

AR5K SERIES

5000 HOURS LONG LIFE TYPE

ALUMINUM SOLID ELECTROLYTIC CAPACITOR ▲ THT type

Very high ripple current up to 6.1A at 100kHz/105°C

Ultra-low ESR up to 7mΩ at 100kHz/20°C

Low drift and stable electrical characteristics over lifetime

No liquid electrolyte ▲ No dry-out effect

Long lifetime with 5000 hours at 105°C

SPECIFICATION

Item		Characteristics
Category Temperature Range		-55°C to +105°C
Rated Voltage Range	V_R	2.5V _{DC} to 16V _{DC}
Rated Capacitance Range	C_R	10μF to 1200μF
Capacitance Tolerance ▪ At 20°C; 120Hz	ΔC	±20%
Surge Voltage ▪ At 105°C	V_S	$V_S = 1.15 \times V_R$
Dissipation Factor ▪ At 20°C; 120Hz	$\tan \delta$	0.1 max.
Leakage Current ▪ At 20°C; after 2min.	I_{LEAK}	Shall not exceed values in the electrical characteristics
Endurance	Test	105°C ▲ 5000hrs ▲ V_R applied
	Appearance	No significant damage
	$\Delta C/C_R$	≤ ±20% of the initial value
	$\tan \delta$	≤ 150% of the initial specified value
	ESR	≤ 150% of the initial specified value
	I_{LEAK}	≤ The initial specified value
Damp Heat (Steady State)	Test	60°C ▲ 90 to 95% RH ▲ 1000hrs ▲ No voltage applied
	Appearance	No significant damage
	$\Delta C/C_R$	≤ ±20% of the initial value
	$\tan \delta$	≤ 150% of the initial specified value
	ESR	≤ 150% of the initial specified value
	I_{LEAK}	≤ The initial specified value
Surge Voltage	Test	1000 cycles and each one includes charge with V_S specified at 105°C for 0.5min through a protective resistor ($R=1k\Omega$) and discharge for 5.5min.
	Appearance	No significant damage
	$\Delta C/C_R$	≤ ±20% of the initial value
	$\tan \delta$	≤ 150% of the initial specified value
	ESR	≤ 150% of the initial specified value
	I_{LEAK}	≤ The initial specified value

ELECTRICAL CHARACTERISTICS

V_{RDC} (V)	C_R (μF)	Size Code	Dimensions (mm)				I_{LEAK} 20°C 2min (μA)	ESR 20°C 100kHz (m Ω)	I_R 105°C 100kHz (mA)	Part Number ^{Note 1}
			D	L	F	ϕd				
2.5	390	05X8	5	8	2	0.5	500	7	4180	2R5AR5K391M05X8CT
	560	05X8	5	8	2	0.5	500	7	4180	2R5AR5K561M05X8CT
	560	06X8	6.3	8	2.5	0.6	500	7	5000	2R5AR5K561M06X8CT
	820	06X8	6.3	8	2.5	0.6	500	7	5000	2R5AR5K821M06X8CT
	820	08X8	8	8	3.5	0.6	500	7	6100	2R5AR5K821M08X8CT
	1000	08X8	8	8	3.5	0.6	500	7	6100	2R5AR5K102M08X8CT
3	820	06X8	6.3	8	2.5	0.6	500	7	5000	3R0AR5K821M06X8CT
4	560	06X8	6.3	8	2.5	0.6	500	7	5000	4R0AR5K561M06X8CT
6.3	100	06X5	6.3	5	2.5	0.45	126	35	2100	6R3AR5K101M06X5CT
	470	06X8	6.3	8	2.5	0.6	592	8	4700	6R3AR5K471M06X8CT
	560	06X8	6.3	8	2.5	0.6	705	8	4700	6R3AR5K561M06X8CT
	560	08X8	8	8	3.5	0.6	705	8	5700	6R3AR5K561M08X8CT
	820	06X8	6.3	8	2.5	0.6	1033	8	4700	6R3AR5K821M06X8CT
	820	08X8	8	8	3.5	0.6	1033	8	5700	6R3AR5K821M08X8CT
10	10	04X5	4	5	1.5	0.45	300	80	700	100AR5K100M04X5C
16	100	06X5	6.3	5	2.5	0.45	320	24	2490	160AR5K101M06X5CT
	100	06X8	6.3	8	2.5	0.6	320	25	2820	160AR5K101M06X8CT
	270	06X8	6.3	8	2.5	0.6	864	10	5000	160AR5K271M06X8CT
	270	08X8	8	8	3.5	0.6	864	10	5000	160AR5K271M08X8CT
	270	08A2	8	12	3.5	0.6	864	10	5230	160AR5K271M08A2CT
	470	08X8	8	8	3.5	0.6	1505	10	5000	160AR5K471M08X8CT
	470	08A2	8	12	3.5	0.6	1505	10	5230	160AR5K471M08A2CT
	470	10A2	10	12	5	0.6	1505	10	6100	160AR5K471M10A2CT
	680	08A2	8	12	3.5	0.6	2176	10	5230	160AR5K681M08A2CT
	820	08A2	8	12	3.5	0.6	2624	12	4950	160AR5K821M08A2CT
	1000	10A2	10	12	5	0.6	3200	12	5400	160AR5K102M10A2CT
	1200	10A2	10	12	5	0.6	3840	12	5400	160AR5K122M10A2CT

