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IN REPLY
REFER TO DSCC-VAS

DATE 23 September 2004

MEMORANDUM FOR MILITARY/INDUSTRY DISTRIBUTION

SUBJECT: Initial Draft of MIL-PRF-38510/140, Revision A; Project Number 5962-2061

The initial draft for this subject document, dated 23 September 2004, is now available for viewing and downloading from the DSCC-VA Web site:

<http://www.dscc.dla.mil/Programs/MilSpec/DocSearch.asp>

Major changes to this document include reactivation of the document and references to MIL-M-38510 have been changed to MIL-PRF-38535. Paragraphs have been changed to meet current requirements of MIL-STD-961. Burn-in circuits have been deleted and replaced by a statement requiring the circuits to be maintained by the manufacturer under document control. The slash sheet is being updated to reflect current requirements.

Concurrence or comments are required at this Center within 45 days from the date of this letter. Late comments will be held for the next coordination of the document. Comments from military departments must be identified as either "Essential" or "Suggested". Essential comments must be justified with supporting data. Military review activities should forward comments to their custodians of this office, as applicable, in sufficient time to allow for consolidating the department reply.

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NOTE: This draft, dated 23 September 2004 prepared by Defense Supply Center Columbus (DSCC-VAS) has not been approved and is subject to modification.

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(Project 5962-2061)

INCH-POUND
MIL-M-38510/140A
DRAFT
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 XX XXXXX 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.

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	Performance grade
01	0 V to +10 V unipolar 0 V to +20 V unipolar -5 V to +5 V bipolar -10 V to +10 V bipolar	Monolithic	High
02	Same as defined for device type 01	Monolithic	Medium
03	"	Hybrid	High
04	"	Hybrid	Medium
05	"	Monolithic	High
06	"	Monolithic	Medium

1.2.2 Device class. The device class 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

Comments, suggestions, or questions on this document should be addressed to: Commander, Defense Supply Center Columbus, ATTN: DSCL-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 www.dodssp.daps.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 $T_A = +125^\circ C$	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 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 www.dodssp.daps.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 takes 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	V _{FSR} = 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
12/8 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 ≤ TA ≤ +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	P _d	(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/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/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 ≤ TA ≤ +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, <u>2/</u> I _L = 1.5 mA, bipolar, VFSR = 20 V	01,02	9.95	10.05	V
			03,04, 05,06	9.90	10.10	
(high byte) (low byte) (middle nibble override, trailing zeros) (high nibble Hi-Z) (low nibble Hi-Z)	m1	12/8 = 0.0 V, A ₀ = logic "0", <u>5/</u> 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
	m2	12/8 = 0.0 V, A ₀ = logic "1", <u>5/</u> V _{IN} = 10.08 V min, I _L = -0.5 mA, output code = XXXX 0000 1111, measure output bits 9-12		2.4		
	m3	12/8 = 0.0 V, A ₀ = logic "1", <u>5/</u> V _{IN} = 10.08 V min, I _L = -1.6 mA, output code = XXXX 0000 1111, measure output bits 5-8			0.4	
	m4	12/8 = 0.0 V, A ₀ = logic "1", <u>5/</u> V _{IN} = 10.08 V min, V _O = 0.4 V, output code = XXXX 0000 1111, measure output bits 1-4		-10	10	μA
	m5	12/8 = 0.0 V, A ₀ = logic "0", <u>5/</u> 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/C}	V _{IN} = -7 mV max, V _{R/C} = 0.8 V (initial), V _{R/C} = 2.0 V, output code = 0000 0000 0000	All	(Logic "0")		
		V _{IN} = 10.08 mV min, V _{R/C} = 0.8 V (initial), V _{R/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 ≤ TA ≤ +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 _{CS}	V _{IN} = 10.08 V min, V _{CE} = logic "1", V _{CS} = 0.8 V, convert output code = 1111 1111 1111		(Logic "1")			
		V _{IN} = -7 mV max, V _{CE} = logic "1", V _{CS} = 2.0 V, output code = 1111 1111 1111		(Logic "1")			
		V _{IN} = -7 mV max, V _{CE} = logic "1", V _{CS} = 0.8 V, convert, output code = 0000 0000 0000		(Logic "0")			
	V _{A0}	V _{IN} = 10.08 V min, 12/8 = 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}	+PSS1	13.5 V ≤ V _{CC} ≤ 15.0 V, 15.0 V ≤ V _{CC} ≤ 16.5 V output transition = 0000 0000 000φ and 1111 1111 111φ 6/	All	-0.10	0.10	LSB / %PS	
	+PSS2	11.4 V ≤ V _{CC} ≤ 12.0 V, 12.0 V ≤ V _{CC} ≤ 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 ≤ TA ≤ +125°C unless otherwise specified see 3.6 and figures 4 and 8	Device type	Limits <u>1/</u>		Unit
				Min	Max	
Power supply sensitivity to V _{LOG}	+PSS3	4.5 V ≤ V _{LOG} ≤ 5.0 V, 5.0 V ≤ V _{LOG} ≤ 5.5 V output transition = 0000 0000 000φ and 1111 1111 111φ <u>6/</u> (figures 6 and 8)	All	-0.10	0.10	LSB / %PS
Power supply sensitivity to V _{EE}	-PSS1	-16.5 V ≤ V _{EE} ≤ -15.0 V, -15.0 V ≤ V _{EE} ≤ -13.5 V output transition = 0000 0000 000φ and 1111 1111 111φ <u>6/</u>	All	-0.10	0.10	LSB / %PS
	-PSS2	-12.6 V ≤ V _{CC} ≤ -12.0 V, -12.0 V ≤ V _{CC} ≤ -11.5 V output transition = 0000 0000 000φ and 1111 1111 111φ <u>6/</u> (figures 6 and 8)		-0.20	0.20	
Missing code check	MCC	All codes check	All	0	0	Codes
Unipolar offset voltage	V _{IO}	Output transition = 0000 0000 000φ <u>6/</u> Initial , TA = 25°C, see figures 6 and 8	01,02	-0.5	1.5	LSB
		Output transition = 0000 0000 000φ <u>6/</u> End point , TA = 25°C, see figure 6 and 8		-1.0	2.0	
		Output transition = 0000 0000 000φ <u>6/</u> Initial , TA = 25°C, see figures 6 and 8	03,04, 05,06	-1.5	2.5	
		Output transition = 0000 0000 000φ <u>6/</u> End point , TA = 25°C, see figure 6 and 8		-2.0	3.0	
Unipolar offset voltage drift	ΔV _{IO} / ΔT	Output transition = 0000 0000 000φ <u>6/</u> 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 <u>6/</u> Bipolar, VFSR = 20 V, Initial , TA = 25°C, see figures 6 and 8	All	-4.5	3.5	LSB
		Output code = φφφφ φφφφ φφφφ <u>6/</u> Bipolar, VFSR = 20 V, End point , TA = 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 ≤ TA ≤ +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 = 0000 0000 000φ 6/ Bipolar, VFSR = 20 V, TA = 25°C, see figures 6 and 8	01,03, 05	-1	1	LSB
		Output code = 0000 0000 000φ 6/ Bipolar, VFSR = 20 V, TA = 25°C, see figure 6 and 8	02,04, 06	-2	2	
Gain error	AE	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	
	BPAE	Bipolar, VFSR = 20 V, TA = 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, TA = 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 ≤ TA ≤ +125°C unless otherwise specified see 3.6 and figures 4 and 8	Device type	Limits <u>1/</u>		Unit
				Min	Max	
Integral linearity error	LE	(Abbreviated test), -55°C ≤ TA ≤ +125°C, figures 6 and 8	All	-1.0	1.0	LSB
		(Abbreviated test), TA = +25°C, figures 6 and 8		-0.5	0.5	
Integral linearity error	LE	(All codes test), -55°C ≤ TA ≤ +125°C, figures 6 and 8	All	-1.0	1.0	LSB
		(All codes test), TA = +25°C, figures 6 and 8		-0.5	0.5	
Differential linearity error	D _{LE}	(Abbreviated test), -55°C ≤ TA ≤ +125°C, figures 6 and 8	All	-0.9	2.0	LSB
		(Abbreviated test), TA = +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 <u>2/</u> TA = +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 <u>2/</u> TA = +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 <u>2/</u> TA = +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 <u>2/</u> TA = +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 <u>2/</u> TA = +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 ≤ TA ≤ +125°C unless otherwise specified see 3.6 and figures 4 and 8	Device type	Limits 1/		Unit
				Min	Max	
STS delay from R/̄C	t _{DS}	Low to high transition, referenced to high to low R/̄C transition, output code = 0000 0000 0000 2/ TA = +25°C, figures 7 and 8	All		600	ns
Data access time from R/̄C	t _{DDR}	Output data valid, referenced to low to high R/̄C transition, output code = 0000 0000 0000 and 1111 1111 1111 2/ TA = +25°C, figures 7 and 8	All		250	ns
Data valid after R/̄C low	t _{HDR}	Output data valid, referenced to high to low R/̄C transition, output code = 0000 0000 0000 and 1111 1111 1111 2/ TA = +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”, TA = 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”, TA = 25°C, measured separately to V _{LOG}			75	
Input resistance	R _i	V _{IN} (analog) = 1/2 V, TA = 25°C	All	3	7	kΩ
Transition uncertainty	NT	Output transition = φφφ φφφ φφφ and 1111 1111 1111 6/ Range = 16% to 84%, TA = 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 A₀ during the ready cycle, may result in damage to the device output buffers. Therefore, it is recommended that CE is low or CS is high before A₀ 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, φφφ φφφ φφφ
represents the transition between code words 0111 1111 1111 and 1000 0000 0000 and
1111 1111 1111φ 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
	1	1	
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) $-55^{\circ}\text{C} \leq T_A \leq +125^{\circ}\text{C}$, 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.

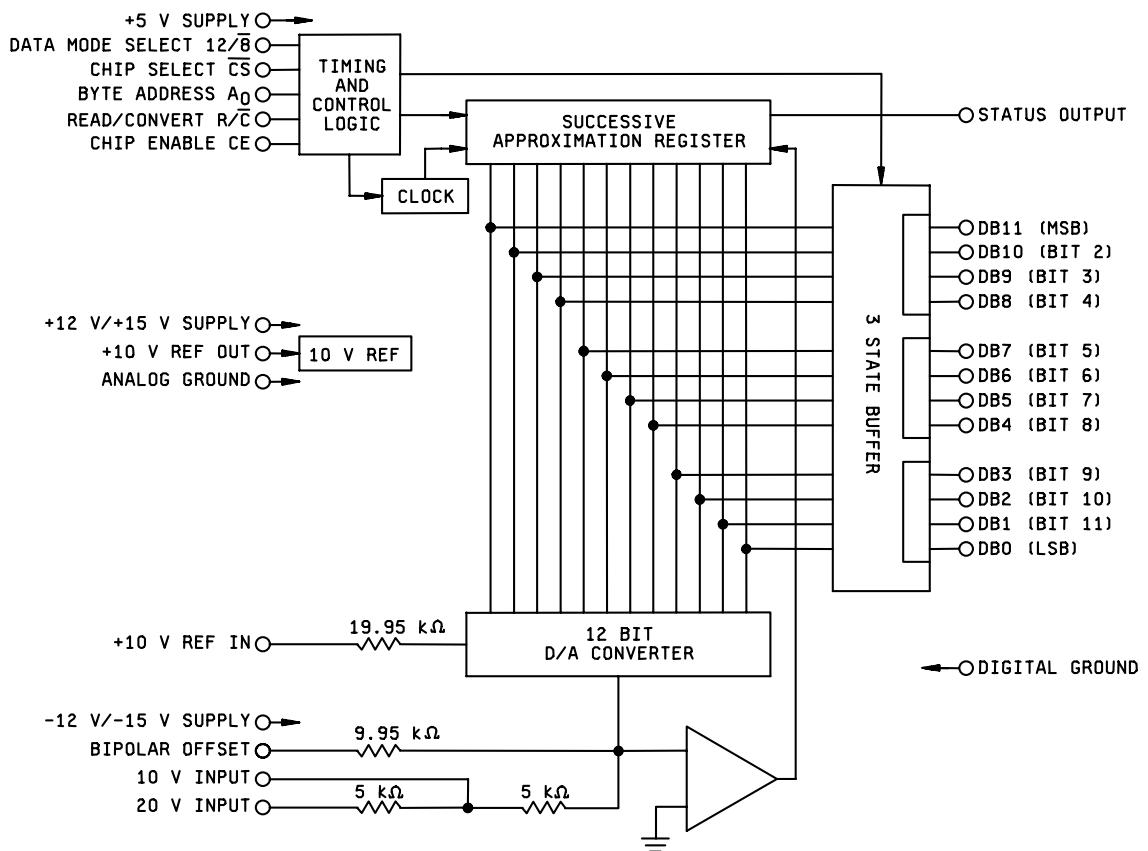
4.5.1 Voltage and current. All voltage values given are referenced to the microcircuit ground terminal. Currents given are conventional and positive when flowing into the referenced terminal.

