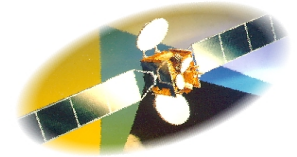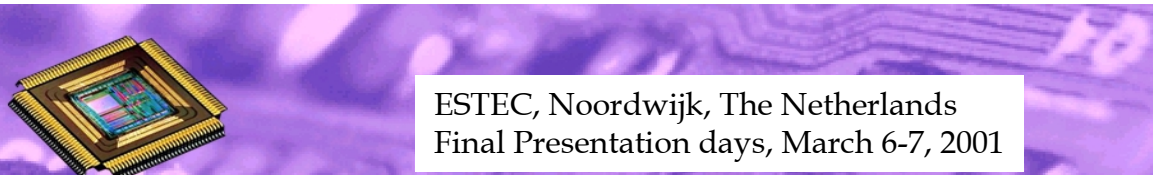**ATMEL**

**WIRELESS & µC**

# FEC decoder
# SMCS & SMCS Lite
# DPC
# AGGA 2 & EVI 32
# for space

F.Beghin, D. de Saint Roman,T.Corbière, G. Mantelet, ATMEL WM, France
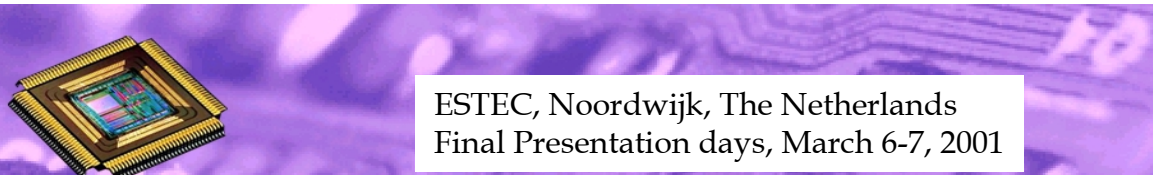
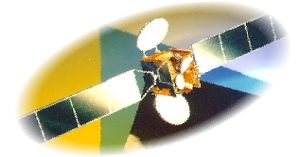ESTEC, Noordwijk, The Netherlands
Final Presentation days, March 6-7, 2001

# Agenda

- **FEC decoder**
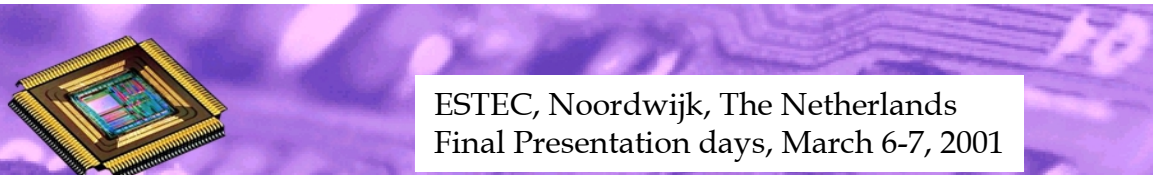  - ➢ **Introduction**
  - ➢ **Need for FEC**
  - ➢ **Viterbi and Reed Solomon decoder chip: TSS902E**
  - ➢ **Ordering informations**
  - ➢ **Conclusions**
- **SMCS & SMCS Lite**
- **DPC**
- **AGGA 2**
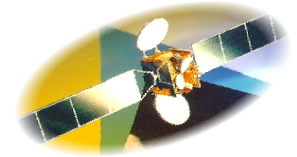- **EVI 32**
- **Standard ASIC reminder**

# Introduction (1)

- **ESTEC funded program**
- **Teamed development activity:**
  - ➤ **ATMEL WM:**
    - ▪ **models development**
    - ▪ **silicon implementation**
    - ▪ **industrialization**
  - ➤ **Alcatel Space Industries:**
    - ▪ **models validation**
    - ▪ **chip validation and characterization**
- **ETS 300421compliant for DVB & DVB-S**
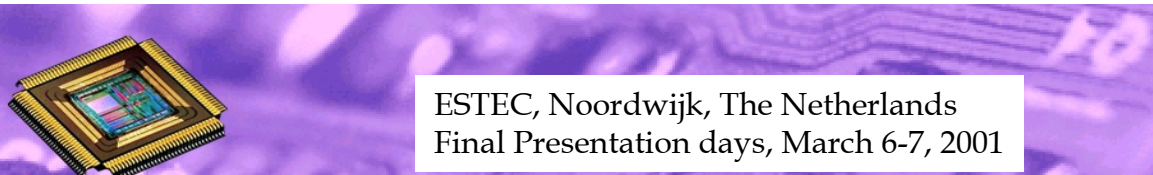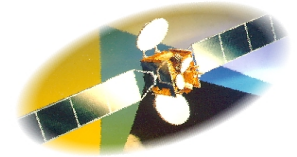- **ISO/IEC-CD 13818-1 MPEG-II transport layer protocol**