Notes

1 Part number shows the standard Tape/Ammo version. Size code 04X5 only in bulk package available.

APPLICATIONS

Input/Output Filter in DC/DC Converter	High Frequency Applications	Equipment with High Expected Life	Server & Industrial PC	Voltage Stabilizing in LED Panels
				

REFERENCE DATA ▲ 3R0AR5K821M06X8CT ▲ 820 μ F ▲ 3V ▲ 6.3 x 8.0mm

Fig. 1 • Frequency Characteristics of ESR & |Z|

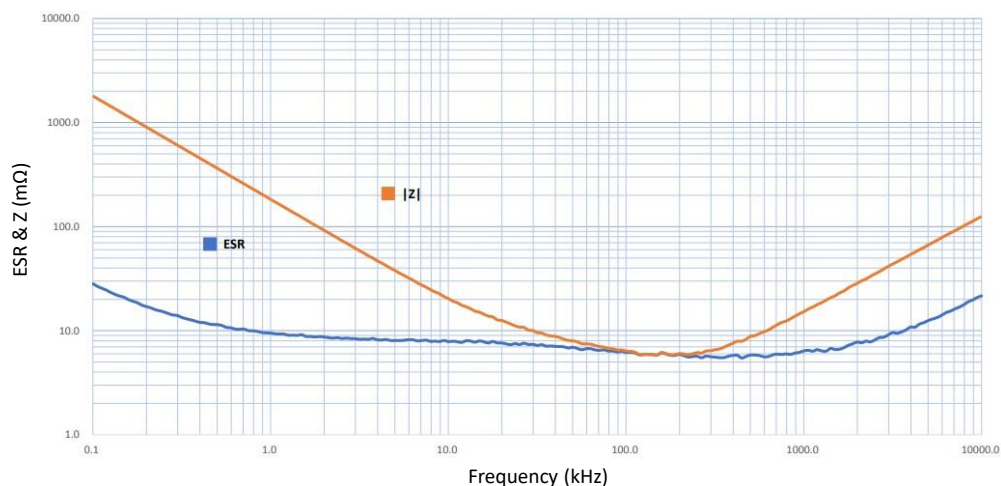


Fig. 2 • Frequency Characteristics of C (μ F)

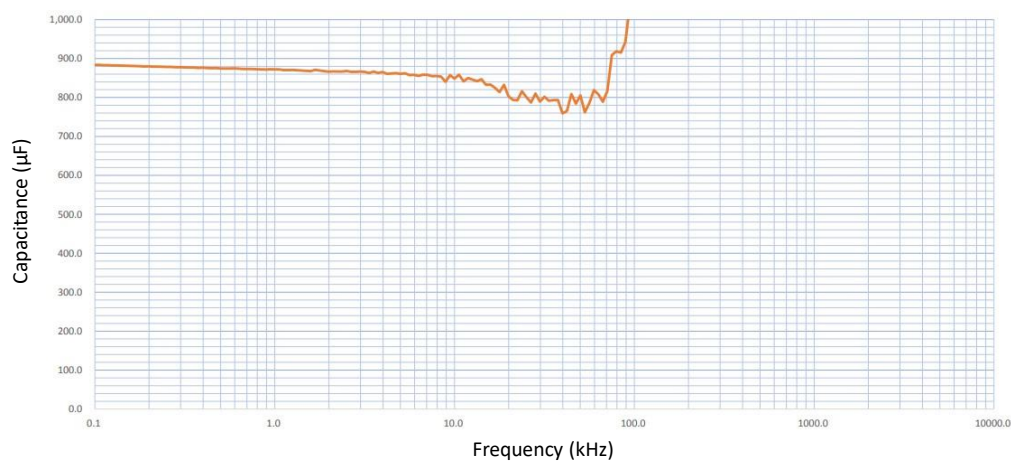
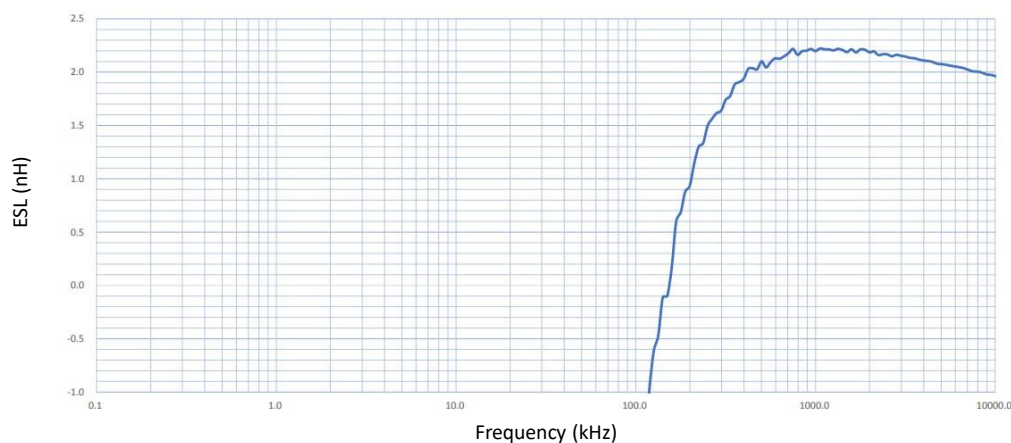


