

**NO.: RD20210728001**

**TO: Ozdisan**

**APPROVAL SHEET No. : T-0615A**

**Series No.: MRW**

**Specification No.:**

**RoHS2.0**

**APPROVAL SHEET**

**FOR AL. ELECTROLYTIC CAPACITORS**

No.	(Customer No.)	(Koshin Part No.)	Description	ΦD x L
1		MRW-050V4R7MC057-T/R	50V4.7μF	5X5.7

**APPROVED BY:**

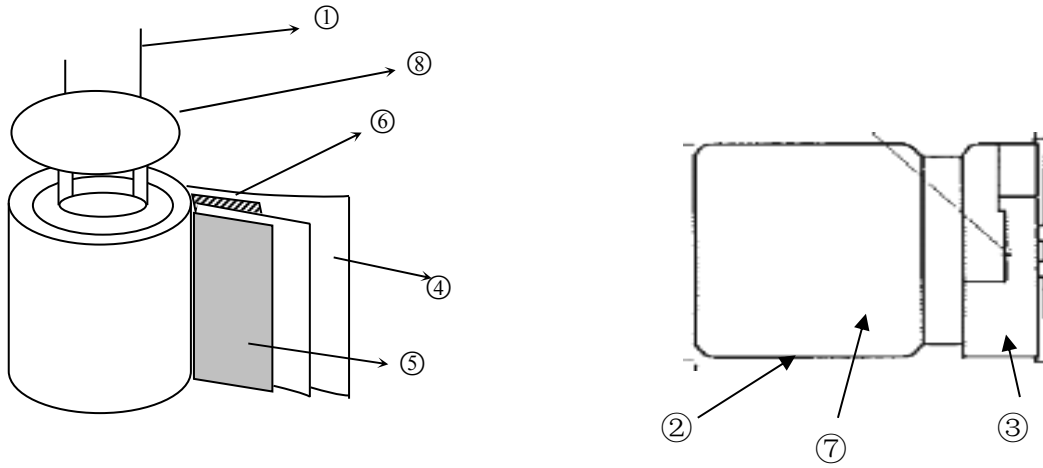
**PLEASE SIGN RETURN US ONE COPY OF THE APPROVAL SHEET.**

**DESIGNED BY:JIANGYUN    CHECKED BY:JUANGYUANYUAN    APPROVED BY: HAUNGXUEHUI**  
**DATE: 2021-7-28**

**KOSHIN**

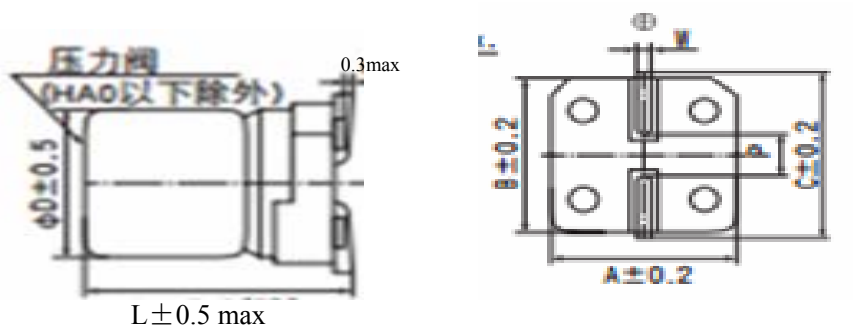
**DJS-DS-0013**

1. Inner conformation drawing and inner constitute parts(curtness drawing):



No:	Composing part	Material
①	Lead wire	Fe+Al+Cu+Sn
②	Case	Aluminum
③	Base plate	PPA
④	Paper	Cellulose
⑤	Anode foil	Aluminum foil
⑥	Cathode foil	Aluminum foil
⑦	Chemical liquid	GBL
⑧	Seal	Rubber

Standard Size map:



Lead spacing and Diameter

Unit: mm

$\phi D$	L	A	B	C	W	P $\pm 0.2$
5	5.7	5.3	5.3	5.9	0.5~0.8	1.4

Coefficient of Frequency for Ripple Current

Case Code	Frequency (Hz)				
	capacitance ( $\mu F$ )	120	1K	10K	100K
B057-G105	1.0	1.00	1.50	1.75	1.80
	2.2 to 10	1.00	1.30	1.40	1.50
	22 to 1,500	1.00	1.05	1.08	1.08
H135-K215	4.7	1.00	1.75	2.30	2.50
	10 to 68	1.00	1.50	1.75	1.80
	100 to 1,000	1.00	1.30	1.40	1.50
	2,200-10,000	1.00	1.05	1.08	1.08



