

NOTICE - WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

01E9001

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL

REQUIREMENTS:

1. GENERAL:

- A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
- B. UNITS SHALL MEET THE REQUIREMENTS OF MIL-S-19500/290 EXCEPT AS, AND IN ADDITION TO THE REQUIREMENTS, SPECIFIED HEREIN.
- C. SUPPLIER SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS CONTAINED IN ND 1015404, CLASS 2.
- D. UNITS SHALL BE CAPABLE OF MEETING THE QUALIFICATION REQUIREMENTS OF ND 1002051.
- E. MARKING:
 - (1) PARTS SHALL BE PERMANENTLY AND LEGIBLY MARKED, IN ACCORDANCE WITH ND 1002019, WITH THE NASA PART NUMBER (DRAWING NUMBER AND REVISION LETTER) OR AS MANY SIGNIFICANT DIGITS AS POSSIBLE (E.G. 6310). OTHER MARKING SUCH AS MANUFACTURER'S IDENTIFICATION AND TYPE NUMBER IS PERMISSIBLE.
- F. PREPARATION FOR DELIVERY SHALL BE IN ACCORDANCE WITH ND 1002215, CLASS I, CODE 2.
 - (1) MARKING OF SHIPPING CONTAINERS SHALL CONFORM TO THE MARKING OF UNIT AND INTERMEDIATE PACKAGES AND THE METHODS OF MARKING AS SPECIFIED IN ND 1002215.

2. ACCEPTANCE AND INSPECTION:

A. MECHANICAL PROPERTIES:

- (1) DIMENSIONS: AS DELINEATED HEREIN.

B. ELECTRICAL CHARACTERISTICS: PER TABLES I, II, AND III AS LISTED BELOW:

- (1) PRE-ELECTRICAL TEST PROCESSING: ON LOTS OF 500 OR LESS, THE TESTS OF TABLE I SHALL BE PERFORMED IN THE SEQUENCE INDICATED BEFORE THE TESTS OF TABLE II.
- (2) ELECTRICAL TESTING: THE TESTS LISTED IN TABLE II SHALL BE PERFORMED AS LISTED BELOW:

- COLLECTOR CUTOFF CURRENT
- COLLECTOR-BASE BREAKDOWN VOLTAGE
- EMITTER-BASE BREAKDOWN VOLTAGE
- EMITTER-BASE REVERSE CURRENT
- COLLECTOR-EMITTER SUSTAINING VOLTAGE
- COLLECTOR-EMITTER CURRENT
- COLLECTOR-EMITTER THRESHOLD CURRENT
- DIRECT CURRENT GAIN
- BASE-EMITTER SATURATION VOLTAGE
- COLLECTOR-EMITTER SATURATION VOLTAGE
- COLLECTOR CAPACITANCE
- TURN-ON AND TURN-OFF TIME

PROCURE ONLY FROM APPROVED SOURCES LISTED IN ND 1002034 FOR THIS DRAWING.

(3) QUALITY DEMONSTRATION TESTING: PER TABLE III USING ACCEPTABLE UNITS FROM SUBGROUP 2 OF TABLE II FOR SUBGROUP 2, 3, AND 4 OF TABLE III. SUBGROUPS 1 AND 5 MAY USE ELECTRICAL REJECTS FROM THE SAME LOT.

C. VENDOR SUPPLIED DATA: EACH SHIPMENT OF PARTS SHALL BE ACCOMPANIED BY THE FOLLOWING DOCUMENTATION.

- (1) CERTIFICATE OF COMPLIANCE WITH LEAD MATERIAL REQUIREMENT.
- (2) CERTIFICATE OF COMPLIANCE WITH ND 1015404, CLASS 2.

