

■ Features

- Performance Specified for Common IPM Applications Over Industrial Temperature Range.
- Short Maximum Propagation Delays
- Minimized Pulse Width Distortion (PWD)
- Very High Common Mode Rejection (CMR)
- Hysteresis
- Truth Table Guaranteed: VCC from 3.0V to 30V
- Positive output type (totem pole output, No Pull-up Resistor Required)
- Industrial temperature range: -40° C to 110° C

■ Description

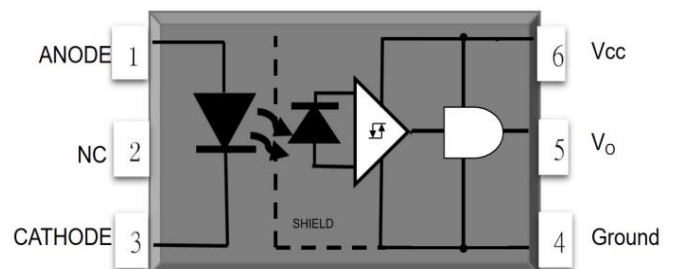
The MP480 fast speed optocouplers contains a GaAsP LED and photo detector with built-in Schmitt trigger to provide logic-compatible waveforms, eliminating the need for additional wave shaping.

The totem pole output eliminates the need for a pull up resistor and allows for direct drive Intelligent Power Module or gate drive. Minimized propagation delay difference between devices make these optocouplers excellent solutions for improving inverter efficiency through reduced switching dead time.

■ Applications

- IGBT/MOSFET gate drive
- IPM Interface Isolation
- Industrial Inverters
- AC/Brushless DC motor drives
- General Digital Isolation

■ Schematic



ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	VALUE	UNIT	Note
INPUT				
Forward Current	IF	25	mA	
Peak Transient Input Current	IF(TRAN)	1.0	A	1
Reverse Voltage	VR	5	V	
Input Power Dissipation	PI	45	mW	
OUTPUT				
Supply Voltage	VCC	35	V	
Output Voltage	VO	VCC	V	
Peak Output Current	IO	50	mA	
Output Power Dissipation	PO	125	mW	
COMMON				
Total Power Dissipation	Ptot	145	mW	
Isolation Voltage	Viso	5000	Vrms	2
Operating Temperature	Topr	-40~110	°C	
Storage Temperature	Tstg	-55~125	°C	
Soldering Temperature	Tsol	260	°C	3

Note 1. $\leq 1\mu\text{s}$ P.W, 300pps

Note 2. AC For 1 Minute, R.H. = 40 ~ 60%

Note 3. For 10 seconds

TRUTH TABLE

LED	VO
On	High
Off	Low

RECOMMENDED OPERATION CONDITIONS

PARAMETER	SYMBOL	MIN	MAX	UNIT
Operating Temperature	TA	-40	105	°C
Supply Voltage	VCC	3.0	30	V
Input Current (ON)	IF(ON)	7.0	16	mA
Input Voltage (OFF)	VF(OFF)	0	0.8	V

ELECTRICAL OPTICAL CHARACTERISTICS (VCC=20V, VEE=GND, TA=25°C unless specified otherwise)

PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT	TEST CONDITION	NOTE
INPUT CHARACTERISTICS							
Forward Voltage	VF	1.2	1.3	1.9	V	IF=10mA	
Reverse Current	IR	-	-	10	μA	VR=5V	
Input Reverse Voltage	BVR	5	-	-	V	IR=10μA	
Input Threshold Current	IFLH	-	3.0	5.0	mA	IO= 0mA, VO> 5V	
Input Threshold Voltage	VFHL	0.8	1.3	-	V	IO= 0mA, VO< 5V	
Input Capacitance	Cin	-	60	-	pF	VF=0, f=1MHz	
OUTPUT CHARACTERISTICS							
High Level Supply Current	ICCH	-	0.9	3.0	mA	VCC=5.5V, IF=10mA, IO=0mA	
		-	1.1	3.0	mA	VCC=20V, IF=10mA, IO=0mA	
Low Level Supply Current	ICCL	-	1.0	3.0	mA	VCC=5.5V, VF=0V, IO=0mA	
		-	1.2	3.0	mA	VCC=20V, VF=0V, IO=0mA	
High Level Output Voltage	VOH	VCC-0.3	VCC-0.05	-	V	IF= 10mA, IO= -2.6mA	
Low Level Output Voltage	VOL	-	0.09	0.5	V	IF= 0mA, IO= 6.4mA	
High Level Output Current	IOSH	-	-170	-25	mA	VCC=5.5V, IF=10mA	
Low Level Output Current	IOSL	25	200	-	mA	VO= VCC=5.5V, VF=0V	
Isolation Resistance	Riso	10 ⁹	-	-	Ω	DC500V, 40 ~ 60% R.H.	



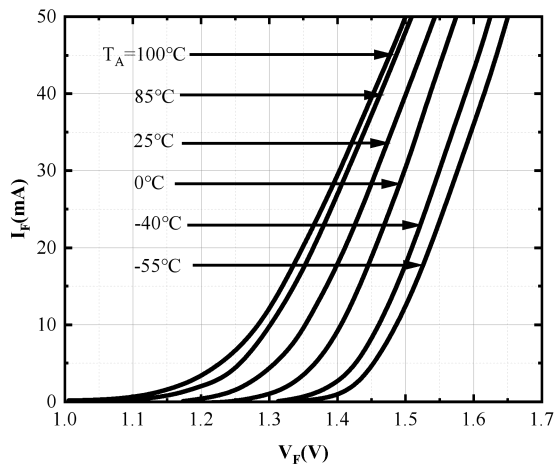
MP480 Series

LSOP6, IPM Photo Coupler

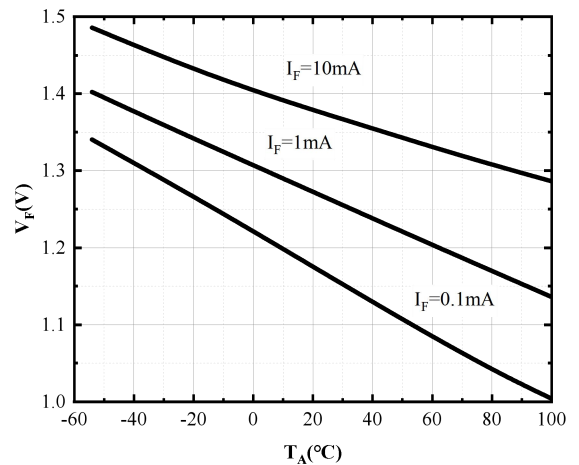
ELECTRICAL OPTICAL CHARACTERISTICS (VCC=20V, VEE=GND, TA=25°C unless specified otherwise)

PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT	TEST CONDITION	NOTE
SWITCHING CHARACTERISTICS							
Propagation Delay Time to Output Low Level	TPHL	-	100	200	ns	IF= 10mA, CL= 15pF, Rg= 5KΩ, f= 100kHz, Duty = 10%	
Propagation Delay Time to Output High Level	TPLH	-	85	200			
Pulse Width Distortion	PWD	-	-	250			
Propagation Delay Difference Between Any Two Parts	PDD	-100	-	100			
Rise Time	tr	-	16	-			
Fall Time	tf	-	6	-			
Common Mode Transient Immunity at Logic High	CMH	10	-	-	kV/μs	IF=10mA, VCC= 5V, VCM= 1KV	
Common Mode Transient Immunity at Logic Low	CML	10	-	-	kV/μs	VF=0V, VCC= 5V, VCM= 1KV	

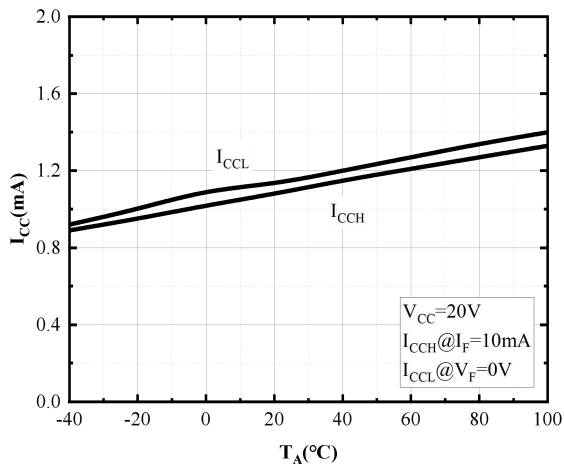
CHARACTERISTIC CURVES



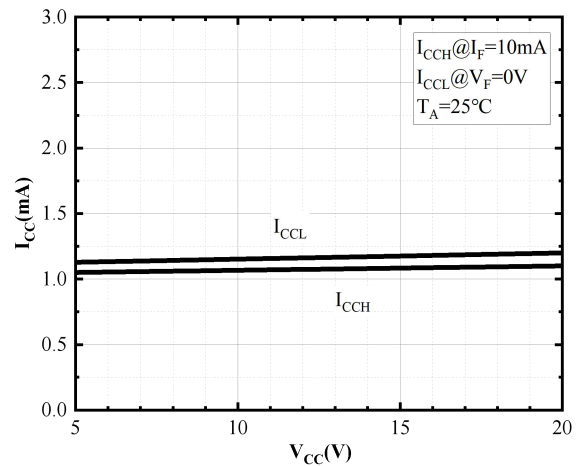
**Fig.1 Forward Current
vs. Forward Voltage**



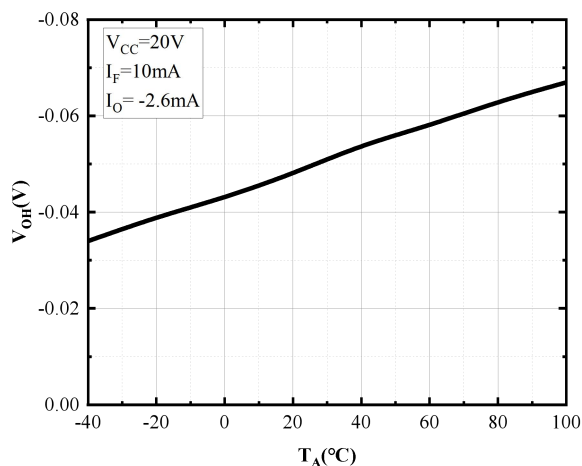
**Fig.2 Forward Voltage
vs. Ambient Temperature**



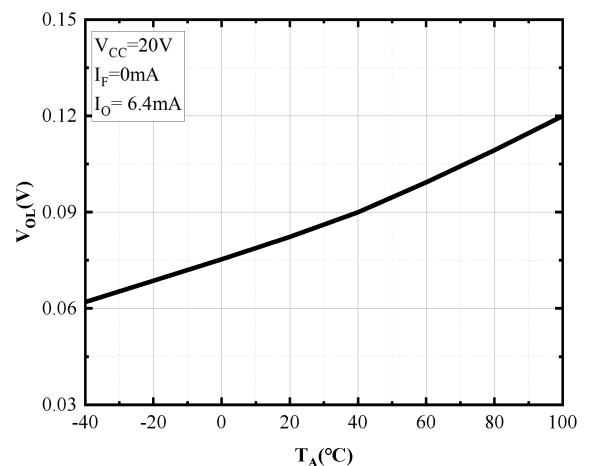
**Fig.3 Supply Current
vs. Ambient Temperature**