# Introduction (2)

- **Designed on MG1265E, 5 V, MQFPF132:**
  - ➢ **SEU LET better than 30 MeV**
  - ➢ **Total dose better than 50 Krads**
  - ➢ **Latch up immune**
  - ➢ **Covered by QML Q & V DSCC certification, effective December 10, 99 but no SMD/AID, therefore, available only as "QML databook" product**
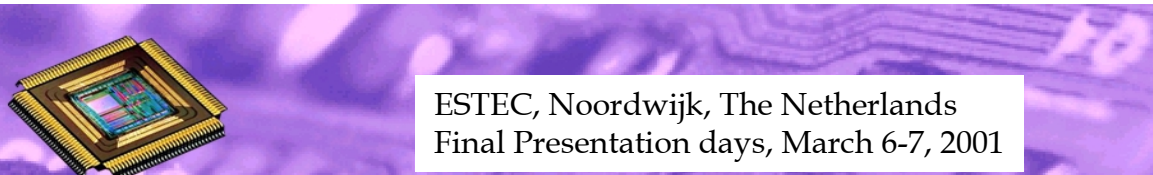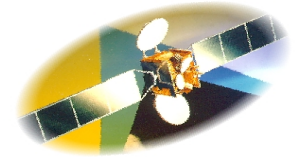- **Application support through ATMEL WM application lab**

# Need for FEC decoder

- **Regenerative satellites allow:**
  - ➢ **higher level of interference immunity**
  - ➢ **on board processing**
  - ➢ **to accommodate more noisy transmission media**
  - ➢ **lower emitted power from ground stations/mobiles**
  - ➢ **lower antenna sensitivity of ground stations/mobiles antenna**
  - ➢ **cheaper portable systems**
- **FEC:**
  - ➢ **have extended trackrecords,**
  - ➢ **therefore, have been standardized,**
  - ➢ **allowing system designs**

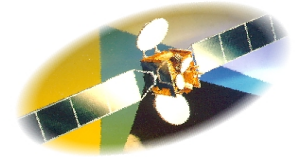# Viterbi & RS decoder chip: TSS902E (1)

- **Viterbi:**
  - ➤ **hard decision, or 3 bit soft decision decoder input**
  - ➤ **K=7 constraint length**
  - ➤ **3.5 dB Eb/No for a 2.E-4 BER (1/2 code rate)**
- **Reed Solomon:**
  - ➤ **supported programmable shortened code lengths: K = 34 to 239 bytes**
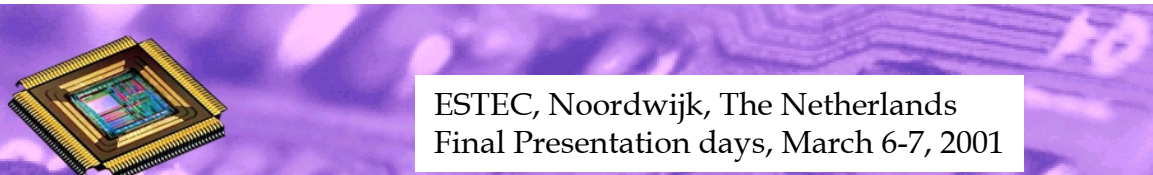  - ➤ **T = 8 bytes correction capability**
  - ➤ **16 bytes check symbols**

