

**NO.: RD20191011001**

**TO: Ozdisan**

**APPROVAL SHEET No. : T-0621A**

**Series No.: MRA**

**Specification No.:**

# Halogen-Free RoHS

## APPROVAL SHEET

### FOR AL. ELECTROLYTIC CAPACITORS

No.	(Customer No.)	(Koshin Part No.)	Description	ΦD x L
1		MRA-050V102MK165-T/R	50V1000μF	18X16.5

**APPROVED BY:**

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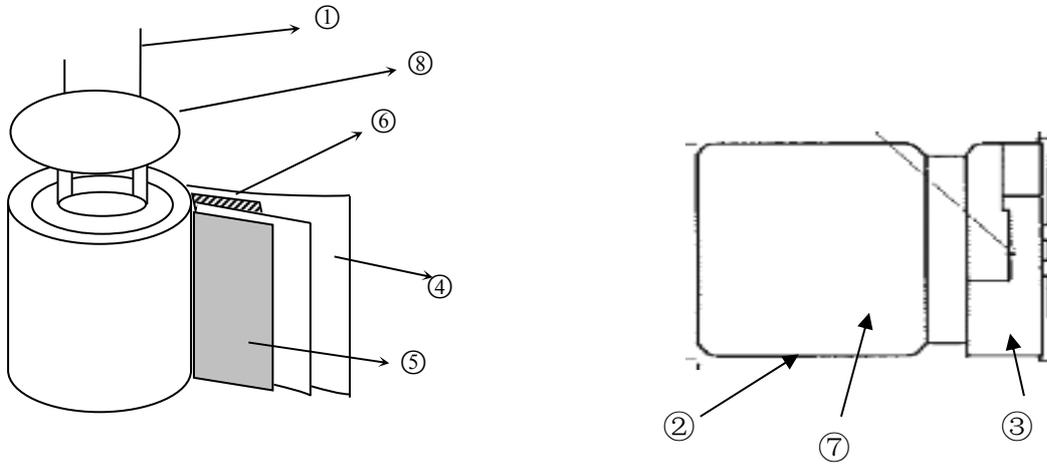
**PLEASE SIGN RETURN US ONE COPY OF THE APPROVAL SHEET.**

**DESIGNED BY: MENGXIAOCONG    CHECKED BY: JUANGYUANYUAN    APPROVED BY: HAUNGXUEHUI**  
**DATE: 2020-7-25**

**KOSHIN**

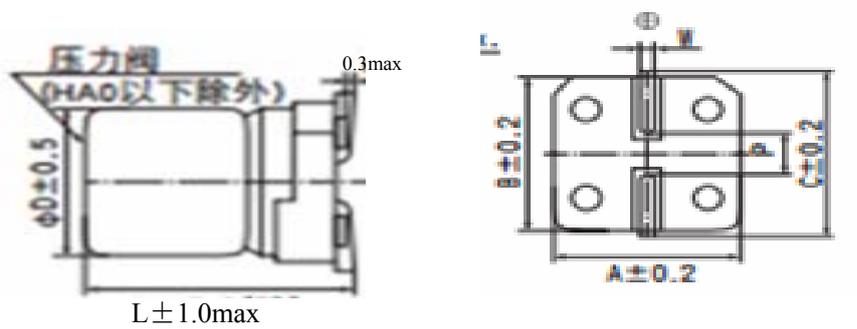
DJS-DS-0013

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 $\pm 0.2$
18	16.5	19.0	19.0	20.0	1.0~1.3	6.5

Coefficient of Frequency for Ripple Current

Frequency (Hz) \ Capacitance( $\mu F$ )	Frequency (Hz)			
	120	1K	10K	100K
1.0 to 4.7	0.35	0.70	0.90	1.0
10 to 100	0.40	0.75	0.90	1.0
150to470	0.50	0.85	0.94	1.0
1000	0.60	0.87	0.95	1.0



