

### ■ Features

- High isolation 5000 VRMS
- DC input with a high speed driver
- Operating temperature range - 40 °C to 100 °C
- Rail to rail output
- REACH & RoHS compliance
- Halogen free (Optional)
- MSL class 1
- Regulatory Approvals
  - UL - UL1577
  - VDE - EN60747-5-5
  - CQC – GB4943.1-2022

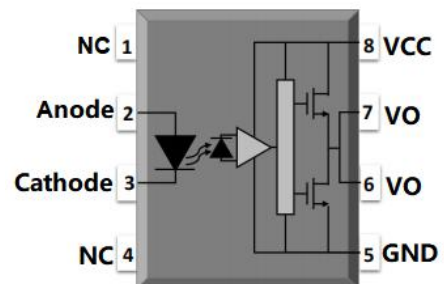
### ■ Applications

- IGBT/MOSFET gate drive
- Uninterruptible power supply
- Industrial Inverter
- AC/Brushless DC motor drives
- Switching power suppliers

### ■ Description

The MPC3120R series combine an AlGaAs infrared emitting diode as the emitter which is optically coupled to an integrated circuit with a power output stage in a plastic DIP8 package with different lead forming options.

### ■ Schematic





**MPC3120R Series**  
**DIP8, DC Input, 2.5A, Gate Driver Photo Coupler**

ABSOLUTE MAXIMUM RATINGS				
PARAMETER	SYMBOL	VALUE	UNIT	Note
INPUT				
Forward Current	IF	25	mA	
Peak Forward Current	IFP	50	mA	1
Peak Transient Current	IF(trans)	1	A	2
Operating Frequency	f	50	kHz	
Reverse Voltage	VR	5	V	
Input Power Dissipation	PI	100	mW	
OUTPUT				
Supply Voltage	VCC	35	V	
Output Voltage	VO	35	V	
Peak Output Current	IO	2.5	A	
Output Power Dissipation	PO	250	mW	
COMMON				
Total Power Dissipation	Ptot	295	mW	
Isolation Voltage	Viso	5000	Vrms	3
Operating Temperature	Topr	-55~100	°C	
Storage Temperature	Tstg	-55~125	°C	
Soldering Temperature	Tsol	260	°C	4

Note 1. 50% duty, 1ms P.W

Note 2.  $\leq 1\mu\text{s}$  P.W, 300pps

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

Note 4. For 10 seconds

TRUTH TABLE			
LED	VDD-VSS "Positive Going" (Turn-on)	VDD-VSS "Negative Going" (Turn-off)	VO
Off	0V to 30V	0V to 30V	Low
On	0V to 11.5V	0V to 10V	Low
On	11.5V to 13.5V	10V to 12V	Transition
On	13.5V to 30V	12V to 30V	High



# MPC3120R Series

## DIP8, DC Input, 2.5A, Gate Driver Photo Coupler

### RECOMMENDED OPERATION CONDITIONS

PARAMETER	SYMBOL	MIN.	MA.	UNIT
Operating Temperature	TA	-40	100	°C
Supply Voltage	VCC	15	30	V
Input Current (ON)	IF(ON)	7	16	mA
Input Voltage (OFF)	VF(OFF)	0	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
<b>INPUT CHARACTERISTICS</b>							
Forward Voltage	VF	-	1.38	1.8	V	IF=10mA	
Reverse Current	IR	-	-	10	μA	VR=5V	
Input Capacitance	Cin	-	13	-	pF	V=0, f=1MHz	
<b>OUTPUT CHARACTERISTICS</b>							
High Level Supply Current	ICCH	-	1.66	3	mA	IF= 7mA to 10mA, VO= Open	
Low Level Supply Current	ICCL	-	1.8	3	mA	VF = 0 to 0.8V, VO= Open	
<b>TRANSFER CHARACTERISTICS</b>							
High Level Output Voltage	VOH	VCC-0.3	VCC-0.1	-	V	IF= 10mA, IO= -100mA	
Low Level Output Voltage	VOL	-	VEE+0.1	VEE+0.25	V	IF= 0mA, IO= 100mA	
High Level Output Current	IOPH	-1	-	-	A	VO= VCC-1.5V	
		-2.5	-	-	A	VO= VCC-4V	
Low Level Output Current	IOPL	1	-	-	A	VO= VEE+1.5V	
		2.5	-	-	A	VO= VEE+4V	
Input Threshold Current	IFLH	-	2.38	5	mA	IO= 0mA, VO> 5V	
Input Threshold Voltage	VFHL	0.8	-	-	V	IO= 0mA, VO< 5V	
Under Voltage Lockout Threshold	VUVLO+	11	13.01	13.5	V	IO= 10mA, VO> 5V	
	VUVLO-	9.5	11.01	12	V	IO= 10mA, VO< 5V	
Isolation Resistance	Riso	10 <sup>12</sup>	10 <sup>14</sup>	-	Ω	DC500V, 40 ~ 60% R.H.	
Floating Capacitance	CIO	-	1.0	-	pF	V=0, f=1MHz	



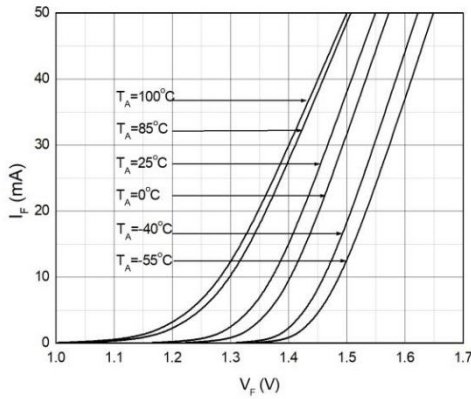
# MPC3120R Series

## DIP8, DC Input, 2.5A, Gate Driver Photo Coupler

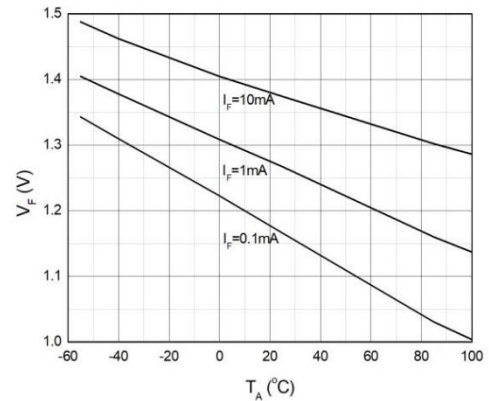
### ELECTRICAL OPTICAL CHARACTERISTICS (VCC=30V, VEE=GND, TA=25°C unless specified otherwise)

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITION	NOTE
<b>SWITCHING CHARACTERISTICS</b>							
Propagation Delay Time to Output Low Level	TPHL	50	103	500	ns	IF= 7 to 16mA, CL= 10nF, RL= 10Ω, f= 10kHz, Duty = 50%, TA= 25 °C	
Propagation Delay Time to Output High Level	TPLH	50	83	500	ns		
Pulse Width Distortion	TPHL-TPLH	-	20	200	ns		
Propagation Delay Skew	tPSK	-100	-	100	ns		
Rise Time	tr	-	13	-	ns		
Fall Time	tf	-	13	-	ns		
UVLO Turn On Delay	tUVLO(ON)	-	1.6	-	μs	IF= 10mA, VO> 5V	
UVLO Turn Off Delay	tUVLO(OFF)	-	0.4	-	μs	IF= 10mA, VO< 5V	
Common Mode Transient Immunity at Logic High	CMH	-20	-	-	kV/μs	IF=7 to16mA, VCC=30V,TA=25 °C, VCM= 2kV	
Common Mode Transient Immunity at Logic Low	CML	20	-	-	kV/μs	IF=0mA VCC= 30V, RL, TA= 25 °C, VCM= 2kV	

