

■ Features

- Dual Voltage Operating (3.3/5V)
- Low power consumption
- High speed : 10MBd typ
- 15 kV/ μ s minimum Common Mode Rejection (CMR) at VCM = 1000 V
- LSTTL/TTL compatible
- Guaranteed performance over temperature -40°C ~ +110°C
- Low input current capability : 5mA

■ Applications

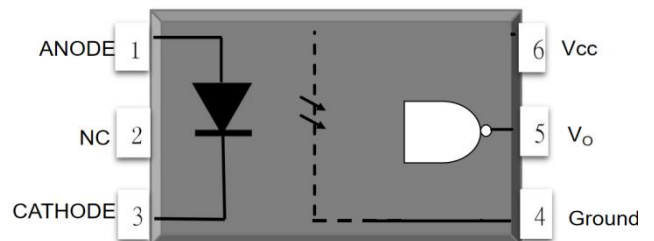
- Isolated line receiver
- Computer-peripheral interfaces
- Microprocessor system interfaces
- Digital isolation for A/D, D/A conversion
- Switching power supply
- Instrument input/output isolation
- Ground loop elimination
- Pulse transformer replacement
- Field buses

■ Description

The MP60L series consists of a high efficient AlGaAs Light Emitting Diode and a high speed optical detector. This design provides excellent AC and DC isolation between the input and output sides of the Optocoupler. The output of the optical detector features an open collector Schottky clamped transistor. The internal shield ensures high common mode transient immunity.

A guaranteed common mode transient immunity is up to 15KV/ μ s at 3.3V. The Optocoupler operational parameters are guaranteed over the temperature range from -40°C ~ +110°C.

■ Schematic





MP60L Series

LSOP6,10Mb/s, High Speed Logic Gate Photo Coupler

ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	VALUE	UNIT	Note
INPUT				
Forward Current	IF	25	mA	
Reverse Voltage	VR	5	V	
Input Power Dissipation	PI	45	mW	
OUTPUT				
Supply Voltage	VCC	7	V	
Output Voltage	VO	7	V	
Peak Output Current	IO	50	mA	
Output Power Dissipation	PO	85	mW	
COMMON				
Total Power Dissipation	Ptot	295	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. Maximum pulse width = 10μs

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	85	°C
Supply Voltage	VCC	2.7	3.6	V
		4.5	5.5	
Input Current (ON)	IF(ON)	5	15	mA
Input Voltage (OFF)	VF(OFF)	-	0.8	V
Output Pull-up Resistor	RL	330	4K	Ω

ELECTRICAL OPTICAL CHARACTERISTICS (VCC=3.3V&5.5V, VEE=GND, TA=25°C unless specified otherwise)

PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT	TEST CONDITION	NOTE
INPUT CHARACTERISTICS							
Forward Voltage	VF	-	1.3	1.8	V	IF=10mA	
Reverse Current	IR	-	-	10	μA	VR=5V	
Input Capacitance	Cin	-	60	-	pF	VF=0, f=1MHz	
OUTPUT CHARACTERISTICS							
High Level Supply Current	ICCH	-	4.4	10	mA	IF=0mA,VO=Open,VCC=3.3V	
		-	7.2	10	mA	IF=0mA,VO=Open,VCC=5.5V	
Low Level Supply Current	ICCL	-	6.4	13	mA	IF=10mA,VO=Open,VCC=3.3V	
		-	9.4	13	mA	IF=10mA,VO=Open,VCC=5.5V	
TRANSFER CHARACTERISTICS							
Low Level Output Voltage	VOL	-	0.4	0.6	V	VCC=3.3V,IF= 5mA,IOL= 13mA	
		-	0.4	0.6	V	VCC=5.5V,IF= 5mA, IOL= 13mA	
High Level Output Current	IOH	-	4.5	50	μA	IF=250μA,VO=VCC=3.3V	
		-	5.5	50	μA	IF=250μA,VO=VCC=5.5V	
Input Threshold Current	ITH	-	2.4	5	mA	VCC=3.3V,VO=0.6V,IOL=13mA	
		-	2.5	5	mA	VCC=5.5V,IO≥13mA,VO=0.6V	
Isolation Resistance	Riso	10^9	10^12	-	Ω	DC500V, 40 ~ 60% R.H.	



MP60L Series

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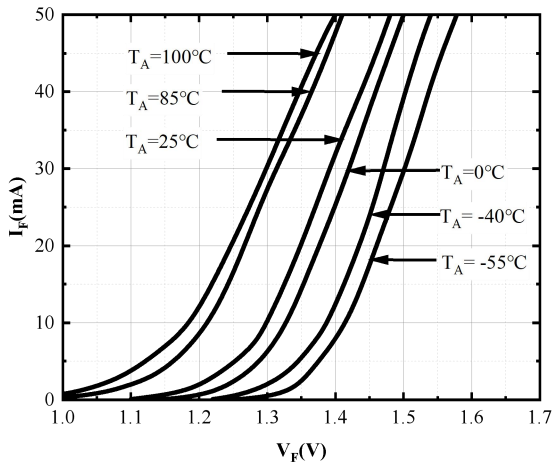
ELECTRICAL OPTICAL CHARACTERISTICS (VCC=3.3V, VEE=GND, TA=25°C unless specified otherwise)

PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT	TEST CONDITION	NOTE
SWITCHING CHARACTERISTICS							
Propagation Delay Time to Output Low Level	TPHL	-	55	100	ns	IF= 7.5mA, CL= 15pF, RL= 350Ω, f= 10kHz, Duty = 50%, TA= 25 °C	
Propagation Delay Time to Output High Level	TPLH	-	75	100			
Pulse Width Distortion	PWD	-	20	35			
Propagation Delay Skew	PDD	-	-	40			
Rise Time	tr	-	50	-			
Fall Time	tf	-	5	-			
Common Mode Transient Immunity at Logic High	CMH	15	-	-	kV/μs	IF=0mA RL=350 Ω, VCM= 1KV	
Common Mode Transient Immunity at Logic Low	CML	15	-	-	kV/μs	IF=7.5mA RL= 350Ω, VCM= 1KV	

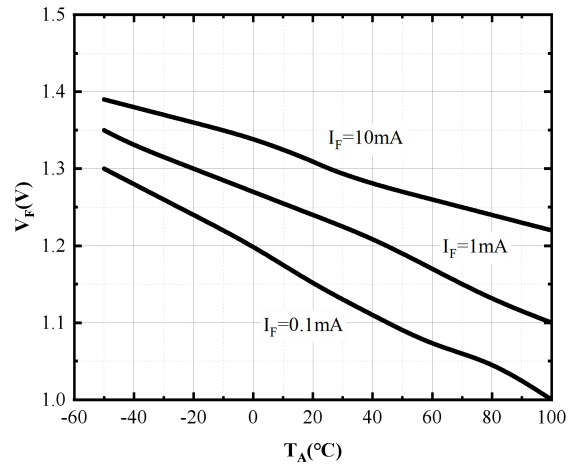
ELECTRICAL OPTICAL CHARACTERISTICS (VCC=5V, VEE=GND, TA=25°C unless specified otherwise)

PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT	TEST CONDITION	NOTE
SWITCHING CHARACTERISTICS							
Propagation Delay Time to Output Low Level	TPHL	-	35	100	ns	IF= 7.5mA, CL= 15pF, RL= 350Ω, f= 10kHz, Duty = 50%, TA= 25 °C	
Propagation Delay Time to Output High Level	TPLH	-	55	100			
Pulse Width Distortion	PWD	-	20	35			
Propagation Delay Skew	PDD	-	-	40			
Rise Time	tr	-	80	-			
Fall Time	tf	-	5	-			
Common Mode Transient Immunity at Logic High	CMH	15	-	-	kV/μs	IF=0mA RL=350 Ω, VCM= 1KV	
Common Mode Transient Immunity at Logic Low	CML	15	-	-	kV/μs	IF=7.5mA RL= 350Ω, VCM= 1KV	

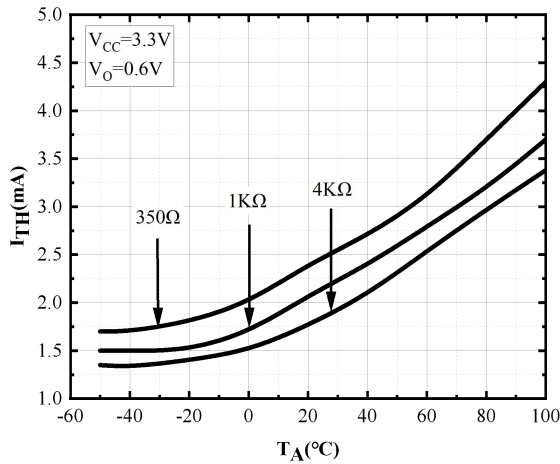
CHARACTERISTIC CURVES



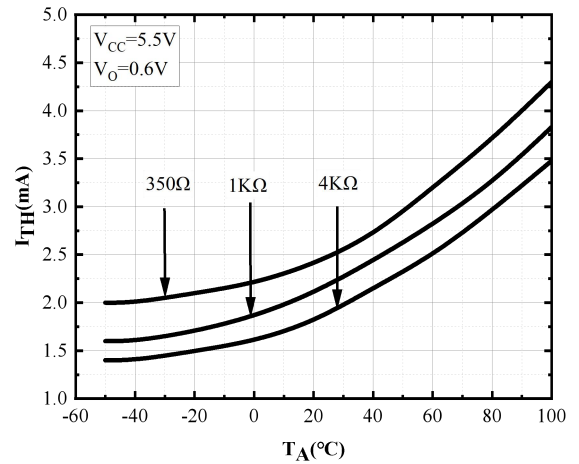
**Fig.1 Forward Current
vs. Forward Voltage**



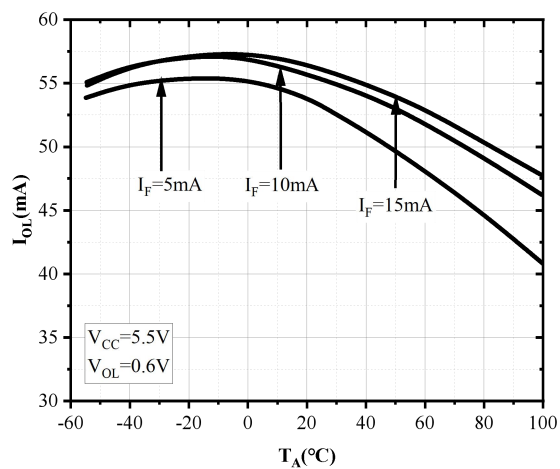
**Fig.2 Forward Voltage
vs. Ambient Temperature**



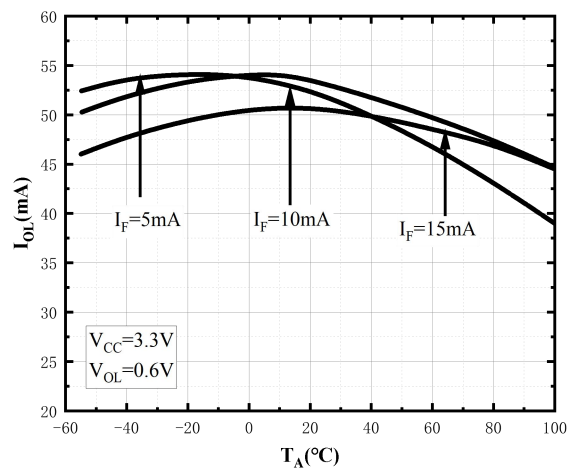
**Fig.3 Input Threshold Current
vs. Ambient Temperature**



