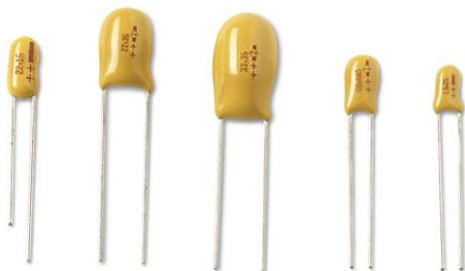


Resin-Coated, Radial-Leaded Solid Tantalum Capacitors



FEATURES

- Flame retardant encapsulation
- Very high temperature range
- Improved humidity class
- Low leakage current
- Very high CV product
- Low failure rate
- Tantalum capacitors with sintered anode and solid semiconductor electrolyte with flame retardant fluidized bed coating. The type ETPW is characterized by very favorable electrical values even at higher ambient temperatures. The capacitors comply with DIN 45910 part 146 and they are also available as a radially taped version.
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912



MECHANICAL SPECIFICATIONS

Color: gold

Laser Marked: capacity and voltage in clear text; plus pole marked

Leads: standard (tin / lead), RoHS compliant (100 % tin)

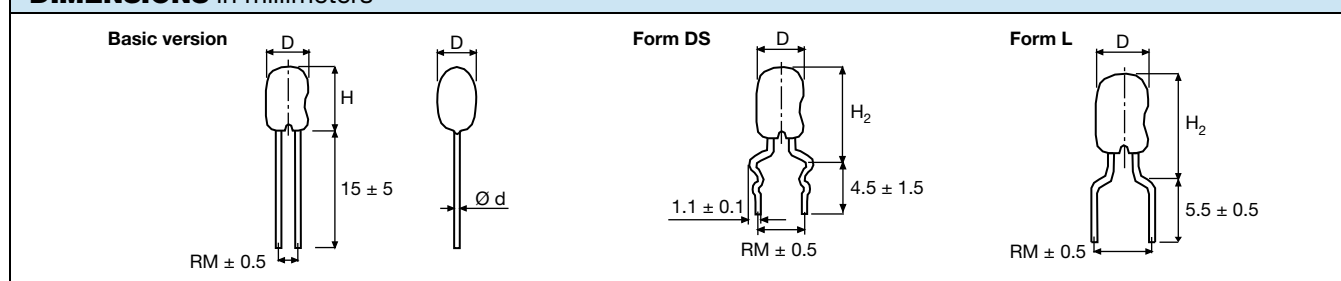
Note

* This datasheet provides information about parts that are RoHS-compliant and / or parts that are non RoHS-compliant. For example, parts with lead (Pb) terminations are not RoHS-compliant. Please see the information / tables in this datasheet for details

ORDERING INFORMATION

P1A TYPE	686 CAPACITANCE	603 DC VOLTAGE RATING AT +85 °C	M CAPACITANCE TOLERANCE	00 LEAD STYLE AND PACKAGING	D	E3 RoHS- COMPLIANT
ETPW 1A ETPW 6R	Expressed in picofarads. The first two digits are significant figures. The third is the number of zeros following.	Expressed by zeros if needed to complete the 3 digit block. A decimal point is indicated by an "0" (603 = 6.3 V).	M = ± 20 % K = ± 10 %	See Lead Styles and Packaging table.		E3 = 100 % tin termination (RoHS-compliant design) Blank = SnPb termination (standard design)

