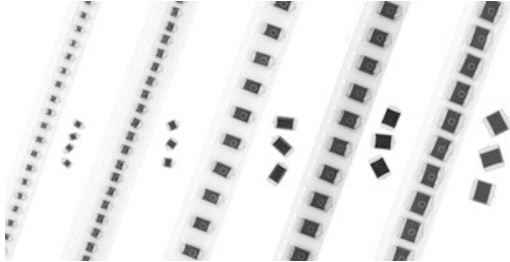


## Solid Tantalum Chip Capacitors TANTAMOUNT<sup>®</sup>, Low Profile, Low ESR, Conformal Coated, Maximum CV



### FEATURES

- New robust 6.3 V ratings for battery operated wireless applications
- New case size offerings
- 1.2 mm to 2 mm height
- Terminations: Lead (Pb)-free (2) standard
- Very low ESR
- 8 mm, 12 mm tape and reel packaging available per EIA-481-1 and reeling per IEC 286-3  
7" [178 mm] standard  
13" [330 mm] available
- Footprint compatible with EIA 535BAAC and CECC 30801 molded chips
- Compliant to RoHS directive 2002/95/EC


**RoHS\***  
COMPLIANT

### PERFORMANCE CHARACTERISTICS

**Operating Temperature:** - 55 °C to + 85 °C  
(To + 125 °C with voltage derating)

**Note**

- Refer to Doc. 40088

**Capacitance Range:** 1 µF to 1000 µF

**Capacitance Tolerance:** ± 10 %, ± 20 % standard

**Voltage Rating:** 4 WVDC to 35 WVDC

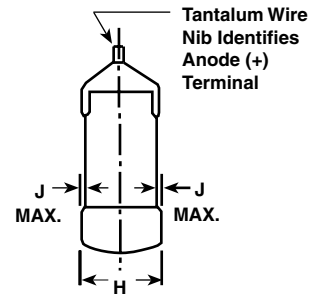
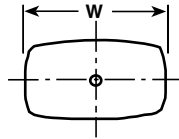
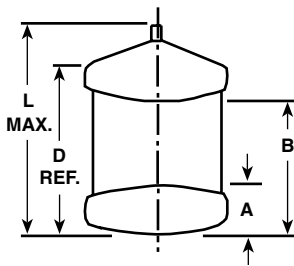
<b>ORDERING INFORMATION</b>							
<b>591D</b>	<b>106</b>	<b>X0</b>	<b>010</b>	<b>B</b>	<b>2</b>	<b>T</b>	<b>15H</b>
TYPE	CAPACITANCE	CAPACITANCE TOLERANCE	DC VOLTAGE RATING AT + 85 °C	CASE CODE	TERMINATION	REEL SIZE AND PACKAGING	SUFFIX
	This is expressed in picofarads. The first two digits are the significant figures. The third is the number of zeros to follow.	<b>X0 = ± 20 %</b> X9 = ± 10 %	This is 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	<b>2 = 100 % Tin</b> 4 = Gold plated 8 = Solder plated 60/40 Special order	<b>T = Tape and reel</b> <b>7" [178 mm] reel</b> W = 13" [330 mm] reel	Maximum height (mm) see dimensions

**Notes**

- Preferred Tolerance and reel sizes are in bold.
- We reserve the right to supply higher voltage ratings and tighter capacitance tolerance capacitors in the same case size.
- Voltage substitutions will be marked with the higher voltage rating.

