

MULTILAYER CHIP VARISTORS

PART NO. DW0603-240E2R5NT

1. Electrical Specification

1.1 Technical Data

	Symbol	Value	Unit
Maximum allowable continuous AC voltage *1	V_{RMS}	NIL	V
Maximum allowable continuous DC voltage	V_{DC}	24	V
Varistor voltage measured*2	V_B	90-130	V
Typical capacitance value measured at 1MHz*3	C	2.5	PF
Typical capacitance value tolerance *3	C	(2-3.5)	PF
Clamping voltage measured*4	V_C	<200	V
Leakage current at V_{DC} *1(At initial state)	I_{LVDC}	<1	μA
Leakage current at V_{DC} *1(After ESD Test)	I_{LVDC}	<1	μA

1.2 Reference Data

Response time	T_{rise}	<1	ns
ESD testing	IEC61000-4-2	level 4	
Operating ambient temperature		-40~+85	°C
Storage temperature		-40~+125	°C
Reflow temperature profile(Recommend)		260	°C

1.3 Other Data

Body	No
End termination	Ag/Ni/Sn
Packaging	Tape
Complies with Standard	IEC61000-4-2、IEC61000-4-5
Complies with RoSH Standard	

Notes:

*1 AC voltage at 50~60Hz

*2 Varistor voltage

*3 Capacitance

*4 Maximum clamping voltage

*5 The components shall be employed within 1 year, in the nitrogen condition.

Measured at 1mA DC

Measured at $f=1KHz, V_{RMS}=0.5V$

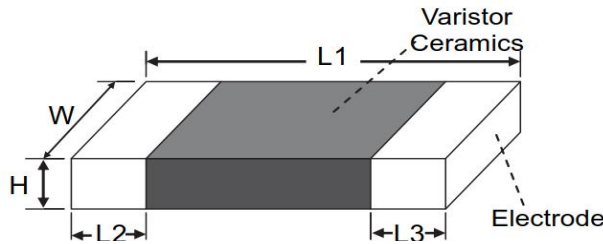
Measured at 30ns by IEC6100-4-2,30A@8kV,level4



2.Size:

Unit: mm

Type	Length(L1)	Width (W)	High (H)	Electrode (L2,L3)
0603	1.60±0.20	0.80±0.20	0.80 (max)	0.30±0.10



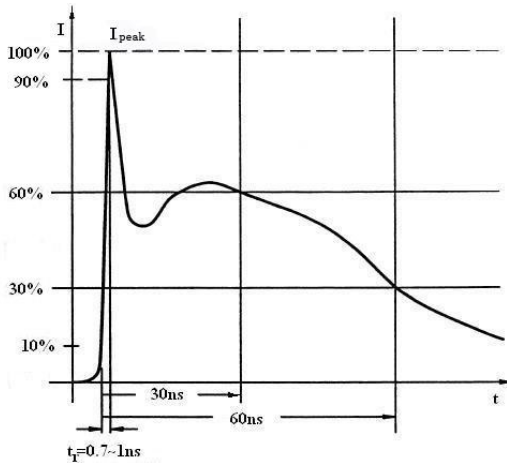
2. Ordering Information

2.1 Standards

DW 0603 - 240 E 2R5 N T
 ① ② ③ ④ ⑤ ⑥ ⑦

- ①production series: DONGWO ESD
- ②type: 0603
- ③Working voltage: 240-24V
- ④E: For ESD
- ⑤capacitance: 2R5:2.5 PF
- ⑥end termination: S: Ag/Pd N: Ag/Ni/Sn
- ⑦package: T: taping B: bulk
- ⑧design No.

