

Resin-Coated, Radial-Lead Tantalum Capacitors



FEATURES

- RoHS Compliant design available
- Flame retardant encapsulation
- Very high temperature range
- Improved humidity class
- Very low leakage current
- Very high CV product
- Very low leakage current
- Very low failure rate
- Preaged under temperature and voltage



RoHS*
COMPLIANT

MECHANICAL SPECIFICATIONS

Colour: Gold

Laser Marked: Capacity and voltage in clear text; Plus pole marked, Date code (year/month) according to DIN IEC 62

Leads: Standard (Tin/Lead), RoHS Compliant (100 % Tin)

Tantalum capacitors with sintered anode and solid semiconductor electrolyte with flame retardant fluidized bed coating. The type ETQW is characterized by very favorable electrical values even at higher ambient temperatures. The capacitor complies with DIN 45910 part 147. This type is also available as a radially taped version.

ORDERING INFORMATION						
Q1B	685	603	M	00	D	E3
TYPE	CAPACITANCE	DC VOLTAGE RATING AT +85 °C	CAPACITANCE TOLERANCE	LEAD STYLE AND PACKAGING		RoHS COMPLIANT
ETQW 1A ETQW 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	Ø D ± 0.05	FORM DS		FORM L	
					H ₂ MAX.	RM	H ₂ MAX.	RM
ETQW - 1	4.5	7.5	2.5	0.5	10.5	5	10.5	5
ETQW - 2	5.0	9.5	2.5	0.5	12.5	5	12.5	5
ETQW - 3	6.0	10.5	2.5	0.5	13.5	5	13.5	5
ETQW - 4	6.5	11.5	2.5	0.5	14.5	5	14.5	5
ETQW - 5	9.0	14.0	5.0	0.5	17.0	5	-	-
ETQW - 6	9.5	17.0	5.0	0.5	20.0	5	-	-

* Pb containing terminations are not RoHS compliant, exemptions may apply



STANDARD 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 AT + 85 °C, Surge = 3.9 V . . . U _C = 2 V AT + 125 °C										
6.8	1A	Q1A685003(*)_ _D	4.5	7.5	10.5	2.5	0.5	0.5	5.4	0.06
10.0	1A	Q1A106003(*)_ _D	4.5	7.5	10.5	2.5	0.5	0.5	4.5	0.06
15.0	1B	Q1B156003(*)_ _D	4.5	7.5	10.5	2.5	0.5	0.5	3.6	0.06
22.0	2C	Q2C226003(*)_ _D	5.0	9.5	12.5	2.5	0.5	0.5	2.9	0.06
33.0	2D	Q2D336003(*)_ _D	5.0	9.5	12.5	2.5	0.5	0.8	2.3	0.06
47.0	2E	Q2E476003(*)_ _D	5.0	9.5	12.5	2.5	0.5	1.1	1.8	0.06
68.0	3F	Q3F686003(*)_ _D	6.0	10.5	13.5	2.5	0.5	1.6	1.4	0.06
100.0	3G	Q3G107003(*)_ _D	6.0	10.5	13.5	2.5	0.5	2.4	1.1	0.08
150.0	4H	Q4H157003(*)_ _D	6.5	11.5	14.5	2.5	0.5	3.6	0.9	0.08
220.0	5J	Q5J227003(*)_ _D	9.0	14.0	17.0	5.0	0.5	5.3	0.7	0.08
330.0	5L	Q5L337003(*)_ _D	9.0	14.0	17.0	5.0	0.5	7.9	0.6	0.08

Note:

(1) Insert M for ± 20 % tolerance or K for ± 10 %
 _ _ Lead style and packaging code, see lead style and packaging



