ORIENT

Photo coupler

Product Data Sheet

Name: OR-M701

Customer: _____

Date: _____

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1. Features

(1) Compliance Halogens Free (Br < 900ppm, Cl < 900ppm, Br+Cl<1500ppm)
(2) High current transfer ratio : 2000% typical.
(3) Low input current requirements : 0.5mA
(4) High output current : 60mA
(5) Performance guaranteed guarantee : 0~70°C.
(6) Instantaneous common mode rejection : 10KV/μs
(7) TTL compatible low output voltage : 0.1V VOL typical
(8) Safety approval
UL approved(No.E323844)
VDE approved(No.40029733)
CQC approved (No.CQC19001231256)
(9) In compliance with RoHS, REACH standards
(10) MSL Class I

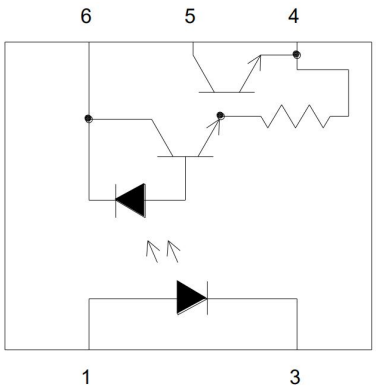
2. Instructions

These high gain series couplers use a light emitter diode and an integrated high gain photo detector to provide extremely high current transfer ratio between input and output. Separate pins for the photodiode and output stage result in TTL compatible saturation voltage and high speed operation. Where desired the Vcc and Vo terminals may be tied together to achieve conventional photo darlington operation. A base access terminal allows a gain bandwidth adjustment to be made.

3. Application Range

(1)Low input current line receiver (2)Telephone ring detector
(3)EIA-RS-232C line receiver (4)Current loop receiver
(5)Ground isolate most logic families:
TTL/TTL, CMOS/TTL, CMOS/CMOS, LSTTL/TTL, CMOS/LSTTL
(6)AC line voltage status indicator: low input power dissipation

4. Functional Diagram



PIN Configuration

1.Anode
2.NC
3.Cathode
4.GND
5.Output
6.Vcc

Truth table

Input（LED）	Output
ON	L
OFF	H

0.1 capacitor F bypass capacitance needs to be connected between A Pin4 and Pin6

5. Absolute Maximum Ratings (Ta=25℃)*1

Parameter		Symbol	Rated Value	Unit
Input	Average Forward Input Current	$I_{F(AVG)}$	20	mA
	Peak Input Current (50% duty cycle, 1 ms pulse width)	I_F	1.0	A
	Reverse Input Voltage	V_R	5	V
	Power Dissipation	P_I	35	mW
Output	Output Collector Current	I_O	60	mA
	Output Collector Power Dissipation	P_O	100	mW
	Supply Voltage	V_{CC}	-0.5~18	V
	Insulation Voltage	V_{iso}	3750	Vrms
	Working Temperature	T_{opr}	-40 ～ + 85	℃
	Storage Temperature	T_{stg}	-55～ + 125	
*2	Soldering Temperature	T_{sol}	260	

*1. Room temperature = 25 ℃. Exceeding the maximum absolute rating can permanently damage the device. Working long hours at the maximum absolute rating can affect reliability.

*2. soldering time is 10 seconds.

6. Opto-electronic Characteristics

Parameter		Symbol	Min	Typ	Max	Unit	Condition
Input	Forward voltage	V_F	—	1.30	1.8	V	I_F= 10mA T_A=25°C
	Input Forward Voltage Temperature Coefficient	$\Delta V_F/\Delta T$	—	-1.8	—	mV/°C	I_F=10mA
	Reverse Voltage	BV_R	5	—	—	V	I_R=10μA
	Input Capacitance	C_{IN}	—	60	—	pF	f = 1MHz, V_F = 0V
Detector	Current transfer ratio	CTR	400	1800	3500	%	I_F=0.5mA; V_{CC}=4.5V; T_A=25°C ; V_O=0.4V
			500	1600	2600		I_F=1.6mA; V_{CC}=4.5V; T_A=25°C ; V_O=0.4V
	High Level Supply Current	I_{CCH}	—	0.07	10	μA	V_O=Open, V_{CC}=18V, I_F=0mA
	Low Level Supply Current	I_{CCL}	—	0.7	1.5	mA	V_O=Open, V_{CC}=18V, I_F=1.6mA
	High Level Output Current	I_{OH}	—	0.3	100	μA	V_O=V_{CC}=18V, I_F=0mA
	Low Level Output Voltage	V_{OL}	—	0.1	0.4	V	I_F=1.6mA; V_{CC}=4.5V; I_O=8mA
				0.1	0.4		I_F=5mA; V_{CC}=4.5V; I_O=15mA
				0.2	0.4		I_F=12mA; V_{CC}=4.5V; I_O=24mA

*1.Over recommended temperature (T_A= 0°C to 70°C) unless otherwise specified.

