

■ 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
- Inverted output type (totem pole output, No Pull-up Resistor Required)
- Industrial temperature range: -40° C to 110° C

■ Description

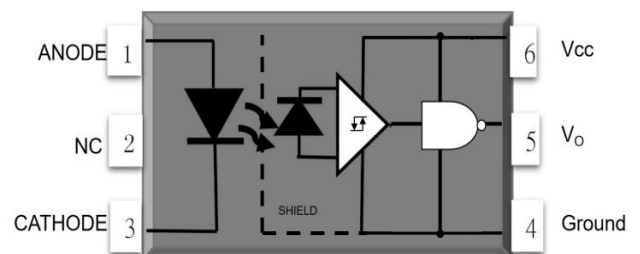
The high-speed MP481 optocoupler contains a GaAsP LED, a photo detector, and a Schmitt trigger that eliminates the requirement for external waveform conditioning circuits.

The totem pole output eliminates the requirement for a pull-up resistor. An Intelligent Power Module, Power MOSFET, or IGBT can be driven directly. Propagation delay difference between devices has been minimized to maximize.

■ 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	210	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	Low
Off	High

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	-	2.7	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	-	1.0	3.0	mA	VCC=5.5V, VF= 0V, IO= 0mA	
		-	1.2	3.0	mA	VCC=20V, VF= 0V, IO= 0mA	
Low Level Supply Current	ICCL	-	0.9	3.0	mA	VCC=5.5V, IF = 10mA, IO=0mA	
		-	1.1	3.0	mA	VCC=20V, IF =10mA, IO=0mA	
High Level Output Voltage	VOH	VCC-0.3	VCC-0.12	-	V	VF= 0V, IO= -6.5mA	
Low Level Output Voltage	VOL	-	0.09	0.3	V	IF= 10mA, IO= 6.5mA	
High Level Output Current	IOSH	-	-165	-25	mA	VCC=5.5V, VF=0V	1
		-	-190	-50	mA	VCC=20V, VF=0V	2
Low Level Output Current	IOSL	25	200	-	mA	VO= VCC=5.5V, IF=10mA	1
		50	190	-	mA	VO= VCC=20V, IF=10mA	2
Isolation Resistance	Riso	10 ⁹	-	-	Ω	DC500V, 40 ~ 60% R.H.	

Note1. Maximum pulse width = 50μs.

Note2. Maximum pulse width = 10μs.



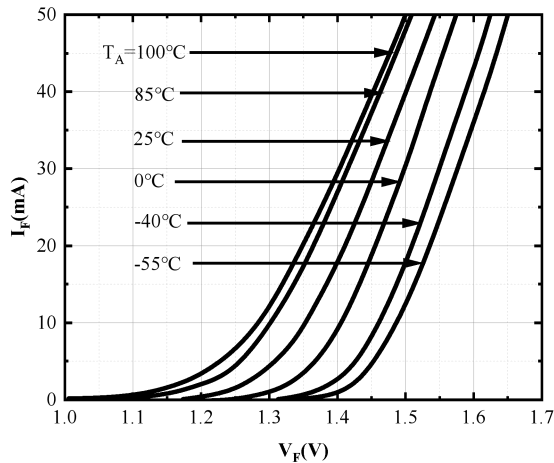
MP481 Series

LSOP6, IPM Photo Coupler

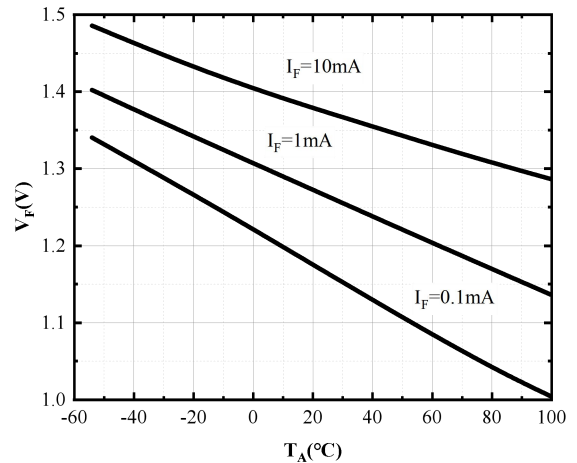
ELECTRICAL OPTICAL CHARACTERISTICS (VCC=20V, VEE=GND, TA=25°C unless specified otherwise)

PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT	TEST CONDITION	NOTE
SWITCHING CHARACTERISTICS							
Propagation Delay Time to Output Low Level	TPHL	-	85	200	ns	IF= 10mA, CL= 15pF, Rg= 5KΩ, f= 100kHz, Duty = 10%	
Propagation Delay Time to Output High Level	TPLH	-	100	200			
Pulse Width Distortion	PWD	-	15	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	VF=0V,VCC=5V, TA=25°C, VCM= 1KV	
Common Mode Transient Immunity at Logic Low	CML	10	-	-	kV/ μ s	IF=10mA,VCC= 5V, TA= 25°C, VCM= 1KV	