3. DESIGN:

A. STORAGE LIFE: INDEFINITE WHEN STORED AT TEMPERATURES BETWEEN -65°C AND +200°C.

B. ABSOLUTE MAXIMUM RATINGS AT 25°C AMBIENT.

- (1) COLLECTOR-EMITTER VOLTAGE (V_{CE0}): 40 VDC
- (2) COLLECTOR-BASE VOLTAGE (V_{CB0}): 60 VDC
- (3) EMITTER-BASE VOLTAGE (V_{EB0}): 5 VDC
- (4) COLLECTOR CURRENT (I_C): 600 MILLIAMPERES
- (5) POWER DISSIPATION (P_T): 0.4 WATTS
1.8 WATTS AT 25°C CASE TEMPERATURE
- (6) THERMAL RESISTANCE, JUNCTION-CASE (θ_{JC}): 80°C/WATT
- (7) THERMAL RESISTANCE, JUNCTION-AMBIENT (θ_{JA}): 435°C/WATT
- (8) TEMPERATURE RANGE, JUNCTION, OPERATING: -65°C TO +200°C.
- (9) TEMPERATURE RANGE, STORAGE: -65°C TO +300°C

C. CONSTRUCTION:

- (1) SEMICONDUCTOR: SILICON PLANAR EPITAXIAL PNP
- (2) CASE: METAL CASE HERMETICALLY SEALED (JEDEC TO-18)
- (3) COLLECTOR SHALL BE ELECTRICALLY CONNECTED TO THE CASE INTERNALLY.
- (4) LEAD MATERIAL: WELDABLE, GOLD PLATED, ANNEALED IRON-NICKEL-COBALT (KOVAR) ALLOY IN ACCORDANCE WITH ND 1015402.

D. QUALITY ASSURANCE REQUIREMENTS:

- (1) LOT DEFINITION: A GROUP OF PARTS IN A SINGLE PROCUREMENT SELECTED FROM A SINGLE CONTINUOUS PRODUCTION RUN USING LIKE MATERIALS WHICH ARE CONTROLLED USING A PROCESS WHICH IS THE SAME FROM THE BEGINNING TO THE END OF THE RUN.
- (2) INSPECTION CONDITIONS: UNLESS OTHERWISE SPECIFIED, ALL INSPECTIONS SHALL BE MADE AT AN AMBIENT TEMPERATURE OF +25° ± 3°C.

CLASS B RELEASE PER TDRR ¹⁵⁷³⁷ DATE 1/24/66

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			
MIT INSTRUMENTATION LAB CAMBRIDGE, MASS.		MANNED SPACECRAFT CENTER HOUSTON, TEXAS	
DRAWN <i>D. Hines</i> DATE <i>30 Nov 65</i>		TRANSISTOR, SILICON, TYPE PNP, SWITCHING SPECIFICATION CONTROL DRAWING	
CHECKED <i>R.T. Dismore</i> DATE <i>9 Dec 65</i>			
DO NOT SCALE THIS DRAWING		CODE IDENT NO.	NASA DRAWING NO.
MATERIAL SEE NOTE		SIZE C	1006310
HEAT TREATMENT NONE		SCALE NONE	WT
FINAL FINISH NONE		SHEET 1 OF 4	
NEXT ASSY	USED ON		
APPLICATION			

NOTICE - WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONFERRING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

