INCH-POUND
MIL-M-38510/140A
22 December 2004
SUPERSEDING
MIL-M-38510/140
31 October 1986

MILITARY SPECIFICATION

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

Reactivated after 22 December 2004 and may be used for either new or existing design acquisitions.

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

The requirements for acquiring the product herein shall consist of this specification sheet and MIL-PRF-38535 and MIL-PRF-38534.

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. For this product, the requirements of MIL-M-38510 have been superseded by MIL-PRF-38535, (see 6.3).

1.2 Part or identifying number (PIN). The PIN is in accordance with MIL-PRF-38535, and as specified herein.

1.2.1 Device types. The device types are internally compensated and are as follows:

Device type	Input voltage range (all device types) (pin programmable)	Technology	Bipolar zero drift ($\Delta B_Z / \Delta T$) LSB limits		Gain error drift ($\Delta AE / \Delta T$) ppm/°C limits	
			Min	Max	Min	Max
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	-1	+1	-12.5	+12.5
02	Same as defined for device type 01	Monolithic	-2	+2	-25	+25
03	"	Hybrid 1/	-1	+1	-12.5	+12.5
04	"	Hybrid 1/	-2	+2	-25	+25
05	"	Monolithic	-1	+1	-12.5	+12.5
06	"	Monolithic	-2	+2	-25	+25

1.2.2 Device class. The device class is the product assurance level as defined in MIL-PRF-38535.

1.2.3 Case outline. The case outlines are as designated in MIL-STD-1835 and as follows:

Outline letter	Descriptive designator	Terminals	Package style
X	GDIP1-T28 or CDIP2-T28	28	Dual-in-line

1/ The 03 and 04 devices shall have to meet the hybrid requirements of MIL-PRF-38534.

Comments, suggestions, or questions on this document should be addressed to: Commander, Defense Supply Center Columbus, ATTN: DSCC-VAS, 3990 East Broad St., Columbus, OH 43218-3990, or emailed to linear@dscc.dla.mil. Since contact information can change, you may want to verify the currency of this address information using the ASSIST Online database at http://assist.daps.dla.mil.

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 (P_D)	1000 mW
Lead temperature (soldering, 10 seconds)	+300°C.
Storage temperature range	-65°C to +150°C
Junction temperature (T_J) (may be exceeded during burn-in)	+175°C

1.4 Recommended operating conditions.

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

1.5 Power and thermal characteristics.

Case outlines	Maximum allowable power dissipation	Maximum θ_{JC}	Maximum θ_{JA}
X	1000 mW at T_A = +125°C	25°C/W	60°C/W

2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3, 4, or 5 of this specification. This section does not include documents cited in other sections of this specification or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements of documents cited in sections 3, 4, or 5 of this specification, whether or not they are listed.

2.2 Government documents.

2.2.1 Specifications, standards, and handbooks. The following specifications and standards form a part of this specification to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

DEPARTMENT OF DEFENSE SPECIFICATIONS

MIL-PRF-38535 - Integrated Circuits (Microcircuits) Manufacturing, General Specification for.

DEPARTMENT OF DEFENSE SPECIFICATIONS

MIL-PRF-38534 - Hybrid Microcircuits, General Specification for.

DEPARTMENT OF DEFENSE STANDARDS

MIL-STD-883 - Test Method Standard for Microelectronics.
MIL-STD-1835 - Interface Standard Electronic Component Case Outlines.

(Copies of these documents are available online at http://assist.daps.dla.mil/quicksearch/ or http://assist.daps.dla.mil or from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.)

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

3. REQUIREMENTS

3.1 Qualification. Microcircuits furnished under this specification shall be products that are manufactured by a manufacturer authorized by the qualifying activity for listing on the applicable qualified manufacturers list before contract award (see 4.3 and 6.4).

3.2 Item requirements. The individual item requirements shall be in accordance with MIL-PRF-38535 and as specified herein or as modified in the device manufacturer's Quality Management (QM) plan. The modification in the QM plan shall not affect the form, fit, or function as described herein.

3.3 Design, construction, and physical dimensions. The design, construction, and physical dimensions shall be as specified in MIL-PRF-38535 and herein.

3.3.1 Terminal connections. The terminal connections shall be as specified on figure 1.

3.3.2 Schematic circuits. The schematic circuits shall be maintained by the manufacturer and made available to the qualifying activity and the preparing activity upon request.

3.3.3 Block diagram and circuit operation table. The block diagram and circuit operation table shall be as specified on figure 2.

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

3.4 Lead material and finish. The lead material and finish shall be in accordance with MIL-PRF-38535 (see 6.6).

3.5 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 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 ≤ T_A ≤ +125°C	

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

3.7 Marking. Marking shall be in accordance with MIL-PRF-38535.

3.7.1 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 especially for this requirement.

3.8 Microcircuit group assignment. The devices covered by this specification shall be in microcircuit group H and number 57 (see MIL-PRF-38535, appendix A).

TABLE I. Electrical performance characteristics.

Test 1/	Symbol	Conditions $-55°C \le T_A \le +125°C$ unless otherwise specified see 3.6 and figures 4 and 8	Device type	Limits		Unit
				Min	Max	
Power supply current from V_{CC}	I_{CC}	Output code = 0000 0000 0000 and 1111 1111 1111 2/	All	1	16	mA
Power supply current from V_{EE}	I_{EE}	Output code = 0000 0000 0000 and 1111 1111 1111 2/	All	-30	-1	mA
Power supply current from V_{LOG}	I_{LOG}	Output code = 0000 0000 0000 and 1111 1111 1111 2/	All	1	40	mA
Power dissipation	Pd	(calculated worse case of 2 condition) 3/	All		725	mW
Input low current	I_{IL}	V_{LOG} = 5.5 V, V_{IN}(LOGIC) = 0.0 V	All	-10	1	µA
Input high current	I_{IH}	V_{LOG} = 5.5 V, V_{IN}(LOGIC) = 2.4 V	All	-1	10	µA
		V_{LOG} = 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	All	-10	10	µA
	I_{ZL}	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., 8-bit cycle	01,02, 03,04	10	29	µs
		Output code = 0000 0000 0000 2/	05,06	6	11.5	
		V_{IN} = -7 mV max., 12-bit cycle	01,02, 03,04	15	40	
		Output code = 0000 0000 0000 2/	05,06	9	17	
Output logic voltage levels	V_{OL}	V_{LOG} = 4.5 V, I_L = 1.6 mA, Output code = 0000 0000 0000, 2/ Measure output bits 1-12 & STS,	All		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, see figures 4, 5, and 8		2.4		

See footnotes at end of table.

TABLE I. Electrical performance characteristics – Continued.

Test 1/	Symbol	Conditions $-55°C \le T_A \le +125°C$ unless otherwise specified see 3.6 and figures 4 and 8	Device type	Limits		Unit
				Min	Max	
Reference voltage	V_{REF}	Output code = 0000 0000 0000, 2/ I_L = 1.5 mA, bipolar, VFSR = 20 V	01,02	9.95	10.05	V
			03,04, 05,06	9.90	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, I_L = -0.5 mA, output code = 1111 1111 XXXX, measure output bits 1-8	All	2.4		V
(low byte)	m2	$12/\overline{8}$ = 0.0 V, A_0 = logic "1", 5/ V_{IN} = 10.08 V min, I_L = -0.5 mA, output code = XXXX 0000 1111, measure output bits 9-12		2.4		
(middle nibble override, trailing zeros)	m3	$12/\overline{8}$ = 0.0 V, A_0 = logic "1", 5/ V_{IN} = 10.08 V min, I_L = -1.6 mA, output code = XXXX 0000 1111, measure output bits 5-8			0.4	
(high nibble Hi-Z)	m4	$12/\overline{8}$ = 0.0 V, A_0 = logic "1", 5/ V_{IN} = 10.08 V min, V_O = 0.4 V, output code = XXXX 0000 1111, measure output bits 1-4		-10	10	µA
(low nibble Hi-Z)	m5	$12/\overline{8}$ = 0.0 V, A_0 = logic "0", 5/ V_{IN} = 10.08 V min, V_O = 0.4 V, output code = 1111 1111 XXXX, measure output bits 9-12		-10	10	µA
Logic threshold	$V_{R/\overline{C}}$	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	All	(Logic "0")		
		V_{IN} = 10.08 mV min, $V_{R/\overline{C}}$ = 0.8 V (initial), $V_{R/\overline{C}}$ = 2.0 V, output code = 1111 1111 1111	All	(Logic "1")		

See footnotes at end of table.

TABLE I. Electrical performance characteristics – Continued.

Test 1/	Symbol	Conditions $-55°C \le T_A \le +125°C$ unless otherwise specified see 3.6 and figures 4 and 8	Device type	Limits		Unit
				Min	Max	
Logic threshold	V_{CE}	V_{IN} = 10.08 V min, V_{CE} = 2.0, convert, output code = 1111 1111 1111	All	(Logic “1”)		
		V_{IN} = -7 mV max, V_{CE} = 0.8, output code = 1111 1111 1111		(Logic “1”)		
		V_{IN} = -7 mV max, V_{CE} = 2.0, 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_{IN} = -7 mV max, V_{CE} = logic “1”, $V_{\overline{CS}}$ = 2.0 V, 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_{A0}	V_{IN} = 10.08 V min, 12/$\overline{8}$ = 0.0 V, V_{A0} = 0.8 V, convert, output code = 1111 1111 XXXX, measure output bits 5-8		(Logic “1”)		
		V_{CE} = logic “0”, V_{A0} = 2.0 V, V_{CE} = logic “1”, output code = XXXX 0000 1111, measure output bits 5-8		(Logic “0”)		
Power supply sensitivity to V_{CC}	$+P_{SS1}$	13.5 V $\le V_{CC} \le$ 15.0 V, 15.0 V $\le V_{CC} \le$ 16.5 V output transition = 0000 0000 000ϕ and 1111 1111 111ϕ 6/	All	-0.10	0.10	LSB / %PS
	$+P_{SS2}$	11.4 V $\le V_{CC} \le$ 12.0 V, 12.0 V $\le V_{CC} \le$ 12.6 V output transition = 0000 0000 000ϕ and 1111 1111 111ϕ 6/ (figures 6 and 8)		-0.20	0.20	

See footnotes at end of table.

TABLE I. Electrical performance characteristics – Continued.

Test	Symbol	Conditions $-55°C \le T_A \le +125°C$ unless otherwise specified see 3.6 and figures 4 and 8	Device type	Limits 1/		Unit
				Min	Max	
Power supply sensitivity to V_{LOG}	$+P_{SS3}$	$4.5\ V \le V_{LOG} \le 5.0\ V$, $5.0\ V \le V_{LOG} \le 5.5\ V$ output transition = 0000 0000 000ϕ and 1111 1111 111ϕ 6/ (figures 6 and 8)	All	-0.10	0.10	LSB / %PS
Power supply sensitivity to V_{EE}	$-P_{SS1}$	$-16.5\ V \le V_{EE} \le -15.0\ V$, $-15.0\ V \le V_{EE} \le -13.5\ V$ output transition = 0000 0000 000ϕ and 1111 1111 111ϕ 6/	All	-0.10	0.10	LSB / %PS
	$-P_{SS2}$	$-12.6\ V \le V_{CC} \le -12.0\ V$, $-12.0\ V \le V_{CC} \le -11.5\ V$ output transition = 0000 0000 000ϕ and 1111 1111 111ϕ 6/ (figures 6 and 8)		-0.20	0.20	
Missing code check	M_{CC}	All codes check	All	0	0	Codes
Unipolar offset voltage	V_{IO}	Output transition = 0000 0000 000ϕ 6/ Initial , $T_A = 25°C$, see figures 6 and 8	01,02	-0.5	1.5	LSB
		Output transition = 0000 0000 000ϕ 6/ End point , $T_A = 25°C$, see figure 6 and 8		-1.0	2.0	
		Output transition = 0000 0000 000ϕ 6/ Initial , $T_A = 25°C$, see figures 6 and 8	03,04, 05,06	-1.5	2.5	
		Output transition = 0000 0000 000ϕ 6/ End point , $T_A = 25°C$, see figure 6 and 8		-2.0	3.0	
Unipolar offset voltage drift	$\Delta V_{IO} / \Delta T$	Output transition = 0000 0000 000ϕ 6/ see figure 6 and 8	01,02	-0.5	0.5	LSB
			03,04 05,06	-1.0	1.0	
Bipolar zero	B_Z	Output code = ϕϕϕϕ ϕϕϕϕ ϕϕϕϕ 6/ Bipolar, VFSR = 20 V, Initial , $T_A = 25°C$, see figures 6 and 8	All	-4.5	3.5	LSB
		Output code = ϕϕϕϕ ϕϕϕϕ ϕϕϕϕ 6/ Bipolar, VFSR = 20 V, End point , $T_A = 25°C$, see figure 6 and 8		-5.5	4.5	

See footnotes at end of table.

TABLE I. Electrical performance characteristics – Continued.

Test	Symbol	Conditions $-55°C \le T_A \le +125°C$ unless otherwise specified see 3.6 and figures 4 and 8	Device type	Limits 1/		Unit
				Min	Max	
Bipolar zero drift	$\Delta B_Z / \Delta T$	Output code = ϕϕϕϕ ϕϕϕϕ ϕϕϕϕ 6/ Bipolar, VFSR = 20 V, T_A = 25°C, see figures 6 and 8	01,03, 05	-1	1	LSB
		Output code = ϕϕϕϕ ϕϕϕϕ ϕϕϕϕ 6/ Bipolar, VFSR = 20 V, T_A = 25°C, see figure 6 and 8	02,04, 06	-2	2	
Gain error	A_E	Output transition = 0000 0000 000ϕ and 1111 1111 111ϕ 6/ Initial	01	-0.125	0.125	%FSR
		Output transition = 0000 0000 000ϕ and 1111 1111 111ϕ 6/ End point		-0.225	0.225	
		Output transition = 0000 0000 000ϕ and 1111 1111 111ϕ 6/ Initial	02	-0.25	0.25	
		Output transition = 0000 0000 000ϕ and 1111 1111 111ϕ 6/ End point		-0.35	0.35	
		Output transition = 0000 0000 000ϕ and 1111 1111 111ϕ 6/ Initial	03,04, 05,06	-0.3	0.3	
		Output transition = 0000 0000 000ϕ and 1111 1111 111ϕ 6/ End point		-0.4	0.4	
	B_{PAE}	Bipolar, VFSR = 20 V, T_A = 25°C, see figures 6 and 8	01	-0.125	0.125	%FSR
			02	-0.25	0.25	
			03,04, 05,06	-0.3	0.3	
Gain error drift	$\Delta AE / \Delta T$	Output transition = 0000 0000 000ϕ and 1111 1111 111ϕ	01,03, 05	-12.5	12.5	ppm/°C
			02,04, 06	-25	25	
	$\Delta BPAE / \Delta T$	Bipolar, VFSR = 20 V, T_A = 25°C, see figures 6 and 8	01,03, 05	-12.5	12.5	
			02,04, 06	-25	25	

See footnotes at end of table.

TABLE I. Electrical performance characteristics – Continued.

Test	Symbol	Conditions $-55°C \le T_A \le +125°C$ unless otherwise specified see 3.6 and figures 4 and 8	Device type	Limits 1/		Unit
				Min	Max	
Integral linearity error	L_E	(Abbreviated test), $-55°C \le T_A \le +125°C$, figures 6 and 8	All	-1.0	1.0	LSB
		(Abbreviated test), $T_A = +25°C$, figures 6 and 8		-0.5	0.5	
Integral linearity error	L_E	(All codes test), $-55°C \le T_A \le +125°C$, figures 6 and 8	All	-1.0	1.0	LSB
		(All codes test), $T_A = +25°C$, figures 6 and 8		-0.5	0.5	
Differential linearity error	D_{LE}	(Abbreviated test), $-55°C \le T_A \le +125°C$, figures 6 and 8	All	-0.9	2.0	LSB
		(Abbreviated test), $T_A = +25°C$, figures 6 and 8		-0.9	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 7 and 8	All		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/ $T_A = +25°C$, figures 7 and 8	01,02, 03,04		200	ns
			05,06		250	
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 7 and 8	All	25		ns
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/ $T_A = +25°C$, figures 7 and 8	01,02, 03,04	300	1000	ns
			05,06	100	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/ $T_A = +25°C$, figures 7 and 8	01,02		100	ns
			03,04, 05,06		150	

See footnotes at end of table.

