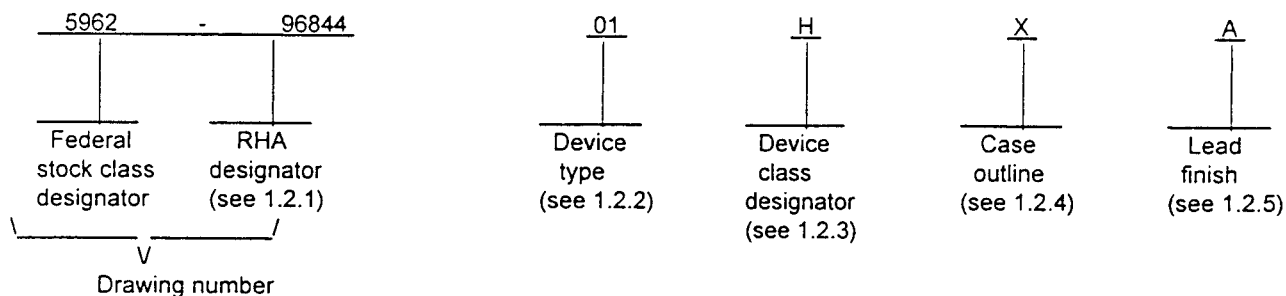


DESC FORM 193
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DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited.

1. SCOPE

1.1 Scope. This drawing documents two product assurance classes, high reliability (device class H) and space application (device class K) and a choice of case outlines and lead finishes are available and are reflected in the Part or Identifying Number (PIN). When available, a choice of radiation hardness assurance levels are reflected in the PIN.

1.2 PIN. The PIN shall be as shown in the following example:



1.2.1 Radiation hardness assurance (RHA) designator. Device classes H and K RHA marked devices shall meet the MIL-PRF-38534 specified RHA levels and shall be marked with the appropriate RHA designator. A dash (-) indicates a non-RHA device.

1.2.2 Device type(s). The device type(s) shall identify the circuit function as follows:

Device type	Generic number	Circuit function	Accuracy (± 1.0 LSB)
01	SD-14591X2-112	90 V, 400 Hz, S/D converter, 14-Bit	5.2 minute
02	SD-14591X2-114	90 V, 400 Hz, S/D converter, 14-Bit	2.6 minute
03	SD-14591X3-112	90 V, 60 Hz, S/D converter, 14-Bit	5.2 minute
04	SD-14591X3-114	90 V, 60 Hz, S/D converter, 14-Bit	2.6 minute
05	SD-14592X2-112	90 V, 400 Hz, S/D converter, 16-Bit	5.2 minute
06	SD-14592X2-114	90 V, 400 Hz, S/D converter, 16-Bit	2.6 minute
07	SD-14592X2-115	90 V, 400 Hz, S/D converter, 16-Bit	1.3 minute
08	SD-14592X3-112	90 V, 60 Hz, S/D converter, 16-Bit	5.2 minute
09	SD-14592X3-114	90 V, 60 Hz, S/D converter, 16-Bit	2.6 minute
10	SD-14592X3-115	90 V, 60 Hz, S/D converter, 16-Bit	1.3 minute

1.2.3 Device class designator. This device class designator shall be a single letter identifying the product assurance level as follows:

Device class

H or K

Device performance documentation

Certification and qualification to MIL-PRF-38534

1.2.4 Case outline(s). The case outline(s) shall be as designated in MIL-STD-1835 and as follows:

Outline letter	Descriptive designator	Terminals	Package style
X	See figure 1	36	Dual-in-line
Y	See figure 1	36	Flat pack

1.2.5 Lead finish. The lead finish shall be as specified in MIL-PRF-38534 for classes H and K.

STANDARD
MICROCIRCUIT DRAWING
DEFENSE ELECTRONICS SUPPLY CENTER
DAYTON, OHIO 45444

SIZE
A

REVISION LEVEL

5962-96844

SHEET

2

1.3 Absolute maximum ratings. 1/

Positive supply voltage (V_{CC})	+18 V dc
Logic supply voltage (V_{DD})	+7.0 V dc
Reference input voltage	130 V rms
Digital input voltage range	-0.3 V dc to +7.0 V dc
Power dissipation, $T_C = +125^\circ\text{C}$ (P_D)	720 mW
Storage temperature range	-65°C to +150°C
Lead temperature (soldering, 10 seconds)	+300°C
Thermal resistance, junction-to-case (θ_{JC})	8.0°C/W
Thermal resistance, junction-to-ambient (θ_{JA})	20°C/W

