



# ORIENT

## Photo coupler

### Product Data Sheet

Part Number: OR-250

Customer: \_\_\_\_\_

Date: \_\_\_\_\_

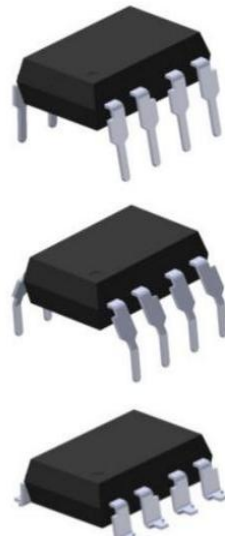
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### 1. Features

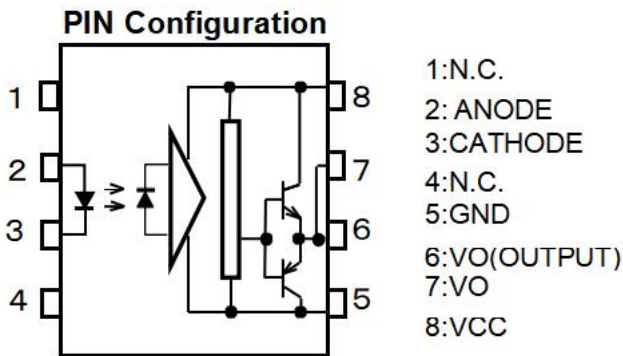
- (1) Input Threshold Current:  $I_F=5mA(MAX)$
- (2) Supply Current( $I_{CC}$ ) :  $8mA(MAX)$
- (3) Supply Voltage( $V_{CC}$ ):  $10\sim35V$
- (4) Output Current( $I_O$ ):  $\pm 2.0A(MAX)$
- (5) Switching Time( $t_{pLH}/t_{pHL}$ ) :  $0.5\mu s(MAX)$
- (6) Isolation Voltage:  $2500V_{rms}$
- (7) Industrial temperature range:  $-20^{\circ}C$  to  $85^{\circ}C$
- (8) Safety approval
  - UL approved(No.E323844)
  - VDE approved(No.40029733)
  - CQC approved (No.CQC19001231254 )
- (9) In compliance with RoHS, REACH standards
- (10) MSL Class I



### 2. Instructions

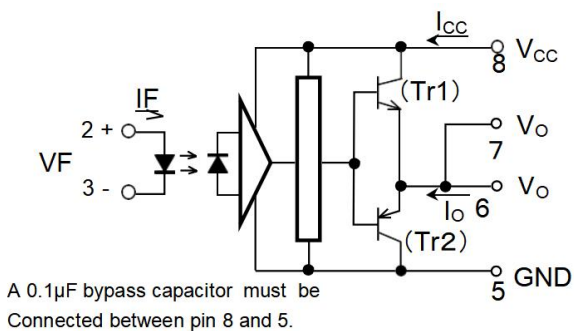
The OR-250 consists of a GaAlAs light emitting diode and a integrated photodetector. This unit is 8-lead DIP. OR-250 is suitable for gate driving circuit of IGBT or power MOSFET.

### 3. PIN Configuration



TRUTH TABLE		Tr 1	Tr 2
INPUT LED	ON	ON	OFF
	OFF	OFF	ON

### 4. Schematic



## 5. Absolute Maximum Ratings (Ta=25°C)

CHARACTERISTIC			SYMBOL	RATING	UNIT	
LED	Forward Current		$I_F$	25	mA	
	Forward Current Derating (Ta≥70°C)		$\Delta I_F / \Delta T_a$	-0.36	mA / °C	
	Peak Transient Forward Current (Note 1)		$I_{FPT}$	1	A	
	Reverse Voltage		$V_R$	5	V	
	Junction Temperature		$T_j$	125	°C	
DETECTOR	"H" Peak Output Current	PW ≤2.5μs, f≤15 kHz	(Note 2)	$I_{OPH}$	-1.5	A
		PW ≤1.0μs, f≤15 kHz		-2.0		
	"L" Peak Output Current	PW ≤2.5μs, f≤15 kHz		$I_{OPL}$	+1.5	A
		PW ≤1.0μs, f≤15 kHz		+2.0		
	Output Voltage		(Ta≤70°C)	$V_O$	35	V
			(Ta=85°C)		24	
	Supply Voltage		(Ta≤70°C)	$V_{CC}$	35	V
			(Ta=85°C)		24	
	Output Voltage Derating (Ta≥70°C)			$\Delta V_O / \Delta T_a$	-0.75	V / °C
	Supply Voltage Derating (Ta≥70°C)			$\Delta V_{CC} / \Delta T_a$	-0.75	V / °C
Junction Temperature			$T_j$	125	°C	
Operating Frequency (Note 3)			f	25	kHz	
Operating Temperature Range			$T_{opr}$	-20~85	°C	
Storage Temperature Range			$T_{stg}$	-55~125	°C	
Lead Soldering Temperature(10s)			$T_{sol}$	260	°C	
Isolation Voltage (AC,1min., R.H. ≤60%,Ta=25°C) (Note 4)			$BV_S$	2500	Vrms	

