

Ceramic ESD Protection Device LXES**A series

Document No. LX-1-1111 Rev1.0

p1/17

1. This specification shall be applied to the ESD Protection Device.

LXES15AAA1-133 LXES15AAA1-153 LXES03AAA1-154

2. Part Number Configuration

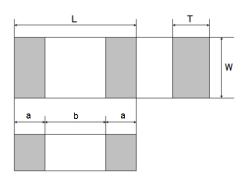
- ① Product ID (LXES = ESD Protection device)
- 2 Dimension Code

	Unit : mm
Code	Dimension
03	0.6 x 0.3
15	1.0 x 0.5

- ③ Type (A:Ceramic ESD)
- 4 Control Code
- (5) Number of channel
- 6 Serial Number

3. CONSTRUCTION, DIMENSIONS

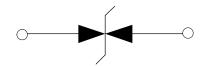
3 - 1 DIMENSIONS



Unit: mm

Size	L	W	T	а	b
0603	0.60±0.03	0.30±0.03	0.33 max	0.15±0.05	0.20 min
1005	1.00±0.05	0.50±0.05	0.33 max	0.20±0.10	0.40 min

3 - 2 Circuit Diagram



TERMINAL CONFIGURATION

This device is bi-directional.

3 - 3 Product Weight

P/N	Weight [mg]
LXES03AAA1-154	0.2
LXES15AAA1-133	0.5
LXES15AAA1-153	0.5

4. CHARACTERISTICS

4 - 1 - 1 Ratings (LXES15AAA1-133)

Parameter	Symbol	Ratings	Units
Rated Voltage	V_{DC}	15	V
Operating Temperature	T _{OP}	-40 to +85	°C
Storage Temperature	T _{STO}	-40 to +85	°C

4 - 1 - 2 Ratings (LXES15AAA1-153/ LXES03AAA1-154)

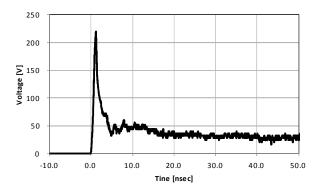
Parameter	Symbol	Ratings	Units
Rated Voltage	V_{DC}	4	V
Operating Temperature	T _{OP}	-40 to +85	°C
Storage Temperature	T _{STO}	-40 to +85	°C

4 - 2 Electrical Characteristics (T=25 deg.C)

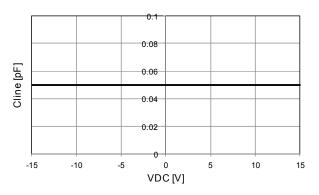
Chip size	Part No.	Capacitance	ESD IEC 61000-4-2 (Air)	ESD IEC 61000-4-2 (Contact)
	Symbol	С	-	-
[mm]	Unit	[pF]	kV	kV
	Test condition	1MHz Vbias=0V		
0603	LXES03AAA1-154	0.05 typ	±15	±15
1005	LXES15AAA1-133	0.05 typ	±15	±15
1005	LXES15AAA1-153	0.05 typ	±15	±15

4 - 3 Typical Characteristic

LXES03AAA1-154

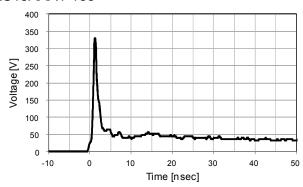


ESD Waveform (IEC61000-4-2:8kV Contact)

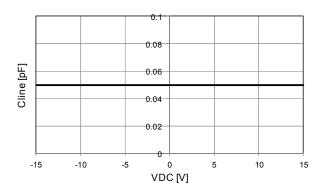


Voltage – Capacitance Characteristic

LXES15AAA1-133

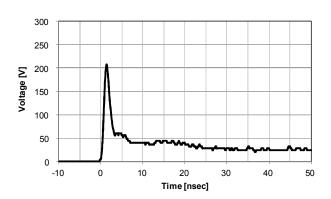


ESD Waveform (IEC61000-4-2:8kV Contact)

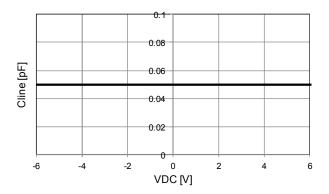


Voltage - Capacitance Characteristic

LXES15AAA1-153



ESD Waveform (IEC61000-4-2:8kV Contact)



