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Pages 1 to 25

**TRANSISTORS, HIGH POWER, NPN,  
BASED ON TYPES 2N5664 THROUGH 2N5667  
ESA/SCC Detail Specification No. 5203/038**





**space components  
coordination group**

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		SCCG Chairman	ESA Director General or his Deputy
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**DOCUMENTATION CHANGE NOTICE**

Rev. Letter	Rev. Date	Reference	CHANGE Item	Approved DCR No.
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		DCN		None
		Para. 1.2	: Text deleted and new text added	23661
		Para. 1.4	: New text added	221193
		Para. 2	: Item "(c)" deleted	23661
		Table 1(b)	: In Remarks, "T <sub>case</sub> " added	23661
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		Para. 4.2.3	: Existing text deleted and new text added	23661
		Para. 4.5.1	: Existing text deleted and new text added	23661
		Para. 4.5.5	: Deleted	23661
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		Para. 4.7.3	: In second sentence, "5" amended to "5(b)"	23661
		Para. 4.7.4	: Renumbered as "4.7.5"	23661
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		Para. 4.7.6	: New Para. 4.7.6 added	221193
		Table 2	: Imperial dimensions deleted from Note 2	23661
		Table 3	: Test 19 details transferred to Figure 1(c) and Test deleted	221193
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**1. GENERAL****1.1 SCOPE**

This specification details the ratings, physical and electrical characteristics, test and inspection data for a Transistor, High Power, NPN, based on Types 2N5664 through 2N5667. It shall be read in conjunction with ESA/SCC Generic Specification No. 5000, the requirements of which are supplemented herein.

**1.2 COMPONENT TYPE VARIANTS**

Variants of the basic transistors specified herein, which are also covered by this specification, are given in Table 1(a)

**1.3 MAXIMUM RATINGS**

The maximum ratings, which shall not be exceeded at any time during use or storage, applicable to the transistors specified herein are as scheduled in Table 1(b).

**1.4 PARAMETER DERATING INFORMATION**

The derating information applicable to the transistors specified herein is shown in Figure 1(a).

◦ The safe operating area information applicable to the transistors specified herein is shown in Figures 1(b) and 1(c).

**1.5 PHYSICAL DIMENSIONS**

The physical dimensions of the transistors specified herein are shown in Figure 2.

**1.6 FUNCTIONAL DIAGRAM**

The functional diagram showing lead identification, of the transistors specified herein, is shown in Figure 3.

**1.7 HIGH TEMPERATURE TEST PRECAUTIONS**

- For tin-lead plated or solder-dipped lead finish, all tests to be performed at a temperature that exceeds +125°C shall be carried out in a 100% inert atmosphere.

**2. APPLICABLE DOCUMENTS**

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

- (a) ESA/SCC Generic Specification No. 5000 for Discrete Semiconductor Components.
- (b) MIL-STD-750, Test Methods and Procedures for Semiconductor Devices.

**3. TERMS, DEFINITIONS, ABBREVIATIONS, SYMBOLS AND UNITS**

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

**TABLE 1(a) - TYPE VARIANTS**

VARIANT	BASED ON TYPE	CASE	FIGURE	LEAD MATERIAL AND FINISH
01	2N5664	TO66	2(a)	D2
02	2N5664	TO66	2(a)	D3 or D4
03	2N5665	TO66	2(a)	D2
04	2N5665	TO66	2(a)	D3 or D4
05	2N5666	TO5	2(b)	D2
06	2N5666	TO5	2(b)	D3 or D4
07	2N5667	TO5	2(b)	D2
08	2N5667	TO5	2(b)	D3 or D4
09	2N5666	TO39	2(c)	D2
10	2N5666	TO39	2(c)	D3 or D4
11	2N5667	TO39	2(c)	D2
12	2N5667	TO39	2(c)	D3 or D4



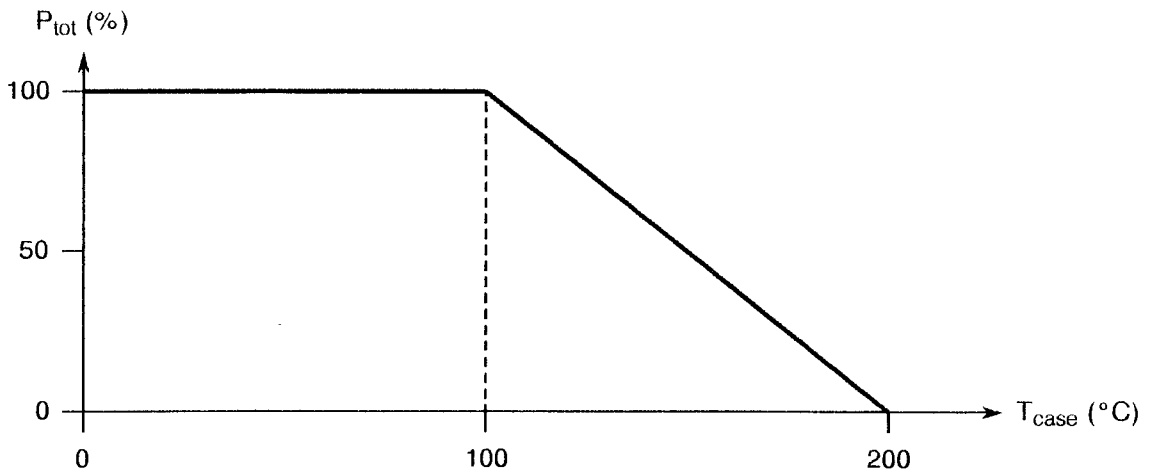
**TABLE 1(b) - MAXIMUM RATINGS**

No.	CHARACTERISTICS	SYMBOL	MAXIMUM RATINGS	UNIT	REMARKS
1	Collector - Base Voltage Variants 01-02-05-06-09-10 Variants 03-04-07-08-11-12	$V_{CBO}$	250 400	V	
2	Collector - Emitter Voltage Variants 01-02-05-06-09-10 Variants 03-04-07-08-11-12	$V_{CEO}$	200 300	V	
3	Emitter - Base Voltage	$V_{EBO}$	6.0	V	
4	d.c. Collector Current (Continuous)	$I_C$	5.0	A	
5	Peak Collector Current	$I_{CP}$	10	Apk	
6	d.c. Base Current	$I_B$	1.0	A	
7	Power Dissipation Variants 01-02-03-04 Variants 05-06-07-08-09-10-11-12	$P_{tot}$	30 15	W	Note 1
8	Operating Temperature Range	$T_{op}$	- 65 to + 200	°C	$T_{case}$
9	Storage Temperature Range	$T_{stg}$	- 65 to + 200	°C	
10	Soldering Temperature	$T_{sol}$	+ 260	°C	Note 2
11	Thermal Resistance Variants 01-02-03-04 Variants 05-06-07-08-09-10-11-12	$R_{TH(J-C)}$	3.3 6.7	°C/W	

**NOTES**

1. At  $T_{case} = +100^{\circ}C$ . For derating at  $T_{case} > +100^{\circ}C$ , see Figure 1(a).
2. 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.

