CN194
Over-The-Air Update Module for PLC Applications

October 2019

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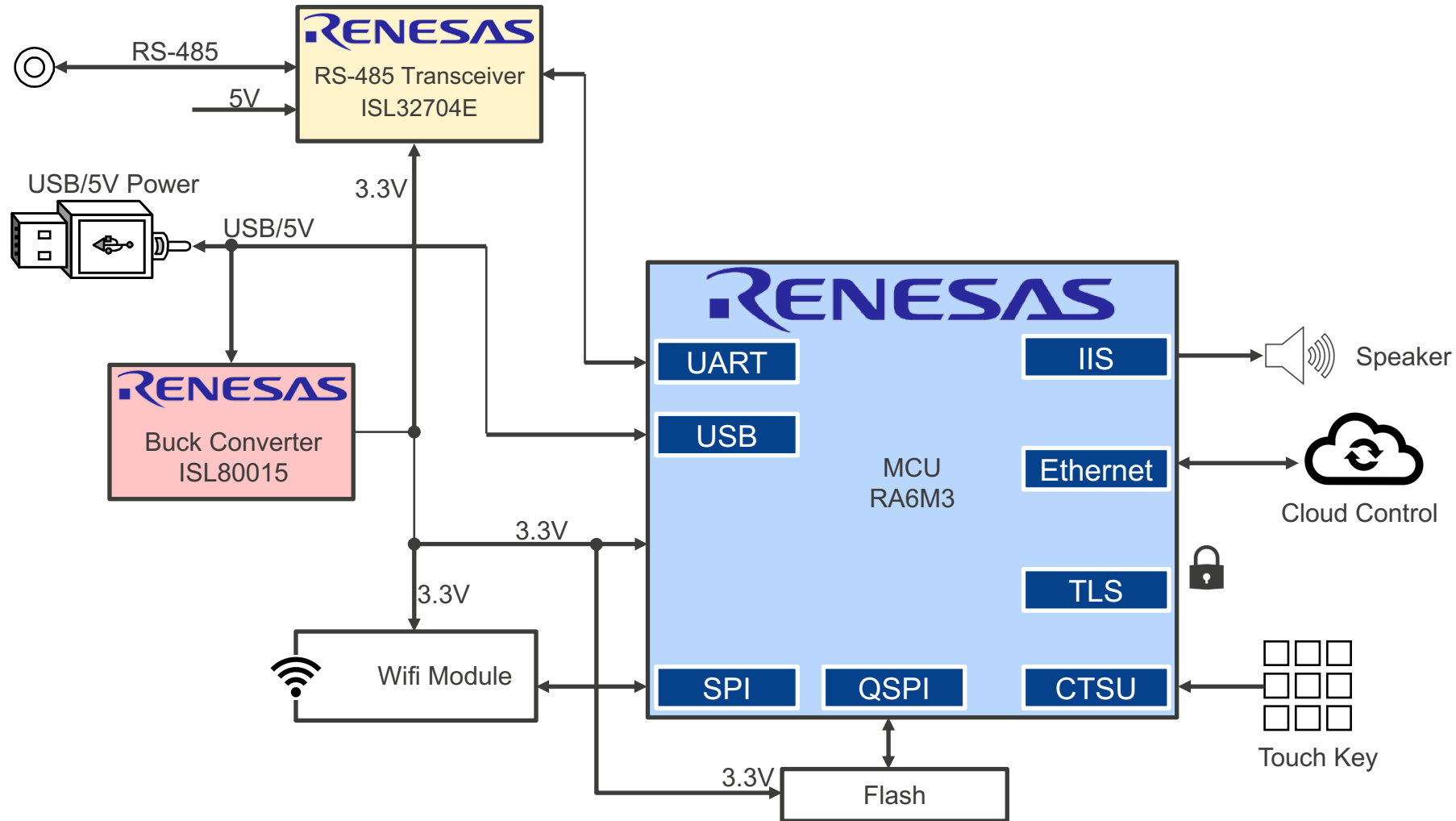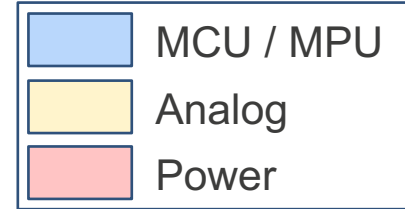RENESAS

Over-The-Air Update Module For PLC Applications

■ **Overview**

With the rapid development of intelligent manufacturing, more and more customers hope to achieve remote control and over-the-air (OTA) communication through industrial program logic controllers (PLC). Based on years of experience in the industrial field and understanding of customer challenges, the PLC intelligent upgrade system launched by Renesas and its partners meets the needs of customers, while also providing for a safe and secure communication, and covering a variety of PLC brands and application scenarios. This solution includes a one-stop solution for customers - from cloud compute to OTA, and debug management to final terminal solution.

