

REVISIONS

LTR	DESCRIPTION	DATE (YR-MO-DA)	APPROVED
D	Delete vendors: CAGE 07263, 27014, and 18324. Delete all sources from 7700101AX, and add footnote. Add logic diagram. Figure 1, change pin 1 to CKB and pin 14 to CKA. Revise to military drawing format.	87-11-09	R. P. Evans
E	Changes in accordance with NOR 5962-R173-92. --tvn	92-04-27	Monica L. Poelking
F	Update to reflect latest changes in format and requirements. Editorial changes throughout. --les	03-08-26	Raymond Monnin
G	Update to reflect latest changes in format and requirements. Correct paragraph in 3.5. Editorial changes throughout. --les	05-08-16	Raymond Monnin

THE ORIGINAL FIRST PAGE OF THIS DRAWING HAS BEEN REPLACED.

CURRENT CAGE CODE 67268

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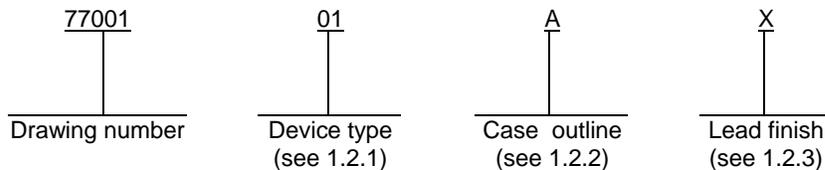
REV STATUS	REV	G	G	G	G	G	G	G	G	G	G	G	G	G	G		
OF SHEETS	SHEET	1	2	3	4	5	6	7	8	9	10	11	12				

PMIC N/A	PREPARED BY Monica L. Grosel	<p align="center">DEFENSE SUPPLY CENTER COLUMBUS COLUMBUS, OHIO 43218-3990 http://www.dsccl.dla.mil</p> <p align="center">MICROCIRCUIT, DIGITAL, BIPOLAR LOW-POWER SCHOTTKY TTL, COUNTER, MONOLITHIC SILICON</p>															
<p align="center">STANDARD MICROCIRCUIT DRAWING</p> <p>THIS DRAWING IS AVAILABLE FOR USE BY ALL DEPARTMENTS AND AGENCIES OF THE DEPARTMENT OF DEFENSE</p> <p align="center">AMSC N/A</p>	CHECKED BY D. A. DiCenzo																
	APPROVED BY Robert P. Evans																
	DRAWING APPROVAL DATE 77-02-03																
	REVISION LEVEL G	SIZE A	CAGE CODE 14933	77001													
		SHEET 1 OF 8															

1. SCOPE

1.1 Scope. This drawing describes device requirements for MIL-STD-883 compliant, non-JAN class level B microcircuits in accordance with MIL-PRF-38535, appendix A.

1.2 Part or Identifying Number (PIN). The complete PIN is as shown in the following example:



1.2.1 Device type. The device type identify the circuit function as follows:

<u>Device type</u>	<u>Generic number</u>	<u>Circuit function</u>
01	54LS93	Binary counter

1.2.2 Case outlines. The case outlines are as designated in MIL-STD-1835 and as follows:

<u>Outline letter</u>	<u>Descriptive designator</u>	<u>Terminals</u>	<u>Package style</u>
A	GDFP5-F14 or CDFP6-F14	14	flat
C	GDIP1-T14 or CDIP2-T14	14	dual-in-line
D	GDFP1-F14 or CDFP2-F14	14	flat

1.2.3 Lead finish. The lead finish is as specified in MIL-PRF-38535, appendix A.

1.3 Absolute maximum ratings.

Supply voltage range	-0.5 V dc to +7.0 V dc
Input voltage range	-1.5 V dc at -18 mA to +5.5 V dc
Storage temperature range.....	-65°C to +150°C
Maximum power dissipation (P _D) per device ^{1/}	83 mW
Lead temperature (soldering, 10 seconds)	+300°C
Thermal resistance, junction-to-case (θ _{JC})	See MIL-STD-1835
Junction temperature (T _J)	+175°C

1.4 Recommended operating conditions.

Supply voltage range (V _{CC})	4.5 V dc minimim to 5.5 V dc maximum
Minimum high level input voltage (V _{IH})	2.0 V dc
Maximum low level input voltage (V _{IL})	0.7 V dc
Case operating temperature range (T _C)	-55°C to +125°C

^{1/} Maximum power dissipation is defined as V_{CC} x I_{CC}, and must withstand the added P_D due to short-circuit test; e.g., I_{OS}.

