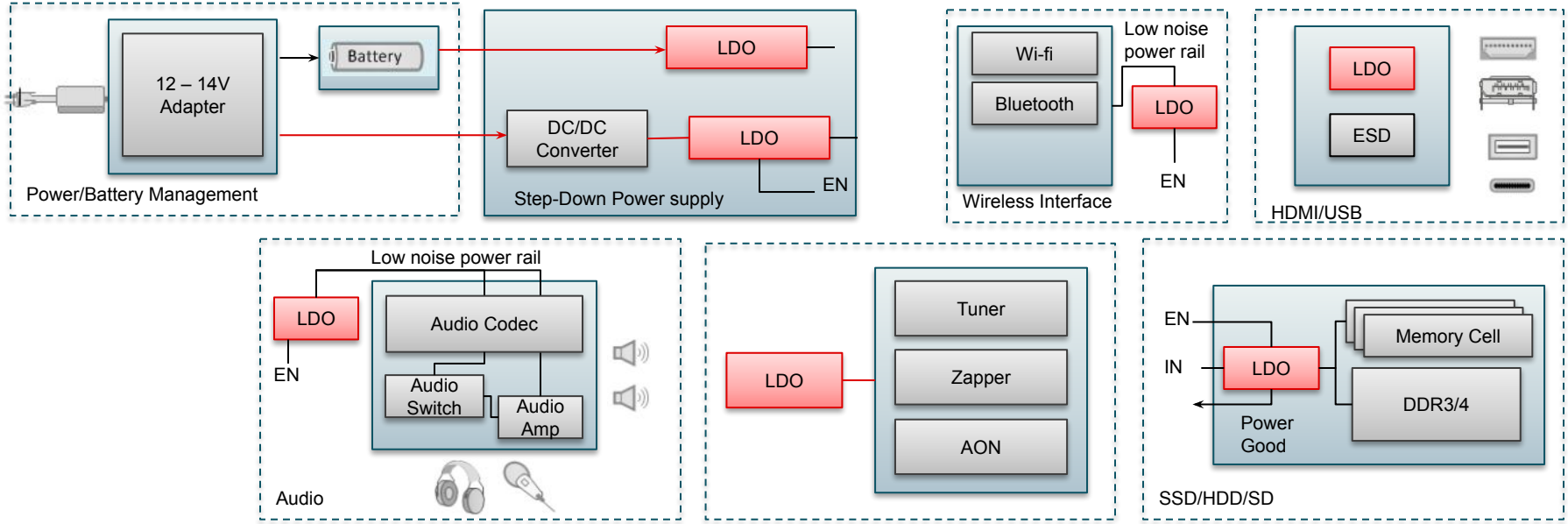
Linear Power: Low Dropout Regulators

STB and Media

Jose Gonzalez – Product Marketing Engineer

Use Cases and Block Diagrams: STB



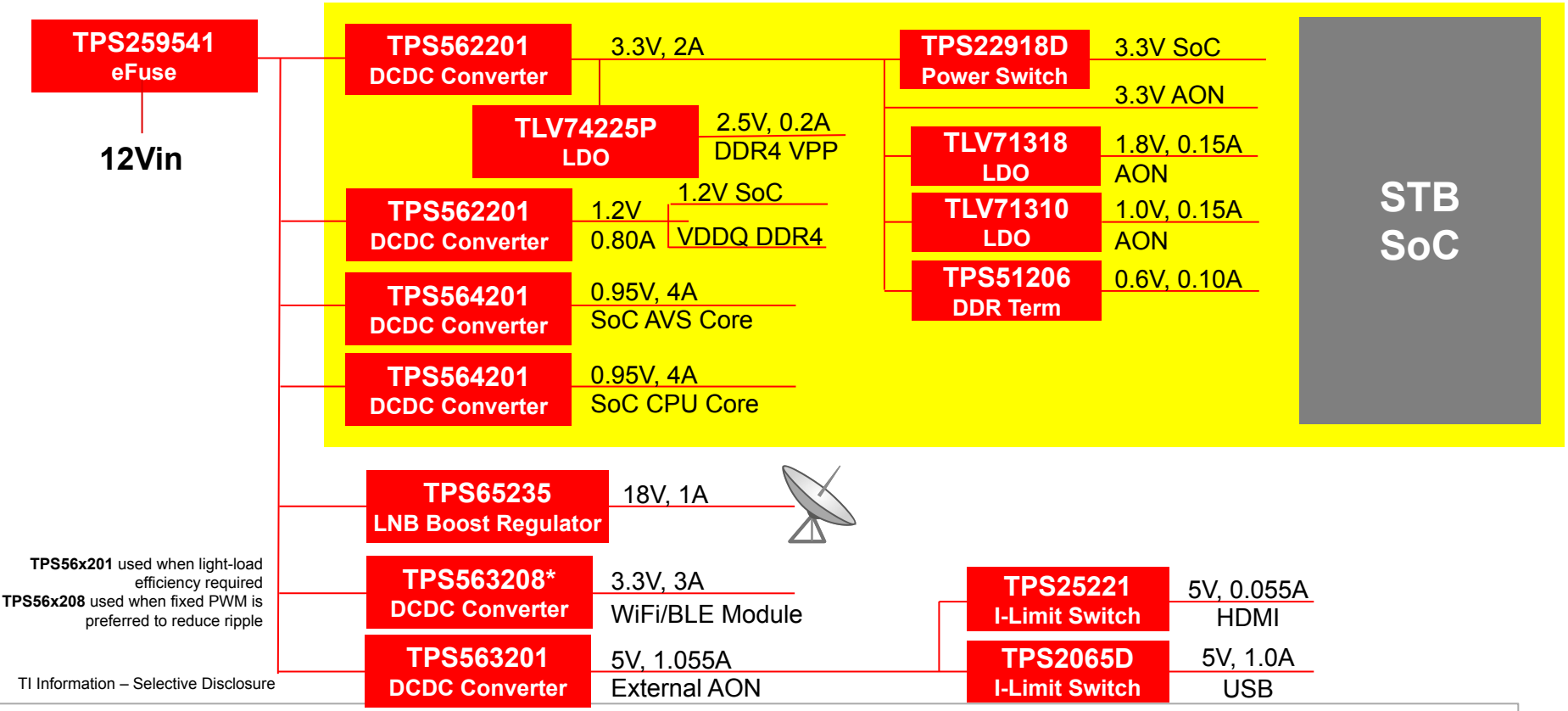
Primary LDO Use

Typically used for low-dropout conditions or low current demand with emphasis on low noise and low standby power

HOME

STB Power Supply

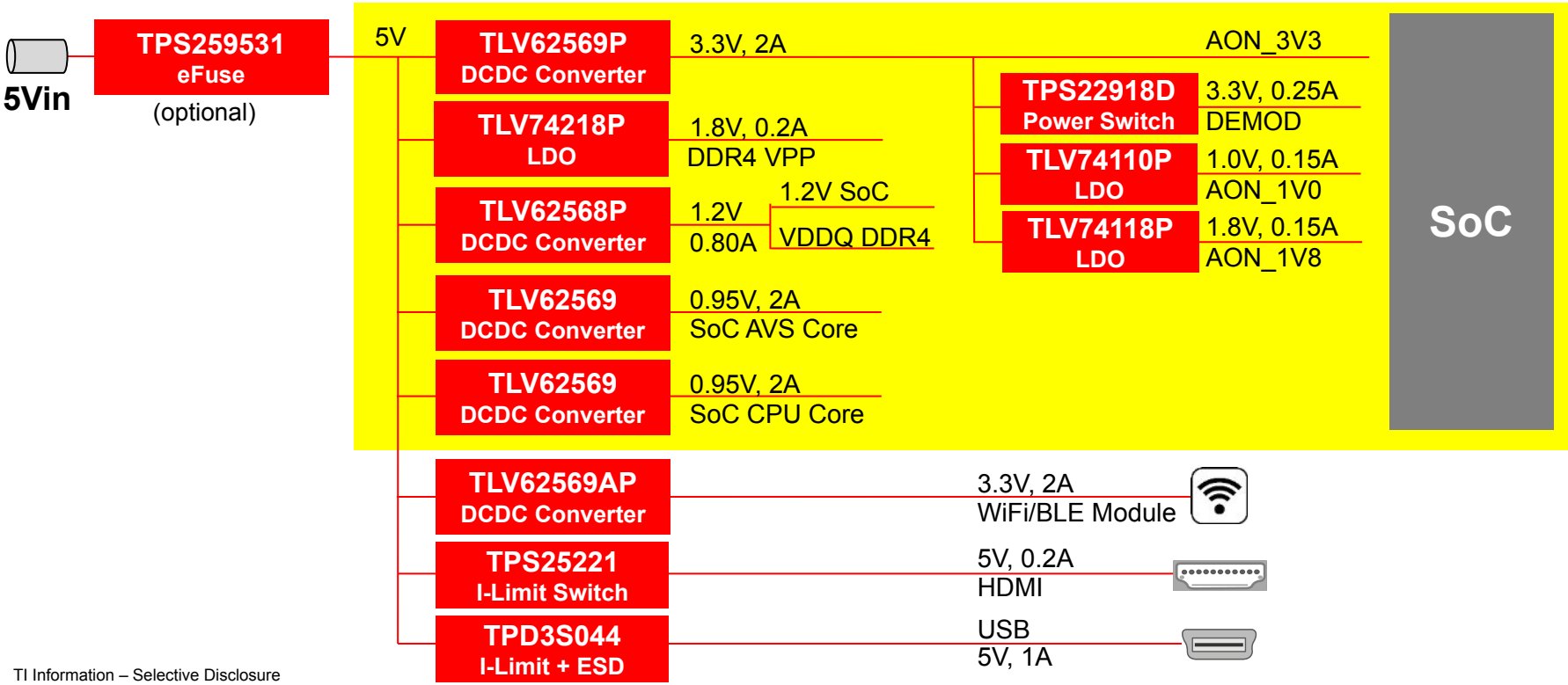
Optimized for 12Vin STB (with Satellite)



TPS56x201 used when light-load efficiency required
TPS56x208 used when fixed PWM is preferred to reduce ripple

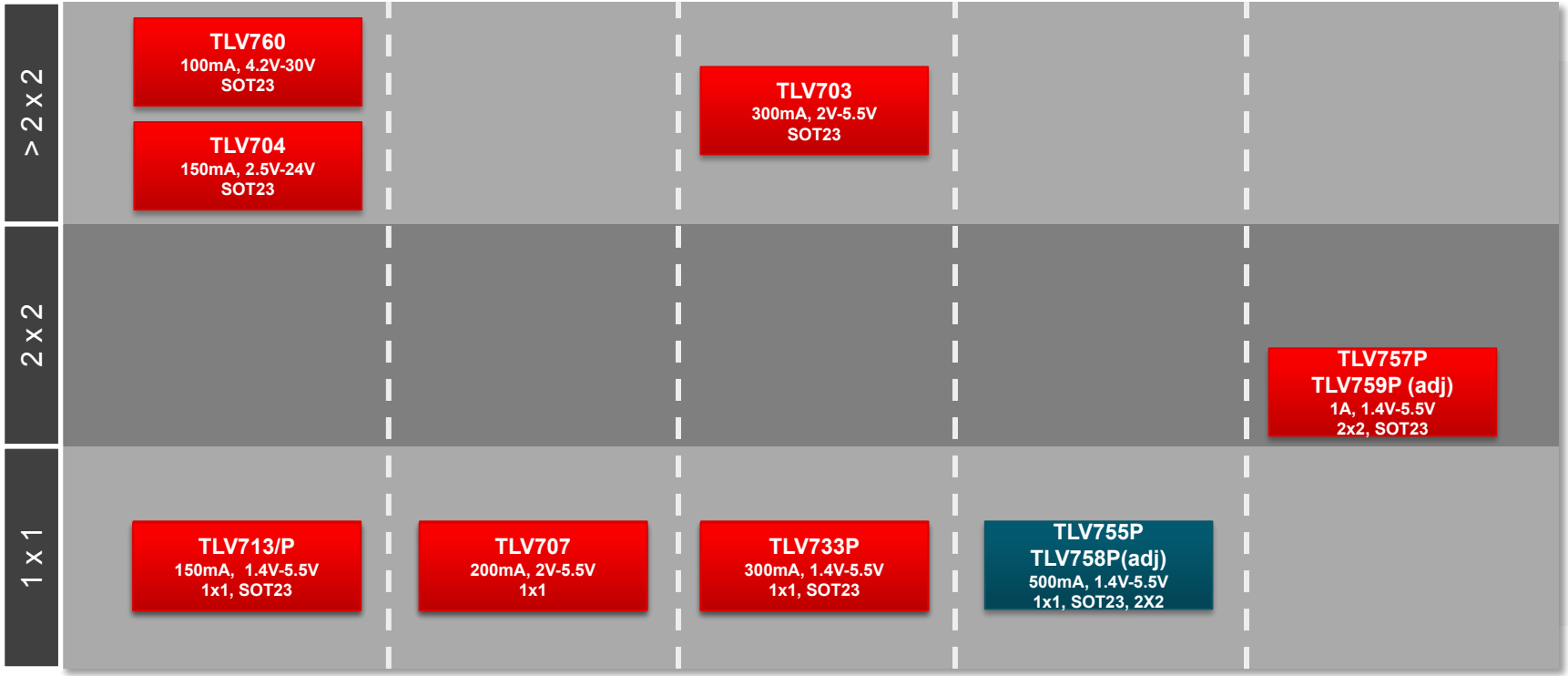
OTT STB Power Supply

Optimized for 5Vin STB, OTT Box and HDMI TV Dongle



LDO Power Solutions

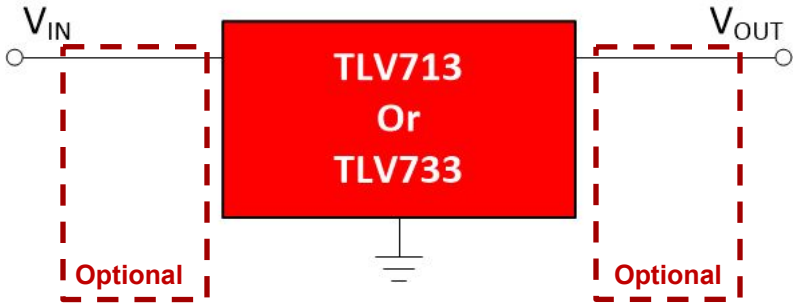
Value Line LDOs and Lin Regs



LDO Power Solutions

Capacitor-Free LDOs (MLCC Shortage Solution)

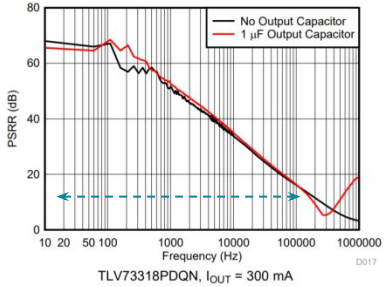
TLV713P and TLV733P Can work without input and output capacitors



Ceramic Capacitor (MLCC) Shortage (2018)

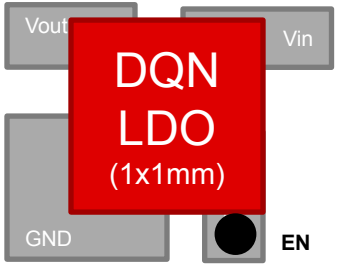
The 2018 market in 1H has created a challenge for designs in portable electronics. The lead-times for the industry could cause delays in delivery and manufacturing.

