



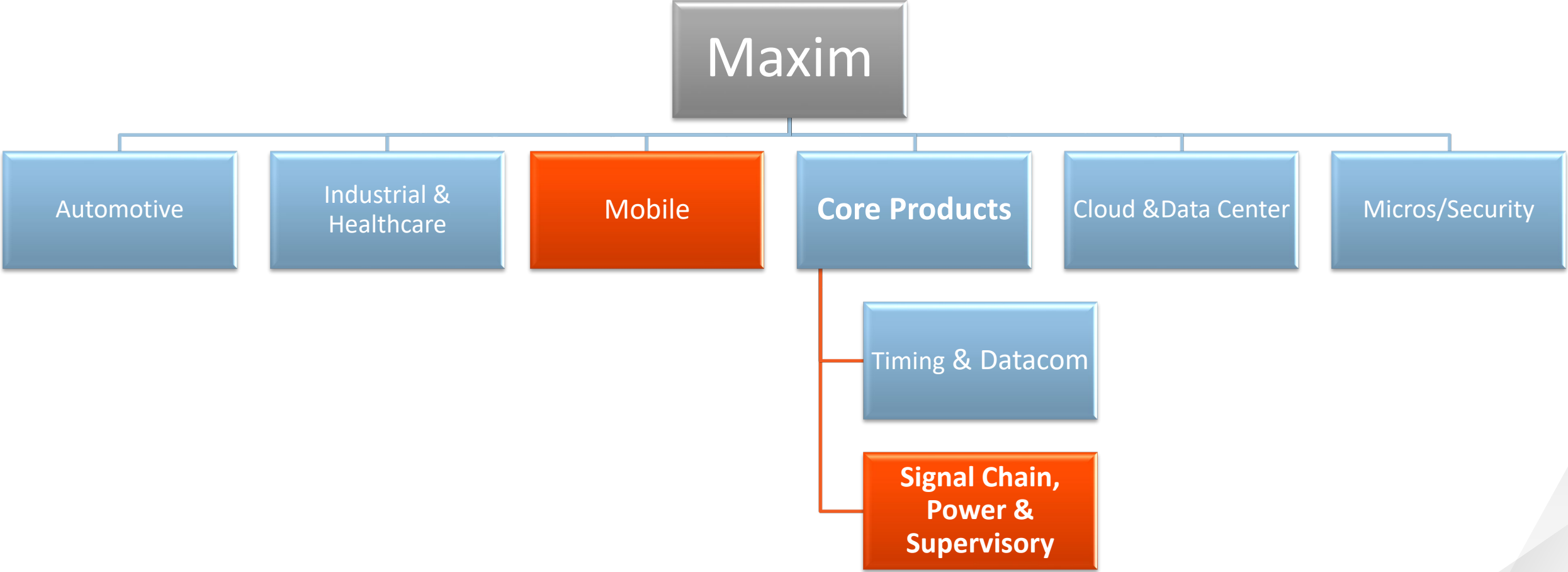
美信行動裝置電源產品

新加坡商安富利 閻松駿(Johnny Yan)-
資深應用工程經理

**Mobile Power – Power Management for Consumer
Electronics**
Maxim Integrated

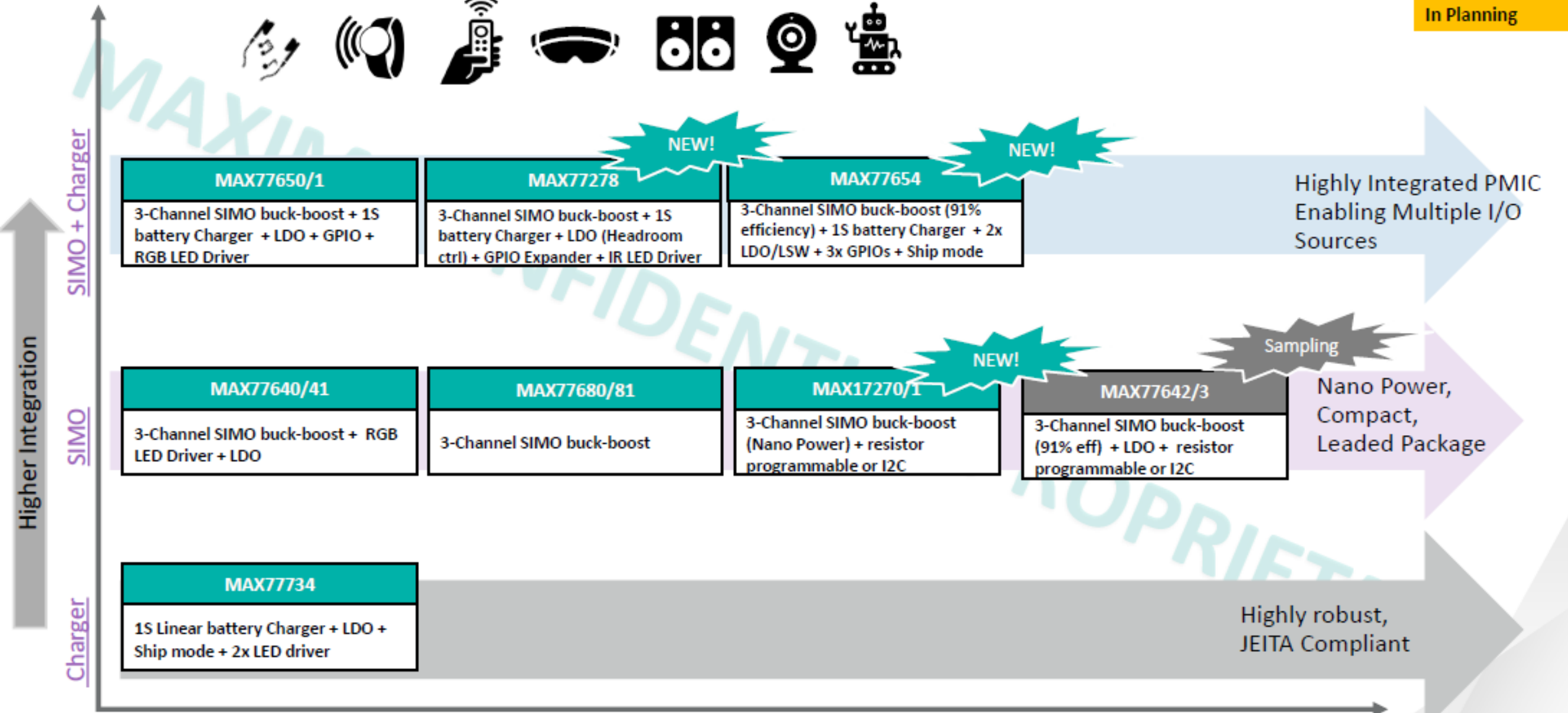
AVNET
Reach Further™

Maxim Organization



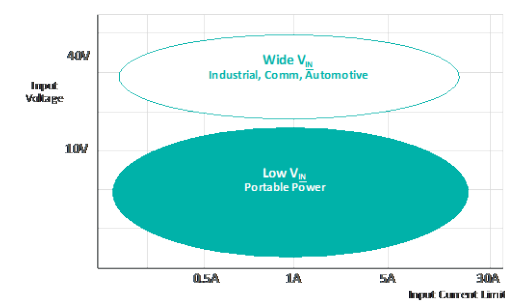
Low Power SIMO PMIC Portfolio

In Production
In Development
In Planning



MAX17270-MAX17273

2.7V to 5V, nanoPower SIMO Output Buck-Boost Converter

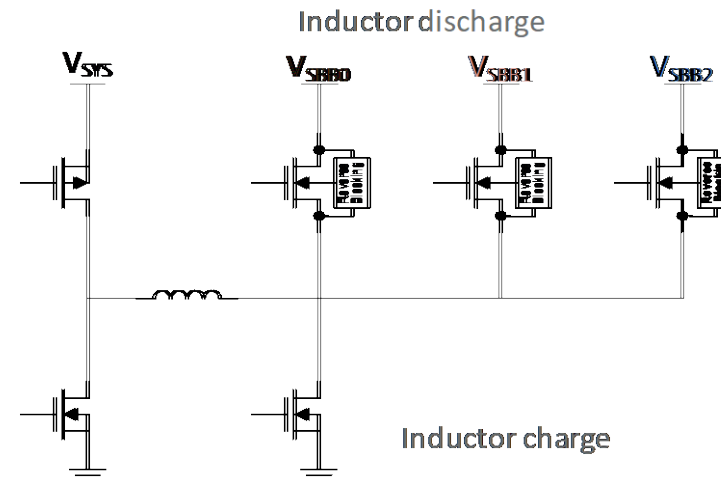
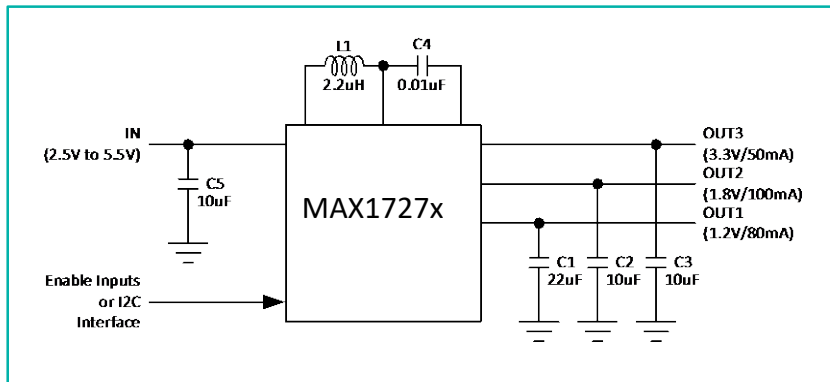


Benefits

- Minimized Solution Size
- Minimize power consumption during system standby and shutdown
- Maximize design flexibility

Features

- Regulates 3x outputs with single 2.2 μ H Inductor
- 3x3x0.75 16TQFN and 1.85x1.72x0.64 WLP Packages Available
- High Efficiency: Up to 90% Peak Efficiency
- Quiescent Current: 200nA per Output plus 700nA Bias; Shutdown Current: <0.1 μ A
- Rselect™ to set up 33 (5-bit) output voltages with one pin and one resistor per output



High efficiency DCDC Portfolio Table

Part Number	Status	Topology	# Outputs	Input Voltage (V)	Output Voltage (V)	Output Current (A)	I2C (Y/N)	Package		
								X (mm)	Y (mm)	Bumps (Pins)
MAX77812	Released	Buck	1-4	2.5 - 5.5	0.25 - 1.525	20	Y	3.408	3.368	64
MAX77874	Released	Buck	1	2.7 - 4.8	0.25 - 1.3	16	Y	2.92	2.22	48
MAX77511	Released	Buck	1-4	2.3 - 10	0.25 - 5.2	12	Y	3.57	3.57	64
MAX8973A	Released	Buck	1	2.6 - 4.5	0.6 - 1.4	9	Y	3.23	2.03	28
MAX8972	Released	Buck	1	2.6 - 4.5	0.6 - 1.4	6	Y	3.23	2.03	28
MAX77504	Released	Buck	1	2.3 - 15	0.6 - 99%Vin	3	N	1.7	1.7	16
MAX77503	Released	Buck	1	3 - 14	0.8 - 99%Vin	1.5	Y	1.85	1.4	12
MAX77324	Released	Buck	1	2.5 - 4.8	0.6 - 2	1.5	N	1.22	0.85	6
MAX77756	Released	Buck	1	3 - 24	1 - 99%Vin	0.5	Y	2.33	1.42	15
MAX77596	Released	Buck	1	3.5 - 24	1 - 10	0.3	Y	2	2.5	10 TDFN
MAX77816	Released	Buck-Boost	1	2.3 - 5.5	2.6 - 5.14	3	Y	1.827	2.127	20
MAX77813	Released	Buck-Boost	1	2.3 - 5.5	2.8 - 5.14	2	Y	1.827	2.127	20
MAX77801	Released	Buck-Boost	1	2.3 - 5.5	2.8 - 4.18	2	Y	1.827	2.127	20
MAX77827	Released	Buck-Boost	1	1.8 - 5.5	2.3 - 5	1	N	1.608	2.008	12

