



CR-L Series

1. APPLICABLE RANGE

THIS SPECIFICATION APPLY TO NON – INFLAMMABILITY CEMENT RESISTOR.

2. Part Number

2-1	2-2	2-3	2-4	2-5
CR	L	5W	1R	J
Type	Terminal Form	Rate Wattage	Nominal Resistance	Tolerance

2-1. Type

CR---Copper wire product

NCR---Copper wire Non-inductive product

CP-CR---CP wire product

CP-NCR---CP wire Non-inductive product

2-2 Terminal Form

Upon the shape of terminal, it has L form

2-3. Rated Wattage

Shown by “W” 、 such as 5W 、 10W、 15W、50W。

2-4. Nominal Resistance:

R,K Ω are its unit which is in accordance with E-24 series, such as 1R, 0R1, 0R47, 1K.

2-5. Tolerance

It is measured by Bridge-method at room temperature and expressed by a capital letter.

J ±5%, G ±2%, F ±1%

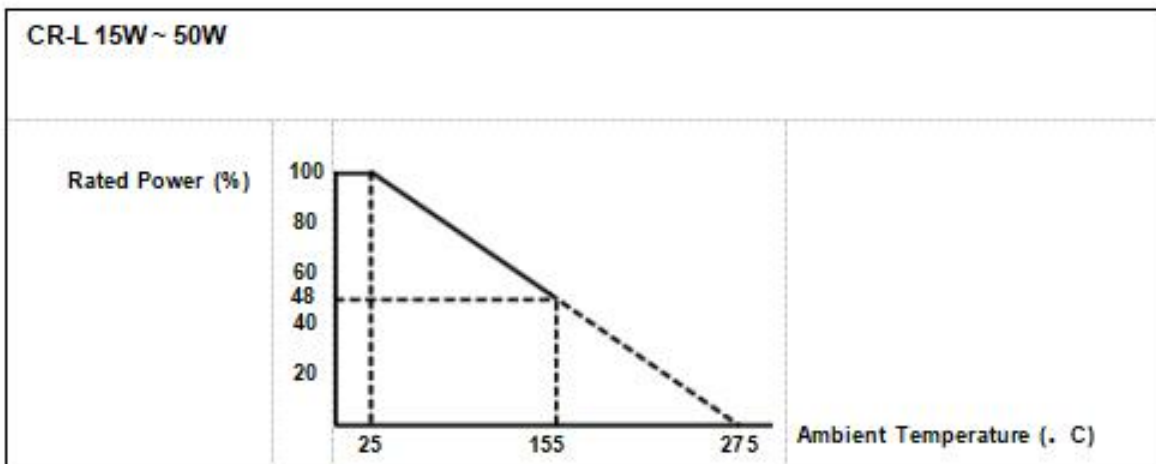
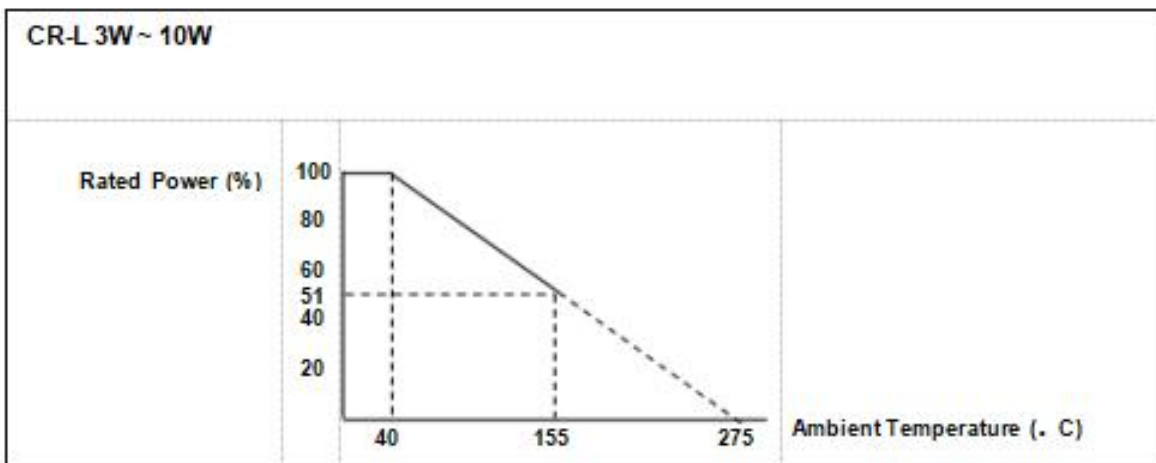
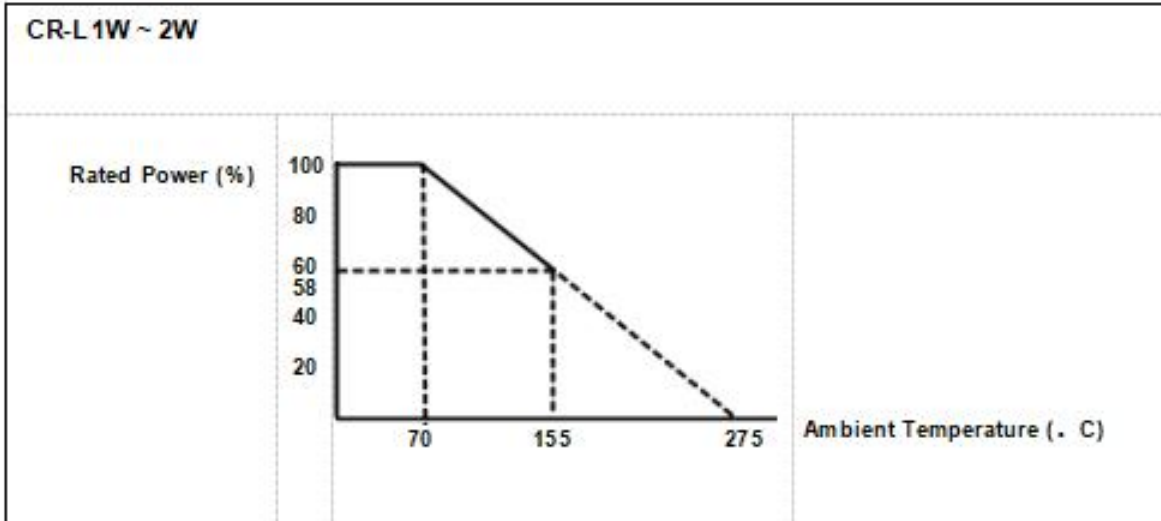
3. Rating Power

