

SPECIFICATIONS

Customer	
Product Name	Common Mode Chokes
Sunlord Part Number	CWS7060EF-SERIES
Customer Part Number	

New Released, Revised]

SPEC No.: ES031-06

【This SPEC is total 9 pages including specifications and appendix.】

【ROHS Compliant Parts】

Approved By	Checked By	Issued By
Yuanfang Liu	-	Simei Yu

Shenzhen Sunlord Electronics Co., Ltd.

Address: Sunlord Industrial Park, Dafuyuan Industrial Zone, Guanlan, Shenzhen, China 518110
Tel: 0086-755-29832333 Fax: 0086-755-82269029 E-Mail: sunlord@sunlordinc.com

【For Customer approval Only】

Date: _____

Qualification Status: Full Restricted Rejected

Approved By	Verified By	Re-checked By	Checked By

Comments:

Rev.	Effective Date	Changed Contents	Change reasons	Approved By
01	Jun.29, 2020	New release	/	Simei Yu
02	Dec.14, 2021	1. Modify diagram 2. Delete item 2 electrical description in the specification 3. Voltage withstand test conditions are added at the electrical remarks	/	Simei Yu
03	Oct.16, 2022	Add common mode and differential mode test methods	/	Simei Yu
04	Nov.25, 2022	Add CWS7060EF-222T curve	/	Simei Yu
05	Nov.29, 2022	1.Modify common mode and differential mode test methods 2.Add electrical schematic diagram	/	Simei Yu
06	Jan.10,2023	Revised 501 impedance definition standard	/	Simei Yu
07	Jan.31,2023	Added L value test criteria	/	Simei Yu

Caution:

All products listed in this specification are developed, designed and intended for use in general electronics equipment. The products are not designed or warranted to meet the requirements of the applications listed below, whose performance and/or quality require especially high reliability, or whose failure, malfunction or trouble might directly cause damage to society, person, or property. Please understand that we are not responsible for any damage or liability caused by use of the products in any of the applications below. Please contact us for more details if you intend to use our products in the following applications.

1. Aircraft equipment
2. Aerospace equipment
3. Undersea equipment
4. Nuclear control equipment
5. military equipment
6. Power plant equipment
7. Medical equipment
8. Transportation equipment (automobiles, trains, ships,etc.)
9. Traffic signal equipment
10. Disaster prevention / crime prevention equipment
11. Applications of similar complexity or with reliability requirements comparable to the applications listed in the above

1. Scope

This specification applies to CWS7060EF-SERIES Common Mode Chokes

2. Product Description and Identification (Part Number)

1) Description

Common Mode Chokes, CWS7060EF-701T,

2) Product Identification (Part Number)

CWS 7060 EF -701 T
 ① ② ③ ④ ⑤

① Type		② External Dimensions (mm)	
CWS		7060	
③ Configuration		④ Nominal Impedance [Ω]	
EF		Example	
⑤ Packing		701	
T		700	

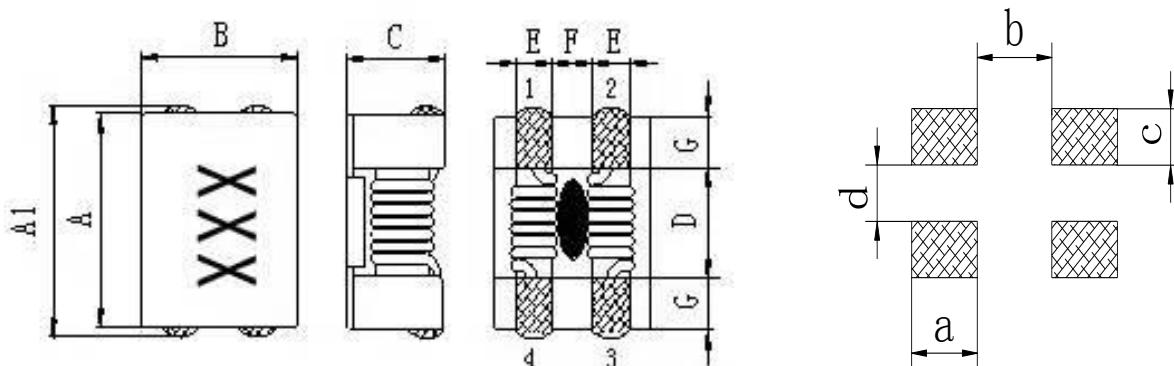
3. Electrical Characteristics

Please refer to **Appendix A** (Page 6)

- 1) Operating temperature (Including self-generated heat): $-40^{\circ}\text{C} \sim +125^{\circ}\text{C}$
- 2) Storage temperature and humidity range (product with packing): $0^{\circ}\text{C} \sim +40^{\circ}\text{C}$, RH 70% Max.

