

REVISIONS

LTR	DESCRIPTION	DATE (YR-MO-DA)	APPROVED
A	Add two vendors, CAGE 24355 and CAGE 17856. Add device type 02. Make changes to 1.2.1, 1.3, 1.4, and table I, figure 1, and figure 3. Editorial changes throughout.	89-11-09	M.A. Frye
B	Remove vendor, CAGE 24355 from device type 01 and 02. Add device type 03. Table I changes. Editorial changes throughout.	93-03-02	M.A. Frye

CURRENT CAGE CODE 67268

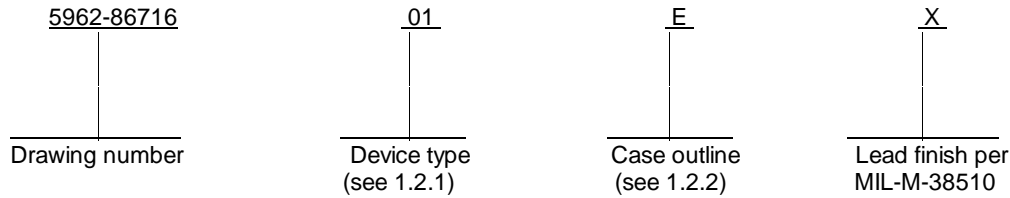
REV																				
SHEET																				
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REV STATUS OF SHEETS	REV	B	B	B	B	B	B	B	B	B	B	B	B							
	SHEET	1	2	3	4	5	6	7	8	9	10	11								

PMIC N/A	PREPARED BY Rick Officer	DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444																	
STANDARDIZED MILITARY DRAWING THIS DRAWING IS AVAILABLE FOR USE BY ALL DEPARTMENTS AND AGENCIES OF THE DEPARTMENT OF DEFENSE AMSC N/A	CHECKED BY Charles E. Besore																		
	APPROVED BY Michael A. Frye	MICROCIRCUIT, LINEAR, CMOS, HIGH SPEED QUAD SPST ANALOG SWITCH, MONOLITHIC SILICON																	
	DRAWING APPROVAL DATE 87-01-30																		
	REVISION LEVEL B																		
	SIZE A	CAGE CODE 14933	5962-86716																
	SHEET	1	OF	11															

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 or Identifying Number (PIN). The complete PIN shall be as shown in the following example:



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

<u>Device type</u>	<u>Generic number</u>	<u>Circuit function</u>
01	HI201HS	High speed quad SPST CMOS analog switch
02	DG271	High speed quad SPST CMOS analog switch
03	ADG201HST	High speed quad SPST CMOS analog switch

1.2.2 Case outline(s). The case outline(s) shall be 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	GDIP1-T16 or CDIP2-T16	16	Dual-in-line
2	CQCC1-N20	20	Square leadless chip carrier

1.2.3 Lead finish. The lead finish shall be as specified in MIL-M-38510. Finish letter "X" shall not be marked on the microcircuit or its packaging. The "X" designation is for use in specifications when lead finishes A, B, and C are considered acceptable and interchangeable without preference.

1.3 Absolute maximum ratings. 1/

Positive supply voltage (V+ to ground):

- Device type 01 ----- +18 V
- Device types 02 and 03 ----- +25 V

Negative supply voltage (V- to ground):

- Device type 01 ----- -18 V
- Device types 02 and 03 ----- -25 V

Digital input voltage (V_{IN}):

- Device types 01 and 03 ----- V- (-4 V) to V+ (+4 V) or 20 mA, whichever comes first
- Device type 02 ----- V- (-2 V) to V+ (+2 V) or 20 mA whichever comes first

Analog input voltage, one switch (V_S):

- V- (-2 V) to V+ (+2 V) or 20 mA whichever comes first

Maximum power dissipation (P_D):

- Device types 01 and 03 ----- 750 mW 2/
- Device type 02 ----- 900 mW 3/

Maximum junction temperature (T_J):

- +150° C

Lead temperature (soldering, 10 seconds):

- +275° C

Thermal resistance, junction-to-case (θ_{JC}):

- See MIL-STD-1835

Thermal resistance, junction-to-ambient (θ_{JA}):

- 76° C/W

Storage temperature range:

- -65° C to +150° C

Peak current, S or D (pulsed at 1 ms, 10 percent duty cycle max):

- Device type 01 ----- 50 mA
- Device type 02 ----- 100 mA
- Device type 03 ----- 70 mA

1/ Unless otherwise specified, all voltages are referenced to ground.
 2/ Derate case E, 8 mW/° C above T_A = +75° C. Derate case 2, 10 mW/° C above T_A = +75° C.
 3/ Derate case E, 12 mW/° C above T_A = +75° C. Derate case 2, 10 mW/° C above T_A = +75° C.

