MPCM501 Series

SOP5, 1Mbit/s High Speed Transistor Photo Coupler

■ Features

- High isolation 3750 VRMS
- DC input with high speed transistor
- Operating temperature range - 55 °C to 100 °C
- REACH compliance
- Halogen free
- MSL class 1
- Regulatory Approvals
  - UL - UL1577 (Pending Approved)
  - VDE - EN60747-5-5(VDE0884-5)
  - CQC – GB4943.1, GB8898

■ Applications

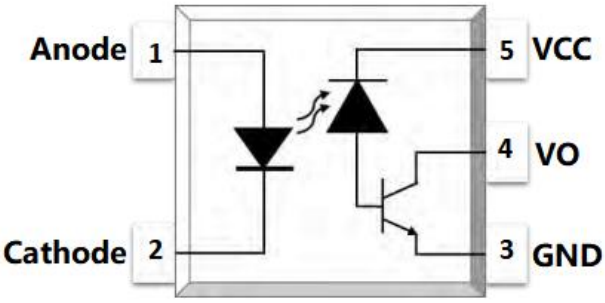
- Line receivers
- Telecommunication equipment
- Out interface to CMOS-LSTTL-TTL
- Wide bandwidth analog coupling
- Pulse Transformer replacement
- Computer-peripheral interface

■ 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.

With the robust coplanar double mold structure, MPCM501 series provide the most stable isolation feature.

■ Schematic



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	8	mA	
Peak Output Current	I_O	16	mA	
Output Power Dissipation	P_O	100	mW	
COMMON				
Total Power Dissipation	Ptot	200	mW	
Isolation Voltage	Viso	3750	Vrms	3
Operating Temperature	Topr	-40~100	°C	
Storage Temperature	Tstg	-55~125	°C	
Soldering Temperature	Tsol	260	°C	4

Note 1. 50% duty, 1ms P.W
Note 2. ≤1μs P.W,300pps
Note 3. AC For 1 Minute, R.H. = 40 ~ 60%
Note 4. For 10 seconds

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	Cin	-	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}	-	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	μA	I_F=0mA, V_O=V_{CC}=15V, Ta=25°C	
		-	-	50	μA	I_F=0mA, V_O=V_{CC}=15V	
TRANSFER CHARACTERISTICS(at Ta=0 to 70°C , unless specified otherwise)							
Current Transfer Ratio	CTR	20	-	-	%	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}	-	-	0.4	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	Riso	10^12	10^14	-	Ω	DC500V, 40 ~ 60% R.H.	
Floating Capacitance	C_{IO}	-	0.3	-	pF	V=0, f=1MHz	

ELECTRICAL OPTICAL CHARACTERISTICS							
PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT	TEST CONDITION	NOTE
SWITCHING CHARACTERISTICS(at Ta=0 to 70°C, I_F=16mA ,V_{CC}=5V, unless specified otherwise)							
Propagation Delay Time to Logic Low	TPHL	-	0.4	0.8	µs	R_L=1.9kΩ,T_A=25°C	Fig.13
		-	-	1.0		R_L=1.9kΩ	
Propagation Delay Time to Logic High	TPLH	-	0.35	0.8	µs	R_L=1.9kΩ,T_A=25°C	Fig.13
		-	-	1.0		R_L=1.9kΩ	
Common Mode Transient Immunity at Logic High	CM_H	15	-	-	kV/µs	I_F = 0mA , V_{CM}=1500Vpp, RL=1.9kΩ, T_A =25°C	Fig.15
Common Mode Transient Immunity at Logic Low	CM_L	15	-	-	kV/µs	I_F = 16mA , VCM=1500Vpp, R_L=1.9kΩ, T_A =25°C	Fig.15

