

■ Features

- 1.0A maximum peak output current
- 0.8A minimum peak output current
- Operating temperature range - 40 °C to 110 °C
- Rail to rail output voltage
- 200ns maximum propagation delay
- 100ns maximum propagation delay difference
- Wide operating VCC Range: 10V to 30V
- Under Voltage Lock-Out protection (UVLO) with hysteresis

■ Applications

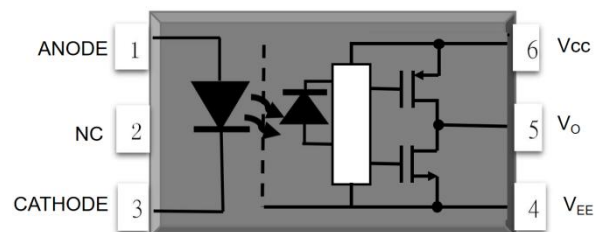
- IGBT/MOSFET gate drive
- Industrial inverters
- AC and Brushless DC motor drives
- Induction Heating
- Switching power supplies (SPSs)

■ Description

The MP314 series Photocoupler is ideally suited for driving power IGBTs and MOSFETs used in motor control inverter applications and inverters in power supply system.

It contains an AlGaAs LED optically coupled to an integrated circuit with a power output stage. The Photocoupler operational parameters are guaranteed over the temperature range from -40°C~ +110°C.

■ Schematic





MP314 Series

LSOP6, 1.0A, Gate Driver Photo Coupler

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-VEE	35	V	
Output Voltage	VO(PEAK)	VCC	V	
“High” Peak Output Current	IOH(PEAK)	1.0	A	2
“Low” Peak Output Current	IOL(PEAK)	1.0	A	2
Output Power Dissipation	PO	250	mW	
COMMON				
Total Power Dissipation	Ptot	295	mW	
Isolation Voltage	Viso	5000	Vrms	3
Operating Temperature	Topr	-40~110	°C	
Storage Temperature	Tstg	-55~125	°C	
Soldering Temperature	Tsol	260	°C	4

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

Note 2. Maximum pulse width = $10\mu\text{s}$.

Note 3. AC For 1 Minute, R.H. = 40 ~ 60%.

Note 4. For 10 seconds.

TRUTH TABLE

LED	VCC-VEE "Positive Going" (Turn-on)	VCC-VEE "Negative Going" (Turn-off)	VO
Off	0V to 30V	0V to 30V	Low
On	0V to 6.9V	0V to 5.9V	Low
On	6.9V to 8.7V	5.9V to 7.5V	Transition
On	8.7V to 30V	7.5V to 30V	High



MP314 Series

LSOP6, 1.0A, Gate Driver Photo Coupler

RECOMMENDED OPERATION CONDITIONS

PARAMETER	SYMBOL	MIN	MAX	UNIT
Operating Temperature	TA	-40	105	°C
Supply Voltage	VCC	10	30	V
Input Current (ON)	IF(ON)	7	16	mA
Input Voltage (OFF)	VF(OFF)	-3.6	0.8	V

ELECTRICAL OPTICAL CHARACTERISTICS (VCC=30V, 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	-	1.8	5	mA	IO=0mA, VO>5V	
Input Threshold Voltage	VFHL	0.8	1.2	-	V	IO=0mA, VO<5V	
Input Capacitance	Cin	-	33	-	pF	VF=0, f=1MHz	
OUTPUT CHARACTERISTICS							
High Level Supply Current	ICCH	-	1.7	3.0	mA	IF=10mA, VO=Open	
Low Level Supply Current	ICCL	-	2.1	3.0	mA	VF=0V, VO=Open	
High Level Output Voltage	VOH	VCC-0.6	VCC-0.25	-	V	IF= 10mA, IO= -100mA	
Low Level Output Voltage	VOL	-	0.15	0.4	V	IF= 0mA, IO= 100mA	
High Level Output Current	IOH	-	-0.8	-0.4	A	IF=10mA, VO= VCC-2V	1
		-	-	-0.8	A	IF=10mA, VO= VCC-3V	2
Low Level Output Current	IOL	0.4	0.9	-	A	IF=0mA, VO= VEE+2V	1
		0.8	-	-	A	IF=0mA, VO= VEE+3V	2
Under Voltage Lockout Threshold	VUVLO+	6.9	7.9	8.7	V	IF= 10mA, VO> 5V	
	VUVLO-	5.9	6.8	7.5	V	IF= 10mA, VO< 5V	
UVLO Hysteresis	UVLO _{HYS}	-	1.1	-	V	-	
Isolation Resistance	Riso	10 ⁹	-	-	Ω	DC500V, 40 ~ 60% R.H.	

Note1. Maximum pulse width = 50μs.

Note2. Maximum pulse width = 10μs.



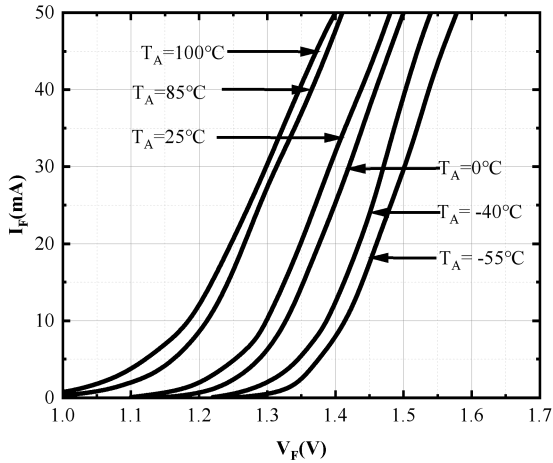
MP314 Series

LSOP6, 1.0A, Gate Driver Photo Coupler

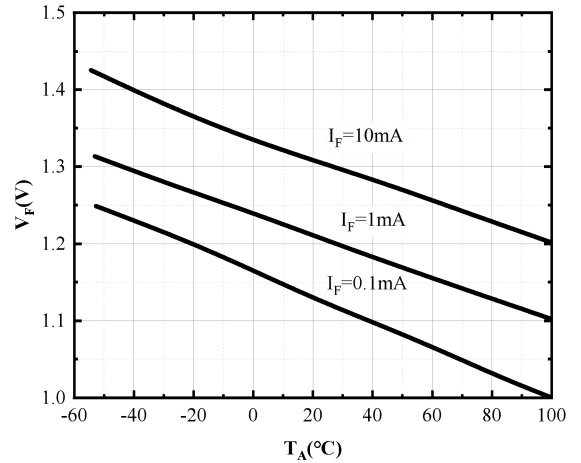
ELECTRICAL OPTICAL CHARACTERISTICS (VCC=30V, VEE=GND, TA=25°C unless specified otherwise)

PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT	TEST CONDITION	NOTE
SWITCHING CHARACTERISTICS							
Propagation Delay Time to Output Low Level	TPHL	-	100	200	ns	IF= 10mA, Cg= 3nF, Rg= 47Ω, f= 10kHz, Duty = 50%, TA= 25 °C	
Propagation Delay Time to Output High Level	TPLH	-	140	200			
Pulse Width Distortion	PWD	-	22	70			
Propagation Delay Difference Between Any Two Parts	PDD	-100	-	100			
Rise Time	tr	-	30	-			
Fall Time	tf	-	30	-			
Common Mode Transient Immunity at Logic High	CMH	20	25	-	kV/μs	IF=10mA, VCC=30V,VCM= 1.5KV	
Common Mode Transient Immunity at Logic Low	CML	20	25	-	kV/μs	VF=0V, VCC= 30V, VCM= 1.5KV	

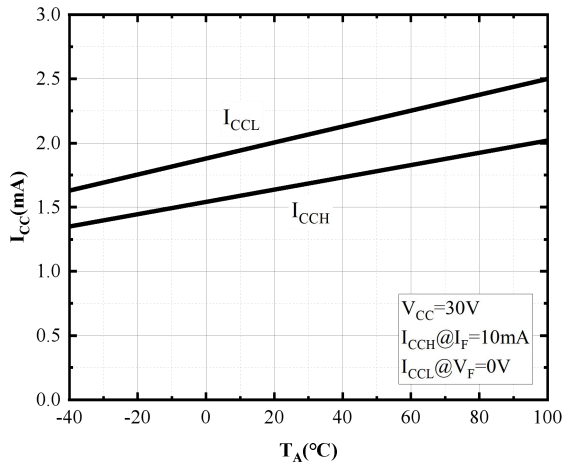
CHARACTERISTIC CURVES



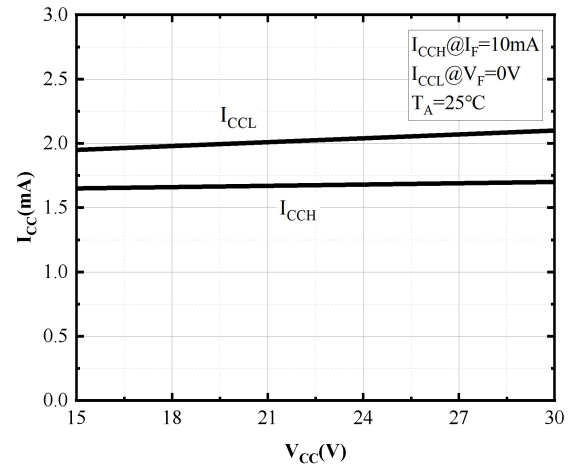
**Fig.1 Forward Current
vs. Forward Voltage**



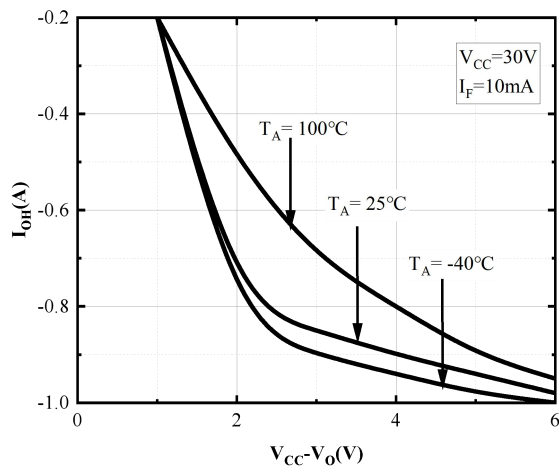
**Fig.2 Forward Voltage
vs. Ambient Temperature**



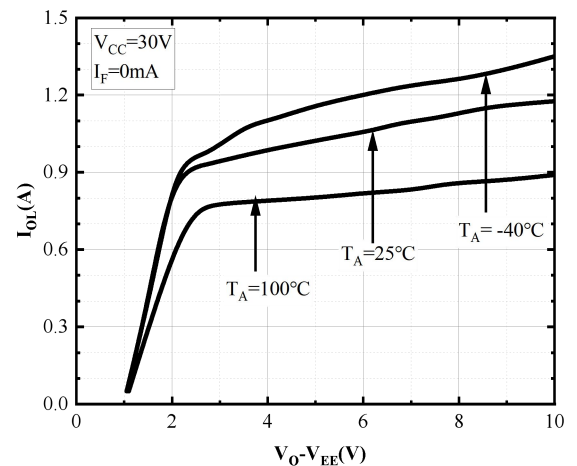
**Fig.3 Supply Current
vs. Ambient Temperature**



