



NXP Semiconductors

Application Guide 2010



Introduction

Welcome to this latest version of NXP's application guide, produced for the benefit of the internal and external sales teams in the Distribution channel.

NXP's focus on High Performance Mixed-Signal (HPMS) is about developing application optimized solutions and pursuing cost of ownership reductions for our customers through SiP and/or silicon level integration.

Our strong heritage of innovation in RF, Analog, Power and Digital Processing gives us a unique portfolio of IP and fabrication processes, along with competitive front-end and volume back-end operations including a strong package innovation track record. Combining these with application insights and sub-system expertise enables us to create multiple solutions to engineering problems that deliver on functional performance, efficiency, robustness and versatility.

The application solutions you will find in this guide are not intended as reference designs, nor do they represent or meet actual design requirements. The intention here is to solely provide a few simplified illustrations of some key products from the NXP portfolio that could be incorporated in some specified applications.

What they do show is the broad range of generic applications where our HPMS products can be applied and indicate the key products we can offer and the benefits that they bring to these applications.

We hope you find this guide useful and would be pleased to receive your feedback in order that we may improve any subsequent versions.

High performance mixed signal capabilities

Combining analog and digital circuitry, NXP's high performance mixed signal capabilities cover a very wide range of devices, from simple logic gates to secure and low power DSP core designs for consumer and automotive applications, and beyond.

NXP's proprietary processes include RF (LDMOS and SiGe:C BiCMOS), mixed-signal (SOI ABCD smart power technology) and high-voltage (EZ-HV SOI high-voltage BCDMOS and TrenchMOS) technologies.

Our strong heritage of innovation means you can choose from a broad portfolio of solutions that deliver on functional performance, efficiency, robustness and versatility.

Highlights

RF

- ▶ Integrated Doherty transistor
- ▶ Medium power MMICs
- ▶ Low IF radio tuner / front-ends
- ▶ HITAG transponder ICs

Power

- ▶ GreenChip / StarPlug families of SMPS controllers
- ▶ High-efficiency Class D audio amplifiers
- ▶ Lighting controllers and switches
- ▶ Automotive and general purpose MOSFETs

Data processing

- ▶ 8-bit to 32-bit general purpose microcontrollers
- ▶ SMARTMX and 32-bit HiPerSmart crypto-controllers
- ▶ Software radio DSPs
- ▶ High SFDR data converters with latest JEDEC serial interface
- ▶ FlexRay node transceiver

Standard products

- ▶ Comprehensive logic device portfolio
- ▶ Temperature sensors and temperature and voltage monitors
- ▶ Integrated and dedicated ESD protection, EMI and signal conditioning solutions
- ▶ 3-quadrant (high-commutation) triacs
- ▶ Low V_{CEsat} (BISS) loadswitches

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Highlights

Dashboard

- ▶ PCF8576 single chip LCD driver
40*4-bit RAM, I²C, low power consumption

Power manager

- ▶ BUK7614-55A N-channel enhancement MOSFET
Very low R_{DSon} (14 m Ω)
- ▶ BC817-40 NPN transistor
High IC (500 mA), low V_{CEsat} (700 mV)

HID lamp driver

- ▶ UBA2036 full-bridge controller
Integrated bootstrap diode, high V_{in} , adaptive non-overlap, bridge disable function

Standard components

- ▶ 74HC573D octal D-type latch
3-state, JEDEC standard compliant
- ▶ 74HCT04D hex inverter
High ESD protection, JEDEC standard no. 8-1A compliant
- ▶ BZX84 voltage regulator diode
Non-repetitive peak reverse $P_d = 40$ W
- ▶ BAV70 high speed switching diode
 $T_{rr} < 4$ ns, low Cd (< 15 pF), low leak current, SMD package

Backseat entertainment

- ▶ UDA1355 Stereo audio codec with SPDIF interface
Single-chip, integrated DACs and ADCs use bitstream conversion

Sensor

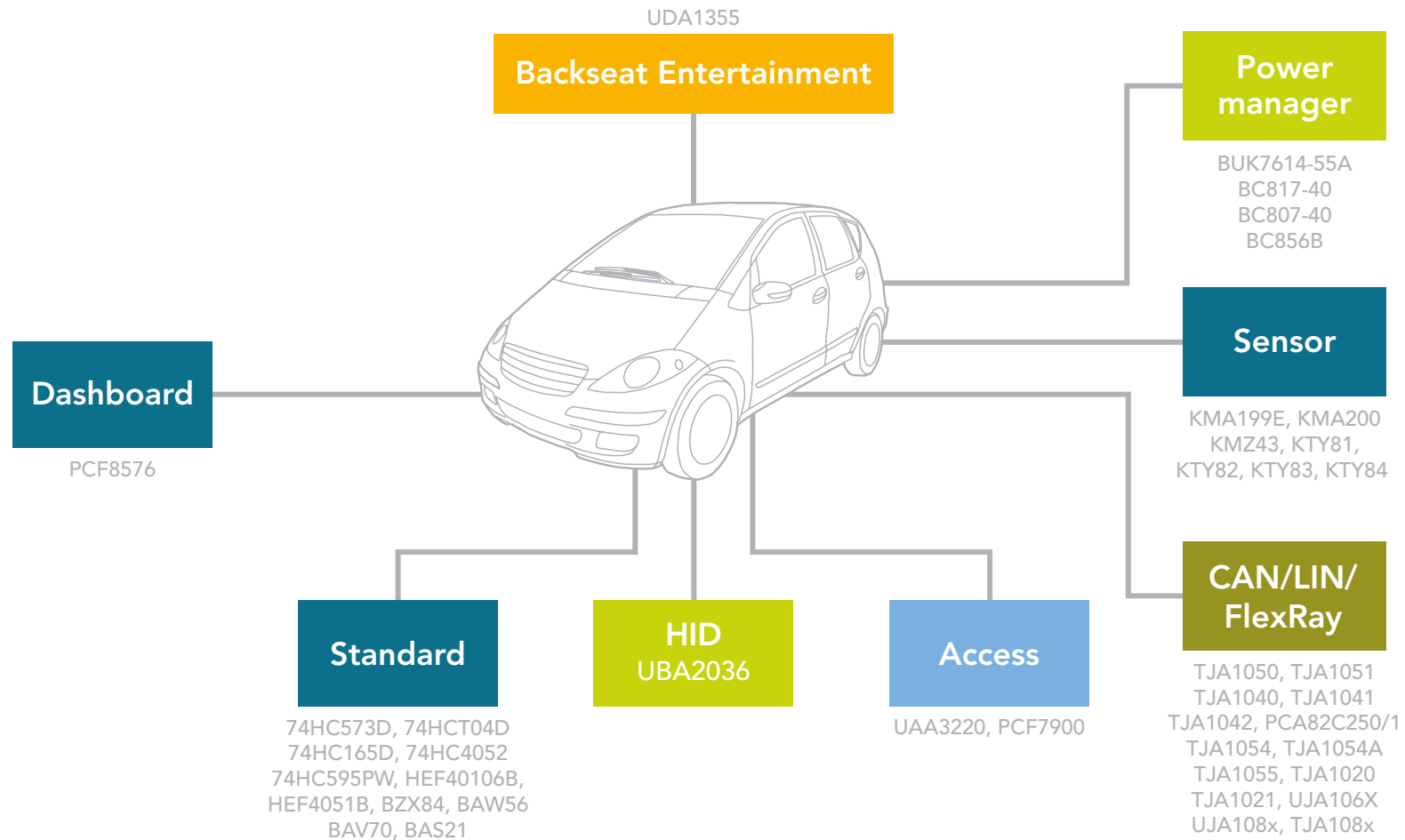
- ▶ KMA200 Programmable angle sensor
Various maximum parameter adjustments and a 32-bit identifier
- ▶ KMZ43 Magnetic field sensor
Contactless principle, wear-free operation, accuracy independent of mechanical tolerances
- ▶ KTY84 Silicon temperature sensors
Long-term stability, fail-safe behavior, virtually linear characteristics

CAN / LIN bus

- ▶ TJA1041 High-speed CAN transceiver with standby and sleep mode
Fully compatible with ISO 11898, very low EME
- ▶ TJA1054A Fault-tolerant CAN transceiver
Very low EME, good EMI, full wake-up capability during bus failures
- ▶ TJA1021 LIN 2.1/SAE J2602 transceiver
Very low EME, high EMI
- ▶ UJA1065 High-speed CAN/LIN fail-safe system basis chip
ECU functions in a single package, advanced low-power concept

Key benefits / features

- ▶ More than 15 years experience in transceivers
- ▶ Reduces power consumption, and hence CO₂ emissions
- ▶ Worldwide application and technical support



Highlights

System controller

- ▶ LPC2109 16-/32-bit ARM microcontroller
ISP/IAP flash with 10-bit ADC and CAN
- ▶ LPC2364 16-/32-bit ARM microcontroller
ISP/IAP flash, Ethernet, USB 2.0, 2 CAN, 4 UART and 70 I/Os
- ▶ LPC3230 16-/32-bit ARM system controller for high-end solutions
LCD controller, VFP coprocessor and DDR support

CarDSP

- ▶ SAA7706 car radio digital signal processor (DSP)
Performs all signal functions between power amplifiers and AM/FM outputs and the CD, tape and phone inputs

Power amplifier

- ▶ TDA8571 4 x 40 W BTL quad car radio power amplifier
Very few external components, diagnostic facility, good ripple rejection
- ▶ TDA8589 4 x 45 W power amplifier and multiple voltage regulator
I²C-bus allows independent amplifier / speaker diagnostics
- ▶ TDF8590 2 x 80 W SE (4 Ω) or 1 x 160 W BTL (8 Ω) class-D amplifier
High-efficiency, low power dissipation, HSOP24 power package

Radio tuner

- ▶ TEF6730 Front-end for digital-IF car radio
Fast-mode I²C-bus, autonomous tuning functions for easy control, no manual alignments needed

- ▶ TEF6862 CREST (Car Radio Enhanced Selectivity Tuner)
includes crystal oscillator, VCO, PLL synthesizer and state machine
- ▶ TEF6906 Integrated RDS/TMC receiver
FM RF front-end, RDS/RBDS radio data demodulator

Car CD/MP3

- ▶ SAF784x One chip CD audio device with integrated MP3/WMA decoder
DAC, preamplifier, laser driver and ARM7TDMI-S microprocessor