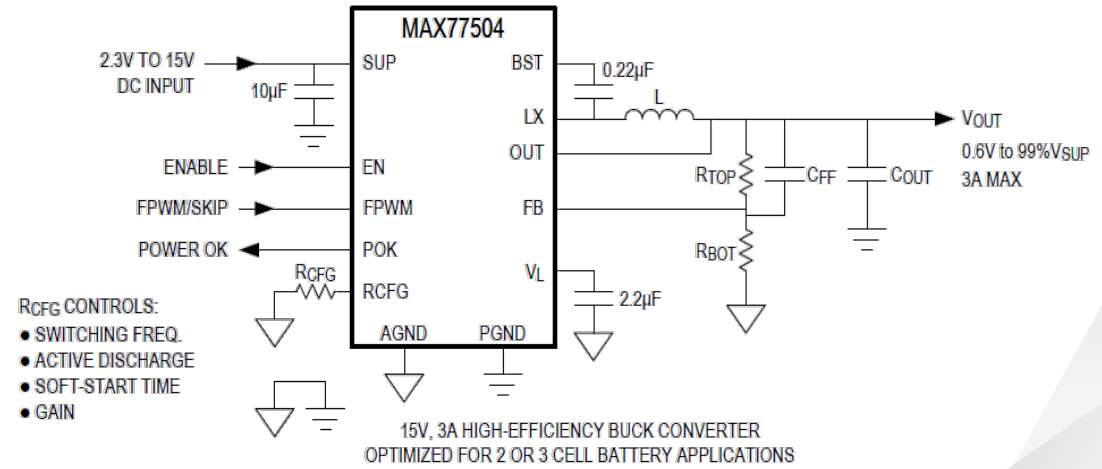
MAX77504

3A 15V High Efficiency Buck Converter

Development

- 3A Continuous Output Current
- 2.3V – 15V Input Voltage Range
- 0.6V – 99%V_{IN} External Resistor Adjustable
- 94% Peak Efficiency (7.4V_{IN}, 3.3V_{OUT})
- 10μA Quiescent Current
- Single Resistor Programmable
 - > Switching Frequency from 0.5MHz to 1.5MHz
 - > Soft-Start Time
 - > Gain
 - > Active Discharge
- Enable, Power OK and FPWM Pins For Direct Hardware Control
- Protection Features
 - > Cycle by Cycle Inductor Current Limit
 - > Short-Circuit Hiccup Mode
 - > UVLO
 - > Thermal Shutdown Protection
- 1.7mm x 1.7mm WLP-16 and 2.5mm x 2.5mm FCQFN-12

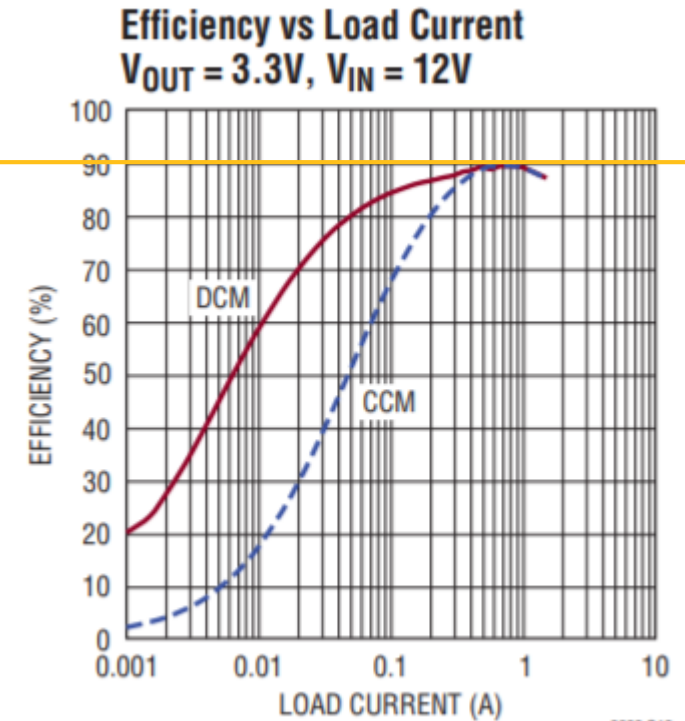
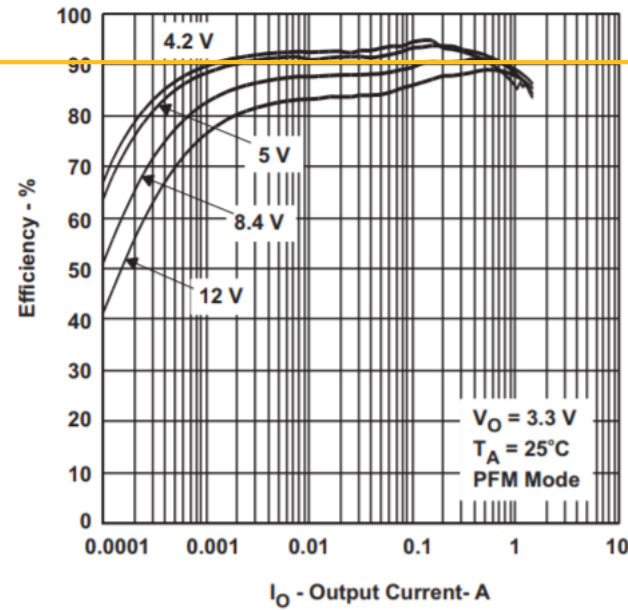
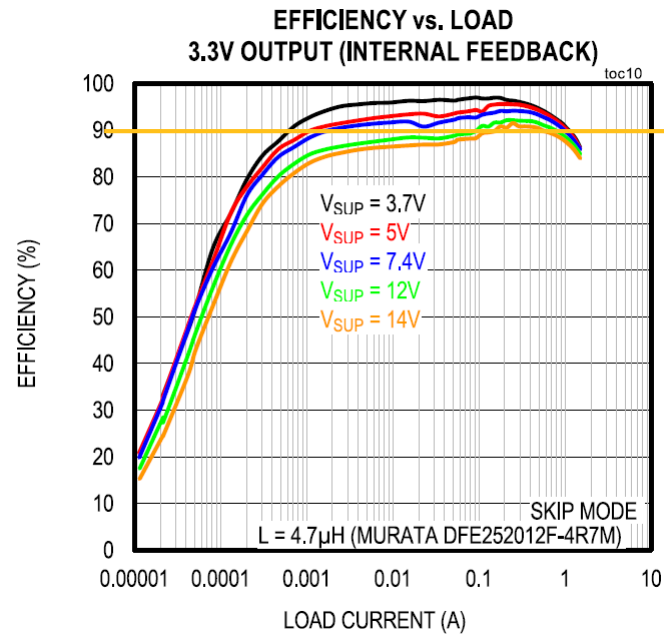
- 1/2/3 cell Li+ battery powered equipment
- Core Voltage Direct Conversion
- High Efficiency
- Extends Battery Life



MAX77504 Offers Higher Efficiency, Low IQ, Core Voltage Support In A 30% Smaller QFN Package

	MAX77504	TPS62130	ISL85003	LTC3604
Input Voltage	2.3V – 15V	3V – 17V	4.5V – 18V	3.6V – 15V
I_Q	10 μ A ($V_O > 1.8V$) 30 μ A ($V_O < 1.8V$)	17 μ A	320 μ A	300 μ A
Efficiency (est.)	95% $V_{IN} = 7.4V$ $V_O = 3.3V$	95% $V_{IN} = 5V$ $V_O = 3.3V$	95% $V_{IN} = 5V$ $V_O = 3.3V$	95% $V_{IN} = 5V$
I_{OUT}	3A	3A	3A	2.5A
Output Voltage	0.6V – 99% V_{IN}	0.9V – 6V	From 0.8V	From 0.6V
Package	<ul style="list-style-type: none"> 1.7mm x 1.7mm 16WLP 2.5mm x 2.5mm FCQFN 12L 	3mm x 3mm QFN	3mm x 4mm DFN	3mm x 3mm QFN

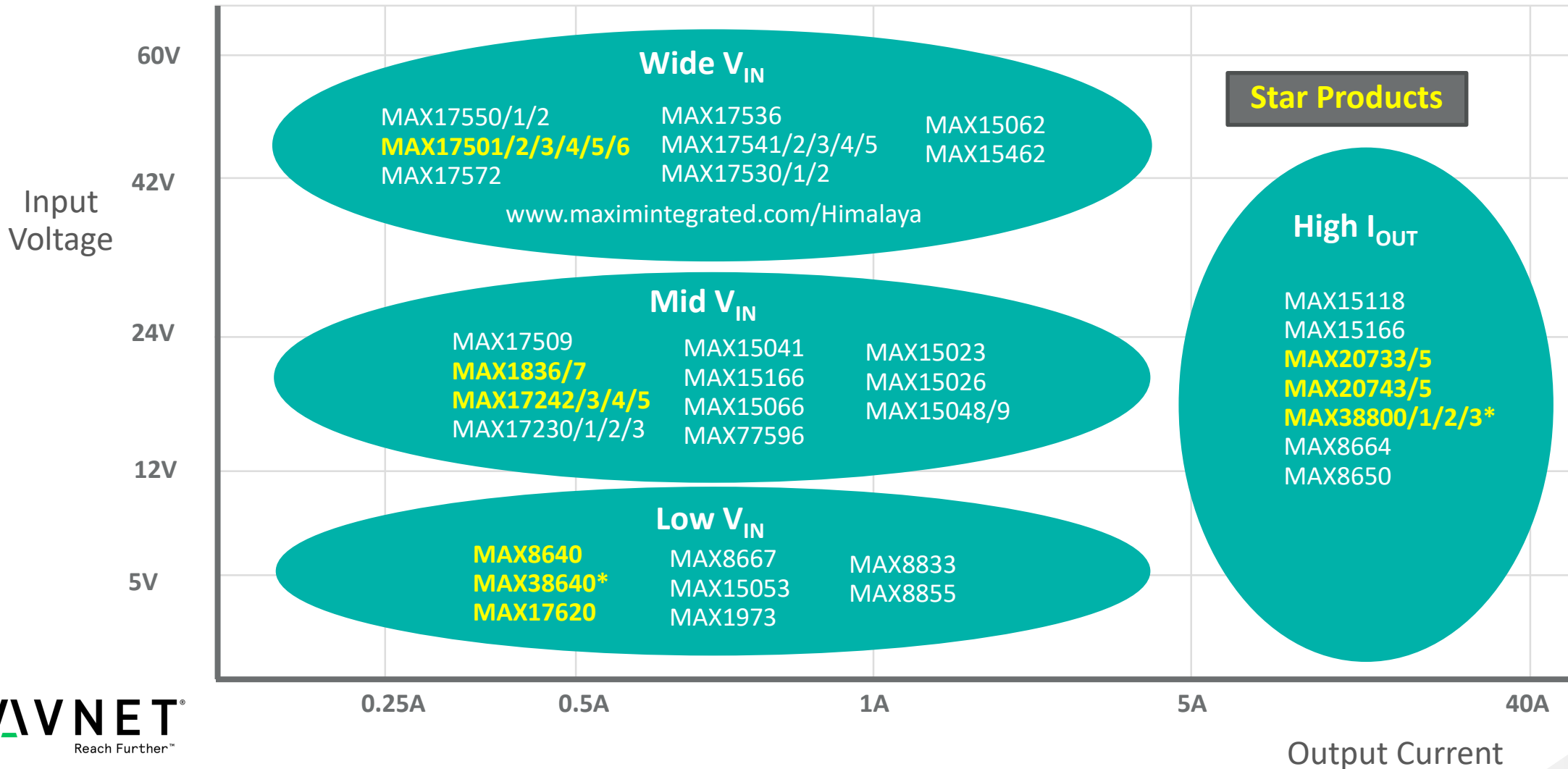
MAX77504 Offers the Highest Efficiency with the Lowest I_Q Throughout the Load Range