## Series MRA Capacitor

### 1. Our part No. :

For example :

<u>MRA</u>	<u>050V</u>	<u>102</u>	<u>M</u>	<u>K165</u>
Series code	rated voltage	capacitance	tolerance	case size symbol
MRA	50v	1000 $\mu$ F	$\pm 20\%$	$\Phi 18 \times 16.5$

### 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	80
Tan $\delta$ (max)	0.30	0.26	0.22	0.16	0.13	0.12	0.10

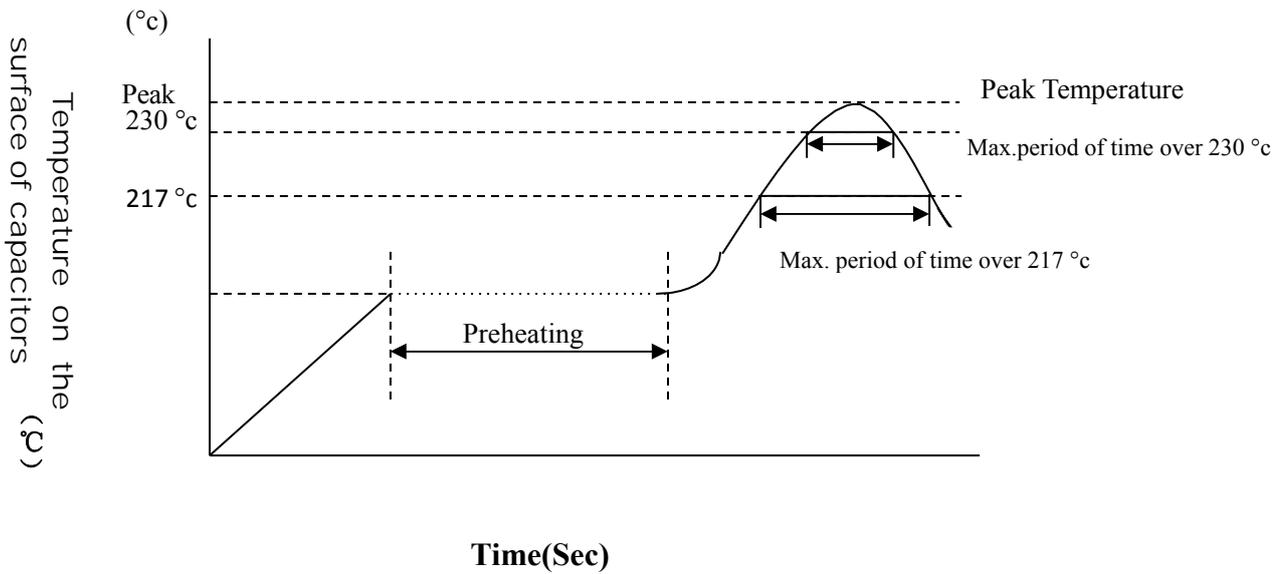
Note: 0.02 is added to each 1000  $\mu$  F increase over 1000  $\mu$  F

##### 3.2.3 Leakage current ( $\mu$ A) :

Rated voltage (VDC)	6.3-80	
Leakage Current ( $\mu$ A)	4X5.4-10X10.5	Less than 0.01CV or 3 $\mu$ A, whichever is large (at 20°C, 2 minutes) 小于或等于 0.01CV 或者 3 $\mu$ A, 取较大值 (在 20°C, 充电 2 分钟后测试)
	12.5X13.5-18X21.5	Less than 0.03CV or 4 $\mu$ A, whichever is large (at 20°C, 2 minutes) 小于或等于 0.03CV 或者 4 $\mu$ A, 取较大值 (在 20°C, 充电 1 分钟后测试)

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.



