ORIENT

Photo coupler

Product Data Sheet

Name: OR-M501-(HB)

Customer: _____

Date: _____

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Preliminary

This datasheet is a preliminary design specification, and the formal specifications are subject to the recognition letter with jointly signed

1. Features

(1) Compliance Halogens Free (Br < 900ppm, Cl <900ppm, Br+Cl <1500ppm)
(2) High speed : 1MBd.
(3) Adapted to the dual-in-line, lead spacing width, surface installation.
(4) Wide operating temperature range of -40°C to 105°C
(5) Open collector output.
(6) Safety approval
UL approved(No.E323844)
VDE approved(No.40029733)
CQC approved (No.CQC19001231256)
(7) In compliance with RoHS, REACH standards
(8) MSL Class I

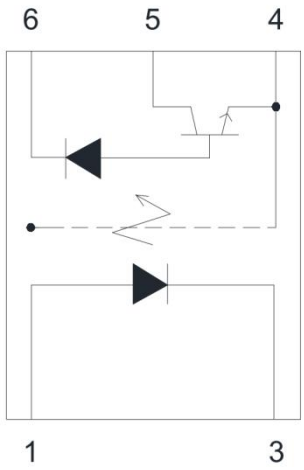
2. Instructions

OR-M501-(HB) consists of highly efficient AlGaAs light-emitting diodes and high-speed optical detectors. The design provides good ac and dc isolation at the input and output ends of the photoelectric coupler. Connections related to photodiode biasing can improve the speed of conventional phototransistor couplers by reducing the capacitance of the matrix collector.

3. Application Range

• line receiver isolation
• switching power supply
• motor control system

4. Functional Diagram



1. Anode
3. Cathode
4. GND
5. Vo (Output)
6. Vcc

Truth table	
Input（LED）	Output
ON	L
OFF	H

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

Parameter		Symbol	Rated Value	Unit
Input	Average Forward Input Current	I_F	20	mA
	Reverse Input Voltage	V_R	5	V
	Power Dissipation	P_I	45	mW
Output	Output Collector Current	I_O	8	mA
	Output Collector Voltage	V_O	20	V
	Output Collector Power Dissipation	P_O	100	mW
Supply Voltage		V_{CC}	30	V
Insulation Voltage		V_{iso}	3750	Vrms
Operating Temperature		T_{opr}	-40～+ 105	℃
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. Recommended Operating Conditions

Characteristics	Symbol	Min	Typ.	Max	Unit
Supply voltage	V_{CC}	2.7	---	24	V
Forward current	I_F	7	---	16	mA
Operating temperature	T_{opr}	-40	---	105	℃

Note:
Recommended operating conditions are given as a design guideline to obtain expected performance of the device. Additionally, each item is an independent guideline respectively. In developing designs using this product, please confirm specified characteristics shown in this document.

7. Electrical optical characteristics

Parameter	Symbol	Min	Typ	Max	Unit	Condition
Forward voltage	V_F	1.2	1.4	1.8	V	I_F= 16mA
Reverse voltage	BV_R	5	—	—	V	I_R = 10μA
Current transfer ratio	CTR	20	33	50	%	I_F= 16mA, V_O=0.4V, V_{CC}=4.5V
Low Level Output Voltage	V_{OL}	—	0.2	0.5	V	V_{CC}=4.5V, I_F=16mA,I_O=2.4mA
		—	0.2	0.4	V	V_{CC}=4.5V, I_F=16mA,I_O=3.0mA
High Level Output Current	I_{OH}	—	0.01	1	uA	V_{CC}=15V, V_O=15V,I_F=0mA
Low Level Supply Current	I_{CCL}	—	220	—	uA	I_F=16mA,V_O=open, VCC=15V
High Level Supply Current	I_{CCH}	—	0.002	1	uA	I_F=0mA,V_O=open, VCC=15V

Typical values at T_A = 25℃

8. Switching Characteristics

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Propagation delay time to output Low level	t_{PHL}	R_L=1.9kΩ I_F=16mA	—	0.39	0.8	μs
Propagation delay time to output High level	t_{PLH}	R_L=1.9kΩ I_F=16mA	—	0.55	0.8	μs