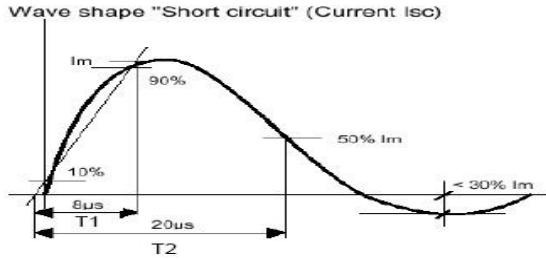
3.ESD Wave Form



4.Surge Wave Form

SEVERITY LEVEL	AIRDIRCHARGE	DIRECT ISCHARGE
1	2 KV	2 KV
2	4 KV	4 KV
3	8 KV	6 KV
4	15 KV	8 KV

SEVERITY LEVEL	T1	T2
1	8 μs	20 μs



IEC61000-4-5 Standards

5. Environmental Reliability Test

Characteristic	Test method and description			
High Temperature Storage	The specimen shall be subjected to 125°C for 1000 hours in a thermostatic bath without load and then stored at room temperature and humidity for 1 to 2 hours. The change of varistor voltage shall be within 10%.			
Temperature Cycle	The temperature cycle of specified temperature shall be repeated five times and then stored at room temperature and humidity for one two hours. The change of varistor voltage shall be within 10% and mechanical damage shall be examined.	Step	Temperature	Period
		1	-40 ± 3 °C	30min ± 3
		2	Room Temperature	1~2hours
		3	125 ± 2 °C	30min ± 3
4	Room Temperature	1~2hours		
High Temperature Load	After being continuously applied the maximum allowable voltage at 85°C for 1000hours, the specimen shall be stored at room temperature and humidity for one or hours, the change of varistor voltage shall be within 10%.			
Damp Heat Load/ Humidity Load	The specimen should be subjected to 40°C, 90 to 95%RH environment, and the maximum allowable voltage applied for 1000 hours, then stored at room temperature and humidity for one or two hours. The change of varistor voltage shall be within 10%.			
Low Temperature Storage	The specimen should be subjected to -40°C, without load for 1000 hours and then stored at room temperature for one two hours. The change of varistor voltage shall be within 10%.			

6. Soldering Recommendation

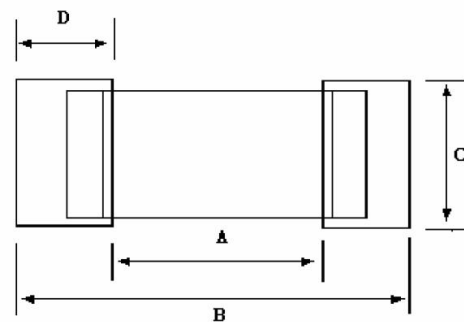
The principal techniques used for the soldering of components in surface mount technology are infrared reflow and wave soldering.

6.1 Soldering Recommendations

Recommended solder pad layout

(Unit : mm)

	A	B	C	D
0402	0.4~0.6	1.4~1.8	0.5~0.6	0.6~1.2
0603	0.9~1.2	2.7~3.2	0.7~1.0	0.9~1.2
0805	1.0~1.5	2.6~3.2	1.2~1.5	1.1~1.8
1206	1.8~2.5	4.2~5.2	1.2~1.8	1.2~1.8
1210	1.8~2.5	4.2~5.2	2.2~3.0	1.3~2.0
1812	2.5~3.3	5.5~6.7	2.8~3.6	1.3~2.2
2220	3.8~4.6	6.6~7.8	4.8~5.5	1.3~2.2



6.2 The SIR test of the solder paste shall be done (Based on JIS-Z-3284)

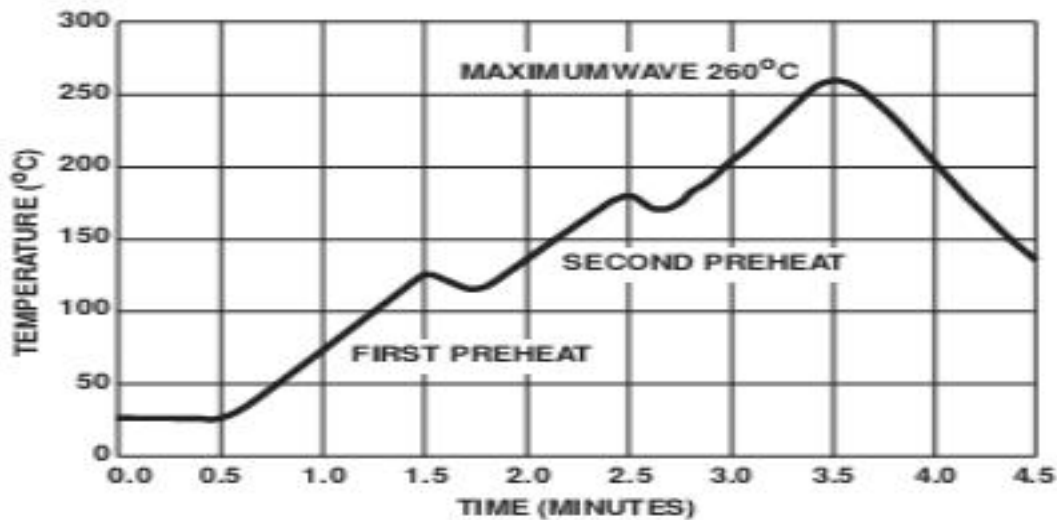


6.3 Steel plate and foot distance printing

Foot distance printing (mm)	Steel Plate thickness (mm)
> 0.65mm	0.18mm
0.65mm~0.5mm	0.15mm
0.50mm~0.40mm	0.12mm
>=0.40 mm	0.10mm

