

■ Features

- 3.0A maximum peak output current
- 2.5A minimum peak output current
- Operating temperature range - 40 °C to 110 °C
- Rail to rail output voltage
- 200 ns maximum propagation delay
- 100 ns maximum propagation delay difference
- LED current input with hysteresis
- 35 kV/ μ s minimum Common Mode Rejection (CMR) at $V_{CM} = 1500V$
- Wide operating VCC Range: 15V to 30V
- Under Voltage Lock-Out protection (UVLO) with hysteresis

■ Applications

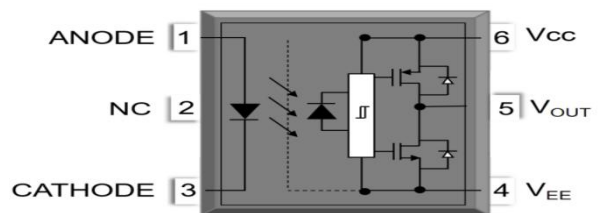
- IGBT/MOSFET gate drive
- Renewable energy inverters
- Industrial inverters
- Switching power supplies
- AC and Brushless DC motor drives

■ Description

The MP341 contains an AlGaAs LED, which is optically coupled to an integrated circuit with a power output stage. This optocoupler is ideally suited for driving power IGBTs and MOSFETs used in motor control inverter applications.

The high operating voltage range of the output stage provides the drive voltages required by gate controlled devices. The voltage and high peak output current supplied by this optocoupler make it ideally suited for direct driving IGBT with ratings up to 1200V/50A. For IGBTs with higher ratings, this optocoupler can be used to drive a discrete power stage which drives the IGBT gate.

■ Schematic





MP341 Series LSOP6, 3.0A, Gate Driver Photo Coupler

ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	VALUE	UNIT	Note
INPUT				
Forward Current	IF	25	mA	
Peak Transient Current	IF(trans)	1	A	1
Reverse Voltage	VR	5	V	
Input Power Dissipation	PI	45	mW	
OUTPUT				
Supply Voltage	VCC	35	V	
Output Voltage	VO	35	V	
“High” Peak Output Current	IOH(PEAK)	3.0	A	2
“Low” Peak Output Current	IOL(PEAK)	3.0	A	2
Input Current (Rise/Fall Time)	$T_{r(IN)}/T_{f(IN)}$	500	ns	
Output Power Dissipation	PO	700	mW	
COMMON				
Total Power Dissipation	Ptot	745	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 11V	0V to 9.5V	LOW
ON	11V to 13.5V	9.5V to 12V	TRANSITION
ON	13.5V to 30V	12V to 30V	HIGH



MP341 Series

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RECOMMENDED OPERATION CONDITIONS

PARAMETER	SYMBOL	MIN	MAX	UNIT
Operating Temperature	TA	-40	105	°C
Supply Voltage	VCC	15	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=100μA	
Input Threshold Current	IFLH	-	2.0	4.0	mA	Rg=10Ω, Cg=22nF, VO>5V	
Input Threshold Voltage	VFHL	0.8	1.2	-	V	Rg=10Ω, Cg=22nF, VO<5V	
Input Capacitance	Cin	-	33	-	pF	VF=0, f=1MHz	
OUTPUT CHARACTERISTICS							
High Level Supply Current	ICCH	-	1.6	3.0	mA	IF=10mA, Rg=10Ω, Cg=22nF	
Low Level Supply Current	ICCL	-	1.9	3.0	mA	VF=0V, Rg=10Ω, Cg=22nF	
High Level Output Voltage	VOH	VCC-0.3	VCC-0.15	-	V	IF= 10mA, IO= -100mA	
Low Level Output Voltage	VOL	-	0.07	0.2	V	IF= 0mA, IO= 100mA	
High Level Output Current	IOH	-	-2.6	-1.0	A	VO= VCC-4V	1
		-	-	-2.5	A	VO≥VCC-15V	2
Low Level Output Current	IOL	1.0	2.6	-	A	VO= VEE+2.5V	1
		2.5	-	-	A	VO≤VEE+15V	2
Under Voltage Lockout Threshold	VUVLO+	11	12.5	13.5	V	IF= 10mA, VO> 5V	
	VUVLO-	9.5	11	12	V	IF= 10mA, VO< 5V	
UVLO Hysteresis	UVLO _{HYS}	-	1.5	-	V		
Isolation Resistance	Riso	10 ⁹	-	-	Ω	DC500V, 40 ~ 60% R.H.	

Note1. Maximum pulse width = 50μs

Note2. Maximum pulse width = 10μs



MP341 Series

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

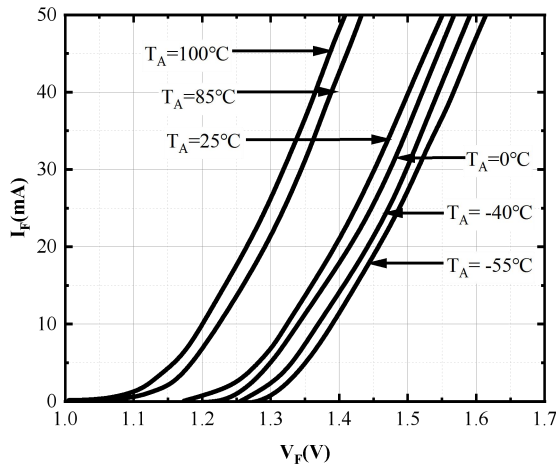
PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT	TEST CONDITION	NOTE
SWITCHING CHARACTERISTICS							
Propagation Delay Time to Output Low Level	TPHL	50	90	200	ns	IF= 10mA, Cg= 22nF Rg= 10Ω, f= 20kHz Duty = 50%	
Propagation Delay Time to Output High Level	TPLH	50	95	200			
Pulse Width Distortion	PWD	-	22	70			
Propagation Delay Difference Between Any Two Parts	PDD	-100	-	100			1
Rise Time	tr	-	35	-			
Fall Time	tf	-	35	-			
Common Mode Transient Immunity at Logic High	CM _H	35	50	-	kV/μs	IF=10mA, VCC=30V, VCM= 1.5KV	2
Common Mode Transient Immunity at Logic Low	CM _L	35	50	-	kV/μs	VF=0V, VCC= 30V, VCM= 1.5KV	3

Note1. The difference between t_{PHL} and t_{PLH} between any two parts series parts under same test conditions.

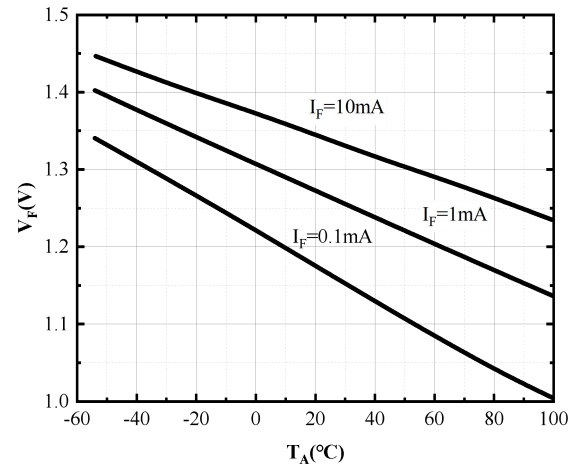
Note2. CMH is the maximum rate of rise of the common mode voltage that can be sustained with the output voltage in the logic high state (V_O > 15 V).

