REVISIONS			
LTR	DESCRIPTION	DATE (YR-MO-DA)	APPROVED
A	Change drawing CAGE code to 67268. Add case outline. Device type 02JX no longer available from an approved source. Technical and editorial changes throughout.	91-11-01	M. A. Frye
B	Changes in accordance with NOR 5962-R101-93.	93-03-23	Monica L. Poelking
C	Changes in accordance with NOR 5962-R148-93.	93-09-16	Monica L. Poelking
D	Add vendor CAGE F8859. Add device class V criteria. Editorial changes throughout - gap.	99-11-23	Raymond Monnin
E	Add case outline X. Add delta limits for class V devices. Editorial changes throughout - gap.	00-07-27	Raymond Monnin
F	Change the delta limit for the V_{OH} parameter in table III. Update boilerplate to latest MIL-PRF-38535 requirements. - CFS	01-01-17	Thomas M. Hess
G	Add case outline Z. - jak	01-07-23	Thomas M. Hess

THE FRONT PAGE OF THIS DRAWING HAS BEEN REPLACED
CURRRENT CAGE CODE 67268

REV																			
SHEET																			
REV	E	F	E	F															
SHEET	15	16	17	18															

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

PMIC N/A

PREPARED BY
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Michael A. Frye

DRAWING APPROVAL DATE
87-06-23

REVISION LEVEL
G

DEFENSE SUPPLY CENTER COLUMBUS

COLUMBUS, OHIO 43216
http://www.dscc.dla.mil

STANDARD MICROCIRCUIT DRAWING

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

AMSC N/A

MICROCIRCUITS, DIGITAL, ADVANCED CMOS OCTAL BUFFER/LINE DRIVER WITH THREE-STATE OUTPUTS, MONOLITHIC SILICON

SIZE	CAGE CODE	
A	**14933**	**5962-87552**

SHEET 1 OF 18

DSCC FORM 2233
APR 97

5962-E501-01

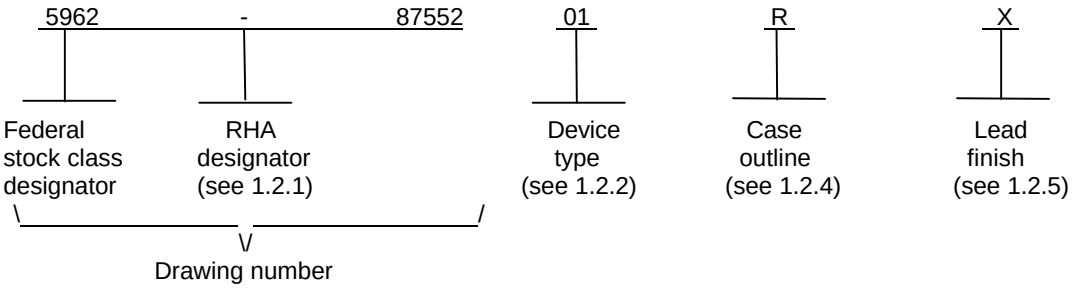
DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited.

1. SCOPE

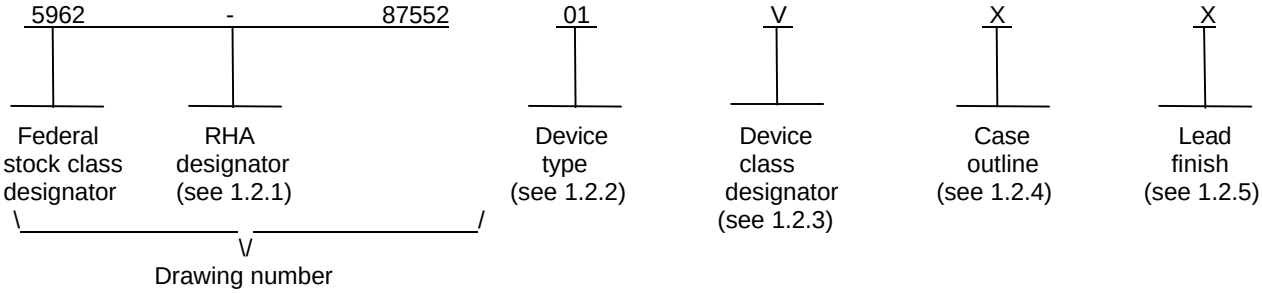
1.1 Scope. This drawing documents two product assurance class levels consisting of high reliability (device classes Q and M) and space application (device class V). A choice of case outlines and lead finishes are available and are reflected in the Part or Identifying Number (PIN). When available, a choice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

Device type	Generic number	Circuit function
01	54AC244	Octal buffer/line driver with three-state outputs
02	54AC11244	Octal buffer/line driver with three-state outputs

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.

