



ARHE SERIES

1 000 HOURS 125°C TYPE

ALUMINUM SOLID ELECTROLYTIC CAPACITOR • THT type

High ripple current up to 2.1A at 100kHz/125°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

High temperature approved with 1 000 hours at 125°C

SPECIFICATION

Item		Characteristics
Category Temperature Range		-55°C to +125°C
Rated Voltage Range	V_R	2.5V _{DC} to 63V _{DC}
Rated Capacitance Range	C_R	47μF to 1500μF
Capacitance Tolerance • At 20°C; 120Hz	ΔC	±20%
Surge Voltage • At 125°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	125°C ▲ 1000hrs ▲ 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
	$\tan \delta$	≤ 200% of the initial specified value
	ESR	≤ 200% 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 125°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 (mΩ)	I _R 125°C 100kHz (mA)	Part Number ^{Note 1}
			D	L	P	Ød				
2.5	820	06X8	6.3	8	2.5	0.6	500	7	2000	2R5ARHE821M06X8T
	1200	06A0	6.3	10	2.5	0.6	600	7	2080	2R5ARHE122M06A0T
4	560	06X8	6.3	8	2.5	0.6	500	7	2000	4R0ARHE561M06X8T
6.3	560	06X8	6.3	8	2.5	0.6	705	10	1600	6R3ARHE561M06X8T
16	100	06X8	6.3	8	2.5	0.6	320	25	1000	160ARHE101M06X8T
	270	06X8	6.3	8	2.5	0.6	864	16	1280	160ARHE271M06X8T
	270	08X8	8	8	3.5	0.6	864	16	1520	160ARHE271M08X8T
	270	08A2	8	12	3.5	0.6	864	14	1800	160ARHE271M08A2T
	1000	10A2	10	12	5	0.6	3200	12	2160	160ARHE102M10A2T
25	100	06X8	6.3	8	2.5	0.6	500	20	1120	250ARHE101M06X8T
	180	08A2	8	12	3.5	0.6	900	16	1720	250ARHE181M08A2T
	220	08A2	8	12	3.5	0.6	1100	16	1720	250ARHE221M08A2T
	330	08A2	8	12	3.5	0.6	1650	16	1720	250ARHE331M08A2T
	470	08A2	8	12	3.5	0.6	2350	16	1720	250ARHE471M08A2T
	560	08A6	8	16	3.5	0.6	2800	14	1880	250ARHE561M08A6T
	560	10A2	10	12	5	0.6	2800	14	1880	250ARHE561M10A2T
	680	08A6	8	16	3.5	0.6	3400	14	1880	250ARHE681M08A6T
	680	10A2	10	12	5	0.6	3400	14	1880	250ARHE681M10A2T
	820	08B0	8	20	3.5	0.6	4100	14	2040	250ARHE821M08B0T
	1000	10A6	10	16	5	0.6	5000	14	2040	250ARHE102M10A6T
	1500	10B0	10	20	5	0.6	7500	14	2160	250ARHE152M10B0T
35	68	08X8	8	8	3.5	0.6	476	26	1120	350ARHE680M08X8T
	100	08X8	8	8	3.5	0.6	700	26	1120	350ARHE101M08X8T
	150	08A2	8	12	3.5	0.6	1050	20	1440	350ARHE151M08A2T
	220	08A2	8	12	3.5	0.6	1540	20	1440	350ARHE221M08A2T
	330	08A6	8	16	3.5	0.6	2310	18	1560	350ARHE331M08A6T
	330	10A2	10	12	5	0.6	2310	18	1760	350ARHE331M10A2T
	470	08B0	8	20	3.5	0.6	3290	16	1840	350ARHE471M08B0T
	470	10A6	10	16	5	0.6	3290	16	1840	350ARHE471M10A6T
	560	10A6	10	16	5	0.6	3920	16	1840	350ARHE561M10A6T
	680	10B0	10	20	5	0.6	4760	16	2000	350ARHE681M10B0T
50	47	08A2	8	12	3.5	0.6	470	25	1200	500ARHE470M08A2T
	68	08A2	8	12	3.5	0.6	680	25	1200	500ARHE680M08A2T
	150	08A6	8	16	3.5	0.6	1500	20	1440	500ARHE151M08A6T
	180	10A2	10	12	5	0.6	1800	25	1320	500ARHE181M10A2T
	220	10A2	10	12	5	0.6	2200	25	1320	500ARHE221M10A2T
	390	10B0	10	20	5	0.6	3900	18	1600	500ARHE391M10B0T