Note3. CML is the maximum rate of fall of the common mode voltage that can be sustained with the output voltage in the logic low state (V_O < 1 V).

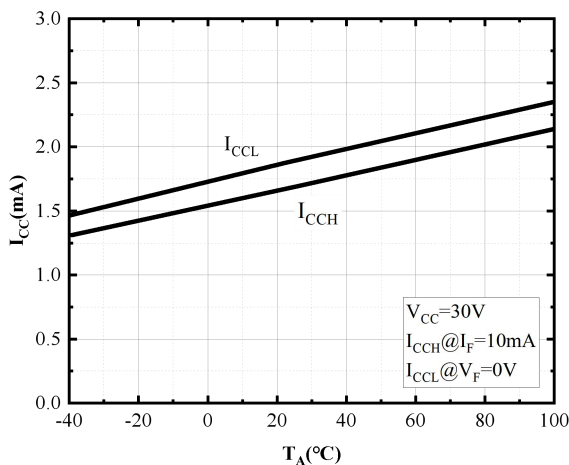
CHARACTERISTIC CURVES



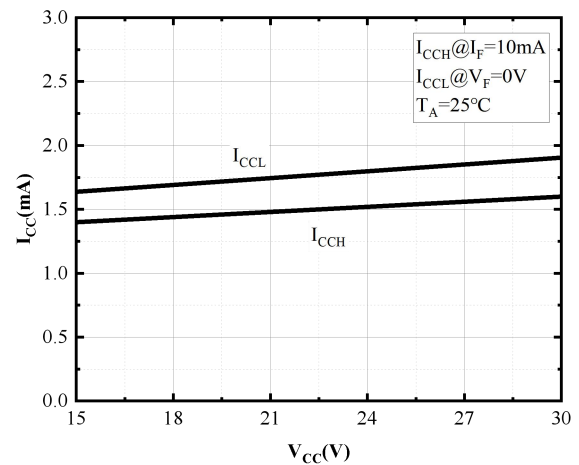
**Fig.1 Forward Current
vs. Forward Voltage**



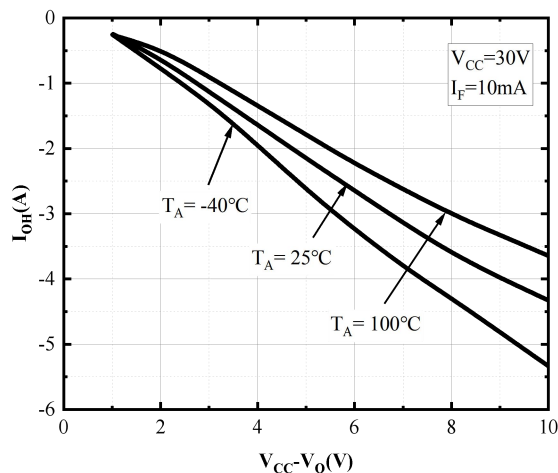
**Fig.2 Forward Voltage
vs. Ambient Temperature**



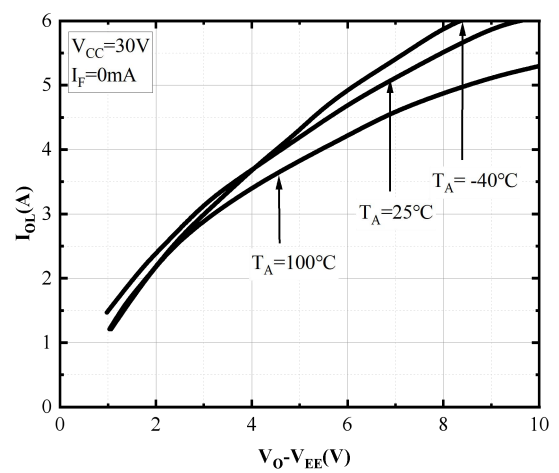
**Fig.3 Supply Current
vs. Ambient Temperature**



