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WS 2 8 1 5

- **Intelligent control integrated LED light source**
- **12V DC Power-supply**
- **Dual-signal wires version**
- **Signal break-point continuous transmission**

Features and Benefits

- The control circuit and the LED share the only power source.
- 12V DC power supply, there are a decrease of the whole operating current, a decrease in voltage drop, and furthermore an increase consistency of three-color mixing even long distance signal transmission.
- The control circuit and RGB chip are integrated in a 5050 components, to form an external control pixel.

- Using the built-in signal reshaping circuit to achieve the signal waveform shaping, and no distortion of waveform of signal takes place.
- Built-in power-on reset and brown-out reset circuits.
- The gray levels of each pixel are of 256 levels, which achieves “256*256*256=16777216” full-color display, and the refresh frequency reaches to 2KHz/s.
- Serial cascade interface, data receiving and decoding depend on just one signal line.
- Dual-signal wires version, signal break-point continuous transmission.
- Any two point the distance more than 3m transmission signal without any increase circuit.
- When the refresh rate is 30fps, cascade numbers are far more than 1024 points.
- Data transmitting at speeds of up to 800Kbps.
- Good color consistency reliability, high cost-effective.

Applications

- Guardrail tube series, point light display series, flexible/rigid strips series, module series applications.
- Lighting stage costumes, innovative gadgets or any other electronic products.

General description

WS2813 is an intelligent control LED light source that the control circuit and RGB chip are integrated in a package of 5050 components. Its internal include intelligent digital port data latch and signal reshaping amplification drive circuit. Also include a precision internal oscillator and a 12V voltage programmable constant current control part, which achieves highly consistent color effect.

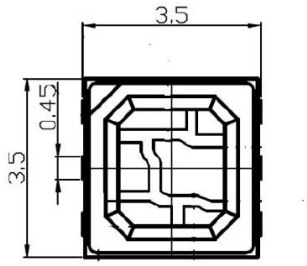
The data transfer protocol use single NZR communication mode. After the pixel power-on reset, the DIN port receive data from controller, the first pixel collect initial 24bit data then sent to the internal data latch, the other data which reshaping by the internal signal reshaping amplification circuit sent to the next cascade pixel through the DO port. After transmission for each pixel, the signal to reduce 24bit. Every pixel adopts auto-reshaping transmit technology, making the pixel cascade numbers are not limited to the signal transmission, only relate to the speed of signal transmission.

The BIN receives the data signal, and then compare the data with the DIN side after phagocytosis of 24bit data, if DIN do NOT receive the signal, then switching to BIN for receiving the input signal, which ensure that any the IC's damage does not affect the signal cascade transmission and make the BIN in state of receiving signal until restart after power-off.

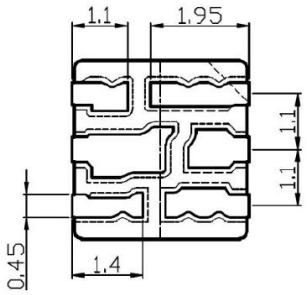
Refresh Frequency updates to 2KHz, Low Frame Frequency and no Flicker appear in HD Video Camera.

300us or more of reset time, it won’t cause wrong reset while interruption, it supports the lower frequency and inexpensive MCU.