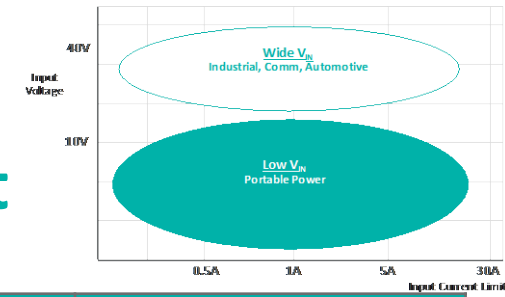
3600 G19

Maxim Step Down/Buck Portfolio

Synchronous, Multiple Outputs, Small Size



Low V_{IN} Boost and Buck-Boost nanoPower, True Shut Down, Single Inductor Multiple Output



Topology	Part Number	V_{IN} (V)	V_{OUT} (V)	I_{IN} Limit (A)	I_Q (μ A)	No of Output	True Shutdown	Pkg Size
Buck	MAX38640	1.8V to 5.5V	0.5V to 5V	175mA/350mA /700mA	0.3	1	na	2x2 μ DFN 1.4x0.8 WLP
Boost	MAX17220- MAX17225	0.4 to 5.5	1.8 to 5.5	0.225/0.5/1	0.3	1	Y	2x2 μ DFN 0.88x 1.4 WLP
	MAX8815	1.2 to 5.5	3.3 to 5	2.5	30	1	Y	3x3 TDFN
	MAX8969	2.5 to 5.5	3.3 to 5.7	2.6	30	1	Y	1.25x1.25 WLP
	MAX77231	2.75 to 4.8	11 to 16	0.225	125	1 w/ LDO	Y	1.24x1.24 WLP
	MAX1522/3/4	2.5 to 5.5	Controller	Controller	25	1	Y	6 SOT
Buck-Boost	MAX77801	2.3 to 5.5	2.6 to 4.2	4.7	55	1	Y	3x3 TQFN
	MAX17270	2.7 to 5.5	0.8 to 5.5	0.5	1.3	3	Y	1.77x1.77 WLP 3x3 TQFN

- Wide Range
- Small Size
- Power Saving

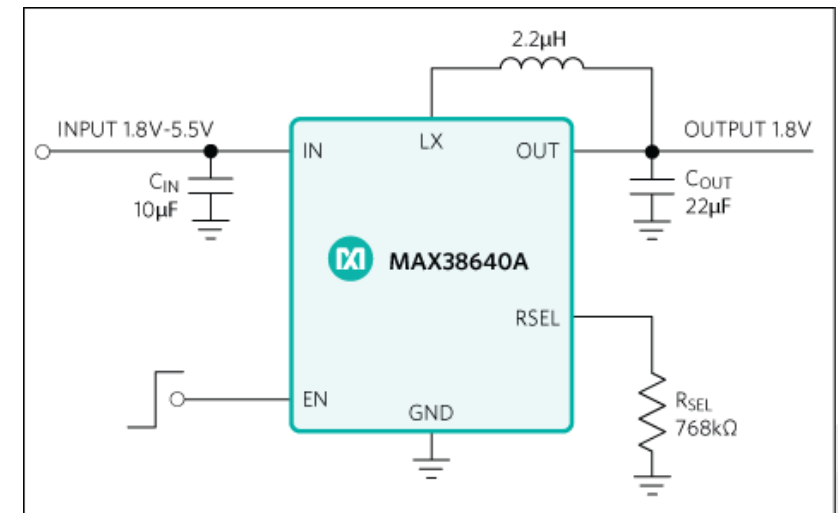
MAX38640

Production

700mA Tiny 1.8V–5.5V Input, 330nA IQ

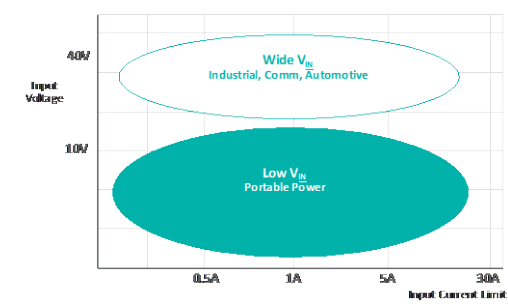
- Extends Battery Life
 - > 330nA Ultra-Low Quiescent Supply Current
 - > 5nA Shutdown Current
 - > 96% Peak Efficiency and Over 88% at 10 μ A/300mA continuous output current
- Easy to Use – Addresses Popular Operation
 - > 1.8V to 5.5V Input Range
 - > Single Resistor Adjustable V_{OUT} from 0.7V to 3.3V (A-Option)
 - > Preprogrammed V_{OUT} from 0.5V to 5.0V (B-Option)
 - > \pm 1.75% Output Voltage Accuracy
 - > Up to 175mA/350mA/700mA Load Current
- Reduces Size and Increases Reliability
 - > -40°C to +85°C Temperature Range
 - > 2mm x 2mm 6-pin μ DFN Package
 - > 1.42mm x 0.89mm, 0.4mm Pitch 6-pin (2 x 3) WLP

Single Li-ion and Coin Cell Battery Products



MAX17220-MAX17225

nanoPower Boost Converter

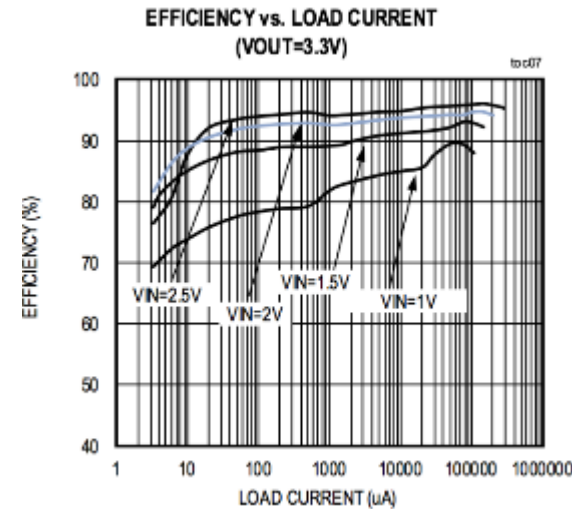
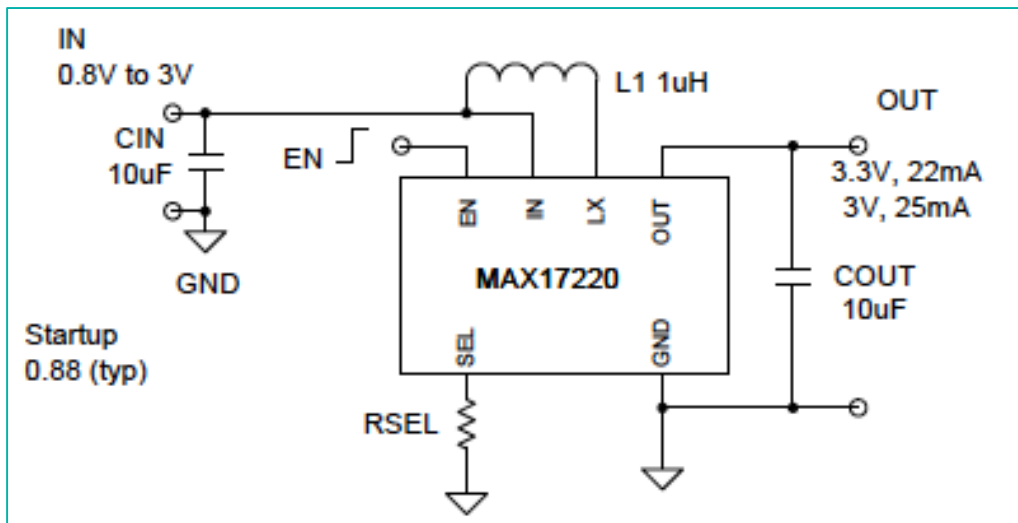


Benefits

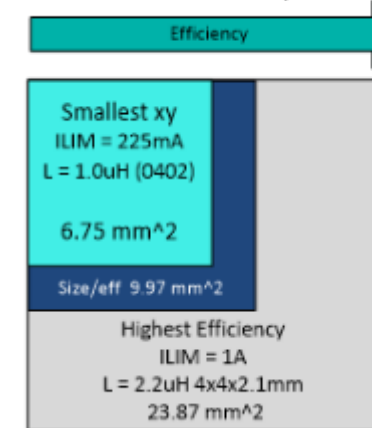
- Extend Battery Life
- Reduce Solution Size
- Maximize Design Flexibility

Features

- 0.4V to 5.5V Input, 0.88V Start up voltage
- 300nA Low IQ, 0A reversed current with Vout from 0 to 5.5V during True Shutdown
- 0.88x1.4mm² 6-WLP and 2x2mm² uDFN Packages
- 225mA/500mA/1A IIN Limit Allows Small Inductor Options (1.6x0.8x0.6 or 2.0x1.5x1.0)
- 32 Output Voltages by A Single Resistor Set Up (RSEL)



MAX1722x Ultra low power Boost



Lowest I_Q in the smallest possible form factor

MAX1722x Competitive Advantages

Enable the longest Battery Life

Key Specs & Features	Customer Benefits	Maxim MAX17222	TI TPS61098	TI TPS61220
Quiescent Current	Preserve battery at system standby mode	300nA	300nA + LDO Loss	5.5uA
True Shutdown	Extend shelf life for end products	Yes 0A reversed current with Vout from 0 to 5.5V	No. Optional LDO or load switch	No. Needs 2x FETs, 1xR and 1xC for external shutdown
Input Voltage Range	Allow running off an “almost-dead” battery	0.4V to 5.5V	0.7V to 4.5V	0.7V to 5.5V
Efficiency	Increase battery life	93% (VIN = 2V, VOUT=3.3V, IOUT=100uA)	LDO/Load Switch Loss + 90% (VIN = 2V, VOUT=3.3V, IOUT=100uA)	77%(VIN = 2V, VOUT=3.3V, IOUT=100uA)