4. Shape and Dimensions

1. Dimensions and recommended PCB pattern for reflow soldering:.



Symbol	A	A1	B	C.	D	E	F	G	a	b	c	d
CWS7060EF	7.0 ± 0.5	7.5 ± 0.6	6.0 ± 0.5	3.8Max	3.5Ref.	1.5Ref.	1.5Ref	1.7Ref	3.0	2.9	1.9	1.3

Marking: White "XXX".

Remarks: A size does not contain solder point.

2. Material List

Symbol	Components	Material
a	Core	Ferrite core
b	Wire	Enamelled copper wire
c	Base	Plastic
d	Adhesive	Epoxy resin
e	Terminal	Sn /Cu
f	Ink	White

5. Test and Measurement Procedures

5.1 Test Conditions

5.1.1 Unless otherwise specified, the standard atmospheric conditions for measurement/test as:

- Ambient Temperature: $20 \pm 15^{\circ}\text{C}$
- Relative Humidity: $65 \pm 20\%$
- Air Pressure: 86 KPa to 106 KPa

5.1.2 If any doubt on the results, measurements/tests should be made within the following limits:

- Ambient Temperature: $20 \pm 2^\circ\text{C}$
- Relative Humidity: $65 \pm 5\%$
- Air Pressure: 86KPa to 106 KPa

5.2 Visual Examination

- Inspection Equipment: 20 X magnifier

5.3 Electrical Test

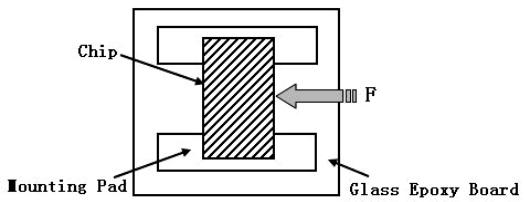
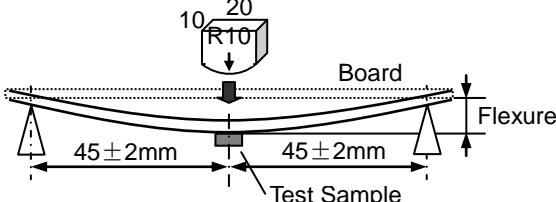
5.3.1 DC Resistance (DCR)

- Refer to **Appendix A**.
- Test equipment (Analyzer): HIOKI3540 or equivalent.

5.3.2 Rated Current

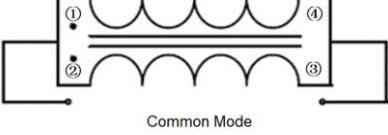
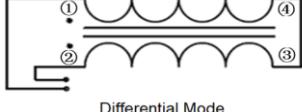
- Refer to **Appendix A**.
- Test equipment: Agilent E3633A, NF ZM2355, R2M-2H3 or equivalent
- DC current (A) that will cause an approximate ΔT of 40°C (reference ambient temperature is 25°C)

5.4 Reliability Test

Item	Requirements	Test Methods and Remarks								
5.4.1 Terminal Strength	No removal or split of the termination or other defects shall occur.	<p>① The test samples shall be soldered to the board by the reflow. Then apply force to X and Y directions.</p> <p>② Applied force: 5N .</p> <p>③ Keep time: 5s</p> <p>④ Speed: 1.0 mm/s.</p> 								
5.4.2 Resistance to Flexure	<p>① No visible mechanical damage.</p> <p>② Impedance change: within $\pm 30\%$.</p>	<p>d. The test samples shall be soldered to the board by the reflow. Then apply force in the direction of the arrow.</p> <p>e. Flexure: 2mm</p> <p>f. Pressurizing Speed: 0.5mm/sec.</p> <p>g. Keep time: ≥ 5 sec.</p> 								
5.4.3 Vibration	<p>① No visible mechanical damage.</p> <p>② Impedance change: within $\pm 30\%$.</p>	<p>① The test samples shall be soldered to the board by the reflow. Then it shall be submitted to below test conditions.</p> <table border="1" data-bbox="865 1650 1421 1852"> <tr> <td>Fre. Range</td><td>10~55Hz</td></tr> <tr> <td>Total Amplitude</td><td>1.5mm(May not exceed acceleration 196 m/s^2)</td></tr> <tr> <td>Sweeping Method</td><td>10Hz to 55Hz to 10Hz for 1 min.</td></tr> <tr> <td>Time</td><td>For 2 hours on each X,Y,Z axis.</td></tr> </table> <p>② Recovery: At least 2 hours of recovery under the standard condition after the test, followed by the measurement within 24 hours.</p>	Fre. Range	10~55Hz	Total Amplitude	1.5mm(May not exceed acceleration 196 m/s^2)	Sweeping Method	10Hz to 55Hz to 10Hz for 1 min.	Time	For 2 hours on each X,Y,Z axis.
Fre. Range	10~55Hz									
Total Amplitude	1.5mm(May not exceed acceleration 196 m/s^2)									
Sweeping Method	10Hz to 55Hz to 10Hz for 1 min.									
Time	For 2 hours on each X,Y,Z axis.									

