



Solid Electrolytic Capacitors for High Reliability Applications

KEMET makes it possible.

Electronic Components
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KOCAP Polymer Capacitors

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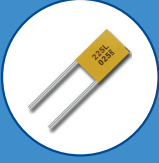
Why Choose KEMET

KEMET Electronics Corporation is a leading global supplier of electronic components. We offer our customers the broadest selection of capacitor technologies in the industry, along with an expanding range of electromechanical devices, electromagnetic compatibility solutions and supercapacitors.

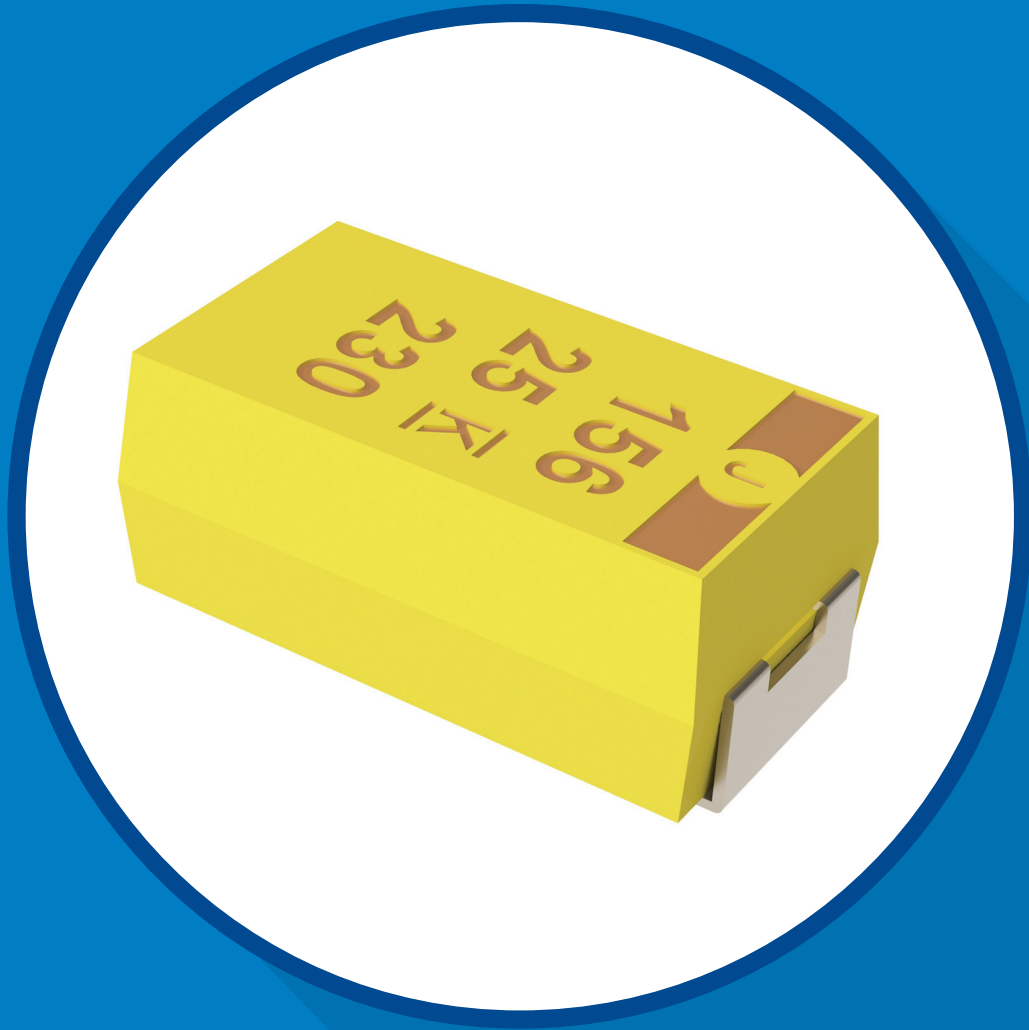
Our vision is to be the preferred supplier of electronic component solutions for customers demanding the highest standards of quality, delivery and service.

