

SPECIFICATIONS

Customer	
Product Name	Common Mode Chokes
Sunlord Part Number	CWS1211EF-SERIES
Customer Part Number	

[☒New Released, ☐Revised]

SPEC No.: CWS1002230000

【This SPEC is total 11 pages including specifications and appendix.】

【ROHS Compliant Parts.】

Approved By	Checked By	Issued By

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【For Customer approval Only】

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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	/	New release	/	Zeng Sui

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 CWS1211EF-SERIES Common Mode Chokes

2. Product Description and Identification (Part Number)

- 1) Description
Common Mode Chokes,
Product Identification (Part Number)

CWS 1211 EF -701 I
① ② ③ ④ ⑤

①Type	
CWS	Common Mode Chokes

③Configuration	
EF	EF Type Base

⑤Packing	
T	Tape Package

②External Dimensions (mm)	
1211	

④Nominal Impedance [Ω]	
Example	Example
701	700

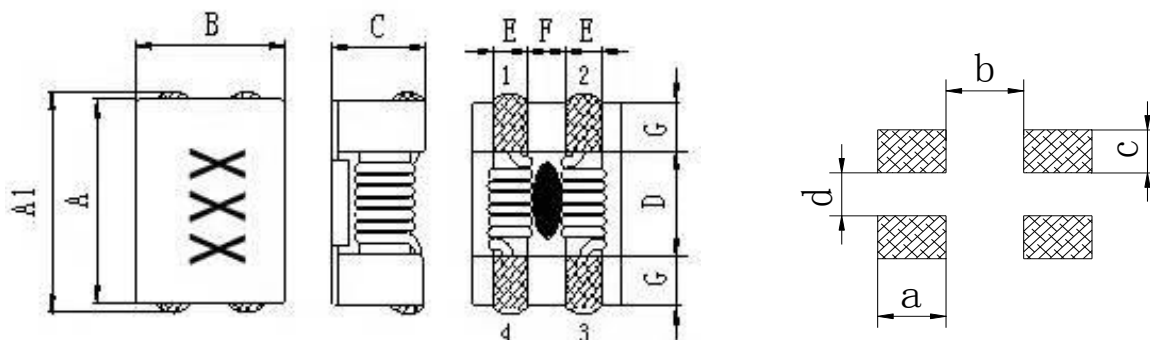
3. Electrical Characteristics

Please refer to **Appendix A**

- Operating temperature (Including self-generated heat): -40℃~+125℃
- Storage temperature and humidity range (product with packing): 0℃~+40℃, RH 70% Max.

4. Shape and Dimensions

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



Unit: mm

Symbol	A	A1	B	C	D	E	F	G	a	b	c	d
CWS1211EF	12±0.5	12.5±0.6	10.8±0.5	6.6Max	7.0Ref.	2.7Ref.	2.5Ref	2.5Ref	3.9	6.1	3.1	2.3

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:

- a. Ambient Temperature: $20 \pm 15^{\circ}\text{C}$
- b. Relative Humidity: $65 \pm 20\%$
- c. 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:

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

5.2 Visual Examination

- a. Inspection Equipment: 20 X magnifier

5.3 Electrical Test

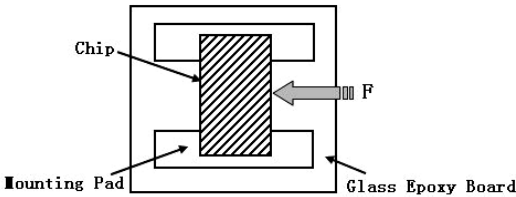
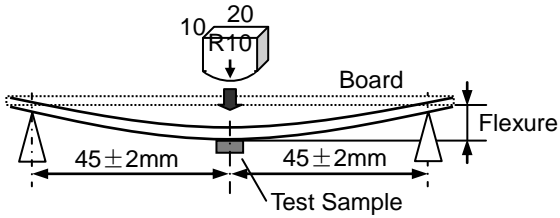
5.3.1 DC Resistance (DCR)

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

5.3.2 Rated Current

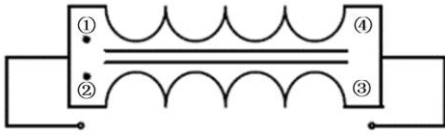

- a. Refer to Appendix A.
- b. Test equipment: Agilent E3633A, NF ZM2355, R2M-2H3 or equivalent
- c. DC current (A) that will cause an approximate ΔT of 40°C (reference ambient temperature is 25°C)

