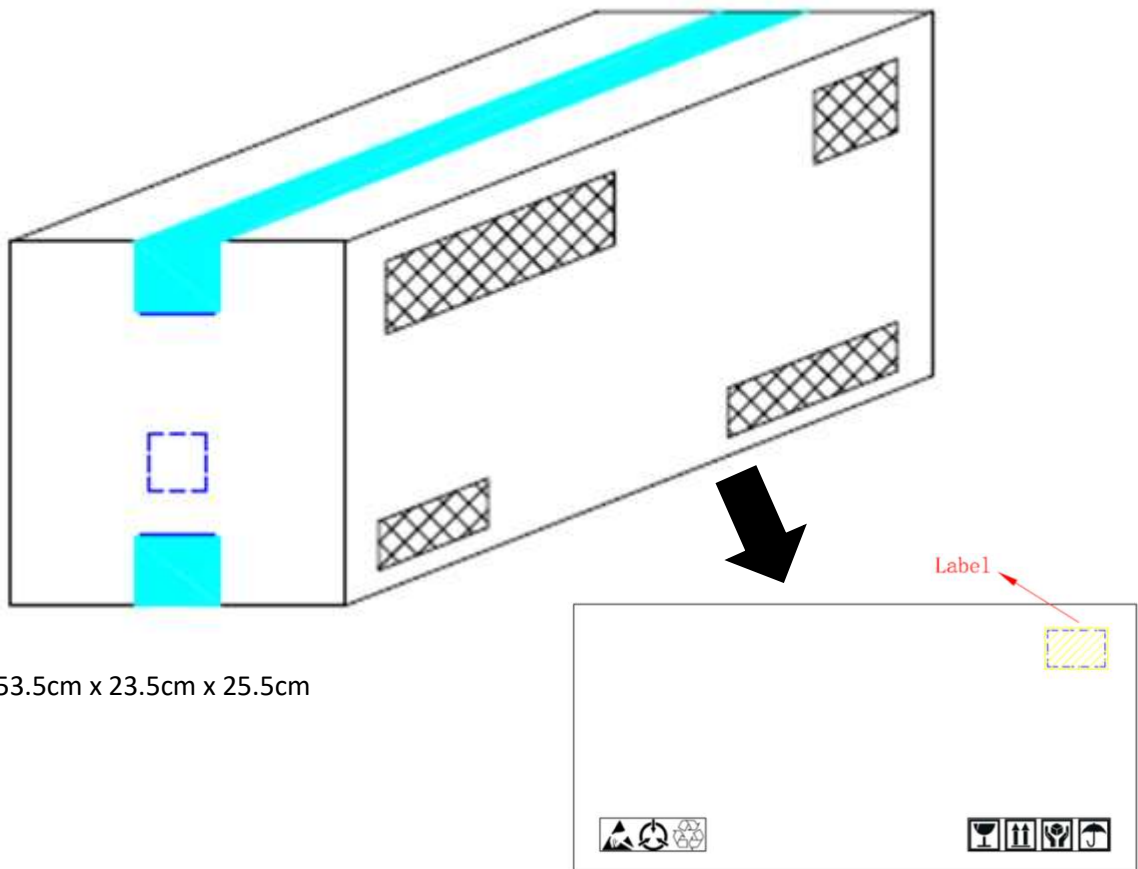
BOX SPECIFICATIONS (Tube Type)