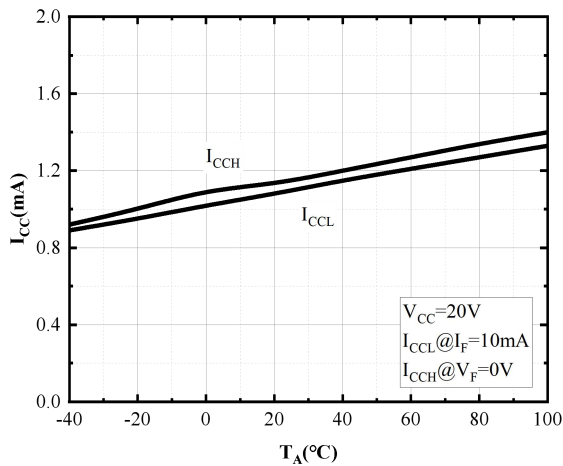
CHARACTERISTIC CURVES



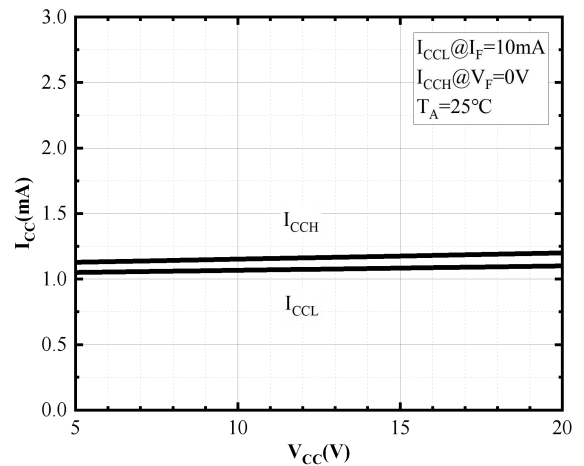
**Fig.1 Forward Current
vs. Forward Voltage**



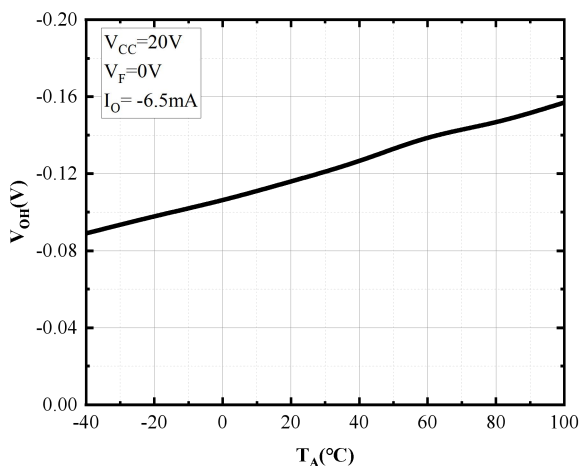
**Fig.2 Forward Voltage
vs. Ambient Temperature**



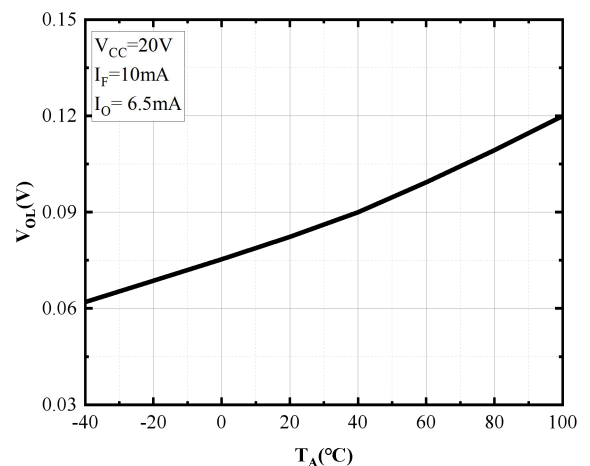
**Fig.3 Supply Current
vs. Ambient Temperature**



