光頡科技股份有限公司
Viking Tech Corporation

Data Sheet

Customer：	
Product :	Multilayer Chip Varistor - VA Series
Size:	0402/0405/0508/0603/0612/0805/1206/1210/1812 /2220
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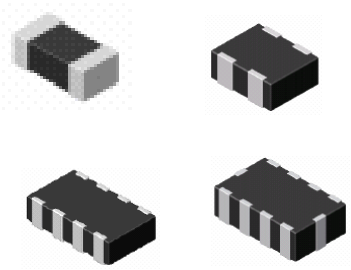
光頡科技股份有限公司
Viking Tech Corporation

Multilayer Chip Varistor
(VA Series)

■Features

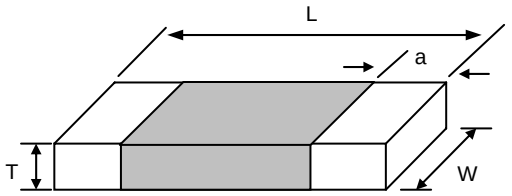


- Varistor with high reliability can protect the electronics systems from over voltages by limited surge voltage and absorbing energy
- High surge current handling capability
- High energy protection capability
- Low clamping voltages, providing better surge
- Low capacitance values, providing digital switching circuitry protection
- High insulation resistance, preventing electric arcing to the adjacent devices or circuits

■Applications

- Surge Series for Power Line I/O, AC/DC,AC Three-Phase ,AC Three-Phase and Ground.
- ESD Series for Data Line :USB ,HDMI ,IEE1394,RF,Wireless Device,Display,RS232,IrDA1.0,Microphone,Speaker

■Dimensions



Unit: mm

Type	Size (Inch)	L	W	T	a
VA02	0402	1.00±0.10	0.50±0.10	0.5±0.1	0.25±0.1
VA03	0603	1.60±0.10	0.80±0.15	0.90 max	0.3±0.1
VA05	0805	2.00±0.20	1.25±0.15	1.00 max	0.4±0.2
VA06	1206	3.20±0.20	1.60±0.15	1.20 max	0.5±0.2
VA10	1210	3.20±0.20	2.50±0.20	1.50 max	0.5±0.2
VA12	1812	4.50±0.20	3.20±0.20	2.00 max	0.5+0.3/-0.1
VA20	2220	5.70±0.20	5.00±0.20	3.00 max	0.5+0.3/-0.1

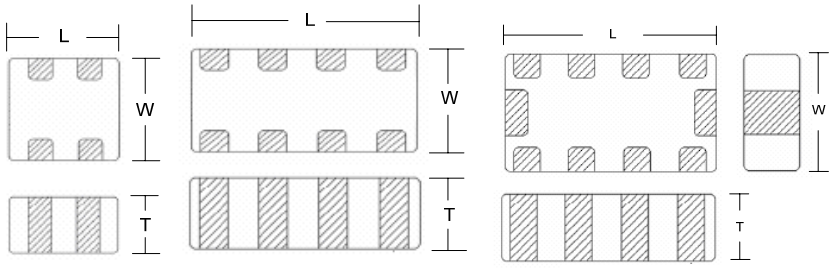


Figure 1 Figure 2 Figure 3

Unit: mm

Type	Size (Inch)	Figure	L	W	T max
VA05-2R	0405	1	1.37±0.15	1.00±0.15	0.66
VA08-4R	0508	2	2.00±0.20	1.25±0.20	0.80
VA12-4R	0612	2	3.20±0.20	1.60±0.15	0.95
VA08-4R(EE)	0508	3	2.00±0.20	1.25±0.20	0.80

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■Part Numbering for Standard / High Surge Series

VA	05	T	120	S
Product Type	Dimensions	Packaging Code	Breakdown Voltage	Design Code
	01: 0201 02: 0402 03: 0603 05: 0805 06: 1206 10: 1210 12: 1812 20: 2220	T: Taping Reel	080: 8V 240: 24V	: Standard S: High Surge

