STMicroelectronics
Leader in Power Supply Applications

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意法半導體
電源管理IC與照明應用產品行銷技術經理
A complete offering of devices and solutions across power applications

Chargers

Discrete & Power Transistors

All In One, Desktop Lighting

Adapters

Servers

Data centers

Efficient

Competitive

Smart

ST's portfolio delivers complementarity for targeted end markets
High synergies between R&D and manufacturing
Offering across the Power Application

Full Power Coverage

ViperPLUS (<20W)

Flyback QR STCH02 (15W~50W)

TM Mode PFC L656X (Power Factor 10~250W)

Low Power (Buck / Buck-Boost / Flyback)

Middle Power (QR Flyback / PFC)

High Power (PFC / LLC / SR LLC / Combo)

CCM PFC L4984D (250W~500W)
LLC L6599AD/L6699D (50W~400W)
SR for LLC SRK200X (50W~400W)
Analog and Digital Power (PFC+LLC Combo 50W~250W)

High-power-density and cost-effective power supplies
The stand by reference for the Industry: The VIPerPLUS family

Several billions TAM in small and medium home appliances
Lighting and metering applications also addressed by the ViperPLUS Family
Target Market - ViperPlus Family

**Household Appliances**
- Periodical appliances
- Continuous appliances
- Behavioral appliances

**Building & home control**
- Lighting systems
- Control Systems (BACnet)
- Heating

**Small Industrial**
- Periodical appliances
- Continuous appliances
- Behavioral appliances

**Metering**
- Energy meters

**Adapter**
- Electronic components
## ViperPlus Family

Full coverage for each Power Range

<table>
<thead>
<tr>
<th>Buck Converter</th>
<th>100mA</th>
<th>200mA</th>
<th>350mA</th>
<th>600mA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fly-back Converter</td>
<td>5W</td>
<td>8W</td>
<td>12W</td>
<td>15W</td>
</tr>
</tbody>
</table>

- **800V**
  - 32Ω 350mA
  - 24Ω 400mA
  - 20Ω 480/600 mA
  - 19Ω (900V) Ext RSENSE
  - 14Ω Ext RSENSE
  - 7Ω 700mA
  - 4.5Ω 1 / 1.15A

### Chips
- **VIPer0P**
- **VIPerPlus*1**
- **VIPerPlus*5**
- **VIPerPlus*6**
- **VIPerPlus*7**
- **VIPerPlus*8**
- **Altair0***

- **VIPer0P**
- **VIPer1**
- **VIPer11**
- **VIPer25**
- **VIPer35**
- **VIPer26**
- **VIPer26K**
- **VIPer27**
- **VIPer28**
- **VIPer37**
- **VIPer38**
- **Altair 04**
- **Altair 05**
ZPM - Fully Managed by MCU

VIPer0P

Forcing **OFF** pin to ground to enter ZPM
→ managed by MCU

Forcing **ON** to ground to exit ZPM
→ managed by MCU using a touch button or the IR receiver
→ soft start-up during restart

During ZPM the MCU is supplied through ON pin

<table>
<thead>
<tr>
<th>$V_{IN}$</th>
<th>Input power @ no load Supplied from $V_{OUT}$ (diode)</th>
<th>Input power @ no load Self supply</th>
</tr>
</thead>
<tbody>
<tr>
<td>115 V$_{AC}$</td>
<td>4.9 mW</td>
<td>10.3 mW</td>
</tr>
<tr>
<td>230 V$_{AC}$</td>
<td>9.1 mW</td>
<td>120 mW</td>
</tr>
</tbody>
</table>
Smart (Digital) Powers

Being smart in power is a necessity

Digital adoption from low volume Datacom / Telecom Server (~40Mu) to high-volume consumer electronics (~500Mu)

Digital Power Supply

Digital Lighting

Efficiency

Flexibility & Programmability

Technology – Techniques – Products : The Smart Approach of STMicroelectronics

Significant development time reduction thanks to easy application configurability:
Digital communication enables real-time design modifications with minimum or no hardware changes
• The **STLUX/STNRG** are the flexible digital platforms with a full set of specific features and peripherals for AC/DC and DC/DC Power Conversion

• Suitable for:
  
  • Smart Lighting: LED, HID, Fluorescent applications with dimming capability (PWM and/or LINEAR) and integration with sensors
  
  • Digital Power Supply (SMPS): PFC control, LLC, Asymmetrical Half Bridge, Fly-back, Full Bridge topologies and Buck / Boost single/multi channel synchronous rectification

• Wired or wireless communications, simple installation in large indoor and outdoor area, reducing maintenance costs
STLUX Key Features

- **SIX** configurable PWM State Machine Event Driven (SMED) 1.3ns resolution (with automatic dithering) – 10.4 native.
- 4 analog comparators and 6 fast digital inputs synchronized with 96MHz clock.
- 8 channels 10 bit ADC with programmable op amp GAIN resolution, 2.4 µs conversion time,
- -40 °C to 105 °C temperature range
- TSSOP38

- STLUX digital power converters are the right solution for digital power conversion applications.
- ST programmable SMED peripherals + Switch matrix and 8 bits ST core provide flexible and complete power management functionalities in a single IC.
- By providing high-speed PWMs (96MHz), dedicated 8ch ADCs with selectable gain, STLUX exploits system performance and reliability.
Event 1

