

AVEP SERIES

3000 HOURS SURGE STABLE TYPE

ALUMINUM SOLID ELECTROLYTIC CAPACITOR ▪ SMD type
 High ripple current up to 5.4A at 100kHz/105°C
 Very high surge stability with 2000 cycles
 Low drift and stable electrical characteristics over lifetime
 Moisture Sensitivity Level ▲ MSL 1
Long lifetime with 3000 hours at 105°C



SPECIFICATION

Item		Characteristics
Category Temperature Range		-55°C to +105°C
Rated Voltage Range	V_R	16V _{DC} to 35V _{DC}
Rated Capacitance Range	C_R	47μF to 1000μF
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	$\tan \delta$	0.12 max.
Leakage Current ▪ At 20°C; after 2min.	I_{LEAK}	Shall not exceed values in the electrical characteristics
Endurance	Test	105°C ▲ 3000hrs ▲ 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	2000 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				
16	560	0812	8.0	12.0	1792	14	4950	160AVEP561M0812
	820	0812	8.0	12.0	2624	14	4950	160AVEP821M0812
	1000	1012	10.0	12.3	3200	12	5400	160AVEP102M1012
25	220	0807	8.0	6.8	1100	20	3800	250AVEP221M0807
	270	0613	6.3	13.2	1350	18	3500	250AVEP271M0613
	330	0810	8.0	9.7	1650	20	3600	250AVEP331M0810
	470	0613	6.3	13.2	2350	18	3800	250AVEP471M0613
35	47	0606	6.3	5.8	329	35	2100	350AVEP470M0606
	100	0608	6.3	7.5	700	34	1450	350AVEP101M0608

Notes

1 Part number shows the standard Tape/Reel 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 ▲ 160AVEP271M0608 ▲ 270 μ F ▲ 16V ▲ 6.3 x 7.5mm

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

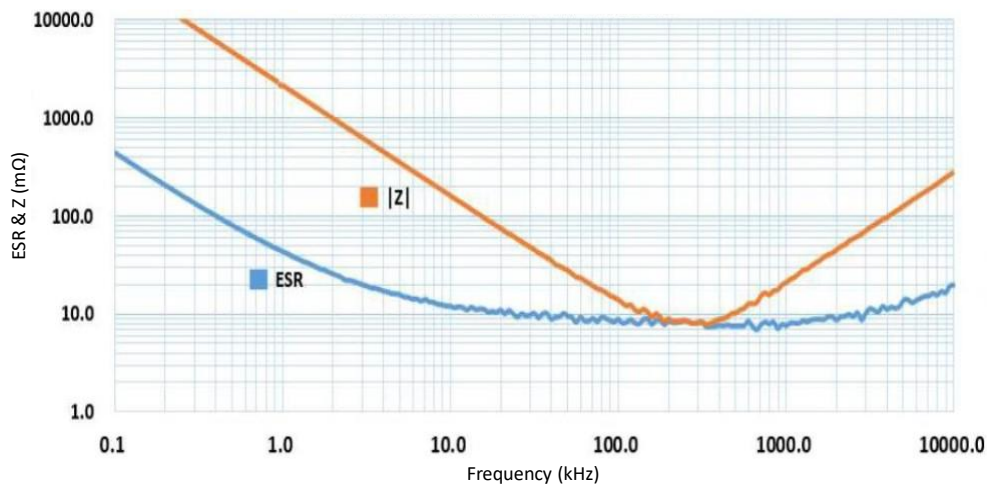


Fig. 2 • Frequency Characteristics of C (μ F)

