DOCUMENT CHANGE REQUEST

DCR number 421	Changes required for: N/A	Originator: aissa nehdi
Date: 2008/07/24	Date sent: 2008/07/24	Organisation: CNES
Status: IMPLEMENTED		

Title:	Transistors Low Power NPN, based on type 2N2222A		
Number:	5201/002	Issue:	2

Other documents affected:

Page:

1.4.2 Component Type Variants page 5
1.6 PHYSICAL DIMENSIONS AND TERMINAL IDENTIFICATION page 6

Paragraph:

1.4.2 Component Type Variants page 5
1.6 PHYSICAL DIMENSIONS AND TERMINAL IDENTIFICATION page 6

Original wording:

Proposed wording:

Variants 11 & 12 added (Chip Carrier Package CCP) 3 terminal

Justification:

NA

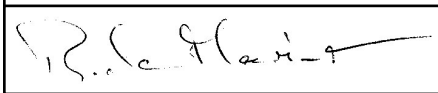
Attachments:

dcr421att08_09_19.pdf, DCR421att.pdf, null

Modifications:

In order to incorporate the 2 new Variants, 11 & 12, the changes as shown in the modified attachment (see attached), shall be made to Paras 1.4.2, 1.5, 1.6.3 (new para), 1.7, 2.4.1 of 5201/002 issue 2. see attached

Approval signature:



Date signed:

2008-07-24

MODIFIED ATTACHMENT FOR DCR421

SHOWING 'APPROVED WORDING' IF DIFFERENT FROM "PROPOSED WORDING":

S.T
19/9/08.

1.4.2 Component Type Variants

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

Variant Number	Based on Type	Case	Lead/Terminal Material and finish	Weight max g
01	2N3700	TO-18	D2	0.4
02	2N3700	TO-18	D3 or D4	0.4
04	2N3700	CCP	2	0.06
05	2N3700	CCP	4	0.06
06	2N3700	CCP	2	0.06
07	2N3700	CCP	4	0.06

See mark-up of Para 1.4.2 attached: *

1.5 Maximum Rating

see mark-up of Para 1.5 attached: *

(V_{CEO})

1.7 Functional Diagram

see mark-up of Para 1.7 attached: *

2.4.1 Room Temp Electrical Measurements

For $V_{(BR)CEO}$ see mark-up of Table attached: *

For $|h_{fe}|$ — " —

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: 520100201

- Detail Specification Reference: 5201002
- Component Type Variant Number: 01 (as required)

1.4.2 Component Type Variants

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

Variant Number	Based on Type	Case	Lead/Terminal Material and/or Finish	Weight max g	$V_{(BR)CEO}$ min V	$\|h_{fe}\|$
01	2N2222A	TO-18	D2	0.4	40	3 to 10
02	2N2222A	TO-18	D3 or D4	0.4	40	3 to 10
04	2N2222A	CCP	2	0.06	40	3 to 10
05	2N2222A	CCP	4	0.06	40	3 to 10
06	2N2222A	TO-18	D2	0.4	50	2.5 min
07	2N2222A	TO-18	D3 or D4	0.4	50	2.5 min
09	2N2222A	CCP	2	0.06	50	2.5 min
10	2N2222A	CCP	4	0.06	50	2.5 min
11	2N2222A	CCP (4 Terminal)	2	0.06	40	3 to 10
12	2N2222A	CCP (4 Terminal)	4	0.06	40	3 to 10

(C3 Terminal)

The lead/terminal material and/or 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.