MIL Qualified KEMET Series

Military Specifications Product Portfolio (Tantalum)

MIL-PRF Specification		Style	KEMET Series	Description
MIL-PRF-39003/01 MIL-PRF-39003/02 MIL-PRF-39003/03 MIL-PRF-39003/04 MIL-PRF-39003/06 MIL-PRF-39003/09 MIL-PRF-39003/10 MIL-PRF-39003/10		CSR13 CSR09 CSR23 CSR91 CSR33 CSR21 CSS13 CSS33	T212 T222 T242 T213 T252 T262 T216 T256	Tantalum Hermetically Sealed / Axial
MIL-PRF-49137/01 MIL-PRF-49137/05		CX01 CX05	T323	Tantalum Molded /Axial
MIL-PRF-49137/06		CX06	T378	Tantalum Molded / Radial
MIL-PRF-49137/02		CX02 CX12	T363 T369	Tantalum Dipped / Radial
MIL-PRF-55365/04 MIL-PRF-55365/08 MIL-PRF-55365/11 MIL-PRF-55365/11		CWR09 CWR11 CWR19 CWR29	T409 T492 T419 T429	Tantalum Surface Mount Chip





T540/T541 Polymer COTS

T540/T541 Polymer COTS

- Designed for high reliability applications (defense, aerospace, oil and gas)
- B, C and D failure rates are available and were performed according to KEMET's KO-CAP® Reliability Assessment Method*
- Ultra low ESR (3 to 10 times lower than an equivalent MnO_2)
- High capacitance (Up to 3 times more capacitance than equivalent MnO_2 at operating conditions)
- Better frequency stability than an equivalent MnO_2
- Higher application voltage (up to 48 V) versus equivalent MnO_2
- Higher ripple current capability versus equivalent MnO_2
- Defense Logistics Agency approved (DLA Drawing 04051 and 04052)

*KEMET's KO-CAP® Reliability Assessment Method provides KEMET the capability to now offer our T540 and T541 Series with assessed reliability levels of B (0.1%/Khrs), C (0.01%/Khrs) and D (0.001%/Khrs). This is the only polymer capacitor available on the market today with assessed reliability levels. Designers can now match the reliability requirements of their project to the capacitor level. The traditional Weibull methods of assessing reliability is not suitable for the polymer electrolytic capacitor and falls short of properly assessing the lot-to-lot reliability of these products. Prior to this release, this capability was only available through Source Control Drawings, but is now available by simply adding a desired failure rate in to 13th character of the part number.



www.kemet.com/t540



www.kemet.com/t541

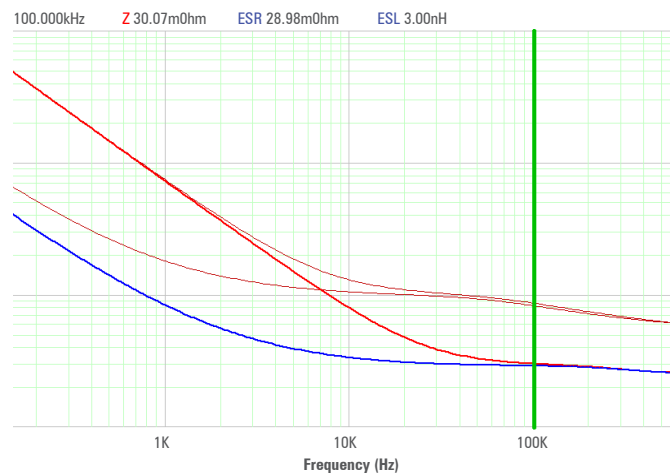
Top Selling Products

Series	Part Number	Case Size	Capacitance (μF)	Voltage (V)	ESR ($\text{m}\Omega$)
T541	T541X337M016	7343-43	330	16	25
T541	T541X336M050	7343-43	33	50	75
T541	T541X156M063	7343-43	15	63	50

