DOCUMENT CHANGE REQUEST

DCR number 488

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 2N2219A		
Number:	5201/003	Issue:	2

Other documents affected:

Page:

See attached mark-up of 5201/003 (Issue 3 - Draft A). Note that this mark-up also includes the changes of DCR 447 and DCR 411 (DCR 447 was approved 16th December 2008); it is proposed that once this DCR has been approved, DCRs 447 and 411 are introduced

Paragraph:

See attached mark-up of 5201/003 (Issue 3 - Draft A). Note that this mark-up also includes the changes of DCR 447 and DCR 411 (DCR 447 was approved 16th December 2008); it is proposed that once this DCR has been approved, DCRs 447 and 411 are introduced

Original wording:

Proposed wording:

To introduce a number of editorial and technical changes (see the attached mark-up) which are required to make this detail spec clear, complete and consistent with the standard format and content of specifications for similar Part Types.

Justification:

Improve the appearance, content and clarity of the spec.

Attachments:
5201003_Issue_3_-_Draft_A.pdf, null
Modifications:
N/A
Approval signature:
Date signed:
2009-04-14

General: correct font needs to be applied to most of the text in this spec.

European Space Components Coordination

Pages 1 to 14

TRANSISTORS, LOW POWER, NPN

BASED ON TYPE 2N2219A

ESCC Detail Specification No. 5201/003

as applicable

Issue ~~2~~ 3 - Draft A	~~April 2007~~

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
~~187, 265~~ 411, 447, tbd	Specification up issued to incorporate editorial and technical changes per DCRs.

1. GENERAL

1.1 SCOPE

This specification details the ratings, physical and electrical characteristics and test and inspection data for the component type variants and/or the range of components specified below. It supplements the requirements of, and shall be read in conjunction with, the ESCC Generic Specification listed under Applicable Documents.

1.2 APPLICABLE DOCUMENTS

The following documents form part of this specification and shall be read in conjunction with it:

(a) ESCC Generic Specification No. 5000
(b) MIL-STD-750, Test Methods and Procedures for Semiconductor Devices

1.3 TERMS, DEFINITIONS, ABBREVIATIONS, SYMBOLS AND UNITS

For the purpose of this specification, the terms, definitions, abbreviations, symbols and units specified in ESCC Basic Specification No. 21300 shall apply.

1.4 THE ESCC COMPONENT NUMBER AND COMPONENT TYPE VARIANTS

1.4.1 The ESCC Component Number

The ESCC Component Number shall be constituted as follows:

Example: 520100301

- Detail Specification Reference: 5201003
- Component Type Variant Number: 01 (as required)

1.4.2 Component Type Variants

The component type variants applicable to this specification are as follows:

/ Terminal

Variant No.	Based on Type	Case	Lead Material and Finish	Weight max g
01	2N2219A	TO-39	D2	1.2
02	2N2219A	TO-39	D3 or D4	1.2

/terminal

The lead material and finish shall be in accordance with the requirements of ESCC Basic Specification No. 23500.

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}	75	V	Over entire operating temperature range
Collector-Emitter Voltage	V_{CEO}	40	V	
Emitter-Base Voltage	V_{EBO}	6 font	V	
Collector Current	I_C	800	mA	Continuous
Power Dissipation	P_{tot1}	0.8	W	At $T_{amb} \leq +25°C$ ~~Note 1~~
	P_{tot2}	3	W	At $T_{case} \leq +25°C$ ~~Note 1~~
Operating Temperature Range	T_{op}	-65 to +200	°C	Note ~~2~~ 1
Storage Temperature Range	T_{stg}	-65 to +~~2~~200	°C	Note ~~2~~ 1
Soldering Temperature	T_{sol}	+260	°C	Note ~~3~~ 2

see attached

NOTES:

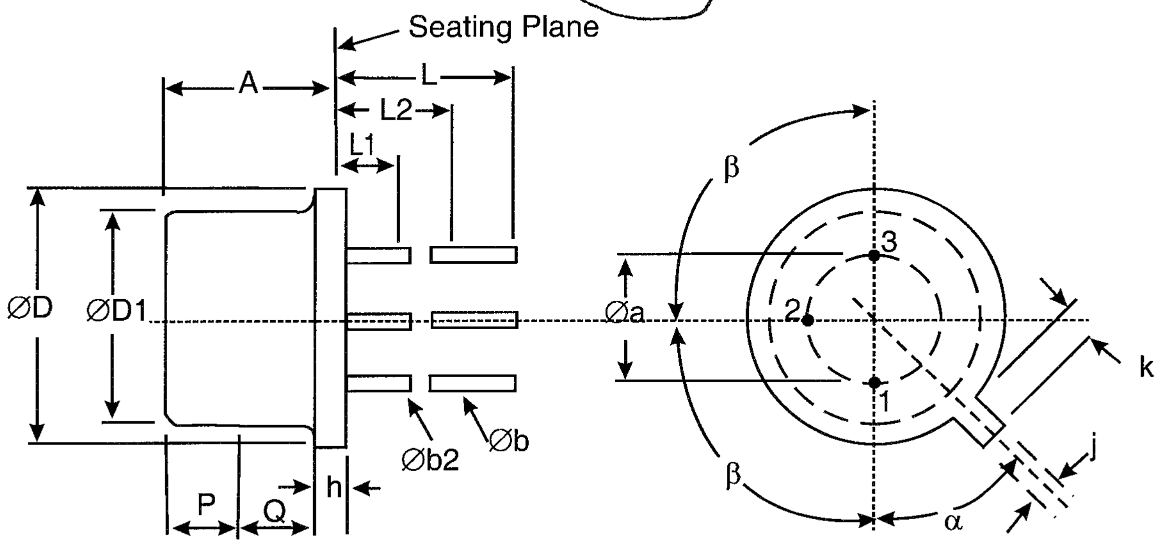
~~1. For T_{amb} or T_{case} > +25°C, derate linearly to 0W at +200°C.~~

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

no spaces ie (TO-39)

1.6 PHYSICAL DIMENSIONS AND TERMINAL IDENTIFICATION

Metal Can Package (TO - 39) - 3 Lead



Symbols	Dimensions mm		Notes
	Min	Max	
Øa	4.83	5.35	

Thermal Resistance, Junction-to-Ambient	$R_{th(j-a)}$	218.8	°C/W	
Thermal Resistance, Junction-to-Case	$R_{th(j-c)}$	58.3	°C/W	

1.8 MATERIALS AND FINISHES

Materials and finishes shall be as follows:

a) Case

The case shall be hermetically sealed and have a metal body with hard glass seals.

b) Leads / Terminals

As specified in Component Type Variants.

2. REQUIREMENTS

2.1 GENERAL

The complete requirements for procurement of the components specified herein are as stated in this specification and the ESCC Generic Specification. Permitted deviations from the Generic Specification, applicable to this specification only, are listed below.

Permitted deviations from the Generic Specification and this Detail Specification, formally agreed with specific Manufacturers on the basis that the alternative requirements are equivalent to the ESCC requirement and do not affect the component's reliability, are listed in the appendices attached to this specification.

2.1.1 Deviations from the Generic Specification

2.1.1.1 Deviation from Screening Tests - Chart F3

High Temperature Reverse Bias Burn-in and the subsequent Final Measurements for HTRB shall be omitted.

2.2 MARKING

The marking shall be in accordance with the requirements of ESCC Basic Specification No. 21700 and as follows.

The information to be marked on the component shall be:

(a) The ESCC qualified components symbol (for ESCC qualified components only).
(b) The ESCC Component Number.
(c) Traceability information.

2.3 TERMINAL STRENGTH

The test conditions for terminal strength, tested as specified in the ESCC Generic Specification, shall be as follows:

Test Condition: E, lead fatigue.

2.4 ELECTRICAL MEASUREMENTS AT ROOM, HIGH AND LOW TEMPERATURES

Electrical measurements shall be performed at room, high and low temperatures.

