

REVISIONS

LTR	DESCRIPTION	DATE (YR-MO-DA)	APPROVED
A	Changes in accordance with NOR 5962-R001-92.	91-10-08	M. A. Frye
B	Changes in accordance with NOR 5962-R222-94.	94-06-29	M. A. Frye
C	Add case outline X. Change format for device classes Q and V. Changes to 1.3, 1.4 and table I. - drw	98-07-09	Raymond Monnin
D	Add radiation hardened information. - drw	99-02-01	Raymond Monnin

THE ORIGINAL FIRST PAGE OF THIS DRAWING HAS BEEN REPLACED.

REV																			
SHEET																			
REV	D	D	D	D															
SHEET	15	16	17	18															
REV STATUS	REV			D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	
OF SHEETS	SHEET			1	2	3	4	5	6	7	8	9	10	11	12	13	14		

PMIC N/A	PREPARED BY Rick C. Officer	DEFENSE SUPPLY CENTER COLUMBUS COLUMBUS, OHIO 43216													
STANDARD MICROCIRCUIT DRAWING THIS DRAWING IS AVAILABLE FOR USE BY ALL DEPARTMENTS AND AGENCIES OF THE DEPARTMENT OF DEFENSE AMSC N/A	CHECKED BY Charles E. Besore														
	APPROVED BY Michael A. Frye	MICROCIRCUIT, LINEAR, RS-485 DIFFERENTIAL BUS TRANSCEIVER, MONOLITHIC SILICON													
	DRAWING APPROVAL DATE 90-10-18														
	REVISION LEVEL D	SIZE A	CAGE CODE 67268	5962-89615											
		SHEET 1 OF 18													

DSCC FORM 2233
APR 97

5962-E119-99

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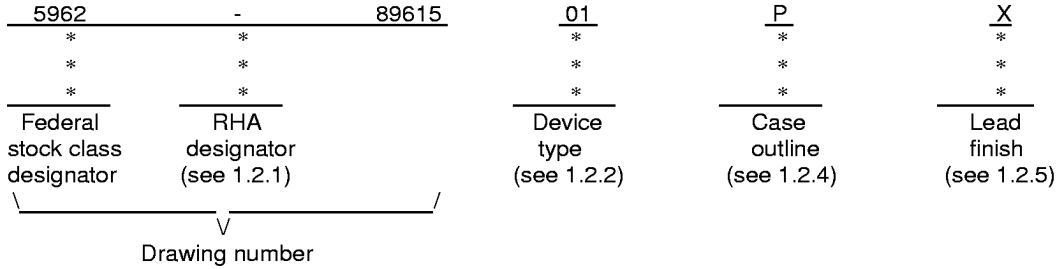
1. SCOPE

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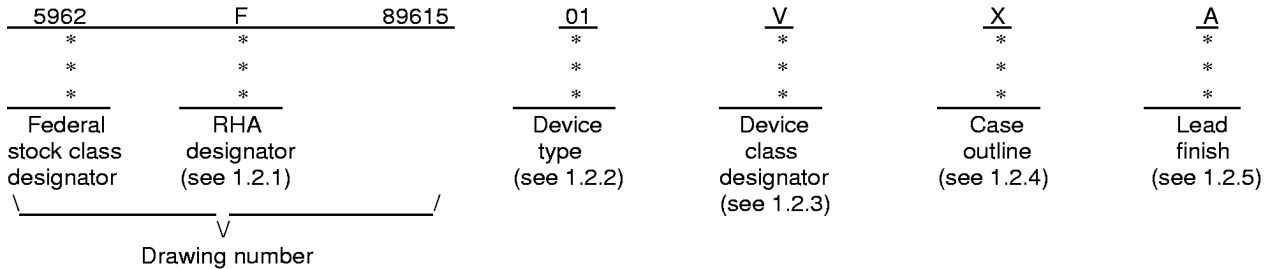
This drawing documents two product assurance class levels consisting of high reliability (device classes Q and M) and space application (device class V). A choice of case outlines and lead finishes are available and are reflected in the Part or Identifying Number (PIN). When available, a choice of Radiation Hardness Assurance (RHA) levels are reflected in the PIN.

1.2 PIN. The PIN is as shown in the following examples.

For device classes M and Q:



For device class V:



1.2.1 RHA designator. Device classes Q and V RHA marked devices meet the MIL-PRF-38535 specified RHA levels and are marked with the appropriate RHA designator. Device class M RHA marked devices meet the MIL-PRF-38535, appendix A specified RHA levels and are marked with the appropriate RHA designator. A dash (-) indicates a non-RHA device.