4.5.2 Life test and burn-in cooldown procedure. When devices are measured at $+25^{\circ}\text{C}$ following application of steady state life or burn-in test condition, they shall be cooled within $+10^{\circ}\text{C}$ 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 / $\bar{8}$
3	CHIP SELECT \bar{CS}
4	BYTE ADDRESS A ₀
5	READ/CONVERT R / \bar{C}
6	CHIP SELECT CE
7	+12 V / +15 V SUPPLY (+VCC)
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 μ F bypass capacitor should be connected between pins 9 and 15 as close to the unit as possible and wide conductor runs should be employed.

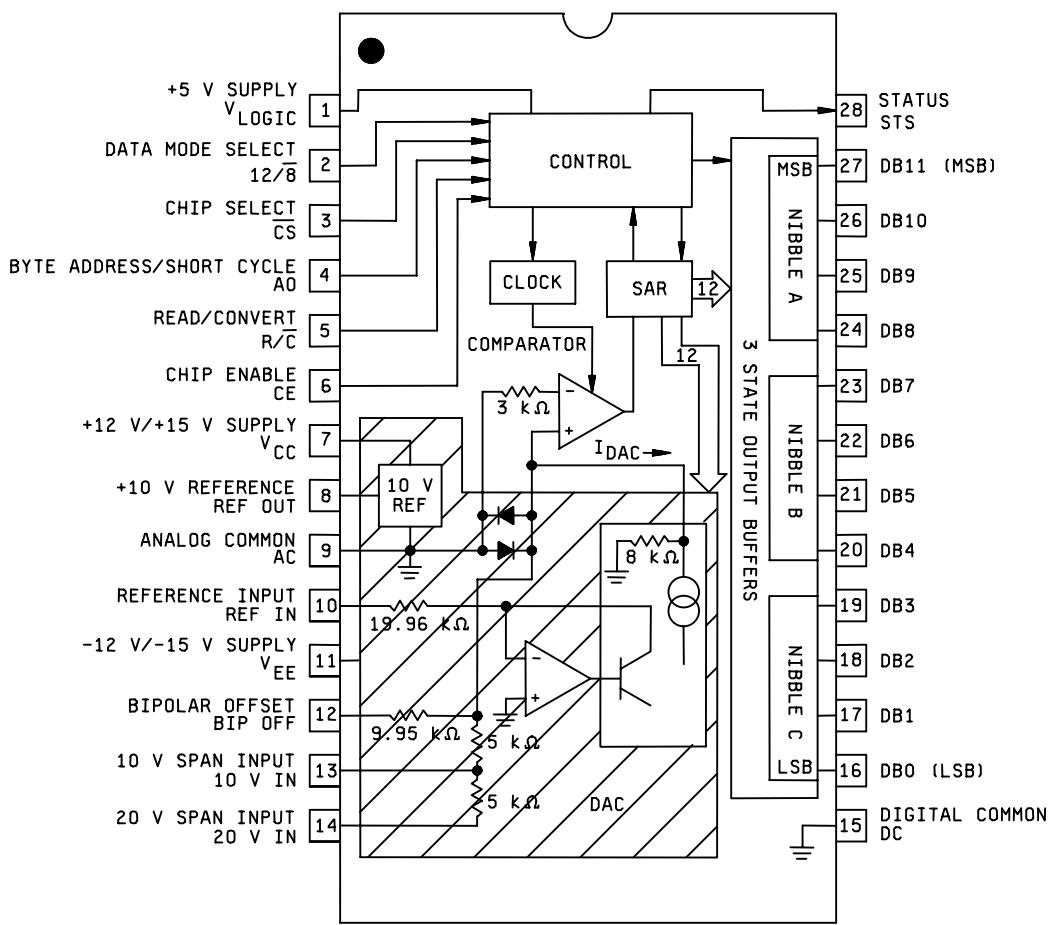
Figure 1. Terminal connections.

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	\bar{CS}	R / \bar{C}	12 / 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.

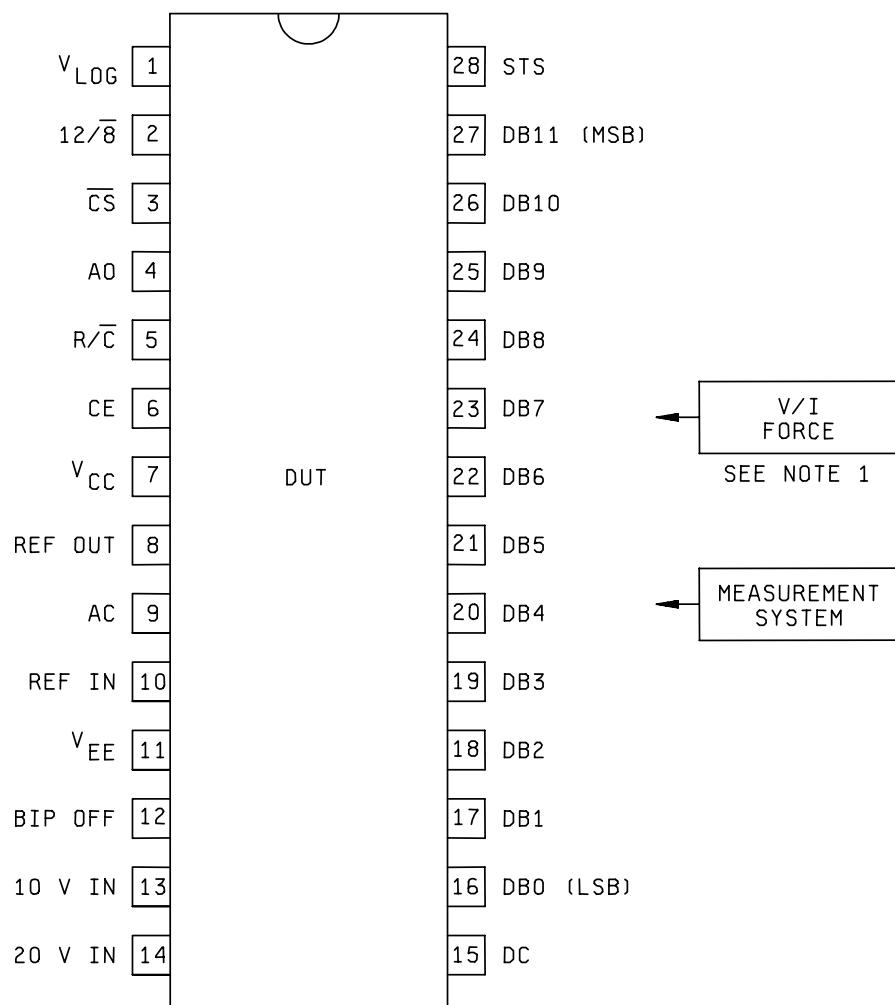
FIGURE 3. Functional block diagram.

THIS CIRCUIT IS TO BE DELETED.

FIGURE X. Functional schematics with application notes.

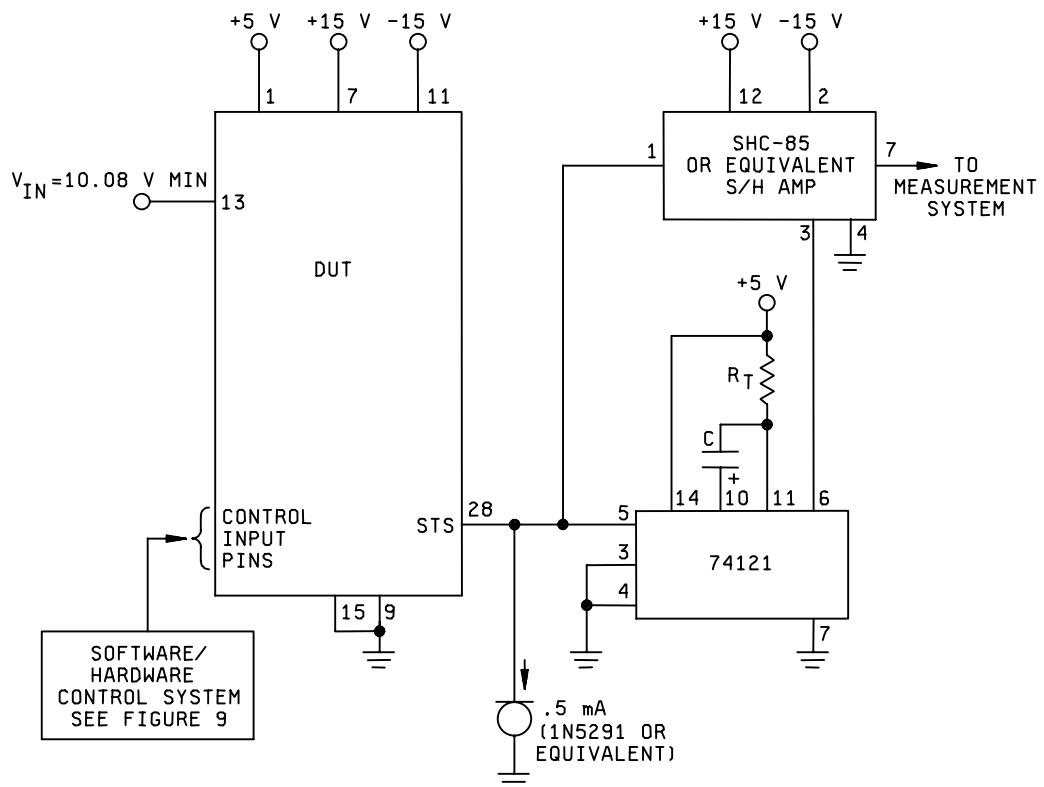
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FIGURE X. Test circuit for burn-in and steady state life test.



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

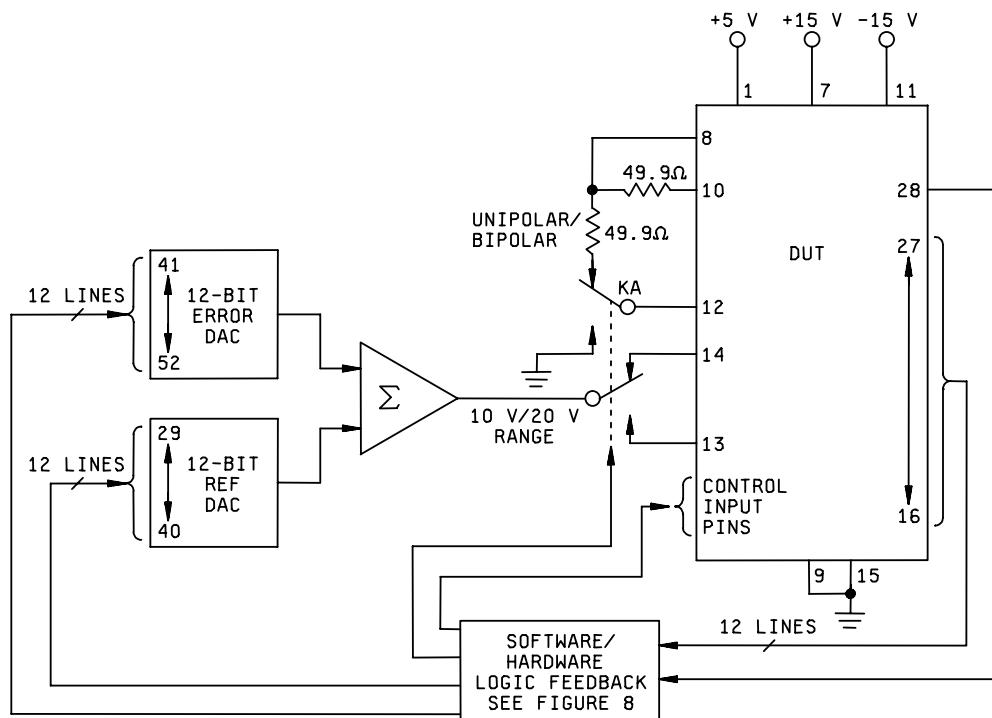
FIGURE 4. Test circuit for static test.