(Note 1) : Pulse width PW≤1μs,300pps

(Note 2) : Exponential Waveform

(Note 3) : Exponential Waveform  $I_{OPH} \leq -1.0A (\leq 2.5\mu s)$ ,  $I_{OPL} \leq +1.0A (\leq 2.5\mu s)$

(Note 4) : Device considered a two terminal device : pins 1,2,3 and 4 shorted together and pins 5,6,7 and 8 shorted together.

(Note 5) : A ceramic capacitor(0.1μF) should be connected from pin 8 to pin 5 to stabilize the operation of the high gain linear amplifier.Failure to provide the bypassing may impair the switching property.The total lead length between capacitor and coupler should not exceed 1cm.

## 6. Recommended Operating Conditions

CHARACTERISTIC	SYMBOL	MIN	TYP.	MAX	UNIT	
Input Current, ON	$I_{F(ON)}$	7	8	10	mA	
Input Voltage, OFF	$V_{F(OFF)}$	0	—	0.8	V	
Supply Voltage	$V_{CC}$	15	—	30	20	V
Peak Output Current	$I_{OPH}/I_{OPL}$	—	—	±0.5		A
Operating Temperature	$T_{opr}$	-20	25	70	85	°C

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

CHARACTERISTIC	SYMBOL	TEST CIRCUIT	TEST CONDITION	MIN	TYP.	MAX	UNIT		
Input Forward Voltage	$V_F$	—	$I_F = 10 \text{ mA}, T_a = 25^\circ\text{C}$	—	1.5	1.8	V		
Temperature Coefficient of Forward Voltage	$\Delta V_F / \Delta T_a$	—	$I_F = 10 \text{ mA}$	—	-1.9	—	mV/°C		
Input Reverse Current	$I_R$	—	$V_R = 5 \text{ V}, T_a = 25^\circ\text{C}$	—	—	10	μA		
Input Capacitance	$C_T$	—	$V = 0, f = 1 \text{ MHz}, T_a = 25^\circ\text{C}$	—	50	250	pF		
Output Current	"H" Level	$I_{OPH}$	2	$V_{CC} = 30 \text{ V} (*1)$	$I_F = 10 \text{ mA}$ $V_{8-6} = 4 \text{ V}$	-1.0	-1.4	—	A
	"L" Level	$I_{OPL}$	1		$I_F = 0$ $V_{6-5} = 2.5 \text{ V}$	1.0	2.0	—	
Output Voltage	"H" Level	$V_{OH}$	3	$V_{CC1} = +15 \text{ V}, V_{EE1} = -15 \text{ V}$ $R_L = 200\Omega, I_F = 5 \text{ mA}$	11	13	—	V	
	"L" Level	$V_{OL}$	4		$V_{CC1} = +15 \text{ V}, V_{EE1} = -15 \text{ V}$ $R_L = 200\Omega, V_F = 0.8 \text{ V}$	—	-14		-12.5
Supply Current	"H" Level	$I_{CCH}$	—	$V_{CC} = 30 \text{ V}$	$I_F = 10 \text{ mA}$	—	—	8	mA
	"L" Level	$I_{CCL}$	—		$I_F = 0 \text{ mA}$	—	—	8	mA
Threshold Input Current	L→H	$I_{FLH}$	—	$V_{CC1} = +15 \text{ V}, V_{EE1} = -15 \text{ V}$ $R_L = 200\Omega, V_O > 0\text{V}$	—	1.4	5	mA	
Threshold Input Voltage	H→L	$V_{FHL}$	—		$V_{CC1} = +15 \text{ V}, V_{EE1} = -15 \text{ V}$ $R_L = 200\Omega, V_O < 0\text{V}$	0.8	—	—	V
Supply Voltage	$V_{CC}$	—	—	—	10	—	35	V	
Capacitance (Input-Output)	$C_S$	—	$V_S = 0, f = 1 \text{ MHz}, T_a = 25^\circ\text{C}$	—	1.0	2.0	pF		
Resistance (Input-Output)	$R_S$	—	$V_S = 500 \text{ V}, T_a = 25^\circ\text{C}$ $R.H. \leq 60\%$	$1 \times 10^{12}$	$10^{14}$	—	Ω		