## Series MRW Capacitor

### 1. Our part No. :

For example :

<u>MRW</u>	<u>050V</u>	<u>4R7</u>	<u>M</u>	<u>C057</u>
Series code	rated voltage	capacitance	tolerance	case size symbol
MRW	50 v	4.7 $\mu$ F	$\pm 20\%$	$\Phi 5 \times 5.7$

### 2 Marking:

Include company's brand series code, rated voltage, capacitance and polarity

### 3. Specifications:

3.1 Temperature range : -40 ~+105°C

#### 3.2 Electrical characteristics

3.2.1 Capacitance tolerance :  $\pm 20\%$

3.2.2 Tangent of loss angle ( $\tan \delta$ ) : (at 20°C, 120Hz )

Rated voltage (V)		6.3	10	16	25	35	50	63	100	160-250	400-450
$\tan \delta$ (max.)	B052-G100	0.35	0.24	0.26	0.16	0.14	0.12	0.12	0.12	-	-
	H135-K215	0.38	0.34	0.30	0.26	0.22	0.18	0.14	0.10	0.20	0.25

Note: 0.02 is added to each 1000  $\mu$ F increase over 1000  $\mu$ F

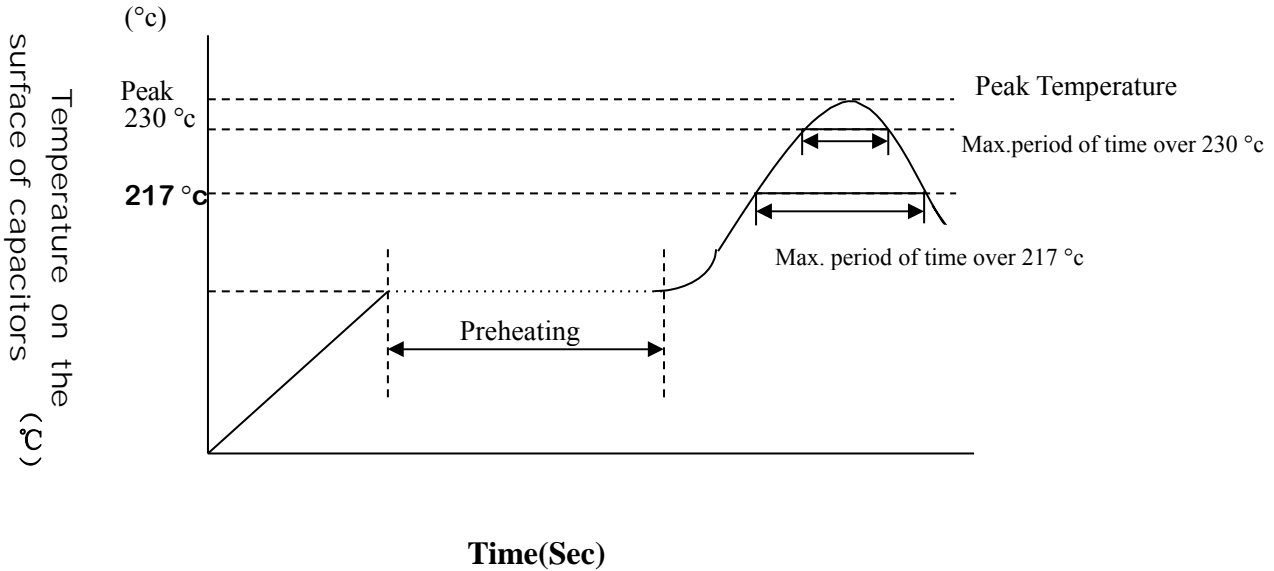
3.2.3 Leakage current ( $\mu$  A) :