Style \ Power Rating 70°C	CR-L-1W	CR-L-2W	CR-L-3W	CR-L-5W	CR-L-7W
Operating Temp. Range	-30°C ~ +155°C				
Max. Working Voltage	200V	250V	350V	350V	500V
Max. Overload Voltage	500V	500V	700V	700V	1000V
Dielectric Withstanding Voltage (AC)	500V	500V	700V	700V	1000V
Value Range $\pm 5\%$ (Ceramic core)	0.1 ~27 Ω	0.1 ~36 Ω	0.1 ~68 Ω	0.1 ~680 Ω	0.1 ~680 Ω
Value Range $\pm 5\%$ (Film)	30 ~47K	39 ~100K	75 ~100K	681 ~820K	681 ~820K
Temp. Coefficient	± 300 ppm/°C				

Style \ Power Rating 70°C	CR-L-10W	CR-L-15W	CR-L-20W	CR-L-25W	CR-L-30W
Operating Temp. Range	-30°C ~ +155°C				
Max. Working Voltage	500V	500V	500V	1000V	1000V
Max. Overload Voltage	1000V	1000V	1000V	2000V	2000V
Dielectric Withstanding Voltage (AC)	1000V	1000V	1000V	2000V	2000V
Value Range $\pm 5\%$ (Ceramic core)	0.1 ~680 Ω	0.1 ~680 Ω	0.1 ~680 Ω	0.1 ~680 Ω	0.1 ~680 Ω
Value Range $\pm 5\%$ (Film)	681 ~820K	681 ~820K	681 ~820K	681 ~820K	681 ~820K
Temp. Coefficient	± 300 ppm/°C				

Style \ Power Rating 70°C	CR-L-40W	CR-L-50W
Operating Temp. Range	-30°C ~ +155°C	
Max. Working Voltage	1000V	1000V
Max. Overload Voltage	2000V	2000V
Dielectric Withstanding Voltage (AC)	2000V	2000V
Value Range $\pm 5\%$ (Ceramic core)	0.1 ~1K Ω	0.1 ~1K Ω
Temp. Coefficient	± 300 ppm/°C	

DERATING CURVE



4. MECHANICAL CHARACTERISTIC

4-1 TERMINAL SOLDER ABILITY

DIP THE TERMINAL WITHIN 7mm FROM THE EDGE INTO FLUX FOR 5 TO 10 SECONDS THEN ADJUSTING THE SOLDERING TEMPERATURE TO $230 \pm 5^{\circ}\text{C}$, WIPE THE SOLDERING DREGS AND BURNED FLUX FROM THE MELTED SOLDER, NEXT DIP THE TERMINAL 5mm FROM THE EDGE, DIP TIME 3 ± 0.5 SECONDS. THEN PULL IT OUT WITHIN 25.4 ± 6.4 SECONDS, COOL IT IN AIR THEN WASH THE FLUX AWAY. THE LEAD WIRE SHOULD MEET FOLLOWING CONDITIONS AFTER REMOVE THE FLUX.

