



MPCM501 Series

SOP5, 1Mbit/s High Speed Transistor Optocoupler

Description

The MPCM501 series combine an AlGaAs infrared emitting diode as the emitter which is optically coupled to a silicon high speed photo transistor in a plastic SOP5 package. A separate design between photodiode and transistor reduces the base-collector capacitance of the input transistor which improves the speed by several orders of magnitude over conventional phototransistor optocouplers. With the robust coplanar double mold structure, MPCM501 series provide the most stable isolation feature.

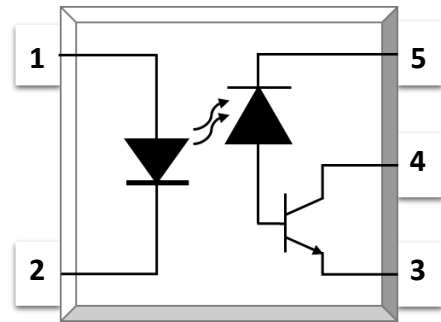
Features

- High isolation 3750 V_{RMS}
- DC input with transistor output
- Operating temperature range - 55 °C to 110 °C
- RoHS & REACH Compliance
- MSL class 1

Applications

- Line receivers
- Telecommunication equipment
- Out interface to CMOS-LSTTL-TTL
- Wide bandwidth analog coupling
- Pulse transformer replacement

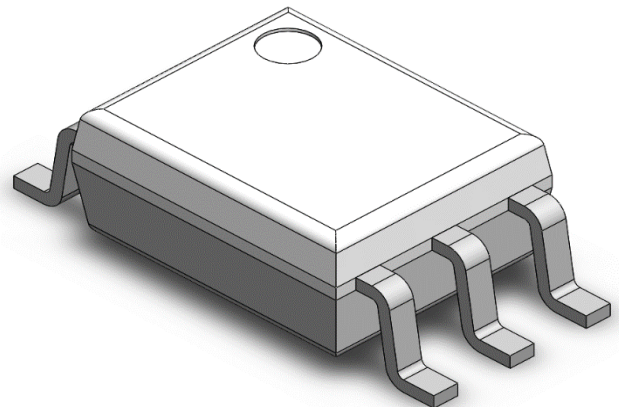
SCHEMATIC



PIN DEFINITION

1. Anode
2. Cathode
3. GND
4. V_{OUT}
5. V_{CC}

PACKAGE OUTLINE





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ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	VALUE	UNIT	Note
INPUT				
Forward Current	I_F	25	mA	
Peak Forward Current	I_{FP}	50	mA	1
Peak Transient Current	$I_{F(trans)}$	1	A	2
Reverse Voltage	V_R	5	V	
Input Power Dissipation	P_I	100	mW	
OUTPUT				
Supply Voltage	V_{CC}	-0.5~30	V	
Output Voltage	V_O	-0.5~20	V	
Output Current	I_O	50	mA	
Emitter-Base Reverse Voltage	V_{EBR}	5	V	
Base Current	I_B	5	mA	
Output Power Dissipation	P_O	100	mW	
COMMON				
Total Power Dissipation	P_{tot}	200	mW	
Isolation Voltage	V_{iso}	3750	V _{rms}	3
Operating Temperature	T_{opr}	-55~110	°C	
Storage Temperature	T_{stg}	-55~150	°C	
Soldering Temperature	T_{sol}	260	°C	4

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	-	1.45	1.8	V	I _F =16mA	
Reverse Current	I _R	-	-	10	μA	V _R =5V	
Input Capacitance	C _{in}	-	60	-	pF	V=0, f=1MHz	
OUTPUT							
High Level Supply Current	I _{CCH}	-	0.01	1	μA	I _F =0mA, V _O =Open, V _{CC} =15V, Ta=25°C	
		-	-	2	μA	I _F =0mA, V _O =Open, V _{CC} =15V	
Low Level Supply Current	I _{CCL}	-	140	200	μA	I _F =16mA, V _O =Open, V _{CC} =15V	
Logic High Output Current	I _{OH}	-	0.001	0.5	μA	I _F =0mA, V _O =V _{CC} =5.5V, Ta=25°C	
		-	0.01	1		I _F =0mA, V _O =V _{CC} =15V, Ta=25°C	
		-	-	50		I _F =0mA, V _O =V _{CC} =15V	