Fig. 3 • Frequency Characteristics of ESL (nH)



REFERENCE DATA ▲ 6R3AR5K561M06X8CT ▲ 560 μ F ▲ 6.3V ▲ 6.3 x 8.0mm

Fig. 4 ▪ Frequency Characteristics of ESR & |Z|

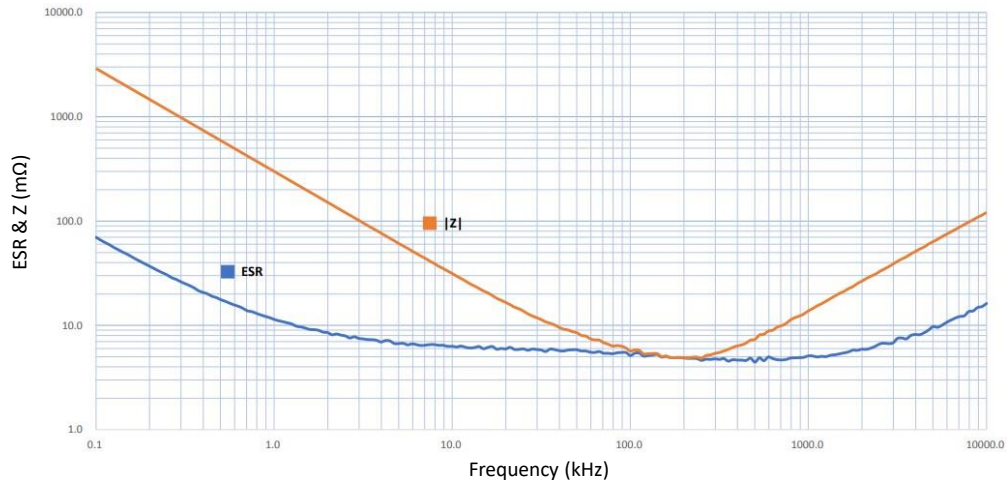


Fig. 5 ▪ Frequency Characteristics of C (μ F)

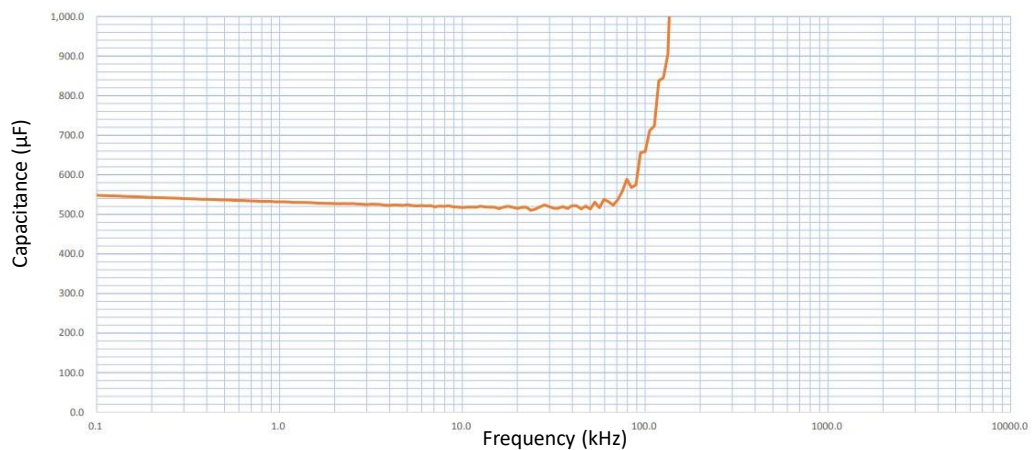
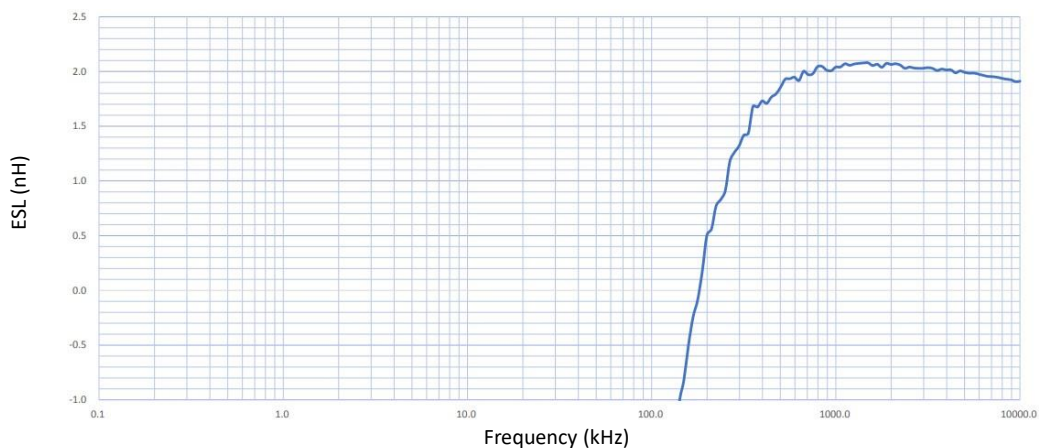


