



ORIENT

Photo MOS

Product Data Sheet

Part Number: OR-5211

Customer: _____

Date: _____

SHENZHEN ORIENT COMPONENTS CO., LTD

Block A 3rd Floor No.4 Building, Tian'an Cyber Park, Huangge Rd, LongGang Dist, Shenzhen, GD

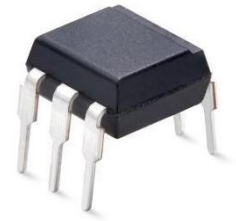
TEL: 0755-29681816

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www.orient-opto.com

1. Features

- (1) Compact Solid-State Bi-directional Signal Switch
- (2) Single Channel Normally-off Single-Pole-Single-Throw (SPST) Relay
- (3) 600V Output Withstand Voltage
- (4) 0.2A or 0.4A Current Rating
- (5) Low Input Current: CMOS Compatibility
- (6) Low On-Resistance: 2.5Ω Typical for DC-only, 10Ω Typical for AC/DC
- (7) High Speed Switching: 0.7ms (Ton), 0.07ms (Toff) Typical @ IF = 5mA
- (8) High Transient Immunity: >1kV/μs
- (9) High Input-to-Output Insulation Voltage 5000V
- (10) In compliance with RoHS, REACH standards
- (11) MSL Class I



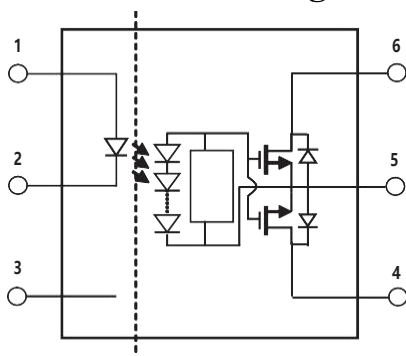
2. Instructions

- (1) The OR-5211 consists of an AlGaAs infrared light-emitting diode (LED) input stage optically coupled to a high-voltage output detector circuit. The detector consists of a high-speed photovoltaic diode array and driver circuitry to switch on/off two discrete high voltage MOSFETs. The relay turns on (contact closes) with a minimum input current of 3mA through the input LED. The relay turns off (contact opens) with an input voltage of 0.8V or less.
- (2) The OR-5211 connection A, as shown in the schematic, allows the relay to switch either ac or dc loads. The connection B, with its advantages of reduced on-resistance and higher output current, allows the relays to switch dc loads only.
- (3) The electrical and switching characteristics are specified over the temperature range of -40°C to +85°C.

3. Application Range

- (1) Industrial Controls
- (2) Factory Automation
- (3) Data Acquisition
- (4) Measuring Instrument
- (5) Medical System
- (6) Security System
- (7) EMR / Reed Relay Replacement

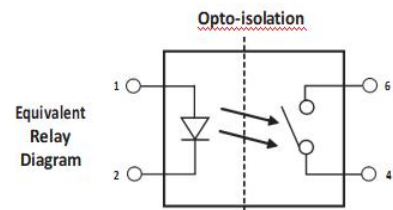
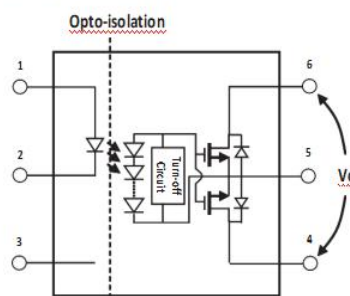
4. Functional Diagram



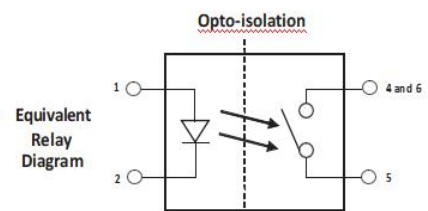
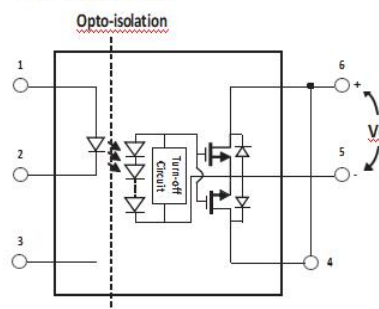
Truth Table	
LED	Output
Off	Open
On	Close

5. Schematic

Schematic
Connection A – AC/DC



Connection B – DC Only



6. Absolute Maximum Ratings (Ta=25°C)*1

Parameter		Symbol	Min.	Max.	Units
Storage Temperature		T _S	-55	125	°C
Operating Temperature		T _A	-40	85	°C
Junction Temperature		T _J	-	125	°C
Lead Soldering Cycle	Temperature		-	260	°C
	Time		-	10	sec
Input Current	Average	I _F	-	25	mA
	Surge		-	50	mA
	Transient		-	1000	mA
Reversed Input Voltage		V _R	-	5	V
Input Power Dissipation		P _{IN}	-	40	mW
Output Power Dissipation	Connection A	P _O	-	640	mW
	Connection B		-	640	mW
Average Output Current (T _A =25 °C, T _C ≤100 °C)	Connection A	I _O	-	0.2	A
	Connection B		-	0.4	A
*1 Output Voltage (T _A =25 °C)	Connection A	V _O	- 600	600	V
	Connection B		0	600	V

7. Recommended Operating Conditions

Parameter	Symbol	Min.	Max.	Units
Input Current (ON)	I _{F(ON)}	3	20	mA
Input Voltage (OFF)	V _{F(OFF)}	0	0.8	V
Operating Temperature	T _A	-40	+85	°C

8. Electronic Characteristics

Over recommended operating $T_A = -40^{\circ}\text{C}$ to 85°C , $I_F = 5\text{mA}$ to 10mA , unless otherwise specified.

