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Date : 2025/09/24

APPROVAL SHEET

Product Name : AUTOMOTIVE Soft Termination Safety certified

Part No. : FKFH Series

Description : X1/Y2 & X2 Class, Size 1808~2220, C0G/X7R, 250Vac/630Vdc

PREPARED BY	APPROVED BY

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SPECIFICATION

FOR

Product Name : AUTOMOTIVE Soft Termination Safety certified

Part No. : FKFH Series

Description : X1/Y2 & X2 Class , Size 1808~2220, C0G/X7R,
250Vac/630Vdc

SPEC. No. : FKFH-000-001-01

DATE : 2025/09/23

DRAWN BY	CHECEKED BY	APPROVED BY
<i>Jane Hsiao</i>	<i>Yvens Chou</i>	<i>Hank chiang</i>



1. INTRODUCTION

PROSPERITY's SAFETY CERTIFIED CAPACITORS are designed for surge or lightning immunity in modem facsimile and other equipments. The capacitors of FK series are class X1/Y2 compliant, and the capacitors of FH series are class X2 compliant respectively.

The green type capacitors in FK/FH series are manufactured by using environmentally friendly materials without lead or cadmium.

The terminations are composed of plated nickel and pure tin to feature the superior leaching resistance during soldering.

2. FEATURES

- High reliability and stability.
- Small size and high capacitance.
- Safety standard approval by :
 EN 60384-14 : 2013/A1 : 2016
 IEC 60384-14 : 2013/AMD1 : 2016
 UL 60384-14 (Ed 2.0) UL 62368-1 (2nd Edition)
- Certificate number :
 R 50359148 by TUV.
 E346791 (FOWX2/8) by UL, E231248 by UL.
- CQC20001247849 by CQC (FK series)
 License No. ENEC-03020 (FK series)
 RoHS and HALOGEN compliant.

3. APPLICATIONS

- Modem.
- Facsimile.
- Telephone.
- Other electronic equipment for lighting or surge protection and isolation.



4. HOW TO ORDER

FK	08	X	100	J	502	E	F	H
PDC Family	Size	Dielectric	Capacitance	Tolerance	Impulse Voltage	Packaging	Thickness	Customer Code
Table 1	Table 2	Table 3	Table 4	Table 5	Table 6	Table 7	Table 8	Table 9

Table 1	PDC Family
Code	Description
FK	Safety X1 & Y2 series
FH	Safety X2 series

Table 2		Size			
Code	Description	Code	Description	Code	Description
08	1808 (4520)	21	2211 (5728)		
12	1812 (4532)	20	2220 (5750)		

Table 3		Dielectric Material Characteristics	
Code	Description	Code	Description
X	X7R		

Table 4		Capacitance Rule Code	
Code	Description	Code	Description
0R5	0.5pF	104	104=10x10 ⁴ =100nF

Table 5		Tolerance			
Code	Description	Code	Description	Code	Description
A	±0.05 pF	D	±0.50 pF	J	±5 %
B	±0.10 pF	F	±1 %	K	±10 %
C	±0.25 pF	G	±2 %	M	±20 %

Table 6		Impulse Voltage			
Code	Description	Code	Description	Code	
502	5KV	252	2.5KV	302	
602	6KV	(FH06X)		(FH series)	

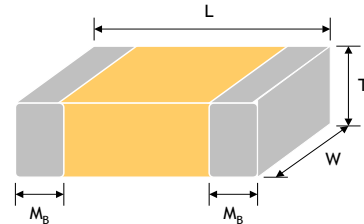
Table 7		Packaging Type	
Code	Description	Code	Description
B	Bulk	E	Embossed Tape

Table 8		Thickness Description			
Code	Description	Code	Description	Code	Description
C	1.25±0.10 mm	E	1.60±0.20 mm	G	2.50±0.30 mm
D	1.40±0.15 mm	F	2.00±0.20 mm	H	2.80±0.30 mm

Table 9	Customer Code
Code	Description
H	AEC Q200 + Anti-Arcing + Anti-Bending
S	AEC Q200 + Anti-Bending



5. EXTERNAL DIMENSIONS

Size Inch (mm)	L (mm)	W (mm)	Code / T (mm)	M _B (mm)	
1808(4520)	4.50+0.9/-0.3	2.00±0.30	See No.4 Reference Table 8	0.50±0.25	
1812(4532)	4.50+0.9/-0.3	3.20±0.40		0.50±0.25	
2211(5728)	5.70±0.50	2.80±0.40		0.60±0.10	
2220(5750)	5.70±0.50	5.00±0.50		0.60±0.10	
					Fig. 5.1 The outline of MLCC

