ORIENT

Photo MOS

Product Data Sheet

Part Number: OR-406A

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) Normally open (1-Form-A)

(2) Compact 4-pin DIP size

(3) High input-output isolation voltage (Viso = 5000 Vrms)

(4) Low operating current: 3 mA (max)

(5) Load voltage:60 V (min)

(6) Low on resistance: 0.4 Ω (typ) at TA = 25℃(@ t < 1 s)

(7) Wide operating temperature range of -40°C to 85°C

(8) Safety approval

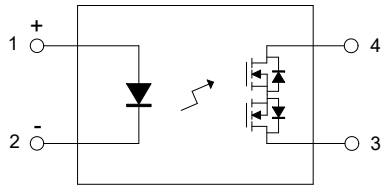
UL approved(No.E323844)

VDE approved(No.40029733)

CQC approved (No.CQC09001029446)

(9) In compliance with RoHS, REACH standards

(10) MSL Level 1



1. Anode
2. Cathode
3. 4. MOSFET

2. Description

The OR-406A are solid state relays containing an AIGaAs infrared LEDs on the light emitting side (input side) optically coupled to a high voltage output detector circuit. The detector consists of a photovoltaic diode array and MOSFETs on the output side. They can enable AC/DC and DC only output connections. The single channel configuration is equivalent to 1 form A EMR. They are packaged in 4 pin DIP and available in surface mount SMD option.

3. Applications

(1) Exchange equipment

(2) Measurement equipment

(3) FA/OA equipment

(4) Industrial controls

(5) Security

4. Absolute Maximum Ratings (Unless Otherwise Specified, Ta = 25°C)

Parameter		Symbol	Rating	Unit
Input	Forward Current	I_F	50	mA
	Reverse Voltage	V_R	5	V
	Peak Forward Current*1	I_{FP}	1	A
	Power Dissipation	P_{in}	75	mW
Output	Load Voltage	V_L	60	V
	Continuous Load Current	I_L	550	mA
	Pulse Load Current*2	I_{peak}	1.2	A
	Power Dissipation	P_{out}	500	mW
Total Power Dissipation		P_T	550	mW
Isolation Voltage*3		V_{iso}	5000	Vrms
Storage Temperature		T_{stg}	-55 to 125	°C
Operating Temperature		T_{opr}	-40 to 85	°C
Soldering Temperature*4		T_{sol}	260	°C

Notes:
*1. f =100Hz, Duty Cycle = 0.1%
*2. A connection: 100ms (1 shot), Vl = DC
*3. AC for 1 minute, R.H.= 40 ∽60% R.H. In this test, pins 1,2 are shorted together, and pins 3,4 are shorted together.
*4. For 10 seconds

5. Recommended Operating Conditions (Note)

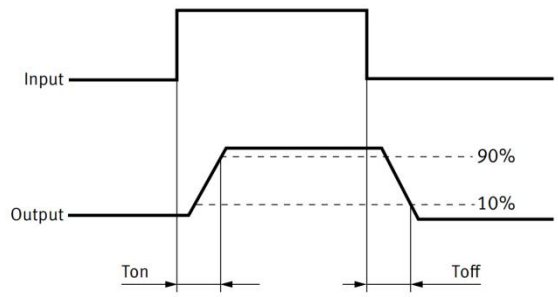
Characteristics	Symbol	Min	Typ.	Max	Unit
Load Voltage	V_L	---	---	48	V
Forward Current	I_F	8	10	30	mA
Continuous Load Current	I_L	---	---	440	mA
Operating Temperature	T_{opr}	-40	---	85	°C

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.