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.	<div>① The test samples shall be soldered to the board by the reflow. Then apply force to X and Y directions.</div> <div>② Applied force: 5N</div> <div>③ Keep time: 5s</div> <div>④ Speed: 1.0 mm/s.</div> <div></div>								
5.4.2 Resistance to Flexure	<div>① No visible mechanical damage.</div> <div>② Impedance change: within ±30%.</div>	<div>d. The test samples shall be soldered to the board by the reflow. Then apply force in the direction of the arrow.</div> <div>e. Flexure: 2mm</div> <div>f. Pressurizing Speed: 0.5mm/sec.</div> <div>g. Keep time: ≥ 5 sec.</div> <div></div>								
5.4.3 Vibration	<div>① No visible mechanical damage.</div> <div>② Impedance change: within ±30%.</div>	<div>① The test samples shall be soldered to the board by the reflow. Then it shall be submitted to below test conditions.</div> <table><tr><td>Fre. Range</td><td>10~55Hz</td></tr><tr><td>Total Amplitude</td><td>1.5mm(May not exceed acceleration 196 m/s²)</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> <div>② Recovery: At least 2 hours of recovery under the standard condition after the test, followed by the measurement within 24 hours.</div>	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.	① The test samples shall be dipped in flux, and the immersed in molten solder. ② Solder Temperature: 240±5℃ ③ Keep time: 3±0.5s ④ Immersion depth: all sides of mounting terminal shall by immersed. ⑤ Flux: 25% Rosin and 75% ethanol in weight.															
5.4.5 Resistance to Soldering Heat	No visible mechanical damage. Impedance change : within ± 30%.	① The test sample shall be exposed to reflow oven as below. <table><tr><td>230±5℃</td><td>40s</td></tr><tr><td>Peak tem. at 260±5℃</td><td>5s</td></tr></table> ② Reflow time: 2times. ③ Recovery: At least 2 hours of recovery under the standard condition after the test , followed by the measurement within 24 hours.	230±5℃	40s	Peak tem. at 260±5℃	5s											
230±5℃	40s																
Peak tem. at 260±5℃	5s																
5.4.6 Thermal Shock	① No visible mechanical damage. ② Impedance change : within ± 30%.	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. <table><tr><td>Step</td><td>Temperature(℃)</td><td>Duration(min)</td></tr><tr><td>1</td><td>-40</td><td>30±3</td></tr><tr><td>2</td><td>Room temperature</td><td>Within 3</td></tr><tr><td>3</td><td>+125</td><td>30±3</td></tr><tr><td>4</td><td>Room temperature</td><td>Within 3</td></tr></table> ② Number of cycle: 100cycles. ③ Recovery: At least 2 hours of recovery under the standard condition after the test , followed by the measurement within 24 hours.	Step	Temperature(℃)	Duration(min)	1	-40	30±3	2	Room temperature	Within 3	3	+125	30±3	4	Room temperature	Within 3
Step	Temperature(℃)	Duration(min)															
1	-40	30±3															
2	Room temperature	Within 3															
3	+125	30±3															
4	Room temperature	Within 3															
5.4.7 Damp Heat	① No visible mechanical damage. ② Impedance change : within ± 30%	① The test samples shall be soldered to the board by the reflow. Then it shall be submitted to below test conditions. <table><tr><td>Temperature</td><td>60±2℃</td></tr><tr><td>Humidity</td><td>90~95%RH</td></tr><tr><td>Time</td><td>96hour</td></tr></table> ② Recovery: At least 2 hours of recovery under the standard condition after the test, followed by the measurement within 24 hours.	Temperature	60±2℃	Humidity	90~95%RH	Time	96hour									
Temperature	60±2℃																
Humidity	90~95%RH																
Time	96hour																