*2.All typicals at T_A= 25°C

7. Switching Characteristics

Parameter	Symbol	Min	Typ	Max	Unit	Condition
Propagation delay time to output High level	t_{PLH}	—	5	75	μs	T_A = 25°C I_F = 0.5mA; R_L = 4.7KΩ
		—	0.2	2		T_A = 25°C I_F = 12mA; R_L = 270Ω
		—	0.7	20		T_A = 25°C I_F = 1.6mA; R_L = 2.2KΩ
Propagation delay time to output Low level	t_{PHL}	—	2	60		T_A = 25°C I_F = 0.5mA; R_L = 4.7KΩ
		—	7	10		T_A = 25°C I_F = 12mA; R_L = 270Ω
		—	4	35		T_A = 25°C I_F = 1.6mA; R_L = 2.2KΩ
Logic High Common Mode Transient Immunity	$\|CM_H\|$	1	10	—	KV/μs	I_F = 0mA; $\|V_{CM}\|$ = 10Vp-p R_L = 2.2KΩ
Logic Low Common Mode Transient Immunity	$\|CM_L\|$	1	10	—		I_F = 1.6mA; $\|V_{CM}\|$ =10Vp-p R_L=2.2KΩ

*1.Over recommended temperature (T_A= 0°C to 70°C) unless otherwise specified.

*2.All typicals at T_A= 25°C

8. Order Information

Part Number

OR-M701-W-Y-Z

Note

W = Tape and reel option. (TP or TP1).

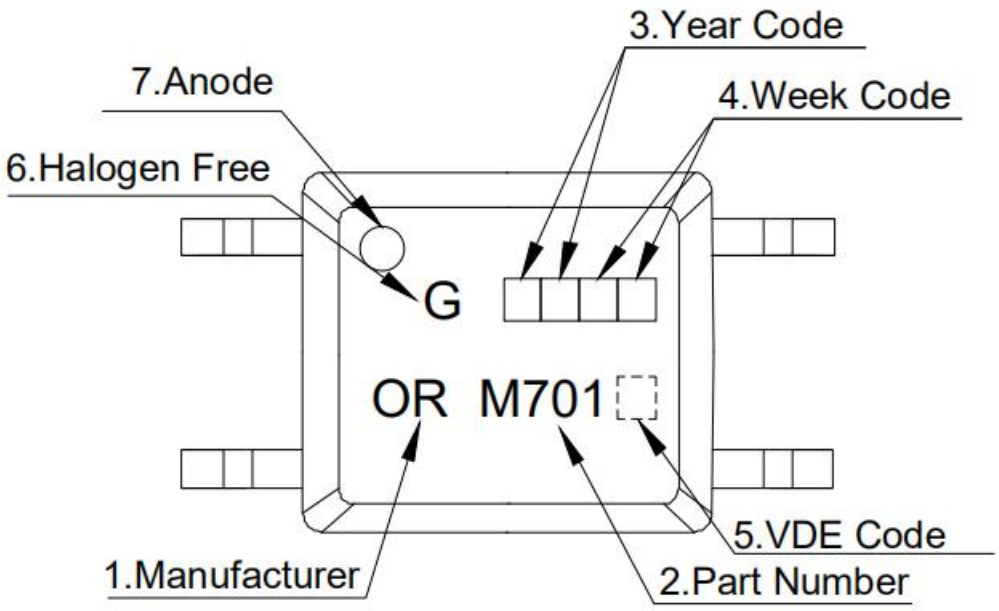
Y = 'V' code for VDE safety (This options is not necessary).

Z = 'G' code for Halogen free .

* VDE Code can be selected.

