REVISIONS			
LTR	DESCRIPTION	DATE (YR-MO-DA)	APPROVED
B	Added case outline Y. Table I; changed the max limt for the Differential voltage range (V_{IDR}) from ±4 V peak to ±10 V peak per NOR 5962-R026-96. Redrew entire document. -sld	98-09-15	K.A. Cottongim

REV																			
SHEET																			
REV	B	B	B	B	B	B													
SHEET	15	16	17	18	19	20													

REV STATUS OF SHEETS																	
REV	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
SHEET	1	2	3	4	5	6	7	8	9	10	11	12	13	14			

PMIC N/A

STANDARD MICROCIRCUIT DRAWING

THIS DRAWING IS AVAILABLE FOR USE BY ALL DEPARTMENTS AND AGENCIES OF THE DEPARTMENT OF DEFENSE

AMSC N/A

PREPARED BY
Steve L. Duncan

CHECKED BY
Michael C. Jones

APPROVED BY
Kendall A. Cottongim

DRAWING APPROVAL DATE
95-10-13

REVISION LEVEL
B

DEFENSE SUPPLY CENTER COLUMBUS
COLUMBUS, OHIO 43216-5000

MICROCIRCUIT, HYBRID, LINEAR, MIL-STD-1553, DUAL CHANNEL, TRANSCEIVER, -15 VOLT AND +5 VOLT

SIZE	CAGE CODE	
A	**67268**	**5962-95505**

SHEET 1 OF 20

DSCC FORM 2233
APR 97

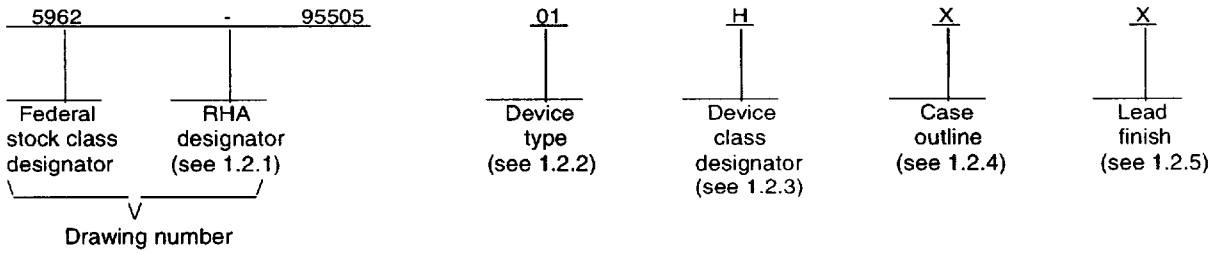
5962-E486-98

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

1. SCOPE

1.1 Scope. This drawing documents five product assurance classes, class D (lowest reliability), class E, (exceptions), class G (lowest high reliability), class H (high reliability), and class K, (highest reliability) 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
01	ARX4810	MIL-STD-1553, transceiver, dual channel

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

Device class	Device performance documentation
D, E, G, H, or K	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	22	Flat package
Y	See figure 1	22	Flat package

1.2.5 Lead finish. The lead finish shall be as specified in MIL-PRF-38534.

1.3 Absolute maximum ratings. 1/

Positive power supply voltage range (V_{CC})	-0.3 V to +5.5 V
Negative power supply (V_{EE})	-18 V maximum
Receiver differential input voltage	±10 V
Receiver input voltage (common mode)	±5 V
Driver peak output current	300 mA
Power dissipation (P_D), total package, $-55°C \le T_C \le +125°C$	4 W 2/
Maximum junction-to-case temperature rise for hottest device	6°C
Thermal resistance: Junction to bottom of case (Θ_{JC}), hottest device	3°C/W
Storage temperature range	-65°C to +150°C

1.4 Recommended operating conditions.

Positive supply voltage range (V_{CC})	+4.75 V to +5.5 V
Negative supply voltage range (V_{EE})	-12 V to -15 V
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 solitation.

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.
2/ Normal operating conditions require one transmitter on and the other off at any given time, with a maximum power dissipation of 3.2 watts.

3. REQUIREMENTS

3.1 Item requirements. The individual item performance requirements for device classes D, E, G, H, and K shall be in accordance with MIL-PRF-38534. Compliance with MIL-PRF-38534 may include the performance of all tests herein or as designated in the device manufacturer's Quality Management (QM) plan or as designated for the applicable device class. Therefore, the tests and inspections herein may not be performed for the applicable device class (see MIL-PRF-38534). Futhermore, the manufacturers may take exceptions or use alternate methods to the tests and inspections herein and not perform them. However, the performance requirements as defined in MIL-PRF-38534 shall be met for the appilcable device class.

