# Wet Tantalum Capacitor, Button, All-Tantalum Case, -55 °C to +125 °C Operation

## INTRODUCTION

This conveniently-packaged polar button unit employs a non-solid electrolyte, and has a sintered tantalum anode. The anode is produced from a high capacitance powder resulting in a capacitor of small size and large CV product.

The cathode is also of tantalum and overcomes the restrictions of a silver cathode system in allowing a high ripple current rating and application of a 3 V reverse potential. This all-tantalum construction results in a non-catastrophic wear-out mechanism.

The seal is a high efficient system comprising a PTFE gasket clamped between coined plates of tantalum by a work-hardened nickel ring. This type of seal, common to all button styles, is largely responsible for their long life and high reliability and severe military environments.

The CA2 series ranges are available in several termination options. These include a mounting stud and pins for circuit mounting.

## APPLICATIONS

The CA2 series are designed for use in general military and professional applications. For example: Power supply “smoothing” filter networks, switching, by-pass, timer functions and where reverse potentials occur.

## WEIGHT

The CA2 style with a stud termination weighs approximately 18.1 g, including the nut. The CA2 styles, which has a printed circuit board mounting, weighs approximately 17.3 g.

## FEATURES

- All-Tantalum electrodes eliminate silver migration
- Withstands high ripple current
- Long life reliability
- Reverse voltage capability
- Instant use after long storage

## PERFORMANCE CHARACTERISTICS

**Operating Temperature:** -55 °C to +125 °C
**Voltage Range:** 6 $V_{DC}$ to 125 $V_{DC}$
**Capacitance Range:** 47 µF to 1800 µF

## SPECIFICATIONS

**Environmental classification:** 55/125/56
**Vibration:** 10 Hz to 2000 Hz, 0.75 mm or 98 $m/s^2$, 15 h
**Bump:** 390 $m/s^2$, 4000 bumps
**Shock:** 981 $m/s^2$
**Acceleration:** 981 $m/s^2$
**Low air pressure:** 1 kPa

## APPROVALS

These capacitors are available released to:

- BS CECC 30 202 002

## RIPPLE CURRENT CAPABILITY

The maximum allowable ripple current is 1 $A_{RMS}$ up to 85 °C and 750 $mA_{RMS}$ to 125 °C. These values apply under normal cooling conditions and are irrespective of frequency or waveform. The algebraic sum of the AC peak and DC voltages must not exceed the forward or reverse voltage ratings at the relevant temperature.

At certain frequency/temperature/DC voltage combinations higher levels of ripple current may be used. The applications department should be contacted before the above levels are exceeded.

## REVERSE VOLTAGE CAPABILITY

The CA2 series employ tantalum cathodes which allow the continuous application of reverse potentials not exceeding 3 V over the whole temperature range.

## SURGE VOLTAGE

The surge voltage capability is 115 % of the voltage rating at the relevant temperature.

## TEMPERATURE RANGE

The capacitor is designed for operation between -55 °C and +125 °C, with linear voltage derating above +85 °C to 66 % of the rated voltage at +125 °C.

## CAPACITANCE TOLERANCE

The standard capacitance tolerance is ± 20 % although special tolerances are available by arrangement.

## APPLICATION INFORMATION

Capacitors may be operated at less than the rated voltage, resulting in significantly reduced leakage current values.

In timing circuits, or other applications where the device is subjected only to a DC voltage, the ballistic or DC capacitance will be somewhat larger than measured at 50 Hz.

The parametric information must necessarily be brief, although additional comprehensive data is available on request, and the tests tailored to customers' requirements can be made.

## RELIABILITY

All capacitors are subjected to burn-in. This is to remove infant mortalities and ensure reliability. The capacitor lifetime is enhanced when the unit is subjected to a reduced ripple current, a low ambient temperature, and is externally cooled. The use of a heat sink is recommended.

