

Innovation in power conversion

PoE Interface

L1  
10  $\mu$ H  
1 A

C4  
1000 pF R7  
1500 V 10 k

# Product Selector Guide

## DC-DC Products

September 2008



## Features & Benefits

**The DPA-Switch Family** combines a 220 V power MOSFET with a controller that provides current monitoring, undervoltage and over temperature protection, soft start and other control functions in a single device, saving up to 30 external components in the power supply design. Combining the key switching elements into a single package reduces design complexity and ensures rapid, low-risk development of highly cost-effective power supplies.

**Superior Performance and Flexibility.** The DPA-Switch family supports a range of power requirements in either forward or flyback topologies and offers a variety of package options to maximize design flexibility. A DIP-8 package is available for low-cost designs, and a thermally efficient TO-263-7C R package (2 °C/Watt) is available for higher power applications.

### Product Highlights

- Supports flyback and forward topology
- Programmable internal current sense eliminates external sense components
- Built-in auto-restart for output overload/open loop protection
- Line undervoltage (UV) detection: meets ETSI standards
- Line overvoltage (OV) shutdown protection
- Fully integrated soft-start for minimum stress/overshoot
- Hysteretic thermal shutdown for over temperature protection and automatic recovery
- Source connected tab for low EMI

### EcoSmart® Energy Efficiency

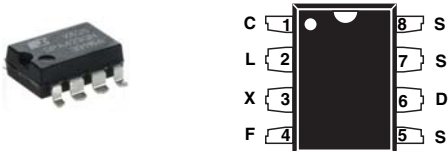
- Extremely low consumption at no-load (10 mA typ.) and in remote off (2 mA max.)
- Cycle skipping at light load for high standby efficiency



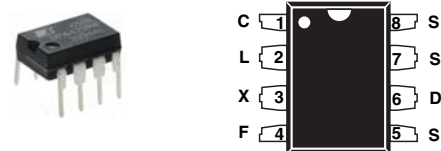
### Package Information

- P and G packages have Pb-free finish (100% matte tin), are RoHS compliant and meet requirements of JEDEC standard J-STD-020C table 4.2. The R package is not available in Pb-free finish.