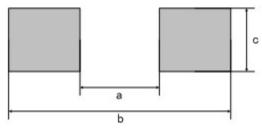
Voltage - Capacitance Characteristic

5. Reliability Test

No.	Items	Specifications	Test Methods	Number	Result (Fail)
1	Vibration Resistance	No severe damages Satisfy dimension specifications	Solder specimens on the testing jig (glass fluorine boards) shown in appended Fig.1 by a Pb free solder. The soldering shall be done either by iron or reflow and be conducted with care so that the soldering is uniform and free of defect such as by heat shock. Frequency: 10~2000 Hz Acceleration: 196 m/s2 Direction: X,Y,Z 3 axis Period: 2 h on each directionTotal 6 h.	22	G (0)
2	Shock		Solder specimens on the testing jig (glass fluorine boards) shown in appended Fig.1 by a Pb free solder. The soldering shall be done either by iron or reflow and be conducted with care so that the soldering is uniform and free of defect such as by heat shock Acceleration : 14,700 m/s2 Period : 0.3 ms. Cycle : 3 times	22	G (0)
3	Deflection		Solder specimens on the testing jig (glass epoxy boards) shown in appended Fig.2 by a Pb free solder. The soldering shall be done either by iron or reflow and be conducted with care so that the soldering is uniform and free of defect such as by heat shock. No damage with 1.6mm deflection	22	G (0)
4	Soldering strength (Push Strength)			22	G (0)
5	Solderability of Termination	75% of the terminations is to be soldered evenly and continuously.	Immerse specimens first an ethanol solution of rosin, then in a Pb free solder solution for 3±0.5 sec. at 245±5 °C. Preheat : 150 °C, 60 sec. Solder Paste : Sn-3.0Ag-0.5Cu Flux : Solution of ethanol and rosin (25 % rosin in weight proportion)	22	G (0)
6	Resistance to Soldering Heat (Reflow) Electrical specifications	No severe damages Satisfy specifications listed in paragraph 4-2 over operational temperature range	Preheat Temperature : 150-180 °C Preheat Period : 90+/-30 s High Temperature : 220 °C High Temp. Period : 30+/-10 s Peak Temperature : 260+5/-0 °C Specimens are soldered twice with the above condition, and then kept in room condition for 24 h before measurements.	22	G (0)

No.	Items	5	Specifications		Test Metho	ods	Number	Result (Fail)
7	High Temp. Exposure	Appeara nce	No severe damages	Tempera Period Room (-2/-0 °C 00+48/-0 h 24 h	22	G (0)
8	Temperature Cycle	Electrical Specifica tions	Satisfy specifications listed in paragraph 4-2 over operational temperature range	suppo and u Fig.1 accor and t table.	inder the same	e same manner e conditions as he 100 cycles nperatures the following 24 h at room	22	G (0)
9	Humidity (Steady State)			Temperature:85±2 °C Humidity:80~90 %RH Period:1000+48/-0 h Room Condition:2 ~ 24 h			22	G (0)
10	Low Temp. Exposure			Period:	ature:-40±2°C 1000+48/-0 h condition:2 ~		22	G (0)

Fig. 1 Reference Land Pattern

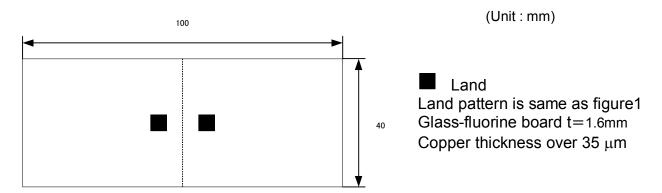


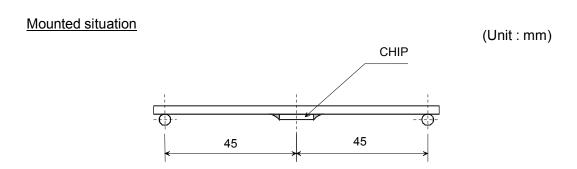
Unit: mm

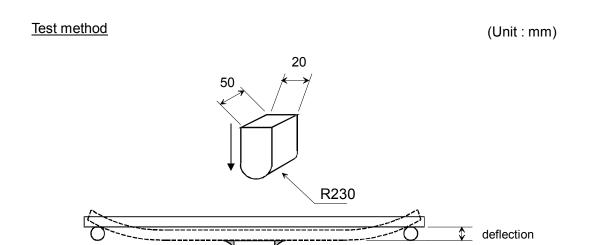
Size	а	b	С
0603	0.25	0.8	0.3
1005	0.4	1.2	0.5

Notes: this land layout is for reference purpose only.