Device class	Device requirements documentation
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

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

Outline letter	Descriptive designator	Terminals	Package style
J	GDIP1-T24 or CDIP2-T24	24	Dual-in-line
K	GDFP2-F24 or CDFP3-F24	24	Flat pack
L	GDIP3-T24 or CDIP4-T24	24	Dual-in-line
R	GDIP1-T20 or CDIP2-T20	20	Dual-in-line
S	GDFP2-F20 or CDFP3-F20	20	Flat pack
X	see figure 1	20	Flat pack
Z	GDFP1-G20	20	Flat pack
2	CQCC1-N20	20	Square leadless chip carrier
3	CQCC1-N28	28	Square leadless chip carrier

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/, 2/, 3/

Supply voltage range (V_{CC}) ..... -0.5 V dc to +7.0 V dc
DC input voltage range (V_{IN}) ..... -0.5 V dc to V_{CC} + 0.5 V dc
DC output voltage range (V_{OUT}) ..... -0.5 V dc to V_{CC} + 0.5 V dc
Clamp diode current (I_{IK}, I_{OK}) ..... ±20 mA
DC output current (per output pin) ..... ±50 mA
DC V_{CC} or GND current (per output pin) ..... ±25 mA 4/
Maximum power dissipation (P_D) ..... 500 mW
Storage temperature range (T_{STG}) ..... -65°C to +150°C
Lead temperature (soldering, 10 seconds) ..... +245°C
Thermal resistance, junction-to-case (θ_{JC}) ..... See MIL-STD-1835
Junction temperature (T_J) ..... +175°C 5/

1.4 Recommended operating conditions. 2/, 3/, 6/

Supply voltage range (V_{CC}) ..... +2.0 V dc to +6.0 V dc
Input voltage range (V_{IN}) ..... +0.0 V dc to V_{CC}
Output voltage range (V_{OUT}) ..... +0.0 V dc to V_{CC}
Case operating temperature range (T_C) ..... -55°C to +125°C
Input rise or fall times (t_r, t_f):
  Device type 01;
    V_{CC} = 3.6 V and 5.5 V ..... 0 to 8 ns/V
  Device type 02;
    Data V_{CC} = 3.6 V and 5.5 V ..... 0 to 10 ns/V
    m$\overline{OE}$ V_{CC} = 3.6 V and 5.5 V ..... 0 to 5 ns/V

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/ Unless otherwise noted, all voltages are referenced to GND.
3/ The limits for the parameters specified herein shall apply over the full specified V_{CC} range and case temperature range of -55°C to +125°C.
4/ For devices with multiple V_{CC} or GND pins, this value represents the total V_{CC} or GND current.
5/ Maximum junction temperature shall not be exceeded except for allowable short duration burn-in screening conditions in accordance with method 5004 of MIL-STD-883.
6/ Operation from 2.0 V dc to 3.0 V dc is provided for compatibility with data retention and battery back-up systems. Data retention implies no input transition and no stored data loss with the following conditions: $V_{IH} \geq 70\%\ V_{CC}$, $V_{IL} \leq 30\%\ V_{CC}$, $V_{OH} \geq 70\%\ V_{CC}$ @ -20µA, $V_{OL} \leq 30\%\ V_{CC}$ @ 20 µA.

2. APPLICABLE DOCUMENTS

2.1 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-1835 - Interface Standard Electronic Component 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 Non-Government publications. The following document(s) form a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents which are DOD adopted are those listed in the issue of the DODISS cited in the solicitation. Unless otherwise specified, the issues of documents not listed in the DODISS are the issues of the documents cited in the solicitation.

ELECTRONIC INDUSTRIES ALLIANCE (EIA)

JEDEC Standard No. 20 - Standardized for Description of 54/74ACXXXX and 54/74ACTXXXX Advanced High-Speed CMOS Devices.

(Applications for copies should be addressed to the Electronics Industries Alliance, 2001 Eye Street, NW, Washington, DC 20006.)

(Non-Government standards and other publications are normally available from the organizations that prepare or distribute the documents. These documents may also be available in or through libraries or other informational services.)

2.3 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 table. The truth table shall be as specified on figure 3.

3.2.4 Logic diagram. The logic diagram shall be as specified on figure 4.

3.2.5 Switching waveforms and test circuit. The switching waveforms and test circuit shall be as specified on figure 5.

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 case 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. 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-PRF-38535, appendix A.

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 36 (see MIL-PRF-38535, appendix A).

4. QUALITY ASSURANCE PROVISIONS

4.1 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 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 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 = +125°C, 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).

