



## Challenge

More selection of performance and packaging combinations for your power supply design

## Solution

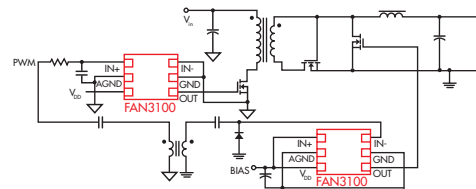
Fairchild's Low-side Gate Drivers with a wide selection of performance and packaging options

## Advantages

- Industry's smallest packages (2mm x 2mm and 3mm x 3mm MLP)
- Choice of TTL or CMOS input thresholds for all devices for best circuit compatibility
- Short and well-controlled time delays for 1 MHz+ switching, paralleling drivers, and optimizing drive timing to maximize efficiency

## Maximize Flexibility in your Power Supply Designs with the FAN31xx and FAN32xx Series of Low-Side Gate Drivers

The FAN31xx and FAN32xx series of high-speed, low-side gate drivers offers flexibility for power supply designs, providing a wide selection of performance and packaging combinations to create compact, highly efficient and reliable power supplies. Available in either the industry's smallest packaging (2mm x 2mm or 3mm x 3mm MLP) or industry-standard SOIC or SOT packaging, these gate drivers meet design needs for higher power density, higher efficiency and ease of manufacturing. With the additional flexibility offered by input-threshold and package choices, two inputs per channel, a higher voltage range, short propagation delays and delay matching between channels, power-supply designs can be further optimized in terms of efficiency, reliability, power density and cost.



*Typical Application: Forward Converter with Hybrid Synchronous Rectifier*

## Applications

- Synchronous rectifier circuits
- Switch mode power supplies (SMPSs)
- DC-DC converters
- Line drivers

| Product Number         | Type      | Gate Drive <sup>(1)</sup> (Sink/Source) | Input Thresholds | Logic   | Package       |
|------------------------|-----------|---|------------------|---|---------------|
| FAN3100                | Single 2A | +2.5A / -1.8A                           | CMOS, TTL        | Single Channel of Two-Input/One-Output              | SOT23-5, MLP6 |
| FAN3226                | Dual 2A   | +2.4A / -1.6A                           | CMOS, TTL        | Dual Inverting Channels + Dual Enable               | SOIC8, MLP8   |
| FAN3227                | Dual 2A   | +2.4A / -1.6A                           | CMOS, TTL        | Dual Non-Inverting Channels + Dual Enable           | SOIC8, MLP8   |
| FAN3228                | Dual 2A   | +2.4A / -1.6A                           | CMOS, TTL        | Dual Channels of Two-Input/One-Output, Pin Config.1 | SOIC8, MLP8   |
| FAN3229                | Dual 2A   | +2.4A / -1.6A                           | CMOS, TTL        | Dual Channels of Two-Input/One-Output, Pin Config.2 | SOIC8, MLP8   |
| FAN3223                | Dual 4A   | +4.3A / -2.8A                           | CMOS, TTL        | Dual Inverting Channels + Dual Enable               | SOIC8, MLP8   |
| FAN3224                | Dual 4A   | +4.3A / -2.8A                           | CMOS, TTL        | Dual Non-Inverting Channels + Dual Enable           | SOIC8, MLP8   |
| FAN3225                | Dual 4A   | +4.3A / -2.8A                           | CMOS, TTL        | Dual Channels of Two-Input/One-Output               | SOIC8, MLP8   |
| FAN3121 <sup>(2)</sup> | Single 9A | +9A / -6A                               | CMOS, TTL        | Single Inverting Channel + Enable                   | SOIC8, MLP8   |
| FAN3122 <sup>(2)</sup> | Single 9A | +9A / -6A                               | CMOS, TTL        | Single Non-Inverting Channel + Enable               | SOIC8, MLP8   |

(1) Typical currents with  $V_{DD} = 12V$  and OUT at 6V

(2) Coming soon

# FSFR2100

FOR MORE INFORMATION PLEASE VISIT THE FOLLOWING WEBSITE:

[www.fairchildsemi.com/ds/FS/FSFR2100.pdf](http://www.fairchildsemi.com/ds/FS/FSFR2100.pdf)  
[www.fairchildsemi.com/an/AN/AN-4151.pdf](http://www.fairchildsemi.com/an/AN/AN-4151.pdf)