**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

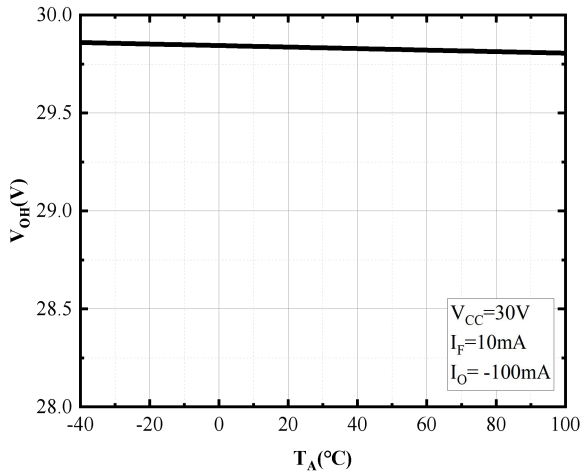


Fig.7 High Level Output Voltage vs. Ambient Temperature

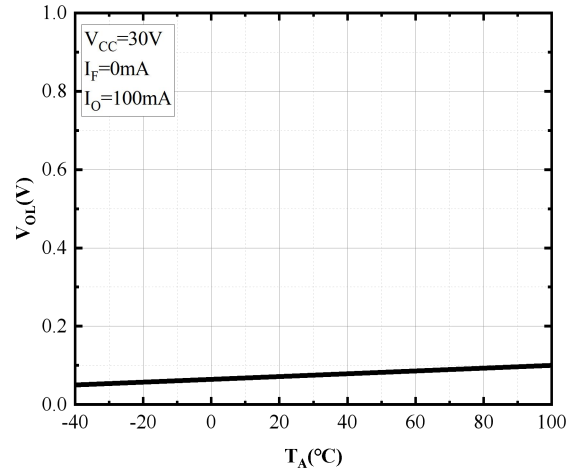


Fig.8 Low Level Output Voltage vs. Ambient Temperature

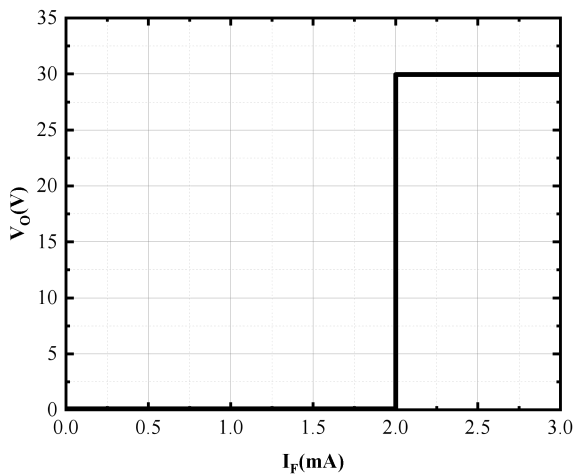


Fig.9 Output Voltage vs. Forward Current

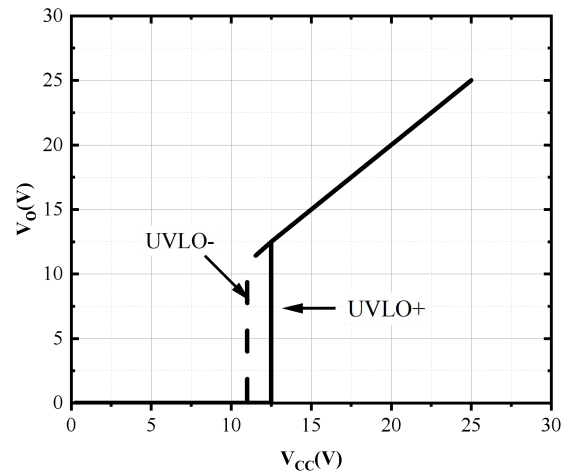


Fig.10 Output Voltage vs. Supply Voltage

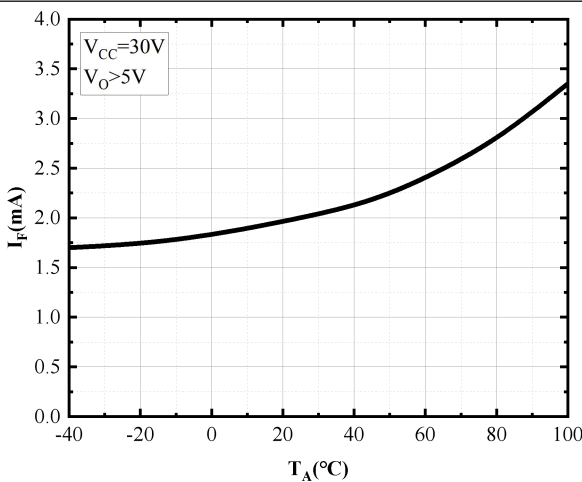


Fig.11 Forward Current vs. Ambient Temperature

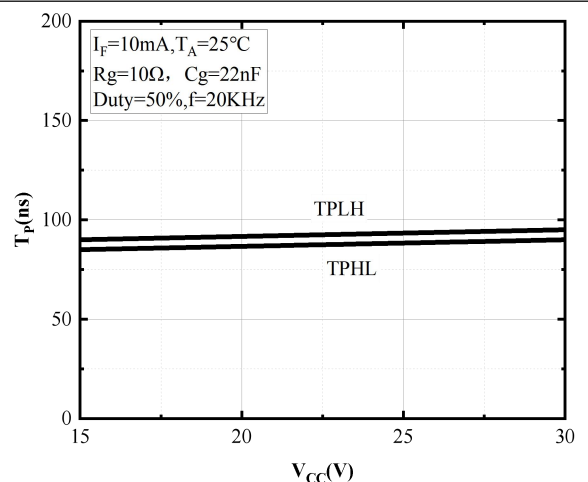
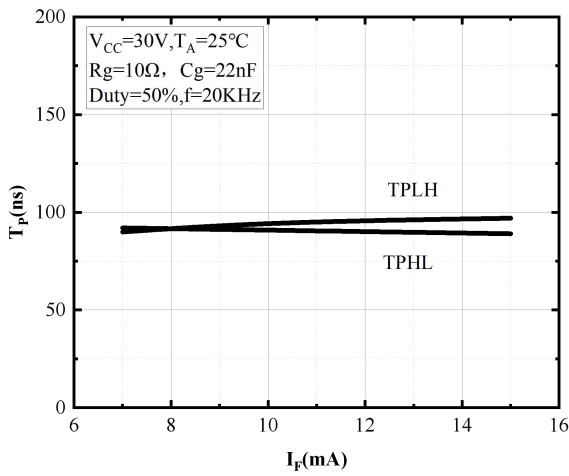
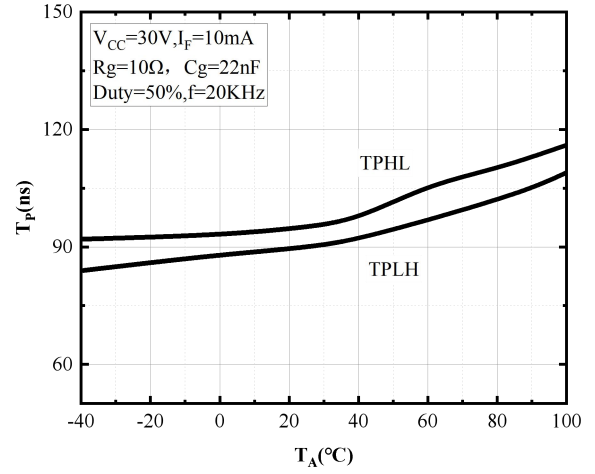


Fig.12 Propagation Delay vs. Supply Voltage

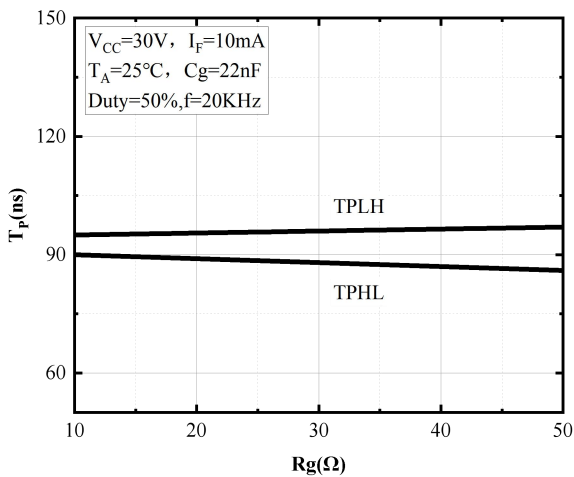
CHARACTERISTIC CURVES



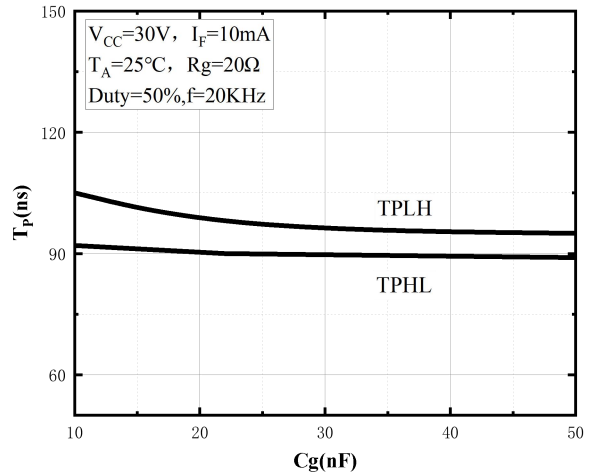
**Fig.13 Propagation Delay
vs. Forward Current**