## ORDERING PROCEDURE

Example: CA2C (220 µF, 50 $V_{DC}$)

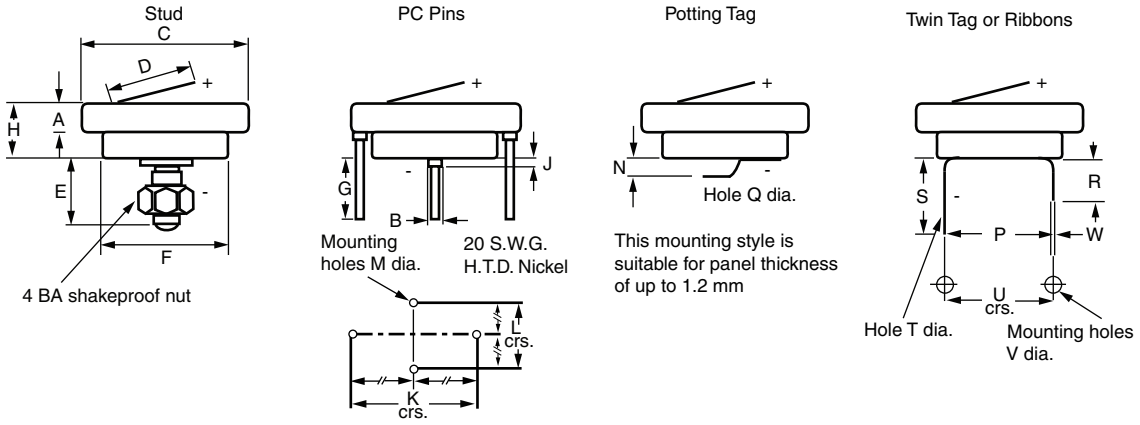
Vishay Part Number: CA2C227M050P

## ORDERING INFORMATION

| CA2 | C | 227 | M | 100 | A | - |
|---|---|---|---|---|---|---|
| MODEL | CASE CODE | CAPACITANCE | TOLERANCE | VOLTAGE | TERMINATION AND PACKAGING | |
| | 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 | M = 20 % (std)<br>K = 10 %<br>(special order) | 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) | A = Stud<br>B = PC mount pins<br>C = Twin tag or ribbon<br>D = Panel or potting tag | Blank = Standard (tin/lead coating) |

## DIMENSIONS in inches [millimeters]

The CA2 series is comprised of two case sizes, differing in depth of cup only. The case size dimensions are shown in the table. Four mounting styles are available in both case sizes.




| CASE CODE | A | H max. | C | D | E | F | G | B | J | K crs. | L crs. | M dia. | N nom. | P | Q dia. | R | S | T dia. | U crs. | V dia. | W nom. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C | 3.6 [0.142] | 8.5 (1) [0.335] | 21.8 [0.858] | 8.4 (2) [0.331] | 8.4 | 16.2 | 8.4 | 1.8 | 0.8 | 20.3 | 10.2 | 1.1 | 2.4 | 13.1 | 1.0 | 7.5 | 10.7 | 1.6 | 13.0 | 3.5 | 0.30 |

**Notes**

- All dimensions are in mm, and are maximum unless otherwise stated

(1) For B case size, case height is 6.7 mm

(2) Width of anode tag 4.22 mm max.

