QUALIFICATION
REQUIREMENTS REMOVED

INCH-POUND

MIL-M-38510/120B
18 April 1990
SUPERSEDING
MIL-M-38510/120A
1 October 1984

MILITARY SPECIFICATION

MICROCIRCUITS, LINEAR, HYBRID,
12 BIT ANALOG-TO-DIGITAL CONVERTERS

Inactive for new design after date of this revision

This specification is approved for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification covers the detail requirements for hybrid 12-bit successive approximation A/D converters. Two product assurance classes, and a choice of case outline and lead finish are provided and are reflected in the complete Part or Identifying Number (PIN). The term Part or Identifying Number (PIN) is equivalent to the term part number which was previously used in this specification.

1.2 Classification.

1.2.1 Device types. The device types shall be as follows:

Device type	Circuit	Input voltage range	Reference
01	A/D converter	0 V to -10 V	Internal
02	"	0 V to -10 V	External
03	"	-5 V to +5 V	Internal
04	"	-5 V to +5 V	External
05	"	-10 V to +10 V	Internal
06	"	-10 V to +10 V	External
07	"	0 V to +10 V	Internal
08	"	0 V to +10 V	External
09	A/D converter, high speed	0 V to -10 V	Internal
10	"	0 V to -10 V	External
11	"	-5 V to +5 V	Internal
12	"	-5 V to +5 V	External
13	"	-10 V to +10 V	Internal
14	"	-10 V to +10 V	External
15	"	0 V to +10 V	Internal
16	"	0 V to +10 V	External

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Rome Air Development Center, (RBE-2), Griffiss AFB, NY 13441-5700, by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

AMSC N/A FSC 5962

1.2.2 Device class. The device class shall be the product assurance level as defined in MIL-H-38534.

1.2.3 Case outlines. The case outlines shall be designated as follows:

Letter	Case outline
X	(24-lead, 1.250" x .600" x .250") dual-in-line package (see figure 1)
Y	(24-lead, 1.330" x .800" x .236") dual-in-line package (see figure 2)

1.3 Absolute maximum ratings.

Positive supply voltage (V_{CC}) - - - - - - - - - - +18 V

Negative supply voltage (V_{EE}) - - - - - - - - - - -18 V

Logic supply voltage (V_{LOG}) - - - - - - - - - - - +7 V

Analog input voltage - - - - - - - - - - - - - - ±25 V

Digital input voltage - - - - - - - - - - - - - - +5.5 V

Digital output voltage - - - - - - - - - - - - - - $+V_{LOG}$ V

Reference input voltage (V_{REF}) - - - - - - - - 0 to -15 V (ext. ref. only)

Lead temperature (soldering, 60 seconds) - - - +300°C

Junction temperature (T_J) - - - - - - - - - - - - +175°C

1.4 Recommended operating conditions.

Supply voltage range - - - - - - - - - - - - - - +5 V ±0.5 V
±15 V ±0.45 V

External reference IN - - - - - - - - - - - - - - -10.000 V

Ambient operating temperature range (T_A) - - - -55°C to +125°C

1.5 Power and thermal characteristics.

Package	Case outline	Maximum allowable 1/ power dissipation	Maximum θ_{JC}	Maximum θ_{JA}
24-lead, dual-in-line	X or Y	1.0 W at T_A = +125°C	5°C/W	40°C/W

1/ All leads welded or soldered to pc board.

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation (see 6.2).

SPECIFICATIONS

MILITARY

MIL-M-38510 - Microcircuits, General Specification for.
MIL-H-38534 - Hybrid Microcircuits, General Specification for.

STANDARD

MILITARY

MIL-STD-883 - Test Methods and Procedures for Microelectronics.

(Unless otherwise indicated, copies of federal and military specifications, standards, and handbooks are available from the Naval Publications and Forms Center, (ATTN: NPODS), 5801 Tabor Avenue, Philadelphia, PA 19120-5099.)

2.2 Order of precedence. In the event of a conflict between the text of this document and the references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 Detail specification. The individual item requirements shall be in accordance with MIL-H-38534, and as specified herein.

3.2 Design, construction, and physical dimensions. The design, construction, and physical dimensions shall be as specified in MIL-H-38534 and herein.

3.2.1 Terminal connections. The terminal connections shall be as specified on figure 3.

3.2.2 Functional schematic circuit. The functional schematic circuit shall be as specified on figure 4.

3.2.3 Block and timing diagrams. The block and timing diagrams shall be as specified on figures 5 and 6, respectively.

3.2.4 Case outlines. The case outlines shall be as specified in 1.2.3.

3.2.5 Package and sealing material. Package and sealing material shall be in accordance with MIL-H-38534.

3.3 Lead material and finish. The lead material and finish shall be in accordance with MIL-H-38534 (see 6.4).

3.4 Electrical performance characteristics. Unless otherwise specified, the electrical performance characteristics are as specified in table I, and apply over the full ambient operating temperature range.

3.5 Electrical test requirements. The electrical test requirements for each device class shall be the subgroups specified in table II. The electrical tests for each subgroup are described in table III.

3.6 Marking. Marking shall be in accordance with MIL-M-38510. The "JAN" or "J" certification mark shall not be used.

3.6.1 Correctness of indexing and markings. All devices shall be subjected to the final electrical tests specified in table II after part marking to verify that they are correctly indexed and identified by PIN. Optionally, an approved electrical test may be devised especially for this requirement.

3.7 Microcircuit group assignment. The devices covered by this specification shall be in microcircuit technology group I (see MIL-M-38510, appendix E).

3.8 Manufacturer eligibility. To be eligible to supply microcircuits to this specification, a manufacturer shall have a manufacturer certification in accordance with MIL-H-38534 for at least one line, not necessarily the line producing the device type described herein.

3.9 Certification. Certification in accordance with MIL-H-38534 is not required for these devices.

4. QUALITY ASSURANCE PROVISIONS

4.1 Sampling and inspection. Sampling and inspection procedures shall be in accordance with MIL-H-38534 and method 5008, as applicable, of MIL-STD-883, except as modified herein.

4.2 Screening. Screening shall be in accordance with method 5008 of MIL-STD-883, and shall be conducted on all devices prior to qualification and quality conformance inspection. The following additional criteria shall apply:

a. Burn-in tests (method 1015 of MIL-STD-883).

   (1) Class S devices: Static tests (test condition B) using the circuit shown on figure 9.

   (2) Class B devices: Test condition B, using the circuit shown on figure 9.

b. Interim and final electrical test parameters shall be as specified in table II, except interim electrical parameters test prior to burn-in is optional at the discretion of the manufacturer.

c. The percent defective allowable (PDA) for class S and class B devices shall be as specified in MIL-H-38534, based on failures from group A, subgroup 1 test after cooldown as final electrical test in accordance with method 5008 of MIL-STD-883 and with no intervening electrical measurements. If interim electrical parameter tests are performed prior to burn-in, failures resulting from pre burn-in screening may be excluded from the PDA. If interim electrical parameter tests prior to burn-in are omitted, then all screening failures shall be included in the PDA. The verified failures of group A, subgroup 1 after burn-in divided by the total number of devices submitted for burn-in in that lot shall be used to determine the percent defective for that lot, and the lot shall be accepted or rejected based on the PDA for the applicable device class.

d. Internal visual inspection method 2017 (hybrid and multichip criteria) of MIL-STD-883.

TABLE I. Electrical performance characteristics.

Characteristics	Symbol	Conditions (See figure 10), $-55^{\circ}C \leq T_A \leq +125^{\circ}C$ unless otherwise specified	Limits		Unit
			Min	Max	
Conversion time 1/	t_C	Device types 01 to 08	---	50	µs
		Device types 09 to 16	---	13	µs
Power supply current from V_{CC}	I_{CC}	V_{CC} = 15 V; V_{IN} (analog) = max positive input voltage +0.5 V, output code = 0000 0000 0000, device types - all	3	28	mA
		V_{IN} (analog) = max negative input voltage -0.5 V, output code = 1111 1111 1111, device types - all	3	28	mA
Power supply current from V_{EE}	I_{EE}	V_{EE} = -15 V; V_{IN} (analog) = max positive input voltage +0.5 V, output code = 0000 0000 0000, device types - all	-35	-1	mA
		V_{IN} (analog) = max negative input voltage -0.5 V, output code = 1111 1111 1111, device types - all	-35	-1	mA
Power supply current from V_{LOG}	I_{LOG}	V_{LOG} = 5 V; V_{IN} (analog) = max positive input voltage +0.5 V, output code = 0000 0000 0000, device types - all	1	68	mA
		V_{IN} (analog) = max negative input voltage -0.5 V, output code = 1111 1111 1111, device types - all	1	68	mA
Reference input	I_{REF}	V_{REF} = -10 V; V_{IN} (analog) = max positive input voltage +0.5 V, device types - 02,04,06,08,10,12, 14,16	-2	-0.1	mA
		V_{IN} (analog) = max negative input voltage -0.5 V, device types - 02,04,06,08,10,12, 14,16	-2	-0.1	mA
Power dissipation	P_D	Device types - 02,04,06,08,10,12, 14,16	---	0.8	W
		Device types - 01,03,05,07,09,11, 13,15	---	1	W
Input low current	I_{IL}	V_{IN}(Logic) = 0.3 V, device types - all	-0.6	-0.05	mA

See footnotes at end of table.

TABLE I. Electrical performance characteristics - Continued.

Characteristics	Symbol	Conditions (See figure 10), $-55°C \leq T_A \leq +125°C$ unless otherwise specified	Limits Min	Limits Max	Unit
Input high current	I_{IH}	V_{IN}(Logic) = 2.4 V, device types - all	0	40	µA
		V_{IN}(Logic) = 5.5 V, device types - all	0	1	mA
Output short circuit current	I_{OS}	V_{IN}(analog) = max negative input voltage -0.5 V, output code = 1111 1111 1111 (test one output at a time), device types - all	-35	-4	mA
Output logic voltage levels	V_{OH}	I_L = -80 µA, device types - all	2.4	---	V
	V_{OL}	I_L = 3.2 mA, device types - all	---	0.4	V
Serial/parallel	S_O	Set V_{IN} for output code = 1000 0000 0000, serial output code exactly equals parallel output code. Device types - all (see figures 10 and 11)	Pass/fail		
Zero error at V_{IN} = 0 V	Z_E	ΔV_{CC}(max) = ΔV_{EE}(max) = ±.015 V, output transition = 0000 0000 000Ø, device types - 01,02,09,10,			
		$-55°C \leq T_A \leq +125°C$,	-3	+1	LSB
		T_A = +25°C, 2/	-2	0	LSB
		end-point limit 3/ (see figures 12 through 14)	-3	+1	LSB
		Output transition = ØØØØ ØØØØ ØØØØ. Device types - 03,04,05,06,11,12, 13,14, $-55°C \leq T_A \leq +125°C$,	-2	+2	LSB
		T_A = +25°C,	-1	+1	LSB
		end-point limit 3/ (see figures 12 through 14)	-2	+2	LSB
		Output transition = 1111 1111 111Ø. Device types - 07,08,15,16, $-55°C \leq T_A \leq +125°C$,	-1	+3	LSB
		T_A = +25°C	0	+2	LSB
		end-point limit 3/ (see figures 12 through 14)	-1	+3	LSB

See footnotes at end of table.

TABLE I. Electrical performance characteristics - Continued.

Characteristics	Symbol	Conditions $-55^\circ C \leq T_A \leq +125^\circ C$ unless otherwise specified	Limits Min	Limits Max	Unit
End-point accuracy	$+V_{FSE}$	$\Delta V_{CC}(max) = \Delta V_{EE}(max) = \pm.015$ V, output transition = 0000 0000 000ø, device types - 04, 06,08,12,14,16, $-55^\circ C \leq T_A \leq +125^\circ C$, $T_A = +25^\circ C$, end-point limit 3/ (see figures 12 through 14)	 -4 -2 -4	 +4 +2 +4	 LSB LSB LSB
		Device types - 03, 05,07,11,13,15, $-55^\circ C \leq T_A \leq +125^\circ C$, $T_A = +25^\circ C$, end-point limit 3/ (see figures 12 through 14)	 -16 -2 -6	 +16 +2 +6	 LSB LSB LSB
End-point accuracy	$-V_{FSE}$	$\Delta V_{CC}(max) = \Delta V_{EE}(max) = \pm.015$ V, output transition = 1111 1111 111ø, device types - 02, 04,06,10,12,14, $-55^\circ C \leq T_A \leq +125^\circ C$, $T_A = +25^\circ C$, end-point limit 3/ (see figures 12 through 14)	 -4 -2 -4	 +4 +2 +4	 LSB LSB LSB
		Device types - 01, 03,05,09,11,13, $-55^\circ C \leq T_A \leq +125^\circ C$, $T_A = +25^\circ C$, end-point limit 3/ (see figures 12 through 14)	 -16 -2 -6	 +16 +2 +6	 LSB LSB LSB
Bit transition linearity error (end point) 4/	T_{LE}	$\Delta V_{CC}(max) = \Delta V_{EE}(max) = \pm.015$ V, abbreviated test, device types - all, $-55^\circ C \leq T_A \leq +125^\circ C$, $T_A = +25^\circ C$ (see figures 12 through 14)	 -.75 -.50	 +.75 +.50	 LSB LSB
Major carry errors	M_{CE}	$\Delta V_{CC}(max) = \Delta V_{EE}(max) = \pm.015$ V, 800-7FF (HEX) to 002-001 (HEX), device types - all, $-55^\circ C \leq T_A \leq +125^\circ C$, $T_A = +25^\circ C$ (see figures 12 through 14)	 -0.9 -0.9	 +1.5 +1.0	 LSB LSB
		7FF-7FE (HEX) to 001-000 (HEX), device types - all, $-55^\circ C \leq T_A \leq +125^\circ C$, $T_A = +25^\circ C$, (see figures 12 through 14)	 -0.9 -0.9	 +1.5 +1.0	 LSB LSB

See footnotes at end of table.

TABLE I. Electrical performance characteristics - Continued.

Characteristics	Symbol	Conditions (See figure 10), $-55^{\circ}C \leq T_A \leq +125^{\circ}C$ unless otherwise specified	Limits Min	Max	Unit
Power supply sensitivity to V_{CC}	$+P_{SS1}$	V_{CC} = 14.55 V, 15.45 V, output transition = 0000 0000 000ø, device types - all	-1	+1	LSB/ %PS
		Output transition = 1111 1111 111ø, device types - all, (see figures 12 through 14)	-1	+1	LSB/ %PS
	$-P_{SS1}$	V_{EE} = -14.55 V, -15.45 V, output transition = 0000 0000 000ø, device types - 01,03,05,07,09,11, 13,15	-2	+2	LSB/ %PS
		Device types - 02,04,06,08,10, 12,14,16	-1	+1	LSB/ %PS
		Output transition = 1111 1111 111ø, device types - 01,03,05,07,09,11, 13,15	-2	+2	LSB/ %PS
		Device types - 02,04,06,08,10, 12,14,16 (see figures 12 through 14)	-1	+1	LSB/ %PS
Power supply sensitivity to V_{LOG}	$+P_{SS2}$	V_{LOG} = 4.5 V, 5.5 V, output transition = 0000 0000 000ø, device types - all	-1	+1	LSB/ %PS
		Output transition = 1111 1111 111ø, device types - all (see figures 12 through 14)	-1	+1	LSB/ %PS
Bit transition linearity error (end point) 3/	T_{LE}	$\Delta V_{CC}(max) = \Delta V_{EE}(max) = \pm.015$ V, all - codes test, device types - all, $-55^{\circ}C \leq T_A \leq 125^{\circ}C$, $T_A = +25^{\circ}C$, (see figures 12 through 14)	-.75 -.50	+.75 +.50	LSB LSB
Propagation delay	t_{PHL}	Serial output referenced to low to high clock transition output code = 1111 1111 1111, device types - all	20	160	ns
	t_{PLH}	Parallel output LSB referenced to high to low e.o.c. transition output code = 1111 1111 1111, device types - all	---	30	ns
		Serial output referenced to low to high clock transition output code = 1111 1111 1111, device types - all (see figures 15 and 16)	20	160	ns

See footnotes at end of table.

TABLE I. Electrical performance characteristics - Continued.

Characteristics	Symbol	Conditions (See figure 10), $-55^{\circ}C \leq T_A \leq +125^{\circ}C$ unless otherwise specified	Limits		Unit
			Min	Max	
Input resistance	R_I	V_{IN}(analog) = 1/2 V_{FS}, e.o.c. = logic "0", T_A = +25°C, device types - 01 to 04, 07 to 12, 15, 16	3.5	10	kΩ
		05, 06, 13, 14 (see figure 10)	7.0	20	kΩ
Transition uncertainty	N_T	ΔV_{CC}(max) = ΔV_{EE}(max) = ±.015 V, V_{IN} = mid-range voltage, output code = 0000 0000 0000$_{\phi}$, device types - all, T_A = +25°C, (see figure 17)	0	+0.5	LSB

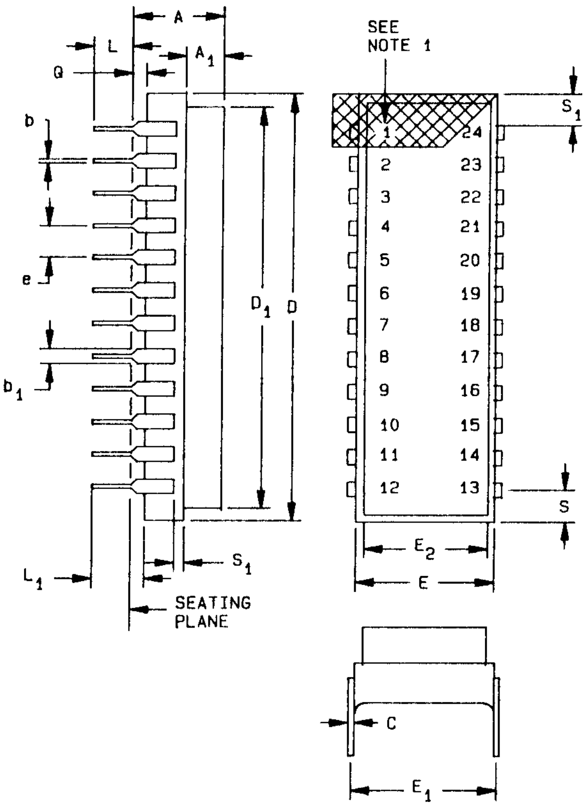
1/ The listed conversion times are for test purposes and are based on maximum clock frequencies of 260 kHz and 1 MHz for device types 01 through 08 and 09 through 16, respectively.

2/ ϕ represents the transition point between two adjacent code-words (i.e.: 0000 0000 0000 and 0000 0000 0001 or 0111 1111 1111 and 1000 0000 0000).

3/ Refer to table IV for end-point parameters.

4/ The abbreviated bit transition linearity error test shown for subgroups 4, 5 and 6 shall represent the minimum number of tests required. The manufacturer shall add additional tests or calculations to assure that the worst positive and negative error values, as determined by the abbreviated test, are within 150 milliLSB, of the worst positive and negative error values, as determined by the all codes test for subgroups 7 and 8.

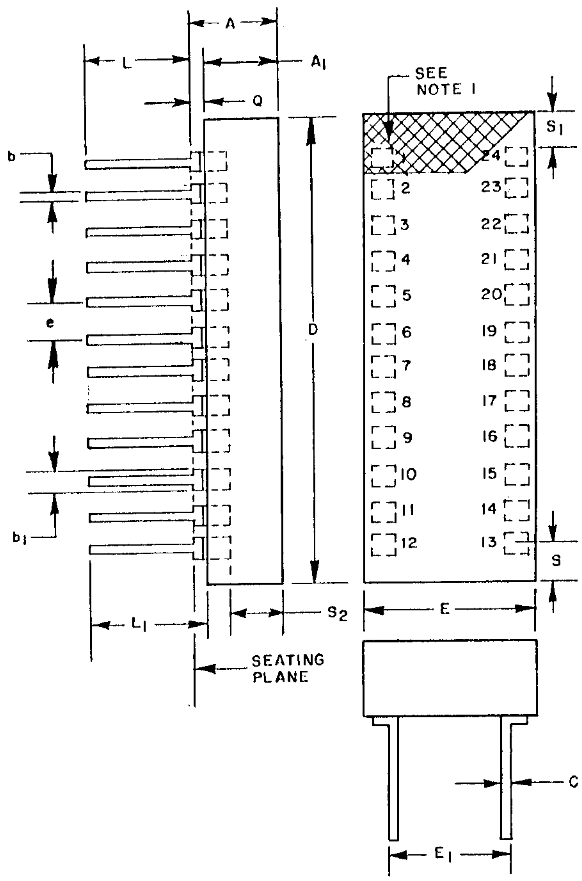
Symbol	Inches		Millimeters		Notes
	Min	Max	Min	Max	
A		.250		6.35	
A_1	.100 BSC		2.54 BSC		
b	.016	.020	0.41	0.51	10
b_1		.040		1.02	4,10
C	.016	.020	0.41	0.51	10
D	1.233	1.267	31.32	32.18	6
D_1		1.230		31.24	
E	.585	.605	14.86	15.37	6
E_1	.590	.610	14.99	15.49	9
E_2		.585		14.86	
e	.100 BSC		2.54 BSC		
L	.125	.200	3.18	5.08	
L_1	.210	.230	5.33	5.84	
Q	.040	.060	1.02	1.52	5
S		.130		3.30	8
S_1	.060	.088	1.52	2.24	8
S_2	.005		0.13		



NOTES:
1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. Index area; a notch or a pin one identification mark shall be located adjacent to pin one and shall be within the shaded area shown. The manufacturer's identification shall not be used as a pin one identification mark.
4. The minimum limit for dimension b_1 may be .023 (0.58 mm) for leads number 1, 12, 13, and 24 only.
5. Dimension Q shall be measured from the seating plane to the base plane.
6. This dimension allows for off-center lid, meniscus, and glass overrun.
7. The basic pin spacing is .100 (2.54 mm) between centerlines. Each pin centerline shall be located within ±.005 (0.13 mm) of its exact longitudinal position relative to pins 1 and 24.
8. Applies to all four corners (leads number 1, 12, 13, and 24).
9. E_1 shall be measured at the centerline of the leads.
10. All leads: Increase maximum limit by .003 (0.08 mm) measured at the center of the flat, when lead finish A is applied.
11. Twenty-two spaces.

