

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 THEREBY.

REQUIREMENTS:

1. GENERAL:

- INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
 - UNITS SHALL MEET THE REQUIREMENTS OF MIL-S-19500 EXCEPT AS, AND IN ADDITION TO THE REQUIREMENTS SPECIFIED HEREIN.
 - SUPPLIER SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS CONTAINED IN ND 1015404, CLASS 2.
 - MARKING: UNITS SHALL BE MARKED IN ACCORDANCE WITH ND 1002019 WITH THE MANUFACTURER'S IDENTIFICATION, DATE CODE, DIFFUSION SUB-LOT CODE, KEYING STRIPE, "(COLOR OPTIONAL, BLACK OR WHITE)" AND THE NUMBER 321. THE BACK OF THE PACKAGE MAY BE UTILIZED FOR THE DIFFUSION SUB-LOT NUMBER.
 - PREPARATION FOR DELIVERY SHALL BE IN ACCORDANCE WITH ND 1002215, CLASS I, CODE 2.
 - MARKING OF SHIPPING CONTAINERS SHALL CONFORM TO THE MARKING OF UNIT AND INTERMEDIATE PACKAGES AND THE METHODS OF MARKING AS SPECIFIED IN ND 1002215.
 - THE SHIPMENT LOTS, MADE UP OF UNITS AS SPECIFIED BY THIS DRAWING, MUST MEET THE REQUIREMENTS OF ND 1002248, WHEN PROCESSED AS SPECIFIED IN ND 1002248, PERFORMED AT THE BUYERS PLANT. LOTS OR SUBLOTS REJECTED BY THE CRITERIA OF PARA. 4.3 OF ND 1002248 SHALL BE RETURNED TO THE VENDOR.
- ##### 2. ACCEPTANCE AND INSPECTION: QUALITY DEMONSTRATION PER TABLES I AND II

A. DEFINITIONS:

- A SHIPMENT LOT IS DEFINED AS A GROUP OF PARTS ASSEMBLED FROM DIFFUSION SUB-LOTS AND DATE CODES WHICH ARE SHIPPED AT ONE TIME WHICH HAVE BEEN FABRICATED IN A SINGLE CONTINUOUS PRODUCTION RUN USING LIKE MATERIALS WHICH ARE CONTROLLED USING A CONTROLLED PROCESS. NO PROCESS CHANGES DEFINED AS CRITICAL BY ND 1015404 NEGOTIATION MAY BE CHANGED DURING THE FABRICATION OF A SHIPMENT LOT. MAXIMUM NUMBER OF UNITS SHIPPED IN A LOT SHALL BE 5,000. A MAXIMUM OF 100 DIFFUSION SUB-LOTS MAY BE USED TO ASSEMBLE ONE SHIPMENT LOT. A SHIPMENT LOT MAY INCLUDE MORE THAN ONE DATE CODE LOT.
- A DIFFUSION SUB-LOT IS DEFINED AS A GROUP OF PARTS FABRICATED FROM MATERIALS WHICH WERE PROCESSED THROUGH DIFFUSION MASKING, ETCHING AND METALLIZATION AT ONE TIME (A SINGLE BATCH). THIS SUB-LOT IDENTIFICATION MUST BE MAINTAINED THROUGH SUBSEQUENT STAGES OF ASSEMBLY AND TEST. A DIFFUSION SUB-LOT SHALL BE SEALED WITH ONLY ONE DATE CODE.
- DATE CODE LOT IS DEFINED AS THOSE UNITS SEALED DURING ONE WEEK.

B. TEST CONDITIONS:

- THE TESTS AS DEFINED IN TABLES I & II SHALL BE PERFORMED BY THE QUALITY CONTROL DEPARTMENT OF THE VENDOR.
- UNLESS OTHERWISE SPECIFIED HEREIN ALL ELECTRICAL TESTS MUST BE REFERENCED TO AN AMBIENT TEMPERATURE OF PLUS 25 PLUS OR MINUS 1/2 DEGREE CENTIGRADE.
- THE PRE-SEAL TEST PER TABLE I SHALL BE PERFORMED AFTER THE FINAL PRODUCTION INTERNAL VISUAL INSPECTION AND PRIOR TO SEALING.