LDOs can help alleviate the burden by working with no capacitors!



TLV73318PDQN, I_{OUT} = 300 mA

Layout Example



Performance and Space Savings

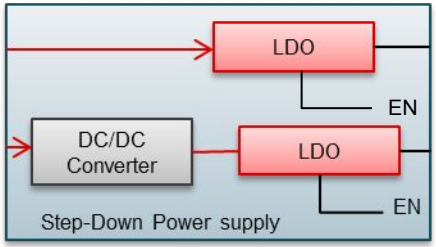
If the power supply operating frequency is below or at 100KHz the PSRR of the TLV733 can behave very well for easy low current loads. If a higher frequency is needed then a capacitor would be recommended

Having no capacitors in the input/output also saves on space!

LDO Power Solutions
Replacing TLV1117 with TLV766/7

Development
Sampling
Released

TLV1117** 800mA



Up to 18V_{IN}

TLV766** 500mA

TLV767** 1A

Improvements From TLV1117 to TLV766/7
Lower I_Q: From 5000 µA to 50 µA
Smaller Size : From 6.5mmx3.5mm to 2mmx2mm
Improved Reliability : Added Fold-back Current Limiting
Dropout Voltage @100mA : From 1.1V to ~140mV
Lower V_{OUT} Capability : From 1.25 to 0.8V
Added Enable

Up to 6V_{IN}

TLV755P 500mA

TLV758P* 500mA

TLV1117LV** 1A

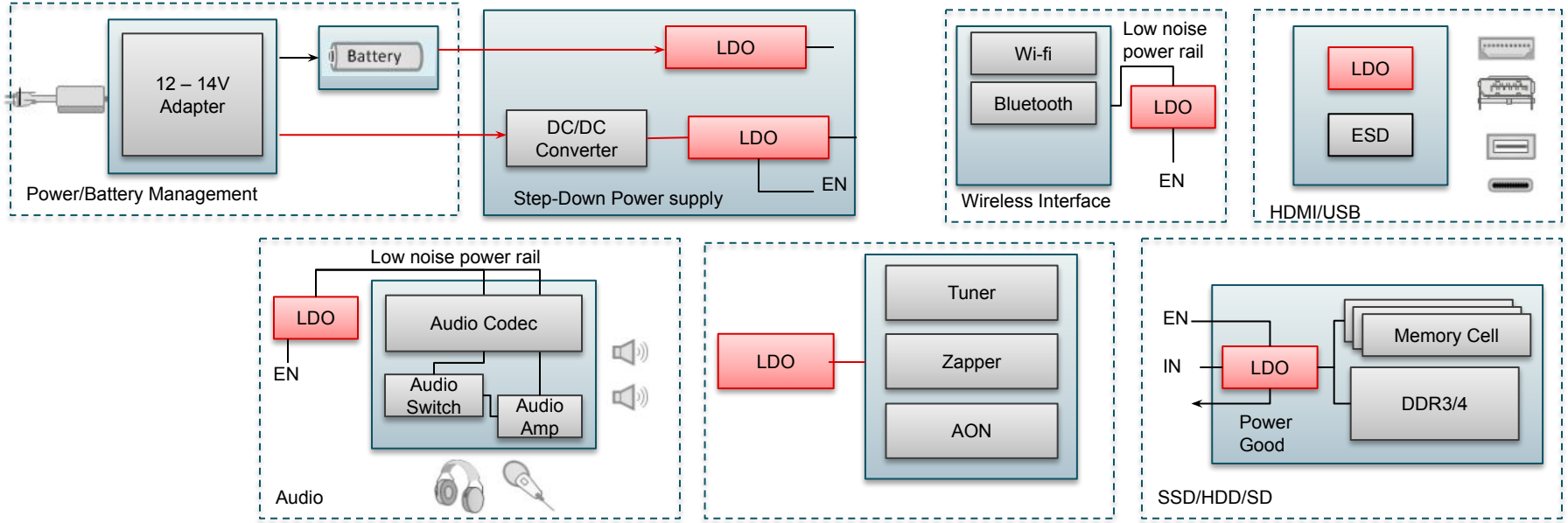
Improvements From TLV1117LV to TLV75x
Lower I_Q: from 100µA to 20 µA
Smaller Size : From 6.5mmx3.5mm to 1mmx1mm
Dropout Voltage 1A: From 800mV to 475mV
Lower V_{OUT} Capability : From 1.25 to 0.6V

TLV757P 1A

TLV759P* 1A

*Adjustable Output
**Fixed/Adjustable Output

Use Cases and Block Diagrams: STB

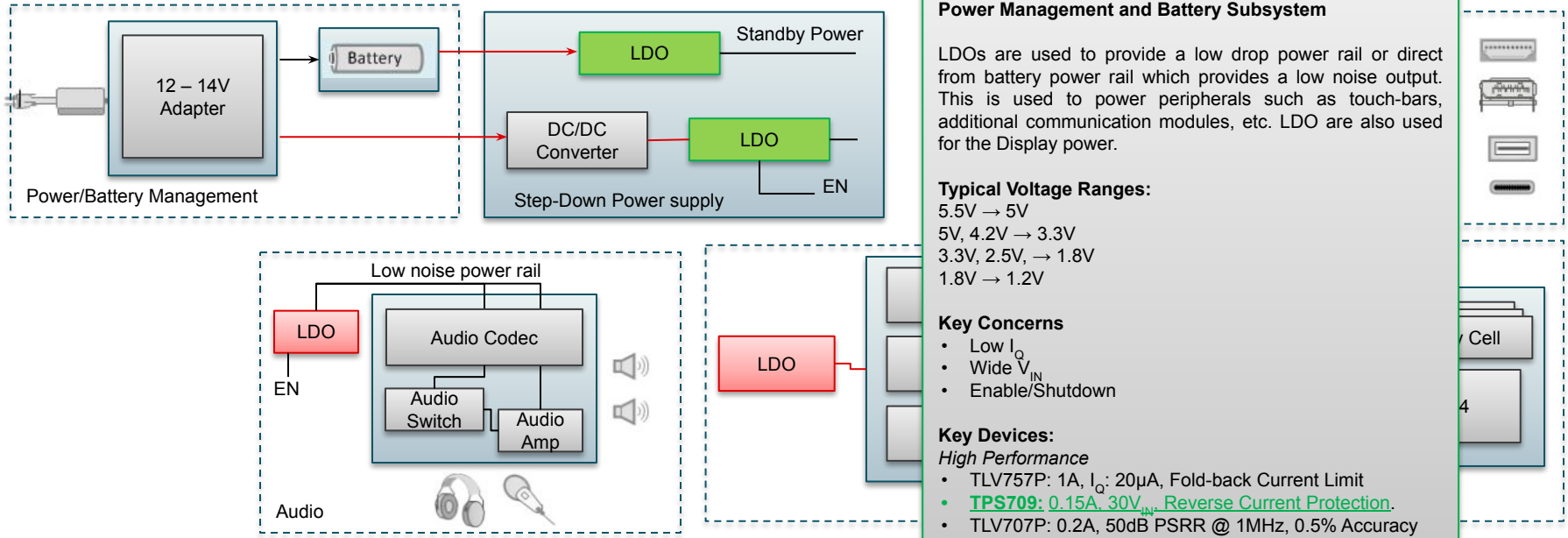


Primary LDO Use

Typically used for low-dropout conditions or low current demand with emphasis on low noise and low standby power

HOME

Use Cases and Block Diagrams: STB



Power Management and Battery Subsystem

LDOs are used to provide a low drop power rail or direct from battery power rail which provides a low noise output. This is used to power peripherals such as touch-bars, additional communication modules, etc. LDO are also used for the Display power.

Typical Voltage Ranges:
5.5V → 5V
5V, 4.2V → 3.3V
3.3V, 2.5V, → 1.8V
1.8V → 1.2V

Key Concerns
- Low I_Q
- Wide V_{IN}
- Enable/Shutdown

Key Devices:
High Performance
- TLV757P: 1A, I_Q: 20µA, Fold-back Current Limit
- **TPS709:** 0.15A, 30V_{IN}, Reverse Current Protection.
- TLV707P: 0.2A, 50dB PSRR @ 1MHz, 0.5% Accuracy
- TPS7A25: 0.3A, 18V_{IN}, , Power Good.

Value Line
- TLV713/741: 0.15A, 230mV_{DROP}, Cap-less Stable
- TLV733/743: 0.3A, 125mV_{DROP}, Cap-less Stable
- **TLV704: 0.15A, 24V_{IN}, I_Q: 3.2 µA**
- TLV705: 0.2A, 105mV_{DROP}, Ultra-low profile pkg

Primary LDO Use

Typically used for low-dropout conditions or lo
demand with emphasis on low noise and low s

HOME

Use Cases and Block Diagrams: STB

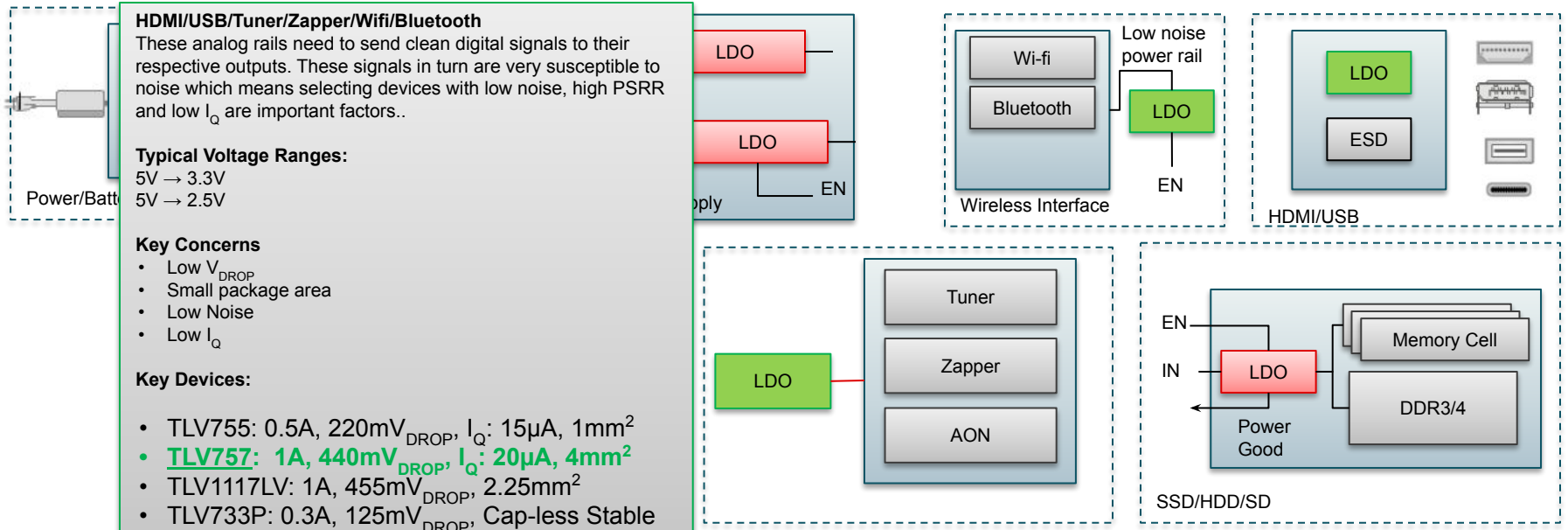
HDMI/USB/Tuner/Zapper/Wifi/Bluetooth
These analog rails need to send clean digital signals to their respective outputs. These signals in turn are very susceptible to noise which means selecting devices with low noise, high PSRR and low I_Q are important factors..