(a) TERMINAL SHOULD BE NEW SMOOTH.

(b) PIN HOLE DOES NOT NEED TO CONCENTRATE IN ONE PLACE, BUT THE TOTAL AREA SHOULD NOT OVER 10%

4-2 TERMINAL INTENSITY

(a) STRESS

ABNORMAL PHENOMENON WILL NOT OCCUR WITHIN 4.5 KG NET WEIGHT FROM THE DIRECTION OF THE FIXING TERMINAL OF THE RESISTOR.

(b) BEND

BENDING PHENOMENON WILL NOT OCCUR WITHIN 500 g NET WEIGHT FROM RANDOM DIRECTION WITHIN 60 SECONDS THE BENDING ANGLE WILL BE WITHIN 5 DEGREE.

5. NON-INFLAMMABILITY

5-1. BURN TEST (UL-492, ITEM 278)

PUT RESISTOR OVER TESTING FLAME FOR 15 SECONDS, AND THEN REMOVE THE FLAME OR ANOTHER 15 SECONDS, THUS CYCLE 5 TIMES AFTER THE TEST. HEAT SHOULD BE DISMISSED WITHIN 10 SECONDS AFTER COMPLETION OF FULL CYCLE TEST, NO COLOUR CHANGE OR CRACK BREAKAGE.

5-2 OVERLOADING TEST

APPLY 120% OF RATING POWER, LASTING 1 MINUTE NO SMELL AND NO SMOKE

6. ELECTRICAL CHARACTERISTIC

6-1 TEMPERATURE RESISTANCE (PLEASE REFER TO TABLE 5-1)

KEEP THE RESISTOR IN THE EVERY STAGE TEMPERATURE AROUND 30 TO 40 MIN.
BY USING THE FORMULA BELOW.

AND ALSO THE TEMP. RESISEANCE COEFFICIENT WILL BE CALCULATED.

* TEMPERATURE RESISRANCE COEFFICIENT

$$=(R - R_0 / R_0) \times (1/T - 1/T_0) \times 10^6 \quad (\text{PPM}/^\circ\text{C})$$

R₀: RESISTANCE (Ω) IN BASE TEMP.(2nd STAGE).

R: RESISTANCE IN EVERY TESTING TEMP.STAGE.

T₀: BASE TEMP. (2nd STAGE).

T: TESTING TEMP. (°C).

THE TEMP.COEFFICIENT SHOULD BE WITHIN ± 260 ppm IN ALL STAGES.

5-1 (Table 5-1) 單 °C

1st	2st	3rd	4th	5th
-30 ± 2	25 ± 2	65 ± 2	105 ± 2	180 ± 2

6-2 TRANSIENT OVERLOAD

APPLY VOLTAGE 10 TIMES OVER RATING POWER FOR 5 SECONDS,NO CHANGE IN MECHANICAL APPEARANCE THEN PUT IN ROOM CONDITION FOR 30 MIN.THE VARIANCE OF VALUE SHOULD BE WITHIN $(2\% + 0.05 \Omega)$.

6-3. TEMPERATURE SENSITIVITY (NORMAL STATE)

PUT RESISTOR IN THE STATE OF TEMP. $40 \pm 2^{\circ}\text{C}$ CONSTANT ,RELATIVE HUMIDITY 90~95% CONSTANT ,CONNECT RESISTOR AS ANODE ,CONNECT METAL PLATE AS CATHODE, APPLY 100V DC FOR 1,000 HOURS, THE VARIANCE OF VALUE SHOULD BE WITHIN $3\% \pm 0.05 \Omega$.

6-4. DURABILITY (RATING LOAD)

UNDER CONSTANT TEMP. $70 \pm 3^{\circ}\text{C}$. (IN CASE OVER 15W , $25 \pm 3^{\circ}\text{C}$),APPLYING RATING VOLTAGE FOR 1.5 HOURS, THEN DISCONNECTING FOR 0.5 HOUR, RECYCLING FOR 1,000 HOURS,PUR RESISTOR IN ROOM CONDITION AND ZERO LOADING FOR 1 HOUR THE VARIANE OF VALUE SHALL BE WITHIN Ω .NO PROMINENT CHANGES IN APPEARANCE.