TABLE I. Electrical performance characteristics – Continued.

Test	Symbol	Conditions $-55°C \le T_A \le +125°C$ unless otherwise specified see 3.6 and figures 4 and 8	Device type	Limits 1/		Unit
				Min	Max	
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 7 and 8	All		600	ns
Data access time from R/$\overline{C}$	t_{DDR}	Output data valid, referenced to low to high R/$\overline{C}$ transition, output code = 0000 0000 0000 and 1111 1111 1111 2/ T_A = +25°C, figures 7 and 8	All		250	ns
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 7 and 8	All	25		ns
Output short circuit current	I_{OSC}	V_{LOG} = 5.5 V, output code = 1111 1111 1111 and 2/ STS output = logic "1", T_A = 25°C, measured separately to ground	All	-40		mA
		V_{LOG} = 5.5 V, output code = 0000 0000 0000 and 2/ STS output = logic "0", T_A = 25°C, measured separately to V_{LOG}			75	
Input resistance	Ri	V_{IN}(analog) = 1/2 V, T_A = 25°C	All	3	7	kΩ
Transition uncertainty	NT	Output transition = ϕϕϕϕ ϕϕϕϕ ϕϕϕϕ and 1111 1111 1111 6/ Range = 16% to 84%, T_A = 25°C (figures 6 and 8)	All	-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/ ϕ represent the transition point between two adjacent code words (for example: 0000 0000 000ϕ) represents the transition between code words 0000 0000 0000 and 0000 0000 0001, ϕϕϕϕ ϕϕϕϕ ϕϕϕϕ represents the transition between code words 0111 1111 1111 and 1000 0000 0000 and 1111 1111 111ϕ represents the transition between code words 1111 1111 1110 and 1111 1111 1111.

TABLE II. Electrical test requirements.

MIL-PRF-38535 test requirements	Subgroups (see table III) 1/	
	Class S devices	Class B 2/ devices
Interim electrical parameters	1	1
Final electrical test parameters	1*, 2, 3, 4, 5, 6	1*, 2, 3, 4, 5, 6
Group A test requirements	1, 2, 3, 4, 5 ,6, 7, 8, 9	1, 2, 3, 4, 5 ,6, 7, 8, 9
Group B electrical test parameters when using the method 5005 QCI option	1, 4 and table IV delta limits	N/A
Group C end-point electrical parameters	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	1, 2, 3, 4, 5, 6	1, 4

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

4. VERIFICATION.

4.1 Sampling and inspection. Sampling and inspection procedures shall be in accordance with MIL-PRF-38535 or as modified in the device manufacturer's Quality Management (QM) plan. The modification in the QM plan shall not effect the form, fit, or function as function as described herein.

4.2 Screening. Screening shall be in accordance with MIL-PRF-38535, and shall be conducted on all devices prior to qualification and quality conformance inspection. The following additional criteria shall apply:

a. The burn-in test duration, test condition, and test temperature, or approved alternatives shall be as specified in the device manufacturer's QM plan in accordance with MIL-PRF-38535. The burn-in test circuit shall be maintained under document control by the device manufacturer's Technology Review Board (TRB) in accordance with MIL-PRF-38535 and shall be made available to the acquiring or preparing activity upon request. The test circuit shall specify the inputs, outputs, biases, and power dissipation, as applicable, in accordance with the intent specified in test method 1015 of MIL-STD-883.
For class S devices, dynamic tests (test condition D) using the manufacturer's burn-in circuit.
For class B devices, test condition D, using the manufacturer's burn-in circuit.

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

c. Additional screening for space level product shall be as specified in MIL-PRF-38535.

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-PRF-38535.

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, 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 types (see 6.6) and submission of data in accordance with MIL-PRF-38535.

4.4 Technology Conformance inspection (TCI). Technology conformance inspection shall be in accordance with MIL-PRF-38535 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 III of MIL-PRF-38535 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 sample size series number for subgroup 8 shall be 5.

4.4.2 Group B inspection. Group B inspection shall be in accordance with table II of MIL-PRF-38535 and as follows:

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

4.4.3 Group C inspection. Group C inspection shall be in accordance with table IV of MIL-PRF-38535 and as follows:

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

b. The steady-state life test duration, test condition, and test temperature, or approved alternatives shall be as specified in the device manufacturer's QM plan in accordance with MIL-PRF-38535. The burn-in test circuit shall be maintained under document control by the device manufacturer's Technology Review Board (TRB) in accordance with MIL-PRF-38535 and shall be made available to the acquiring or preparing activity upon request. The test circuit shall specify the inputs, outputs, biases, and power dissipation, as applicable, in accordance with the intent specified in test method 1005 of MIL-STD-883.

4.4.4 Group D inspection. Group D inspection shall be in accordance with table V of MIL-PRF-38535. End point electrical parameters shall be as specified in table II herein.

4.5 Methods of inspection. Methods of inspection shall be as specified and as follows.

4.5.1 Voltage and current. All voltage values given are referenced to the microcircuit ground terminal. Currents given are conventional and positive when flowing into the referenced 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 within +10°C of their power stable condition at room temperature prior to removal of the bias.

Device types	01, 02, 03, 04, 05, 06
Case outlines	X, Y, Z
Terminal number	Terminal symbol
1	+5 V SUPPLY (+V LOGIC)
2	DATA MODE SELECT 12 / $\overline{8}$
3	CHIP SELECT $\overline{CS}$
4	BYTE ADDRESS A_0
5	READ/CONVERT R / $\overline{C}$
6	CHIP SELECT CE
7	+12 V / +15 V SUPPLY ($+V_{CC}$)
8	+10 V REF OUT
9	ANALOG GND (SEE NOTE)
10	+10 V REF IN
11	-12 V / -15 V SUPPLY (V_{EE})
12	BIPOLAR OFFSET
13	10 V INPUT
14	20 V INPUT
15	DIGITAL GND (SEE NOTE)
16	DB 0 (LSB)
17	DB 1 (BIT 11)
18	DB 2 (BIT 10)
19	DB 3 (BIT 9)
20	DB 4 (BIT 8)
21	DB 5 (BIT 7)
22	DB 6 (BIT 6)
23	DB 7 (BIT 5)
24	DB 8 (BIT 4)
25	DB 9 (BIT 3)
26	DB 10 (BIT 2)
27	DB 11 (MSB)
28	STATUS OUTPUT

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 1. Terminal connections.

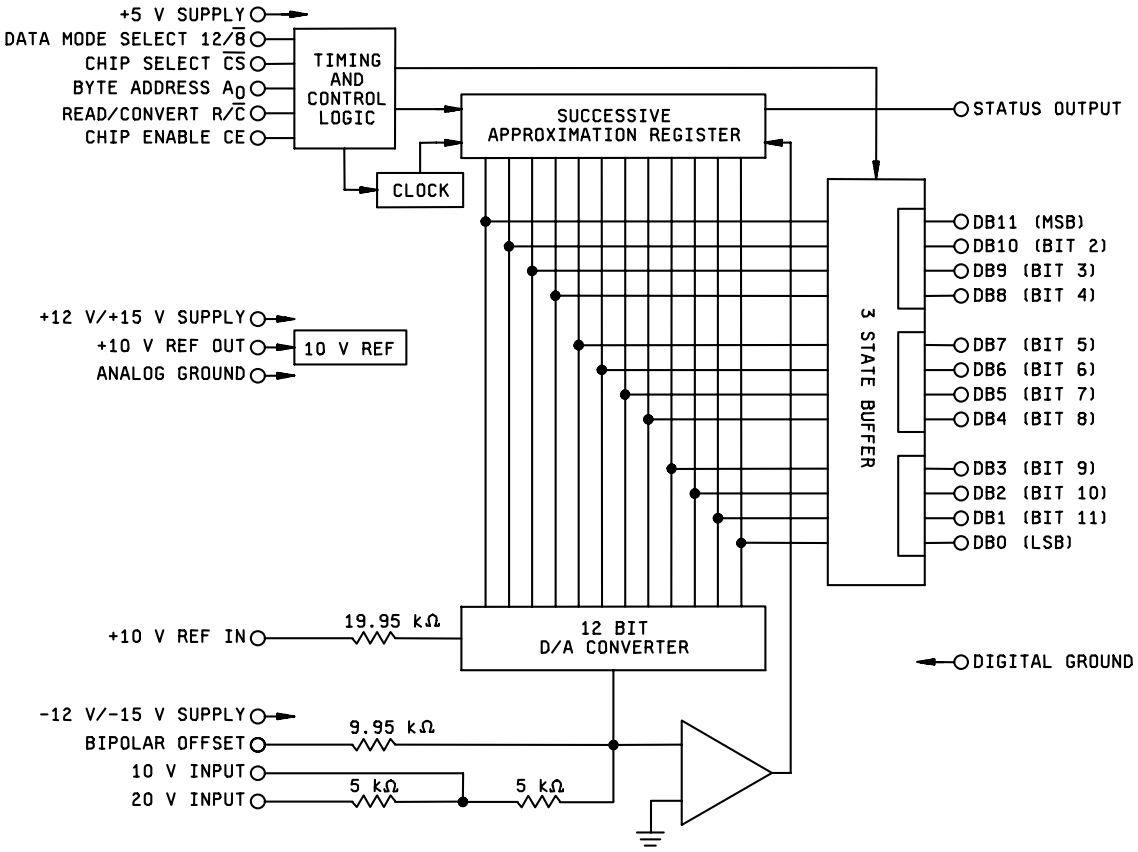


Figure 2. Functional block diagram and operational information.

ANALOG INPUT VOLTAGE (VOLTS)				DIGITAL OUTPUT
0 to +10 V	0 to +20 V	±5 V	±10 V	MSB LSB
+10.0000	+20.0000	+5.0000	+10.0000	1111 1111 1111
+9.9963	+19.9927	+4.9963	+9.9927	1111 1111 111ϕ
+5.0012	+10.0024	+0.0012	+0.0024	1000 0000 000ϕ
+4.9988	+9.9976	-0.0012	-0.0024	ϕϕϕϕ ϕϕϕϕ ϕϕϕϕ
+4.9963	+9.9927	-0.0037	-0.0073	0111 1111 111ϕ
+0.0012	+0.0024	-4.9988	-9.9976	0000 0000 000ϕ
+0.0000	0.000	-5.000	-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	Enable 12-bit parallel output
1	0	0-1	0.0 V	0	Enables 8 MSB's
1	0	0-1	0.0 V	1	Enables 4 LSB's and 4 trailing zero's

Figure 2. Functional block diagram and operational information – Continued.

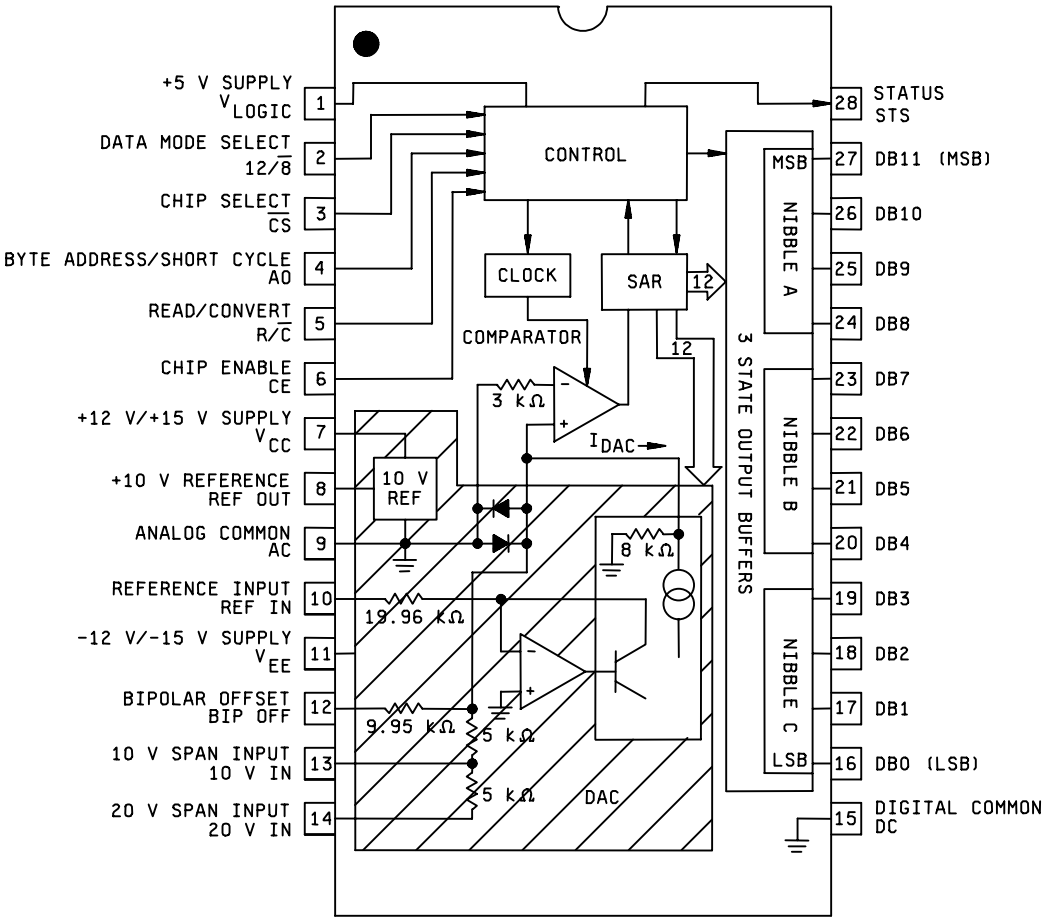
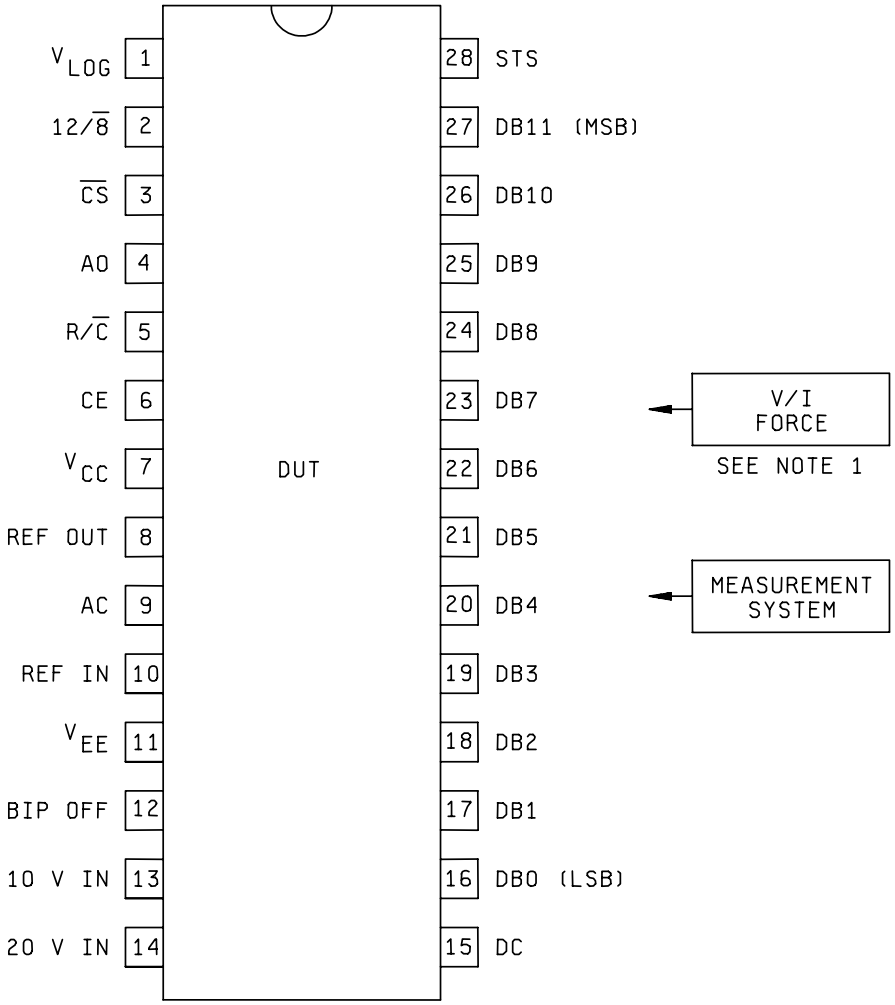
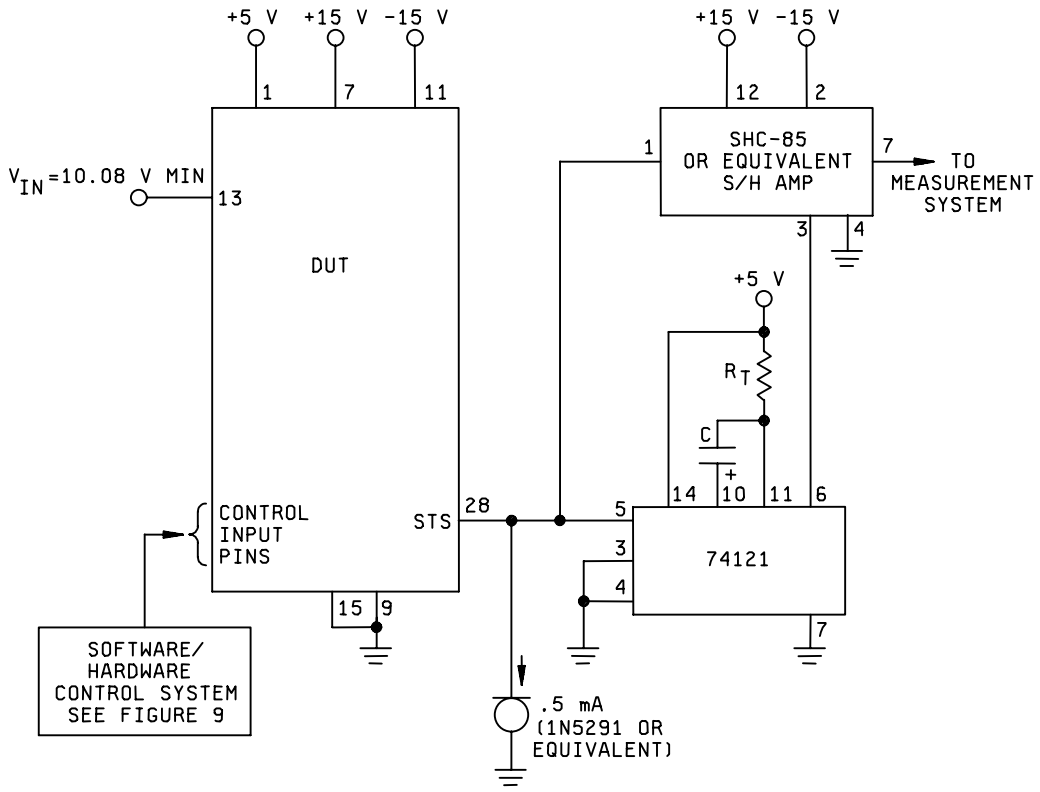


