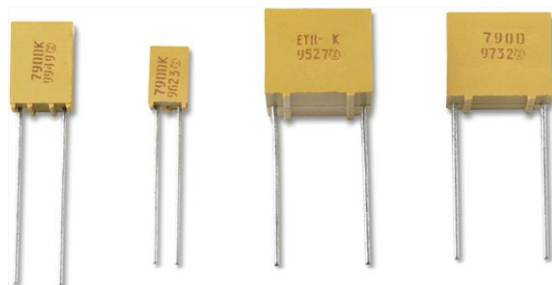


Resin-Molded, Radial-Lead Solid Tantalum Capacitors



PERFORMANCE CHARACTERISTICS

Operating Temperature: - 55 °C to +125 °C
(above 85 °C, voltage derating is required)

Capacitance Range: 0.1 µF to 330 µF

Capacitance Tolerance: ± 10 %, ± 20 %

Voltage Rating: 6.3 V_{DC} to 50 V_{DC}

FEATURES

- Terminations: Tin/lead (SnPb), 100 % tin (Sn)
- Four case sizes precisely molded with a flame retardant epoxy resin
- Stand off on all case sizes
- Available on tape for automatic insertion equipment (only A- and B-case, C- and D-case on request)
- Low leakage current
- Low impedance
- Extended value ranges available
- Material categorization: For definitions of compliance please see www.vishay.com/doc?99912



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

790D	157	X0	006	R	2	P	E3
MODEL	CAPACITANCE	CAPACITANCE TOLERANCE	DC VOLTAGE RATING	CASE CODE	STYLE NUMBER	PACKAGING	RoHS COMPLIANT
790D = Standard and extended range	Expressed in picofarads. The first two digits are the significant figures. The third is the number of zeros following.	X0 = ± 20 % X9 = ± 10 %	Expressed in volts. To complete the three-digit block, zeros precede the voltage rating. A decimal point is indicated by an "R" (6R3 = 6.3 V)	See Ratings and Case Codes table	Insulated case (standard)	See packing information B: Bulk G: Ammopack (H = 16.5 mm) H: Ammopack (H = 18.5 mm) I: Ammopack shouldered leads (A case) X: Reel pack (H = 16.5 mm) Y: Reel pack (H = 18.5 mm) Z: Reel pack shouldered leads (A case)	E3 = 100 % tin termination (RoHS compliant) Blank = SnPb termination

DIMENSIONS in inches [millimeters]

CASE CODE	H MAX.	D MAX.	T MAX.	E ± 0.15 [0.006]	Ø 0.05 [0.002] (+10 %)
A	0.287 [7.3]	0.185 [4.7]	0.165 [4.2]	0.100 [2.54]	0.020 [0.5]
B	0.413 [10.5]	0.287 [7.3]	0.189 [4.8]	0.200 [5.08]	0.020 [0.5]
C	0.413 [10.5]	0.484 [12.3]	0.287 [7.3]	0.400 [10.16]	0.024 [0.6]
D	0.413 [10.5]	0.484 [12.3]	0.484 [12.3]	0.400 [10.16]	0.024 [0.6]