Buck-Boost Converters

MAX77827

Development

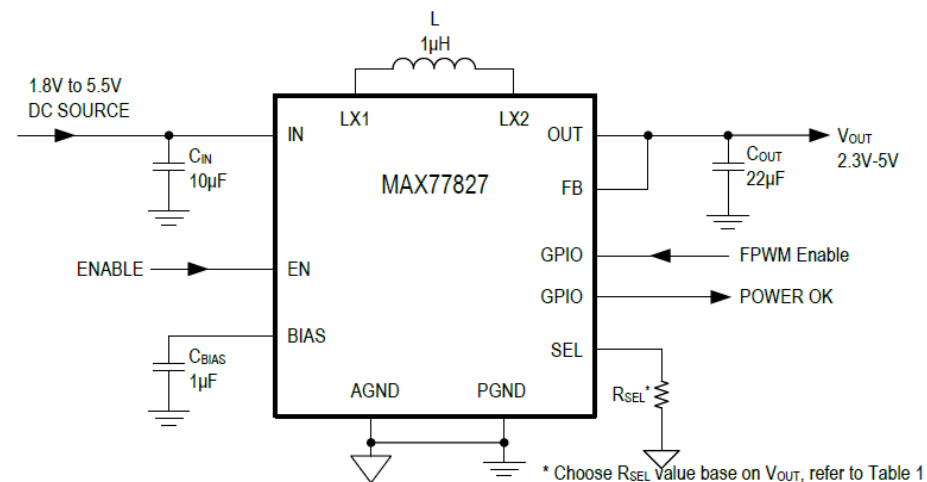
Samples August 2018

1A Ultra Low I_Q Low VIN Buck Boost

- **1A** Continuous Output Current ($V_{OUT}=3.3V-V_{IN}>3.0V$)
- **1.8V – 5.5V** Input Voltage Range
- **2.30V – 5.0V** Adjustable Output Voltage
 - > **Single** External Resistor Feedback
 - > $\pm 1\%$ output accuracy
- **~95%** peak efficiency
 - > $6\mu A$ quiescent current
- **2.5MHz** PWM operations
 - > Selectable SKIP mode for improved light load efficiency
 - > Seamless buck-boost transition
 - > Fast transient response
- Enable pin for direct hardware control
- UVLO, OTP, OCP, output discharge, true shutdown
- **1.640mm x 2.040mm WLP-12** and TQFN-12 packages

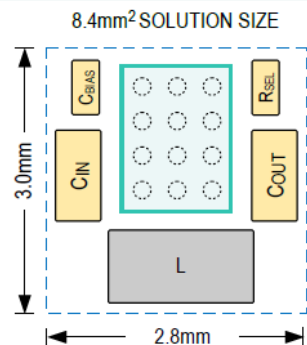
Low V_{IN} High Efficiency 1A Buck-Boost Regulator for 1-cell Li+ battery and 2/3-cells Alkaline primary battery pack powered equipment.

- **1-cell Li+ battery powered equipment**
- **2/3-cells Alkaline battery powered devices**
- **Extends battery life**
- **Small solution footprint**



MAX77827 Offers the Best In Class I_Q and Smallest Solution Size

	MAX77827	TPS63010	ISL9110	LTC3536
Input Voltage	1.8V – 5.5V	2V – 5.5V	1.8V – 5.5V	1.8V – 5.5V
Output Voltage	2.3V – 5V	1.2V – 5.5V	1V – 5.2V	1.8V – 5.5V
I_Q	6μA	50μA	35μA	32μA
Peak Efficiency (est.)	95% $V_{IN} = 3.5V$ $V_O = 3.4V$	95% $V_{IN} = 3.6V$ $V_O = 3.3V$	94% $V_{IN} = 3V$ $V_O = 3.3V$	95% $V_{IN} = 3.7V$ $V_O = 3.3V$
I_{OUT}	1A	1.2A	1.2A	1A
Package	2.008mm x 1.608mm 12WLP	2.126mm x 1.922mm 20BGA	3mm x 3mm TDFN	3mm x 3mm DFN



MAX77827 total solution size is smaller than some competitors' package size alone while offering the lowest I_Q

MAX77813

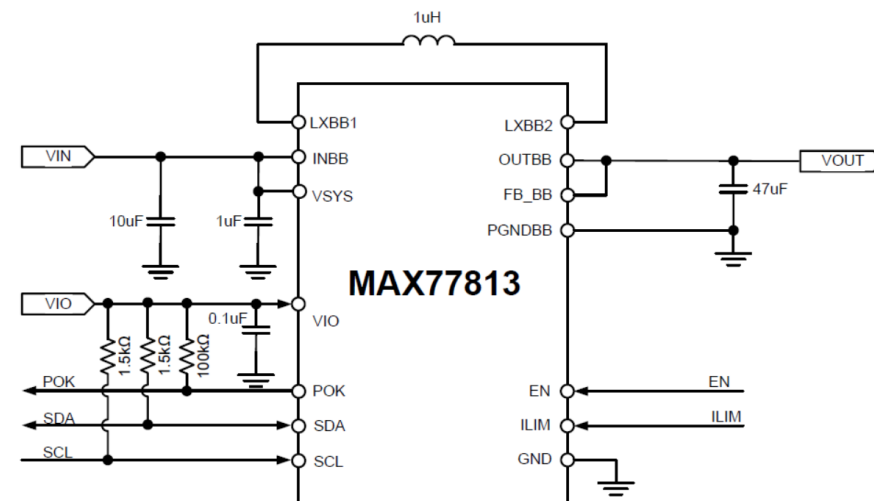
Production

2A High-Efficiency Buck-Boost Regulator

- $V_{IN} = 2.3V - 5.5V$ input range
- 2A continuous output current ($V_{OUT}=3.3V-V_{IN}>2.8V$)
 - > 5.4A/800 μ s Burst Mode
 - > Selectable 1.8A/4.5A current limit
- $V_{OUT} = 2.60V - 5.14V / 20mV$ steps
 - > $\pm 1\%$ Accuracy over line/temp
 - > Seamless Buck/Boost transition
- 97% peak efficiency
 - > 55 μ A quiescent current
- 2.5MHz current mode PWM operations
 - > SKIP mode for improved light load efficiency
 - > Fast transient response
- High speed 3.4MHz I²C serial interface
- Enable pin and Power OK flag
- UVLO, OTP, OCP, output discharge, true shutdown and soft-start and soft-stop protections
- 2.127mm x 1.827m x 0.64mm WLP-20 package / 0.4mm pitch

High Efficiency 2A Buck/Boost Regulator for single cell Li+ battery powered equipment with fast transient response.

- Smartphones and tablets
- Wearables
- 1-cell Li+ battery powered equipment
- Extends battery life
- Small solution footprint



MAX77801

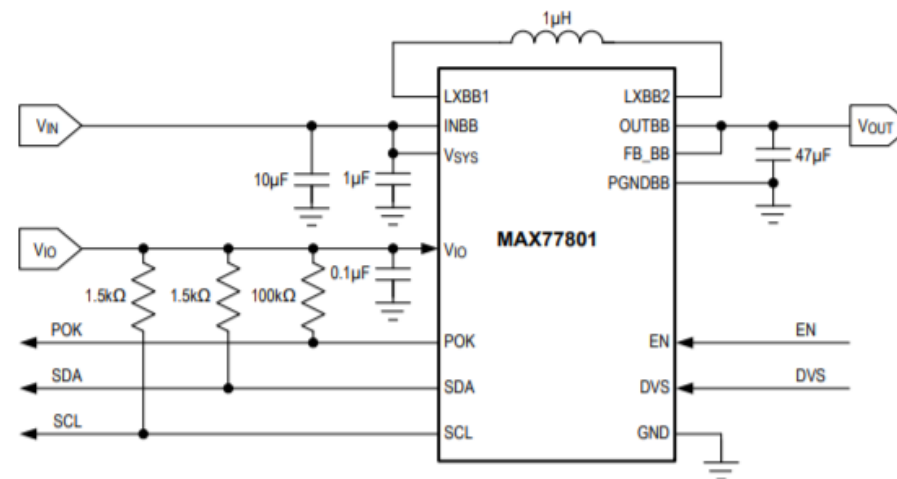
Production

2A High-Efficiency Buck-Boost Regulator

- $V_{IN} = 2.3V - 5.5V$ input range
- 2A continuous output current ($V_{OUT}=3.3V-V_{IN}>2.8V$)
 - > 1A ($V_{OUT}=3.3V-V_{IN}>2.3V$)
- $V_{OUT} = 2.60V - 4.1875V$ / 12.5mV steps
 - > Seamless Buck/Boost transition
- 97% peak efficiency
 - > 55µA quiescent current
 - > SKIP mode for improved light load efficiency
- 2.5MHz current mode PWM operations
 - > Fast transient response
- DVS – Dynamic voltage scaling with 2 preset voltages
 - > Dedicated DVS control pin
- High speed 3.4MHz I²C serial interface
- Enable pin and Power OK flag
- UVLO, OTP, OCP, output discharge, true shutdown and soft-start and soft-stop protections
- 2.127mm x 1.827m x 0.64mm WLP-20 package / 0.4mm pitch

- Smartphones and tablets
- Wearables
- 1-cell Li+ battery powered equipment
- Extends battery life
- Small solution footprint

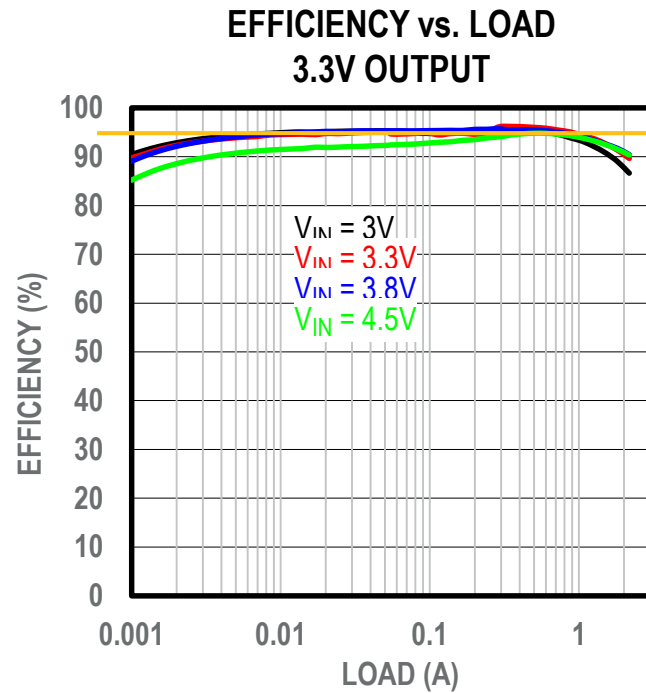
High Efficiency 2A Buck/Boost Regulator for single cell Li+ battery powered equipment with fast transient response.



