a YAGEO company

KEMET Snap-In Electrolytic Evolution!

Solution for multiple market problems!

Press-Fit ALFxx:

Eliminates Solder!

Press-Fit

Solution for Multiple Problems

Problem

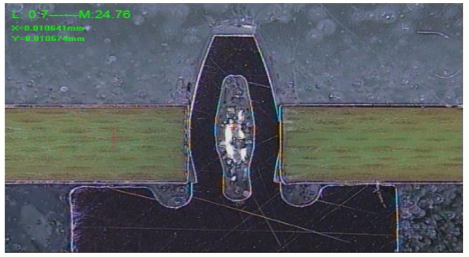
Soldering Problems

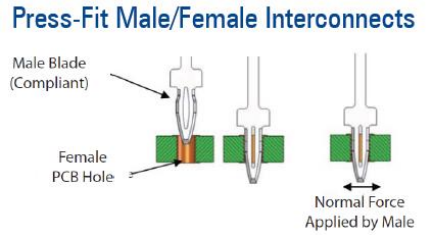
- Ever increasing large aluminum electrolytics used on a PCB
- Heavy copper tracking on the PCB acts as a heat sink making soldering difficult
- Low/Mid volumes are assembled with expensive hand-soldering which has high variability
- Solder quality issues result - cold spots, voids, splatter, cracks, solder balls, flux residue and others

Solution

Stop Soldering!

- No solder and no flux needed
- Press-Fit pins create the electrical connection within the PCB
- The Press-Fit pin used by KEMET is the proven ‘eye of the needle technology





Press-Fit

Solution for Multiple Problems

- After reflow or hand soldering, the PCB must be washed
- More aggressive methods of washing are emerging, and this can force water under the insulating sleeve of larger aluminum electrolytics.

Problem

Washing Problems

- Expensive Hand-washing
- Selective soldering after the washing operation – expensive equipment and programming required
- Protecting large capacitors with “a hat” before washing (ummmmm really??)
- Removing the insulating sleeve which can lead to other complications

Solution

Stop Washing

- Insert Press-Fit after washing with a simple pressing operation
- Without solder and flux, no washing is required

Ballooning sleeve caused by water entrapment during aggressive washing of a large electrolytic

Press-Fit

Solution for Multiple Problems

Problem

Rework Problems

- At the end of the line and PCB tests faulty.....
- Saving the good, valuable components with rework makes sense, if you can.....
- Solder makes removal of the capacitor difficult
- Capacitor or PCB may no longer be usable

Solution

Push the Press-Fit capacitor out with a manual Arbor Press

- PTH in the PCB can be used with a new Press-Fit up to 2X
- Capacitors can be salvaged but re-use should use solder to ensure the performance

Press-Fit

Solution for Multiple Problems

Problem

Field Repair or Preventative Maintenance

- Multiple soldered components makes field work complicated and lengthy
- This creates angry customers and cranky repairmen

Solution

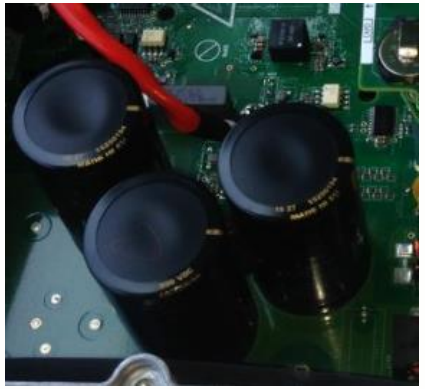
Easy Repair

- Instead of de-soldering and re-soldering, or even replacing the entire PCB, use a simple arbor press to push out the Press-Fit capacitors and re-insert new ones in a fraction of the time or at much less expense

Press-Fit

Other Advantages

All the electrical robustness of the KEMET Industrial Snap-in family	Design flexibility for optimization	On-line life calculator to determine hours of life in the specific application	PET sleeve and Lexan disc are recognized to UL: QMTR2, UL No. E358957



Applications

Energy Storage Systems	Drives	Alternative Energy	Press-Fit can be qualified AEC-Q200 – think EV On-board Chargers	Applications using PCBs with multiple large Snap-ins!

