ORIENT

Photo coupler

Product Data Sheet

Name: OR-053X

Customer: _____

Date: _____

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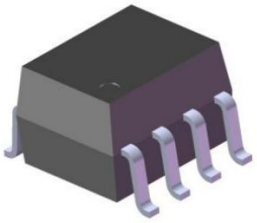
Preliminary

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

1. Features



(1) High speed 1MBd

(2) Guaranteed performance from -40 to 105°C

(3) High isolation voltage between input and output (Viso=3750 Vrms)

(4) Safety approval

UL approved(No.E323844)

VDE approved(No.40029733)

CQC approved (No.CQC19001231254)

(5) In compliance with RoHS, REACH standards

(6) MSL Class I

2. Instructions

The OR-053X devices each consist of an infrared emitting diode, optically coupled to a high speed photo detector transistor. A separate connection for the photo diode bias and output-transistor collector increase the speed by several orders of magnitude over conventional photo transistor couplers by reducing the base-collector capacitance of the input transistor.

The devices are packaged in an 8-pin small outline package which conforms to the standard SO-8 footprint.

3. Application Range

(1) Replacement for low speed phototransistor photo couplers

(2) Power transistor isolation in motor drives

(3) Feedback loop in switch-mode power supplies

(4) High speed logic ground isolation

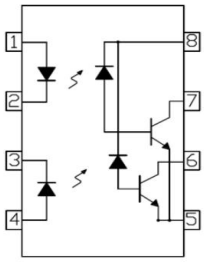
(5) Line receivers

(6) Telecommunication equipments

(7) Home appliances

4. Functional Diagram

Schematic



Pin Configuration

1. Anode
2. Cathode
3. Cathode
4. Anode
5. Gnd
6. Vout 2
7. Vout 1
8. V_{CC}

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

Parameter		Symbol	Rated Value	Unit
Input	Average Forward Input Current	I_F	25	mA
	Peak forward current (50% duty, 1ms P.W)	I_{FP}	50	mA
	Reverse Input Voltage	V_R	5	V
	Power Dissipation	P_I	40	mW
Output	Output Collector Current	I_O	50	mA
	Output Collector Voltage	V_O	-0.5 to 20	V
	Supply Voltage	V_{CC}	-0.5 to 30	V
	Output Collector Power Dissipation	P_O	100	mW
	Emitter-Base reverse voltage	V_{EBR}	5	V
	Average Output current	I_O	8	mA
	Peak Output current	$I_{O(PK)}$	16	mA
Insulation Voltage		V_{iso}	3750	Vrms
Working 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. Opto-electronic Characteristics (TA = 25°C)

Parameter			Symbol	Min	Typ	Max	Unit	Condition
Input	Forward Voltage		V_F	—	1.4	1.8	V	I_F= 16mA
	Reverse Voltage		BV_R	5	—	—	V	I_R = 10μA
	Input Capacitance		C_{IN}	—	60	—	pF	f = 1MHz,VF = 0V
Detector	High Level Supply Current		I_{CCH}	—	0.01	1	μA	V_{CC}=15V,I_F=16mA V_O=Open
	Low Level Supply Current		I_{CCL}	—	—	400	μA	V_{CC}=15V,I_F=16mA V_O=Open
	High Level Output Current		I_{OH}	—	0.001	0.5	μA	V_O=V_{CC}=5.5V, I_F=0mA
				—	—	50		V_O=V_{CC}=15V, I_F=0mA
Transfer Characteristics	Current Transfer Ratio	OR-0530	CTR	7	—	50	%	I_F = 16mA ,V_O = 0.4V, V_{CC}=4.5V
		OR-0531		19	—	50		
		OR-0530		5	—	—		I_F = 16mA ,V_O = 0.5V, V_{CC}=4.5V
		OR-0531		15	—	—		
	Logic Low Output Voltage	OR-0530	V_{OL}	—	0.18	0.4	V	I_F = 16mA ,Io = 1.1mA, Vcc=4.5V
		OR-0531		—	0.30	0.4		I_F = 16mA ,Io = 3mA, Vcc=4.5V
		OR-0530		—	—	0.5		I_F = 16mA ,Io = 0.8mA, Vcc=4.5V
		OR-0531		—	—	0.5		I_F=16mA ,Io=2.4mA, Vcc=4.5V

