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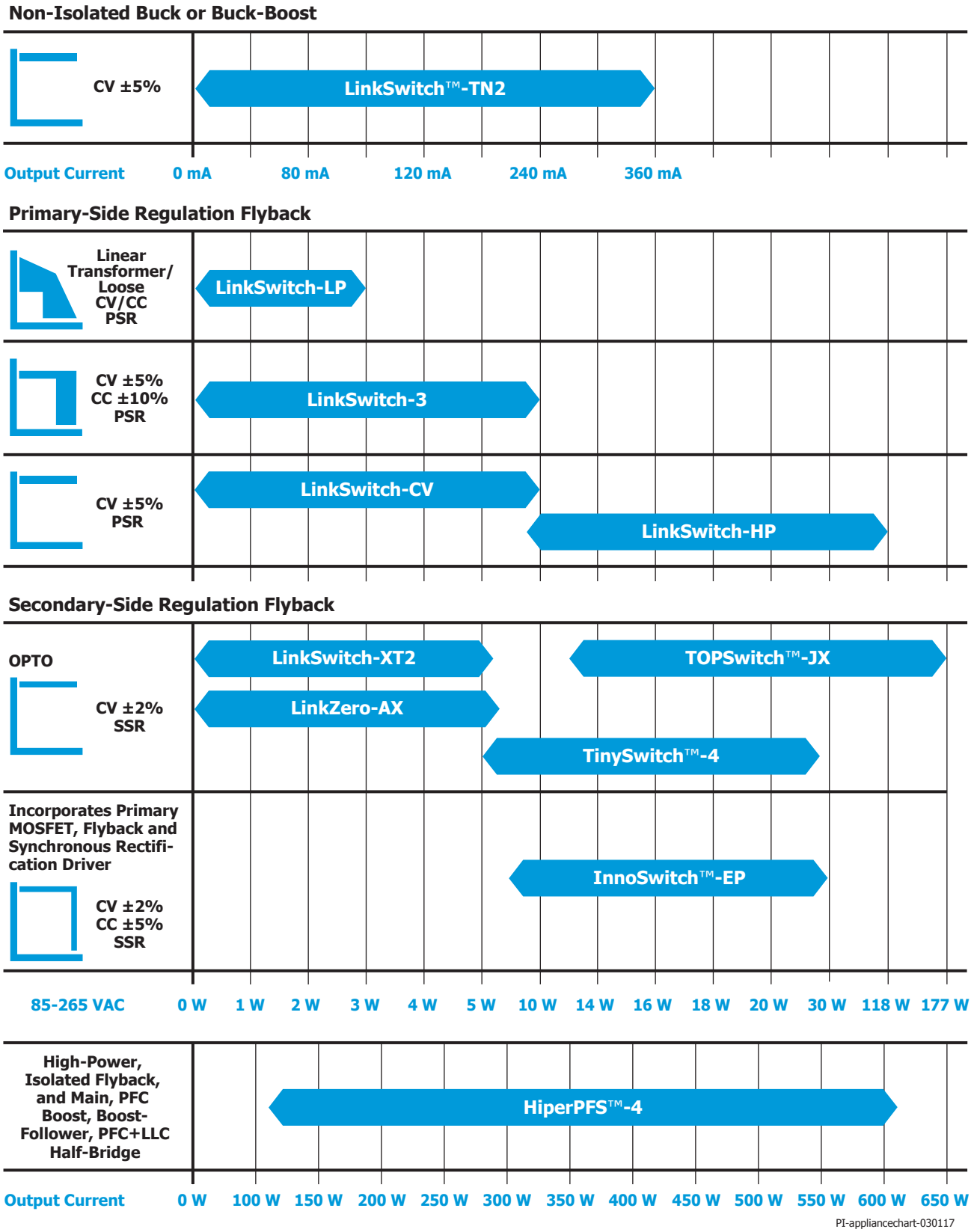
Innovation in power conversion

Product Selector Guide
Appliance Power Supply ICs

March 2017

Product Selector Guide

Output Characteristics and Power



PI-appliancechart-030117

LinkSwitch-TN2 – Highly Energy Efficient Off-line Switcher IC with Integrated System Level Protection for Low Component-Count Power Supplies[1]

Product[4]	230 VAC ± 15%		85-265 VAC	
	MDCM[2] (mA)	CCM[3] (mA)	MDCM[2] (mA)	CCM[3] (mA)
LNK3202P/G/D	63	80	63	80
LNK3204P/G/D	120	170	120	170
LNK3205P/G/D	175	270	175	270
LNK3206P/G/D	225	360	225	360

Additional Features:

- 725 V internal MOSFET rating
- Self-powered
- ON/OFF control
- Hysteretic thermal shutdown
- Power limiting
- Frequency jitter reduces EMI
- EcoSmart™ low standby/no-load power consumption

Notes:

1. *Typical output current in a non-isolated buck converter with devices operating at default current limit and adequate heat sinking. Output power capability depends on respective output voltage and thermal requirements. See Key Applications Considerations Section for complete description of assumptions, including fully discontinuous conduction mode (DCM) operation.*
2. *Mostly discontinuous conduction mode.*
3. *Continuous conduction mode.*
4. *Packages: P: PDIP-8C, G: SMD-8C, D: SO-8C.*

LinkSwitch-CV / LP / AX / XT2 – Very Low Power AC-DC Power Conversion

Product[2]	Continuous Output Power (W)	Continuous Output Power (W)
	Open Frame[1]	Open Frame[1]
LinkSwitch-CV	230 VAC ± 15%	85-265 VAC
LNK623P/D	9	6
LNK624P/D	11	6.5
LNK625P/D	13.5	8
LNK626P/D	17	10
LinkSwitch-LP	230 VAC ± 15%	85-265 VAC
LNK562P/G/D	1.9	1.9
LNK563P/G/D	2.5	2.5
LNK564P/G/D	3	3
LinkZero-AX	230 VAC ± 15%	85-265 VAC
LNK584G	3	3
LNK584D	3	3
LNK585G	4.5	4
LNK585D	5	4.5
LNK586G	6	5
LNK586D	6.5	5.5
LinkSwitch-XT2	230 VAC ± 15%	85-265 VAC
LNK3604P/G/D (C_{BP} = 1.0 µF)	7.3	4.6
LNK3604P/G/D (C_{BP} = 0.1 µF)	9.2	6.1