## Challenge

High efficiency half-bridge resonant converter

## Solution

Fairchild's FSFR2100 with 97% efficiency

## Advantages

### Ease of Design

- Integration of components into one package

### System Efficiency

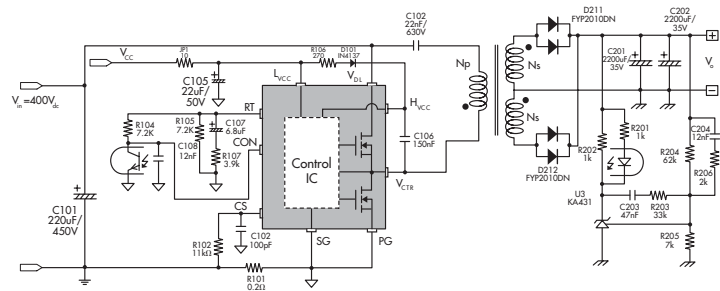
- ZVS technique improves power efficiency and decreases EMI
- Advanced burst mode operation reduces power consumption to below 1W

### System Reliability

- Excellent noise immunity due to built-in high-side drive circuit with common mode noise canceling technique
- Minimizes the effect of reverse recovery against abnormal operation conditions due to the MOSFET's fast recovery body diodes
- Built-in protection features

## Simplify Design and Increase Efficiency in Half-Bridge Resonant Converters up to 450W with Fairchild's Green FPS™ Power Switch

The FSFR2100 is a highly integrated Green FPS power switch that increases power efficiency and system reliability, and reduces valuable design time in resonant converter designs. Offering a "system-in-a-package" approach that integrates everything necessary to build reliable and efficient resonant converters, this power switch integrates a pulse-frequency-modulation (PFM) controller with a high voltage gate driver circuit and two fast recovery MOSFETs (FRFET®) along with soft-start, burst operation and important protection features into a thermally-efficient 9-SIP package.



(LLC Resonant Half-Bridge Converter)

### Applications:

- Telecom power supplies
- High-end audio amplifier power supplies
- Large size laser printer power supplies
- LCD TV power supplies
- PDP power supplies

| Product Number | Drain Voltage Max (V) | R <sub>DS(ON)</sub> Max (Ω) | t <sub>rr</sub> (ns) | D <sub>T</sub> (ns) | Max. Output Power without Heat sink (V <sub>IN</sub> =350~400V) (W) | Max. Output Power with Heat sink (V <sub>IN</sub> =350~400V) (W) | Package |
|----------------|-----------------------|-----------------------------|----------------------|---------------------|---|--|---------|
| FSFR2100       | 600                   | 0.38                        | 120                  | 350                 | 200   | 450  | 9-SIP   |



# FDMF8704

FOR MORE INFORMATION PLEASE VISIT THE FOLLOWING WEBSITE:

[www.fairchildsemi.com/ds/FD/FDMF8704.pdf](http://www.fairchildsemi.com/ds/FD/FDMF8704.pdf)  
[www.fairchildsemi.com/ds/FD/FDMF8704V.pdf](http://www.fairchildsemi.com/ds/FD/FDMF8704V.pdf)

## Challenge

Increase efficiency and reduce space in ultra-dense DC-DC applications

## Solution

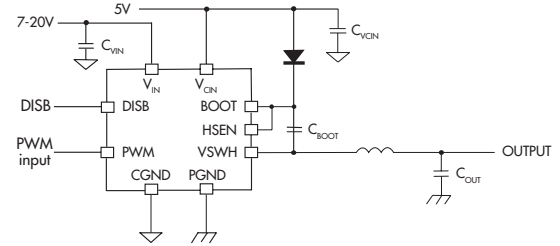
Energy- and space-efficient FET plus driver module

## Advantages

- 14% reduction in power losses
- 72% space savings
- High bandwidth (1MHz), which reduces passive components

## Maximize Efficiency Across High, Medium and Light Loads in DC-DC Applications with Fairchild's FET Plus Driver Module

The FDMF8704 and FDMF8704v reduce power losses by 14% compared to conventional solutions, while saving 72% board space. Based on Intel's® DrMOS specification, the FDMF8704 and FDMF8704v are a FET plus driver power stage solution that integrates one driver IC, three power MOSFETs and one Schottky diode into an 8mm x 8mm MLP package, conserving valuable PCB real estate. These DrMOS modules are capable of operating at 1MHz, which eliminates passive components to further reduce board space and lower BOM costs. By using Fairchild's driver plus FET multi-chip modules, computing manufacturers can easily meet the demand for higher efficiency mandated by energy regulatory programs such as Energy Star.