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 AT + 85 °C, Surge = 7.8 V . . . U_C = 4 V AT + 125 °C										
4.7	1A	Q1A475603(*)_ _D	4.5	7.5	10.5	2.5	0.5	0.5	5.4	0.06
6.8	1B	Q1B685603(*)_ _D	4.5	7.5	10.5	2.5	0.5	0.5	4.5	0.06
10.0	2C	Q2C106603(*)_ _D	5.0	9.5	12.5	2.5	0.5	0.5	3.6	0.06
15.0	2D	Q2D156603(*)_ _D	5.0	9.5	12.5	2.5	0.5	0.8	2.9	0.06
22.0	2E	Q2E226603(*)_ _D	5.0	9.5	12.5	2.5	0.5	1.1	2.3	0.06
33.0	3F	Q3F336603(*)_ _D	6.0	10.5	13.5	2.5	0.5	1.7	1.8	0.06
47.0	3G	Q3G476603(*)_ _D	6.0	10.5	13.5	2.5	0.5	2.4	1.7	0.06
68.0	4H	Q4H686603(*)_ _D	6.5	11.5	14.5	2.5	0.5	3.4	1.1	0.06
100.0	5J	Q5J107603(*)_ _D	9.0	14.0	17.0	5.0	0.5	5.0	0.9	0.08
150.0	5L	Q5L157603(*)_ _D	9.0	14.0	17.0	5.0	0.5	7.6	0.7	0.08
220.0	6M	Q6M227603(*)_ _D	9.5	17.0	20.0	5.0	0.5	11.1	0.6	0.08
330.0	6P	Q6P337603(*)_ _D	9.5	17.0	20.0	5.0	0.5	16.6	0.5	0.08
U_R = 10 V AT + 85 °C, Surge = 13 V . . . U_C = 6.3 V AT + 125 °C										
3.3	1A	Q1A335010(*)_ _D	4.5	7.5	10.5	2.5	0.5	0.5	5.9	0.06
4.7	1B	Q1B475010(*)_ _D	4.5	7.5	10.5	2.5	0.5	0.5	4.5	0.06
6.8	2C	Q2C685010(*)_ _D	5.0	9.5	12.5	2.5	0.5	0.5	3.6	0.06
10.0	2D	Q2D106010(*)_ _D	5.0	9.5	12.5	2.5	0.5	0.8	2.9	0.06
15.0	2E	Q2E156010(*)_ _D	5.0	9.5	12.5	2.5	0.5	1.2	2.3	0.06
22.0	3F	Q3F226010(*)_ _D	6.0	10.5	13.5	2.5	0.5	1.8	1.8	0.06
33.0	3G	Q3G336010(*)_ _D	6.0	10.5	13.5	2.5	0.5	2.6	1.4	0.06
47.0	4H	Q4H476010(*)_ _D	6.5	11.5	14.5	2.5	0.5	3.8	1.1	0.06
68.0	5J	Q5J686010(*)_ _D	9.0	14.0	17.0	5.0	0.5	5.4	0.9	0.06
100.0	5L	Q5L107010(*)_ _D	9.0	14.0	17.0	5.0	0.5	8.0	0.7	0.08
150.0	6N	Q6N157010(*)_ _D	9.5	17.0	20.0	5.0	0.5	12.0	0.6	0.08
220.0	6P	Q6P227010(*)_ _D	9.5	17.0	20.0	5.0	0.5	17.6	0.5	0.08
