

LTR	DESCRIPTION	DATE (YR-MO-DA)	APPROVED
A	Changes in accordance with NOR 5962-R345-92 - tvn	92 -10 - 05	Monica Poelking
B	Changes in accordance with NOR 5962-R137-96 - les	96 - 06 - 05	Michael A. Frye
C	Add a new package outline letter F - tdn	97 - 08 - 07	Raymond Monnin



REV																				
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REV STATUS OF SHEETS	REV	C	C	C	C	C	C	C	C	C	C	C								
	SHEET	1	2	3	4	5	6	7	8	9	10									

PMIC N/A	PREPARED BY Larry Gauder	<b>DEFENSE SUPPLY CENTER COLUMBUS COLUMBUS, OHIO 43216</b>		
<b>STANDARD MICROCIRCUIT DRAWING</b>  THIS DRAWING IS AVAILABLE FOR USE BY ALL DEPARTMENTS AND AGENCIES OF THE DEPARTMENT OF DEFENSE  AMSC N/A	CHECKED BY Raymond Monnin			
	APPROVED BY Dan DiCenzo			
	DRAWING APPROVAL DATE 24 AUGUST 1988			
	REVISION LEVEL C	SIZE <b>A</b> CAGE CODE <b>67268</b> <b>5962-88698</b>		
		SHEET 1 OF 10		

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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:

<u>5962-88698</u>	<u>01</u>	<u>E</u>	<u>X</u>
*	*	*	*
*	*	*	*
*	*	*	*
*	*	*	*
-----	-----	-----	-----
Drawing number	Device type (see 1.2.1)	Case outline (see 1.2.2)	Lead finish (see 1.2.3)

1.2.1 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	54ALS193A	Synchronous 4-bit up/down counters

1.2.2 Case outline(s). The case outline(s) 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>
E	CDIP1-T16 or GDIP1-T16	16	Dual-in-line package
F	GDFP2-F16 or CDFP3-F16	16	Flat pack
2	CQCC1-N20	20	Square leadless chip carrier

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 minimum to +7.0 V dc maximum
Input voltage range-----	-1.5 V dc at -18 mA to +7.0 V dc
Storage temperature range-----	-65°C to +150°C
Lead temperature (soldering, 10 seconds)----	+300°C
Junction temperature (T <sub>j</sub> )-----	+175°C
Maximum power dissipation (P <sub>D</sub> ) 1/-----	121 mW
Thermal resistance, junction-to-case θ <sub>JC</sub> -----	See MIL-STD-1835

1.4 Recommended operating conditions

Supply voltage range (V <sub>CC</sub> )-----	+4.5 V dc minimum to +5.5 V dc maximum
Minimum high level input voltage (V <sub>IH</sub> )-----	+2.0 V dc
Maximum low level input voltage (V <sub>IL</sub> ):	
T <sub>C</sub> = +125°C-----	+0.7 V dc
T <sub>C</sub> = -55°C-----	+0.8 V dc
T <sub>C</sub> = +25°C-----	+0.8 V dc
High level output current (I <sub>OH</sub> )-----	-0.4 mA
Low level output current (I <sub>OL</sub> )-----	4 mA
Case operating temperature range (T <sub>C</sub> )-----	-55°C to +125°C
Input setup time t <sub>sr</sub> :	
Data before LOAD ↑-----	25 ns minimum
Clear inactive before UP↑ or DOWN ↓-----	20 ns minimum
LOAD inactive before UP↑ or DOWN ↓-----	20 ns minimum

1/ Maximum power dissipation is defined as V<sub>CC</sub> x I<sub>CC</sub>, and must withstand the added P<sub>D</sub> to short circuit test; e.g., b.

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Input hold time $t_{IH}$	5 ns minimum
Data after LOAD	5 ns minimum
UP high after DOWN $t_{UH}$	5 ns minimum
DOWN high after UP $t_{DH}$	5 ns minimum
Input pulse width $t_w$	
CLR high	10 ns minimum
LOAD low	25 ns minimum
UP or DOWN, high or low	30 ns minimum

## 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

#### MILITARY

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

### STANDARDS

#### MILITARY

MIL-STD-883 - Test Methods and Procedures for Microelectronics.

MIL-STD-973 - Configuration Management.

MIL-STD-1835 - Microcircuit Case Outlines.

### HANDBOOKS

#### MILITARY

MIL-HDBK-103 - List of Standard Microcircuit Drawings (SMD's).

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 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.

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- 3.2.1 Case outline(s) The case outline(s) 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(s) The truth table(s) shall be as specified on figure 2.
- 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 or ambient) 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 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 as listed in MIL-HDBK-103 (see 6.6 herein). 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.
- 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 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 in accordance with MIL-PRF-38535, appendix A.
- 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. QUALITY ASSURANCE PROVISIONS

- 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 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 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 test prior to burn-in are optional at the discretion of the manufacturer.

