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NEWS LETTER

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DC-DC CONVERTERS - NEW RELEASES

KAYTRONICS has been in marketing service for last 22 years offering applications, project solutions to design engineers, project managers in Defence Electronics, Avionics, Aerospace and Telecomm sectors.

We are an established US & Singapore based company having strong management & technical expertise in providing specialized services to our esteemed clients.

With our strong presence for more than 20 years in US, we have established close relations with reputed manufacturers of RF / MW components and Hi-speed digital circuits.

MESA MW are sole import Managers of 30 reputed US, U.K. OEM's. Quality Performance, Reliability, Service, Just in-time delivery is our goal by which we are now a dependable supplier in the industry.

Ensuring that you get a best technology we act as a source of information, which will be a co-coordinator between the manufacturers & customers.

Through Singapore, we offer you high quality Telecommunication Components from Taiwan, South Korea & Singapore.

It is our goal to bring to your attention state of art products from our reputed principals.

We dedicate this issue to our DATEL Inc., USA a world class manufacturer of HI-REL Miniature DC-DC Products.



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**CUSTOMER SATISFACTION IS OUR
BIGGEST ASSET**

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Power Converter Theory

Modern switching AC/DC and DC/DC power converters represent the most recent fulfillment of the need for the stable, well-regulated, direct current (DC) power for a variety of electronic instruments, equipment and systems. In the not too distant past, linear power converters were the mainstay of power conversion and voltage relation. Switching power converters were still an in fact technology usually related to low-volume, high cost, commercial or military applications. Over the past 15 years, advances in technology have allowed modular power converter designers to take advan-

tage of circuit configurations, components and materials simply not available prior to that time. These advances have allowed modular power converters to increase their electrical and thermal performance while decreasing their size and cost by utilizing switching power-conversion techniques. Consequently, modern modular power conversion has become a multi-billion dollar industry whose products have attained commodity status.

a. Buck (or) Step-Down Regulator :

This switching regulator converts an input voltage to a regulated, lower-valued, output voltage.

b. Boost (or) Step-Up Regulator :

This regulator converts an input voltage into a regulated, greater-valued, output voltage.

c. Flyback / Buck-Boost Regulator :

This switching regulator converts an input voltage into a regulated, inverted, lower-valued output voltage.

d. Cuk Converter

This switching regulator converts an I/p voltage into a regulated, inverted, lower-valued or higher-valued output voltage depending upon the duty cycle.

former or other flux-coupled magnetic element.

a. The Fly back Converter

The fly back switching regulator converts an input voltage into a regulated, lower or higher-valued output voltage depending on its transformer's turns ratio.

b. Forward Converter

The forward switching regulator converts an input voltage into a regulated, lower or higher-valued output voltage depending on its transformer's turn ratio.

c. Push- Pull Converter

The push-pull switching regulator converts an input voltage into a regulated, lower-valued output voltage.

Switching Converter Topologies

Topology refers to the various configurations of power used transfer, control and regulate power (voltage) from an input voltage source. The many different switching—regulator topologies can be grouped into two basic categories: Non-Isolated, in which the input source and the output load share a common current path during operation & Isolated, in which the energy transfer is achieved by a mutually coupled magnetic element (a transformer), the load is achieved by means of a magnetic flux rather than a common current. One topology is selected over the other based upon

the cost goals, performance objectives and input-line / output-load characteristics of the system in which it is to operate. Any one topology is not “better” than another. Each has desirable characteristic and short comings, and selection is a matter of properly applying the correct power converter to the system requirement.

i. NON-ISOLATED SWITCH CONVERTERS

There are four basic, non-isolated, switching - regulator topologies applicable to modular DC/DC converters.

ii. ISOLATED SWITCHING CONVERTERS

There are many isolated switching converter topologies, however, there are but three that are applicable to a discussion of modern modular DC/DC converters. They are the Fly back, Forward and Push-pull power converters. For these circuits, all energy transfer from the input power source to the load is achieved via a transformer or other flux-coupled magnetic element.

