# DOCUMENT CHANGE REQUEST

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|---|---|---|---|
| DCR number 494 | Changes required for: General | Originator: S Jeffery - ESCC |
| Date: 2009/04/14 | Date sent: 2009/04/14 | Organisation: ESA/ESTEC |
| Status: IMPLEMENTED | | |

| | | | |
|---|---|---|---|
| Title: | Transistors Low Power NPN, based on type 2N2369A | | |
| Number: | 5201/006 | Issue: | 3 |

Other documents affected:

Page:

See attachment

Paragraph:

See attachment

Original wording:

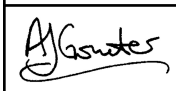
Proposed wording:

The duty cycle test condition for hFE1 parameter in Para. 2.4.2, High and Low Temperature Electrical Measurements is corrected from 1% to 2%. There are a number of other editorial and technical changes which are required to make this detail spec clear, complete and consistent with the standard format and content of specifications for similar Part Types.

See attached mark-up for details of all proposed changes. Note that this DCR replaces the withdrawn DCR 463.

Justification:

To correct a technical error and also to improve the appearance, content and clarity of the spec.

| |
|---|
| Attachments: |
| 5201006_Issue_4_-_Draft_B.pdf, null |
| Modifications: |
| N/A |
| Approval signature: |
|  |
| Date signed: |
| 2009-04-14 |

European Space Components Coordination

Pages 1 to 16

# TRANSISTORS, LOW POWER, NPN

## BASED ON TYPE 2N2369A

## ESCC Detail Specification No. 5201/006

as applicable

| | |
|---|---|
| Issue ~~3~~ 4 - Draft B | ~~December 2008~~ |

Document Custodian: European Space Agency - see https://escies.org

as applicable

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## DOCUMENTATION CHANGE NOTICE

(Refer to https://escies.org for ESCC DCR content)

| DCR No. | CHANGE DESCRIPTION |
|---|---|
| ~~4233~~ 4447 | Specification up issued to incorporate editorial and technical changes per DCR§. |

thod

1.5 MAXIMUM RATINGS

The maximum ratings shall not be exceeded at any time during use or storage.

Maximum ratings shall only be exceeded during testing to the extent specified in this specification and when stipulated in Test Methods and Procedures of the ESCC Generic Specification.

| Characteristics | Symbols | Maximum Ratings | Unit | Remarks |
|---|---|---|---|---|
| Collector-Base Voltage | $V_{CBO}$ | 40 | V | Over entire operating temperature range |
| Collector-Emitter Voltage | $V_{CES}$ | 40 | V | |
| Collector-Emitter Voltage | $V_{CEO}$ | 15 | V | |
| Emitter-Base Voltage | $V_{EBO}$ | 4.5 | V | |
| Collector Current | $I_C$ | 500 | mA | 10µs pulse |
| Power Dissipation<br>For TO-18 and CCP | $P_{tot1}$ | 0.36 | W | At $T_{amb} \leq +25°C$<br>~~Note 1~~ |
| ~~For CCP~~ | ~~$P_{tot2}$~~ | ~~0.58 (Note 2)~~ | ~~W~~ | |
| For TO-18 | $P_{tot2}$ 1 2 | 1.2 | W | At $T_{case} \leq +25°C$<br>~~Note 1~~ |
| Operating Temperature Range | $T_{op}$ | -65 to +200 | °C | Note 2 |
| Storage Temperature Range | $T_{stg}$ | -65 to + 200 | °C | Note 2 |
| Soldering Temperature<br>For TO-18<br>For CCP | $T_{sol}$ | <br>+260<br>+245 | °C | <br>Note 3<br>Note 4 |

see attached

**NOTES:**

~~1. For $T_{amb}$ or $T_{case}$ > +25°C, derate linearly to 0W at +200°C.~~

~~2. When mounted on a 15 x 15 x 0.6mm ceramic substrate.~~

, and any handling,

2. For Variants with tin-lead plating or hot solder dip lead finish all testing performed at $T_{amb}$ > +125°C shall be carried out in a 100% inert atmosphere.

3. Duration 10 seconds maximum at a distance of not less than 1.5mm from the device body and the same lead shall not be resoldered until 3 minutes have elapsed.