# Viterbi & RS decoder chip: TSS902E (2)
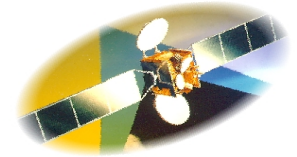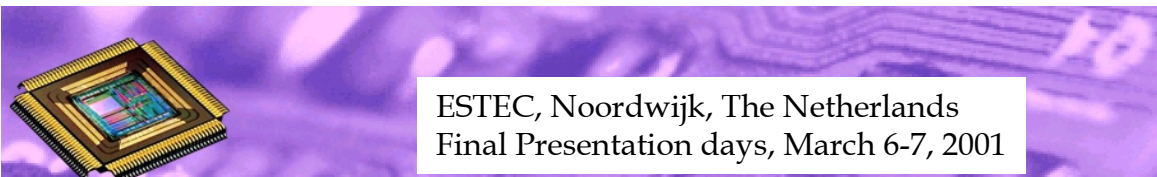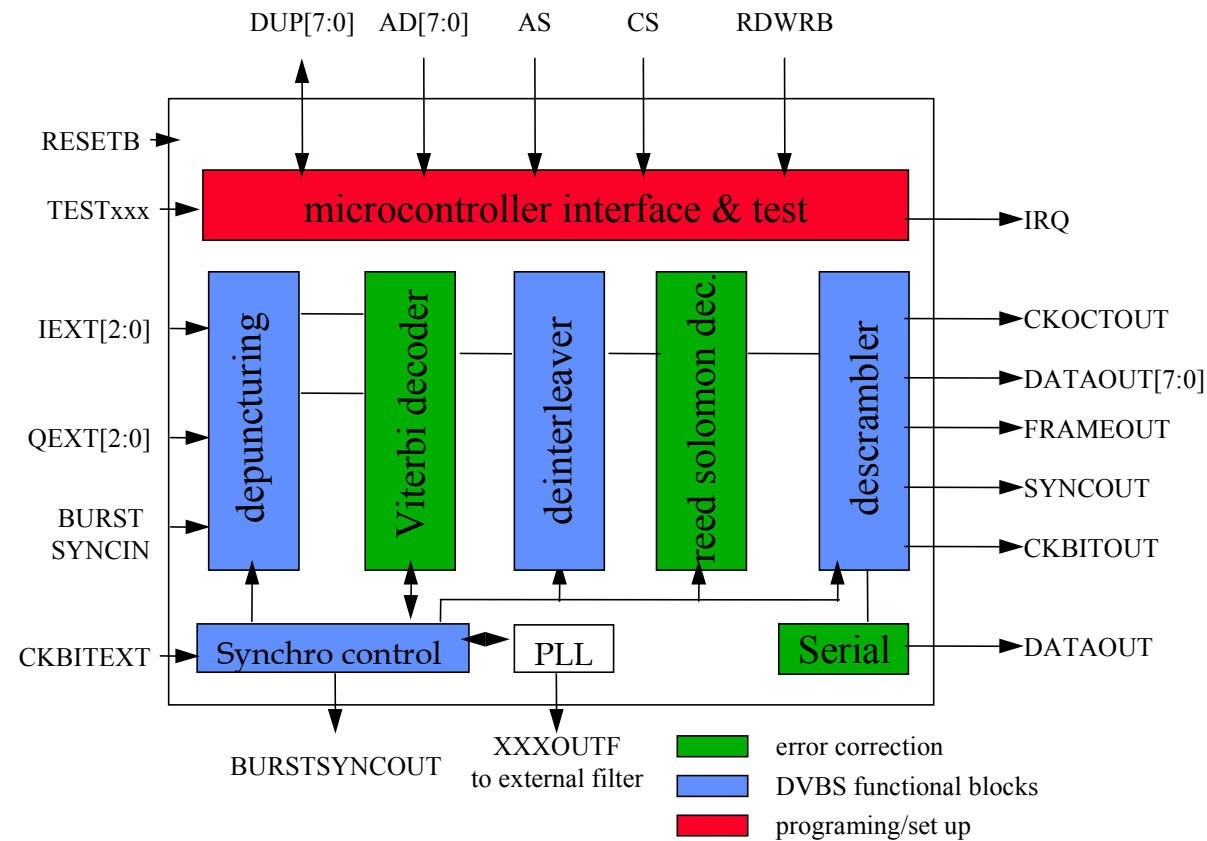
- **Miscellaneous:**
  - ➢ **selectable code rates: 1/2, 2/3, 3/4, 5/6 & 7/8, with automatic acquisition**
  - ➢ **synchro controller ( automatic for QPSK and BPSK)**