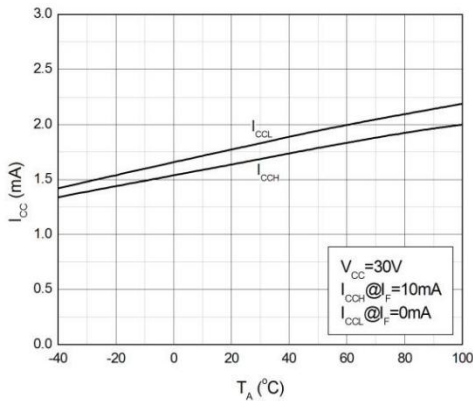
**CHARACTERISTIC CURVES**



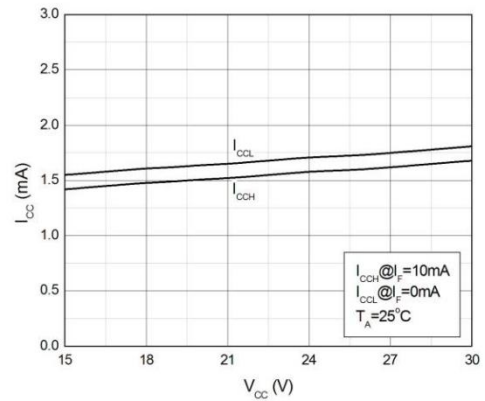
**Fig.1 Forward Current vs. Forward Voltage**



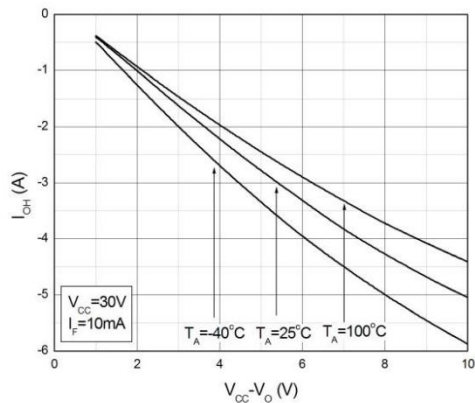
**Fig.2 Forward Voltage vs. Ambient Temperature**



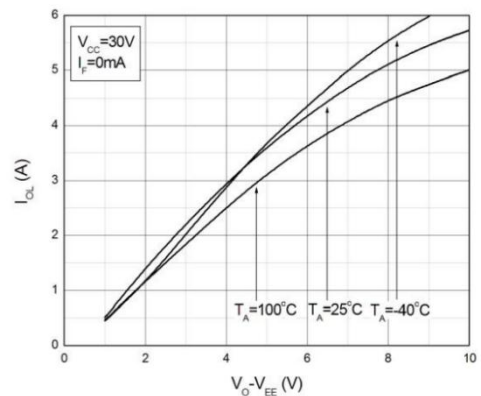
**Fig.3 Supply Current vs. Ambient Temperature**



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

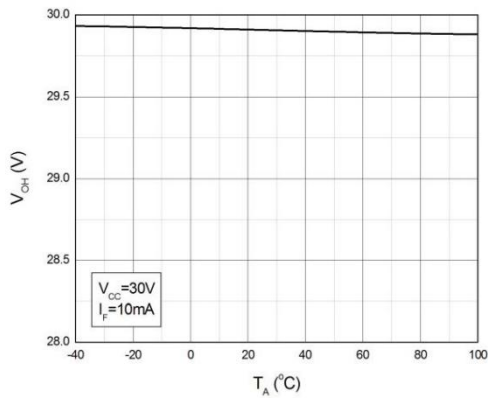


**Fig.5 High Level Output Voltage vs. High Level Output Current**

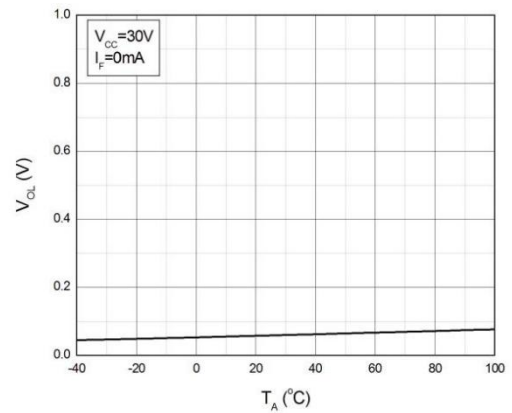


**Fig.6 Low Level Output Voltage vs. Low Level Output Current**

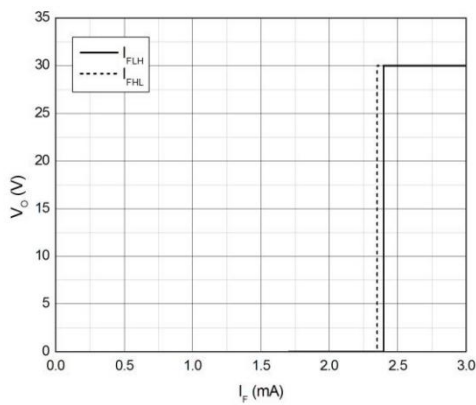
**CHARACTERISTIC CURVES**



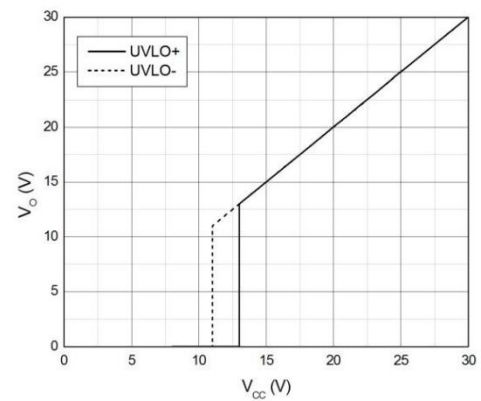
**Fig.7 High Level Output Voltage vs. Ambient Temperature**



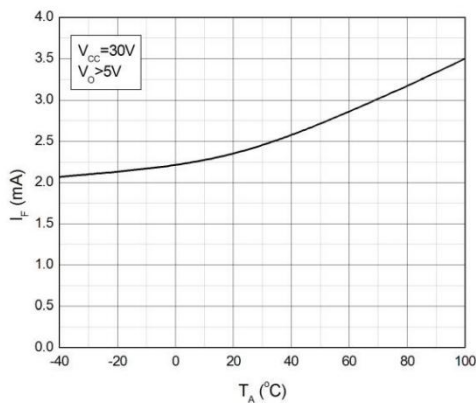
**Fig.8 Low Level Output Voltage vs. Ambient Temperature**



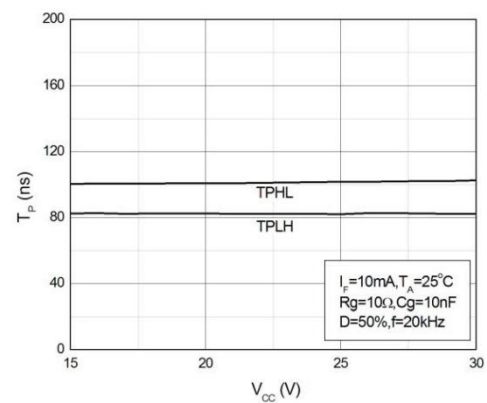
**Fig.9 Output Voltage vs. Forward Current**