POWER DISTRIBUTION

The proper delivery of power to every load connected a modular DC/DC converter is as important as the selection of the converter itself. Therefore, it is necessary to design the power distribution system in a way that minimizes interaction between distributed loads connected to the power converter.

EFFICIENCY OF SWITCHING POWER CONVERTERS

Determining the efficiency of a switching power converter is more complicated than for a linear voltage regulator. The linear regulator has a fixed set of DC losses, and most of the power dissipation is in the pass transistor. A switching regulator not only has DC losses but also AC losses in the switching elements and in the energy-storage elements as well.

Switching power converters exhibit high efficiencies because the power-switching elements are on for only a fraction of the total switching cycle (they have high peak power but low average power) and because the losses

in the magnetic and capacitive elements can be controlled and minimized (through careful magnetic design and material selection). DC/DC power converter efficiencies in the range of 75% to 90% are readily achievable with switching designs. Non-isolated topologies tend to be more efficient because they have fewer power handling components and also do not have the losses of the power transformer. Even with their added complexities, isolated converters are still able to achieve efficiencies in the 80% and greater range.

POWER CONVERTER PROTECTION

Most power converters require some form of protection, usually to limit the maximum output power. Otherwise, there is a risk of destroying the converter with a momentary output overload or overstress. The most common form of protection is current limiting, in which the maximum output current deliverable by the converter is electronically limited to a safe value. This value is typically 110% to 150% of the converter's maximum Specified / rated load current

The power converter protection technique is switched—mode current limit-

ing or “hiccup” control. In this approach, when the maximum current—limit threshold is exceeded, the output current is interrupted for a period of time t then reapplied for a time period t . The output current can be thought of as “hiccuping”, as it no longer exhibits as steady-state output characteristics.

Two additional protection features often used in conjunction with one another are under voltage lock-out (UVLO) and converter soft start.

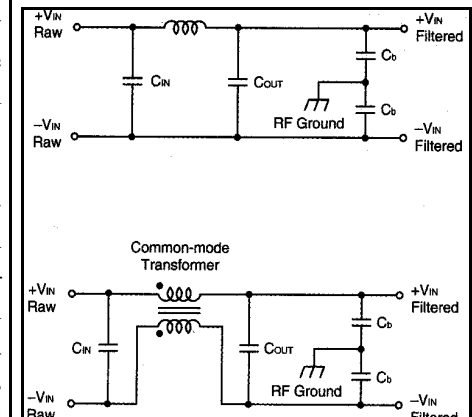
FILTERING & NOISE

An important consideration in the design and application of switching power converters is electrical noise in the forms of **electro-magnetic and radio-frequency interference (EMI and RFI)**. All switched-mode power converters generate EMI and RFI noise as a result of their operation. The noise is not necessarily the artefact of their operation at some fixed switching frequency (typically between 50 KHz and 1 MHz). Rather, it results because switching converters rely on large voltage swings at extremely high rates of change (dV / dt) which inadvertently produce high-frequency voltage spikes at the leading and trailing edge of the power switching event. Therefore, although the noise frequency spectrum has the switching frequency fundamental as its major contributor, the noise is quite broad band ranging from dc to several hundred MHz.

These voltage slew rates and spikes induce large ac displacement currents in both physical and parasitic circuit elements. The displacement currents can cause noise in two forms. ..**conducted noise** (in the connecting busses, wires and ground planes) which is conducted to other circuitry, and **radiated noise** (capacitive coupled current to the case or heat sink) which is transformed to voltage which is then radiated to other

circuitry .These noises can never be fully eliminated, however, they can be greatly attenuated (by proper electrical and packaging design) to levels confirming to accepted regulator agency limits.

Conducted noise has two major contributors. The first results from ripple current at the input to the converter. The second is due to the output voltage reflected input ripple current on the rest of the power system current can be greatly reduced by incorporating a single-ended "pi" filter at the input of the converter for differential mode conducted noise, or a double-ended “pi” filter for common mode noise reduction.



