power integrations™

LinkSwitch-TNZ Product Family

Power Supply with Lossless AC Zero-Cross and X-Capacitor Discharge

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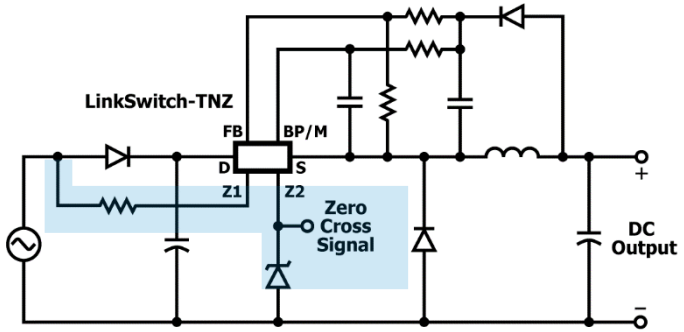
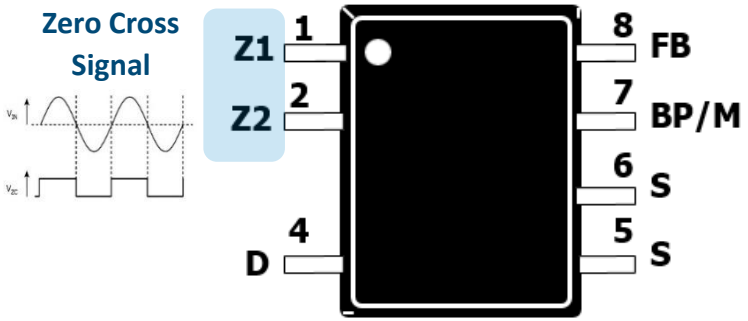
ac-dc converters led drivers gate drivers motor drivers

LinkSwitch™-TNZ Product Family

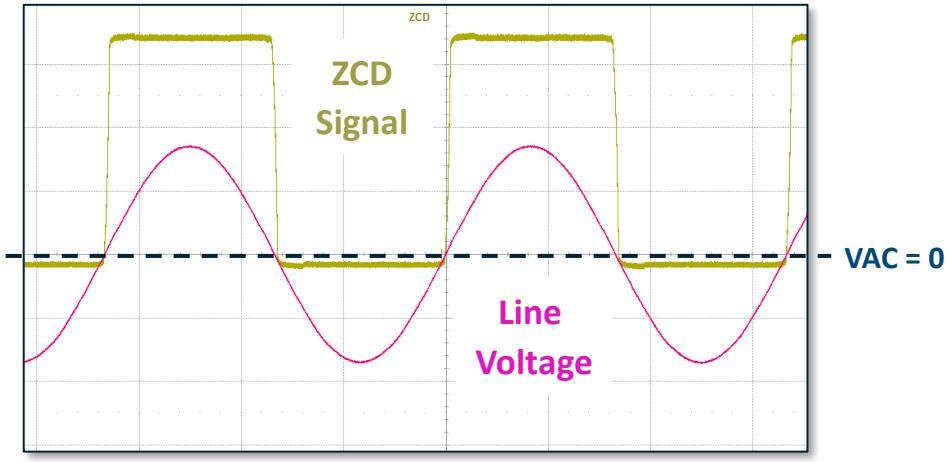
- **Aux power supply: LNK33x2-33x7D**
  - Flyback, buck and buck-boost
  - Power: 575 mA buck, 12 W flyback
  - Soft-start
  - < 20 mW no-load power
  - <150 µA leakage minimizes flicker in lighting applications
- **Lossless integrated feature options**
  - VAC zero-cross signal
  - X-capacitor discharge
- **Applications**
  - 2/3 wire dimmers, switches, occupancy sensors
  - Devices with relay/TRIAC turn-on control
  - Detecting presence or lack of AC line
  - Home appliances