Typical Voltage Ranges:
5V → 3.3V
5V → 2.5V

Key Concerns
- Low V_{DROP}
- Small package area
- Low Noise
- Low I_Q

Key Devices:

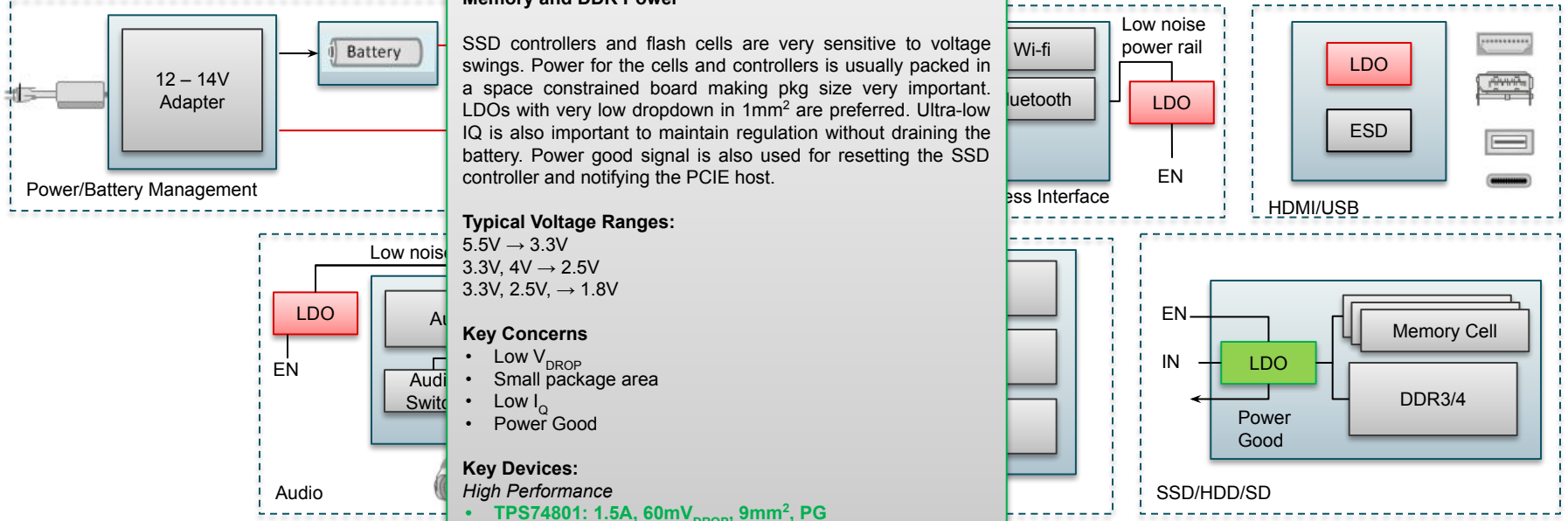
- TLV755: 0.5A, 220mV$_{DROP}$, I_Q: 15µA, 1mm^2
- **TLV757: 1A, 440mV$_{DROP}$, I_Q: 20µA, 4mm^2**
- TLV1117LV: 1A, 455mV$_{DROP}$, 2.25mm^2
- TLV733P: 0.3A, 125mV$_{DROP}$, Cap-less Stable
- TPS7A37: 1A, 1% accuracy, 4mm^2
- TPS748: 3A, 1% accuracy, 4mm^2



ary LDO Use

Typically used for low-dropout conditions or low current demand with emphasis on low noise and low standby power

Use Cases and Block Diagrams: STB



Memory and DDR Power

SSD controllers and flash cells are very sensitive to voltage swings. Power for the cells and controllers is usually packed in a space constrained board making pkg size very important. LDOs with very low dropdown in 1mm^2 are preferred. Ultra-low IQ is also important to maintain regulation without draining the battery. Power good signal is also used for resetting the SSD controller and notifying the PCIE host.

Typical Voltage Ranges:
5.5V → 3.3V
3.3V, 4V → 2.5V
3.3V, 2.5V, → 1.8V

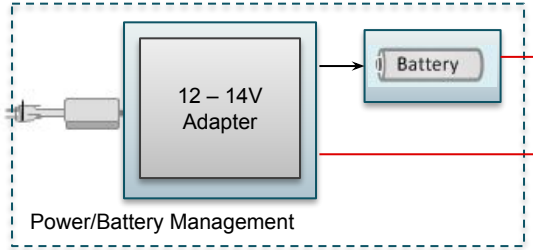
Key Concerns
- Low V_{DROP}
- Small package area
- Low I_Q
- Power Good

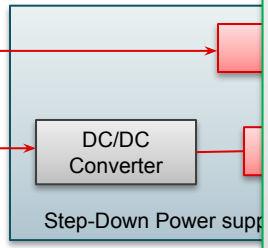
Key Devices:
High Performance
- **TPS74801: 1.5A, 60mV$_{DROP}$, 9mm^2, PG**
- TLV700: 0.2A, 43mV$_{DROP}$, 2.25mm^2
- **LP5912: 0.5A, 85mV$_{DROP}$, 4mm^2, PG**
- TPS782: 0.15A, 130mV$_{DROP}$, I_Q: 500nA, 4mm^2

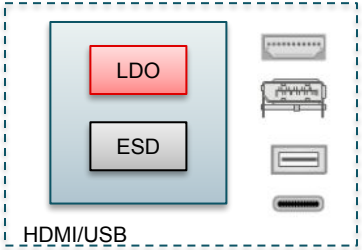
Value Line
- TLV733P: 0.3A, 125mV$_{DROP}$, Cap-less Stable
- TLV707P: 0.2A, 50dB PSRR @ 1MHz, 1mm^2
- TLV713P: 0.15A, 230mV$_{DROP}$, Cap-less Stable

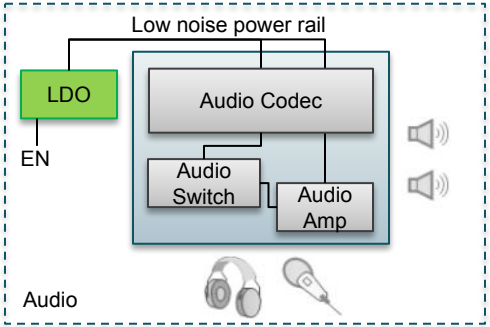
HOME

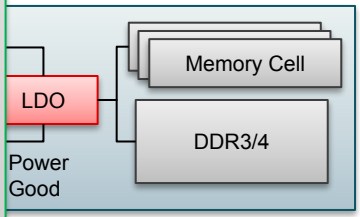
Use Cases and Block Diagrams: STB











Audio Codec

LDOs are used to provide ultra low noise power to the audio codec to improve the sound quality of the speakers, headphone and microphones. Small Size LDOs are desirable due to space constrained audio modules. High Fidelity Audio has become a good selling feature for the Note Books market.

Typical Voltage Ranges:
5.5V → 3.3V
3.3V, 4V → 2.5V
3.3V, 2.5V → 1.8V

Key Concerns
- Low Noise
- High PSRR
- Small package area

Key Devices:
High Performance
- **LP5907: 250mA, 6.5uV RMS Noise, 82dB PSRR**
- LP5910: 300mA, 12uV RMS Noise, 75dB PSRR
- LP5912: 500mA, 12uV RMS, 75dB PSRR
- TPS720: 350mA, 48uV RMS, 85dB PSRR

Value Line
- TLV705P: 0.2A, 26uV RMS, 55dB PSRR @ 1MHz
- **TLV707P: 0.2A, 45uV RMS, 50dB PSRR @ 1MHz**
- **TLV702P: 0.15A, 48uV RMS, 50dB PSRR @ 1MHz**

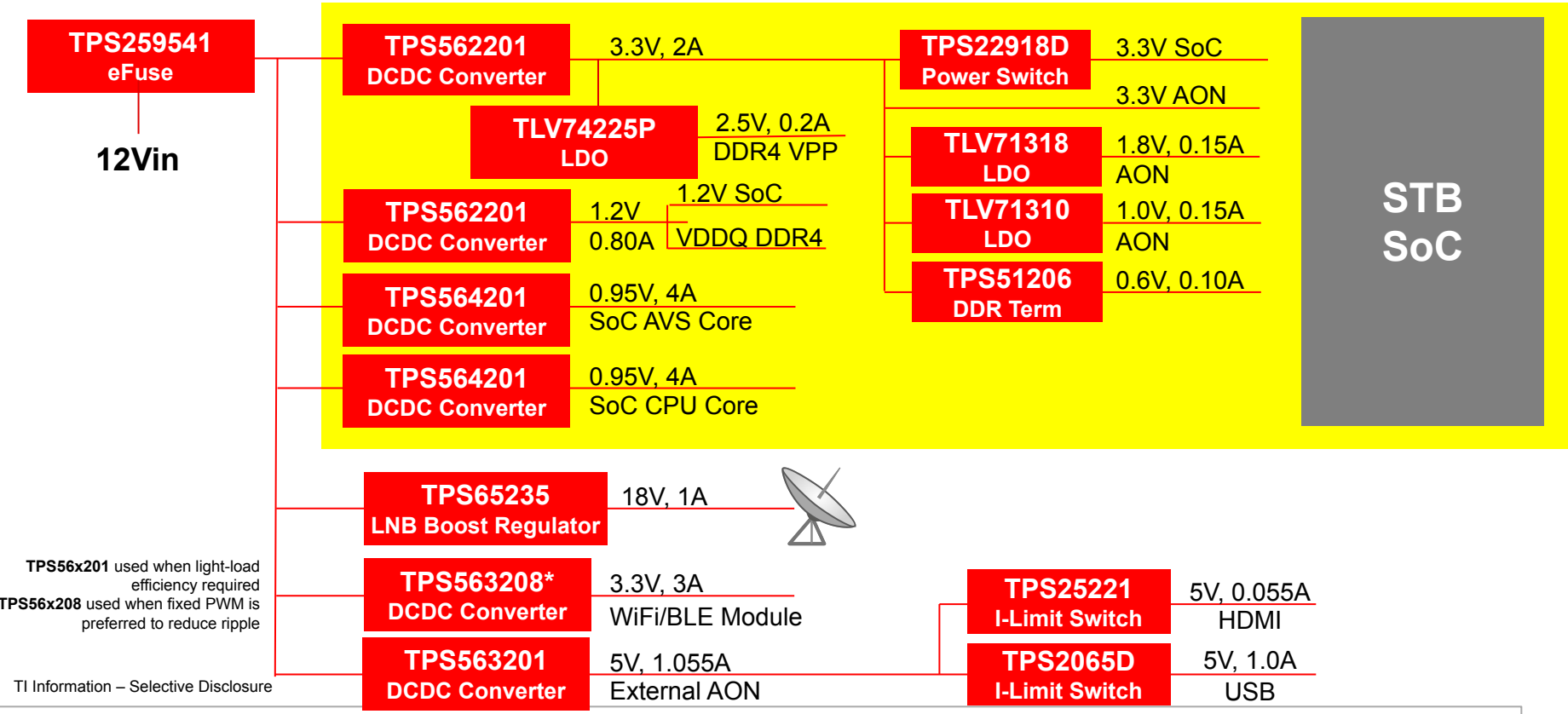
Prima

Typically used for low-drop
demand with emphasis on

HOME

STB Power Supply

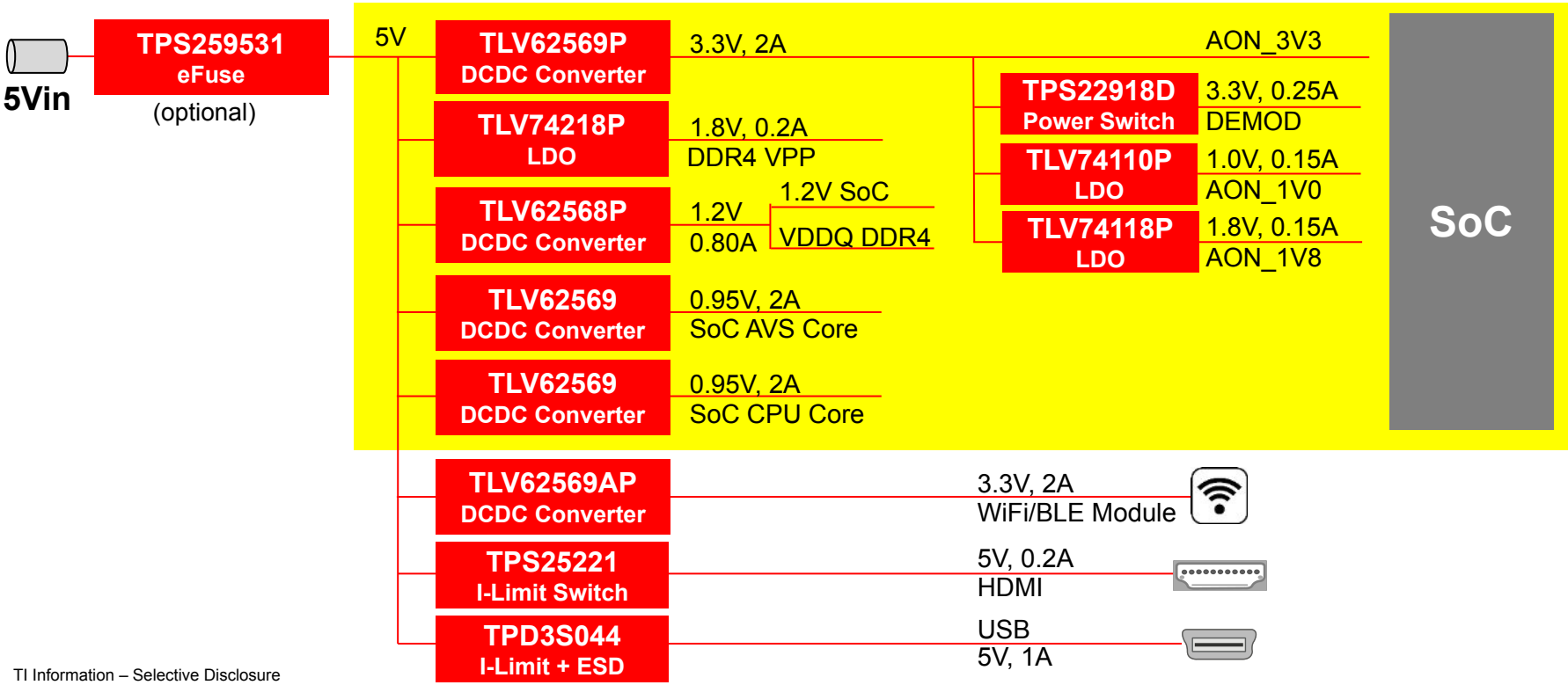
Optimized for 12Vin STB (with Satellite)