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

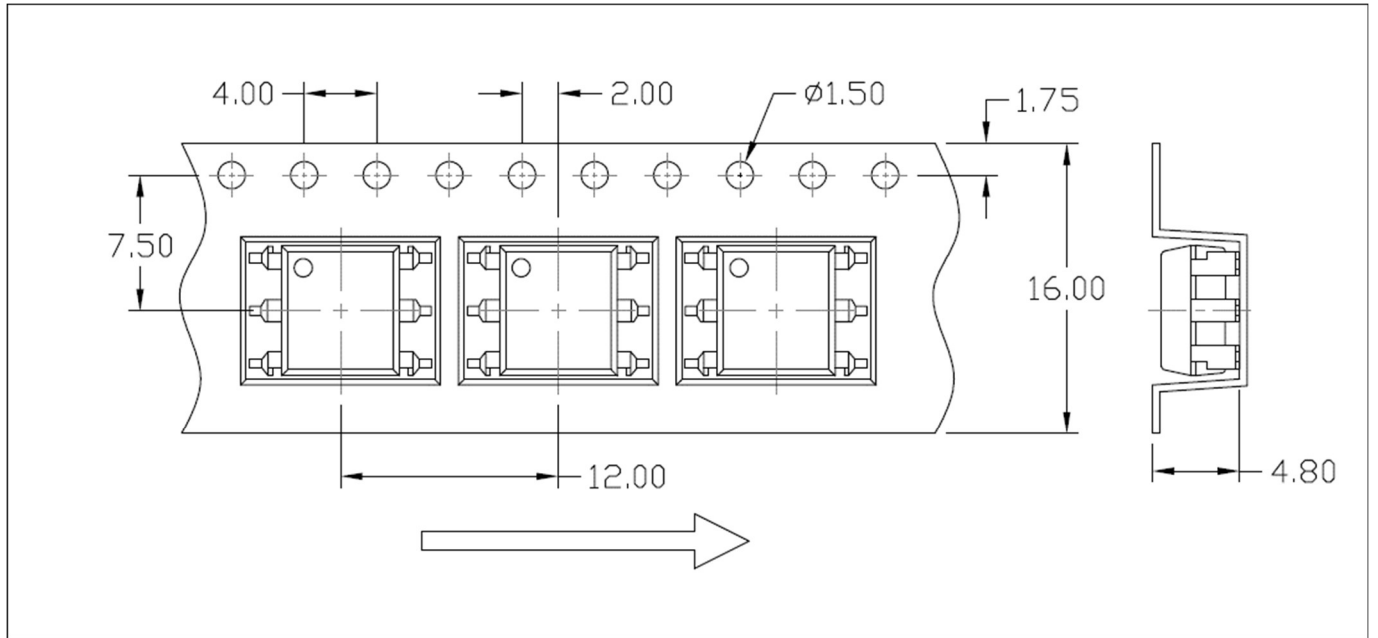


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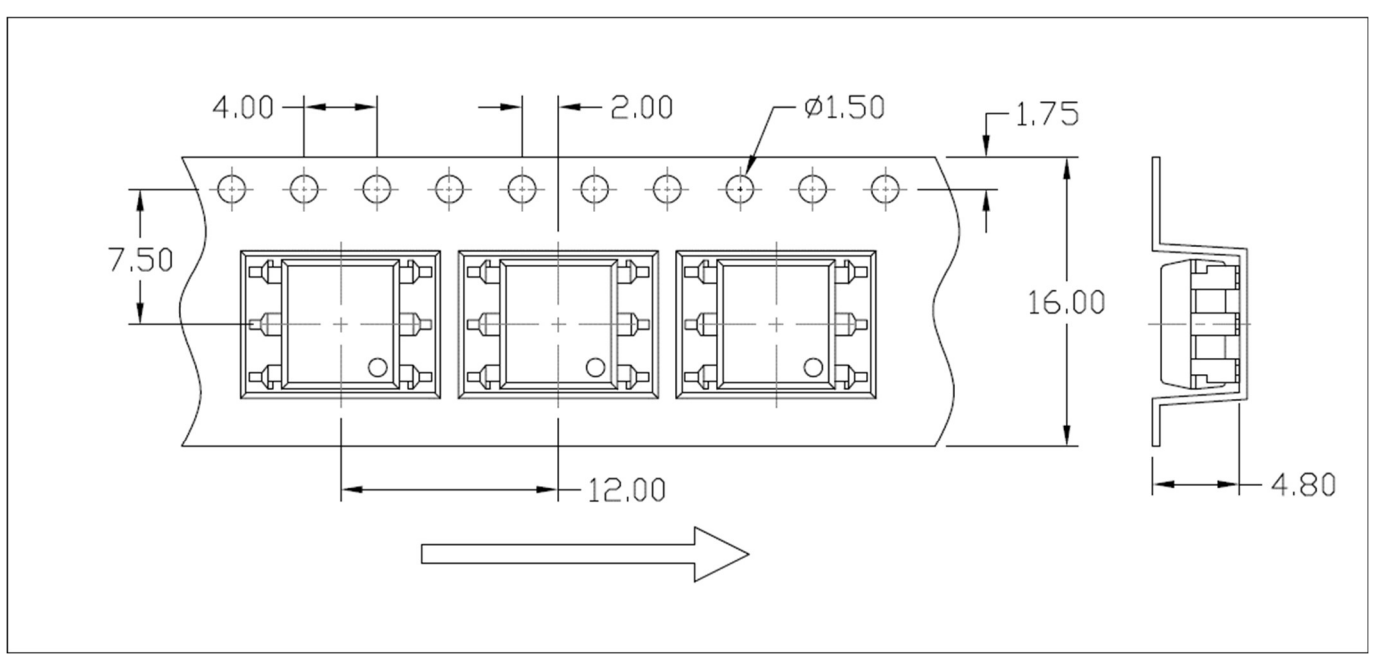
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CARRIER TAPE SPECIFICATIONS (Dimensions in mm unless otherwise stated)

