# NxH5104 4MBit SPI EEPROM

February 2017, by Karolien De Baere
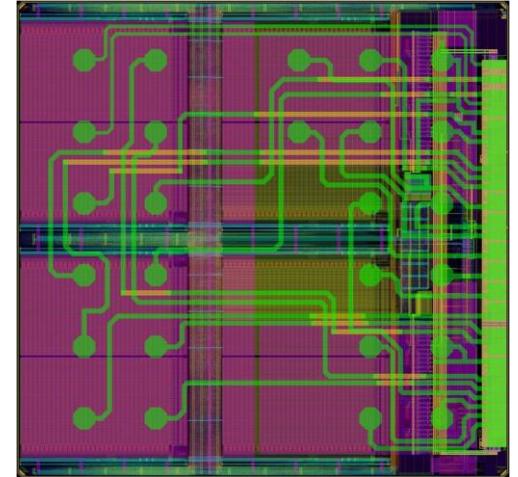
# Introducing NxH5104 4MBit EEPROM

**4MBit or 500kByte**
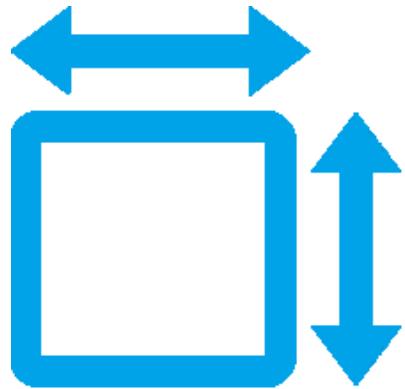
**2.8mm by 2.7mm**
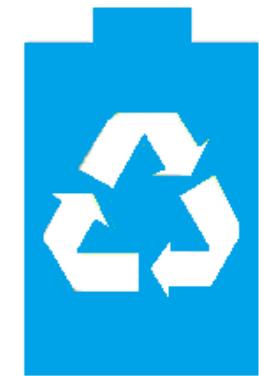
**Av. write current at 0.7mA**

**Write protection**

# NxH5104 – ultra low power 4MBit SPI EEPROM

| | |
|---|---|
| **Minimal footprint** | 4Mbit in **7.8mm² area** (2.80mm by 2.74mm) **WL-CSP** package with **13 bumps, 400um pitch** Highly integrated: 1 external cap |
| **Supply direct from battery** | With integrated Power Management Unit to support ZnAir, NiMH and Silver-Zink batteries, offering direct operation from **1.0 .. 2.0V supply** |
| **Ultra low power** | Designed for minimal average and peak currents: <br>• Power-down < 5 uA <br>• Average read current at .6 mA |
| **Interfaces** | 128-byte and **256-byte page** access via **SPI** <br>• Speed up to 10MHz |
| **Auxiliary supply** | **Auxiliary supply** with current limiting allows supplying e.g. a LED <br>• 2mA up to 3.2V |
| **Reliable** | Operating temperature -20 to 85 degrees <br>>10 years data retention <br>500 000 program cycles |

NXP

# EEPROM application domains – some examples

Hearing Aids

Metering

Headset Hearables

Medical

**NXP**

# NxH5104 Competitor benchmark

There are no 4MBit EEPROM devices announced. Thus benchmark against existing 2MBit EEPROM and 4MBit flash.

| | ST M95M02-DR 2MBit SPI EEPROM | NXP NxH5104 4MBit SPI EEPROM | OnSemi CAT25M02 2MBit SPI EEPROM | MicroChip SST26WF040B 4MBit SPI Flash |
|---|---|---|---|---|
| Features | 2Mbit SPI @ 5MHz | 4Mbit SPI @ 10MHz | 2MBit SPI @ 5MHz | 4Mbit SPI @40MHz |
| Supply | 1.8-5.5V | 0.9-2.0V | 1.6..3.6V | 1.65-1.95V |
| Current @1.8V | •Standby <5uA<br>•Read 3mA<br>•Write 3mA | •Power down <5uA<br>•Read 600uA<br>•Program 1.5mA | • Standby <3uA<br>• Read >1.2mA<br>• Write <2mA | •Standby 2uA<br>•Read 10 mA<br>•Write 25 mA |
| Reliability | 1 MCycles<br>200Yrs retention<br>-40°C to +85°C | 500 kCycles<br>>10yrs retention<br>-20°C to +85°C | 1 MCycles<br>100yrs retention<br>-40°C to +125°C | 100 kCycles<br>100yrs retention<br>-40°C to +85°C |
| Drive LED | No | Yes | No | No |
| Footprint/ package (*) | 7.2mm2 WLCSP8 SO8 | 7.8mm2 WLCSP13 | 6.4mm2 WLCSP8 SO8 | SO8 WSON8 – 30mm2 |

Alternative recent technologies as MRAM and FRAM require higher supply levels (e.g. 3.3V or 2.5V) and are very expensive.