Car USB

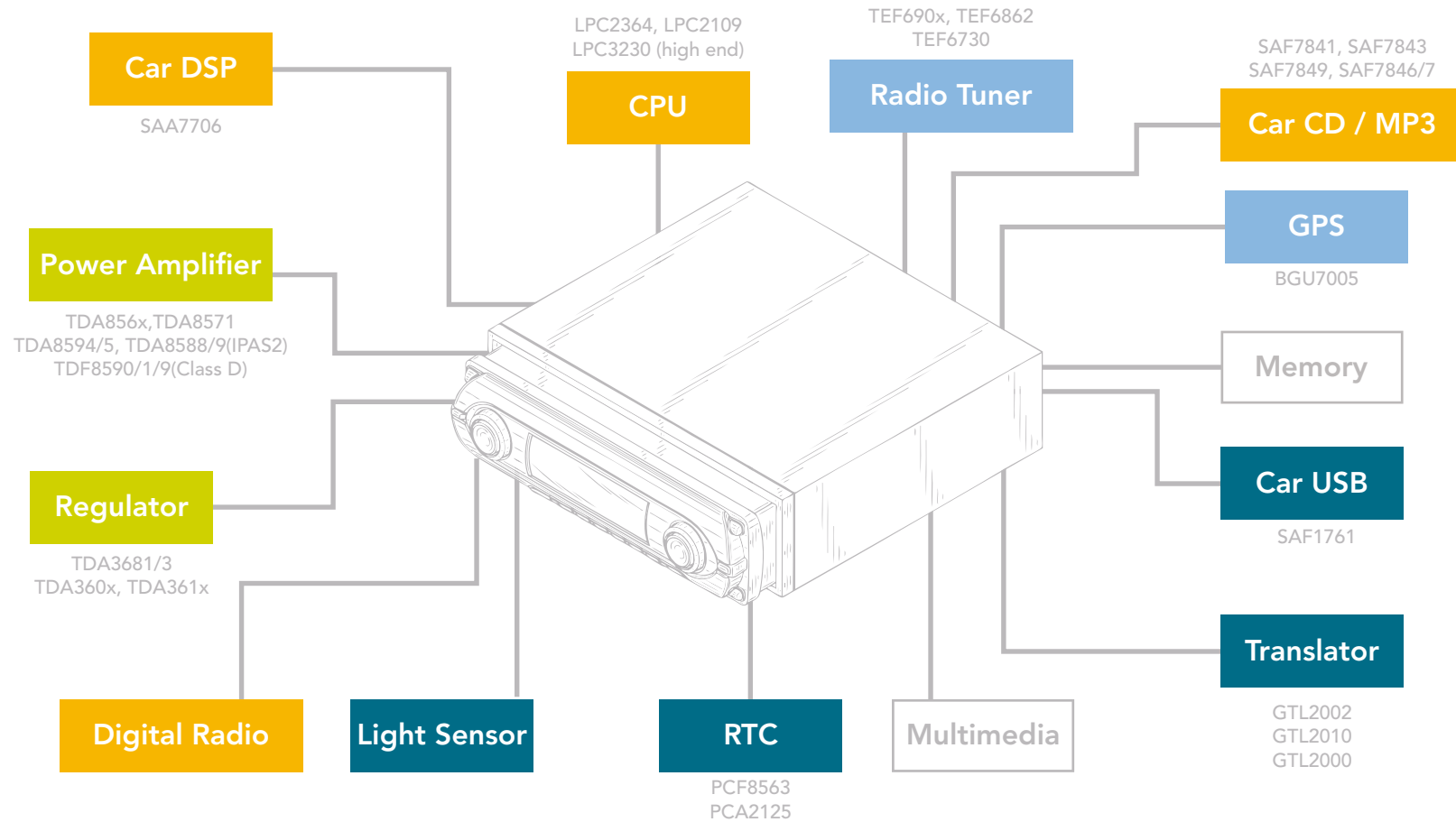
- ▶ SAF1761 Hi-Speed USB On-The-Go controller
AEC-Q100 qualified, 3 ports supporting 3 operational modes

GPS

- ▶ BGU7005 SiGe:C Low Noise Amplifier MMIC for GPS
NF = 0.9 dB at 1.575 GHz, low power consumption

Key benefits / features

- ▶ Stay competitive in the car audio market
- ▶ Cost-effective
- ▶ Reduce overall power consumption
- ▶ Supplier of CD/MP3 and multi-standard radio systems



Highlights

Power supply

- ▶ TEA1530 GreenChip II SMPS control IC
 - High integration minimizes number of external components
 - Direct start-up possible from rectified universal mains voltage
- ▶ TEA1532 GreenChip II SMPS control IC
 - High integration minimizes number of external components
 - Direct start-up possible from rectified universal mains voltage
 - Built-in green functions ensure optimum efficiency at all power levels

I²C interface

- ▶ LM75A digital temperature sensor and thermal watchdog
 - Pin-to-pin compatible with industry-standard LM75
 - Temperature resolution of 0.125 °C
 - Small, 8-pin SO8 and TSSOP8 packages
- ▶ PCA9530/1/2/3 2-, 4-, 8- and 16-bit LED dimmers
 - 2 selectable, fully programmable blink rates
 - 256 brightness steps
- ▶ PCA9550/1/2/3 2-, 4-, 8- and 16-bit LED drivers with programmable blink rates
 - Internal oscillator and power-on reset
 - Low standby current

- ▶ PCF8563 RTC
 - Low backup current
 - Programmable clock output for peripheral devices
 - Alarm and timer functions
- ▶ PCF8583 clock/calendar with 240 x 8-bit RAM
 - Automatic word address incrementing
 - Programmable alarm, timer and interrupt function

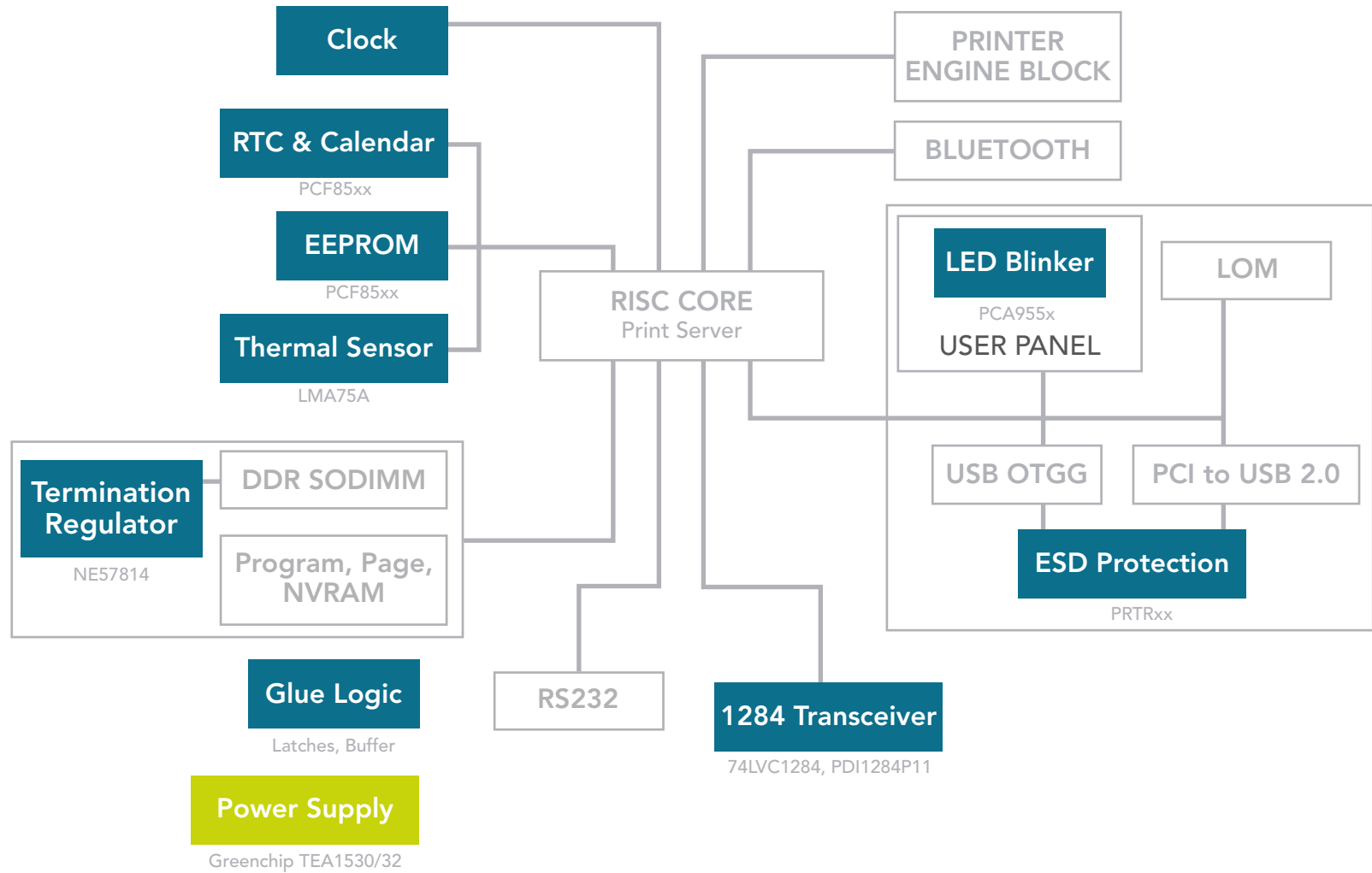
Key benefits / features

GreenChip II family

- ▶ Cost optimization, ideal for printer adapter applications
- ▶ Easy design-in speeds time-to-market
- ▶ Up to 90% efficiency possible due to quasi resonant flyback operation

I²C devices

- ▶ Number one supplier in I²C interface field
- ▶ Board product portfolio, flexible selection and easy design-in
- ▶ Strong technical support



Highlights

DC/DC power supply

- ▶ PH9930L, PH8030L, PH3830L and PH3330L N-channel TrenchMOS logic level FETs in LFPACK package
- ▶ Very low switching and conduction losses
- ▶ Optimized for DC/DC converters

DisplayPort

- ▶ PTN3300A, PTN3300B DVI/HDMI level shifters
- ▶ HPD, DDC and high speed TMDS level shifting
- ▶ PTN3301 DVI/HDMI level shifter
- ▶ Up to 2.25 Gbps operation, active DDC buffer, HDMI detect
- ▶ CBTL06121A/B, CBTL06122A/B, CBTL06141 multiplexers
- ▶ Shutdown and standby modes minimize power consumption

Audio amplifier

- ▶ TDA8552 2 x 1.4 W BTL amplifier with digital volume control
- ▶ Few external components, low standby current
- ▶ SA58670 2.1 W/channel stereo class-D audio amplifier
- ▶ Low supply and shutdown currents, short-circuit and thermal protection, space saving HVQFN20 package

LED backlighting

- ▶ UBA3070 LED backlight driver IC
- ▶ Controller with power-efficient boundary conduction mode of operation

Termination regulator

- ▶ NE57814 DDR memory termination regulator with enhanced efficiency
- ▶ Significantly reduces parts count, board space and overall system cost

AC to DC adapter

- ▶ TEA1750 GreenChip III SMPS control IC
- ▶ Integrated PFC and flyback controller, universal mains supply operation, very low external component count

Glue chip

- ▶ PCA9504A Glue chip 4
- ▶ Supports platforms based on Intel processors, integrates miscellaneous motherboard logic and analog functions into a single, small footprint 56-pin TSSOP device

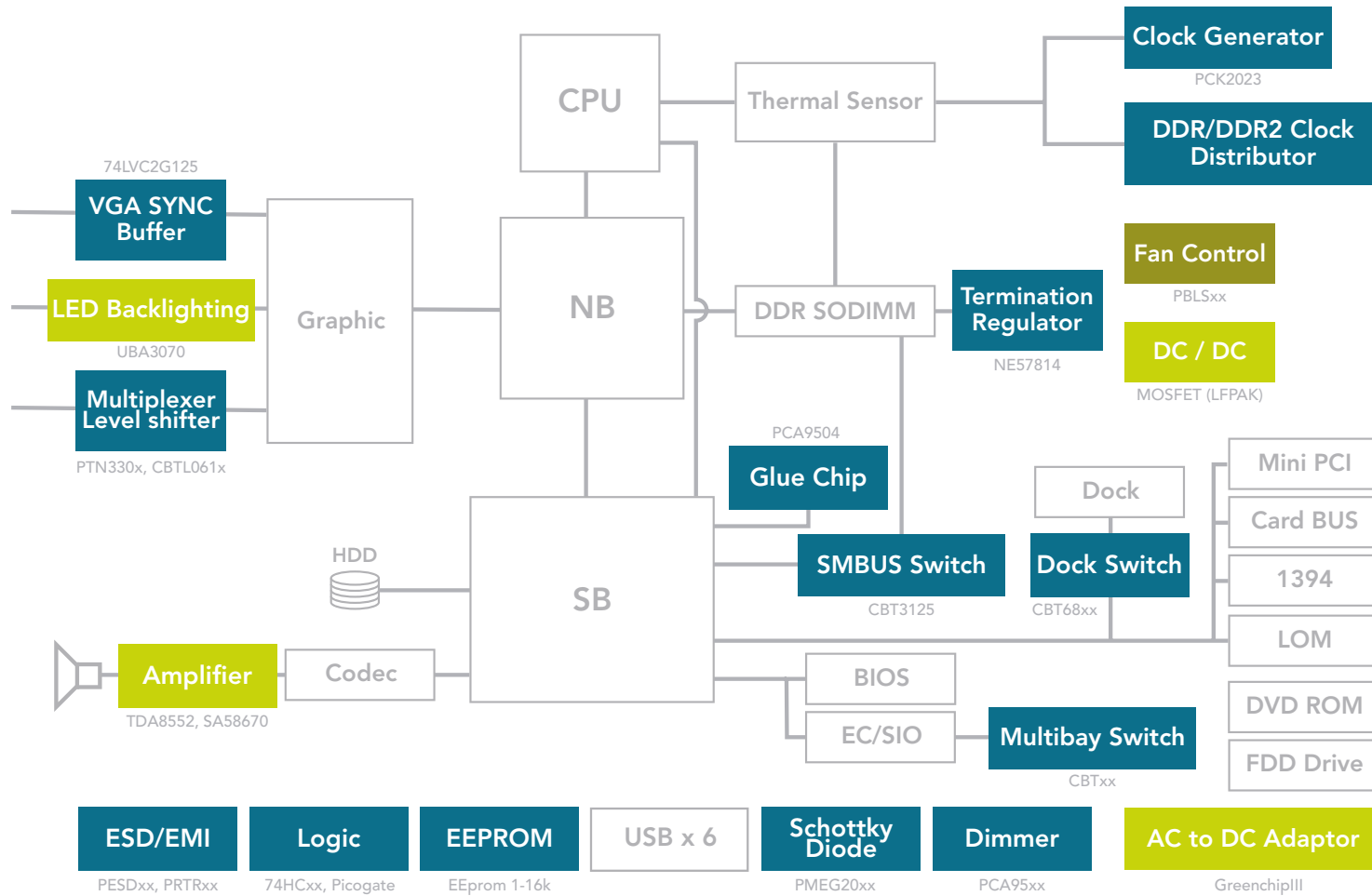
Key benefits / features

LFPACK MOSFETs

- ▶ Virtually zero package resistance and very low package inductance
- ▶ Low thermal resistance to board enhances power handling
- ▶ Allows topside heatsinking for increased power handling
- ▶ High power density, ideal for multi-phase CPU core power supply
- ▶ Track record of successful application in global top tier Notebooks