Press-Fit

Vibration

- Testing has proven that the vibration performance of Press-Fit pins is the same as that of KEMET's robust Industrial Snap-in terminals soldered into a PCB in parts with the same size/weight.
- Same vibration rating in the specifications – 10 g
- Vibrations specifications are always with the capacitors clamped by the body. The rating measures the internal elements' abilty to withstand vibration; common failure point is the tabs inside the capacitor

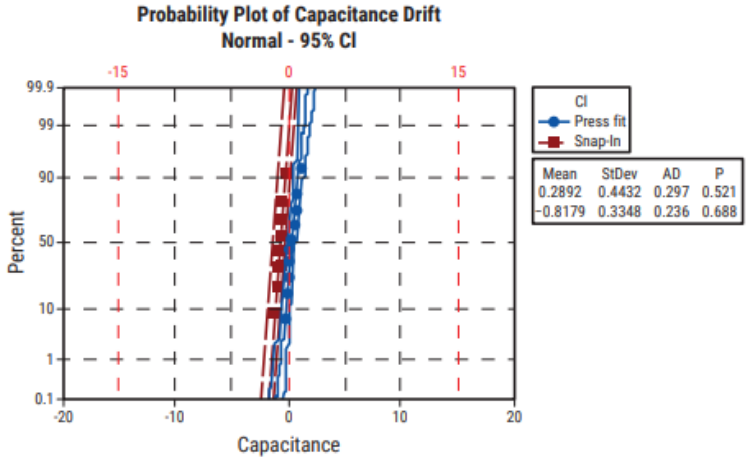
		Procedure	Requirements
Vibration Test Specifications	D ≤ 40 mm	0.75 mm displacement amplitude or 10 g maximum acceleration. Vibration applied for three 2-hour sessions at 10 – 500 Hz (Capacitor clamped by body).	No leakage of electrolyte or other visible damage. Deviations in capacitance from initial measurements must not exceed: Δ C/C < 5%
	D > 40 mm	0.35 mm displacement amplitude or 5 g maximum acceleration. Vibration applied for three 0.5-hour sessions at 10 – 55 Hz (Capacitor clamped by body).	