FIGURE 3. Functional block diagram.



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

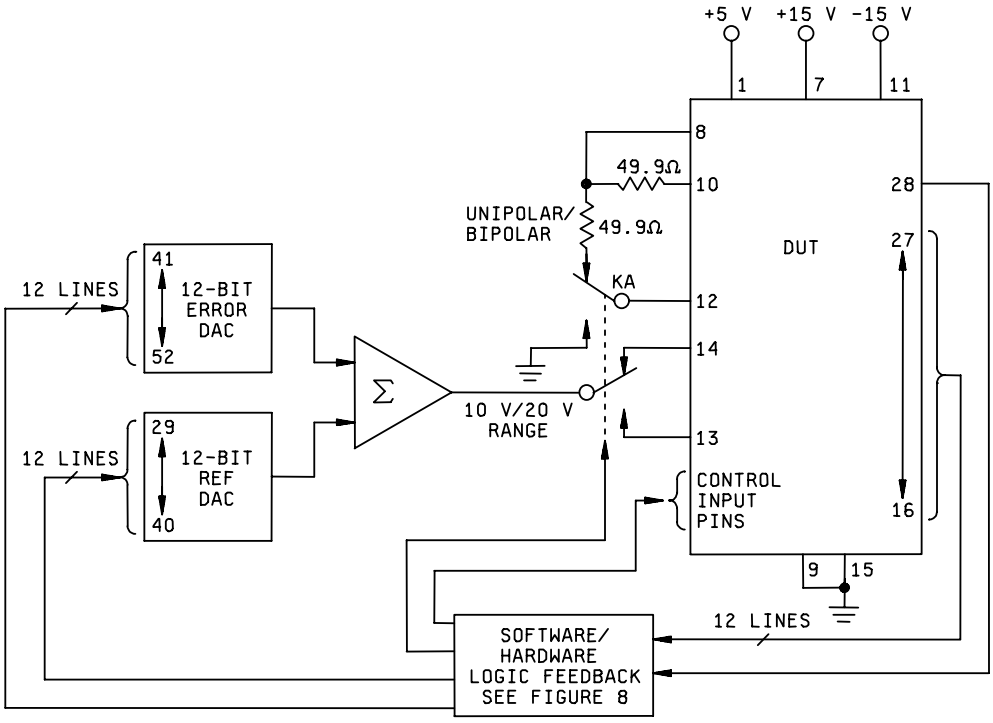
FIGURE 4. Test circuit for static test.



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 5. 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 6. Test circuit for dynamic test.

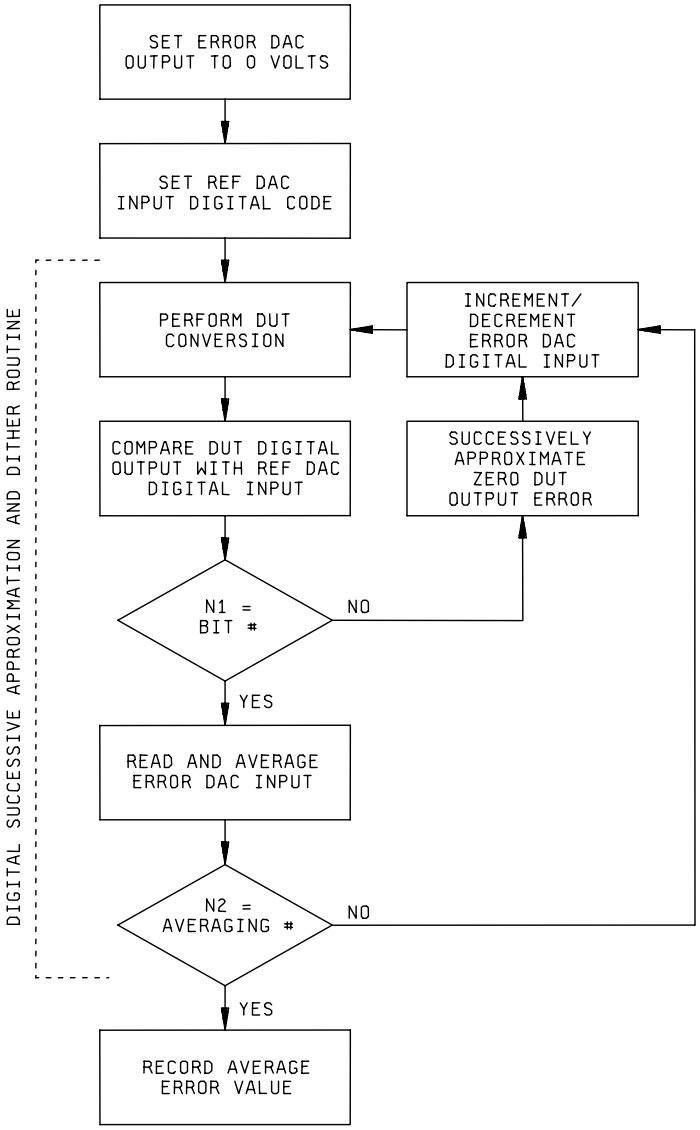


FIGURE 6. Test circuit for dynamic test – Continued.

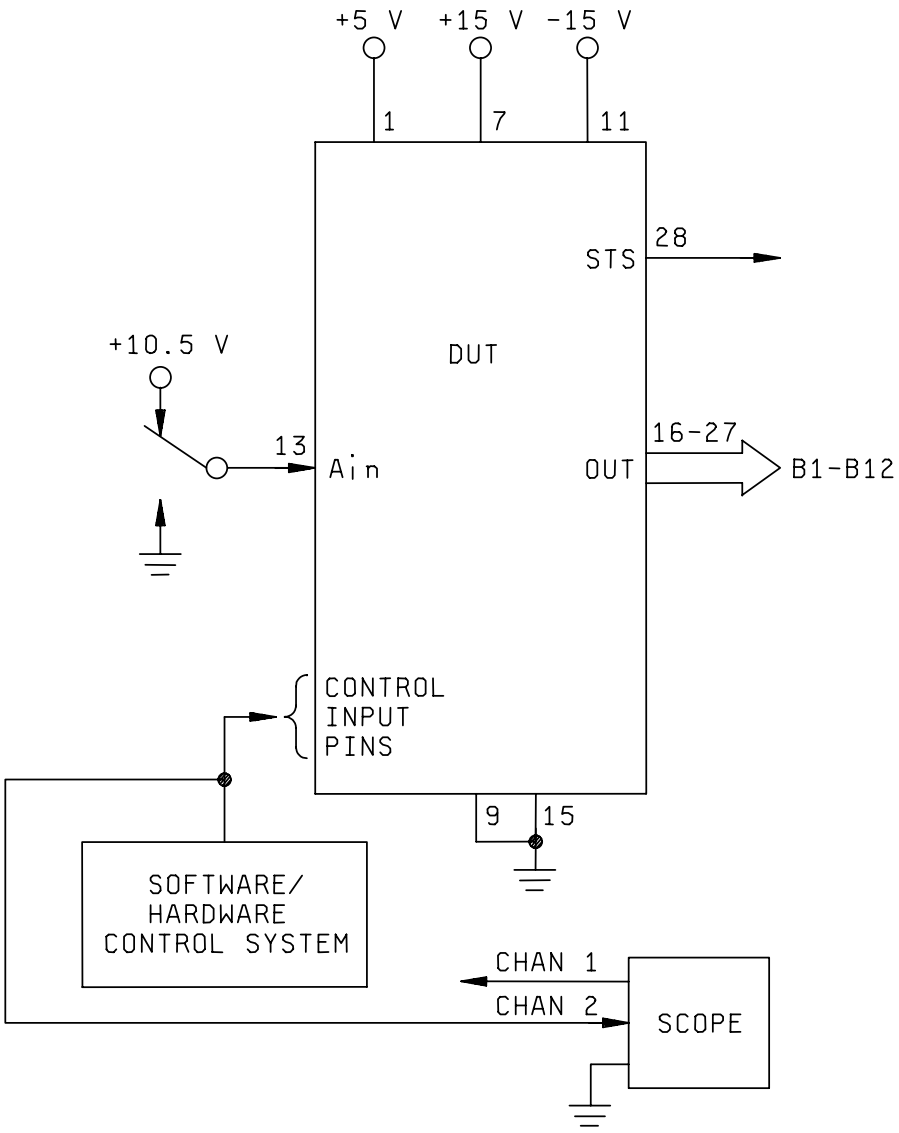
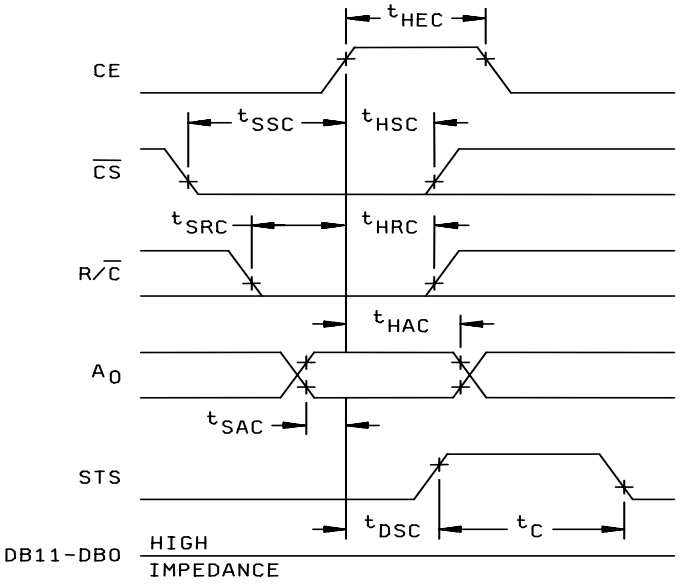
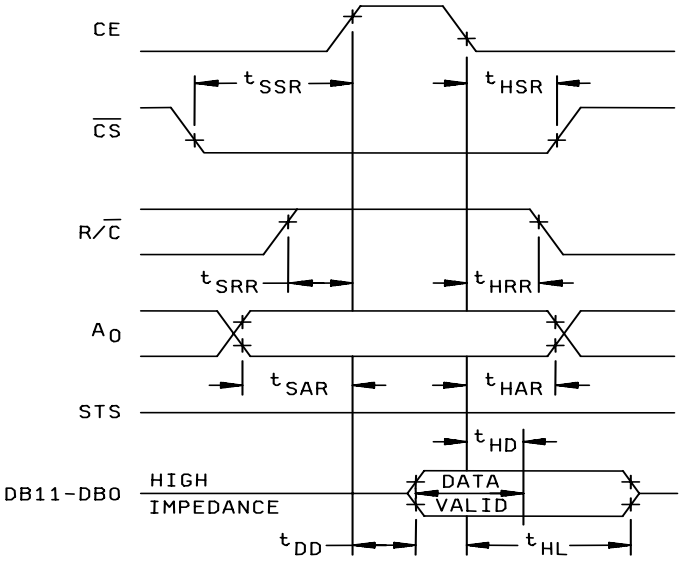


FIGURE 7. Test circuit for propagation delay.



CONVERT START TIMING



READ CYCLE TIMING

FIGURE 8. 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	ns
t_{HSC}	$\overline{CS}$ low during CE high	200	ns
t_{SRC}	R/$\overline{C}$ to CE setup	250	ns
t_{HRC}	R/$\overline{C}$ low during CE high	200	ns
t_{SAC}	A_0 to CE setup	0	ns
t_{HAC}	A_0 valid during CE high	300	ns

READ MODE

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

NOTES:

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 to 2.0 V from a logic “0” and from a logic “1”., respectively.

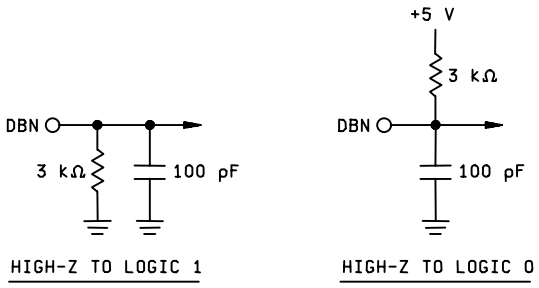
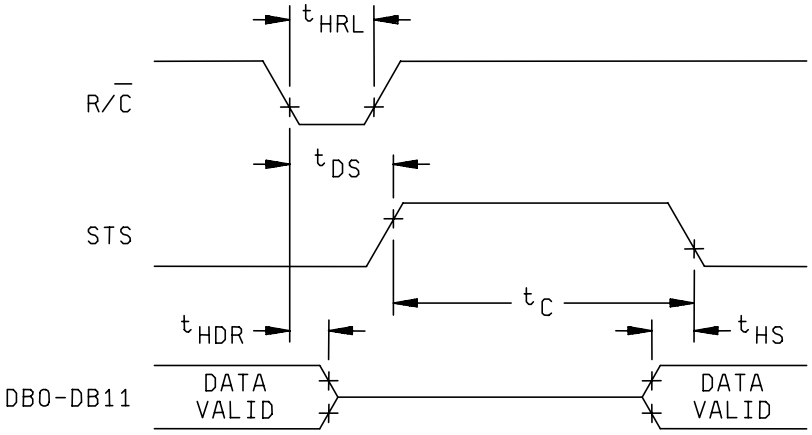
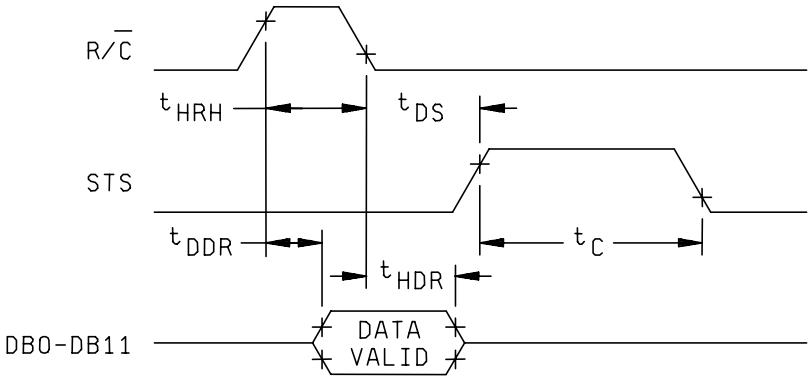


FIGURE 8. Timing diagrams (system controlled operation) – Continued.



