SGS-THOMSON MICROELECTRONICS

MICROMODULES

SMART CARD IC's

EMBEDDING PROCESS

BRIEF DATA

INTRODUCTION

The manufacturing process of Smartcards involves various components and technologies in order to issue a finished product:

– a plastic card into which a cavity is made for micromodule embedding.

– a micromodule, the specific package of the die.

THE PLASTIC CARD

Usually a plastic card is made of PVC, ABS, or other materials having equal or better performance. Some characters can be embossed on it and/or a magnetic strip added. A card becomes a Smartcard once a silicon chip is added to it. For that purpose, a cavity is made into the card in order to embed the electronic micromodule.

Physical dimensions, contacts assignments of SGS-THOMSON micromodules are in full compliance with ISO 7816.

THE MICROMODULE

The micromodule is the specific package dedicated to Smartcards, allowing:

– electrical connections with the external device via the contacts on one side.

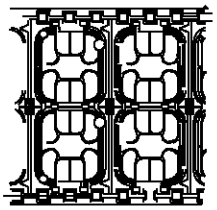
– interface area with the card body on the other side, suitable to the embedding process.

The micromodule is constituted of the silicon chip, the interconnection layer on which the die is assembled and wired, and electrical contacts.

– The silicon chip

The chips used in Smartcards vary in form and function. From the lower cost memory chips for prepaid applications, memories integrating advanced authentication functions and anti tearing for second generation telephone applications, up to the high end chips using a CPU core, Ram, ROM and EEPROM memories up to 8Kbytes, and chips integrating a dedicated co-processor for Public Key Cryptography schemes, SGS-THOMSON offers its whole portfolio of Smartcards IC's in micromodule.

SGS THOMSON MICROMODULE EXAMPLE



Continuously striving to improve the reliability of its products, SGS-THOMSON added to its 3rd generation of Microcontrollers an ISSUER configuration, which allows fast and efficient test after assembly. Capitalising on the experience on quality and reliability results obtained with Non volatile memories technologies, and aware that the process of assembly may impact the reliability level of the EEPROM cells, SGS-THOMSON enables Card Issuers to test cards at the last step of manufacturing. In addition, the level of security is increased, by submitting the ISSUER configuration to the successful presentation of a transport key.

– The interconnection layer has several purposes:
  To ensure the chip assembly
  To provide the electrical contacts
  To be the embedding interface (to be glued in the card).

It is made of:

– Metallised epoxy tape.

– Contacts side, which is made to be in full conformity to ISO7816.

The main steps to make micromodules are assembly and test. SGS-THOMSON's policy, for security and know how reasons, is to keep test operations in the SGS-THOMSON Smartcard Manufacturing site.

SGS-THOMSON Microelectronics currently provides Smartcards IC's in micromodule form in the two following standards, which differ in term of distance between the indexing holes on the tap:

– 35 mm
– Super 35

SECURITY PROCEDURES and TRACEABILITY

The transport of wafers or assembled micromodules between the SGS-THOMSON Smartcard manufacturing site and the assembly plants is carried out in special reinforced vehicles. These plants (assembly and test) apply "restricted access" rules in regards to physical access and production information. A controlled storage area is designated for the assembly and test activities.

For third generation MCU's, SGS THOMSON writes traceability data in the OTP zone (reserved by SGS THOMSON). The traceability data uses a total of 6 bytes and contains the following information, coded in binary :

Diffusion site :	000	for ROUSSET
	001	for AGRATE
Year	000	for 1994
	001	for 1995
	002	for 1996

Micromodules are assembled in reels, which contain all the dice of the wafer assembled, whether good or bad. The traceability is insured by a label glued on the reel which contains the following information:order number

– batch number
– device type (product commercial reference)
– total quantity and good units shipped per reel.

Product portfolio in 35mm standard tape

PRODUCT	MICROMODULE
ST1200	U ; UI ;
ST130x ST14C02C ST16612 ST16B22	U ; UI ; UR

Product portfolio in Super 35mm standard tape

PRODUCT	MICROMODULE
ST1200 ST133X ST14E32F / ST15E32F	D1
ST14C02C / ST14C04C	D2
ST16F48 ST16601 ST16SF48 / SF44 / SF42 ST16CF54	D4
FRENCH BANKS ST16301 / ST16601	D5

Note : ST16601 / ST16SFxx / ST16CF54 are third generation MCU's.

TRACEABILITY DATA