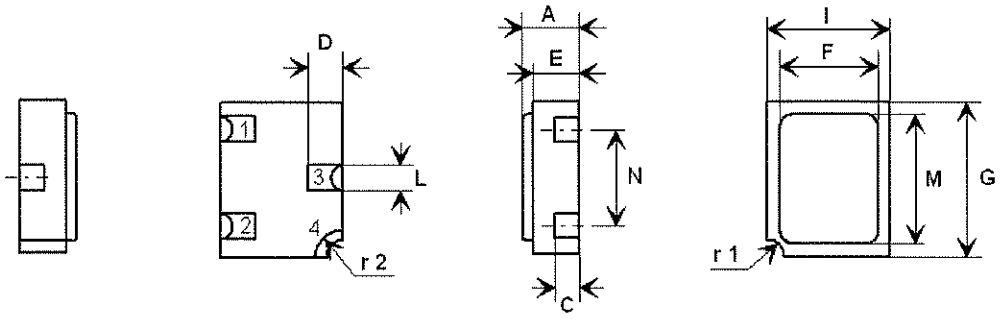
Characteristics	Symbols	Maximum Ratings	Unit	Remarks
Collector-Base Voltage	V_{CBO}	75	V	Over entire operating temperature range
Collector-Emitter Voltage Variants 01 to 05, 11, 12 Variants 06 to 10	V_{CEO}	 40 50	V	
Emitter-Base Voltage	V_{EBO}	6	V	
Collector Current	I_C	800	mA	Continuous
Power Dissipation For TO-18 and CCP	P_{tot1}	0.5	W	At $T_{amb} \leq +25^{\circ}C$ Note 1
For CCP	P_{tot2}	0.73 (Note 2)	W	
For TO-18	P_{tot3}	1.8	W	At $T_{case} \leq +25^{\circ}C$ Note 1
Operating Temperature Range	T_{op}	-65 to +200	°C	Note 3
Storage Temperature Range	T_{stg}	-65 to +200	°C	Note 3
Soldering Temperature For TO-18 For CCP	T_{sol}	 +260 +245	°C	 Note 4 Note 5

NOTES:

1. For T_{amb} or $T_{case} > +25^{\circ}C$, derate linearly to 0W at $+200^{\circ}C$.
2. When mounted on a 15 x 15 x 0.6mm ceramic substrate.
3. 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.
4. 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.
5. Duration 5 seconds maximum and the same terminal shall not be resoldered until 3 minutes have elapsed.

4

1.6.3 Chip Carrier Package (CCP) - 3 terminal

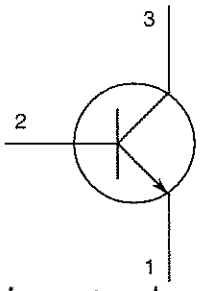


Symbols	Dimensions mm		Notes
	Min	Max	
A	1.15	1.5	
C	0.45	0.56	2
D	0.6	0.91	2
E	0.91	1.12	
F	1.9	2.15	
G	2.9	3.25	
I	2.4	2.85	
L	0.4	0.6	2
M	2.4	2.65	
N	1.8	2	
r1	0.3 TYPICAL		1
r2	0.56 TYPICAL		1

NOTES:

1. Terminal identification is specified by reference to the corner notch position where terminal 1 = emitter, terminal 2 = base, terminal 3 = collector, terminal 4 = shielding connected to the lid.
2. Applies to all terminals, 1, 2, 3 S

1.7 FUNCTIONAL DIAGRAM



1. Emitter.
2. Base.
3. Collector.
4. Shielding

NOTES: 3 terminal (Variants 04, 05, 09, 11)

1. For TO-18, the collector is internally connected to the case.
2. For CCP, the lid is not connected to any terminal.
3. For 4 terminal CCP (Variants 11, 12), the shielding terminal is connected to the lid.

1.8 MATERIALS AND FINISHES

Materials and finishes shall be as follows:

a) Case
For the metal can package the case shall be hermetically sealed and have a metal body with hard glass seals.
For the chip carrier package the case shall be hermetically sealed and have a ceramic body with a Kovar lid.

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

(a) 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:
For TO-18, 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

