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

PMIC N/A

STANDARDIZED MILITARY DRAWING

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AMSC N/A

PREPARED BY: Larry T. Gauder

CHECKED BY: Tim H. Noh

APPROVED BY: William K. Heckman

DRAWING APPROVAL DATE: 9 JULY 1990

REVISION LEVEL:

DEFENSE ELECTRONICS SUPPLY CENTER
DAYTON, OHIO 45444

MICROCIRCUIT, DIGITAL, BIPOLAR, ADVANCE LOW POWER SCHOTTKY, TTL, OCTAL BUS TRANSCEIVERS AND REGISTERS WITH INVERTING THREE STATE OUTPUTS, MONOLITHIC SILICON

| SIZE | CAGE CODE | |
|---|---|---|
| A | 67268 | 5962-90523 |

SHEET 1

DESC FORM 193
SEP 87

* U.S. GOVERNMENT PRINTING OFFICE: 1987 — 748-129/60911

5962-E1555

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1. SCOPE

1.1 Scope. This drawing describes device requirements for class B microcircuits in accordance with 1.2.1 of MIL-STD-883, "Provisions for the use of MIL-STD-883 in conjunction with compliant non-JAN devices".

1.2 Part number. The complete part number shall be as shown in the following example:

| 5962-90523 | 01 | K | X |
|---|---|---|---|
| Drawing number | Device type (1.2.1) | Case outline (1.2.2) | Lead finish per MIL-M-38510 |

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

| Device type | Generic number | Circuit function |
|---|---|---|
| 01 | 54ALS648 | Octal bus transceivers and registers with inverting three-state outputs |

1.2.2 Case outlines. The case outlines shall be as designated in appendix C of MIL-M-38510, and as follows:

| Outline letter | Case outline |
|---|---|
| K | F-6 (24-lead, .640" x .420" x .090") flat package |
| L | D-9 (24-lead, 1.280" x .310" x .200") dual-in-line package |
| 3 | C-4 (28-terminal, .460" x .460" x .100",) square chip carrier package |

1.3 Absolute maximum ratings.

| | |
|---|---|
| Supply voltage range $V_{CC}$ | -0.5 V dc to +7.0 V dc |
| DC input voltage: | |
| Control inputs | -1.2 V dc at -18 mA to +7.0 V dc |
| I/O ports | -1.2 V dc at -18 mA to +5.5 V dc |
| Storage temperature range | -65°C to +150°C |
| Maximum power dissipation ($P_D$) 1/ | 484 mW |
| Lead temperature (soldering, 10 seconds) | +300°C |
| Thermal resistance, junction-to-case ($\theta_{JC}$) | See MIL-M-38510, appendix C |
| Junction temperature ($T_J$) | +175°C |

1.4 Recommended operating conditions.

| | |
|---|---|
| Supply voltage range ($V_{CC}$) | +4.5 V dc minimum to +5.5 V dc maximum |
| Minimum high level input voltage ($V_{IH}$) | 2.0 V dc |
| Maximum low level input voltage ($V_{IL}$): | |
| $T_C$ = +125°C | 0.7 V dc |
| $T_C$ = -55°C | 0.8 V dc |
| $T_C$ = +25°C | 0.8 V dc |
| Maximum high level output current ($I_{OH}$) | -12 mA |
| Maximum low level output current ($I_{OL}$) | 12 mA |
| Case operating temperature range ($T_C$) | -55°C to +125°C |
| Pulse duration, clocks high or low ($t_W$) | 14.5 ns minimum |
| Setup time, A before CAB^ or B before CBA^ ($t_S$) | 15.0 ns minimum |
| Hold time, A after CAB^ or B after CBA^ ($t_H$) | 0 ns minimum |

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., $I_O$.



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2. APPLICABLE DOCUMENTS

2.1 Government specification, standard, and bulletin. Unless otherwise specified, the following specification, standard, and bulletin of the issue listed in that issue of the Department of Defense Index of Specifications and Standards specified in the solicitation, form a part of this drawing to the extent specified herein.

SPECIFICATION

MILITARY

MIL-M-38510 - Microcircuits, General Specification for.

STANDARD

MILITARY

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

BULLETIN

MILITARY

MIL-BUL-103 - List of Standardized Military Drawings (SMD's).