5.4.4 Solderability	95% or more of mounting terminal side shall be covered with fresh solder.	<p>① The test samples shall be dipped in flux, and the immersed in molten solder.</p> <p>② Solder Temperature: $240\pm5^{\circ}\text{C}$</p> <p>③ Keep time: $3\pm0.5\text{s}$</p> <p>④ Immersion depth: all sides of mounting terminal shall be immersed.</p> <p>⑤ Flux: 25% Rosin and 75% ethanol in weight.</p>															
5.4.5 Resistance to Soldering Heat	<p>① No visible mechanical damage.</p> <p>② Impedance change: within $\pm30\%$.</p>	<p>① The test sample shall be exposed to reflow oven as below.</p> <table border="1"> <tr> <td>$230\pm5^{\circ}\text{C}$</td> <td>40s</td> </tr> <tr> <td>Peak tem. at $260\pm5^{\circ}\text{C}$</td> <td>5s</td> </tr> </table> <p>② Reflow time: 2times.</p> <p>③ Recovery: At least 2 hours of recovery under the standard condition after the test , followed by the measurement within 24 hours.</p>	$230\pm5^{\circ}\text{C}$	40s	Peak tem. at $260\pm5^{\circ}\text{C}$	5s											
$230\pm5^{\circ}\text{C}$	40s																
Peak tem. at $260\pm5^{\circ}\text{C}$	5s																
5.4.6 Thermal Shock	<p>① No visible mechanical damage.</p> <p>② Impedance change: within $\pm30\%$.</p>	<p>① The test samples shall be soldered to the board by the reflow. Then it shall be placed at specified temperature for specified time by step 1 to step 4 as shown in below table in sequence.</p> <table border="1"> <thead> <tr> <th>Step</th> <th>Temperature($^{\circ}\text{C}$)</th> <th>Duration(min)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>-25</td> <td>30 ± 3</td> </tr> <tr> <td>2</td> <td>Room temperature</td> <td>Within 3</td> </tr> <tr> <td>3</td> <td>+85</td> <td>30 ± 3</td> </tr> <tr> <td>4</td> <td>Room temperature</td> <td>Within 3</td> </tr> </tbody> </table> <p>② Number of cycle: 100cycles.</p> <p>③ Recovery: At least 2 hours of recovery under the standard condition after the test , followed by the measurement within 24 hours.</p>	Step	Temperature($^{\circ}\text{C}$)	Duration(min)	1	-25	30 ± 3	2	Room temperature	Within 3	3	+85	30 ± 3	4	Room temperature	Within 3
Step	Temperature($^{\circ}\text{C}$)	Duration(min)															
1	-25	30 ± 3															
2	Room temperature	Within 3															
3	+85	30 ± 3															
4	Room temperature	Within 3															
5.4.7 Damp heat	<p>① No visible mechanical damage.</p> <p>② Impedance change: within $\pm30\%$.</p>	<p>① The test samples shall be soldered to the board by the reflow. Then it shall be submitted to below test conditions.</p> <table border="1"> <tr> <td>Temperature</td> <td>$60\pm2^{\circ}\text{C}$</td> </tr> <tr> <td>Humidity</td> <td>90~95%RH</td> </tr> <tr> <td>Time</td> <td>96hour</td> </tr> </table> <p>② Recovery: At least 2 hours of recovery under the standard condition after the test , followed by the measurement within 24 hours.</p>	Temperature	$60\pm2^{\circ}\text{C}$	Humidity	90~95%RH	Time	96hour									
Temperature	$60\pm2^{\circ}\text{C}$																
Humidity	90~95%RH																
Time	96hour																