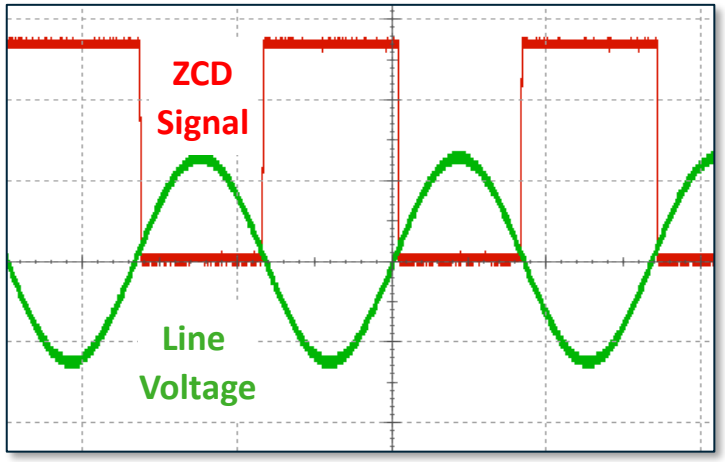


AC Zero-Cross Signal – Transitions at Crossover

- **Zero-cross detection provides logic signal when VAC passes through 0 V**
  - Signal used to synchronize turn-on of power supply via relay or TRIAC
  - By switching at VAC = 0 in-rush current is dramatically reduced

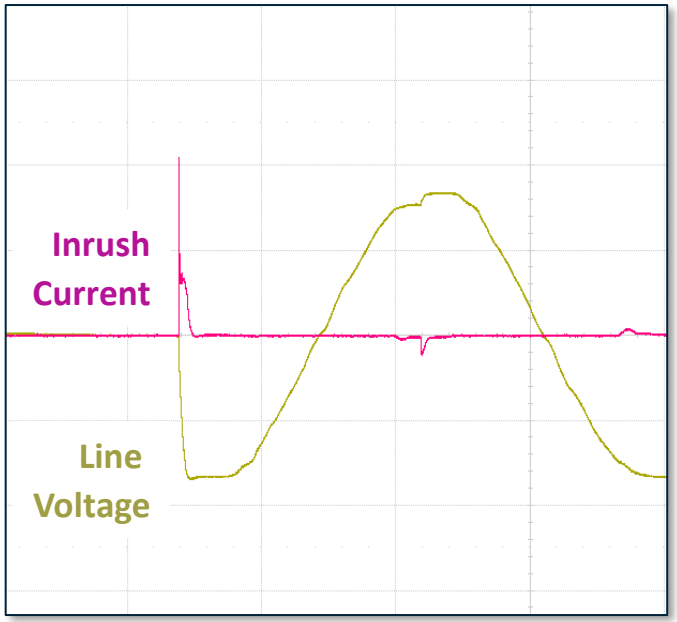


Buck Configuration



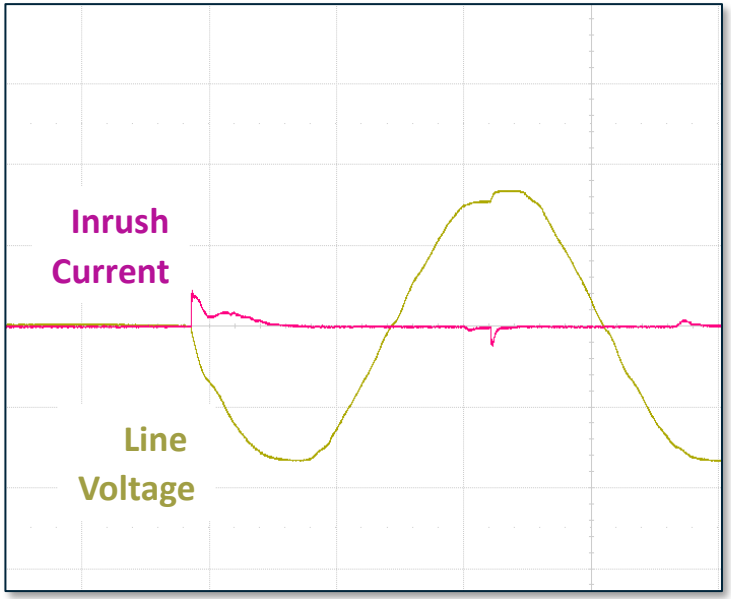
Isolated Flyback

Zero-Cross Detection Dramatically Reduces In-Rush Current in Relay-Switched Applications