  - ➢ **de-interleaver (I = 12)**
  - ➢ **descrambler for energy dispersal**
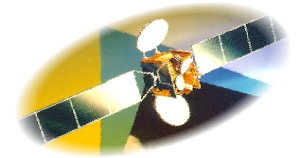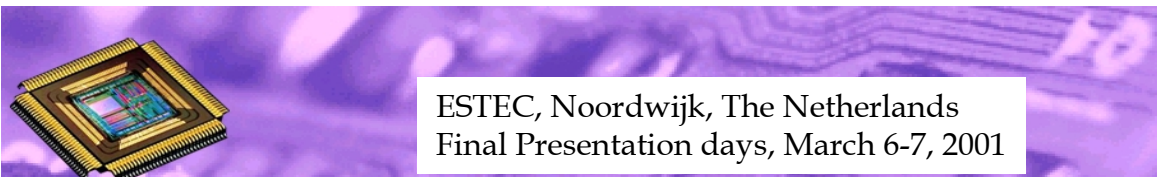  - ➢ **µcontroller interface for programmability and test**
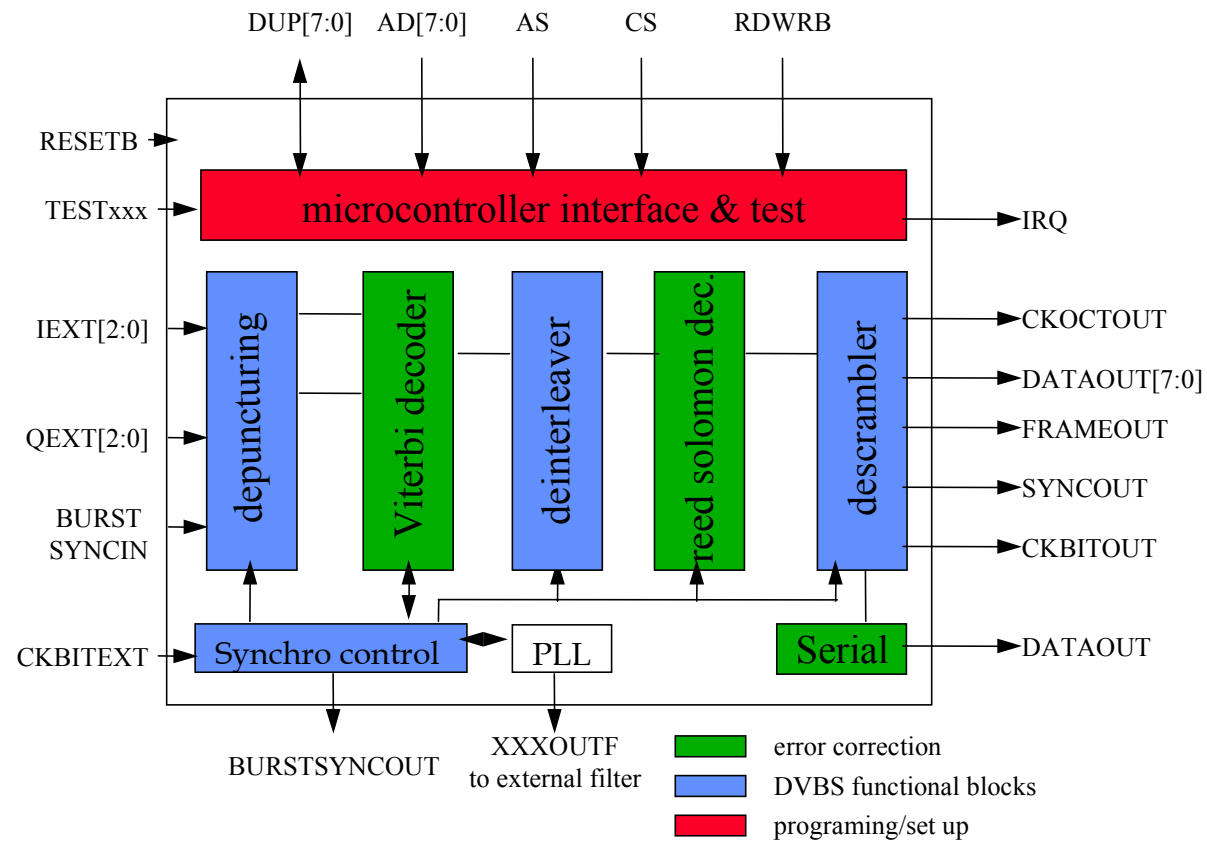
# Viterbi & RS decoder chip: TSS902E (3)