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

<u>Device type</u>	<u>Generic number</u>	<u>Circuit function</u>
01	DS16F95	RS-485 differential bus transceiver

1.2.3 Device class designator. The device class designator is a single letter identifying the product assurance level as listed below. Since the device class designator has been added after the original issuance of this drawing, device classes M and Q designators will not be included in the PIN and will not be marked on the device.

<u>Device class</u>	<u>Device requirements documentation</u>
M	Vendor self-certification to the requirements for MIL-STD-883 compliant, non-JAN class level B microcircuits in accordance with MIL-PRF-38535, appendix A
Q or V	Certification and qualification to MIL-PRF-38535

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

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Outline letter	Description	Terminals	Package style
P	GDIP1-T8 or CDIP2-T8	8	Dual-in-line
2	CQCC1-N20	20	Leadless chip carrier
H	GDFP1-F10 or CDFP2-F10	10	Flat Pack
X	See figure 1	10	Flat Pack

1.2.5 Lead finish. The lead finish is as specified in MIL-PRF-38535 for device classes Q and V or MIL-PRF-38535, appendix A for device class M.

1.3 Absolute maximum ratings. 1/

Supply voltage (V_{CC})	+7.0 V dc
Differential input voltage	-10 V/+15 V dc
Enable input voltage.....	5.5 V dc
Lead temperature:	
Case P (soldering, 60 seconds).....	+300°C
Case 2, H and X (soldering, 10 seconds).....	+260°C
Storage temperature	-65°C to +175°C
Junction temperature (T_J)	+175°C
Power dissipation (P_D): 2/	
Case P	1274 mW
Case 2	1800 mW
Case H and X	725 mW
Thermal resistance, junction-to-case (θ_{JC}):	
Case P	14°C/W
Case 2.....	17°C/W
Case H and X	18°C/W
Thermal resistance, junction-to-ambient(θ_{JA}):	
Case P at 1 W	118°C/W
Case 2.....	83°C/W
Case H and X at 0.5 W	207°C/W

1.4 Recommended operating conditions.

Supply voltage range (V_{CC}).....	+4.5 V dc to +5.5 V dc
Ambient operating temperature range (T_A)	-55°C to +125°C
Voltage at any bus terminal:	
(separately or common mode, V_I or V_{CM})	-7.0 V to +12 V dc
Differential input voltage (V_{ID}).....	-7.0 V to +12 V dc
Output current HIGH (I_{OH}) :	
Driver.....	-60 mA
Receiver	-400 μ A
Output current LOW (I_{OL}) :	
Driver.....	60 mA
Receiver	16 mA

1.5 Radiation features.

Total Dose (Dose rate = 50 to 300 rads (Si)/s, MIL-STD-883, method1019.5, condition A)..... \leq 300 Krads(Si)

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/ Must withstand the added P_D due to short circuit test, e.g., I_{OS} . Derate above $T_A = +25^\circ\text{C}$, 8.5 mW/ $^\circ\text{C}$ for case P, 12.1 mW/ $^\circ\text{C}$ for case 2, 4.8 mW/ $^\circ\text{C}$ for case H and X.

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2. APPLICABLE DOCUMENTS

[查询"5962-89615"供应商](#)
Government specification, standards, and handbooks. The following specification, standards, and handbooks 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-38535 Integrated Circuits, Manufacturing, General Specification for.

STANDARDS

DEPARTMENT OF DEFENSE

MIL-STD-883 - Test Method Standard Microcircuits.
MIL-STD-973 - Configuration Management.
MIL-STD-1835 - Interface Standard For Microcircuit Case Outlines.

HANDBOOKS

DEPARTMENT OF DEFENSE

MIL-HDBK-103 - List of Standard Microcircuit Drawings.
MIL-HDBK-780 - Standard Microcircuit Drawings.

(Unless otherwise indicated, copies of the specification, standards, and handbooks 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.

3. REQUIREMENTS

3.1 Item requirements. The individual item requirements for device classes Q and V 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. The individual item requirements for device class M shall be in accordance with MIL-PRF-38535, appendix A for non-JAN class level B devices and as specified herein.

3.2 Design, construction, and physical dimensions. The design, construction, and physical dimensions shall be as specified in MIL-PRF-38535 and herein for device classes Q and V or MIL-PRF-38535, appendix A and herein for device class M.

3.2.1 Case outlines. The case outlines 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 Truth tables. The truth tables shall be as specified on figure 3.

3.2.4 Radiation exposure circuit. The radiation exposure circuit shall be as specified on figure 4.

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

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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.

