About Power Integrations

Power Integrations is the leading supplier of high-voltage analog integrated circuits used in energy-efficient power supplies. The company’s innovative technology enables compact, energy-efficient power converters for a wide range of electronic products, AC-DC, DC-DC and LED lighting applications. With industry-leading product quality and delivery, the company has shipped billions of devices to customers around the world.

### Mid-Power Product Portfolio

- **Qspeed** 600 V, 300 V, 200 V, and 150 V high performance diodes
- **CAPZero/SENZero** energy saving devices for reducing no-load or standby input power
- **HiperPFS-4** and **HiperPFS-3** integrated CCM PFC solution
- **HiperTFS-2** integrated two-switch forward converter solution
- **HiperLCS** integrated LLC resonant converter solution
- **TOPSwitch-JX** integrated secondary-side regulated flyback solution
- **LinkSwitch-HP** integrated primary-side regulated flyback solution

For more information, please visit [www.power.com](http://www.power.com)

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<thead>
<tr>
<th>High-Performance High-Voltage Diodes</th>
<th>Qspeed™</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Products to Support Low Standby and No-Load Operation</td>
<td>CAPZero™-2/ SENZero™</td>
</tr>
<tr>
<td>High Power, Isolated Flyback and Main, PFC Boost, Boost-Follower, PFC + LLC Half Bridge</td>
<td>HiperTFS™-2 (Standby)</td>
</tr>
<tr>
<td>Isolated Flyback</td>
<td>TOPSwitch™-JX</td>
</tr>
<tr>
<td></td>
<td>LinkSwitch™-HP</td>
</tr>
</tbody>
</table>

For more information, please visit [www.power.com](http://www.power.com)
HiperLCS – Resonant Converter Power MOSFET LLC Solution

<table>
<thead>
<tr>
<th>Product</th>
<th>Maximum Practical Power¹ (W)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LCS700HG/LG</td>
<td>110</td>
</tr>
<tr>
<td>LCS701HG/LG</td>
<td>170</td>
</tr>
<tr>
<td>LCS702HG/LG</td>
<td>220</td>
</tr>
<tr>
<td>LCS703HG/LG</td>
<td>275</td>
</tr>
<tr>
<td>LCS705HG</td>
<td>350</td>
</tr>
<tr>
<td>LCS708HG</td>
<td>440</td>
</tr>
</tbody>
</table>

Table 1. Output Power Table.

Notes:
1. Maximum practical power is the power the part can deliver when properly mounted to a heat sink and a maximum heat sink temperature of 90 °C.

Additional Features:
- LLC half-bridge power stage incorporating controller, high and low-side gate drives, and high-voltage power MOSFETs
- High maximum operating frequency of 1 MHz
- Precise duty symmetry balances output rectifier current, improving efficiency
- Comprehensive fault handling and current limiting
  - Programmable brown-in/out thresholds and hysteresis
  - Undervoltage (UV) and overvoltage (OV) protection
  - Programmable over-current protection (OCP)
  - Short-circuit protection (SCP)
  - Over-temperature protection (OTP)
- Programmable dead-time for optimized design
- Programmable soft-start time and delay before soft-start
- Accurate programmable minimum and maximum frequency limits

HiperTFS-2 – Two-Switch Forward and Flyback Solution

<table>
<thead>
<tr>
<th>Product²</th>
<th>Two-Switch Forward 380 V</th>
<th>Flyback 100 V - 400 V</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Continuous¹ (50 °C)</td>
<td>Peak²</td>
</tr>
<tr>
<td>TFS7701H</td>
<td>148 W</td>
<td>187 W</td>
</tr>
<tr>
<td>TFS7702H</td>
<td>190 W</td>
<td>297 W</td>
</tr>
<tr>
<td>TFS7703H</td>
<td>229 W</td>
<td>375 W</td>
</tr>
<tr>
<td>TFS7704H</td>
<td>251 W</td>
<td>419 W</td>
</tr>
<tr>
<td>TFS7705H</td>
<td>269 W</td>
<td>466 W</td>
</tr>
<tr>
<td>TFS7706H</td>
<td>296 W</td>
<td>513 W</td>
</tr>
<tr>
<td>TFS7707H</td>
<td>322 W</td>
<td>553 W</td>
</tr>
<tr>
<td>TFS7708H</td>
<td>343 W</td>
<td>586 W</td>
</tr>
</tbody>
</table>

Table 1. Output Power Table.