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

		UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES CAPACITOR VALUES ARE IN μ f RESISTOR VALUES ARE IN OHMS TOLERANCES ON FRACTIONS DECIMALS ANGLES \pm \pm \pm DO NOT SCALE THIS DRAWING
		MATERIAL
NEXT ASSY	USED ON	
APPLICATION		

1006321

C. VENDOR SUPPLIED INFORMATION: THE FOLLOWING DATA AND INFORMATION IS TO BE SUPPLIED WITH EACH SHIPMENT. ALL INFORMATION SUPPLIED WILL REFERENCE THE UNIT PART NUMBER, APPLICABLE PURCHASE ORDER NUMBER, QUANTITY AND DATE OF SHIPMENT, AND THE APPLICABLE DATE CODES OR DIFFUSION LOT CODES.

- A CERTIFICATE OF COMPLIANCE COVERING LEAD MATERIAL REQUIREMENTS OF PARAGRAPH 3.C.(3).
 - A CERTIFICATE OF COMPLIANCE COVERING THE REQUIREMENTS OF ND 1015404.
 - THE NOMINAL LEAD DIMENSIONS AS REQUIRED BY PARAGRAPH 2.E.
 - THE PRESEAL INSPECTION DATA REQUIRED BY PARAGRAPH 4.C.
 - THE SUBGROUP 1 AND 3 TEST DATA REQUIRED BY TABLE II.
- A SUMMARY OF TEST RESULTS OF SUBGROUPS 1&3, INCLUDING THE NUMBER OF UNITS TESTED & NUMBER OF FAILURES FOUND, SHALL BE SUBMITTED WITH EACH SHIPMENT LOT. TABLE II SHALL BE REPRODUCED.
- D. SELECTION OF UNITS FOR TEST: UP OF UNITS WHICH CONSTITUTE A SHIPMENT LOT.
- THE SAMPLE USED FOR TABLE II SHALL BE RANDOMLY SELECTED FROM THE ENTIRE GROUP OF UNITS WHICH CONSTITUTE A SHIPMENT LOT.
 - A SHIPMENT LOT MAY BE RESUBMITTED FOR TABLE II SUBGROUP 1&3, THE REQUIREMENT OF MIL-S-19500C GROUP 1&3 FOR LOT RESUBMITTAL SHALL APPLY WITH THE TIGHTENED INSPECTION FOR THE CHARACTERISTICS WHICH FAILED.

REVISIONS					
SYM	ZONE	DESCRIPTION	DR	CHK	DATE
C		REDRAWN AND REVISED PER TDRR 19259			
E		REVISED PER TDRR 20877			11/16/65 WK
F		REVISED PER TDRR 27100			3/24/66 GK

REPLACES REV(C) WITH CHANGES

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS				
MIT INSTRUMENTATION LAB CAMBRIDGE, MASS.		MANNED SPACECRAFT CENTER HOUSTON, TEXAS		
DRAWN <i>A. Wong</i>	27 MAY 65	DUAL NOR GATE (FLAT PACK) SPECIFICATION CONTROL DRAWING		
CHECKED <i>A. Wong</i>	6-2-65			
APPROVED <i>A. Wong</i>	1 Jun 65			
APPROVED <i>E. C. Hall</i>	2 Jun 65			
APPROVED MIT <i>W. K. ...</i>	2 Jun 65	CODE IDENT NO.	SIZE	DRAWING NO.
APPROVED MSC <i>W. K. ...</i>	2 Jun 65	80230	C	1006321
DATE		SCALE	SHEET 1 OF 5	
		NONE		

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2. E. LEAD DIMENSIONS: THE PARTS SUPPLIED IN ANY SHIPMENT LOT MUST BE UNIFORM WITH RESPECT TO LEAD DIMENSIONS. THE LEAD THICKNESS SHALL BE WITHIN ± 0.0005 INCHES OF A NOMINAL VALUE TO BE SPECIFIED BY THE VENDOR. THE LEAD WIDTH SHALL BE WITHIN ± 0.001 INCHES OF A NOMINAL VALUE ALSO TO BE SUPPLIED. THE NOMINAL VALUES FOR EACH SHIPPING LOT WILL BE SUPPLIED WITH THE APPLICABLE SHIPMENT.