6-5. DURABILITY (HUMIDITY)

CONSTANT TEMP. $40 \pm 2^{\circ}\text{C}$,RELATIVE HUMIDITY 90~95%,APPLYING O F RATING VOLTAGE) DC FOR 1.5 HOUR, DISCONNECT FOR 0.5 HOUR, CYCLING FOR 1,000 HOURS THEN RETURNED TO ROOM CONDITION AND ZERO LOADING FOR I HOUR, THE VARIANCE OF VALUE SHOULD BE WITHIN $3\% \pm 0.05$. NO PROMINENT CHANGES IN APPEARANCE.

6-6. THERMAL SHOCK

APPLY RATING POWER IN ROOM TEMP.FOR 30 MIN. BRING RESISTOR IMMEDIATELY IN 8~12 SECONDS TO THE AIR OF $-30 \pm 5^{\circ}\text{C}$ OR OVER 15 MIN . THEN RETURN TO ROOM TEMP. AND KEEP IT FOR I HOUR. THE VARIANCE OF VALUE SHOULD BE WITHIN $2\% \pm 0.05$. NO PROMINENT CHANGES IN APPEARANCE.

6-7. ISULATION RESISTANCE

PUT RESISTOR ON FLAT METAL PLATE, CONNECTING BETWEEN ONE OF TERMINAL AND THE PLATE,THST UNDER 500V DC ,THE VALUE SHALL OVER 10,000 MEG Ω .

6-8. VOLTAGE DURABILITY

PUT RESISTOR IN THE SAME STATE WITH ITEM 5-7, APPLYING AC SIN WAVE 1,000V FOR 1 MIN. IN BETWEEN TERMINAL AND PLATE. NO DAMAGE OCCURS.

6-9. SOLDERING TEMP. DURABILITY

DIP THE TERMINAL OF THE RESISTOR 5.0 ± 0.8 mm FROM THE EDGE ACCORDING TO THE CONDITIONS STATED IN TABLE I, THE PUT IN NORMAL TEMP. FOR 24 NO PROMINENT CHANGES IN APPEARANCE.

CONDITION \ ITEM	SOLDERING TEMP. °C	DIP TIME SECONDS
AUTO SOLDERING	260 ± 5 °C	10 ± 1 SEC
MANUAL SOLDERING	350 ± 10 °C	3 ± 1 SEC

