Tantalum Chip Capacitors

SpeedPower, Low ESR

Ordering code: **B45197A5475+30***
Date: July 2006

SMD

Features

- Wide variety of low ESR values
- High ripple current capability
- High volumetric efficiency
- Excellent solderability
- Stable temperature and frequency characteristics
- Low leakage current, low dissipation factor
- Low self-inductance
- High resistance to shock and vibration
- Suitable for use without series resistor (recommended operating conditions see www.epcos.com/tantalum_gti, section 4.4)
- Lead-free and material content compatible with RoHS

Technical data and ordering code

Ordering code	(tinned terminals)		B45197A5475+30*	
Rated capacitance	(20 °C, 120 Hz)	C_R	4.7	µF
Rated voltage	(up to 85 °C) (up to 125 °C)	V_R	25 16	VDC
Operating temperature range		T_{op}	−55 ... +125	°C
Maximum leakage current	(20 °C, V_R, 5 min)	$I_{leak,max}$	1.2	µA
Maximum dissipation factor	(20 °C, 120 Hz)	DF_{max}	6	%
Maximum equivalent series resistance	(20 °C, 100 kHz)	ESR_{max}	530	mΩ
Maximum ripple current	(20 °C, 100 kHz)	$I_{AC,max}$	0.46	A
Case size			C	
EIA code			6032-28	
Dimensions	(L x W x H)		6.0 ±0.3 x 3.2 ±0.3 x 2.5 ±0.3 (0.236 ±0.012 x 0.126 ±0.012 x 0.098 ±0.012)	mm (inch)
Failure rate (1 fit = $1 \cdot 10^{-9}$ failures/h)	(at 40 °C; ≤ V_R, $R_S \leq 0.1$ Ω/V)		≤40	fit

* = Code number for reel diameter
6 = 330-mm reel
9 = 180-mm reel

+ = Capacitance tolerance
M = ±20%
K = ±10%

Ordering code structure

B45	197A	1	157	+	4	0	*

Tantalum capacitor

Series
197A = SpeedPower, Low ESR, tinned terminals
198R = SpeedPower, Low ESR, gold-plated terminals

Rated voltage
0 = 4 V, 1 = 6.3 V, 2 = 10 V, 3 = 16 V, 4 = 20 V, 5 = 25 V, 6 = 35 V, 7 = 50 V

Rated capacitance + exponent
C [pF] · 10^x
E.g.: 686 = 68 pF · 10^6 = 68 µF, 157 = 15 pF · 10^7 = 150 µF

Capacitance tolerance
M = ±20%, K = ±10%

Case size
1 = A
2 = B
3 = C
4 = D
5 = E

ESR quality
0 = standard

Reel diameter
9 = 180 mm, 6 = 330 mm

Cautions and warnings

When using tantalum capacitors with a manganese dioxide coating, the following cautions and warnings should be taken into account:

Polarity

Because tantalum capacitors are *polar capacitors,* it is important to observe their polarity markings (positive pole on the anode, negative pole on the cathode). Any incorrect polarity resulting from the sum of the AC and DC voltage components must be smaller than or equal to the permitted *polarity reversal voltage* (see “General technical information”, section 4.6 and section 4.8 under www.epcos.com/tantalum_capacitors). To avoid reducing their reliability, this voltage may only occur for a short time, at most five times for a duration of one minute per hour.

Voltage

The *maximum continuous voltage* depends on the ambient temperature. Within the temperature range of −55 to +85 °C, the rated voltage is equal to the maximum continuous voltage. Between + 85 and + 125 °C the maximum continuous voltage must be reduced linearly from the full rated voltage to 2/3 of it (derating). At 150 °C (only B4519*P series) the voltage must be reduced to 1/2 and at 175 °C (only B4519*T series) to 1/3 of the rated voltage. Operation below the maximum continuous voltage has a positive effect on the capacitor’s failure rate. The maximum continuous voltage must not be exceeded (see“Quality and environment”, section 1.11 under www.epcos.com/tantalum_capacitors).

All unfavourable operating conditions (such as possible line overvoltages, unfavourable tolerances of the transformation ratio of the line transformer in the equipment, repeated overvoltages when the equipment is switched on, high ambient temperatures) must be taken into account when determining the *operating voltage*.

The *surge voltage* is the maximum voltage (peak value) that may be applied to the capacitor for short periods, at most five times for a total duration of up to 1 minute per hour. The surge voltage must not be applied for periodic charging and discharging in the course of normal operation and cannot be part of the operating voltage. The permissible surge voltage for all capacitors in this data book is 1.3 x the rated voltage. The occurrence of voltage impulses (transient voltages) that exceed the surge voltage may lead to irreparable damage.

Capacitance

The actual *capacitance* of a capacitor can deviate from the rated capacitance by as much as the full magnitude of the tolerance at delivery. The capacitance varies with the temperature (at +125 °C +12% up to +20%) and decreases with increasing frequency (see “General technical information”, section 5 under www.epcos.com/tantalum_capacitors).

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Low-resistance applications and voltage networks

For *low-resistance applications*, EPCOS recommends a maximum operating voltage of half the permissible maximum continuous voltage, so that the capacitors have sufficient tolerance to withstand voltage peaks. Depending on the conditions of use, the early failure rate is higher here by a factor of 2 to 20 than in the range with a constant failure rate as specified in the data book (see“Quality and environment”, section 1.11 under www.epcos.com/tantalum_capacitors).

When operated directly in a *voltage network*, the capacitor should be protected against overvoltage, e.g. by a suppressor diode, and against polarity reversal by a diode. If a capacitor is operated in an unprotected low-impedance circuit and fails because the permissible conditions for the forward DC voltage, reverse DC voltage, surge current, power dissipation or temperature are exceeded, the continued current flow through the overstressed capacitor may produce overheating. The overheated capacitor may damage the surrounding components and the circuit board (see“Quality and environment”, section 1.11 and “General technical information”, section 4.11 under www.epcos.com/tantalum_capacitors).

Storage conditions

Capacitors with solid electrolyte may be stored at temperatures down to –80 °C. The upper *storage temperature* must not exceed +85 °C (for blister tape the temperature limit is +40 °C). The storage conditions should not exceed +40 °C and 70% R. H. A drypack is useful to prevent the effects of humidity.

Note

For more detailed information about cautions and warnings for tantalum electrolytic capacitors (e.g. other electrical values beside those listed above), see “General technical information” and “Quality and environment” under www.epcos.com/tantalum_capacitors.

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1. Some parts of this publication contain **statements about the suitability of our products for certain areas of application**. These statements are based on our knowledge of typical requirements that are often placed on our products in the areas of application concerned. We nevertheless expressly point out **that such statements cannot be regarded as binding statements about the suitability of our products for a particular customer application**. As a rule, EPCOS is either unfamiliar with individual customer applications or less familiar with them than the customers themselves. For these reasons, it is always ultimately incumbent on the customer to check and decide whether an EPCOS product with the properties described in the product specification is suitable for use in a particular customer application.
2. We also point out that **in individual cases, a malfunction of passive electronic components or failure before the end of their usual service life cannot be completely ruled out in the current state of the art, even if they are operated as specified**. In customer applications requiring a very high level of operational safety and especially in customer applications in which the malfunction or failure of a passive electronic component could endanger human life or health (e.g. in accident prevention or life-saving systems), it must therefore be ensured by means of suitable design of the customer application or other action taken by the customer (e.g. installation of protective circuitry or redundancy) that no injury or damage is sustained by third parties in the event of malfunction or failure of a passive electronic component.
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