(Copies of the specification, standard, and bulletin required by manufacturers in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting activity.)

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 shall take precedence.

3. REQUIREMENTS

3.1 Item requirements. The individual item requirements shall be in accordance with 1.2.1 of MIL-STD-883, "Provisions for the use of MIL-STD-883 in conjunction with compliant non-JAN devices" and as specified herein.

3.2 Design, construction, and physical dimensions. The design, construction, and physical dimensions shall be as specified in MIL-M-38510 and herein.

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

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

3.2.3 Test circuit and switching waveforms. The test circuit and switching waveforms shall be as specified on figure 3.

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

3.3 Electrical performance characteristics. Unless otherwise specified, the electrical performance characteristics are as specified in table I and 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 described in table I.



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TABLE I. Electrical performance characteristics.

| Test | Symbol | Conditions $-55°C < T_C < +125°C$ unless otherwise specified 1/ | | | Group A subgroups | Limits | | Unit |
|---|---|---|---|---|---|---|---|---|
| | | | | | | Min | Max | |
| High level output voltage | $V_{OH}$ | $V_{CC}$ = 4.5 V<br>$V_{IH}$ = 2.0 V<br>2/ | $V_{IL}$ = 0.8 V | $I_{OH}$ = -0.4 mA | 1, 3 | 2.5 | | V |
| | | | | $I_{OH}$ = -3.0 mA | | 2.4 | | |
| | | | | $I_{OH}$ = -12 mA | | 2.0 | | |
| | | | $V_{IL}$ = 0.7 V | $I_{OH}$ = -0.4 mA | 2 | 2.5 | | |
| | | | | $I_{OH}$ = -3.0 mA | | 2.4 | | |
| | | | | $I_{OH}$ = -12 mA | | 2.0 | | |
| Low level output voltage | $V_{OL}$ | $V_{CC}$ = 4.5 V<br>$V_{IN}$ = 2.0 V<br>$I_{OL}$ = 12 mA 2/ | $V_{IL}$ = 0.8 V | | 1, 3 | | 0.4 | V |
| | | | $V_{IL}$ = 0.7 V | | 2 | | 0.4 | V |
| Input clamp voltage | $V_{IC}$ | $V_{CC}$ = 4.5 V, $I_{IN}$ = -18 mA | | | 1, 2, 3 | | -1.2 | V |
| High level input current | $I_{IH1}$ | $V_{CC}$ = 5.5 V<br>3/ | $V_{IN}$ = 7.0 V | Control inputs | 1, 2, 3 | | 0.1 | mA |
| | | | $V_{IN}$ = 5.5 V | A or B ports | | | 0.1 | |
| | $I_{IH2}$ | | $V_{IN}$ = 2.7 V | Control inputs | | | 20 | µA |
| | | | | A or B ports | | | 20 | |
| Low level input current | $I_{IL}$ | $V_{CC}$ = 5.5 V, $V_{IN}$ = 0.4 V<br>3/ | | Control inputs | 1, 2, 3 | | -0.2 | mA |
| | | | | A or B ports | | | -0.2 | |
| Output current | $I_O$ | $V_{CC}$ = 5.5 V, 4/ $V_{OUT}$ = 2.25 V | | | 1, 2, 3 | -30 | -112 | mA |

See footnotes at end of table.



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TABLE I. Electrical performance characterisics - Continued.