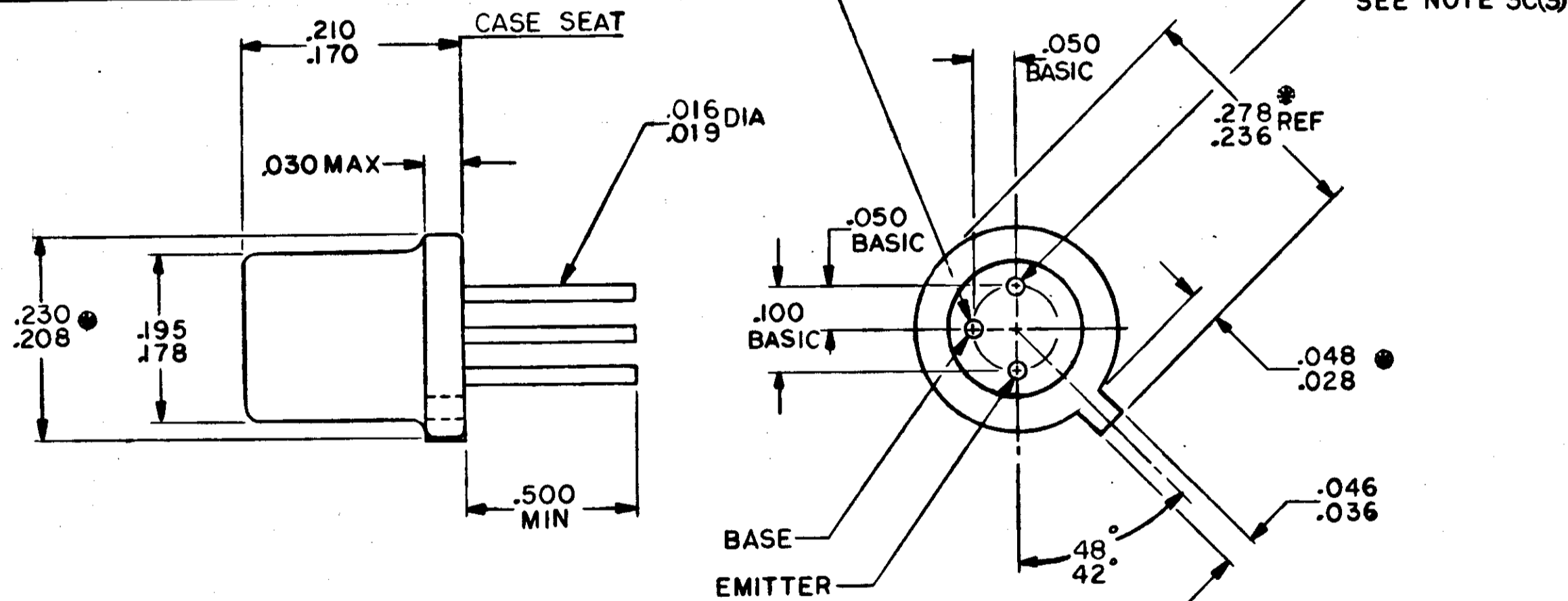
01E9001

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL

TABLE I

TEST	MIL-STD-750 TEST CONDITIONS	LOT	
		1 TO 500	OVER 500
		100%	NO REQUIREMENT
THERMAL SHOCK	METHOD 1056, CONDITION B (+200°C TO -65°C, 3 CYCLES)	↓	↓
STORAGE LIFE (HIGH TEMPERATURE STABILIZATION)	METHOD 1031, Tstg = 300° ± 5°C, 72 ⁺⁸ ₋₄ HOURS	↓	↓
CONSTANT ACCELERATION	METHOD 2006 (20,000 G)	↓	↓
POWER, BURN-IN	METHOD 1026 P = 270 MILLIWATTS VCE = -11.0 VOLTS MINIMUM TA = +22°C MIN IN FREE AMBIENT AIR t = 168 ⁺¹² ₋₆ HOURS	↓	↓
SEAL TEST	MIL-STD-202C, METHOD 112, CONDITION C 10 ⁻⁸ ATM CC/SEC MAX = ACCEPTANCE	↓	↓

CLASS B RELEASE PER TDRR 15737 DATE 1/26/65



* TAB LENGTH IS DETERMINED BY DIFFERENCE OF (DIM. OVER TAB - OD)

NOTED

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			
MIT INSTRUMENTATION LAB CAMBRIDGE, MASS.		MANNED SPACECRAFT CENTER HOUSTON, TEXAS	
DRAWN <i>D. M. ...</i> DATE 10/26/64 CHECKED <i>R. T. ...</i> DATE 10/26/64		TRANSISTOR, SILICON, TYPE PNP, SWITCHING SPECIFICATION CONTROL DRAWING	
APPROVAL <i>Edwin C. Hall 22 Jan 65</i>			
HEAT TREATMENT NONE		CODE IDENT NO.	NASA DRAWING NO.
FINAL FINISH NONE		MIT APPROVAL <i>...</i>	1006310
NEXT ASSY	USED ON	MIT APPROVAL <i>...</i>	SCALE NONE WT
APPLICATION		SHEET 2 OF 4	