Multiplexers and level shifters

- ▶ Broad portfolio of DisplayPort and PCIe switching or multiplexing products for desktop, notebook and workstation motherboards
- ▶ Close cooperation with Intel and AMD to define DisplayPort interface products



Highlights

Audio / microphone / keypad interface

- ▶ PESD5V0S1BL low capacitance bidirectional ESD protection diode

USB interface

- ▶ PRTR5V0U2X ultra low capacitance double rail-to-rail ESD protection diode

I/O ports

- ▶ IP425xCZ 4-/6-/8-channel passive filter network with ESD protection
4-line protection in QFN package

Audio amplifier

- ▶ SA58671/2 1.2 W stereo class D amplifier

Backlight

- ▶ PMEG2010 1 A Schottky rectifier
Several package options, ultra high speed switching, very low forward voltage

Standard components

- ▶ ESD, EMI and signal conditioning products
Single-line ESD protection in SOD882 package
- ▶ Small-signal transistors and diodes
- ▶ PMZ* series small-signal MOSFETs
SOT883 package makes the PMZ* series the world's smallest MOSFETs

Audio amplifier

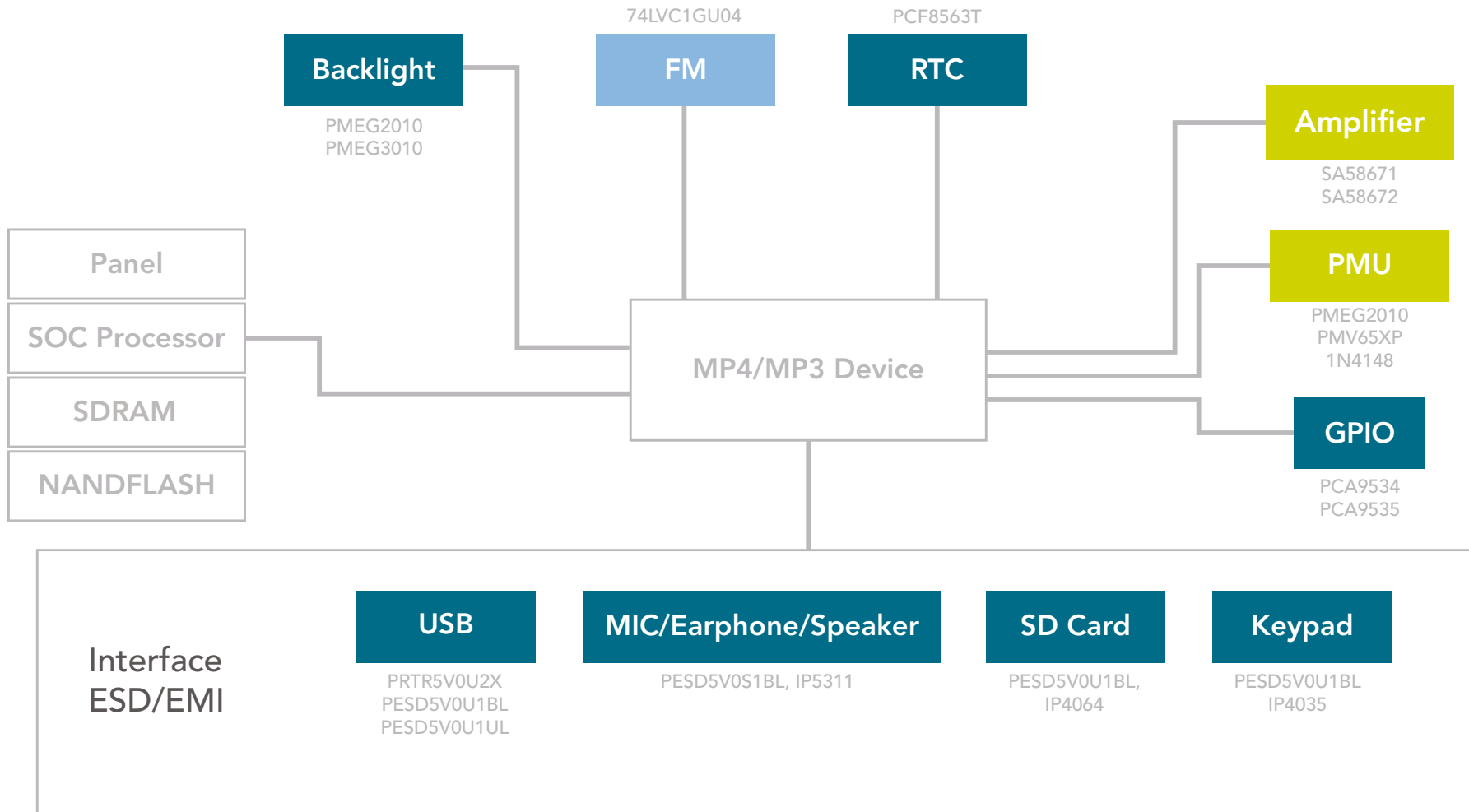
- ▶ SA58671 1.2 W/channel stereo class-D audio amplifier
Low supply and shutdown currents, short-circuit and thermal protection, space saving WLCSP package
- ▶ SA58672 3.0 W mono class-D audio amplifier
Low supply and shutdown currents, short-circuit and thermal protection, space saving WLCSP package

PMU

- ▶ 1N4148 High-speed switching diode
Hermetically sealed leaded glass SOD27 (DO-35) package, switching speed max. 4 ns
- ▶ PMV65XP P-channel TrenchMOS extremely low level FET
Low conduction losses due to low on-state resistance, suitable for low gate drive sources

Key benefits / features

- ▶ World's smallest MOSFET
- ▶ Class D amplifiers aid miniaturization
- ▶ Wide selection of devices
- ▶ Find best fit products and reduce your time-to-market



Highlights

Tuners

- ▶ TDA18218 low cost DVB-T silicon tuner
- ▶ TDA18212/18219 Multistandard digital terrestrial silicon tuners
- ▶ TDA8263 / CX24113 fully integrated satellite tuner
- ▶ CX24118 / CX2413x fully integrated dual satellite DVB-S2 tuner
- ▶ TDA2013x dual fully integrated satellite tuner with integrated LNA/splitter, RF switches and dual loop through
- ▶ TDA18252/TDA18253 cable silicon tuners

Low Noise Amplifier (LNA)

- ▶ BGU703x

Passive Loop Through Switch

- ▶ BF1108 (5 V)
- ▶ BF1118 (3.3 V)

High-bandwidth video switch

- ▶ NX5DV330 Single 5V analog switch (4PCO/4PTT) for video multiplexing/demultiplexing

HDMI

- ▶ TDA9984 transmitter with integrated upscaler
- ▶ IP4777CZ338 ESD protection and DDC buffer

Audio DAC

- ▶ UDA1334 Low power audio DAC offering high linearity, wide dynamic range, low distortion, Standby or Sleep modes

Smart card

- ▶ TDA8024 IC card interface
- ▶ TDA8034 Low cost smart-card interface

(AC to DC) Adapter

- ▶ TEA152x 'STARplug' SMPS ICs for low-power systems
- ▶ TEA1532 Quasi resonant flyback
- ▶ TEA1733 Fixed frequency flyback

ESD protections

Integrated and discrete ESD protections are available for all the input and output interfaces, including antenna input and HDMI output

Logic

A large number of functions such as Shape drivers, clock divider are available in MicroPak or DQFN packages, including leadless packages optimized to prevent probing of sensitive signals

CAN tuners

- ▶ MOSFETs
- ▶ Varicap diodes

Discretes

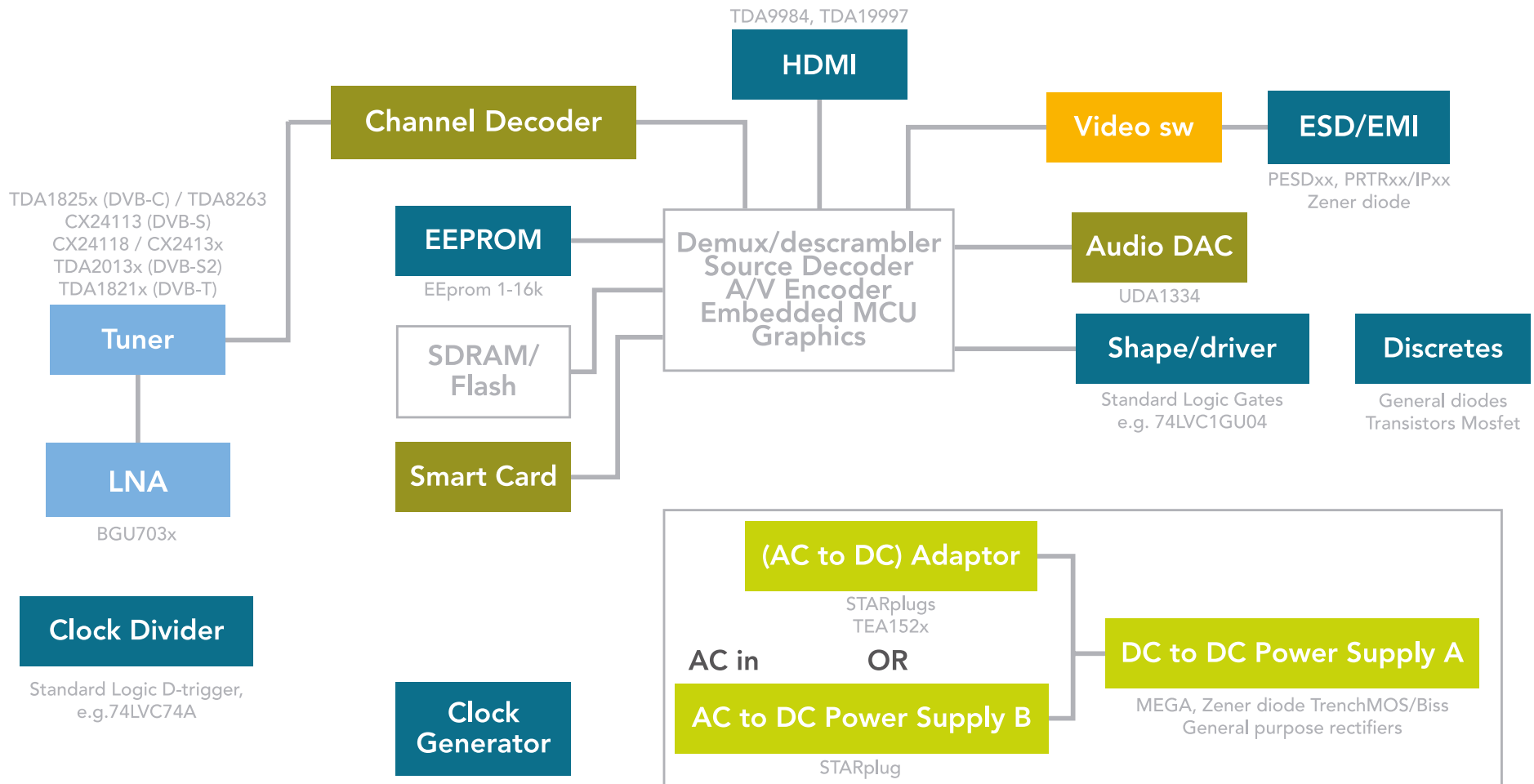
Numerous small signal transistors, diodes, Schottky diodes and MOSFETs, pn rectifier and wide SMD package range are also available