Notes

1 Part number shows the standard Tape/Ammo version

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 125°C 100kHz (mA)	Part Number ^{Note 1}
			D	L	P	ϕd				
63	47	08A2	8	12	3.5	0.6	592	25	1200	630ARHE470M08A2T
	56	08A2	8	12	3.5	0.6	705	25	1200	630ARHE560M08A2T
	56	10A2	10	12	5	0.6	705	25	1320	630ARHE560M10A2T
	100	10A2	10	12	5	0.6	1260	25	1320	630ARHE101M10A2T
	180	10A6	10	16	5	0.6	2268	22	1440	630ARHE181M10A6T
	220	10B0	10	20	5	0.6	2772	20	1600	630ARHE221M10B0T

Notes

- 1 Part number shows the standard Tape/Ammo version

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 ▲ 160ARHE101M06X8 ▲ 100 μ F ▲ 16V ▲ 6.3 x 8.0mm

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

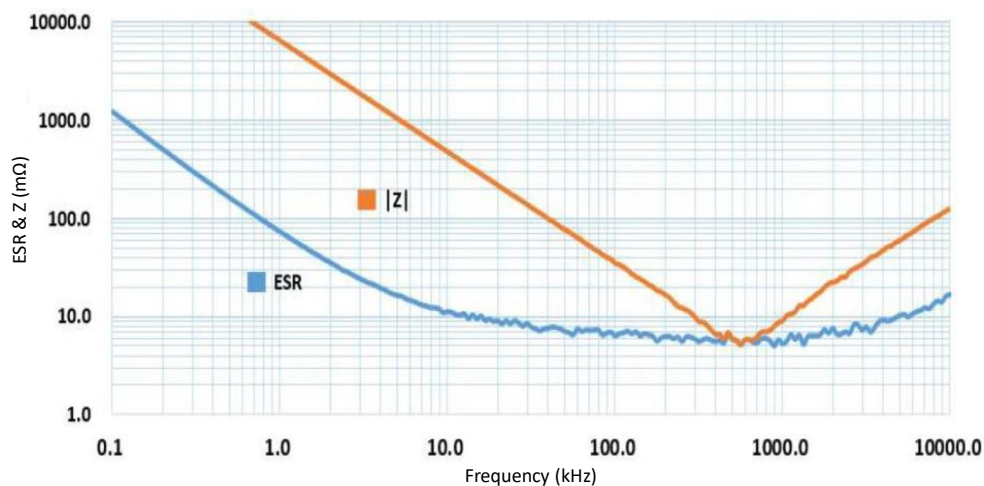


Fig. 2 • Frequency Characteristics of C (μ F)