Notes:
1. Maximum practical continuous power in an open frame design with adequate heat sinking to maintain a heat sink temperature ≤95 °C (see Key Applications Considerations for more information) measured at specified ambient temperature.
2. Peak load less than 10 seconds and average power less than maximum continuous load.
3. Package: eSIP-16F. (Note: Direct attach to heat sink, does not require insulation SIL pad).

Additional Features:
- Single IC solution for two-switch forward main (66 kHz/132 kHz) and flyback (132 kHz) standby
- High integration allows smaller form factor and higher power density designs, with reduced component count
- Incorporates control, gate drivers, and three power MOSFETs
- Level shift technology eliminates need for pulse transformer
- Protection features include: UV, OV, OTP, OVP, standby OCP, SCP, and \( I_{\text{LIMIT}} \)
- Transformer reset control, prevents saturation under all conditions
- Up to 586 W peak output power in a highly compact package
- >90% efficiency at full load
HiperPFS-3 – PFC Controller with Integrated High-Voltage MOSFET and Qspeed Diode Optimized for High PF and Efficiency Across Load Range

### Universal Input Devices

<table>
<thead>
<tr>
<th>Product</th>
<th>Maximum Continuous Output Power Rating at 90 VAC² (Full Power Mode) (W)</th>
<th>Peak Output Power² (Full Power Mode) (W)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PFS7523L/H</td>
<td>110</td>
<td>120</td>
</tr>
<tr>
<td>PFS7524L/H</td>
<td>130</td>
<td>150</td>
</tr>
<tr>
<td>PFS7525L/H</td>
<td>185</td>
<td>205</td>
</tr>
<tr>
<td>PFS7526H</td>
<td>230</td>
<td>260</td>
</tr>
<tr>
<td>PFS7527H</td>
<td>290</td>
<td>320</td>
</tr>
<tr>
<td>PFS7528H</td>
<td>350</td>
<td>385</td>
</tr>
<tr>
<td>PFS7529H</td>
<td>405</td>
<td>450</td>
</tr>
</tbody>
</table>

### High-Line Only Input Devices

<table>
<thead>
<tr>
<th>Product</th>
<th>Maximum Continuous Output Power Rating at 180 VAC² (Full Power Mode) (W)</th>
<th>Peak Output Power² (Full Power Mode) (W)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PFS7533H</td>
<td>255</td>
<td>280</td>
</tr>
<tr>
<td>PFS7534H</td>
<td>315</td>
<td>350</td>
</tr>
<tr>
<td>PFS7535H</td>
<td>435</td>
<td>480</td>
</tr>
<tr>
<td>PFS7536H</td>
<td>550</td>
<td>610</td>
</tr>
<tr>
<td>PFS7537H</td>
<td>675</td>
<td>750</td>
</tr>
<tr>
<td>PFS7538H</td>
<td>810</td>
<td>900</td>
</tr>
<tr>
<td>PFS7539H</td>
<td>900</td>
<td>1000</td>
</tr>
</tbody>
</table>

**Additional Features:**
- Incorporates high-voltage power MOSFET, ultra-low reverse recovery loss Qspeed diode, controller and gate driver
- EN61000-3-2 Class C and Class D compliance
- Integrated protection features reduce external component count
  - Accurate built-in brown-in/out protection
  - Accurate built-in undervoltage (UV) protection
  - Hysteresis thermal shutdown (OTP)
  - Internal power limiting function for overload protection
  - Cycle-by-cycle power switch current limit
  - Internal non-linear error amplifier for enhanced load transient response
- No external current sense resistor required
- Provides 'lossless' internal sensing via sense-FET
- Minimizes high current gate drive loop area
- Minimizes output overshoot and stresses during start-up
- Integrated power limit
- Improved dynamic response
- Digitally controlled input line feed-forward gain adjustment for flattened loop gain across entire input voltage range
- Eliminates up to 40 discrete components for higher reliability and lower cost
- Continuous conduction mode PFC uses novel constant amp-second [on-time] volt-second [off-time] control engine
- High efficiency across load
- High power factor across load
- Low cost EMI filter
- Frequency sliding technique for light load efficiency improvements
- >95% efficiency from 10% load to full load achievable at nominal input voltages
- Variable switching frequency to simplify EMI filter design
- Varies over line input voltage to maximize efficiency and minimize EMI filter requirements
- Varies with input line cycle voltage by >60 kHz to maximize spread spectrum effect