3. DESIGN:

A. ABSOLUTE MAXIMUM RATINGS AT 25°C AMBIENT:

- (1) VOLTAGE TO PIN 10: PLUS 10.0 VOLTS WITH RESPECT TO PIN 5.
- (2) VOLTAGE APPLIED TO ANY INPUT PIN PLUS OR MINUS 4 VOLTS WITH RESPECT TO PIN 5.
- (3) THERMAL RESISTANCE, JUNCTION-CASE. (θ_{JC}): 200°C/WATT.
- (4) THERMAL RESISTANCE, JUNCTION-AMBIENT. (θ_{JA}): 500°C/WATT.

B. TEMPERATURE:

- (1) TEMPERATURE RANGE, JUNCTION, OPERATING: -55°C TO +125°C.
- (2) TEMPERATURE RANGE, JUNCTION, STORAGE: -65°C TO +150°C.
- (3) TEMPERATURE, SOLDERING LEADS: +250°C (1 MINUTE MAX).

C. CONSTRUCTION:

- (1) SEMICONDUCTOR: SILICON, NPN.
- (2) ENCLOSURE: A HERMETICALLY SEALED PACKAGE ELECTRICALLY ISOLATED FROM POWER OR GROUND, THE DIMENSIONS OF WHICH MEET THE REQUIREMENTS OF FIGURE 1 AND PARAGRAPH 2.E.
- (3) LEADS:
LEAD MATERIAL SHALL BE IN ACCORDANCE WITH NASA DOCUMENT PS 1015402 WITH THE FOLLOWING EXCEPTIONS:
GOLD PLATE SHALL BE A MINIMUM OF 100 AND A MAXIMUM OF 200 MICRO INCHES. THE NICKEL STRIKE UNDER THE GOLD SHALL BE OPTIONAL BUT IF USED SHALL BE A MAXIMUM OF 100 MICRO INCHES, AND PARAGRAPH 3.4.2 SHALL NOT APPLY. CERTIFICATE OF COMPLIANCE FOR LEAD MATERIAL SHALL ACCOMPANY EACH LOT SHIPPED.

4. TEST METHODS: (REF. MIL-STD-750 WITH EXCEPTIONS NOTED BELOW).

- A. AVERAGE PROPAGATION DELAY (T_p): MEASUREMENTS SHALL BE PERFORMED ON EACH INPUT USING TEST CIRCUIT SPECIFIED IN FIGURE 2 MADE UP OF ACCEPTABLE UNITS WHERE $T_p = (T_1 + T_2)/2$. VOLTAGE 4V \pm 10% DURING TEST ALL UNUSED BASES SHALL BE GROUNDED.

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REVISIONS						
SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
D		REDRAWN AND REVISED PER TDRR 79259				
E		REVISED PER TDRR 20877	REP		8/10/65 WK	
F		REVISED PER TDRR 27100			3/22/66 WK	

Ⓓ REPLACES REV(C) WITH CHANGES

MASTER

		UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES CAPACITOR VALUES ARE IN μ f RESISTOR VALUES ARE IN OHMS TOLERANCES ON FRACTIONS DECIMALS ANGLES \pm \pm \pm DO NOT SCALE THIS DRAWING MATERIAL
NEXT ASSY	USED ON	SEE NOTE
APPLICATION		