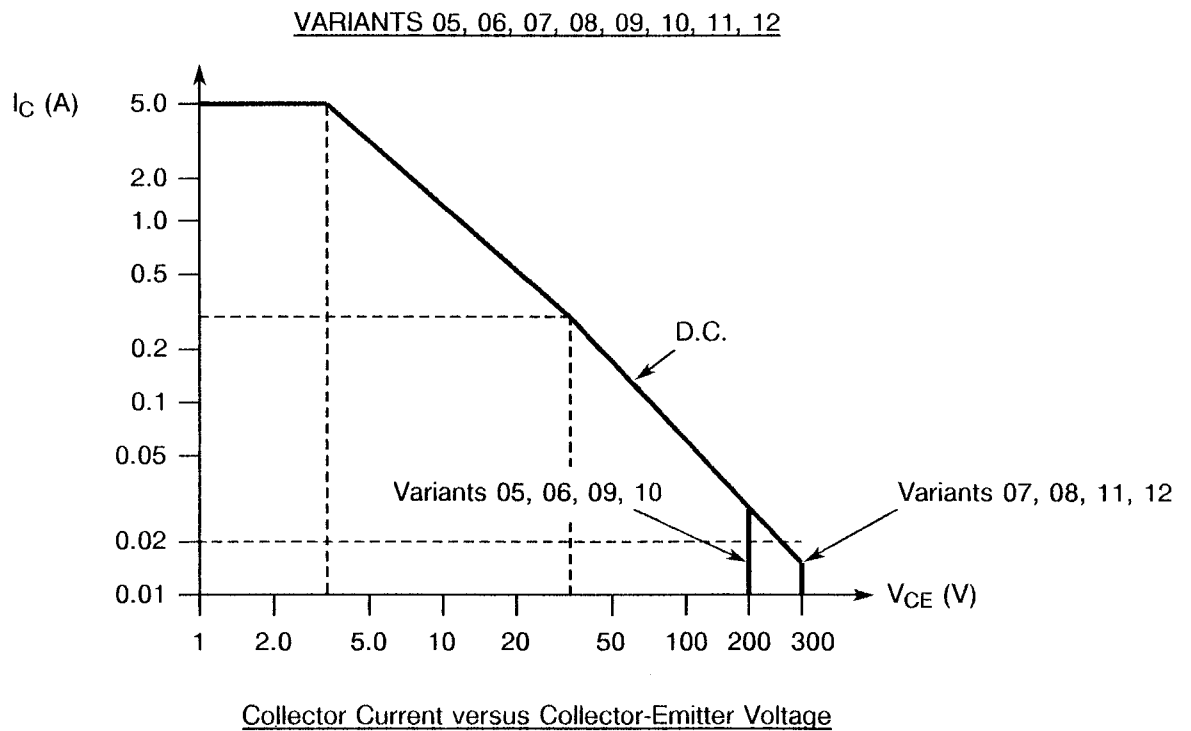
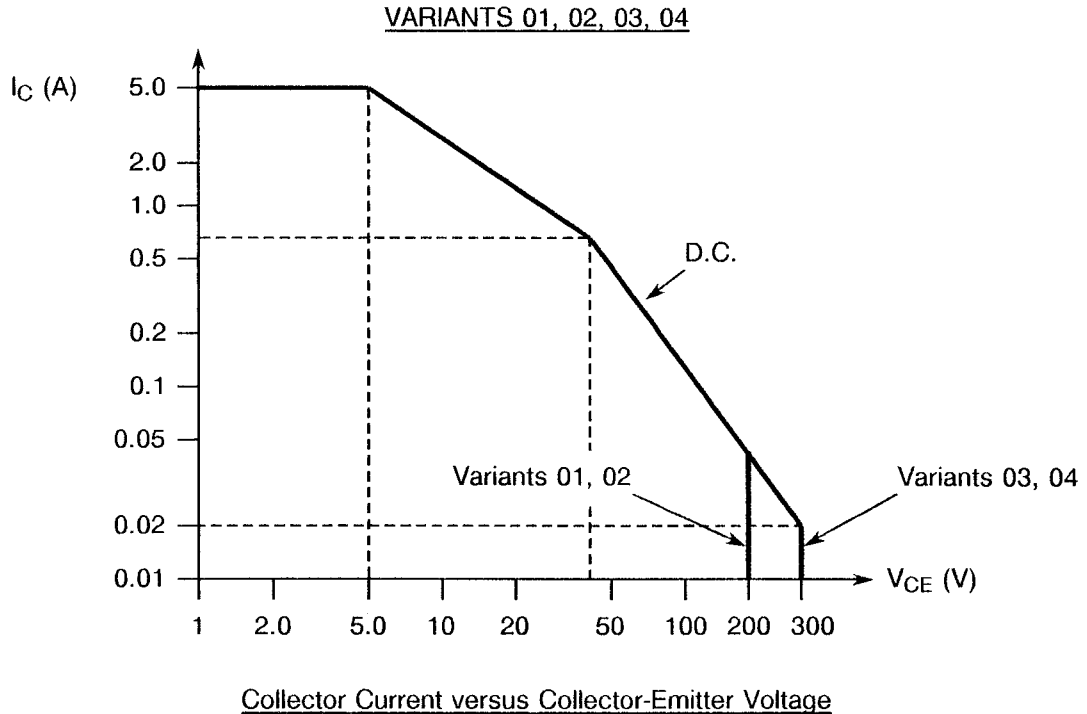
**FIGURE 1(a) - PARAMETER DERATING INFORMATION**



