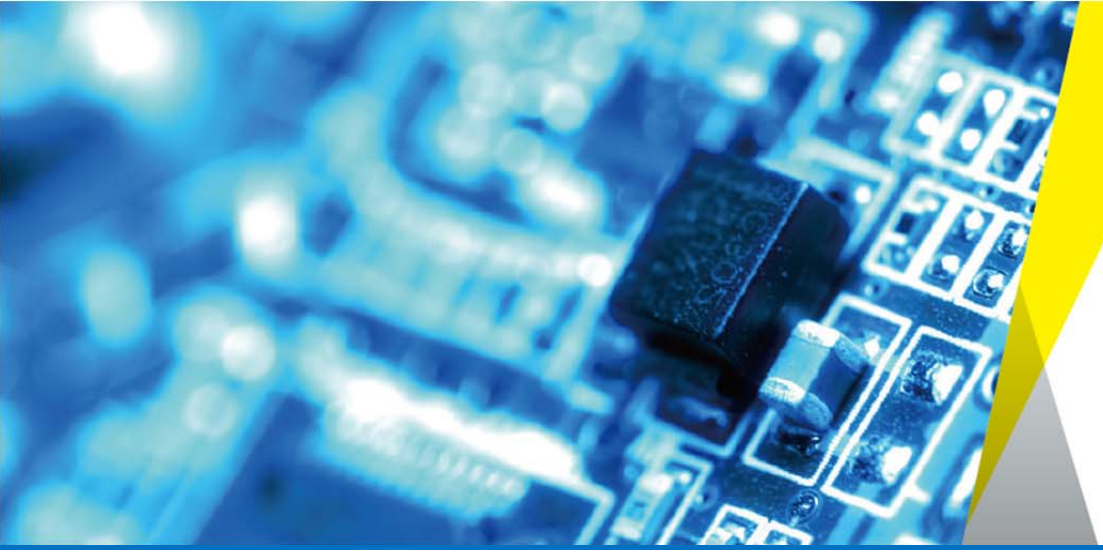

DATASHEET

Product Name	**Metal Oxide Film Fixed Resistors**
Part Name	**MOR Series**
File No.	**DIP-SP-004**

Uniroyal Electronics Global Co., Ltd.

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Manufacture Plant	Uniroyal Electronics Industry Co., Ltd.
	Aeon Technology Corporation
	Royal Electronic Factory (Thailand) Co., Ltd.
	Royal Technology (Thailand) Co., Ltd.

1. Scope

1.1 This datasheet is the characteristics of Metal Oxide Film Fixed Resistors manufactured by UNI-ROYAL.
1.2 Excellent flame retardant coating
1.3 High stability even in bad environment
1.4 High purity ceramic core
1.5 Meet EIA-RC2655A requirements
1.6 High safety standard
1.7 Compliant with RoHS directive.
1.8 Halogen free requirement.

2. Part No. System

The standard Part No. includes 14 digits with the following explanation:

2.1 1th ~4th digits

For Coated type, the 1st~3rd digits are to indicate the product type and the 4th digit is the special feature. Example: MOR0=Metal Oxide Film Fixed Resistors

2.2 5th~6th digits:

2.2.1 This is to indicate the wattage or power rating. To dieting the size and the numbers, The following codes are used; and please refer to the following chart for detail: W=Normal Size; 1"~"G"to denote"1"~"16"as Hexadecimal:

1/16W~1W: (＜1W)

Wattage	1/2	1/3	1/4	1/5	1/6	1/8	1/10	1/16
Normal Size	W2	W3	W4	W5	W6	W8	WA	WG
Small Size	S2	S3	S4	S5	S6	S8	SA	SG
Extra Small Size	U2	U3	U4	U5	U6	U8	UA	UG

1W~16W (≧1W)

Wattage	1	2	3	5	7	8	9	10	15
Normal Size	1W	2W	3W	5W	7W	8W	9W	AW	FW
Small Size	1S	2S	3S	5S	7S	8S	9S	AS	FS
Extra Small Size	1U	2U	3U	5U	7U	8U	9U	AU	FU

2.2.2 For power rating less or equal to 1 watt, the 5th digit will be the letters W to represent the size required & the 6th digit will be a number or a letter code. Example: WA=1/10W; W4=1/4W

2.3 The 7th digit is to denote the Resistance Tolerance. The following letter code is to be used for indicating the standard Resistance Tolerance.
D=±0.5% F=±1% G=±2% J=±5% K= ±10%

2.4 The 8th to 11th digits is to denote the Resistance Value.

2.4.1 If value belongs to standard value of E-24 series, the 8th code is zero, 9th~10th codes are the significant figures of resistance value, and the 11th code is the power of ten.

