VISHAY INTERTECHNOLOGY, INC.

CAPACITORS

SELECTOR GUIDE

HI-REL SOLID TANTALUM CHIP CAPACITORS

CWR11, T83, T88, T82, CWR06, T97, T96, T95, T92

APPLICATIONS

- Aerospace
- Military
- Avionics
- Radar
- Weapons Systems
- Missiles
- Communications
- Power Supplies
- Ruggedized Data Recorder Systems
- Sensor and Signal Processing Applications

Case Code	EIA SIZE	L	W	H	P	Tw	T_H (MIN.)
T83/CWR11*							
A*	3216-18	0.126 ± 0.008 [3.2 ± 0.20]	0.063 ± 0.008 [1.6 ± 0.20]	0.063 ± 0.008 [1.6 + 0.20]	0.031 ± 0.012 [0.80 ± 0.30]	0.047 ± 0.004 [1.2 ± 0.10]	0.028 [0.70]
B*	3528-21	0.138 ± 0.008 [3.5 ± 0.20]	0.110 ± 0.008 [2.8 ± 0.20]	0.075 ± 0.008 [1.9 ± 0.20]	0.031 ± 0.012 [0.80 ± 0.30]	0.087 ± 0.004 [2.2 ± 0.10]	0.028 [0.70]
C*	6032-28	0.236 ±0.012 [6.0 ± 0.30]	0.126 ± 0.012 [3.2 ± 0.30]	0.098 ± 0.012 [2.5 ± 0.30]	0.051 ± 0.012 [1.3 + 0.30]	0.087 ± 0.004 [2.2 ± 0.10]	0.039 [1.0]
D*	7343-31	0.287 ± 0.012 [7.3 ± 0.30]	0.170 ± 0.012 [4.3 ± 0.30]	0.110 ± 0.012 [2.8 ± 0.30]	0.051 ± 0.012 [1.3 ± 0.30]	0.095 ± 0.004 [2.4 ± 0.10]	0.039 [1.0]
E	7343-43	0.287 ± 0.012 [7.3 ± 0.30]	0.170 ± 0.012 [4.3 ± 0.30]	0.158 ± 0.012 [4.0 ± 0.30]	0.051 ± 0.012 [1.3 ± 0.30]	0.095 ± 0.004 [2.4 ± 0.10]	0.039 [1.0]
T88							
M	0603 [1608]	0.063 ± 0.004 [1.60 ± 0.1]	0.033 ± 0.004 [0.85 ± 0.1]	0.031 ± 0.004 [0.80 ±0.1]	0.020 ± 0.004 [0.50 ±0.1]	0.024 ± 0.004 [0.60 ± 0.1]	0.024 ± 0.004 [0.60 ± 0.1]
S	0805 [2012]	0.079 ± 0.004 [2.00 ± 0.1]	0.049 ± 0.004 [1.25 ±0.1]	0.031 ± 0.004 [0.80 ±6.1]	0.020 ± 0.004 [0.50 ±0.1]	0.039 ± 0.004 [1.0 ±0.1]	0.035 ± 0.004 [0.90 ± 0.1]
T82							
R	0805 [2012]	0.079 ± 0.008 [2.0 ± 0.2]	0.051 ± 0.008 [1.3 ± 0.2]	0.047 (Max.) [1.2 Max.]	0.020 ± 0.012 [0.5 ± 0.3]		
P	0805 [2012]	0.079 ± 0.010 [2.0 ± 0.25]	0.053 + 0.008 [1.35 ± 0.2]	0.053 ± 0.008 [1.35 ± 0.2]			