NOTES:

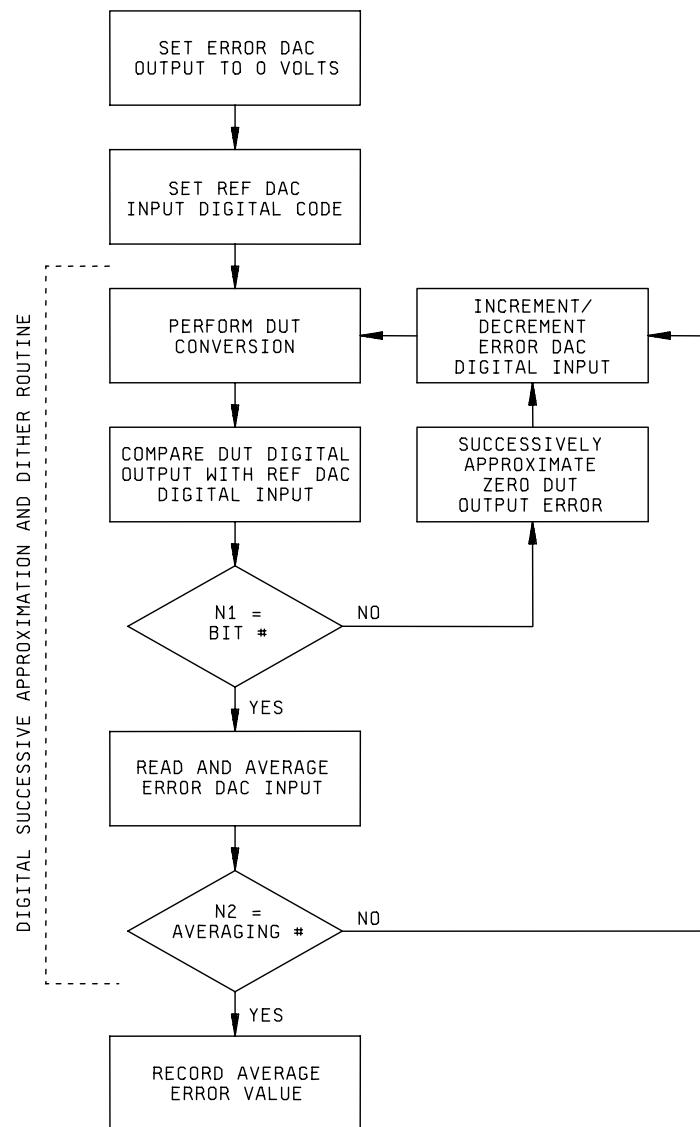
1. R_T and C are selected for an 8.0 μ s delay time interval.
2. DUT test circuit shall be as defined in table I.

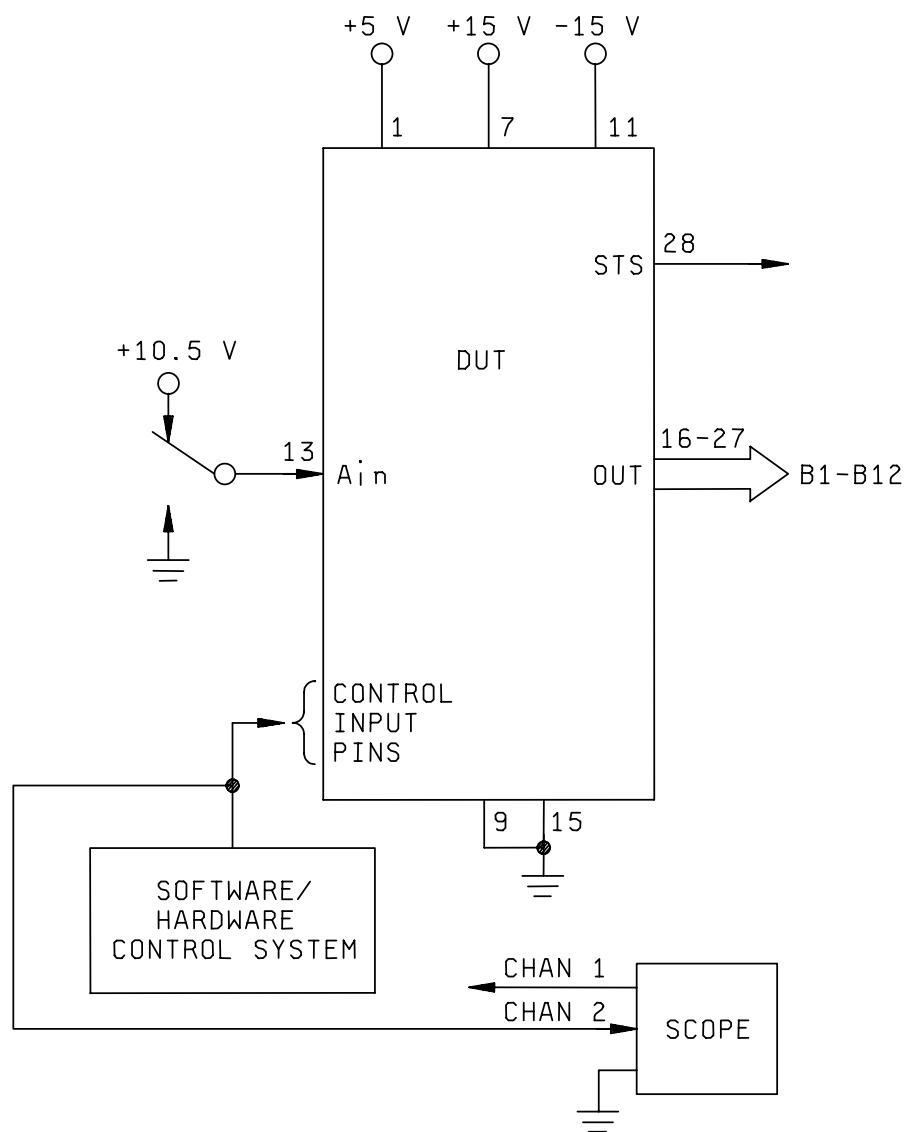
FIGURE 5. Output test circuit for measuring the STS logic "1" voltage level.

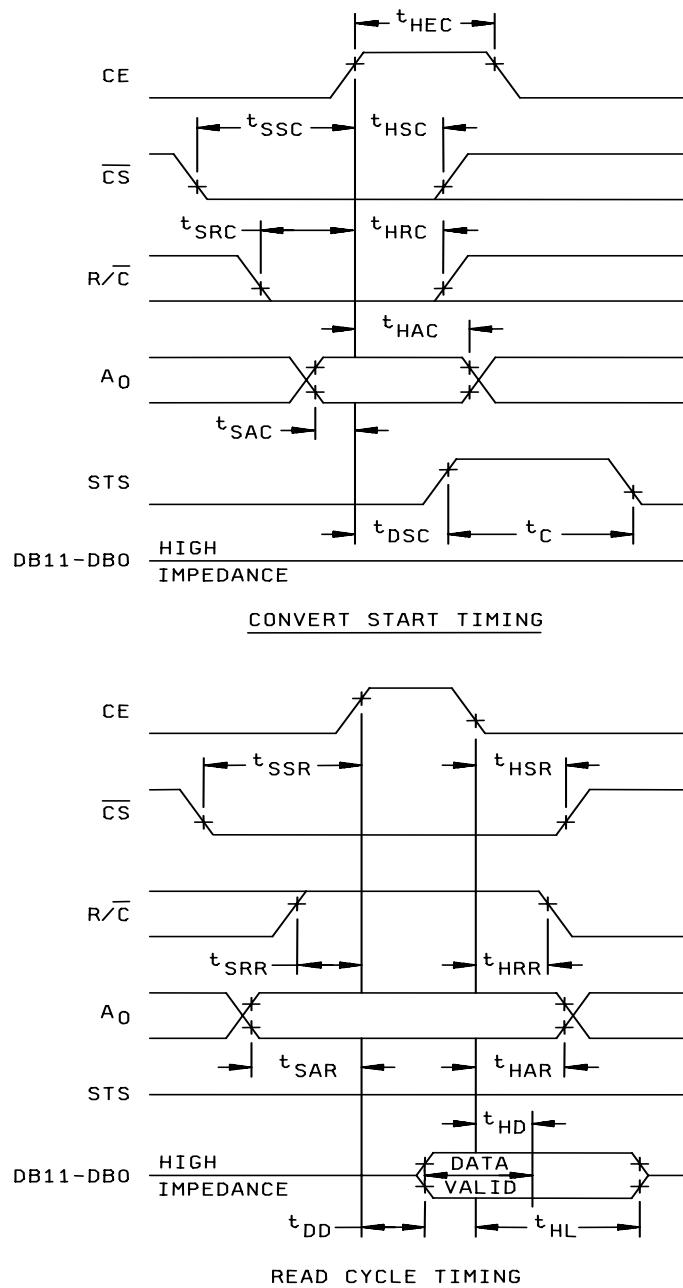


NOTE: The 12 bit ref DAC shall have an accuracy of 16 bits.

FIGURE 6. Test circuit for dynamic test.

FIGURE 6. Test circuit for dynamic test – Continued.

FIGURE 7. Test circuit for propagation delay.

FIGURE 8. Timing diagrams (system controlled operation).

Test setup timing specifications

CONVERT MODE

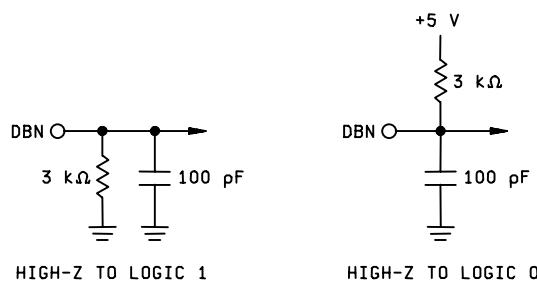
Symbol	Parameter	Min	Unit
t _{HEC}	CE pulse width	300	ns
t _{SSC}	\overline{CS} to CE setup	300	ns
t _{HSC}	\overline{CS} low during CE high	200	ns
t _{SRC}	R/ \overline{C} to CE setup	250	ns
t _{HRC}	R/ \overline{C} low during CE high	200	ns
t _{SAC}	A ₀ to CE setup	0	ns
t _{HAC}	A ₀ valid during CE high	300	ns

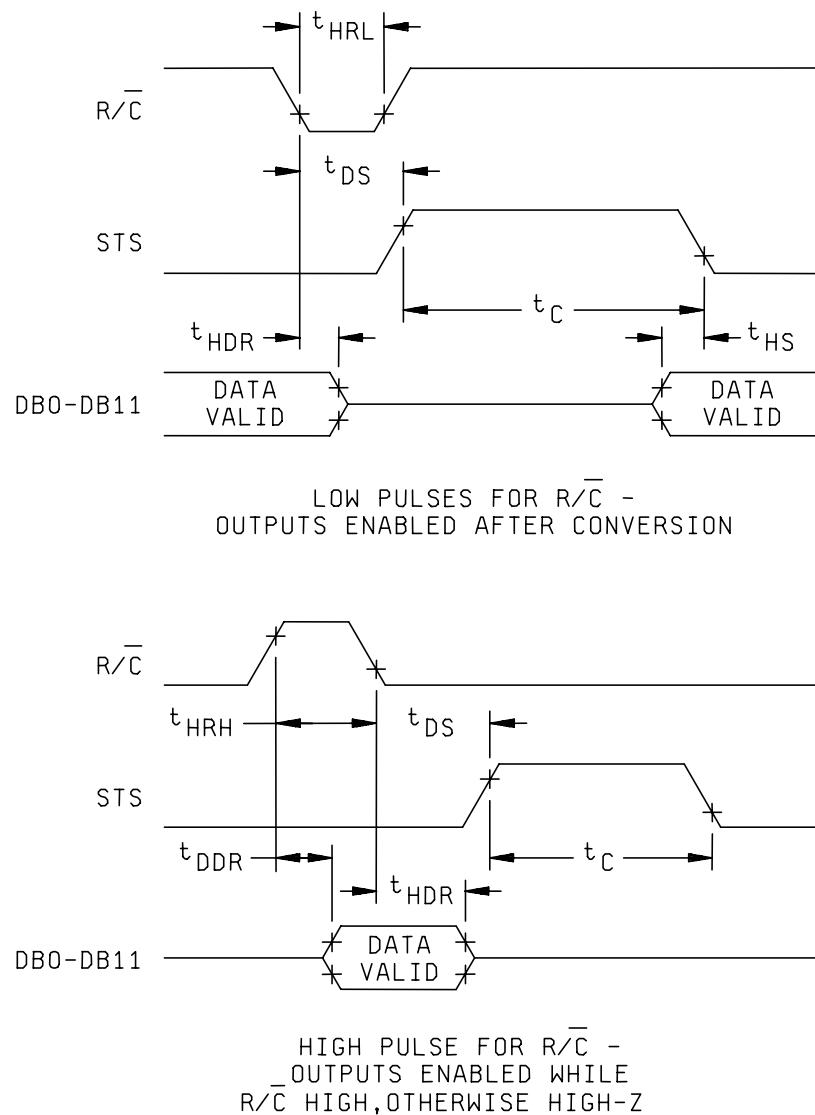
READ MODE

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.

