

## Overview

KEMET's M550 and M551 Modular Series are manufactured by placing T550 or T551 Polymer Hermetic Sealed Capacitors (PHS) in parallel. The T550 and T551 Series are manufactured utilizing KEMET's exclusive F-Tech process and are 100% tested per KEMET's patented Simulated Breakdown Screening process. This configuration provides high and stable capacitance (up to 8,200  $\mu\text{F}$ ), extremely low ESR (down to 15 m $\Omega$ ) and extremely low and stable leakage current, all in a mechanically robust package.

The M55 Modules are available in two temperature offerings: 105°C (M550 Series) and 125°C (M551 Series). With reduced ESR and enhanced capacitance retention at higher frequencies and low temperatures, KEMET modules provide the highest total capacitance and the lowest total cost of ownership for high power applications.

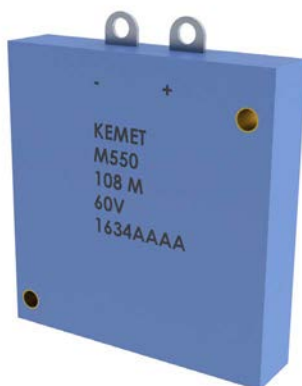
## Benefits

- Extremely low and stable ESR (as low as 15 m $\Omega$ )
- Voltage Ratings from 6 to 180 VDC
- High frequency capacitance retention
- Low temperature capacitance stability
- High ripple current capability (17,500 mA<sub>rms</sub>)
- High inrush current capability
- Excellent power dissipation capability
- Stackable packaging
- Mechanically robust assembly and epoxy housing
- Operates at up to 80% rated voltage
- Customized solutions available
- RoHS compliant terminations available

## Applications

Designed for mission critical applications requiring high power, filtering, hold-up and current pulse generation.

Module 1



Module 2



## Ordering Information

| M               | 550                                                                    | B         | 108                                                                                    | M                     | 060                                                                                                                                          | A                                                                                 | A                                                                                                                                                                 |
|-----------------|------------------------------------------------------------------------|-----------|----------------------------------------------------------------------------------------|-----------------------|----------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Capacitor Class | Series                                                                 | Case Size | Capacitance Code (pF)                                                                  | Capacitance Tolerance | Rated Voltage (VDC)                                                                                                                          | Product Level                                                                     | Termination Finish                                                                                                                                                |
| M = Module      | 550= Capacitor Series (PHS 105°C)<br>551= Capacitor Series (PHS 125°C) | B         | First two digits represent significant figures. Third digit specifies number of zeros. | K = ±10%<br>M = ±20%  | 006 = 6<br>008 = 8<br>010 = 10<br>015 = 15<br>025 = 25<br>030 = 30<br>040 = 40<br>050 = 50<br>060 = 60<br>075 = 75<br>100 = 100<br>180 = 180 | A = N/A<br>B* = DLA 13030 standard reliability<br>T* = DLA 13030 high reliability | A = 100% silver (Ag)<br>T = 100% tin (Sn) plated<br>H = Tin/lead (SnPb) solder coated (5% Pb minimum)<br>S = Solder coated (60% Sn, 40% Pb)<br>G = 100% gold (Au) |

\* Only available on DLA discrete part numbers. Refer to part number table for details.