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

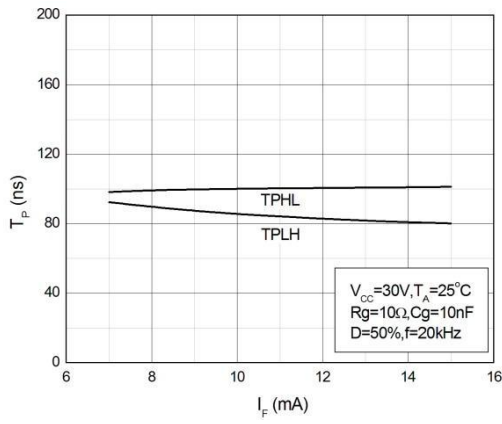


**Fig.11 Forward Current vs. Ambient Temperature**

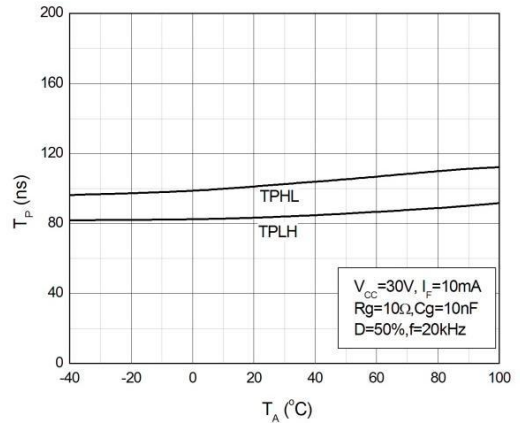


**Fig.12 Propagation Delay vs. Supply Voltage**

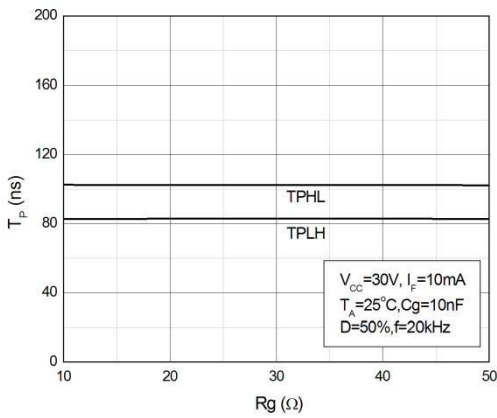
**CHARACTERISTIC CURVES**



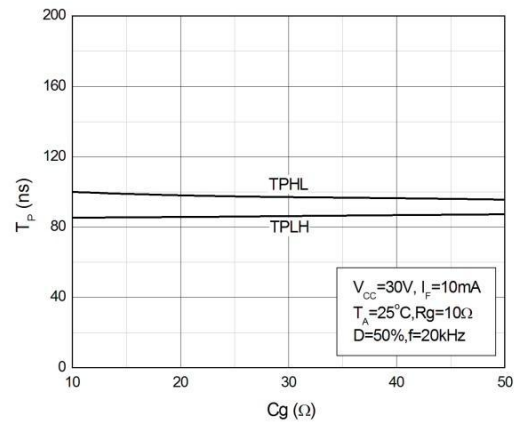
**Fig.13 Propagation Delay vs. Forward Current**