CHARACTERISTIC CURVES

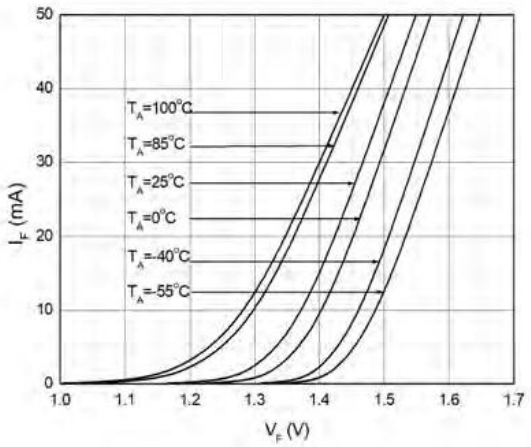


Fig.1 Forward Current vs. Forward Voltage

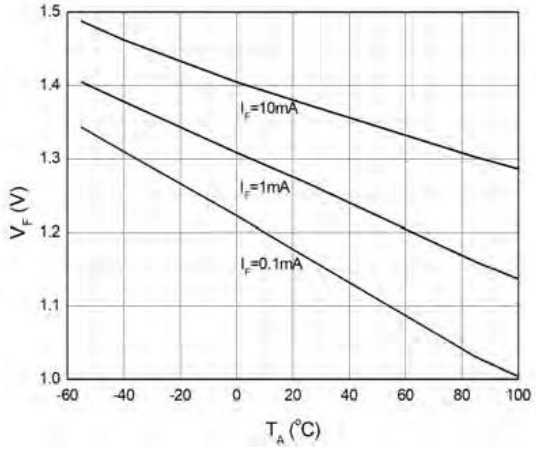


Fig.2 Forward Voltage vs. Ambient Temperature

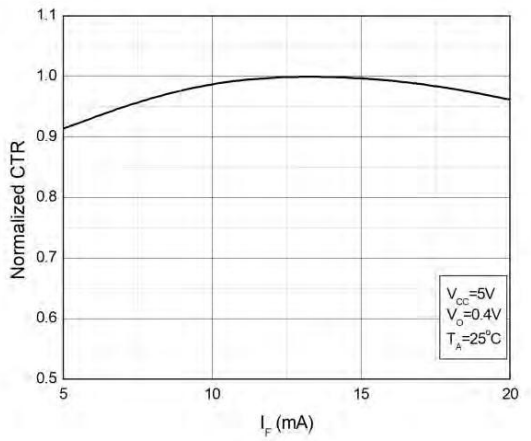


Fig.3 Input Threshold Current vs. Ambient Temperature

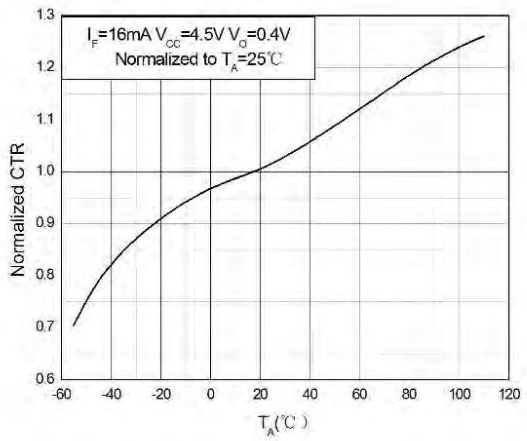


Fig.4 Input Threshold Current vs. Ambient Temperature

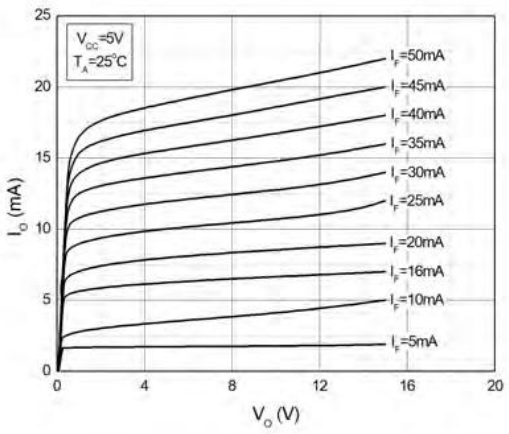


