T550 Polymer Hermetic Seal (PHS) Series

Overview

The KEMET T550 Polymer Hermetic Seal (PHS) Series is a tantalum capacitor with a Ta anode and Ta_2O_5 dielectric. A conductive organic polymer replaces the traditionally used MnO_2 or wet electrolyte as the cathode plate of the capacitor. This results in very low ESR and improved capacitance retention at high frequency and low temperature. The T550 PHS Series also exhibits a benign failure mode which eliminates the case breach that can occur in wet tantalum types. Additionally, this part may be operated at voltages up to 80% of rated voltage with equivalent or better reliability than traditional MnO_2 or wet tantalum capacitors operated at 50% of rated voltage.

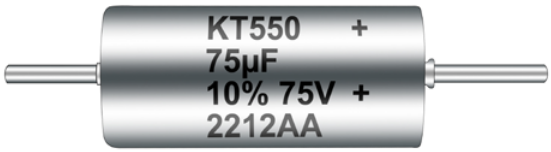
T550 PHS Series also offers higher ripple current handling capability and a lower ESR range than wet tantalums. With reduced ESR and enhanced capacitance retention at higher frequencies and low temperatures, the T550 PHS Series provides the highest total capacitance and the most economical solution for high power applications, all within an approximately 25% lighter package than the equivalent wet tantalum capacitor.

Benefits

- +105°C maximum operating temperature
- Capacitance: 75 µF to 120 µF
- Polymer cathode technology
- ≤ 0.0075 CV (µA) at rated voltage after 5 minutes
- Extremely low ESR
- High frequency capacitance retention
- Low temperature capacitance retention
- 100% accelerated steady state aging
- 100% surge current tested
- 100% Simulated Breakdown Screening™
- Volumetric efficiency
- Use of up to 80% of rated voltage
- Non-ignition failure mode
- Approximately 25% lighter than equivalent wet tantalum
- Case dimensions equivalent to MIL–PRF–39006/25

Applications

Typical applications include high voltage power management such as buck boost converters, filtering, hold-up capacitors, and other high ripple current applications.



SPICE

For a detailed analysis of specific part numbers, please visit www.kemet.com for a free download of KEMET's SPICE software. The KEMET SPICE program is freeware intended to aid design engineers in analyzing the performance of these capacitors over frequency, temperature, ripple, and DC bias conditions.

Ordering Information

T	550	B	107	M	025	A	T	4251
Capacitor Class	Series	Case Size	Capacitance Code (pF)	Capacitance Tolerance	Voltage	Failure Rate/ Design	Lead Material	Surge Option
T = Tantalum	550 = Polymer Hermetic Seal	B	First two digits represent significant figures. Third digit specifies number of zeros.	K = ±10% M = ±20%	025 = 25 V 040 = 40 V 050 = 50 V 060 = 60 V 075= 75 V	A = N/A	T = 100% tin (Sn) plated H = Tin/lead (SnPb) solder coated (5% Pb minimum)	4250 surge current, 10 cycles +25°C 4251 surge current, 10 cycles, -55°C and +85°C

Performance Characteristics

Item	Performance Characteristics
Operating Temperature	-55°C to 105°C *
Rated Capacitance Range	75 µF to 120 µF @ 120 Hz/25°C *
Capacitance Tolerance	K Tolerance (10%), M Tolerance (20%)
Rated Voltage Range	25 – 75 V
DF (120 Hz @ 25°C)	Refer to Part Number Electrical Specification Table
ESR (100 kHz @ 25°C)	Refer to Part Number Electrical Specification Table
Leakage Current	Refer to Part Number Electrical Specification Table (@ Rated voltage up to +85°C and 78% of rated voltage applied at 105°C)
Packaging	According MIL–PRF–39006