**RATINGS AND CASE CODES**

C _R (μF)	RATED VOLTAGE U _R AT +85 °C															
	6.3 V		10 V		16 V		20 V		25 V		35 V		40 V		50 V	
	CATEGORY VOLTAGE U _C 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	
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 (μF)	CASE CODE	PART NUMBER	MAX. DCL AT +25 °C (μA)	MAX. DF 120 Hz, AT +25 °C (%)	MAX. IMPEDANCE 100 kHz, AT +25 °C (Ω)
$U_R = 6.3 V_{DC}$ 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
22	A	790D226X(1)6R3A2(2)	1.3	6	2.1
47	B	790D476X(1)6R3B2(2)	2.9	6	1.3
68	B	790D686X(1)6R3B2(2)	4.2	6	1.3
150	C	790D157X(1)6R3C2(2)	9.4	6	0.6
220	C	790D227X(1)6R3C2(2)	13.8	6	0.6
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 (μ F)	CASE CODE	PART NUMBER	MAX. DCL AT +25 °C (μ A)	MAX. DF 120 Hz, AT +25 °C (%)	MAX. IMPEDANCE 100 kHz, AT +25 °C (Ω)
$U_R = 10 V_{DC}$ AT +85 °C, SURGE = 13 V; $U_C = 6.3 V_{DC}$ AT +125 °C, SURGE = 8 V					
4.7	A	790D475X(1)010A2(2)	1.0	6	4.0
15	A	790D156X(1)010A2(2)	1.5	6	2.5
33	B	790D336X(1)010B2(2)	3.3	6	1.3
47	B	790D476X(1)010B2(2)	4.7	6	1.4
68	B	790D686X(1)010B2(2)	6.8	6	1.3
100	C	790D107X(1)010C2(2)	10.0	6	0.6
150	C	790D157X(1)010C2(2)	15.0	6	0.6
220	D	790D227X(1)010D2(2)	22.0	8	0.4
$U_R = 16 V_{DC}$ AT +85 °C, SURGE = 20 V; $U_C = 10 V_{DC}$ AT +125 °C, SURGE = 13 V					
2.2	A	790D225X(1)016A2(2)	1.0	6	5.5
3.3	A	790D335X(1)016A2(2)	1.0	6	4.4
10	A	790D106X(1)016A2(2)	1.6	6	2.7
15	B	790D156X(1)016B2(2)	2.4	6	1.6
22	B	790D226X(1)016B2(2)	3.5	6	1.3
33	B	790D336X(1)016B2(2)	5.2	6	1.6
47	C	790D476X(1)016C2(2)	7.5	6	0.8
68	C	790D686X(1)016C2(2)	10.8	6	0.6
100	C	790D107X(1)016C2(2)	16.0	6	0.7
100	D	790D107X(1)016D2(2)	16.0	6	0.5
150	D	790D157X(1)016D2(2)	24.0	8	0.4
$U_R = 20 V_{DC}$ AT +85 °C, SURGE = 26 V; $U_C = 13 V_{DC}$ AT +125 °C, SURGE = 16 V					
2.2	A	790D225X(1)020A2(2)	1.0	6	5.5
6.8	A	790D685X(1)020A2(2)	1.3	6	3.5
15	B	790D156X(1)020B2(2)	3.0	6	1.5
22	B	790D226X(1)020B2(2)	4.4	6	2.1
47	C	790D476X(1)020C2(2)	9.4	6	0.7
68	C	790D686X(1)020C2(2)	13.6	6	0.8
100	D	790D107X(1)020D2(2)	20.0	6	0.7
$U_R = 25 V_{DC}$ AT +85 °C, SURGE = 32 V; $U_C = 16 V_{DC}$ AT +125 °C, SURGE = 20 V					
1.5	A	790D155X(1)025A2(2)	1.0	6	6.0
4.7	A	790D475X(1)025A2(2)	1.1	6	4.5
10	B	790D106X(1)025B2(2)	2.5	6	1.6
15	B	790D156X(1)025B2(2)	3.7	6	2.4
22	B	790D226X(1)025B2(2)	5.5	6	2.1
33	C	790D336X(1)025C2(2)	8.2	6	0.8
47	D	790D476X(1)025D2(2)	11.8	6	1.0
$U_R = 35 V_{DC}$ AT +85 °C, SURGE = 45 V; $U_C = 23 V_{DC}$ AT +125 °C, SURGE = 29 V					
3.3	A	790D335X(1)035A2(2)	1.2	6	6.0
10	B	790D106X(1)035B2(2)	3.5	6	2.6
33	C	790D336X(1)035C2(2)	11.6	6	1.3

