Industrial Barcode Scanner

Overview

Barcode scanners are widely used in industrial applications such as automatic tracking and quality control. Barcode scanners have advantages over other tracking methods, as they offer faster input speed, higher reliability, and the ability to scan a large amount of information, while being flexible.

Renesas has a range of MCU/MPUs, power and analog devices that can be used for any barcode scanner solution, optimizing the solution to the specific need. This design utilizes the Renesas RZ/A2M MPU, which is designed for embedded artificial intelligence (e-AI) based imaging in smart appliances, networked cameras, service robots, scanner products, and industrial machinery that require high-speed image processing. It features a unique hybrid approach to image recognition and machine vision by combining proprietary DRP technology for fast pre-processing of image data and feature extraction.

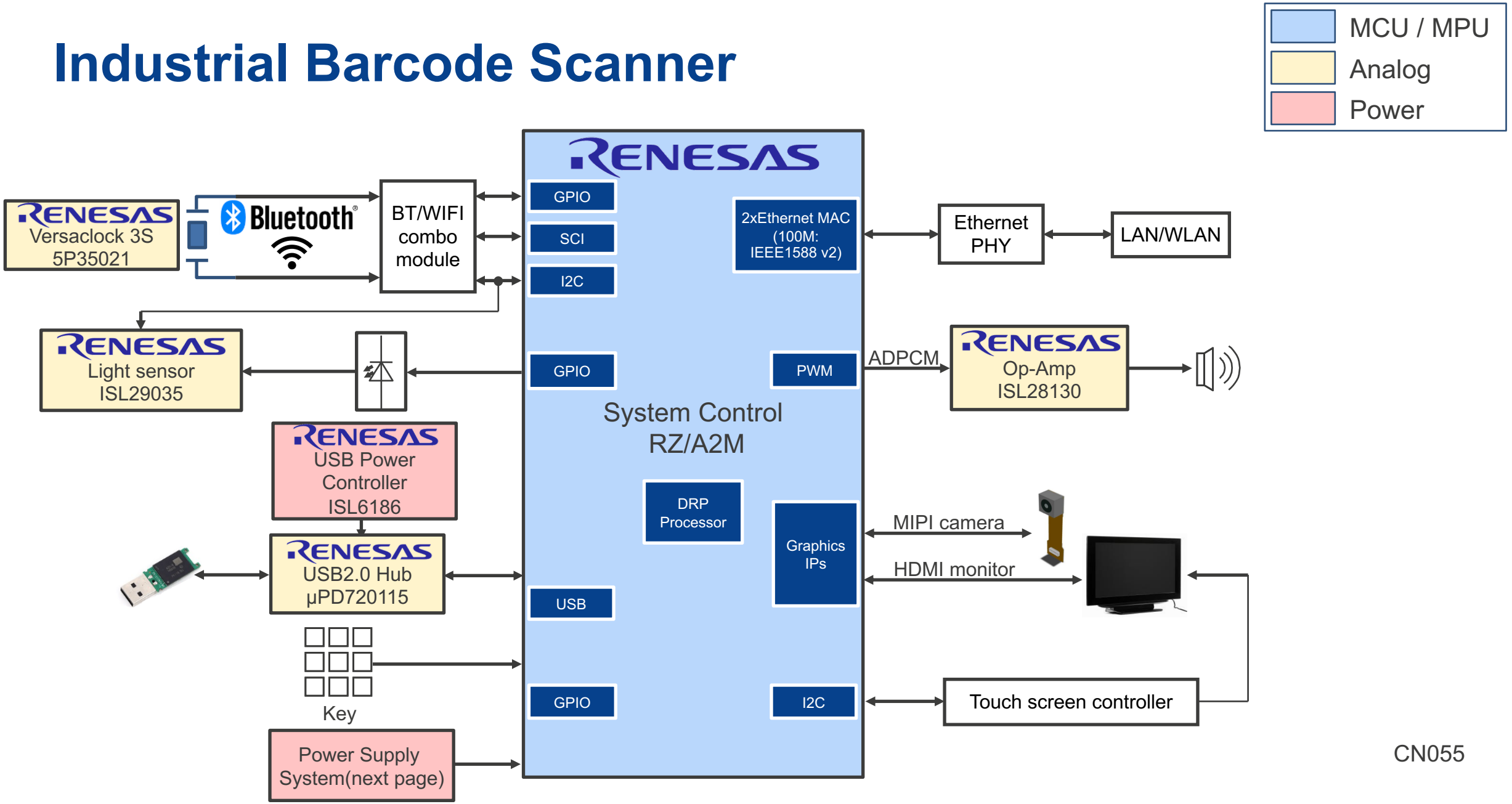
The high performance power and analog system utilizes Renesas' PMIC, DC/DC, USB power supply controller & hub controller, OPA, timing, and an advanced digital light sensor.