## 8. Switching Characteristics

CHARACTERISTIC		SYMBOL	TEST CIRCUIT	TEST CONDITION	MIN	TYP.	MAX	UNIT	
Propagation Delay Time	L→H	$t_{pLH}$	5	$I_F = 8 \text{ mA}, V_{CC} = 15 \text{ V}$ $R_L = 20\Omega, C_L = 10\text{nF}$	0.05	0.15	0.5	$\mu\text{s}$	
	H→L	$t_{pHL}$			0.05	0.15	0.5		
Switching Time Dispersion between ON and OFF		$ tpHL-tpLH $			—	—	0.45		
Output Rise Time		$t_r$			—		—		
Output Fall Time		$t_f$			—		—		
Common Mode Transient Immunity at High Level Output		$CM_H$	6	$V_{CM} = 1000 \text{ V}, I_F = 8 \text{ mA}$ $V_{CC} = 30 \text{ V}, T_a = 25^\circ\text{C}$	-15000	—	—	$\text{V}/\mu\text{s}$	
Common Mode Transient Immunity at Low Level Output		$CM_L$			15000	—	—	$\text{V}/\mu\text{s}$	

## 9. Order Information

### Part Number

**OR-250U-Y-Z**

### Note

U = Lead form option (S, M or none)

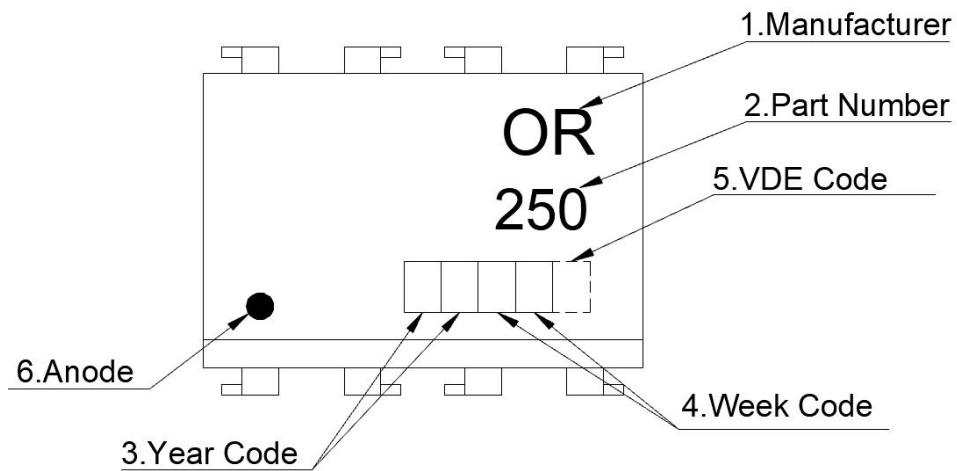
Y = Tape and reel option ( TA,TA1 or none).

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

\* VDE Code can be selected.

Option	Description	Packing quantity
None	Standard SMD Option	45 units per tube
M	Wide lead bend (0.4 inch spacing)	45 units per tube
TA	Surface mount lead form (low profile) + TA tape & reel option	1000 units per reel
TA1	Surface mount lead form (low profile) + TA1 tape & reel option	1000 units per reel

## 10. Naming Rule



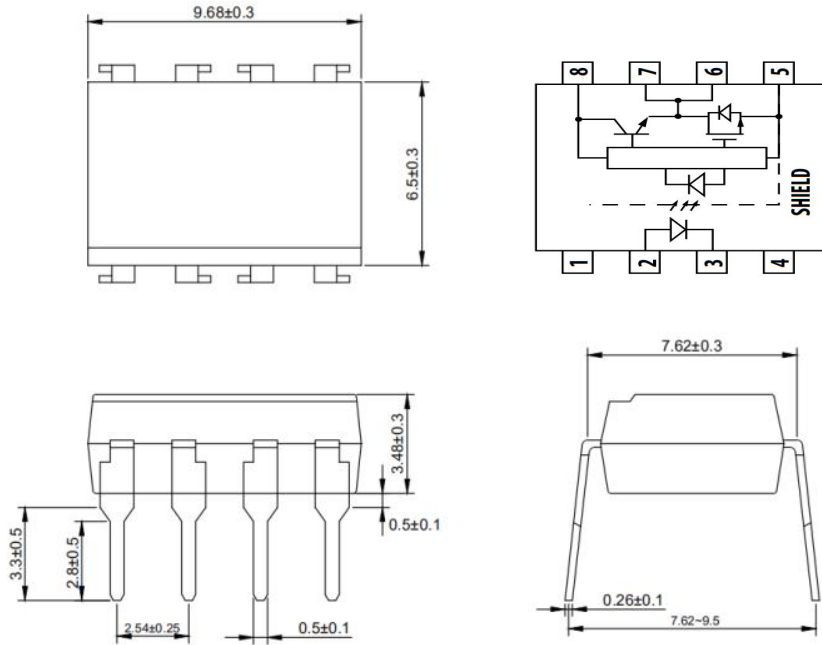
### NOTE:

1. Manufacturer : ORIENT.
2. Part Number : 250.
3. Year Code : '21' means '2021' and so on.
4. Week Code : 01 represents the first week, 02 represents the second week, and so on.
5. VDE Code . (Optional)
6. Anode.