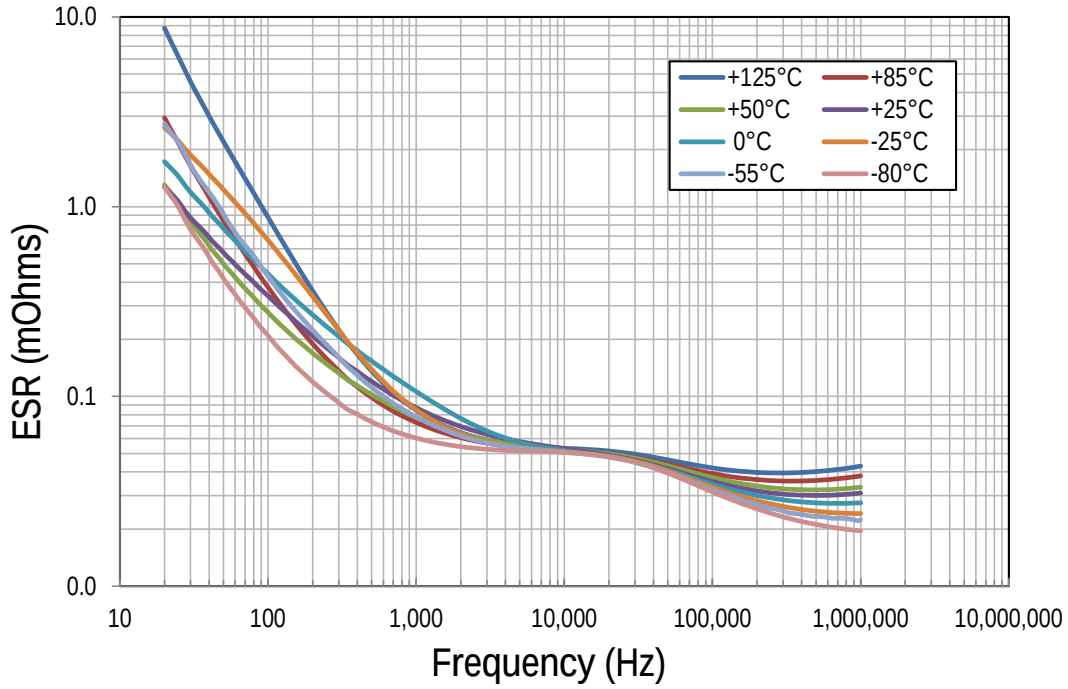
KEMET does not recommend storage above 85ºC.
** Additional case sizes, capacitance/voltage and operating temperature under development.*

Qualification

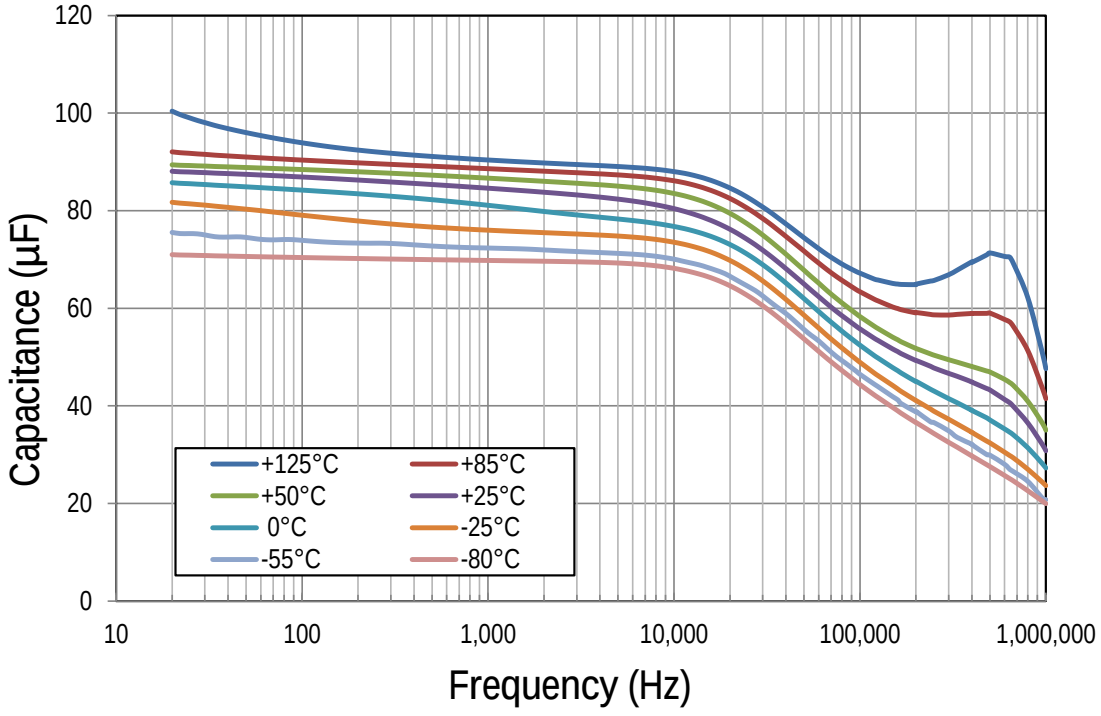
Test Performed	Method Reference	Test Conditions
Reliability and Environmental Tests		
AC Ripple Life at 85˚C	MIL–PRF–39006	85˚C, 40 kHz ripple current, 2,000 hours
85˚C Life	MIL–PRF–39006	85˚C, rated voltage, 2,000 hours
105˚C Life		105°C, 0.78 x rated voltage, 2,000 hours
Ripple Current	MIL–PRF–39003	25˚C, 240 hours, sinusoidal alternating voltage at a frequency of 40 kHz superimposed on 50% rated voltage
Surge Voltage	MIL–PRF–39006	85˚C, 1.15 x rated voltage, 1,000 cycles, except Delta Cap shall be +10%/-20%
Surge Current	MIL–PRF–39003	+25 °C, 10 cycles (Option A): Option B available
Low Temperature Storage	MIL–PRF–39006	-62˚C for 72 hours followed by 1 hour at 125˚C
Reverse Voltage	KEMET Catalog	1 V for 8 hours maximum at 25°C, 1 V for 2 hours maximum at 70°C
Physical, Mechanical and Process Tests		
Visual and Mechanical Examination (Internal and External)	MIL–PRF–39006	Case dimensions, marking
Terminal Strength	MIL–PRF–39006	Pull test and wire lead bend test
Resistance to Solvents	MIL–PRF–39006	Immersion in (3) solvents
Resistance to Soldering Heat	MIL–PRF–39006	Immersed to within 0.05 inch of capacitor body
Solderability	MIL–PRF–39006	Depth of insertion in flux and solder to within 0.062 inch of welded joint
Shock and Vibration	MIL–STD–202, Method 213, 204	Shock Method 213: Condition I, 100 g peak; Vibration Method 204: Condition D, 20 g peak
Barometric Pressure (reduced)	MIL–PRF–39006	150,000 feet for 5 minutes, voltage applied for 1 minute
Salt Atmosphere (corrosion)	MIL–PRF–39006	Subjected to fine mist of salt solution
Moisture Resistance	MIL–PRF–39006	65˚C at 6 volts
Dielectric Withstanding Voltage	MIL–PRF–39006	2,000 VDC, 60 seconds, sleeving examined for evidence of breakdown
Insulation Resistance	MIL–PRF–39003	500 VDC, 1 minute, insulation resistance not less than 1,000 MΩ
Electrical Characterization		
Temperature Stability	Reference MIL–PRF–39006	-55˚C to 105˚C
Frequency Scan	KEMET Standard	Impedance, ESR and capacitance versus frequency