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

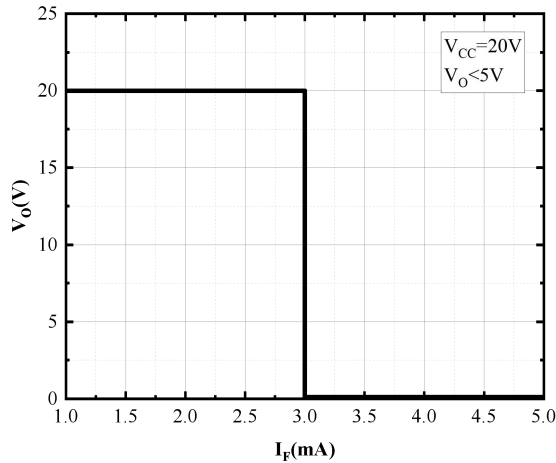


**Fig.5 High Level Output Voltage
vs. Ambient Temperature**

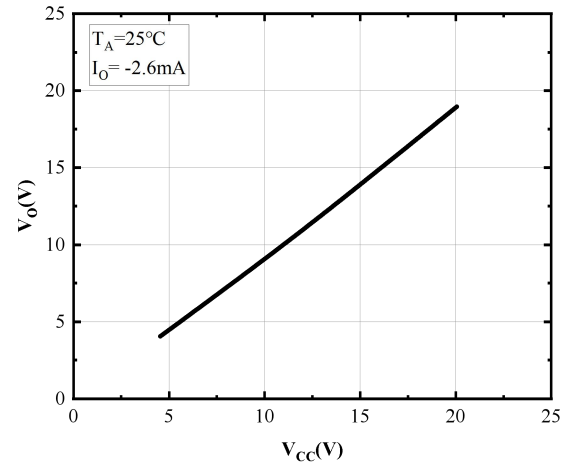


**Fig.6 Low Level Output Voltage
vs. Ambient Temperature**

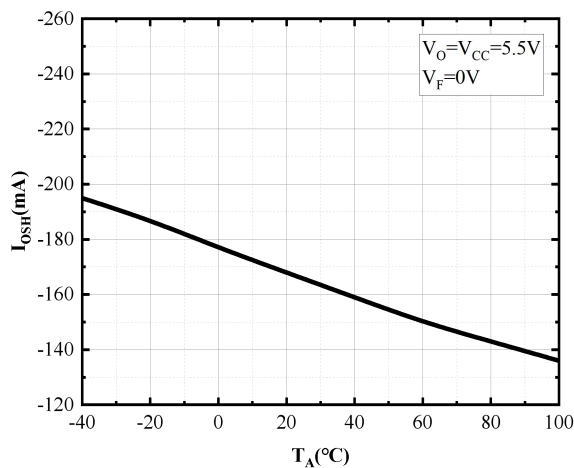
CHARACTERISTIC CURVES



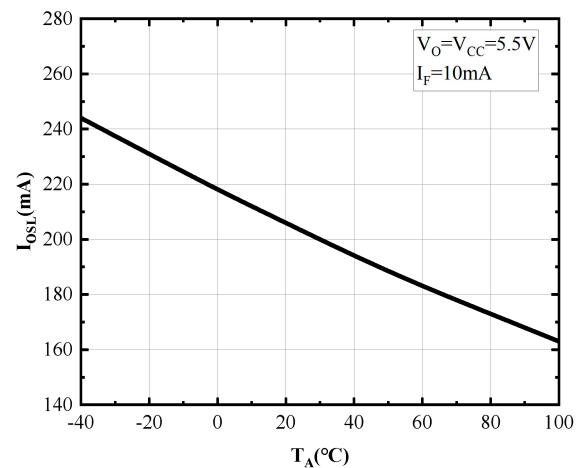
**Fig.7 Output Voltage
vs. Forward Current**



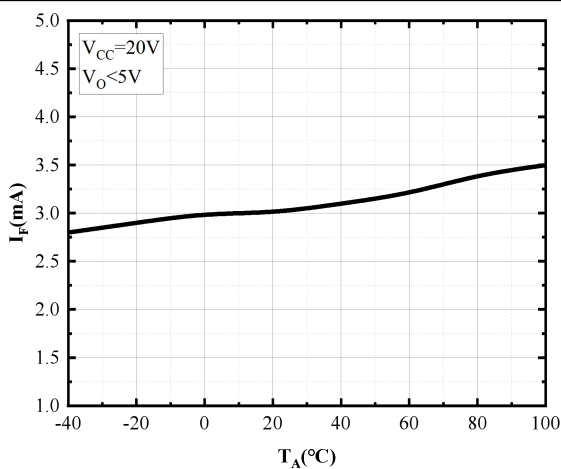
**Fig.8 Output Voltage
vs. Supply Voltage**



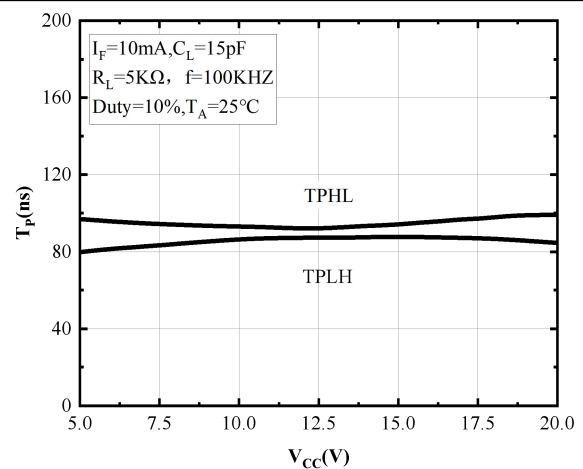
**Fig.9 High Level Output Current
vs. Ambient Temperature**