## STANDARD RATINGS

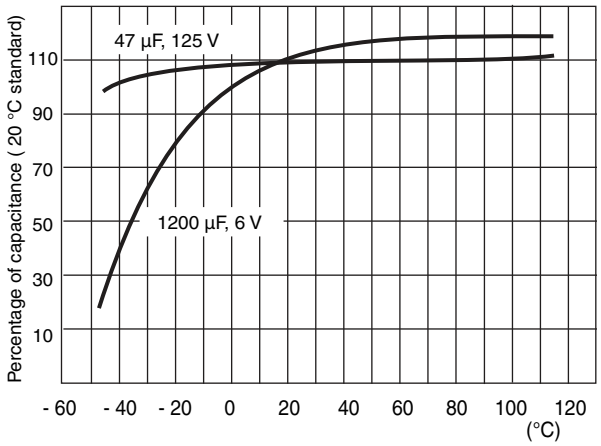
| VISHAY PART NUMBERS | CASE CODE | CAPACITANCE AT 50 Hz (µF) | DISSIPATION FACTOR AT 50 Hz (%) | | MAX. ESR AT 20 °C 100 kHz (Ω) | MAX. ESR AT -55 °C 100 kHz (Ω) | MAX. DC AT 20 °C (µA) | MAX. DC AT 125 °C (µA) | ΔC AT 50 Hz (%) | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | 20 °C | 125 °C | | | | | -55 °C | 125 °C |
| **6 $V_{DC}$ AT 85 °C; 4 $V_{DC}$ AT 125 °C** | | | | | | | | | | |
| CA2C128(1)006(2) | C | 1200 | 75.0 | 95.0 | 1.0 | 5.0 | 15.0 | 50 | -80 | 25.0 |
| **8 $V_{DC}$ AT 85 °C; 5.3 $V_{DC}$ AT 125 °C** | | | | | | | | | | |
| CA2C108(1)008(2) | C | 1000 | 65.0 | 85.0 | 1.0 | 5.0 | 10.0 | 50 | -75 | 25.0 |
| **10 $V_{DC}$ AT 85 °C; 6.6 $V_{DC}$ AT 125 °C** | | | | | | | | | | |
| CA2C827(1)010(2) | C | 820 | 55.0 | 70.0 | 1.0 | 5.0 | 10.0 | 50 | -70 | 20.0 |
| **15 $V_{DC}$ AT 85 °C; 10 $V_{DC}$ AT 125 °C** | | | | | | | | | | |
| CA2C687(1)015(2) | C | 680 | 45.0 | 55.0 | 1.0 | 5.0 | 8.0 | 50 | -65 | 20.0 |
| **20 $V_{DC}$ AT 85 °C; 13.4 $V_{DC}$ AT 125 °C** | | | | | | | | | | |
| CA2C397(1)020(2) | C | 390 | 25.0 | 30.0 | 1.0 | 5.0 | 5.0 | 50 | -50 | 15.0 |
| CA2C477(1)020(2) | C | 470 | 30.0 | 40.0 | 1.0 | 5.0 | 5.0 | 50 | -55 | 15.0 |
| CA2C567(1)020(2) | C | 560 | 35.0 | 45.0 | 1.0 | 5.0 | 5.0 | 50 | -60 | 15.0 |
| **30 $V_{DC}$ AT 85 °C; 20 $V_{DC}$ AT 125 °C** | | | | | | | | | | |
| CA2C277(1)030(2) | C | 270 | 17.0 | 20.0 | 1.0 | 5.0 | 5.0 | 50 | -45 | 10.0 |
| CA2C337(1)030(2) | C | 330 | 20.0 | 25.0 | 1.0 | 5.0 | 5.0 | 50 | -50 | 10.0 |
| **50 $V_{DC}$ AT 85 °C; 33.3 $V_{DC}$ AT 125 °C** | | | | | | | | | | |
| CA2C157(1)050(2) | C | 150 | 9.5 | 12.0 | 1.0 | 5.0 | 3.0 | 50 | -30 | 10.0 |
| CA2C187(1)050(2) | C | 180 | 11.5 | 15.0 | 1.0 | 5.0 | 3.0 | 50 | -35 | 10.0 |
| CA2C227(1)050(2) | C | 220 | 14.0 | 18.0 | 1.0 | 5.0 | 3.0 | 50 | -40 | 10.0 |
| **75 $V_{DC}$ AT 85 °C; 50 $V_{DC}$ AT 125 °C** | | | | | | | | | | |
| CA2C686(1)075(2) | C | 68 | 5.0 | 6.5 | 1.0 | 5.0 | 3.0 | 50 | -15.0 | 7.5 |
| CA2C826(1)075(2) | C | 82 | 5.5 | 7.0 | 1.0 | 5.0 | 3.0 | 50 | -17.5 | 7.5 |
| CA2C107(1)075(2) | C | 100 | 7.0 | 9.0 | 1.0 | 5.0 | 3.0 | 50 | -20 | 7.5 |
| CA2C127(1)075(2) | C | 120 | 7.5 | 10.0 | 1.0 | 5.0 | 3.0 | 50 | -25 | 7.5 |
| **100 $V_{DC}$ AT 85 °C; 66.7 $V_{DC}$ AT 125 °C** | | | | | | | | | | |
| CA2C566(1)100(2) | C | 56 | 3.5 | 4.5 | 1.0 | 5.0 | 3.0 | 50 | -12.5 | 7.5 |
| **125 $V_{DC}$ AT 85 °C; 83.3 $V_{DC}$ AT 125 °C** | | | | | | | | | | |
| CA2C476(1)125(2) | C | 47 | 3.0 | 4.0 | 1.0 | 5.0 | 3.0 | 50 | -10.0 | 7.5 |