| Test | Symbol | Conditions $-55°C \le T_C \le +125°C$ unless otherwise specified 1/ | | Group A subgroups | Limits | | Unit |
|---|---|---|---|---|---|---|---|
| | | | | | Min | Max | |
| Quiescent current | $I_{CCH}$ | $V_{CC}$ = 5.5 V | Outputs high | 1, 2, 3 | | 76 | mA |
| | $I_{CCL}$ | | Outputs low | | | 88 | |
| | $I_{CCZ}$ | | Outputs disabled | | | 88 | |
| Functional tests | | See 4.3.1c | 5/ | 7, 8 | | | |
| Maximum frequency | $f_{MAX}$ | $V_{CC}$ = 4.5 V to 5.5 V<br>$C_L$ = 50 pF<br>$R_1$ = 500Ω<br>$R_2$ = 500Ω<br>See figure 3 | | 9, 10, 11 | 35 | | MHz |
| Propagation delay time, from CBA or CAB to A or B | $t_{PLH1}$ | | | 9, 10, 11 | 8 | 39 | ns |
| | $t_{PHL1}$ | | 6/ | | 5 | 23 | |
| Propagation delay time, from A or B to B or A | $t_{PLH2}$ | | | 9, 10, 11 | 3 | 20 | ns |
| | $t_{PHL2}$ | | | | 2 | 12 | |
| Propagation delay time, from SBA or SAB to A or B (with A or B low) 7/ | $t_{PLH3}$ | | | 9, 10, 11 | 5 | 44 | ns |
| | $t_{PHL3}$ | | | | 4 | 26 | |
| Propagation delay time, from SBA or SAB to A or B (with A or B high) 7/ | $t_{PLH4}$ | | | 9, 10, 11 | 6 | 30 | ns |
| | $t_{PHL4}$ | | | | 6 | 25 | |

See footnotes at end of table.



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TABLE I. Electrical performance characterisics - Continued.

| Test | Symbol | Conditions $-55°C \le T_C \le +125°C$ unless otherwise specified 1/ | Group A subgroups | Limits Min | Limits Max | Unit |
|---|---|---|---|---|---|---|
| Enable time, from $\overline{G}$ to A or B | $t_{PZH1}$ | $V_{CC}$ = 4.5 V to 5.5 V<br>$C_L$ = 50 pF<br>$R_1$ = 500Ω<br>$R_2$ = 500Ω<br>See figure 3 | 9, 10, 11 | 4 | 25 | ns |
| | $t_{PZL1}$ | | | 4 | 25 | |
| Disable time, from $\overline{G}$ to A or B | $t_{PHZ1}$ | 6/ | 9, 10, 11 | 1 | 12 | ns |
| | $t_{PLZ1}$ | | | 2 | 21 | |
| Enable time, from DIR to A or B | $t_{PZH2}$ | | 9, 10, 11 | 4 | 35 | ns |
| | $t_{PZL2}$ | | | 3 | 25 | |
| Disable time, from DIR to A or B | $t_{PHZ2}$ | | 9, 10, 11 | 1 | 17 | ns |
| | $t_{PLZ2}$ | | | 2 | 22 | |

1/ Unused inputs that do not directly control the pin under test must be put at $\ge$ 2.5 V or $\le$ 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 $V_{IL}$ maximum or $V_{IH}$ minimum produces the proper state, the test must be performed with each input being selected as the $V_{IL}$ maximum or $V_{IH}$ minimum input.

3/ For I/O ports, the parameters $I_{IH2}$ and $I_{IL}$ include the off-state output current.

4/ 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 the test condition shall not exceed one second.

5/ Functional tests shall be conducted at input test conditions of GND $\le V_{IL} \le V_{OL}$ and $V_{OH} \le V_{IH} \le V_{CC}$.

6/ Propagation delay limits are based on single output switching. Unused inputs = 3.5 V or $\le$ 0.3 V.

7/ These input parameters are measured with the internal output state of the storage register opposite to that of the bus input.



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| Device type | 01 | |
|---|---|---|
| Case outlines | K and L | 3 |
| Terminal number | Terminal symbol | |
| 1 | CAB | NC |
| 2 | SAB | CAB |
| 3 | DIR | SAB |
| 4 | A1 | DIR |
| 5 | A2 | A1 |
| 6 | A3 | A2 |
| 7 | A4 | A3 |
| 8 | A5 | NC |
| 9 | A6 | A4 |
| 10 | A7 | A5 |
| 11 | A8 | A6 |
| 12 | GND | A7 |
| 13 | B8 | A8 |
| 14 | B7 | GND |
| 15 | B6 | NC |
| 16 | B5 | B8 |
| 17 | B4 | B7 |
| 18 | B3 | B6 |
| 19 | B2 | B5 |
| 20 | B1 | B4 |
| 21 | $\overline{G}$ | B3 |
| 22 | SBA | NC |
| 23 | CBA | B2 |
| 24 | $V_{CC}$ | B1 |
| 25 | --- | $\overline{G}$ |
| 26 | --- | SBA |
| 27 | --- | CBA |
| 28 | --- | $V_{CC}$ |

NC = No connection

FIGURE 1. Terminal connections.