Leakage Current ( $\mu$ A)	Rated voltage (VDC)	6.3-100	160-450
	4X5.2-10X10	Less than 0.01CV or 3 $\mu$ A, whichever is large (at 20°C, 2 minutes)	--
	12.5X13.5-18X21.5	Less than 0.03CV or 4 $\mu$ A, whichever is large (at 20°C, 1 minutes)	0.04CV +100 $\mu$ A (at 20°C, 1 minutes)

Note: I : Leakage current ( $\mu$  A) , C : Capacitance ( $\mu$  F) , V : Rated DC working voltage (V)

## RECOMMEDED SOLDERING CONDITIONS FOR ALUMINIUM SURFACE MOUNT TYPE

-Air or Infrared reflow soldering




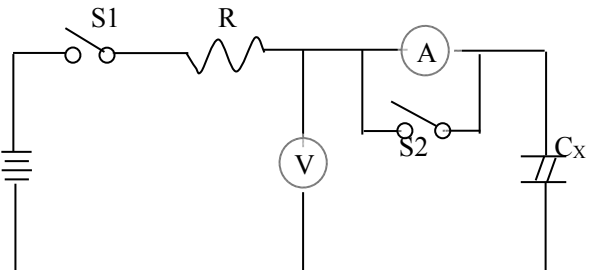
SMDshape	size	voltage	preheating	Time maintained over 217 °C	Time maintained over 230 °C	Peak temperature	Reflow number
	B52~E87	4~63V	150 - 180C ≤120Sec.	≤90 Sec	≤60 Sec	≤260 °C	≤2 times
		63V,80V		≤60 Sec	≤40 Sec	≤250 °C	≤2 times
	F63~G100	4~50V		≤60 Sec	≤30 Sec	≤245 °C	≤2 times
		63V~100, 400V		≤30 Sec	≤20 Sec	≤240 °C	≤2 times
	H135~K215	6.3~50V		≤30 Sec	≤20 Sec	≤240 °C	≤2 times
		63~450V		≤20 Sec	-	≤230 °C	≤2 times

**Remark: Reflow number cannot over 2 times. After first time reflow , must be ensure that the temperature of capacitors became cold to room temperature(5~35°C) ,then continue second flow.**

1. Scope:

This specification applies to aluminum electrolytic capacitor ,used in electronic equipment.

2. Electrical characteristics:

NO	ITEM	TEST METHOD		SPECIFICATION	
2.1	Rated voltage			Voltage range 、	
2.2	Capacitance	1.Measuring frequency:120Hz±12Hz 2.Measuring voltage:≤0.5Vrms+0.5VDC~2.0VDC 3.Measuring circuit: 		capacitance range ,see specification of this series	
2.3	Dissipation factor				
2.4	Leakage current	DC leakage current shall be measured after 1~2minutes application of the DC rated working voltage through the 1000 Ω resistor at 20℃    R: 1000 Ω 100 Ω                                      S1:Switch A: DC current meter                                      S2:Switch for protect of V: DC voltage meter                                      current meter C <sub>x</sub> : Testing capacitor		Dissipation factor, leakage current, see specification of this series.	
2.5	Temperature characteristics	STEP	TEMPERATURE	STORAGE TIME	Step2. Low temperature impedance stability Less than specified value.  Step4. Capacitance change: within ± 10% of the initial measured value.  Dissipation factor: Less than specified value.
		1	20℃ ± 2℃	30minutes	
		2	-40℃ ± 3℃	2hours	
		3	20℃ ± 2℃	4hours	
		4	105℃ ± 2℃	2hours	
Step1.Measure the impedance. (   Z   ,20℃ 120Hz±2HZ) Step2. Measure the impedance at thermal balance after 2 hours. (   Z   , -40℃ 120Hz±2HZ)  Step4.Measure the leakage current at thermal balance after 2 hours.					