ELECTRICAL OPTICAL CHARACTERISTICS

PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT	TEST CONDITION	NOTE
TRANSFER CHARACTERISTICS(at Ta=0 to 70°C , unless specified otherwise)							
Current Transfer Ratio	CTR	20	-	50	%	I _F = 16mA ,V _O = 0.4V, V _{CC} =4.5V, Ta=25°C	
		15	-	-		I _F = 16mA ,V _O = 0.5V, V _{CC} =4.5V	
Logic Low Output Voltage	V _{OL}	-	0.18	0.4	V	I _F = 16mA ,I _O = 3mA, V _{CC} =4.5V, Ta=25°C	
		-	-	0.5		I _F = 16mA ,I _O =2.4mA, V _{CC} =4.5V	
Isolation Resistance	R _{iso}	10 ¹²	10 ¹⁴	-	Ω	DC500V, 40 ~ 60% R.H.	
Floating Capacitance	C _{IO}	-	0.3	1	pF	V=0, f=1MHz	



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ELECTRICAL OPTICAL CHARACTERISTICS

PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT	TEST CONDITION	NOTE
SWITCHING CHARACTERISTICS (Ta=0 to 70°C, VCC=5V, IF=16mA, unless specified otherwise)							
Propagation Delay Time to Logic Low	T _{PHL}	-	0.35	0.8	μs	R _L =1.9kΩ, Ta=25°C	
		-	-	1		R _L =1.9kΩ	
Propagation Delay Time to Logic High	T _{PLH}	-	0.3	0.8	μs	R _L =1.9kΩ, Ta=25°C	
		-	-	1		R _L =1.9kΩ	
Common Mode Transient Immunity at Logic High	CM _H	15	20	-	kV/μs	I _F = 0mA, V _{CM} =1500Vp-p, R _L =1.9KΩ, Ta =25°C	
Common Mode Transient Immunity at Logic Low	CM _L	15	20	-	kV/μs	I _F = 0mA, V _{CM} =1500Vp-p, R _L =1.9kΩ, Ta =25°C	