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3.5 Marking. The part shall be marked with the PIN listed in 1.2 herein. In addition, the manufacturer's PIN may also be marked as listed in MIL-HDBK-103. For packages where marking of the entire SMD PIN number is not feasible due to space limitations, the manufacturer has the option of not marking the "5962-" on the device. For RHA product using this option, the RHA designator shall still be marked. Marking for device classes Q and V shall be in accordance with MIL-PRF-38535. Marking for device class M shall be in accordance with MIL-PRF-38535, appendix A.

3.5.1 Certification/compliance mark. The certification mark for device classes Q and V shall be a "QML" or "Q" as required in MIL-PRF-38535. The compliance mark for device class M shall be a "C" as required in MIL-PRF-38535, appendix A.

3.6 Certificate of compliance. For device classes Q and V, a certificate of compliance shall be required from a QML-38535 listed manufacturer in order to supply to the requirements of this drawing (see 6.6.1 herein). For device class M, a certificate of compliance shall be required from a manufacturer in order to be listed as an approved source of supply in MIL-HDBK-103 (see 6.6.2 herein). The certificate of compliance submitted to DSCC-VA prior to listing as an approved source of supply for this drawing shall affirm that the manufacturer's product meets, for device classes Q and V, the requirements of MIL-PRF-38535 and herein or for device class M, the requirements of MIL-PRF-38535, appendix A and herein.

3.7 Certificate of conformance. A certificate of conformance as required for device classes Q and V in MIL-PRF-38535 or for device class M in MIL-PRF-38535, appendix A shall be provided with each lot of microcircuits delivered to this drawing.

3.8 Notification of change for device class M. For device class M, notification to DSCC-VA of change of product (see 6.2 herein) involving devices acquired to this drawing is required for any change as defined in MIL-STD-973.

3.9 Verification and review for device class M. For device class M, DSCC, DSCC's agent, and the acquiring activity retain the option to review the manufacturer's facility and applicable required documentation. Offshore documentation shall be made available onshore at the option of the reviewer.

3.10 Microcircuit group assignment for device class M. Device class M devices covered by this drawing shall be in microcircuit group number 53 (see MIL-PRF-38535, appendix A)

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TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions <u>1/</u> , <u>2/</u> -55°C ≤ T _A ≤ +125°C V _{CC} = 5.5 V unless otherwise specified	Group A subgroups	Limits		Unit
				Min	Max	
Electrical characteristics for driver.						
Differential output voltage	V _{OD1}	V _{CC} = 5.5 V, I _O = 0 A, V _{IN} = 0.8 V	1, 2, 3		6	V
		V _{CC} = 5.5 V, I _O = 0 A, V _{IN} = 2.0 V				
	V _{OD2}	V _{CC} = 4.5 V, R _L = 100Ω		2		
		V _{CC} = 4.5 V, R _L = 54Ω		1.5		
	V _{OD3}	V _{CC} = -7 V to 12 V		1		
Change in differential output voltage <u>3/</u>	DELTA V _{OD}	V _{CC} = 4.5 V, R _L = 100Ω	1, 2, 3		±200	mV
		V _{CC} = 4.5 V, R _L = 54Ω				
Change in common mode output voltage <u>3/</u>	DELTA V _{OC}	V _{CC} = 4.5 V, R _L = 100Ω	1, 2, 3		±200	mV
		V _{CC} = 4.5 V, R _L = 54Ω				
Common mode output voltage	V _{OC}	R _L = 100Ω	1, 2, 3		3	V
		R _L = 54Ω				
Logical "1" input current	I _{IH}	V _I = 2.4 V	1, 2, 3		20	μA
Output current	I _O	Output disable, V _{OUT} = 12 V	1, 2, 3		1	mA
		Output disable, V _{OUT} = 12 V, V _{CC} = 0 V				

See footnotes at end of table.

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TABLE I. Electrical performance characteristics - continued.

Test	Symbol	Conditions <u>1/</u> , <u>2/</u> -55°C ≤ T _A ≤ +125°C V _{CC} = 5.5 V unless otherwise specified	Group A subgroups	Limits		Unit
				Min	Max	
Electrical characteristics for driver - continued.						
Output current	I _o	Output disable, V _{OUT} = -7 V <u>4/</u>	1, 2, 3		-0.8	mA
		Output disable, V _{OUT} = -7 V, V _{CC} = 0 V				
Output short circuit current	I _{OS}	V _{IN} = 3 V, V _{OUT} = V _{CC}	1, 2, 3		150	mA
		V _{IN} = 0 V, V _{OUT} = V _{CC}				
		V _{IN} = 3 V, V _{OUT} = -7 V <u>4/</u>			-250	
		V _{IN} = 0 V, V _{OUT} = -7 V <u>4/</u>				
		V _{IN} = 3 V, V _{OUT} = 0 V <u>4/</u>			-150	
		V _{IN} = 0 V, V _{OUT} = 0 V <u>4/</u>				
		V _{IN} = 0 V, V _{OUT} = 12 V			250	
		V _{IN} = 3 V, V _{OUT} = 12 V				
Logical "1" output voltage	V _{OH}	V _{CC} = 4.5 V, I _o = -20 mA	1, 2, 3	3		V
Logical "0" output voltage	V _{OL}	V _{CC} = 4.5 V, I _o = 20 mA	1, 2, 3		2	V

See footnotes at end of table.