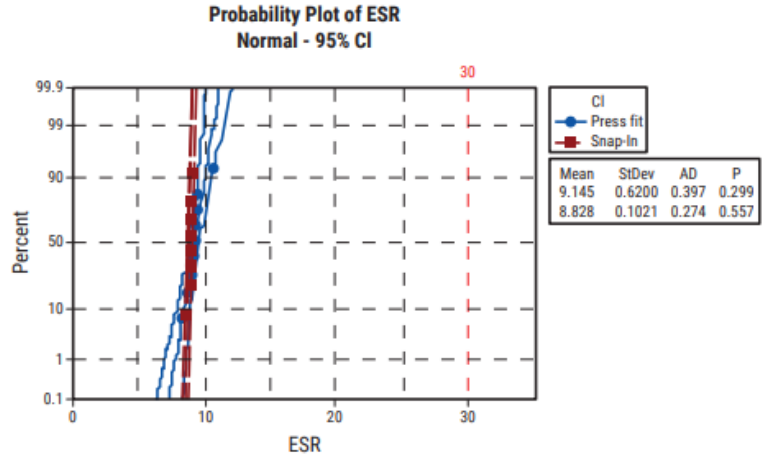
Press-Fit

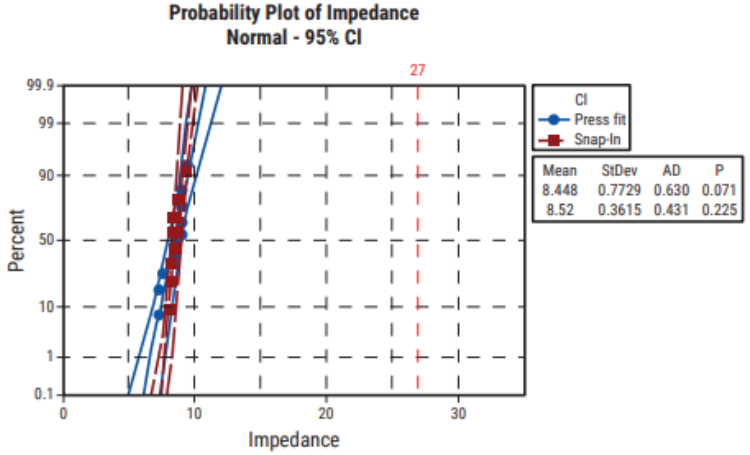
Electrical performance

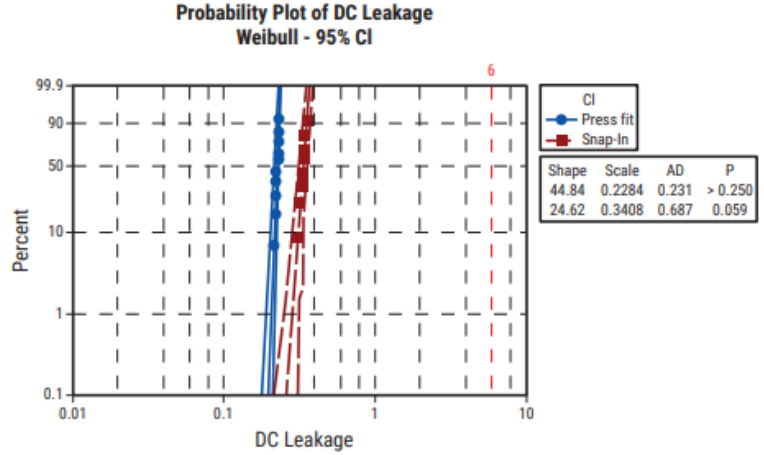
- Testing has proven that the electrical performance is the same or better than the corresponding Snap-in equivalent. The pin material actually has slightly lower resistance than that of Snap-in terminals

Endurance Test - AC









Press-Fit

KEMET is first to market with the Press-Fit version of a Snap-in but it is not patented

- Press-Fit technology is not new in the electronic component industry. It's been used for years and is common in IGBTs and Connectors.
- The Press-Fit connection is a proven concept; pairing it with a large aluminum electrolytic is a new innovation
- Other Electrolytic manufacturers are testing and in development now

- Just as other manufacturers are in development, KEMET continues to build the technical road-map
  - Smaller diameter 3 pin version
  - Expansion of the series to include 630V
  - AEC-Q200 qualification of the series (available now on part number basis)

Press-Fit

Reduce Assembly Costs!

- No solder or flux
- Doesn’t require expensive hand-soldering
- Elimination of solder quality failures reduces scrap and increases yield
- Insert after washing – eliminate water trapped under the sleeve or hand washing, expensive selective solder equipment, and other protective measures
- New options to maximize savings during rework.

+ Advantages in the field

Major EU Customer estimated 70% assembly cost reduction!

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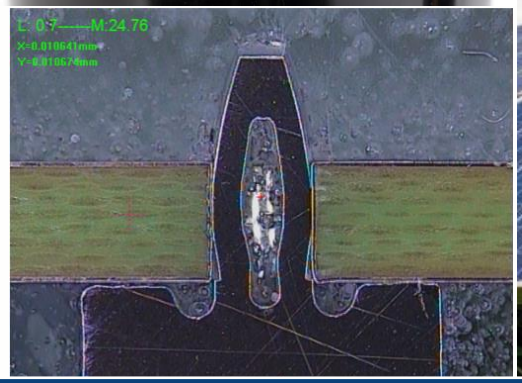
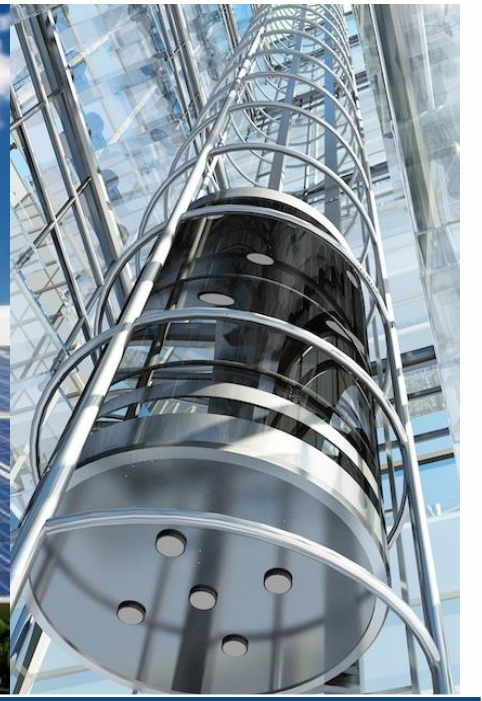
Press-Fit...*the evolution of snap-in...*





