

■ Features

- High isolation 5000 VRMS
- DC input with logic gate output
- Operating temperature range - 40 °C to 110 °C
- RoHS & REACH Compliance
- Halogen free
- MSL class 1

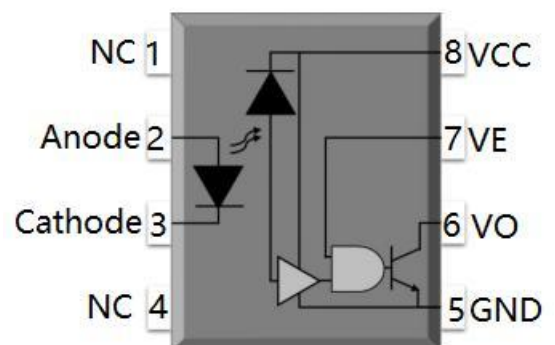
■ Applications

- Ground loop elimination
- LSTTL to TTL, LSTTL or CMOS
- Line receiver, data transmission
- Data multiplexing
- Switching power supply
- Pulse transformer replacement
- Computer-peripheral

■ Description

The 6N137 series combine an AlGaAs infrared emitting diode as the emitter which is optically coupled to a silicon high speed integrated photo-detector logic gate with a strobable output in a plastic DIP8 package with different lead forming options.

■ Schematic





MP6N137 Series

DIP8, 10Mbit/s High Speed Logic Gate 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
Reverse Voltage	VR	5	V	
Enable Voltage	VE	VCC+0.5	V	
Input Power Dissipation	PI	100	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	200	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. 50% duty, 1ms P.W

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

Note 3. AC For 1 Minute, R.H. <50%

Note 4. For 10 seconds



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RECOMMENDED OPERATION CONDITIONS

PARAMETER	SYMBOL	MIN	MAX	UNIT
Operating Temperature	TA	-40	100	°C
Supply Voltage	VCC	2.7	3.6	V
	VCC	4.5	5.5	V
Low Level Input Current	IFL	0	250	uA
High Level Input Current	IFH	5	15	mV
Low Level Enable Voltage	VEL	0	0.8	V
High Level Enable Voltage	VEH	2	VCC	V
Output Pull-up Resistor	RL	330	4K	Ω
Fan Out (at RL=1kΩ per channel)	N	-	5	TTL Loads

ELECTRICAL OPTICAL CHARACTERISTICS (VCC=5.5V, 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 Threshold Current	IFT	-	3.0	5	mA	VO=0.6V, VE=2.0V, IOL=13mA	
Input Capacitance	Cin	-	13	-	pF	VF=0, f=1MHz	
OUTPUT CHARACTERISTICS							
High Level Supply Current	ICCH	-	7.2	10	mA	IF=0mA, VE=0.5V	
Low Level Supply Current	ICCL	-	9.7	13	mA	IF=10mA, VE=0.5V	
High Level Enable Current	IEH	-	-0.59	-1.6	mA	VE=2.0V	
Low Level Enable Current	IEL	-	-0.85	-1.6	mA	VE=0.5V	
High Level Enable Voltage	VEH	2.0	-	-	V	IF=10mA	
Low Level Enable Voltage	VEL	-	-	0.8	V	IF=10mA	
High Level Output Current	IOH	-	40	100	uA	VO=5.5V, IF=250uA, VE=2.0V	
Low Level Output Voltage	VOL	-	0.39	0.6	V	IF= 5mA, VE=2.0V, ICL=13mA	
Isolation Resistance	RI-O	10^12	10^14	-	Ω	DC500V, 40 ~ 60% R.H.	
Floating Capacitance	CI-O	-	1.0	-	pF	VF=0, f=1MHz	



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ELECTRICAL OPTICAL CHARACTERISTICS (VCC=5.0V, IF=7.5mA, 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	75	ns	CL=15pF, RL=350 Ω	
Propagation Delay Time to Output High Level	TPLH	-	40	75			
Pulse Width Distortion	PWD	-	5	35			
Rise Time	tr	-	27	-			
Fall Time	tf	-	7	-			
Enable Propagation Delay Time to Output Low Level	TEHL	-	15	-	ns	CL=15pF, RL=350 Ω, VEH=3.5V	
Enable Propagation Delay Time to Output High Level	TELH	-	15	-	ns		
Common Mode Transient Immunity at Logic High	CMH	10	15	-	kV/us	VCC=5V, IF=0mA, RL=350 Ω, VCM=1kV	
Common Mode Transient Immunity at Logic Low	CML	10	15	-	kV/us	VCC=5V, IF=10mA, RL=350 Ω, VCM=1kV	



MP6N137 Series

DIP8, 10Mbit/s High Speed Logic Gate Photo Coupler

ELECTRICAL OPTICAL CHARACTERISTICS (VCC=3.3V, 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 Threshold Current	IFT	-	3.0	5	mA	VO=0.6V, VE=2.0V, IOL=13mA	
Input Capacitance	Cin	-	13	-	pF	VF=0, f=1MHz	
OUTPUT CHARACTERISTICS							
High Level Supply Current	ICCH	-	4.8	10	mA	IF=0mA, VE=0.5V	
Low Level Supply Current	ICCL	-	7.2	13	mA	IF=10mA, VE=0.5V	
High Level Enable Current	IEH	-	-0.21	-1.6	mA	VE=2.0V	
Low Level Enable Current	IEL	-	-0.47	-1.6	mA	VE=0.5V	
High Level Enable Voltage	VEH	2.0	-	-	V	IF=10mA	
Low Level Enable Voltage	VEL	-	-	0.8	V	IF=10mA	
High Level Output Current	IOH	-	4.0	100	uA	VO=3.3V, IF=250uA, VE=2.0V	
Low Level Output Voltage	VOL	-	0.39	0.6	V	IF= 5mA, VE=2.0V, ICL=13mA	
Isolation Resistance	RI-O	10 ¹²	10 ¹⁴	-	Ω	DC500V, 40 ~ 60% R.H.	
Floating Capacitance	CI-O	-	1.0	-	pF	VF=0, f=1MHz	



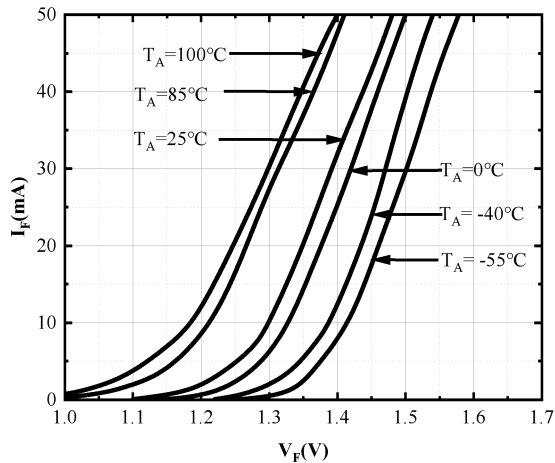
MP6N137 Series

DIP8, 10Mbit/s High Speed Logic Gate Photo Coupler

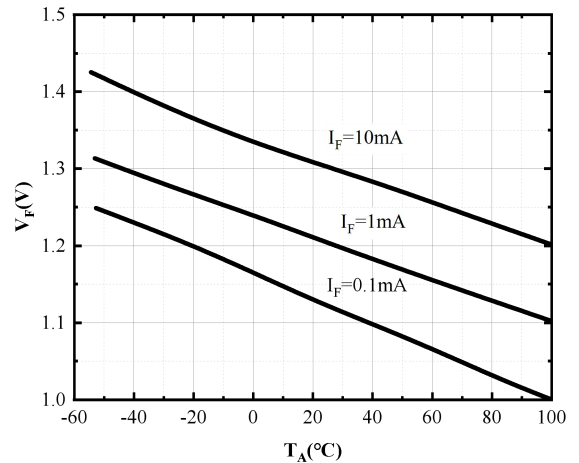
ELECTRICAL OPTICAL CHARACTERISTICS (VCC=3.3V, IF=7.5mA, TA=25°C unless specified otherwise)

PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT	TEST CONDITION	NOTE
SWITCHING CHARACTERISTICS							
Propagation Delay Time to Output Low Level	TPHL	-	35	75	ns	CL=15pF, RL=350 Ω	
Propagation Delay Time to Output High Level	TPLH	-	50	75			
Pulse Width Distortion	PWD	-	15	35			
Rise Time	tr	-	30	-			
Fall Time	tf	-	7	-			
Enable Propagation Delay Time to Output Low Level	TEHL	-	15	-	ns	CL=15pF, RL=350 Ω , VEH=3.5V	
Enable Propagation Delay Time to Output High Level	TELH	-	15	-	ns		
Common Mode Transient Immunity at Logic High	CMH	10	15	-	kV/us	VCC=3.3V, IF=0mA, RL=350 Ω , VCM=1kV	
Common Mode Transient Immunity at Logic Low	CML	10	15	-	kV/us	VCC=3.3V, IF=10mA, RL=350 Ω , VCM=1kV	

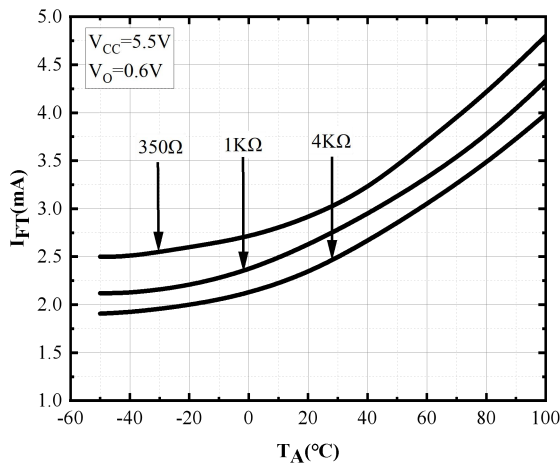
CHARACTERISTIC CURVES



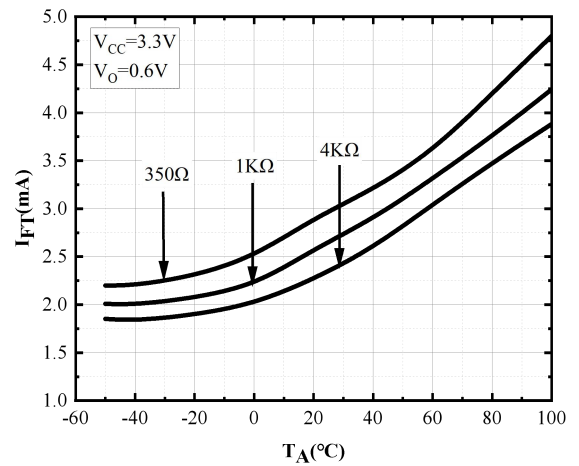
**Fig.1 Forward Current
vs. Forward Voltage**



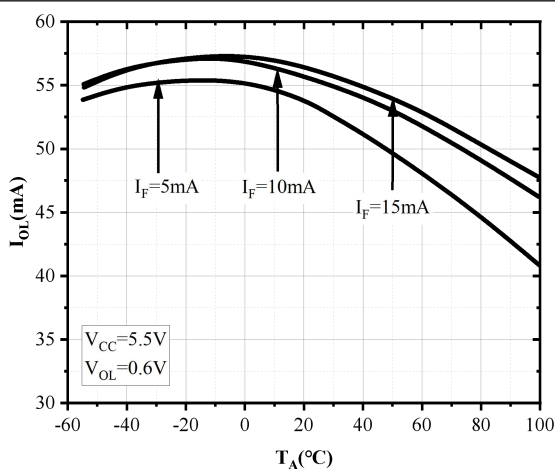
**Fig.2 Forward Voltage
vs. Ambient Temperature**



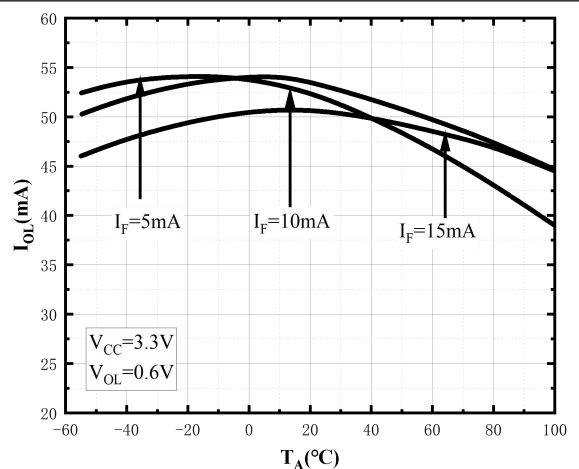
**Fig.3 Input Threshold Current
vs. Ambient Temperature**



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

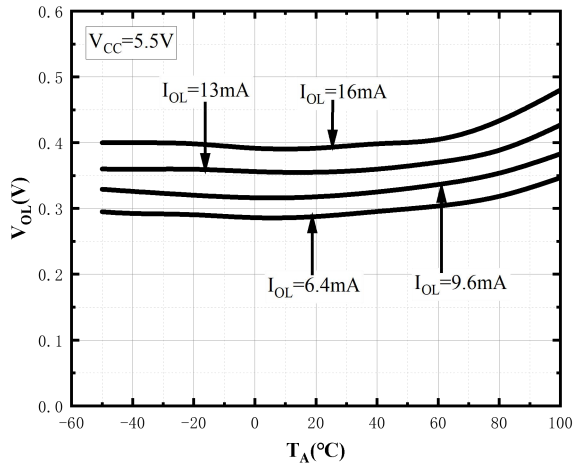


**Fig.5 Low Level Output Current
vs. Ambient Temperature**

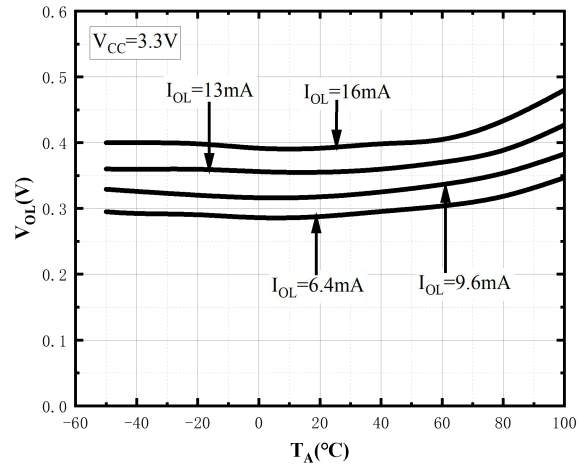


**Fig.6 Low Level Output Current
vs. Ambient Temperature**

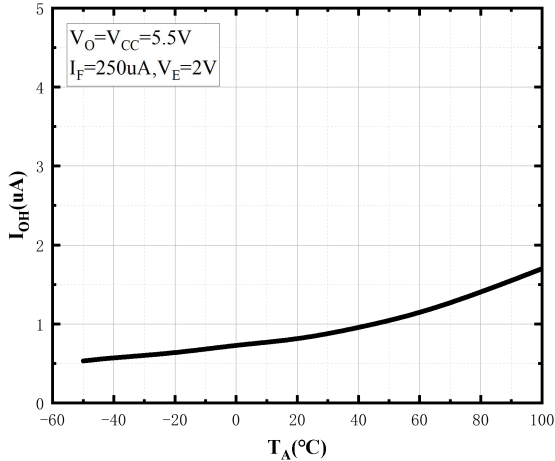
CHARACTERISTIC CURVES



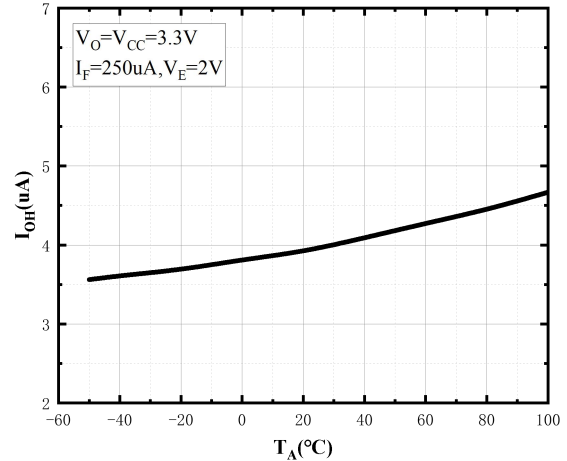
**Fig.7 Low Level Output Voltage
vs. Ambient Temperature**