# Viterbi & RS decoder chip: TSS902E (3)

# Viterbi/RS decoder ordering informations

- **Part numbers**                              **Q flow**                    **MOQ**

  - ➢ **TSS902EMA-E**                    protos                          1
  - ➢ **TSS902EAM**                      -2 or Q                         25
  - ➢ **TSS902EAMQ**                     QML Q databook                  25
  - ➢ **TSS902EASC**                     SCC C                           25
  - ➢ **TSS902EASB**                     SCC B                           25
  - ➢ **TSS902EASV**                     QML V databook                  25
  - ➢ **TSS902EBM-E**                    die protos                      50
  - ➢ **TSS902EBMQ**                     die QML Q databook              50
  - ➢ **TSS902EBSV**                     die QML V databook              50

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# Conclusions

- **Delivered for projects in Europe, USA and India**
- **Burst mode verified and demonstrated**
- **Turbo codes are grabbing market share**
- **Demand is currently not active**
- **Blocks could be generated when demand shows up**
- **The resulting chip is available**
- **Though our ROI is negative**

# SMCS 332

- **Designed:**
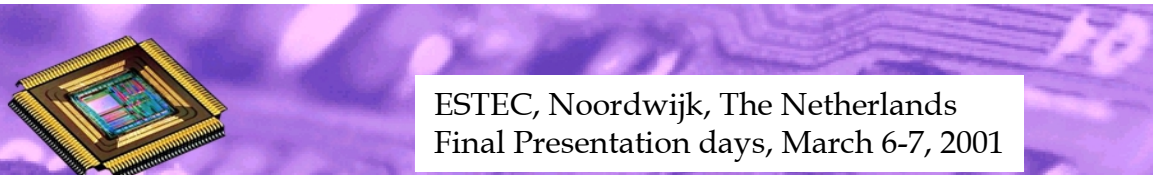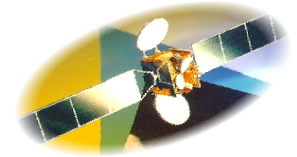  - ➢ **by DSS / ASTRIUM Germany**
  - ➢ **on MG1140E, 5 V, MQFPF/L196**
- **SEU LET better than 30 MeV**
- **Total dose better than 50 Krads**
- **Latch up immune**
- **Covered by QML Q & V DSCC certification, effective December 10, 99, but no SMD/AID, therefore, only available as "QML databook" product**
- **Application support by ATMEL WM application lab, backed by Astrium Germany**
- **Astrium royalty included in the price list**
- **STM IEEE-1355 license fee included in the price list**

# SMCS332 ordering informations (1)

- **Part numbers**      **Lead form**      **Q flow**      **MOQ**

| Part numbers | Lead form | Q flow | MOQ |
|---|---|---|---|
| ➤ **TSS901EMA-E** | L | protos | 1 |
| ➤ **TSS901EAM** | L | -2 or Q | 25 |
| ➤ **TSS901EAMQ** | L | QML Q databook | 25 |
| ➤ **TSS901EASC** | L | SCC C | 25 |
| ➤ **TSS901EASB** | L | SCC B | 25 |
| ➤ **TSS901EASV** | L | QML V databook | 25 |
| ➤ **TSS901EMC-E** | die | protos | 50 |
| ➤ **TSS901ECMQ** | die | QML Q databook | 50 |
| ➤ **TSS901ECSV** | die | QML V databook | 50 |

# SMCS332 ordering informations (1)

- **Part numbers**

| | Lead form | Q flow | MOQ |
|---|---|---|---|
| ➢ **TSS901EMB-E** | **F** | **protos** | **1** |
| ➢ **TSS901EBM** | **F** | **-2 or Q** | **25** |
| ➢ **TSS901EBMQ** | **F** | **QML Q databook** | **25** |
| ➢ **TSS901EBSC** | **F** | **SCC C** | **25** |
| ➢ **TSS901EBSB** | **F** | **SCC B** | **25** |
| ➢ **TSS901EBSV** | **F** | **QML V databook** | **25** |

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Final Presentation days, March 6-7, 2001

