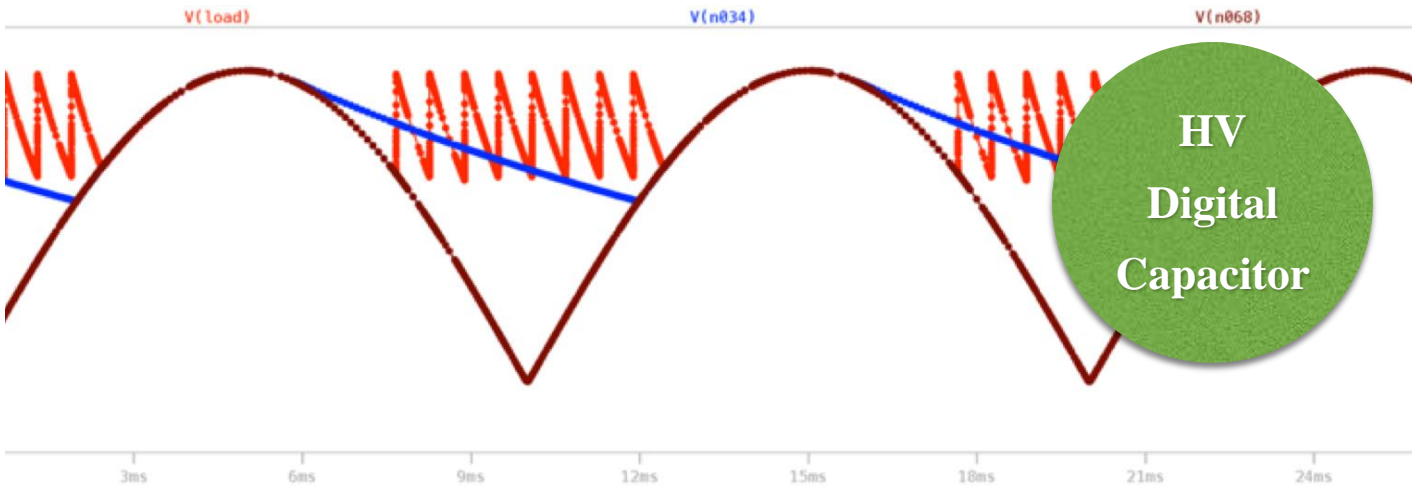


FIDES-M4



DC VALLEY FILL SMOOTH FILTER

AC-DC converter DC smooth filtering novel technology

When AC-DC rectifier DC output are unsuitable to application which need a “steady and smooth” DC supply voltage. Usually we used electrolytic aluminum capacitor. The smoothing capacitor are DC voltage pulses from the rectifier charging up the capacitor to peak voltage reduce ripple output. Disadvantages are weak of temperature and low PFC with big body size.

However, there are two important parameters to consider when choosing a suitable smoothing capacitor and there are its Working Voltage, which must be higher then the no load output value of the rectifier and its capacitance value, which determines the amount of ripple that will be appear superimposed in the

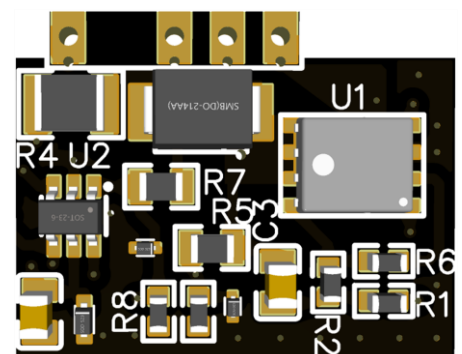
top of the DC voltage. But aluminum electrolytic capacitors have a limited life span in terms of reliability. This occurs because the electrolyte in the element eventually dissipates. The changes in performance over time can be described as follow :

Eventually, the capacitance begins to drop off. The tangent of the loss handle begins to increase.