**Advanced Package for High Power Applications**
- Up to 450 W [universal], 1 kW [high-line only] peak output power capability in a highly compact package
- Simple adhesive or clip mounting to heat sink
- No insulation pad required and can be directly connected to heat sink
- Staggered pin arrangement for simple routing of board traces and high-voltage creepage requirements
- Single package solution for PFC converter reduces assembly costs and layout size

**Notes:**
1. Maximum practical continuous power at 90 VAC in an open-frame design with adequate heat sinking, measured at 50 °C ambient.
2. Internal output power limit.
HiperPFS-4 – PFC Controller with Integrated 600 V MOSFET Optimized for High PF and Efficiency Across Load Range

<table>
<thead>
<tr>
<th>Product</th>
<th>Continuous Output Power at 90 VAC (W)</th>
<th>Peak Output Power (W)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PFS7623H/L</td>
<td>110</td>
<td>120</td>
</tr>
<tr>
<td>PFS7624H/L</td>
<td>130</td>
<td>150</td>
</tr>
<tr>
<td>PFS7625H/L</td>
<td>185</td>
<td>205</td>
</tr>
<tr>
<td>PFS7626H</td>
<td>230</td>
<td>260</td>
</tr>
<tr>
<td>PFS7627H</td>
<td>290</td>
<td>320</td>
</tr>
<tr>
<td>PFS7628H</td>
<td>350</td>
<td>385</td>
</tr>
<tr>
<td>PFS7629H</td>
<td>405</td>
<td>450</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Product</th>
<th>Continuous Output Power at 180 VAC (W)</th>
<th>Peak Output Power (W)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PFS7633H</td>
<td>255</td>
<td>280</td>
</tr>
<tr>
<td>PFS7634H</td>
<td>315</td>
<td>350</td>
</tr>
<tr>
<td>PFS7635H</td>
<td>435</td>
<td>480</td>
</tr>
<tr>
<td>PFS7636H</td>
<td>550</td>
<td>610</td>
</tr>
</tbody>
</table>

Additional Features:
- Incorporates 600 V power MOSFET, controller and gate driver.
- EN61000-3-2 Class C and Class D compliance.
- Integrated protection features reduce external component count.
- Accurate built-in undervoltage (UV) protection.
- Accurate built-in overvoltage (OV) protection.
- Hysteresis thermal shutdown (OTP).
- Internal power limiting function for overload protection.
- Cycle-by-cycle power-switch current limit.
- Internal non-linear error amplifier for enhanced load transient response.
- No external current sense resistor required.
- Provides 'lossless' internal sensing via sense-FET.
- Reduces component count and system losses.
- Minimizes high current gate drive loop area.
- Minimizes output overshoot and stresses during start-up.
- Integrated power limit.
- Improved dynamic response.
- Digital controlled input line feed-forward gain adjustment for flattened loop gain across entire input voltage range.
- Eliminates up to 39 discrete components for higher reliability and lower cost.
- Continuous conduction mode PFC uses novel constant amp-second [on-time] volt-second [off-time] control.
- High efficiency across load.
- High power factor across load.
- Frequency sliding technique for light load efficiency improvements.
- >95% efficiency from 10% load to full load achievable at nominal input voltages.
- Variable switching frequency to simplify EMI filter design.
- Varies over line input voltage to maximize efficiency and minimize EMI filter requirements.
- Varies with input line cycle voltage by >60 kHz to maximize spread spectrum effect.
- Up to 450 W [universal], 610 W [high-line only] peak output power capability in a highly compact package.
- Simple adhesive or clip mounting to heat sink.
- No insulation pad required and can be directly connected to heat sink.
- Staggered pin arrangement allows simple routing of board traces and to meet high-voltage creepage requirements.
- Single package solution for PFC converter reduces assembly costs and layout size.
**High-Efficiency, Flyback Solution**