Additional Features:

- 700 V / 725 V internal MOSFET rating
- Self-powered
- ON/OFF control
- Hysteretic over-temperature protection
- Power limiting
- Frequency jitter reduces EMI
- EcoSmart™ low standby/no-load power consumption

Notes:

1. *Maximum practical continuous power in an open frame design with adequate heat sinking, measured at 50 °C ambient.*
2. *Packages: P: DIP-8B, P: DIP-8C, G: SMD-8B, D: SO-8C.*

IC Product Tables

SENZero – Zero[1] Loss High Voltage Sense Signal Disconnect IC

Product[2]	Integrated Disconnect MOSFETs	230 VAC Power Consumption in Standby
SEN012D	2	<1 mW
SEN013D	3	<1.5 mW

Notes:
1. *IEC 16301 clause 4.5 rounds standby power use below 5 mW to zero.*
2. *Package: D: SO-8.*

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

CAPZero-2 – Zero[1] Loss Automatic X Capacitor Discharge IC

Product[2]	BV_{DSS}	Total X Capacitance	Total Series Resistance (R1 + R2)
CAP200DG	1000 V	100 nF to 6 µF	7.5 MΩ to 142 kΩ

Notes:
1. *IEC 62301 clause 4.5 rounds standby power use below 5 mW to zero.*
2. *Package: D: SO-8.*

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

LinkSwitch-3 – Energy-Efficient, Accurate Primary-Side Regulation CV/CC Switcher for Adapters and Chargers[1,2,3,4]

Product[5]	90-264 VAC
	D (eSIP-7C) and K (eSOP-12B) Packages
	Open Frame (W)
LNK6404D / LNK6424D	4.1
LNK6405D / LNK6415D / LNK6425D	5.1
LNK6406D / LNK6416D / LNK6426D / LNK6436D / LNK6446D	6.1
LNK6407D / LNK6417D / LNK6427D	7.5

Product[5]	E (eSIP-7C) and K (eSOP-12B) Packages
	Open Frame (W)
LNK6407K / LNK6417K / LNK6427K	9
LNK6408K / LNK6418K / LNK6428K / LNK6448K	10
LNK6408E / LNK6418E / LNK6428E / LNK6448E	10

Additional Features:
- Compensates for transformer inductance tolerances
- Compensates for input line voltage variations
- Compensates for cable voltage drop
- Compensates for external component temperature variations
- Very accurate IC parameter tolerances using proprietary trimming technology
- Frequency jittering greatly reduces EMI filter cost
- Even tolerances achievable with external resistor selection/trimming
- Programmable switching frequency up to 85 kHz to reduce transformer size
- Minimum operation frequency fixed to improve transient load response

Notes:
1. *Assumes minimum input DC voltage >90 VDC, K_P ≥1 (Recommend K_P ≥1.15 for accurate CC regulation), η >78%, D_{MAX} <55%.*
2. *Output power capability is reduced if a lower input voltage is used.*
3. *Minimum continuous power with adequate heat sink measured at 50 °C ambient with device junction below 110 °C.*
4. *Assumes bias winding is used to supply BYPASS pin.*
5. *Package: D: SO-8C, E: eSIP-7C, K: eSOP-12B.*

TinySwitch-4 – Energy-Efficient, Off-Line Switcher with Line Compensated Overload Power

Product[2]	Peak or Open Frame[1] (W)	Peak or Open Frame[1] (W)
	230 VAC ± 15%	85-265 VAC
TNY284P/D/K	11	8.5
TNY285P/D	15	11.5
TNY285K	15	11.5
TNY286P/D	19	15
TNY286K	19	15
TNY287P	23.5	18
TNY287D	23.5	18
TNY287K	23.5	18
TNY288P	28	21.5
TNY288D	26	19.5
TNY288K	28	21.5
TNY289P	32	25
TNY289K	32	25
TNY290P	36.5	28.5
TNY290K	36.5	28.5

Additional Features:
- 725 V internal MOSFET rating
- Self-powered
- Hysteretic thermal shutdown protection
- Frequency jitter reduces EMI
- EcoSmart low standby/no-load power consumption
- On-time extension
- Latching output overvoltage protection
- Line undervoltage lockout
- Selectable current limit

Notes:
1. *Minimum peak power capability in any design or minimum continuous power in an open frame design.*
2. *Packages: P: DIP-8C, D: SO-8C, K: eSOP-12B.*

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

Product[4]	Heat Sink	230 VAC ±15%	85-265 VAC
		Open Frame (W)	Open Frame (W)
LNK6xx3K/V	PCB-W[1]	25	15
LNK6xx3E	Metal	35	27
LNK6xx4K/V	PCB-W[1]	28	20
LNK6xx4E	Metal	47	36
LNK6xx5K/V	PCB-W[1]	30	22
LNK6xx5E	Metal	59[2]	45
LNK6xx6K/V	PCB-W[1]	34	26
LNK6xx6E	Metal	88[2]	68[2]
LNK6xx7K/V	PCB-W[1]	41	30
LNK6xx7E	Metal	117[2]	90[2]
LNK6xx8K/V	PCB-W[1]	47	34
LNK6xx8E	Metal	135[2]	104[2]
LNK6xx9K/V	PCB-W[1]	54	39
LNK6xx9E	Metal	153[2]	118[2]

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.*
3. *Packages: E: eSIP-7C, K: eSOP-12B, V: eDIP-12B.*