Case Code	L	W	H	P	T_1	T_2 (MAX.)
CWR06						
A	0.100 ±0.015 [2.54 + 0.38]	0.050 + 0.015 [1.27 ± 0.38]	0.050 ± 0.015 [1.27 ± 0.38]	0.030 ± 0.005 [0.76 ± 0.13]	0.005 [0.13]	0.015 [0.38]
B	0.150 ± 0.015 [3.81 ± 0.38]	0.050 ± 0.015 [1.27 ± 0.38]				
C	0.200 ±0.015 [5.08 ± 0.38]	0.050 + 0.015 [1.27 ± 0.38]				
D	0.150 ±0.015 [3.81 ± 0.38]	0.100 + 0.015 [2.54 + 0.38]				
E	0.200 ± 0.015 [5.08 ± 0.38]	0.100 ± 0.015 [2.54 ± 0.38]				
F	0.220 ±0.015 [5.59 ± 0.38]	0.135 ± 0.015 [3.43 ± 0.38]	0.070 ± 0.015 [1.78 ± 0.38]			
G	0.265 ± 0.015 [6.73 ± 0.38]	0.110 ± 0.015 [2.79 ± 0.38]	0.110 ± 0.015 [2.79 ± 0.38]	0.050 ± 0.005 [1.27 ± 0.13]		
H	0.285 ± 0.015 [7.24 ± 0.38]	0.150 ± 0.015 [3.81 ± 0.38]				

P = Termination Depth
Tw = Termination Width
T_H = Termination Height

*** CWR11 Case Code offerings.**

SERIES	T83	T95	T96	CWR11	CWR06
TYPE	Surface Mount TANTAMOUNT® Chip, Hi-Rel COTS, Molded Case	Surface Mount TANTAMOUNT® Chip, Hi-Rel COTS, Conformal Coated	Surface Mount TANTAMOUNT® Chip, Hi-Rel COTS, Conformal Coated	TANTAMOUNT® Solid Electrolyte Chip, Molded	Surface Mount MIDGET® Solid Electrolyte Chip, Conformal Coated
FEATURES	Hi-Rel COTS, lead (Pb)-free, RoHS compliant	Hi-Rel, Maximum C/V, lead (Pb)-free, RoHS compliant	Hi-Rel, Built-in Fuse, Maximum C/V, lead (Pb)-free, RoHS compliant	MIL-C-55365/8 Qualified	MIL-C-55365/4 Qualified, RoHS compliant
TEMPERATURE RANGE °C	-55 °C to +125 °C	-55 °C to + 125 °C	-55 °C to + 125 °C	-55 °C to + 125 °C	-55 °C to + 125 °C
CAPACITANCE RANGE (uF)	0.10 uF to 330 uF	0.10 uF to 680 uF	150 uF	0.10 uF to 100 uF	0.10 uF to 100 uF
VOLTAGE RANGE (V)	4 - 50	4 - 50	4 - 50	4 - 50	4 - 50
CAPACITANCE TOLERANCE (%)	±20, ±10	±20, ±10	±20, ±10	±20, ±10	±20, ±10
LEAKAGE CURRENT (uA)	0.01 CV or 0.5 uA Max.	0.01 CV or 0.5 uA Max.	0.01 CV or 0.5 uA Max.	0.01 CV or 0.5 uA Max.	0.01 CV or 0.5 uA Max.
DISSIPATION FACTOR	4-8 Max.	4-14 Max.	8 Max.	4 -12 Max.	6-12 Max.
CASE CODES	A, B, C, D, E	B, C, D, R, S, V, X, Y, Z	R	A, B, D	A, B, C, D, E, F, G, H

SERIES	T92	T97	T82	T88
TYPE	Surface Mount TANTAMOUNT® Chip, Hi-Rel COTS, Conformal Coated	Surface Mount TANTAMOUNT® Chip, Hi-Rel COTS, Conformal Coated	Surface Mount TANTAMOUNT® Chip, Hi-Rel COTS,Molded,	Surface Mount TANTAMOUNT® Chip, Hi-Rel COTS,Molded,
FEATURES	Hi-Rel, Maximum C/V, lead (Pb)-free, RoHS compliant	Hi-Rel,Ultra-Low ESR, lead (Pb)-free, RoHS compliant, Multi-Anode	Lead-Frameless, 0805 Footprint	Lead-Frameless, Face-Down Terminations, 0805 & 0603
TEMPERATURE RANGE °C	-55 °C to + 125 °C	-55 °C to + 125 °C	-55 °C to + 125 °C	-55 °C to + 125 °C
CAPACITANCE RANGE (uF)	1 uF - 2200 uF	22 uF - 1500 uF	1 uF - 47 uF	1 uF - 47 uF
VOLTAGE RANGE (V)	4 - 50	4 - 75	2 - 20	4 - 16
CAPACITANCE TOLERANCE (%)	±20, ±10	±20, ±10	±20, ±10	±20, ±10
LEAKAGE CURRENT (uA)	0.01 CV or 0.5 uA Max.	0.01 CV or 0.5 uA Max.	0.01 CV or 0.5 uA Max.	0.01 CV or 0.5 uA Max.
DISSIPATION FACTOR	4-24 Max.	6-8 Max.	4 -12 Max.	4-20 Max.
CASE CODES	A, B, C, D, R, S, X	E, F, R, V	P, R	M, S