1.4 Recommended operating conditions.

Positive supply voltage range (V_{CC})	+14.25 V dc to +15.75 V dc
Logic supply voltage range (V_{DD})	+4.5 V dc to +5.5 V dc
Case operating temperature range (T_C)	-55°C to +125°C

2. APPLICABLE DOCUMENTS

2.1 Government specification, standards, and handbook. The following specification, standards, and handbook form a part of this drawing to the extent specified herein. Unless otherwise specified, the issues of these documents are those listed in the issue of the Department of Defense Index of Specifications and Standards (DoDISS) and supplement thereto, cited in the solicitation.

SPECIFICATION

DEPARTMENT OF DEFENSE

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

STANDARDS

DEPARTMENT OF DEFENSE

MIL-STD-883 - Test Methods and Procedures for Microelectronics.
MIL-STD-973 - Configuration Management.
MIL-STD-1835 - Microcircuit Case Outlines.

HANDBOOK

DEPARTMENT OF DEFENSE

MIL-HDBK-780 - Standard Microcircuit Drawings.

(Unless otherwise indicated, copies of the specification, standards, and handbook are available from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.)

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

1/ Stresses above the absolute maximum rating may cause permanent damage to the device. Extended operation at the maximum levels may degrade performance and affect reliability.

STANDARD MICROCIRCUIT DRAWING DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444	SIZE A		5962-96844
		REVISION LEVEL	SHEET 3

3. REQUIREMENTS

3.1 Item requirements. The individual item performance requirements for device classes H and K shall be in accordance with MIL-PRF-38534 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.

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

3.2.1 Case outline(s). The case outline(s) shall be in accordance with 1.2.4 herein and figure 1.

3.2.2 Terminal connections. The terminal connections shall be as specified on figure 2.

3.2.3 Timing diagrams(s). The timing diagram(s) shall be as specified on figure 3.

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

3.4 Electrical test requirements. The electrical test requirements shall be the subgroups specified in table II. The electrical tests for each subgroup are defined in table I.

3.5 Marking of Device(s). Marking of device(s) shall be in accordance with MIL-PRF-38534. The device shall be marked with the PIN listed in 1.2 herein. In addition, the manufacturer's vendor similar PIN may also be marked as listed in QML-38534.

3.6 Data. In addition to the general performance requirements of MIL-PRF-38534, the manufacturer of the device described herein shall maintain the electrical test data (variables format) from the initial quality conformance inspection group A lot sample, for each device type listed herein. Also, the data should include a summary of all parameters manually tested, and for those which, if any, are guaranteed. This data shall be maintained under document revision level control by the manufacturer and be made available to the preparing activity (DESC-EL) upon request.

3.7 Certificate of compliance. A certificate of compliance shall be required from a manufacturer in order to supply to this drawing. The certificate of compliance (original copy) submitted to DESC-EL shall affirm that the manufacturer's product meets the performance requirements of MIL-PRF-38534 and herein.

3.8 Certificate of conformance. A certificate of conformance as required in MIL-PRF-38534 shall be provided with each lot of microcircuits delivered to this drawing.

4. QUALITY ASSURANCE PROVISIONS

4.1 Sampling and inspection. Sampling and inspection procedures shall be in accordance with MIL-PRF-38534 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. .

STANDARD MICROCIRCUIT DRAWING DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444	SIZE A		5962-96844
		REVISION LEVEL	SHEET 1

TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions <u>1/</u> $-55^{\circ}\text{C} \leq T_C \leq +125^{\circ}\text{C}$ unless otherwise specified	Group A subgroups	Device type	Limits		Unit
					Min	Max	
Differential linearity	DL	<u>2/</u>	7,8A,8B	All	-1.0	+1.0	LSB
Accuracy repeatability	AR	<u>2/</u>	7,8A,8B	All	-1.0	+1.0	LSB
Output accuracy	AOUT	<u>3/</u>	4,5,6	01,03, 05,08	-5.2	+5.2	LSB
				02,04, 06,09	-2.6	+2.6	
				07,10	-1.3	+1.3	
Reference synthesizer <u>2/</u>	RS	Reference phase shift between the converter signal and reference inputs	4,5,6	All	-45	+45	Degree
Reference input impedance <u>2/</u>	Z _{IN1}	Single ended	4,5,6	All	100		kΩ
		Differential	4,5,6	All	250		
Reference input common mode range <u>2/</u>	CMR ₁		4,5,6	All	-210	+210	V _{pk}
Signal input impedance <u>2/</u>	Z _{IN2}	Single ended <u>4/</u>	4,5,6	All	85		kΩ
		Differential <u>4/</u>		All	130		
Signal input mode range <u>2/</u>	CMR ₂	<u>4/</u>	4,5,6	All	-25	+25	V

See footnotes at end of table.

STANDARD
MICROCIRCUIT DRAWING
DEFENSE ELECTRONICS SUPPLY CENTER
DAYTON, OHIO 45444

SIZE
A

5962-96844

REVISION LEVEL

SHEET

3

TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions <u>1/</u> -55°C ≤ T _C ≤ +125°C unless otherwise specified	Group A subgroups	Device type	Limits		Unit
					Min	Max	
Digital output low <u>5/</u> voltage	V _{OL}	I _{OL} = -1.6 mA, output bits 1 through 16, and BIT	1,2,3	All		0.4	V
Digital output high <u>5/</u> voltage	V _{OH}	I _{OH} = -400 μA, output bits 1 through 16, and BIT	1,2,3	All	2.8		V
Output leakage current (high impedance) <u>2/ 5/</u>	I _Z	Output bits 1 through 16	1,2,3	All	-10	+10	μA
Digital output delay, converter busy	t _{CB}	Positive pulse, see figure 3	7,8A,8B	All	0.4	2.0	μs
Digital output error detection <u>5/</u> (built-in-test)	BIT	Logic 1 indicates fault, minimum error for bit condition	7,8A,8B	All	20	100	LSB
Analog output error <u>2/</u>	e _{OUT}	14-bit mode	7,8A,8B	01-04	5.3	7.3	mV rms /LSB
		16-bit mode		05-10	2.6	3.6	
Analog output offset voltage	V _{OS}	V _{OUT} at zero speed <u>6/</u>	4,5,6	All	-35	+35	mV
Analog output positive linearity error <u>7/</u>	EUP	<u>6/</u>	4,5,6	All		2.0	%
Analog output negative linearity error <u>7/</u>	EUN	<u>6/</u>	4,5,6	All		2.0	%
Analog output reversal error	EB	Difference between positive and negative linearity <u>6/</u>	4,5,6	All		2.0	%
Bias voltage	V _{BIAS}		4,5,6	All	1/3 V _{CC} , ±10%		V dc

See footnotes at end of table.

STANDARD
MICROCIRCUIT DRAWING
DEFENSE ELECTRONICS SUPPLY CENTER
DAYTON, OHIO 45444

SIZE
A

5962-96844

REVISION LEVEL

SHEET

3

TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions ^{1/} -55°C ≤ T _C ≤ +125°C unless otherwise specified	Group A subgroups	Device type	Limits		Unit
					Min	Max	
Analog output scale factor	SF	Slope of the linearity ^{6/} ^{8/} line	4,5,6	All		15	%
Digital input high voltage	V _{IH}	$\overline{\text{INH}}$, $\overline{\text{EL}}$, $\overline{\text{EM}}$, and digital output bits	7,8A,8B	All	2.4		V
Digital input low voltage	V _{IL}		7,8A,8B	All		0.8	V
Inhibit ($\overline{\text{INH}}$) voltage	V _{INH}	No digital angles change while INH is logic 0	7,8A,8B	All		0.8	V
Enable voltage ^{5/}	V _E	16-bit mode, $\overline{\text{EM}}$ controls output bits 1 through 8 and EL controls output bits 9 through 16.	7,8A,8B	All		0.8	V
Disable voltage ^{5/} (high impedance)	V _D	14-bit mode, $\overline{\text{EM}}$ controls output bits 1 through 6 and EL controls output bits 7 through 14.	7,8A,8B	All	2.0		V
Positive supply current	I _{CC}	V _{CC} = +15.75 V	1,2,3	All		25	mA
Logic supply current	I _{DD}	V _{DD} = +5.5 V	1,2,3	All		10	mA
Bandwidth	BW		7,8A,8B	01, 02, 05 - 07	9.8	18.2	Hz
				03, 04, 08 - 10	38	70	

^{1/} V_{CC} = +15.0 V dc and V_{DD} = +5.0 V dc.