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

Product[4]	PCB Copper Area[1]	
	Open Frame[2] (W)	Open Frame[2] (W)
	230 VAC ± 15%[3]	85-265 VAC
TOP264V	34	22.5
TOP264K	49	30
TOP265V	36	25
TOP265K	53	34
TOP266V	39	28.5
TOP266K	58	39
TOP267V	44	32
TOP267K	65	45
TOP268V	48	36
TOP268K	73	50
TOP269V	51	37.5
TOP269K	81	55
TOP270V	55	41
TOP270K	91	60
TOP271V	59	43
TOP271K	102	66
Product[4]	**Metal Heat Sink[1]**	
	Open Frame[2] (W)	Open Frame[2] (W)
	230 VAC ±15%[3]	85-265 VAC
TOP264E/V	62	43
TOP265E/V	81	57
TOP266E/V	119	86
TOP267E/V	137	103
TOP268E/V	148	112
TOP269E/V	162	120
TOP270E/V	190	140
TOP271E/V	244	177

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 hysteretic 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.*
4. *Packages: E: eSIP-7C, V: eDIP-12, K: eSOP-12.*

IC Product Tables

InnoSwitch-EP – Off-Line CV/CC Flyback Switcher IC with Integrated 725 V / 900 V MOSFET, Sync-Rect Feedback with Advanced Protection

Product[3]	Peak or Open Frame[1,2] (W)	
	725 V MOSFET	
	230 VAC ±15%	85-265 VAC
INN2603K	24	15
INN2604K	27	20
INN2605K	35	25
Product[3]	900 V MOSFET	
	230 VAC ±15%	85-484 VAC
INN2904K	29	20

Notes:
1. *Minimum continuous power in a typical non-ventilated enclosed typical size adapter measured at 40 °C ambient. Max output power is dependent on the design. With condition that package temperature must be < = 125 °C.*
2. *Minimum peak power capability.*
3. *Package: K: eSOP-R16B.*

Additional Features:

- A Highly Integrated, Compact Footprint
  - Incorporates flyback controller, 725 V / 900 V MOSFET, secondary-side sensing and synchronous rectification driver
  - FluxLink™ integrated, HIPOT-isolated, feedback link
  - Exceptional CV accuracy, independent of transformer design or external components
  - Excellent multi-output cross regulation with weighted SSR feedback and synch FETs
- EcoSmart – Energy Efficient
  - <10 mW no-load at 230 VAC when supplied by transformer bias winding
  - Easily meets all global energy efficiency regulations
- Advanced Protection / Safety Features
- Primary sensed output OVP
  - Secondary sensed output overshoot clamp
  - Secondary sensed output OCP to zero output voltage
  - Hysteretic thermal shutdown
  - Input voltage monitor with accurate brown-in/brown-out and overvoltage protection
- Full Safety and Regulatory Compliance
  - 100% production HIPOT compliance testing equivalent to 6 kV DC/1 sec
  - Reinforced insulation
  - Isolation voltage >3,500 VAC for INN26xx series, >4,000 VAC for INN2904 series
  - UL1577 and TUV (EN60950) safety approved
  - EN61000-4-8 (100 A/m) and EN61000-4-9 (1000 A/m) compliant
- Green Package
  - Halogen free and RoHS compliant
- Applications
  - Appliance, industrial, and smart lighting

HiperPFS-4 – PFC Controller with Integrated 600 V MOSFET Optimized for High PF and Efficiency Across Load Range

Universal Input Devices

Product	Continuous Output Power at 90 VAC[1] (W)	Peak Output Power[2] (W)
PFS7623H/L	110	120
PFS7624H/L	130	150
PFS7625H/L	185	205
PFS7626H	230	260
PFS7627H	290	320
PFS7628H	350	385
PFS7629H	405	450

High-Line Input Only Devices

Product	Continuous Output Power at 180 VAC[1] (W)	Peak Output Power[2] (W)
PFS7633H	255	280
PFS7634H	315	350
PFS7635H	435	480
PFS7636H	550	610

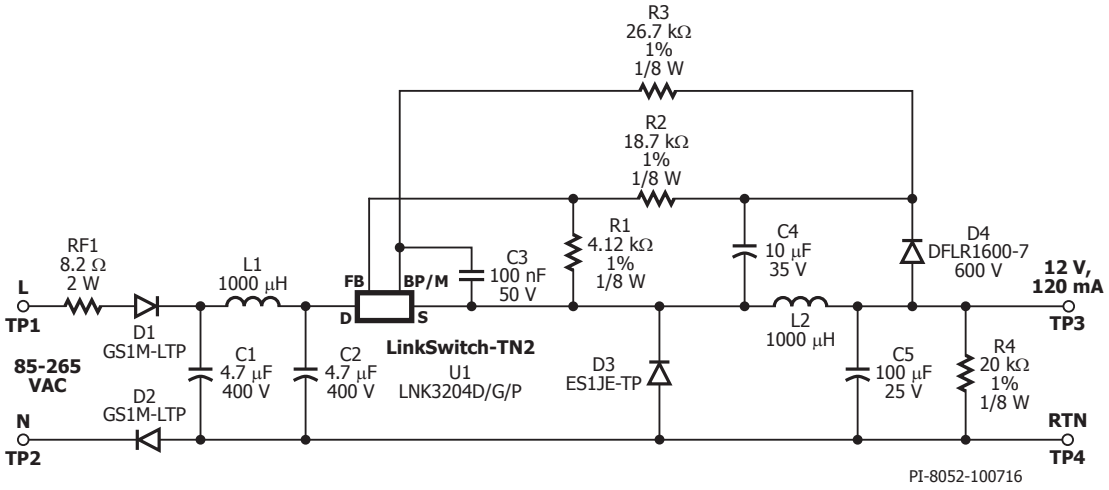
Notes:
1. *Maximum practical continuous power in an open-frame design with adequate heat sinking, measured at 50 °C ambient.*
2. *Internal output power limit.*

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 brown-in/out protection.
  - Accurate built-in undervoltage (UV) protection.
  - Accurate built-in overvoltage (OV) protection.
  - Hysteretic 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.
  - Digitally 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.