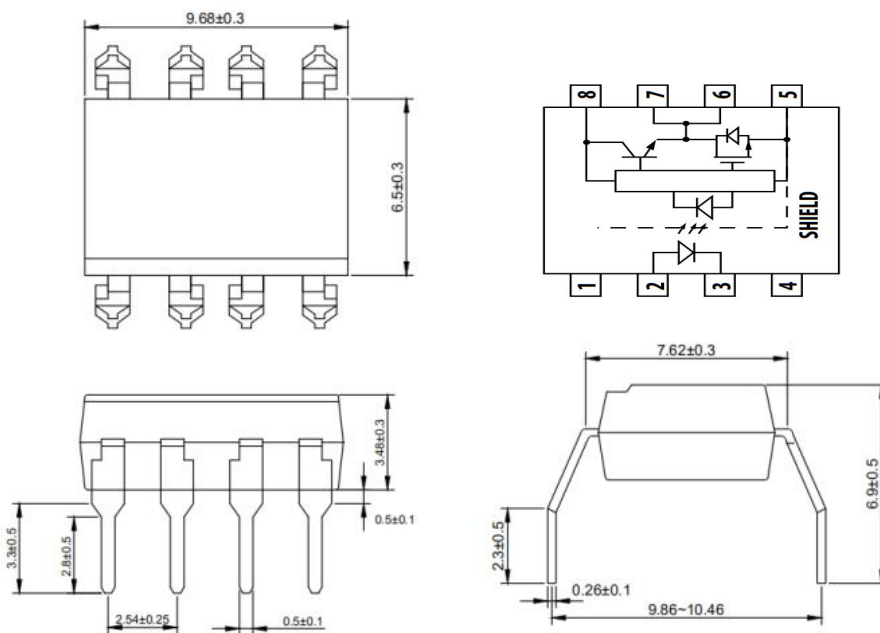
\* VDE Mark can be selected.