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 Transmitter output waveform(s). The transmitter output waveform(s) shall be as specified on figure 3.

3.2.4 Transmitter output offset waveform(s). The transmitter output offset waveform(s) shall be as specified on figure 4.

3.2.5 Transformer connection and test circuit. The transformer connection and test circuit shall be as specified on figure 5.

3.2.6 Block diagram. The block diagram shall be as specified on figure 6.

3.2.7 Zero crossing deviation test circuit and voltage waveform. The zero crossing deviation test circuit and voltage waveform shall be as specified on figure 7.

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 (DSCC-VA) 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 DSCC-VA 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.

TABLE I. Electrical performance characteristics, Transmitter section.

Test	Symbol	Conditions 1/ $-55°C \le T_C \le +125°C$ unless otherwise specified	Group A subgroups	Device type	Limits		Unit
					Min	Max	
INPUT CHARACTERISTICS, TX DATA IN or TX $\overline{\text{DATA}}$ IN							
Input low current	I_{IL}	V_{IN} = 0.4 V	1,2,3	01		-0.4	mA
Input high current	I_{IH}	V_{IN} = 2.7 V	1,2,3	01		40	µA
Input low voltage	V_{IL}		1,2,3	01		0.7	V
Input high voltage	V_{IH}		1,2,3	01	2.0		V
INHIBIT CHARACTERISITICS							
Input low current	I_{IL}	V_{IN} = 0.4 V	1,2,3	01		-0.4	mA
Input high current	I_{IH}	V_{IN} = 2.7 V	1,2,3	01		40	µA
Input low voltage	V_{IL}		1,2,3	01		0.7	V
Input high voltage	V_{IH}		1,2,3	01	2.0		V
Delay from TX inhibit, (0 to 1) to inhibited output	t_{DXOFF}	2/	9,10,11	01		350	ns
Delay from TX inhibit, (1 to 0) to active output	t_{DXON}	2/	9,10,11	01		350	ns
Differential output noise, inhibit mode	V_{NOI}		4,5,6	01		10	mV p-p
Differential output impedance (inhibited)	Z_{OI}	3/	4,5,6	01	7		kΩ
OUTPUT CHARACTERISITICS							
Differential output level	V_O	R_L = 35Ω	1,2,3	01	6	7.7	V p-p
Rise and fall times 10% to 90% of p-p output	t_R, t_F		9,10,11	01	220	300	ns
Output offset at point A-A' on figure 5, 2.5 µs after midpoint crossing of the parity bit of the last word of a 660 µs message	V_{OS}	R_L = 35Ω	4,5,6	01		±90	mV peak

See footnotes at end of table.

TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions 1/ $-55°C \le T_C \le +125°C$ unless otherwise specified	Group A subgroups	Device type	Limits		Unit
					Min	Max	
OUTPUT CHARACTERISTICS - continued.							
Delay from 50% point of TX DATA or TX DATA input to zero crossing of differential signal	t_{DTX}	2/	9,10,11	01		350	ns
Command, positive sync pulse width measured from the +0.28 V on the positive going edge to the -0.28 V after the zero crossing on the negative going edge. (see figure 3)	TSPW		9,10,11	01	1.475	1.575	µs
RECEIVER SECTION							
Differential input impedance	Z_{IN}	f = 1 MHz	4,5,6	01	20		kΩ
Differential voltage range	V_{IDR}		4,5,6	01		±10	V peak
Input common mode voltage range	V_{ICMR}	2/	4,5,6	01	±2.5		V peak
Common mode rejection ratio	CMRR	2/	4,5,6	01	40		dB
STROBE CHARACTERISITICS (Logic "0" inhibits output) if not used, a 1 kΩ pullup to 5 V is recommended.							
Input low current	I_{IL}	V_S = 0.4 V	1,2,3	01		-0.4	mA
Input high current	I_{IH}	V_S = 2.7 V	1,2,3	01		+40	µA
Input low voltage	V_{IL}		1,2,3	01		0.7	V
Input high voltage	V_{IH}		1,2,3	01	2.0		V
Strobe delay (turn-on or turn-off)	t_{SD}	2/	9,10,11	01		150	ns
THRESHOLD CHARACTERISITICS (Sinewave input)							
Input threshold voltage (referred to the bus)	V_{TH}	f = 100 KHz to 1 MHz	4,5,6	01	0.60	1.15	V p-p

See footnotes at end of table.

TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions 1/ $-55°C \le T_C \le +125°C$ unless otherwise specified	Group A subgroups	Device type	Limits		Unit
					Min	Max	
OUTPUT CHARACTERISITICS, RX DATA and RX $\overline{\text{DATA}}$							
Output low voltage	V_{OL}	I_{OL} = 4 mA	1,2,3	01		0.5	V
Output high voltage	V_{OH}	I_{OH} = -0.4 mA	1,2,3	01	2.5		V
Delay (average) from differential input zero crossings to RX DATA and RX $\overline{\text{DATA}}$ output 50%points	t_{DRX}		9,10,11	01		300	ns
Zero crossing deviation	t_{ZCD}	V_{IN} = 2.1 V, f = 1 MHz, $t_R = t_F$ = 300 ns, T_A = +25°C, see figure 7	9	01	340	660	ns
Zero crossing deviation Group C end-point electricals only	t_{ZCD}	V_{IN} = 4.2 V, f = 1 MHz, $t_R = t_F$ = 300 ns, T_A = +25°C, see figure 7	9	01	340	660	ns
POWER SUPPLY							
+Supply (V_{CC})	I_{CC-SB}	V_{CC} = +5 V, Standby mode	1,2,3	01		60	mA
	I_{CC-25}	V_{CC} = +5 V, 25% duty cycle 2/	4,5,6			90	
	I_{CC-50}	V_{CC} = +5 V, 50% duty cycle				110	
	I_{CC-100}	V_{CC} = +5 V, 100% duty cycle 2/				145	
-Supply (V_{EE})	I_{EE-SB}	V_{EE} = -15 V, standby mode	1,2,3	01		60	mA
	I_{EE-25}	V_{EE} = -15 V, 25% duty cycle 2/	4,5,6			85	
	I_{EE-50}	V_{EE} = -15 V, 50% duty cycle				105	
	I_{EE-100}	V_{EE} = -15 V, 100% duty cycle 2/				140	

1/ Unless otherwise specified, Supply voltage ranges are as follows:
$-11.4\ V\ dc \le V_{EE} \le -15.75\ V\ dc$, $+4.75\ V\ dc \le V_{CC} \le +5.5\ V\ dc$
2/ Parameters shall be tested as part of device initial characterization and after design and process changes. Parameters shall be guaranteed to the limits specified in table I.
3/ Measured at 1 MHz from bus side of transformer after contribution from the transformer is accounted for.

Case outlines X and Y

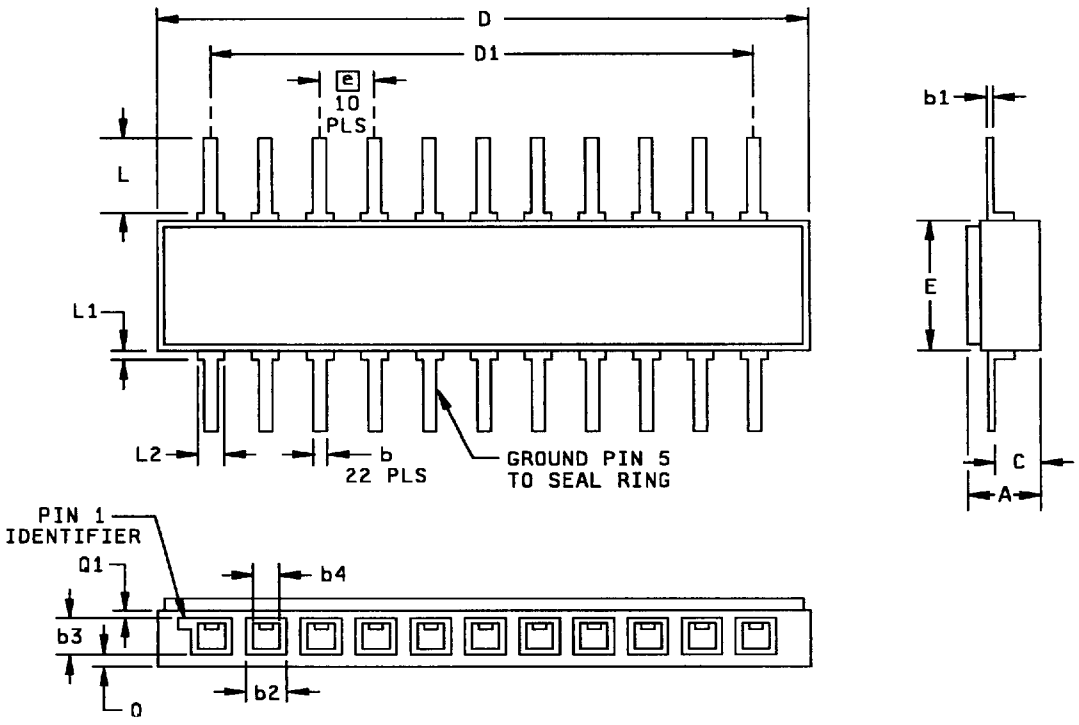


FIGURE 1. Case outline(s).