Typical values at T_A = 25℃

9. Isolation characteristics

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Withstand Insulation Test Voltage	V_{ISO}	RH ≤ 50%, t =1min, T_A=25℃	3750	—	—	V_{RMS}
Input-Output Resistance	R_{I-O}	V_{I-O}=500V DC	—	10^{12}	—	Ω

Typical values at T_A = 25℃

10. Order Information

Part Number

OR-M501-X-Y-Z-(HB)

Note

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

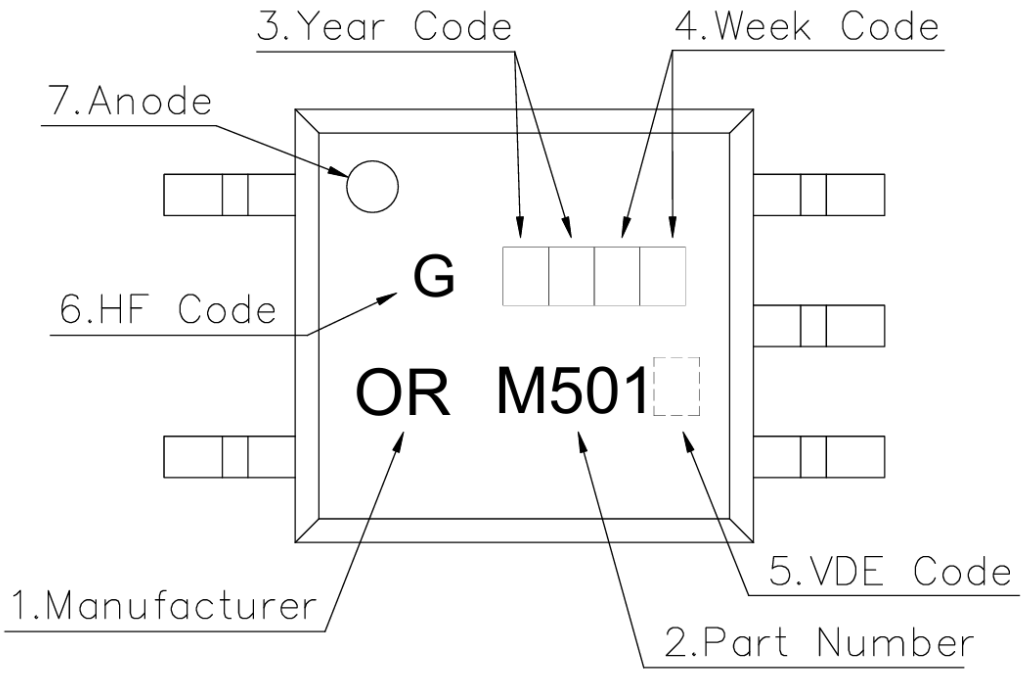
Y = 'V' code for VDE safety (This options is not necessary).