■ **System Benefits**
   – The RA6M3 is a high-performance MCU with Ethernet connectivity and real-time system control
   – High-performance buck converters and RS-485 transceivers designed for industry applications

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Over-The-Air Update Module for PLC Applications

Block Diagram #CN194
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Over-The-Air Update Module for PLC Applications

Device Category	P/N	Key Features
MCU	RA6M3	Leading performance 120-MHz Arm® Cortex®-M4 core, up to 2MB code flash memory, 640-KB SRAM, Graphics LCD Controller, 2D Drawing Engine, Capacitive Touch Sensing Unit, Ethernet MAC Controller with IEEE 1588 PTP, USB 2.0 High-Speed, USB 2.0 Full-Speed, SDHI, Quad SPI, security and safety features, and advanced analog.
Power	ISL80015	Highly efficient, monolithic, synchronous step-down DC/DC converters integrate MOSFET
Analog	ISL32704E	Ultra-Low EMI, Smallest Package Isolated RS-485 Transceiver, +/-15KV ESD

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RA6M3 – Ultra-Low Power 120-MHz Arm® Cortex®-M4 Core
Fully Featured for Applications Needing HMI/Control/ Security/Graphical and Capacitive Touch

High Performance
- 120MHz Arm® Cortex®-M4 CPU

Highly Integrated Capabilities
- 1MB-2MB Flash Memory and 640kB SRAM
- 128-bit unique ID
- 12-Bit ADC (x2)
- 12-Bit DAC

Communication Interfaces
- USB 2.0 (Full Speed/ High Speed)
- Ethernet Controller with DMA
- SCI x10/SPIx2/IICx3

HMI Interface
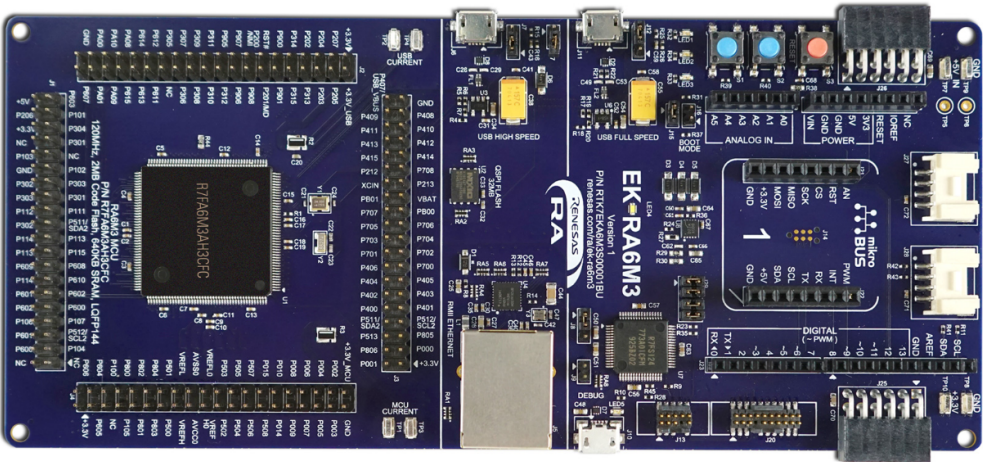- Capacitive Touch Sensing Unit (18ch.)
- Graphics LCD Controller

Security and Encryption
- AES128/192/256, 3DES/ARC4, SHA1/SHA224/SHA256/MD5, GHASH, RSA/DSA/ECC
- True Random Number Generator (TRNG)

FLASH / RAM	2MB / 640kB	RA6M3	RA6M3	RA6M3	RA6M3	RA6M3
	1MB / 640kB	RA6M3	RA6M3	RA6M3	RA6M3	RA6M3
Pin Count Package Size Pitch		100pin LQFP 14x14 0.5mm	144pin LQFP 20x20 0.5mm	145pin LGA 7x7 0.5mm	176pin LQFP 24x24 0.5mm	176pin BGA 13x13 0.8mm