U_R = 16 V AT + 85 °C, Surge = 20.8 V . . . U_C = 10 V AT + 125 °C										
2.2	1A	Q1A225016(*)_ _D	4.5	7.5	10.5	2.5	0.5	0.5	6.3	0.06
3.3	1B	Q1B335016(*)_ _D	4.5	7.5	10.5	2.5	0.5	0.5	5.4	0.06
4.7	2C	Q2C475016(*)_ _D	5.0	9.5	12.5	2.5	0.5	0.6	4.1	0.06
6.8	2D	Q2D685016(*)_ _D	5.0	9.5	12.5	2.5	0.5	0.9	2.9	0.06
10.0	2E	Q2E106016(*)_ _D	5.0	9.5	12.5	2.5	0.5	1.3	2.3	0.06
15.0	3F	Q3F156016(*)_ _D	6.0	10.5	13.5	2.5	0.5	1.9	1.8	0.06
22.0	3G	Q3G226016(*)_ _D	6.0	10.5	13.5	2.5	0.5	2.8	1.4	0.06
33.0	4H	Q4H336016(*)_ _D	6.5	11.5	14.5	2.5	0.5	4.2	1.1	0.06
47.0	5K	Q5K476016(*)_ _D	9.0	14.0	17.0	5.0	0.5	6.0	0.9	0.06
68.0	5L	Q5L686016(*)_ _D	9.0	14.0	17.0	5.0	0.5	8.7	0.7	0.06
100.0	6N	Q6N107016(*)_ _D	9.5	17.0	20.0	5.0	0.5	12.8	0.6	0.08
150.0	6R	Q6R157016(*)_ _D	9.5	17.0	20.0	5.0	0.5	19.2	0.5	0.08
U_R = 25 V AT + 85 °C, Surge = 32.5 V . . . U_C = 16 V AT + 125 °C										
1.0	1A	Q1A105025(*)_ _D	4.5	7.1	10.5	2.5	0.5	0.5	7.7	0.04
1.5	1A	Q1A155025(*)_ _D	4.5	7.5	10.5	2.5	0.5	0.5	6.8	0.04
2.2	1B	Q1B225025(*)_ _D	4.5	7.5	10.5	2.5	0.5	0.5	5.4	0.06
3.3	2C	Q2C335025(*)_ _D	5.0	9.5	12.5	2.5	0.5	0.7	4.1	0.06
4.7	2D	Q2D475025(*)_ _D	5.0	9.5	12.5	2.5	0.5	0.9	2.9	0.06
6.8	2E	Q2E685025(*)_ _D	5.0	9.5	12.5	2.5	0.5	1.4	2.3	0.06
10.0	3F	Q3F106025(*)_ _D	6.0	10.5	13.5	2.5	0.5	2.0	1.8	0.06
15.0	4H	Q4H156025(*)_ _D	6.5	11.5	14.5	2.5	0.5	3.0	1.4	0.06
22.0	5J	Q5J226025(*)_ _D	9.0	14.0	17.0	5.0	0.5	4.4	1.1	0.06
33.0	5K	Q5K336025(*)_ _D	9.0	14.0	17.0	5.0	0.5	6.6	0.9	0.06
47.0	6M	Q6M476025(*)_ _D	9.5	17.0	20.0	5.0	0.5	9.4	0.7	0.06
68.0	6N	Q6N686025(*)_ _D	9.5	17.0	20.0	5.0	0.5	13.6	0.6	0.06