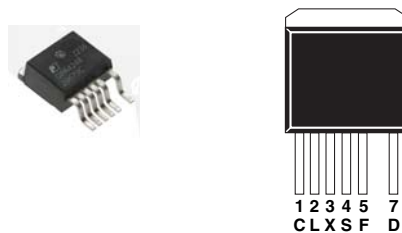
**G-Package**



**P-Package**



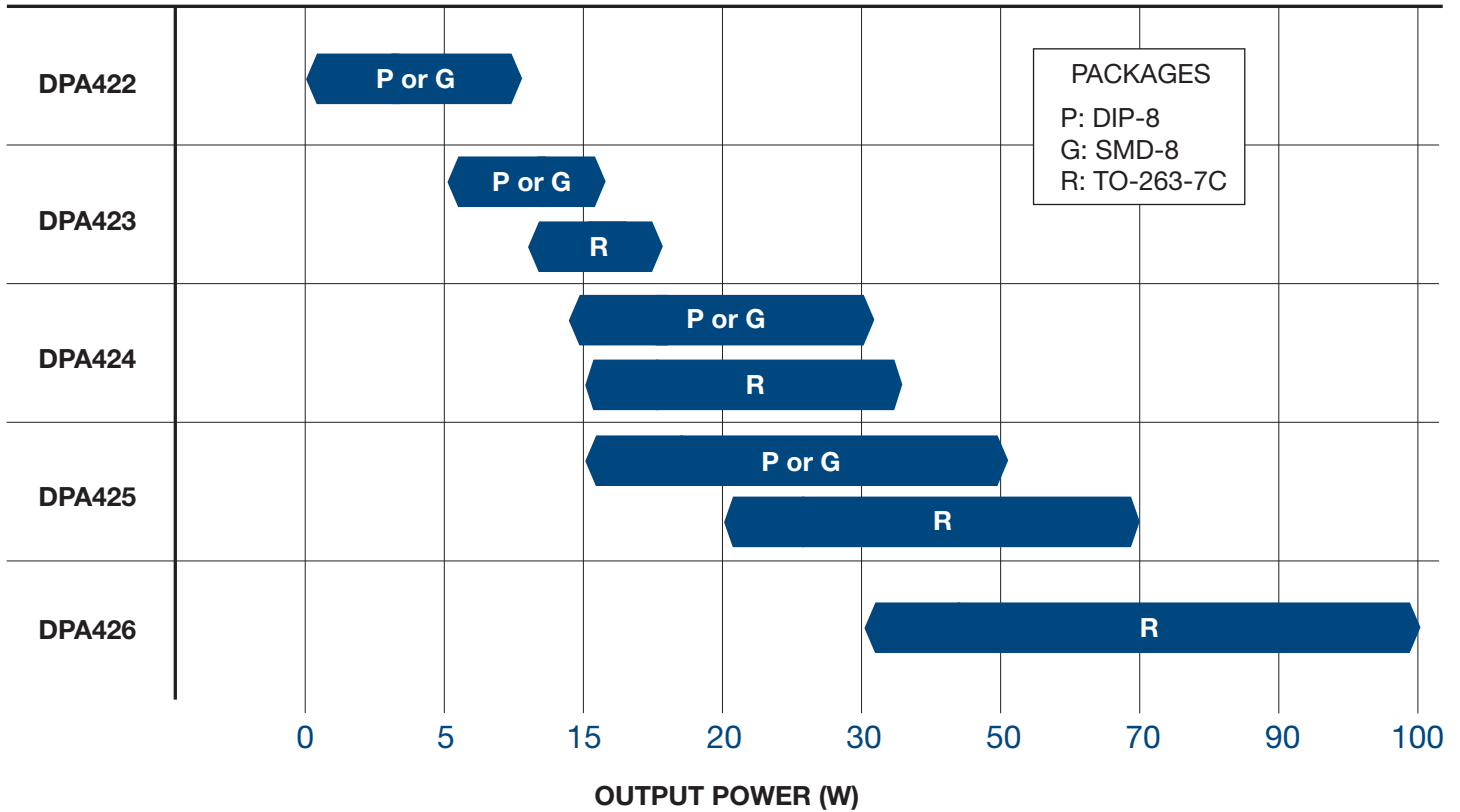
**R-Package**



### Typical Applications

- PoE applications: VoIP phones, WLAN, security cameras
- Telco central office equipment: xDSL, ISDN, PABX
- Distributed power architectures (24 V/48 V bus)
- Industrial controls
- LED lighting

## Product Selector Guide



## 24 V / 48 V DC-DC Power Conversion (Up to 100 W)

### Output Power Table

Total Device Dissipation <sup>3</sup> PRODUCT <sup>4</sup>	36-75 VDC Input Range (Forward) <sup>2</sup>					
	0.5 W	1 W	2.5 W	4 W	6 W	Max Power Output <sup>1</sup>
DPA422 <sup>7</sup>	7.5 W	10 W	-	-	-	10 W
DPA423	12 W	16 W	-	-	-	18 W
DPA424	16 W	23 W	35 W	-	-	35 W
DPA425	23 W	32 W	50 W	62 W	-	70 W
DPA426 <sup>5</sup>	25 W	35 W	55 W	70 W	83 W	100 W

Total Device Dissipation <sup>3</sup> PRODUCT <sup>4</sup>	36-75 VDC Input Range (Flyback) <sup>2</sup>				
	0.5 W	0.75 W	1 W	1.5 W	Max Power Output <sup>1</sup>
DPA422 <sup>7</sup>	6.5 W	9 W	-	-	9 W
DPA423	9 W	13 W	-	-	13 W
DPA424	10 W	14.5 W	18 W	24 W	26 W
DPA425	- <sup>6</sup>	- <sup>6</sup>	- <sup>6</sup>	25.5 W	52 W

Notes:  
1. Maximum output power is limited by device internal current limit. 2. See Applications Considerations section of the DPA-Switch data sheet for complete description of assumptions and for output powers with other input voltage ranges. 3. For device dissipation of 1.5 W or below, use P or G packages. Device dissipation above 1.5 W is possible with R packages. 4. Packages: P: DIP-8, G: SMD-8, R: TO-263-7C. For lead-free package options, see Part Ordering section of the DPA-Switch data sheet. 5. Available in R package only. 6. Due to higher switching losses, the DPA425 may not deliver additional power compared to a smaller device. 7. Available in P and G package only.