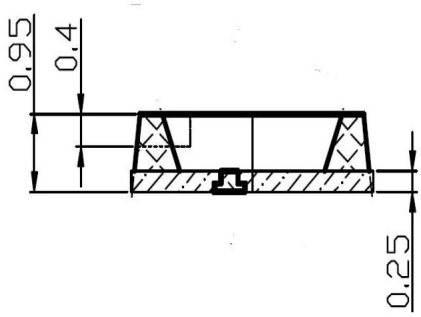
Mechanical Dimensions



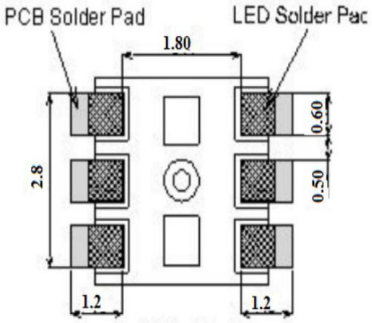
Top View



Back View



side view

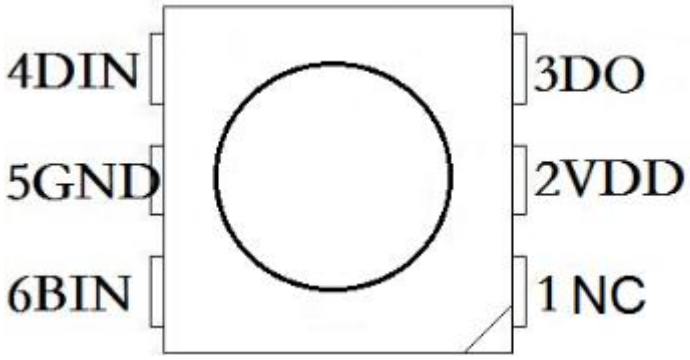


Solder Pad

◆ **Remarks**

1. Dimension: 5.0*5.4*1.5mm
2. Default tolerance: ±0.01mm

PIN Configuration



PIN Function

NO.	Symbol	PIN	Function description
1	NC	HANGING	Suspended in PCB layout, the circuit will be out of operation when it connects to other circuits.

2	VDD	POWER VOLTAGE	Power Voltage, connect to “+12V”
3	DO	DATA OUT	Control data signal output
4	DIN	DATA IN	Control data signal input
5	GND	GROUND	Data & Power Grounding
6	BIN	BACKUP DATA IN	Backup Control data signal input

Absolute Maximum Ratings

Parameter	Symbol	Ratings	Unit
Power supply voltage	V_{DD}	+9~+13	V
Input voltage	V_I	-0.5～VDD+0.5	V
Operating Temperature	Topt	-25～+60	℃
Storage Temperature	Tstg	-40~+105	℃

Electrical Characteristics (TA=-20～+70℃, VDD=4.5～5.5V, VSS=0V)

Parameter	Symbol	Min.	Tpy.	Max.	Unit	Conditions
Input Current	I_I	——	——	±1	μA	V_I=VDD/VSS
High-level Input	V_{IH}	0.7VDD	——	——	V	D_{IN}, SET
Low-level Input	V_{IL}	——	——	0.3 VDD	V	D_{IN}, SET
Hysteresis voltage	V_H	——	0.35	——	V	D_{IN}, SET

Switching Characteristics (TA=-20～+70℃, VDD=4.5～5.5V, VSS=0V)

Parameter	Symbol	Condition	Min	Tpy	Max	Unit
Transmission Delay Time	t_{PLZ}	CL=15pF, DIN→DOUT, RL=10KΩ	——	——	300	ns
Fall time	t_{THZ}	CL=300pF, OUTR/OUTG/OUTB	——	——	120	μs
Input-capacitance	C_I	——	——	——	15	pF

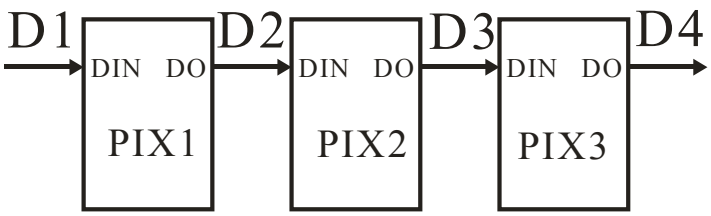
Data Transfer Time (TH+TL=1.1μs±300ns)

T0H	0-code, High-level time	220ns~480ns
T1H	1-code, High-level time	750ns~2μs
T0L	0-code, Low-level time	750ns~2μs
T1L	1-code, Low-level time	220ns~480ns