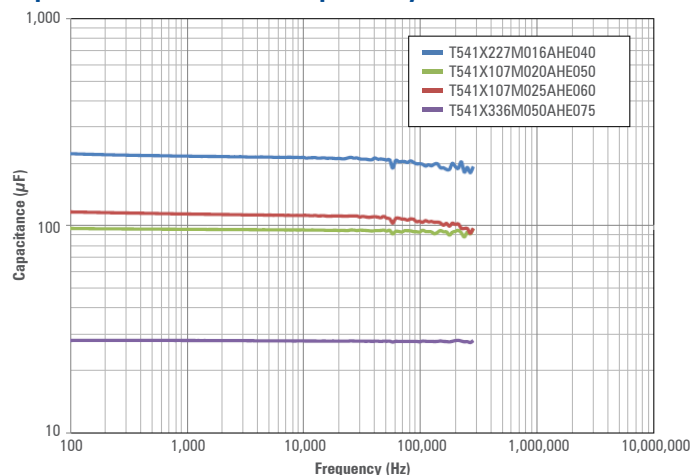
Typical Applications

- Output filter SMPS
- Point-of-load
- Low frequency decoupling

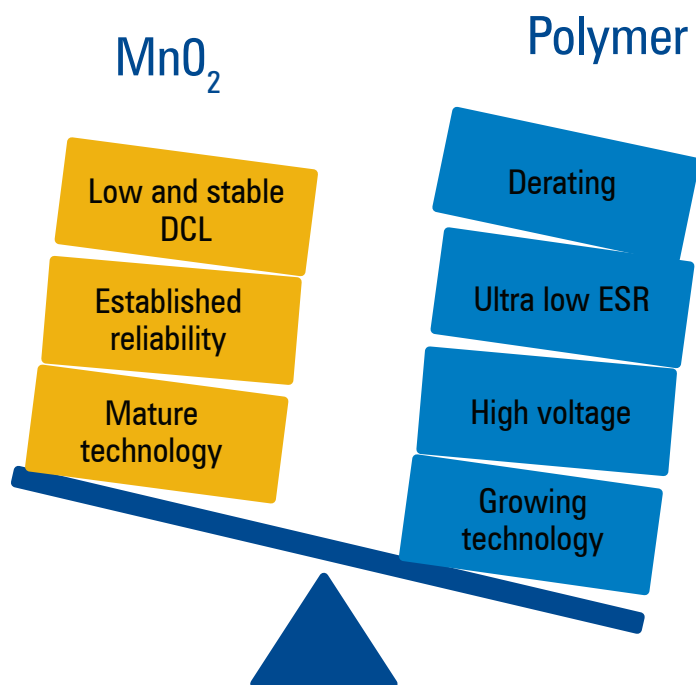
ESR vs. Frequency



Capacitance vs. Frequency



MnO₂ vs. Polymer Technology Advantages

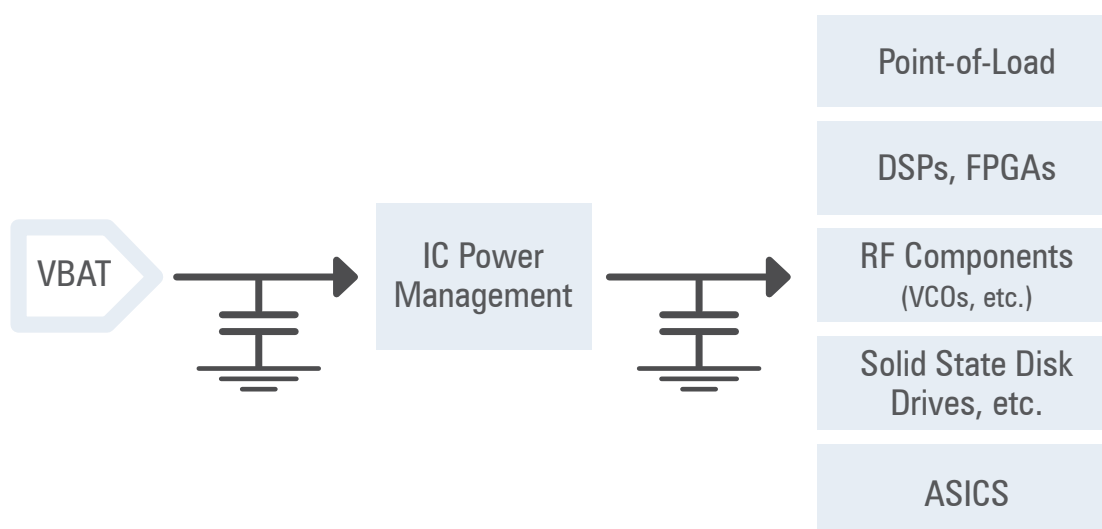


Well-suited for:

- Consumer
- Cloud infrastructure
- Screens that connect
- Transportation
- Defense & aerospace

	Capacitance	DCL	ESR	Derating	Ripple	Failure Mode	Cap. Stability
MnO ₂	Excellent volumetric efficiency	Low and stable DCL	Medium/ High (0.1 up to Ω level)	50% F-Tech/SBDS	Good	—	Good over temperature and frequency
Polymer	Excellent volumetric efficiency	Stable DCL (higher than MnO ₂)	Ultra low (Down to single digit)	10% up to 10 V 20% higher than 10 V	Excellent	Benign failure mode	Excellent over temperature and frequency

Defense & Aerospace



Application Requirements



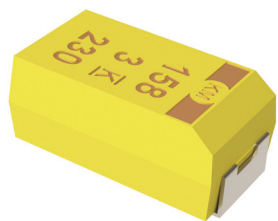
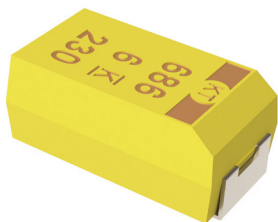
High

Power rail up to 48 V



ESR: 5 m Ω to 150 m Ω

Recommendations (Input/Output)



- Operating Temperature: -55° C to +125°C
- Voltage Range: 4 V to 63 V
- Capacitance Range: 47 μ F to 470 μ F
- DLA Drawing: 04051 and 04052

Higher Voltage Availability

- T541X226M050AH ESR 75 m Ω
- T541X336M050AH ESR 75 m Ω
- T541X106M063AH ESR 75 m Ω
- T541X156M063AH ESR 50 m Ω

KEMET Recommendations

Series	Part Number	Case Size	Capacitance (μ F)	Voltage (V)	ESR (m Ω)
T541	T541X477M010	7343-43	470	6	5
T541	T541D157M010	7343-31	150	10	6
T541	T541D227M010	7343-31	220	10	6
T541	T541D337M010	7343-31	330	10	5
T541	T541X337M016	7343-43	330	16	25
T541	T541X336M050	7343-43	33	50	75
T541	T541X156M063	7343-43	15	63	50



T550/T551 Polymer Hermetic Seal (PHS)

- Designed for high reliability applications (defense and aerospace)
- 125°C maximum operating temperature
- Higher application voltage (up to 80 V)
- Higher ripple current capability versus wet tantalum
- 25% lighter than wet tantalum capacitors
- MIL-PRF-39006/22/25/30/31 case sizes
- Defense Logistics Agency approved (DLA Drawing 13030)

Advantages over Wet Tantalum

Parameter	Polymer Hermetic Seal	Wet Tantalum
Weight	3.28 grams	4.36 grams
Technology	New	Old (1940's)
Capacitance at -55°C/ 1 Khz 82 μ F	70 μ F	~10 μ F
Derating	20%	50%
Failure Mode	Benign	Rupture/Sulfuric Acid
ESR	100 m Ω	1.4 Ω
Ripple Current Maximum RMS 40 kHz	3000 mA	1420 mA
Inrush Current Capability	14x more than wet	Reference: 1
Mechanical Robustness (shock and vibration)	Solid construction	Movable components (insulator and brushing)