Fig.5 Low Level Output Current vs. Ambient Temperature

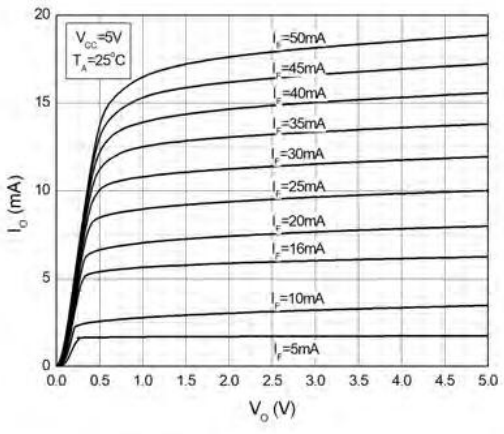


Fig.6 Low Level Output Current vs. Ambient Temperature

CHARACTERISTIC CURVES

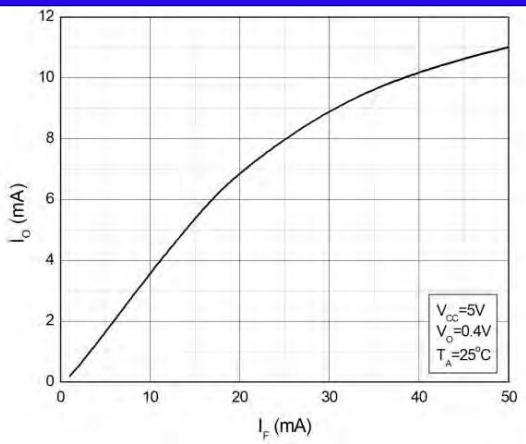


Fig.7 Low Level Output Voltage vs. Ambient Temperature

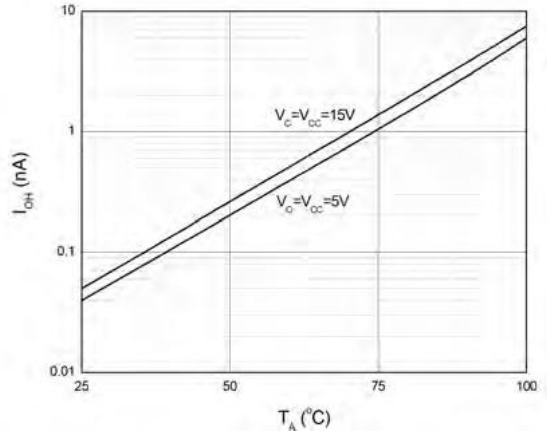


Fig.8 Low Level Output Voltage vs. Ambient Temperature

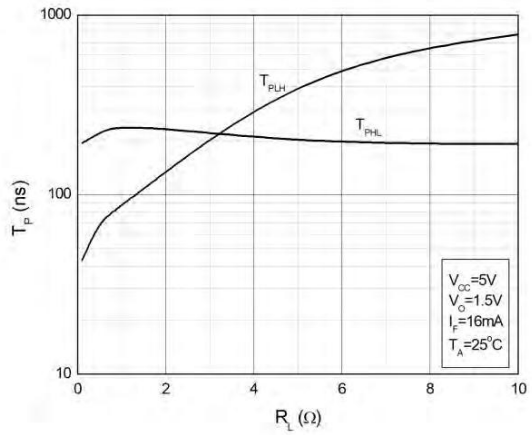


Fig.9 High Level Output Current vs. Ambient Temperature