■Part Numbering for ESD Series

VA	05	T	120	E	101	N
Product Type	Dimensions	Packaging Code	Working Voltage	Design Code	Capacitance	Capacitance Tolerance
	01: 0201 02: 0402 03: 0603 05: 0805	T: Taping Reel	050: 5V 120: 12V	E: ESD	2R5: 2.5pF 220: 22pF 101:100pF	N: ±30% M: ±20% Z: +80%-20%

■Part Numbering for Array

VA	03	T	050	E E	220	N	-R2
Product Type	Dimensions (L×W)	Packaging Code	Working Voltage	Design Code	Capacitance	Capacitance Tolerance	Channel Code
	05: 0405 08: 0508 12: 0612	T: Taping Reel	050: 5V 120: 12V	E: ESD EE:EMI+ESD	2R5: 2.5pF 220: 22pF 101:100pF	N: ±30% Y: ±25%	-R2: 2port -R4: 4port

■Standard Electrical Specifications

VA02 / Standard Type

Item / Part No.	Maximum Working Voltage		Breakdown Voltage	Maximum Peak Current	Maximum Clamping Voltage		Maximum Energy Absorption	Typical Capacitance
	AC (V_{RMS})	DC (V)	1mA (V)	8/20 μs (A)	(A)	(V)	10/1000 μs (J)	1KHz (pF)
VA02T080	4	5.5	8(8-11)	20	1	20	0.05	200
VA02T120	6	9	12(10.2-13.8)	20	1	23	0.05	135
VA02T150	8	11	15(12.75-17.25)	20	1	25	0.05	75
VA02T180	11	14	18(15.3-20.7)	20	1	30	0.05	50
VA02T240	14	18	24(21.6-26.4)	20	1	39	0.05	45

VA03 / Standard Type

Item / Part No.	Maximum Working Voltage		Breakdown Voltage	Maximum Peak Current	Maximum Clamping Voltage		Maximum Energy Absorption	Typical Capacitance
	AC (V_{RMS})	DC (V)	1mA (V)	8/20 μs (A)	(A)	(V)	10/1000 μs (J)	1KHz (pF)
VA03T080	4	5.5	8(8-11)	30	1	20	0.1	360
VA03T120	6	9	12(10.2-13.8)	30	1	23	0.1	300
VA03T180	11	14	18(15.3-20.7)	30	1	30	0.1	210
VA03T240	14	18	24(21.6-26.4)	30	1	39	0.1	160
VA03T270	17	22	27(24.3-29.7)	30	1	44	0.1	145
VA03T330	20	26	33(29.7-36.3)	30	1	54	0.1	130
VA03T390	25	30	39(35.1-42.9)	30	1	65	0.1	110
VA03T470	30	38	47(42.3-51.7)	30	1	77	0.1	90

VA05 / Standard Type

Item / Part No.	Maximum Working Voltage		Breakdown Voltage	Maximum Peak Current	Maximum Clamping Voltage		Maximum Energy Absorption	Typical Capacitance
	AC (V_{RMS})	DC (V)	1mA (V)	8/20 μs (A)	(A)	(V)	10/1000 μs (J)	1KHz (pF)
VA05T080	4	5.5	8(8-11)	80	1	20	0.1	1400
VA05T120	6	9	12(10.2-13.8)	80	1	23	0.1	650
VA05T180	11	14	18(15.3-20.7)	100	1	30	0.1	350
VA05T240	14	18	24(21.6-26.4)	100	1	39	0.1	300
VA05T270	17	22	27(24.3-29.7)	100	1	44	0.2	250
VA05T330	20	26	33(29.7-36.3)	100	1	54	0.3	220
VA05T390	25	30	39(35.1-42.9)	100	1	65	0.3	200
VA05T470	30	38	47(42.3-51.7)	100	1	77	0.3	150
VA05T560	35	45	56(50.4-61.6)	80	1	90	0.3	110