**Fig.4 Input Threshold Current
vs. Ambient Temperature**

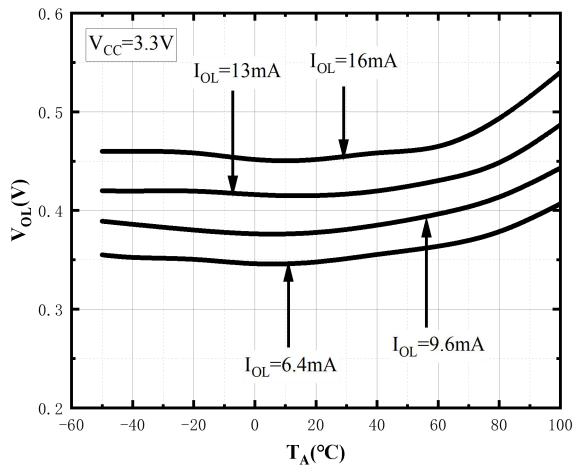


**Fig.5 Low Level Output Current
vs. Ambient Temperature**

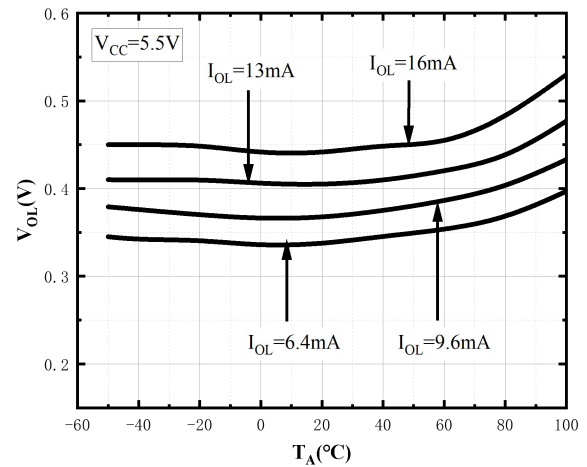


**Fig.6 Low Level Output Current
vs. Ambient Temperature**

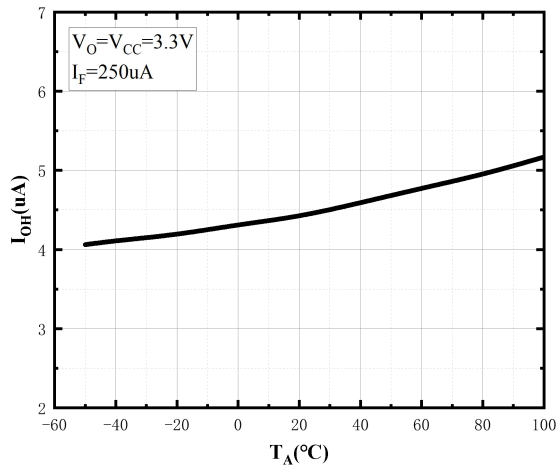
CHARACTERISTIC CURVES



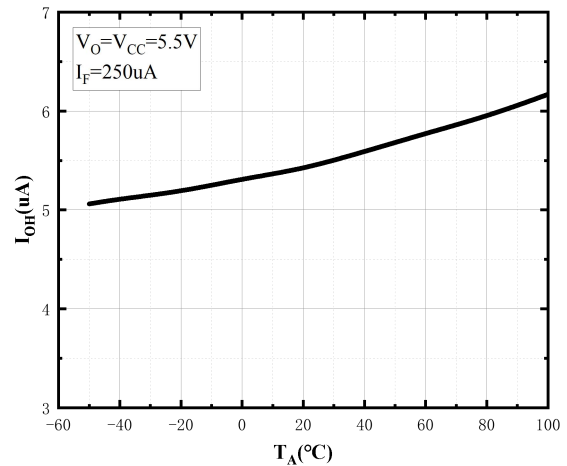
**Fig.7 Low Level Output Voltage
vs. Ambient Temperature**



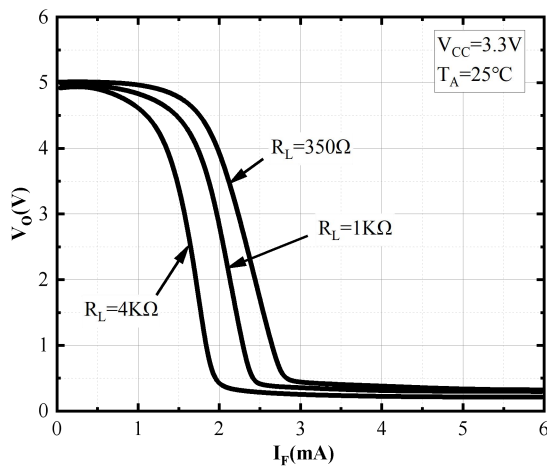
**Fig.8 Low Level Output Voltage
vs. Ambient Temperature**



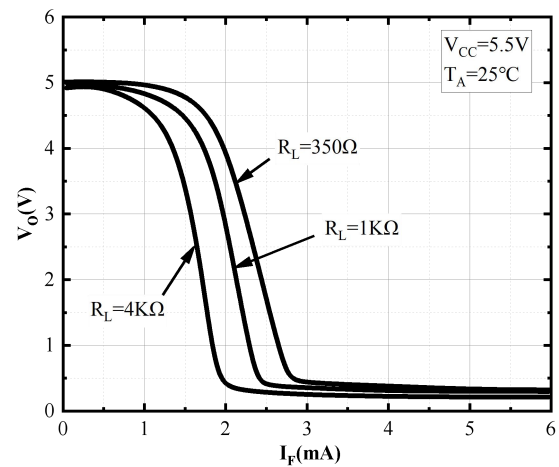
**Fig.9 High Level Output Current
vs. Ambient Temperature**



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

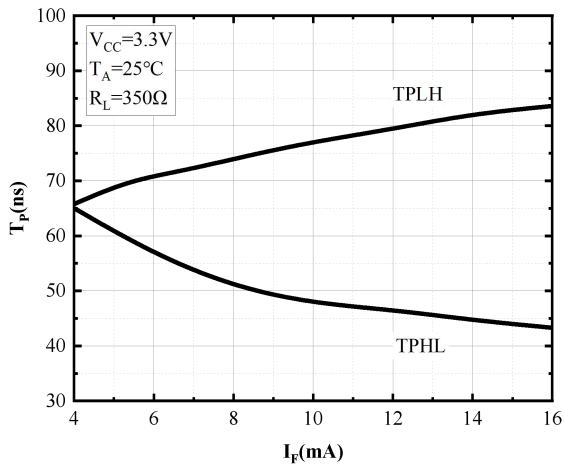


**Fig.11 Output Voltage
vs. Forward Current**

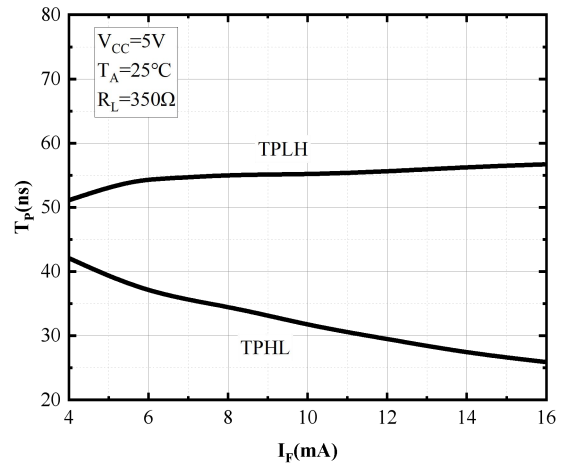


**Fig.12 Output Voltage
vs. Forward Current**

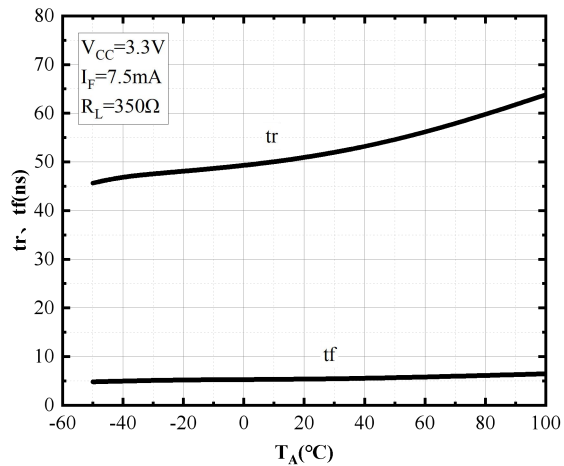
CHARACTERISTIC CURVES



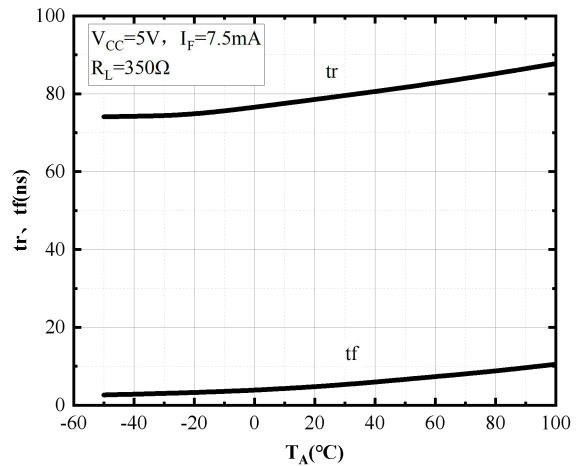
**Fig.13 Propagation Delay
vs. Forward Current**