## Performance Characteristics

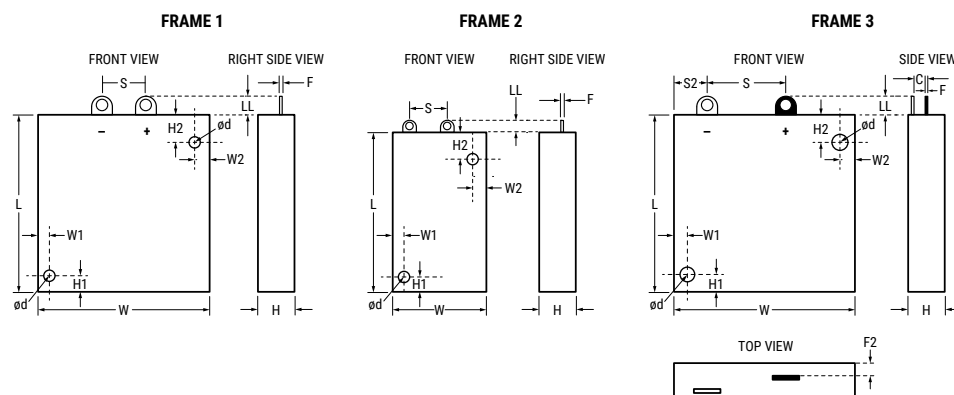
| Item                    | Performance Characteristics                         |
|-------------------------|-----------------------------------------------------|
| Operating Temperature   | -55°C to 105°C/125°C*                               |
| Rated Capacitance Range | 60 µF to 8,200 µF at 120 Hz/25°C                    |
| Capacitance Tolerance   | K Tolerance (10%), M Tolerance (20%)                |
| Rated Voltage Range     | 6 – 180 V                                           |
| DF (120 Hz at 25°C)     | Refer to Part Number Electrical Specification Table |
| ESR (100 kHz at 25°C)   | Refer to Part Number Electrical Specification Table |
| Leakage Current         | Refer to Part Number Electrical Specification Table |

\* Refer to the part number specification table.

## Qualification

| Test Performed                              | Method Reference  | Test Conditions                                                                                             |
|---------------------------------------------|-------------------|-------------------------------------------------------------------------------------------------------------|
| Reliability and Environmental Tests         |                   |                                                                                                             |
| AC Ripple Life at 85°C, 0.67 V <sub>r</sub> | MIL-PRF-39006     | 85°C, 40 kHz ripple current, 2,000 hours                                                                    |
| Thermal Shock                               | MIL-PRF-39006     | Condition A, -55°C to +105°C 5 cycles                                                                       |
| Temperature Stability                       | MIL-PRF-39006     | Extreme temperature exposure at a succession of continuous steps at +25°C, -55°C, +25°C, +85°C, +105, +25°C |
| Physical, Mechanical and Process Tests      |                   |                                                                                                             |
| Mechanical Shock                            | KEMET Custom Test | Condition I                                                                                                 |
| Vibration High Frequency                    | MIL-PRF-39006     | Method 204, Test condition D, 20 g peak                                                                     |

## Dimensions – Millimeters (Inches)



| Dimensions mm (In) |                       |                       |                       |                 |                        |                |                        |                        |                        |                        |               |                             |
|--------------------|-----------------------|-----------------------|-----------------------|-----------------|------------------------|----------------|------------------------|------------------------|------------------------|------------------------|---------------|-----------------------------|
| Frame Size         | L<br>±0.38<br>(0.015) | W<br>±0.38<br>(0.015) | H<br>±0.20<br>(0.008) | S<br>ref        | LL<br>± 0.1<br>(0.004) | F<br>ref       | H1<br>± 0.1<br>(0.004) | W1<br>± 0.1<br>(0.004) | H2<br>± 0.1<br>(0.004) | W2<br>± 0.1<br>(0.004) | d<br>ref      | Weight<br>per module<br>(g) |
| 1                  | 52.1<br>(2.05)        | 50.6<br>(1.99)        | 11.1<br>(0.44)        | 12.71<br>(0.50) | 5.6<br>(0.22)          | 0.81<br>(0.03) | 4.5<br>(0.18)          | 3.2<br>(0.13)          | 8.2<br>(0.32)          | 4.4<br>(0.17)          | 3.2<br>(0.13) | 80                          |
| 2                  | 48.4<br>(1.90)        | 28.2<br>(1.11)        | 11.1<br>(0.44)        | 11.50<br>(0.45) | 3.2<br>(0.13)          | 0.81<br>(0.03) | 4.5<br>(0.18)          | 3.2<br>(0.13)          | 8.2<br>(0.32)          | 4.4<br>(0.17)          | 3.2<br>(0.13) | 50                          |