FIGURE 9. Timing diagrams (stand alone operation).

Test setup timing specifications

STAND ALONE MODE

Symbol	Parameter	Min	Unit
t _{HRL}	Low R/C pulse width	350	ns
t _{HRH}	High R/C pulse width	250	ns

NOTE: For stand-alone operation, CE is tied to logic "1", 12/8 is wired to +5 V, and 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.

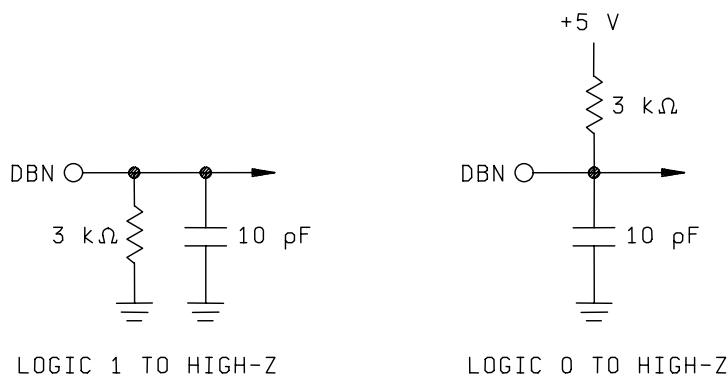
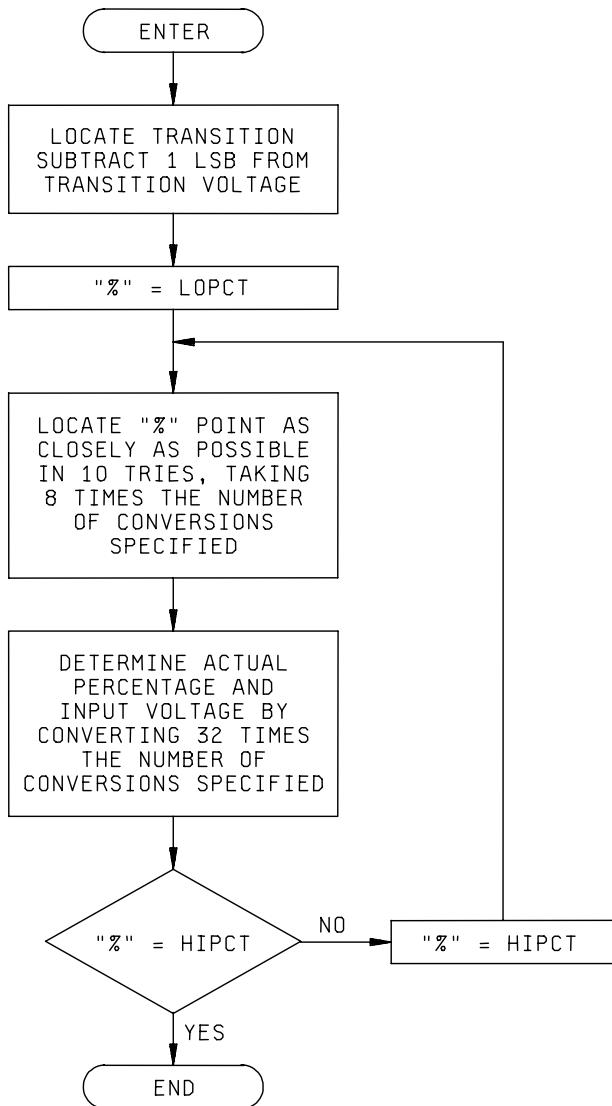


FIGURE 9. Timing diagrams (stand alone operation) – Continued.



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)				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		Min	Max	
$T_A = +25^\circ\text{C}$	I _{CC1}	1	+15.0	-15.0	+5.0	Max (-) Max (+)	0000 0000 0000 1111 1111 1111	7 I1 mA	I _{CC1} = I ₁ I _{CC2} = I ₂	All device types	1	16	mA	
	I _{CC2}	2	"	"	"	Max (+)		7 I2 "		"	1	16	"	
	I _{EE1}	3	"	"	"	Max (-) Max (+)	0000 0000 0000 1111 1111 1111	11 I3 "	I _{EE1} = I ₃ I _{EE2} = I ₄	"	-30	-1	"	
	I _{EE2}	4	"	"	"	Max (+)		11 I4 "		"	-30	-1	"	
	I _{LOG1}	5	"	"	"	Max (-) Max (+)	0000 0000 0000 1111 1111 1111	1 I5 "	I _{LOG1} = I ₅ I _{LOG2} = I ₆	"	1	40	"	
	I _{LOG2}	6	"	"	"	Max (+)		1 I6 "		"	1	40	"	
	P _{d1}	7	"	"	"	Max (-) Max (+)	0000 0000 0000 1111 1111 1111			P _{d1} = I _{CC1} * V _{CC} + I _{EE1} * V _{EE} + I _{LOG1} * V _{LOG} P _{d2} = I _{CC2} * V _{CC} + I _{EE2} * V _{EE} + I _{LOG2} * V _{LOG}	---	725	mW	
	P _{d2}	8	"	"	"	Max (+)					---	725	mW	
	I _{IL1}	9	"	"	"	---	---	3 I7 mA	I _{IL1} = I ₇ I _{IL2} = I ₈ I _{IL3} = I ₉ I _{IL4} = I ₁₀	V _{IN(logic)} = 0.0 V All device types	-10	1	µA	
	I _{IL2}	10	"	"	"	"	"	4 I8 "		"	"	"	"	
	I _{IL3}	11	"	"	"	"	"	5 I9 "		"	"	"	"	
	I _{IL4}	12	"	"	"	"	"	6 I10 "		"	"	"	"	
	I _{IH1}	13	"	"	"	"	"	3 I11 µA	I _{IH1} = I ₁₁ I _{IH2} = I ₁₂ I _{IH3} = I ₁₃ I _{IH4} = I ₁₄	V _{IN(logic)} = 2.4 V All device types	-1	10	µA	
	I _{IH2}	14	"	"	"	"	"	4 I12 "		"	"	"	"	
	I _{IH3}	15	"	"	"	"	"	5 I13 "		"	"	"	"	
	I _{IH4}	16	"	"	"	"	"	6 I14 "		"	"	"	"	
	I _{IH5}	17	"	"	"	"	"	3 I15 µA	I _{IH5} = I ₁₅ I _{IH6} = I ₁₆ I _{IH7} = I ₁₇ I _{IH8} = I ₁₈	V _{IN(logic)} = 5.5 V All device types	-1	10	µA	
	I _{IH6}	18	"	"	"	"	"	4 I16 "		"	"	"	"	
	I _{IH7}	19	"	"	"	"	"	5 I17 "		"	"	"	"	
	I _{IH8}	20	"	"	"	"	"	6 I18 "		"	"	"	"	
	I _{ZL1}	21	"	"	+5.5 V	Max (+)	1111 1111 1111	16 I19 µA	I _{ZL1} = I ₁₉ I _{ZL2} = I ₂₀	V _O = 0.0 V VR / C = logic "0" All device types	-10	10	µA	
	I _{ZL2}	22	"	"	"	"	"	17 I20 "		"	"	"	"	
	I _{ZL3}	23	"	"	"	"	"	18 I21 "	I _{ZL3} = I ₂₁		"	"	"	
	I _{ZL4}	24	"	"	"	"	"	19 I22 "	I _{ZL4} = I ₂₂		"	"	"	
	I _{ZL5}	25	"	"	"	"	"	20 I23 "	I _{ZL5} = I ₂₃		"	"	"	
	I _{ZL6}	26	"	"	"	"	"	21 I24 "	I _{ZL6} = I ₂₄		"	"	"	
	I _{ZL7}	27	"	"	"	"	"	22 I25 "	I _{ZL7} = I ₂₅		"	"	"	
	I _{ZL8}	28	"	"	"	"	"	23 I26 "	I _{ZL8} = I ₂₆		"	"	"	
	I _{ZL9}	29	"	"	"	"	"	24 I27 "	I _{ZL9} = I ₂₇		"	"	"	
	I _{ZL10}	30	"	"	"	"	"	25 I28 "	I _{ZL10} = I ₂₈		"	"	"	
	I _{ZL11}	31	"	"	"	"	"	26 I29 "	I _{ZL11} = I ₂₉		"	"	"	
	I _{ZL12}	32	"	"	"	"	"	27 I30 "	I _{ZL12} = I ₃₀		"	"	"	