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

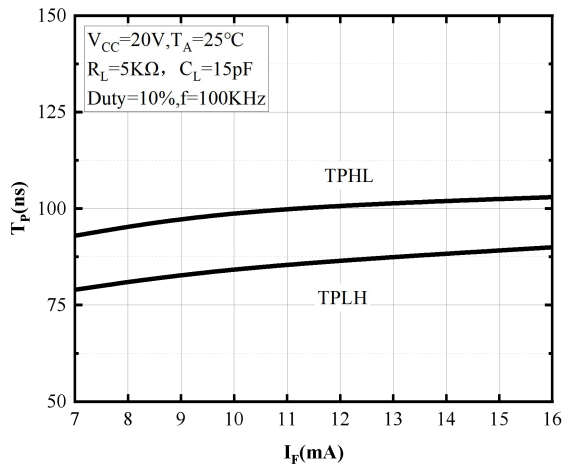


**Fig.11 Forward Current
vs. Ambient Temperature**

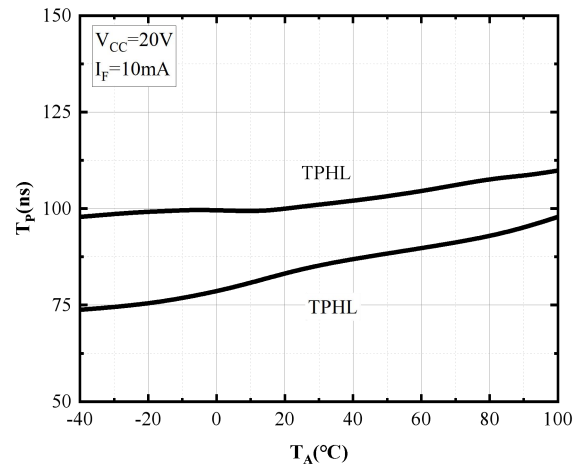


**Fig.12 Propagation Delay
vs. Supply Voltage**

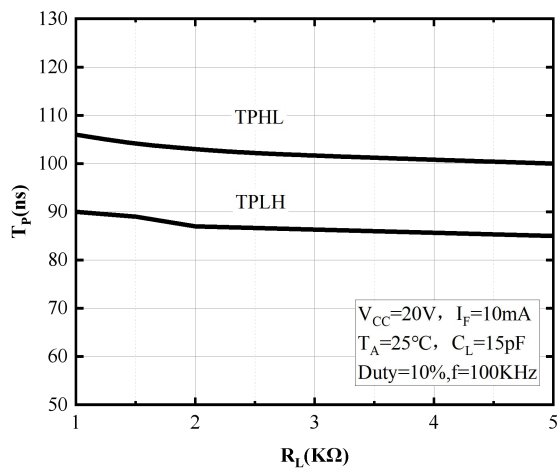
CHARACTERISTIC CURVES



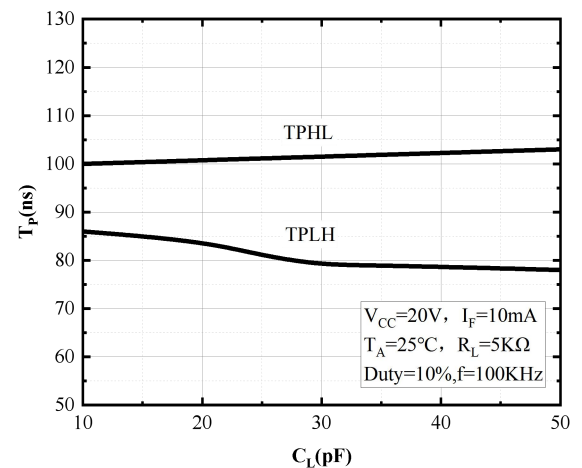
**Fig.13 Propagation Delay
vs. Forward Current**