**Table 1 – Ratings & Part Number Reference**

| Rated Voltage (V) 85°C | Rated Capacitance (μF) | Frame Size | KEMET Module Part Number | DC Leakage μA at 25°C max/5min | DF% at 25°C 120 Hz Max | Maximum ESR mΩ at 25°C 100 kHz | Ripple Current mArms at 85°C/40 kHz | Maximum Operating Temperature (°C) |
|------------------------|------------------------|------------|--------------------------|--------------------------------|------------------------|--------------------------------|-------------------------------------|------------------------------------|
| 6                      | 700                    | 2          | M550B707(1)006A(3)       | 32                             | 5                      | 40                             | 7550                                | 105                                |
| 6                      | 700                    | 2          | M551B707(1)006A(3)       | 32                             | 5                      | 40                             | 7550                                | 125                                |
| 6                      | 4100                   | 2          | M550B418(1)006A(3)       | 185                            | 5                      | 30                             | 8750                                | 105                                |
| 6                      | 4100                   | 2          | M551B418(1)006A(3)       | 185                            | 5                      | 30                             | 8750                                | 125                                |
| 6                      | 8200                   | 1          | M550B828(1)006A(3)       | 369                            | 5                      | 15                             | 17500                               | 105                                |
| 6                      | 8200                   | 1          | M551B828(1)006A(3)       | 369                            | 5                      | 15                             | 17500                               | 125                                |
| 8                      | 1100                   | 2          | M550B118(1)008A(3)       | 66                             | 5                      | 40                             | 7550                                | 105                                |
| 8                      | 1100                   | 2          | M551B118(1)008A(3)       | 66                             | 5                      | 40                             | 7550                                | 125                                |
| 8                      | 3400                   | 2          | M550B348(1)008A(3)       | 204                            | 5                      | 30                             | 8750                                | 105                                |
| 8                      | 3400                   | 2          | M551B348(1)008A(3)       | 204                            | 5                      | 30                             | 8750                                | 125                                |
| 8                      | 6800                   | 1          | M550B688(1)008A(3)       | 408                            | 5                      | 15                             | 17500                               | 105                                |
| 8                      | 6800                   | 1          | M551B688(1)008A(3)       | 408                            | 5                      | 15                             | 17500                               | 125                                |
| 10                     | 500                    | 2          | M550B507(1)010A(3)       | 38                             | 5                      | 50                             | 7000                                | 105                                |
| 10                     | 500                    | 2          | M551B507(1)010A(3)       | 38                             | 5                      | 50                             | 7000                                | 125                                |
| 10                     | 900                    | 2          | M550B907(1)010A(3)       | 68                             | 5                      | 40                             | 7900                                | 105                                |
| 10                     | 900                    | 2          | M551B907(1)010A(3)       | 68                             | 5                      | 40                             | 7900                                | 125                                |
| 10                     | 2200                   | 2          | M550B228(1)010A(3)       | 210                            | 5                      | 30                             | 8750                                | 105                                |
| 10                     | 2200                   | 2          | M551B228(1)010A(3)       | 210                            | 5                      | 30                             | 8750                                | 125                                |
| 10                     | 5600                   | 1          | M550B568(1)010A(3)       | 420                            | 5                      | 15                             | 17500                               | 105                                |
| 10                     | 5600                   | 1          | M551B568(1)010A(3)       | 420                            | 5                      | 15                             | 17500                               | 125                                |
| 15                     | 350                    | 2          | M550B357(1)015A(3)       | 40                             | 5                      | 50                             | 7000                                | 105                                |
| 15                     | 350                    | 2          | M551B357(1)015A(3)       | 40                             | 5                      | 50                             | 7000                                | 125                                |
| 15                     | 600                    | 2          | M550B607(1)015A(3)       | 68                             | 5                      | 40                             | 7900                                | 105                                |
| 15                     | 600                    | 2          | M551B607(1)015A(3)       | 68                             | 5                      | 40                             | 7900                                | 125                                |
| 15                     | 2000                   | 2          | M550B208(1)015A(3)       | 225                            | 5                      | 30                             | 8750                                | 105                                |
| 15                     | 2000                   | 2          | M551B208(1)015A(3)       | 225                            | 5                      | 30                             | 8750                                | 125                                |