NO	ITEM	TEST METHOD	SPECIFICATION
2.6	Surge test	Rated surge voltage shall be applied (switch on) for 30 ± 5 second and then shall be applied (switch off) with discharge for 5.5min at room temperature. This cycle shall be repeated for 1000 cycles. Duration of one cycle is 6 ± 0.5 minutes	<p>Capacitance change: within ± 15% of the initial specified value.</p> <p>Dissipation factor: Less than specified value.</p> <p>Leakage current: Within initial specified value.</p>

### 3. Mechanical characteristics

NO	ITEM	TEST METHOD	SPECIFICATION																
3.1	Lead strength	<p>(A) Tensile strength: wire lead terminal:</p> <table border="1"> <tr> <td>d(mm)</td> <td>≤ 0.5</td> <td>0.5 &lt; d ≤ 0.8</td> <td>0.8 &lt; d ≤ 1.25</td> </tr> <tr> <td>load(kg)</td> <td>0.5</td> <td>1.0</td> <td>2.0</td> </tr> </table> <p>The capacitor shall withstand the constant tensile force specified between the body and each lead for 10 seconds without damage either mechanical or electrical.</p> <p>(B) Bending strength: wire lead terminal:</p> <table border="1"> <tr> <td>d(mm)</td> <td>≤ 0.5</td> <td>0.5 &lt; d ≤ 0.8</td> <td>0.8 &lt; d ≤ 1.25</td> </tr> <tr> <td>load(kg)</td> <td>0.5</td> <td>0.5</td> <td>1.0</td> </tr> </table> <p>with the capacitor in a vertical position apply the load specified axially to each lead. The capacitor shall be rotated slowly from the vertical to the horizontal position, back to the vertical position. The 90° in the opposite direction and back the original position. Performance of capacitor shall not have change and leads shall be undamaged.</p>	d(mm)	≤ 0.5	0.5 < d ≤ 0.8	0.8 < d ≤ 1.25	load(kg)	0.5	1.0	2.0	d(mm)	≤ 0.5	0.5 < d ≤ 0.8	0.8 < d ≤ 1.25	load(kg)	0.5	0.5	1.0	<p>When the capacitance is measured, there shall be no intermittent contacts, or open-or short-circuiting.</p> <p>There shall be no such mechanical damage as terminal damage etc.</p>
d(mm)	≤ 0.5	0.5 < d ≤ 0.8	0.8 < d ≤ 1.25																
load(kg)	0.5	1.0	2.0																
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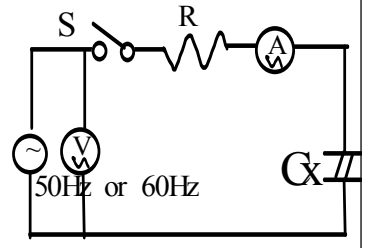
NO.	ITEM	TEST METHOD	SPECIFICATION
3.2	Vibration resistance	The frequency of the vibration shall vary uniformly within the range 10 to 55 Hz with the amplitude of 0.75 mm, completing the cycle in the internal of one minute. The capacitor shall be securely mounted by its leads with hold the body of capacitor. The capacitor shall be vibrated in three mutually perpendicular directions for a period of 2 hours in each direction.	Capacitance change: within $\pm 5\%$ of initial measured value.  Appearance: no abnormal.
3.3	Solder ability	The leads are dipped in the solder bath of Sn at $235^{\circ}\text{C} \pm 5^{\circ}\text{C}$ for $2 \pm 0.5$ seconds. The dipping depth should be set at 1.5~2.0 mm.	The solder alloy shall cover the 95% or more of dipped lead's area.

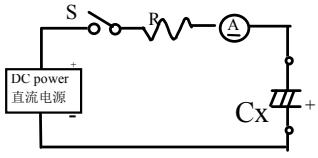
#### 4. Reliability

:

NO	ITEM	TEST METHOD	SPECIFICATIO
4.1	Soldering heat resistance	The leads immerse in the solder bath of Sn at $260^{\circ}\text{C} \pm 5^{\circ}\text{C}$ for $30 \pm 1$ seconds until a distance of 1.5~2.0 mm from the case. After the capacitors are removed from the hot plate and then restored to standard atmospheric conditions for 1 to 2 hours, the capacitors shall meet the right requirements.	No visible damage or leakage of electrolyte.  Capacitance change: Within $\pm 10\%$ of the initial measured value  Tan $\delta$ : Less than specified value.  Leakage current: Less than specified value
4.2	Damp head steady (state)	Subject the capacitor to $40^{\circ}\text{C} \pm 2^{\circ}\text{C}$ and 90% to 95% relative humidity for $240 \pm 8$ hours.	Capacitance change: Within $\pm 15\%$ of the initial measured value Tan $\delta$ : Less than 1.2 specified value. Leakage current: Less than specified value Impedance: Less than 1.2 specified value.