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 9. 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	ns

NOTE: For stand-alone operation, CE is tied to logic “1”, 12/$\overline{8}$ is wired to +5 V, and $\overline{CS}$ and A0 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 “1”, respectively.

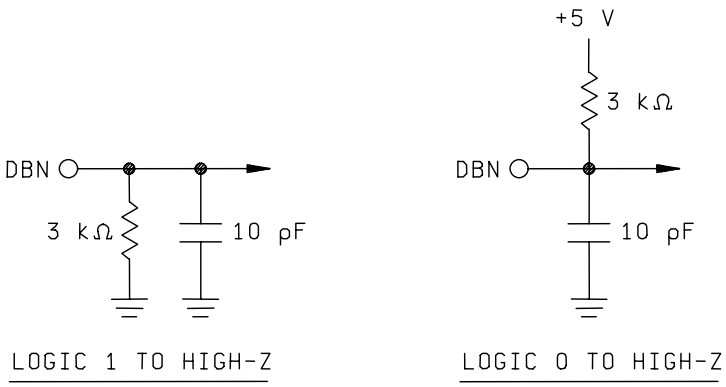
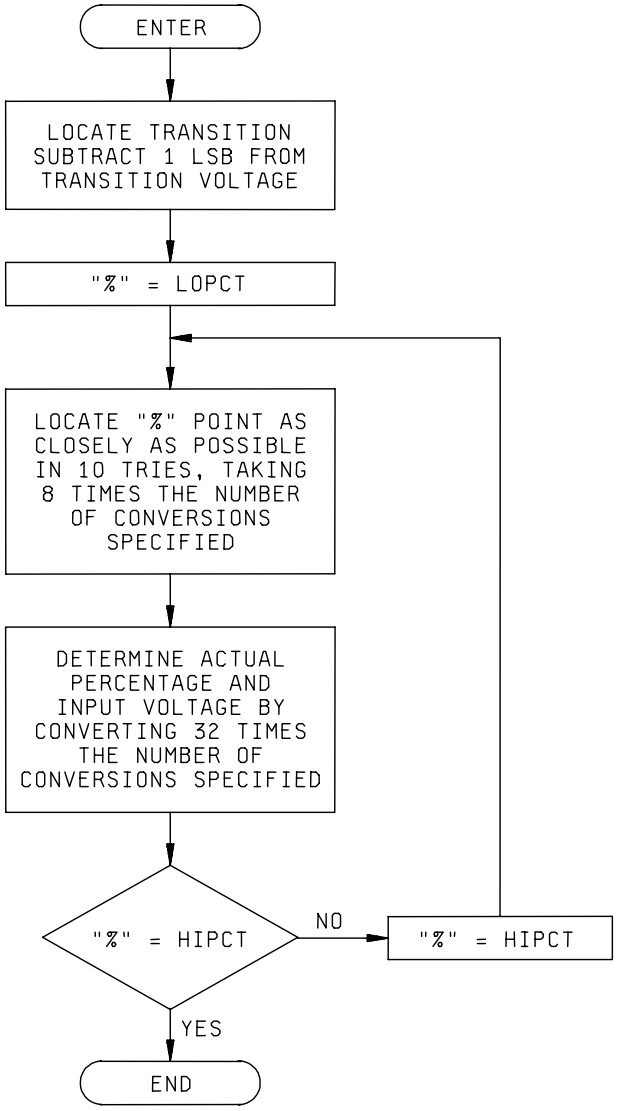


FIGURE 9. Timing diagrams (stand alone operation) – Continued.



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 10. Algorithm for measuring transition uncertainty.

TABLE III. Group A inspection for all device types.

Subgroup	Symbol	Test no.	Applied voltages ref. pin 9 (figures 4, 8) 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	Equation and notes	Limits Min	Max	Units
1	I_{CC1}	1	+15.0 V	-15.0 V	+5.0 V	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	"
T_A = +25°C	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	-10	1	µA
	I_{IL2}	10	"	"	"	"	" " "	4	I8	"	I_{IL2} = I8 All device types	"	"	"
	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	-1	10	µA
	I_{IH2}	14	"	"	"	"	" " "	4	I12	"	I_{IH2} = I12 All device types	"	"	"
	I_{IH3}	15	"	"	"	"	" " "	5	I13	"	I_{IH3} = I13	"	"	"
	I_{IH4}	16	"	"	"	"	" " "	6	I14	"	I_{IH4} = I14	"	"	"
	I_{IH5}	17	"	"	"	"	" " "	3	I15	µA	I_{IH5} = I15 $V_{IN(logic)}$ = 5.5 V	-1	10	µA
	I_{IH6}	18	"	"	"	"	" " "	4	I16	"	I_{IH6} = I16 All device types	"	"	"
	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	µA	I_{ZL1} = I19 V_O = 0.0 V	-10	10	µA
	I_{ZL2}	22	"	"	"	"	" " "	17	I20	"	I_{ZL2} = I20 VR/ $\overline{C}$ = logic "0"	"	"	"
	I_{ZL3}	23	"	"	"	"	" " "	18	I21	"	I_{ZL3} = I21 All device types	"	"	"
	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	"	"	"

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

Subgroup	Symbol	Test no.	Applied voltages ref. pin 9 (figures 4, 8) 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	Equation and notes		Limits Min	Max	Units
1	I_{ZH1}	33	+15.0 V	-15.0 V	+5.5 V	Max (-)	0000 0000 0000	16	I31	µA	I_{ZH1} = I31	V_O = 5.5 V	-10	10	µA
	I_{ZH2}	34	"	"	"	"	" " "	17	I32	"	I_{ZH2} = I32	VR/ $\overline{C}$ = logic "0"	"	"	"
T_A = +25°C	I_{ZH3}	35	"	"	"	"	" " "	18	I33	"	I_{ZH3} = I33	All device types	"	"	"
	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				
	tc1	45	"	"	+5.0	"	0000 0000 0000	28	t1	s	tc1 = t1 8-bit cycle	device types 01,02,03,04	10	29	µs
												device types 05,06	6	11.5	"
	tc2	46	"	"	"	"	0000 0000 0000	28	t2	s	tc2 = t2 12-bit cycle	device types 01,02,03,04	15	40	"
												device types 05,06	9	17	"
	V_{OL1}	47	"	"	+4.5 V	"	0000 0000 0000	16	E1	V	V_{OL1} = E1	I_L = 1.6 mA		0.4	V
	V_{OL2}	48	"	"	"	"	" " "	17	E2	"	V_{OL2} = E2	VR/ $\overline{C}$ = 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	V_{OH1} = E14	I_L = -0.5 mA	2.4		V
	V_{OH2}	61	"	"	"	"	" " "	17	E15	"	V_{OH2} = E15	VR/ $\overline{C}$ = 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 6, 7, 10)	"		"

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

Subgroup	Symbol	Test no.	Applied voltages ref. pin 9 (figures 4, 8) 7 V_{CC} (V) $_V$	11 $_{EE}$ (V) $_V$	1 $_{DD}$ (V) $_V$	13 $_{IN}$ (a) (V)	DUT digital output code-word 27 <----------> 16 MSB <----------->LSB	Measurement sense lines ref. pin no. 9 Pin	Value	Unit	Equation and notes		Limits Min	Max	Units
1 T_A = +25°C	V_{REF}	73	+15.0	-15.0	+5.0	Max (-)	0000 0000 0000	8	E27	V	V_{REF} = E27	Bipolar, V_{FSR} = 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	V “
	m1	74	“	“	“	Max (+)	1111 1111 XXXX	27	E28	“	m1a = E28	I_L = -0.5 mA	2.4		“
		75	“	“	“	“	“ “ “	26	E29	“	m1b = E29	$V_{12/8}$ = 0.0 V	“		“
		76	“	“	“	“	“ “ “	25	E30	“	m1c = E30	V_{A0} = logic “0”	“		“
		77	“	“	“	“	“ “ “	24	E31	“	m1d = E31	$V_{R/C}$ = logic “0” -> “1”	“		“
		78	“	“	“	“	“ “ “	23	E32	“	m1e = E32	All device types	“		“
		79	“	“	“	“	“ “ “	22	E33	“	m1f = E33		“		“
		80	“	“	“	“	“ “ “	21	E34	“	m1g = E34		“		“
		81	“	“	“	“	“ “ “	20	E35	“	m1h = E35		“		“
	m2	82	“	“	“	“	XXXX 0000 1111	19	E36	“	m2a = E36	I_L = -0.5 mA	2.4		“
		83	“	“	“	“	“ “ “	18	E37	“	m2b = E37	V_{CE} = logic “0”	“		“
		84	“	“	“	“	“ “ “	17	E38	“	m2c = E38	V_{A0} = logic “0”	“		“
		85	“	“	“	“	“ “ “	16	E39	“	m2d = E39	V_{CE} = logic “1” All device types	“		“
	m3	86	“	“	“	“	XXXX 0000 1111	23	E40	“	m3a = E40	I_L = 1.6 mA		0.4	“
		87	“	“	“	“	“ “ “	22	E41	“	m3b = E41	All device types		“	“
		88	“	“	“	“	“ “ “	21	E42	“	m3c = E42			“	“
		89	“	“	“	“	“ “ “	20	E43	“	m3d = E43			“	“
		90	“	“	“	“	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		“	“	“
m4		93	“	“	“	“	“ “ “	24	I46	“	m4d = I46		“	“	“
		94	“	“	“	“	1111 1111 XXXX	19	I47	µA	m5a = I47	V_O = 0.4 V	-10	10	µA
		95	“	“	“	“	“ “ “	18	I48	“	m5b = I48	V_{CE} = logic “0”	“	“	“
		96	“	“	“	“	“ “ “	17	I49	“	m5c = I49	V_{A0} = logic “0”	“	“	“
m5		97	“	“	“	“	“ “ “	16	I50	“	m5d = I50	V_{CE} = logic “1” All device types	“	“	“

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

Subgroup	Symbol	Test no.	Applied voltages ref. pin 9 (figures 4, 8) 7 V_{CC} (V)	11 EE (V)	1 DD (V)	13 IN (a) (V)	DUT digital output code-word 27 <----------> 16 MSB <----------> LSB	Measurement sense limit ref. pin 9 Pin	Value	Unit	Equation and notes	Limits Min	Max	Units
1 T_A = +25°C	VR/$\overline{C}$	98	+15.0 V	-15.0 V	+5.0 V	Max (-)	0000 0000 0000	16	E44	V	V_{OL14} = E44 VR/$\overline{C}$ = 0.8 V (Init.)	Logic	"0"	
			"	"	"	"	" " "	17	E45	"	V_{OL15} = E45 VR/$\overline{C}$ = 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		"	
	VR/$\overline{C}$	99	"	"	"	Max (+)	1111 1111 1111	16	E57	V	V_{OH14} = E57 (Convert and read)	Logic	"1"	
			"	"	"	"	" " "	17	E58	"	V_{OH15} = E58 VR/$\overline{C}$ = 0.8 V (Init.)			
			"	"	"	"	" " "	18	E59	"	V_{OH16} = E59 VR/$\overline{C}$ = 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	+15.0 V	-15.0 V	+5.0 V	Max (+)	1111 1111 1111	16	E70	V	V_{OH27} = E70 (Convert and read)	Logic	"1"	
			"	"	"	"	" " "	17	E71	"	V_{OH28} = E71 V_{CE} = 0.8 V (Init.)		"	
			"	"	"	"	" " "	18	E72	"	V_{OH29} = E72 V_{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		"	

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

Subgroup	Symbol	Test no.	Applied voltages ref. pin 9 (figures 4, 8) 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	Equation and notes	Limits Min	Max	Units
1 T_A = +25°C	V_{CE}	101	+15.0 V	-15.0 V	+5.0 V	Max (-)	1111 1111 1111	16	E83	V	V_{OH40} = E83 V_{CE} = 0.8 V	Logic	"1"	
			"	"	"	"	" " "	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		"	
		102	+15.0 V	-15.0 V	+5.0 V	Max (-)	0000 0000 0000	16	E96	V	V_{OL27} = E96 All device types	Logic	"0"	
			"	"	"	"	" " "	17	E97	"	V_{OL28} = E97 V_{CE} = 2.0 V (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	+15.0 V	-15.0 V	+5.0 V	Max (+)	1111 1111 1111	16	E109	V	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		"	

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

Subgroup	Symbol	Test no.	Applied voltages ref. pin 9 (figures 4, 8) 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	Equation and notes		Limits Min	Max	Units
1	V $\overline{CS}$	104	+15.0 V	-15.0 V	+5.0 V	Max (-)	1111 1111 1111	16	E122	V	V_{OH66} = E122	All device types	Logic	"1"	
			"	"	"	"	" " "	17	E123	"	V_{OH67} = E123	Set V $\overline{CS}$ = 2.0 V			
T_A = +25°C			"	"	"	"	" " "	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	+15.0 V	-15.0 V	+5.0 V	Max (-)	0000 0000 0000	16	E135	V	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_{A0}	106	+15.0 V	-15.0 V	+5.0 V	Max (-)	1111 1111 XXXX	20	E148	V	V_{OH79} = E148	All device types	Logic	"1"	
			"	"	"	"	" " "	21	E149	"	V_{OH80} = E149	V12/ $\overline{8}$ = 0.0 V			
			"	"	"	"	" " "	22	E150	"	V_{OH81} = E150	V_{A0} = 0.8 V, (convert	"		
			"	"	"	"	" " "	23	E151	"	V_{OH82} = E151	and read)		"	
		107	+15.0 V	-15.0 V	+5.0 V	Max (-)	XXXX 0000 1111	20	E152	V	V_{OL53} = E152	All device types	Logic	"0"	
			"	"	"	"	" " "	21	E153	"	V_{OL54} = E153	V_{CE} = logic "0",		"	
			"	"	"	"	" " "	22	E154	"	V_{OL55} = E154	V_{A0} = 2.0 V,		"	
			"	"	"	"	" " "	23	E155	"	V_{OL56} = E155	V_{CE} = logic "1"			