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

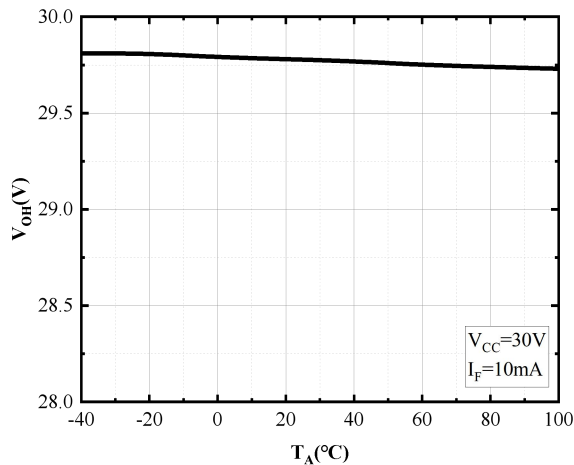


**Fig.5 High Level Output Voltage
vs. High Level Output Current**

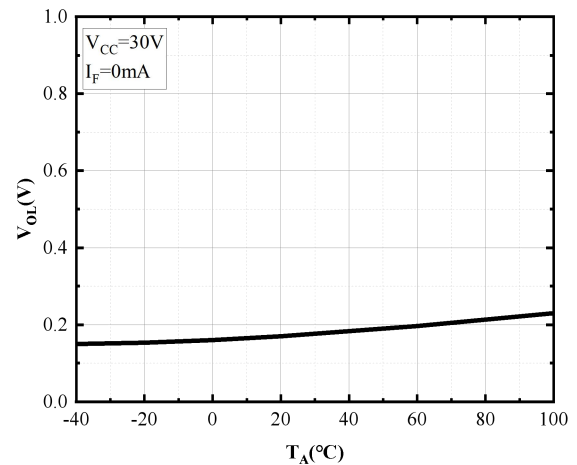


**Fig.6 Low Level Output Voltage
vs. Low Level Output Current**

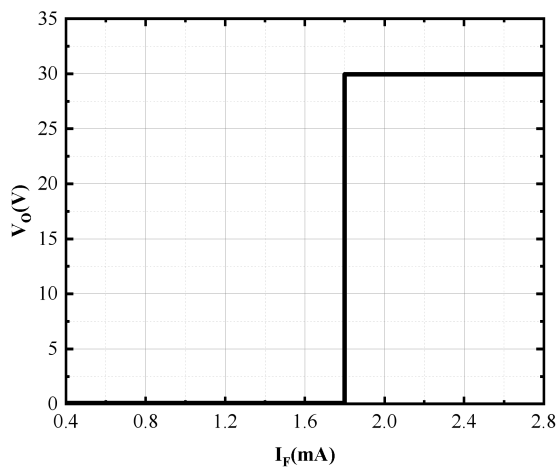
CHARACTERISTIC CURVES



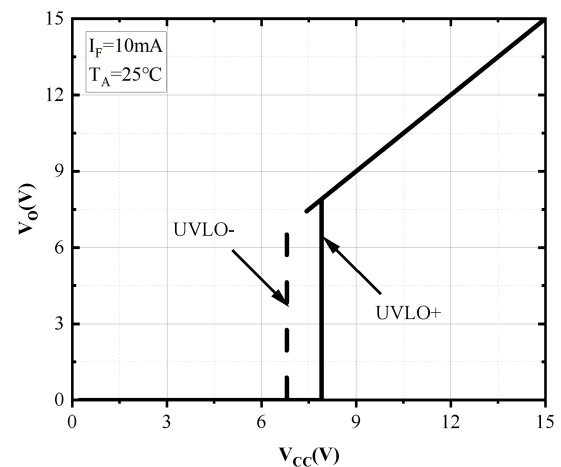
**Fig.7 High Level Output Voltage
vs. Ambient Temperature**



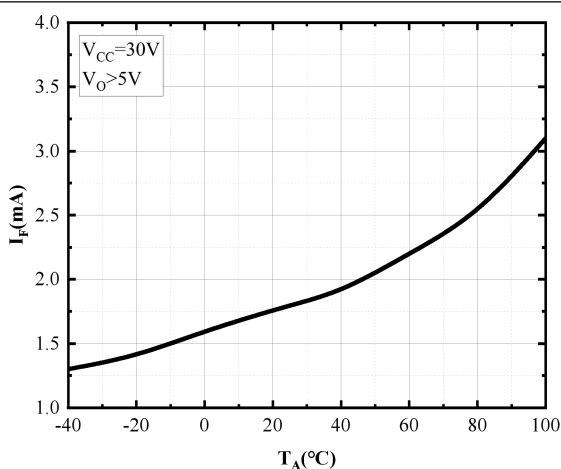
**Fig.8 Low Level Output Voltage
vs. Ambient Temperature**



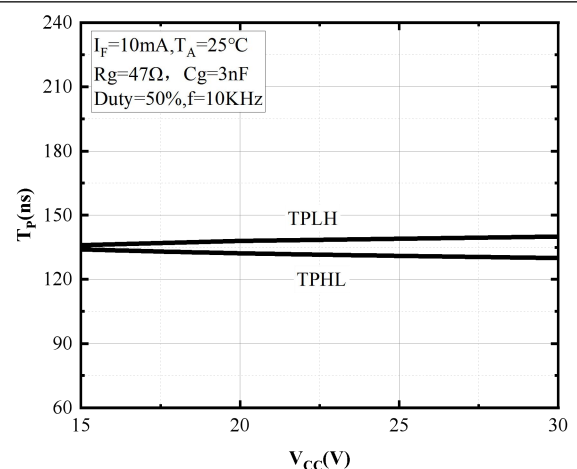
**Fig.9 Output Voltage
vs. Forward Current**



**Fig.10 Output Voltage
vs. Supply Voltage**

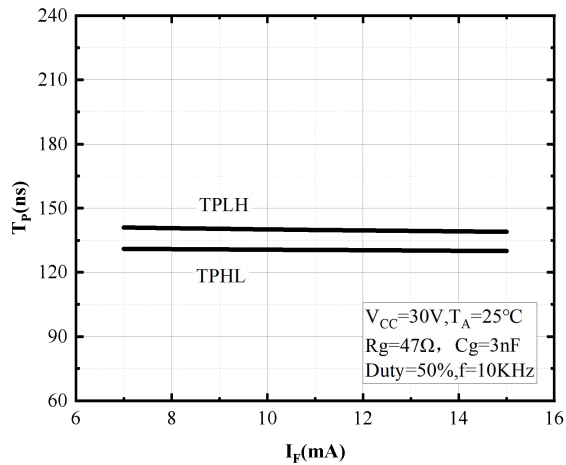


**Fig.11 Forward Current
vs. Ambient Temperature**

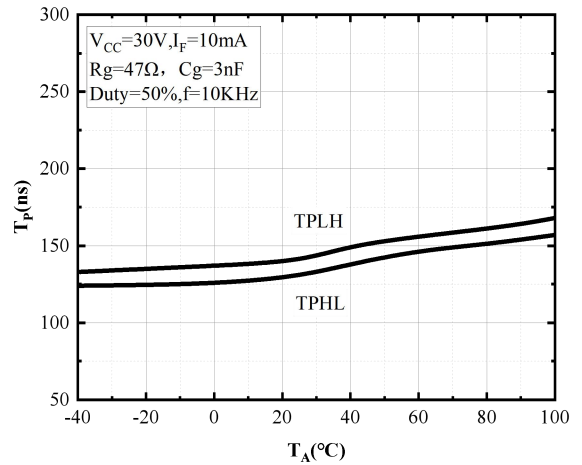


**Fig.12 Propagation Delay
vs. Supply Voltage**

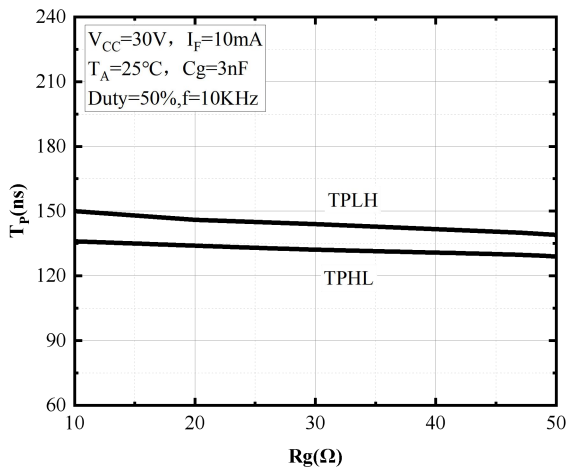
CHARACTERISTIC CURVES



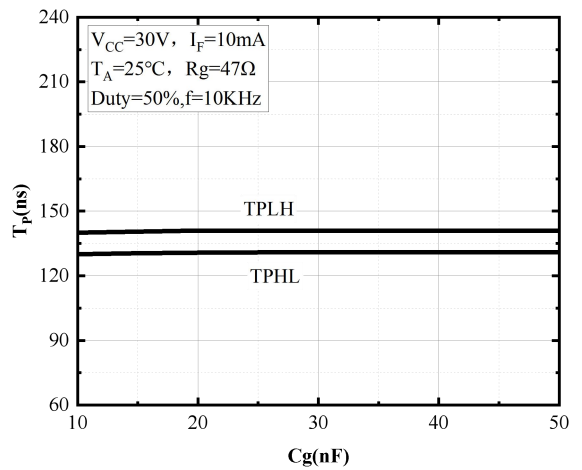
**Fig.13 Propagation Delay
vs. Forward Current**