6. Electro-Optical Characteristics (Unless Otherwise Specified, Ta = 25°C)

Parameter		Symbol	Min.	Typ.	Max.	Unit	Condition
Input	Forward Voltage	V_F	---	1.38	1.8	V	I_F = 10 mA
	Reverse Current	I_R	---	---	5	μA	V_R = 5 V
Output	Off State Leakage Current	I_{leak}	---	---	5	μA	I_F = 0 mA, V_L = 60 V
	On Resistance	$R_{(ON)}$	---	0.4	2.5	Ω	I_F = 10 mA, I_L = 550 mA Within 1 s
	Output Capacitance	$C_{(OUT)}$	---	85	---	pF	V_L = 0 V, f = 1 MHz
Transfer Characteristics	LED Turn On Current	$IF_{(ON)}$	---	0.7	3	mA	I_L = Max.
	LED Turn Off Current	$IF_{(OFF)}$	0.1	0.4	---	mA	I_L = 0.1 mA
	Turn On Time	T_{on}	---	0.30	1	ms	I_F = 10 mA, I_L = 550 mA, R_L = 200 Ω
	Turn Off Time	T_{off}	---	0.06	0.5		
	Isolation Resistance	R_{I-O}	5×10^{10}	1×10^{12}	---	Ω	V_{I-O} = 500V DC
	Isolation Capacitance	C_{I-O}	---	1.5	---	pF	V_{I-O} = 0 V, f = 1 MHz

*Turn on/Turn off time



7. Order Information

Part Number

OR-406AU-W-Y

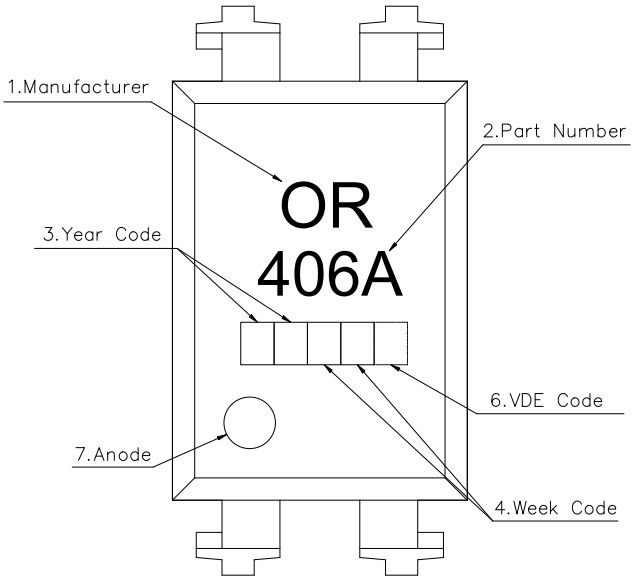
Note

406A = Part Number
U = Lead form option (S, M or none)
W = Tape and reel option(TP,TP1 or none).
Y = 'V' code for VDE safety (This options is not necessary).

* VDE Code can be selected.

Option	Description	Packing quantity
None	Standard DIP-4	100 units per tube
M	Wide lead bend (0.4 inch spacing)	100 units per tube
S(TP)	Surface mount lead form (low profile) + TP tape & reel option	2000 units per reel
S(TP1)	Surface mount lead form (low profile) + TP1 tape & reel option	2000 units per reel