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

Subgroup	Symbol	Test no.	Applied voltages ref. pin 9 (figures 4, 8)				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	
1 TA = +25°C	IZH1	33	+15.0	-15.0	+5.5 V	Max (-)	0000 0000 0000	16	I31	μA	IZH1 = I31	V _O = 5.5 V	-10	10	μA		
	IZH2	34	"	"	"	"	" " "	17	I32	"	IZH2 = I32	VR/ C̄ = logic "0"	"	"	"		
	IZH3	35	"	"	"	"	" " "	18	I33	"	IZH3 = I33	All device types	"	"	"		
	IZH4	36	"	"	"	"	" " "	19	I34	"	IZH4 = I34	"	"	"	"		
	IZH5	37	"	"	"	"	" " "	20	I35	"	IZH5 = I35	"	"	"	"		
	IZH6	38	"	"	"	"	" " "	21	I36	"	IZH6 = I36	"	"	"	"		
	IZH7	39	"	"	"	"	" " "	22	I37	"	IZH7 = I37	"	"	"	"		
	IZH8	40	"	"	"	"	" " "	23	I38	"	IZH8 = I38	"	"	"	"		
	IZH9	41	"	"	"	"	" " "	24	I39	"	IZH9 = I39	"	"	"	"		
	IZH10	42	"	"	"	"	" " "	25	I40	"	IZH10 = I40	"	"	"	"		
	IZH11	43	"	"	"	"	" " "	26	I41	"	IZH11 = I41	"	"	"	"		
	IZH12	44	"	"	"	"	" " "	27	I42	"	IZH12 = 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		
	tc2	46	"	"	"	"	0000 0000 0000	28	t2	s	tc2 = t2 12-bit cycle	device types 05,06	6	11.5	"		
	device types 01,02,03,04														15	40	"
	device types 05,06														9	17	"
31	VOL1	47	"	"	+4.5 V	"	0000 0000 0000	16	E1	V	VOL1 = E1	I _L = 1.6 mA	0.4	V			
	VOL2	48	"	"	"	"	" " "	17	E2	"	VOL2 = E2	VR/ C̄ = logic "0" -> "1"	"	"			
	VOL3	49	"	"	"	"	" " "	18	E3	"	VOL3 = E3	All device types	"	"			
	VOL4	50	"	"	"	"	" " "	19	E4	"	VOL4 = E4	"	"				
	VOL5	51	"	"	"	"	" " "	20	E5	"	VOL5 = E5	"	"				
	VOL6	52	"	"	"	"	" " "	21	E6	"	VOL6 = E6	"	"				
	VOL7	53	"	"	"	"	" " "	22	E7	"	VOL7 = E7	"	"				
	VOL8	54	"	"	"	"	" " "	23	E8	"	VOL8 = E8	"	"				
	VOL9	55	"	"	"	"	" " "	24	E9	"	VOL9 = E9	"	"				
	VOL10	56	"	"	"	"	" " "	25	E10	"	VOL10 = E10	"	"				
	VOL11	57	"	"	"	"	" " "	26	E11	"	VOL11 = E11	"	"				
	VOL12	58	"	"	"	"	" " "	27	E12	"	VOL12 = E12	"	"				
	VOL13	59	"	"	"	"	" " "	28	E13	"	VOL13 = E13	"	"				
	VOH1	60	"	"	"	Max (+)	1111 1111 1111	16	E14	V	VOH1 = E14	I _L = -0.5 mA	2.4	V			
	VOH2	61	"	"	"	"	" " "	17	E15	"	VOH2 = E15	VR/ C̄ = logic "0" -> "1"	"	"			
	VOH3	62	"	"	"	"	" " "	18	E16	"	VOH3 = E16	All device types	"	"			
	VOH4	63	"	"	"	"	" " "	19	E17	"	VOH4 = E17	"	"				
	VOH5	64	"	"	"	"	" " "	20	E18	"	VOH5 = E18	"	"				
	VOH6	65	"	"	"	"	" " "	21	E19	"	VOH6 = E19	"	"				
	VOH7	66	"	"	"	"	" " "	22	E20	"	VOH7 = E20	"	"				
	VOH8	67	"	"	"	"	" " "	23	E21	"	VOH8 = E21	"	"				
	VOH9	68	"	"	"	"	" " "	24	E22	"	VOH9 = E22	"	"				
	VOH10	69	"	"	"	"	" " "	25	E23	"	VOH10 = E23	"	"				
	VOH11	70	"	"	"	"	" " "	26	E24	"	VOH11 = E24	"	"				
	VOH12	71	"	"	"	"	" " "	27	E25	"	VOH12 = E25	"	"				
	VOH13	72	"	"	"	"	" " "	28	E26	"	VOH13 = 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)				DUT digital output code-word	Measurement sense lines ref. pin no. 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		Min	Max		
1 T _A = +25°C	V _{REF}	73	+15.0	-15.0	+5.0	Max (-)	0000 0000 0000				Bipolar, V _{FSR} = 20 V I _L = 1.5 mA device types 01,02 device types 03,04,05,06	9.95	10.05	V	
			"	"	"	Max (+)	1111 1111 XXXX				V _{REF} = E27	9.90	10.10	"	
	m1	74	"	"	"	"	" " "				m1a = E28	I _L = -0.5 mA	2.4	"	
		75	"	"	"	"	" " "				m1b = E29	V _{12/8} = 0.0 V	"	"	
		76	"	"	"	"	" " "				m1c = E30	V _{A0} = logic "0"	"	"	
		77	"	"	"	"	" " "				m1d = E31	V _{R/C} = logic "0" -> "1"	"	"	
		78	"	"	"	"	" " "				m1e = E32	All device types	"	"	
		79	"	"	"	"	" " "				m1f = E33	"	"	"	
		80	"	"	"	"	" " "				m1g = E34	"	"	"	
		81	"	"	"	"	" " "				m1h = E35	"	"	"	
	m2	82	"	"	"	"	XXXX 0000 1111				m2a = E36	I _L = -0.5 mA	2.4	"	
		83	"	"	"	"	" " "				m2b = E37	V _{C/E} = logic "0"	"	"	
		84	"	"	"	"	" " "				m2c = E38	V _{A0} = logic "0"	"	"	
		85	"	"	"	"	" " "				m2d = E39	V _{C/E} = logic "1" All device types	"	"	
	m3	86	"	"	"	"	XXXX 0000 1111				m3a = E40	I _L = 1.6 mA	0.4	"	
		87	"	"	"	"	" " "				m3b = E41	All device types	"	"	
		88	"	"	"	"	" " "				m3c = E42	"	"	"	
		89	"	"	"	"	" " "				m3d = E43	"	"	"	
	m4	90	"	"	"	"	XXXX 0000 1111				m4a = I43	V _O = 0.4 V	-10	10	µA
		91	"	"	"	"	" " "				m4b = I44	All device types	"	"	"
		92	"	"	"	"	" " "				m4c = I45	"	"	"	"
		93	"	"	"	"	" " "				m4d = I46	"	"	"	"
	m5	94	"	"	"	"	1111 1111 XXXX				m5a = I47	V _O = 0.4 V	-10	10	µA
		95	"	"	"	"	" " "				m5b = I48	V _{C/E} = logic "0"	"	"	"
		96	"	"	"	"	" " "				m5c = I49	V _{A0} = logic "0"	"	"	"
		97	"	"	"	"	" " "				m5d = I50	V _{C/E} = 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)				DUT digital output code-word	Measurement sense limit 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		
1 TA = +25°C	VR/̄C	98	+15.0	-15.0	+5.0 V	Max (-)	0000 0000 0000	16	E44	V	V _{O14} = E44 VR/̄C = 0.8 V (Init.)	Logic	"0"	
			"	"	"	"	" " "	17	E45	"	V _{O15} = E45 VR/̄C = 2.0 V (Conv.)		"	
			"	"	"	"	" " "	18	E46	"	V _{O16} = E46 All device types		"	
			"	"	"	"	" " "	19	E47	"	V _{O17} = E47		"	
			"	"	"	"	" " "	20	E48	"	V _{O18} = E48		"	
			"	"	"	"	" " "	21	E49	"	V _{O19} = E49		"	
			"	"	"	"	" " "	22	E50	"	V _{O20} = E50		"	
			"	"	"	"	" " "	23	E51	"	V _{O21} = E51		"	
			"	"	"	"	" " "	24	E52	"	V _{O22} = E52		"	
			"	"	"	"	" " "	25	E53	"	V _{O23} = E53		"	
			"	"	"	"	" " "	26	E54	"	V _{O24} = E54		"	
			"	"	"	"	" " "	27	E55	"	V _{O25} = E55		"	
			"	"	"	"	" " "	28	E56	"	V _{O26} = E56		"	
			"	"	"	Max (+)	1111 1111 1111	16	E57	V	V _{OH14} = E57 (Convert and read)	Logic	"1"	
			"	"	"	"	" " "	17	E58	"	V _{OH15} = E58 VR/̄C = 0.8 V (Init.)		"	
			"	"	"	"	" " "	18	E59	"	V _{OH16} = E59 VR/̄C = 2.0 V		"	
			"	"	"	"	" " "	19	E60	"	All device types		"	
			"	"	"	"	" " "	20	E61	"	V _{OH17} = E60		"	
			"	"	"	"	" " "	21	E62	"	V _{OH18} = E61		"	
			"	"	"	"	" " "	22	E63	"	V _{OH19} = E62		"	
			"	"	"	"	" " "	23	E64	"	V _{OH20} = E63		"	
			"	"	"	"	" " "	24	E65	"	V _{OH21} = E64		"	
			"	"	"	"	" " "	25	E66	"	V _{OH22} = E65		"	
			"	"	"	"	" " "	26	E67	"	V _{OH23} = E66		"	
			"	"	"	"	" " "	27	E68	"	V _{OH24} = E67		"	
			"	"	"	"	" " "	28	E69	"	V _{OH25} = E68		"	
			"	"	"	Max (+)	1111 1111 1111	16	E70	V	V _{OH27} = E70 (Convert and read)	Logic	"1"	
			"	"	"	"	" " "	17	E71	"	V _{OH28} = E71 V _C = 0.8 V (Init.)		"	
			"	"	"	"	" " "	18	E72	"	V _{OH29} = E72 V _C = 2.0 V		"	
			"	"	"	"	" " "	19	E73	"	All device types		"	
			"	"	"	"	" " "	20	E74	"	V _{OH30} = E73		"	
			"	"	"	"	" " "	21	E75	"	V _{OH31} = E74		"	
			"	"	"	"	" " "	22	E76	"	V _{OH32} = E75		"	
			"	"	"	"	" " "	23	E77	"	V _{OH33} = E76		"	
			"	"	"	"	" " "	24	E78	"	V _{OH34} = E77		"	
			"	"	"	"	" " "	25	E79	"	V _{OH35} = E78		"	
			"	"	"	"	" " "	26	E80	"	V _{OH36} = E79		"	
			"	"	"	"	" " "	27	E81	"	V _{OH37} = E80		"	
			"	"	"	"	" " "	28	E82	"	V _{OH38} = E81		"	
			"	"	"	Max (+)	1111 1111 1111	16	E83	V	V _{OH39} = E82 V _C = 2.0 V	Logic	"1"	

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

Subgroup	Symbol	Test no.	Applied voltages ref. pin 9 (figures 4, 8)				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		Min	Max	
1 $T_A = +25^\circ C$	VCE	101	+15.0	-15.0	+5.0 V	Max (-)	1111 1111 1111	16	E83	V	$V_{OH40} = E83$ $V_{CE} = 0.8 \text{ V}$ $V_{IN(a)} = -7 \text{ mV}$ All device types	Logic	"1"	
			"	"	"	"	" " "	17	E84	"	$V_{OH41} = E84$	"	"	
			"	"	"	"	" " "	18	E85	"	$V_{OH42} = E85$	"	"	
			"	"	"	"	" " "	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	-15.0	+5.0 V	Max (-)	0000 0000 0000	16	E96	V	$V_{OL27} = E96$ All device types	Logic	"0"	
			"	"	"	"	" " "	17	E97	"	$V_{OL28} = E97$	"	"	
			"	"	"	"	" " "	18	E98	"	$V_{OL29} = E98$	"	"	
			"	"	"	"	" " "	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	"	$V_{OL39} = E108$	"	"	
		103	+15.0	-15.0	+5.0 V	Max (+)	1111 1111 1111	16	E109	V	$V_{OH53} = E109$ All device types	Logic	"1"	
			"	"	"	"	" " "	17	E110	"	$V_{OH54} = E110$	"	"	
			"	"	"	"	" " "	18	E111	"	$V_{OH55} = E111$	"	"	
			"	"	"	"	" " "	19	E112	"	$V_{OH56} = E112$	"	"	
			"	"	"	"	" " "	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)				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		Min	Max	
1 $T_A = +25^\circ C$	V_{CS}	104	+15.0	-15.0	+5.0 V	Max (-)	1111 1111 1111	16	E122	V	$V_{OH66} = E122$ All device types	Logic	"1"	
			"	"	"	"	" " "	17	E123	"	$V_{OH67} = E123$ Set $V_{CS} = 2.0 \text{ V}$	"		
			"	"	"	"	" " "	18	E124	"	$V_{OH68} = E124$ Set $V_{IN(a)} = -7 \text{ mV}$	"		
			"	"	"	"	" " "	19	E125	"	$V_{OH69} = E125$ Set $V_{CE} = \text{logic "1"}$ (read)	"		
			"	"	"	"	" " "	20	E126	"	$V_{OH70} = E126$	"		
			"	"	"	"	" " "	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	-15.0	+5.0 V	Max (-)	0000 0000 0000	16	E135	V	$V_{OL40} = E135$ All device types	Logic	"0"	
			"	"	"	"	" " "	17	E136	"	$V_{OL41} = E136$ $V_{CS} = 0.8 \text{ V}$ (convert and read)	"		
			"	"	"	"	" " "	18	E137	"	$V_{OL42} = E137$	"		
			"	"	"	"	" " "	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	"	$V_{OL52} = E147$	"		
VA0	VA0	106	+15.0	-15.0	+5.0 V	Max (-)	1111 1111 XXXX	20	E148	V	$V_{OH79} = E148$ All device types	Logic	"1"	
			"	"	"	"	" " "	21	E149	"	$V_{OH80} = E149$ $V_{12/8} = 0.0 \text{ V}$	"		
		107	+15.0	-15.0	+5.0 V	Max (-)	XXXX 0000 1111	22	E150	"	$V_{OH81} = E150$ $V_{A0} = 0.8 \text{ V}$, (convert and read)	"		
			"	"	"	"	" " "	23	E151	"	$V_{OH82} = E151$	"		
			"	"	"	"	" " "	20	E152	V	$V_{OL53} = E152$ All device types	Logic	"0"	
			"	"	"	"	" " "	21	E153	"	$V_{CE} = \text{logic "0"},$	"		
			"	"	"	"	" " "	22	E154	"	$V_{A0} = 2.0 \text{ V},$	"		
			"	"	"	"	" " "	23	E155	"	$V_{CE} = \text{logic "1"}$	"		

