Battery-powered SoC applications call for stringent power requirements. In such applications, normal mode operations need high efficiency to maximize battery life, and sleep mode operations must be ultra low power to retain the information as long as possible between battery charge or replacement.

Dolphin’s RAR-eSR-qLR-01 Retention Alternating Regulator enables this combination embedding two regulation sub-components: a switching inductor regulator (eSR) and an ultra low quiescent linear regulator (qLR). A Regulation Control Unit (RCU) manages booting and transitions between each regulation functions.

The result is a fully integrated and secured solution that is power-efficient in both normal and sleep mode. Normal mode can supply up to 50 mA loads with up to 95% peak efficiency, while sleep mode can supply up to 300 µA for a quiescent current of 200 nA.

KEY BENEFITS OF THE RAR
- Combines high-efficiency in normal mode and ultra-low quiescent operation in sleep mode
- Ideal regulator for power and voltage islets
- Secured integration in the SoC
- Embedded RCU (Regulator Control Unit) to manage booting and mode transitions and to ensure data integrity
- Configurable output drive before delivery to fit the application
- Performances in sleep mode
  - Set of qLR with variable quiescent current: 50 nA, 100 nA and 200 nA to adjust regulator performances to the islet
  - Can supply always-on loads up to 300 µA
  - Accessible voltage reference can be used by wake-up circuitry
- Performances in normal mode
  - PFM embedded mode allowing high-efficiency at low load
  - High Efficiency (up to 95% peak efficiency)
- Low Bill-of-Material: Fully integrated feedback and active compensation loop to reduce the number of additional external passive components
- Low Output Ripple
- Over-temperature/Over-current protected Output

RAR PRINCIPLES

Modes of Operation

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<th>eSR output</th>
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<td>Regulated</td>
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<tr>
<td>Ultra Low Power mode</td>
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<td>Grounded</td>
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EXAMPLE OF USAGES & APPLICATIONS

- Data retention in memory or logic islets
- Ultra Low Power logic islets
- Security devices
- Battery connected devices
- Low Power MCU
- Medical devices

PMNet

Other Supply

eSR

qLR

RCU

2xAA

3.3 – 2.0V

Power Line

SoC

Logic & MCU
1.8 V
100 mA
ICK

SRAM
1.8/1.2V
20 mA
ICK

dolphin-ip.com/prelude