Parameter		Sym.	Min.	Typ.	Max.	Units	Conditions
Output Withstand Voltage		$V_{O(OFF)}$	600	650	-	V	$V_F=0.8\text{V}$, $I_O=250\ \mu\text{A}$, $T_A=25^{\circ}\text{C}$
			550	-	-	V	$V_F=0.8\text{V}$, $I_O=250\ \mu\text{A}$
Output On-Resistance	Connection A	$R_{(ON)}$	-	10	16	Ω	$I_F=5\text{mA}$, $I_O=0.2\text{A}$, Pulse $\leq 30\text{ms}$, $T_A=25^{\circ}\text{C}$
	Connection B	$R_{(ON)}$	-	2.5	4	Ω	$I_F=5\text{mA}$, $I_O=0.4\text{A}$, Pulse $\leq 30\text{ms}$, $T_A=25^{\circ}\text{C}$
Output Leakage Current		$I_{O(OFF)}$	-	0.001	0.1	μA	$V_F=0.8\text{V}$, $V_O=600\text{V}$, $T_A=25^{\circ}\text{C}$
			-	-	1	μA	$V_F=0.8\text{V}$, $V_O=550\text{V}$
Output Off-Capacitance		$C_{(OFF)}$	-	500	-	pF	$V_F=0.8\text{V}$, $V_O=0\text{V}$, $f=1\text{MHz}$
Output Offset Voltage		$ V_{(OS)} $	-	1	-	μV	$I_F=5\text{mA}$, $I_O=0\text{mA}$
Input Reverse Breakdown Voltage		V_R	5	-	-	V	$I_R=10\ \mu\text{A}$
Input Forward Voltage		V_F	1.1	1.3	1.7	V	$I_F=5\text{mA}$

9. Switching Characteristics

Over recommended operating $T_A = -40^{\circ}\text{C}$ to 85°C , $I_F = 5\text{mA}$ to 10mA , unless otherwise specified

Parameter		Sym.	Min.	Typ.	Max.	Units	Conditions
Turn On Time		T_{ON}	---	0.7	2.5	ms	$I_F=5\text{mA}$, $I_O=0.2\text{A}$, $T_A=25^{\circ}\text{C}$
			---	---	5.0	ms	$I_F=5\text{mA}$, $I_O=0.2\text{A}$
			---	0.4	1.5	ms	$I_F=10\text{mA}$, $I_O=0.2\text{A}$, $T_A=25^{\circ}\text{C}$
			---	---	3.0	ms	$I_F=10\text{mA}$, $I_O=0.2\text{A}$
Turn Off Time		T_{OFF}	---	0.07	0.5	ms	$I_F=5\text{mA}$, $I_O=0.2\text{A}$, $T_A=25^{\circ}\text{C}$
			---	---	1	ms	$I_F=5\text{mA}$, $I_O=0.2\text{A}$
			---	0.06	0.2	ms	$I_F=10\text{mA}$, $I_O=0.2\text{A}$, $T_A=25^{\circ}\text{C}$
			---	---	0.5	ms	$I_F=10\text{mA}$, $I_O=0.2\text{A}$
*3 Output Transient Rejection		dV_{O}/d_t	1	7	---	kV/ s	$\Delta V_O=600\text{V}$, $R_M \geq 1\text{M}\Omega$, $C_M=1000\text{pF}$, $T_A=25^{\circ}\text{C}$
*3 Input-Output Transient Rejection		dV_{I-O}/d_t	1	20	---	kV/ s	$V_{DD}=5\text{V}$, $\Delta V_{I-O}=1000\text{V}$, $R_L=1\text{k}\Omega$, $C_L=25\text{pF}$, $T_A=25^{\circ}\text{C}$

Notes:

- For derating, refer to Figure 1 and 2.
- The voltage across the output terminal of the relay should not exceed this rated withstand voltage. Over-voltage protection circuits should be added in some applications to protect against over-voltage transients.
- During the pulsed $R_{(ON)}$ measurement (I_O duration $\leq 30\text{ms}$), ambient (T_A) and case temperature (T_C) are equal.



10. Order Information

Part Number

OR-5211Y-Z

Note

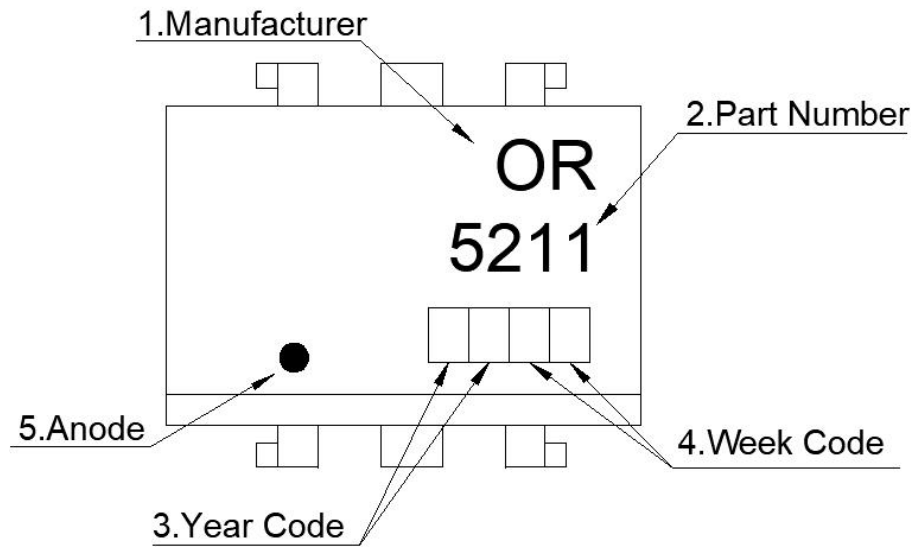
5211 = Part Number.