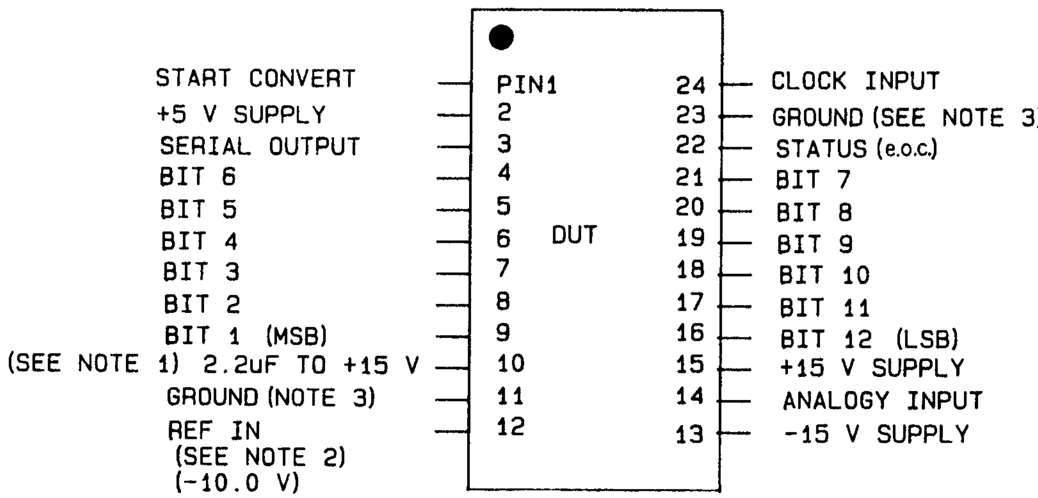
FIGURE 1. Case outline X.

Symbol	Inches		Millimeters		Notes
	Min	Max	Min	Max	
A		.236		5.99	
A_1	.120	.170	3.05	4.32	
b	.016	.022	0.41	0.56	10
b_1	.035	.045	0.89	1.14	4,10
C	.009	.015	0.23	0.38	10
D	1.275	1.375	32.39	34.93	6
E	.770	.830	19.56	21.08	6
E_1	.590	.610	14.99	15.49	9
e	.100 BSC		2.54 BSC		11
L	.170	.215	4.32	5.46	
L_1	.205	.250	5.21	6.35	
Q	.015	.035	0.38	0.89	5
S	.087	.125	2.21	3.18	8
S_1		.114		2.90	8
S_2	.010		0.25		



NOTES:
1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. Index area; a notch or a pin one identification mark shall be located adjacent to pin one and shall be within the shaded area shown. The manufacturer's identification shall not be used as a pin one identification mark.
4. The minimum limit for dimension b_1 may be .023 (0.58 mm) for leads number 1, 12, 13, and 24 only.
5. Dimension Q shall be measured from the seating plane to the base plane.
6. This dimension allows for off-center lid, meniscus, and glass overrun.
7. The basic pin spacing is .100 (2.54 mm) between centerlines. Each pin centerline shall be located within ±.010 (0.25 mm) of its exact longitudinal position relative to pins 1 and 24.
8. Applies to all four corners (leads number 1, 12, 13, and 24).
9. E_1 shall be measured at the centerline of the leads.
10. All leads: Increase maximum limit by .003 (0.08 mm) measured at the center of the flat, when lead finish A is applied.
11. Twenty-two spaces.
12. If this configuration is used, no organic or polymeric materials shall be molded to the bottom of the package to cover the leads.

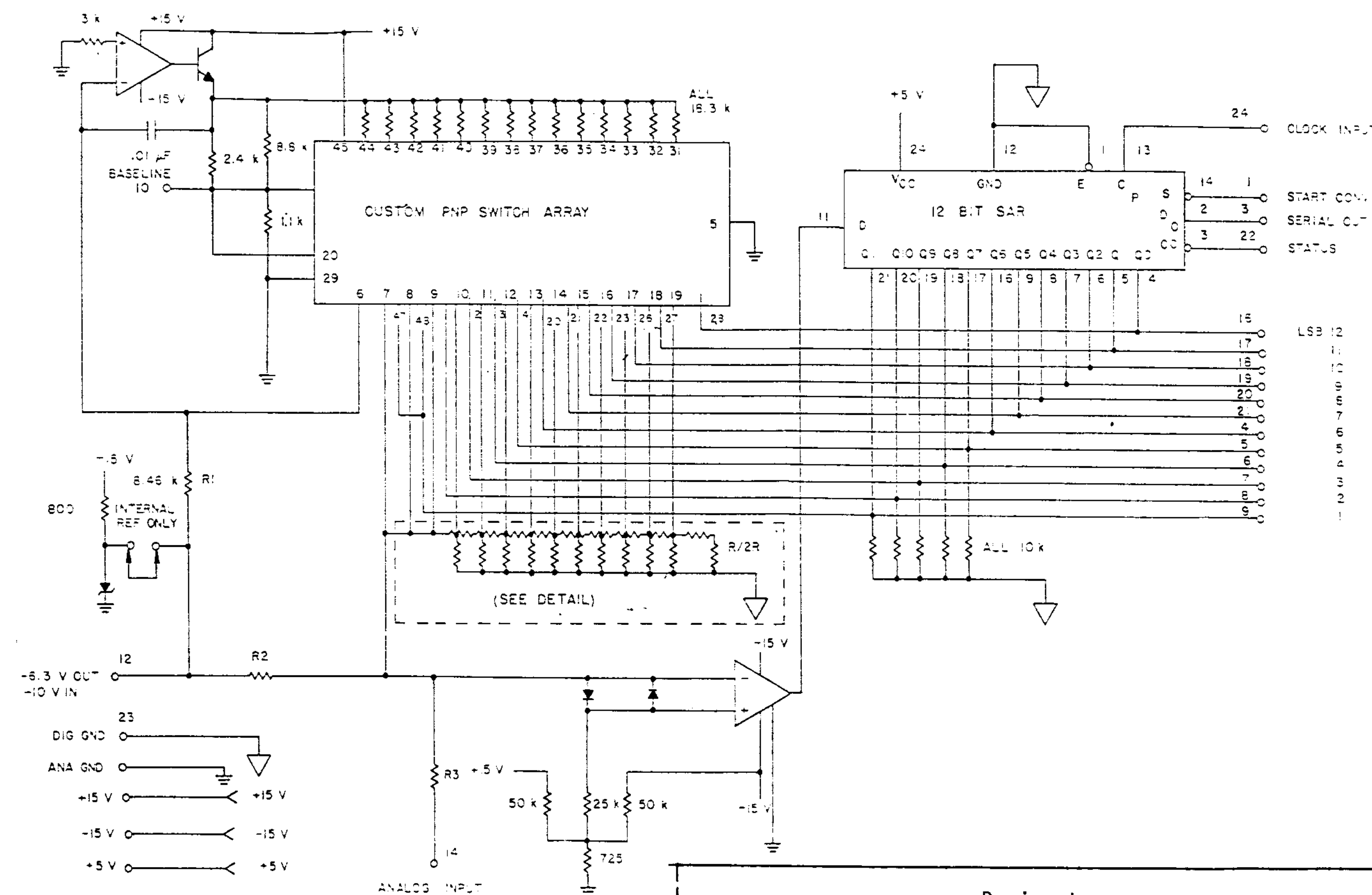
FIGURE 2. Case outline Y.



NOTES:

1. The 2.2 μF capacitor is required for device types 09 through 16 only. No other connection shall be made to pin 10. Positive terminal shall be connected to pin 15.
2. For device types 02, 04, 06, 08, 10, 12, 14, and 16, a -10 V external reference is applied to pin 12. No other connection shall be made to pin 12.
3. The units two ground pins (pins 11 and 23) must be connected together as close to the package as possible, and preferably should be connected to a large analog ground plane underneath the package. If these commons must be run separately, a non-polarized 0.01 μF bypass capacitor should be connected between pins 11 and 23 as close to the unit as possible and wide conductor runs should be employed.

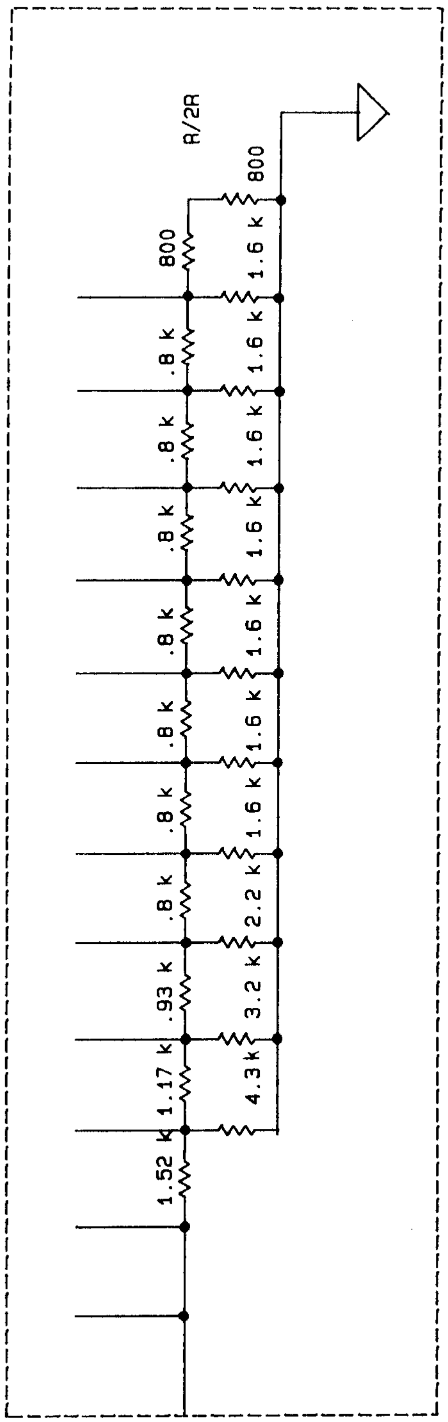
FIGURE 3. Terminal connections (all devices).



Device type								
R no.	-1/-9	-2/-10	-3/-11	-4/-12	-5/-13	-6/-14	-7/-15	-8/-16
R1	16.9k	26.8k	16.9k	26.9k	16.9k	26.8k	16.9k	26.8k
R2			8.5k	13.4k	8.5k	13.4k	4.2k	6.7k
R3	6.7k	6.7k	6.7k	6.7k	13.4k	13.4k	6.7k	6.7k

NOTE: All resistances are nominal and in ohms.

FIGURE 4. Functional schematic circuits.



DETAIL

FIGURE 4. Functional schematic circuits - Continued.

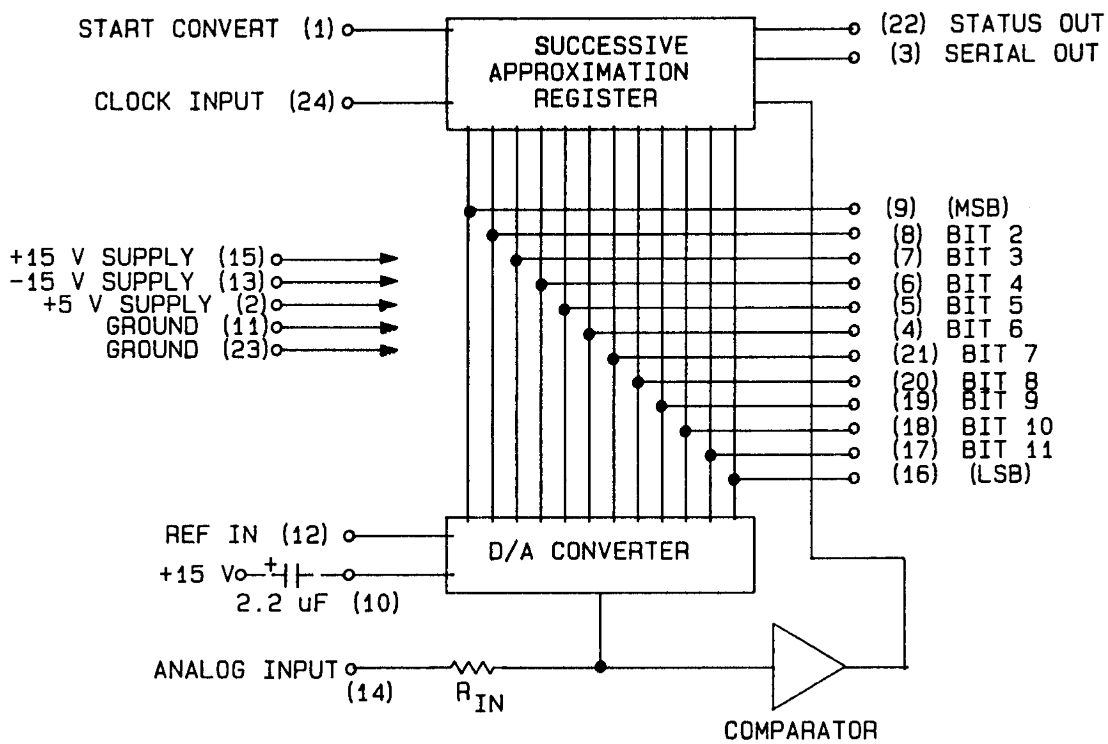
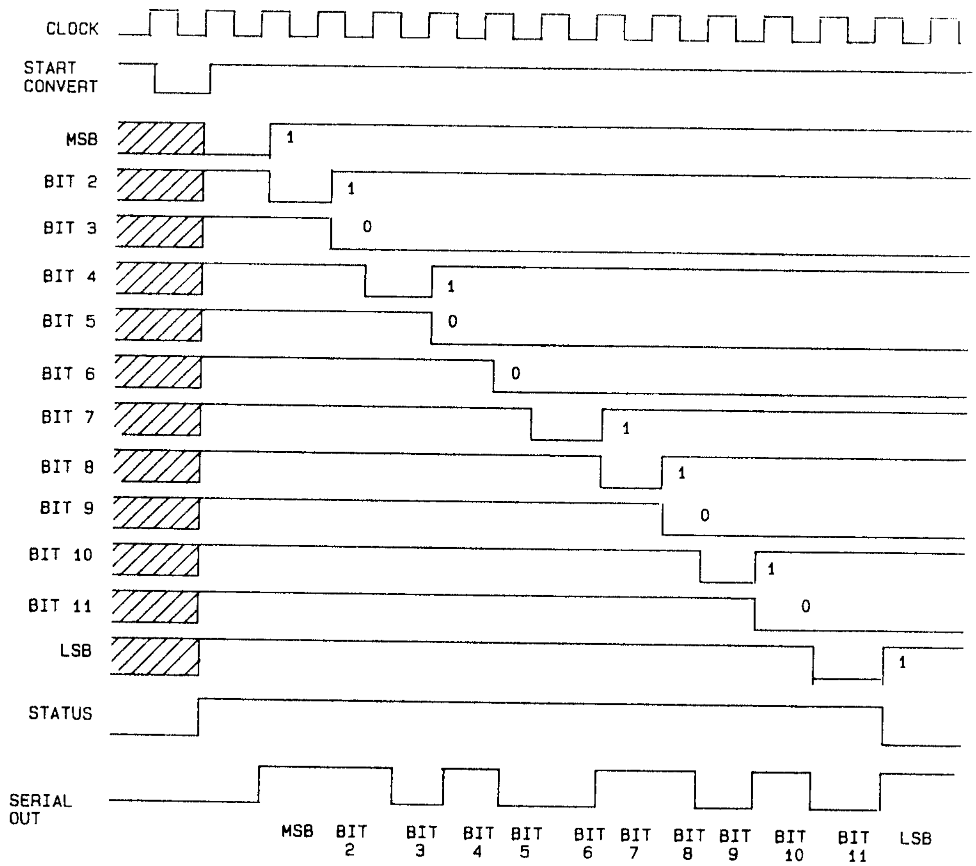


FIGURE 5. Block diagram.



NOTES:

1. Operation shown in for the digital work 1101 0011 0101 which corresponds to 1.7432 V on the 0 to +10 V input range (07, 08, 15, 16).
2. Conversion time is defined as the width of the STATUS (e.o.c.) pulse.
3. The converter is reset (MSB = "0", all other bits = "1") by holding the START CONVERT low during a low to high clock transition. The START CONVERT must be low for a minimum of 25 ns prior to the clock transition. Holding the START low will hold the converter in the reset state. Actual conversion will begin on the next rising clock edge after the START has returned high.
4. The delay between the resetting clock edge and STATUS actually rising to a "1" is 160 ns maximum.
5. The START CONVERT may be brought low at any time during a conversion to reset and begin converting again.
6. Both serial and parallel data bits become valid on the same rising clock edges. Serial data is valid on subsequent falling clock edges, and these edges can be used to clock serial data into receiving registers.
7. Output data will be valid 30 ns (maximum) after the STATUS (e.o.c.) output has returned low. Parallel output data will remain valid and the STATUS output low until another conversion is initiated.
8. For continuous conversion, connect the STATUS output (pin 22) to the START CONVERT input (pin 1). See section on continuous conversion.
9. When the converter is initially "powered up" it may come on at any point in the conversion cycle.

FIGURE 6. Timing diagram.

Voltage range	Maximum clock frequency = 260 kHz		Maximum clock frequency = 1 MHz	
	Int voltage reference	Ext voltage reference	Int voltage reference	Ext voltage reference
0 V to -10 V	01	02	09	10
+5 V to -5 V	03	04	11	12
+10 V to -10 V	05	06	13	14
+10 V to 0 V	07	08	15	16

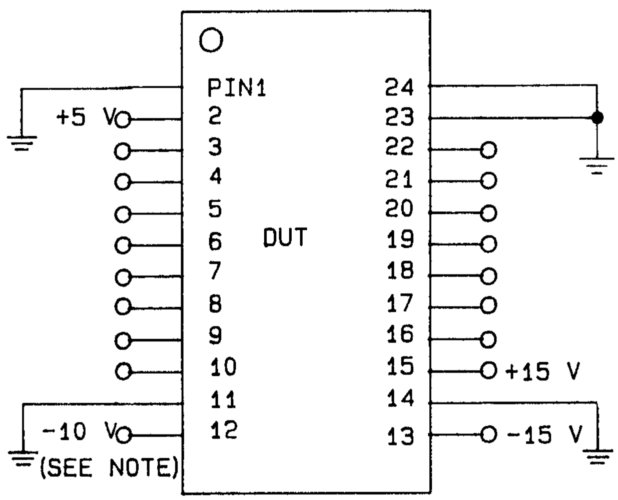
FIGURE 7. Device type vs external stimuli.

Analog input				Digital output
01, 02, 09, 10	03, 04, 11, 12	05, 06, 13, 14	07, 08, 15, 16	MSB LSB
0.0000 V 0.0024 V	+5.0000 V +4.9976 V	+10.0000 V +9.9951 V	+10.0000 V +9.9976 V	0000 0000 0000 0000 0000 000ø*
-4.9976 V -5.0000 V -5.0024 V	+0.0024 V 0.0000 V -0.0024 V	+0.0049 V 0.0000 V -0.0049 V	+5.0024 V +5.0000 V -4.9976 V	0111 1111 1110* øøøø øøøø øøøø* 1000 0000 000ø*
-9.9976 V -10.0000 V	-4.9976 V -5.0000 V	-9.9951 V -10.0000 V	+0.0024 V 0.0000 V	1111 1111 111ø* 1111 1111 1111

* Voltages given are the theoretical values for the transitions indicated. Ideally with the converter continuously converting, the output bits indicated as ø will change from "1" to "0" or vice versa as the input voltage passes through the level indicated. See the section on absolute accuracy error for an explanation of output transition voltage.