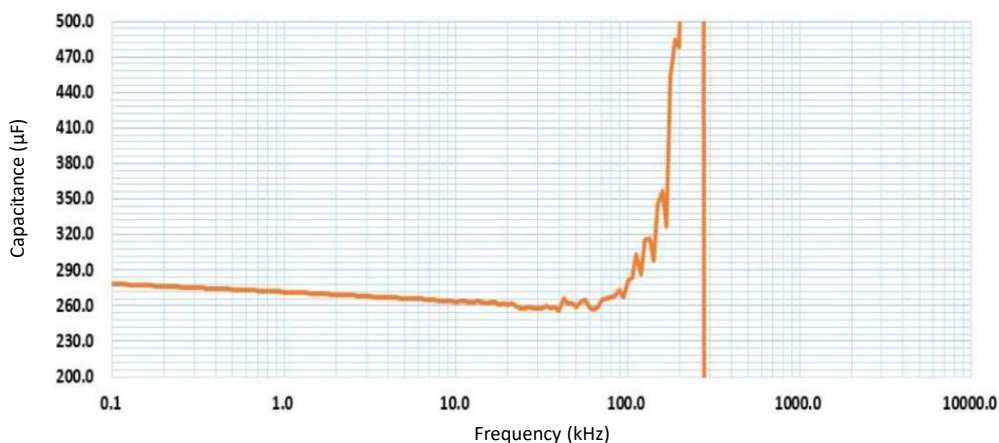
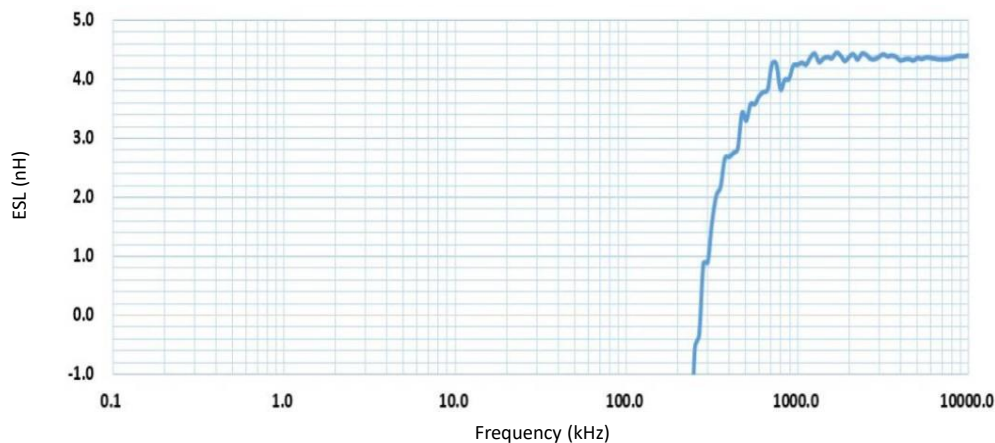


Fig. 3 • Frequency Characteristics of ESL (nH)



REFERENCE DATA ▲ 350AVEP101M0608 ▲ 100 μ F ▲ 35V ▲ 6.3 x 7.5mm

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

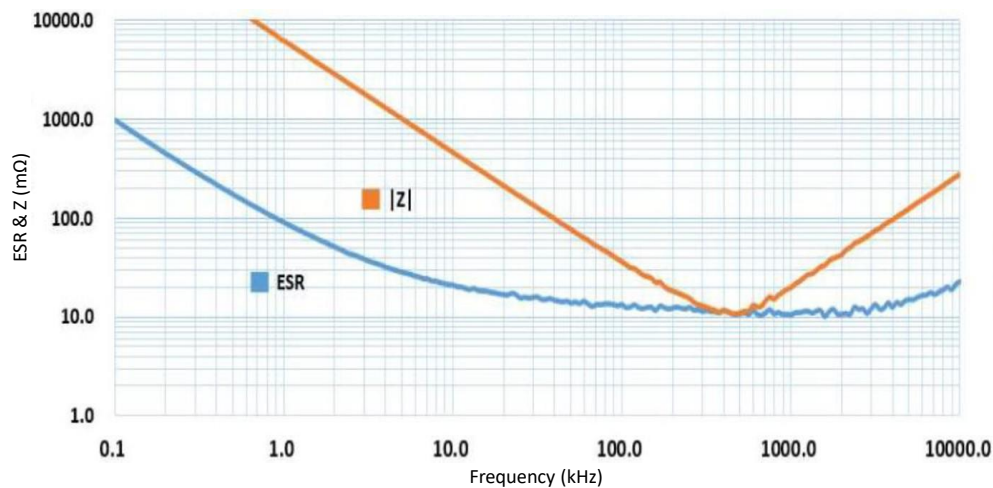


Fig. 5 • Frequency Characteristics of C (μ F)