**Fig.4 Supply Current
vs. Supply Voltage**

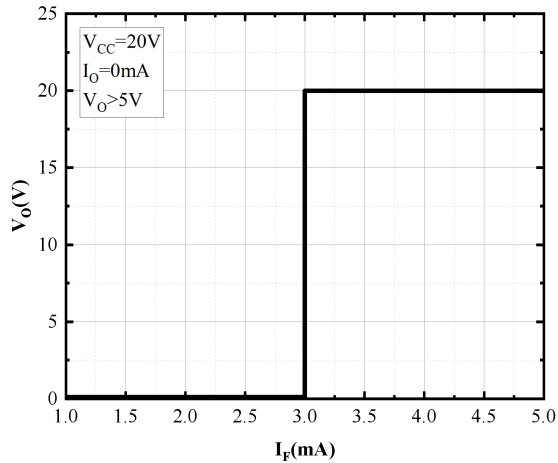


**Fig.5 High Level Output Voltage
vs. Ambient Temperature**

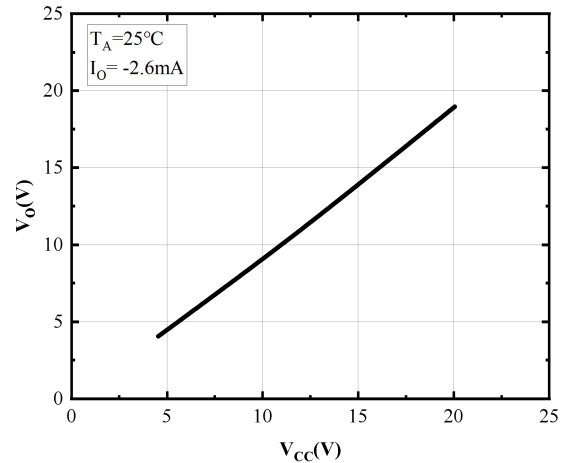


**Fig.6 Low Level Output Voltage
vs. Ambient Temperature**

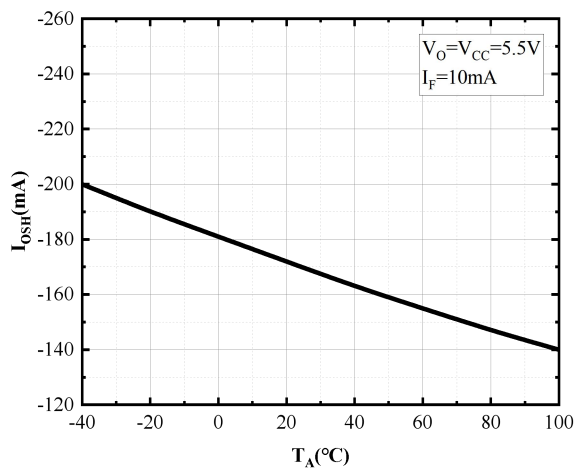
CHARACTERISTIC CURVES



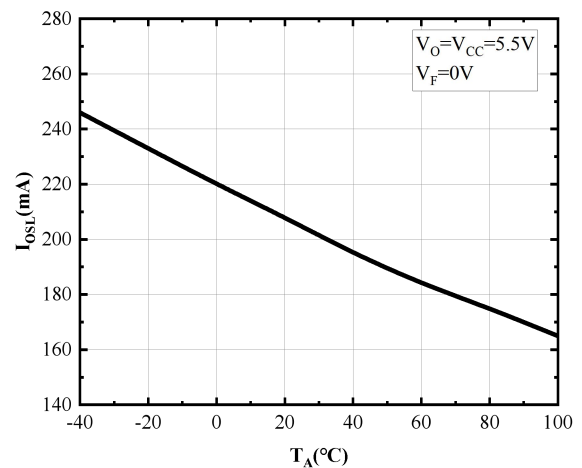
**Fig.7 Output Voltage
vs. Forward Current**



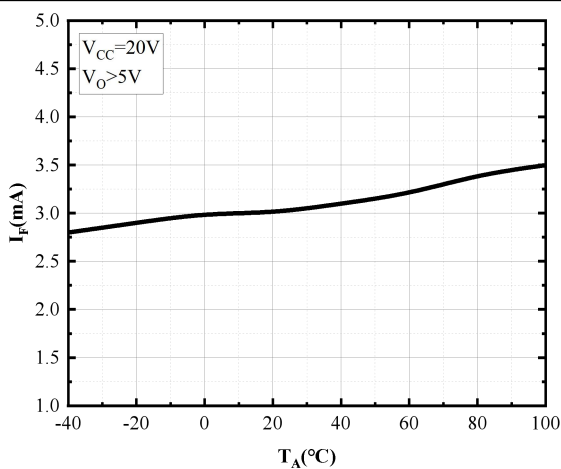
**Fig.8 Output Voltage
vs. Supply Voltage**



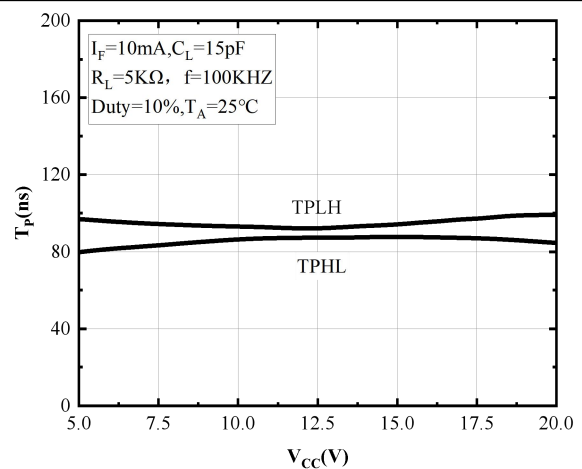
**Fig.9 High Level Output Current
vs. Ambient Temperature**



