

**RATINGS AND CASE CODES**

C <sub>R</sub> (μF)	RATED VOLTAGE U <sub>R</sub> AT +85 °C															
	6.3 V		10 V		16 V		20 V		25 V		35 V		40 V		50 V	
	CATEGORY VOLTAGE U <sub>C</sub> AT +125 °C															
	4.0 V		6.3 V		10 V		13 V		16 V		23 V		25 V		32 V	
	STD.	EXT.	STD.	EXT.	STD.	EXT.	STD.	EXT.	STD.	EXT.	STD.	EXT.	STD.	EXT.	STD.	EXT.
0.10														A		A
0.15															A	A
0.22															A	A
0.33														A		
0.47														A		
0.68																A
1.0														A		A / B
1.5									A					B		B
2.2					A		A							B		B
3.3					A							A	B	A	B	
4.7			A							A			B		B	
6.8	A							A					B		C	
10						A			B			B	C		C	
15				A	B		B			B			C		C	
22		A			B			B		B			C			
33			B			B			C			C		D		
47		B		B	C		C			D				D		
68				B	C			C								
100			C		D	C	D									
150	C			C		D										
220		C	D													
330	D															

**STANDARD RATINGS / EXTENDED RATINGS**

CAPACITANCE $C_R$ ( $\mu F$ )	CASE CODE	PART NUMBER	MAX. DCL AT +25 °C ( $\mu A$ )	MAX. DF 120 Hz, AT +25 °C (%)	MAX. IMPEDANCE 100 kHz, AT +25 °C ( $\Omega$ )
$U_R = 6.3 V_{DC}$ AT +85 °C, SURGE = 8 V; $U_C = 4 V_{DC}$ AT +125 °C, SURGE = 5 V					
6.8	A	790D685X(1)6R3A2(2)	1.0	6	4.0
<b>22</b>	<b>A</b>	<b>790D226X(1)6R3A2(2)</b>	<b>1.3</b>	<b>6</b>	<b>2.1</b>
47	B	790D476X(1)6R3B2(2)	2.9	6	1.3
<b>68</b>	<b>B</b>	<b>790D686X(1)6R3B2(2)</b>	<b>4.2</b>	<b>6</b>	<b>1.3</b>
150	C	790D157X(1)6R3C2(2)	9.4	6	0.6
<b>220</b>	<b>C</b>	<b>790D227X(1)6R3C2(2)</b>	<b>13.8</b>	<b>6</b>	<b>0.6</b>
330	D	790D337X(1)6R3D2(2)	20.7	8	0.4

**Notes**

- Part number definitions:
  - Insert 0 for  $\pm 20\%$  tolerance or 9 for  $\pm 10\%$
  - See Ordering Information, packaging code
- Extended ratings in bold print