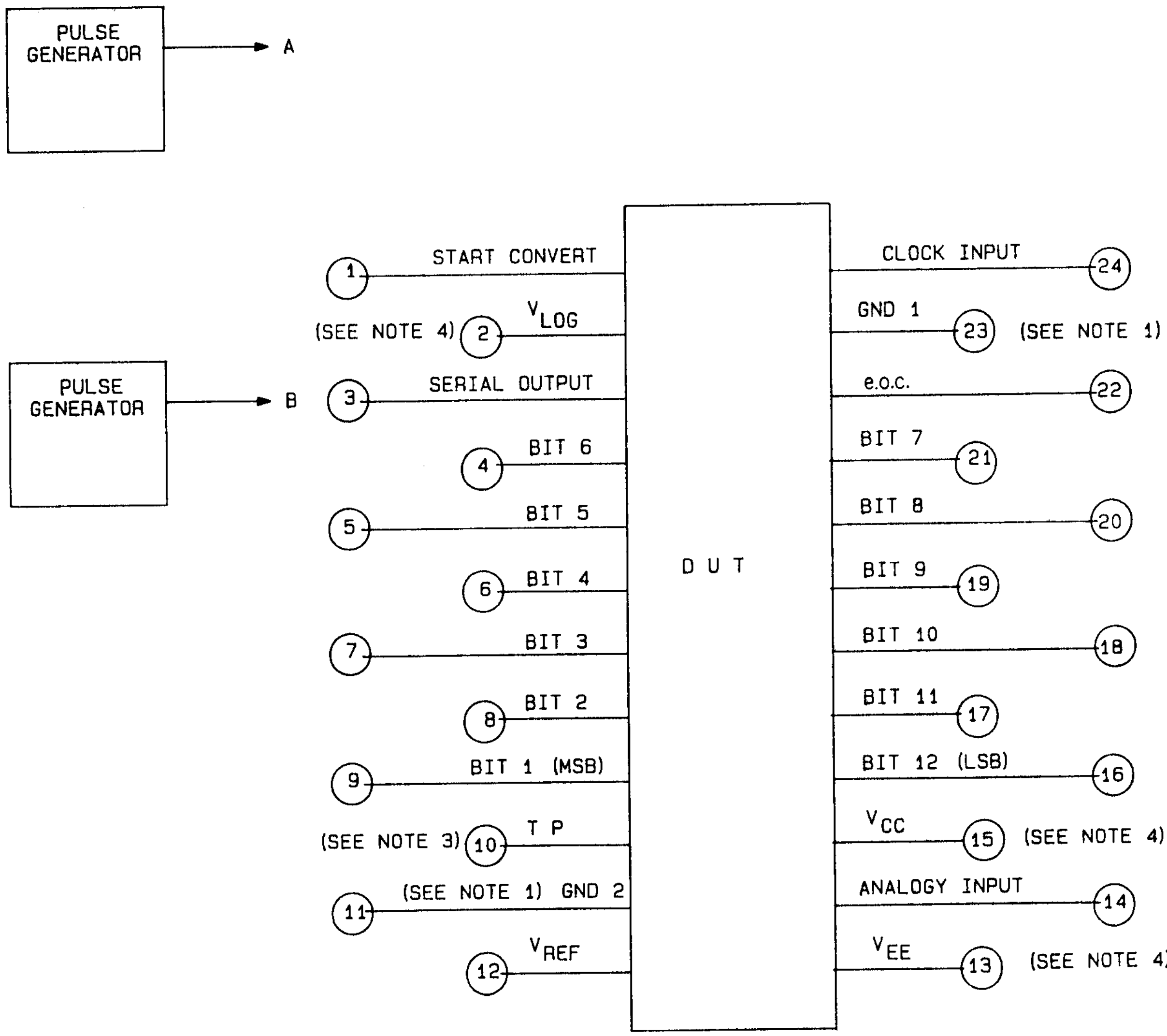
Example: For 05, 06, 13, and 14 (±10 V analog input range) the transition from digital output 0000 0000 0000 to 0000 0000 0001 (or vice versa) will ideally occur at an input voltage of +9.9951 volts. Subsequently, any input voltage more positive than +9.9951 volts will give a digital output of all "0's". The transition from digital output 1000 0000 0000 to 0111 1111 1111 will ideally occur at an input of zero volts, and the 1111 1111 1111 to 1111 1111 1110 transition should occur at -9.9951 volts. An input more negative than -9.9951 volts will give all "1's".

FIGURE 8. Digital output codes.



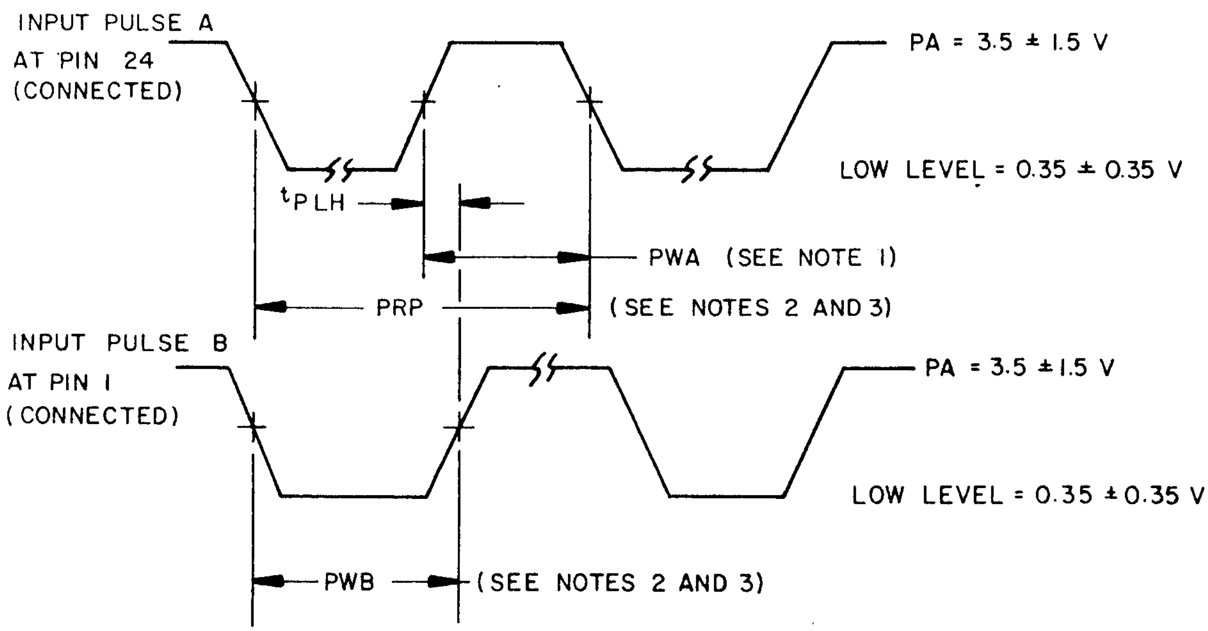
NOTE: For device types 02, 04, 06, 08, 10, 12, 14, and 16, connect DUT pin 12 to -10 V. For all other device types, pin 12 is open.

FIGURE 9. Test circuit for burn-in and steady-state life test (all devices).



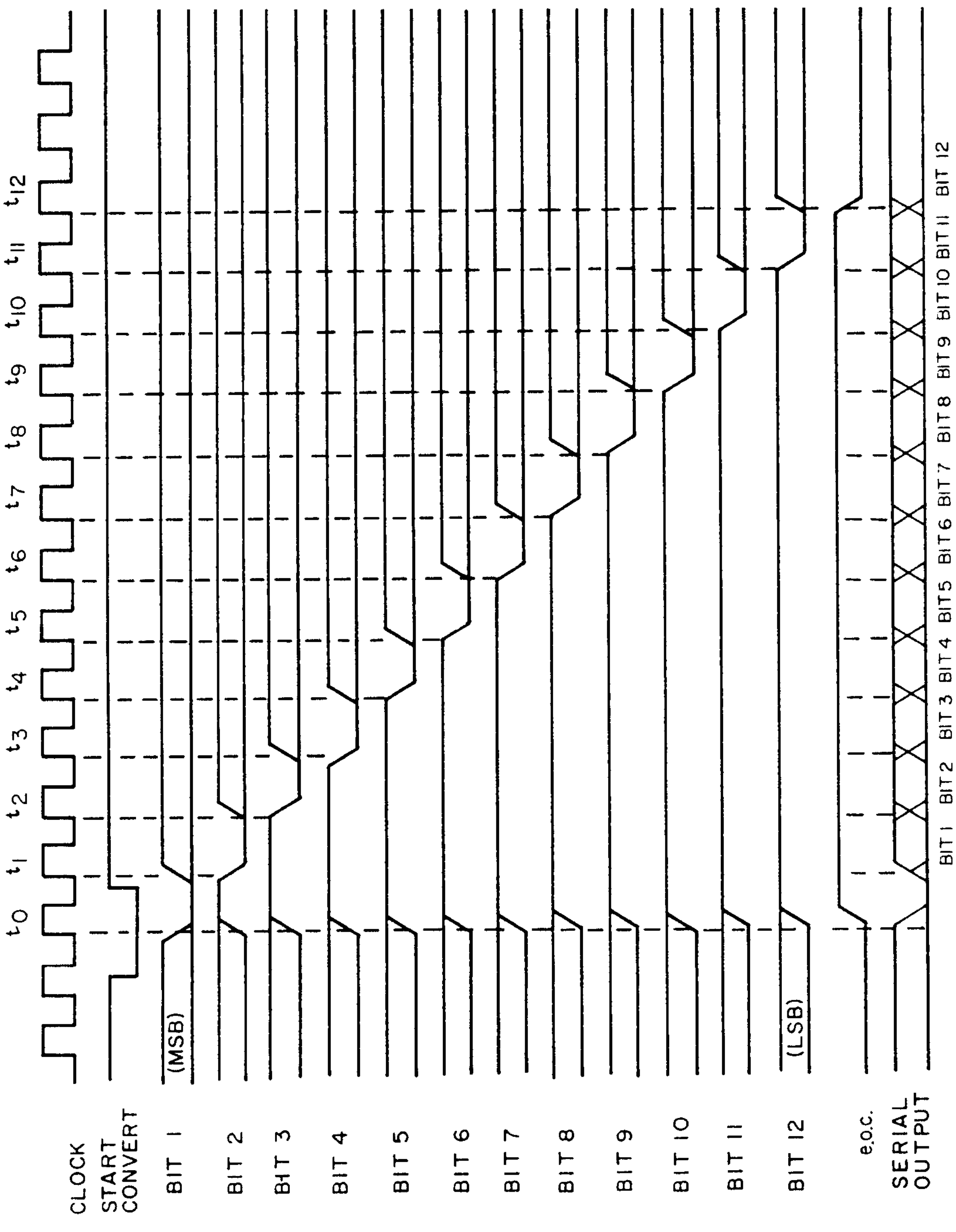
NOTES:
1. Connect pins 11 and 23 together to form unipoint ground.
2. For device types 02, 04, 06, 08, 10, 12, 14, and 16, a -10 V external reference is applied to pin 12. No other connections shall be made to pin 12.
3. For device types 09 through 16, a 2.2 μF tantalum capacitor shall be connected between pins 10 and 15. Positive terminal to pin 15. No other connections shall be made to pin 10.
4. Unless otherwise specified, V_{CC} = +15.0 V, V_{EE} = -15.0 V and V_{LOG} = +5.0 V.

FIGURE 10. Test circuit for static tests for device types 01 through 16.



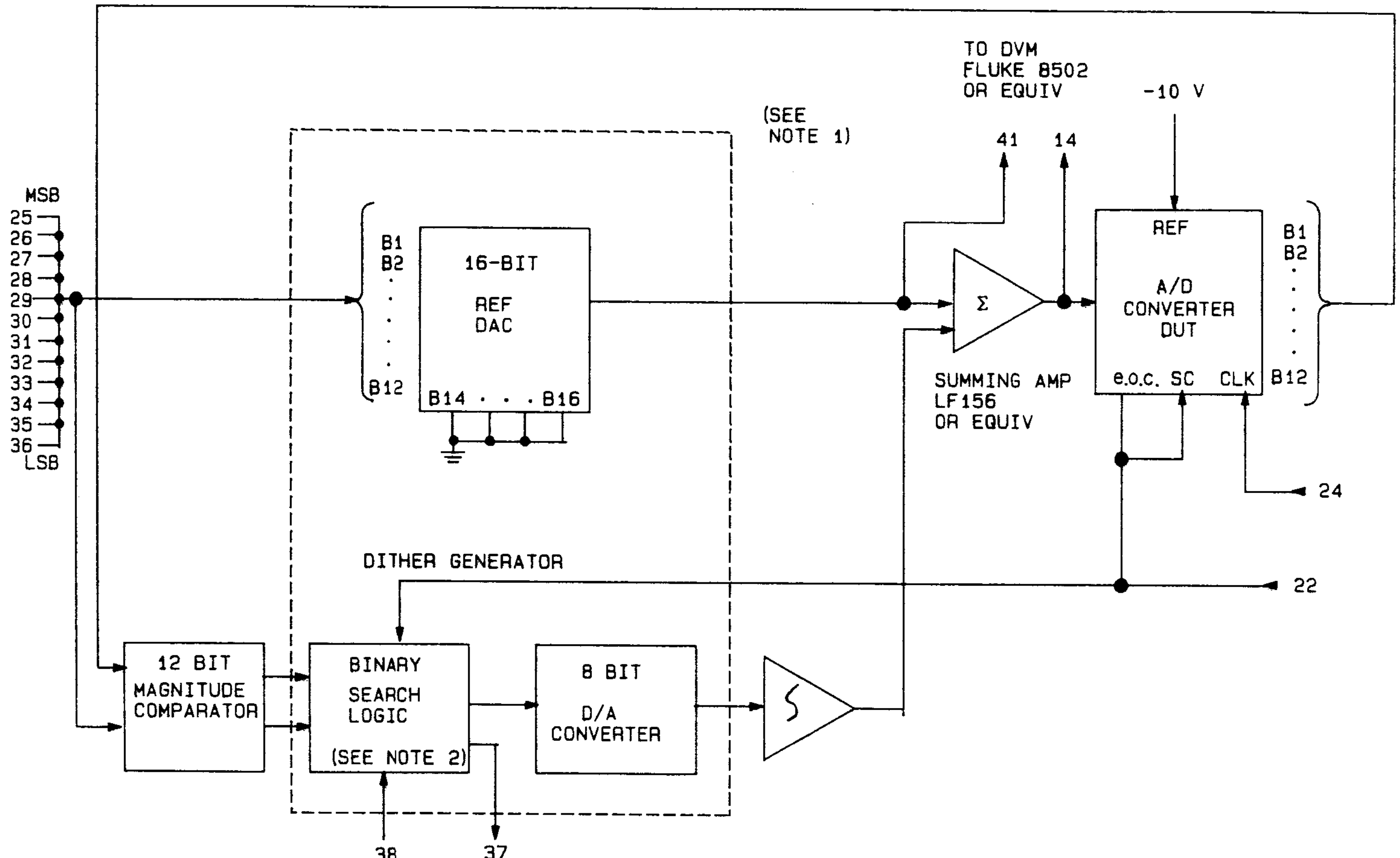
NOTES:
1. For all device types:
   PWA = 200 ±10 ns.
   t_{PLH} = 10 to 160 ns.
2. For device types 01 through 08:
   PRP = 3.85 ±.2 µs.
   PWB = 40 ns to 3.65 µs.
3. For device types 09 through 16:
   PRP = 1 ±.05 µs.
   PWB = 40 ns to 800 ns.

FIGURE 10. Test circuit for static tests for device types 01 through 16 - Continued.



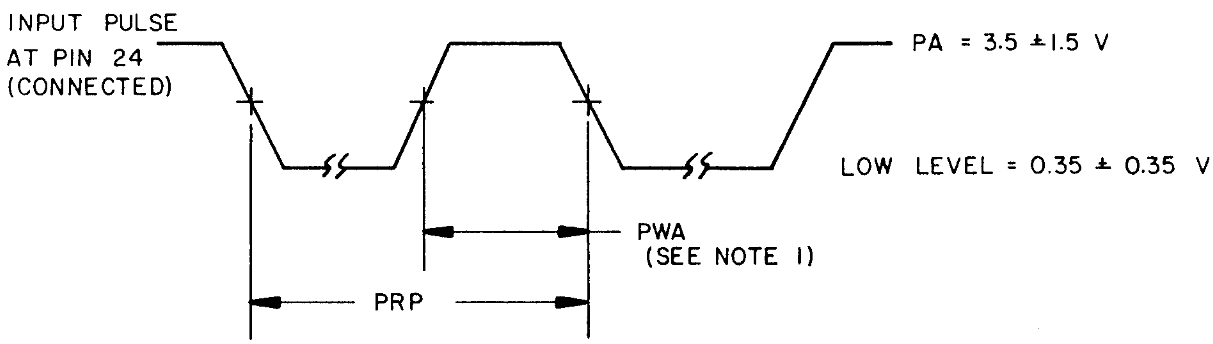
NOTE: Verify code of serial output (bit 1 through bit 12) is the same as parallel outputs.

FIGURE 11. Timing diagram for serial to parallel check.



NOTES:
1. The circuit contained within the dashed outline is for fast automatic testing and is optional. The 8-bit D/A converter may be replaced with a bipolar current source that is controlled directly by the magnitude comparator.
2. A more detailed drawing of the binary search logic is presented on figure 14.
3. Adapter pins 1 through 24 correspond to DUT pins 1 through 24.
4. Unless otherwise specified, V_{CC} = +15.0 V, V_{EE} = -15.0 V, and V_{LOG} = +5.0 V.

FIGURE 12. Block diagram of A/D converter dynamic test circuit.



NOTES:
1. Input pulse parameters:
   PWA = 200 ±10 ns.
   PRP = 3.85 ±.2 μs for device types 01 through 08.
   PRP = 1 ±.05 μs for device types 09 through 16.
2. All voltages are referenced to 0 V.

FIGURE 13. Waveform of DUT clock input (pin 24) for dynamic test circuit.

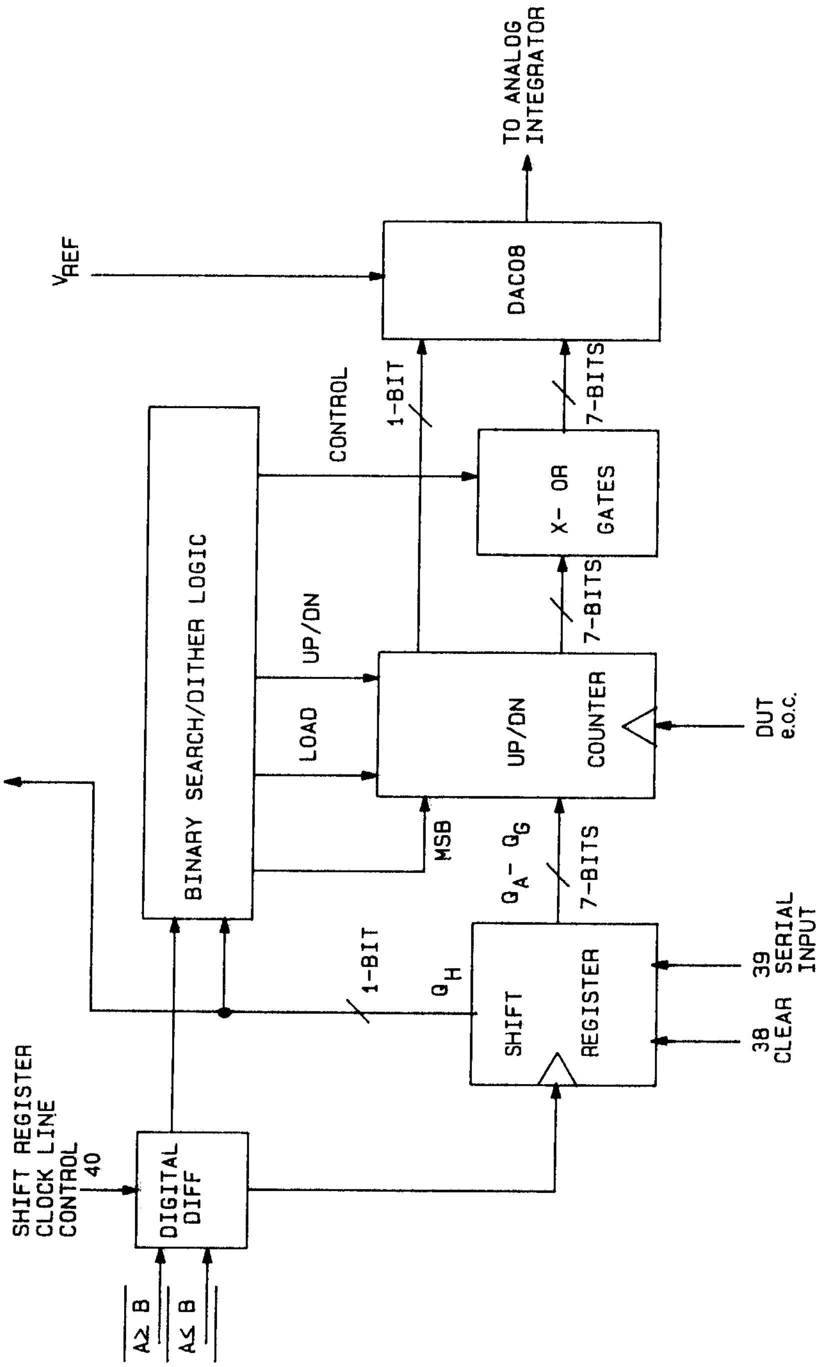
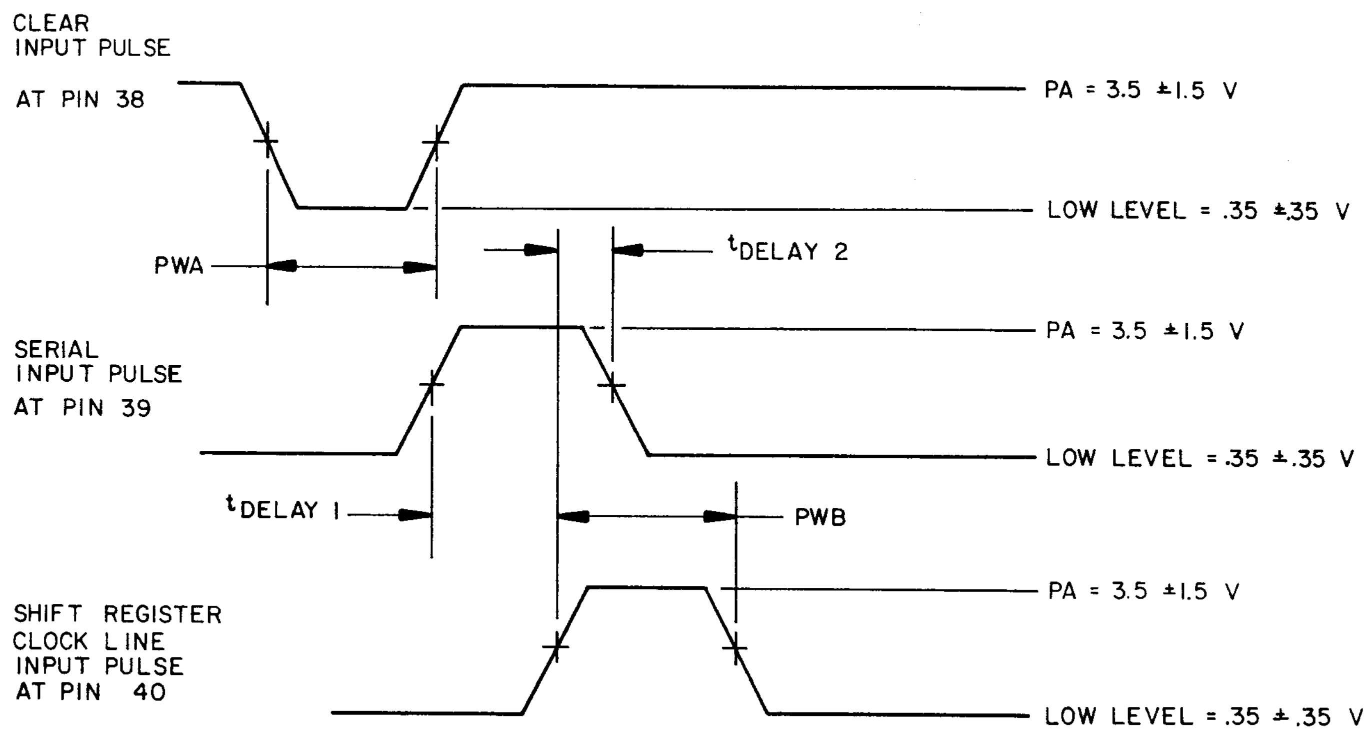