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS				
MIT INSTRUMENTATION LAB CAMBRIDGE, MASS.		MANNED SPACECRAFT CENTER HOUSTON, TEXAS		
DRAWN <i>Bl. Wang</i>	27 MAR 65	DUAL NOR GATE (FLAT PACK) SPECIFICATION CONTROL DRAWING		
CHECKED <i>A. M. J.</i>	6-2-65			
APPROVED <i>P. D. H.</i>	1 JUN 65	CODE IDENT NO. SIZE DRAWING NO. 80230 C 1006321		
APPROVED <i>Eden C. Hall</i>	2 JAN 66			
APPROVED MIT <i>W. R. J.</i>	2 JAN 66	SHEET 2 OF 5		
APPROVED MSC <i>W. J. R.</i>	6-2-65			
DATE	SCALE NONE			

B. VISUAL AND MECHANICAL EXTERNAL EXAMINATION UNDER 10X AND 80X MAGNIFICATION:

MARKINGS SHALL BE LEGIBLE. THE CASE FINISH SHALL HAVE NO FLAKING, SPATTERING, CHIPPING OR HOLES. THE GLASS OR CERAMIC SHALL HAVE NO SEAL IMPAIRING CRACKS. RE-ENTRANCE AT THE GLASS, CERAMIC OR SOLDER SEAL SHALL NOT EXTEND TO OVER 50% OF THE SEAL WIDTH. NO FOREIGN MATTER SHALL BE IN OR ON THE SEAL INTERFACE. LEADS SHALL BE FREE FROM KINKS AND NICKS AND SHALL MAINTAIN A UNIFORM THICKNESS WITHIN LEAD SPECIFICATIONS. THE UNITS SHALL COMPLY WITH THE SPECIFIED LEAD MATERIAL REQUIREMENT. LEAD SECTION (A) MAY BE CUT FROM THE LEAD PREFORM AND SHALL NOT BE SUBJECTED TO PHYSICAL EXAMINATION. NO BODY PAINT SHALL BE ON THE LEADS OR PACKAGE SEAL AREA.

C. PRESEAL VISUAL INSPECTION: THE PRESEAL VISUAL INSPECTION SHALL BE PERFORMED USING THE REJECTION CRITERIA OF ND 1002257. THE DIFFUSION SUBLOT SHALL BE UTILIZED FOR SAMPLING SPECIFIED IN TABLE I. DATA SHALL ACCOMPANY EACH SHIPMENT COVERING THE NUMBER OF SUB-LOTS TESTED, THE NUMBER OF UNITS THAT FAILED FROM EACH SUB-LOT, THE CAUSE OF FAILURE, AND THE NUMBER OF TIMES EACH SUB-LOT WAS RESUBMITTED TO TABLE I TEST.

TABLE I

PRE SEAL VISUAL INSPECTION		
TEST	TEST CONDITIONS	DIFFUSION SUB-LOT
VISUAL INTERNAL INSPECTION	SEE NOTE 2.C.(4) AND 4.C.	LTPD* = 7 MAX ACC NO. = 1

- ① MAX BODY DIMENSIONS INCLUDE ALL GLASS CLIMB. BODY DIM. TO BE SYMMETRICAL ABOUT ϵ WITHIN .010 AND ϵ OF LEADS TO BE SYMMETRICAL WITHIN .005 OF ϵ OF PIN 1. ϵ OF LEADS TO BE MEASURED WITHIN .030 OF PACKAGE BODY.
- ② SEE PARAGRAPH 2.E.