| 15                     | 3900                   | 1          | M550B398(1)015A(3)       | 439                            | 5                      | 15                             | 17500                               | 105                                |
| 15                     | 3900                   | 1          | M551B398(1)015A(3)       | 439                            | 5                      | 15                             | 17500                               | 125                                |
| 25                     | 250                    | 2          | M550B257(1)025A(3)       | 47                             | 5                      | 50                             | 6375                                | 105                                |
| 25                     | 250                    | 2          | M551B257(1)025A(3)       | 47                             | 5                      | 50                             | 6375                                | 125                                |
| 25                     | 500                    | 2          | M550B507(1)025(2)(3) *   | 94                             | 5                      | 60                             | 6000                                | 105                                |
| 25                     | 500                    | 2          | M551B507(1)025(2)(3) *   | 94                             | 5                      | 60                             | 6000                                | 125                                |
| 25                     | 1000                   | 1          | M550B108(1)025(2)(3) *   | 188                            | 5                      | 30                             | 12000                               | 105                                |
| 25                     | 1000                   | 1          | M551B108(1)025A(3)       | 188                            | 5                      | 30                             | 12000                               | 125                                |
| 30                     | 200                    | 2          | M550B207(1)030A(3)       | 45                             | 5                      | 50                             | 6375                                | 105                                |
| 30                     | 200                    | 2          | M551B207(1)030A(3)       | 45                             | 5                      | 50                             | 6375                                | 125                                |
| 30                     | 340                    | 2          | M550B347(1)030A(3)       | 77                             | 5                      | 50                             | 7000                                | 105                                |
| 30                     | 340                    | 2          | M551B347(1)030A(3)       | 77                             | 5                      | 50                             | 7000                                | 125                                |
| 30                     | 680                    | 1          | M550B687(1)030A(3)       | 153                            | 5                      | 25                             | 14000                               | 105                                |
| 30                     | 680                    | 1          | M551B687(1)030A(3)       | 153                            | 5                      | 25                             | 14000                               | 125                                |
| 40                     | 500                    | 2          | M550B507(1)040(2)(3) *   | 150                            | 5                      | 50                             | 6750                                | 105                                |
| 40                     | 500                    | 2          | M551B507(1)040(2)(3) *   | 150                            | 5                      | 50                             | 6750                                | 125                                |
| 40                     | 600                    | 2          | M550B607(1)040(2)(3) *   | 180                            | 5                      | 40                             | 6750                                | 105                                |
| 40                     | 600                    | 2          | M551B607(1)040(2)(3) *   | 180                            | 5                      | 40                             | 6750                                | 125                                |
| 40                     | 1000                   | 1          | M550B108(1)040(2)(3) *   | 300                            | 5                      | 25                             | 13500                               | 105                                |
| 40                     | 1000                   | 1          | M551B108(1)040A(3)       | 300                            | 5                      | 25                             | 13500                               | 125                                |
| 40                     | 1200                   | 1          | M550B128(1)040(2)(3) *   | 360                            | 5                      | 20                             | 15100                               | 105                                |
| 40                     | 1200                   | 1          | M551B128(1)040A(3)       | 360                            | 5                      | 20                             | 15100                               | 125                                |
| 50                     | 120                    | 2          | M550B127(1)050A(3)       | 47                             | 5                      | 50                             | 6375                                | 105                                |
| 50                     | 120                    | 2          | M551B127(1)050A(3)       | 47                             | 5                      | 50                             | 6375                                | 125                                |
| 50                     | 240                    | 2          | M550B247(1)050A(3)       | 90                             | 5                      | 50                             | 6750                                | 105                                |
| 50                     | 240                    | 2          | M551B247(1)050A(3)       | 90                             | 5                      | 50                             | 6750                                | 125                                |
| 50                     | 500                    | 2          | M550B507(1)050(2)(3) *   | 188                            | 5                      | 40                             | 7250                                | 105                                |
| 50                     | 500                    | 2          | M551B507(1)050(2)(3) *   | 188                            | 5                      | 40                             | 7250                                | 125                                |
| 50                     | 600                    | 2          | M550B607(1)050(2)(3) *   | 225                            | 5                      | 30                             | 8750                                | 105                                |

