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LSCM
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香港物流及供應鏈管理應用技術研發中心

香港中文大學
THE CHINESE UNIVERSITY OF HONG KONG

Nuclear 90

90 nm Passive UHF RFID Tag Reference Design

RFID Hardware and Systems

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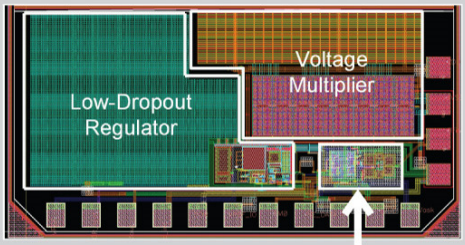
Now our cutting-edge **90 nm Passive UHF RFID Tag Reference Design - Nuclear 90** and advanced **Clock Recovery Circuit Design - Nuclear 90 CRC**, shattering your product design limitations. Its synergy gives you the freedom to imagine product revolution and the capability to get to the market faster than anyone else.

Developing passive UHF RFID tag reference design within an area of 100 nm is an unprecedented challenge, nevertheless, through the sophisticated composition of the 4 significant modules - power regulator, RF modulator & demodulator, anti-collision logic circuit and memory interface circuit, the distinguished performance of **Nuclear 90** under small size is promising.

By taking advantage of high-precision **Nuclear 90 CRC**, decoding the downlink data, encoding the uplink data and clocking the command handler in the base-band processor under stringent frequency accuracy can be achieved.

With **Nuclear 90** and **Nuclear 90 CRC**, the possibilities are endless. It breaks through tag design without constraints and no more restarting projects from scratch.



Layout of Nuclear 90

Key Features - Nuclear 90

Compact Tag Size
With chip dimensions 1800×1200×280 μm, tag size can be much reduced.

Reduce Fabrication Cost
By using NMOSFETs in a standard CMOS technology, considerable number of diodes can be eliminated.

Low Power Consumption
Power utilization can be greatly reduced by introducing RF envelope as clock and control signal of the gating clock.

Low Power Leakage
With specially-designed I/O devices, the effect of gate-current leakage can be mitigated.

Long Read Range
With 900 MHz operating frequency and -9 dBm sensitivity, operating range can be up to 4.7 meters (4W EIRP).

High Data Rate
Read rate up to 640 kbits per second.

Stable RF Signals
Retrieve information directly from pulse-interval encoding (PIE) data to conquer the dramatic shift of clock frequency.

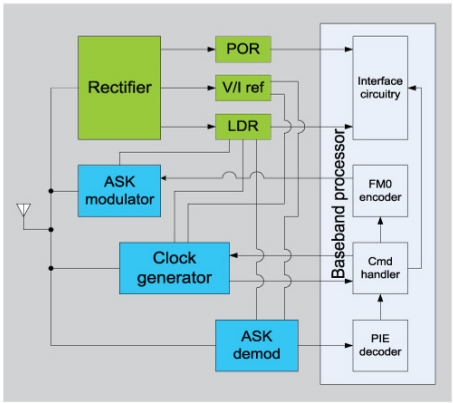
Outstanding Performance
Performance characterized with great accuracy and fast processing.

EPC compatible
Fully comply with EPC C1G2 standard.

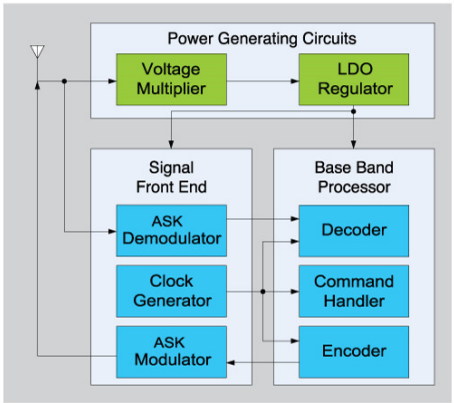
Key Features - Nuclear 90 CRC

High Accuracy
Settling the clock frequency to 2.56 MHz within ±4% frequency deviation, the circuit enables stringent frequency accuracy in decoding the downlink data, encoding the uplink data and clocking the command handler in the base-band processor.

High Flexibility
Digital frequency-locked loop (FLL) based structure makes amenable technology scaling.



Architecture of Nuclear 90



Structure of Nuclear 90 CRC

Why Nuclear 90

Passive UHF RFID tag has been used for decades and has gained widespread adoption within logistics and supply chain industry. However, the relatively high cost and clumsy size of existing passive UHF RFID tag make the application unable to penetrate into every level of the logistic and supply chain industry and other potential sectors all the while.

Now, the emergence of **Nuclear 90** brings new light to the application of passive UHF RFID tag. This leading know-how illustrates compact-sized passive UHF RFID tag with low fabrication cost and outstanding performance is possible. Tag size and unit price no longer are barriers to passive UHF RFID application. A broader range of products which is in small size and low cost will be able to be manipulated under RFID technology. In the same way, more powerful functionalities are allowed to be embedded in a tag with the same size under this reference design. Extensive and comprehensive use of passive UHF RFID is around the corner.

Beyond a doubt, **Nuclear 90** will ultimately bring a new dimension to the development of the whole logistics and supply chain industry and generate great impact on other sectors.

Applications

- Asset Tracking & Security
- Livestock Identification
- Retail Operations Management
- Manufacturing Management