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



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



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

TEST CIRCUITS

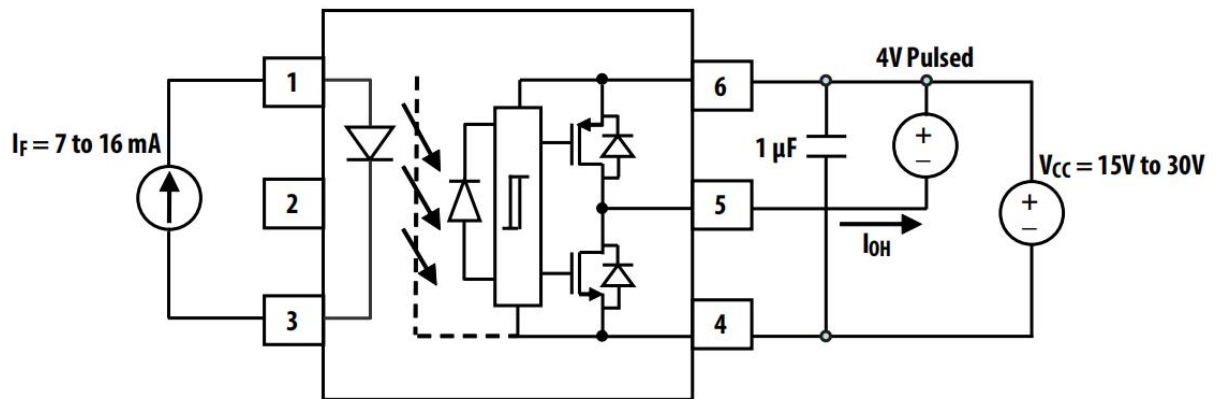


Fig.17 Test Circuits for IOH

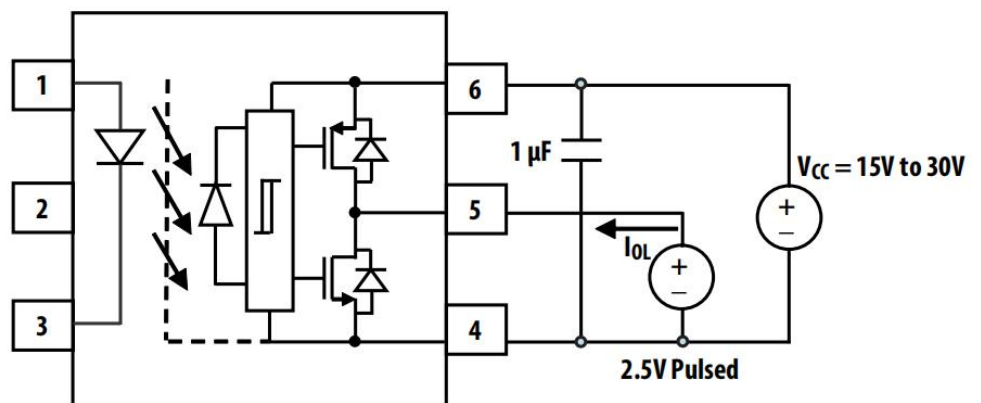


Fig.18 Test Circuits for IOL

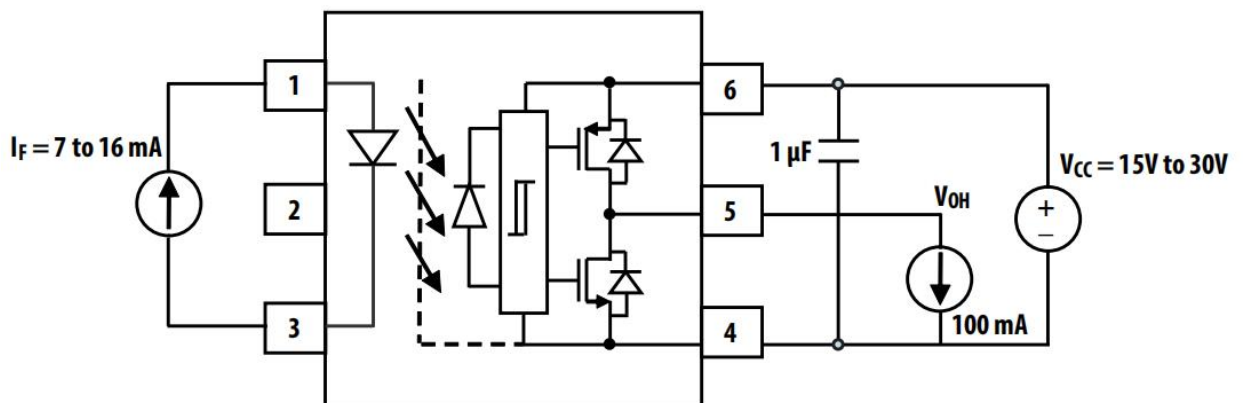


Fig.19 Test Circuits for VOH