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

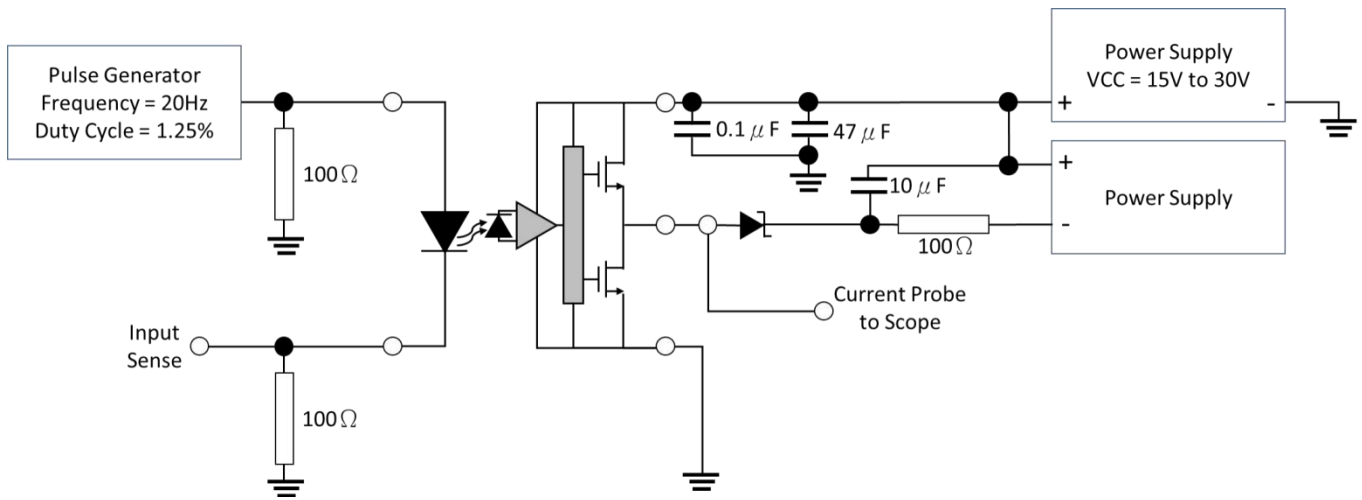


**Fig.15 Propagation Delay vs. Load Resistance**

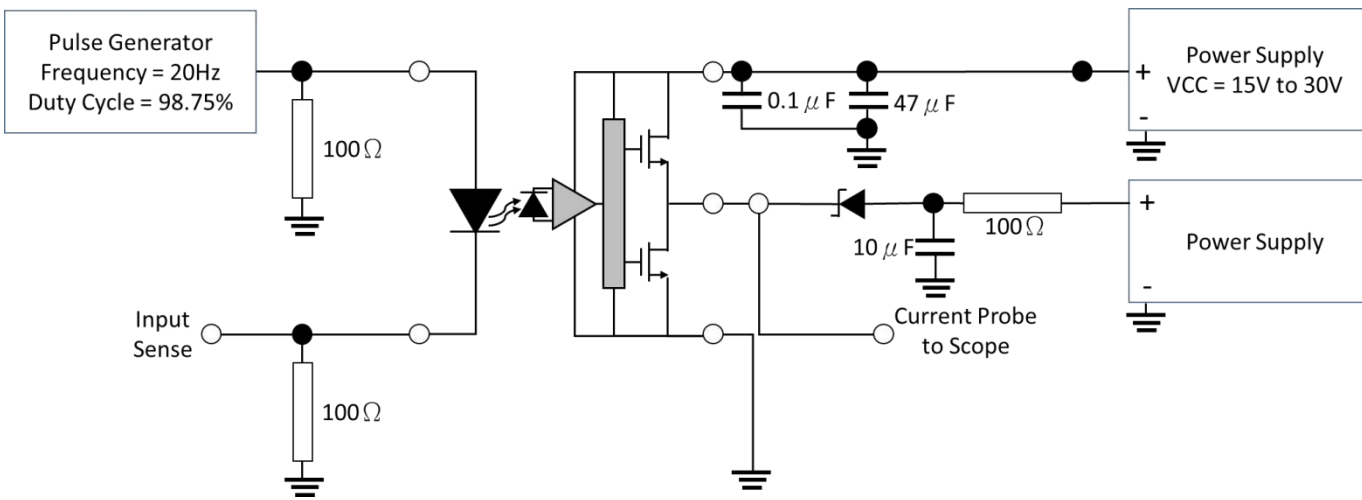


**Fig.16 Propagation Delay vs. Load Capacitance**

**TEST CIRCUITS**



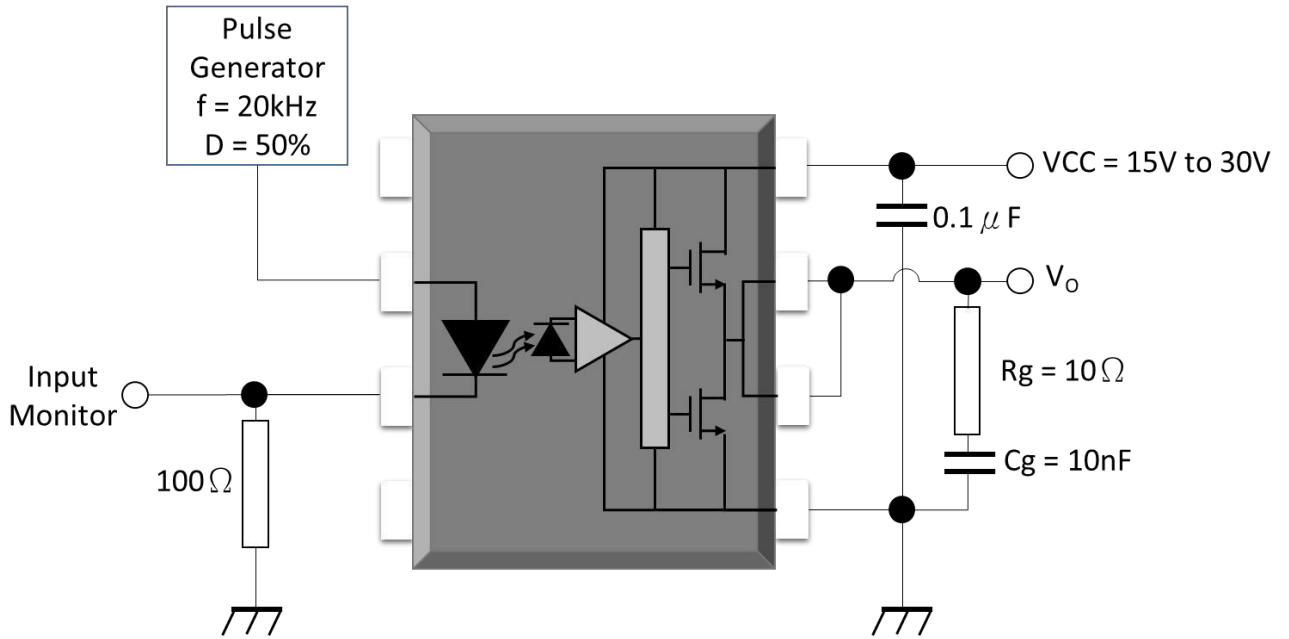
**Fig.17 Test Circuits for IOH**



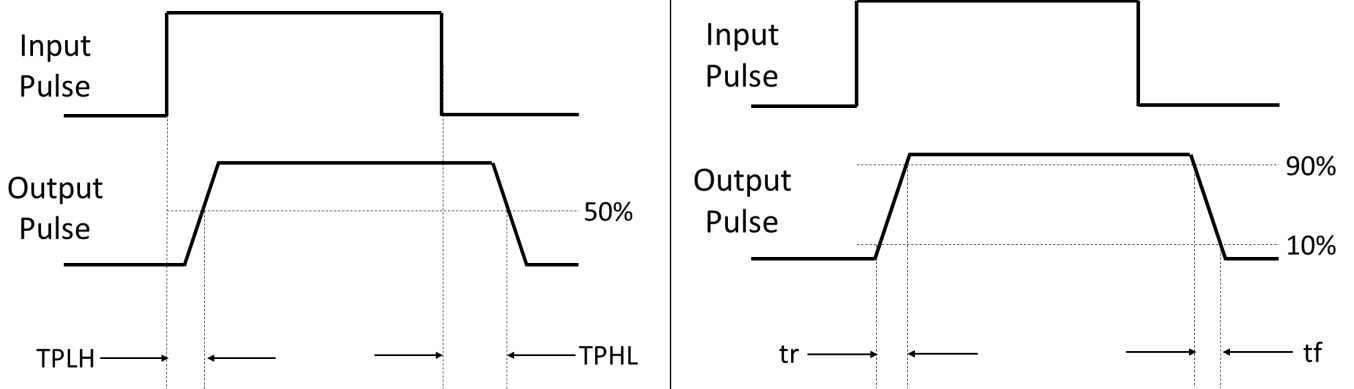