CHARACTERISTIC CURVES

Fig.1 Forward Current vs. Forward Voltage

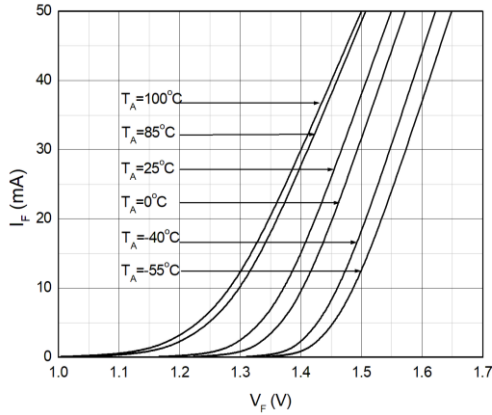


Fig.2 Forward Voltage vs. Ambient Temperature

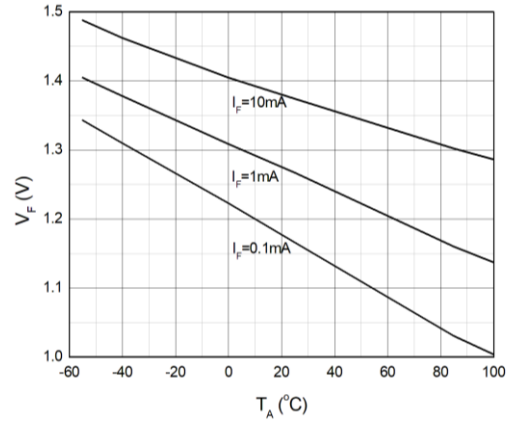


Fig.3 Normalized CTR vs. Forward Current

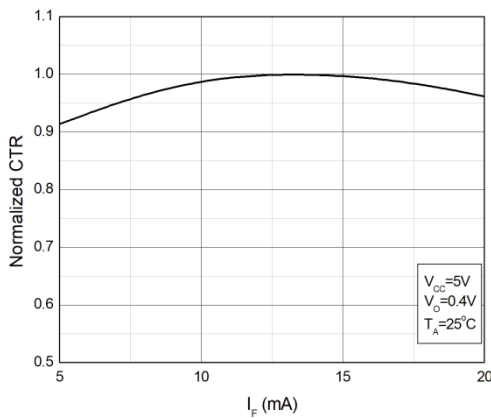


Fig.4 Normalized CTR vs. Ambient Temperature

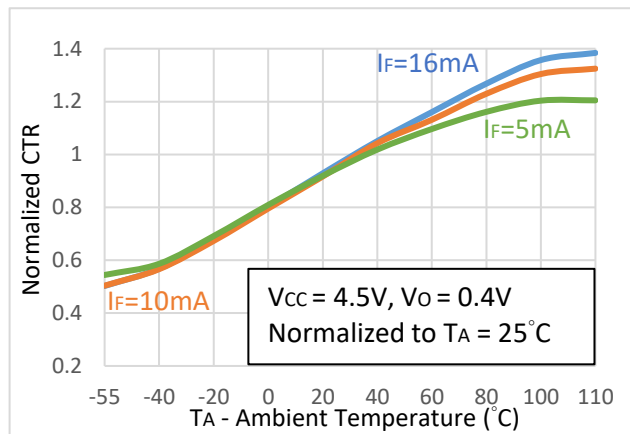


Fig.5 Output Current vs. Output Voltage(0~15V)

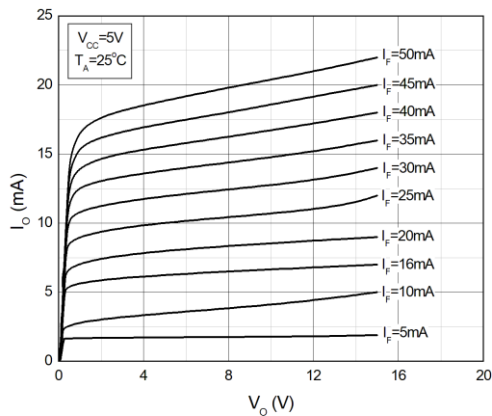
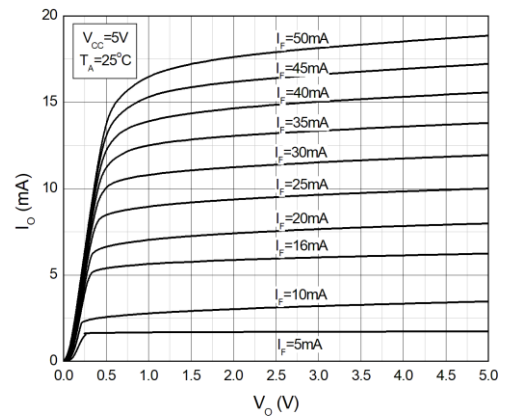


Fig.6 Output Current vs. Output Voltage(0~5V)