STANDARD MICROCIRCUIT DRAWING DEFENSE SUPPLY CENTER COLUMBUS COLUMBUS, OHIO 43216-5000	SIZE **A**		**5962-95505**
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Case outlines X and Y - Continued

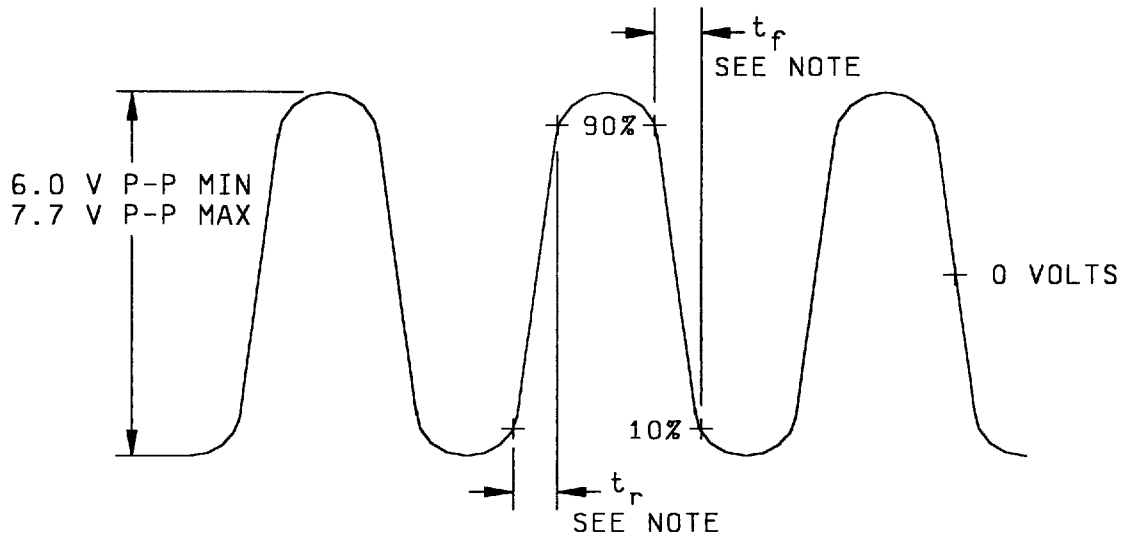
Symbol	Millimeters		Inches	
	Min	Max	Min	Max
A		3.55		.140
b	0.41	0.51	.016	.020
b1	0.20	0.30	.008	.012
b2	1.78 REF		.070 REF	
b3	2.18 REF		.086 REF	
b4	1.02 REF		.040 REF	
C	1.27	2.03	.050	.080
D		30.48		1.200
D1		25.40		1.000
e	2.54 BSC		.100 BSC	
E		7.87		.310
L	See note 2		See note 2	
L1	0.51	1.02	.020	.040
L2	1.02 REF		.040 REF	
Q	0.13 REF		.005 REF	
Q1	0.13		.005	

NOTES:
1. The case outlines X and Y were originally designed using inch-pound units of measurement, in the event of conflict between the metric and inch-pound units, the inch-pound shall take precedence.
2. For the case outline X the lead length, dimension L is .160 inches (4.06 mm) minimum and for the case outline Y the lead length, dimension L is .300 inches (7.62 mm) minimum.

FIGURE 1. Case outline(s) - Continued.

Device type	01
Case outlines	X and Y
Terminal number	Terminal symbol
1	TX INHIBIT A
2	TX DATA IN A
3	TX $\overline{\text{DATA}}$ IN A
4	$\overline{\text{STROBE}}$ A
5	GND A
6	RX $\overline{\text{DATA}}$ OUT B
7	RX DATA OUT B
8	$\overline{\text{TX/RX}}$ B
9	TX/RX B
10	V_{EE} CHANNEL B
11	V_{CC} CHANNEL B
12	TX INHIBIT B
13	TX DATA IN B
14	TX $\overline{\text{DATA}}$ IN B
15	$\overline{\text{STROBE}}$ B
16	GND B
17	RX $\overline{\text{DATA}}$ OUT A
18	RX DATA OUT A
19	$\overline{\text{TX/RX}}$ A
20	TX/RX
21	V_{EE} CHANNEL A
22	V_{CC} CHANNEL A

FIGURE 2. Terminal connections.