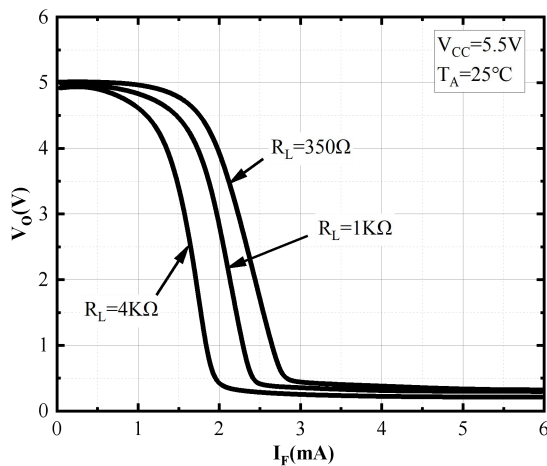
**Fig.8 Low Level Output Voltage
vs. Ambient Temperature**



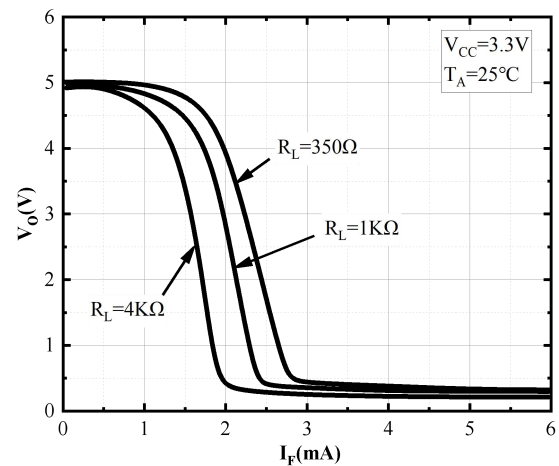
**Fig.9 High Level Output Current
vs. Ambient Temperature**



**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

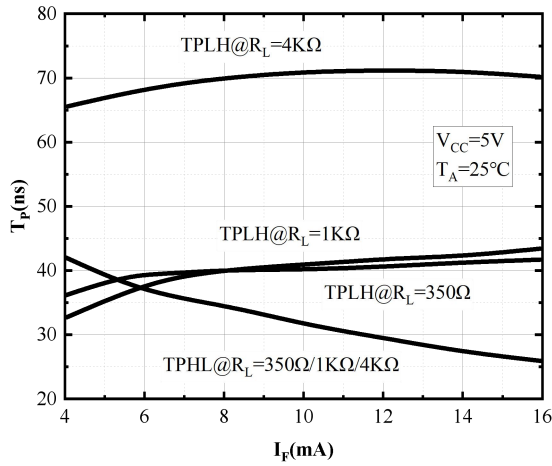


Fig.13 Propagation Delay vs. Forward Current

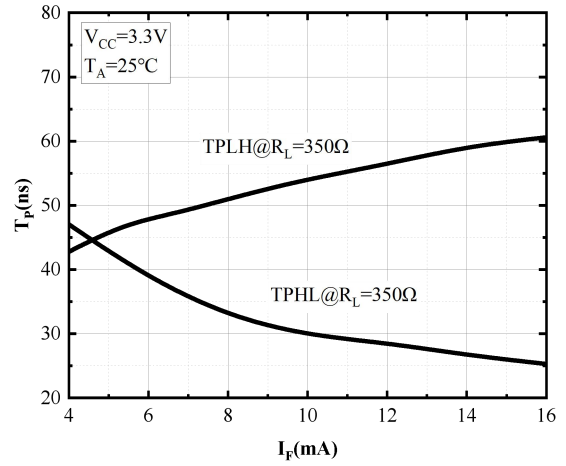


Fig.14 Propagation Delay vs. Forward Current

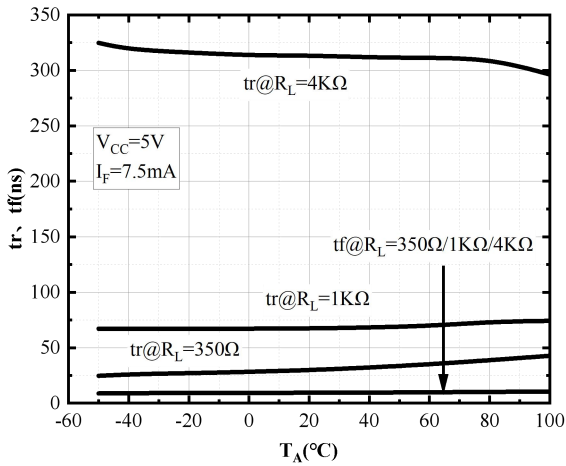


Fig.15 Rise and Fall Time vs. Ambient Temperature

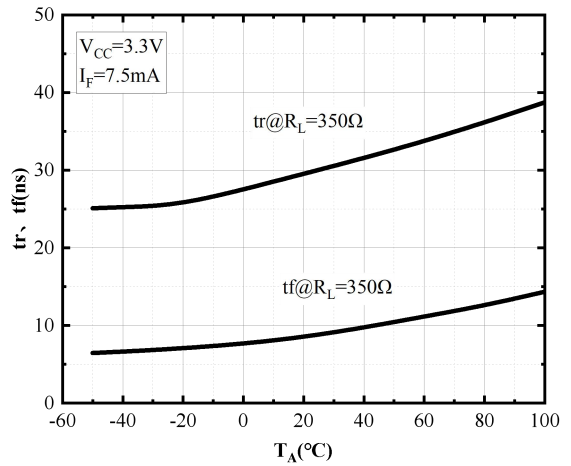


Fig.16 Rise and Fall Time vs. Ambient Temperature

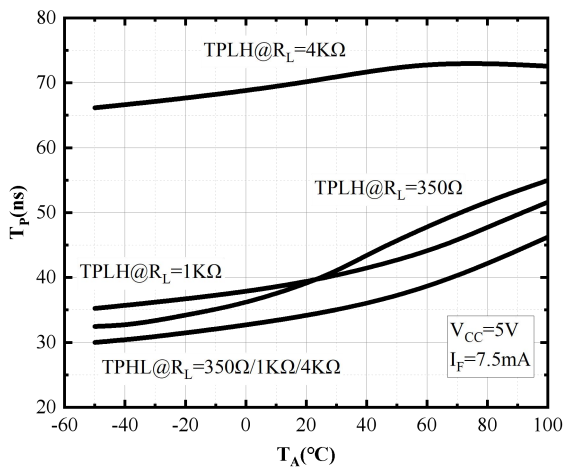


Fig.17 Propagation Delay vs. Ambient Temperature

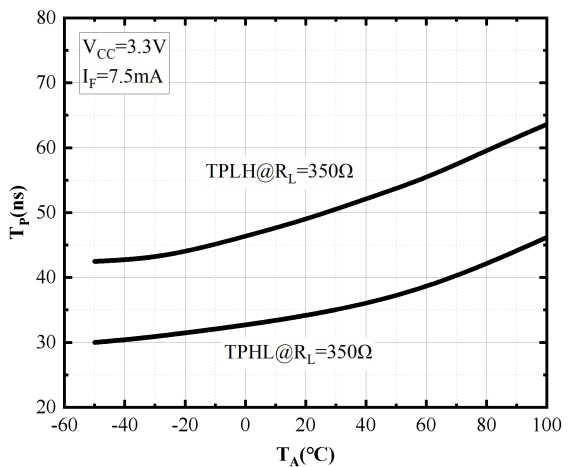
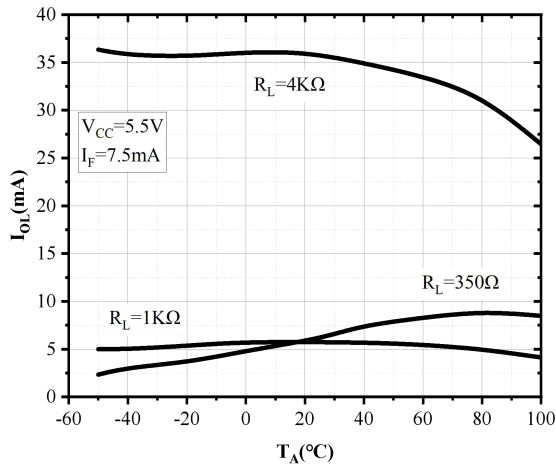
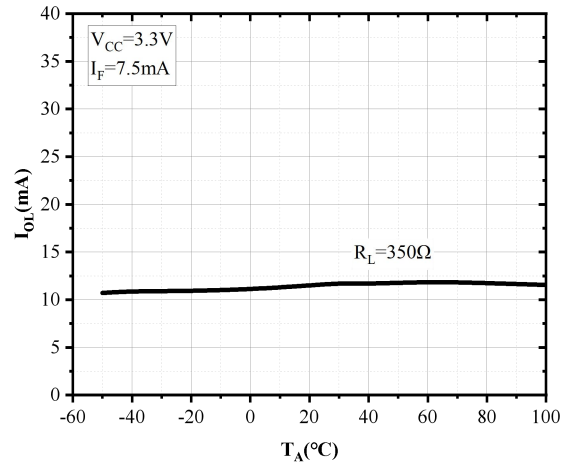