4. Duration 5 seconds maximum and the same terminal shall not be resoldered until 3 minutes have elapsed.

1. Thermal Resistance, Junction-to-case only applies to TO-18 packaged Variants.

| | | | | |
|---|---|---|---|---|
| Thermal Resistance, Junction-to-Ambient | $R_{th(j-a)}$ | 486 | °C/W | |
| Thermal Resistance, Junction-to-Case | $R_{th(j-c)}$ | 145.8 | °C/W | Note 1 |

2.4.2 High and Low Temperatures Electrical Measurements

| Characteristics | Symbols | MIL-STD-750 Test Method | Test Conditions Note 1 | Limits | | Units |
|---|---|---|---|---|---|---|
| | | | | Min | Max | |
| Collector-Emitter Cut-off Current | $I_{CES}$ | 3041 | $T_{amb}$=+150(+0-5)°C<br>$V_{CE}$=20V,<br>Bias Condition C | - | 30 | µA |
| Forward-Current Transfer Ratio 1 | $h_{FE1}$ | 3076 | $T_{amb}$=-55(+5-0)°C<br>$V_{CE}$=350mV<br>$I_C$=10mA<br>Note 2 | 15 | - | - |

**NOTES:**
1. Read and record measurements shall be performed on a sample of 5 components with 0 failures allowed. Alternatively a 100% inspection may be performed.
2. Pulse measurement: Pulse Width ≤ 300µs, Duty Cycle ≤ 1%

2.5 PARAMETER DRIFT VALUES

Unless otherwise specified, the measurements shall be performed at $T_{amb}$=+22 ±3°C.

The test methods and test conditions shall be as per the corresponding test defined in Room Temperature Electrical Measurements.

The drift values (Δ) shall not be exceeded for each characteristic specified. The corresponding absolute limit values for each characteristic shall not be exceeded.

| Characteristics | Symbols | Limits | | | Units |
|---|---|---|---|---|---|
| | | Drift Value Δ | Absolute | | |
| | | | Min | Max | |
| Collector-Emitter Cut-off Current | $I_{CES}$ | ±25 or (1) ±100% | - | 400 | nA |
| Collector-Emitter Saturation Voltage | $V_{CE(sat)}$ | ±25 or (1) ±15% | - | 500 | mV |
| Forward-Current Transfer Ratio 1 | $h_{FE1}$ | ±15% | 40 | 120 | - |

**NOTES:**
1. Whichever is the greater referred to the initial value.

2.6 INTERMEDIATE AND END-POINT ELECTRICAL MEASUREMENTS

Unless otherwise specified, the measurements shall be performed at $T_{amb}$=+22 ±3°C.

The test methods and test conditions shall be as per the corresponding test defined in Room

Temperature Electrical Measurements.

The limit values for each characteristic shall not be exceeded.

| Characteristics | Symbols | Limits | | Units |
|---|---|---|---|---|
| | | Min | Max | |
| Collector-Emitter Cut-off Current | $I_{CES}$ | - | 400 | nA |
| Collector-Emitter Saturation Voltage | $V_{CE(sat)}$ | - | 500 | mV |
| Forward-Current Transfer Ratio 1 | $h_{FE1}$ | 40 | 120 | - |

2.7 POWER BURN-IN CONDITIONS

| Characteristics | Symbols | Conditions | Units |
|---|---|---|---|
| Ambient Temperature | $T_{amb}$ | +25 to +50 | °C |
| Power Dissipation | $P_{tot}$ | As per Maximum Ratings, $P_{tot}$ derated at the chosen $T_{amb}$ | W |
| Collector-Base Voltage | $V_{CB}$ | 10 | V |

Derate $P_{tot1}$

using the specified $R_{th(j-a)}$.

2.8 OPERATING LIFE CONDITIONS

The conditions shall be as specified for Power Burn-in.

## APPENDIX 'A'

AGREED DEVIATIONS FOR STMICROELECTRONICS (F)

| ITEMS AFFECTED | DESCRIPTION OF DEVIATIONS |
|---|---|
| Deviations from Production Control-Chart F2 | Special In-process Control Internal Visual Inspection.<br>For CCP packages the criteria specified for voids in the fillet and minimum die mounting material around the visible die perimeter for die mounting defects may be omitted providing that a radiographic inspection to verify the die-attach process is performed on a sample basis in accordance with STMicroelectronics procedure 0076637. |
| Deviations from Room Temperature Electrical Measurements | All AC characteristics (Room Temperature Electrical Measurement Note 2) may be considered guaranteed but not tested if successful pilot lot testing has been performed on the wafer lot which includes AC characteristic measurements per the Detail Specification.<br><br>A summary of the pilot lot testing shall be provided if required by the Purchase Order. |
| Deviations from High and Low Temperatures Electrical Measurements | All characteristics specified may be considered guaranteed but not tested if successful pilot lot testing has been performed on the wafer lot which includes characteristic measurements at high and low temperatures per the Detail Specification. A summary of the pilot lot testing shall be provided if required by the Purchase Order. |
| Deviations from Screening Tests - Chart F3 | Solderability is not applicable unless specifically stipulated in the Purchase Order. |