## 11. Outer Dimension

### (1) OR-250

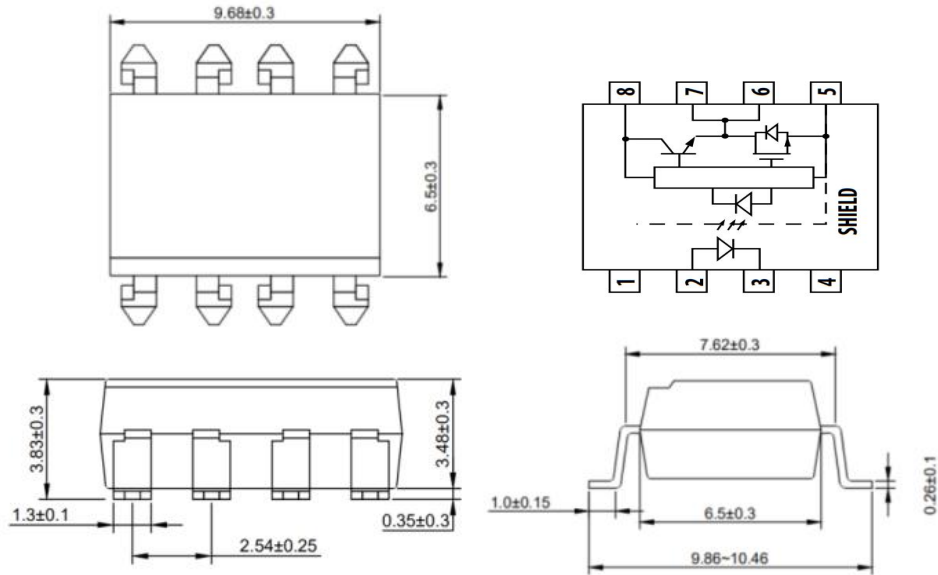


### (2) OR-250M

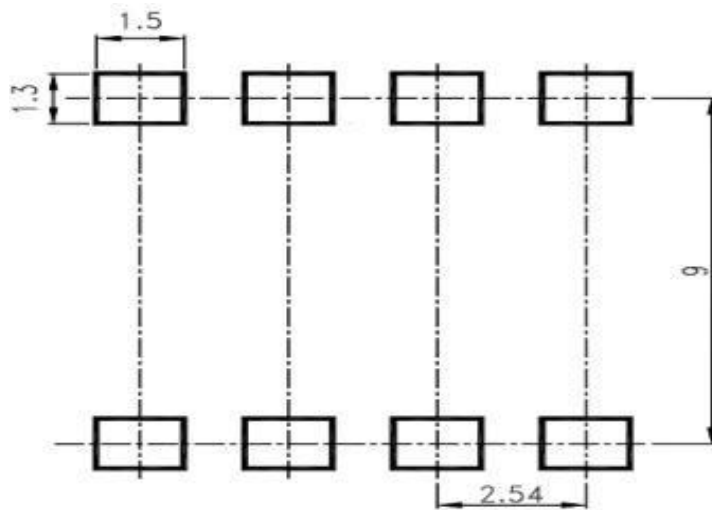




(3) OR-250S



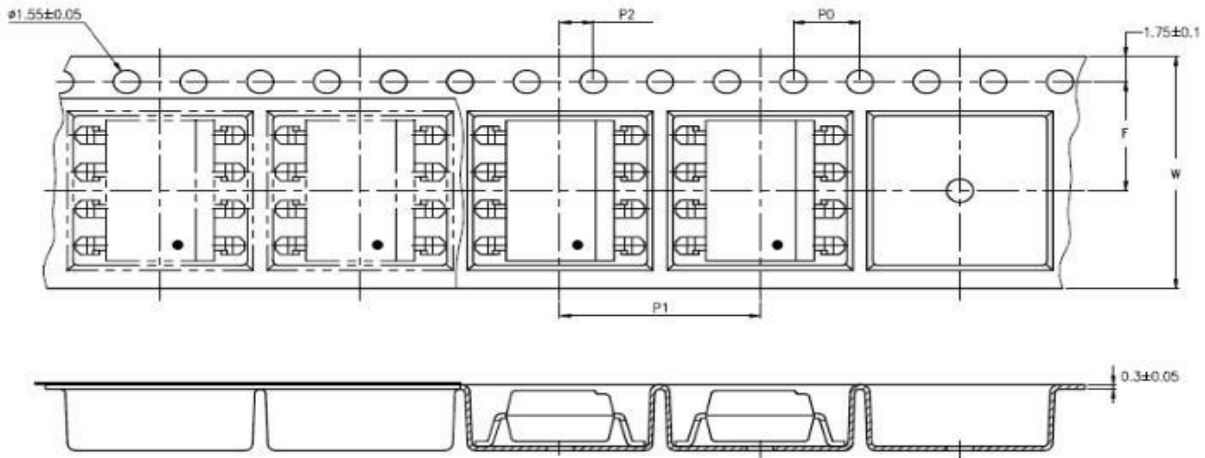
12. Recommended Foot Print Patterns (Mount Pad)



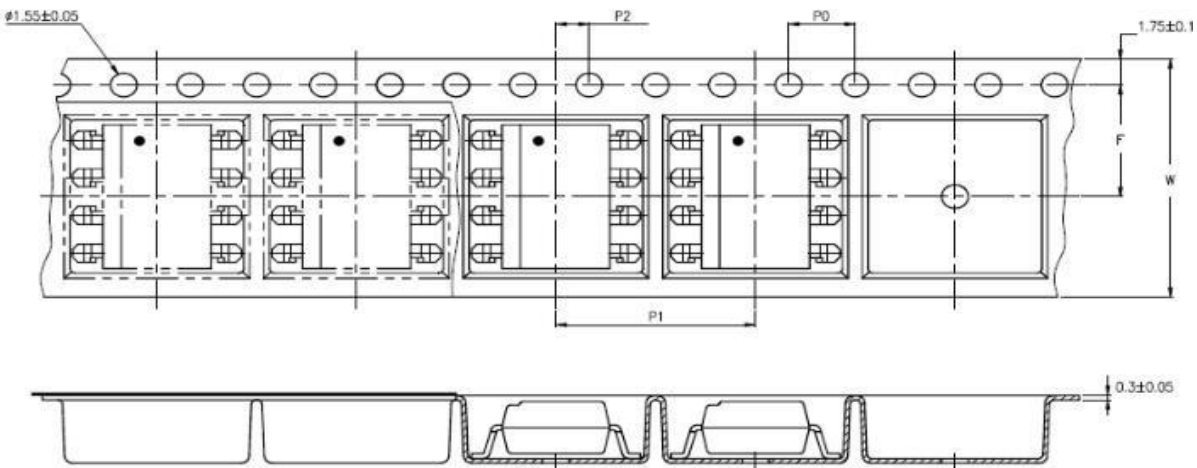
unit: mm

### 13. Taping Dimensions

#### (1) OR-250S-TA



#### (2) OR-250S-TA1



type	symbol	Size: mm ( inches )
bandwidth	W	16±0.3 (0.63)
pitch	P0	4±0.1 (0.15)
pitch	F	7.5±0.1 (0.295)
	P2	2±0.1 (0.079)
interval	P1	12±0.1 (0.472)