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



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



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

TEST CIRCUITS

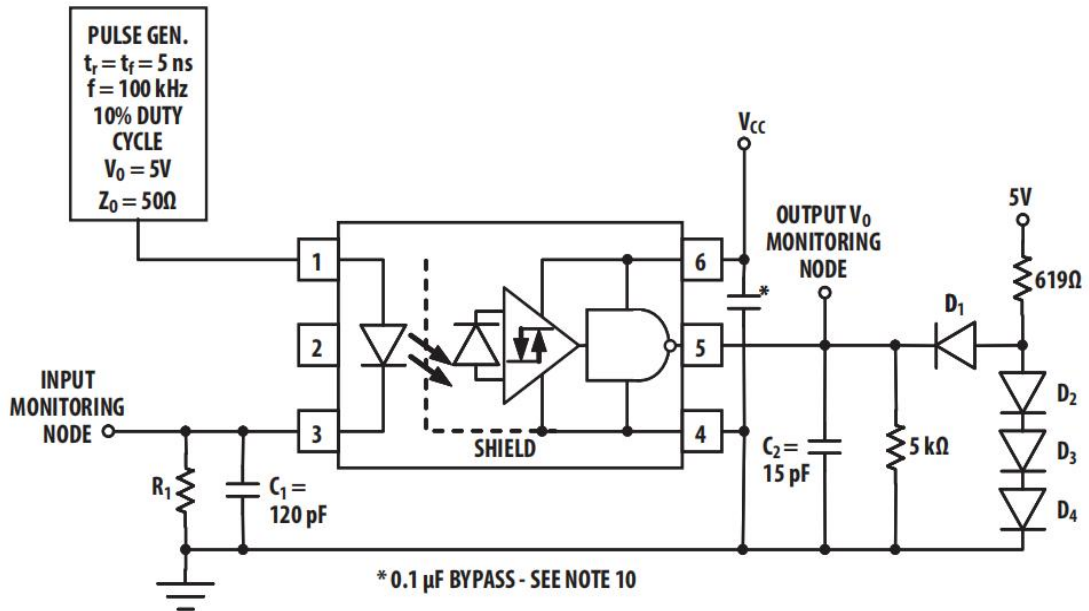


Fig.17 Test Circuits for TPHL, TPLH, t_r , t_f

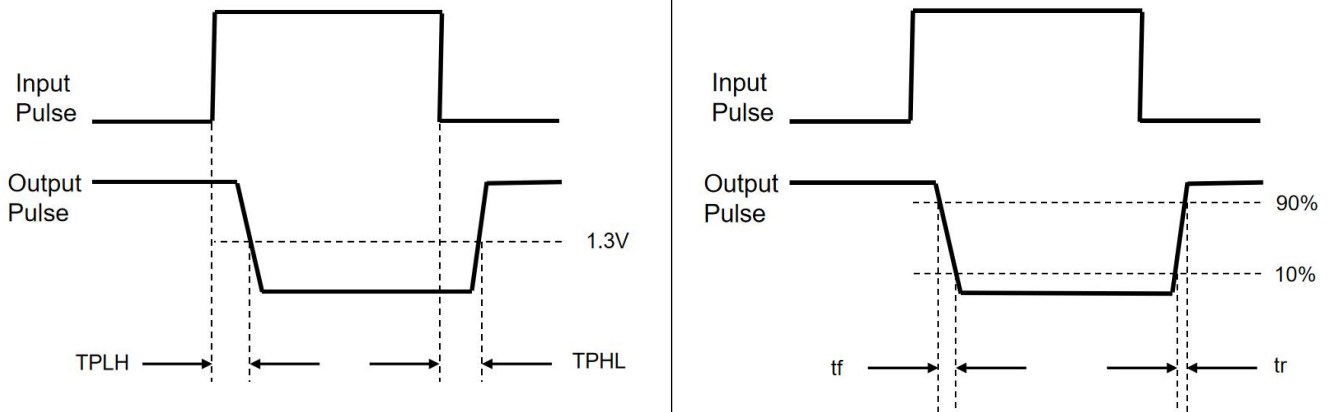


Fig.18 Wave forms of TPHL, TPLH, t_r , t_f

TEST CIRCUITS

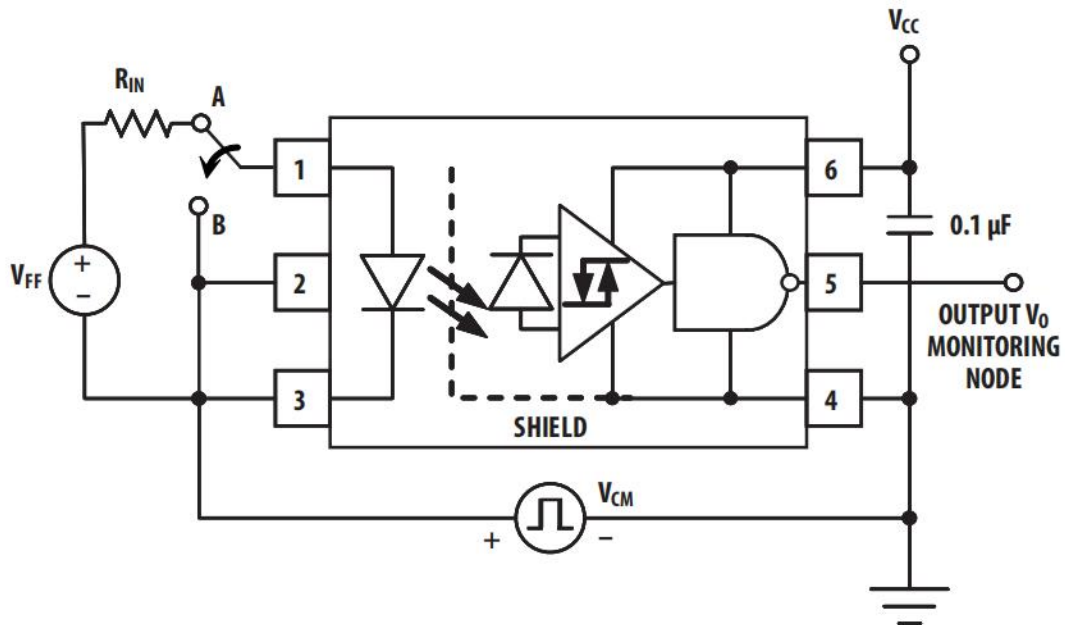


Fig.19 Test Circuits for Common Mode Transient Immunity

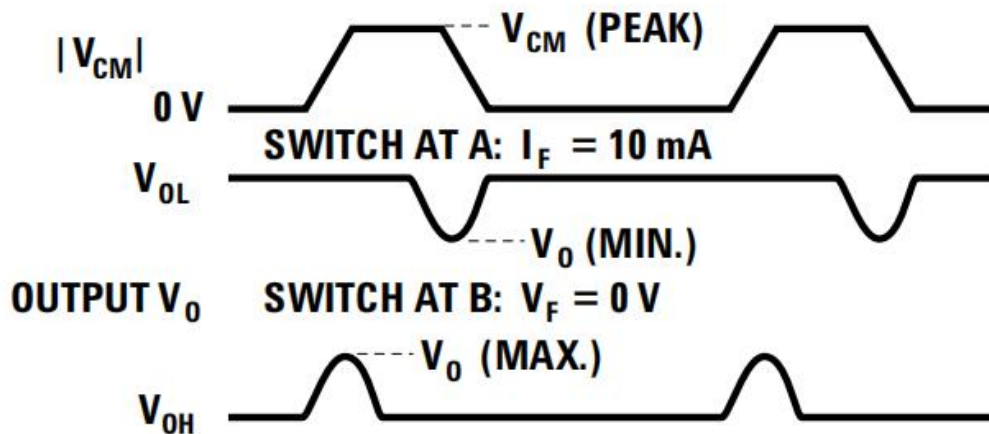
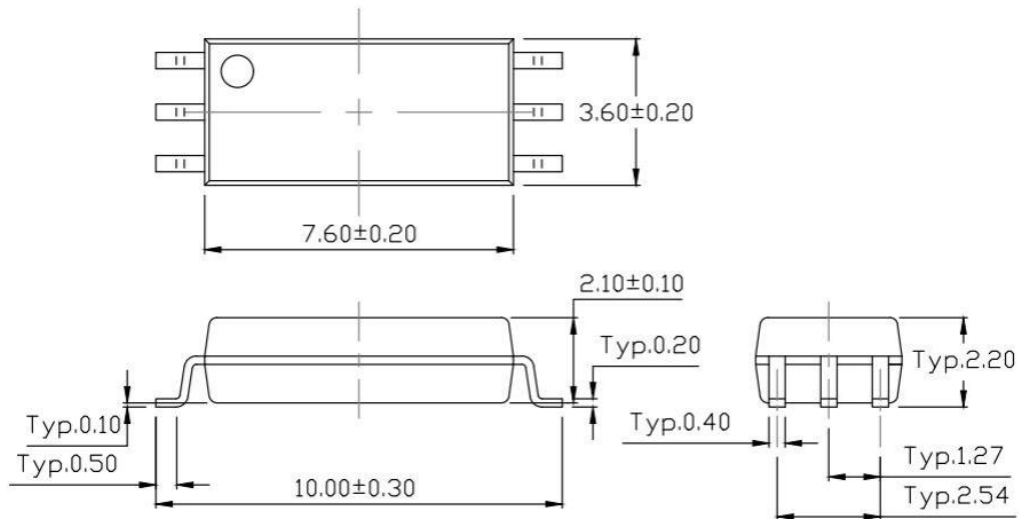


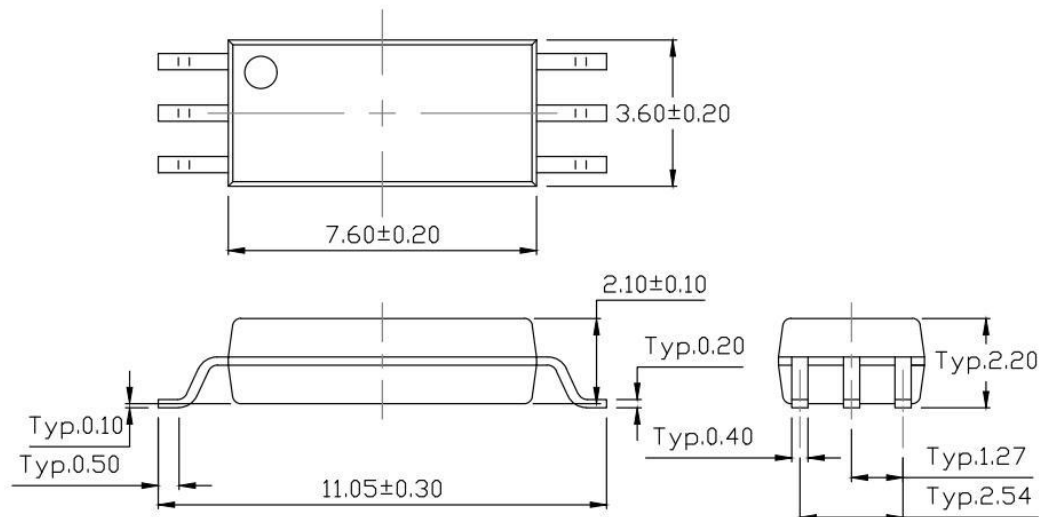
Fig.20 Waveforms of Common Mode Transient Immunity