DIMENSIONS in millimeters



MODEL	D MAX.	H MAX.	RM ± 0.5	Ø D ± 0.05	FORM DS H ₂ MAX.	FORM DS RM	FORM L H ₂ MAX.	FORM L RM
ETPW - 1 A, B	4.0	7.1	2.5	0.5	10.5	5	10.5	5
ETPW - 2 C, D	4.5	8.0	2.5	0.5	11.0	5	11.0	5
ETPW - 2 E	5.0	9.5	2.5	0.5	12.5	5	12.5	5
ETPW - 3 F	5.0	9.5	2.5	0.5	12.5	5	12.5	5
ETPW - 3 G	5.5	10.0	2.5	0.5	13.0	5	13.0	5
ETPW - 4 H	6.0	10.0	2.5	0.5	13.0	5	13.0	5
ETPW - 5 J, K ⁽¹⁾	8.6	12.5	2.5	0.5	15.5	5	15.5	5
ETPW - 5 J, K, L	8.6	12.5	5.0	0.5	15.5	5	-	-
ETPW - 6 M, N	9.5	15.0	5.0	0.5	18.0	5	-	-
ETPW - 6 P, R	9.5	16.0	5.0	0.5	19.0	5	-	-

Note

⁽¹⁾ J, K with RM 2.5 mm: 100 µF - 6.3 V, 68 µF - 10 V, 47 µF - 16 V, 22 µF - 25 V

**RATINGS AND CASE CODES**

C_R (μF)	RATED VOLTAGE U_R AT +85 °C						
	3.0 V	6.3 V	10 V	16 V	25 V	35 V	50 V
0.10						1A	1A
0.15						1A	1A
0.22						1A	1A
0.33						1A	1B
0.47						1A	1B
0.68						1A	2C
1.0					1A	1A	2D
1.5					1A	1B	2E
2.2				1A	1B	2C	3F
3.3			1A	1B	2C	2D	3G
4.7		1A	1B	2C	2D	2E	4H
6.8	1A	1B	2C	2D	2E	3F	5J
10	1A	2C	2D	2E	3F	3G	5L
15	1B	2D	2E	3F	4H	5J	6M
22	2C	2E	3F	3G	5J	5L	6P
33	2D	3F	3G	4H	5K	6M	
47	2E	3G	4H	5K	6M	6P	
68	3F	4H	5J	5L	6N		
100	3G	5J	5L	6N			
150	4H	5L	6N	6R			
220	5J	6M	6P				
330	5L	6P					
470							

STANDARD RATINGS

C _R (μF)	CASE CODE	PART NUMBER	DIMENSIONS					MAX. DCL AT +20 °C (μA)	MAX. Z AT 100 kHz (Ω)	MAX. DF AT 120 Hz +20 °C
			D MAX. (mm)	H MAX. (mm)	H ₂ MAX. (mm)	RM ± 0.05	d ± 0.05			
U _R = 3 V _{DC} AT +85 °C, SURGE = 3.9 V; U _C = 2 V _{DC} AT +125 °C										
6.8	1A	P1A685003(1)(2)D	4.0	7.1	10.5	2.5	0.5	0.5	6.0	0.06
10	1A	P1A106003(1)(2)D	4.0	7.1	10.5	2.5	0.5	0.5	5.0	0.08
15	1B	P1B156003(1)(2)D	4.0	7.1	10.5	2.5	0.5	0.5	4.0	0.08
22	2C	P2C226003(1)(2)D	4.5	8.0	11.0	2.5	0.5	0.7	3.2	0.08
33	2D	P2D336003(1)(2)D	4.5	8.0	11.0	2.5	0.5	1.0	2.5	0.08
47	2E	P2E476003(1)(2)D	5.0	9.5	12.5	2.5	0.5	1.4	2.0	0.08
68	3F	P3F686003(1)(2)D	5.0	9.5	12.5	2.5	0.5	2.0	1.6	0.08
100	3G	P3G107003(1)(2)D	5.5	10.0	13.0	2.5	0.5	3.0	1.2	0.10
150	4H	P4H157003(1)(2)D	6.0	10.0	13.0	2.5	0.5	4.5	1.0	0.10
220	5J	P5J227003(1)(2)D	8.6	12.5	15.5	5.0	0.5	6.6	0.8	0.10
330	5L	P5L337003(1)(2)D	8.6	12.5	15.5	5.0	0.5	9.9	0.6	0.10

Note

- Part number definitions:
 - Insert M for ± 20 % tolerance or K for ± 10 %
 - Lead style and packaging code, see Lead Styles and Packaging table



