MILITARY SPECIFICATION

MICROCIRCUITS, LINEAR, MONOLITHIC AND HYBRID SILICON, MICROPROCESSOR COMPATIBLE, 12 BIT ANALOG-TO-DIGITAL CONVERTERS

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 monolithic and hybrid, microprocessor compatible, 12-bit successive approximation analog-to-digital converters buffered outputs. Two product assurance classes and a choice of case outlines and lead finishes are provided and are reflected in the complete part number.

1.2 Part number. The part number shall be in accordance with MIL-M-38510.

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

Device type	Input voltage range (all device types) (pin programmable)	Technology	Performance grade
01	0 V to +10 V unipolar 0 V to +20 V unipolar -5 V to +5 V bipolar -10 V to +10 V bipolar	Monolithic	High
02	Same as defined for device type 01.	Monolithic	Medium
03	"	Hybrid	High
04	"	Hybrid	Medium
05	"	Monolithic	High
06	"	Monolithic	Medium

1.2.2 Device class. The device class shall be the product assurance level as defined in MIL-M-38510.

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

Outline letter	Case outline, (see MIL-M-38510, appendix C)
X	D-10 (28-lead, 1/2" x 1-3/8"), dual-in-line package

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, by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this docufment or by letter.

AMSC N/A FSC 5962

DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited.

1.3 Absolute maximum ratings.

Positive supply voltage (V_{CC}) to digital return - - - - -	+18 V
Negative supply voltage (V_{EE}) to digital return - - - - -	-18 V
Positive supply voltage (V_{LOG}) to digital return- - - - -	+7 V
Digital input voltage to digital return - - - - - - - - - -	-0.5 V to V_{LOG} +0.5 V
Digital output voltage to digital return (Hi-Z output)- -	0 V to V_{LOG} +0.5 V
Analog return to digital return - - - - - - - - - - - - - -	±1 V
Analog input voltage to analog return - - - - - - - - - - -	±16.5 V
±20 V analog input voltage to analog return - - - - - - - -	±24 V
V_{REF} out short to analog return - - - - - - - - - - - - - -	Indefinite
V_{REF} out short to V_{CC} - - - - - - - - - - - - - - - - - - -	10 ms
Power dissipation -	1000 mW
Lead temperature (soldering, 10 seconds)- - - - - - - - - -	300°C
Storage temperature -	-65°C to +150°C
Junction temperature (may be exceeded during burn-in) - -	+175°C

1.4 Recommended operating conditions.

Positive supply voltage range (V_{CC}) - - - - - - - - - - - -	+11.4 to +16.5 V
Negative supply voltage range (V_{EE}) - - - - - - - - - - - -	-16.5 to -11.4 V
Positive supply voltage range (V_{LOG})- - - - - - - - - - - -	+4.5 to 5.5 V
Ambient operating temperature range - - - - - - - - - - - -	-55°C to +125°C

1.5 Power and thermal characteristics.

Package	Case outline	Maximum allowable power dissipation	Maximum θ_{JC}	Maximum θ_{JA}
28 lead dual-in-line	X	1000 mW at T_A = +125°C	25°C/W	60°C/W

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specification and standard. The following specification and standard, form a part of this specification to the extent specified herein. Unless otherwise specified, the issues of these documents shall be those listed in the issue of the Department of Defense Index of Specifications and Standards and supplement thereto, cited in the solicitation.

SPECIFICATION

MILITARY

MIL-M-38510 - Microcircuits, General Specification for.

STANDARD

MILITARY

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

(Copies of the specification and standard required by contractors in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting activity.)

2.2 Order of precedence. In the event of a conflict between the text of this specification and the references cited herein (except for associated detail specifications, specification sheets or MS standards), the text of this specification shall take precedence. Nothing in this specification, however, shall supersede applicable laws and regulations unless a specific exemption has been obtained.

TABLE I. Electrical performance characteristics.

Parameter 1/	Symbol	Conditions (see 3.4 and figures 6 and 10 unless otherwise specified)	Limits Min	Max	Units
Power supply current from V_{CC}	I_{CC}	Output code = 0000 0000 0000 and 1111 1111 1111 2/	1	16	mA
Power supply current from V_{EE}	I_{EE}	Output code = 0000 0000 0000 and 1111 1111 1111 2/	-30	-1	"
Power supply current from V_{LOG}	I_{LOG}	Output code = 0000 0000 0000 and 1111 1111 1111 2/	1	40	"
Power dissipation	P_d	(calculated worse case of 2 conditions) 3/		725	mW
Input low current	I_{IL}	V_{LOG} = 5.5 V V_{IN}(LOGIC) = 0.0 V	-10	1	µA
Input high current	I_{IH}	V_{LOG} = 5.5 V V_{IN}(LOGIC) = 2.4 V	-1	10	"
		V_{IN}(LOGIC) = 5.5 V	-1	10	"
High impedance state output current	I_{ZL}	V_{LOG} = 5.5 V V_{IN} = 10.08 V min. Output code = 1111 1111 1111 2/ Set R/$\overline{C}$ = Logic "0" Output bits 1 through 12 measured separately V_O = 0.0 V	-10	10	"
	I_{ZH}	V_{LOG} = 5.5 V V_{IN} = -7 mV max Output code = 0000 0000 0000 2/ Set R/$\overline{C}$ = logic "0" Output bits 1 through 12 measured separately V_O = 5.5 V	-10	10	"
Conversion time	t_c	V_{IN} = -7 mV max Output code = 0000 0000 0000 2/ 8-bit cycle Device types 01, 02, 03, 04 Device types 05, 06 12-bit cycle Device types 01, 02, 03, 04 Device types 05, 06	 10 6 15 9	 29 11.5 40 17	 µs " " "

See footnotes at end of table.

TABLE I. Electrical performance characteristics - Continued.

Parameter 1/	Symbol	Conditions (see 3.4 and figures 6 and 10 unless otherwise specified)	Limits Min	Limits Max	Units
Output logic voltage levels	V_{OL}	V_{LOG} = 4.5 V Output code = 0000 0000 0000 2/ Measure output bits 1-12 & STS I_L = 1.6 mA		0.4	V
	V_{OH}	V_{LOG} = 4.5 V Output code = 1111 1111 1111 2/ Measure output bits 1-12 & STS I_L = -0.5 mA (Figures 6, 7, and 10)	2.4		"
Reference voltage	V_{REF}	Output code = 0000 0000 0000 2/ Bipolar, VFSR = 20 V I_L = 1.5 mA Device types 01, 02 Device types 03, 04, 05, 06	 9.95 9.90	 10.05 10.10	 " "
Output operating modes (high byte)	m1	$12/\overline{8}$ = 0.0 V A_0 = logic "0" 5/ V_{IN} = 10.08 V min Output code = 1111 1111 XXXX I_L = -0.5 mA Measure output bits 1-8	2.4		"
(low byte)	m2	$12/\overline{8}$ = 0.0 V A_0 = logic "1" 5/ V_{IN} = 10.08 V min Output code = XXXX 0000 1111 I_L = -0.5 mA Measure output bits 9-12	2.4		"
(middle nybble override, trailing zeros)	m3	$12/\overline{8}$ = 0.0 V A_0 = logic "1" 5/ V_{IN} = 10.08 V min Output code = XXXX 0000 1111 I_L = -1.6 mA Measure output bits 5-8		0.4	"
(high nybble Hi-Z)	m4	$12/\overline{8}$ = 0.0 V A_0 = logic "1" 5/ V_{IN} = 10.08 V min Output code = XXXX 0000 1111 V_O = 0.4 V Measure output bits 1-4	-10	10	µA
(low nybble Hi-Z)	m5	$12/\overline{8}$ = 0.0 V A_0 = logic "0" 5/ V_{IN} = 10.08 V min Output code = 1111 1111 XXXX V_O = 0.4 V Measure output bits 9-12	-10	10	µA

See footnotes at end of table.

TABLE I. Electrical performance characteristics - Continued.

Parameter 1/	Symbol	Conditions (see 3.4 and figures 6 and 10 unless otherwise specified)	Limits Min	Limits Max	Units
Logic thresholds	$V_{R/\overline{C}}$	$V_{IN\_}$ = -7 mV max $V_{R/\overline{C}}$ = 0.8 V (initial) $V_{R/\overline{C}}$ = 2.0 V Output code = 0000 0000 0000	(Logic "0")		
		$V_{IN\_}$ = 10.08 V min $V_{R/\overline{C}}$ = 0.8 V (initial) $V_{R/\overline{C}}$ = 2.0 V Output code = 1111 1111 1111	(Logic "1")		
	V_{CE}	V_{IN} = 10.08 V min V_{CE} = 2.0 V, convert Output code = 1111 1111 1111	(Logic "1")		
		V_{IN} = -7 mV max V_{CE} = 0.8 V Output code = 1111 1111 1111	(Logic "1")		
		V_{IN} = -7 mV max V_{CE} = 2.0 V, convert Output code = 0000 0000 0000	(Logic "0")		
	$V_{\overline{CS}}$	V_{IN} = 10.08 V min V_{CE} = logic "1" $V_{\overline{CS}}$ = 0.8 V, convert Output code = 1111 1111 1111	(Logic "1")		
		$V_{\overline{CS}}$ = 2.0 V V_{CE} = logic "1" V_{IN} = -7 mV max Output code = 1111 1111 1111	(Logic "1")		
		V_{IN} = -7 mV max V_{CE} = logic "1" $V_{\overline{CS}}$ = 0.8 V, convert Output code = 0000 0000 0000	(Logic "0")		
	V_{AO}	$V_{IN\_}$ = 10.08 V min $12/\overline{8}$ = 0.0 V V_{AO} = 0.8 V, convert Output code = 1111 1111 XXXX Measure output bits 5-8	(Logic "1")		
		V_{CE} = logic "0" V_{AO} = 2.0 V, V_{CE} = logic "1" Output code = XXXX 0000 1111 Measure outputs bits 5-8	(Logic "0")		

See footnotes at end of table.

TABLE I. Electrical performance characteristics - Continued.

Parameter 1/	Symbol	Conditions (see 3.4 and figures 6 and 10 unless otherwise specified)	Limits Min	Limits Max	Units
Power supply sensitivity to V_{CC}	$+P_{SS1}$	$13.5\ V \leq V_{CC} \leq 15.0\ V$, $15.0\ V \leq V_{CC} \leq 16.5\ V$ Output transition = 0000 0000 000ø and 1111 1111 111ø 6/	-.10	.10	LSB/ %PS
	$+P_{SS2}$	$11.4\ V \leq V_{CC} \leq 12.0\ V$, $12.0\ V \leq V_{CC} \leq 12.6\ V$ Output transition = 0000 0000 000ø and 1111 1111 111ø 6/ (Figures 8 and 10)	-.20	.20	"
Power supply sensitivity to V_{LOG}	$+P_{SS3}$	$4.5\ V \leq V_{LOG} \leq 5.0\ V$, $5.0\ V \leq V_{LOG} \leq 5.5\ V$ Output transition = 0000 0000 000ø and 1111 1111 111ø (Figures 8 and 10) 6/	-.10	.10	"
Power supply sensitivity to V_{EE}	$-P_{SS1}$	$-16.5\ V \leq V_{EE} \leq -15.0\ V$, $-15.0\ V \leq V_{EE} \leq -13.5\ V$ Output transition = 0000 0000 000ø and 1111 1111 111ø 6/	-.10	.10	"
	$-P_{SS2}$	$-12.6\ V \leq V_{EE} \leq -12.0\ V$, $-12.0\ V \leq V_{EE} \leq -11.5\ V$ Output transition = 0000 0000 000ø and 1111 1111 111ø 6/ (Figures 8 and 10)	-.20	.20	"
Missing code check	M_{CC}	All codes check	0	0	Codes
Unipolar offset voltage	V_{IO}	Output transition = 0000 0000 000ø $T_A = 25°C$ 6/			
		Device types 01, 02 Initial	-0.5	1.5	LSB
		End point	-1.0	2.0	"
		Device types 03, 04, 05, 06 Initial	-1.5	2.5	"
		End point	-2.0	3.0	"
		(Figures 8 and 10)			
Unipolar offset voltage drift	dV_{IO}/dT	Output transition = 0000 0000 000ø 6/			
		Device types 01, 02	-0.5	0.5	"
		Device types 03, 04, 05, 06	-1.0	1.0	"
		(Figures 8 and 10)			

See footnotes at end of table.

TABLE I. Electrical performance characteristics - Continued.

Parameter 1/	Symbol	Conditions (see 3.4 and figures 6 and 10 unless otherwise specified)	Limits Min	Limits Max	Units
Bipolar zero	B_Z	Output code = ØØØØ ØØØØ ØØØØ 6/ Bipolar, VFSR = 20 V Initial End point T_A = 25°C (Figures 8 and 10)	 -4.5 -5.5	 3.5 4.5	 LSB "
Bipolar zero drift	d_{BZ} /dT	Output code = ØØØØ ØØØØ ØØØØ 6/ Bipolar, VFSR = 20 V Device types 01, 03, 05 Device types 02, 04, 06 (Figures 8 and 10)	 -1 -2	 1 2	 " "
Gain error	A_E	Output transition = 0000 0000 000Ø and 1111 1111 111Ø 6/ Device type 01 Initial End point Device type 02 Initial End point Device types 03, 04, 05, 06 Initial End point	 -0.125 -0.225 -0.25 -0.35 -0.3 -0.4	 0.125 0.225 0.25 0.35 0.3 0.4	 %FSR " " " " "
	B_{PAE}	Bipolar, VFSR = 20 V T_A = 25°C Device type 01 Device type 02 Device types 03, 04, 05, 06 (Figures 8 and 10)	 -0.125 -0.25 -0.3	 0.125 0.25 0.3	 " " "
Gain error drift	d_{AE} /dT	Output transition = 0000 0000 000Ø and 1111 1111 111Ø Device types 01, 03, 05 Device types 02, 04, 06	 -12.5 -25	 12.5 25	 ppm /°C
	d_{BPAE} /dT	Bipolar, VFSR = 20 V Device types 01, 03, 05 Device types 02, 04, 06 (Figures 8 and 10)	 -12.5 -25	 12.5 25	 " "
Integral linearity error	L_E	(Abbreviated test) -55°C ≤ T_A ≤ 125°C T_A = 25°C (Figures 8 and 10)	 -1.0 -0.5	 1.0 0.5	 LSB "
Integral linearity error	L_E	(All codes test) -55°C ≤ T_A ≤ 125°C T_A = 25°C (Figures 8 and 10)	 -1.0 -0.5	 1.0 0.5	 " "

See footnotes at end of table.

TABLE I. Electrical performance characteristics - Continued.

Parameter 1/	Symbol	Conditions (see 3.4 and figures 6 and 10 unless otherwise specified)	Limits Min	Limits Max	Units
Differential linearity error	D_{LE}	(Abbreviated test) $-55°C \leq T_A \leq 125°C$ $T_A = 25°C$ (Figures 8 and 10)	 -0.9 -0.9	 2.0 1.0	 " "
STS delay from CE	t_{DSC}	Low to high transition, referenced to low to high CE transition Output code = 0000 0000 0000 2/ $T_A = 25°C$ (Figures 9 and 10)		350	ns
Data access time from CE	t_{DD}	Output data valid, referenced to low to high CE transition Output code = 0000 0000 0000 and 1111 1111 1111 2/ $T_A = 25°C$ Device types 01, 02, 03, 04 Device types 05, 06 (Figures 9 and 10)		 200 250	 ns "
Data valid after CE low	t_{HD}	Output data valid, referenced to high to low CE transition Output code = 0000 0000 0000 and 1111 1111 1111 2/ $T_A = 25°C$ (Figures 9 and 10)	25		"
STS delay after data valid	t_{HS}	High to low transition referenced to data valid Output code = 0000 0000 0000 and 1111 1111 1111 2/ $T_A = 25°C$ Device types 01, 02, 03, 04 Device types 05, 06 (Figures 9 and 11)	 300 100	 1000 600	 " "
Output float delay	t_{HL}	Output delay to Hi-Z, referenced to high to low CE transition Output code = 0000 0000 0000 and 1111 1111 1111 2/ $T_A = 25°C$ Device types 01, 02 Device types 03, 04, 05, 06 (Figures 9 and 10)		 100 150	 " "
STS delay from R/$\overline{C}$	t_{DS}	Low to high transition, referenced to high to low R/$\overline{C}$ transition Output code = 0000 0000 0000 2/ $T_A = 25°C$ (Figures 9 and 11)		600	"

See footnotes at end of table.

TABLE I. Electrical performance characteristics - Continued.

Parameter 1/	Symbol	Conditions (see 3.4 and figures 6 and 10 unless otherwise specified)	Limits Min	Limits Max	Units
Data access time from R/$\overline{C}$	t_{DDR}	Output data valid, referenced to low to high low R/$\overline{C}$ transition Output code = 0000 0000 0000 and 1111 1111 1111 2/ T_A = 25°C (Figures 9 and 11)		250	"
Data valid after R/$\overline{C}$ low	t_{HDR}	Output data valid, referenced to high to low R/$\overline{C}$ transition Output code = 0000 0000 0000 and 1111 1111 1111 2/ T_A = 25°C (Figures 9 and 11)	25		ns
Output short circuit current	I_{OSC}	V_{LOG} = 5.5 V Output code = 1111 1111 1111 and 2/ STS output = logic "1" measured separately to ground	-40		mA
		Output code = 0000 0000 0000 and 2/ STS output = logic "0" measured separately to V_{LOG} T_A = 25°C		75	mA
Input resistance	Ri	V_{IN}(analog) = 1/2 V T_A = 25°C	3	7	kohms
Transition uncertainity	NT	Output transition = ØØØØ ØØØØ ØØØØ and 1111 1111 1111 6/ Range = 16% to 84% T_A = 25°C (Figures 8 and 10)	-0.5	0.5	LSB

1/ See paragraph 6.5 for symbols and definitions.

2/ An output code of 0000 0000 0000 is guaranteed by an input voltage V_{IN} = -7.0 mV and an output code of 1111 1111 1111 is guaranteed by an input voltage V_{IN} = 10.08 V.

3/ $P_d = (V_{CC} * I_{CC} + V_{EE} * I_{EE} + V_{LOGIC} * I_{LOGIC})$. Power dissipation shall be calculated using the two output code conditions 0000 0000 0000 and 1111 1111 1111.

4/ The reference voltage external load current shall be constant dc and shall not exceed 1.5 mA.

5/ Changing A_0 during the ready cycle, may result in damage to the device output buffers. Therefore, it is recommended that CE is low or $\overline{CS}$ is high before A_0 is changed.

6/ Ø represents the transition point between two adjacent code-words (i.e: 0000 0000 000Ø) represents the transition between code-words 0000 0000 0000 and 0000 0000 0001, ØØØØ ØØØØ ØØØØ represents the transition between code-words 0111 1111 1111 and 1000 0000 0000 and 1111 1111 111Ø represents the transition between code-words 1111 1111 1110 and 1111 1111 1111.

3. REQUIREMENTS

3.1 Detail specification. The individual item requirements shall be in accordance with MIL-M-38510, and as specified herein.

3.2 Design, construction, and physical dimensions. The design, construction, and physical dimensions shall be as specified in MIL-M-38510 and herein.

3.2.1 Case outline. The case outline shall be as specified in 1.2.3 herein.

3.2.2 Functional diagram and terminal connections. The functional diagram and terminal connections shall be as specified on figures 1 and 2.

3.2.3 Functional block diagram. The functional block diagram shall be as specified on figure 4.

3.2.4 Schematic circuits. The schematic circuits shall be submitted to the preparing activity prior to inclusion of manufacturer's device in this specification and shall be submitted to the qualifying activity and agent activity (DESC-ECS) as a prerequisite for qualification. All qualified manufacturers' schematics shall be maintained by the agent activity and will be available upon request.

3.2.5 Package and sealing material. Package and sealing material shall be in accordance with MIL-M-38510 (see 6.5).

3.3 Lead material and finish. The lead material and finish shall be in accordance with MIL-M-38510 and 6.3 herein.

3.4 Electrical performance characteristics. The electrical performance characteristics are as specified in table I, and apply over the full recommended ambient operating temperature range, unless otherwise specified. The following conditions shall also apply unless otherwise specified:

Unipolar operation	VFSR = 10 V
V_{CC} = +15.0 V	V_{EE} = -15.0 V
$\overline{CS}$ input = logic "0"	Logic "0" = 0.8 V maximum
CE input = logic "1"	Logic "1" = 2.0 V minimum
12/$\overline{8}$ input = V	V_{LOG} = +5.0 V
$-55°C \leq T_A \leq +125°C$	

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.

TABLE II. Electrical test requirements.

MIL-STD-883 test requirements	Subgroups (see table III) 1/ Class S devices	Class B devices 2/
Interim electrical parameters (method 5004)	1	1
Final electrical test parameters (method 5004)	1, 2, 3, 4, 5, 6	1, 2, 3, 4, 5, 6
Group A test requirements (method 5005)	1,2,3,4,5,6, 7,8,9,	1,2,3,4,5,6, 7,8,9,
Group C end-point electrical parameters (method 5005)	1,4 and table IV delta limits	1,4 and table IV delta limits
Additional electrical subgroups for group C periodic inspections	N/A	---
Group D end-point electrical parameters (method 5005)	1, 2, 3, 4, 5, 6	1, 4

1/ PDA applies to subgroup 1 (see 4.2c).
2/ Subgroup 8, as listed in table III, test 581 through test 588 is used for initial and redesign qualification (class B only).

3.6 Marking. Marking shall be in accordance with MIL-M-38510.

3.6.1 Serialization. All class S devices shall be serialized in accordance with MIL-M-38510.

3.6.2 Correctness of indexing and markings. All devices shall be subjected to the final electrical tests subgroups 1 and 4 specified in table II after part marking to verify that they are correctly indexed and identified by part number. Optionally, an approved electrical test may be devised especialy for this requirement.

3.7 Microcircuit group assignment. The devices covered by this specification shall be in microcircuit technology group I and 57 (see MIL-M-38510, appendix E).

4. QUALITY ASSURANCE PROVISIONS

4.1 Sampling and inspection. Sampling and inspection procedures shall be in accordance with MIL-M-38510 methods 5005 and 5007 , as applicable, of MIL-STD-883, except as modified herein.

4.2 Screening. Screening shall be in accordance with method 5004 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: Dynamic tests (test condition D) using the circuit shown on figure 5. Test duration shall be as defined in MIL-STD-883.