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| Inputs | | | | | | Data I/O | | Operation or function |
|---|---|---|---|---|---|---|---|---|
| G | DIR | CAB | CBA | SAB | SBA | A1 thru A8 | B1 thru B8 | |
| X | X | ^ | X | X | X | Input | Unspecified* | Store A, B unspecified* |
| X | X | X | ^ | X | X | Unspecified* | Input | Store B, A unspecified* |
| H | X | ^ | ^ | X | X | Input | Input | Store A and B data |
| H | X | H/L | H/L | X | X | Input | Input | Isolation, hold storage |
| L | L | X | X | X | L | Output | Input | Real-time $\overline{B}$ data to A bus |
| L | L | X | H/L | X | H | Output | Input | Stored $\overline{B}$ data to A bus |
| L | H | X | X | L | X | Input | Output | Real-time $\overline{A}$ data to B bus |
| L | H | H/L | X | H | X | Input | Output | Store $\overline{A}$ data to B bus |

H = High voltage level
L = Low voltage level
X = Irrelevant
^ = Transition from low to high
* = The data output functions may be enabled or disabled by various signals at the $\overline{G}$ and DIR inputs. Data input functions are always enable, i.e., data at the bus pins will be stored on every low-to-high transition of the clock inputs.

FIGURE 2. Truth table.



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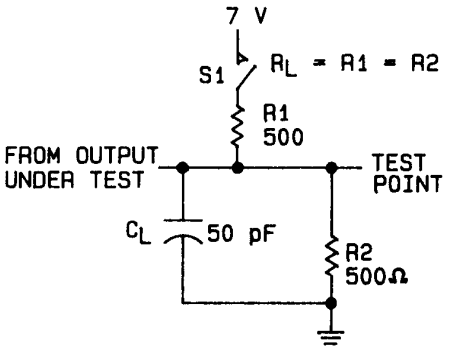


FIGURE 3. Test circuit and switching waveforms.



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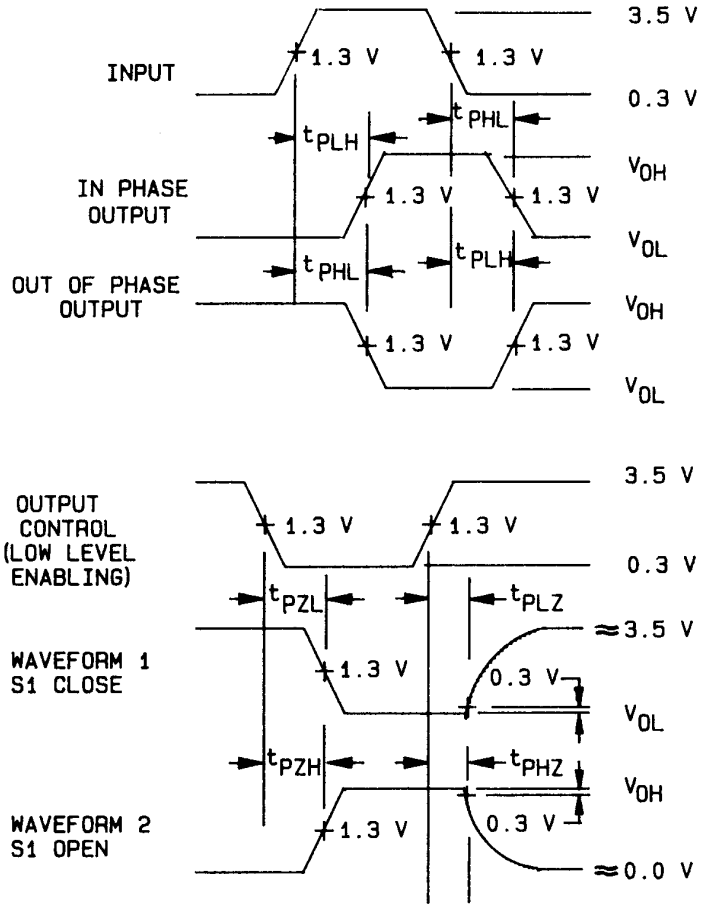


NOTES:
1. $C_L$ includes probe and jig capacitance.
2. Waveform 1 is for an output with internal condtions such that the output is low except when disabled by the output control.
3. Waveform 2 is for an output with internal conditions such that the output is high except when disabled by the output control.
4. When measuring propagation delay items of three-state outputs, switch S1 is open.
5. The outputs are measured one at a time with one input transition per measurement.
6. All input pulses have the following characteristics: PRR $\leq$ 10 MHz, duty cycle = 50 percent, $t_r = t_f$ = 3 ns ±1 ns.