6.4 Wave Soldering

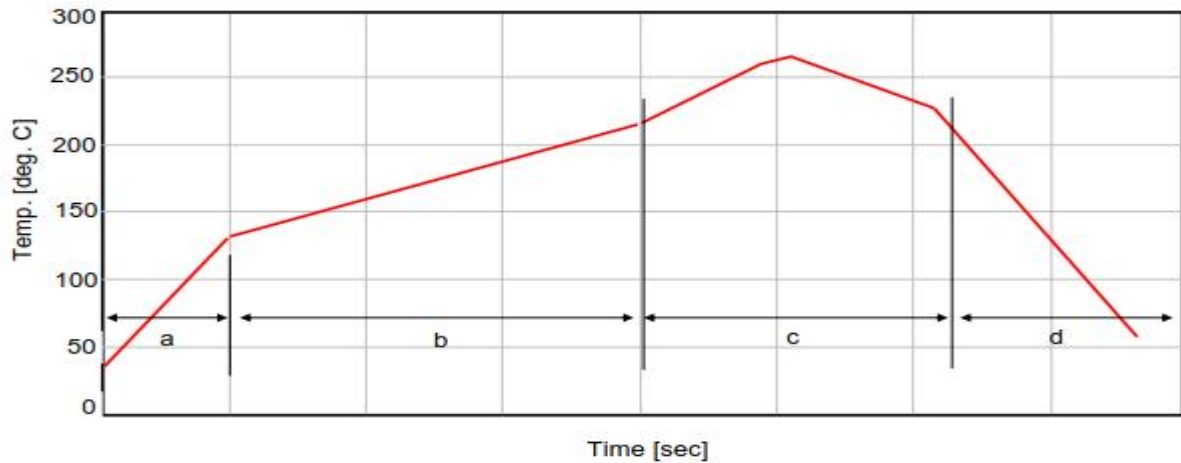
When wave soldering, The MLCV is attach to the circuit board by means of an adhesive. The assembly is then place on a conveyor and run though the soldering process to contact the wave. Wave soldering is the most strenuous of the processes. To avoid the possibility of generating stresses due to thermal shock., a preheat stage in the soldering process is recommended, and the peak temperature of the solder process should be rigidly controlled. The following is the typical profiles.



WAVE SOLDER PROFILE

6.5 Reflow Soldering

When reflow soldering, the device is placed a solder paste on the substrate ,as the solder paste is heated, it re-flows and solders the unite to board. When using a reflow process ,care should be taken to ensure that the MLCV is not subjected to an thermal gradient steeper than 4 degrees per second; the ideal gradient being 2degrees per second. During the soldering process, preheating to within 100 degrees of the soldier's peak temperature is essential to minimize thermal shock. The following is typical profile.



Zone		temp. range [deg. C]	time [sec]	Remark
a	Curing	RT ~ 130	60	
b	Preheat	max 220	90 ~ 150	* Solder : Sn-Ag-Cu * 260deg. C, over 10sec
c	Soldering	220 ~ 260 [max 270]	90 ~ 150	
d	Cooling	220 ~ RT	min 60	

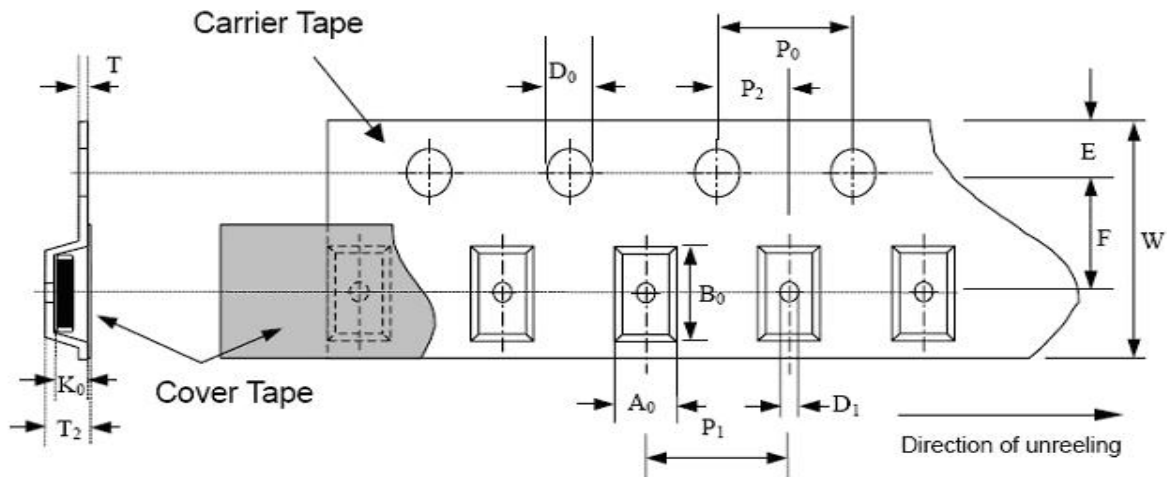
REFLOW SOLDER PROFILE

7 Packaging Specification

7.1 Carrier tape transparent cover tape should be heat-sealed to carry the products, and the reel should be used to reel the carrier tape.