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Continuous current, any terminal (except S or D):
 Device type 01 ----- 25 mA
 Device types 02 and 03 ----- 20 mA

1.4 Recommended operating conditions.

Positive supply voltage (V+) ----- +15 V dc
 Negative supply voltage (V-) ----- -15 V dc
 Minimum high level input voltage (V_{IH}):
 Device types 01 and 03 ----- 2.4 V dc
 Device type 02 ----- 2.0 V dc
 Maximum low level input voltage (V_{IL}) ----- 0.8 V dc
 Ambient operating temperature range (T_A) ----- -55° C to +125° C
 Ground (GND) ----- 0 V dc

2. APPLICABLE DOCUMENTS

2.1 Government specification, standards, and bulletin. Unless otherwise specified, the following specification, standards, 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.

STANDARDS

MILITARY

MIL-STD-883 - Test Methods and Procedures for Microelectronics.
 MIL-STD-1835 - Microcircuit Case Outlines.

BULLETIN

MILITARY

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

(Copies of the specification, standards, 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 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 Functional diagram. The functional diagram 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 ambient operating temperature range.

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TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions -55° C ≤ T _A ≤ +125° C V ₊ = +15 V dc, V ₋ = -15 V dc unless otherwise specified	Device type	Group A subgroups	Limits <u>1/</u>		Unit
					Min	Max	
Analog signal range	V _S	T _A = +25° C <u>2/</u>	All	4		±15	V
ON resistance	R _{DS(ON)}	V _S = ±10 V, I _D = 1 mA V _{IN} = 0.8 V	All	1		50	Ω
				2, 3		75	
Source OFF leakage current	I _{S(OFF)}	V _S = ±14 V, V _D = ±14 V V _{IN} = 2.4 V	01	1		±10	nA
				2, 3		±100	
		V _D = ±14 V, V _S = ±14 V V _{IN} = 2.4 V	02, 03	1		±1	
			02	2, 3		±100	
03			±60				
Drain OFF leakage current	I _{D(OFF)}	V _S = ±14 V, V _D = ±14 V V _{IN} = 2.4 V	01	1		±10	nA
				2, 3		±100	
		V _D = ±14 V, V _S = ±14 V V _{IN} = 2.4 V	02, 03	1		±1	
			02	2, 3		±100	
03			±60				
Channel ON leakage current	I _{D(ON)}	V _D = V _S = ±14 V, V _{IN} = 0.8 V	01	1		±10	nA
				2, 3		±100	
				02, 03	1		±1
				02	2, 3		±100
				03			±60
Low level input voltage <u>3/</u>	V _{IL}		All	7,8		0.8	V
High level input voltage <u>3/</u>	V _{IH}		01,03	7,8		2.4	V
			02			2.0	

See footnotes at end of table.

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TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions -55° C ≤ T _A ≤ +125° C V ₊ = +15 V dc, V ₋ = -15 V dc unless otherwise specified	Device type	Group A subgroups	Limits <u>1/</u>		Unit
					Min	Max	
Input leakage current (low)	I _{IL}	V _{IN} under test = 0.8 V All other V _{IN} = 4.0 V	01	1, 2, 3		±500	μA
		V _{IN} under test = 0 V All other V _{IN} = 2.0 V	02	1		±1	
				2, 3		±10	
V _{IN} under test = 1.0 V All other V _{IN} = 16.5 V	03	1, 2, 3		±1			
Input leakage current (high)	I _{IH}	V _{IN} under test = 4.0 V All other V _{IN} = 0.8 V	01	1, 2, 3		±40	μA
		V _{IN} under test = 2.0 V All other V _{IN} = 0 V	02	1		±1	
				2, 3		±10	
V _{IN} under test = 16.5 V All other V _{IN} = 1.0 V	03	1, 2, 3		±1			
Positive supply current	I ₊	V _{IN} = 2.4 V or V _{IN} = 0.8 V for all switches	01	1, 2, 3		10	mA
		V _{IN} = 0 V or V _{IN} = 2.0 V for all switches	02	1		10	
				2, 3		11	
V _{IN} = 3.0 V or V _{IN} = 0.8 V for all switches	03	1, 2, 3		10			
Negative supply current	I ₋	V _{IN} = 2.4 V or V _{IN} = 0.8 V for all switches	01	1, 2, 3		-6	mA
		V _{IN} = 0 V or V _{IN} = 2.0 V for all switches	02	1		-6	
				2, 3		-10	
V _{IN} = 2.4 V or V _{IN} = 0.8 V for all switches	03	1, 2, 3		-6			

See footnotes at end of table.