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

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

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

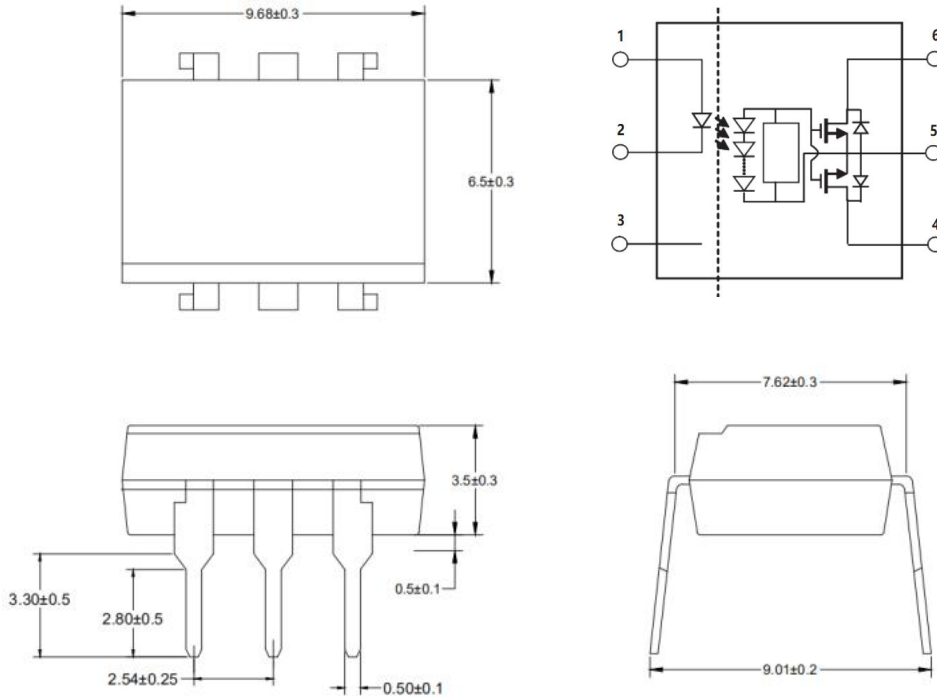
11. Naming Rule



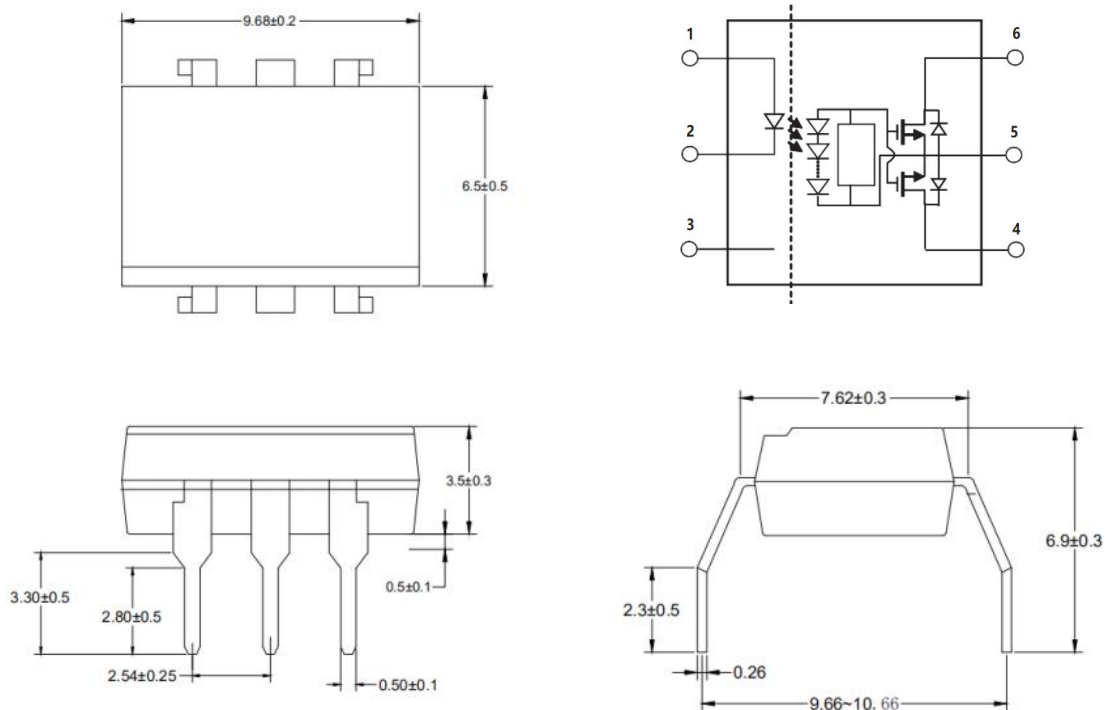
1. Manufacturer : ORIENT.
2. Part Number : 5211.
3. Year Code : '21' means '2021' and so on.
4. Week Code : 01 means the first week, 02 means the second week and so on.
5. Anode.