Option S(T1) & SL(T1)



Option S(T2) & SL(T2)



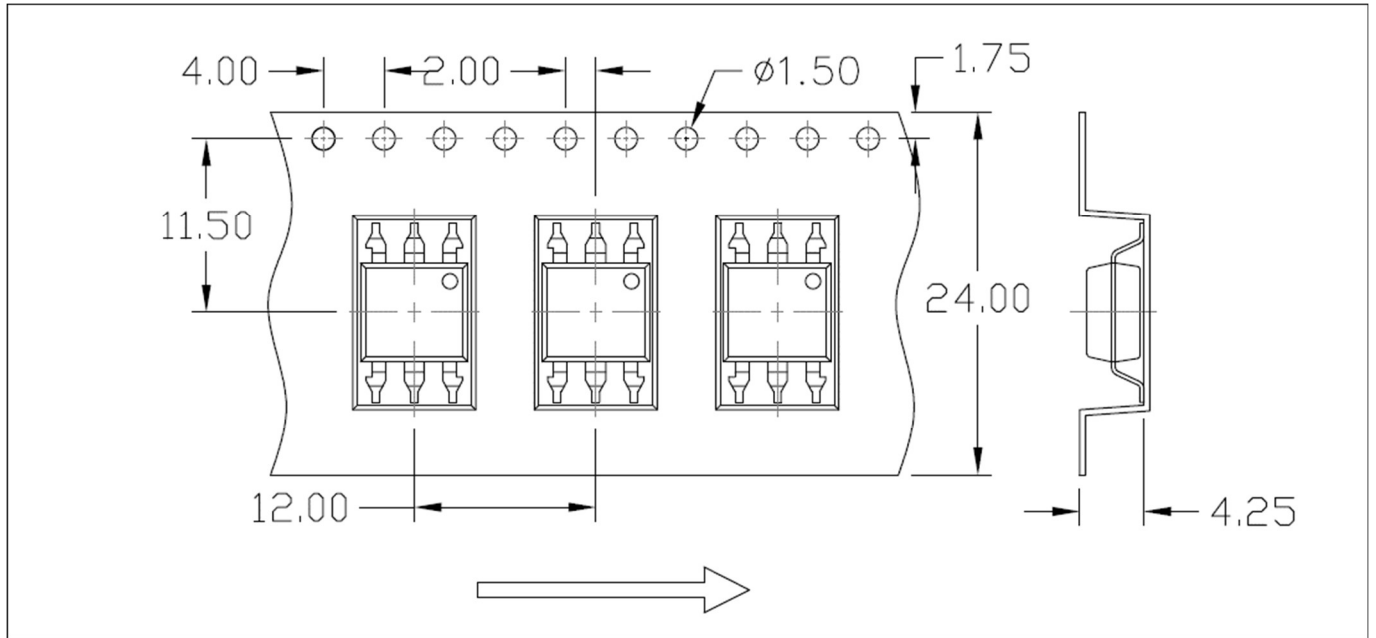


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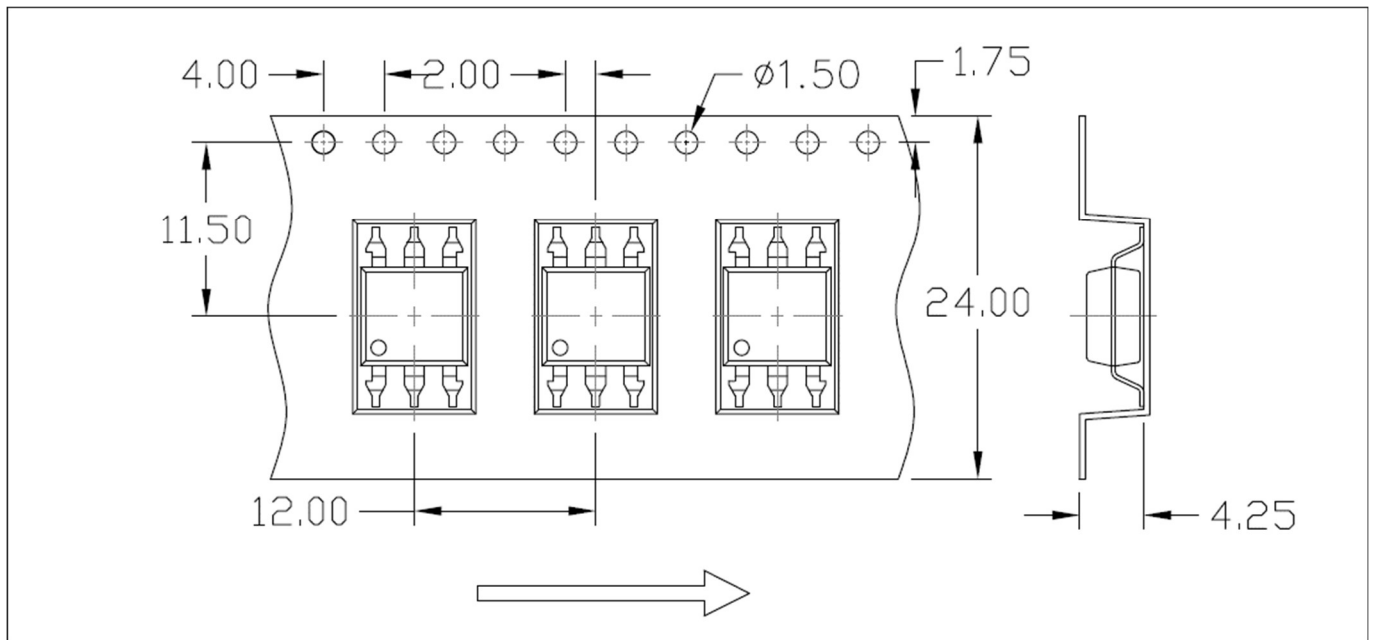
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CARRIER TAPE SPECIFICATIONS (Dimensions in mm unless otherwise stated)

Option SLM(T1)



Option SLM(T2)