Option	Description	Packing quantity
TP	Surface mount lead form (low profile) + TP tape & reel option	3000 units per reel
TP1	Surface mount lead form (low profile) + TP1 tape & reel option	3000 units per reel

9. Naming Rule



1. Manufacturer : ORIENT.

2. Part Number : M701.

3. Year Code □□ : '21' means '2021' and so on.

4. Week Code □□: 01 means the first week, 02 means the second week and so on.

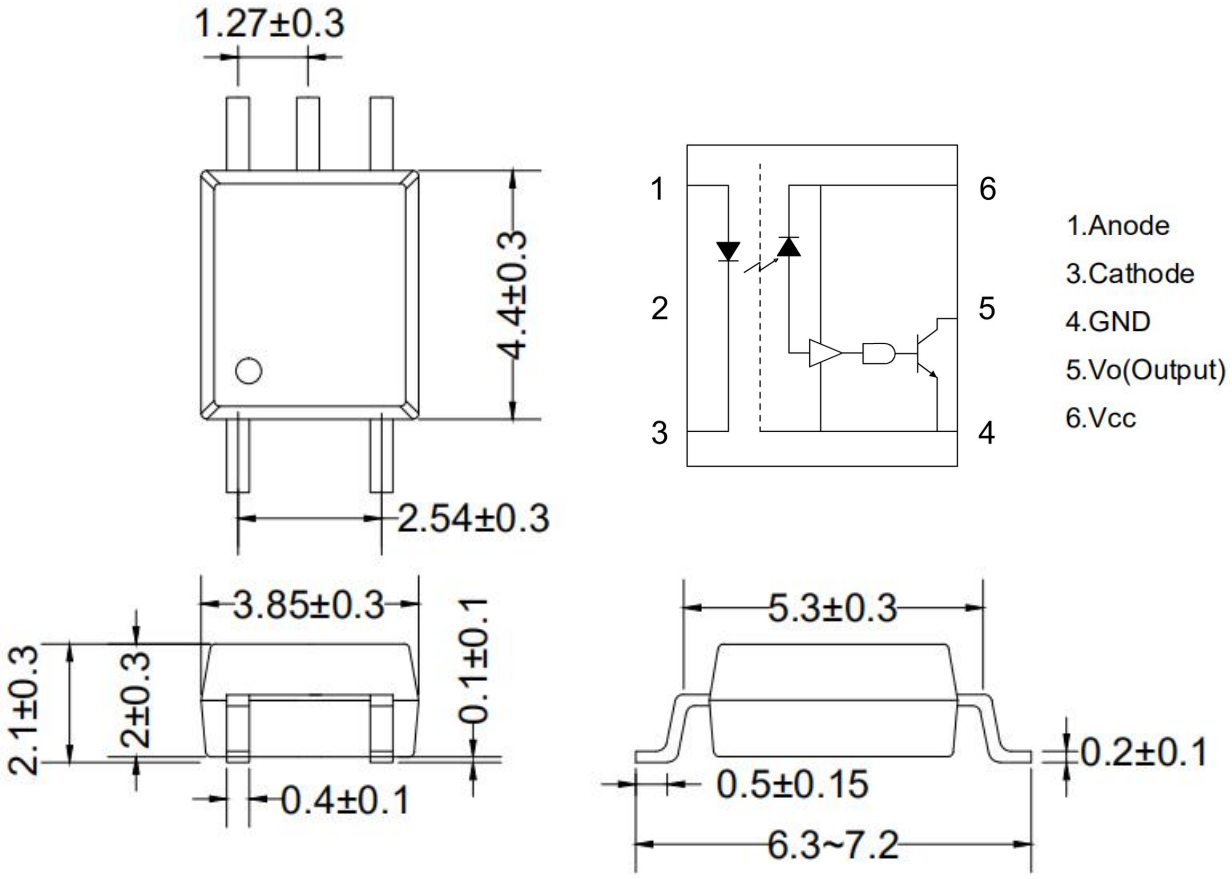
5. VDE Code ⬚. (Optional)

6. HF Code 'G': Halogen Free.

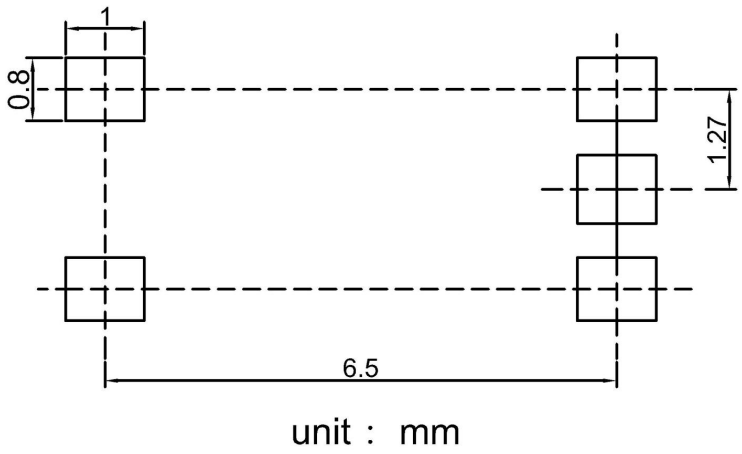
7. Anode.

