

Notebook Computer Guide

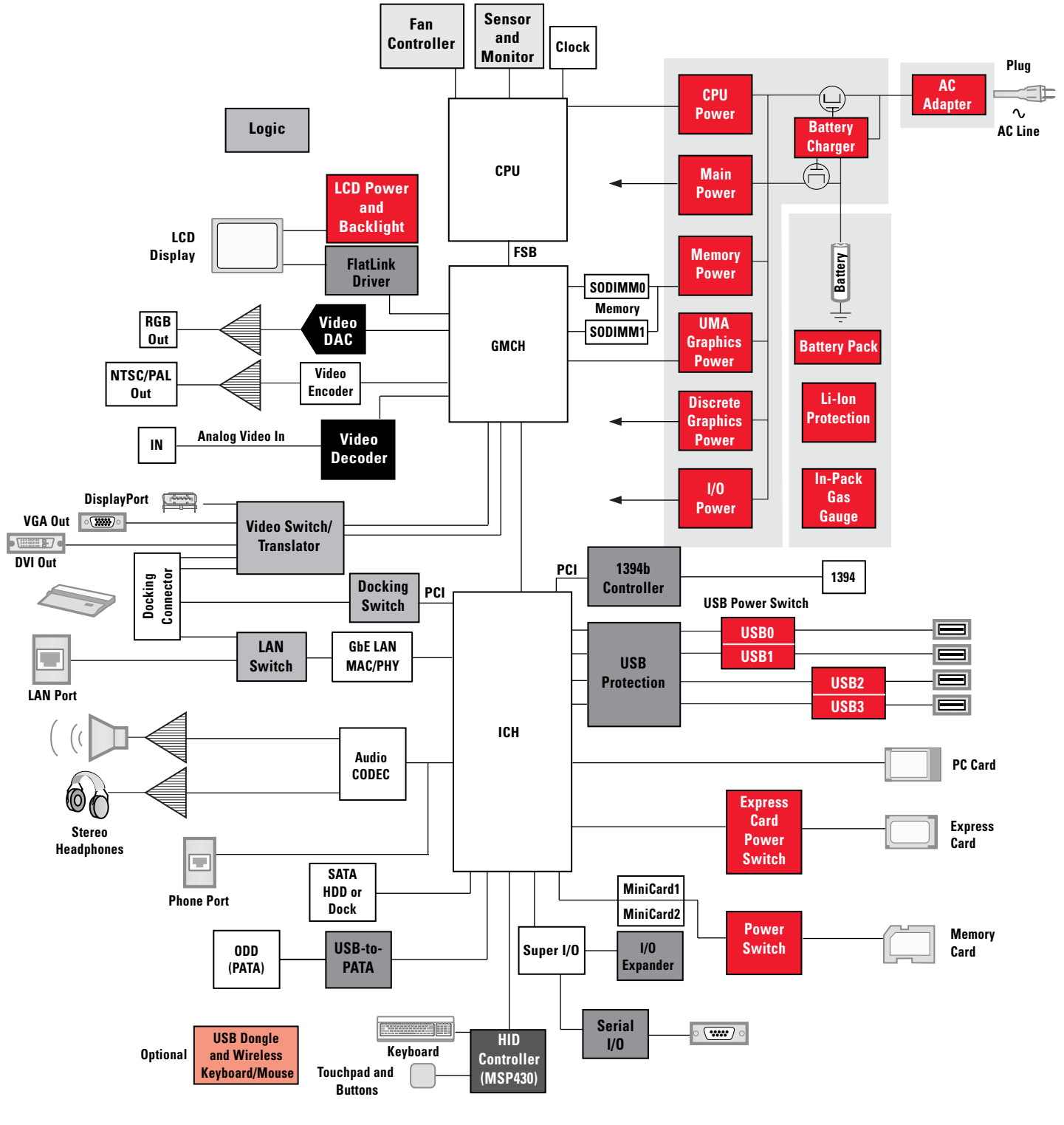


Amplifiers, Interface, Logic, Power Management
and Temperature Sensors





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LEGEND

Processor	Interface	Amplifier	Logic	Power	ADC/DAC	Low Power RF	Other
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For recommended components, visit www.ti.com/pcdiagram



Mobile Intel CPU Power

TPS51620

Get samples and more information at: www.ti.com/sc/device/TPS51620

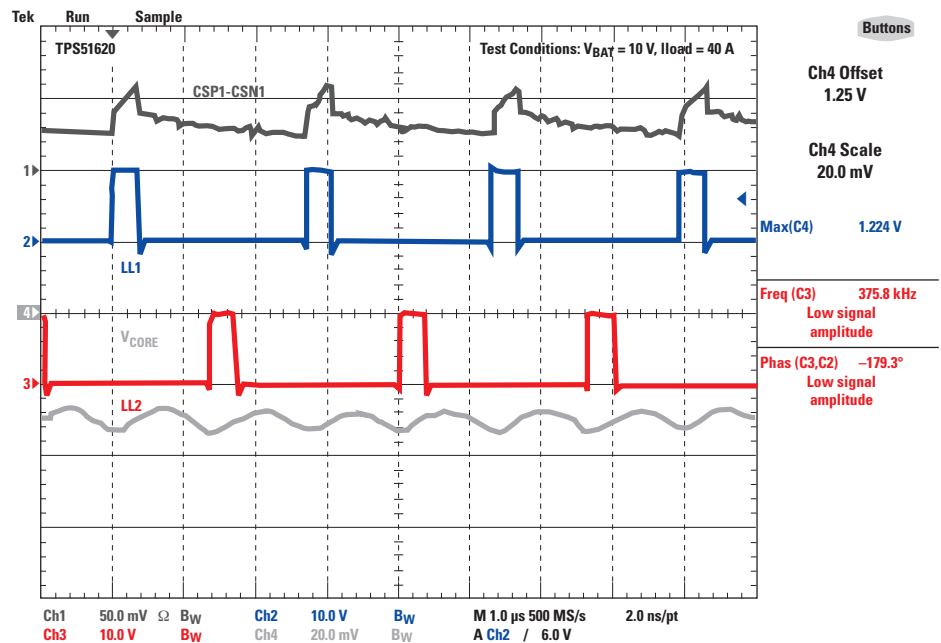
Key Features

- Minimum external parts count
- Compliant to full Intel IMVP-6+ specifications
- 7-bit DAC
- Optimized efficiency at light and heavy loads
- Patented overshoot reduction (OSR) reduces output capacitance
- Accurate, adjustable voltage positioning
- Selectable 200-/300-/400-/500-kHz frequency

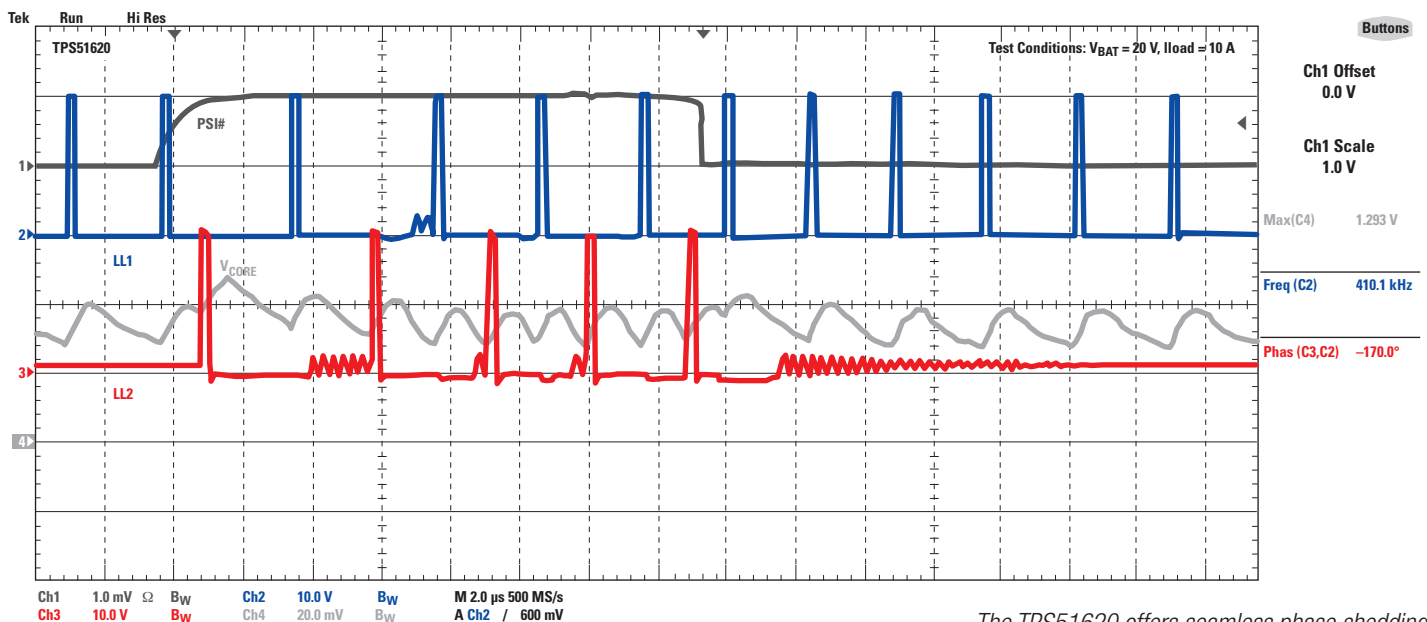
Benefits

- 50-A Current drive capability
- Remote sense
- Accurate VID control with 0.5% DAC
- Programmed, accurate droop
- Blazing transient response, plus OSR
- Automatic skip mode
- Minimum external parts count
- Power monitor/diagnostic fault monitor
- Seamless phase add/drop

The TPS51620 is a selectable dual- or single-phase, fully IMVP-6+ spec-compliant step-down controller with integrated gate drivers. Advanced control features such as D-CAP™ Mode architecture and overshoot reduction (OSR) provide fast transient response, low output capacitance and high efficiency. The TPS51620 also supports single-phase operation for light loads.



The TPS51620 offers precise phase matching.



The TPS51620 offers seamless phase shedding.

Special note: These devices are designed specifically to power IMVP mobile processors under a strict third-party license agreement with Intel. The OEM/ODM must have a current MVP license agreement (RSNDA-MVP) in place with Intel. For more information, please contact IMVP@list.ti.com.



Mobile Intel CPU Power

TPS51610

Get samples and more information at: www.ti.com/sc/device/TPS51610

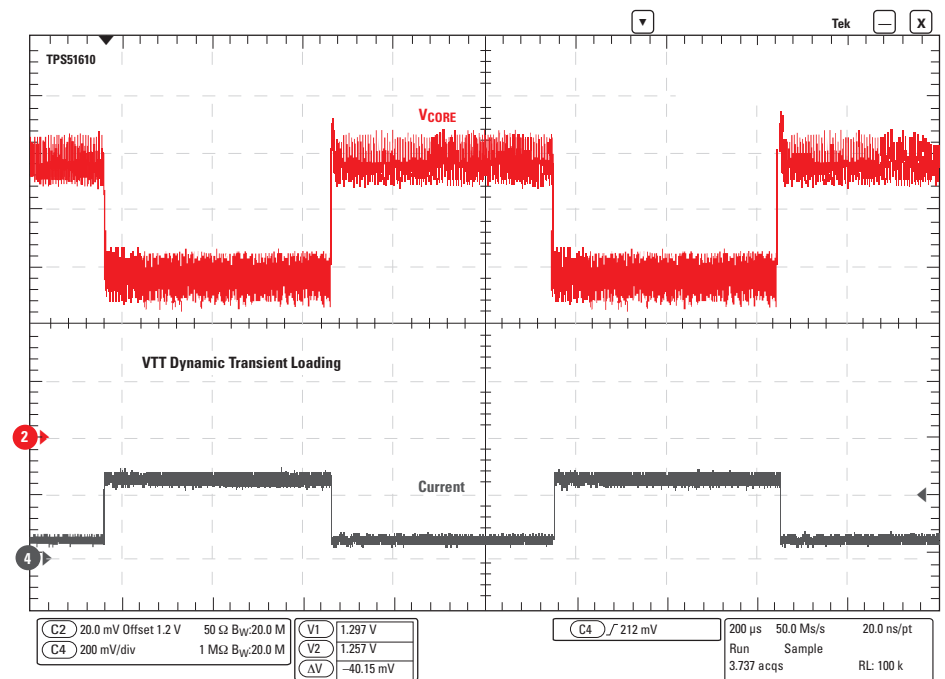
Key Features

- Minimum external parts count
- Full IMVP-6+ compliance, including VRTT and output power monitor
- Dual-mode DAC supports 5-bit and 7-bit VIDs
- 0.3-V to 1.5-V output range
- ± 8 mV V_{CORE} accuracy over line/load/temp
- Optimized efficiency at light and heavy loads
- Patented output overshoot reduction (OSR) reduces output capacitance

Benefits

- 25-A current drive capability
- Dual-mode DAC supporting both CPU and GPU apps
- Remote sense
- Accurate VID control with 0.5% DAC
- Programmed, accurate droop
- Blazing transient response, plus overshoot reduction
- Automatic skip mode
- Minimum external parts count
- Power monitor/diagnostic fault monitor

The TPS51610 is a fully IMVP-6+ spec-compliant single-phase synchronous buck controller with integrated gate drivers designed for use in low-power CPUs and Intel integrated graphics solutions for IMVP-6+ generation notebook systems. Advanced control features such as D-CAP™ Mode architecture and overshoot reduction (OSR) provide fast transient response, low output capacitance and high efficiency. The TPS51610 DAC provides the 5-bit graphics “render” VID.



The TPS51610 offers blazing fast transient response.

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Dual-Synchronous, Step-Down Controller with Out-of-Audio Operation and 100-mA LDOs for Notebook System Power

TPS51125

Get samples, datasheets, evaluation modules and application reports at: www.ti.com/sc/device/TPS51125

Key Features

- Wide input voltage range: 5.5 V to 28 V
- Output voltage range: 2 V to 5.5 V
- Built-in 100-mA, 5-V/3.3-V LDO with switches
- Built-in 1% 2-V reference output
- With/without out-of-audio mode selectable light load and PWM only operation
- Internal 1.6-ms voltage servo soft start
- Adaptive on-time control architecture with four selectable frequency settings
- 4500 ppm/°C $R_{DS(on)}$ current sensing

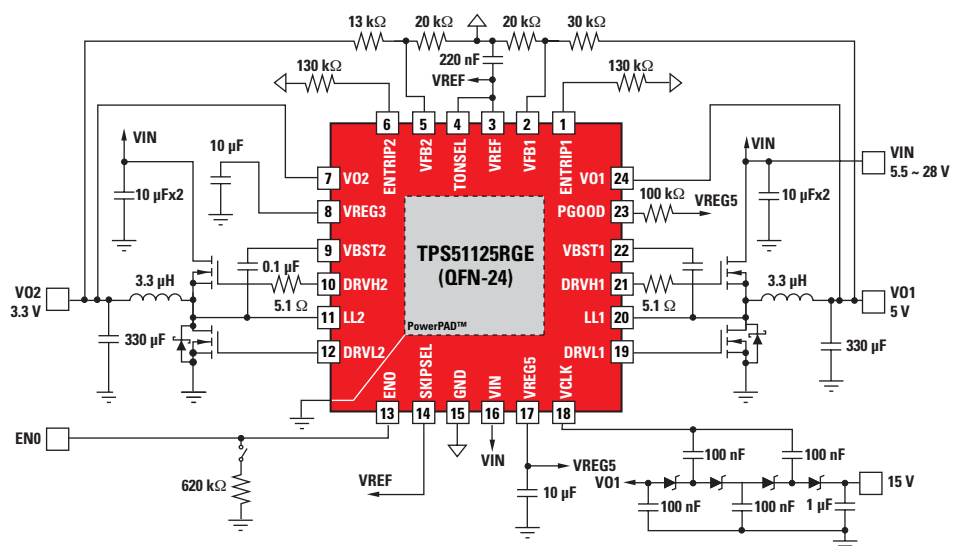
Benefits

- Complete main power solution
- Supports <100-ns transient response and ceramic output capacitors
- Flexible OCP optimized for lossless or accurate sensing
- Optimized for high light-load efficiency
- Optimized for power sequencing and ease-of-use
- Each switching rail can be independently monitored
- Supports 5-, 12- and 19-V inputs
- Package optimized for small solution size

The TPS51125 is a complete five-output main power solution for the notebook computer. Two of the outputs are high-efficiency DC/DC controllers providing both 5-V and 3.3-V main switching power rails. These switchers have a pseudo-fixed frequency and adaptive on-time control.