Key applications

- ▶ SD / HD zapper STB
- ▶ DVR / dual view STB

Consumer

DVB set-top box



Highlights

Power

- ▶ TEA1733 (small screen TV < 75 W)
- ▶ TEA175x GreenChip 3 (mid-size TV 75-150 W)
- ▶ TEA1611/TEA1713 GreenChip resonant (>75 W - 500 W)
- ▶ Power MOSFETS

Standby power supply

- ▶ TEA152x 'STARplug' SMPS ICs for low-power systems
Operates from universal AC mains supplies (80 V to 276 V), adjustable frequency for flexible design, many protections

DC/DC conversion

- ▶ Schottky rectifiers, low $V_{CE(sat)}$ (BISS) transistors
- ▶ Low V_F (MEGA) Schottky diode / BISS transistor modules
- ▶ TL431 adjustable shunt regulator

Tuner

- ▶ N-channel dual gate MOSFETS
- ▶ Varicap diodes
- ▶ CX24118 fully integrated satellite DVB-S2 tuner
- ▶ TDA18272 Terrestrial analog and digital TV Silicon Tuner

HDMI

- ▶ TDA19998 4:1 HDMI fast switch
- ▶ PCA9507 DDC level shifter with rise time accelerator
- ▶ PCA9527 DDC+CEC level shifter with rise time accelerator on DDC lines
- ▶ PCA9306 DDC level shifter

Audio

- ▶ TDA8932/33 - 2x 10-18W Mid-Power audio amplifier
- ▶ TFA9810/15 - 2x 9-28W Mid-Power audio amplifier
- ▶ TDA1308 class AB stereo headphone driver

Backlight

- ▶ UBA3070 LED string driver for LED backlight

ESD protections

- ▶ IP4220CZ6 dual USB 2.0 integrated ESD protection
- ▶ IP4776CZ38 HDMI ESD protection

Standard components

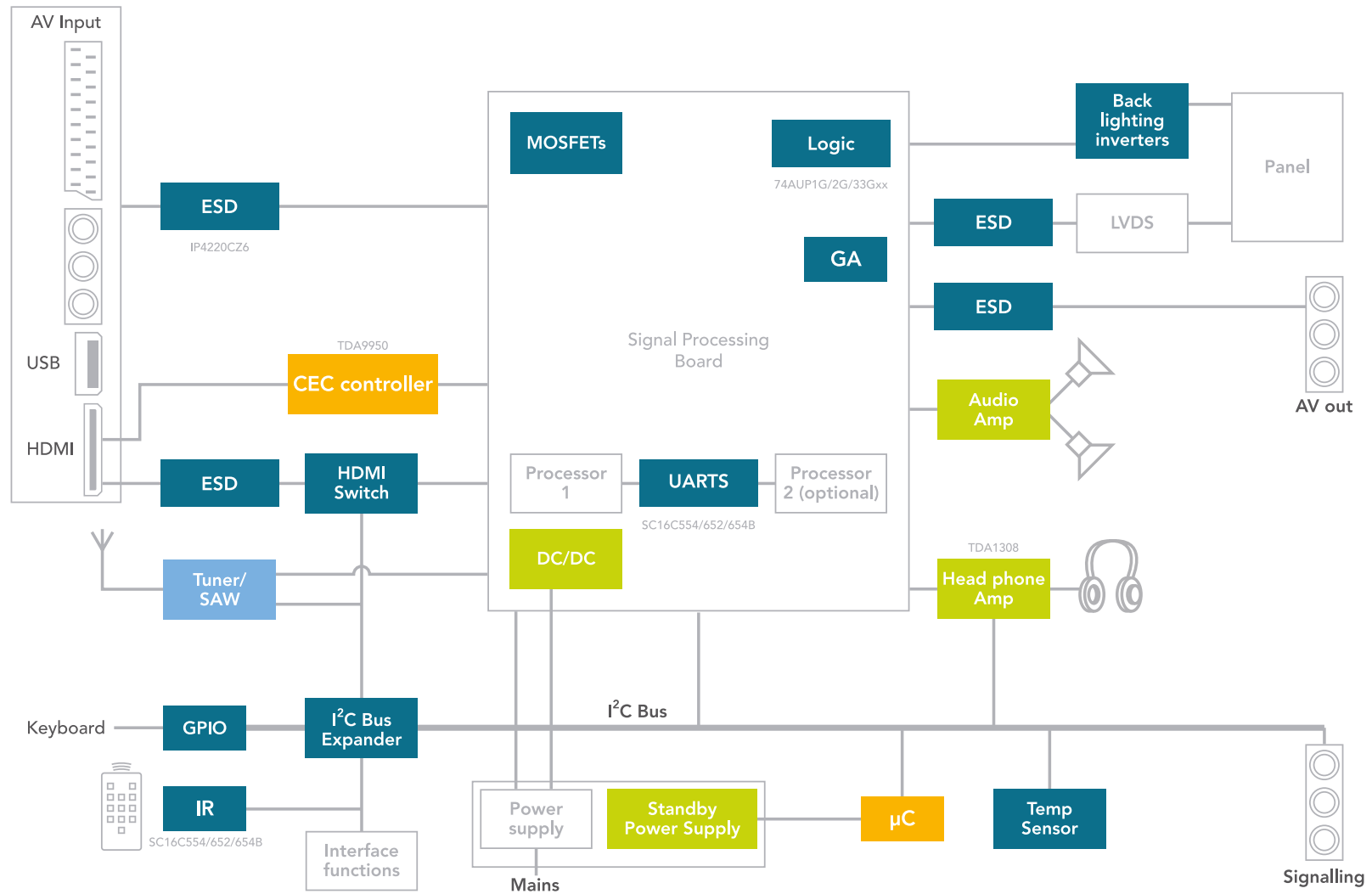
- ▶ I²C temperature/voltage monitors and bus repeaters/hubs/extendors
- ▶ HC4052/53 5 V, analog switch (DP4T)
- ▶ 74AUP1G/2G/33Gxxx ultra-low-power CMOS logic products
- ▶ 74HCT4094 5V 8-stage shift-and-store Bus Register
- ▶ SC16C554/652/654B dual and quad UARTs
- ▶ 74AUP1Z04 1.8V Clock Driver
- ▶ 74HC4046 5V PLL with VCO

Key benefits / features

- ▶ Enhance product differentiation
- ▶ Complete or customize your system solution
- ▶ Outstanding choice of leading ICs and discrete components
- ▶ Find best fit products and reduce your time-to-market

Consumer

LCD TV



Highlights

UCODE passive UHF transponder ICs

- ▶ UCODE G2XM and G2XL
High anti-collision rates and long operating distances

ICODE interface platform

- ▶ ICODE SLI, SLI-S, SLI-L and SLI-SY
- ▶ ICODE UID-OTP
Low-cost, re-programmable and disposable solution

HITAG transponder ICs

- ▶ HITAG 1, HITAG 2 and HITAG S
- ▶ HITAG μ , μ Advanced and μ Advanced+
- ▶ HITAG RO
Robust in harsh environments (e.g. metal or moisture within the antenna field), ensuring safe data transmission, unaffected by electronic interference

Key benefits / features

- ▶ Track product status quickly and easily from design to sale
- ▶ Precise, real-time information
- ▶ Cuts labor costs, improves efficiency and reduces shrinkage

Highlights

NFC transceivers, controllers and secure modules

- ▶ PN511, PN512 transmission modules
Highly integrated, contactless communication at 13.56 MHz
- ▶ PN531, PN532, PN533, PN544 NFC controllers
Highly integrated, includes microcontroller

Key benefits / features

- ▶ Enables contactless transactions such as mobile payment, transit and ticket purchase
- ▶ Provides secure storage for confidential personal data, such as credit card numbers
- ▶ Helps in connecting longer range wireless connections including Bluetooth and WiFi
- ▶ Enables transfer of data, music or pictures
- ▶ Eases access to information while on the move – reading smart posters and labels, digital content

Highlights

Microcontroller

- ▶ LPC1700 ARM Cortex M3 microcontrollers for high end communications smart meters
- ▶ LPC1100 ARM Cortex M0 low power microcontrollers for low-end smart meters
- ▶ EM773 Energy Metering IC for non-billing applications

Wireless M-Bus products

- ▶ OL2381 Wireless m-bus transceiver supporting 112 kbps and all m-bus modes from S1 to T2
- ▶ OL2300/OL2311 Wireless m-bus transmitter / receiver products for unidirectional applications

Real-time clock

- ▶ PCF2123 low-power RTC
Watchdog functionality, freely programmable timer and alarm with interrupt capability
- ▶ PCF2129/27 accurate RTCs
With temperature compensated crystal oscillator

Display driver

- ▶ PCF8562/8576 4 x 32 / 4 x 40 segment LCD drivers
Versatile blinking modes, no external components required

UART extension

- ▶ SC16Cxx0/xx2/xx4 single, dual and quad high-speed UARTs
5 V, 3.3 V and 2.5 V operation, industrial temperature range

RFID/NFC connectivity

- ▶ MFRC52201HN1 Contactless reader IC
Supports ISO/IEC 14443 A/MIFARE mode, supports MF1xxS20, MF1xxS70 and MF1xxS50 products
- ▶ MFRC50001T Highly integrated ISO14443A reader IC
Outstanding modulation and demodulation concept, high flexibility

Logic

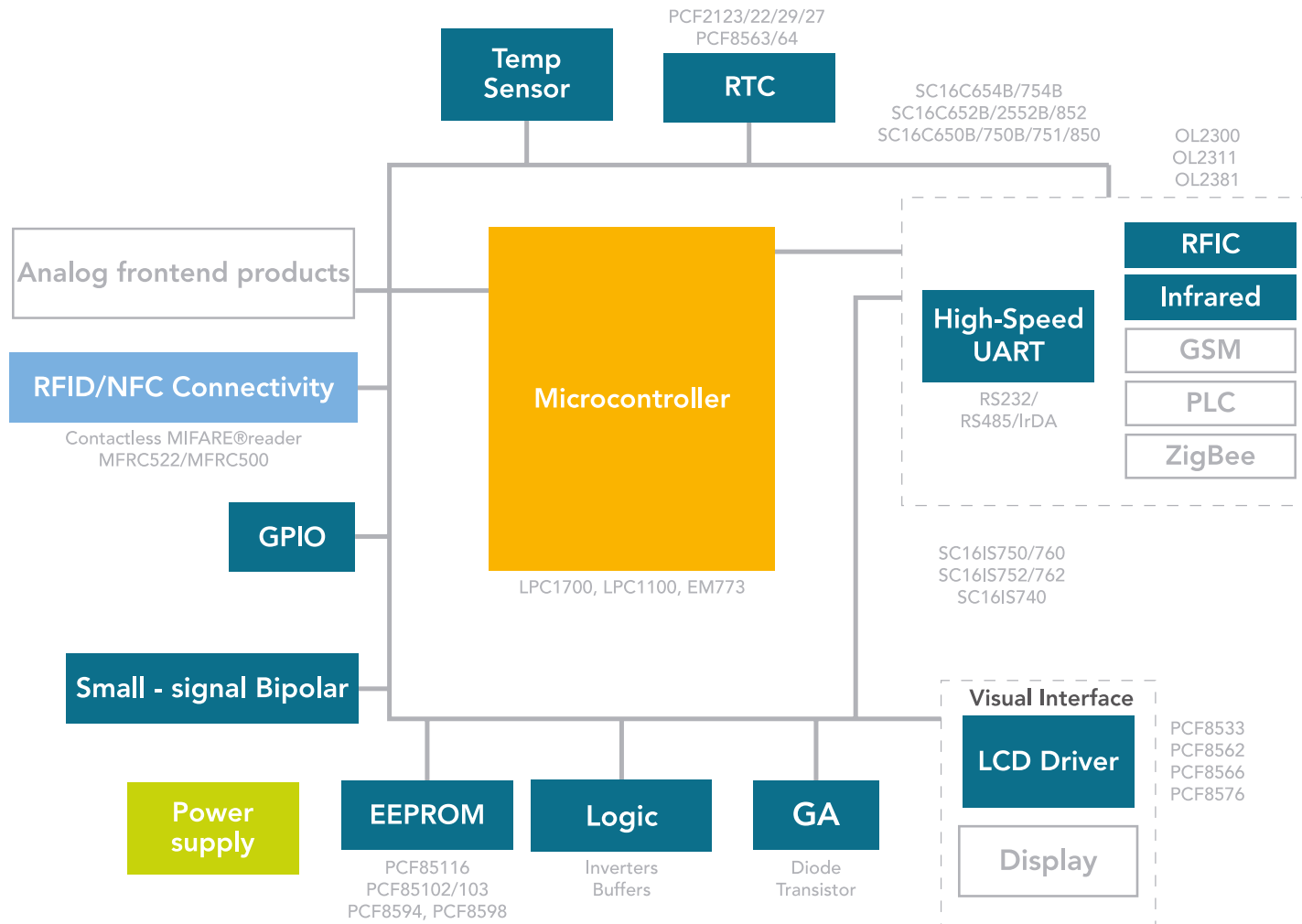
Broad portfolio of functions and packages with high noise immunity and long term reliability