T88	
Case Code	
M	
S	

T82	
Case Code	
P	
R	

T83	
Case Code	
A	
B	
C	
D	
E	

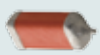
CWR06	
Case Code	
A	
B	
C	
D	
E	
F	
G	
H	

CWR11	
Case Code	
A	
B	
C	
D	

T96	
Case Code	
R*	

T97	
Case Code	
E	
F	
R	
V	

T92	
Case Code	
A 15H	
A 20H	
B 20H	
C 15H	
C 20H	
D 15H	
D 20H	
R 15H	
R 20H	
S 13H	
X 20H	
X 25H	

T95	
Case Code	
A	
B	
C	
D	
R	
S	
V	
X	
Y	
Z	

Case Code	Suffix*	H	W	L (MAX.)	A	B	D (REF.)	J (MAX.)
T97								
E		0.157 ± 0.016 [4.0 ± 0.4]	0.173 ± 0.016 [4.4 ± 0.4]	0.287 ± 0.012 [7.3 ± 0.3]	0.051 ± 0.012 [1.3 ± 0.3]	0.180 ± 0.025 [4.6 ± 0.6]	0.253 [6.4]	0.004 [0.1]
F		0.187 ± 0.016 [4.7 ± 0.4]	0.238 ± 0.016 [6.0 ± 0.4]				0.243 [6.2]	
R		0.142 ± 0.016 [3.6 ± 0.4]	0.238 ± 0.016 [6.0 ± 0.4]				0.243 [6.2]	
V		0.079 [2.0] Max.	0.173 ± 0.016 [4.4 ± 0.4]				0.253 [6.4]	
T95								
B		0.075 + 0.012-0.024 [1.9 + 0.3-0.6]	0.110 + 0.012-0.016 [2.8 + 0.3-0.4].	0.158 [4.0]	0.031 ± 0.012 [0.80 ± 0.30]	0.097 ± 0.016 [2.5 ± 0.4]	0.138 [3.5]	0.004 [0.1]
C		0.098 ± 0.012 [2.5 ± 0.3]	0.126 ± 0.012 [3.2 ± 0.3]	0.281 [7.1]	0.051 ± 0.012 [1.3 ± 0.30]	0.180 ± 0.024 [4.6 ± 0.6]	0.236 [6.0]	
D		0.110 ± 0.012 [2.8 ± 0.3]	0.170 ±0.012 [4.3 ± 0.3]	0.293 [7.5]	0.051 ± 0.012 [1.3 ± 0.30]	0.180 + 0.024 [4.6 ± 0.6]	0.253 [6.4]	
R		0.136 ± 0.012 [3.5 ± 0.3]	0.235 ± 0.012 [6.0 ± 0.3]	0.283 [7.2]	0.051 ± 0.012 [1.3 ± 0.30]	0.180 ± 0.024 [4.6 ± 0.6]	0.243 [6.2]	
S		0.048 ± 0.008 [1.22 ± 0.2]	0.072 ± 0.008 [1.83 ±0.2]	0.143 [3.63]	0.023 ± 0.010 [0.58 ± 0.25]	0.085 ± 0.015 [2.16 ± 0.37]	0.115 [2.9]	
V		0.051 ± 0.010 [1.3 ± 0.25]	0.104 ± 0.010 [2.65 ± 0.25]	0.143 [3.63]	0.023 + 0.010 [0.58 ± 0.25]	0.085 ± 0.015 [2.16 ± 0.37]	0.115 [2.9]	
X		0.051 ± 0.010 [1.3 ± 0.25].	0.104 ± 0.010 [2.65 ± 0.25]	0.285 [7.24]	0.040 ± 0.020 [1.0 ± 0.5]	0.200 ± 0.027 [5.08 ± 0.69]	0.243 [6.2]	
Y		0.069 ± 0.010 [1.75 ± 0.25]	0.104 ± 0.010 [2.65 ± 0.25]	0.285 [7.24]	0.040 ± 0.020 [1.0 ± 0.5]	0.200 ± 0.027 [5.08 ± 0.69]	0.243 [6.2]	
Z		0.104 ± 0.010 [2.65 ± 0.25]	0.104 ± 0.010 [2.65 ± 0.25]	0.285 [7.24]	0.040 ± 0.020 [1.0 ± 0.5]	0.200 ± 0.027 [5.08 ± 0.69]	0.243 [6.2]	