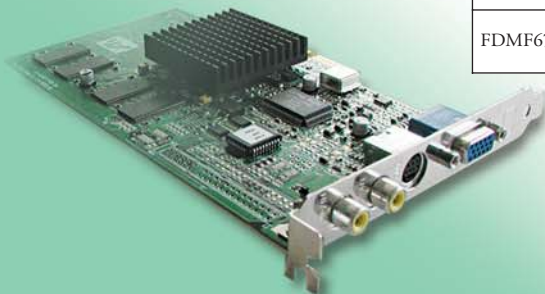


FDMF8704 Powertrain Application Circuit

## Applications:

- Ultra-dense servers
- Blade servers
- Advanced gaming systems
- Desktops
- Media center PCs
- Graphic cards
- Networking equipment
- Telecom equipment
- High current DC-DC Point of load (PoL) converters

| Product Number | Description                                    | V <sub>IN</sub> Range Typ (V) | V <sub>OUT</sub> Range Typ (V) | I <sub>OUT</sub> Max (A) | Frequency | Package   |
|----------------|--|-------------------------------|--------------------------------|--------------------------|-----------|-----------|
| FDMF8704       | High efficiency/frequency DrMOS module         | 7-20                          | 0.8-3.2                        | 32                       | 1 MHz     | MLP 8 x 8 |
| FDMF8704v      | High efficiency/frequency DrMOS module with VR | 7-20                          | 0.8-3.2                        | 32                       | 1 MHz     | MLP 8 x 8 |
| FDMF8700       | Standard DrMOS module                          | 6.4-14                        | 0.8-3.2                        | 30                       | 500 kHz   | MLP 8 x 8 |
| FDMF8705       | Low current DrMOS module                       | 6.4-14                        | 0.8-3.2                        | 18                       | 500 kHz   | MLP 8 x 8 |
| FDMF6700       | Ultra-compact DrMOS module                     | 6.4-14                        | 0.8-3.2                        | 25                       | 500 kHz   | MLP 6 x 6 |



# FAN7371

FOR MORE INFORMATION PLEASE VISIT THE FOLLOWING WEBSITES:

[www.fairchildsemi.com/hvic.pdf](http://www.fairchildsemi.com/hvic.pdf)  
[www.fairchildsemi.com/ds/FA/FAN7371.pdf](http://www.fairchildsemi.com/ds/FA/FAN7371.pdf)

## Challenge

A space-efficient HVIC solution that improves system reliability

## Solution

Fairchild's FAN7371 saves space and increases system reliability

## Advantages

### System reliability

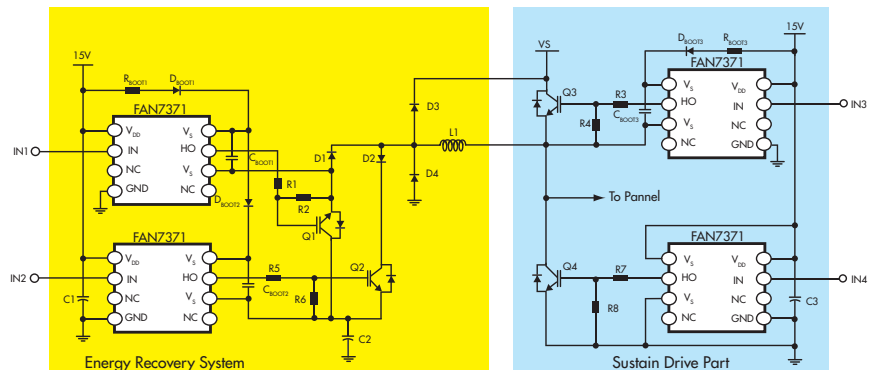
- Common mode noise canceling technique that provides excellent noise immunity
- Advanced level-shifting circuitry for the widest extended allowable negative  $V_S$  swing and robust positive and negative  $V_B$
- Low temperature dependency that delivers full functionality at either cold or hot ambient temperatures

### Space savings

- 50% space savings compared to isolated or pulse transformer-based solutions
- 4A current driving capability eliminates the need for a buffer transistor compared to low current HVICs

## Improve System Reliability and Noise Immunity While Saving Space with Fairchild's High Current, High-Side Gate Driver

The FAN7371 is a high voltage gate driver IC (HVIC) with 4A current driving capability, which ensures exceptional system reliability and space benefits in consumer and industrial applications. The FAN7371 features the industry's widest high-side driver operation with negative  $V_S$  swings of up to  $-9.8V$  (at  $V_{BS} = 15V$ ), robust positive and negative  $V_B$  and an innovative common-mode  $dv/dt$  noise canceling circuit. In addition, the FAN7371 provides excellent noise immunity and increases system reliability. This HVIC saves at least 50% PCB area compared to isolated or pulse transformer-based solutions, and eliminates a buffer transistor compared to other low current HVICs on the market.