**Fig.18 Test Circuits for IOL**



**TEST CIRCUITS**

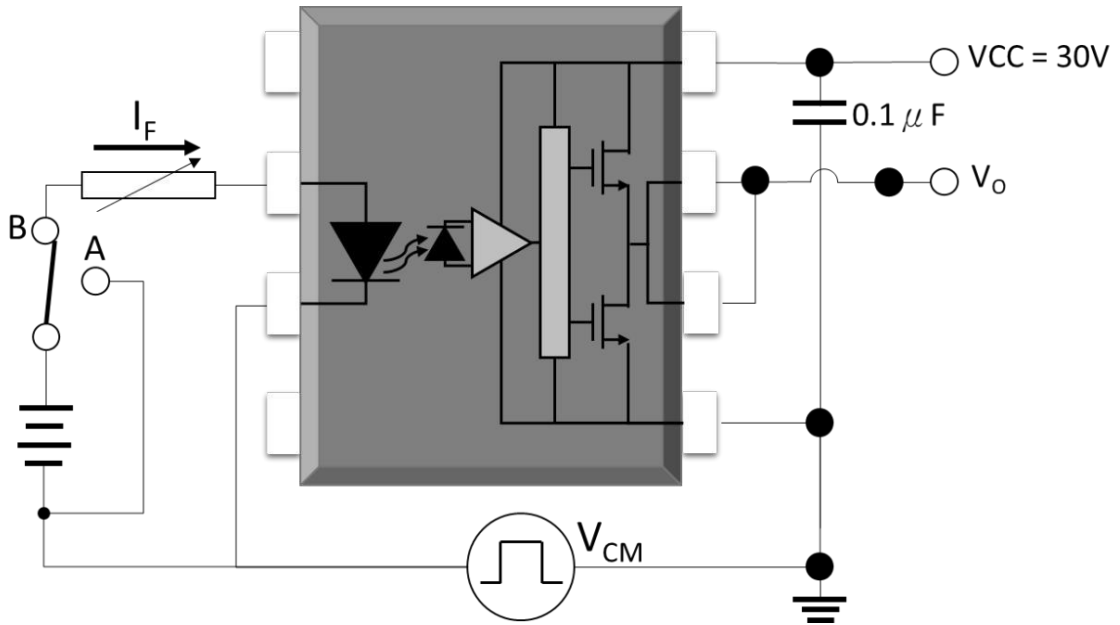


**Fig.19 Test Circuits for TPHL, TPLH, tr, tf**

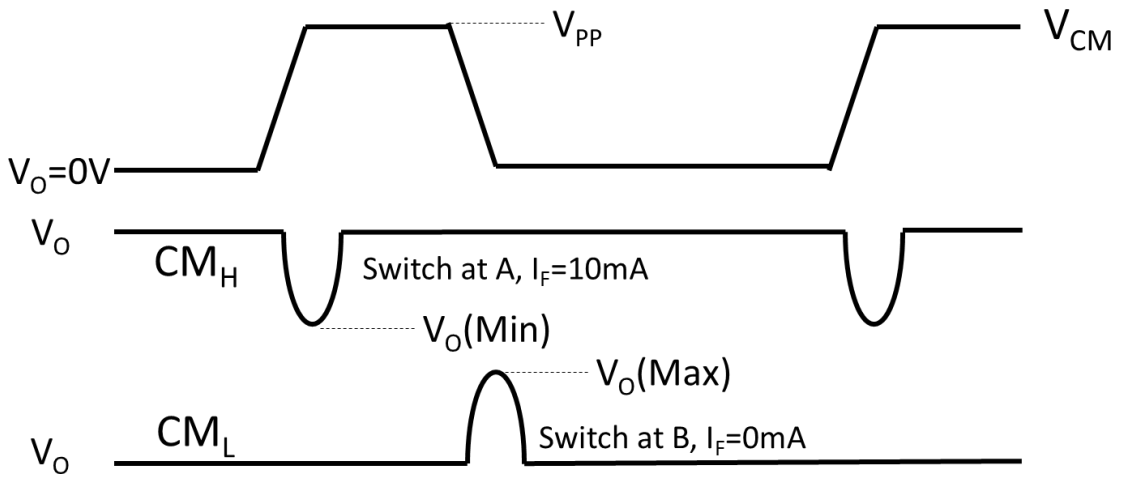


**Fig.20 Waveforms of TPHL, TPLH, tr, tf**

**TEST CIRCUITS**



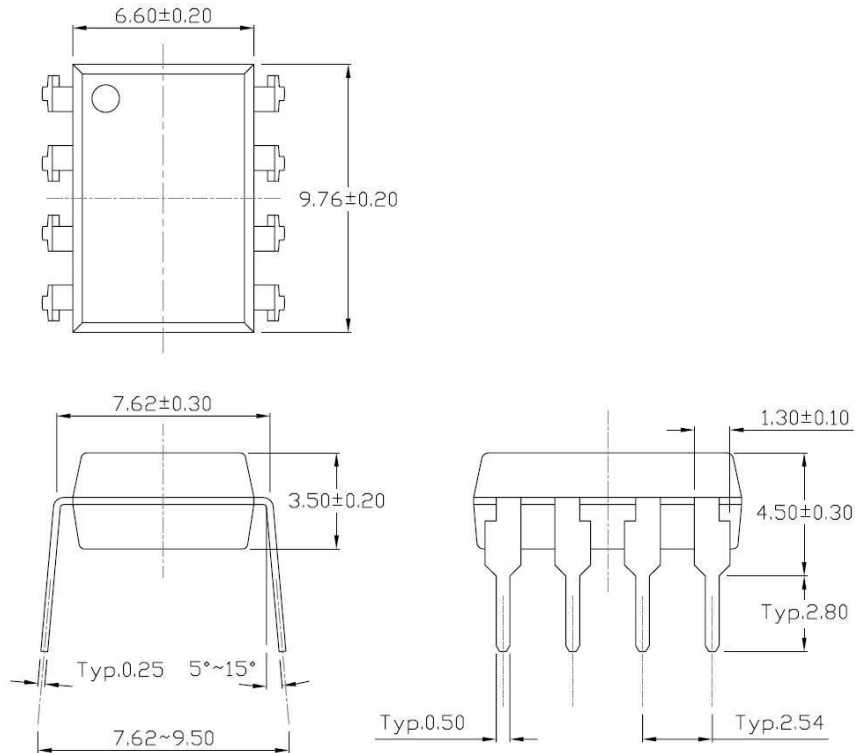
**Fig.21 Test Circuits for Common Mode Transient Immunity**



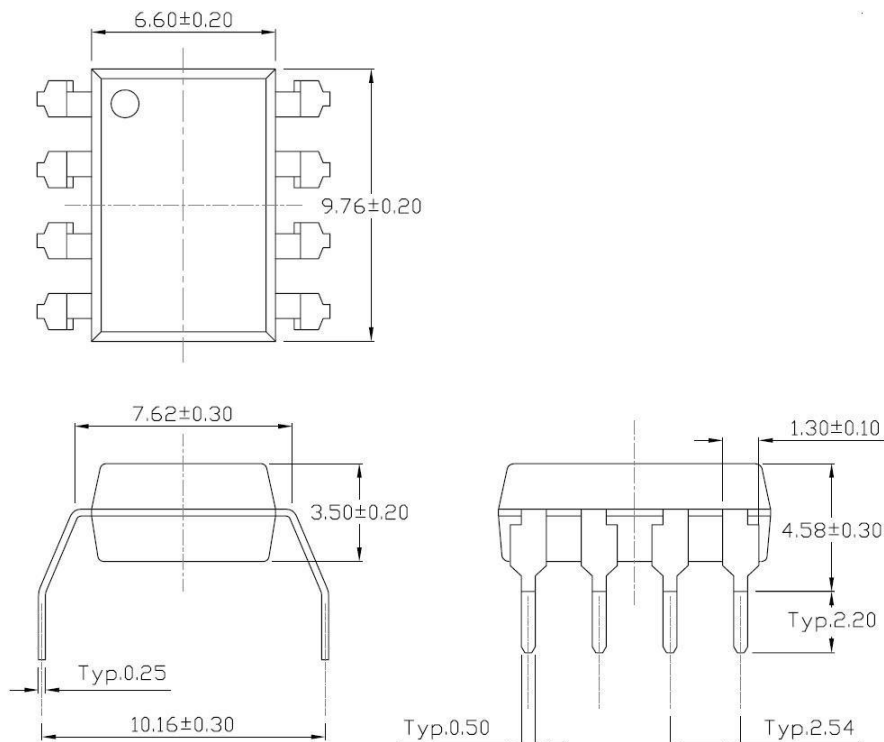
**Fig.22 Waveforms of Common Mode Transient Immunity**

