Kilopass

NVM IP. Boundless Freedom to Embed

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itera

LOGIC CMOS EMBEDDED FTP NVM IN 40NM AT TSMC, GLOBALFOUNDRIES, AND UMC

Product Overview

General Description

Itera is the industry's first logic CMOS embedded few-time programmable (FTP) non-volatile memory (NVM) in 40nm that delivers up to 1024 cycles of programming capability. Itera enables high volume mobile and consumer system-on-chip (SoC) to achieve lower cost, higher performance, and greater integration by replacing external serial EEPROM and NOR flash. With up to 1024 cycles of re-programmability, the endurance Itera provides is more than enough for over 50% of the mobile and consumer applications. Time stamp, security key revocation, firmware updates, and trimming adjustments can now be implemented with Itera.

Itera is a quantum leap from the embedded FTP solutions in the market today. Itera is implemented in logic CMOS without any additional mask or processing step compared to merged process embedded FTP solutions that add 25% to 40% to die cost. Itera is available in leading edge process nodes like 40nm compared to embedded FTP solutions that are only available in older process nodes down to 90nm. With cost savings and availability in advanced processing nodes, high volume mobile and consumer systems now have an alternative to serial EEPROM and serial NOR Flash.

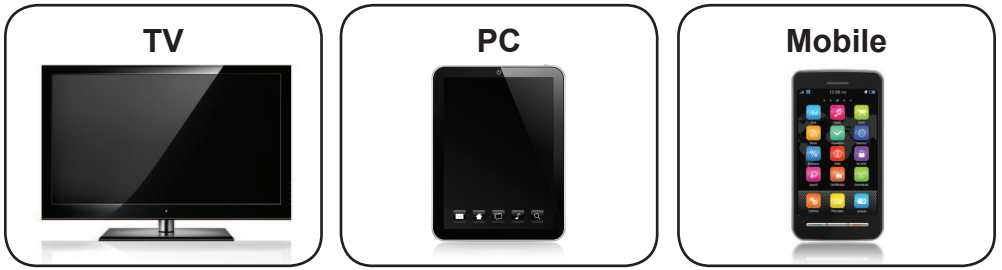
Itera is built upon Kilopass' patented 2T antifuse technology, which has been integrated in over 2 billion integrated circuits (ICs) as a solution for one-time programmable (OTP) NVM. With 2T antifuse technology scaling 25X from 180nm to 20nm, the evolution of OTP to FTP was inevitable. Redundancy in the memory to enable re-programmability consumes only a small percentage of the overall area due to the dramatic scaling of the 2T antifuse bit cell in advanced process nodes. As a result, Itera integrated in a SoC is up to 70% less in total cost than an external FTP.

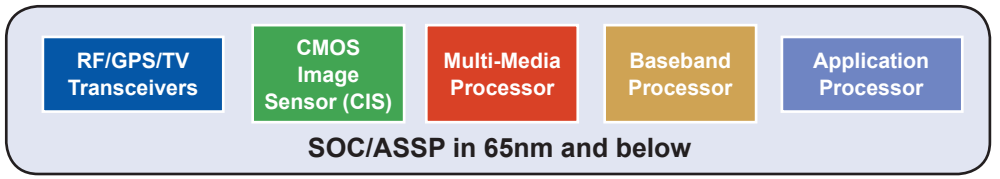
In addition, Itera also excels in simplicity of integration, performance, and reliability. Itera's interface is an industry standard Open Core Protocol (OCP) that will dramatically simplify the integration at the front-end. Many SoCs are already deploying OCP for other IPs so no proprietary or new interfaces need to be learned. Itera achieves 24X improvement in performance over discrete SPI interface reprogrammable solutions like serial Flash or EEPROM. With the improved performance, Itera can be executed in place (XIP) rather than shadowed. The reliability of Itera is the same as XPM or Gusto since it is built on the same 2T antifuse technology. To serve a wide variety of applications including automotive and industrial, the Kilopass technology has been qualified through a stringent high temperature operating life (HTOL) and high temperature storage life (HTSL) standard in process nodes including 40nm.

Applications

The three hottest end products are in the TV, PC, and mobile markets. The TV is being transformed into a multi-functional display. The tablet is driving a PC renaissance. With growing market share in the Smartphone category, the mobile wallet is making the mobile handset even more feature rich. One day in the near future, it may be main stream for the mobile handset to be the TV remote or to deliver content to the TV.

As advertisers are trying to gain consumers' mindshare through these three mediums, chip makers are busy developing next generation products including RF transceivers, image sensors, multimedia processors, baseband processors, and applications processors for these hot end product. Itera provides a critical ingredient for these high volume ICs to enable faster time to market and reduce systems cost.





Applications	Usage	Endurance	Total Market Size (2014)
Consumer: Application Processor, Media Processor, Image Signal Processor	Counters, Time Stamps, Code Storage, Security Keys	<100 cycles	1B units
Mobile Application Processor (GPS, Tablets, Netbooks, MID)	Security Keys, Counters, Code Storage	1-1000 cycles	300M units
WLAN/PAN SOC; MFR (multi function radios combining several wireless standards)	Prototyping, Trimming Calibration, Code Storage	1-1000 cycles	3B units
Imaging (image sensors, touch screen ctl, printer controls)	Time Stamp, Trimming Calibration, Code Storage	1-10000 cycles	1B units

