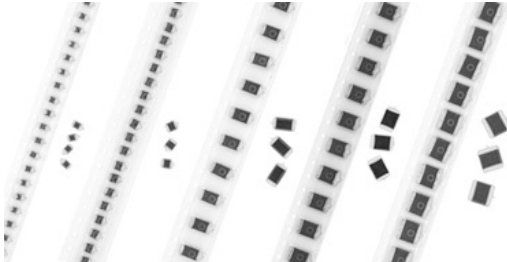


Solid Tantalum Chip Capacitors TANTAMOUNT®, Low Profile, Low ESR, Conformal Coated, Maximum CV



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



Pb-free
Available
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

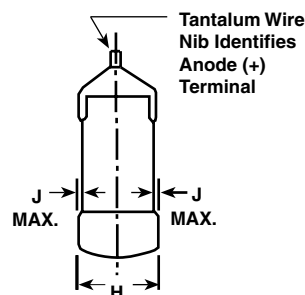
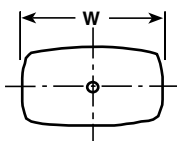
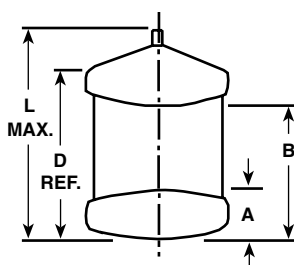
Voltage Rating: 4 WVDC to 35 WVDC

ORDERING INFORMATION

591D	106	X0	010	B	2	T	15H
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.	X0 = ± 20 % 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	2 = 100 % Tin 4 = Gold Plated 8 = Solder Plated 60/40 Special Order	T = Tape and Reel 7" [178 mm] Reel W = 13" [330 mm] Reel	Maximum height (mm) see dimensions

Note: 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 $\pm$ 0.3]	0.146 [3.7]	0.072 ± 0.012 [1.8 $\pm$ 0.3]	0.031 ± 0.012 [0.80 $\pm$ 0.30]	0.087 ± 0.016 [2.2 $\pm$ 0.4]	0.115 [2.9]	0.004 [0.1]
B	15H	0.047 ± 0.012 [1.2 $\pm$ 0.3]	0.158 [4.0]	0.110 ± 0.012 [2.8 $\pm$ 0.3]	0.031 ± 0.012 [0.80 $\pm$ 0.30]	0.097 ± 0.016 [2.5 $\pm$ 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 $\pm$ 0.3]	0.281 [7.1]	0.126 ± 0.012 [3.2 $\pm$ 0.3]	0.051 ± 0.012 [1.3 $\pm$ 0.30]	0.180 ± 0.024 [4.4 $\pm$ 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 $\pm$ 0.3]	0.298 [7.5]	0.170 ± 0.012 [4.3 $\pm$ 0.3]	0.051 ± 0.012 [1.3 $\pm$ 0.30]	0.180 ± 0.024 [4.6 $\pm$ 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 $\pm$ 0.3]	0.285 [7.2]	$0.235 \pm 0.012/-0.024$ [6.0 $\pm$ 0.3/-0.6]	0.051 ± 0.012 [1.3 $\pm$ 0.30]	0.180 ± 0.024 [4.6 $\pm$ 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/EXTENDED RATINGS						
CAPACITANCE (μ F)	CASE CODE	PART NUMBER*	MAX. DCL AT + 25 °C (μ A)	MAX. DF AT + 25 °C 120 Hz (%)	MAX. ESR AT + 25 °C 100 kHz (Ω)	MAX. RIPPLE 100 kHz I_{rms} (A)
4 WVDC AT + 85 °C, SURGE = 5.2 V . . . 2.7 WVDC AT + 125 °C, SURGE = 3.4 V						
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
6.3 WVDC AT + 85 °C, SURGE = 8 V . . . 4 WVDC AT + 125 °C, SURGE = 5 V						
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"

STANDARD/EXTENDED RATINGS						
CAPACITANCE (μ F)	CASE CODE	PART NUMBER*	MAX. DCL AT + 25 °C (μ A)	MAX. DF AT + 25 °C 120 Hz (%)	MAX. ESR AT + 25 °C 100 kHz (Ω)	MAX. RIPPLE 100 kHz I _{rms} (A)
6.3 WVDC AT + 85 °C, SURGE = 8 V ... 4 WVDC AT + 125 °C, SURGE = 5 V						
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
10 WVDC AT + 85 °C, SURGE = 13 V ... 7 WVDC AT + 125 °C, SURGE = 8 V						
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
16 WVDC AT + 85 °C, SURGE = 20 V ... 10 WVDC AT + 125 °C, SURGE = 12 V						
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