STANDARD RATINGS										
C _R (μF)	CASE CODE	PART NUMBER	DIMENSIONS					MAX. DCL AT +20 °C (μA)	MAX. Z AT 100 kHz (Ω)	MAX. DF AT 120 Hz +20 °C
			D MAX. (mm)	H MAX. (mm)	H ₂ MAX. (mm)	RM ± 0.05	d ± 0.05			
U _R = 6.3 V _{DC} AT +85 °C, SURGE = 7.8 V; U _C = 4 V _{DC} AT +125 °C										
4.7	1A	P1A475603(1)(2)D	4.0	7.1	10.5	2.5	0.5	0.5	6.0	0.06
6.8	1B	P1B685603(1)(2)D	4.0	7.1	10.5	2.5	0.5	0.5	5.0	0.06
10	2C	P2C106603(1)(2)D	4.5	8.0	11.0	2.5	0.5	0.6	4.0	0.08
15	2D	P2D156603(1)(2)D	4.5	8.0	11.0	2.5	0.5	0.9	3.2	0.08
22	2E	P2E226603(1)(2)D	5.0	9.5	12.5	2.5	0.5	1.4	2.5	0.08
33	3F	P3F336603(1)(2)D	5.0	9.5	12.5	2.5	0.5	2.1	2.0	0.08
47	3G	P3G476603(1)(2)D	5.5	10.0	13.0	2.5	0.5	3.0	1.6	0.08
68	4H	P4H686603(1)(2)D	6.0	10.0	13.0	2.5	0.5	4.3	1.2	0.08
100	5J	P5J107603(1)(2)D	8.6	12.5	15.5	2.5	0.5	6.3	1.0	0.10
150	5L	P5L157603(1)(2)D	8.6	12.5	15.5	5.0	0.5	9.5	0.8	0.10
220	6M	P6M227603(1)(2)D	9.5	15.0	18.0	5.0	0.5	13.9	0.6	0.10
330	6P	P6P337603(1)(2)D	9.5	16.0	19.0	5.0	0.5	20.8	0.5	0.10
U _R = 10 V _{DC} AT +85 °C, SURGE = 13 V; U _C = 6.3 V _{DC} AT +125 °C										
3.3	1A	P1A335010(1)(2)D	4.0	7.1	10.5	2.5	0.5	0.5	6.5	0.06
4.7	1B	P1B475010(1)(2)D	4.0	7.1	10.5	2.5	0.5	0.5	5.0	0.06
6.8	2C	P2C685010(1)(2)D	4.5	8.0	11.0	2.5	0.5	0.7	4.0	0.06
10	2D	P2D106010(1)(2)D	4.5	8.0	11.0	2.5	0.5	1.0	3.2	0.08
15	2E	P2E156010(1)(2)D	5.0	9.5	12.5	2.5	0.5	1.5	2.5	0.08
22	3F	P3F226010(1)(2)D	5.0	9.5	12.5	2.5	0.5	2.2	2.0	0.08
33	3G	P3G336010(1)(2)D	5.5	10.0	13.0	2.5	0.5	3.3	1.6	0.08
47	4H	P4H476010(1)(2)D	6.0	10.0	13.0	2.5	0.5	4.7	1.2	0.08
68	5J	P5J686010(1)(2)D	8.6	12.5	15.5	2.5	0.5	6.8	1.0	0.08
100	5L	P5L107010(1)(2)D	8.6	12.5	15.5	5.0	0.5	10.0	0.8	0.10
150	6N	P6N157010(1)(2)D	9.5	15.0	18.0	5.0	0.5	15.0	0.6	0.10
220	6P	P6P227010(1)(2)D	9.5	16.0	19.0	5.0	0.5	22.0	0.5	0.10
U _R = 16 V _{DC} AT +85 °C, SURGE = 20.8 V; U _C = 10 V _{DC} AT +125 °C										
2.2	1A	P1A225016(1)(2)D	4.0	7.1	10.5	2.5	0.5	0.5	7.0	0.06
3.3	1B	P1B335016(1)(2)D	4.0	7.1	10.5	2.5	0.5	0.5	6.0	0.06
4.7	2C	P2C475016(1)(2)D	4.5	8.0	11.0	2.5	0.5	0.8	4.5	0.06
6.8	2D	P2D685016(1)(2)D	4.5	8.0	11.0	2.5	0.5	1.1	3.2	0.06
10	2E	P2E106016(1)(2)D	5.0	9.5	12.5	2.5	0.5	1.6	2.5	0.08
15	3F	P3F156016(1)(2)D	5.0	9.5	12.5	2.5	0.5	2.4	2.0	0.08
22	3G	P3G226016(1)(2)D	5.5	10.0	13.0	2.5	0.5	3.5	1.6	0.08
33	4H	P4H336016(1)(2)D	6.0	10.0	13.0	2.5	0.5	5.3	1.2	0.08
47	5K	P5K476016(1)(2)D	8.6	12.5	15.5	2.5	0.5	7.5	1.0	0.08
68	5L	P5L686016(1)(2)D	8.6	12.5	15.5	5.0	0.5	10.9	0.8	0.08
100	6N	P6N107016(1)(2)D	9.5	15.0	18.0	5.0	0.5	16.0	0.6	0.10
150	6R	P6R157016(1)(2)D	9.5	16.0	19.0	5.0	0.5	24.0	0.5	0.10