CHARACTERISTIC CURVES

Fig.7 Output Current vs. Forward Current

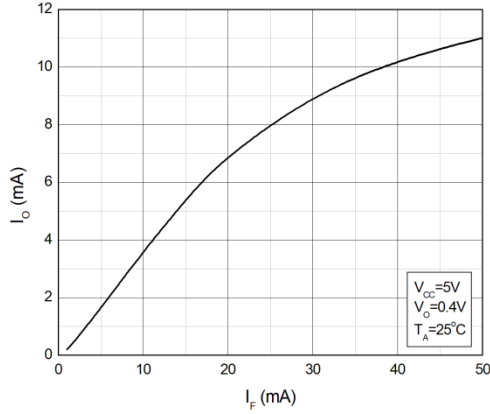


Fig.8 Logic High Output Current vs. Ambient Temperature

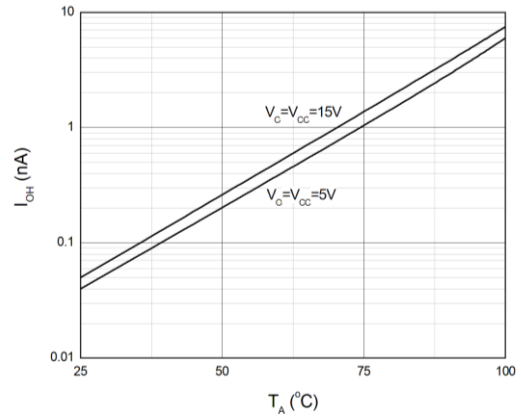


Fig.9 Propagation Delay vs. Load Resistance

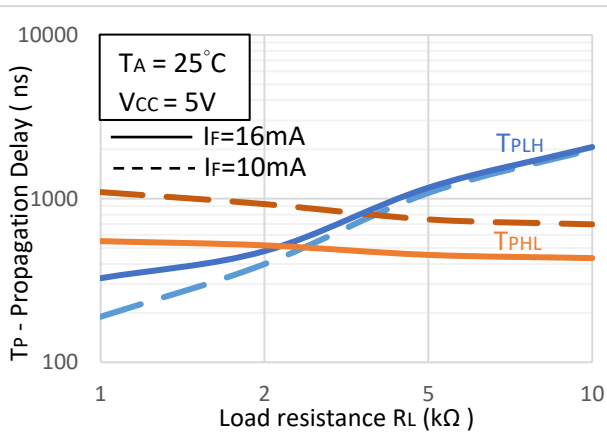


Fig.10 Switching Time vs. Load Resistance

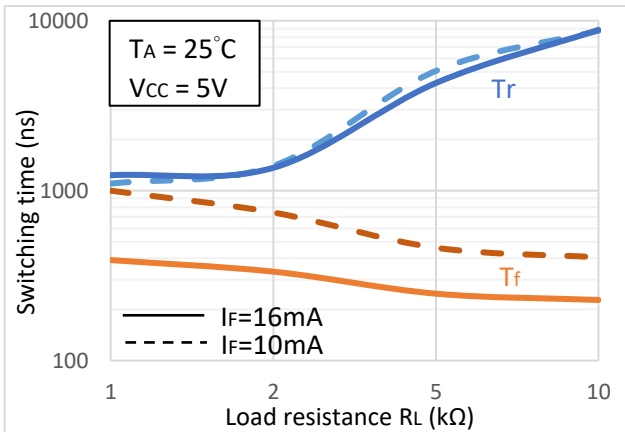


Fig.11 Propagation Delay vs. Ambient Temperature

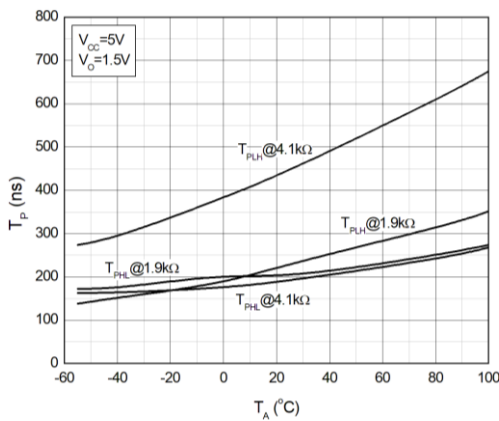
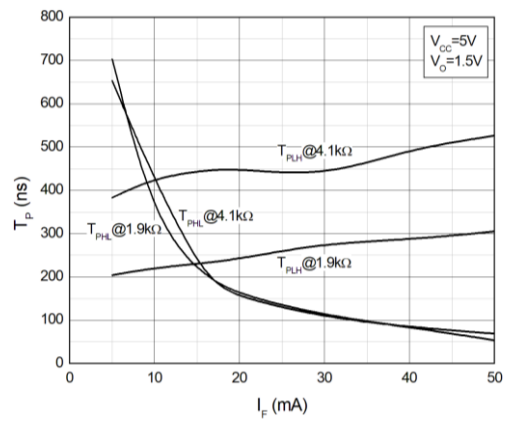