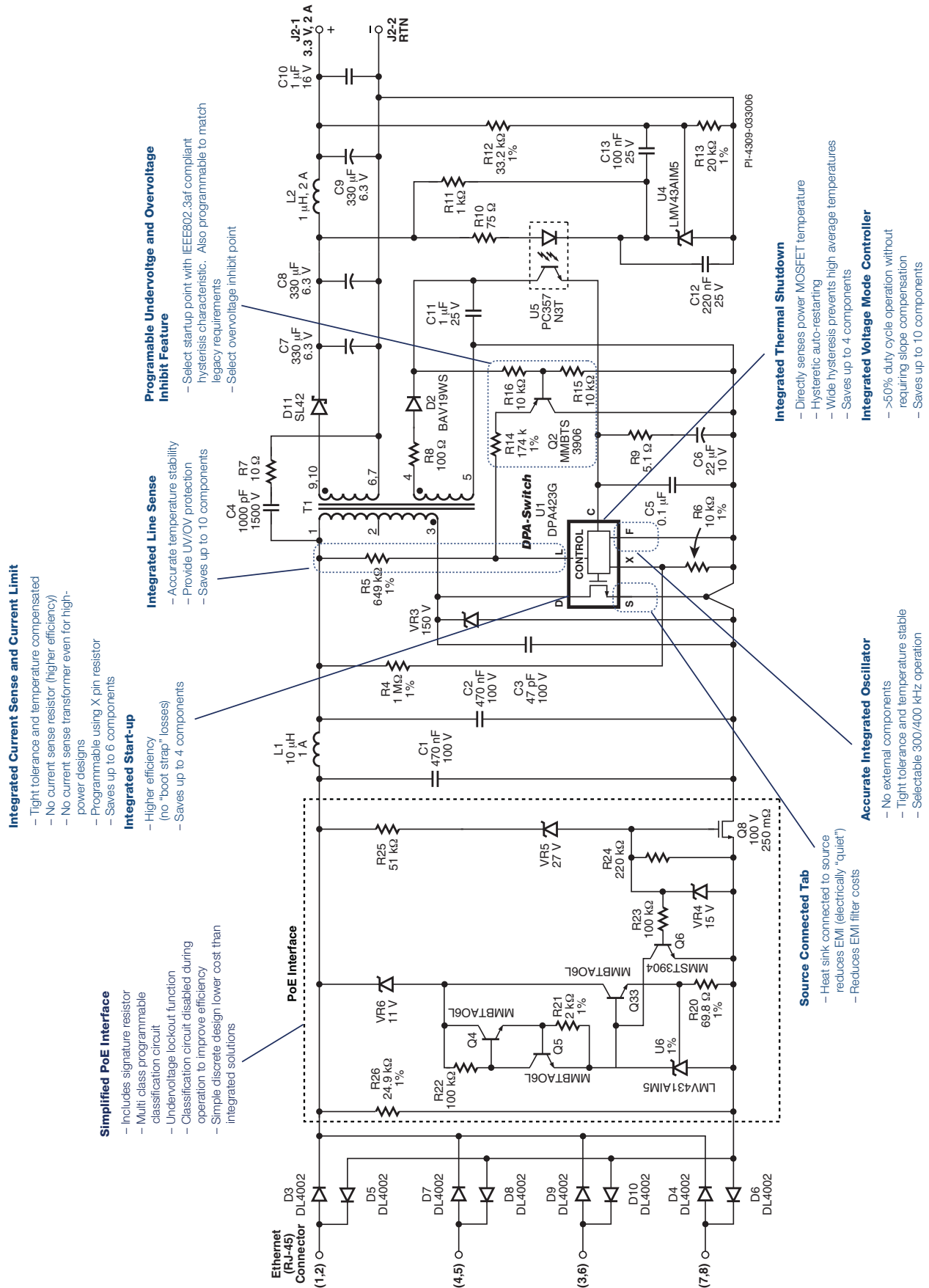
### Integrated Features

HV-FET Rating	220 V	Soft Start	✓	Hysteretic Thermal Shutdown	✓	Remote ON/OFF	✓
Switching Frequency (kHz)	400/ 300	Fully Integrated Current Sensing	✓	Power Limiting	✓	EcoSmart® Low Standby/ No-load Power Consumption	✓
Max. Duty Cycle (DC <sub>MAX</sub> )	75%	Adjustable Current Limit	✓	Line UV Detection	✓	Synchronizable to Lower External Clock Frequency	✓
Control Method	PWM	Auto Restart	✓	Line OV Detection	✓	Remote ON/OFF	✓