Application Requirements



www.kemet.com/t550



www.kemet.com/t551

High



Power rail up to 60 V

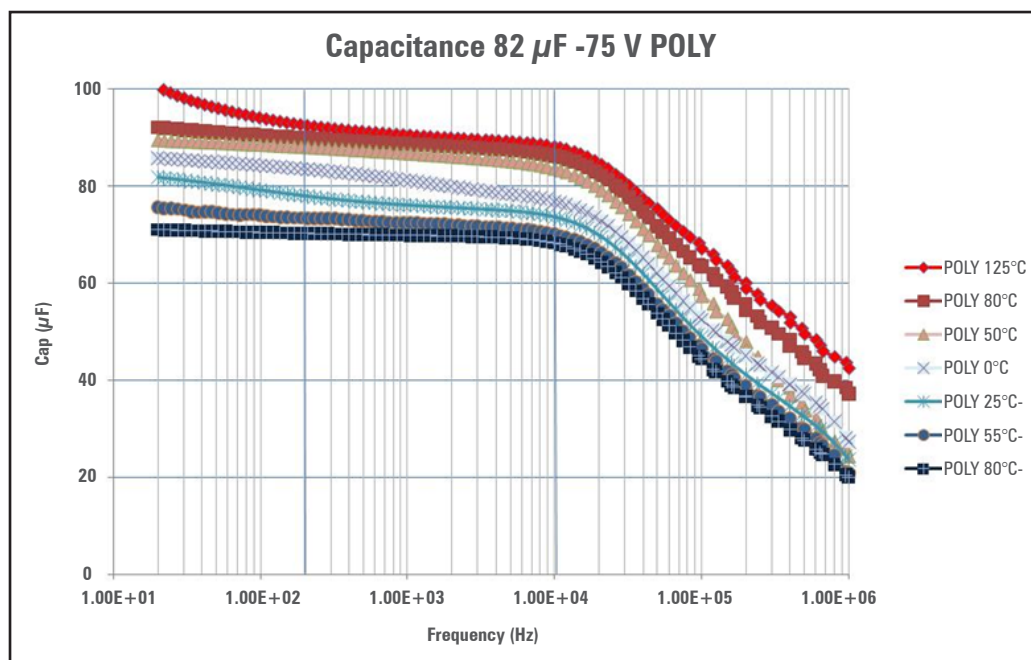
+

Low

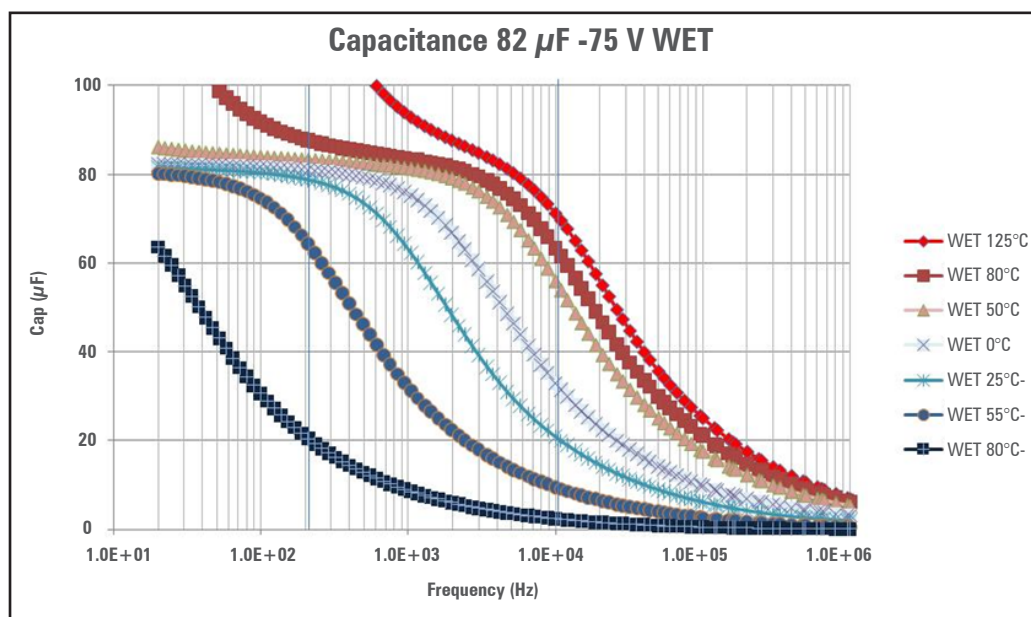
Ω

ESR:
Starting at 200 m Ω

Capacitance vs. Frequency/Temperature



Capacitance vs. Frequency/Temperature Wet Tantalum



Features & Benefits

High Reliability Design	Details
F-Tech Anode	Chemically pure and mechanically robust anode
Nine patents and applications	- Low ESR - Low and stable DCL - High reliability
Simulated Breakdown Screening (SBDS)	Detects hidden defects in the dielectric
Internal Environment Control	Ensures consistent performance over time