**Fig.10 Low Level Output Current
vs. Ambient Temperature**

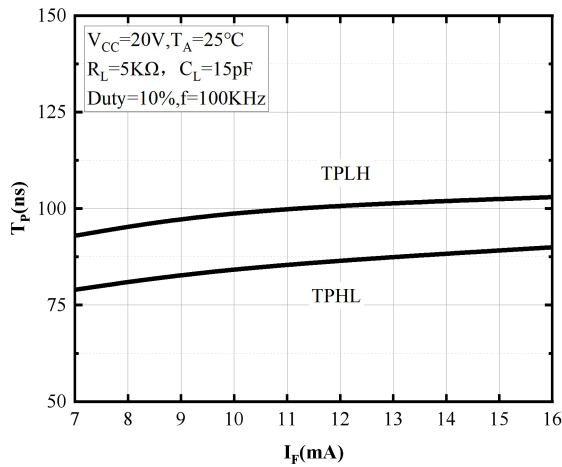


**Fig.11 Forward Current
vs. Ambient Temperature**

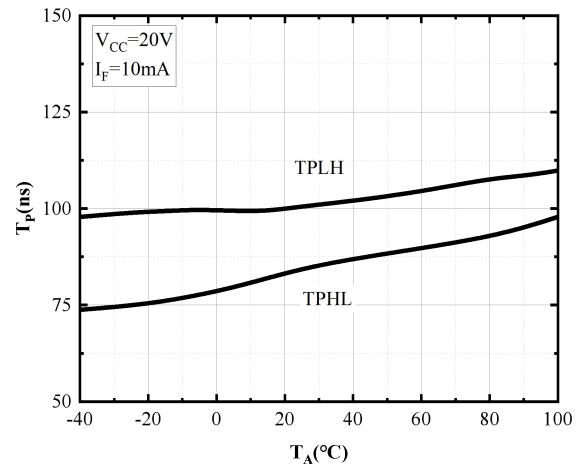


**Fig.12 Propagation Delay
vs. Supply Voltage**

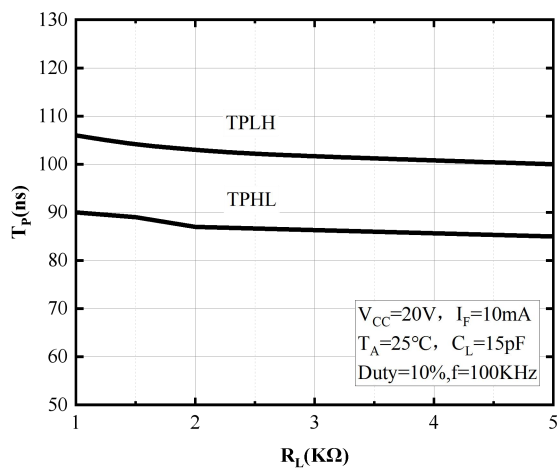
CHARACTERISTIC CURVES



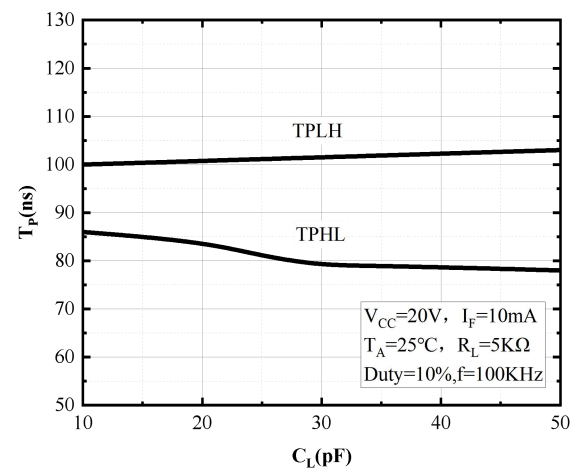
**Fig.13 Propagation Delay
vs. Forward Current**