7. Opto-electronic Characteristics (TA = 25°C)

Parameter	Symbol	Min.	Typ*	Max.	Unit	Conditions
Propagation Delay Time to Logic Low	t_{PHL}	—	0.39	0.8	μs	Rl=1.9KΩ IF=16mA
Propagation Delay Time to Logic High	t_{PLH}	—	0.65	0.8	μs	Rl=1.9KΩ IF=16mA

8. Order Information

Part Number

OR-053X-Y-Z

Note

X = Part Number,0530 or 0531.

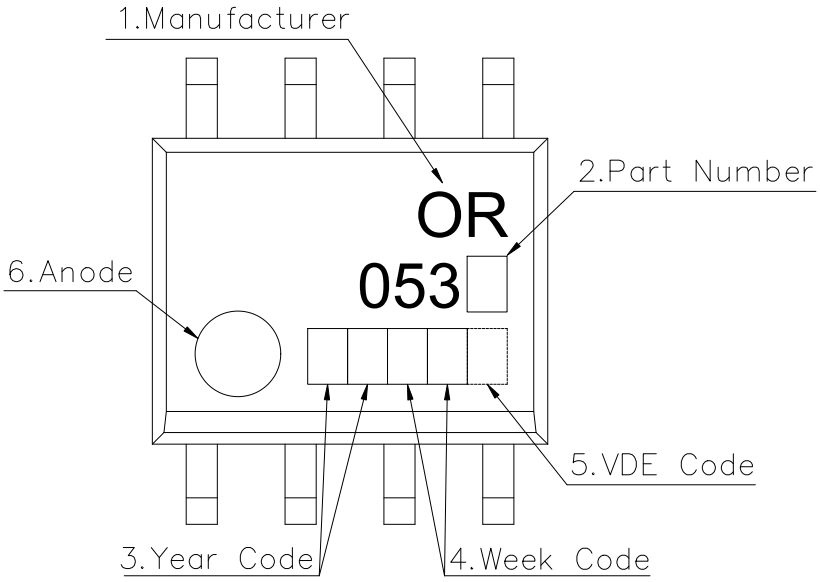
Y = Tape and reel option. (TA or TA1).

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

* VDE Code can be selected.

Option	Description	Packing quantity
TP	Surface mount lead form (low profile) + TA tape & reel option	1000 units per reel
TP1	Surface mount lead form (low profile) + TA1 tape & reel option	1000 units per reel

9. Naming Rule



1.Manufacturer : ORIENT.

2.Part Number : 0530 or 0531.

3.Year Code □□ : '23' means '2023' and so on.