Table I. Electrical performance characteristics.

Test and MIL-STD-883 test method 1/	Symbol	Test conditions 2/ $-55°C \le T_C \le +125°C$ $+3.0\ V \le V_{CC} \le +5.5\ V$ unless otherwise specified	Device type and Device class	V_{CC}	Group A subgroups	Limits 3/		Unit
						Min	Max	
Positive input clamp voltage 3022	V_{IC+}	For input under test, $I_{IN} = 1.0$ mA	All V	0.0 V	1	0.4	1.5	V
Negative input clamp voltage 3022	V_{IC-}	For input under test, $I_{IN} = -1.0$ mA	All V	Open	1	-0.4	-1.5	V
High level output voltage 3006	V_{OH} 4/	$V_{IN} = V_{IH}$ minimum or V_{IL} maximum	All All	3.0 V	1, 2, 3	2.9		V
		$I_{OH} = -50\ \mu A$	All All	4.5 V	1, 2, 3	4.4		
			All All	5.5 V	1, 2, 3	5.4		
		$V_{IN} = V_{IH}$ minimum or V_{IL} maximum	All All	3.0 V	1	2.56		
		$I_{OH} = -12$ mA			2, 3	2.40		
		$V_{IN} = V_{IH}$ minimum or V_{IL} maximum	All All	4.5 V	1	3.86		
					2, 3	3.70		
		$I_{OH} = -24$ mA	All All	5.5 V	1	4.86		
					2, 3	4.70		
		$V_{IN} = V_{IH}$ minimum or V_{IL} maximum $I_{OH} = -50$ mA	All All	5.5 V	1, 2, 3	3.85		
Low level output voltage 3007	V_{OL} 4/	$V_{IN} = V_{IH}$ minimum or V_{IL} maximum	All All	3.0 V	1, 2, 3		0.1	V
		$I_{OL} = 50\ \mu A$	All All	4.5 V	1, 2, 3		0.1	
			All All	5.5 V	1, 2, 3		0.1	
		$V_{IN} = V_{IH}$ minimum or V_{IL} maximum	All All	3.0 V	1		0.36	
		$I_{OL} = 12$ mA			2, 3		0.50	
		$V_{IN} = V_{IH}$ minimum or V_{IL} maximum	All All	4.5 V	1		0.36	
					2, 3		0.50	
		$I_{OL} = 24$ mA	All All	5.5 V	1		0.36	
					2, 3		0.50	
		$V_{IN} = V_{IH}$ minimum or V_{IL} maximum $I_{OL} = 50$ mA	All All	5.5 V	1, 2, 3		1.65	
High level input voltage	V_{IH} 5/		All All	3.0 V	1, 2, 3	2.1		V
			All All	4.5 V	1, 2, 3	3.15		
			All All	5.5 V	1, 2, 3	3.85		

See footnotes at end of table.

Table I. Electrical performance characteristics - Continued.

Test and MIL-STD-883 test method 1/	Symbol	Test conditions 2/ $-55°C \le T_C \le +125°C$ $+3.0\ V \le V_{CC} \le +5.5\ V$ unless otherwise specified	Device type and Device class	V_{CC}	Group A subgroups	Limits 3/		Unit
						Min	Max	
Low level input voltage	V_{IL} 5/		All All	3.0 V	1, 2, 3		0.9	V
			All All	4.5 V	1, 2, 3		1.35	
			All All	5.5 V	1, 2, 3		1.65	
Input leakage current low 3009	I_{IL}	$V_{IN} = 0.0\ V$	All All	5.5 V	1		-0.1	µA
					2, 3		-1.0	
Input leakage current high 3010	I_{IH}	$V_{IN} = 5.5\ V$	All All	5.5 V	1		0.1	µA
					2, 3		1.0	
Quiescent supply current, output high 3005	I_{CCH}	$V_{IN} = V_{CC}$ or GND	All All	5.5 V	1		4	µA
					2, 3		80	
Quiescent supply current, output low 3005	I_{CCL}	$V_{IN} = V_{CC}$ or GND	All All	5.5 V	1		4	µA
					2, 3		80	
Quiescent supply current, outputs three state 3005	I_{CCZ}	$V_{IN} = V_{CC}$ or GND	All All	5.5 V	1		4	µA
					2, 3		80	
Three state output leakage current high 3021	I_{OZH}	$m\overline{OE} = V_{IH}$ min or V_{IL} max, all other inputs = V_{CC} or GND, $V_{OUT} = 5.5$, test with each $m\overline{OE} = V_{IH}$ min	All All	5.5 V	1, 2, 3		+5.0	µA
Three state output leakage current low 3020	I_{OZL}	$m\overline{OE} = V_{IH}$ min or V_{IL} max, all other inputs = V_{CC} or GND, V_{OUT} = GND, test with each $m\overline{OE} = V_{IH}$ min	All All	5.5 V	1, 2, 3		-5.0	µA
Input capacitance 3012	C_{IN}	See 4.4.1c $T_C = +25°C$	All All		4		8.0	pF
Power dissipation capacitance	C_{PD} 6/	See 4.4.1c $T_C = +25°C$, f = 1 MHz	All All	5.0 V	4		60.0	pF
Functional tests 3014	7/	See 4.4.1b $V_{IN} = V_{IH}$ or V_{IL} Verify output V_{OUT}	All All	3.0 V	7, 8	L	H	
				5.5 V	7, 8	L	H	