**Fig.14 Propagation Delay
vs. Ambient Temperature**



**Fig.15 Propagation Delay
vs. Load Resistance**



**Fig.16 Propagation Delay
vs. Load Capacitance**

TEST CIRCUITS

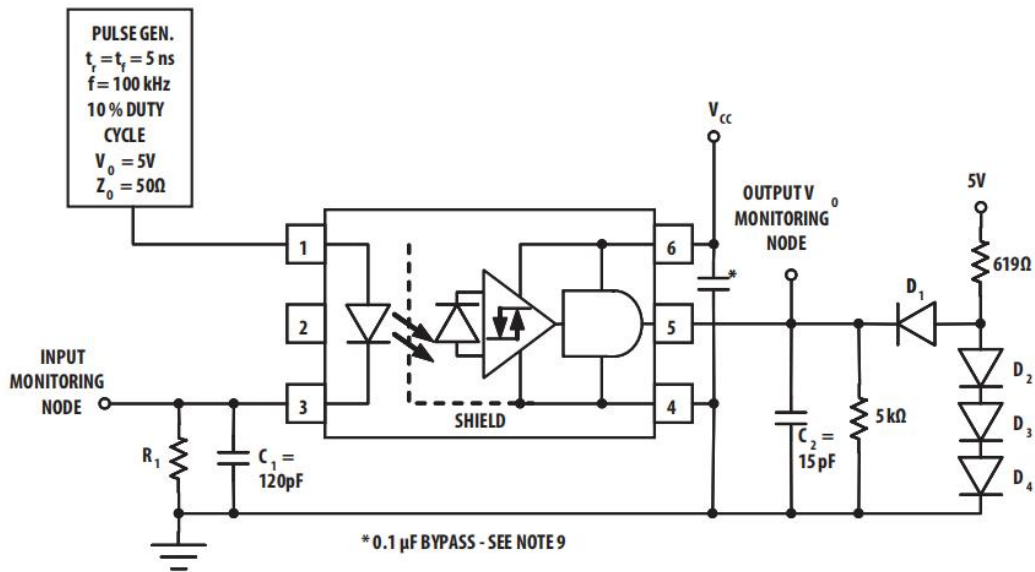


Fig.17 Test Circuits for TPHL, TPLH, t_r , t_f

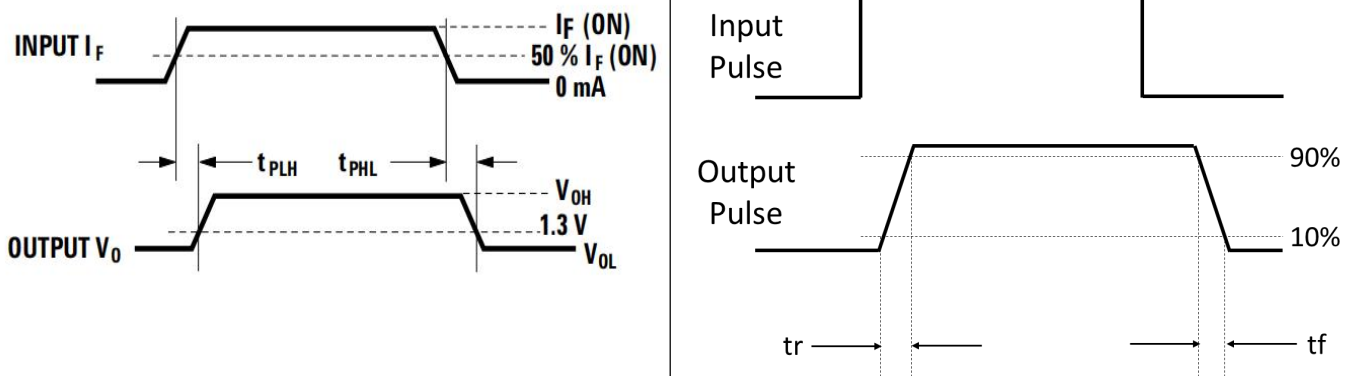


Fig.18 Wave forms of TPHL, TPLH, t_r , t_f

TEST CIRCUITS

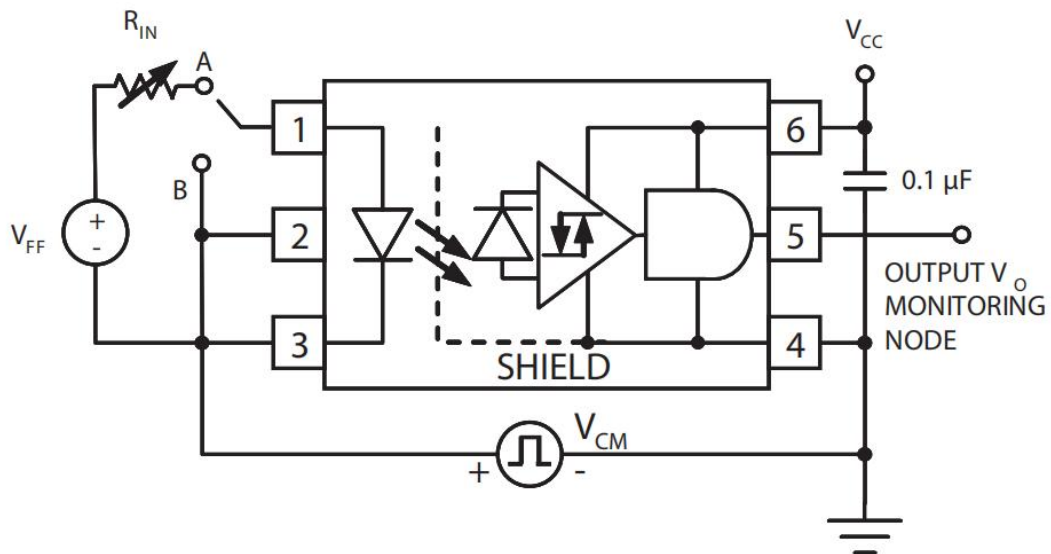


Fig.19 Test Circuits for Common Mode Transient Immunity

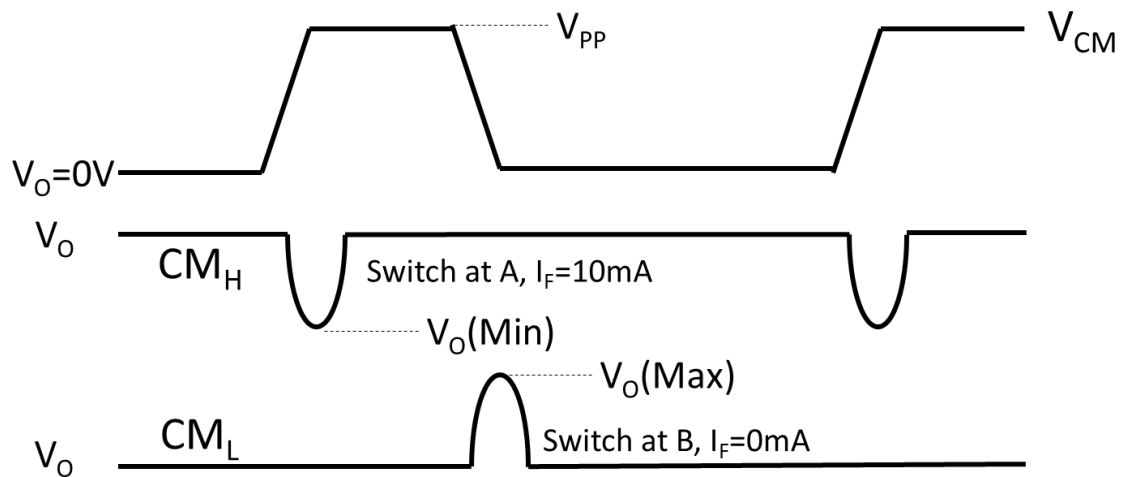
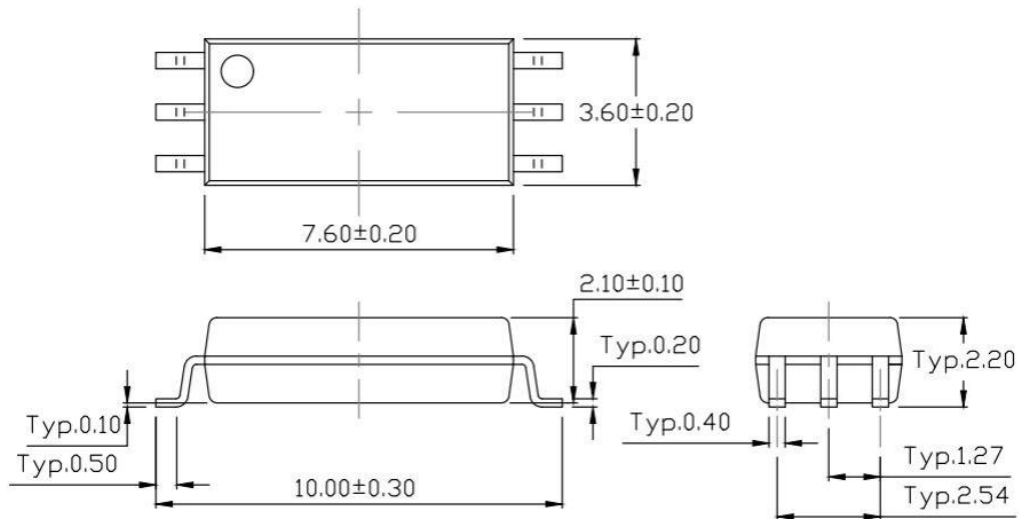