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

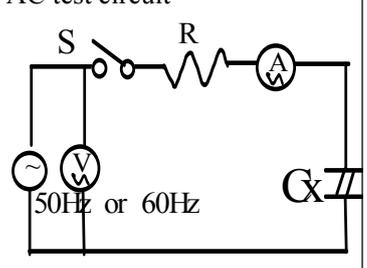
NO	ITEM	TEST METHOD	SPECIFICATION																
3.1	Lead strength	<p>(A) Tensile strength: wire lead terminal:</p> <table border="1" style="margin-left: 20px; border-collapse: collapse; text-align: center;"> <tr> <td style="padding: 2px;">d(mm)</td> <td style="padding: 2px;">≤0.5</td> <td style="padding: 2px;">0.5&lt;d≤0.8</td> <td style="padding: 2px;">0.8&lt;d≤1.25</td> </tr> <tr> <td style="padding: 2px;">load(kg)</td> <td style="padding: 2px;">0.5</td> <td style="padding: 2px;">1.0</td> <td style="padding: 2px;">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" style="margin-left: 20px; border-collapse: collapse; text-align: center;"> <tr> <td style="padding: 2px;">d(mm)</td> <td style="padding: 2px;">≤0.5</td> <td style="padding: 2px;">0.5&lt;d≤0.8</td> <td style="padding: 2px;">0.8&lt;d≤1.25</td> </tr> <tr> <td style="padding: 2px;">load(kg)</td> <td style="padding: 2px;">0.5</td> <td style="padding: 2px;">0.5</td> <td style="padding: 2px;">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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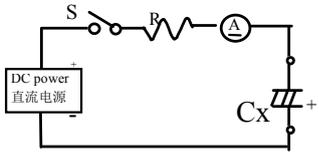
NO.	ITEM	TEST METHOD	SPECIFICATION
3.2	Vibration resistance	The frequency of the vibration shall vary uniformly within the range 10 to 55 Hz with the amplitude of 0.75 mm, completing the cycle in the internal of one minute. The capacitor shall be securely mounted by its leads with hold the body of capacitor. 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

:

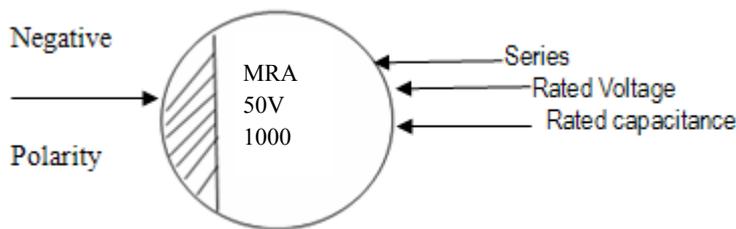
NO	ITEM	TEST METHOD	SPECIFICATIO
4.1	Soldering heat resistance	The leads immerse in the solder bath of Sn at $260^{\circ}\text{C} \pm 5^{\circ}\text{C}$ for $30 \pm 1$ seconds until a distance of 1.5~2.0 mm from the case. After the capacitors are removed from the hot plate and then restored to standard 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	After 5000 hours continuous application of DC rated working voltage and rated ripple current at $105^{\circ}\text{C}\pm 2^{\circ}\text{C}$ , Measurements shall be performed after 16 hours exposed at room temperature.	<p>Capacitance change: within <math>\pm 30\%</math> of the initial specified value.</p> <p>Dissipation factor: Less than 300% of the initial specified value.</p> <p>Leakage current: The initial specified value or less.</p>														
4.4	Shelf life	The following specifications shall be satisfied when the capacitors are restores to $20^{\circ}\text{C}$ after exposing them for 1,000 hours at $105^{\circ}\text{C}\pm 2^{\circ}\text{C}$ 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.	<p>Capacitance change: Within <math>\pm 10\%</math> of the initial value.</p> <p>Tan <math>\delta</math> :less than specified value</p> <p>Leakage current: Less than specified value.</p> <p>Appearance: no Abnormal.</p>														
4.5	Storage at low temperature	The capacitor shall be stored at temperature of $-40^{\circ}\text{C} \pm 3^{\circ}\text{C}$ for 16 hours, during which time be subjected to standard atmospheric conditions for 16 hours or more. After which measurements shall be made.	<p>Capacitance change: Within <math>\pm 10\%</math> of the initial value.</p> <p>Tan <math>\delta</math> :less than specified value</p> <p>Leakage current: Less than specified value.</p> <p>Appearance: no Abnormal.</p>														
4.6	Pressure relief	<p>AC test: Applied voltage: AC voltage not exceeding 0.7 times of the rated direct voltage or 250V AC whichever is the lower.</p> <p>Frequency: 50Hz or 60Hz. Series resistor :refer to the table below</p> <table border="1" style="margin: 10px auto; border-collapse: collapse;"> <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 <math>\Omega</math></td> </tr> <tr> <td><math>1\mu\text{F} &lt; C \leq 10\mu\text{F}</math></td> <td>100 <math>\Omega</math></td> </tr> <tr> <td><math>10\mu\text{F} &lt; C \leq 100\mu\text{F}</math></td> <td>10 <math>\Omega</math></td> </tr> <tr> <td><math>100\mu\text{F} &lt; C \leq 1000\mu\text{F}</math></td> <td>1 <math>\Omega</math></td> </tr> <tr> <td><math>1000\mu\text{F} &lt; C \leq 10000\mu\text{F}</math></td> <td>0.1 <math>\Omega</math></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>	Capacitance(C)	Series resistor	$C < 1\mu\text{F}$	1000 $\Omega$	$1\mu\text{F} < C \leq 10\mu\text{F}$	100 $\Omega$	$10\mu\text{F} < C \leq 100\mu\text{F}$	10 $\Omega$	$100\mu\text{F} < C \leq 1000\mu\text{F}$	1 $\Omega$	$1000\mu\text{F} < C \leq 10000\mu\text{F}$	0.1 $\Omega$	$10000\mu\text{F} < C$	*	<p>AC test circuit</p>  <p> <math>\sim</math> : AC power  S : Switch  <math>\odot</math> : AC voltage meter  <math>\odot</math> : AC current meter  R : protection resistor  CX : testing capacitor </p>
Capacitance(C)	Series resistor																
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$10000\mu\text{F} < C$	*																

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            Ⓐ : 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>, Tan <math>\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	1,2,2- trichloroethane
Butanol	Tetrachloroethylene
Methanol	Chloroform(colorless volatilizable liquid)
Propanol	Dichloromethane
Detergent	Trichloroethylene

## Carrier Pack Taping Specification:

Fig.1

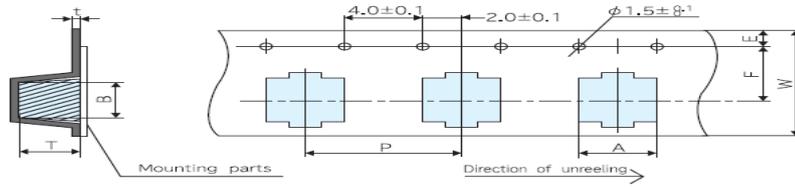
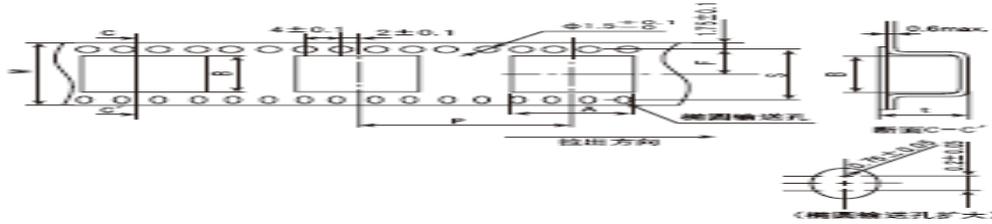