12. Outer Dimension

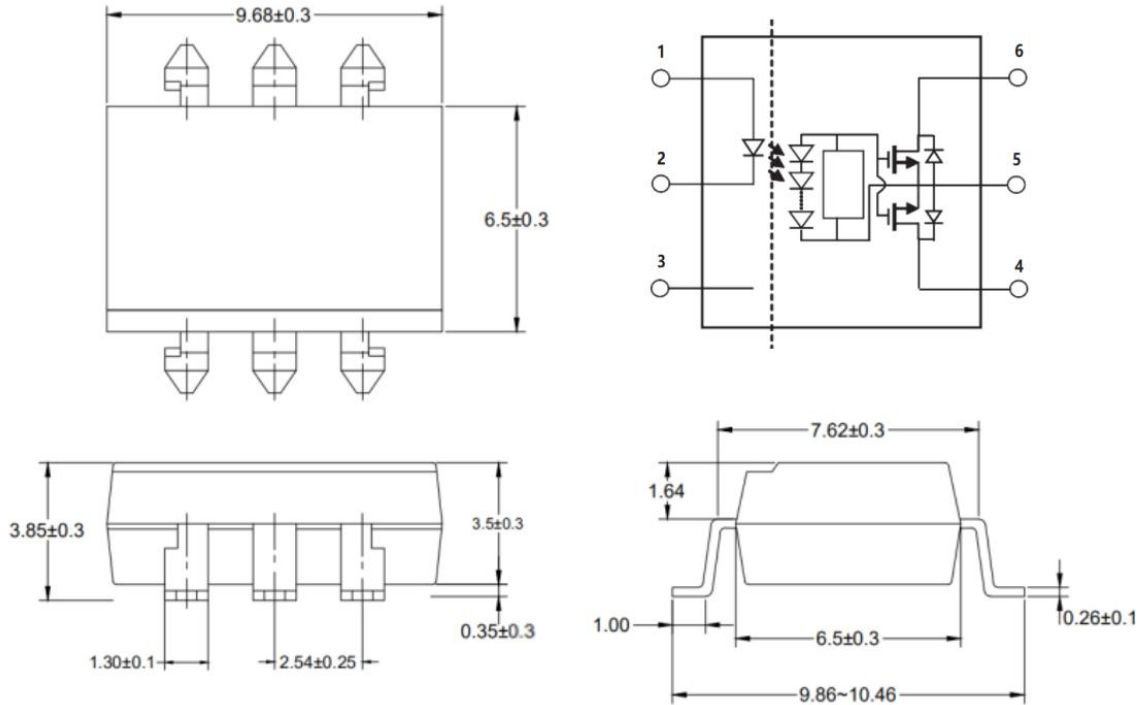
(1) OR-5211



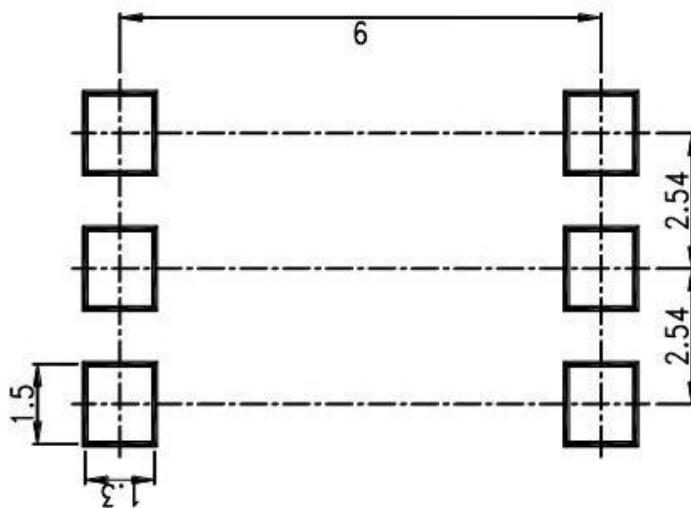
(2) (2) OR-5211M



(3) OR-5211S



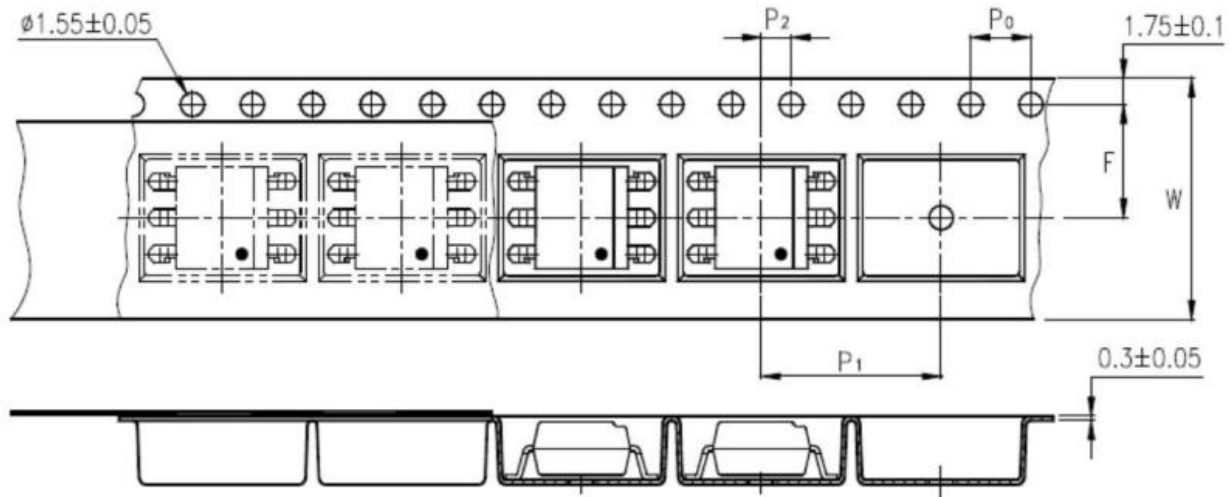
13. Recommended Foot Print Patterns (Mount Pad)