# DPA-Switch vs. Discrete Design

33-57 VDC Input, 12.95 W Class Programmable Power over Ethernet DC-DC Converter (see DAK-86)



### Integrated Current Sense and Current Limit

- Tight tolerance and temperature compensated
- No current sense resistor (higher efficiency)
- No current sense transformer even for high-power designs
- Programmable using X pin resistor
- Saves up to 6 components

### Integrated Start-up

- Higher efficiency (no "boot strap" losses)
- Saves up to 4 components

### Programmable Undervoltage and Overvoltage Inhibit Feature

- Select startup point with IEEE802.3af compliant hysteresis characteristic. Also programmable to match legacy requirements
- Select overvoltage inhibit point

### Integrated Line Sense

- Accurate temperature stability
- Provide UV/OV protection
- Saves up to 10 components

### Integrated Thermal Shutdown

- Directly senses power MOSFET temperature
- Hysteretic auto-restarting
- Wide hysteresis prevents high average temperatures
- Saves up to 4 components

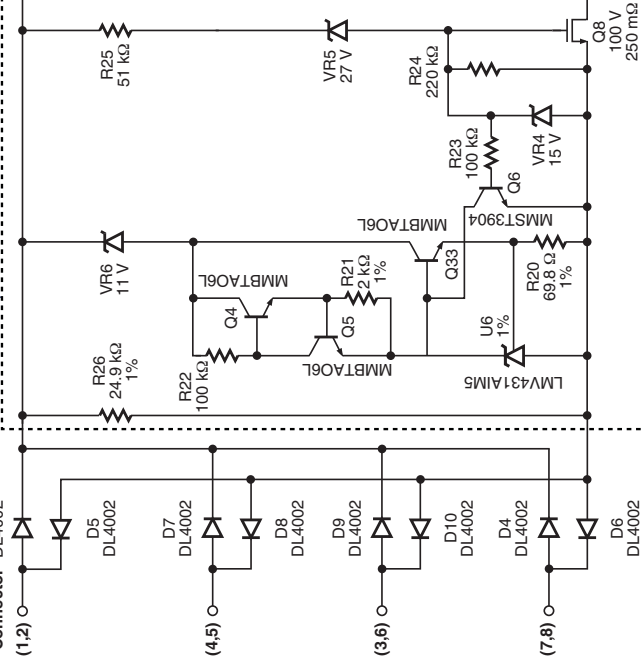
### Integrated Voltage Mode Controller

- >50% duty cycle operation without requiring slope compensation
- Saves up to 10 components

### Simplified PoE Interface

- Includes signature resistor
- Multi class programmable classification circuit
- Undervoltage lockout function
- Classification circuit disabled during operation to improve efficiency
- Simple discrete design lower cost than integrated solutions