**PACKAGE DIMENSIONS (Dimensions in mm unless otherwise stated)**

**Standard DIP – Through Hole (DIP Type)**

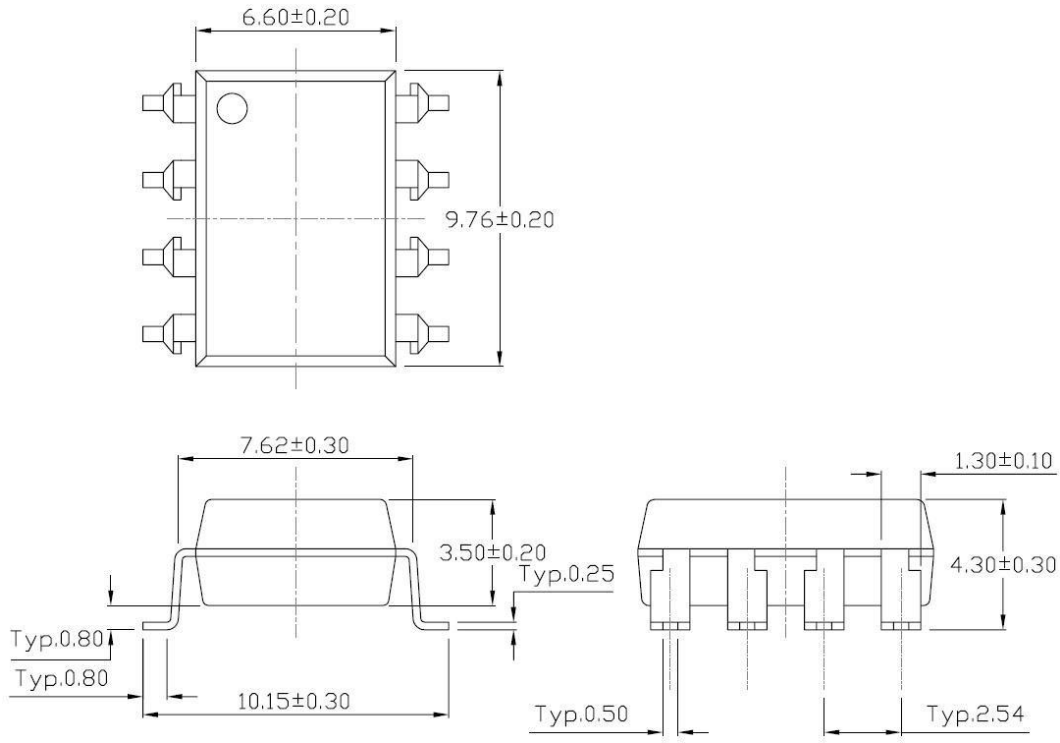


**Gullwing (400mil) Lead Forming – Through Hole (M Type)**

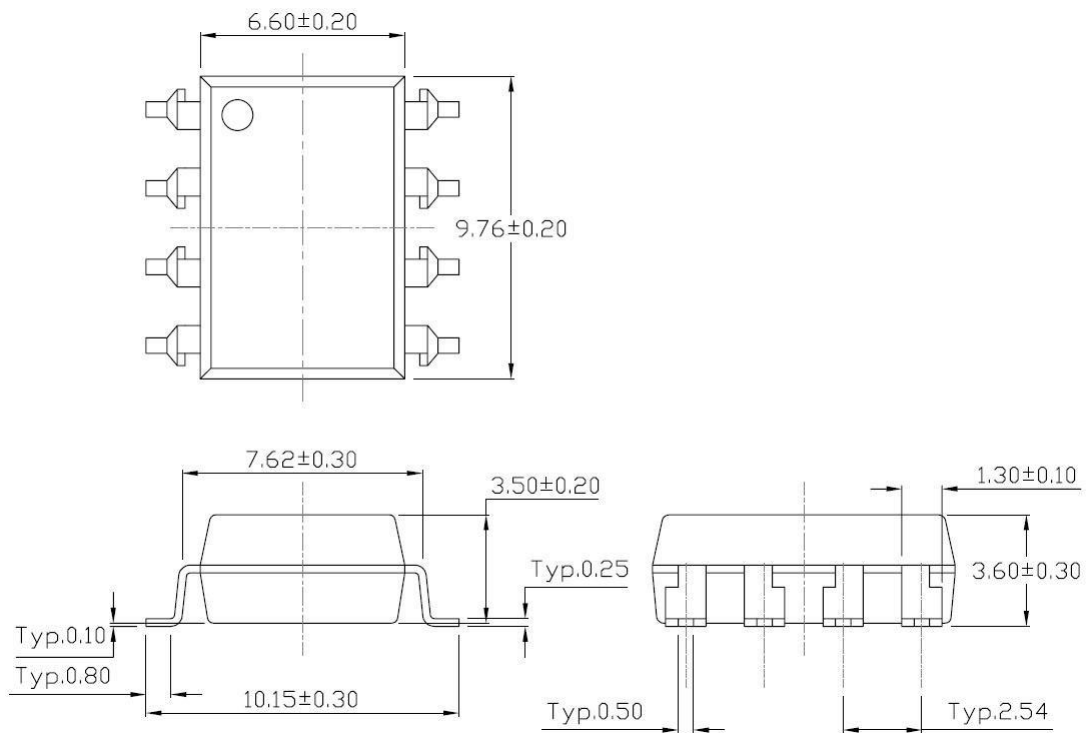


**PACKAGE DIMENSIONS (Dimensions in mm unless otherwise stated)**

**Surface Mount Lead Forming (S Type)**

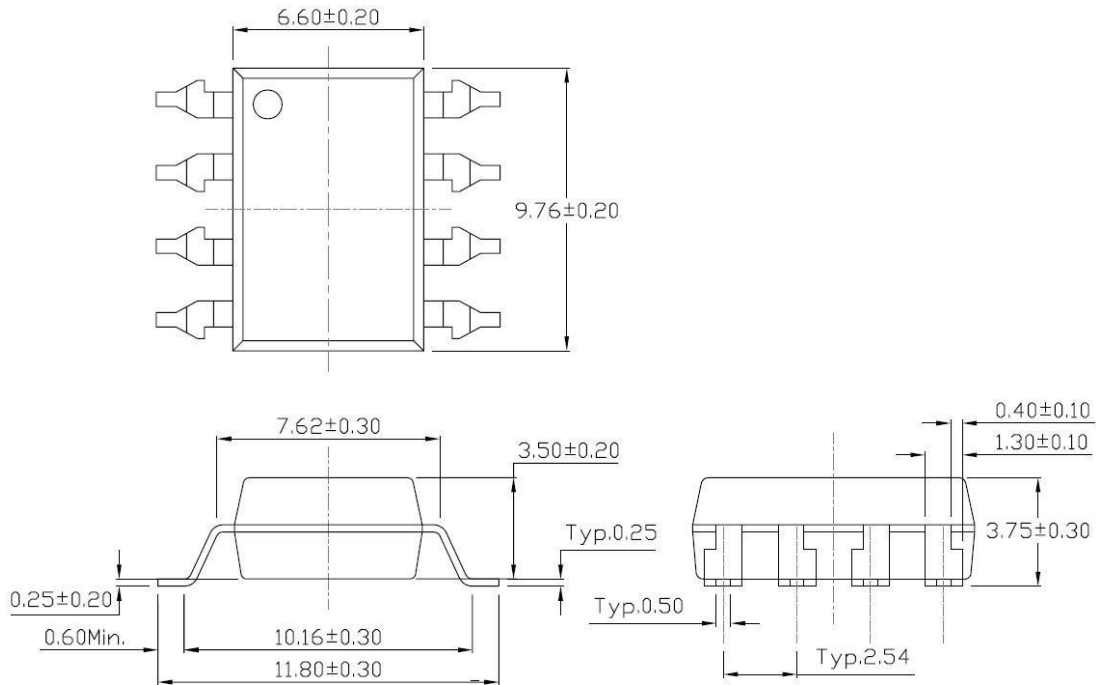


**Surface Mount (Low Profile) Lead Forming (SL Type)**



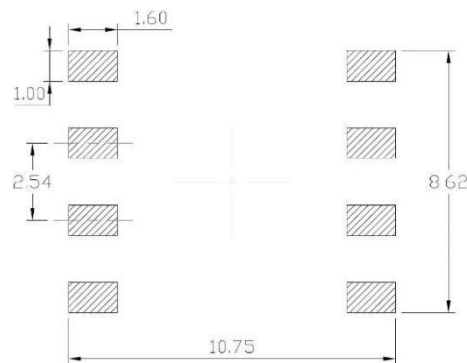
**PACKAGE DIMENSIONS (Dimensions in mm unless otherwise stated)**