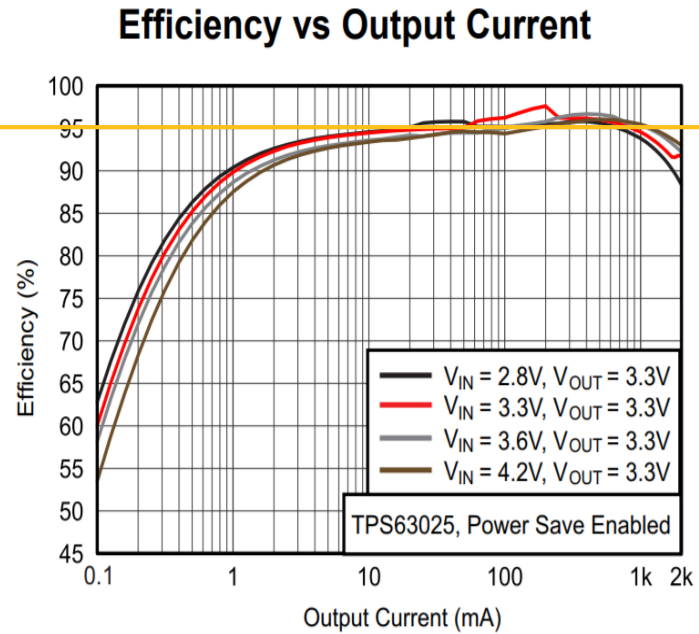
MAX77813 and MAX77801 Offers The Best Efficiency with Advanced Features

	MAX77813	MAX77801	TPS630250	ISL91107	LTC3533
Input Voltage	2.3V – 5.5V	2.3V – 5.5V	2.3V – 5.5V	1.8V – 5.5V	1.8V – 5.5V
IQ	55µA	55µA	35µA	45µA	40µA
Efficiency	97%	97%	95%	96%	96%
I _{out}	2A	2A	2A	2A	2A
Output Voltage	2.6V – 5.14V	2.6V – 5.14V	2.5V – 3.6V	1V – 5.2V	1.8V – 5.25V
I2C	YES	YES	NO	NO	NO
POK	YES	YES	NO	NO	NO
I _{LIM}	YES	NO	NO	NO	NO
DVS	NO	YES	NO	NO	NO
Price/1Ku	\$0.89	\$0.89	\$0.87	\$0.80	\$3.55
Package	1.827mm x 2.127mm 20-Bump WLP	1.827mm x 2.127mm 20-Bump WLP	1.766mm x 2.086mm 20-Bump WLP	1.51mm x 2.15mm	3mm x 4mm DFN

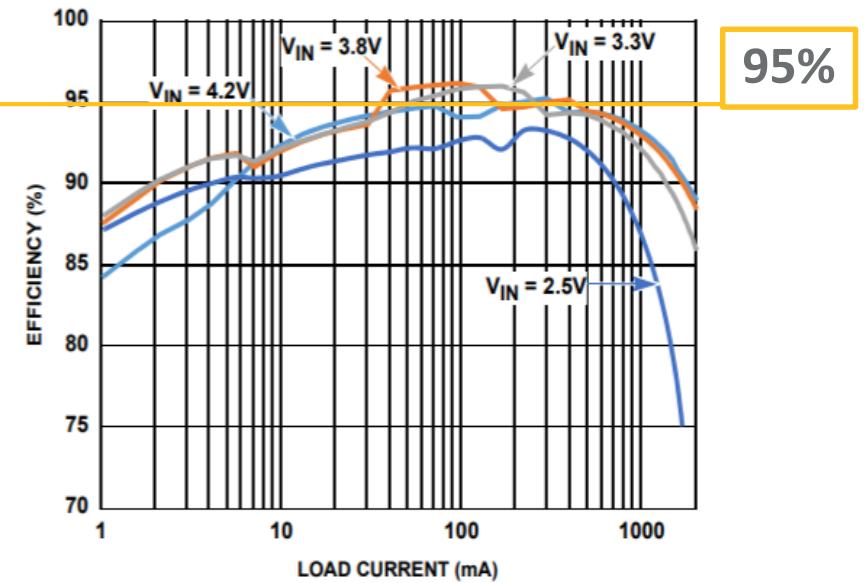
MAX77813 and MAX77801 Has The Best Efficiency Across Load Range