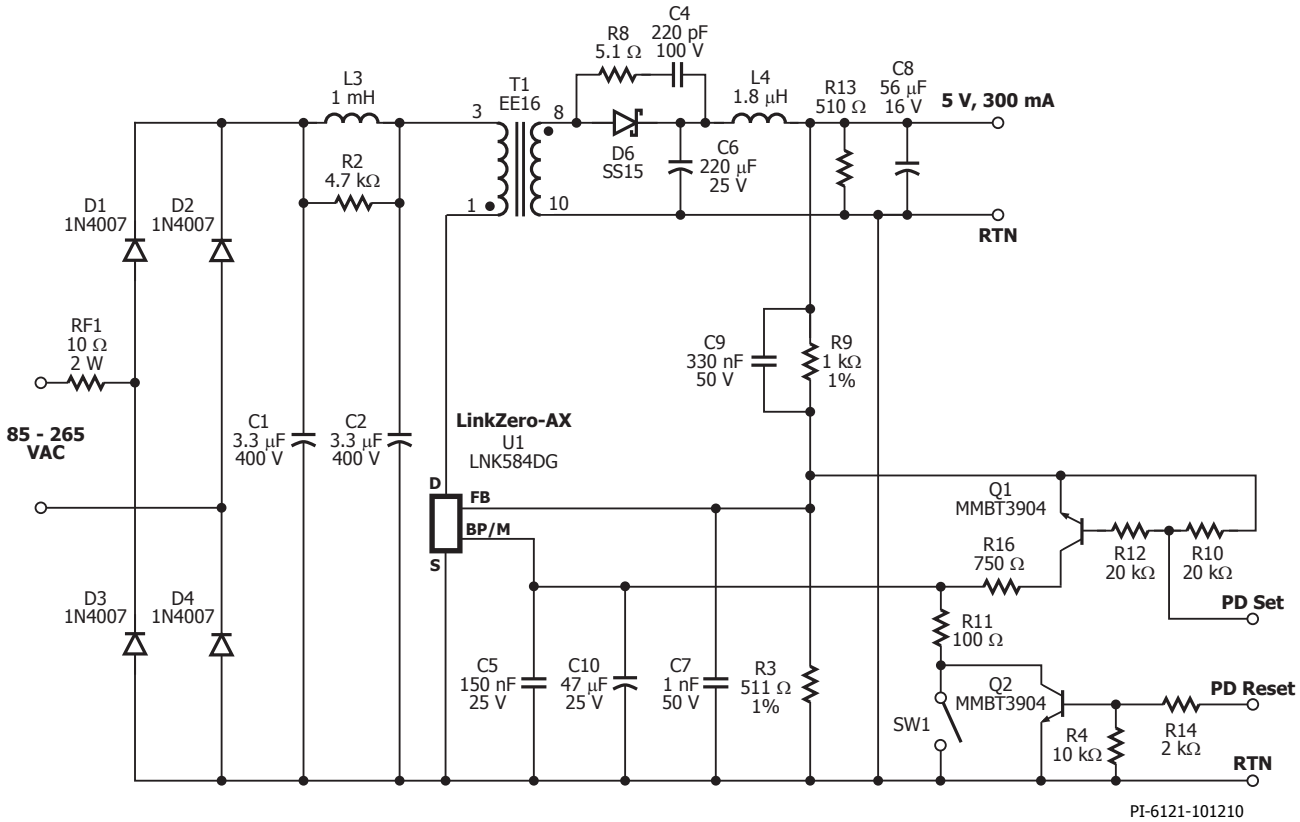
LinkSwitch-TN2 – <30 mW No-Load, Non-Isolated Output Buck Power Supply (RDK-506)

1.44 W, 12 V, 120 mA OUTPUT, 85 – 265 VAC INPUT, NON-ISOLATED BUCK APPLIANCE POWER SUPPLY



LinkZero-AX – Non-Isolated, Zero Standby Consumption Power Supply (DER-260)

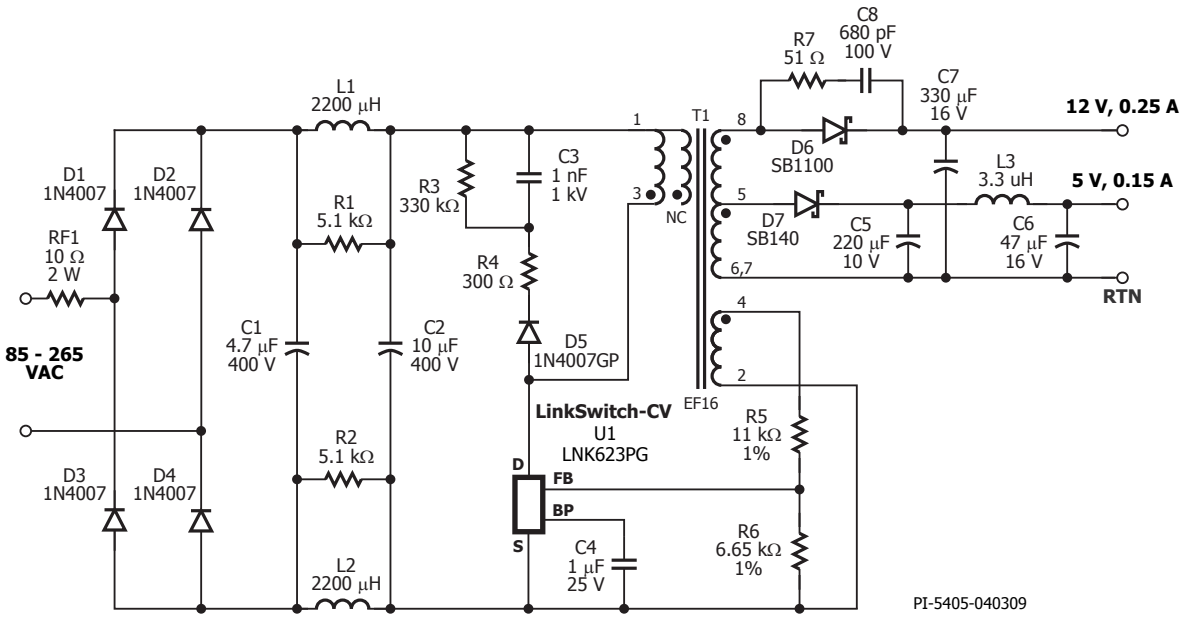
1.5 W, 5 V, 300 mA OUTPUT, 85 – 265 VAC INPUT FLYBACK POWER SUPPLY