Fig. 6 ▪ Frequency Characteristics of ESL (nH)



REFERENCE DATA ▲ 160AR5K271M06X8CT ▲ 270 μ F ▲ 16V ▲ 6.3 x 8.0mm

Fig. 7 • Frequency Characteristics of ESR & |Z|

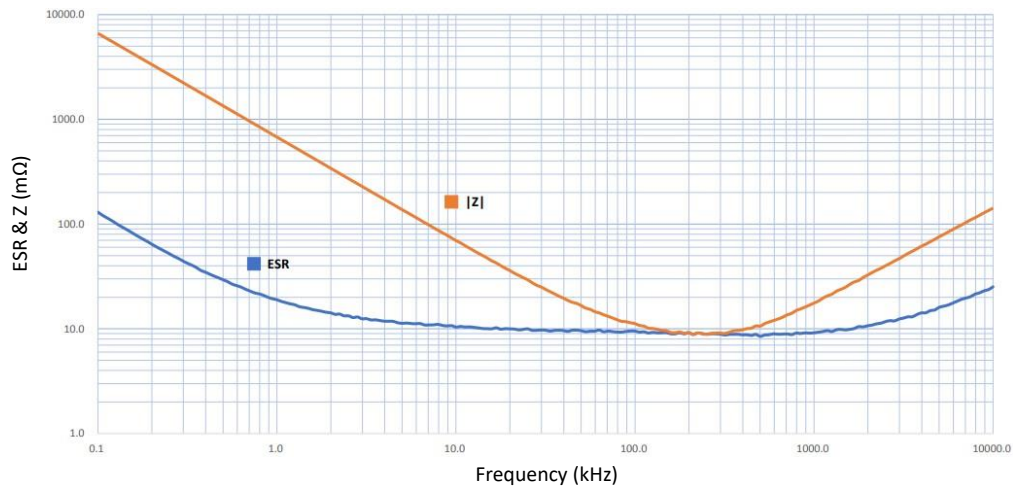


Fig. 8 • Frequency Characteristics of C (μ F)