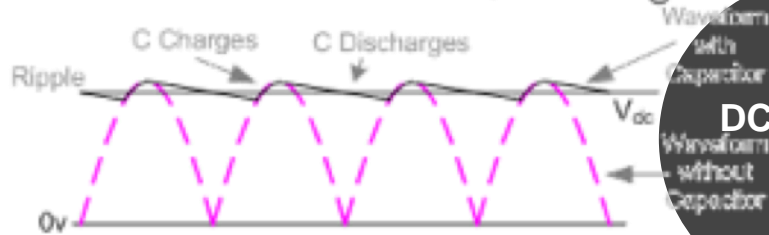
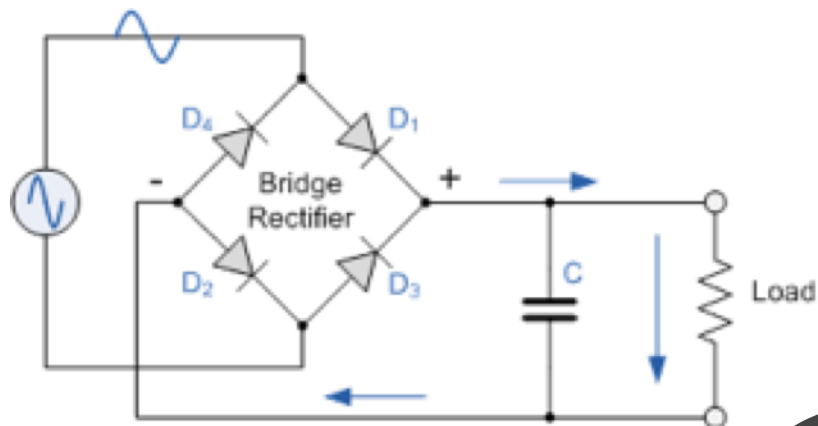
Generally, when voltages are applied, the leakage current begins to drop. At the end of the life span, the capacitor enters an open-circuit mode as the dielectric dries up. For every rise in operating temperature by 10degrees centigrade, the service life is shortened to on half, and double for every 10 degree

drop(10degree 2 fold rule). Aluminum electrolytic capacitor life expectancy is limited as liquid electrolyte dries out over time and temperature. Such a problems are increased to SMPS failure with lighting flickers to LED lights many claims. With IoT and Electric Vehicle battery charger safety.

FIDES-M4

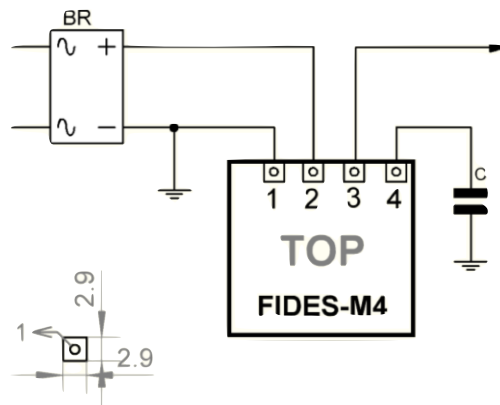
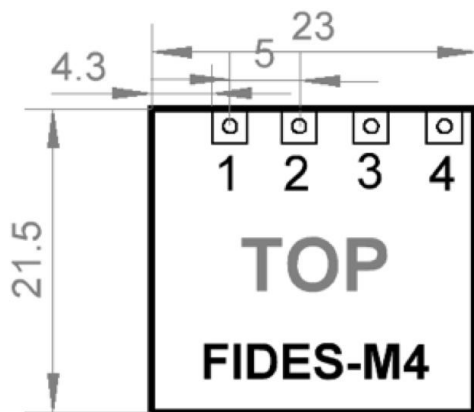


FIDES-M4



Resultant Output Waveform

DC smooth filter



Module size are above.
23x21.5x2.5mm

Smooth capacitor are depending on load voltage with DC out load condition
Capacitor recommend over 450V MLCC
Max operating input DC are 380VDC
1Hz-150Hz

FOOT PRINT

FOOT PRINT RECOMMENDED

SPECIFICATIONS

- CATEGORY TEMPERATURE : -40°C TO +125°C
- RATED VOLTAGE RANGE : 600V
- MAXIMUM PASS CURRENT : DC 2A
- VALLEY FILL FREQUENCY : 1-150HZ

USAGE PRECAUTIONS

FIDES-M4 Pin description

FIDES-M4 module are used in many applications where compact power supplies are required. Module correction power factor operation in smoothing mode making SMPS more efficient and reduce internal total harmonic distortion (THD), reduced inrush current with compliant EN61000-3-2.