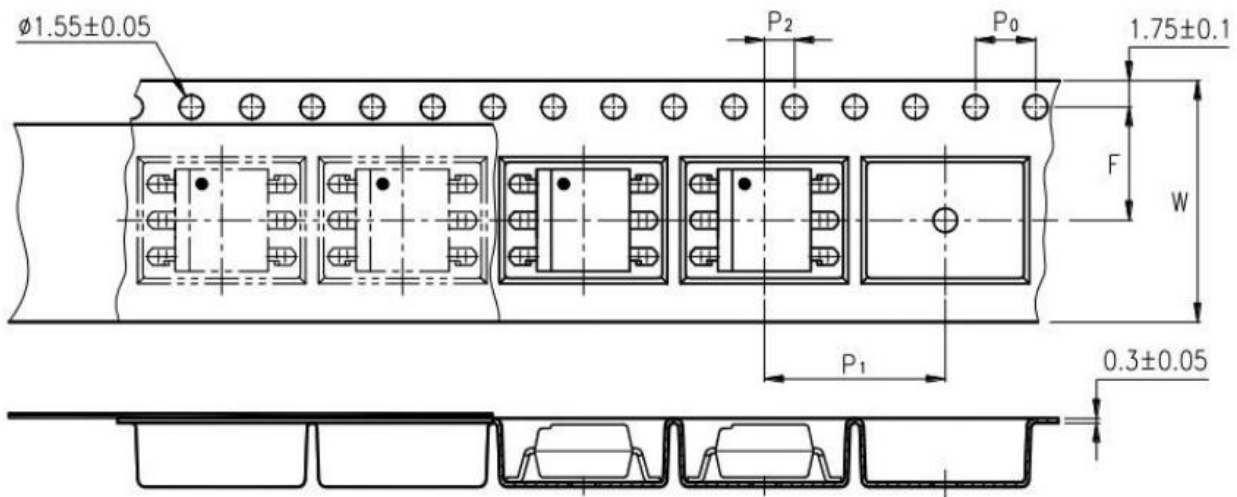
Unit: mm

14. Taping Dimensions

(1) OR-5211-TA



(3) OR-5211-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

15. Package Dimension

(1) package dimension

DIP/M 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



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





内箱码

外箱码

“XXXXXXXXXXXXXXXXXX” (一体机序列码)
Made in China

Note:

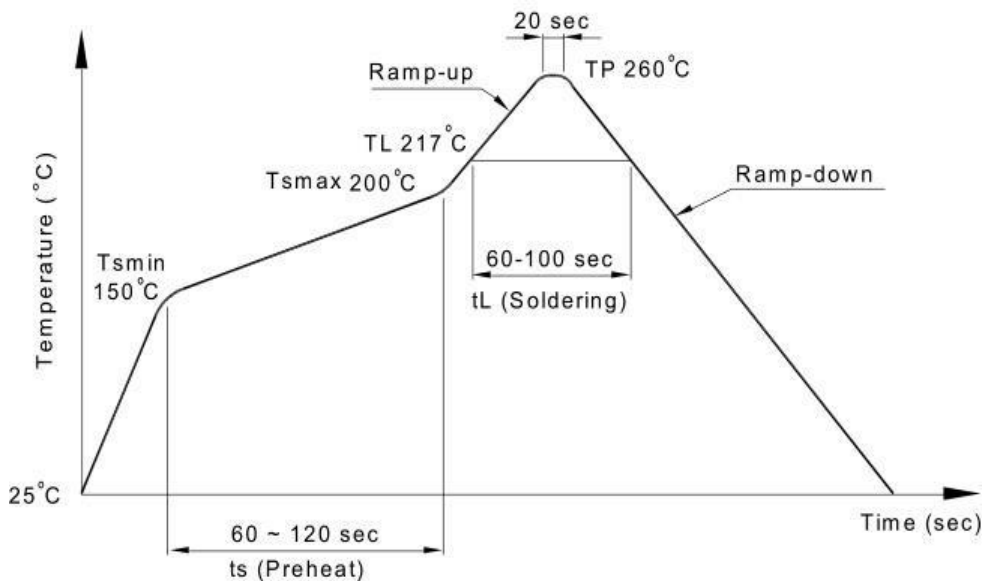
1. Material Code :Product ID.
2. P/N :Contents with "Order Information" in the specification.
3. Lot No. :Product data.
4. D/C :Product weeks.
5. Quantity :Packaging quantity.

16. 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.

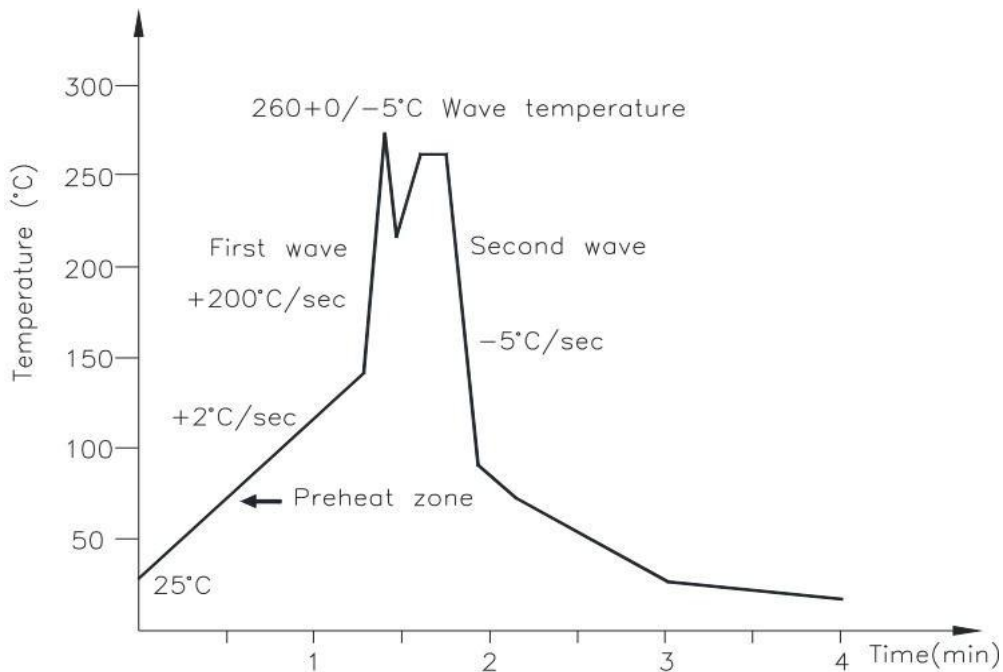
Profile item	Conditions
Preheat - Temperature Min (T Smin) - Temperature Max (T Smax) - Time (min to max) (ts)	150°C 200°C 90±30 sec
Soldering zone - Temperature (TL) - Time (t L)	217°C 60 sec
Peak Temperature	260°C
Peak Temperature time	20 sec
Ramp-up rate	3°C / sec max.
Ramp-down rate from peak temperature	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 80sec