^{2/} Guaranteed by design, but not tested. Parameter shall be guaranteed to limits specified in table I for all lots not specifically tested.

^{3/} Output accuracy is measured at angles from 0° to 180°, in 15° increments, and at 225°, 270°, and 315°.

^{4/} Signal input voltage shall be 81 V_{rms} to 99 V_{rms}.

^{5/} These parameters are tested on a go-no-go basis only or in conjunction with other measured parameters and are not directly testable.

^{6/} Velocity data is measured at multiples of ±32/32, ±24/32, ±16/32, ±8/32, and ±0 of the rated full speed. 400 Hz, 14-bit at 10 rps and 16-bit at 2.5 rps. 60 Hz, 14-bit at 2.5 rps and 16-bit at 0.61 rps.

^{7/} Analog output linearity error is defined as the best straight line from zero speed, to either positive or negative direction as applicable, that yields the lowest peak error readings.

^{8/} Velocity output scaling: 400 Hz, 16-bit at 0.71 rps/volt and 14-bit at 2.8 rps/volt. 60 Hz, 16-bit at 0.17 rps/volt and 14-bit at 0.71 rps/volt. (Referenced V (analog ground) approximately equals 1/3 of V_{CC}).

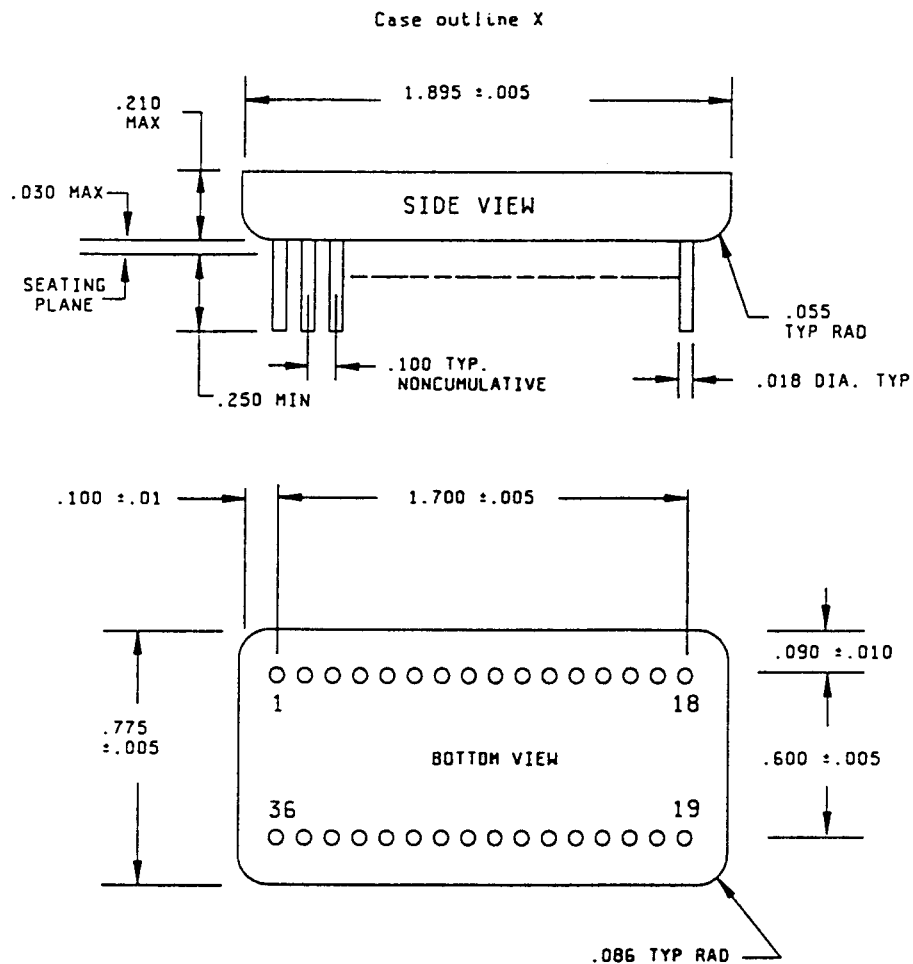
STANDARD
MICROCIRCUIT DRAWING
DEFENSE ELECTRONICS SUPPLY CENTER
DAYTON, OHIO 45444