TPS56x201 used when light-load efficiency required
TPS56x208 used when fixed PWM is preferred to reduce ripple

OTT STB Power Supply

Optimized for 5Vin STB, OTT Box and HDMI TV Dongle



LDO for STBs/TV

Value/ Hi Performance /New	GPN	SBE-2	Description (Short)	Used for (function it performs)	Pkg size	Key Specs (List 3 key specs)	Positioning (How to WIN against comp and why it's a fit for this EE) *Add competitor*	Supporting Collateral (TIDA, PMP, App Note, EVM)
Popular	TLV1117	LP-LDO	The TLV1117 device is a positive low-dropout voltage regulator designed to provide up to 800 mA of output current.	Power supply for controller, and I/o	4.00 × 4.00	• Output Current of 800 mA • **0.2% Line Regulation Maximum** • **0.4% Load Regulation Maximum**	• The wide vin and high current output makes it ideal for I/O powering and high load power rail supplies. This is a popular device for industrial, **if power rails are at 5V or lower promote TLV1117LV for added value**	• TIDA-00834 • TIDA-00434
Value	TLV733P TLV707P TLV713P		The TLV733 series of LDOs are ultra-small, low quiescent current LDOs that can source 300 mA with good line and load transient performance.	Powering MCU, flash memory and other low voltage rails	1.00 x 1.00	• Foldback Overcurrent Protection • Accuracy: 1% typical, 1.4% max • Low IQ: 34 µA	• The TLV733 series is designed with a modern capacitor-free architecture to ensure stability without an input or output capacitor. This makes this family of LDOs very useful for space constrained applications and the low IQ enables a long battery life • **Main competition is Torex, Diodes and Ricoh**	• TIDA-03030
Hi Performance	TPS735		The TPS735 family of LDOs offers excellent ac performance with very low IQ. High power-supply rejection ratio (PSRR), low noise of 13.2uVRMS	Powers RF transmitters and ADCs	2.00 x 2.00	• Ultra-low Noise: 13.2 µVRMS • Low IQ: 46 µA • Very Low Dropout: 280 mV at 500 mA	• The ultra low noise and Low IQ makes this device perfect for wifi enabled STBs and TVs while consuming very little power and offering space savings. • **Main competition is Ricoh, Richtek, ADI: R1173, RT9013, ADP125**	• tida-01378 • TIDA-00428 • TIDA-00427
Hi Performance	TPS7A37		The TPS7A37family of LDOs is a high accuracy (1%), 1-A, LDOs with very low dropout (200mv @ 1A) and excellent load transient response	Powering MCU, flash memory and other low voltage rails	2.00 x 2.00	• Ultralow Dropout: 200-mV Max at 1 A • 1% Accuracy Over Line, Load and Temp • Thermal Shutdown and Current Limit	• The high current output makes this LDO ideal for powering video processors and main controllers in STBs and TVs that usually require high currents for operation. It also offers proper operation across temperature and load. • **Competitors are On Semi and Diodes: NCP5980 & AP1118**	• EVM
New	TLV755 (500mA) TLV757 (1A)		TLV757 is a 1A, 1% Accuracy LDO with protection features like inrush current control and foldback current limit.	Powering MCU, Wi-Fi, & Audio Modules	2 x 2	• 1% Accuracy • Low IQ: 20µA • Foldback and Inrush Current Protection	• TLV757 is a smaller cost effective power solution with relatively low IQ that can be powered with a variety of input rails. This LDO family is our latest	• TBD
New	TLV676		TLV767 is a family of 0.5/1A, 16V input LDOs with fold back current protection. This LDO can source large current while maintaining excellent transient response and enabling low power operation	Powering MCU, flash memory and other low voltage rails	2.00 x 2.00	• Input voltage range up to 16 Vmax • Small low load (<1mA) quiescent current <50µA • Fold back current limiting and thermal protection	• The TLV767 is the next generation of our TLV1117 with improved functionality and protection features. TLV1117 is very ubiquitous in STBs for its wide input and current range, this device improves on the offering while maintain a low footprint and similar pinout	• TBD

Products Contacts: Jose Gonzalez, Wilson Fwu, Ritushree Khanna

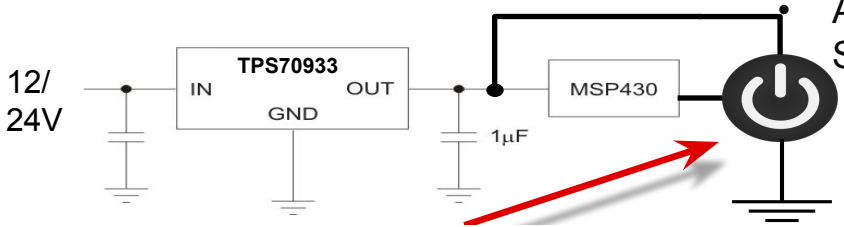
Where we can Win
Standby Power Solutions for STB

Why? To power Always ON rails. STB must consume <500mW when idle and be more than 80% efficient overall when operating

How? TPS709 can power standby electronics and internal MCU can turn on DC/DC converters and sequence system power on

TPS709

- *Ultra 1µA Low standby power*
- Vin up to 30V can sustain transients
- Reverse current protection
  - Can help hold up V_{RBAT} if V_{IN} fails
- Available in SOT23-5 package or SON2x2



Always **ON** Power required for Power Logic

TPS7A26 (In development)

- Low Iq 2.5uA Standby power
- Vin up to 18V can sustain transients and multi cell battery operation
- Has Power Good signal
- Supports higher current = 0.5A
- Available in SOT23-5 and 2mm x 2mm SON packages.

ENERGY STAR

LDO Discovery Questions for STBs

- Is the customer concerned about saving battery power consumption in standby mode?
- What is powering the Tuner?
- What is powering the Audio codec?
- Is their Low Noise Buck Regulator (LNBR) low enough noise?
  - *How are they post regulating the LNBR?*
- Is the customer looking to save the cost and size of the switcher inductor?

LP5907:
250 mA Ultra Low Noise, Low IQ LDO

Features

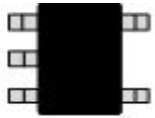
- **Very low noise: 6.5 µVrms**
- **High PSRR: 82 dB at 1 kHz**
- Stable with ceramic output caps ≥ 0.47 µF
- Low I_Q: 12 µA enabled, <1 µA disabled
- Low dropout: 120 mV typical
- ±2% Total output voltage tolerance
- 1 MΩ pull-down resistor on V_{OUT}
- Extremely small solution size (< 1mm^2)

Benefits

- **Industry leading noise performance and PSRR guarantee signal integrity**
  - **Eliminates need for external filtering**
  - **Extremely clean rail for noise-sensitive applications**
- Elimination of bypass cap reduces BOM cost and size only 2 ceramics caps required
- Efficient solution for battery operated applications
- Facilitates discharging of the output when disabled

Applications

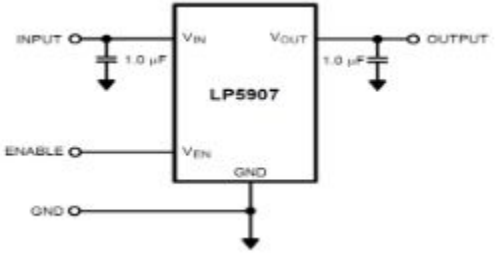
- Low Noise Post DC-DC Regulation
- Cellular Phones
- PDA Handsets
- Wireless LAN devices



SOT-23
3.2mm x 3.2mm

X2SON
1.0mm x 1.0mm

DSBGA
0.65mm x 0.65mm



Device	V_{IN}	I_{OUT}	V_{DO}	I_Q	Package
LP5907	2.2 to 5.5V	250 mA	120 mV	12 µA	Ultra thin DSBGA-4, X2SON, SOT-23

LP5910

300mA, Ultra Low Noise, High PSRR LDO

Features

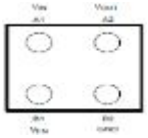
- Iout: 300mA
- Vin: 1.3-3.3V
- Fixed Vout: 0.8-2.3V in 25mV steps
- Low Noise: 12µVrms
- High PSRR: 75dB @ 1kHz
- Low Drop Out: Vdo <120mV
- Quiescent Current: <12µA (typ)
- High Accuracy: 2.0%
- DSBGA, WSON package options

Applications

- **Low current, noise sensitive loads**
- Radio transceivers
- Clocking
- PLL/Synthesizer
- Portable electronics
- Sensors

Benefits

- Low noise and high PSRR
- Optimal performance in noise sensitive radio and clocking applications
- Low drop out
- Vin near Vout for lowest thermal heating
- Low quiescent current
- Reduces power consumption from the battery
- Small footprint

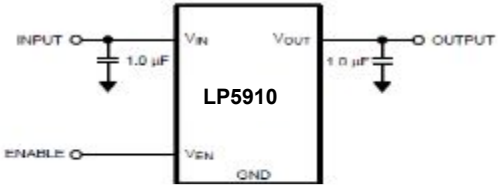


DSBGA

0.71mm x 0.71mm

WSON-6

2mm x 2mm



Device	V_{IN}	Io	Noise	I_Q	Package
LP5910	1.3- 3.3V	300mA	12µVrms	<12uA	DSBGA, WSON

LP5912

500mA Ultra-low noise, low IQ, Low V_{IN}/V_{OUT} LDO

Features

- **Vin: 1.6-6.50V**
- **Fixed Vout:0.8-5.5V**
  - Currently RTM-ed : (0.9, 1.5, 1.8, 2.8, 3.3)
- **Low Noise: 12µVrms typ 10-100kHz**
- Good PSRR: 80dB @ 1kHz, 65dB @ 10kHz
- **Low Drop Out: Vdo 150mV @ IL=500mA**
- Vout Accuracy: ±2% over temp.
- **Enable and Power Good**
- **Reverse current protection**
- Short Circuit Protection
- Thermal Overload Protection
- **Output auto-discharge** on disable
- 2x2mm WSON-6L package

Applications

- **Medium current, noise sensitive systems**
- Battery-powered systems
- Radio transceivers, PLL/Synthesizer, Clocking
- ADAS, Infotainment

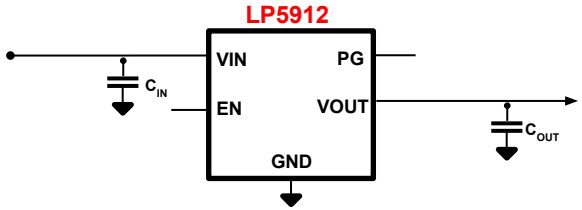
Benefits

- **Wide Vin/Vout range** reduces BOM count
- **Low noise** and good PSRR for use in noise sensitive radio and clocking applications
- **Low drop out** for highest efficiency and optimal thermal performance
- **Output auto discharge** to avoid false system power up sequencing.
- **Small footprint**

WSON (2x2mm)

Bottom View

Typical Application



Device	V_{IN}	Io	Noise	Package
LP5912	1.6- 6.5V	500mA	12 µVrms	WSON-DRV (2x2mm)

TPS720:

350mA, Ultra-Low VIN, RF Low-Dropout Linear Regulator with Bias

Features

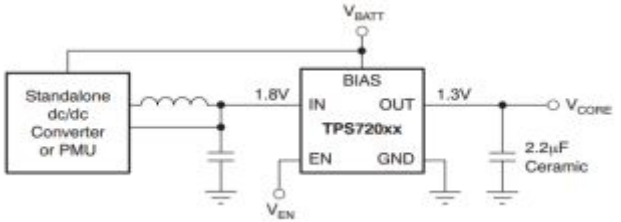
- Low Quiescent Current: 38µA
- Excellent Load Transient Response
- Excellent Line Transient Response
- Low Noise: 48µVRMS (10Hz to 100kHz)
- 80dB VIN PSRR (10Hz to 10kHz)
- Fast Start-Up Time: 140µs
- Built-In Soft-Start with Monotonic VOUT Rise
- Low Dropout: 110mV @ 350mA
- Package: 1.3x1.0 CSP, 2x2 SON

Benefits

- Extends battery life via lower consumption
- Able to quickly respond to changes in line and load for RF applications that turn on quickly
- Maintains a clean output rail
- Attenuates upstream ripple from DC/DC conv.
- Output voltage ramps quickly for processors
- Monotonic rise for DSPs and FPGAs
- Able to regulate at a high efficiency
- Small form factor to conserve space

Applications

- Digital Cameras
- Smart phone cameras
- Imaging
- Wireless LAN
- Portable Electronics