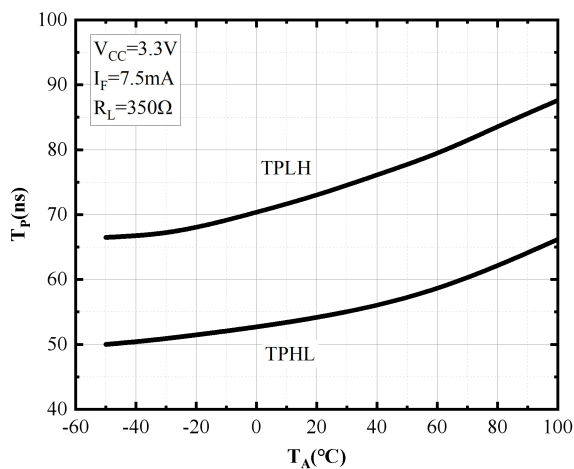
**Fig.14 Propagation Delay
vs. Forward Current**



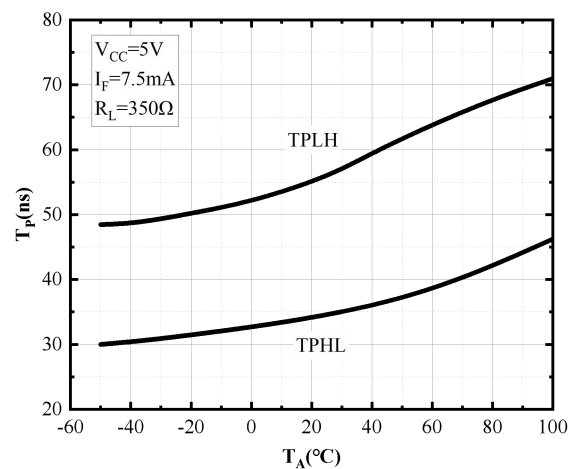
**Fig.15 Rise and Fall Time
vs. Ambient Temperature**