System Benefits

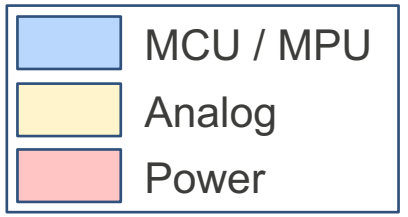
- High-speed embedded AI-based image processing device with Dynamically Reconfigurable Processor (DRP) technology
- Rich Renesas power and analog devices: PMIC, DC/DC, USB ASSP, operational amplifier, timing, and sensor
- QR code recognition with light proximity induction
- HDMI monitor support and AI-extensible features

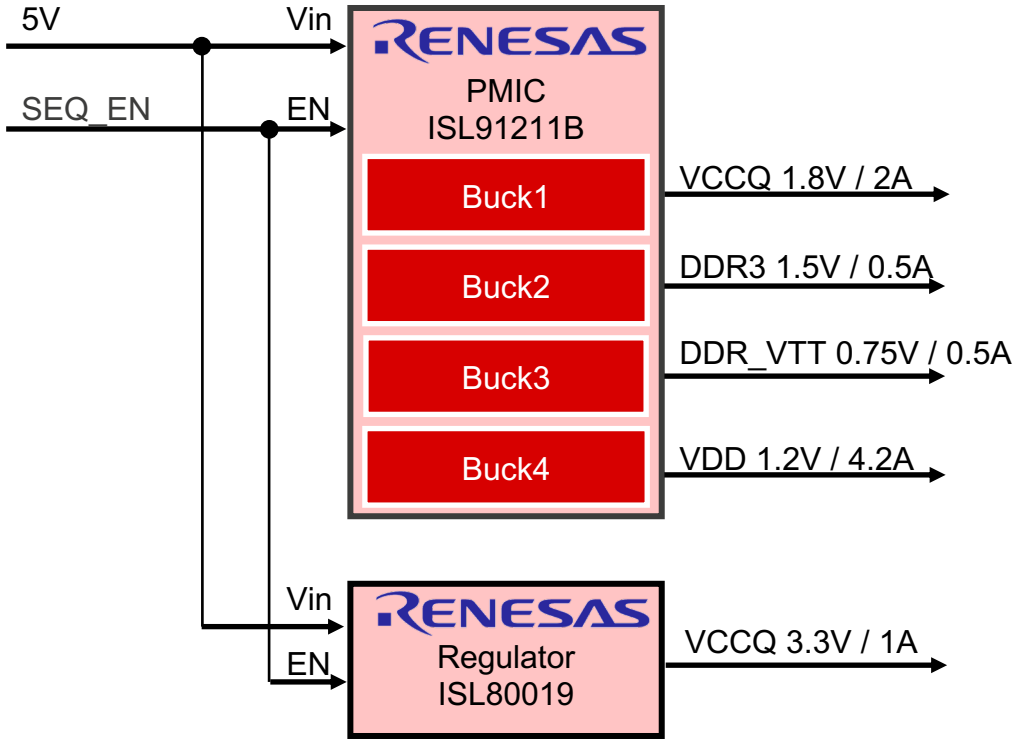
CN055

Industrial Barcode Scanner



Industrial Barcode Scanner: Power Supply





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Industrial Barcode Scanner

Device Category	P/N	Key Features
MCU	RZ/A2M R7S9210xxVCBG	The RZ/A2M MPU is designed for high-speed image processing with DRP. It includes 4 MB of on-chip SRAM, MIPI camera interface, a two-channel Ethernet interface, and hardware security features for crypto acceleration and establishing a Root of Trust.
Power	ISL6186	USB port power supply controller family provides overcurrent (OC) fault protection for one or more USB ports
	ISL80019	Highly efficient, synchronous step-down DC/DC converters that can deliver up to 2A
	ISL91211B	4-phase, 4 output programmable PMIC
Analog	µPD720115	4-Port USB 2.0 hub controller, which complies with USB 2.0 Specification
	ISL29035	Light sensor close to human eye response
	5P35021	Programmable clock generator and is designed for low power, consumer, and high performance PCI Express applications.