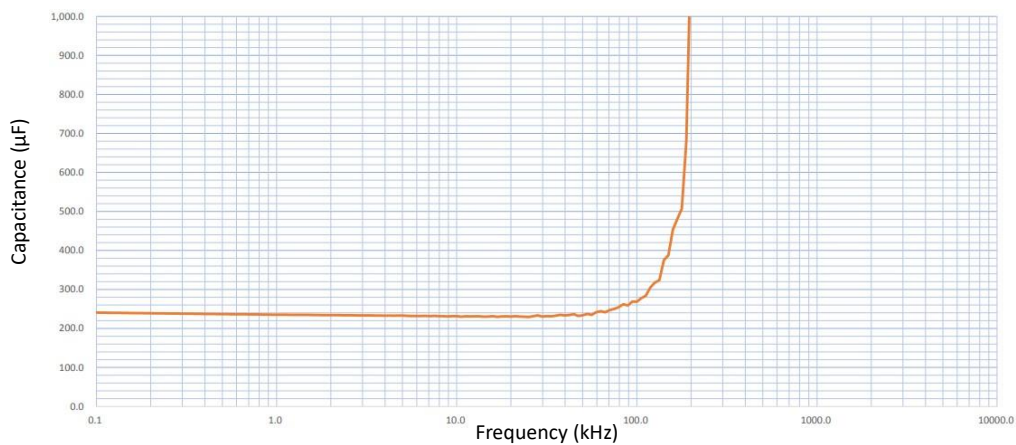
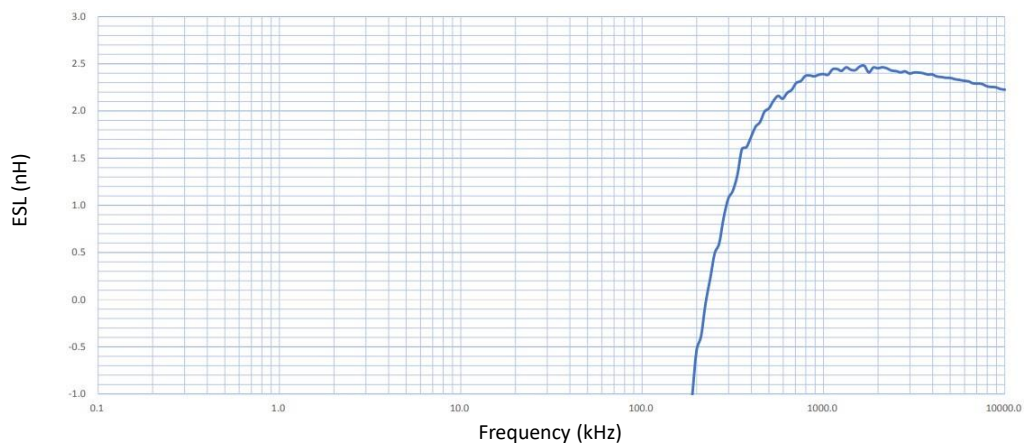


Fig. 9 • Frequency Characteristics of ESL (nH)



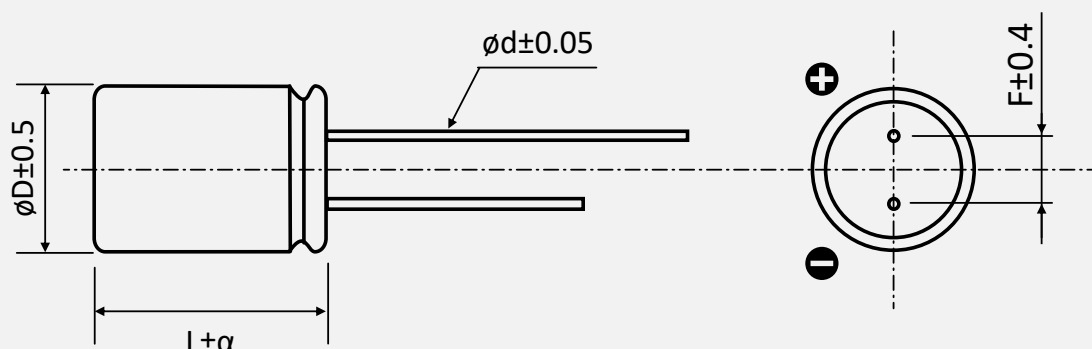
FREQUENCY CORRECTION FACTOR

Frequency Correction Factor of Permissible Ripple Current

Frequency	$120\text{Hz} \leq f < 1\text{kHz}$	$1\text{kHz} \leq f < 10\text{kHz}$	$10\text{kHz} \leq f < 50\text{kHz}$	$50\text{kHz} \leq f < 100\text{kHz}$	$100\text{kHz} \leq f < 500\text{kHz}$
Coefficient	0.05	0.3	0.7	0.85	1

PACKAGE OUTLINE ▲ All dimensions in mm

Dimensions



Size Code	$\varnothing D \pm 0.5 \text{ max.}$	L	α	$\varnothing d \pm 0.05$	$F \pm 0.4$
04X5	4.0	5.0	-0.5 to +1.0	0.45	1.5
05X8	5.0	8.0	-0.5 to +1.0	0.50	2.0
06X5	6.3	5.0	-0.5 to +1.0	0.45	2.5
06X8	6.3	8.0	-0.5 to +1.0	0.60	2.5
08X8	8.0	8.0	-0.5 to +1.0	0.60	3.5
08A2	8.0	12.0	-0.5 to +1.0	0.60	3.5
10A2	10.0	12.0	-0.5 to +1.0	0.60	5.0

PRODUCT CODE

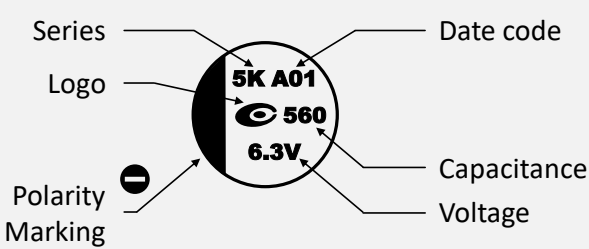
Example: AR5K series ▲ 560μF ▲ 6.3V_{DC} ▲ ±20% ▲ D=6.3mm ▲ L=8mm ▲ F=2.5mm ▲ Tape/Ammo