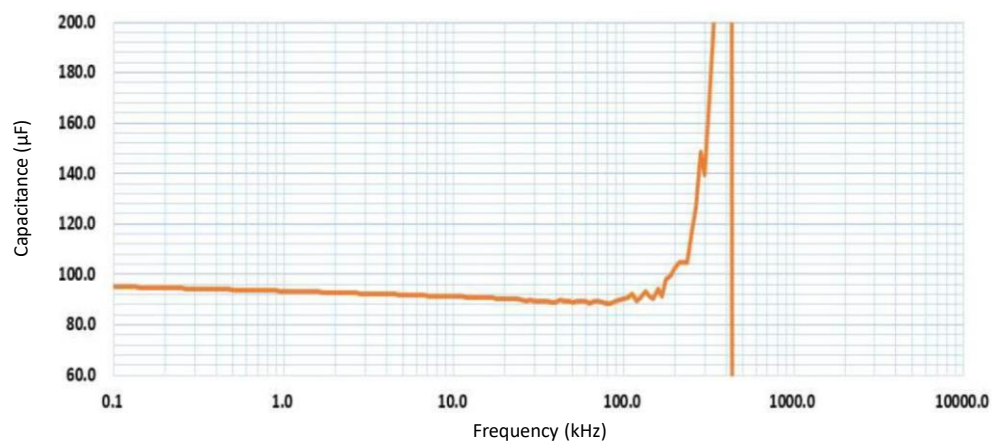
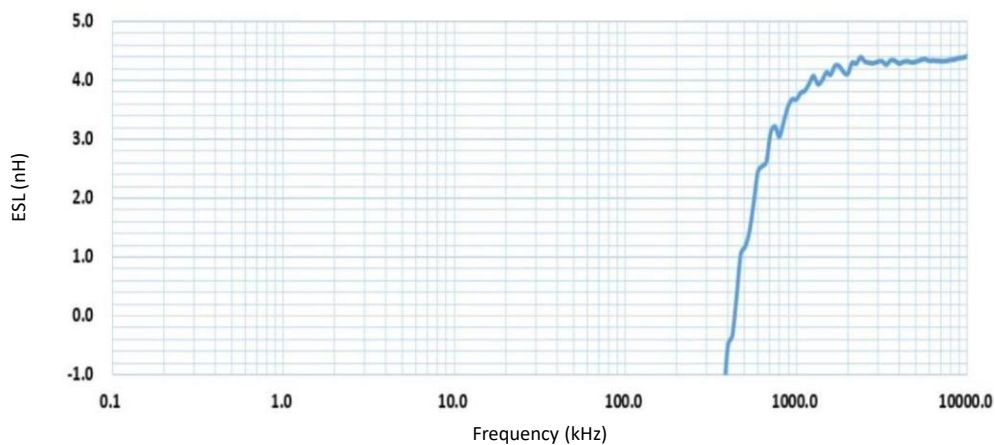


Fig. 6 • Frequency Characteristics of ESL (nH)



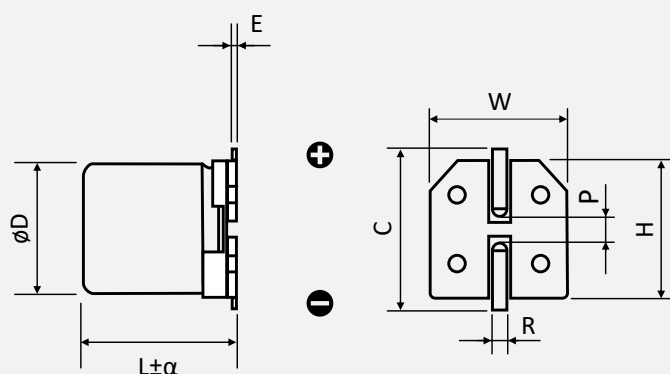
FREQUENCY CORRECTION FACTOR

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	$\varnothing D$	L	α	E	W	H	C	R	P
Tolerance	$\pm 0.5 \text{ max.}$	-	-	-	± 0.2	± 0.2	± 0.2	-	± 0.3
0606	6.3	5.8	± 0.2	0.00 to 0.20	6.6	6.6	7.3	0.5 to 0.8	2.1
0608	6.3	7.5	± 0.5	0.00 to 0.20	6.6	6.6	7.3	0.5 to 0.8	2.1
0613	6.3	13.2	± 0.3	0.00 to 0.20	6.6	6.6	7.3	0.6 to 0.9	2.1
0807	8.0	6.8	± 0.2	0.00 to 0.20	8.3	8.3	9.0	0.8 to 1.1	2.9
0810	8.0	9.7	± 0.3	0.00 to 0.20	8.3	8.3	9.0	0.8 to 1.1	2.9
0812	8.0	12.0	± 0.5	0.00 to 0.20	8.3	8.3	9.0	0.8 to 1.1	3.2
1012	10.0	12.3	± 0.2	0.00 to 0.20	10.3	10.3	11.0	0.8 to 1.1	4.6