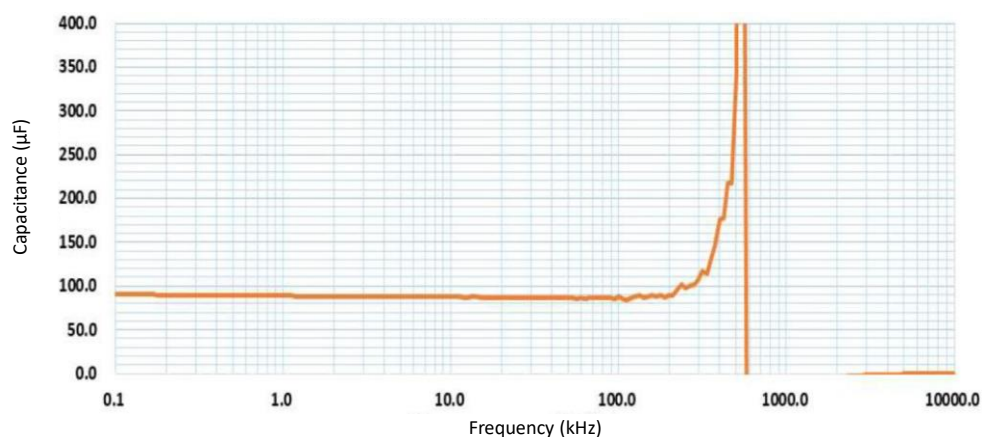
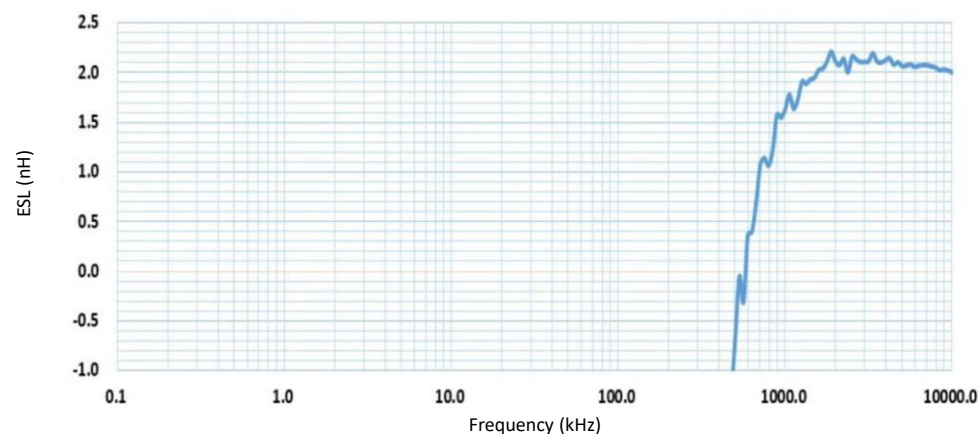


Fig. 3 • Frequency Characteristics of ESL (nH)



REFERENCE DATA ▲ 160ARHE271M08A2 ▲ 270 μ F ▲ 16V ▲ 8.0 x 12.0mm

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

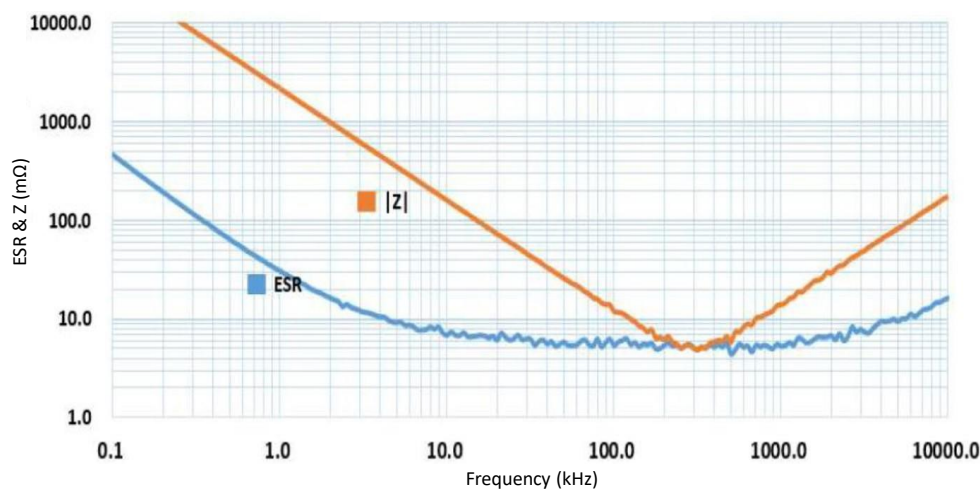


Fig. 5 • Frequency Characteristics of C (μ F)