**Fig.16 Rise and Fall Time
vs. Ambient Temperature**



**Fig.17 Propagation Delay
vs. Ambient Temperature**



**Fig.18 Propagation Delay
vs. Ambient Temperature**

TEST CIRCUITS

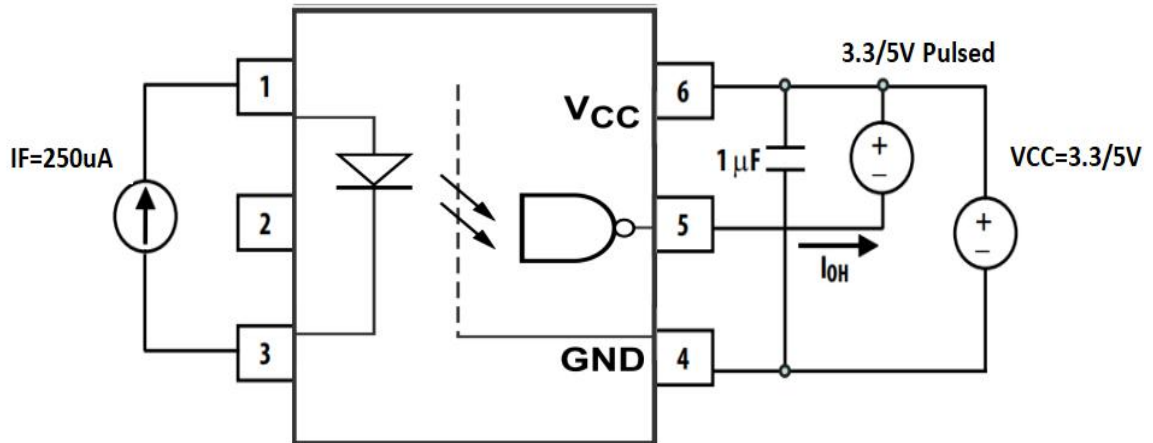


Fig.19 Test Circuits for IOH

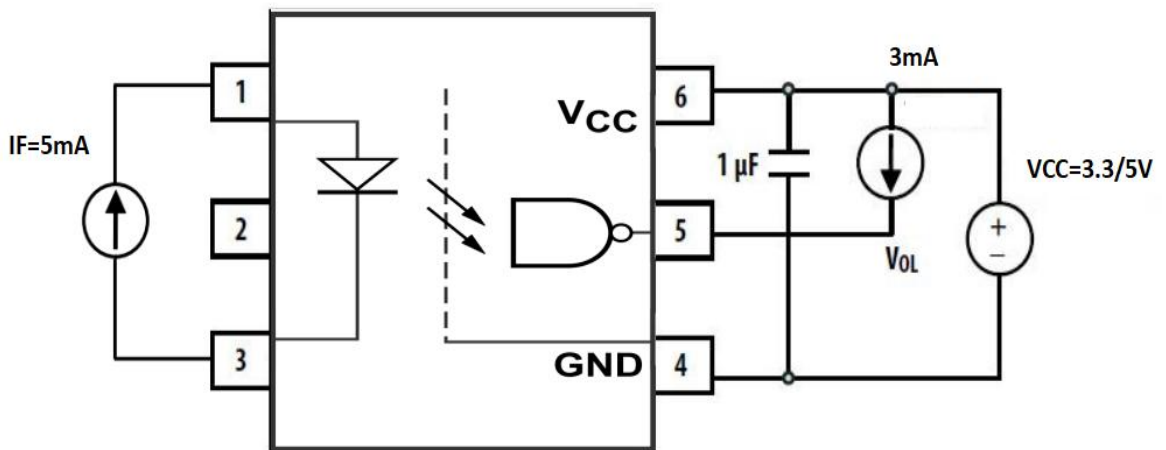


Fig.20 Test Circuits for VOL

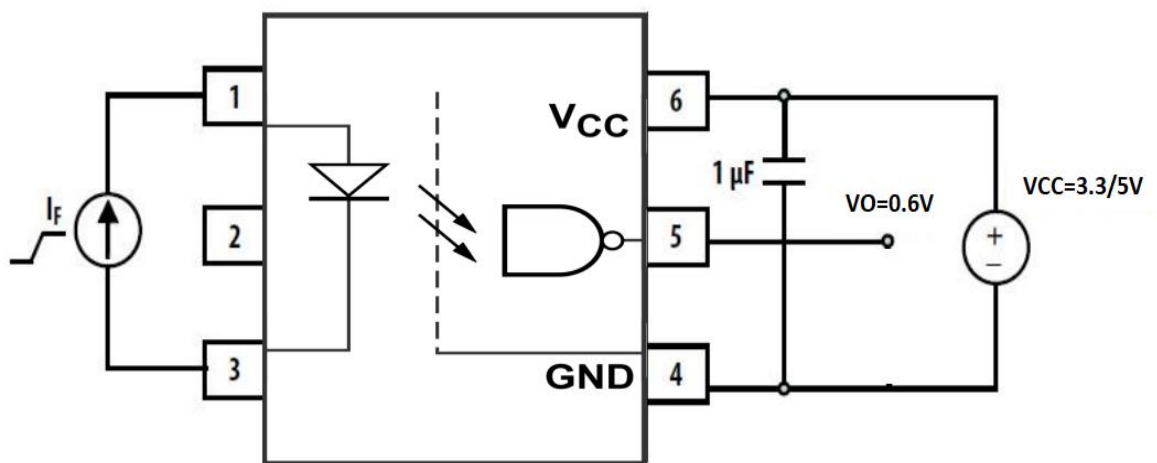


Fig.21 Test Circuits for ITH

TEST CIRCUITS

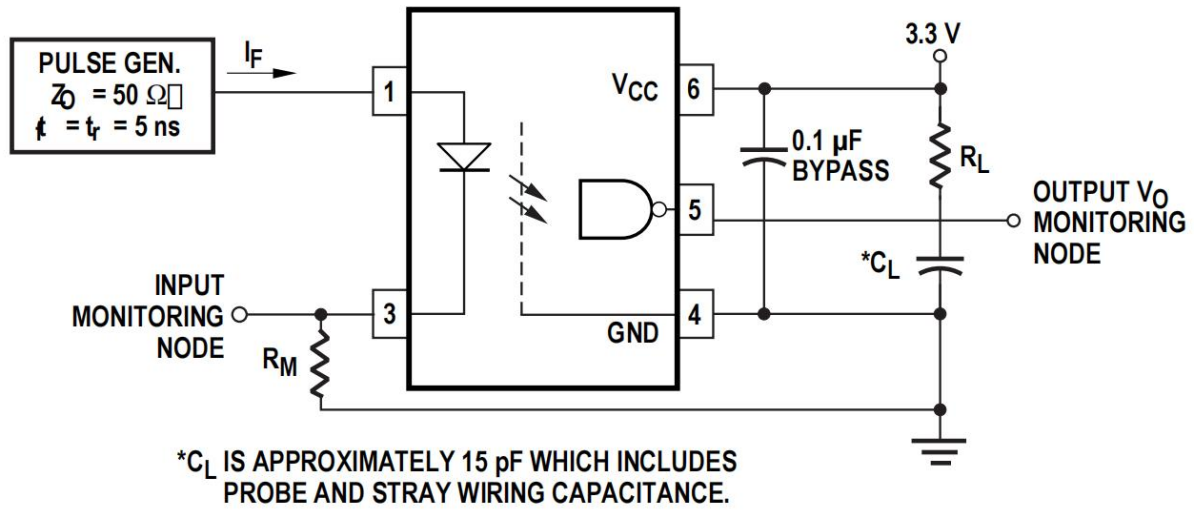