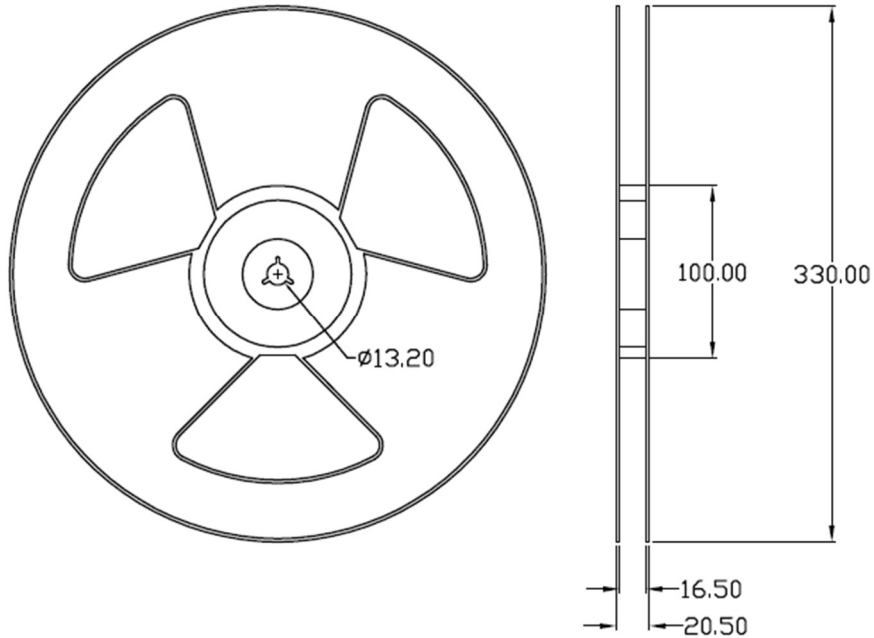


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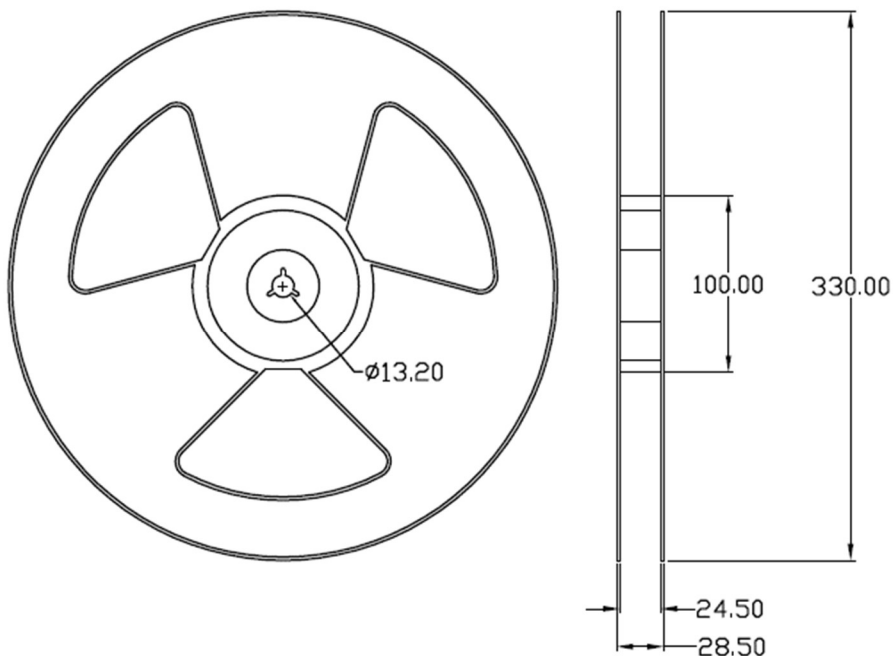
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REEL SPECIFICATIONS (Dimensions in mm unless otherwise stated)