Electrical/Physical Characteristics

Series	Temperature Range	Case Sizes	Tolerance	Dielectric	Pins	Voltage Options	Capacitance Values
ALF70	-40 to 85°C	35, 40, 45, 50 mm diameter; 30 to 105 mm length (smaller diameters on road-map	±20%	Aluminum Electrolytic	4 pin option 5 pin option (3 pin on road-map)	40-600 VDC	50-150,000 µF
ALF80	-40 to 105°C					25-500 VDC	200-240,000 µF

Press-Fit

Fun Facts

- Press-Fit terminations are not a new concept. The market has long term experience with the technology.

- Minimum PCB board thickness = 1.57mm
- See datasheet for details on PTH size/tolerance and copper plating requirements
- Not a “drop-in” replacement for Snap-in; use for new designs and re-designs (due to hole sizing)

- Shoulder on the pin helps ensure proper fit – press till the shoulder contacts the PCB

- Meets BS EN 60352-5:2012 (Press-Fit standard)
- Base material = Copper Alloy C19010
- Plating Material - Ni and Sn

- Press-Fit capacitors can be pushed out and re-inserted (re-use of capacitors requires solder)
- Replacement during Preventive Maintenance in the field is greatly simplified – press out and new capacitors press in with the same manual arbor press and simple tooling
- PTH can be re-used up to 2X with a new Press-Fit capacitor

- Pressure to insert the Press-Fit pins is 100N per pin.
  A 4 pin Press-Fit requires 400N of pressure (roughly 90 pounds). Maximum pressure is 125N per pin.

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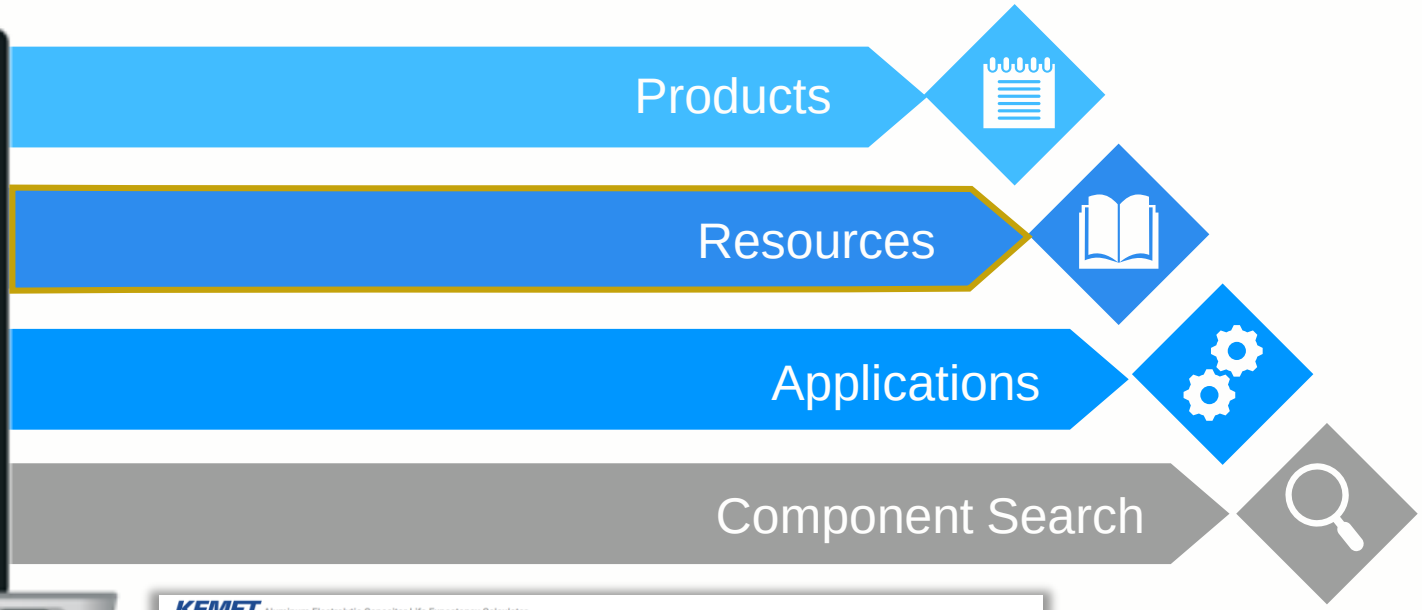
Life Time Calculation