Fig.18 Propagation Delay vs. Ambient Temperature

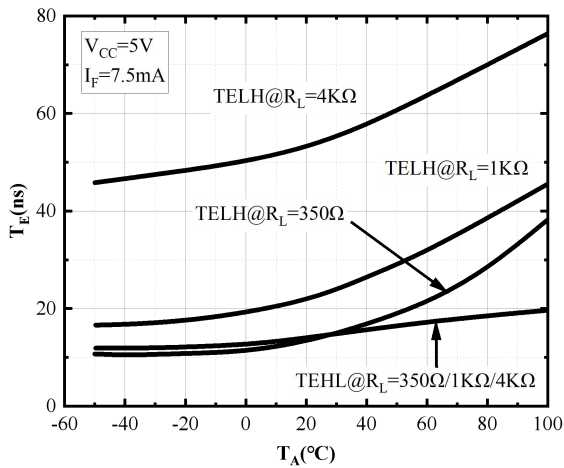
CHARACTERISTIC CURVES



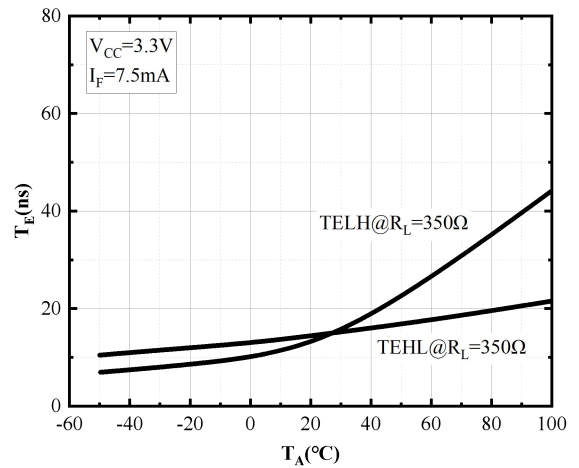
**Fig.19 Pulse Width Distortion
vs. Ambient Temperature**