   (2) Class B devices: Test condition D, using the circuit shown on figure 5.

b. Interim and final electrical test parameters shall be as specified in table II, except interim electrical parameters tests 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-M-38510, based on failures from group A, subgroup 1 test after cooldown as final electrical tests in accordance with method 5004 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 (methods 2010 and 2017 (multi-chip criteria) of MIL-STD-883). For multichip devices, internal visual inspection shall be performed for each chip within the package.

4.3 Qualification inspection. Qualification inspection shall be in accordance with MIL-M-38510. Inspections to be performed shall be specified in method 5005 of MIL-STD-883, and herein for groups A, B, C, and D inspections (see 4.4.1 through 4.4.4).

4.3.1 Qualification extension. For qualification inspection, if a manufacturer qualifies to device type 01 (monolithic) or device type 03 (hybrid), which is designed and manufactured identically (same die or dice, same process, same screening) in all respects (except electrical testing) to device type 02 (monolithic) or device type 04 (hybrid) respectively, then qualification may be extended to device type 02 or 04 respectively when authorized by the qualifying activity. Additionally, part I qualification may be extended to device type 02 or 04 respectively only after acceptance by the qualifying activity of subgroup C1 testing performed on the AT device type (see 6.6) and submission of data in accordance with MIL-M-38510, appendix D.

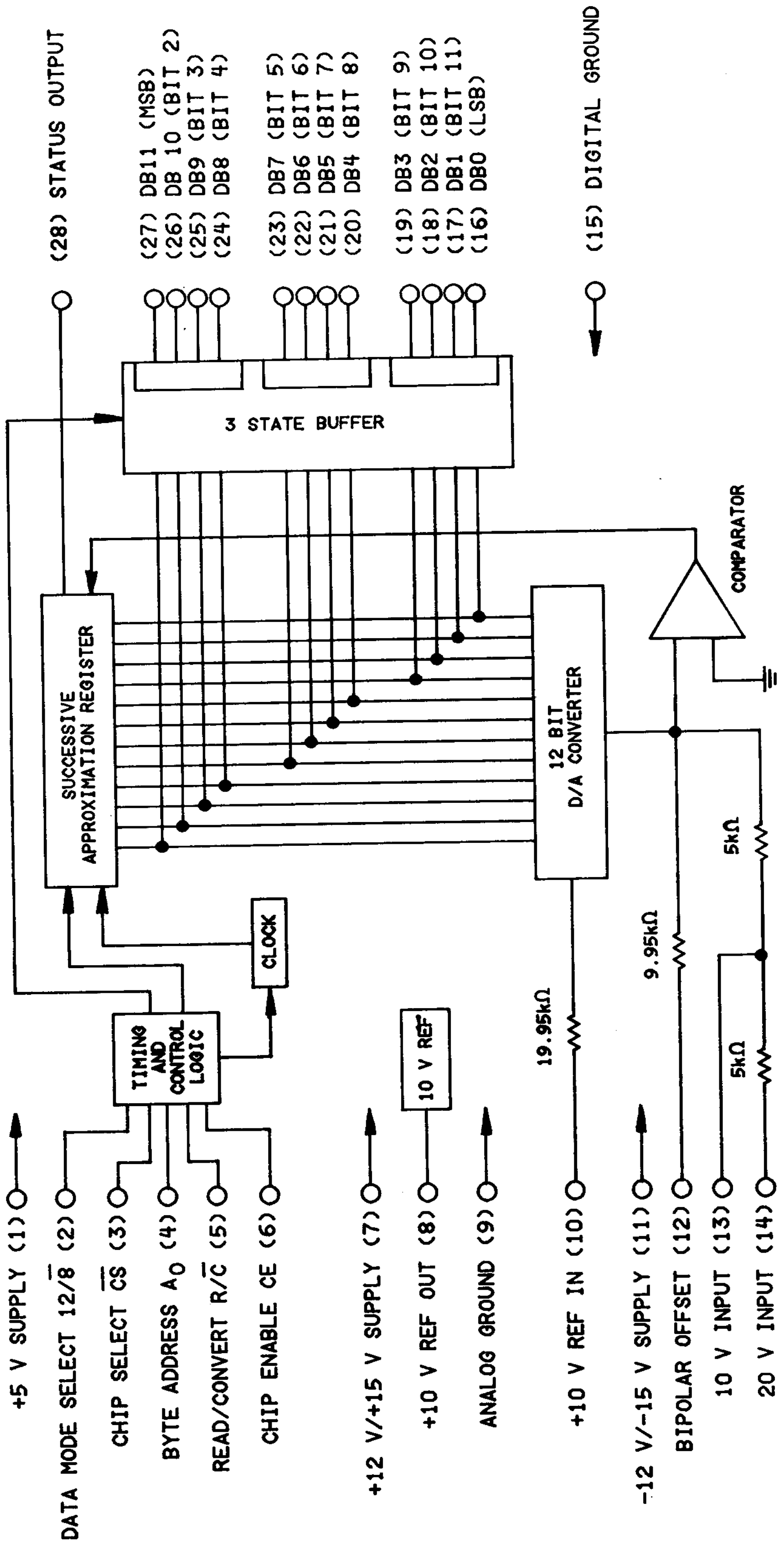


FIGURE 1. Functional block diagram and operational information.

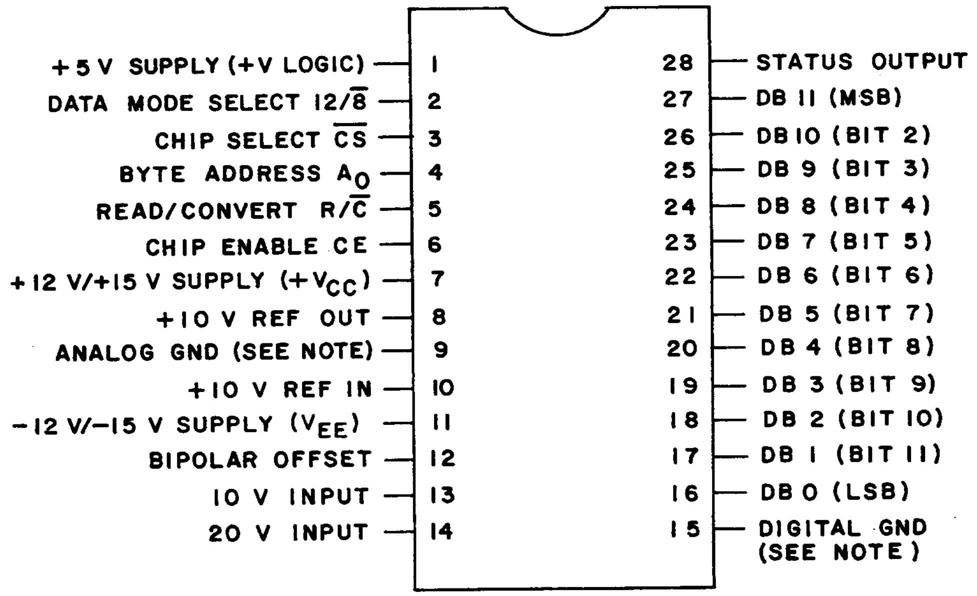
ANALOG INPUT VOLTAGE (VOLTS)				DIGITAL OUTPUT
0 to +10 V	0 to +20V	±5V	±10V	MSB LSB
+10.0000	+20.0000	+5.0000	+10.0000	1111 1111 1111
+ 9.9963	+19.9927	+4.9963	+ 9.9927	1111 1111 111Ø
+ 5.0012	+10.0024	+0.0012	+ 0.0024	1000 0000 000Ø
+ 4.9988	+ 9.9976	-0.0012	- 0.0024	ØØØØ ØØØØ ØØØØ
+ 4.9963	+ 9.9927	-0.0037	- 0.0073	0111 1111 111Ø
+ 0.0012	+ 0.0024	-4.9988	- 9.9976	0000 0000 000Ø
+ 0.0000	0.0000	-5.0000	-10.0000	0000 0000 0000

Control Inputs					Operation
CE	$\overline{CS}$	$R/\overline{C}$	$12/\overline{8}$	A_0	
0	X	X	X	X	No operation
X	1	X	X	X	No operation
1	0	1-0	X	0	Initiates 12-bit conversion
1	0	1-0	X	1	Initiates 8-bit conversion
0-1	0	0	X	0	Initiates 12-bit conversion
0-1	0	0	X	1	Initiates 8-bit conversion
1	1-0	0	X	0	Initiates 12-bit conversion
1	1-0	0	X	1	Initiates 8-bit conversion
1	0	0-1	V_{LOG}	X	Enables 12-bit parallel output
1	0	0-1	0.0V	0	Enables 8 MSB's
1	0	0-1	0.0V	1	Enables 4 LSB's and 4 trailing zeros

FIGURE 1. Functional block diagram and operational information - Continued.

All device types

Cases X, Y and Z



NOTE: The units two ground pins (pins 9 and 15) 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 9 and 15 as close to the unit as possible and wide conductor runs should be employed.

FIGURE 2. Terminal connections.

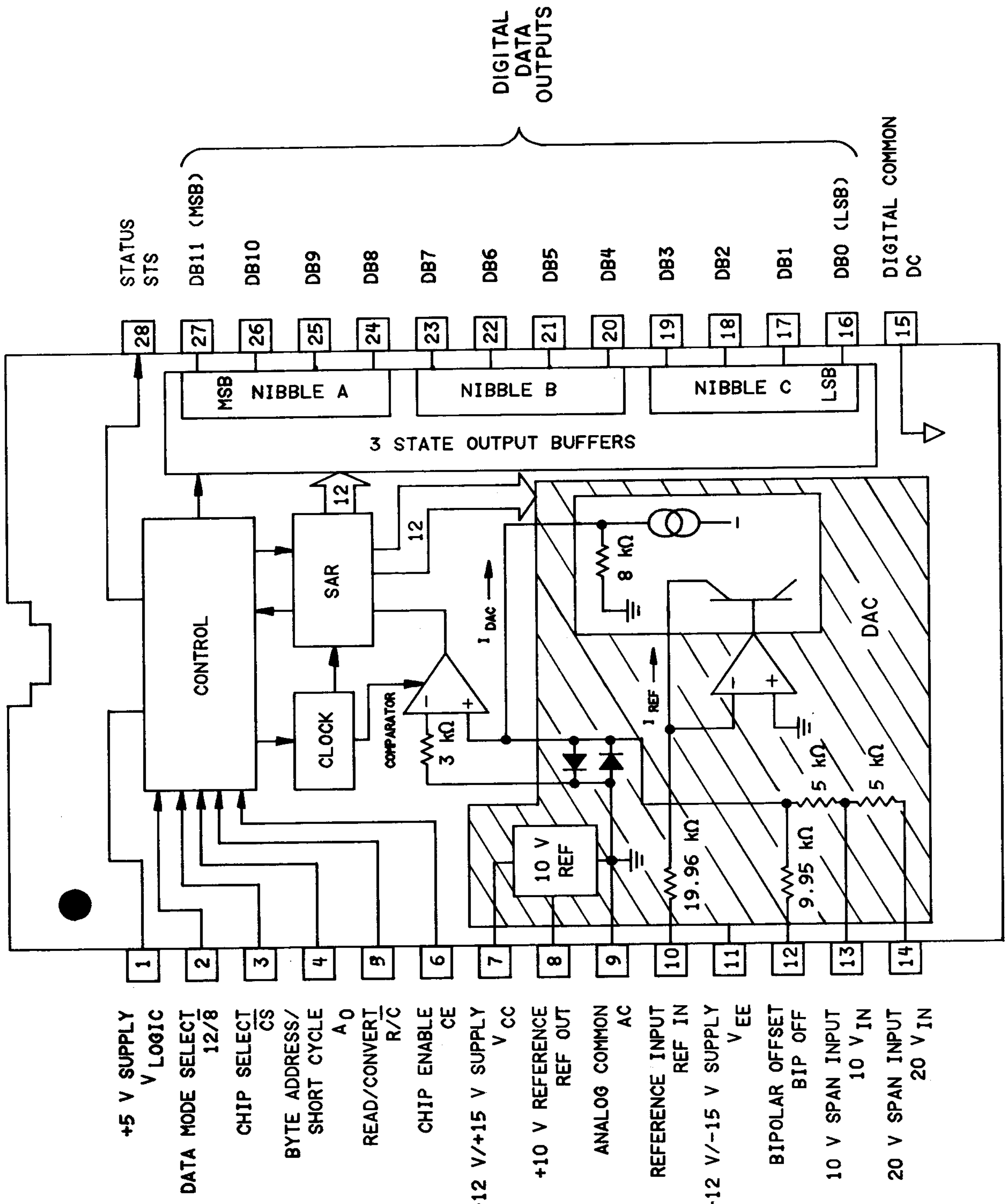
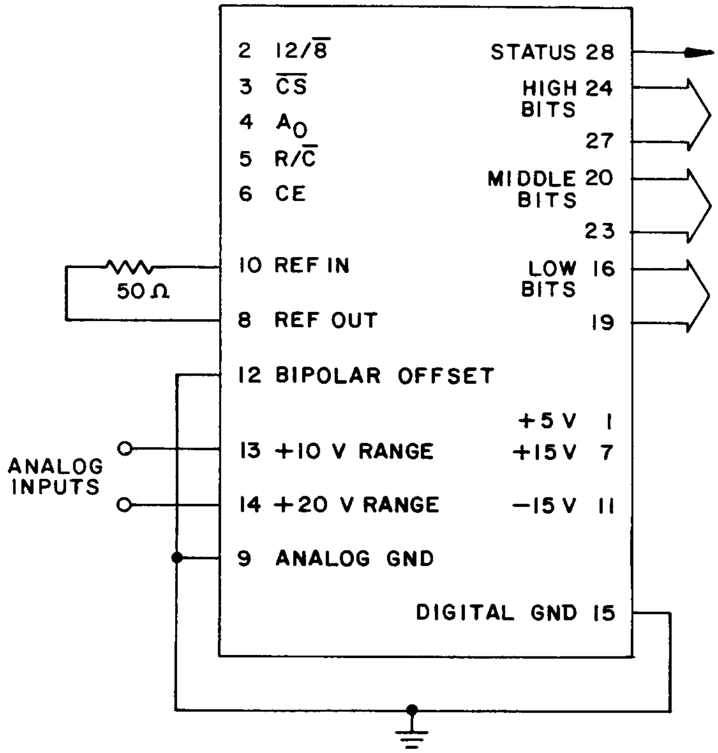


FIGURE 3. Functional block diagram.

UNIPOLAR OPERATION WITHOUT TRIM ADJUSTMENT



UNIPOLAR OPERATION WITH TRIM ADJUSTMENT

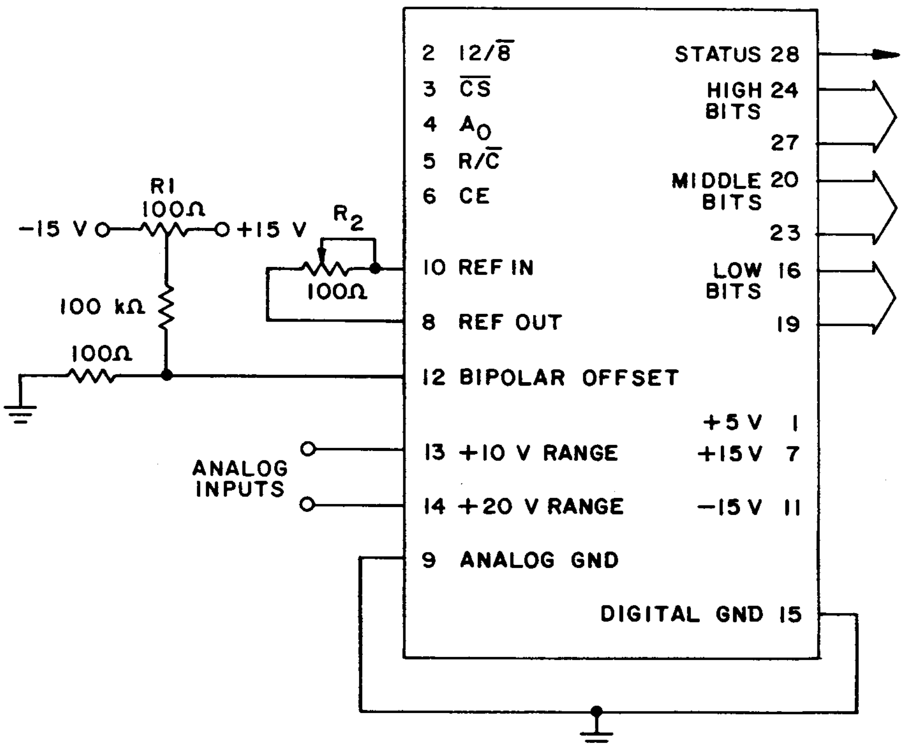
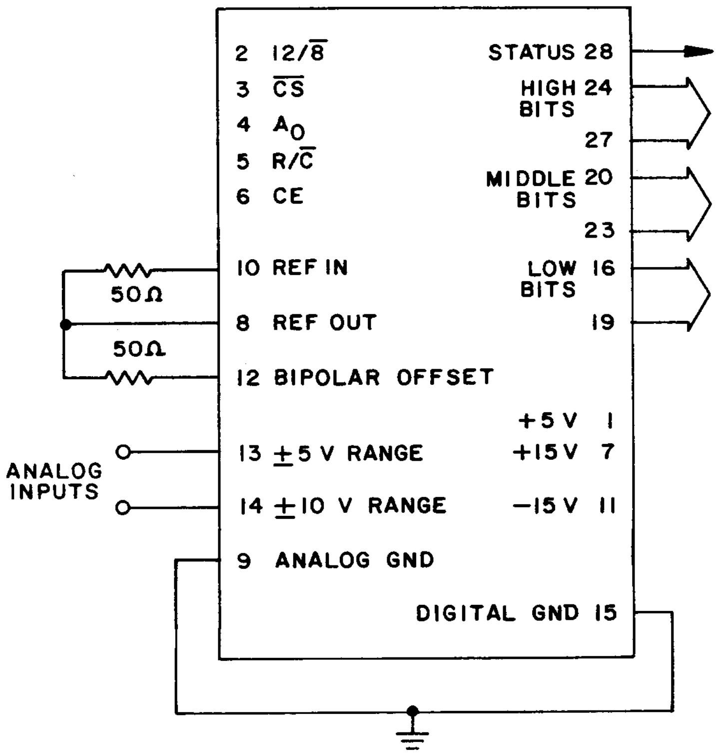


FIGURE 4. Functional schematics with application notes.

BIPOLAR OPERATION WITHOUT TRIM ADJUSTMENT



BIPOLAR OPERATION WITH TRIM ADJUSTMENT

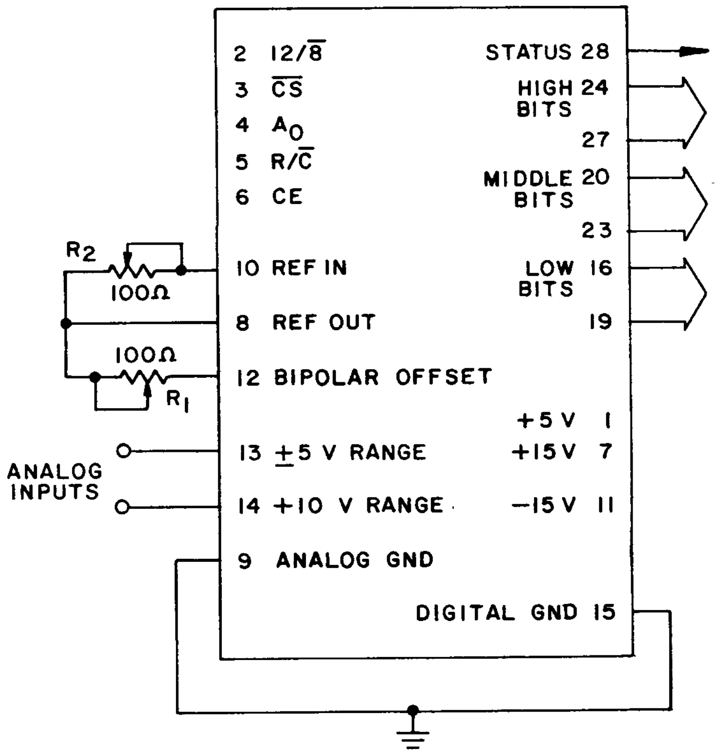
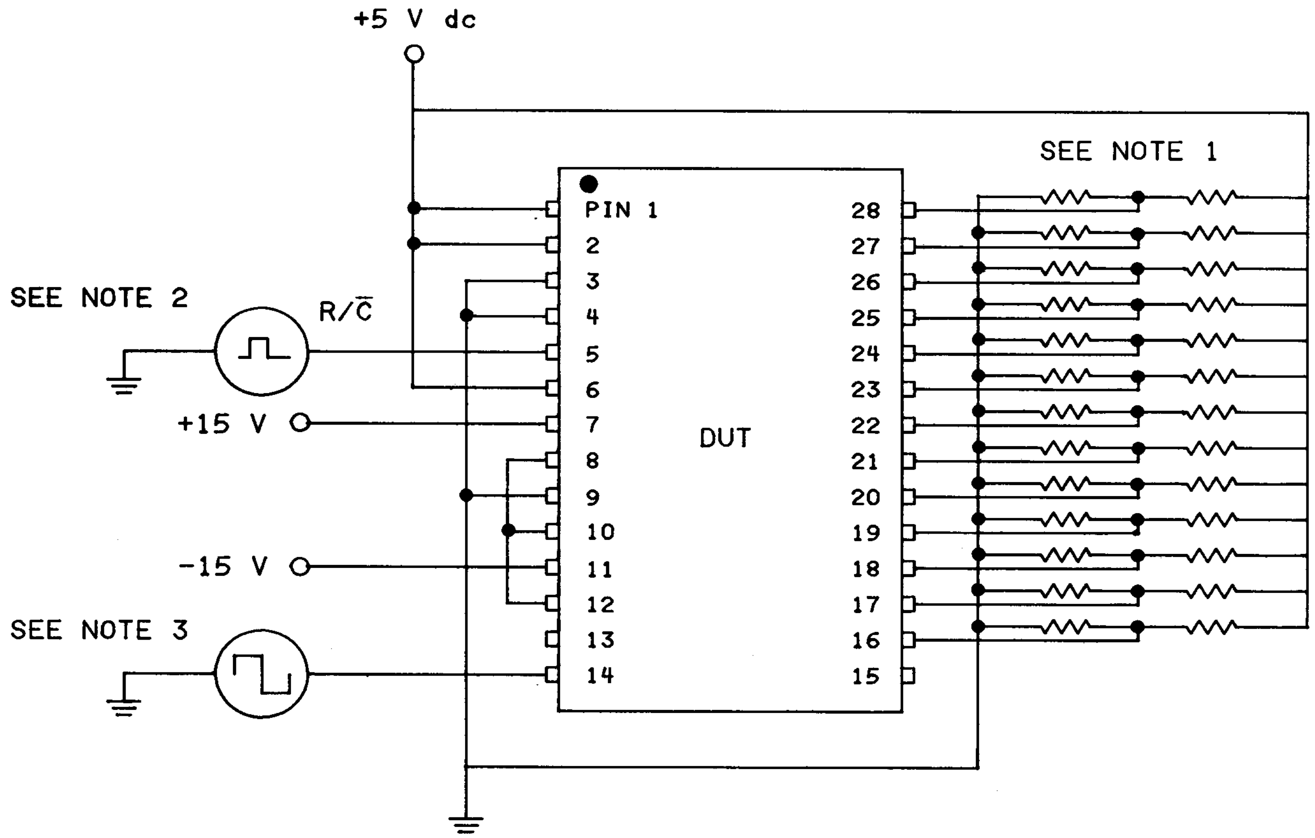


FIGURE 4. Functional schematics with application notes - Continued.