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TABLE I. Electrical performance characteristics

Test	Symbol	Conditions -55°C ≤ T <sub>C</sub> ≤ +125°C unless otherwise specified		Group A subgroups	Device Type	Limits		Unit				
						Min	Max					
High level output voltage	V <sub>OH</sub>	V <sub>CC</sub> = 4.5 V I <sub>OH</sub> = -0.4 mA V <sub>IH</sub> = 2.0 V 2/	V <sub>IL</sub> = 0.7 V	2	01	2.5		V				
			V <sub>IL</sub> = 0.8 V	1, 3	01							
Low level output voltage	V <sub>OL</sub>	V <sub>CC</sub> = 4.5 V I <sub>OL</sub> = 4.0 mA V <sub>IH</sub> = 2.0 V 2/	V <sub>IL</sub> = 0.7 V	2	01		0.4	V				
			V <sub>IL</sub> = 0.8 V	1, 3	01							
Input clamp voltage	V <sub>IC</sub>	V <sub>CC</sub> = 4.5 V I <sub>IN</sub> = -18 mA		1, 2, 3	01		-1.5	V				
Low level input current	I <sub>IL</sub>	V <sub>CC</sub> = 5.5 V V <sub>IN</sub> = 0.4V unused inputs ≥ 4.5 V	UP, DOWN	1, 2, 3	01		-0.2	mA				
			All others				-0.1					
High level input current	I <sub>IH1</sub>	V <sub>CC</sub> = 5.5 V, V <sub>IN</sub> = 2.7 V unused inputs = 0.0 V		1, 2, 3	01		20	μA				
	I <sub>IH2</sub>	V <sub>CC</sub> = 5.5 V, V <sub>IN</sub> = 7.0 V unused inputs = 0.0 V		1, 2, 3	01		0.1	mA				
Output current	I <sub>O</sub>	V <sub>CC</sub> = 5.5 V, V <sub>OUT</sub> = 2.25 V 3/		1, 2, 3	01	-20	-112	mA				
Supply current	I <sub>CC</sub>	V <sub>CC</sub> = 5.5 V 4/		1, 2, 3	01		22	mA				
Functional tests		See 4.3.1c 5/		7, 8	01							
Clock frequency	f <sub>MAX</sub>	V <sub>CC</sub> = 4.5 to 5.5 V C <sub>L</sub> = 50 pF R <sub>L</sub> = 500Ω See figure 3 6/		9, 10, 11	01	25		MHz				
Propagation delay time, from UP to CO	t <sub>PLH1</sub>			9, 10, 11	01	3	19	ns				
	t <sub>PHL1</sub>						3	21	ns			
Propagation delay time, from DOWN to BO	t <sub>PLH2</sub>					9, 10, 11	01	4	19	5	21	ns
	t <sub>PHL2</sub>											
Propagation delay time, from UP or DOWN to any Q	t <sub>PLH3</sub>					9, 10, 11	01	3	23	4	20	ns
	t <sub>PHL3</sub>											
Propagation delay time, from LOAD TO ANY Q	t <sub>PLH4</sub>					9, 10, 11	01	7	38	8	37	ns
	t <sub>PHL4</sub>											
Propagation delay time, from CLR to any Q	t <sub>PHL5</sub>					9, 10, 11	01	5	20		20	ns

See footnotes at end of table.

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TABLE I. Electrical performance characteristics- Continued.

- 1/ Unused inputs that do not directly control the pin under test must be  $\geq 2.5$  V or  $\leq 0.4$  V. No unused inputs shall exceed 5.5 V or go less than 0.0 V. No inputs shall be floated.
- 2/ All outputs must be tested. In the case where only one input at  $V_L$  maximum or  $V_{IH}$  minimum produces the proper state, the test must be performed with each input being selected as the  $V_L$  maximum or  $V_{IH}$  minimum input.
- 3/ The output conditions have been chosen to produce a current that closely approximates one half of the true short circuit output current,  $I_{OS}$ . Not more than one output will be tested at one time and duration of test shall not exceed one second.
- 4/  $I_{CC}$  is measured with the CLR and LOAD inputs grounded and all other inputs at 4.5 V.
- 5/ Functional tests shall be conducted at input test conditions of GND:  $V_{IL} \leq V_{OL}$  and  $V_{OH} \leq V_{IH} \leq V_{CC}$ .
- 6/ Propagation delay limits are based on single output switching. Unused inputs = 3.5 V or 0.3 V.

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, and 6 in table I, method 5005 of MIL-STD-883 shall be omitted.
- c. Subgroups 7 and 8 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 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.
  - (2)  $T_A = +125^\circ\text{C}$ , minimum.
  - (3) Test duration: 1,000 hours, except as permitted by method 1005 of MIL-STD-883.