Notes

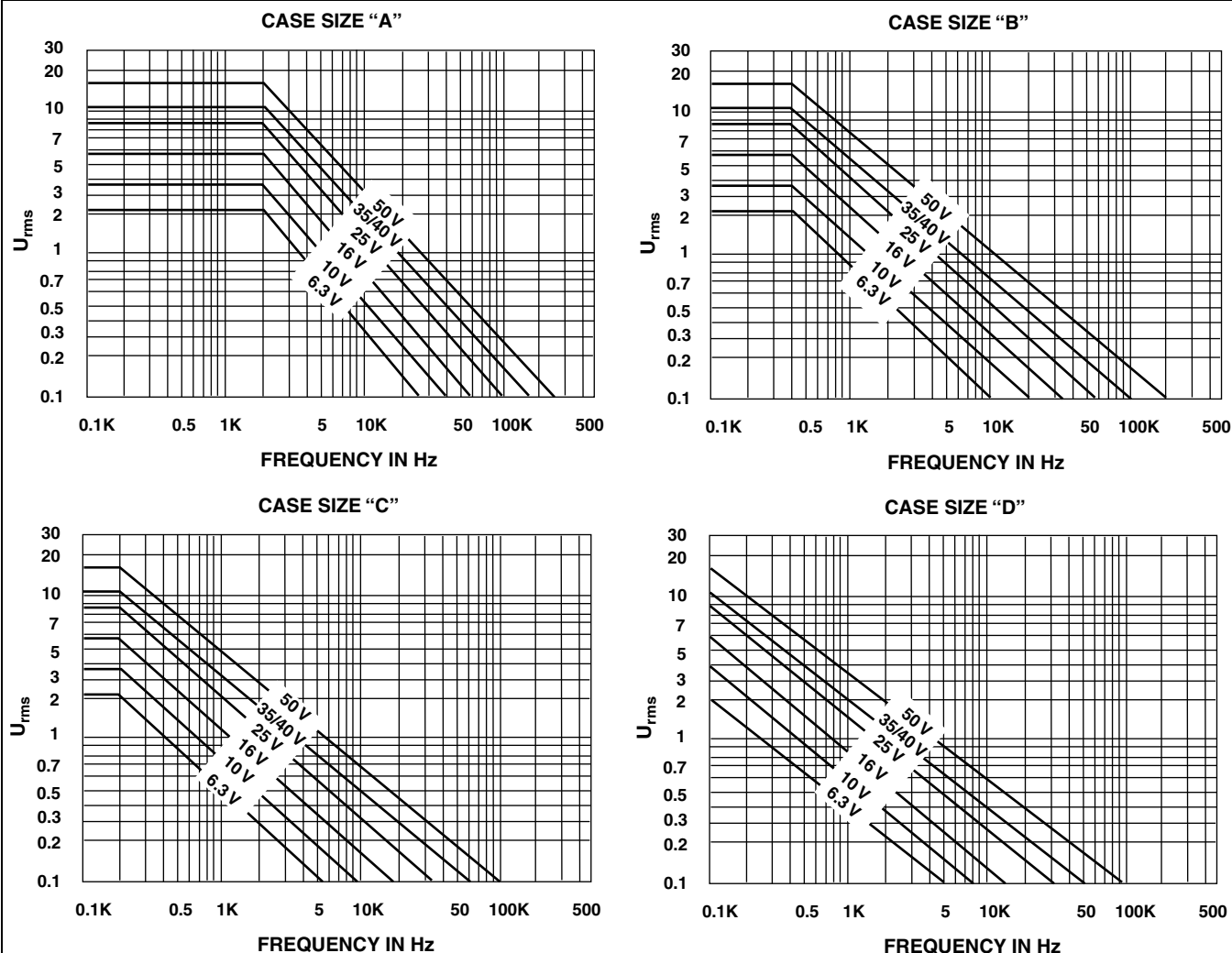
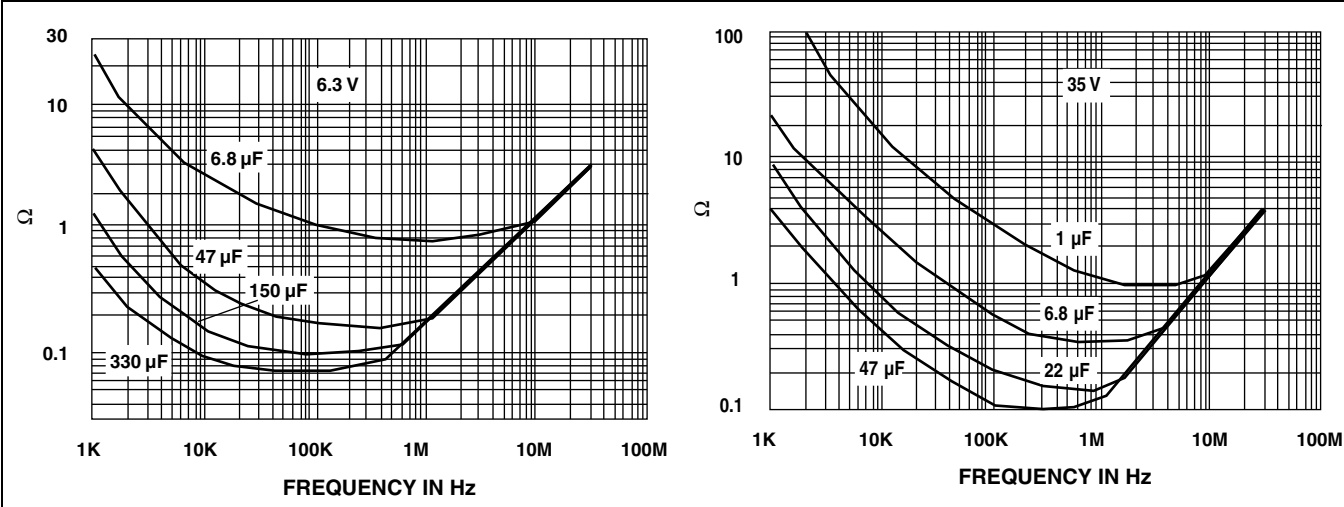
- Part number definitions:
 - Insert 0 for ± 20 % tolerance or 9 for ± 10 %
 - See Ordering Information, packaging code
- Extended ratings in bold print