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

Subgroup	Symbol	Test no.	Applied voltages ref. pin 9 (figures 4, 8) 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	Equation and notes	Limits Min	Max	Units
1	$+P_{SS1}$		+15.0	-15.0	+5.0	0000 0000 0000	0000 0000 000ϕ	13	E156	V	All devices			
		108	+13.5	"	"	" " "	" " "	"	E157	"	$+P_{SS1a}$ = 41*(E156-E157)	-.10	+.10	LSB/%PS
T_A =		109	+16.5	"	"	" " "	" " "	"	E158	"	$+P_{SS1b}$ = 41*(E158-E156)	"	"	"
+25°C			+15.0	"	"	1111 1111 1110	1111 1111 111ϕ	"	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	+5.0	0000 0000 0000	0000 0000 000ϕ	13	E162	V	All devices			
		112	+11.4	"	"	" " "	" " "	"	E163	"	$+P_{SS2a}$ = 81.9*(E162-E163)	-.20	+.20	LSB/%PS
		113	+12.6	"	"	" " "	" " "	"	E164	"	$+P_{SS2b}$ = 81.9*(E164-E162)	"	"	"
			+12.0	"	"	1111 1111 1110	1111 1111 111ϕ	"	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 000ϕ	13	E168	V	All devices			
		116	"	"	+4.5	" " "	" " "	"	E169	"	$+P_{SS3a}$ = 41*(E168-E169)	-.10	+.10	LSB/%PS
		117	"	"	+5.5	" " "	" " "	"	E170	"	$+P_{SS3b}$ = 41*(E170-E168)	"	"	"
			"	"	+5.0	1111 1111 1110	1111 1111 111ϕ	"	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 000ϕ	13	E174	V	All devices			
		120	"	-16.5	"	" " "	" " "	"	E175	"	$-P_{SS1a}$ = 41*(E174-E175)	-.10	+.10	LSB/%PS
		121	"	-13.5	"	" " "	" " "	"	E176	"	$-P_{SS1b}$ = 41*(E176-E174)	"	"	"
			"	-15.0	"	1111 1111 1110	1111 1111 111ϕ	"	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	+5.0	0000 0000 0000	0000 0000 000ϕ	13	E180	V	All devices			
		124	"	-12.6	"	" " "	" " "	"	E181	"	$-P_{SS2a}$ = 81.9*(E180-E181)	-.20	+.20	LSB/%PS
		125	"	-11.4	"	" " "	" " "	"	E182	"	$-P_{SS2b}$ = 81.9*(E182-E180)	"	"	"
			"	-12.0	"	1111 1111 1110	1111 1111 111ϕ	"	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 6, 8) 7 V_{CC} (V)	11 $_{EE}$ (V)	1 $_{DD}$ (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	Equation and notes	Limits Min	Max	Units
4	V_{IO}	382	+15.0	-15.0	+5.0	0000 0000 0000	0000 0000 000ϕ		13	E556	V	V_{IO} = 410*(E566) Device types 01, 02	-0.5	1.5	LSB
												03,04,05,06	-1.5	2.5	"
T_A =	B_Z	383	"	"	"	0111 1111 1111	ϕϕϕϕ ϕϕϕϕ ϕϕϕϕ	KA	"	E557	"	B_Z = 410*(E557) All device types	-4.5	3.5	"
+25°C	AE	384	"	"	"	0000 0000 0000	0000 0000 000ϕ			E558	"	A_E = 100*(9.995-(E559- Device type 01	-.125	.125	%/FSR
			"	"	"	1111 1111 1110	1111 1111 111ϕ		"	E559	"	E558)) / (E559-E558) Device types 02	-.25	.25	"
								"				03,04,05,06	-.3	.3	"
	B_{PAE}	385	"	"	"	0000 0000 0000	0000 0000 000ϕ	KA	"	E560	"	B_{PAE} = 100*(19.990* Device type 01	-0.125	0.125	%/FSR
			"	"	"	1111 1111 1110	1111 1111 111ϕ	"	"	E561	"	(E560-E559)) / Device types 02	-0.25	0.25	"
												(E560-E559) 03,04,05,06	-0.3	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 code word ; S = (E563-E563)/4094			
			"	"	"	1111 1111 1110	1111 1111 111ϕ	"	"	E562	"				
			"	"	"	0000 0000 0000	0000 0000 000ϕ	"	"	E563	"	All device types	-.5	.5	LSB
	L_{E1}	386	"	"	"	0000 0000 0001	0000 0000 00ϕϕ	"	"	E564	"	L_{E1} = ((E563+E564)/2-1*S-E563 +S/2) / S	"	"	"
	L_{E2}	387	"	"	"	0000 0000 0010	0000 0000 001ϕ	"	"	E565	"	L_{E2} = ((E564+E565)/2-2*S-E563 +S/2) / S	"	"	"
						0000 0000 0011	0000 0000 0ϕϕϕ	"	"	E566	"				
	L_{E3}	388	"	"	"	0000 0000 0100	0000 0000 010ϕ	"	"	E567	"	L_{E3} = ((E566+E567)/2-4*S-E563 +S/2) / S	"	"	"
						0000 0000 0111	0000 0000 ϕϕϕϕ	"	"	E568	"				
	L_{E4}	389	"	"	"	0000 0000 1000	0000 0000 100ϕ	"	"	E569	"	L_{E4} = ((E568+E569)/2-8*S-E563 +S/2) / S	"	"	"
						0000 0000 1111	0000 000ϕ ϕϕϕϕ	"	"	E570	"				
	L_{E5}	390	"	"	"	0000 0001 0000	0000 0001 000ϕ	"	"	E571	"	L_{E5} = ((E570+E571)/2-16*S-E563 +S/2) / S	"	"	"
						0000 0001 1111	0000 00ϕϕ ϕϕϕϕ	"	"	E572	"				
	L_{E6}	391	"	"	"	0000 0010 0000	0000 0010 000ϕ	"	"	E573	"	L_{E6} = ((E572+E573)/2-32*S-E563 +S/2) / S	"	"	"
						0000 0011 1111	0000 0ϕϕϕ ϕϕϕϕ	"	"	E574	"				
	L_{E7}	392	"	"	"	0000 0100 0000	0000 0100 000ϕ	"	"	E575	"	L_{E7} = ((E574+E575)/2-64*S-E563 +S/2) / S	"	"	"
						0000 0111 1111	0000 ϕϕϕϕ ϕϕϕϕ	"	"	E576	"				
	L_{E8}	393	"	"	"	0000 1000 0000	0000 1000 000ϕ	"	"	E577	"	L_{E8} = ((E576+E577)/2-128*S-E563 +S/2) / S	"	"	"
						0000 1111 1111	000ϕ ϕϕϕϕ ϕϕϕϕ	"	"	E578	"				
	L_{E9}	394	"	"	"	0001 0000 0000	0001 0000 000ϕ	"	"	E579	"	L_{E9} = ((E578+E579)/2-256*S-E563 +S/2) / S	"	"	"
						0001 1111 1111	00ϕϕ ϕϕϕϕ ϕϕϕϕ	"	"	E580	"				
	L_{E10}	395	"	"	"	0010 0000 0000	0010 0000 000ϕ	"	"	E581	"	L_{E10} = ((E580+E581)/2-512*S-E563 +S/2) / S	"	"	"
						0010 1111 1111	001ϕ ϕϕϕϕ ϕϕϕϕ	"	"	E582	"				
	L_{E11}	396	"	"	"	0011 0000 0000	0011 0000 000ϕ	"	"	E583	"	L_{E11} = ((E582+E583)/2-768*S-E563 +S/2) / S	"	"	"
						0011 1111 1111	0ϕϕϕ ϕϕϕϕ ϕϕϕϕ	"	"	E584	"				

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

Subgroup	Symbol	Test no.	Applied voltages ref. pin 9 (figures 6, 8) 7 V_{CC} (V)	11 $_{EE}$ (V) $_V$	1 $_{DD}$ (V)	Applied digital code-word 29 <----------> 40 MSB <----------->LSB	DUT digital output code-word 29 <----------> 16 MSB <----------->LSB	Active relays Pin	Measurement sense lines ref. pin 9	Value	Unit	Equation and notes	Limits Min	Max	Units
4 T_A = +25°C	L_{E12}	397	+15.0	-15.0	+5.0	0100 0000 0000 0100 1111 1111	0100 0000 000ϕ 010ϕ ϕϕϕϕ ϕϕϕϕ	KA “	13 “	E585 E586	V “	L_{E12} = ((E584+E585)/2-1024*S-E563 +S/2) / S	-.5	.5	LSB
	L_{E13}	398	“	“	“	0101 0000 0000 0101 1111 1111	0101 0000 000ϕ 01ϕϕ ϕϕϕϕ ϕϕϕϕ	“ “	“ “	E587 E588	“ “	L_{E13} = ((E586+E587)/2-1280*S-E563 +S/2) / S	“	“	“
	L_{E14}	399	“	“	“	0110 0000 0000 0110 1111 1111	0110 0000 000ϕ 011ϕ ϕϕϕϕ ϕϕϕϕ	“ “	“ “	E589 E590	“ “	L_{E14} = ((E588+E589)/2-1536*S-E563 +S/2) / S	“	“	“
	L_{E15}	400	“	“	“	0111 0000 0000 0111 1111 1111	0111 0000 000ϕ ϕϕϕϕ ϕϕϕϕ ϕϕϕϕ	“ “	“ “	E591 E592	“ “	L_{E15} = ((E590+E591)/2-1792*S-E563 +S/2) / S	“	“	“
	L_{E16}	401	“	“	“	1000 0000 0000 1000 1111 1111	1000 0000 000ϕ 100ϕ ϕϕϕϕ ϕϕϕϕ	“ “	“ “	E593 E594	“ “	L_{E16} = ((E592+E593)/2-2048*S-E563 +S/2) / S	“	“	“
	L_{E17}	402	“	“	“	1001 0000 0000 1001 1111 1111	1001 0000 000ϕ 10ϕϕ ϕϕϕϕ ϕϕϕϕ	“ “	“ “	E595 E596	“ “	L_{E17} = ((E594+E595)/2-2304*S-E563 +S/2) / S	“	“	“
	L_{E18}	403	“	“	“	1010 0000 0000 1010 1111 1111	1010 0000 000ϕ 101ϕ ϕϕϕϕ ϕϕϕϕ	“ “	“ “	E597 E598	“ “	L_{E18} = ((E596+E597)/2-2560*S-E563 +S/2) / S	“	“	“
	L_{E19}	404	“	“	“	1011 0000 0000 1011 1111 1111	1011 0000 000ϕ 1ϕϕϕ ϕϕϕϕ ϕϕϕϕ	“ “	“ “	E599 E600	“ “	L_{E19} = ((E598+E599)/2-2816*S-E563 +S/2) / S	“	“	“
	L_{E20}	405	“	“	“	1100 0000 0000 1100 1111 1111	1100 0000 000ϕ 110ϕ ϕϕϕϕ ϕϕϕϕ	“ “	“ “	E601 E602	“ “	L_{E20} = ((E600+E601)/2-3072*S-E563 +S/2) / S	“	“	“
	L_{E21}	406	“	“	“	1101 0000 0000 1101 1111 1111	1101 0000 000ϕ 11ϕϕ ϕϕϕϕ ϕϕϕϕ	“ “	“ “	E603 E604	“ “	L_{E21} = ((E602+E603)/2-3328*S-E563 +S/2) / S	“	“	“
	L_{E22}	407	“	“	“	1110 0000 0000 1110 1111 1111	1110 0000 000ϕ 111ϕ ϕϕϕϕ ϕϕϕϕ	“ “	“ “	E605 E606	“ “	L_{E22} = ((E604+E605)/2-3584*S-E563 +S/2) / S	“	“	“
	L_{E23}	408	“	“	“	1111 0000 0000 1111 1111 1111	1111 0000 000ϕ 1111 ϕϕϕϕ ϕϕϕϕ	“ “	“ “	E607 E608	“ “	L_{E23} = ((E606+E607)/2-3840*S-E563 +S/2) / S	“	“	“
	L_{E24}	409	“	“	“	1111 0000 0000 1111 1011 1111	1111 0000 000ϕ 1111 1ϕϕϕ ϕϕϕϕ	“ “	“ “	E609 E610	“ “	L_{E24} = ((E608+E609)/2-3968*S-E563 +S/2) / S	“	“	“
	L_{E25}	410	“	“	“	1111 1100 0000 1111 1101 1111	1111 1100 000ϕ 1111 11ϕϕ ϕϕϕϕ	“ “	“ “	E611 E612	“ “	L_{E25} = ((E610+E611)/2-4032*S-E563 +S/2) / S	“	“	“
	L_{E26}	411	“	“	“	1111 1110 0000 1111 1110 1111	1111 1110 000ϕ 1111 111ϕ ϕϕϕϕ	“ “	“ “	E613 E614	“ “	L_{E26} = ((E612+E613)/2-4064*S-E563 +S/2) / S	“	“	“
	L_{E27}	412	“	“	“	1111 1111 0000 1111 1111 0111	1111 1111 000ϕ 1111 1111 ϕϕϕϕ	“ “	“ “	E615 E616	“ “	L_{E27} = ((E614+E615)/2-4080*S-E563 +S/2) / S	“	“	“
	L_{E28}	413	“	“	“	1111 1111 1000 1111 1111 1011	1111 1111 100ϕ 1111 1111 1ϕϕϕ	“ “	“ “	E617 E618	“ “	L_{E28} = ((E616+E617)/2-4088*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 6, 8) 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 Pin	Measurement sense lines ref. pin 9	Value	Unit	Equation and notes	Limits Min	Limits Max	Units
4	L_{E29}	414	+15.0	-15.0	+5.0	1111 1111 1100 1111 1111 1101	1111 1111 110ϕ 1111 1111 11ϕϕ	KA “	13 “	E619 E620	V “	L_{E29} = ((E618+E619)/2-4092*S-E563 +S/2) / S	-.5	.5	LSB
T_A = +25°C	L_{E30}	415	“	“	“	1111 1111 1110	1111 1111 111ϕ	“	“	E621	“	L_{E30} = ((E620+E621)/2-4094*S-E563 +S/2) / S	“	“	“
												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 00ϕϕ	KA	13		V	D_{LE1} = (E564-E563) / S	-.9	1.0	LSB
	D_{LE2}	417	“	“	“	0000 0000 0010	0000 0000 001ϕ	“	“		“	D_{LE2} = (E565-E564) / S	“	“	“
	D_{LE3}	418	“	“	“	0000 0000 0100	0000 0000 010ϕ	“	“		“	D_{LE3} = (E567-E566) / S	“	“	“
	D_{LE4}	419	“	“	“	0000 0000 1000	0000 0000 100ϕ	“	“		“	D_{LE4} = (E569-E568) / S	“	“	“
	D_{LE5}	420	“	“	“	0000 0001 0000	0000 0001 000ϕ	“	“		“	D_{LE5} = (E571-E570) / S	“	“	“
	D_{LE6}	421	“	“	“	0000 0010 0000	0000 0010 000ϕ	“	“		“	D_{LE6} = (E573-E572) / S	“	“	“
	D_{LE7}	422	“	“	“	0000 0100 0000	0000 0100 000ϕ	“	“		“	D_{LE7} = (E575-E574) / S	“	“	“
	D_{LE8}	423	“	“	“	0000 1000 0000	0000 1000 000ϕ	“	“		“	D_{LE8} = (E577-E576) / S	“	“	“
	D_{LE9}	424	“	“	“	0001 0000 0000	0001 0000 000ϕ	“	“		“	D_{LE9} = (E579-E578) / S	“	“	“
	D_{LE10}	425	“	“	“	0010 0000 0000	0010 0000 000ϕ	“	“		“	D_{LE10} = (E581-E580) / S	“	“	“
	D_{LE11}	426	“	“	“	0011 0000 0000	0011 0000 000ϕ	“	“		“	D_{LE11} = (E583-E582) / S	“	“	“
	D_{LE12}	427	“	“	“	0100 0000 0000	0100 0000 000ϕ	“	“		“	D_{LE12} = (E585-E584) / S	“	“	“
	D_{LE13}	428	“	“	“	0101 0000 0000	0101 0000 000ϕ	“	“		“	D_{LE13} = (E587-E586) / S	“	“	“
	D_{LE14}	429	“	“	“	0110 0000 0000	0110 0000 000ϕ	“	“		“	D_{LE14} = (E589-E588) / S	“	“	“
	D_{LE15}	430	“	“	“	0111 0000 0000	0111 0000 000ϕ	“	“		“	D_{LE15} = (E591-E590) / S	“	“	“
	D_{LE16}	431	“	“	“	1000 0000 0000	1000 0000 000ϕ	“	“		“	D_{LE16} = (E593-E592) / S	“	“	“
	D_{LE17}	432	“	“	“	1001 0000 0000	1001 0000 000ϕ	“	“		“	D_{LE17} = (E595-E594) / S	“	“	“
	D_{LE18}	433	“	“	“	1010 0000 0000	1010 0000 000ϕ	“	“		“	D_{LE18} = (E597-E596) / S	“	“	“
	D_{LE19}	434	“	“	“	1011 0000 0000	1011 0000 000ϕ	“	“		“	D_{LE19} = (E599-E598) / S	“	“	“
	D_{LE20}	435	“	“	“	1100 0000 0000	1100 0000 000ϕ	“	“		“	D_{LE20} = (E601-E600) / S	“	“	“
	D_{LE21}	436	“	“	“	1101 0000 0000	1101 0000 000ϕ	“	“		“	D_{LE21} = (E603-E602) / S	“	“	“
	D_{LE22}	437	“	“	“	1110 0000 0000	1110 0000 000ϕ	“	“		“	D_{LE22} = (E605-E604) / S	“	“	“
	D_{LE23}	438	“	“	“	1111 0000 0000	1111 0000 000ϕ	“	“		“	D_{LE23} = (E607-E606) / S	“	“	“
	D_{LE24}	439	“	“	“	1111 1000 0000	1111 1000 000ϕ	“	“		“	D_{LE24} = (E609-E608) / S	“	“	“
	D_{LE25}	440	“	“	“	1111 1100 0000	1111 1100 000ϕ	“	“		“	D_{LE25} = (E611-E610) / S	“	“	“