Resources → Design Tools

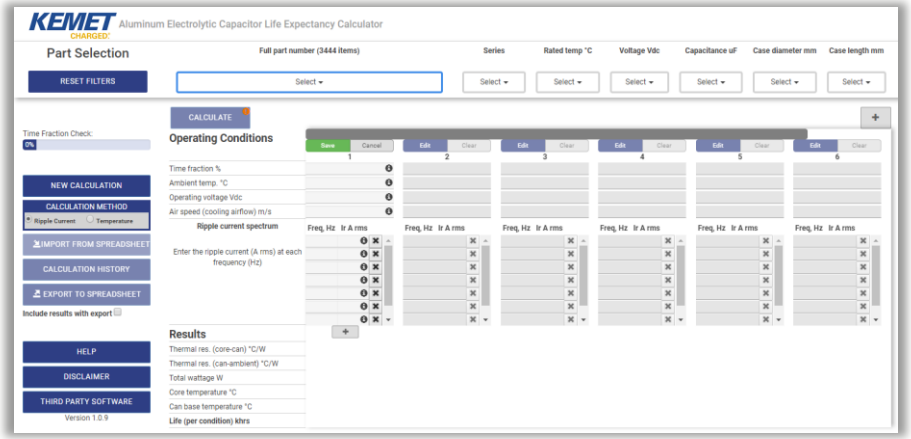
Access and Download KEMET's Top Design Tools

Capacitor Life Calculator

STP Files (3D Models)

SSD Configuration Calculator

K-SIM



ECAD: Screw Terminal, Snap-In & Press-Fit

Ambient Ta	105.0	A Tc		Life Factor Le	60500	RHa °C/Watt	1.948	old	Op. Vop	450	ED Type
Average Th	105			Arrhenius T2	10	Airflow m/s	0		Std. Vfs	680	Poly
Tr (core rise)	0.0			Act Tr x @ EOL Tx	2	Current paths	1		V Factor Kv	1.000	0.5 mm
Max core Tm	120.0			Max ESR (x)	2	Act esr temp	0.0		Life Lop	15125	H/Sink
Tr for calc Ir	5.0			ESR Factor Ke	1	Use actual esr			Fail mode	ESR	0

Default freqs | Get Data | Write Cat Data | Refresh | Life Calc | More detail

	Freq	Act ESR	ESR(stdt)	IMP(stdt)	ESR	Calc Ir	Act Ir	Watts
	100	0	9.0	159.4	5.7	21.47	0	0.00
	120	0	8.5	132.9	5.2	22.47	0	0.00
	360	0	6.9	44.7	3.6	27.17	0	0.00
*	0	0	5.1	-1.0	1.8	39.14	0	0.00

Theoretical simulation:

- Thermal conditions (ambient, core temperature)
- Ripple currents/frequencies
- ESR, Impedance
- Operational Life
- Airflow

Samples:

1. Samples for testing with thermocouples
   Measuring the core temperature of the capacitor
2. Performance in a real application environment
3. Test data for evaluation

Thank You!