EEPROM

- ▶ PCF85102C-2 256 x 8-bit CMOS EEPROM with I²C-bus interface
Standby current (typical) 4 μ A, on-chip voltage multiplier

Key benefits / features

- ▶ Broad portfolio including microcontrollers, RTCs, display drivers, interfaces, power supply and conversion, and MIFARE contactless ICs
- ▶ World-wide application and technical support



Highlights

Motor (pump)

- ▶ 3Q triacs: BTA204, BTA208, BTA312 series
Wide range of current and package options, few protection components needed

Valves and door lock

- ▶ 3Q triacs: BTA201 series
- ▶ AC thyristors: ACT1xx family with in-built overvoltage protection
High immunity to false triggering, surface mount and through-hole packages, industry standard pinout

Drain pump

- ▶ 3Q triacs: BTA201, BTA202, BTA204 series
Few protection components needed, surface mount and through-hole packages

SMPS

- ▶ TEA152x series for low power applications
Over current, over temperature and short circuit protection, low stand-by power, high efficiency, Energy Star 2.0 complaint

Standard components

- ▶ Zener, Mega Schotkky diode and rectifiers
 - ▶ Analog MUX/DMUX, level shifters
- Diverse package portfolio: TSSOP, DQFN, SOD, PicoGate, etc

Microcontroller

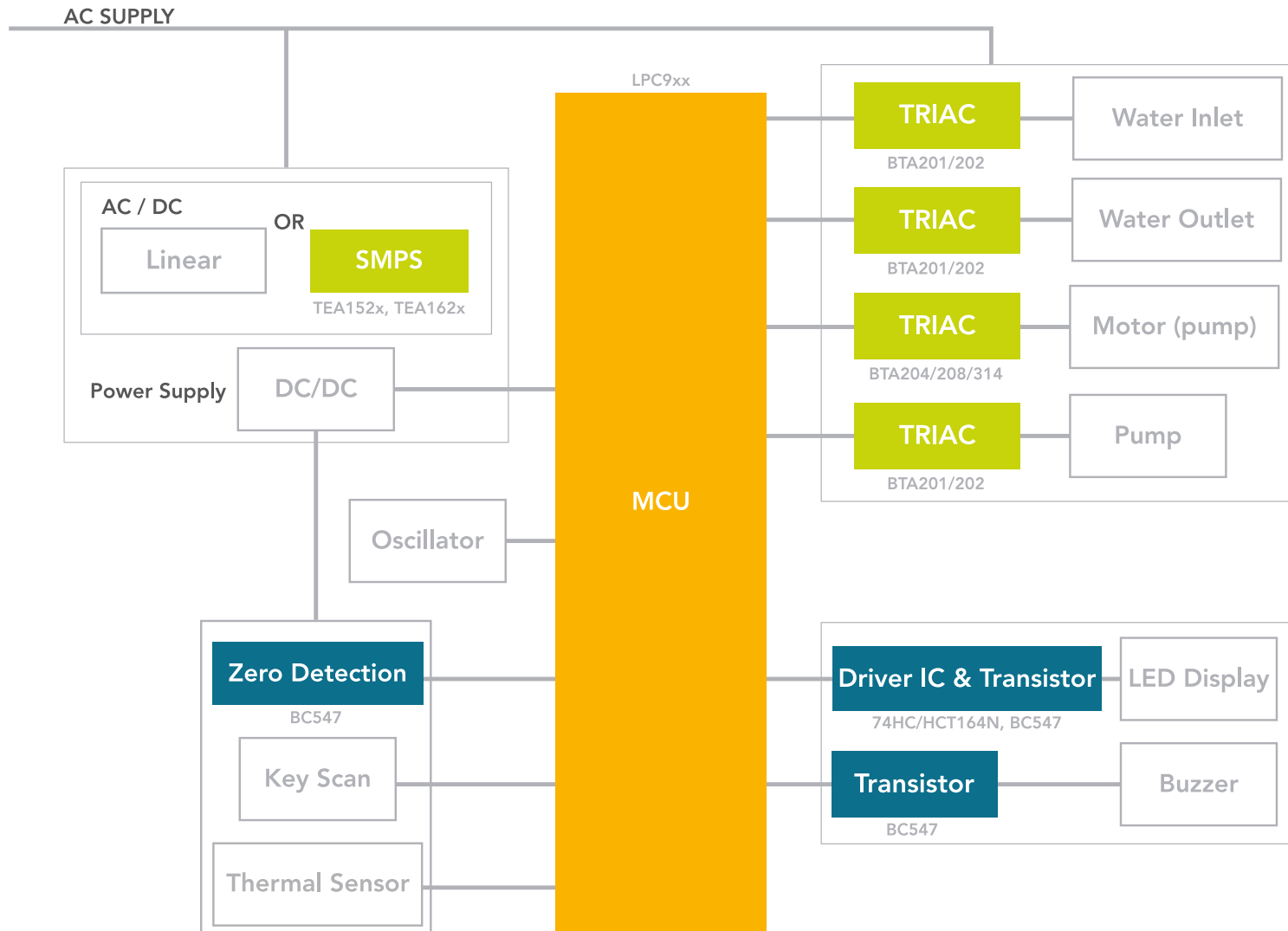
- ▶ LPC11xx (Cortex-M0) featuring: 32-bit low cost core, +/-1% IRC, better code density vs. 16-bit, 33-/48-pin packages (64-pin on the roadmap)
- ▶ LPC13xx (Cortex-M3) featuring: pin compatible to LPC11xx, 10 bit ADC, class B software, available in 33-/48-pin packages (64-pin on the roadmap)
- ▶ LPC17xx (Cortex-M3) featuring: 120 Mhz core, flexible DMA, fast GPIOs, 80-/100-pin packages (up to 208-pin on the roadmap with dedicated functionalities for user interface)

Communication and interfaces

- ▶ I²C Peripherals: Leader in I²C technology, wide range of LCD drivers, bus extenders/expanders, LED drivers
Capacitive Touch solutions for proximity and contact applications, single button PCF8883 (multiple button solutions on the roadmap)

Key benefits / features

- ▶ Complete solutions for user interface, motor control, power supply, etc
- ▶ Application specific support available



Highlights

Compressor

- ▶ 3Q triacs: BTA208, BTA312, BTA316 series
Wide range of current and package options, few protection components needed

Valves and Fan

- ▶ 3Q triacs: BTA201 series
- ▶ AC thyristors: ACT1xx family with in-built overvoltage protection
Few protection components needed, surface mount and through-hole packages, industry standard pinout

Lighting and defrost

- ▶ 4Q triacs: BT13x series
- ▶ 3Q triacs: BTA20x series
Surface mount and through-hole packages

SMPS

- ▶ TEA152x/TEA17xx series for low power applications
Over current, over temperature and short circuit protection, low stand-by power, high efficiency, Energy Star 2.0 complaint

Standard components

- ▶ Zener, Mega Schotkky diode and rectifiers
- ▶ Analog MUX/DMUX, level shifters, diverse package portfolio: TSSOP, DQFN, SOD, PicoGate, etc

Microcontroller

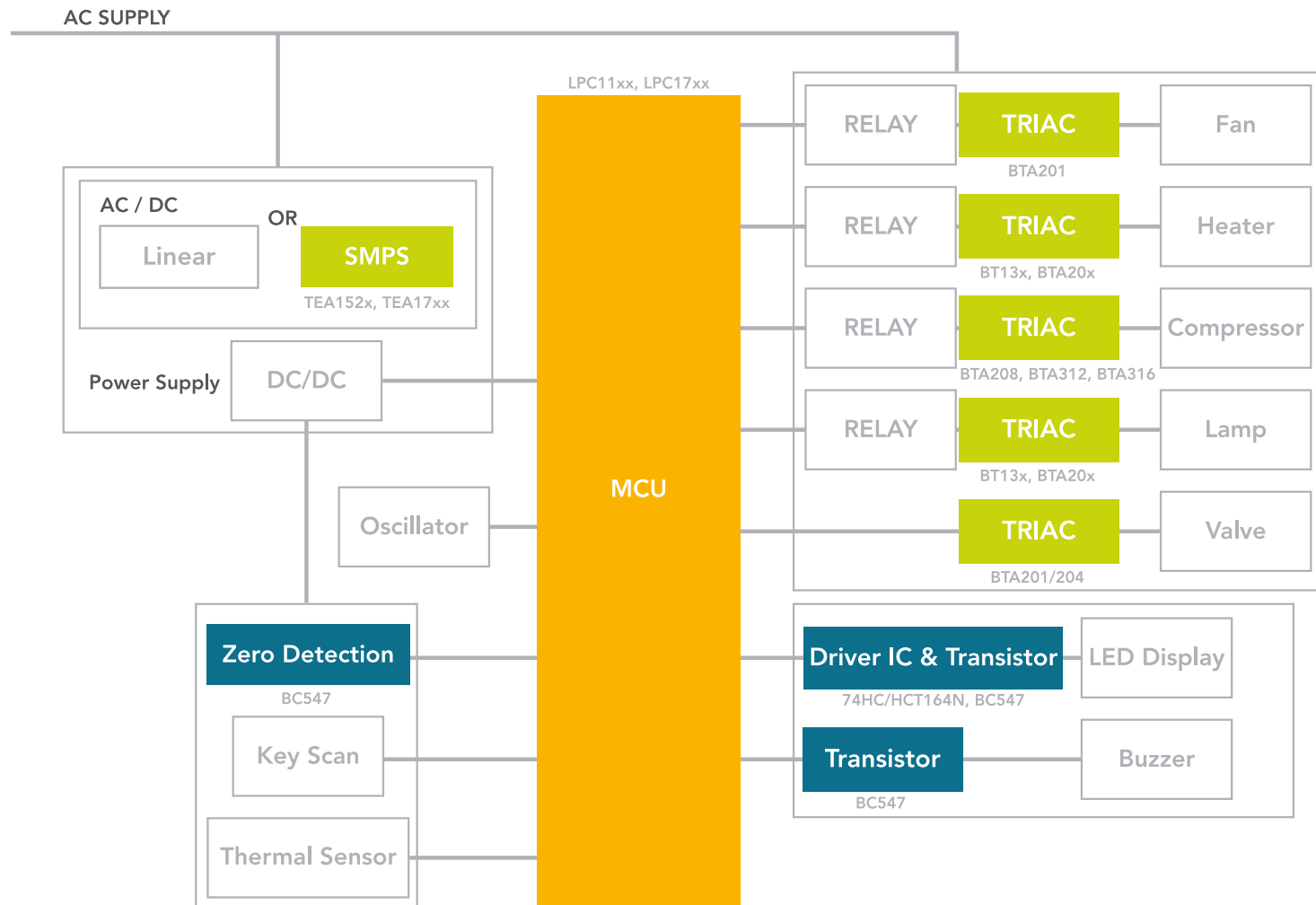
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Communication and interfaces