6R3		AR5K		561		M		06X8		CT	
Rated Voltage (V _{DC})		Series		Capacitance Code ^{Note 1} (μF)		Capacitance Tolerance (%)		Package Code		Marking & Packaging Type	
Code	VDC	Code	Series	Code	μF	Code	Tol.	Code	D x L	Code	Type
2R5	2.5	AR5K	AR5K	100	10	M	±20	04X5	4.0 x 5.0	C Blank T	Grey Marking Bulk Tape/Ammo
3R0	3.0			101	100			05X8	5.0 x 8.0		
4R0	4.0			471	470			06X5	6.3 x 5.0		
6R3	6.3			102	1000			06X8	6.3 x 8.0		
100	10.0			122	1200			08X8	8.0 x 8.0		
160	16.0							08A2	8.0 x 12.0		
								10A2	10.0 x 12.0		

Note:

- Capacitance code expressed in μF. The first two digits represent significant figures. The last digit specifies the total number of zeros to be added.

PRODUCT MARKING

Marking	Details	
	Marking	Description
	Logo	Manufacturer Logo
	Series	5K = AR5K
	Date code	See date code table
	Capacitance	560 = 560μF
	Voltage	6.3V = 6.3V
		Polarity (-) marking

DATE CODE

Example:

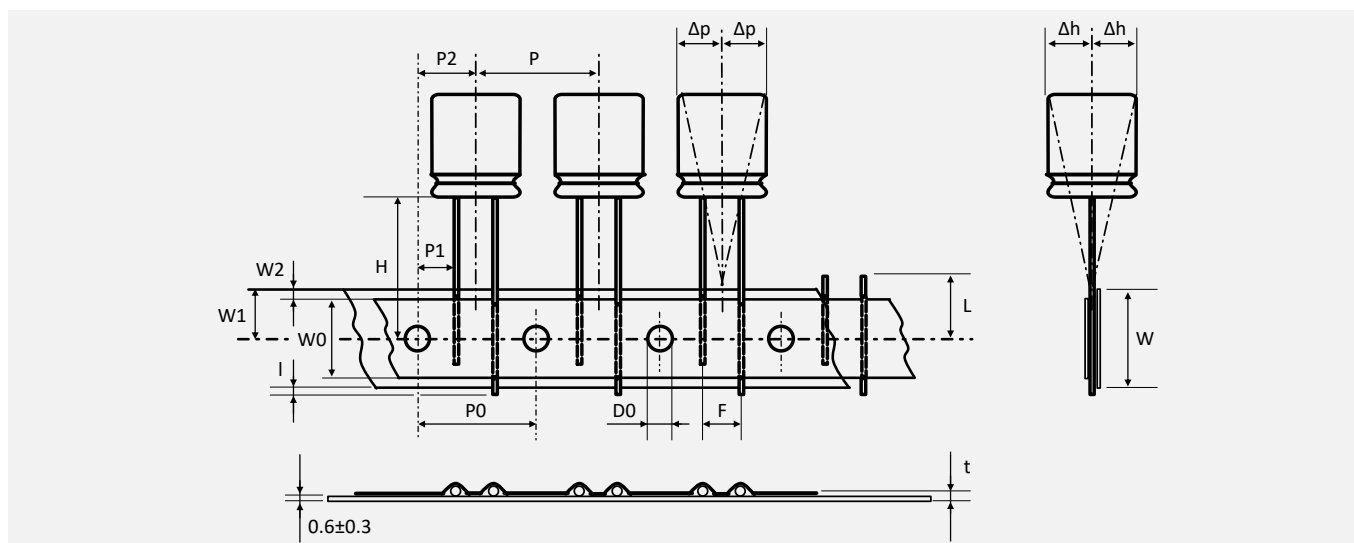
Date code

A01: A01 = 1st week of 2020

A		01	
Year		Week	
A	2019	01	1 st
B	2020	02	2 nd
...	...	...	...
Z	2030	53	53 rd

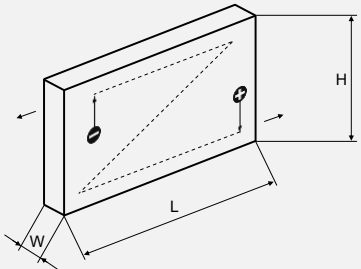
TAPING SPECIFICATION ▲ THT TYPE

Dimensions in mm



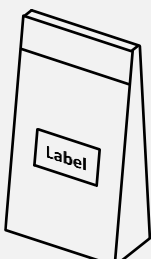
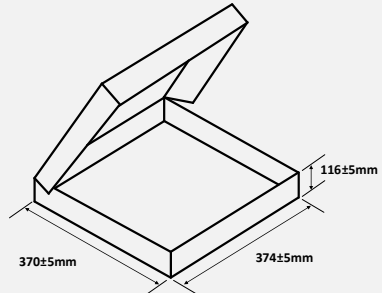
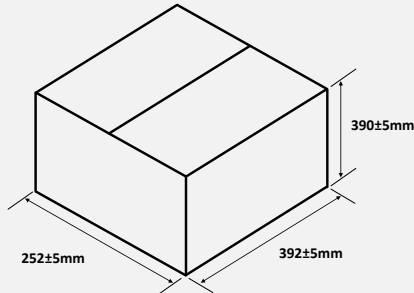
Size Code	F	P	P0	P1	P2	Δp	Δh	W	W0	W1	W2	H	ØD0	t	I	L
Tolerance	$\begin{matrix} +0.8 \\ -0.2 \end{matrix}$	±1.0	±0.2	±0.5	±1.0	±1.0	±1.0	±0.5	Min	±0.5	Max	±0.75	±0.2	±0.3	Max	max
05X8	2	12.7	12.7	5.1	6.35	0	0	18	9.5	9	2.5	18.5	4	0.6	0	11
06X5	2.5	12.7	12.7	5.1	6.35	0	0	18	9.5	9	2.5	18.5	4	0.6	0	11
06X8	2.5	12.7	12.7	5.1	6.35	0	0	18	9.5	9	2.5	18.5	4	0.6	0	11
08X8	3.5	12.7	12.7	4.6	6.35	0	0	18	9.5	9	2.5	18.5	4	0.6	0	11
08A2	3.5	12.7	12.7	4.6	6.35	0	0	18	9.5	9	2.5	18.5	4	0.6	0	11
10A2	5	12.7	12.7	3.85	6.35	0	0	18	9.5	9	2.5	18.5	4	0.6	0	11