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



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



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

TEST CIRCUITS

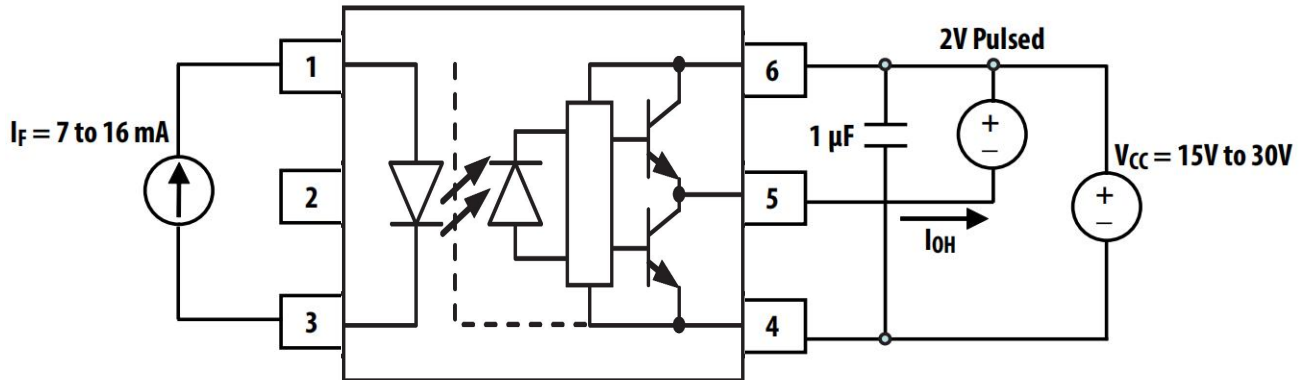


Fig.17 Test Circuits for IOH

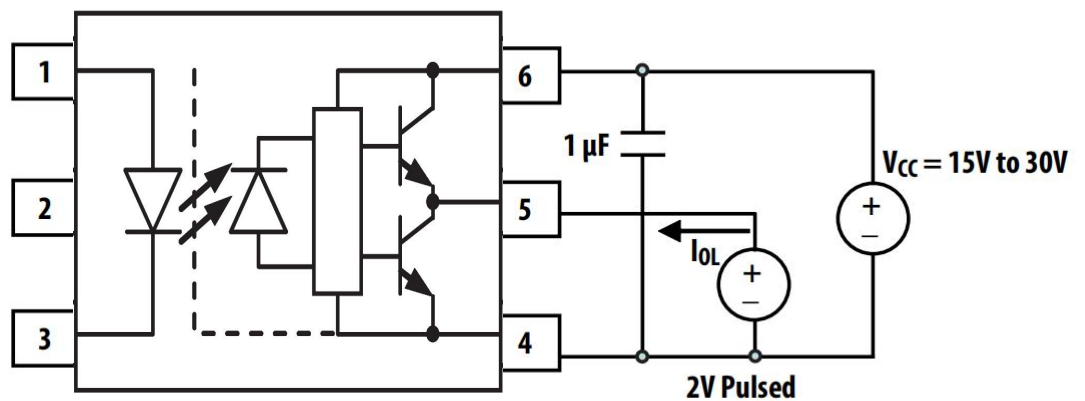


Fig.18 Test Circuits for IOL

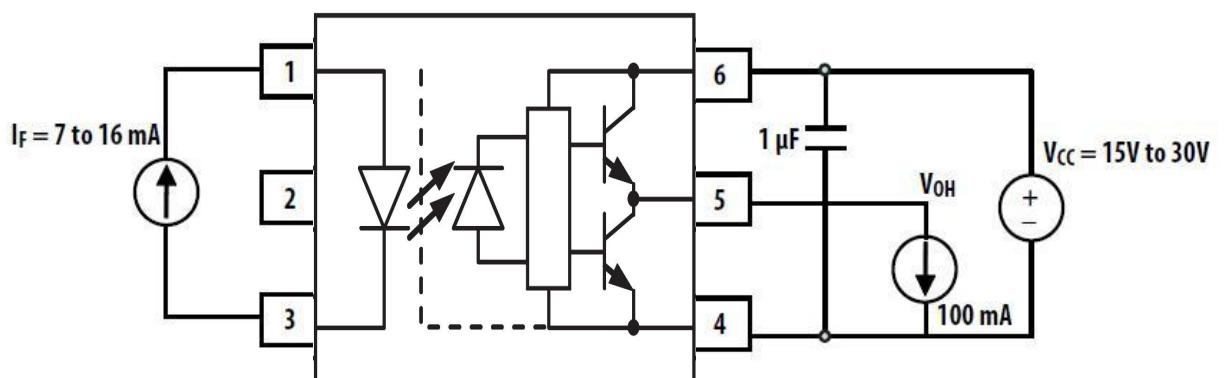


Fig.19 Test Circuits for VOH