Power Dissipation versus Temperature



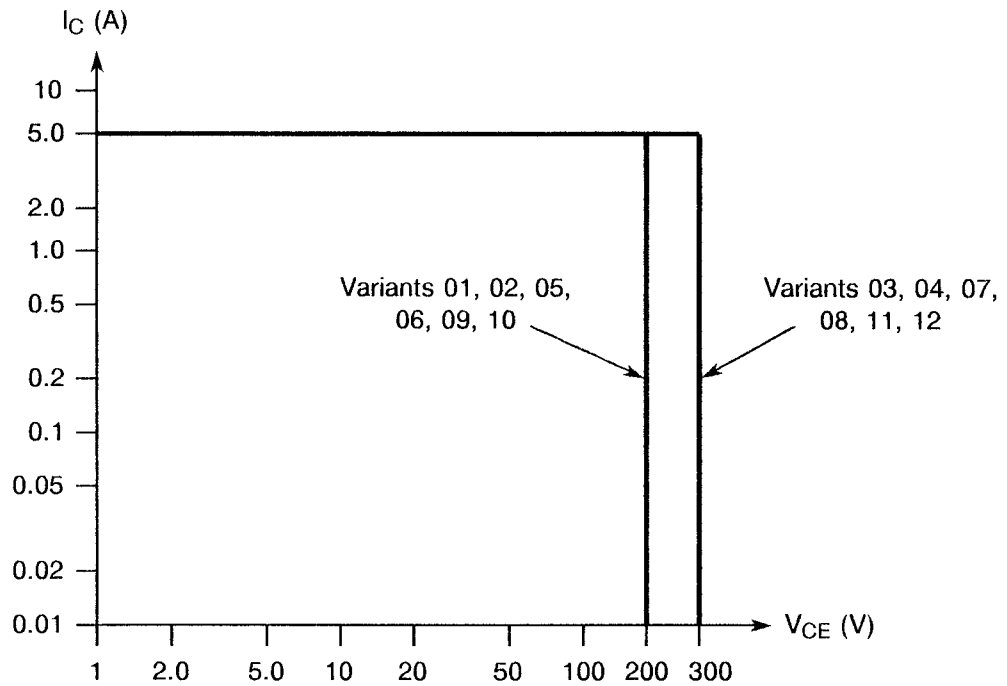
**FIGURE 1(b) - FORWARD BIAS SAFE OPERATING AREA (MAXIMUM CONTINUOUS d.c.)**



**NOTES**

1. See Para. 4.7.6.



**FIGURE 1(c) - FORWARD BIAS SAFE OPERATING AREA FOR SWITCHING BETWEEN SATURATION AND CUT-OFF (CLAMPED INDUCTIVE LOAD)****TEST CONDITIONS** $V_{CC} = 50V$  $I_C = 5.0A$  $R_L \leq 2.0\Omega$  $L = 40mH$  $t_r + t_f \leq 10\mu s$  $t_p = 4.0ms$ Duty Cycle  $\leq 2.0\%$  $R_S = 0.50\Omega$  $R_{BB1} = 50\Omega$  $V_{BB1} = 50V$  $R_{BB2} = 50\Omega$  $V_{BB2} = -4.0V$ Variants 01-02-05-06-09-10

