Energy-efficient solutions for offline LED lighting and general illumination
Offline LED lighting/general illumination

ST’s position
- #1 in lighting segment*
- #2 in power management**

ST’s expertise
- System solutions
- Technology integration and innovation
- Excellent technical support

*STMicroelectronics, Datapoint and Darnell – 2008
**iSupply - 2010
Contents

- Energy-efficient solutions for offline LED lighting
  - Offline LED driver solutions
    - Features/benefits
    - System evaluation boards and tools
  - General illumination applications
    - Residential lighting
    - Commercial lighting
    - Architectural and decorative lighting
    - Street lighting and public illumination
    - Emergency lighting
    - Machine vision
Driving LEDs using AC-DC solutions

Isolated and non-isolated topologies with high efficiencies and power factor

<table>
<thead>
<tr>
<th>Power Range</th>
<th>Application Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 to 10 W</td>
<td>Single package approach, primary-side or secondary-side CC regulation</td>
</tr>
<tr>
<td></td>
<td>- Incandescent replacement</td>
</tr>
<tr>
<td></td>
<td>- Decorative bulbs</td>
</tr>
<tr>
<td>10 to 50 W</td>
<td>Single-stage AC-DC, single or multiple LED strings</td>
</tr>
<tr>
<td></td>
<td>- Triac dimmable or post regulation w/dimming</td>
</tr>
<tr>
<td></td>
<td>- Incandescent and fluorescent replacement</td>
</tr>
<tr>
<td></td>
<td>- Architectural and decorative lighting</td>
</tr>
<tr>
<td>50 W and above</td>
<td>Single-stage or double-stage AC-DC plus analog or digital CC controllers</td>
</tr>
<tr>
<td></td>
<td>- Streetlights</td>
</tr>
<tr>
<td></td>
<td>- Parking garages</td>
</tr>
<tr>
<td></td>
<td>- Warehouse high bays</td>
</tr>
</tbody>
</table>

www.BDTIC.com/ST
Non-isolated applications: up to 10W

<table>
<thead>
<tr>
<th>Device</th>
<th>Part number/family</th>
<th>Benefits</th>
</tr>
</thead>
</table>
| Monolithic converter | VIPer family (Integrated controller + MOSFET) | ▪ 800 V avalanche rugged MOSFET (VIPerPlus)  
▪ Jittering for low EMI (VIPerPlus)  
▪ Advanced OVP and OCP |
| Ultrafast diodes | STTHxx                               | ▪ Wide selection of electrical parameters and packages                     |

Applications | AC-DC solutions for LED driving
▪ Bulb replacement  
▪ Lamp retrofit  
▪ Buck  
▪ Buck-boost  
▪ Flyback
Non-isolated eval boards: 3-10W

VIPer family: High-voltage converters in non-isolated topologies

3-watt LED driver STEVAL-ILL026V1

<table>
<thead>
<tr>
<th>Evaluation board</th>
<th>Application note</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>STEVAL-ILL026V1</td>
<td>AN2961</td>
<td>3 W non-isolated offline LED driver solution based on VIPER22AS</td>
</tr>
<tr>
<td>STEVAL-ILL017V1</td>
<td>AN2811</td>
<td>3.5 W non-isolated flyback constant-current source based on VIPER17</td>
</tr>
</tbody>
</table>

Key features

- Single package approach:
  - integrated
  - robust
  - sophisticated

Main benefits

- Miniaturized form factors
- Easy design
- High power factor > 0.7
- Compliant to energy saving regulations
- No high-voltage electrolytic cap usage
- High reliability (extended MTBF)
Non-isolated applications: up to 20W

Device | Part number/family | Benefits
---|---|---
PWM controller | L6562A | • High power factor
Buck and buck-boost MOSFETs | SuperMESH 3* | • High safety margin and ruggedness
 | MDmesh II* (super junction) | • High immunity to dV/dt, low conduction and switching losses
Ultrafast diodes | STTHxx | • Up to 800 V with the best RDS(on) in the market
 | | • Best-in-class in dynamic dV/dt
 | | • Low input capacitance and gate charge, low gate input resistance
* See MOSFET selection guide in presentation, online, and in energy-efficient solutions for LED lighting brochure