# SMCS lite

- **Designed:**
  - ➢ **by DSS / ASTRIUM Germany**
  - ➢ **on MG1090E, 5 V, MQFPF100**
- **SEU LET better than 30 MeV**
- **Total dose better than 50 Krads**
- **Latch up immune**
- **Covered by QML Q & V DSCC certification, effective December 10, 99, but SMD/AID or "QML databook" not yet defined**
- **Application support by ATMEL WM application lab, backed by Astrium Germany**
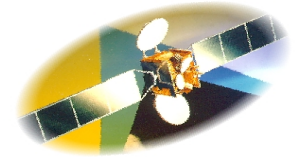- **Astrium royalty included in the price list**
- **STM IEEE-1355 license fee included in the price list**
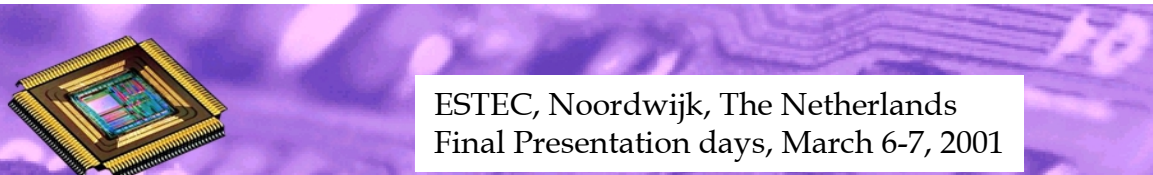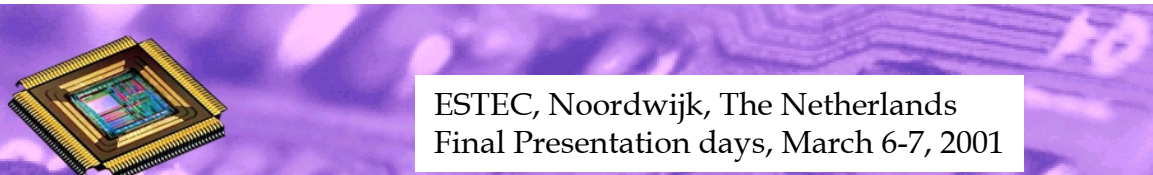
ESTEC, Noordwijk, The Netherlands
Final Presentation days, March 6-7, 2001
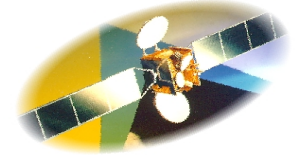
# SMCS Lite ordering informations

- **Part numbers**                          **Q flow**                               **MOQ**

  - ➢ **T7906EKT-E**          protos                                    1
  - ➢ **T7906EKT**            -2 or Q                                   25
  - ➢ **T7906EKTMQ**          QML Q/QML Q databook                      25
  - ➢ **T7906EKTSC**          SCC C                                     25
  - ➢ **T7906EKTSB**          SCC B                                     25
  - ➢ **T7906EKTSV**          QML V/QML V databook                      25
  - ➢ **T7906EDD-E**          die protos                                50
  - ➢ **T7906EDDMQ**          die QML Q/QML databook                    50
  - ➢ **T7906EDDSV**          die QML V/QML databook                    50
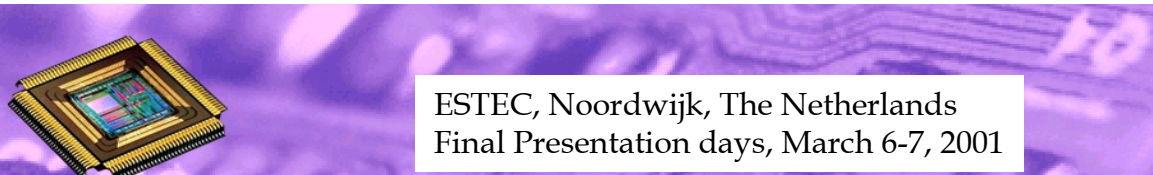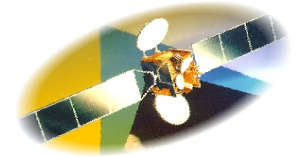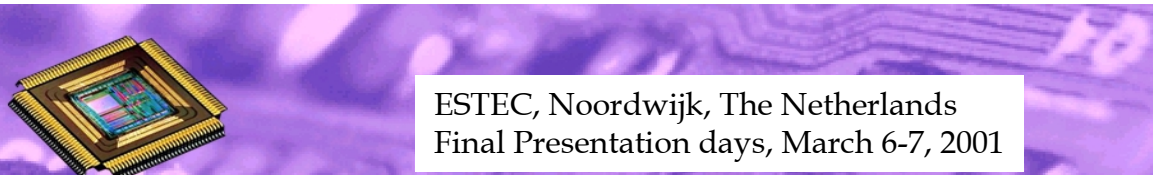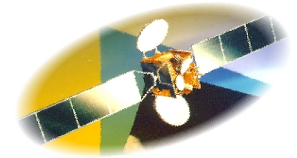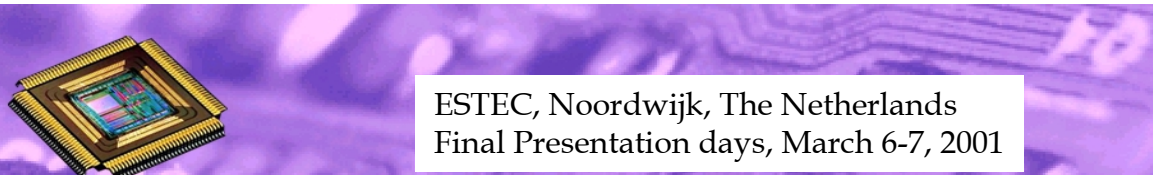
# DPC