* VDE Code can be selected.

10. Outer Dimension

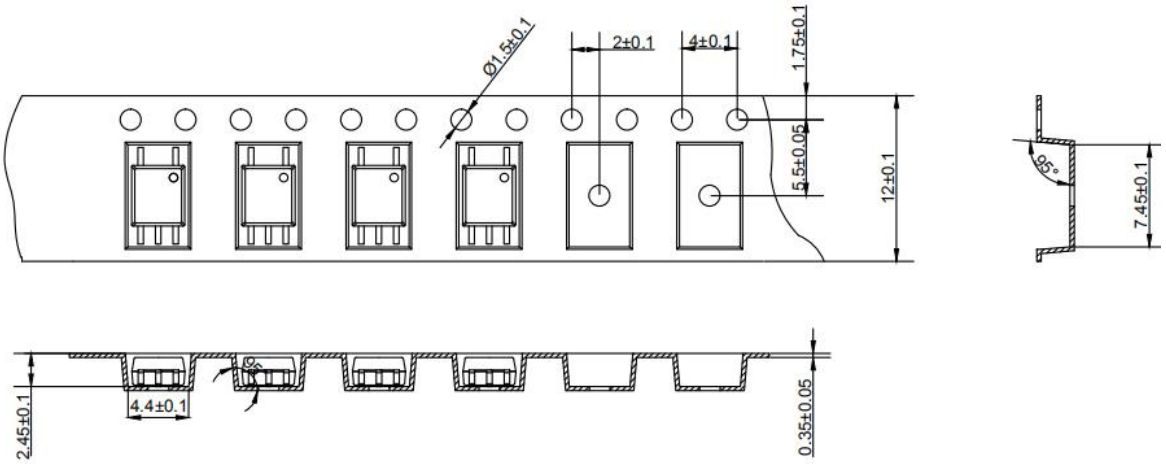


11. Recommended Foot Print Patterns (Mount Pad)

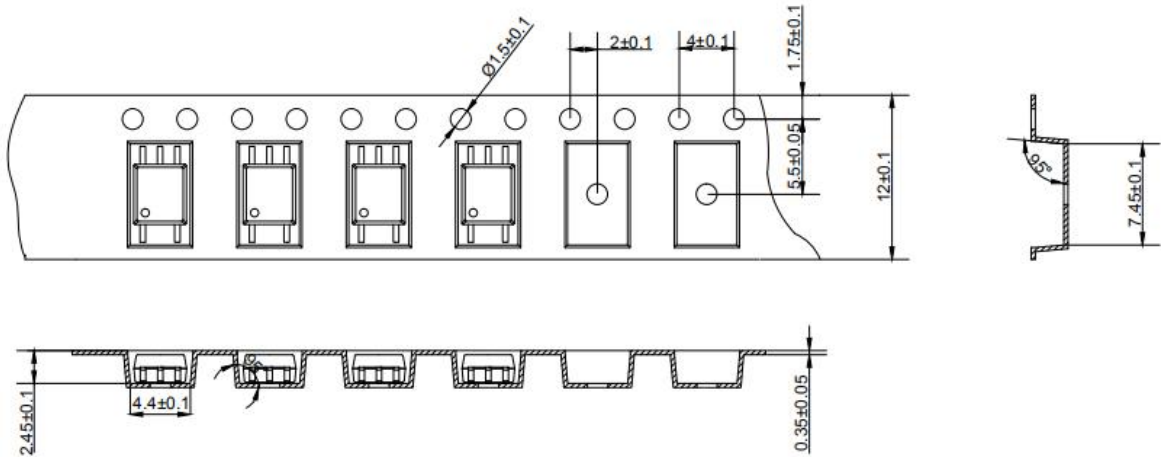


12. Taping Dimensions

（1）OR-M701-TP



（2）OR-M701-TP1



Description	Symbol	Dimension in mm(inch)
Tape wide	W	12±0.3（0.472）
Pitch of sprocket holes	P0	4±0.1（0.157）
Distance of compartment	F	5.5±0.1（0.217）
	P2	2±0.1（0.079）
Distance of compartment to compartment	P1	8±0.1（0.315）