6. GENERAL ELECTRICAL DATA

Dielectric	C0G		X7R							
Size	1812		1808, 1812, 2211, 2220							
Rated voltage	250Vac/630Vdc									
Capacitance range	X2 Class : 10pF ~ 2700pF		X1/Y2 Class : 100pF ~ 4700pF							
Capacitance tolerance	<table><tr><td>Cap. Rang</td><td>Tolerance Spec.</td></tr><tr><td>Cap.≤10pF</td><td>A (±0.05pF), B (±0.1pF), C (±0.25pF)D (±0.5pF)</td></tr><tr><td>10pF≤Cap.</td><td>F (±1%), G (±2%), J (±5%), K (±10%), M (±20%)</td></tr></table>		Cap. Rang	Tolerance Spec.	Cap.≤10pF	A (±0.05pF), B (±0.1pF), C (±0.25pF)D (±0.5pF)	10pF≤Cap.	F (±1%), G (±2%), J (±5%), K (±10%), M (±20%)	J (±5%) K (±10%) M (±20%)	
	Cap. Rang	Tolerance Spec.								
	Cap.≤10pF	A (±0.05pF), B (±0.1pF), C (±0.25pF)D (±0.5pF)								
	10pF≤Cap.	F (±1%), G (±2%), J (±5%), K (±10%), M (±20%)								
Tan δ	<table><tr><td>Cap. Range</td><td>Q Spec.</td></tr><tr><td>Cap.<30pF</td><td>Q≥400+20C</td></tr><tr><td>Cap.≥30pF</td><td>Q≥1000</td></tr></table>		Cap. Range	Q Spec.	Cap.<30pF	Q≥400+20C	Cap.≥30pF	Q≥1000	≤2.5%	
	Cap. Range	Q Spec.								
	Cap.<30pF	Q≥400+20C								
	Cap.≥30pF	Q≥1000								
Capacitance & Tan δ Test condition	Measured at the condition of 30~70% related humidity									
	For 25°C at ambient temperature		Preconditioning for Class II MLCC : Perform a heat treatment at 150±10°C for 1 hour, then leave in ambient condition for 24±2 hours before measurement							
	<table><tr><td>Cap. Rang</td><td>Test Condition</td></tr><tr><td>Cap.≤1000pF</td><td>1.0±0.2Vrms, 1.0MHz±10%</td></tr><tr><td>Cap.>1000pF</td><td>1.0±0.2Vrms, 1.0KHz±10%</td></tr></table>			Cap. Rang	Test Condition	Cap.≤1000pF	1.0±0.2Vrms, 1.0MHz±10%	Cap.>1000pF	1.0±0.2Vrms, 1.0KHz±10%	
	Cap. Rang	Test Condition								
	Cap.≤1000pF	1.0±0.2Vrms, 1.0MHz±10%								
	Cap.>1000pF	1.0±0.2Vrms, 1.0KHz±10%								
Insulation resistance	≥100GΩ or RxC≥1000Ω-F, whichever is smaller		≥10GΩ or RxC≥500Ω-F, whichever is smaller							
Operating temperature	-55°C to +125°C									
Temperature coefficient	±30ppm /°C		±15%							
Termination	Cu or Ag/Ni/Sn (lead-free termination)									



7. CAPACITANCE RANGE

Class		X1/Y2 (FK series)				X2(FH series)
Rated voltage		250Vac/630Vdc				
Certificated		TUV / UL / CQC (IEC 60384-14)				
Dielectric		X7R				C0G
Cap.(pF)	EIA Size	1808	1812	2211	2220	1812
	Impulse	5KV (502)				2.5KV (302)
10	100					C
12	120					C
15	150					C
18	180					
22	220					C
27	270					C
33	330					C
39	390					C
47	470					C
56	560					C
68	680					C
82	820					C
100	101	E		E		C
120	121	E*		E*		C
130	131			E*		C
150	151	E*	E*	E*		C
160	161	E*	E*	E*	F*	C
180	181	E*	E*	E*	F*	C
220	221	E*	E*	E*	F*	C
270	271	F*	E*	E*	F*	D
300	301	F*	E*	E*	F*	
330	331	F*	E*	E*	F*	D
390	391	F*	E*	E*	F*	D
470	471	F*	E*	F*	F*	E
560	561	F*	E*	F*	F*	F
680	681	F*	F*	F*	F*	F
720	721	F*	F*	F*	F*	
820	821	F*	F*	F*	F*	G
1000	102	F*	G*	G*	F*	G
1200	122			G*	G*	E/F/G
1500	152			G*	G*	F/G
1800	182			G*	G*	F/G
2200	222			G*	G*	G
2700	272			H*	G*	H
3300	332				G*	
3900	392				G*	
4700	472				G*	
5600	562					
6800	682					
8200	822					
10000	103					
12000	123					
15000	153					
18000	183					
22000	223					
27000	273					
33000	333					
39000	393					
47000	473					
56000	563					

“*” Surface coating only.