2.4.2 If value belongs to standard value of E-96 series, the 8th~10th codes are the significant figures of resistance value, and the 11th code is the power of ten.

2.4.3 The following number s and the letter codes are to be used to indicate the number of zeros in the 11th digit:
$0=10^0$ $1=10^1$ $2=10^2$ $3=10^3$ $4=10^4$ $5=10^5$ $6=10^6$ $J=10^{-1}$ $K=10^{-2}$ $L=10^{-3}$ $M=10^{-4}$

2.5 The 12th, 13th & 14th digits.

2.5.1 The 12th digit is to denote the Packaging Type with the following codes: A=Tape/Box; T=Tape/Reel; B=Bulk/Box

2.5 .2 The 13th digit is normally to indicate the Packing Quantity of Tape/Reel packaging types. The following letter code is to be used for some packing quantities:
4=4000pcs 5=5000pcs C=10000pcs D=20000pcs E=15000pcs

2.5.3 For some items, the 14th digit alone can use to denote special features of additional information with the following codes:

0=NIL	P=Panasert type	1=Avisert type 1	2=Avisert type 2
3=Avisert type 3	8=PT-58mm	9=PT-64mm	7=Lead wire(H)38mm
A=PT-83mm	C=PT-73mm	D=PT-71mm	

3. Ordering Procedure

(Example: MOR 1WS ±5% 8.2Ω T/B-1000)

M O R 0 1 S J 0 8 2 J A 1 0

Product Type:
MOR=Metal Oxide Film Fixed Resistors

Wattage:
Normal size:
W4=1/4W
W2=1/2W
1W=1W
2W=2W
3W=3W
5W=5W
7W=7W
9W=9W
Small size:
S2=1/2WS
1S=1WS
2S=2WS
3S=3WS
5S=5WS

Special Features:
0= Standard product
I= Non-Inductive

Tolerance :
G=±2%
J=±5%
K=±10%

Resistance Value:
±2%、±5%、10% series:
The 1st digit will be "0"; the 2nd & 3rd digits are for the significant figures of the resistance and the 4th digit denotes number of zeros following
Example:20KΩ:0203
≤±1%series:
The 1st to 3rd digits are for the significant figures of the resistance and 4th digit denotes number of zeros following.

Example:20KΩ:2002
J=10^{-1}; K=10^{-2}; L=10^{-3}

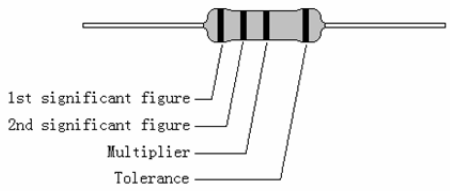
Packing quantity:
1=1,000pcs
2=2,000pcs
3=3,000pcs
4=4,000pcs
5=5,000pcs
A=500pcs
B=2,500pcs

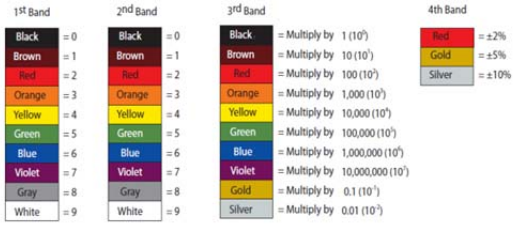
Additional Information:
0=NIL
P=Panasert type
1=Avisert type 1
2=Avisert type 2
3=Avisert type 3
8=PT-58mm
9=PT-64mm
7=Lead wire(H)38mm
A=PT-83mm
C=PT-73mm
D=PT-71mm

Packing Type:
A=Tape/Box
T=Tape/Reel
B=Bulk/Box
P=Tape/Box of PT-26 product

4. Marking

Resistors shall be marked with color coding
Colors shall be in accordance with JIS C 0802