NOTE: Rise and fall times measured at points A-A' in figure 5.

FIGURE 3. Transmitter (TX) output waveform.

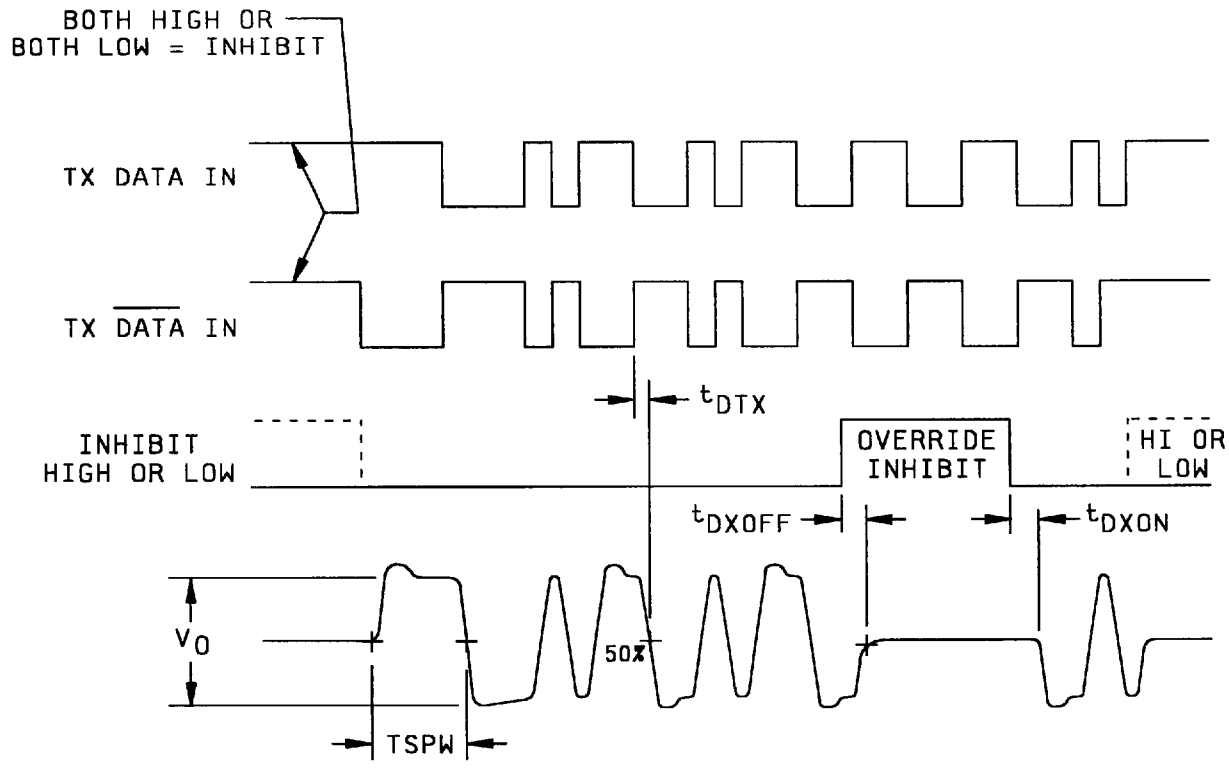
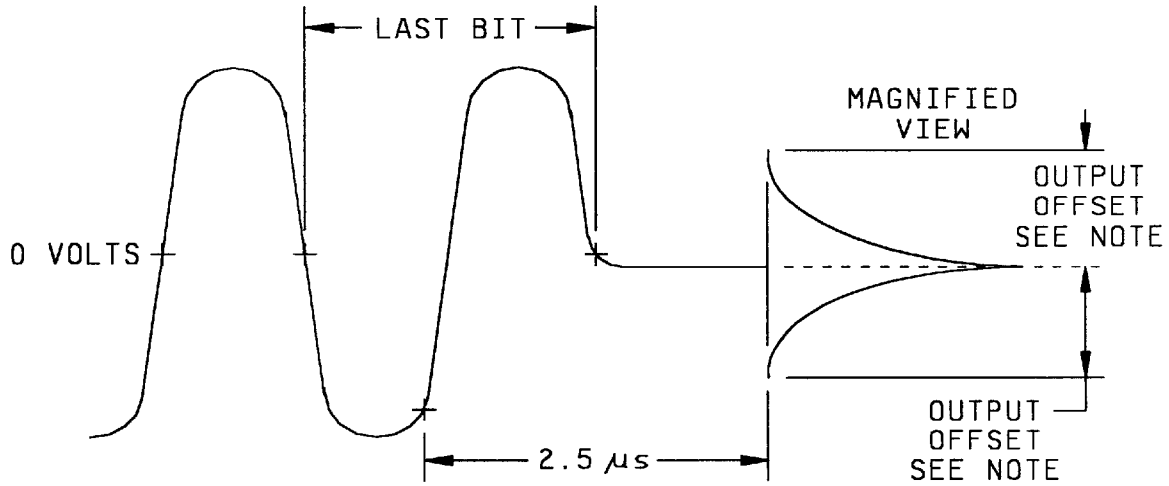
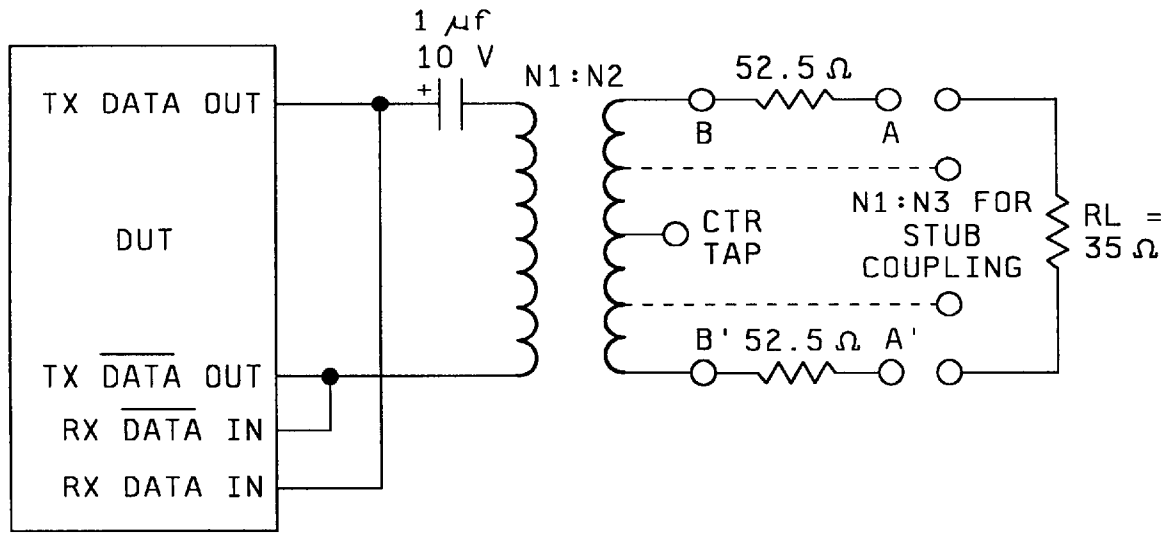