01E9001

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL

INITIAL RELEASE CLASS B

NOTICE - WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

TABLE II

ACCEPTANCE INSPECTION							
TEST	SYMBOL	MIL-STD-750 TEST CONDITIONS	LIMIT		UNITS	LOT	
			MIN	MAX		1 TO 500	OVER 500
SUBGROUP 1 VISUAL AND MECHANICAL EXAMINATION		METHOD 2071 (SEE NOTE 2 A (3))				LTPD* = 10 MAX ACC NO. = 3	LTPD* = 10 MAX ACC NO. = 3
SUBGROUP 2							
COLLECTOR CUTOFF CURRENT	Icbo	V _{CB} = -50 V; I _E = 0		10	μA	100%	LTPD* = 2 (COMBINED) MAX ACC NO. = 3
COLLECTOR CUTOFF CURRENT 150°C	Icbo	V _{CB} = -50 V; I _E = 0		10	μA		
COLLECTOR-BASE BREAKDOWN VOLTAGE	BVCBO	I _C = -10 μA; I _E = 0	60		V		
EMITTER-BASE REVERSE CURRENT	I _{EBO}	V _{EB} = -3 V; I _C = 0		0.1	μA		
EMITTER-BASE BREAKDOWN VOLTAGE	BVEBO	I _E = -10 μA; I _C = 0	5		V		
COLLECTOR-EMITTER SUSTAINING VOLTAGE	V _{CEO} SUST	I _C = -10 mA PULSED I _B = 0	60				
COLLECTOR-EMITTER CURRENT RES. RETURN	I _{CER}	V _{CE} = -20 V; R _{BE} = 100 K		10	μA		
COLLECTOR-EMITTER THRESHOLD CURRENT	I _{CES}	V _{BE} = -0; V _{CE} = -50 V		10	μA		
DC CURRENT GAIN	h _{FE}	I _C = -150 mA; V _{CE} = -10 V	100	300			
DC CURRENT GAIN	h _{FE}	I _C = -10 mA; V _{CE} = -10 V	140				
DC CURRENT GAIN	h _{FE}	I _C = -1 mA; V _{CE} = -10 V	135				
DC CURRENT GAIN	h _{FE}	I _C = -500 μA; V _{CE} = -10 V	50				
BASE-EMITTER SATURATION VOLTAGE	V _{BE(sat)}	I _C = -50 mA; I _B = -2.5 mA	0.7	-1.0	V		
COLLECTOR-EMITTER SATURATION VOLTAGE	V _{CE(sat)}	I _C = -50 mA; I _B = -2.5 mA		0.25	V		
COLLECTOR-EMITTER SATURATION VOLTAGE	V _{CE(sat)}	I _C = -150 mA; I _B = -15 mA		0.4	V		
COLLECTOR CAPACITANCE	C _{obo}	V _{CB} = -10 V; I _E = 0; F = 0.14 mc		10	PF		
TURN ON TIME	t _{on}	I _{B1} = I _{B2} = 30 mA; I _C = 300 mA t _w > 400 nsec 2% DUTY CYCLE		40	NSEC		
TURN OFF TIME	t _{off}	I _{B1} = I _{B2} = 30 mA; I _C = 300 mA t _w > 400 nsec 2% DUTY CYCLE		100	NSEC		

*LTPD PER MIL-S-19500D, TABLE CI OR II

CLASS B RELEASE PER TDRR 15737 DATE 1/24/65

NOTES

		UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
		TOLERANCES ON
		FRACTIONS DECIMALS ANGLES
		± ± ±
		DO NOT SCALE THIS DRAWING
		MATERIAL
		SEE NOTE
		HEAT TREATMENT
		NONE
		FINAL FINISH
		NONE
NEXT ASSY	USED ON	
APPLICATION		

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			
MIT INSTRUMENTATION LAB CAMBRIDGE, MASS.		MANNED SPACECRAFT CENTER HOUSTON, TEXAS	
DRAWN <i>[Signature]</i> DATE <i>DEC 68</i>		TRANSISTOR, SILICON, TYPE PNP, SWITCHING SPECIFICATION CONTROL DRAWING	
CHECKED <i>[Signature]</i> DATE <i>12/22/68</i>			
APPROVAL <i>[Signature]</i>		CODE IDENT NO.	SIZE
APPROVAL <i>[Signature]</i>			C
NASA APPROVAL <i>[Signature]</i>		MIT APPROVAL	NASA DRAWING NO.
MIT APPROVAL <i>[Signature]</i>			1006310
SCALE NONE		WT	SHEET 3 OF 4

NOTICE - WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVERTING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