STANDARD RATINGS / EXTENDED RATINGS					
CAPACITANCE $C_R$ ( $\mu$ F)	CASE CODE	PART NUMBER	MAX. DCL AT +25 °C ( $\mu$ A)	MAX. DF 120 Hz, AT +25 °C (%)	MAX. IMPEDANCE 100 kHz, AT +25 °C ( $\Omega$ )
<b><math>U_R = 10 V_{DC}</math> AT +85 °C, SURGE = 13 V; <math>U_C = 6.3 V_{DC}</math> AT +125 °C, SURGE = 8 V</b>					
4.7	A	790D475X(1)010A2(2)	1.0	6	4.0
<b>15</b>	<b>A</b>	<b>790D156X(1)010A2(2)</b>	<b>1.5</b>	<b>6</b>	<b>2.5</b>
33	B	790D336X(1)010B2(2)	3.3	6	1.3
<b>47</b>	<b>B</b>	<b>790D476X(1)010B2(2)</b>	<b>4.7</b>	<b>6</b>	<b>1.4</b>
<b>68</b>	<b>B</b>	<b>790D686X(1)010B2(2)</b>	<b>6.8</b>	<b>6</b>	<b>1.3</b>
100	C	790D107X(1)010C2(2)	10.0	6	0.6
<b>150</b>	<b>C</b>	<b>790D157X(1)010C2(2)</b>	<b>15.0</b>	<b>6</b>	<b>0.6</b>
220	D	790D227X(1)010D2(2)	22.0	8	0.4
<b><math>U_R = 16 V_{DC}</math> AT +85 °C, SURGE = 20 V; <math>U_C = 10 V_{DC}</math> AT +125 °C, SURGE = 13 V</b>					
2.2	A	790D225X(1)016A2(2)	1.0	6	5.5
3.3	A	790D335X(1)016A2(2)	1.0	6	4.4
<b>10</b>	<b>A</b>	<b>790D106X(1)016A2(2)</b>	<b>1.6</b>	<b>6</b>	<b>2.7</b>
15	B	790D156X(1)016B2(2)	2.4	6	1.6
22	B	790D226X(1)016B2(2)	3.5	6	1.3
<b>33</b>	<b>B</b>	<b>790D336X(1)016B2(2)</b>	<b>5.2</b>	<b>6</b>	<b>1.6</b>
47	C	790D476X(1)016C2(2)	7.5	6	0.8
68	C	790D686X(1)016C2(2)	10.8	6	0.6
<b>100</b>	<b>C</b>	<b>790D107X(1)016C2(2)</b>	<b>16.0</b>	<b>6</b>	<b>0.7</b>
100	D	790D107X(1)016D2(2)	16.0	6	0.5
150	D	790D157X(1)016D2(2)	24.0	8	0.4
<b><math>U_R = 20 V_{DC}</math> AT +85 °C, SURGE = 26 V; <math>U_C = 13 V_{DC}</math> AT +125 °C, SURGE = 16 V</b>					
2.2	A	790D225X(1)020A2(2)	1.0	6	5.5
<b>6.8</b>	<b>A</b>	<b>790D685X(1)020A2(2)</b>	<b>1.3</b>	<b>6</b>	<b>3.5</b>
15	B	790D156X(1)020B2(2)	3.0	6	1.5
<b>22</b>	<b>B</b>	<b>790D226X(1)020B2(2)</b>	<b>4.4</b>	<b>6</b>	<b>2.1</b>
47	C	790D476X(1)020C2(2)	9.4	6	0.7
<b>68</b>	<b>C</b>	<b>790D686X(1)020C2(2)</b>	<b>13.6</b>	<b>6</b>	<b>0.8</b>
100	D	790D107X(1)020D2(2)	20.0	6	0.7
<b><math>U_R = 25 V_{DC}</math> AT +85 °C, SURGE = 32 V; <math>U_C = 16 V_{DC}</math> AT +125 °C, SURGE = 20 V</b>					
1.5	A	790D155X(1)025A2(2)	1.0	6	6.0
<b>4.7</b>	<b>A</b>	<b>790D475X(1)025A2(2)</b>	<b>1.1</b>	<b>6</b>	<b>4.5</b>
10	B	790D106X(1)025B2(2)	2.5	6	1.6
<b>15</b>	<b>B</b>	<b>790D156X(1)025B2(2)</b>	<b>3.7</b>	<b>6</b>	<b>2.4</b>
<b>22</b>	<b>B</b>	<b>790D226X(1)025B2(2)</b>	<b>5.5</b>	<b>6</b>	<b>2.1</b>
33	C	790D336X(1)025C2(2)	8.2	6	0.8
47	D	790D476X(1)025D2(2)	11.8	6	1.0
<b><math>U_R = 35 V_{DC}</math> AT +85 °C, SURGE = 45 V; <math>U_C = 23 V_{DC}</math> AT +125 °C, SURGE = 29 V</b>					
<b>3.3</b>	<b>A</b>	<b>790D335X(1)035A2(2)</b>	<b>1.2</b>	<b>6</b>	<b>6.0</b>
<b>10</b>	<b>B</b>	<b>790D106X(1)035B2(2)</b>	<b>3.5</b>	<b>6</b>	<b>2.6</b>
<b>33</b>	<b>C</b>	<b>790D336X(1)035C2(2)</b>	<b>11.6</b>	<b>6</b>	<b>1.3</b>