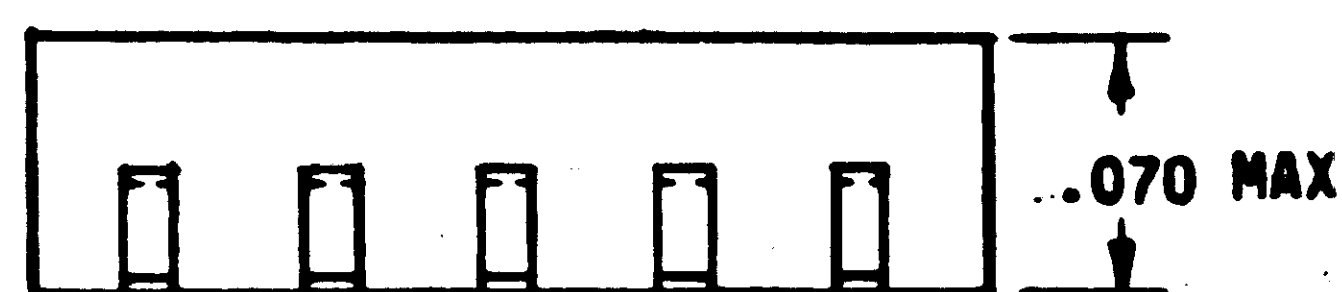
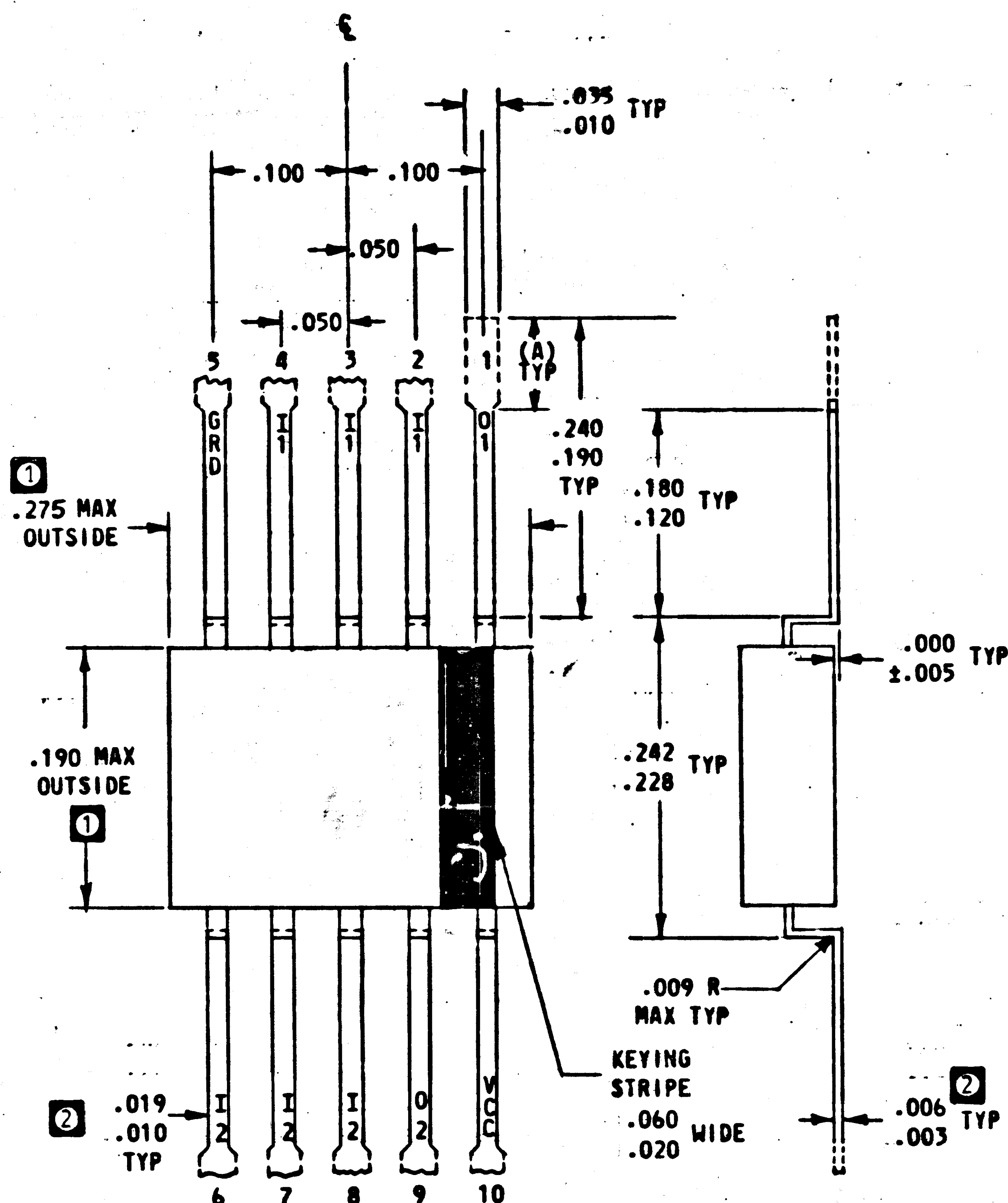