See footnotes at end of table.

Table I. Electrical performance characteristics - Continued.

Test and MIL-STD-883 test method 1/	Symbol	Test conditions 2/ $-55°C \le T_C \le +125°C$ $+3.0\ V \le V_{CC} \le +5.5\ V$ unless otherwise specified	Device type and Device class	V_{CC}	Group A subgroups	Limits 3/		Unit
						Min	Max	
Propagation delay time, mAn to mYn 3003	t_{PHL} 8/	C_L = 50 pF minimum R_L = 500Ω See figure 5	01 02 All	3.0 V	9	1.0 1.0	10.5 8.6	ns
			01 02 All		10, 11	1.0 1.0	12.0 10.5	
			01 02 All	4.5 V	9	1.0 1.0	8.0 6.4	
			01 02 All		10, 11	1.0 1.0	9.0 7.4	
	t_{PLH} 8/		01 02 All	3.0 V	9	1.0 1.0	11.0 9.3	
			01 02 All		10, 11	1.0 1.0	12.5 10.8	
			01 02 All	4.5 V	9	1.0 1.0	8.5 6.7	
			01 02 All		10, 11	1.0 1.0	9.5 7.7	
Output disable time, m$\overline{OE}$ to mYn 3003	t_{PHZ} 8/	C_L = 50 pF minimum R_L = 500Ω See figure 5	01 02 All	3.0 V	9	1.0 1.0	10.0 7.9	ns
			01 02 All		10, 11	1.0 1.0	12.5 8.7	
			01 02 All	4.5 V	9	1.0 1.0	9.0 7.0	
			01 02 All		10, 11	1.0 1.0	10.5 7.6	
	t_{PLZ} 8/		01 02 All	3.0 V	9	1.0 1.0	11.0 9.4	
			01 02 All		10, 11	1.0 1.0	13.0 10.4	
			01 02 All	4.5 V	9	1.0 1.0	9.0 7.8	
			01 02 All		10, 11	1.0 1.0	11.0 8.6	

See footnotes at end of table.

Table I. Electrical performance characteristics - Continued.

Test and MIL-STD-883 test method 1/	Symbol	Test conditions 2/ $-55°C \le T_C \le +125°C$ $+3.0\ V \le V_{CC} \le +5.5\ V$ unless otherwise specified	Device type and Device class	V_{CC}	Group A subgroups	Limits 3/		Unit
						Min	Max	
Output enable time, m$\overline{OE}$ to mYn 3003	t_{PZH}	C_L = 50 pF R_L = 500Ω	01 02 All	3.0 V	9	1.0 1.0	10.5 10.7	ns
	8/	See figure 5	01 02 All		10, 11	1.0 1.0	11.5 12.9	
			01 02 All	4.5 V	9	1.0 1.0	7.5 7.7	
			01 02 All		10, 11	1.0 1.0	9.0 9.3	
	t_{PZL}		01 02 All	3.0 V	9	1.0 1.0	11.0 10.6	
	8/		01 02 All		10, 11	1.0 1.0	13.0 12.9	
			01 02 All	4.5 V	9	1.0 1.0	8.5 7.6	
			01 02 All		10, 11	1.0 1.0	10.5 9.1	

1/ For tests not listed in the referenced MIL-STD-883, [e.g. V_{IH}, V_{IL}], utilize the general test procedure under the conditions listed herein.

2/ Each input/output, as applicable, shall be tested at the specified temperature, for the specified limits, to the tests in table I herein. Output terminals not designated shall be high level logic, low level logic, or open, except as follows:

a. V_{IC} (pos) tests, the GND terminal can be open. T_C = +25°C.
b. V_{IC} (neg) tests, the V_{CC} terminal shall be open. T_C = +25°C.
c. All I_{CC} tests, the output terminal shall be open. When performing these tests, the current meter shall be placed in the circuit such that all current flows through the meter.