Flash/ RAM/ Package Table

RTK7EKA6M3S00001BU

Part #	Flash Memory	RAM	Temp	Package
R7FA6M3AH3CFC	2MB	640KB	40 ~ 105℃	176 LQFP
R7FA6M3AF3CFC	1MB	640KB	40 ~ 105℃	176 LQFP

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ISL80015/15A – 3.3V/5V, 1.5A Sync Buck DC/DC
Compact Synchronous Buck Converters with High Efficiency

Compact for Space-Limited Applications

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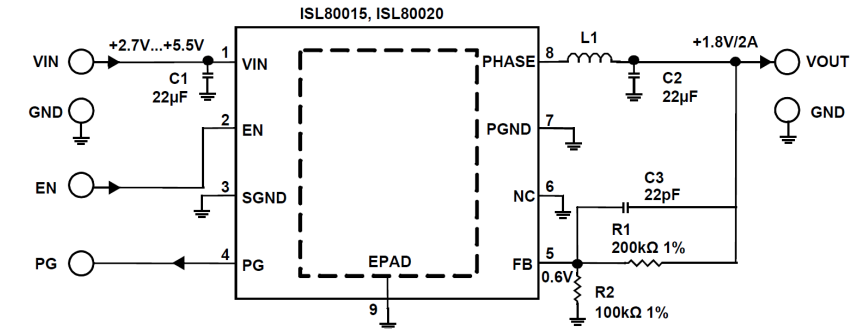- The high-side PMOS eliminates external boot capacitor

High Efficiency

- Integrate very low $r_{DS(ON)}$ MOSFETs maximize efficiency up to 95%
- 100% duty cycle (1MHz)
- Fixed PWM mode

Excellent Safety

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

Part #	Iout (A)	F_{SW}(MHZ)	V_{IN} Range(V)	V_{OUT} Range(V)	Package
ISL80015FRZ-T	1.5	1	2.7 to 5.5	0.6 to 5.5	2x2 TDFN
ISL80015AFRZ-T	1.5	2	2.7 to 5.5	0.6 to 5.5	2x2 TDFN

Typical Application Circuit

ISL80020ADEMO1Z Evaluation Board

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ISL32704E – Smallest Package Isolated RS-485 Transceiver
Ultra-Low EMI, High Drive Capability, Robust ESD
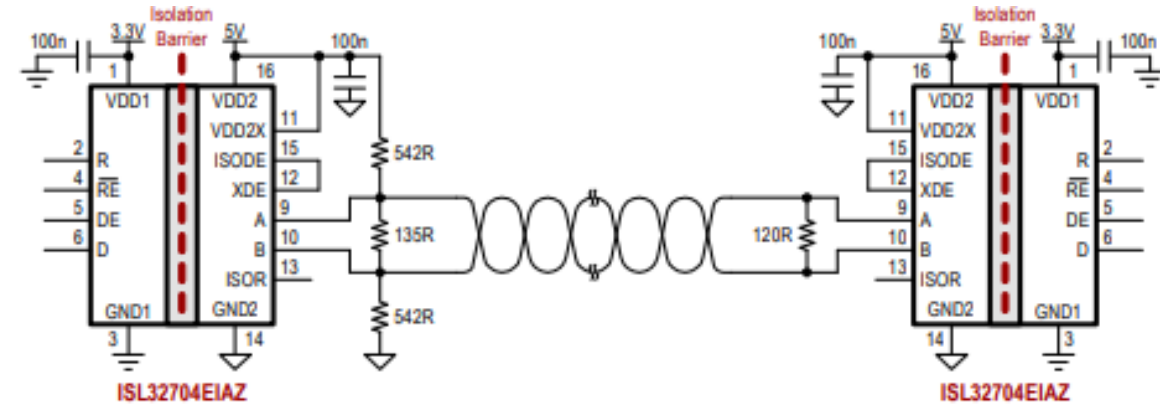
High Speed

- 4Mbps data rate

High Reliability

- 2.5kVRMS isolation per UL 1577
- 600VRMS working voltage per VDE 0884
- 15kV ESD bus-pin protection

Good Connectivity

- The device is compatible with 3V and 5V input supplies

Industry Standard

- UL 1577 recognized
- VDE V0884-10 certified

Typical Operating Circuits

ISL32704EVAL1Z Evaluation Board

Part #	HALF/FULL DUPLEX	Temp. Rang	Data Rate Mbps	Isolation Rating	Package
ISL32704EIAZ	Half	-40 to +85	4	2.5kV	16 Ld QSOP
ISL32704EIBZ	Half	-40 to +85	4	2.5kV	16 Ld SOIC

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