Clamp Voltage = 200(+0 - 5) V

Variants 03-04-07-08-11-12

Clamp Voltage = 300(+0 - 5) V

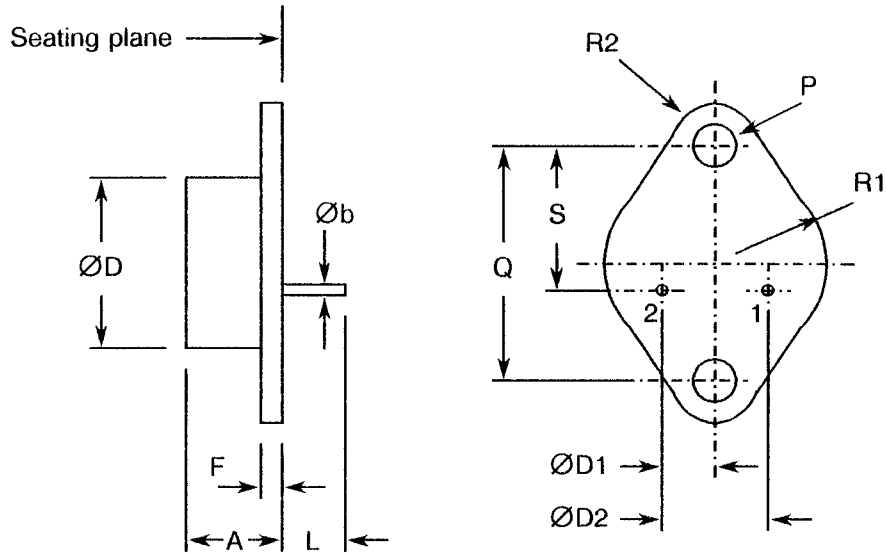
**NOTES**

1. See Para. 4.7.6.



**FIGURE 2 - PHYSICAL DIMENSIONS**

FIGURE 2(a) - VARIANTS 01 TO 04

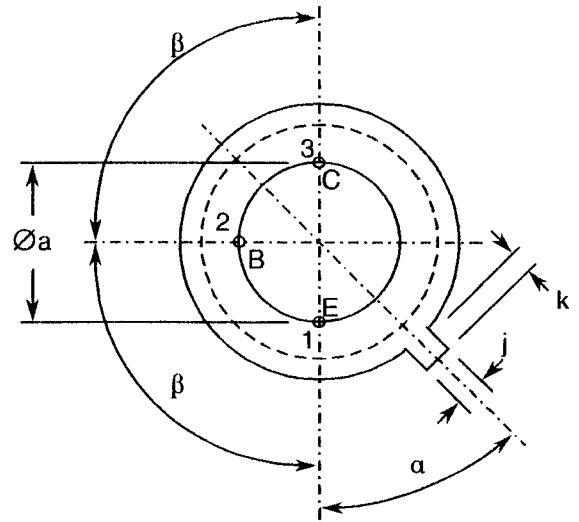
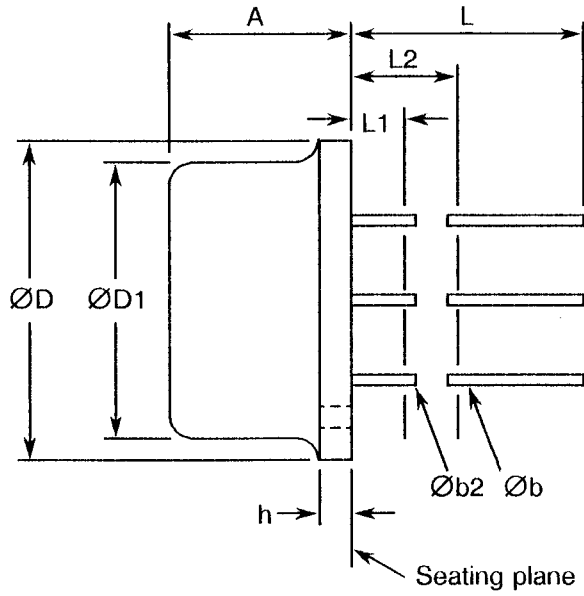


SYMBOL	MILLIMETRES		REMARKS
	MIN.	MAX.	
A	6.35	8.63	Both holes
Øb	0.711	0.863	
ØD	-	15.75	
ØD1	2.36	2.72	
ØD2	4.82	5.33	
F	1.27	1.90	
L	9.41	-	
P	3.60	3.68	
Q	24.33	24.43	
R1	-	8.89	
R2	-	3.68	
S	14.47	14.98	



**FIGURE 2 - PHYSICAL DIMENSIONS (CONTINUED)**

**FIGURE 2(b) - VARIANTS 05 TO 08**



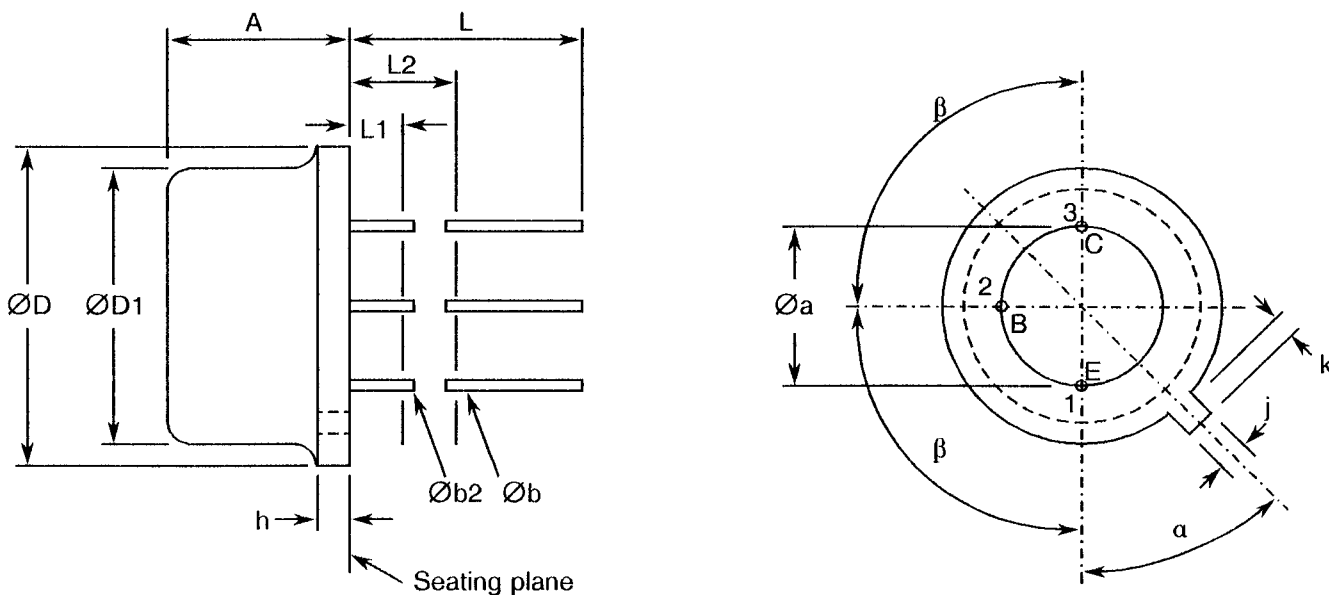
SYMBOL	MILLIMETRES		NOTES
	MIN.	MAX.	
Øa	4.83	5.33	
A	6.10	6.60	
Øb	0.406	0.533	1
Øb2	0.406	0.483	1
ØD	8.51	9.40	
ØD1	7.75	8.51	
h	0.254	0.762	
j	0.711	0.864	
k	0.737	1.14	2
L	38.10	44.45	1
L1	-	1.27	1
L2	6.35	-	1
α		45°	
β		90°	

**NOTES:** See Page 13.



**FIGURE 2 - PHYSICAL DIMENSIONS (CONTINUED)**

FIGURE 2(c) - VARIANTS 09 TO 12



SYMBOL	MILLIMETRES		NOTES
	MIN.	MAX.	
$\varnothing a$	4.83	5.33	
A	6.10	6.60	
$\varnothing b$	0.406	0.533	1
$\varnothing b2$	0.406	0.483	1
$\varnothing D$	8.89	9.40	
$\varnothing D1$	8.00	8.51	
h	0.229	3.18	
j	0.711	0.864	
k	0.737	1.02	2
L	12.70	-	1
L1	-	1.27	1
L2	6.35	-	1
$\alpha$		45°	
$\beta$		90°	

**NOTES:** See Page 13.



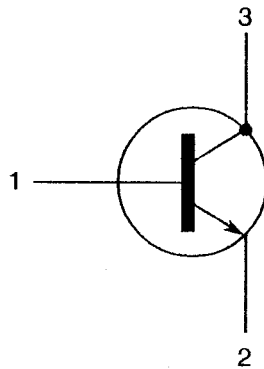
**FIGURE 2 - PHYSICAL DIMENSIONS (CONTINUED)**

**NOTES**

1. (3 leads)  $\varnothing b2$  applies between L1 and L2.  $\varnothing b$  applies between L2 and 12.70mm from seating plane. Diameter is uncontrolled in L1 and beyond 12.70mm from seating plane.
2. Measured from maximum diameter of the actual device.