	ISL28130	The ISL28130 is a single micropower, low offset drift operational amplifiers that are optimized for single and dual supply operation from 1.8V to 5.5V and ±0.9V to ±2.75V.

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ISL6186 – Industry Grade USB Port Power Controller

USB Port Power Management for USB 3.0 or circuit breakers

Optional for In/output Operation

- 2.5V to 5V operating range
- 45mOhm integrated power P-channel MOSFET switches
- Continuous current options for 1.5A, 3A and 3.6A

System Power Supply Protection

- Thermally insensitive 12ms of current limiting prior to turn-Off
- Internal current monitoring, accurate current limiting
- Output discharges with Reverse current blocking when disabled

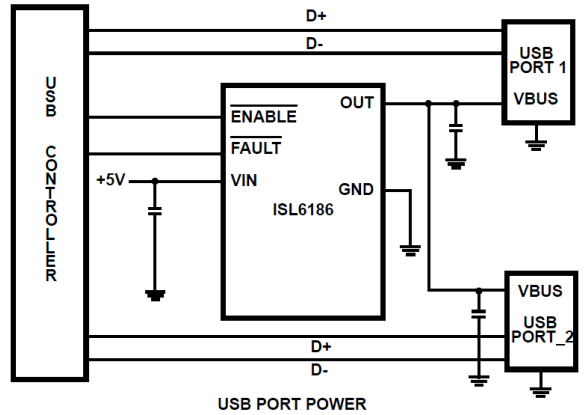
Optional Latch/Auto-Retry function

- Latch-off or auto restart and enable polarity options

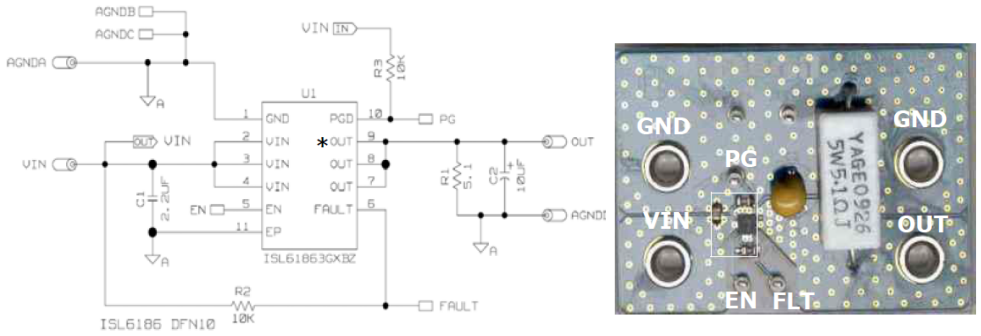
Low Power Design

- 1µA off-state supply current

Part #	Iout @ 5V	Latch / Autoretry	Power-Good out	Temp.	Package
ISL61863AIRZ	1.5 A	Latch	Yes	-40/+85	10L 3x3 DFN
ISL61863HIRZ	3A	Retry	Yes	-40/+85	10L 3x3 DFN
ISL61863LIRZ	3.6 A	Retry	Yes	-40/+85	10L 3x3 DFN



Typical Operating Circuits



ISL61863EVAL1Z Evaluation Board

ISL80019 – Vin 5.5V/1.5A/2x2mm Sync Buck DC/DC

Compact Synchronous Buck Regulators for Space Limited Applications

Compact for Space Limited Applications

- 8 pin 2mmx2mm TDFN
- 1MHz switching frequency, allowing for the use of small inductors
- The high-side PMOS reduce the external boot