STANDARD MICROCIRCUIT DRAWING DEFENSE SUPPLY CENTER COLUMBUS COLUMBUS, OHIO 43218-3990	SIZE A	77001
	REVISION LEVEL G	SHEET 2

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 cited in the solicitation or contract.

DEPARTMENT OF DEFENSE SPECIFICATION

MIL-PRF-38535 - Integrated Circuits, Manufacturing, General Specification for.

DEPARTMENT OF DEFENSE STANDARDS

MIL-STD-883 - Test Method Standard Microcircuits.
MIL-STD-1835 - Interface Standard Electronic Component Case Outlines.

DEPARTMENT OF DEFENSE HANDBOOKS

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

(Copies of these documents are available online at <http://assist.daps.dla.mil/quicksearch/> or <http://assist.daps.dla.mil> or 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 shall be in accordance with MIL-PRF-38535, appendix A for non-JAN class level B devices and as specified herein. Product built to this drawing that is produced by a Qualified Manufacturer Listing (QML) certified and qualified manufacturer or a manufacturer who has been granted transitional certification to MIL-PRF-38535 may be processed as QML product in accordance with the manufacturers approved program plan and qualifying activity approval in accordance with MIL-PRF-38535. This QML flow as documented in the Quality Management (QM) plan may make modifications to the requirements herein. These modifications shall not affect form, fit, or function of the device. These modifications shall not affect the PIN as described herein. A "Q" or "QML" certification mark in accordance with MIL-PRF-38535 is required to identify when the QML flow option is used.

3.2 Design, construction, and physical dimensions. The design, construction, and physical dimensions shall be as specified in MIL-PRF-38535, appendix A and herein.

3.2.1 Case outlines. The case outlines shall be in accordance with 1.2.2 herein.

3.2.2 Terminal connections. The terminal connections shall be as specified on figure 1.

3.2.3 Truth table. The truth table shall be as specified on figure 2.

3.2.4 Logic diagrams. The logic diagrams shall be as specified on figure 3.

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

STANDARD MICROCIRCUIT DRAWING DEFENSE SUPPLY CENTER COLUMBUS COLUMBUS, OHIO 43218-3990	SIZE A		77001
		REVISION LEVEL G	SHEET 3

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

3.5 Marking. Marking shall be in accordance with MIL-PRF-38535, appendix A. The part shall be marked with the PIN listed in 1.2 herein. In addition, the manufacturer's PIN may also be marked.

3.5.1 Certification/compliance mark. A compliance indicator "C" shall be marked on all non-JAN devices built in compliance to MIL-PRF-38535, appendix A. The compliance indicator "C" shall be replaced with a "Q" or "QML" certification mark in accordance with MIL-PRF-38535 to identify when the QML flow option is used.

3.6 Certificate of compliance. 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 herein). The certificate of compliance submitted to DSCC-VA prior to listing as an approved source of supply shall affirm that the manufacturer's product meets the requirements of MIL-PRF-38535, appendix A and the requirements herein.

3.7 Certificate of conformance. A certificate of conformance as required in MIL-PRF-38535, appendix A shall be provided with each lot of microcircuits delivered to this drawing.

3.8 Notification of change. Notification of change to DSCC-VA shall be required for any change that affects this drawing.

3.9 Verification and review. 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.

4. VERIFICATION

4.1 Sampling and inspection. Sampling and inspection procedures shall be in accordance with MIL-PRF-38535, appendix A.

4.2 Screening. Screening shall be in accordance with method 5004 of MIL-STD-883, and shall be conducted on all devices prior to quality conformance inspection. 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 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 method 1015 of MIL-STD-883.

(2) $T_A = +125^\circ\text{C}$, minimum.