## Notes

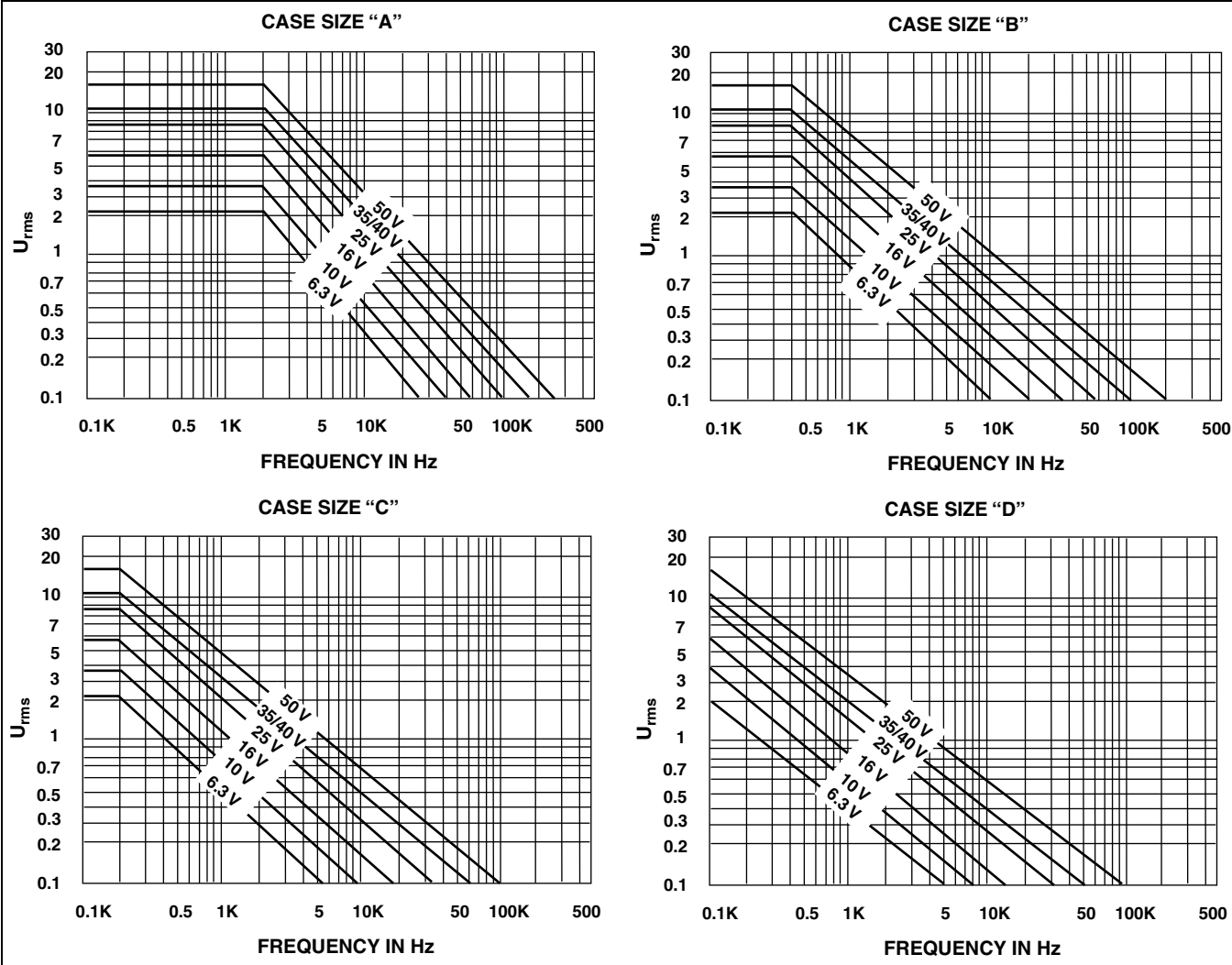
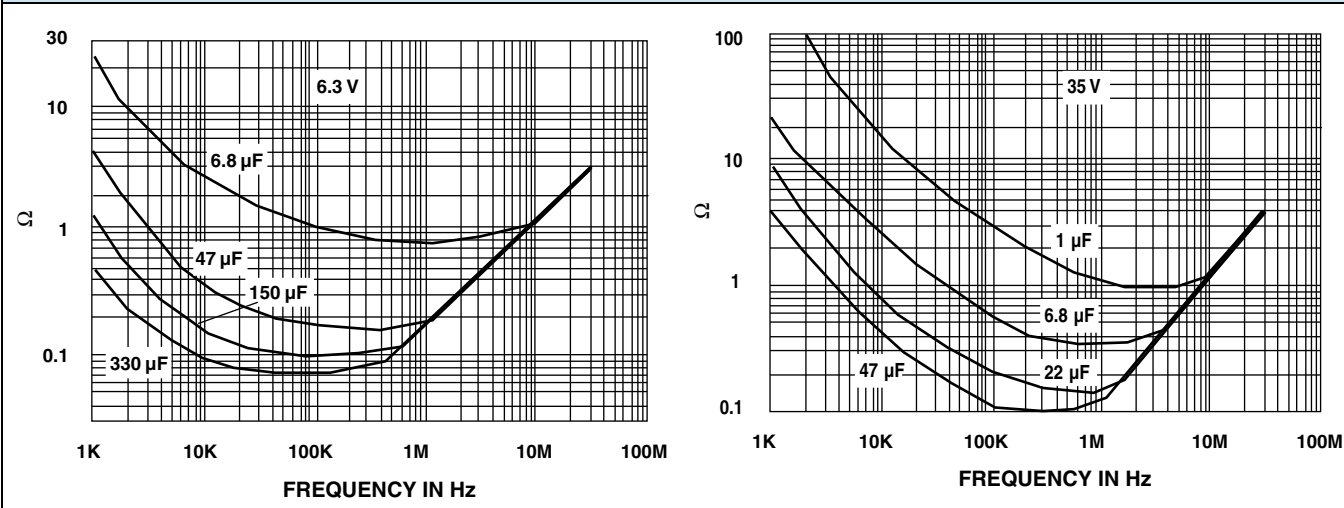
- Part number definitions:
  - Insert 0 for  $\pm 20$  % tolerance or 9 for  $\pm 10$  %
  - See Ordering Information, packaging code
- Extended ratings in bold print