Device	V_{IN}	V_{OUT}	I_{OUT}	V_{DO}	IQ	Package
TPS720	1.1 – 4.5V	0.9 – 3.6V	350mA	110mV	38uA	CSP SON

TPS744:
3.0A Ultra Low Dropout LDO w/ Soft-Start

Features

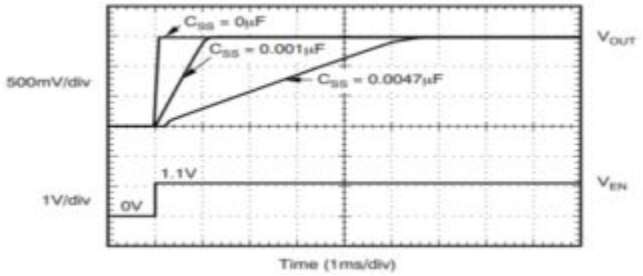
- Adjustable Soft-Start Pin
- 1% Accuracy over Line, Load, and Temp.
- Supports input voltages as low as 0.9V
- Ultra-Low Dropout: 115mV at 3A
- Stable with Any or No Output Capacitor
- Excellent Transient Response
- Open-Drain Power Good
- Low thermal resistance (θ_{JA}): 35°C/W
- Package: 5x5 QFN-20, DDPAK-7

Applications

- FPGA Applications
- DSP Core and I/O Voltages
- Post-Regulation Applications
- Applications with Special Start-Up Time or Sequencing Requirements

Benefits

- Provides a monotonic startup for processors
- Keeps the output rail tight
- Able to regulate low Vin/Vout rails
- Maintains high efficiency operation
- Minimizes total solution size
- Responds to quick changes in line or load
- Sequences additional rails in system
- Optimized for space-constrained systems



Device	V_{IN}	V_{OUT}	I_{OUT}	V_{DO}	Package
TPS744	0.9V – 5.5V	0.8 – 3.6V	3.0A	115mV@3.0A	QFN-20 DDPAK-7

TPS748:
1.5A Ultra LDO with Programmable Soft-Start

Features

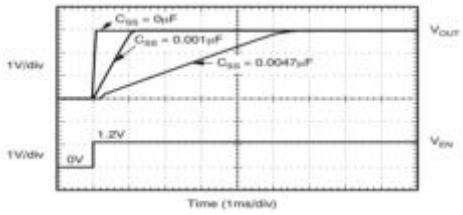
- Adjustable Soft-Start Pin (TPS742xx)
- 2% Accuracy over Line, Load, and Temp.
- Supports input voltages as low as 0.9V
- Ultra-Low Dropout: 60mV at 1.5A
- Stable with Any Output Capacitor ≥ 2.2uF
- Excellent Transient Response
- Open-Drain Power Good
- Package: 3x3 SON-10, 5x5 QFN-20

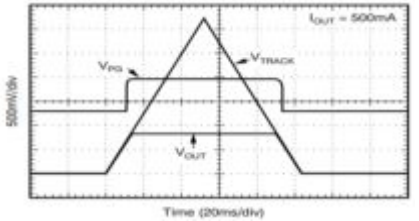
Applications

- FPGA Applications
- DSP Core and I/O Voltages
- Post-Regulation Applications
- Applications with Special Start-Up Time or Sequencing Requirements

Benefits

- Provides a monotonic startup for processors
- Allows for ratiometric or simultaneous tracking
- Keeps the output rail tight
- Able to regulate low Vin/Vout rails
- Maintains high efficiency operation
- Minimizes total solution size
- Responds to quick changes in line or load
- Sequences additional rails in system
- Optimized for space-constrained systems





Device	V_{IN}	V_{OUT}	I_{OUT}	V_{DO}	Package
TPS748xx	0.9V – 5.5V	0.8 – 3.6V	1.5A	60mV@1.5A	SON-10 QFN-20

TPS709:

30V, 150mA Ultra Low I_Q LDO with Reverse Current Protection

Features

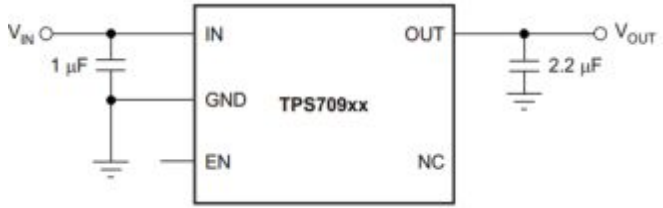
- Ultra-Low IQ: 1.3uA
- Input Voltage Range: 2.7V – 30V
- Reverse Current Protection
- Low Dropout: 245mV @ 50mA
- 2% Accuracy Over Temperature
- Stable with 1.5µF Ceramic Output Capacitor
- Available in SOT23-5, SON-6 (2x2)

Benefits

- Extends battery life
- Able to withstand large voltage spikes
- Helps to hold-up V_{OUT} if V_{IN} fails
- Capable of high efficiency
- Ensures tight rails over temperature
- Requires small capacitor for smaller solution

Applications

- Zigbee™ Networks, WLAN, and Other PC Add-On Cards
- Home Automation
- eMeters
- IP Cameras
- Portable Power Tools, Remote Control Devices
- Wireless Handsets, Smart Phones, Tablets



Device	I_{OUT}	V_{IN}	V_{DO}	I_Q	Package
TPS709	150mA	2.7V-30V	245mV	1.3uA	SOT23

In Development – TLV755:
500mA, Low Vin, LDO Regulator in 1x1mm Package

Features

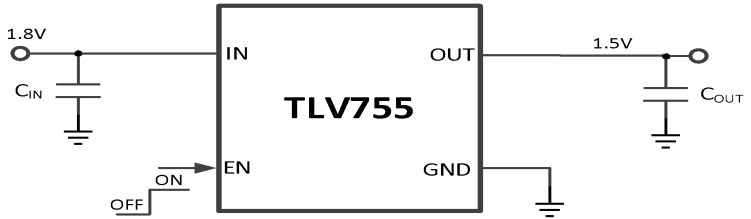
- **Available in 1x1 DFN, SOT23-5, SON-6 2mm x 2mm**
- Inrush current control
- 1% Typical Accuracy, 1.5% over Temp
- V_{IN} Range: 1.4V-5.5V
- Available in fixed voltages: 0.6V to 5.0V
- Low I_Q: 20uA (typ)
- $V_{DO,MAX}$=220mV @ 500mA (3.3V V_{OUT})
- Foldback Current limit
- Available in Active Pulldown
- Also available in SOT223 (pin compatible with TLV1117LV)

Benefits

- Smaller / Cost effective power solution
- Eliminate large surge currents during power up.
- Stable output for low power applications
- Power from wide variety of input rails.
- Powers processors with sub 1.0V requirements
- Longer battery life
- Allows for tighter voltage conversions.
- Avoid large fault currents / thermal shutdown
- Ensures proper load power cycling.
- For best thermal performance.

Applications

- Smartphones/Tablets
- Gaming Consoles
- Notebooks
- Set-top Boxes



Samples: Available Now

Device	V_{IN}	I_{OUT}	V_{DO}	I_Q	Package
TLV755	1.4V – 5.5V	500mA	220mV@500mA	20uA	1x1 DFN SOT23-5 2x2 DFN

Low Vin Roadmap

In Development – TLV757:
1A, Low Vin, LDO Regulator in 2x2mm Package

Features

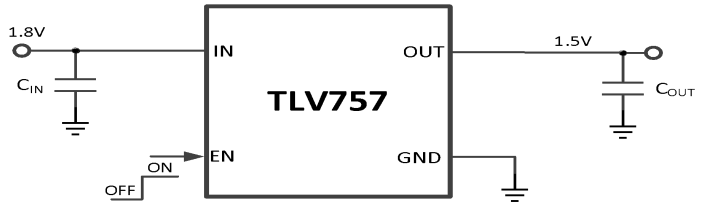
- **Available in SOT23-5 & 2x2 DFN (DRV)**
- Inrush current control
- 1% Typical Accuracy, 1.5% over Temp
- V_{IN} Range: 1.6V-5.5V
- Available in fixed voltages: 1.0V to 5.0V
- Low I_Q: 20uA (typ)
- $V_{DO,MAX}$=440mV @ 1A (3.3V V_{OUT})
- Foldback Current limit
- Available in Active Pulldown
- Also available in SOT223 (pin compatible with TLV1117LV)

Benefits

- Smaller / Cost effective power solution
- Eliminate large surge currents during power up.
- Stable output for low power applications
- Power from wide variety of input rails.
- Powers processors with sub 1.0V requirements
- Longer battery life
- Allows for tighter voltage conversions.
- Avoid large fault currents / thermal shutdown
- Ensures proper load power cycling.

Applications

- Smartphones/Tablets
- Gaming Consoles
- Notebooks
- Set-top Boxes



Samples: Available Now

Device	V_{IN}	I_{OUT}	V_{DO}	I_Q	Package
TLV757	1.6V – 5.5V	1A	440mV@1A	20uA	SOT23-5; 2x2 DFN SOT223

Low Vin Roadmap

Texas Instruments

In Development – TPS7A05

200mA, Ultra Low I_Q LDO in 1x1 package

Features

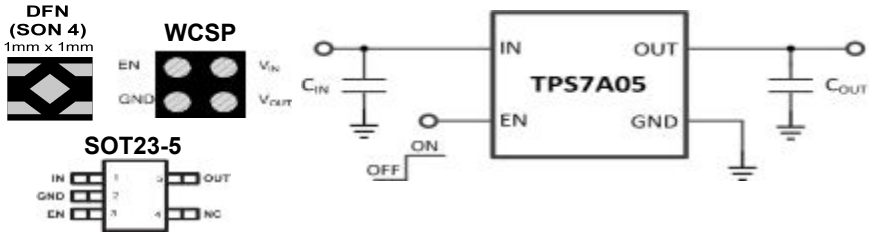
- Ultra Low I_Q: 1uA (typ); 2uA,max (-40C to +85C)
- 1% Typical Accuracy, 1.5% (-40C to +85C)
- Fast Transient Response
  - 1mA to 100mA load: 50us recovery
- Very Low Dropout
  - 336mV(max) @ I_{OUT}=200mA,V_{OUT}=1.8V
- Available in fixed output voltages 0.8V to 3.3V
- WCSP (0.65mm X 0.65mm), SON-4 (1x1)
- Available with Active Pulldown (P version)
- T_J = -40 to +125C operation

Applications

- Wearable fitness devices
- Tablets, e-readers, Remote Controls
- Portable Consumer products
- Always-on power supplies

Benefits

- Low current for long battery life
- Stable output for low power applications
- Suited for applications with low duty cycles and long sleep durations
- Allows for maximum efficiency by optimizing upstream power for minimum power loss.
- Powers processor with sub 1.2V power rails
- Small packaging for space critical applications
- Allows for compliance loads requiring deterministic power down behavior.



Device	V_{IN}	I_{OUT}	V_{DO}	I_Q	Package
TPS7A05	1.4V – 5.5V	200mA	365mV (max) @V_{OUT}=1.5V	1uA	WCSP (0.35mm pitch) QFN-4 (1x1); SOT23-5

Samples: October '17

Low Vin Roadmap

Texas Instruments

In Development – TPS7A10:
Low V_{IN}/Low V_{OUT}, Low I_Q 300mA LDO

Features

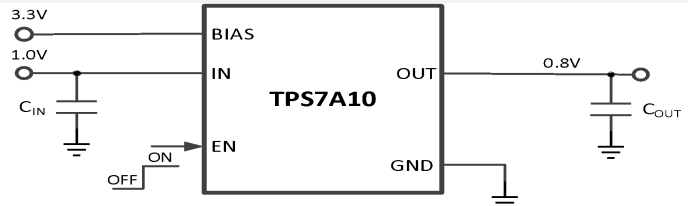
- V_{IN} Range: 0.7V to 3.6V
- V_{BIAS} Range: 1.7V to 5.5V
- V_{OUT} Range: 0.5V to 3.3V (fixed)
- Ultra Low Dropout: 150mV (max) at 300mA
- I_Q = 5uA (typ)
- PSRR: 40dB @ 1.5MHz
- 1.0% output accuracy over temp(-40C to 85C)
- Active output discharge
- Packages available:
  - 1.5mmx1.5mm WSON (DSE)
  - 0.78mmx1.13mm WCSP-5

Benefits

- Low V_{IN} operation for optimizing solution efficiency
- Allows powering BIAS from as low as 2.5V rail
- Low V_{OUT} for support of new ASIC cores.
- Allows for minimum power loss at low V_{IN}
- Low quiescent current for minimum standby power
- Able to reject noise from upstream DC/DC stage
- Ideal for rails which require tight regulation.
- Ensures well controlled power-down event
- Small solution size for space constrained applications.