Additional detailed information on qualified devices (i.e. pin for pin conditions and testing sequence) is available from the qualifying activity (DSCC-VQC) upon request.

3/ For negative and positive voltage and current values, the sign designates the potential difference in reference to GND and the direction of current flow, respectively; and the absolute value of the magnitude, not the sign, is relative to the minimum and maximum limits, as applicable, listed herein. All devices shall meet or exceed the limits specified in table I, as applicable, at $3.0\ V \le V_{CC} \le 3.6\ V$ and $4.5\ V \le V_{CC} \le 5.5\ V$.

4/ The V_{OH} and V_{OL} tests shall be tested at V_{CC} = 3.0 V and 4.5 V. The V_{OH} and V_{OL} tests are guaranteed, if not tested, for other values of V_{CC}. Limits shown apply to operation at V_{CC} = 3.3 V ±0.3 V and V_{CC} = 5.0 V ±0.5 V. Tests with input current at +50 mA or -50 mA are performed on only one input at a time with duration not to exceed 10 ms. Transmission driving tests may be performed using $V_{IN} = V_{CC}$ or GND. When $V_{IN} = V_{CC}$ or GND is used, the test is guaranteed for $V_{IN} = V_{IH}$ minimum and V_{IL} maximum.

Table I. Electrical performance characteristics - Continued.

5/ The V_{IH} and V_{IL} tests are not required if applied as forcing functions for V_{OH} and V_{OL} tests.

6/ Power dissipation capacitance (C_{PD}) determines both the power consumption (P_D) and dynamic current consumption (I_S). Where:

$P_D = (C_{PD} + C_L) (V_{CC} \times V_{CC})f + (I_{CC} \times V_{CC})$

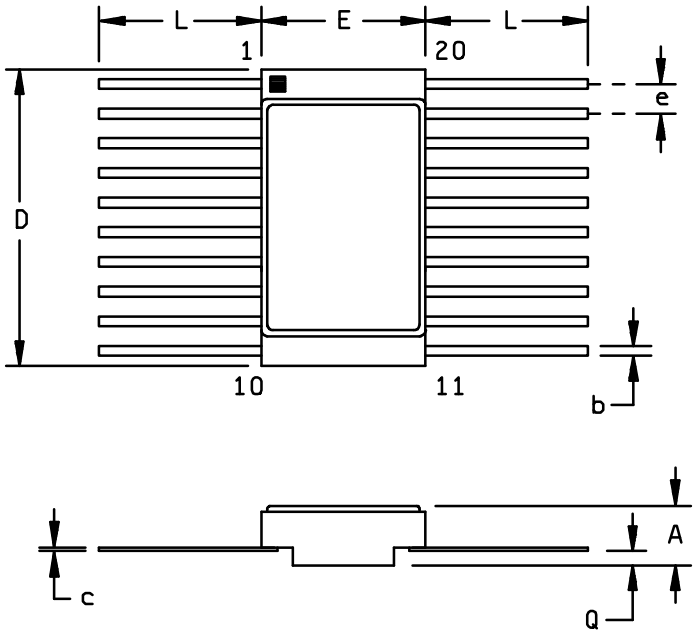
$I_S = (C_{PD} + C_L) V_{CC}f + I_{CC}$

f is the frequency of the input signal and C_L is the external output load capacitance.

7/ Tests shall be performed in sequence, attributes data only. Functional tests shall include the truth table and other logic patterns used for fault detection. The test vectors used to verify the truth table shall, at a minimum, test all functions of each input and output. All possible input to output logic patterns per function shall be guaranteed, if not tested, to the truth table in figure 3 herein. Functional tests shall be performed in sequence as approved by the qualifying activity on qualified devices. For V_{OUT} measurements, $L \leq 0.3V_{CC}$ and $H \geq 0.7V_{CC}$.

8/ For propagation delay tests, all paths must be tested. AC limits at V_{CC} = 5.5 V are equal to the limits at V_{CC} = 4.5 V and guaranteed by testing at V_{CC} = 4.5 V. AC limits at V_{CC} = 3.6 V are equal to limits at V_{CC} = 3.0 V and guaranteed by testing at V_{CC} = 3.0 V. Minimum ac limits for V_{CC} = 5.5 V are 1.0 ns and guaranteed by guardbanding the V_{CC} = 4.5 V minimum limits to 1.5 ns.

Case X



Dimensions				
Symbol	Inches		Millimeters	
	Min	Max	Min	Max
A	.045	.085	1.14	2.16
b	.015	.019	0.38	0.48
c	.003	.006	0.076	0.152
D	.505	.515	12.83	13.08
E	.275	.285	6.99	7.24
e	.045	.055	1.14	1.40
L	.250	.370	6.35	9.39
Q	.010	---	0.25	---
N	20		20	

FIGURE 1. Case outlines.