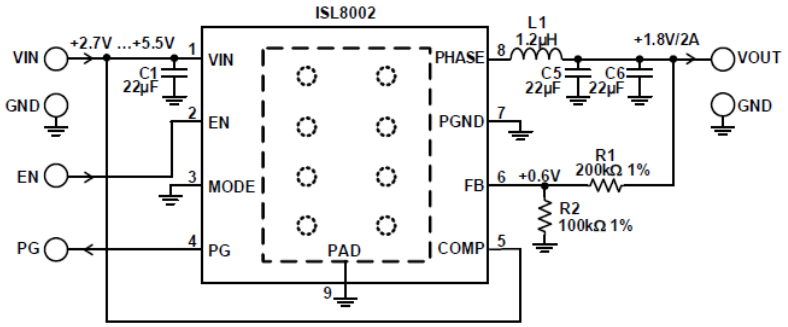
High Efficiency

- 1MHz switching frequency, providing superior transient response.
- Integrate very low $r_{DS(ON)}$ MOSFETs maximize efficiency Up to 95%
- PFM reducing switching losses at light
- Low Quiescent Current <35uA

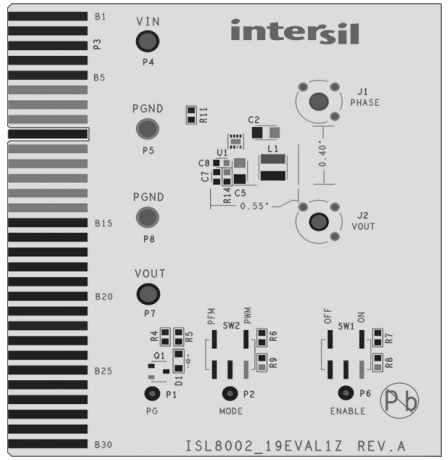
Fail Safe Design

- Overcurrent and short circuit protection
- Over-temperature/thermal protection
- V_{IN} Undervoltage Lockout and V_{OUT} Overvoltage Protection

Part #	Specification	Temp.	Package
ISL80019IRZ-T7A	1.5A, 1 MHz	-40 to 85C	8Ld 2x2mm
ISL80019FRZ-T7A	1.5A, 1 MHz	-40 to 125C	8Ld 2x2mm



Typical Operating Circuits



ISL80019xEVAL1Z Evaluation Board

BIG IDEAS FOR EVERY SPACE RENESAS

ISL91211A/B – Triple/Quad Output PMIC with SPI/I²C

4-phase, 4-output Programmable PMIC, up to 5A per Phase

Input / Output configurations

- Multiple output configuration
  3 output: 2+1+1 (ISL91211A/12A)
  4 outputs: 1+1+1+1+1 (ISL91211B/12B)
- V_{IN} range: 2.5V to 5.5V
- V_{OUT} range: 0.3V to 2.0V
- I_{OUT} up to 5A per phase (total= 20A)

High efficiency

- Low IQ: 75uA in DCM (no switching)
- 95% peak efficiency @ V_{IN} = 3.8V, V_{OUT} = 1.8V
- Automatic DCM/CCM transition and automatic Diode Emulation Mode for highest efficiency

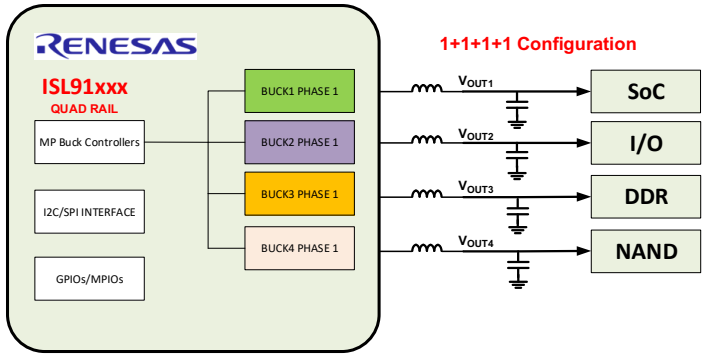
High V_{OUT} accuracy, fast transient response

- < ±0.5% system accuracy
- Remote V_{OUT} sensing
- Independent dynamic voltage scaling (DVS) for each output
- Programmable frequency from 2MHz to 6MHz