TEST CIRCUITS

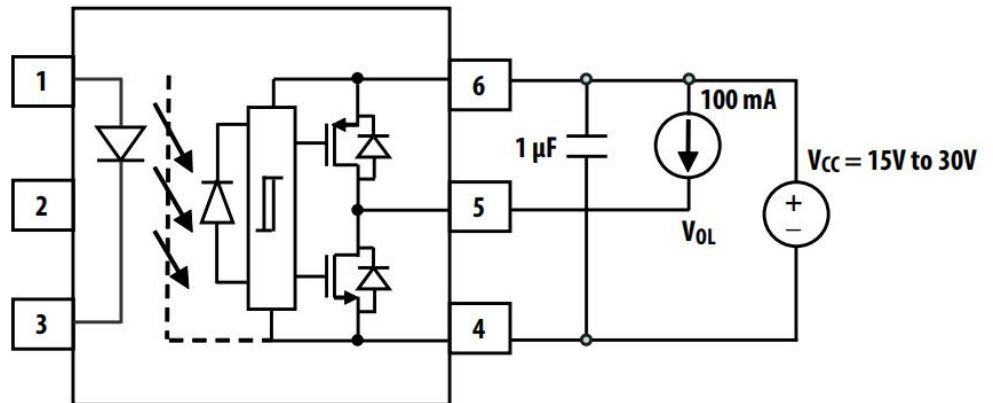


Fig.20 Test Circuits for V_{OL}

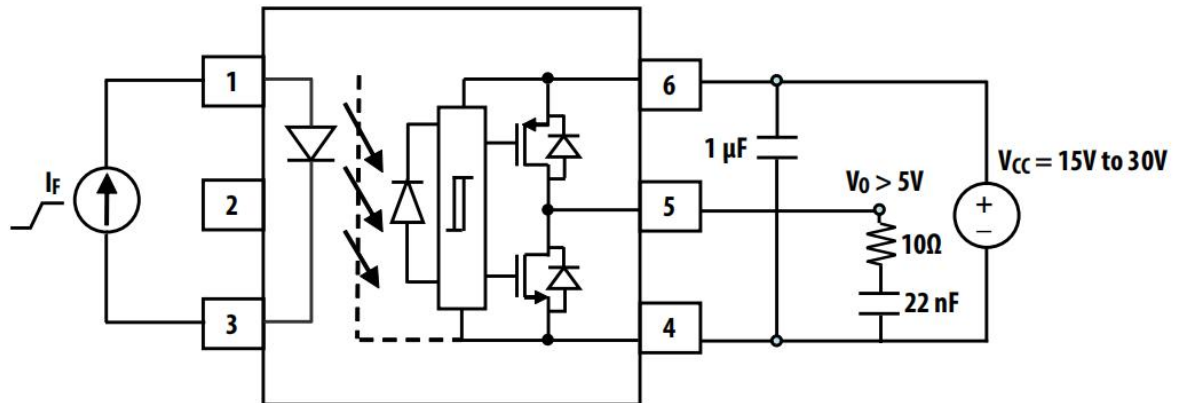


Fig.21 Test Circuits for I_{FHL}

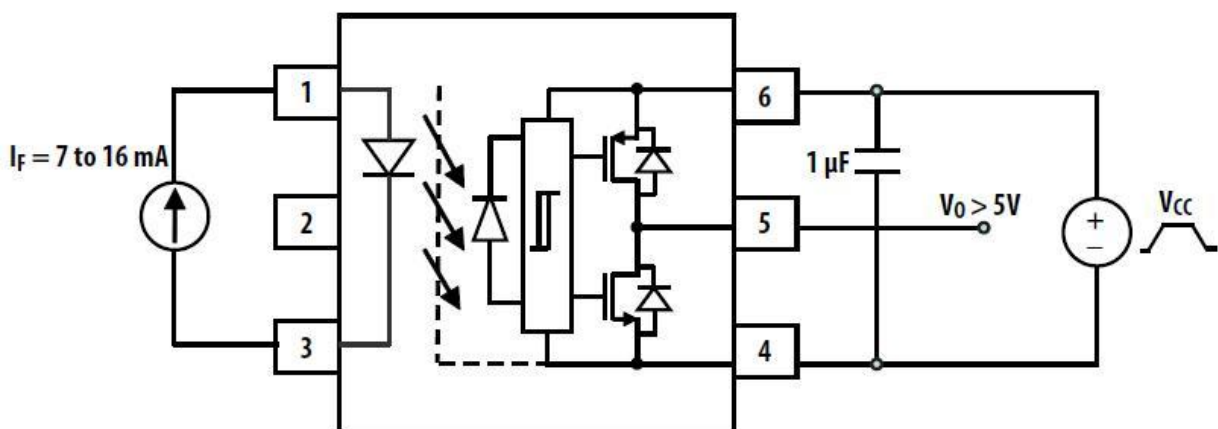


Fig.22 Test Circuits for UVLO

TEST CIRCUITS

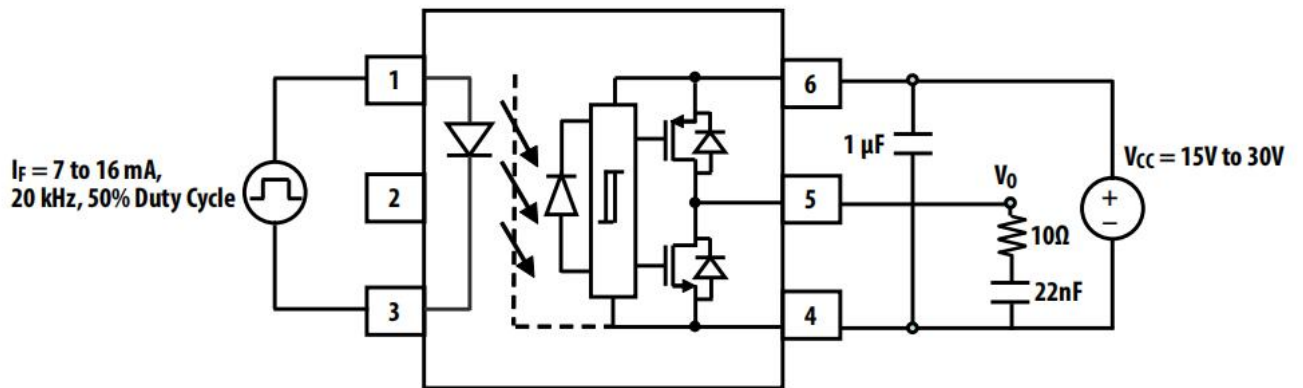


Fig.23 Test Circuits for TPHL, TPLH, tr, tf

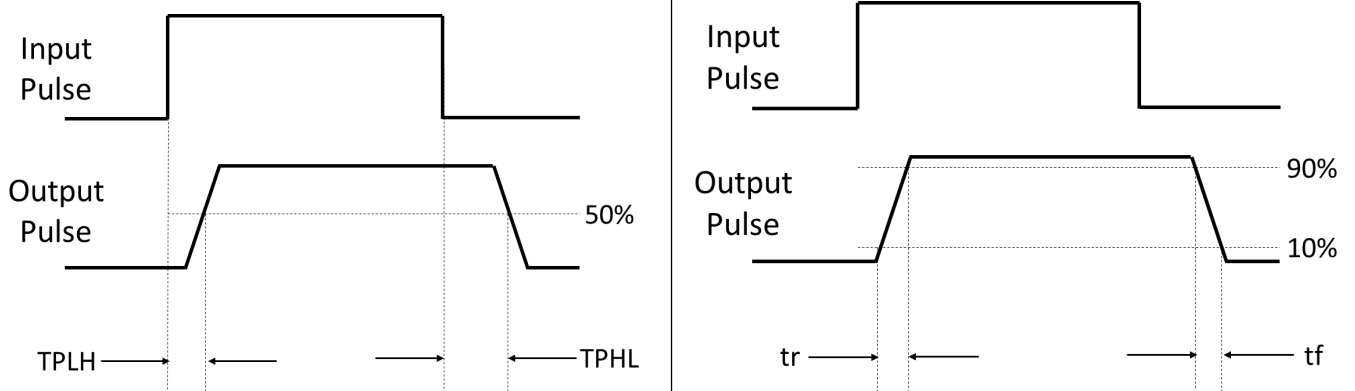