**Note**

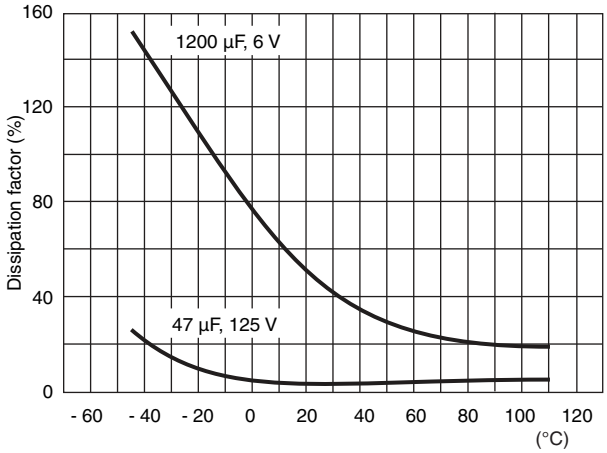
- Part number definitions:
  (1) Capacitance tolerance: M= 20 % standard, K = 10 % special order
  (2) Termination type: A = Stud or bolt, B = Pins for PCB, C = Twin tags or ribbons, D = Potting tag

## PERFORMANCE CURVES

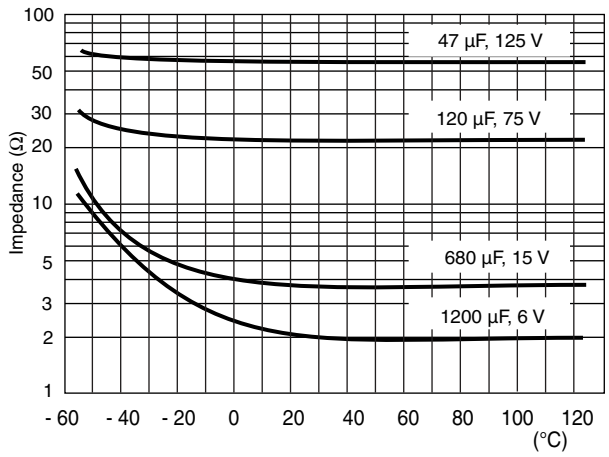
Capacitance/temperature at 50 Hz



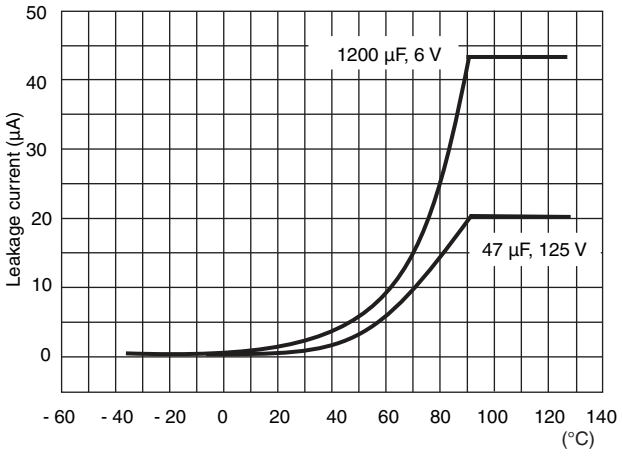

Dissipation factor/temperature at 50 Hz



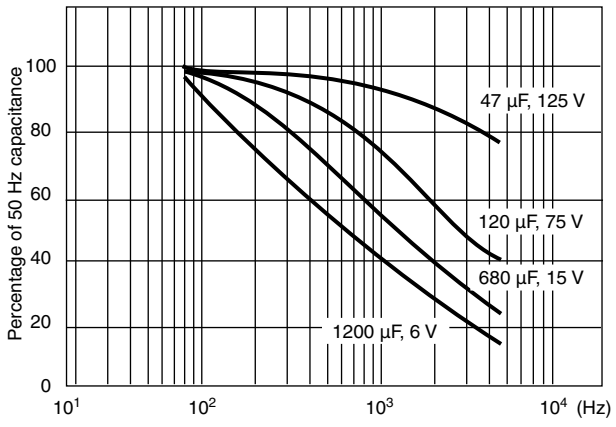

Impedance/temperature at 50 Hz



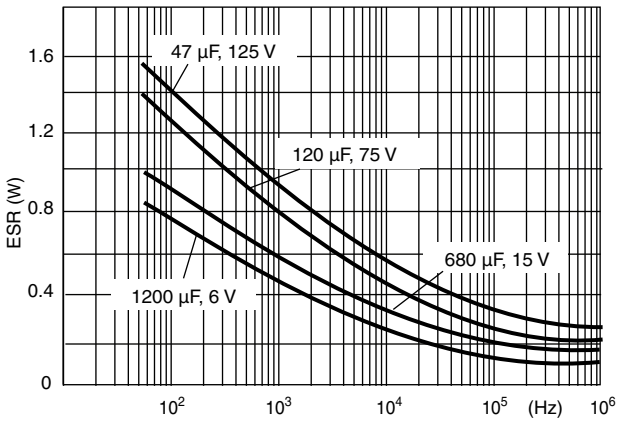

Leakage current/temperature at maximum voltage




Capacitance/frequency at 20 °C

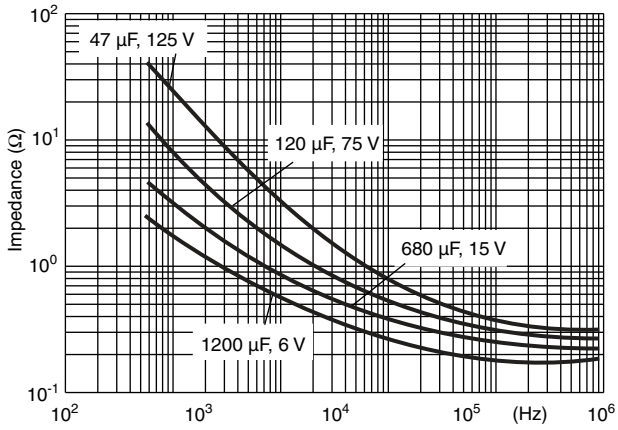



ESR/frequency at 20 °C



## PERFORMANCE CURVES

Impedance/frequency at 20 °C




**Note**

- All performance curves are provided from historic Arcotronics style CA/CAE datasheet information

## CROSS REFERENCE

| VISHAY PART NUMBER | ARCOTRONICS PART NUMBER | NATO PART NUMBER |
|---|---|---|
| **CA** | | |
| CA2C476M125A | 402/1/50157/003 | 5910-99017-2755 |
| CA2C566M100A | 402/1/50157/004 | 5910-99017-2754 |
| CA2C686M075A | 402/1/50157/005 | 5910-99017-2750 |
| CA2C826M075A | 402/1/50157/006 | 5910-99017-2751 |
| CA2C107M075A | 402/1/50157/007 | 5910-99017-2752 |
| CA2C127M075A | 402/1/50157/008 | 5910-99017-2753 |
| CA2C157M050A | 402/1/50157/009 | 5910-99017-2747 |
| CA2C187M050A | 402/1/50157/010 | 5910-99017-2748 |
| CA2C227M050A | 402/1/50157/011 | 5910-99017-2749 |