Fig.22 Test Circuits for TPHL, TPLH, tr, tf

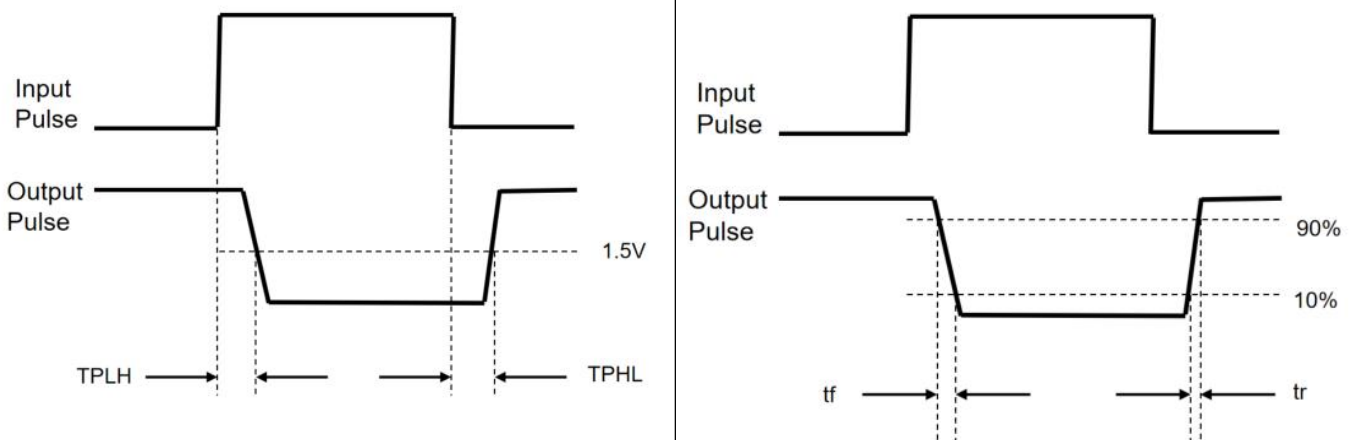


Fig.23 Wave forms of TPHL, TPLH, tr, tf

TEST CIRCUITS

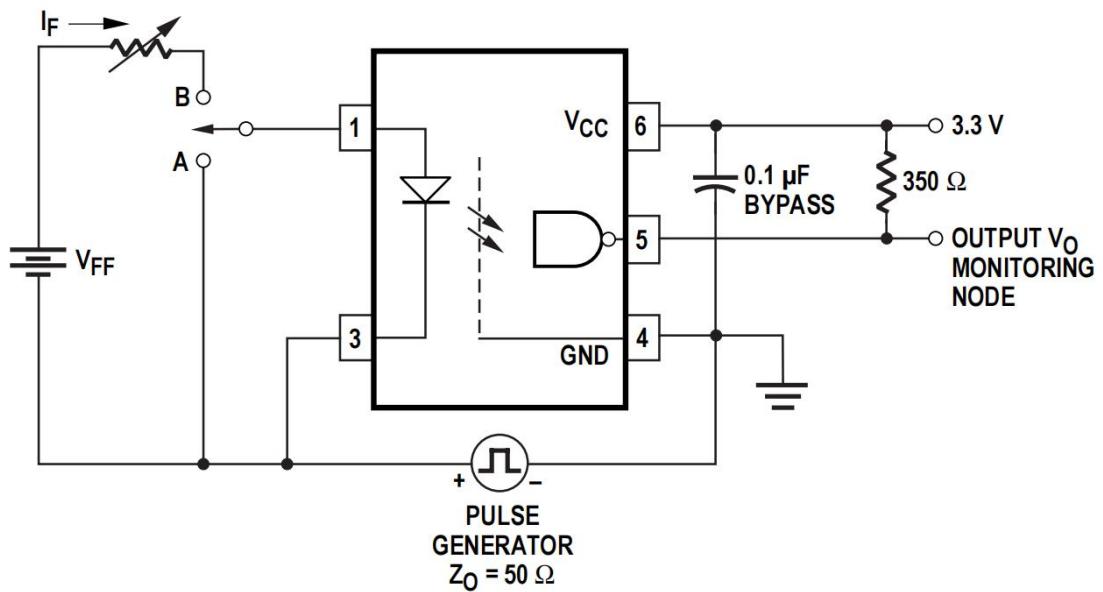


Fig.24 Test Circuits for Common Mode Transient Immunity

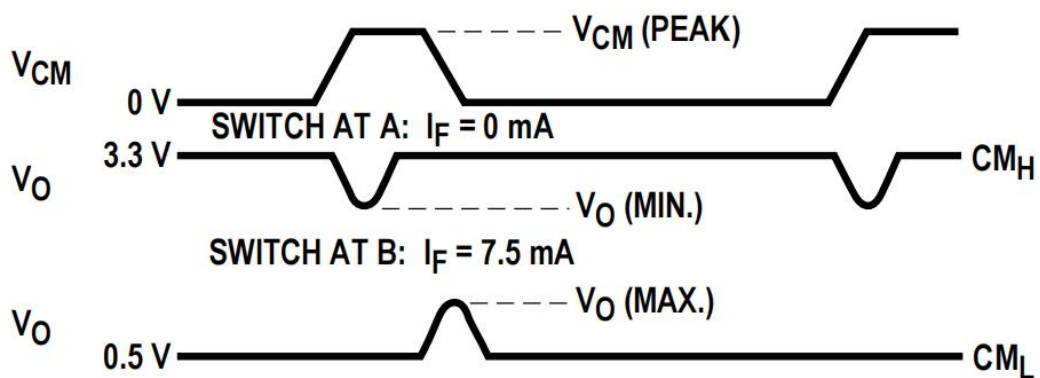
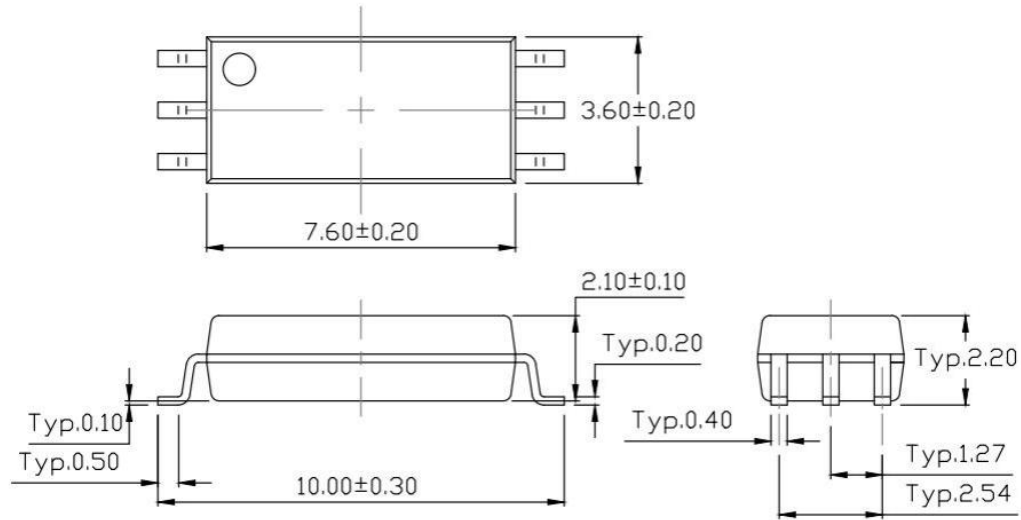


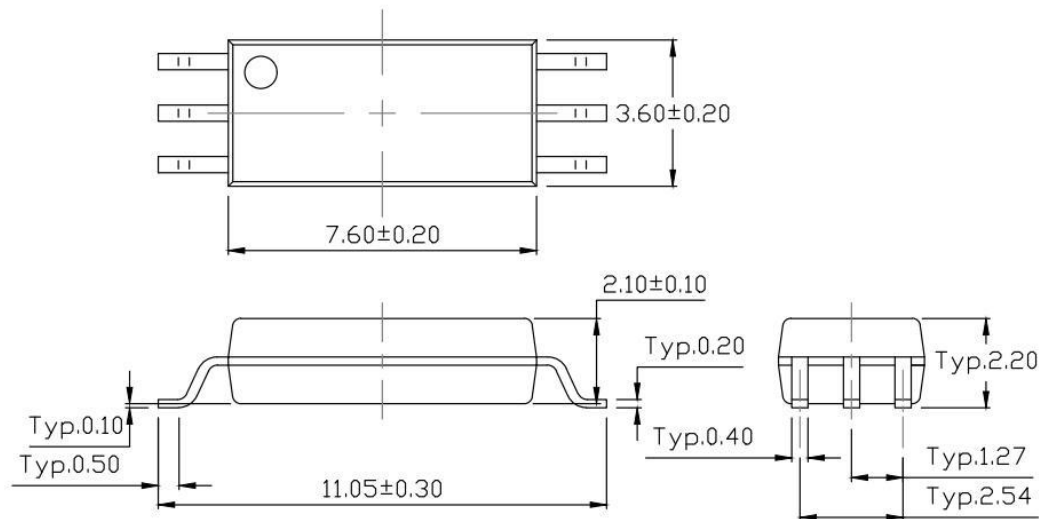
Fig.25 Waveforms of Common Mode Transient Immunity

PACKAGE DIMENSIONS (Dimensions in mm unless otherwise stated)