TEST CIRCUITS

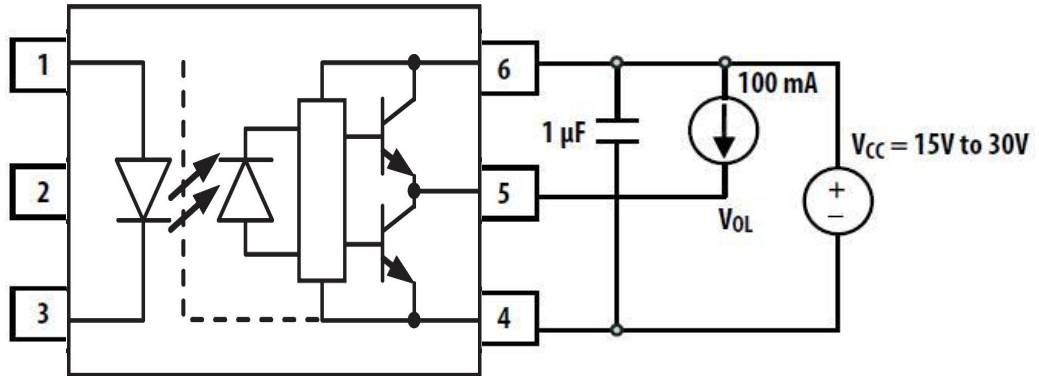


Fig.20 Test Circuits for VOL

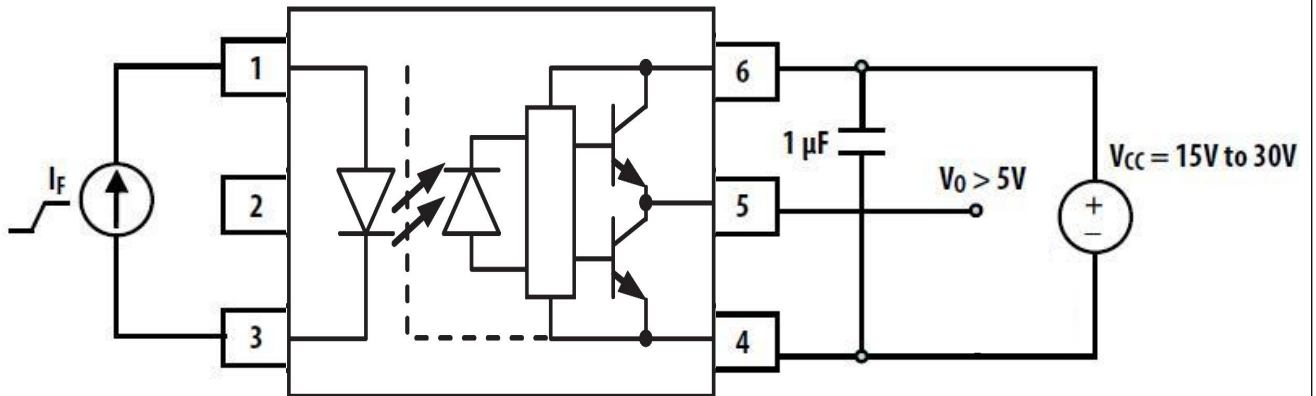


Fig.21 Test Circuits for IFHL

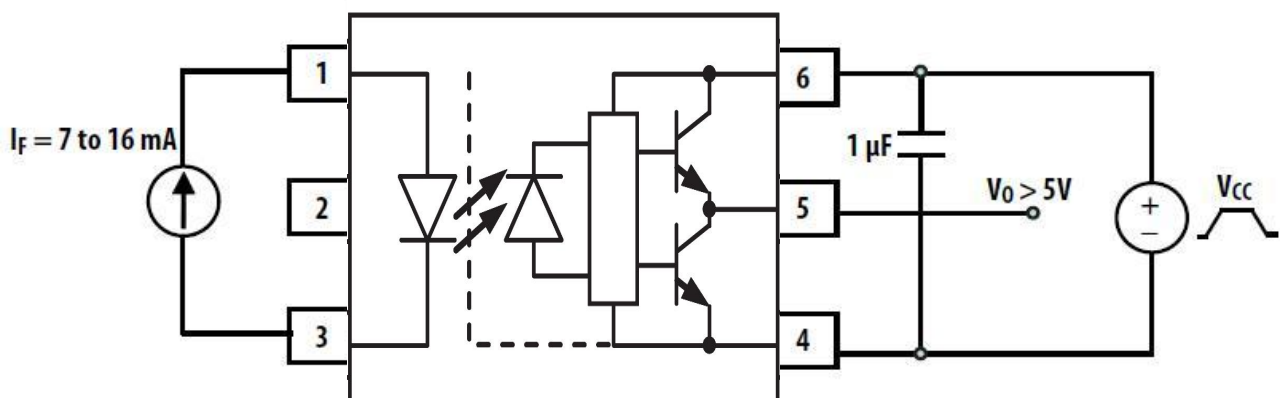


Fig.22 Test Circuits for UVLO

TEST CIRCUITS

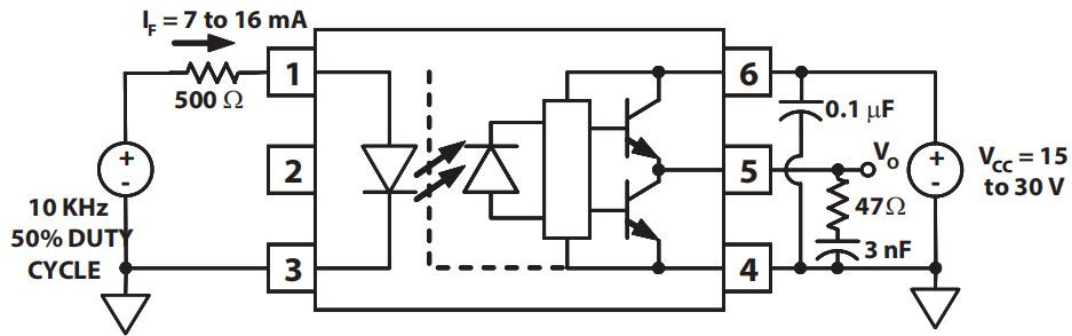


Fig.23 Test Circuits for TPHL, TPLH, tr, tf

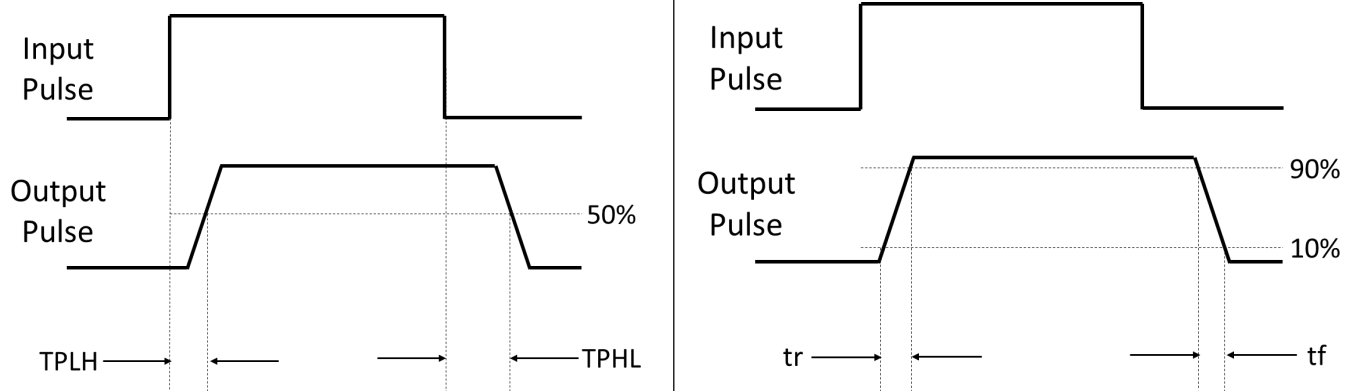