Note

- Part number definitions:
 - Insert M for ± 20 % tolerance or K for ± 10 %
 - Lead style and packaging code, see Lead Styles and Packaging table



STANDARD RATINGS

C _R (μF)	CASE CODE	PART NUMBER	DIMENSIONS					MAX. DCL AT +20 °C (μA)	MAX. Z AT 100 kHz (Ω)	MAX. DF AT 120 Hz +20 °C
			D MAX. (mm)	H MAX. (mm)	H ₂ MAX. (mm)	RM ± 0.05	d ± 0.05			
U _R = 25 V _{DC} AT +85 °C, SURGE = 32.5 V; U _C = 16 V _{DC} AT +125 °C										
1.0	1A	P1A105025(1)(2)D	4.0	7.1	10.5	2.5	0.5	0.5	8.5	0.04
1.5	1A	P1A155025(1)(2)D	4.0	7.1	10.5	2.5	0.5	0.5	7.5	0.04
2.2	1B	P1B225025(1)(2)D	4.0	7.1	10.5	2.5	0.5	0.6	6.0	0.06
3.3	2C	P2C335025(1)(2)D	4.5	8.0	11.0	2.5	0.5	0.8	4.5	0.06
4.7	2D	P2D475025(1)(2)D	4.5	8.0	11.0	2.5	0.5	1.2	3.2	0.06
6.8	2E	P2E685025(1)(2)D	5.0	9.5	12.5	2.5	0.5	1.7	2.5	0.06
10	3F	P3F106025(1)(2)D	5.0	9.5	12.5	2.5	0.5	2.5	2.0	0.08
15	4H	P4H156025(1)(2)D	6.0	10.0	13.0	2.5	0.5	3.8	1.6	0.08
22	5J	P5J226025(1)(2)D	8.6	12.5	15.5	2.5	0.5	5.5	1.2	0.08
33	5K	P5K336025(1)(2)D	8.6	12.5	15.5	5.0	0.5	8.3	1.0	0.08
47	6M	P6M476025(1)(2)D	9.5	15.0	18.0	5.0	0.5	11.8	0.8	0.08
68	6N	P6N686025(1)(2)D	9.5	15.0	18.0	5.0	0.5	17.0	0.6	0.08
U _R = 35 V _{DC} AT +85 °C, SURGE = 45.5 V; U _C = 23 V _{DC} AT +125 °C										
0.10	1A	P1A104035(1)(2)D	4.0	7.1	10.5	2.5	0.5	0.5	38.0	0.04
0.15	1A	P1A154035(1)(2)D	4.0	7.1	10.5	2.5	0.5	0.5	30.0	0.04
0.22	1A	P1A224035(1)(2)D	4.0	7.1	10.5	2.5	0.5	0.5	23.0	0.04
0.33	1A	P1A334035(1)(2)D	4.0	7.1	10.5	2.5	0.5	0.5	18.0	0.04
0.47	1A	P1A474035(1)(2)D	4.0	7.1	10.5	2.5	0.5	0.5	14.0	0.04
0.68	1A	P1A684035(1)(2)D	4.0	7.1	10.5	2.5	0.5	0.5	10.0	0.04