### PoE Interface



### Source Connected Tab

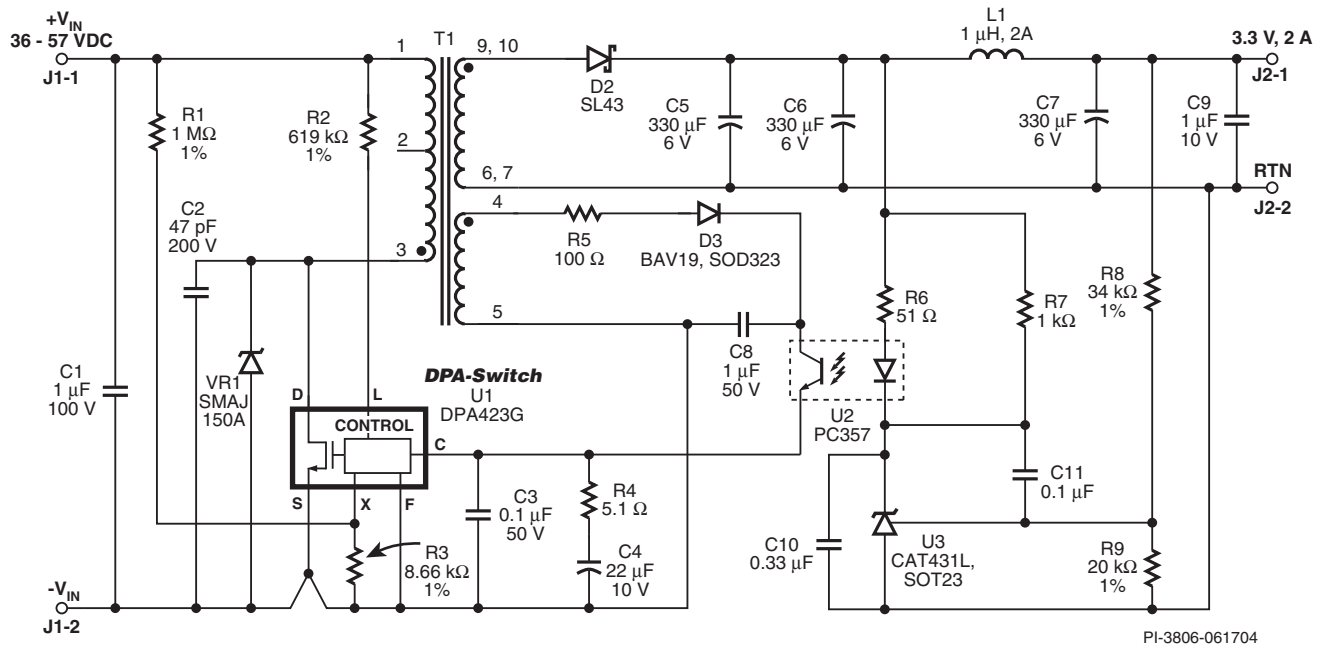
- Heat sink connected to source reduces EMI (electrically "quiet")
- Reduces EMI filter costs

### Accurate Integrated Oscillator

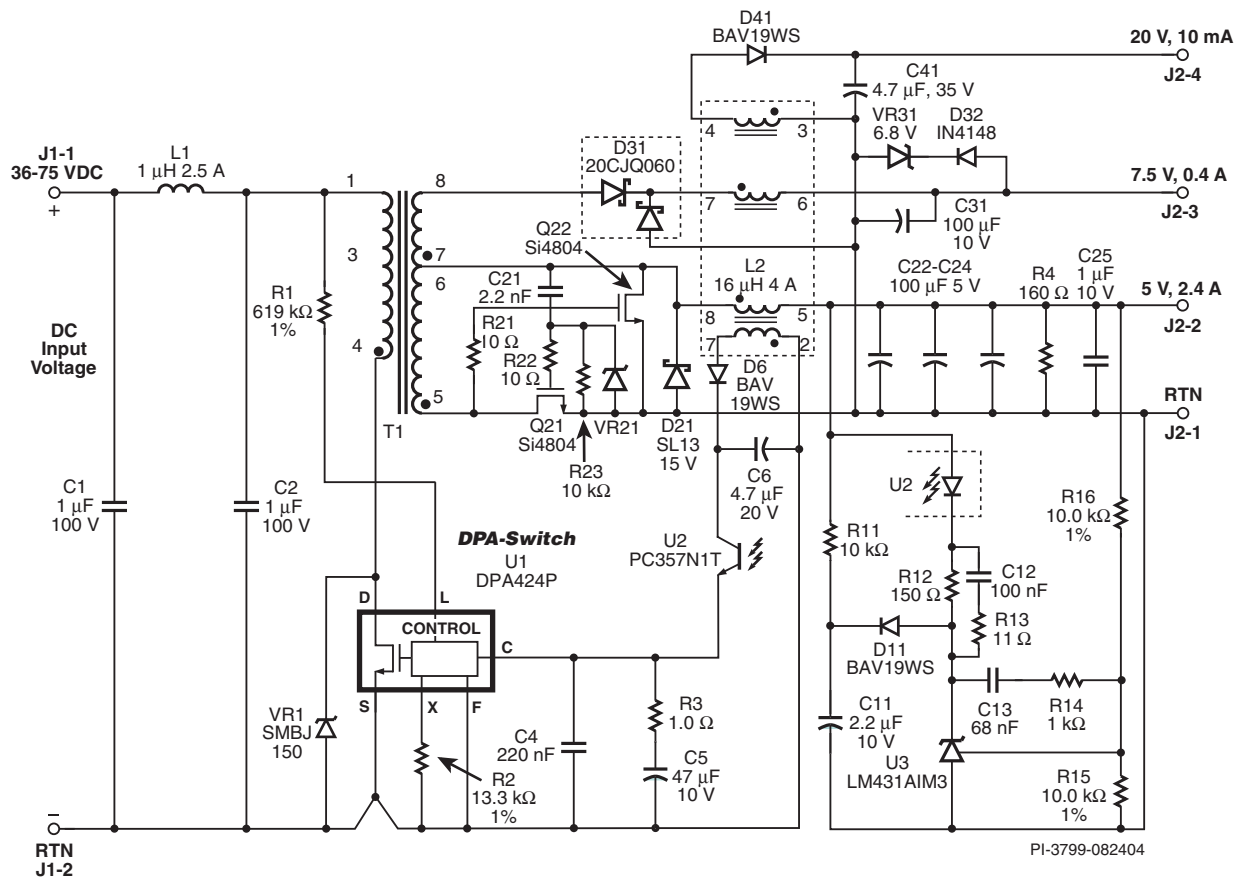
- No external components
- Tight tolerance and temperature stable
- Selectable 300/400 kHz operation