**FIGURE 3 - FUNCTIONAL DIAGRAM**

FIGURE 3(a) - VARIANTS 01 TO 04

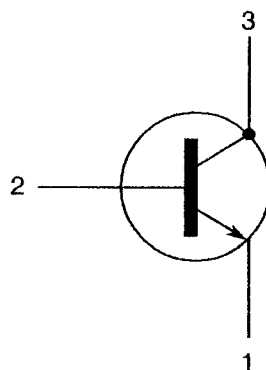


1. Base
2. Emitter
3. Collector

**NOTES**

1. The collector is internally connected to the case.

FIGURE 3(b) - VARIANTS 05 TO 12



1. Emitter
2. Base
3. Collector

**NOTES**

1. The collector is internally connected to the case.



#### 4. REQUIREMENTS

##### 4.1 GENERAL

The complete requirements for procurement of the transistors specified herein are stated in this specification and ESA/SCC Generic Specification No. 5000. Deviations from the Generic Specification, applicable to this specification only, are listed in Para. 4.2.

Deviations from the applicable Generic Specification and this Detail Specification, formally agreed with specific Manufacturers on the basis that the alternative requirements are equivalent to the ESA/SCC requirements and do not affect the components' reliability, are listed in the appendices attached to this specification.

##### 4.2 DEVIATIONS FROM GENERIC SPECIFICATION

###### 4.2.1 Deviations from Special In-process Controls

None.

###### 4.2.2 Deviations from Final Production Tests (Chart II)

None.

###### 4.2.3 Deviations from Burn-in Tests (Chart III)

(a) Para. 7.1.1(a), "High Temperature Reverse Bias" test and subsequent electrical measurements related to this test shall be omitted.

###### 4.2.4 Deviations from Qualification Tests (Chart IV)

None.

###### 4.2.5 Deviations from Lot Acceptance Tests (Chart V)

None.

##### 4.3 MECHANICAL REQUIREMENTS

###### 4.3.1 Dimension Check

The dimensions of the transistors specified herein shall be checked. They shall conform to those shown in Figure 2.

###### 4.3.2 Weight

The maximum weight of the transistors specified herein shall be 18 grammes for Variants 01 to 04 and 12 grammes for Variants 05 and 12.

###### 4.3.3 Terminal Strength

The requirements for terminal strength testing are specified in Section 9 of ESA/SCC Generic Specification No. 5000. The test conditions shall be as follows:-

###### Variants 01 to 04

Test Condition: 'A' (Tension)

Applied Force: 10 Newtons

Duration: 10 seconds

###### Variants 05 to 12

Test Condition: 'E' (Lead Fatigue)

Applied Force:  $5.0 \pm 0.1$  Newtons, 3 bends at  $45^\circ$



4.4 MATERIALS AND FINISHES

The materials and finishes shall be as specified herein. Where a definite material is not specified, a material which will enable the transistors specified herein to meet the performance requirements of this specification shall be used. Acceptance or approval of any constituent material does not guarantee acceptance of the finished product.

4.4.1 Case

The case shall be hermetically sealed and have a metal body with hard glass seals and the lid shall be welded, brazed, preform soldered or glass frit sealed.

4.4.2 Lead Material and Finish

The lead material shall be either Type 'D' with either Type '2' or Type '3 or 4' finish in accordance with the requirements of ESA/SCC Basic Specification No. 23500 (see Table 1(a) for Type Variants.

4.5 MARKING

4.5.1 General

The marking of components delivered to this specification shall be in accordance with the requirements of ESA/SCC Basic Specification No. 21700 and the following paragraphs. When the component is too small to accommodate all of the marking specified, as much as space permits shall be marked and the marking information, in full, shall accompany the component in its primary package.

The information to be marked and the order of precedence, shall be as follows:-

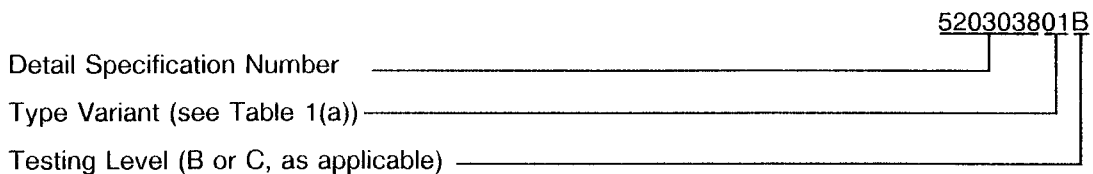
- (a) Lead Identification.
- (b) The SCC Component Number.
- (c) Traceability Information.

4.5.2 Lead Identification

Lead identification shall be as shown in Figures 2 and 3.

4.5.3 The SCC Component Number

Each component shall bear the SCC Component Number which shall be constituted and marked as follows:-



4.5.4 Traceability Information

Each component shall be marked in respect of traceability information in accordance with the requirements of ESA/SCC Basic Specification No. 21700.



#### 4.6 ELECTRICAL MEASUREMENTS

##### 4.6.1 Electrical Measurements at Room Temperature

The parameters to be measured at room temperature are scheduled in Table 2. Unless otherwise specified, measurements shall be performed at  $T_{amb} = +25 \pm 3$  °C.

##### 4.6.2 Electrical Measurements at High and Low Temperatures

The parameters to be measured at high and low temperatures are scheduled in Table 3. The measurements shall be performed at  $T_{amb} = -55(+5-0)$  and  $+150(+0-5)$  °C respectively.

##### 4.6.3 Circuits for Electrical Measurements

Circuits for use in performing the electrical measurements listed in Table 2 of this specification are shown in Figure 4.

#### 4.7 BURN-IN TESTS

##### 4.7.1 Parameter Drift Values

The parameter drift values applicable to burn-in are specified in Table 4 of this specification. Unless otherwise stated, measurements shall be performed at  $T_{amb} = +25 \pm 3$  °C. The parameter drift values ( $\Delta$ ) applicable to the parameters scheduled shall not be exceeded. In addition to these drift value requirements for a given parameter, the appropriate limit value specified in Table 2 shall not be exceeded.