STANDARD RATINGS / EXTENDED RATINGS					
CAPACITANCE $C_R$ ( $\mu$ F)	CASE CODE	PART NUMBER	MAX. DCL AT +25 °C ( $\mu$ A)	MAX. DF 120 Hz, AT +25 °C (%)	MAX. IMPEDANCE 100 kHz, AT +25 °C ( $\Omega$ )
<b><math>U_R = 40 V_{DC}</math> AT +85 °C, SURGE = 52 V; <math>U_C = 25 V_{DC}</math> AT +125 °C, SURGE = 32 V</b>					
0.10	A	790D104X(1)040A2(2)	1.0	6	30.0
0.15	A	790D154X(1)040A2(2)	1.0	6	24.0
0.22	A	790D224X(1)040A2(2)	1.0	6	18.0
0.33	A	790D334X(1)040A2(2)	1.0	6	14.0
0.47	A	790D474X(1)040A2(2)	1.0	6	11.0
1.0	A	790D105X(1)040A2(2)	1.0	6	6.5
1.5	B	790D155X(1)040B2(2)	1.0	6	5.2
2.2	B	790D225X(1)040B2(2)	1.0	6	4.0
3.3	A	790D335X(1)040A2(2)	1.3	6	2.8
3.3	B	790D335X(1)040B2(2)	1.3	6	2.8
4.7	B	790D475X(1)040B2(2)	1.8	6	2.0
6.8	B	790D685X(1)040B2(2)	2.7	6	1.6
10	C	790D106X(1)040C2(2)	4.0	6	1.3
15	C	790D156X(1)040C2(2)	6.0	6	1.0
22	C	790D226X(1)040C2(2)	8.8	6	0.8
33	D	790D336X(1)040D2(2)	13.2	6	0.6
47	D	790D476X(1)040D2(2)	18.8	6	0.5
<b><math>U_R = 50 V_{DC}</math> AT +85 °C, SURGE = 65 V; <math>U_C = 32 V_{DC}</math> AT +125 °C, SURGE = 41 V</b>					
0.10	A	790D104X(1)050A2(2)	1.0	6	30
0.15	A	790D154X(1)050A2(2)	1.0	6	24
0.22	A	790D224X(1)050A2(2)	1.0	6	18
0.68	A	790D684X(1)050A2(2)	1.0	6	8.0
1.0	A	790D105X(1)050A2(2)	1.0	6	6.5
1.0	B	790D105X(1)050B2(2)	1.0	6	6.5
1.5	B	790D155X(1)050B2(2)	1.0	6	5.2
2.2	B	790D225X(1)050B2(2)	1.1	6	4.0
3.3	B	790D335X(1)050B2(2)	1.6	6	2.8
4.7	B	790D475X(1)050B2(2)	2.3	6	2.0
6.8	C	790D685X(1)050C2(2)	3.4	6	1.6
10	C	790D106X(1)050C2(2)	5.0	6	1.3
15	C	790D156X(1)050C2(2)	7.5	6	1.0