Testing Protocol	Details
In-line testing protocols	- Life test (steady state aging) - Surge current - SBDS - X-ray - Acceptance Quality Limit (AQL)



Product Offering

Existing & Short Term Roadmap: T550 Series (DLA Drawing)

V_r	6 V	8 V	10 V	15 V	25 V	30 V	40 V	50 V	60 V	75 V	100 V
Cap (μ F)											
20									200		
25								170			190*
39									160		
40						170					
47								150			
50					170						
68						140					
70				140							
75										110*	
100			140		190*		150*	130*	100*		
120				110			120*	90*			
140	120										
180			110								
220		120									
390				90							
560			90								
680		90									
820	90										

ESR (m Ω)

* DLA Drawing 13030 Part Number Available

T550/T551 Polymer Hermetic Seal (PHS)

Product Offering

Existing & Short Term Roadmap: T551 Series

Rated Voltage	Rated Capacitance	Case Size	KEMET Part Number	DC Leakage	DF	Maximum ESR	Ripple Current
(V) 85°C	μF	KEMET/EIA	(See below for part options)	μA at 25°C Maximum/5 Minutes	% at 25°C 120 Hz Max	mΩ at 25°C 100 kHz	mA _{rms} at 85°C/40 kHz
6	140	B	T551B147(1)006A(2)	6.3	5.0	120	1510
6	820	B	T551B827(1)006A(2)	36.9	5.0	90	1750
8	220	B	T551B227(1)008A(2)	13.2	5.0	120	1510
8	680	B	T551B687(1)008A(2)	40.8	5.0	90	1750
10	100	B	T551B107(1)010A(2)	7.5	5.0	140	1400
10	180	B	T551B187(1)010A(2)	13.5	5.0	110	1580
10	560	B	T551B567(1)010A(2)	42.0	5.0	90	1750
15	70	B	T551B706(1)015A(2)	7.9	5.0	140	1400
15	120	B	T551B127(1)015A(2)	13.5	5.0	110	1580
15	390	B	T551B397(1)015A(2)	43.9	5.0	90	1750
25	50	B	T551B506(1)025A(2)	9.4	5.0	170	1275
25	100	B	T551B107(1)025A(2)	18.8	5.0	190	1200
30	40	B	T551B406(1)030A(2)	9.0	5.0	170	1275
30	68	B	T551B686(1)030A(2)	15.3	5.0	140	1400
40	100	B	T551B107(1)040A(2)	30.0	5.0	150	1350
40	120	B	T551B127(1)040A(2)	36.0	5.0	120	1510
50	25	B	T551B256(1)050A(2)	9.4	5.0	170	1275
50	47	B	T551B476(1)050A(2)	17.6	5.0	150	1350
50	100	B	T551B107(1)050A(2)	37.5	5.0	130	1450
50	120	B	T551B127(1)050A(2)	45.0	5.0	90	1750
60	20	B	T551B206(1)060A(2)	9.0	5.0	200	1175
60	39	B	T551B396(1)060A(2)	17.6	5.0	160	1310
60	100	B	T551B107(1)060A(2)	45.0	5.0	100	1660



Modules

Featured

- Designed for high reliability applications (defense and aerospace)
- 105°C or 125°C maximum operating temperature
- Higher application voltage (up to 100 V)
- Higher ripple current capability versus wet tantalum
- Approximately 50% lighter than competition
- Defense Logistics Agency approved (DLA Drawing 13030)*