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

Subgroup	Symbol	Test no.	Applied voltages ref. pin 9 (figures 6, 8) 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 Pin	Measurement sense lines ref. pin 9	Value	Unit	Equation and notes	Limits Min	Limits Max	Units
4	D_{LE26}	441	+15.0	-15.0	+5.0	1111 1110 0000	1111 1110 000ϕ	KA	13		V	D_{LE26} = (E613-E612) / S	-.9	1.0	LSB
	D_{LE27}	442	"	"	"	1111 1111 0000	1111 1111 000ϕ	"	"		"	D_{LE27} = (E615-E614) / S	"	"	"
T_A = +25°C	D_{LE28}	443	"	"	"	1111 1111 1000	1111 1111 100ϕ	"	"		"	D_{LE28} = (E617-E616) / S	"	"	"
	D_{LE29}	444	"	"	"	1111 1111 1100	1111 1111 110ϕ	"	"		"	D_{LE29} = (E619-E618) / S	"	"	"
	D_{LE30}	445	"	"	"	1111 1111 1110	1111 1111 111ϕ	"	"		"	D_{LE30} = (E621-E620) / S	"	"	"
	M_{CC}	446	+15.0	-15.0	+5.0	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 4, 5), all device types	0		Codes
5	dV_{IO} / dT	447	"	"	"	0000 0000 0000	0000 0000 000ϕ		13	E622	V	dV_{IO} / dT = 410* (E622-E556)			
												Device types 01,02	-0.5	0.5	LSB
T_A = +125°C												Device types 03, 04, 05, 06	-1.0	1.0	"
	dBZ / dT	448	"	"	"	0111 1111 1111	ϕϕϕϕ ϕϕϕϕ ϕϕϕϕ	KA	"	E623	"	dBZ / dT = 410* (E623-E557)			
												Device types 01, 03, 05	-1.0	1.0	LSB
												Device types 02, 04, 06	-2.0	2.0	"
	dAE / dT	449	"	"	"	0000 0000 0000 1111 1111 1110	0000 0000 000ϕ 1111 1111 111ϕ	"	"	E624 E625	" "	dAE / dT = $9.995*10^{6}$* (1 / (E624 – E625)) - (1 / (E559 – E558))			
												Device types 01, 03, 05	-12.5	12.5	ppm/°C
												Device types 02, 04, 06	-25	25	"
	dBPAE / dT	450	"	"	"	0000 0000 0000 1111 1111 1110	0000 0000 000ϕ 1111 1111 111ϕ	KA "	" "	E626 E627	" "	dBPAE / dT = $19.99*10^{6}$* (1 / (E627 – E626)) - (1 / (E561 – E560))			
												Device types 01, 03, 05	-12.5	12.5	ppm/°C
												Device types 02, 04, 06	-25	25	"

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

Subgroup	Symbol	Test no.	Applied voltages ref. pin 9 (figures 6, 8) 7 V_{CC} (V)	11 $_{EE}$ (V)	1 $_{DD}$ (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	Equation and notes	Limits Min	Max	Units
5 T_A = +125°C			+15.0	-15.0	+5.0	1111 1111 1110	1111 1111 111ϕ	KA	13	E628	V	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			
			"	"	"	0000 0000 0000	0000 0000 000ϕ	"	"	E629	"				
	L_{E1}	451	"	"	"	0000 0000 0001	0000 0000 00ϕϕ	"	"	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 001ϕ	"	"	E631	"	L_{E2} = ((E630+E631)/2-2*S-E629 +S/2) / S	"	"	"
						0000 0000 0011	0000 0000 0ϕϕϕ	"	"	E632	"				
	L_{E3}	453	"	"	"	0000 0000 0100	0000 0000 010ϕ	"	"	E633	"	L_{E3} = ((E632+E633)/2-4*S-E629 +S/2) / S	"	"	"
						0000 0000 0111	0000 0000 ϕϕϕϕ	"	"	E634	"				
	L_{E4}	454	"	"	"	0000 0000 1000	0000 0000 100ϕ	"	"	E635	"	L_{E4} = ((E634+E635)/2-8*S-E629 +S/2) / S	"	"	"
						0000 0000 1111	0000 000ϕ ϕϕϕϕ	"	"	E636	"				
	L_{E5}	455	"	"	"	0000 0001 0000	0000 0001 000ϕ	"	"	E637	"	L_{E5} = ((E636+E637)/2-16*S-E629 +S/2) / S	"	"	"
						0000 0001 1111	0000 00ϕϕ ϕϕϕϕ	"	"	E638	"				
	L_{E6}	456	"	"	"	0000 0010 0000	0000 0010 000ϕ	"	"	E639	"	L_{E6} = ((E638+E639)/2-32*S-E629 +S/2) / S	"	"	"
						0000 0011 1111	0000 0ϕϕϕ ϕϕϕϕ	"	"	E640	"				
	L_{E7}	457	"	"	"	0000 0100 0000	0000 0100 000ϕ	"	"	E641	"	L_{E7} = ((E640+E641)/2-64*S-E629 +S/2) / S	"	"	"
						0000 0111 1111	0000 ϕϕϕϕ ϕϕϕϕ	"	"	E642	"				
	L_{E8}	458	"	"	"	0000 1000 0000	0000 1000 000ϕ	"	"	E643	"	L_{E8} = ((E642+E643)/2-128*S-E629 +S/2) / S	"	"	"
						0000 1111 1111	000ϕ ϕϕϕϕ ϕϕϕϕ	"	"	E644	"				
	L_{E9}	459	"	"	"	0001 0000 0000	0001 0000 000ϕ	"	"	E645	"	L_{E9} = ((E644+E645)/2-256*S-E629 +S/2) / S	"	"	"
						0001 1111 1111	00ϕϕ ϕϕϕϕ ϕϕϕϕ	"	"	E646	"				
	L_{E10}	460	"	"	"	0010 0000 0000	0010 0000 000ϕ	"	"	E647	"	L_{E10} = ((E646+E647)/2-512*S-E629 +S/2) / S	"	"	"
						0010 1111 1111	001ϕ ϕϕϕϕ ϕϕϕϕ	"	"	E648	"				
	L_{E11}	461	"	"	"	0011 0000 0000	0011 0000 000ϕ	"	"	E649	"	L_{E11} = ((E648+E649)/2-768*S-E629 +S/2) / S	"	"	"
						0011 1111 1111	0ϕϕϕ ϕϕϕϕ ϕϕϕϕ	"	"	E650	"				
	L_{E12}	462	"	"	"	0100 0000 0000	0100 0000 000ϕ	"	"	E651	"	L_{E12} = ((E650+E651)/2-1024*S-E629 +S/2) / S	"	"	"
						0100 1111 1111	010ϕ ϕϕϕϕ ϕϕϕϕ	"	"	E652	"				
	L_{E13}	463	"	"	"	0101 0000 0000	0101 0000 000ϕ	"	"	E653	"	L_{E13} = ((E652+E653)/2-1280*S-E629 +S/2) / S	"	"	"
						0101 1111 1111	01ϕϕ ϕϕϕϕ ϕϕϕϕ	"	"	E654	"				
	L_{E14}	464	"	"	"	0110 0000 0000	0110 0000 000ϕ	"	"	E655	"	L_{E14} = ((E654+E655)/2-1536*S-E629 +S/2) / S	"	"	"
						0110 1111 1111	011ϕ ϕϕϕϕ ϕϕϕϕ	"	"	E656	"				

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

Subgroup	Symbol	Test no.	Applied voltages ref. pin 9 (figures 6, 8)			Applied digital code-word	DUT digital output code-word	Active relays	Measurement sense lines ref. pin 9			Equation and notes	Limits		Units
			7 V_{CC} (V)	11 $_{EE}$ (V)	1 $_{DD}$ (V)	29 <----------> 40 MSB <----------->LSB	29 <----------> 16 MSB <----------->LSB		Pin	Value	Unit		Min	Max	
5	L_{E15}	465	+15.0	-15.0	+5.0	0111 0000 0000 0111 1111 1111	0111 0000 000ϕ ϕϕϕϕ ϕϕϕϕ ϕϕϕϕ	KA “	13 “	E657 E658	“ “	L_{E15} = ((E656+E657)/2-1792*S-E629 +S/2) / S	-1.0	1.0	LSB
T_A = +125°C	L_{E16}	466	“	“	“	1000 0000 0000 1000 1111 1111	1000 0000 000ϕ 100ϕ ϕϕϕϕ ϕϕϕϕ	“ “	“ “	E659 E660	“ “	L_{E16} = ((E658+E659)/2-2048*S-E629 +S/2) / S	“	“	“
	L_{E17}	467	“	“	“	1001 0000 0000 1001 1111 1111	1001 0000 000ϕ 10ϕϕ ϕϕϕϕ ϕϕϕϕ	“ “	“ “	E661 E662	“ “	L_{E17} = ((E660+E661)/2-2304*S-E629 +S/2) / S	“	“	“
	L_{E18}	468	“	“	“	1010 0000 0000 1010 1111 1111	1010 0000 000ϕ 101ϕ ϕϕϕϕ ϕϕϕϕ	“ “	“ “	E663 E664	“ “	L_{E18} = ((E662+E663)/2-2560*S-E629 +S/2) / S	“	“	“
	L_{E19}	469	“	“	“	1011 0000 0000 1011 1111 1111	1011 0000 000ϕ 1ϕϕϕ ϕϕϕϕ ϕϕϕϕ	“ “	“ “	E665 E666	“ “	L_{E19} = ((E664+E665)/2-2816*S-E629 +S/2) / S	“	“	“
	L_{E20}	470	“	“	“	1100 0000 0000 1100 1111 1111	1100 0000 000ϕ 110ϕ ϕϕϕϕ ϕϕϕϕ	“ “	“ “	E667 E668	“ “	L_{E20} = ((E666+E667)/2-3072*S-E629 +S/2) / S	“	“	“
	L_{E21}	471	“	“	“	1101 0000 0000 1101 1111 1111	1101 0000 000ϕ 11ϕϕ ϕϕϕϕ ϕϕϕϕ	“ “	“ “	E669 E670	“ “	L_{E21} = ((E668+E669)/2-3328*S-E629 +S/2) / S	“	“	“
	L_{E22}	472	“	“	“	1110 0000 0000 1110 1111 1111	1110 0000 000ϕ 111ϕ ϕϕϕϕ ϕϕϕϕ	“ “	“ “	E671 E672	“ “	L_{E22} = ((E670+E671)/2-3584*S-E629 +S/2) / S	“	“	“
	L_{E23}	473	“	“	“	1111 0000 0000 1111 0111 1111	1111 0000 000ϕ 1111 ϕϕϕϕ ϕϕϕϕ	“ “	“ “	E673 E674	“ “	L_{E23} = ((E672+E673)/2-3840*S-E629 +S/2) / S	“	“	“
	L_{E24}	474	“	“	“	1111 1000 0000 1111 1011 1111	1111 1000 000ϕ 1111 1ϕϕϕ ϕϕϕϕ	“ “	“ “	E675 E676	“ “	L_{E24} = ((E674+E675)/2-3968*S-E629 +S/2) / S	“	“	“
	L_{E25}	475	“	“	“	1111 1100 0000 1111 1101 1111	1111 1100 000ϕ 1111 11ϕϕ ϕϕϕϕ	“ “	“ “	E677 E678	“ “	L_{E25} = ((E676+E677)/2-4032*S-E629 +S/2) / S	“	“	“
	L_{E26}	476	“	“	“	1111 1110 0000 1111 1110 1111	1111 1110 000ϕ 1111 111ϕ ϕϕϕϕ	“ “	“ “	E679 E680	“ “	L_{E26} = ((E678+E679)/2-4064*S-E629 +S/2) / S	“	“	“
	L_{E27}	477	“	“	“	1111 1111 0000 1111 1111 0111	1111 1111 000ϕ 1111 1111 ϕϕϕϕ	“ “	“ “	E681 E682	“ “	L_{E27} = ((E680+E681)/2-4080*S-E629 +S/2) / S	“	“	“
	L_{E28}	478	“	“	“	1111 1111 1000 1111 1111 1011	1111 1111 100ϕ 1111 1111 1ϕϕϕ	“ “	“ “	E683 E684	“ “	L_{E28} = ((E682+E683)/2-4088*S-E629 +S/2) / S	“	“	“
	L_{E29}	479	“	“	“	1111 1111 1000 1111 1111 1011	1111 1111 110ϕ 1111 1111 11ϕϕ	“ “	“ “	E685 E686	“ “	L_{E29} = ((E684+E685)/2-4092*S-E629 +S/2) / S	“	“	“
	L_{E30}	480	“	“	“	1111 1111 1110	1111 1111 111ϕ	“	“	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 6, 8) 7 V_{CC} (V)	11 $_{EE}$ (V) $_V$	1 $_{DD}$ (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	Equation and notes	Limits Min	Max	Units
5 T_A = +125°C												For end-point 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 00φφ	KA	13		V	D_{LE1} = (E630-E629) / S	-0.9	2.0	LSB
	D_{LE2}	482	"	"	"	0000 0000 0010	0000 0000 001φ	"	"		"	D_{LE2} = (E631-E630) / S	"	"	"
	D_{LE3}	483	"	"	"	0000 0000 0100	0000 0000 010φ	"	"		"	D_{LE3} = (E633-E632) / S	"	"	"
	D_{LE4}	484	"	"	"	0000 0000 1000	0000 0000 100φ	"	"		"	D_{LE4} = (E635-E634) / S	"	"	"
	D_{LE5}	485	"	"	"	0000 0001 0000	0000 0001 000φ	"	"		"	D_{LE5} = (E637-E636) / S	"	"	"
	D_{LE6}	486	"	"	"	0000 0010 0000	0000 0010 000φ	"	"		"	D_{LE6} = (E639-E638) / S	"	"	"
	D_{LE7}	487	"	"	"	0000 0100 0000	0000 0100 000φ	"	"		"	D_{LE7} = (E641-E640) / S	"	"	"
	D_{LE8}	488	"	"	"	0000 1000 0000	0000 1000 000φ	"	"		"	D_{LE8} = (E643-E642) / S	"	"	"
	D_{LE9}	489	"	"	"	0001 0000 0000	0001 0000 000φ	"	"		"	D_{LE9} = (E645-E644) / S	"	"	"
	D_{LE10}	490	"	"	"	0010 0000 0000	0010 0000 000φ	"	"		"	D_{LE10} = (E647-E646) / S	"	"	"
	D_{LE11}	491	"	"	"	0011 0000 0000	0011 0000 000φ	"	"		"	D_{LE11} = (E649-E648) / S	"	"	"
	D_{LE12}	492	"	"	"	0100 0000 0000	0100 0000 000φ	"	"		"	D_{LE12} = (E651-E650) / S	"	"	"
	D_{LE13}	493	"	"	"	0101 0000 0000	0101 0000 000φ	"	"		"	D_{LE13} = (E653-E652) / S	"	"	"
	D_{LE14}	494	"	"	"	0110 0000 0000	0110 0000 000φ	"	"		"	D_{LE14} = (E655-E654) / S	"	"	"
	D_{LE15}	495	"	"	"	0111 0000 0000	0111 0000 000φ	"	"		"	D_{LE15} = (E657-E656) / S	"	"	"
	D_{LE16}	496	"	"	"	1000 0000 0000	1000 0000 000φ	"	"		"	D_{LE16} = (E659-E658) / S	"	"	"
	D_{LE17}	497	"	"	"	1001 0000 0000	1001 0000 000φ	"	"		"	D_{LE17} = (E661-E660) / S	"	"	"
	D_{LE18}	498	"	"	"	1010 0000 0000	1010 0000 000φ	"	"		"	D_{LE18} = (E663-E662) / S	"	"	"
	D_{LE19}	499	"	"	"	1011 0000 0000	1011 0000 000φ	"	"		"	D_{LE19} = (E665-E664) / S	"	"	"
	D_{LE20}	500	"	"	"	1100 0000 0000	1100 0000 000φ	"	"		"	D_{LE20} = (E667-E666) / S	"	"	"
	D_{LE21}	501	"	"	"	1101 0000 0000	1101 0000 000φ	"	"		"	D_{LE21} = (E669-E668) / S	"	"	"
	D_{LE22}	502	"	"	"	1110 0000 0000	1110 0000 000φ	"	"		"	D_{LE22} = (E671-E670) / S	"	"	"
	D_{LE23}	503	"	"	"	1111 0000 0000	1111 0000 000φ	"	"		"	D_{LE23} = (E673-E672) / S	"	"	"
	D_{LE24}	504	"	"	"	1111 1000 0000	1111 1000 000φ	"	"		"	D_{LE24} = (E675-E674) / S	"	"	"
	D_{LE25}	505	"	"	"	1111 1100 0000	1111 1100 000φ	"	"		"	D_{LE25} = (E677-E676) / S	"	"	"
	D_{LE26}	506	"	"	"	1111 1110 0000	1111 1110 000φ	"	"		"	D_{LE26} = (E679-E678) / S	"	"	"
	D_{LE27}	507	"	"	"	1111 1111 0000	1111 1111 000φ	"	"		"	D_{LE27} = (E681-E680) / S	"	"	"
	D_{LE28}	508	"	"	"	1111 1111 1000	1111 1111 100φ	"	"		"	D_{LE28} = (E683-E682) / S	"	"	"
	D_{LE29}	509	"	"	"	1111 1111 1100	1111 1111 110φ	"	"		"	D_{LE29} = (E685-E684) / S	"	"	"
	D_{LE30}	510	"	"	"	1111 1111 1110	1111 1111 111φ	"	"		"	D_{LE30} = (E687-E686) / S	"	"	"