(1) To complete KEMET part number, insert M for ±20% or K for ±10%. Designates capacitance tolerance.

(2) To complete KEMET part number, insert B = standard reliability, or T = high reliability. See Ordering Information table for details.

(3) To complete KEMET part number, insert T = 100% matte tin (Sn) plated, H = standard solder coated (SnPb 5% Pb minimum), S = 60% tin (Sn) 40% lead (Pb), G = 100% gold (Au), A = 100% silver (Ag). Designates termination finish.

**Table 1 – Ratings & Part Number Reference cont'd**

| Rated Voltage (V) 85°C | Rated Capacitance (μF) | Frame Size | KEMET Module Part Number | DC Leakage μA at 25°C max/5min | DF% at 25°C 120 Hz Max | Maximum ESR mΩ at 25°C 100 kHz | Ripple Current mArms at 85°C/40 kHz | Maximum Operating Temperature (°C) |
|------------------------|------------------------|------------|--------------------------|--------------------------------|------------------------|--------------------------------|-------------------------------------|------------------------------------|
| 50                     | 600                    | 2          | M551B607(1)050(2)(3) *   | 225                            | 5                      | 30                             | 8750                                | 125                                |
| 50                     | 1000                   | 1          | M550B108(1)050(2)(3) *   | 375                            | 5                      | 20                             | 14500                               | 105                                |
| 50                     | 1000                   | 1          | M551B108(1)050A(3)       | 375                            | 5                      | 20                             | 14500                               | 125                                |
| 50                     | 1200                   | 1          | M550B128(1)050(2)(3) *   | 450                            | 5                      | 15                             | 17500                               | 105                                |
| 50                     | 1200                   | 1          | M551B128(1)050A(3)       | 450                            | 5                      | 15                             | 17500                               | 125                                |
| 60                     | 100                    | 2          | M550B107(1)060A(3)       | 45                             | 5                      | 60                             | 5875                                | 105                                |
| 60                     | 100                    | 2          | M551B107(1)060A(3)       | 45                             | 5                      | 60                             | 5875                                | 125                                |
| 60                     | 500                    | 2          | M550B507(1)060A(3)       | 225                            | 5                      | 50                             | 8300                                | 105                                |
| 60                     | 500                    | 2          | M551B507(1)060A(3)       | 225                            | 5                      | 50                             | 8300                                | 125                                |
| 60                     | 1000                   | 1          | M550B108(1)060(2)(3) *   | 450                            | 5                      | 25                             | 16600                               | 105                                |
| 60                     | 1000                   | 1          | M551B108(1)060A(3)       | 450                            | 5                      | 25                             | 16600                               | 125                                |
| 75                     | 370                    | 2          | M550B377(1)075A(3)       | 208                            | 5                      | 40                             | 7900                                | 105                                |
| 75                     | 750                    | 1          | M550B757(1)075(2)(3) *   | 422                            | 5                      | 20                             | 15800                               | 105                                |
| 100                    | 120                    | 2          | M550B127(1)100A(3)       | 90                             | 5                      | 60                             | 6375                                | 105                                |
| 100                    | 250                    | 1          | M550B257(1)100(2)(3) *   | 188                            | 5                      | 30                             | 12750                               | 105                                |
| 108                    | 250                    | 3          | M550B257(1)108(2)(3)     | 350                            | 5                      | 50                             | 8300                                | 105                                |
| 108                    | 250                    | 3          | M551B257(1)108(2)(3)     | 350                            | 5                      | 50                             | 8300                                | 125                                |
| 135                    | 180                    | 3          | M550B187(1)135(2)(3)     | 302                            | 5                      | 50                             | 7900                                | 105                                |
| 180                    | 60                     | 3          | M550B606(1)180(2)(3)     | 141                            | 5                      | 80                             | 6000                                | 105                                |