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

**DIMENSIONS** in inches [millimeters]



CASE CODE	SUFFIX	H	L (MAX.)	W	A	B	D (REF.)	J (MAX.)
A	15H	0.047 ± 0.012 [1.2 ± 0.3]	0.146 [3.7]	0.072 ± 0.012 [1.8 ± 0.3]	0.031 ± 0.012 [0.80 ± 0.30]	0.087 ± 0.016 [2.2 ± 0.4]	0.115 [2.9]	0.004 [0.1]
B	15H	0.047 ± 0.012 [1.2 ± 0.3]	0.158 [4.0]	0.110 ± 0.012 [2.8 ± 0.3]	0.031 ± 0.012 [0.80 ± 0.30]	0.097 ± 0.016 [2.5 ± 0.4]	0.139 [3.5]	0.004 [0.1]
B	20H	0.079 [2.0] Max.						
C	15H	0.047 ± 0.012 [1.2 ± 0.3]	0.281 [7.1]	0.126 ± 0.012 [3.2 ± 0.3]	0.051 ± 0.012 [1.3 ± 0.30]	0.180 ± 0.024 [4.4 ± 0.6]	0.238 [6.0]	0.004 [0.1]
C	20H	0.079 [2.0] Max.						
D	15H	0.047 ± 0.012 [1.2 ± 0.3]	0.298 [7.5]	0.170 ± 0.012 [4.3 ± 0.3]	0.051 ± 0.012 [1.3 ± 0.30]	0.180 ± 0.024 [4.6 ± 0.6]	0.254 [6.4]	0.004 [0.1]
D	20H	0.079 [2.0] Max.						
R	15H	0.047 ± 0.012 [1.2 ± 0.3]	0.285 [7.2]	0.235 ± 0.012/- 0.024 [6.0 ± 0.3/- 0.6]	0.051 ± 0.012 [1.3 ± 0.30]	0.180 ± 0.024 [4.6 ± 0.6]	0.246 [6.2]	0.004 [0.1]
R	20H	0.079 [2.0] Max.						

**Note**

• The anode termination (D less B) will be a minimum of 0.012" [0.3 mm]

**RATINGS AND CASE CODES**

µF	4 V	6.3 V	10 V	16 V	20 V	25 V	35 V
1.0							A/B
2.2						A/B	B/C
3.3						B/C	B/C/D
4.7				A	A/B	C	B/R
6.8				A	B/C	C/D	D/R
10			A/B	B/C	B/D	D/R	R
15		A/B		B/D	C/R	C*/R	
22	A/B	A/B	A/B/C	C/D	C*/D/R	D*	
33		B/C	C/D	C/D/R	D*/R	D*	
47	B/C	C/D	D/R	C/R			
68	C/D	D/R	C/D/R	C/D		R	
100	D/R	B/C/D/R	B/C/D	D			
150	C/R	C/D/R	C/D	R			
220	C/D	C/D/R	D/R	R			
330	C/D	C/D/R	D/R				
470	C/D/R	C/D/R					
680	D/R	R					
1000	R	R					

**Note**

\* Preliminary values, contact factory for availability



Solid Tantalum Chip Capacitors TANTAMOUNT®  
Low Profile, Low ESR, Conformal Coated, Maximum CV