Design Examples

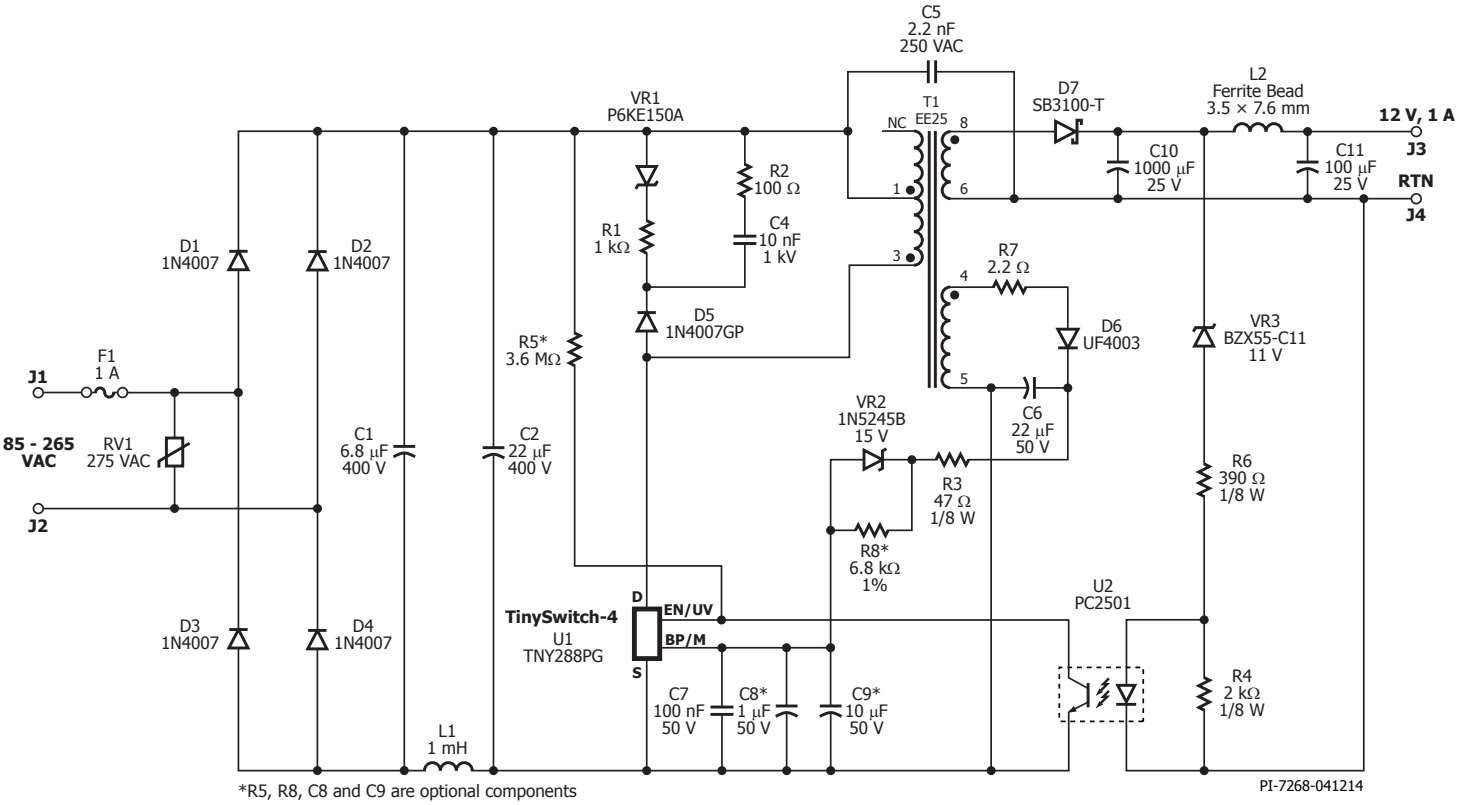
LinkSwitch-CV – 2-Output, Constant Voltage Power Supply (DER-213)

3.8 W, 12 V, 0.25 A, and 5 V, 0.15 A OUTPUTS, 85 – 265 VAC INPUT FLYBACK POWER SUPPLY



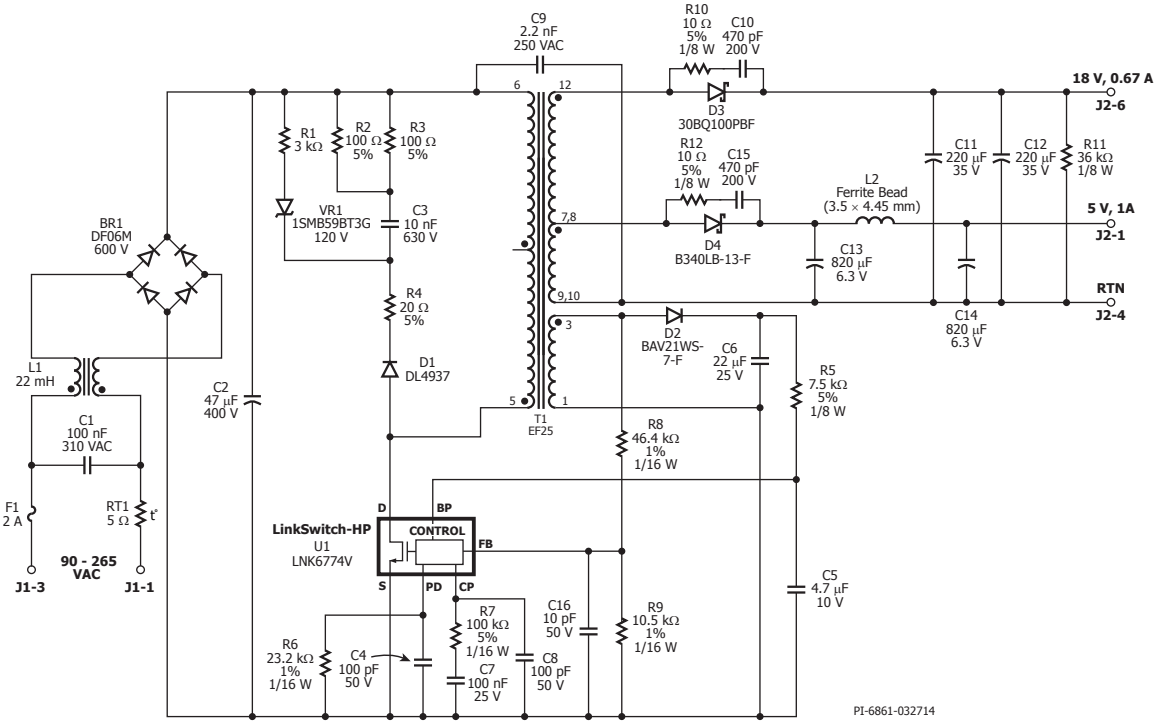
TinySwitch-4 – <30 mW No-Load, Universal Input Adapter (RDK-399)