The TPS51125 offers two control schemes, D-CAP™ Mode and current mode. D-CAP Mode is the simplest, allows for the fastest transient and does not require any loop compensation. Current mode requires simple loop compensation and allows for a ceramic-output capacitor design. In addition, the TPS51125 has two LDO outputs, each set to 5 V and 3.3 V, that are capable of supporting 100-mA loads. These LDOs are used during start-up and offer a glitch-free switch-over after the 5-V and 3.3-V switchers have powered up.

The fifth output, a 2-V reference capable of supporting 50 μ A, is commonly used as an accurate reference within the notebook computer. To ensure optimal ease-of-use, the TPS51125 is equipped with an independent power good signal for each switcher and separate enable signals for each switcher and LDOs. This total solution is housed in a small 4x4-mm QFN-24 package.



TPS51125 typical application diagram.

Alternate Main Power Solutions

Device	Key Features	URL Link
TPS51120	5x5-mm, QFN-32 dual current-mode synchronous step-down controller with 100-mA standby regulator	www.ti.com/sc/device/TPS51120
TPS51220	5x5-mm, QFN-32 dual synchronous buck-regulator controller with two LDOs	www.ti.com/sc/device/TPS51220
TPS51221	5x5-mm, QFN-32 dual synchronous buck-regulator controller with two LDOs	www.ti.com/sc/device/TPS51221



Fixed Frequency, 99 Percent Duty Cycle Peak Current Mode Notebook System Power Controller TPS51220

Get samples, datasheets, evaluation modules and application reports at: www.ti.com/sc/device/TPS51220

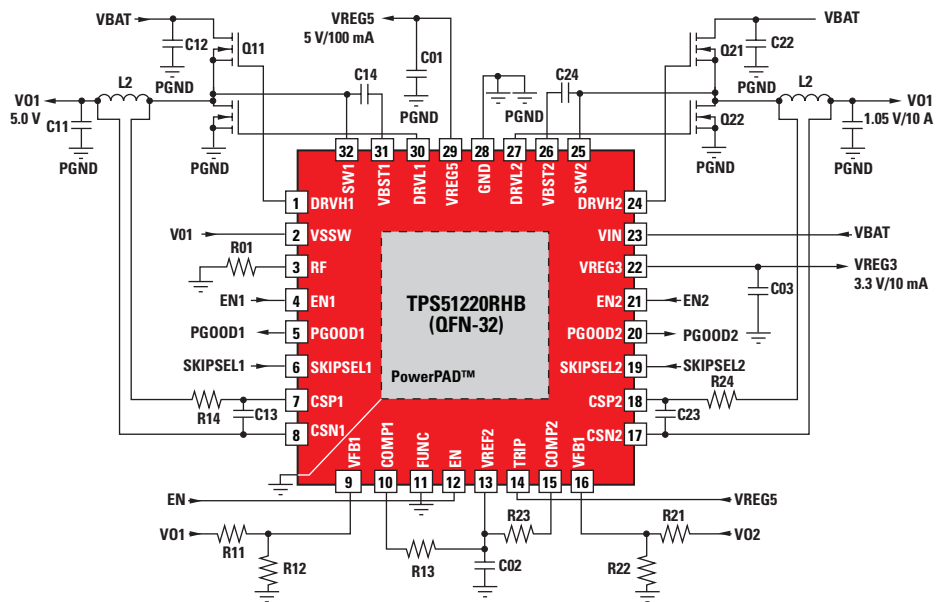
Key Features

- Input voltage range: 4.5 V to 28 V
- Output voltage range: 1 V to 12 V
- Selectable light load operation (continuous/auto skip/out-of-audio skip)
- Programmable droop compensation
- Voltage servo adjustable soft start
- 200-kHz to 1-MHz fixed frequency PWM
- Selectable current/D-CAP™ Mode architecture
- 180° phase shift between channels
- Packaging: 32-pin 5x5-mm QFN

Benefits

- Supports wide input-voltage range
- Wide output-voltage range with high accuracy
- Fast switching frequency uses smaller output filter
- Synchronizes to external clock to reduce noise
- Reduced input-ripple current requires less bulk capacitance
- High efficiency and low noise at lighter loads
- Compact solution size with three additional regulated auxiliary outputs
- Fast transients to use with ceramic capacitors
- Small footprint

The TPS51220 is a dual synchronous buck regulator controller with two LDOs. It is optimized for a 5-V/3.3-V system controller, enabling designers to cost-effectively complete two-cell to four-cell notebook system power supplies. The TPS51220 supports high efficiency, fast transient response and 99 percent duty cycle operation. It supports supply input voltages ranging from 4.5 V to 28 V and output voltages from 1 V to 12 V. Two types of control schemes are available depending on the application. Peak current mode supports stability operation with lower ESR capacitor and output accuracy. The D-CAP™ Mode supports fast transient response. The high duty (99 percent) operation and wide input/output voltage range support flexible design for small mobile PCs and a wide variety of other applications. The fixed frequency can be adjusted from 200 kHz to 1 MHz by a resistor, and each channel runs 180° out of phase. The TPS51220 can also synchronize to the external clock, and the interleaving ratio can be adjusted by its duty. The TPS51220 is available in a 32-pin 5x5-mm QFN package and is specified from -40°C to +85°C.



Typical application circuit.

Alternate Main Power Solutions

Device	Key Specifications	URL Link
TPS51125	4x4-mm, QFN-32 dual synchronous step-down controller with out-of-audio operation, charge pump and 100-mA internal LDO	www.ti.com/sc/device/TPS51125
TPS51120	5x5-mm, QFN-32 dual current mode synchronous step-down controller with 100-mA standby regulator	www.ti.com/sc/device/TPS51120
TPS51221	5x5-mm, QFN-32 dual synchronous buck regulator controller with two LDOs	www.ti.com/sc/device/TPS51221



Optimized Power Solution for System I/O

TPS51124

Get samples, datasheets, evaluation modules and application reports at: www.ti.com/sc/device/TPS51124

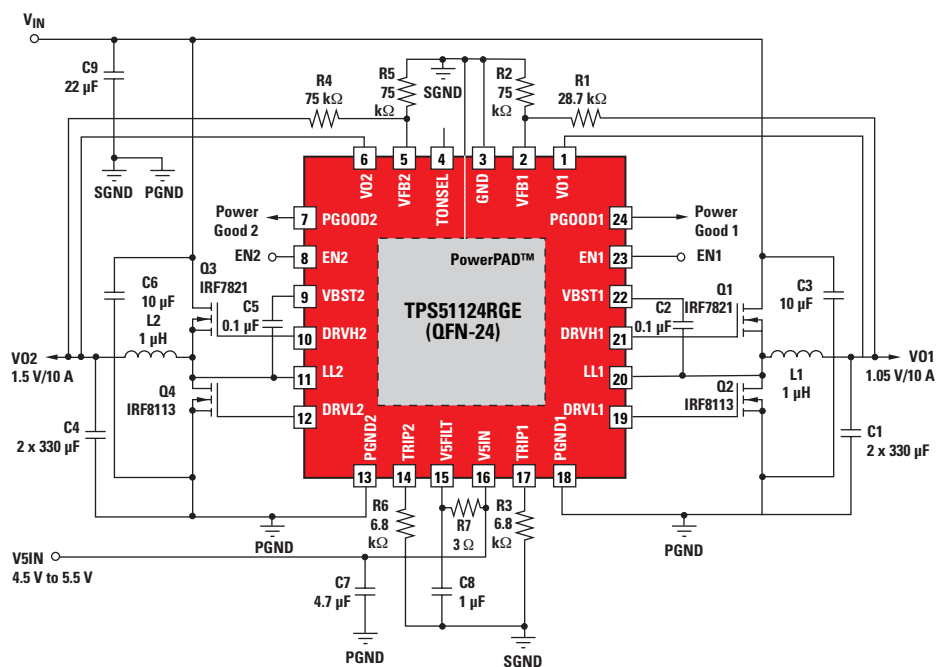
Key Features

- Optimized dual output
- Fixed D-CAP™ Mode
- Pseudo-fixed frequency with adaptive on-time control
- Low-side $R_{DS(on)}$ lossless current sensing
- Fixed internal soft-start time and skip-mode operation
- Fully integrated soft off
- Integrated boost diodes and independent power good signals
- 3-V to 28-V input voltage range
- Packaging: 4x4-mm QFN-24

Benefits

- Minimal external components
- Supports <100-ns transient response
- Optimized for best performance and small solution size
- Lossless OCP saves external resistor
- Designed for high light-load efficiency
- Ideal for power sequencing
- Wide input voltage range: supports 3.3-, 5-, 12- and 19-V inputs
- Packaged for small solution size

The TPS51124 is a dual DC/DC controller optimized for notebook computers. The two outputs are high-efficiency, adjustable DC/DC controllers that provide the I/O power rails. These switchers have a pseudo-fixed frequency and adaptive on-time control. The TPS51124 offers a solution that is easy to use without the burden of adding extra external components. This is achieved with D-CAP™ Mode, the simplest control scheme which allows for the fastest transient and does not require any loop compensation. The controller achieves optimization by integrating the soft-start times, supporting low-side $R_{DS(on)}$ current sensing only (OCP) for integrating both switcher boost diodes and maintaining the highest efficiency with a part that is always with a skip mode option. The TPS51124 is also equipped with separate power good and enable pins for each switcher. This solution is housed in a small 4x4-mm QFN-24 package.



Typical application diagram.

Alternate I/O Power Solutions

Device	Key Features	URL Link
TPS51117	QFN-14 package, one-switcher output, pseudo-fixed frequency D-CAP™ Mode	www.ti.com/sc/device/TPS51117
TPS5130	TQFP-48 package, three-switcher outputs, 5-V /3.3-V LDOs, LDO controller, fixed-frequency voltage mode	www.ti.com/sc/device/TPS5130
TPS5110	TSSOP-24 package, one-switcher output, LDO controller, fixed-frequency voltage mode	www.ti.com/sc/device/TPS5110



Complete Power Solution for V_{DDQ} , V_{TT} and V_{REF}

TPS51116

Get samples, datasheets, evaluation modules and application reports at: www.ti.com/sc/device/TPS51116

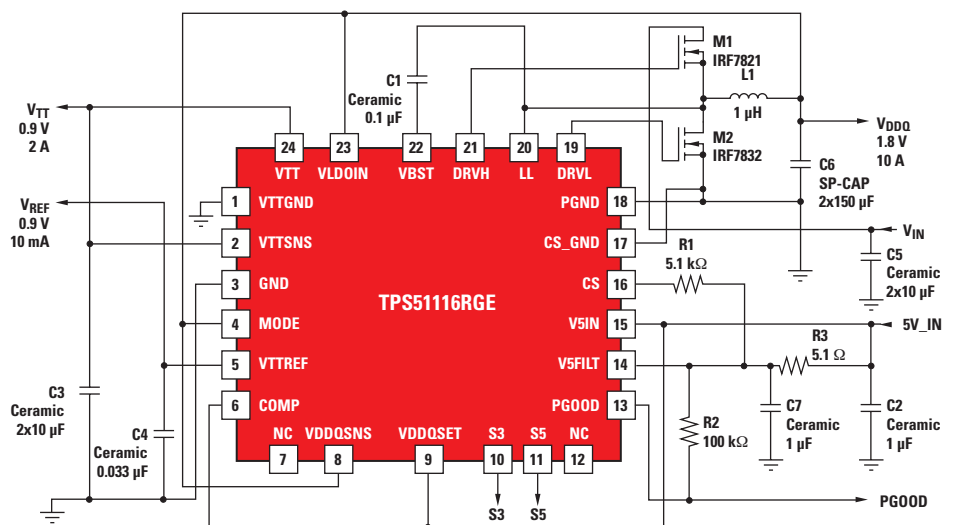
Key Features

- Integrated V_{DDQ} , V_{TT} and V_{REF} rails
- Selectable D-CAP™ Mode
- Selectable current mode
- Pseudo-fixed frequency with adaptive on time
- Selectable temperature compensated $R_{DS(on)}$ /resistor OCP
- Fixed PWM or auto-skip modes of operation
- Integrated S3 and S4/S5 states
- Power good signal
- Integrated boost diode
- Packaging: 4x4-mm QFN-24 or HTSSOP-20

Benefits

- Complete DDR power solution
- Supports <100-ns transient response
- Supports ceramic-output capacitor design
- Optimized for best performance and small solution size
- Flexible OCP optimized for lossless or accurate sensing
- Fixed soft-start value saves output capacitors
- Supports high-Z in S3 and soft start off in S4/S5
- Power good monitor for V_{DDQ} output
- Packaged optimized for small solution size

The TPS51116 is a complete DDR power solution. The switcher is designed to provide a high-efficiency output for the V_{DDQ} power rail and has a pseudo-fixed frequency and adaptive on-time control. The TPS51116 offers two control schemes, D-CAP™ Mode and current mode. D-CAP Mode is the simplest, allows for the fastest transient and does not require any loop compensation. Current mode requires simple loop compensation and allows for a ceramic-output capacitor design. TPS51116 integrates a high-performance LDO that provides power for the V_{TT} rail. The input to the LDO can be changed to optimize total power dissipation and is capable of sinking/sourcing 3 A. Also integrated is the buffered reference power rail for V_{REF} . This output is capable of supporting a full 10-mA load. The TPS51116 integrates the complete S3 and S4/S5-state control. Simply connecting these pins to the S3 and S4/S5 signals allows for high-Z in S3 and soft-start off in both S4 and S5. This total solution is offered in a small 4x4-mm QFN-24 package or an HTSSOP-20 package.



Typical application diagram.