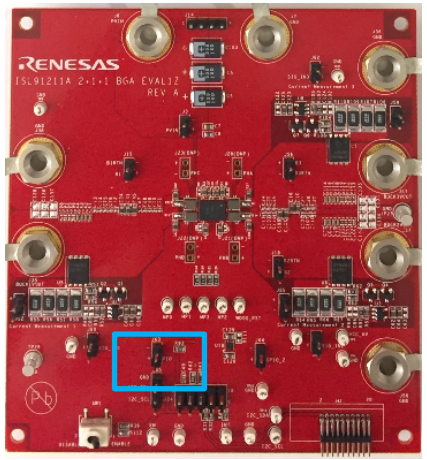
Reliable solution

- SCP, OCP, UVP, OVP, OTP protections with fault detection

Part #	Phase Configuration	Max DC I_{OUT}/Phase	Package
ISL91211AIIZ-T	2+1+1	5A	2.55 x 3.67mm WLCSP
ISL91211BIIZ-T	1+1+1+1	5A	2.55 x 3.67mm WLCSP
ISL91211A-BGA	2+1+1	5A	4.7 x 6.30mm BGA
ISL91211B-BGA	1+1+1+1	5A	4.7 x 6.30mm BGA



Typical Application Circuit



BGA Package Solution Size:
10mm x 13mm (all components on PCB top side)

RZ/A2M – Arm® Cortex®-A9 MPU with Embedded SRAM

Unique DRP Technology for Image Processing

No External Memory Required

- Embedded 4MB SRAM inside
- Benefit cost and board size

High Speed on Image Processing

- With 2D graphic accelerator
- DRP tech with specific library

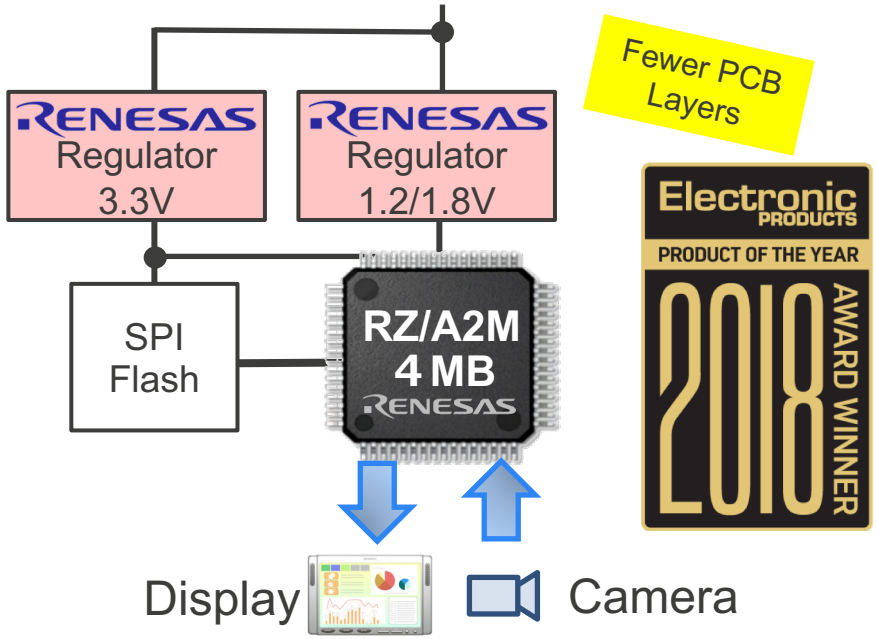
Low Power Consumption

- Eco-friendly DRP tech on real time processing comparing to common FPGA

Multi Interface and Security

- Support MIPI interface
- Double channel Ethernet interface
- On-chip hardware encryption

Part #	Feature	Package
R7S921040VCBG	No DRP, no trusted secure IP	PLBG0176GA-B
R7S921045VCBG	No DRP, w/ trusted secure IP	PLBG0176GA-B
R7S921051VCBG	w/ DRP, no trusted secure IP	PLBG0256KA-B
R7S921056VCBG	w/ DRP, w/ trusted secure IP	PLBG0256KA-B