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TABLE I. Electrical performance characteristics - continued.

Test	Symbol	Conditions 1/, 2/ -55°C ≤ T _A ≤ +125°C V _{CC} = 5.5 V unless otherwise specified	Group A subgroups	Limits		Unit
				Min	Max	
Electrical characteristics for receiver.						
Logical "1" output voltage	V _{OH}	V _{CC} = 4.5 V, V _{id} = 200 mV, I _{OH} = -400 μA	1, 2, 3	2.5		V
Logical "0" output voltage	V _{OL}	V _{CC} = 4.5 V, V _{id} = -200 mV, I _{OL} = 8 mA	1, 2, 3		.45	V
		V _{CC} = 4.5 V, V _{id} = -200 mV, I _{OL} = 16 mA			.5	
Line input current	I _I	Untested input = 0 V, V _I = 12 V	1, 2, 3		1	mA
		Untested input = 0 V, V _I = 12 V V _{CC} = 0 V				
		Untested input = 0 V, V _I = -7 V 4/			-8	
		Untested input = 0 V, V _I = -7 V 4/ V _{CC} = 0 V				
Logical "1" input current	I _{IH}	V _I = 2.7 V (receiver)	1, 2, 3		20	μA
Input resistance	R _{IN}	V _{CC} = 0 V and 5.5 V Untested input = 0 V, V _I = 12 V and -7 V, guaranteed by line input current	1, 2, 3	10		kΩ
High impedance state output current	I _{OZ}	V _{OUT} = 0.4 V to 2.4 V	1, 2, 3		±20	μA
Output short circuit current	I _{OS}	V _{IN} = 1 V, V _{OUT} = 0	1, 2, 3	-85	-15	mA

See footnotes at end of table.

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TABLE I. Electrical performance characteristics - continued.

Test	Symbol	Conditions <u>1</u> , <u>2</u> / -55°C ≤ T _A ≤ +125°C V _{CC} = 5.5 V unless otherwise specified	Group A subgroups	Limits		Unit
				Min	Max	
Electrical characteristics for receiver - continued.						
Differential input high threshold voltage	V _{TH}	V _{CC} = 4.5 V, V _{OUT} = 2.5 V, I _O = -4 mA, V _{CM} = 12 V, 0 V, and -7 V	1, 2, 3		.2	V
		V _{CC} = 5.5 V, V _{OUT} = 2.5 V, I _O = -4 mA, V _{CM} = 12 V, 0 V, and -7 V				
Differential input low threshold voltage	V _{TL}	V _{CC} = 4.5 V, V _{OUT} = .5 V, I _O = 8 mA, V _{CM} = 12 V, 0 V, and -7 V	1, 2, 3		-2	V
		V _{CC} = 5.5 V, V _{OUT} = .5 V, I _O = 8 mA, V _{CM} = 12 V, 0 V, and -7 V				
Hysteresis	V _{TH+} -(V _{TH-})	V _{CC} = 4.5 V, V _{CM} = 0 V	1, 2, 3		35	mV
		V _{CC} = 5.5 V, V _{CM} = 0 V				
Electrical characteristics for both driver and receiver.						
Supply current I _{CC} both disable	I _{CC}	RE = 2 V, DE = .8 V	1, 2, 3		25	mA
Supply current I _{CC} both enable	I _{CC}	RE = .8 V, DE = 2 V	1, 2, 3		28	mA
Input clamp voltage	V _{IC}	I _I = -18 mA	1, 2, 3		-1.3	V
Logical "1" input voltage	V _{IH}		1, 2, 3	2		V
Logical "0" input voltage	V _{IL}		1, 2, 3		.8	V
Logical "1" enable input voltage	V _{IH}		1, 2, 3	2		V
Logical "0" enable input voltage	V _{IL}		1, 2, 3		.8	V
Logical "0" input current	I _{IL}	V _I = .4 V <u>4</u> /	1, 2, 3		-50	μA

See footnotes at end of table.

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TABLE I. Electrical performance characteristics - continued.