STANDARD RATINGS/EXTENDED RATINGS					
CAPACITANCE C_R (μ F)	CASE CODE	PART NUMBER	MAX. DCL AT +25 °C (μ A)	MAX. DF 120 Hz, AT +25 °C (%)	MAX. IMPEDANCE 100 kHz, AT +25 °C (Ω)
$U_R = 40 V_{DC}$ AT +85 °C, SURGE = 52 V; $U_C = 25 V_{DC}$ AT +125 °C, SURGE = 32 V					
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
$U_R = 50 V_{DC}$ AT +85 °C, SURGE = 65 V; $U_C = 32 V_{DC}$ AT +125 °C, SURGE = 41 V					
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
1.5	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:
 - (1) Insert 0 for ± 20 % tolerance or 9 for ± 10 %
 - (2) See Ordering Information, packaging code
- Extended ratings in bold print

MAXIMUM PERMISSIBLE RIPPLE VOLTAGE AT +25 °C

TYPICAL CURVES OF IMPEDANCE VS FREQUENCY


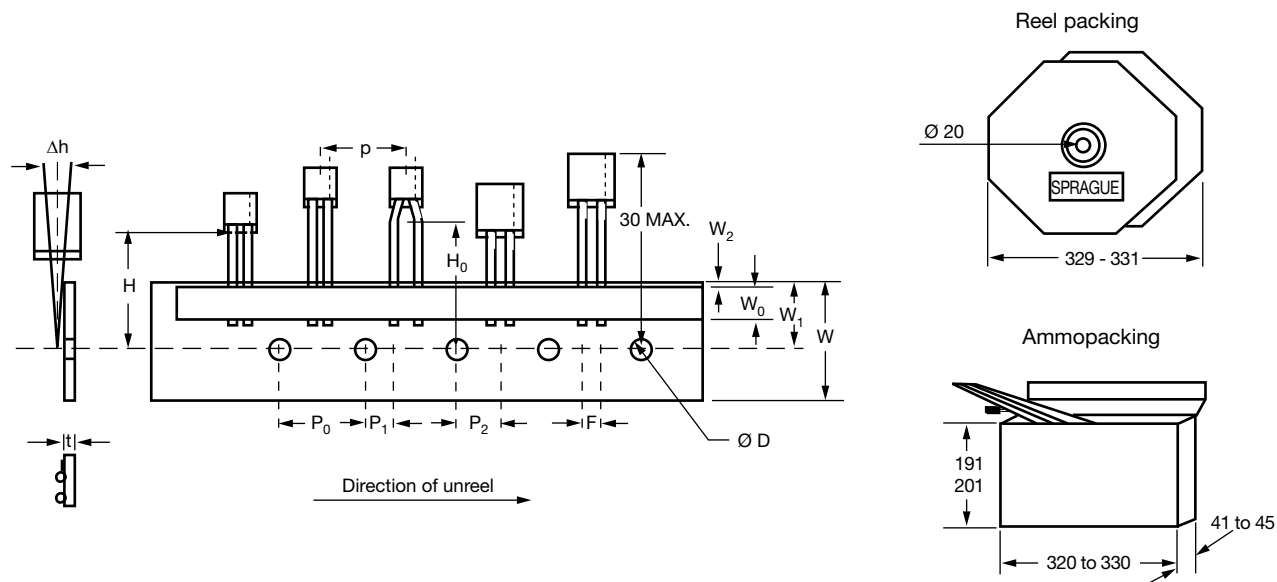
**PACKAGING QUANTITIES**

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

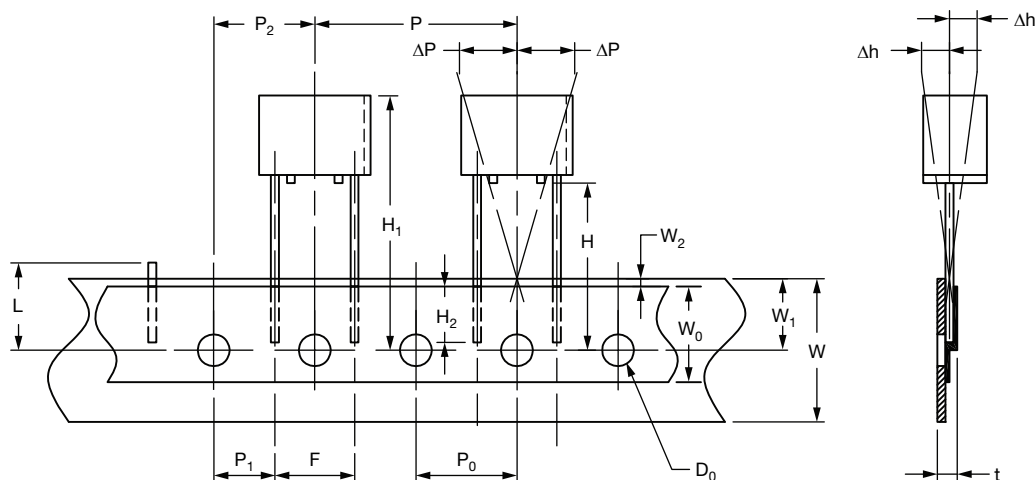
PERFORMANCE CHARACTERISTICS

- 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 Ω
 $\Delta C/C \leq 5$ % of initial value
 $IL \leq$ initial limit
 $DF \leq$ initial limit
- Marking:**
Top: Rating and polarity
Front: Type, date code, Sprague trademark

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 μA whichever is greater
		8 %	
+85 °C	+12 %	9 %	0.1 $C_R \times U_R$ or 10 μA whichever is greater
		11 %	
+125 °C	+15 %	12 %	0.125 $C_R \times U_R$ or 12.5 μA 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 ₀	12.7 ± 0.3		
Tape width	W	18 (+ 1/- 0.5)		
Hold down tape width	W ₀	12		
Hole position	W ₁	9 (+ 0.75/- 0.5)		
Hold down tape position	W ₂	0 (+ 3/- 0)		
Feed hole diameter	D ₀	4.0 ± 0.3		
Tape thickness	T	0.5 ± 0.2		
Component alignment	Δh	0 ± 2		
Lead clinch height	H ₀	16.0 ± 0.5		
Hole center to component center	P ₂	6.35 ± 1.3		
Lead wire spacing Feed hole center to wire center	F P ₁	CASE A 2.5 + 0.6/- 0.1 5.1 ± 0.7	CASE A 5 + 0.6/- 0.1 3.85 ± 0.7	CASE B 5 + 0.6/- 0.1 3.85 ± 0.7
Reel pack options	H = 16.5 H = 18.5	X Y	Z	X Y
