



Pages 1 to 16

## TRANSISTORS, MATCHED DUAL, PNP

BASED ON TYPE 2N3810

ESCC Detail Specification No. 5207/005

as applicable

Issue 3 - Draft A	April 2008
-------------------	------------



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



as applicable

**LEGAL DISCLAIMER AND COPYRIGHT**

European Space Agency, Copyright © 2008, All rights reserved.

The European Space Agency disclaims any liability or responsibility, to any person or entity, with respect to any loss or damage caused, or alleged to be caused, directly or indirectly by the use and application of this ESCC publication.

This publication, without the prior permission of the European Space Agency and provided that it is not used for a commercial purpose, may be:

- copied in whole, in any medium, without alteration or modification.
- copied in part, in any medium, provided that the ESCC document identification, comprising the ESCC symbol, document number and document issue, is removed.



**DOCUMENTATION CHANGE NOTICE**

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

DCR No.	CHANGE DESCRIPTION
<del>447, 382</del>	Specification up issued to incorporate editorial and technical changes per DCR <del>s</del> . <span style="border: 1px solid black; border-radius: 50%; padding: 2px;">s</span>

447, tbd

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	$V_{CBO}$	-60	V	Over entire operating temperature range
Collector-Emitter Voltage	$V_{CEO}$	-60	V	
Emitter-Base Voltage	$V_{EBO}$	-5	V	
Collector Current	$I_C$	50	mA	Continuous
Power Dissipation (One Section)				At $T_{amb} \leq +25^\circ C$ <del>Note 1</del>
For TO-78 and CCP	$P_{totO1}$	0.5	W	At $T_{case} \leq +25^\circ C$ <del>Note 1</del>
<del>For CCP</del>	<del><math>P_{totO2}</math></del>	<del>0.6 (Note 2)</del>	<del>W</del>	
For TO-78	$P_{totO} \times 2$	0.5	W	
Power Dissipation (Both Sections)				At $T_{amb} \leq +25^\circ C$ <del>Note 1</del>
For TO-78 and CCP	$P_{totB1}$	0.6	W	At $T_{case} \leq +25^\circ C$ <del>Note 1</del>
<del>For CCP</del>	<del><math>P_{totB2}</math></del>	<del>1.2 (Note 2)</del>	<del>W</del>	
For TO-78	$P_{totB} \times 2$	0.6	W	
Operating Temperature Range	$T_{op}$	-55 to +200	$^\circ C$	Note 2
Storage Temperature Range	$T_{stg}$	-65 to +200	$^\circ C$	Note 2
Soldering Temperature	$T_{sol}$		$^\circ C$	
For TO-78		+260		Note 3
For CCP		+245		Note 4

see attached

make symbols bigger

**NOTES:**

1. ~~For  $T_{amb}$  or  $T_{case} > +25^\circ C$ , derate linearly to 0W at  $+200^\circ C$~~  Thermal resistance, Junction-to-Case  
~~When mounted on a 15 x 15 x 0.6mm ceramic substrate~~
2. For Variants with tin-lead plating or hot solder dip lead finish all testing performed at  $T_{amb} > +125^\circ C$  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.

only applies to TO-78 packaged Variants.

Thermal Resistance, Junction-to-Ambient	$R_{th(j-a)}$	350 291.7	°C/W	For one section For both sections
Thermal Resistance, Junction-to-Case	$R_{th(j-c)}$	350 291.7	°C/W	For one section For both sections Note 1



Characteristics	Symbols	MIL-STD-750 Test Method	Test Conditions	Limits		Units
				Min	Max	
Small-Signal Short-Circuit Forward-Current Transfer Ratio	$h_{fe}$	3206	$I_C = -1\text{mA}$ , $V_{CE} = -10\text{V}$ $f = 1\text{kHz}$ Note 3	150	600	-
Spot Noise Figure	NF1	3246	$V_{CE} = -5\text{V}$ $I_C = -200\mu\text{A}$ $R_s = 2\text{k}\Omega$ $f = 100\text{Hz}$ $BW = 20\text{Hz}$ Note 3	-	7	dB
	NF2	3246	$V_{CE} = -5\text{V}$ $I_C = -200\mu\text{A}$ $R_s = 2\text{k}\Omega$ $f = 1\text{kHz}$ $BW = 200\text{Hz}$ Note 3	-	3	dB
Wide-Band Noise Figure	$NF_w$	3246	$V_{CE} = -5\text{V}$ $I_C = -200\mu\text{A}$ $R_s = 2\text{k}\Omega$ $10\text{Hz} \leq f \leq 15.7\text{kHz}$ Note 3	-	3.5	dB
Output Capacitance	$C_{obo}$	3236	$V_{CB} = -5\text{V}$ , $I_E = 0\text{A}$ $100\text{kHz} \leq f \leq 1\text{MHz}$ Note 3	-	6	pF
Input Capacitance	$C_{ibo}$	3240	$V_{EB} = -500\text{mV}$ , $I_C = 0\text{A}$ $100\text{kHz} \leq f \leq 1\text{MHz}$ Note 3	-	15	pF
Small-Signal Input Impedance	$h_{ie}$	3201	$V_{CE} = -10\text{V}$ $I_C = -1\text{mA}$ $f = 1\text{kHz}$ Note 3	3	30	k $\Omega$

**NOTES:**

1. Pulsed measurement: Pulse Width  $\leq 300\mu\text{s}$ , Duty Cycle  $\leq 2\%$ .
2. Any device whose measurement values exceed the specified limits shall be removed from the lot, but only count for PDA when such values exceed twice the specified limits (i.e.  $> 10\text{mV}$  or  $> 6\text{mV}$ ).
3. For AC characteristics read and record measurements shall be performed on a sample of 32 components with 0 failures allowed. Alternatively a 100% inspection may be performed.