**Fig.20 Pulse Width Distortion
vs. Ambient Temperature**



**Fig.21 Enable Propagation Delay
vs. Ambient Temperature**



**Fig.22 Enable Propagation Delay
vs. Ambient Temperature**

TEST CIRCUITS

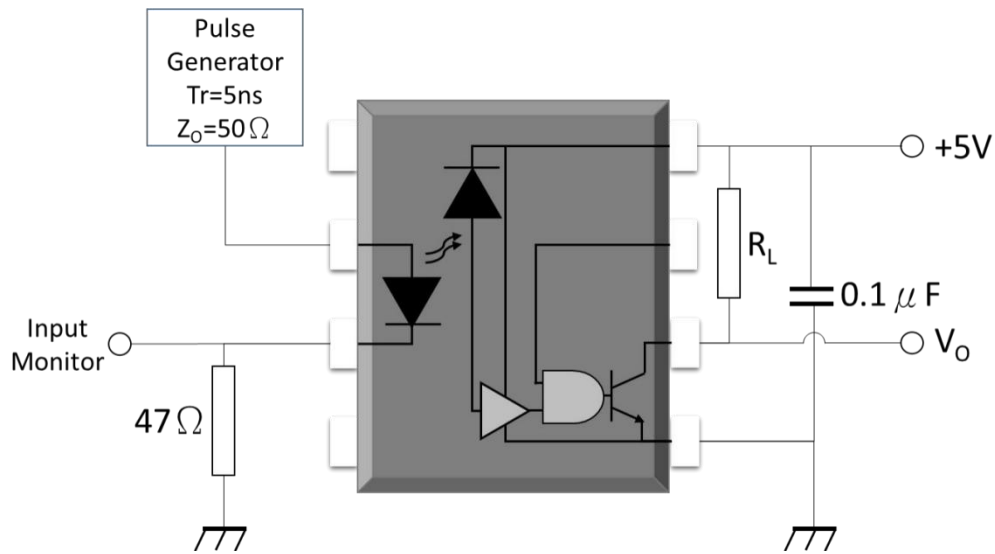


Fig.23 Test Circuits for TPHL, TPLH, tr, tf

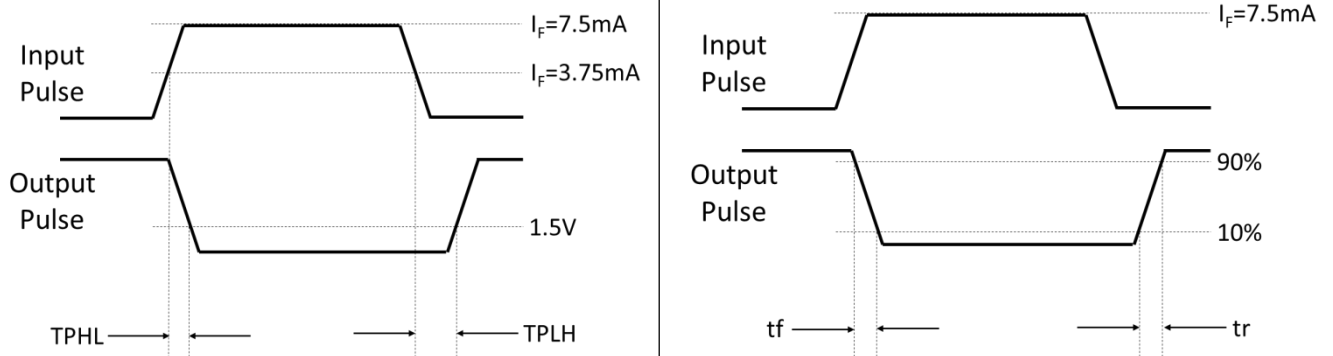


Fig.24 Wave forms of TPHL, TPLH, tr, tf

TEST CIRCUITS

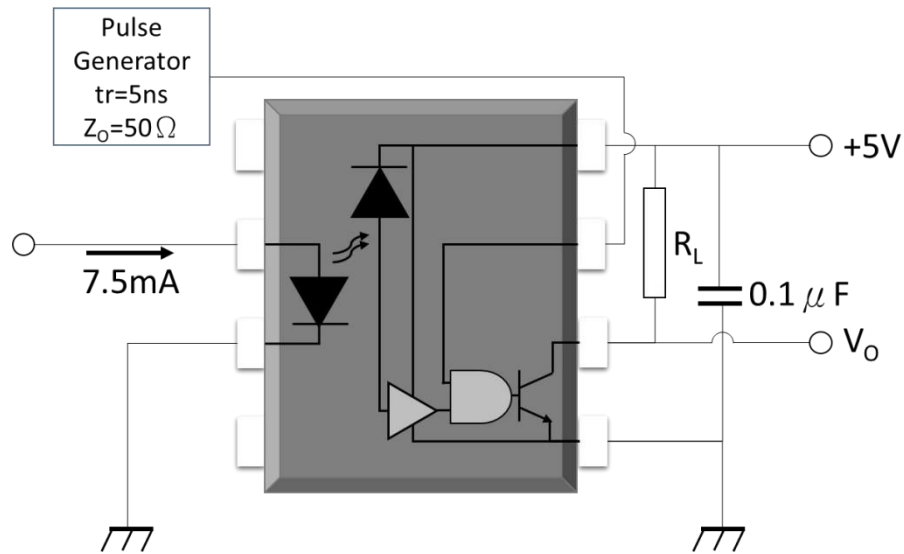


Fig.25 Test Circuits for TEHL, TELH

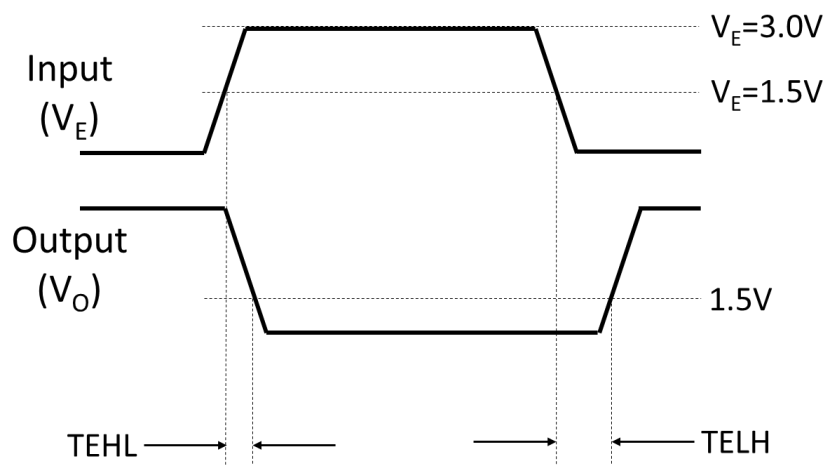


Fig.26 Wave forms of TEHL, TELH

TEST CIRCUITS

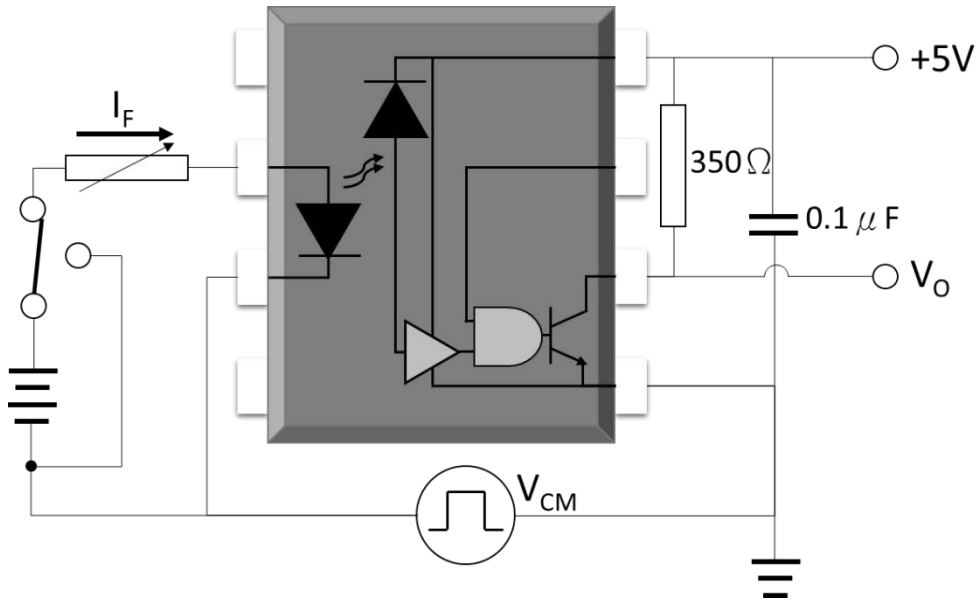


Fig.27 Test Circuits for Common Mode Transient Immunity

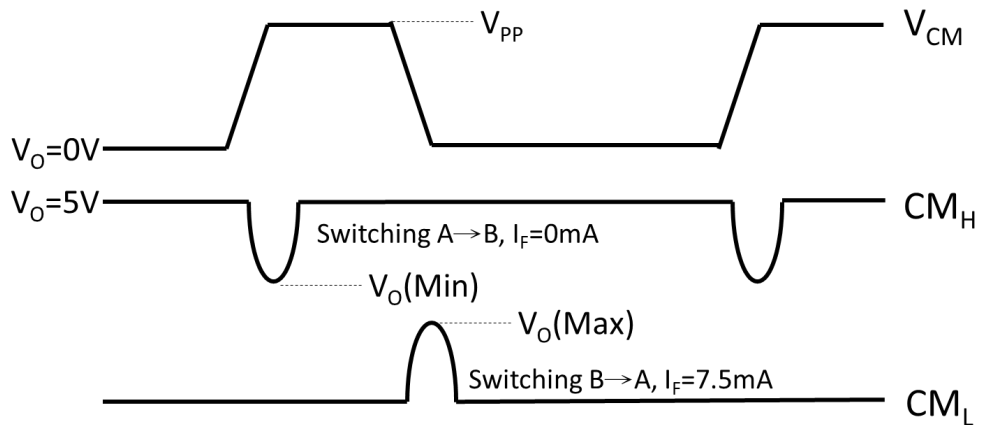
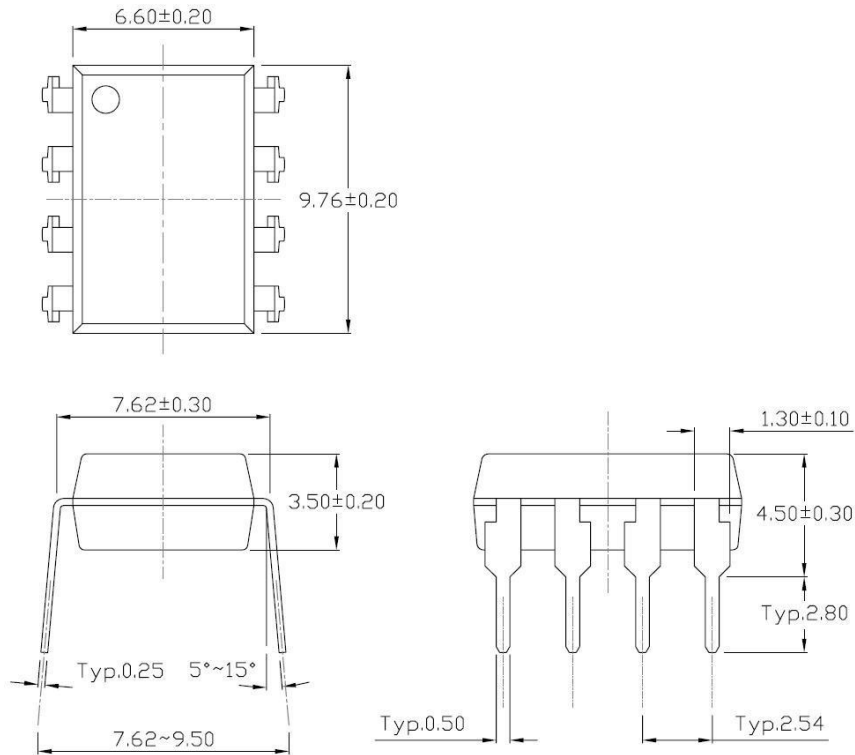


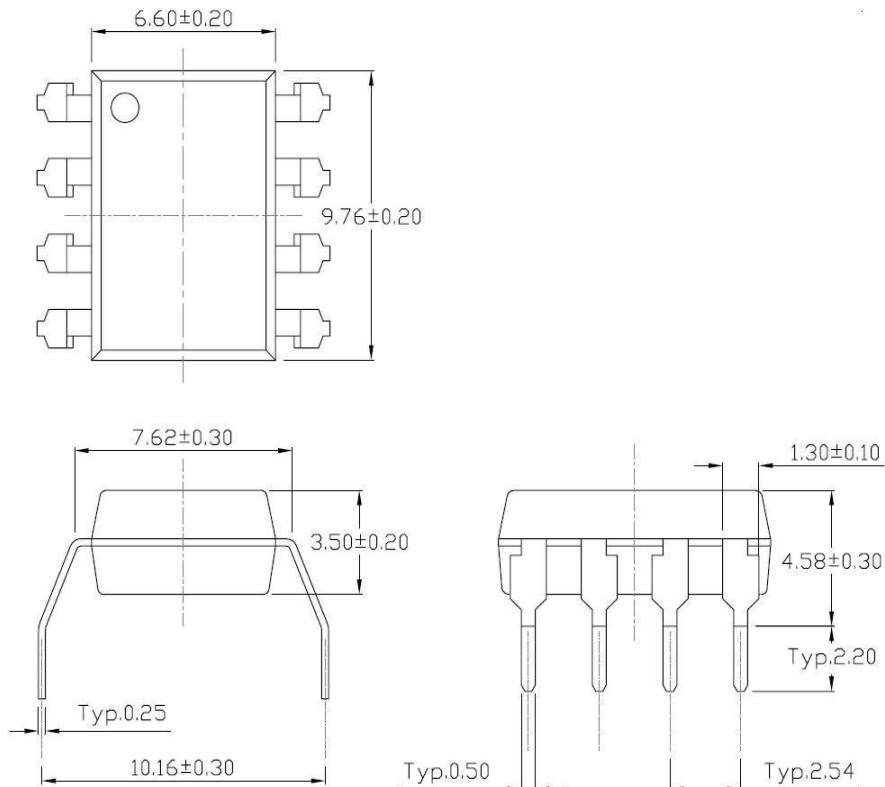
Fig.28 Waveforms of Common Mode Transient Immunity