Test	Symbol	Conditions <u>1/</u> , <u>2/</u> -55°C ≤ T _A ≤ +125°C V _{CC} = 5 V, P _{RR} = 1 Mhz, T _r ≤ T _f ≤ 6 ns, V _{LO} = 0 V, Z _{OUT} = 50Ω, AMP = 3 V, 50% duty cycle unless otherwise specified	Group A subgroups	Limits		Unit
				Min	Max	
Timing characteristics of driver.						
Differential output delay time	t _{dd}	R _L = 60Ω <u>5/</u>	9	8	25	ns
			10, 11	8	30	
Differential output transition time	t _{TD}	R _L = 60Ω <u>5/</u> , <u>6/</u>	9	8	25	ns
			10, 11	8	30	
Propagation delay time low to high	t _{PLH}	R _L = 27Ω	9	6	18	ns
			10, 11	6	25	
Propagation delay time high to low	t _{PHL}	R _L = 27Ω	9	6	18	ns
			10, 11	6	25	
Output enable time to high	t _{PZH}	R _L = 110Ω	9		35	ns
			10, 11		45	
Output enable time to low	t _{PZL}	R _L = 110Ω	9		40	ns
			10, 11		50	
Output disable time from high	t _{PHZ}	R _L = 110Ω	9		30	ns
			10, 11		40	
Output disable time from low	t _{PLZ}	R _L = 110Ω	9		30	ns
			10, 11		40	
Differential output skew time	t _{skew}		9		6	ns
			10, 11		12	

See footnotes at end of table.

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TABLE I. Electrical performance characteristics - continued.

Test	Symbol	Conditions <u>1/</u> , <u>2/</u> -55°C ≤ T _A ≤ +125°C V _{CC} = 5 V, P _{RR} = 1 Mhz, T _r ≤ T _f ≤ 6 ns, V _{LO} = 0 V, Z _{OUT} = 50Ω, AMP = 3 V, 50% duty cycle unless otherwise specified	Group A subgroups	Limits		Unit
				Min	Max	
Timing characteristics of receiver.						
Propagation delay time low to high	t _{PLH}	C _L = 15 pF	9	10	27	ns
			10, 11	10	38	
Propagation delay time high to low	t _{PHL}	C _L = 15 pF	9	10	27	ns
			10, 11	10	38	
Output enable time to high	t _{PZH}	C _L = 15 pF	9		20	ns
			10, 11		30	
Output enable time to low	t _{PZL}	C _L = 15 pF	9		20	ns
			10, 11		30	
Output to output delay time	t _{PLH} -t _{PHL}		9		8	ns
			10, 11		16	
Output disable time from high	t _{PHZ}	C _L = 20 pF	9		30	ns
			10, 11		40	
		C _L = 5 pF <u>7/</u>	9		20	
			10, 11		30	
Output disable time from low	t _{PLZ}	C _L = 5 pF	9		20	ns
			10, 11		30	

1/ Devices supplied to this drawing will meet all levels M, D, P, L, R, F of irradiation. However, this device is only tested at the 'F' level. Pre and post irradiation values are identical unless otherwise specified in table I. When performing post irradiation electrical measurements for any RHA level, T_A = +25°C.

2/ These parts may be dose rate sensitive in a space environment and demonstrate enhanced low dose rate effect. Radiation end point limits for the noted parameters are guaranteed only for the conditions specified in MIL-STD-883, method 1019.5, condition A.

3/ Delta V_{OD} and Delta V_{OC} are the changes in magnitude of V_{OD} and V_{OC}.

4/ Negative sign of the limits indicates the direction of the current flow only.

5/ Rise time 20 percent to 80 percent, fall time 80 percent to 20 percent.

6/ t_{TD} = (noninverting output rise time + inverting output fall time) / 2,
(noninverting output fall time + inverting output rise time) / 2.

7/ Tested at 20 pF, guaranteed at 5 pF.