7.2 The adhesion of the heat-sealed cover tape shall be 40 + 20/ - 15 grams

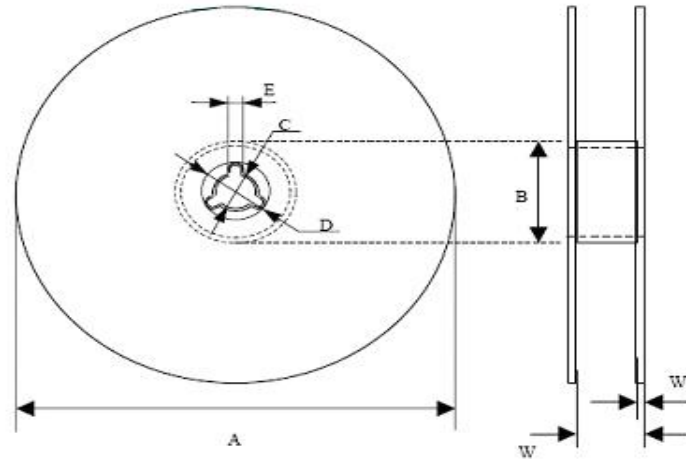
7.3 Both the head and the end portion of taping shall be empty for reel package and SMT auto-pickup machine. And a normal paper tape shall be connected in the head of taping for the operator handle.



type	A ₀	B ₀	K ₀	T	T ₂	D ₀	D ₁	P ₁	P ₂	P ₀	W	E	F
	±0.10	±0.10	±0.10	±0.05	±0.05	+0.10 -0.00	±0.05	±0.10	±0.05	±0.05	±0.20	±0.10	±0.05
0402	0.62	1.12	0.60	0.22	0.10	1.50	1.00	4.00	2.00	4.00	8.00	1.75	3.50
0603	1.08	1.88	1.04	0.22	0.10	1.50	1.00	4.00	2.00	4.00	8.00	1.75	3.50
0805	1.42	2.30	1.04	0.22	0.10	1.50	1.00	4.00	2.00	4.00	8.00	1.75	3.50
1206	1.88	3.50	1.27	0.20	0.10	1.50	1.00	4.00	2.00	4.00	8.00	1.75	3.50
1210	2.18	3.46	1.45	0.22	0.10	1.50	1.00	4.00	2.00	4.00	8.00	1.75	3.50

1812	3.66	4.95	1.74	0.25	0.10	1.50	1.50	8.00	2.00	4.00	12.00	1.75	5.50
2220	5.10	5.97	2.80	0.25	0.10	1.50	1.50	8.00	2.00	4.00	12.00	1.75	5.50

8. Reel Dimension



type	A	B	C	D	E	W	W ₁
0402	178.0±1.0	60.0±0.5	13.0±0.2	21.0±0.2	2.0±0.5	9.0±0.50	1.5±0.15
0603	178.0±1.0	60.0±0.5	13.0±0.2	21.0±0.2	2.0±0.5	9.0±0.50	1.5±0.15
0805	178.0±1.0	60.0±0.5	13.0±0.2	21.0±0.2	2.0±0.5	9.0±0.50	1.5±0.15
1206	178.0±1.0	60.0±0.5	13.0±0.2	21.0±0.2	2.0±0.5	9.0±0.50	1.5±0.15
1210	178.0±1.0	60.0±0.5	13.0±0.2	21.0±0.2	2.0±0.5	9.0±0.50	1.5±0.15
1812	178.0±1.0	60.0±0.5	13.5±0.1	21.0±0.2	2.0±0.5	13.6±0.2	1.5±0.15
2220	178.0±1.0	60.0±0.5	13.5±0.1	21.0±0.2	2.0±0.5	13.6±0.2	1.5±0.15

type	10402	0603	0805		1206	1210	1812	2220
quantity	paper	10000	4000	4000	-	-	-	-
	plastic	-	-	-	3000	3000	3000	1000
Minimum ordering	-	4000	4000	3000	3000	3000	3000	1000