VA06 / Standard Type

Item / Part No.	Maximum Working Voltage		Breakdown Voltage	Maximum Peak Current	Maximum Clamping Voltage		Maximum Energy Absorption	Typical Capacitance
	AC (V_{RMS})	DC (V)	1mA (V)	8/20 μs (A)	(A)	(V)	10/1000 μs (J)	1KHz (pF)
VA06T080	4	5.5	8(8-11)	100	1	20	0.2	3100
VA06T180	11	14	18(15.3-20.7)	100	1	30	0.3	800
VA06T240	14	18	24(21.6-26.4)	100	1	39	0.3	620
VA06T270	17	22	27(24.3-29.7)	100	1	44	0.4	700
VA06T330	20	26	33(29.7-36.3)	100	1	54	0.5	480
VA06T390	25	30	39(35.1-42.9)	100	1	65	0.6	400
VA06T470	30	38	47(42.3-51.7)	100	1	77	0.7	260
VA06T560	35	45	56(50.4-61.6)	100	1	90	0.8	230
VA06T680	40	56	68(61.2-74.8)	100	1	110	1.0	200
VA06T820	50	65	82(73.8-90.2)	100	1	135	0.5	175
VA06T101	60	85	100(90-110)	100	1	165	0.6	150

VA10 / Standard Type

Item / Part No.	Maximum Working Voltage		Breakdown Voltage	Maximum Peak Current	Maximum Clamping Voltage		Maximum Energy Absorption	Typical Capacitance
	AC (V_{RMS})	DC (V)	1mA (V)	8/20 μs (A)	(A)	(V)	10/1000 μs (J)	1KHz (pF)
VA10T080	4	5.5	8(8-11)	250	2.5	20	0.5	5200
VA10T240	14	18	24(21.6-26.4)	250	2.5	38	0.8	1150
VA10T270	17	22	27(24.3-29.7)	250	2.5	44	1.0	1720
VA10T330	20	26	33(29.7-36.3)	250	2.5	54	1.2	610
VA10T390	25	30	39(35.1-42.9)	250	2.5	65	1.4	920
VA10T470	30	38	47(42.3-51.7)	250	2.5	77	1.6	780
VA10T560	35	45	56(50.4-61.6)	250	2.5	90	2.0	400
VA10T680	40	56	68(61.2-74.8)	250	2.5	110	2.3	300
VA10T101	60	85	100(90-110)	200	2.5	165	1.4	210

VA12 / Standard Type

Item / Part No.	Maximum Working Voltage		Breakdown Voltage	Maximum Peak Current	Maximum Clamping Voltage		Maximum Energy Absorption	Typical Capacitance
	AC (V_{RMS})	DC (V)	1mA (V)	8/20 μs (A)	(A)	(V)	10/1000 μs (J)	1KHz (pF)
VA12T240	14	18	24(21.6-26.4)	500	5	38	1.7	2000
VA12T390	25	30	39(35.1-42.9)	500	5	65	2.9	2500
VA12T470	30	38	47(42.3-51.7)	500	5	77	3.5	2200
VA12T560	35	45	56(50.4-61.6)	500	5	90	4.2	1000

VA20 / Standard Type

Item / Part No.	Maximum Working Voltage		Breakdown Voltage	Maximum Peak Current	Maximum Clamping Voltage		Maximum Energy Absorption	Typical Capacitance
	AC (V_{RMS})	DC (V)	1mA (V)	8/20 μs (A)	(A)	(V)	10/1000 μs (J)	1KHz (pF)
VA20T240	14	18	24(21.6-26.4)	1000	10	38	3.1	8500
VA20T390	25	30	39(35.1-42.9)	1000	10	65	5.5	3900
VA20T470	30	38	47(42.3-51.7)	1000	10	77	6.3	4600
VA20T680	40	56	68(61.2-74.8)	1000	10	110	8.8	4000