Applications

- Smartphones
- Tablets
- Wearables



Device	V_{IN} Range V_{BIAS} Range	I_{OUT}	I_Q	V_{OUT} Range	Max V_{DO}	Package
TPS7A10	0.7V-3.6V 1.7V-5.5V	300mA	5uA	0.5V to 3.3V	150mV @ 300mA	1.5x1.5 DFN WCSP-5

Samples: October '17

In Development – TPS7A25:
18V, 300mA Low IQ LDO with Power Good

Features

- **Low Quiescent Current: 2.5uA**
- **Input Voltage Range: 2.7V to 18V**
- **Wide output Range: 1.2V to 17V**
  - **Fixed and Adjustable**
- **Low Dropout 300mV @ 300mA**
- **Power Good Output**

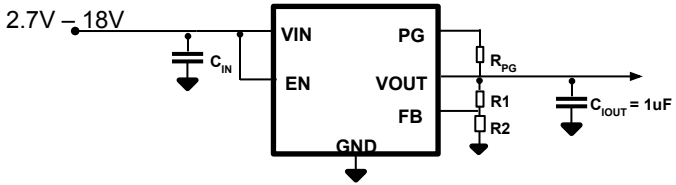
- 2% Accurate (Max) Fixed and Adj Outputs
- Available in 2x2 DFN and SOT23-6

Benefits

- Reduces battery drain
- Can withstand transients and be used with 12V rails
- Generate standard rails: 1.2V, 1.8V, 3.3V, 5V, 12V
- Able to provide for very small step-down regulation for minimum power loss
- Allows for monitoring and sequencing of rails
- Accurate regulation, fixed outputs for small solution, adjustable outputs for more flexibility
- Available in small solution size or standard easy to use SOT

Applications

- Smart Grid and Energy
- Building Automation
- Portable Industrial Systems
- Point of Sale Units
- Battery Operated Systems



Device	Vin Range	Junction Temp Range	VOUT Range	Max Dropout	Package
TPS7A25	2.7V-18V	-40C to +125C	1.2V to 17V	300mV@300mA	SON-6 SOT-6

Samples: December ‘17

In Development– TPS746:

Adjustable 1A, Low Vin, LDO Regulator with Power Good

Features

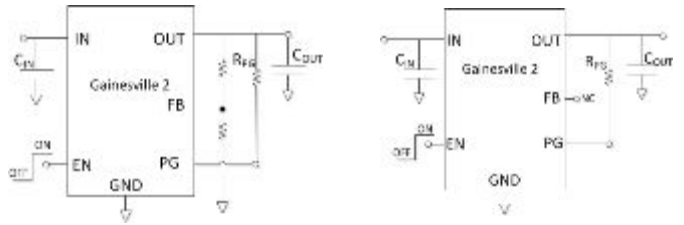
- VIN Range: 1.4V-5.5V
- Vout: Adjustable and Fixed (0.6V to 5.0V)
- 1% Typical Accuracy, 2.0% over Temp
- High PSRR: 50dB @ 100KHz
- Inrush current control
- Foldback current limit
- Low I_Q: 25uA (typ)
- Available in Active Pulldown
- Power Good Output
- **Available in 2 x 2 DRV and SOT23-5 (DBV)**

Benefits

- Smaller / Cost effective power solution
- Eliminate large surge currents during power up
- Avoids thermal limit cycling in short circuit faults.
- Stable output for low power applications
- Power from wide variety of input rails.
- Powers processors with sub 1.0V requirements
- Longer battery life
- Ideal for noise sensitive loads.
- Avoid large fault currents / thermal shutdown
- Allows sequencing of power rails using the power good signal

Applications

- Storage - SSD
- Building Automation
- Notebooks
- Set-top Boxes
- Automotive



Device	V_{IN}	I_{OUT}	V_{DO}	I_Q	Package
Gainesville2	1.4V – 5.5V	1A	440mV @ 1A	25uA	2 x2 DFN SOT23-5

In Development – TPS745:

Adjustable 500mA, Low Vin, LDO Regulator with Power Good

Features

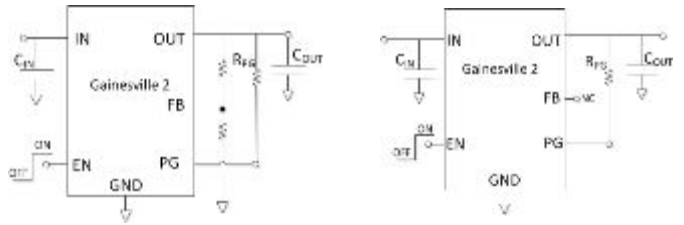
- VIN Range: 1.4V-5.5V
- Vout: Adjustable and Fixed (0.6V to 5.0V)
- 1% Typical Accuracy, 2.0% over Temp
- High PSRR: 50dB @ 100KHz
- Inrush current control
- Foldback current limit
- Low I_Q: 25uA (typ)
- Available in Active Pulldown
- Power Good Output
- **Available in 2 x 2 DRV and SOT23-5 (DBV)**

Benefits

- Smaller / Cost effective power solution
- Eliminate large surge currents during power up
- Avoids thermal limit cycling in short circuit faults.
- Stable output for low power applications
- Power from wide variety of input rails.
- Powers processors with sub 1.0V requirements
- Longer battery life
- Ideal for noise sensitive loads.
- Avoid large fault currents / thermal shutdown
- Allows sequencing of power rails using the power good signal

Applications

- Storage - SSD
- Building Automation
- Notebooks
- Set-top Boxes
- Automotive



Device	V_{IN}	I_{OUT}	V_{DO}	I_Q	Package
Gainesville2	1.4V – 5.5V	500mA	220mV@500mA	25uA	2 x2 DFN SOT23-5

TLV713P:
Capacitor Free, 150mA 1mm x 1mm LDO

Features

- **Stable with or without input/output capacitors**
- Low Vin of 1.4V
- Foldback Current Protection
- 1% Typical Accuracy, 1.5% Accuracy over Temp
- Available in fixed voltages 1.0V to 3.3V
- TLV713P – Active Output Pulldown
- Available in 1x1 SON w/Pad and SOT23-5

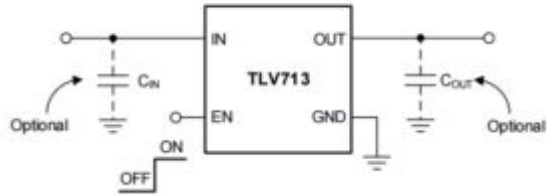
Benefits

- Smallest / Cost effective power solution
- Increased power supply utilization
- Avoid large short currents/ thermal shutdown
- Stable output for Low Power App
- Powers recent processors with sub <1.2V rail
- Quick discharge to control logic
- Small solution size

Applications

- Wireless Handsets
- IP Security Cameras
- Smart phones
- Tablets
- Other Hand-Held Products

Typical Application Circuit



Device	V_{IN}	I_{OUT}	V_{DO}	I_Q	Package
TLV713	1.4 – 5.5	150mA	230mV@ 150mA	50uA	SON-4 SOT-23-5

TLV733 / TLV733P:

Capacitor Free, 300mA, Low Vin, LDO Regulator in 1x1mm Package

Features

- **Stable with or without an output capacitor**
- **Available in 1x1 DFN and SOT-23-5**
- Inrush current control
- 1% Typical Accuracy, 1.25% over Temp
- Available in fixed voltages 1.0V to 3.3V
- Foldback Current limit
- TLV733P – Active output pull-down
- Low IQ = 34uA (typ)
- Additional voltage options available upon request

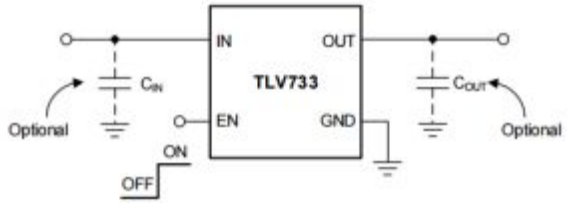
Benefits

- Smaller / Cost effective power solution
- Eliminate large surge currents during power up
- Stable output for low power applications
- Powers processors with sub 1.2V requirements
- Avoid large fault currents / thermal shutdown
- Quick discharge to control logic
- Longer battery life

Applications

- Wireless Handsets
- Smart phones
- MP3 Players
- Set-top Boxes
- Other Hand-Held Products

Typical Application Circuit



Device	V_{IN}	V_{OUT}	I_{OUT}	V_{DO}	I_Q	Package
TLV733P	1.4V – 5.5V	1.0V – 3.3V	300mA	122mV@300mA	34uA	QFN-4, SOT23-5

TPS782/3:
150 mA, 500 nA I_Q Low Dropout Voltage Regulators

Features

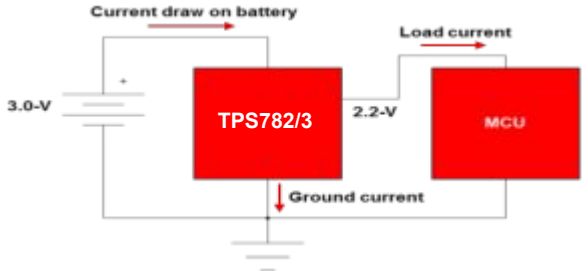
- Ultralow I_Q: 500nA (Typ)
- Low Dropout: 130 mV
- 3% Accuracy over Temperature
- Stable with 1 uF ceramic capacitor
- Active Pulldown (TPS782)
- Package: 5SOT (Both) and 6SON (TPS782)

Benefits

- Extended Battery life
- Maximize system efficiency
- Keeps the rail tight in hot environments
- Keeps external component size at minimum
- Discharges VOUT while device is off
- Minimizes solution size for small applications

Applications

- Battery-Powered and Portable Applications
- Tablets & Smartphones
- Fitness bands
- Data logging applications



Device	V_{IN}	V_{OUT}	I_{OUT}	V_{DO}	I_Q	Package
TPS782/3	2.2V – 5.5V	1.8V – 4.2V	150mA	130 mV @ 150mA	500nA	5SOT, 6SON

TPS709:

30V, 150mA Ultra Low I_Q LDO with Reverse Current Protection

Features

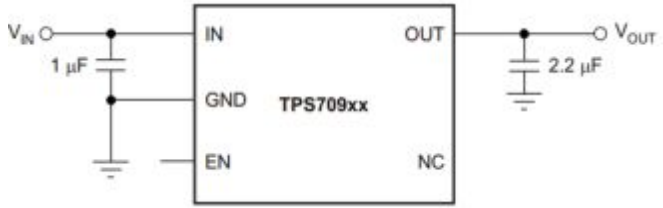
- Ultra-Low IQ: 1.3uA
- Input Voltage Range: 2.7V – 30V
- Reverse Current Protection
- Low Dropout: 245mV @ 50mA
- 2% Accuracy Over Temperature
- Stable with 1.5µF Ceramic Output Capacitor
- Available in SOT23-5, SON-6 (2x2)

Benefits

- Extends battery life
- Able to withstand large voltage spikes
- Helps to hold-up V_{OUT} if V_{IN} fails
- Capable of high efficiency
- Ensures tight rails over temperature
- Requires small capacitor for smaller solution

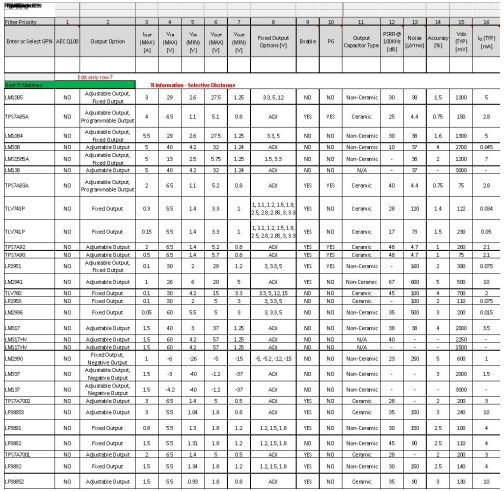
Applications

- Zigbee™ Networks, WLAN, and Other PC Add-On Cards
- Home Automation
- eMeters
- IP Cameras
- Portable Power Tools, Remote Control Devices
- Wireless Handsets, Smart Phones, Tablets