Item	Requirements	Test Methods and Remarks								
5.4.8 Loading Under Damp Heat	① No visible mechanical damage. ② Impedance change : within ± 30%	① The test samples shall be soldered to the board by the reflow. Then it shall be submitted to below test conditions. <table><tr><td>Temperature</td><td>60±2℃</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> ② Recovery: At least 2 hours of recovery under the standard condition after the test, followed by the measurement within 24 hours.	Temperature	60±2℃	Humidity	90~95%RH	Applied current	Rated current	Time	96hour
Temperature	60±2℃									
Humidity	90~95%RH									
Applied current	Rated current									
Time	96hour									
5.4.9 Resistance to Low Temperature	① No visible mechanical damage. ② Impedance change : within ± 30%	① The test samples shall be soldered to the board by the reflow. Then it shall be submitted to below test conditions. <table><tr><td>Temperature</td><td>-40±3℃</td></tr><tr><td>Time</td><td>96hour</td></tr></table> ② Recovery: At least 2 hours of recovery under the standard condition after the test, followed by the measurement within 24 hours.	Temperature	-40±3℃	Time	96hour				
Temperature	-40±3℃									
Time	96hour									

5.4.10 Resistance to High Temperature	<div>① No visible mechanical damage.</div> <div>② Impedance change : within ± 30%.</div>	<div>① The test samples shall be submitted to below test conditions.</div> <table><tr><td>Temperature</td><td>125±3℃</td></tr><tr><td>Time</td><td>96hour</td></tr></table> <div>② Recovery: At least 2 hours of recovery under the standard condition after the test , followed by the measurement within 24 hours.</div>	Temperature	125±3℃	Time	96hour		
Temperature	125±3℃							
Time	96hour							
5.4.11 Loading at High Temperature (Life Test)	<div>① No visible mechanical damage.</div> <div>② Impedance change : within ± 30%.</div>	<div>① The test samples shall be soldered to the board by the reflow. Then it shall be submitted to below test conditions.</div> <table><tr><td>Temperature</td><td>85±3℃</td></tr><tr><td>Applied current</td><td>Rated current</td></tr><tr><td>Time</td><td>96hour</td></tr></table> <div>② Recovery: At least 2 hours of recovery under the standard condition after the test , followed by the measurement within 24 hours.</div>	Temperature	85±3℃	Applied current	Rated current	Time	96hour
Temperature	85±3℃							
Applied current	Rated current							
Time	96hour							
5.4.12 Impedance (Common Mode)	Refer to Electrical Characteristics	<div>Test equipment: High Accuracy RF LCR Meter Agilent 4287A/E4991A or equivalent.</div> <div>Common Mode Impedance is tested according to the following circuit.</div> <div></div> <div>Common Mode</div>						
5.4.13 Impedance (Differential Mode)	Refer to Electrical Characteristics	<div>Test equipment: High Accuracy RF LCR Meter Agilent 4287A/E4991A or equivalent.</div> <div>Differential Mode Impedance is tested according to the following circuit.</div> <div></div> <div>Differential Mode</div>						

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)

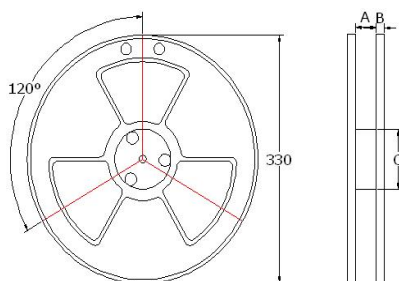


Fig.6.1-1

b. Taping Dimensions (Unit: mm)