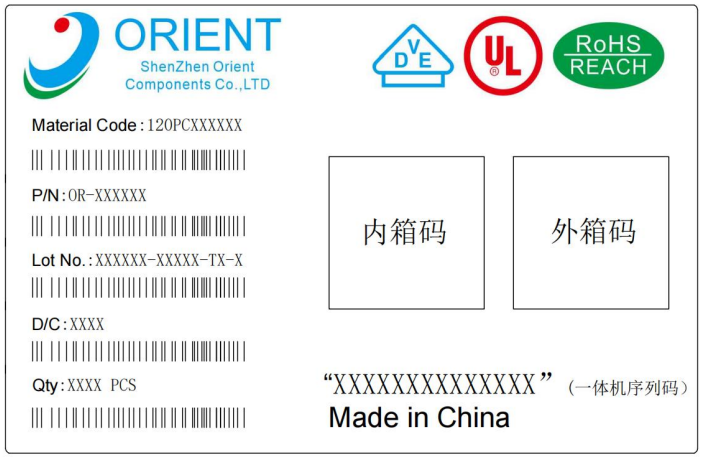
Encapsulation type	TP/TP1
amount （pcs）	3000

13. Package Dimension

(1) package dimension

Packing Information	
Packing type	Reel type
Tape Width	12mm
Qty per Reel	3,000pcs
Small box (inner) Dimension	345*345*45mm
Large box (Outer) Dimension	480x360x360mm
Max qty per small box	6,000pcs
Max qty per large box	60,000pcs

(2)Packing Label Sample



Note:

1. Material Code :Product ID.
2. P/N :Contents with "Order Information" in the specification.
3. Lot No. :Product data.
4. D/C :Product weeks.
5. Quantity :Packaging quantity.

14. Reliability Test

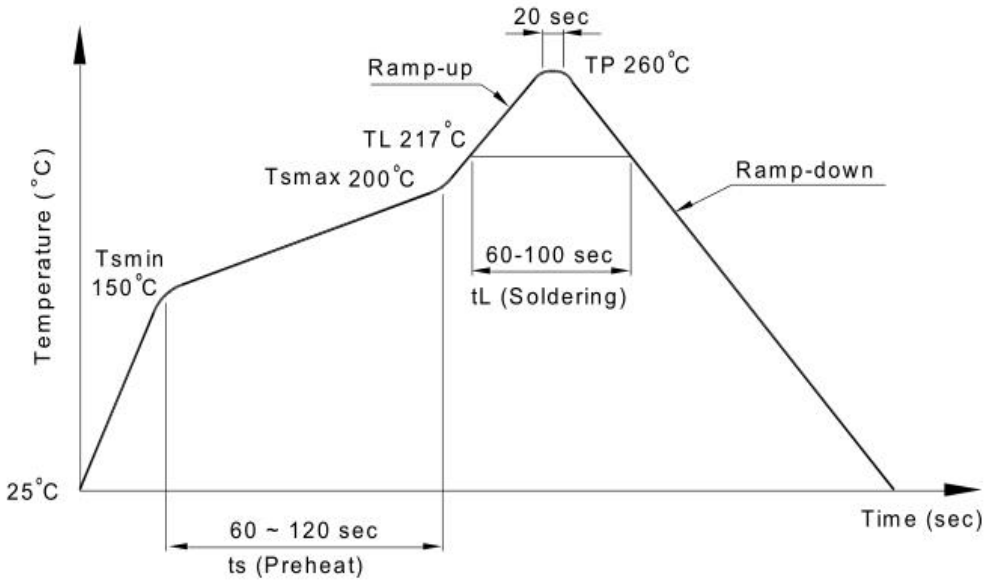
NO.	ITEMS	Reliability Testing				
		QTY. (Pcs)	Condition	Process	Device	Standard
1	RSH 耐焊接热	22	260±5℃	5s/3 次	锡炉	JESD22-A106
2	HTSL 高温存储	77	125℃	168 hrs 500 hrs 1000 hrs	高温烤箱 测试仪	JESD22-A103
3	LTSL 低温存储	77	-40℃	168 hrs 500 hrs 1000 hrs	低温箱 测试仪	JESD22-A119
4	TC 温度循环	77	H:125℃ 15min ∫5min L:-55℃ 15min	300 cycle	冷热冲击机	JESD22-A104
5	TS 温度冲击	77	H:100℃ 5min ∫15s L:-40℃ 5min	300 cycle	冷热冲击机	JESD22-A106
6	HTOL 高温操作	77	100℃ IF=10mA Vcc=5V	168 hrs 500 hrs 1000 hrs	高温烤箱 测试仪、 老化电路板	JESD22-A108
7	ESD-HBM 人体模式	22	≥8KV 1Cycle	1 次	ESD 静电测试仪	JESD22-A114
8	SD 可焊性	22	Pb-free 245±5℃	5s/1 次	锡炉	JESD22-B102
9	HTHB 温湿寿命试验	77	85℃,85%RH IF=10mA,Vcc=5V	168 hrs 500 hrs 1000 hrs	恒温恒湿机，测试仪	JESD22-A101
10	Autoclave 压力锅	77	Ta=121 ℃,100%RH,2atm	96hrs	压力锅	JESD22-A102