Fig. 2 <u>Testing board</u>



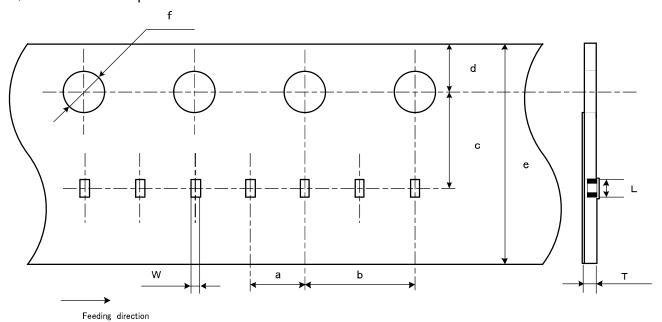




6. Tape and Reel Packing

(1) LXES03A

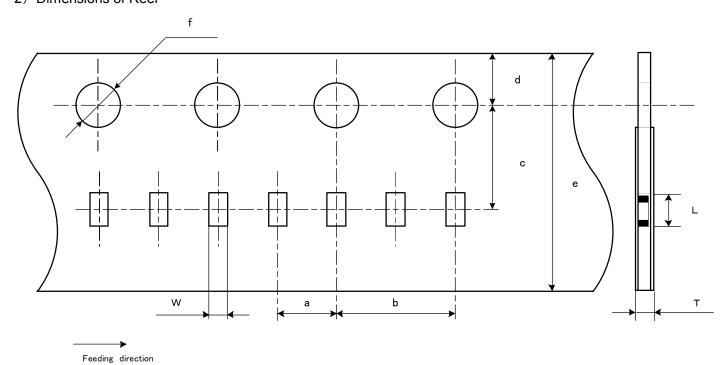
1) Dimensions of Tape



									Unit : mm
Symbol	L	W	Т	а	b	С	d	е	f
Size	(0.67)	(0.37)	0.5 max	2.00+/-0.05	4.00+/-0.10	3.50+/-0.05	1.75+/-0.1	8.00+/-0.30	φ 1.55+/-0.05

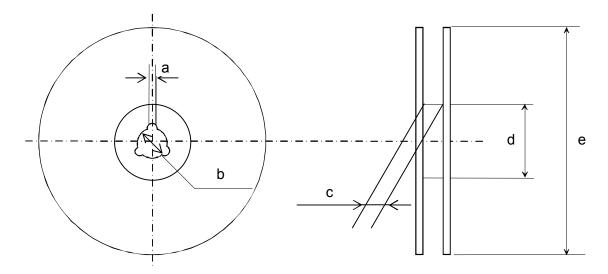
(2) LXES15A series

2) Dimensions of Reel



									Unit : mm
Symbol	L	W	Т	а	b	С	d	е	f
Size	(1.12)	(0.62)	0.5 max	2.00+/-0.05	4.00+/-0.10	3.50+/-0.05	1.75+/-0.1	8.00+/-0.30	φ 1.55+/-0.05

(3) Dimensions of Reel



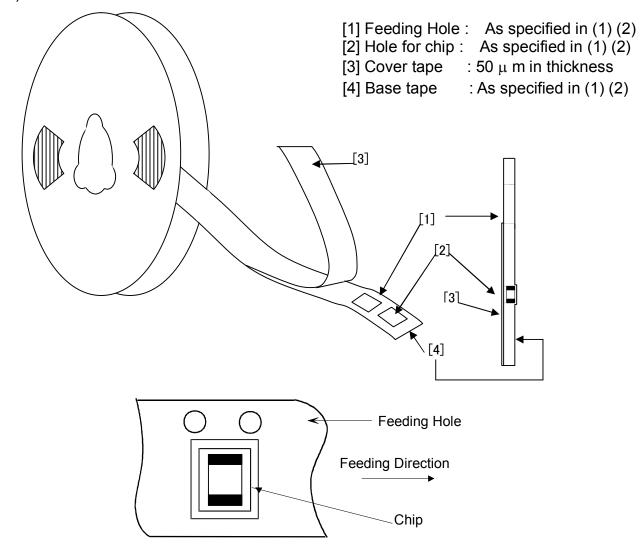
					Unit : mm
Symbol	а	b	С	d	е
Size	2.0+/-0.5	φ13.0+/-0.2	9.0+1.0/-0	φ60+1.0/-0	φ180+0/-1.5