**Notes**

- Part number definitions:
  - Insert 0 for  $\pm 20$  % tolerance or 9 for  $\pm 10$  %
  - See Ordering Information, packaging code
- Extended ratings in bold print

**MAXIMUM PERMISSIBLE RIPPLE VOLTAGE AT +25 °C**

**TYPICAL CURVES OF IMPEDANCE VS FREQUENCY**


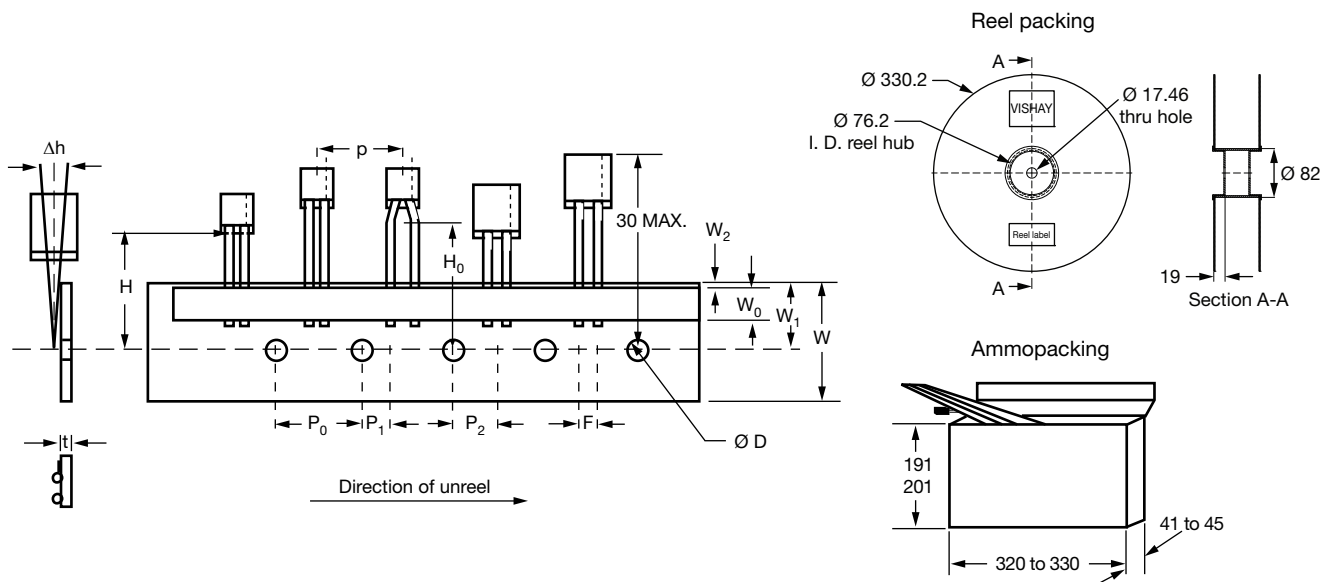
**PACKAGING QUANTITIES**

CASE CODE	TAPE AND REEL	AMMO	BULK
A	1000	1000	500
B	1000	1000	250
C	300	300	100
D	200	200	50

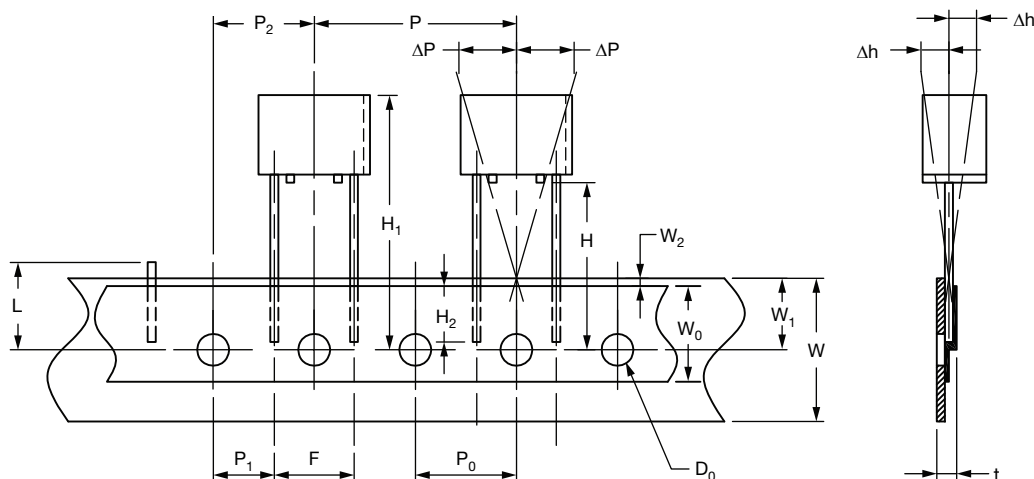
**PERFORMANCE CHARACTERISTICS**

- Operating Temperature:** -55 °C to +85 °C with rated voltage  $U_R$  applied. +85 °C to 125 °C with linear voltage derating to category voltage  $U_C$  (see general information) applied.
- Capacitance and Tolerance:** capacitance measured at 100 Hz and +25 °C shall be within the specified tolerance limits of the nominal rating.
- Reverse Voltage:** 15 % of rated voltage at +25 °C  
5 % of rated voltage at +85 °C
- Surge Voltage:** 130 % of  $U_R$  at +85 °C  
130 % of  $U_C$  at +125 °C
- Impedance at 100 kHz:** measured at +20 °C  $\pm$  5 °C, impedance shall not exceed the values listed in datasheet.