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

Subgroup	Symbol	Test no.	Applied voltages ref. pin 9 (figures 4, 8)			Applied digital code-word	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)			Pin	Value	Unit		Min	Max	
1 $T_A = +25^\circ C$	+PSS1	108	+15.0	-15.0	+5.0	0000 0000 0000	0000 0000 000φ	13	E156	V	All devices			
		109	+13.5	"	"	" " "	" " "		E157	"	+PSS1a = 41*(E156-E157)	-.10	.10	LSB/%PS
		110	+16.5	"	"	" " "	" " "		E158	"	+PSS1b = 41*(E158-E156)	"	"	"
		111	+15.0	"	"	1111 1111 1110	1111 1111 111φ		E159	"	+PSS1c = 41*(E159-E160)	"	"	"
		112	+13.5	"	"	" " "	" " "		E160	"	+PSS1d = 41*(E161-E159)	"	"	"
	+PSS2	113	+16.5	"	"	" " "	" " "		E161	"	All devices			
		114	+12.0	-12.0	+5.0	0000 0000 0000	0000 0000 000φ	13	E162	V	+PSS2a = 81.9*(E162-E163)	-.20	.20	LSB/%PS
		115	+11.4	"	"	" " "	" " "		E163	"	+PSS2b = 81.9*(E164-E162)	"	"	"
		116	+12.6	"	"	1111 1111 1110	1111 1111 111φ		E164	"	+PSS2c = 81.9*(E165-E166)	"	"	"
		117	+12.0	"	"	" " "	" " "		E165	"	+PSS2d = 81.9*(E167-E165)	"	"	"
	+PSS3	118	+15.0	-15.0	"	0000 0000 0000	0000 0000 000φ	13	E166	V	All devices			
		119	"	"	+4.5	" " "	" " "		E167	"	+PSS3a = 41*(E168-E169)	-.10	.10	LSB/%PS
		120	"	"	+5.5	" " "	" " "		E168	V	+PSS3b = 41*(E170-E168)	"	"	"
		121	"	"	+5.0	1111 1111 1110	1111 1111 111φ		E169	"	+PSS3c = 41*(E171-E172)	"	"	"
		122	"	"	+4.5	" " "	" " "		E170	"	+PSS3d = 41*(E173-E171)	"	"	"
	-PSS1	123	"	"	+5.5	" " "	" " "		E171	"	All devices			
		124	+15.0	-15.0	+5.0	0000 0000 0000	0000 0000 000φ	13	E172	V	-PSS1a = 41*(E174-E175)	-.10	.10	LSB/%PS
		125	"	-16.5	"	" " "	" " "		E173	"	-PSS1b = 41*(E176-E174)	"	"	"
		126	"	-13.5	"	1111 1111 1110	1111 1111 111φ		E174	"	-PSS1c = 41*(E177-E178)	"	"	"
		127	"	-13.5	"	" " "	" " "		E175	"	-PSS1d = 41*(E179-E177)	"	"	"
	-PSS2	128	+12.0	-12.0	+5.0	0000 0000 0000	0000 0000 000φ	13	E176	V	All devices			
		129	"	-12.6	"	" " "	" " "		E177	"	-PSS2a = 81.9*(E180-E181)	-.20	.20	LSB/%PS
		130	"	-11.4	"	" " "	" " "		E178	"	-PSS2b = 81.9*(E182-E180)	"	"	"
		131	"	-12.0	"	1111 1111 1110	1111 1111 111φ		E179	"	-PSS2c = 81.9*(E183-E184)	"	"	"
		132	"	-12.6	"	" " "	" " "		E180	V	-PSS2d = 81.9*(E185-E183)	"	"	"
2 $T_A = +125^\circ C$	(All test parameters, test conditions, equations and test limits in subgroup 2 are identical with those specified in table III, subgroup 1.)													
3 $T_A = -55^\circ C$	(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)			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 V _{EE} (V)	1 V _{D^D} (V)				Pin	Value	Unit		Min	Max		
4 TA = +25°C	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 03,04,05,06	-0.5 -1.5	1.5 2.5	LSB “
	B _Z	383	“	“	“	0111 1111 1111	φφφφ φφφφ φφφφ	KA	“	E557	“	B _Z = 410*(E557)	All device types	-4.5	3.5	“
	AE	384	“	“	“	0000 0000 0000	0000 0000 000φ		“	E558	“	A _E = 100*(9.995-(E559-E558)) / (E559-E558)	Device type 01 Device types 02 03,04,05,06	.125 .25 .3	.125 .25 .3	%/FSR “
	B _{PAE}	385	“	“	“	0000 0000 0000	0000 0000 000φ	KA	“	E560	“	B _{PAE} = 100*(19.990*(E560-E559)) / (E560-E559)	Device type 01 Device types 02 03,04,05,06	-0.125 -0.25 -0.3	0.125 0.25 0.3	%/FSR “
	L _{E1}	386	“	“	“	1111 1111 1110	1111 1111 111φ		“	E562	“	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 DAC code word ; S = (E563-E563)/4094				
	L _{E2}	387	“	“	“	0000 0000 0010	0000 0000 001φ		“	E565	“	L _{E2} = ((E564+E565)/2-2*S-E563+S/2) / S		“	“	
	L _{E3}	388	“	“	“	0000 0000 0100	0000 0000 010φ		“	E567	“	L _{E3} = ((E566+E567)/2-4*S-E563+S/2) / S		“	“	
	L _{E4}	389	“	“	“	0000 0000 1000	0000 0000 100φ		“	E569	“	L _{E4} = ((E568+E569)/2-8*S-E563+S/2) / S		“	“	
	L _{E5}	390	“	“	“	0000 0001 0000	0000 0001 000φ		“	E571	“	L _{E5} = ((E570+E571)/2-16*S-E563+S/2) / S		“	“	
	L _{E6}	391	“	“	“	0000 0010 0000	0000 0010 000φ		“	E573	“	L _{E6} = ((E572+E573)/2-32*S-E563+S/2) / S		“	“	
	L _{E7}	392	“	“	“	0000 0100 0000	0000 0100 000φ		“	E575	“	L _{E7} = ((E574+E575)/2-64*S-E563+S/2) / S		“	“	
	L _{E8}	393	“	“	“	0000 1000 0000	0000 1000 000φ		“	E577	“	L _{E8} = ((E576+E577)/2-128*S-E563+S/2) / S		“	“	
	L _{E9}	394	“	“	“	0001 0000 0000	0001 0000 000φ		“	E579	“	L _{E9} = ((E578+E579)/2-256*S-E563+S/2) / S		“	“	
	L _{E10}	395	“	“	“	0010 0000 0000	0010 0000 000φ		“	E581	“	L _{E10} = ((E580+E581)/2-512*S-E563+S/2) / S		“	“	
	L _{E11}	396	“	“	“	0011 0000 0000	0011 0000 000φ		“	E583	“	L _{E11} = ((E582+E583)/2-768*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)			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 V _{EE} (V)	1 V _{D^D} (V)				Pin	Value	Unit		Min	Max	
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 010φ 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 0φφφ 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)			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 V _{EE} (V)	1 V _{D^D} (V)				Pin	Value	Unit		Min	Max	
4 T _A = +25°C	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
	L _{E30}	415	"	"	"	1111 1111 1110	1111 1111 111φ	"	"	E621	"	L _{E30} = ((E620+E621)/2-4094*S-E563+S/2) / S	"	"	"
	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)			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 V _{EE} (V)	1 V _{D^D} (V)				Pin	Value	Unit		Min	Max	
4 TA = +25°C	D _{LE} 26	441	+15.0	-15.0	+5.0	1111 1110 0000	1111 1110 000φ	KA	13		V	D _{LE} 26 = (E613-E612) / S	-9	1.0	LSB
	D _{LE} 27	442	"	"	"	1111 1111 0000	1111 1111 000φ	"	"	"	"	D _{LE} 27 = (E615-E614) / S	"	"	"
	D _{LE} 28	443	"	"	"	1111 1111 1000	1111 1111 100φ	"	"	"	"	D _{LE} 28 = (E617-E616) / S	"	"	"
	D _{LE} 29	444	"	"	"	1111 1111 1100	1111 1111 110φ	"	"	"	"	D _{LE} 29 = (E619-E618) / S	"	"	"
	D _{LE} 30	445	"	"	"	1111 1111 1110	1111 1111 111φ	"	"	"	"	D _{LE} 30 = (E621-E620) / S	"	"	"
	MCC	446	+15.0	-15.0	+5.0	V _{IN} (analog) = Max (-) through Max(+)	0000 0000 0000 through 1111 1111 1111					MCC = number of missing output codes from 0000 0000 0000 to 1111 1111 1111. (Figures 4, 5), all device types		0	Codes
5 TA = +125°C	dV _{IO} / dT	447	"	"	"	0000 0000 0000	0000 0000 000φ		13	E622	V	dV _{IO} / dT = 410* (E622-E556) Device types 01,02 Device types 03, 04, 05, 06	-0.5	0.5	LSB
	dBZ / dT	448	"	"	"	0111 1111 1111	φφφφ φφφφ φφφφ	KA	"	E623	"	dBZ / dT = 410* (E623-E557) Device types 01, 03, 05 Device types 02, 04, 06	-1.0	1.0	"
	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 Device types 02, 04, 06	-12.5	12.5	ppm/°C
	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 Device types 02, 04, 06	-12.5	12.5	ppm/°C

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 V _{EE} (V)	1 V _{D^D} (V)				Pin	Value	Unit		Min	Max	
5 $T_A = +125^\circ C$	L _E 1	451	+15.0	-15.0	+5.0	1111 1111 1110 0000 0000 0000 0000 0000 0001	1111 1111 1110 0000 0000 0000 0000 0000 0000	KA	13	E628 E629 E630	V	For end-point linearity error, $L_E(N) = (E(N+628)+E(N+629)) / 2 - V(\text{ideal}) / S$ $V(\text{ideal}) = N1 * S + E629 - S/2$ N1 – Applied ref DAC code-word $S = (E628-E629) / 4094$ All device types	-1.0	1.0	LSB
			"	"	"	0000 0000 0010 0000 0000 0011	0000 0000 0010 0000 0000 0fff0	"	"	E631 E632	"	$L_{E1} = ((E629+E630)/2-1*S-E629+S/2) / S$			
			"	"	"	0000 0000 0100 0000 0000 0111	0000 0000 0100 0000 0000 0fff0	"	"	E633 E634	"	$L_{E2} = ((E630+E631)/2-2*S-E629+S/2) / S$			
			"	"	"	0000 0000 1000 0000 0000 1111	0000 0000 1000 0000 0000 0fff0	"	"	E635 E636	"	$L_{E3} = ((E632+E633)/2-4*S-E629+S/2) / S$			
			"	"	"	0000 0001 0000 0000 0001 1111	0000 0001 0000 0000 0000 0fff0	"	"	E637 E638	"	$L_{E4} = ((E634+E635)/2-8*S-E629+S/2) / S$			
			"	"	"	0000 0010 0000 0000 0011 1111	0000 0010 0000 0000 0000 0fff0	"	"	E639 E640	"	$L_{E5} = ((E636+E637)/2-16*S-E629+S/2) / S$			
			"	"	"	0000 0100 0000 0000 0111 1111	0000 0100 0000 0000 0000 0fff0	"	"	E641 E642	"	$L_{E6} = ((E638+E639)/2-32*S-E629+S/2) / S$			
			"	"	"	0000 1000 0000 0000 1111 1111	0000 1000 0000 0000 0000 0fff0	"	"	E643 E644	"	$L_{E7} = ((E640+E641)/2-64*S-E629+S/2) / S$			
			"	"	"	0001 0000 0000 0001 1111 1111	0001 0000 0000 0000 0000 0fff0	"	"	E645 E646	"	$L_{E8} = ((E642+E643)/2-128*S-E629+S/2) / S$			
			"	"	"	0010 0000 0000 0010 1111 1111	0010 0000 0000 0010 0000 0fff0	"	"	E647 E648	"	$L_{E9} = ((E644+E645)/2-256*S-E629+S/2) / S$			
			"	"	"	0011 0000 0000 0011 1111 1111	0011 0000 0000 0011 0000 0fff0	"	"	E649 E650	"	$L_{E10} = ((E646+E647)/2-512*S-E629+S/2) / S$			
			"	"	"	0100 0000 0000 0100 1111 1111	0100 0000 0000 0100 0000 0fff0	"	"	E651 E652	"	$L_{E11} = ((E648+E649)/2-768*S-E629+S/2) / S$			
			"	"	"	0101 0000 0000 0101 1111 1111	0101 0000 0000 0101 0000 0fff0	"	"	E653 E654	"	$L_{E12} = ((E650+E651)/2-1024*S-E629+S/2) / S$			
			"	"	"	0110 0000 0000 0110 1111 1111	0110 0000 0000 0110 0000 0fff0	"	"	E655 E656	"	$L_{E13} = ((E652+E653)/2-1280*S-E629+S/2) / S$			
			"	"	"	0111 0000 0000 0111 1111 1111	0111 0000 0000 0111 0000 0fff0	"	"	E657 E658	"	$L_{E14} = ((E654+E655)/2-1536*S-E629+S/2) / S$			

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

Subgroup	Symbol	Test no.	Applied voltages ref. pin 9 (figures 6, 8)			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 V _{EE} (V)	1 V _{D^D} (V)				Pin	Value	Unit		Min	Max	
$T_A = +125^\circ C$	L _{E15}	465	+15.0	-15.0	+5.0	0111 0000 0000 0111 1111 1111	0111 0000 0000φ φφφφ φφφφ φφφφ	KA	13	E657 E658	"	$L_{E15} = ((E656+E657)/2-1792*S-E629+S/2) / S$	-1.0	1.0	LSB
	L _{E16}	466	"	"	"	1000 0000 0000 1000 1111 1111	1000 0000 0000φ 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 0000φ 100φ 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 0000φ 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 0000φ 100φ 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 0000φ 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 0000φ 110φ 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 0000φ 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 0000φ 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 0000φ 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 0000φ 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 0000φ 1111 1110 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 0000φ 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 1000φ 1111 1111 100φ	"	"	E683 E684	"	$L_{E28} = ((E682+E683)/2-4088*S-E629+S/2) / S$	"	"	"
	L _{E29}	479	"	"	"	1111 1111 1000 1111 1111 1011	1111 1111 1100φ 1111 1111 110φ	"	"	E685 E686	"	$L_{E29} = ((E684+E685)/2-4092*S-E629+S/2) / S$	"	"	"
	L _{E30}	480	"	"	"	1111 1111 1110	1111 1111 1111φ	"	"	E687	"	$L_{E30} = ((E686+E687)/2-4094*S-E629+S/2) / S$	"	"	"