Device type	01		02	
Case outlines	R, S, X, Z	2	J, K, L	3
Terminal number	Terminal symbol		Terminal symbol	
1	$1\overline{OE}$	$1\overline{OE}$	1Y1	NC
2	1A1	1A1	1Y2	V_{CC}
3	2Y4	2Y4	1Y3	1A4
4	1A2	1A2	1Y4	1A3
5	2Y3	2Y3	GND	1A2
6	1A3	1A3	GND	1A1
7	2Y2	2Y2	GND	$1\overline{OE}$
8	1A4	1A4	GND	NC
9	2Y1	2Y1	2Y1	1Y1
10	GND	GND	2Y2	1Y2
11	2A1	2A1	2Y3	1Y3
12	1Y4	1Y4	2Y4	1Y4
13	2A2	2A2	$2\overline{OE}$	GND
14	1Y3	1Y3	2A4	GND
15	2A3	2A3	2A3	NC
16	1Y2	1Y2	2A2	GND
17	2A4	2A4	2A1	GND
18	1Y1	1Y1	V_{CC}	2Y1
19	$2\overline{OE}$	$2\overline{OE}$	V_{CC}	2Y2
20	V_{CC}	V_{CC}	1A4	2Y3
21	---	---	1A3	2Y4
22	---	---	1A2	NC
23	---	---	1A1	$2\overline{OE}$
24	---	---	$1\overline{OE}$	2A4
25	---	---	---	2A3
26	---	---	---	2A2
27	---	---	---	2A1
28	---	---	---	V_{CC}

NC = no connection

FIGURE 2. Terminal connections.

(Each Buffer)

Inputs		Outputs
$m\overline{OE}$	mAn	mYn
L	L	L
L	H	H
H	X	Z

H = High voltage level
L = Low voltage level
X = Immaterial
Z = High impedance

FIGURE 3. Truth table.