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Case outline	E and F	2	Case outline	E and F	2
Terminal number	Terminal symbol		Terminal number	Terminal symbol	
1	B	NC	11	LOAD	NC
2	QB	B	12	CO	D
3	QA	QB	13	BO	C
4	DOWN	QA	14	CLR	LOAD
5	UP	DOWN	15	A	CO
6	QC	NC	16	V <sub>cc</sub>	NC
7	QD	UP	17	---	BO
8	GND	QC	18	---	CLR
9	D	QD	19	---	A
10	C	GND	20	---	V <sub>cc</sub>

FIGURE 1. Terminal connections

Inputs				Output
CLR	LOAD	UP	DOWN	
H	X	X	X	Clear Data to outputs Count up Count down
L	L	X	X	
L	H	↑	H	
L	H	H	↑	

Inputs		Outputs		
UP	DOWN	Count	BO	CO
H	L	0	⌋	H
L	H	15	H	⌋
All other conditions			H	H

⌋ = Low level pulse

- L = Low
- H = High
- X = Irrelevant
- ↑ = Clock transition low to high

FIGURE 2. Truth tables.

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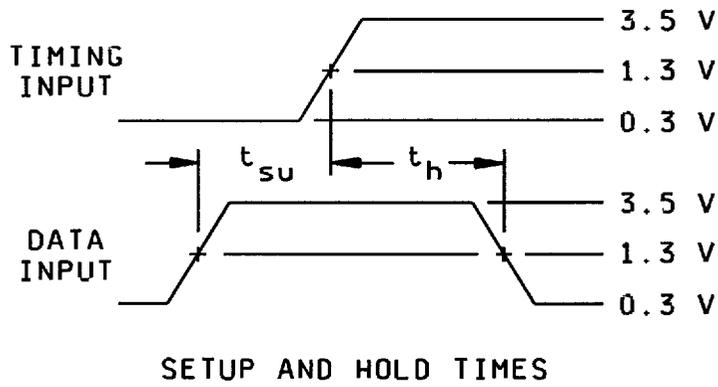
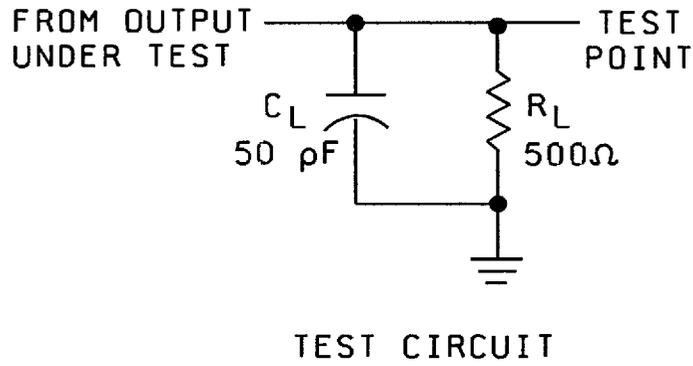
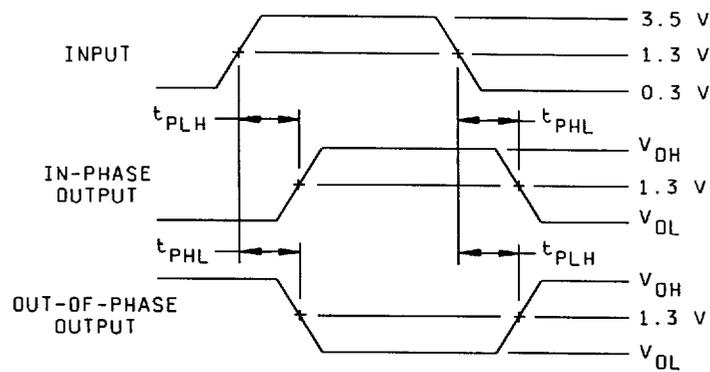


FIGURE 3. Test circuit and switching waveforms.

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NOTES:

1. C<sub>L</sub> includes probe and jig capacitance.
2. All input pulses have the following characteristics: PRR ≤ 10 Mhz, duty cycle = 50%, t<sub>r</sub> = t<sub>f</sub> = 3 ns ± 1 ns.
3. The outputs are measured one at a time with one input transition per measurement.

FIGURE 3. Test circuit and switching waveforms- Continued.

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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, 7, 8, 9, 10, 11
Group A test requirements (method 5005)	1, 2, 3, 7, 8, 9, 10, 11
Groups C and D end-point electrical parameters (method 5005)	1, 2, 3

\* PDA applies to subgroup 1.

5. PACKAGING

5.1 Packaging requirements The requirements for packaging shall be in accordance with MILPRF-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 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 microelectronics devices (FSC 5962) should contact DSCC-VA, telephone (614) 692-0525.

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

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.

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STANDARD MICROCIRCUIT DRAWING SOURCE APPROVAL BULLETIN

DATE: 97-08-07

Approved sources of supply for SMD 5962-88698 are listed below for immediate acquisition only and shall be added to MIL-HDBK-103 and QML-38535 during the next revision. MIL-HDBK-103 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>
5962-8869801EA	01295	SNJ54ALS193AJ
5962-8869801FA	01295	SNJ54ALS193AW
5962-88698012A	01295	SNJ54ALS193AFK

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

01295

Vendor name and address

Texas Instruments, Incorporated  
13500 N. Central Expressway  
P.O. Box 655303  
Dallas, TX 75265  
Point of contact: I-20 at FM 1788  
Midland, TX 79711-0448

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