QUALIFICATION REPORT

SHORT FORM

DEVICE INFORMATION

TYPE **TS92X**

FUNCTION **RAIL TO RAIL HIGH OUTPUT CURRENT OPERATIONAL AMPLIFIER FAMILY**

FAMILY **R/R OPAMP**

DIE PROCESS

	TS921	**TS922**	**TS924**	**TS925**
PROCESS	HF2CMOS	HF2CMOS	HF2CMOS	HF2CMOS
WAFER SIZE	6"	6"	6"	6"
CHIP DIMENSION (µm)	1380 * 1190	1870*1410	1980*2500	1990*2670
MASK REFERENCE	PF40	PF36	PF46	PE24
METALLIZATION	Al -Si-Cu	Al -Si-Cu	AlSiCu	AlSiCu
PASSIVATION	SiO2 + SiN	SiO2 + SiN	SiO2 + SiN	SiO2 + SiN
PASSIVATION METHOD	CVD	CVD	CVD	CVD
THICKNESS OF PASSIVATION(µm)	0.5 + 0.6	0.5 + 0.6	0.5 + 0.6	0.5 + 0.6

PACKAGE PROCESS

PACKAGE TYPE	SO	TSSOP	DIP	SOT23-5
LEAD FRAME MATERIAL	Copper	Copper	Copper	Copper
LEAD COATING	Tin plating	Tin plating	Tin Dipping	Tin Dipping
DIE ATTACH	Silver filled epoxy glue	Silver filled epoxy glue	Silver filled epoxy glue	Silver filled epoxy glue
WIRE BOND PROCESS	Thermosonic ball bonding	Thermosonic ball bonding	Thermosonic ball bonding	Thermosonic ball bonding
WIRE MATERIAL	Gold	Gold	Gold	Gold
WIRE DIAMETER	25 um	25 um	25 um	25 um
MOLD MATERIAL	HC10-2 MP8000	KMC184-3a	MG46FC-AM	MP8000

STANDARD LINEAR ICs

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PRODUCT DEVELOPMENT FLOW

"Quality is what the customer says it is."
Tom Peters

Manufacturing and reliability must be considered at the design level in order to manufacture reliable products meeting customers' expectations.

New product development plans adopt the Quality Function Deployment **(QFD)** methodology as a basic tool to understand customers' requirements. This formally translates the customers' need into technical requirements as product specifications, process operations and manufacturing process controls, that represent the key points for the product finalization.

In SGS-THOMSON, a corporate procedure defines the product maturity, specifying three maturity levels with rules from one level to the next. They are: design, engineering and production. In addition there are various sub levels. This procedure governs the entire life cycle of a product from new product proposal to its obsolescence. It also determines when and how, engineering samples can be released at sub-maturity levels in a controlled manner by defining "for application study only" or "not yet fully qualified" on the customer documentation.