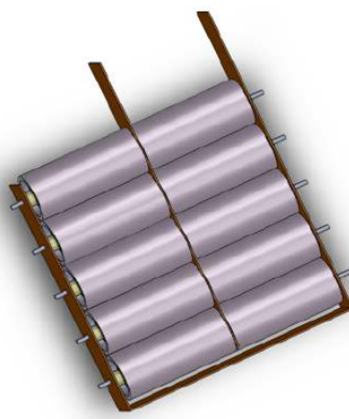
*Discrete parts

Examples of High Energy Modules

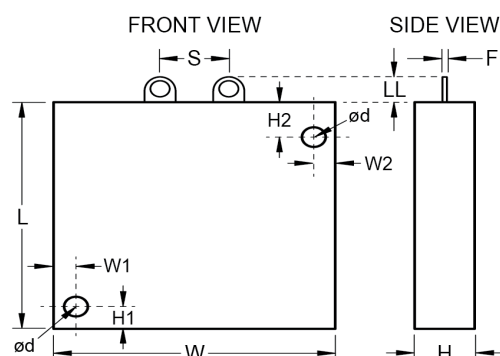
8,200 μ F 6 V 15 m Ω → M551B828M006AH

250 μ F 100 V 30 m Ω → M550B257M100AH

1,000 μ F 60 V 25 m Ω → M551B108M060AH



Dimensions - Milimeters (Inches)



Dimensions mm (In)

Module Frame Size	H ±0.38 (0.015)	H1 ± 0.1 (0.004)	H2 ± 0.1 (0.004)	T ±0.20 (0.008)	W ±0.38 (0.015)	W1 ± 0.1 (0.004)	W2 ± 0.1 (0.004)	LL ± 0.1 (0.004)	S ref	F ref	d ref	Weight per module (g)
1	50.6 (1.99)	4.5 (0.18)	8.2 (0.32)	11.1 (0.44)	52.1 (2.05)	3.2 (0.13)	4.4 (0.17)	5.6 (0.22)	12.71 (0.50)	0.81 (0.03)	3.2 (0.13)	80

Ratings & Part Number Reference

Rated Voltage (V) 85°C	Rated Capacitance (μF)	KEMET Module Part Number	DC Leakage μA at 25°C Maximum/5 minutes	DF% at 25°C 120 Hz Max	Maximum ESR mΩ at 25°C 100 kHz	Ripple Current mA _{rms} at 85°C/40 kHz	Maximum Operating Temperature (°C)
6	8,200	M550B828(1)006A(3)	369	5	15	17,500	105
6	8,200	M551B828(1)006A(3)	369	5	15	17,500	125
8	6,800	M550B688(1)008A(3)	408	5	15	17,500	105
8	6,800	M551B688(1)008A(3)	408	5	15	17,500	125
10	5,600	M550B568(1)010A(3)	420	5	15	17,500	105
10	5,600	M551B568(1)010A(3)	420	5	15	17,500	125
15	3,900	M550B398(1)015A(3)	439	5	15	17,500	105
15	3,900	M551B398(1)015A(3)	439	5	15	17,500	125
25	1,000	M550B108(1)025(2)(3)	188	5	30	12,000	105
25	1,000	M551B108(1)025A(3)	188	5	30	12,000	125
30	680	M550B687(1)030A(3)	153	5	25	14,000	105
30	680	M551B687(1)030A(3)	153	5	25	14,000	125
40	1,000	M550B108(1)040(2)(3)	300	5	25	13,500	105
40	1,000	M551B108(1)040A(3)	300	5	25	13,500	125
40	1,200	M550B128(1)040(2)(3)	360	5	20	15,100	105
40	1,200	M551B128(1)040A(3)	360	5	20	15,100	125
50	1,000	M550B108(1)050(2)(3)	375	5	20	14,500	105
50	1,000	M551B108(1)050A(3)	375	5	20	14,500	125
50	1,200	M550B128(1)050(2)(3)	450	5	15	17,500	105
50	1,200	M551B128(1)050A(3)	450	5	15	17,500	125
60	1,000	M550B108(1)060(2)(3)	450	5	25	16,600	105
60	1,000	M551B108(1)060A(3)	450	5	25	16,600	125
75	750	M550B757(1)075(2)(3)	422	5	20	15,800	105
100	250	M550B257(1)100(2)(3)	188	5	30	12,750	105

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Countries and Areas listed below represent KEMET operations throughout the world.

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India	Portugal	
Indonesia	Singapore	