PDP Application Diagram

## Applications:

- Plasma display panels (PDPs)
- High intensity discharge (HID) lighting applications
- Induction heating applications
- General purpose inverter applications

| Product | Circuit   |                 | Offset Voltage (V) | Output Current (A) |      | Delay Time (ns) |           | Quiescent Current ( $\mu A$ ) |           | $d_t/d_v$ | $V_S$ (V) | Package |
|---------|-----------|-----------------|--------------------|--------------------|------|-----------------|-----------|-------------------------------|-----------|-----------|-----------|---------|
|         | Type      | Input to Output |                    | Source             | Sink | $t_{on}$        | $t_{off}$ | $I_{QBS}$                     | $I_{QQC}$ |           |           |         |
| FAN7371 | High-side | 1 to 1          | 600                | 4                  | 4    | 150             | 150       | 65                            | 25        | 50        | -9.8      | 8-SOP   |



# STEALTH™ II

FOR MORE INFORMATION PLEASE VISIT THE FOLLOWING WEBSITES:

[www.fairchildsemi.com/ds/FF/FFP15S60S.pdf](http://www.fairchildsemi.com/ds/FF/FFP15S60S.pdf)  
[www.fairchildsemi.com/ds/FF/FFP30S60S.pdf](http://www.fairchildsemi.com/ds/FF/FFP30S60S.pdf)

## Challenge

Help power supply designers achieve higher levels of efficiency in less space

## Solution

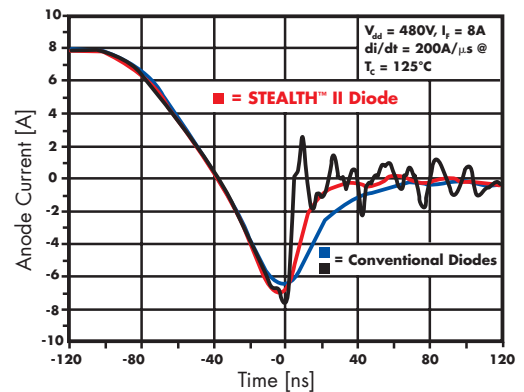
STEALTH II boost diodes lower reverse recovery losses and EMI in PFC circuitry

## Advantages

- Energy efficiency through high-speed switching ( FFP15S60S:  $t_{rr} \text{ Max} < 35\text{ns} @ I_F = 15\text{A}$ ) and low forward voltage drop ( $V_f < 2.6\text{V}$ )
- System reliability attained by soft recovery characteristics (FFP15S60S:  $t_b/t_a > 0.9$ )
- Space-savings resulting from elimination of the snubber circuit and reduced EMI filter size

## Increase Power Supply Efficiency and Reliability While Reducing Space with Fairchild's STEALTH II Rectifiers

These STEALTH II rectifiers feature fast reverse recovery and soft recovery characteristics that enable reduced MOSFET switching losses and EMI in continuous-current-mode (CCM) power factor correction (PFC) designs. Alternate solutions provide snappy reverse recovery, but this is at the expense of EMI characteristics. Fairchild's STEALTH II rectifiers feature a low-stored charge and soft recovery that minimize ringing and electrical noise in the power switching circuit, which, in turn, reduces overall EMI. By using Fairchild's STEALTH II rectifiers, designers do not need to use a snubber circuit and can reduce the size of the EMI filter—making the overall solution more efficient, compact and less expensive.



## Applications:

- General purpose power supplies
- Switch mode power supplies (SMPSs)
- Boost diodes in continuous mode power factor correction
- Power switching circuits

| Product Number | $V_{RRM}$ | $I_{F(AV)}$ | $I_{FSM}$ | $V_f \text{ Max}$ | $t_{rr} \text{ Max}$ | Package |
|----------------|-----------|-------------|-----------|-------------------|----------------------|---------|
|                | (V)       | (A)         | (A)       | (V)               | (ns)                 |         |
| FFP04S60S      | 600       | 4           | 40        | 2.6               | 25                   | TO-220  |
| FFPF04S60S     | 600       | 4           | 40        | 2.6               | 25                   | TO-220F |
| FFP15S60S      | 600       | 15          | 150       | 2.6               | 35                   | TO-220  |
| FFPF15S60S     | 600       | 15          | 150       | 2.6               | 35                   | TO-220F |
| FFH15S60S      | 600       | 15          | 150       | 2.6               | 35                   | TO-247  |
| FFP30S60S      | 600       | 30          | 300       | 2.6               | 40                   | TO-220  |
| FFH30S60S      | 600       | 30          | 300       | 2.6               | 40                   | TO-247  |