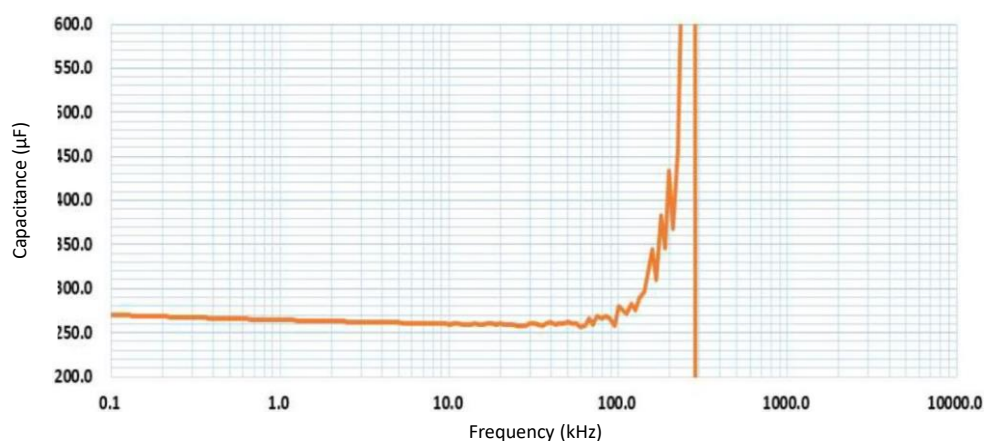
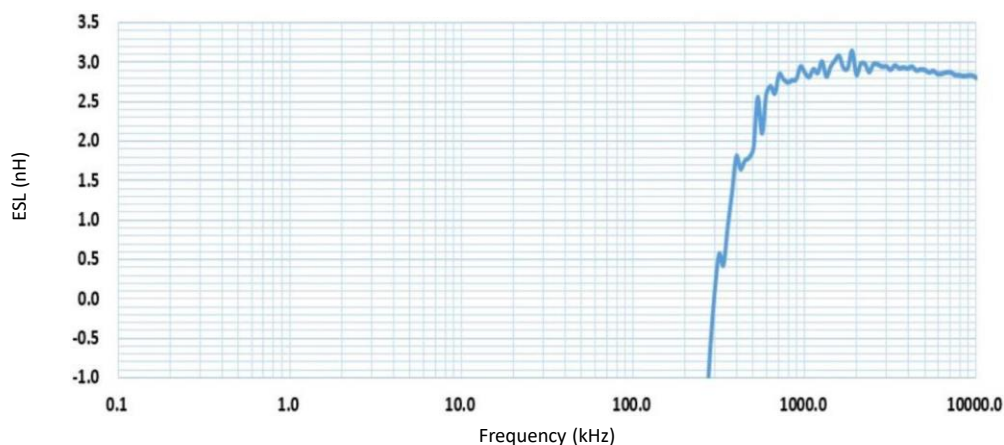


Fig. 6 • Frequency Characteristics of ESL (nH)



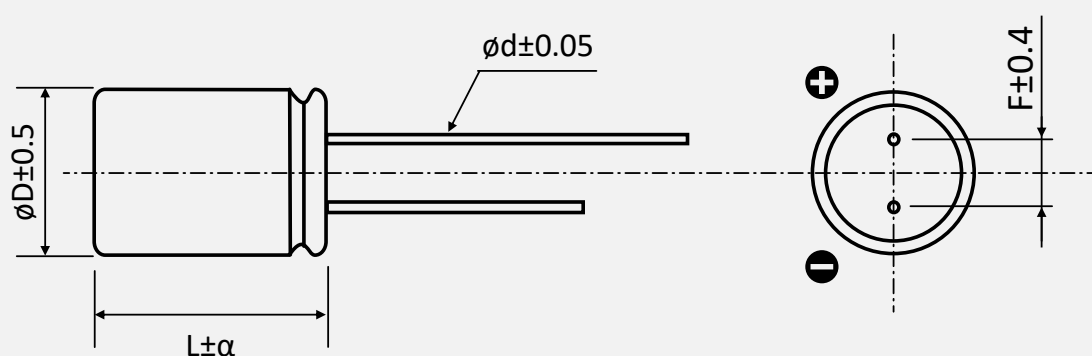
FREQUENCY CORRECTION FACTOR

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	$\varnothing d \pm 0.05$	$F \pm 0.4$
06X8	6.3	8.0	-0.5 to +1.0	0.60	2.5
06A0	6.3	10.0	-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
08A6	8.0	16.0	-0.5 to +1.0	0.60	3.5
08B0	8.0	20.0	-0.5 to +1.0	0.60	3.5
10A2	10.0	12.0	-0.5 to +1.0	0.60	5.0
10A6	10.0	16.0	-0.5 to +1.0	0.60	5.0
10B0	10.0	20.0	-0.5 to +1.0	0.60	5.0