Vishay Sprague

STANDARD RATINGS						
CAPACITANCE ( $\mu$ F)	CASE CODE	PART NUMBER*	MAX. DCL AT + 25 °C ( $\mu$ A)	MAX. DF AT + 25 °C 120 Hz (%)	MAX. ESR AT + 25 °C 100 kHz ( $\Omega$ )	MAX. RIPPLE 100 kHz $I_{rms}$ (A)
<b>4 WVDC AT + 85 °C, 2.7 WVDC AT + 125 °C</b>						
22	A	591D226X_004A2_15H	0.9	6	1.200	0.22
22	B	591D226X_004B2_15H	0.9	6	0.800	0.32
47	B	591D476X_004B2_15H	1.9	6	0.800	0.33
47	C	591D476X_004C2_15H	1.9	6	0.200	0.74
68	C	591D686X_004C2_15H	2.7	6	0.180	0.78
68	D	591D686X_004D2_15H	2.7	6	0.140	1.04
100	D	591D107X_004D2_15H	4.0	8	0.130	1.07
100	R	591D107X_004R2_15H	4.0	8	0.110	1.22
150	C	591D157X_004C2_15H	6.0	8	0.150	0.86
150	R	591D157X_004R2_15H	6.0	8	0.100	1.28
220	D	591D227X_004D2_15H	8.8	8	0.100	1.22
220	C	591D227X_004C2_20H	8.8	8	0.075	1.21
330	D	591D337X_004D2_20H	13.2	8	0.060	1.53
330	C	591D337X_004C2_20H	13.2	8	0.070	1.25
470	R	591D477X_004R2_20H	18.8	8	0.045	1.97
470	C	591D477X_004C2_20H	18.8	10	0.070	1.25
470	D	591D477X_004D2_20H	18.8	10	0.060	1.52
680	D	591D687X_004D2_20H	27.2	12	0.085	1.28
680	R	591D687X_004R2_20H	27.2	12	0.045	1.97
1000	R	591D108X_004R2_20H	40.0	14	0.050	1.67
<b>6.3 WVDC AT + 85 °C, 4 WVDC AT + 125 °C</b>						
15	A	591D156X_6R3A2_15H	0.9	6	1.300	0.24
15	B	591D156X_6R3B2_15H	0.9	6	0.800	0.32
22	A	591D226X_6R3A2_13H	1.4	6	0.800	0.20
22	B	591D226X_6R3B2_15H	1.4	6	0.800	0.32
33	B	591D336X_6R3B2_15H	2.1	6	0.800	0.32
33	C	591D336X_6R3C2_15H	2.1	6	0.200	0.74
47	C	591D476X_6R3C2_15H	3.0	6	0.200	0.74
47	D	591D476X_6R3D2_15H	3.0	6	0.140	1.04
68	D	591D686X_6R3D2_15H	4.0	6	0.130	1.07
68	R	591D686X_6R3R2_15H	4.0	6	0.110	1.22
100	B	591D107X_6R3B2_15H	6.0	8	0.500	0.41
100	C	591D107X_6R3C2_15H	6.0	6	0.190	0.76
100	C	591D107X_6W3C2_15H	6.0	6	0.190	0.76
100	D	591D107X_6R3D2_15H	6.0	6	0.150	0.91
100	R	591D107X_6R3R2_15H	6.0	8	0.100	1.28
100	R	591D107X_6W3R2_15H	6.0	8	0.100	1.28
150	D	591D157X_6R3D2_15H	9.5	6	0.120	0.88
150	R	591D157X_6R3R2_15H	9.5	8	0.140	1.08
150	R	591D157X_6W3R2_15H	9.5	8	0.140	1.08
150	C	591D157X_6R3C2_20H	9.5	8	0.080	1.17
220	R	591D227X_6R3R2_15H	13.9	8	0.150	1.05
220	D	591D227X_6R3D2_20H	13.9	8	0.065	1.47
220	C	591D227X_6R3C2_20H	13.9	8	0.075	1.21
220	C	591D227X_6W3C2_20H	13.9	8	0.075	1.21
330	R	591D337X_6R3R2_20H	20.8	8	0.045	1.97
330	D	591D337X_6R3D2_20H	20.8	8	0.060	1.52

**Note**

\* Preliminary values, contact factory for availability. For 10 % tolerance, specify "9"; for 20 % tolerance, change to "0"