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.

STANDARD MICROCIRCUIT DRAWING DEFENSE SUPPLY CENTER COLUMBUS COLUMBUS, OHIO 43218-3990	SIZE A		77001
		REVISION LEVEL G	SHEET 4

TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions -55°C ≤ T _C ≤ +125°C unless otherwise specified	Group A subgroups	Device type	Limits		Unit
					Min	Max	
High level output voltage	V _{OH}	V _{CC} = 4.5 V, I _{OH} = -0.4 mA, V _{IH} = 2.0 V, V _{IL} = 0.7 V	1, 2, 3	All	2.5		V
Low level output voltage	V _{OL}	V _{CC} = 4.5 V, I _{OL} = 4.0 mA, V _{IH} = 2.0 V, V _{IL} = 0.7 V	1, 2, 3	All		0.4	V
Input clamp voltage	V _{IC}	V _{CC} = 4.5 V, I _{IN} = -18 mA T _C = +25°C	1	All		-1.5	V
High level input current at reset inputs	I _{IH1}	V _{CC} = 5.5 V, V _{IH} = 2.7 V	1, 2, 3	All		20	μA
	I _{IH2}	V _{CC} = 5.5 V, V _{IH} = 5.5 V	1, 2, 3	All		100	μA
High level input current at A input	I _{IH3}	V _{CC} = 5.5 V, V _{IH} = 2.7 V	1, 2, 3	All		40	μA
	I _{IH4}	V _{CC} = 5.5 V, V _{IH} = 5.5 V	1, 2, 3	All		200	μA
High level input current at B input	I _{IH5}	V _{CC} = 5.5 V, V _{IH} = 2.7 V	1, 2, 3	All		80	μA
	I _{IH6}	V _{CC} = 5.5 V, V _{IH} = 5.5 V	1, 2, 3	All		400	μA
Low level input current at reset inputs	I _{IL1}	V _{CC} = 5.5 V, V _{IL} = 0.4 V	1, 2, 3	All		-0.4	mA
Low level input current at A input	I _{IL2}	V _{CC} = 5.5 V, V _{IL} = 0.4 V	1, 2, 3	All		-2.4	mA
Low level input current at B input	I _{IL3}	V _{CC} = 5.5 V, V _{IL} = 0.4 V	1, 2, 3	All		-3.2	mA
Short circuit output current	I _{OS}	V _{CC} = 5.5 V, V _{OUT} = 0 V <u>1/</u>	1, 2, 3	All	-15	-130	mA
Supply current	I _{CC}	V _{CC} = 5.5 V	1, 2, 3	All		15	mA
Functional tests		See 4.3.1c	7	All			

See footnotes at end of table.

STANDARD MICROCIRCUIT DRAWING DEFENSE SUPPLY CENTER COLUMBUS COLUMBUS, OHIO 43218-3990	SIZE A		77001
		REVISION LEVEL G	SHEET 5

TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions -55°C ≤ T _C ≤ +125°C unless otherwise specified		Group A subgroups	Device type	Limits		Unit
						Min	Max	
Maximum clock frequency from A to Q _A	f _{MAX1}	V _{CC} = 5.0 V, R _L = 2 kΩ ±5% 2/	C _L = 15 pF ±10%	9	All	32		MHz
				10, 11	All	20		MHz
			C _L = 50 pF ±10%	9	All	28		MHz
				10, 11	All	19		MHz
Maximum clock frequency from B to Q _B	f _{MAX2}		C _L = 15 pF ±10%	9	All	16		MHz
				10, 11	All	10		MHz
			C _L = 50 pF ±10%	9	All	11		MHz
				10, 11	All	6		MHz
Propagation delay time, output from A to Q _A	t _{PHL1}	C _L = 15 pF ±10%	9	All		18	ns	
			10, 11	All		25	ns	
		C _L = 50 pF ±10%	9	All		23	ns	
			10, 11	All		32	ns	
	t _{PLH1}	C _L = 15 pF ±10%	9	All		16	ns	
			10, 11	All		22	ns	
		C _L = 50 pF ±10%	9	All		21	ns	
			10, 11	All		29	ns	
Propagation delay time, output from A to Q _D	t _{PHL2}	C _L = 15 pF ±10%	9	All		70	ns	
			10, 11	All		98	ns	
		C _L = 50 pF ±10%	9	All		75	ns	
			10, 11	All		105	ns	
	t _{PLH2}	C _L = 15 pF ±10%	9	All		70	ns	
			10, 11	All		98	ns	
		C _L = 50 pF ±10%	9	All		75	ns	
			10, 11	All		105	ns	

See footnotes at end of table.