Option S & Option SL



Option SLM



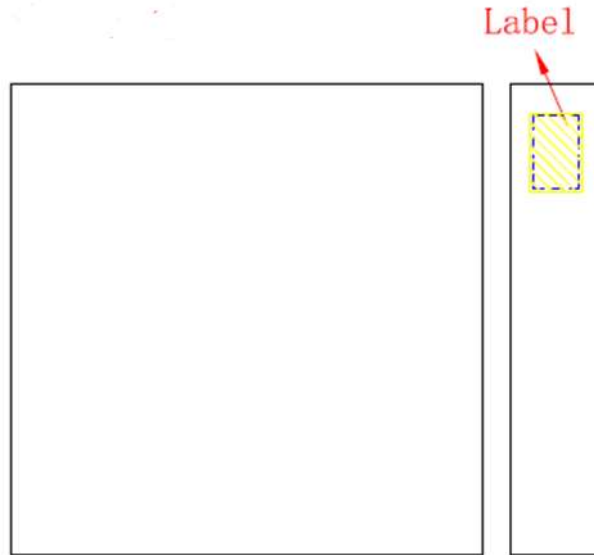


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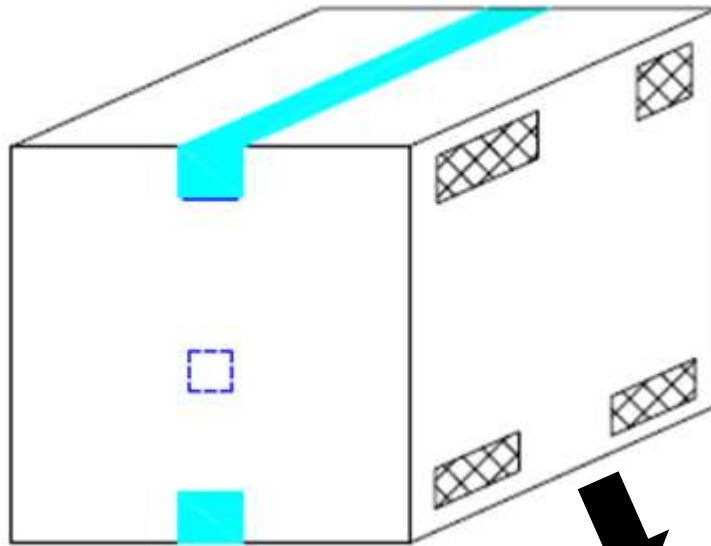
BOX SPECIFICATIONS (Reel Type)