Device	I_{OUT}	V_{IN}	V_{DO}	I_Q	Package
TPS709	150mA	2.7V-30V	245mV	1.3uA	SOT23

Competitive Database



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Enter or Select GPN	AEC Q100	Output Option	I_{OUT} (MAX) [A]	V_{IN} (MAX) [V]	V_{IN} (MIN) [V]	V_{OUT} (MAX) [V]	V_{OUT} (MIN) [V]	Fixed Output Options [V]	Enable	PG	Output Capacitor Type	PSRR @ 100kHz (dB)	Noise (µVrms)	Accuracy (%)	Vdo (TYP) [mV]	I_Q (TYP) [mA]
Enter only row 7																
TI Internal Use Only		TI Information - Selective Disclosure														
LM1085	NO	Adjustable Output, Fixed Output	3	29	2.6	27.5	1.25	3.3, 5, 12	NO	NO	Non-Ceramic	30	38	1.5	1300	5
TPS7A85A	NO	Adjustable Output, Programmable Output	4	6.5	1.1	5.1	0.8	ADJ	YES	YES	Ceramic	25	4.4	0.75	150	2.8
LM1084	NO	Adjustable Output, Fixed Output	5.5	29	2.6	27.5	1.25	3.3, 5	NO	NO	Non-Ceramic	30	38	1.6	1300	5
LM336	NO	Adjustable Output	5	40	4.2	32	1.24	ADJ	NO	NO	Non-Ceramic	10	37	4	2700	0.045
LM1085A	NO	Adjustable Output, Fixed Output	5	15	2.5	5.75	1.25	1.5, 3.3	NO	NO	Non-Ceramic	-	38	2	1200	7
LM130	NO	Adjustable Output	5	40	4.2	32	1.24	ADJ	NO	NO	N/A	-	37	-	3000	-
TPS7A83A	NO	Adjustable Output, Programmable Output	2	6.5	1.1	5.2	0.8	ADJ	YES	YES	Ceramic	40	4.4	0.75	75	2.8
TLV761P	NO	Fixed Output	0.3	5.5	1.4	3.3	1	1, 1.1, 1.2, 1.5, 1.8, 2.5, 2.8, 2.85, 3, 3.3	YES	NO	Ceramic	28	120	1.4	122	0.084
TLV741P	NO	Fixed Output	0.15	5.5	1.4	3.3	1	1, 1.1, 1.2, 1.5, 1.8, 2.5, 2.8, 2.85, 3, 3.3	YES	NO	Ceramic	17	73	1.5	230	0.05
TPS7A52	NO	Adjustable Output	2	6.5	1.4	5.2	0.8	ADJ	YES	YES	Ceramic	48	4.7	1	260	2.1
TPS7A85	NO	Adjustable Output	0.5	6.5	1.4	5.7	0.8	ADJ	YES	YES	Ceramic	48	4.7	1	75	2.1
LP2951	NO	Adjustable Output, Fixed Output	0.1	30	2	29	1.2	3, 3.3, 5	YES	YES	Non-Ceramic	-	100	2	380	0.075
LM2941	NO	Adjustable Output	1	26	6	20	5	ADJ	YES	NO	Non-Ceramic	67	600	5	500	10
TLV760	NO	Fixed Output	0.1	30	4.2	15	3.3	3.3, 5, 12, 15	NO	NO	Ceramic	45	100	4	700	2
LP2950	NO	Fixed Output	0.1	30	2	5	3	3, 3.3, 5	NO	NO	Ceramic	-	100	2	130	0.075
LM2936	NO	Fixed Output	0.05	60	5.5	5	3	3, 3.3, 5	NO	NO	Non-Ceramic	35	500	3	200	0.015
LM317	NO	Adjustable Output	1.5	40	3	37	1.25	ADJ	NO	NO	Non-Ceramic	38	38	4	2000	3.5
LM317HV	NO	Adjustable Output	1.5	60	4.2	57	1.25	ADJ	NO	NO	N/A	40	-	-	2250	-
LM117HV	NO	Adjustable Output	1.5	60	4.2	57	1.25	ADJ	NO	NO	N/A	-	-	-	1800	-
LM2990	NO	Fixed Output, Negative Output	1	-6	-26	-5	-15	-5, -5.2, -12, -15	NO	NO	Non-Ceramic	28	260	5	600	1
LM337	NO	Adjustable Output, Negative Output	1.5	-3	-40	-1.2	-37	ADJ	NO	NO	Non-Ceramic	-	-	3	2000	1.5
LM137	NO	Adjustable Output, Negative Output	1.5	-4.2	-40	-1.2	-37	ADJ	NO	NO	Non-Ceramic	-	-	-	1800	-
TPS7A7002	NO	Adjustable Output	3	6.5	1.4	5	0.5	ADJ	YES	NO	Ceramic	28	-	2	200	3
LP38853	NO	Adjustable Output	3	5.5	1.04	1.8	0.8	ADJ	YES	NO	Ceramic	35	150	3	240	10
LP3881	NO	Fixed Output	0.8	5.5	1.3	1.8	1.2	1.2, 1.5, 1.8	YES	NO	Non-Ceramic	50	150	2.5	100	4
LP3882	NO	Fixed Output	1.5	5.5	1.31	1.8	1.2	1.2, 1.5, 1.8	NO	NO	Non-Ceramic	45	90	2.5	110	4
TPS7A700	NO	Adjustable Output	2	6.5	1.4	5	0.5	ADJ	YES	NO	Ceramic	28	-	2	200	3
LP3882	NO	Fixed Output	1.5	5.5	1.34	1.8	1.2	1.2, 1.5, 1.8	YES	NO	Non-Ceramic	30	150	2.5	140	4
LP38852	NO	Adjustable Output	1.5	5.5	0.99	1.8	0.8	ADJ	YES	NO	Ceramic	35	90	3	190	10

Anpec – APL5930

GPN	APL5930	TPS7A84A	TPS7A84	TPS7A7300	TPS7A7002	TPS74901
AEC Q100	NO	NO	NO	NO	NO	NO
Output Options	Adjustable Output	Adjustable Output, Programmable Output	Adjustable Output, Programmable Output	Adjustable Output, Programmable Output	Adjustable Output	Adjustable Output
Iout (Max) (A)	3	3	3	3	3	3
Vin (Max) (V)	3.65	6.5	6.5	6.5	6.5	5.5
Vin (Min) (V)	1.2	1.1	1.1	1.43	1.4	0.8
Vout (Max) (V)	3.5	5.15	5	5	5	3.6
Vout (Min) (V)	0.8	0.8	0.8	0.9	0.5	0.8
Fixed Output Options (V)	ADJ	ADJ	ADJ	ADJ	ADJ	ADJ
Enable	YES	YES	YES	YES	YES	YES
Power Good	YES	YES	YES	YES	NO	YES
Output Capacitor Type	Ceramic	Ceramic	Ceramic	Ceramic	Ceramic	Ceramic
PSRR @ 100KHz (dB)	28	25	25	25	28	28
Noise (uVrms)	-	4.4	4.4	40	-	20
Accuracy (%)	1.5	0.75	1	2	2	2
Vdo (Typ) (mV)	230	110	110	240	200	120
Iq (Typ) (mA)	1	2.8	2.8	4	3	3
Thermal Resistance θJA (°C/W)	42	43	35	36	47	34
Min Package Area (mm2)	19.11	12.25	12.25	25	19.071	9
Package Type	SOPowerPAD	VQFN	VQFN	VQFN	SOPowerPAD	DDPAK/TO-263,VQFN,VSON

Diodes – AP7361

GPN	AP7361	TPS7A37	TLV1117LV	TPS725	TPS737
AEC Q100	NO	NO	NO	NO	NO
Output Options	Adjustable Output, Fixed Output	Adjustable Output, Fixed Output	Fixed Output	Adjustable Output, Fixed Output	Adjustable Output, Fixed Output
Iout (Max) (A)	1	1	1	1	1
Vin (Max) (V)	6	5.5	5.5	6	5.5
Vin (Min) (V)	2.2	2.2	2	1.8	2.2
Vout (Max) (V)	5	5.5	3.3	5.5	5.4
Vout (Min) (V)	0.8	1.2	1.2	1.22	1.2
Fixed Output Options (V)	1, 1.2, 1.5, 1.8, 2.5, 2.8, 3.3, ADJ	2.1, 2.5	1.2, 1.5, 1.8, 2.5, 2.8, 3, 3.3	1.5, 1.6, 1.8, 2.5	1.8, 2.5, 3, 3.3, 4
Enable	YES	YES	NO	YES	YES
Power Good	NO	NO	NO	YES	NO
Output Capacitor Type	Ceramic	Ceramic	Ceramic	Cap Free, Ceramic	Ceramic
PSRR @ 100KHz (dB)	35	32	50	20	33
Noise (uVrms)	-	32	60	150	48
Accuracy (%)	1.5	1	2	2	3
Vdo (Typ) (mV)	360	130	570	170	130
Iq (Typ) (mA)	0.06	0.4	0.05	0.075	0.4
Thermal Resistance θJA (°C/W)	74	67	63	23	50
Min Package Area (mm2)	9	4	22.75	19.159	4
Package Type	WSON, SOPowerPAD, SOT-223, TO-252, SOT-89	WSON	SOT-223	DDPAK/TO-263,SOIC ,SOT-223	SON,SOT-223,WSON

Rohm – BDxxIC0W

GPN	BDxxIC0W	LP3892	LP3882	LP3879	LP3891
AEC Q100	NO	NO	NO	NO	NO
Output Options	Adjustable Output, Fixed Output	Fixed Output	Fixed Output	Fixed Output	Fixed Output
Iout (Max) (A)	1	1.5	1.5	0.8	0.8
Vin (Max) (V)	5.5	5.5	5.5	6	5.5
Vin (Min) (V)	2.4	1.34	1.31	2.5	1.3
Vout (Max) (V)	4.5	1.8	1.8	1.2	1.8
Vout (Min) (V)	0.8	1.2	1.2	1	1.2
Fixed Output Options (V)	1.0, 1.2, 1.25, 1.5, 1.8, 2.5, 2.6, 3.0, 3.3	1.2, 1.5, 1.8	1.2, 1.5, 1.8	1, 1.2	1.2, 1.5, 1.8
Enable	YES	YES	NO	YES	YES
Power Good	NO	NO	NO	NO	NO
Output Capacitor Type	Ceramic	Non-Ceramic	Non-Ceramic	Ceramic	Non-Ceramic
PSRR @ 100KHz (dB)	-	30	45	35	30
Noise (uVrms)	-	150	90	18	150
Accuracy (%)	1	2.5	2.5	3	2.5
Vdo (Typ) (mV)	400	140	110	475	100
Iq (Typ) (mA)	-	4	4	0.2	4
Thermal Resistance θJA (°C/W)	147.1	40	40	40	40
Min Package Area (mm2)	4.16	19.071	19.071	16	19.071
Package Type	SOPowerPAD	DDPAK/TO-263,SOPowerPAD	DDPAK/TO-263,SOPowerPAD	SOPowerPAD,WSON	SOPowerPAD,DDPAK/TO-263

Rohm – BUxxTD2WNVX

GPN	BUxxTD2WNVX	TLV707P	TLV700	TLV705	TPS728	TPS799
AEC Q100	NO	NO	NO	NO	NO	NO
Output Options	Fixed Output	Fixed Output	Fixed Output	Fixed Output	Fixed Output	Adjustable Output, Fixed Output
Iout (Max) (A)	0.2	0.2	0.2	0.2	0.2	0.2
Vin (Max) (V)	6	5	5.5	5.5	6.5	6.5
Vin (Min) (V)	1.7	2	2	2	2.7	2.7
Vout (Max) (V)	1	3.6	3.6	3.6	3.3	6.5
Vout (Min) (V)	3.4	1	1.2	1.2	1.2	1.2
Fixed Output Options (V)	1, 1.05, 1.1, 1.15, 1.2, 1.25, 1.3, 1.5, 1.8, 1.85, 1.9, 2, 2.05, 2.1, 2.3, 2.5, 2.6, 2.7, 2.75, 2.8, 2.85, 2.9, 3, 3.1, 3.2, 3.3, 3.4	1, 1.1, 1.2, 1.5, 1.8, 1.85, 1.9, 2.5, 2.6, 2.8, 2.85, 2.9, 3, 3.3, 3.4, 3.6	1.2, 1.3, 1.5, 1.8, 1.9, 2.2, 2.5, 2.8, 2.9, 3, 3.1, 3.2, 3.3, 3.6	1.2, 1.5, 1.8, 1.85, 2.5, 2.8, 2.85, 3, 3.3, 3.4, 3.6	1.2, 1.5, 1.75, 1.8, 1.85, 2.85, 2.95, 3, 3.15, 3.3	1.2, 1.25, 1.3, 1.5, 1.8, 1.85, 1.9, 1.95, 2, 2.1, 2.5, 2.6, 2.7, 2.75, 2.8, 2.85, 3, 3.15, 3.2, 3.3, 4.2, 4.5
Enable	YES	YES	YES	YES	YES	YES
Power Good	NO	NO	NO	NO	NO	NO
Output Capacitor Type	Ceramic	Ceramic	Ceramic	Ceramic	Ceramic	Ceramic
PSRR @ 100KHz (dB)	45	40	51	52	40	38
Noise (uVrms)	-	45	48	26	210	29
Accuracy (%)	1.5	1.5	2	2	3	2
Vdo (Typ) (mV)	220	250	175	145	230	100
Iq (Typ) (mA)	0.035	0.025	0.03	0.03	0.05	0.04
Thermal Resistance θJA (°C/W)	223	208	236	160	65	74
Min Package Area (mm2)	1	1	2.25	0.5929	1.92	1.92
Package Type	X2SON	X2SON	SC70,SOT-23-THIN ,WSON	DSBGA,DSLGA	DSBGA,WSON	DSBGA,WSON,SOT-23-THIN

Richtek – RT9069

GPN	RT9069	LM340	TLV760	TPS709	TLV704
AEC Q100	NO	NO	NO	NO	NO
Output Options	Fixed Output	Fixed Output	Fixed Output	Fixed Output	Fixed Output
Iout (Max) (A)	0.2	1.5	0.1	0.15	0.15
Vin (Max) (V)	36	35	30	30	24
Vin (Min) (V)	3.5	7.5	4.2	2.7	2.5
Vout (Max) (V)	12	15	15	6	5
Vout (Min) (V)	2.5	5	3.3	1.2	3
Fixed Output Options (V)	2.5, 3, 3.3, 5, 9, 12	5, 12, 15	3.3, 5, 12, 15	1.2, 1.35, 1.5, 1.6, 1.8, 1.9, 2.5, 2.7, 2.8, 3, 3.3, 3.6, 3.8, 3.9, 5, 6	3, 3.3, 3.6, 5
Enable	YES	NO	NO	YES	NO
Power Good	NO	NO	NO	NO	NO
Output Capacitor Type	Ceramic	Cap Free, Ceramic	Ceramic	Ceramic	Ceramic
PSRR @ 100KHz (dB)	40	50	45	26	42
Noise (uVrms)	-	40	100	190	550
Accuracy (%)	2	5	4	2	2
Vdo (Typ) (mV)	200	2000	700	300	400
Iq (Typ) (mA)	0.0035	8	2	0.001	0.003
Thermal Resistance θJA (°C/W)	30.6	24	270	73	213
Min Package Area (mm2)	2.56	22.75	4.64	4	4.64
Package Type	SOPowerPAD, SOT-89, SOT-23, SON	DDPAK/TO-263,TO-3,SOT-223,TO-220	SOT-23	SOT-23,WSON	SOT-23