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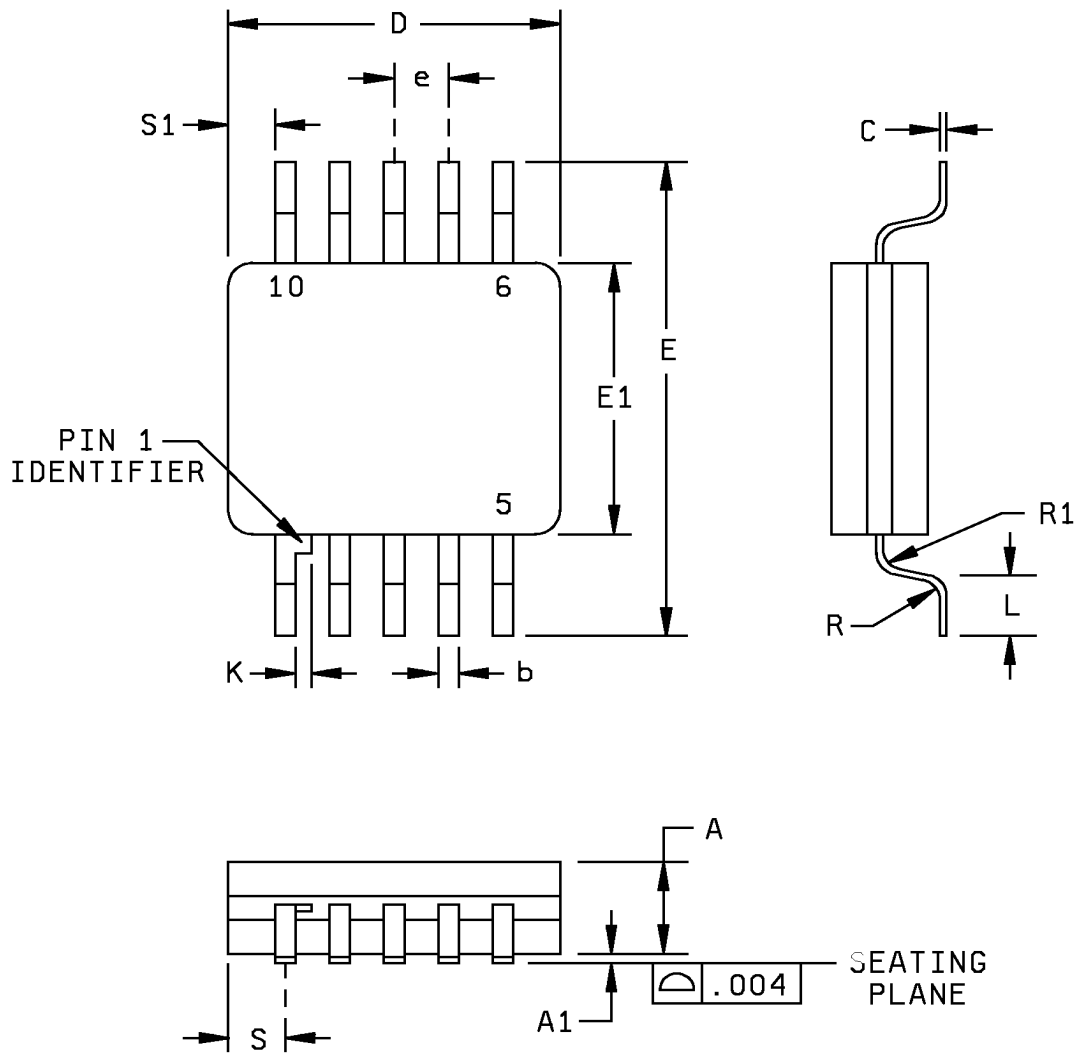


FIGURE 1. Case outline X.

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Letter	Inches		Millimeters		Notes
	Min	Max	Min	Max	
A	.050	.080	1.27	2.03	
A1	.004	.012	0.10	0.30	
b	.015	.019	0.38	0.48	2
C	.004	.008	0.10	0.20	2
D		.270		6.86	
E	.400	.420	10.16	10.67	
E1	.236	.261	5.99	6.63	
e	.048	.052	1.22	1.32	
K	.008	.012	0.20	0.30	
L	.037	.043	0.94	1.09	
R	.013	.017	0.33	0.43	
R1	.013	.017	0.33	0.43	
S		.045		1.14	
S1	.005		0.13		

NOTES:

1. The U.S. government preferred system of measurement is the metric SI system. However, since this item was originally designed using inch pound units of measurement, in the event of conflict between the metric and inch-pound units, the inch-pound units shall take precedence.
2. Maximum limit may be increased by .003 inches after lead finish is applied.

FIGURE 1. Case outline X - continued.

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Device type	01		
Case outline	P	H and X	2
Terminal number	Terminal symbol		
1	R	R	NC
2	<u>RE</u>	<u>RE</u>	R
3	DE	DE	NC
4	D	D	<u>NC</u>
5	GND	GND	RE
6	A IN/OUT BUS PORT	A IN/OUT BUS PORT	NC
7	B IN/OUT BUS PORT	B IN/OUT BUS PORT	DE
8	V _{CC}	NC	NC
9	---	NC	NC
10	---	V _{CC}	D
11	---	---	NC
12	---	---	GND
13	---	---	NC
14	---	---	NC
15	---	---	A IN/OUT BUS PORT
16	---	---	NC
17	---	---	B IN/OUT BUS PORT
18	---	---	NC
19	---	---	NC
20	---	---	V _{CC}

FIGURE 2. Terminal connections.