Item	Requirements	Test Methods and Remarks								
5.4.8 Loading Under Damp Heat	<p>① No visible mechanical damage.</p> <p>② Impedance change: within $\pm30\%$.</p>	<p>① The test samples shall be soldered to the board by the reflow. Then it shall be submitted to below test conditions.</p> <table border="1"> <tr> <td>Temperature</td> <td>$60\pm2^{\circ}\text{C}$</td> </tr> <tr> <td>Humidity</td> <td>90~95%RH</td> </tr> <tr> <td>Applied current</td> <td>Rated current</td> </tr> <tr> <td>Time</td> <td>96hour</td> </tr> </table> <p>② Recovery: At least 2 hours of recovery under the standard condition after the test , followed by the measurement within 24 hours.</p>	Temperature	$60\pm2^{\circ}\text{C}$	Humidity	90~95%RH	Applied current	Rated current	Time	96hour
Temperature	$60\pm2^{\circ}\text{C}$									
Humidity	90~95%RH									
Applied current	Rated current									
Time	96hour									
5.4.9 Resistance to Low Temperature	<p>① No visible mechanical damage.</p> <p>② Impedance change: within $\pm30\%$.</p>	<p>① The test samples shall be soldered to the board by the reflow. Then it shall be submitted to below test conditions.</p> <table border="1"> <tr> <td>Temperature</td> <td>$-25\pm3^{\circ}\text{C}$</td> </tr> <tr> <td>Time</td> <td>96hour</td> </tr> </table> <p>② Recovery: At least 2 hours of recovery under the standard condition after the test , followed by the measurement within 24 hours.</p>	Temperature	$-25\pm3^{\circ}\text{C}$	Time	96hour				
Temperature	$-25\pm3^{\circ}\text{C}$									
Time	96hour									

5.4.10 Resistance to High Temperature	<p>① No visible mechanical damage. ② Impedance change: within $\pm 30\%$.</p>	<p>① The test samples shall be submitted to below test conditions.</p> <table border="1"> <tr> <td>Temperature</td><td>85$\pm 3^\circ\text{C}$</td></tr> <tr> <td>Time</td><td>96hour</td></tr> </table> <p>② Recovery: At least 2 hours of recovery under the standard condition after the test , followed by the measurement within 24 hours.</p>	Temperature	85 $\pm 3^\circ\text{C}$	Time	96hour		
Temperature	85 $\pm 3^\circ\text{C}$							
Time	96hour							
5.4.11 Loading at High Temperature (Life Test)	<p>① No visible mechanical damage. ② Impedance change: within $\pm 30\%$.</p>	<p>① The test samples shall be soldered to the board by the reflow. Then it shall be submitted to below test conditions.</p> <table border="1"> <tr> <td>Temperature</td><td>85$\pm 3^\circ\text{C}$</td></tr> <tr> <td>Applied current</td><td>Rated current</td></tr> <tr> <td>Time</td><td>96hour</td></tr> </table> <p>② Recovery: At least 2 hours of recovery under the standard condition after the test , followed by the measurement within 24 hours.</p>	Temperature	85 $\pm 3^\circ\text{C}$	Applied current	Rated current	Time	96hour
Temperature	85 $\pm 3^\circ\text{C}$							
Applied current	Rated current							
Time	96hour							
5.4.12 Impedance (Common Mode)	Refer to Electrical Characteristics	<p>Test equipment: High Accuracy RF LCR Meter Agilent 4287A/E4991A or equivalent.</p> <p>Common Mode Impedance is tested according to the following circuit.</p> 						
5.4.13 Impedance (Differential Mode)	Refer to Electrical Characteristics	<p>Test equipment: High Accuracy RF LCR Meter Agilent 4287A/E4991A or equivalent.</p> <p>Differential Mode Impedance is tested according to the following circuit.</p> 						

6. Packaging

6.1 Tape Carrier Packaging:

Packaging code: T

- (1) Tape carrier packaging are specified in attached figure **Fig.6.1-1~2**
- (2) Tape carrier packaging quantity:

a. Reel Drawings (Unit: mm)

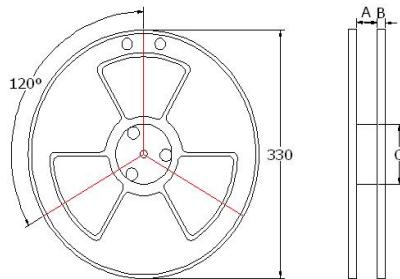


Fig.6.1-1

c. Taping Dimensions (Unit: mm)