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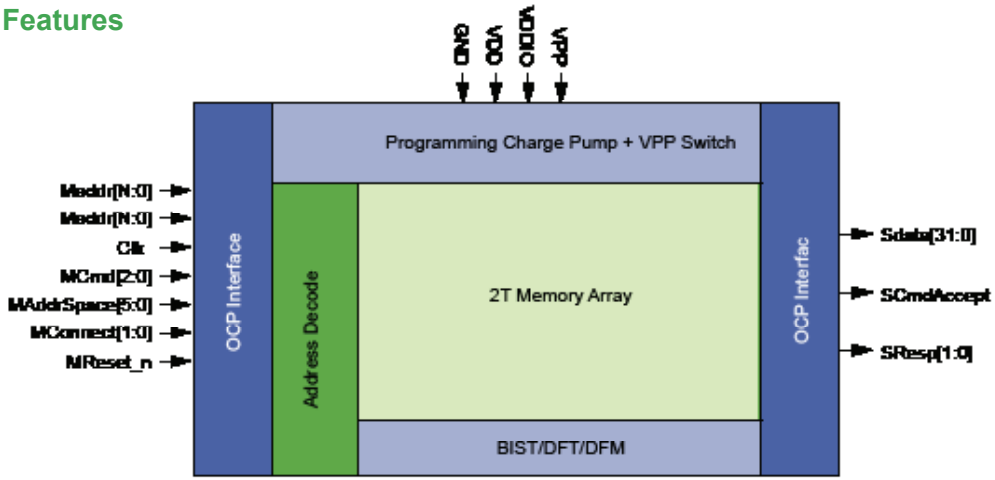
Features



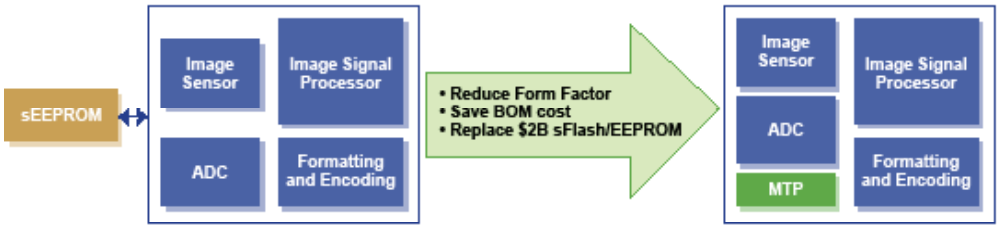
- Few-time programmable synchronous memory
- Configurable options
  - 32bit to 1Mb Itera memory
  - External VPP programming plus field programmability features with internal charge pump
  - Open Core Protocol (OCP) 3.0 interface
- Program: x32
- Read: x32
- VDD (core supply)
- VDDIO (2.5V)
  - Asymmetric power domain shut down
- Data throughput: 20ns
- Programming Operating Temperature Range:
  -20C to 125C (Junction)
- Read Operating Temperature Range:
  -40C to 125C (Junction)
- SEC-DEC error correction scheme
- Built in manufacturing patterns
- BIST to simplify manufacturing test
- Data Retention: more than 10 years

- Deliverables
  - Front-end: LEF, Verilog model, Synopsys models
  - Back-end: GDS, FRAM, CDL, PIPO log, DRC & LVS reports
  - Collateral: datasheet, integration guide, application notes

Availability

Itera products have FTP capacity of 32 bit to 1Mb with initially availablility at 40nm at TSMC, GLOBALFOUNDRIES, and UMC. 65nm and 55nm will be available in 2H'11 and 28nm in 1H'12. Of embedded FTP NVM in the industry, Itera has the broadest product offering. With 16 FTP configurations available off the shelf, Itera provides solutions that meet the needs of a wide range of applications for today's mobile and consumer SOCs to update keys, trimming index, calibration settings, boot strap, firmware, and software index, and many more.

Measurable Benefits of Itera



Cost savings from replacing EEPROM/s-Flash with Itera in 40nm	
Customer Parameters	**Result**
1. 64Kb of external EEPROM ($O.29/chip plus $0.05 in system overhead) = $O.34/chip in B0M cost	**- Savings of $6.3M per product life cycle ($10.2M vs. $3.9M)**
2. Average $3,500/wafer cost over 3 years of product life	**- Reduces board form factor**
3. 10M chips per year in production volume	**- 24X higher performance than**

Product Part Number	Itera Capacity	Sector Size	Sector Programmability
KMTX40LP32b-R32W32-32b1K	32b	32b	1024
KMTX40LP64b-R32W32-64b1K	64b	64b	1024
KMTX40LP128b-R32W32-128b1K	128b	128b	1024
KMTX40LP256b-R32W32-256b1K	256b	256b	1024
KMTX40LP512b-R32W32-512b1K	512b	512b	1023
KMTX40LP1K-R32W32-1K1K	1kb	1kb	1024
KMTX40LP2K-R32W32-2K256	2kb	2kb	256
KMTX40LP2K-R32W32-2K512	2kb	2Kb	512
KMTX40LP4K-R32W32-4K128	4kb	4kb	128
KMTX40LP4K-R32W32-4K256	4kb	4kb	256
KMTX40LP4K-R32W32-4K511	4kb	4kb	511
KMTX40LP8K-R32W32-8K128	8kb	8kb	128
KMTX40LP8K-R32W32-4K510	8kb	4kb	510
KMTX40LP16K-R32W32-4K508	16kb	4kb	508
KMTX40LP32K-R32W32-4K502	32kb	4kb	502
KMTX40LP64K-R32W32-4K480	64kb	4kb	480
KMTX40LP128K-R32W32-16K248	128kb	16kb	248
KMTX40LP256K-R32W32-16K240	256kb	16kb	240
KMTX40LP512K-R32W32-64K120	512kb	64kb	120
KMTX40LP1M-R32W32-64K104	1Mb	64kb	104