SIZE
A

5962-96844

REVISION LEVEL

SHEET



Inches	mm	Inches	mm
.002	0.05	.100	2.54
.005	0.13	.210	5.33
.010	0.25	.250	6.35
.018	0.46	.600	15.24
.030	0.76	.775	19.69
.055	1.40	1.700	43.18
.086	2.18	1.895	48.13
.090	2.29		

NOTES:

1. Dot on package lid indicates pin 1.
2. Dimensions are in inches.
3. Metric equivalents are given for information only.
4. Lead identification numbers are for reference only.
5. Lead spacing dimensions apply only at seating plane.

FIGURE 1. Case outlines.

STANDARD
MICROCIRCUIT DRAWING
DEFENSE ELECTRONICS SUPPLY CENTER
DAYTON, OHIO 45444

SIZE
A

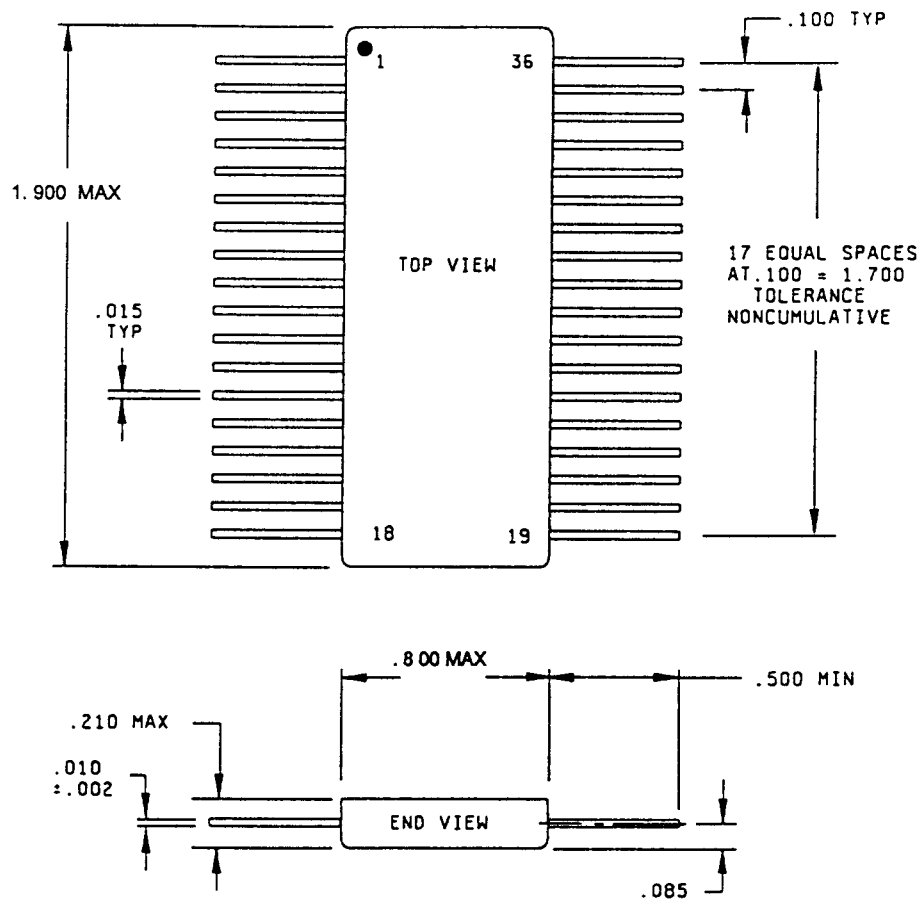
5962-96844

REVISION LEVEL

SHEET

3

Case outline Y



Inches	mm	Inches	mm
.002	0.05	.100	2.52
.010	0.25	.210	5.33
.015	0.38	.500	12.70
.085	2.16	.800	20.32
.100	2.54	1.700	43.18
.210	5.33	1.900	48.26

NOTES:

1. Dimensions are in inches.
2. Metric equivalents are given for information only.
3. Unless otherwise specified, tolerance is ± 0.005 inch (0.13 mm).
4. Lead identification numbers are for reference only.