1.0	1A	P1A105035(1)(2)D	4.0	7.1	10.5	2.5	0.5	0.5	8.0	0.04
1.5	1B	P1B155035(1)(2)D	4.0	7.1	10.5	2.5	0.5	0.5	6.5	0.04
2.2	2C	P2C225035(1)(2)D	4.5	8.0	11.0	2.5	0.5	0.8	5.0	0.06
3.3	2D	P2D335035(1)(2)D	4.5	8.0	11.0	2.5	0.5	1.2	3.5	0.06
4.7	2E	P2E475035(1)(2)D	5.0	9.5	12.5	2.5	0.5	1.6	2.5	0.06
6.8	3F	P3F685035(1)(2)D	5.0	9.5	12.5	2.5	0.5	2.4	2.0	0.06
10	3G	P3G106035(1)(2)D	5.5	10.0	13.0	2.5	0.5	3.5	1.6	0.08
15	5J	P5J156035(1)(2)D	8.6	12.5	15.5	5.0	0.5	5.3	1.2	0.08
22	5L	P5L226035(1)(2)D	8.6	12.5	15.5	5.0	0.5	7.7	1.0	0.08
33	6M	P6M336035(1)(2)D	9.5	15.0	18.0	5.0	0.5	11.6	0.8	0.08
47	6P	P6P476035(1)(2)D	9.5	16.0	19.0	5.0	0.5	16.5	0.8	0.08
U _R = 50 V _{DC} AT +85 °C, SURGE = 65 V; U _C = 33 V _{DC} AT +125 °C										
0.10	1A	P1A104050(1)(2)D	4.0	7.1	10.5	2.5	0.5	0.5	38.0	0.04
0.15	1A	P1A154050(1)(2)D	4.0	7.1	10.5	2.5	0.5	0.5	30.0	0.04
0.22	1A	P1A224050(1)(2)D	4.0	7.1	10.5	2.5	0.5	0.5	23.0	0.04
0.33	1B	P1B334050(1)(2)D	4.0	7.1	10.5	2.5	0.5	0.5	18.0	0.04
0.47	1B	P1B474050(1)(2)D	4.0	7.1	10.5	2.5	0.5	0.5	14.0	0.04
0.68	2C	P2C684050(1)(2)D	4.5	8.0	11.0	2.5	0.5	0.5	10.0	0.04
1.0	2D	P2D105050(1)(2)D	4.5	8.0	11.0	2.5	0.5	0.5	8.0	0.04
1.5	2E	P2E155050(1)(2)D	5.0	9.5	12.5	2.5	0.5	0.8	6.5	0.04
2.2	3F	P3F225050(1)(2)D	5.0	9.5	12.5	2.5	0.5	1.1	5.0	0.06
3.3	3G	P3G335050(1)(2)D	5.5	10.0	13.0	2.5	0.5	1.7	3.5	0.06
4.7	4H	P4H475050(1)(2)D	6.0	10.0	13.0	2.5	0.5	2.4	2.5	0.06
6.8	5J	P5J685050(1)(2)D	8.6	12.5	15.5	5.0	0.5	3.4	2.0	0.06
10	5L	P5L106050(1)(2)D	8.6	12.5	15.5	5.0	0.5	5.0	1.6	0.08
15	6M	P6M156050(1)(2)D	9.5	15.0	18.0	5.0	0.5	7.5	1.2	0.08
22	6P	P6P226050(1)(2)D	9.5	16.0	19.0	5.0	0.5	11.0	1.0	0.08