12 W, 12 V, 1 A OUTPUT, 85 – 265 VAC INPUT FLYBACK CONVERTER



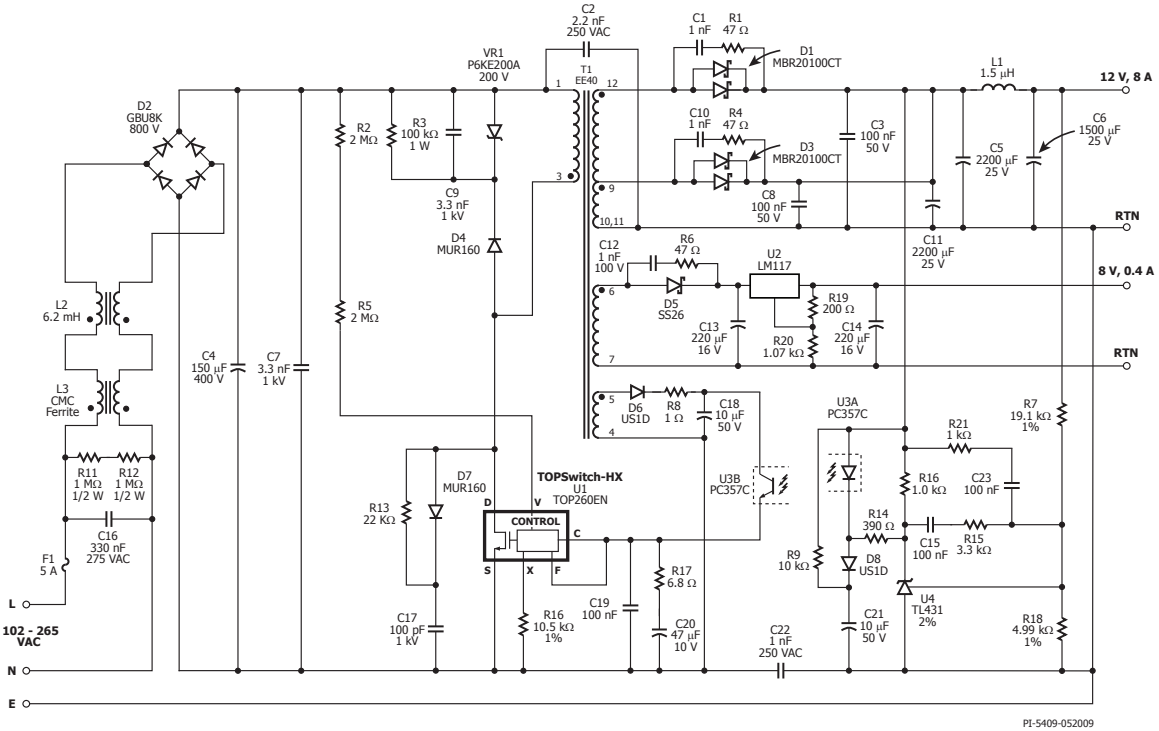
LinkSwitch-HP – 2-Output, Isolated, Universal Input Flyback Power Supply (RDR-321)

17 W, 5 V, 1 A and 18 V, 670 mA OUTPUTS, 90 – 265 VAC INPUT FLYBACK POWER SUPPLY



TOPSwitch-HX – 2-Output, Refrigerator Power Supply (DER-218)