Input voltage range	Adjustment	Input voltage	Pot	Adjust pot to point where D.U.T. is just just on the verge of switching between the the two codes shown.
0 to +20V	ZERO	2.44mV	R_1	000000000000 000000000001
	GAIN	19.9927V	R_2	111111111110 111111111111
0 to +10V	ZERO	1.22mV	R_1	000000000000 000000000001
	GAIN	9.9963V	R_2	111111111110 111111111111

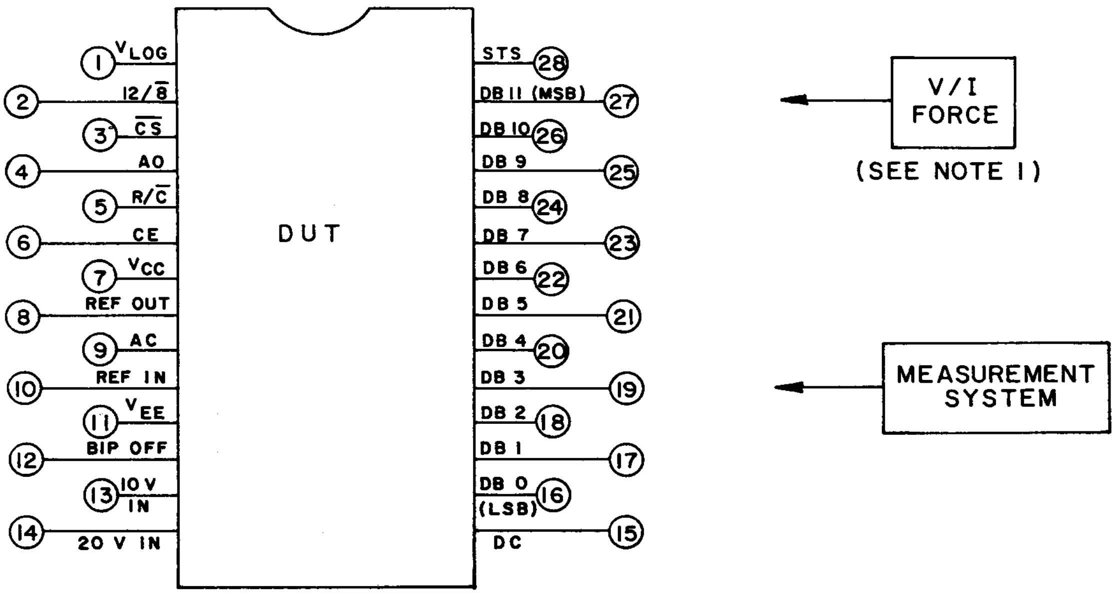
Input voltage range	Adjustment	Input voltage	Pot	Adjust pot to point where D.U.T. is just just on the verge of switching between the the two codes shown.
±5V	ZERO	-4.9988V	R_1	000000000000 000000000001
	GAIN	4.9963V	R_2	111111111110 111111111111
±10V	ZERO	-9.9976V	R_1	000000000000 000000000001
	GAIN	9.9927V	R_2	111111111110 111111111111

FIGURE 4. Functional schematics with application notes - Continued.



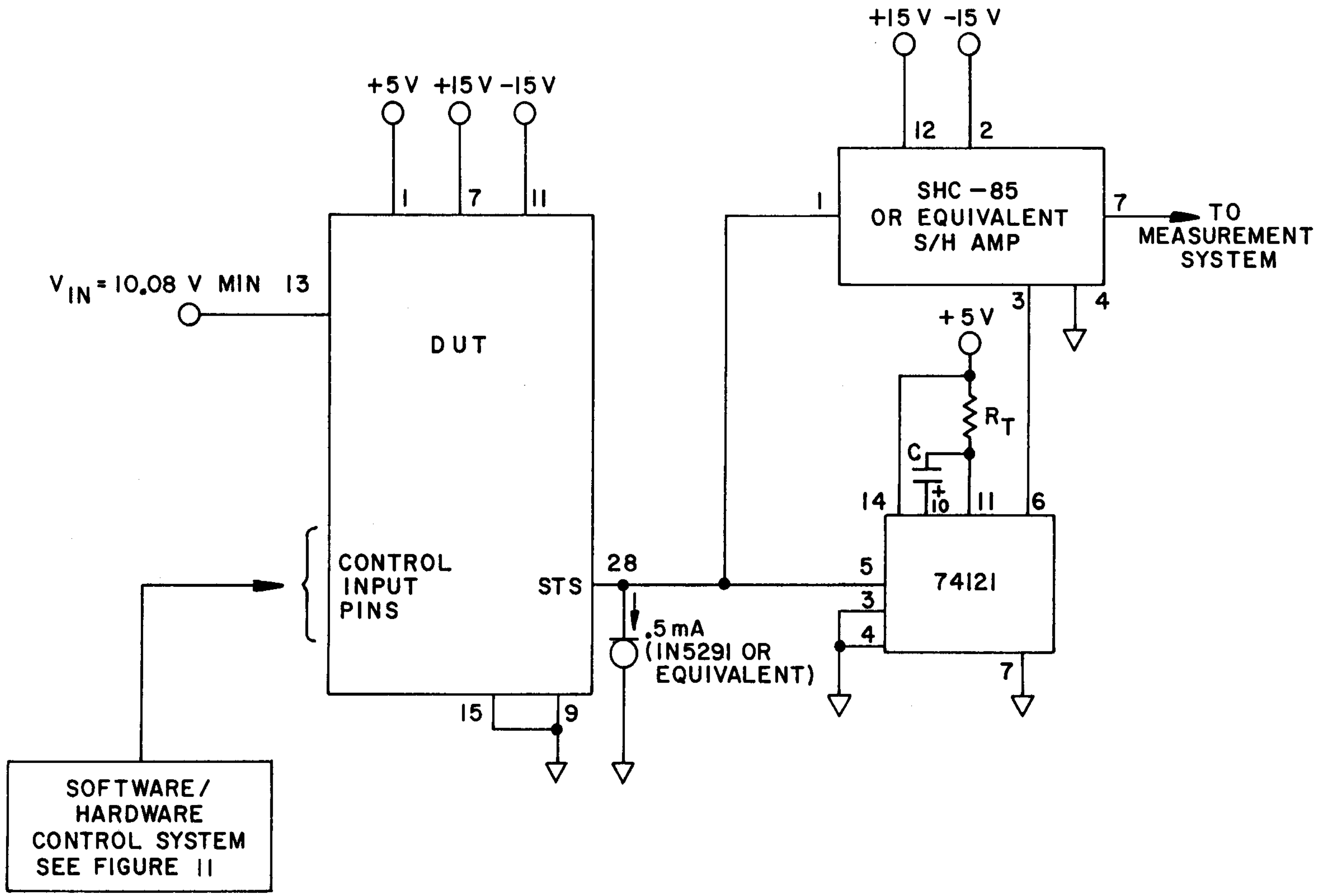
NOTES:
1. All resistors shall have a measured value of 3.0 kΩ, ±1%, 1/4 watt and shall not exceed their branded value due to use, heat, or age.
2. Pulse width shall be 1 µs minimum.
   Pulse repetition rate shall be 1 kHz.
   Pulse levels shall be 0 V and 5 V.
3. Frequency shall be 60 Hz synchronized to the R/$\overline{C}$ pulse. Amplitude shall be + 10 V minimum and -10 V maximum.
4. One 10 µF ±20% capacitor shall be connected from each voltage supply line to ground.

FIGURE 5. Test circuit for burn-in and steady state life test.



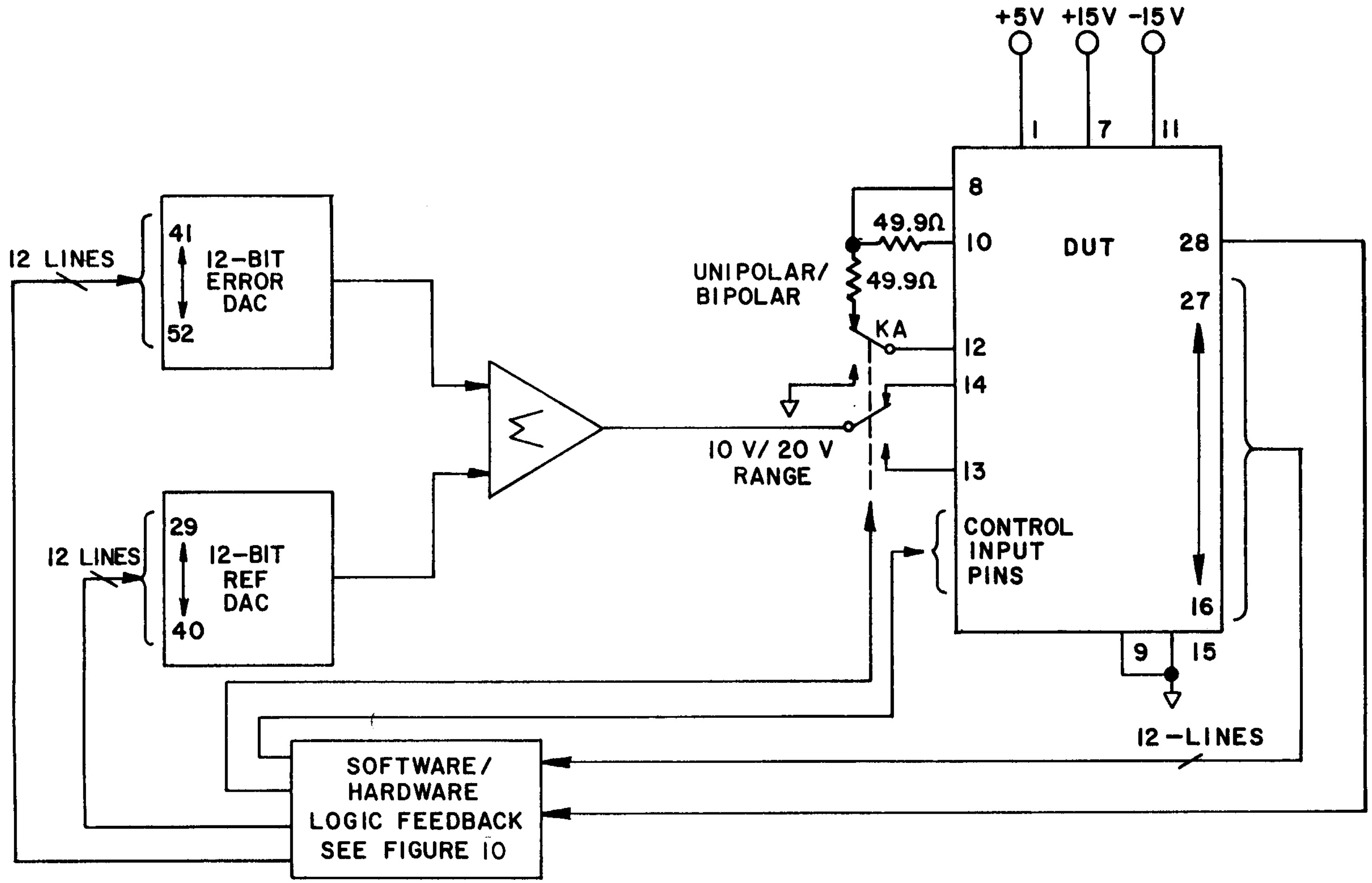
NOTE: The connections of the V/I force and measurement system are software controlled.

FIGURE 6. Test circuit for static test.



NOTES:
1. R_T and C are selected for an 8.0 µs delay time interval.
2. DUT test circuit shall be as defined in table I.

FIGURE 7. Output test circuit for measuring the STS logic "1" voltage level.



NOTE: The 12-bit ref DAC shall have an accuracy of 16-bits.

FIGURE 8. Test circuit for dynamic test.

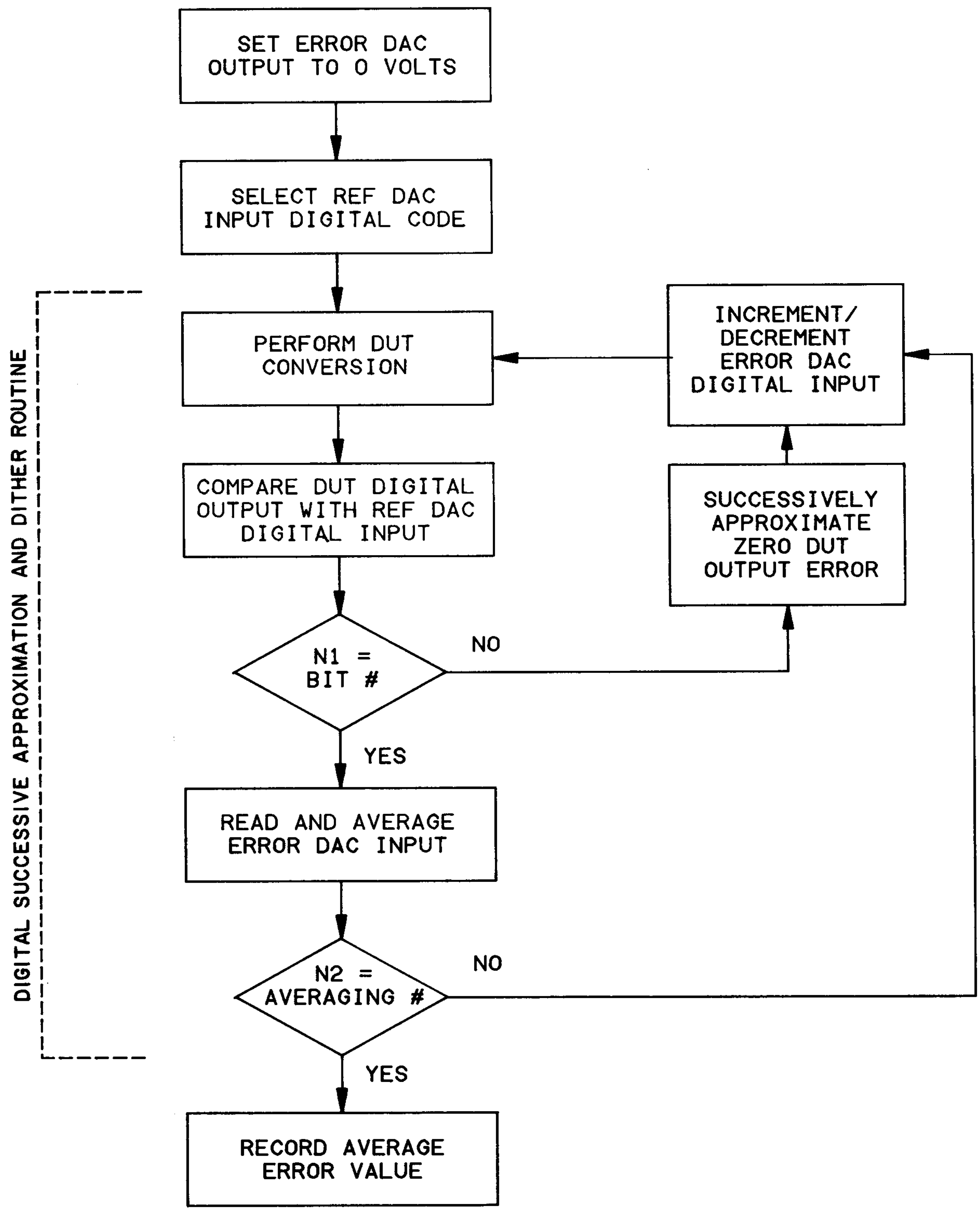


FIGURE 8. Test circuit for dynamic test - Continued.

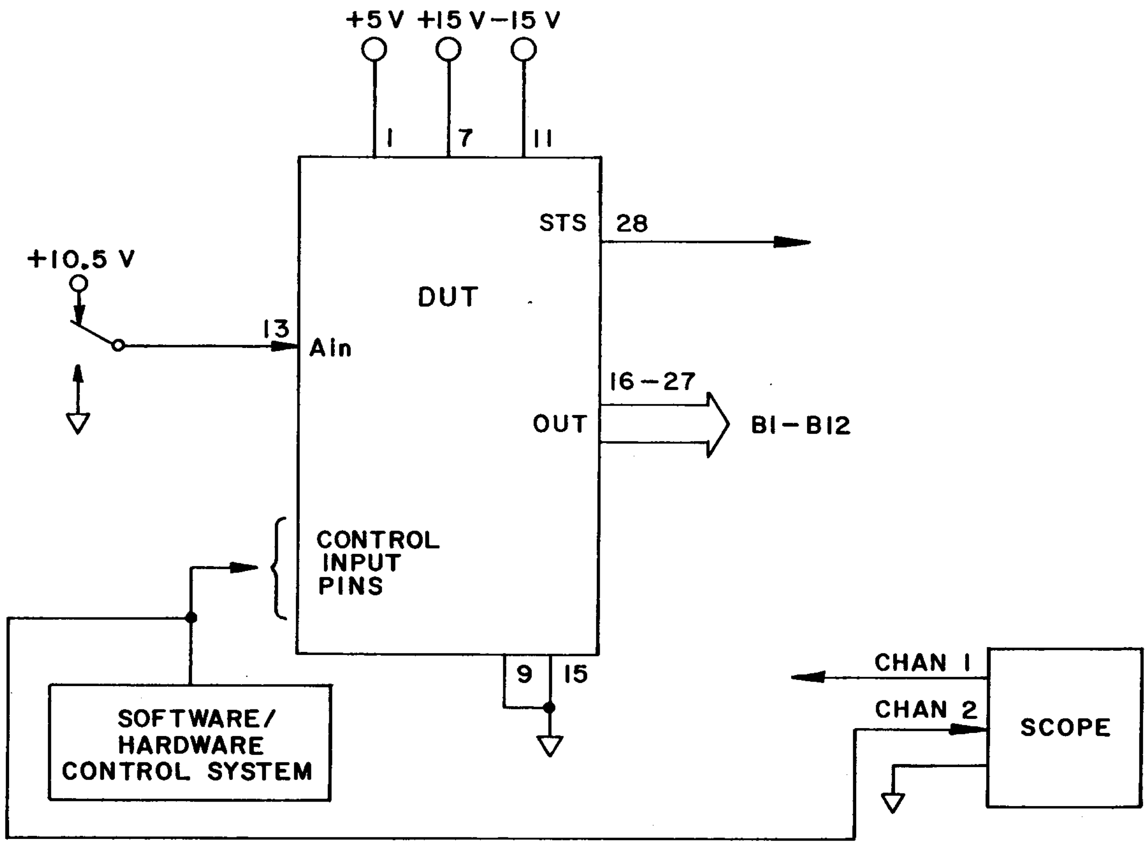
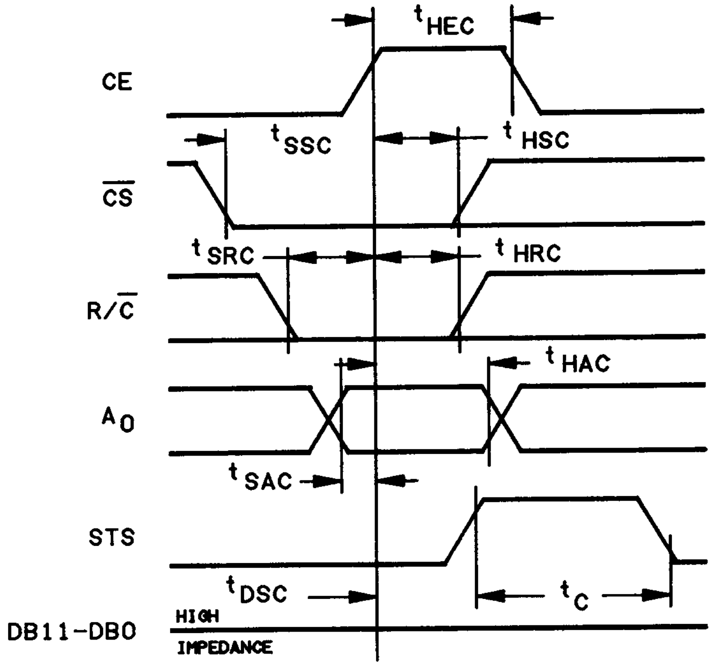
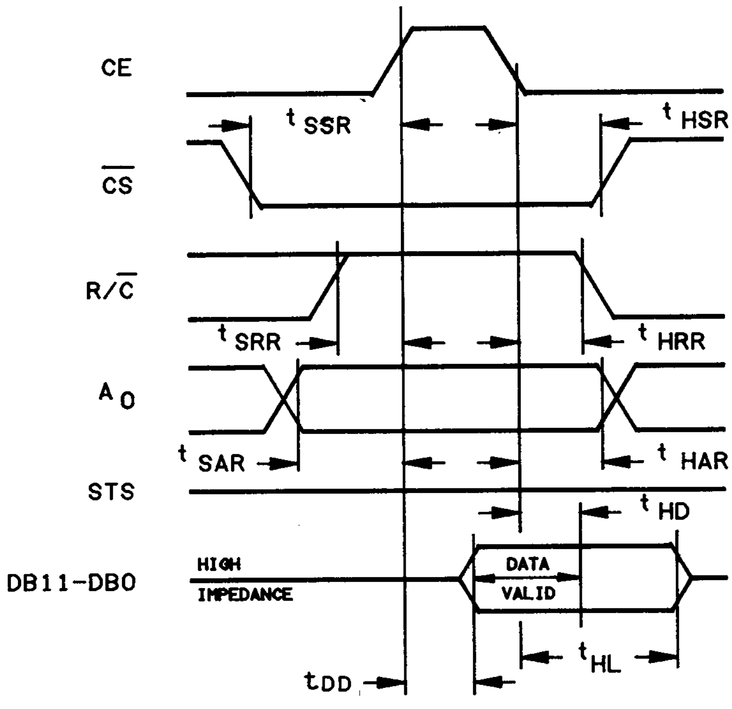


FIGURE 9. Test circuit for propagation delay.



CONVERT START TIMING



READ CYCLE TIMING

FIGURE 10. Timing diagrams (system controlled operation).

Test setup timing specifications

CONVERT MODE

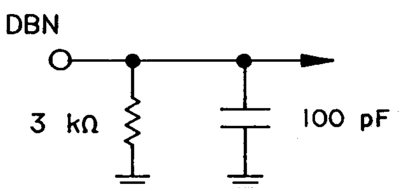
Symbol	Parameter	Min	Unit
t_{HEC}	CE Pulse width	300	ns
t_{SSC}	$\overline{CS}$ to CE Setup	300	"
t_{HSC}	$\overline{CS}$ Low during CE high	200	"
t_{SRC}	$R/\overline{C}$ to CE setup	250	"
t_{HRC}	$R/\overline{C}$ Low during CE high	200	"
t_{SAC}	A_0 to CE Setup	0	"
t_{HAC}	A_0 valid during CE high	300	"

READ MODE

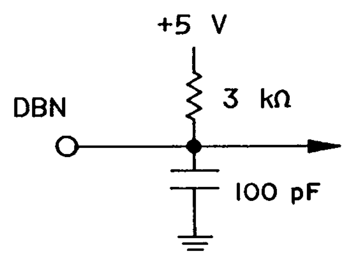
Symbol	Parameter	Min	Unit
t_{SSR}	$\overline{CS}$ to CE Setup	150	ns
t_{SRR}	$R/\overline{C}$ to CE Setup	0	"
t_{SAR}	A_0 to CE Setup	150	"
t_{HSR}	$\overline{CS}$ Valid after CE low	50	"
t_{HRR}	$R/\overline{C}$ High after CE low	0	"
t_{HAR}	A_0 Valid after CE low	50	"

NOTE:

1. Test parameter t_{DD} is measured with the following load circuit and the access time is defined as the time required for an output to reach 0.4 V and 2.4 V for V_{OL} and V_{OH}, respectively.
2. Test parameters t_{HL} and t_{HD} are measured with the following load circuit and the float delay time are defined as the time required for an output to reach 0.8 V and 2.0 V from a logic "0" and from a logic "1", respectively.

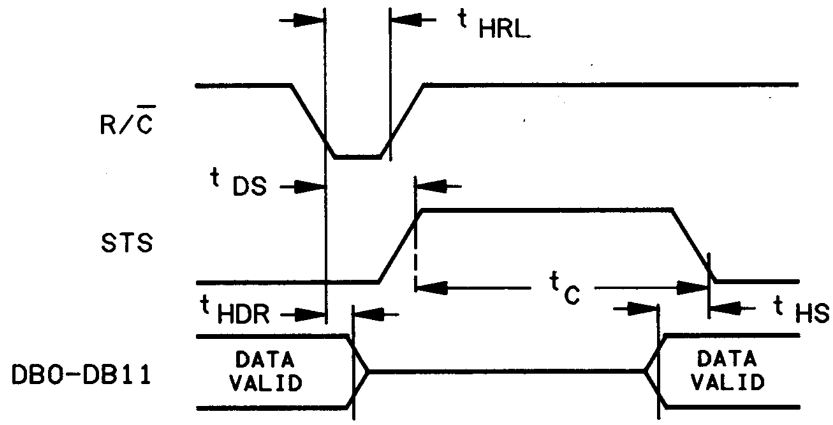


a. High-Z to Logic 1

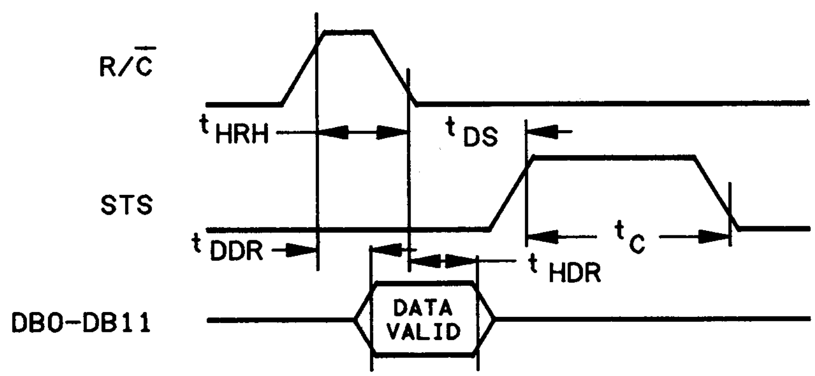


b. High-Z to Logic 0

FIGURE 10. Timing diagrams (system controlled operation) - Continued.



LOW PULSES FOR R/$\overline{C}$ -
OUTPUTS ENABLED AFTER CONVERSION



HIGH PULSE FOR R/$\overline{C}$ -
OUTPUTS ENABLED WHILE
R/$\overline{C}$ HIGH, OTHERWISE HIGH-Z

FIGURE 11. Timing diagrams (stand alone operation).

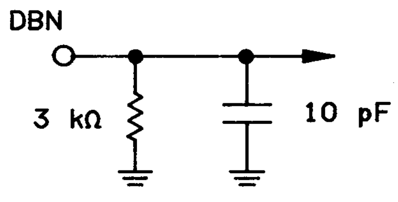
Test setup timing specifications

STAND ALONE MODE

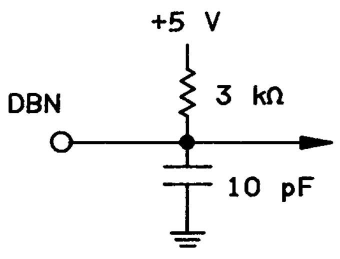
Symbol	Parameter	Min	Unit
t_{HRL}	Low R/$\overline{C}$ pulse width	350	ns
t_{HRH}	High R/$\overline{C}$ pulse width	250	"

NOTE: For stand-alone operation, CE is tied to logic "1",
12/$\overline{8}$ is wired to +5 V, and
$\overline{CS}$ and A_0 are tied to logic "0".

Test parameter t_{RR} is measured with the following load circuit and the access time is defined as the time required for an output to reach 0.4 V and 2.4 V for V_{OL} and V_{OH}, respectively.
Test parameter t_{HDR} is measured with the following load circuit and the float delay time is defined as the time required for an output to reach 0.8 V and 2.0 V from a logic "0" and from a logic "1", respectively.

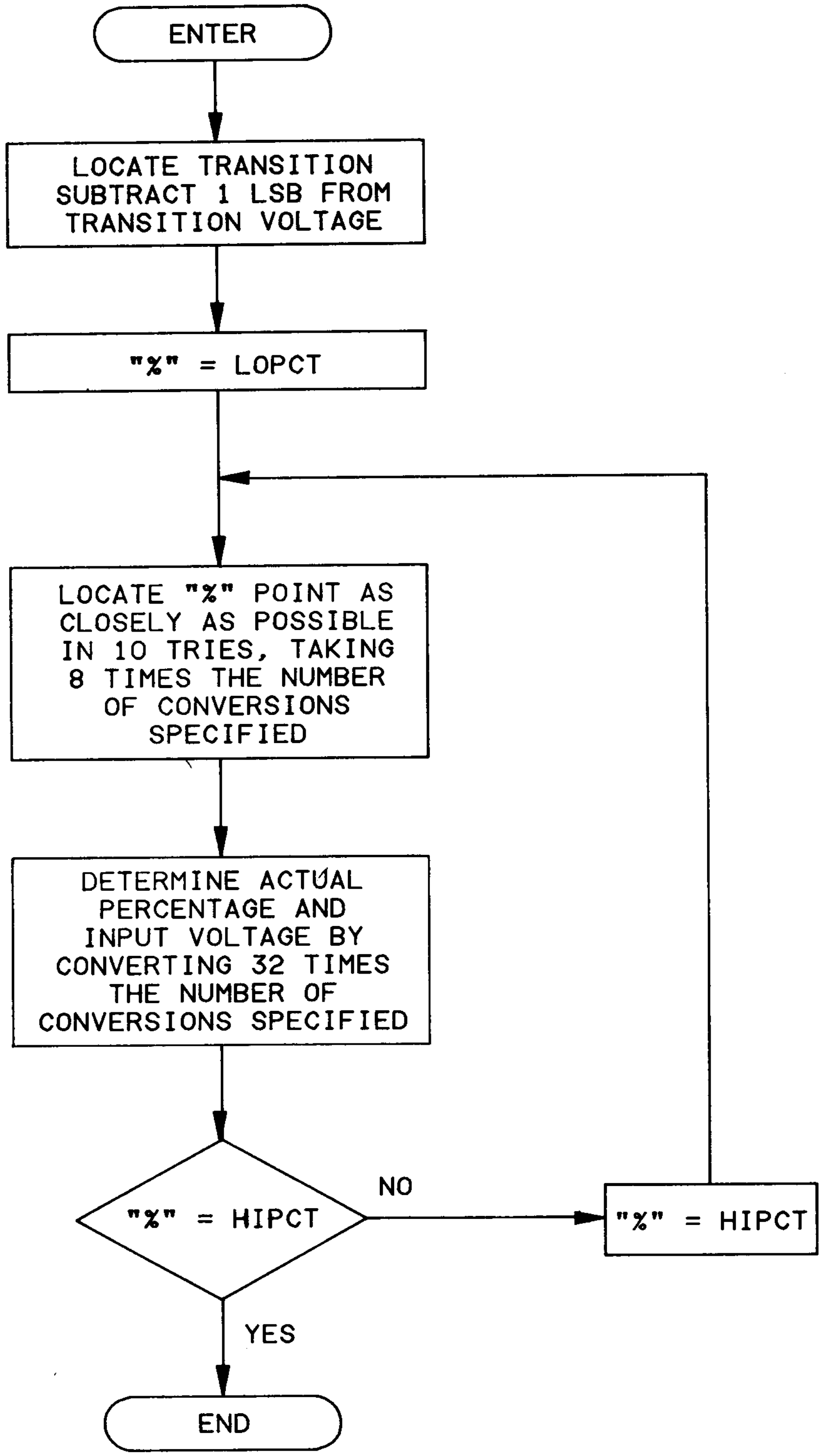


a. Logic 1 to High Z



b. Logic 0 to High Z

FIGURE 11. Timing diagrams (stand alone operation) - Continued.



NOTE: The transition uncertainty is measured from the point where 16% of the measured values are skewed to the left to a point where 16% of the measured values are skewed to the right.

FIGURE 12. Algorithm for measuring transition uncertainty.

TABLE III. Group A inspection for all device types.

Subgroup	Symbol	Test no.	Applied voltages ref. pin 9 (figures 6, 10) 7 V_{CC} (V)	11 V_{EE} (V)	1 V_{DD} (V)	13 V_{IN}(a) (V)	DUT digital output code-word 27<------------->16 MSB<------------>LSB	Measurement sense lines ref. pin 9 Pin	Value	Unit	Equations and notes		Limits Min	Max	Units
1 T_A = 25°C	I_{CC1}	1	+15.0	-15.0	+5.0	Max (-)	0000 0000 0000	7	I1	mA	I_{CC1} = I1	All device types	1	16	mA
	I_{CC2}	2	"	"	"	Max (+)	1111 1111 1111	7	I2	"	I_{CC2} = I2	"	1	16	"
	I_{EE1}	3	"	"	"	Max (-)	0000 0000 0000	11	I3	"	I_{EE1} = I3	"	-30	-1	"
	I_{EE2}	4	"	"	"	Max (+)	1111 1111 1111	11	I4	"	I_{EE2} = I4	"	-30	-1	"
	I_{LOG1}	5	"	"	"	Max (-)	0000 0000 0000	1	I5	"	I_{LOG1} = I5	"	1	40	"
	I_{LOG2}	6	"	"	"	Max (+)	1111 1111 1111	1	I6	"	I_{LOG2} = I6	"	1	40	"
	P_{d1}	7	"	"	"	Max (-)	0000 0000 0000				$P_{d1} = I_{CC1} * V_{CC} + I_{EE1} * V_{EE} + I_{LOG1} * V_{LOG}$		---	725	mW
	P_{d2}	8	"	"	"	Max (+)	1111 1111 1111				$P_{d2} = I_{CC2} * V_{CC} + I_{EE2} * V_{EE} + I_{LOG2} * V_{LOG}$		---	725	mW
	I_{IL1}	9	"	"	"	---	---- ---- ----	3	I7	mA	I_{IL1} = I7	$V_{IN(logic)}$ = 0.0 V All device types	-10	1	µA
	I_{IL2}	10	"	"	"	"	" " "	4	I8	"	I_{IL2} = I8		"	"	"
	I_{IL3}	11	"	"	"	"	" " "	5	I9	"	I_{IL3} = I9		"	"	"
	I_{IL4}	12	"	"	"	"	" " "	6	I10	"	I_{IL4} = I10		"	"	"
	I_{IH1}	13	"	"	"	"	" " "	3	I11	µA	I_{IH1} = I11	$V_{IN(logic)}$ = 2.4 V All device types	-1	10	"
	I_{IH2}	14	"	"	"	"	" " "	4	I12	"	I_{IH2} = I12		"	"	"
	I_{IH3}	15	"	"	"	"	" " "	5	I13	"	I_{IH3} = I13		"	"	"
	I_{IH4}	16	"	"	"	"	" " "	6	I14	"	I_{IH4} = I14		"	"	"
	I_{IH5}	17	"	"	"	"	" " "	3	I15	"	I_{IH5} = I15	$V_{IN(logic)}$ = 5.5 V All device types	"	"	"
	I_{IH6}	18	"	"	"	"	" " "	4	I16	"	I_{IH6} = I16		"	"	"
	I_{IH7}	19	"	"	"	"	" " "	5	I17	"	I_{IH7} = I17		"	"	"
	I_{IH8}	20	"	"	"	"	" " "	6	I18	"	I_{IH8} = I18		"	"	"
	I_{ZL1}	21	"	"	+5.5 V	Max (+)	1111 1111 1111	16	I19	"	I_{ZL1} = I19	V_O = 0.0 V $V_{R/\overline{C}}$ = logic "0" All device types	-10	10	"
	I_{ZL2}	22	"	"	"	"	" " "	17	I20	"	I_{ZL2} = I20		"	"	"
	I_{ZL3}	23	"	"	"	"	" " "	18	I21	"	I_{ZL3} = I21		"	"	"
	I_{ZL4}	24	"	"	"	"	" " "	19	I22	"	I_{ZL4} = I22		"	"	"
	I_{ZL5}	25	"	"	"	"	" " "	20	I23	"	I_{ZL5} = I23		"	"	"
	I_{ZL6}	26	"	"	"	"	" " "	21	I24	"	I_{ZL6} = I24		"	"	"
	I_{ZL7}	27	"	"	"	"	" " "	22	I25	"	I_{ZL7} = I25		"	"	"
	I_{ZL8}	28	"	"	"	"	" " "	23	I26	"	I_{ZL8} = I26		"	"	"
	I_{ZL9}	29	"	"	"	"	" " "	24	I27	"	I_{ZL9} = I27		"	"	"
	I_{ZL10}	30	"	"	"	"	" " "	25	I28	"	I_{ZL10} = I28		"	"	"
	I_{ZL11}	31	"	"	"	"	" " "	26	I29	"	I_{ZL11} = I29		"	"	"
	I_{ZL12}	32	"	"	"	"	" " "	27	I30	"	I_{ZL12} = I30		"	"	"
	I_{ZH1}	33	"	"	"	Max (-)	0000 0000 0000	16	I31	"	I_{ZH1} = I31	V_O = 5.5 V $V_{R/\overline{C}}$ = logic "0" All device types	"	"	"
	I_{ZH2}	34	"	"	"	"	" " "	17	I32	"	I_{ZH2} = I32		"	"	"
	I_{ZH3}	35	"	"	"	"	" " "	18	I33	"	I_{ZH3} = I33		"	"	"
	I_{ZH4}	36	"	"	"	"	" " "	19	I34	"	I_{ZH4} = I34		"	"	"
	I_{ZH5}	37	"	"	"	"	" " "	20	I35	"	I_{ZH5} = I35		"	"	"
	I_{ZH6}	38	"	"	"	"	" " "	21	I36	"	I_{ZH6} = I36		"	"	"
	I_{ZH7}	39	"	"	"	"	" " "	22	I37	"	I_{ZH7} = I37		"	"	"
	I_{ZH8}	40	"	"	"	"	" " "	23	I38	"	I_{ZH8} = I38		"	"	"
	I_{ZH9}	41	"	"	"	"	" " "	24	I39	"	I_{ZH9} = I39		"	"	"
	I_{ZH10}	42	"	"	"	"	" " "	25	I40	"	I_{ZH10} = I40		"	"	"
	I_{ZH11}	43	"	"	"	"	" " "	26	I41	"	I_{ZH11} = I41		"	"	"
	I_{ZH12}	44	"	"	"	"	" " "	27	I42	"	I_{ZH12} = I42		"	"	"

TABLE III. Group A inspection for all device types - Continued.

Subgroup	Symbol	Test no.	Applied voltages ref. pin 9 (figures 6, 10)				DUT digital output code-word	Measurement sense lines ref. pin no. 9			Equations and notes	Limits		Units
			7 V_{CC} (V)	11 V_{EE} (V)	1 V_{DD} (V)	13 V_{IN}(a) (V)	27<-------------->16 MSB<------------>LSB	Pin	Value	Unit		Min	Max	
1 $T_A = 25°C$	tc1	45	+15.0	-15.0	+5.0	Max (-)	0000 0000 0000	28	t1	s	tc1 = t1 8-bit cycle device types 01,02,03,04 device types 05, 06	10 6	29 11.5	µs "
	tc2	46	"	"	"	"	0000 0000 0000	28	t2	s	tc2 = t2 12-bit cycle device types 01,02,03,04 device types 05, 06	15 9	40 17	" "
	V_{OL1}	47	"	"	+4.5	"	" " "	16	E1	V	V_{OL1} = E1 I_L = 1.6 mA		0.4	V
	V_{OL2}	48	"	"	"	"	" " "	17	E2	"	V_{OL2} = E2 $V_{R/\overline{C}}$ = logic "0" -> "1"		"	"
	V_{OL3}	49	"	"	"	"	" " "	18	E3	"	V_{OL3} = E3 All device types		"	"
	V_{OL4}	50	"	"	"	"	" " "	19	E4	"	V_{OL4} = E4		"	"
	V_{OL5}	51	"	"	"	"	" " "	20	E5	"	V_{OL5} = E5		"	"
	V_{OL6}	52	"	"	"	"	" " "	21	E6	"	V_{OL6} = E6		"	"
	V_{OL7}	53	"	"	"	"	" " "	22	E7	"	V_{OL7} = E7		"	"
	V_{OL8}	54	"	"	"	"	" " "	23	E8	"	V_{OL8} = E8		"	"
	V_{OL9}	55	"	"	"	"	" " "	24	E9	"	V_{OL9} = E9		"	"
	V_{OL10}	56	"	"	"	"	" " "	25	E10	"	V_{OL10} = E10		"	"
	V_{OL11}	57	"	"	"	"	" " "	26	E11	"	V_{OL11} = E11		"	"
	V_{OL12}	58	"	"	"	"	" " "	27	E12	"	V_{OL12} = E12		"	"
	V_{OL13}	59	"	"	"	"	" " "	28	E13	"	V_{OL13} = E13		"	"
	V_{OH1}	60	"	"	"	Max (+)	1111 1111 1111	16	E14	"	V_{OH1} = E14 I_L = -0.5 mA	2.4		V
	V_{OH2}	61	"	"	"	"	" " "	17	E15	"	V_{OH2} = E15 $V_{R/\overline{C}}$ = logic "0" -> "1"	"		"
	V_{OH3}	62	"	"	"	"	" " "	18	E16	"	V_{OH3} = E16 All device types	"		"
	V_{OH4}	63	"	"	"	"	" " "	19	E17	"	V_{OH4} = E17	"		"
	V_{OH5}	64	"	"	"	"	" " "	20	E18	"	V_{OH5} = E18	"		"
	V_{OH6}	65	"	"	"	"	" " "	21	E19	"	V_{OH6} = E19	"		"
	V_{OH7}	66	"	"	"	"	" " "	22	E20	"	V_{OH7} = E20	"		"
	V_{OH8}	67	"	"	"	"	" " "	23	E21	"	V_{OH8} = E21	"		"
	V_{OH9}	68	"	"	"	"	" " "	24	E22	"	V_{OH9} = E22	"		"
	V_{OH10}	69	"	"	"	"	" " "	25	E23	"	V_{OH10} = E23	"		"
	V_{OH11}	70	"	"	"	"	" " "	26	E24	"	V_{OH11} = E24	"		"
	V_{OH12}	71	"	"	"	"	" " "	27	E25	"	V_{OH12} = E25	"		"
	V_{OH13}	72	"	"	"	"	" " "	28	E26	"	V_{OH13} = E26 (Figures 8, 9, 12)	"		"
	V_{REF}	73	"	"	+5.0	Max (-)	0000 0000 0000	8	E27	"	V_{REF} = E27 Bipolar, V_{FSR} = 20 V I_L = 1.5 mA device types 01, 02 03, 04, 05, 06	9.95 9.90	10.05 10.10	" "
	lm1	74	"	"	"	Max (+)	1111 1111 XXXX	27	E28	"	lm1a = E28 I_L = -0.5 mA	2.4		"
		75	"	"	"	"	" " "	26	E29	"	lm1b = E29 $V_{12/8}$ = 0.0 V	"		"
		76	"	"	"	"	" " "	25	E30	"	lm1c = E30 V_{AO} = logic "0"	"		"
		77	"	"	"	"	" " "	24	E31	"	lm1d = E31 $V_{R/\overline{C}}$ = logic "0" -> "1"	"		"
		78	"	"	"	"	" " "	23	E32	"	lm1e = E32 All device types	"		"
		79	"	"	"	"	" " "	22	E33	"	lm1f = E33	"		"
		80	"	"	"	"	" " "	21	E34	"	lm1g = E34	"		"
		81	"	"	"	"	" " "	20	E35	"	lm1h = E35	"		"
	lm2	82	"	"	"	"	XXXX 0000 1111	19	E36	"	lm2a = E36 I_L = -0.5 mA	2.4		"
		83	"	"	"	"	" " "	18	E37	"	lm2b = E37 V_{CE} = logic "0"	"		"
		84	"	"	"	"	" " "	17	E38	"	lm2c = E38 V_{AO} = logic "1"	"		"
		85	"	"	"	"	" " "	16	E39	"	lm2d = E39 $V_{\overline{CE}}$ = logic "1" All device types	"		"
	lm3	86	"	"	"	"	" " "	23	E40	"	lm3a = E40 I_L = 1.6 mA		0.4	"
		87	"	"	"	"	" " "	22	E41	"	lm3b = E41 All device types		"	"
		88	"	"	"	"	" " "	21	E42	"	lm3c = E42		"	"
		89	"	"	"	"	" " "	20	E43	"	lm3d = E43		"	"

TABLE III. Group A inspection for all device types - Continued.