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APR 97

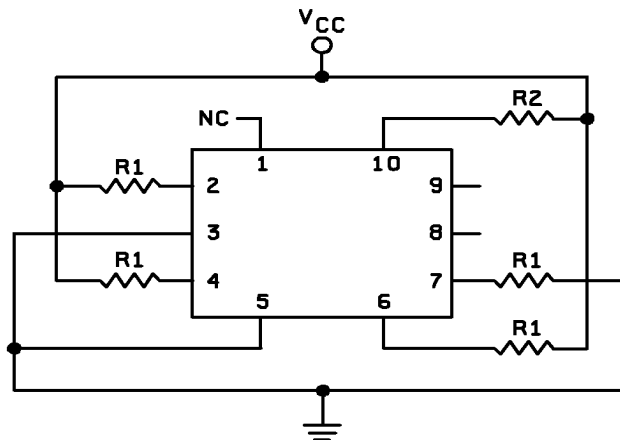
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Differential input D	Enable DE	Outputs	
		A	B
H	H	H	L
L	H	L	H
X	L	Z	Z

Differential inputs A - B	Enable \overline{RE}	Output R
$V_{ID} \geq .2 V$	L	H
$V_{ID} \leq -.2 V$	L	L
X	H	Z

H = High
L = Low
X = Don't care
Z = High impedance

FIGURE 3. Truth tables.



$V_{CC} = 5.0 V$ min to $5.5 V$ max
 $R1 = 4.99 K\Omega, 1/4 W$
 $R2 = 10\Omega, 1/4 W$

FIGURE 4. Radiation exposure circuit.

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4. QUALITY ASSURANCE PROVISIONS

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Sampling and Inspection

For device classes Q and V, 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 affect the form, fit, or function as described herein. For device class M, sampling and inspection procedures shall be in accordance with MIL-PRF-38535, appendix A.

4.2 Screening. For device classes Q and V, screening shall be in accordance with MIL-PRF-38535, and shall be conducted on all devices prior to qualification and technology conformance inspection. For device class M, screening shall be in accordance with method 5004 of MIL-STD-883, and shall be conducted on all devices prior to quality conformance inspection.

4.2.1 Additional criteria for device class M.

- a. Burn-in test, method 1015 of MIL-STD-883.
 - (1) Test condition C. The test circuit shall be maintained by the manufacturer under document revision level control and shall be made available to the preparing or acquiring 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.
 - (2) $T_A = +125EC$, minimum.
- b. Interim and final electrical test parameters shall be as specified in table II herein.

4.2.2 Additional criteria for device classes Q and V.

- 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 revision level control of 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.
- b. Interim and final electrical test parameters shall be as specified in table II herein.
- c. Additional screening for device class V beyond the requirements of device class Q shall be as specified in MIL-PRF-38535, appendix B.

4.3 Qualification inspection for device classes Q and V. Qualification inspection for device classes Q and V shall be in accordance with MIL-PRF-38535. Inspections to be performed shall be those specified in MIL-PRF-38535 and herein for groups A, B, C, D, and E inspections (see 4.4.1 through 4.4.4).

4.4 Conformance inspection. Technology conformance inspection for classes Q and V shall be in accordance with MIL-PRF-38535 including groups A, B, C, D, and E inspections and as specified herein except where option 2 of MIL-PRF-38535 permits alternate in-line control testing. Quality conformance inspection for device class M shall be in accordance with MIL-PRF-38535, appendix A and as specified herein. Inspections to be performed for device class M shall be those specified in method 5005 of MIL-STD-883 and herein for groups A, B, C, D, and E inspections (see 4.4.1 through 4.4.4).

4.4.1 Group A inspection.

- a. Tests shall be as specified in table II herein.
- b. Subgroups 4, 5, 6, 7 and 8 in table I, method 5005 of MIL-STD-883 shall be omitted.

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TABLE II. Electrical test requirements.

Test requirements	Subgroups (in accordance with MIL-STD-883, method 5005, table I)	Subgroups (in accordance with MIL-PRF-38535, table III)	
	Device class M	Device class Q	Device class V
Interim electrical parameters (see 4.2)	1	1	1
Final electrical parameters (see 4.2)	<u>1</u> / 1, 2, 3	<u>1</u> / 1, 2, 3	<u>1</u> / 1, 2, 3
Group A test requirements (see 4.4)	1, 2, 3, 9, 10, 11	1, 2, 3, 9, 10, 11	1, 2, 3, 9, 10, 11
Group C end-point electrical parameters (see 4.4)	1, 2, 3	1, 2, 3	1, 2, 3
Group D end-point electrical parameters (see 4.4)	1, 2, 3	1, 2, 3	1, 2, 3
Group E end-point electrical parameters (see 4.4)	---	---	---

1/ PDA applies to subgroup 1.