Applications

AC-DC solutions for LED Driving
- Neon and bulb replacement
- Lamp retrofit

Applications

- Inverse buck
- Buck-boost

www.BDTIC.com/ST
L6562A PWM controller eval boards

Key features
- Buck-boost topology
- Transition mode operation
- High power factor > 0.8
- Open-load protection
- Short-circuit protection

Main benefits
- Simple
- Low cost
- Lower switching losses
- Spread of EMI spectrum
- Compliant to energy saving regulations, suitable for residential lighting
- Robust

Evaluation board | Application note | Description
--- | --- | ---
STEVAL-ILL027V2 | AN3111 | 18 W single-stage offline LED driver

HPF inverse buck STEVAL-ILL034V1
## Isolated applications: Up to 10W

### Applications

<table>
<thead>
<tr>
<th>AC-DC solutions for LED driving</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bulb replacement</td>
</tr>
<tr>
<td>Lamp retrofit</td>
</tr>
</tbody>
</table>

### Flyback

#### Device

<table>
<thead>
<tr>
<th>Device</th>
<th>Part number/family</th>
<th>Benefits</th>
</tr>
</thead>
</table>
| Primary IC      | HVLED805 (controller + MOSFET) | - CC/CV primary regulation  
                  |                                                                           | - QR zero voltage switching operation  
                  |                                                                           | - 800 V avalanche rugged MOSFET                              |
|                 | VIPer Plus (controller + MOSFET) | - 800 V avalanche rugged MOSFET, high power factor  
                  |                                                                           | - Jittering for low EMI                                         |
|                 | Schottky diodes STPSxx        | - Wide product range in Vf/Ir trade off, avalanche ruggedness          |
|                 | CV/CC control SEA0x           | - Very low current consumption, wide input voltage range               |

---

www.BDTIC.com/ST
### Key features

- Single package approach
  - integrated
  - robust
  - sophisticated

- CC/CV primary regulation

- No optocoupler

- Zero voltage switching operation and high voltage start-up

### Main benefits

- Miniaturized form factors
- Easy design

- Reduced costs and system complexity
- Very small form factor to fit in LED retrofit applications

- High reliability (extended MTBF)

- High efficiency up to 85%
HVLED805 eval board solutions

**EVALHVLED805**

4.2 W solution for 350 mA LED type

**STEVAL-ILL037V1**

Efficiency > 80%

3.2 W solution for 200 mA LED type

**Evaluation board** | **Application note** | **Description**
--- | --- | ---
EVALHVLED805 | Data brief | 4.2 W offline LED driver with primary-side regulation
STEVAL-ILL037V1 | AN3360 | 3.2 W LED power supply based on HVLED805

3 W solution for 300 mA LED type

No e-cap solution

Solution with e-cap
VIPerPlus family overview

- Quasi-resonant
  - VIPer35*
  - VIPer25
  - VIPer15

- Fixed frequency with jittering
  - VIPer37
  - VIPer38*
  - VIPer26
  - VIPer16
  - VIPer06*

- Non isolated
  - Buck/buck-boost/flyback

- Isolated
  - Flyback

Supported topologies

Power (W) w/85-440 V_{AC}

- Full production
- *Production 2011
VIPerPlus HPF LED driver eval board

High-voltage converters in high power factor flyback

<table>
<thead>
<tr>
<th>Key features</th>
<th>Main benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>▪ Single package approach</td>
<td>▪ Miniaturized form factors</td>
</tr>
<tr>
<td>▪ integrated</td>
<td>▪ Easy design</td>
</tr>
<tr>
<td>▪ robust</td>
<td></td>
</tr>
<tr>
<td>▪ sophisticated</td>
<td></td>
</tr>
<tr>
<td>▪ High-frequency operation</td>
<td></td>
</tr>
<tr>
<td>▪ High power factor &gt; 0.9</td>
<td>▪ Compliant to energy saving regulations, suitable for commercial lighting</td>
</tr>
<tr>
<td>▪ No electrolytic output capacitor if current ripple is accepted</td>
<td>▪ High reliability (extended MTBF)</td>
</tr>
</tbody>
</table>

Evaluation board | Application note | Description                                                                                                                                                                         |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>EVLVIP27-7WLED *</td>
<td>AN3212</td>
<td>3.5 W to 7 W high power factor offline LED driver based on VIPer devices</td>
</tr>
</tbody>
</table>