PRODUCT CODE

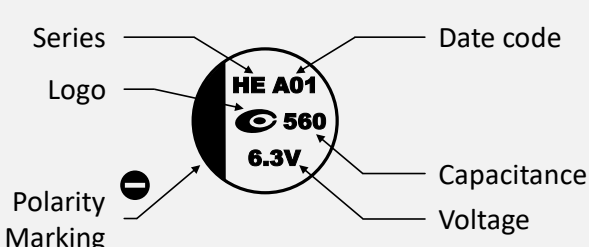
Example: ARHE series ▲ 560μF ▲ 6.3V_{DC} ▲ ±20% ▲ D=6.3mm ▲ L=8mm ▲ F=2.5mm ▲ Tape/Ammo

6R3		ARHE		561		M		06X8		T	
Rated Voltage (V _{DC})		Series		Capacitance Code ^{Note 1} (μF)		Capacitance Tolerance (%)		Package Code		Packaging Type	
Code	VDC	Code	Series	Code	μF	Code	Tol.	Code	D x L	Code	Type
2R5	2.5	ARHE	ARHE	470	47	M	±20	06X8	6.3 x 8.0	Blank T	Bulk Tape/Ammo
4R0	4.0			101	100			06A0	6.3 x 10.0		
6R3	6.3			471	470			08X8	8.0 x 8.0		
160	16.0			102	1000			08A2	8.0 x 12.0		
250	25.0			152	1500			08A6	8.0 x 16.0		
350	35.0							08B0	8.0 x 20.0		
500	50.0							10A2	10.0 x 12.0		
630	63.0							10A6	10.0 x 16.0		
								10B0	10.0 x 20.0		

Note:

- 1 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 Logo Series Date code Capacitance Voltage Polarity Marking
	Description Manufacturer Logo HE = ARHE See date code table 560 = 560μF 6.3V = 6.3V Polarity (-) marking

DATE CODE

Example:

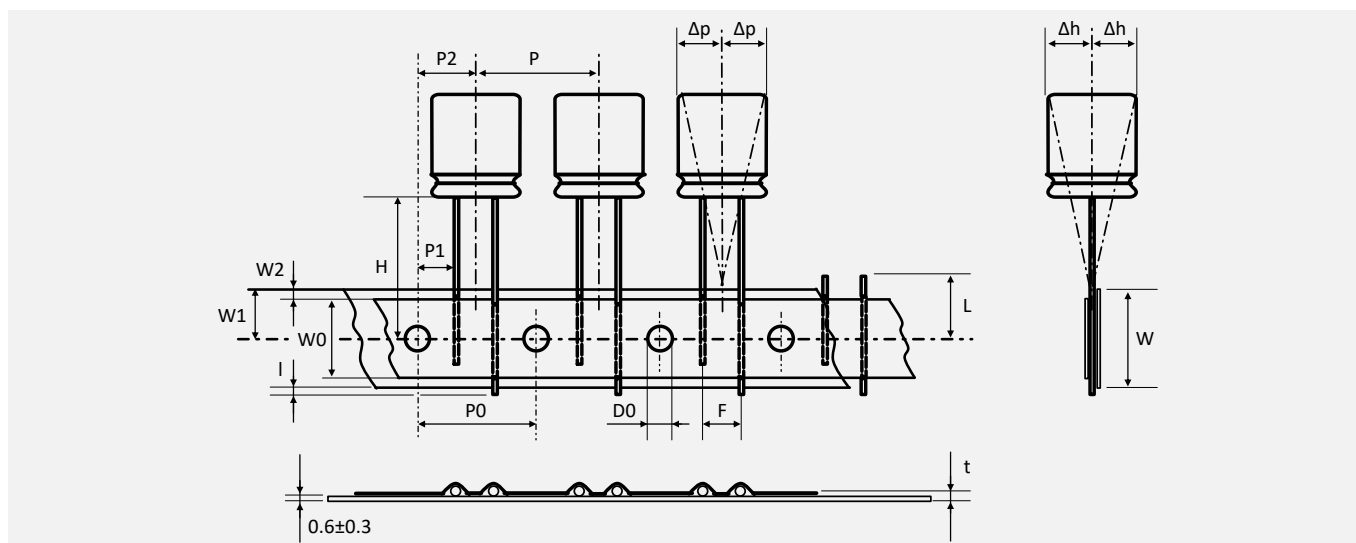
Date code

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

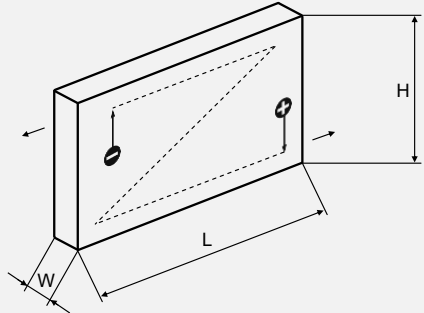
TAPING SPECIFICATION ▲ THT TYPE

Dimensions in mm



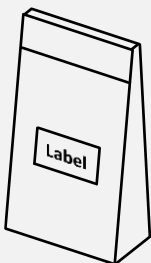
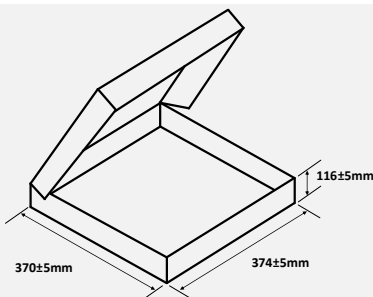
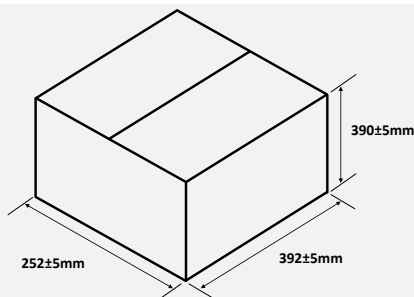
Size Code	F	P	P0	P1	P2	Δp	Δh	W	W0	W1	W2	H	ØD0	t	l	L
Tolerance	+0.8	±1.0	±0.2	±0.5	±1.0	±1.0	±1.0	±0.5	Min	±0.5	Max	±0.75	±0.2	±0.3	Max	max
	-0.2															
06X8	2.5	12.7	12.7	5.1	6.35	0	0	18	9.5	9	2.5	18.5	4	0.6	0	11
06A0	2.5	12.7	12.7	5.1	6.35	0	0	18	9.5	9	2.5	18.5	4	0.6	0	11
08X8	3.5	12.7	12.7	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
08A6	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
08B0	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
10A6	5	12.7	12.7	3.85	6.35	0	0	18	9.5	9	2.5	18.5	4	0.6	0	11
10B0	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 6.3	8.0	06X8	335	42	260	2 000
	Ø 6.3	10.0	06A0	335	45	260	2 000
	Ø 8.0	8.0	08X8	335	42	260	1 200
	Ø 8.0	12.0	08A2	335	45	260	1 200
	Ø 8.0	16.0	08A6	335	53	260	1 200
	Ø 8.0	20.0	08B0	335	53	260	1 200
	Ø 10.0	12.0	10A2	335	45	260	650
	Ø 10.0	16.0	10A6	335	45	260	650
	Ø 10.0	20.0	10B0	335	55	260	650

BULK PACKAGING ▲ THT TYPE

Code	Capacitor Dimensions		Quantity / Bag	Quantity / Inner Box		Quantity outer box	
	ØD	L					
06X8	6.3	8.0	500 pcs	6 bags	3 000 pcs	5 inner boxes	15 000 pcs
06A0	6.3	10.0	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
08A6	8.0	16.0	300 pcs	4 bags	1 200 pcs	5 inner boxes	6 000 pcs
08B0	8.0	20.0	300 pcs	4 bags	1 200 pcs	5 inner boxes	6 000 pcs
10A2	10.0	12.0	300 pcs	4 bags	1 200 pcs	5 inner boxes	6 000 pcs
10A6	10.0	16.0	200 pcs	4 bags	800 pcs	5 inner boxes	4 000 pcs
10B0	10.0	20.0	200 pcs	4 bags	800 pcs	5 inner boxes	4 000 pcs