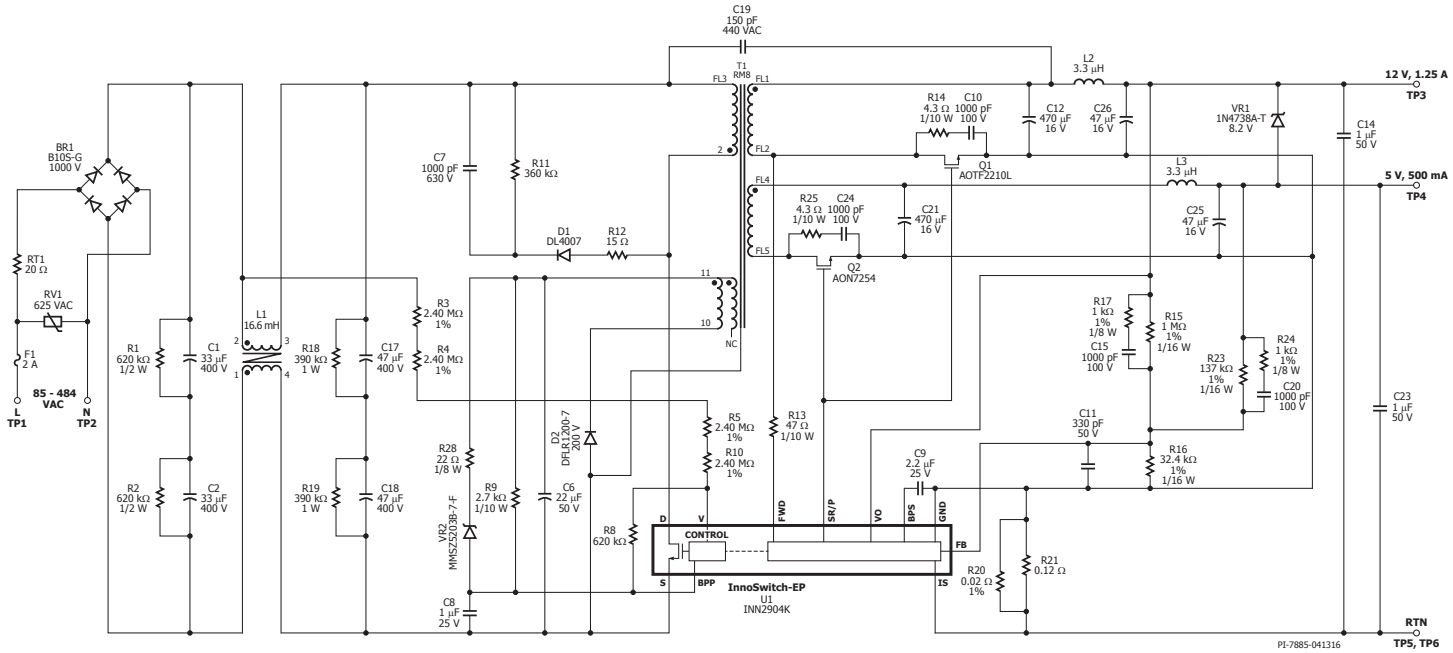
100 W, 12 V, 8 A, and 8 V, 0.4 A OUTPUTS, 102 – 265 VAC INPUT FLYBACK POWER SUPPLY



Design Examples

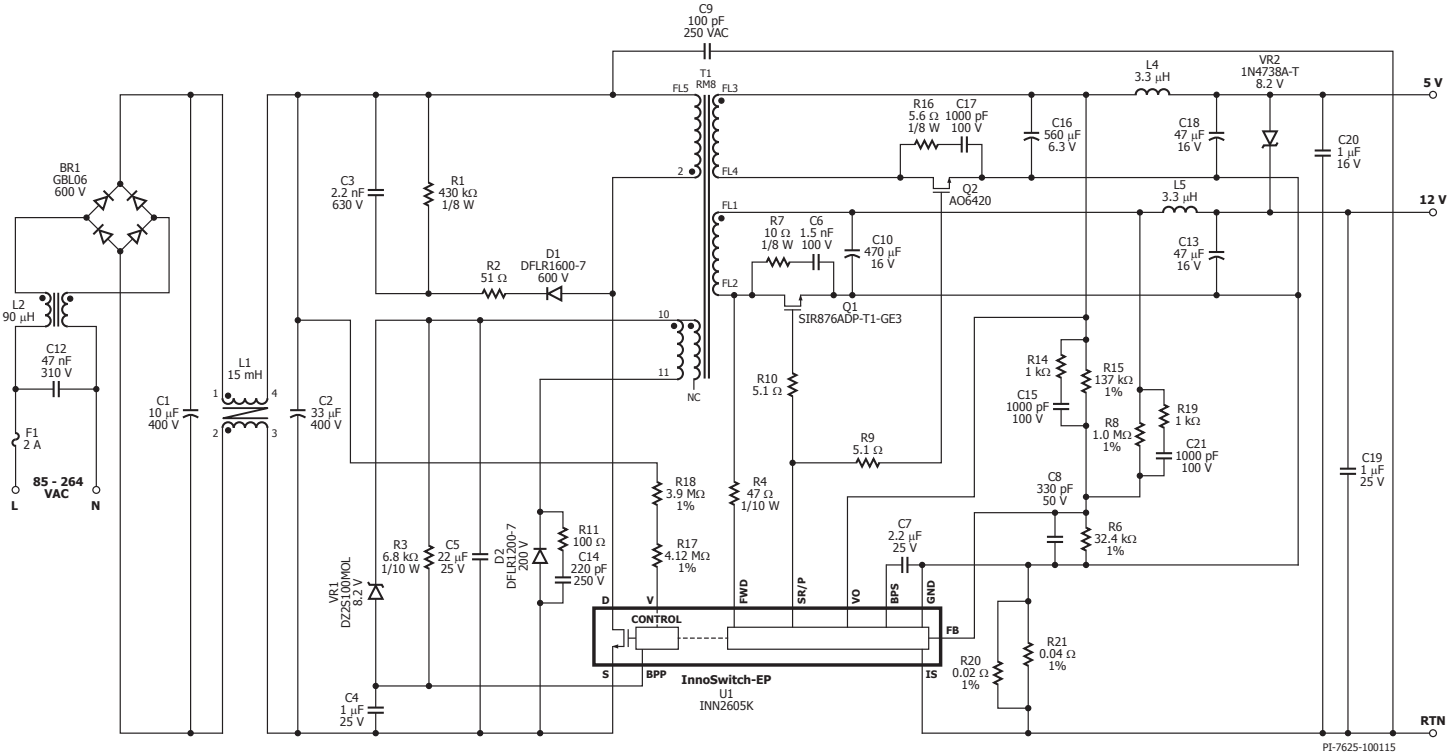
InnoSwitch-EP – 2-Output, Isolated, Universal Input Flyback Power Supply with 900 V MOSFET (RDK-531)