- ▶ I²C peripherals: Leader in I²C technology, wide range of LCD drivers, bus extenders/expanders, LED drivers
Capacitive Touch solutions for proximity and contact applications, single button PCF8883 (multiple button solutions on the roadmap)

Key benefits / features

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Highlights

Motor (drum)

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Wide range of current and package options, few protection components needed

Valves and door lock

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High immunity to false triggering, surface mount and through-hole packages, industry standard pinout

Drain pump

- ▶ 3Q triacs: BTA201, BTA202, BTA204 series
Few protection components needed, surface mount and through-hole packages

SMPS

- ▶ TEA152x series for low power applications
Over current, over temperature and short circuit protection, low stand-by power, high efficiency, Energy Star 2.0 complaint

Standard components

- ▶ Zener, Mega Schotkky diode and rectifiers
- ▶ Analog MUX/DMUX, level shifters
Diverse package portfolio: TSSOP, DQFN, SOD, PicoGate, etc

Microcontroller

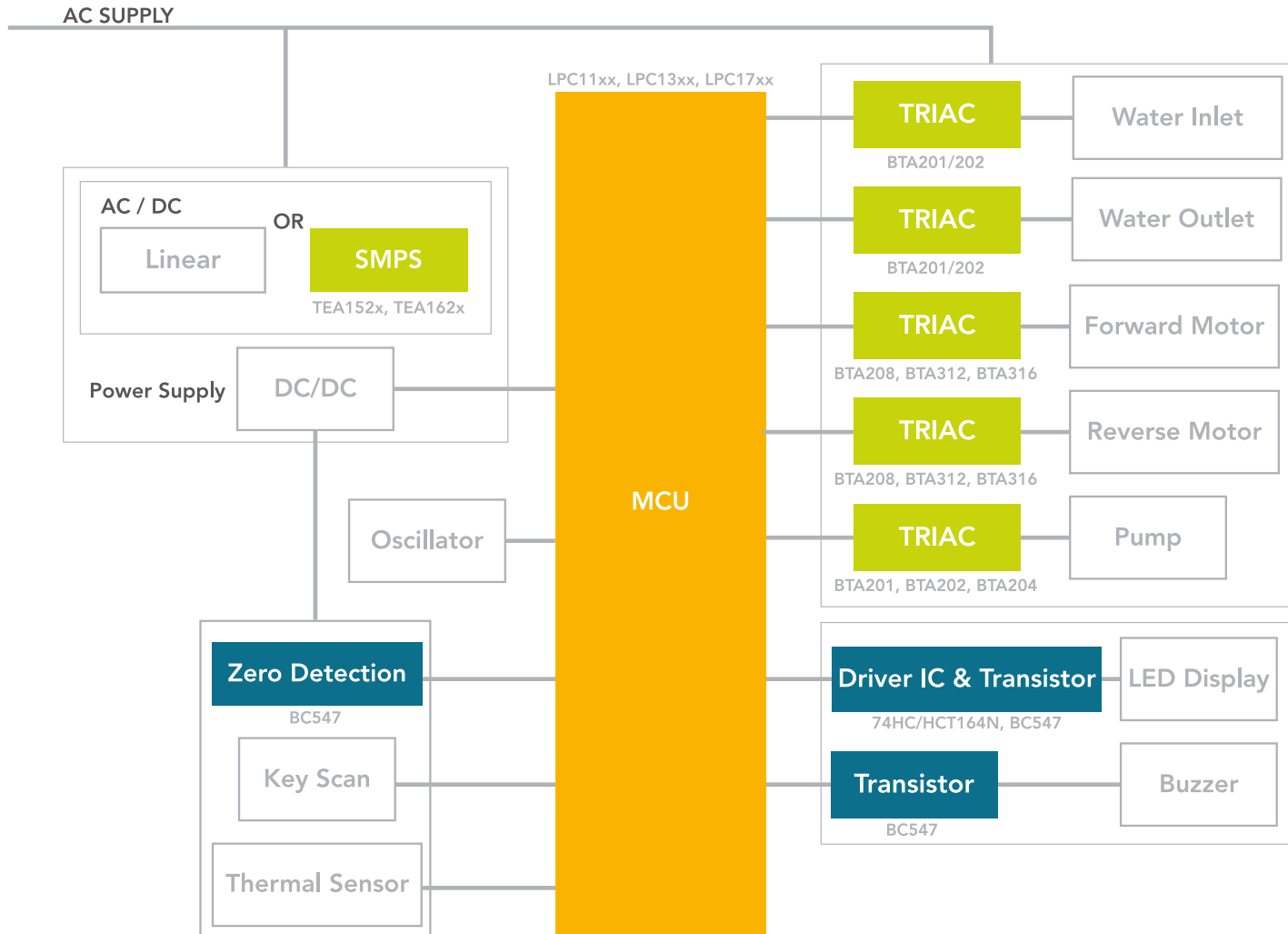
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Communication and interfaces

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- ▶ Complete solutions for user interface, motor control, power supply, etc
- ▶ Application specific support available



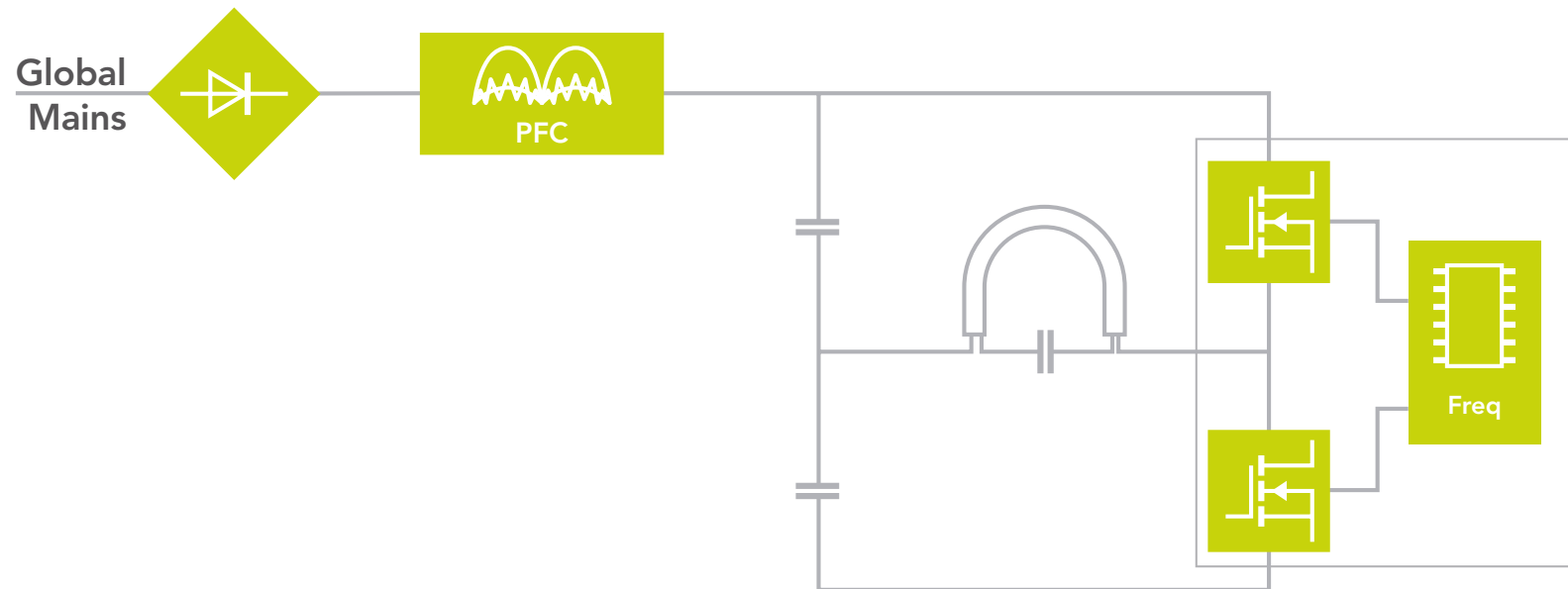
Highlights

CFL driver ICs

- ▶ UBA2024(A) Half-bridge power IC for CFL lamps
Soft start function, adjustable internal oscillator, internal drive function with high-voltage level shifter
- ▶ UBA2028 600 V dimmable power IC for compact fluorescent lamps
High voltage level shift circuit, oscillator function, lamp voltage monitor, current control function, timer function and protections
- ▶ UBA3070 Universal LED driver
Switch-mode buck converter capable of driving LED strings up to 600 V, direct PWM dimming, fast transient response

Key benefits / features

- ▶ Instant start-up with maximum brightness thanks to patented glow phase
- ▶ Improved performance and efficiency
- ▶ Higher end-product quality at similar price
- ▶ Greater reliability and longer lamp lifetimes
- ▶ Few components and easier engineering design and assembly
- ▶ Smaller end products



Highlights

SMPS controller IC

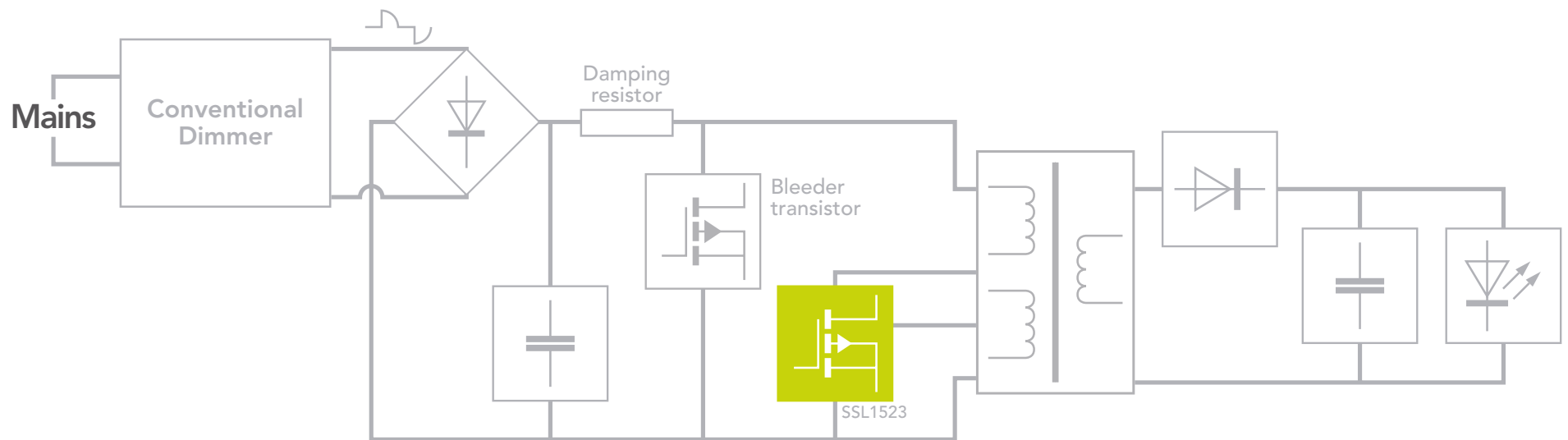
- ▶ SSL1523 STARplug compact flyback converter
Valley switching, adaptive switching frequency and low-resistance internal transistors

LED Drivers

- ▶ SSL2101 mains LED driver IC for dimmable LED lighting
- ▶ SSL2102 mains LED driver IC for dimmable LED lighting
- ▶ SSL1750 mains LED driver IC

Key benefits / features

- ▶ High-performance SSL solution
- ▶ Integrate easily into products
- ▶ Help you deliver lighting products with:
 - lower energy consumption
 - longer lifetimes
 - smaller form factors
 - increased robustness
 - improved intelligence