PRODUCT CODE

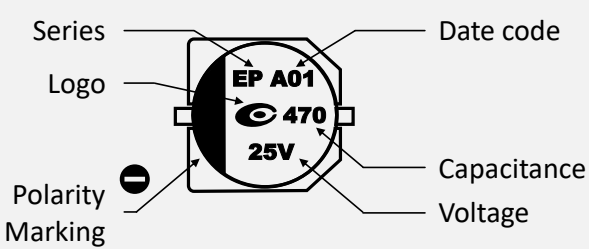
Example: AVEP series ▲ 470 μ F ▲ 25V_{DC} ▲ $\pm$ 20% ▲ D=6.3mm ▲ L=13.2mm ▲ Tape/Reel

250		AVEP		471		M		0613	
Rated Voltage (V _{DC})		Series		Capacitance Code ^{Note 1} (μ F)		Capacitance Tolerance (%)		Package Code	
Code	VDC	Code	Series	Code	μ F	Code	Tol.	Code	D x L
160	16	AVEP	AVEP	470	47	M	$\pm$ 20	0606	6.3 x 5.8
250	25			101	100			0608	6.3 x 7.5
350	35			821	820			0613	6.3 x 13.2
				102	1000			0807	8.0 x 6.8
								0810	8.0 x 9.7
								0812	8.0 x 12.0
								1012	10.0 x 12.3

Note:

- Capacitance code expressed in μ F. 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	EP = AVEP
	Date code	See date code table
	Capacitance	470 = 470 μ F
	Voltage	25V = 25V
		Polarity (-) marking

DATE CODE

Example:

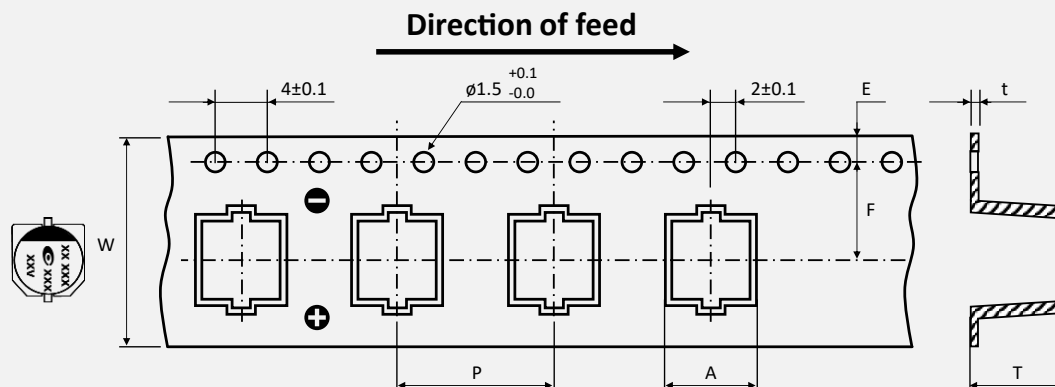
Date code

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 ▲ SMD TYPE

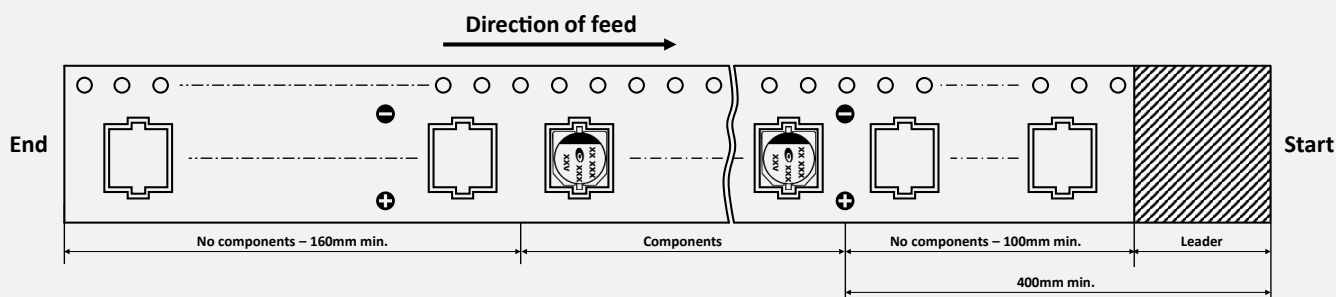
Dimensions in mm



Size Code	W (mm)	A (mm)	B (mm)	F (mm)	E (mm)	P (mm)	T (mm)	t (mm)
Tolerance	± 0.3	± 0.2	± 0.2	± 0.1	± 0.1	± 0.1	± 0.2	± 0.05
0606	16	6.8	6.8	7.5	1.75	12	6.3	0.4
0608	16	7	7	7.5	1.75	12	8.2	0.5
0613	16	7	7	7.5	1.75	12	14	0.5
0807	24	8.7	8.7	11.5	1.75	12	7.2	0.5
0810	24	8.7	8.7	11.5	1.75	16	10	0.5
0812	24	8.7	8.7	11.5	1.75	16	12	0.5
1012	24	10.7	10.7	11.5	1.75	16	13	0.5