Encapsulation type	TA/TA1
amount (pcs)	1000

## 14. Package Dimension

### (1) package dimension


DIP Type

Packing Information	
Packing type	Tube
Qty per Tube	45pcs
Small box (Inner) Dimension	525*128*60mm
Large box (Outer) Dimension	545*290*335mm
The Amount per Inner Box	2,250pcs
The Amount per Outer Box	22,500pcs

SOP Type

Packing Information	
Packing type	Reel type
Tape Width	16mm
Qty per Reel	1,000pcs
Small box (inner) Dimension	345*345*58.5mm
Large box (Outer) Dimension	620x360x360mm
Max qty per small box	2,000pcs
Max qty per large box	20,000pcs

### (2)Packing Label Sample



The label features the ORIENT logo and company name at the top left. It includes several certification logos: a blue triangle with 'VDE', a red circle with 'UL', and a green oval with 'RoHS REACH'. The label contains the following text and barcodes:

- Material Code : 120PCXXXXXX
- P/N : OR-XXXXXX
- Lot No. : XXXXXX-XXXXX-TX-X
- D/C : XXXX
- Qty : XXXX PCS

Two boxes are provided for '内箱码' (Inner Box Code) and '外箱码' (Outer Box Code). At the bottom, it displays a long alphanumeric string 'XXXXXXXXXXXXXXXXXX' (一体机序列码) and 'Made in China'.

#### Note:

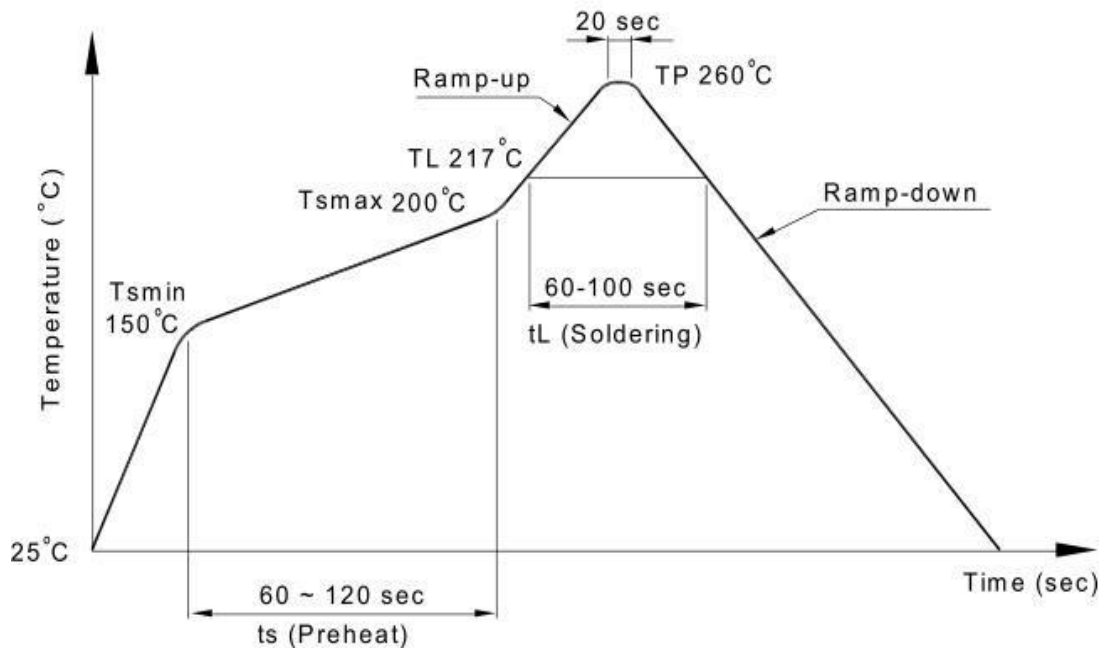
1. Material Code :Product ID.
2. P/N :Contents with "Order Information" in the specification.
3. Lot No. :Product data.
4. D/C :Product weeks.
5. Quantity :Packaging quantity.