# FAN5665

FOR MORE INFORMATION PLEASE VISIT THE FOLLOWING WEBSITES:

[www.fairchildsemi.com/ds/FA/FAN5665.pdf](http://www.fairchildsemi.com/ds/FA/FAN5665.pdf)  
[www.fairchildsemi.com/pf/FA/FAN5665.html](http://www.fairchildsemi.com/pf/FA/FAN5665.html)

## Challenge

An ultra-compact charge pump boost solution

## Solution

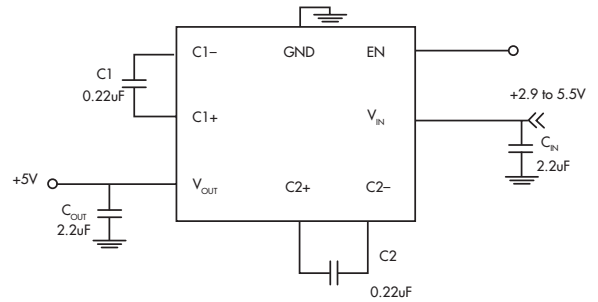
Fairchild's FAN5665 with the industry's smallest footprint

## Advantages

- 1.21mm x 1.21mm WL-CSP packaging to save space
- Built-in preregulator eliminating the need for a bulky inductor
- Low in-rush current
- Thin surface mount capacitors to save space

## Conserve Space in Your Portable Designs with the Industry's Smallest Charge Pump Boost Solution

The FAN5665 is a 5V/30mA switched capacitor step-up DC-DC converter packaged in a 1.21mm x 1.21mm WL-CSP package that saves 20% space over conventional solutions. Its profile is ultra-low (0.4mm pitch), which eliminates the need for an inductor. This charge pump has the added benefit of using a preregulator in its design. The preregulator results in the industry's lowest startup in-rush current that minimizes noise, which could adversely affect the application's operation.



Typical application

## Applications:

- USB OTG applications
- Network cards
- LED solutions
- Low profile portable applications

| Product Number | V <sub>in</sub> (V) | I <sub>out</sub> Max (mA) | Efficiency V <sub>i</sub> =3.6V, V <sub>o</sub> =5V, load=30ma | Number of modes | I <sub>q</sub> typ/max switching no load (µA) | Peak Startup Current V <sub>i</sub> =3V, V <sub>o</sub> =5V, load=30ma (mA) | Package |
|----------------|---------------------|---------------------------|--|-----------------|---|---|---------|
| FAN5665        | 2.9-5.5             | 30                        | 92%  | 1x, 1.5x, 2x    | 190/400                                       | 85  | WL-CSP  |



# Global power resource™

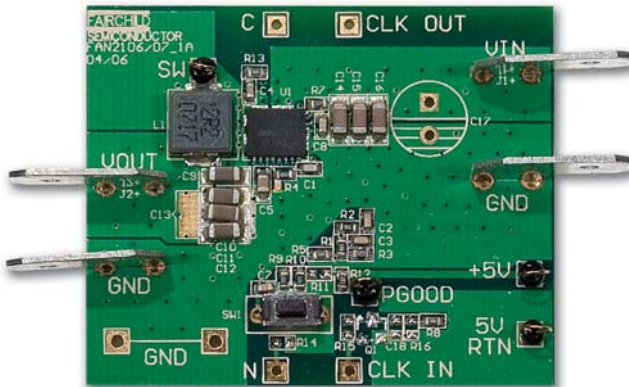
**Evaluation boards are instrumental in evaluating ICs for performance and ease-of-use in designs**

## Save Valuable Design Time with Fairchild's New Evaluation Boards

The FEB178/179 evaluation boards are compact circuits that include the FAN5350, a 1µH inductor and one small 4.7µF input and output capacitor. The FAN5350 is a 3MHz/600mA synchronous Buck converter with both 16µA quiescent current and 20mV transient response that is ideal for cell phones, media players, GPS devices, Bluetooth headsets and other single-cell 2.7V to 5.5V lithium-ion-powered portable applications.