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

11. Naming Rule

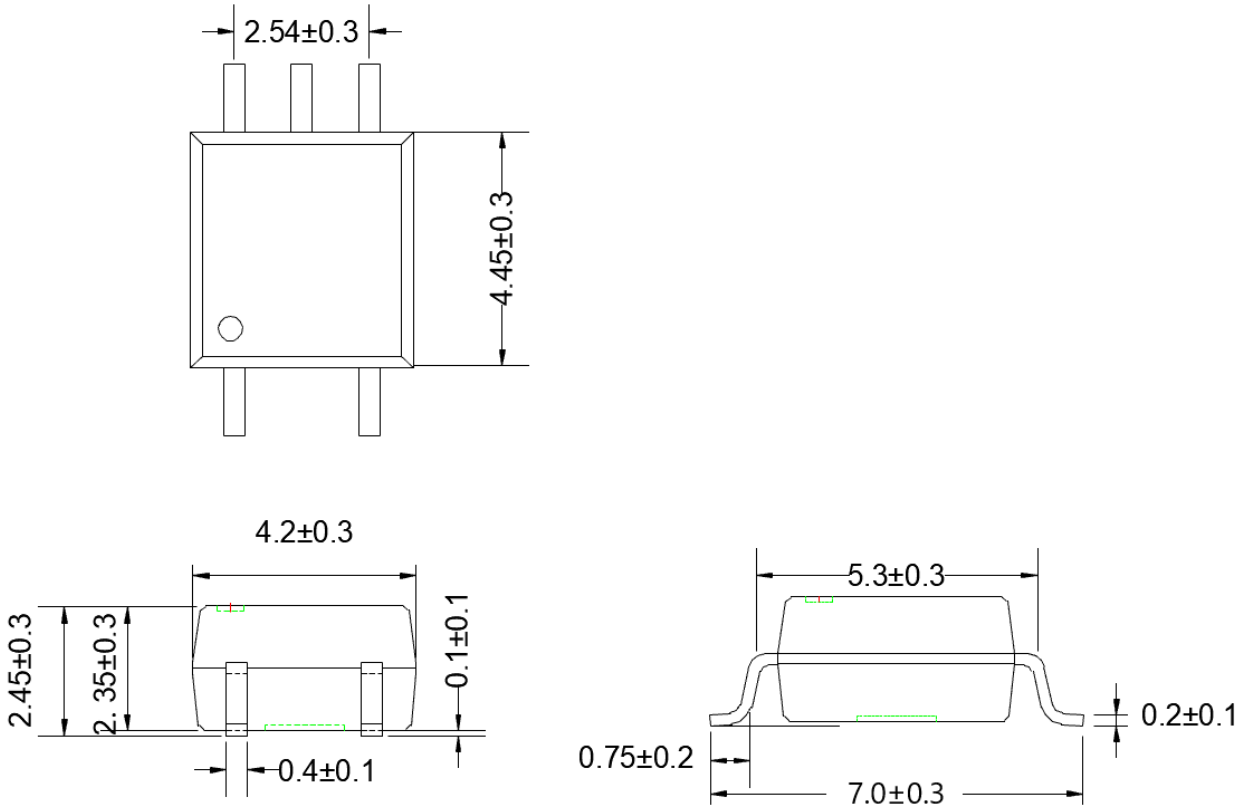


1. Manufacturer : ORIENT.
2. Part Number : M501.
3. Year Code □□ : '21' means '2021' and so on.
4. Week Code □□ : 01 means the first week, 02 means the second week and so on.
5. VDE Code ⬚ . (Optional)
6. HF Code 'G': Halogen Free.
7. Anode.

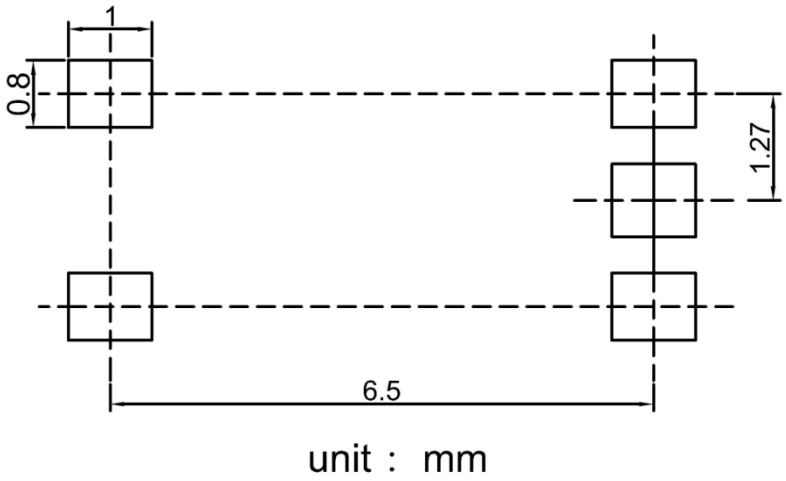
* VDE Code can be selected.