Highlights

MCU

- ▶ LPC2214 ARM microcontroller
128/256 kB ISP/IAP flash with 10-bit ADC and external memory interface
- ▶ LPC2378 ARM microcontroller
512 kB ISP/IAP flash, Ethernet, USB 2.0, CAN and 10-bit ADC/DAC
- ▶ LPC2478 ARM microcontroller
512 kB flash, Ethernet, CAN, LCD, USB 2.0 device/host/OTG, external memory interface

RFID/NFC connectivity

- ▶ MFRC52201HN1 Contactless reader IC
Supports ISO/IEC 14443 A/MIFARE mode, supports MF1xxS20, MF1xxS70 and MF1xxS50 products
- ▶ MFRC50001T Highly integrated ISO14443A reader IC
Outstanding modulation and demodulation concept, high flexibility

Smart card

- ▶ TDA8007B Double multiprotocol IC card interface
Integrated ISO UART and time-out counters, chip select, external I/O and interrupt features
- ▶ TDA8020HL Dual IC card interface
Very few external components, I²C-bus control, voltage supervisor for power-on reset and drop-out detection

- ▶ TDA8023 Low power IC card interface
Shutdown input for very low power consumption when unused, power reduction modes when active
- ▶ MFRC53101T Contactless ISO/IEC 14443 reader IC
Outstanding modulation and demodulation, wide range of methods and protocols, small, fully integrated package

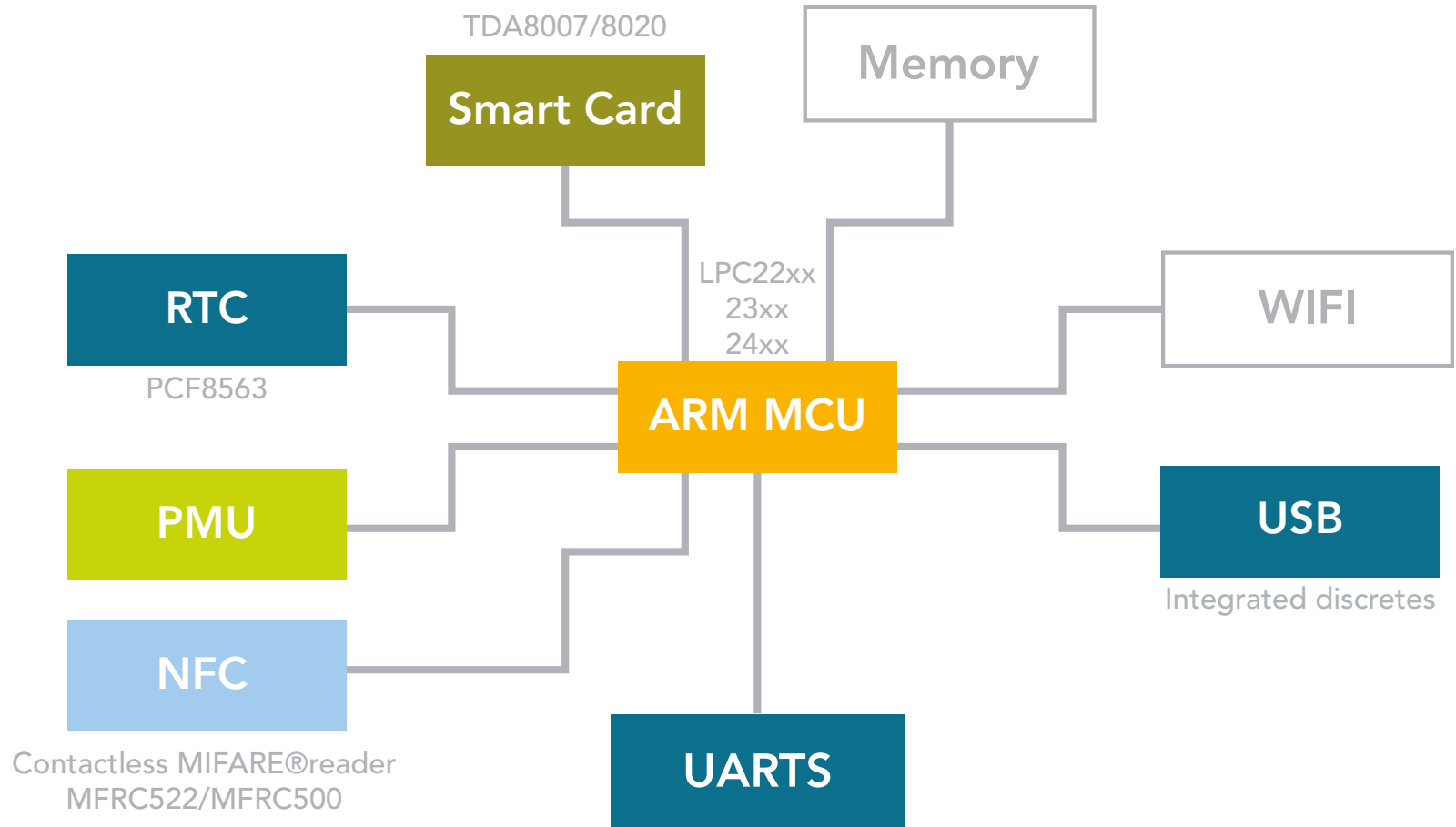
RTC

- ▶ PCF8563 Real-time clock/calendar
Low backup current, programmable clock output for peripheral devices, alarm and timer functions

Key benefits / features

LPC2214/2378/2478 ARM-based microcontrollers

- ▶ High speed embedded on-chip flash memory, zero wait-state (execute code from Flash or SRAM), parallel buses
- ▶ High performance peripherals
- ▶ Industrial temperature
- ▶ Tools and field support



Highlights

Microcontrollers with embedded CAN

- ▶ LPC2xxx
32-bit family based on 1.8 V ARM7TDMI-S core, 10-bit ADC

CAN transceivers

- ▶ TJA104x and TJA105x
Fully compatible with ISO 11898 standard, high EMC performance enables simple, cost-effective designs

Stand-alone CAN controller

- ▶ SJA1000
CAN 2.0B protocol, programmable CAN output driver configuration

High-speed DAC with JESD204A serial interface

- ▶ DAC1408
14-bit DAC, up to 650 Msps, 2x and 4x interpolating

I/O and LED drivers

- ▶ PCA955x and PCA963x
Blink frequency 0.16 Hz to 160 Hz, unused bits can act as normal general-purpose I/O

EEPROM with I²C interface

- ▶ PCF85xx
From 1 to 8 kbits, 1 million times programmable, 10 years non-volatile data retention

Clock and calendar

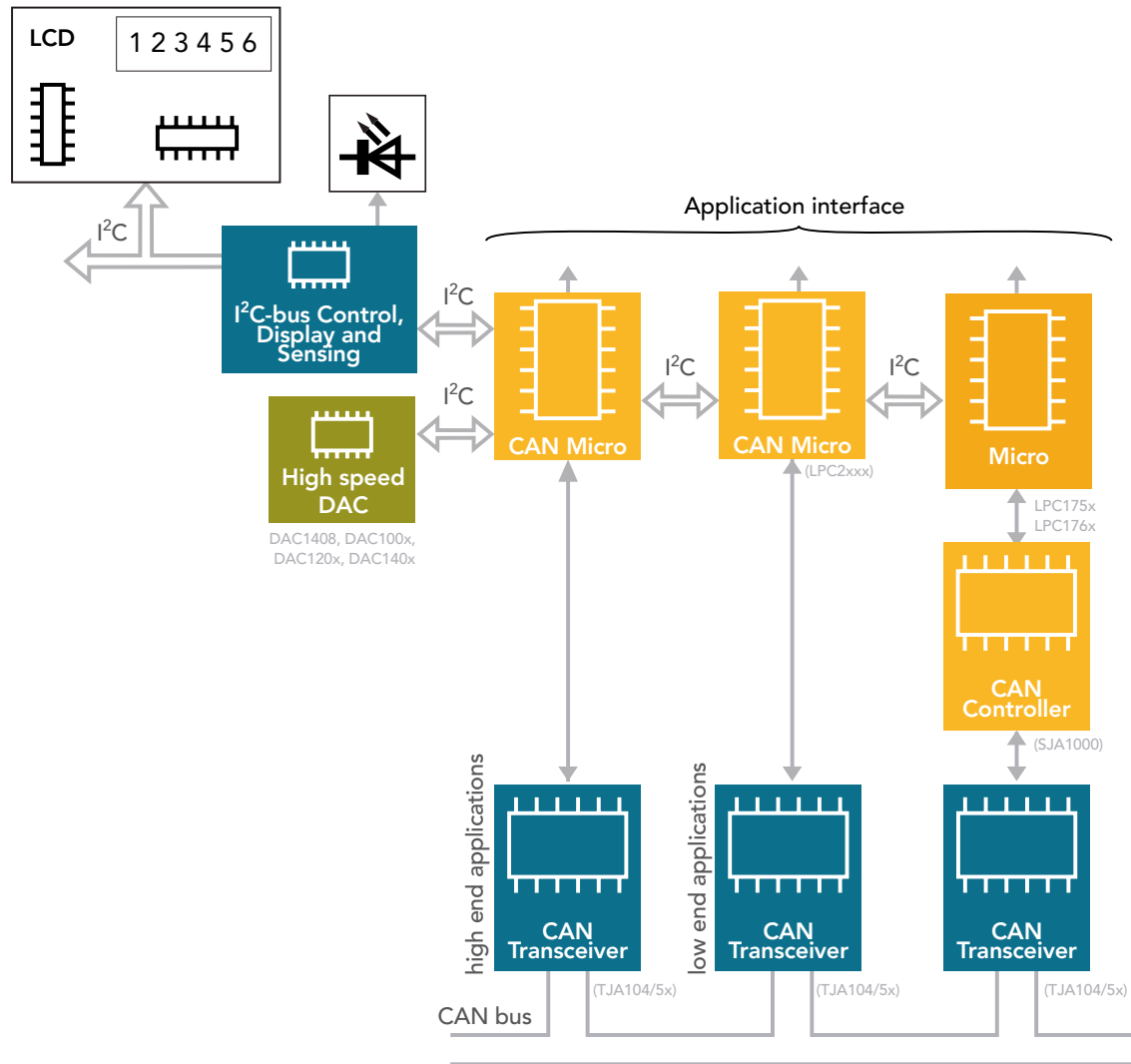
- ▶ PCF85xx
Ideal for periodic alarms, date and time stamping

Temperature sensors

- ▶ LM75A, NE1617/9 and SE95
Simultaneous internal and remote monitoring, no calibration required, many programmable features
- ▶ SA56004x
Remote / local digital sensor, over-temperature alarms

Key benefits / features

- ▶ Solutions covering individual systems, production lines and entire facilities
- ▶ Provides simple access to measurement data from central control systems
- ▶ Comprehensive interconnectivity coverage
- ▶ Vast range of CAN devices offering secure solutions for all instrumentation applications
- ▶ Meet exacting automotive requirements with superior EMC specification
- ▶ Robust products ensuring precise numeric control, even in heavy equipment



Highlights

LCD graphic and segment drivers

▶ PCF8576/7/8/9

Various multiplex / voltage options, high processor compatibility, display RAM ensures minimal communication overheads

MIFARE smart card ICs and readers

▶ MF0x, MF1x, MF3x, MFRC53xxx and CLRC63201

Industry standard, consistent product portfolio, future-proof evolution path and roadmap

Single-chip smart card reader ICs

▶ TDA80xx

Enable fast, flexible design, incorporate protocol management and interface

I/O and LED drivers

▶ PCA955x and PCA963x

Blink frequency 0.16 Hz to 160 Hz, unused bits can act as normal general-purpose I/O

EEPROM with I²C interface

▶ PCF85xx

From 1 to 8 kbits, 1 million times programmable, 10 years non-volatile data retention

I²C multiplexers / switches

▶ PCA954x

Hot insertion support

Low power RTC

▶ PCF8593

Year-month-day-weekday-hour-minute-second, ideal for periodic alarms, date and time stamping