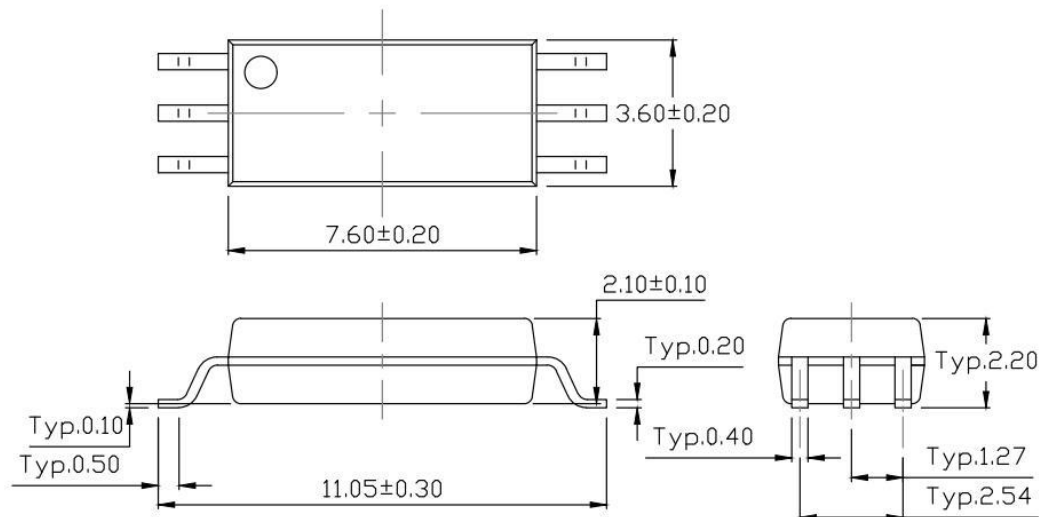
Fig.20 Waveforms of Common Mode Transient Immunity

PACKAGE DIMENSIONS (Dimensions in mm unless otherwise stated)

Standard P Type

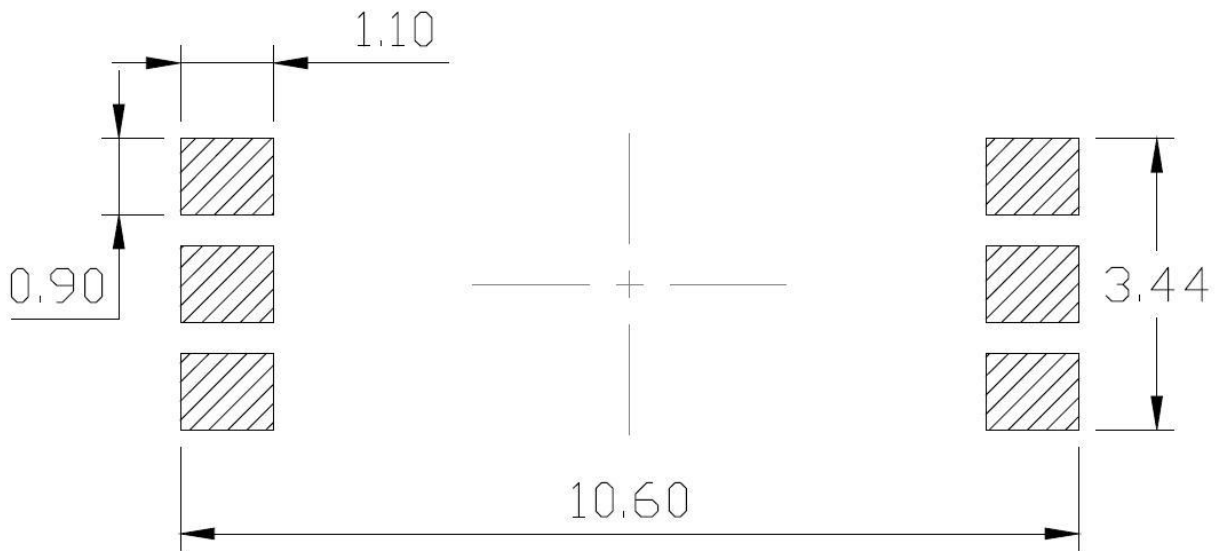


Standard W Type

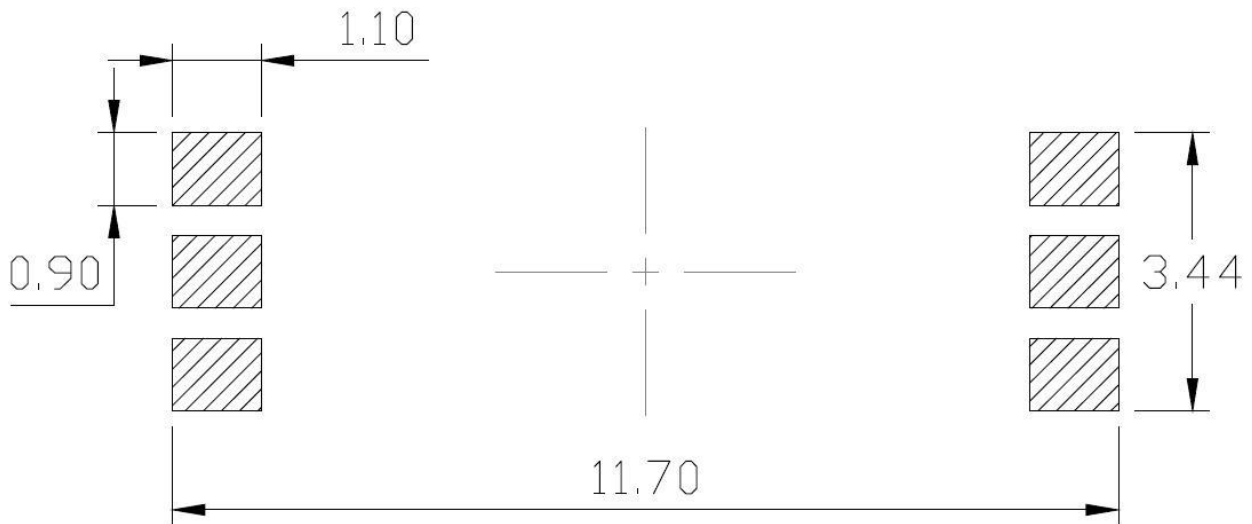


Recommended Solder Mask (Dimensions in mm unless otherwise stated)