**Surface Mount (Gullwing) Lead Forming (SLM Type)**

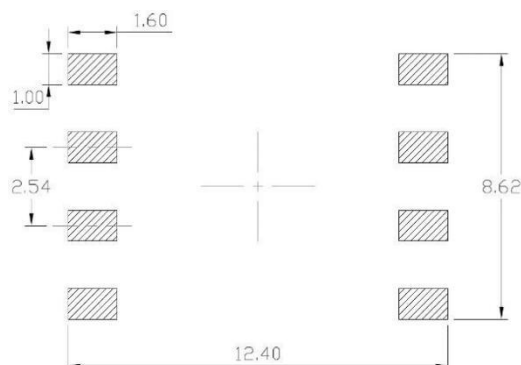


**Recommended Solder Mask (Dimensions in mm unless otherwise stated)**

**Surface Mount Lead Forming & Surface Mount (Low Profile) Lead Forming**

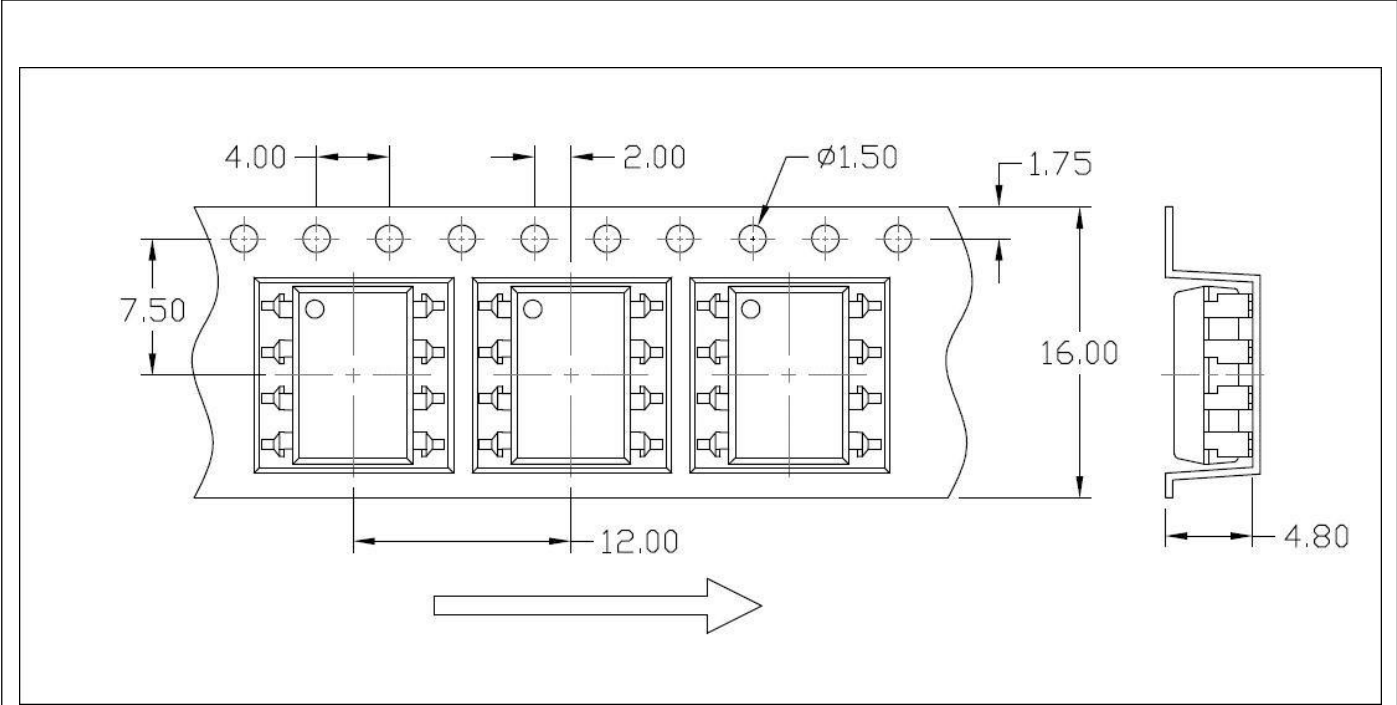


**Surface Mount (Gullwing) Lead Forming**

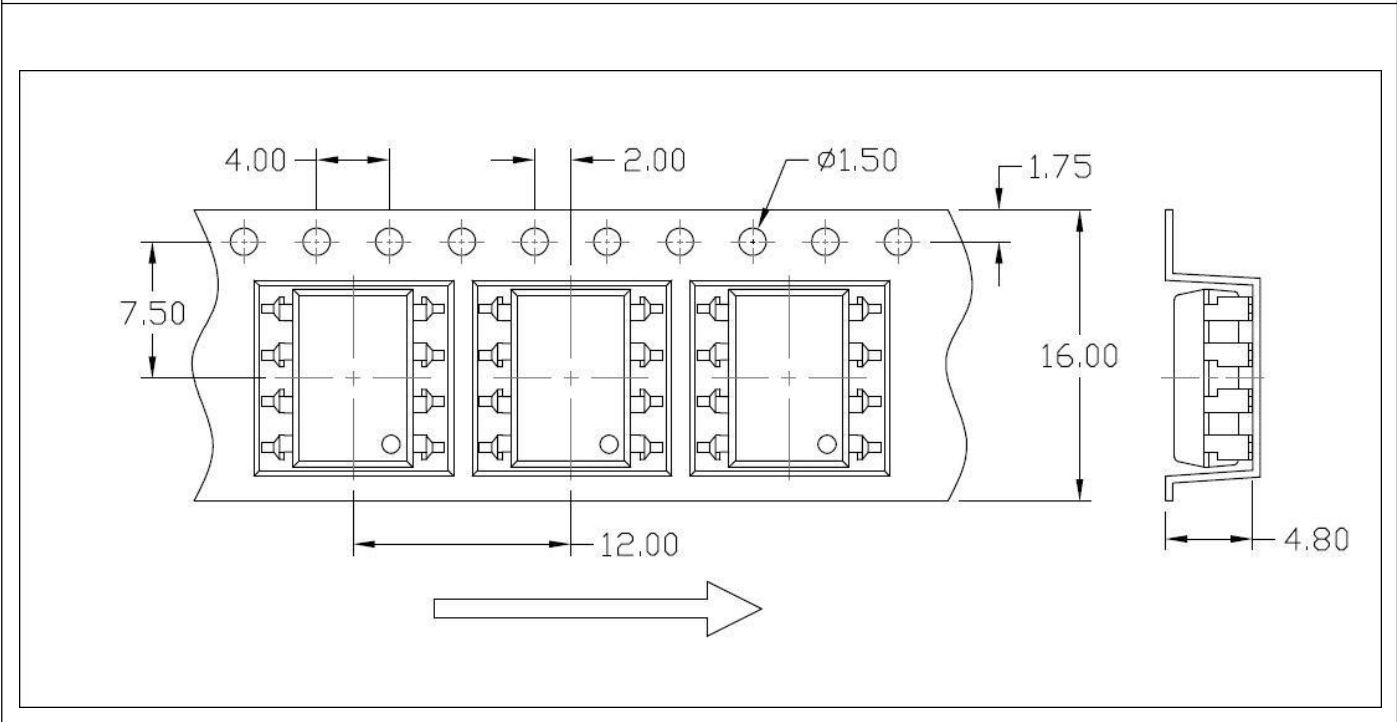


**CARRIER TAPE SPECIFICATIONS (Dimensions in mm unless otherwise stated)**

**Option S(T1) & SL(T1)**

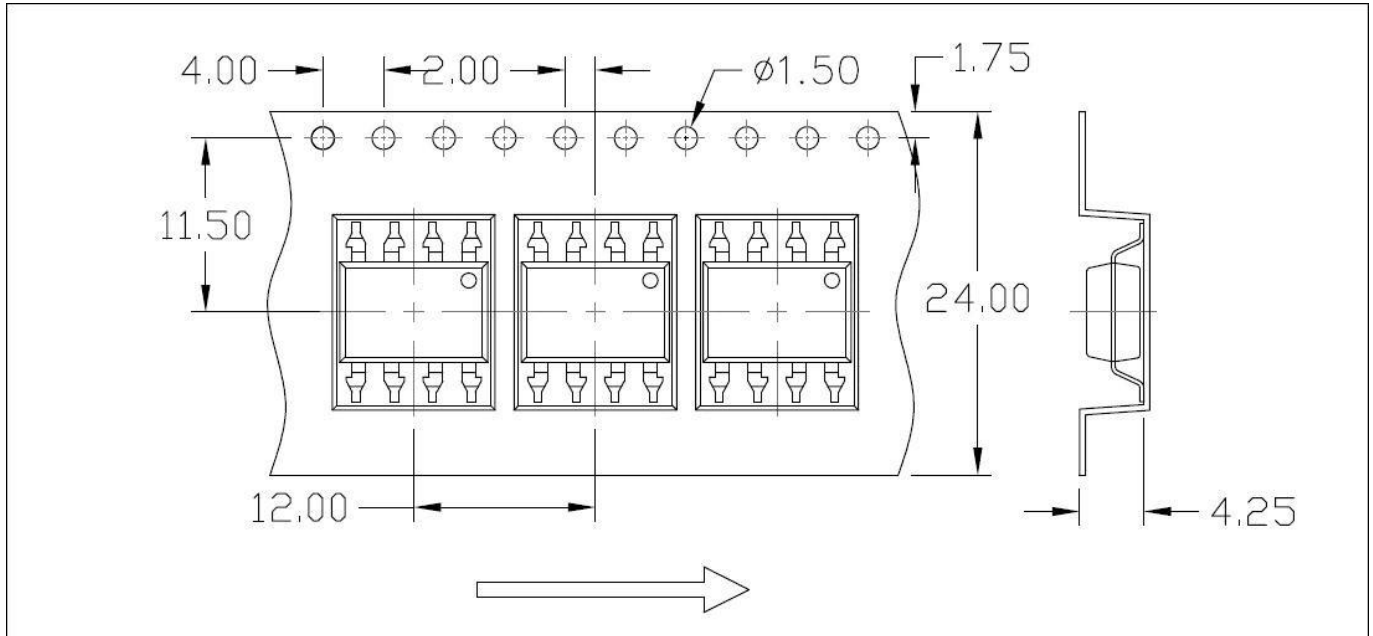


**Option S(T2) & SL(T2)**

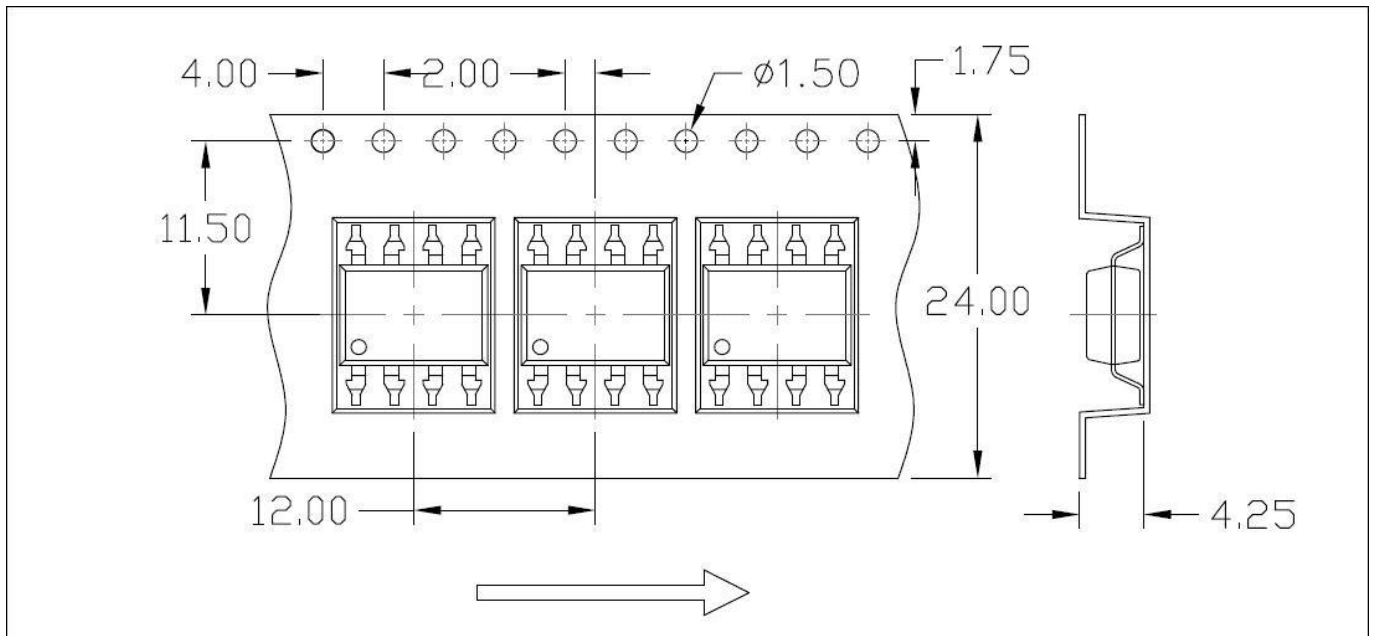


**Carrier Tape Specifications (Dimensions in mm unless otherwise stated)**

**Option SLM(T1)**



**Option SLM(T2)**



**ORDERING AND MARKING INFORMATION**

**MARKING INFORMATION**



**MPC** : Company Abbr.  
**3120R** : Part Number  
**V** : VDE Option  
**Y** : Fiscal Year  
**A** : Manufacturing Code  
**WW** : Work Week

**ORDERING INFORMATION**

**MPC3120R(Y)(Z)-GV**

MPC – Company Abbr.

3120R– Part Number

Y – Lead Form Option (M/S/SL/None)

Z – Tape and Reel Option (T1/T2)

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

V – VDE Option (V or None)

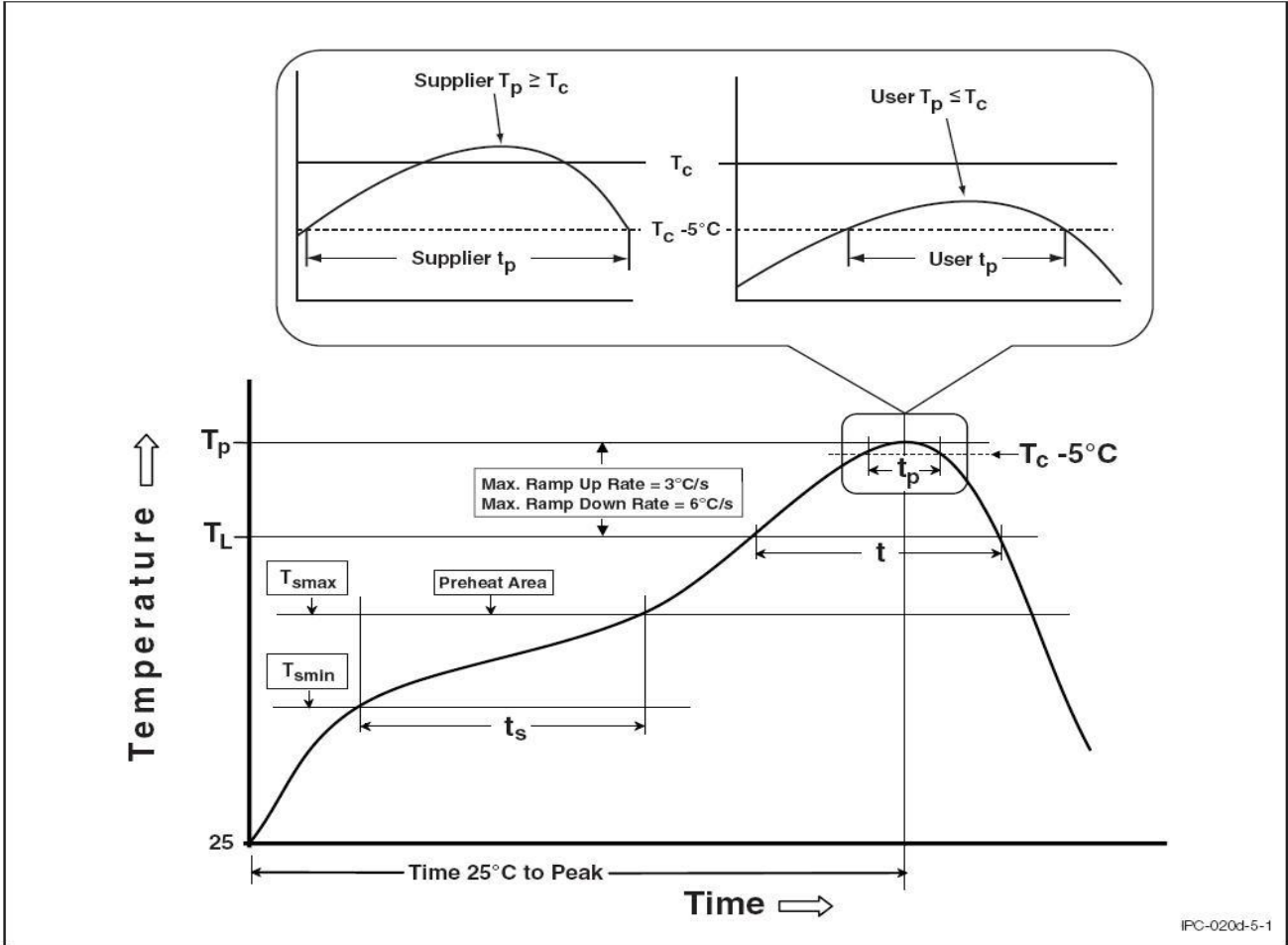
**PACKING QUANTITY**

Option	Quantity	Quantity – Inner box	Quantity – Outer box
None	50 Units/Tube	32 Tubes/Inner box	10 Inner box/Outer box = 16k Units