- Stability at low and high temperatures:** capacitance change with temperature, dissipation factor and DC leakage current shall not exceed the limits of the following table.
- Life Test:** 2000 h at +85 °C with rated voltage applied  
2000 h at +125 °C with category voltage applied  
 $\Delta C/C \leq 10$  % of initial value  
 $IL \leq 1.25$  initial limit  
 $DF \leq$  initial limit
- Humidity Test:** 56 days at +40 °C, 90 % relative humidity  
 $\Delta C/C \leq 8$  % of initial value  
 $IL \leq$  initial limit  
 $DF \leq$  initial limit
- Charge and Discharge Test:**  
1 million cycles at +85 °C,  
0.5 s charge at  $U_R$   
0.5 s discharge  
Series resistance < 0.5  $\Omega$   
 $\Delta C/C \leq 5$  % of initial value  
 $IL \leq$  initial limit  
 $DF \leq$  initial limit
- Marking:**  
Top: Rating and polarity  
Front: Type, date code, Vishay identification

TEMP.	CAPACITANCE CHANGE $C_R U_R \leq 1900$ $C_R U_R > 1900$	DISSIPATION FACTOR $I_L$	LEAKAGE CURRENT
-55 °C	-10 %	9 %	-
		11 %	
+25 °C	-	6 %	0.01 $C_R \times U_R$ or 1 $\mu A$ whichever is greater
		8 %	
+85 °C	+12 %	9 %	0.1 $C_R \times U_R$ or 10 $\mu A$ whichever is greater
		11 %	
+125 °C	+15 %	12 %	0.125 $C_R \times U_R$ or 12.5 $\mu A$ whichever is greater
		14 %	