Note:

(*) Insert M for ± 20 % tolerance or K for ± 10 %

_ _ Lead style and packaging code, see lead style and packaging



Resin-Coated, Radial-Leaded
Tantalum Capacitors

Vishay Sprague

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 = 35 V AT + 85 °C, Surge = 45.5 V . . . U_C = 23 V AT + 125 °C										
0.1	1A	Q1A104035(*)_ _D	4.5	7.5	10.5	2.5	0.5	0.5	34.2	0.04
0.15	1A	Q1A154035(*)_ _D	4.5	7.5	10.5	2.5	0.5	0.5	27.0	0.04
0.22	1A	Q1A224035(*)_ _D	4.5	7.5	10.5	2.5	0.5	0.5	20.7	0.04
0.33	1A	Q1A334035(*)_ _D	4.5	7.5	10.5	2.5	0.5	0.5	16.2	0.04
0.47	1A	Q1A474035(*)_ _D	4.5	7.5	10.5	2.5	0.5	0.5	12.6	0.04
0.68	1A	Q1A684035(*)_ _D	4.5	7.5	10.5	2.5	0.5	0.5	9.0	0.04
1.0	1A	Q1A105035(*)_ _D	4.5	7.5	10.5	2.5	0.5	0.5	7.2	0.04
1.5	1B	Q1A155035(*)_ _D	4.5	7.5	10.5	2.5	0.5	0.5	5.9	0.04
2.2	2C	Q2C225035(*)_ _D	5.0	9.5	12.5	2.5	0.5	0.6	4.5	0.06
3.3	2D	Q2D335035(*)_ _D	5.0	9.5	12.5	2.5	0.5	0.9	3.2	0.06
4.7	2E	Q2E475035(*)_ _D	5.0	9.5	12.5	2.5	0.5	1.3	2.3	0.06
6.8	3F	Q3F685035(*)_ _D	6.0	10.5	13.5	2.5	0.5	1.9	1.8	0.06
10.0	3G	Q3G106035(*)_ _D	6.0	10.5	13.5	2.5	0.5	2.8	1.4	0.06
15.0	5J	Q5J156035(*)_ _D	9.0	14.0	17.0	5.0	0.5	4.2	1.1	0.06
22.0	5L	Q5L226035(*)_ _D	9.0	14.0	17.0	5.0	0.5	6.2	0.9	0.06
33.0	6M	Q6M336035(*)_ _D	9.5	17.0	20.0	5.0	0.5	9.2	0.7	0.06
47.0	6P	Q6P476035(*)_ _D	9.5	17.0	20.0	5.0	0.5	13.2	0.6	0.06
U_R = 50 V AT + 85 °C, Surge = 65 V . . . U_C = 33 V AT + 125 °C										
0.1	1A	Q1A104050(*)_ _D	4.5	7.5	10.5	2.5	0.5	0.5	34.2	0.04
0.15	1A	Q1A154050(*)_ _D	4.5	7.5	10.5	2.5	0.5	0.5	27.0	0.04
0.22	1A	Q1A224050(*)_ _D	4.5	7.5	10.5	2.5	0.5	0.5	20.7	0.04
0.33	1B	Q1B334050(*)_ _D	4.5	7.5	10.5	2.5	0.5	0.5	16.2	0.04
0.47	1B	Q1B474050(*)_ _D	4.5	7.5	10.5	2.5	0.5	0.5	12.6	0.04
0.68	2C	Q2C684050(*)_ _D	5.0	9.5	12.5	2.5	0.5	0.5	9.0	0.04
1.0	2D	Q2D105050(*)_ _D	5.0	9.5	12.5	2.5	0.5	0.5	7.2	0.04
1.5	2E	Q2E155050(*)_ _D	5.0	9.5	12.5	2.5	0.5	0.6	5.9	0.04
2.2	3F	Q3F225050(*)_ _D	6.0	10.5	13.5	2.5	0.5	0.9	4.5	0.06
3.3	3G	Q3G335050(*)_ _D	6.0	10.5	13.5	2.5	0.5	1.3	3.2	0.06
4.7	4H	Q4H475050(*)_ _D	6.5	11.5	14.5	2.5	0.5	1.9	2.3	0.06
6.8	5J	Q5J685050(*)_ _D	9.0	14.0	17.0	5.0	0.5	2.7	1.8	0.06
10.0	5L	Q5L106050(*)_ _D	9.0	14.0	17.0	5.0	0.5	4.0	1.4	0.06
15.0	6M	Q6M156050(*)_ _D	9.5	17.0	20.0	5.0	0.5	6.0	1.1	0.06
22.0	6P	Q6P226050(*)_ _D	9.5	17.0	20.0	5.0	0.5	8.8	0.9	0.06

Note:

(*) Insert M for ± 20 % tolerance or K for ± 10 %

_ _ Lead style and packaging code, see lead style and packaging



PERFORMANCE CHARACTERISTICS

1. **Climatic Category:** 55/125/56 acc. to IEC
2. **Temperature Range:** - 55 °C up to + 125 °C with linear voltage derating to category voltage UC
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 µF to 330 µF
7. **Capacitance Tolerance:** ± 20 %, ± 10 %,
8. **Leakage Current in µA:** Measured at + 20 °C after 5 minutes: ≤ 0.008 x CR x UR or 0.5 µA, 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".
16. **Characteristics at high and low temperatures** (the values shall not exceed the following limits)

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 ⁽²⁾
13. **Failure percentage:** ≤ 0.3 % within 100 000 h ⁽²⁾
14. **Failure rate (I):** ≤ 0.3 10⁻⁷/h = ≤ 30 fit ⁽²⁾
15. **Failure criteria:** Catastrophic failure: Short circuit or interruption

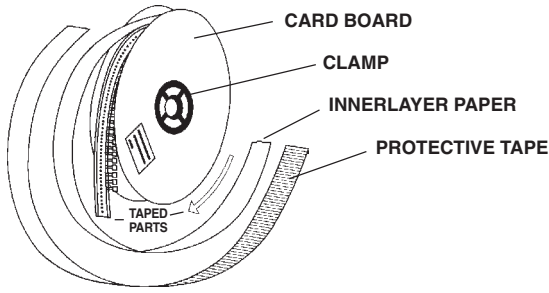
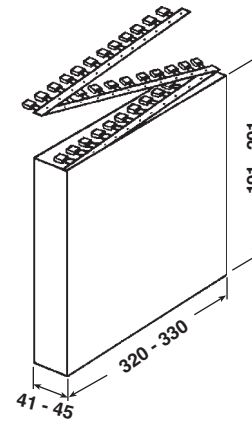
Drift failure: DC/C > + 5 - 15 %
Z > 3 times initial limit value
IR > 5 times initial value + 5 µA