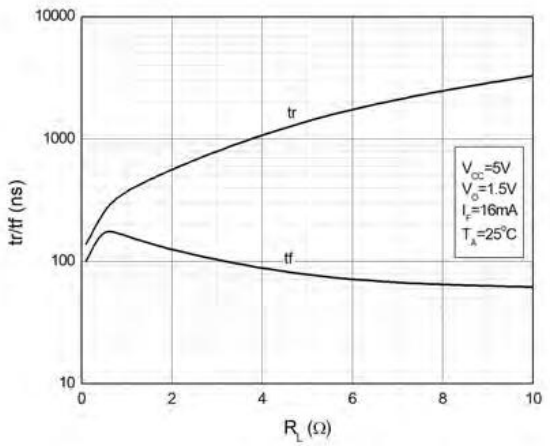


Fig.10 High Level Output Current vs. Ambient Temperature

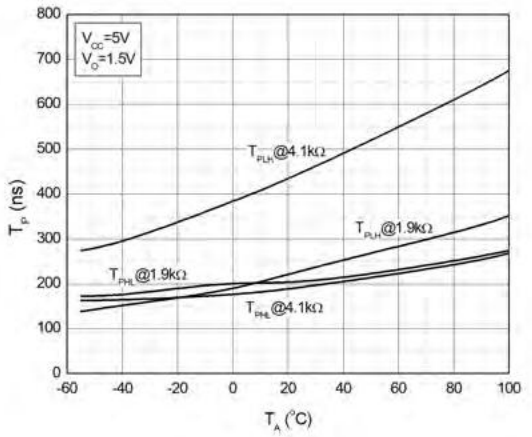


Fig.11 Output Voltage vs. Ambient Temperature

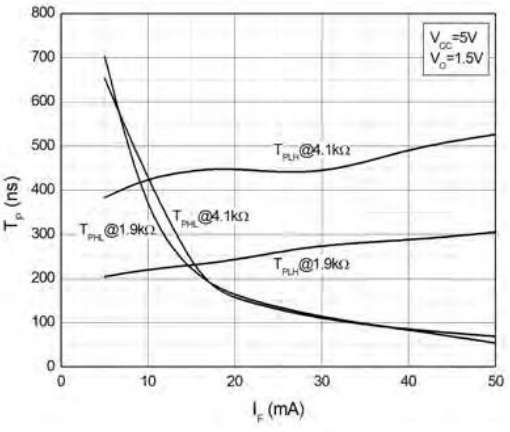


Fig.12 Output Voltage vs. Forward Current

TEST CIRCUITS

Fig.13 Test Circuits for TPHL, TPLH, tr, tf

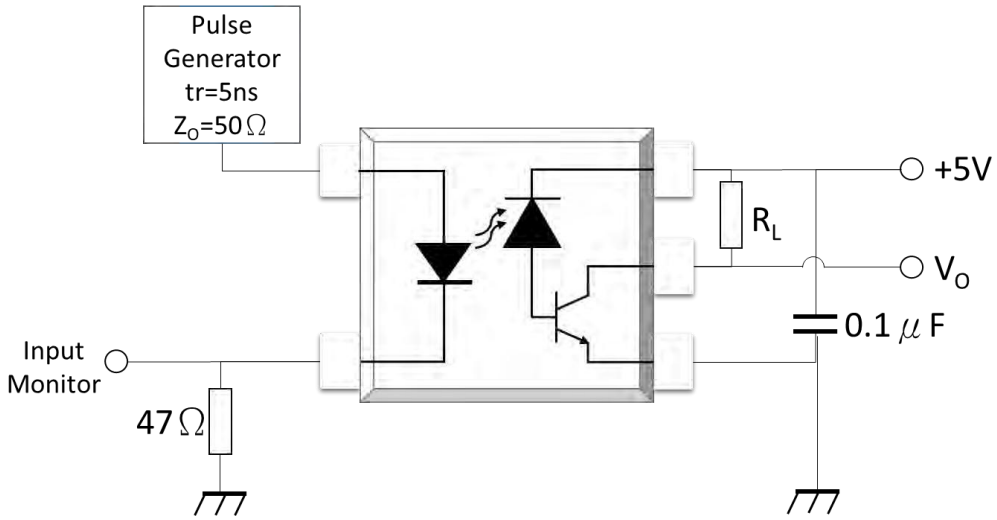
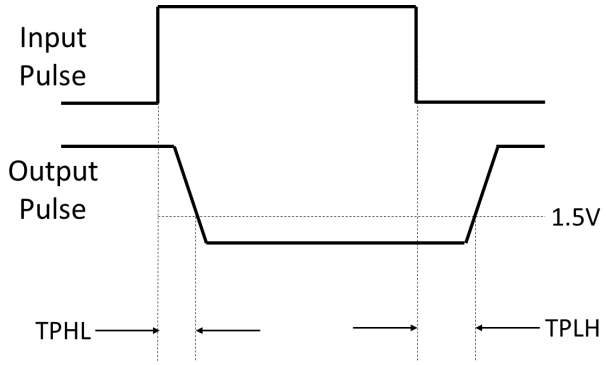
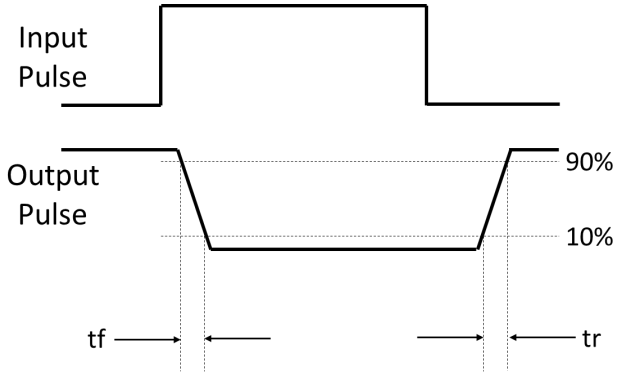