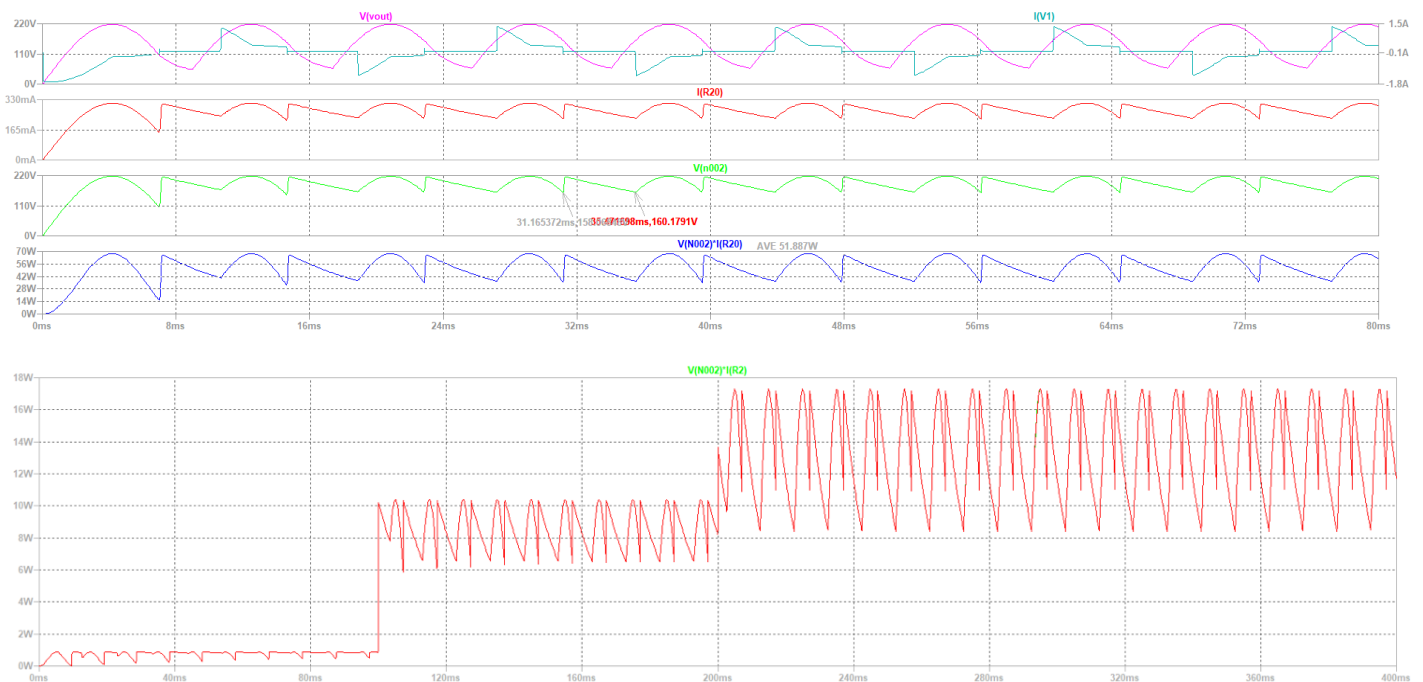
The high voltage AC-DC converter smooth filtering features including wide temperature antiaging capacity technology increase SMPS malfunction.

FIDES-M4 are easy substitute aluminum electrolytic capacitor without technical challenge.

Absolute Maximum Ratings

Parameter	Symbol	Limits	Conditions
1PIN	GND		Ground. Current return for the signal part of the module and the VCAP. All of ground connections of the bias components should be tied to a trace going to this pin and kept separate from any pulsed current return.
2PIN INPUT VOLTAGE	+HVDC	+380V	1Hz~150Hz Continue I _F 2A limit.
3PIN OUTPUT VOLTAGE	+DCO	V _{peak}	Valley fill smooth filter output.
4PIN VCAP	μF/V	-	External high voltage smooth capacitor.

WAVE FORM IN, OUT



FIDES LEAD-FREE COMPONENT TERMINATIONS

To comply with European and world wide legislation to remove "Leas" from the electronic component manufacturing process, FIDES Co Ltd directed the quality assurance division during 2004 to investigate the impact on our industry, identify alternative alloys to replace lead (Pb) and assess the impact on component soldering durability due to the expected increase in the soldering process temperature.

FIDES is now well-advanced and experienced in lead-free termination plating via volume trials with selected SAMSUNG and KOREA manufacturing company partners. We are now in a position to request customer to approve our lead-free alloys and to accept lead-free component shipments by signing a lead-free acceptance request form. A comprehensive change notice supports this form which includes reliability test data based on the FIDES plating solutions against various lead-free solders and SnPb eutectic. Key properties covered in the change notice are component wetting time and joint reliability with respect to thermal cycling mechanical stress and package durability with increased soldering temperatures.