**TOPSwitch-JX – Integrated Off-Line Switcher with EcoSmart Technology for Highly Efficient Power Supplies Auto-Restart Protection Option**

<table>
<thead>
<tr>
<th>Product*</th>
<th>PCB Copper Area†</th>
<th>Metal Heat Sink‡</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Open Frame(W)</td>
<td>Open Frame(W)</td>
</tr>
<tr>
<td>TOP264V</td>
<td>34</td>
<td>22.5</td>
</tr>
<tr>
<td>TOP264K</td>
<td>49</td>
<td>30</td>
</tr>
<tr>
<td>TOP265V</td>
<td>36</td>
<td>25</td>
</tr>
<tr>
<td>TOP265K</td>
<td>53</td>
<td>34</td>
</tr>
<tr>
<td>TOP266V</td>
<td>39</td>
<td>28.5</td>
</tr>
<tr>
<td>TOP266K</td>
<td>58</td>
<td>39</td>
</tr>
<tr>
<td>TOP267V</td>
<td>44</td>
<td>32</td>
</tr>
<tr>
<td>TOP267K</td>
<td>65</td>
<td>45</td>
</tr>
<tr>
<td>TOP268V</td>
<td>48</td>
<td>36</td>
</tr>
<tr>
<td>TOP268K</td>
<td>73</td>
<td>50</td>
</tr>
<tr>
<td>TOP269V</td>
<td>51</td>
<td>37.5</td>
</tr>
<tr>
<td>TOP269K</td>
<td>81</td>
<td>55</td>
</tr>
<tr>
<td>TOP270V</td>
<td>55</td>
<td>41</td>
</tr>
<tr>
<td>TOP270K</td>
<td>91</td>
<td>60</td>
</tr>
<tr>
<td>TOP271V</td>
<td>59</td>
<td>43</td>
</tr>
<tr>
<td>TOP271K</td>
<td>102</td>
<td>66</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Product*</th>
<th>Open Frame(W)</th>
<th>Open Frame(W)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOP264E/V</td>
<td>62</td>
<td>43</td>
</tr>
<tr>
<td>TOP265E/V</td>
<td>81</td>
<td>57</td>
</tr>
<tr>
<td>TOP266E/V</td>
<td>119</td>
<td>86</td>
</tr>
<tr>
<td>TOP268E/V</td>
<td>137</td>
<td>103</td>
</tr>
<tr>
<td>TOP267E/V</td>
<td>148</td>
<td>112</td>
</tr>
<tr>
<td>TOP270E/V</td>
<td>190</td>
<td>140</td>
</tr>
<tr>
<td>TOP271E/V</td>
<td>244</td>
<td>177</td>
</tr>
</tbody>
</table>

**Additional Features:**
- Multi-mode operation maximizes efficiency at all loads
- eDIP-12 package
- Low profile horizontal orientation for ultra-slim designs
- Heat transfer to both PCB and heat sink
- Optional external heat sink provides thermal impedance equivalent to a TO-220
- eSIP-12 package
- Vertical orientation for minimum PCB footprint
- Simple heat sink mounting using clip provides thermal impedance equivalent to a TO-220
- eSOP-12 package
- 66 W universal input/output power capability
- Low profile surface mounted for ultra-slim designs
- Heat transfer to PCB via exposed pad and SOURCE pins
- Supports wave or reflow soldering
- Output overvoltage protection is user programmable for latching/non-latching shutdown with fast AC reset
- Allows both primary and secondary sensing
- Line undervoltage detection prevents turn-off glitches
- Line overvoltage shutdown extends line surge limit
- Accurate programmable current limit
- Optimized line feed-forward for line ripple rejection
- 132 kHz frequency reduces transformer and power supply size
- Half frequency option for video applications
- Frequency jittering reduces EMI filter cost
- Improved auto-restart delivers <3% of maximum power in short-circuit and open loop fault conditions
- Accurate hysteresis thermal shutdown function automatically recovers
- Fully integrated soft-start for minimum start-up stress