MAX77813

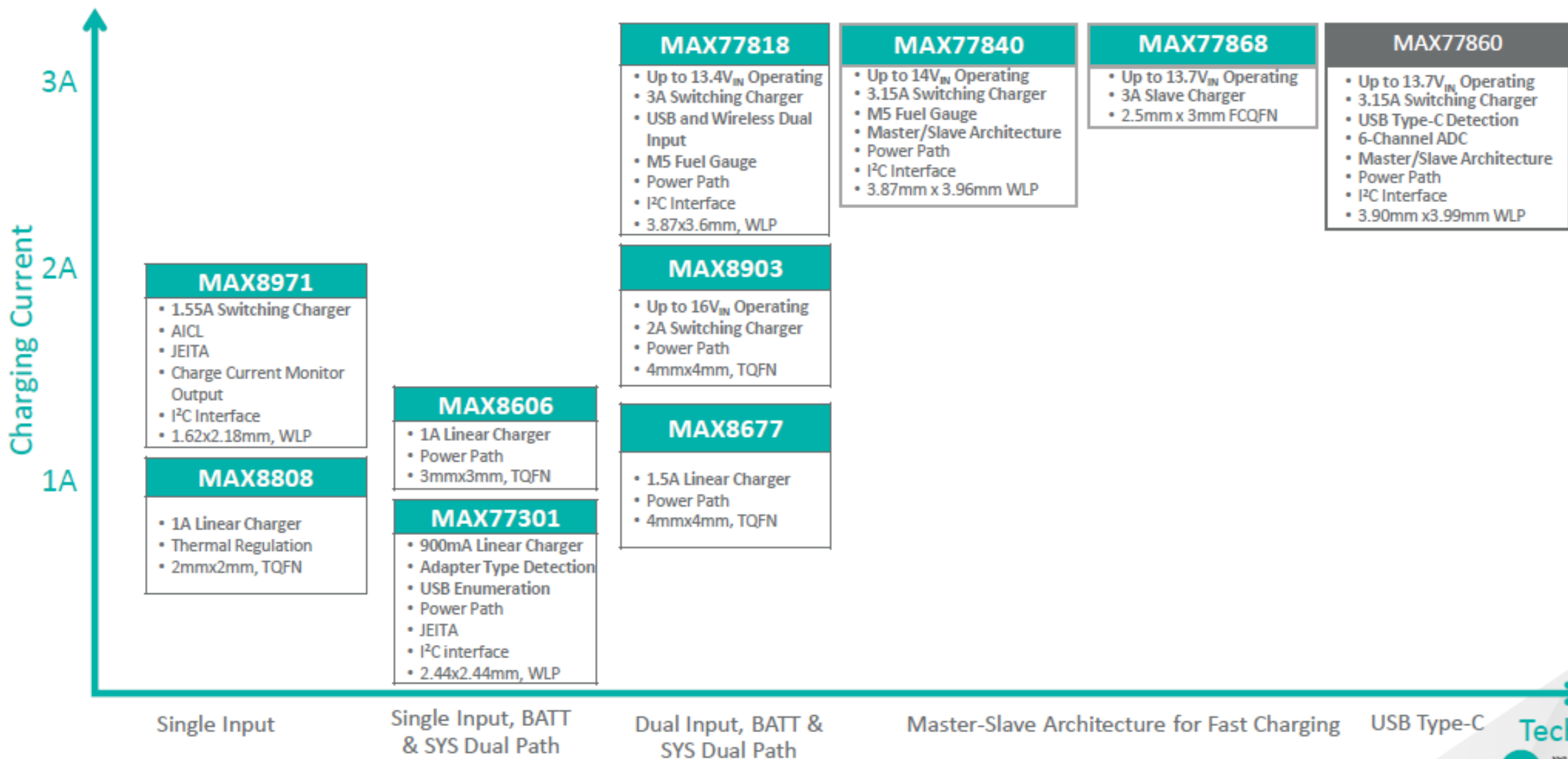


TPS63025



ISL91107

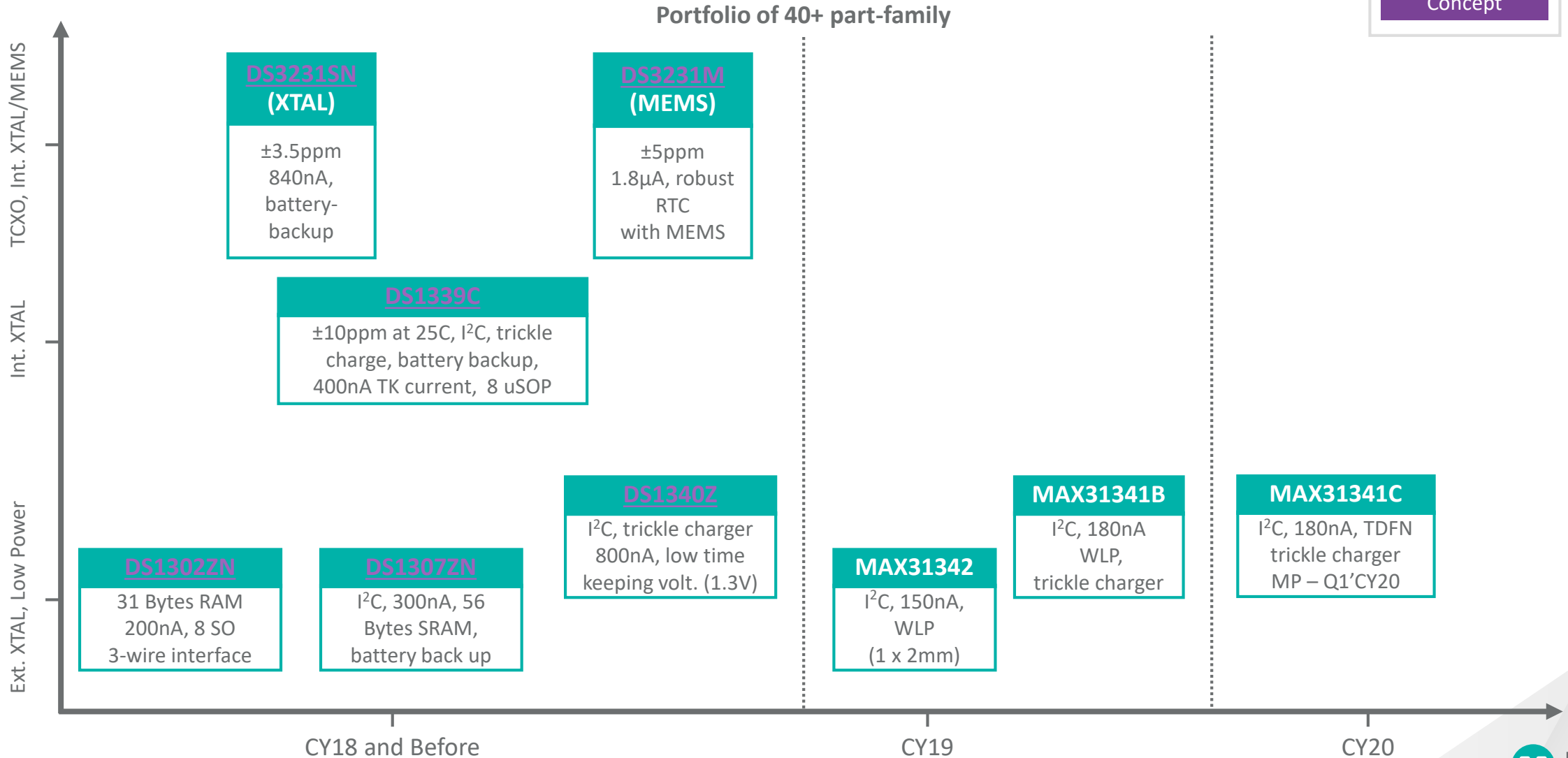
Battery Charger Product Family



Serial RTC Product Portfolio

Legend

- Production
- Development
- Concept

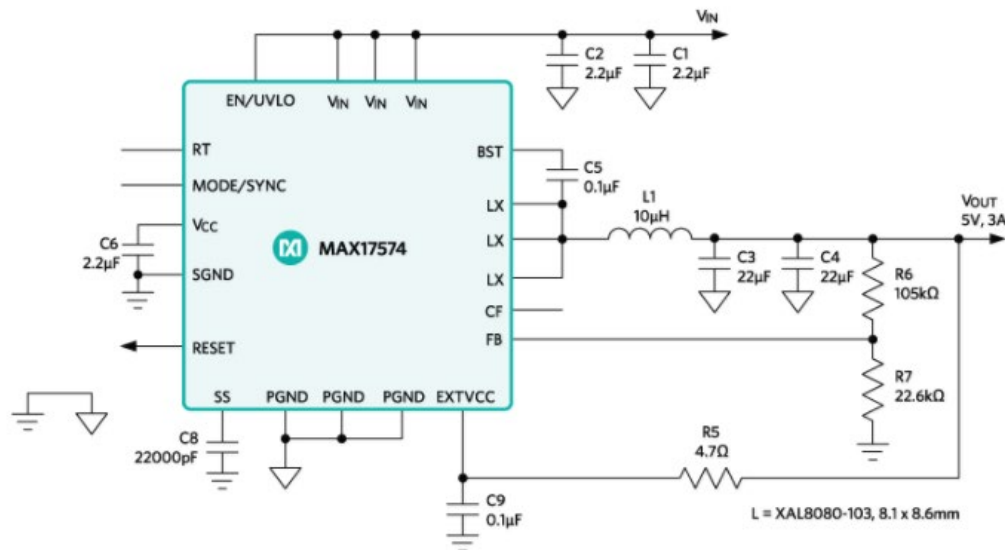
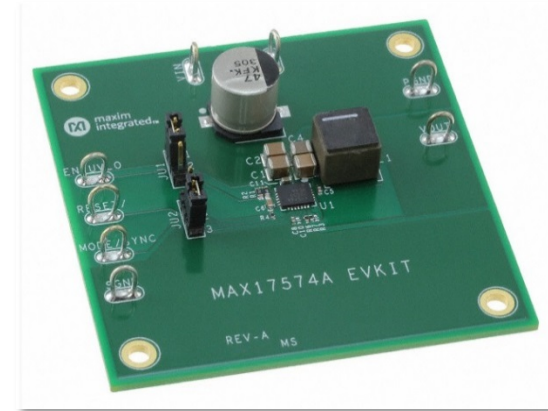


MAX17574A

4.5V to 60V, 3A Integrated FET Synchronous Step-down Converter.

MAX17574 Benefits and Features

- Wide **4.5V to 60V** Input
- Output Adjustable from **0.9V to 90%VIN**
- Internal Compensation for **Any Output Voltage**
- **No Schottky**-Synchronous Operation
- High Industrial **-40°C to +125°C** Ambient Operating



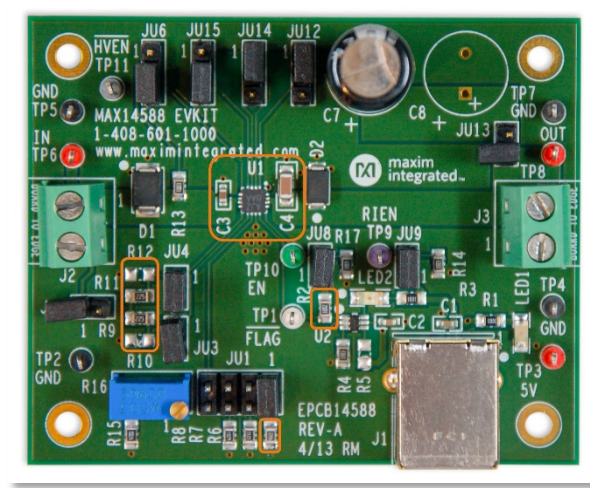
MAX17574EVKITB

- **6.5V to 60V** Input / **5V 3A** Output
- Peak efficiency at **>90%**
- **500kHz** Switching Frequency
- Enable/UVLO Input, Resistor-Programmable UVLO Threshold
- Overcurrent and Over temperature Protection

MAX14588

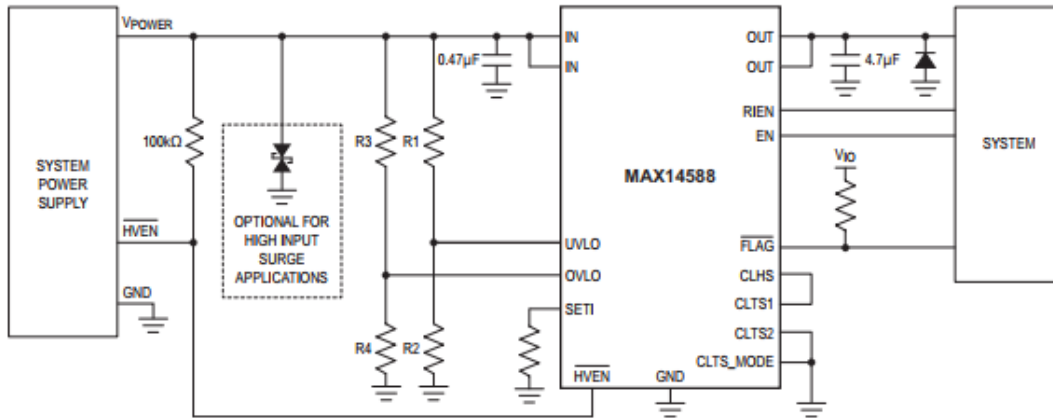
1A Adjustable Overcurrent and Overvoltage Protector with High Accuracy

- Wide Input Supply Range: **+4.5V to +36V**
- Negative Input Tolerance **to -36V**
- **Low RON 190mΩ** (typ)
- Reverse Current Flow Control Input
- Thermal **Overload Protection**
- Extended **-40°C to +125°C** Temperature Range
- **Adjustable OVLO and UVLO** Thresholds
- Programmable Forward-Current Limit: 0.15A to 1A
- Programmable Overcurrent Fault Response: **Autoretry, Latch-Off, and Continuous**



MAX14588 EVKIT

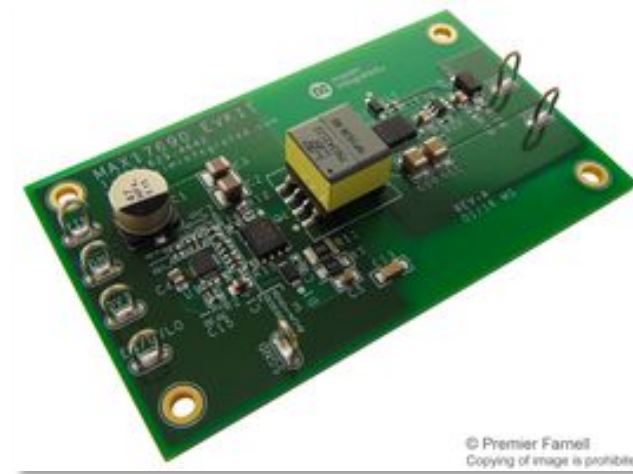
- 4.5V to 36V Operating Voltage
- Features TVS Diode and Schottky Diode
- Evaluates Three Current-Limit Types, Current-Limit Threshold, OVLO, and UVLO



MAX17690

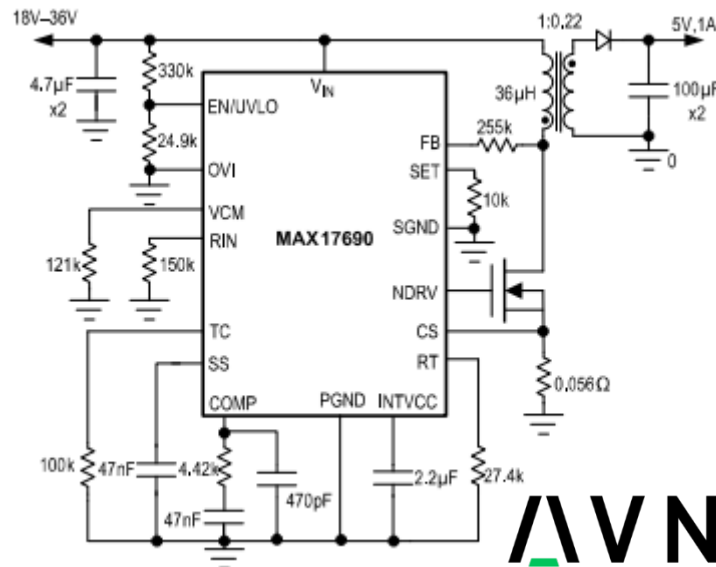
60V, No-Opto Isolated Flyback Controller

- 4.5V to 60V Input Voltage Range
- No Optocoupler or Third Winding Required to Derive Feedback Signal Across Isolation Boundary
- 2A/4A Peak Source/Sink Gate Drive Currents
- 50kHz to 250kHz Programmable Switching Frequency
- Input EN/UVLO Feature
- Input Overvoltage Protection
- Programmable Soft-Start
- Hiccup-Mode Short-Circuit Protection
- Thermal Shutdown Protection
- -40°C to 125°C Operating Temperature Range



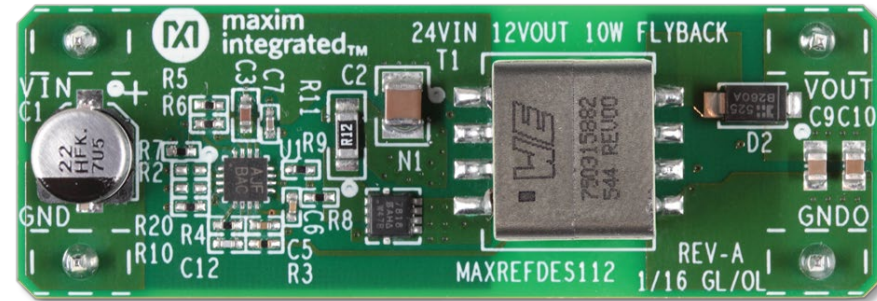
MAX17690B EVKIT

- 18V to 36V Input Range
- Isolated Output: 5V/1A DC
- Compact Design with High-Frequency (180kHz) Switching
- Minimum Number of External Components
- 85.8% Peak Efficiency
- Low-Cost Flyback Design
- Galvanic Isolation up to 1,875VAC