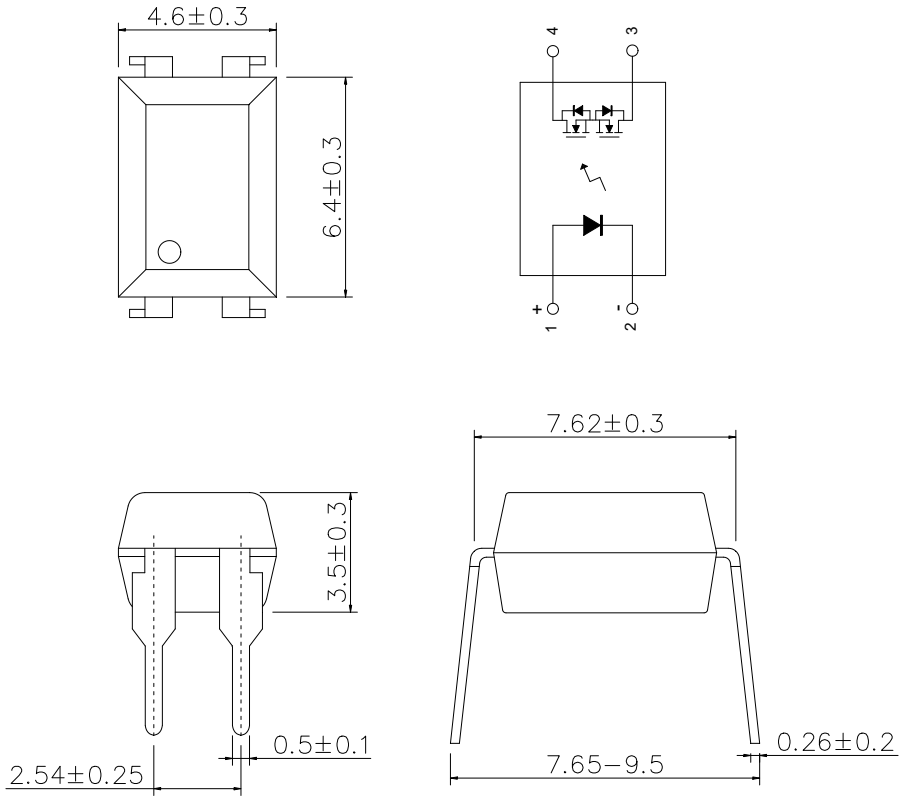
8. Naming Rule



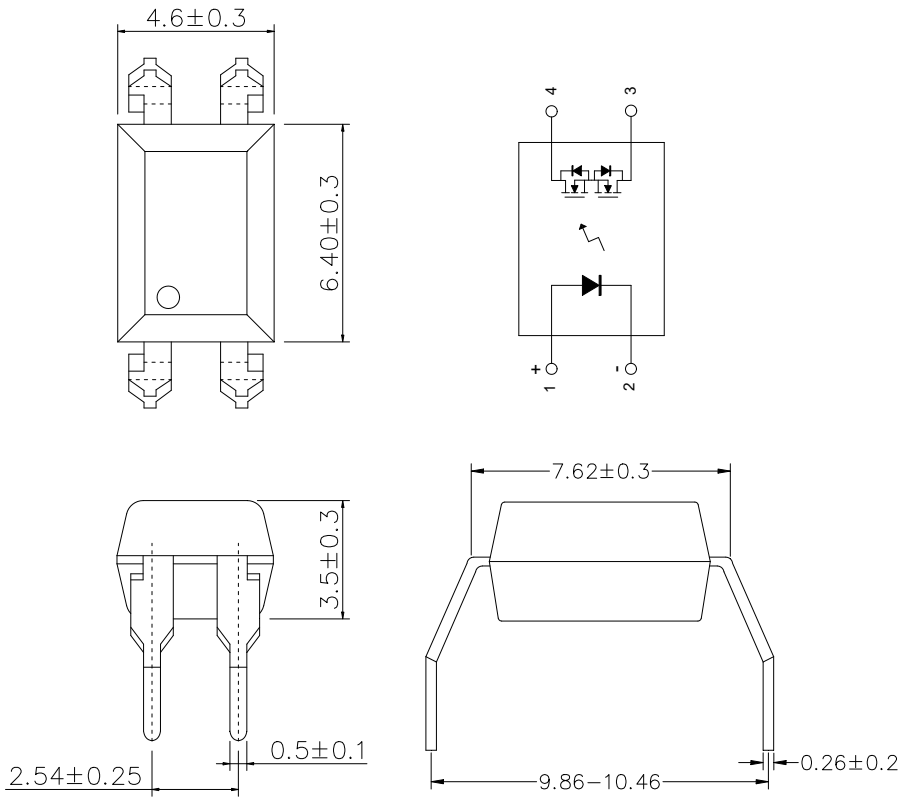
1. Manufacturer : ORIENT.
2. Part Number □□ : '06' means 406A.
3. Year Code □□ : '23' means '2023' and so on.
4. Week Code □□ : 01 represents the first week, 02 represents the second week, and so on.
5. VDE Code ⬚ : (Optional)
6. Anode.