4.4.2 Group C inspection. The group C inspection end-point electrical parameters shall be as specified in table II herein.

4.4.2.1 Additional criteria for device class M. Steady-state life test conditions, method 1005 of MIL-STD-883:

- a. Test condition C. The test circuit shall be maintained by the manufacturer under document revision level control and shall be made available to the preparing or acquiring 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.
- b. $T_A = +125EC$, minimum.
- c. Test duration: 1,000 hours, except as permitted by method 1005 of MIL-STD-883.

4.4.2.2 Additional criteria for device classes Q and V. 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 test circuit shall be maintained under document revision level control by the device manufacturer's 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.

4.4.3 Group D inspection. The group D inspection end-point electrical parameters shall be as specified in table II herein.

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4.4.4 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 M, Q, and V shall be as specified in MIL-I-38535. End-point electrical parameters shall be as specified in table I herein.

4.4.4.1 Total dose irradiation testing. Total dose irradiation testing shall be performed in accordance with MIL-STD-883 method 1019, condition A, and as specified herein.

4.4.4.1.1 Accelerated aging test. Accelerated aging tests shall be performed on all devices requiring a RHA level greater than 5k rads(Si). The post-anneal end-point electrical parameter limits shall be as specified in table I herein and shall be the pre-irradiation end-point electrical parameter limit at 25°C ±5°C. Testing shall be performed at initial qualification and after any design or process changes which may affect the RHA response of the device.

4.4.4.2 Dose rate burnout. When required by the customer test shall be performed on devices, SEC, or approved test structures at technology qualifications and after any design or process changes which may effect the RHA capability of the process. Dose rate burnout shall be performed in accordance with test method 1023 of MIL-STD-883 and as specified herein.

5. PACKAGING

5.1 Packaging requirements. The requirements for packaging shall be in accordance with MIL-PRF-38535 for device classes Q and V or MIL-PRF-38535, appendix A for device class M.

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.

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

6.2 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.

6.3 Record of users. Military and industrial users should inform Defense Supply Center Columbus when a system application requires configuration control and which SMD's are applicable to that system. 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) 692-0525.

6.4 Comments. Comments on this drawing should be directed to DSCC-VA, Columbus, Ohio 43216-5000, or telephone (614) 692-0674.

6.5 Abbreviations, symbols, and definitions. The abbreviations, symbols, and definitions used herein are defined in MIL-PRF-38535 and MIL-HDBK-1331.

6.6 Sources of supply.

6.6.1 Sources of supply for device classes Q and V. Sources of supply for device classes Q and V are listed in QML-38535. The vendors listed in QML-38535 have submitted a certificate of compliance (see 3.6 herein) to DSCC-VA and have agreed to this drawing.

6.6.2 Approved sources of supply for device class M. Approved sources of supply for class M are listed in MIL-HDBK-103. The vendors listed in MIL-HDBK-103 have agreed to this drawing and a certificate of compliance (see 3.6 herein) has been submitted to and accepted by DSCC-VA.

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STANDARD MICROCIRCUIT DRAWING BULLETIN

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DATE: 99-02-01

Approved sources of supply for SMD 5962-89615 are listed below for immediate acquisition information only and shall be added to MIL-HDBK-103 and QML-38535 during the next revision. MIL-HDBK-103 and QML-38535 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 MIL-HDBK-103 and QML-38535.

Standard microcircuit drawing PIN <u>1/</u>	Vendor CAGE number	Vendor similar PIN <u>2/</u>
5962-89615012A	27014	DS16F95E/883
5962-8961501HA	27014	DS16F95W/883
5962-8961501PA	27014	DS16F95J/883
5962-8961501QXA	27014	DS16F95WG/883
5962-8961501VHA	27014	DS16F95W-QMLV
5962-8961501VPA	27014	DS16F95J-QMLV
5962-8961501VXA	27014	DS16F95WG-QMLV
5962F8961501QHA	27014	DS16F95WFQML
5962F8961501QPA	27014	DS16F95JFQML
5962F8961501QXA	27014	DS16F95WGFQML
5962F8961501VHA	27014	DS16F95WFQMLV
5962F8961501VPA	27014	DS16F95JFQMLV
5962F8961501VXA	27014	DS16F95WGFQMLV

- 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.

<u>Vendor CAGE number</u>	<u>Vendor name and address</u>
27014	National Semiconductor 2900 Semiconductor Drive P. O. Box 58090 Santa Clara, CA 95052-8090

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