##### 4.7.2 Conditions for High Temperature Reverse Bias Burn-in

Not applicable.

##### 4.7.3 Conditions for Power Burn-in

The requirements for power burn-in are specified in Section 7 of ESA/SCC Generic Specification No. 5000. The conditions for power burn-in shall be as specified in Table 5(b) of this specification.

##### 4.7.4 Electrical Circuit for High Temperature Reverse Bias Burn-in

Not applicable.

##### 4.7.5 Electrical Circuit for Power Burn-in

Not applicable.

##### 4.7.6 Verification of Safe Operating Area

The requirements for verification of safe operating area testing are specified in Section 9 of ESA/SCC Generic Specification No. 5000.

The tests and Test Methods shall be as follows:-

- (a) Maximum Continuous d.c., in accordance with MIL-STD-750, Method 3051 and Figure 1(b) of this specification, at  $T_{case} = +100$ °C.
- (b) Switching between Saturation and Cut-off, Clamped Inductive Load, in accordance with MIL-STD-750, Method 3053, Test Condition B and Figure 1 (c) of this specification, at  $T_{case} = +100$ °C.





**TABLE 2 - ELECTRICAL MEASUREMENTS AT ROOM TEMPERATURE - d.c. PARAMETERS**

No.	CHARACTERISTICS	SYMBOL	MIL-STD-750 TEST METHOD	TEST CONDITIONS	LIMITS		UNIT
					MIN	MAX	
1	Collector-Emitter Breakdown Voltage	$V_{(BR)CER}$	3011 Bias Cond. 'B'	$I_C = 10mA$ $R_{BE} = 100\Omega$ Variants 01-02-05-06-09-10 Variants 03-04-07-08-11-12 Note 1	250 400	- -	V
2	Collector-Emitter Breakdown Voltage	$V_{(BR)CEO}$	3011 Bias Cond. 'D'	$I_C = 10mA$ Variants 01-02-05-06-09-10 Variants 03-04-07-08-11-12 Note 1	200 300	- -	V
3	Emitter-Base Breakdown Voltage	$V_{(BR)EBO}$	3026 Bias Cond. 'D'	$I_E = 10\mu A$	6.0	-	$\mu A$
4	Collector-Emitter Cut-off Current	$I_{CES}$	3041 Bias Cond. 'C'	Variants 01-02-05-06-09-10 $V_{CE} = 200V$ Variants 03-04-07-08-11-12 $V_{CE} = 300V$	-	0.2	$\mu A$
5	Collector-Base Cut-off Current 1	$I_{CBO1}$	3036 Bias Cond. 'D'	Variants 01-02-05-06-09-10 $V_{CB} = 200V$ Variants 03-04-07-08-11-12 $V_{CB} = 300V$	-	0.1	$\mu A$
6	Collector-Base Cut-off Current 2	$I_{CBO2}$	3036 Bias Cond. 'D'	Variants 01-02-05-06-09-10 $V_{CB} = 250V$ Variants 03-04-07-08-11-12 $V_{CB} = 400V$	-	0.1	mA
7	d.c. Forward Current Transfer Ratio 1	$h_{FE1}$	3076	$V_{CE} = 2.0V, I_C = 0.5A$ Variants 01-02-05-06-09-10 Variants 03-04-07-08-11-12 Note 1	40 25	- -	-
8	d.c. Forward Current Transfer Ratio 2	$h_{FE2}$	3076	$V_{CE} = 5.0V, I_C = 1.0A$ Variants 01-02-05-06-09-10 Variants 03-04-07-08-11-12 Note 1	40 25	120 75	-
9	d.c. Forward Current Transfer Ratio 3	$h_{FE3}$	3076	$V_{CE} = 5.0V, I_C = 3.0A$ Variants 01-02-05-06-09-10 Variants 03-04-07-08-11-12 Note 1	15 10	- -	-
10	d.c. Forward Current Transfer Ratio 4	$h_{FE4}$	3076	$V_{CE} = 5.0V, I_C = 5.0A$ Note 1	5.0	-	-

**NOTES:** See Page 19.

**SCC**ESA/SCC Detail Specification  
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**TABLE 2 - ELECTRICAL MEASUREMENTS AT ROOM TEMPERATURE - d.c. PARAMETERS (CONT'D)**

No.	CHARACTERISTICS	SYMBOL	MIL-STD-750 TEST METHOD	TEST CONDITIONS	LIMITS		UNIT
					MIN	MAX	
11	Collector-Emitter Saturation Voltage 1	$V_{CE(SAT)1}$	3071	$I_C = 3.0A$ Variants 01-02-05-06-09-10 $I_B = 0.3A$ Variants 03-04-07-08-11-12 $I_B = 0.6A$ Notes 1 and 2	-	0.4	V
12	Collector-Emitter Saturation Voltage 2	$V_{CE(SAT)2}$	3071	$I_C = 5.0A$ $I_B = 1.0A$ Notes 1 and 2	-	1.0	V
13	Base-Emitter Saturation Voltage 1	$V_{BE(SAT)1}$	3066 Bias Cond. 'A'	$I_C = 3.0A$ Variants 01-02-05-06-09-10 $I_B = 0.3A$ Variants 03-04-07-08-11-12 $I_B = 0.6A$ Notes 1 and 2	-	1.2	V
14	Base-Emitter Saturation Voltage 2	$V_{BE(SAT)2}$	3066 Bias Cond. 'A'	$I_C = 5.0A$ $I_B = 1.0A$ Notes 1 and 2	-	1.5	V