Temperature sensors

▶ LM75A, NE1617/9 and SE95

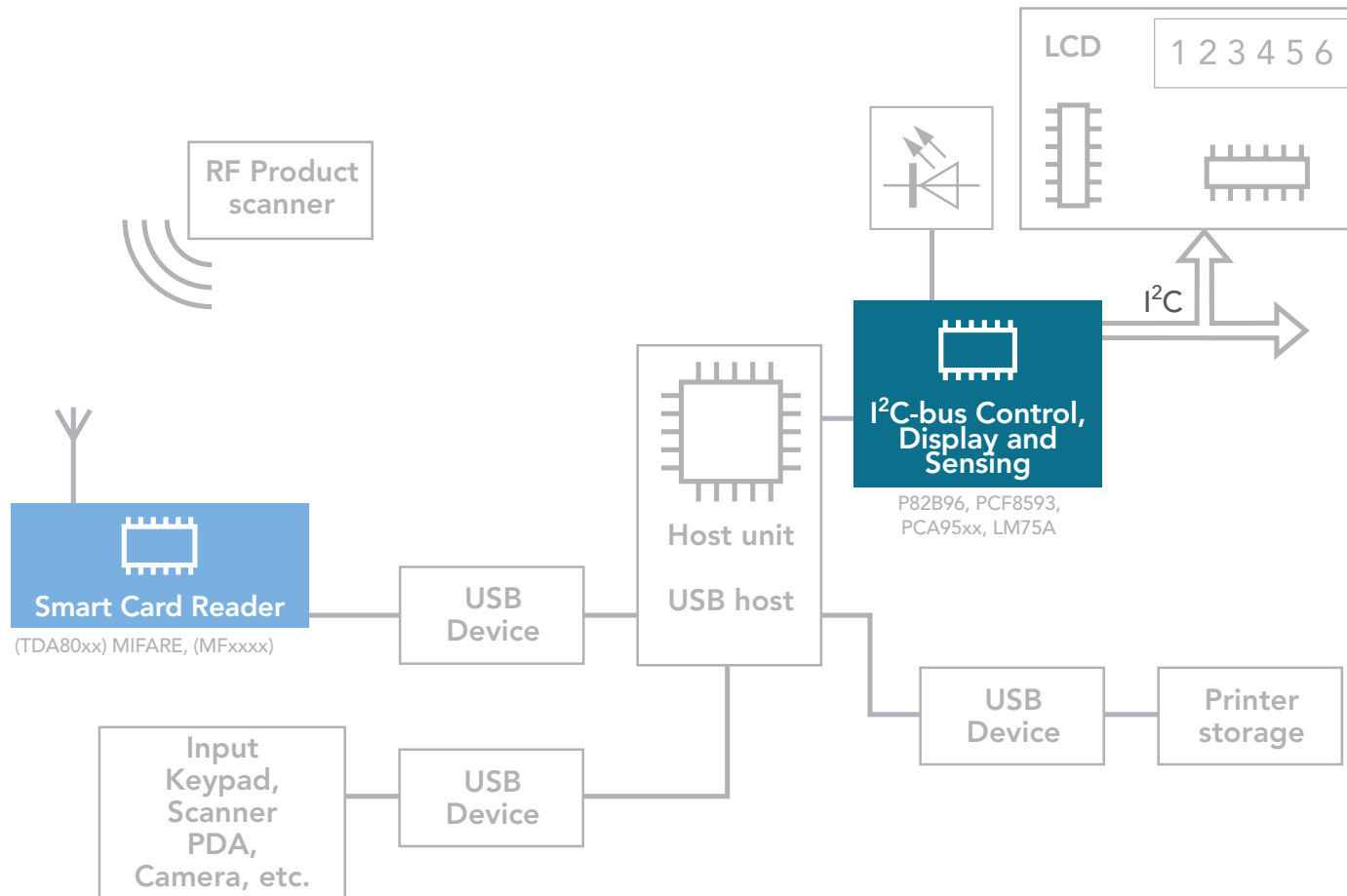
Simultaneous internal and remote monitoring, no calibration required, many programmable features

▶ SA56004x

Remote / local digital sensor, over-temperature alarms, 11-bit 0.125 °C resolution

Key benefits / features

- ▶ Perfect balance between display complexity and low power consumption
- ▶ Ideal for applications such as data loggers, meter readers and EPOS terminals



Highlights

Audio

- ▶ SA58635 Class G stereo headphone amplifier
- ▶ SA58671/2 Class D amplifiers
- ▶ MEMS microphones
- ▶ Mini acoustic speakers and receivers

RF system

- ▶ BGU7003 SiGeC MMIC
Integrated temperature stabilized bias, leadless SOT891 package
- ▶ BFU725F NPN wideband silicon germanium RF transistor
4-pin dual-emitter SOT343F package

NFC section

- ▶ PN544 Second-generation NFC controller

Interface and LED

- ▶ SC16C85xx 1.8 - 3.3 V single- and dual-channel UARTs
128-byte FIFOs, infrared (IrDA), 16/68 mode or XScale VLIO bus interface
- ▶ PCA9574/75 1.1V GPIO
With /RESET & /INT, 14/28-TSSOP, 14/28-SO, 14/28-HVQFN packages
- ▶ PCA953*/5* 2, 4, 8 and 16 bit LED dimmers (blinkers)
Selectable, fully programmable blink rates
- ▶ PCA9633 4-channel Fm+ I²C LED driver
RGBA, 256 steps per LED output, programmable

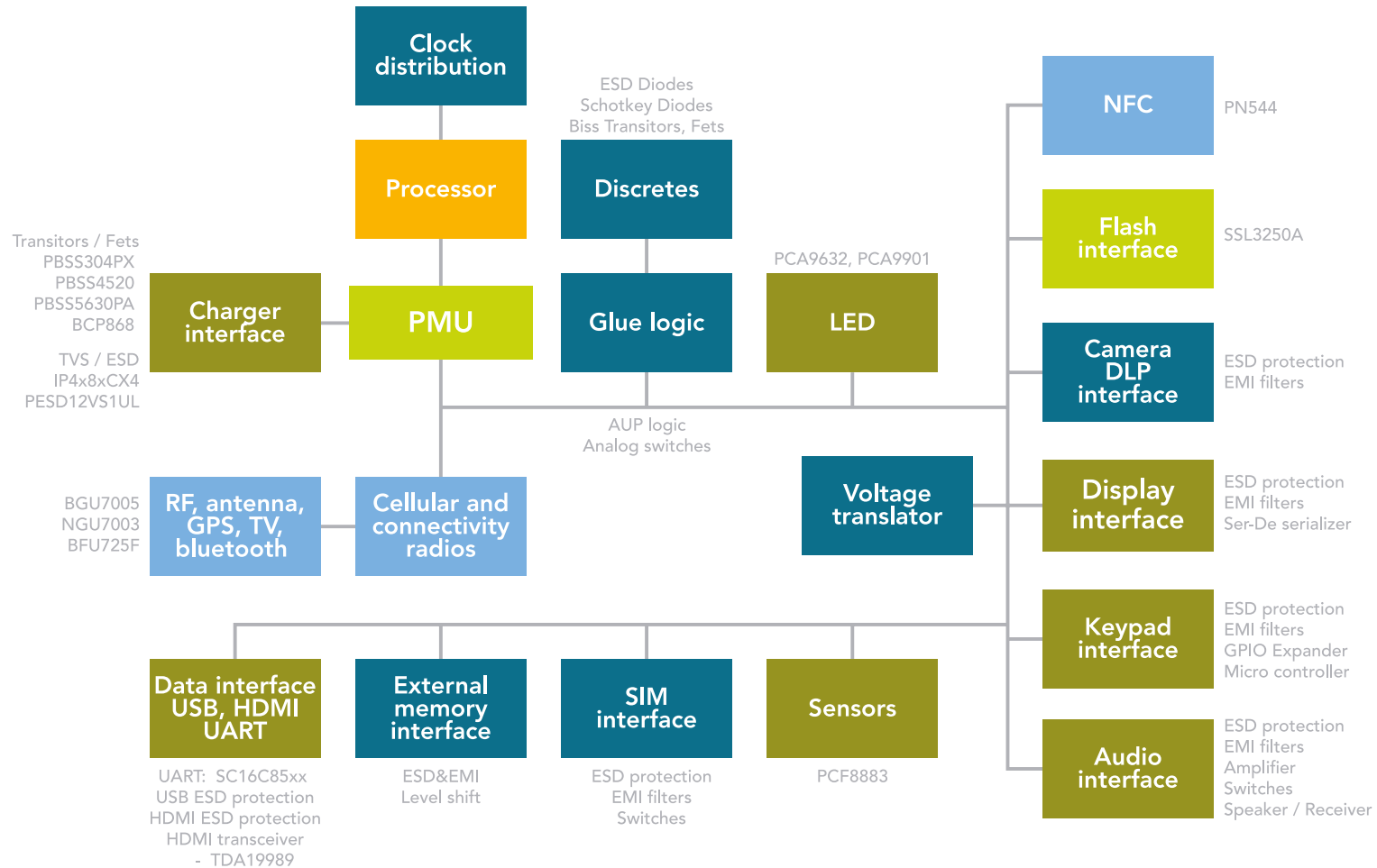
- ▶ PTN37xx simple mobile interface link ICs
Configurable as transmitter-serializer or receiver-deserializer for RGB888 video data

Standard components

- ▶ 74LVC1Gx / 74LVC2Gx / 74AUP1Gx series of logic gates
- ▶ PESDx / BZAx / PRTRx series of ESD protection diodes / arrays
- ▶ IPx series of integrated EMI filter & ESD protection products
- ▶ 1PS79SB3x / BATx / PMEGx series of Schottky diodes / rectifiers
- ▶ BCx / PDT(A)x / PBSSx series of small-signal bipolar transistors
- ▶ PMVx / PMRx / PMZx P-/N-channel small single MOSFETs

Key benefits / features

- ▶ Cover entire audio path from microphone to amplifier and speakers
- ▶ Highly integrated NFC and RFID front-ends deliver the best security and interoperability.
- ▶ Extensive EMI filter and ESD protection options
- ▶ Comprehensive standard product portfolio



Highlights

RF power amplifier

- ▶ BLF6Gxxx and BLF7Gxxx LDMOS RF power transistors
High efficiency, best-in-class ruggedness, ease of use in Doherty configuration
- ▶ Complete portfolio of drivers and final transistors for all applications including Wimax, GSM, WCDMA and LTE base stations and repeaters
- ▶ Integrated Doherty amplifiers available for TD-SCDMA (BLD6G21L(S)-50) and WCDMA (BLD6G22L(S)-50) applications

High speed data converters with JESD204A serial interface

- ▶ DAC1408
14-bit DAC, up to 650 Msps, 2x and 4x interpolating
- ▶ ADC1213 / ADC1413
Dual 12-/14-bits ADC, 65, 80, 105 or 125 Msps, serial JESD204A

MCU

- ▶ LPC2292 16/32-bit ARM microcontroller
256 kB ISP/IAP flash with CAN, 10-bit ADC, external memory interface
- ▶ LPC3000 32-bit ARM microcontroller
Cortex-M3 core

I²C interface

- ▶ LM75A digital temperature sensor and thermal watchdog
11-bit ADC offering 0.125 °C temperature resolution, only 3.5 uA shutdown supply current
- ▶ PCA9511A hot swappable I²C-bus and SMBus buffer

- Supports clock stretching and multiple master arbitration / synchronization
- ▶ PCA9534/54/55 I/O port with interrupt
Low standby current, noise filter on SCL/SDA inputs, no glitch on power-up
- ▶ PCF8563 RTC
Low backup current, programmable clock output for peripheral devices, integrated oscillator capacitor
- ▶ PCF8583 clock/calendar with 240 x 8-bit low-voltage RAM
Programmable alarm, timer and interrupt function

Key benefits / features

RF Power LDMOS transistors

- ▶ High-efficiency solutions with support for Doherty amplifier designs
- ▶ All standards and frequency bands up to 3.8 GHz supported
- ▶ High efficiency, best-in-class ruggedness, ease of use in Doherty configuration

Microcontrollers

- ▶ Board product portfolio of 80x51, ARM7 and ARM9 cores
- ▶ Continuous R&D investment to ensure market-leading solutions
- ▶ Rich development tools and kits

I²C devices

- ▶ Number #1 supplier in I²C interface field
- ▶ Board product portfolio, flexible selection and easy design-in
- ▶ Strong technical support

Wireless infrastructure

Base station