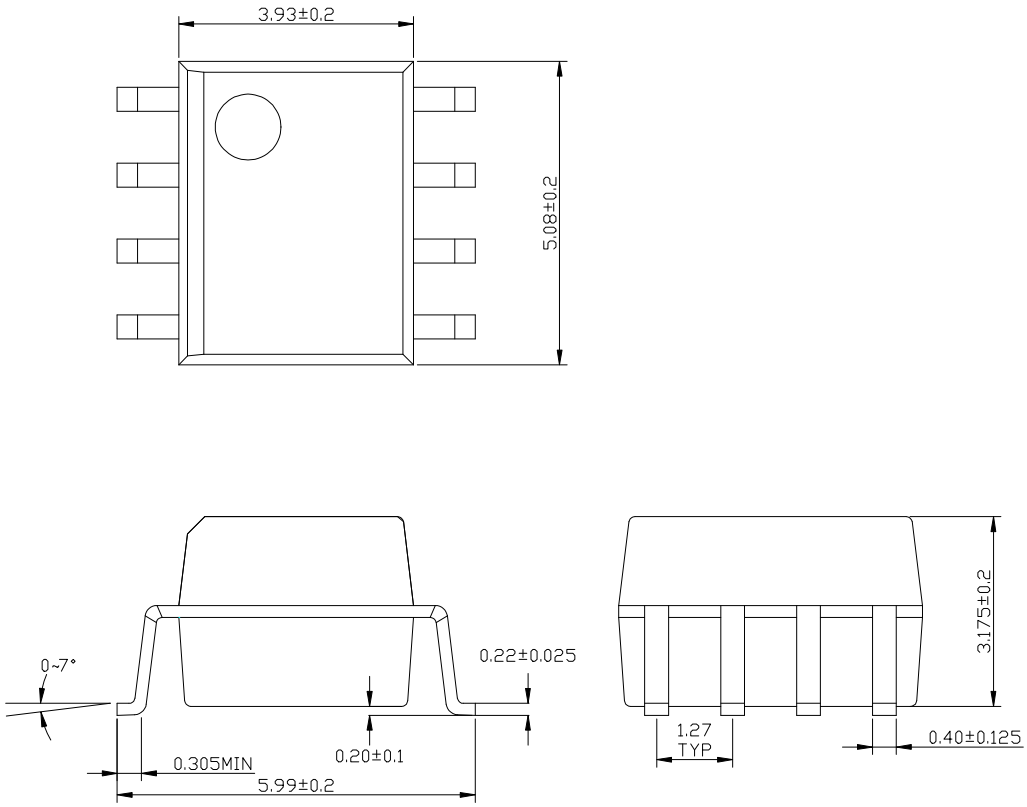
4.Week Code □□ : 01 means the first week, 02 means the second week and so on.

5.VDE Code ⬚ . (Optional)

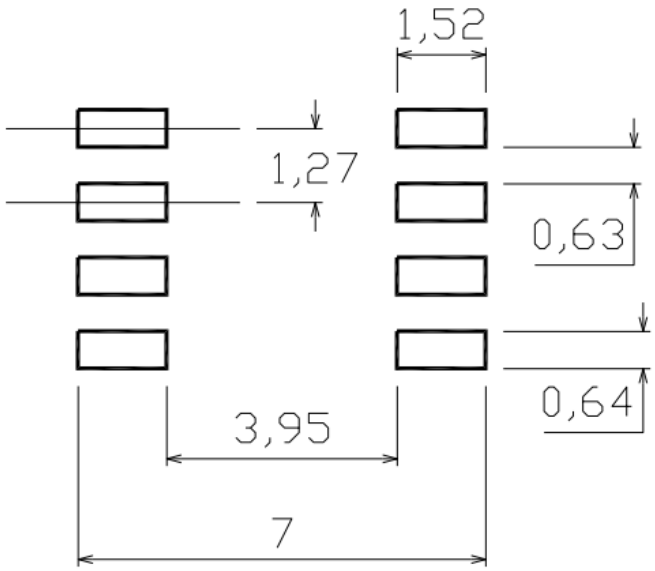
6.Anode.

* VDE Mark can be selected.

10. Package Dimension



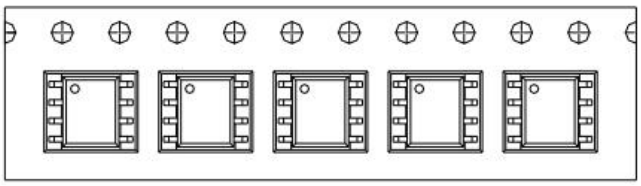
11. Recommended Foot Print Patterns (Mount Pad)