9. Package Dimension (Unit：mm）

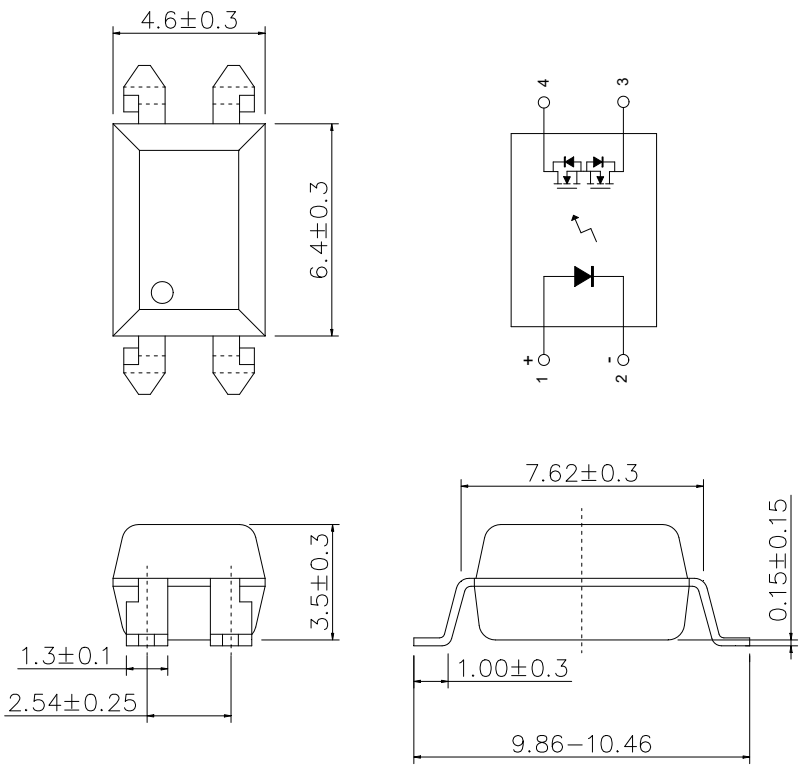
(1) OR-406A



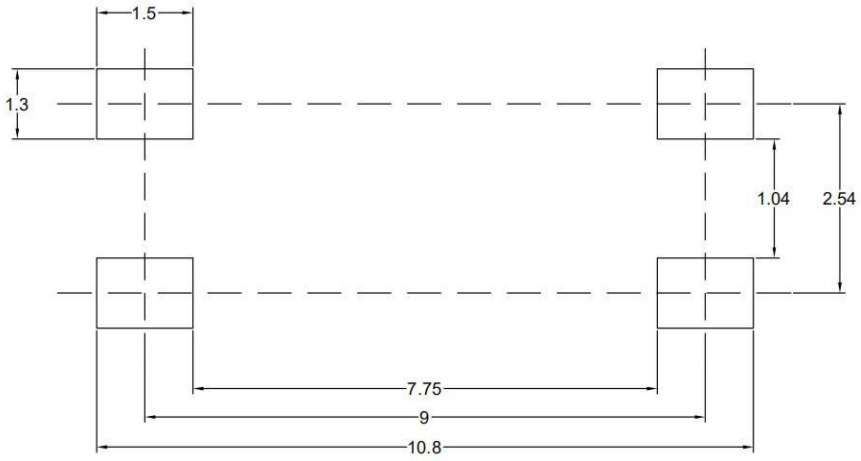
(2) OR-406AM



(3) OR-406AS



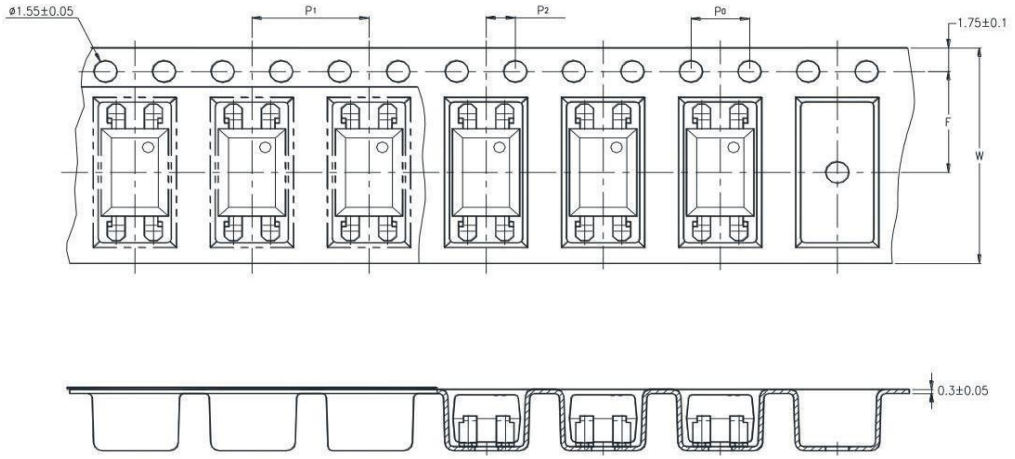
10. Recommended Foot Print Patterns (Mount Pad)