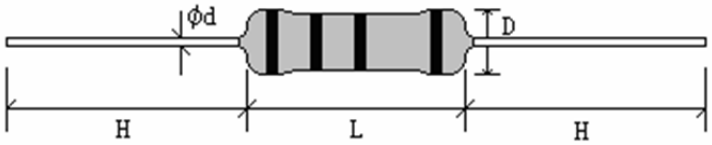


4.1 Label:
Label shall be marked with following items:
(1) Type and style
(2) Nominal resistance
(3) Resistance tolerance
(4) Quantity
(5) Lot number
(6) PPM

Example:

Metal Oxide Film Fixed Resistors	
WATT: 1WS	VAL:8.2Ω
Q'TY: 1,000	TOL: 5%
LOT: 5021548	PPM:

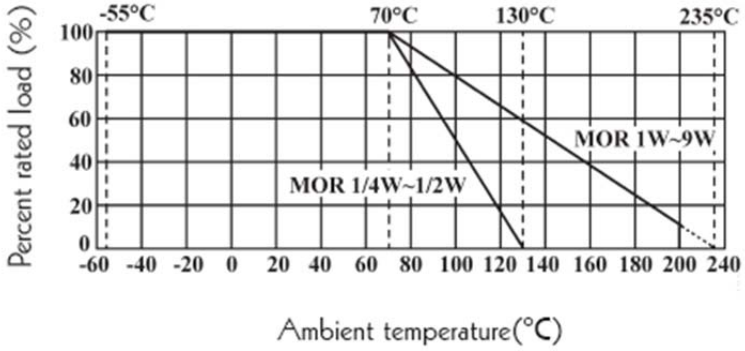
5. Dimension



Type	Dimension(mm)					Max Working Voltage	Max Overload Voltage	Dielectric Withstanding Voltage	Tolerance	Resistance Range
	D	L	d ±0.05	H ±3	PT					
MOR 1/4W	2.2±0.5	6.5±1.0	0.54	28	52	250V	400V	250V	±2%、±5%	0.1Ω~470KΩ
MOR 1/2WS	2.2±0.5	6.5±1.0	0.54	28	52	250V	400V	250V	±2%、±5%	0.1Ω~470KΩ
MOR 1/2W	3.0±0.6	9.5±1.0	0.54	28	52	250V	400V	250V	±2%、±5%	0.1Ω~560KΩ
MOR 1WS	3.5±0.6	9.5±1.0	0.54	28	52	350V	600V	350V	±2%、±5%	0.1Ω~560KΩ
MOR 1W	4.5±0.6	11.5±1.0	0.70	25	52	350V	600V	350V	±2%、±5%	0.1Ω~560KΩ
MOR 2WS	4.5±0.6	11.5±1.0	0.70	25	52	350V	600V	350V	±2%、±5%	0.1Ω~560KΩ
MOR 2W	5.0±0.6	15.5±1.0	0.70	28	64	350V	600V	350V	±2%、±5%	0.1Ω~560KΩ
MOR 3WS	5.0±0.6	15.5±1.0	0.70	28	64	350V	600V	350V	±2%、±5%	0.1Ω~560KΩ
MOR 3W	6.0±0.6	17.5±1.0	0.75	28	64	500V	800V	500V	±2%、±5%	0.1Ω~560KΩ
MOR 5WS	6.0±0.6	17.5±1.0	0.75	28	64	500V	800V	500V	±2%、±5%	0.1Ω~560KΩ
MOR 5W	8.0±0.6	24.5±1.0	0.75	38	90	750V	1000V	750V	±2%、±5%	0.1Ω~680KΩ
MOR 7W	8.0±0.6	29.5±1.0	0.75	38	B/B	750V	1000V	750V	±2%、±5%	20Ω~150KΩ
MOR 8W	8.0±0.6	39.5±1.0	1.00	38	B/B	750V	1000V	750V	±2%、±5%	30Ω~200KΩ
MOR 9W	8.0±0.6	52.5±1.0	1.00	38	B/B	750V	1000V	750V	±2%、±5%	50Ω~200KΩ

6. Derating Curve

Resistors shall have a power rating based on continuous load operation at an ambient temperature from -55℃ to 70℃. For temperature in excess of 70℃, the load shall be derate as shown in figure 1



Voltage rating:

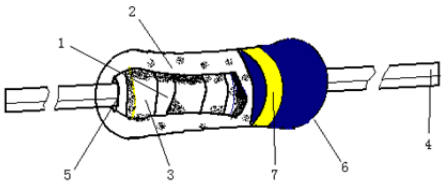
Resistors shall have a rated direct-current (DC) continuous working voltage or an approximate sine-wave root-mean-square (RMS) alternating-current (AC) continuous working voltage at commercial-line frequency and waveform corresponding to the power rating, as determined from the following formula:

$$RCWV = \sqrt{P \times R}$$

Remark: RCWV: Rating Continuous Working Voltage (Volt.) P: power rating (Watt) R: nominal resistance (Ω)

In no case shall the rated DC or RMS AC continuous working voltage be greater than the applicable maximum value. The overload voltage is 2.5 times RCWV or Max. Overload voltage whichever is lower.

7. Structure



No.	Name	Material
1	Basic body	Rod type ceramics
2	Resistor	Metal Oxide Film
3	End cap	Steel (Tin plated iron surface)
4	Lead wire	Tin solder coated copper wire
5	Joint	By welding
6	Coating	Insulated resin Color: Gray (Normal size) Sea blue (Small size)
7	Color code	Epoxy resin

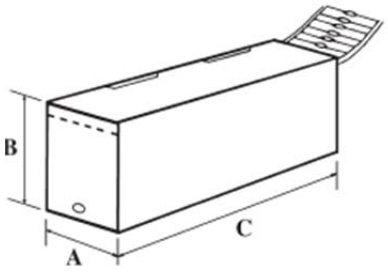
8. Performance Specification

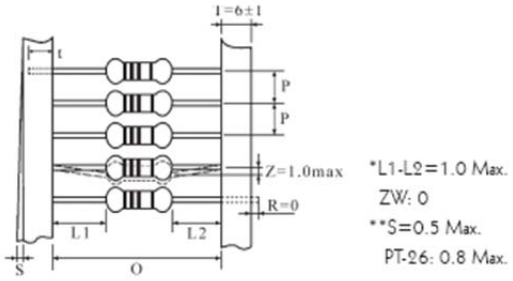
Characteristic	Limits	Test Method (GB/T5729&JIS-C-5201&IEC60115-1)
Temperature Coefficient	1/4W 1/2WS ≦100KΩ: ±350PPM/℃ 100KΩ<R≦470KΩ: 0～-700PPM/℃ 1/2W、1WS: ≦120KΩ: ±350PPM/℃ 120KΩ<R≦560KΩ 0～-700PPM/℃ 1W、2W、2WS、3W、3WS、5WS: ≦150KΩ: ±350PPM/℃ 150KΩ<R≦560KΩ 0～-700PPM/℃ 5W: ≦180KΩ: ±350PPM/℃ 180KΩ<R≦680KΩ 0～-700PPM/℃ 7W、8W、9W: ±350PPM/℃	4.8 Natural resistance changes per temp. Degree centigrade $\frac{R_2-R_1}{R_1(t_2-t_1)} \times 10^6$ (PPM/℃) R_1: Resistance Value at room temperature（t_1）; R_2: Resistance at test temperature（t_2） t_1: +25°C or specified room temperature t_2: Test temperature（-55℃or 125℃）
Short-time overload	Resistance change rate is: ±(1%+0.05Ω)Max for normal size. ±(2%+0.05Ω)Max for small size. With no evidence of mechanical damage.	4.13 Permanent resistance change after the application of a potential of 2.5 times RCWV or Max. Overload Voltage whichever less for 5 seconds.
Dielectric Withstanding Voltage	No evidence of flashover mechanical damage, arcing or insulation break down.	4.7 Resistors shall be clamped in the trough of a 90°metallic V-block and shall be tested at AC potential respectively specified in the above list for 60-70 seconds.
Pulse overload	Resistance change rate is: ±(2%+0.05Ω)Max for normal size. ±(5%+0.05Ω)Max for small size. With no evidence of mechanical damage.	4.28 Resistance change after 10,000 cycles (1 second “ON ”, 25 seconds “OFF ”) at 4 times RCWV or Max. Overload whichever less.