# NxH5104 4MBit SPI EEPROM
## Block diagram
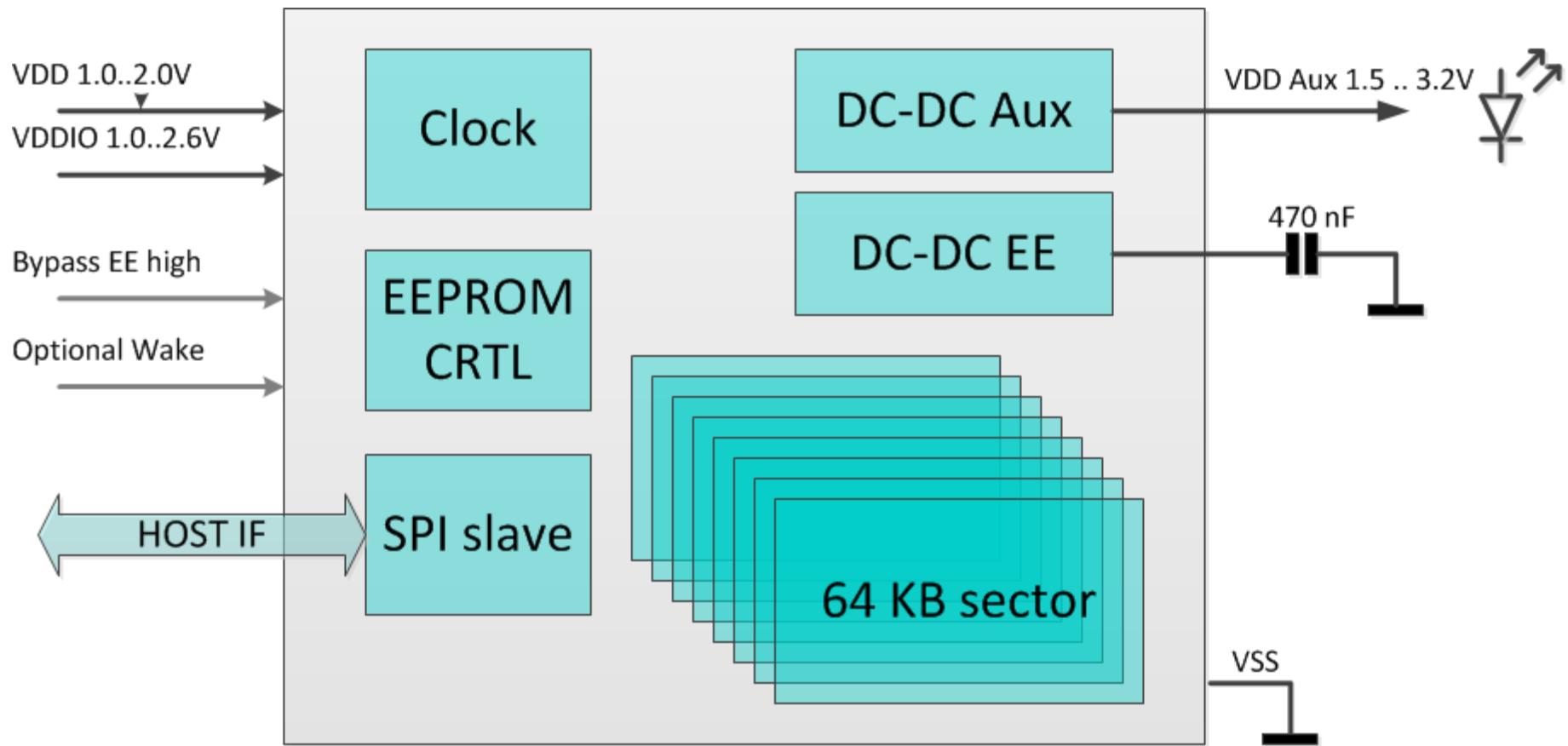