PACKAGE DIMENSIONS (Dimensions in mm unless otherwise stated)

Standard P Type

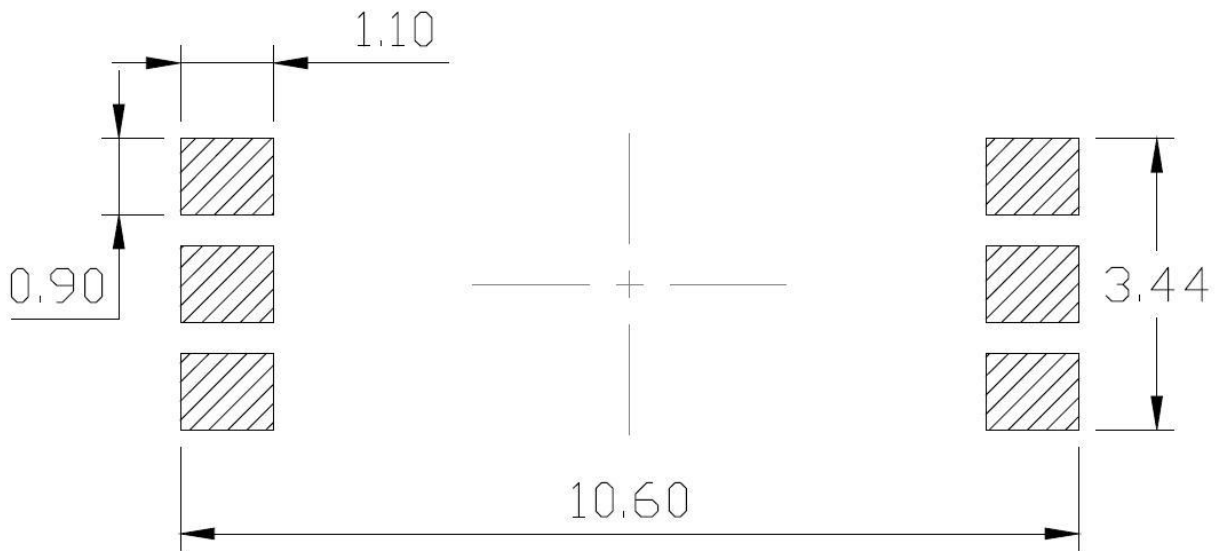


Standard W Type

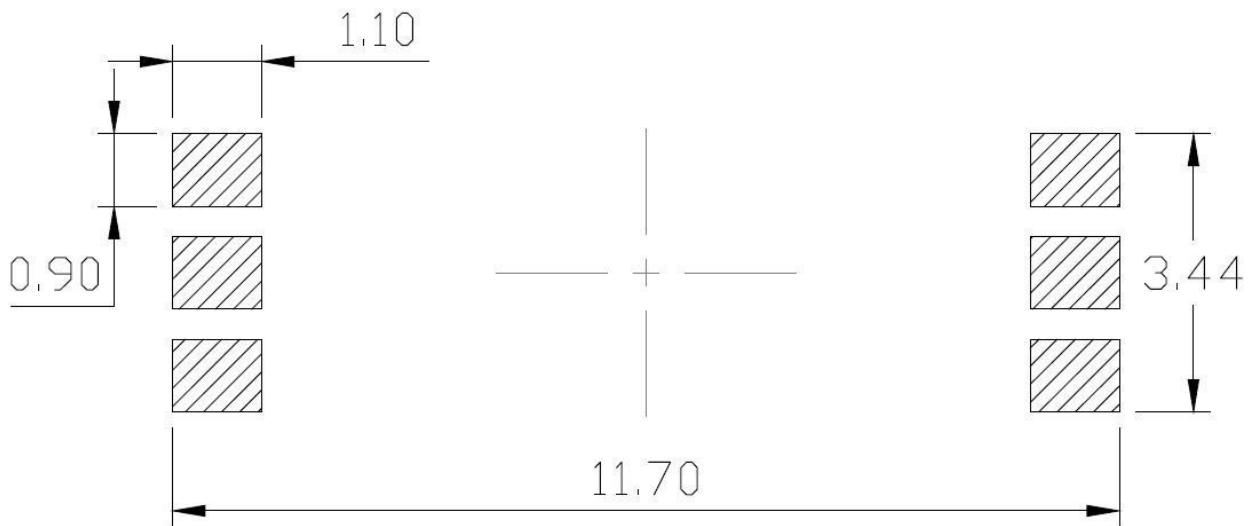


Recommended Solder Mask (Dimensions in mm unless otherwise stated)