17.5 W, 12 V, 1.25 A and 5 V, 500 mA OUTPUTS, 85 – 484 VAC INPUT FLYBACK POWER SUPPLY



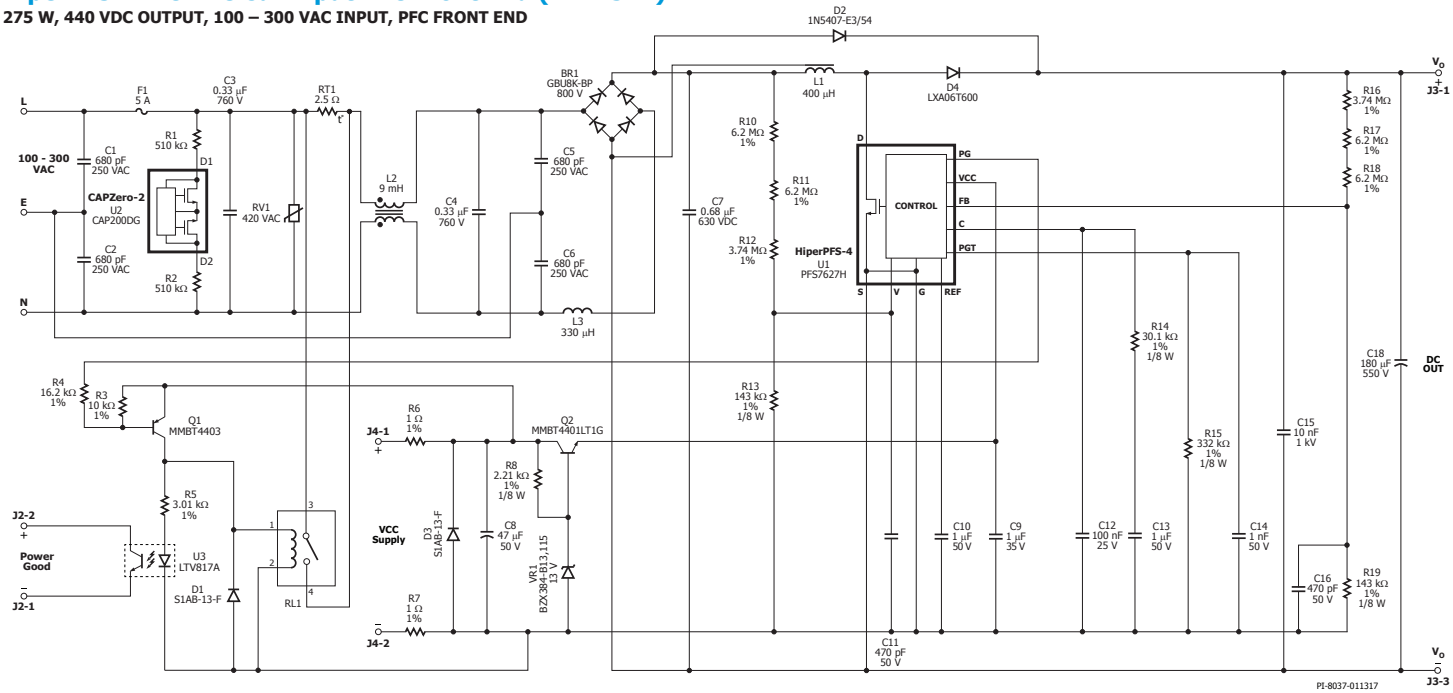
InnoSwitch-EP – 2-Output, Isolated, Universal Input Flyback Power Supply (RDK-469)

20 W, 12 V, 1.5 A and 5 V, 0.5 A OUTPUTS, 85 – 264 VAC INPUT FLYBACK POWER SUPPLY

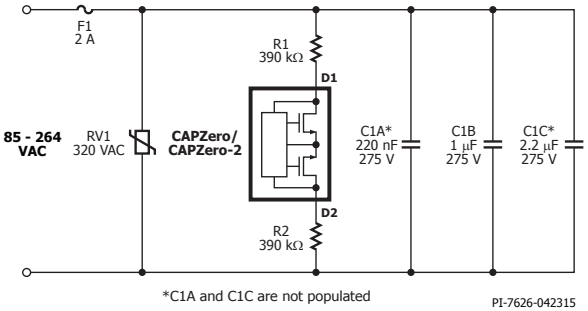


HiperPFS-4 – Universal Input PFC Front End (DER-547)

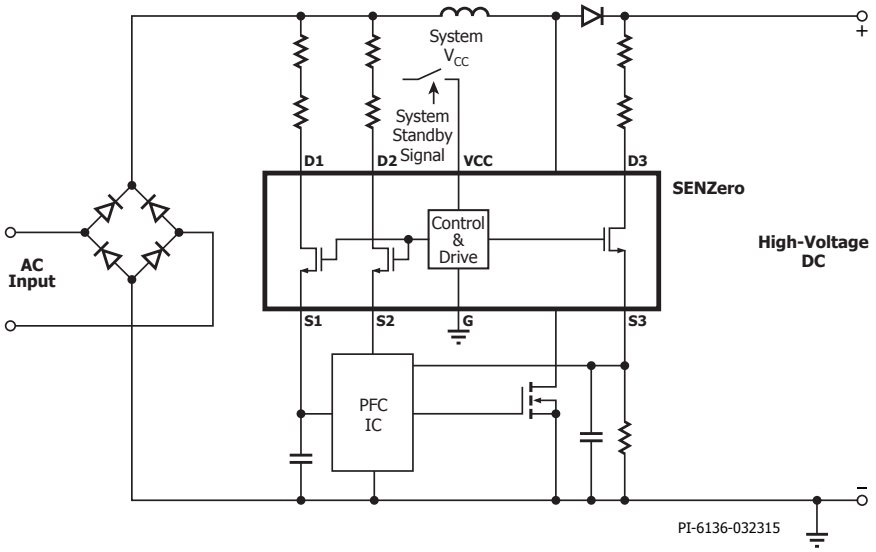
275 W, 440 VDC OUTPUT, 100 – 300 VAC INPUT, PFC FRONT END



CAPZero/CAPZero-2 – Active Discharging of the X Capacitor for Reduced Standby or No-load Power Consumption (RDK-252)



SENZero – SEN013DG used in PFC Circuit to Lower Power Consumption During Standby Mode



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