Inner Box

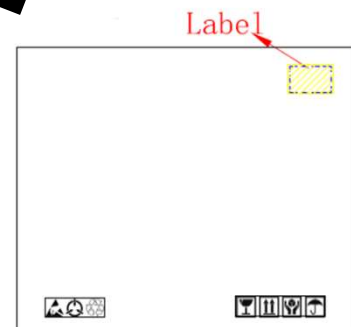


- L x W x H = 36cm x 36cm x 6.9cm

Outer Box



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



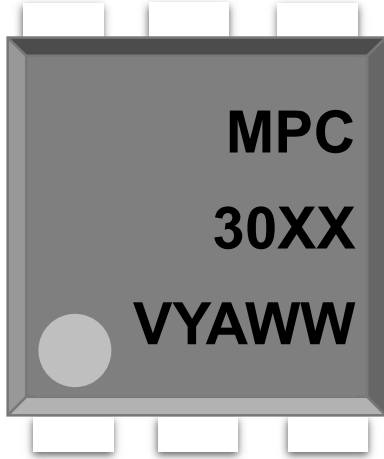


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ORDERING AND MARKING INFORMATION

MARKING INFORMATION



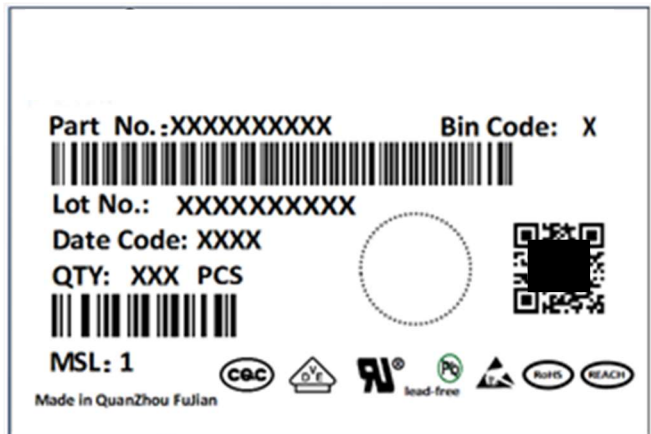
MPC : Company Abbr.
30XX : Part Number & Rank
V : VDE Option
Y : Fiscal Year
A : Manufacturing Code
WW : Work Week

ORDERING INFORMATION

LABEL INFORMATION

MPC30XX(Y)(Z)-GV

MPC – Company Abbr.
 30XX – Part Number
 (10/11/12/21/22/23/51/52/53)
 Y – Lead Form Option (M/S/SL/None)
 Z – Tape and Reel Option (T1/T2)
 G – Green Option (G or None)
 V – VDE Option (V or None)



Packing Quantity

Option	Quantity	Quantity – Inner box	Quantity – Outer box
None	50 Units/Tube	32 Tubes/Inner box	10 Inner box/Outer box = 16k Units
M	50 Units/Tube	28 Tubes/Inner box	10 Inner box/Outer box = 14k Units
S(T1)	1000 Units/Reel	3 Reels/Inner box	5 Inner box/Outer box = 15k Units
S(T2)	1000 Units/Reel	3 Reels/Inner box	5 Inner box/Outer box = 15k Units
SL(T1)	1000 Units/Reel	3 Reels/Inner box	5 Inner box/Outer box = 15k Units
SL(T2)	1000 Units/Reel	3 Reels/Inner box	5 Inner box/Outer box = 15k Units