M	50 Units/Tube	32 Tubes/Inner box	10 Inner box/Outer box = 16k Units
S(T1)	1000 Units/Reel	3 Reels/Inner box	5 Inner box/Outer box = 15k Units
S(T2)	1000 Units/Reel	3 Reels/Inner box	5 Inner box/Outer box = 15k Units
SL(T1)	1000 Units/Reel	3 Reels/Inner box	5 Inner box/Outer box = 15k Units
SL(T2)	1000 Units/Reel	3 Reels/Inner box	5 Inner box/Outer box = 15k Units



**REFLOW INFORMATION**

**REFLOW PROFILE**



Profile Feature	Sn-Pb Assembly Profile	Pb-Free Assembly Profile
Temperature Min. (T <sub>smin</sub> )	100	150°C
Temperature Max. (T <sub>smax</sub> )	150	200°C
Time (t <sub>s</sub> ) from (T <sub>smin</sub> to T <sub>smax</sub> )	60-120 seconds	60-120 seconds
Ramp-up Rate (t <sub>L</sub> to t <sub>P</sub> )	3°C/second max.	3°C/second max.
Liquidous Temperature (T <sub>L</sub> )	183°C	217°C
Time (t <sub>L</sub> ) Maintained Above (T <sub>L</sub> )	60 – 150 seconds	60 – 150 seconds
Peak Body Package Temperature	235°C +0°C / -5°C	260°C +0°C / -5°C
Time (t <sub>P</sub> ) within 5°C of 260°C	20 seconds	30 seconds
Ramp-down Rate (T <sub>P</sub> to T <sub>L</sub> )	6°C/second max	6°C/second max
Time 25°C to Peak Temperature	6 minutes max.	8 minutes max.



# MPC3120R Series

## DIP8, DC Input, 2.5A, Gate Driver Photo Coupler

### 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)
1.0	2022-07-21	Datasheet Complete
1.1	2023-07-05	Upgrade Datasheet