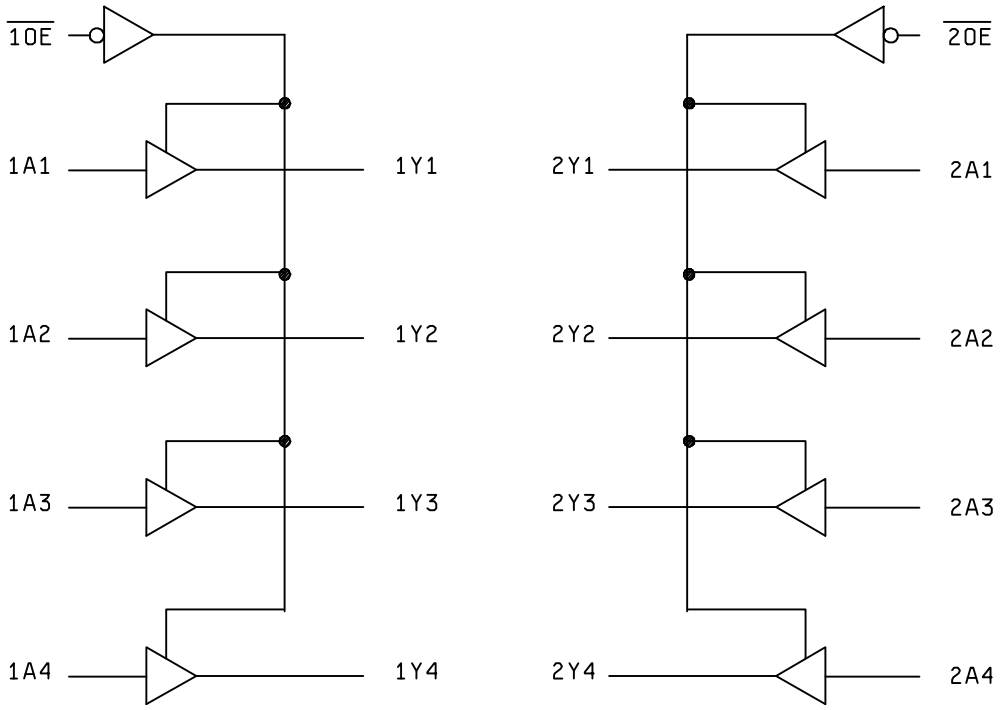
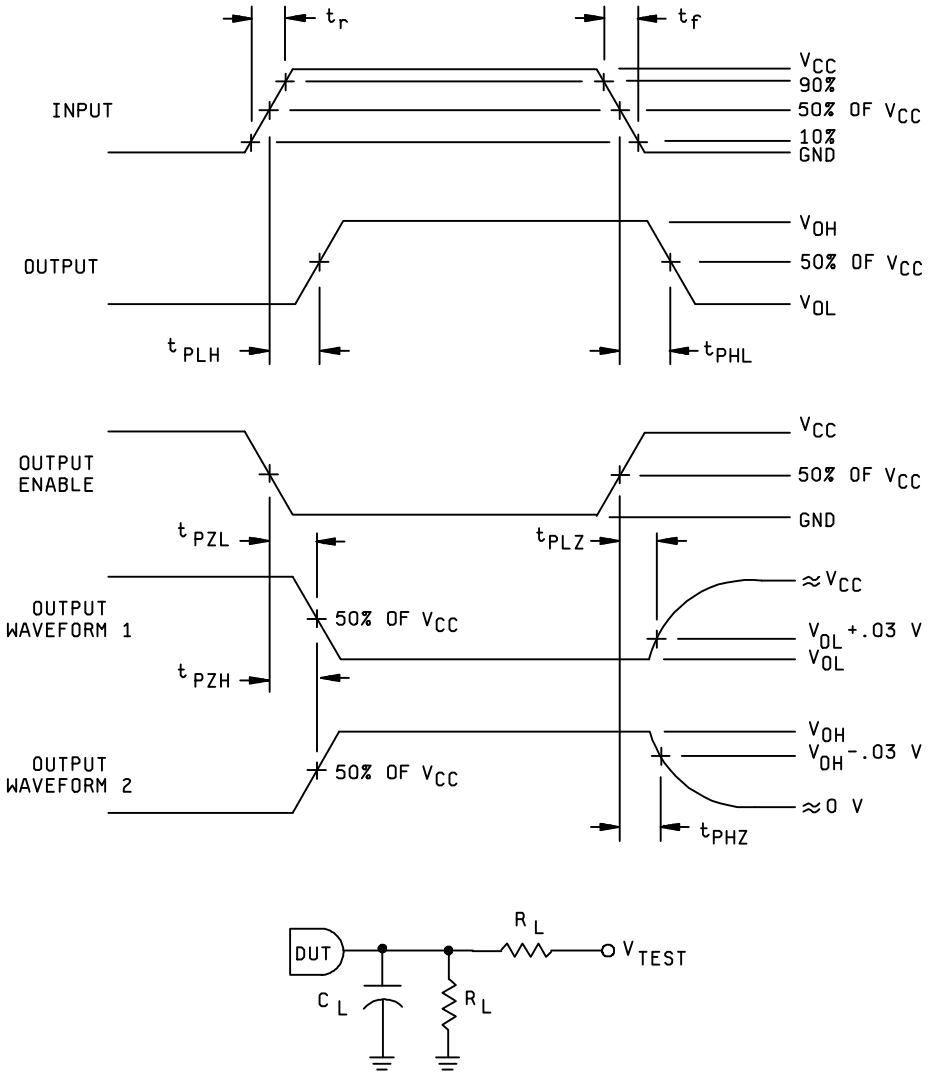


FIGURE 4. Logic diagram.



NOTES:

1. V_{TEST} = open for t_{PLH}, t_{PHL}, t_{PHZ}, and t_{PZH}. V_{TEST} = 2 x V_{CC} for t_{PLZ} and t_{PZL}.
2. C_L = 50 pF or equivalent, (includes probe and jig capacitance).
3. R_L = 500Ω or equivalent.
4. Waveform 1 is for an output with internal conditions such that the output is low except when disabled by the output control. Waveform 2 is for an output with internal conditions such that the output is high except when disabled by the output control.
5. Input signal from pulse generator: V_{IN} = 0.0 V to V_{CC}; PRR ≤ 1 MHz; Z_O = 50Ω; t_r ≤ 3.0 ns; t_f ≤ 3.0 ns; t_r and t_f shall be measured from 10% of V_{CC} to 90% of V_{CC} and from 90% of V_{CC} to 10% of V_{CC}, respectively; duty cycle = 50 percent.
6. Timing parameters shall be tested at a minimum input frequency of 1MHz.
7. The outputs are measured one at a time with one transition per measurement.

FIGURE 5. Switching waveforms and test circuit - Continued.

4.3.1 Electrostatic discharge sensitivity qualification inspection . Electrostatic discharge sensitivity (ESDS) testing shall be performed in accordance with MIL-STD-883, method 3015. ESDS testing shall be measured only for initial qualification and after process or design changes which may affect ESDS classification.

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. 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).