* Please contact local sales support to order this board
Isolated applications: from 10 to 75W

Offline single-stage HPF flyback solution

### Applications

<table>
<thead>
<tr>
<th>Device</th>
<th>Part number/family</th>
<th>Benefits</th>
</tr>
</thead>
</table>
| Primary IC      | L6562A / AT (PFC controller) | - High power factor flyback  
                  |                     | - Triac dimmable  
                  |                     | - Extended temperature range (AT version)  |
| Flyback MOSFET  | SuperMESH 3*      | - High safety margin and ruggedness  
                  |                     | - High immunity to dV/dt, low conduction and switching losses  |
|                 | MDmesh II* (super junction) | - Up to 800 V with best $R_{DS(on)}$ in the market  
                  |                     | - Best-in-class in dynamic dV/dt  
                  |                     | - Low input capacitance and gate charge, low gate input resistance  |
| Schottky diodes | STPSxx             | - Wide product range in $V_f/I_r$ trade-off, avalanche ruggedness  |
| CV/CC control   | SEA0x              | - Very low current consumption, wide input voltage range  |

* See MOSFET selection guide in presentation, online, and in energy-efficient solutions for LED lighting brochure

[Image of circuit diagram]

AC-DC solutions for LED driving

- Tube lamp and bulb replacement  
  - Flyback
- Architectural and decorative lighting  
  - Flyback
- Street lighting  
  - Flyback

[www.BDTIC.com/ST]
L6562A

15W Triac dimmable eval board

### Key features

- High power factor flyback topology supported > 0.9
- Compliant to energy saving regulations
- Control and power section separated
- Suitable for high power
- Design flexibility
- Triac dimmable
- Commonly available dimming option for home fixtures
- High output voltage
- No limitation to the number of LEDs within a string
- Based on low-cost controller and MOSFETs
- Cost-effective solution

### Main benefits

<table>
<thead>
<tr>
<th>Evaluation board</th>
<th>Application note</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>STEVAL-ILL016V2</td>
<td>AN2711</td>
<td>15 W offline Triac dimmable LED driver from 96 to 32 V&lt;sub&gt;AC&lt;/sub&gt;</td>
</tr>
</tbody>
</table>

www.BDTIC.com/ST
L6562A

HPF flyback + inverse buck eval boards

Key features

<table>
<thead>
<tr>
<th>Main benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>High efficiency (&gt; 90%), high power factor (&gt; 0.9), flyback topology supported</td>
</tr>
<tr>
<td>Compliant to energy saving regulations</td>
</tr>
<tr>
<td>Control and power section separated</td>
</tr>
<tr>
<td>Suitable for high power</td>
</tr>
<tr>
<td>Design flexibility</td>
</tr>
<tr>
<td>CC regulator in inverse buck working in fixed off time</td>
</tr>
<tr>
<td>Constant ripple current, when input/output voltages change</td>
</tr>
<tr>
<td>High output voltage</td>
</tr>
<tr>
<td>No limit to number of LEDs on string</td>
</tr>
</tbody>
</table>

Evaluation board | Application note | Description |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>STEVAL-ILL019V1</td>
<td>UM0926</td>
<td>35 W offline RGGB LED driver with individual channel brightness regulation</td>
</tr>
<tr>
<td>EVL6562A-35WFLB *</td>
<td>AN2838</td>
<td>35 W wide-range HPF flyback converter with L6562A</td>
</tr>
<tr>
<td>EVL6562A-LED</td>
<td>AN2928 AN2983</td>
<td>Modified buck converter for LED applications</td>
</tr>
</tbody>
</table>

* Please contact local sales support to order this board
Non-isolated: 80W and higher eval board

PFC boost + inverse buck

- Street lighting
- PFC boost
- Inverse buck

Key features
- LED current setting to 350 mA, 700 mA and 1 A
- High efficiency (~90%), high power factor, very low THD
- High output voltage
- No limitation to the number of LEDs within a string
- EN55015 and EN61000-3-2 compliant
- Satisfies the relevant lighting regulations

Evaluation board | Application note | Description
--- | --- | ---
STEVAL-ILL013V1 | AN2928 UM0670 | 80 W offline LED driver with dimming based on L6562A
Isolated: >70W resonant LED eval boards