No ZCD

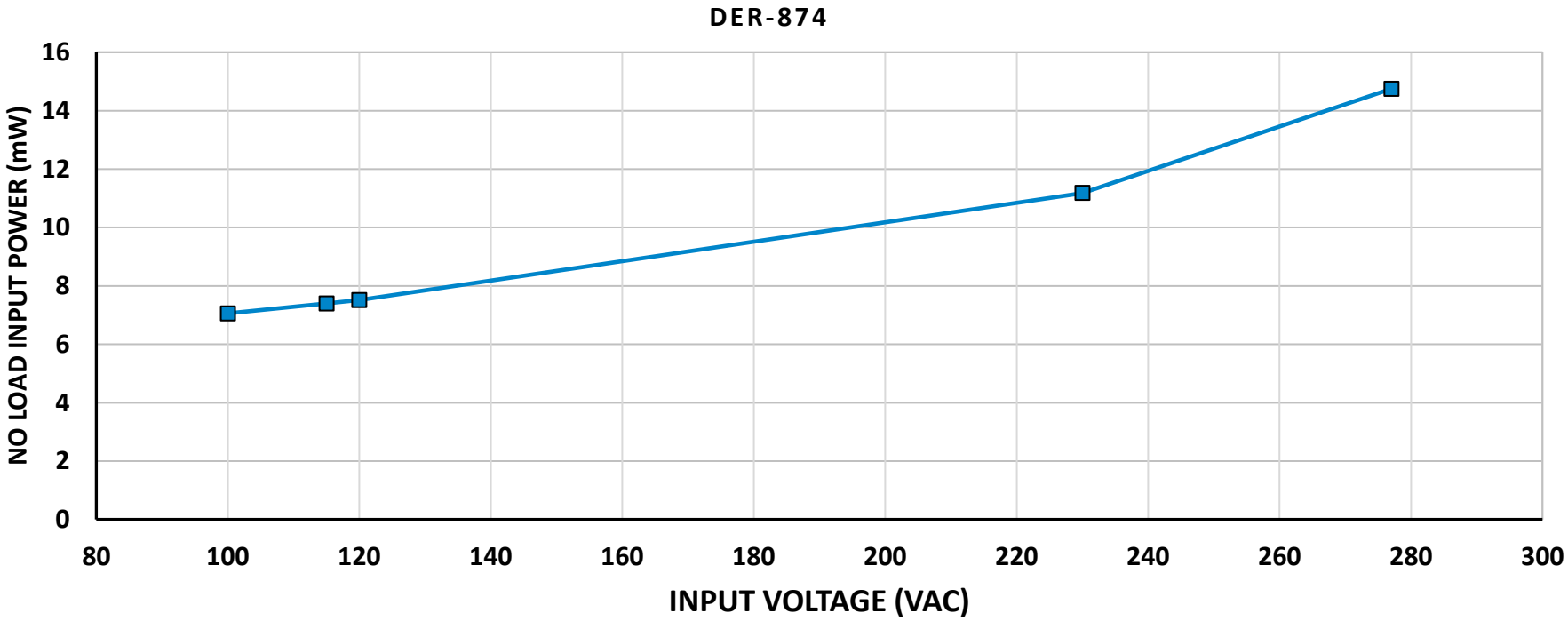
Peak in-rush current = 103 A



With ZCD

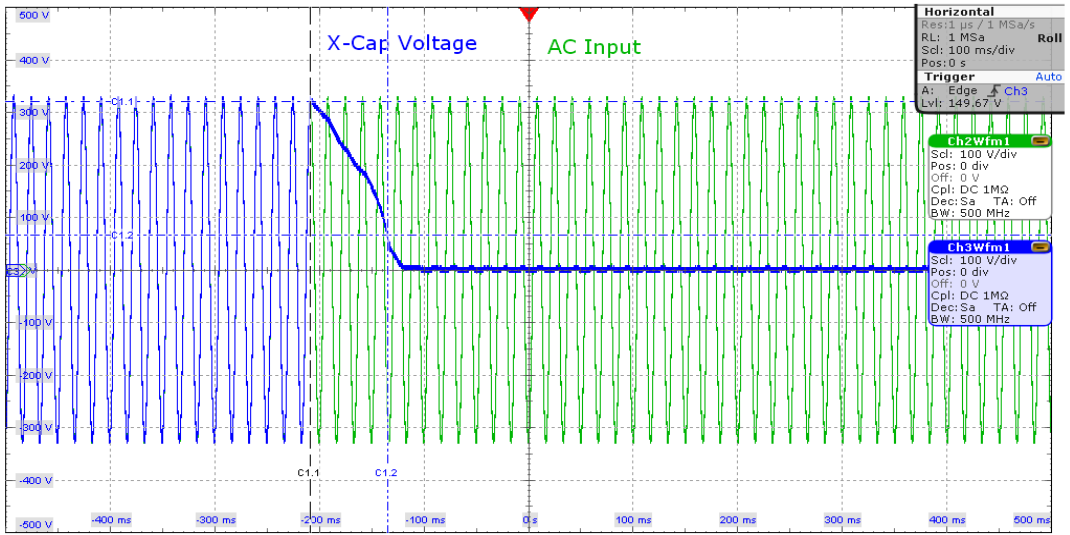
Peak in-rush current = 21.8 A

No-Load Power Consumption < 30 mW



Reduce Standby Power in Home Appliances with Active X-Capacitor Discharge

- LNK331x can eliminate energy lost by X-capacitor discharge bleed resistors
- CB (IEC62368-1) and Nemko (EN62368-1) certifications