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TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions -55°C ≤ T _A ≤ +125°C V ₊ = +15 V dc, V ₋ = -15 V dc unless otherwise specified	Device type	Group A subgroups	Limits <u>1</u> /		Unit
					Min	Max	
Switch on time	t _{on}	R _L = 1 kΩ, C _L = 35 pF V _S = ±10 V, V _{IH} = +3 V V _{IL} = 0 V, See figure 3	01	9		50	ns
				10, 11		100	
		R _L = 1 kΩ, C _L = 35 pF V _{IH} = +5 V, V _{IL} = 0 V, V _S = ±10 V See figure 3	02	9		65	
				10, 11		80	
		R _L = 1 kΩ, C _L = 35 pF V _{IH} = +3 V, V _{IL} = 0 V, V _S = ±10 V See figure 3	03	9, 10, 11		50	
Switch off time	t _{off}	R _L = 1 kΩ, C _L = 35 pF V _{IH} = +3 V, V _S = ±10 V, V _{IL} = 0 V See figure 3	01	9		50	
				10, 11		100	
		R _L = 1 kΩ, C _L = 35 pF V _{IH} = +5 V, V _{IL} = 0 V, V _S = ±10 V See figure 3	02	9		65	
				10, 11		80	
		R _L = 1 kΩ, C _L = 35 pF V _{IN} = +3 V, V _{IL} = 0 V, V _S = ±10 V See figure 3	03	9, 10, 11		50	
Capacitance address	C _A	GND = 0 V, V _{IL} = 0 V f = 1 MHz, T _A = +25°C <u>4</u> /	All	4		15	pF
Capacitance input switch	C _{IS}	GND = 0 V, V _{IH} = 5 V f = 1 MHz, T _A = +25°C <u>4</u> /	All	4		15	pF
Capacitance output switch	C _{OS}	GND = 0 V, V _{IH} = 5 V f = 1 MHz, T _A = +25°C <u>4</u> /	All	4		20	pF

See footnotes at end of table.

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TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions -55°C ≤ T _A ≤ +125°C V ₊ = +15 V dc, V ₋ = -15 V dc unless otherwise specified	Device type	Group A subgroups	Limits <u>1/</u>		Unit
					Min	Max	
Off isolation	V _{ISO}	V _{GEN} = 1 V _{p-p} f = 100 kHz, T _A = +25°C <u>2/</u>	All	4	60		dB
Crosstalk between channels	V _{CT}		All	4	60		dB
Charge transfer error	V _{CTE}	T _A = +25°C <u>2/</u>	All	4		±10	mV

1/ The limiting terms "min" (minimum) and "max" (maximum) shall be considered to apply to magnitudes only. Negative current shall be defined as conventional current flow out of a device terminal.

2/ These parameters may not be tested, but shall be guaranteed to the limits specified in table I herein.

3/ Test not required if applied as a forcing function.

4/ Subgroup 4 (C_A, C_{IS}, and C_{OS} measurements) shall be measured only for the initial test and after process or design changes which may affect capacitance.

STANDARDIZED
MILITARY DRAWING
DEFENSE ELECTRONICS SUPPLY CENTER
DAYTON, OHIO 454444

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Device types	01 through 03	
Case outlines	E	2
Terminal number	Terminal symbol	
1	IN ₁	NC
2	D ₁	IN ₁
3	S ₁	D ₁
4	V-	S ₁
5	GND	V-
6	S ₄	NC
7	D ₄	GND
8	IN ₄	S ₄
9	IN ₃	D ₄
10	D ₃	IN ₄
11	S ₃	NC
12	NC	IN ₃
13	V+	D ₃
14	S ₂	S ₃
15	D ₂	NC
16	IN ₂	NC
17	---	V+
18	---	S ₂
19	---	D ₂
20	---	IN ₂

NOTES:

1. NC = no connection.
2. The source and drain are interchangeable and have been arbitrarily established.

FIGURE 1. Terminal connections.