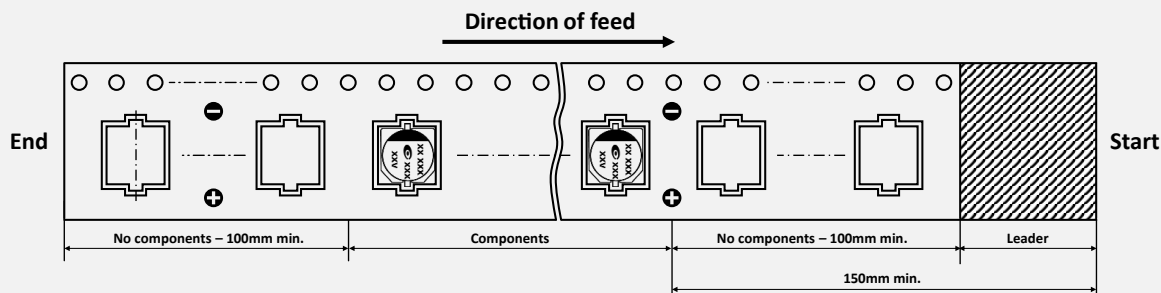
START AND END OF TAPE ▲ SMD TYPE

Diameter 5mm / 6mm and 8mm



START AND END OF TAPE ▲ SMD TYPE

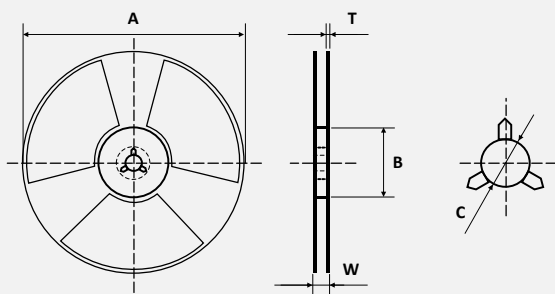
Diameter 10mm



REEL DIMENSION AND PACKAGING QUANTITY ▲ SMD TYPE

Code	Capacitor Dimensions		A ± 2	B ± 0.5	C ± 0.5	W ± 0.8	T ± 0.3	1 Reel	1 Box	
	ØD (mm)	L (mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(pcs)	(pcs)	(reel)
0606	6.3	5.8	381	100	13	16.5	2.5	1 200	7 200	6
0608	6.3	7.5	381	100	13	16.5	2.5	900	5 400	6
0613	6.3	13.2	381	100	13	16.5	2.5	500	3 000	6
0807	8.0	6.8	381	100	13	25.9	2.5	1 000	5 000	5
0810	8.0	9.7	381	100	13	25.9	2.5	500	2 500	5
0812	8.0	12.0	381	100	13	25.9	2.5	400	2 000	5
1012	10.0	12.3	381	100	13	25.9	2.5	450	2 250	5

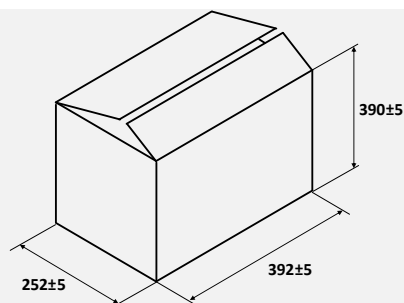
Reel



Label on the reel
Size L x W = 70mm x 35mm

1. **P/N:** Customer part number
2. **DESC:** Customer specification
3. **SPEC:** Manufacturer part number
4. **COO:** Country of origin
5. **QTY:** Quantity (pcs)
6. **MAKER:** Manufacturer
7. **VENDOR:** Manufacturer
8. **DC:** Date code
9. **LOT/NO:** Production lot