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 V _{EE} (V)	1 V _{DD} (V)				Pin	Value	Unit		Min	Max	
5 T _A = +125°C	DLE1	481	+15.0	-15.0	+5.0	0000 0000 0001	0000 0000 00φφ	KA	13	“	V	For end-point linearity error, $D_{LE}(N) = (E(N+629)-E(N+628)) / S$ $S = (E628-E629) / 4094$ All device types	“	“	LSB
	DLE2	482	“	“	“	0000 0000 0010	0000 0000 001φ	“	“	“	“	DLE1 = (E630-E629) / S	-0.9	2.0	LSB
	DLE3	483	“	“	“	0000 0000 0100	0000 0000 010φ	“	“	“	“	DLE2 = (E631-E630) / S	“	“	“
	DLE4	484	“	“	“	0000 0000 1000	0000 0000 100φ	“	“	“	“	DLE3 = (E633-E632) / S	“	“	“
	DLE5	485	“	“	“	0000 0001 0000	0000 0001 000φ	“	“	“	“	DLE4 = (E635-E634) / S	“	“	“
	DLE6	486	“	“	“	0000 0010 0000	0000 0010 000φ	“	“	“	“	DLE5 = (E637-E636) / S	“	“	“
	DLE7	487	“	“	“	0000 0100 0000	0000 0100 000φ	“	“	“	“	DLE6 = (E639-E638) / S	“	“	“
	DLE8	488	“	“	“	0000 1000 0000	0000 1000 000φ	“	“	“	“	DLE7 = (E641-E640) / S	“	“	“
	DLE9	489	“	“	“	0001 0000 0000	0001 0000 000φ	“	“	“	“	DLE8 = (E643-E642) / S	“	“	“
	DLE10	490	“	“	“	0010 0000 0000	0010 0000 000φ	“	“	“	“	DLE9 = (E645-E644) / S	“	“	“
	DLE11	491	“	“	“	0011 0000 0000	0011 0000 000φ	“	“	“	“	DLE10 = (E647-E646) / S	“	“	“
	DLE12	492	“	“	“	0100 0000 0000	0100 0000 000φ	“	“	“	“	DLE11 = (E649-E648) / S	“	“	“
	DLE13	493	“	“	“	0101 0000 0000	0101 0000 000φ	“	“	“	“	DLE12 = (E651-E650) / S	“	“	“
	DLE14	494	“	“	“	0110 0000 0000	0110 0000 000φ	“	“	“	“	DLE13 = (E653-E652) / S	“	“	“
	DLE15	495	“	“	“	0111 0000 0000	0111 0000 000φ	“	“	“	“	DLE14 = (E655-E654) / S	“	“	“
	DLE16	496	“	“	“	1000 0000 0000	1000 0000 000φ	“	“	“	“	DLE15 = (E657-E656) / S	“	“	“
	DLE17	497	“	“	“	1001 0000 0000	1001 0000 000φ	“	“	“	“	DLE16 = (E659-E658) / S	“	“	“
	DLE18	498	“	“	“	1010 0000 0000	1010 0000 000φ	“	“	“	“	DLE17 = (E661-E660) / S	“	“	“
	DLE19	499	“	“	“	1011 0000 0000	1011 0000 000φ	“	“	“	“	DLE18 = (E663-E662) / S	“	“	“
	DLE20	500	“	“	“	1100 0000 0000	1100 0000 000φ	“	“	“	“	DLE19 = (E665-E664) / S	“	“	“
	DLE21	501	“	“	“	1101 0000 0000	1101 0000 000φ	“	“	“	“	DLE20 = (E667-E666) / S	“	“	“
	DLE22	502	“	“	“	1110 0000 0000	1110 0000 000φ	“	“	“	“	DLE21 = (E669-E668) / S	“	“	“
	DLE23	503	“	“	“	1111 0000 0000	1111 0000 000φ	“	“	“	“	DLE22 = (E671-E670) / S	“	“	“
	DLE24	504	“	“	“	1111 1000 0000	1111 1000 000φ	“	“	“	“	DLE23 = (E673-E672) / S	“	“	“
	DLE25	505	“	“	“	1111 1100 0000	1111 1100 000φ	“	“	“	“	DLE24 = (E675-E674) / S	“	“	“
	DLE26	506	“	“	“	1111 1110 0000	1111 1110 000φ	“	“	“	“	DLE25 = (E677-E676) / S	“	“	“
	DLE27	507	“	“	“	1111 1111 0000	1111 1111 000φ	“	“	“	“	DLE26 = (E679-E678) / S	“	“	“
	DLE28	508	“	“	“	1111 1111 1000	1111 1111 100φ	“	“	“	“	DLE27 = (E681-E680) / S	“	“	“
	DLE29	509	“	“	“	1111 1111 1100	1111 1111 110φ	“	“	“	“	DLE28 = (E683-E682) / S	“	“	“
	DLE30	510	“	“	“	1111 1111 1110	1111 1111 111φ	“	“	“	“	DLE29 = (E685-E684) / S	“	“	“
												DLE30 = (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)			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 V _{EE} (V)	1 V _{D^D} (V)				29 <-----> 40 MSB <-----> LSB	29 <-----> 16 MSB <-----> LSB	Pin	Value	Unit	Min	Max	
5 T _A = +125°C	MCC	511	+15.0	-15.0	+5.0	V _{IN(a)} = Max (-) through Max (+)	0000 0000 0000 through 1111 1111 1111	MCC = 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	0.5	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	1.0	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	12.5	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	12.5	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 0φφφ	KA " " " "	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 0000 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 0001 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 V _{EE} (V)	1 V _{D^D} (V)				Pin	Value	Unit		Min	Max	
6 TA = -55°C	L _{E6}	521	+15.0 “	-15.0 “	+5.0 “	0000 0010 0000 0000 0011 1111	0000 0010 000φ 0000 0φφφ φφφφ	KA	13 “	E705 E706	“	L _{E6} = ((E704+E705)/2-32*S-E695 +S/2) / S	-1.0	1.0	LSB
	L _{E7}	522	“	“	“	0000 0100 0000 0000 0111 1111	0000 0100 000φ 0000 φφφφ φφφφ	“	“	E707 E708	“	L _{E7} = ((E706+E707)/2-64*S-E695 +S/2) / S	“	“	“
	L _{E8}	523	“	“	“	0000 1000 0000 0000 1111 1111	0000 1000 000φ 000φ φφφφ φφφφ	“	“	E709 E710	“	L _{E8} = ((E708+E709)/2-128*S-E695 +S/2) / S	“	“	“
	L _{E9}	524	“	“	“	0001 0000 0000 0001 1111 1111	0001 0000 000φ 00φφ φφφφ φφφφ	“	“	E711 E712	“	L _{E9} = ((E710+E711)/2-256*S-E695 +S/2) / S	“	“	“
	L _{E10}	525	“	“	“	0010 0000 0000 0010 1111 1111	0010 0000 000φ 001φ φφφφ φφφφ	“	“	E713 E714	“	L _{E10} = ((E712+E713)/2-512*S-E695 +S/2) / S	“	“	“
	L _{E11}	526	“	“	“	0011 0000 0000 0011 1111 1111	0011 0000 000φ 0φφφ φφφφ φφφφ	“	“	E715 E716	“	L _{E11} = ((E714+E715)/2-768*S-E695 +S/2) / S	“	“	“
	L _{E12}	527	“	“	“	0100 0000 0000 0100 1111 1111	0100 0000 000φ 010φ φφφφ φφφφ	“	“	E717 E718	“	L _{E12} = ((E716+E717)/2-1024*S-E695 +S/2) / S	“	“	“
	L _{E13}	528	“	“	“	0101 0000 0000 0101 1111 1111	0101 0000 000φ 01φφ φφφφ φφφφ	“	“	E719 E720	“	L _{E13} = ((E718+E719)/2-1280*S-E695 +S/2) / S	“	“	“
	L _{E14}	529	“	“	“	0110 0000 0000 0110 1111 1111	0110 0000 000φ 011φ φφφφ φφφφ	“	“	E721 E722	“	L _{E14} = ((E720+E721)/2-1536*S-E695 +S/2) / S	“	“	“
	L _{E15}	530	“	“	“	0111 0000 0000 0111 1111 1111	0111 0000 000φ 0φφφ φφφφ φφφφ	“	“	E723 E724	“	L _{E15} = ((E722+E723)/2-1792*S-E695 +S/2) / S	“	“	“
	L _{E16}	531	“	“	“	1000 0000 0000 1000 1111 1111	1000 0000 000φ 100φ φφφφ φφφφ	“	“	E725 E726	“	L _{E16} = ((E724+E725)/2-2048*S-E695 +S/2) / S	“	“	“
	L _{E17}	532	“	“	“	1001 0000 0000 1001 1111 1111	1001 0000 000φ 10φφ φφφφ φφφφ	“	“	E727 E728	“	L _{E17} = ((E726+E727)/2-2304*S-E695 +S/2) / S	“	“	“
	L _{E18}	533	“	“	“	1010 0000 0000 1010 1111 1111	1010 0000 000φ 101φ φφφφ φφφφ	“	“	E729 E730	“	L _{E18} = ((E728+E729)/2-2560*S-E695 +S/2) / S	“	“	“
	L _{E19}	534	“	“	“	1011 0000 0000 1011 1111 1111	1011 0000 000φ 1φφφ φφφφ φφφφ	“	“	E731 E732	“	L _{E19} = ((E730+E731)/2-2816*S-E695 +S/2) / S	“	“	“
	L _{E20}	535	“	“	“	1100 0000 0000 1100 1111 1111	1100 0000 000φ 110φ φφφφ φφφφ	“	“	E733 E734	“	L _{E20} = ((E732+E733)/2-3072*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 V _{EE} (V)	1 V _{D^D} (V)				Pin	Value	Unit		Min	Max	
6 TA = -55°C	L _{E21}	536	+15.0 “	-15.0 “	+5.0 “	1101 0000 0000 1101 1111 1111	1101 0000 000φ 110φ φφφφ φφφφ	KA	13 “	E735 E736	“ “	L _{E21} = ((E734+E735)/2-3328*S-E695+S/2) / S	-1.0	1.0	LSB
	L _{E22}	537	“	“	“	1110 0000 0000 1110 1111 1111	1110 0000 000φ 111φ φφφφ φφφφ	“	“	E737 E738	“ “	L _{E22} = ((E736+E737)/2-3584*S-E695+S/2) / S	“	“	“
	L _{E23}	538	“	“	“	1111 0000 0000 1111 0111 1111	1111 0000 000φ 1111 φφφφ φφφφ	“	“	E739 E740	“ “	L _{E23} = ((E738+E739)/2-3840*S-E695+S/2) / S	“	“	“
	L _{E24}	539	“	“	“	1111 1000 0000 1111 1011 1111	1111 1000 000φ 1111 1φφφ φφφφ	“	“	E741 E742	“ “	L _{E24} = ((E740+E741)/2-3968*S-E695+S/2) / S	“	“	“
	L _{E25}	540	“	“	“	1111 1100 0000 1111 1101 1111	1111 1100 000φ 1111 11φφ φφφφ	“	“	E743 E744	“ “	L _{E25} = ((E742+E743)/2-4032*S-E695+S/2) / S	“	“	“
	L _{E26}	541	“	“	“	1111 1110 0000 1111 1110 1111	1111 1110 000φ 1111 111φ φφφφ	“	“	E745 E746	“ “	L _{E26} = ((E744+E745)/2-4064*S-E695+S/2) / S	“	“	“
	L _{E27}	542	“	“	“	1111 1111 0000 1111 1111 0111	1111 1111 000φ 1111 1111 φφφφ	“	“	E747 E748	“ “	L _{E27} = ((E746+E747)/2-4080*S-E695+S/2) / S	“	“	“
	L _{E28}	543	“	“	“	1111 1111 1000 1111 1111 1011	1111 1111 100φ 1111 1111 1φφφ	“	“	E749 E750	“ “	L _{E28} = ((E748+E749)/2-4088*S-E695+S/2) / S	“	“	“
	L _{E29}	544	“	“	“	1111 1111 1100 1111 1111 1101	1111 1111 110φ 1111 1111 110φ	“	“	E751 E752	“ “	L _{E29} = ((E750+E751)/2-4092*S-E695+S/2) / S	“	“	“
	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 0010 0000 0000 0100 0000 0000 1000 0000 0001 0000 0000 0010 0000 0000 0100 0000 0000 1000 0000 0001 0000 0000 0010 0000 0000	0000 0000 00φφ 0000 0000 001φ 0000 0000 010φ 0000 0000 100φ 0000 0001 000φ 0000 0010 000φ 0000 0100 000φ 0000 1000 000φ 0001 0000 000φ 0010 0000 000φ	KA	13 “	V	D _{LE1} = (E696-E695) / S D _{LE2} = (E697-E696) / S D _{LE3} = (E699-E698) / S D _{LE4} = (E701-E700) / S D _{LE5} = (E703-E702) / S D _{LE6} = (E705-E704) / S D _{LE7} = (E707-E706) / S D _{LE8} = (E709-E708) / S D _{LE9} = (E711-E710) / S D _{LE10} = (E713-E712) / S	-0.9	2.0	LSB	
	D _{LE2}	547	“	“	“								“	“	“
	D _{LE3}	548	“	“	“								“	“	“
	D _{LE4}	549	“	“	“								“	“	“
	D _{LE5}	550	“	“	“								“	“	“
	D _{LE6}	551	“	“	“								“	“	“
	D _{LE7}	552	“	“	“								“	“	“
	D _{LE8}	553	“	“	“								“	“	“
	D _{LE9}	554	“	“	“								“	“	“
	D _{LE10}	555	“	“	“								“	“	“

