

INDUSTRY'S FIRST AND ONLY 4MB LOGIC NON-VOLATILE MEMORY IP

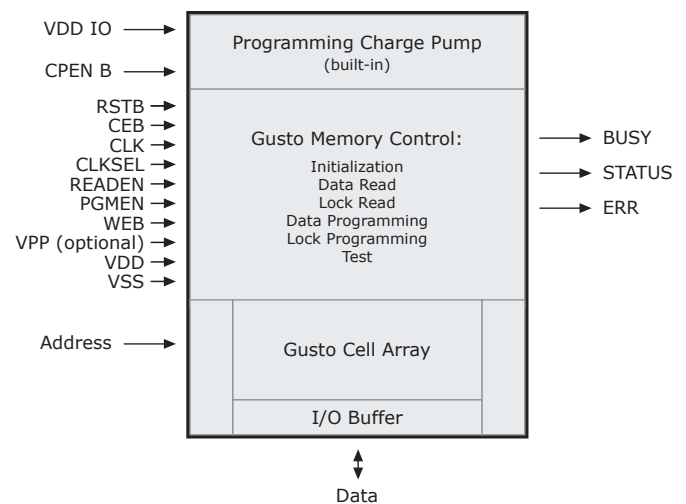
1.1 General Description

With 4x the capacity of the previous largest embedded non-volatile memory (NVM) IP, Gusto can store and safeguard firmware code critical to vertical system-on-chip (SoC) applications – code that delivers vital differentiating functionality. Gusto allows SoC developers to integrate significantly more software functionality into an SoC than ever before and modify it in response to changing market needs, confident that the data is secure. Gusto shatters the capacity limitation barrier that has – until now – restricted NVM IP to smaller storage tasks such as non-differentiating configuration, calibration and trim; and yield recovery. For the first time, NVM now can support the significant firmware code storage requirements of SoCs targeted at applications such as hand-held and home baseband; mobile application processors; global positioning systems (GPS); netbooks; hand-held mobile Internet devices (MID); wireless local area networks (WLAN); radio frequency (RF) wireless; and multimedia applications, including digital television (DTV) and set-top box (STB) media processors.

In addition to its market-leading capacity, Gusto offers 4x greater density and 4x higher performance than XPM, with 10x less active power consumption and 40x less standby power consumption. Unlike on-chip Flash memory, it safeguards critical firmware code from reverse-engineering using proven Kilopass technology that has achieved third-party security certification from 180nm to 65nm, with 40nm soon to come.

1.2 Features

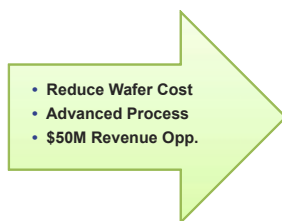
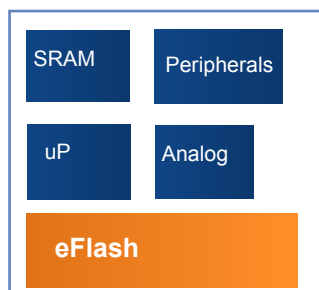
- One-time programmable synchronous memory
- Support 40LP and 45 SOI
- Configurable options
 - 512Kb to 4Mb Gusto memory
 - External VPP programming with field programmability features with internal charge pump
 - Sector lock
 - Data bus interface
 - Program: x32
 - Read: x32
 - Random access and page mode options
 - Read operating voltage
 - VDD (core supply)
 - VDDIO (2.5V for 40LP, 1.8V for 45 SOI)
 - Asymmetric power domain shut down
 - ROM conversion with ROM-it!
- SEC-DEC error correction scheme
- Built in manufacturing patterns
- Multi-foundry availability – TSMC, UMC, and IBM



- Proven 2T bitcell technology from 500,000 manufactured wafers
- Data Retention: 10 years
- Deliverables
 - Front-end: FRAM, Antenna LEF, Verilog model, Synopsys models
 - Back-end: GDS, DRC & LVS reports, PIPO log
 - Collateral: datasheet, test methodology guide, integration guide, application notes

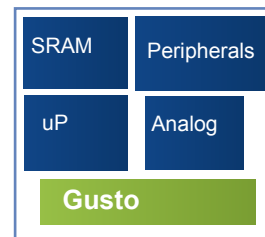
1.3 Applications

1

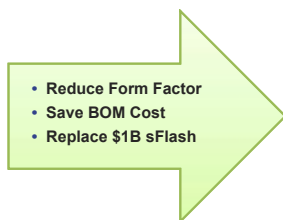
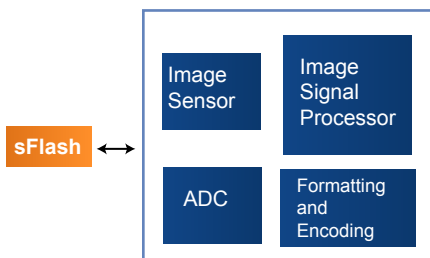


- Reduce Wafer Cost
- Advanced Process
- \$50M Revenue Opp.

eFlash Alternative

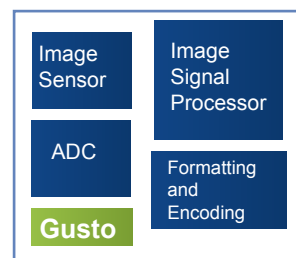


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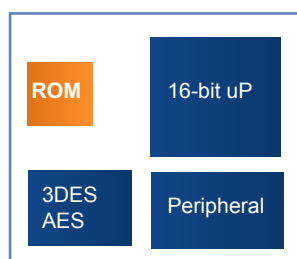


- Reduce Form Factor
- Save BOM Cost
- Replace \$1B sFlash

sFlash Alternative



3



- Faster Time to Market
- \$2M in Mask Savings

ROM Alternative



- Consumer: application processor, media processor, image signal processor
- Handheld baseband SOC
- Home baseband SOC
- Mobile application process (GPS, netbook, MID)
- WLAN SOC; MFR
- RF wireless SOC

1.4 Measurable Benefits of Gusto

Benefits	Customer Parameters	Result
Cost savings from EEPROM/S-Flash	<ol style="list-style-type: none">2 Mb of external EEPROM/S-Flash (\$0.25/chip, plus ~ \$0.10 in system overhead) = \$0.35/chip in BOM cost.Average \$4,000/wafer cost over 3 years of product life50M chips per year in production volume	<ol style="list-style-type: none">Savings of \$12.5M /year (\$17.5M vs. \$5M)Reduces board form factor4X higher performance than quad S-Flash
Time-to-market savings from programmable ROM code	<ol style="list-style-type: none">5 different ROM codes per base SOC chip for different end-customer or product line.Each ROM code takes 2 rev from alpha to production quality.Each ROM rev takes 40 days from code to chip deliveryEach diffusion ROM mask cost is \$200K	<ol style="list-style-type: none">Saves \$2M in mask costSaves 80 days in field trial
Enable embedded secure code storage	<ol style="list-style-type: none">< 8Mb of security firmware, OS kernel, and keys.M-banking, & conditional access vendors demand on-die storage of secure software and authorization	<ol style="list-style-type: none">Only mobile-SOC to pass CA securityMeets even DOD security standardEliminates need for MCM



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