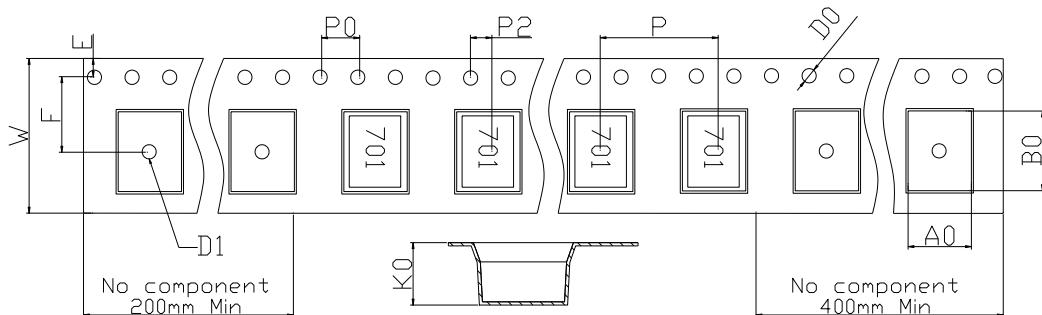


Fig.6.1-2

Type	Tape dimensions (mm)										
	W	P	P0	P2	D0	D1	E	F	A0	B0	K0
CWS7060EF	16	12	4.0	2.0	1.5	1.5	1.75	7.5	6.35	7.85	3.80

Type	Standard Quantity		
	Reel(Pcs)	Middle Carton(Pcs)	Big Carton(Pcs)
CWS7060EF	1500	1500	7500

c. Peeling off force: 10gf to 130gf in the direction show below.

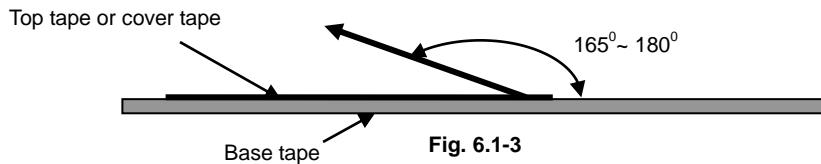
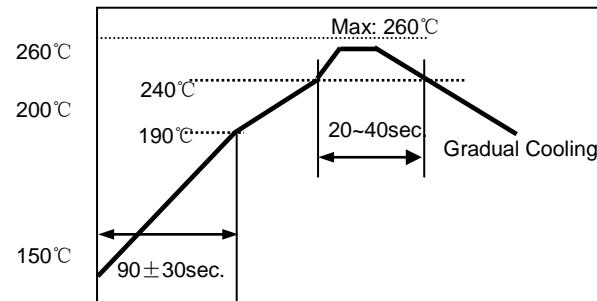


Fig. 6.1-3

7. Recommended Soldering Technologies

7.1 Re-flowing Profile:

- △ 1~2 °C/sec. Ramp
- △ Pre-heating: 150~190°C/90±30 sec.
- △ Time above 240°C: 20~40sec
- △ Peak temperature: 260°C Max./5sec;
- △ Solder paste: Sn/3.0Ag/0.5Cu
- △ Max.2 times for Re-flowing

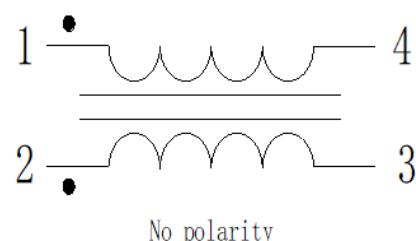


Appendix A: Electrical Characteristics(@ 25°C)

Part Number	Impedance	Max. DC Resistance	Rated Current Typ	Rated Voltage Max	Insulation Resistance Min	Inductance (Ref)
Units	Ω	mΩ	A	V(DC)	MΩ	(uH)
Symbol	Z _{com}	-				L (1-4) (2-3)
Test Condition	100MHz	-	ΔT≤40°C			100KHz/1V
CWS7060EF-400T	40Min / 70Typ	5	15	125	10	1.10
CWS7060EF-101T	100 Min / 140Typ	10	9	125	10	1.60
CWS7060EF-301T	225Min / 300Typ	10	5	125	10	3.30
CWS7060EF-501T	400Min /600Typ	10	5	125	10	4.50
CWS7060EF-601T	500Min /700Typ	15	4	125	10	5.60
CWS7060EF-701T	500Min /700Typ	15	4	125	10	5.60
CWS7060EF-102T	800Min / 1020Typ	17	3	125	10	6.80
CWS7060EF-132T	910Min / 1300Typ	21	2.5	125	10	9.50
CWS7060EF-222T	1700Min / 2200Typ	50	1.2	125	10	20.0
CWS7060EF-272T	2000Min / 2700Typ	63	1.0	125	10	22.5
CWS7060EF-302T	2500Min / 3000Typ	75	0.9	125	10	26.0

Withstand voltage test: AC250V/0.5mA/2S

B: ELECTRICAL SCHEMATIC



Curve:

