

Automotive Discrete Group (ADG)
Power Transistor Macro-Division

Process Change Notification

STAC2942BW ; STAC3932B; STAC4932B, STAC4932F, STAC4932F1MR New RJR 5FT80092 frame qualification

Dear Customer,

Following the continuous improvement of our service and in order to increase productivity, we would like to inform you of a qualification of a new RJR frame 5FT80092 to replace the actual RJR frame 5FT86666.

In the next pages, we are reporting all the details of the change and the plan to release it in production

The change has been classified as **Class 1** according to the ST internal rules.

| | | Assessment of impact on Supply Chain regarding following aspects - contractual agreements - technical interface of processability / manufacturability of customer - form, fit, function, quality performance, reliability | | Remaining risks on Supply Chain? | |
|-----------|-----------------------------------|---|-----|---|--|
| ID | Type of change | No | Yes | | |
| SEM-PA-02 | Change of leadframe base material | X | | | |

The qualification of the change was completed.

Sincerely Yours!

Tech name

| | |
|--|--|
| ST Part number: | ST PN: STAC2942BW; STAC3932B; STAC4932B, STAC4932F, STAC4932F1MR Package: STAC780 |
| Reason and background of the change | Replacement of the actual RJR Frame 5FT86666 with the new one 5FT80092 to secure supply chain. |
| Detailed description of change(s), including affected type of changes | Width lead dimension reduction and plating material composition |
| Impact on form, fit, function, or reliability. | New lead frame will be compatible with the old one. See attached presentation |
| Datasheet | YES |
| Benefit of the change | Secure production continuity |
| Qualification Plan and Implementation date for change | The qualification has been completed according to the attached qualification plan |
| Traceability Information | Dedicated Finish Good |
| PPAP Update | NA |

RELIABILITY EVALUATION REPORT
New STAC780-4F/B packages for DMOS products qualification
(silicon test vehicle 4925)
Process Change

| General Information | |
|----------------------------|-----------------------------|
| Commercial Product | : STAC3932F – STAC3932B |
| Product Line | :4925 |
| Product Description | : RF DMOS |
| Package | :STAC780-4F / STAC780-4B |
| Silicon Technology | : DMOS |
| Division | : Power Transistor Division |

| Traceability | |
|------------------------|-------------------------------------|
| Diffusion Plant | :CT6 |
| Assembly Plant | : BOUSKOURA 2 - MOROCCO |
| Reliability Assessment | |
| Passed | <input checked="" type="checkbox"/> |

Disclaimer: this report is a summary of the qualification plan results performed in good faith by STMicroelectronics to evaluate the electronic devices conformance to its specific mission profile for Automotive Application. This report and its contents shall not be disclosed to a third party, except in full, without previous written agreement by STMicroelectronics or under the approval of the author (see below)

REVISION HISTORY

| Version | Date | Author | Changes description |
|---------|---------------|--------------------|---------------------|
| 1.0 | 05-March-2020 | Michele PANZARELLA | |

APPROVED BY:
 CORRADO CAPPELLO
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 ST MICROELECTRONICS

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1. RELIABILITY EVALUATION OVERVIEW

1.1 Objective

To evaluate the new STAC780-4F/B packages for DMOS products.

1.2 Reliability Test Plan

Reliability tests performed on this device are in agreement with internal spec 0061692 and are listed in the Test Plan For details on test conditions, generic data used and spec reference see test results summary at Par.3

1.2.1 TEST PLAN

TABLE 2

| # | Stress | Abrv | Reference | Test Flag | Comments |
|---|-------------------------------------|------|---|-----------|----------|
| 1 | Pre and Post-Stress Electrical Test | TEST | User specification or supplier's standard Specification | Y | |
| 2 | High Temperature Storage Life | HTSL | JESD22B-101 | Y | |
| 3 | Temperature Cycling | TC | JESD22A-104 | Y | |
| 4 | Mechanical Sequence | MS | JESD22-B103B | Y | |

1.3 CONCLUSION

On the basis of the positive reliability assessment, the new STAC780-4F/B package for DMOS products can be considered qualifiable from reliability point of view.

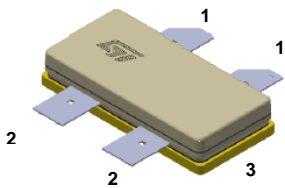
2. DEVICE/TEST VEHICLE CHARACTERISTICS

2.1 Generalities

The STAC3932B and the STAC3932F are N-channel MOS field-effect RF power transistor. It is intended for use in 100 V DC large signal applications up to 250 MHz.

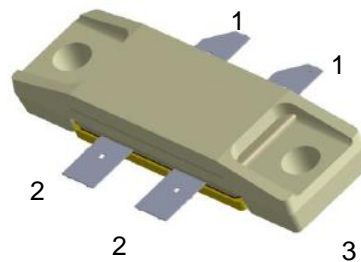
2.2 Pin connection

STAC780-4F (flangeless)



- 1.Drain
- 2.Gate
- 3.Source

STAC780-4B (bolt-down)



- 1.Drain
- 2.Gate
- 3.Source

2.5 Traceability

| Wafer fab information | |
|--|-------------------|
| Wafer fab manufacturing location | CT6 |
| Wafer diameter (inches) | 6" |
| Silicon process technology | DMOS |
| Die finishing front side (passivation) | SiN (nitride) |
| Die finishing back side | Au/As |
| Die area (Stepping die size) | 6980 um x 1430 um |
| Metal levels/Materials | 1 / AlCu |

| Assembly Information | |
|-----------------------------------|--|
| Assembly plant location | BOUSKOURA - MOROCCO |
| Package description | STAC780-4B/F |
| Frame | FRAME SW0800 4L 380x780 LCP STAC780-4PPF BASE THERMAL BeO 385x810 STAC244-KAI |
| Die attach material | AuSi eutectic |
| Wires bonding materials/diameters | WIRE Al-Si D1.5 |
| Molding compound | LID LCP |

| Reliability Testing Information | |
|---------------------------------|---------|
| Reliability laboratory location | Catania |
| Electrical testing location (*) | Catania |
| Tester (*) | Tesec |

3. TESTS RESULTS SUMMARY

3.1 Lot Information

| Lot # | Line | PN | Packages | Note |
|-------|------|------------|------------|--------------|
| 1 | 4925 | STAC3932F1 | STAC780-4F | (flangeless) |
| 2 | | | | |
| 3 | | STAC3932B | STAC780-4B | (bolt-down) |

3.2 Test results summary

| Test | PC | Std ref. | Conditions | SS | Steps | Failure/SS | | |
|-------------------------------|----|--------------------|--|-----|--------------|------------|-------|------|
| | | | | | | Lot 1 | Lot 2 | Lot3 |
| TEST | | User specification | All qualification parts tested per the requirements of the appropriate device specification. | | | 80 | 80 | 80 |
| External visual | | JESD22 B-101 | All devices submitted for testing | | | 80 | 80 | 80 |
| Parametric Verification | | User specification | All parameters according to user specification at room temperature and the maximum specified operating temperature | 135 | | 80 | 80 | 80 |
| Die Oriented Tests | | | | | | | | |
| HTSL | N | JESD22 A-103 | T _j = 175°C | 135 | 168 H | 0/45 | 0/45 | 0/45 |
| | | | | | 500 H | 0/45 | 0/45 | 0/45 |
| | | | | | 1000 H | 0/45 | 0/45 | 0/45 |
| Package Oriented Tests | | | | | | | | |
| TC | N | JESD22 A-104 | TA=-65°C TO 150°C | 75 | 100cy | 0/25 | 0/25 | 0/25 |
| | | | | | 200cy | 0/25 | 0/25 | 0/25 |
| | | | | | 500cy | 0/25 | 0/25 | 0/25 |
| MS | N | JESD22-B103B | VIBRATION a=20g; f=100/2000 Hz; 4' x 3 orient. x 4 cycles | 30 | After stress | 0/10 | 0/10 | 0/10 |

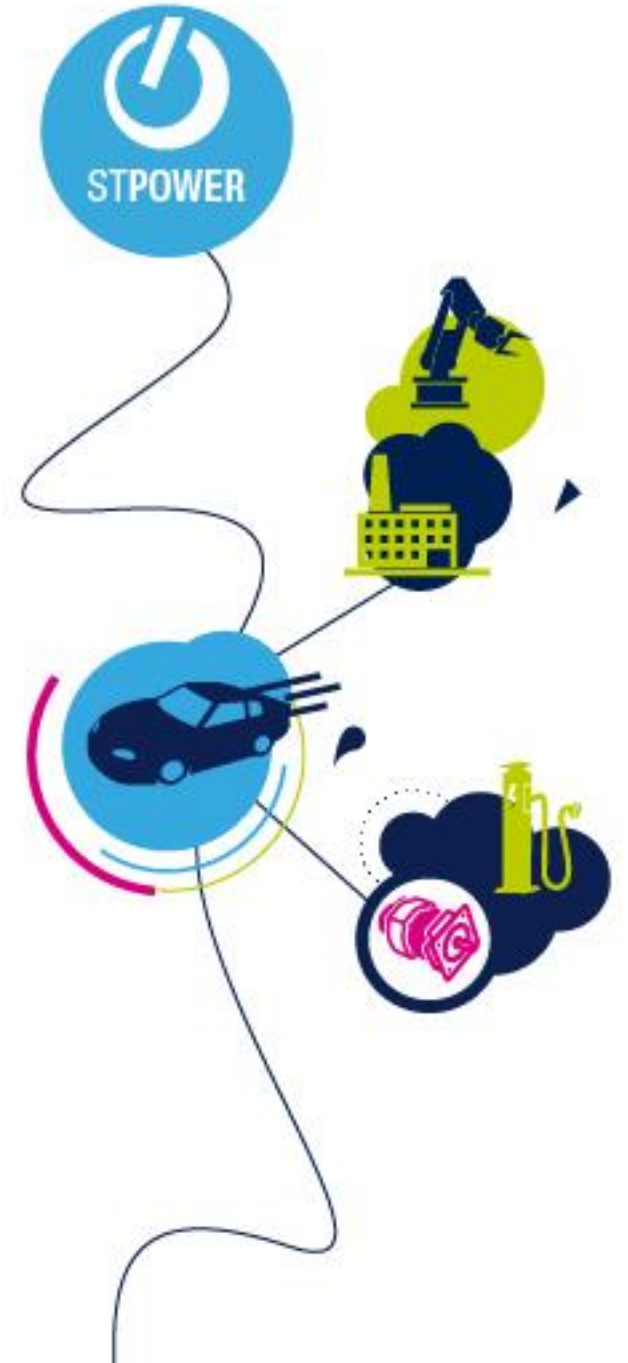
STAC780-4 vs STAC244

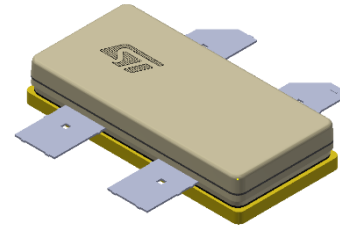
5FT80092 vs 5FT8666 lead frame

Gan & Power RF Marketing team
February 25th, 2020



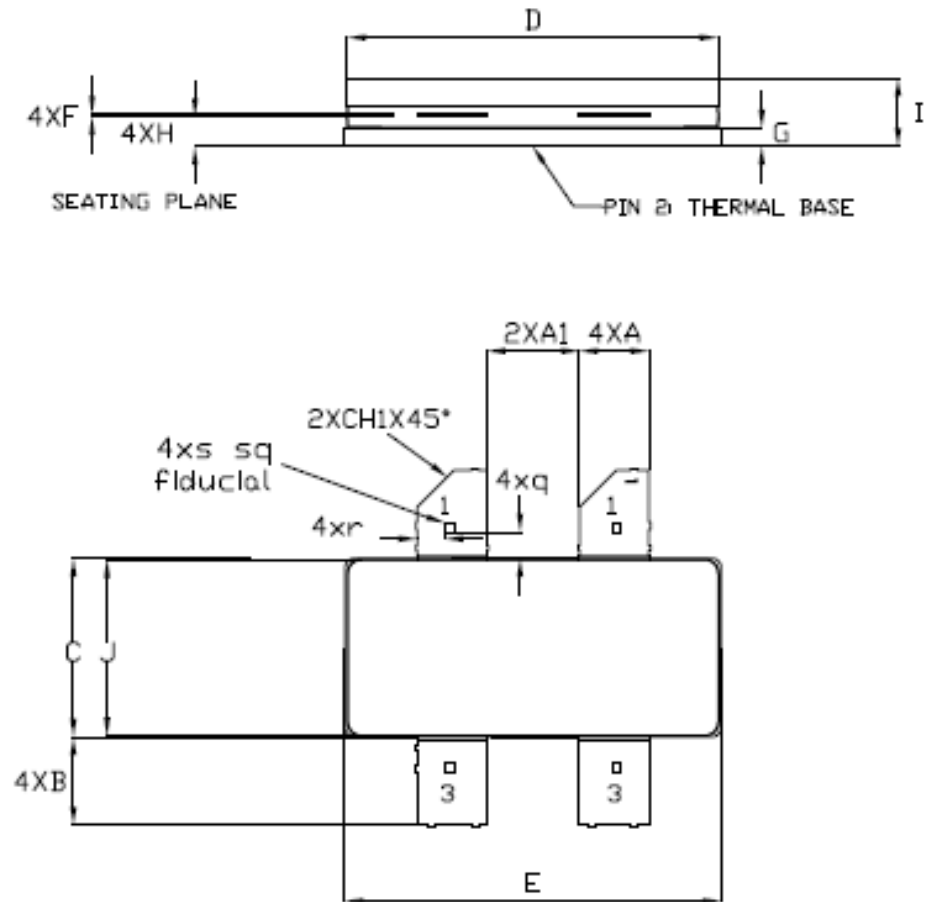
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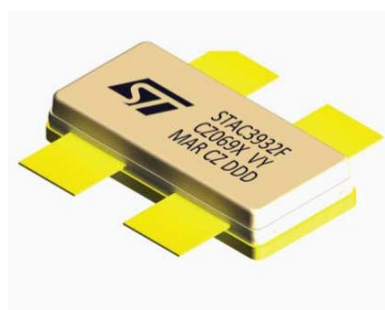




STAC780-4F

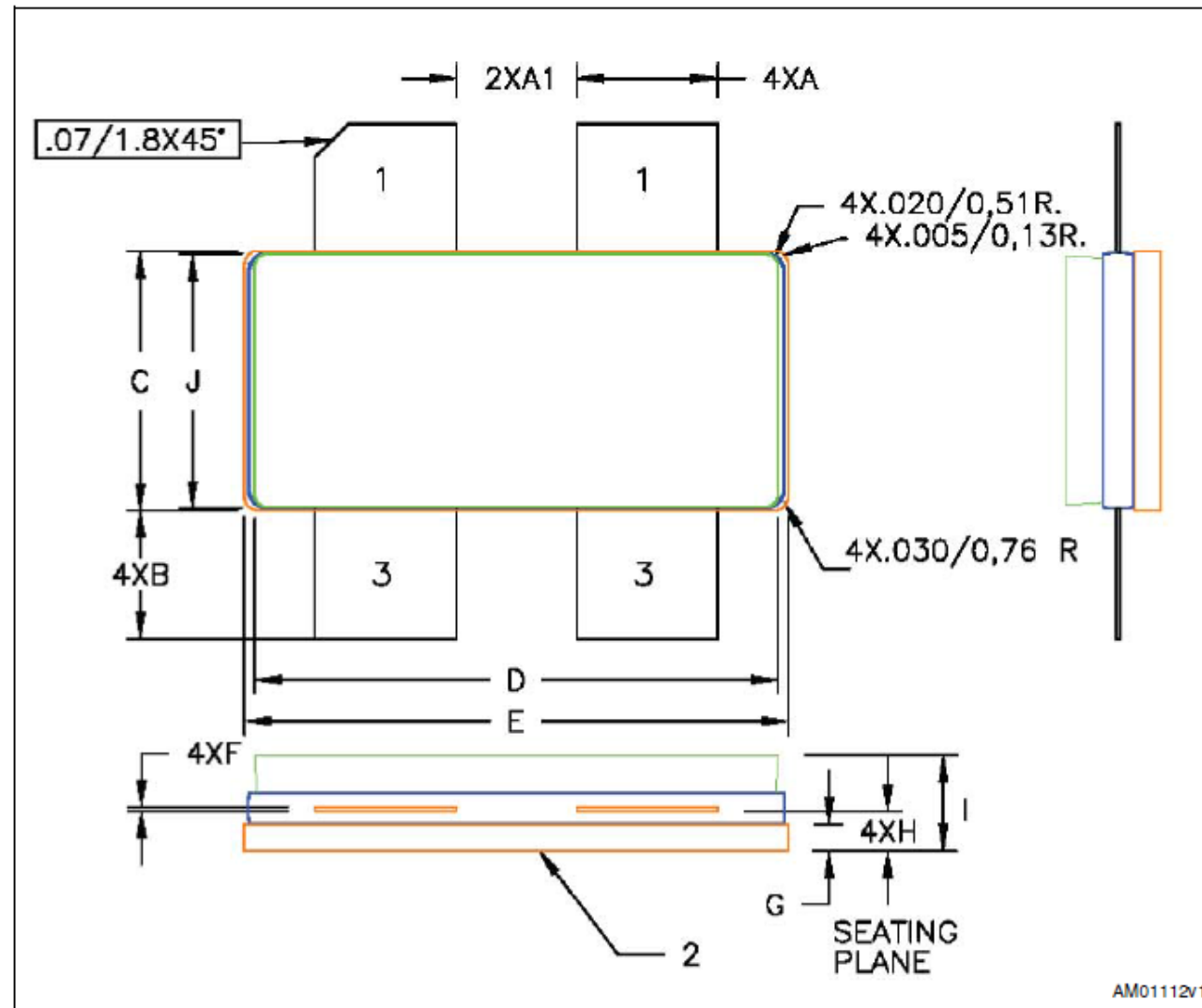
| DIMENSIONS | | | | | | |
|------------|----------------|-------|-------|--------------------|-------|-------|
| REF. DIM | DATA BOOK (mm) | | | DATA BOOK (inches) | | |
| | NOM | MIN | MAX | NOM | MIN | MAX |
| A | - | 3.76 | 3.86 | - | 0.148 | 0.152 |
| A1 | - | 5.03 | 5.13 | - | 0.198 | 0.202 |
| B | - | 4.57 | 5.08 | - | 0.180 | 0.200 |
| C | - | 9.65 | 9.91 | - | 0.380 | 0.390 |
| D | - | 20.17 | 20.37 | - | 0.794 | 0.802 |
| E | - | 20.45 | 20.70 | - | 0.805 | 0.815 |
| F | - | 0.11 | 0.17 | - | 0.005 | 0.007 |
| G | - | 0.97 | 1.14 | - | 0.038 | 0.045 |
| H | - | 1.52 | 1.70 | - | 0.060 | 0.067 |
| I | - | 3.18 | 4.32 | - | 0.125 | 0.170 |
| J | - | 9.52 | 9.78 | - | 0.375 | 0.385 |
| q | 1.37 | - | - | 0.057 | - | - |
| r | 1.52 | - | - | 0.060 | - | - |
| s | 0.51 | - | - | 0.020 | - | - |
| CH1 | 2.03 | - | - | 0.08 | - | - |





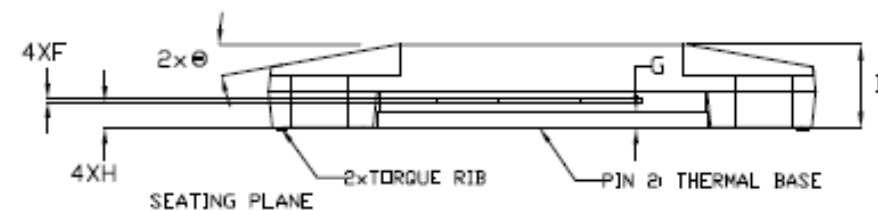
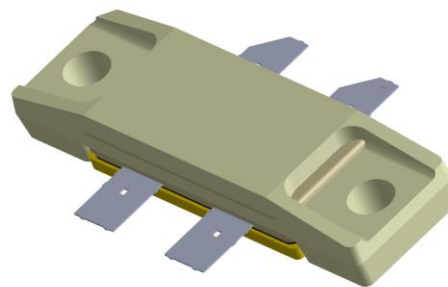
STAC244F

| Dim. | mm. | | Inch | |
|------|-------|-------|-------|-------|
| | Min | Max | Min | Max |
| A | 5.10 | 5.59 | 200 | 220 |
| A1 | 4.32 | 4.83 | 170 | 190 |
| B | 4.32 | 5.33 | 170 | 210 |
| C | 9.65 | 9.91 | 380 | 390 |
| D | 19.61 | 20.02 | 772 | 788 |
| E | 20.45 | 20.70 | 805 | 815 |
| F | 0.08 | 1.15 | 0.003 | 0.006 |
| G | 0.89 | 1.14 | 0.035 | 0.045 |
| H | 1.45 | 1.70 | 0.057 | 0.067 |
| I | 3.18 | 4.32 | 0.125 | 0.170 |
| J | 9.27 | 9.53 | 0.365 | 0.375 |



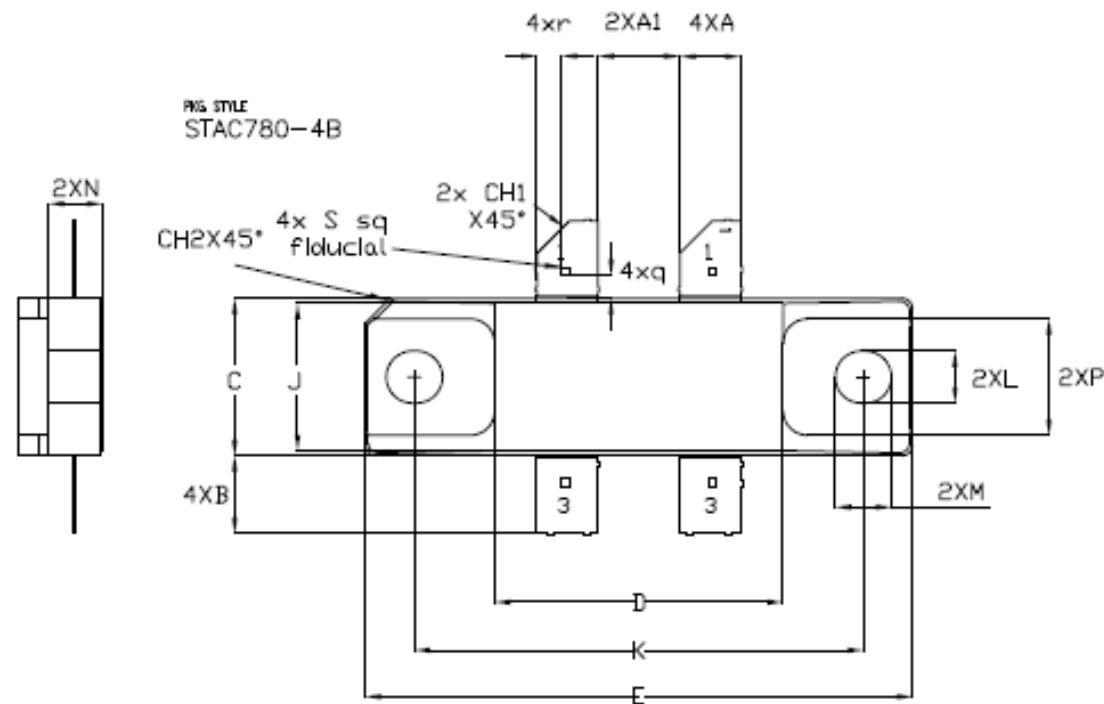


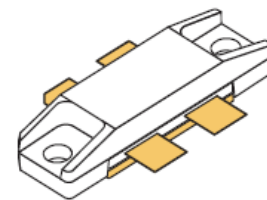
STAC780-4B



DIMENSIONS

| REF. DIM | DATA BOOK (mm) | | | DATA BOOK (inches) | | |
|----------|----------------|-------|-------|--------------------|-------|--------|
| | NOM | MIN | MAX | NOM | MIN | MAX |
| A | - | 3.76 | 3.86 | - | 0.148 | 0.152 |
| A1 | - | 5.03 | 5.13 | - | 0.198 | 0.2020 |
| B | - | 4.57 | 5.08 | - | 0.180 | 0.200 |
| C | - | 9.65 | 9.91 | - | 0.380 | 0.390 |
| D | - | 17.78 | 18.08 | - | 0.700 | 0.712 |
| E | - | 33.88 | 34.19 | - | 1.334 | 1.346 |
| F | - | 0.11 | 0.17 | - | 0.005 | 0.007 |
| G | - | 0.97 | 1.14 | - | 0.038 | 0.045 |
| H | - | 1.52 | 1.70 | - | 0.060 | 0.067 |
| I | - | 4.83 | 5.33 | - | 0.190 | 0.210 |
| J | - | 9.52 | 9.78 | - | 0.375 | 0.385 |
| K | - | 27.69 | 28.19 | - | 1.090 | 1.110 |
| L | 3.25 | 3.20 | 3.30 | 0.128 | 0.126 | 0.130 |
| M | 3.51 | 3.43 | 3.58 | 0.138 | 0.135 | 0.141 |
| N | 3.38 | 3.30 | 3.45 | 0.133 | 0.130 | 0.136 |
| p | 7.21 | 7.14 | 7.29 | 0.284 | 0.281 | 0.287 |
| q | 1.37 | - | - | 0.057 | - | - |
| r | 1.52 | - | - | 0.060 | - | - |
| s | 0.51 | - | - | 0.020 | - | - |
| Θ | 10° | - | - | 10° | - | - |
| CH1 | 2.03 | - | - | 0.08 | - | - |
| CH2 | 1.52 | - | - | 0.060 | - | - |





STAC244B

STAC244B
Air cavity

| Dim. | mm | | |
|------|-------|------|-------|
| | Min. | Typ. | Max. |
| A | 5.08 | | 5.59 |
| A1 | 4.32 | | 4.83 |
| B | 4.32 | | 5.33 |
| C | 9.65 | | 9.91 |
| D | 17.78 | | 18.08 |
| E | 33.88 | | 34.19 |
| F | 0.10 | | 0.15 |
| G | | 1.02 | |
| H | 1.45 | | 1.70 |
| I | 4.83 | | 5.33 |
| J | 9.27 | | 9.52 |
| K | 27.69 | | 28.19 |
| L | 3.12 | 3.23 | 3.33 |
| M | 3.35 | 3.45 | 3.56 |