# Design Examples

## Cost-Effective 6.6 W, 3.3 V Flyback DC-DC Converter (EP-86)



## 15 W Multi-Output DC-DC Converter (DI-69)



Visit [www.powerint.com/appcircuits.htm](http://www.powerint.com/appcircuits.htm) for additional design examples.

## Design Tools

### Reference Design Kits (RDks)

RDks include a working prototype power supply, sample devices, unpopulated pcb, data sheet, comprehensive engineering report and other related documentation.

<b>DAK-21A</b>	30 W, DC-DC Forward Converter
<b>DAK-68A</b>	6.6 W, Class 0 PoE Converter
<b>DAK-71A</b>	6 W, DC-DC Converter
<b>DAK-86</b>	6.6 W, Multi-Class Programmable PoE Powered Device



### Power Supply Design Software\*

With **PI Expert™** Suite, you're only "mouse clicks" away from determining the key components in your next switching power supply design, including the best Power Integrations power IC and detailed instructions for building the transformer! It's fast & easy... and best of all, **FREE!**

### DPA-Switch Product and Design Collateral\*

<b>Data Sheet</b>	<b>DPA422-426</b>	DPA-Switch Family Data Sheet
<b>Application Note</b>	<b>AN-31</b>	DPA-Switch DC-DC Forward Converter Design Guide
<b>Design Ideas (2-page technical Circuit Document)</b>	<b>DI-24</b>	Application: Telecom (36-75 VDC Input): 30 W, 5 V Forward Converter
	<b>DI-25</b>	Application: Telecom (36-75 VDC Input): 30 W, 5 V Forward Converter (Sync. Rectification)
	<b>DI-29</b>	Application: Telecom (36-75 VDC Input): 25 W, 7 V Flyback Converter
	<b>DI-31</b>	Application: Telecom (36-75 VDC Input): 70 W, 5 V Forward Converter
	<b>DI-37</b>	Application: Telecom (36-75 VDC Input): 16.5 W, 3.3 V Forward Converter (Sync. Rectification)
	<b>DI-40</b>	Application: Telecom (36-75 VDC Input): 20 W, 2.5 V Forward Converter (Sync. Rectification)
	<b>DI-51</b>	Application: Telecom (36-75 VDC Input): 5 W, 5 V Flyback Converter
	<b>DI-52</b>	Application: Telecom (36-75 VDC Input): 60 W, 12 V Forward Converter (Sync. Rectification)
	<b>DI-53</b>	Application: Telecom (36-75 VDC Input): 50 W, 5 V / 3.3 V Forward Converter (Sync. Rectification)
	<b>DI-56</b>	Application: Telecom (36-75 VDC Input): 19.2 W, ±12 V Flyback Converter
	<b>DI-57</b>	Application: Telecom (36-75 VDC Input): 60 W, 12 V Flyback Converter
	<b>DI-69</b>	Application: VoIP Phone, 15 W, 5 V / 7.5 V / 20 V Forward Converter (Sync. Rectification)
	<b>DI-70</b>	Application: PoE VoIP Phone, 15 W, 5 V / 7.5 V / 20 V Forward Converter (Sync. Rectification)
<b>DI-88</b>	Application: PoE PD Flyback Converter with Programmable Class	

\* Downloadable from [www.powerint.com](http://www.powerint.com)