Note

- Part number definitions:
 - Insert M for ± 20 % tolerance or K for ± 10 %
 - Lead style and packaging code, see Lead Styles and Packaging table

PERFORMANCE CHARACTERISTICS

1. **Climatic Category:** 55 / 125 / 56 according to IEC
2. **Temperature Range:** -55 °C up to +125 °C with linear voltage derating to category voltage U_C
3. **Rated Voltage, Category Voltage:**
3 V to 50 V; 2 V to 33 V
4. **Surge Voltage:** 1.3 times of rated voltage at +85 °C
5. **Reverse Voltage (Temporary):**
15 % of the rated DC voltage at +20 °C
10 % of the rated DC voltage at +55 °C
5 % of the rated DC voltage at +85 °C
6. **Rated Capacitance:** 0.1 μ F to 330 μ F
7. **Capacitance Tolerance:** ± 20 %, ± 10 %
8. **Leakage Current in μ A:** measured at +20 °C after 5 min: $\leq 0.01 \times C_R \times U_R$ or 0.5 μ A, whichever is greater
9. **Dissipation Factor:** at 120 Hz and +20 °C
See table
10. **Impedance:** measured at 100 kHz and +20 °C
See table
11. **Permissible AC Voltage Stress:** the highest permissible AC voltage for the respective frequency may be taken from the brochure "General Information".

The values apply for +20 °C. For higher temperatures, the values have to be multiplied with the following factors:

TEMPERATURE	FACTOR
+50 °C	0.7
+85 °C	0.5
+125 °C	0.3

Intermediate values can be obtained by linear interpolation.

For further notes on AC voltage stress: see general information

12. **Service life:** > 300 000 h ⁽¹⁾
13. **Failure percentage:** ≤ 0.6 % within 100 000 h ⁽¹⁾
14. **Failure rate (λ):** ≤ 0.6 10⁻⁷/h = ≤ 60 fit ⁽¹⁾
15. **Failure criteria:** catastrophic failure: short circuit or interruption
Drift failure: DC/C > + 5 % - 15 %
Z > 3 times initial limit value
IR > 5 times initial value + 5 μ A

Note

⁽¹⁾ Related to U_R , +40 °C and a circuit resistance of $\geq 3 \Omega/V$

16. Characteristics at high and low temperatures (the values shall not exceed the following limits)

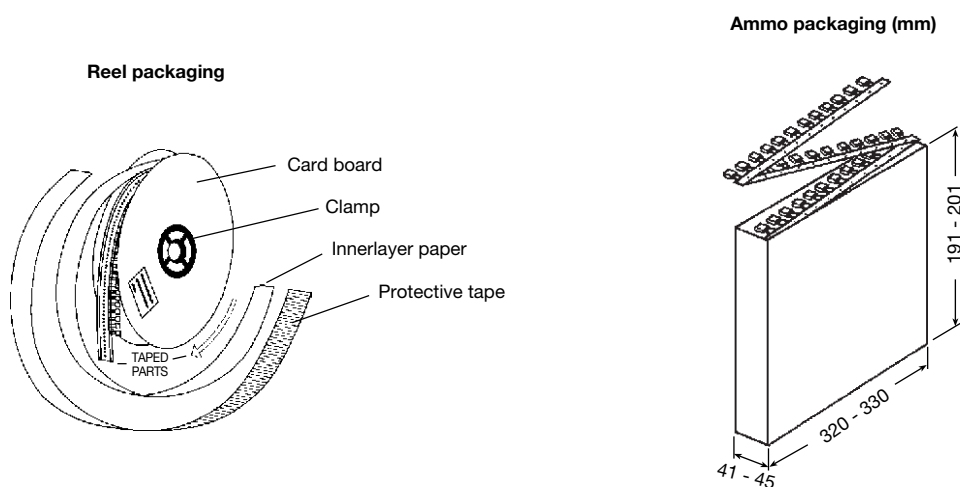
TEST TEMPERATURE	-55 °C	+20 °C	+85 °C	+125 °C
$\Delta C/C < \tan \delta$	-10 %	-	+12 %	+15 %
$\leq 1.5 \mu F$	0.04	0.04	0.04	0.06
$< 10 \mu F$	0.06	0.06	0.06	0.08
$< 100 \mu F$	0.08	0.08	0.08	0.08
$\geq 100 \mu F$	0.10	0.10	0.10	0.10
Leakage current IR	-	$\leq 0.01 \times C_R \times U_R$ or 0.5 μA whichever is greater	$\leq 0.1 \times C_R \times U_R$ or 10 μA whichever is greater	$\leq 0.125 \times C_R \times U_R$ or 12.5 μA whichever is greater ⁽¹⁾