Alternate DDR Power Solutions

Device	Key Features	URL Link
TPS51020	TSSOP-30 package, two-switcher (V_{DDQ}/V_{TT}) outputs, fixed-frequency voltage mode	www.ti.com/sc/device/TPS51020
TPS51100	MSOP-10 package, 3-A sink/source V_{TT} LDO and V_{REF} output	www.ti.com/sc/device/TPS51100



Synchronous Switcher Controller with 2-A LDO for VGA Power

TPS51511

Get samples, datasheets, evaluation modules and application reports at www.ti.com/sc/device/TPS51511

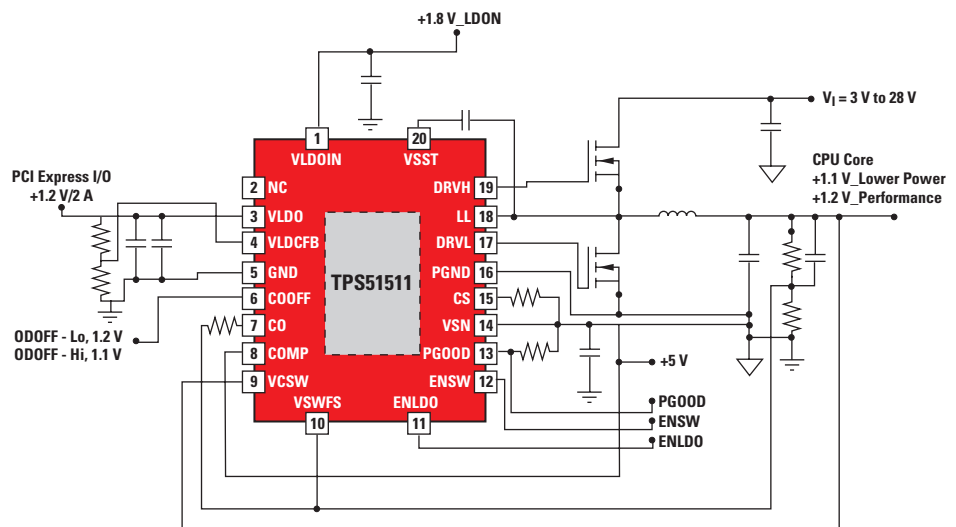
Key Features

- Switcher controller:
 - Adjustable output buck converter: 0.75 V to 3.3 V
 - Wide input voltage range: 3.0 V to 28 V
 - Fixed D-CAP™ Mode
 - Selectable current mode
 - Current sensing from $R_{DS(on)}$ or resistor
 - Internal switch supports dynamic output voltage change
 - Advanced power good mask feature
- LDO Regulator:
 - 2-A LDO for GPU I/O power
 - Input range: up to 5 V
 - Output range: 0.75 V to 3.3 V
 - Requires only 20- μ F ceramic capacitor for LDO output
- Packaging: 20-pin QFN

Benefits

- Supports dynamic 1-bit and 2-bit graphics solutions
- Integrated switcher/LDO offers a compact power solution
- Supports <100-ns transient response
- Supports ceramic-output capacitor design
- Flexible OCP optimized for lossless or accurate sensing
- Fixed soft start value saves output capacitors
- Package optimized for small solution size

The TPS51511 is a 350-kHz D-CAP™ Mode synchronous switcher with a 2-A, source-only, low dropout (LDO) regulator. It is specifically for low cost, low noise, low external component count power systems for GPU applications. The integrated OD switch in the buck controller supports dynamic output voltage change. The current mode option of the synchronous buck converter can support pure output ceramic capacitor applications. The TPS51511 is available in a thermally enhanced 20-pin QFN package and is specified from -40°C to $+85^{\circ}\text{C}$.



TPS51511 circuit diagram.

Alternate Graphics Power Solutions

Device	Key Specifications	URL Link
TPS51117	QFN-14 package, one-switcher output, pseudo-fixed frequency D-CAP™ Mode	www.ti.com/sc/device/TPS51117
TPS51124	Dual, synchronous step-down controller for low-voltage system power	www.ti.com/sc/device/TPS51124



Mobile Intel GPU Power

TPS51610

Get samples, datasheets, evaluation modules and application reports at: www.ti.com/sc/device/TPS51610

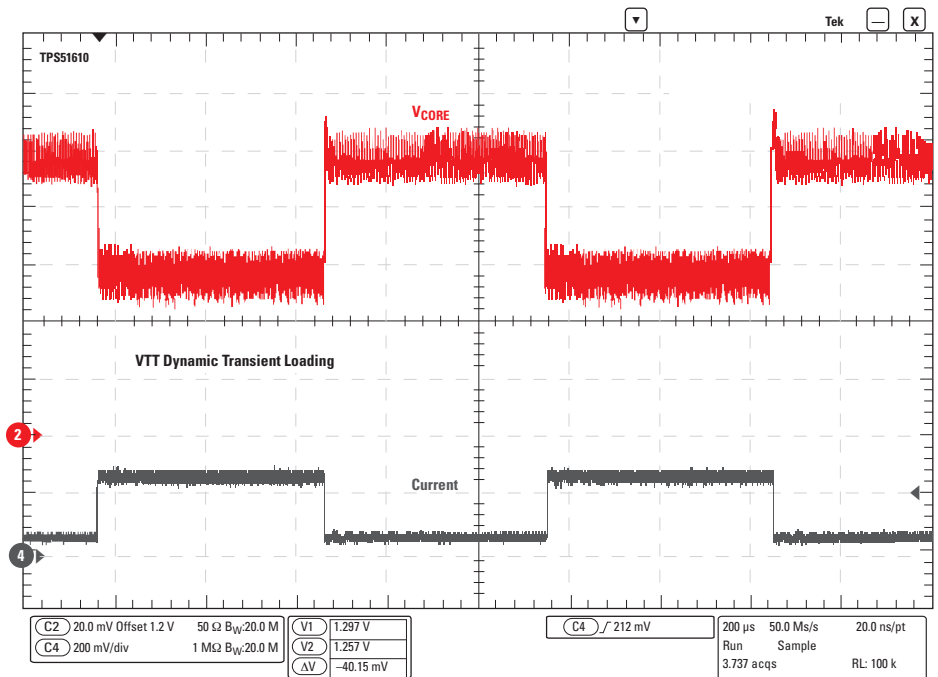
Key Features

- Minimum external parts count
- Full IMVP-6+ compliance, including VRTT and output power monitor
- Dual-mode DAC supports 5-bit and 7-bit VIDs
- 0.3-V to 1.5-V output range
- ± 8 mV V_{CORE} accuracy over line/load/temp
- Optimized efficiency at light and heavy loads
- Patented output overshoot reduction (OSR) reduces output capacitance

Benefits

- 25-A current drive capability
- Dual-mode DAC supporting both CPU and GPU apps
- Remote sense
- Accurate VID control with 0.5% DAC
- Programmed, accurate droop
- Blazing transient response, plus overshoot reduction
- Automatic skip mode
- Minimum external parts count
- Power monitor/diagnostic fault monitor

The TPS51610 is a fully IMVP-6+ spec-compliant single-phase synchronous buck controller with integrated gate drivers designed for use in low-power CPUs and Intel integrated graphics solutions for IMVP-6+ generation notebook systems. Advanced control features such as D-CAP™ Mode architecture and overshoot reduction (OSR) provide fast transient response, low output capacitance and high efficiency. The TPS51610 DAC provides the 5-bit graphics “render” VID.



The TPS51610 offers blazing fast transient response.

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Host-Controlled Multi-Chemistry Battery Charger with Low Input Power Detect

bq24705

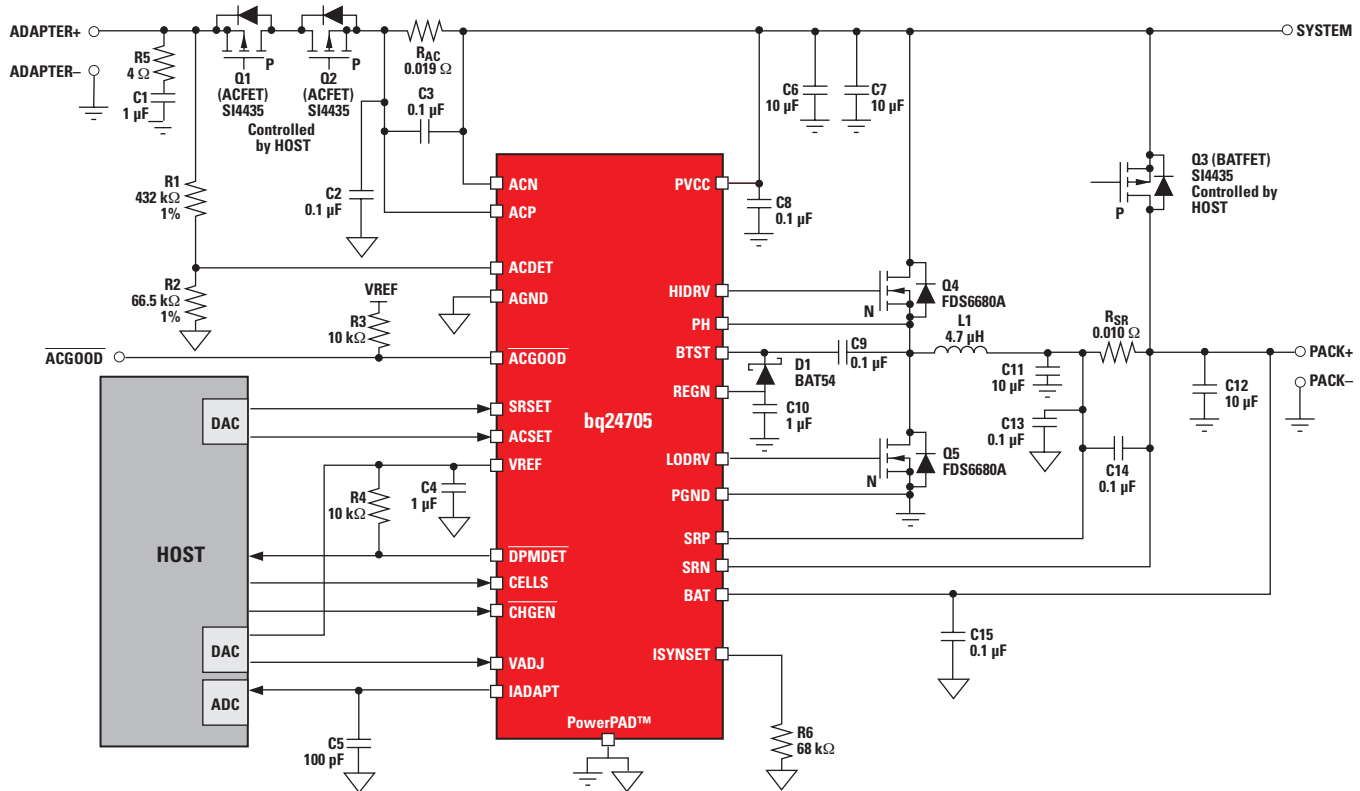
Get samples, datasheets, evaluation modules and application reports at: www.ti.com/sc/device/bq24705

Key Features

- NMOS-NMOS synchronous buck converter with 600-kHz frequency and >95% efficiency
- 30-ns minimum driver dead-time and 99.5% maximum effective duty cycle
- High-accuracy voltage and current regulation
 - $\pm 0.5\%$ charge voltage accuracy
 - $\pm 3\%$ charge current accuracy
 - $\pm 3\%$ adapter current accuracy
 - $\pm 2\%$ input current sense amp accuracy
- Integration
 - Internal loop compensation
 - Internal soft start
- Safety
 - Input overvoltage protection (OVP)
 - Dynamic power management (DPM) with status indicator
 - Reverse-conduction protection input FET
 - Battery overvoltage protection
- Packaging: 24-pin, 4x4-mm QFN

Benefits

- Works with small inductors
- Ensures break-before-make switching to prevent shoot-through
- Industry's highest accuracy for safe and efficient charging
- Reduces external components, solution size and cost
- Maximizes use of input power, avoids adapter overcurrent



Typical system schematic, voltage and current programmed by DAC.



Host-Controlled Multi-Chemistry Battery Charger with Low Input Power Detect (Continued)

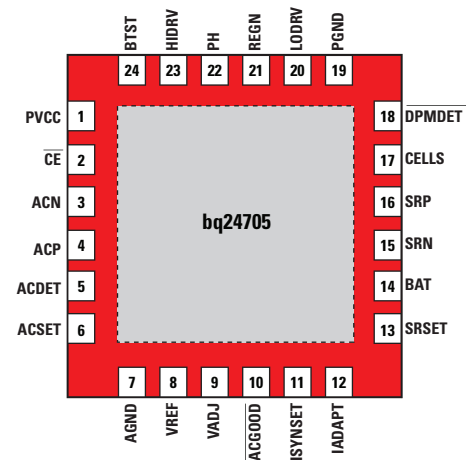
bq24705

Get samples, datasheets and evaluation modules at: www.ti.com/sc/device/bq24705

The bq24705 is a high-efficiency, synchronous battery charger with integrated compensation, offering low component count and small solution size. Charge current and voltage programming allows high regulation accuracies and can be either hardwired with resistors or programmed by the system power management microcontroller using a DAC or GPIOs.

The bq24705 charges two, three, or four series Li+ cells, supporting up to 8 A of charge current and is available in a 24-pin, 4x4-mm thin QFN package.

The bq24705 features dynamic power management (DPM) and input power limiting. These features reduce battery charge current when the input power limit is reached to avoid overloading the AC adapter when supplying the load and the battery charger simultaneously. A highly-accurate current-sense amplifier enables precise measurement of input current from the AC adapter to monitor the overall system power.



bq24705, 24-pin QFN, top view.

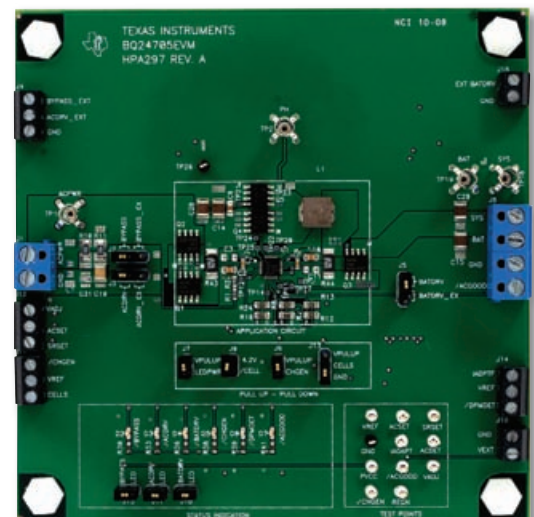
Alternate Battery Charger Solutions

Device	Switching Frequency (KHz)	AC Over Power Protection	Temp Sense	Input OVP	DPM Active Indicator	System Power Selector	Compensation	SMBus	Package
bq24740	300	No	No	Yes	Yes	No	Internal	No	28-pin, 5x5-QFN
bq24750	300	Yes	Yes	Yes	Yes	Yes	Internal	No	28-pin, 5x5-QFN
bq24751A	300	Yes	No	Yes	No	Yes	Internal	No	28-pin, 5x5-QFN
bq24745	300	No	No	Yes	No	No	External	Yes	28-pin, 5x5-QFN
bq24721C	300 or 500	No	Yes	No	No	Yes	Internal	Yes	28-pin, 5x5-QFN

Battery Charger Evaluation Modules (EVMs)

TI's battery-charger evaluation modules allow you to determine how a specific product will operate in your system, so you can deliver winning designs to market faster. To order any of the following evaluation modules, visit the product folder or contact your local TI Product Information Center (see page 35) or local distributor.