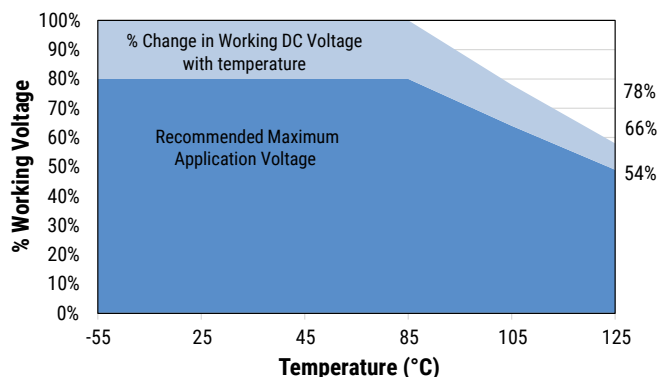
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## Recommended Voltage Derating Guidelines

|                                                                 | -55°C to 105°C | 105°C to 125°C |
|-----------------------------------------------------------------|----------------|----------------|
| % Change in Working DC Voltage with Temperature                 | 78% of $V_R$   | 66% of $V_R$   |
| Recommended Maximum Application Voltage (As % of Rated Voltage) | 63% of $V_R$   | 54% of $V_R$   |



## 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 ( $P_{max}$ )<br>mWatts at 25°C<br>with +60°C Rise |
|-----------|-----------------------------------------|------------------------------------------------------------------------------|
| KEMET     | MIL-PRF-39006/22/<br>25/30/31 Case Size |                                                                              |
| B         | T2                                      | 715                                                                          |

| Temperature Compensation Multipliers for<br>Maximum Power Dissipation ( $P_{max}$ ) |                                              |                                               |
|-------------------------------------------------------------------------------------|----------------------------------------------|-----------------------------------------------|
| $T \leq 45^\circ\text{C}$                                                           | $45^\circ\text{C} < T \leq 85^\circ\text{C}$ | $85^\circ\text{C} < T \leq 125^\circ\text{C}$ |
| 1.00                                                                                | 0.70                                         | 0.10                                          |

$T$  = Environmental Temperature

Using the  $P_{max}$  of the device, the maximum allowable rms ripple current or voltage may be determined.

$$I(max) = \sqrt{P_{max}/R}$$

$$E(max) = Z \sqrt{P_{max}/R}$$

$I$  = rms ripple current (amperes)

$E$  = rms ripple voltage (volts)

$P_{max}$  = maximum power dissipation (watts)

$R$  = ESR at specified frequency (ohms)

$Z$  = Impedance at specified frequency (ohms)

The maximum power dissipation rating must be reduced with increasing environmental operating temperatures. Refer to the Temperature Compensation Multiplier table for details.

## 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 table at right. KEMET can offer lower capacitance in this voltage with higher reverse voltage capability. In addition, we continue to improve our capability for this characteristic.