Standard P Type

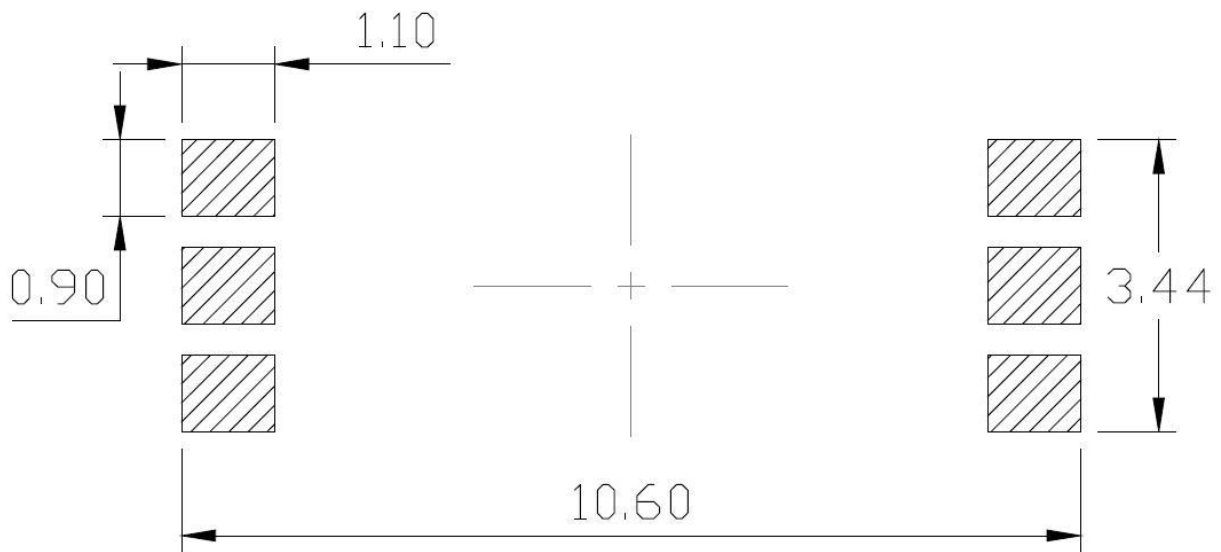


Standard W Type

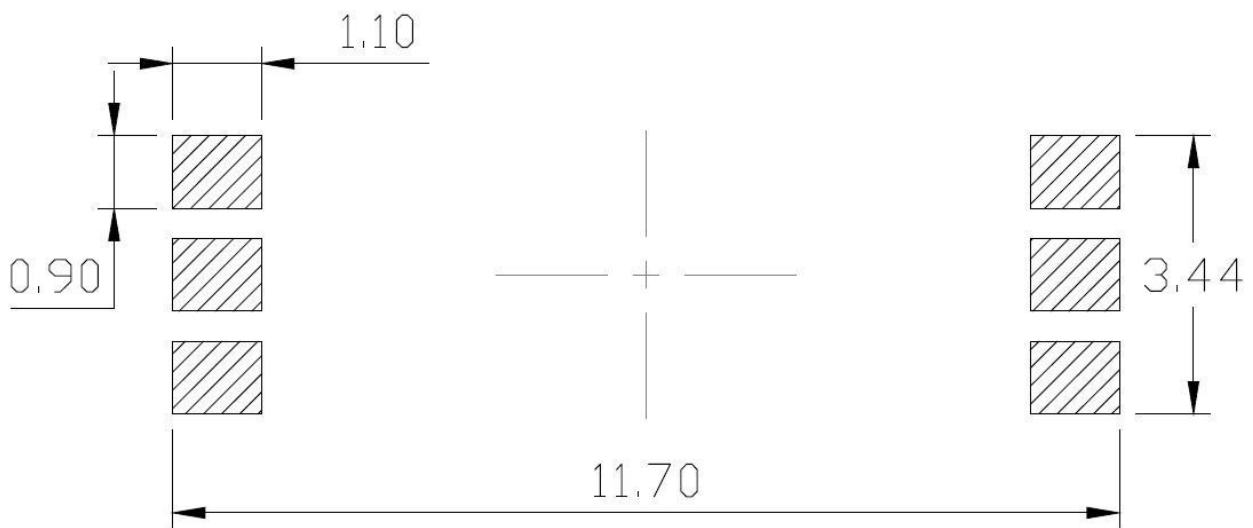


Recommended Solder Mask (Dimensions in mm unless otherwise stated)

Standard P Type

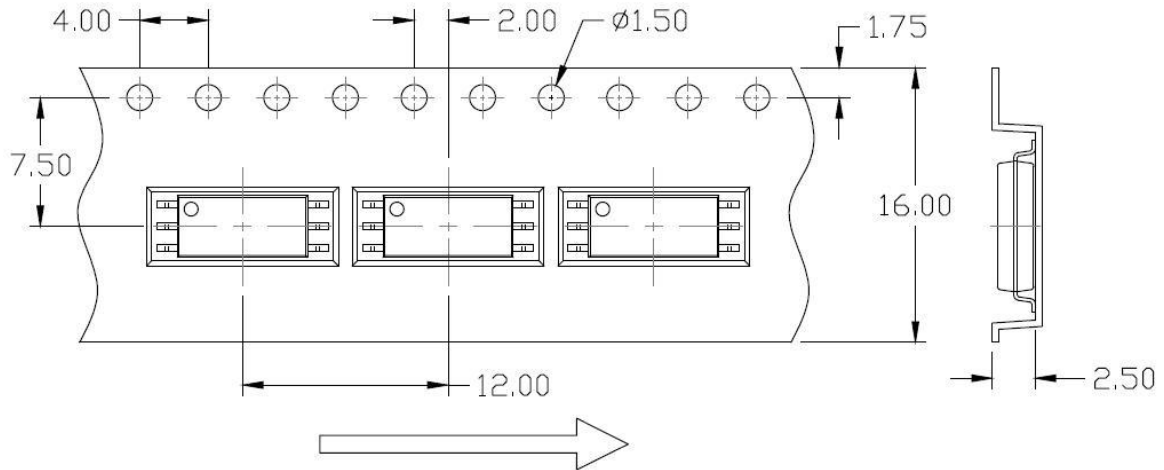


Standard W Type

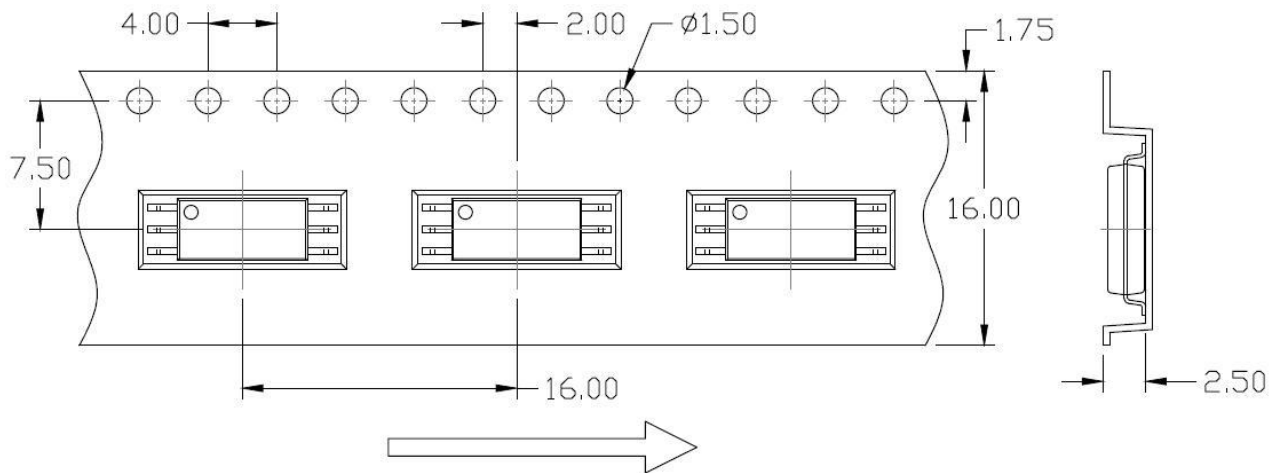


CARRIER TAPE SPECIFICATIONS (Dimensions in mm unless otherwise stated)

Standard P(T3)