12. Outer Dimension

（1）OR-M501



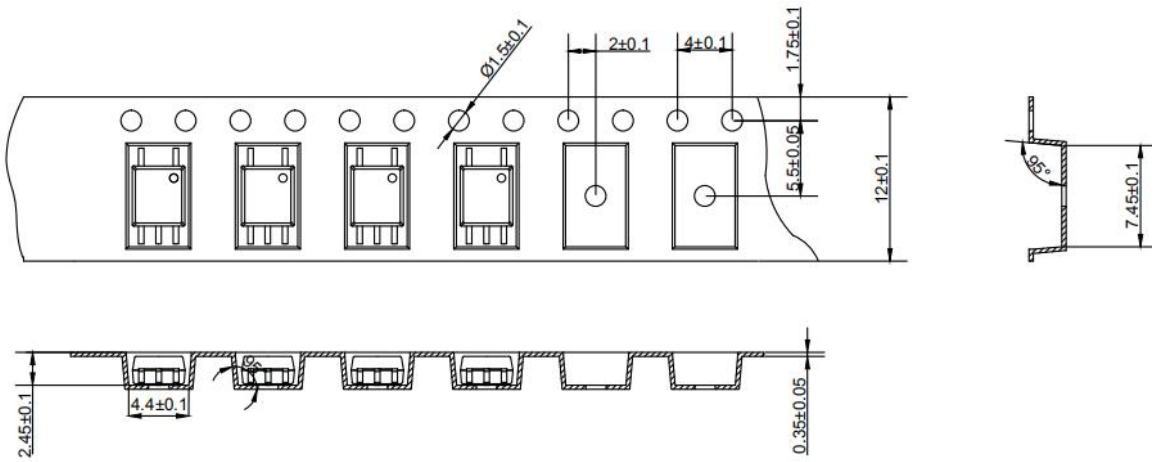
13. Recommended Foot Print Patterns (Mount Pad)



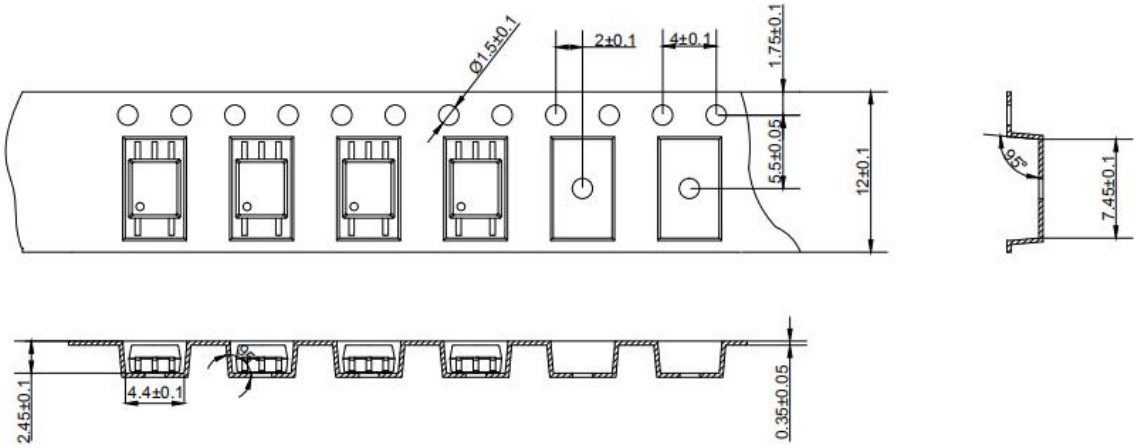
unit： mm

14. Taping Dimensions

（1）OR-M501-TP



（2）OR-M501-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）

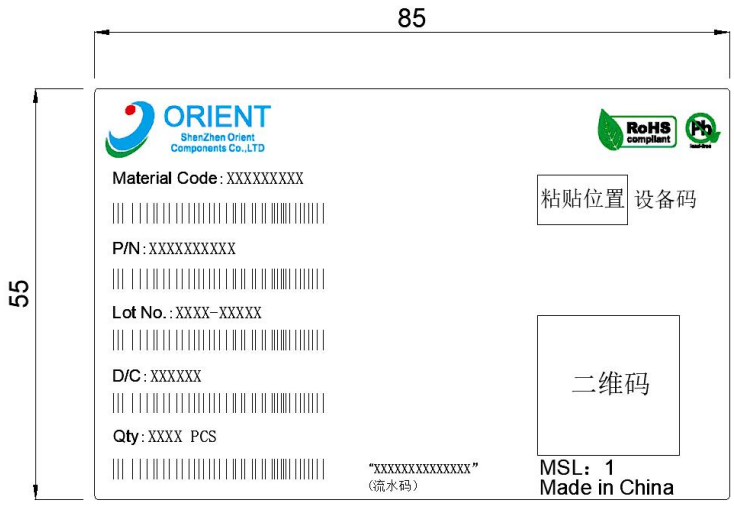
Encapsulation type	TP/TP1
amount （pcs）	3000