**Notes:**
1. See Key Application Considerations in the data sheet section for more details.
2. Maximum continuous power in an open frame design at +50 °C ambient temperature.
3. 230 VAC or 110/115 VAC with doubler.
High-Efficiency, PSR Flyback Solution

LinkSwitch-HP – Energy Efficient, High-Power Off-Line Switcher with Accurate Primary-Side Regulation (PSR)

<table>
<thead>
<tr>
<th>Product</th>
<th>Heat Sink</th>
<th>230 VAC ±15%</th>
<th>85-265 VAC</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Open Frame (W)</td>
<td>Open Frame (W)</td>
<td></td>
</tr>
<tr>
<td>LNK6xx3K/V</td>
<td>PCB-W¹</td>
<td>25</td>
<td>15</td>
</tr>
<tr>
<td>LNK6xx3E</td>
<td>Metal</td>
<td>35</td>
<td>27</td>
</tr>
<tr>
<td>LNK6xx4K/V</td>
<td>PCB-W¹</td>
<td>28</td>
<td>20</td>
</tr>
<tr>
<td>LNK6xx4E</td>
<td>Metal</td>
<td>47</td>
<td>36</td>
</tr>
<tr>
<td>LNK6xx5K/V</td>
<td>PCB-W¹</td>
<td>30</td>
<td>22</td>
</tr>
<tr>
<td>LNK6xx5E</td>
<td>Metal</td>
<td>59²</td>
<td>45</td>
</tr>
<tr>
<td>LNK6xx6K/V</td>
<td>PCB-W¹</td>
<td>34</td>
<td>26</td>
</tr>
<tr>
<td>LNK6xx6E</td>
<td>Metal</td>
<td>88²</td>
<td>68²</td>
</tr>
<tr>
<td>LNK6xx7K/V</td>
<td>PCB-W¹</td>
<td>41</td>
<td>30</td>
</tr>
<tr>
<td>LNK6xx7E</td>
<td>Metal</td>
<td>117²</td>
<td>90²</td>
</tr>
<tr>
<td>LNK6xx8K/V</td>
<td>PCB-W¹</td>
<td>47</td>
<td>34</td>
</tr>
<tr>
<td>LNK6xx8E</td>
<td>Metal</td>
<td>135²</td>
<td>104²</td>
</tr>
<tr>
<td>LNK6xx9K/V</td>
<td>PCB-W¹</td>
<td>54</td>
<td>39</td>
</tr>
<tr>
<td>LNK6xx9E</td>
<td>Metal</td>
<td>153²</td>
<td>118²</td>
</tr>
</tbody>
</table>

Additional Features:
- EcoSmart – energy efficient
- Multi-mode control maximizes efficiency
- No-load consumption below 30 mW at 230 VAC (LNK67xx)
- >75% efficiency with 1 W input at 230 VAC
- >50% efficiency with 0.1 W input at 230 VAC
- High design flexibility for low system cost
- Dramatically simplifies power supply designs
- Eliminates optocoupler and all secondary control circuitry
- ±5% or better output voltage tolerance
- 132 kHz operation reduces transformer and power supply size
- Accurate programmable current limit
- Compensation over line limits overload power
- Frequency jittering reduces EMI filter cost

Notes:
1. PCB heat sink with wave soldering.
2. Maximum power specified based on proper thermal dissipation.

CAPZero-2 – Zero¹ Loss Automatic X Capacitor Discharge IC

<table>
<thead>
<tr>
<th>Product²</th>
<th>BVₜₜ</th>
<th>Total X Capacitance</th>
<th>Total Series Resistance (R1 + R2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAP200DG 1000 V</td>
<td>100 nF to 6 µF</td>
<td>7.5 MΩ to 142 kΩ</td>
<td></td>
</tr>
</tbody>
</table>

Additional Features:
- Automatically discharges X capacitors through discharge resistors when AC is disconnected
- Simplifies EMI filter design – larger X capacitor allows smaller inductive components with no change in consumption

Notes:
1. IEC 62301 clause 4.5 rounds standby power use below 5 mW to zero.