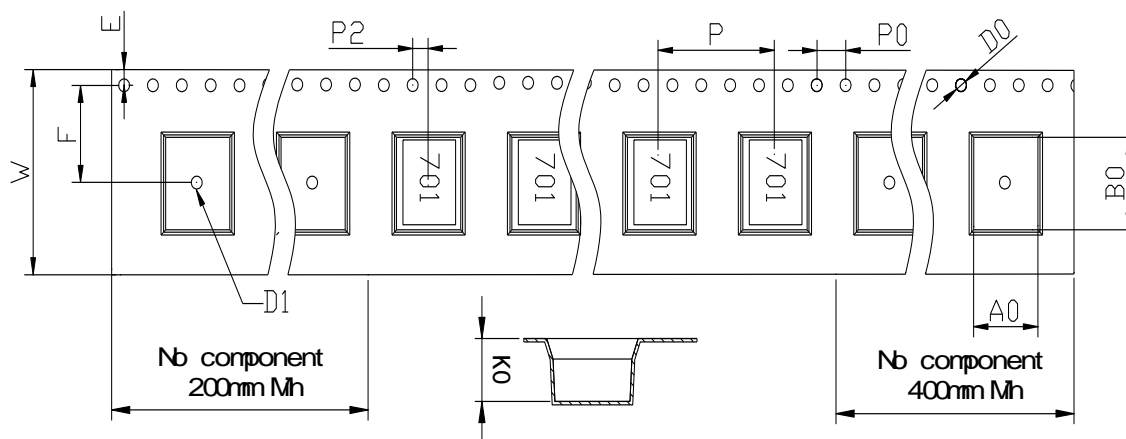


Fig.6.1-2

Type	Tape dimensions (mm)										
	W	P	P0	P2	D0	D1	E	F	A0	B0	K0
CWS1211EF	24	16	4.0	2.0	1.5	1.5	1.75	11.5	11.3	13.0	6.6

Type	Standard Quantity		
	Reel(Pcs)	Middle Carton(Pcs)	Big Carton(Pcs)
CWS1211EF	500	500	2500

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

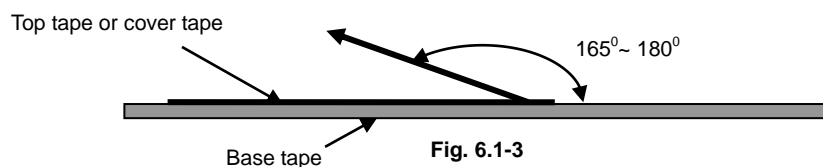


Fig. 6.1-3

6.2 Storage

- (1) The solderability of the external electrodes may deteriorate if packages are stored in high humidity. Besides, to ensure packing material's good state, packages must be stored at -10°C to 40°C and 70% RH Max.
- (2) The solderability of the external electrodes may deteriorate if packages are exposed to dust or harmful gas (e.g. HCl, sulfurous gas of H₂S).
- (3) Packaging materials may deform if packages are exposed directly to sunlight.
- (4) Minimum packages, such as polyvinyl heat-seal packages shall not be opened until they are used. If opened, use the reels as soon as possible.
- (5) Solderability shall be guaranteed for a period of time from the date of delivery on condition that they are stored at the specified environment. For those parts, which passed more than the time shall be checked solderability before using.
- (6) For magnetic products, keep clear of anything that may generate magnetic fields to avoid change of products performance.
- (7) To avoid any damage to products, do not load mechanic force on products or place heavy goods on products, and exclude strong vibration or drop.
- (8) In case of storage over 12 months, solderability shall be checked before actual usage.

7. Warning and Attention

7.1 Precautions on Use

- (1) Always wear static control bands to protect against ESD.
- (2) Any devices used with the products (soldering irons, measuring instruments) should be properly grounded.
- (3) Keep bare hands and metal conductors (i.e., metal desk) away from electrodes or conductive areas that lead to electrodes.
- (4) Preheat when soldering.
- (5) Don't apply current in excess of the rated current value. It may reduce the impedance or inductance, or cause damage to components due to over-current.
- (6) For magnetic products, keep clear of anything that may generate magnetic fields such as speakers and coils. Use non-magnetic tweezers when handling the chips.
- (7) When soldering, the electrical characteristics may be varied due to hot energy and mechanical stress.
- (8) When coating products with resin, the relatively high resin curing stress may change the electrical characteristics. For exterior

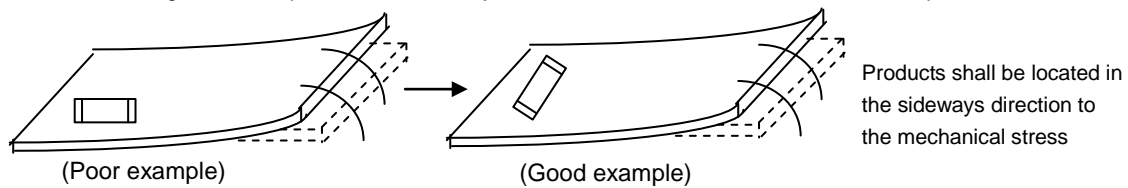
coating, select resin carefully so that electrical and mechanical performance of the product is not affected. Before using, please evaluate reliability with the product mounted in your application set.

