Vishay FunctionPAK® DC/DC Converters

Vishay currently offers more than 20 versions of DC/DC Converters and Current Control modules. FunctionPAK products are complete circuit functions in single BGA/LGA modules that set industry records for solution footprint size, height profile, and power density. They represent the multi-chip module (MCM) product lines of Vishay's Integrated Products Division (IPD) which also offers custom products to meet industry needs.

WHAT IS FUNCTIONPAK?

FunctionPAk is the generic name of the MCM product lines offered by Vishay IPD. The name was chosen to emphasize two things:

1. The products offered are complete circuit functions, not partial solutions. DC/DC converters and current controllers offered by many other integrated circuit (IC) manufacturers are silicon chips that provide only the basic operation for circuit functions. The end user must then select up to 22 other components that surround the silicon IC in order to make it a complete circuit solution. The selection of these components and the board layout affect the final performance in such critical ways as efficiency, ripple voltage, life, etc. So these critical features as defined by the IC manufacturer may not be the same as the performance features achieved when the customer completes the circuit on the board with the addition of external components. Then, because assemblage of parts do not become a complete circuit function until the first time all parts come together on the board, the function must be tested as a subsystem function on the board. When purchased as a complete function in a single module, the one package contains all circuit components and is fully tested with all circuit parameters defined exactly as used in the customer's system.

2. The FunctionPAKs are offered as complete circuits in monolithic packages with all the savings in design time, Bill of Material production, purchasing, stocking, assembly, board space, etc. One needs only to specify, order, receive, and mount just one module that arrives completely tested and guaranteed, thus eliminating the necessity to test the function apart from the overall system test. It is worth noting that many applications are developed by digital engineers who prefer to leave integration to the analog engineers, and they appreciate the opportunity to obtain a complete circuit in one pre-defined package.

WHY USE FUNCTIONPAK?

FunctionPAK provides complete solutions. It supplies complete circuit functions in BGA/ LGA modules optimized for size, performance, and economy. FunctionPAK has many advantages, among them :

- saves space and weight
- reduces component
- saves purchasing expense
- reduces net cost
- reduces inventory
- simplifies end product design/development
- reduces assembly cost
- saves time
- speeds time-to-market

WHAT STANDARD FUNCTIONPAK PRODUCTS ARE AVAILABLE?

Presently standard products include a range of dc/dc converters up to 4 amps @ 15 Watts, constant current sources delivering up to 2 amps, and constant current controllers with one or two channel outputs. These are the smallest lowest profile products of their kind on the market. Specifications for each device are shown in this catalog, and a summary comparison is given on page ?? . Any voltage in the range specified is considered a "standard" and there is no extra cost for any product in the specified range. Because there are continuing developments in these areas, users should check www.vishay.com/integrated modules for the latest series of developments as well as for application notes and user guides.

WHY VISHAY?

1. World's Broadest Line of Discrete Semiconductors and Passive Components

Vishay has the world's broadest line of discrete semiconductors and passive electronic components. Vishay is the #1 manufacturer of diodes and rectifiers worldwide and the # 2 manufacturer of discrete semiconductors. Vishay is also the world's largest manufacturer of infrared data communication devices (IRDCs), and has a leading position in power and analog switching circuits. Vishay's production facilities for production of passive components extend to 65 manufacturing sites in 15 different countries.

2. Technology Access

With so many diverse technologies under Vishay's direct control, Vishay is uniquely qualified to tailor components to each individual application. An IC can be used in flip chip form instead of a small-outline package as supplied to original equipment manufacturers (OEM) or electronic manufacturing service (EMS) markets; inductors and

capacitors can be selected for specific performance parameters or left unpackaged for space savings, etc. In fact, superior new inductors and capacitors have already been developed as part of the optimization process of FunctionPAK development.

3. Global Market Presence

Vishay serves customers through a global network of manufacturing facilities, sales and technical support offices, independent distributorships, and manufacturer's representatives. Vishay has customer service centers and inventories strategically located where customers need them—in the Americas, Europe, and Asia.

WHAT ARE DC/DC CONVERTERS?

DC/DC circuits are active circuits that either take a low and varying input voltage and step it up to a higher specific and stable output voltage (boost converter), or take a high and varying input voltage and step it down to a lower specific and stable output voltage (buck converter.) For example, the fading output voltage of a battery is processed through a dc/dc converter that maintains the constant output voltage necessary to drive a circuit and protect the circuit from possible damage caused by voltage instability.

WHERE ARE DC/DC CONVERTERS USED?

DC/DC Converters are commonly used as Point Of Load (POL) power sources to drive a wide variety of semiconductor devices from a single voltage routed around the board in an intermediate bus architecture (IBA). The POL converters are placed right alongside each semiconductor device and shift the single IBA voltage to the different voltage levels required by each IC. Typically, they drive such devices as FPGAs, microprocessors, DSPs, ADCs, SDRAMs, up/down converters, etc.

DC/DC Converters are also used wherever rechargeable batteries are used. Theses applications are characterized by portability (size, weight, etc.) and length of service from a single charge. For example, the efficiency of the DC/DC converter directly affects the standby and talk time available from a cell phone between battery charges.

WHAT ARE CURRENT CONTROL PRODUCTS?

The Current control products fall into two categories: Constant current controllers and constant current sources. A constant current controller takes a constant DC voltage and converts it to a constant current output. When the input voltage is subject to variation or instability a DC/DC converter is first used to steady the DC voltage and then the constant current controller takes that steady voltage and puts out a constant current. The constant current source is a DC/DC converter and a constant current controller within one package so that the single module can take an unsteady voltage in and convert to a constant current out. When a steady input voltage is already available, only the constant current controller is needed

WHERE ARE CURRENT CONTROL PRODUCTS USED?

Constant current control products are used in a wide variety of applications such as driving power LEDs in back-panel lighting, flashlights, bicycle lights, headlamps, automotive and household lighting, architectural and garden lighting as well as street lighting. They are also used to power laser diodes and for drying ink in inkjet printers. A constant voltage source can drive a power LED but that reduced the life of the LEDs significantly. When the power LEDs begin to heat up, their internal resistance begins to drop, causing them to draw more current. The LEDs then run up to 50% hotter with 80 % increase in current. The result is that the costly power LEDs are reduced to a fraction of their intended load life. The constant control products are monolithic complete modules that conserve the life of the LEDs and reduce overall LED expense and costly repair time.