AMMO PACKAGING QUANTITIES ▲ THT TYPE

Carton	Diameter (mm)	Length (mm)	Size Code	L max. (mm)	W max. (mm)	H max. (mm)	Qty per carton (pcs)
	Ø 5.0	8.0	05X8	335	42	260	2000
	Ø 6.3	5.0	06X5	335	39	260	2000
	Ø 6.3	8.0	06X8	335	42	260	2000
	Ø 8.0	8.0	08X8	335	42	260	1200
	Ø 8.0	12.0	08A2	335	45	260	1200
	Ø 10.0	12.0	10A2	335	45	260	650

BULK PACKAGING ▲ THT TYPE

Code	Capacitor Dimensions		Quantity / Bag	Quantity / Inner Box		Quantity outer box	
	ØD	L					
04X5	4.0	5.0	1 000 pcs	12 bags	12 000 pcs	5 inner boxes	60 000 pcs
05X8	5.0	8.0	500 pcs	6 bags	3 000 pcs	5 inner boxes	15 000 pcs
06X5	6.3	5.0	500 pcs	6 bags	3 000 pcs	5 inner boxes	15 000 pcs
06X8	6.3	8.0	500 pcs	6 bags	3 000 pcs	5 inner boxes	15 000 pcs
08X8	8.0	8.0	500 pcs	4 bags	2 000 pcs	5 inner boxes	10 000 pcs
08A2	8.0	12.0	400 pcs	4 bags	1 600 pcs	5 inner boxes	8 000 pcs
10A2	10.0	12.0	300 pcs	4 bags	1 200 pcs	5 inner boxes	6 000 pcs

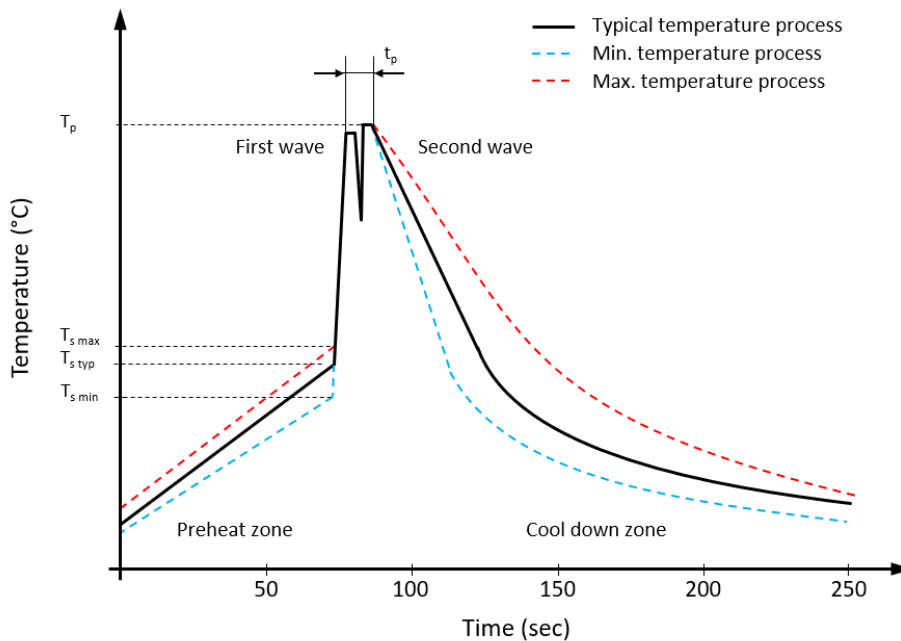
Bag	Inner Box	Outer Carton
 Label content Size L x W = 70mm x 50mm P/N: Customer part number R-ID: CCF1001290001 CCF: Fix 10: e.g., 2010 01: e.g., January 29: e.g., Day 29th 0001: Running number DESC: Customer specification SPEC: Manufacturer part number COO: Country of origin MAKER: Manufacturer VENDOR: Manufacturer DC: Date code LOT/NO: Production lot	 Label on the inner box Size L x W = 70mm x 35mm P/N: Customer part number DESC: Customer specification SPEC: Manufacturer part number COO: Country of origin QTY: Quantity (pcs) MAKER: Manufacturer VENDOR: Manufacturer DC: Date code LOT/NO: Production lot	 Label on the outer carton Size L x W = 100mm x 90mm CUSTOMER: Customer name P/O: Customer order number P/N: Customer part number DESCRIPTION: Manufacturer part number QTY: Quantity (pcs) and shipping date COO: Country of origin