SENZero – Zero¹ Loss High Voltage Sense Signal Disconnect IC

<table>
<thead>
<tr>
<th>Product²</th>
<th>Integrated Disconnect MOSFETs</th>
<th>230 VAC Power Consumption in Standby</th>
</tr>
</thead>
<tbody>
<tr>
<td>SEN012D</td>
<td>2</td>
<td>&lt;1 mW</td>
</tr>
<tr>
<td>SEN013D</td>
<td>3</td>
<td>&lt;1.5 mW</td>
</tr>
</tbody>
</table>

Additional Features:
- Eliminates significant standby losses
- Disconnects unnecessary circuit blocks during standby, remote-off, or light-load conditions
- Ultra-low leakage (maximum 1 mA) 650 V MOSFETs <0.5 mW per channel during standby

Notes:
1. IEC 16301 clause 4.5 rounds standby power use below 5 mW to zero.
High-Performance Diodes

Qspeed Diodes
Qspeed™ diodes combine an extremely low reverse recovery charge (Q_{RR}) with very soft recovery. Together, these features help designers improve the performance of their power conversion circuits.

Product Highlights
- Ideal for continuous conduction mode (CCM) PFC circuits
- Very low reverse recovery (Q_{RR}) greatly reduces power loss in PFC diode and switching MOSFET
- Flat Q_{RR} temperature characteristic reduces overdesign compared to ultrafast diodes
- Ultra-soft recovery characteristic reduces EMI
- Reduced switching losses and EMI allows higher switching frequency for smaller PFC inductors
- Common cathode TO-220 package option is ideal for interleaved designs
- Reduced peak inverse voltage and soft recovery characteristic eliminate snubber circuits
- Ideal for output rectifier diodes for electric vehicle chargers
- Product families optimized for different performance characteristics – lowest EMI and highest efficiency against different operating frequencies

Application Guide

<table>
<thead>
<tr>
<th>f &lt; 80 kHz</th>
<th>X-Series</th>
<th>Lowest V_f</th>
</tr>
</thead>
<tbody>
<tr>
<td>f &gt; 80 kHz</td>
<td>Q-Series</td>
<td>Lowest EMI</td>
</tr>
<tr>
<td></td>
<td>H-Series</td>
<td>Highest Efficiency</td>
</tr>
</tbody>
</table>

Qspeed diodes significantly reduce reverse recovery loss that improves efficiency.
**Design Examples**

**HiperLCS – LLC High-Voltage DC-DC Resonant Converter (DER-270)**

125 W, 24 V, 4 A, and 12 V, 2.4 A, 380 VDC INPUT LED TV POWER SUPPLY

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**Input line sensing UVLO protection**

**Boot strap**

**Output Rectifier**

Highly integrated LLC resonant converter and power MOSFETs

High switching frequency reduces magnets size and cost

**Output Rectifier**

Very tight symmetry and duty cycle enabling 60 V Schottky at 24 V output

**Main output ceramic capacitors**

**Post filter and damping network**

**Soft start capacitor**

**EMI filter**

Smaller value resonant capacitor

**Small output tantalum capacitor**

**Current Sense Circuit**

Simple, fast (1-cycle) no peak detector or rectifier needed

**Feedback Circuit**

Programmable max. Power, FMIN, FBURST and dead-time

**VCC input network**

**Main output ceramic capacitors**

**Active load Zener**

**Boot strap**

**High-voltage bypass capacitor**

**Boot strap**

**Input line sensing UVLO protection**

**Highly integrated LLC resonant converter and power MOSFETs**
HiperLCS – LLC CVCC Charger (DER-447)

184 W, 23 V, 0.5 A – 8 A, 90 – 132 VAC INPUT BATTERY CHARGER POWER SUPPLY
HiperTFS-2 – Two-Switch Forward and Flyback Standby Power Supply (DER-368)

190 W CONTINUOUS, 280 W PEAK, 12 V, 15 A and 12 V, 0.83 A, 300 – 420 VAC INPUT ALL-IN-ONE PC POWER SUPPLY
Design Examples