FIGURE 3. Transmitter (TX) output waveform - Continued.



NOTE: Offset measured at point A-A' in figure 5.

FIGURE 4. Transmitter (TX) output offset.



NOTE: Transformer turns ratio: N1:N2 = 1:1, N1:N3 = 1:0.71

FIGURE 5. Transformer connection and test circuit.

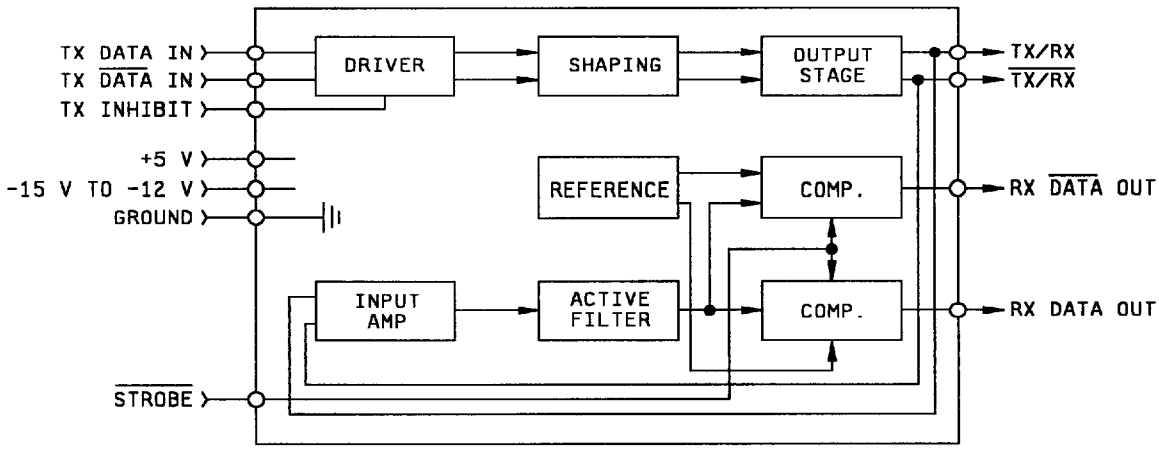
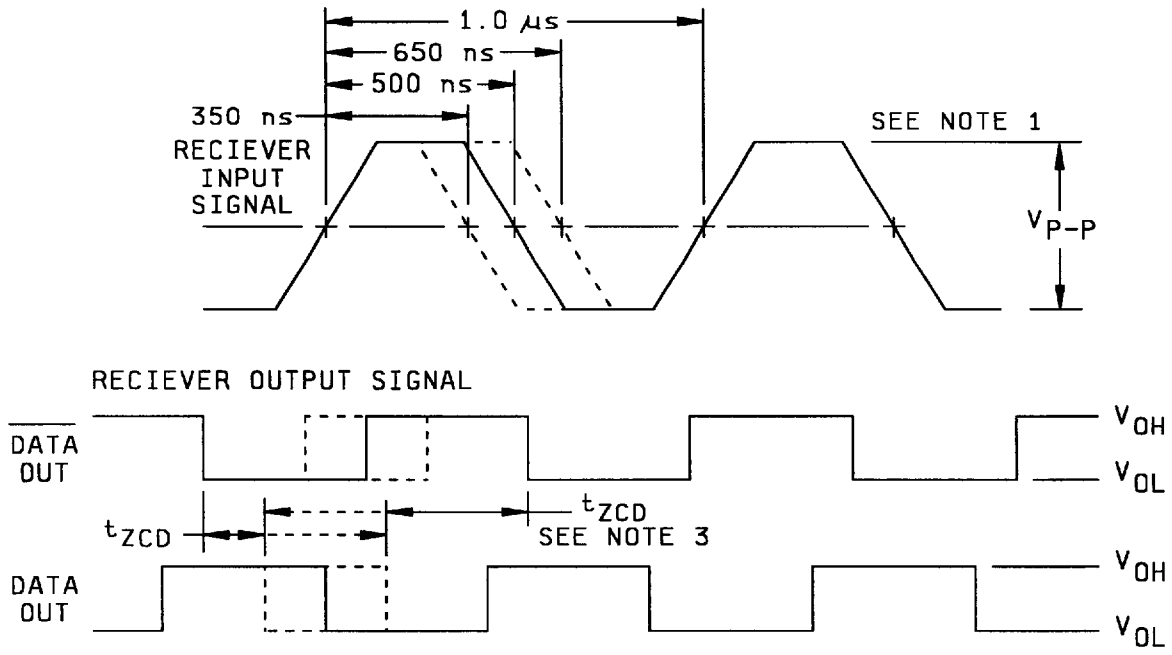
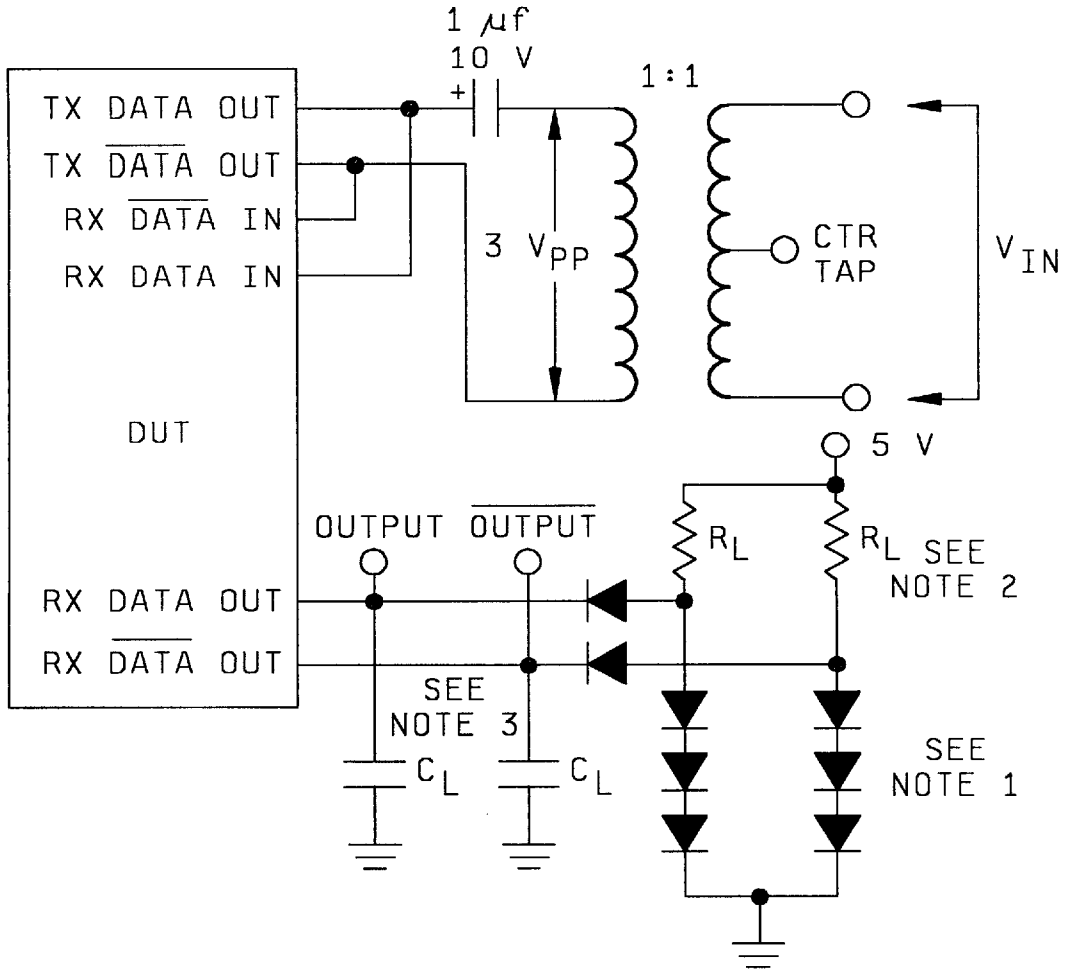