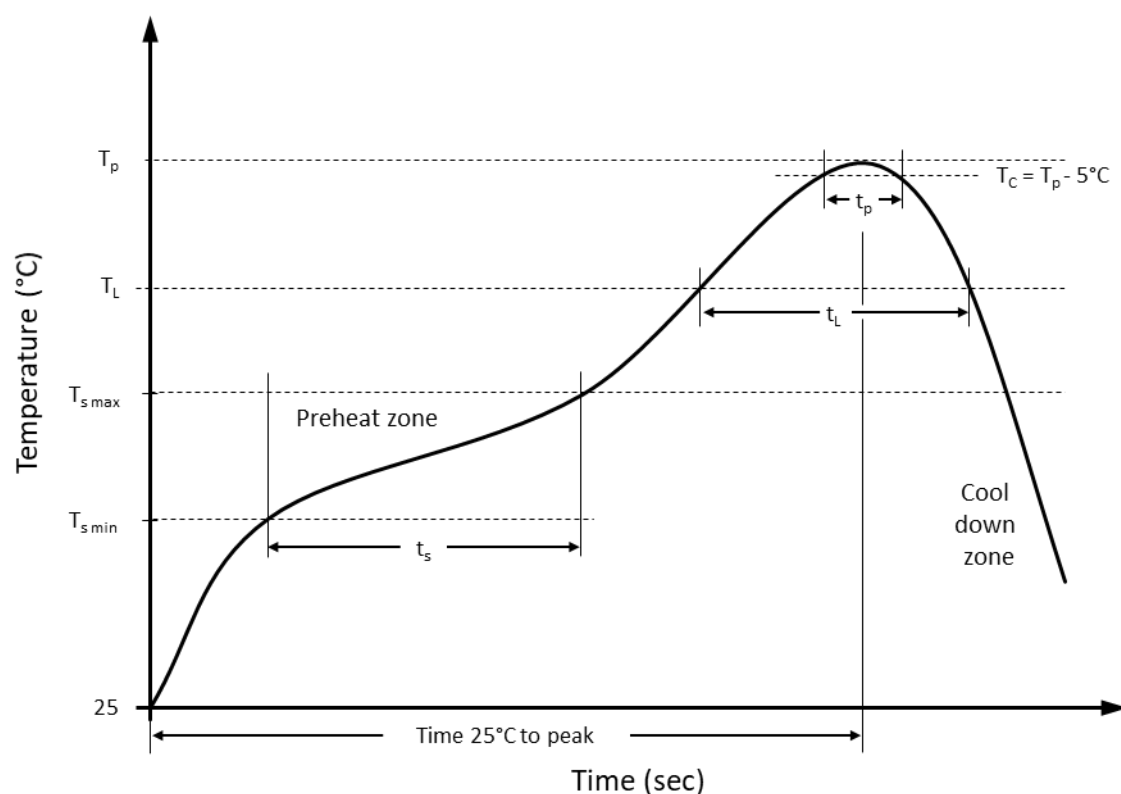
Carton (Dimensions in mm)



Label on the outer carton
Size L x W = 100mm x 90mm

1. **CUSTOMER:** Customer name
2. **P/O:** Customer order number
3. **P/N:** Customer part number
4. **DESCRIPTION:** Manufacturer part number
5. **QTY:** Quantity (pcs) and shipping date
6. **COO:** Country of origin

RECOMMENDED REFLOW SOLDERING PROFILE ▲ SMD PACKAGE



Recommended reflow soldering conditions ▲ Refer to JEDEC J-STD-020E

Profile Features		Pb-Free Assembly
Preheat temperature min.	$T_{s \min}$	150 °C
Preheat temperature max.	$T_{s \max}$	200 °C
Preheat time t_s from $T_{s \min}$ to $T_{s \max}$	t_s	120 seconds
Ramp-up rate (T_L to T_p)		max. 3 °C/second
Liquidous temperature	T_L	217 °C
Time t_L maintained above T_L	t_L	See table below
Peak package body temperature	T_p	See table below
Timeframe of within 5°C below and up to max actual peak body temperature	t_p	See table below
Ramp-down rate (T_L to T_p)		max. 6 °C/second
Time 25°C to peak temperature		max. 8 minutes

Size Code	Time > 200°C	t_L Time > 217°C	Time > 230°C	T_p Peak Temperature	t_p Timeframe	Allowed Reflow Runs
≤ 6.3 mm	70 sec. max.	70 sec. max.	70 sec. max.	260 °C	5 sec	Max. twice
≥ 8mm	70 sec. max.	70 sec. max.	70 sec. max.	245 °C	10 sec	Max. twice
				260 °C	5 sec	Only once

REVISION TABLE

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

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