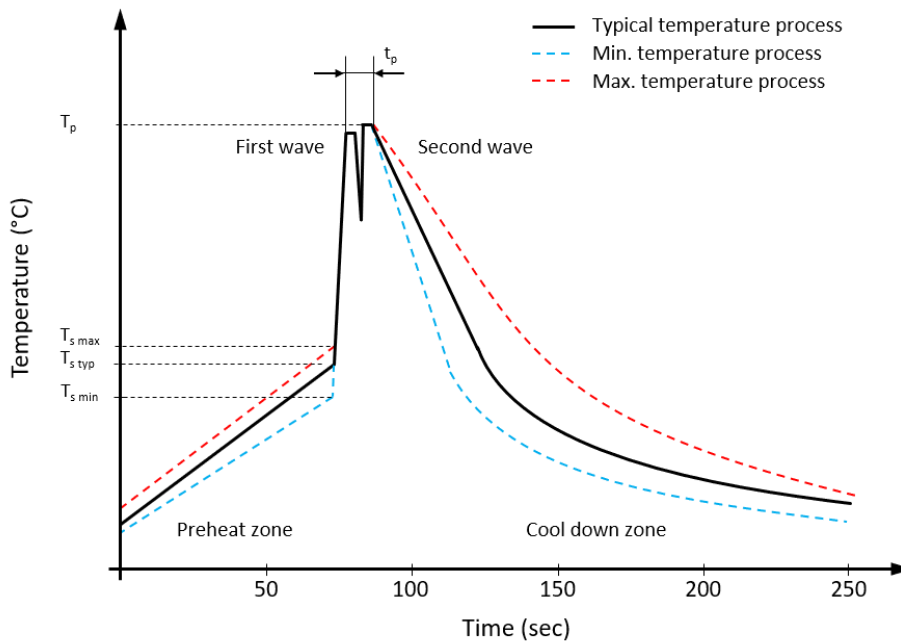
Bag	Inner Box	Outer Carton
		
Label content Size L x W = 70mm x 50mm P/N: Customer part number R-ID: CCF1001290001 CCF: Fix 10: e.g., 2010 01: e.g., January 29: e.g., Day 29th 0001: Running number DESC: Customer specification SPEC: Manufacturer part number COO: Country of origin MAKER: Manufacturer VENDOR: 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					
06X8	6.3	8.0	500 pcs	8 bags	4 000 pcs	5 inner boxes	20 000 pcs
06A0	6.3	10.0	500 pcs	6 bags	3 000 pcs	5 inner boxes	15 000 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
08A6	8.0	16.0	500 pcs	4 bags	2 000 pcs	5 inner boxes	10 000 pcs
08B0	8.0	20.0	400 pcs	4 bags	1 600 pcs	5 inner boxes	8 000 pcs
10A2	10.0	12.0	500 pcs	4 bags	2 000 pcs	5 inner boxes	10 000 pcs
10A6	10.0	16.0	400 pcs	4 bags	1 600 pcs	5 inner boxes	8 000 pcs
10B0	10.0	20.0	350 pcs	4 bags	1 400 pcs	5 inner boxes	7 000 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.

All information and technical specifications made available by MGT are for guidance only and we reserve the right to change or modify them without prior notice. Unless expressly stated in writing by MGT, we reject any guarantees, obligations, or warranties.

All MGT products with the technical specifications described are suitable for use in certain applications. Operating, production, storage and environmental conditions can have a massive influence on the parameters mentioned in the data sheets, which cause the performance to vary over time.

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.

MGT components are not designed or rated for use in life support, rescue, safety critical, military, or aerospace applications where failure or malfunction could result in property or environmental damage, serious injury or death. In the aforementioned cases, please contact us before using MGT products.

In principle, we reserve all rights and MGT's general terms and conditions apply. You can find them on our website www.mgt.co.com.