Terminal strength	No evidence of mechanical damage	4.16 Direct load: Resistance to a 2.5Kg direct load for 10 seconds in the direction of the longitudinal axis of the terminal leads. Twist test: Terminal leads shall be bent through 90° at a point of about 6mm from the body of the resistor and shall be rotated through 360° about the original axis of the bent terminal in alternating direction for a total of 3 rotations.
Resistance to soldering heat	ΔR/R ≤ ± (1%+0.05 Ω)， with no evidence of mechanical damage	4.18 Permanent resistance change when leads immersed to a point 2.0-2.5mm from the body in 260℃±5℃solder for 10±1 seconds.
Solderability	95% coverage Min.	4.17 The area covered with a new, smooth, clean, shiny and continuous surface free from concentrated pinholes. Test temp. Of solder:245℃±3℃ Dwell time in solder: 2~3seconds.
Resistance to solvent	No deterioration of protective coatings & markings	4.29 Specimens shall be immersed in a bath of IPA completely for a 5±0.5 minutes using ultrasonic test equipment
Rapid change of temperature	ΔR/R ≤ ± (2%+0.05Ω) with no evidence of mechanical damage	4.19 30 min at lower limit temperature and 30 min at upper limit temperature，100 cycles.
Humidity (steady state)	ΔR/R ≤ ± (2%+0.05 Ω) with no evidence of mechanical damage	4.24 temporary resistance change after a 240 hours exposure in a humidity test chamber controlled at 40℃±2℃and 90 to 95% relative humidity.
Load life in humidity	＜100KΩ: ±(5%+0.05Ω) ≧100KΩ: ±(10%+0.05Ω)	7.9 resistance change after 1,000 hours (1.5 hours “ON”,0.5 hour “OFF”) at RCWV or Max. Overload whichever less in a humidity test chamber controlled at 40℃ ±2℃and 90 to 95% relative humidity.
Load life	＜100KΩ: ±(5%+0.05Ω) ≧100KΩ: ±(10%+0.05Ω)	4.25.1 permanent resistance change after 1,000 hours operating at RCWV or Max. Overload whichever less with duty cycle of 1.5 hours “ON”, 0.5 hour “OFF” at 70℃±2℃ambient.
Flame retardant	Resistor insulation is self-extinguishing within 10 seconds after externally applied flame is removed.	7.12 The burner is placed remote fro, resistor ignited and adjusted to produce a blue flame 38mm in height and a top of flame 127mm above the top of burner tube. Resistor is supported from its lead at 45° from the horizontal so that the lower end of resistor is the top of blue flame. The test flame is placed to remain for 15 seconds and removed for 15 seconds. The operation is to be repeated until resistor has been subjected to 5 application of test flame.
Low Temperature Storage	＜100KΩ: ±(5%+0.05Ω) ≧100KΩ: ±(10%+0.05Ω)	IEC 60068-2-1 (Aa) Lower limit temperature，for 2H.
High Temperature Exposure	＜100KΩ: ±(5%+0.05Ω) ≧100KΩ: ±(10%+0.05Ω)	MIL-STD-202 108A Upper limit temperature ，for 16H.

9. Packing

9.1 Tapes in Box Packing

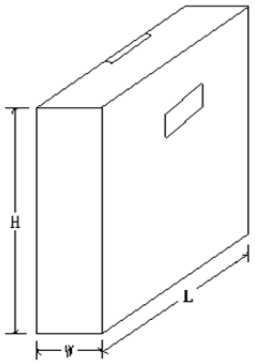


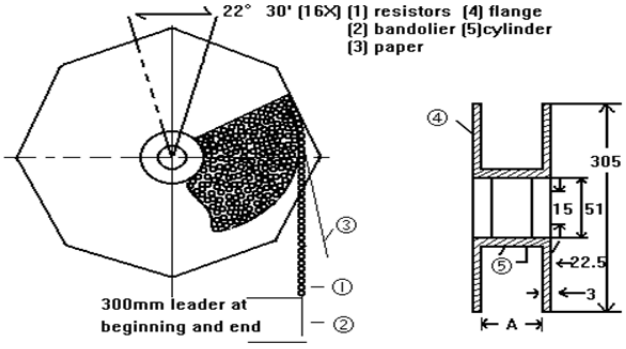


Dimension of T/B (mm)