T96								
R		0.136 ± 0.012 [3.5 ± 0.3]	0.235 ± 0.012 [6.0 ± 0.3]	0.283 [7.2]	0.051 ± 0.012 [1.3 ± 0.30]	0.180 ± 0.024 [4.6 ± 0.6]	0.243 [6.2]	0.004 [0.1]
T92								
A	12H	0.047 [1.2] Max	0.072 ± 0.012 [1.8 ± 0.3]	0.146 [3.7]	0.031 ± 0.012 [0.80 ± 0.3]	0.087 ± 0.016 [2.2 ± 0.4]	0.115 [2.9]	0.004 [0.1]
	15H*	0.047 ± 0.012 [1.2 ± 0.3]						
B	13H	0.057 [1.3] Max	0.110 ± 0.012 [2.8 ± 0.3]	0.158 [4.0]	0.031 ± 0.012 [0.80 ± 0.3]	0.097 ± 0.016 [2.5 ± 0.4]	0.139 [3.5]	
	15H	0.047 ± 0.012 [1.2 ± 0.3]						
	20H	0.079 [2.0] Max						
C	14H	0.055 [1.4] Max	0.126 ± 0.012 [3.2 ± 0.3]	0.281 [7.1]	0.051 ± 0.012 [1.3 ± 0.3]	0.180 ± 0.024 [4.4 ± 0.6]	0.238 [6.0]	
	15H	0.047 ± 0.012 [1.2 ± 0.3]						
	20H	0.079 [2.0] Max						
D	15H	0.047 ± 0.012 [1.2 ± 0.3]	0.170 ±0.012 [4.3 ± 0.3]	0.298 [7.5]	0.051 ± 0.012 [1.3 ± 0.3]	0.180 ± 0.024 [4.6 ± 0.6]	0.254 [6.4]	
	20H	0.079 [2.0] Max						
R	15H	0.047 ± 0.012 [1.2 ± 0.3]	0.235 ±0.012 [6.0 ± 0.3]	0.285 [7.2]	0.051 ± 0.012 [1.3 ± 0.30]	0.180 ± 0.024 [4.6 ± 0.6]	0.246 [6.2]	
	20H	0.079 [2.0) Max						
S	13H	0.040 + 0.012 [1.0 ± 0.3]	0.063 ± 0.012 [1.6 ± 0.3]	0.126 ± 0.012 [3.2 ± 0.3]	0.031 ± 0.012 [0.8 ± 0.3]	0.079 ± 0.012 [2.0 ± 0.3]	0.087 [2.2]	
X	20H	0.079 [2.0] Max.	0.290 ± 0.010 [7.37 ± 0.25]	0.575 [14.5]	0.051 ± 0.016 [1.3 ± 0.4]	0.470 ± 0.024 [11.9 ± 0.6]	0.524 [13.2]	
	25H	0.098 [2.5] Max.]						

*** Maximum Height (mm) ie.: 1.5 mm max. height**

ORDERING INFORMATION

CWRxx	D	B	155	K	B	OPTIONAL
TYPE	VOLTAGE	TERMINATION FINISH	CAPACITANCE	CAPACITANCE TOLERANCE	FAILURE RATE %/1000 HOURS	SURGE CURRENT OPTIONS
	C = 4 V D = 6 V F = 10 V H = 15 V J = 20 V K = 25 V M = 35 V N = 50 V	B = Gold - Standard (RoHS compliant) CWR06 Only H = Solder Plate CWR11 C = Solder Dipped F = Solder Fused	This is expressed in picofarads. The first two digits are the significant figures. The third is the number of zeros to follow.	K = ± 10 % M = ± 20 % J = ± 5 %	A = Commercial M = 1.0 P = 0.1 R = 0.01 S = 0.001 B = 0.1 C = 0.01	A = 10 Cycles at +25 °C B = 10 Cycles at -55 °C and + 85 °C C = 10 Cycles at -55 °C and + 85 °C (Before Weibull Grading)