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	11	1				Pin	Value	Unit		Min	Max	
6 TA = -55°C	DLE11	556	+15.0	-15.0	+5.0	0011 0000 0000	0011 0000 0000φ	KA	13		V	DLE11 = (E715-E714) / S	-0.9	2.0	LSB
	DLE12	557	"	"	"	0100 0000 0000	0100 0000 0000φ	"	"		"	DLE12 = (E717-E716) / S	"	"	"
	DLE13	558	"	"	"	0101 0000 0000	0101 0000 0000φ	"	"		"	DLE13 = (E719-E718) / S	"	"	"
	DLE14	559	"	"	"	0110 0000 0000	0110 0000 0000φ	"	"		"	DLE14 = (E721-E720) / S	"	"	"
	DLE15	560	"	"	"	0111 0000 0000	0111 0000 0000φ	"	"		"	DLE15 = (E723-E722) / S	"	"	"
	DLE16	561	"	"	"	1000 0000 0000	1000 0000 0000φ	"	"		"	DLE16 = (E725-E724) / S	"	"	"
	DLE17	562	"	"	"	1001 0000 0000	1001 0000 0000φ	"	"		"	DLE17 = (E727-E726) / S	"	"	"
	DLE18	563	"	"	"	1010 0000 0000	1010 0000 0000φ	"	"		"	DLE18 = (E729-E728) / S	"	"	"
	DLE19	564	"	"	"	1011 0000 0000	1011 0000 0000φ	"	"		"	DLE19 = (E731-E730) / S	"	"	"
	DLE20	565	"	"	"	1100 0000 0000	1100 0000 0000φ	"	"		"	DLE20 = (E733-E732) / S	"	"	"
	DLE21	566	"	"	"	1101 0000 0000	1101 0000 0000φ	"	"		"	DLE21 = (E735-E734) / S	"	"	"
	DLE22	567	"	"	"	1110 0000 0000	1110 0000 0000φ	"	"		"	DLE22 = (E737-E736) / S	"	"	"
	DLE23	568	"	"	"	1111 0000 0000	1111 0000 0000φ	"	"		"	DLE23 = (E739-E738) / S	"	"	"
	DLE24	569	"	"	"	1111 1000 0000	1111 1000 0000φ	"	"		"	DLE24 = (E741-E740) / S	"	"	"
	DLE25	570	"	"	"	1111 1100 0000	1111 1100 0000φ	"	"		"	DLE25 = (E743-E742) / S	"	"	"
	DLE26	571	"	"	"	1111 1110 0000	1111 1110 0000φ	"	"		"	DLE26 = (E745-E744) / S	"	"	"
	DLE27	572	"	"	"	1111 1111 0000	1111 1111 0000φ	"	"		"	DLE27 = (E747-E746) / S	"	"	"
	DLE28	573	"	"	"	1111 1111 1000	1111 1111 1000φ	"	"		"	DLE28 = (E749-E748) / S	"	"	"
	DLE29	574	"	"	"	1111 1111 1100	1111 1111 1100φ	"	"		"	DLE29 = (E751-E750) / S	"	"	"
	DLE30	575	"	"	"	1111 1111 1110	1111 1111 1110φ	"	"		"	DLE30 = (E753-E752) / S	"	"	"
	MCC	576	+15.0	-15.0	+5.0	$V_{IN(a)} = \text{Max}(-)$ through Max(+)	0000 0000 0000 through 1111 1111 1111					MCC = 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)			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 V _{EE} (V)	1 V _{D^D} (V)				Pin	Value	Unit		Min	Max		
7 T _A = +25°C		577	+15.0	-15.0	+5.0	1111 1111 1110 0000 0000 0000	29 <-----> 40 MSB <-----> LSB	29 <-----> 16 MSB <-----> LSB		KA	13	E754	V			
		578	"	"	"	0000 0000 0000 0000 0000 0000			"	"	E755	"				
		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 $S = (E754-E755) / 4094$														
		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)----> KA 13 E756 V $L_{Emp} = (E756+E757) / 2-N1*S-E755+S / 2) / S$ All device types												0	+0.5	LSB
4		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)----> KA 13 E758 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)			Applied digital code-word	DUT digital output code-word	Active relays	Measurement sense lines ref. pin 9			Equations and notes	Limits		Units	
			7 V _{CC} (V)	11 V _{EE} (V)	1 V _{D^D} (V)				Pin	Value	Unit		Min	Max		
8 T _A = +125°C			581 582	+15.0 “	-15.0 “	+5.0 “	1111 1111 1110 0000 0000 0000	1111 1111 1110 0000 0000 0000	KA “	13 “	E760 E761	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 $S = (E760-E761) / 4094$			
			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
4			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)			Applied digital code-word	DUT digital output code-word	Active relays	Measurement sense lines ref. pin 9			Equations and notes	Limits		Units
			7 V _{CC} (V)	11 V _{EE} (V)	1 V _{D^D} (V)				Pin	Value	Unit		Min	Max	
8 T _A = -55°C		585	+15.0	-15.0	+5.0	1111 1111 1110 0000 0000 0000	1111 1111 1110 0000 0000 0000	KA “	13 “	E766 E767	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 $S = (E760-E761) / 4094$			
		586	“	“	“										
		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 _{Em^p}	587 “	+15.0 “	-15.0 “	+5.0 “	<----(N1-1)----> <----(N)---->	<----(N-1)----> <----(N-1)---->	KA “	13 “	E768 E769	V “	L _{Em^p} = (E768+E769) / 2-N1*S-E767+S / 2) / S All device types	0	+1.0
50		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
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
		590	"	"	"	"	0000 00000 0000	27	t8	"	t _{DD1} = t8	Device types 01,02,03,04	200	"	"
	t _{DD}	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	"	"
	t _{HD}	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	"	"	"
		596	"	"	"	Max (-)	0000 00000 0000	27	t14	"	t _{HD1} = t14	All device types	25	250	"
	t _{HD}	597	"	"	"	"	" " "	22	t15	"	t _{HD2} = t15	Data valid, referenced to CE high to low transition	"	"	"
		598	"	"	"	"	" " "	16	t16	"	t _{HD3} = t16	"	"	"	"
		599	"	"	"	Max (+)	1111 1111 1111	27	t17	"	t _{HD4} = t17	All device types	"	"	"
51	t _{HS}	600	"	"	"	"	" " "	22	t18	"	t _{HD5} = t18	Data valid, referenced to CE high to low transition	"	"	"
		601	"	"	"	"	" " "	16	t19	"	t _{HD6} = t19	"	"	"	"
		602	"	"	"	Max (-)	0000 00000 0000	27	t20	"	t _{HS1} = t20	Device types 01,02,03,04	300	1000	"
	t _{HS}	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	"
	t _{HS}	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)	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 _{HL}	608	+15.0	-15.0	+5.0	Max (-)	0000 00000 0000	27	t26	ns	t _{HL1} = t26	Device types 01,02	100	ns	
		609	"	"	"	"	" " "	22	t27	"	t _{HL2} = t27	Device types 03,04,05,06	150	"	
		610	"	"	"	"	" " "	16	t28	"	t _{HL3} = t28	Hi-Z delay, referenced to CE high to low transition	"	"	
		611	"	"	"	Max (+)	1111 1111 1111	27	t29	"	t _{HL4} = t29	Device types 01,02	100	"	
		612	"	"	"	"	" " "	22	t30	"	t _{HL5} = t30	Device types 03,04,05,06	150	"	
		613	"	"	"	"	" " "	16	t31	"	t _{HL6} = t31	Hi-Z delay, referenced to 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/ C̄ high to low transition	600	"	
		615	"	"	"	Max (-)	0000 00000 0000	27	t33	"	t _{DDR1} = t33	All device types	250	"	
		616	"	"	"	"	" " "	22	t34	"	t _{DDR2} = t34	Data valid, referenced to R/ C̄	"	"	
		617	"	"	"	"	" " "	16	t35	"	t _{DDR3} = t35	low to high transition	"	"	
		618	"	"	"	Max (+)	1111 1111 1111	27	t36	"	t _{DDR4} = t36	All device types	"	"	
	t _{HDR}	619	"	"	"	"	" " "	22	t37	"	t _{DDR5} = t37	Data valid, referenced to R/ C̄	"	"	
		620	"	"	"	"	" " "	16	t38	"	t _{DDR6} = t38	low to high transition	"	"	
		621	"	"	"	Max (-)	0000 00000 0000	27	t39	"	t _{HDR1} = t39	All device types	25	"	
		622	"	"	"	"	" " "	22	t40	"	t _{HDR2} = t40	Data valid, referenced to R/ C̄	"	"	
		623	"	"	"	"	" " "	16	t41	"	t _{HDR3} = t41	high to low transition	"	"	
	t _{HDR}	624	"	"	"	Max (+)	1111 1111 1111	27	t42	"	t _{HDR4} = t42	All device types	"	"	
		625	"	"	"	"	" " "	22	t43	"	t _{HDR5} = t43	Data valid, referenced to R/ C̄	"	"	
		626	"	"	"	"	" " "	16	t44	"	t _{HDR6} = t44	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)				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	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	
		628	"	"	"	Max (+)	1111 1111 1111	27	I128	"	Iosc1 = I128 All device types	-40	"	mA	
	Iosc	629	"	"	"	"	" " "	22	I129	"	Iosc2 = I129 Measured separately	"	"	"	
		630	"	"	"	"	" " "	16	I130	"	Iosc3 = I130 to ground	"	"	"	
		631	"	"	"	"	" " "	28	I131	"	Iosc4 = I131 (Output = logic "1")	"	"	"	
		632	"	"	"	Max (-)	0000 0000 0000	27	I132	"	Iosc5 = I132 All device types		75	mA	
		633	"	"	"	"	" " "	22	I133	"	Iosc6 = I133 Measured separately	"	"	"	
		634	"	"	"	"	" " "	16	I134	"	Iosc7 = I134 to V _{LOG}	"	"	"	
		635	"	"	"	"	" " "	28	I135	"	Iosc8 = 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)				Applied digital code-word		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)	29 <-----> 40 MSB <-----> LSB	27 <-----> 16 MSB <-----> LSB	Pin	Value	Unit					Min	Max	
9 T _A = 25°C	NT	636	+15.0	-15.0	+5.0	0111 1111 1111 1111 1111 1110	φφφφ φφφφ φφφφ 1111 1111 1111φ	13	E772	V	NT1 = E772 NT2 = E773	Range = 16% to 84% All device types		-0.5 -0.5	0.5 0.5	LSB 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
$\Delta A_E / \Delta T$	Gain error drift with respect to temperature
$\Delta B_Z / \Delta T$	Bipolar zero drift
DLE	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.
MCC	Missing code check
MSB	Most significant bit
NT	Transition uncertainty due to all sources (for example, noise, settling time, etc.)
P_d	Power dissipation
P_{SS}	Power supply sensitivity

Symbol	Description
R / C	Read and convert, not
R _i	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 _{DSC}	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 last significant bit is the bit in the output code that carries the least weight. The value of the least significant bit is the average difference between the analog input voltages at two adjacent output bit transitions. The ideal difference voltage is the value of the full scale range divided by 1024.

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

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

6.6 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

Preparing activity:
 DLA - CC
 Project 5962-2061

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