Part No.	O	P	A±5	B±5	C±5	Qty/Box
MOR 1/4W	52±1	5±0.3	75	116	255	5,000pcs
MOR 1/2WS	52±1	5±0.3	75	116	255	5,000pcs
MOR 1/2W	52±1	5±0.3	75	45	255	1,000pcs
MOR 1WS	52±1	5±0.3	75	70	255	1,000pcs
MOR 1W	52±1	5±0.3	80	82	255	1,000pcs
MOR 2WS	52±1	5±0.3	80	82	255	1,000pcs
MOR 2W	64±5	10±0.5	90	119	255	1,000pcs
MOR 3WS	64±5	10±0.5	90	119	255	1,000pcs
MOR 3W	64±5	10±0.5	90	88	255	500pcs
MOR 5WS	64±5	10±0.5	90	88	255	500pcs
MOR 5W	90±5	10±0.5	115	124	500	500pcs

9.2 Tapes in Reel Packing

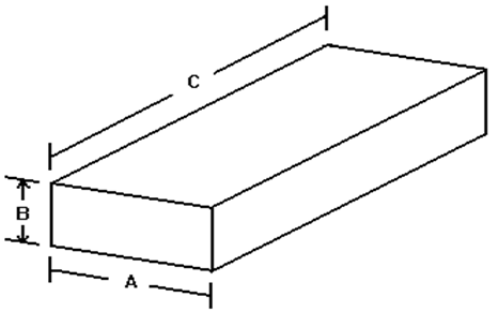




Dimension of Reel (mm)

Part No.	O	A	W±5	H±5	L±5	Qty/Box
MOR 1/4W	52±1	73±2	85	294	293	5,000pcs
MOR 1/2WS	52±1	73±2	85	294	293	5,000pcs
MOR 1/2W	52±1	73±2	85	294	293	4,000pcs
MOR 1WS	52±1	73±2	85	294	293	4,000pcs
MOR 1W	52±1	73±2	85	294	293	2,500pcs
MOR 2WS	52±1	73±2	85	294	293	2,500pcs
MOR 2W	64±5	80±5	95	294	293	1,000pcs
MOR 3WS	64±5	80±5	95	294	293	1,000pcs
MOR 3W	64±5	80±5	95	294	293	1,000pcs
MOR 5WS	64±5	80±5	95	294	293	1,000pcs
MOR 5W	90±5	115±5	121	310	310	700pcs

9.3 Bulk in Box Packing



Dimension of Box (mm)

Part No.	A±5	B±5	C±5	Qty. of Bag/Box
MOR 1/4W	140	80	240	500/10,000pcs
MOR 1/2WS	140	80	240	500/10,000pcs
MOR 1/2W	140	80	240	200/4,000pcs
MOR 1WS	140	80	240	200/4,000pcs
MOR 1W	140	80	240	100/2,500pcs
MOR 2WS	140	80	240	100/2,500pcs
MOR 2W	140	80	240	100/1,500pcs
MOR 3WS	140	80	240	100/1,500pcs
MOR 3W	140	80	240	100/1,000pcs
MOR 5WS	140	80	240	100/1,000pcs
MOR 5W	140	80	240	25/400pcs
MOR 7W	140	80	240	25/300pcs
MOR 8W	140	80	240	25/200pcs
MOR 9W	140	80	240	25/200pcs

10. Note

10.1. UNI-ROYAL recommend products store in warehouse with temperature between 15 to 35℃ under humidity between 25 to 75%RH. Even under storage conditions recommended above, solder ability of products will be degraded stored over 1 year old.

10.2. Cartons must be placed in correct direction which indicated on carton, otherwise the reel or wire will be deformed.

10.3. Storage conditions as below are inappropriate:

a. Stored in high electrostatic environment

b. Stored in direct sunshine, rain, snow or condensation.

c. Exposed to sea wind or corrosive gases, such as Cl_2, H_2S, NH_3, SO_2, NO_2, Br etc.

11. Record

Version	Description	Page	Date	Amended by	Checked by
1	First version	1~8	Mar.20, 2018	Haiyan Chen	Nana Chen
2	Modify characteristic	5~6	Feb.19, 2019	Haiyan Chen	Yuhua Xu
3	Modify the size of 8W and 9W wires from "0.75" to "1.00"	4	Mar.15, 2022	Haiyan Chen	Yuhua Xu
4	Modify the temperature coefficient test conditions	4	Oct.28, 2022	Haiyan Chen	Yuhua Xu
5	Modify the packaging size and the number of packages	7~8	Jun.23, 2025	Haiyan Chen	Yuhua Xu