<b>STANDARD RATINGS</b>						
CAPACITANCE ( $\mu$ F)	CASE CODE	PART NUMBER*	MAX. DCL AT + 25 °C ( $\mu$ A)	MAX. DF AT + 25 °C 120 Hz (%)	MAX. ESR AT+ 25 °C 100 kHz ( $\Omega$ )	MAX. RIPPLE 100 kHz I <sub>rms</sub> (A)
<b>6.3 WVDC AT + 85 °C, 4 WVDC AT + 125 °C</b>						
330	D	591D337X_6W3D2_20H	20.8	8	0.060	1.52
330	C	591D337X_6R3C2_20H	20.8	8	0.070	1.25
470	C	591D477X_6R3C2_20H	29.6	10	0.060	1.35
470	C	591D477X06R3C2_16H	29.6	14	0.080	1.12
470	R	591D477X_6R3R2_20H	29.6	10	0.045	1.97
470	R	591D477X_6W3R2_20H	29.6	10	0.045	1.97
470	D	591D477X_6R3D2_20H	29.6	10	0.085	1.28
680	R	591D687X_6R3R2_20H	42.8	10	0.060	1.87
680	R	591D687X_6R3R2_16H	42.8	10	0.060	1.87
1000	R	591D108X_6R3R2_20H	63	20	0.075	1.52
1500	R	591D158X06R3R2_20H	95	33	0.06	1.71
<b>10 WVDC AT + 85 °C, 7 WVDC AT + 125 °C</b>						
10	A	591D106X_010A2_15H	1.0	6	1.300	0.24
10	B	591D106X_010B2_15H	1.0	6	0.850	0.31
22	A	591D226X_010A2_13H	2.2	6	0.800	0.27
22	A	591D226X_010A2_15H	2.2	6	0.900	0.26
22	B	591D226X_010B2_15H	2.2	6	0.800	0.32
22	C	591D226X_010C2_15H	2.2	6	0.200	0.74
33	C	591D336X_010C2_15H	3.3	6	0.200	0.74
33	D	591D336X_010D2_15H	3.3	6	0.140	1.04
47	D	591D476X_010D2_15H	4.7	6	0.140	1.04
47	R	591D476X_010R2_15H	4.7	6	0.120	1.17
68	C	591D686X_010C2_15H	6.8	6	0.190	0.76
68	D	591D686X_010D2_15H	6.8	6	0.130	1.15
68	R	591D686X_010R2_15H	6.8	6	0.110	1.22
100	B	591D107X_010B2T20H	10.0	14	0.250	0.57
100	C	591D107X_010C2_20H	10.0	8	0.085	1.13
100	D	591D107X_010D2_15H	10.0	8	0.130	1.07
150	D	591D157X_010D2_20H	15.0	8	0.075	1.37
150	D	591D157X_010D2_15H	15.0	8	0.120	1.02
150	C	591D157X_010C2_15H	15.0	8	0.083	1.17
150	C	591D157X_010C2_20H	15.0	8	0.080	1.17
220	R	591D227X_010R2_20H	22.0	8	0.055	1.78
220	D	591D227X_010D2_20H	22.0	8	0.065	1.47
330	D	591D337X_010D2_20H	33.0	8	0.060	1.53
330	R	591D337X_010R2_20H	33.0	8	0.050	1.87
330	R	591D337X_010R2_18H	33.0	8	0.050	1.87
<b>16 WVDC AT + 85 °C, 10 WVDC AT + 125 °C</b>						
4.7	A	591D475X_016A2_15H	0.8	6	1.750	0.19
6.8	A	591D685X_016A2_15H	1.1	6	1.750	0.19
10	B	591D106X_016B2_15H	1.6	6	0.800	0.32
10	C	591D106X_016C2_15H	1.6	6	0.500	0.45
15	B	591D156X_016B2_15H	2.4	6	0.700	1.07
15	D	591D156X_016D2_15H	2.4	6	0.250	0.77
22	C	591D226X_016C2_15H	3.5	6	0.240	0.67
22	D	591D226X_016D2_15H	3.5	6	0.180	0.91
33	C	591D336X_016C2_15H	5.3	6	0.180	0.74
33	D	591D336X_016D2_15H	5.3	6	0.170	0.94
33	R	591D336X_016R2_15H	5.3	6	0.140	1.08
47	R	591D476X_016R2_15H	7.5	6	0.130	1.12
47	C	591D476X_016C2_20H	7.5	6	0.180	0.78

**Note**

\* Preliminary values, contact factory for availability. For 10 % tolerance, specify "9"; for 20 % tolerance, change to "0"



Solid Tantalum Chip Capacitors TANTAMOUNT®  
Low Profile, Low ESR, Conformal Coated, Maximum CV