(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

17. Characteristics Curve

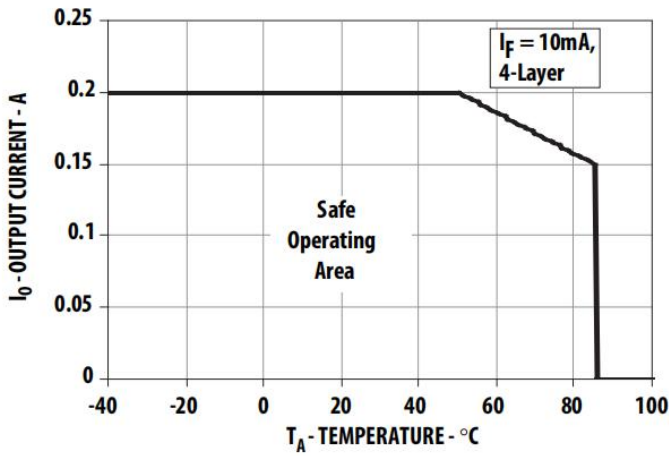


Figure 1. Maximum Output Current Rating vs Ambient Temperature (AC/DC Connection)

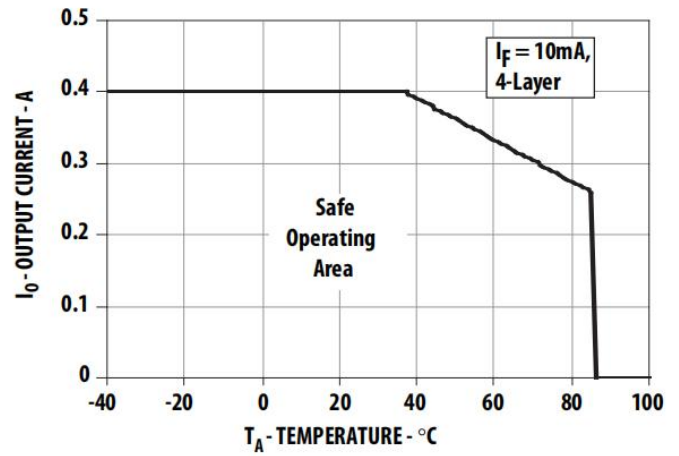


Figure 2. Maximum Output Current Rating vs Ambient Temperature (DC Connection)