■High Surge Electrical Specifications

VA06 / High Surge Type

Item / Part No.	Maximum Working Voltage		Breakdown Voltage	Maximum Peak Current	Maximum Clamping Voltage		Maximum Energy Absorption	Typical Capacitance
	AC (V_{RMS})	DC (V)	1mA (V)	8/20 μs (A)	(A)	(V)	10/1000 μs (J)	1KHz (pF)
VA06T180S	11	14	18(15.3-20.7)	200	1	30	0.5	1200
VA06T240S	14	18	24(21.6-26.4)	200	1	38	0.5	780
VA06T270S	17	22	27(24.3-29.7)	200	1	44	0.7	750
VA06T330S	20	26	33(29.7-36.3)	200	1	54	1.0	700
VA06T390S	25	30	39(35.1-42.9)	200	1	65	1.0	510
VA06T470S	30	38	47(42.3-51.7)	200	1	77	1.1	440

VA10 / High Surge Type

Item / Part No.	Maximum Working Voltage		Breakdown Voltage	Maximum Peak Current	Maximum Clamping Voltage		Maximum Energy Absorption	Typical Capacitance
	AC (V_{RMS})	DC (V)	1mA (V)	8/20 μs (A)	(A)	(V)	10/1000 μs (J)	1KHz (pF)
VA10T180S	11	14	18(15.3-20.7)	400	2.5	30	1.2	2000
VA10T240S	14	18	24(21.6-26.4)	400	2.5	38	1.4	1600
VA10T270S	17	22	27(24.3-29.7)	400	2.5	44	1.7	1500
VA10T330S	20	26	33(29.7-36.3)	400	2.5	54	1.9	880
VA10T390S	25	30	39(35.1-42.9)	400	2.5	65	1.7	800
VA10T470S	30	38	47(42.3-51.7)	400	2.5	77	2.0	530

VA12 / High Surge Type

Item / Part No.	Maximum Working Voltage		Breakdown Voltage	Maximum Peak Current	Maximum Clamping Voltage		Maximum Energy Absorption	Typical Capacitance
	AC (V_{RMS})	DC (V)	1mA (V)	8/20 μs (A)	(A)	(V)	10/1000 μs (J)	1KHz (pF)
VA12T240S	14	18	24(21.6-26.4)	800	5	38	2.3	3500
VA12T390S	25	30	39(35.1-42.9)	800	5	65	3.7	2350
VA12T470S	30	38	47(42.3-51.7)	800	5	77	4.2	1600
VA12T560S	35	45	56(50.4-61.6)	800	5	90	4.2	1200

VA20 / High Surge Type

Item / Part No.	Maximum Working Voltage		Breakdown Voltage	Maximum Peak Current	Maximum Clamping Voltage		Maximum Energy Absorption	Typical Capacitance
	AC (V_{RMS})	DC (V)	1mA (V)	8/20 μs (A)	(A)	(V)	10/1000 μs (J)	1KHz (pF)
VA20T180S	11	14	18(15.3-20.7)	1200	10	30	5.4	10500
VA20T240S	14	18	24(21.6-26.4)	1200	10	38	5.8	8500
VA20T270S	17	22	27(24.3-29.7)	1200	10	44	7.2	8300
VA20T330S	20	26	33(29.7-36.3)	1200	10	54	7.8	8000
VA20T390S	25	30	39(35.1-42.9)	1200	10	65	9.6	6000
VA20T470S	30	38	47(42.3-51.7)	1200	10	77	12	4000
VA20T560S	35	45	56(50.4-61.6)	1200	10	90	12	3500

■ESD Electrical Specifications

VA01 / ESD Type

Item / Part No.	Maximum Working Voltage	Maximum Clamping Voltage Vclamp	Maximum Leakage Current	Capacitance Value	ESD Contact	ESD Air
	VDC	(V)	(uA)	pF	KV	KV
VA01T050E330N	5	26	2	33	8	15
VA01T120E120N	12	50	2	12	8	15