**PFC (L6562AT) + resonant converter (L6599AT) + inverse buck (L6562AT) with MOSFETs***

<table>
<thead>
<tr>
<th><strong>Key features</strong></th>
<th><strong>Main benefits</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>PFC + resonant controller, with extended temperature range</td>
<td>Suitable for outdoor applications</td>
</tr>
<tr>
<td>No el-cap usage</td>
<td>High rel (extended MTBF)</td>
</tr>
<tr>
<td>Zero voltage switching and symmetrical topology</td>
<td>Very high efficiency &gt; 92%</td>
</tr>
<tr>
<td>Post-regulation with dimming solution</td>
<td>Dimmable solutions</td>
</tr>
<tr>
<td>EN55015 and EN61000-3-2 compliant</td>
<td>Satisfies the relevant lighting regulations</td>
</tr>
</tbody>
</table>

---

**Evaluation board**

<table>
<thead>
<tr>
<th>Evaluation board</th>
<th>Application note</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>EVL130W-SL-EU</td>
<td>AN3105</td>
<td>48 V, 130 W LED street lighting SMPS based on L6562AT and L6599AT for European input mains range</td>
</tr>
<tr>
<td>EVL130W-STRLIG</td>
<td>AN3106</td>
<td>48 V, 130 W LED street lighting SMPS based on L6562AT and L6599AT for wide input mains range</td>
</tr>
<tr>
<td>EVL6562A-LED</td>
<td>AN2983 AN2928 for ref</td>
<td>Modified buck converter for LED applications</td>
</tr>
</tbody>
</table>

* See MOSFET selection guide earlier in presentation, online, and in energy-efficient solutions for LED lighting brochure
Isolated LED supply: >75W eval board

### L6564: current mode PFC controller

<table>
<thead>
<tr>
<th>Key features</th>
<th>Main benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fast bidirectional input voltage feedforward</td>
<td>Fast reaction to</td>
</tr>
<tr>
<td></td>
<td>• load change</td>
</tr>
<tr>
<td></td>
<td>• input voltage change</td>
</tr>
<tr>
<td>Protection</td>
<td>Very robust design</td>
</tr>
<tr>
<td>• for inductor saturation</td>
<td></td>
</tr>
<tr>
<td>• adjustable overvoltage</td>
<td></td>
</tr>
<tr>
<td>• against feedback loop disconnection</td>
<td></td>
</tr>
<tr>
<td>Low start-up current</td>
<td>High efficiency</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Device</th>
<th>Part number/family</th>
<th>Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PFC controller</td>
<td>L6562AT L6563S, L6564</td>
<td>• Flexibility: 8 pins (L6562A) to 10 pins (L6564) up to 14 pins (L6563S) with different levels of protection</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• T version for extended temperature range (-40 to 150 °C)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Device</th>
<th>Part number/family</th>
<th>Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ideal for</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• PFC preregulator</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• SMPS for LED luminaries</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Evaluation board</th>
<th>Application note</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>EVL6564-100W</td>
<td>AN3022</td>
<td>100 W transition mode PFC preregulator with L6564</td>
</tr>
</tbody>
</table>

www.BDTIC.com/ST
L6585DE: SMPS eval board for LEDs

Front-end one-chip SMPS solution

**Description and purpose**
- Highly-efficient and compact power supply for high-brightness LED applications such as street lighting

**Key features**
- Input voltage 90 to 264 V<sub>AC</sub>
- Output current: 2.7 A
- Output voltage: 48 V
- No el cap (extended MTBF)
- Efficiency: 91% (115 VAC), 93% (230 VAC)
- System power: 130 W
- OCP, SC protection

**Key products**
- L6585DE, STF9NM60N, STF21NM60N, STPS10150C, STTH3L06

**Typical applications**
- Street lighting SMPS, adapters (with 19 V, 4.7 A output)

PFC stage + series-resonant half-bridge topology

STEVAL-ILL038V1

www.BDTIC.com/ST
Digital current controller eval board

Multi-string LED driving based on STM8S microcontroller

Key features

- Inverse buck topology in CCM
- Ground referred circuit, no need for gate drivers
- Logic level MOSFET driven directly by microcontroller
- Low-voltage sensing circuit
- High efficiency up to 98%
- Works w/o output capacitor
- Accurate average-current control
- Long lifetime for LED
- Able to compensate for Vf variation due to thermal issue
- Global dimming from 2% to 100% at 225 Hz (PWM dimming)
- No flicker
- Independent analog dimming
- Suitable for RGBW luminaries