Solutions adopted by FIDES depending on package style are

**Tin (Sn) - Tin (Sn) Silver (Ag) Copper (Cu) - Tin(Sn)
Copper(Cu) - Nickel(Ni) Gold (Au)**

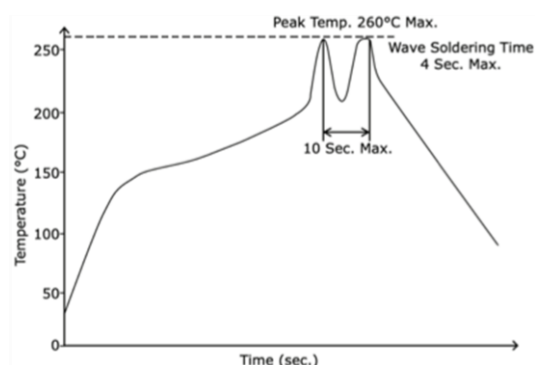
Plating process are:

Electroplating Solder Dipping Barrel electroplating

All FIDES component packages and epoxies have been re-qualified or modified to ensure reliability and durability at a minimum of 260°C (some are 265°C). The change notice lists all package styles and maximum solder heat resistance before and after redesign and re-qualification. This exercise was a major activity and is key to customer confidence when

processes are 100% lead-free and temperatures will rise from today's 215°C - 235 °C to the anticipated reflow temperature window of approximately 230°C - 245°C. Wave soldering processes will reach 260°C.

FIDES is supporting the lead-free component introduction strategy that until all components on an assembly are 100% lead-free, the PCB can be lead-free and a mix of Pb free and SnPb plated components can be placed on the assembly but the solder paste/wave must contain lead until the components are 100% lead-free.



The FIDES change notice is very much focused on this issue and is designed to give our customers high confidence that lead-free components can be utilized on leaded processes with no adverse effects on joint reliability or changes to any process parameters.

NOTES

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The content specified herein is subject to change for improvement without notice.

The products are not designed or manufactured to be used with any equipment, device or system which requires an extremely high level of reliability the failure or malfunction of which may result in a direct threat to human life or create a risk of human injury (such as a medical instrument, transportation equipment, aerospace machinery, nuclear-reactor controller, fuel controller or other safety device) FIDES shall bear no responsibility in any way for use of any such special purpose, please contact a FIDES sales representative before purchasing.

Power Module Usage Precautions

Nowadays, AC to DC power converter such as conventional fly-back technology SMPS, which include Power Factor (PFC) controllers and PFC-PWM combo controllers, offer cost and energy saving solutions that address the demanding requirements of a diverse range of medium and high power Switch Mode Power Supply (SMPS) designs. But aluminum electrolytic capacitor decreases the efficiency and leads to life time failure.

FIDES-topologies offer the only solution to non-electrolytic aluminum capacitor with an increase efficiency by using full solid states high voltage digital controlled capacitor with innovated PFC increase function in the power supply integrated circuit that allow the use of smaller external components helping to minimize board size and cost depreciation for LED lamp and IoT AC-DC power converter. Specially Li-ion battery AC-DC charger. This technology is ideal for making an epoch-making free ripple and is sustainable.

When a general lighting system requires a lot of power, then the first power-conversion stage, the AC-DC stage, gets integrated. Because the driver technology used with the LEDs is not equal sufficient for sustainability and size. The U.S. Department of Energy (DoE) and the European Union have made it clear that they want it to exhibit a very

clean power factor and voltage ripple, which is difficult because of that drawbacks of thermal damaged aluminum electrolytic capacitor on the output of the rectifier bridge.

This is approached in different ways. The EU's IEC61000-3-2 specifies acceptable levels for the first 32 harmonics of the ac line frequency, while the DoE's Energy Star program (which is voluntary but enforced by the buying power of the U.S. government) specifies a power factor of at least 0.7. On top of that, real customers for general lighting applications demand a minimum power factor of 0.9, so that's what designers aim for.

That in turn requires a somewhat sophisticated fly-back topology for the first stage, with operation in critical conduction mode. Subsequent stages of switching regulation, buck, boost, or buck/boost support a final stage that provides the drive to the string or parallel strings of LEDs. This is generally a switcher also.

Alternatively, it is possible to use this discharged energy at near by zero cross moments regulations, which makes it less expensive to achieve the required overall efficiency. The output stage, in that case, could be designed to supply the full stable currents to small capacitances needed by the 100Hz or 120Hz currents valley while dissipating

less than a volt in its own passive capacitors.

Fides will provide operational benefit to the following problems

General AC-DC rectify smooth use aluminum electrolytic capacitor. TV, PC, IoT, Electric vehicle, lighting system reliability depend on AC-DC power supply.

However, the operating temperature such a LEDs bulbs lead to service life time and flicker problems in modern or electronic goods.

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FIDES-M4

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