Fig.2



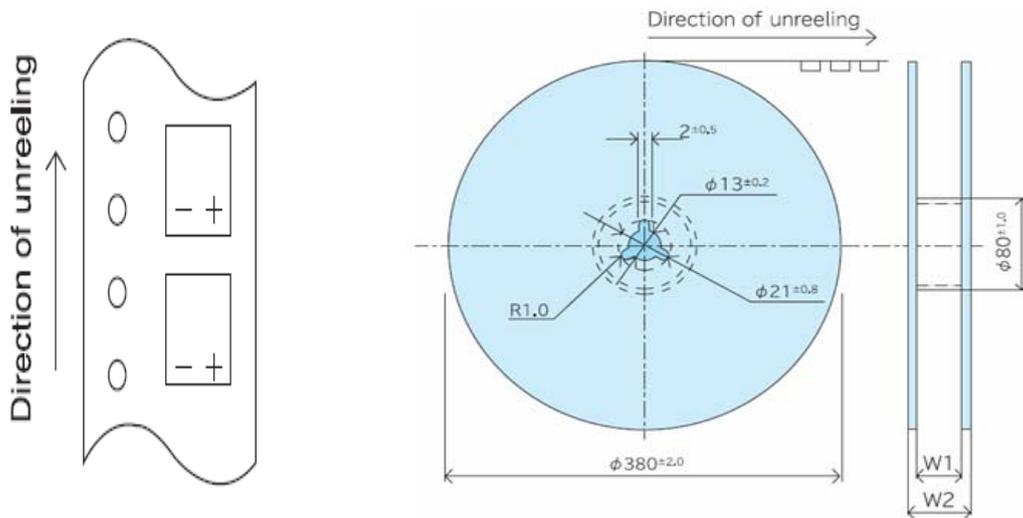
Product size table

Unit: mm

Dimension Size Code	A	B	W	F	E	P	t	S	T	Fig.
Φ18X16.5	19.5±0.2	19.5±0.2	44	20.2	1.75±0.1	32	0.5max	-	17.5±0.2	2

Polarity:

Package for SMD Type:



Size Code	W1(mm)	W2(mm)	Qty/Reel
Φ 18	46±0.5	52.0±1.0	125pcs

Surface Mount Aluminum Electrolytic Capacitor Specification																			
Series	MRA	50 V 1000 $\mu$ F	Part No.	MRA-050V102MK165-T/R															
Customer No.			Case size	$\Phi$ D18 X L 16.5															
Specification	Items		Standard																
	Operating temperature range		- 40 ~ + 105 $^{\circ}$ C																
	Capacitance tolerance		$\pm$ 20% ( 20 $^{\circ}$ C , 120Hz )																
	Dissipation factor (MAX)		( Less than ) 18% ( 20 $^{\circ}$ C , 120Hz )																
	Leakage current (MAX)		( Less than ) 1500 $\mu$ A ( 20 $^{\circ}$ C 50 V 1 min )																
	Impedance (MAX)		0.073 $\Omega$ ( 100KHz , 20 $^{\circ}$ C )																
	Ripple current (MAX)		1610mArms ( 100KHz , 105 $^{\circ}$ C )																
	Load life		<b>5000 hrs</b>																
Outline	Marking color		Blue																
	( Dimensions )																		
	<p style="text-align: center;">(unit):mm</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <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 style="text-align: center;">18</td> <td style="text-align: center;">16.5</td> <td style="text-align: center;">19.0</td> <td style="text-align: center;">19.0</td> <td style="text-align: center;">20.0</td> <td style="text-align: center;">1.0~1.3</td> <td style="text-align: center;">6.5</td> </tr> </tbody> </table>						$\Phi$ D	L	A	B	C	W	P $\pm$ 0.2	18	16.5	19.0	19.0	20.0	1.0~1.3
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Recorder	(The first edition) :2020-7-25																		
Wrote by: MengXiaoCong		Checked by: JiangYuanYuan		Approved by: HuangXueHui															