01E9001

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL

TABLE III

QUALITY DEMONSTRATION TESTS			
TEST	MIL-STD-750 TEST CONDITIONS	LOT	
		1 TO 500	OVER 500
SUBGROUP 1 PHYSICAL DIMENSIONS	METHOD 2066	NO REQUIREMENTS	LTPD = 20 MAX ACC NO. = 1
SUBGROUP 2** THERMAL SHOCK SEAL TEST	METHOD 1056, CONDITION B (+200°C TO -65°C, 5 CYCLES)		LTPD = 10 (COMBINED) MAX ACC NO. = 3
SUBGROUP 3** STORAGE LIFE SHOCK VIBRATION VARIABLE FREQUENCY CONSTANT ACCELERATION	METHOD 1031 Tstg = 200° ± 5°C, 1000 HOURS METHOD 2016, 1500 G, 0.5 MSEC 5 BLOWS EACH IN X1, Y1, Y2, Z1 DIRECTIONS, 20 BLOWS TOTAL METHOD 2056, 30 G FROM 5 TO 2000 CPS LIMITED TO 0.12 DOUBLE AMPLITUDE, 3 CYCLES, 15 MINUTES PER CYCLE MINIMUM. METHOD 2006, 20,000 G		LTPD = 10 (COMBINED) MAX ACC NO. = 3
SUBGROUP 4 OPERATION LIFE	METHOD 1026 P = 270 MILLIWATTS VCE = -11 VOLTS MINIMUM TA = +22°C MIN IN FREE AMBIENT AIR t = 1000 HOURS		λ* = 10 MAX ACC NO. = 3
SUBGROUP 5** LEAD TENSION LEAD FATIGUE	METHOD 2036 4 POUND LOAD FOR 10 SECONDS 4 POUND LOAD FOR 6 ARCS		LTPD = 20 (COMBINED) MAX ACC NO. = 3

* PER MIL-S-19500D TABLE CI OR II
** TESTS TO BE PERFORMED IN ORDER INDICATED

TABLE III (CONTINUED)

TEST	SYMBOL	TEST CONDITION	LIMIT
END POINTS FOR SUBGROUP 2			
COLLECTOR CUTOFF CURRENT	ICBO	V _{CB} = -50V, I _C = 0	±50% *
EMITTER CUTOFF CURRENT	IEBO	V _{EB} = -3 V, I _C = 0	±50% *
DC CURRENT GAIN	hFE	V _{CE} = -1 V, I _C = -10 mA	±10% *
END POINTS FOR SUBGROUPS 3 AND 4			
COLLECTOR CUTOFF CURRENT	ICBO	V _{CB} = -50V, I _E = 0	±100% *
EMITTER CUTOFF CURRENT	IEBO	V _{EB} = -3 V, I _C = 0	±100% *
DC CURRENT GAIN	hFE	V _{CE} = -1 V, I _C = -10 mA	±20% *

* THE PARAMETER MEASURED MAY NOT CHANGE ANY GREATER THAN THE PERCENTAGE SPECIFIED BETWEEN THE INITIAL VALUE AND THE END OF TEST VALUE. VALUES OF COLLECTOR AND EMITTER CUTOFF CURRENTS LESS THAN 5 MILLIMICROAMPERES MAY BE CONSIDERED TO BE 5 MILLIMICROAMPERES FOR CALCULATING PERCENTAGE CHANGE.

CLASS B RELEASE PER TDRR 15737 DATE 1/26/65

NOTED

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON	
FRACTIONS DECIMALS ANGLES	± ± ±
DO NOT SCALE THIS DRAWING	
MATERIAL	SEE NOTE
HEAT TREATMENT	NONE
FINAL FINISH	NONE
NEXT ASSY	USED ON
APPLICATION	

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			
MIT INSTRUMENTATION LAB CAMBRIDGE, MASS.		MANNED SPACECRAFT CENTER HOUSTON, TEXAS	
DRAWN <i>D. Howard</i> DATE 2 DEC 64 CHECKED <i>R.T. Driscoll</i> WSM		TRANSISTOR, SILICON, TYPE PNP, SWITCHING SPECIFICATION CONTROL DRAWING	
APPROVAL <i>Edna C. Hall</i> 22 Jan 65		CODE IDENT NO.	NASA DRAWING NO.
NASA APPROVAL <i>G.C. Hall</i> 22 Jan 65		SIZE	1006310
MIT APPROVAL <i>W.K. ...</i>		C	
MIT APPROVAL <i>W.K. ...</i>		SCALE NONE	WT
			SHEET 4 OF 4