# NxH5104 4MBit SPI EEPROM
## Package outline
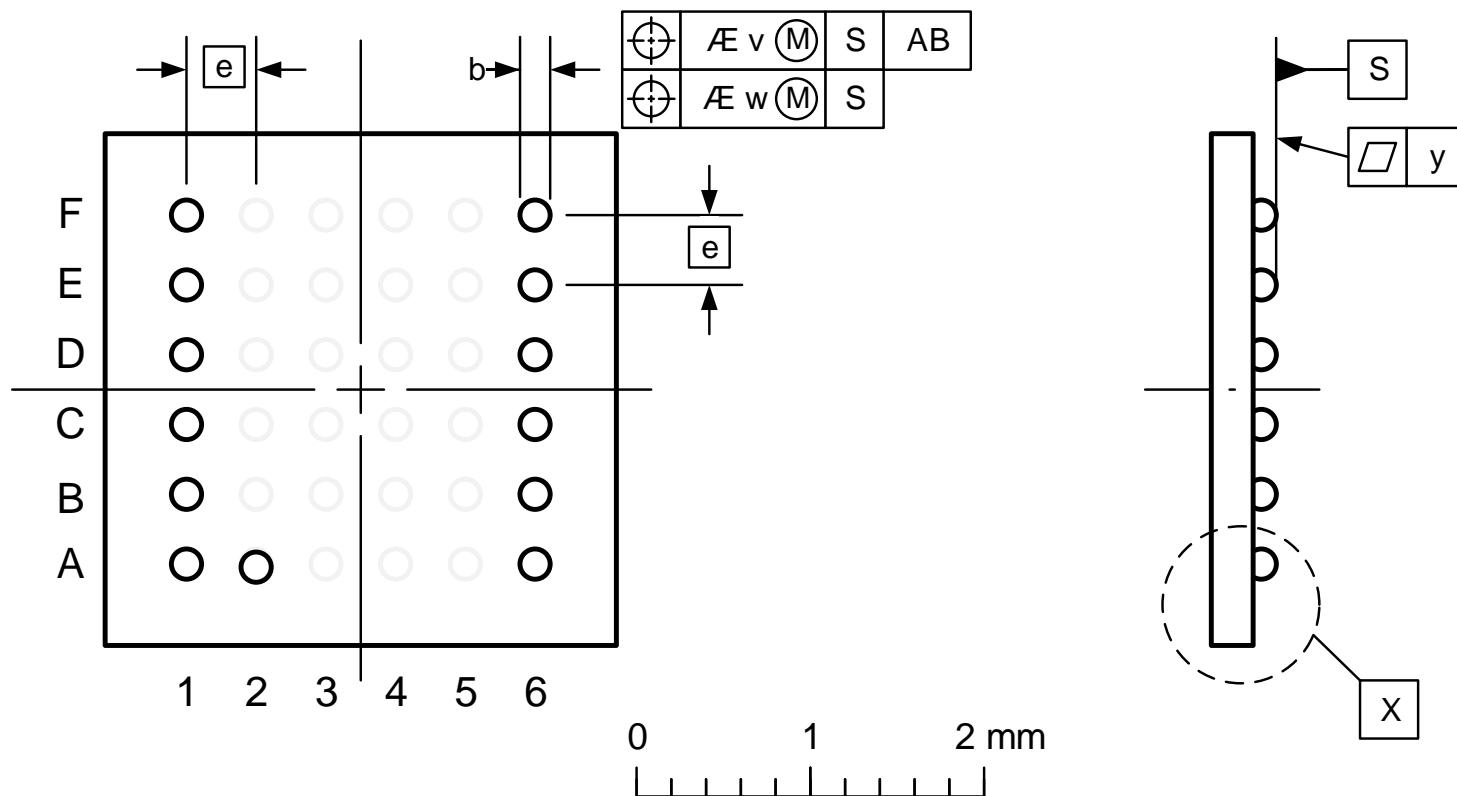