Note

⁽¹⁾ Measured at category voltage

PRODUCT INFORMATION	
Mounting of Through Hole Components	www.vishay.com/doc?40108
Solid Tantalum Capacitors (With MnO ₂ Electrolyte) Voltage Derating	www.vishay.com/doc?40246
SELECTOR GUIDES	
Quick Reference Guide	www.vishay.com/doc?40037
Selector Guide	www.vishay.com/doc?49054
Parameter Comparison Guide	www.vishay.com/doc?40033
FAQ	
Frequently Asked Questions	www.vishay.com/doc?40110

LEAD STYLES AND PACKAGING

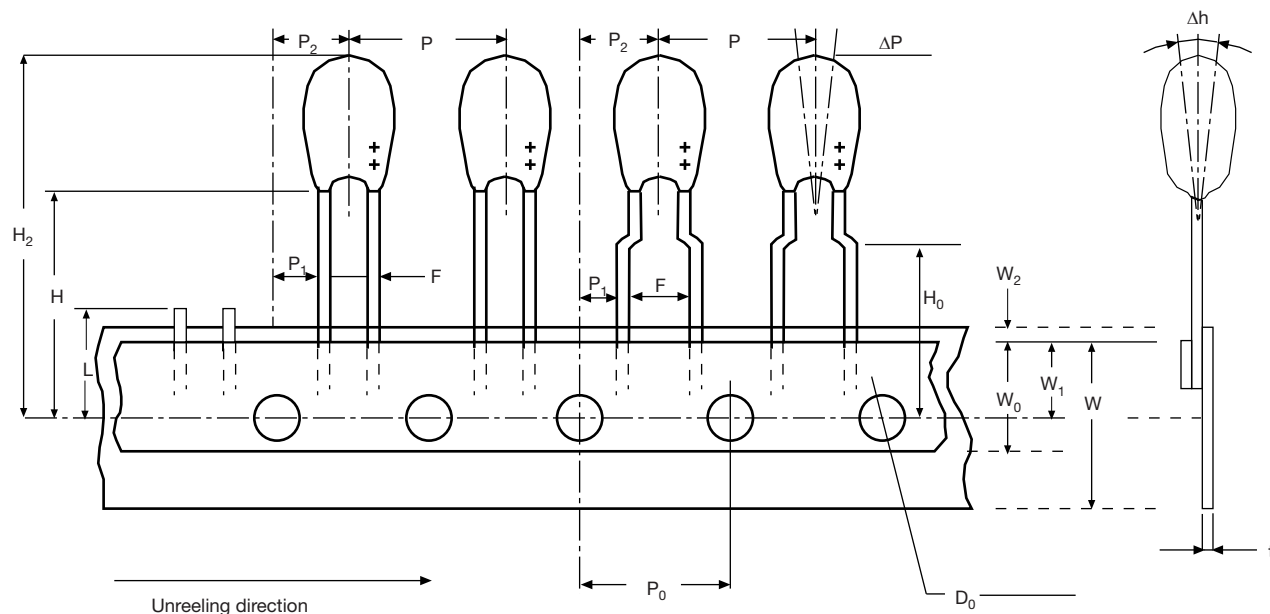


CASE SIZE	CODE	RM IN mm ± 0.5	SPECIFICATION	REMARKS
1 - 6	00	2.5 / 5	Bulk	Reel with positive pole in tape run direction in front is standard
1 - 4 ⁽¹⁾	C0	5	Form L, bulk	
1 - 6	V0	5	Form DS, bulk	
1 - 4 ⁽¹⁾	W0	2.5	Reel, positive pole in front of unreeling direction	
1 - 4 ⁽¹⁾	T0	2.5	Reel, negative pole in front of unreeling direction	
1 - 4 ⁽¹⁾	H0	2.5	Ammo	
1 - 5	V2	5	Reel, positive pole in front of unreeling direction	
1 - 5	R0	5	Reel, negative pole in front of unreeling direction	
1 - 5	O8	5	Ammo	