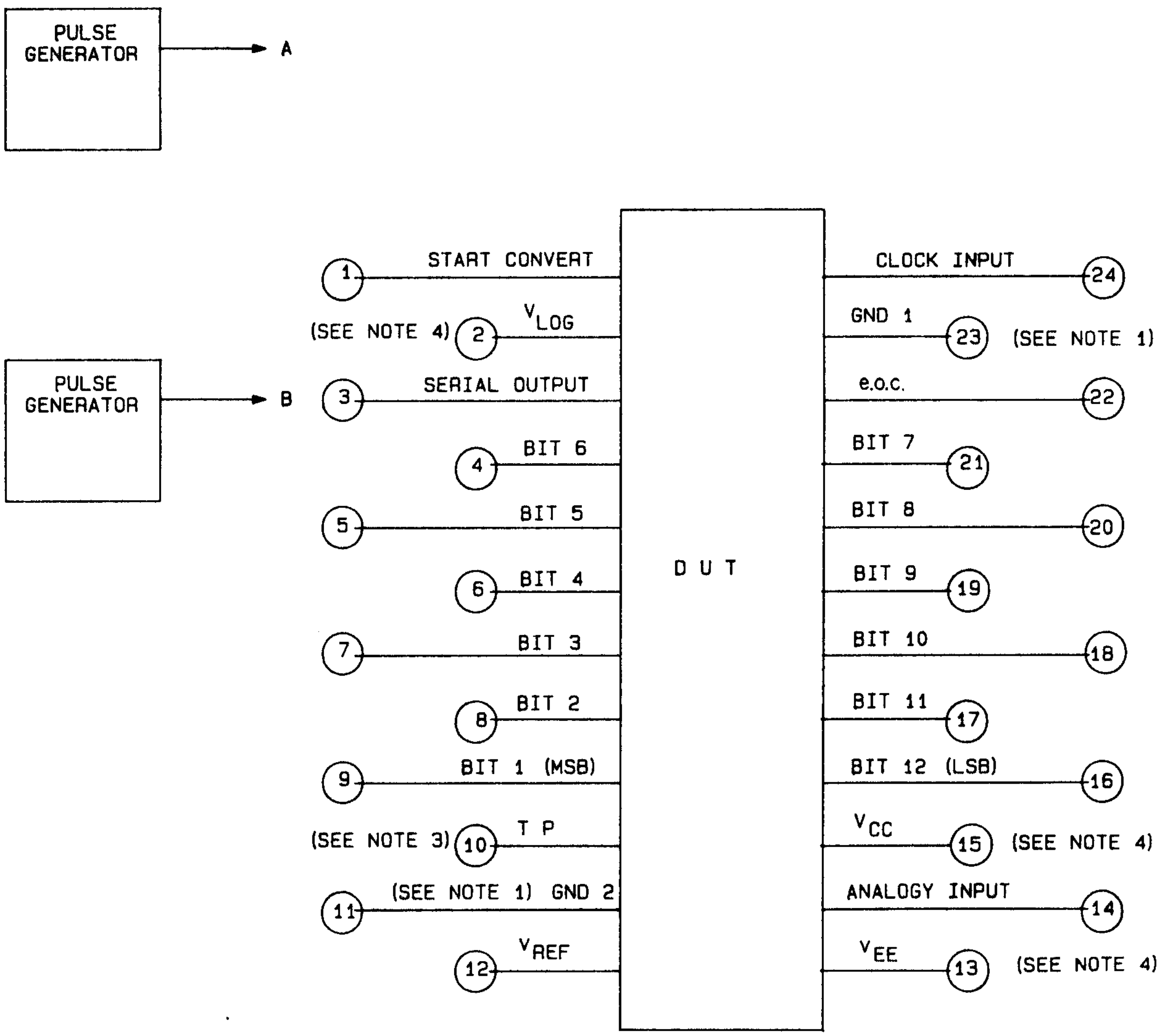
FIGURE 14. Block digram of binary search and dither circuit.



NOTES:

1. PWA = 20 ns (minimum).
   PWA = 20 ns (minimum).
   t_{DELAY1} = 20 ns (minimum).
   t_{DELAY2} = 20 ns (minimum).
2. The timing for the serial input pulse and the clockline input pulse should be established at the shift register.
3. Unless otherwise specified, V_{CC} = +15.0 V, V_{EE} = -15.0 V, and V_{LOG} = +5.0 V.

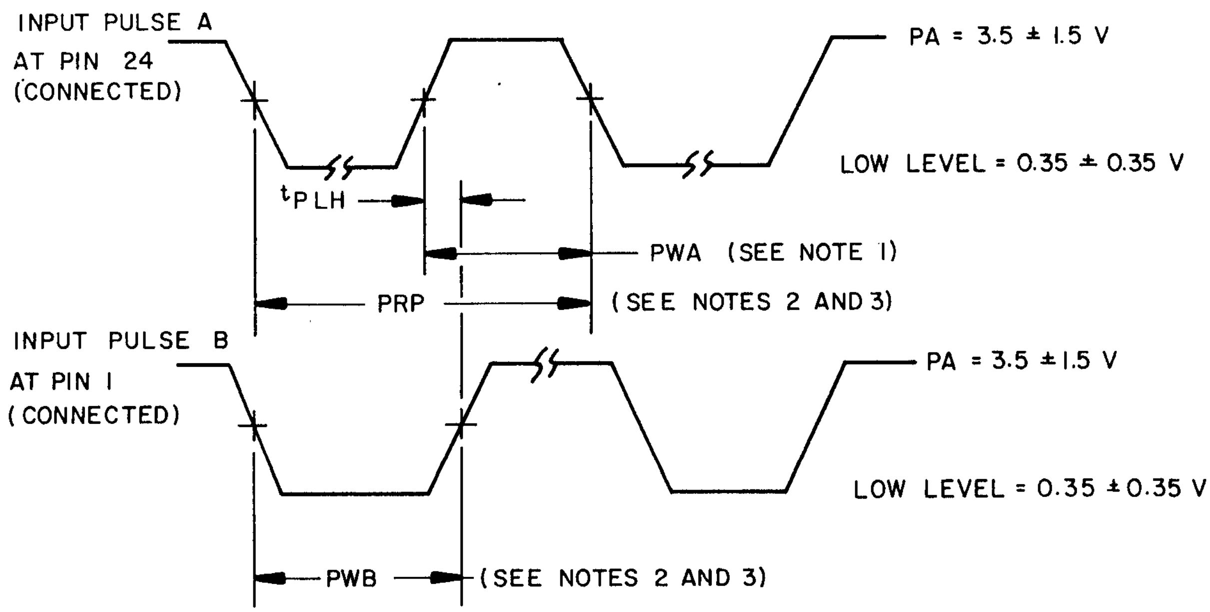
FIGURE 14. Reset waveforms for binary search and dither test circuit - Continued.



NOTES:

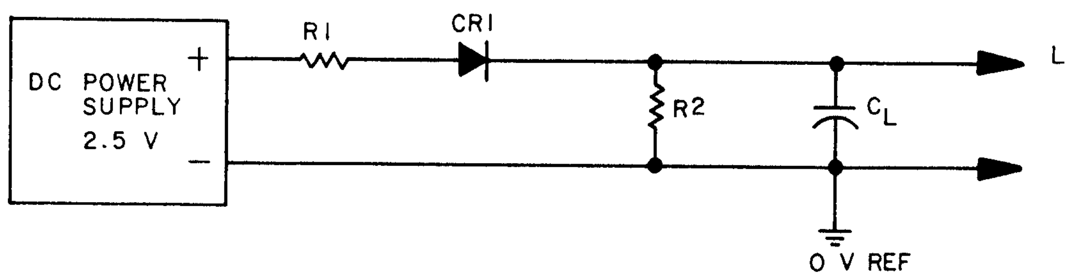
1. Connect pins 11 and 23 together to form unipoint ground.
2. For device types 02, 04, 06, 08, 10, 12, 14, and 16, a -10 V external reference is applied to pin 12. No other connections shall be made to pin 12.
3. For device types 09 through 16, a 2.2 μF tantalum capacitor shall be connected between pins 10 and 15. Positive terminal to pin 15. No other connections shall be made to pin 10.
4. Unless otherwise specified, V_{CC} = +15.0 V, V_{EE} = -15.0 V and V_{LOG} = +5.0 V.

FIGURE 15. Test circuit for propagation delay tests for device types 01 through 16.



NOTES:
1. For all device types:
   PWA = 200 ±10 ns.
   t_{PLH} = 10 ±2 ns.
2. For all device types: PWB = 40 ±3 ns.
3. For device types 01 through 08; PRP = 3.85 ±.2 μs.
4. For device types 09 through 16; PRP = 1 ±.05 μs.

FIGURE 15. Test circuit for propagation delay tests for device types 01 through 16 - Continued.



NOTES:
1. CR1 = 1N4150, or equivalent.
2. R1 = 464Ω.
3. R2 = 30.1 kΩ ±1%, 1/8 W.
4. C_L = 50 ±5 pF (including probe and parasitic capacitance).

FIGURE 16. Logic load test circuit for propagation delay tests.

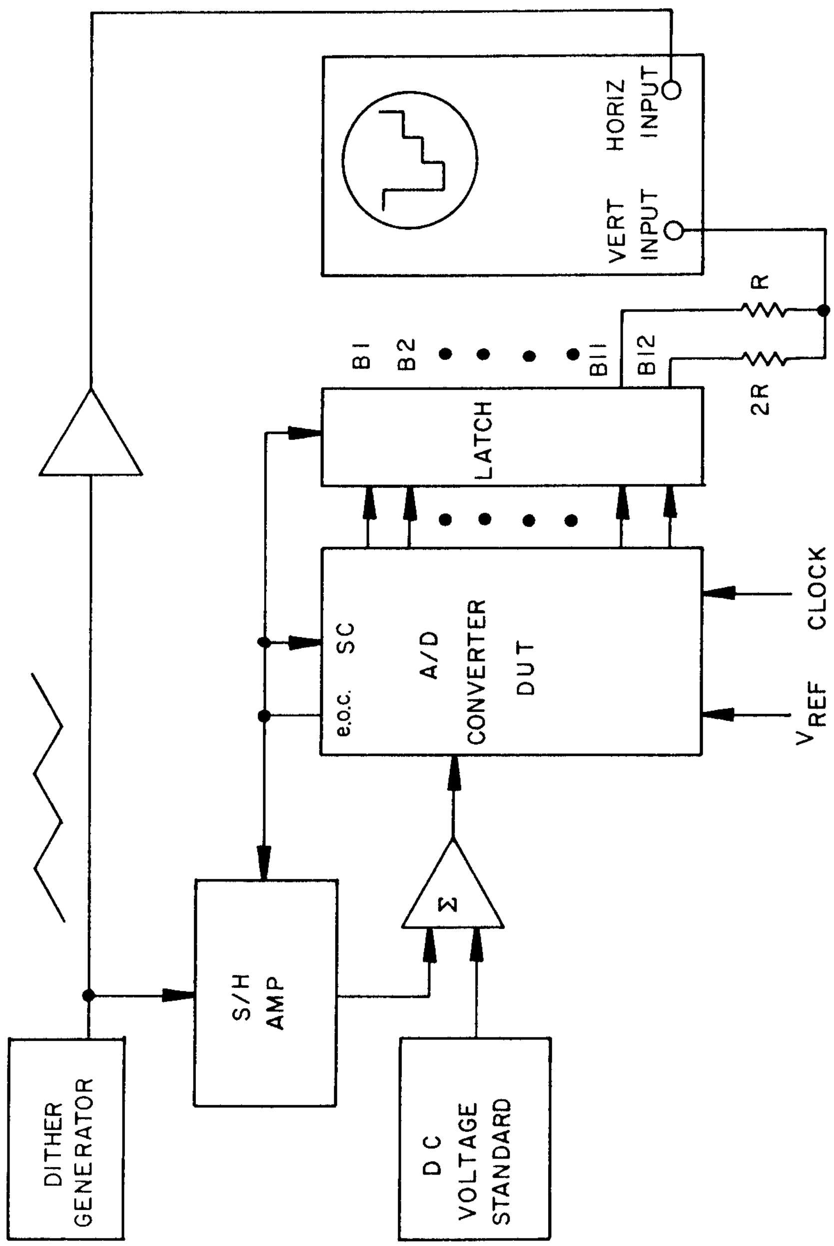
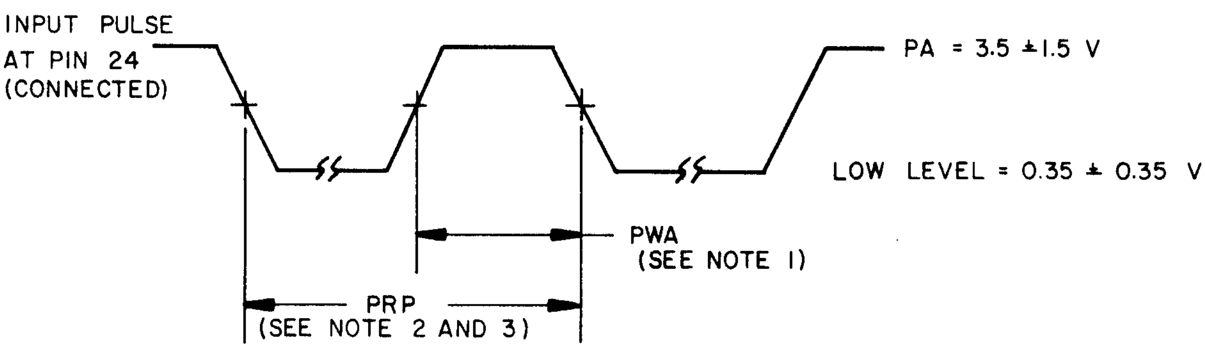


FIGURE 17. Optional test circuit for transition uncertainty test.



NOTES:
1. For device types: PWA = 200 ±10 ns.
2. For device types 01 through 08, PRP = 3.85 ±.2 μs.
3. For device types 09 through 16, PRP = 1 ±.05 μs.

FIGURE 17. Waveform for transition uncertainty test for device types 01 through 16 - Continued.

4.3 Qualification inspection. Qualification inspection is not required.

4.4 Quality conformance inspections. Quality conformance inspection shall be in accordance with MIL-H-38534 and as specified herein. Inspections to be performed shall be those specified in method 5008 of MIL-STD-883 and herein for groups A, B, C, and D inspections (see 4.4.1 through 4.4.4).

TABLE II. Electrical test requirements.

MIL-STD-883 test requirements	Subgroups (see table III)	
	Class S 1/	Class B 1/
Interim electrical parameters (method 5008)	1,4	1,4
Final electrical test parameters (method 5008) 2/	1,2,3,4,5,6	1,2,3,4,5,6
Group A test requirements (method 5008)	1,2,3,4,5,6,9	1,2,3,4,5,6,9
Group C end-point and group B, class S, electrical parameters (method 5008)	1,2,3,4,5,6, and table IV delta limits	1,4, and table IV delta limits
Additional electrical subgroups for group C periodic inspection	7,8,10,11,12	7,8,10,11,12

1/ See 4.4.4.
2/ PDA applies to subgroup 1 (see 4.2c).

4.4.1 Group A inspection. Group A inspection shall be in accordance with table X of method 5008 of MIL-STD-883 and as follows:

a. Tests shall be as specified in table II herein.

b. Subgroups 10 and 11 shall be omitted.

4.4.2 Group B inspection. Group B inspection shall be in accordance with table XI of method 5008 of MIL-STD-883 and as follows:

a. Electrical parameters shall be as specified in table II herein and shall be added to a special subgroup B inspection.

b. Steady-state life test for class S devices using the circuit shown on figure 9.

TABLE III. Group A inspection for device types 01 through 16.

Subgroup	Symbol	Test no.	Applied voltages and loads ref. pin 11 (see figure 10): 15 V_{CC} (V)	13 V_{EE} (V)	2 V_{LOG} (V)	24 CLK (V)	1 SC (V)	14 V_{IN}(a) (V)	Output: Pin	Output: Load	Measurement sense lines ref. pin 11: Pin	Value	Unit	Equations	Device types	Limits: Min	Limits: Max	Unit
1 T_A = +25°C	I_{CC1}	1	+15.00	-15.00	+5.0	A	B	Max (+)			15	I1	mA	I_{CC1} = I1	All	3	28	mA
	I_{CC2}	2	"	"	"	"	"	Max (-)			15	I2	"	I_{CC2} = I2	"	3	28	"
	I_{EE1}	3	"	"	"	"	"	Max (+)			13	I3	"	I_{EE1} = I3	"	-35	-1	"
	I_{EE2}	4	"	"	"	"	"	Max (-)			13	I4	"	I_{EE2} = I4	"	-35	-1	"
	I_{LOG1}	5	"	"	"	"	"	Max (+)			2	I5	"	I_{LOG1} = I5	"	1	68	"
	I_{LOG2}	6	"	"	"	"	"	Max (-)			2	I6	"	I_{LOG2} = I6	"	1	68	"
	I_{REF1}	7	"	"	"	"	"	Max (+)			12	I7	"	I_{REF1} = I7	02,04,06,08, 10,12,14,16	-2	-0.1	"
	I_{REF2}	8	"	"	"	"	"	Max (-)			12	I8	"	I_{REF2} = I8	02,04,06,08, 10,12,14,16	-2	-0.1	"
	PD1a	9												PD1a = 15(I1-I3) +5(I5) -10(I7)	02,04,06,08, 10,12,14,16		0.8	W
	PD1b	10												PD1b = 15(I1-I3) +5(I5)	01,03,05,07, 09,11,13,15		1	"
	PD2a	11												PD2a = 15(I2-I4) +5(I6) -10(I8)	02,04,06,08, 10,12,14,16		0.8	"
	PD2b	12												PD2b = 15(I2-I4) +5(I6)	01,03,05,07, 09,11,13,15		1	"
	I_{IL1}	15	+15.00	-15.00	+5.0	0.3	B				1	I9	mA	I_{IL1} = I9	All	-0.6	-0.05	mA
	I_{IL2}	16	"	"	"	A	0.3				24	I10	mA	I_{IL2} = I10	"	-0.6	-0.05	mA
	I_{IH1}	17	"	"	"	2.4	B				1	I11	µA	I_{IH1} = I11	"	0	40	µA
	I_{IH2}	18	"	"	"	A	2.4				24	I12	µA	I_{IH2} = I12	"	"	40	µA
	I_{IH3}	19	"	"	"	5.5	B				1	I13	mA	I_{IH3} = I13	"	"	1	mA
	I_{IH4}	20	"	"	"	A	5.5				24	I14	"	I_{IH4} = I14	"	"	1	"
	I_{OS1}	21	"	"	"	"	B	Max (-)	9	GND	9	I15	"	I_{OS1} = I15 (Test one output at a time)	"	-35	-4	"
	I_{OS2}	22	"	"	"	"	"	"	8	"	8	I16	"	I_{OS2} = I16	"	"	"	"
	I_{OS3}	23	"	"	"	"	"	"	7	"	7	I17	"	I_{OS3} = I17	"	"	"	"
	I_{OS4}	24	"	"	"	"	"	"	6	"	6	I18	"	I_{OS4} = I18	"	"	"	"
	I_{OS5}	25	"	"	"	"	"	"	5	"	5	I19	"	I_{OS5} = I19	"	"	"	"
	I_{OS6}	26	"	"	"	"	"	"	4	"	4	I20	"	I_{OS6} = I20	"	"	"	"
	I_{OS7}	27	"	"	"	"	"	"	21	"	21	I21	"	I_{OS7} = I21	"	"	"	"
	I_{OS8}	28	"	"	"	"	"	"	20	"	20	I22	"	I_{OS8} = I22	"	"	"	"
	I_{OS9}	29	"	"	"	"	"	"	19	"	19	I23	"	I_{OS9} = I23	"	"	"	"
	I_{OS10}	30	"	"	"	"	"	"	18	"	18	I24	"	I_{OS10} = I24	"	"	"	"
	I_{OS11}	31	"	"	"	"	"	"	17	"	17	I25	"	I_{OS11} = I25	"	"	"	"
	I_{OS12}	32	"	"	"	"	"	"	16	"	16	I26	"	I_{OS12} = I26	"	"	"	"
	I_{OS13}	33	"	"	"	"	"	"	3	"	3	I27	"	I_{OS13} = I27	"	"	"	"
	I_{OS14}	34	"	"	"	"	"	"	22	"	22	I28	"	I_{OS14} = I28	"	"	"	"

TABLE III. Group A inspection for device types 01 through 16 - Continued.