PACKAGE DIMENSIONS (Dimensions in mm unless otherwise stated)

Standard DIP – Through Hole (DIP Type)

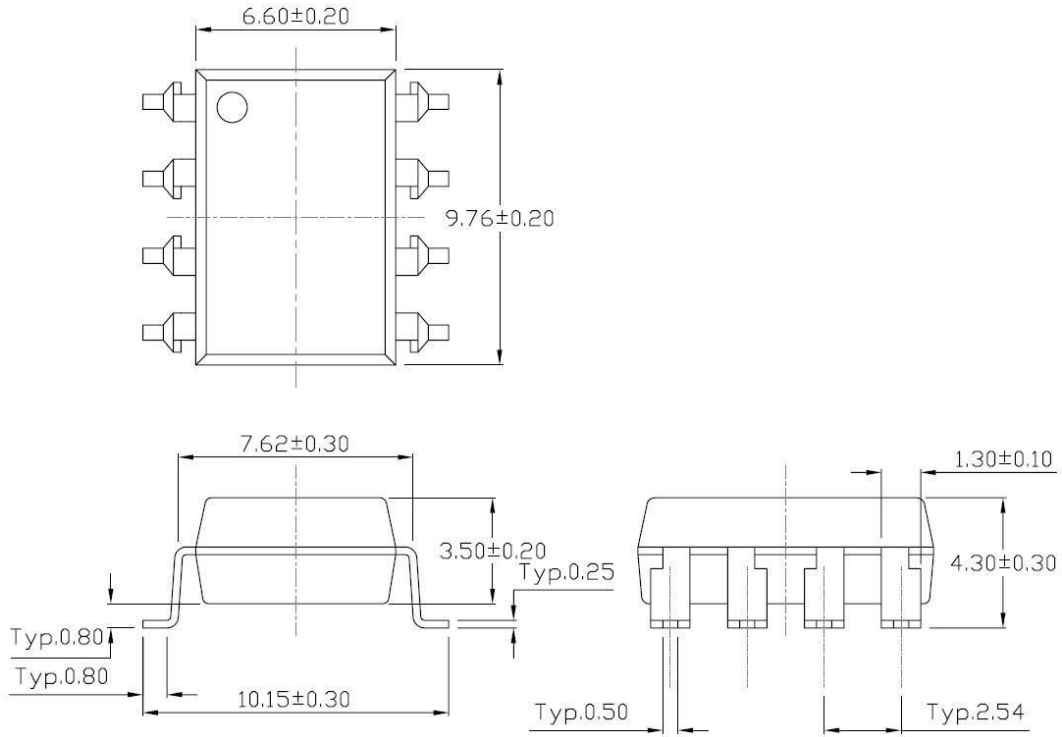


Gullwing (400mil) Lead Forming – Through Hole (M Type)

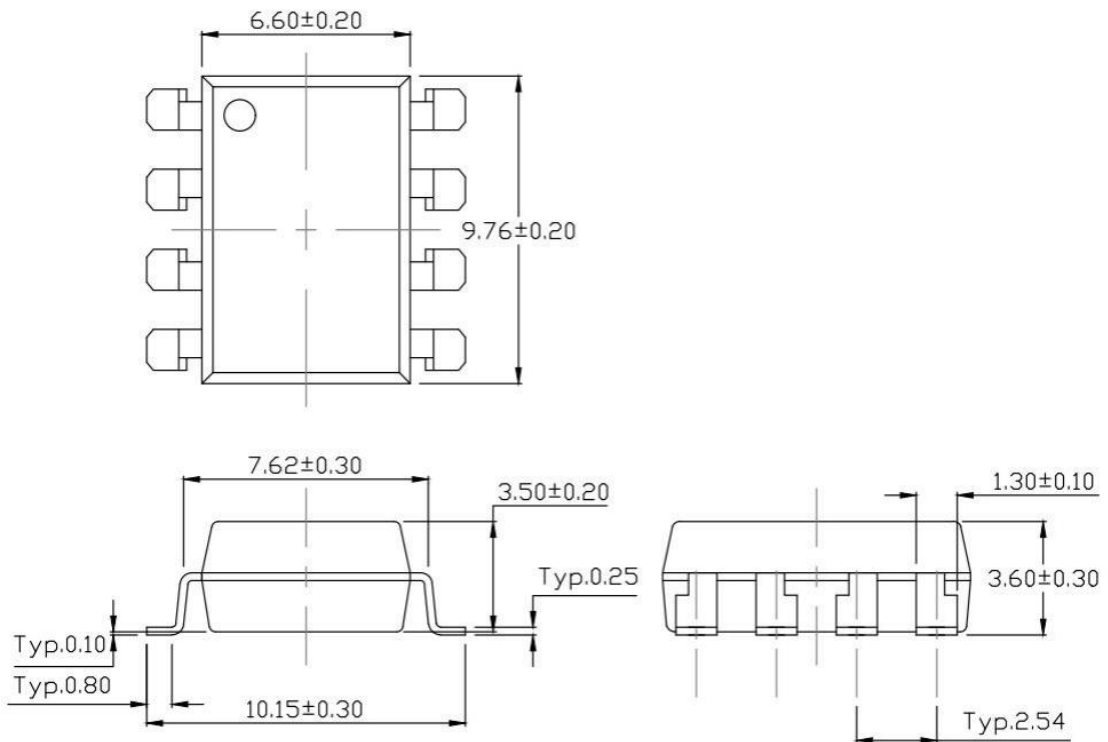


PACKAGE DIMENSIONS (Dimensions in mm unless otherwise stated)

Surface Mount Lead Forming (S Type)

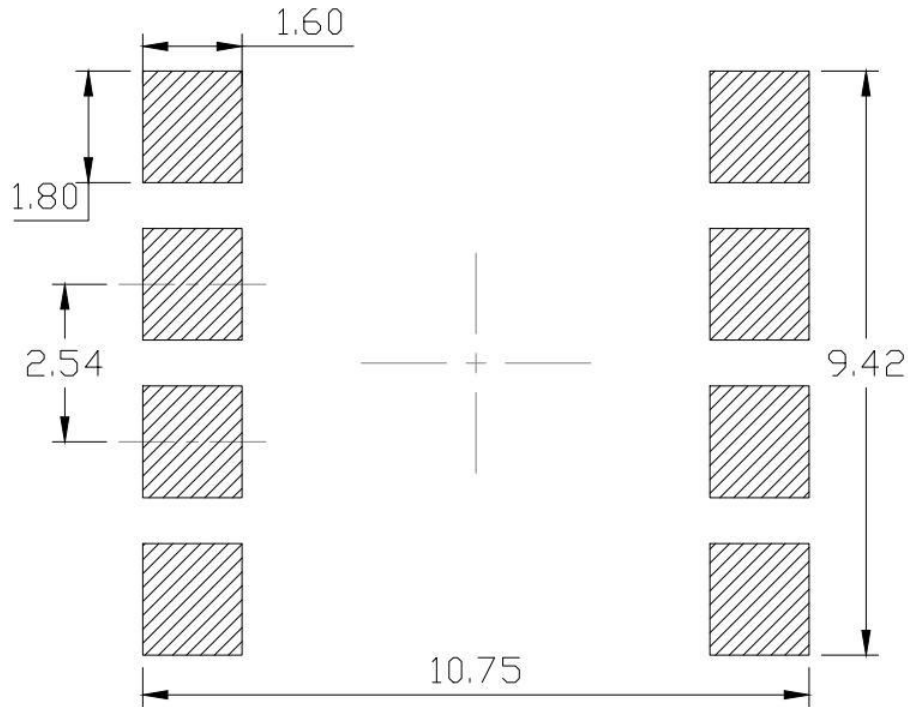


Surface Mount (Low Profile) Lead Forming (SL Type)