8. RELIABILITY TEST CONDITIONS AND REQUIREMENTS

No.	Item	Standard Methods	Test Condition	Requirements											
1.	Visual examination and Dimensions	IEC 60384-1 4.1	---	* No remarkable defect. * Dimensions to confirm to individual specification sheet.											
2.	Destructive Physical Analysis EIA-469		Per EIA-469.	* No defects or abnormalities.											
3.	Electrical Characterization		* Capacitance. * D.F. (Dissipation Factor). * Class I : (C0G) Cap.≤1000pF, 1.0±0.2Vrms, 1MHz±10%. Cap.>1000pF, 1.0±0.2Vrms, 1KHz±10%. * Class II : (X7R) 1.0±0.2Vrms, 1KHz±10%.	* Capacitance within the specified tolerance. <table><tr><th>Dielectric</th><th>Q/D.F.</th><th>Remark</th></tr><tr><td rowspan="2">Class I (C0G)</td><td>Q≥1000</td><td>Cap.≥30pF</td></tr><tr><td>Q≥400+20C</td><td>Cap.<30pF</td></tr><tr><td>Class II (X7R)</td><td>D.F.≤2.5%</td><td>-</td></tr></table>	Dielectric	Q/D.F.	Remark	Class I (C0G)	Q≥1000	Cap.≥30pF	Q≥400+20C	Cap.<30pF	Class II (X7R)	D.F.≤2.5%	-
			Dielectric	Q/D.F.	Remark										
			Class I (C0G)	Q≥1000	Cap.≥30pF										
				Q≥400+20C	Cap.<30pF										
			Class II (X7R)	D.F.≤2.5%	-										
* Insulation Resistance. To apply rated voltage for max. 120 sec.	* I.R. : ≥10GΩ or RxC≥500Ω-F, whichever is smaller.														
* To apply voltage : X capacitor : 1075Vdc (4.3Ur). Y capacitor : 1500Vac. * Duration : 60 sec. * Add test 4000Vdc (1~5 sec.) for FK20X series. * Add test 3000Vdc (1~5 sec.) for FK08X/FK12X/ FK21X series. * The charge current shall not exceed 0.05A. * The voltage shall be raised from the near zero to the test voltage a rate not exceeding 150V(r.m.s.)/sec.	* No evidence of damage or flash over during test.														
* Temperature Coefficient (With no electrical load) Operation temperature : -55~125°C at 25°C.	* Capacitance Change : <table><tr><th>T.C.</th><th>Capacitance Change</th></tr><tr><td>C0G</td><td>±30ppm/°C</td></tr><tr><td>X7R</td><td>±15%</td></tr></table>	T.C.	Capacitance Change	C0G	±30ppm/°C	X7R	±15%								
T.C.	Capacitance Change														
C0G	±30ppm/°C														
X7R	±15%														
4.	Biased Humidity Ref. MIL-STD-202 Method 103		* Test temperature : 85±3°C. * Humidity : 85±5%RH. * Test time : 1000 +24/-0 hrs. * To apply voltage : Rated voltage (Max. 500Vdc) and 1.3~1.5Vdc (add 100k ohm resistor). Add apply 250Vac. * Before initial measurement (Class II only) : To apply test voltage for 1hr at test temp. and then set for 24±2 hrs at room temp. * Measurement to be made after keeping at room temp. for 24±2 hrs.	No remarkable damage. * Cap. Change : C0G : Within ±3.0% or ±0.3pF, whichever is larger. X7R : Within ±12.5%. * Q/D.F. : C0G : Q≥200 for Cap.≥30pF. Q≥100+10/3C for Cap.<30pF. X7R : D.F.≤200% of initial requirement. * I.R. : ≥500MΩ or RxC≥25Ω-F, whichever is smaller.											
5.	Resistance to Soldering Heat Ref. MIL-STD-202 Method 210	IEC 60384-14 4.4 IEC 60384-21/22 4.9	* Solder temperature : 260±5°C. * Dipping time : 10±1 sec. * Reflow Soldering : Peak 260 +0/-5°C profile for Mega cap. * Before initial measurement (X7R only) : Perform 150 +0/-10°C for 1 hr and then set for 24±2 hrs at room temp. * Measurement to be made after keeping at room temp. for 24±2 hrs.	* No remarkable damage. * Cap. change : C0G : Within ±2.5% or ±0.25pF, whichever is larger. X7R : Within ±7.5%. * Q/D.F. value : To meet the initial requirement. * I.R. : To meet the initial requirement.											