Dimensions (mm are the original dimensions)

| Unit | | A | $A_1$ | $A_2$ | b | D | E | e | $e_1$ | $e_2$ | v | w | y |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| mm | max | 0.42 | 0.115 | 0.305 | 0.140 | 2.83 | 2.77 | | | | | | |
| | nom | 0.38 | 0.100 | 0.280 | 0.125 | 2.80 | 2.74 | 0.4 | 2.0 | 2.0 | 0.15 | 0.05 | 0.05 |
| | min | 0.34 | 0.085 | 0.255 | 0.110 | 2.77 | 2.71 | | | | | | |

# SO-8 style evaluation board
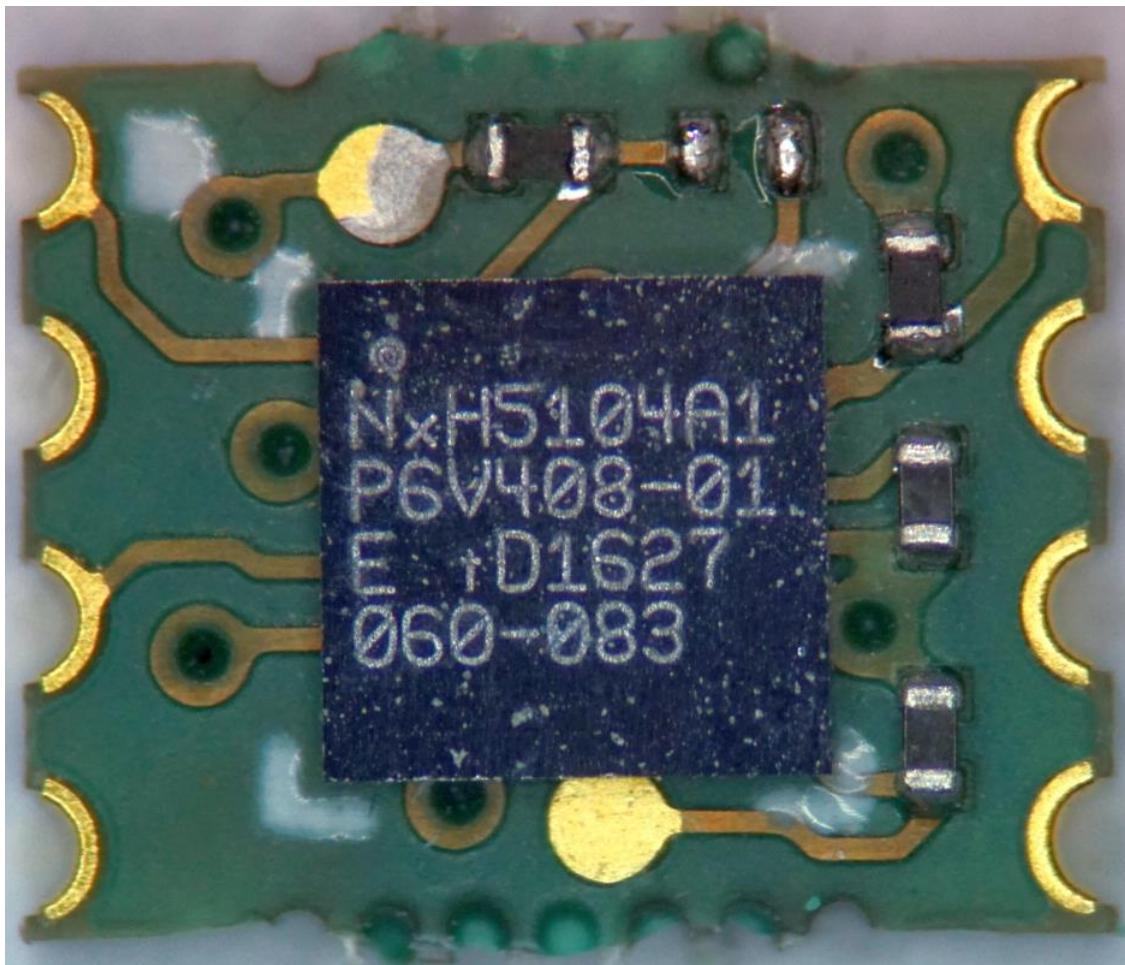
# NxH5104 4MBit SPI EEPROM
## Application modes

- Single supply  for VDD and VDDIO
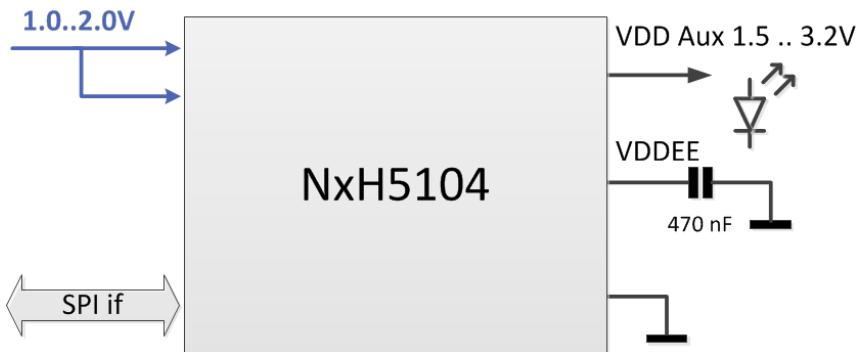
- Single HIGH supply  for VDD and VDDIO

- Dual supply  for VDD and VDDIO