VA02 / ESD Type

Item / Part No.	Maximum Working Voltage	Maximum Clamping Voltage Vclamp	Maximum Leakage Current	Capacitance Value	ESD Contact	ESD Air
	VDC	(V)	(uA)	pF	KV	KV
VA02T050E050Z	5	72	1	4-9	8	15
VA02T050E100N		72		10		
VA02T050E220N		52		22		
VA02T050E330N		52		33		
VA02T050E560N		52		56		
VA02T050E101N		52		100		
VA02T120E050Z	12	72	2	4-9	8	15
VA02T120E100N		72		10		
VA02T120E220N		55		22		
VA02T120E330N		55		33		
VA02T120E560N		55		56		
VA02T120E101N		55		100		
VA02T240E0R3Z	24	350	1	0.15-0.45	8	15
VA02T240E0R8Z		200		0.8-1.5		
VA02T240E2R5Z		200		2-4.5		
VA02T240E3R0Z		200		1.6-5.4		

VA03 / ESD Type

Item / Part No.	Maximum Working Voltage	Maximum Clamping Voltage Vclamp	Maximum Leakage Current	Capacitance Value	ESD Contact	ESD Air
	VDC	(V)	(uA)	pF	KV	KV
VA03T050E050Z	5	55	1	4-9	8	15
VA03T050E100N		65		10		
VA03T050E220N		34		22		
VA03T050E330N		34		33		
VA03T050E560N		36		56		
VA03T050E101N		36		100		
VA03T120E050Z	12	85	2	4-9	8	15
VA03T120E100N		60		10		
VA03T120E220N		55		22		
VA03T120E330N		55		33		
VA03T120E560N		55		56		
VA03T120E101N		55		100		
VA03T240E0R3Z	24	350	1	0.15-0.45	8	15
VA03T240E0R8Z		200		0.8-1.5		
VA03T240E2R5Z		240		2-4.5		
VA03T240E3R0Z		-		1.6-5.4		

A05 / ESD Type

Item / Part No.	Maximum Working Voltage	Maximum Clamping Voltage Vclamp	Maximum Leakage Current	Capacitance Value	ESD Contact	ESD Air
	VDC	(V)	(uA)	pF	KV	KV
VA05T120E560N	12	60	1	56	8	15
VA05T120E101N	12	60	1	100	8	15

■Array Electrical Specifications

VA05 / ESD Type

Item / Part No.	Maximum Working Voltage	Breakdown Voltage	Clamping Voltage	Leakage Current	Insulation Resistance	Capacitance Value
	DC	V	V	uA	MΩ	pF
VA05T050E470M-R2	5	24	<45	1	10	47
VA05T050E750M-R2	5	24	<45	1	10	75

VA08 / ESD Type

Item / Part No.	Maximum Working Voltage	Breakdown Voltage	Clamping Voltage	Leakage Current	Insulation Resistance	Capacitance Value
	DC	V	V	uA	MΩ	pF
VA08T050E100M-R4	5	24	<60	5	10	10
VA08T050E200M-R4	5	24	<60	5	10	20
VA08T050E500M-R4	5	18-28	<50	1	10	50
VA08-180E070M-R4	18	26-36	<65	2	10	4.9-9.1

VA12 ESD Type

Item / Part No.	Maximum Working Voltage	Breakdown Voltage	Clamping Voltage	Leakage Current	Insulation Resistance	Capacitance Value
	DC	V	V	uA	MΩ	pF
VA12T180E121M-R4	18	28	<50	5	10	120

VA08 / ESD+EMI Type

Item / Part No.	Maximum Working Voltage	Breakdown Voltage	Cut off Frequency	Clamping @8/20 μs	Attenuation @800-2000MHz	ESD Withstanding Capability	Capacitance Value
	DC	V	MHz	V	dB	KV	pF
VA08T050EE100M-R4	5	20-30	100	<55	<-25	8	60
VA08T050EE200M-R4	5	20-30	200	<65	<-25	8	30
VA08T050EE300M-R4	5	34-44	300	<80	<-25	8	15