Subgroup	Symbol	Test no.	Applied voltages ref. pin 9 (figures 6, 10) 7 V_{CC} (V)	11 V_{EE} (V)	1 V_{DD} (V)	13 $V_{IN}(a)$ (V)	DUT digital output code-word 27<------------->16 MSB<------------>LSB	Measurement sense lines ref. pin 9 Pin	Value	Unit	Equations and notes		Limits Min	Max	Units
1 T_A = 25°C	m4	90	+15.0	-15.0	+5.0	Max (+)	XXXX 0000 1111	27	I43	µA	m4a = I43	V_O = 0.4 V	-10	10	µA
		91	"	"	"	"	" " "	26	I44	"	m4b = I44	All device types	"	"	"
		92	"	"	"	"	" " "	25	I45	"	m4c = I45		"	"	"
		93	"	"	"	"	" " "	24	I46	"	m4d = I46		"	"	"
	m5	94	"	"	"	"	1111 1111 XXXX	19	I47	"	m5a = I47	V_O = 0.4 V	"	"	"
		95	"	"	"	"	" " "	18	I48	"	m5b = I48	V_{CE} = logic "0"	"	"	"
		96	"	"	"	"	" " "	17	I49	"	m5c = I49	V_{AO} = logic "0"	"	"	"
		97	"	"	"	"	" " "	16	I50	"	m5d = I50	$V_{\overline{CE}}$ = logic "1"	"	"	"
												All device types			
	$V_{R/\overline{C}}$	98	"	"	"	Max (-)	0000 0000 0000	16	E44	V	V_{OL14} = E44	$V_{R/\overline{C}}$ = .8 V (Init.)	(Logic "0")		
			"	"	"	"	" " "	17	E45	"	V_{OL15} = E45	$V_{R/\overline{C}}$ = 2.0 V (Conv.)	"		
			"	"	"	"	" " "	18	E46	"	V_{OL16} = E46	All device types	"		
			"	"	"	"	" " "	19	E47	"	V_{OL17} = E47		"		
			"	"	"	"	" " "	20	E48	"	V_{OL18} = E48		"		
			"	"	"	"	" " "	21	E49	"	V_{OL19} = E49		"		
			"	"	"	"	" " "	22	E50	"	V_{OL20} = E50		"		
			"	"	"	"	" " "	23	E51	"	V_{OL21} = E51		"		
			"	"	"	"	" " "	24	E52	"	V_{OL22} = E52		"		
			"	"	"	"	" " "	25	E53	"	V_{OL23} = E53		"		
			"	"	"	"	" " "	26	E54	"	V_{OL24} = E54		"		
			"	"	"	"	" " "	27	E55	"	V_{OL25} = E55		"		
			"	"	"	"	" " "	28	E56	"	V_{OL26} = E56		"		
	$V_{R/\overline{C}}$	99	"	"	"	Max (+)	1111 1111 1111	16	E57	"	V_{OH14} = E57	(Convert and read)	(Logic "1")		
			"	"	"	"	" " "	17	E58	"	V_{OH15} = E58	$V_{R/\overline{C}}$ = .8 V (Init.)	"		
			"	"	"	"	" " "	18	E59	"	V_{OH16} = E59	$V_{R/\overline{C}}$ = 2.0 V	"		
			"	"	"	"	" " "	19	E60	"	V_{OH17} = E60	All device types	"		
			"	"	"	"	" " "	20	E61	"	V_{OH18} = E61		"		
			"	"	"	"	" " "	21	E62	"	V_{OH19} = E62		"		
			"	"	"	"	" " "	22	E63	"	V_{OH20} = E63		"		
			"	"	"	"	" " "	23	E64	"	V_{OH21} = E64		"		
			"	"	"	"	" " "	24	E65	"	V_{OH22} = E65		"		
			"	"	"	"	" " "	25	E66	"	V_{OH23} = E66		"		
			"	"	"	"	" " "	26	E67	"	V_{OH24} = E67		"		
			"	"	"	"	" " "	27	E68	"	V_{OH25} = E68		"		
			"	"	"	"	" " "	28	E69	"	V_{OH26} = E69		"		
	V_{CE}	100	"	"	"	"	" " "	16	E70	"	V_{OH27} = E70	(Convert and read)	"		
			"	"	"	"	" " "	17	E71	"	V_{OH28} = E71	V_{CE} = .8 V (Init.)	"		
			"	"	"	"	" " "	18	E72	"	V_{OH29} = E72	$V_{\overline{CE}}$ = 2.0 V	"		
			"	"	"	"	" " "	19	E73	"	V_{OH30} = E73	All device types	"		
			"	"	"	"	" " "	20	E74	"	V_{OH31} = E74		"		
			"	"	"	"	" " "	21	E75	"	V_{OH32} = E75		"		
			"	"	"	"	" " "	22	E76	"	V_{OH33} = E76		"		
			"	"	"	"	" " "	23	E77	"	V_{OH34} = E77		"		
			"	"	"	"	" " "	24	E78	"	V_{OH35} = E78		"		
			"	"	"	"	" " "	25	E79	"	V_{OH36} = E79		"		
			"	"	"	"	" " "	26	E80	"	V_{OH37} = E80		"		
			"	"	"	"	" " "	27	E81	"	V_{OH38} = E81		"		
			"	"	"	"	" " "	28	E82	"	V_{OH39} = E82		"		
		101	"	"	"	Max (-)	" " "	16	E83	"	V_{OH40} = E83	V_{CE} = 0.8 V	"		
			"	"	"	"	" " "	17	E84	"	V_{OH41} = E84	$V_{IN(a)}$ = -7 mV	"		
			"	"	"	"	" " "	18	E85	"	V_{OH42} = E85	All device types	"		
			"	"	"	"	" " "	19	E86	"	V_{OH43} = E86		"		
			"	"	"	"	" " "	20	E87	"	V_{OH44} = E87		"		
			"	"	"	"	" " "	21	E88	"	V_{OH45} = E88		"		
			"	"	"	"	" " "	22	E89	"	V_{OH46} = E89		"		
			"	"	"	"	" " "	23	E90	"	V_{OH47} = E90		"		
			"	"	"	"	" " "	24	E91	"	V_{OH48} = E91		"		
			"	"	"	"	" " "	25	E92	"	V_{OH49} = E92		"		
			"	"	"	"	" " "	26	E93	"	V_{OH50} = E93		"		
			"	"	"	"	" " "	27	E94	"	V_{OH51} = E94		"		
			"	"	"	"	" " "	28	E95	"	V_{OH52} = E95		"		

TABLE III. Group A inspection for all device types - Continued.

Subgroup	Symbol	Test no.	Applied voltages ref. pin 9 (figures 6, 10)				DUT digital output code-word	Measurement sense lines ref. pin 9			Equations and notes		Limits		Units
			7 V_{CC} (V)	11 V_{EE} (V)	1 V_{DD} (V)	13 $V_{IN(a)}$ (V)	27<------------->16 MSB<----------->LSB	Pin	Value	Unit			Min	Max	
1 $T_A = 25°C$	V_{CE}	102	+15.0	-15.0	+5.0	Max (-)	0000 0000 0000	16	E96	V	V_{OL27} = E96	All device types	(Logic "0")		
			"	"	"	"	" " "	17	E97	"	V_{OL28} = E97	V_{CE} = 2.0 (convert	"		
			"	"	"	"	" " "	18	E98	"	V_{OL29} = E98	and read)	"		
			"	"	"	"	" " "	19	E99	"	V_{OL30} = E99		"		
			"	"	"	"	" " "	20	E100	"	V_{OL31} = E100		"		
			"	"	"	"	" " "	21	E101	"	V_{OL32} = E101		"		
			"	"	"	"	" " "	22	E102	"	V_{OL33} = E102		"		
			"	"	"	"	" " "	23	E103	"	V_{OL34} = E103		"		
			"	"	"	"	" " "	24	E104	"	V_{OL35} = E104		"		
			"	"	"	"	" " "	25	E105	"	V_{OL36} = E105		"		
			"	"	"	"	" " "	26	E106	"	V_{OL37} = E106		"		
			"	"	"	"	" " "	27	E107	"	V_{OL38} = E107		"		
			"	"	"	"	" " "	28	E108	"	V_{OL39} = E108		"		
	$V_{\overline{CS}}$	103	"	"	"	Max (+)	1111 1111 1111	16	E109	"	V_{OH53} = E109	All device types	(Logic "1")		
			"	"	"	"	" " "	17	E110	"	V_{OH54} = E110	V_{CE} = logic "1",	"		
			"	"	"	"	" " "	18	E111	"	V_{OH55} = E111	$V_{\overline{CS}}$ = 0.8 V, (convert	"		
			"	"	"	"	" " "	19	E112	"	V_{OH56} = E112	and read)	"		
			"	"	"	"	" " "	20	E113	"	V_{OH57} = E113		"		
			"	"	"	"	" " "	21	E114	"	V_{OH58} = E114		"		
			"	"	"	"	" " "	22	E115	"	V_{OH59} = E115		"		
			"	"	"	"	" " "	23	E116	"	V_{OH60} = E116		"		
			"	"	"	"	" " "	24	E117	"	V_{OH61} = E117		"		
			"	"	"	"	" " "	25	E118	"	V_{OH62} = E118		"		
			"	"	"	"	" " "	26	E119	"	V_{OH63} = E119		"		
			"	"	"	"	" " "	27	E120	"	V_{OH64} = E120		"		
			"	"	"	"	" " "	28	E121	"	V_{OH65} = E121		"		
		104	"	"	"	Max (-)	" " "	16	E122	"	V_{OH66} = E122	All device types	"		
			"	"	"	"	" " "	17	E123	"	V_{OH67} = E123	Set $V_{\overline{CS}}$ = 2.0 V	"		
			"	"	"	"	" " "	18	E124	"	V_{OH68} = E124	Set $V_{IN(a)}$ = -7 mV	"		
			"	"	"	"	" " "	19	E125	"	V_{OH69} = E125	Set V_{CE} = logic "1"	"		
			"	"	"	"	" " "	20	E126	"	V_{OH70} = E126	(read)	"		
			"	"	"	"	" " "	21	E127	"	V_{OH71} = E127		"		
			"	"	"	"	" " "	22	E128	"	V_{OH72} = E128		"		
			"	"	"	"	" " "	23	E129	"	V_{OH73} = E129		"		
			"	"	"	"	" " "	24	E130	"	V_{OH74} = E130		"		
			"	"	"	"	" " "	25	E131	"	V_{OH75} = E131		"		
			"	"	"	"	" " "	26	E132	"	V_{OH76} = E132		"		
			"	"	"	"	" " "	27	E133	"	V_{OH77} = E133		"		
			"	"	"	"	" " "	28	E134	"	V_{OH78} = E134		"		
		105	"	"	"	"	0000 0000 0000	16	E135	"	V_{OL40} = E135	All device types	(Logic "0")		
			"	"	"	"	" " "	17	E136	"	V_{OL41} = E136	$V_{\overline{CS}}$ = 0.8 V (convert	"		
			"	"	"	"	" " "	18	E137	"	V_{OL42} = E137	and read)	"		
			"	"	"	"	" " "	19	E138	"	V_{OL43} = E138		"		
			"	"	"	"	" " "	20	E139	"	V_{OL44} = E139		"		
			"	"	"	"	" " "	21	E140	"	V_{OL45} = E140		"		
			"	"	"	"	" " "	22	E141	"	V_{OL46} = E141		"		
			"	"	"	"	" " "	23	E142	"	V_{OL47} = E142		"		
			"	"	"	"	" " "	24	E143	"	V_{OL48} = E143		"		
			"	"	"	"	" " "	25	E144	"	V_{OL49} = E144		"		
			"	"	"	"	" " "	26	E145	"	V_{OL50} = E145		"		
			"	"	"	"	" " "	27	E146	"	V_{OL51} = E146		"		
			"	"	"	"	" " "	28	E147	"	V_{OL52} = E147		"		
	V_{AO}	106	"	"	"	"	1111 1111 XXXX	20	E148	"	V_{OH79} = E148	All device types	(Logic "1")		
			"	"	"	"	" " "	21	E149	"	V_{OH80} = E149	$V_{12/8}$ = 0.0 V	"		
			"	"	"	"	" " "	22	E150	"	V_{OH81} = E150	V_{AO} = 0.8 V, (convert	"		
			"	"	"	"	" " "	23	E151	"	V_{OH82} = E151	and read)			
		107	"	"	"	"	XXXX 0000 1111	20	E152	"	V_{OL53} = E152	All device types	(Logic "0")		
			"	"	"	"	" " "	21	E153	"	V_{OL54} = E153	V_{CE} = logic "0",	"		
			"	"	"	"	" " "	22	E154	"	V_{OL55} = E154	V_{AO} = 2.0 V,	"		
			"	"	"	"	" " "	23	E155	"	V_{OL56} = E155	V_{CE} = logic "1"	"		

TABLE III. Group A inspection for all device types - Continued.

Subgroup	Symbol	Test no.	Applied voltages ref. pin 9 (figures 6, 10) 7 V_{CC} (V)	11 V_{EE} (V)	1 V_{DD} (V)	Applied digital code-word 29<--------->40 MSB<------->LSB	DUT digital output code-word 27<--------->16 MSB<------->LSB	Measurement sense lines ref. pin 9 Pin	Value	Unit	Equations and notes	Limits Min	Max	Units
1 T_A = 25°C	$+P_{SS1}$		+15.0	-15.0	+5.0	0000 0000 0000	0000 0000 000ø	13	E156	V	All device types			
		108	+13.5	"	"	" " "	" " "	"	E157	"	$+P_{SS1a}$ = 41*(E156-E157)	-.10	+.10	LSB/%PS
		109	+16.5	"	"	" " "	" " "	"	E158	"	$+P_{SS1b}$ = 41*(E158-E156)	"	"	"
			+15.0	"	"	1111 1111 1110	1111 1111 111ø	"	E159	"				
		110	+13.5	"	"	" " "	" " "	"	E160	"	$+P_{SS1c}$ = 41*(E159-E160)	"	"	"
		111	+16.5	"	"	" " "	" " "	"	E161	"	$+P_{SS1d}$ = 41*(E161-E159)	"	"	"
	$+P_{SS2}$		+12.0	-12.0	"	0000 0000 0000	0000 0000 000ø	"	E162	"	All device types			
		112	+11.4	"	"	" " "	" " "	"	E163	"	$+P_{SS2a}$ = 81.9*(E162-E163)	-.20	+.20	"
		113	+12.6	"	"	" " "	" " "	"	E164	"	$+P_{SS2b}$ = 81.9*(E164-E162)	"	"	"
			+12.0	"	"	1111 1111 1110	1111 1111 111ø	"	E165	"				
		114	+11.4	"	"	" " "	" " "	"	E166	"	$+P_{SS2c}$ = 81.9*(E165-E166)	"	"	"
		115	+12.6	"	"	" " "	" " "	"	E167	"	$+P_{SS2d}$ = 81.9*(E167-E165)	"	"	"
	$+P_{SS3}$		+15.0	-15.0	"	0000 0000 0000	0000 0000 000ø	"	E168	"	All device types			
		116	"	"	+4.5	" " "	" " "	"	E169	"	$+P_{SS3a}$ = 41*(E168-E169)	-.10	+.10	"
		117	"	"	+5.5	" " "	" " "	"	E170	"	$+P_{SS3b}$ = 41*(E170-E168)	"	"	"
			"	"	+5.0	1111 1111 1110	1111 1111 111ø	"	E171	"				
		118	"	"	+4.5	" " "	" " "	"	E172	"	$+P_{SS3c}$ = 41*(E171-E172)	"	"	"
		119	"	"	+5.5	" " "	" " "	"	E173	"	$+P_{SS3d}$ = 41*(E173-E171)	"	"	"
	$-P_{SS1}$		+15.0	-15.0	+5.0	0000 0000 0000	0000 0000 000ø	"	E174	"	All device types			
		120	"	-16.5	"	" " "	" " "	"	E175	"	$-P_{SS1a}$ = 41*(E174-E175)	"	"	"
		121	"	-13.5	"	" " "	" " "	"	E176	"	$-P_{SS1b}$ = 41*(E176-E174)	"	"	"
			"	-15.0	"	1111 1111 1110	1111 1111 111ø	"	E177	"				
		122	"	-16.5	"	" " "	" " "	"	E178	"	$-P_{SS1c}$ = 41*(E177-E178)	"	"	"
		123	"	-13.5	"	" " "	" " "	"	E179	"	$-P_{SS1d}$ = 41*(E179-E177)	"	"	"
	$-P_{SS2}$		+12.0	-12.0	"	0000 0000 0000	0000 0000 000ø	"	E180	"	All device types			
		124	"	-12.6	"	" " "	" " "	"	E181	"	$-P_{SS2a}$ = 81.9*(E180-E181)	-.20	+.20	"
		125	"	-11.4	"	" " "	" " "	"	E182	"	$-P_{SS2b}$ = 81.9*(E182-E180)	"	"	"
			"	-12.0	"	1111 1111 1110	1111 1111 111ø	"	E183	"				
		126	"	-12.6	"	" " "	" " "	"	E184	"	$-P_{SS2c}$ = 81.9*(E183-E184)	"	"	"
		127	"	-11.4	"	" " "	" " "	"	E185	"	$-P_{SS2d}$ = 81.9*(E185-E183)	"	"	"
2 T_A = 125°C	(All test parameters, test conditions, equations and test limits in subgroup 2 are identical with those specified in table III, subgroup 1.)													
3 T_A = -55°C	(All test parameters, test conditions, equations and test limits in subgroup 3 are identical with those specified in table III, subgroup 1.)													

TABLE III. Group A inspection for all device types - Continued.