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
Final electrical parameters (see 4.2)	1/ 1, 2, 3, 7, 8, 9	1/ 1, 2, 3, 7, 8, 9	2/, 3/ 1, 2, 3, 7, 8, 9, 10, 11
Group A test requirements (see 4.4)	1, 2, 3, 4, 7, 8, 9, 10, 11	1, 2, 3, 4, 7, 8, 9, 10, 11	1, 2, 3, 4, 7, 8, 9, 10, 11
Group C end-point electrical parameters (see 4.4)	1, 2, 3	1, 2, 3	3/ 1, 2, 3, 7,8, 9, 10, 11
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, 7, 9	1, 7, 9	1, 7, 9

1/ PDA applies to subgroup 1.
2/ PDA applies to subgroups 1, 7, and deltas.
3/ Delta limits as specified in table III shall be required where specified, and the delta limits shall be completed with reference to the zero hour electrical parameters.

Table III. Burn-in and operating life test delta parameters (+25°C).

Parameter	Symbol	Delta Limits
Supply current	I_{CC}	±300 nA
Input current low level	I_{IL}	±20 nA
Input current high level	I_{IH}	±20 nA
Output voltage low level V_{CC} = 5.5 V I_{OL} = 24 mA	V_{OL}	±0.04 V
Output voltage high level V_{CC} = 5.5 V I_{OH} = -24 mA	V_{OH}	±0.20 V

4.4.1 Group A inspection

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

b. For device class M, subgroups 7 and 8 tests shall be sufficient to verify the truth table in figure 3 herein. The test vectors used to verify the truth table shall, at a minimum, test all functions of each input and output. All possible input to output logic patterns per function shall be guaranteed, if not tested, to the truth table in figure 3, herein. For device classes Q and V, subgroups 7 and 8 shall include verifying the functionality of the device.

c. C_{IN} and C_{PD} shall be measured only for initial qualification and after process or design changes which may affect capacitance. C_{IN} shall be measured between the designated terminal and GND at a frequency of 1 MHz. C_{PD} shall be tested in accordance with the latest revision of JEDEC Standard No. 20 and table I herein. For C_{IN} and C_{PD}, test all applicable pins on five devices with zero failures.

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 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 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 = +125°C, 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.

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).

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

b. For device classes Q and V, the devices or test vehicle shall be subjected to radiation hardness assured tests as specified in MIL-PRF-38535 for the RHA level being tested. For device class M, the devices shall be subjected to radiation hardness assured tests as specified in MIL-PRF-38535, appendix A for the RHA level being tested. All device classes must meet the postirradiation end-point electrical parameter limits as defined in table I at T_A = +25°C ±5°C, after exposure, to the subgroups specified in table II herein.

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

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

4.5.1 Voltage and current. Unless otherwise specified, all voltages given are referenced to the microcircuit GND terminal. Currents given are conventional current and positive when flowing into the referenced terminal.

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.

6.1.2 Substitutability. Device class Q devices will replace device class M devices.

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 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) 692-0544.

6.4 Comments. Comments on this drawing should be directed to DSCC-VA, Columbus, Ohio 43216-5000, or telephone (614) 692-0547.

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.

STANDARD MICROCIRCUIT DRAWING SOURCE APPROVAL BULLETIN

DATE: 01-07-23

Approved sources of supply for SMD 5962-87552 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 1/	Vendor CAGE number	Vendor similar PIN 2/
5962-8755201RA	27014 01295	54AC244DMQB SNJ54AC244J
5962-8755201SA	27014 01295	54AC244FMQB SNJ54AC244W
5962-8755201XA	F8859	54AC244K02Q
5962-8755201XC	F8859	54AC244K01Q
5962-8755201ZA	27014	54AC244WG-QML
5962-8755201VSA	3/	
5962-8755201VXA	F8859	54AC244K02V
5962-8755201VXC	F8859	54AC244K01V
5962-87552012A	27014 01295	54AC244LMQB SNJ54AC244FK
5962-8755202JA	3/	
5962-8755202KA	3/	
5962-8755202LA	3/	
5962-87552023A	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.

3/ No longer available from an approved source of supply.

Vendor CAGE number	Vendor name and address
27014	National Semiconductor 2900 Semiconductor Drive P. O. Box 58090 Santa Clara, CA 95052-8090 Point of contact: 5 Foden Road South Portland, ME 04106
F8859	ST Microelectronics 3 rue de Suisse BP4199 35041 RENNES cedex2 - France
01295	Texas Instruments 8505 Forest Ln. P. O. Box 660199 Dallas, TX 75243 Point of contact: U.S. Highway 75 South P. O. Box 84 M/S 853 Sherman, TX 75090-9493