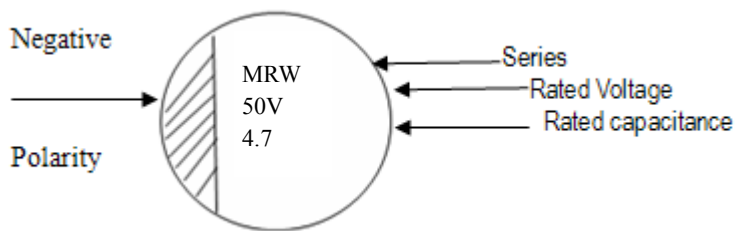


NO.	ITEM	TEST METHOD	SPECIFICATION														
4.3	Load life	The following specifications shall be satisfied when the capacitors are restores to 20°C after the rated voltage is applied for 2,000 hours at 105°C.	Capacitance change: (4-6.3VDC) within±30% of the initial specified value. (10-100VDC) within±25% of the initial specified value. (160-450VDC) within±20% of the initial specified value.														
4.4	Shelf life	The following specifications shall be satisfied when the capacitors are restores to 20°C after exposing them for 500 hours at105°C without voltage applied. The rated voltage shall be applied to the capacitors for a minimum for 30 minutes, at least 24 hours and not more than 48 hours before the measurements	Dissipation factor: (4-100VDC) Less than 300% of the initial specified value. (160-450VDC) Less than 200% of the initial specified value.  Leakage current: The initial specified value or less.														
4.5	Storage at low temperature	The capacitor shall be stored at temperature of -40°C ± 3 °C for 16 hours, during which time be subjected to standard atmospheric conditions for 16 hours or more. After which measurements shall be made.	Capacitance change: Within ±10% of the initial value.  Tan δ :less than specified value  Leakage current: Less than specified value.  Appearance: no Abnormal.														
4.6	Pressure relief	AC test: Applied voltage: AC voltage not exceeding 0.7 times of the rated direct voltage or 250V AC whichever is the lower.  Frequency: 50Hz or 60Hz. Series resistor :refer to the table below	AC test circuit   <table border="1" data-bbox="363 1556 1050 1921"> <thead> <tr> <th>Capacitance(C)</th> <th>Series resistor</th> </tr> </thead> <tbody> <tr> <td><math>C &lt; 1\mu\text{F}</math></td> <td>1000 Ω</td> </tr> <tr> <td><math>1\mu\text{F} &lt; C \leq 10\mu\text{F}</math></td> <td>100 Ω</td> </tr> <tr> <td><math>10\mu\text{F} &lt; C \leq 100\mu\text{F}</math></td> <td>10 Ω</td> </tr> <tr> <td><math>100\mu\text{F} &lt; C \leq 1000\mu\text{F}</math></td> <td>1 Ω</td> </tr> <tr> <td><math>1000\mu\text{F} &lt; C \leq 10000\mu\text{F}</math></td> <td>0.1 Ω</td> </tr> <tr> <td><math>10000\mu\text{F} &lt; C</math></td> <td>*</td> </tr> </tbody> </table> <p>* Resistance is equivalent to half impedance by test frequency.</p> <p>⊗ : AC power S : Switch ⊙ : AC voltage meter ⊙ : AC current meter R : protection resistor CX : testing capacitor</p>	Capacitance(C)	Series resistor	$C < 1\mu\text{F}$	1000 Ω	$1\mu\text{F} < C \leq 10\mu\text{F}$	100 Ω	$10\mu\text{F} < C \leq 100\mu\text{F}$	10 Ω	$100\mu\text{F} < C \leq 1000\mu\text{F}$	1 Ω	$1000\mu\text{F} < C \leq 10000\mu\text{F}$	0.1 Ω	$10000\mu\text{F} < C$	*
Capacitance(C)	Series resistor																
$C < 1\mu\text{F}$	1000 Ω																
$1\mu\text{F} < C \leq 10\mu\text{F}$	100 Ω																
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$100\mu\text{F} < C \leq 1000\mu\text{F}$	1 Ω																
$1000\mu\text{F} < C \leq 10000\mu\text{F}$	0.1 Ω																
$10000\mu\text{F} < C$	*																