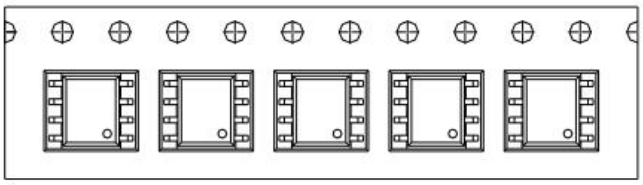
unit：mm

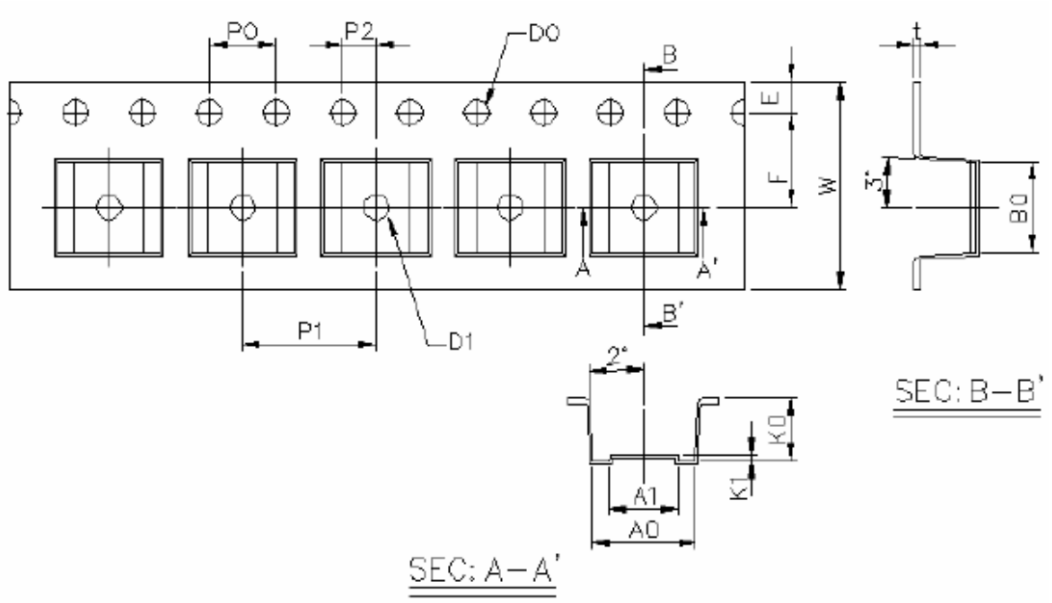
12. Taping Dimensions

(1)OR-053X-TA1



(2)OR-053X-TA





Dimension No.	A0	A1	B0	D0	D1	E	F
Dimension(mm)	6.2±0.1	4.1±0.1	5.28±0.1	1.5±0.1	1.5±0.3	1.75±0.1	5.5±0.1
Dimension No.	Po	P1	P2	t	W	K0	K1
Dimension(mm)	4.0±0.1	8.0±0.1	2.0±0.1	0.4±0.1	12.0+0.3/ -0.1	3.7±0.1	0.3±0.1

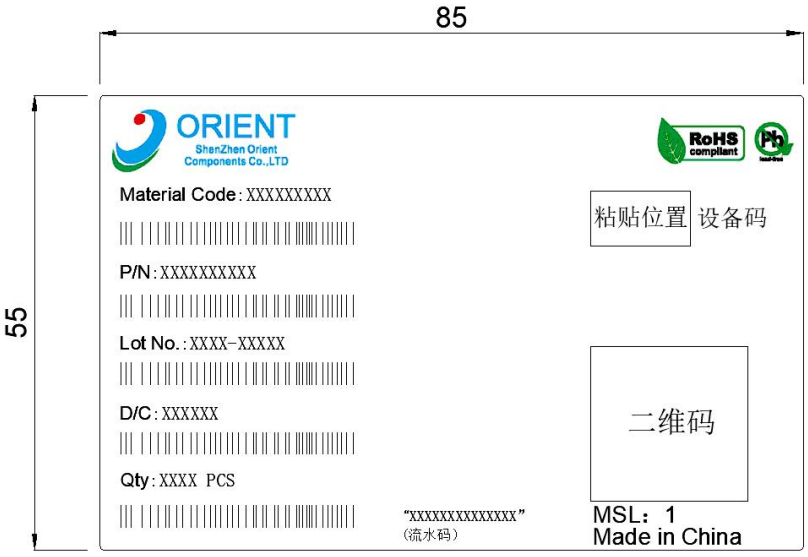
Encapsulation type	TA1/TA
amount （pcs）	2000