Rohm – BUxxUA3

GPN	BUxxUA3WNVX	TLV733P	LP5907	LP5910	TLV702
AEC Q100	NO	NO	NO	NO	NO
Output Options	Fixed Output	Fixed Output	Fixed Output	Fixed Output	Fixed Output
Iout (Max) (A)	0.3	0.3	0.25	0.3	0.3
Vin (Max) (V)	5.5	5.5	5.5	3.3	5.5
Vin (Min) (V)	1.7	1.4	2.2	1.3	2
Vout (Max) (V)	4	3.3	4.5	1.8	4.75
Vout (Min) (V)	1	1	1.2	0.9	1.2
Fixed Output Options (V)	1, 1.05, 1.1, 1.15, 1.2, 1.25, 1.3, 1.35, 1.4, 1.45, 1.5, 1.55, 1.6, 1.65, 1.7, 1.75, 1.8, 1.85, .19, 1.95, 2, 2.05, 2.1, 2.15, 2.2, 2.25, 2.3, 2.35, 2.4, 2.45, 2.5, 2.55, 2.6, 2.65, 2.7, 2.75, 2.8, 2.85, 2.9, 2.95, 3, 3.05, 3.1, 3.15, 3.2, 3.25, 3.3, 3.35, 3.4, 3.45, 3.5, 3.55, 3.6, 3.65, 3.7, 3.5, 3.8, 3.85, 3.9, 3.95, 4	1, 1.1, 1.2, 1.5, 1.8, 2.5, 2.8, 2.85, 3, 3.3	1.2, 1.5, 1.8, 1.9, 2.2, 2.5, 2.7, 2.75, 2.8, 2.85, 2.9, 3, 3.1, 3.2, 3.3, 3.7, 4, 4.5	0.9, 1, 1.1, 1.2, 1.8	1.2, 1.5, 1.8, 2.5, 2.8, 2.9, 3, 3.1, 3.3, 3.5, 3.6, 3.7, 4.3, 4.5, 4.75
Enable	YES	YES	YES	YES	YES
Power Good	NO	NO	NO	NO	NO
Output Capacitor Type	Ceramic	Cap Free, Ceramic	Ceramic	Ceramic	Ceramic
PSRR @ 100KHz (dB)	30	28	60	40	51
Noise (uVrms)	-	120	6.5	12	48
Accuracy (%)	1	1.4	2	2	2
Vdo (Typ) (mV)	200	122	50	120	220
Iq (Typ) (mA)	0.05	0.034	0.012	0.012	0.03
Thermal Resistance θJA (°C/W)	223	219	193	79	249
Min Package Area (mm2)	1	1	0.77	0.49	2.25
Package Type	X2SON	SOT-23,X2SON	SOT-23,X2SON,DSBGA	DSBGA,WSON	SOT-23,WSON

Intersil – ISL9021A

	ISL9021A	TLV733P	LP5910	TPS720
V_{IN} (V)	1.5 to 5.5	1.4 to 5.5	1.3 to 3.3	1.1 to 4.5
V_{OUT} (V)	0.9 to 3.3	1 to 3.3	0.9 to 1.8	0.9 to 1.8
Fixed/Adj	Fixed	Fixed	Fixed	Fixed
I_{OUT} (mA)	250	300	300	350
Current Limit (min) (mA)	260	360	450 (typ)	420
FB/V_{OUT} Accuracy (max)	1.8%	1.4% (over temp)	2%	2%
I_Q (no load) (max) (µA)	50	60	25	30 (typ), 80
I_Q (shutdown) (µA)	1	1 (@25°C)	2	2
Noise (10Hz to 100kHz) (μV_{RMS})	8.5 x V_{OUT}	66 x V_{OUT}	12	32 x V_{OUT}
Package	0.975x1.155 WCSP 1.6x1.6 DFN-6	1x1 X2SON SOT23-5	0.75x0.75 WCSP 2.1x2.1 DFN-6	1.36x0.96 WCSP 2x2 DFN-6
Dropout (V_{DO}) (max) (250mA) (mV)	250	250	150	142
θJA (°C/W)	135.64	218.6	79.2	66.5
Temp Range	-40 to 85°C	-40 to 125°C	-40 to 125°C	-40 to 125°C
Enable (EN)?	Y	Y	Y	Y
Cap-Free?	N	Y	N	N
C_{OUT} (min) (µF)	1	0	1	2.2

Ricoh – RP114

RICOH

	RP114x	TLV733P	LP5910	TLV702
V_{IN} (V)	1.4 to 5.5	1.4 to 5.5	1.3 to 3.3	2 to 5.5
V_{OUT} (V)	0.8 to 3.6	1 to 3.3	0.8 to 2.3	1.2 to 4.75
Fixed/Adj	Fixed	Fixed	Fixed	Fixed
I_{OUT} (mA)	300	300	300	300
Current Limit (min) (mA)	300	360	450 (typ)	320
FB/V_{OUT} Accuracy (max)	3% (over temp)	1.4% (over temp)	2%	2% (over temp)
I_Q (no load) (max) (µA)	75	60	25	55
I_Q (shutdown) (µA)	1 (@25°C)	1 (@25°C)	2	2
Package	1x1 X2SON SC70-5 SOT23-5	1x1 X2SON SOT23-5	0.75x0.75 WCSP 2.1x2.1 DFN-6	SOT23-5 1.5x1.5 DFN-6
Dropout (V_{DO}) (max) (300mA) (mV)	390 (@1.8V) 290 (@3.3V)	300 (@1.8V) 270 (@3.3V)	180 (@1.8V)	375
θJA (°C/W)	250	218.6	79.2	249.2
Temp Range	-40 to 85°C	-40 to 125°C	-40 to 125°C	-40 to 125°C
Enable (EN)?	Y	Y	Y	Y
Cap-Free?	N	Y	N	N

Ricoh – RP103

RICOH

	RP103	TLV733	TLV707	TLV702
V_{IN} (V)	1.7 to 5.25	1.4 to 5.5	2 to 5	2 to 5.5
V_{OUT} (V)	1.2 to 3.3	1 to 3.3	0.85 to 3.6	1.2 to 4.75
Fixed/Adj	Fixed	Fixed	Fixed	Fixed
I_{OUT} (mA)	150	300	200	300
Current Limit (min) (mA)	180	360	240	320
FB/V_{OUT} Accuracy (max)	1.5% (over temp)	1.4% (over temp)	1.5% (over temp)	2% (over temp)
I_Q (no load) (max) (µA)	50	60	50	55
I_Q (shutdown) (µA)	1 @ 25°C	1 @ 25°C	1 @ 25°C (typ)	2
Package	1x1 X2SON-4 SC70-4 SOT23-5	1x1 X2SON-4 SOT23-5	1x1 X2SON-4	1.5x1.5 DFN-6 SOT23-5
Dropout (V_{DO}) (max) (150mA) (mV)	270 (3.3V)	270 (3.3V)	270 (3.3V)	188
Noise (10Hz – 100kHz) (μV_{RMS})	50 x V_{OUT}	66 x V_{OUT}	25 x V_{OUT}	27 x V_{OUT}
θJA (°C/W)	250	218.6	208.1	249.2
Enable (EN)?	Y	Y	Y	Y
Cap-Free?	N	Y	N	N
Output Cap (min) (µF)	0.47	0	0.1	0.1
Temp Range	-40 to 85°C	-40 to 125°C	-40 to 125°C	-40 to 125°C

Torex – XC6209, XC6212

	XC6209/12	TLV713P	TPS709	TLV704
V_{IN} (V)	2 to 10	1.4 to 5.5	2.7 to 30	2.5 to 24
V_{OUT} (V)	0.9 to 6	1 to 3.3	1.5 to 6	3 to 5
Fixed/Adj	Fixed	Fixed	Fixed	Fixed
I_{OUT} (mA)	150	150	150	150
Current Limit (min) (mA)	300 (typ)	180	200	160
FB/V_{OUT} Accuracy (max)	2% (25°C)	1.5%	2% (over temp)	2% (25°C)
I_Q (no load) (max) (µA)	50 (25°C)	75	2.05	4.5 (25°C)
I_Q (shutdown) (µA)	0.1 (typ)	1	0.15 (typ)	-
Package	SOT23-5 1.8x2 DFN-6 SOT89-5	SOT23-5 1x1 X2SON	SOT23-5 2x2 SON-6	SOT23-5
Dropout (V_{DO}) (max) (@150mA) (mV)	410	600	1200	1650 (25°C)
θJA (°C/W)	100	249	73.1	213.1
Temp Range	-40 to 85°C	-40 to 125°C	-40 to 125°C	-40 to 125°C
Enable (EN)?	Y	Y	Y	N
Cap-Free?	N	Y	N	N

Analog Devices – ADP150, ADP151

		ADP150	ADP151	LP5907	TLV707
V_{IN} (V)		2.2 to 5	2.2 to 5	2.2 to 5.5	2 to 5
V_{OUT} (V)		1.8 to 3.3	1.1 to 3.3	1.2 to 4.5	0.85 to 3.6
Fixed/Adj		Fixed	Fixed	Fixed	Fixed
I_{OUT} (mA)		150	200	250	200
Dropout (V_{DO}) (@150mA) (mV)		160	150	120	225
FB/V_{OUT} Accuracy (max)		-2.5/+1.5	-2.5/+1.5	2	1.5
I_Q (no load) (max) (µA)		22	20	25	50
I_Q (shutdown) (µA)		1	1	1	1 (typ)
Noise (10Hz – 100kHz) (μV_{RMS})		9	9	**6.5**	25 x V_{OUT}
PSRR (dB)	(10kHz)	59	57	69	50
	(100kHz)	48	46	63	40
	(500kHz)	36	39	47	43
	(1MHz)	33	32	38	47
	(2MHz)	37	33	32	48
θJA (°C/W)		170	63.6	193.4	208.1
Output Discharge?		N	N	Y	Y
Enable (EN)?		Y	Y	Y	Y
Package		0.8x0.8 WCSP SOT23-5	0.8x0.8 WCSP 2x2 DFN-6 SOT23-5	0.65x0.65 WCSP 1x1 X2SON SOT23-5	1x1 X2SON

Linear Tech – LT1761, LT1962

	LT1761	LT1962	TPS7A49	LP5907
V_{IN} (V)	1.8 to 20	1.8 to 20	3 to 36	2.2 to 5
V_{OUT} (V)	1.22 to 20 (adj.) 1.2 to 5 (fixed)	1.22 to 20 (adj.) 1.5 to 5 (fixed)	1.2 to 33 (adj.)	1.2 to 4.5 (fixed)
I_{OUT} (max) (mA)	100mA	300mA	150mA	250mA
Noise (10Hz to 100kHz) (μV_{RMS})	30 x V_{OUT}	33 x V_{OUT}	12.8 x V_{OUT}	6.5
V_{DO} (max) (@100mA) (mV)	450	330	400	100
PSRR (100kHz) (dB)	30	35	55	60
Quiescent current (I_Q) (µA)	20uA	30uA	>60uA	12uA
θJA (°C/W)	125	110	47.7	193.4
Soft Start?	No	No	Yes	No
Package	2.8x2.9mm 5SOT-23	3x5mm MSOP-8	3x3mm DFN 3x5mm MSOP-8 PowerPad	2.8x2.9mm 5SOT-23 1x1mm QFN

Diodes – AP7361

	AP7361	TPS7A37	TLV1117LV
V_{IN} (V)	2.2 to 6	2.2 to 5.5	2 to 5.5
V_{OUT} (V)	1 to 5	1.2 to 5.5	1.2 to 3.3
I_{OUT} (A)	1	1	1
I_Q (no load) (max) (µA)	90 (@25°C)	400	100 (@25°C)
Dropout (V_{DO}) (max) (@1A) (V)	0.7 (@25°C)	0.2	0.7 (@25°C)
FB/V_{OUT} Accuracy (max)	3	1	2 (@25°C)
PSRR (100kHz) (dB)	28	33	50
Noise (10Hz – 100kHz) (μV_{RMS})	-	27 x V_{OUT}	33 x V_{OUT}
Package	3x3 DFN-8 SOT223-4 TO252-3 SOT89-5 SO-8	2x2 DFN	SOT223-4
C_{OUT} (min) (µF)	2.2	1	1
Soft Start?	N	N	N
Enable?	Y	Y	N
Reverse Current Protection?	N	Y	N
Temp Range	-40 to 85°C	-40 to 125°C	-40 to 125°C

Richtek – RT9059

RICHTEK

	RT9059	TPS7A84	TPS74401	TPS74901
V_{IN} (V)	1 to 5	1.1 to 6.5	0.9 to 5.5	0.9 to 5.5
V_{OUT} (V)	0.8 to (V_{IN} - V_{DO})	0.8 to 5	0.9 to 3.6	0.8 to 3.6
V_{BIAS}?	Y	Optional	Y	Y
Fixed/Adj	Adj.	Adj.	Adj.	Adj.
I_{OUT} (A)	3	3	3	3
Dropout (V_{DO}) (max) (@3A) (mV)	450 @ 25°C	180	195	280
FB/V_{OUT} Accuracy (max)	1.5% @ 25°C + resistor tolerance	1%	1% + resistor tolerance	2% + resistor tolerance
Noise (10Hz – 100kHz) (μV_{RMS})	N/A	5.5 x V_{OUT}	16 x V_{OUT}	25 x V_{OUT}
PSRR (100kHz) (dB)	N/A	19	27	12
PSRR (1MHz) (dB)	N/A	30	27	22
Package	3x3 DFN-10 SO-8	3.5x3.5 QFN-20	5x5 QFN-20	3x3 DFN-10
Enable (EN)?	Y	Y	Y	Y
NR/SS?	N	Y	Y	Y
Power Good (PG)?	Y	Y	Y	Y
θ_{JA} (°C/W)	70	35.4	35.4	48.1