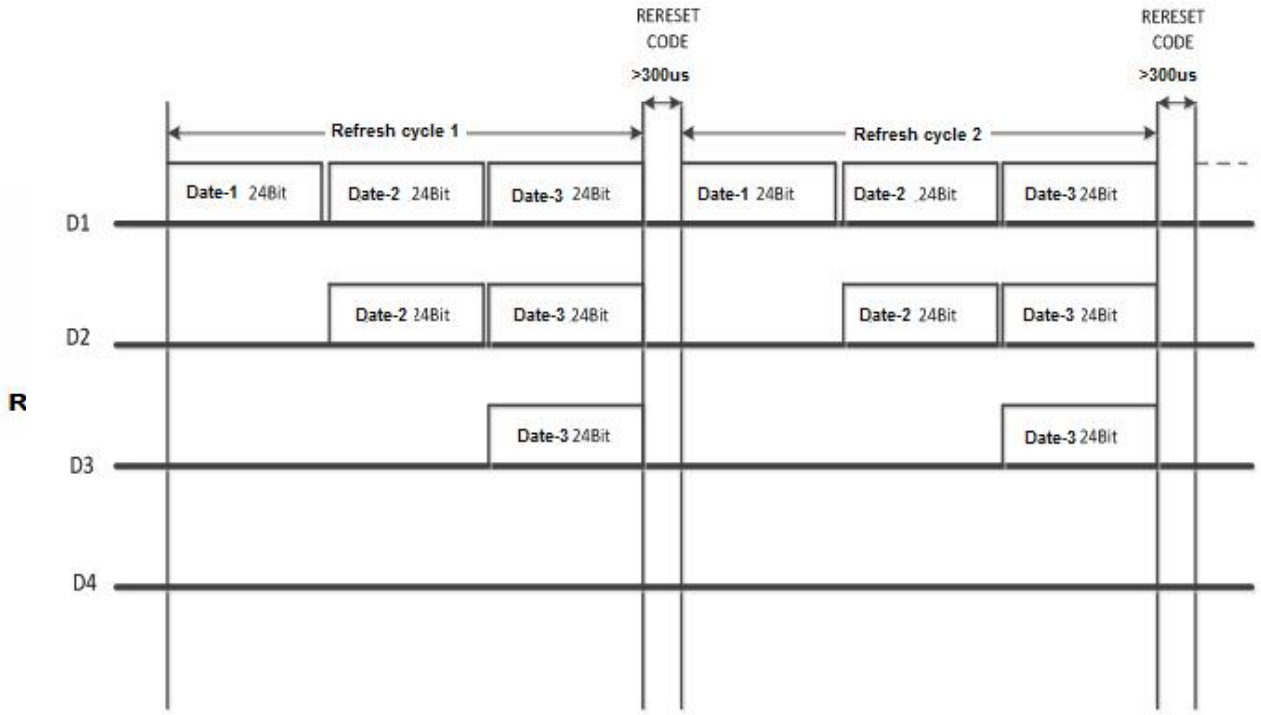
RES	Frame unit, Low-level time	300μs or more

Sequence Chart

Cascade Method



Data Transmission Method



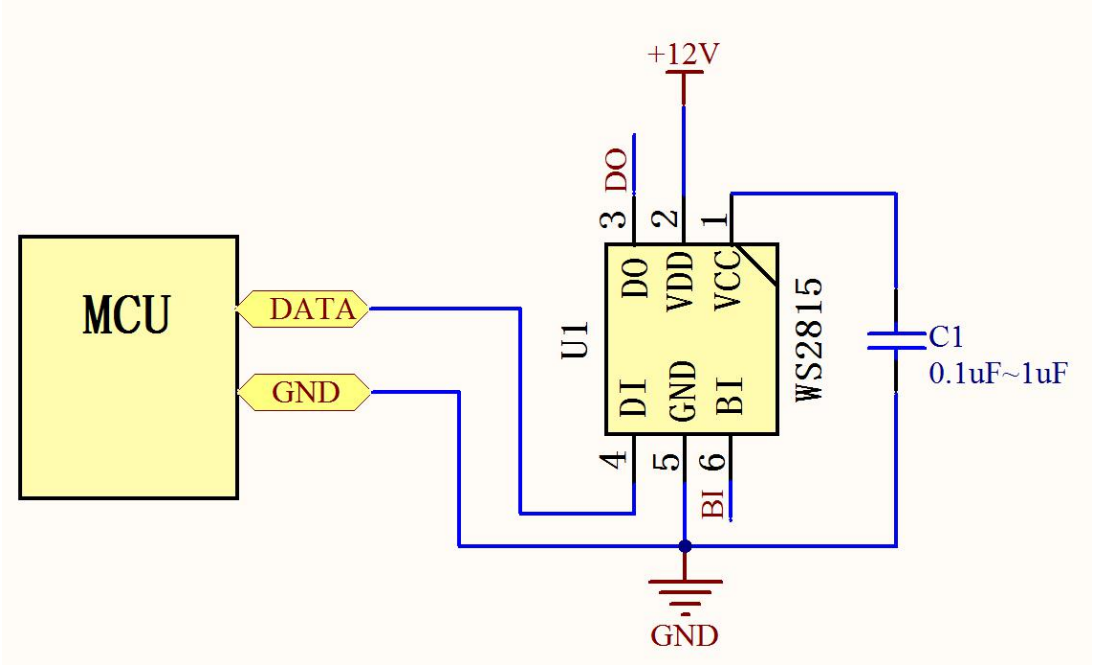
Note: D1 is the data from MCU, and D2, D3, D4 are from Cascade Circuits.