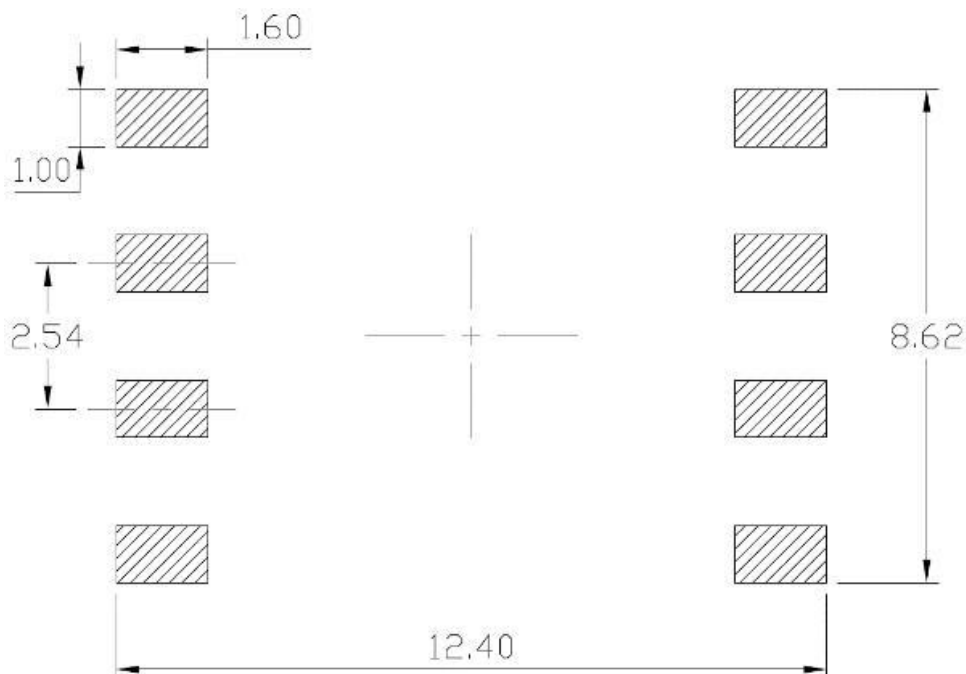


Recommended Solder Mask (Dimensions in mm unless otherwise stated)

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

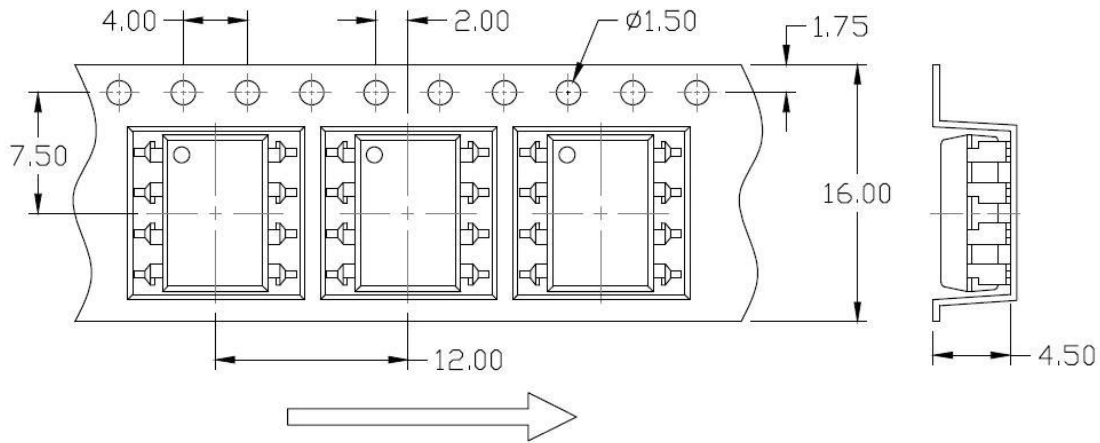


Surface Mount (Gullwing) Lead Forming

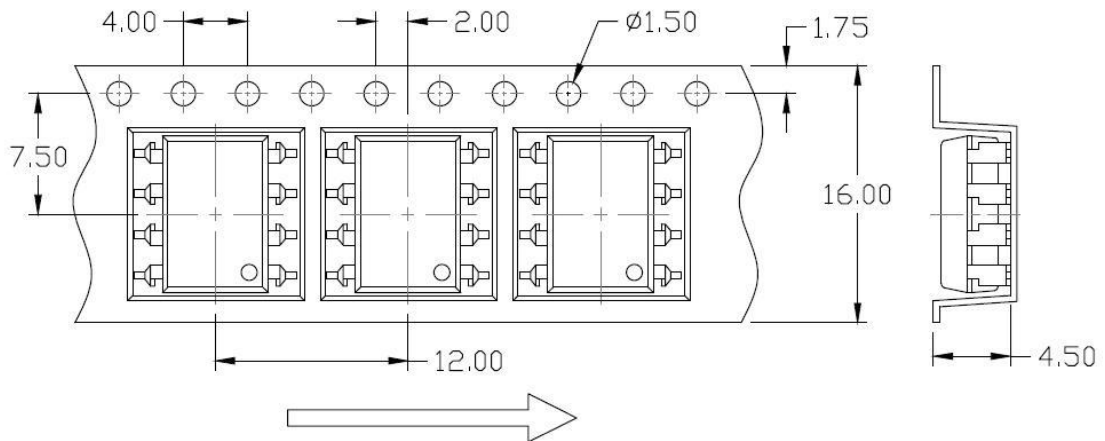


CARRIER TAPE SPECIFICATIONS (Dimensions in mm unless otherwise stated)

Option S(T1)

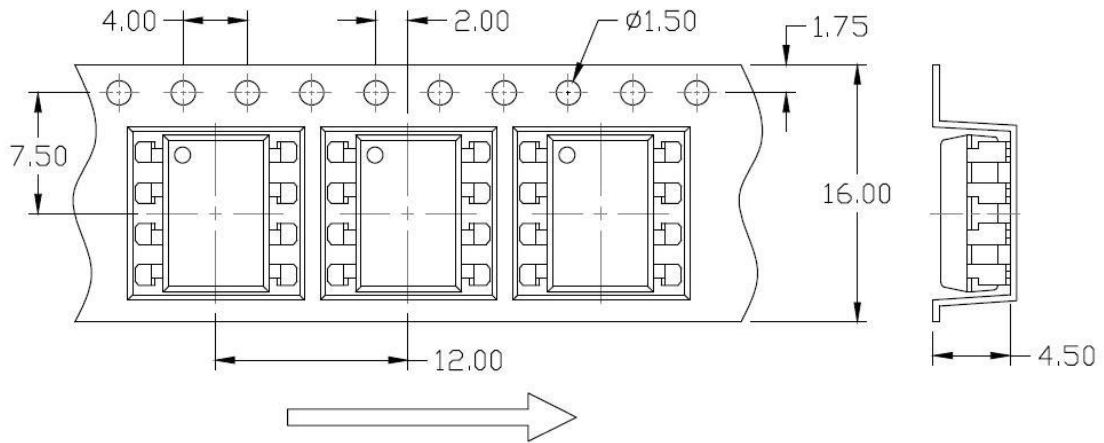


Option S(T2)