15. Temperature Profile Of Soldering

（1）IR Reflow soldering (JEDEC-STD-020C compliant)

Note: one solder backflow is recommended under the conditions described below in the temperature and time profile. Do not weld more than three times.

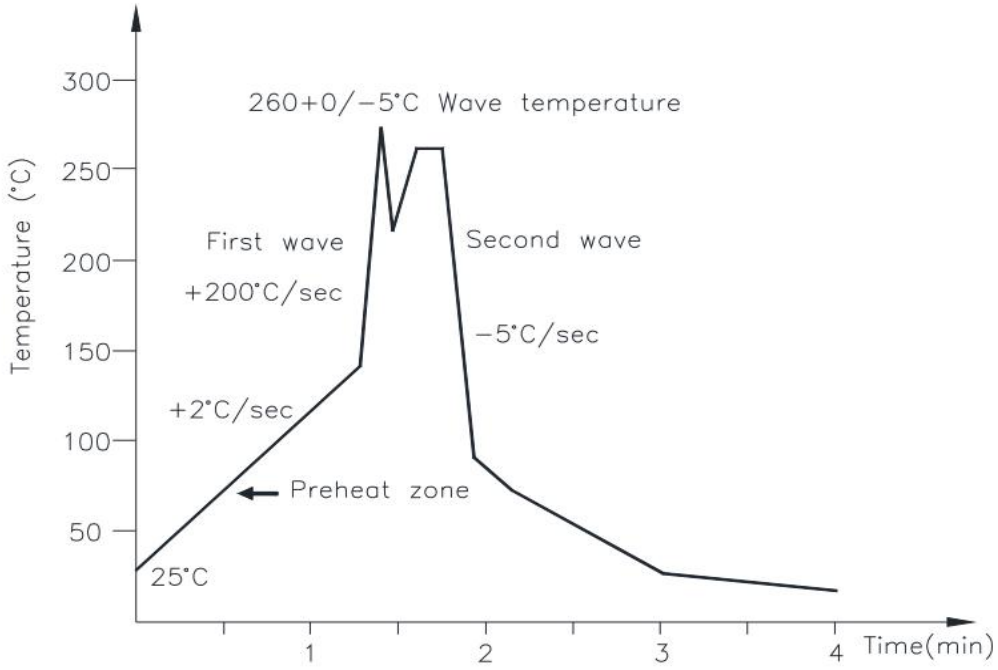
Profile item	Conditions
Preheat - Temperature Min (T Smin) - Temperature Max (T Smax) - Time (min to max) (ts)	150˚C 200˚C 90±30 sec
Soldering zone - Temperature (TL) - Time (t L)	217˚C 60 sec
Peak Temperature	260˚C
Peak Temperature time	20 sec
Ramp-up rate	3˚C / sec max.
Ramp-down rate from peak temperature	3~6˚C / sec
Reflow times	≤3



（2） Wave soldering (JEDEC22A111 compliant)

One-time welding is recommended under the temperature condition.

Temperature Time	260+0/-5˚C 10 sec
Preheat temperature Preheat time	5 to 140˚C 30 to 80 sec



（3） Hand soldering by soldering iron

Single lead welding is allowed in each process and one-time welding is recommended.