8. RELIABILITY TEST CONDITIONS AND REQUIREMENTS

No.	Item	Standard Methods	Test Condition	Requirements															
6.	ESD Ref. AEC-Q200-002		* Per AEC-Q200-002.	* No remarkable damage. * Cap. : Within the specified tolerance. * Q/D.F. value : To meet the initial requirement. * I.R. : To meet the initial requirement.															
7.	Temperature Cycle Ref. JESD22 Method JA-104	IEC 60384-21/22 4.11	* Conduct 1000 cycles according to the temp. and time. <table><tr><th>Step</th><th>Temp.(°C)</th><th>Time(min.)</th></tr><tr><td>1</td><td>Min. operating temp. +0/-3</td><td>30±3</td></tr><tr><td>2</td><td>Room temp.</td><td>2~3</td></tr><tr><td>3</td><td>Max. operating temp. +3/-0</td><td>30±3</td></tr><tr><td>4</td><td>Room temp.</td><td>2~3</td></tr></table> * Measurement to be made after keeping at room temperature for 24±2 hrs	Step	Temp.(°C)	Time(min.)	1	Min. operating temp. +0/-3	30±3	2	Room temp.	2~3	3	Max. operating temp. +3/-0	30±3	4	Room temp.	2~3	* No remarkable damage. * Cap. change : C0G : Within ±2.5% or ±0.25pF, whichever is larger. X7R : Within ±10.0%. * Q/D.F. value : C0G : To meet the initial requirement. X7R : D.F.≤200% of initial requirement. * I.R. : To meet the initial requirement.
Step	Temp.(°C)	Time(min.)																	
1	Min. operating temp. +0/-3	30±3																	
2	Room temp.	2~3																	
3	Max. operating temp. +3/-0	30±3																	
4	Room temp.	2~3																	
8.	Moisture Resistance Ref. MIL-STD-202 Method 106	IEC 60384-14 4.12	* Test temp. : 25~65°C * Humidity : 80~100% RH. * Test time : 10 cycles, t=24hrs/cycle. * Applied voltage : 250Vac * Measurement to be made after keeping at room temp. for 48±4 hrs (Class II).	* No remarkable damage. * Cap. Change : C0G : Within ±3.0% or ±0.3pF, whichever is larger. X7R : Within ±12.5%. * Q/D.F. : C0G : Q≥350 for Cap.>30pF. Q≥275+2.5C for 10pF≤Cap.≤30pF. Q≥200+10C for Cap.<10pF. X7R : D.F.≤200% of initial requirement. * I.R. : ≥1GΩ or RxC≥50Ω-F, whichever is smaller.															
9.	Passive Flammability	IEC 60384-14 4.17 IEC 60384-1 4.38	* Volume sample : 21.56 mm³. * Flame exposure time : 5 sec. Max. * Category of flammability : C.	* Capacitor didn't burn at all.															
10.	Active Flammability	IEC 60384-14 4.17 IEC 60384-1 4.38	* The capacitors applied UR (250Vac). Then each sample shall be subjected to 20 discharges from a tank capacitor, charge to a voltage that, when discharged, places Ui 2500V for X2, Ui 5000V for X1Y2 across the capacitor under test. The interval between successive discharges shall be 5 sec.	* The cheese cloth shall not burn with a flame.															
11.	Thermal shock Ref. MIL-STD-202 Method 107		* Conduct 300 cycles according to the temp. and time. <table><tr><th>Step</th><th>Temp.(°C)</th><th>Time(min.)</th></tr><tr><td>1</td><td>Min. operating temp. +0/-3</td><td>15±3</td></tr><tr><td>2</td><td>Max. operating temp. +3/-0</td><td>15±3</td></tr></table> * Max. transfer time : 20 sec. * Before initial measurement (X7R only) : Perform 150 +0/-10°C for 1 hr and then set for 24±2 hrs at room temp. * Measurement to be made after keeping at room temp. for 24±2 hrs.	Step	Temp.(°C)	Time(min.)	1	Min. operating temp. +0/-3	15±3	2	Max. operating temp. +3/-0	15±3	* No remarkable damage. * Cap. change : C0G : Within ±2.5% or ±0.25pF, whichever is larger. X7R : Within ±10.0%. * Q/D.F. value : C0G : To meet the initial requirement. X7R : D.F.≤200% of initial requirement. * I.R. : To meet the initial requirement.						
Step	Temp.(°C)	Time(min.)																	
1	Min. operating temp. +0/-3	15±3																	
2	Max. operating temp. +3/-0	15±3																	