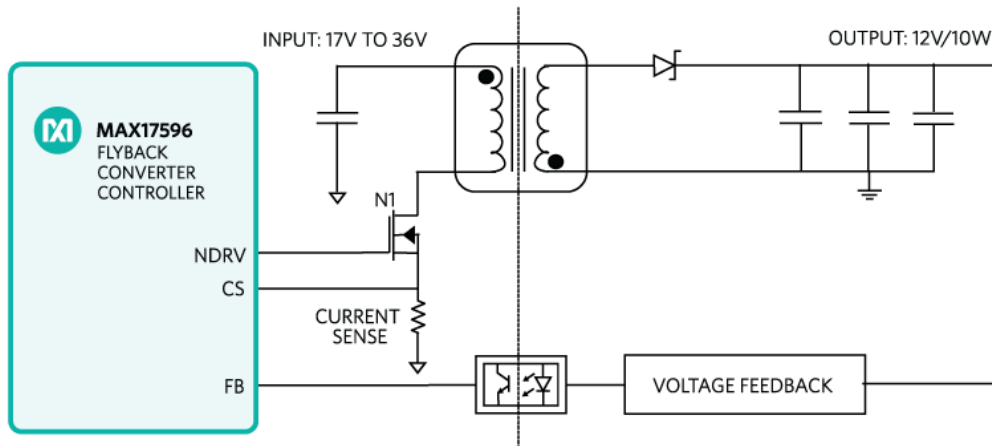
MAX17596 ISOLATED 24V TO 12V 10W FLYBACK POWER SUPPLY

- MAXREFDES112#
- 24V input / 12V output at 10W (0.8A)
- MAX17596 is peak-current-mode converter with flexible switching frequency
- $\pm 5\%$ output accuracy
- Peak efficiency at 88%



Includes :

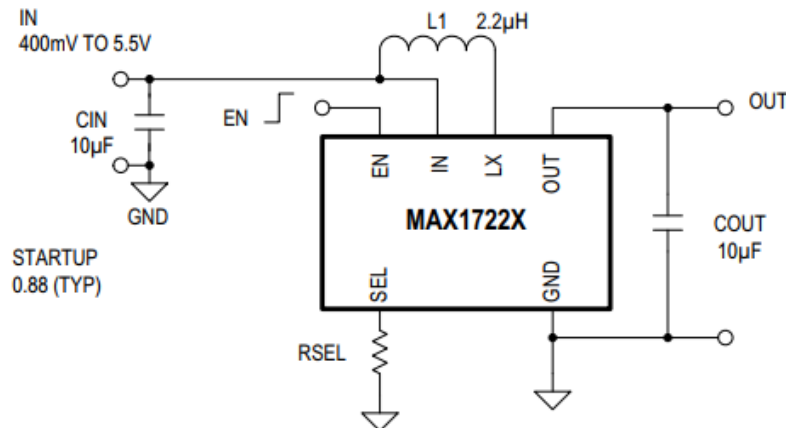
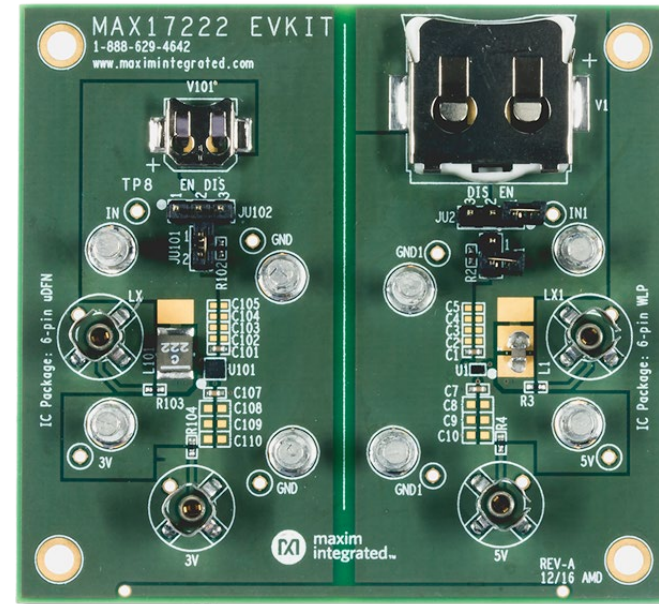
- 1:0.789 Transformer Halo TGSP-P145EP10LF
- Flyback and Boost Regulators IC (16 TQFN) MAX17597ATE+
- V-Ref Adjustable 1.24V to 16V 20mA (SOT23-3) TLV431BSN1T1G
- Optocoupler 3kV Transistor (4 SOIC) Avago ACPL-217-50AE



MAX17222

400mV to 5.5V Input, nanoPower Synchronous Boost Converter with True Shutdown

- 300nA Quiescent Supply Current Into OUT
- True Shutdown Mode
 - ✓ 0.5nA Shutdown Current
- 95% Peak Efficiency
- 400mV to 5.5V Input Range
- 0.88V Minimum Startup Voltage
- 1.8V to 5V Output Voltage Range
- 225mA, 500mA, and 1A Peak Inductor Current Limit
 - ✓ MAX17220: 225mA I_{LIM}
 - ✓ MAX17222/MAX17223: 500mA I_{LIM}
 - ✓ MAX17224/MAX17225: 1A I_{LIM}

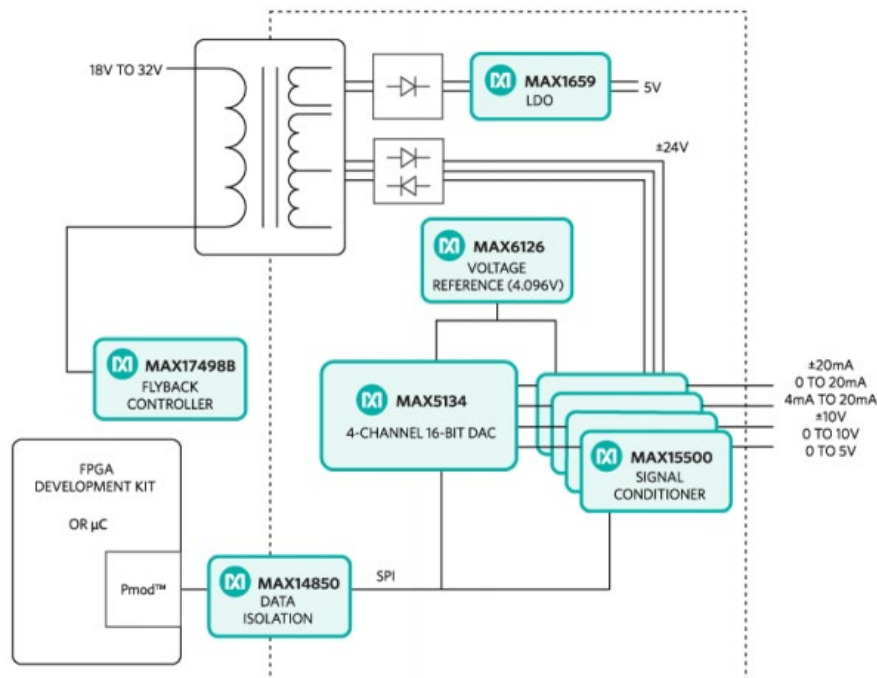


- Two Independent Circuits on One Board
- 400mV to 5.5V Input Range
- 1.8V to 5V Configurable Output Voltage in 100mV/step
- Up to 100mA/225mA/425mA Output Current

MAXREFDES24#

4-CHANNEL ANALOG OUTPUT

- MAX14850 Six-Channel Digital Isolator
- MAX15500 Industrial Analog Current/Voltage Output Conditioners
- MAX1659 350mA, 16.5V Input, Low-Dropout Linear Regulators
- MAX17498B AC-DC and DC-DC Peak-Current-Mode Converters for Flyback/Boost Applications
- MAX5134 Pin-/Software-Compatible, 16-/12-Bit, Voltage-Output DACs
- MAX6126 Ultra-High-Precision Ultra-Low-Noise, Series Voltage Reference

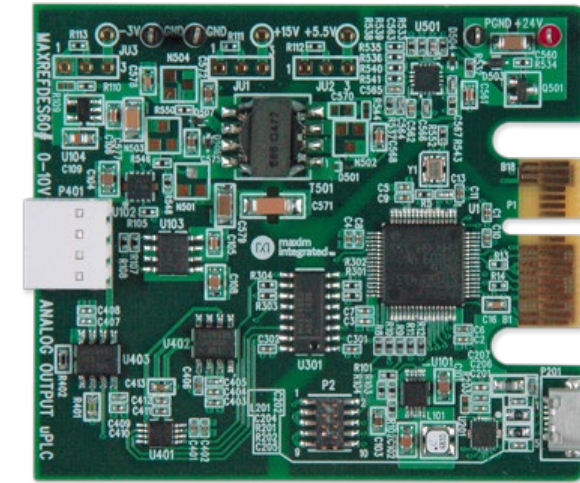
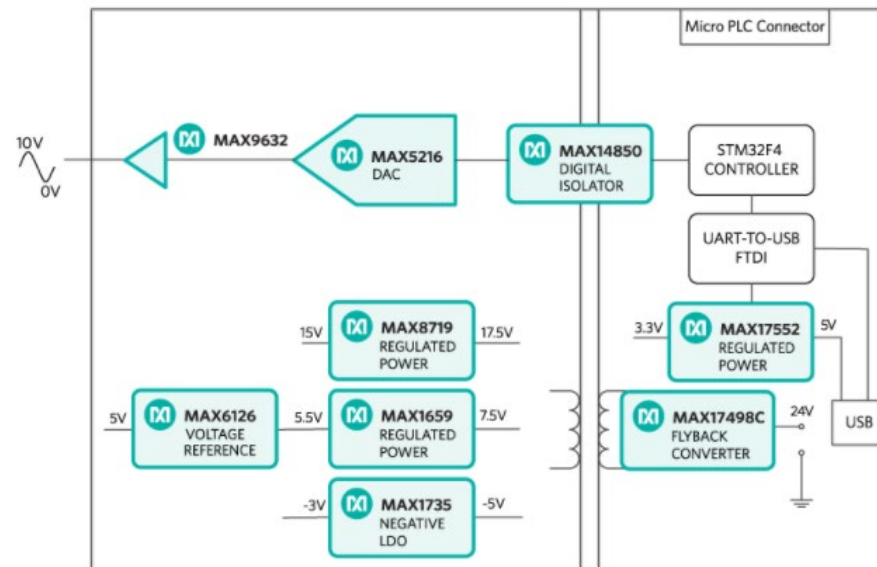


- Programmable high-accuracy current/voltage output
- Current output drives up to 1kΩ
- Voltage output drives loads down to 1kΩ
- Extensive error reporting
- Isolated power and data