Fig.24 Wave forms of TPLH, TPLH, tr, tf

TEST CIRCUITS

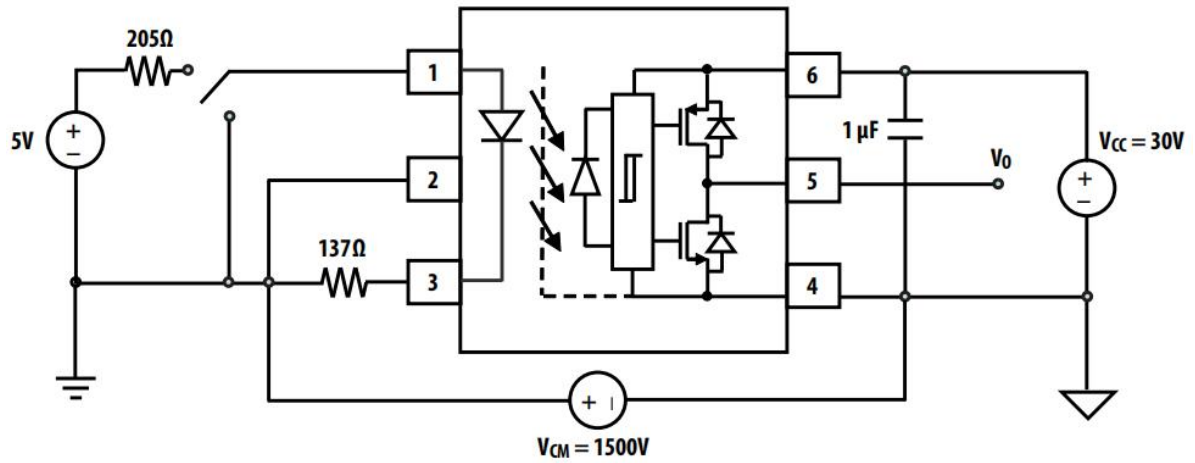


Fig.25 Test Circuits for Common Mode Transient Immunity

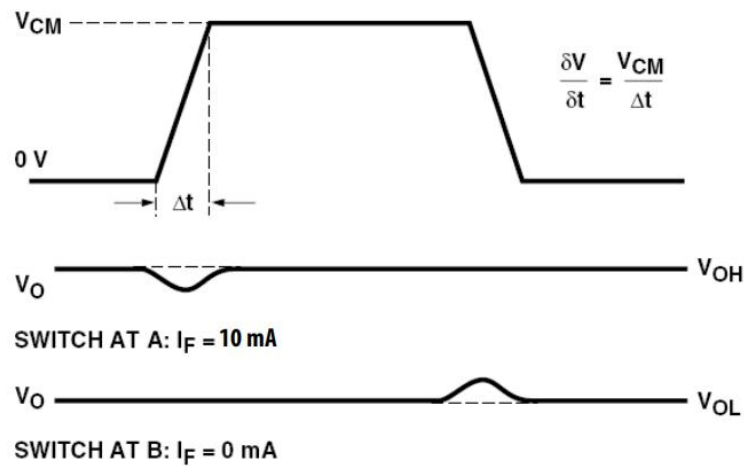
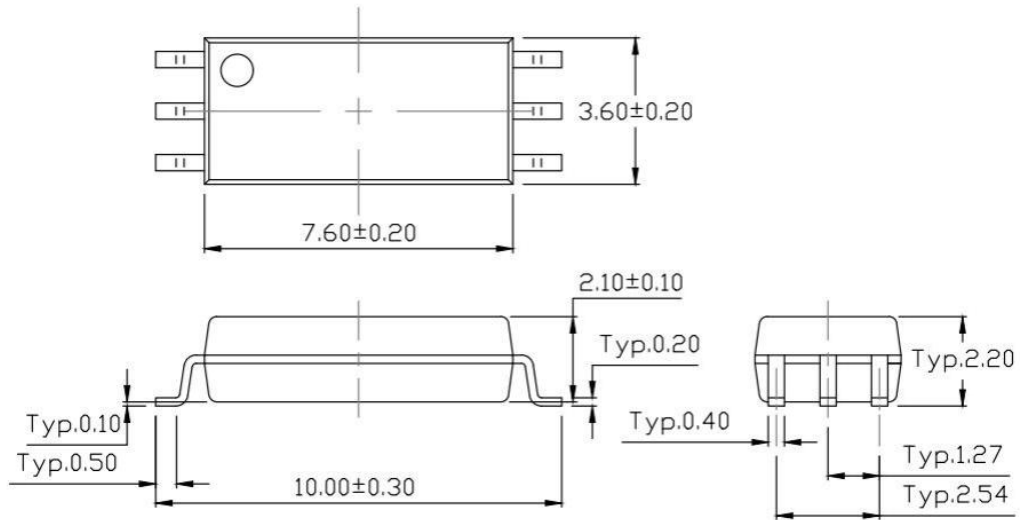


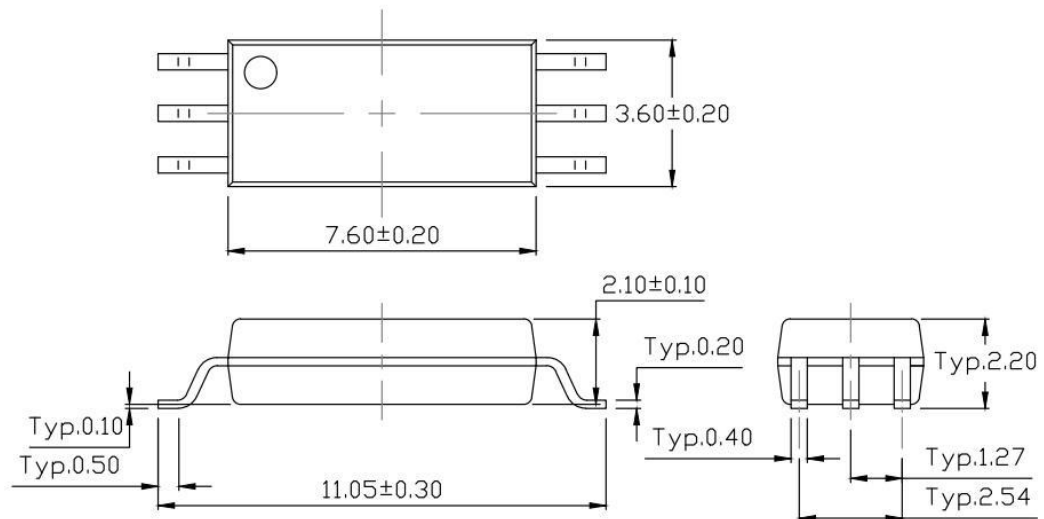
Fig.26 Waveforms of Common Mode Transient Immunity

PACKAGE DIMENSIONS (Dimensions in mm unless otherwise stated)