- HSE
  - LSI – 153 kHz
  - HSI – 16 Mhz
  - PLL (96 Mhz)

- 4x Analog Comparator

- PWMs
- 6x Digital Inputs

Event 2

- ADC with sequencer
- Serial – I2C
- DALI

3x Events

CPU

Registers

6x SMEDs (State Machine)

- Init
- Hold
- S0
- S1
- S2
- S3

6x PWMs

PWM state:
- LOW
- HIGH

STLUX Platform
USB Type-C and Power Delivery

ST powering the future of USB

2.1 billion devices with USB 3.0 and 3.1 in 2016* – 12% of mobile handsets with Type-C connectors by 2016**

- More power with USB Power Delivery (100W)
- Optimize management on multiple peripherals
- More Speed with USB 3.1 (10 Gbit/s)
- More protocols

ST's portfolio delivers leading-edge and dedicated solutions

*Source: USB Implementers Forum  **Source: Strategy Analytics
USB Type-C and Power Delivery

A solution for each profile!

PROFILE 1
5V @ 2A 10W

PROFILE 2
5V @ 2A, 12V @ 1.5A 18W

PROFILE 3
5V @ 2A, 12V @ 1.5A 36W

PROFILE 4
5V @ 2A, 12V, 20V @ 3A 60W

PROFILE 5
5V @ 2A, 12V, 20V @ 5A 100W

STCH02 + STUSB47 & STM32

STCMB1 + DCDC + I/F

*Source: USB Implementers Forum
**Source: Strategy Analytics
Quick Charging

Charging become quick

STMicroelectronics addresses Qualcomm Quick Charge Platform 3.0 with dedicated products offering

- STCH02
- STQC30
- SRK1000 (optional)

High Efficiency

Dedicated product offering
Quick Charging

STQC 30 competitive advantages

LESS COMPONENTS
• Full features in a compact package
• Discharge bleeder integrated
• Programmable current profiles

HIGH PERFORMANCE
• Low standby consumption
• Adaptive overvoltage protection
• Extended Vcc range (for operation lower than 3V)

STQC30
QC 3.0 & QC2.0 (CLASS A)
Wireless Charging

Leave cables at home and top up batteries

In 2018 about one billion wireless power receiver units will be shipped worldwide

- Multiple standards supported (Qi and PMA)
- Customizable end-applications
- Complete portfolio with Transmitter & Receiver supporting multiple industry standards and end-applications (IoT, mobile, wearable, power tools, automotive-grade and medical-grade applications)
Wireless Power

System know-how for complete solution with TX and RX

- Load
  - Output Power
  - Sensing & Control
  - Magnetic Coupling
  - Primary Coil
  - Power Conversion Unit
  - Communications & Control Unit
  - System Unit

- RX
- TX

- Power Pick-up Unit
- Communications & Control Unit
  - Secondary Coil
  - Receiver

- Mobil Device
  - DIGITAL COMMUNICATION
  - POWER

- Input Power

- Multiple Qi and PMA standards supported
- Digital feedback from RX to TX
- Foreign object detection (FOD)
- Customizable end-applications
Wireless Charging: Consumer

Wireless power reference design: plug and play

STWBC: Transmitter

- Ubiquitous: 5 V USB powered
- Plug and play: Qi 1.2 LP certified (5 W)
- Smart Standby: 3 mW consumption with FOD
- Flexible: customizable via GUI or software API

Receiver: STWLC03

- Energy friendly: Integrated high-performance buck converter and synchronous rectifier
- Plug and play: certification with Qi (5 W) and PMA standards (7.5 W)
- Safe: enables safe operation with advanced FOD
- Flexible: supports different battery chemistry and direct charging
Wireless Charging: Wearable

System know-how for complete solution with TX and RX

Transmitter STWBC-WA

Receiver: STWLC04

- 5 V USB powered
- Active presence detection
- Stand-by FOD
- Firmware customization with API

- Li-Ion direct charging supported
- Support for 5 V regulated voltage
- Space saving solution with optimized BOM
- Up to 3 mm Z

Wireless power reference design – 1 watt wireless delivery and end-applications (IoT, mobile, wearable, power tools, automotive-grade and medical-grade applications)
Key Takeaways

• ST is one of the world’s leading suppliers of both integrated and discrete power conversion semiconductor devices.

• ST’s power management devices enable energy-saving, high-power-density and lower-standby power design solutions. They ease the migration from analog to digital design to achieve increased flexibility, smaller form factors and higher efficiency.

• A comprehensive product portfolio with a broad range of packages
  - Highly-integrated AC-DC converters
  - Switching DC-DC converters
  - Silicon andsic power MOSFETs
  - IGBTs
  - Silicon and SIC rectifiers
  - Battery management ICs
  - Wireless battery charger ICs
  - Protections
  - Linear voltage regulators
  - LED drivers
  - Digital controllers
  - Microcontrollers
  - Photovoltaic ICs

• ST offers the optimized and complete solutions to answer your application requirements and reduce time to market

Have a look at ST’s new Power Management Guide that provides a complete mapping of ST’s devices and includes information about evaluation boards and tools
Thank you!