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

Subgroup	Symbol	Test no.	Applied voltages ref. pin 9 (figures 6, 8) 7 V_{CC} (V)	11 $_{EE}$ (V)	1 $_{DD}$ (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	Equation and notes	Limits Min	Max	Units
5 T_A = +125°C	M_{CC}	511	+15.0	-15.0	+5.0	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 4, 5), all device types	0		Codes
6 T_A = -55°C	dV_{IO} / dT	512	“	“	“	0000 0000 0000	0000 0000 000ϕ		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 “
	dBZ / dT	513	“	“	“	0111 1111 1111	ϕϕϕϕ ϕϕϕϕ ϕϕϕϕ	KA	“	E689	“	dBZ / dT = 410* (E557-E687) Device types 01, 02, 05 Device types 03, 04, 05, 06	 -1.0 -2.0	 1.0 2.0	 LSB “
	dAE / dT	514	“	“	“	0000 0000 0000 1111 1111 1110	0000 0000 000ϕ 1111 1111 111ϕ	 “	 “	E690 E691	“ “	dAE / dT = $12.49*10^6$* (1 / (E559 – E558)) - (1 / (E691 – E690)) Device types 01, 03 Device types 02, 04, 06	 -12.5 -25	 12.5 25	 ppm/°C “
	dBPAE / dT	515	“	“	“	0000 0000 0000 1111 1111 1110	0000 0000 000ϕ 1111 1111 111ϕ	KA “	“ “	E692 E693	“ “	dBPAE / dT = $24.99*10^6$* (1 / (E561 – E560)) - (1 / (E693 – E692)) Device types 01, 03, 05 Device types 02, 04, 06	 -12.5 -25	 12.5 25	 ppm/°C “
	L_{E1}	516	+15.0 “ “	-15.0 “ “	+5.0 “ “	1111 1111 1110 0000 0000 0000 0000 0000 0001	1111 1111 111ϕ 0000 0000 000ϕ 0000 0000 00ϕϕ	KA “ “	13 “ “	E694 E695 E696	V “ “	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 L_{E1} = ((E695+E696)/2-1*S-E695 +S/2) / S	-1.0	1.0	LSB
	L_{E2}	517	“ “	“ “	“ “	0000 0000 0010 0000 0000 0011	0000 0000 001ϕ 0000 0000 0ϕϕϕ	“ “	“ “	E697 E698	“ “	L_{E2} = ((E696+E697)/2-2*S-E695 +S/2) / S	“	“	“
	L_{E3}	518	“ “	“ “	“ “	0000 0000 0100 0000 0000 0111	0000 0000 010ϕ 0000 0000 ϕϕϕϕ	“ “	“ “	E699 E700	“ “	L_{E3} = ((E698+E699)/2-4*S-E695 +S/2) / S	“	“	“
	L_{E4}	519	“ “	“ “	“ “	0000 0000 1000 0000 0000 1111	0000 0000 100ϕ 0000 000ϕ ϕϕϕϕ	“ “	“ “	E701 E702	“ “	L_{E4} = ((E700+E701)/2-8*S-E695 +S/2) / S	“	“	“
	L_{E5}	520	“ “	“ “	“ “	0000 0001 0000 0000 0001 1111	0000 0001 000ϕ 0000 00ϕϕ ϕϕϕϕ	“ “	“ “	E703 E704	“ “	L_{E5} = ((E702+E703)/2-16*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 6, 8)			Applied digital code-word	DUT digital output code-word	Active relays	Measurement sense lines ref. pin 9			Equation and notes	Limits		Units
			7 V_{CC} (V)	11 $_{EE}$ (V)	1 $_{DD}$ (V)	29 <----------> 40 MSB <----------> LSB	29 <----------> 16 MSB <----------> LSB		Pin	Value	Unit		Min	Max	
6	L_{E6}	521	+15.0	-15.0	+5.0	0000 0010 0000	0000 0010 000ϕ	KA	13	E705	"	L_{E6} = ((E704+E705)/2-32*S-E695 +S/2) / S	-1.0	1.0	LSB
			"	"	"	0000 0011 1111	0000 0ϕϕϕ ϕϕϕϕ	"	"	E706	"				
T_A = -55°C	L_{E7}	522	"	"	"	0000 0100 0000	0000 0100 000ϕ	"	"	E707	"	L_{E7} = ((E706+E707)/2-64*S-E695 +S/2) / S	"	"	"
			"	"	"	0000 0111 1111	0000 ϕϕϕϕ ϕϕϕϕ	"	"	E708	"				
	L_{E8}	523	"	"	"	0000 1000 0000	0000 1000 000ϕ	"	"	E709	"	L_{E8} = ((E708+E709)/2-128*S-E695 +S/2) / S	"	"	"
			"	"	"	0000 1111 1111	000ϕ ϕϕϕϕ ϕϕϕϕ	"	"	E710	"				
	L_{E9}	524	"	"	"	0001 0000 0000	0001 0000 000ϕ	"	"	E711	"	L_{E9} = ((E710+E711)/2-256*S-E695 +S/2) / S	"	"	"
			"	"	"	0001 1111 1111	00ϕϕ ϕϕϕϕ ϕϕϕϕ	"	"	E712	"				
	L_{E10}	525	"	"	"	0010 0000 0000	0010 0000 000ϕ	"	"	E713	"	L_{E10} = ((E712+E713)/2-512*S-E695 +S/2) / S	"	"	"
			"	"	"	0010 1111 1111	001ϕ ϕϕϕϕ ϕϕϕϕ	"	"	E714	"				
	L_{E11}	526	"	"	"	0011 0000 0000	0011 0000 000ϕ	"	"	E715	"	L_{E11} = ((E714+E715)/2-768*S-E695 +S/2) / S	"	"	"
			"	"	"	0011 1111 1111	0ϕϕϕ ϕϕϕϕ ϕϕϕϕ	"	"	E716	"				
	L_{E12}	527	"	"	"	0100 0000 0000	0100 0000 000ϕ	"	"	E717	"	L_{E12} = ((E716+E717)/2-1024*S-E695 +S/2) / S	"	"	"
			"	"	"	0100 1111 1111	010ϕ ϕϕϕϕ ϕϕϕϕ	"	"	E718	"				
	L_{E13}	528	"	"	"	0101 0000 0000	0101 0000 000ϕ	"	"	E719	"	L_{E13} = ((E718+E719)/2-1280*S-E695 +S/2) / S	"	"	"
			"	"	"	0101 1111 1111	01ϕϕ ϕϕϕϕ ϕϕϕϕ	"	"	E720	"				
	L_{E14}	529	"	"	"	0110 0000 0000	0110 0000 000ϕ	"	"	E721	"	L_{E14} = ((E720+E721)/2-1536*S-E695 +S/2) / S	"	"	"
			"	"	"	0110 1111 1111	011ϕ ϕϕϕϕ ϕϕϕϕ	"	"	E722	"				
	L_{E15}	530	"	"	"	0111 0000 0000	0111 0000 000ϕ	"	"	E723	"	L_{E15} = ((E722+E723)/2-1792*S-E695 +S/2) / S	"	"	"
			"	"	"	0111 1111 1111	ϕϕϕϕ ϕϕϕϕ ϕϕϕϕ	"	"	E724	"				
	L_{E16}	531	"	"	"	1000 0000 0000	1000 0000 000ϕ	"	"	E725	"	L_{E16} = ((E724+E725)/2-2048*S-E695 +S/2) / S	"	"	"
			"	"	"	1000 1111 1111	100ϕ ϕϕϕϕ ϕϕϕϕ	"	"	E726	"				
	L_{E17}	532	"	"	"	1001 0000 0000	1001 0000 000ϕ	"	"	E727	"	L_{E17} = ((E726+E727)/2-2304*S-E695 +S/2) / S	"	"	"
			"	"	"	1001 1111 1111	10ϕϕ ϕϕϕϕ ϕϕϕϕ	"	"	E728	"				
	L_{E18}	533	"	"	"	1010 0000 0000	1010 0000 000ϕ	"	"	E729	"	L_{E18} = ((E728+E729)/2-2560*S-E695 +S/2) / S	"	"	"
			"	"	"	1010 1111 1111	101ϕ ϕϕϕϕ ϕϕϕϕ	"	"	E730	"				
	L_{E19}	534	"	"	"	1011 0000 0000	1011 0000 000ϕ	"	"	E731	"	L_{E19} = ((E730+E731)/2-2816*S-E695 +S/2) / S	"	"	"
			"	"	"	1011 1111 1111	1ϕϕϕ ϕϕϕϕ ϕϕϕϕ	"	"	E732	"				
	L_{E20}	535	"	"	"	1100 0000 0000	1100 0000 000ϕ	"	"	E733	"	L_{E20} = ((E732+E733)/2-3072*S-E695 +S/2) / S	"	"	"
			"	"	"	1100 1111 1111	110ϕ ϕϕϕϕ ϕϕϕϕ	"	"	E734	"				

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

Subgroup	Symbol	Test no.	Applied voltages ref. pin 9 (figures 6, 8) 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	Equation and notes	Limits Min	Max	Units
6	L_{E21}	536	+15.0	-15.0	+5.0	1101 0000 0000	1101 0000 000ϕ	KA	13	E735	"	L_{E21} = ((E734+E735)/2-3328*S-E695 +S/2) / S	-1.0	1.0	LSB
			"	"	"	1101 1111 1111	11ϕϕ ϕϕϕϕ ϕϕϕϕ	"	"	E736	"				
T_A = -55°C	L_{E22}	537	"	"	"	1110 0000 0000	1110 0000 000ϕ	"	"	E737	"	L_{E22} = ((E736+E737)/2-3584*S-E695 +S/2) / S	"	"	"
			"	"	"	1110 1111 1111	111ϕ ϕϕϕϕ ϕϕϕϕ	"	"	E738	"				
	L_{E23}	538	"	"	"	1111 0000 0000	1111 0000 000ϕ	"	"	E739	"	L_{E23} = ((E738+E739)/2-3840*S-E695 +S/2) / S	"	"	"
			"	"	"	1111 0111 1111	1111 ϕϕϕϕ ϕϕϕϕ	"	"	E740	"				
	L_{E24}	539	"	"	"	1111 1000 0000	1111 1000 000ϕ	"	"	E741	"	L_{E24} = ((E740+E741)/2-3968*S-E695 +S/2) / S	"	"	"
			"	"	"	1111 1011 1111	1111 1ϕϕϕ ϕϕϕϕ	"	"	E742	"				
	L_{E25}	540	"	"	"	1111 1100 0000	1111 1100 000ϕ	"	"	E743	"	L_{E25} = ((E742+E743)/2-4032*S-E695 +S/2) / S	"	"	"
			"	"	"	1111 1101 1111	1111 11ϕϕ ϕϕϕϕ	"	"	E744	"				
	L_{E26}	541	"	"	"	1111 1110 0000	1111 1110 000ϕ	"	"	E745	"	L_{E26} = ((E744+E745)/2-4064*S-E695 +S/2) / S	"	"	"
			"	"	"	1111 1110 1111	1111 111ϕ ϕϕϕϕ	"	"	E746	"				
	L_{E27}	542	"	"	"	1111 1111 0000	1111 1111 000ϕ	"	"	E747	"	L_{E27} = ((E746+E747)/2-4080*S-E695 +S/2) / S	"	"	"
			"	"	"	1111 1111 0111	1111 1111 ϕϕϕϕ	"	"	E748	"				
	L_{E28}	543	"	"	"	1111 1111 1000	1111 1111 100ϕ	"	"	E749	"	L_{E28} = ((E748+E749)/2-4088*S-E695 +S/2) / S	"	"	"
			"	"	"	1111 1111 1011	1111 1111 1ϕϕϕ	"	"	E750	"				
	L_{E29}	544	"	"	"	1111 1111 1100	1111 1111 110ϕ	"	"	E751	"	L_{E29} = ((E750+E751)/2-4092*S-E695 +S/2) / S	"	"	"
			"	"	"	1111 1111 1101	1111 1111 110ϕ	"	"	E752	"				
	L_{E30}	545	"	"	"	1111 1111 1110	1111 1111 111ϕ	"	"	E753	"	L_{E30} = ((E752+E753)/2-4094*S-E695 +S/2) / S	"	"	"
												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 00ϕϕ	KA	13		V	D_{LE1} = (E696-E695) / S	-0.9	2.0	LSB
	D_{LE2}	547	"	"	"	0000 0000 0010	0000 0000 001ϕ	"	"		"	D_{LE2} = (E697-E696) / S	"	"	"
	D_{LE3}	548	"	"	"	0000 0000 0100	0000 0000 010ϕ	"	"		"	D_{LE3} = (E699-E698) / S	"	"	"
	D_{LE4}	549	"	"	"	0000 0000 1000	0000 0000 100ϕ	"	"		"	D_{LE4} = (E701-E700) / S	"	"	"
	D_{LE5}	550	"	"	"	0000 0001 0000	0000 0001 000ϕ	"	"		"	D_{LE5} = (E703-E702) / S	"	"	"
	D_{LE6}	551	"	"	"	0000 0010 0000	0000 0010 000ϕ	"	"		"	D_{LE6} = (E705-E704) / S	"	"	"
	D_{LE7}	552	"	"	"	0000 0100 0000	0000 0100 000ϕ	"	"		"	D_{LE7} = (E707-E706) / S	"	"	"
	D_{LE8}	553	"	"	"	0000 1000 0000	0000 1000 000ϕ	"	"		"	D_{LE8} = (E709-E708) / S	"	"	"
	D_{LE9}	554	"	"	"	0001 0000 0000	0001 0000 000ϕ	"	"		"	D_{LE9} = (E711-E710) / S	"	"	"
	D_{LE10}	555	"	"	"	0010 0000 0000	0010 0000 000ϕ	"	"		"	D_{LE10} = (E713-E712) / S	"	"	"