- **Designed:**
  - ➤ **by ASTRIUM France**
  - ➤ **on MG2265E, 5 V, MQFPF256**
- **SEU LET better than 20 MeV**
- **Total dose better than 70 Krads**
- **Latch up immune**
- **Covered by QML Q & V DSCC certification, effective December 10, 99, but SMD/AID or "QML databook" not yet defined**
- **Application support by ATMEL WM application lab, backed by Astrium**
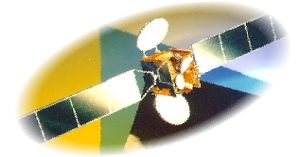- **Astrium royalty included in the price list**
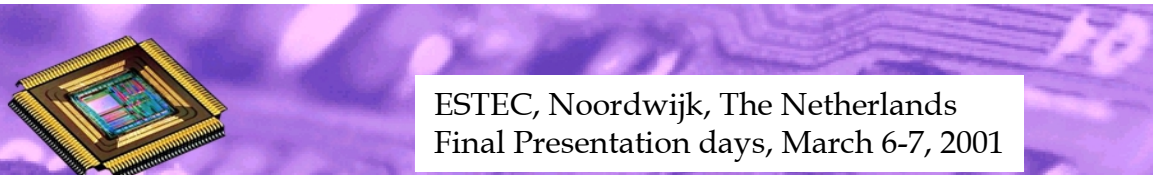
# DPC ordering informations

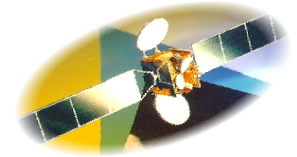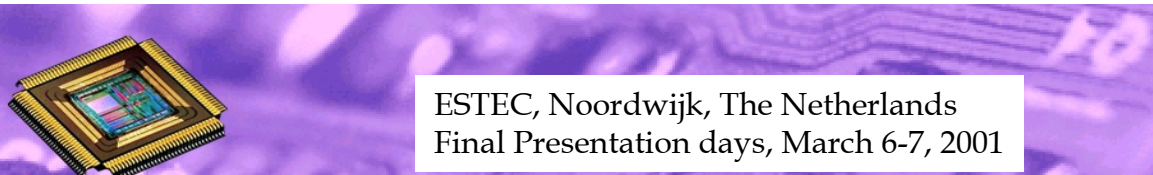| Part numbers | Q flow | MOQ |
|---|---|---|
| T7904EKZ-E | protos | 1 |
| T7904EKZ | -2 or Q | 25 |
| T7904EKZMQ | QML Q/QML databook | 25 |
| T7904EKZSC | SCC C | 25 |
| T7904EKZSB | SCC B | 25 |
| T7904EKZSV | QML V/QML databook | 25 |
| T7904EDD-E | die protos | 50 |
| T7904EDDMQ | die QML Q/QML databook | 50 |
| T7904EDDSV | die QML V/QML databook | 50 |

# AGGA-2

- **Designed:**
  - ➢ **by ESTEC / SES**
  - ➢ **on MG2265E, 5 V, MQFPL160**
- **SEU LET better than 20 MeV**
- **Total dose better than 70 Krads**
- **Latch up immune**
- **Covered by QML Q & V DSCC certification, effective December 10, 99, but SMD/AID or "QML databook" not yet defined**
- **Application support by ATMEL WM application lab, backed by ESTEC**
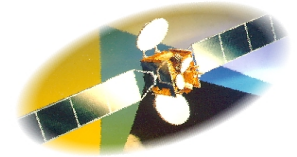- **No royalty included in the price list**
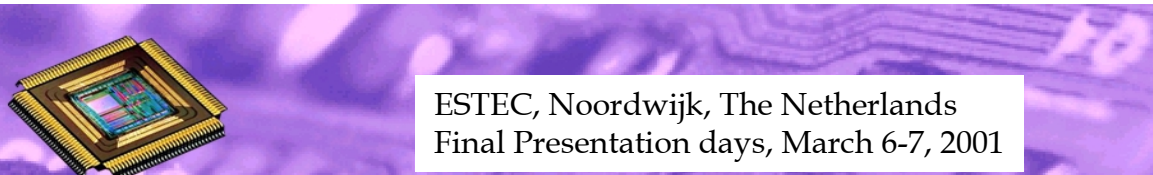
# AGGA 2 ordering informations