Electrical Characteristics

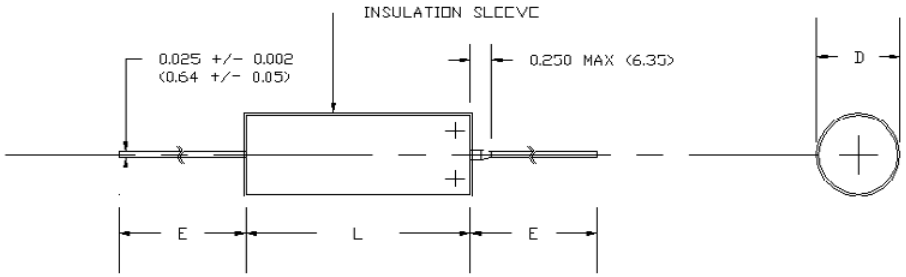
ESR vs. Frequency



Capacitance vs. Frequency



Dimensions – Millimeters



		Uninsulated Case		Insulated Case	
Case Code	MIL–PRF–39006/22/25/30/31 Case Size	L +0.031(0.79) -0.016(0.41)	D ±0.016(0.41)	D Maximum	E ±0.25(6.35)
B	T2	0.641(16.28)	0.281(7.14)	0.312(7.92)	*1.50(38.10)

** Lead length of 2.25" available upon request*

Table 1 – Ratings & Part Number Reference

Rated Voltage	Rated Capacitance	Case Size	KEMET Part Number	DC Leakage	DF	ESR	Maximum Allowable Ripple Current
(V) 85°C	µF	KEMET/EIA	(See below for part options)	µA @ 25°C Maximum/5 Minutes	% @ 25°C 120 Hz Max	mΩ @ 25°C 100 kHz Maximum	mArms @ 85°C/40 kHz
25	100	B	T550B107(1)025A(2)	18.8	5.0	190	1360
40	100	B	T550B107(1)040A(2)	30.0	5.0	150	1530
40	120	B	T550B127(1)040A(2)	36.0	5.0	120	1700
50	100	B	T550B107(1)050A(2)	37.5	5.0	130	1640
50	120	B	T550B127(1)050A(2)	45.0	5.0	90	1970
60	100	B	T550B107(1)060A(2)	45.0	5.0	100	1870
75	75	B	T550B756(1)075A(2)	42.2	5.0	110	1785