Composition of 24bit data

R7	R6	R5	R4	R3	R2	R1	R0	G7	G6	G5	G4	G3	G2	G1	G0	B7	B6	B5	B4	B3	B2	B1	B0

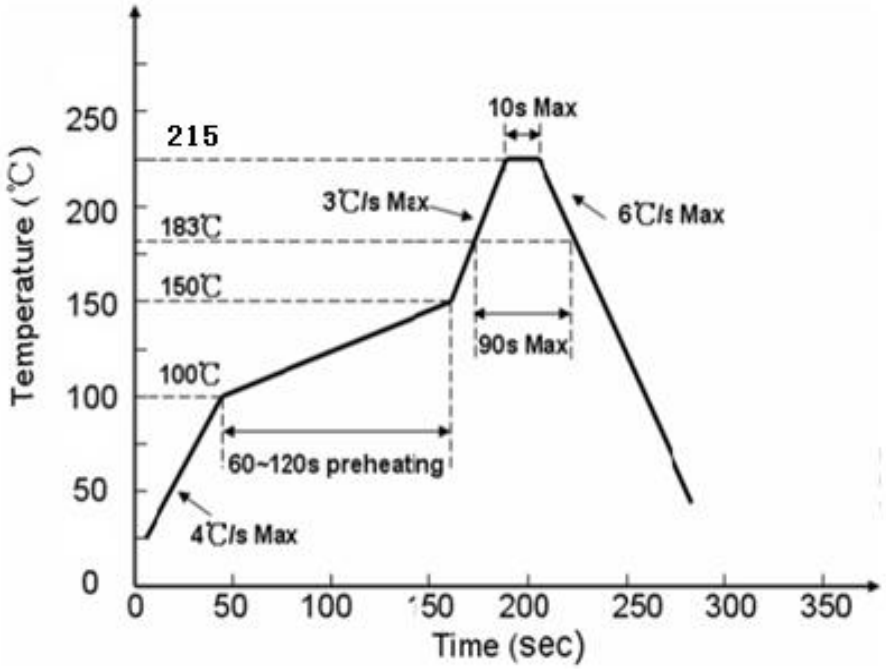
Note: Data transmit in order of GRB, high bit data is first.