Description	Part No.	Price
bq24705 evaluation module	BQ24705EVM	\$99
bq24745 evaluation module	BQ24745EVM	\$99
bq24751A evaluation module	BQ24751AEVM	\$149





Precision Adjustable Current-Limited Power-Distribution Switch

TPS2550

Get samples, datasheets and evaluation modules at: www.ti.com/sc/device/TPS2550

Key Features

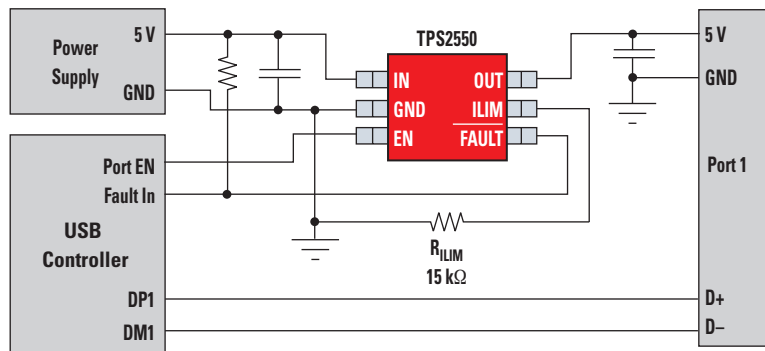
- 100-mA to 1.1-A resistor programmable current limit
- Wide 2.5-V to 6.5-V operating range
- Fast 2- μ S overcurrent response
- Chip enable pin and deglitched fault reporting output
- -40°C to $+85^{\circ}\text{C}$ ambient temperature range
- Compliant to USB standard and UL certified
- Packaging: SOT-23-6 and 2x2-mm SON-6 options

Benefits

- Single IC can be used across multiple platforms with just a resistor change
- Can be used across a wide voltage range
- Fast OC response enables use of smaller supplies
- Enable provides port control; deglitched fault prevents false triggers
- Wide temperature range for use in many applications
- Simplifies design process and shortens design cycle
- Small package options save board space

The TPS2550 power-distribution switch is for applications where heavy capacitive loads and short circuits are likely to be encountered, incorporating a 100-m Ω , N-channel MOSFET in a single package. The current-limit threshold is user adjustable between 100 mA and 1.1 A through an external resistor. The power-switch rise and fall times are controlled to minimize current surges during switching.

The device limits the output current to a desired level by switching into a constant-current mode when the output load exceeds the current-limit threshold or if a short is present. An internal reverse-voltage detection comparator disables the power switch in the event that the output voltage is driven higher than the input to protect devices on the input side of the switch.



Typical application diagram.

Low-Cost Power Switch Matrix

Channels	TPS2048A TPS2058A	TPS2044B TPS2054B			<div style="background-color: red; color: white; padding: 2px;">New</div> Typical Package Options: SOIC MSOP SOT23
3	TPS2047B TPS2057A	TPS2043B TPS2053B	TPS2063 TPS2067		
2	TPS2046B TPS2056A	TPS2042B TPS2052B	TPS2062 TPS2066	TPS2060 TPS2064	
1	TPS2045A TPS2055A TPS2049	TPS2041B TPS2051B	TPS2061 TPS2065	TPS2068 TPS2069	

\leftarrow TPS2550 Adjustable* \rightarrow

Typical Current Limit (A)
 $r_{DS(on)} = 70 \text{ m}\Omega$ (typ)

* The TPS2550 covers current limit values from 100 mA to 1.1 A.

Low- $R_{DS(on)}$ Power Switch Matrix

Enable Polarity	Reverse Blocking					
High	Yes	TPS2030	TPS2031	TPS2032	TPS2033	TPS2034
Low	Yes	TPS2020	TPS2021	TPS2022	TPS2023	TPS2024
Low	No	TPS2010A	TPS2011A	TPS2012A	TPS2013A	

Typical Current Limit (A)
 $r_{DS(on)} = 33 \text{ m}\Omega$



Integrated ExpressCard Power Interface Switch

TPS2231

Get samples, datasheets, evaluation modules and application reports at: www.ti.com/sc/device/TPS2231

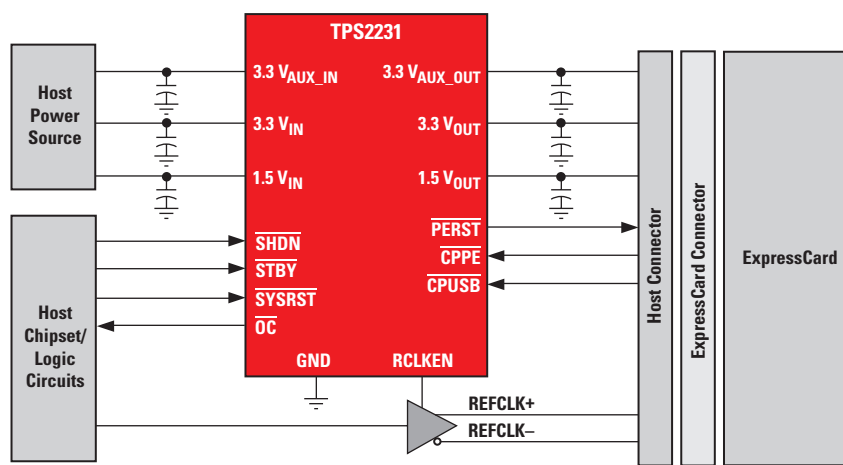
Key Features

- Meets PC card standard for ExpressCard technology
- TTL logic compatible inputs
- Short-circuit and thermal protection
- 50- μ A (typ) quiescent current on 3.3-V auxiliary input (single)

Benefits

- PC card standard drives volume, price and pin-for-pin compatibility
- Meets TTL logic communication standard
- Meets power switch requirements
- Low quiescent current for battery applications

The TPS2231 and TPS2236 ExpressCard power interface switches provide the total power management solution required by the ExpressCard specification. The TPS2231 and TPS2236 ExpressCard power interface switches distribute 3.3 V, AUX and 1.5 V to the ExpressCard socket. Each voltage rail is protected with integrated current-limiting circuitry. The TPS2231 supports systems with single-slot ExpressCard/34 or ExpressCard/54 sockets. The TPS2236 supports systems with dual-slot ExpressCard sockets.



Typical ExpressCard power-distribution application.

Selection Guide

Device	Ports	3-V $R_{DS(on)}$ (m Ω) (typ)	Interface	Current Limit (A) (min)
TPS2231	One	45	Parallel	2.5
TPS2236	Two	45	Parallel	2.5



SBS 1.1 Compliant Battery Gas Gauge

bq20z90

Get samples, datasheets, evaluation modules and application reports at: www.ti.com/sc/device/PARTnumber
(replace **PARTnumber** with **bq20z90-v150**, **bq20z70-v160**, **bq20z80A-v110**, **bq20z75-v160** or **bq20z95**)

Key Features

- Patented Impedance Track™ gas gauge algorithm
- Two-wire SMBus v1.1 interface
- Full array of programmable voltage-current and temperature-protection features
- Optional pulse-charging feature for improved charge times
- Supports SHA-1 authentication
- Improved, fully integrated cell balancing
- Packaging: SM8-30

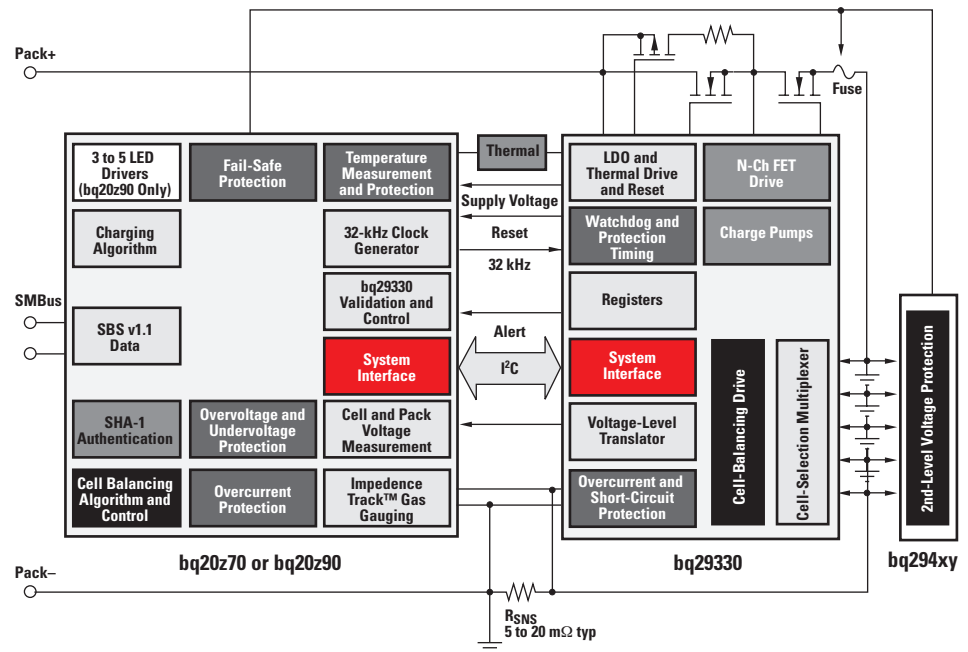
Benefits

- Self-learning dynamic algorithm allows for 99% accurate reporting of battery capacity independently from cell age, environment or user profile
- The removed full-charge/discharge learning cycle enables smaller sense resistors
- Self-discharge is now measured instead of estimated

The bq20z70 through bq20z90 family of devices features Impedance Track™ technology, the industry's first dynamic, self-learning, gas gauging algorithm. This new algorithm enables 99 percent accurate reporting of remaining battery pack capacity under varying load and temperature conditions.

This high-accuracy reporting allows you to use the full chemical capacity of a battery pack, enabling application in smaller form factors and with longer run times.

Impedance Track technology removes learning-cycle requirements and permits the use of a smaller sense resistor, further extending run time and accuracy.



Full protection and reporting battery-pack electronics for 2-4 series cell applications.

Alternate Gas Gauge Solutions

Device	Key Specifications	URL Link
bq20z70	TSSOP-20 package, Li-Ion protection, cell balancing, charging algorithm; self-calibrating coulomb counter with <math><0.65\text{ nVh}</math> resolution and an offset error of <math><1\text{ }\mu\text{V}</math> enables better than 99% reporting accuracy with bq29330	www.ti.com/sc/device/bq20z70
bq20z80-v102	TSSOP-38 package, Li-Ion protection, cell balancing, charging algorithm; self-calibrating coulomb counter with <math><0.65\text{ nVh}</math> resolution and an offset error of <math><1\text{ }\mu\text{V}</math> enables better than 99% reporting accuracy with bq29312A	www.ti.com/sc/device/bq20z80-v102



High-Efficiency, Phase-Shifted, Full-Bridge CCFL Controller

TPS68000

Get samples, datasheets and evaluation modules at: www.ti.com/sc/device/TPS68000

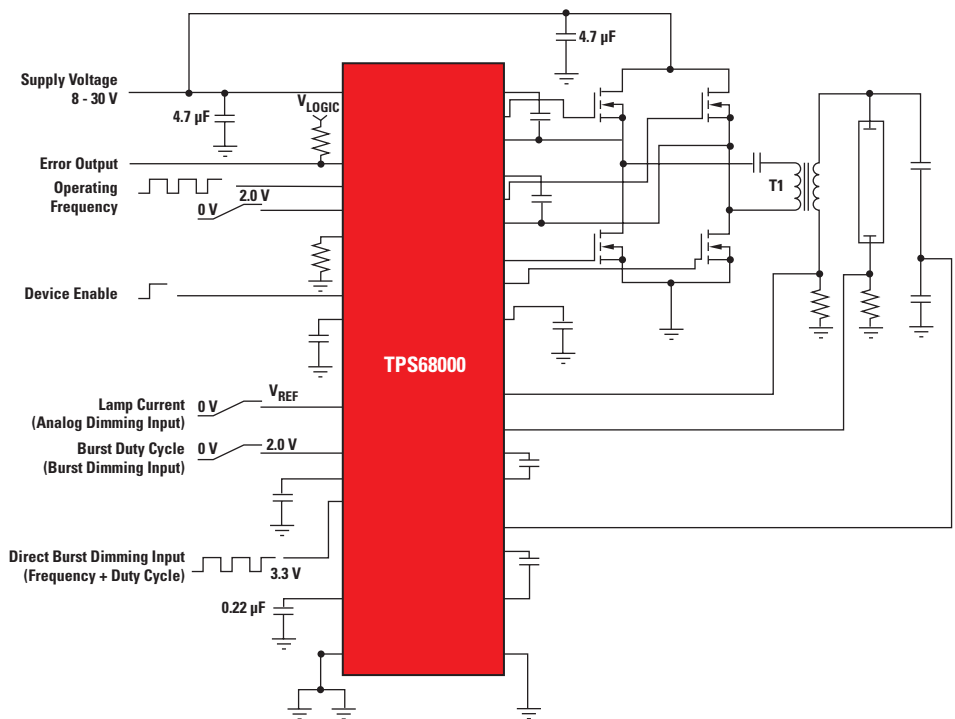
Key Features

- 8-V to 30-V input voltage range
- Full-bridge topology with integrated gate drivers for four NMOS switches
- Synchronizable constant-frequency operation
- Programmable phase delays
- Lamp-voltage and lamp-current regulation
- Analog and burst dimming
- Programmable voltage regulation timeout
- Open-lamp and short-circuit protection
- Internal overtemperature protection
- Internal and adjustable soft start
- Undervoltage lockout
- Packaging: SM8-30

Benefits

- Direct PWM dimming (frequency and duty cycle)
- Internal functions to support multi-controller applications
- Two levels of protection

The TPS68000 is a highly integrated, highly efficient power supply controller for CCFL applications. The device offers a wide input voltage range and can drive all four NMOS switches directly without the need for additional circuitry. The TPS68000 supports single-lamp or multi-lamp applications. To protect the lamp during fault conditions, overvoltage and overcurrent protection are implemented. The device features analog dimming and burst dimming. To minimize RMS input current in a multi-controller application, the burst signal can be phase-shifted to the external PWM, which is called distributed dimming.



TPS68000 application circuit for single lamp.