Standard P Type

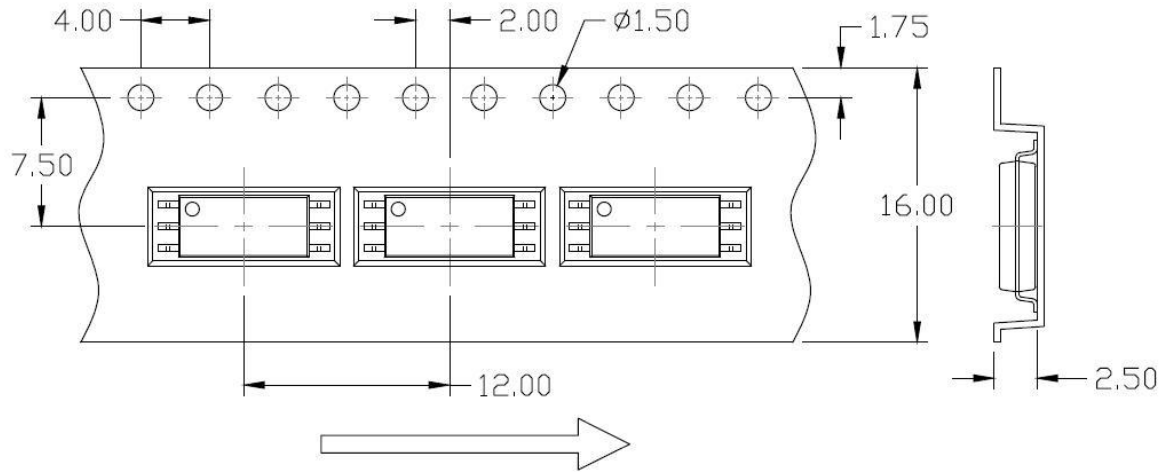


Standard W Type

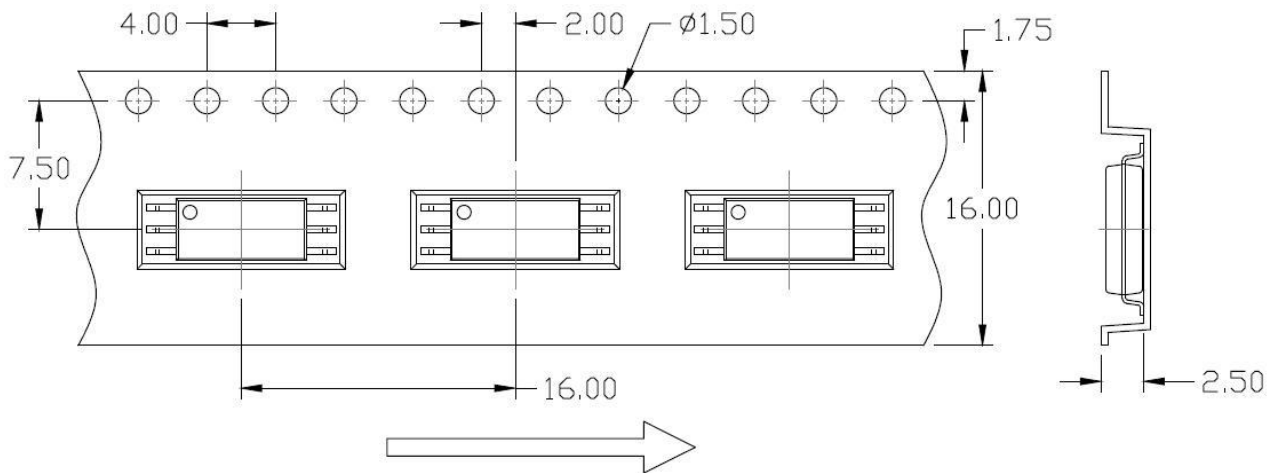


CARRIER TAPE SPECIFICATIONS (Dimensions in mm unless otherwise stated)

Option P(T3)