Typical Application Diagram

RZ/A2M Evaluation Board

µPD720115 – USB 2.0 Hub Controller with 4 ports

Supports USB Battery Charging Specification 1.2

Low cost on External Component

- Integrates two regulators to eliminate external regulators and this saves system costs

Wide Range Usage Environment

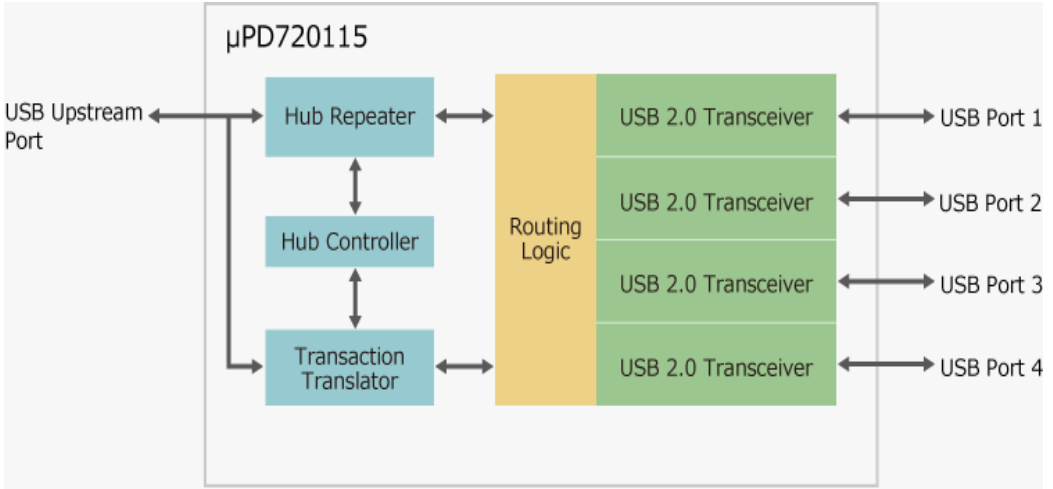
- Enhances operating temperature range from -40 to +85 degree

Trusted Reliability and Stability

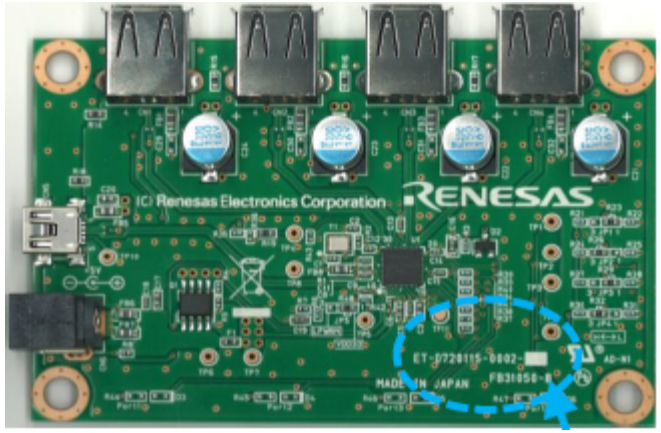
- USB-IF Certified : TID(Test ID) = 30000066
- Supporting USB 2.0 Link Power Management
- Supports Individual/Gang power control/overcurrent detection

Flexible Downstream Output Port

- Configurable downstream port counts of 2,3, or 4 ports



µPD720115 Block Diagram



ET-D720115-0002 Reference Board

Part #	Feature	Package
UPD720115K8-611-BAK-A	0~85°C	40-pin QFN (6mm X 6mm)
UPD720115K8-711-BAK-A	-40~85°C	40-pin QFN (6mm X 6mm)

ISL29035 – Integrated Digital Light Sensor with Interrupt

Ambient and Infrared Light-to-digital Converter with I²C (SMBus compatible) Interface

Integrated Functions and Small Package

- 6 pin 1.5mmx1.3mm ODFN
- On-chip 16-bit ADC
- I²C (SMBus compatible) Interface
- Integrated noise reduction 50/60Hz