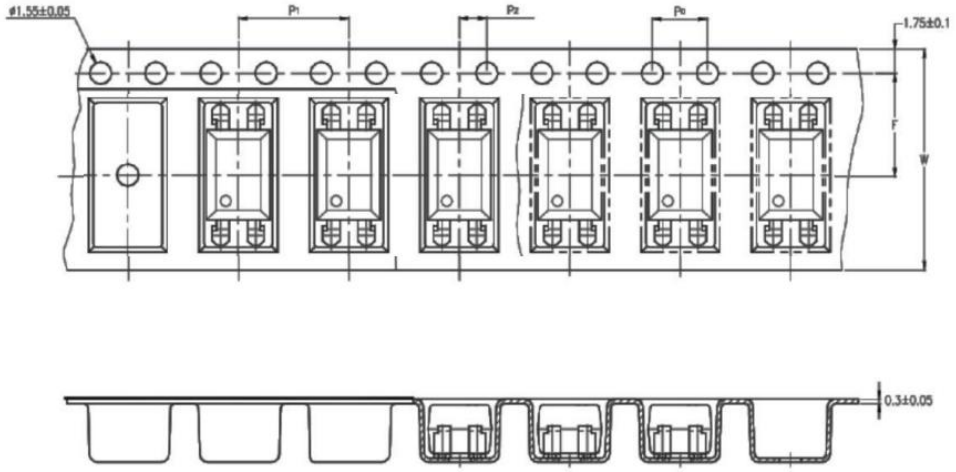
Unit：mm

11. Taping Dimensions

(1) OR-406AS-TP



(2) OR-406AS-TP1



Description	Symbol	Dimension in mm (inch)
Tape wide	W	16±0.3 (0.63)
Pitch of sprocket holes	P_0	4±0.1 (0.15)
Distance of compartment	F	7.5±0.1 (0.295)
	P2	2±0.1 (0.079)
Distance of compartment to compartment	P1	12±0.1 (0.472)

Package Type	TP/TP1
Quantities(pcs)	2000

12. Package Dimension

(1) package dimension

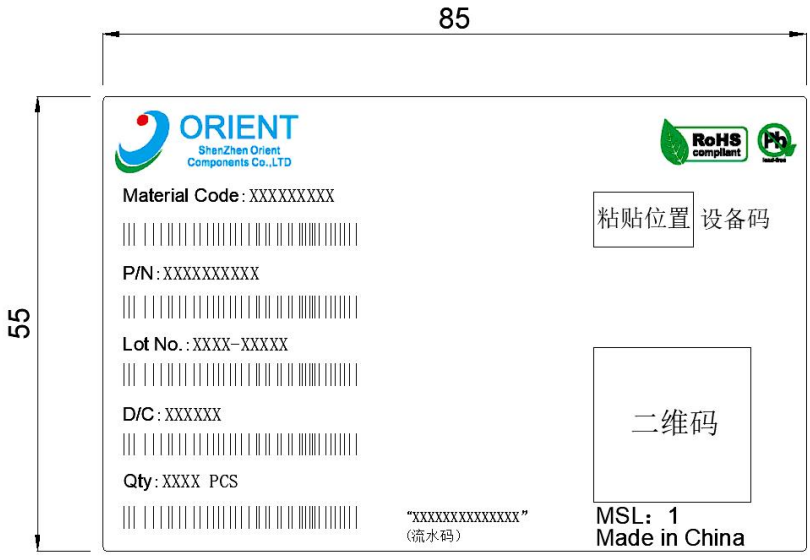
DIP/M type

Packing Information	
Packing type	Tube
Qty per Tube	100pcs
Small box (Inner) Dimension	525*128*60mm
Large box (Outer) Dimension	545*290*335mm
The Amount per Inner Box	5,000pcs
The Amount per Outer Box	50,000pcs

SOP type

Packing Information	
Packing type	Reel type
Tape Width	16mm
Qty per Reel	2,000pcs
Small box (inner) Dimension	345*345*58.5mm
Large box (Outer) Dimension	620x360x360mm
Max qty per small box	4,000pcs
Max qty per large box	40,000pcs

(2) Packing Label Sample



Note:

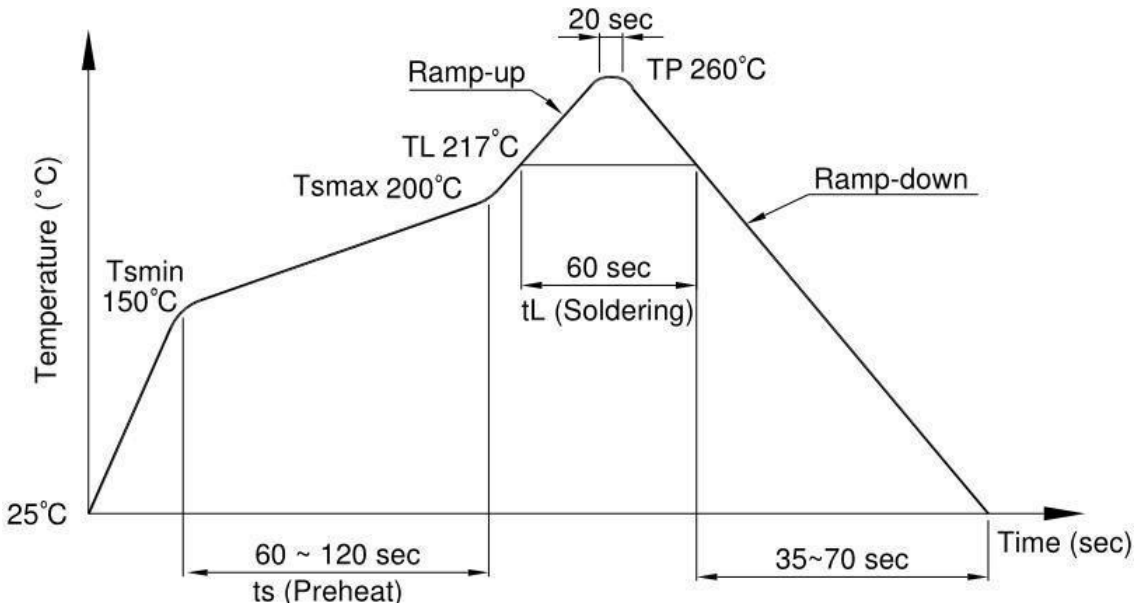
1. Material Code :Product ID.
2. P/N :Contents with "Order Information" in the specification.
3. Lot No. :Product weeks.
4. D/C :Product data.
5. Quantity :Packaging quantity.

13. Temperature Profile Of Soldering

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

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

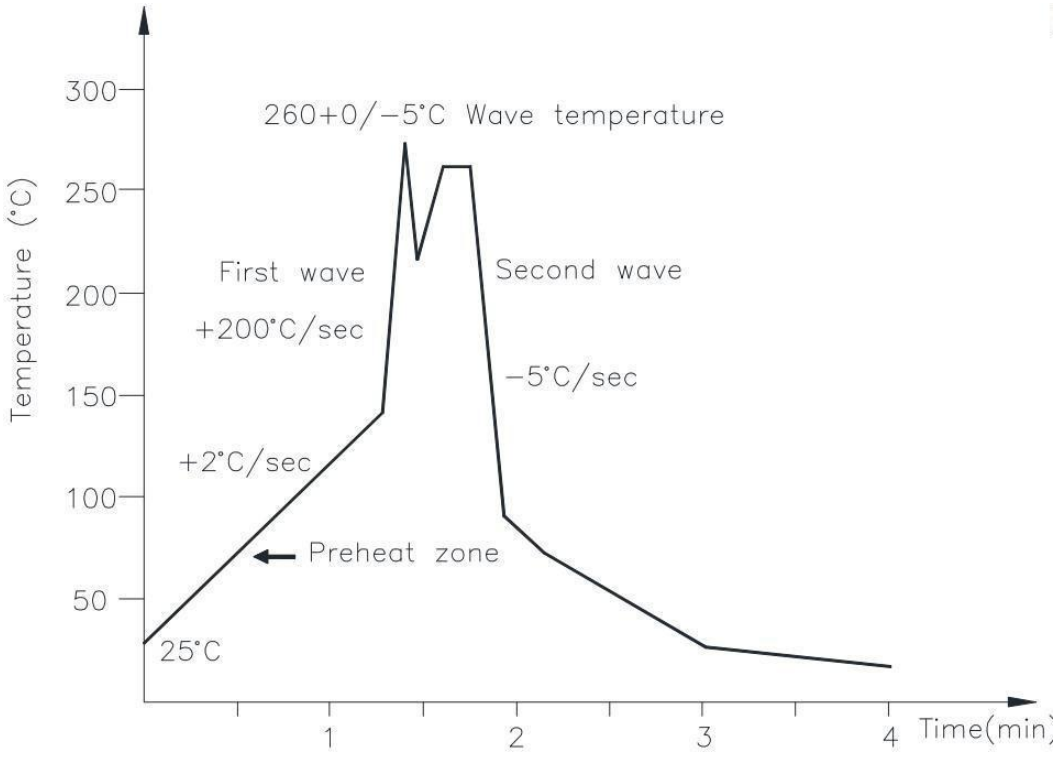
Profile item	Conditions
Preheat - Temperature Min (T Smin) - Temperature Max (T Smax) - Time (min to max) (ts)	 150˚C 200˚C 90±30 sec
Soldering zone - Temperature (TL) - Time (t L)	 217˚C 60 sec
Peak Temperature	260˚C
Peak Temperature time	20 sec
Ramp-up rate	3˚C / sec max.
Ramp-down rate from peak temperature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