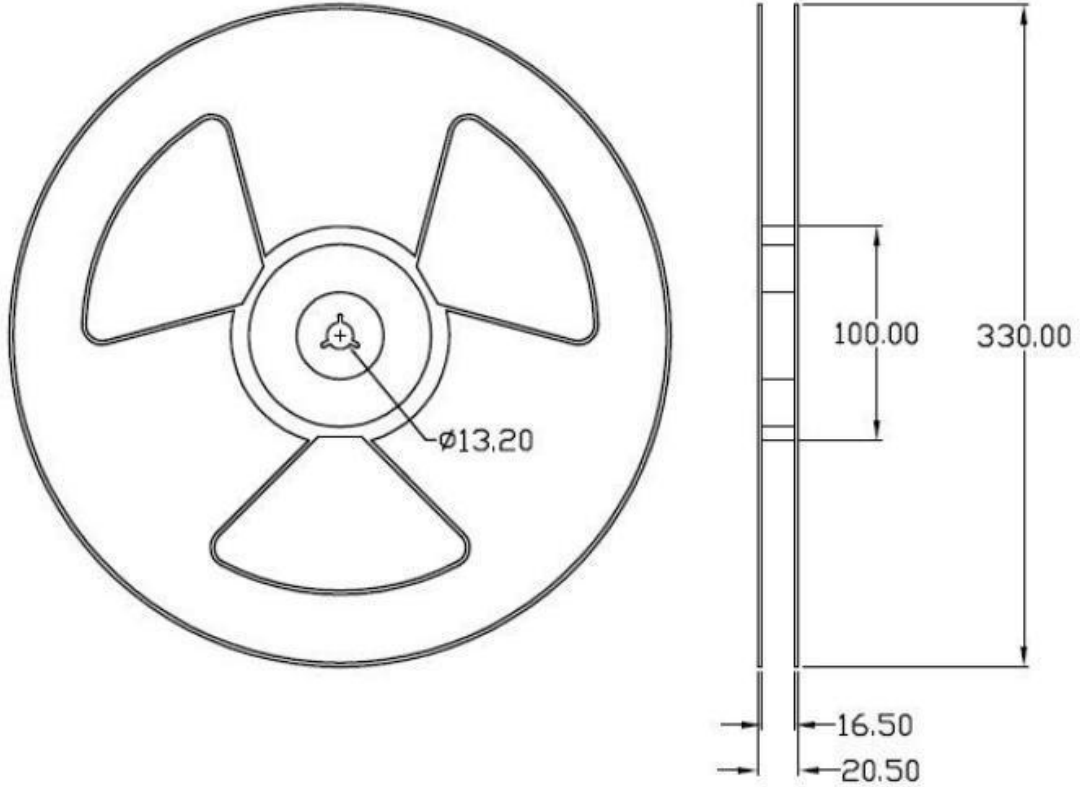


Option W(T3)



REEL SPECIFICATIONS (Dimensions in mm unless otherwise stated)

Option



ORDERING AND MARKING INFORMATION

MARKING INFORMATION

	MP	: Company Abbr.
	480	: Part Number
	V	: VDE Option (V or None)
	N	:Customer Specified Option(1~9 or None)
	Y	: Fiscal Year
	A	: Manufacturing Code
	WW	: Work Week

ORDERING INFORMATION

MP480(Y)(Z)-GV(XN)

MP -Company Abbr.

480 -Part Number.

(Y) -Lead Form Option (P/W).

(Z) -Tape and Reel Option (T3).

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

V -VDE Option (V or None).

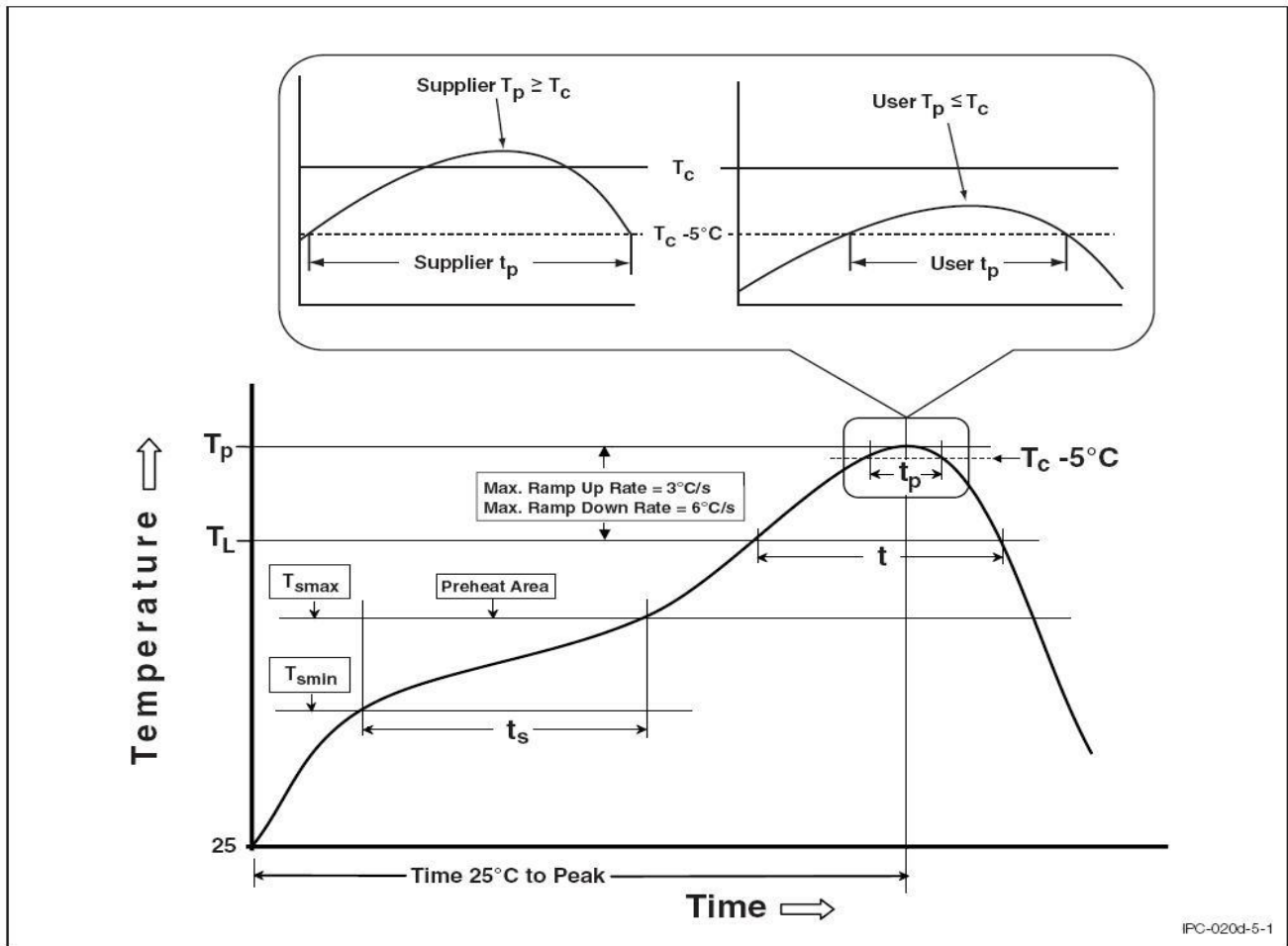
(XN)-Customer Specified Option (X: A~Z or None; N:1~9 or None)

PACKING QUANTITY

Option	Quantity	Quantity – Inner box	Quantity – Outer box
P(T3)	1500 Units/Reel	3 Reels/Inner box	5 Inner box/Outer box = 22.5k Units
W(T3)	1500 Units/Reel	3 Reels/Inner box	5 Inner box/Outer box = 22.5k Units

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

- 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)
0.1	2024-05-08	Datasheet Complete
1.0	2024-07-18	Upgrade Datasheet