Subgroup	Symbol	Test no.	Applied voltages ref. pin 9 (figures 8, 10): 7 V_{CC} (V)	11 V_{EE} (V)	1 V_{DD} (V)	Applied digital code-word 29<--------->40 MSB<--------->LSB	DUT digital output code-word 29<--------->16 MSB<--------->LSB	Active relays	Measurement sense lines ref. pin 9: Pin	Value	Unit	Equations and notes	Limits: Min	Max	Units
4 T_A = 25°C	V_{IO}	382	+15.0	-15.0	+5.0	0000 0000 0000	0000 0000 000ø		13	E556	V	V_{IO} = 410*(E556) Device types 01, 02 03, 04, 05, 06	-0.5 -1.5	1.5 2.5	LSB "
	B_Z	383	"	"	"	0111 1111 1111	øøøø øøøø øøøø	KA	"	E557	"	B_Z = 410*(E557) All device types	-4.5	3.5	"
	A_E	384	" "	" "	" "	0000 0000 0000 1111 1111 1110	0000 0000 000ø 1111 1111 111ø		" "	E558 E559	" "	A_E = 100*(9.995-(E559-E558) Device type 01 /(E559-E558)) Device type 02 03, 04, 05, 06	-.125 -.25 -.3	.125 .25 .3	%/FSR " "
	B_{PAE}	385	" "	" "	" "	0000 0000 0000 1111 1111 1110	0000 0000 000ø 1111 1111 111ø	KA "	" "	E560 E561	" "	B_{PAE} = 100*(19.990*(E560-E559) Device type 01 /(E560-E559)) Device type 02 03, 04, 05, 06	-0.125 -0.25 -0.3	0.125 0.25 0.3	" " "
												For end-point linearity error,			
												L_E(N) = ((E(N+562)+E(N+563))/2-V(ideal))/S			
												V(ideal) = N1*S+E563-S/2 N1 = Applied ref DAC			
			"	"	"	1111 1111 1110	1111 1111 111ø	"	"	E562	"	code-word; S = (E563-E563)/4094			
			"	"	"	0000 0000 0000	0000 0000 000ø	"	"	E563	"	All device types	-.5	.5	LSB
	L_{E1}	386	"	"	"	0000 0000 0001	0000 0000 00øø	"	"	E564	"	L_{E1} = ((E563+E564)/2-1*S-E563 +S/2)/S	"	"	"
	L_{E2}	387	"	"	"	0000 0000 0010	0000 0000 001ø	"	"	E565	"	L_{E2} = ((E564+E565)/2-2*S-E563 +S/2)/S	"	"	"
			"	"	"	0000 0000 0011	0000 0000 0øøø	"	"	E566	"				
	L_{E3}	388	"	"	"	0000 0000 0100	0000 0000 010ø	"	"	E567	"	L_{E3} = ((E566+E567)/2-4*S-E563 +S/2)/S	"	"	"
			"	"	"	0000 0000 0111	0000 0000 øøøø	"	"	E568	"				
	L_{E4}	389	"	"	"	0000 0000 1000	0000 0000 100ø	"	"	E569	"	L_{E4} = ((E568+E569)/2-8*S-E563 +S/2)/S	"	"	"
			"	"	"	0000 0000 1111	0000 000ø øøøø	"	"	E570	"				
	L_{E5}	390	"	"	"	0000 0001 0000	0000 0001 000ø	"	"	E571	"	L_{E5} = ((E570+E571)/2-16*S-E563 +S/2)/S	"	"	"
			"	"	"	0000 0001 1111	0000 00øø øøøø	"	"	E572	"				
	L_{E6}	391	"	"	"	0000 0010 0000	0000 0010 000ø	"	"	E573	"	L_{E6} = ((E572+E573)/2-32*S-E563 +S/2)/S	"	"	"
			"	"	"	0000 0011 1111	0000 0øøø øøøø	"	"	E574	"				
	L_{E7}	392	"	"	"	0000 0100 0000	0000 0100 000ø	"	"	E575	"	L_{E7} = ((E574+E575)/2-64*S-E563 +S/2)/S	"	"	"
			"	"	"	0000 0111 1111	0000 øøøø øøøø	"	"	E576	"				
	L_{E8}	393	"	"	"	0000 1000 0000	0000 1000 000ø	"	"	E577	"	L_{E8} = ((E576+E577)/2-128*S-E563 +S/2)/S	"	"	"
			"	"	"	0000 1111 1111	000ø øøøø øøøø	"	"	E578	"				
	L_{E9}	394	"	"	"	0001 0000 0000	0001 0000 000ø	"	"	E579	"	L_{E9} = ((E578+E579)/2-256*S-E563 +S/2)/S	"	"	"
			"	"	"	0001 1111 1111	00øø øøøø øøøø	"	"	E580	"				
	L_{E10}	395	"	"	"	0010 0000 0000	0010 0000 000ø	"	"	E581	"	L_{E10} = ((E580+E581)/2-512*S-E563 +S/2)/S	"	"	"
			"	"	"	0010 1111 1111	001ø øøøø øøøø	"	"	E582	"				
	L_{E11}	396	"	"	"	0011 0000 0000	0011 0000 000ø	"	"	E583	"	L_{E11} = ((E582+E583)/2-768*S-E563 +S/2)/S	"	"	"
			"	"	"	0011 1111 1111	0øøø øøøø øøøø	"	"	E584	"				
	L_{E12}	397	"	"	"	0100 0000 0000	0100 0000 000ø	"	"	E585	"	L_{E12} = ((E584+E585)/2-1024*S-E563 +S/2)/S	"	"	"
			"	"	"	0100 1111 1111	010ø øøøø øøøø	"	"	E586	"				
	L_{E13}	398	"	"	"	0101 0000 0000	0101 0000 000ø	"	"	E587	"	L_{E13} = ((E586+E587)/2-1280*S-E563 +S/2)/S	"	"	"
			"	"	"	0101 1111 1111	01øø øøøø øøøø	"	"	E588	"				
	L_{E14}	399	"	"	"	0110 0000 0000	0110 0000 000ø	"	"	E589	"	L_{E14} = ((E588+E589)/2-1536*S-E563 +S/2)/S	"	"	"
			"	"	"	0110 1111 1111	011ø øøøø øøøø	"	"	E590	"				
	L_{E15}	400	"	"	"	0111 0000 0000	0111 0000 000ø	"	"	E591	"	L_{E15} = ((E590+E591)/2-1792*S-E563 +S/2)/S	"	"	"
			"	"	"	0111 1111 1111	øøøø øøøø øøøø	"	"	E592	"				
	L_{E16}	401	"	"	"	1000 0000 0000	1000 0000 000ø	"	"	E593	"	L_{E16} = ((E592+E593)/2-2048*S-E563 +S/2)/S	"	"	"
			"	"	"	1000 1111 1111	100ø øøøø øøøø	"	"	E594	"				
	L_{E17}	402	"	"	"	1001 0000 0000	1001 0000 000ø	"	"	E595	"	L_{E17} = ((E594+E595)/2-2304*S-E563 +S/2)/S	"	"	"
			"	"	"	1001 1111 1111	10øø øøøø øøøø	"	"	E596	"				
	L_{E18}	403	"	"	"	1010 0000 0000	1010 0000 000ø	"	"	E597	"	L_{E18} = ((E596+E597)/2-2560*S-E563 +S/2)/S	"	"	"
			"	"	"	1010 1111 1111	101ø øøøø øøøø	"	"	E598	"				
	L_{E19}	404	"	"	"	1011 0000 0000	1011 0000 000ø	"	"	E599	"	L_{E19} = ((E598+E599)/2-2816*S-E563 +S/2)/S	"	"	"
			"	"	"	1011 1111 1111	1øøø øøøø øøøø	"	"	E600	"				
	L_{E20}	405	"	"	"	1100 0000 0000	1100 0000 000ø	"	"	E601	"	L_{E20} = ((E600+E601)/2-3072*S-E563 +S/2)/S	"	"	"
			"	"	"	1100 1111 1111	110ø øøøø øøøø	"	"	E602	"				
	L_{E21}	406	"	"	"	1101 0000 0000	1101 0000 000ø	"	"	E603	"	L_{E21} = ((E602+E603)/2-3328*S-E563 +S/2)/S	"	"	"
			"	"	"	1101 1111 1111	11øø øøøø øøøø	"	"	E604	"				
	L_{E22}	407	"	"	"	1110 0000 0000	1110 0000 000ø	"	"	E605	"	L_{E22} = ((E604+E605)/2-3584*S-E563 +S/2)/S	"	"	"
			"	"	"	1110 1111 1111	111ø øøøø øøøø	"	"	E606	"				
	L_{E23}	408	"	"	"	1111 0000 0000	1111 0000 000ø	"	"	E607	"	L_{E23} = ((E606+E607)/2-3840*S-E563 +S/2)/S	"	"	"
			"	"	"	1111 0111 1111	1111 øøøø øøøø	"	"	E608	"				
	L_{E24}	409	"	"	"	1111 1000 0000	1111 1000 000ø	"	"	E609	"	L_{E24} = ((E608+E609)/2-3968*S-E563 +S/2)/S	"	"	"
			"	"	"	1111 1011 1111	1111 1øøø øøøø	"	"	E610	"				
	L_{E25}	410	"	"	"	1111 1100 0000	1111 1100 000ø	"	"	E611	"	L_{E25} = ((E610+E611)/2-4032*S-E563 +S/2)/S	"	"	"
			"	"	"	1111 1101 1111	1111 11øø øøøø	"	"	E612	"				
	L_{E26}	411	"	"	"	1111 1110 0000	1111 1110 000ø	"	"	E613	"	L_{E26} = ((E612+E613)/2-4064*S-E563 +S/2)/S	"	"	"
			"	"	"	1111 1110 1111	1111 111ø øøøø	"	"	E614	"				
	L_{E27}	412	"	"	"	1111 1111 0000	1111 1111 000ø	"	"	E615	"	L_{E27} = ((E614+E615)/2-4080*S-E563 +S/2)/S	"	"	"
			"	"	"	1111 1111 0111	1111 1111 øøøø	"	"	E616	"				
	L_{E28}	413	"	"	"	1111 1111 1000	1111 1111 100ø	"	"	E617	"	L_{E28} = ((E616+E617)/2-4088*S-E563 +S/2)/S	"	"	"
			"	"	"	1111 1111 1011	1111 1111 1øøø	"	"	E618	"				
	L_{E29}	414	"	"	"	1111 1111 1100	1111 1111 110ø	"	"	E619	"	L_{E29} = ((E618+E619)/2-4092*S-E563 +S/2)/S	"	"	"
			"	"	"	1111 1111 1101	1111 1111 11øø	"	"	E620	"				
	L_{E30}	415	"	"	"	1111 1111 1110	1111 1111 111ø	"	"	E621	"	L_{E30} = ((E620+E621)/2-4094*S-E563 +S/2)/S	"	"	"

TABLE III. Group A inspection for all device types - Continued.

Subgroup	Symbol	Test no.	Applied voltages ref. pin 9 (figures 8, 10) 7 V_{CC} (V)	11 V_{EE} (V)	1 V_{DD} (V)	Applied digital code-word 29<---------->40 MSB<--------->LSB	DUT digital output code-word 29<---------->16 MSB<--------->LSB	Active relays	Measurement sense lines ref. pin 9 Pin	Value	Unit	Equations and notes	Limits Min	Max	Units
4 T_A = 25°C												For differential linearity error, $D_{LE}(N) = (E(N+563) - E(N+562))/S$ $S = (562-E563)/4094$, All device types			
	D_{LE1}	416	+15.0	-15.0	+5.0	0000 0000 0001	0000 0000 00ØØ	KA	13		V	D_{LE1} = (E564-E563)/S	-.9	1.0	LSB
	D_{LE2}	417	"	"	"	0000 0000 0010	0000 0000 001Ø	"	"		"	D_{LE2} = (E565-E564)/S	"	"	"
	D_{LE3}	418	"	"	"	0000 0000 0100	0000 0000 010Ø	"	"		"	D_{LE3} = (E567-E566)/S	"	"	"
	D_{LE4}	419	"	"	"	0000 0000 1000	0000 0000 100Ø	"	"		"	D_{LE4} = (E569-E568)/S	"	"	"
	D_{LE5}	420	"	"	"	0000 0001 0000	0000 0001 000Ø	"	"		"	D_{LE5} = (E571-E570)/S	"	"	"
	D_{LE6}	421	"	"	"	0000 0010 0000	0000 0010 000Ø	"	"		"	D_{LE6} = (E573-E572)/S	"	"	"
	D_{LE7}	422	"	"	"	0000 0100 0000	0000 0100 000Ø	"	"		"	D_{LE7} = (E575-E574)/S	"	"	"
	D_{LE8}	423	"	"	"	0000 1000 0000	0000 1000 000Ø	"	"		"	D_{LE8} = (E577-E576)/S	"	"	"
	D_{LE9}	424	"	"	"	0001 0000 0000	0001 0000 000Ø	"	"		"	D_{LE9} = (E579-E578)/S	"	"	"
	D_{LE10}	425	"	"	"	0010 0000 0000	0010 0000 000Ø	"	"		"	D_{LE10} = (E581-E580)/S	"	"	"
	D_{LE11}	426	"	"	"	0011 0000 0000	0011 0000 000Ø	"	"		"	D_{LE11} = (E583-E582)/S	"	"	"
	D_{LE12}	427	"	"	"	0100 0000 0000	0100 0000 000Ø	"	"		"	D_{LE12} = (E585-E584)/S	"	"	"
	D_{LE13}	428	"	"	"	0101 0000 0000	0101 0000 000Ø	"	"		"	D_{LE13} = (E587-E586)/S	"	"	"
	D_{LE14}	429	"	"	"	0110 0000 0000	0110 0000 000Ø	"	"		"	D_{LE14} = (E589-E588)/S	"	"	"
	D_{LE15}	430	"	"	"	0111 0000 0000	0111 0000 000Ø	"	"		"	D_{LE15} = (E591-E590)/S	"	"	"
	D_{LE16}	431	"	"	"	1000 0000 0000	1000 0000 000Ø	"	"		"	D_{LE16} = (E593-E592)/S	"	"	"
	D_{LE17}	432	"	"	"	1001 0000 0000	1001 0000 000Ø	"	"		"	D_{LE17} = (E595-E594)/S	"	"	"
	D_{LE18}	433	"	"	"	1010 0000 0000	1010 0000 000Ø	"	"		"	D_{LE18} = (E597-E596)/S	"	"	"
	D_{LE19}	434	"	"	"	1011 0000 0000	1011 0000 000Ø	"	"		"	D_{LE19} = (E599-E598)/S	"	"	"
	D_{LE20}	435	"	"	"	1100 0000 0000	1100 0000 000Ø	"	"		"	D_{LE20} = (E601-E600)/S	"	"	"
	D_{LE21}	436	"	"	"	1101 0000 0000	1101 0000 000Ø	"	"		"	D_{LE21} = (E603-E602)/S	"	"	"
	D_{LE22}	437	"	"	"	1110 0000 0000	1110 0000 000Ø	"	"		"	D_{LE22} = (E605-E604)/S	"	"	"
	D_{LE23}	438	"	"	"	1111 0000 0000	1111 0000 000Ø	"	"		"	D_{LE23} = (E607-E606)/S	"	"	"
	D_{LE24}	439	"	"	"	1111 1000 0000	1111 1000 000Ø	"	"		"	D_{LE24} = (E609-E608)/S	"	"	"
	D_{LE25}	440	"	"	"	1111 1100 0000	1111 1100 000Ø	"	"		"	D_{LE25} = (E611-E610)/S	"	"	"
	D_{LE26}	441	"	"	"	1111 1110 0000	1111 1110 000Ø	"	"		"	D_{LE26} = (E613-E612)/S	"	"	"
	D_{LE27}	442	"	"	"	1111 1111 0000	1111 1111 000Ø	"	"		"	D_{LE27} = (E615-E614)/S	"	"	"
	D_{LE28}	443	"	"	"	1111 1111 1000	1111 1111 100Ø	"	"		"	D_{LE28} = (E617-E616)/S	"	"	"
	D_{LE29}	444	"	"	"	1111 1111 1100	1111 1111 110Ø	"	"		"	D_{LE29} = (E619-E618)/S	"	"	"
	D_{LE30}	445	"	"	"	1111 1111 1110	1111 1111 111Ø	"	"		"	D_{LE30} = (E621-E620)/S	"	"	"
	M_{CC}	446	"	"	"	V_{IN}(analog) = Max (-) through Max (+)	0000 0000 0000 through 1111 1111 1111		M_{CC} = number of missing output codes from 0000 0000 0000 to 1111 1111 1111. (Figures 6, 7), all device types					0	Codes
5 T_A = 125°C	dV_{IO}/dT	447	"	"	"	0000 0000 0000	0000 0000 000Ø		13	E622	V	dV_{IO}/dT = 410* (E622-E556) Device types 01, 02 Device types 03,04,05,06	-0.5 -1.0	0.5 1.0	LSB "
	dBZ/dT	448	"	"	"	0111 1111 1111	ØØØØ ØØØØ ØØØØ	KA	"	E623	"	dBZ/dT = 410* (E623-E557) Device types 01, 03, 05 Device types 02, 04, 06	-1.0 -2.0	1.0 2.0	" "
	dAE/dT	449	"	"	"	0000 0000 0000 1111 1111 1110	0000 0000 000Ø 1111 1111 111Ø		" "	E624 E625	" "	$dAE/dT = 9.995*10^6* \left(\frac{1}{E624-E625} - \frac{1}{E559-E558}\right)$ Device types 01, 03, 05 Device types 02, 04, 06	-12.5 -25	12.5 25	ppm/°C "
	$dBPAE/dT$	450	"	"	"	0000 0000 0000 1111 1111 1110	0000 0000 000Ø 1111 1111 111Ø	KA "	" "	E626 E627	" "	$dBPAE/dT = 19.99*10^6* \left(\frac{1}{E627-E626} - \frac{1}{E561-E560}\right)$ Device types 01, 03, 05 Device types 02, 04, 06	-12.5 -25	12.5 25	ppm/°C "

TABLE III. Group A inspection for all device types - Continued.

Subgroup	Symbol	Test no.	Applied voltages ref. pin 9 (figures 8, 10) 7 V_{CC} (V)	11 V_{EE} (V)	1 V_{DD} (V)	Applied digital code-word 29<--------->40 MSB<-------->LSB	DUT digital output code-word 29<--------->16 MSB<-------->LSB	Active relays	Measurement sense lines ref. pin 9 Pin	Value	Unit	Equations and notes	Limits Min	Max	Units
5 T_A = 125°C												For end-point linearity error, $L_E(N)$ = ((E(N+628)+E(N+629))/2-V(ideal))/S V(ideal) = N1* S+E629-S/2 N1 - Applied ref DAC code-word S = (E628-E629)/4094 All device types			
			+15.0	-15.0	+5.0	1111 1111 1110	1111 1111 111ø	KA	13	E628	V				
			"	"	"	0000 0000 0000	0000 0000 000ø	"	"	E629	"				
	L_{E1}	451	"	"	"	0000 0000 0001	0000 0000 00øø	"	"	E630	"	L_{E1} = ((E629+E630)/2-1*S-E629+S/2)/S	-1.0	1.0	LSB
	L_{E2}	452	"	"	"	0000 0000 0010	0000 0000 001ø	"	"	E631	"	L_{E2} = ((E630+E631)/2-2*S-E629+S/2)/S	"	"	"
			"	"	"	0000 0000 0011	0000 0000 0øøø	"	"	E632	"				
	L_{E3}	453	"	"	"	0000 0000 0100	0000 0000 010ø	"	"	E633	"	L_{E3} = ((E632+E633)/2-4*S-E629+S/2)/S	"	"	"
			"	"	"	0000 0000 0111	0000 0000 øøøø	"	"	E634	"				
	L_{E4}	454	"	"	"	0000 0000 1000	0000 0000 100ø	"	"	E635	"	L_{E4} = ((E634+E635)/2-8*S-E629+S/2)/S	"	"	"
			"	"	"	0000 0000 1111	0000 000ø øøøø	"	"	E636	"				
	L_{E5}	455	"	"	"	0000 0001 0000	0000 0001 000ø	"	"	E637	"	L_{E5} = ((E636+E637)/2-16*S-E629+S/2)/S	"	"	"
			"	"	"	0000 0001 1111	0000 00øø øøøø	"	"	E638	"				
	L_{E6}	456	"	"	"	0000 0010 0000	0000 0010 000ø	"	"	E639	"	L_{E6} = ((E638+E639)/2-32*S-E629+S/2)/S	"	"	"
			"	"	"	0000 0011 1111	0000 0øøø øøøø	"	"	E640	"				
	L_{E7}	457	"	"	"	0000 0100 0000	0000 0100 000ø	"	"	E641	"	L_{E7} = ((E640+E641)/2-64*S-E629+S/2)/S	"	"	"
			"	"	"	0000 0111 1111	0000 øøøø øøøø	"	"	E642	"				
	L_{E8}	458	"	"	"	0000 1000 0000	0000 1000 000ø	"	"	E643	"	L_{E8} = ((E642+E643)/2-128*S-E629+S/2)/S	"	"	"
			"	"	"	0000 1111 1111	000ø øøøø øøøø	"	"	E644	"				
	L_{E9}	459	"	"	"	0001 0000 0000	0001 0000 000ø	"	"	E645	"	L_{E9} = ((E644+E645)/2-256*S-E629+S/2)/S	"	"	"
			"	"	"	0001 1111 1111	00øø øøøø øøøø	"	"	E646	"				
	L_{E10}	460	"	"	"	0010 0000 0000	0010 0000 000ø	"	"	E647	"	L_{E10} = ((E646+E647)/2-512*S-E629+S/2)/S	"	"	"
			"	"	"	0010 1111 1111	001ø øøøø øøøø	"	"	E648	"				
	L_{E11}	461	"	"	"	0011 0000 0000	0011 0000 000ø	"	"	E649	"	L_{E11} = ((E648+E649)/2-768*S-E629+S/2)/S	"	"	"
			"	"	"	0011 1111 1111	0øøø øøøø øøøø	"	"	E650	"				
	L_{E12}	462	"	"	"	0100 0000 0000	0100 0000 000ø	"	"	E651	"	L_{E12} = ((E650+E651)/2-1024*S-E629+S/2)/S	"	"	"
			"	"	"	0100 1111 1111	010ø øøøø øøøø	"	"	E652	"				
	L_{E13}	463	"	"	"	0101 0000 0000	0101 0000 000ø	"	"	E653	"	L_{E13} = ((E652+E653)/2-1280*S-E629+S/2)/S	"	"	"
			"	"	"	0101 1111 1111	01øø øøøø øøøø	"	"	E654	"				
	L_{E14}	464	"	"	"	0110 0000 0000	0110 0000 000ø	"	"	E655	"	L_{E14} = ((E654+E655)/2-1536*S-E629+S/2)/S	"	"	"
			"	"	"	0110 1111 1111	011ø øøøø øøøø	"	"	E656	"				
	L_{E15}	465	"	"	"	0111 0000 0000	0111 0000 000ø	"	"	E657	"	L_{E15} = ((E656+E657)/2-1792*S-E629+S/2)/S	"	"	"
			"	"	"	0111 1111 1111	øøøø øøøø øøøø	"	"	E658	"				
	L_{E16}	466	"	"	"	1000 0000 0000	1000 0000 000ø	"	"	E659	"	L_{E16} = ((E658+E659)/2-2048*S-E629+S/2)/S	"	"	"
			"	"	"	1000 1111 1111	100ø øøøø øøøø	"	"	E660	"				
	L_{E17}	467	"	"	"	1001 0000 0000	1001 0000 000ø	"	"	E661	"	L_{E17} = ((E660+E661)/2-2304*S-E629+S/2)/S	"	"	"
			"	"	"	1001 1111 1111	10øø øøøø øøøø	"	"	E662	"				
	L_{E18}	468	"	"	"	1010 0000 0000	1010 0000 000ø	"	"	E663	"	L_{E18} = ((E662+E663)/2-2560*S-E629+S/2)/S	"	"	"
			"	"	"	1010 1111 1111	101ø øøøø øøøø	"	"	E664	"				
	L_{E19}	469	"	"	"	1011 0000 0000	1011 0000 000ø	"	"	E665	"	L_{E19} = ((E664+E665)/2-2816*S-E629+S/2)/S	"	"	"
			"	"	"	1011 1111 1111	1øøø øøøø øøøø	"	"	E666	"				
	L_{E20}	470	"	"	"	1100 0000 0000	1100 0000 000ø	"	"	E667	"	L_{E20} = ((E666+E667)/2-3072*S-E629+S/2)/S	"	"	"
			"	"	"	1100 1111 1111	110ø øøøø øøøø	"	"	E668	"				
	L_{E21}	471	"	"	"	1101 0000 0000	1101 0000 000ø	"	"	E669	"	L_{E21} = ((E668+E669)/2-3328*S-E629+S/2)/S	"	"	"
			"	"	"	1101 1111 1111	11øø øøøø øøøø	"	"	E670	"				
	L_{E22}	472	"	"	"	1110 0000 0000	1110 0000 000ø	"	"	E671	"	L_{E22} = ((E670+E671)/2-3584*S-E629+S/2)/S	"	"	"
			"	"	"	1110 1111 1111	111ø øøøø øøøø	"	"	E672	"				
	L_{E23}	473	"	"	"	1111 0000 0000	1111 0000 000ø	"	"	E673	"	L_{E23} = ((E672+E673)/2-3840*S-E629+S/2)/S	"	"	"
			"	"	"	1111 0111 1111	1111 øøøø øøøø	"	"	E674	"				
	L_{E24}	474	"	"	"	1111 1000 0000	1111 1000 000ø	"	"	E675	"	L_{E24} = ((E674+E675)/2-3968*S-E629+S/2)/S	"	"	"
			"	"	"	1111 1011 1111	1111 1øøø øøøø	"	"	E676	"				
	L_{E25}	475	"	"	"	1111 1100 0000	1111 1100 000ø	"	"	E677	"	L_{E25} = ((E676+E677)/2-4032*S-E629+S/2)/S	"	"	"
			"	"	"	1111 1101 1111	1111 11øø øøøø	"	"	E678	"				
	L_{E26}	476	"	"	"	1111 1110 0000	1111 1110 000ø	"	"	E679	"	L_{E26} = ((E678+E679)/2-4064*S-E629+S/2)/S	"	"	"
			"	"	"	1111 1110 1111	1111 111ø øøøø	"	"	E680	"				
	L_{E27}	477	"	"	"	1111 1111 0000	1111 1111 000ø	"	"	E681	"	L_{E27} = ((E680+E681)/2-4080*S-E629+S/2)/S	"	"	"
			"	"	"	1111 1111 0111	1111 1111 øøøø	"	"	E682	"				
	L_{E28}	478	"	"	"	1111 1111 1000	1111 1111 100ø	"	"	E683	"	L_{E28} = ((E682+E683)/2-4088*S-E629+S/2)/S	"	"	"
			"	"	"	1111 1111 1011	1111 1111 1øøø	"	"	E684	"				
	L_{E29}	479	"	"	"	1111 1111 1100	1111 1111 110ø	"	"	E685	"	L_{E29} = ((E684+E685)/2-4092*S-E629+S/2)/S	"	"	"
			"	"	"	1111 1111 1101	1111 1111 11øø	"	"	E686	"				
	L_{E30}	480	"	"	"	1111 1111 1110	1111 1111 111ø	"	"	E687	"	L_{E30} = ((E686+E687)/2-4094*S-E629+S/2)/S	"	"	"

TABLE III. Group A inspection for all device types - Continued.