13. Package Dimension

(1) package dimension

Packing Information	
Packing type	Reel type
Tape Width	12mm
Qty per Reel	2,000pcs
Small box (inner) Dimension	345*345*45mm
Large box (Outer) Dimension	480*360*360mm
Max qty per small box	4,000pcs
Max qty per large box	40,000pcs

(2)Packing Label Sample



Note:

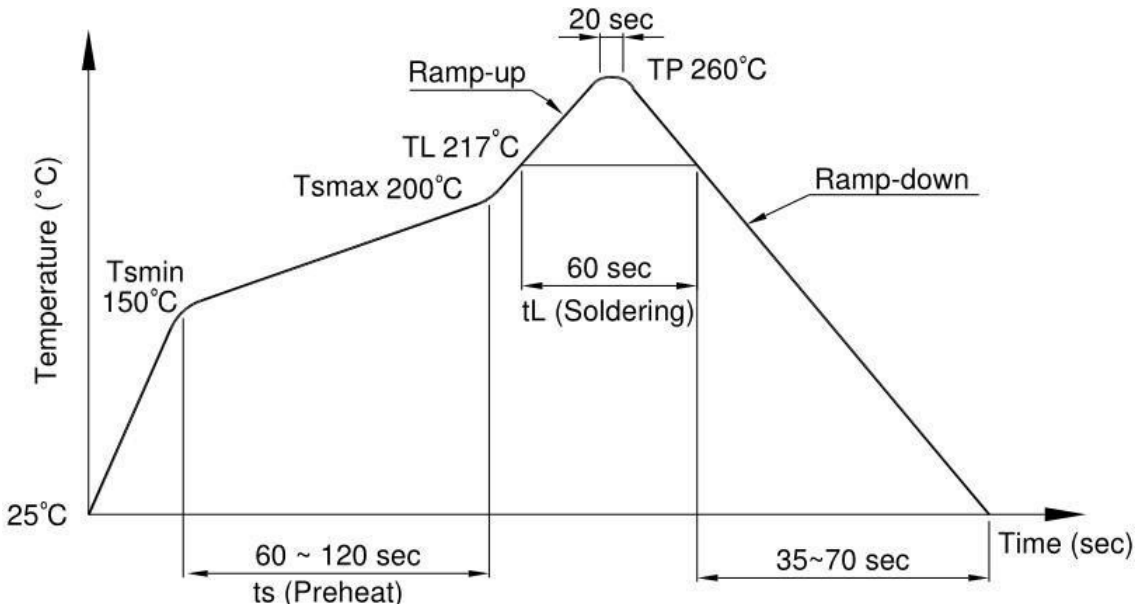
1. Material Code :Product ID.
2. P/N :Contents with "Order Information" in the specification.
3. Lot No. :Product weeks.
4. D/C :Product data.
5. Quantity :Packaging quantity.

14. Temperature Profile Of Soldering

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

One time soldering reflow is recommended within the condition of temperature and time profile shown below. Do not solder more than three times.