Standard P Type

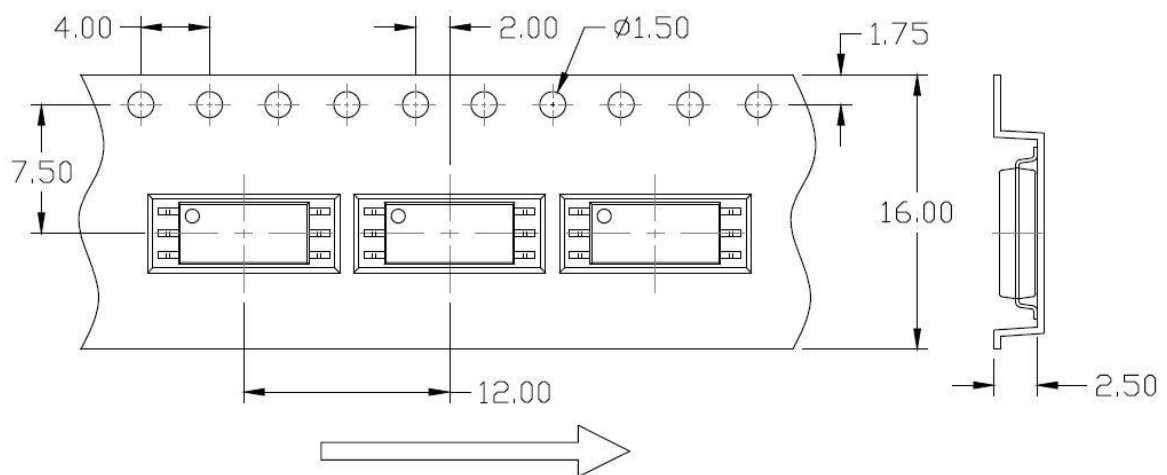


Standard W Type

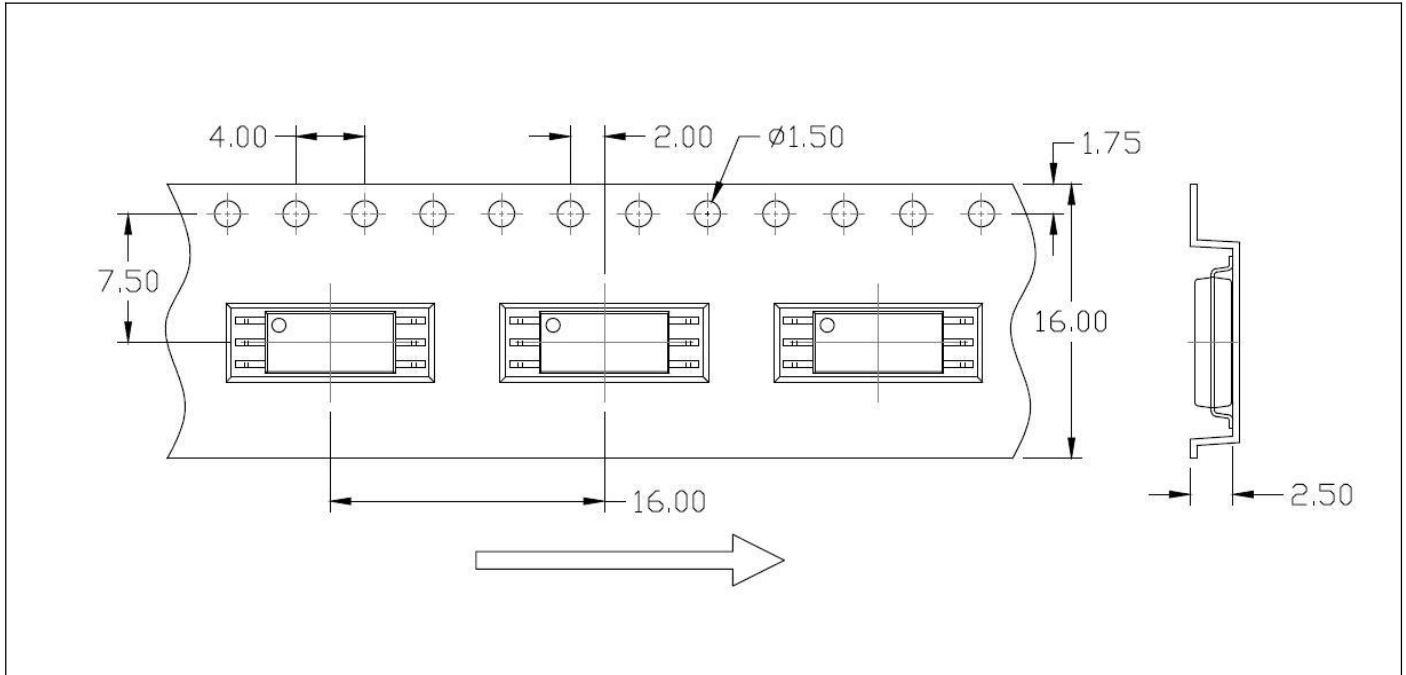


CARRIER TAPE SPECIFICATIONS (Dimensions in mm unless otherwise stated)

Option P(T3)