FIGURE 6. Block diagram.



NOTES:
1. MIL-STD-1553 format.
2. 100 ns ≤ t_R ≤ 300 ns, 100ns ≤ t_F ≤ 300 ns. ____
3. Measure t_{ZCD} from 2.0 volt level on DATA(DATA) to 2.0 volt level on DATA(DATA).

FIGURE 7. Zero crossing deviation test circuit and voltage waveforms.



NOTES:
1. Diodes are 1N3064 or equivalent.
2. R_L = 2 KΩ ±5%.
3. C_L = 50 pF ±10%, includes scope probe, wiring and stray capacitance.
4. Transformer part number 13222115-01 or equivalent

FIGURE 7. Zero crossing deviation test circuit and voltage waveforms - Continued.

TABLE II. Electrical test requirements.

MIL-PRF-38534 test requirements	Subgroups (in accordance with MIL-PRF-38534, group A test table)
Interim electrical parameters	1
Final electrical parameters	1*,2,3,4,5,6,9,10,11
Group A test requirements	1,2,3,4,5,6,9,10,11
Group C end-point electrical parameters	1,2,3
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. 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 DSCC-VA 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:

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

b. Subgroups 7 and 8 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 DSCC-VA 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 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 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. 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°C ±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

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 Supply Center Columbus when a system application requires configuration control and the applicable SMD. DSCC 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 DSCC-VA, telephone (614) 692-0526.

6.5 Comments. Comments on this drawing should be directed to DSCC-VA, Columbus, Ohio 43216-5000, or telephone (614) 692-0512.

6.6 Sources of supply. Sources of supply are listed in QML-38534. The vendors listed in QML-38534 have submitted a certificate of compliance (see 3.7 herein) to DSCC-VA and have agreed to this drawing.

STANDARD MICROCIRCUIT DRAWING SOURCE APPROVAL BULLETIN

DATE: 98-09-15

Approved sources of supply for SMD 5962-95505 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 DSCC-VA. This bulletin is superseded by the next dated revision of QML-38534.

Standard microcircuit drawing PIN 1/	Vendor CAGE number	Vendor similar PIN 2/
5962-9550501HXC 5962-9550501HYC	88379 88379	ARX4810-201-1 ARX4810-203-1
5962-9550501HXA 5962-9550501HYA	88379 88379	ARX4810-201-2 ARX4810-203-2
5962-9550501HXC 5962-9550501HXA 5962-9550501HYC 5962-9550501HYA	88379 88379 88379 88379	ARX4810-201-3 ARX4810-201-3 ARX4810-203-3 ARX4810-203-3

1/ The lead finish shown for each PIN representing a hermetic package is the most readily available from the manufacturer listed for that part. If the desired lead finish is not listed contact the vendor to determine its availability.

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 number	Vendor name and address
88379	Aeroflex Circuit Technology Incorporated 35 South Service Road Plainview, NY 11803

The information contained herein is disseminated for convenience only and the Government assumes no liability whatsoever for any inaccuracies in this information bulletin.