15. 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:

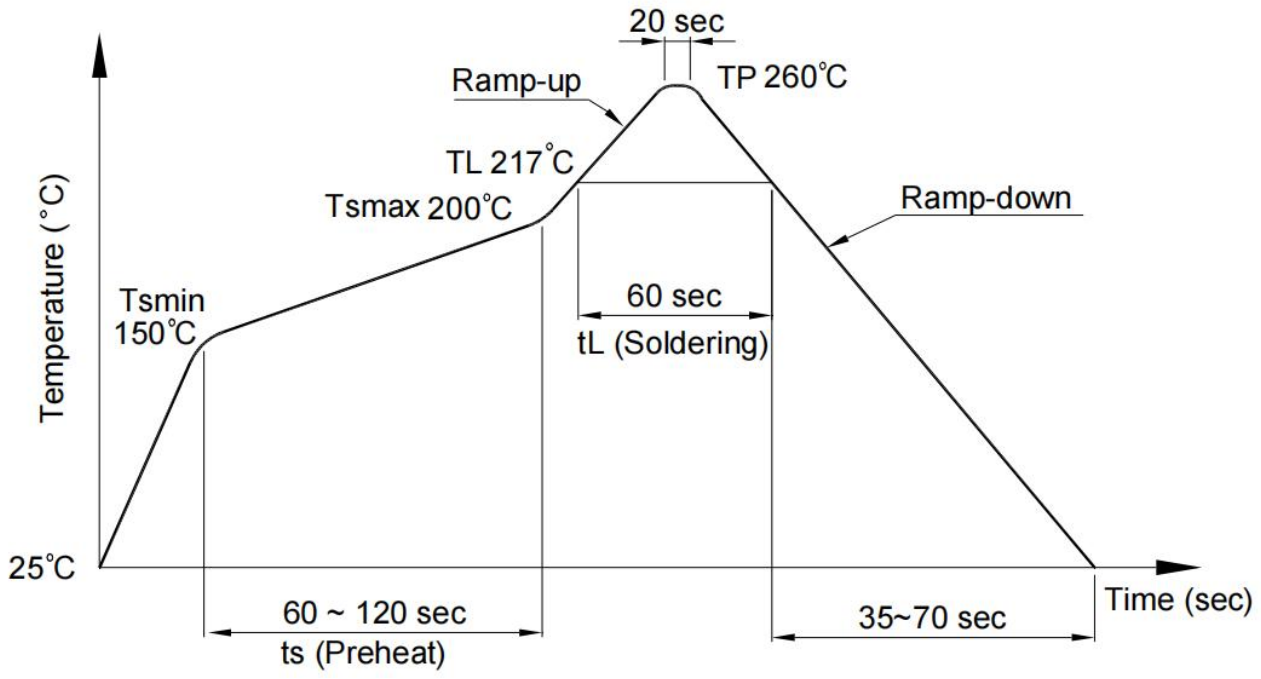
1. Material Code :Product ID.
2. P/N :Contents with "Order Information" in the specification.
3. Lot No. :Product weeks.
4. D/C :Product data.
5. Quantity :Packaging quantity.

16. Temperature Profile Of Soldering

（1）IR Reflow soldering (JEDEC-STD-020 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.