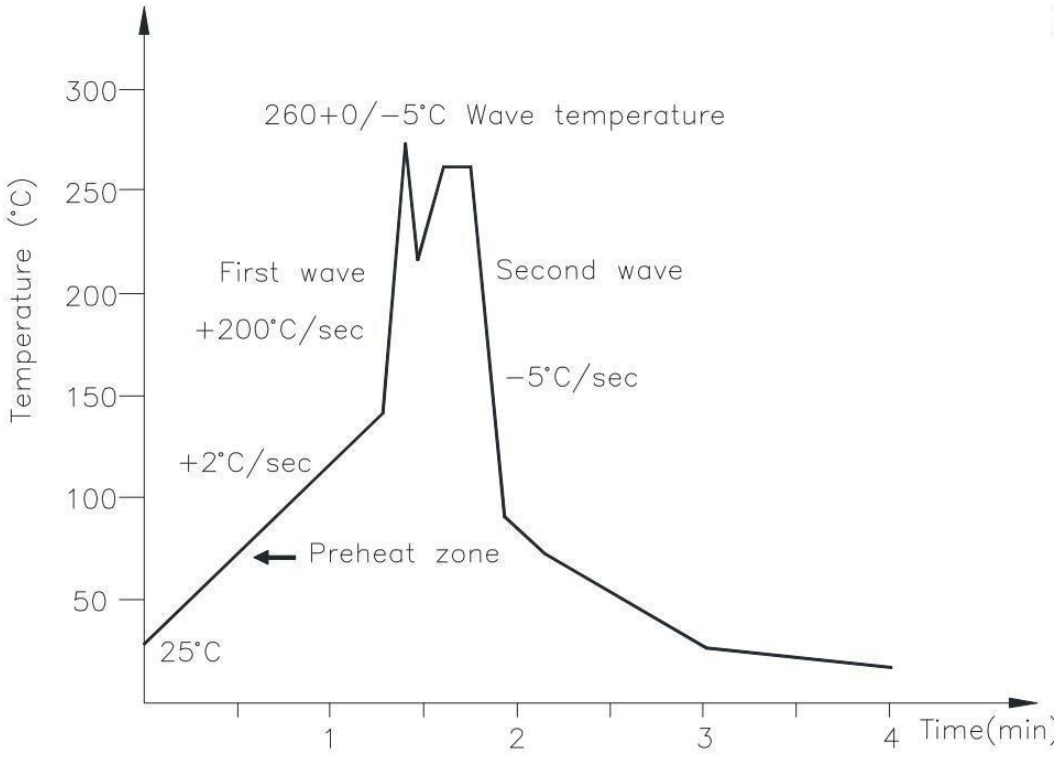
Profile item	Conditions
Preheat - Temperature Min (T Smin) - Temperature Max (T Smax) - Time (min to max) (ts)	 150˚C 200˚C 90±30 sec
Soldering zone - Temperature (TL) - Time (t L)	 217˚C 60 sec
Peak Temperature	260˚C
Peak Temperature time	20 sec
Ramp-up rate	3˚C / sec max.
Ramp-down rate from peak temperature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



2. Wave soldering (JEDEC22A111 compliant)

One time soldering is recommended within the condition of temperature.

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



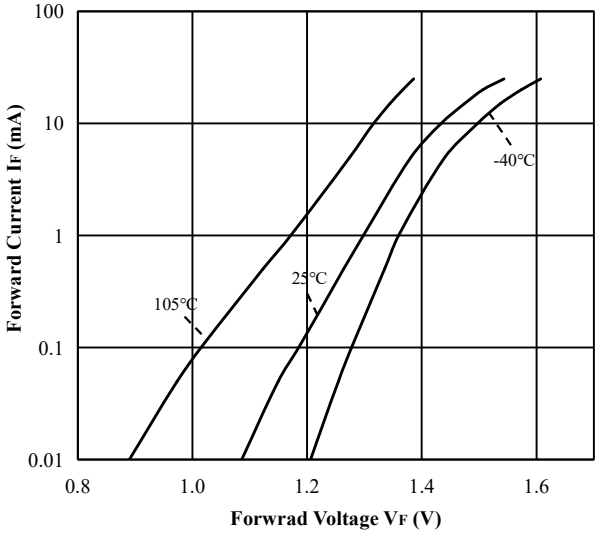
3. Hand soldering by soldering iron

Allow single lead soldering in every single process. One time soldering is recommended.