8. RELIABILITY TEST CONDITIONS AND REQUIREMENTS

No.	Item	Standard Methods	Test Condition	Requirements
12.	High Temperature Load (Endurance) Ref. MIL-STD-202 Method 108	IEC 60384-14 4.14	* Impulse Voltage : Each individual capacitor shall be subjected to a $V_p = 5.0KV$ (X1Y2 Class Impulse 5KV) or $V_p = 2.5KV$ (X2 Class Impulse 2.5KV) impulse for three times before applied to endurance test. * Test temp. : $125 \pm 3^\circ C$. * Test time : $1000 + 48/-0$ hrs. * Applied voltage : X capacitor : $1.25U_R$ (312.5Vac). Y capacitor : $1.70U_R$ (425Vac). Once every hour the voltage shall be increased to 1000Vrms for 0.1 sec. * Measurement to be made after keeping at room temp. for 48 ± 4 hrs (Class II) * An additional test of 750Vdc (120% of the rated DC voltage) is added for safety-related automotive products.	* Impulse Voltage : No evidence of damage or flash over during test. * Appearance : No mechanical damage. * Cap. change : C0G : Within $\pm 2.5\%$ or $\pm 0.25pF$, whichever is larger. X7R within $\pm 20\%$. * D.F. value : C0G : To meet the initial requirement. X7R : D.F. $\leq 200\%$ of initial requirement. * I.R. : To meet the initial requirement. * I.R. : $\geq 1G\Omega$.
13.	Resistance to Solvents Ref. MIL-STD-202 Method 215		* Temperature : $25 \pm 5^\circ C$. * Time : $3 + 0.5/-0$ min. * Solvent : Iso-propyl alcohol.	* No remarkable damage. * Cap. : Within the specified tolerance. * Q/D.F. value : To meet the initial requirement. * I.R. : To meet the initial requirement.
14.	Mechanical Shock Ref. MIL-STD-202 Method 213		* Peak value : $1500g's$. * Wave : 1/2 sine. * Velocity : 15.4 ft/sec. * Three shocks in each direction should be applied along 3 mutually perpendicular axes of the test specimen (18 shocks).	* No remarkable damage. * Cap. : Within the specified tolerance. * Q/D.F. value : To meet the initial requirement. * I.R. : To meet the initial requirement.
15.	Solderability Ref. J-STD-002 JESD22-B102E		* Condition A Un-mounted chips 4hrs / $155^\circ C$*dry then completely immersed for 5 ± 0.5 sec in solder bath at $245 \pm 5^\circ C$. (4hrs / $155^\circ C$*dry and peak $260 + 0/-5^\circ C$ reflow profile for Mega cap) * Condition B Un-mounted chips steam 8 hrs then completely immersed for 10 ± 1sec in solder bath at $220 + 5/-0^\circ C$. * Condition C Un-mounted chips steam 8 hrs then completely immersed for 10 ± 1 sec. in solder bath at $260 + 0/-5^\circ C$.	* All terminations shall exhibit a continuous solder coating free from defects from a minimum of 95% of the critical surface area of any individual termination.



8. RELIABILITY TEST CONDITIONS AND REQUIREMENTS

No.	Item	Standard Methods	Test Condition	Requirements
16.	Board Flex Ref. AEC-Q200-005		* The middle part of substrate shall be pressurized by means of the pressurizing rod at a rate of about 1 mm per second until the deflection becomes 3mm and then the pressure shall be maintained for 60±1 sec. * Measurement to be made after keeping at room temp. for 24±2 hrs.	* No remarkable damage. * Cap. : Within the specified tolerance. * Q/D.F. value : To meet the initial requirement. * I.R. : To meet the initial requirement. (This capacitance change means the change of capacitance under specified flexure of substrate from the capacitance measured before the test)
17.	Adhesive Strength of Termination Ref. AEC-Q200-006	IEC 60384-21/22 4.15 IEC 60384-1 4.13	* Pressurizing force : 2N(0402), 5N(0603), 10N(0805), 17.7N(≥1206). * Test time : 60±1 sec.	* No remarkable damage or removal of the terminations. * Capacitance within the specified tolerance. * Q/D.F. value : To meet the initial requirement. * I.R. : To meet the initial requirement.
18.	Vibration Ref. MIL-STD-202 Method 204	IEC 60384-1 4.17	* Vibration frequency : 10~2000 Hz/min. (5g's for 20 min.). * Total amplitude : 1.5mm. * 12 cycles each of 3 orientations (36 times)	* No remarkable damage. * Cap. : Within the specified tolerance. * Q/D.F. value : To meet the initial requirement. * I.R. : To meet the initial requirement.
19.	Beam Load Test Ref. AEC-Q200-003		* Break strength test. * Beam speed : 2.5±0.25 mm/sec.	The chip endure following force : Chip length ≤2.5mm : Thickness >0.5mm (20N), ≤0.5mm (8N). Chip length ≥3.2mm : Thickness ≥1.25mm (54.5N), <1.25mm (15N).