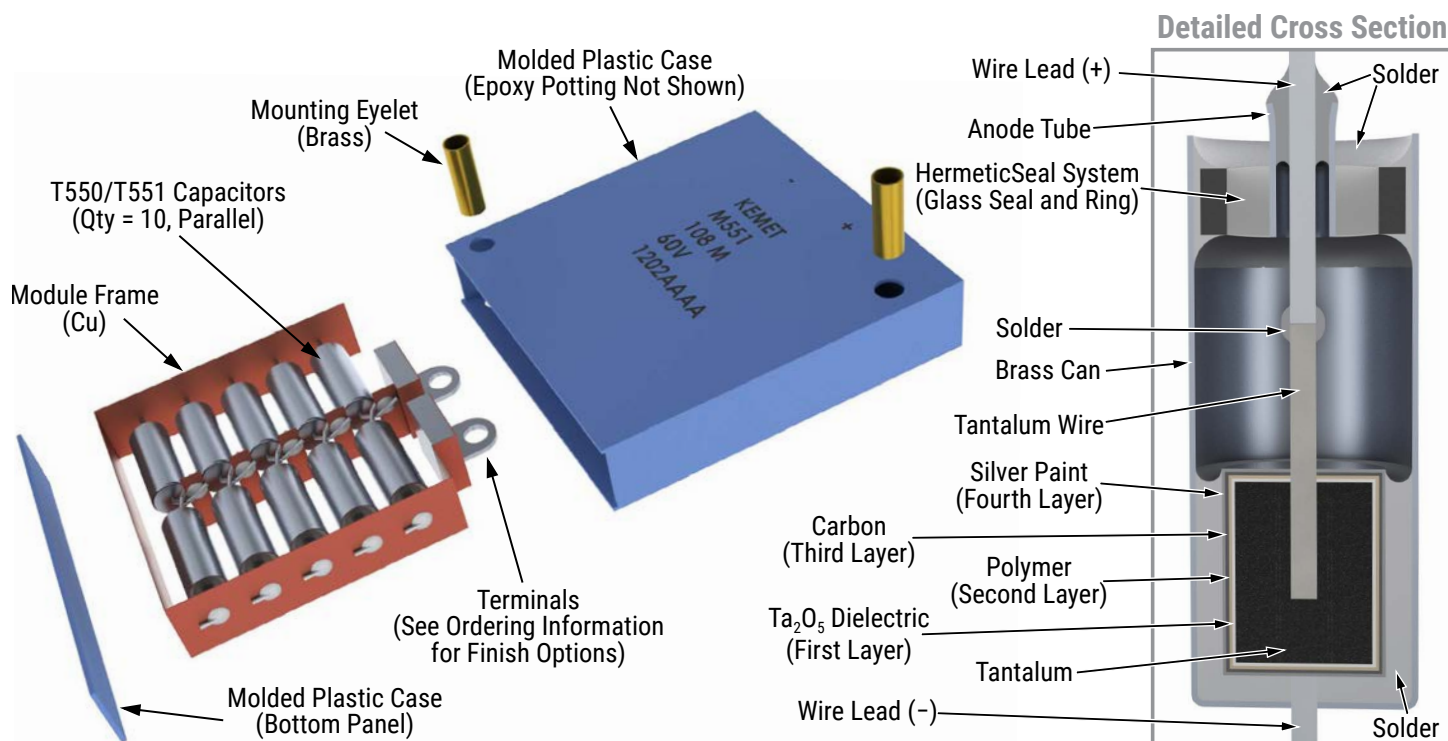
| Temperature | Permissible Reverse Voltage |
|-------------|-----------------------------|
| 25°C        | 1 V for 8 hours Maximum     |
| 70°C        | 1 V for 2 hours Maximum     |

## Mounting

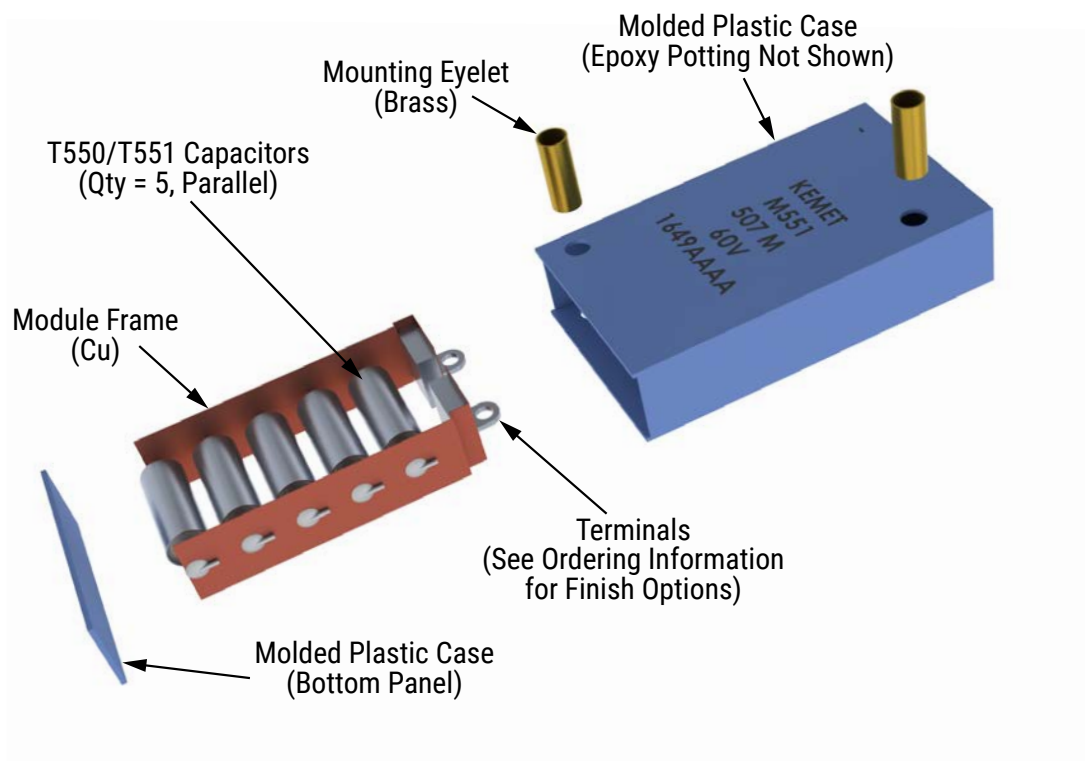
The M550 and M551 Modular Series are suitable for stacking to the board. The use of a heat sink is recommended. These products are not suitable for reflow soldering. For manual-soldering process with soldering iron, the maximum recommended temperature is 350°C for no more than 3 seconds. Care should be taken to avoid contact of the soldering iron to the epoxy housing. The iron should be used to heat the solder pad, applying solder between the pad and the terminal of the module, until reflow occurs.