Vishay Sprague

STANDARD/EXTENDED RATINGS						
CAPACITANCE (μ F)	CASE CODE	PART NUMBER*	MAX. DCL AT + 25 °C (μ A)	MAX. DF AT + 25 °C 120 Hz (%)	MAX. ESR AT + 25 °C 100 kHz (Ω)	MAX. RIPPLE 100 kHz I _{rms} (A)
16 WVDC AT + 85 °C, SURGE = 20 V . . . 10 WVDC AT + 125 °C, SURGE = 12 V						
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
20 WVDC AT + 85 °C, SURGE = 26 V . . . 13 WVDC AT + 125 °C, SURGE = 16 V						
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*
25 WVDC AT + 85 °C, SURGE = 33 V . . . 17 WVDC AT + 125 °C, SURGE = 20 V						
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
35 WVDC AT + 85 °C, SURGE = 46 V . . . 23 WVDC AT + 125 °C, SURGE = 28 V						
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:

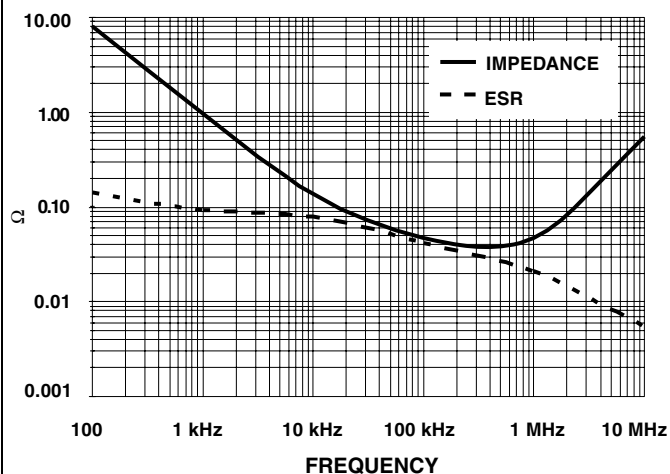
* Preliminary values, contact factory for availability. For 10 % tolerance, specify "9"; for 20 % tolerance, change to "0"

CASE CODE/PART NUMBER X-REF

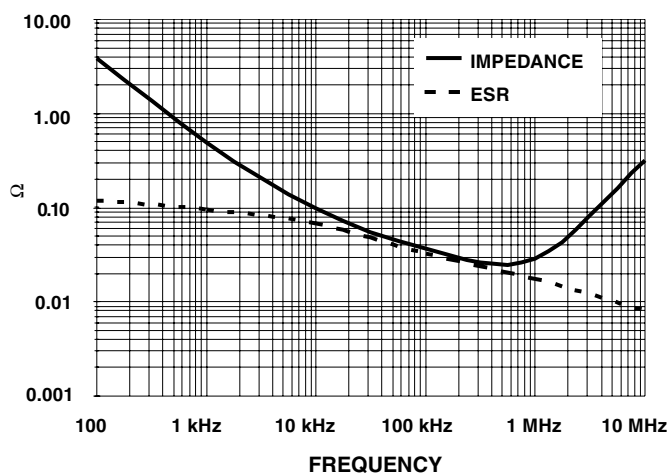
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V2_	D2_20H
W2_	R2_20H