Ammopack options	H = 16.5 H = 18.5	G H	I	G 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 ₀	12.7 ± 0.3	
Tape width	W	18.0 (+ 1/- 0.5)	
Hold down tape width	W ₀	12	
Hole position	W ₁	9.0 (+ 0.75/- 0.5)	
Hold down tape position	W ₂	0 (+ 3/- 0)	
Maximum height of components	H ₁	32 max.	
Tolerance of positioning parts sideways	ΔP	0 ± 1.0	
Feed hole diameter	D ₀	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 ₁	7.62 ± 0.7	
Hole center to component center	P ₂	12.7 ± 1.0	
Length of leads under adhesive tape	H ₂	5.0 min. to 9.0 max.	
Reel pack options	H = 16.5 H = 18.5	CASE C X Y	CASE D X Y
Ammopack options	H = 16.5 H = 18.5	G H	G H

PRODUCT INFORMATION

Quick Reference Guide	www.vishay.com/doc?40037
Selector Guide	www.vishay.com/doc?49054
Parameter Comparison Guide	www.vishay.com/doc?40033
Mounting of Through-Hole Components	www.vishay.com/doc?40108
Frequently Asked Questions	www.vishay.com/doc?40110



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Vishay Intertechnology, Inc. hereby certifies that all its products that are identified as RoHS-Compliant fulfill the definitions and restrictions defined under Directive 2011/65/EU of The European Parliament and of the Council of June 8, 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment (EEE) - recast, unless otherwise specified as non-compliant.

Please note that some Vishay documentation may still make reference to RoHS Directive 2002/95/EC. We confirm that all the products identified as being compliant to Directive 2002/95/EC conform to Directive 2011/65/EU.

Vishay Intertechnology, Inc. hereby certifies that all its products that are identified as Halogen-Free follow Halogen-Free requirements as per JEDEC JS709A standards. Please note that some Vishay documentation may still make reference to the IEC 61249-2-21 definition. We confirm that all the products identified as being compliant to IEC 61249-2-21 conform to JEDEC JS709A standards.