HiperTFS-2 – High-Efficiency, Non-PFC Stage Forward Power Supply (DER-483)

184 W, 23 V, 0.5 A – 8 A, 90 – 132 VAC INPUT BATTERY CHARGER POWER SUPPLY
HiperPFS-3 – Boost PFC Front-End Power Supply (DER-394)

275 W, 385 V, 0.71 A, 90 – 264 VAC INPUT PFC FRONT-END POWER SUPPLY

Design Examples
HiperPFS-4 – Boost PFC Front-End Power Supply (DER-547)

275 W, 440 V, 0.63 A, 100 – 300 VAC INPUT PFC FRONT-END POWER SUPPLY

- **Design Examples**
- **HiperPFS-4** – Boost PFC Front-End Power Supply (DER-547)
- 275 W, 440 V, 0.63 A, 100 – 300 VAC INPUT PFC FRONT-END POWER SUPPLY

- **Circuit Diagram**
- DC voltage sense, loop compensation and OVP protection
- Spread spectrum variable switching frequency over line cycle reduces EMI
- CAPZero eliminates power lost from X capacitor discharge resistors
- Drive from external bias supply
- Input line sense (brown-in and brown-out protection)
- Signal on secondary winding sensing regulating over the opto-isolator EMI

- **Components**
  - U1: HiperPFS-4 integrated PFC controller plus MOSFET and lossless current sensing
  - Drive from external bias supply
  - POWER GOOD generates a control synchronization signal when output voltage is within regulation

- **Additional Notes**
  - Ultra-low reverse recovery Q-speed Diode
  - DC voltage sense, loop compensation and OVP protection
  - Drive from external bias supply

- **Performance Specifications**
  - 275 W, 440 V, 0.63 A
  - 100 – 300 VAC INPUT

- **Related Links**
  - www.power.com
LinkSwitch-HP – High-Efficiency, Universal Input Power Supply (RDK-313)

30 W, 12 V, 2.5 A, 90 – 265 VAC INPUT ADAPTER POWER SUPPLY
LinkSwitch-HP – High-Efficiency, Universal Input Power Supply (DER-581)
45 W, 19 V, 2.37 A, 90 – 265 VAC INPUT APPLIANCE POWER SUPPLY
TOPSwitch-JX – LCD Monitor (DER-187)

35 W, 13 V, 2.69 A, 90 – 264 VAC INPUT FLYBACK LCD MONITOR POWER SUPPLY

Frequency jittering simplifies EMI filter design, reducing development time and component cost

Line undervoltage/overvoltage (UV/OV) detection, dual-slope line feed-forward for output ripple reduction

132 kHz switching frequency for greatly reduced transformer cost

725 V MOSFET technology allows higher transformer turns ratio enabling lower diode voltage rating; reduces circuit cost, improves efficiency

Output overvoltage protection (OVP). Resistor (R5) sets latching or hysteretic shutdown

TOPSwitch-JX
- Accurate thermal shutdown with large hysteresis provides complete system-level protection
- Tight 1% tolerance minimizes the size of the transformer and output diodes and reduces overload to rated power ratio
- Internal high-voltage current source eliminates start-up circuitry
- Internal current sense circuit eliminates sense resistor
- DIP-8 package with 2 Ω MOSFET and optimized pinout eliminates heat sink
- Auto-restart limits available power to <3% of maximum power in short-circuit and open-loop fault conditions

Design Examples
TOPSwitch-JX – Universal Input Non-PFC CVCC Flyback Charger (DER-566)
70 W, 23 V, 3.04 A, 90 – 264 VAC INPUT BATTERY CHARGER POWER SUPPLY
**Reference Designs**

**Design Example Report (DER)**

Design Example Reports contain a power supply design specification, schematic, bill of materials, transformer documentation, and PCB layout. This design has been built and bench-tested to provide performance data and typical operation characteristics.

**Reference Design Report (RDR)**

Reference Design Reports contain a power supply reference design specification, schematic, bill of materials, transformer documentation, and PCB layout. Performance data and typical operating characteristics are included. The design has been put into production for use in our Reference Design Kits (RDKs).

### Application Table

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