**NOTES:** See Page 19.

**TABLE 2 - ELECTRICAL MEASUREMENTS AT ROOM TEMPERATURE - a.c. PARAMETERS**

No.	CHARACTERISTICS	SYMBOL	MIL-STD-750 TEST METHOD	TEST FIG.	TEST CONDITIONS (NOTE 3)	LIMITS		UNIT
						MIN	MAX	
15	Gain-Bandwidth Product	$f_T$	3306	-	$V_{CE} = 5.0V$ $I_C = 0.5A$ $f = 10MHz$	20	70	MHz
16	Open Circuit Output Capacitance	$C_{obo}$	3236	-	$V_{CB} = 10V$ $I_E = 0$ $f = 1.0MHz$	-	120	pF
17	Turn-on Time	$t_{on}$	-	4(a) 4(b)	$V_{CC} = 100V$ $I_C = 1.0A$ Variants 01-02-05-06-09-10 $I_{B1} = - I_{B2} = 30mA$ Variants 03-04-07-08-11-12 $I_{B1} = - I_{B2} = 50mA$	-	0.25	$\mu s$
18	Turn-off Time	$t_{off}$	-	4(a) 4(b)	$V_{CC} = 100V$ $I_C = 1.0A$ Variants 01-02-05-06-09-10 $I_{B1} = - I_{B2} = 30mA$ Variants 03-04-07-08-11-12 $I_{B1} = - I_{B2} = 50mA$	-	1.5 2.0	$\mu s$

**NOTES**

1. Pulsed measurement, pulse length  $\leq 300\mu s$ , Duty Cycle  $\leq 2.0\%$ .
2. Devices shall be measured at less than 3.175mm from the case.
3. Measurements shall be performed on a sample basis, LTPD7 or less.

**TABLE 3 - ELECTRICAL MEASUREMENTS AT HIGH AND LOW TEMPERATURES**

No.	CHARACTERISTICS	SYMBOL	MIL-STD-750 TEST METHOD	TEST CONDITIONS	LIMITS		UNIT
					MIN	MAX	
4	Collector-Emitter Cut-off Current	$I_{CES}$	3041 Bias Cond. 'C'	Variants 01-02-05-06-09-10 $V_{CE} = 200V$ Variants 03-04-07-08-11-12 $V_{CE} = 300V$ $T_{amb} = +150(+0 - 5) ^\circ C$	-	100	$\mu A$
8	d.c. Forward Current Transfer Ratio 2	$h_{FE2}$	3076	$V_{CE} = 5.0V, I_C = 1.0A$ Variants 01-02-05-06-09-10 Variants 03-04-07-08-11-12 $T_{amb} = -65(+5 - 0) ^\circ C$	15 10	- -	-

**NOTES**

1. Pulsed measurement, pulse length  $\leq 300\mu s$ , Duty Cycle  $\leq 2.0\%$ .

**TABLE 4 - PARAMETER DRIFT VALUES**

No.	CHARACTERISTICS	SYMBOL	SPEC. AND/OR TEST METHOD	TEST CONDITIONS	CHANGE LIMITS ( $\Delta$ )	UNIT
4	Collector-Emitter Cut-off Current	$I_{CES}$	As per Table 2	As per Table 2	$\pm 20$ or (1) $\pm 100$	nA %
8	D.C. Forward Current Transfer Ratio 2	$h_{FE2}$	As per Table 2	As per Table 2	$\pm 25$	%
12	Collector-Emitter Saturation Voltage 2	$V_{CE(SAT)2}$	As per Table 2	As per Table 2	$\pm 100$	mV