Note: ⁽²⁾ related to UR, + 40 °C and a circuit resistance of ≥ 3 Ω/V

TEST TEMPERATURE	- 55 °C	+ 20 °C	+ 85 °C	+ 125 °C
ΔC/C < tanδ	- 10 %	-	+ 12 %	+ 15 %
≤ 1.5 µF	0.04	0.04	0.04	0.04
< 10 µF	0.06	0.06	0.06	0.06
< 100 µF	0.08	0.06	0.08	0.08
≥ 100 µF	0.10	0.08	0.10	0.10
Leakage current IR	-	≤ 0.008 x CR x UR or 0.5 µA whichever is greater	≤ 0.08 x CR x UR or 5.0 µA whichever is greater	≤ 0.1 x CR x UR or 6.25 µA whichever is greater ⁽¹⁾

Note:

⁽¹⁾ Measured at category voltage

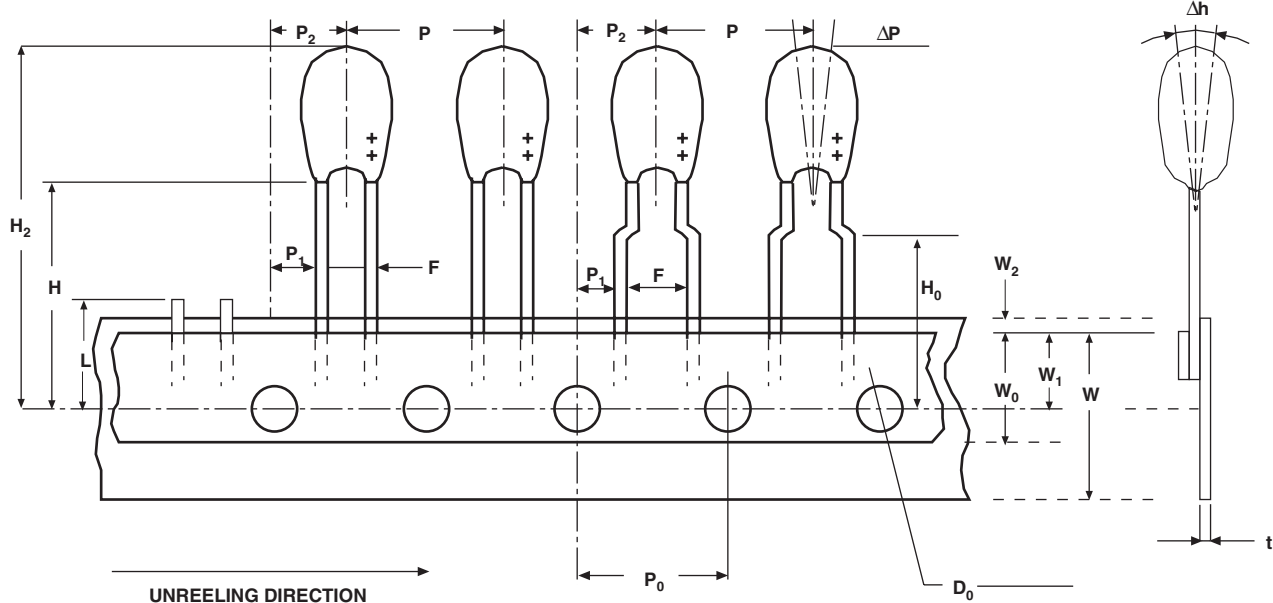
LEAD STYLES AND PACKAGING
REEL PACKING

AMMO PACKAGING (mm)


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 - 6	V0	5	Form DS, Bulk	
1 - 4	W0	2.5	Reel, positive pole in front of unreeling direction	
1 - 4	T0	2.5	Reel, negative pole in front of unreeling direction	
1 - 4	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	
1 - 4	C0	5	Style "L" Bulk	

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

TAPING ACCORDING TO IEC 286-2

(meets 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 snipped leads	L	Max. 11.0

Note:

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



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All product specifications and data are subject to change without notice.

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