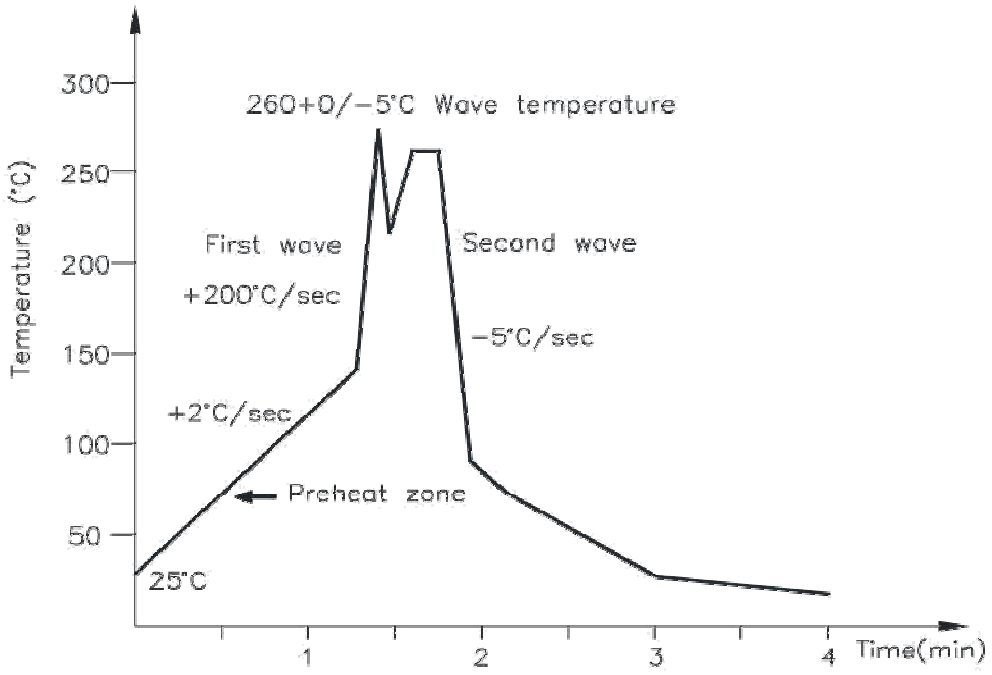
Profile item	Conditions
Preheat - Temperature Min (T Smin) - Temperature Max (T Smax) - Time (min to max) (ts)	 150˚C 200˚C 90±30 sec
Soldering zone - Temperature (TL) - Time (t L)	 217˚C 60 sec
Peak Temperature	260˚C
Peak Temperature time	20 sec
Ramp-up rate	3˚C / sec max.
Ramp-down rate from peak temperature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