Fig.24 Wave forms of TPHL, TPLH, tr, tf

TEST CIRCUITS

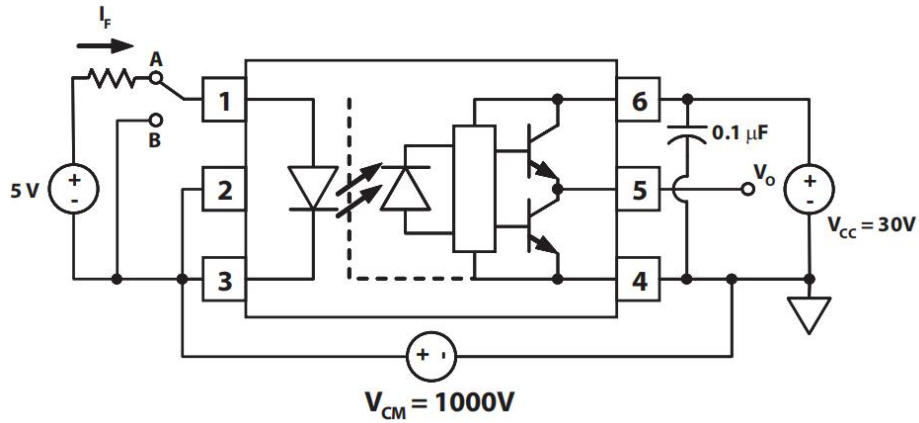


Fig.25 Test Circuits for Common Mode Transient Immunity

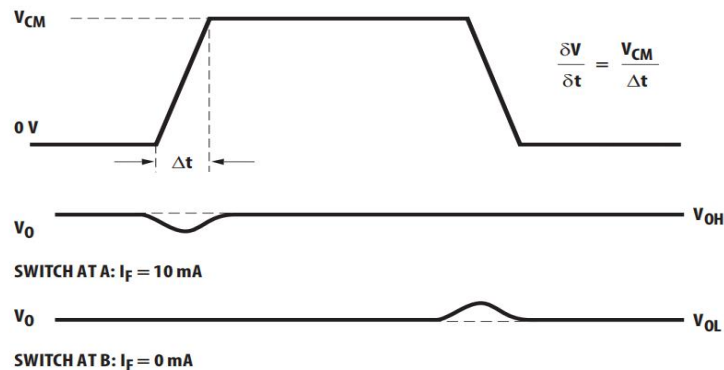
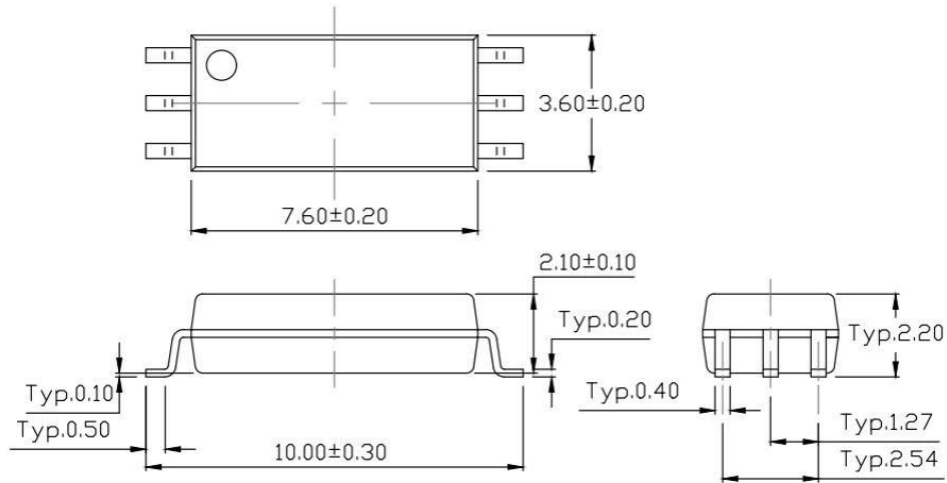


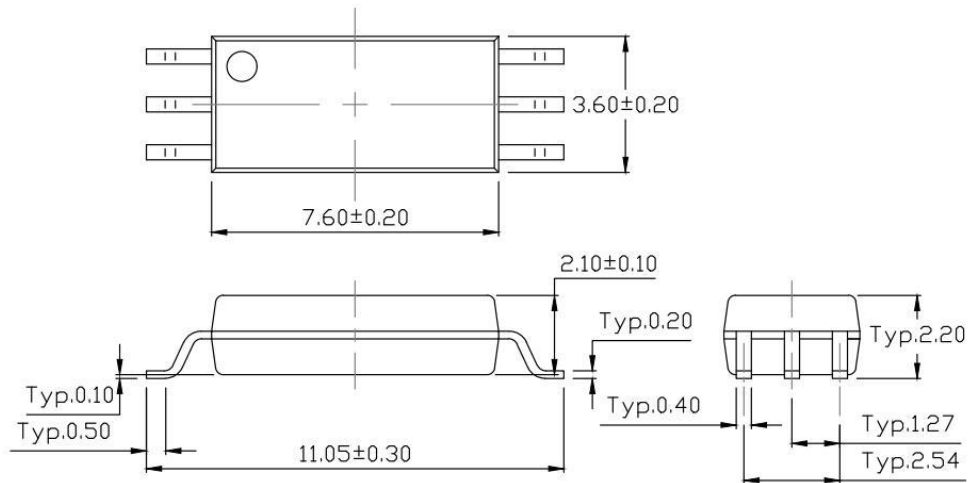
Fig.26 Waveforms of Common Mode Transient Immunity

PACKAGE DIMENSIONS (Dimensions in mm unless otherwise stated)