Fig.12 Propagation Delay vs. Forward Current



TEST CIRCUITS

Fig.13 Test Circuits for T_{PHL} , T_{PLH} , t_r , t_f

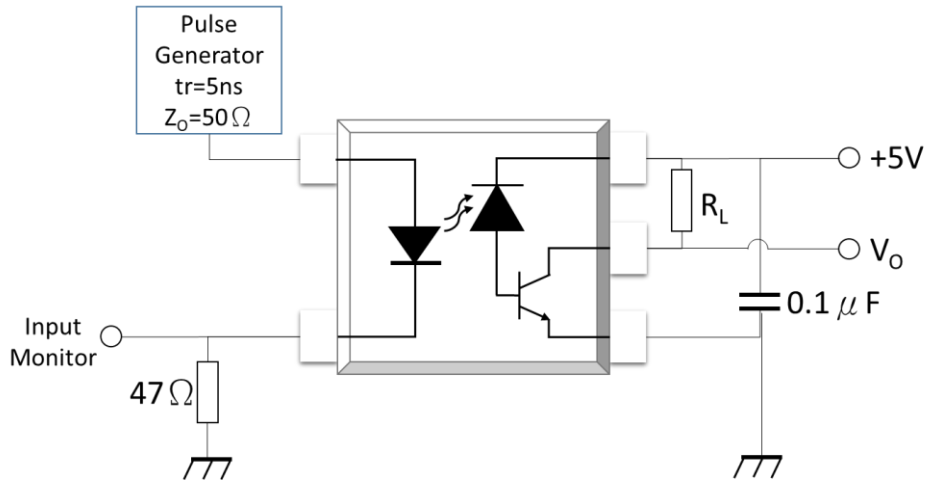
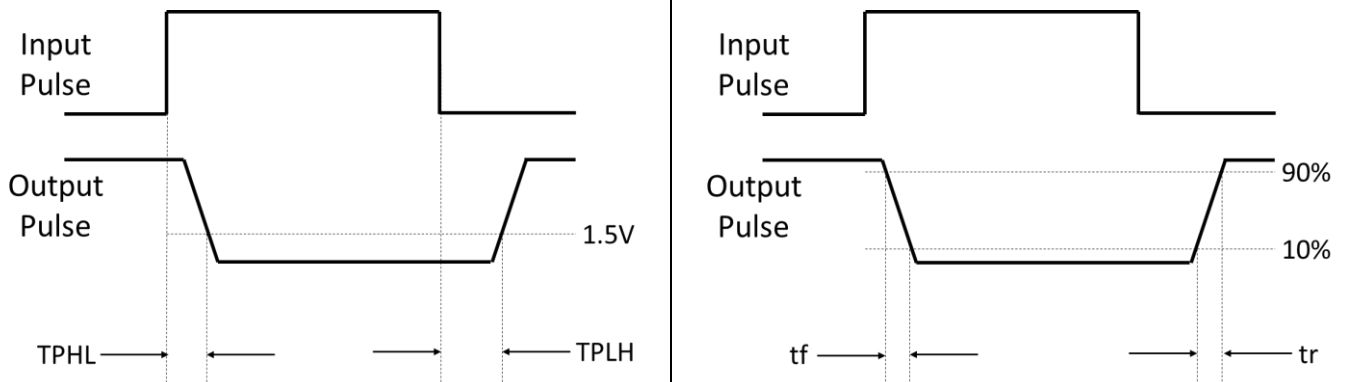