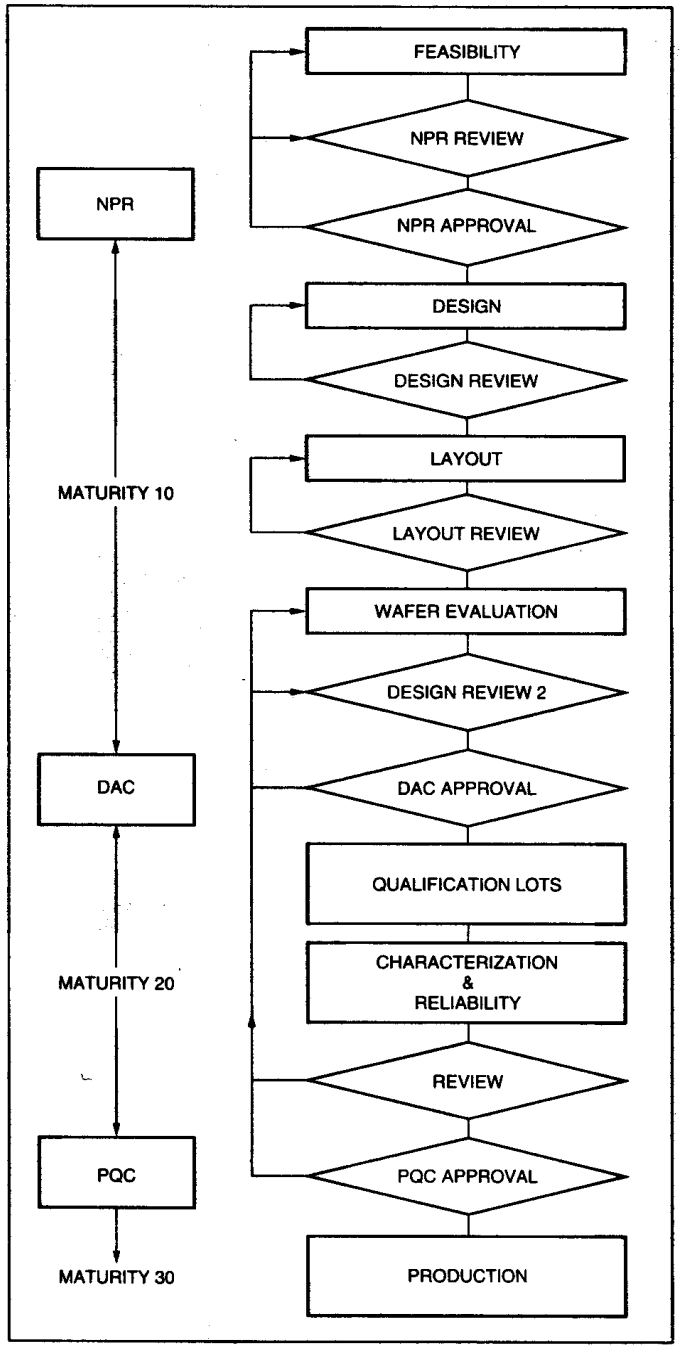
Each new product begins from the preparation of a target specification and a document called a New Product Request **(NPR)**, which contains business and technical details. The purpose of this first control is to evaluate the potential of the product and determine if there is sufficient justification to allocate design resources.

Once the NPR is approved the designers can start work. Designers work to clearly defined design rules which incorporate robust design principles. When the design is complete and the first working samples are available they are evaluated to make sure that the design is acceptable for the next phase, Engineering.

The results of these tests are included in the next key document, the Design Approval Certificate **(DAC)**. The approval of the DAC commits the company to a major investment so it is essential to ensure that the product is ready to proceed.

While a product is in design and characterization (maturity 10 & 20), samples may be given to customers with the documentation indicating "engineering samples for application study only and at the customers' risk" under the responsibility of the Division Manager.

New product is prepared for qualification through product characterization and reliability testing. A Product Qualification Certificate **(PQC)** which permits the new product to proceed to manufacturing must be approved by Group Management.



Product design qualification flow

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TS921

QUALIFICATION RESULTS

a) Electrical characterization

- ► Yield analysis on 2 front-end lots : conform to ST standard results
- ► Electrical parameters distribution on 3+1 lots (3*Sot23-5 + 1 SO8), 50 pieces
- ►at T = -40°C / 25°C / 125°C : results conform to datasheet specification.

b) ESD measurement was performed according to MILSTD883C

- ► ESD resistance is higher than 2kV

c) Latch-up measurement was performed according to ST specification (n°0018695)

- ► No latch-up was observed.

d) Reliability tests were performed according to qualification plan

Reliability Test	*Nb rejects*	*Package*
High Temp Bias Test		
T° = 125°C		
Duration = 168h	0/72	SO8
2000h	0/76	SOT23-5
Temp Humidity Bias Test		
T ° = 85°C at 85% humidity		
Duration = 2000h	0/76	SOT23-5
1000h	0/76	SOT23-5
1000h	0/76	SOT23-5

Reliability Test	*Nb rejects*	*Package*
Pressure Pot Test		
121°C / 2 atm		
Duration : 480h	0/76	SOT23-5
480h	0/76	SOT23-5
480h	0/76	SOT23-5
Thermal Cycles air/air		
-65/+150°C		
Duration = 1000 cycles	0/76	SOT23-5
1000 cycles	0/76	SOT23-5
1000 cycles	0/76	SOT23-5
Thermal Shock L/L		
-65/+150°C		
Duration = 500 shocks	0/76	SOT23-5
500 shocks	0/76	SOT23-5
500 shocks	0/76	SOT23-5

e) Conclusion

- ►Electrical and reliability results meet or exceed the requirements set in the ST qualification program (0128267C). Then device TS921 is qualified for both packages (SO8 and SOT23-5).