2.4.2 High and Low Temperatures Electrical Measurements

make ° symbol bigger

Characteristics	Symbols	MIL-STD-750 Test Method	Test Conditions Note 1	Limits		Units
				Min	Max	
Collector-Base Cut-off Current	$I_{CBO}$	3036	$T_{amb} = +150(+0-5)^{\circ}\text{C}$ $V_{CB} = -50\text{V}$ , Bias Condition D	-	-10	$\mu\text{A}$

Characteristics	Symbols	MIL-STD-750 Test Method	Test Conditions Note 1	Limits		Units
				Min	Max	
Forward-Current Transfer Ratio 2	$h_{FE2}$	3076	$T_{amb} = -55(+5-0)^{\circ}C$ $V_{CE} = -5V$ $I_C = -100\mu A$	60	-	-
Forward-Current Transfer Ratio Comparison	$h_{FE2-1}/h_{FE2-2}$	3076	$T_{amb} = -55$ to $+125^{\circ}C$ $V_{CE} = -5V, I_C = -100\mu A$	0.85	1.18	-
Base-Emitter Voltage Differential Change	$I\Delta(V_{BE1} - V_{BE2})\Delta T_a$ $mb1$	3066	$T_{amb} = -55(+5-0)^{\circ}C$ to $+25\pm 3^{\circ}C$ $V_{CE} = -5V$ $I_C = -100\mu A$ Test condition B	-	800	$\mu V$
	$I\Delta(V_{BE1} - V_{BE2})\Delta T_a$ $mb2$	3066	$T_{amb} = +25\pm 3^{\circ}C$ to $+125(+0-5)^{\circ}C$ $V_{CE} = -5V$ $I_C = -100\mu A$ Test condition B	-	1000	$\mu V$

make symbol bigger

**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.

2.5

**PARAMETER DRIFT VALUES**

Unless otherwise specified, the measurements shall be performed at  $T_{amb} = +22 \pm 3^{\circ}C$ .

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

The drift values ( $\Delta$ ) 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 $\Delta$	Absolute		
			Min	Max	
Collector-Base Cut-off Current	$I_{CBO}$	$\pm 2$ or (1) $\pm 100\%$	-	-10	nA
Collector-Emitter Saturation Voltage 2	$V_{CE(sat)2}$	$\pm 15$ or (1) $\pm 10\%$	-	-250	mV
Forward-Current Transfer Ratio 2	$h_{FE2}$	$\pm 15\%$	150	450	-

**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  $T_{amb}=+22 \pm 3^{\circ}\text{C}$ .

The test methods and test conditions shall be as per the corresponding test defined in either Room Temperature Electrical Measurements or High and Low Temperatures Electrical Measurements, as applicable.

The limit values for each characteristic shall not be exceeded.

Characteristics	Symbols	Limits		Units
		Min	Max	
Collector-Base Cut-off Current	$I_{CBO}$	-	-20	nA
Collector-Emitter Saturation Voltage 2	$V_{CE(sat)2}$	-	-250	mV
Forward-Current Transfer Ratio 2	$h_{FE2}$	150	450	-
Forward-Current Transfer Ratio Comparison	$h_{FE2-1}/h_{FE2-2}$	0.85	1.18	-
Base-Emitter Voltage Differential 2	$ V_{BE1}-V_{BE2} 2$	-	6	mV
Base-Emitter Voltage Differential Change (Note 1)	$ \Delta(V_{BE1}-V_{BE2})\Delta T_{amb} 1$	-	1	mV
	$ \Delta(V_{BE1}-V_{BE2})\Delta T_{amb} 2$	-	1.2	mV

**NOTES:**

1. Measured after Operating Life test only.

2.7 HIGH TEMPERATURE REVERSE BIAS BURN-IN CONDITIONS

Characteristics	Symbols	Test Conditions	Units
Ambient Temperature	$T_{amb}$	+150(+0 -5)	$^{\circ}\text{C}$
Collector-Base Voltage (Note 1)	$V_{CB}$	-45	V
Duration	t	72 Minimum	hrs

**NOTES:**

1. On completion of High Temperature Reverse Bias Burn-in, the collector-base voltage shall continue to be applied until  $T_{case} < +30^{\circ}\text{C}$ .

2.8 POWER BURN-IN CONDITIONS

Characteristics	Symbols	Test Conditions	Units
Ambient Temperature	$T_{amb}$	+25 <del>to</del> to +50	$^{\circ}\text{C}$
Power Dissipation (Both Sections)	$P_{totB}$	As per Maximum Ratings $P_{totB1}$ derated at the specified $T_{amb}$	W
Collector-Base Voltage	$V_{CB}$	-45	V

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



P
APPENDIX 'A'
S-  
AGREED DEVIATIONS FOR STMICROELECTRONICS (F)

ITEMS AFFECTED	DESCRIPTION OF DEVIATIONS
Deviations from Production Control-Chart F2	<p>Special In-process Control Internal Visual Inspection.            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 STMicronics procedure 0076637.</p>
Deviations from Room Temperature Electrical Measurements	<p>All AC characteristics (Room Temperature Electrical Measurement Note 3) 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.</p> <p>A summary of the pilot lot testing shall be provided if required by the Purchase Order.</p>
Deviations from High and Low Temperatures Electrical Measurements	<p>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.</p>
Deviations from Screening Tests - Chart F3	<p>Solderability is not applicable unless specifically stipulated in the Purchase Order.</p>

(Approved DCR 447 refers)