FIGURE 1. Case outlines - Continued.

STANDARD
MICROCIRCUIT DRAWING
DEFENSE ELECTRONICS SUPPLY CENTER
DAYTON, OHIO 45444

SIZE
A

REVISION LEVEL

5962-96844

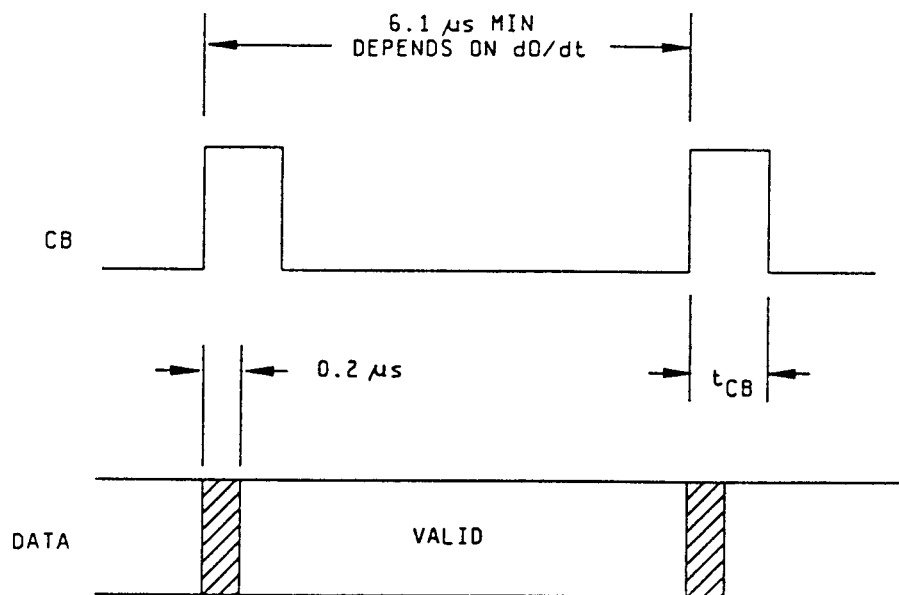
SHEET

9

Device types	All	Device types	All
Case outlines	X and Y	Case outlines	X and Y
Terminal number	Terminal symbol	Terminal number	Terminal symbol
1	S1(S)	19	RH
2	S2(S)	20	RL
3	S3(S)	21	BIT-15(16-BIT mode only)
4	No connection	22	BIT-16(LSB,16-BIT mode)
5	BIT-1 (MSB)	23	VEL
6	BIT-2	24	<u>CB</u>
7	BIT-3	25	<u>EL</u>
8	BIT-4	26	EM
9	BIT-5	27	e
10	BIT-6	28	+5 V or (V_{DD})
11	BIT-7	29	<u>GROUND</u>
12	BIT-8	30	BIT
13	BIT-9	31	No connection
14	BIT-10	32	+15 V or (V_{CC})
15	BIT-11	33	INH
16	BIT-12	34	V (analog ground)
17	BIT-13	35	No connection
18	BIT-14(LSB,14-BIT mode)	36	No connection

FIGURE 2. Terminal connections.

STANDARD MICROCIRCUIT DRAWING DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444	SIZE A		5962-96844
		REVISION LEVEL	SHEET 10



CONVERTER BUSY, (CB).

FIGURE 3. Timing diagram(s).

TABLE II. Electrical test requirements.

STANDARD MICROCIRCUIT DRAWING DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444	SIZE A		5962-96844
		REVISION LEVEL	SHEET 11

MIL-PRF-38534 test requirements	Subgroups (in accordance with MIL-PRF-38534, group A test table)
Interim electrical parameters	1,4,7
Final electrical test parameters	1*,2,3,4,5,6,7,8A,8B
Group A test requirements	1,2,3,4,5,6,7,8A,8B
Group C end-point electrical parameters	1,2,3,4,7
MIL-STD-883, group E end-point electrical parameters for RHA devices	Subgroups ** (in accordance with method 5005, group A test table)

* PDA applies to subgroup 1.