■Environmental Characteristics

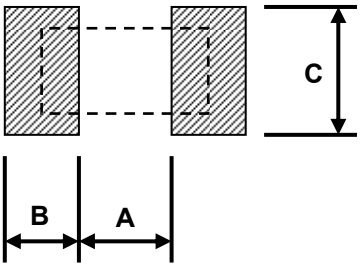
Item	Requirement	Test Method
High Temperature Storage	The change of varistor voltage shall be within 10%	The specimen shall be subjected to 125±2℃ for 1000±12 hours in a thermostatic bath without load and then stored at room temperature and normal humidity for 1 to 2 hours.
Temperature Cycle	The change of varistor voltage shall be within 10% and mechanical damage shall be examined	The temperature cycle of specified temperature shall be repeated five times and then stored at room temperature and normal humidity for one or two hours.

Step	Temperature	Period
1	-40±3℃	30min±3
2	Room Temperature	1 hour
3	125±3℃	30min±3
4	Room Temperature	1 hour

High Temperature Load	The change of varistor voltage shall be within 10%	After being continuously applied the maximum allowable voltage @ 85±2℃ for 1000±2 hours, the specimen shall be stored at room temperature and normal humidity for one or two hours.
Damp Heat Load	The change of varistor voltage shall be within 10%	The specimen should be subjected to 40±2℃, 90~95% RH environment, and the maximum allowable voltage for 1000 hours, then stored at room temperature and normal humidity for one or two hours.
Low Temperature Storage	The change of varistor voltage shall be within 10%	The specimen should be subjected to -40±2℃

■Storage Temperature: 25±3°C; Humidity < 80%RH

■Recommend Land Pattern



Unit: mm

Type	A	B	C
VA01	0.25-0.35	0.2-0.3	0.25-0.35
VA02	0.4-0.6	0.5-0.7	0.5-0.6
VA03	0.9-1.2	0.8-1.2	0.7-1.0
VA05	1.0-1.5	1.0-1.4	1.2-1.5
VA06	1.8-2.5	1.0-1.4	1.2-1.8
VA10	1.8-2.5	1.0-1.4	2.2-3.0
VA12	2.5-3.3	1.2-1.8	2.8-3.6
VA20	3.8-4.6	1.2-1.8	4.8-5.5