Main benefits

Evaluation board | Application note | Description
--- | --- | ---
STEVAL-ILL031V1 | AN3151 | Digital constant-current controller for multi-string LED applications based on STM8S208x

www.BDTIC.com/ST
Solar-LED streetlight controller w/STM32

25 W LED lamp driver and 80 W battery charger

### Description and purpose
- Cost-optimized and fully-protected solution to control solar energy storage and to manage LED streetlights

### Key features
- Maximum power point tracker (MPPT) for more efficient energy use
- Automatic day/night detection
- Automatic battery/mains switchover
- Constant-current control for LED lamps
- Battery charge control with temperature monitoring
- Easy system monitoring via debug
- Full protection function for battery, LED lamp and solar panel

### Key products
- STP40NF10, STP75NF75, STPS20H100, STPS1L60, STPS2045

### Typical applications
- LED street lighting, solar LED applications

### Evaluation board
- **STEVAL-ILL022V1**

### Application note
- UM0512

### Description
- STEVAL-ILL022V1 solar-LED streetlight controller with 25 W LED lamp driver and 80 W battery charger based on the STM32F101Rx

[Image of Solar-LED streetlight controller w/STM32]

[Image of STM32 MCU]

[Image of STEVAL-ILL022V1]

[Image of evaluation board]

[Image of application note]

[Image of typical applications]

[Image of description]

[Image of key products]

[Image of key features]