MAXREFDES60#

16-BIT ANALOG OUTPUT MICRO PLC

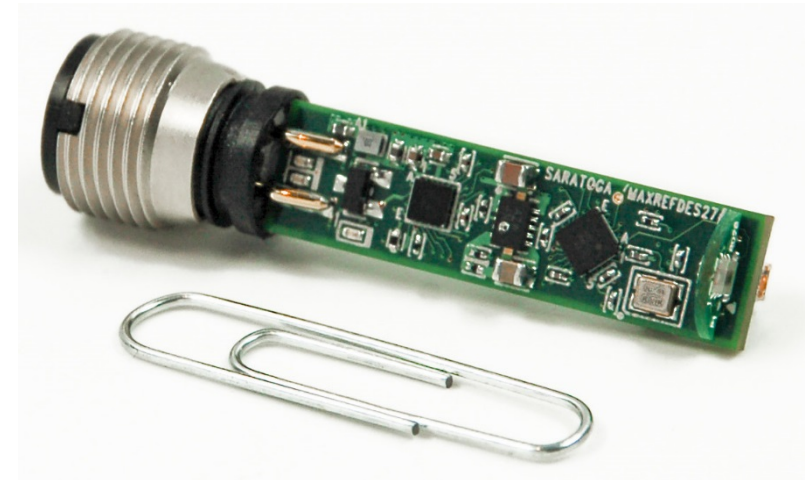
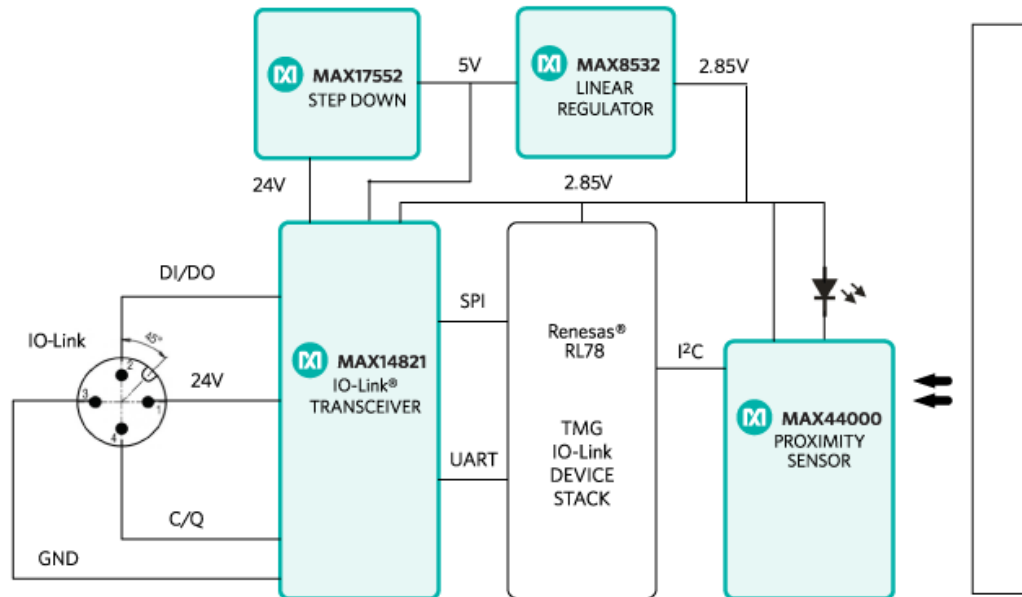
- MAX9632 low-noise, fast-settling buffer
- MAX5216 16-bit, low-power DAC
- MAX6126 ultra-high precision 4.096V voltage reference
- MAX14850 600V_{RMS} data isolation
- STM32F4 STMicroelectronics®
- MAX17552 high-efficiency DC-DC converter
- MAX17498C/MAX8719/MAX1659/MAX1735 isolated/regulated +15V, +5.5V, and -5V



- Programmable high-accuracy current/voltage output
- Current output drives up to 1kΩ
- Voltage output drives loads down to 1kΩ
- Extensive error reporting
- Isolated power and data

MAXREFDES27#: IO-LINK OPTICAL PROXIMITY SENSOR

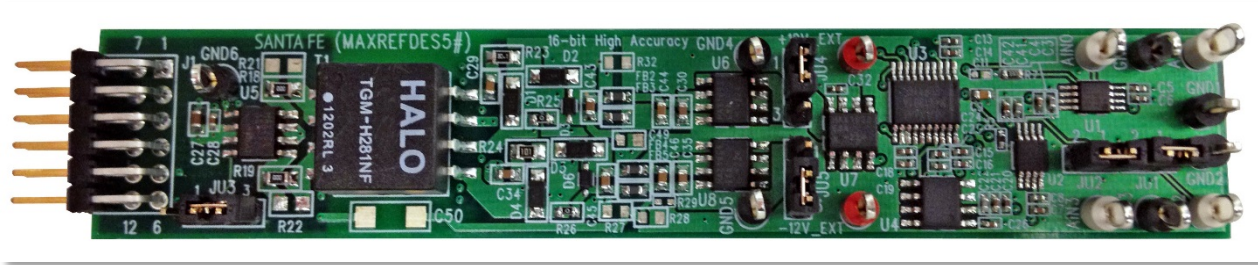
- Tiny industrial sensor form factor
- Ultra low power: 150mW
- Low cost
- IEC 61131-9
- IO-Link version 1.1 and 1.0 compliant
- Field bus agnostic
- Transient voltage suppression
- Reverse polarity and short-circuit protected



MAXREFDES5#

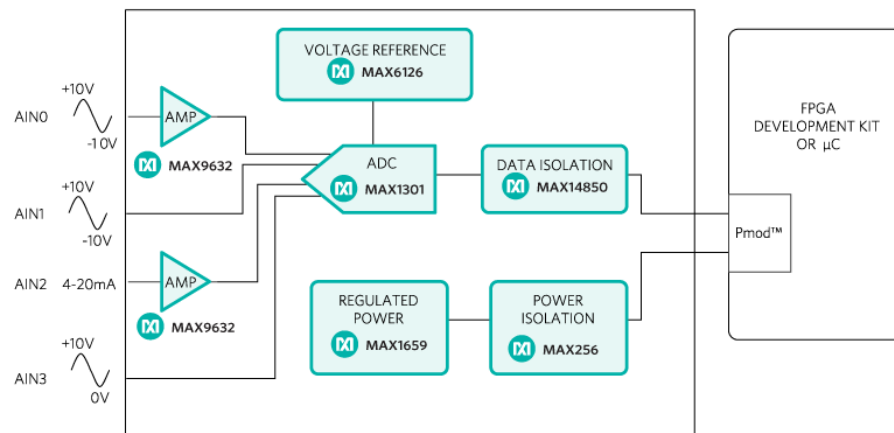
16-BIT HIGH ACCURACY MULTI-INPUT ISOLATED ANALOG FRONT END (AFE)

- MAX9632 low-noise, fast-settling buffer
- MAX1301 ultra-high precision 4.096V voltage reference
- MAX6126 ultra-high precision 4.096V voltage reference
- MAX14850 600V_{RMS} data isolation
- MAX256/MAX1659 +12V, -12V, and 5V power rails



Includes :

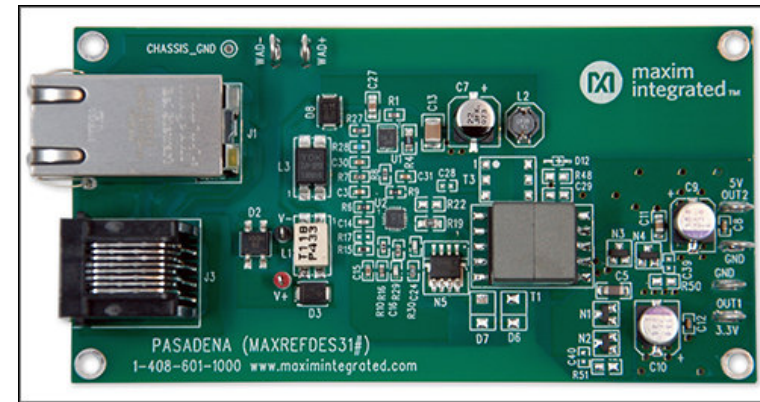
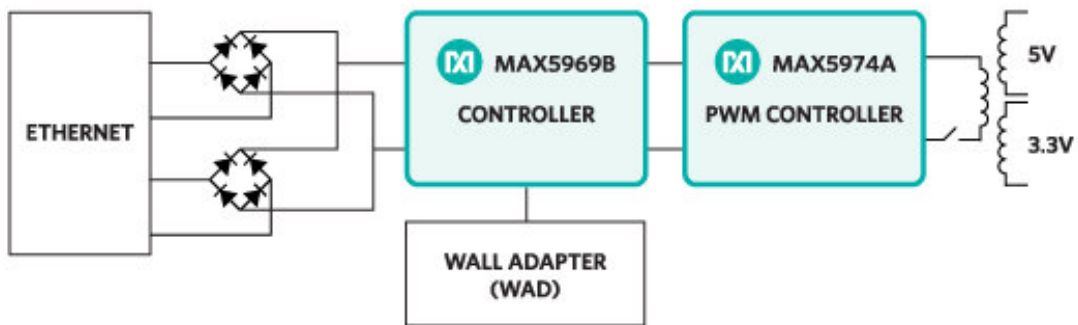
- High accuracy
- $\pm 10V$, 0 to 10V, and 4–20mA Inputs
- Isolated power and data
- Small printed circuit board (PCB) area
- Device drivers
- Example C source code



MAXREFDES31#

3.3V AND 5V POE POWERED DEVICE

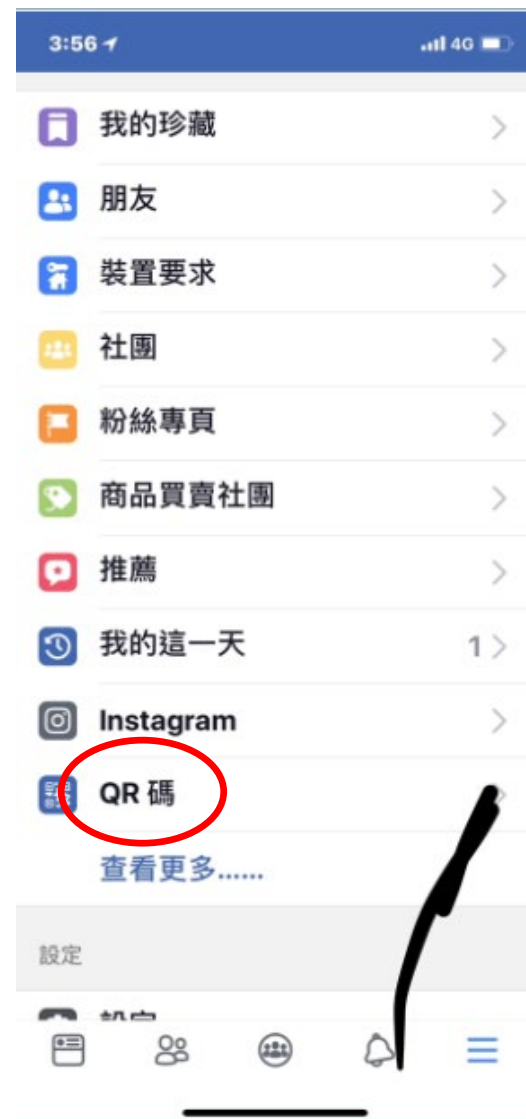
- MAX5969B controller is fully compliant with the IEEE® 802.3af/at standard in a power-over-Ethernet (PoE) system IEEE 802.3af/at compliant
- MAX5974A controls 40V to 57V input-voltage, current-mode PWM converters and provides frequency foldback.
- Dual output
- Tight line regulation
- Low ripple
- Excellent load transient response
- High efficiency



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3. 選擇 QR碼掃描
4. 掃描完成 加入安富利美信大師



Thank you

有獎徵答 (每人限答一題)

- MAX38640 最大輸出電流是多少?
 - A) 200mA
 - B) 300mA
 - C) 700mA
 - D) 900mA
- MAX3134C 的耗電流是多少?
 - A) 20nA
 - B) 1mA
 - C) 100nA
 - D) 180nA
- 目前美信最大的專業代理商是?
 - A) AV NET
 - B) Avnet
 - C) Avent
 - D) Avntt