Alternate Display Power Solutions

Device	Key Specifications	URL Link
UCC3973	BiCMOS cold cathode fluorescent lamp driver controller	www.ti.com/sc/device/UCC3973
UCC3975/76/77	Multi-topology piezoelectric transformer controller	www.ti.com/sc/device/UCC3975



White LED Driver for Notebook Display

TPS61181

Get samples, datasheets, evaluation modules and application reports at: www.ti.com/sc/device/TPS61181

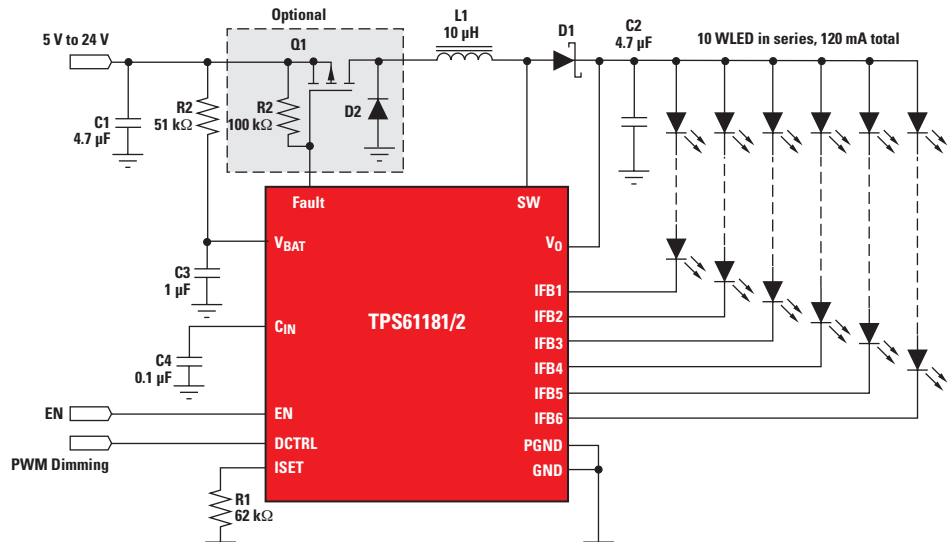
Key Features

- 5-V to 24-V input voltage
- Integrated 1.5-A, 40-V MOSFET
- 1.0-MHz/1.3-MHz switching frequency
- Boost output auto adaptive to WLED voltages
- Small external components
- Integrated loop compensation
- Six current sink of 25 mA
- Up to 10 WLED in series
- Less than 3% current matching and accuracy
- Packaging: 3x3-mm, QFN-16

Benefits

- Small package and very small solution size
- Drives up to 60 LEDs
- Minimized output ripple under PWM dimming
- Driver for input and output isolation

The TPS61181 provides a highly integrated solution for media-size LCD backlights. This device has a built-in, high-efficiency boost regulator with integrated 1.5-A, 40-V power MOSFET. The six current-sink regulators provide high-precision current regulation and matching. In total, the device can support up to 60 WLEDs. In addition, the boost output automatically adjusts its voltage to the WLED forward voltage to improve efficiency.



TPS61181/2 typical application.

Alternate Display Power Solutions

Device	Key Specifications	URL Link
TPS61165	High brightness white LED driver in 2x2-mm QFN package	www.ti.com/sc/device/TPS61165
TPS61161	White LED driver with digital and PWM brightness control in 2x2-mm QFN package	www.ti.com/sc/device/TPS61161
TPS68000	CCFL controller for full-bridge phase-shift topologies	www.ti.com/sc/device/TPS68000



Bias Supply for TV and Monitor TFT LCD Panels

TPS65160A

Get samples, datasheets, evaluation modules and application reports at: www.ti.com/sc/device/TPS65160A

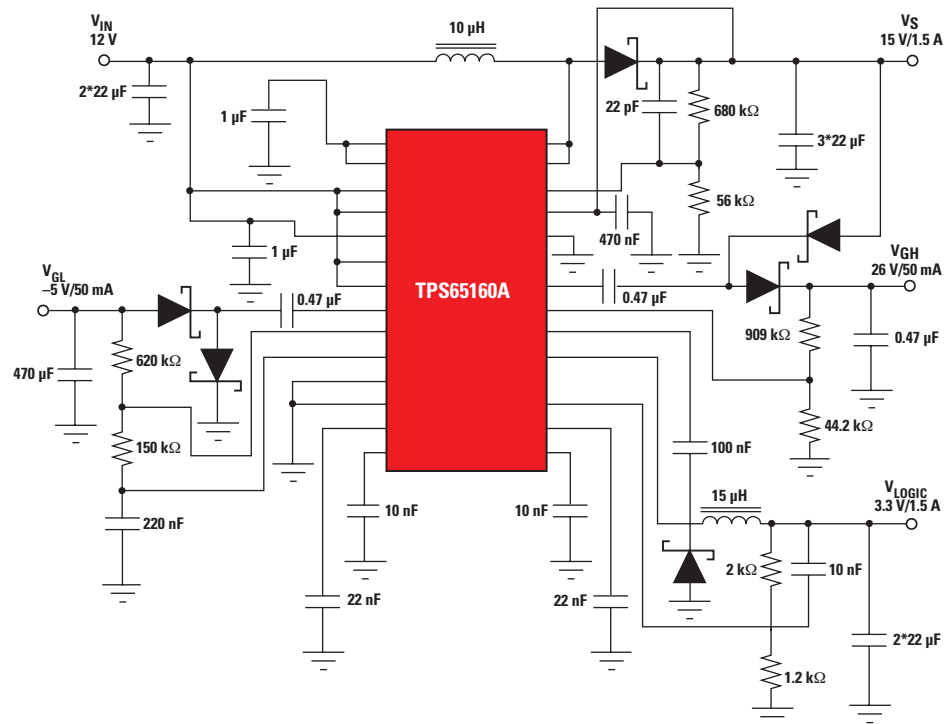
Key Features

- 8-V to 14-V input voltage range
- V_S output voltage range up to 20 V
- 2.8-A boost converter switch with 1% tolerance
- 1.8-A step-down converter with 1.5% tolerance
- 500-/750-kHz fixed switching frequency
- Negative-charge pump driver for V_{GL} output
- Positive-charge pump driver for V_{GH} output
- Adjustable sequencing for V_{GL} and V_{GH} outputs
- Gate drive signal to drive external MOSFET
- Internal and adjustable soft start
- Packaging: HTSSOP-28

Benefits

- Fully integrated TFT LCD bias supply
- Integrated and adjustable sequencing
- Maximum protection features
- Short-circuit and overvoltage protection and thermal shutdown

The TPS65160A offers a compact power-supply solution to provide all four voltages required by thin film transistor (TFT) LCD panels. With its high-current capabilities, the device is ideal for large-screen monitor panels and LCD TV applications. The device can be powered directly from a 12-V input voltage to generate the bias voltages, V_{GH} and V_{GL} ; the source voltage, V_S ; and the logic voltage for the LCD panels.



Positive-charge pump doubler running from the output V_S ($SUP = V_S$) when higher V_{GH} voltages are required.

Alternate Display Power Solutions

Device	Key Specifications	URL Link
TPS65150	High-accuracy, large-form-factor TFT LCD bias supply with flicker compensation, sequencing	www.ti.com/sc/device/TPS65150
TPS65161	LCD TV/monitor TFT display bias supply with protection, soft start, sequencing	www.ti.com/sc/device/TPS65161



Eight-Pin Quasi-Resonant Green-Mode Controller

UCC28600

Get samples, datasheets, evaluation modules and application reports at: www.ti.com/sc/device/UCC28600

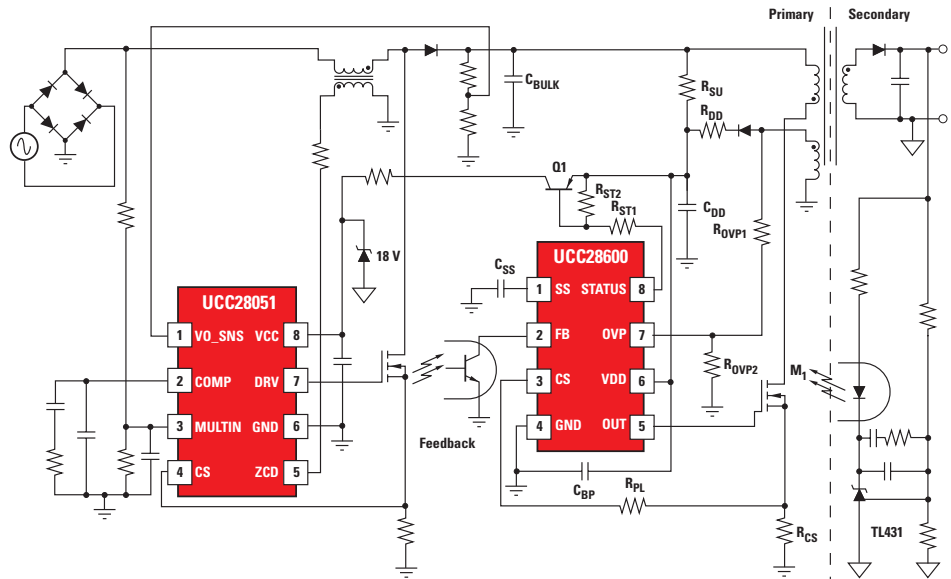
Key Features

- Full green-mode capability in eight pins
- Multimode operation provides advanced energy-saving capability
- No-load power consumption to 150 mW
- Advanced current limit protection:
 - Cycle-by-cycle power limit
 - Overcurrent hiccup restart mode
- Programmable overvoltage protection
- Low-frequency (40-kHz) burst mode for better efficiencies at light- and no-load operation
- +1-A TrueDrive™ gate-drive output
- Packaging: SOIC-8, PDIP-8

Benefits

- Valley switching provides high efficiency and low EMI
- Green-mode status pin disables power-factor correction (PFC) during light load for energy savings
- Green-mode tool simplifies design and component selection

The UCC28600 is a PWM controller that integrates built-in advanced energy-saving and high-level protection features to provide cost-effective solutions for energy-efficient power supplies. The UCC28600 incorporates frequency fold-back and burst-mode operation to reduce light-load and no-load operation frequencies. The UCC28600 is offered in an SOIC-8 package with an operating temperature range of -40°C to $+105^{\circ}\text{C}$.



Typical green-mode adapter solution with UCC28051 PFC front-end.



Fan Controller and Temperature Monitor

AMC6821

Get samples, datasheets and evaluation modules at: www.ti.com/sc/device/AMC6821

Key Features

- Remote and local temperature measurement:
 - Remote: $\pm 1^\circ\text{C}$ accuracy
 - Local: $\pm 2^\circ\text{C}$ accuracy
 - 0.125 $^\circ\text{C}$ resolution on both local and remote
- Fan speed monitor
 - RPM range: 100 to 23,000
 - 6% to 7% accuracy
- PWM fan control output:
 - 0 to 100% duty cycle (8 bits)
 - 10-Hz to 40-kHz output frequency
- Control modes:
 - Auto-temperature fan-speed control mode
 - Software-RPM control mode
 - Software-DCY mode
- SMBus/two-wire interface
- 2.7-V to 5.5-V operation
- Packaging: QSOP-16

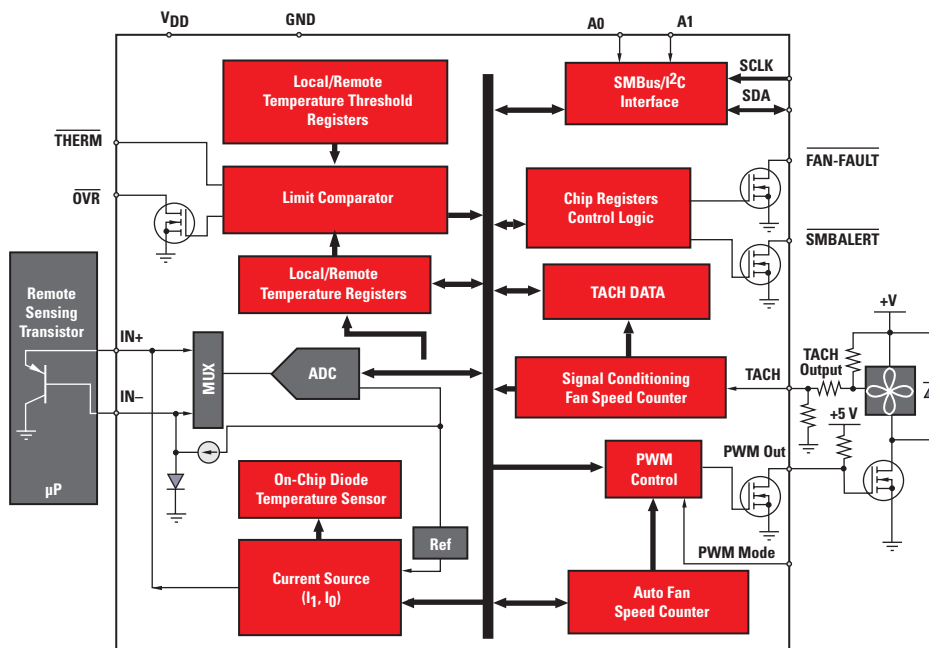
Benefits

- Reduces audible fan noise
- Reduces power consumption
- Stand-alone mode reduces CPU processing and bus activity

The AMC6821 is a fan controller with local (on chip) and remote temperature sensing.

The AMC6821 features an internal linear control loop for optimum fan speed. The device has three operation modes. In the auto-temperature fan-speed mode, the fan speed is adjusted automatically to an optimum value when the temperature changes. In the software-RPM mode, the fan speed is maintained at a software-defined target value. Both of these are closed-looped modes. In the software-DCY mode, the PWM driver's duty cycle is set to the value the user writes to the device.

In any closed-looped modes AMC6821 can run stand-alone, which reduces system controller power consumption and reduces bus activity. Operating as low as 2.7 V, it is ideal for notebook designs.



AMC6821 functional block diagram.



Digital Temp Sensor with SMBus/Two-Wire Serial Interface in SOT563

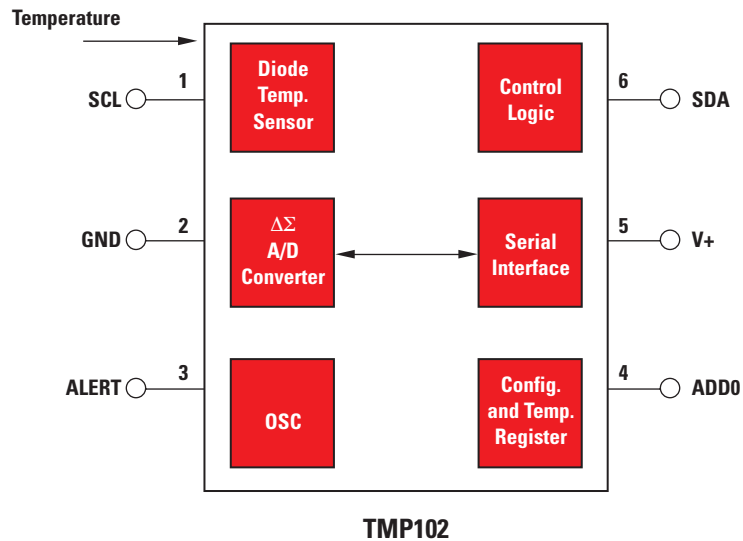
TMP102

Get samples and datasheets at: www.ti.com/sc/device/TMP102

Key Features

- Accuracy: 0.5°C (–25°C to +85°C)
- Low quiescent current: 10 μ A (max) active, 1 μ A (max) shutdown
- Supply range: 1.4 V to 3.6 V
- Resolution: 12 bits
- Digital output: two-wire serial interface
- Packaging: SOT563

The TMP102 is a two-wire, serial-output temperature sensor available in a tiny SOT563 package. Requiring no external components, the TMP102 is capable of reading temperatures to a resolution of 0.0625°C. It features SMBus and two-wire interface compatibility and allows up to four devices on one bus. It also features an SMB alert function.



TMP102 pin assignments.