FIGURE 1

		FIGURE 1	
		UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES	
		TOLERANCES ON	
		DECIMALS	DECIMALS ANGLES
		.xx	.xxx ±
		±	±
		DO NOT SCALE DRAWING	
		MATERIAL	
NEXT ASSY	USED ON		
APPLICATION			

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LIST OF MATERIALS			
MIT INSTRUMENTATION LAB CAMBRIDGE, MASS		MANNED SPACECRAFT CENTER HOUSTON, TEXAS	
DRAWN <i>W. Wong</i> DATE 24 MAY 65		DUAL NOR GATE (FLAT PACK) SPECIFICATION CONTROL DRAWING	
CHECKED <i>A. M. Arts</i> 6-2-65			
APPROVAL <i>P. D. Hamley</i> 1 June 65			
APPROVAL <i>Edson C. Hall</i> 2 June 65		NASA DRAWING NO.	
NASA APPROVAL <i>W. J. Rhee</i> 6-2-65		CODE IDENT NO.	80230 C
MIT APPROVAL		SCALE NONE	WT
MIT APPROVAL <i>W. J. Rhee</i> 2 June 65		SHEET 3 OF 5	

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

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1006321

REVISIONS					
SYM	ZONE	DESCRIPTION	DR	CHK	DATE
D		REDRAWN AND REVISED PER TDRR 19259			
E		REVISED PER TDRR 20877			8/16/65 WK
F		REVISED PER TDRR 27100			3/2/66 WK