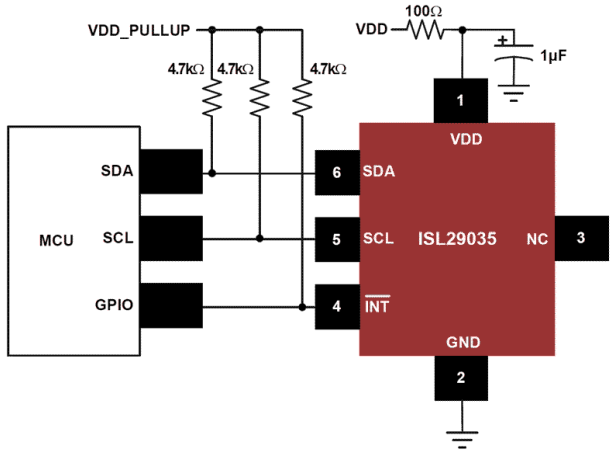
High Perfomance

- Dynamic Range 1: 4,200,000
- Close to human eye response with excellent IR/UV rejection
- Operation across -40 to +85°C

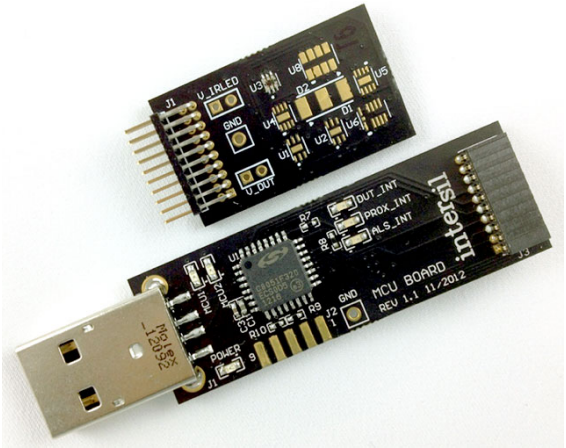
Low Power Design

- Normal operation 57uA
- 2 power down mode support shutdown current < 0.51uA

Part #	ALS Sensing	Interrupt Pin	Package
ISL29034IROZ	Yes	No	4 Ld 1.5x1.3 ODFN
ISL29035IROZ	Yes	Yes	6 Ld 1.5x1.6 ODFN



Typical Operating Circuits



ISL29035EVAL1Z Evaluation Board

5P35021 – VersaClock® 3S Programmable Clock Generator

Programmable Clock Generator for Low Power, High Performance PCIe Gen1-3

High Performance

- PCIe clocks phase jitter: PCIe Gen3
- Differential clocks < 1.5ps rms jitter range12kHz–20MHz

Configurable and Programmable

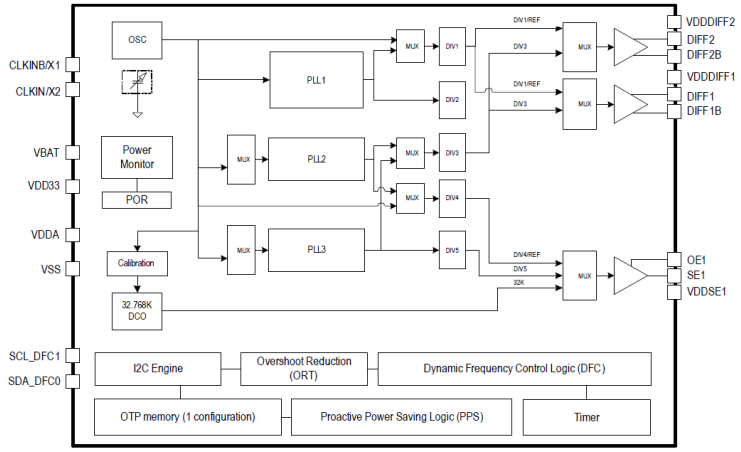
- Configurable OE pin function as OE, PD#, PPS or DFC control
- Configurable PLL bandwidth; minimizes jitter peaking
- Store user configuration into OTP memory
- Programmable VCO and PLL source selection