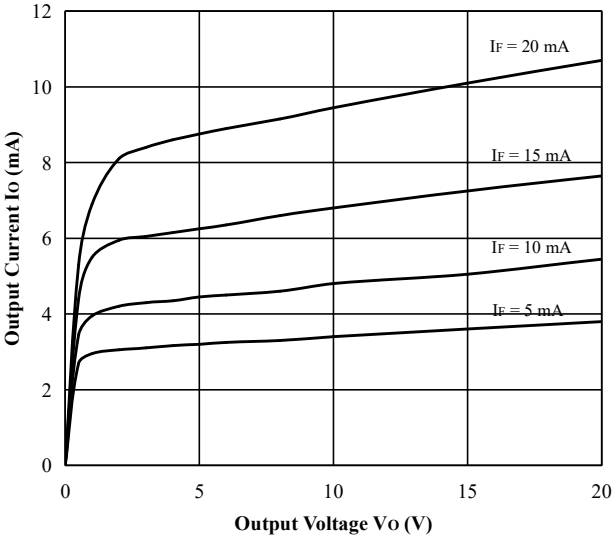
Temperature Time	380+0/-5˚C 3 sec max

15. Characteristics Curve

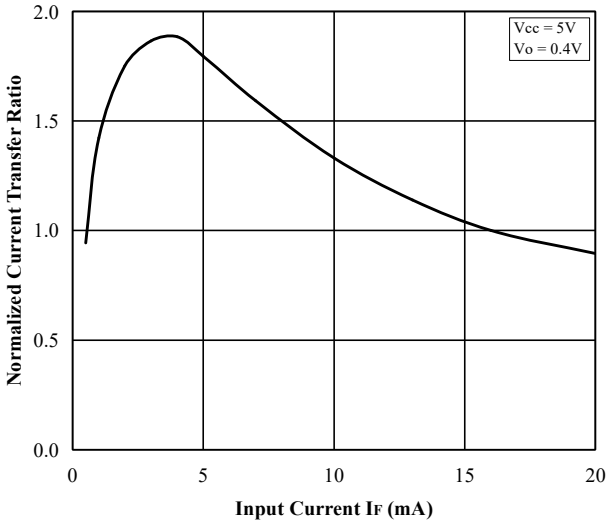
FORWARD CURRENT vs. FORWARD VOLTAGE



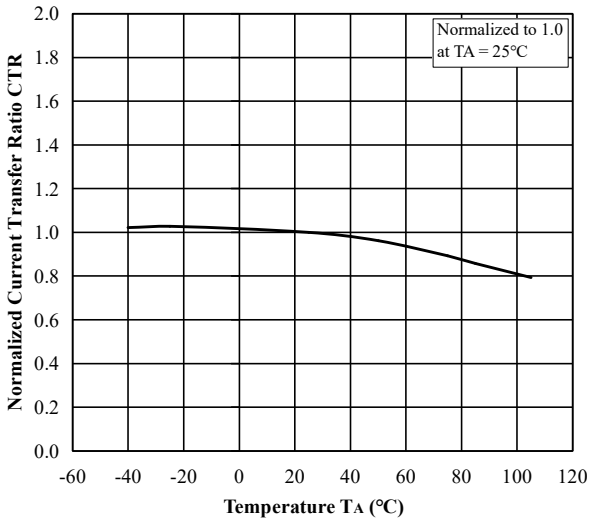
OUTPUT CURRENT vs. OUTPUT VOLTAGE



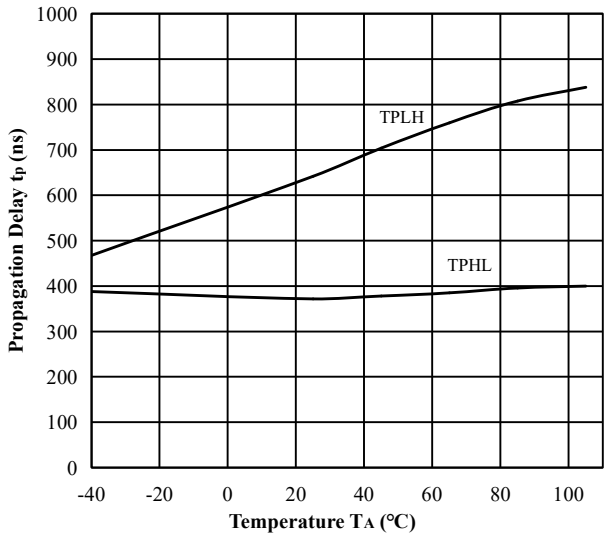
CURRENT TRANSFER RATIO vs. INPUT CURRENT