Standard P Type

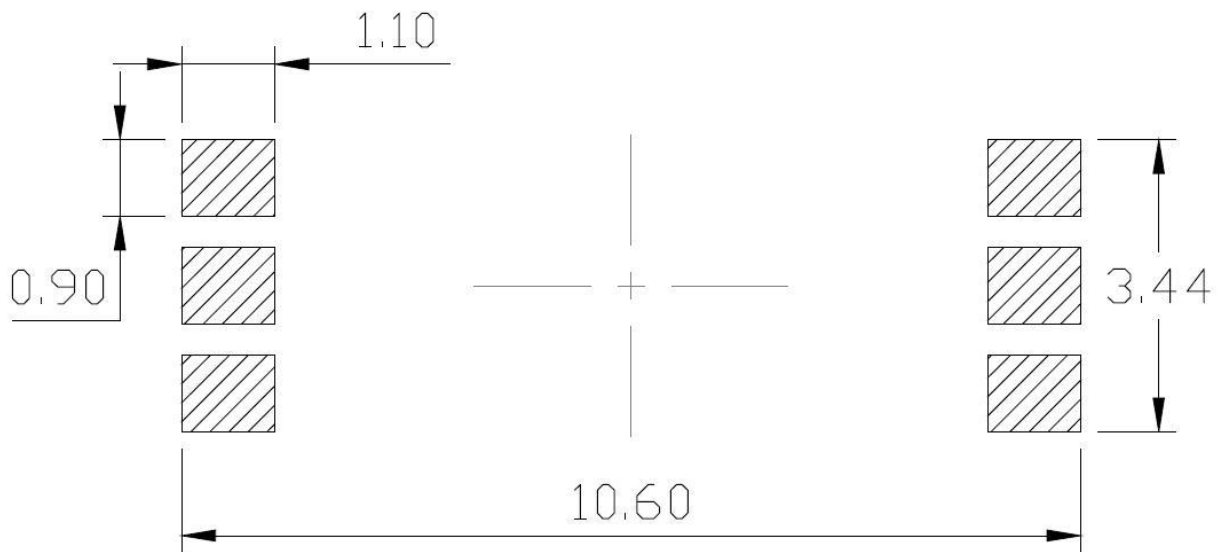


Standard W Type

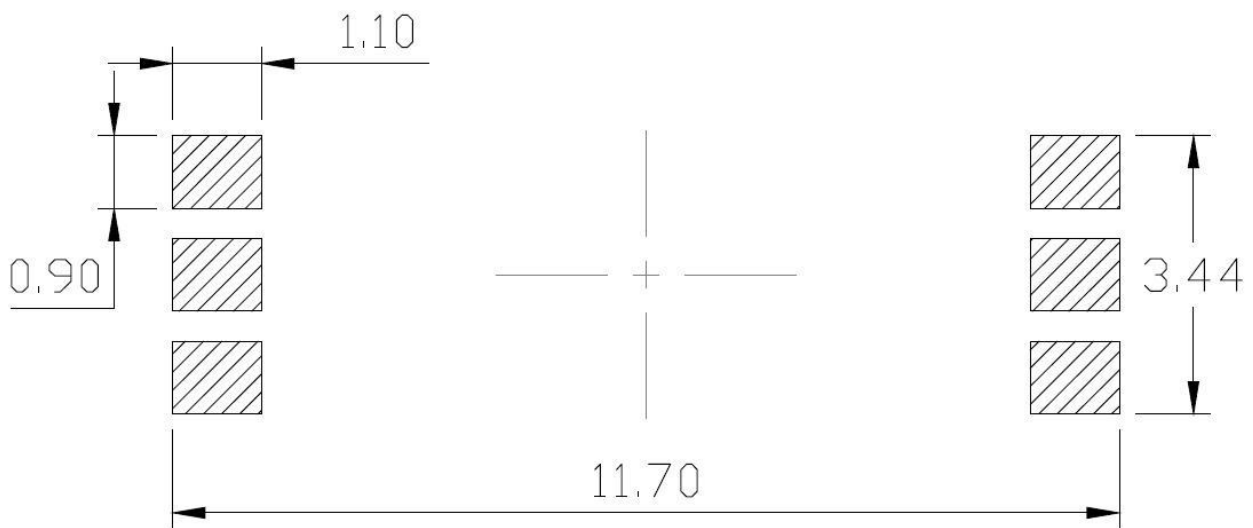


Recommended Solder Mask (Dimensions in mm unless otherwise stated)

Standard P Type

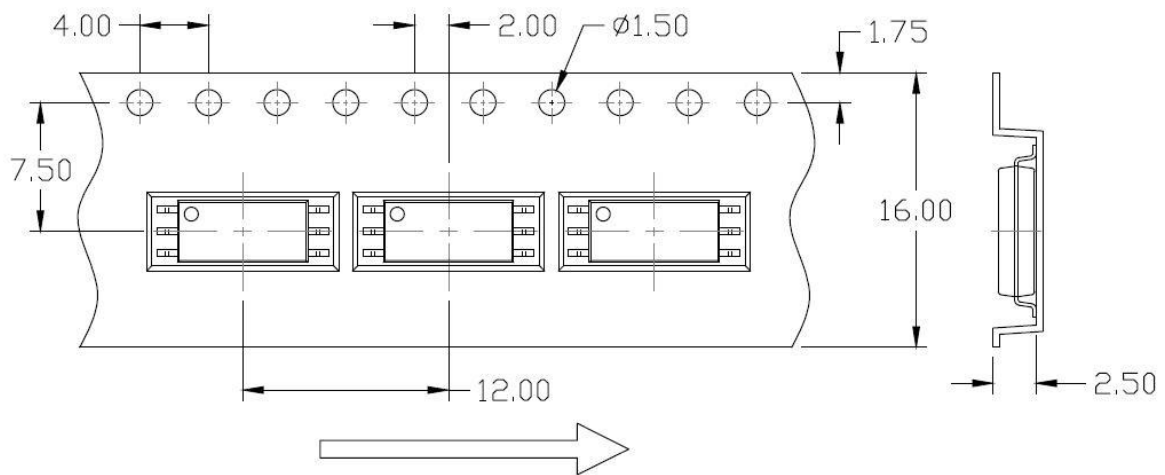


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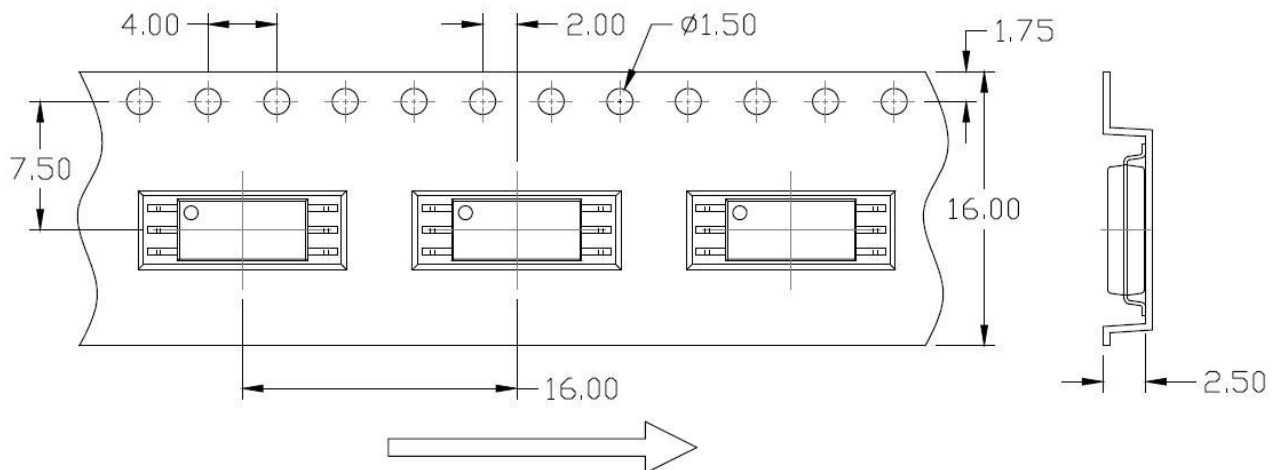


CARRIER TAPE SPECIFICATIONS (Dimensions in mm unless otherwise stated)

Option P(T3)