These evaluation board kits feature a completely assembled and tested surface mount board that provides easy probe access points to all inputs and outputs to test electrical characteristics and waveforms. The kits also include a user's guide and a datasheet for the FAN5350.

The FEB167 evaluation board is a compact circuit that includes the FAN2106, Fairchild's TinyBuck™ solution. The FAN2106 is a fully integrated 6A, 24V-input synchronous Buck regulator in a 5mm x 6mm MLP package that provides an optimal solution for Point of Load (PoL) applications. The evaluation board is configured for light-load, power-saving operations. It provides 1.8V<sub>OUT</sub>, 0-6A from 8-20V<sub>IN</sub> at a 500kHz switching rate using low-cost ceramic output capacitors. This kit features an evaluation board, a user's guide and a FAN2106 datasheet.



The FEB167 Evaluation Board (FAN2106)



The FAN5350MPX



The FAN5350UCX



**DATASHEETS,  
SAMPLES, BUY**

TECHNICAL  
INFORMATION

APPLICATIONS

DESIGN CENTER

SUPPORT

COMPANY

INVESTORS

**POWER MANAGEMENT ICs**

**AC-DC: Power Factor Correction**

- Continuous Conduction Mode (CCM) PFC Controllers
- Critical (CrCM) / Boundary Conduction Mode (BCM) PFC Controllers
- PFC + PWM Combination (Combo) Controllers

**Isolated DC-DC**

- Green-Mode PWM Controllers
- Integrated Green-Mode PWM Regulators (Green FPS™)
- Integrated PWM Regulators (FPS™)
- Primary-side only CV/CC Controllers
- Standard SMPS PWM Controllers

**Non-Isolated DC-DC**

- Charge-Pump Controllers (External Switch)
- Multi-phase Controllers
- Step-down Controllers (External Switch)
- Step-down Regulators (Integrated Switch)
- Step-up Regulators (Integrated Switch)

**Power Drivers**

- DrMOS Integrated Drivers
- High Voltage Gate Drivers (HVIC)
- Low-Side Gate Drivers
- Synchronous Rectifier Controllers / Drivers
- Synchronous-Buck / Multi-phase Drivers

**Supervisory / Monitor ICs**

- Ground Fault Interrupt (GFI) Controllers
- Supervisors + PWM
- Temperature Sensors
- Voltage Supervisors / Detectors / Stabilizers

**Voltage Regulators**

- LDOs
- Positive Voltage Linear Regulators
- Negative Voltage Linear Regulators
- Shunt Regulators

**POWER SEMICONDUCTORS**

**Diodes & Rectifiers**

- Bridge Rectifiers
- Rectifiers
- Schottky Diodes & Rectifiers
- Small Signal Diodes
- Transient Voltage Suppressors
- Zener Diodes

**Integrated Power Solutions**

- DrMOS Integrated Drivers
- IGBT Module
- Full Function Load Switches (IntelliMAX™)
- MOSFET/Schottky Combos
- Solenoid Drivers
- Smart Power Modules (SPM™)

**Transistors**

- BJTs
- IGBT Discrete
- JFETs
- Load Switches
- MOSFETs
- MOSFET/Schottky Combos
- Small Signal Transistors

**TRIACs**

- TRIACs

**LIGHTING AND DISPLAY**

- CCFL Ballast IC
- CFL/Lighting Ballast Control IC
- Critical (CrCM)/Boundary Conduction Mode (BCM) PFC Controllers for Lighting
- High Voltage Gate Drivers (HVIC)
- LED Drivers
- PDP Smart Power Module (PDP-SPM™)

**SIGNAL PATH ICs**

**Amplifiers & Comparators**

- Comparators
- High Performance Amplifiers (>15MHz)
- Operational Amplifiers

**Signal Conversion**

- Triple Video DACs
- Video Filter Drivers
- Video Switch Matrix/Multiplexers

**Interface**

- LVDS
- Serializer/Deserializer (µSerDes™)
- USB Transceiver

**Switches**

- Analog/Audio Switches
- Bus Switches
- USB Switches
- Video Switches

**LOGIC | TINYLOGIC®**

- Buffers, Drivers, Transceivers
- Flip flops, Latches, Registers
- Gates
- MSI Functions
- Multiplexer/Demultiplexer Encoders/Decoders
- Specialty Logic
- TinyLogic®
- Voltage Level Translators

**OPTOELECTRONICS**

- Infrared Products
- Optocouplers

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