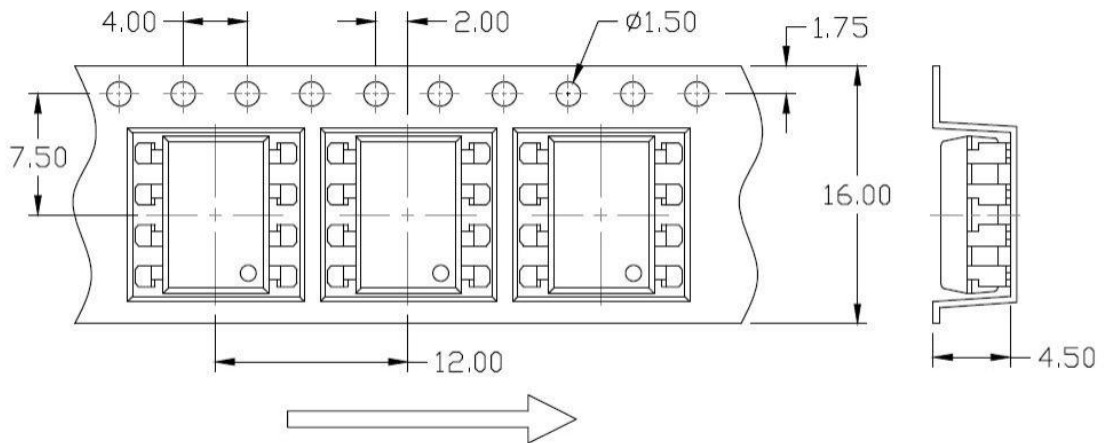


Carrier Tape Specifications (Dimensions in mm unless otherwise stated)

Option SL(T1)

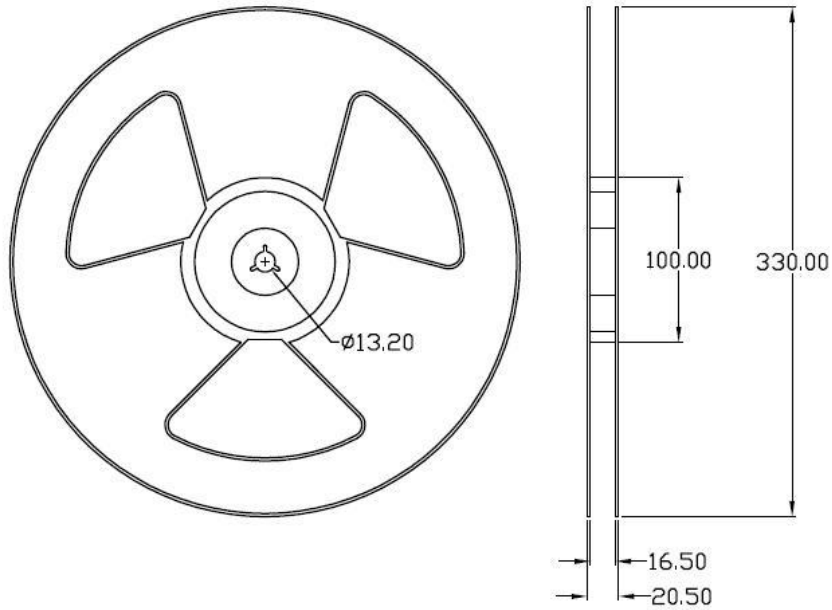


Option SL(T2)



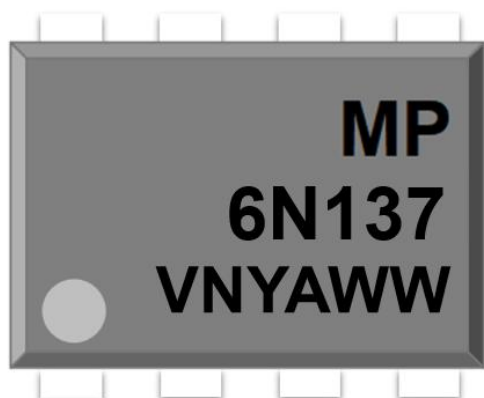
REEL SPECIFICATIONS (Dimensions in mm unless otherwise stated)

Option S & SL



ORDERING AND MARKING INFORMATION

MARKING INFORMATION



MP	: Company Abbr.
6N137	: 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

MP6N137(Y)(Z)-GV(XN)

MP -Company Abbr.

6N137 -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).

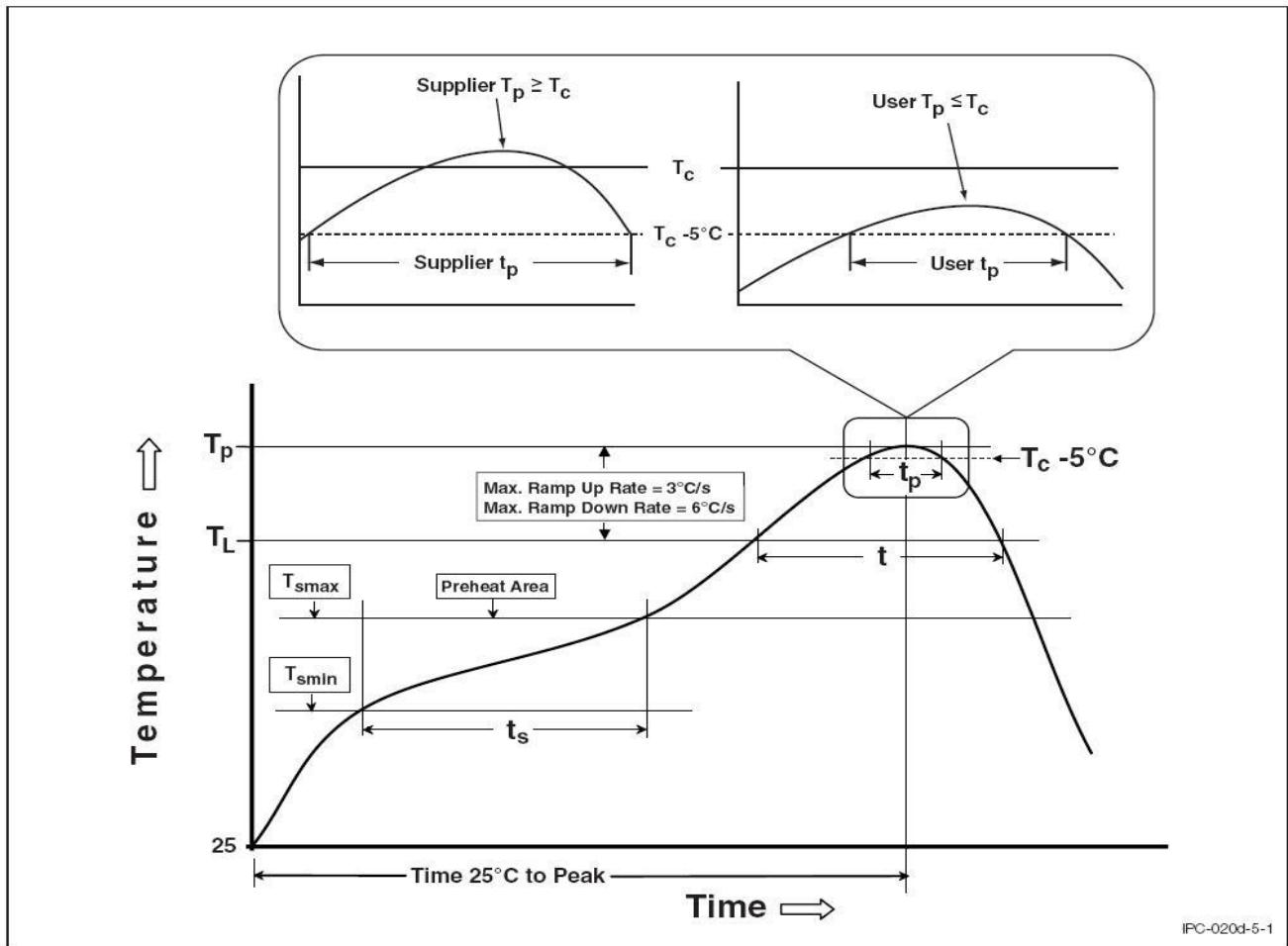
(XN)-Customer Specified Option (X: A~Z or None; N:1~9 or None)

PACKING QUANTITY

Option	Quantity	Quantity – Inner box	Quantity – Outer box
None	45 Units/Tube	32 Tubes/Inner box	10 Inner box/Outer box = 14.4k Units
M	45 Units/Tube	32 Tubes/Inner box	10 Inner box/Outer box = 14.4k 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 _{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.



MP6N137 Series

DIP8, 10Mbit/s High Speed Logic Gate 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)
0.1	2024-04-18	Datasheet Complete