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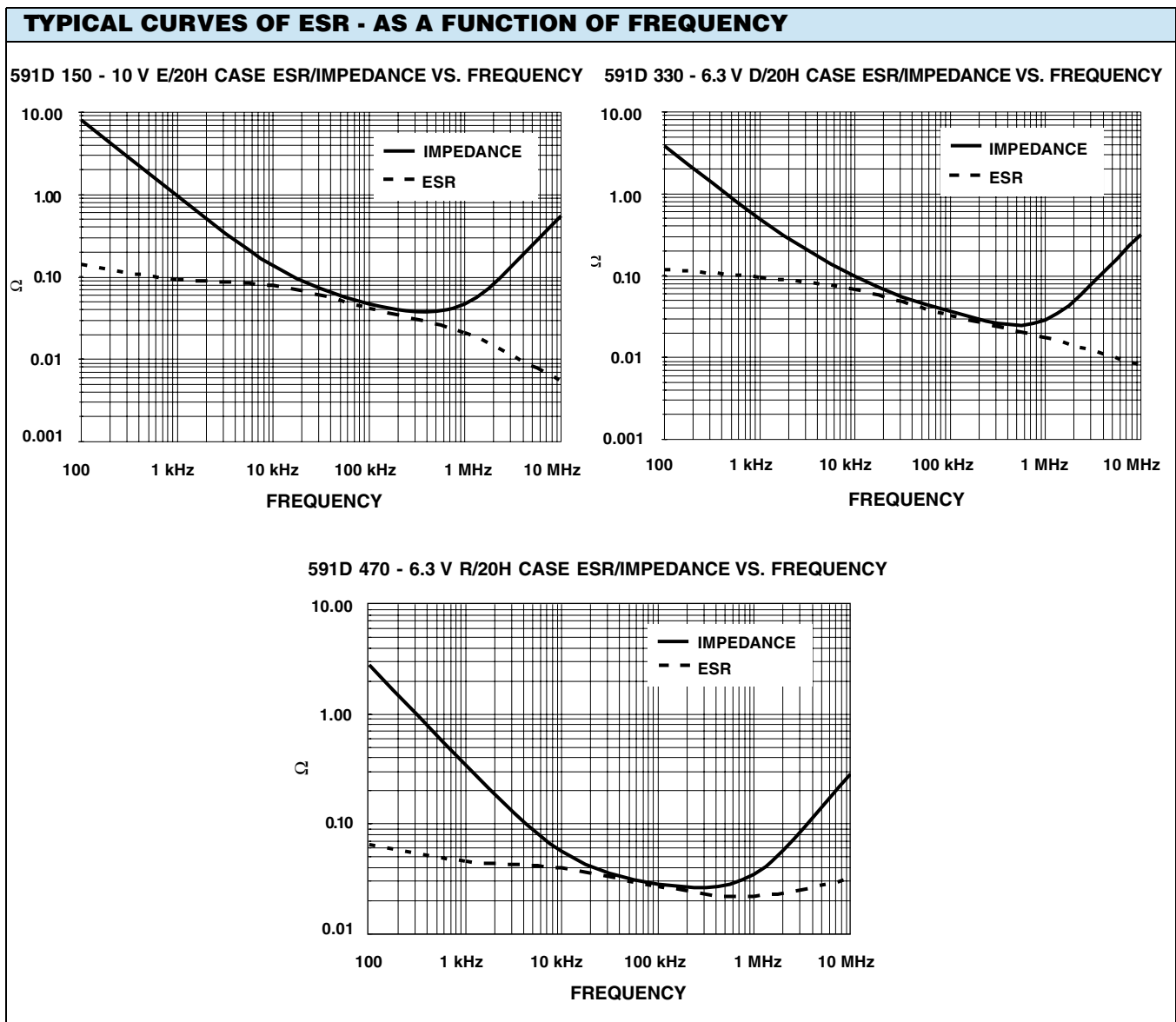
<b>STANDARD RATINGS</b>						
CAPACITANCE (μF)	CASE CODE	PART NUMBER*	MAX. DCL AT + 25 °C (μA)	MAX. DF AT + 25 °C 120 Hz (%)	MAX. ESR AT + 25 °C 100 kHz (Ω)	MAX. RIPPLE 100 kHz I <sub>rms</sub> (A)
<b>16 WVDC AT + 85 °C, 10 WVDC AT + 125 °C</b>						
68	D	591D686X_016D2_20H	10.9	6	0.080	1.32
68	C	591D686X_016C2_20H	10.9	6	0.100	1.05
100	D	591D107X_016D2_20H	16.0	8	0.075	1.37
150	R	591D157X_016R2_20H	24.0	8	0.060	1.71
220	R	591D227X_016R2_20H	35.2	10	0.075	1.53
<b>20 WVDC AT + 85 °C, 13 WVDC AT + 125 °C</b>						
4.7	A	591D475X_020A2_15H	0.9	6	1.900	0.18
4.7	B	591D475X_020B2_15H	0.9	6	1.600	0.22
6.8	B	591D685X_020B2_15H	1.4	6	1.600	0.22
6.8	C	591D685X_020C2_15H	1.4	6	0.400	0.52
10	B	591D106X_020B2_15H	2.0	6	1.500	0.23
10	D	591D106X_020D2_15H	2.0	6	0.270	0.75
15	C	591D156X_020C2_15H	3.0	6	0.300	0.60
15	R	591D156X_020R2_15H	3.0	6	0.180	0.91
22	D	591D226X_020D2_15H	4.4	6	0.200	0.87
22	R	591D226X_020R2_15H	4.4	6	0.140	1.09
22*	D*	591D226X_020D2_20H*	4.4*	6*	0.150*	0.90*
22*	C*	591D226X_020C2_20H*	4.4*	6*	0.375*	0.54*
33	R	591D336X_020R2_15H	6.6	6	0.140	1.08
33*	D*	591D336X_020D2_20H*	6.6*	6*	0.200*	0.73*