(1) To complete KEMET part number, insert M for ±20% or K for ±10%. Designates capacitance tolerance.
(2) To complete KEMET part number, insert T = 100% Matte Tin (Sn) Plated, H = Standard Solder coated (SnPb 5% Pb minimum). Designates termination finish. Refer to Ordering Information for additional detail.
Higher voltage ratings and tighter tolerance product including ESR may be substituted within the same size at KEMET's option. Voltage substitution will be marked with the higher voltage rating. Substitutions can include better than series.

Ripple Current/Ripple Voltage

Permissible AC ripple voltage and current are related to equivalent series resistance (ESR) and the power dissipation capabilities of the device. Permissible AC ripple voltage that may be applied is limited by two criteria:

1. The positive peak AC voltage plus the DC bias voltage, if any, must not exceed the DC voltage rating of the capacitor.
2. The negative peak AC voltage in combination with bias voltage, if any, must not exceed the allowable limits specified for reverse voltage.

The maximum power dissipation by case size can be determined using the below left table. The maximum power dissipation rating stated in the table must be reduced with increasing environmental operating temperatures. Refer to the below right table for temperature compensation requirements.

Case Code		Maximum Power Dissipation (P max) mWatts @ 25°C
KEMET	MIL–PRF–39006/22/ 25/30/31 Case Size	
B	T2	715

Temperature Compensation Multipliers for Maximum Power Dissipation (P max)		
≤ 45°C	45°C < T ≤ 85°C	85°C < T ≤ 105°C
1.00	0.70	0.25

T= Environmental Temperature

Using the P max of the device, the maximum allowable rms ripple current or voltage may be determined.

$I(max) = \sqrt{P\ max/R}$
$E(max) = \sqrt{P\ max*R}$

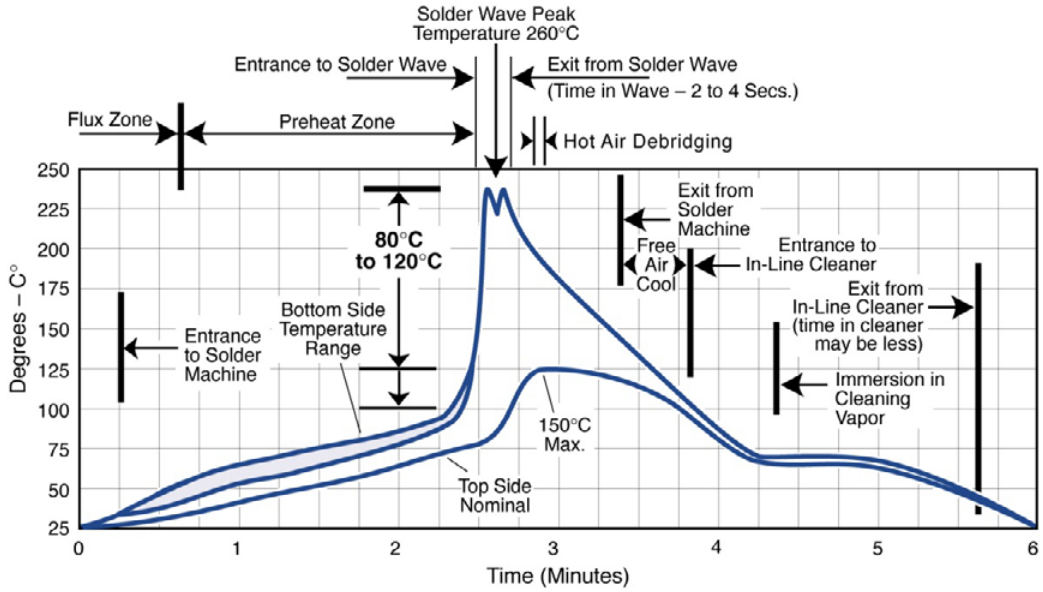
I = rms ripple current (amperes)
E = rms ripple voltage (volts)
P max = maximum power dissipation (watts)
R = ESR at specified frequency (ohms)

Reverse Voltage

Solid tantalum polymer capacitors are polar devices and may be permanently damaged or destroyed if connected with the wrong polarity. A small reverse voltage is permissible for time periods per the below table.
KEMET can offer lower capacitance in this voltage with higher reverse voltage capability.
In addition, we continue to improve our capability for this characteristic.