Application Circuit

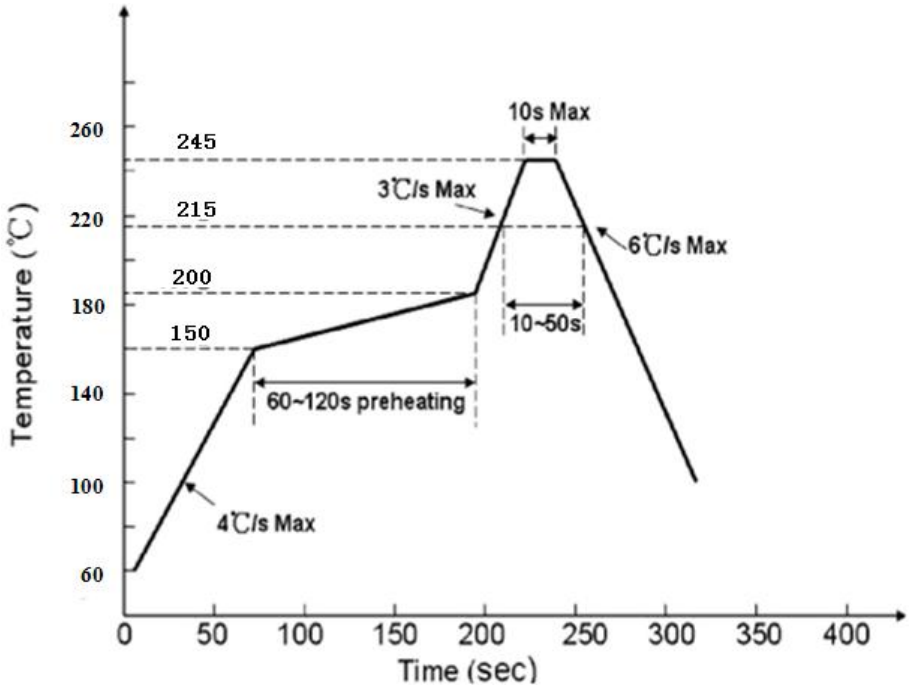

+12V
MCU
DATA
GND
U1
3 DO
2
1
DO
VDD
VCC
DI
GND
BI
4
5
6 BI
WS2815
C1
0.1uF~1uF
GND

Reflow Instructions

1 Leaded Reflow:



2) Leade-free Reflow:



Curve Description	Lead Reflow Solder	Lead-free Reflow Solder/SMT

The lowest preheat temperature (Tsmin)	100℃	150℃
The highest preheat temperature (Tsmax)	150℃	200℃
Preheating time (Tsmin to Tsmax) (ts)	60-120 S	60-180 S
Average rate of temperature rise (Tsmax to Tp)	<3℃/S	<3℃/S
LIQUID REGION temperature (TL)	183℃	217℃
LIQUID REGION Holding Time (tL)	60-150 S	60-150 S
Peak Temperature (Tp)	215 ℃	245 ℃
High Temperature Region(Tp=-5℃) Holding Time (tp)	<10 S	<10 S
Cooling Rate	<6℃/S	<6℃/S
Room Temperature to Peak Holding Time	<6 min	<6 min

◆ Remarks

1. This has to be baked for 48 hours at the baking temperature of 65-70℃ before being used.
2. Use up with 2 hours after taking out from oven.
3. Please replace the unused LEDs into oven.

◆ Reflow instruction

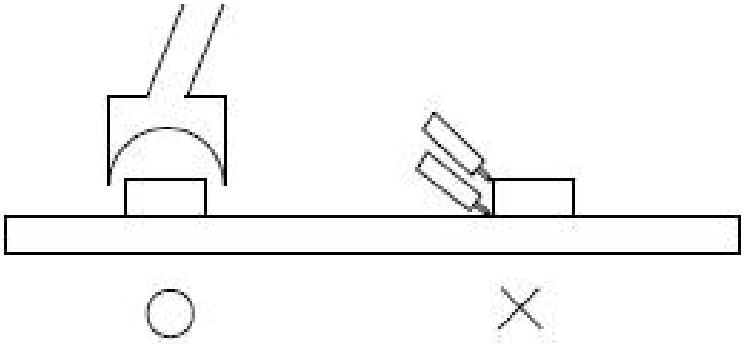
1. No more than two times of reflow.
2. Do not beat the colloid surface when the material is heated.

◆ Manual Soldering instruction

1. Soldering iron's temperature must be under 300℃, and operating time must be less than 3 seconds.
2. It should be done only once for the manual soldering.

◆ Repairing instruction

Normally, it can't be repaired after reflow. You need to use double-ended solder iron and make sure that whether it will do damage to the LEDs' characteristics when repairing is inevitable.



◆ Storing and Transporting

1. Scope of application

Front side up, moisture-proof and waterproof, no extrusion, no collision and no vibration.

2．Storage and its period

① Room temperature sealed storage: 20℃～30℃, 40%～60%RH, product is valid for ONE month.

② Moisture-proof sealed storage: 20℃～30℃, 25%～60%RH, product is valid for THREE month.

③ Use up with 2 hours after removing from packages.(Environmental conditions for temperature <30℃, relative humidity<60%)

◆ Dehumidification

We would recommend to do dehumidification if they exceed the valid storage period of products or dampened due to other reasons.

Dehumidification Method: 70℃-75℃/22±2 Hours

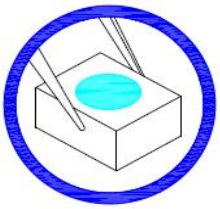
◆ Electrostatic Protection

LED is an electrostatic sensitive component, although the LED products are with excellent anti-static ability, they will cause a certain damage by any electrostatic discharge. By taking some electrostatic measures to avoid the damages when using the LEDs, such as wearing anti-static gloves and anti-static bracelet, etc..