## 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.

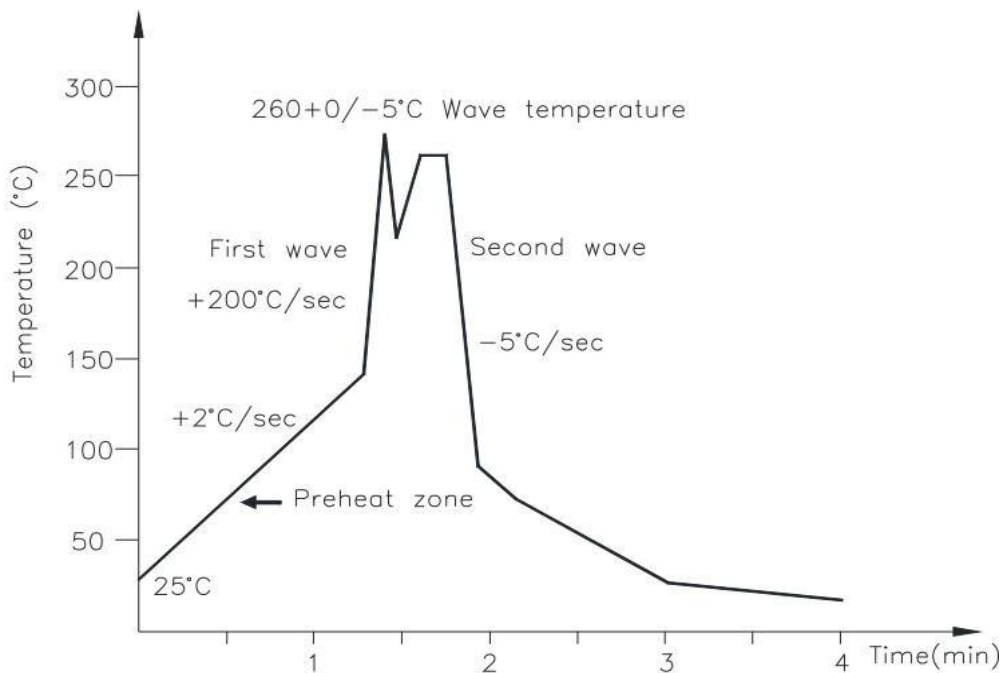
Profile item	Conditions
Preheat - Temperature Min (T Smin ) - Temperature Max (T Smax ) - Time (min to max) (ts)	150°C 200°C 90±30 sec
Soldering zone - Temperature (TL ) - Time (t L )	217°C 60 sec
Peak Temperature	260°C
Peak Temperature time	20 sec
Ramp-up rate	3°C / sec max.
Ramp-down rate from peak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



(2) Wave soldering (JEDEC22A111 compliant)

One-time welding is recommended under the temperature condition.

Temperature	260+0/-5°C
Time	10 sec
Preheat temperature	5 to 140°C
Preheat time	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	380+0/-5°C
Time	3 sec max