Subgroup	Symbol	Test no.	Applied voltages and loads ref. pin 11 (see figure 10) 15 V_{CC} (V)	13 V_{EE} (V)	2 V_{LOG} (V)	24 CLK (V)	1 SC (V)	14 V_{IN}(a) (V)	Output Pin	Output Load	Measurement sense lines ref. pin 11 Pin	Value	Unit	Equations	Device types	Limits Min	Limits Max	Unit
1 T_A = +25°C	V_{OH1}	35	+15.00	-15.00	+5.0	A	B	Max (-)	9	-80 µA	9	E1	V	V_{OH1} = E1	All	2.4		V
	V_{OH2}	36	"	"	"	"	"	"	8	"	8	E2	"	V_{OH2} = E2	"	"		"
	V_{OH3}	37	"	"	"	"	"	"	7	"	7	E3	"	V_{OH3} = E3	"	"		"
	V_{OH4}	38	"	"	"	"	"	"	6	"	6	E4	"	V_{OH4} = E4	"	"		"
	V_{OH5}	39	"	"	"	"	"	"	5	"	5	E5	"	V_{OH5} = E5	"	"		"
	V_{OH6}	40	"	"	"	"	"	"	4	"	4	E6	"	V_{OH6} = E6	"	"		"
	V_{OH7}	41	"	"	"	"	"	"	21	"	21	E7	"	V_{OH7} = E7	"	"		"
	V_{OH8}	42	"	"	"	"	"	"	20	"	20	E8	"	V_{OH8} = E8	"	"		"
	V_{OH9}	43	"	"	"	"	"	"	19	"	19	E9	"	V_{OH9} = E9	"	"		"
	V_{OH10}	44	"	"	"	"	"	"	18	"	18	E10	"	V_{OH10} = E10	"	"		"
	V_{OH11}	45	"	"	"	"	"	"	17	"	17	E11	"	V_{OH11} = E11	"	"		"
	V_{OH12}	46	"	"	"	"	"	"	16	"	16	E12	"	V_{OH12} = E12	"	"		"
	V_{OH13}	47	"	"	"	"	"	"	3	"	3	E13	"	V_{OH13} = E13	"	"		"
	V_{OH14}	48	"	"	"	"	"	"	22	"	22	E14	"	V_{OH14} = E14	"	"		"
	V_{OL1}	49	"	"	"	"	"	Max (+)	9	3.2 mA	9	E15	V	V_{OL1} = E15	"		0.4	"
	V_{OL2}	50	"	"	"	"	"	"	8	"	8	E16	"	V_{OL2} = E16	"		"	"
	V_{OL3}	51	"	"	"	"	"	"	7	"	7	E17	"	V_{OL3} = E17	"		"	"
	V_{OL4}	52	"	"	"	"	"	"	6	"	6	E18	"	V_{OL4} = E18	"		"	"
	V_{OL5}	53	"	"	"	"	"	"	5	"	5	E19	"	V_{OL5} = E19	"		"	"
	V_{OL6}	54	"	"	"	"	"	"	4	"	4	E20	"	V_{OL6} = E20	"		"	"
	V_{OL7}	55	"	"	"	"	"	"	21	"	21	E21	"	V_{OL7} = E21	"		"	"
	V_{OL8}	56	"	"	"	"	"	"	20	"	20	E22	"	V_{OL8} = E22	"		"	"
	V_{OL9}	57	"	"	"	"	"	"	19	"	19	E23	"	V_{OL9} = E23	"		"	"
	V_{OL10}	58	"	"	"	"	"	"	18	"	18	E24	"	V_{OL10} = E24	"		"	"
	V_{OL11}	59	"	"	"	"	"	"	17	"	17	E25	"	V_{OL11} = E25	"		"	"
	V_{OL12}	60	"	"	"	"	"	"	16	"	16	E26	"	V_{OL12} = E26	"		"	"
	V_{OL13}	61	"	"	"	"	"	"	3	"	3	E27	"	V_{OH13} = E27	"		"	"
	V_{OL14}	62	"	"	"	"	"	"	22	"	22	E28	"	V_{OH14} = E28	"		"	"
2 T_A = +125°C	(All test parameters, test conditions, equations, and test limits are identical with those specified in table III, subgroup 1.)																	
3 T_A = -55°C	(All test parameters, test conditions, equations, and test limits are identical with those specified in table III, subgroup 1.)																	

TABLE III. Group A inspection for device types 01 through 16 - Continued.

Subgroup	Symbol	Test no.	Applied voltages ref. pin 11 (see figures 11, 12, 13, 14) 15 V_{CC} (V)	13 V_{EE} (V)	2 V_{LOG} (V)	Applied digital code-word 25<--------->36 MSB<------->LSB	Parallel output digital code-word 9<-->4,21<->16 MSB<------>LSB	Measurement sense lines ref. pin 11 Pin	Value	Unit	Equations and notes	Device types	Limits Min	Max	Unit
4	S01	187	+15.00	-15.00	+5.0		1--- ---- ----	9	E85	V	Logic limits				
T_A = +25°C			"	"	"		1--- ---- ----	3	E86	"	S01; E85 = E86 (at t1)	All	Pass/Fail		
	S02	188	"	"	"		10-- ---- ----	8	E87	"					
			"	"	"		10-- ---- ----	3	E88	"	S02; E87 = E88 (at t2)	"	"		
	S03	189	"	"	"		100- ---- ----	7	E89	"					
			"	"	"		100- ---- ----	3	E90	"	S03; E89 = E90 (at t3)	"	"		
	S04	190	"	"	"		1000 ---- ----	6	E91	"					
			"	"	"		1000 ---- ----	3	E92	"	S04; E91 = E92 (at t4)	"	"		
	S05	191	"	"	"		1000 0--- ----	5	E93	"					
			"	"	"		1000 0--- ----	3	E94	"	S05; E93 = E94 (at t5)	"	"		
	S06	192	"	"	"		1000 00-- ----	4	E95	"					
			"	"	"		1000 00-- ----	3	E96	"	S06; E95 = E96 (at t6)	"	"		
	S07	193	"	"	"		1000 000- ----	21	E97	"					
			"	"	"		1000 000- ----	3	E98	"	S07; E97 = E98 (at t7)	"	"		
	S08	194	"	"	"		1000 0000 ----	20	E99	"					
			"	"	"		1000 0000 ----	3	E100	"	S08; E99 = E100 (at t8)	"	"		
	S09	195	"	"	"		1000 0000 0---	19	E101	"					
			"	"	"		1000 0000 0---	3	E102	"	S09; E101 = E102 (at t9)	"	"		
	S010	196	"	"	"		1000 0000 00--	18	E103	"					
			"	"	"		1000 0000 00--	3	E104	"	S010; E103 = E104 (at t10)	"	"		
	S011	197	"	"	"		1000 0000 000-	17	E105	"					
			"	"	"		1000 0000 000-	3	E106	"	S011; E105 = E106 (at t11)	"	"		
	S012	198	"	"	"		1000 0000 0000	16	E107	"					
			"	"	"		1000 0000 0000	3	E108	"	S012; E107 = E108 (at t12) (see figures 10 and 11)	"	"		
	ZE	199	"	"	"	0000 0000 0000	0000 0000 000ø	14	E109	"	ZE = 410* (E109)	01,02,09,10	-2	0	LSB
		200	"	"	"	0111 1111 1111	øøøø øøøø øøøø	"	E110	"	ZE = 410* (E110)	03,04,11,12	-1	+1	"
		201	"	"	"	0111 1111 1111	øøøø øøøø øøøø	"	E111	"	ZE = 205* (E111)	05,06,13,14	-1	+1	"
		202	"	"	"	1111 1111 1110	1111 1111 111ø	"	E112	"	ZE = 410* (E112)	07,08,15,16	0	+2	"
	+VFSE	203	"	"	"	0000 0000 0000	0000 0000 000ø	"	E113	"	+VFSE = 410* (E113-5+10/4096)	03,11	-2	"	"
		204	"	"	"	" " "	"	"	E114	"	+VFSE = 410* (E114-5+10/4096)	04,12	"	"	"
		205	"	"	"	" " "	"	"	E115	"	+VFSE = 205* (E115-10+20/4096)	05,13	"	"	"
		206	"	"	"	" " "	"	"	E116	"	+VFSE = 205* (E116-10+20/4096)	06,14	"	"	"
		207	"	"	"	" " "	"	"	E117	"	+VFSE = 410* (E117-10+10/4096)	07,15	"	"	"
		208	"	"	"	" " "	"	"	E118	"	+VFSE = 410* (E118-10+10/4096)	08,16	"	"	"
	-VFSE	209	"	"	"	1111 1111 1110	1111 1111 111ø	"	E119	"	-VFSE = 410* (E119+10-10/4096)	01,09	"	"	"
		210	"	"	"	" " "	"	"	E120	"	-VFSE = 410* (E120+10-10/4096)	02,10	"	"	"
		211	"	"	"	" " "	"	"	E121	"	-VFSE = 410* (E121+5-10/4096)	03,11	"	"	"
		212	"	"	"	" " "	"	"	E122	"	-VFSE = 410* (E122+5-10/4096)	04,12	"	"	"
		213	"	"	"	" " "	"	"	E123	"	-VFSE = 205* (E123+10-20/4096)	05,13	"	"	"
		214	"	"	"	" " "	"	"	E124	"	-VFSE = 205* (E124+10-20/4096)	06,14	"	"	"
											For end-point linearity, TLE(N) = (E(N+125)-V(ideal))/S where S = (E168 -E125)/4094 for N = 1 to 42				
			+15.00	-15.00	+5.0	0000 0000 0000	0000 0000 000ø	14	E125	V					
	TLE1	215	"	"	"	0000 0000 0001	0000 0000 00øø	"	E126	"	TLE1 = (E126-S-E125)/S	All	-.50	+.50	LSB
	TLE2	216	"	"	"	0000 0000 0010	0000 0000 001ø	"	E127	"	TLE2 = (E127-2*S-E125)/S	"	"	"	"
	TLE3	217	"	"	"	0000 0000 0011	0000 0000 0øøø	"	E128	"	TLE3 = (E128-3*S-E125)/S	"	"	"	"
	TLE4	218	"	"	"	0000 0000 0100	0000 0000 010ø	"	E129	"	TLE4 = (E129-4*S-E125)/S	"	"	"	"
	TLE5	219	"	"	"	0000 0000 0110	0000 0000 011ø	"	E130	"	TLE5 = (E130-6*S-E125)/S	"	"	"	"

TABLE III. Group A inspection for device types 01 through 16 - Continued.

Subgroup	Symbol	Test no.	Applied voltages ref. pin 11 (see figures 11, 12, 13, 14) 15 V_{CC} (V)	13 V_{EE} (V)	2 V_{LOG} (V)	Applied digital code-word 25<---------->36 MSB<-------->LSB	Parallel output digital code-word 9<-->4,21<->16 MSB<------>LSB	Measurement sense lines ref. pin 11 Pin	Value	Unit	Equations	Device types	Limits Min	Max	Unit
4 T_A = +25°C	TLE6	220	+15.00	-15.00	+5.0	0000 0000 0111	0000 0000 øøøø	14	E131	V	TLE6 = (E131-7*S-E125)/S	All	-.50	+.50	LSB
	TLE7	221	"	"	"	0000 0000 1000	0000 0000 100ø	"	E132	"	TLE7 = (E132-8*S-E125)/S	"	"	"	"
	TLE8	222	"	"	"	0000 0000 1110	0000 0000 111ø	"	E133	"	TLE8 = (E133-14*S-E125)/S	"	"	"	"
	TLE9	223	"	"	"	0000 0000 1111	0000 000ø øøøø	"	E134	"	TLE9 = (E134-15*S-E125)/S	"	"	"	"
	TLE10	224	"	"	"	0000 0001 0000	0000 0001 000ø	"	E135	"	TLE10 = (E135-16*S-E125)/S	"	"	"	"
	TLE11	225	"	"	"	0000 0001 1110	0000 0001 111ø	"	E136	"	TLE11 = (E136-30*S-E125)/S	"	"	"	"
	TLE12	226	"	"	"	0000 0001 1111	0000 00øø øøøø	"	E137	"	TLE12 = (E137-31*S-E125)/S	"	"	"	"
	TLE13	227	"	"	"	0000 0010 0000	0000 0010 000ø	"	E138	"	TLE13 = (E138-32*S-E125)/S	"	"	"	"
	TLE14	228	"	"	"	0000 0011 1110	0000 0011 111ø	"	E139	"	TLE14 = (E139-62*S-E125)/S	"	"	"	"
	TLE15	229	"	"	"	0000 0011 1111	0000 0øøø øøøø	"	E140	"	TLE15 = (E140-63*S-E125)/S	"	"	"	"
	TLE16	230	"	"	"	0000 0100 0000	0000 0100 000ø	"	E141	"	TLE16 = (E141-64*S-E125)/S	"	"	"	"
	TLE17	231	"	"	"	0000 0111 1110	0000 0111 111ø	"	E142	"	TLE17 = (E142-126*S-E125)/S	"	"	"	"
	TLE18	232	"	"	"	0000 0111 1111	0000 øøøø øøøø	"	E143	"	TLE18 = (E143-127*S-E125)/S	"	"	"	"
	TLE19	233	"	"	"	0000 1000 0000	0000 1000 000ø	"	E144	"	TLE19 = (E144-128*S-E125)/S	"	"	"	"
	TLE20	234	"	"	"	0000 1111 1110	0000 1111 111ø	"	E145	"	TLE20 = (E145-254*S-E125)/S	"	"	"	"
	TLE21	235	"	"	"	0000 1111 1111	000ø øøøø øøøø	"	E146	"	TLE21 = (E146-255*S-E125)/S	"	"	"	"
	TLE22	236	"	"	"	0001 0000 0000	0001 0000 000ø	"	E147	"	TLE22 = (E147-256*S-E125)/S	"	"	"	"
	TLE23	237	"	"	"	0001 1111 1110	0001 1111 111ø	"	E148	"	TLE23 = (E148-510*S-E125)/S	"	"	"	"
	TLE24	238	"	"	"	0001 1111 1111	00øø øøøø øøøø	"	E149	"	TLE24 = (E149-511*S-E125)/S	"	"	"	"
	TLE25	239	"	"	"	0010 0000 0000	0010 0000 000ø	"	E150	"	TLE25 = (E150-512*S-E125)/S	"	"	"	"
	TLE26	240	"	"	"	0011 1111 1110	0011 1111 111ø	"	E151	"	TLE26 = (E151-1022*S-E125)/S	"	"	"	"
	TLE27	241	"	"	"	0011 1111 1111	0øøø øøøø øøøø	"	E152	"	TLE27 = (E152-1023*S-E125)/S	"	"	"	"
	TLE28	242	"	"	"	0100 0000 0000	0100 0000 000ø	"	E153	"	TLE28 = (E153-1024*S-E125)/S	"	"	"	"
	TLE29	243	"	"	"	0111 1111 1110	0111 1111 111ø	"	E154	"	TLE29 = (E154-2046*S-E125)/S	"	"	"	"
	TLE30	244	"	"	"	0111 1111 1111	øøøø øøøø øøøø	"	E155	"	TLE30 = (E155-2047*S-E125)/S	"	"	"	"
	TLE31	245	"	"	"	1000 0000 0000	1000 0000 000ø	"	E156	"	TLE31 = (E156-2048*S-E125)/S	"	"	"	"
	TLE32	246	"	"	"	0010 1111 1111	001ø øøøø øøøø	"	E157	"	TLE32 = (E157-767*S-E125)/S	"	"	"	"
	TLE33	247	"	"	"	0100 1111 1111	010ø øøøø øøøø	"	E158	"	TLE33 = (E158-1279*S-E125)/S	"	"	"	"
	TLE34	248	"	"	"	0101 1111 1111	01øø øøøø øøøø	"	E159	"	TLE34 = (E159-1535*S-E125)/S	"	"	"	"
	TLE35	249	"	"	"	0110 1111 1111	011ø øøøø øøøø	"	E160	"	TLE35 = (E160-1791*S-E125)/S	"	"	"	"
	TLE36	250	"	"	"	1000 1111 1111	100ø øøøø øøøø	"	E161	"	TLE36 = (E161-2303*S-E125)/S	"	"	"	"
	TLE37	251	"	"	"	1001 1111 1111	10øø øøøø øøøø	"	E162	"	TLE37 = (E162-2559*S-E125)/S	"	"	"	"
	TLE38	252	"	"	"	1010 1111 1111	101ø øøøø øøøø	"	E163	"	TLE38 = (E163-2815*S-E125)/S	"	"	"	"
	TLE39	253	"	"	"	1011 1111 1111	1øøø øøøø øøøø	"	E164	"	TLE39 = (E164-3071*S-E125)/S	"	"	"	"
	TLE40	254	"	"	"	1100 1111 1111	110ø øøøø øøøø	"	E165	"	TLE40 = (E165-3327*S-E125)/S	"	"	"	"
	TLE41	255	"	"	"	1101 1111 1111	11øø øøøø øøøø	"	E166	"	TLE41 = (E166-3583*S-E125)/S	"	"	"	"
	TLE42	256	"	"	"	1110 1111 1111	111ø øøøø øøøø	"	E167	"	TLE42 = (E167-3839*S-E125)/S	"	"	"	"
			"	"	"	1111 1111 1110	1111 1111 111ø	"	E168	"					
			"	"	"	0000 0000 0000	0000 0000 000ø	"	E169	"	S = (E201-E169)/4094				
	MCE1	257	"	"	"	0000 0000 0001	0000 0000 00øø	"	E170	"	MCE1 = (E170-E169-S)/S	"	-.9	+1.0	"
	MCE2	258	"	"	"	0000 0000 0010	0000 0000 001ø	"	E171	"	MCE2 = (E171-E170-S)/S	"	"	"	"
	MCE3	259	"	"	"	0000 0000 0011	0000 0000 0øøø	"	E172	"	MCE3 = (E172-E171-S)/S	"	"	"	"
	MCE4	260	"	"	"	0000 0000 0100	0000 0000 010ø	"	E173	"	MCE4 = (E173-E172-S)/S	"	"	"	"
			"	"	"	0000 0000 0110	0000 0000 011ø	"	E174	"					
	MCE5	261	"	"	"	0000 0000 0111	0000 0000 øøøø	"	E175	"	MCE5 = (E175-E174-S)/S	"	"	"	"
	MCE6	262	"	"	"	0000 0000 1000	0000 0000 100ø	"	E176	"	MCE6 = (E176-E175-S)/S	"	"	"	"
			"	"	"	0000 0000 1110	0000 0000 111ø	"	E177	"					
	MCE7	263	"	"	"	0000 0000 1111	0000 000ø øøøø	"	E178	"	MCE7 = (E178-E177-S)/S	"	"	"	"
	MCE8	264	"	"	"	0000 0001 0000	0000 0001 000ø	"	E179	"	MCE8 = (E179-E178-S)/S	"	"	"	"
			"	"	"	0000 0001 1110	0000 0001 111ø	"	E180	"					
	MCE9	265	"	"	"	0000 0001 1111	0000 00øø øøøø	"	E181	"	MCE9 = (E181-E180-S)/S	"	"	"	"
	MCE10	266	"	"	"	0000 0010 0000	0000 0010 000ø	"	E182	"	MCE10 = (E182-E181-S)/S	"	"	"	"
			"	"	"	0000 0011 1110	0000 0011 111ø	"	E183	"					
	MCE11	267	"	"	"	0000 0011 1111	0000 0øøø øøøø	"	E184	"	MCE11 = (E184-E183-S)/S	"	"	"	"
	MCE12	268	"	"	"	0000 0100 0000	0000 0100 000ø	"	E185	"	MCE12 = (E185-E184-S)/S	"	"	"	"
			"	"	"	0000 0111 1110	0000 0111 111ø	"	E186	"					
	MCE13	269	"	"	"	0000 0111 1111	0000 øøøø øøøø	"	E187	"	MCE13 = (E187-E186-S)/S	"	"	"	"

TABLE III. Group A inspection for device types 01 through 16 - Continued.