- **Part numbers**                    **Q flow**                          **MOQ**

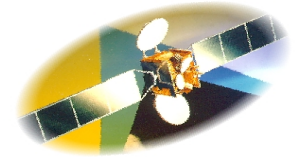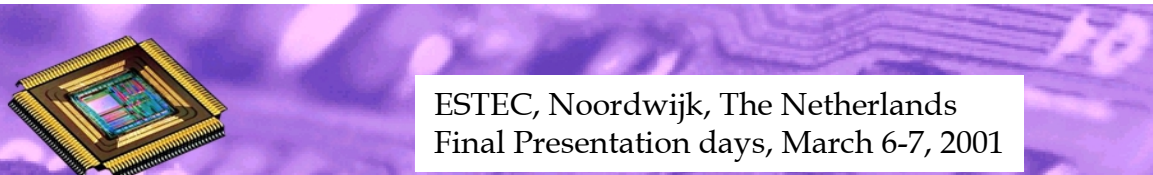| | Part numbers | Q flow | MOQ |
|---|---|---|---|
| ➢ | **T7905EFW-E** | protos | 1 |
| ➢ | **T7905EFW** | -2 or Q | 25 |
| ➢ | **T7905EFWMQ** | QML Q/QML databook | 25 |
| ➢ | **T7905EFWSC** | SCC C | 25 |
| ➢ | **T7905EFWSB** | SCC B | 25 |
| ➢ | **T7905EFWSV** | QML V/QML databook | 25 |
| ➢ | **T7905EDD-E** | die protos | 50 |
| ➢ | **T7905EDDMQ** | die QML Q/QML databook | 50 |
| ➢ | **T7905EDDSV** | die QML V/QML databook | 50 |

# EVI 32

- **Designed:**
  - ➢ **by ASTRIUM France**
  - ➢ **on  MG2142P, 5 V, MQFPF256….**
- **SEU LET better than 20 MeV**
- **Total dose better than 100 Krads**
- **Latch up immune**
- **Covered by QML Q & V DSCC certification, effective December 10, 99, but SMD/AID or "QML databook" not yet defined**
- **Application support by ATMEL WM application lab, backed by Astrium**
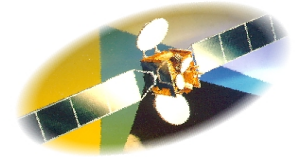- **Royalty included in the price list**
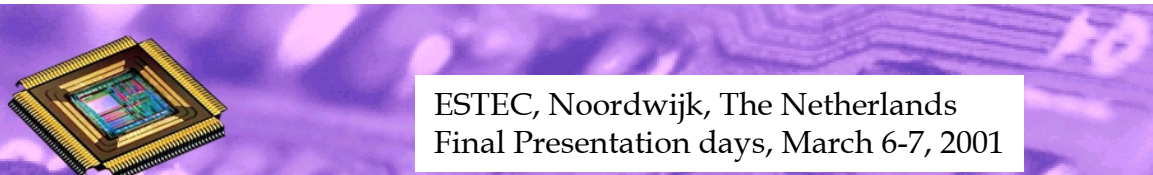
# EVI 32 ordering informations

| Part numbers | Q flow | MOQ |
|---|---|---|
| T7907EFW-E | protos | 1 |
| T7907EFW | -2 or Q | 25 |
| T7907EFWMQ | QML Q/QML databook | 25 |
| T7907EFWSC | SCC C | 25 |
| T7907EFWSB | SCC B | 25 |
| T7907EFWSV | QML V/QML databook | 25 |
| T7907EDD-E | die protos | 50 |
| T7907EDDMQ | die QML Q/QML databook | 50 |
| T7907EDDSV | die QML V/QML databook | 50 |

# Reminder on ATMEL WM Standard ASIC / ASSP offering

- **Most of the time, designed by a third company, who owns it, for an application for which it is then specified**

- **A procurement spec is then issued (SCC or SMD/AID)**

- **Front end application support is provided by ATMEL WM, but backed by design owner which is therefore further entitled for royalty which is included in the price list**

- **As a consequence, there is no possibility for procurement spec evolution / change**