The effects of a power converter's reflected ripple current on the rest of power system can be greatly reduced by single or double-ended input "pi" filters

New DC-DC Converters

DATEL announces the low-voltage, high-current extension of our highly successful, 15 Watt A-Series DC-DC Converters. **1.5 Volts and 2.5 Volts** models.. All capable of supplying a continuously 6 amps .. Join the popular **3.3V, 5V, 12V and 15V** models already sold in high volumes. 6 Amps is the most output current anyone offers from the standard 2 x 1 package. Input voltage ranges for all models are the usual **10-18 V (“D12” models), 18-36V (“D24” models) and 36-75 V (“D48” models).**

These new, low voltage, 6 amps models of the industry-leading **9-15 W** 2x1's (the package size is the standard 2 inches by 1 inch) exemplify a change in how we present DC-DC's to the world. Many customers no longer think of DC-DC's and other power supplies in terms of Watts. As output voltages fall and current levels rise, Watts (the product of Volts and Amps) no longer adequately describe the capabilities of given devices. Customers needs to know volts and Amps.

The 1.5 V/6A, 1.8V/6A and 2.5V/6A models of the 2x1's respectively de-

liver 9, 10.8 and 1.5 Watts. Consequently, we are now referring to the entire family of products as **DATEL's 9-15 W, A-Series.**

At Datel's web site, the press release for the new low-voltage, 6 amp models and the updated A-series, 9-15 W data sheet can be found in the New Product Announcement <http://store.datel.com/cgi-bin/datel.storefront/EN/product>.

All models offer optional output-trim and on/off control functions, and the options cost more.

Isolated, Dual Output, Low Voltage

- 15 Watts, SMT 2" x 1" Gull-wing package DSM-5/3.3, 15W Series
- 30 Watts, Low V out. Pick Two: 3.3 V @ 6A, 2.5 V @ 7A, 1.8 V @ 7A.
- 33 Watts, 5V/3.3 V High current from either output BWR-5/3.3, 33W
- 30 Watts, 5V/3.3V Two independent converters, One package. BWR-5/3.3, 30 W series
- 15A Total Current Dual 5V / 3.3 V, 3.3 / 2.5 V or 3.3 V / 1.8 V

Non-Isolated, Single Output, Low Voltage

- 1.8 V output standard, SIP and gull-wing SMT packages.
- 2.5 V output standard, SIP and gull-wing SMT packages
- 3.3 V output standard, SIP and gull-wing SMT packages.
- 5V output standard and SIP packages

Isolated Single-Output

- 5 Watts, SMT New 1" x 1" Gull-wing package USM, 5W Series
- 11-15 Watts, A-Series 11-15 W models
- 11-18 Watts standard DIP or SMT 1 " x 2" packages UEP/USM Series
- 13-30 Watts in the standard 1.6 " x 2" package / pinout The UHE series
- 16-40 Watts in the standard 20 Watts format A-Series, 16-40 W models
- 48V in—to-48 Vout 60 and 72 W "Half Bricks" provide Isolation The UCP series, 60/72 Models
- 15-20A ¹/₄ -Bricks USP/USQ series
- 25-30A ¹/₂ -Bricks The industry's best "Half Brick" The UHP Series

Isolated Bipolar-Output

- 5 Watts, SMT New 1" x 1" Gull-wing Package BSM, 5W series
- 15-17 Watts, SMT ideal for xDSL Line Drivers, The BSM, 15-17 Series
- 15-17 Watts in the standard 10 Watt format A-Series, 15-17 W models etc.

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Product Line at an glance

TWTAs, Amplifiers, EMI/EMC sub systems, Chip Resistors, Inductors & Diodes, DC-DC Converters, A/D, D/A, SHM, MW PTFE Laminates, Substrates, Switch-Coaxial commercial and space qualified. Amplifiers, LNA, SSPA Oscillators, Crystals, OCXO, VCXO, TCXO. Semi-Rigid, Flexible Cables, Cable assemblies, Delay Lines and

High voltage connectors. Waveguide Switches, Connectors. Power Dividers, Phase Shifters, Couplers, Adapters, MW Terminations. Telemetry System Antennas. Filters, multiplexers, sub-assemblies, duplexers, Heli-coils & inserts.

**** We shall provide full-length brochures, catalogs upon request.**