■Recommend Land Pattern for Array

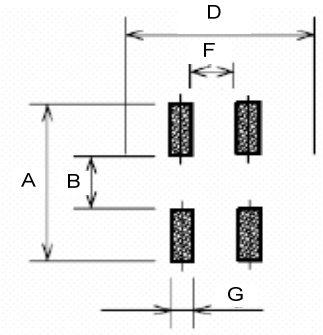


Figure 1

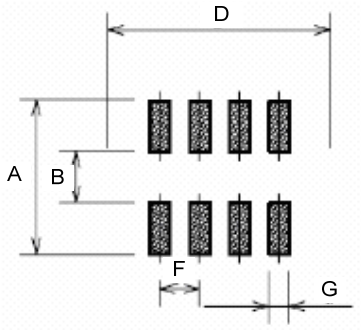


Figure 2

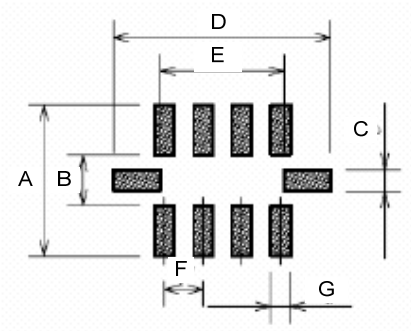


Figure 3

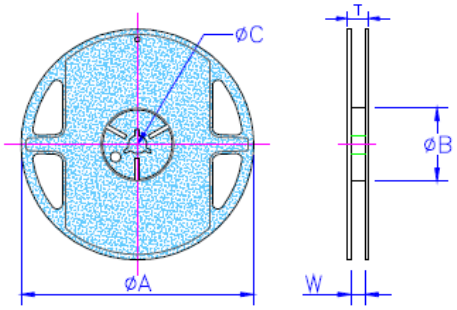
Type	Figure	A	B	C	D	E	F	G
VA05-2R	1	1.20	0.28	-	1.80	-	0.34	0.30
VA08-4R	2	2.10	0.40	-	2.50	-	0.50	0.35
VA12-4R	2	2.60	0.80	-	3.60	-	0.80	0.50
VA08(EE)-4R	3	2.00	0.60	0.25	2.50	1.60	0.50	0.25

■Packaging

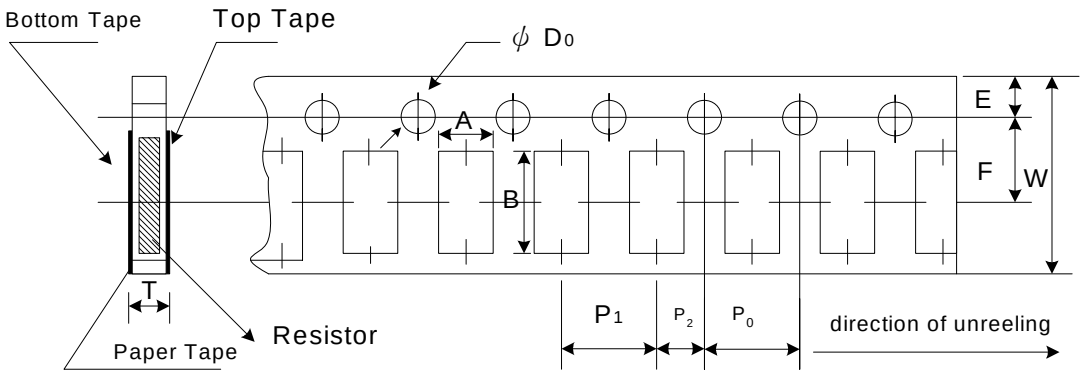
Packing Quantity & Reel Specifications

Unit :mm

Type	ØA	ØB	ØC	W	T	Paper Tape (EA)	Emboss Plastic Tape (EA)
VA01(0201)	178.0±1.0	60.0+1.0	13.5±0.7	9.5±1.0	11.5±1.0	15,000	-
VA02(0402)	178.0±1.0	60.0+1.0	13.5±0.7	9.5±1.0	11.5±1.0	10,000	-
VA03(0603)	178.0±1.0	60.0+1.0	13.5±0.7	9.5±1.0	11.5±1.0	4,000	-
VA05(0805)	178.0±1.0	60.0+1.0	13.5±0.7	9.5±1.0	11.5±1.0	3,000	-
VA06(1206)	178.0±1.0	60.0+1.0	13.5±0.7	9.5±1.0	11.5±1.0	3,000	-
VA10(1210)	178.0±1.0	60.0+1.0	13.5±0.7	9.5±1.0	11.5±1.0	2,000	-
VA12(1812)	178.0±1.0	60.0+1.0	13.5±0.7	13.5±1.0	15.5±1.0	-	1,000
VA20(2220)	178.0±1.0	60.0+1.0	13.5±0.7	13.5±1.0	15.5±1.0	-	1,000
VA05(0405)	178.0±1.0	60.0+1.0	13.5±0.7	9.5±1.0	11.5±1.0	4,000	-
VA08(0508)	178.0±1.0	60.0+1.0	13.5±0.7	9.5±1.0	11.5±1.0	4,000	-
VA12(0612)	178.0±1.0	60.0+1.0	13.5±0.7	9.5±1.0	11.5±1.0	3,000	-