2.4.1 Room Temperature Electrical Measurements

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The measurements shall be performed at T_{amb}=+22 ±3oC.

Characteristics	Symbols	MIL-STD-750 Test Method	Test Conditions	Limits		Units
				Min	Max	
Collector-Base Breakdown Voltage	$V_{(BR)CBO}$	3001	$I_C = 10\mu A$, Bias Condition D	75	-	V
Collector-Emitter Breakdown Voltage	$V_{(BR)CEO}$	3011	$I_C = 10mA$, Bias Condition D Note 1	40	-	V
Emitter-Base Breakdown Voltage	$V_{(BR)EBO}$	3026	$I_E = 10\mu A$, Bias Condition D	6	-	V
Collector-Base Cut-off Current	I_{CBO}	3036	$V_{CB} = 60V$, Bias Condition D	-	10	nA
Emitter-Base Cut-off Current	I_{EBO}	3061	$V_{EB} = 3V$, Bias Condition D	-	10	nA
Collector-Emitter Saturation Voltage	$V_{CE(sat)1}$	3071	$I_C=150mA$ $I_B=15mA$ Note 1	-	300	mV
	$V_{CE(sat)2}$	3071	$I_C=500mA$ $I_B=50mA$ Note 1	-	1	V
Base-Emitter Saturation Voltage	$V_{BE(sat)}$	3066	Test Condition A $I_C=150mA$ $I_B=15mA$ Note 1	-	1.2	V
Forward-Current Transfer Ratio	h_{FE1}	3076	$V_{CE}=10V$; $I_C=10mA$ Note 1	75	-	-
	h_{FE2}	3076	$V_{CE}=10V$; $I_C=150mA$ Note 1	100	300	-
	h_{FE3}	3076	$V_{CE}=10V$; $I_C=500mA$ Note 1	40	-	-
Magnitude of Small-Signal Short-Circuit Forward-Current Transfer Ratio	$\|h_{fe}\|$	3306	$V_{CE}=20V$, $I_C=20mA$ f=100MHz Note 2	2.5	-	–
Output Capacitance	C_{obo}	3236	$V_{CB}=10V$ $I_E=0A$ ≤ 100kHz≤ f ~~≥~~1MHz Note 2	-	8	pF
Turn-on Time	t_{on}	-	$I_C=150mA$ $I_B=15mA$ Notes 2, 3	-	35	ns
Turn-off Time	t_{off}	-	$I_C=150mA$ $I_B=15mA$ Notes 2, 4	-	300	ns

DCR 411 refers

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-Base Cut-off Current	I_{CBO}	3036	T_{amb}=+150(+0-5)°C V_{CB}=60V, Bias Condition D	-	10	μA
Forward-Current Transfer Ratio 1	h_{FE1}	3076	T_{amb}=-55(+5-0)°C V_{CE}=10V I_C=10mA Note 2	35	-	-

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 ≤ 2%

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2.5 PARAMETER DRIFT VALUES

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

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-Base Cut-off Current	I_{CBO}	±2 or (1) ±100%	-	10	nA
Collector-Emitter Saturation Voltage 1	$V_{CE(sat)1}$	±30 or (1) ±15%	-	300	mV
Forward-Current Transfer Ratio 2	h_{FE2}	±15%	100	300	-

font issue

NOTES:

1. Whichever is the greater referred to the initial value.

° superscript

2.6 INTERMEDIATE AND END-POINT ELECTRICAL MEASUREMENTS

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

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-Base Cut-off Current	I_{CBO}	-	10	nA
Collector-Emitter Saturation Voltage 1	$V_{CE(sat)1}$	-	300	mV
Forward-Current Transfer Ratio 2	h_{FE2}	100	300	-

2.7 POWER BURN-IN CONDITIONS

Characteristics	Symbols	Test Conditions	Units
Ambient Temperature	T_{amb}	+20 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 to 40	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 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. 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.

(Approved
DCR
447
refers)