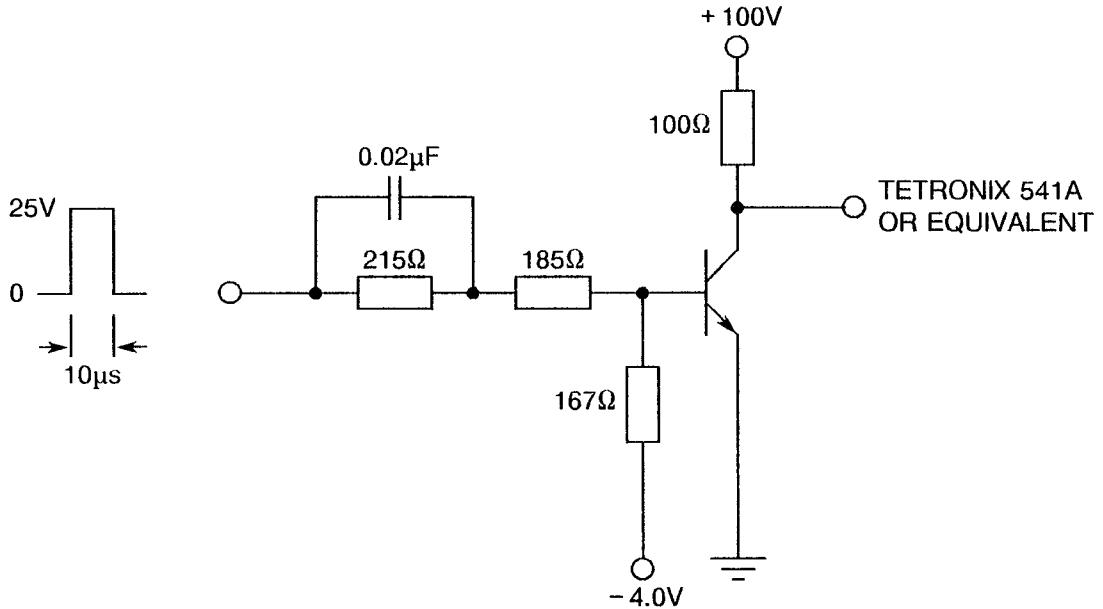
**NOTES**

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

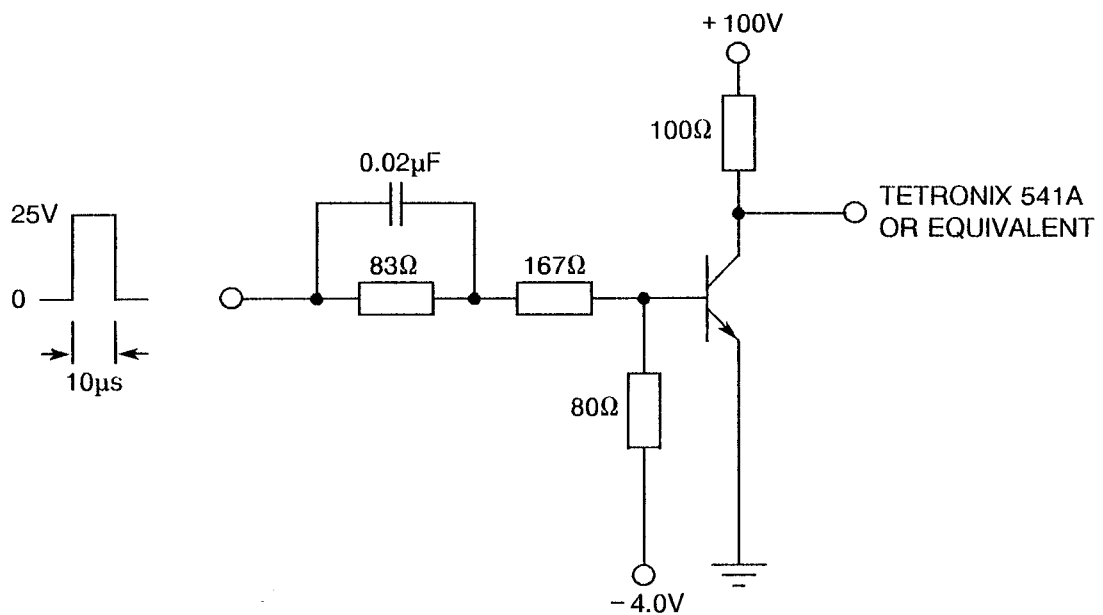


**FIGURE 4 - CIRCUITS FOR ELECTRICAL MEASUREMENTS**

**FIGURE 4(a) - CIRCUITS FOR SWITCHING SPEED MEASUREMENTS,  
VARIANTS 01, 02, 05, 06, 09, 10**



**FIGURE 4(b) - CIRCUITS FOR SWITCHING SPEED MEASUREMENTS,  
VARIANTS 03, 04, 07, 08, 11, 12**



**NOTES**

1. Input Pulse Voltage, -4.0V and +100V shall be adjusted to obtain the correct values of  $I_{B1}$ ,  $I_{B2}$  and  $I_C$ .
2. Pulse Generator -  $t_r$  and  $t_f \leq 15ns$ ,  $Z_{out} = 50\Omega$ , Duty Cycle  $\leq 2.0\%$ .
3. Resistors shall be non-inductive types.

**TABLE 5(a) - CONDITIONS FOR HIGH TEMPERATURE REVERSE BIAS BURN-IN**

Not applicable.

**TABLE 5(b) - CONDITIONS FOR POWER BURN-IN AND OPERATING LIFE TESTS**

No.	CHARACTERISTICS	SYMBOL	CONDITIONS	UNIT
1	Ambient Temperature	$T_{amb}$	$+ 25 \pm 3$	°C
2	Power Dissipation	$P_{tot}$	Variants 01 to 04: 2.5 Variants 05 to 12: 1.2 Note 1	W
3	Collector-Emitter Voltage	$V_{CE}$	Variants 01 to 04: 100 Variants 05 to 12: 150	V

**NOTES**



1. No heatsink, or forced air directly on the device, shall be permitted.

**FIGURE 5(a) - ELECTRICAL CIRCUIT FOR HIGH TEMPERATURE REVERSE BIAS BURN-IN**

Not applicable.

**FIGURE 5(b) - ELECTRICAL CIRCUIT FOR POWER BURN-IN AND OPERATING LIFE TESTS**

Not applicable.

 	<p style="text-align: center;">ESA/SCC Detail Specification No. 5203/038</p>	<p style="text-align: right;">PAGE 23 ISSUE 3</p>
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4.8 ENVIRONMENTAL AND ENDURANCE TESTS (CHARTS IV AND V OF ESA/SCC GENERIC SPECIFICATION NO. 5000)

4.8.1 Electrical Measurements on Completion of Environmental Tests

The parameters to be measured on completion of environmental tests are scheduled in Table 2. Unless otherwise stated, the measurements shall be performed at  $T_{amb} = +25 \pm 3$  °C.

4.8.2 Electrical Measurements at Intermediate Points and on Completion of Endurance Tests

The parameters to be measured at intermediate points and on completion of endurance tests are scheduled in Table 6 of this specification. Unless otherwise stated, the measurements shall be performed at  $T_{amb} = +25 \pm 3$  °C.

4.8.3 Conditions for Operating Life Tests (Part of Endurance Testing)

The requirements for operating life testing are specified in Section 9 of ESA/SCC Generic Specification No. 5000. The conditions for operating life testing shall be the same as specified in Table 5(b) for the power burn-in test.

4.8.4 Electrical Circuits for Operating Life Tests

Not applicable.

4.8.5 Conditions for High Temperature Storage Test (Part of Endurance Testing)

The requirements for the high temperature storage test are specified in ESA/SCC Generic Specification No. 5000. The temperature to be applied shall be the maximum storage temperature specified in Table 1(b) of this specification.

**TABLE 6 - ELECTRICAL MEASUREMENTS AT INTERMEDIATE POINTS AND ON COMPLETION OF ENDURANCE TESTING**

No.	CHARACTERISTICS	SYMBOL	SPEC. AND/OR TEST METHOD	TEST CONDITIONS	LIMITS		UNIT
					MIN.	MAX.	
4	Collector-Emitter Cut-off Current	$I_{CES}$	As per Table 2	As per Table 2	-	0.2	$\mu A$
8	d.c. Forward Transfer Ratio 2	$h_{FE2}$	As per Table 2	As per Table 2	See Table 2		-
12	Collector-Emitter Saturation Voltage 2	$V_{CE(SAT)2}$	As per Table 2	As per Table 2	-	1.0	V





APPENDIX 'A'

AGREED DEVIATIONS FOR UNITRODE/SOLITRON

ITEMS AFFECTED	DESCRIPTION OF DEVIATIONS
Para. 4.2.2	Para. 9.1, "Internal (Pre-encapsulation) Inspection", shall be performed in accordance with MIL-STD-750, Method 2074. Para. 9.10, "External Visual Inspection", shall be performed in accordance with MIL-STD-750, Method 2071.
Para. 4.2.3	Para. 9.10, "External Visual Inspection", shall be performed in accordance with MIL-STD-750, Method 2071. Para. 9.12, "Radiographic Inspection", shall be performed in accordance with MIL-STD-750, Method 2076.
Para. 4.2.4	Para. 9.10, "External Visual Inspection", shall be performed in accordance with MIL-STD-750, Method 2071.
Para. 4.2.5	Para. 9.10, "External Visual Inspection", shall be performed in accordance with MIL-STD-750, Method 2071.