TYPICAL CURVES OF ESR - AS A FUNCTION OF FREQUENCY

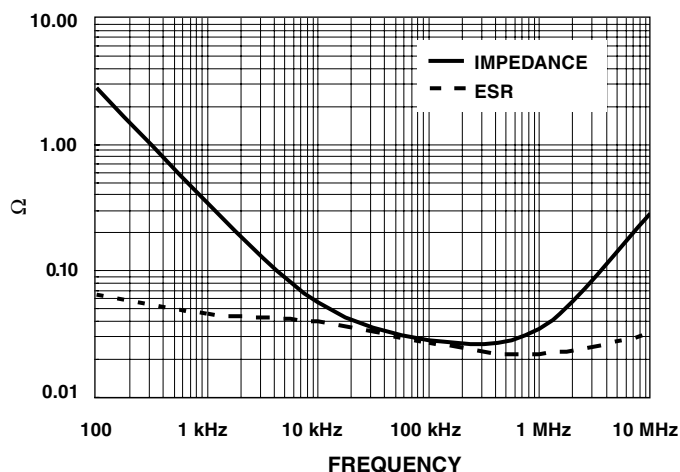
591D 150 - 10 V E/20H CASE ESR/IMPEDANCE VS. FREQUENCY



591D 330 - 6.3 V D/20H CASE ESR/IMPEDANCE VS. FREQUENCY



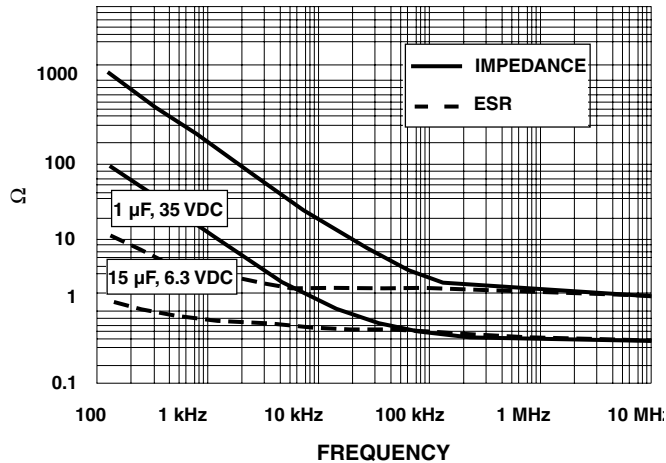
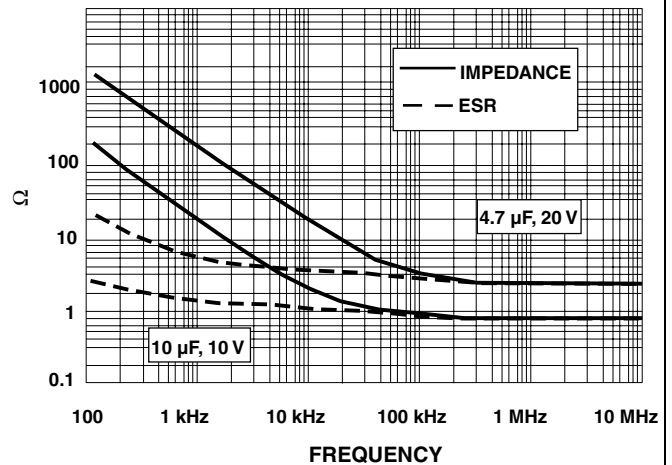
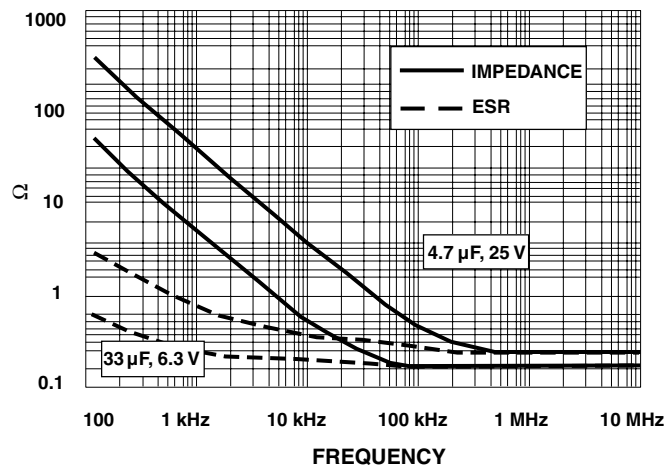
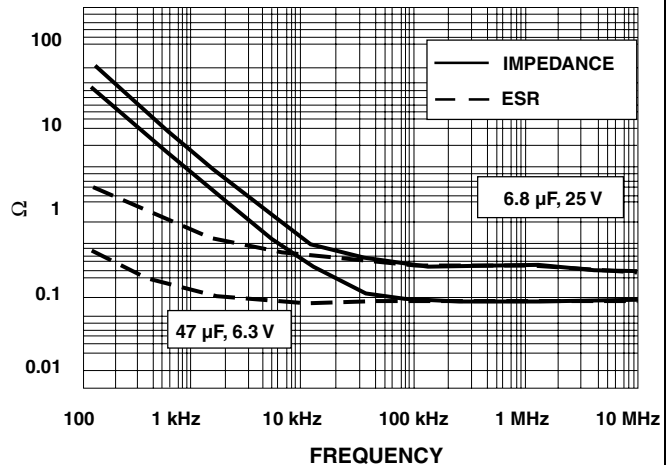
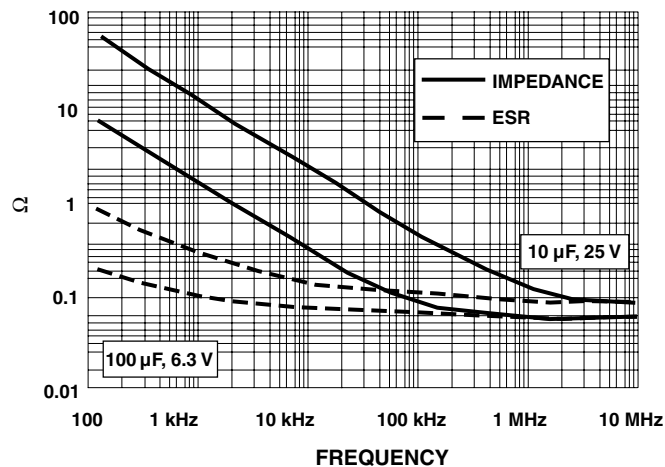
591D 470 - 6.3 V R/20H CASE ESR/IMPEDANCE VS. FREQUENCY





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

Vishay Sprague

TYPICAL CURVES AT + 25 °C, IMPEDANCE AND ESR VS. FREQUENCY**"A" CASE****"B" CASE****"C" CASE****"D" CASE****"R" CASE**



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