Subgroup	Symbol	Test no.	Applied voltages ref. pin 11 (see figures 11, 12, 13, 14) 15 V_{CC} (V)	13 V_{EE} (V)	2 V_{LOG} (V)	Applied digital code-word 25<--------->36 MSB<------->LSB	Parallel output digital code-word 9<-->4,21<->16 MSB<------>LSB	Measurement sense lines ref. pin 11 Pin	Value	Unit	Equations	Device types	Limits Min	Max	Unit
4 T_A = +25°C	MCE14	270	+15.00	-15.00	+5.0	0000 1000 0000	0000 1000 000ø	14	E188	V	MCE14 = (E188-E187-S)/S	All	-.9	+1.0	LSB
			"	"	"	0000 1111 1110	0000 1111 111ø	"	E189	"					
	MCE15	271	"	"	"	0000 1111 1111	000ø øøøø øøøø	"	E190	"	MCE15 = (E190-E189-S)/S	"	"	"	"
	MCE16	272	"	"	"	0001 0000 0000	0001 0000 000ø	"	E191	"	MCE16 = (E191-E190-S)/S	"	"	"	"
			"	"	"	0001 1111 1110	0001 1111 111ø	"	E192	"					
	MCE17	273	"	"	"	0001 1111 1111	00øø øøøø øøøø	"	E193	"	MCE17 = (E193-E192-S)/S	"	"	"	"
	MCE18	274	"	"	"	0010 0000 0000	0010 0000 000ø	"	E194	"	MCE18 = (E194-E193-S)/S	"	"	"	"
			"	"	"	0011 1111 1110	0011 1111 111ø	"	E195	"					
	MCE19	275	"	"	"	0011 1111 1111	0øøø øøøø øøøø	"	E196	"	MCE19 = (E196-E195-S)/S	"	"	"	"
	MCE20	276	"	"	"	0100 0000 0000	0100 0000 000ø	"	E197	"	MCE20 = (E197-E196-S)/S	"	"	"	"
			"	"	"	0111 1111 1110	0111 1111 111ø	"	E198	"					
	MCE21	277	"	"	"	0111 1111 1111	øøøø øøøø øøøø	"	E199	"	MCE21 = (E199-E198-S)/S	"	"	"	"
	MCE22	278	"	"	"	1000 0000 0000	1000 0000 000ø	"	E200	"	MCE22 = (E200-E199-S)/S	"	"	"	"
			"	"	"	1111 1111 1110	1111 1111 111ø	"	E201	"					
	+PSS1a	279	+15.45	"	"	0000 0000 0000	0000 0000 000ø	"			For S = (E205-E204)/4094				
			+14.55	"	"	" " "	" " "	"	E202	"	+PSS1a = (E202-E204)/(3*S)	"	-1	+1	LSB/
			+15.00	"	"	" " "	" " "	"	E203	"	+PSS1a = (E203-E204)/(3*S)	"	"	"	%PS
			+15.00	"	"	1111 1111 1110	1111 1111 111ø	"	E204	"					
									E205	"					
	-PSS1b	280	+15.45	"	"	" " "	" " "	"	E206	"	+PSS1b = (E206-E208)/(3*S)	"	"	"	"
			+14.55	"	"	" " "	" " "	"	E207	"	+PSS1b = (E207-E205)/(3*S)				
											For S = (E211-E210)/4094				
	-PSS1a	281	+15.00	-14.55	"	0000 0000 0000	0000 0000 000ø	"	E208	"	-PSS1a = (E208-E210)/(3*S)	01,03,05,07,	-2	+2	"
			"	-15.45	"	" " "	" " "	"	E209	"	-PSS1a = (E209-E210)/(3*S)	09,11,13,15			
			"	-15.00	"	" " "	" " "	"	E210	"					
			"	-15.00	"	1111 1111 1110	1111 1111 111ø	"	E211	"					
											For S = (E215-E214)/4094				
									E212	"	-PSS1a = (E212-E214)/(3*S)	02,04,06,08,	-1	+1	"
		282	"	-14.55	"	0000 0000 0000	0000 0000 000ø	"	E213	"	-PSS1a = (E213-E214)/(3*S)	10,12,14,16			
			"	-15.45	"	" " "	0000 0000 000ø	"	E214	"					
			"	-15.00	"	" " "	0000 0000 000ø	"	E215	"					
			"	-15.00	"	1111 1111 1110	1111 1111 111ø	"			For S = (E211-E210)/4094				
									E216	"	-PSS1b = (E216-E211)/(3*S)	01,03,05,07,	-2	+2	"
	-PSS1b	283	"	-14.55	"	1111 1111 111ø	1111 1111 111ø	"	E217	"	-PSS1b = (E217-E211)/(3*S)	09,11,13,15			
			"	-15.45	"	" " "	" " "	"							
											For S = (E215-E214)/4094				
		284	"	-14.55	"	" " "	" " "	"	E218	"	-PSS1b = (E218-E215)/(3*S)	02,04,06,08,	-1	+1	"
			"	-15.45	"	" " "	" " "	"	E219	"	-PSS1b = (E219-E215)/(3*S)	10,12,14,16			
											For S = (E223-E222)/4094				
	+PSS2a	285	"	-15.00	+5.5	0000 0000 0000	0000 0000 000ø	"	E220	"	+PSS2a = (E220-E222)/(10*S)	All	"	"	"
			"	"	+4.5	" " "	" " "	"	E221	"	+PSS2a = (E221-E222)/(10*S)	"	"	"	"
			"	"	+5.0	" " "	" " "	"	E222	"		"			
			"	"	+5.0	1111 1111 1110	1111 1111 111ø	"	E223	"					
	+PSS2b	286	"	"	+5.5	" " "	" " "	"	E224	"	+PSS2b = (E224-E223)/(10*S)	"	"	"	"
			"	"	+4.5	" " "	" " "	"	E225	"	+PSS2b = (E225-E218)/(10*S)	"	"	"	"

TABLE III. Group A inspection for device types 01 through 16 - Continued.

Subgroup	Symbol	Test no.	Applied voltages ref. pin 11 (see figures 11, 12, 13, 14) 15 V_{CC} (V)	13 V_{EE} (V)	2 V_{LOG} (V)	Applied digital code-word 25<---------->36 MSB<-------->LSB	Parallel output digital code-word 9<-->4,21<->16 MSB<------>LSB	Measurement sense lines ref. pin 11 Pin	Value	Unit	Equations	Device types	Limits Min	Max	Unit
5 T_A = +125°C	S01	287	+15.00	-15.00	+5.0		1--- ---- ----	9	E226	V	Logic limits				
			"	"	"		1--- ---- ----	3	E227	"	S01; E226-E227 (at t1)	All	Pass/Fail		
	S02	288	"	"	"		10-- ---- ----	8	E228	"					
			"	"	"		10-- ---- ----	3	E229	"	S02; E228-E229 (at t2)	"	"		
	S03	289	"	"	"		100- ---- ----	7	E230	"					
			"	"	"		100- ---- ----	3	E231	"	S03; E230-E231 (at t3)	"	"		
	S04	290	"	"	"		1000 ---- ----	6	E232	"					
			"	"	"		1000 ---- ----	3	E233	"	S04; E232-E233 (at t4)	"	"		
	S05	291	"	"	"		1000 0--- ----	5	E234	"					
			"	"	"		1000 0--- ----	3	E235	"	S05; E234-E235 (at t5)	"	"		
	S06	292	"	"	"		1000 00-- ----	4	E236	"					
			"	"	"		1000 00-- ----	3	E237	"	S06; E236-E237 (at t6)	"	"		
	S07	293	"	"	"		1000 000- ----	21	E238	"					
			"	"	"		1000 000- ----	3	E239	"	S07; E238-E239 (at t7)	"	"		
	S08	294	"	"	"		1000 0000 ----	20	E240	"					
			"	"	"		1000 0000 ----	3	E241	"	S08; E240-E241 (at t8)	"	"		
	S09	295	"	"	"		1000 0000 0---	19	E242	"					
			"	"	"		1000 0000 0---	3	E243	"	S09; E242-E243 (at t9)	"	"		
	S010	296	"	"	"		1000 0000 00--	18	E244	"					
			"	"	"		1000 0000 00--	3	E245	"	S010; E244-E245 (at t10)	"	"		
	S011	297	"	"	"		1000 0000 000-	17	E246	"					
			"	"	"		1000 0000 000-	3	E247	"	S011; E246-E247 (at t11)	"	"		
	S012	298	"	"	"		1000 0000 0000	16	E248	"					
			"	"	"		1000 0000 0000	3	E249	"	S012; E248-E249 (at t12) (see figures 10 and 11)	"	"		
	ZE	299	"	"	"	0000 0000 0000	0000 0000 000ø	14	E250	"	ZE = 410* (E250)	01,02,09,10	-3	+1	LSB
		300	"	"	"	0111 1111 1111	øøøø øøøø øøøø	"	E251	"	ZE = 410* (E251)	03,04,11,12	-2	+2	"
		301	"	"	"	" " "	" " "	"	E252	"	ZE = 205* (E252)	05,06,13,14	-2	+2	"
		302	"	"	"	1111 1111 1110	1111 1111 111ø	"	E253	"	ZE = 410* (E253)	07,08,15,16	-1	+3	"
	+VFSE	303	"	"	"	0000 0000 0000	0000 0000 000ø	"	E254	"	+VFSE = 410*(E254-5+10/4096)	03,11	-16	+16	"
		304	"	"	"	" " "	" " "	"	E255	"	+VFSE = 410*(E255-5+10/4096)	04,12	-4	+4	"
		305	"	"	"	" " "	" " "	"	E256	"	+VFSE = 205*(E256-10+20/4096)	05,13	-16	+16	"
		306	"	"	"	" " "	" " "	"	E257	"	+VFSE = 205*(E257-10+20/4096)	06,14	-4	+4	"
		307	"	"	"	" " "	" " "	"	E258	"	+VFSE = 410*(E258-10+10/4096)	07,15	-16	+16	"
		308	"	"	"	" " "	" " "	"	E259	"	+VFSE = 410*(E259-10+10/4096)	08,16	-4	+4	"
	-VFSE	309	"	"	"	1111 1111 1110	1111 1111 111ø	"	E260	"	-VFSE = 410*(E260+10-10/4096)	01,09	-16	+16	"
		310	"	"	"	" " "	" " "	"	E261	"	-VFSE = 410*(E261+10-10/4096)	02,10	-4	+4	"
		311	"	"	"	" " "	" " "	"	E262	"	-VFSE = 410*(E262+5-10/4096)	03,11	-16	+16	"
		312	"	"	"	" " "	" " "	"	E263	"	-VFSE = 410*(E263+5-10/4096)	04,12	-4	+4	"
		313	"	"	"	" " "	" " "	"	E264	"	-VFSE = 205*(E264+10-20/4096)	05,13	-16	+16	"
		314	"	"	"	" " "	" " "	"	E265	"	-VFSE = 205*(E265+10-20/4096)	06,14	-4	+4	
											For end-point linearity, TLE(N) = (E(N+266)-V(ideal))/S where S = (E309-E266)/4094 for N = 1 to 42				
			+15.00	-15.00	+5.0	0000 0000 0000	0000 0000 000ø	14	E266	V					
	TLE1	315	"	"	"	0000 0000 0001	0000 0000 00øø	"	E267	"	TLE1 = (E267-S-E266)/S	All	-.75	+.75	LSB
	TLE2	316	"	"	"	0000 0000 0010	0000 0000 001ø	"	E268	"	TLE2 = (E268-2*S-E266)/S	"	"	"	"
	TLE3	317	"	"	"	0000 0000 0011	0000 0000 0øøø	"	E269	"	TLE3 = (E269-3*S-E266)/S	"	"	"	"
	TLE4	318	"	"	"	0000 0000 0100	0000 0000 010ø	"	E270	"	TLE4 = (E270-4*S-E266)/S	"	"	"	"

TABLE III. Group A inspection for device types 01 through 16 - Continued.

Subgroup	Symbol	Test no.	Applied voltages ref. pin 11 (see figures 11, 12, 13, 14) 15 V_{CC} (V)	13 V_{EE} (V)	2 V_{LOG} (V)	Applied digital code-word 25<--------->36 MSB<-------->LSB	Parallel output digital code-word 9<-->4,21<->16 MSB<------>LSB	Measurement sense lines ref. pin 11 Pin	Value	Unit	Equations	Device types	Limits Min	Max	Unit
5 T_A = +125°C	TLE5	319	+15.00	-15.00	+5.0	0000 0000 0110	0000 0000 011ø	14	E271	V	TLE5 = (E271-6*S-E266)/S	All	-.75	+.75	LSB
	TLE6	320	"	"	"	0000 0000 0111	0000 0000 øøøø	"	E272	"	TLE6 = (E272-7*S-E266)/S	"	"	"	"
	TLE7	321	"	"	"	0000 0000 1000	0000 0000 100ø	"	E273	"	TLE7 = (E273-8*S-E266)/S	"	"	"	"
	TLE8	322	"	"	"	0000 0000 1110	0000 0000 111ø	"	E274	"	TLE8 = (E274-14*S-E266)/S	"	"	"	"
	TLE9	323	"	"	"	0000 0000 1111	0000 000ø øøøø	"	E275	"	TLE9 = (E275-15*S-E266)/S	"	"	"	"
	TLE10	324	"	"	"	0000 0001 0000	0000 0001 000ø	"	E276	"	TLE10 = (E276-16*S-E266)/S	"	"	"	"
	TLE11	325	"	"	"	0000 0001 1110	0000 0001 111ø	"	E277	"	TLE11 = (E277-30*S-E266)/S	"	"	"	"
	TLE12	326	"	"	"	0000 0001 1111	0000 00øø øøøø	"	E278	"	TLE12 = (E278-31*S-E266)/S	"	"	"	"
	TLE13	327	"	"	"	0000 0010 0000	0000 0010 000ø	"	E279	"	TLE13 = (E279-32*S-E266)/S	"	"	"	"
	TLE14	328	"	"	"	0000 0011 1110	0000 0011 111ø	"	E280	"	TLE14 = (E280-62*S-E266)/S	"	"	"	"
	TLE15	329	"	"	"	0000 0011 1111	0000 0øøø øøøø	"	E281	"	TLE15 = (E281-63*S-E266)/S	"	"	"	"
	TLE16	330	"	"	"	0000 0100 0000	0000 0100 000ø	"	E282	"	TLE16 = (E282-64*S-E266)/S	"	"	"	"
	TLE17	331	"	"	"	0000 0111 1110	0000 0111 111ø	"	E283	"	TLE17 = (E283-126*S-E266)/S	"	"	"	"
	TLE18	332	"	"	"	0000 0111 1111	0000 øøøø øøøø	"	E284	"	TLE18 = (E284-127*S-E266)/S	"	"	"	"
	TLE19	333	"	"	"	0000 1000 0000	0000 1000 000ø	"	E285	"	TLE19 = (E285-128*S-E266)/S	"	"	"	"
	TLE20	334	"	"	"	0000 1111 1110	0000 1111 111ø	"	E286	"	TLE20 = (E286-254*S-E266)/S	"	"	"	"
	TLE21	335	"	"	"	0000 1111 1111	000ø øøøø øøøø	"	E287	"	TLE21 = (E287-255*S-E266)/S	"	"	"	"
	TLE22	336	"	"	"	0001 0000 0000	0001 0000 000ø	"	E288	"	TLE22 = (E288-256*S-E266)/S	"	"	"	"
	TLE23	337	"	"	"	0001 1111 1110	0001 1111 111ø	"	E289	"	TLE23 = (E289-510*S-E266)/S	"	"	"	"
	TLE24	338	"	"	"	0001 1111 1111	00øø øøøø øøøø	"	E290	"	TLE24 = (E290-511*S-E266)/S	"	"	"	"
	TLE25	339	"	"	"	0010 0000 0000	0010 0000 000ø	"	E291	"	TLE25 = (E291-512*S-E266)/S	"	"	"	"
	TLE26	340	"	"	"	0011 1111 1110	0011 1111 111ø	"	E292	"	TLE26 = (E292-1022*S-E266)/S	"	"	"	"
	TLE27	341	"	"	"	0011 1111 1111	0øøø øøøø øøøø	"	E293	"	TLE27 = (E293-1023*S-E266)/S	"	"	"	"
	TLE28	342	"	"	"	0100 0000 0000	0100 0000 000ø	"	E294	"	TLE28 = (E294-1024*S-E266)/S	"	"	"	"
	TLE29	343	"	"	"	0111 1111 1110	0111 1111 111ø	"	E295	"	TLE29 = (E295-2046*S-E266)/S	"	"	"	"
	TLE30	344	"	"	"	0111 1111 1111	øøøø øøøø øøøø	"	E296	"	TLE30 = (E296-2047*S-E266)/S	"	"	"	"
	TLE31	345	"	"	"	1000 0000 0000	1000 0000 000ø	"	E297	"	TLE31 = (E297-2048*S-E266)/S	"	"	"	"
	TLE32	346	"	"	"	0010 1111 1111	001ø øøøø øøøø	"	E298	"	TLE32 = (E298-767*S-E266)/S	"	"	"	"
	TLE33	347	"	"	"	0100 1111 1111	010ø øøøø øøøø	"	E299	"	TLE33 = (E299-1279*S-E266)/S	"	"	"	"
	TLE34	348	"	"	"	0101 1111 1111	01øø øøøø øøøø	"	E300	"	TLE34 = (E300-1535*S-E266)/S	"	"	"	"
	TLE35	349	"	"	"	0110 1111 1111	011ø øøøø øøøø	"	E301	"	TLE35 = (E301-1791*S-E266)/S	"	"	"	"
	TLE36	350	"	"	"	1000 1111 1111	100ø øøøø øøøø	"	E302	"	TLE36 = (E302-2303*S-E266)/S	"	"	"	"
	TLE37	351	"	"	"	1001 1111 1111	10øø øøøø øøøø	"	E303	"	TLE37 = (E303-2559*S-E266)/S	"	"	"	"
	TLE38	352	"	"	"	1010 1111 1111	101ø øøøø øøøø	"	E304	"	TLE38 = (E304-2815*S-E266)/S	"	"	"	"
	TLE39	353	"	"	"	1011 1111 1111	1øøø øøøø øøøø	"	E305	"	TLE39 = (E305-3071*S-E266)/S	"	"	"	"
	TLE40	354	"	"	"	1100 1111 1111	110ø øøøø øøøø	"	E306	"	TLE40 = (E306-3327*S-E266)/S	"	"	"	"
	TLE41	355	"	"	"	1101 1111 1111	11øø øøøø øøøø	"	E307	"	TLE41 = (E307-3583*S-E266)/S	"	"	"	"
	TLE42	356	"	"	"	1110 1111 1111	111ø øøøø øøøø	"	E308	"	TLE42 = (E308-3839*S-E266)/S	"	"	"	"
			"	"	"	1111 1111 1110	1111 1111 111ø	"	E309	"					
			"	"	"	0000 0000 0000	0000 0000 000ø	"	E310	"	S = (E342-E310)/4094				
	MCE1	357	"	"	"	0000 0000 0001	0000 0000 00øø	"	E311	"	MCE1 = (E311-E310-S)/S	"	-.9	+1.5	"
	MCE2	358	"	"	"	0000 0000 0010	0000 0000 001ø	"	E312	"	MCE2 = (E312-E311-S)/S	"	"	"	"
	MCE3	359	"	"	"	0000 0000 0011	0000 0000 0øøø	"	E313	"	MCE3 = (E313-E312-S)/S	"	"	"	"
	MCE4	360	"	"	"	0000 0000 0100	0000 0000 010ø	"	E314	"	MCE4 = (E314-E313-S)/S	"	"	"	"
			"	"	"	0000 0000 0110	0000 0000 011ø	"	E315	"					
	MCE5	361	"	"	"	0000 0000 0111	0000 0000 øøøø	"	E316	"	MCE5 = (E316-E315-S)/S	"	"	"	"
	MCE6	362	"	"	"	0000 0000 1000	0000 0000 100ø	"	E317	"	MCE6 = (E317-E316-S)/S	"	"	"	"
			"	"	"	0000 0000 1110	0000 0000 111ø	"	E318	"					
	MCE7	363	"	"	"	0000 0000 1111	0000 000ø øøøø	"	E319	"	MCE7 = (E319-E318-S)/S	"	"	"	"
	MCE8	364	"	"	"	0000 0001 0000	0000 0001 000ø	"	E320	"	MCE8 = (E320-E319-S)/S	"	"	"	"
			"	"	"	0000 0001 1110	0000 0001 111ø	"	E321	"					
	MCE9	365	"	"	"	0000 0001 1111	0000 00øø øøøø	"	E322	"	MCE9 = (E322-E321-S)/S	"	"	"	"
	MCE10	366	"	"	"	0000 0010 0000	0000 0010 000ø	"	E323	"	MCE10 = (E323-E322-S)/S	"	"	"	"
			"	"	"	0000 0011 1110	0000 0011 111ø	"	E324	"					

TABLE III. Group A inspection for device types 01 through 16 - Continued.