NO.	ITEM	TEST METHOD	SPECIFICATION
4.6	Pressure relief	<p>DC test: Send the following electricity while applying the inverse voltage.</p> <p>Where case size:  <math>D \leq 22.4\text{mm}</math>: 1 A d.c. max  <math>D &gt; 22.4\text{mm}</math>: 10 A d.c. max</p> <p>Note: 1. This requirement applies to capacitors with a diameter of 8 mm or more.            2. When the pressure relief device does not open even 30 minutes after commencement of test, the test may be ended.</p>	<p>DC test circuit</p>  <p>S : Switch  <math>\text{Ⓐ}</math> : DC current meter            Cx: testing capacitor</p> <p>The pressure relief device shall open in such a way as to avoid any damage of fire or explosion of capacitor elements (terminal and metal foil etc.) or cover.</p>
4.7	Temp cycle	<p>LSL temperature(°C): <math>-40 \pm 3</math> time(H): 0.5H/timeX5 times    USL temperature(°C): <math>105 \pm 2</math> time(H): 0.5H/timeX5 times    Judgement: CAP: <math>\Delta C/C \leq \pm 10\%</math>, Appearance no Abnormal. No electrolyte leakage.</p>	
4.8	Thermal shock	<p>dry heat temperature (°C): <math>105 \pm 2</math> time(H): 16    moist heat temperature(°C): 55 time(H): 24/            cold temperature(°C): <math>-40 \pm 2</math> time(H): 2/    moist heat temperature(°C): 55 time(H): 24 :            Judgement: CAP, <math>\Delta C/C \leq \pm 10\%</math>, <math>\text{Tan } \delta</math> :Less than 1.2 specified value, Leakage current: Less than specified value. Appearance no Abnormal. No electrolyte leakage.</p>	

5. Marking      For example:

5.1. Marking on capacitors include:



- 1>. Series
- 2>. Rated voltage
- 3>. Rated capacitance (u F)
- 4>. Polarity

5.2. Marking color: Blue



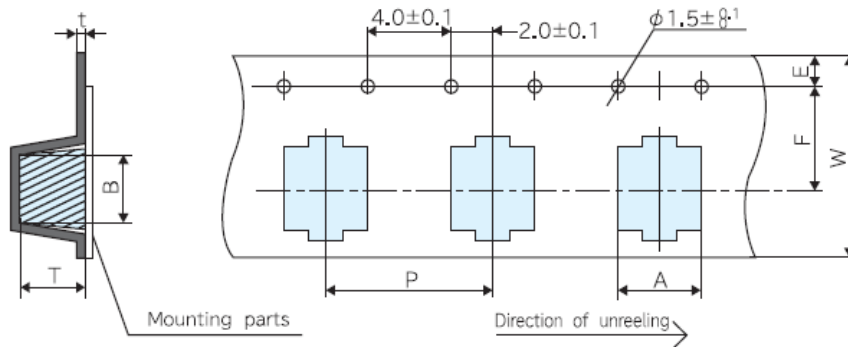
Detergent needing attention

Hydrogen carbide liquid and halogen liquid can cause Aluminum Electrolytic Capacitor to corrode. Some of Safe and Unsafe detergent are as follows

<b>Safe</b>	<b>Unsafe</b>
Dimethylbenzene	1,1,2-trichloroethane
Ethanol	
Butanol	1,2,2- trichloroethane
Methanol	Tetrachloroethylene
Propanol	Chloroform(colorless volatilizable liquid)
Detergent	Dichloromethane
	Trichloroethylene