Temperature Time	380+0/-5˚C 3 sec max

16. Characteristics Curve

Figure 1: DC Transfer Characteristics

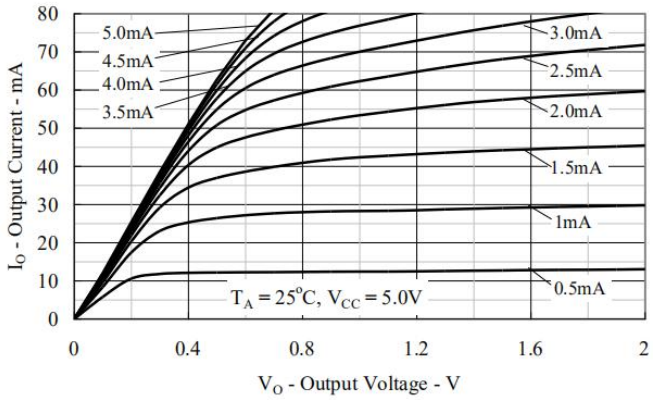


Figure 2: Current Transfer Ratio vs. Forward Current.

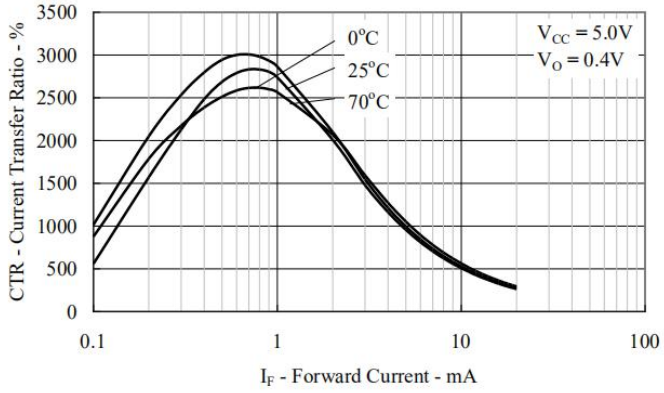


Figure 3: Output Current vs. Forward Current.

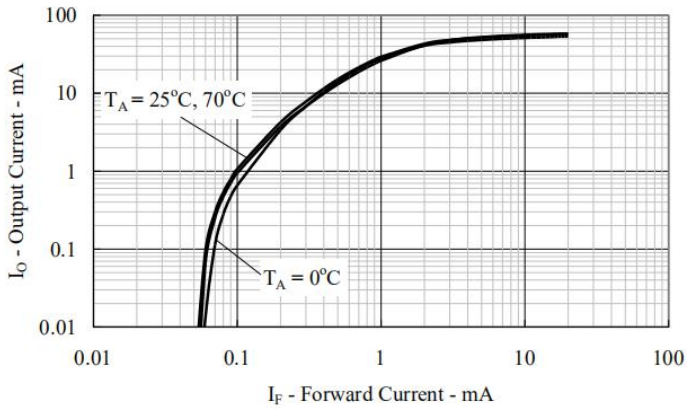


Figure 4: Input Diode Forward Current vs. Forward Voltage

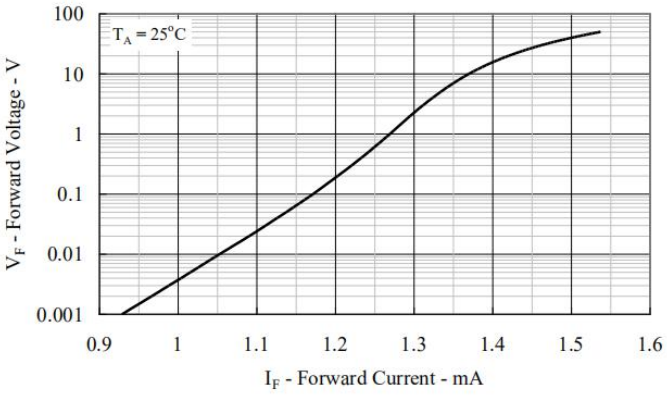
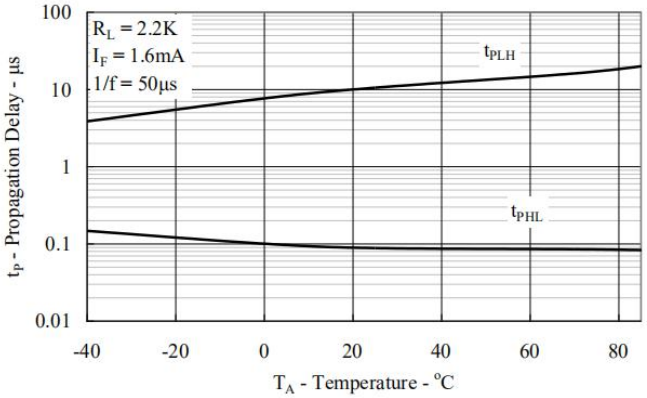