Alternate System Monitoring and Protection Solutions

Device	Key Specifications	URL Link
TMP100/101	2.7 V to 5.5 V, 2°C (max), 50 μ A, I ² C interface, SOT-23	www.ti.com/sc/device/TMP100 www.ti.com/sc/device/TMP101
TMP75	2.7 V to 5.5 V, 2°C (max), 50 μ A, I ² C interface, MSOP, SOIC	www.ti.com/sc/device/TMP75
TMP105	\pm 2°C (max), 50- μ A supply, serial interface, chip-scale packaging	www.ti.com/sc/device/TMP105
TMP106	\pm 2°C, 0.0625°C resolution, 50- μ A supply, chip-scale packaging	www.ti.com/sc/device/TMP106
TMP175	1.5°C (max), I ² C digital temperature sensor in MSOP, SOIC	www.ti.com/sc/device/TMP175
TMP275	0.5°C (max), I ² C digital temperature sensor in MSOP	www.ti.com/sc/device/TMP275



±1°C Remote and Local Temperature Sensors

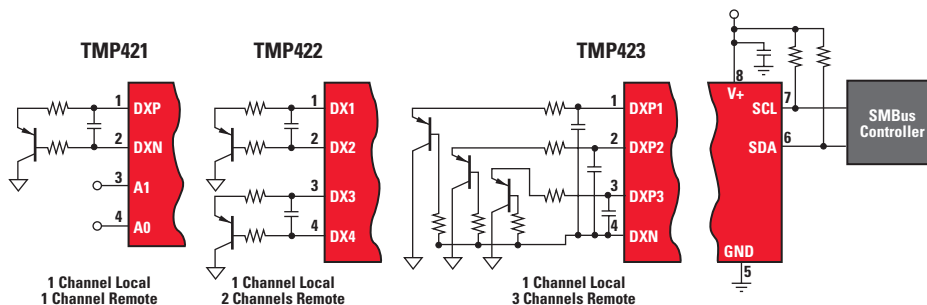
TMP421, TMP422, TMP423

Get samples and datasheets at: www.ti.com/sc/device/PARTnumber
(replace **PARTnumber** with **TMP421**, **TMP422** or **TMP423**)

Key Features

- ±1°C remote diode sensor (max)
- ±1.5°C local temp sensor (max)
- Series resistance cancellation
- n-factor correction
- 2-wire/SMBus serial interface
- Multiple interface addresses
- Diode fault detection
- Packaging: SOT23-8

The TMP421, TMP422 and TMP423 are remote temperature sensor monitors with a built-in local temperature sensor. Remote accuracy is ±1°C with no calibration required. The two-wire serial interface accepts SMBus write byte, read byte, send byte and receive byte commands to configure the device. All devices include series resistance cancellation, programmable non-ideality factor, a wide remote temperature measurement range (up to +150°C) and diode fault protection.



Typical application diagrams.

Alternate System Monitoring and Protection Solutions

Device	Key Specifications	URL Link
TMP400	±2.5°C (max), with programmable non-ideality factor, 2.7 V to 5.5 V, 420 µA I _Q	www.ti.com/sc/device/TMP400
TMP401	±3°C (max), 3 V to 5.5 V, 350 µA I _Q	www.ti.com/sc/device/TMP401
TMP411	±2.5°C (max), with programmable non-ideality factor, 2.7 V to 5.5 V, 350 µA I _Q	www.ti.com/sc/device/TMP411
TMP421	±2°C (max), one channel remote, one channel local, 2.7 V to 5.5 V, 400 µA I _Q	www.ti.com/sc/device/TMP421
TMP422	±2°C (max), two channel remote, one channel local, 2.7 V to 5.5 V, 400 µA I _Q	www.ti.com/sc/device/TMP422
TMP423	±2°C (max), three channel remote, one channel local, 2.7 V to 5.5 V, 400 µA I _Q	www.ti.com/sc/device/TMP423

New products are listed in **bold red**.



Zero-Drift, I²C Bi-Directional Current/Power Monitor in SOT23

INA219

Get samples, datasheets, evaluation modules and application reports at: www.ti.com/sc/device/INA219

Key Features

- Monitors current and voltage and calculates power over I²C bus
- Bidirectional
- CMR: -0.3 V to 26 V with +3.0-V to +5.5-V supply
- 1% (max) accuracy over -25°C to +85°C
- 100- μ V offset (max) and 40-mV FSR
- 12-bit resolution
- Programmable filtering
- Programmable calibration register

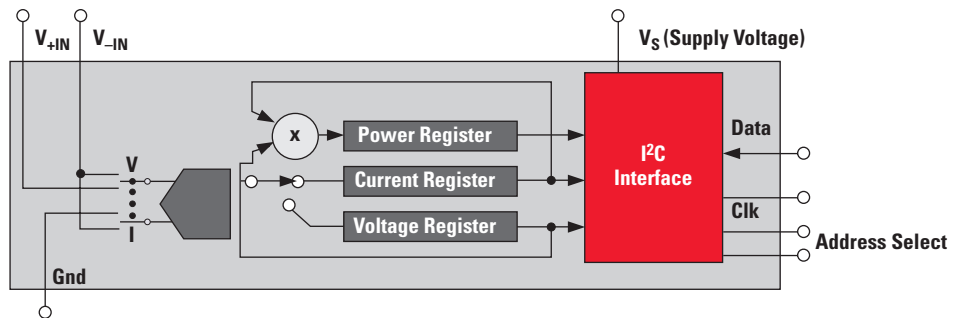
Benefits

- Complete power management solution
- Permits measurement of bidirectional shunt currents
- Accurate at low voltage drops (40-mV FSR)
- Minimizes system margins
- Can be used for system calibrating
- High common mode inputs using a low single supply

The INA219 is a zero-drift, bidirectional current, voltage and power monitor with I²C interface. The INA219 monitors the drop across a shunt resistor and the shunt bus voltage while a separate multiplying register calculates power.

A user-calibrated register enables the INA219 to supply direct readings of current in amps and power in units of watts. You can also use the INA219 without programming in simple applications where only shunt voltage and bus voltage need measuring.

The INA219 offers several programmable modes including a low-power shutdown mode. Programmable averaging of up to 128 samples is available for filtering in noisy environments. Short-cycle conversions are also available for faster conversion rates.



INA219 functional block diagram.

Alternate System Monitoring and Protection Solutions

Device	Key Specifications	Package	URL Link
INA138	Adjustable gain, current output, 2.7-V to 36-V common mode, 25- μ A I_{Q1}	SOT23	www.ti.com/sc/device/INA138
INA193/194/195/196/197/198	20-, 50-, 100-V/V gain, V_{OUT} , -16-V to +80-V common mode	SOT23	www.ti.com/sc/device/INA193
INA203/204/205/206/207/208	20-, 50-, 100-V/V gain, dual comparators, V_{REF} , -16-V to +80-V common mode	MSOP	www.ti.com/sc/device/INA203
INA210/211/212/213/214	Zero drift, bidirectional, 1% accuracy over temp	SC-70	www.ti.com/sc/device/INA210
INA209	Zero drift, I ² C, bidirectional, -0.3-V to +26-V common mode, three-level watchdogs	TSSOP	www.ti.com/sc/device/INA209



Audio Subsystem for Windows Vista Notebooks

TPA6040A4

Get samples, datasheets, evaluation modules and application reports at: www.ti.com/sc/device/TPA6040A4

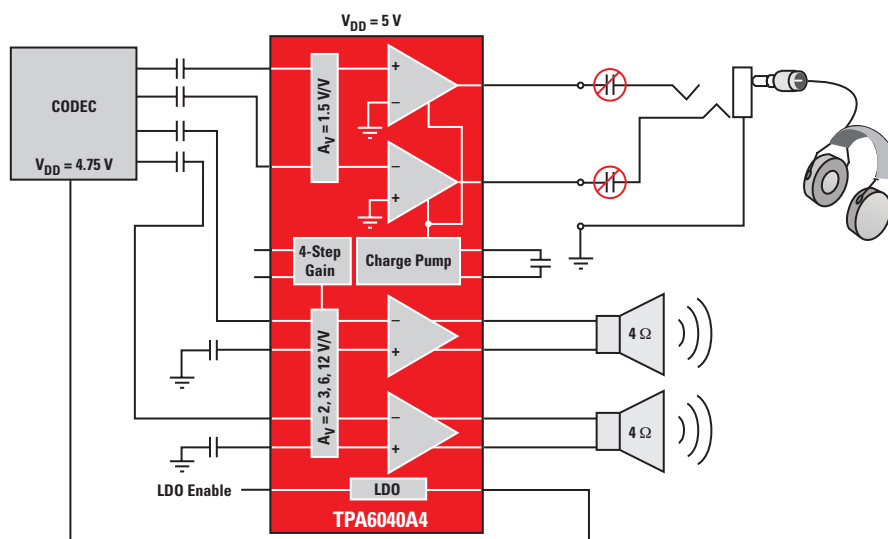
Key Features

- Meets Windows Vista operating system specifications
- 2-W stereo speaker drive from a 5-V supply
- 85-mW cap-free stereo headphone drive
- Integrated regulator
- Integrated gain
- Speakers: 6, 10, 15.6 and 21.6 dB
- Headphone: -1.5 V/V
- Independent shut-down control
- Separate inputs for speaker and headphone audio signals
- Differential architecture
- Packaging: 32-pin QFN (RHB)

Benefits

- High-quality audio playback
- Creates enough sound for large rooms
- Excellent low-frequency response
- Small solution size
- Improves RF and power-supply noise rejection

The TPA6040A4 is an audio power amplifier subsystem that meets Windows Vista operating system specifications. The audio subsystem contains three functional blocks — a 2-W stereo speaker amplifier that provides enough power to make audio easily heard throughout a large conference room or work area; an integrated 85-mW stereo cap-free headphone amplifier that eliminates external capacitors to reduce cost and size and to greatly improve low-frequency response; and an integrated regulator that supplies power to the audio codec, eliminating the cost and space of an external regulator. Finally, the differential input and output architectures for the speaker amplifier offer superior RF-immunity power-supply noise rejection and common-mode noise rejection.



TPA6040A4 application block diagram.

TPA604xA4 Audio Power Amplifier Family

Device	Speaker Enable	Gain (dB)	LDO Voltage (V)
TPA6040A4	Low: Enable, High: Mute	6, 10, 15.6, 21.6	4.75
TPA6041A4	Low: Enable, High: Mute	10, 12, 15.6, 21.6	3.3
TPA6045A4	Low: Enable, High: Mute	10, 12, 15.6, 21.6	3.3
TPA6047A4	Low: Enable, High: Mute	10, 12, 15.6, 21.6	4.75
TPA6048A4	Low: Enable, High: Mute	6, 10, 15.6, 21.6	4.75

Preview products are listed in bold blue.

Alternative Audio Amplifier Solutions

Device	Key Features	URL Link
TPA6017A2	2-W stereo output with internal gain	www.ti.com/sc/device/TPA6017A2
TPA2012D2	2.1-W Class-D stereo output	www.ti.com/sc/device/TPA2012D2
TPA2010D1	2.5-W Class-D mono output	www.ti.com/sc/device/TPA2010D1
TPA2016D2	1.7-W Class-D stereo output	www.ti.com/sc/device/TPA2016D2
TPA3005D2	6-W Class-D stereo output	www.ti.com/sc/device/TPA3005D2
TPA3007D1	6.5-W Class-D mono output	www.ti.com/sc/device/TPA3007D1



IEEE Std 1394b-2002 PHY and OHCI Link Device

TSB83AA22A

Get samples, datasheets and application reports at: www.ti.com/sc/device/TSB83AA22A

Key Features

- Fully supports provisions of IEEE Std 1394b-2002 revision 1.33+ at 1-Gbps signaling rates
- Fully supports provisions of IEEE Std 1394a-2000 and IEEE Std 1394-1995
- Provides two fully backward-compatible, bilingual IEEE Std 1394b-2002 cable ports at up to 800 Mbps
- Fully compliant with open host controller interface (OHCI) requirements
- Power-down features conserve energy in battery-powered applications
- Low-power sleep mode
- Packaging: 7x7-mm MicroStar BGA™

Benefits

- Production-proven 1394b OHCI solution compatible with leading 1394b S800 storage solutions
- Bilingual PHY ports allow either 1394b or combined 1394a/1394b support
- Ultra-low operational power requirements and intelligent power management capabilities minimize power drain on battery-powered devices

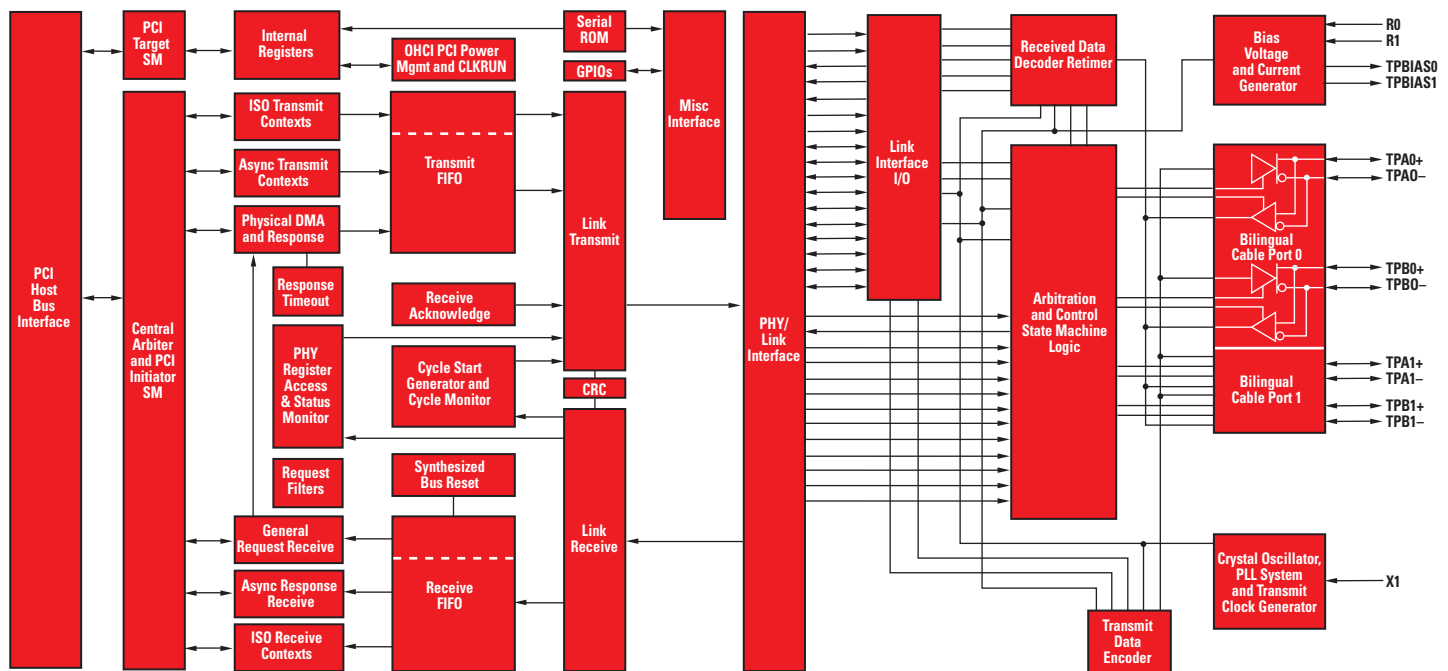
The TSB83AA22A is an IEEE Std 1394b-2002 link-layer design and PHY design combined in an industry-leading, small 7x7-mm package. The TSB83AA22A device is capable of exceptional 800-Mbps performance, providing the throughput and bandwidth to move data efficiently and quickly between the PCI and 1394 buses.

The TSB83AA22A LLC section implements several enhancements to improve overall performance of the device, such as a highly tuned physical data path for enhanced SBP-2 performance; physical post writing buffers and multiple isochronous contexts; and advanced internal arbitration.

The TSB83AA22A LLC section also implements hardware enhancements to better support digital video (DV) and MPEG data stream reception and transmission. These enhancements include automatic time-stamp insertion for transmitted DV and MPEG-formatted streams and common isochronous packet (CIP) header stripping for received DV streams.