(4) Packaging

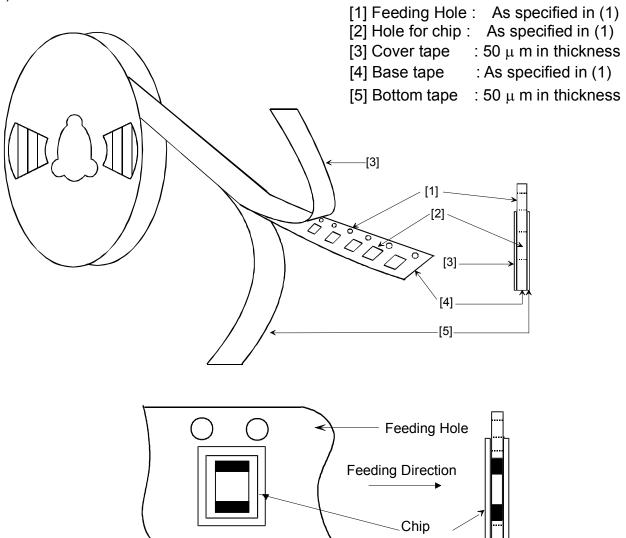
P/N	pcs / reel
LXES03AAA1-154	15,000
LXES15AAA1-133	10.000
LXES15AAA1-153	10,000

(5) Taping Diagrams

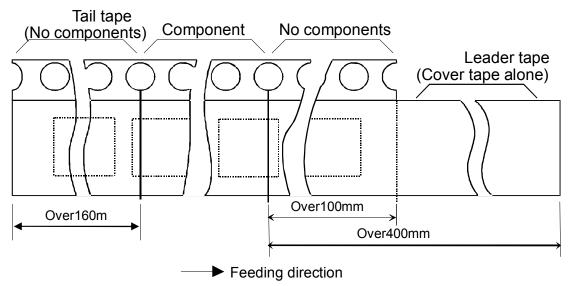
1) LXES03A series



2) LXES15A series



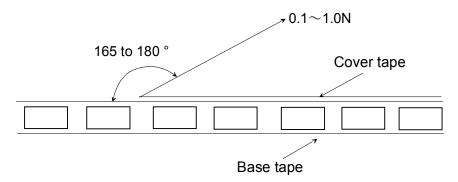
(6) Leader and Tail tape



- (7) The tape for chips are wound clockwise, the feeding holes to the right side as the tape is pulled toward the user.
- (8) Material : Base tape Paper Reel Plastic

Base tape, Reel and Top tape have an anti-ESD function.

(9) Peeling of force: 0.1~1.0 N in the direction of peeling as shown below.



NOTICE

1. Storage Conditions:

To avoid damaging the solderability of the external electrodes, be sure to observe the following points.

- Store products where the ambient temperature is 15 to 35 °C and humidity 45 to 75% RH. (Packing materials, In particular, may be deformed at the temperature over 40 °C.).
- Store products in non corrosive gas (Cl₂, NH₃,SO₂, No_x, etc.).
- Stored products should be used within 6 months of receipt. Solderability should be verified if this period is exceeded.

This product is applicable to MSL1 (Based on IPC/JEDEC J-STD-020)

2. Handling Conditions:

Be careful in handling or transporting products because excessive stress or mechanical shock may break products due to the nature of ceramics structure.

Handle with care if products may have cracks or damages on their terminals, the characteristics of products may change. Do not touch products with bear hands that may result in poor solderability.

3. Standard PCB Design (Land Pattern and Dimensions):

All the ground terminals should be connected to the ground patterns. Furthermore, the ground pattern should be provided between IN and OUT terminals. Please refer to the specifications for the standard land dimensions.

The recommended land pattern and dimensions is as Murata's standard. The characteristics of products may vary depending on the pattern drawing method, grounding method, land dimensions, land forming method of the NC terminals and the PCB material and thickness. Therefore, be sure to verify the characteristics in the actual set. When using non-standard lands, contact Murata beforehand.

4. Notice for Chip Placer:

When placing products on the PCB, products may be stressed and broken by uneven forces from a worn-out chucking locating claw or a suction nozzle. To prevent products from damages, be sure to follow the specifications for the maintenance of the chip placer being used. For the positioning of products on the PCB, be aware that mechanical chucking may damage products.

5. Soldering Conditions:

Carefully perform preheating so that the temperature difference (ΔT) between the solder and products surface should be in the following range. When products are immersed in solvent after mounting, pay special attention to maintain the temperature difference within 100 °C. Soldering must be carried out by the above mentioned conditions to prevent products from damage. Contact Murata before use if concerning other soldering conditions.