**TAPE AND REEL PACKING (Case A and B - meets IEC 286-2)**


DESIGNATIONS	SYMBOL	DIMENSIONS (mm)		
Pitch of component	P	12.7 ± 1.0		
Feed hole pitch	P <sub>0</sub>	12.7 ± 0.3		
Tape width	W	18 (+ 1/- 0.5)		
Hold down tape width	W <sub>0</sub>	12		
Hole position	W <sub>1</sub>	9 (+ 0.75/-0.5)		
Hold down tape position	W <sub>2</sub>	0 (+ 3/-0)		
Feed hole diameter	D <sub>0</sub>	4.0 ± 0.3		
Tape thickness	T	0.5 ± 0.2		
Component alignment	Δh	0 ± 2		
Lead clinch height	H <sub>0</sub>	16.0 ± 0.5		
Hole center to component center	P <sub>2</sub>	6.35 ± 1.3		
Lead wire spacing Feed hole center to wire center	F	<b>CASE A</b> 2.5 + 0.6/- 0.1	<b>CASE A</b> 5 + 0.6/- 0.1	<b>CASE B</b> 5 + 0.6/- 0.1
	P <sub>1</sub>	5.1 ± 0.7	3.85 ± 0.7	3.85 ± 0.7
Reel pack options	H = 16.5	X	Z	X
	H = 18.5	Y		Y
Ammopack options	H = 16.5	G	I	G
	H = 18.5	H		H

**TAPE AND REEL PACKING (Case C and D)**


DESIGNATIONS	SYMBOL	DIMENSIONS (mm)	
Pitch of component	P	25.4 ± 1.0	
Feed hole pitch	P <sub>0</sub>	12.7 ± 0.3	
Tape width	W	18.0 (+ 1/- 0.5)	
Hold down tape width	W <sub>0</sub>	12	
Hole position	W <sub>1</sub>	9.0 (+ 0.75/- 0.5)	
Hold down tape position	W <sub>2</sub>	0 (+ 3/- 0)	
Maximum height of components	H <sub>1</sub>	32 max.	
Tolerance of positioning parts sideways	ΔP	0 ± 1.0	
Feed hole diameter	D <sub>0</sub>	4.0 ± 0.3	
Tape thickness	t	0.5 ± 0.2	
Component alignment	Δh	0 ± 2	
Cut out length	L	11 max.	
Lead wire spacing	F	10.16 + 0.6/- 0.1	
Feed hole center to wire center	P <sub>1</sub>	7.62 ± 0.7	
Hole center to component center	P <sub>2</sub>	12.7 ± 1.0	
Length of leads under adhesive tape	H <sub>2</sub>	5.0 min. to 9.0 max.	
Reel pack options	H = 16.5 H = 18.5	<b>CASE C</b>	<b>CASE D</b>
		X Y	X Y
Ammopack options	H = 16.5 H = 18.5	G H	G H

**PRODUCT INFORMATION**

Quick Reference Guide	<a href="http://www.vishay.com/doc?40037">www.vishay.com/doc?40037</a>
Selector Guide	<a href="http://www.vishay.com/doc?49054">www.vishay.com/doc?49054</a>
Parameter Comparison Guide	<a href="http://www.vishay.com/doc?40033">www.vishay.com/doc?40033</a>
Mounting of Through-Hole Components	<a href="http://www.vishay.com/doc?40108">www.vishay.com/doc?40108</a>
Frequently Asked Questions	<a href="http://www.vishay.com/doc?40110">www.vishay.com/doc?40110</a>
Solid Tantalum Capacitors (With MnO <sub>2</sub> Electrolyte) Voltage Derating	<a href="http://www.vishay.com/doc?40246">www.vishay.com/doc?40246</a>



## 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.

Except as expressly indicated in writing, Vishay products are not designed for use in medical, life-saving, or life-sustaining applications or for any other application in which the failure of the Vishay product could result in personal injury or death. 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.