Note

⁽¹⁾ 100 μ F - 6.3 V, 68 μ F - 10 V, 47 μ F - 16 V, 22 μ F - 25 V

CASE SIZE	BULK 00, V0, C0	REEL W0, T0, V2, R0	AMMO H0, O8
ETPW 1 A, B	500	2500	2500
ETPW 2 C, D, E	500	2000	2000
ETPW 3 F, G	500	1500	1500
ETPW 4 H	500	1500	1500
ETPW 5 J, K, L	100	500	500
ETPW 6 M, N, P, R	100	-	-

TAPING according to IEC 286-2


Dimensions for components on tape and tolerances:

DESIGNATION	SYMBOL	DIMENSIONS (mm)
Holding tape width	W	18.0 (+ 1 / - 0.5)
Adhesive tape width	W ₀	Min. 5.0
Distance of components	P	12.7 ± 1
Hole center to component center	P ₂	6.35 ± 1.3
Hole center to lead	P ₁	5.1 / 3.8 ± 0.7
Distance of body to hole center	H ⁽¹⁾	18.0 (+ 2 / - 0)
Distance of lead to hole center	H ₀	16.0 ± 0.5
Component upper edge to hole center	H ₁	Max. 32.0
Adhesive tape location	W ₂	Max. 3.0
Hole location	W ₁	9.0 (+ 0.75 / - 0.5)
Distance of holes	P ₀	12.7 ± 0.3
Hole diameter	D ₀	4.0 ± 0.3
Lead diameter	d	0.5 ± 0.05
Component alignment	Δh	Max. ± 2.0
Pitch	F	2.5 / 5.0 (+ 0.6 / - 0.1)
Holding tape thickness	t	0.5 ± 0.2
Component alignment	ΔP	Max. ± 1.3
Length of snapped leads	L	Max. 11.0

Note

⁽¹⁾ Also available: 16 mm and 20 mm taping according to DIN-IEC 286 part 2



Disclaimer

ALL PRODUCT, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, "Vishay"), disclaim any and all liability for any errors, inaccuracies or incompleteness contained in any datasheet or in any other disclosure relating to any product.

Vishay makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, Vishay disclaims (i) any and all liability arising out of the application or use of any product, (ii) any and all liability, including without limitation special, consequential or incidental damages, and (iii) any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.

Statements regarding the suitability of products for certain types of applications are based on Vishay's knowledge of typical requirements that are often placed on Vishay products in generic applications. Such statements are not binding statements about the suitability of products for a particular application. It is the customer's responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in datasheets and / or specifications may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated for each customer application by the customer's technical experts. Product specifications do not expand or otherwise modify Vishay's terms and conditions of purchase, including but not limited to the warranty expressed therein.

Hyperlinks included in this datasheet may direct users to third-party websites. These links are provided as a convenience and for informational purposes only. Inclusion of these hyperlinks does not constitute an endorsement or an approval by Vishay of any of the products, services or opinions of the corporation, organization or individual associated with the third-party website. Vishay disclaims any and all liability and bears no responsibility for the accuracy, legality or content of the third-party website or for that of subsequent links.

Vishay products are not designed for use in life-saving or life-sustaining applications or any application in which the failure of the Vishay product could result in personal injury or death unless specifically qualified in writing by Vishay. Customers using or selling Vishay products not expressly indicated for use in such applications do so at their own risk. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay. Product names and markings noted herein may be trademarks of their respective owners.