Standard P Type

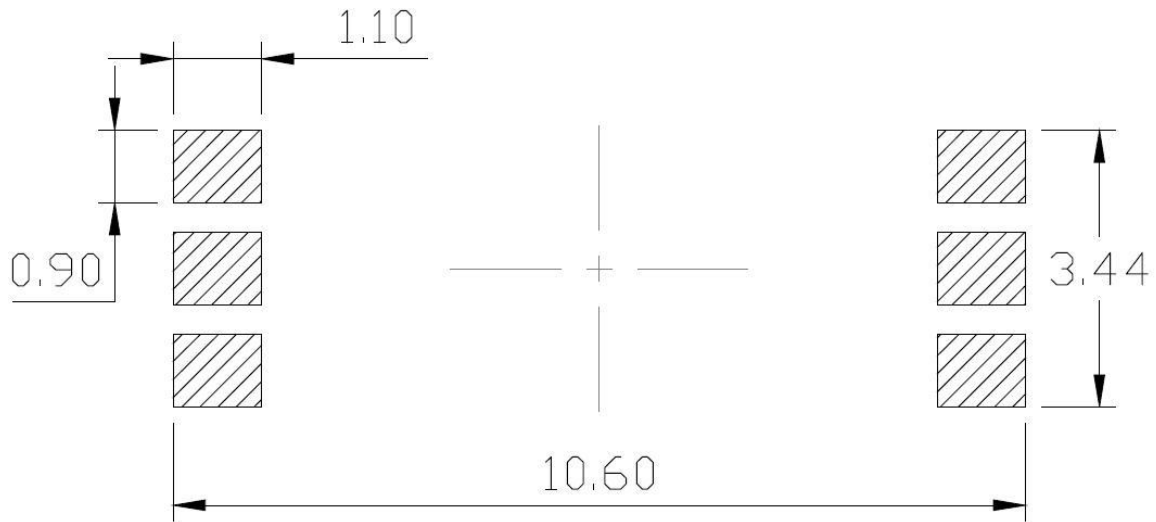


Standard W Type

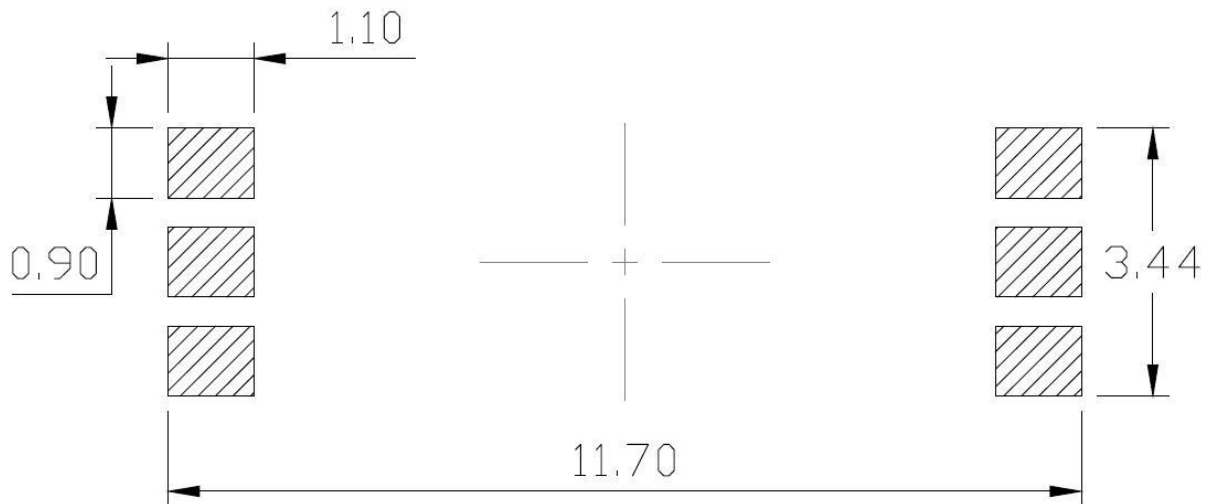


Recommended Solder Mask (Dimensions in mm unless otherwise stated)

Standard P Type

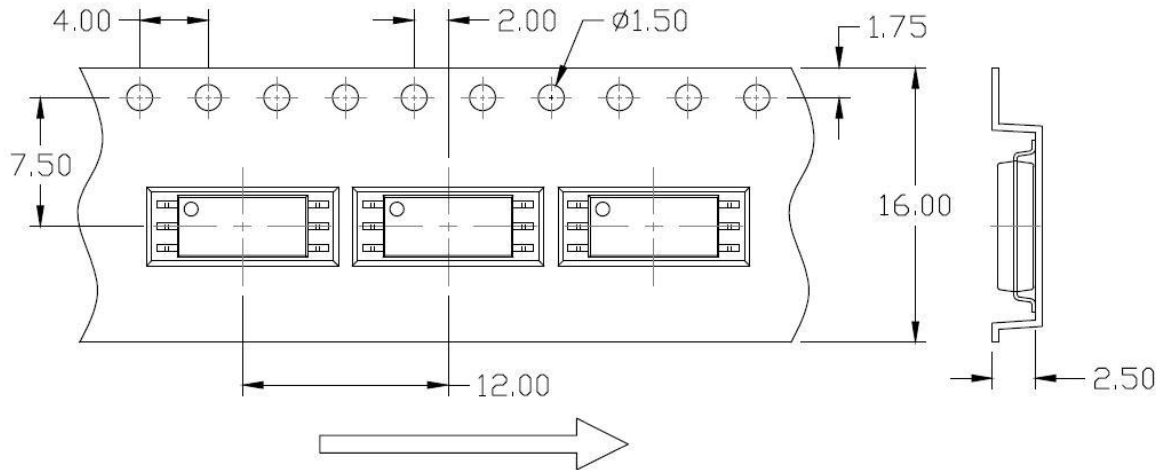


Standard W Type

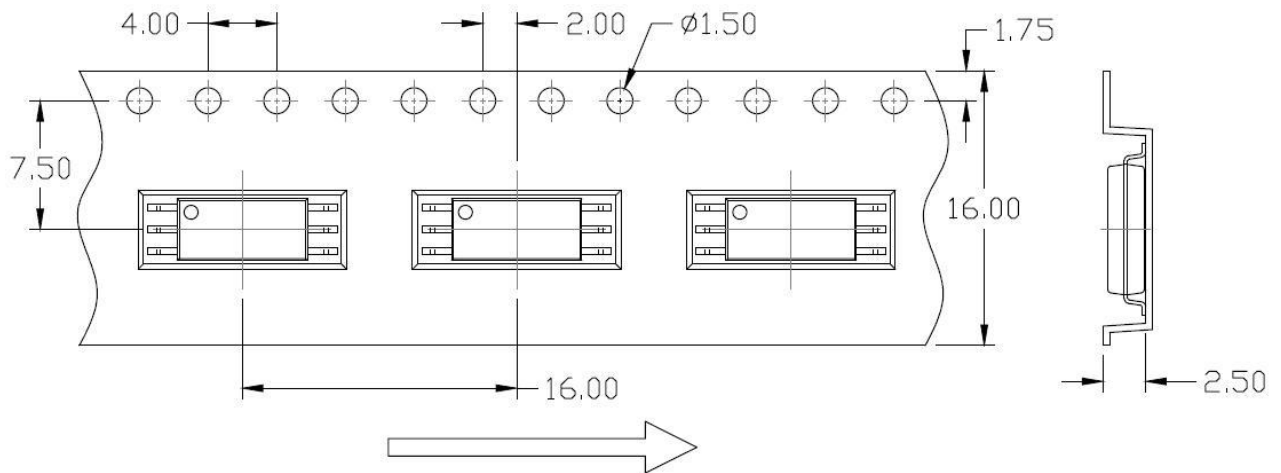


CARRIER TAPE SPECIFICATIONS (Dimensions in mm unless otherwise stated)

Option P(T3)