## 16. Characteristics Curve

Fig.1  $I_{OPL}$  TEST CIRCUIT

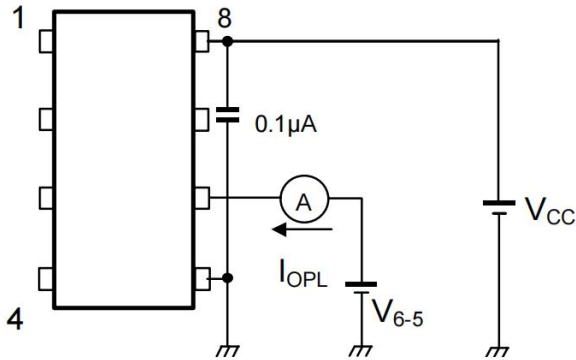


Fig.2  $I_{OPH}$  TEST CIRCUIT

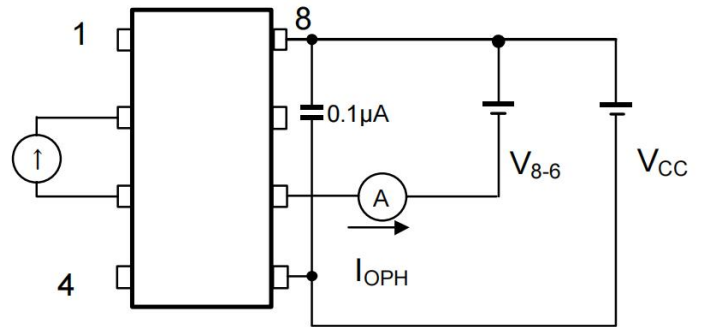


Fig.3  $V_{OH}$  TEST CIRCUIT

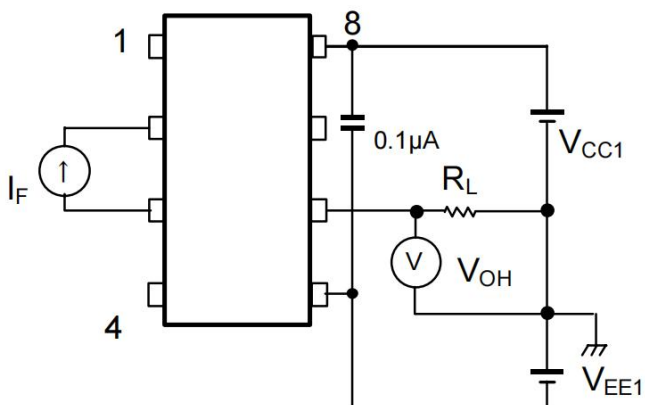


Fig.4  $V_{OL}$  TEST CIRCUIT

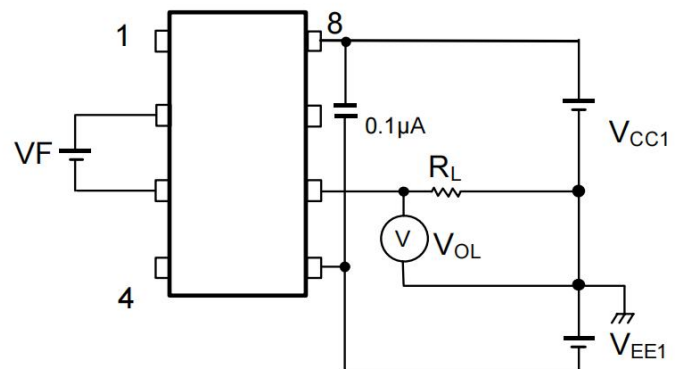


Fig.5  $t_{pLH}$ ,  $t_{pHL}$ ,  $t_r$ ,  $t_f$  TEST CIRCUIT

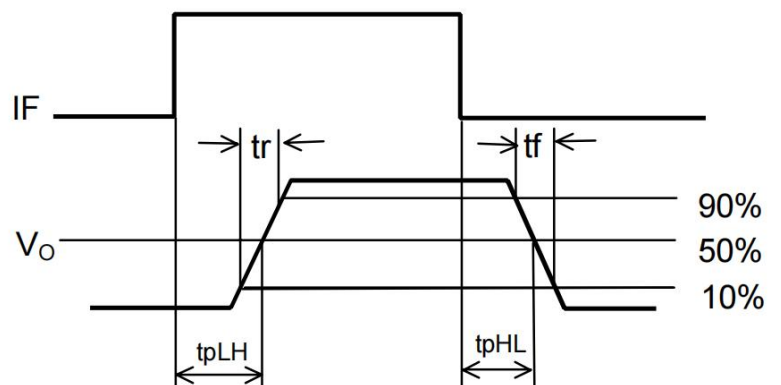
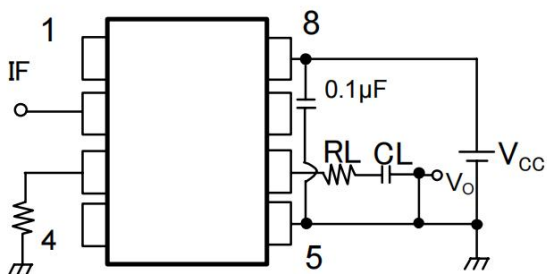
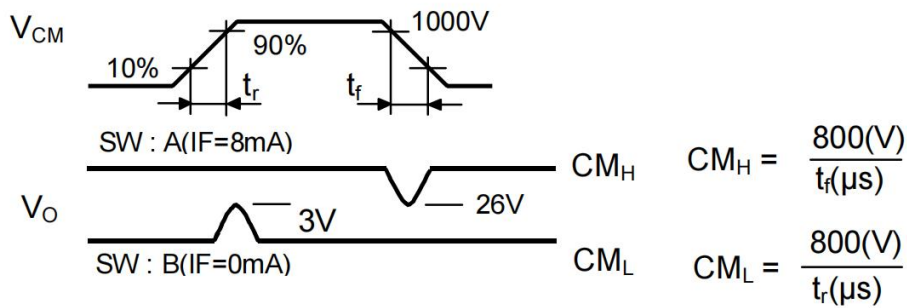
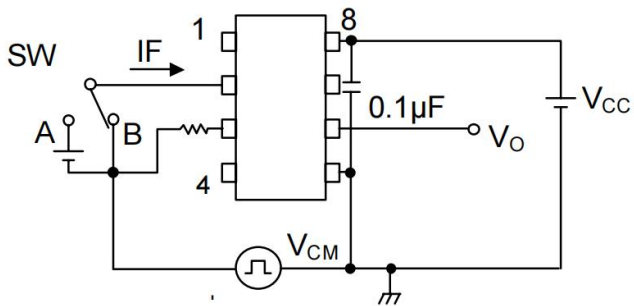


Fig.6 CM<sub>H</sub>, CM<sub>L</sub> TEST CIRCUIT



CM<sub>L</sub>(CM<sub>H</sub>) is the maximum rate of rise(fall) of the common mode voltage that can be sustained with the output voltage in the low(high)state.