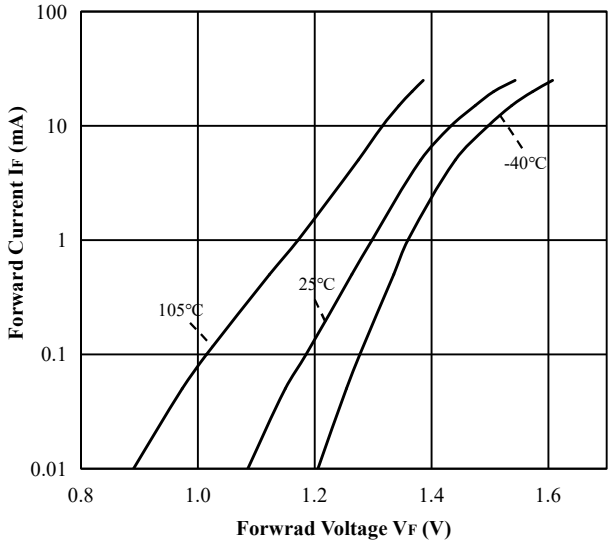
（3）Hand soldering by soldering iron

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

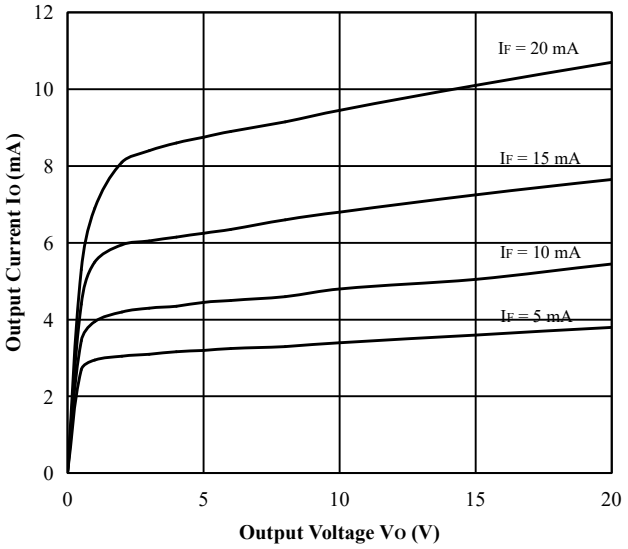
Temperature Time	380+0/-5˚C 3 sec max

17. Characteristics Curve

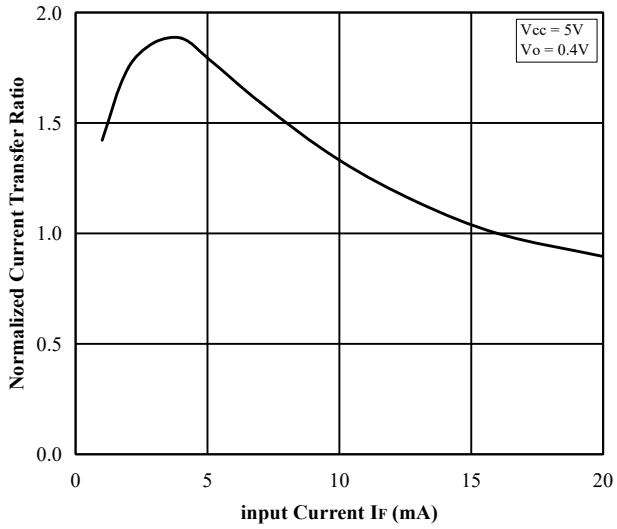
FORWARD CURRENT vs. FORWARD VOLTAGE



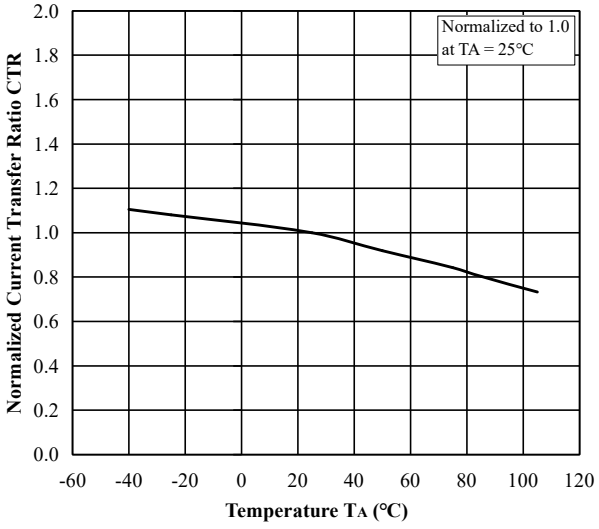
OUTPUT CURRENT vs. OUTPUT VOLTAGE



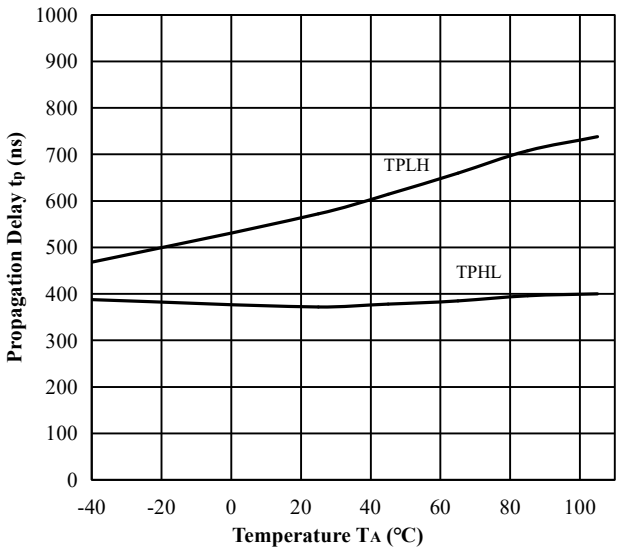
CURRENT TRANSFER RATIO vs. INPUT CURRENT