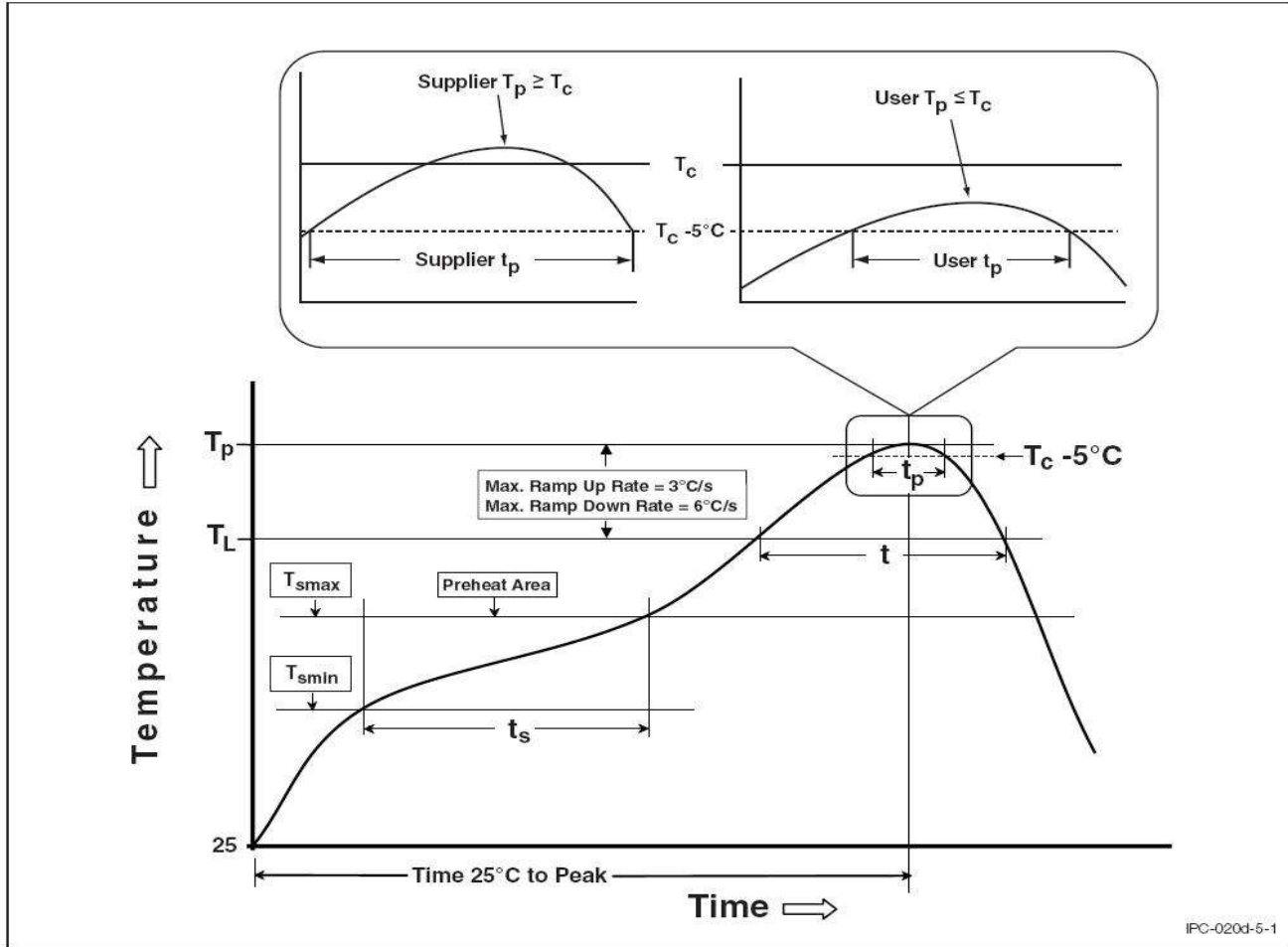


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REFLOW INFORMATION

REFLOW PROFILE



Profile Feature	Sn-Pb Assembly Profile	Pb-Free Assembly Profile
Temperature Min. (TsmIn)	100	150°C
Temperature Max. (Tsmax)	150	200°C
Time (ts) from (TsmIn to Tsmax)	60-120 seconds	60-120 seconds
Ramp-up Rate (tL to tP)	3°C/second max.	3°C/second max.
Liquidous Temperature (TL)	183°C	217°C
Time (tL) Maintained Above (TL)	60 – 150 seconds	60 – 150 seconds
Peak Body Package Temperature	235°C +0°C / -5°C	260°C +0°C / -5°C
Time (tP) within 5°C of 260°C	20 seconds	30 seconds
Ramp-down Rate (TP to TL)	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

- MEMCHIP is continually improving the quality, reliability, function and design. MEMCHIP reserves the right to make changes without further notices.
- The characteristic curves shown in this datasheet are representing typical performance which are not guaranteed.
- MEMCHIP 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, MEMCHIP 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 MEMCHIP 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 MEMCHIP'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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版本 Rev.	生效日期 Effective Date	作者 Applicant	内容 Change Description
1.0	2021/7/12	鍾欣諺	新制訂