Fig.14 Waveforms of T_{PHL} , T_{PLH} , t_r , t_f



TEST CIRCUITS

Fig.15 Test Circuits for Common Mode Transient Immunity

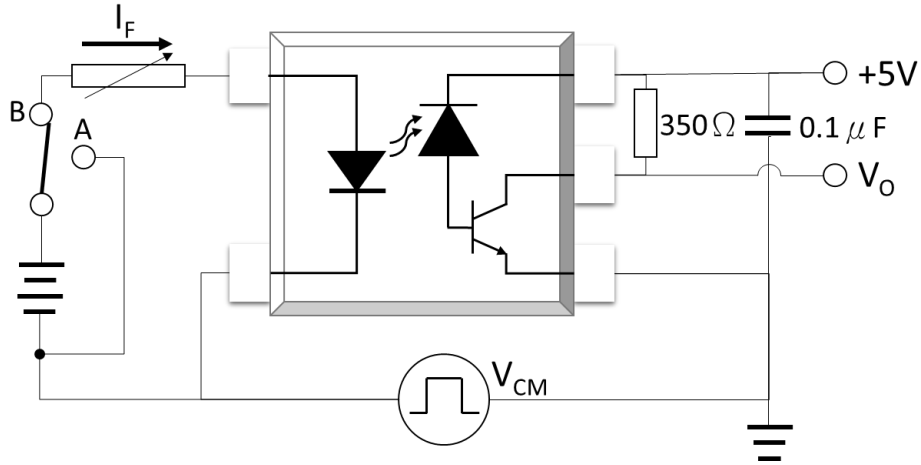
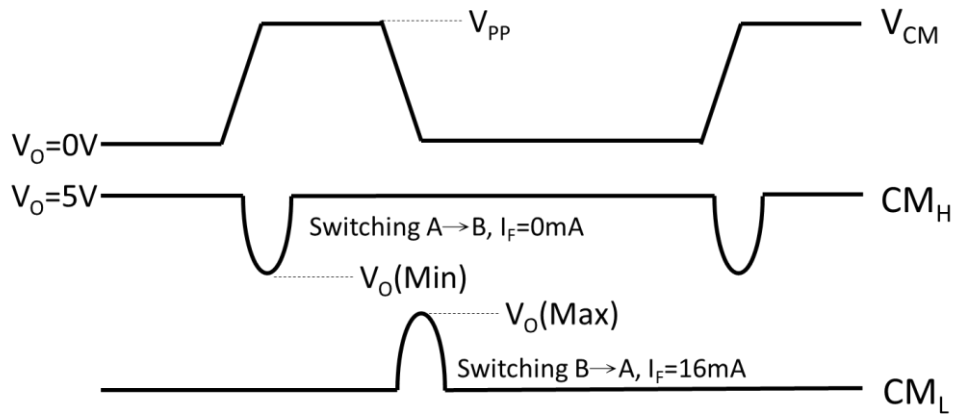