Figure 5: Propagation delay vs. Temperature



17. Switching Time Test Circuit

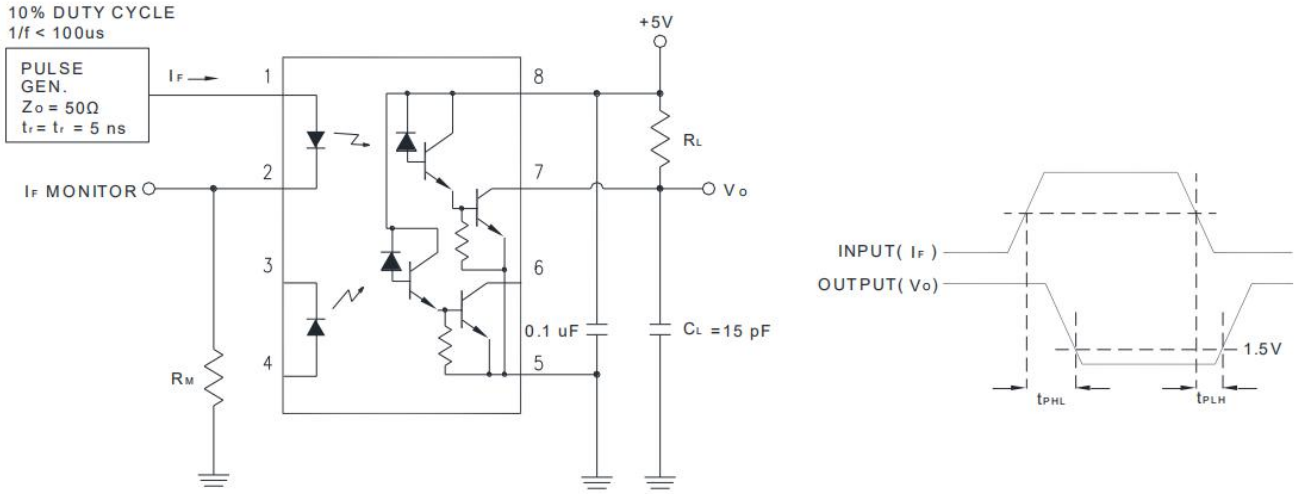


Figure 6: Single Channel Test Circuit for t_{PHL} and t_{PLH}

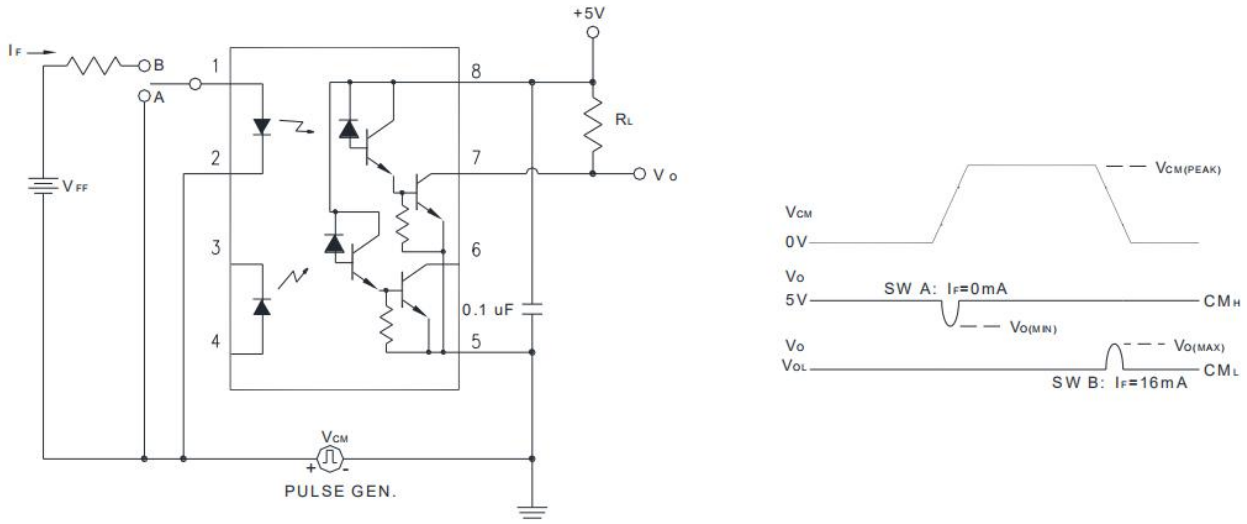


Figure 7: Single Channel Test Circuit for Common Mode Transient Immunity