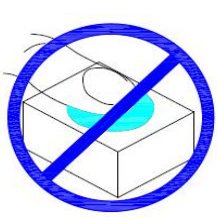
◆ Precautions

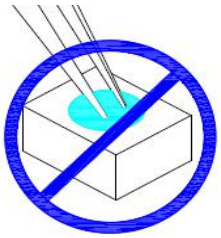
Pressing the colloid surface will affect the reliability of LED because the LED is advanced silicone-gel. And therefore precautions should be taken to avoid the strong pressure on the component. It's proper to make the LED be used in safe condition when using a suction nozzle. Silicon packing with soft and elastic, it greatly reduces thermal stresses and unable to bear external mechanical forces. Therefore, preventive measures should be taken in process of manually handling.

① Clip the LED from its side.

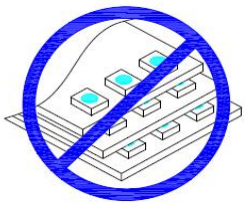


② Neither directly touch the gel surface with the hand or sharp instrument, it may damage its internal circuit.



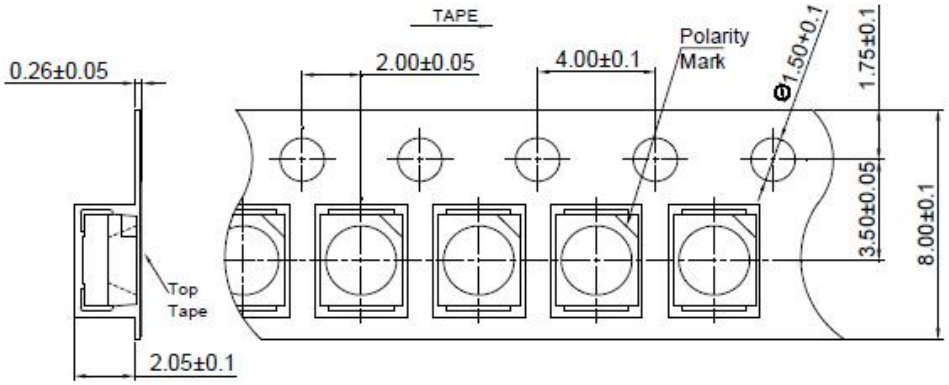


③ Not to be double stacked, it may damage its internal circuit.

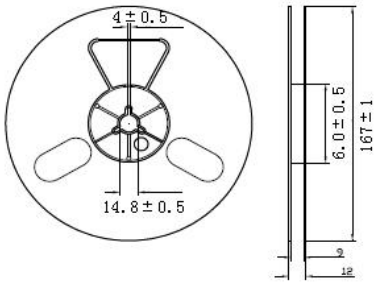
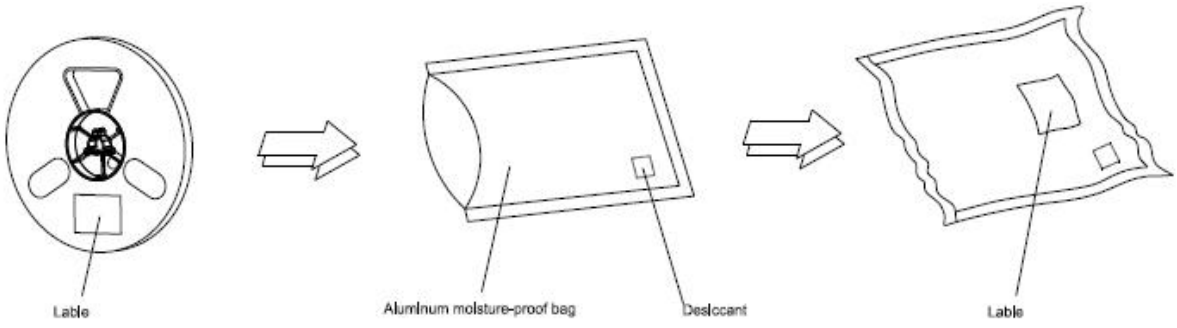


④ Can not be stored in or applied in the acidic sites of PH<7.

Carrier tape (Unit: mm)



Reel size (Unit: mm)



Moisture-proof bag