Temperature	Permissible Reverse Voltage
25°C	1 V for 8 hours Maximum
70°C	1 V for 2 hours Maximum

Optimum Solder Wave Profile



Mounting

T550 capacitors will pass the Resistance to Soldering Heat Test of MIL–STD–202, Method 210, Condition C. This test simulates wave solder of topside board mount product. This demonstration of resistance to solder heat is in accordance with what is believed to be the industry standard. More severe treatment must be considered reflective of an improper soldering process. The above figure is a recommended solder wave profile for T550 tantalum capacitors.

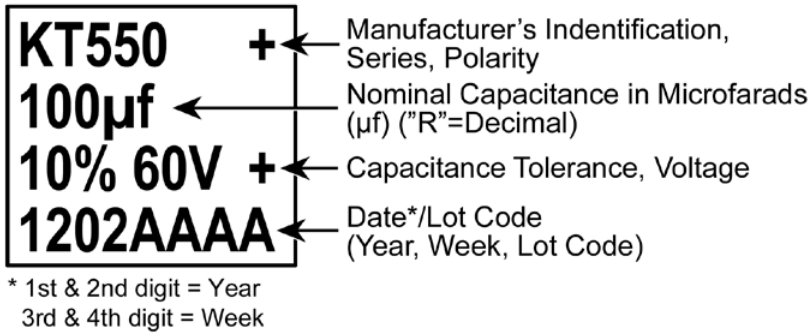
Packaging

Case Size		Pieces per Tray
KEMET	EIA	
B	T2	20

Weight

Case Size		Average Weight (grams)
KEMET	EIA	
B	T2	3.63

Capacitor Marking



* 1st & 2nd digit = Year
3rd & 4th digit = Week

Storage

Tantalum hermetically sealed capacitors should be stored in normal working environments. While the capacitors themselves are quite robust in other environments, solderability will be degraded by exposure to high temperatures, high humidity, corrosive atmospheres, and long term storage. In addition, packaging materials will be degraded by high temperature– reels may soften or warp and tape peel force may increase. KEMET recommends that maximum storage temperature not exceed 40ºC and maximum storage humidity not exceed 60% relative humidity. Temperature fluctuations should be minimized to avoid condensation on the parts and atmospheres should be free of chlorine and sulphur bearing compounds. For optimized solderability capacitors stock should be used promptly, preferably within three years of receipt.

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Shenzhen, China
Tel: 86-755-2518-1306

Beijing, China
Tel: 86-10-5829-1711

Shanghai, China
Tel: 86-21-6447-0707

Taipei, Taiwan
Tel: 886-2-27528585

Southeast Asia
Singapore
Tel: 65-6586-1900

Penang, Malaysia
Tel: 60-4-6430200

Bangalore, India
Tel: 91-806-53-76817

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Other KEMET Resources

Tools	
Resource	Location
Configure A Part: CapEdge	http://capacitoredge.kemet.com
SPICE & FIT Software	http://www.kemet.com/spice
Search Our FAQs: KnowledgeEdge	http://www.kemet.com/keask
Electrolytic LifeCalculator	http://www.kemet.com:8080/elc

Product Information	
Resource	Location
Products	http://www.kemet.com/products
Technical Resources (Including Soldering Techniques)	http://www.kemet.com/technicalpapers
RoHS Statement	http://www.kemet.com/rohs
Quality Documents	http://www.kemet.com/qualitydocuments

Product Request	
Resource	Location
Sample Request	http://www.kemet.com/sample
Engineering Kit Request	http://www.kemet.com/kits

Contact	
Resource	Location
Website	www.kemet.com
Contact Us	http://www.kemet.com/contact
Investor Relations	http://www.kemet.com/ir
Call Us	1-877-MyKEMET
Twitter	http://twitter.com/kemetcapacitors

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Although we design and manufacture our products to the most stringent quality and safety standards, given the current state of the art, isolated component failures may still occur. Accordingly, customer applications which require a high degree of reliability or safety should employ suitable designs or other safeguards (such as installation of protective circuitry or redundancies) in order to ensure that the failure of an electrical component does not result in a risk of personal injury or property damage.

Although all product-related warnings, cautions and notes must be observed, the customer should not assume that all safety measures are indicated or that other measures may not be required.

Digitally signed by Jeannette Calvo
DN: c=US, st=FL, l=Fort Lauderdale, o=KEMET Corp., ou=Marketing Communications, cn=Jeannette Calvo, email=jeannettecalvo@kemet.com
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