Fig.14 Waveforms of TPHL, TPLH, tr, tf





TEST CIRCUITS

Fig.15 Test Circuits for Common Mode Transient Immunity

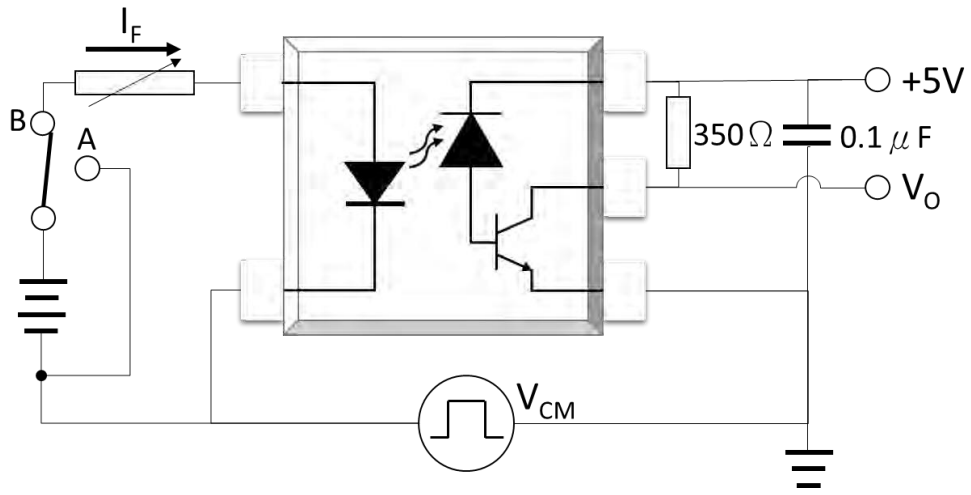
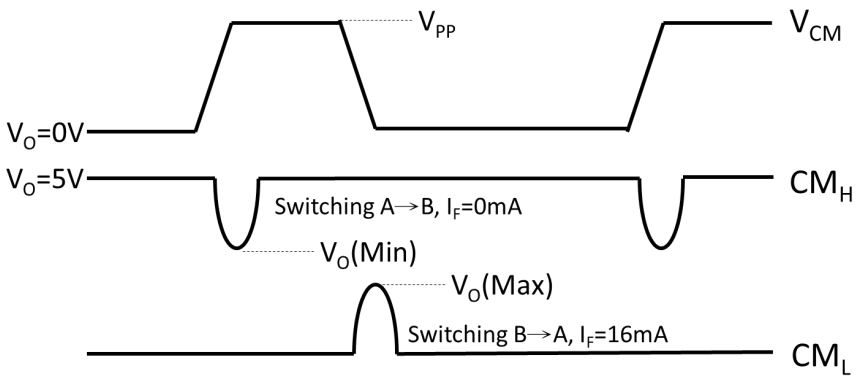
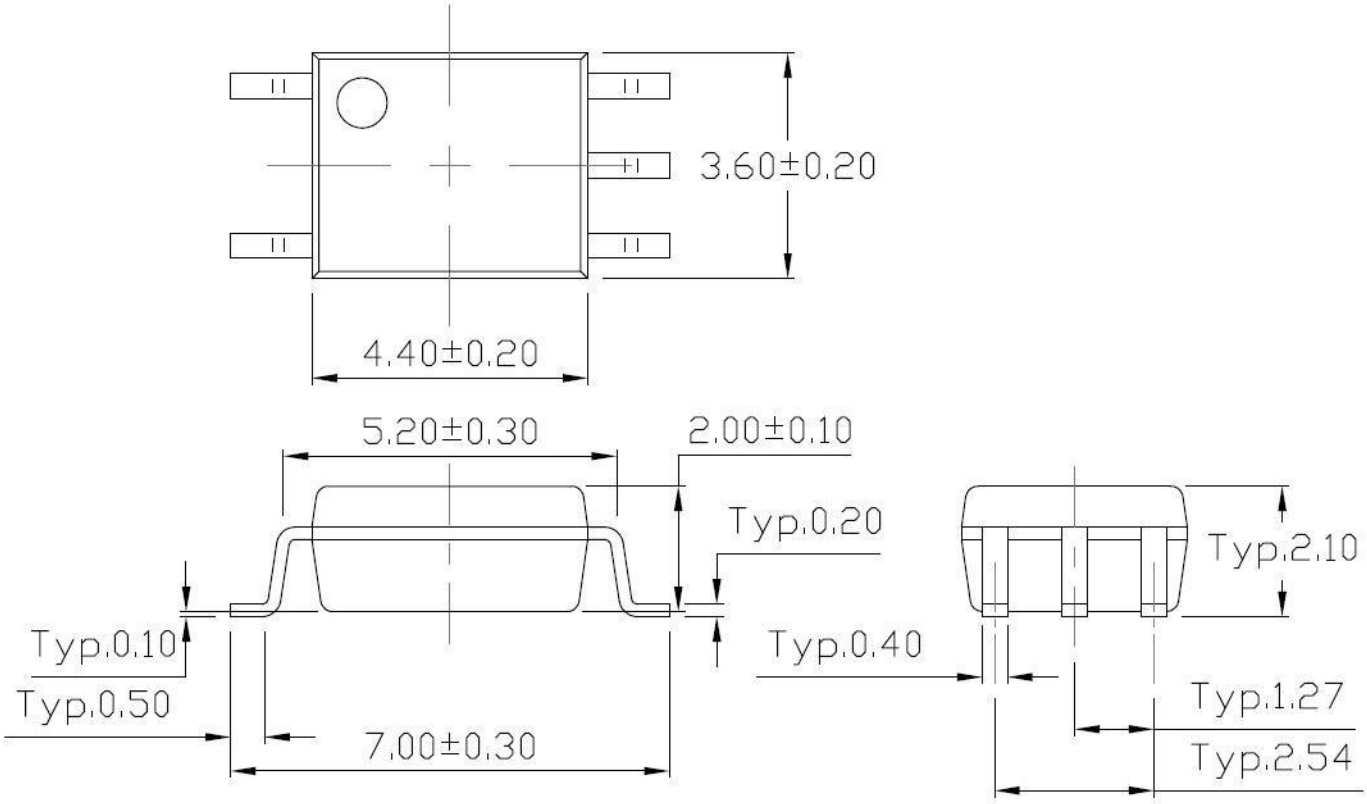