9. PACKAGE DIMENSION AND QUANTITY

Size	Thickness (mm)	Plastic tape	
		7" reel	13" reel
1808(4520)	1.25±0.10	2k	10k
	1.40±0.15	2k	10k
	1.60±0.20	2k	8k
	2.00±0.20	1k	6k
1812(4532)	1.25±0.10	1k	5k
	1.60±0.20	1k	4k
	2.00±0.20	1k	3k
	2.50±0.30	0.5k	3k
2211(5728)	1.60±0.20	1k	4k
	2.00±0.20	1k	3k
	2.50±0.30	0.5k	3k
	2.80±0.30	0.5k	-
2220(5750)	2.00±0.20	1k	3k
	2.50±0.30	0.5k	2k
	2.80±0.30	0.5k	2k

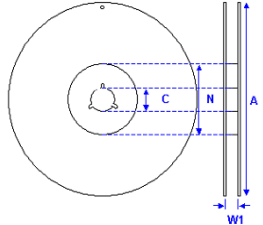
REEL DIMENSIONS		
Size	1808, 1812, 2211, 2220	
Reel size	7"	
C	13.0 +0.5/-0.2	
W ₁	12.4 +2.0/-0	
A	178.0 ±0.1	
N	60.0 +1.0/-0	

Fig. 9.1 The dimension of reel

9.1. EMBOSSED TAPE DIMENSIONS

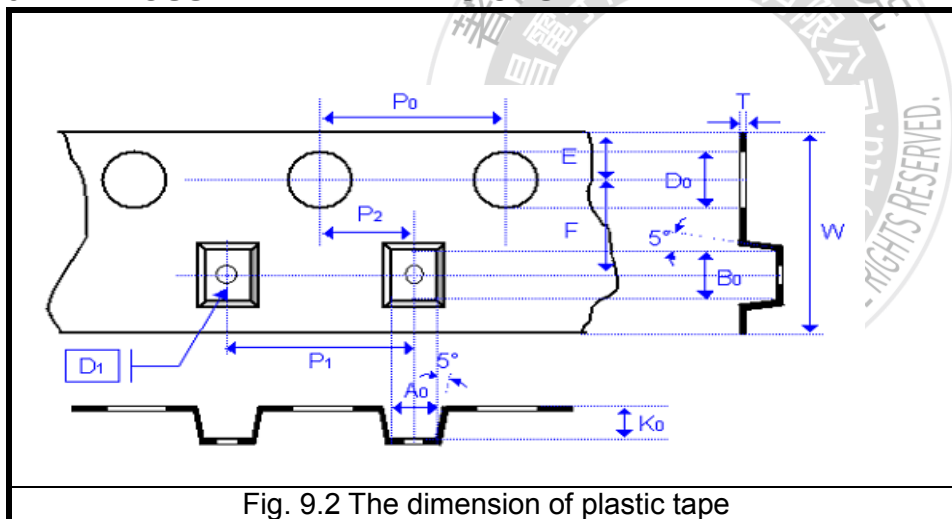


Fig. 9.2 The dimension of plastic tape

Size	1808		1812		2211		2220	
Chip Thickness	1.25±0.10 1.40±0.15 1.60±0.20	2.00±0.20	1.25±0.10 1.60±0.20 2.00±0.20	2.50±0.30	1.60±0.20 2.00±0.20 2.80±0.30	2.50±0.30 2.80±0.30	2.00±0.20	2.50±0.30 2.80±0.30
A ₀	<2.50	<2.50	<3.90	<3.90	<3.30	<3.30	<5.80	<5.80
B ₀	<5.30	<5.30	<5.30	<5.30	<6.50	<6.50	<6.50	<6.50
T	0.25±0.05	0.25±0.05	0.25±0.05	0.25±0.05	0.30±0.10	0.30±0.10	0.30±0.10	0.30±0.10
K ₀	<2.50	<2.50	<2.50	<3.00	<2.50	<3.10	<2.50	<3.10
W	12.00±0.20	12.00±0.20	12.00±0.20	12.00±0.20	12.00±0.20	12.00±0.20	12.00±0.20	12.00±0.20
P ₀	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10
10xP ₀	40.00±0.20	40.00±0.20	40.00±0.20	40.00±0.20	40.00±0.20	40.00±0.20	40.00±0.20	40.00±0.20
P ₁	4.00±0.10	4.00±0.10	8.00±0.10	8.00±0.10	8.00±0.10	8.00±0.10	8.00±0.10	8.00±0.10
P ₂	2.00±0.05	2.00±0.05	2.00±0.05	2.00±0.05	2.00±0.05	2.00±0.05	2.00±0.05	2.00±0.05
D ₀	1.50±0.10/-0	1.50±0.10/-0	1.50±0.10/-0	1.50±0.10/-0	1.50±0.10/-0	1.50±0.10/-0	1.50±0.10/-0	1.50±0.10/-0
D ₁	1.50±0.10	1.50±0.10	1.50±0.10	1.50±0.10	1.50±0.10	1.50±0.10	1.50±0.10	1.50±0.10
E	1.75±0.10	1.75±0.10	1.75±0.10	1.75±0.10	1.75±0.10	1.75±0.10	1.75±0.10	1.75±0.10
F	5.50±0.05	5.50±0.05	5.50±0.05	5.50±0.05	5.50±0.05	5.50±0.05	5.50±0.05	5.50±0.05
Unit :	mm	mm	mm	mm	mm	mm	mm	mm