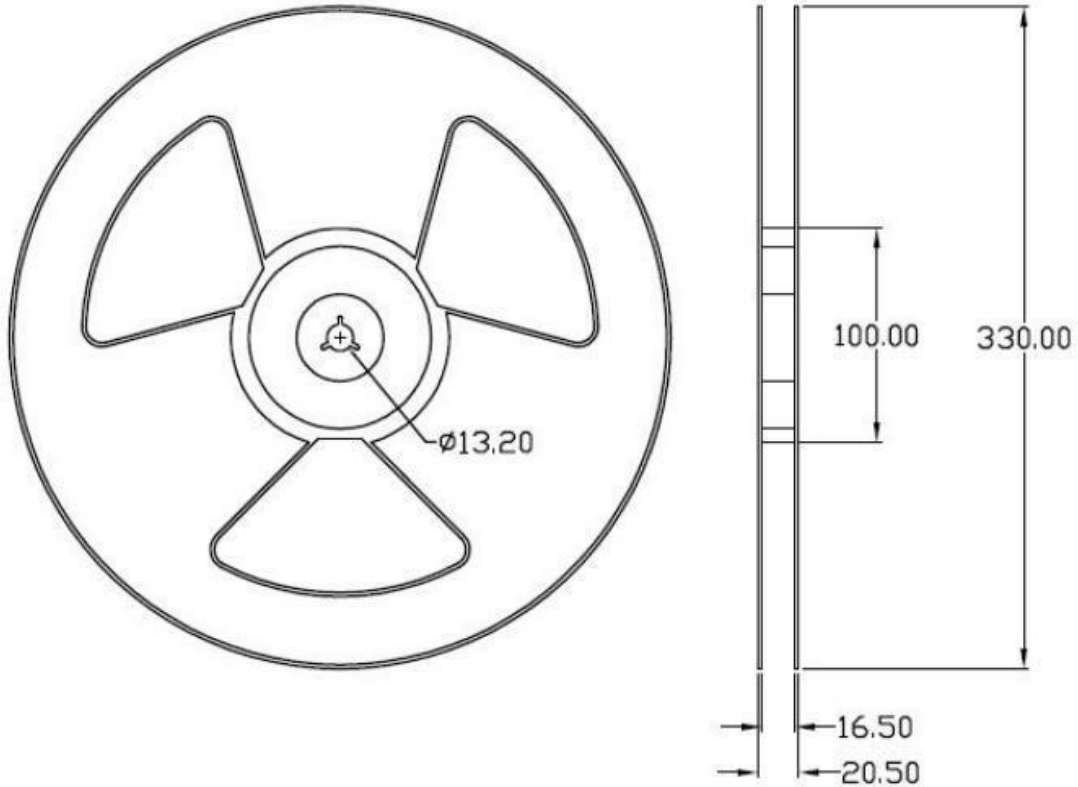


Standard W(T3)



REEL SPECIFICATIONS (Dimensions in mm unless otherwise stated)

Option



ORDERING AND MARKING INFORMATION
MARKING INFORMATION

	MP	: Company Abbr.
	60L	: 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
MP60L(Y)(Z)-GV(XN)

MP -Company Abbr.

60L -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).

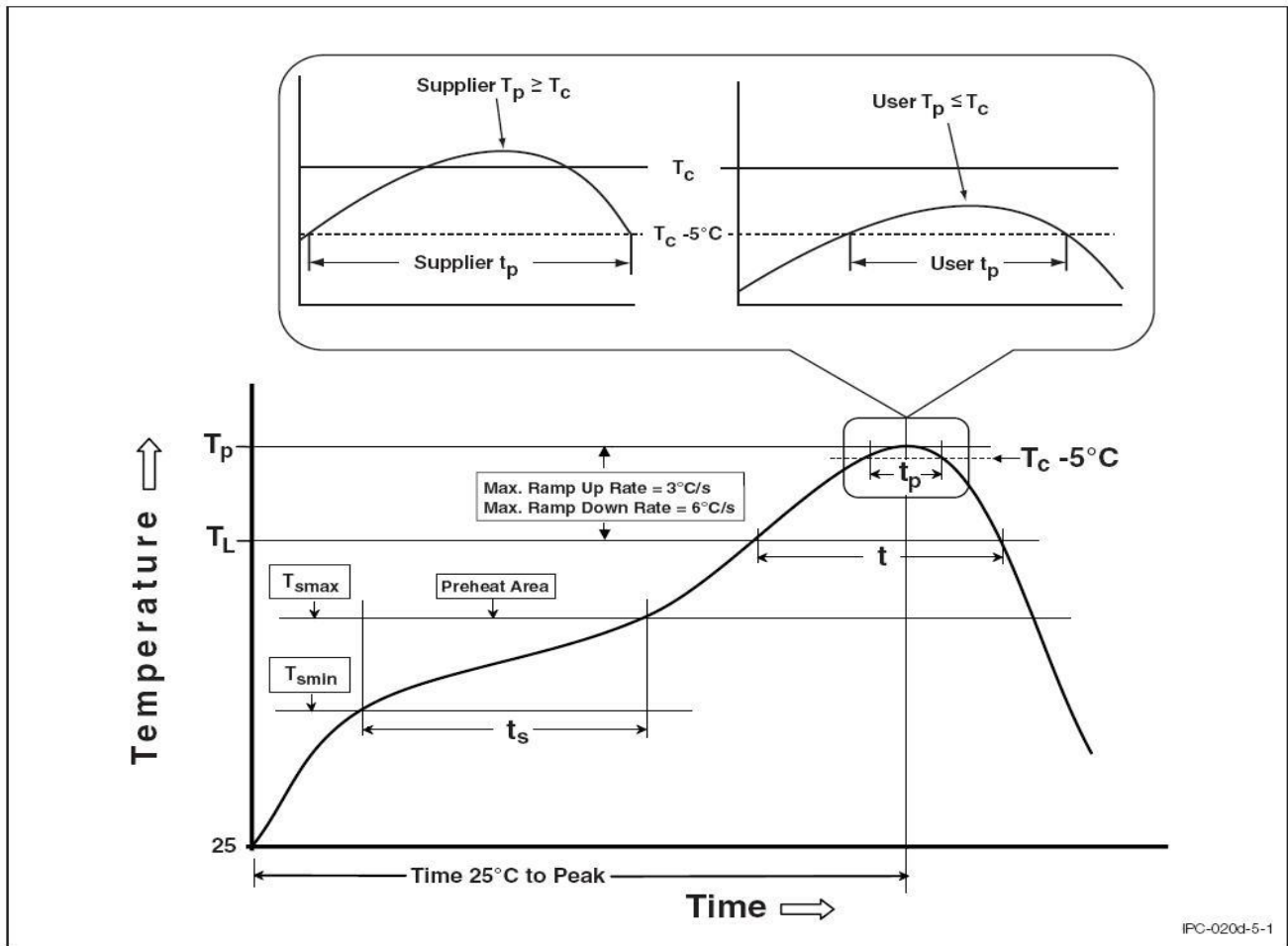
(XN)-Customer Specified Option (X: A~Z or None; N:1~9 or None)

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.



MP60L Series

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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	2024-05-09	Datasheet Complete