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

Subgroup	Symbol	Test no.	Applied voltages ref. pin 9 (figures 6, 8) 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	Equation and notes	Limits Min	Limits Max	Units
6	D_{LE11}	556	+15.0	-15.0	+5.0	0011 0000 0000	0011 0000 000ϕ	KA	13		V	D_{LE11} = (E715-E714) / S	-0.9	2.0	LSB
	D_{LE12}	557	"	"	"	0100 0000 0000	0100 0000 000ϕ	"	"		"	D_{LE12} = (E717-E716) / S	"	"	"
T_A =	D_{LE13}	558	"	"	"	0101 0000 0000	0101 0000 000ϕ	"	"		"	D_{LE13} = (E719-E718) / S	"	"	"
-55°C	D_{LE14}	559	"	"	"	0110 0000 0000	0110 0000 000ϕ	"	"		"	D_{LE14} = (E721-E720) / S	"	"	"
	D_{LE15}	560	"	"	"	0111 0000 0000	0111 0000 000ϕ	"	"		"	D_{LE15} = (E723-E722) / S	"	"	"
	D_{LE16}	561	"	"	"	1000 0000 0000	1000 0000 000ϕ	"	"		"	D_{LE16} = (E725-E724) / S	"	"	"
	D_{LE17}	562	"	"	"	1001 0000 0000	1001 0000 000ϕ	"	"		"	D_{LE17} = (E727-E726) / S	"	"	"
	D_{LE18}	563	"	"	"	1010 0000 0000	1010 0000 000ϕ	"	"		"	D_{LE18} = (E729-E728) / S	"	"	"
	D_{LE19}	564	"	"	"	1011 0000 0000	1011 0000 000ϕ	"	"		"	D_{LE19} = (E731-E730) / S	"	"	"
	D_{LE20}	565	"	"	"	1100 0000 0000	1100 0000 000ϕ	"	"		"	D_{LE20} = (E733-E732) / S	"	"	"
	D_{LE21}	566	"	"	"	1101 0000 0000	1101 0000 000ϕ	"	"		"	D_{LE21} = (E735-E734) / S	"	"	"
	D_{LE22}	567	"	"	"	1110 0000 0000	1110 0000 000ϕ	"	"		"	D_{LE22} = (E737-E736) / S	"	"	"
	D_{LE23}	568	"	"	"	1111 0000 0000	1111 0000 000ϕ	"	"		"	D_{LE23} = (E739-E738) / S	"	"	"
	D_{LE24}	569	"	"	"	1111 1000 0000	1111 1000 000ϕ	"	"		"	D_{LE24} = (E741-E740 / S	"	"	"
	D_{LE25}	570	"	"	"	1111 1100 0000	1111 1100 000ϕ	"	"		"	D_{LE25} = (E743-E742) / S	"	"	"
	D_{LE26}	571	"	"	"	1111 1110 0000	1111 1110 000ϕ	"	"		"	D_{LE26} = (E745-E744) / S	"	"	"
	D_{LE27}	572	"	"	"	1111 1111 0000	1111 1111 000ϕ	"	"		"	D_{LE27} = (E747-E746) / S	"	"	"
	D_{LE28}	573	"	"	"	1111 1111 1000	1111 1111 100ϕ	"	"		"	D_{LE28} = (E749-E748) / S	"	"	"
	D_{LE29}	574	"	"	"	1111 1111 1100	1111 1111 110ϕ	"	"		"	D_{LE29} = (E751-E750) / S	"	"	"
	D_{LE30}	575	"	"	"	1111 1111 1110	1111 1111 111ϕ	"	"		"	D_{LE30} = (E753-E752) / S	"	"	"
	M_{CC}	576	+15.0	-15.0	+5.0	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 4, 5), all device types	0		Codes

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

Subgroup	Symbol	Test no.	Applied voltages ref. pin 9 (figures 6, 8) 7 V_{CC} V	11 V_{EE} (V) 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	Equation and notes	Limits Min	Max	Units
7 T_A = +25°C		(V)										For end-point linearity error, $L_E(N) = (E(N+754)+E(N+755)) / 2-V(ideal)) / S$ V(ideal) = N1* S+E755-S/2 N1 = Applied ref DAC code-word S = (E754-E755) / 4094			
		577	+15.0	-15.0	+5.0	1111 1111 1110	1111 1111 111ϕ	KA	13	E754	V				
		578	"	"	"	0000 0000 0000	0000 0000 000ϕ	"	"	E755	"				
		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 "	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 "	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 6, 8) 7 V_{CC} V	11 V_{EE} (V) 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	Limits Max	Units
8 T_A = +125°C		(V)										For end-point linearity error, $L_E(N) = (E(N+760)+E(N+761)) / 2 - V(ideal)) / S$ V(ideal) = N1* S+E761-S/2 N1 = Applied ref DAC code-word S = (E760-E761) / 4094			
		581	+15.0	-15.0	+5.0	1111 1111 1110	1111 1111 111ϕ	KA	13	E760	V				
		582	“	“	“	0000 0000 0000	0000 0000 000ϕ	“	“	E761	“				
		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	+5.0	<-----(N1-1)-----> <-----(N-1)----->	<-----(N-1)-----> <-----(N)----->	KA	13	E762 E763	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).													
	L_{Emn}	584	+15.0	-15.0	+5.0	<-----(N1-1)-----> <-----(N-1)----->	<-----(N-1)-----> <-----(N)----->	KA	13	E764 E765	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.

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

Subgroup	Symbol	Test no.	Applied voltages ref. pin 9 (figures 6, 8) 7 V_{CC} V	11 EE (V) V	1 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
8 T_A = -55°C		(V)										For end-point linearity error, $L_E(N) = (E(N+766)+E(N+767)) / 2-V(ideal)) / S$ V(ideal) = N1* S+E767-S/2 N1 = Applied ref DAC code-word S = (E760-E761) / 4094			
		585	+15.0	-15.0	+5.0	1111 1111 1110	1111 1111 111ϕ	KA	13	E766	V				
		586	"	"	"	0000 0000 0000	0000 0000 000ϕ	"	"	E767	"				
		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	+5.0	<-----(N1-1)-----> <-----(N)----->	<-----(N-1)-----> <-----(N-1)----->	KA "	13 "	E768 E769	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).													
	L_{Emn}	588	+15.0	-15.0	+5.0	<-----(N1-1)-----> <-----(N)----->	<-----(N-1)-----> <-----(N-1)----->	KA "	13 "	E770 E771	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 4, 5)				DUT digital output code-word	Measurement sense lines ref. pin 9			Equation 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 00000 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	"	"	"	"	0000 00000 0000	27	t8	"	t_{DD1} = t8	Device types 01,02,03,04		200	"
		591	"	"	"	"	" " "	22	t9	"	t_{DD2} = t9	Device types 05,06		250	"
		592	"	"	"	"	" " "	16	t10	"	t_{DD3} = t10	Data valid, referenced to CE low to high transition		"	"
		593	"	"	"	Max (+)	1111 1111 1111	27	t11	"	t_{DD4} = t11	Device types 01,02,03,04		200	"
		594	"	"	"	"	" " "	22	t12	"	t_{DD5} = t12	Device types 05,06		250	"
		595	"	"	"	"	" " "	16	t13	"	t_{DD6} = t13	Data valid, referenced to CE low to high transition		"	"
	t_{HD}	596	"	"	"	Max (-)	0000 00000 0000	27	t14	"	t_{HD1} = t14	All device types	25	250	"
		597	"	"	"	"	" " "	22	t15	"	t_{HD2} = t15	Data valid, referenced to	"	"	"
		598	"	"	"	"	" " "	16	t16	"	t_{HD3} = t16	CE high to low transition	"	"	"
		599	"	"	"	Max (+)	1111 1111 1111	27	t17	"	t_{HD4} = t17	All device types	"	"	"
		600	"	"	"	"	" " "	22	t18	"	t_{HD5} = t18	Data valid, referenced to	"	"	"
		601	"	"	"	"	" " "	16	t19	"	t_{HD6} = t19	CE high to low transition	"	"	"
	t_{HS}	602	"	"	"	Max (-)	0000 00000 0000	27	t20	"	t_{HS1} = t20	Device types 01,02,03,04	300	1000	"
		603	"	"	"	"	" " "	22	t21	"	t_{HS2} = t21	Device types 05,06	100	600	"
		604	"	"	"	"	" " "	16	t22	"	t_{HS3} = t22	STS high to low transition referenced to data valid	"	"	"
		605	"	"	"	Max (+)	1111 1111 1111	27	t23	"	t_{HS4} = t23	Device types 01,02,03,04	300	1000	"
		606	"	"	"	"	" " "	22	t24	"	t_{HS5} = t24	Device types 05,06	100	600	"
		607	"	"	"	"	" " "	16	t25	"	t_{HS6} = t25	STS high to low transition referenced to data valid	"	"	"

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

Subgroup	Symbol	Test no.	Applied voltages ref. pin 9 (figures 4, 5)				DUT digital output code-word	Measurement sense lines ref. pin 9			Equation and notes		Limits		Units
			7 V_{CC} (V) $_V$	11 $_{EE}$ (V) $_V$	1 $_{DD}$ (V)	13 V_{IN}(a) (V)	27 <----------> 16 MSB <----------> LSB	Pin	Value	Unit			Min	Max	
9 T_A = 25°C	t_{HL}	608	+15.0	-15.0	+5.0	Max (-)	0000 00000 0000	27	t26	ns	t_{HL1} = t26	Device types 01,02		100	ns
												Device types 03,04,05,06		150	"
		609	"	"	"	"	" " "	22	t27	"	t_{HL2} = t27	Hi-Z delay, referenced to		"	"
		610	"	"	"	"	" " "	16	t28	"	t_{HL3} = t28	CE high to low transition		"	"
												Device types 01,02		100	"
		611	"	"	"	Max (+)	1111 1111 1111	27	t29	"	t_{HL4} = t29	Device types 03,04,05,06		150	"
		612	"	"	"	"	" " "	22	t30	"	t_{HL5} = t30	Hi-Z delay, referenced to		"	"
		613	"	"	"	"	" " "	16	t31	"	t_{HL6} = t31	CE high to low transition		"	"
	t_{DS}	614	"	"	"	Max (-)	0000 00000 0000	22	t32	ns	t_{DS1a}	All device types STS low to high transition, referenced to R/$\overline{C}$ high to low transition		600	"
	t_{DDR}	615	"	"	"	Max (-)	0000 00000 0000	27	t33	"	t_{DDR1} = t33	All device types	"	250	"
		616	"	"	"	"	" " "	22	t34	"	t_{DDR2} = t34	Data valid, referenced to		"	"
		617	"	"	"	"	" " "	16	t35	"	t_{DDR3} = t35	R/$\overline{C}$ low to high transition			"
		618	"	"	"	Max (+)	1111 1111 1111	27	t36	"	t_{DDR4} = t36	All device types	"	"	"
		619	"	"	"	"	" " "	22	t37	"	t_{DDR5} = t37	Data valid, referenced to		"	"
		620	"	"	"	"	" " "	16	t38	"	t_{DDR6} = t38	R/$\overline{C}$ low to high transition			"
	t_{HDR}	621	"	"	"	Max (-)	0000 00000 0000	27	t39	"	t_{HDR1} = t39	All device types	" 25		"
		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	"		"

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

Subgroup	Symbol	Test no.	Applied voltages ref. pin 9 (figures 4, 5) 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	Equation and notes	Limits Min	Max	Units
9 T_A = 25°C	R1	627	+15.0	-15.0	+5.0	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	mA
		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 6, 8) 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	Equation and notes	Limits Min	Max	Units
9 T_A = 25°C	NT	636	+15.0	-15.0	+5.0	0111 1111 1111	ϕϕϕϕ ϕϕϕϕ ϕϕϕϕ	13	E772	V	NT1 = E772 Range = 16% to 84%	-0.5	0.5	LSB
		637	"	"	"	1111 1111 1110	1111 1111 111ϕ	13	E773	V	NT2 = E773 All device types	-0.5	0.5	LSB

TABLE IV. Group C end point electrical parameters.

Table III test no.	Device type	Symbol	Delta 1/		End-point limits		
			Min	Max	Min	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-PRF-38535).

5. PACKAGING

5.1 Packaging requirements. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.2). When actual packaging of materiel is to be performed by DoD personnel, these personnel need to contact the responsible packaging activity to ascertain requisite packaging requirements. Packaging requirements are maintained by the Inventory Control Point's packaging activity within the Military Department of Defense Agency, or within the Military Department's System Command. Packaging data retrieval is available from the managing Military Department's or Defense Agency's automated packaging files, CD-ROM products, or by contacting the responsible packaging activity.

6. NOTES

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

6.2 Acquisition requirements. Acquisition documents should specify the following:

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

b. PIN and compliance identifier, if applicable (see 1.2).

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

d. Requirements for certificate of compliance, if applicable.

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

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

g. Requirements for product assurance options.

h. Requirements for special carriers, lead lengths, or lead forming, if applicable. These requirements should not affect the part number. Unless otherwise specified, these requirements will not apply to direct purchase by or direct shipment to the Government.

i. Requirements for "JAN" marking.

j. Packaging requirements (see 5.1).

6.3 Superseding information. The requirements of MIL-M-38510 have been superseded to take advantage of the available Qualified Manufacturer Listing (QML) system provided by MIL-PRF-38535. Previous references to MIL-M-38510 in this document have been replaced by appropriate references to MIL-PRF-38535. All technical requirements now consist of this specification and MIL-PRF-38535. The MIL-M-38510 specification sheet number and PIN have been retained to avoid adversely impacting existing government logistics systems and contractor's parts lists.

6.4 Qualification. With respect to products requiring qualification, awards will be made only for products which are, at the time of award of contract, qualified for inclusion in Qualified Manufacturers List QML-38535 whether or not such products have actually been so listed by that date. The attention of the contractors is called to these requirements, and manufacturers are urged to arrange to have the products that they propose to offer to the Federal Government tested for qualification in order that they may be eligible to be awarded contracts or purchase orders for the products covered by this specification. Information pertaining to qualification of products may be obtained from DSCC-VQ, 3990 E. Broad Street, Columbus, Ohio 43218-3990.

6.5 Abbreviations, symbols, and definitions. The abbreviations, symbols, and definitions used herein are defined in MIL-PRF-38535, MIL-STD-1331, and as follows:

Symbol	Description
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
Δ_{AE} / Δ_T	Gain error drift with respect to temperature
Δ_{BZ} / Δ_T	Bipolar zero drift
D_{LE}	Differential linearity error
$\Delta V_{IO} / \Delta t$	Unipolar input offset voltage drift
I_{CC}, I_{EE}, I_{LOGIC}	Input currents for positive (+15 V), negative (-15 V) 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
LE	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 (for example, noise, settling time, etc.)
Pd	Power dissipation
P_{SS}	Power supply sensitivity

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

6.6 Logistic support. Lead materials and finishes (see 3.4) are interchangeable. Unless otherwise specified, microcircuits acquired for Government logistic support will be acquired to device class B (see 1.2.2), lead material and finish A (see 3.4). Longer length leads and lead forming should not affect the part number.

6.7 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 should 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-PRF-38535.

Military device type	Generic-industry type
01	574AU (monolithic)
02	574AT (monolithic)
03	574AU (hybrid)
04	574AT (hybrid)
05	674AU (monolithic)
06	674AT (monolithic)

6.8 Changes from previous issue. Asterisks are not used in this revision to identify changes with respect to the previous issue, due to the extensiveness of the changes.

Custodians:
Army – CR
Navy - EC
Air Force - 11
NASA - NA
DLA – CC

Review activities:
Army - MI, SM
Navy - AS, CG, MC, SH, TD
Air Force – 03, 19, 99

Preparing activity:
DLA - CC

Project 5962-2061

NOTE: The activities listed above were interested in this document as of this date of this document. Since organizations and responsibilities can change, you should verify the currency of the information above using the ASSIT Online database at http://assist.daps.dla.mil.