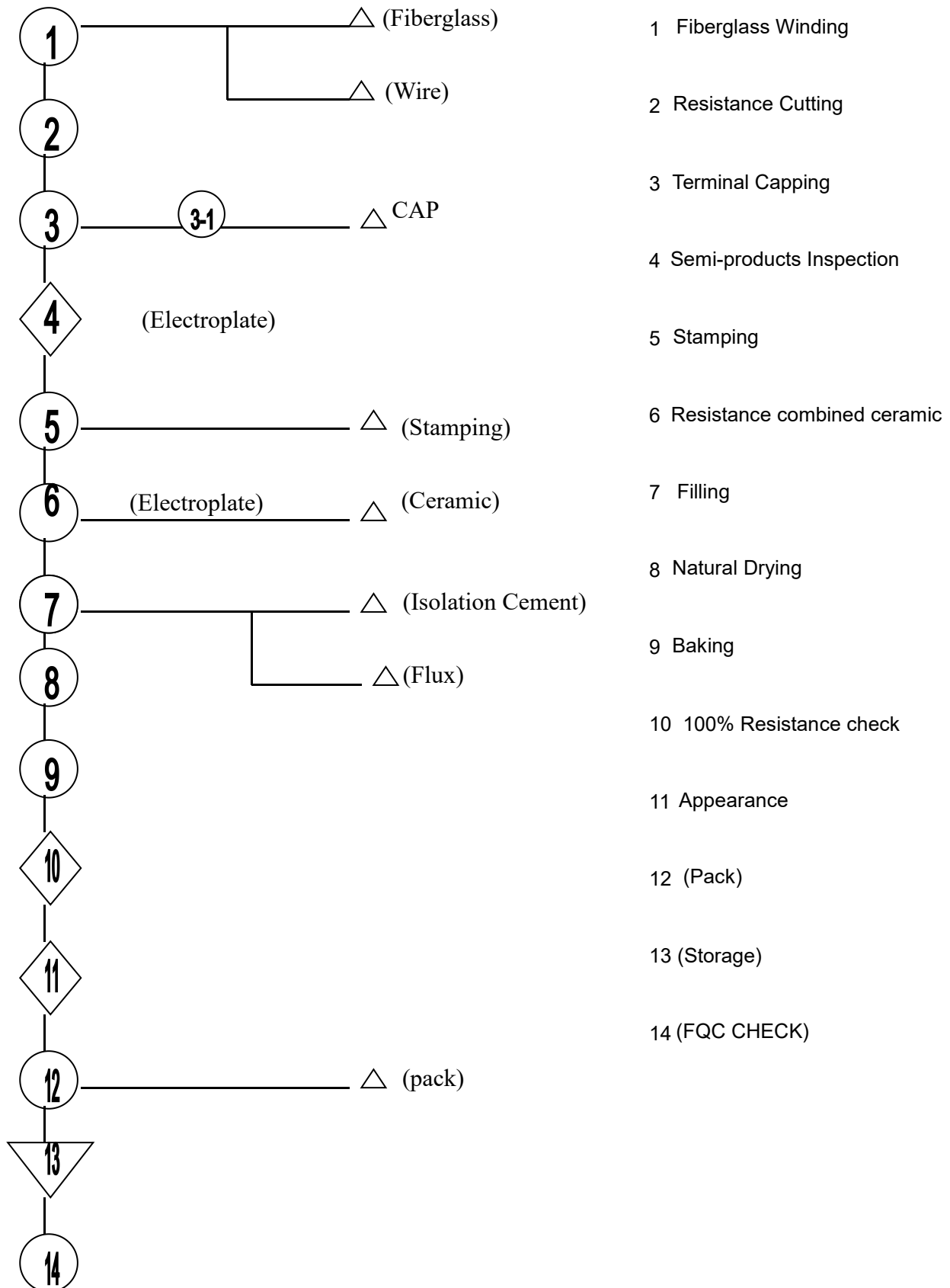
6-10. RATING LOAD

APPLY RATING POWER TO RESISTOR FOR 30 MIN. THE VARIANCE OF RESISTOR VALUE, AFTER 2 HOURS IN ZERO LOAD CONDITION, SHOULD BE WITHIN $\pm 2\%$ 0.05 OHM.

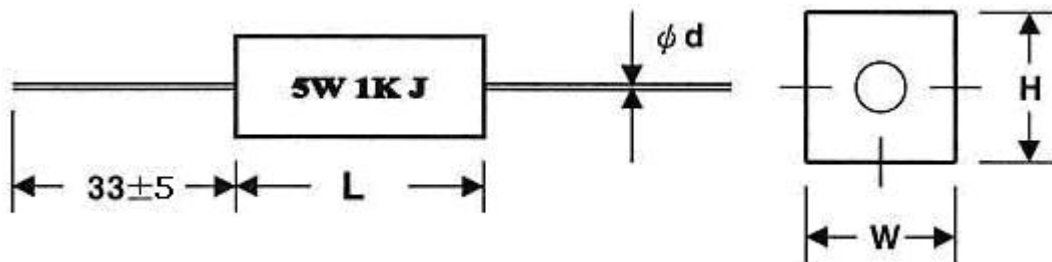
6-11. TEMPERATURE DURABILITY

PUT RESISTOR IN 275 °C CONSTANTLY FOR 2 HOURS. NO PROMINENT CHANGES IN APPEARANCE.

PRODUCTION FLOW CHART



CR - L Series Cement Resistors



DIMENSIONS (mm) :

style	DIMENSIONS (mm) :			
CR-L-L	Normal	Normal	Normal	$\phi d \pm 0.1$
	L	W	H	
1W	13.5 ± 1.0	6.0 ± 1.0	6.0 ± 1.0	0.60
2W	18 ± 1.0	7.0 ± 1.0	7.0 ± 1.0	0.60
3W	22 ± 1.5	8.0 ± 1.0	8.0 ± 1.0	0.60
5W	22 ± 1.5	9.5 ± 1.0	9.5 ± 1.0	0.75
5WA	25 ± 1.5	6.5 ± 1.0	6.5 ± 1.0	0.75
7 W	35 ± 1.5	9.5 ± 1.5	9.5 ± 1.0	0.75
10W	48 ± 1.5	9.5 ± 1.5	9.0 ± 1.0	0.75
15W	48 ± 1.5	13 ± 1.2	13 ± 1.2	0.75
20W	60 ± 2.0	13 ± 1.2	13 ± 1.2	0.75
30W	75 ± 2.5	19 ± 1.2	17 ± 1.2	0.75
40W	89 ± 2.5	19 ± 1.2	19 ± 1.2	0.75
50W	89 ± 2.5	19 ± 1.2	19 ± 1.2	0.75