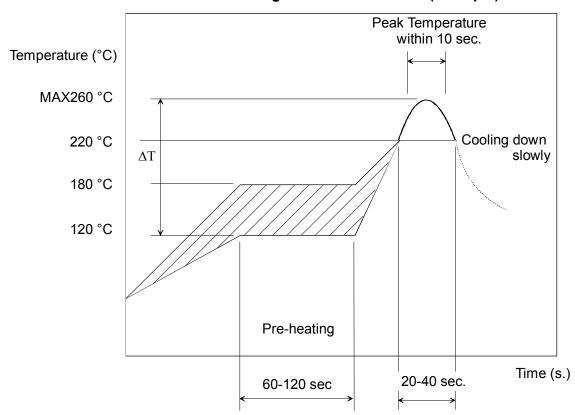
Soldering method	Temperature
Soldering iron method	□\AT<=130 °C
Reflow method	

- Soldering iron method conditions are indicated below.

Kind of iron Item	Ceramics heater
Soldering iron wattage	<=18 W
Temperature of iron-tip	<=350 °C
Iron contact time	within 3 sec

- Diameter of iron-tip : φ3.0 mm max.
- Do not allow the iron-tip to directly touch the ceramic element.

Reflow soldering standard conditions (Example)

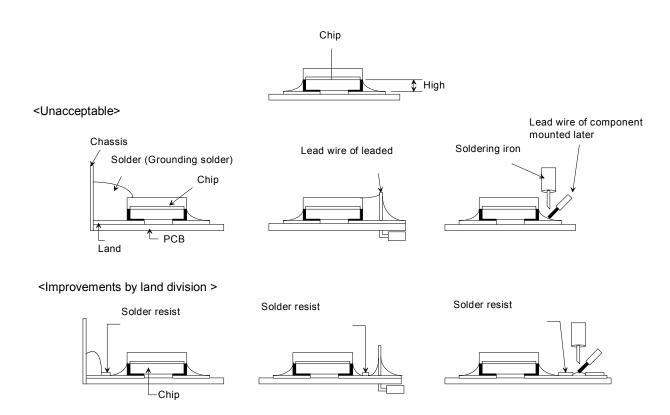


Use rosin type flux or weakly active flux with a chlorine content of 0.2 wt % or less.

Amount of Solder Paste:

- Ensure that solder is applied smoothly to a minimum height of 0.2 to 0.5 mm at the end surface of the external electrodes. If too much or little solder is applied, there is high possibility that the mechanical strength will be insufficient, creating the variation of characteristics.

Amount of solder paste



6. Cleaning Conditions:

Any cleaning is not permitted..

7. Operational Environment Conditions:

Products are designed to work for electronic products under normal environmental conditions (ambient temperature, humidity and pressure). Therefore, products have no problems to be used under the similar conditions to the above-mentioned. However, if products are used under the following circumstances, it may damage products and leakage of electricity and abnormal temperature may occur.

- In an atmosphere containing corrosive gas (Cl₂, NH₃, SO_x, NO_x, etc.).
- In an atmosphere containing combustible and volatile gases.
- In a dusty environment.
- Direct sunlight
- Water splashing place.
- Humid place where water condenses.
- In a freezing environment.

If there are possibilities for products to be used under the preceding clause, consult with Murata before actual use.

If product malfunctions may result in serious damage, including that to human life, sufficient fail-safe measures must be taken, including the following:

- (1) Installation of protection circuits or other protective device to improve system safety
- (2) Installation of redundant circuits in the case of single-circuit failure

8. Limitation of Applications:

The products are designed and produced for application in ordinary electronic equipment (AV equipment, OA equipment, telecommunication, etc). If the products are to be used in devices requiring extremely high reliability following the application listed below, you should consult with the Murata staff in advance.

- Aircraft equipment.
- Aerospace equipment
- Undersea equipment.
- Power plant control equipment.
- Medical equipment.
- Transportation equipment (vehicles, trains, ships, etc.).
- Traffic signal equipment.
- Disaster prevention / crime prevention equipment.
- Data-procession equipment.
- Application which malfunction or operational error may endanger human life and property of assets.
- Application which related to occurrence the serious damage
- Application of similar complexity and/ or reliability requirements to the applications listed in the above.



Please make sure that your product has been evaluated and confirmed against your specifications when our product is mounted to your product.

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- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



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