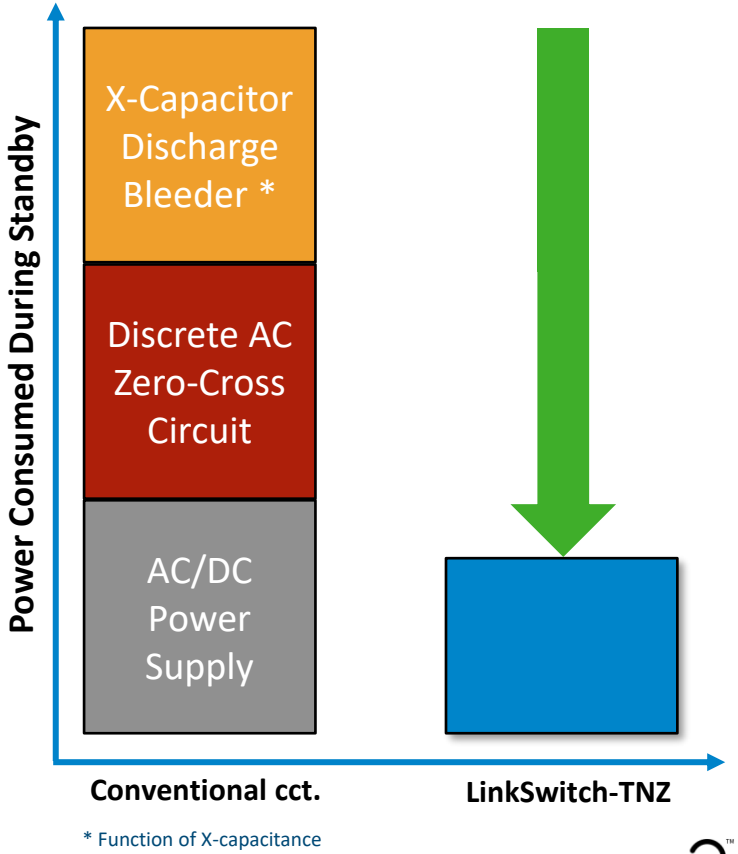
Output Power and Functionality Options

Part Number	230 VAC ± 15%		85-265 VAC	
	MDCM	CCM	MDCM	CCM
Buck Topology				
LNK33x2	63 mA	80 mA	63 mA	80 mA
LNK33x4	120 mA	170 mA	120 mA	170 mA
LN6K33x	225 mA	360 mA	225 mA	360 mA
LNK33x7	360 mA	575 mA	360 mA	575 mA
Flyback Topology				
	230 VAC ± 15%		85-265 VAC	
LNK33x2	5 W		3 W	
LNK33x4	10 W		6 W	
LNK33x6 LNK33x7	18 W		12 W	

Output Options		Buck	Flyback
Power Supply	Isolated	NA	√
	Non-Isolated	√	√
Power Supply + Zero-Cross-Detection (ZCD): LNK330x		√	√
Power Supply + X-Capacitor Discharge: LNK331x		√	√
Power Supply + ZCD + X-Capacitor Discharge: LNK331x		√	√

LinkSwitch-TNZ Provides Circuit and Application Benefits

- **Superior standby performance**
  - Discrete solution consumes 50-100 mW
  - Improved light-load efficiency allows increased product functionality in standby
  - Lowest leakage to prevent flicker in lamp applications
  - X-capacitor discharge function
- **Zero-voltage switching for relays and TRIACs reduces inrush current**
  - Dimmers need ZC for leading/trailing-edge dimming
  - Increased lifetime for relay used in switches and sensors by zero-voltage turn-on
- **Lowest component count solution**
  - >40% reduction compared to discrete



* Function of X-capacitance

Design Tools – Reference Designs

DER-874
6 V / 80 mA output
<150 µA input current
LNK3302

RDK-866
5 V / 500 mA output
Non-isolated ZCD
LNK3307

RDK-877
12 V / 0.5 A output
Isolated ZCD signal
LNK3306

DER-879
12 V / 0.75 A 5 V / 0.2 A
ZCD + X-capacitor discharge
LNK3317

0.5 W | 2.5 W | 6 W | 10 W | **Power**

Non-Isolated Buck | Isolated Flyback

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