Fig.16 Waveforms of Common Mode Transient Immunity

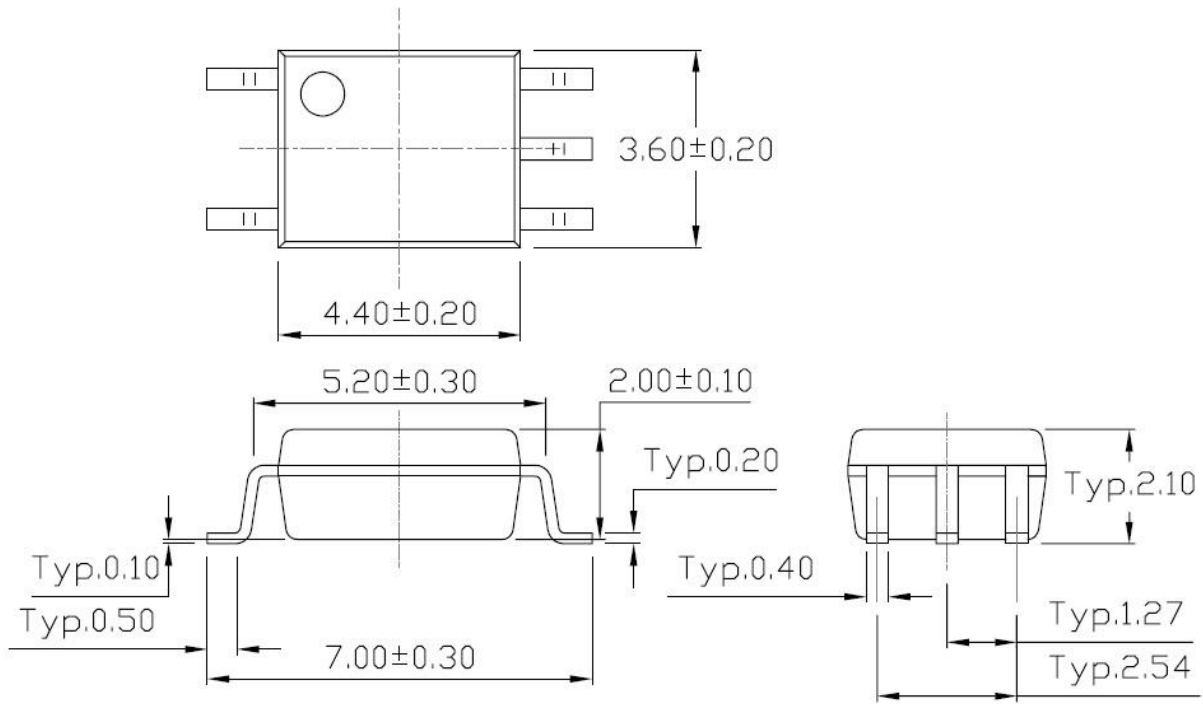




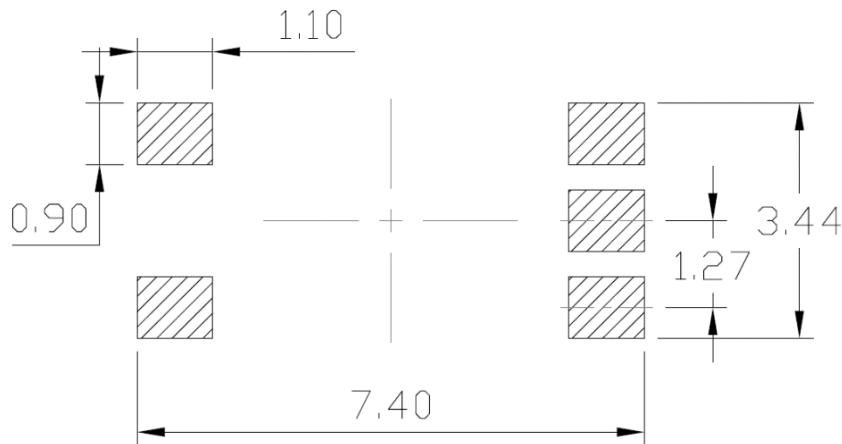
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PACKAGE DIMENSIONS (Dimensions in mm unless otherwise stated)



Recommended Solder Mask (Dimensions in mm unless otherwise stated)



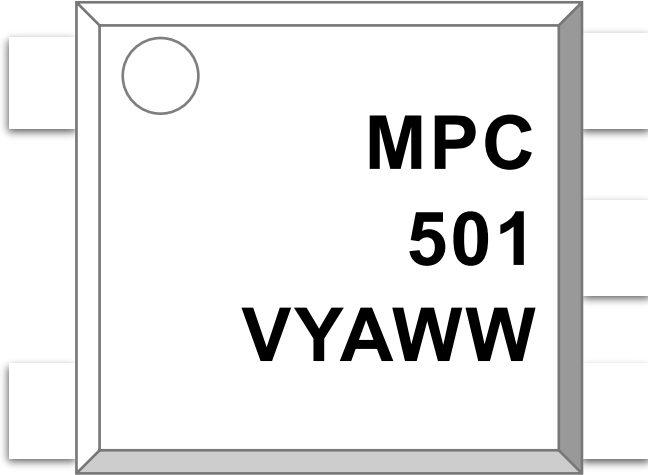


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ORDERING AND MARKING INFORMATION

MARKING INFORMATION



MPC : Company Abbr.
M501 : Part Number
V : VDE Option
Y : Fiscal Year
A : Manufacturing Code
WW : Work Week

ORDERING INFORMATION

MPCM501(Z)-GV

MPC – Company Abbr.
 M – SOP5
 501 – Part Number
 Z – Tape and Reel Option (T1/T2)
 G – Green
 V – VDE Option (V or None)