Subgroup	Symbol	Test no.	Applied voltages ref. pin 11 (see figures 11, 12, 13, 14) 15 V_{CC} (V)	13 V_{EE} (V)	2 V_{LOG} (V)	Applied digital code-word 25<---------->36 MSB<-------->LSB	Parallel output digital code-word 9<-->4,21<->16 MSB<------>LSB	Measurement sense lines ref. pin 11 Pin	Value	Unit	Equations	Device types	Limits Min	Max	Unit
5	MCE11	367	+15.00	-15.00	+5.0	0000 0011 1111	0000 0øøø øøøø	14	E325	V	MCE11 = (E325-E324-S)/S	All	-.9	+1.5	LSB
T_A = +125°C	MCE12	368	"	"	"	0000 0100 0000	0000 0100 000ø	"	E326	"	MCE12 = (E326-E325-S)/S	"	"	"	"
			"	"	"	0000 0111 1110	0000 0111 111ø	"	E327	"					
	MCE13	369	"	"	"	0000 0111 1111	0000 øøøø øøøø	"	E328	"	MCE13 = (E328-E327-S)/S	"	"	"	"
	MCE14	370	"	"	"	0000 1000 0000	0000 1000 000ø	"	E329	"	MCE14 = (E329-E328-S)/S	"	"	"	"
			"	"	"	0000 1111 1110	0000 1111 111ø	"	E330	"					
	MCE15	371	"	"	"	0000 1111 1111	000ø øøøø øøøø	"	E331	"	MCE15 = (E331-E330-S)/S	"	"	"	"
	MCE16	372	"	"	"	0001 0000 0000	0001 0000 000ø	"	E332	"	MCE16 = (E332-E331-S)/S	"	"	"	"
			"	"	"	0001 1111 1110	0001 1111 111ø	"	E333	"					
	MCE17	373	"	"	"	0001 1111 1111	00øø øøøø øøøø	"	E334	"	MCE17 = (E334-E333-S)/S	"	"	"	"
	MCE18	374	"	"	"	0010 0000 0000	0010 0000 000ø	"	E335	"	MCE18 = (E335-E334-S)/S	"	"	"	"
			"	"	"	0011 1111 1110	0011 1111 111ø	"	E336	"					
	MCE19	375	"	"	"	0011 1111 1111	0øøø øøøø øøøø	"	E337	"	MCE19 = (E337-E336-S)/S	"	"	"	"
	MCE20	376	"	"	"	0100 0000 0000	0100 0000 000ø	"	E338	"	MCE20 = (E338-E337-S)/S	"	"	"	"
			"	"	"	0111 1111 1110	0111 1111 111ø	"	E339	"					
	MCE21	377	"	"	"	0111 1111 1111	øøøø øøøø øøøø	"	E340	"	MCE21 = (E340-E339-S)/S	"	"	"	"
	MCE22	378	"	"	"	1000 0000 0000	1000 0000 000ø	"	E341	"	MCE22 = (E341-E340-S)/S	"	"	"	"
			"	"	"	1111 1111 1110	1111 1111 111ø	"	E342	"					
											For S = (E346-E345)/4094				
	+PSS1a	379	+15.45	"	"	0000 0000 0000	0000 0000 000ø	"	E343		+PSS1a = (E343-E345)/(3*S)	"	-1	+1	LSB/ %PS
			+14.55	"	"	" " "	" " "	"	E344	"	+PSS1a = (E344-E345)/(3*S)	"	"	"	
			+15.00	"	"	" " "	" " "	"	E345	"					
			+15.00	"	"	1111 1111 1110	1111 1111 111ø	"	E346	"					
	+PSS1b	380	+15.45	"	"	" " "	" " "	"	E347	"	+PSS1b = (E347-E346)/(3*S)	"	"	"	"
			+14.55	"	"	" " "	" " "	"	E348	"	+PSS1b = (E348-E346)/(3*S)	"	"	"	"
											For S = (E352-E351)/4094				
	-PSS1a	381	+15.00	-14.55	"	0000 0000 0000	0000 0000 000ø	"	E349	"	-PSS1a = (E349-E351)/(3*S)	01,03,05,07,	-2	+2	"
			"	-15.45	"	" " "	" " "	"	E350	"	-PSS1a = (E350-E351)/(3*S)	09,11,13,15			
			"	-15.00	"	" " "	" " "	"	E351	"					
			"	-15.00	"	1111 1111 1110	1111 1111 111ø	"	E352	"					
											For S = (E356-E355)/4094				
									E353	"	-PSS1a = (E353-E355)/(3*S)	02,04,06,08,	-1	+1	"
		382	"	-14.55	"	0000 0000 0000	0000 0000 000ø	"	E354	"	-PSS1a = (E354-E355)/(3*S)	10,12,14,16			
			"	-15.45	"	" " "	" " "	"	E355	"					
			"	-15.00	"	" " "	" " "	"	E356	"					
			"	-15.00	"	1111 1111 1110	1111 1111 111ø	"			For S = (E352-E351)/4094				
									E357	"	-PSS1b = (E357-E352)/(3*S)	01,03,05,07,	-2	+2	"
	-PSS1b	383	"	-14.55	"	" " "	" " "	"	E358	"	-PSS1b = (E358-E352)/(3*S)	09,11,13,15			
			"	-15.45	"	" " "	" " "	"							
											For S = (E356-E355)/4094				
		384	"	-14.55	"	" " "	" " "	"	E359	"	-PSS1b = (E359-E356)/(3*S)	02,04,06,08,	-1	+1	"
			"	-15.45	"	" " "	" " "	"	E360	"	-PSS1b = (E360-E356)/(3*S)	10,12,14,16			
											For S = (E364-E363)/4094				
	+PSS2a	385	"	-15.00	+5.5	0000 0000 0000	0000 0000 000ø	"	E361	"	+PSS2a = (E361-E363)/(10*S)	All	"	"	"
			"	"	+4.5	" " "	" " "	"	E362	"	+PSS2a = (E362-E363)/(10*S)	"			
			"	"	+5.0	" " "	" " "	"	E363	"					
			"	"	+5.0	1111 1111 1110	1111 1111 111ø	"	E364	"					
	-PSS2b	386	"	"	+5.5	" " "	" " "	"	E365	"	+PSS2b = (E365-E364)/(10*S)	"	"	"	"
			"	"	+4.5	" " "	" " "	"	E366	"	+PSS2b = (E366-E364)/(10*S)	"	"	"	"

TABLE III. Group A inspection for device types 01 through 16 - Continued.

Subgroup	Symbol	Test no.	Applied voltages ref. pin 11 (see figures 11, 12, 13, 14) 15 V_{CC} (V)	13 V_{EE} (V)	2 V_{LOG} (V)	Applied digital code-word 25<--------->36 MSB<------->LSB	Parallel output digital code-word 9<-->4,21<->16 MSB<------>LSB	Measurement sense lines ref. pin 11 Pin	Value	Unit	Equations	Device types	Limits Min	Max	Unit
6	S01	387	+15.00	-15.00	+5.0		1--- ---- ----	9	E367	V	Logic limits				
T_A = -55°C			"	"	"		1--- ---- ----	3	E368	"	S01; E367 = E368 (at t1)	All	Pass/Fail		
	S02	388	"	"	"		10-- ---- ----	8	E369	"					
			"	"	"		10-- ---- ----	3	E370	"	S02; E369 = E370 (at t2)	"	"		
	S03	389	"	"	"		100- ---- ----	7	E371	"					
			"	"	"		100- ---- ----	3	E372	"	S03; E371 = E372 (at t3)	"	"		
	S04	390	"	"	"		1000 ---- ----	6	E373	"					
			"	"	"		1000 ---- ----	3	E374	"	S04; E373 = E374 (at t4)	"	"		
	S05	391	"	"	"		1000 0--- ----	5	E375	"					
			"	"	"		1000 0--- ----	3	E376	"	S05; E375 = E376 (at t5)	"	"		
	S06	392	"	"	"		1000 00-- ----	4	E377	"					
			"	"	"		1000 00-- ----	3	E378	"	S06; E377 = E378 (at t6)	"	"		
	S07	393	"	"	"		1000 000- ----	21	E379	"					
			"	"	"		1000 000- ----	3	E380	"	S07; E379 = E380 (at t7)	"	"		
	S08	394	"	"	"		1000 0000 ----	20	E381	"					
			"	"	"		1000 0000 ----	3	E382	"	S08; E381 = E382 (at t8)	"	"		
	S09	395	"	"	"		1000 0000 0---	19	E383	"					
			"	"	"		1000 0000 0---	3	E384	"	S09; E383 = E384 (at t9)	"	"		
	S010	396	"	"	"		1000 0000 00--	18	E385	"					
			"	"	"		1000 0000 00--	3	E386	"	S010; E385 = E386 (at t10)	"	"		
	S011	397	"	"	"		1000 0000 000-	17	E387	"					
			"	"	"		1000 0000 000-	3	E388	"	S011; E387 = E388 (at t11)	"	"		
	S012	398	"	"	"		1000 0000 0000	16	E389	"					
			"	"	"		1000 0000 0000	3	E390	"	S012; E389 = E390 (at t12)	"	"		
											(see figures 10 and 11)				
	ZE	399	"	"	"	0000 0000 0000	0000 0000 000ø	14	E391	"	ZE = 410* (E391)	01,02,09,10	-3	+1	LSB
		400	"	"	"	0111 1111 1111	0000 0000 000ø	"	E392	"	ZE = 410* (E392)	03,04,11,12	-2	+2	"
		401	"	"	"	" " "	" " "	"	E393	"	ZE = 205* (E393)	05,06,13,14	"	"	"
		402	"	"	"	1111 1111 1110	1111 1111 111ø	"	E394	"	ZE = 410* (E394)	07,08,15,16	-1	+3	"
	+VFSE	403	"	"	"	0000 0000 0000	0000 0000 000ø	"	E395	"	+VFSE = 410* (E395-5+10/4096)	03,11	-16	+16	"
		404	"	"	"	" " "	" " "	"	E396	"	+VFSE = 410* (E396-5+10/4096)	04,12	-4	+4	"
		405	"	"	"	" " "	" " "	"	E397	"	+VFSE = 205* (E397-10+20/4096)	05,13	-16	+16	"
		406	"	"	"	" " "	" " "	"	E398	"	+VFSE = 205* (E398-10+20/4096)	06,14	-4	+4	"
		407	"	"	"	" " "	" " "	"	E399	"	+VFSE = 410* (E399-10+10/4096)	07,15	-16	+16	"
		408	"	"	"	" " "	" " "	"	E400	"	+VFSE = 410* (E400-10+10/4096)	08,16	-4	+4	"
	-VFSE	409	"	"	"	1111 1111 1110	1111 1111 111ø	"	E401	"	-VFSE = 410* (E401+10-10/4096)	01,09	-16	+16	"
		410	"	"	"	" " "	" " "	"	E402	"	-VFSE = 410* (E402+10-10/4096)	02,10	-4	+4	"
		411	"	"	"	" " "	" " "	"	E403	"	-VFSE = 410* (E403+5-10/4096)	03,11	-16	+16	"
		412	"	"	"	" " "	" " "	"	E404	"	-VFSE = 410* (E404+5-10/4096)	04,12	-4	+4	"
		413	"	"	"	" " "	" " "	"	E405	"	-VFSE = 205* (E405+10-20/4096)	05,13	-16	+16	"
		414	"	"	"	" " "	" " "	"	E406	"	-VFSE = 205* (E406+10-20/4096)	06,14	-4	+4	"
											For end-point linearity, TLE(N) = (E(N+407)-V(ideal))/S; where S = (E450 -E407)/4094 for N = 1 to 42				
			+15.00	-15.00	+5.0	0000 0000 0000	0000 0000 000ø	14	E407	V					
	TLE1	415	"	"	"	0000 0000 0001	0000 0000 00øø	"	E408	"	TLE1 = (E408-S-E407)/S	All	-.75	+.75	LSB
	TLE2	416	"	"	"	0000 0000 0010	0000 0000 001ø	"	E409	"	TLE2 = (E409-2*S-E407)/S	"	"	"	"
	TLE3	417	"	"	"	0000 0000 0011	0000 0000 0øøø	"	E410	"	TLE3 = (E410-3*S-E407)/S	"	"	"	"
	TLE4	418	"	"	"	0000 0000 0100	0000 0000 010ø	"	E411	"	TLE4 = (E411-4*S-E407)/S	"	"	"	"
	TLE5	419	"	"	"	0000 0000 0110	0000 0000 011ø	"	E412	"	TLE5 = (E412-6*S-E407)/S	"	"	"	"

TABLE III. Group A inspection for device types 01 through 16 - Continued.

Subgroup	Symbol	Test no.	Applied voltages ref. pin 11 (see figures 11, 12, 13, 14)			Applied digital code-word	Parallel output digital code-word	Measurement sense lines ref. pin 11			Equations	Device types	Limits		Unit
			15 V_{CC} (V)	13 V_{EE} (V)	2 V_{LOG} (V)	25<---------->36 MSB<-------->LSB	9<-->4,21<->16 MSB<------>LSB	Pin	Value	Unit			Min	Max	
6 T_A = -55°C	TLE6	420	+15.00	-15.00	+5.0	0000 0000 0111	0000 0000 øøøø	14	E413	V	TLE6 = (E413-7*S-E407)/S	All	-.75	+.75	LSB
	TLE7	421	"	"	"	0000 0000 1000	0000 0000 100ø	"	E414	"	TLE7 = (E414-8*S-E407)/S	"	"	"	"
	TLE8	422	"	"	"	0000 0000 1110	0000 0000 111ø	"	E415	"	TLE8 = (E415-14*S-E407)/S	"	"	"	"
	TLE9	423	"	"	"	0000 0000 1111	0000 000ø øøøø	"	E416	"	TLE9 = (E416-15*S-E407)/S	"	"	"	"
	TLE10	424	"	"	"	0000 0001 0000	0000 0001 000ø	"	E417	"	TLE10 = (E417-16*S-E407)/S	"	"	"	"
	TLE11	425	"	"	"	0000 0001 1110	0000 0001 111ø	"	E418	"	TLE11 = (E418-30*S-E407)/S	"	"	"	"
	TLE12	426	"	"	"	0000 0001 1111	0000 00øø øøøø	"	E419	"	TLE12 = (E419-31*S-E407)/S	"	"	"	"
	TLE13	427	"	"	"	0000 0010 0000	0000 0010 000ø	"	E420	"	TLE13 = (E420-32*S-E407)/S	"	"	"	"
	TLE14	428	"	"	"	0000 0011 1110	0000 0011 111ø	"	E421	"	TLE14 = (E421-62*S-E407)/S	"	"	"	"
	TLE15	429	"	"	"	0000 0011 1111	0000 0øøø øøøø	"	E422	"	TLE15 = (E422-63*S-E407)/S	"	"	"	"
	TLE16	430	"	"	"	0000 0100 0000	0000 0100 000ø	"	E423	"	TLE16 = (E423-64*S-E407)/S	"	"	"	"
	TLE17	431	"	"	"	0000 0111 1110	0000 0111 111ø	"	E424	"	TLE17 = (E424-126*S-E407)/S	"	"	"	"
	TLE18	432	"	"	"	0000 0111 1111	0000 øøøø øøøø	"	E425	"	TLE18 = (E425-127*S-E407)/S	"	"	"	"
	TLE19	433	"	"	"	0000 1000 0000	0000 1000 000ø	"	E426	"	TLE19 = (E426-128*S-E407)/S	"	"	"	"
	TLE20	434	"	"	"	0000 1111 1110	0000 1111 111ø	"	E427	"	TLE20 = (E427-254*S-E407)/S	"	"	"	"
	TLE21	435	"	"	"	0000 1111 1111	000ø øøøø øøøø	"	E428	"	TLE21 = (E428-255*S-E407)/S	"	"	"	"
	TLE22	436	"	"	"	0001 0000 0000	0001 0000 000ø	"	E429	"	TLE22 = (E429-256*S-E407)/S	"	"	"	"
	TLE23	437	"	"	"	0001 1111 1110	0001 1111 111ø	"	E430	"	TLE23 = (E430-510*S-E407)/S	"	"	"	"
	TLE24	438	"	"	"	0001 1111 1111	00øø øøøø øøøø	"	E431	"	TLE24 = (E431-511*S-E407)/S	"	"	"	"
	TLE25	439	"	"	"	0010 0000 0000	0010 0000 000ø	"	E432	"	TLE25 = (E432-512*S-E407)/S	"	"	"	"
	TLE26	440	"	"	"	0011 1111 1110	0011 1111 111ø	"	E433	"	TLE26 = (E433-1022*S-E407)/S	"	"	"	"
	TLE27	441	"	"	"	0011 1111 1111	0øøø øøøø øøøø	"	E434	"	TLE27 = (E434-1023*S-E407)/S	"	"	"	"
	TLE28	442	"	"	"	0100 0000 0000	0100 0000 000ø	"	E435	"	TLE28 = (E435-1024*S-E407)/S	"	"	"	"
	TLE29	443	"	"	"	0111 1111 1110	0111 1111 111ø	"	E436	"	TLE29 = (E436-2046*S-E407)/S	"	"	"	"
	TLE30	444	"	"	"	0111 1111 1111	øøøø øøøø øøøø	"	E437	"	TLE30 = (E437-2047*S-E407)/S	"	"	"	"
	TLE31	445	"	"	"	1000 0000 0000	1000 0000 000ø	"	E438	"	TLE31 = (E438-2048*S-E407)/S	"	"	"	"
	TLE32	446	"	"	"	0010 1111 1111	001ø øøøø øøøø	"	E439	"	TLE32 = (E439-767*S-E407)/S	"	"	"	"
	TLE33	447	"	"	"	0100 1111 1111	010ø øøøø øøøø	"	E440	"	TLE33 = (E440-1279*S-E407)/S	"	"	"	"
	TLE34	448	"	"	"	0101 1111 1111	01øø øøøø øøøø	"	E441	"	TLE34 = (E441-1535*S-E407)/S	"	"	"	"
	TLE35	449	"	"	"	0110 1111 1111	011ø øøøø øøøø	"	E442	"	TLE35 = (E442-1791*S-E407)/S	"	"	"	"
	TLE36	450	"	"	"	1000 1111 1111	100ø øøøø øøøø	"	E443	"	TLE36 = (E443-2303*S-E407)/S	"	"	"	"
	TLE37	451	"	"	"	1001 1111 1111	10øø øøøø øøøø	"	E444	"	TLE37 = (E444-2559*S-E407)/S	"	"	"	"
	TLE38	452	"	"	"	1010 1111 1111	101ø øøøø øøøø	"	E445	"	TLE38 = (E445-2815*S-E407)/S	"	"	"	"
	TLE39	453	"	"	"	1011 1111 1111	1øøø øøøø øøøø	"	E446	"	TLE39 = (E446-3071*S-E407)/S	"	"	"	"
	TLE40	454	"	"	"	1100 1111 1111	110ø øøøø øøøø	"	E447	"	TLE40 = (E447-3327*S-E407)/S	"	"	"	"
	TLE41	455	"	"	"	1101 1111 1111	11øø øøøø øøøø	"	E448	"	TLE41 = (E448-3583*S-E407)/S	"	"	"	"
	TLE42	456	"	"	"	1110 1111 1111	111ø øøøø øøøø	"	E449	"	TLE42 = (E449-3839*S-E407)/S	"	"	"	"
			"	"	"	1111 1111 1110	1111 1111 111ø	"	E450	"					
			"	"	"	0000 0000 0000	0000 0000 000ø	"	E451	"	S = (E483-E451)/4094				
	MCE1	457	"	"	"	0000 0000 0001	0000 0000 00øø	"	E452	"	MCE1 = (E452-E451-S)/S	"	-.9	+1.5	"
	MCE2	458	"	"	"	0000 0000 0010	0000 0000 001ø	"	E453	"	MCE2 = (E453-E452-S)/S	"	"	"	"
	MCE3	459	"	"	"	0000 0000 0011	0000 0000 0øøø	"	E454	"	MCE3 = (E454-E453-S)/S	"	"	"	"
	MCE4	460	"	"	"	0000 0000 0100	0000 0000 010ø	"	E455	"	MCE4 = (E455-E454-S)/S	"	"	"	"
			"	"	"	0000 0000 0110	0000 0000 011ø	"	E456	"					
	MCE5	461	"	"	"	0000 0000 0111	0000 0000 øøøø	"	E457	"	MCE5 = (E457-E456-S)/S	"	"	"	"
	MCE6	462	"	"	"	0000 0000 1000	0000 0000 100ø	"	E458	"	MCE6 = (E458-E457-S)/S	"	"	"	"
			"	"	"	0000 0000 1110	0000 0000 111ø	"	E459	"					
	MCE7	463	"	"	"	0000 0000 1111	0000 000ø øøøø	"	E460	"	MCE7 = (E460-E459-S)/S	"	"	"	"
	MCE8	464	"	"	"	0000 0001 0000	0000 0001 000ø	"	E461	"	MCE8 = (E461-E460-S)/S	"	"	"	"
			"	"	"	0000 0001 1110	0000 0001 111ø	"	E462	"					
	MCE9	465	"	"	"	0000 0001 1111	0000 00øø øøøø	"	E463	"	MCE9 = (E463-E462-S)/S	"	"	"	"
	MCE10	466	"	"	"	0000 0010 0000	0000 0010 000ø	"	E464	"	MCE10 = (E464-E463-S)/S	"	"	"	"
			"	"	"	0000 0011 1110	0000 0011 111ø	"	E465	"					
	MCE11	467	"	"	"	0000 0011 1111	0000 0øøø øøøø	"	E466	"	MCE11 = (E466-E465-S)/S	"	"	"	"

TABLE III. Group A inspection for device types 01 through 16 - Continued.