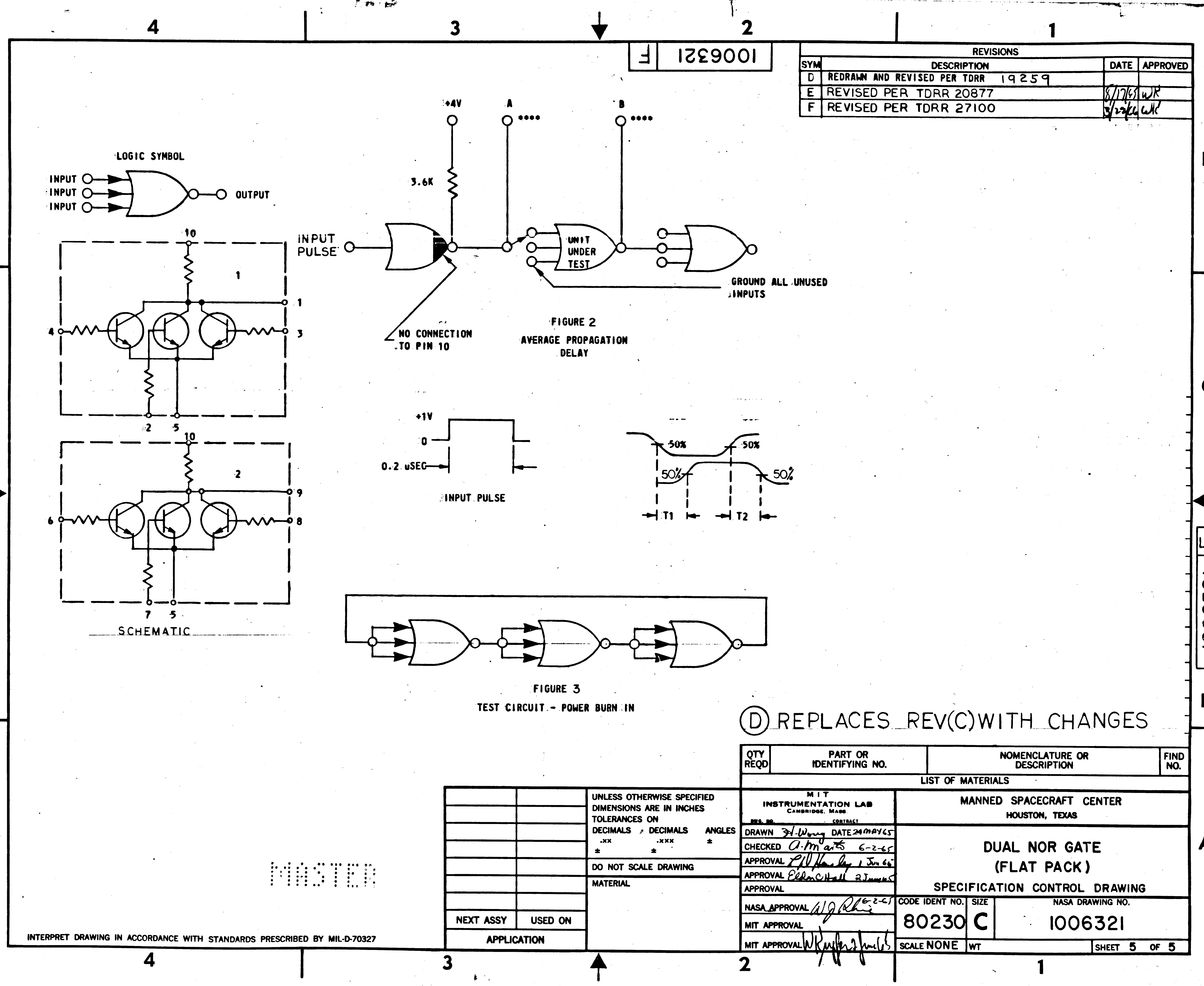
TABLE II
ACCEPTANCE INSPECTION **

TEST ***	SYMBOL	TEST CONDITIONS *****						LIMITS		UNITS	LOT
								MIN	MAX		
SUBGROUP 1 VISUAL AND MECHANICAL EXAMINATION		METHOD 2071 SEE PARAGRAPH (4.B)						-	-		*LTPD = 10 MAX. ACC. NO. = 3
SUBGROUP 2		PIN 2.6	PIN 3.7	PIN 5	PIN 4.8	PIN 1.9	PIN 10				100% TESTING REQUIRED
BASE CURRENT	I _B	+870±2mV	+1800±10mV	0V	+1800±10mV		+4±.01V	152	uA		
BASE CURRENT	I _B	+1800±10mV	+870±2mV	0V	+1800±10mV		+4±.01V	152	uA		
BASE CURRENT	I _B	+1800±10mV	+1800±10mV	0V	+870±2mV		+4±.01V	152	uA		
OUTPUT VOLT PIN 1.9	V _O	+770±2mV	OPEN	0V	OPEN		+4±.01V	300	mV		
OUTPUT VOLT PIN 1.9	V _O	OPEN	+770±2mV	0V	OPEN		+4±.01V	300	mV		
OUTPUT VOLT PIN 1.9	V _O	OPEN	OPEN	0V	+770±2mV		+4±.01V	300	mV		
SAT VOLT PIN 1.9	V _S	+870±2mV	OPEN	0V	OPEN		+4±.01V	220	mV		
SAT VOLT PIN 1.9	V _S	OPEN	+870±2mV	0V	OPEN		+4±.01V	220	mV		
SAT VOLT PIN 1.9	V _S	OPEN	OPEN	0V	+870±2mV		+4±.01V	220	mV		
OUTPUT CURRENT PIN 1.9	I _O	+500±2mV	+500±2mV	0V	+500±2mV	+870±2mV	+4±.01V	760	uA		
COLLECTOR-EMITTER THRESHOLD CURRENT	I _{CEX}	+500±2mV	+500±2mV	0V	+500±2mV	+1.00±.01V	OPEN	15	uA		
SUBGROUP 3											*LTPD = 5 (COMBINED) MAX. ACC. NO. = 3
COLLECT CUTOFF CURRENT	I _{CEO}	OPEN	OPEN	0V	OPEN	+5±.1V	OPEN	100	uA		
EMITTER CUTOFF CURRENT	I _{EBO}	0V	0V	+4±.1V	0V	OPEN	OPEN	100	uA		
COLLECT CUTOFF CURRENT	I _{CBO}	0V	0V	OPEN	0V	+8±.1V	OPEN	100	uA		
INTERFACE TEST	B ₁	870±2mV	OPEN	0V	OPEN	5KΩ TO +10V	OPEN	400	mV		
INTERFACE TEST	B ₂	OPEN	870±2mV	0V	OPEN	5KΩ TO +10V	OPEN	400	mV		
INTERFACE TEST	B ₃	OPEN	OPEN	0V	870±2mV	5KΩ TO +10V	OPEN	400	mV		
COLLECTOR-EMITTER SUSTAINING VOLTAGE	V _{CEO} SUST	I _C = 5 mA (PULSED) PINS 1.9 AND 5						5		VOLTS	
AVERAGE PROPAGATION DELAY	T _P	SEE PARAGRAPH (4.A) AND FIGURE 2							24	nsec	
COLLECTOR RESISTANCE	R _L	BETWEEN PINS 10 AND 1.9 MEASUREMENT CURRENT = 1 mA						2.7	4.15	Kohms	
D.C. CURRENT GAIN	h _{FE}	I _C = 1 mA, V _{CE} = 0.5V ALL TRANSISTORS						30	200		