[Image of description and purpose]
Smart street lighting

Intelligent LED cities – ST solutions

Lamp driver and controller

Power Supply L6562AT
L6599AT

LED Driving STM8S

Lamp communication module:
wireless network solution

STM32W
M24LR64-R

Lamp communication module:
wired network solution

STM32F

STM7540

M24LR64-R

District data concentrator

GPRS Module

M24128-Bxx

STM32F

ST7540

STM32W

M24LR64-R

Lightens street lighting energy load

STMicroelectronics

www.BDTIC.com/ST
### Power MOSFET overview

<table>
<thead>
<tr>
<th>P/N</th>
<th>BVDss (V)</th>
<th>$R_{DS(on)}$ (max) (Ω)</th>
<th>Package</th>
<th>Technology</th>
</tr>
</thead>
<tbody>
<tr>
<td>ST*90N4F3</td>
<td>40</td>
<td>0.0065</td>
<td>DPAK, TO-220, IPAK</td>
<td>STripFET™ III</td>
</tr>
<tr>
<td>ST*20N4F3</td>
<td>40</td>
<td>0.004</td>
<td>D²PAK, TO-220</td>
<td>STripFET™ III</td>
</tr>
<tr>
<td>ST*270N4F3</td>
<td>40</td>
<td>0.0025</td>
<td>D²PAK, TO-220</td>
<td>STripFET™ III</td>
</tr>
<tr>
<td>STL70N4LLF5</td>
<td>40</td>
<td>0.0065</td>
<td>PowerFLAT 5x6</td>
<td>STripFET™ V</td>
</tr>
<tr>
<td>STL80N4LLF3</td>
<td>40</td>
<td>0.005</td>
<td>PowerFLAT 5x6</td>
<td>STripFET™ III</td>
</tr>
<tr>
<td>STL140N4LLF5</td>
<td>40</td>
<td>0.00275</td>
<td>TO-220FP, DPAK, D²PAK</td>
<td>MDmesh™ II</td>
</tr>
<tr>
<td>ST*3NF06L</td>
<td>60</td>
<td>0.1</td>
<td>SOT-223</td>
<td>STripFET™ II</td>
</tr>
<tr>
<td>STS5NF60L</td>
<td>60</td>
<td>0.055</td>
<td>TO-220FP, DPAK, D²PAK</td>
<td>MDmesh™ II</td>
</tr>
<tr>
<td>STS4DNF60L</td>
<td>40</td>
<td>0.055</td>
<td>TO-220FP, DPAK, D²PAK</td>
<td>MDmesh™ II</td>
</tr>
<tr>
<td>STL28NF6F3*</td>
<td>80</td>
<td>0.034</td>
<td>PowerFLAT 3.3 x 3.3</td>
<td>STripFET™ III</td>
</tr>
<tr>
<td>STS4NF100</td>
<td>100</td>
<td>0.06</td>
<td>TO-220FP, DPAK, D²PAK</td>
<td>MDmesh™ II</td>
</tr>
<tr>
<td>ST*19NF20</td>
<td>200</td>
<td>0.16</td>
<td>TO-220, TO-220FP, DPAK</td>
<td>STripFET™ II</td>
</tr>
<tr>
<td>ST*20NF20</td>
<td>200</td>
<td>0.125</td>
<td>TO-220, TO-220FP, DPAK</td>
<td>STripFET™ II</td>
</tr>
<tr>
<td>ST*16NF25</td>
<td>250</td>
<td>0.235</td>
<td>TO-220, TO-220FP, DPAK</td>
<td>STripFET™ II</td>
</tr>
<tr>
<td>ST*50NF25</td>
<td>250</td>
<td>0.069</td>
<td>TO-220, DPAK, D²PAK</td>
<td>STripFET™ II</td>
</tr>
<tr>
<td>STQ3N45K3-AP</td>
<td>450</td>
<td>3.8</td>
<td>IPAK, SOT-223, TO92</td>
<td>SuperMESH 3™</td>
</tr>
<tr>
<td>ST*8NM50N</td>
<td>500</td>
<td>0.79</td>
<td>TO-220, TO-220FP, DPAK</td>
<td>SuperMESH 3™</td>
</tr>
<tr>
<td>ST*10NM50N</td>
<td>500</td>
<td>0.63</td>
<td>TO-220, TO-220FP, DPAK</td>
<td>SuperMESH 3™</td>
</tr>
<tr>
<td>ST*11NM50N</td>
<td>500</td>
<td>0.47</td>
<td>TO-220, TO-220FP, DPAK</td>
<td>SuperMESH 3™</td>
</tr>
<tr>
<td>ST*14NM50N</td>
<td>500</td>
<td>0.32</td>
<td>TO-220, DPAK, D²PAK</td>
<td>SuperMESH 3™</td>
</tr>
<tr>
<td>ST*19NM50N</td>
<td>500</td>
<td>0.25</td>
<td>TO-220, TO-220FP, DPAK</td>
<td>SuperMESH 3™</td>
</tr>
<tr>
<td>ST*23NM50N</td>
<td>500</td>
<td>0.19</td>
<td>TO-220, DPAK, D²PAK</td>
<td>SuperMESH 3™</td>
</tr>
<tr>
<td>ST*28NM50N</td>
<td>500</td>
<td>0.158</td>
<td>TO-220, DPAK, D²PAK</td>
<td>SuperMESH 3™</td>
</tr>
<tr>
<td>ST*5N52K3</td>
<td>525</td>
<td>1.5</td>
<td>D²PAK, TO-220FP, TO-220, IPAK</td>
<td>SuperMESH 3™</td>
</tr>
<tr>
<td>ST*6N52K3</td>
<td>525</td>
<td>1.2</td>
<td>D²PAK, TO-220FP, TO-220, IPAK</td>
<td>SuperMESH 3™</td>
</tr>
<tr>
<td>ST*7N52K3</td>
<td>525</td>
<td>1.15</td>
<td>D²PAK, TO-220FP, TO-220, IPAK</td>
<td>SuperMESH 3™</td>
</tr>
</tbody>
</table>

### ST’s 2nd generation super junction, high-voltage power MOSFET technology

#### MDmesh II
- Improved avalanche ruggedness
- Lower on-resistance
- Enhanced dynamic performance
- Improved diode reverse recovery characteristics

#### SuperMESH 3
- Covers high-voltage breakdown class for

*Under development. Available in Q3/2012*
Energy-efficient solutions on st.com

Offline LED lighting and general illumination

LED lighting brochure

LED application web pages

STMicroelectronics offers a full range of components and evaluation boards for offline LED driver applications. The most common topologies are presented. The major applications covered are residential, commercial, architectural and street lighting.

eDesign Studio  www.st.com/edesignstudio
For more information, visit:

www.st.com > home > support > tools & resources
www.st.com/LED > off-line LED drivers

Thank you