STANDARD MICROCIRCUIT DRAWING DEFENSE SUPPLY CENTER COLUMBUS COLUMBUS, OHIO 43218-3990	SIZE A		77001
		REVISION LEVEL G	SHEET 6

TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions -55°C ≤ T _C ≤ +125°C unless otherwise specified		Group A subgroups	Device type	Limits		Unit		
						Min	Max			
Propagation delay time, output from B to Q _B	t _{PHL3}	V _{CC} = 5.0 V, R _L = 2 kΩ ±5% 2/	C _L = 15 pF ±10%	9	All		21	ns		
				10, 11	All		29	ns		
			C _L = 50 pF ±10%	9	All		26	ns		
				10, 11	All		36	ns		
			t _{PLH3}	C _L = 15 pF ±10%	9	All		16	ns	
					10, 11	All		22	ns	
	C _L = 50 pF ±10%		9	All		21	ns			
			10, 11	All		29	ns			
	Propagation delay time, output from B to Q _C		t _{PHL4}	V _{CC} = 5.0 V, R _L = 2 kΩ ±5% 2/	C _L = 15 pF ±10%	9	All		35	ns
						10, 11	All		49	ns
					C _L = 50 pF ±10%	9	All		40	ns
						10, 11	All		56	ns
t _{PLH4}		C _L = 15 pF ±10%			9	All		32	ns	
					10, 11	All		45	ns	
C _L = 50 pF ±10%		9	All			37	ns			
		10, 11	All			52	ns			
Propagation delay time, output from B to Q _D		t _{PHL5}	V _{CC} = 5.0 V, R _L = 2 kΩ ±5% 2/		C _L = 15 pF ±10%	9	All		51	ns
						10, 11	All		71	ns
					C _L = 50 pF ±10%	9	All		56	ns
						10, 11	All		78	ns
	t _{PLH5}			C _L = 15 pF ±10%	9	All		51	ns	
					10, 11	All		71	ns	
	C _L = 50 pF ±10%	9		All		56	ns			
		10, 11		All		78	ns			

See footnotes at end of table.

STANDARD MICROCIRCUIT DRAWING DEFENSE SUPPLY CENTER COLUMBUS COLUMBUS, OHIO 43218-3990	SIZE A		77001
		REVISION LEVEL G	SHEET 7

TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions -55°C ≤ T _C ≤ +125°C unless otherwise specified		Group A subgroups	Device type	Limits		Unit
						Min	Max	
Propagation delay time, output from set-to-0 to output	t _{PHL6}	V _{CC} = 5.0 V, R _L = 2 kΩ ±5% <u>2/</u>	C _L = 5 pF ±10%	9	All		40	ns
				10, 11	All		56	ns
			C _L = 50 pF ±10%	9	All		45	ns
				10, 11	All		63	ns

- 1/ Not more than one output should be shorted at a time, and the duration of the short-circuit condition should not exceed one second.
- 2/ Propagation delay time testing and maximum clock frequency testing may be performed using either C_L = 15 pF or C_L = 50 pF. However, the manufacturer must certify and guarantee that the microcircuits meet the switching test limits specified for a 50 pF load.

STANDARD MICROCIRCUIT DRAWING DEFENSE SUPPLY CENTER COLUMBUS COLUMBUS, OHIO 43218-3990	SIZE A		77001
		REVISION LEVEL G	SHEET 8

Device type	01
Case outlines	A, C, and D
Terminal number	Terminal symbol
1	CKB
2	R ₀₍₁₎
3	R ₀₍₂₎
4	NC
5	V _{CC}
6	NC
7	NC
8	Q _C
9	Q _B
10	GND
11	Q _D
12	Q _A
13	NC
14	CKA

NC = No connection.