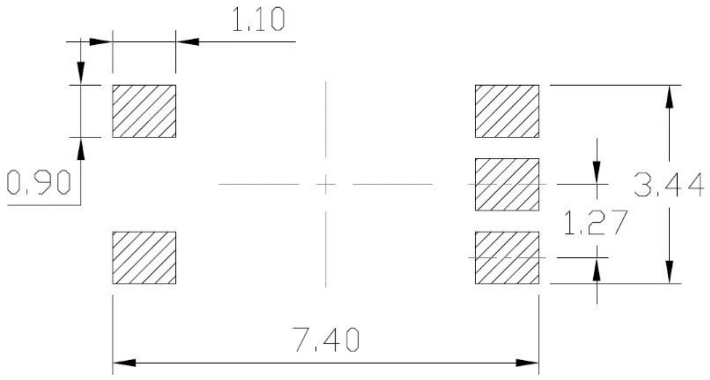
Fig.16 Waveforms of Common Mode Transient Immunity



PACKAGE DIMENSIONS (Dimensions in mm unless otherwise stated)

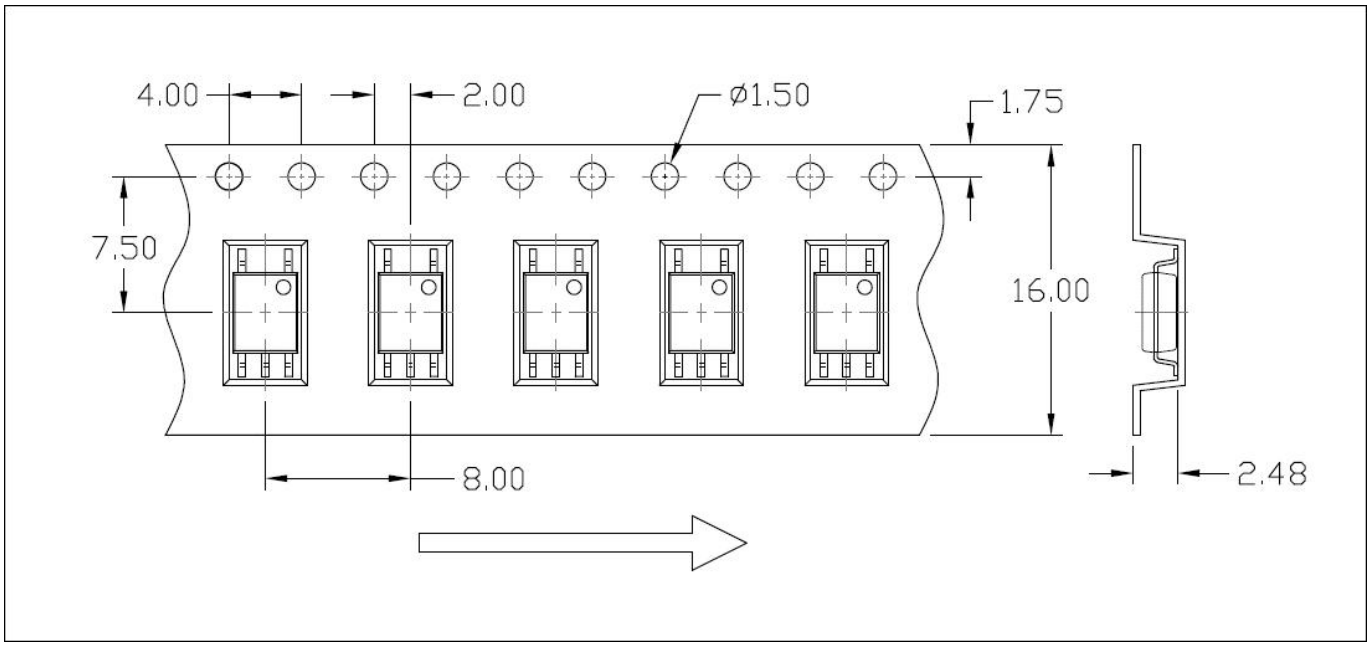


Recommended Solder Mask (Dimensions in mm unless otherwise stated)