- (9) When mount chips with adhesive in preliminary assembly, do appropriate check before the soldering stage, i.e., the size of land pattern, type of adhesive, amount applied, hardening of the adhesive on proper usage and amounts of adhesive to use.
- (10) Mounting density: Add special attention to radiating heat of products when mounting other components nearby. The excessive heat by other products may cause deterioration at joint of this product with substrate.
- (11) Since some products are constructed like an open magnetic circuit, narrow spacing between components may cause magnetic coupling.
- (12) Please do not give the product any excessive mechanical shocks in transportation.
- (13) Please do not touch wires by sharp terminals such as tweezers to avoid causing any damage to wires.
- (14) Please do not add any shock and power to the soldered product to avoid causing any damage to chip body.
- (15) Please do not touch the electrodes by naked hand as the solderability of the external electrodes may deteriorate by grease or oil on the skin.

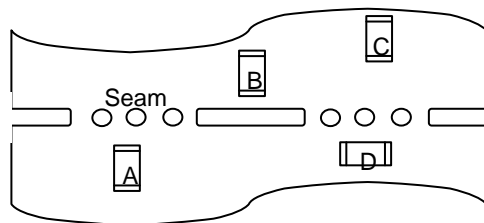
7.2 PCB Bending Design

The following shall be considered when designing and laying out PCB's.

- (1) PCB shall be designed so that products are not subjected to the mechanical stress from board warp or deflection.



- (2) Products location on PCB separation.



Product shall be located carefully because they may be subjected to the mechanical stress in order of $A > C = B > D$.

- (3) When splitting the PCB board, or insert (remove) connector, or fasten thread after mounting components, care is required so as not to give any stress of deflection or twisting to the board. Because mechanical force may cause deterioration of the bonding strength of electrode and solder, even crack of product body. Board separation should not be done manually, but by using appropriate devices.

7.3 Recommended PCB Design for SMT Land-Patterns

When chips are mounted on a PCB, the amount of solder used (size of fillet) can directly affect chip performance. Therefore, the following items must be carefully considered in the design of solder land patterns:

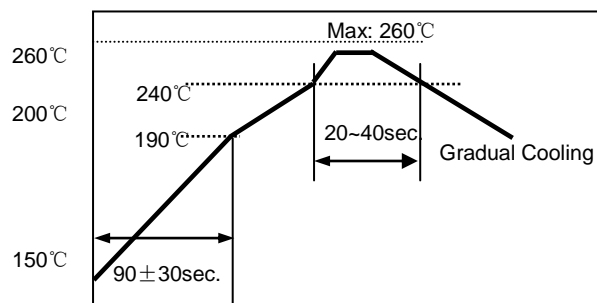
- (1) The amount of solder applied can affect the ability of chips to withstand mechanical stresses which may lead to breaking or cracking. Therefore, when designing land-patterns it is necessary to consider the appropriate size and configuration of the solder pads which in turn determines the amount of solder necessary to form the fillets.
- (2) When more than one part is jointly soldered onto the same land or pad, the pad must be designed that each component's soldering point is separated by solder-resist.

Recommended land dimensions please refer to product specification

8. Recommended Soldering Technologies

8.1 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

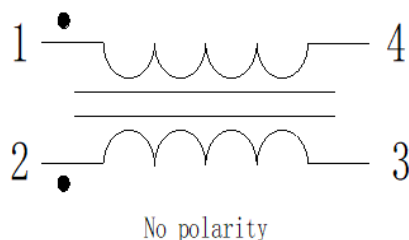


Appendix A: Electrical Characteristics(@ 25℃)

Part Number	Impedance	Impedance Test Condition	Max. DC Resistance	Rated Current Typ	Rated Voltage Max	Insulation Resistance Min
Units	Ω		m Ω	A	V(DC)	M Ω
Symbol	Zcom		-			
Test Condition	-		-	$\Delta T \leq 40^\circ\text{C}$		
CWS1211EF-800T	80Min / 140Typ	100MHz	4.0	10	125	10
CWS1211EF-701T	500 Min / 700Typ	100MHz	6.0	8.0	125	10
CWS1211EF-801T	600Min / 800Typ	100MHz	8.0	8.0	125	10
CWS1211EF-102T	750Min /1000Typ	100MHz	14	6.0	125	10
CWS1211EF-132T	910Min /1300Typ	100MHz	23	4.5	125	10
CWS1211EF-222T	2200Min / 2500Typ	100MHz	35	1.8	125	10

Withstand voltage test: AC250V/0.5mA/2S

Appendix B: ELECTRICAL SCHEMATIC



Appendix C: Curve