14. Characteristics Curves

Figure 1. On Resistance vs Ambient Temperature

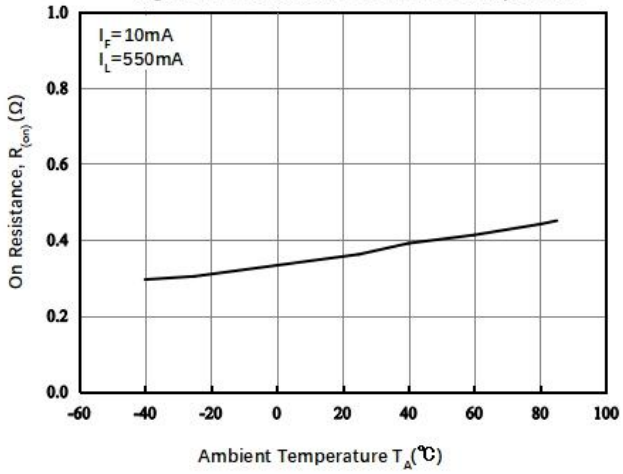


Figure 2. Switching Time vs Ambient Temperature

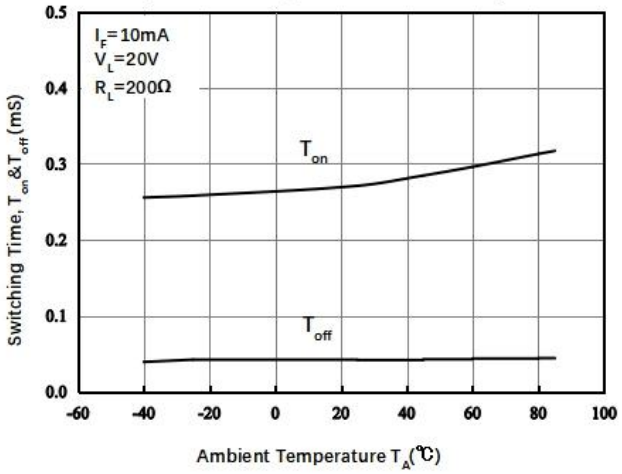


Figure 3. Turn On Time vs LED Forward Current

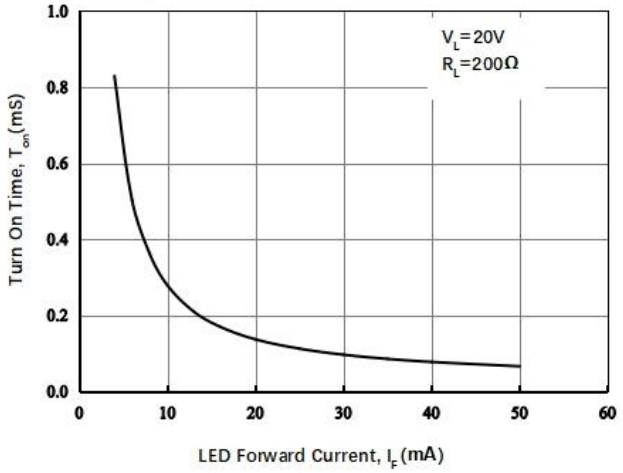


Figure 4. Turn Off Time vs LED Forward Current

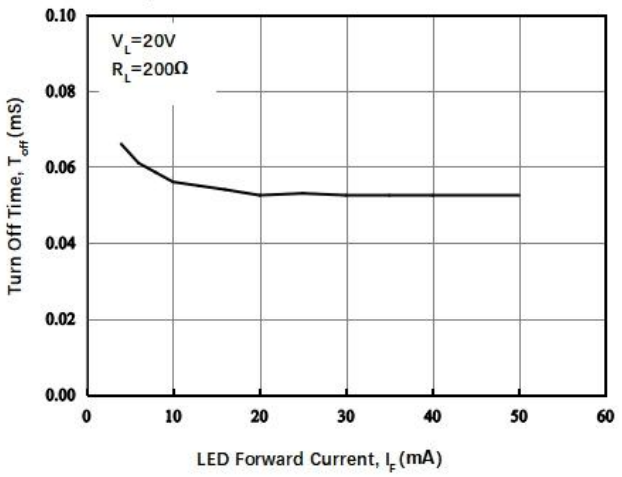


Figure 5. Normalized LED Operate on Current vs Ambient Temperature

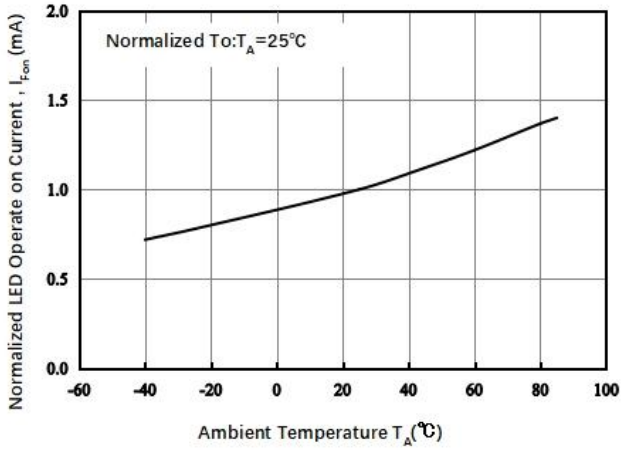


Figure 6. Normalized LED Turn off Current vs Ambient Temperature

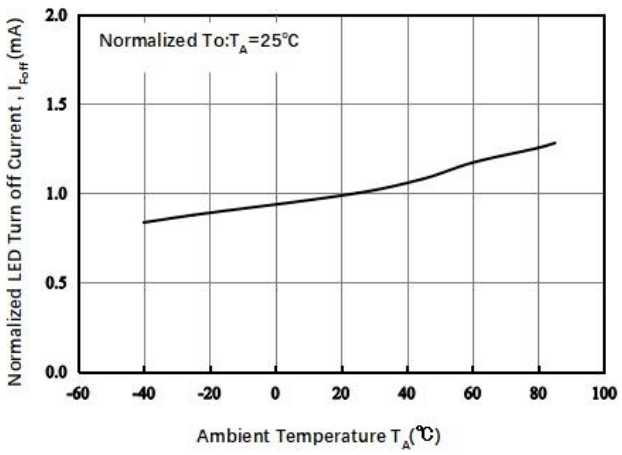
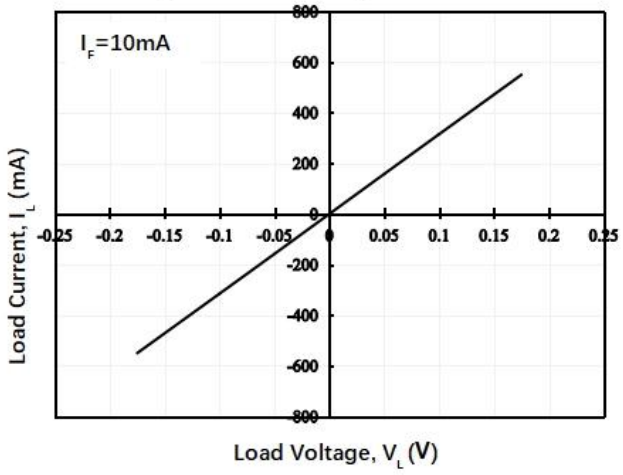


Figure 7. Load Voltage vs Load Current



15. 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.