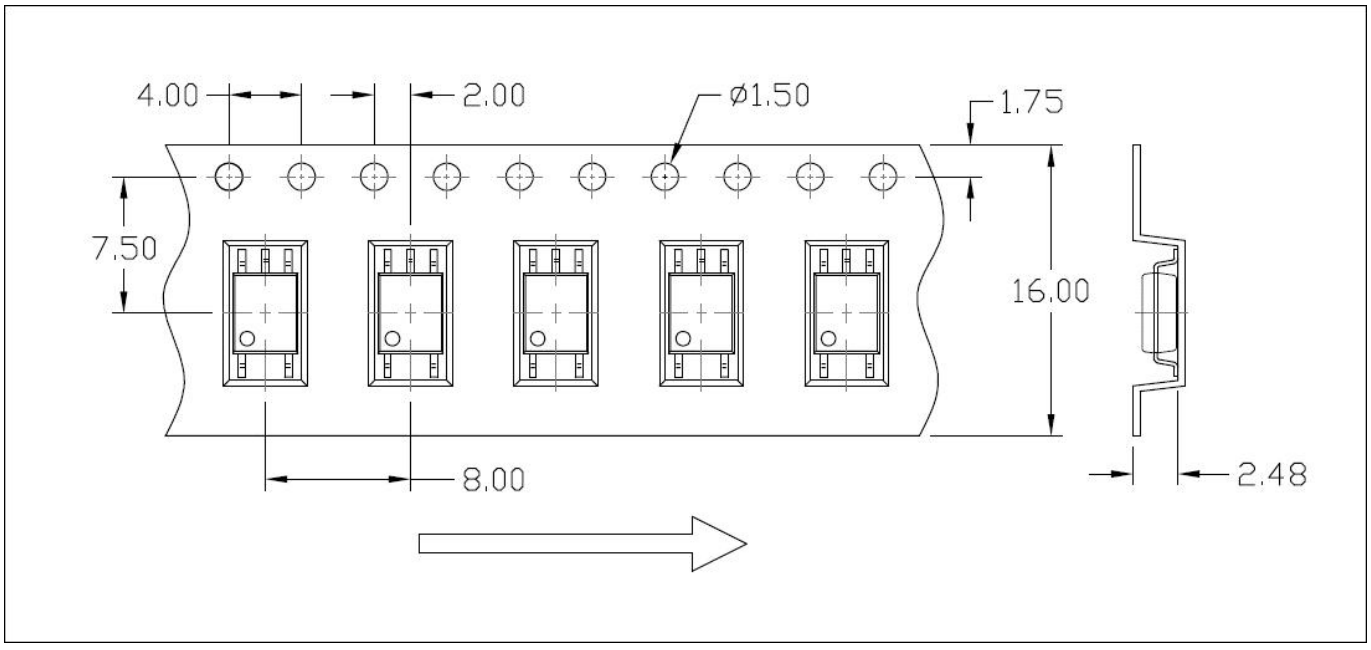


CARRIER TAPE SPECIFICATIONS (Dimensions in mm unless otherwise stated)

Option T1

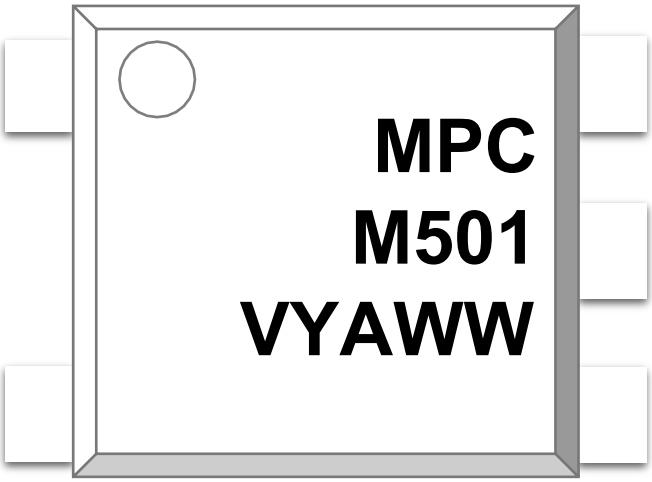


Option T2



ORDERING AND MARKING INFORMATION

MARKING INFORMATION



MPC : Company Abbr.