10. APPLICATION NOTES

STORAGE

To prevent the damage of solderability of terminations, the following storage conditions are recommended :

Indoors under 5 ~ 40°C and 20% ~ 70% RH.

No harmful gases containing sulfuric acid, ammonia, hydrogen sulfide or chlorine.

Packaging should not be opened until the capacitors are required for use. If opened, the pack should be re-sealed as soon as is practicable. Taped product should be stored out of direct sunlight, which might promote deterioration in tape or adhesion performance. The product is recommended to be used within 12 months after shipment and checked the solderability before use.

HANDLING

Chip capacitors are dense, hard, brittle, and abrasive materials. They are liable to suffer mechanical damage, in the form of cracks or chips. Chip Capacitors should be handled with care to avoid contamination or damage. To use vacuum or plastic tweezers to pick up or plastic tweezers is recommended for manual placement. Tape and reeled packages are suitable for automatic pick and placement machine.

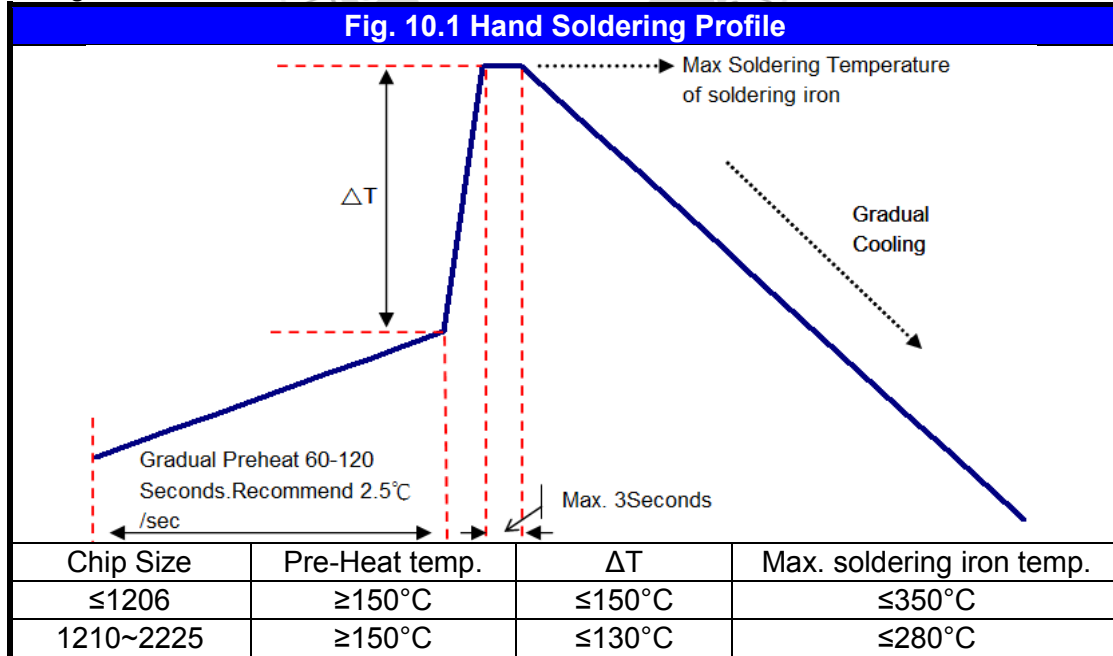
PREHEAT

In order to minimize the risk of thermal shock during soldering, a carefully controlled preheat is required. The rate of preheat should not exceed 3°C per second.