FIGURE 1. Terminal connections.

Truth table

Count	Output			
	Q _A	Q _B	Q _C	Q _D
0	L	L	L	L
1	H	L	L	L
2	L	H	L	L
3	H	H	L	L
4	L	L	H	L
5	H	L	H	L
6	L	H	H	L
7	H	H	H	L
8	L	L	L	H
9	H	L	L	H
10	L	H	L	H
11	H	H	L	H
12	L	L	H	H
13	H	L	H	H
14	L	H	H	H
15	H	H	H	H

Mode selection

Reset inputs		Outputs			
R ₀₍₁₎	R ₀₍₂₎	Q _A	Q _B	Q _C	Q _D
H	H	L	L	L	L
L	H	Count			
H	L	Count			
L	L	Count			

H = High voltage level
L = Low voltage level
X = Don't care

NOTE: Output Q_A connected to input B

FIGURE 2. Truth table.

STANDARD MICROCIRCUIT DRAWING DEFENSE SUPPLY CENTER COLUMBUS COLUMBUS, OHIO 43218-3990	SIZE A		77001
		REVISION LEVEL G	SHEET 9

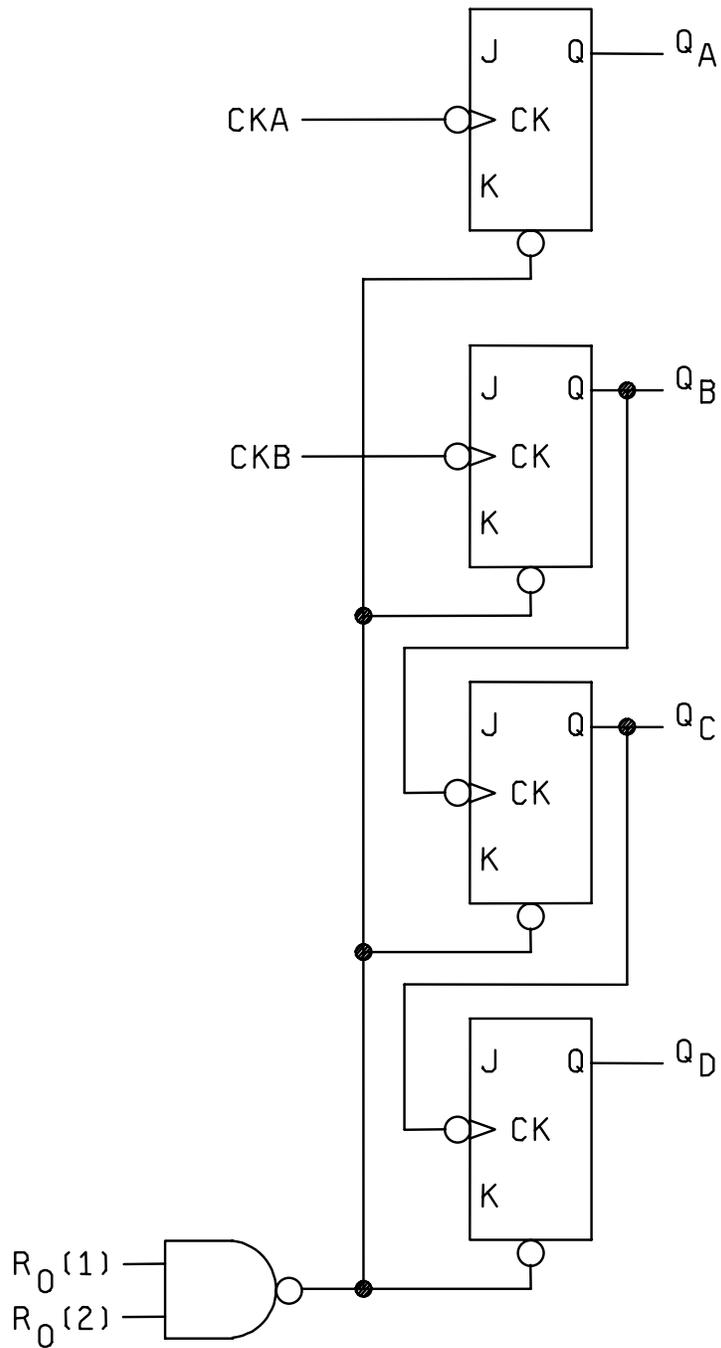


FIGURE 3. Logic diagram.