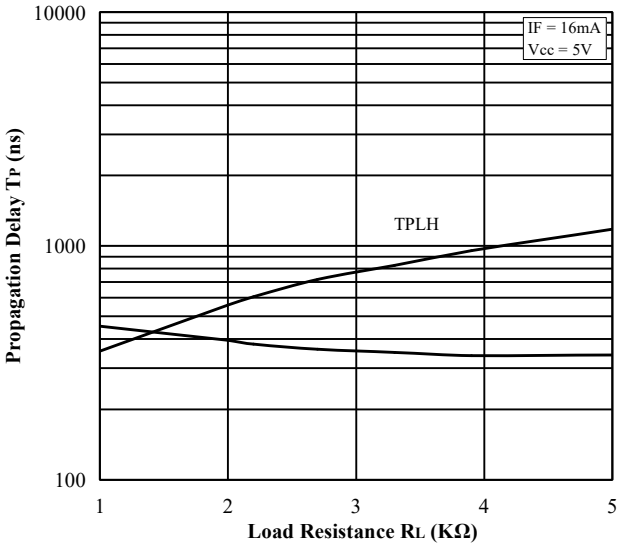
CURRENT TRANSFER RATIO vs. TEMPERATURE



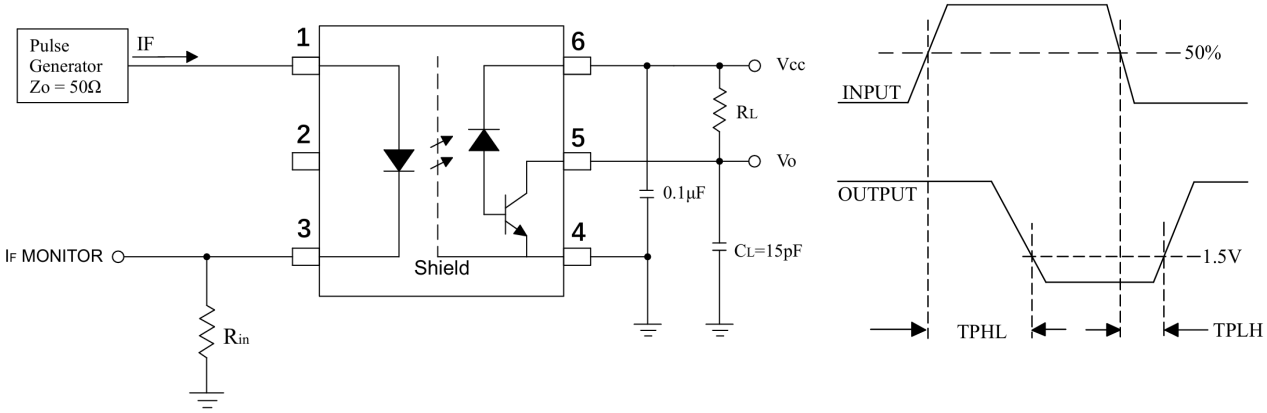
PROPAGATION DELAY TIME vs. TEMPERATURE



PROPAGATION DELAY vs. LOAD RESISTANCE



18. Switching Time Test Circuit



Test Circuit for t_{PHL} and t_{PLH}

19. NOTES

(1) Orient is continually improving the quality, reliability, function or design and Orient reserves the right to make changes without further notices.

(2) The products shown in this publication are designed for the general use in electronic applications such as office automation equipment, communications devices, audio/visual equipment, electrical application and instrumentation.

(3) For equipment/devices where high reliability or safety is required, such as space applications, nuclear power control equipment, medical equipment, etc, please contact our sales representatives.

(4) When requiring a device for any “specific” application, please contact our sales in advice.

(5) If there are any questions about the contents of this publication, please contact us at your convenience.

(6) The contents described herein are subject to change without prior notice.

(7) Immerge unit’s body in solder paste is not recommended.