| CA2C277M030A | 402/1/50157/012 | 5910-99017-2745 |
| CA2C337M030A | 402/1/50157/013 | 5910-99017-2746 |
| CA2C397M020A | 402/1/50157/014 | 5910-99017-2742 |
| CA2C477M020A | 402/1/50157/015 | 5910-99017-2743 |
| CA2C567M020A | 402/1/50157/016 | 5910-99017-2744 |
| CA2C687M015A | 402/1/50157/017 | 5910-99017-2741 |
| CA2C827M010A | 402/1/50157/018 | 5910-99017-2740 |
| CA2C108M008A | 402/1/50157/019 | 5910-99017-2739 |
| CA2C128M006A | 402/1/50157/020 | 5910-99017-2738 |
| **CAPC** | | |
| CA2C476M125B | 402/1/50158/003 | 5910-99017-2773 |
| CA2C566M100B | 402/1/50158/004 | 5910-99017-2772 |
| CA2C686M075B | 402/1/50158/005 | 5910-99017-2756 |
| CA2C826M075B | 402/1/50158/006 | 5910-99017-2769 |
| CA2C107M075B | 402/1/50158/007 | 5910-99017-2770 |
| CA2C127M075B | 402/1/50158/008 | 5910-99017-2771 |
| CA2C157M050B | 402/1/50158/009 | 5910-99017-2765 |
| CA2C187M050B | 402/1/50158/010 | 5910-99017-2766 |
| CA2C227M050B | 402/1/50158/011 | 5910-99017-2767 |
| CA2C277M030B | 402/1/50158/012 | 5910-99017-2763 |
| CA2C337M030B | 402/1/50158/013 | 5910-99017-2764 |
| CA2C397M020B | 402/1/50158/014 | 5910-99017-2760 |
| CA2C477M020B | 402/1/50158/015 | 5910-99017-2761 |
| CA2C567M020B | 402/1/50158/016 | 5910-99017-2762 |
| CA2C687M015B | 402/1/50158/017 | 5910-99017-2759 |
| CA2C827M010B | 402/1/50158/018 | 5910-99017-2758 |
| CA2C108M008B | 402/1/50158/019 | 5910-99017-2757 |
| CA2C128M006B | 402/1/50158/020 | 5910-99017-2756 |

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