<b>25 WVDC AT + 85 °C, 17 WVDC AT + 125 °C</b>						
2.2	A	591D225X_025A2_15H	0.6	6	5.000	0.11
2.2	B	591D225X_025B2_15H	0.6	6	3.800	0.15
3.3	B	591D335X_025B2_15H	0.8	6	3.700	0.15
3.3	C	591D335X_025C2_15H	0.8	6	1.000	0.32
4.7	C	591D475X_025C2_15H	1.2	6	0.800	0.37
6.8	C	591D685X_025C2_15H	1.7	6	0.750	0.38
6.8	D	591D685X_025D2_15H	1.7	6	0.650	0.48
10	D	591D106X_025D2_15H	2.5	6	0.600	0.50
10	R	591D106X_025R2_15H	2.5	6	0.240	0.83
15	R	591D156X_025R2_15H	3.8	6	0.200	0.91
15*	C*	591D156X_025C2_20H*	3.8*	6*	0.250*	0.66*
22*	D*	591D226X_025D2_20H*	5.5*	6*	0.200*	0.84*
33*	D*	591D336X_025D2_20H*	6.0*	6*	0.200*	0.84*
68	R	591D686X_025R2_20H	17	8	0.175	1.00
<b>35 WVDC AT + 85 °C, 23 WVDC AT + 125 °C</b>						
1.0	A	591D105X_035A2_15H	0.5	4	5.000	0.11
1.0	B	591D105X_035B2_15H	0.5	4	4.400	0.13
2.2	B	591D225X_035B2_15H	0.8	6	4.000	0.14
2.2	C	591D225X_035C2_15H	0.8	6	2.000	0.22
3.3	B	591D335X_035B2_15H	1.2	6	3.500	0.15
3.3	C	591D335X_035C2_15H	1.2	6	1.900	0.23
3.3	D	591D335X_035D2_15H	1.2	6	1.500	0.32
4.7	B	591D475X_035B2_15H	1.6	6	0.800	0.32
4.7	R	591D475X_035R2_15H	1.6	6	0.750	0.47
6.8	D	591D685X_035D2_15H	2.4	6	0.950	0.40
6.8	R	591D685X_035R2_15H	2.4	6	0.750	0.47
10	R	591D106X_035R2_15H	3.5	6	0.600	0.52