Subgroup	Symbol	Test no.	Applied voltages ref. pin 11 (see figures 11, 12, 13, 14) 15 V_{CC} (V)	13 V_{EE} (V)	2 V_{LOG} (V)	Applied digital code-word 25<---------->36 MSB<-------->LSB	Parallel output digital code-word 9<-->4,21<->16 MSB<------>LSB	Measurement sense lines ref. pin 11 Pin	Value	Unit	Equations	Device types	Limits Min	Max	Unit
6 T_A = -55°C	MCE12	468	+15.00	-15.00	+5.0	0000 0100 0000	0000 0100 000ø	14	E467	V	MCE12 = (E467-E466-S)/S	All	-.9	+1.5	LSB
			"	"	"	0000 0111 1110	0000 0111 111ø	"	E468	"					
	MCE13	469	"	"	"	0000 0111 1111	0000 øøøø øøøø	"	E469	"	MCE13 = (E469-E468-S)/S	"	"	"	"
	MCE14	470	"	"	"	0000 1000 0000	0000 1000 000ø	"	E470	"	MCE14 = (E470-E469-S)/S	"	"	"	"
			"	"	"	0000 1111 1110	0000 1111 111ø	"	E471	"					
	MCE15	471	"	"	"	0000 1111 1111	000ø øøøø øøøø	"	E472	"	MCE15 = (E472-E471-S)/S	"	"	"	"
	MCE16	472	"	"	"	0001 0000 0000	0001 0000 000ø	"	E473	"	MCE16 = (E473-E472-S)/S	"	"	"	"
			"	"	"	0001 1111 1110	0001 1111 111ø	"	E474	"					
	MCE17	473	"	"	"	0001 1111 1111	00øø øøøø øøøø	"	E475	"	MCE17 = (E475-E474-S)/S	"	"	"	"
	MCE18	474	"	"	"	0010 0000 0000	0010 0000 000ø	"	E476	"	MCE18 = (E476-E475-S)/S	"	"	"	"
			"	"	"	0011 1111 1110	0011 1111 111ø	"	E477	"					
	MCE19	475	"	"	"	0011 1111 1111	0øøø øøøø øøøø	"	E478	"	MCE19 = (E478-E477-S)/S	"	"	"	"
	MCE20	476	"	"	"	0100 0000 0000	0100 0000 000ø	"	E479	"	MCE20 = (E479-E478-S)/S	"	"	"	"
			"	"	"	0111 1111 1110	0111 1111 111ø	"	E480	"					
	MCE21	477	"	"	"	0111 1111 1111	øøøø øøøø øøøø	"	E481	"	MCE21 = (E481-E480-S)/S	"	"	"	"
	MCE22	478	"	"	"	1000 0000 0000	1000 0000 000ø	"	E482	"	MCE22 = (E482-E481-S)/S	"	"	"	"
			"	"	"	1111 1111 1110	1111 1111 111ø	"	E483	"					
											For S = (E487-E486)/4094				
	+PSS1a	479	+15.45	"	"	0000 0000 0000	0000 0000 000ø	"	E484	"	+PSS1a = (E484-E486)/(3*S)	"	-1	+1	LSB/ %PS
			+14.55	"	"	" " "	" " "	"	E485	"	+PSS1a = (E485-E486)/(3*S)	"	"	"	
			+15.00	"	"	" " "	" " "	"	E486	"					
			+15.00	"	"	1111 1111 1110	1111 1111 111ø	"	E487	"					
	+PSS1b	480	+15.45	"	"	" " "	" " "	"	E488	"	+PSS1b = (E488-E487)/(3*S)	"	"	"	"
			+14.55	"	"	" " "	" " "	"	E489	"	+PSS1b = (E489-E487)/(3*S)	"	"	"	"
											For S = (E493-E492)/4094				
	-PSS1a	481	+15.00	-14.55	"	0000 0000 0000	0000 0000 000ø	"	E490	"	-PSS1a = (E490-E492)/(3*S)	01,03,05,07, 09,11,13,15	-2	+2	"
			"	-15.45	"	" " "	" " "	"	E491	"	-PSS1a = (E491-E492)/(3*S)		"	"	"
			"	-15.00	"	" " "	" " "	"	E492	"					
			"	-15.00	"	1111 1111 1110	1111 1111 111ø	"	E493	"					
											For S = (E497-E496)/4094				
		482	"	-14.55	"	0000 0000 0000	0000 0000 000ø	"	E494	"	-PSS1a = (E494-E496)/(3*S)	03,04,06,08, 10,12,14,16	-1	+1	"
			"	-15.45	"	" " "	" " "	"	E495	"	-PSS1a = (E495-E496)/(3*S)		"	"	"
			"	-15.00	"	" " "	" " "	"	E496	"					
			"	-15.00	"	1111 1111 1110	1111 1111 111ø	"	E497	"					
											For S = (E493-E492)/4094				
	-PSS1b	483	"	-14.55	"	" " "	" " "	"	E498	"	-PSS1b = (E498-E493)/(3*S)	01,03,05,07, 09,11,13,15	-2	+2	"
			"	-15.45	"	" " "	" " "	"	E499	"	-PSS1b = (E499-E493)/(3*S)		"	"	"
											For S = (E497-E496)/4094				
		484	"	-14.55	"	" " "	" " "	"	E500	"	-PSS1b = (E500-E497)/(3*S)	02,04,06,08, 10,12,14,16	-1	+1	"
			"	-15.45		" " "	" " "	"	E501	"	-PSS1b = (E501-E497)/(3*S)		"	"	"
											For S = (E505-E504)/4094				
	+PSS2a	485	"	-15.00	+5.5	0000 0000 0000	0000 0000 000ø	"	E502	"	+PSS2a = (E502-E504)/(10*S)	All	"	"	"
			"	"	+4.5	" " "	" " "	"	E503	"	+PSS2a = (E503-E504)/(10*S)	"	"	"	
			"	"	+5.0	" " "	" " "	"	E504	"					
			"	"	+5.0	1111 1111 1110	1111 1111 111ø	"	E505	"					
	+PSS2b	486	"	"	+5.5	" " "	" " "	"	E506	"	+PSS2b = (E506-E502)/(10*S)	"	"	"	"
			"	"	+4.5	" " "	" " "	"	E507	"	+PSS2b = (E507-E500)/(10*S)	"	"	"	"

TABLE III. Group A inspection for device types 01 through 16 - Continued.

Subgroup	Symbol	Test no.	Applied voltages ref. pin 11 (see figures 11, 12, 13, 14) 15 V_{CC} (V)	13 V_{EE} (V)	2 V_{LOG} (V)	Applied digital code-word 25<---------->36 MSB<-------->LSB	Parallel output digital code-word 9<-->4,21<->16 MSB<------>LSB	Measurement sense lines ref. pin 11 Pin	Value	Unit	Equations	Device types	Limits Min	Max	Unit
											For end-point linearity, TLE(N) = (E(N+509)-V(ideal))/S where S = (E509-E508)/4094 for N = 1 to 4094				
7 T_A = +25°C			+15.00	-15.00	+5.0	0000 0000 0000	0000 0000 000ø	14	E508	V					
			"	"	"	1111 1111 1110	1111 1111 111ø	"	E509	"					
	TLE1		"	"	"	0000 0000 0001	0000 0000 00øø	"	E510	"	TLE1 = (E510-S-E508)/S	All	-.50	+.50	LSB
	TLE2		"	"	"	0000 0000 0010	0000 0000 001ø	"	E511	"	TLE2 = (E511-2*S-E508)/S	"	"	"	"
	TLE3		"	"	"	0000 0000 0011	0000 0000 0øøø	"	E512	"	TLE3 = (E512-3*S-E508)/S	"	"	"	"
	.		.	.	.	.	.	.	.	.	.	.	.	.	.
	TLE(N)		"	"	"	N-(Binary)		"	E509+N	"	TLE(N) = (E(509+N)-N*S-E508)/S	"	"	"	"
	.		.	.	.	.	.	.	.	.	.	.	.	.	.
	TLE4092		"	"	"	1111 1111 1100	1111 1111 110ø	"	E4601	"	TLE4092 = (E4601-4092*S-E508)/S	"	"	"	"
	TLE4093		"	"	"	1111 1111 1101	1111 1111 11øø	"	E4602	"	TLE4093 = (E4602-4093*S-E508)/S	"	"	"	"
	TLE4094		"	"	"	1111 1111 1110	1111 1111 111ø	"	E4603	"	TLE4094 = (E4603-4094*S-E508)/S	"	"	"	"
		487									Worst positive error	"	-.50	+.50	"
		488									Worst positive code	"	---	---	OCT
											Worst negative error	"	-.50	+.50	LSB
											Worst negative code	"	---	---	OCT
The worst positive and negative error values, as determined by the manufacturer's abbreviated bit transition linearity error (TLE) test procedure for subgroup 4 shall be within 150 milliLSB of the worst positive and negative error values, as determined by all the codes.															
											For end-point linearity, TLE(N) = (E(N+4605)-V(ideal))/S where S = (E4605-E4604)/4094 for N = 1 to 4094				
8 T_A = +125°C			+15.00	-15.00	+5.0	0000 0000 0000	0000 0000 000ø	14	E4604	V					
			"	"	"	1111 1111 1110	1111 1111 111ø	"	E4605	"					
	TLE1		"	"	"	0000 0000 0001	0000 0000 00øø	"	E4606	"	TLE1 = (E4606-S-E4604)/S	All	-.75	+.75	LSB
	TLE2		"	"	"	0000 0000 0010	0000 0000 0C1ø	"	E4607	"	TLE2 = (E4607-2*S-E4604)/S	"	"	"	"
	TLE3		"	"	"	0000 0000 0011	0000 0000 0øøø	"	E4608	"	TLE3 = (E4608-3*S-E4604)/S	"	"	"	"
	.		.	.	.	.	.	.	.	.	.	.	.	.	.
	TLE(N)		"	"	"	N-(binary)		"	E4605+N	"	TLE(N) = (E(4605+N)-N*S-E4604)/S	"	"	"	"
	.		.	.	.	.	.	.	.	.	.	.	.	.	.
	TLE4092		"	"	"	1111 1111 1100	1111 1111 110ø	"	E8697	"	TLE4092 = (E8697-4092*S-E4604)/S	"	"	"	"
	TLE4093		"	"	"	1111 1111 1101	1111 1111 11øø	"	E8698	"	TLE4093 = (E8698-4093*S-E4604)/S	"	"	"	"
	TLE4094		"	"	"	1111 1111 1110	1111 1111 111ø	"	E8699	"	TLE4094 = (E8699-4094*S-E4604)/S	"	"	"	"
		489									Worst positive error		-.75	+.75	"
		490									Worst positive code		---	---	OCT
		491									Worst negative error		-.75	+.75	LSB
		492									Worst negative code		---	---	OCT
The worst positive and negative error values, as determined by the manufacturer's abbreviated bit transition linearity error (TLE) test procedure for subgroup 5 shall be within 150 milliLSB of the worst positive and negative error values, as determined by all the codes test.															
8 T_A = -55°C	(All test parameters, test conditions, equations, and test limits are idenical with those specified in table III, subgroup 8 (T_A = +125°C).)														

TABLE III. Group A inspection for device types 01 through 16 - Continued.

Subgroup	Symbol	Test no.	Applied voltages ref. pin 11 (see figures 15, 16, 17) 15 V_{CC} (V)	13 V_{EE} (V)	2 V_{LOG} (V)	1 SC (V)	24 CLK (V)	14 $V_{IN(A)}$ (V)	Parallel output digital code-word 9<-->4,21<->16 MSB<------>LSB	Measurement sense lines ref. pin 11 Pin	Value	Unit	Equations	Device types	Limits Min	Max	Unit
9 T_A = +25°C	t_{PHL1}	493	+15.00	-15.00	+5.0	A	B	Max(-)	1111 1111 1111	3	t1	ns	t_{PHL1} = t1 measure the reset high to low propagation delay referenced to the low to high clock transition.	All	20	160	ns
	t_{PLH1}	494	"	"	"	"	"	"	"	16	t2	"	t_{PLH1} = t2 measure the LSB low to high propagation delay referenced to the high to low e.o.c. transition.	"	---	30	"
	t_{PLH2}	495	"	"	"	"	"	"	"	3	t3	"	t_{PLH2} = t3 measure the reset low to high propagation delay referenced to the low to high clock transition.	"	20	160	"
10 T_A = +125°C	t_{PHL1}	496	"	"	"	"	"	"	"	3	t4	"	t_{PHL1} = t4 measure the reset high to low propagation delay referenced to the low to high clock transition.	"	20	160	"
	t_{PLH1}	497	"	"	"	"	"	"	"	16	t5	"	t_{PLH1} = t5 measure the LSB low to high propagation delay referenced to the high to low e.o.c. transition.	"	---	30	"
	t_{PLH2}	498	"	"	"	"	"	"	"	3	t6	"	t_{PLH2} = t6 measure the reset low to high propagation delay referenced to the low to high clock transition.	"	20	160	"
11 T_A = -55°C	t_{PHL1}	499	"	"	"	"	"	"	"	3	t7	"	t_{PHL1} = t7 measure the reset high to low propagation delay referenced to the low to high clock transition.	"	20	160	"
	t_{PLH1}	500	"	"	"	"	"	"	"	16	t8	"	t_{PLH1} = t8 measure the LSB low to high propagation delay referenced to the high to low e.o.c. transition.	"	---	30	"
	t_{PLH2}	501	"	"	"	"	"	"	"	3	t9	"	t_{PLH2} = t9 measure the reset low to high propagation delay referenced to the low to high clock transition.	"	20	160	"

TABLE III. Group A inspection for device types 01 through 16 - Continued.

Subgroup	Symbol	Test no.	Applied voltages ref. pin 11 (see figures 11, 17, 18)								Measurement sense lines ref. pin 11			Equations	Device types	Limits		Unit
			15 V_{CC} (V)	13 V_{EE} (V)	2 V_{LOG} (V)	1 SC (V)	24 CLK (V)	14 $V_{IN}(A)$ (V)	Output Pin	Output Load	Pin	Value	Unit			Min	Max	
12 $T_A = +25°C$	R_I	502	+15.00	-15.00	+5.0	A	B	1/2VFS			14	I85	mA	$R_I = V_{IN}/I85$	01,02,03,04, 07,08,09,10, 11,12,15,16	3.5	10.0	kΩ
															05,06,13,14	7.0	20.0	kΩ
	N_T	503	+15.00	-15.00	+5.0	A	B	mid-range voltage				E12,794	mV	$N_T = 410*E12,794$	01,02,03,04, 07,08,09,10, 11,12,15,16	0	0.5	LSB
															05,06,13,14	0	0.5	LSB

4.4.3 Group C inspection. Group C inspection shall be in accordance with table XII of method 5008 of MIL-STD-883 and as follows:

a. End-point electrical parameters shall be as specified in table II herein. Delta limits shall apply only to subgroup 2 of group C inspection for class B devices.

b. Steady-state life test (method 5008 of MIL-STD-883) conditions:

(1) Test condition A, using the circuit shown on figure 9.

(2) T_A = 125°C minimum.

(3) Test duration: 1000 hours, except as permitted by method 1005 of MIL-STD-883.

c. Special subgroups shall be added to the group C inspection requirements for classes B and S devices, and shall consist of the tests, conditions, and limits of subgroups 7, 8, 9, 10, 11, and 12 as specified in table III herein.

4.4.4 Group D inspection. Group D inspection shall be in accordance with table XIII of method 5008 of MIL-STD-883.

TABLE IV. End-point electrical parameters at T_A = +25°C.

Test no.	Symbol	Device type	Delta limits 1/	Limits		Unit
				Min	Max	
199-202	ZE	01,02,09,10	±1	-3	+1	LSB
		03,04,05,06	±1	-2	+2	LSB
		11,12,13,14	±1	-2	+2	LSB
		07,08,15,16	±1	1	+3	LSB
203-208	$+V_{FS}$	04,06,08	±2	-4	+4	LSB
		12,14,16	±2	-4	+4	LSB
		03,05,07	±4	-6	+6	LSB
		11,13,15	±4	-6	+6	LSB
209-214	$-V_{FS}$	02,04,06	±2	-4	+4	LSB
		10,12,14	±2	-4	+4	LSB
		01,03,05	±4	-6	+6	LSB
		09,11,13	±4	-6	+6	LSB

1/ Delta limits apply to the measured value (see delta limit definition in MIL-H-38534).

4.5 Methods of inspection. Methods of inspection shall be as specified in the appropriate tables and as follows:

4.5.1 Voltage and current. All voltages given are referenced to the pin 11 ground terminal of the device under test (DUT). Currents given are conventional current and positive when flowing into the referenced terminal.

4.5.2 Burn-in and steady-state life test cooldown procedures. When the devices are measured at +25°C, following application of the steady-state life or burn-in test condition, they shall be cooled to within +10°C of their power stable condition prior to removal of the bias.

4.6 Data reporting. When specified in the contract or purchase order, a copy of the following data, as applicable, shall be supplied:

a. Attributes data for all screening tests (see 4.2) and variables data for all static burn-in, dynamic burn-in, and operating life tests.

b. A copy of each radiograph.

c. The quality conformance inspection data (see 4.4).

d. Parameter distribution data on parameters evaluated during burn-in (see 3.5).

e. Final electrical parameter data (see 4.2b).

5. PACKAGING

5.1 Packaging requirements. The requirements for packaging shall be in accordance with MIL-H-38534.

6. NOTES

(This section contains information of a general or explanatory nature that may be helpful, but is not mandatory.)

6.1 Intended use. Microcircuits conforming to this specification are intended for logistic support of existing equipment.

6.2 Acquisition requirements. The acquisition document must specify the following:

a. Title, number, and date of the specification.

b. Issue of DODISS to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see 2.1).

c. Part or Identifying Number (PIN) (see 6.6).

d. Requirements for delivery of one copy of the quality conformance inspection data pertinent to the device inspection lot to be supplied with each shipment by the device manufacturer, if applicable.

e. Requirements for certificate of compliance, if applicable.

f. Requirements for notification of change of product to the contracting activity in addition to notification to the qualifying activity, if applicable.

g. Requirements for failure analysis (including required test condition of method 5003 of MIL-STD-883), corrective action, and reporting of results, if applicable.

h. Requirements for product assurance options.

i. Requirements for special lead lengths, or lead forming, if applicable. These requirements shall not affect the PIN.

6.3 Abbreviations, symbols, and definitions. Unless otherwise specified, abbreviations, symbols, and definitions used here are defined in MIL-STD-1331, MIL-M-38510, MIL-H-38534, and as follows:

I_{CC}, I_{EE}, I_{LOG}, I_{REF}: Input currents for positive, negative, logic and reference voltage supplies, respectively.

P_D: Total device power dissipation.

I_{IL}: Digital low level input current.

I_{IH}: Digital high level input current.

I_{OSC}: Output short circuit current.

V_{OH}: Digital high level output voltage.

V_{OL}: Digital low level output voltage.

S_0: Serial output.

t_{PHL}: High-to-low propagation delay time.

t_{PLH}: Low-to-high propagation delay time.

R_I: Input resistance of the analog input.

P_{SS}: Power supply sensitivity.

Z_E: Input offset voltage for zero output code transition.

V_{FSE}: Full scale voltage error, end-point accuracy.

T_{LE}: Bit transition linearity error.

M_{CE}: Differential linearity error for the output code-words adjacent to the major and minor carry transitions.

N_T: Transition uncertainty due to all sources (i.e. noise, settling time, etc.).

MSB: Most significant bit.

LSB: Least significant bit.

e.o.c.: End of conversion.

SA: Successive approximation.

SAR: Successive approximation register.

S/H amp.: Sample/Hold amplifier.

$V_{IN}(a)$: Analog input voltage.

Max (+): The positive voltage required at the analog voltage input pin to produce a digital code of 0000 0000 0000 at the DUT output pins.

Max (-): The negative voltage required at the analog voltage input pin to produce a digital code of 1111 1111 1111 at the DUT output pins.

Bipolar mode: Bipolar mode is the A/D converter operation mode that includes both positive and negative input analog voltages and provides an inverted offset binary output code.

Bit transition linearity error: Bit transition linearity error is the difference between the measured analog input voltage at each output bit transition point with respect to the ideal voltage at the same bit transition points as defined by a straight line that passes through the first and last bit transition points.

Serial output: Serial output is the bit by bit output of the A/D converter beginning with the MSB.

Full-scale range: Full-scale range is the voltage difference between the input voltages at the first bit transition and the last bit transition plus twice the voltage difference between two adjacent bit transitions.

Least significant bit: The least significant bit is the bit in the output code that carries the least weight. The value of the least significant bit is the average difference between the analog input voltages at two adjacent output bit transitions. The ideal difference voltage is the value of the full scale range divided by 4096.

Monotonicity: A device is monotonic if the ratio of the incremental change in the output to an incremental change in the input ($\Delta O/\Delta I$) does not change sign over the entire operating range.

Most significant bit: The most significant bit is the bit in the output code that carries the most weight. The most significant bit is the output bit that changes state when the analog input voltage change from its most positive value to one-half of the full scale range.

6.4 Logistic support. Lead materials and finishes (see 3.3) are interchangeable. Unless otherwise specified, microcircuits acquired for Government logistic support will be acquired to device class B (see 1.2.2), lead material and finish C (see 3.3). Longer length leads and lead forming shall not affect the PIN.

6.5 Substitutability. The cross-reference information below is presented for the convenience of users. Microcircuits covered by this specification will functionally replace the generic-industry type. Generic-industry microcircuit types may not have equivalent operational performance characteristics across military temperature ranges or reliability factors equivalent to MIL-M-38510 device types and may have slight physical variation in relation to case size. The presence of this information shall not be deemed as permitting substitution of generic-industry types for MIL-M-38510 types or as a waiver of any of the provisions of MIL-M-38510.

Military device type	Industry generic type	Military device type	Industry generic type
01	5200	09	5210
02	5203	10	5213
03	5201	11	5211
04	5204	12	5214
05	5202	13	5212
06	5205	14	5215
07	5206	15	5216
08	5207	16	5217

6.6 Part or Identifying Number (PIN). The PIN shall be in accordance with MIL-M-38510, and as specified herein.

6.7 Changes from previous issue. Marginal notations are not used in this revision to identify changes with respect to the previous issue due to the extensiveness of the changes.

CONCLUDING MATERIAL

Custodians:
Army - ER
Navy - EC
Air Force - 17
NASA - NA

Review activities:
Army - AR, MI
Air Force - 11, 19, 85, 99
Navy - OS, SH
DLA - ES

User activities:
Army - SM
Navy - AS, CG, MC

Preparing activity:
Air Force - 17

Agent:
DLA - ES

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