FIGURE 3. Test circuit and switching waveforms - Continued.



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3.5 Marking. Marking shall be in accordance with MIL-STD-883 (see 3.1 herein). The part shall be marked with the part number listed in 1.2 herein. In addition, the manufacturer's part number may also be marked as listed in MIL-BUL-103 (see 6.6 herein).

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-BUL-103 (see 6.6 herein). The certificate of compliance submitted to DESC-ECC prior to listing as an approved source of supply shall affirm that the manufacturer's product meets the requirements of MIL-STD-883 (see 3.1 herein) and the requirements herein.

3.7 Certificate of conformance. A certificate of conformance as required in MIL-STD-883 (see 3.1 herein) shall be provided with each lot of microcircuits delivered to this drawing.

3.8 Notification of change. Notification of change to DESC-ECC shall be required in accordance with MIL-STD-883 (see 3.1 herein).

3.9 Verification and review. DESC, DESC'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 section 4 of MIL-M-38510 to the extent specified in MIL-STD-883 (see 3.1 herein).

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 using the circuit submitted with the certificate of compliance (see 3.6 herein).

(2) $T_A$ = +125°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.

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 be sufficient to verify the truth table of figure 2.



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TABLE II. Electrical test requirements.

| MIL-STD-883 test requirements | Subgroups (per 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 |
| Group C and D end-point electrical parameters (method 5005) | 1, 2, 3 |

*PDA applies to subgroup 1.

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 using the circuit submitted with the certificate of compliance (see 3.6 herein).

(2) $T_A$ = +125°C, minimum.

(3) Test duration: 1,000 hours, except as permitted by method 1005 of MIL-STD-883.

5. PACKAGING

5.1 Packaging requirements. The requirements for packaging shall be in accordance with MIL-M-38510.

6. NOTES

6.1 Intended use. Microcircuits conforming to this drawing are intended for use when military specifications do not exist and qualified military devices that will perform the required function are not available for OEM application. When a military specification exists and the product covered by this drawing has been qualified for listing on QPL-38510, the device specified herein will be inactivated and will not be used for new design. The QPL-38510 product shall be the preferred item for all applications.

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-481 using DD Form 1693, Engineering Change Proposal (Short Form).



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6.4 Record of users. Military and industrial users shall inform Defense Electronics Supply Center when a system application requires configuration control and the applicable SMD. DESC 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 DESC-ECC, telephone (513) 296-6022.

6.5 Comments. Comments on this drawing should be directed to DESC-ECC, Dayton, Ohio 45444, or telephone (513) 296-8525.

6.6 Approved source of supply. An approved source of supply is listed in MIL-BUL-103. Additional sources will be added to MIL-BUL-103 as they become available. The vendor listed in MIL-BUL-103 has agreed to this drawing and a certificate of compliance (see 3.6 herein) has been submitted to and accepted by DESC-ECC. The approved source of supply listed below is for information purposes only and is current only to the date of the last action of this document.

| Military drawing part number | Vendor CAGE number | Vendor similar part number 1/ |
|---|---|---|
| 5962-9052301LX | 01295 | SNJ54ALS648JT |
| 5962-9052301KX | 01295 | SNJ54ALS648W |
| 5962-90523013X | 01295 | SNJ54ALS648FK |

1/ Caution. Do not use this number for item acquisition. Items acquired to this number may not satisfy the performance requiurements of this drawing.

| Vendor CAGE number | Vendor name and address |
|---|---|
| 01295 | Texas Instruments, Incorporated<br>13500 N. Central Expressway<br>P.O. Box 655303<br>Dallas TX 75265<br>Point of contact: I-20 at FM 1788<br>Midland TX 79711-0448 |



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