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

Characteristics	Symbols	MIL-STD-750 Test Method	Test Conditions	Limits		Units
				Min	Max	
Collector-Base Breakdown Voltage	$V_{(BR)CBO}$	3001	I_C = 100µA Bias Condition D	75	-	V
Collector-Emitter Breakdown Voltage Variants 01 to 05, 11, 12 Variants 06 to 10	$V_{(BR)CEO}$	3011	Bias Condition D Note 1 I_C = 30mA I_C = 10mA	 40 50	 - -	V
Emitter-Base Breakdown Voltage	$V_{(BR)EBO}$	3026	I_E = 100µA 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	$V_{CE(sat)}$	3071	I_C=150mA, I_B=15mA Note 1	-	300	mV
Base-Emitter Saturation Voltage	$V_{BE(sat)}$	3066	I_C=150mA, I_B=15mA Note 1	-	1.2	V
Forward-Current Transfer Ratio	h_{FE1}	3076	V_{CE}=10V, I_C = 100µA	35	-	-
	h_{FE2}		V_{CE}=10V, I_C = 10mA	75	-	-
	h_{FE3}		V_{CE}=10V, I_C = 150mA Note 1	100	300	-
	h_{FE4}		V_{CE}=10V, I_C = 500mA Note 1	40	-	-

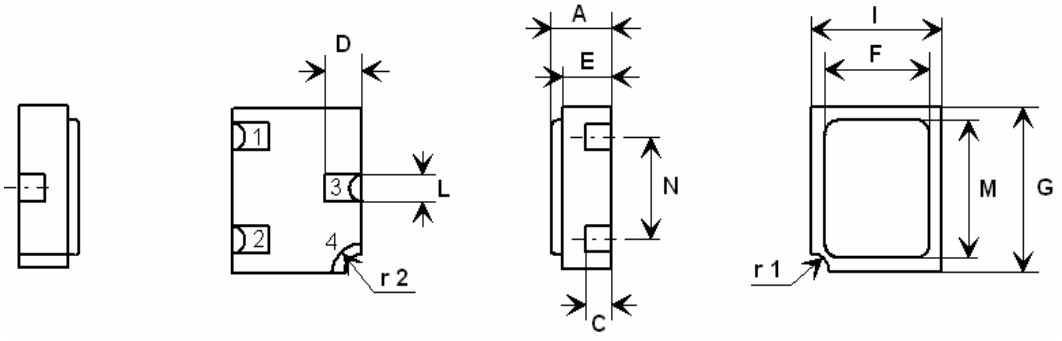
Characteristics	Symbols	MIL-STD-750 Test Method	Test Conditions	Limits		Units
				Min	Max	
Small-Signal Forward-Current Transfer Ratio	$\|h_{fe}\|$	3306	V_{CE}=20V, I_C=20mA f=100MHz Note 2			-
Variants 01 to 05, 11, 12				3	10	
Variants 06 to 10				2.5	-	
Output Capacitance	C_{obo}	3236	V_{CB}=10V, 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	-	285	ns

1. Pulse measurement: Pulse Width ≤ 300µs (Pulse Width for Variants 06 to 10 of $V_{(BR)CEO}$ ≤15ms), Duty Cycle ≤ 1%
2. 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.
3. t_{on} shall be measured using the following test circuit. The input waveform shall be supplied by a pulse generator with the following characteristics: Z_{OUT} = 50Ω, t_r ≤ 2ns, Pulse Width = 200 ±10ns, Duty Cycle ≤ 2%. The input and output waveforms shall be monitored on an oscilloscope with the following: Z_{IN} ≥ 100kΩ, input capacitance ≤ 12pF, t_r ≤ 5ns.

1.4.2 Component Type Variants
The component type variants applicable to this specification are as follows:

Variant Number	Based on Type	Case	Lead/Terminal Material and finish	Weight max g
01	2N3700	**TO-18**	**D2**	**0.4**
02	2N3700	**TO-18**	**D3 or D4**	**0.4**
04	2N3700	**CCP**	**2**	**0.06**
05	2N3700	**CCP**	**4**	**0.06**
06	2N3700	**CCP**	**2**	**0.06**
07	2N3700	**CCP**	**4**	**0.06**

1.6.3 Chip Carrier Package (CCP) - 3 terminal



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G	2.9	3.25	
I	2.4	2.85	
L	0.4	0.6	2
M	2.4	2.65	
N	1.8	2	
r1	0.3 TYPICAL		1
r2	0.56 TYPICAL		

NOTES:

1. Terminal identification is specified by reference to the corner notch position where terminal 1 = emitter, terminal 2 = base, terminal 3 = collector, terminal 4 = Shielding connected to the lid.
2. Applies to all terminals.