Subgroup	Symbol	Test no.	Applied voltages ref. pin 9 (figures 8, 10)			Applied digital code-word	DUT digital output code-word	Active relays	Measurement sense lines ref. pin 9			Equations and notes	Limits		Units
			7 V_{CC} (V)	11 V_{EE} (V)	1 V_{DD} (V)	29<---------->40 MSB<--------->LSB	29<---------->16 MSB<--------->LSB		Pin	Value	Unit		Min	Max	
5 T_A = 125°C												For differential linearity error, $D_{LE}(N)$ = (E(N+629)-E(N+628))/S S = (E628-E629)/4094 All device types			
	D_{LE1}	481	+15.0	-15.0	+5.0	0000 0000 0001	0000 0000 00øø	KA	13		V	D_{LE1} = (E630-E629)/S	-.9	2.0	LSB
	D_{LE2}	482	"	"	"	0000 0000 0010	0000 0000 001ø	"	"		"	D_{LE2} = (E631-E630)/S	"	"	"
	D_{LE3}	483	"	"	"	0000 0000 0100	0000 0000 010ø	"	"		"	D_{LE3} = (E633-E632)/S	"	"	"
	D_{LE4}	484	"	"	"	0000 0000 1000	0000 0000 100ø	"	"		"	D_{LE4} = (E635-E634)/S	"	"	"
	D_{LE5}	485	"	"	"	0000 0001 0000	0000 0001 000ø	"	"		"	D_{LE5} = (E637-E636)/S	"	"	"
	D_{LE6}	486	"	"	"	0000 0010 0000	0000 0010 000ø	"	"		"	D_{LE6} = (E639-E638)/S	"	"	"
	D_{LE7}	487	"	"	"	0000 0100 0000	0000 0100 000ø	"	"		"	D_{LE7} = (E641-E640)/S	"	"	"
	D_{LE8}	488	"	"	"	0000 1000 0000	0000 1000 000ø	"	"		"	D_{LE8} = (E643-E642)/S	"	"	"
	D_{LE9}	489	"	"	"	0001 0000 0000	0001 0000 000ø	"	"		"	D_{LE9} = (E645-E644)/S	"	"	"
	D_{LE10}	490	"	"	"	0010 0000 0000	0010 0000 000ø	"	"		"	D_{LE10} = (E647-E646)/S	"	"	"
	D_{LE11}	491	"	"	"	0011 0000 0000	0011 0000 000ø	"	"		"	D_{LE11} = (E649-E648)/S	"	"	"
	D_{LE12}	492	"	"	"	0100 0000 0000	0100 0000 000ø	"	"		"	D_{LE12} = (E651-E650)/S	"	"	"
	D_{LE13}	493	"	"	"	0101 0000 0000	0101 0000 000ø	"	"		"	D_{LE13} = (E653-E652)/S	"	"	"
	D_{LE14}	494	"	"	"	0110 0000 0000	0110 0000 000ø	"	"		"	D_{LE14} = (E655-E654)/S	"	"	"
	D_{LE15}	495	"	"	"	0111 0000 0000	0111 0000 000ø	"	"		"	D_{LE15} = (E657-E656)/S	"	"	"
	D_{LE16}	496	"	"	"	1000 0000 0000	1000 0000 000ø	"	"		"	D_{LE16} = (E659-E658)/S	"	"	"
	D_{LE17}	497	"	"	"	1001 0000 0000	1001 0000 000ø	"	"		"	D_{LE17} = (E661-E660)/S	"	"	"
	D_{LE18}	498	"	"	"	1010 0000 0000	1010 0000 000ø	"	"		"	D_{LE18} = (E663-E662)/S	"	"	"
	D_{LE19}	499	"	"	"	1011 0000 0000	1011 0000 000ø	"	"		"	D_{LE19} = (E665-E664)/S	"	"	"
	D_{LE20}	500	"	"	"	1100 0000 0000	1100 0000 000ø	"	"		"	D_{LE20} = (E667-E666)/S	"	"	"
	D_{LE21}	501	"	"	"	1101 0000 0000	1101 0000 000ø	"	"		"	D_{LE21} = (E669-E668)/S	"	"	"
	D_{LE22}	502	"	"	"	1110 0000 0000	1110 0000 000ø	"	"		"	D_{LE22} = (E671-E670)/S	"	"	"
	D_{LE23}	503	"	"	"	1111 0000 0000	1111 0000 000ø	"	"		"	D_{LE23} = (E673-E672)/S	"	"	"
	D_{LE24}	504	"	"	"	1111 1000 0000	1111 1000 000ø	"	"		"	D_{LE24} = (E675-E674)/S	"	"	"
	D_{LE25}	505	"	"	"	1111 1100 0000	1111 1100 000ø	"	"		"	D_{LE25} = (E677-E676)/S	"	"	"
	D_{LE26}	506	"	"	"	1111 1110 0000	1111 1110 000ø	"	"		"	D_{LE26} = (E679-E678)/S	"	"	"
	D_{LE27}	507	"	"	"	1111 1111 0000	1111 1111 000ø	"	"		"	D_{LE27} = (E681-E680)/S	"	"	"
	D_{LE28}	508	"	"	"	1111 1111 1000	1111 1111 100ø	"	"		"	D_{LE28} = (E683-E682)/S	"	"	"
	D_{LE29}	509	"	"	"	1111 1111 1100	1111 1111 110ø	"	"		"	D_{LE29} = (E685-E684)/S	"	"	"
	D_{LE30}	510	"	"	"	1111 1111 1110	1111 1111 111ø	"	"		"	D_{LE30} = (E687-E686)/S	"	"	"
	M_{CC}	511	"	"	"	$V_{IN}(a)$=Max (-) through Max (+)	0000 0000 0000 through 1111 1111 1111		M_{CC} = Number of missing output codes from 0000 0000 0000 to 1111 1111 1111. (Figures 6, 7), all device types					0	Codes
6 T_A = -55°C	dV_{IO}/dT	512	"	"	"	0000 0000 0000	0000 0000 000ø		13	E688	V	dV_{IO}/dT = 410*(E556-E688) Device types 01, 02 Device types 03,04,05,06	-0.5 -1.0	0.5 1.0	LSB "
	d_{BZ}/dT	513	"	"	"	0111 1111 1111	øøøø øøøø øøøø	KA	"	E689	"	d_{BZ}/dT = 410*(E557-E687) Device types 01, 02, 05 Device types 03,04,05,06	-1.0 -2.0	1.0 2.0	" "
	d_{AE}/dT	514	"	"	"	0000 0000 0000 1111 1111 1110	0000 0000 000ø 1111 1111 111ø		" "	E690 E691	" "	$d_{AE}/dT = 12.49*10^6*\left(\frac{1}{(E559-E558)} - \frac{1}{E691-E690)}\right)$ Device types 01, 03, 05 Device types 02, 04, 06	-12.5 -25	12.5 25	ppm/°C "
	d_{BPAE}/dT	515	"	"	"	0000 0000 0000 1111 1111 1110	0000 0000 000ø 1111 1111 111ø	KA "	" "	E692 E693	" "	$d_{BPAE}/dT = 24.99*10^6*\left(\frac{1}{(E561-E560)} - \frac{1}{E693-E692)}\right)$ Device types 01, 03, 05 Device types 02, 04, 06	-12.5 -25	12.5 25	" "

TABLE III. Group A inspection for all device types - Continued.

Subgroup	Symbol	Test no.	Applied voltages ref. pin 9 (figures 8, 10)			Applied digital code-word	DUT digital output code-word	Active relays	Measurement sense lines ref. pin 9			Equations and notes	Limits		Units
			7 V_{CC} (V)	11 V_{EE} (V)	1 V_{DD} (V)	29<---------->40 MSB<-------->LSB	29<---------->16 MSB<-------->LSB		Pin	Value	Unit		Min	Max	
6 T_A = -55°C												For end-point linearity error, $L_E(N)$ = ((E(N+694)+E(N+695))/2-V(ideal))/S V(ideal) = N1* S+E695-S/2 N1 - Applied ref DAC code-word S = (E694-E695)/4094 All device types			
			+15.0	-15.0	+5.0	1111 1111 1110	1111 1111 111ø	KA	13	E694	V				
			"	"	"	0000 0000 0000	0000 0000 000ø	"	"	E695	"				
	L_{E1}	516	"	"	"	0000 0000 0001	0000 0000 00øø	"	"	E696	"	L_{E1} = ((E695+E696)/2-1*S-E695+S/2)/S	-1.0	1.0	LSB
	L_{E2}	517	"	"	"	0000 0000 0010	0000 0000 001ø	"	"	E697	"	L_{E2} = ((E696+E697)/2-2*S-E695+S/2)/S	"	"	"
			"	"	"	0000 0000 0011	0000 0000 0øøø	"	"	E698	"				
	L_{E3}	518	"	"	"	0000 0000 0100	0000 0000 010ø	"	"	E699	"	L_{E3} = ((E698+E699)/2-4*S-E695+S/2)/S	"	"	"
			"	"	"	0000 0000 0111	0000 0000 øøøø	"	"	E700	"				
	L_{E4}	519	"	"	"	0000 0000 1000	0000 0000 100ø	"	"	E701	"	L_{E4} = ((E700+E701)/2-8*S-E695+S/2)/S	"	"	"
			"	"	"	0000 0000 1111	0000 000ø øøøø	"	"	E702	"				
	L_{E5}	520	"	"	"	0000 0001 0000	0000 0001 000ø	"	"	E703	"	L_{E5} = ((E702+E703)/2-16*S-E695+S/2)/S	"	"	"
			"	"	"	0000 0001 1111	0000 00øø øøøø	"	"	E704	"				
	L_{E6}	521	"	"	"	0000 0010 0000	0000 0010 000ø	"	"	E705	"	L_{E6} = ((E704+E705)/2-32*S-E695+S/2)/S	"	"	"
			"	"	"	0000 0011 1111	0000 0øøø øøøø	"	"	E706	"				
	L_{E7}	522	"	"	"	0000 0100 0000	0000 0100 000ø	"	"	E707	"	L_{E7} = ((E706+E707)/2-64*S-E695+S/2)/S	"	"	"
			"	"	"	0000 0111 1111	0000 øøøø øøøø	"	"	E709	"				
	L_{E8}	523	"	"	"	0000 1000 0000	0000 1000 000ø	"	"	E709	"	L_{E8} = ((E708+E709)/2-128*S-E695+S/2)/S	"	"	"
			"	"	"	0000 1111 1111	000ø øøøø øøøø	"	"	E710	"				
	L_{E9}	524	"	"	"	0001 0000 0000	0001 0000 000ø	"	"	E711	"	L_{E9} = ((E710+E711)/2-256*S-E695+S/2)/S	"	"	"
			"	"	"	0001 1111 1111	00øø øøøø øøøø	"	"	E712	"				
	L_{E10}	525	"	"	"	0010 0000 0000	0010 0000 000ø	"	"	E713	"	L_{E10} = ((E712+E713)/2-512*S-E695+S/2)/S	"	"	"
			"	"	"	0010 1111 1111	001ø øøøø øøøø	"	"	E714	"				
	L_{E11}	526	"	"	"	0011 0000 0000	0011 0000 000ø	"	"	E715	"	L_{E11} = ((E714+E715)/2-768*S-E695+S/2)/S	"	"	"
			"	"	"	0011 1111 1111	0øøø øøøø øøøø	"	"	E716	"				
	L_{E12}	527	"	"	"	0100 0000 0000	0100 0000 000ø	"	"	E717	"	L_{E12} = ((E716+E717)/2-1024*S-E695+S/2)/S	"	"	"
			"	"	"	0100 1111 1111	010ø øøøø øøøø	"	"	E718	"				
	L_{E13}	528	"	"	"	0101 0000 0000	0101 0000 000ø	"	"	E719	"	L_{E13} = ((E717+E719)/2-1280*S-E695+S/2)/S	"	"	"
			"	"	"	0101 1111 1111	01øø øøøø øøøø	"	"	E720	"				
	L_{E14}	529	"	"	"	0110 0000 0000	0110 0000 000ø	"	"	E721	"	L_{E14} = ((E720+E721)/2-1536*S-E695+S/2)/S	"	"	"
			"	"	"	0110 1111 1111	011ø øøøø øøøø	"	"	E722	"				
	L_{E15}	530	"	"	"	0111 0000 0000	0111 0000 000ø	"	"	E723	"	L_{E15} = ((E722+E723)/2-1792*S-E695+S/2)/S	"	"	"
			"	"	"	0111 1111 1111	øøøø øøøø øøøø	"	"	E724	"				
	L_{E16}	531	"	"	"	1000 0000 0000	1000 0000 000ø	"	"	E725	"	L_{E16} = ((E724+E725)/2-2048*S-E695+S/2)/S	"	"	"
			"	"	"	1000 1111 1111	100ø øøøø øøøø	"	"	E726	"				
	L_{E17}	532	"	"	"	1001 0000 0000	1001 0000 000ø	"	"	E727	"	L_{E17} = ((E726+E727)/2-2304*S-E695+S/2)/S	"	"	"
			"	"	"	1001 1111 1111	10øø øøøø øøøø	"	"	E728	"				
	L_{E18}	533	"	"	"	1010 0000 0000	1010 0000 000ø	"	"	E729	"	L_{E18} = ((E728+E729)/2-2560*S-E695+S/2)/S	"	"	"
			"	"	"	1010 1111 1111	101ø øøøø øøøø	"	"	E730	"				
	L_{E19}	534	"	"	"	1011 0000 0000	1011 0000 000ø	"	"	E731	"	L_{E19} = ((E730+E731)/2-2816*S-E695+S/2)/S	"	"	"
			"	"	"	1011 1111 1111	1øøø øøøø øøøø	"	"	E732	"				
	L_{E20}	535	"	"	"	1100 0000 0000	1100 0000 000ø	"	"	E733	"	L_{E20} = ((E732+E733)/2-3072*S-E695+S/2)/S	"	"	"
			"	"	"	1100 1111 1111	110ø øøøø øøøø	"	"	E734	"				
	L_{E21}	536	"	"	"	1101 0000 0000	1101 0000 000ø	"	"	E735	"	L_{E21} = ((E734+E735)/2-3328*S-E695+S/2)/S	"	"	"
			"	"	"	1101 1111 1111	11øø øøøø øøøø	"	"	E736	"				
	L_{E22}	537	"	"	"	1110 0000 0000	1110 0000 000ø	"	"	E737	"	L_{E22} = ((E736+E737)/2-3584*S-E695+S/2)/S	"	"	"
			"	"	"	1110 1111 1111	111ø øøøø øøøø	"	"	E738	"				
	L_{E23}	538	"	"	"	1111 0000 0000	1111 0000 000ø	"	"	E739	"	L_{E23} = ((E738+E739)/2-3840*S-E695+S/2)/S	"	"	"
			"	"	"	1111 0111 1111	1111 øøøø øøøø	"	"	E740	"				
	L_{E24}	539	"	"	"	1111 1000 0000	1111 1000 000ø	"	"	E741	"	L_{E24} = ((E740+E741)/2-3968*S-E695+S/2)/S	"	"	"
			"	"	"	1111 1011 1111	1111 1øøø øøøø	"	"	E742	"				
	L_{E25}	540	"	"	"	1111 1100 0000	1111 1100 000ø	"	"	E743	"	L_{E25} = ((E742+E743)/2-4032*S-E695+S/2)/S	"	"	"
			"	"	"	1111 1101 1111	1111 11øø øøøø	"	"	E744	"				
	L_{E26}	541	"	"	"	1111 1110 0000	1111 1110 000ø	"	"	E745	"	L_{E26} = ((E744+E745)/2-4064*S-E695+S/2)/S	"	"	"
			"	"	"	1111 1110 1111	1111 111ø øøøø	"	"	E746	"				
	L_{E27}	542	"	"	"	1111 1111 0000	1111 1111 000ø	"	"	E747	"	L_{E27} = ((E746+E747)/2-4080*S-E695+S/2)/S	"	"	"
			"	"	"	1111 1111 0111	1111 1111 øøøø	"	"	E748	"				
	L_{E28}	543	"	"	"	1111 1111 1000	1111 1111 100ø	"	"	E749	"	L_{E28} = ((E748+E749)/2-4088*S-E695+S/2)/S	"	"	"
			"	"	"	1111 1111 1011	1111 1111 1øøø	"	"	E750	"				
	L_{E29}	544	"	"	"	1111 1111 1100	1111 1111 110ø	"	"	E751	"	L_{E29} = ((E750+E751)/2-4092*S-E695+S/2)/S	"	"	"
			"	"	"	1111 1111 1101	1111 1111 110ø	"	"	E752	"				
	L_{E30}	545	"	"	"	1111 1111 1110	1111 1111 111ø	"	"	E753	"	L_{E30} = ((E752+E753)/2-4094*S-E695+S/2)/S	"	"	"

TABLE III. Group A inspection for all device types - Continued.

Subgroup	Symbol	Test no.	Applied voltages ref. pin 9 (figures 8, 10) 7 V_{CC} (V)	11 V_{EE} (V)	1 V_{DD} (V)	Applied digital code-word 29<---------->40 MSB<--------->LSB	DUT digital output code-word 29<---------->16 MSB<--------->LSB	Active relays	Measurement sense lines ref. pin 9 Pin	Value	Unit	Equations and notes	Limits Min	Max	Units
6 T_A = -55°C												For differential linearity error, $D_{LE}(N)$ = (E(N+695)-E(N+694))/S S = (E694-E695)/4094 All device types			
	D_{LE1}	546	+15.0	-15.0	+5.0	0000 0000 0001	0000 0000 0000	KA	13		V	D_{LE1} = (E696-E695)/S	-.9	2.0	LSB
	D_{LE2}	547	"	"	"	0000 0000 0010	0000 0000 0010	"	"		"	D_{LE2} = (E697-E696)/S	"	"	"
	D_{LE3}	548	"	"	"	0000 0000 0100	0000 0000 0100	"	"		"	D_{LE3} = (E699-E698)/S	"	"	"
	D_{LE4}	549	"	"	"	0000 0000 1000	0000 0000 1000	"	"		"	D_{LE4} = (E701-E700)/S	"	"	"
	D_{LE5}	550	"	"	"	0000 0001 0000	0000 0001 0000	"	"		"	D_{LE5} = (E703-E702)/S	"	"	"
	D_{LE6}	551	"	"	"	0000 0010 0000	0000 0010 0000	"	"		"	D_{LE6} = (E705-E704)/S	"	"	"
	D_{LE7}	552	"	"	"	0000 0100 0000	0000 0100 0000	"	"		"	D_{LE7} = (E707-E706)/S	"	"	"
	D_{LE8}	553	"	"	"	0000 1000 0000	0000 1000 0000	"	"		"	D_{LE8} = (E709-E708)/S	"	"	"
	D_{LE9}	554	"	"	"	0001 0000 0000	0001 0000 0000	"	"		"	D_{LE9} = (E711-E710)/S	"	"	"
	D_{LE10}	555	"	"	"	0010 0000 0000	0010 0000 0000	"	"		"	D_{LE10} = (E713-E712)/S	"	"	"
	D_{LE11}	556	"	"	"	0011 0000 0000	0011 0000 0000	"	"		"	D_{LE11} = (E715-E714)/S	"	"	"
	D_{LE12}	557	"	"	"	0100 0000 0000	0100 0000 0000	"	"		"	D_{LE12} = (E717-E716)/S	"	"	"
	D_{LE13}	558	"	"	"	0101 0000 0000	0101 0000 0000	"	"		"	D_{LE13} = (E719-E718)/S	"	"	"
	D_{LE14}	559	"	"	"	0110 0000 0000	0110 0000 0000	"	"		"	D_{LE14} = (E721-E720)/S	"	"	"
	D_{LE15}	560	"	"	"	0111 0000 0000	0111 0000 0000	"	"		"	D_{LE15} = (E723-E722)/S	"	"	"
	D_{LE16}	561	"	"	"	1000 0000 0000	1000 0000 0000	"	"		"	D_{LE16} = (E725-E724)/S	"	"	"
	D_{LE17}	562	"	"	"	1001 0000 0000	1001 0000 0000	"	"		"	D_{LE17} = (E727-E726)/S	"	"	"
	D_{LE18}	563	"	"	"	1010 0000 0000	1010 0000 0000	"	"		"	D_{LE18} = (E729-E728)/S	"	"	"
	D_{LE19}	564	"	"	"	1011 0000 0000	1011 0000 0000	"	"		"	D_{LE19} = (E731-E730)/S	"	"	"
	D_{LE20}	565	"	"	"	1100 0000 0000	1100 0000 0000	"	"		"	D_{LE20} = (E733-E732)/S	"	"	"
	D_{LE21}	566	"	"	"	1101 0000 0000	1101 0000 0000	"	"		"	D_{LE21} = (E735-E734)/S	"	"	"
	D_{LE22}	567	"	"	"	1110 0000 0000	1110 0000 0000	"	"		"	D_{LE22} = (E737-E736)/S	"	"	"
	D_{LE23}	568	"	"	"	1111 0000 0000	1111 0000 0000	"	"		"	D_{LE23} = (E739-E738)/S	"	"	"
	D_{LE24}	569	"	"	"	1111 1000 0000	1111 1000 0000	"	"		"	D_{LE24} = (E741-E740)/S	"	"	"
	D_{LE25}	570	"	"	"	1111 1100 0000	1111 1100 0000	"	"		"	D_{LE25} = (E743-E742)/S	"	"	"
	D_{LE26}	571	"	"	"	1111 1110 0000	1111 1110 0000	"	"		"	D_{LE26} = (E745-E744)/S	"	"	"
	D_{LE27}	572	"	"	"	1111 1111 0000	1111 1111 0000	"	"		"	D_{LE27} = (E747-E746)/S	"	"	"
	D_{LE28}	573	"	"	"	1111 1111 1000	1111 1111 1000	"	"		"	D_{LE28} = (E749-E748)/S	"	"	"
	D_{LE29}	574	"	"	"	1111 1111 1100	1111 1111 1100	"	"		"	D_{LE29} = (E751-E750)/S	"	"	"
	D_{LE30}	575	"	"	"	1111 1111 1110	1111 1111 1110	"	"		"	D_{LE30} = (E753-E752)/S	"	"	"
	M_{CC}	576	"	"	"	$V_{IN}(a)$=Max (-) through Max (+)	0000 0000 0000 through 1111 1111 1111		M_{CC} = Number of missing output codes from 0000 0000 0000 to 1111 1111 1111. (Figures 6, 7), all device types					0	Codes
7 T_A = 25°C												For end-point linearity error, L_E (N) = (E(N*754)+E(N*755))/2-V(ideal))/S V(ideal) = N1**755-S/2 N1 = Applied ref DAC code-word S = (E754-E755)/4094			
		577	"	"	"	1111 1111 1110	1111 1111 1110	KA	13	E754	V				
		578	"	"	"	0000 0000 0000	0000 0000 0000	"	"	E755	V				
	Determine the code-word and the value of the maximum positive Linearity Error for all combinations of the digital input code words from (0000 0000 0000) to (1111 1111 1111).														
	L_{Emp}	579	+15.0 "	-15.0 "	+5.0 "	<----(N1-1)----> <-----(N-1)---->	<----(N-1)-----> <------(N)------>	KA "	13 "	E756 E757	V V	L_{Emp} = (E756+E757)/2-N1*S-E755+S/2)/S All device types	0	+0.5	LSB
	Determine the code-word and the value of the maximum negative Linearity Error for all combinations of the digital input code words from (0000 0000 0000) to (1111 1111 1111).														
	L_{Emn}	580	+15.0 "	-15.0 "	+5.0 "	<----(N1-1)----> <-----(N-1)---->	<----(N-1)-----> <------(N)------>	KA "	13 "	E758 E759	V V	L_{Emn} = (E758+E759)/2-N1*S-E755+S/2)/S All device types	-0.5	0	LSB

For Linearity Error, the worst positive and negative error values, as determined by the manufacturer's abbreviated Integral Linearity Error (L_E) test procedure for subgroup 4 shall be within 150 milliLSB of the worst positive and negative error values, as determined by the all codes test.