## Construction

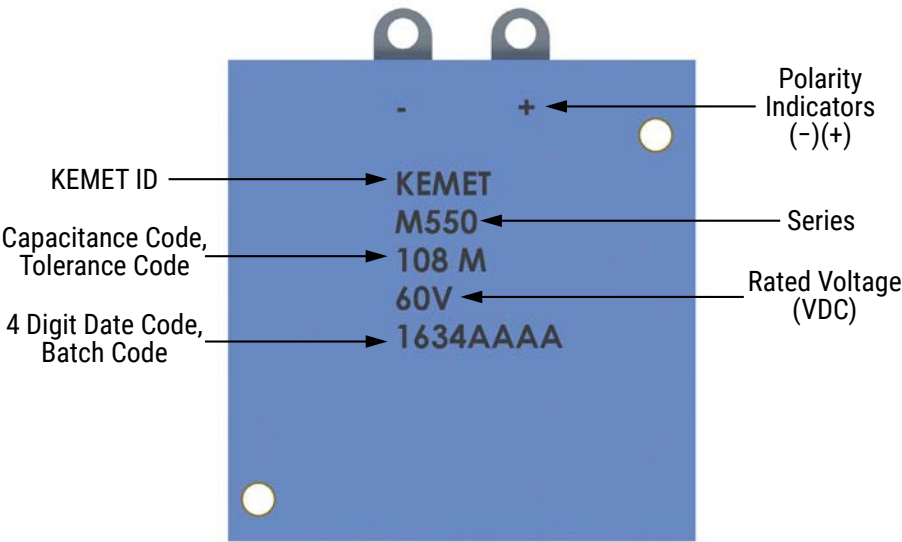
### Module 1



### Module 2



Capacitor Marking



Storage

Polymer Hermetic Seal Modules should be stored in normal working environments. KEMET recommends that maximum storage temperature not exceed 40°C and maximum storage humidity not exceed 90% RH. For optimal solderability, module stock should be used promptly, preferably within three years of receipt.

Packaging

Modules shall be packaged in carton boxes. Packaging methods and materials used shall prevent degradation of physical and mechanical characteristics. MSL 1

| Series | Carton Box Qty |
|--------|----------------|
| M55    | 10 max         |

## KEMET Electronic Corporation Sales Offices

For a complete list of our global sales offices, please visit [www.kemet.com/sales](http://www.kemet.com/sales).

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## Disclaimer

All product specifications, statements, information and data (collectively, the "Information") in this datasheet are subject to change. The customer is responsible for checking and verifying the extent to which the Information contained in this publication is applicable to an order at the time the order is placed.

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Although KEMET designs and manufactures its 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.

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