## Carrier Pack Taping Specification:

Fig.1



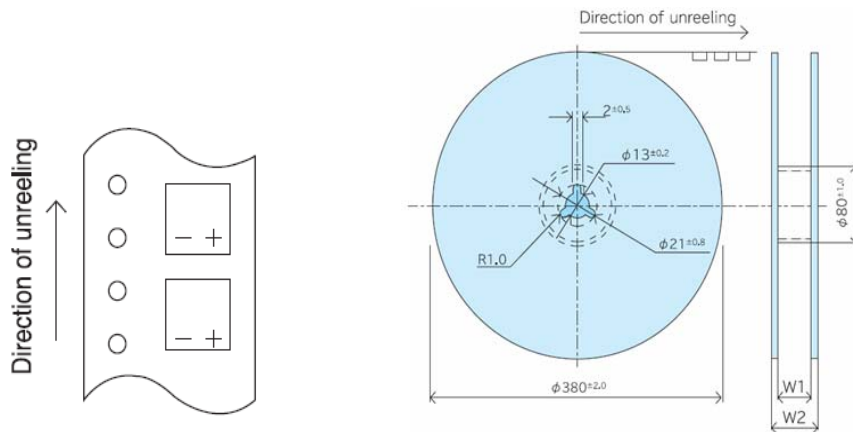
Product size table

Unit: mm

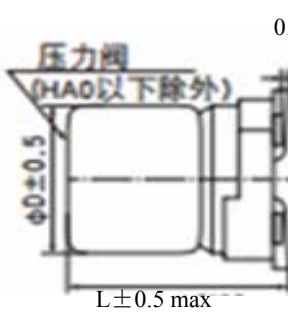
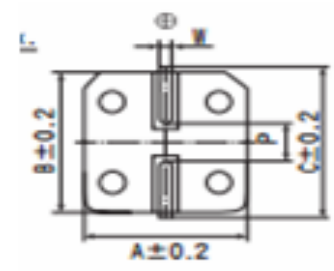
Dimension Size Code	A	B	W	F	E	P	t	T
$\Phi 5X5.7$	$5.7 \pm 0.2$	$5.7 \pm 0.2$	12	5.5	$1.75 \pm 0.1$	12	0.6max	$5.7 \pm 0.2$

Polarity:

Package for SMD Type:



Size Code	W1(mm)	W2(mm)	Q'ty(pcs/reel)	Q'ty(pcs/reel)
$\Phi 5$	$14 \pm 0.5$	$18.5 \pm 1.0$	2000	20000

Surface Mount Aluminum Electrolytic Capacitor Specification																			
Series	MRW	50 V 4.7 $\mu$ F	Part No.	MRW-050V4R7MC057-T/R															
Customer No.			Case size	$\Phi$ D5 X L 5.7															
Specification	Items		Standard																
	Operating temperature range		- 40 ~ + 105 $^{\circ}$ C																
	Capacitance tolerance		$\pm$ 20% ( 20 $^{\circ}$ C , 120Hz )																
	Dissipation factor (MAX)		( Less than ) 12% ( 20 $^{\circ}$ C , 120Hz )																
	Leakage current (MAX)		( Less than ) 3 $\mu$ A ( 20 $^{\circ}$ C 50 V 2 min )																
	Impedance (MAX)		/																
	Ripple current (MAX)		20 mArms ( 120Hz , 105 $^{\circ}$ C )																
	Load life		<b>2000 hrs</b>																
Outline	Marking color		Blue																
	( Dimensions )																		
	<div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;">  <p><math>\Phi</math>D <math>\pm</math>0.5</p> <p>L <math>\pm</math>0.5 max</p> <p>0.3max</p> </div> <div style="text-align: center;">  <p>A <math>\pm</math>0.2</p> <p>B <math>\pm</math>0.2</p> <p>C <math>\pm</math>0.2</p> </div> </div> <p style="text-align: center;">(unit):mm</p> <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse; text-align: center;"> <thead> <tr> <th><math>\Phi</math>D</th> <th>L</th> <th>A</th> <th>B</th> <th>C</th> <th>W</th> <th>P <math>\pm</math>0.2</th> </tr> </thead> <tbody> <tr> <td>5</td> <td>5.7</td> <td>5.3</td> <td>5.3</td> <td>5.9</td> <td>0.5~0.8</td> <td>1.4</td> </tr> </tbody> </table>						$\Phi$ D	L	A	B	C	W	P $\pm$ 0.2	5	5.7	5.3	5.3	5.9	0.5~0.8
$\Phi$ D	L	A	B	C	W	P $\pm$ 0.2													
5	5.7	5.3	5.3	5.9	0.5~0.8	1.4													
Recorder	(The first edition) :2021-7-28																		
Wrote by: JiangYun		Checked by: JiangYuanYuan			Approved by: HuangXueHui														