NB : Detailed results are available upon request.

QUALIFICATION REPORT

SHORT FORM

TS922

QUALIFICATION RESULTS

a) Electrical characterization

- ► Yield analysis on 1 lot : conform to ST standard results
- ► Electrical parameters distribution on 50 pieces at T = -40°C / 25°C / 125°C : results conform to datasheet specification

b) ESD measurement was performed according to MILSTD883C & Machine Model

- ► ESD resistance is higher than 2KV (MIL) and higher than 100V (MM).

c) Latch-up measurement was performed according to ST specification (n°0018695)

- ► Latch- up immunity.

d) Reliability tests were performed according to qualification plan

Reliability Test	***Nb rejects***	Package
High Temperature Bias Test T = 125°C Duration = 1000H	0/76 0/76	SO TSSOP
Temperature Humidity Bias Test 85/85 Duration = 1000H	0/76	TSSOP
PPT test 121°C 2 Atm Duration = 240 H	0/76	TSSOP

e) Conclusion

- ►Electrical and reliability results meet or exceed the requirements set in the ST qualification program (0133707). Then device TS922 is qualified for all packages (SO8, Dip8 and TSSOP8).

NB : Detailed results are available upon request.

QUALIFICATION REPORT

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TS924

QUALIFICATION RESULTS

a) Electrical characterization

- ► Yield analysis on 1 lot: conform to ST standard results.
- ► Electrical parameters distribution on 50 pieces at -40°C/+25°C/+105°C: results conform to datasheet specification.

b) ESD measurement was performed according to MILSTD883C & Machine Model

- ► ESD resistance is higher than 2KV (MIL) and higher than 100V (MM).

c) Latch-up measurement was performed according to ST specification (n°0018695)
No latch-up observed

d) Reliability tests were performed according to qualification plan

Reliability Test	*Nb rejects*	*Package*
High Temperature Bias Test T = 125°C Duration = 168H Duration = 1000H	0/76	SO
Temperature & Humidity Bias T= 85°C / RH = 85% Duration = 168H Duration = 1000H	0/76	SO
Pressure Pot Test 121°C / 2 atm Duration : 240H	0/50	SO
Temperature Cycling T = -65°C / 150°C Duration = 1000C	0/50	SO

NB :Tests done on product family

e) Conclusion

Electrical and reliability results meet or exceed the requirements set in the ST qualification program UDCS_0118623. Then device TS924 is qualified for SOIC,DIP and TSSOP packages.

NB : Detailed results are available upon request.

QUALIFICATION REPORT

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TS925

QUALIFICATION RESULTS

a) Electrical characterization

- ► Yield analysis on 3 lots (2 * Dip16 +1 * SO16) : conform to ST standard results
- ► Electrical parameters distribution on 50 pieces at T= -55 / 25 / 125°C : results conform to datasheet specification

b) ESD measurement was performed according to MILSTD883C & Machine Model

- ► ESD resistance is >2 KV (MIL) and >100V (MM).

c) Latch-up measurement was performed according to ST specification (n°0018695)

No latch-up was observed.

d) Reliability tests were performed according to qualification plan

Reliability Test	*Nb rejects*	*Package*
High Temperature Bias Test Tamb = 125°C Duration = 168H Duration = 1000H	 0/76 0/76	 SO16 DIP16
Temperature and Humidity Bias T=85°C / RH=85% Duration = 168H Duration= 1000H	 0/76 0/76 0/76	 SO16 / TSSOP16 DIP16
Thermal Cycles: -65°c / +150°C Duration = 500 Cycles Durration = 1000 Cycles	 0/50 0/50 0/50	 SO16 / TSSOP16 DIP16
Pressure Pot Test 121°C / 2 atm Duration = 240H	 0/50 0/50 0/50	 DIP16/SO16/TSSOP16

e) Conclusion

Electrical and reliability results meet or exceed the requirements set in the ST qualification program (UDCS_0078686) Then deviceTS925 is qualified for SOIC, PDIP and TSSOP packages.

NB : Detailed results are available upon request.