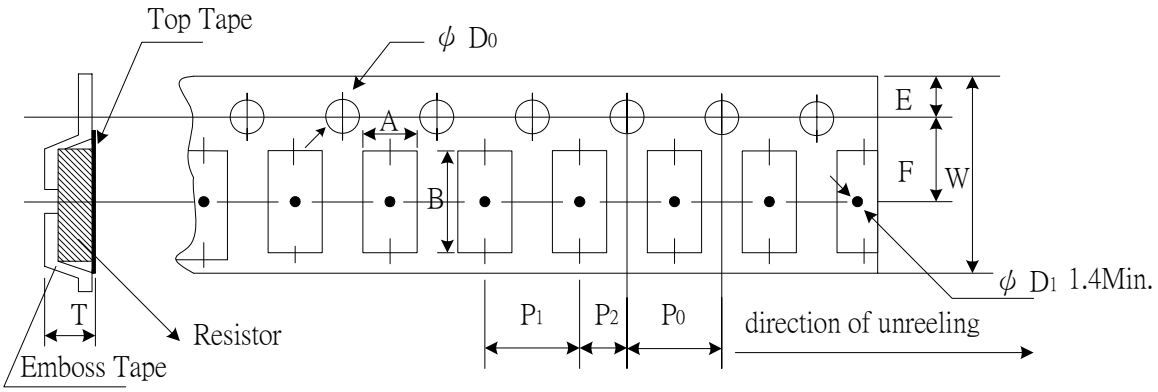
Paper Tape Specifications



Unit: mm

Type	A	B	W	E	F	P_0	P_1	P_2	ΦD_0	T
VA01(0201)	0.37±0.1	0.67±0.1	8.00±0.2	1.75±0.1	3.5±0.05	4.00±0.05	2.00±0.1	2.00±0.05	1.50±0.1	0.50±0.1
VA02(0402)	0.85±0.1	1.25±0.1	8.00±0.2	1.75±0.1	3.5±0.05	4.00±0.05	2.00±0.1	2.00±0.05	1.50±0.1	0.65±0.1
VA03(0603)	1.08±0.1	1.88±0.1	8.00±0.2	1.75±0.1	3.5±0.05	4.00±0.05	4.00±0.1	2.00±0.05	1.50±0.1	0.95±0.1
VA05(0805)	1.42±0.1	2.30±0.1	8.00±0.2	1.75±0.1	3.5±0.05	4.00±0.05	4.00±0.1	2.00±0.05	1.50±0.1	1.04±0.1
VA05(0405)	1.04±0.1	1.38±0.1	8.00±0.2	1.75±0.1	3.5±0.05	4.00±0.05	4.00±0.1	2.00±0.05	1.50±0.1	0.54±0.1
VA05(0508)	1.22±0.1	2.15±0.1	8.00±0.2	1.75±0.1	3.5±0.05	4.00±0.05	4.00±0.1	2.00±0.05	1.50±0.1	1.85±0.1
VA06(1206)	1.88±0.1	3.50±0.1	8.00±0.2	1.75±0.1	3.5±0.05	4.00±0.05	4.00±0.1	2.00±0.05	1.50±0.1	1.27±0.1
VA12(0612)	1.88±0.1	3.50±0.1	8.00±0.2	1.75±0.1	3.5±0.05	4.00±0.05	4.00±0.1	2.00±0.05	1.50±0.1	1.27±0.1
VA10(1210)	2.78±0.1	3.46±0.1	8.00±0.2	1.75±0.1	3.5±0.05	4.00±0.05	4.00±0.1	2.00±0.05	1.50±0.1	1.55±0.1

Emboss Plastic Tape Specifications



Unit: mm

Type	A	B	W	E	F	P_0	P_1	P_2	ΦD_0	T
VA12(1812)	3.66±0.10	4.95±0.10	12.0±0.10	1.75±0.10	5.5±0.05	4.00±0.05	8.00±0.10	2.00±0.05	1.50+0.10	1.99±0.05
VA20(2220)	5.10±0.10	5.97±0.10	12.0±0.10	1.75±0.10	5.5±0.05	4.00±0.05	8.00±0.10	2.00±0.05	1.50+0.10	3.05±0.05