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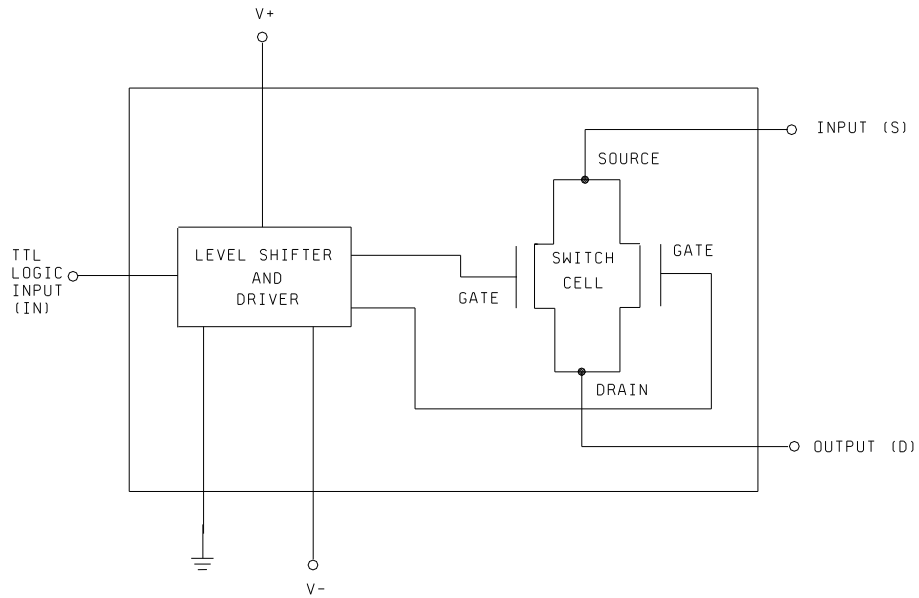
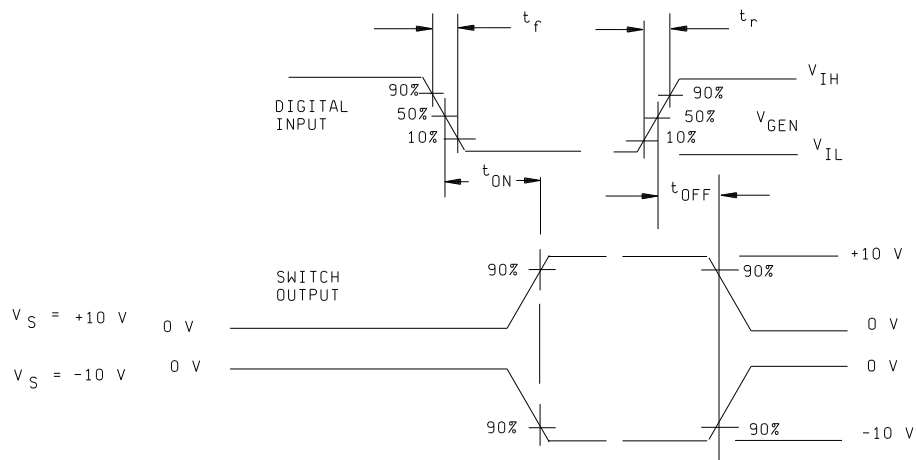


FIGURE 2. Functional diagram.



NOTE: Rise time and fall time ≤ 20 ns.

FIGURE 3. Test circuit and switching waveforms.

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

3.5 Marking. Marking shall be in accordance with MIL-STD-883 (see 3.1 herein). 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-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-EC 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-EC 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. 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 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 5 and 6 in table I, method 5005 of MIL-STD-883 shall be omitted.

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 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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TABLE II. Electrical test requirements.

MIL-STD-883 test requirements	Subgroups (in accordance with method 5005, table I)
Interim electrical parameters (method 5004)	1
Final electrical test parameters (method 5004)	1*, 2, 3, 9, 10, 11
Group A test requirements (method 5005)	1, 2, 3, 4, 7, 8, 9, 10, 11
Groups C and D end-point electrical parameters (method 5005)	1

* PDA applies to subgroup 1.

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 original equipment manufacturer 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).

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-EC, telephone (513) 296-6047.

6.5 Comments. Comments on this drawing should be directed to DESC-EC, Dayton, Ohio 45444, or telephone (513) 296-5377.

6.6 Approved sources of supply. Approved sources of supply are listed in MIL-BUL-103. The vendors listed in MIL-BUL-103 have agreed to this drawing and a certificate of compliance (see 3.6 herein) has been submitted to and accepted by DESC-EC.

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STANDARDIZED MILITARY DRAWING SOURCE APPROVAL BULLETIN

DATE: 93-03-02

Approved sources of supply for SMD 5962-86716 are listed below for immediate acquisition only and shall be added to MIL-BUL-103 during the next revision. MIL-BUL-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 DESC-EC. This bulletin is superseded by the next dated revision of MIL-BUL-103.

Standardized military drawing PIN	Vendor CAGE number	Vendor similar PIN <u>1/</u>
5962-8671601EX	34371	HI1-201HS/883
5962-86716012X	34371	HI4-201HS/883
5962-8671602EX	17856	DG271AK/883
5962-86716022X	17856	DG271AZ/883
5962-8671603EX	<u>2/</u>	ADG201HSTQ/883B
5962-86716032X	<u>2/</u>	ADG201HSTE/883B

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

2/ Not available from an approved source of supply.

<u>Vendor CAGE number</u>	<u>Vendor name and address</u>
34371	Harris Corporation Semiconductor Product Division P.O. Box 883 Melbourne, FL 32902-0883
17856	Siliconix Corporation 2201 Laurelwood Road Santa Clara, CA 95054-2754

The information contained herein is disseminated for convenience only and the Government assumes no liability whatsoever for any inaccuracies in this information bulletin.