STANDARD MICROCIRCUIT DRAWING DEFENSE SUPPLY CENTER COLUMBUS COLUMBUS, OHIO 43218-3990	SIZE A		77001
		REVISION LEVEL G	SHEET 10

TABLE II. Electrical test requirements.

MIL-STD-883 test requirements	Subgroups (in accordance with MIL-STD-883, method 5005, table I)
Interim electrical parameters (method 5004)	- - -
Final electrical test parameters (method 5004)	1*, 2, 3, 9
Group A test requirements (method 5005)	1, 2, 3, 7, 9, 10**, 11**
Groups C and D end-point electrical parameters (method 5005)	1, 2, 3

* PDA applies to subgroup 1.

** Subgroups 10 and 11, if not tested, shall be guaranteed to the specified limits in table I.

4.3 Quality conformance inspection. Quality conformance inspection shall be in accordance with method 5005 of MIL-STD-883 including groups A, B, C, and D inspections. The following additional criteria shall apply.

4.3.1 Group A inspection.

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

4.3.2 Groups C and D inspections.

- a. End-point electrical parameters shall be as specified in table II herein.
- b. Steady-state life test conditions, 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 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 method 1005 of MIL-STD-883.
 - (2) $T_A = +125^{\circ}\text{C}$, minimum.
 - (3) Test duration: 1,000 hours, except as permitted by method 1005 of MIL-STD-883.

STANDARD MICROCIRCUIT DRAWING DEFENSE SUPPLY CENTER COLUMBUS COLUMBUS, OHIO 43218-3990	SIZE A		77001
		REVISION LEVEL G	SHEET 11

5. PACKAGING

5.1 Packaging requirements. The requirements for packaging shall be in accordance with MIL-PRF-38535, appendix A.

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 using DD Form 1692, Engineering Change Proposal.

6.4 Record of users. Military and industrial users shall inform Defense Supply Center Columbus (DSCC) 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 microelectronics devices (FSC 5962) should contact DSCC-VA, telephone (614) 692-0544.

6.5 Comments. Comments on this drawing should be directed to DSCC-VA, Columbus, Ohio 43218-3990, or telephone (614) 692-0547.

6.6 Approved sources of supply. Approved sources of supply 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 DEFENSE SUPPLY CENTER COLUMBUS COLUMBUS, OHIO 43218-3990	SIZE A		77001
		REVISION LEVEL G	SHEET 12

STANDARD MICROCIRCUIT DRAWING BULLETIN

DATE: 05-08-16

Approved sources of supply for SMD 77001 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 information bulletin is superseded by the next dated revision of MIL-HDBK-103 and QML-38535. DSCC maintains an online database of all current sources of supply at <http://www.dscclia.mil/Programs/Smcr/>.

Standard microcircuit drawing PIN <u>1/</u>	Vendor CAGE number	Vendor similar PIN <u>2/</u>	Reference military specification part number
7700101AA	58625	SL54LS93/BAA	M38510/31502BAA
7700101CA	58625 <u>3/</u> 01295	SL54LS93/BCA 54LS93BCAJC SNJ54LS93J	M38510/31502BCA
7700101DA	58625 01295	SL54LS93/BDA SN54LS93W	M38510/31502BDA

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/ Not available from an approved source of supply.

Vendor CAGE number

Vendor name and address

58625

Lansdale Semiconductor Inc.
2929 South 48th St.
Tempe, AZ 85282

01295

Texas Instruments, Inc.
Semiconductor Group
8505 Forest Ln.
PO Box 660199
Dallas, Tx 75243

POC U.S. Highway 75 South
P.O. Box 84, M/S 853
Sherman, TX 75090-9493

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