** When applicable to this standard microcircuit drawing,
the subgroups shall be defined.

4.2 Screening. Screening shall be in accordance with MIL-PRF-38534, and shall be conducted on all devices prior to conformance and periodic inspections. The following additional criteria shall apply:

a. Burn-in test, method 1015 of MIL-STD-883.

(1) Test condition A, B, C, or D. The test circuit shall be maintained by the manufacturer under document revision level control and shall be made available to either DESC-EL or the acquiring activity upon request. Also, 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.

(2) T_A as specified in accordance with table I of method 1015 of MIL-STD-883.

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

4.3 Conformance and periodic inspections. Conformance inspection (CI) and periodic inspection (PI) shall be in accordance with MIL-PRF-38534 and as specified herein.

4.3.1 Group A inspection (CI). Group A inspection shall be in accordance with MIL-PRF-38534 and as follows:

STANDARD MICROCIRCUIT DRAWING DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444	SIZE A		5962-96844
		REVISION LEVEL	SHEET 12

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

b. Subgroups 9, 10, and 11 shall be omitted.

4.3.2 Group B inspection (PI). Group B inspection shall be in accordance with MIL-PRF-38534.

4.3.3 Group C inspection (PI). Group C inspection shall be in accordance with MIL-PRF-38534 and as follows:

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

b. Steady-state life test, method 1005 of MIL-STD-883.

(1) Test condition A, B, C, or D. The test circuit shall be maintained by the manufacturer under document revision level control and shall be made available to either DESC-EL or the acquiring activity upon request. Also, 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.

(2) T_A as specified in accordance with table I of method 1005 of MIL-STD-883.

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

4.3.4 Group D inspection (PI). Group D inspection shall be in accordance with MIL-PRF-38534.

4.3.5 Group E inspection. Group E inspection is required only for parts intended to be marked as radiation hardness assured (see 3.5 herein). RHA levels for device classes H and K shall be M, D, R, and H. RHA quality conformance inspection sample tests shall be performed at the RHA level specified in the acquisition document.

a. RHA tests for device classes H and K for levels M, D, R, and H shall be performed through each level to determine at what levels the devices meet the RHA requirements. These RHA tests shall be performed for initial qualification and after design or process changes which may affect the RHA performance of the device.

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

c. Prior to total dose irradiation, each selected sample shall be assembled in its qualified package. It shall pass the specified group A electrical parameters in table I for subgroups specified in table II herein.

d. For device classes H and K, the devices shall be subjected to radiation hardness assured tests as specified in MIL-PRF-38534 for RHA level being tested, and meet the postirradiation end-point electrical parameter limits as defined in table I at $T_A = +25^\circ\text{C} \pm 5$ percent, after exposure.

e. Prior to and during total dose irradiation testing, the devices shall be biased to establish a worst case condition as specified in the radiation exposure circuit.

f. For device classes H and K, subgroups 1 and 2 in table V, method 5005 of MIL-STD-883 shall be tested as appropriate for device construction.

g. When specified in the purchase order or contract, a copy of the RHA delta limits shall be supplied.

5. PACKAGING

STANDARD MICROCIRCUIT DRAWING DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444	SIZE A		5962-96844
		REVISION LEVEL	SHEET 13

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

6. NOTES

6.1 Intended use. Microcircuits conforming to this drawing are intended for use for Government microcircuit applications (original equipment), design applications, and logistics purposes.

6.2 Replaceability. Microcircuits covered by this drawing will replace the same generic device covered by a contractor-prepared specification or drawing.

6.3 Configuration control of SMD's. All proposed changes to existing SMD's will be coordinated with the users of record for the individual documents. This coordination will be accomplished in accordance with MIL-STD-973 using DD Form 1692, Engineering Change Proposal.

6.4 Record of users. Military and industrial users shall inform Defense Electronics Supply Center when a system application requires configuration control and the applicable SMD. DESC will maintain a record of users and this list will be used for coordination and distribution of changes to the drawings. Users of drawings covering microelectronic devices (FSC 5962) should contact DESC-EL, telephone (513) 296-6047.

6.5 Comments. Comments on this drawing should be directed to DESC-EL, Dayton, Ohio 45444, or telephone (513) 296-5373.

6.6 Sources of supply for device classes H and K. Sources of supply for device classes H and K are listed in QML-38534. The vendors listed in QML-38534 have submitted a certificate of compliance (see 3.7 herein) to DESC-EL and have agreed to this drawing.