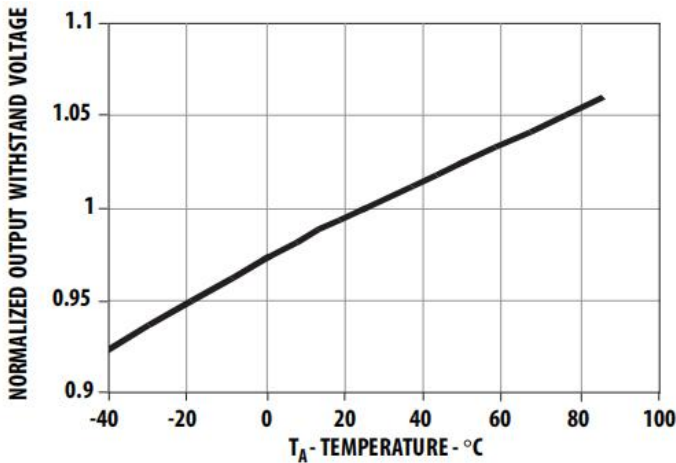


Figure 3. Normalized Typical Output Withstand Voltage vs Temperature

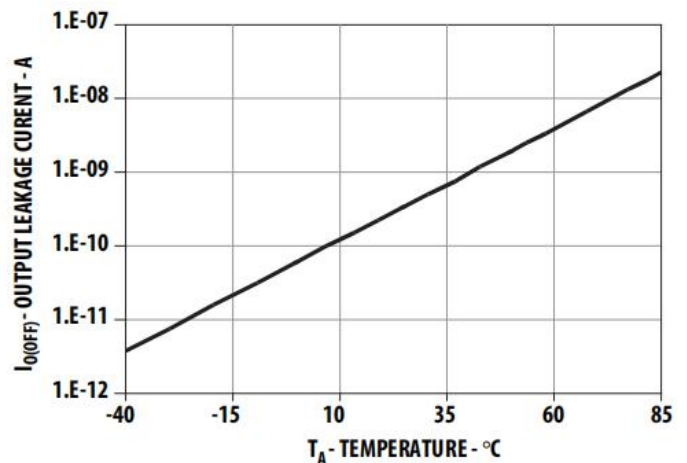


Figure 4. Typical Output Leakage Current vs Ambient Temperature

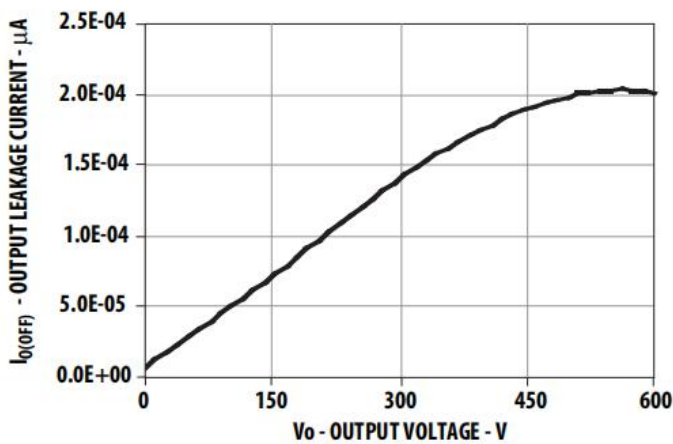


Figure 5. Typical Output Leakage Current vs Output Voltage

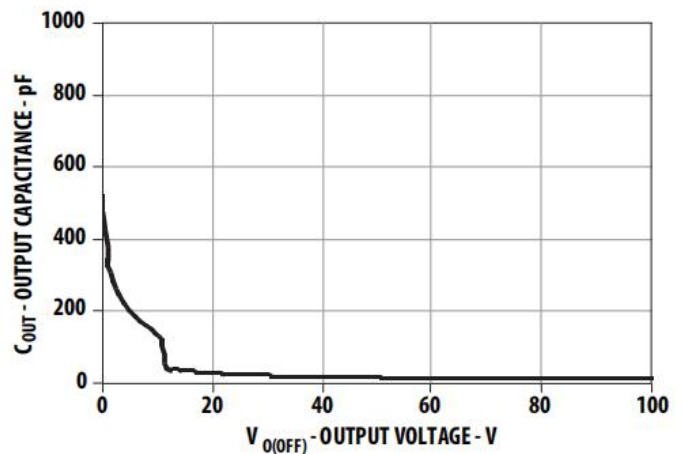


Figure 6. Typical Output Off-State Capacitance vs Output Voltage

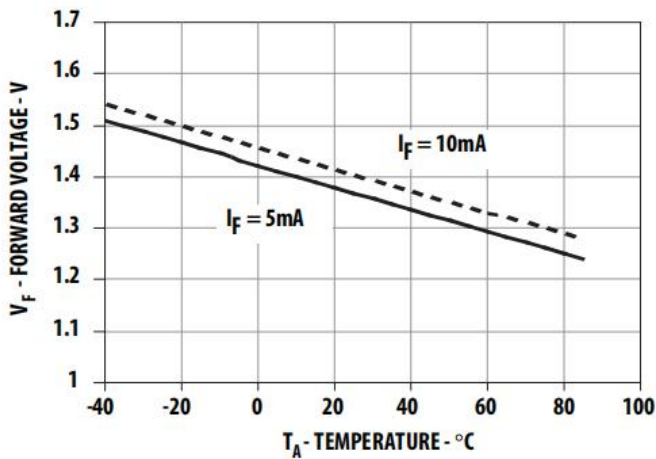


Figure 7. Typical Forward Voltage vs Ambient Temperature

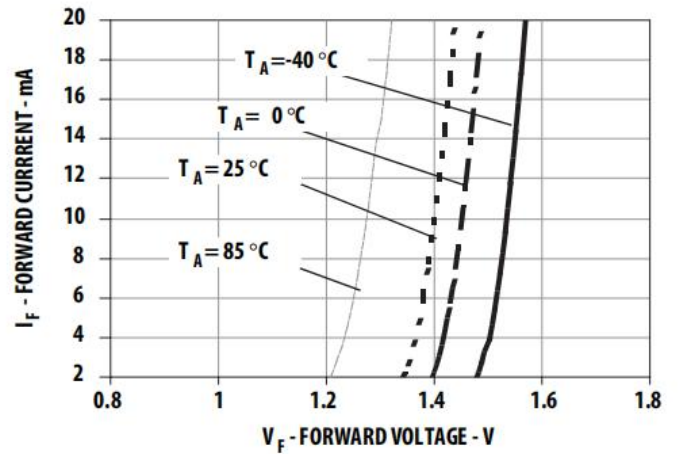