Dynamic Balance

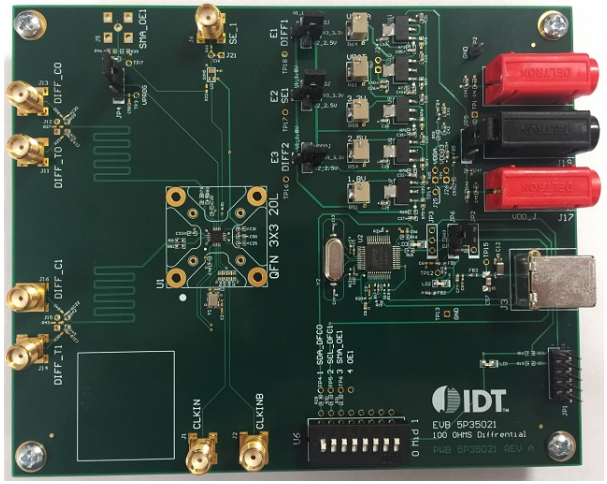
- PPS: Proactive power saving save power during power down
- PPB: Performance power balancing allow min. power consumption
- DFC: Dynamic frequency control allow dynamically switch 4 fre.
- Two PLLs support independent to lower system EMI

Part #	Temp.	Package
5P35021-000NDGI	-40 to +85°C, Industrial	20Ld 3x3mm VFQFPN
5P35021-000NDG2	-40 to +105°C, Automotive Grade 2	20Ld 3x3mm VFQFPN

Block Diagram



Block Diagram



Evaluation Board for 5P35021

ISL28130 – Low Power/Drift RRIO Operational Amplifier

Ideal Low Power Operational Amplifier for Battery-Powered Devices

Low Offset

- Low input offset voltage: 40µV, Max
- Low offset drift: 150nV/°C, Max.
- Input bias current: 250 pA, Max.

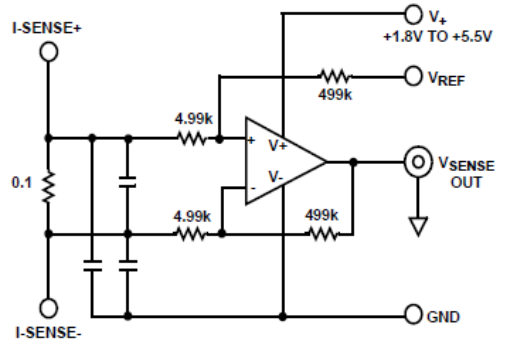
Good Dynamic Performance

- Low noise (0.01Hz to 10Hz): 1.1µVP-P, Typ.
- Rail-to-rail input and output

Low Power Design

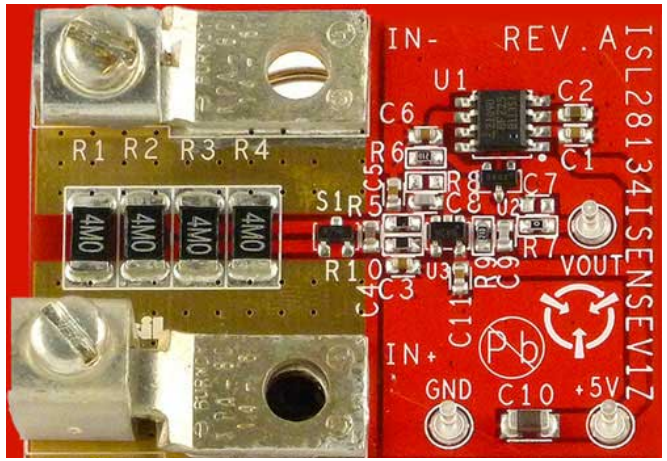
- Quiescent current (per amplifier): 20µA, Typ.
- Single supply range: +1.8V to +5.5V
- Dual supply range: ±0.9V to ±2.75V

Part #	Temp.	Package
ISL28130FHZ	-40 - 125°C	5 Ld SOT-23
ISL28130CEZ	0 - 70°C	5 Ld SC-70
ISL28230CUZ	0 - 70°C	8 Ld MSOP
ISL28230FRZ	-40 - 125°C	8 Ld 3x3 DFN
ISL28430CBZ	0 - 70°C	14 Ld SOIC
ISL28430FVZ	-40 - 125°C	14 Ld TSSOP



BI-DIRECTIONAL CURRENT SENSE AMPLIFIER

Typical Operating Circuit



ISL2813xxSENSEV1Z Precision Current Sense Op Amp