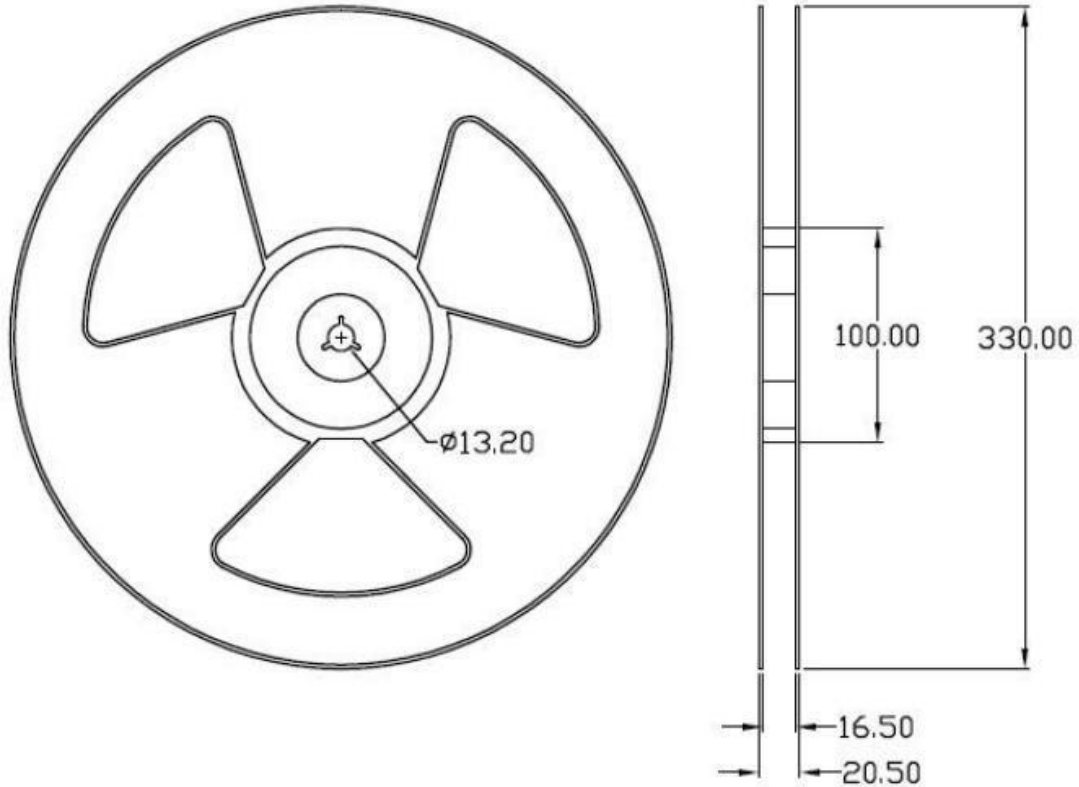


Option W(T3)



REEL SPECIFICATIONS (Dimensions in mm unless otherwise stated)

Option



ORDERING AND MARKING INFORMATION

MARKING INFORMATION

	MP	: Company Abbr.
	341	: 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

MP341(Y)(Z)-GV(XN)

MP -Company Abbr.

341 -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)

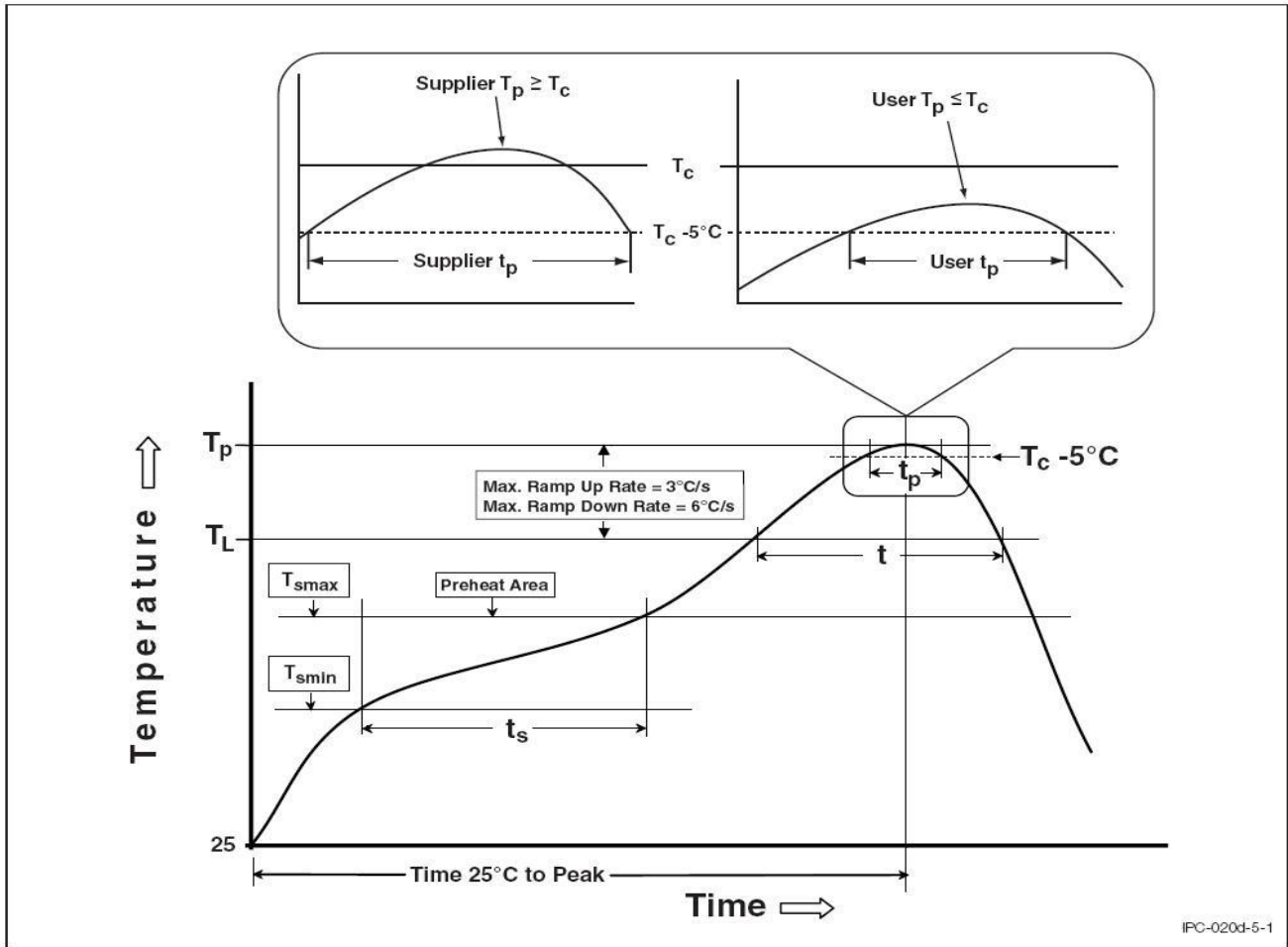
(XN) - Customer Specified Option(X:A~Z or None; N:1~9 or None)

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