Alternate Interface Solutions

Key Specifications				
Device	Spec.	Host I/F	# of Ports	Package
TSB83AA22C	1394b	PCI	2	7x7
XI02213A	1394b	PCIe	3	12x12
XI02200A	1394a	PCIe	2	12x12



TSB83AA22A functional block diagram.



3-V to 5.5-V, Multichannel, RS-232 Line Driver/Receiver with ± 15 -kV IEC ESD Protection

TRS3243E

Get samples, datasheets and application reports at: www.ti.com/sc/device/TRS3243E

Key Features

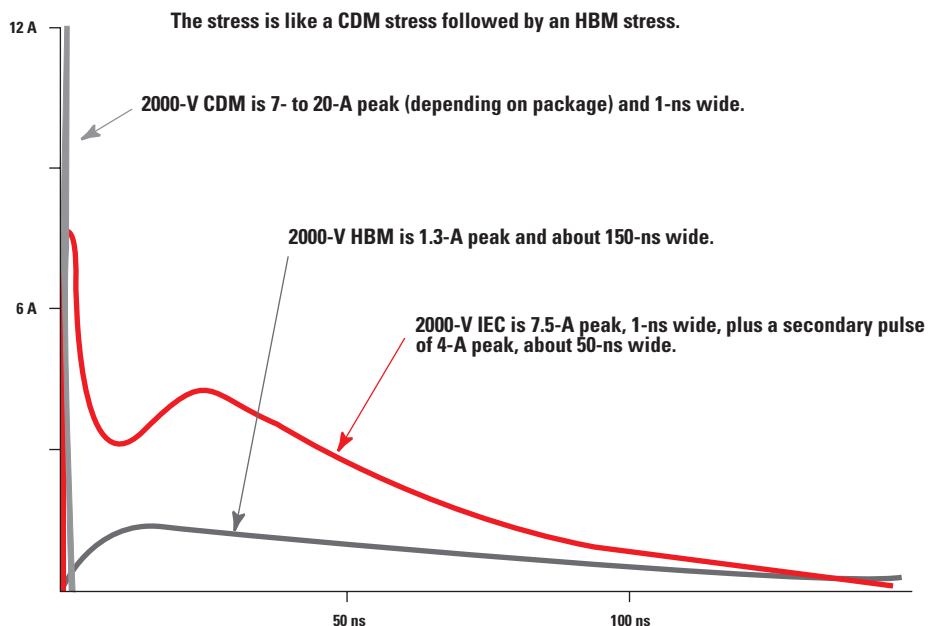
- Single-supply (3.3 V or 5 V) RS-232 interface for IBM PC/AT compatible serial port
- IEC 61000-4-2 ESD protection for RS-232 bus pins
 - ± 15 -kV human-body model (HBM)
 - ± 8 -kV IEC61000-4-2, contact discharge
 - ± 15 -kV IEC61000-4-2, air-gap discharge
- Auto-power down feature
- Always-active non-inverting receiver output (ROUT2B)
- Data rate up to 500 kbps exceeds the RS-232 standard

Benefits

- Equal or better replacement for other '3243's in the industry
- Internal charge pump eliminates the need for multiple supply voltages
- Prevents damage during RS-232 cable connection
- Reduces supply current to 1 μ A when I/Os are idle
- Higher data rate meets the demand for today's consumer/portable devices with increasing throughput
- Space-saving QFN package suitable for portable applications
- All packages are lead free

This device consists of three line drivers, five line receivers and a dual charge-pump circuit with ± 15 -kV ESD (HBM and IEC61000-4-2, air-gap discharge) and ± 8 -kV ESD (IEC61000-4-2, contact discharge) protection on serial-port connection pins. The device meets the requirements of TIA/EIA-232-F and provides the electrical interface between an asynchronous communication controller and the serial-port connector. This combination of drivers and receivers matches that needed for the typical serial port used in portable/consumer equipment, telecom and computing applications.

The charge pump and four small external capacitors allow operation from a single 3-V to 5.5-V supply. In addition, the device includes an always-active noninverting output (ROUT2B) that allows applications using the ring indicator to transmit data while the device is powered down. The device operates at data signaling rates of up to 250 kbps and a maximum driver output slew rate of 30 V/ μ s.



Comparing the current stress used in IEC, CDM and HBM tests.



ESD Protection Solutions

Get more information at: www.ti.com/esd

Key Features

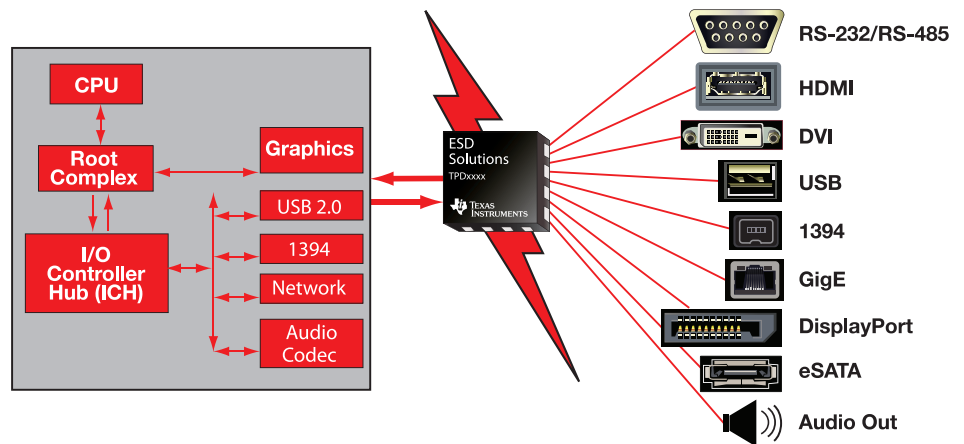
- IEC 61000-4-2 system level ESD protection
- Multiple package options for design flexibility

Benefits

- Low I/O capacitance ideal for high-speed applications
- Space-saving package solutions help reduce board footprint
- Low leakage current allows for usage in high-precision applications

An ESD strike is a constant threat to device reliability and functionality. Many low-voltage core chips or system ASICs offer only device-level human-body model (HBM) ESD protection, which does not address the risks of system-level ESD strikes.

TI's stand-alone ESD solutions provide a space-saving and cost-effective solution to protect the system interconnects from external ESD strikes. The TPD product family of devices from TI provides IEC 61000-4-2 level ESD protection, with solutions for multiple external interfaces, including video, audio and serial data transfer. TI's family of devices meet requirements for low-power, small footprint applications, making them ideal for the mobile computing (notebook) market segment.



Alternate ESD Protection Solutions

Device	# Channels	I/O Capacitance (pF)	VBR (Min) (V)	Package(s)	Application
TPD2E001	2	1.5	11	5SOT 6SON	USB 2.0
TPD3E001	3	1.5	11	5SOT 6SON	USB OTG
TPD4E001	4	1.5	11	6SOT 6SON	USB 2.0, Ethernet, FireWire, eSATA
TPD6E001	6	1.5	11	10QFN 12QFN	USB 2.0, Ethernet, FireWire, eSATA
TPD4E004	4	1.6	6	6SO 6SON	USB 2.0, Ethernet, FireWire, eSATA
TPD6E004	6	1.6	6	8QFN	USB 2.0, Ethernet, FireWire, eSATA
TPD4S009	4	0.9	9	6SOT-23 6SC70 6SON	eSATA, LVDS Signaling
TPD8S009	8	0.9	9	15SON	HDMI, DisplayPort
TPD12S520	12	0.9	9	38TSSOP	HDMI
TPD12S521	12	0.9	9	38TSSOP	HDMI



DisplayPort Switches, Buffers and HDMI Translators

Get samples, datasheets and evaluation modules at: www.ti.com/displayport

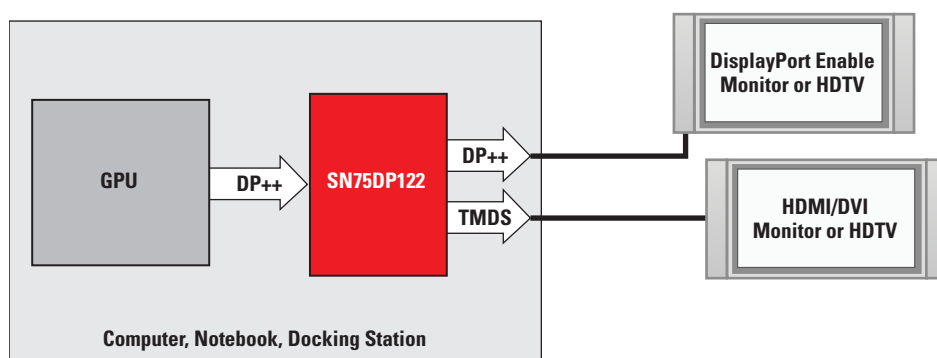
Key Features

- Enhanced ESD: 12-kV HDM on bus pins
- DisplayPort speed: 2.7 Gbps, TMDS up to 2.5 Gbps
- Enhanced commercial temperature range: 0°C to 85°C

DisplayPort is a digital display interface standard from the Video Electronics Standards Association (VESA). It defines a new license-free, royalty-free, digital audio/video interconnect, intended for use between a computer and a display monitor. In the future it may replace the internal LVDS interfaces used to connect the graphics processor to the LCD panel.

TI provides extra functionality to notebook computers with today's core chipsets, which support dual-mode DisplayPort (DP++) video output. With their robust bi-complementary bipolar/CMOS process, TI solutions provide solid signal integrity and the ability to drive longer cables along with high ESD ratings of 12-kV HBM on the bus pins.

TI's DisplayPort devices facilitate backwards compatibility between new notebooks with DisplayPort video output connectors and monitors with DVI inputs, as well as notebooks and TVs with HDMI inputs.



Typical application diagram.

Alternate Interface Solutions

Device	No. of DisplayPort Inputs	No. of DisplayPort Outputs	No. of TMDS Outputs
SN75DP118	1	1	
SN75DP122	1	1	1
SN75DP128	1	2	
SN75DP129	1		1

Preview products are listed in **bold blue**.



eSATA Repeater SN75LVCP412

PREVIEW*

Get samples, datasheets and evaluation modules at: www.ti.com/sc/device/SN75LVCP412

Key Features

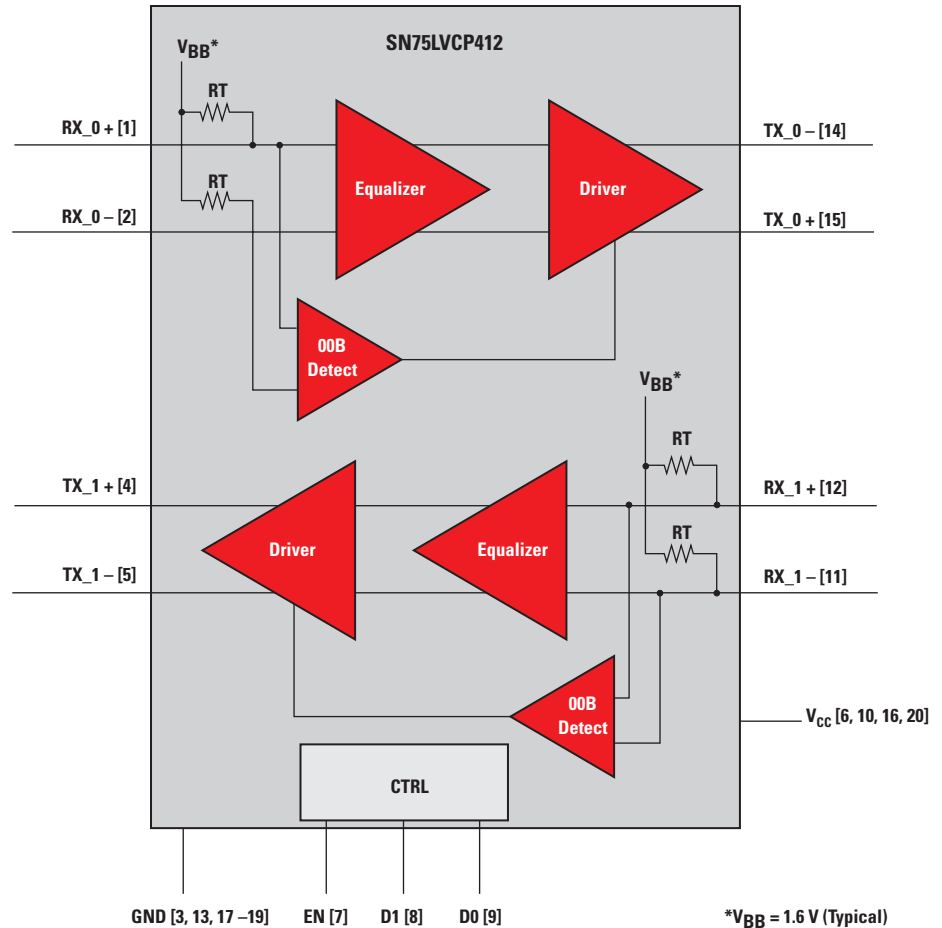
- Supports common mode biasing for OOB
- Channel selectable pre-emphasis
- Receiver equalization
- Packaging: 20-pin 4x4-mm QFN

Benefits

- SATA Gen 2.6, eSATA compliant
- Capability to go over 30 inches FR4 trace
- Excellent jitter and loss compensation
- Saves space

*Expected release November 2008.

TI's SN75LVCP412 is a two-channel 3-Gbps SATA 2.6 redriver with transmitter pre-emphasis and receiver equalization. It overcomes signal loss in traces, cables and connectors, enabling the regeneration of robust signaling levels. The SN75LVCP412 also features external Serial Advanced Technology Attachment (eSATA), which is an interface designed for connecting computers to mass storage devices.



Typical application diagram.