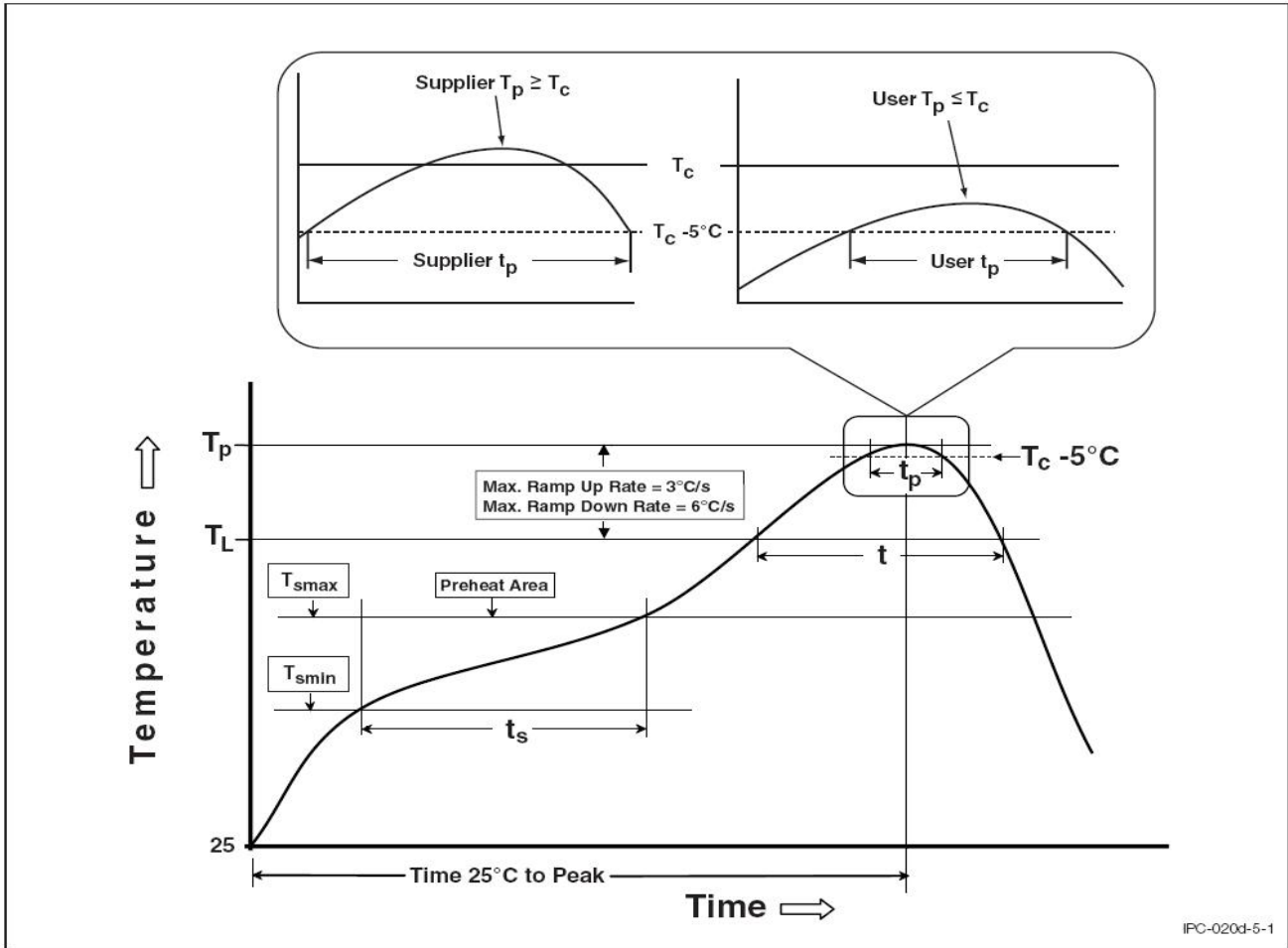
PACKING QUANTITY

Option	Description	Quantity
T1	Surface Mount Lead Forming – With Option 1 Taping	3000Units/Reel
T2	Surface Mount Lead Forming – With Option 2 Taping	3000Units/Reel



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.



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.
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- 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.

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