BULK PACKAGING ▲ THT TYPE WITH CUTTED LEADS NOTE 1

Code	Capacitor Dimensions		Quantity / Bag	Quantity / Inner Box		Quantity outer box	
	ØD	L					
04X5	4.0	5.0	1 000 pcs	24 bags	24 000 pcs	5 inner boxes	120 000 pcs
05X8	5.0	8.0	500 pcs	8 bags	4 000 pcs	5 inner boxes	20 000 pcs
06X5	6.3	5.0	500 pcs	12 bags	6 000 pcs	5 inner boxes	30 000 pcs
06X8	6.3	8.0	500 pcs	8 bags	4 000 pcs	5 inner boxes	20 000 pcs
08X8	8.0	8.0	500 pcs	6 bags	3 000 pcs	5 inner boxes	15 000 pcs
08A2	8.0	12.0	500 pcs	4 bags	2 000 pcs	5 inner boxes	10 000 pcs
10A2	10.0	12.0	500 pcs	4 bags	2 000 pcs	5 inner boxes	10 000 pcs

Note: 1 Please consult MGT for possible lead length, drawing and ordering code.

RECOMMENDED WAVE SOLDERING PROFILE ▲ THT PACKAGE



Profile Features		Value ▲ Sn-Pb Assembly	Value ▲ Pb-free Assembly
Preheat temperature min.	$T_{s \min}$	100 °C	100 °C
Preheat temperature typical	$T_{s \text{ typ}}$	120 °C	120 °C
Preheat temperature max.	$T_{s \max}$	130 °C	130 °C
Preheat time t_s from $T_{s \min}$ to $T_{s \max}$	t_s	70 seconds	70 seconds
Peak temperature	T_p	235 °C to 260 °C	245 °C to 260 °C
Time of actual peak temperature	t_p	Max. 10 seconds Max. 5 second each wave	Max. 10 seconds Max. 5 second each wave
Ramp-down rate min.		~ 2 °C/second	~ 2 °C/second
Ramp-down rate typical		~ 3.5 °C/second	~ 3.5 °C/second
Ramp-down rate max.		~ 5 °C/second	~ 5 °C/second
Time 25°C to 25°C		4 minutes	4 minutes

SOLDERING SUGGESTIONS

When solder a capacitor, heat in soldering is conducted to the element of the capacitor from wire lead and an enclosure, and hence it should be noted that soldering under high temperature and a long period may cause deterioration of breakdown of capacitors. Be sure to solder within the recommended temperature condition range.

HAND SOLDERING

- Soldering iron top temperature: $\leq 350^\circ\text{C}$
- Soldering time: $\leq 3\text{sec}$

If re-work or dipping twice in necessary, it should be done after the capacitor returned to the normal temperature.

Suggestion time is 24 hours.

THT capacitors are not suitable for reflow soldering.

When SMD components are used together with film capacitor, the film capacitor should not pass into the SMD adhesive curing oven. The film capacitor should be assembled after the SMD process.

REVISION TABLE

Revision	Date	Status	Notes
001	01/10/2021	Initial release	Initial publication

DISCLAIMER

Except for the written expressed warranties, MGT does not implicitly, by assumption or whatever else, warrant, undertake, promise any other warranty or guaranty for any MGT product.

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It is subject to the user's duty of care to design and validate his products in such a way that appropriate measures are taken, such as protective circuits or redundant systems to ensure the safety standards required in the application.

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