STANDARD MICROCIRCUIT DRAWING DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444	SIZE A		5962-96844
		REVISION LEVEL	SHEET 14

STANDARD MICROCIRCUIT DRAWING SOURCE APPROVAL BULLETIN

DATE: 96-05-29

Approved sources of supply for SMD 5962-96844 are listed below for immediate acquisition only and shall be added to QML-38534 during the next revision. QML-38534 will be revised to include the addition or deletion of sources. The vendors listed below have agreed to this drawing and a certificate of compliance has been submitted to and accepted by DESC-EL. This bulletin is superseded by the next dated revision of QML-38534.

Standard microcircuit drawing PIN <u>1/</u>	Vendor CAGE number	Vendor similar PIN <u>2/</u>
5962-9684401HXA	19645	SD-14591D2-142
5962-9684401HXC	19645	SD-14591D2-112
5962-9684401HYA	19645	SD-14591F2-142
5962-9684401HYC	19645	SD-14591F2-112
5962-9684402HXA	19645	SD-14591D2-144
5962-9684402HXC	19645	SD-14591D2-114
5962-9684402HYA	19645	SD-14591F2-144
5962-9684402HYC	19645	SD-14591F2-114
5962-9684403HXA	19645	SD-14591D3-142
5962-9684403HXC	19645	SD-14591D3-112
5962-9684403HYA	19645	SD-14591F3-142
5962-9684403HYC	19645	SD-14591F3-112
5962-9684404HXA	19645	SD-14591D3-144
5962-9684404HXC	19645	SD-14591D3-114
5962-9684404HYA	19645	SD-14591F3-144
5962-9684404HYC	19645	SD-14591F3-114
5962-9684405HXA	19645	SD-14592D2-142
5962-9684405HXC	19645	SD-14592D2-112
5962-9684405HYA	19645	SD-14592F2-142
5962-9684405HYC	19645	SD-14592F2-112
5962-9684406HXA	19645	SD-14592D2-144
5962-9684406HXC	19645	SD-14592D2-114
5962-9684406HYA	19645	SD-14592F2-144
5962-9684406HYC	19645	SD-14592F2-114
5962-9684407HXA	19645	SD-14592D2-145
5962-9684407HXC	19645	SD-14592D2-115
5962-9684407HYA	19645	SD-14592F2-145
5962-9684407HYC	19645	SD-14592F2-115

- 1/ The lead finish shown for each PIN representing a hermetic package is the most readily available from the manufacturer listed for that part. The device manufacturers listed herein are authorized to supply alternate lead finishes "A", "B", or "C" at their discretion. Contact the listed approved source of supply for further information.
- 2/ Caution. Do not use this number for item acquisition. Items acquired to this number may not satisfy the performance requirements of this drawing.

STANDARD MICROCIRCUIT DRAWING SOURCE APPROVAL BULLETIN - CONTINUED.

DATE: 96-05-29

Standard microcircuit drawing PIN <u>1/</u>	Vendor CAGE number	Vendor similar PIN <u>2/</u>
5962-9684408HXA	19645	SD-14592D3-142
5962-9684408HXC	19645	SD-14592D3-112
5962-9684408HYA	19645	SD-14592F3-142
5962-9684408HYC	19645	SD-14592F3-112
5962-9684409HXA	19645	SD-14592D3-144
5962-9684409HXC	19645	SD-14592D3-114
5962-9684409HYA	19645	SD-14592F3-144
5962-9684409HYC	19645	SD-14592F3-114
5962-9684410HXA	19645	SD-14592D3-145
5962-9684410HXC	19645	SD-14592D3-115
5962-9684410HYA	19645	SD-14592F3-145
5962-9684410HYC	19645	SD-14592F3-115

- 1/ The lead finish shown for each PIN representing a hermetic package is the most readily available from the manufacturer listed for that part. The device manufacturers listed herein are authorized to supply alternate lead finishes "A", "B", or "C" at their discretion. Contact the listed approved source of supply for further information.
- 2/ Caution. Do not use this number for item acquisition. Items acquired to this number may not satisfy the performance requirements of this drawing.

Vendor CAGE
numberVendor name
and address

19645

ILC Data Device Corporation
105 Wilbur Place
Bohemia, NY 11716-2482

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