Five-Channel Differential 10:20 Multiplexer Switch for DVI/HDMI Applications

TS3DV520E

Get samples, datasheets and application reports at: www.ti.com/sc/device/TS3DV520E

Key Features

- Compatible with HDMI v1.2a (Type A) DVI 1.0 high-speed digital interface
 - Wide bandwidth: over 1.65 Gbps (1.9 Gbps typ)
 - 165-MHz speed operation
 - Serial data stream at 10x pixel clock rate
 - Supports all video formats up to 1080p and SXGA (1280x1024 at 75 Hz)
 - Total raw capacity 4.95 Gbps (single link)
 - HDCP compatible
- Low crosstalk: -37 dB (typ)
- Low bit-to-bit skew: 0.1 ns (max)
- Low and flat on-state resistance: $r_{on} = 4 \Omega$ (typ), $r_{on(Flat)} = 0.5 \Omega$ (typ)
- Low input/output capacitance: 8 pF (typ)
- Rail-to-rail switching on data I/O ports: 0 to 3.6 V
- V_{CC} operating range: 3 V to 3.6 V
- Latch-up performance exceeds 100 mA per JESD 78, Class II
- ESD performance tested per JESD 22
 - 14000-V human-body model (A114-B, Class II)

Benefits

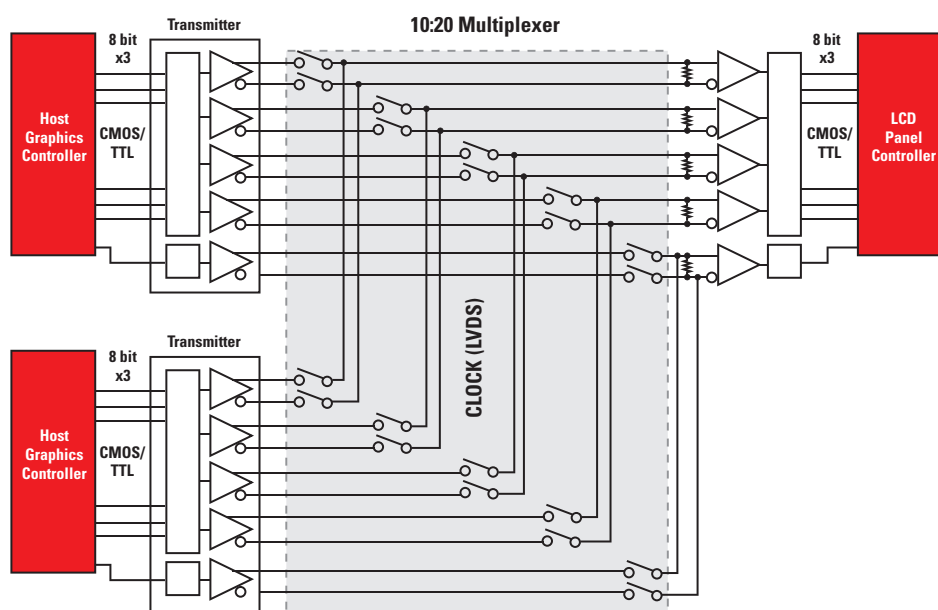
- Low r_{on} minimizes signal degradation
- Flat r_{on} allows consistent performance across temperature and input voltage

The TS3DV520E is a 20-bit to 10-bit multiplexer/demultiplexer digital video switch with a single select (SEL) input. SEL controls the data path of the multiplexer/demultiplexer. The device provides five differential channels for digital video signal switching.

This device provides low and flat on-state resistance (r_{on}) and excellent on-state resistance match. Low input/output capacitance, high bandwidth, low skew, and low crosstalk among channels make this device suitable for various digital video applications, such as DVI and HDMI.

This device is specified for partial power down applications using I_{off} . The I_{off} feature ensures that damaging current will not backflow through the device when it is powered down. The device has isolation during power off.

Voltage on the SEL pin should be less than or equal to V_{CC} , even in the power-down mode ($V_{CC} = 0$ V).



Dual-port HDMI video multiplexer.

Alternate Power Switch Solutions

Device	Key Specifications	URL Link
TS3DV416	Four-channel differential 8:16 multiplexer switch for DVI/HDMI applications	www.ti.com/sc/device/TS3DV416
TS3V330	Quad SPDT wide-bandwidth video switch with low on-state resistance	www.ti.com/sc/device/TS3V330
TS3V340	Quad SPDT high-bandwidth video switch with low and flat on-state resistance	www.ti.com/sc/device/TS3V340
TS5V330	Quad SPDT wide-bandwidth video switch with low on-state resistance	www.ti.com/sc/device/TS5V330
TPA3007D1	6.5-W, Class-D mono output	www.ti.com/sc/device/TPA3007D1
TS3DV520	Five-channel differential 10:20 multiplexer switch for DVI/HDMI applications	www.ti.com/sc/device/TS3DV520
TS3DV421	Four-channel differential 8:24 multiplexer switch	www.ti.com/sc/device/TS3DV421



16-Bit to 8-Bit SPDT Gigabit LAN Switch with LED Switch and Enhanced ESD Protection

TS3L500AE

Get samples, datasheets and application reports at: www.ti.com/sc/device/TS3L500AE

Key Features

- Wide bandwidth: 950 MHz (typ)
- Low crosstalk: -37 dB (typ)
- Low bit-to-bit skew: 100 ps (max)
- Low and flat on-state resistance: $r_{on} = 4 \Omega$ (typ), $r_{on(Flat)} = 0.5 \Omega$ (typ)
- Low input/output capacitance: 8 pF (typ)
- Rail-to-rail switching on data I/O ports: 0 to 3.6 V
- V_{CC} operating range: 3 V to 3.6 V
- Latch-up performance exceeds 100 mA per JESD 78, Class II
- ESD performance tested per JESD 22
 - 8-kV IEC61000-4-2, contact discharge on switch I/Os
 - > 3-kV human body model on SEL

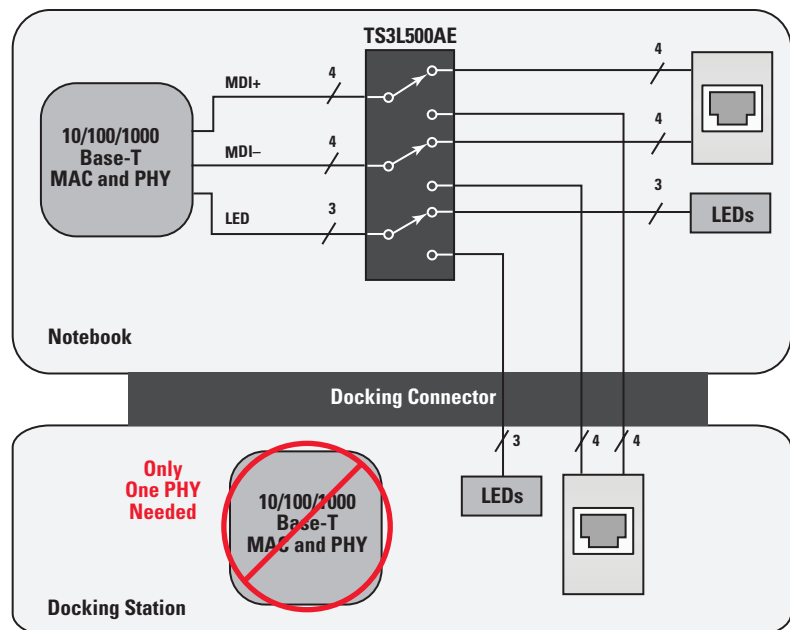
Benefits

- Supports 10/100/1000 Base-T signaling
- Replaces mechanical relays in LAN applications
- Low I/O capacitance minimizes loading and signal distortion
- Incorporates three extra channels for LED switching

The TS3L500AE is a 16-bit to 8-bit multiplexer/demultiplexer LAN switch with a single select (SEL) input. SEL controls the data path of the multiplexer/demultiplexer. The device provides additional I/Os for switching status indicating LED signals and includes high ESD protection.

The device provides a low and flat on-state resistance (r_{on}) and an excellent on-state resistance match. Low input/output capacitance, high bandwidth, low skew and low crosstalk among channels make this device suitable for various LAN applications such as 10/100/1000 Base-T.

This device can be used to replace mechanical relays in LAN applications. It also can be used to route signals from a 10/100 Base-T ethernet transceiver to the RJ-45 LAN connectors in laptops or in docking stations.



Docking station application.

Alternate Power Switch Solutions

Device	Key Specifications	URL Link
TS3L100	Quad SPDT wide-bandwidth LAN switch with low on-state resistance	www.ti.com/sc/device/TS3L100
TS3L110	Quad SPDT wide-bandwidth 10/100 Base-T LAN switch, differential 8:4 multiplexer/demultiplexer	www.ti.com/sc/device/TS3L110
TS3L301	16-bit to 8-bit SPDT gigabit LAN switch with low and flat on-state resistance	www.ti.com/sc/device/TS3L301
TS5L100	Quad SPDT wide-bandwidth LAN switch with low on-state resistance	www.ti.com/sc/device/TS5L100
TS3L500	16-bit to 8-bit SPDT gigabit LAN switch with low and flat on-state resistance	www.ti.com/sc/device/TS3L500



2.4-GHz RF Transceiver for Low-Power RF Applications in the 2.4-GHz ISM Band

CC2500

Get samples, datasheets, evaluation modules and application reports at: www.ti.com/sc/device/CC2500

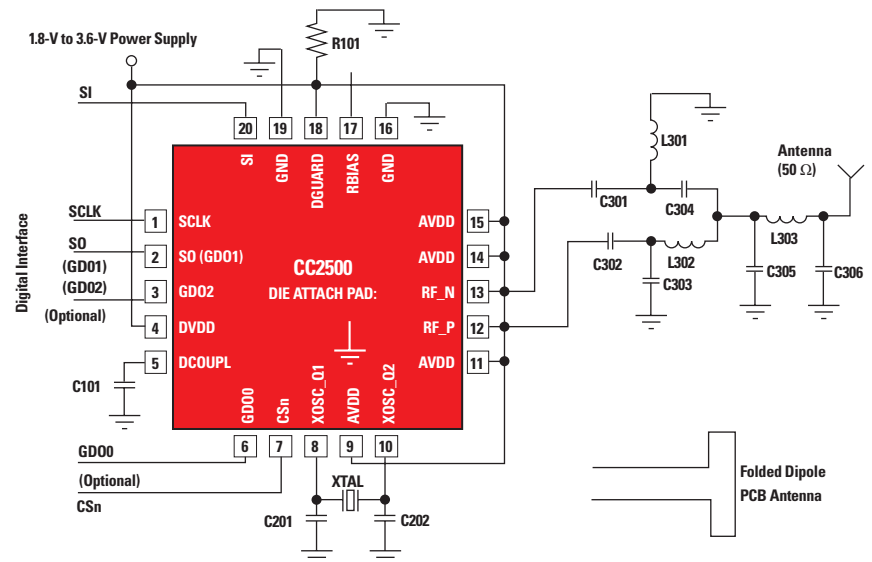
Key Features

- High sensitivity: -104 dBm at 2.4 kBaud, 1% packet error rate
- Low current consumption: 13.3 mA in RX, 250 kBaud, input well above sensitivity limit
- Programmable output power up to +1 dBm
- Excellent receiver selectivity and blocking performance
- Few external components: Complete on-chip frequency synthesizer, no external filters or RF switch needed
- Suited for systems compliant with EN 300 328 and EN 300 440 class 2 (Europe), FCC CFR47 Part 15 (U.S.), and ARIB STDT66 (Japan)
- Many powerful digital features: Full-packet handling, including preamble generation, sync word insertion/detection, address check, flexible packet length and automatic CRC
- Packaging: 4x4-mm 20-pin QLP (lead free and RoHS compliant)

Benefits

- Fast development time and low system cost
- Suited for an inexpensive microcontroller
- Adaptive channel selection with increased robustness and coexistence of the wireless link
- Robust and secure link with very good coexistence with *Bluetooth*[®] and WiFi

The CC2500 is a low-cost 2.4-GHz RF transceiver designed for very low-power wireless applications. The circuit is intended for the 2,400 to 2,483.5-MHz ISM (industrial, scientific and medical) and SRD (short range device) frequency bands. It's integrated with a highly configurable baseband modem, which supports various modulation formats and has a configurable data rate up to 500 kBaud. The CC2500 provides extensive hardware support for packet handling, data buffering, burst transmissions, clear channel assessment, link quality indication and wake-on-radio. The main operating parameters and the 64-byte transmit/receive FIFOs of the CC2500 can be controlled via an SPI interface. In a typical system, the CC2500 will be used together with a microcontroller and a few additional passive components.



Application circuit diagram.

Join the low-power RF community: www.ti.com/lprf-forum



2.4-GHz Radio Transceiver with 8051 MCU and 8-/16-/32-kB Flash Memory

CC2510Fx and CC2511Fx

Get samples, datasheets, evaluation modules and application reports at: www.ti.com/sc/device/CC2510F32

Key Features

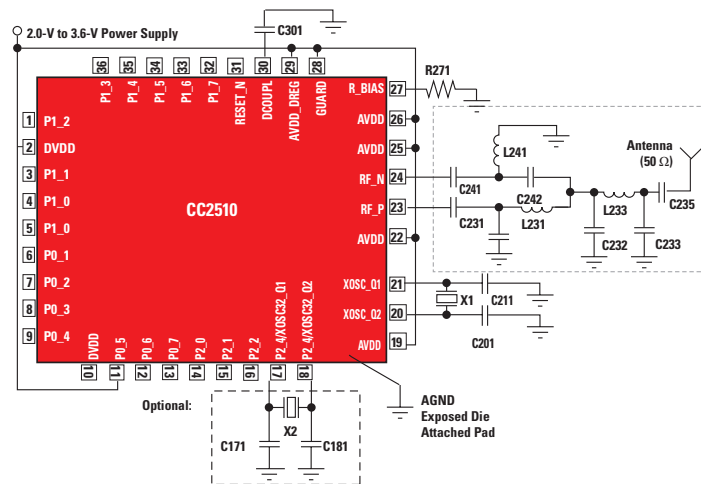
- RF transceiver (CC2500) with integrated high-performance, low-power MCU core with in-system programmable Flash, SRAM and full-speed USB controller (CC2511)
- Excellent receiver selectivity and blocking performance
- High sensitivity: -103 dBm at 2.4 kBaud
- Programmable data rate up to 500 kBaud
- Programmable output power up to 1 dBm for all supported frequencies
- Frequency range: 2,400 to 2,483.5 MHz
- Digital RSSI/LQI support
- Wide supply voltage range: 2.0 V to 3.6 V
- Packaging: 6x6-mm 36-pin QLP (lead free and RoHS compliant)

Benefits

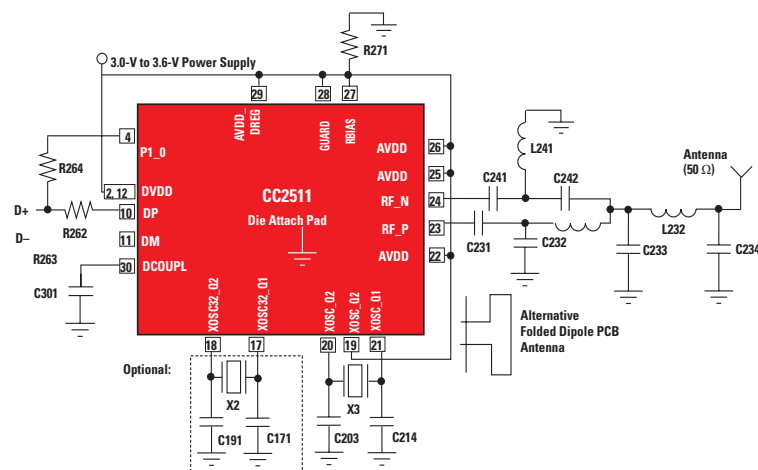
- RF transceiver (CC2500) with integrated high-performance, low-power MCU core with in-system programmable Flash, SRAM and full-speed USB controller (CC2511)
- Complete solution on single chip
- Ideal for low-power, battery-operated systems
- Robust and secure link with very good coexistence with *Bluetooth*[®] and WiFi

The CC2510Fx and CC2511Fx families are low-cost 2.4-GHz System-on-Chip (SoC) solutions designed for low-power wireless applications. The CC2510Fx and CC2511Fx combine the excellent performance of the state-of-the-art CC2500 RF transceiver with an industry-standard enhanced 8051 MCU, up to 32 kB of in-system programmable flash memory and 4 kB of RAM.

The CC2510Fx and CC2511Fx families are suited for systems where very low power consumption is required. This is ensured by several advanced low-power operating modes. The CC2511Fx adds a full-speed USB controller to the feature set of the CC2510Fx. Interfacing to a PC using the USB interface is quick and easy, and the high data rate (12 Mbps) of the USB interface avoids the bottlenecks of RS-232 or low-speed USB interfaces.



CC2510 application circuit diagram.



CC2511 application circuit diagram.



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