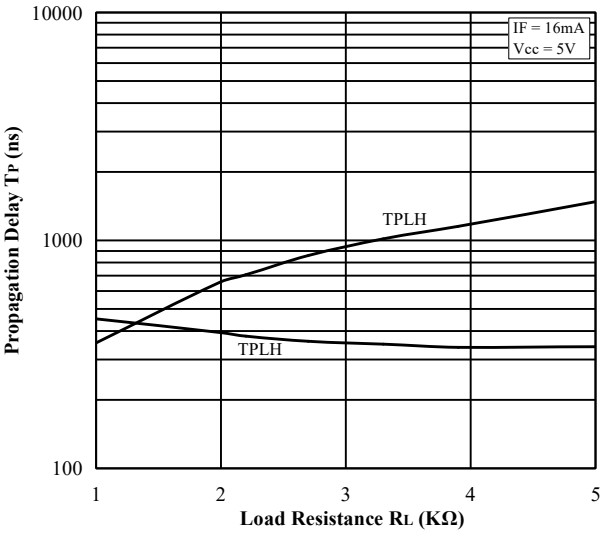
CURRENT TRANSFER RATIO vs. TEMPERATURE



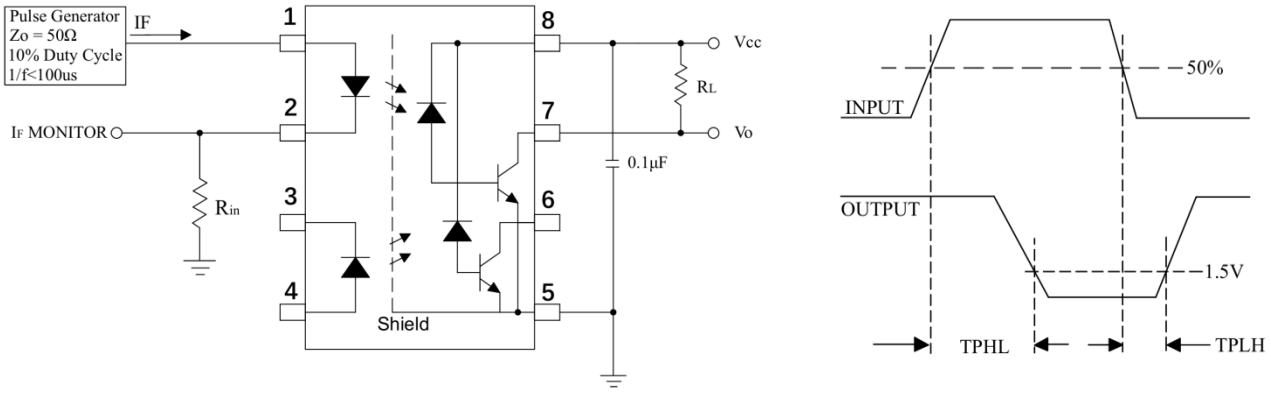
PROPAGATION DELAY TIME vs. TEMPERATURE



PROPAGATION DELAY vs. LOAD RESISTANCE



16. Switching time test circuit



Swiching Time Test Circuit & Waveform

17. 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.