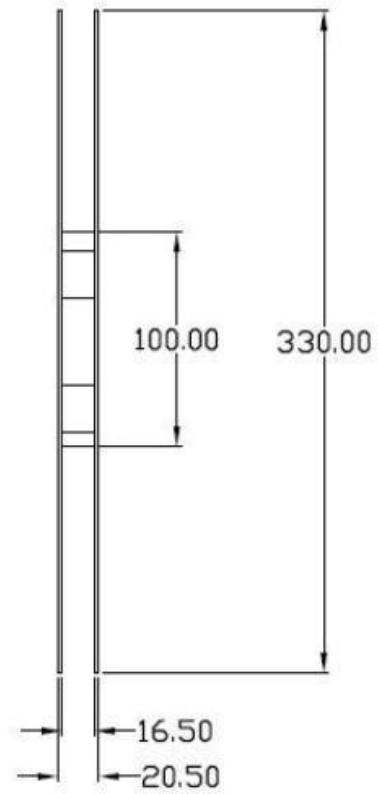
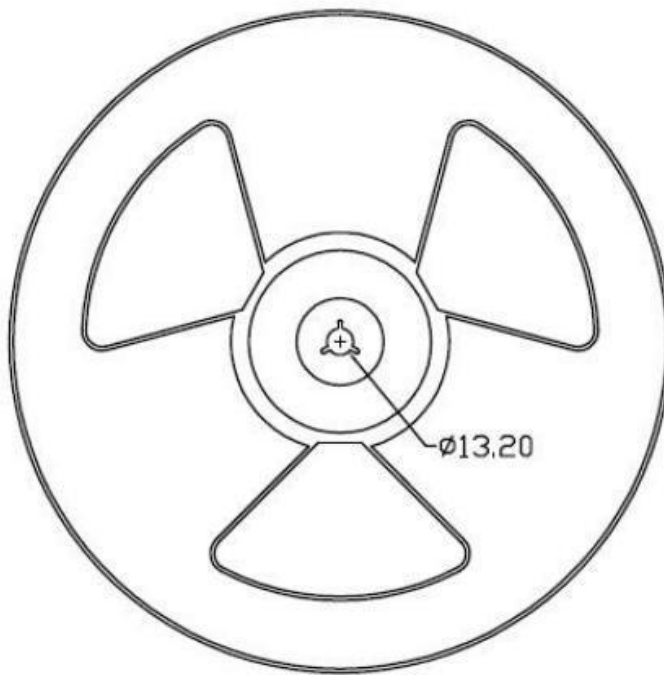


Option W(T3)



REEL SPECIFICATIONS (Dimensions in mm unless otherwise stated)

Option



ORDERING AND MARKING INFORMATION

MARKING INFORMATION



MP	: Company Abbr.
481	: 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

MP481(Y)(Z)-GV(XN)

MP -Company Abbr.

481 -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).

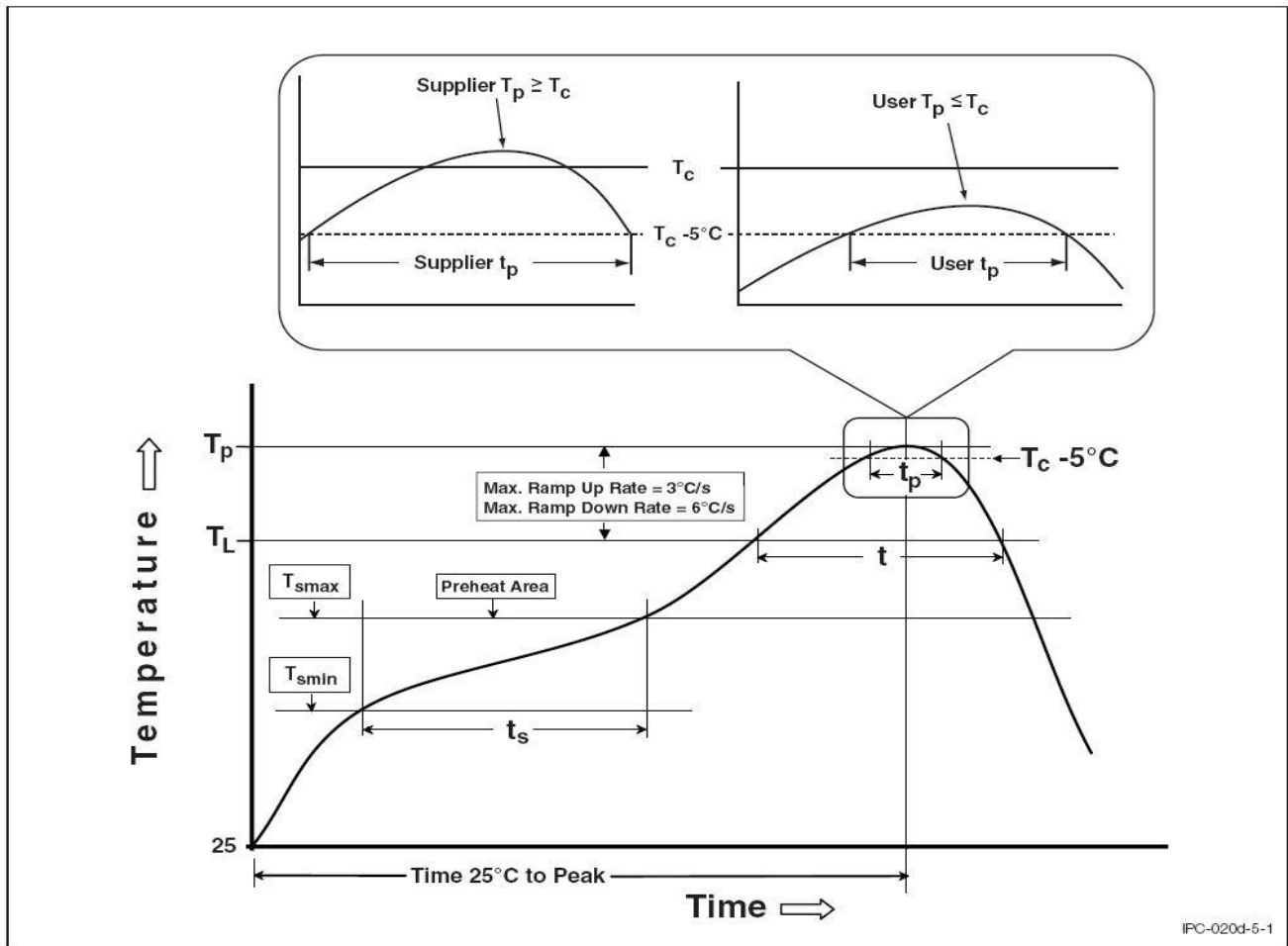
(XN)-Customer Specified Option (X: A~Z or None; N:1~9 or None)

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