Txx	D	107	K	010	E	A	A	S
TYPE	CASE CODE	CAPACITANCE	CAPACITANCE TOLERANCE	DC VOLTAGE RATING AT 85°C	TERMINATION AND PACKAGING	RELIABILITY LEVEL	SURGE CURRENT	ESR
	See Ratings and Case Codes Table	This is expressed in picofarads. The first two digits are the significant figures. The third is the number of zeros to follow.	K = ± 10 % M = ± 20 %	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 volts)	E: SnPb Solder/7" (178mm) reel L: SnPb Solder/7" (178mm) reel C: 100 % Tin/7" (178 mm) reel H: 100% Tin/7" (178 mm), 1/2 reel A: Gold/7" (178 mm) reel G: Gold/7" (178 mm), 1/2 reel	A = 1.0 % B = 0.1 % S = Hi-Rel Standard Z = Non-Established Reliability	A = 10 cycles at +25 °C B = 10 cycles at -55 °C/ +85 °C S = 3 cycles at +25 °C Z = None	S = Std L = Low

RELIABILITY LEVEL

Weibull Reliability Grading
A: 1.0 %/1 k hours, 40 hours, +85 °C, accelerated voltage
B: 0.1 %/1 k hours, 40 hours, +85 °C, accelerated voltage
S: 40 hours, +85 °C, rated voltage
Z: Non-Established Reliability

SURGE CURRENT

A: +25 °C, 10 cycles, rated voltage
B: -55 °C & +85 °C, 10 cycles, rated voltage
C: +25 °C, 3 cycles, rated voltage
Z: None

SEMICONDUCTORS:
Rectifiers • Small-Signal Diodes • Zener and Suppressor Diodes • MOSFETs • RF Transistors • Optoelectronics • ICs

PASSIVE COMPONENTS:
Resistive Products • Magnetics • Capacitors • Strain Gage Transducers and Stress Analysis Systems

One of the World's Largest Manufacturers
of Discrete Semiconductors and Passive Components

WORLDWIDE SALES CONTACTS

THE AMERICAS

UNITED STATES
VISHAY AMERICAS
ONE GREENWICH PLACE
SHELTON, CT 06484
UNITED STATES
PH: +1-402-563-6866
FAX: +1-402-563-6296

ASIA

SINGAPORE
VISHAY INTERTECHNOLOGY
ASIA PTE LTD.
25 TAMPINES STREET 92
KEPPEL BUILDING #02-00
SINGAPORE 528877
PH: +65-6788-6668
FAX: +65-6788-0988

P.R.C.
VISHAY TRADING (SHANGHAI) CO., LTD.
(SHANGHAI REPRESENTATIVE OFFICE)
ROOM D,15F, SUN TONG INFOPORT PLAZA
55 HUAI HAI WEST ROAD
200030 SHANGHAI
P.R.C.
PH: +86-21-5258-5000
FAX: +86-21-5258-7979

JAPAN
VISHAY JAPAN CO., LTD.
MG IKENOHATA BLDG. 4F
1-2-18, IKENOHATA
TAITO-KU
TOKYO 110-0008
JAPAN
PH: +81-3-5832-6210
FAX: +81-3-5832-6260

EUROPE

GERMANY
VISHAY EUROPE SALES GMBH
GEHEIMRAT-ROSENTHAL-STR. 100
95100 SELB
GERMANY
PH: +49-9287-71-0
FAX: +49-9287-70435

FRANCE
VISHAY S.A.
199, BLVD DE LA MADELEINE
06003 NICE, CEDEX 1
FRANCE
PH: +33-4-9337-2920
FAX: +33-4-9337-2997

NETHERLANDS
VISHAY BCCOMPONENTS B.V.
HURKESTRAAT 31
P.O. BOX 8766
5652 AH EINDHOVEN
NETHERLANDS
PH: +31-40-2590-700
FAX: +31-40-2590-777

www.vishay.com

VMN-SG2089-0710