- LTPD PER MIL-S-19500C, TABLE IV
- ** SAMPLE SIZE USED BY THE BUYER AND VENDOR SHALL BE THE SAME AND SHALL CORRESPOND TO THE MAX ACC NUMBER SPECIFIED IN MIL-S-19500C, TABLE IV.
- *** MEASUREMENTS TO BE MADE ON GATE 1 AND GATE 2.
- **** TEKTRONIX SAMPLING PROBE P6032 WITH 50X ATTENUATOR.
- ***** TEST TO BE PERFORMED IN SEQUENCE INDICATED.

Ⓓ REPLACES REV(C) WITH CHANGES

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LIST OF MATERIALS				
MIT INSTRUMENTATION LAB CAMBRIDGE, MASS.		MANNED SPACECRAFT CENTER HOUSTON, TEXAS		
DRAWN <i>H. Wong</i>	27MMY65	DUAL NOR GATE (FLAT PACK) SPECIFICATION CONTROL DRAWING		
CHECKED <i>A. M. ...</i>	6-2-65			
APPROVED <i>L. W. ...</i>	1 Jan 66			
APPROVED <i>E. ...</i>	2 Jan 66			
APPROVED MIT <i>W. R. ...</i>	2 Jan 66	CODE IDENT NO.	SIZE	DRAWING NO.
APPROVED MSC <i>W. R. ...</i>	6-2-65	80230	C	1006321
	DATE	SCALE NONE		SHEET 4 OF 5



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LIST OF MATERIALS			
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DRAWN <i>W. Wong</i> DATE 24 MAY 65		DUAL NOR GATE (FLAT PACK) SPECIFICATION CONTROL DRAWING	
CHECKED <i>A. M. ant</i> 6-2-65			
APPROVAL <i>P. W. Hall</i> 1 Jun 65			
APPROVAL <i>Edmund Hall</i> 2 Jun 65		CODE IDENT NO. SIZE NASA DRAWING NO.	
NASA APPROVAL <i>W. R. Rhee</i> 6-2-65		80230 C 1006321	
MIT APPROVAL		SCALE NONE WT SHEET 5 OF 5	
MIT APPROVAL <i>W. R. Rhee</i> 2 Jun 65			