M501 : Part Number

V : VDE Option

Y : Fiscal Year

A : Manufacturing Code

WW : Work Week

ORDERING INFORMATION

MPCM501(Z)-GV

MPC – Company Abbr.

M501 – Part Number

Z – Tape and Reel Option (T1/T2)

G – Material Option (G: Green, None: Non-Green)

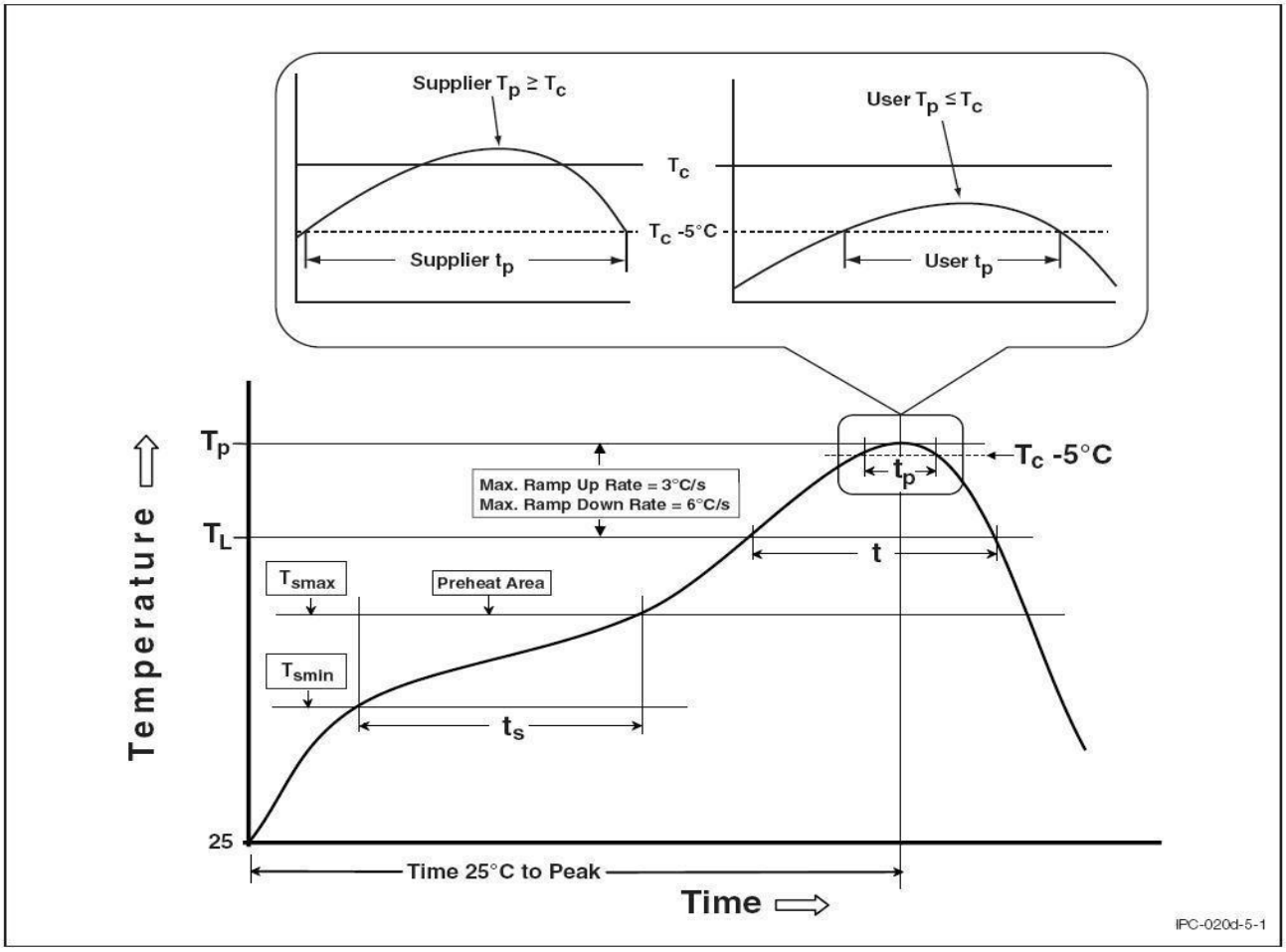
V – VDE Option (V or None)

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. (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.

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