SOLDERING

Use mildly activated rosin fluxes do not use activated flux. The amount of solder in each solder joint should be controlled to prevent the damage of chip capacitors caused by the stress between solder, chips, and substrate.

a.) Hand soldering :



* Soldering iron tip diameter ≤ 1.0 mm and wattage max. 20W.

* The Capacitors shall be pre-heated and that the temperature gradient between the devices and the tip of the soldering iron.

* The required amount of solder shall be melted on the soldering tip.

* The tip of iron should not contact the ceramic body directly.

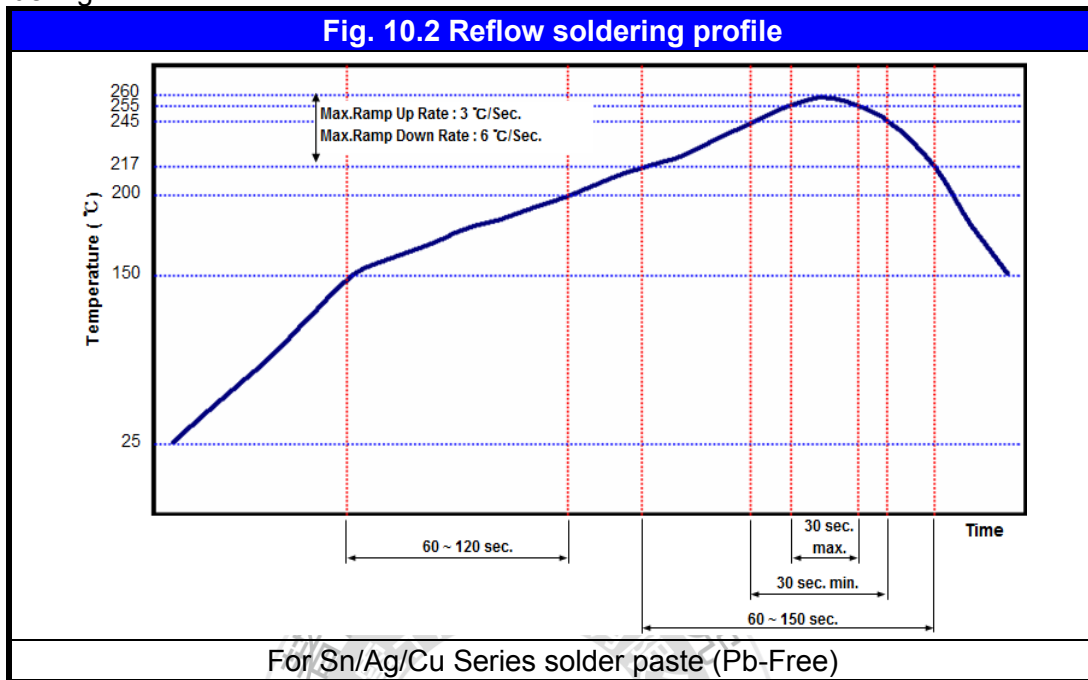
* The Capacitors shall be cooled gradually at room temperature after soldering.

* Forced air cooling is not allowed.



10. APPLICATION NOTES

b.) Reflow soldering :

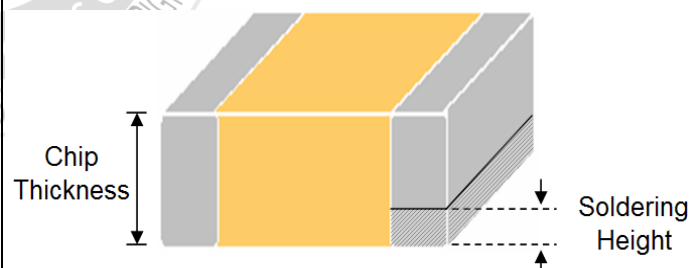


c.) Wave soldering :

Do not apply wave soldering for size >1206 products, the condition for FH06X series products please contact with our sales representative.

Soldering height :

The solder climbing minimum height is suggesting to 25% of chip thickness or 500um whichever is less.
 (Reference from IPC-610E)



COOLING

After soldering, cool the chips and the substrate gradually to room temperature. Natural cooling in air is recommended to minimize stress in the solder joint.

CLEANING

All flux residues must be removed by using suitable electronic-grade vapor-cleaning solvents to eliminate contamination that could cause electrolytic surface corrosion. Good results can be obtained by using ultrasonic cleaning of the solvent. The choice of the proper system is depends upon many factors such as component mix, flux, and solder paste and assembly method. The ability of the cleaning system to remove flux residues and contamination from under the chips is very important.

Surface coating products are not suitable cleaning/washing by solvent