TABLE III. Group A inspection for all device types - Continued.

Subgroup	Symbol	Test no.	Applied voltages ref. pin 9 (figures 8, 10)			Applied digital code-word	DUT digital output code-word	Active relays	Measurement sense lines ref. pin 9			Equations and notes	Limits		Units
			7 V_{CC} (V)	11 V_{EE} (V)	1 V_{DD} (V)	29<---------->40 MSB<--------->LSB	29<---------->16 MSB<--------->LSB		Pin	Value	Unit		Min	Max	
8 T_A = 125°C		581 582	+15.0 +15.0	-15.0 -15.0	+5.0 +5.0	1111 1111 1110 0000 0000 0000	1111 1111 1110 0000 0000 0000	KA KA	13 13	E760 E761	V V	For end-point linearity error, L_E(N) = (E(N*760)+E(N*761))/2-S(ideal))/S V(ideal) = N1*S+E761-S/2 N1 = Applied ref dac code-word S = (E760-E761)/4094			
		Determine the code-word and the value of the maximum positive Linearity Error for all combinations of the digital input code words from (0000 0000 0000) to (1111 1111 1111).													
	L_{Emp}	583	+15.0 +15.0	-15.0 -15.0	+5.0 +5.0	<----(N1-1)----> <-----(N-1)---->	<----(N-1)-----> <-----(N)------>	KA KA	13 13	E762 E763	V V	L_{Emp} = (E762+E763)/2-N1*S-E761+S/2)/S All device types	0	+1.0	LSB
		Determine the code-word and the value of the maximum negative Linearity Error for all combinations of the digital input code words from (0000 0000 0000) to (1111 1111 1111).													
	LE_{mn}	584	+15.0 +15.0	-15.0 -15.0	+5.0 +5.0	<----(N1-1)----> <-----(N-1)---->	<----(N-1)-----> <-----(N)------>	KA KA	13 13	E764 E765	V V	L_{Emn} = (E764+E765)/2-N1*S-E761+S/2)/S All device types	-1.0	0	LSB
For Linearity Error, the worst positive and negative error values, as determined by the manufacturer's abbreviated Integral Linearity Error (L_E) test procedure for subgroup 4 shall be within 150 milliLSB of the worst positive and negative error values, as determined by the all codes test.															
8 T_A = -55°C		585 586	+15.0 +15.0	-15.0 -15.0	+5.0 +5.0	1111 1111 1110 0000 0000 0000	1111 1111 1110 0000 0000 0000	KA KA	13 13	E766 E767	V V	For end-point linearity error, L_E(N) = (E(N*766)+E(N*767))/2-S(ideal))/S V(ideal) = N1*S+E767-S/2 N1 = Applied ref dac code-word S = (E760-E761)/4094			
		Determine the code-word and the value of the maximum positive Linearity Error for all combinations of the digital input code words from (0000 0000 0000) to (1111 1111 1111).													
	L_{Emp}	587	+15.0 +15.0	-15.0 -15.0	+5.0 +5.0	<----(N1-1)----> <-----(N-1)---->	<----(N-1)-----> <-----(N)------>	KA KA	13 13	E768 E769	V V	L_{Emp} = (E768+E769)/2-N1*S-E767+S/2)/S All device types	0	+1.0	LSB
		Determine the code-word and the value of the maximum negative Linearity Error for all combinations of the digital input code words from (0000 0000 0000) to (1111 1111 1111).													
	LE_{mn}	588	+15.0 +15.0	-15.0 -15.0	+5.0 +5.0	<----(N1-1)----> <-----(N-1)---->	<----(N-1)-----> <-----(N)------>	KA KA	13 13	E770 E771	V V	L_{Emn} = (E770+E771)/2-N1*S-E767+S/2)/S All device types	-1.0	0	LSB
For Linearity Error, the worst positive and negative error values, as determined by the manufacturer's abbreviated Integral Linearity Error (L_E) test procedure for subgroup 4 shall be within 150 milliLSB of the worst positive and negative error values, as determined by the all codes test.															

TABLE III. Group A inspection for all device types - Continued.

Subgroup	Symbol	Test no.	Applied voltages ref. pin 9 (figures 6, 7)				DUT digital output code-word	Measurement sense lines ref. pin no. 9			Equations and notes		Limits		Units
			7 V_{CC} (V)	11 V_{EE} (V)	1 V_{DD} (V)	13 $V_{IN}(a)$ (V)	27<------------->16 MSB<----------->LSB	Pin	Value	Unit			Min	Max	
9 $T_A = 25°C$	t_{DSC}	589	+15.0	-15.0	+5.0	Max (-)	0000 0000 0000	28	t7	ns	$t_{DSC} = t7$	All device types STS low to high, referenced to CE low to high transition		350	ns
	t_{DD}	590 591 592	" " "	" " "	" " "	" " "	0000 0000 0000 " " " " " "	27 22 16	t8 t9 t10	" " "	$t_{DD1} = t8$ $t_{DD2} = t9$ $t_{DD3} = t10$	Device types 01,02,03,04 Device types 05, 06 Data valid, referenced to CE low to high transition		200 250 " "	" " " "
		593 594 595	" " "	" " "	" " "	Max (+) "	1111 1111 1111 " " " " " "	27 22 16	t11 t12 t13	" " "	$t_{DD4} = t11$ $t_{DD5} = t12$ $t_{DD6} = t13$	Device types 01,02,03,04 Device types 05, 06 Data valid, referenced to CE low to high transition		200 250 " "	" " " "
	t_{HD}	596 597 598	" " "	" " "	" " "	Max (-) " "	0000 0000 0000 " " " " " "	27 22 16	t14 t15 t16	" " "	$t_{HD1} = t14$ $t_{HD2} = t15$ $t_{HD3} = t16$	All device types Data valid, referenced to CE high to low transition	25 " "	" " "	" " "
		599 600 601	" " "	" " "	" " "	Max (+) " "	1111 1111 1111 " " " " " "	27 22 16	t17 t18 t19	" " "	$t_{HD4} = t17$ $t_{HD5} = t18$ $t_{HD6} = t19$	All device types Data valid, referenced to CE high to low transition	" " "	" " "	" " "
	t_{HS}	602 603 604	" " "	" " "	" " "	Max (-) " "	0000 0000 0000 " " " " " "	27 22 16	t20 t21 t22	" " "	$t_{HS1} = t20$ $t_{HS2} = t21$ $t_{HS3} = t22$	Device types 01,02,03,04 Device types 05, 06 STS high to low transition referenced to data valid	300 100 " "	1000 600 " "	" " " "
		605 606 607	" " "	" " "	" " "	Max (+) " "	1111 1111 1111 " " " " " "	27 22 16	t23 t24 t25	" " "	$t_{HS4} = t23$ $t_{HS5} = t24$ $t_{HS6} = t25$	Device types 01,02,03,04 Device types 05, 06 STS high to low transition referenced to data valid	300 100 " "	1000 600 " "	" " " "
	t_{HL}	608 609 610	" " "	" " "	" " "	Max (-) " "	0000 0000 0000 " " " " " "	27 22 16	t26 t27 t28	" " "	$t_{HL1} = t26$ $t_{HL2} = t27$ $t_{HL3} = t28$	Device types 01, 02 Device types 03,04,05,06 Hi-Z delay, referenced to CE high to low transition		100 150 " "	" " " "
		611 612 613	" " "	" " "	" " "	Max (+) " "	1111 1111 1111 " " " " " "	27 22 16	t29 t30 t31	" " "	$t_{HL4} = t29$ $t_{HL5} = t30$ $t_{HL6} = t31$	Device types 01, 02 Device types 03,04,05,06 Hi-Z delay, referenced to CE high to low transition		100 150 " "	" " " "
	t_{DS}	614	"	"	"	Max (-)	0000 0000 0000	22	t32	"	t_{DS1a}	All device types STS low to high transition, referenced to R/$\overline{C}$ high to low transition		600 " "	" " "
	t_{DDR}	615 616 617	" " "	" " "	" " "	Max (-) " "	0000 0000 0000 " " " " " "	27 22 16	t33 t34 t35	" " "	$t_{DDR1} = t33$ $t_{DDR2} = t34$ $t_{DDR3} = t35$	All device types Data valid, referenced to R/$\overline{C}$ low to high transition		250 " "	" " "
		618 619 620	" " "	" " "	" " "	Max (+) " "	1111 1111 1111 " " " " " "	27 22 16	t36 t37 t38	" " "	$t_{DDR4} = t36$ $t_{DDR5} = t37$ $t_{DDR6} = t38$	All device types Data valid, referenced to R/$\overline{C}$ low to high transition		" " "	" " "

TABLE III. Group A inspection for all device types - Continued.

Subgroup	Symbol	Test no.	Applied voltages ref. pin 9 (figures 6, 7)				DUT digital output code-word	Measurement sense lines ref. pin no. 9			Equations and notes		Limits		Units
			7 V_{CC} (V)	11 V_{EE} (V)	1 V_{DD} (V)	13 V_{IN}(a) (V)	27<-------------->16 MSB<------------>LSB	Pin	Value	Unit			Min	Max	
9 $T_A = 25°C$	t_{HDR}	621	+15.0	-15.0	+5.0	Max (-)	0000 0000 0000	27	t39	ns	t_{HDR1} = t39	All device types	25		ns
		622	"	"	"	"	" " "	22	t40	"	t_{HDR2} = t40	Data valid, referenced to	"		"
		623	"	"	"	"	" " "	16	t41	"	t_{HDR3} = t41	R/$\overline{C}$ high to low transition	"		"
		624	"	"	"	Max (+)	1111 1111 1111	27	t42	"	t_{HDR4} = t42	All device types	"		"
		625	"	"	"	"	" " "	22	t43	"	t_{HDR5} = t43	Data valid, referenced to	"		"
		626	"	"	"	"	" " "	16	t44	"	t_{HDR6} = t44	R/$\overline{C}$ high to low transition	"		"
	R1	627	"	"	"	1/2 VFS	1000 0000 0000	13	I127	mA	Ri(k) = VFS/2*I127	All device types	3	7	kohms
	I_{OSC}	628	"	"	"	Max (+)	1111 1111 1111	27	I128	"	I_{OSC1} = I128	All device types	-40		mA
		629	"	"	"	"	" " "	22	I129	"	I_{OSC2} = I129	Measured separately	"		"
		630	"	"	"	"	" " "	16	I130	"	I_{OSC3} = I130	to ground	"		"
		631	"	"	"	"	" " "	28	I131	"	I_{OSC4} = I131	(Output = logic "1")	"		"
		632	"	"	"	Max (-)	0000 0000 0000	27	I132	"	I_{OSC5} = I132	All device types		75	"
		633	"	"	"	"	" " "	22	I133	"	I_{OSC6} = I133	Measured separately		"	"
		634	"	"	"	"	" " "	16	I134	"	I_{OSC7} = I134	to V_{LOG}		"	"
		635	"	"	"	"	" " "	28	I135	"	I_{OSC8} = I135	(Output = logic "0")		"	"

TABLE III. Group A inspection for all device types - Continued.

Subgroup	Symbol	Test no.	Applied voltages ref. pin 9 (figures 8, 10)			Applied digital code-word	DUT digital output code-word	Measurement sense lines ref. pin 9			Equations and notes		Limits		Units
			7 V_{CC} (V)	11 V_{EE} (V)	1 V_{DD} (V)	29<---------->40 MSB<--------->LSB	27<-------------->16 MSB<------------>LSB	Pin	Value	Unit			Min	Max	
9 $T_A = 25°C$	INT	636	+15.0	-15.0	+5.0	0111 1111 1111	~~0000 0000 0000~~	13	E772	V	INT1 = E772	Range = 16% to 84%	-0.5	0.5	LSB
		637	"	"	"	1111 1111 1110	1111 1111 111~~0~~	13	E773	V	INT2 = E773	All device types	-0.5	0.5	LSB

4.4 Quality conformance inspection. Quality conformance inspection shall be in accordance with MIL-M-38510 and as specified herein. Inspections to be performed shall be those specified in method 5005 of MIL-STD-883, and herein for groups A, B, C, and D inspections (see 4.4.1 through 4.4.4).

4.4.1 Group A inspection. Group A inspection shall be in accordance with table I of method 5005 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.

c. Subgroup 8 (LE (All codes test) $-55°C \leq T_A \leq +125°C$, class B only) shall be performed only for initial qualification and after process or design changes which may affect the Integral Linearity error. The LTPD for subgroup 8 shall be 5.

4.4.2 Group B inspection. Group B inspection shall be in accordance with table II of method 5005 of MIL-STD-883 and as follows:

a. Electrical parameters shall be as specified in table II herein. For class S devices, delta limits shall apply only to subgroup 5 of group B inspection.

b. Steady-state life test for class S devices shall be in accordance with table IIa of method 5005 of MIL-STD-883, using the circuit shown on figure 5. If the alternate burn-in conditions are used the circuit shown on figure 5 shall be used.

4.4.3 Group C inspection. Group C inspection shall be in accordance with table III of method 5005 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 1 of group C inspection for class B devices.

b. Steady-state life test (method 5005 of MIL-STD-883) conditions:

(1) Test condition B, using the circuit shown on figure 5; or test condition D, using the circuit shown on figure 5.

(2) T_A = +125°C minimum.

(3) Test duration: 1,000 hours, except as permitted by appendix B of MIL-STD-38510 and method 1005 of MIL-STD-883.

4.4.4 Group D inspection. Group D inspection shall be in accordance with table IV of method 5005 of MIL-STD-883 and as follows:

a. End-point electrical parameters shall be as specified in table II herein.

b. This group shall be measured only for initial qualification and thereafter for group D tests at +25°C.

TABLE IV. Group C end-point electrical parameters.

Table III test no.	Device type	Symbol	Delta 1/ Min	Delta 1/ Max	End-point limits Min	End-point limits Max	Units
382	01,02	V_{IO}	-0.5	0.5	-1.0	2.0	LSB
	03,04,05,06	V_{IO}	-0.5	0.5	-2.0	3.0	LSB
383	All	B_Z	-1.0	1.0	-5.5	4.5	LSB
384	01	A_E	-0.1	0.1	-0.225	0.225	%FSR
	02	A_E	-0.1	0.1	-0.35	0.35	%FSR
	03,04,05,06	A_E	-0.1	0.1	-0.4	0.4	%FSR

1/ Delta limits apply to the measured value (see delta limit definition in MIL-M-38510).

4.5 Methods of inspection. Methods of inspection shall be as specified in the appropriate tables. Electrical test circuits as prescribed herein or in the referenced test methods of MIL-STD-883 shall be acceptable. Other test circuits shall require the approval of the qualifying activity.

4.5.1 Voltage and current. All voltages given are referenced to the microcircuit ground terminal. Currents given are conventional and positive when flowing into the reference terminal.

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

5. PACKAGING

5.1 Packaging requirements. The requirements for packaging shall be in accordance with MIL-M-38510.

6. NOTES

6.1 Intended use. Microcircuits conforming to this specification are intended for original equipment design applications and logisitic support of existing equipment.

6.2 Ordering data. The acquisition document should specify the following:

a. Complete part number (see 1.2).

b. 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.

c. Requirements for certificate of compliance, if applicable.

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

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

f. Requirements for product assurance options.

g. Requirements for special lead lengths or lead forming, if applicable. These requirements shall not affect the part number.

h. Requirements for "JAN" marking.

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

A_E - - - - - - - - - - - -	Gain error
A_0 - - - - - - - - - - - -	12 or 8 bit conversion initiation control
B_Z - - - - - - - - - - - -	Bipolar zero input voltage for mid-code output transition
CE - - - - - - - - - - - -	Chip enable
$\overline{CS}$ - - - - - - - - - - - -	Chip select, not
d_{AE}/dT - - - - - - - - -	Gain error drift with respect to temperature
d_{BZ}/dT - - - - - - - - -	Bipolar zero drift
D_{LE}- - - - - - - - - - -	Differential linearity error
d_{VIO}/dT- - - - - - - -	Unipolar input offset voltage drift
I_{CC}, I_{EE}, I_{LOGIC}	Input currents for positive (+15 V), negative (-15) and logic (+5 V) voltage supplies, respectively
I_{IL}- - - - - - - - - - -	Digital low level input current
I_{IH}- - - - - - - - - - -	Digital high level input current
I_{OSC} - - - - - - - - - -	Output short circuit current
I_{ZH}- - - - - - - - - - -	Digital output impedance (output forced high)

I_{ZL}	Digital output impedance (output forced low)
Hi-Z	High impedance output mode
L_E	Integral linearity error
LSB	Least significant bit
m(N)	Mode designation for output operation
Max (+)	The positive voltage required at the analog voltage input pin to produce a digital code of 1111 1111 1111 at the DUT output pins.
Max (-)	The negative voltage required at the analog voltage input pin to produce a digital code of 0000 0000 0000 at the DUT output pins.
M_{CC}	Missing code check
MSB	Most significant bit
NT	Transition uncertainty due to all sources (ie noise, settling time, etc.)
P_d	Power dissipation
P_{SS}	Power supply sensitivity
R/C	Read and convert, not
Ri	Input resistance of the analog input
STS	Status
T_A	Ambient temperature
t_c	Conversion time
t_{dd}	Data access time from CE high
t_{DDR}	Data access time from R/C high
t_{DS}	Status delay high from R/C low
t_{DSC}	Status delay high from CE high
t_{HD}	Data valid delay from CE low
t_{HDR}	Three-state output delay from R/C low
t_{HL}	Three-state output delay from CE low
t_{HS}	Status delay low from data valid
VFSR	Full scale voltage range
$V_{IN}(a)$	Analog input voltage
V_O	Digital output voltage
V_{OH}	Digital high level output voltage
V_{OL}	Digital low level output voltage
V_{REF}	Reference output voltage
12/8	12 or 8 bit parallel output enable control

Bipolar mode. Bipolar mode is the D/A converter operation mode that provides both positive and negative output voltages in response to an offset binary input code.

Integral linearity error. Integral linearity error is the difference between the average of two input analog voltages, required to establish adjacent output code-word transitions, with respect to the ideal voltage at the same bit mid-point as defined by a straight line that passes through points extrpolated one half LSB from the first and the last bit transitions.

Differential linearity. Differential linearity is the difference between two input analog voltages required to establish adjacent output code-word transitions. The ideal differential linearity is 1 LSB.

Differential linearity error. Differential linearity error is the difference between the actual and the ideal differential linearity values for any two adjacent code-word transitions.

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 last 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 1024.

Monotonicity. A device is monotonic if the ratio of the incremental change in output to incremental change in input does not change polarity over the full scale range.

Most significant bit. The most significant bit is the bit in the output code that carries the most weight. It 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 required 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 part number.

6.5 Substitutability. The cross-reference information below is presented for the convenience of users. Microcircuits covered by this specification will functionally replace the listed 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 variations 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	Generic-Industry device type
01	574AU (monolithic)
02	574AT (monolithic)
03	574AU (hybrid)
04	574AT (hybrid)
05	674AU (monolithic)
06	674AT (monolithic)

6.6 Handling. MOS devices must be handled with certain precautions to avoid damage due to accumulation of static charge. Input protective devices have been designed in the chip to minimize the effect of this static buildup. However, the following handling practices are recommended:

a. Devices should be handled on benches with conductive and grounded surface.

b. Ground test equipment, tools and operator.

c. Do not handle devices by the leads.

d. Store devices in conductive foam or carriers.

e. Avoid use of plastic, rubber, or silk in MOS areas.

f. Maintain relative humidity above 50 percent, if practical.

g. Unused logic inputs should be connected to logic high or logic low but not left open.

h. Disconnect all low impedance equipment and input signals from the device before switching off dc power supplies.

i. Switch off power supplies before inserting or removing devices from circuits.

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

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

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

Civil agency coordinating activity:
NASA - NA

Preparing activity:
Air Force - 17

Agent:
DLA - ES

(Project 5962-0787)