Figure 8. Typical Forward Current vs Forward Voltage

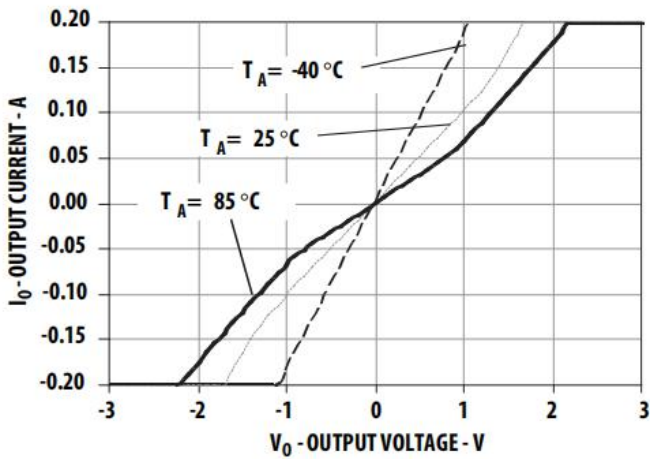


Figure 9. Typical Output Current vs Output Voltage

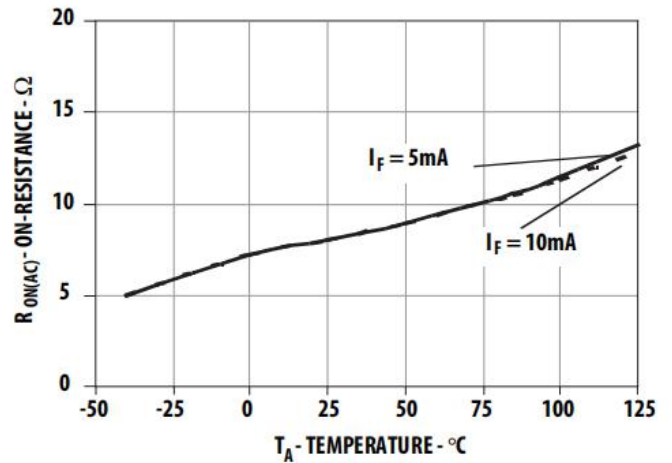


Figure 10. Typical On Resistance (AC/DC Connection) vs Temperature

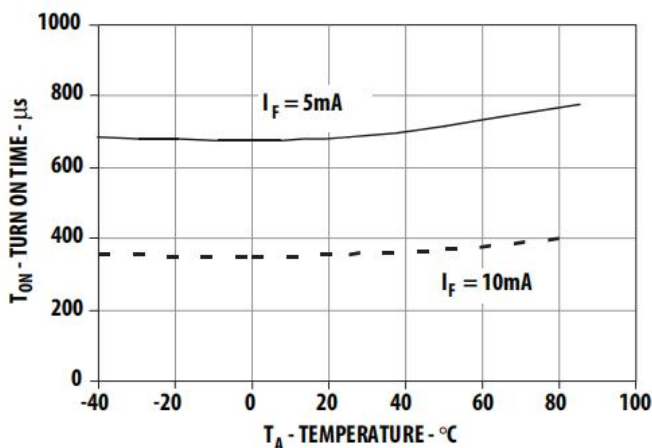


Figure 13. Typical Turn On Time vs Temperature

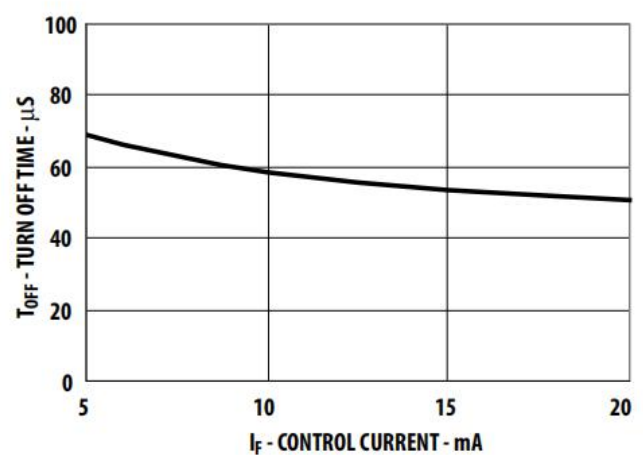


Figure 14. Typical Turn Off Time vs Input Current

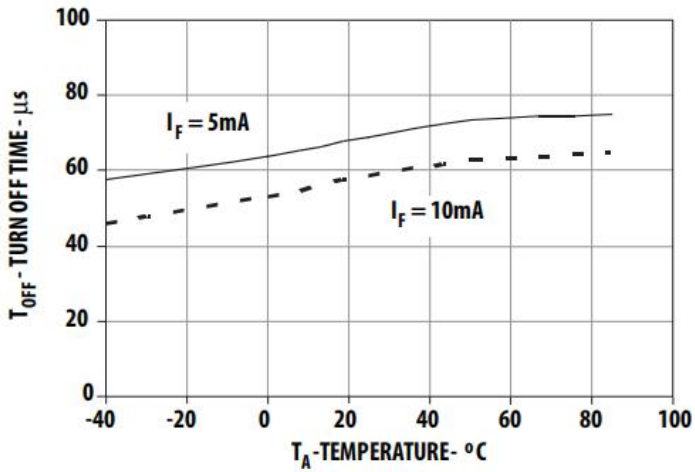


Figure 15. Typical Turn Off Time vs Temperature

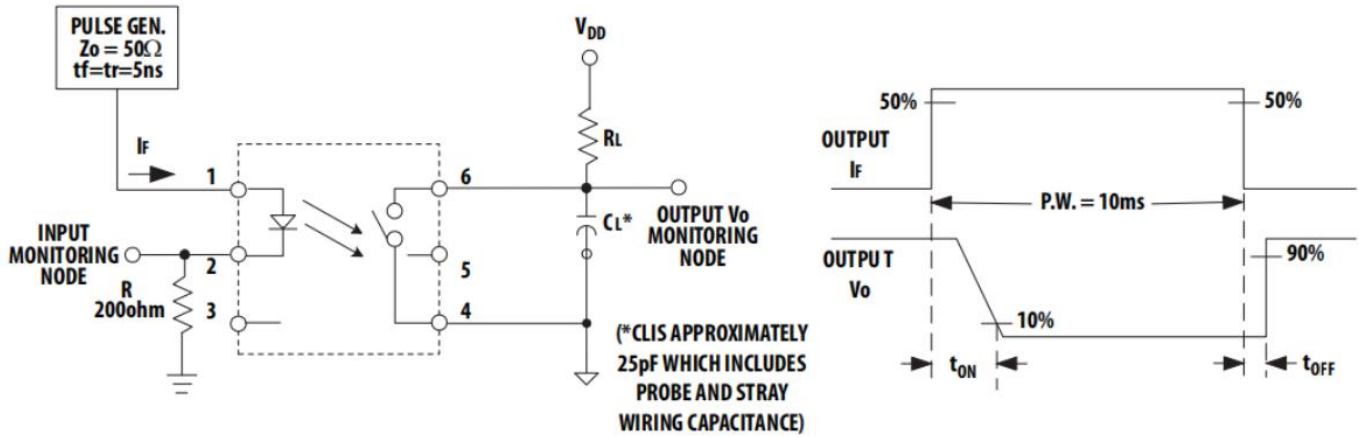


Figure 16 Switching Circuit for TON, TOFF