**Note**

\* Preliminary values, contact factory for availability. For 10 % tolerance, specify "9"; for 20 % tolerance, change to "0"

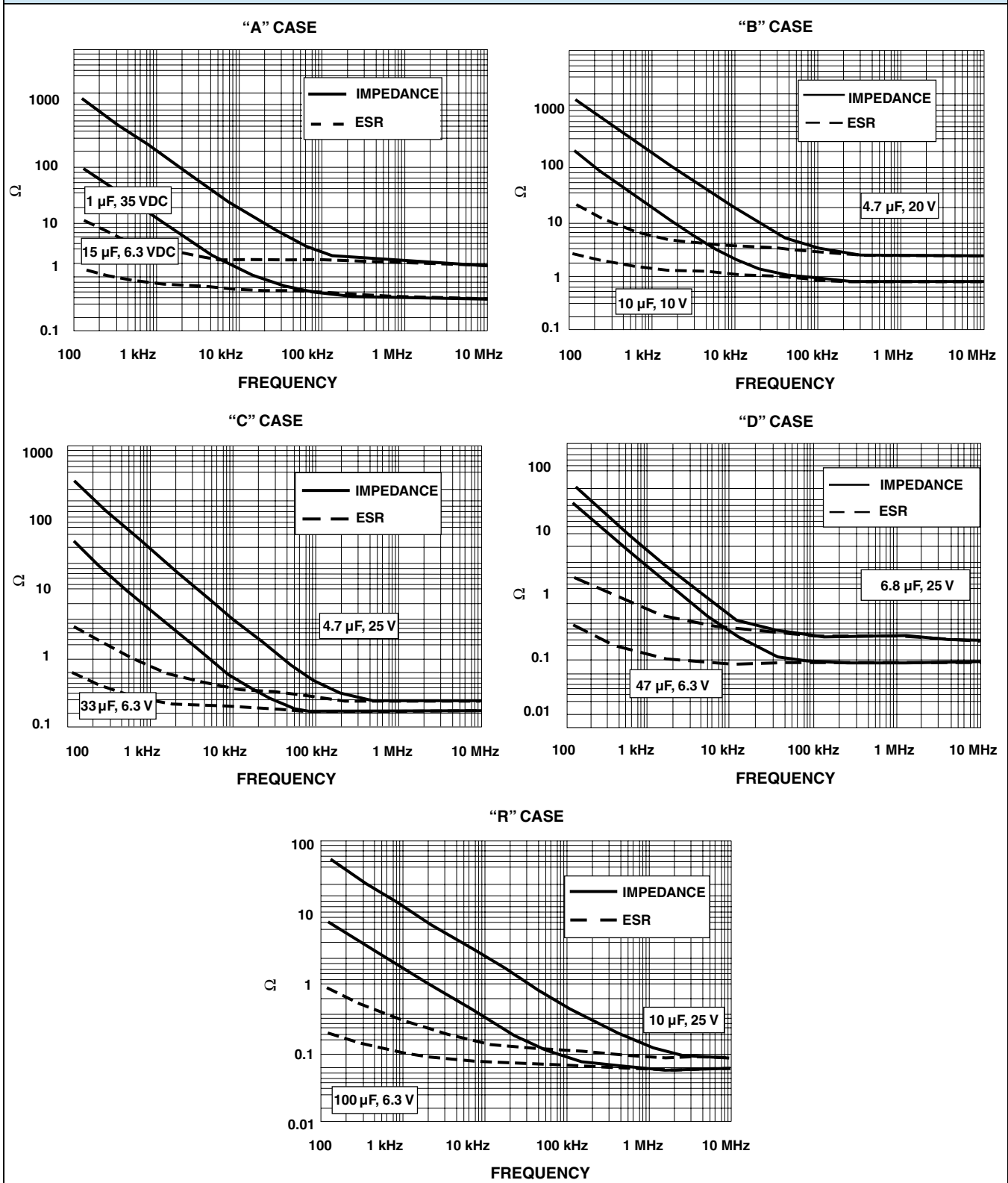


CASE CODE/PART NUMBER X-REF	
OLD	NEW
A2_	A2_15H
B2_	B2_15H
C2_	C2_15H
D2_	D2_15H
R2_	R2_15H
U2_	C2_20H
V2_	D2_20H
W2_	R2_20H





**TYPICAL CURVES AT + 25 °C, IMPEDANCE AND ESR VS. FREQUENCY**





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