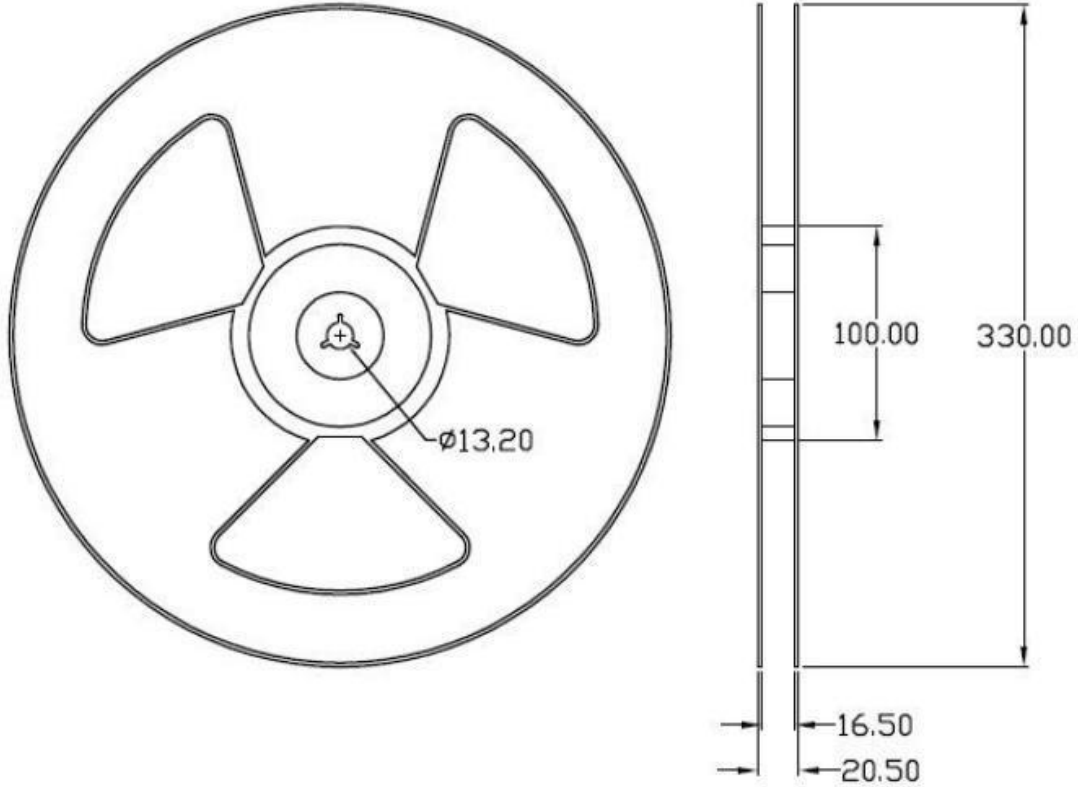


Option W (T3)



REEL SPECIFICATIONS (Dimensions in mm unless otherwise stated)

Option



ORDERING AND MARKING INFORMATION

MARKING INFORMATION

	MP	: Company Abbr.
	314	: 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

MP314(Y)(Z)-GV(XN)

MP -Company Abbr.

314 -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)

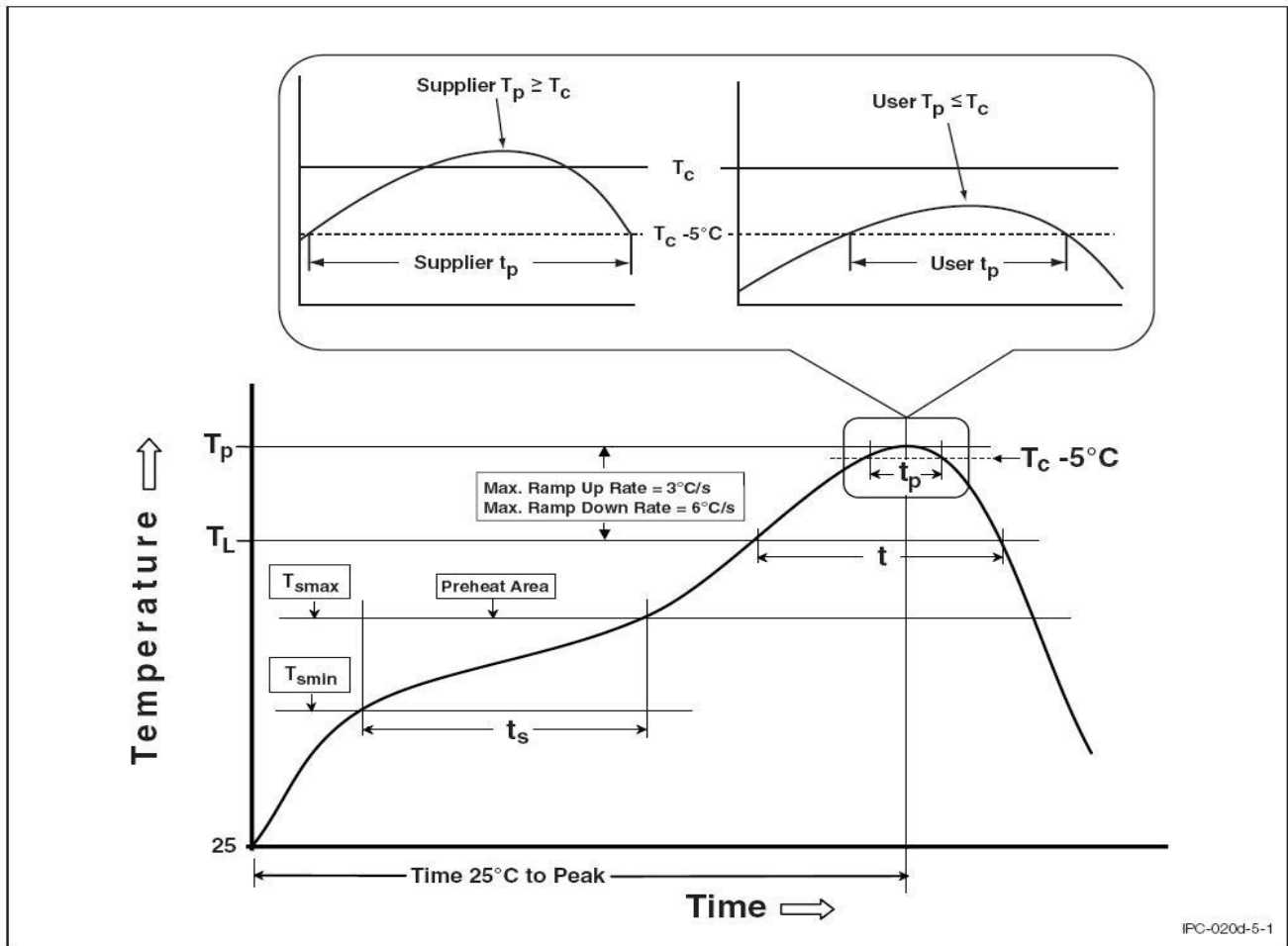
(XN) - Customer Specified Option(X:A~Z or None; N:1~9 or None) .

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

- MP is continually improving the quality, reliability, function and design. MP 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